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.

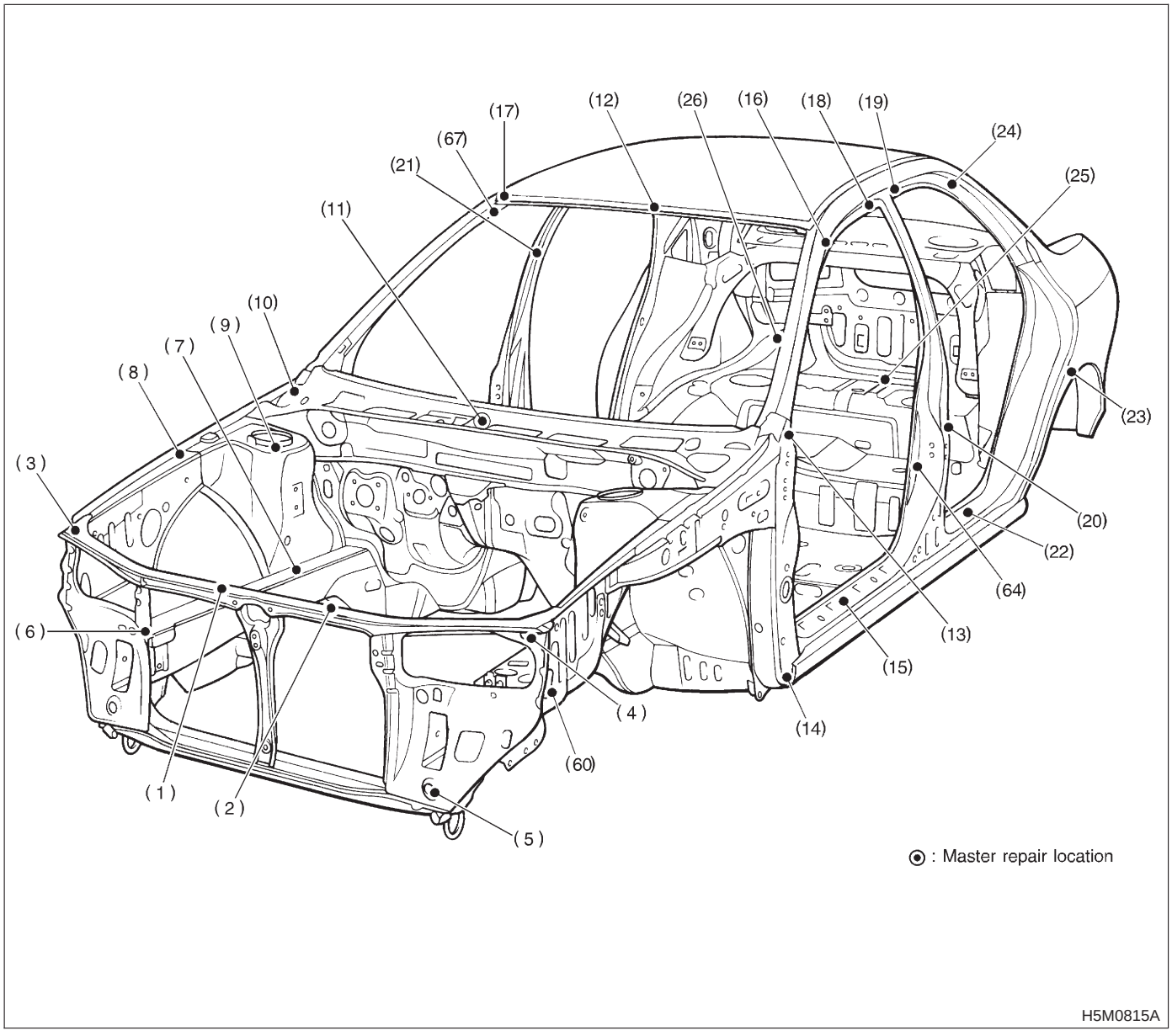
2. Body Datum Points

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.

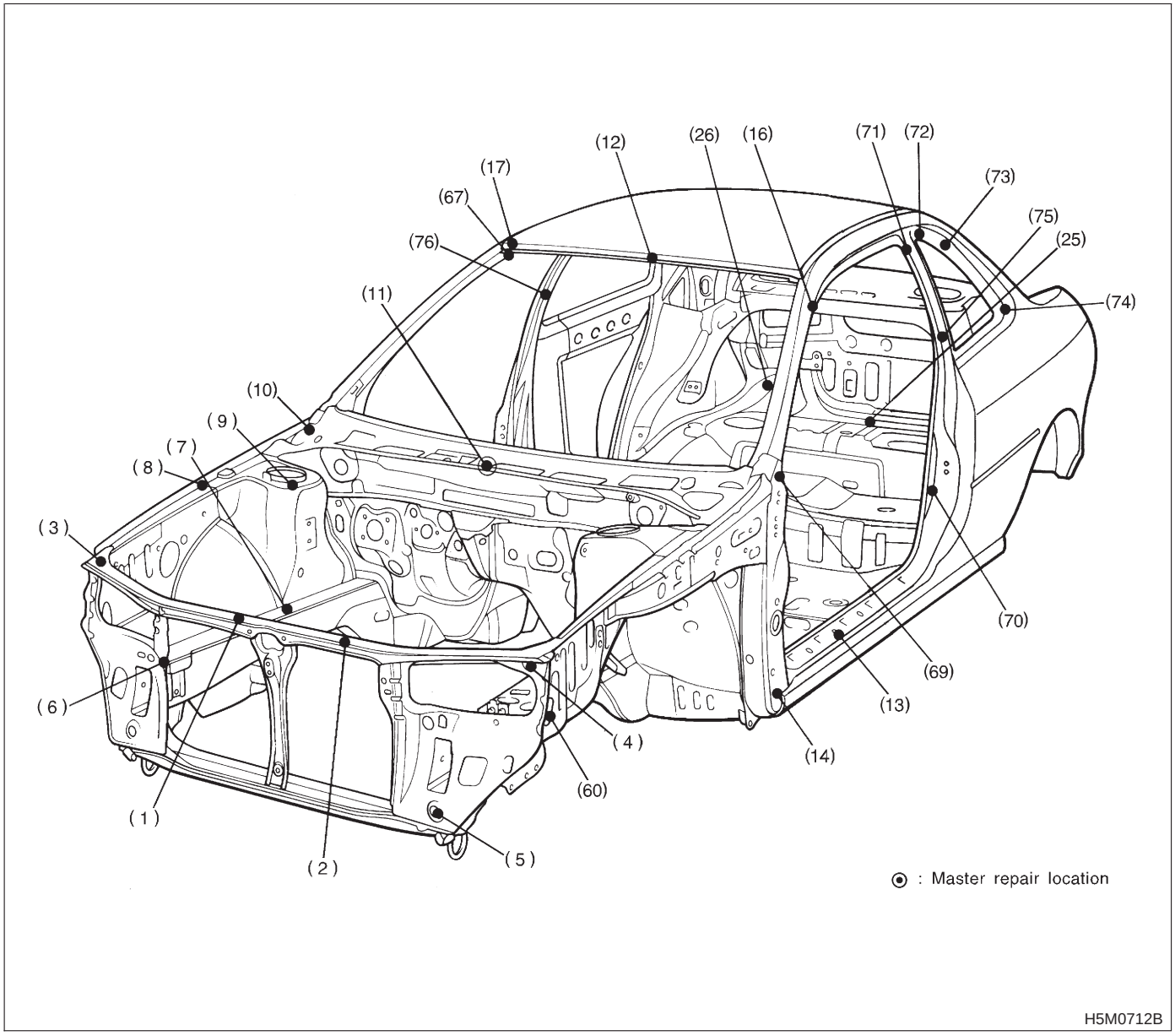
A: ENGINE COMPARTMENT AND ROOM

1. SEDAN AND WAGON



(1) Radiator panel (UPR) repair bolt hole M8 (Right)
(2) Radiator panel (UPR) repair bolt hole M8 (Left)
(3) Fender attaching bolt hole M6 (Symmetrical)
(4) Headlight attaching bolt hole M6 (Symmetrical)
(5) Radiator panel side gauge hole 24 mm (0.94 in) dia. (Symmetrical)
(6) Front bumper mounting hole 14 x 17 mm (0.55 x 0.67 in) dia. (Symmetrical)
(7) Front crossmember attaching bolt hole 12.4 mm (0.488 in) dia. (Symmetrical)
(8) Fender attaching bolt hole M6 (Symmetrical)
(9) Front strut mounting hole 10 mm (0.39 in) dia. (Symmetrical)
(10) Hood hinge attaching bolt hole M8 (Symmetrical)
(11) Cowl panel mounting hole 5 mm (0.20 in) dia. (Located in center of vehicle.)
(12) Front rail (Inner) mirror attaching bolt hole 8 mm (0.31 in) dia.
(13) Fender attaching bolt hole M6 (Symmetrical)
(14) Front pillar gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(15) Wax coat hole, 20 mm (0.79 in) dia. (Symmetrical)
(16) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(17) Sun visor attaching hole 20 mm (0.79 in) dia. (Symmetrical)
(18) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(19) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(20) Center pillar gauge hole 10 mm (0.39 in) dia. (Symmetrical)
(21) Belt anchor attaching bolt hole (Symmetrical)
(22) Wax coat hole, 20 mm (0.79 in) dia. (Symmetrical)
(23) Rear door switch attaching hole 20 mm (0.79 in) dia. (Symmetrical)
(24) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(25) Spare tire attaching bolt hole M8
(26) Air draw hole 7 mm (0.28 in) dia. (Symmetrical)
(60) Fender attaching bolt hole M6 (Symmetrical)
(64) Door switch attaching hole 20 mm (0.79 in) dia. (Symmetrical)
(67) 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.

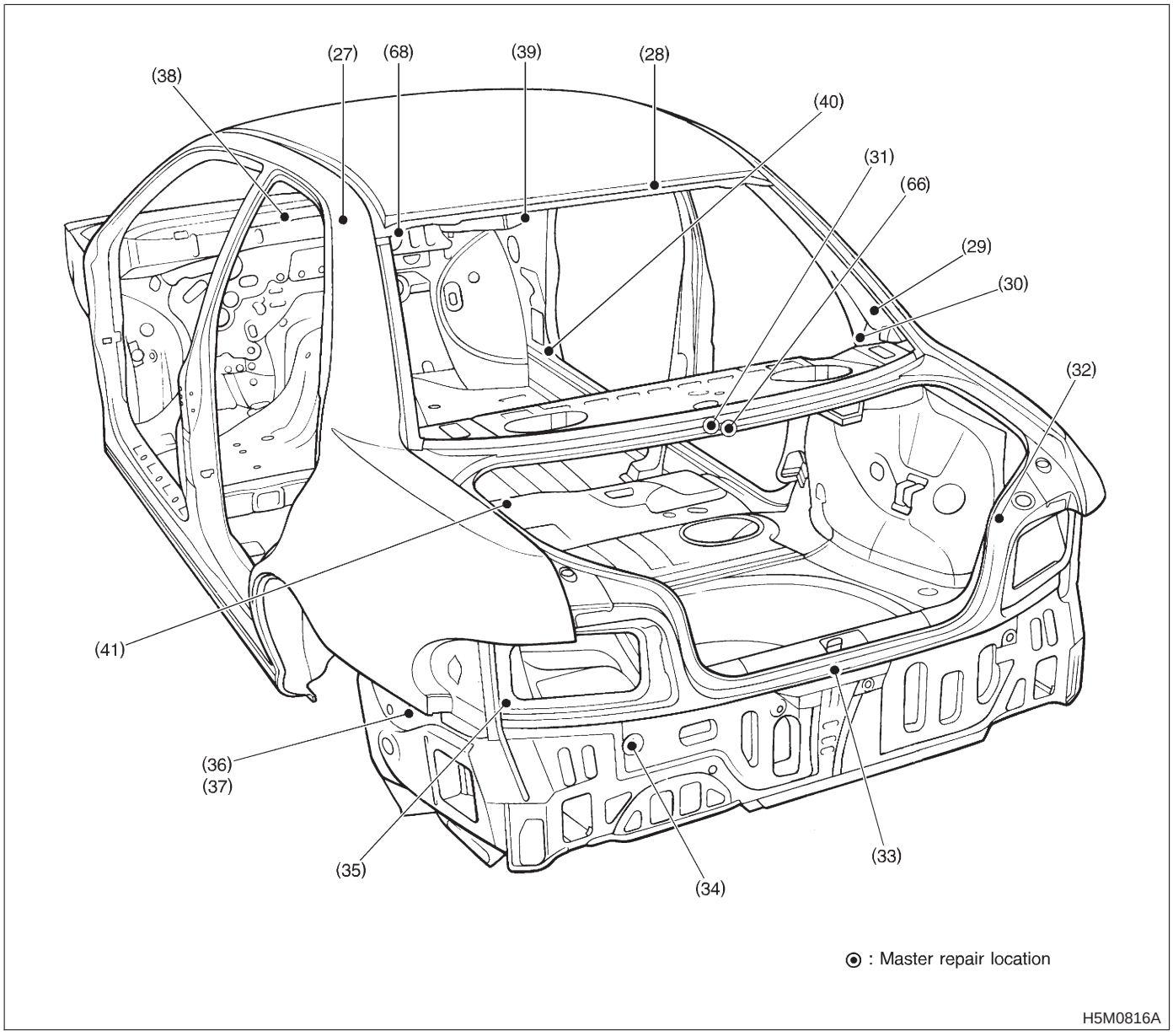
2. COUPE


(12)
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(4)
(14)
(60)
(1)
(2)
(5)
⊙ : Master repair location
H5M0712B

(1) Radiator panel (UPR) repair bolt hole M8 (Right)
(2) Radiator panel (UPR) repair bolt hole M8 (Left)
(3) Fender attaching bolt hole M6 (Symmetrical)
(4) Headlight attaching bolt hole M6 (Symmetrical)
(5) Radiator panel side gauge hole 24 mm (0.94 in) dia. (Symmetrical)
(6) Front bumper mounting hole 14 x 17 mm (0.55 x 0.67 in) dia. (Symmetrical)
(7) Front crossmember attaching bolt hole 12.4 mm (0.488 in) dia. (Symmetrical)
(8) Fender attaching bolt hole M6 (Symmetrical)
(9) Front strut mounting hole 10 mm (0.39 in) dia. (Symmetrical)
(10) Hood hinge attaching bolt hole M8 (Symmetrical)
(11) Cowl panel mounting hole 5 mm (0.20 in) dia. (Located in center of vehicle.)
(12) Front rail (Inner) mirror attaching bolt hole 8 mm (0.31 in) dia.
(13) Fender attaching bolt hole M6 (Symmetrical)
(14) Front pillar gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(16) Retainer attaching square hole 7 mm (0.28 in) (Symmetrical)
(17) Sun visor attaching hole 20 mm (0.79 in) dia. (Symmetrical)
(25) Spare tire attaching bolt hole M8
(26) Air draw hole 7 mm (0.28 in) dia. (Symmetrical)
(60) Fender attaching bolt hole M6 (Symmetrical)
(67) 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.
(69) Wax coat hole 20 mm (0.79 in) dia. (Symmetrical)
(70) Door switch attaching hole 13.5 mm (0.531 in) dia. (Symmetrical)
(71) Retainer attaching square hole 8 mm (0.31 in). (Symmetrical)
(72) Rear quarter glass attaching hole 8 mm (0.31 in) dia. (Symmetrical)
(73) Rear quarter glass attaching hole 7 mm (0.28 in) dia. (Symmetrical)
(74) Rear quarter glass attaching hole 8 x 5.5 mm (0.31 x 0.217 in) dia. (Symmetrical)
(75) Retainer attaching square hole 8 mm (0.31 in). (Symmetrical)
(76) Seat belt anchor attaching bolt hole 16 mm (0.63 in) dia. (Symmetrical)

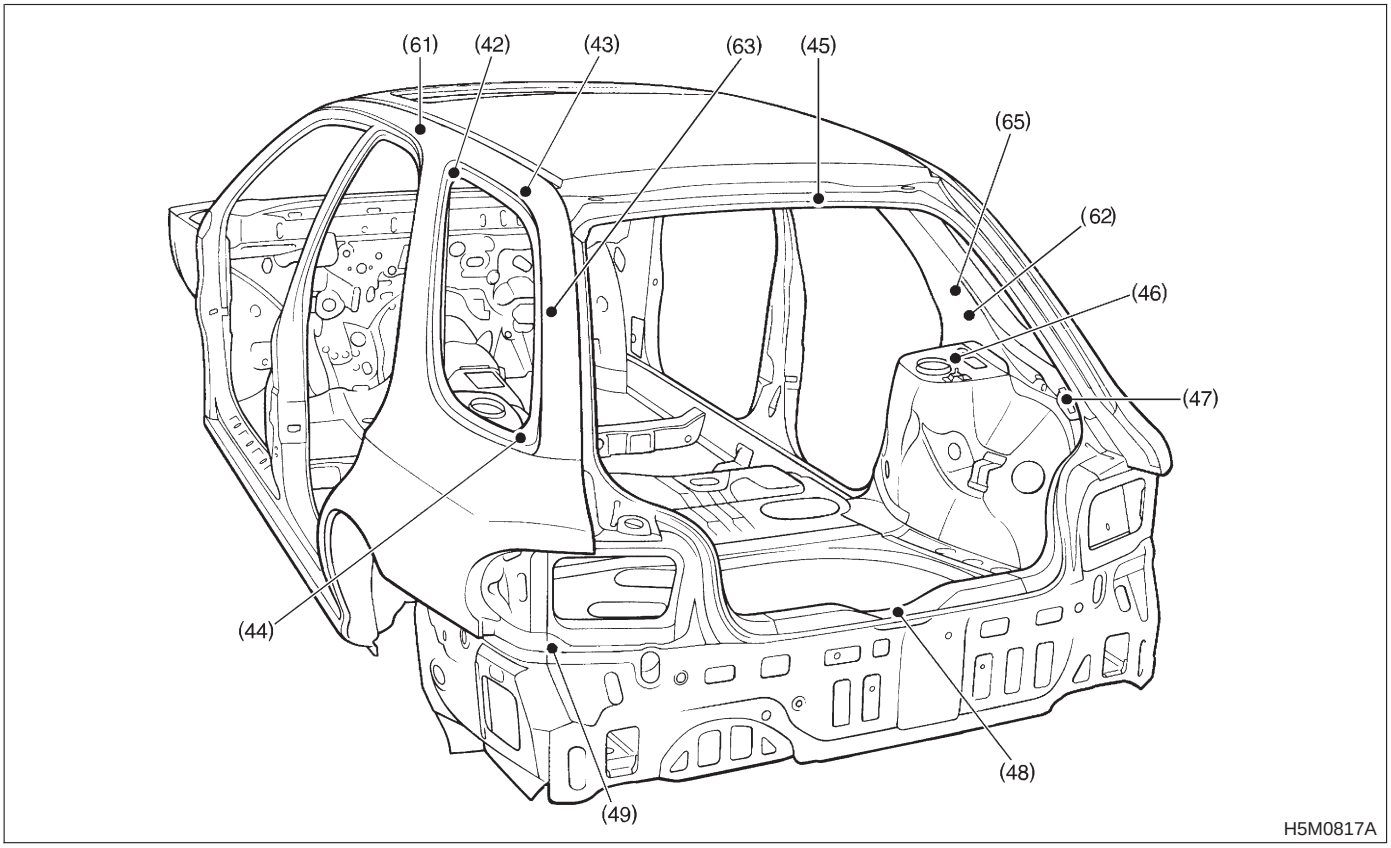
B: LUGGAGE COMPARTMENT AND ROOM

1. SEDAN AND COUPE



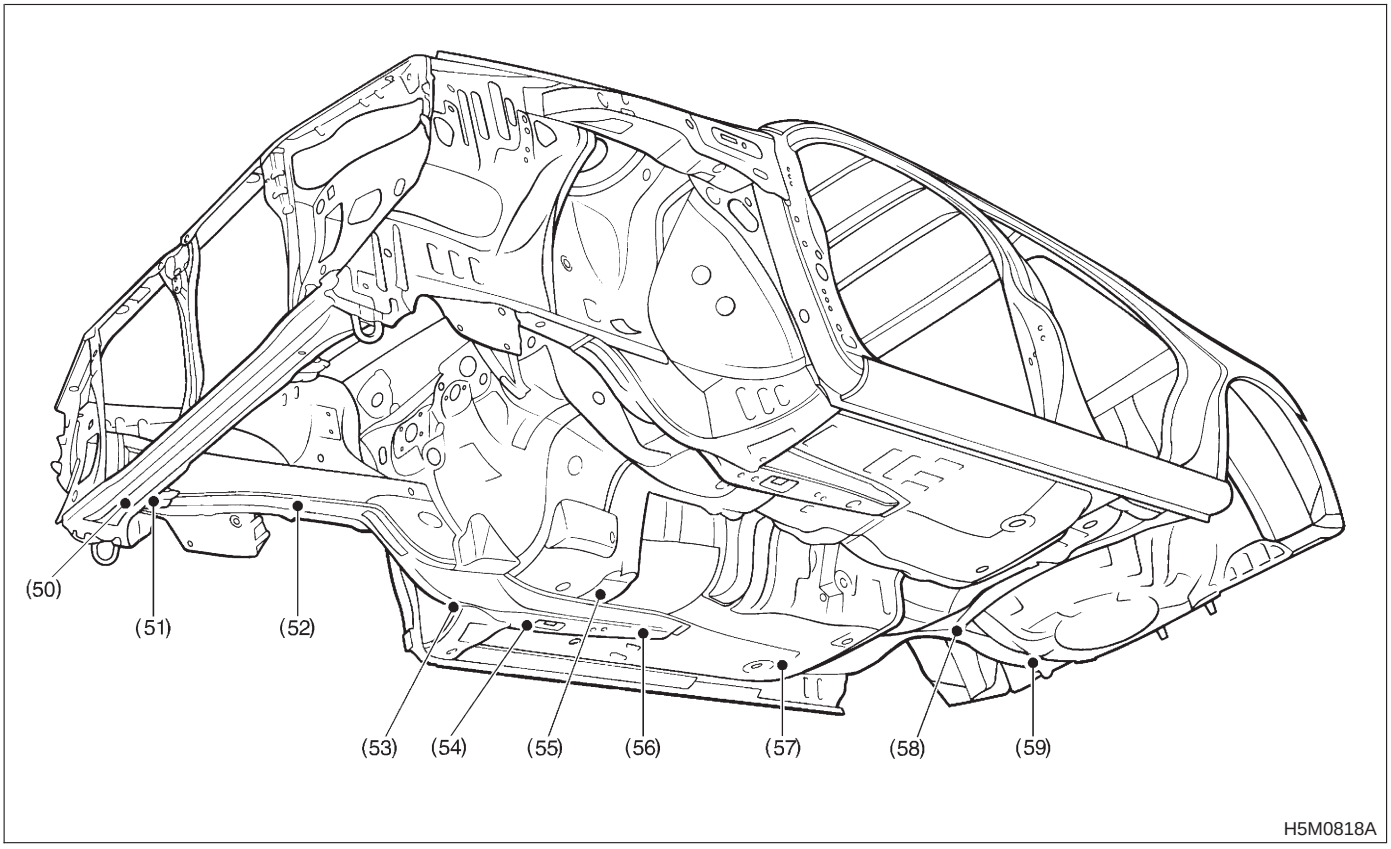
(27) Rear pillar (Inner) gauge hole 8 mm (0.31 in) dia. (Symmetrical)
(28) Rear roof trim attaching hole 8 mm (0.31 in) dia. (Symmetrical)
(29) Rear quarter trim attaching hole 8 mm (0.31 in) dia. (Symmetrical)
(30) Seat belt anchor attaching bolt hole (Symmetrical)
(31) Reinforcement (Rear panel rear) 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



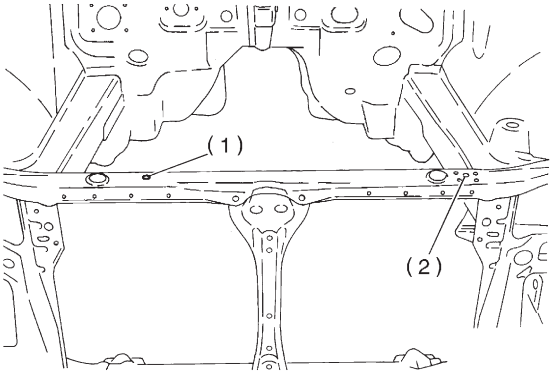
(42) Rear quarter glass attaching hole 8 mm (0.31 in) dia. (Symmetrical)
(43) Roof rail attaching hole 10 mm (0.39 in) dia. (Symmetrical)
(44) Rear quarter glass attaching hole 8 x 15 mm (0.31 x 0.59 in) dia. (Symmetrical)
(45) Rear roof trim attaching hole 8 mm (0.31 in) dia. (Symmetrical)
(46) Rear 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

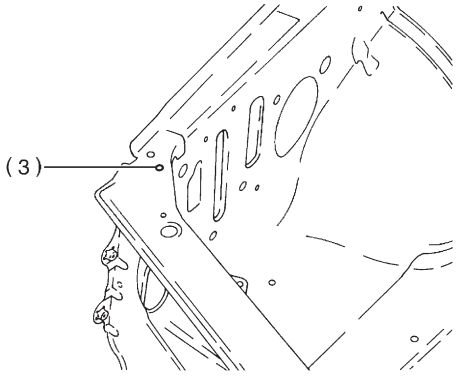


(50) Radiator panel (LWR) frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)
(51) Front side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(52) Front crossmember attaching hole 12.4 mm (0.488 in) dia. (Symmetrical)
(53) Front suspension attaching bolt hole M14
(54) Side frame gauge hole 20 mm (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)

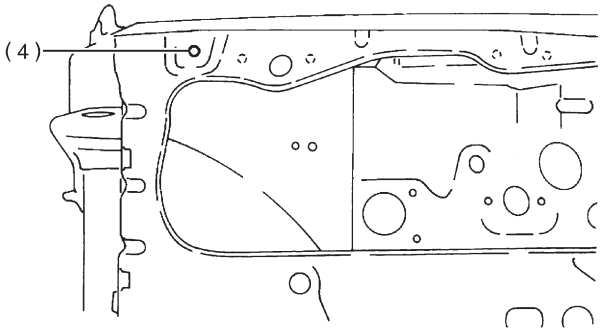
D: DATUM POINT LOCATION



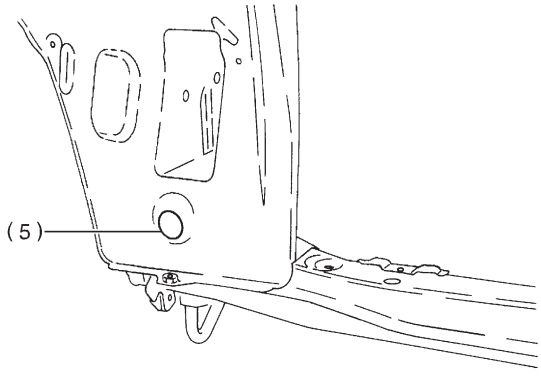
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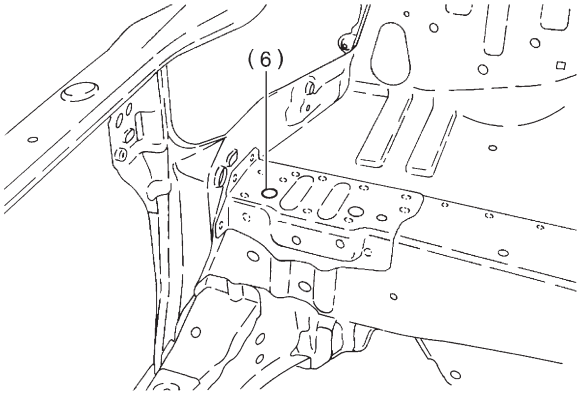
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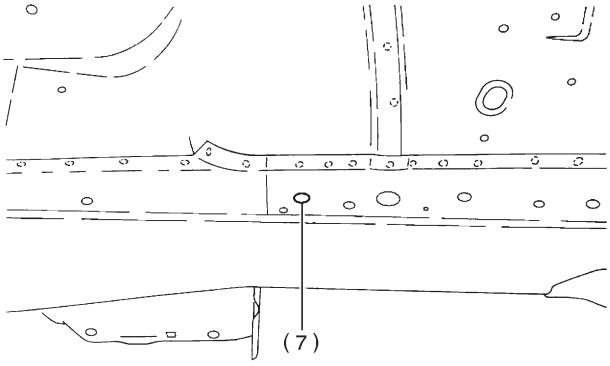
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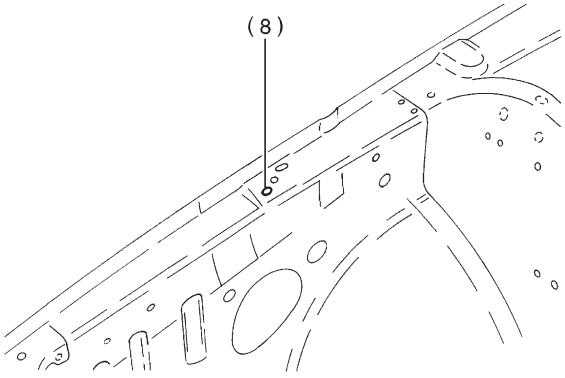
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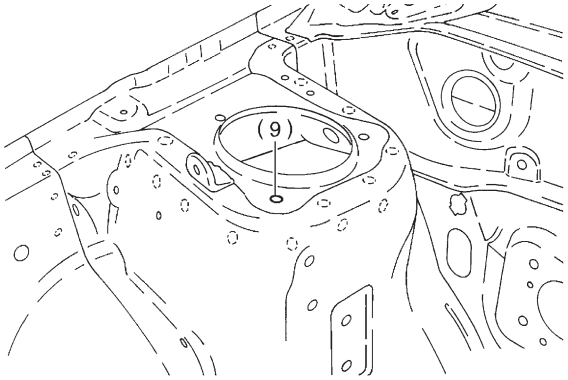
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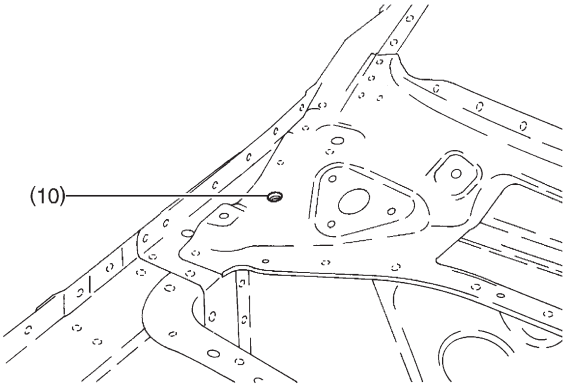
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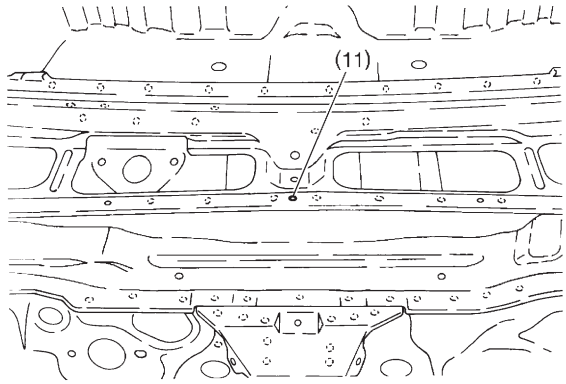
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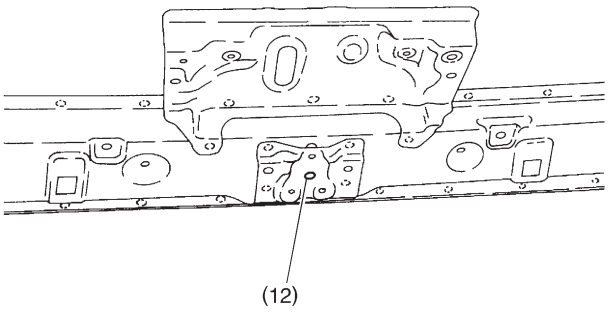
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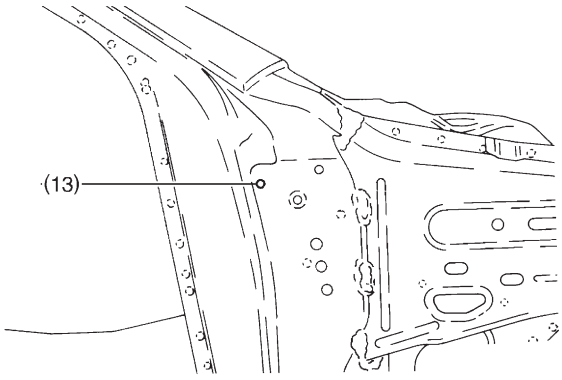
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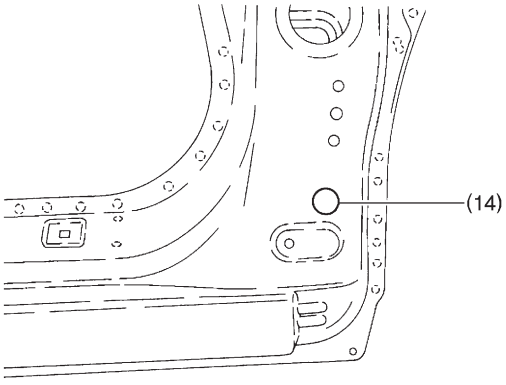
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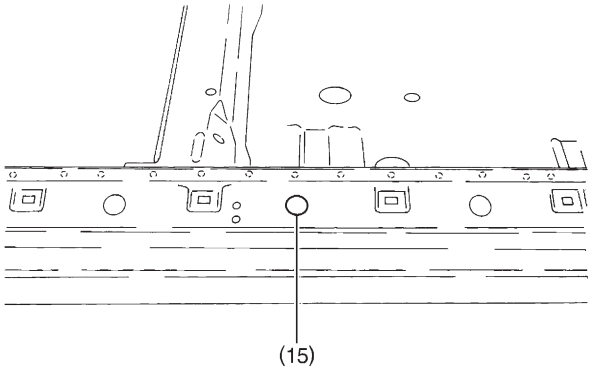
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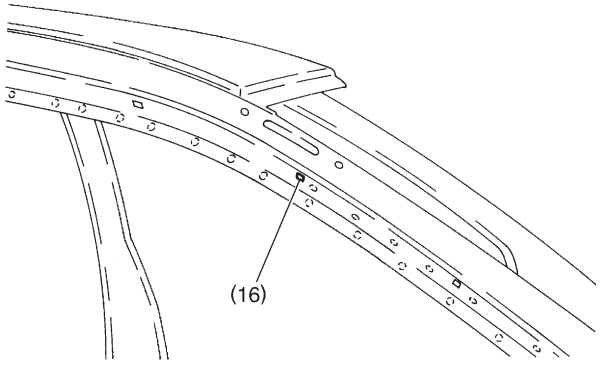
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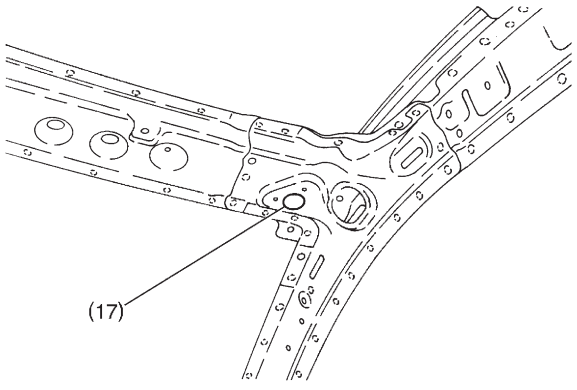
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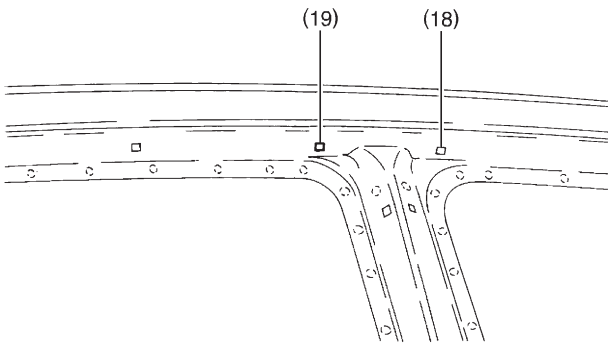
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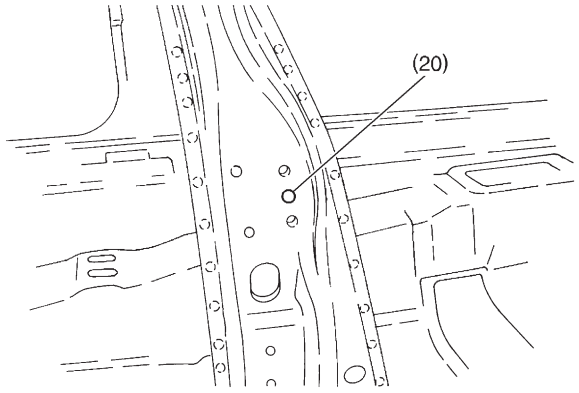
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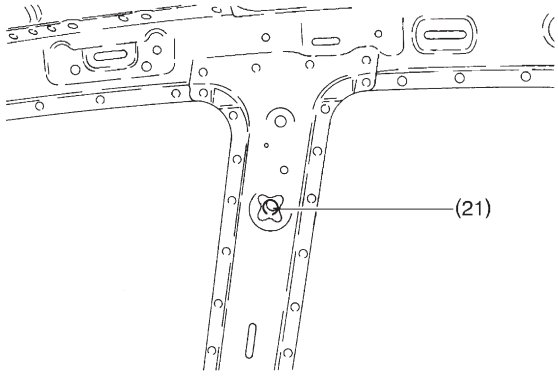
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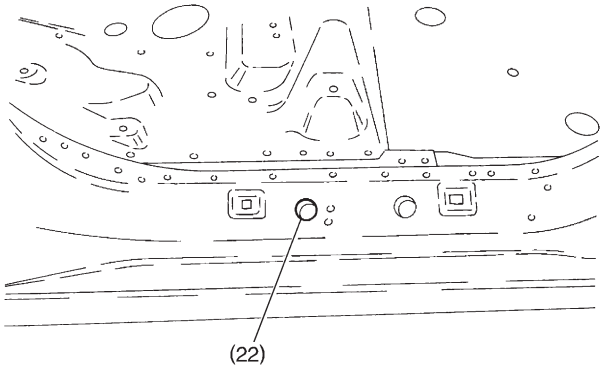
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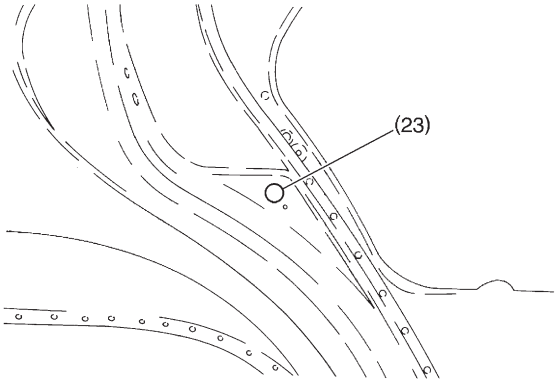
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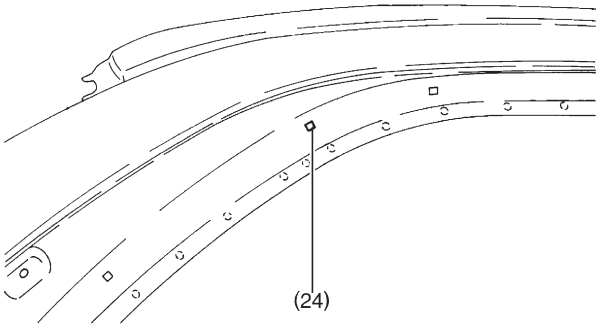
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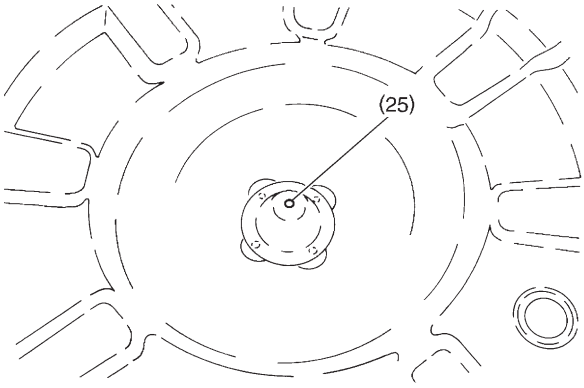
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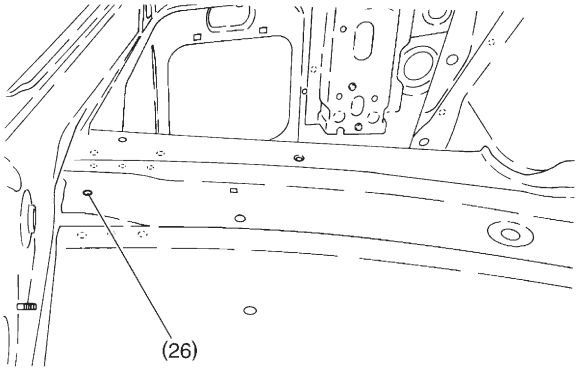
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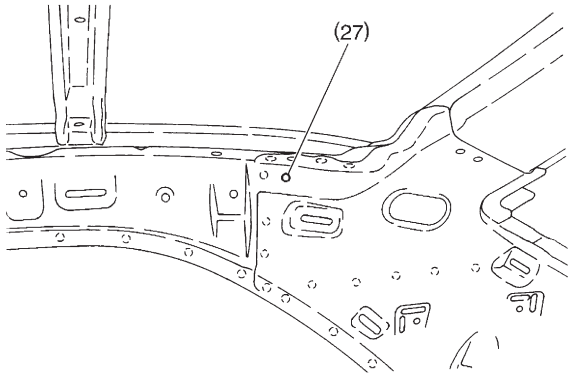
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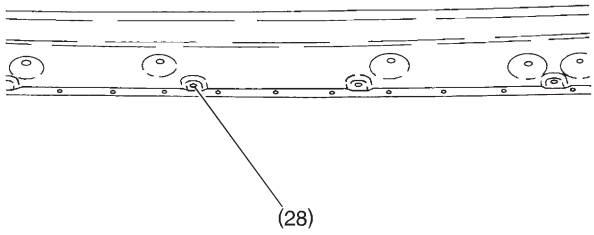


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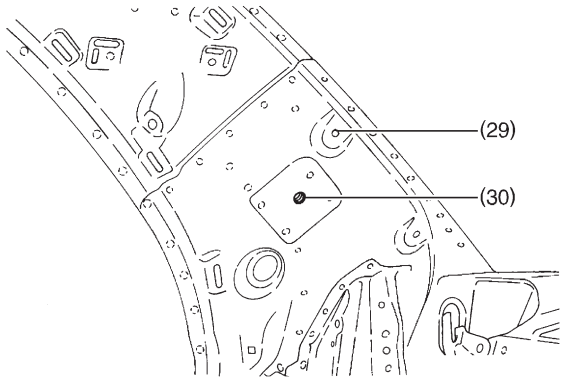


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Sedan

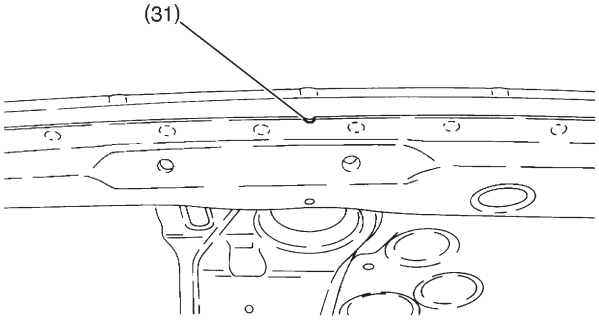


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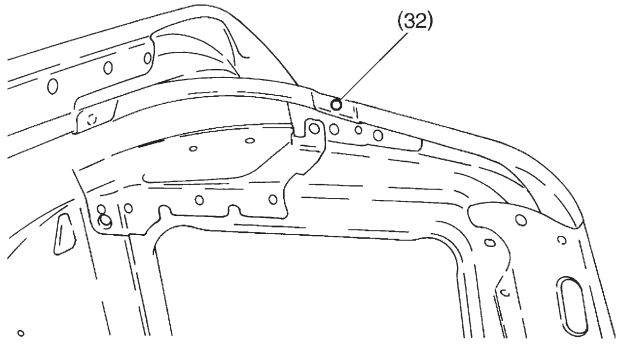


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Sedan

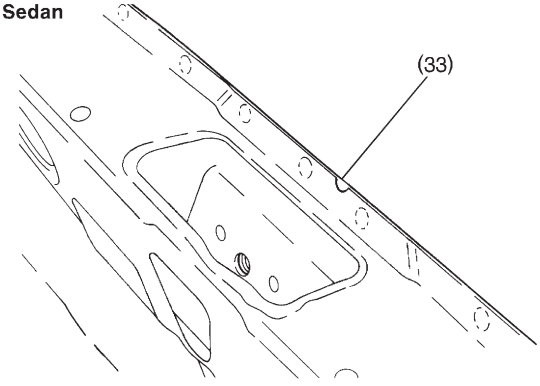


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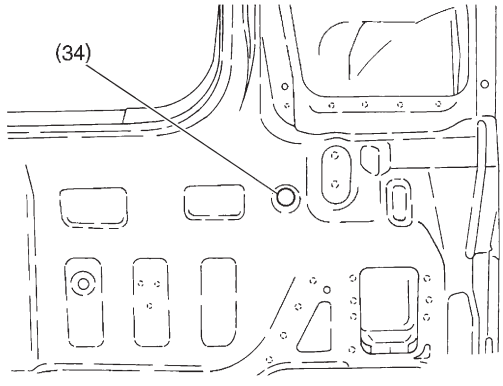


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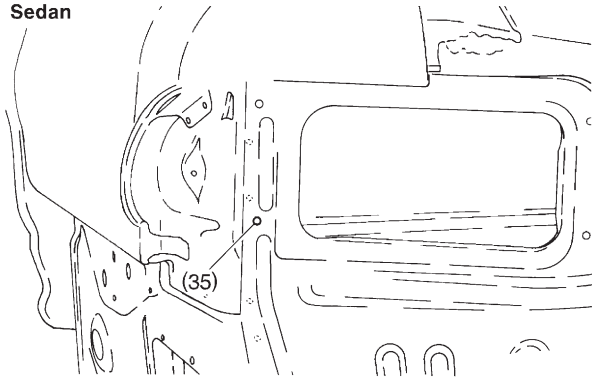


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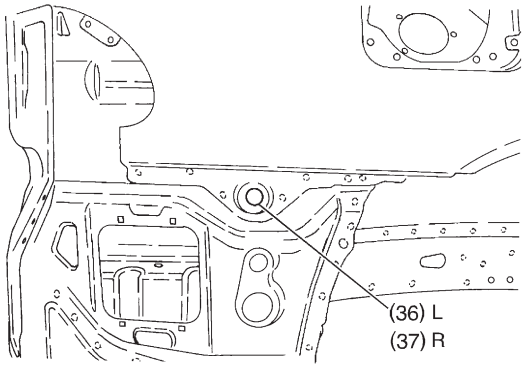


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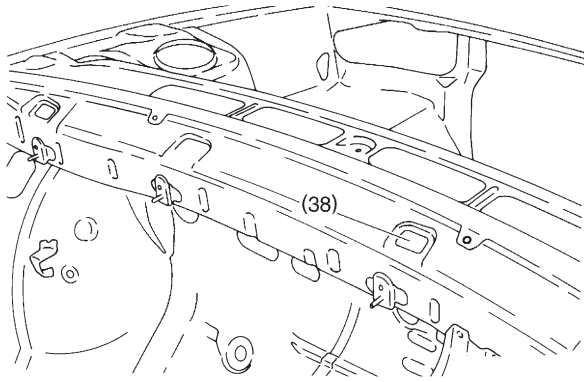
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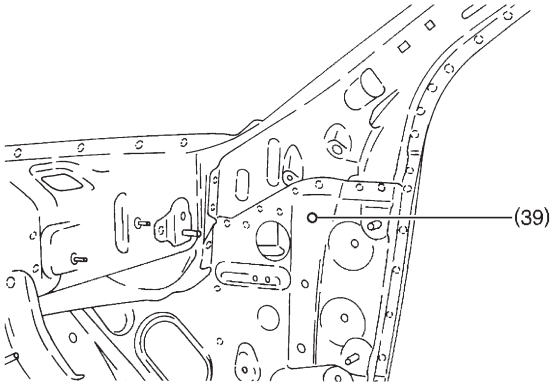
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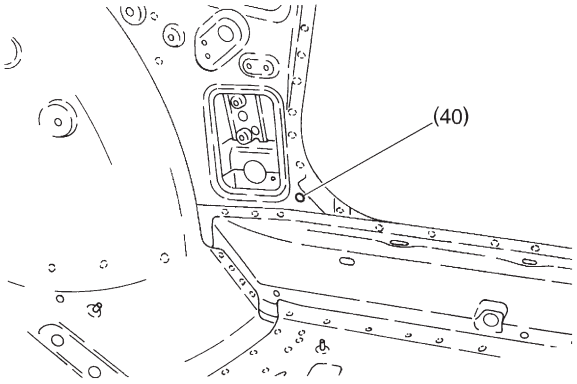
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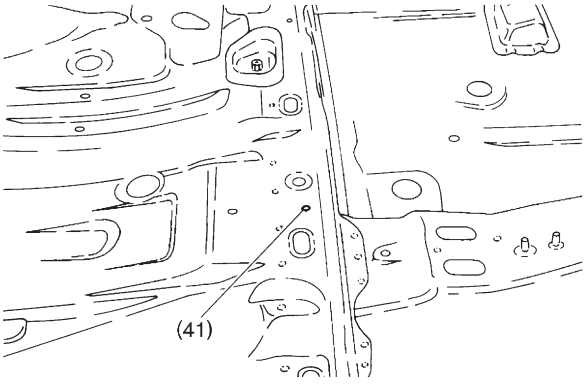
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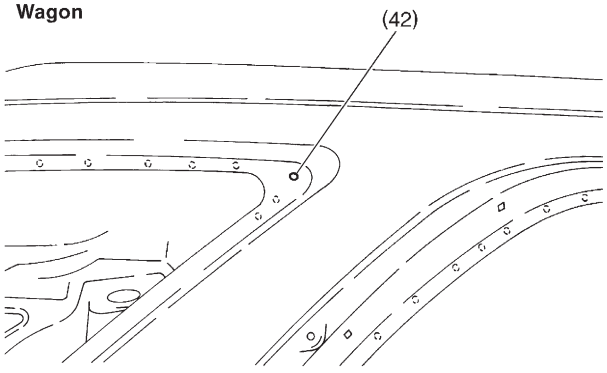


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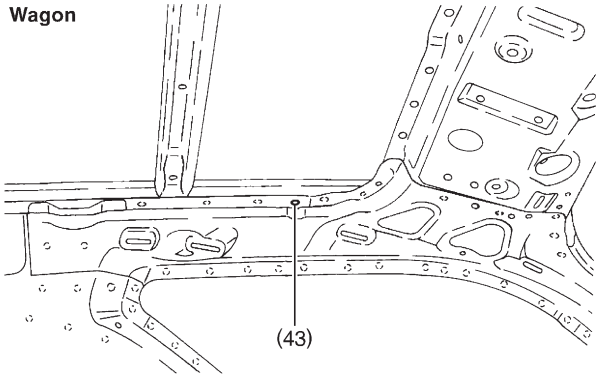
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Wagon



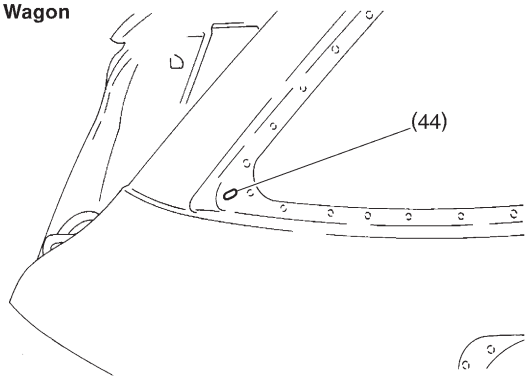
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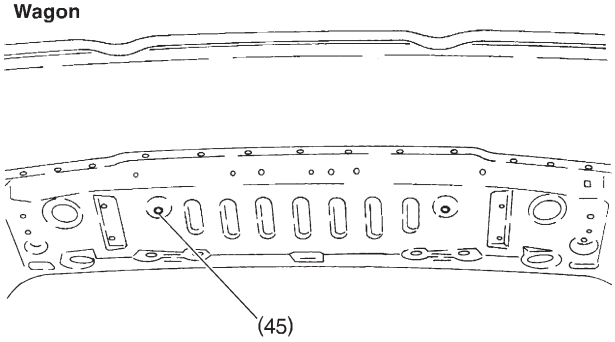
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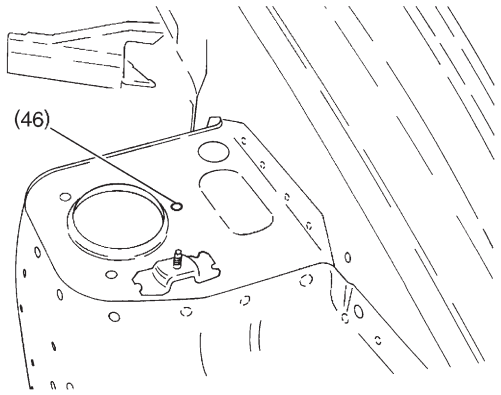


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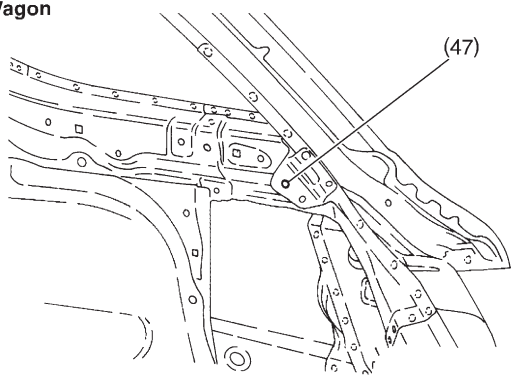


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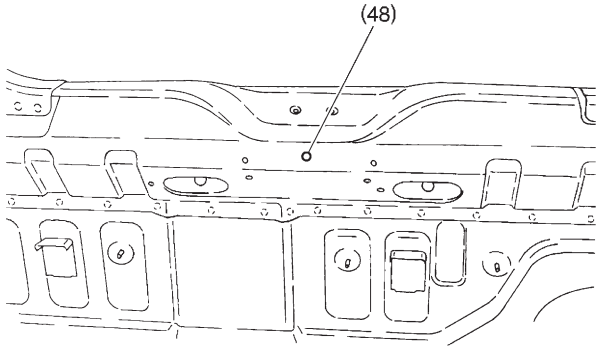
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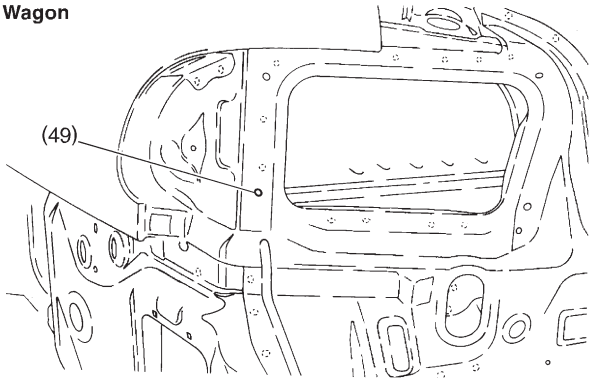
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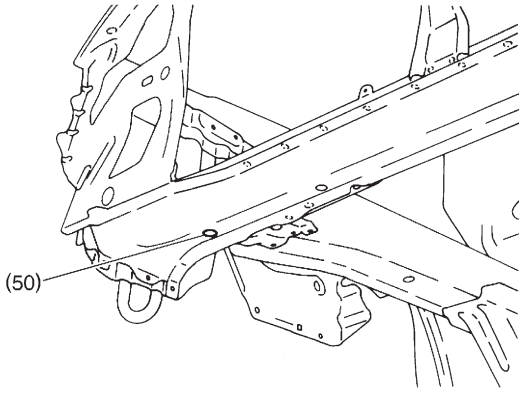


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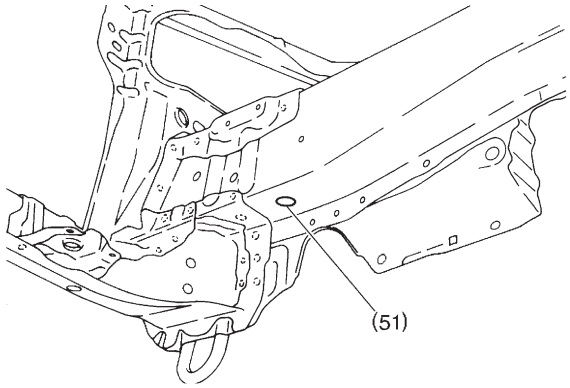
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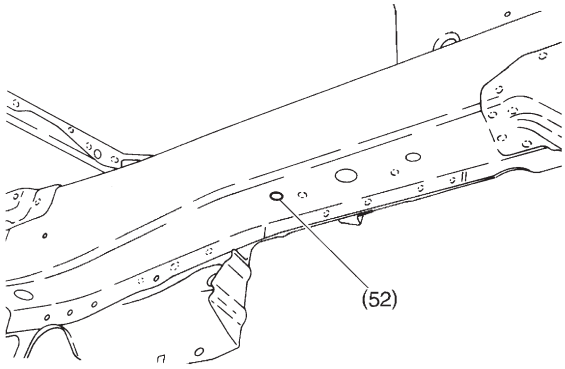
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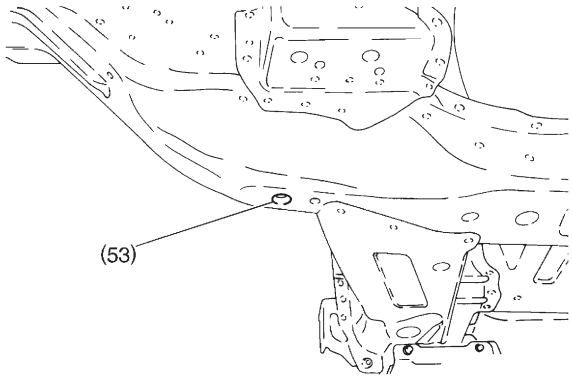
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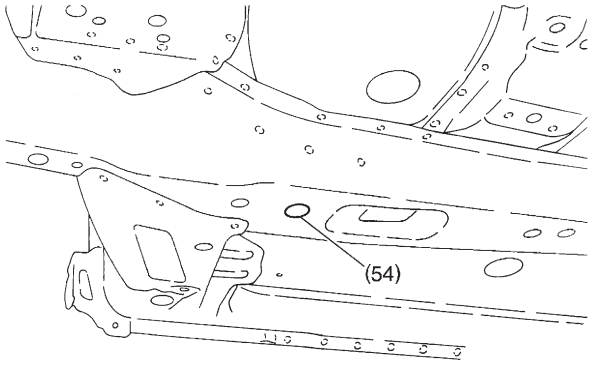
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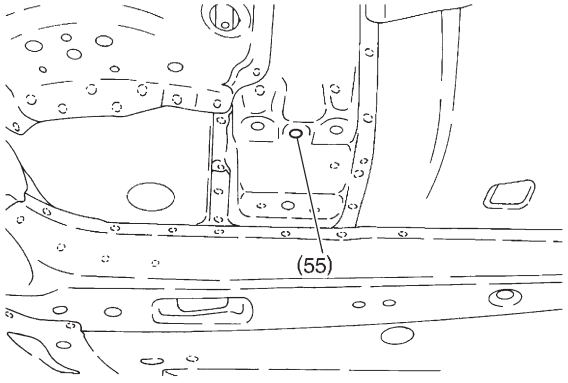
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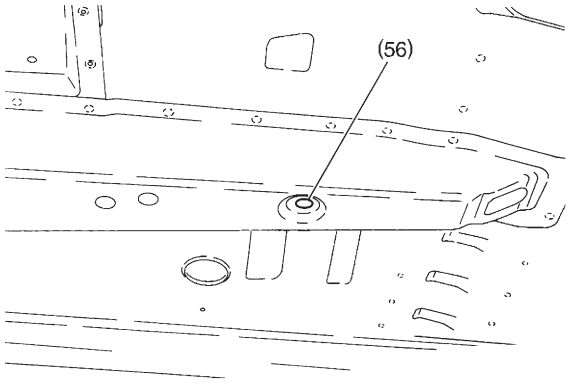
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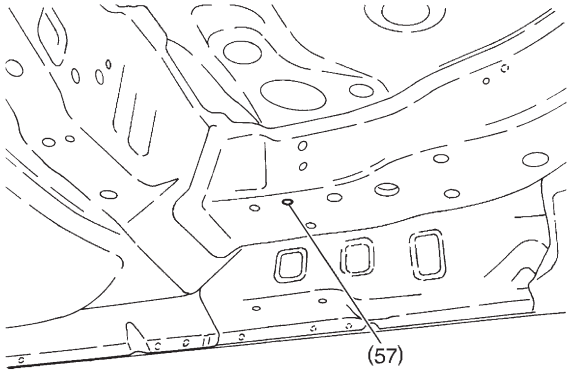
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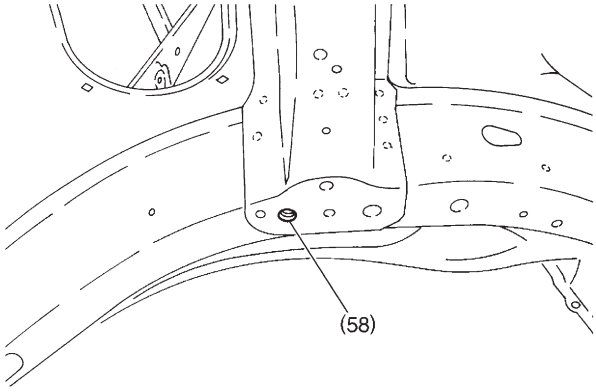
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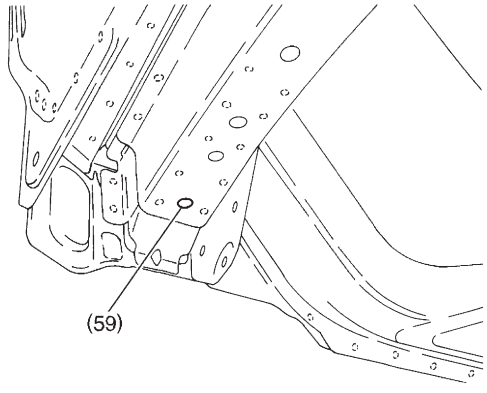
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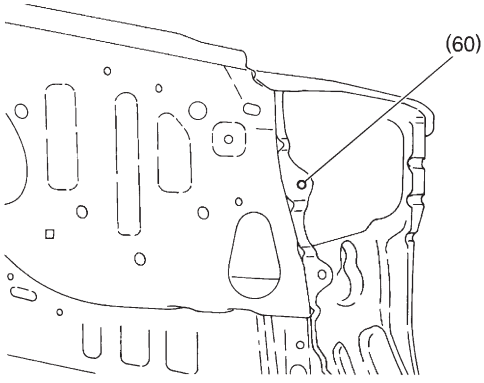
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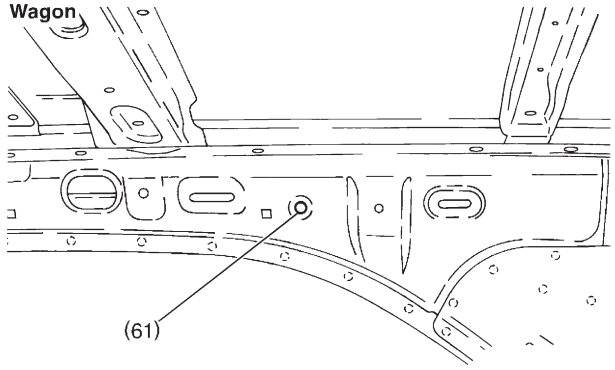


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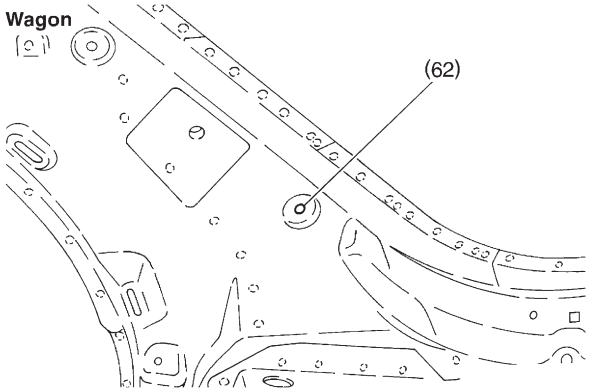
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Wagon



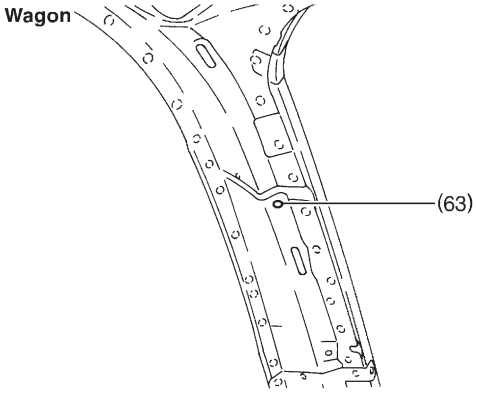
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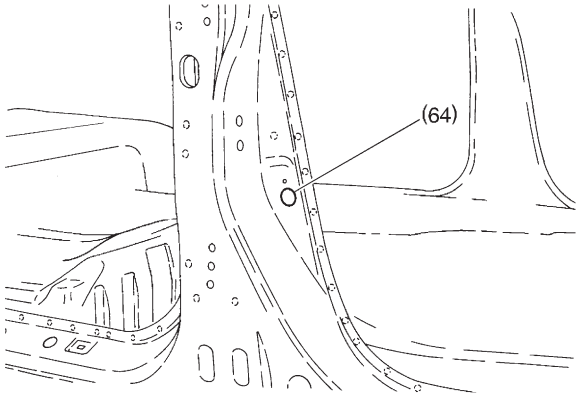


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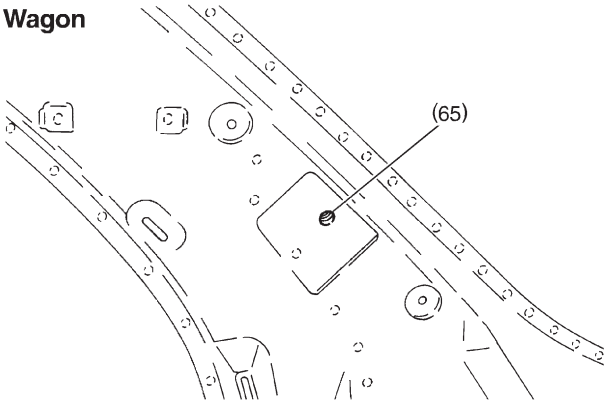


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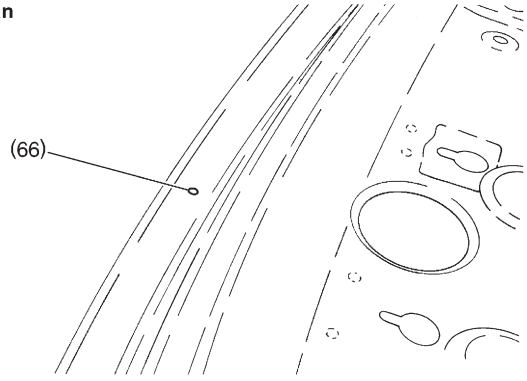
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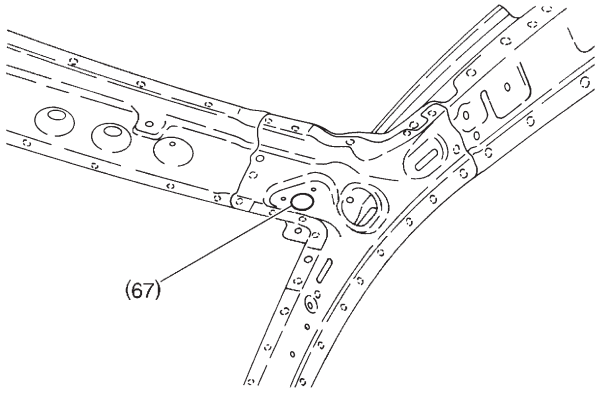


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Sedan

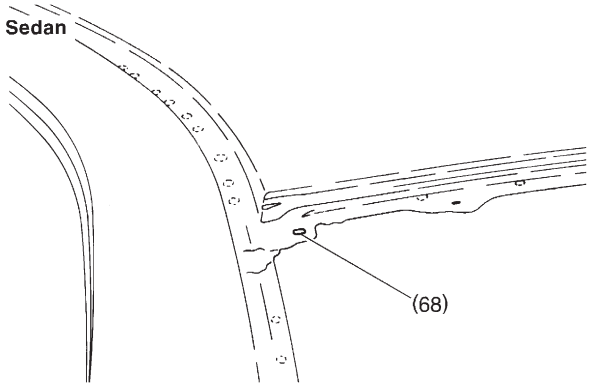


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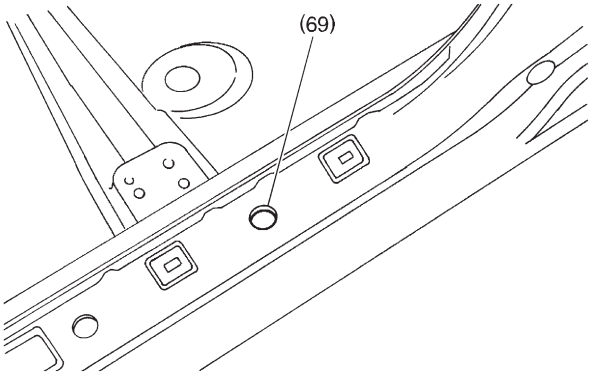


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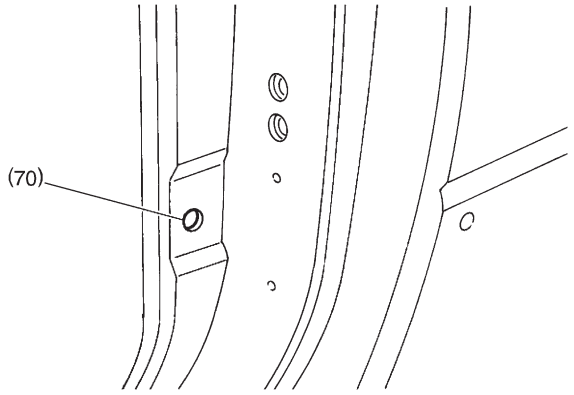
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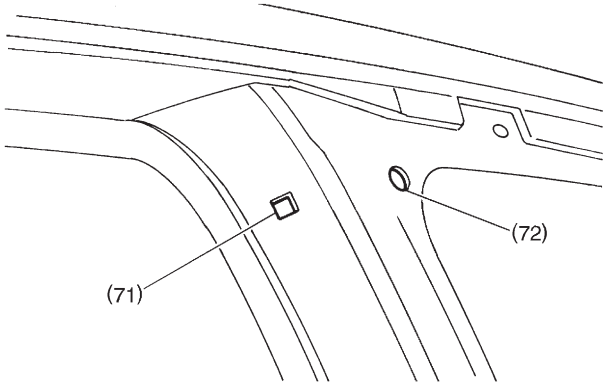
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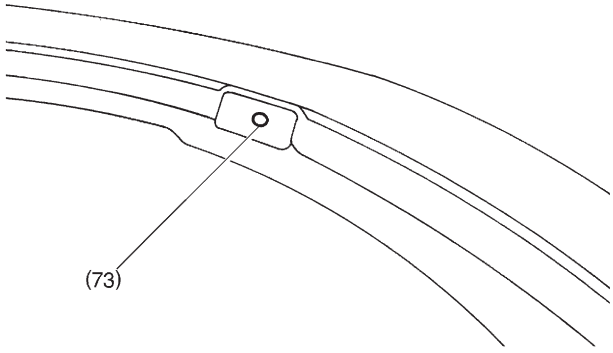
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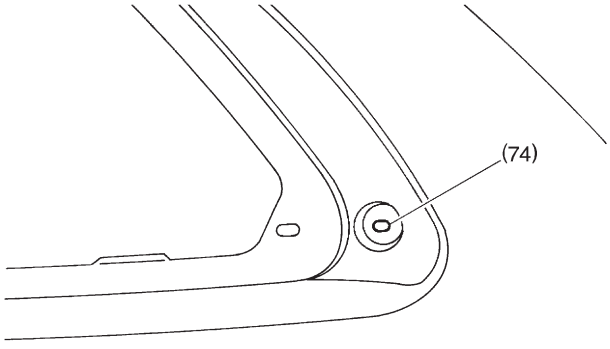
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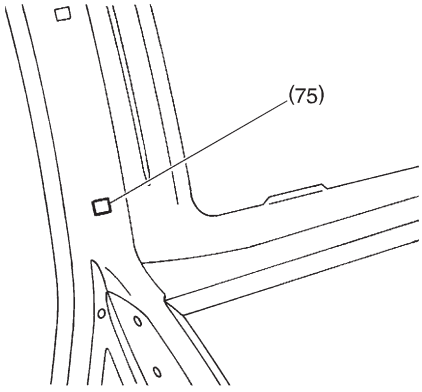
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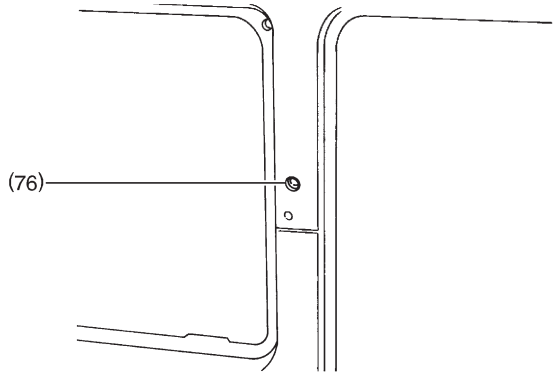
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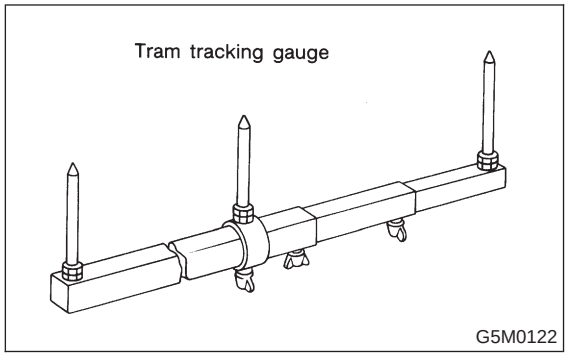
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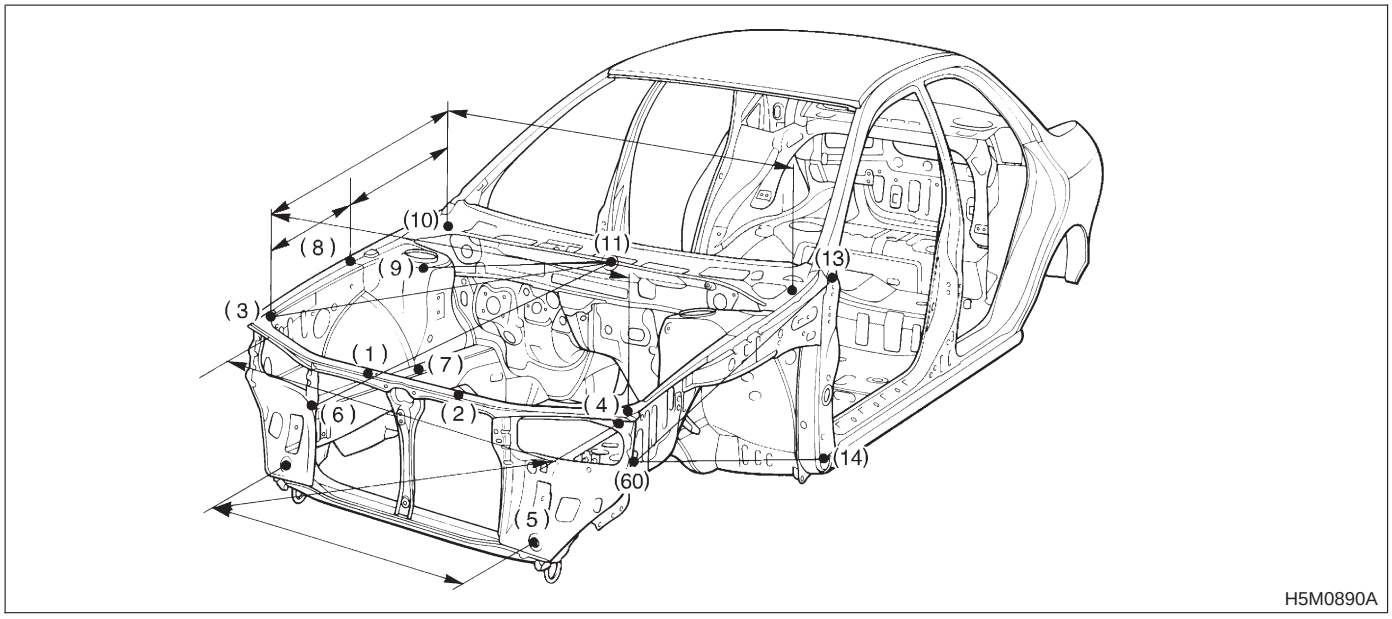
3. Datum Dimensions

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

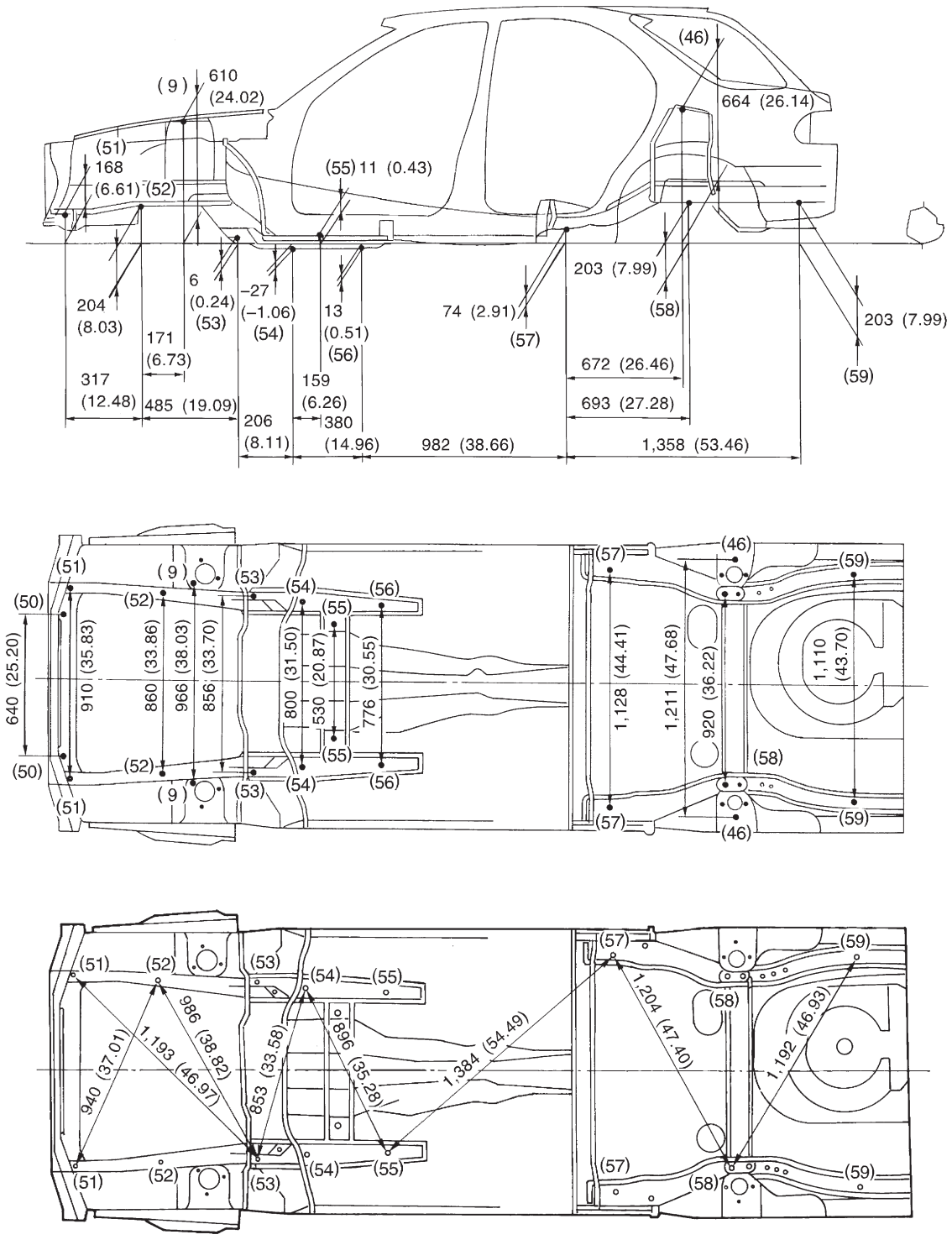


Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(11) to (9) R	525 (20.67)		(10) R to (10) L	1,382 (54.41)
(11) to (9) L	525 (20.67)		(3) R to (3) L	1,336 (52.60)
(11) to (6) R	988 (38.90)		(5) R to (5) L	942 (37.09)
(11) to (6) L	988 (38.90)		(5) R to (4) R	1,174 (46.22)
(11) to (3) R	990 (38.98)		(5) L to (4) L	1,174 (46.22)
(11) to (3) L	990 (38.98)		(4) R to (4) L	1,269 (49.96)
(10) R to (3) R	829 (32.64)		(60) R to (13) R	1,113 (43.82)
(10) L to (3) L	829 (32.64)		(60) L to (13) L	1,113 (43.82)
(10) R to (8) R	567 (22.32)		(60) R to (14) R	1,076 (42.36)
(10) L to (8) L	567 (22.32)		(60) L to (14) L	1,076 (42.36)
(8) R to (3) R	264 (10.39)		(1) to (11)	882 (34.72)
(8) L to (3) L	264 (10.39)		(2) to (11)	913 (35.94)

B: CENTER STRUCTURE

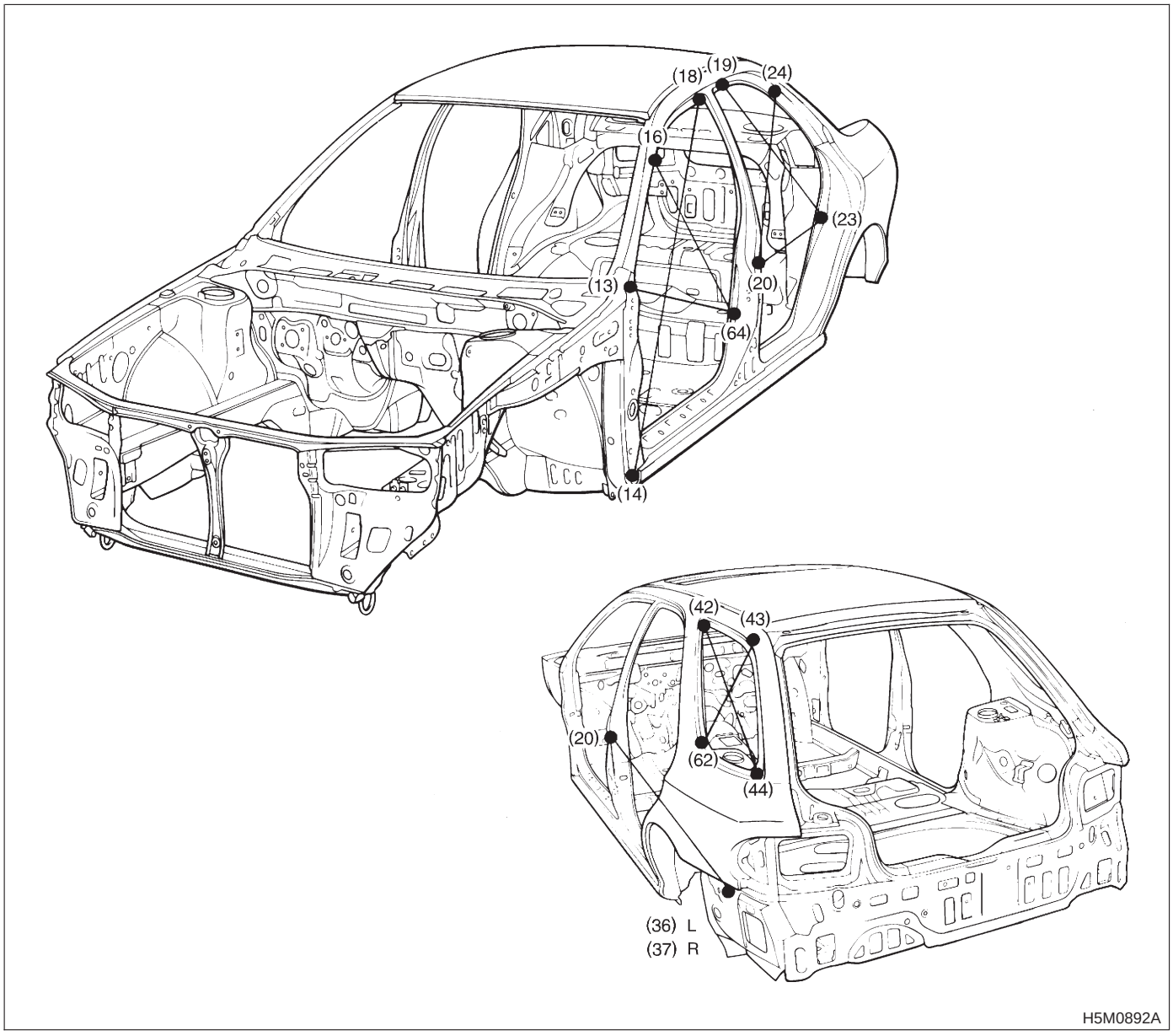
Unit: mm (in)



H5M0891A

C: DOORS AND REAR QUARTER

1. SEDAN AND WAGON

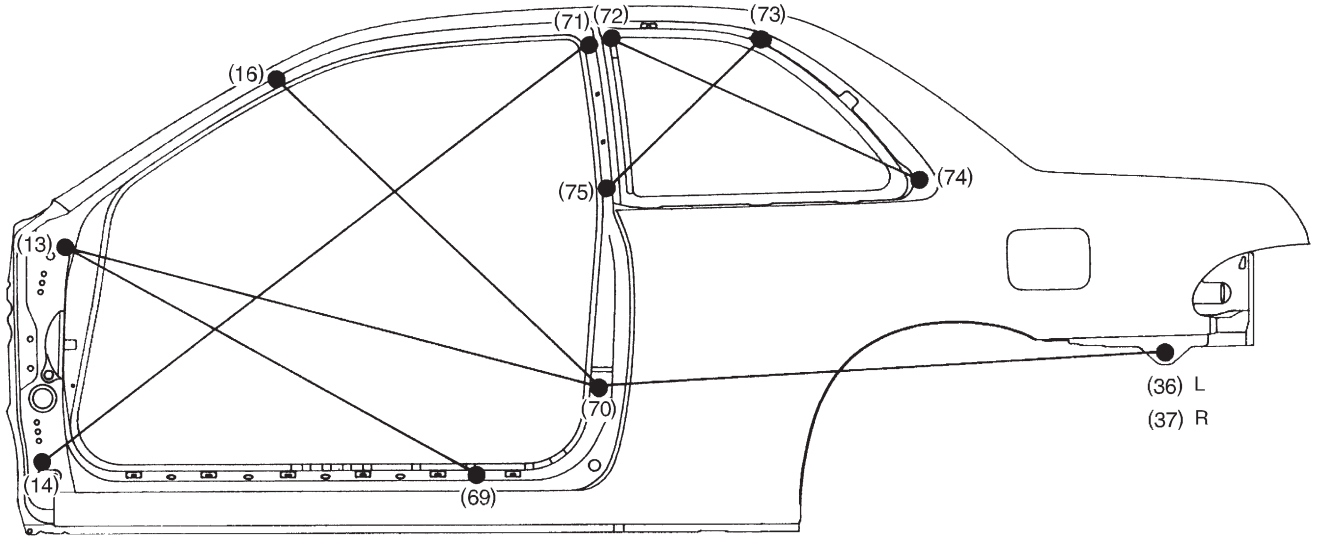


Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(14) to (18)	1,495 (58.86)		(19) to (23)	912 (35.91)
(13) to (64)	947 (37.28)		(20) to (36) L*	1,462 (57.56)
(16) to (64)	976 (38.43)		(20) R to (37) R*	1,481 (58.31)
(20) to (23)	803 (31.61)		(62) to (43) *	377 (14.84)
(20) to (24)	829 (32.64)		(42) to (44) *	847 (33.35)

*: Wagon only

2. COUPE

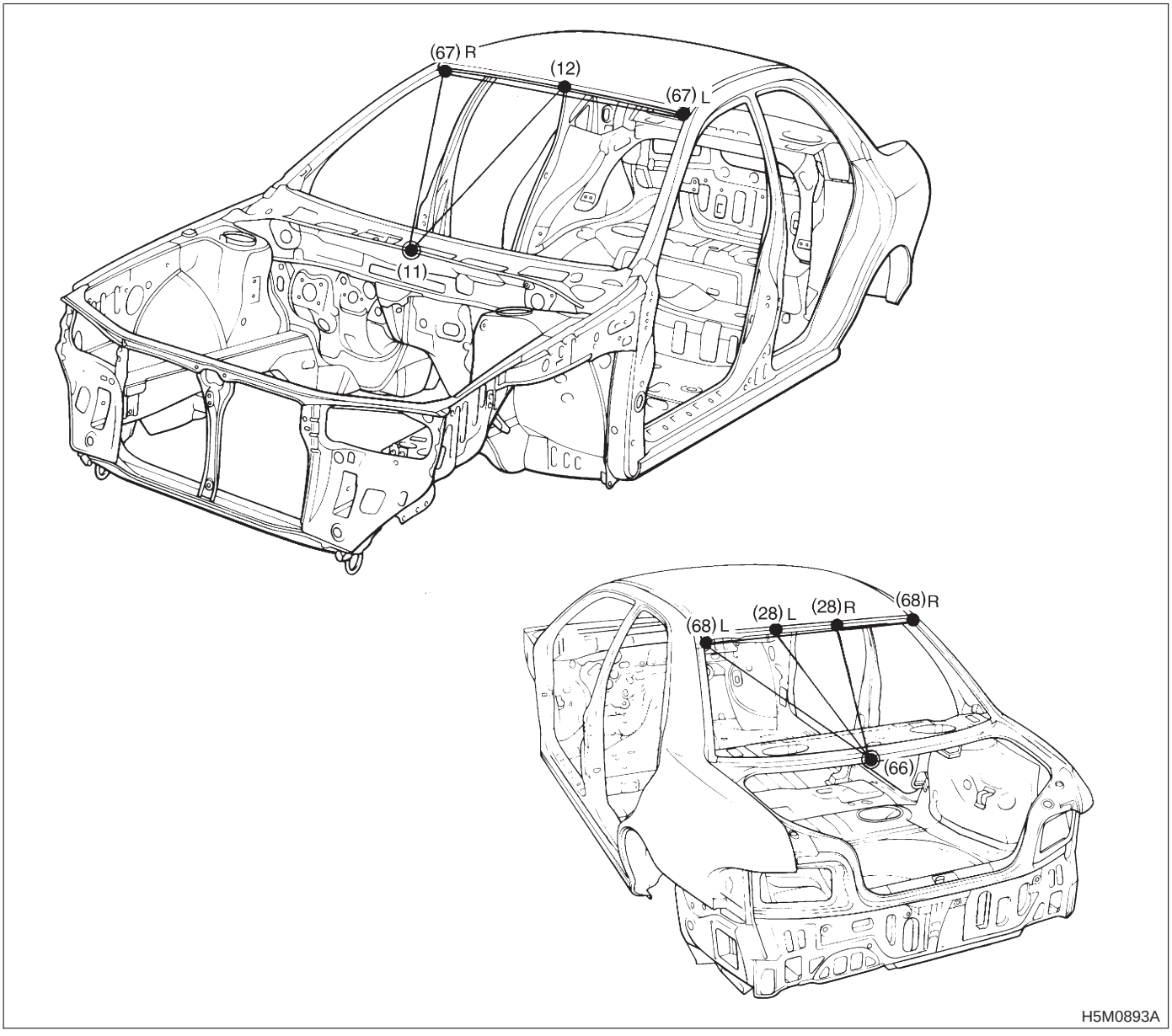


H5M0713B

Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(14) to (71)	1,576 (62.05)		(72) to (74)	778 (30.63)
(13) to (70)	1,251 (49.25)		(73) to (75)	512 (20.16)
(16) to (70)	997 (39.25)		(70) to (36) L	1,295 (50.98)
(13) to (69)	1,063 (41.85)		(70) to (37) R	1,243 (48.94)

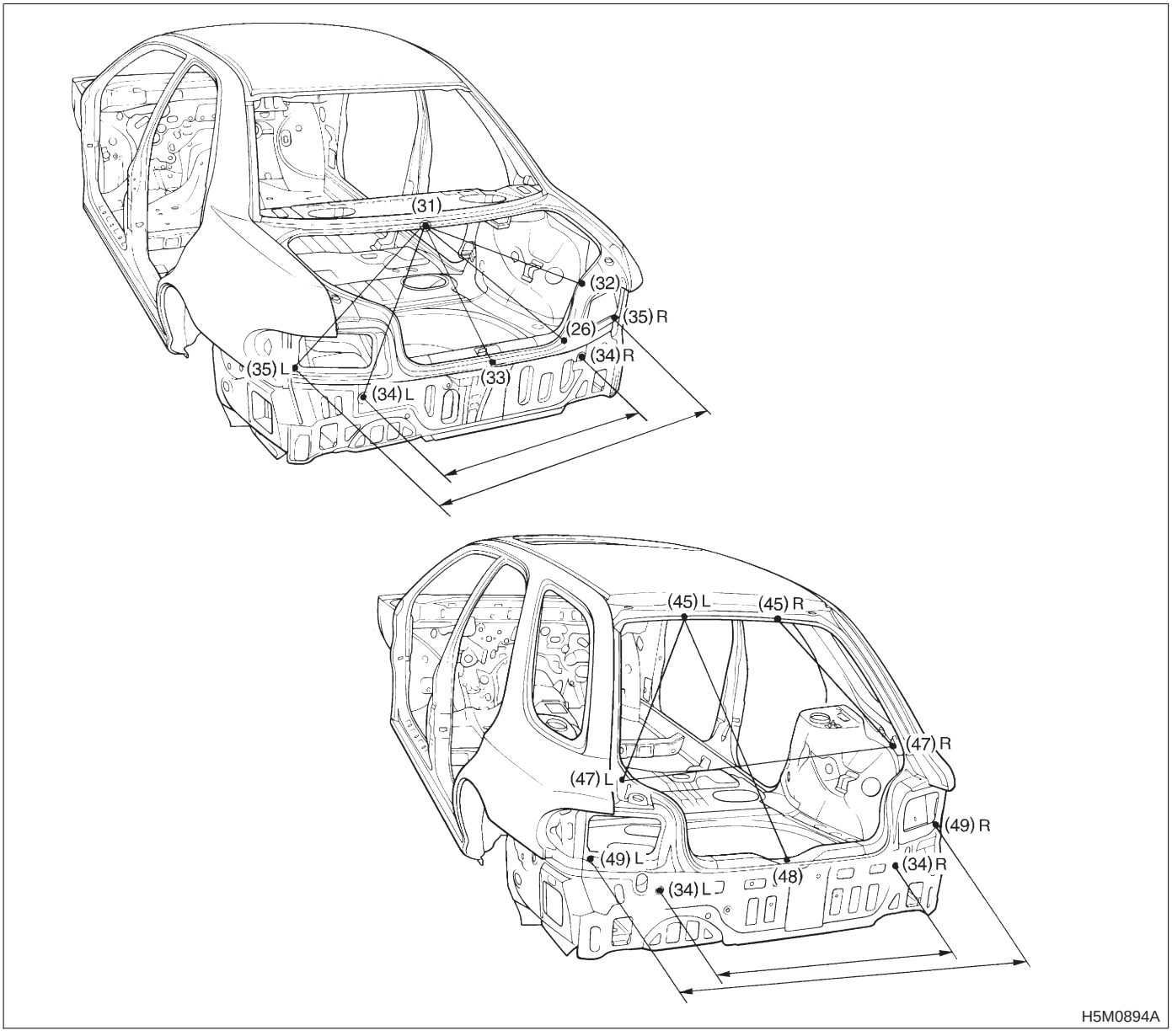
D: FRONT WINDSHIELD AND REAR WINDOW



Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(11) to (12)	989 (38.94)		(66) to (28) L	714 (28.11)
(67) R to (67) L	1,012 (39.84)		(66) to (68) R	856 (33.70)
(11) to (67) R	1,116 (43.94)		(66) to (68) L	856 (33.70)
(11) to (67) L	1,116 (43.94)		(68) R to (68) L	1,012 (39.84)
(66) to (28) R	714 (28.11)			

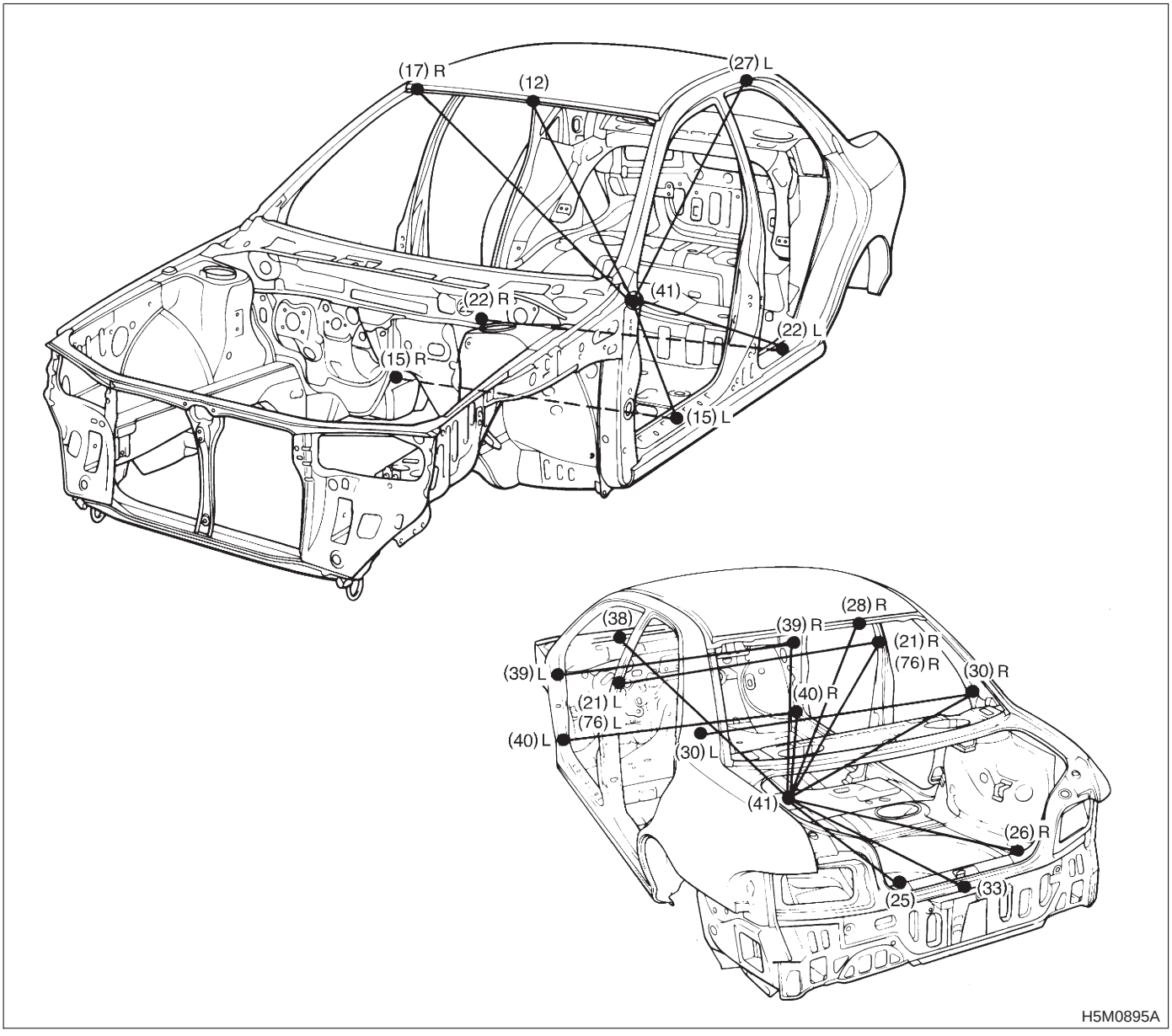
E: TRUNK LID AND REAR GATE



Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(31) to (32) R	575 (22.64)		(35) R to (35) L	1,364 (53.70)
(31) to (32) L	575 (22.64)		(45) R to (48)	988 (38.90)
(31) to (26) R	812 (31.97)		(45) L to (48)	988 (38.90)
(31) to (26) L	812 (31.97)		(45) R to (47) R	926 (36.46)
(31) to (33)	522 (20.55)		(45) L to (47) L	926 (36.46)
(31) to (35) R	794 (31.26)		(47) R to (47) L	1,043 (41.06)
(31) to (35) L	794 (31.26)		(49) R to (49) L	1,355 (52.56)
(34) R to (34)L	890 (35.04)		(34) R to (34) L	890 (35.04)

F: COMPARTMENT

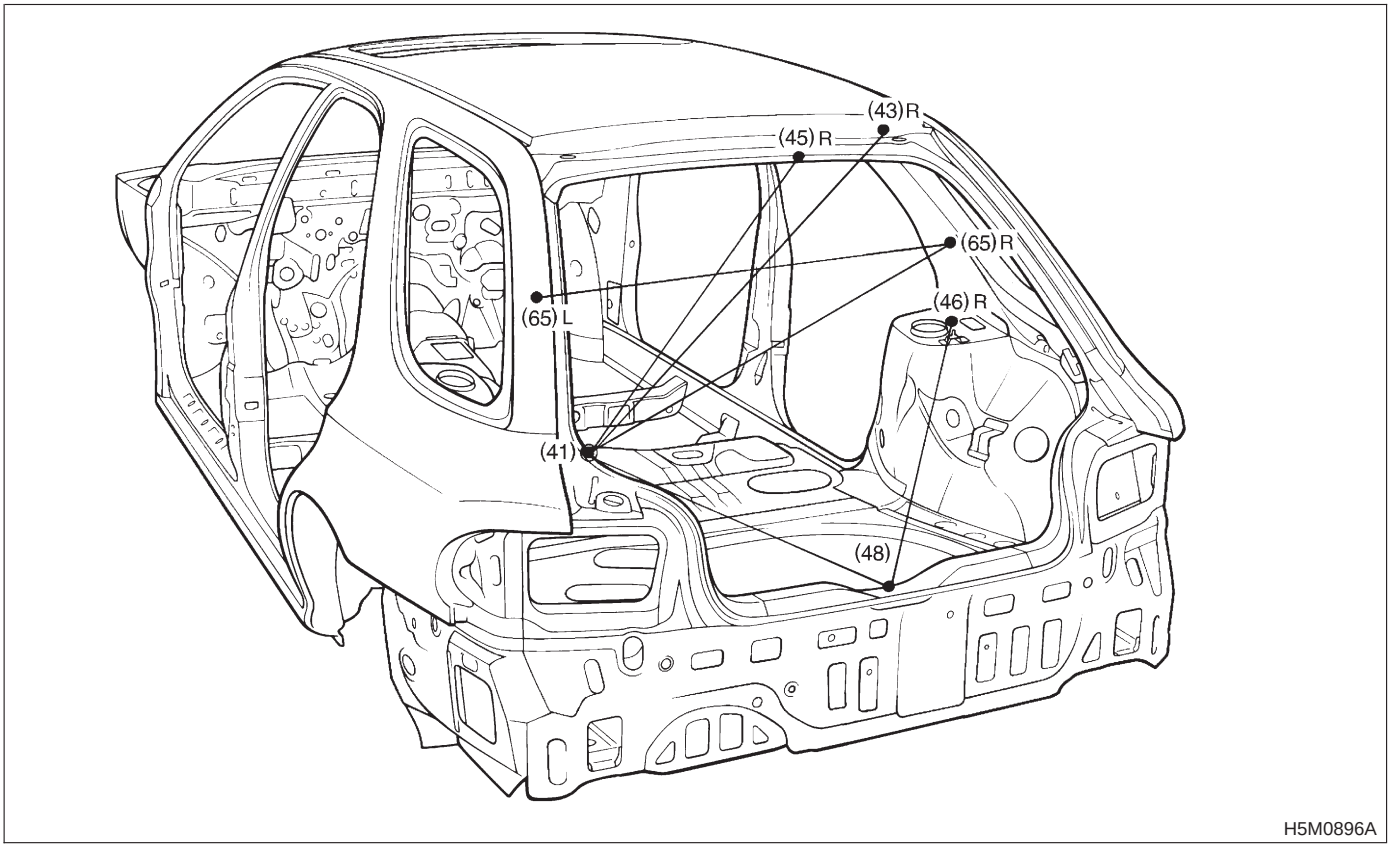


Unit: mm (in)

Point to point	Dimension		Point to point	Dimension		Point to point	Dimension
(30) R to (30) L	1,197 (47.13)		(41) to (15) R	1,140 (44.88)		(41) to (30) L*	1,168 (45.98)
(21) R to (21) L	1,061 (41.77)		(41) to (15) L	1,140 (44.88)		(41) to (28) R*	1,050 (41.34)
(15) R to (15) L	1,453 (57.20)		(41) to (22) R	733 (28.86)		(41) to (28) L*	1,050 (41.34)
(22) R to (22) L	1,453 (57.20)		(41) to (22) L	733 (28.86)		(41) to (21) R	1,038 (40.87)
(39) R to (39) L	1,388 (54.65)		(41) to (12)	1,156 (45.51)		(41) to (21) L	1,038 (40.87)
(40) R to (40) L	1,401 (55.16)		(41) to (27) R	1,085 (42.72)		(41) to (17) R	1,208 (47.56)
(41) to (38)	1,527 (60.12)		(41) to (27) L	1,085 (42.72)		(41) to (17) L	1,208 (47.56)
(41) to (39) R	1,524 (60.00)		(41) to (26) R	1,568 (61.73)		(41) to (33) *	1,569 (61.77)
(41) to (39) L	1,524 (60.00)		(41) to (26) L	1,568 (61.73)		(76) R to (76) L☆	1,212 (47.72)
(41) to (40) R	1,756 (69.13)		(41) to (25)	1,184 (46.61)			
(41) to (40) L	1,756 (69.13)		(41) to (30) R*	1,168 (45.98)			

*: Sedan only ☆ : Coupe only

G: LUGGAGE ROOM

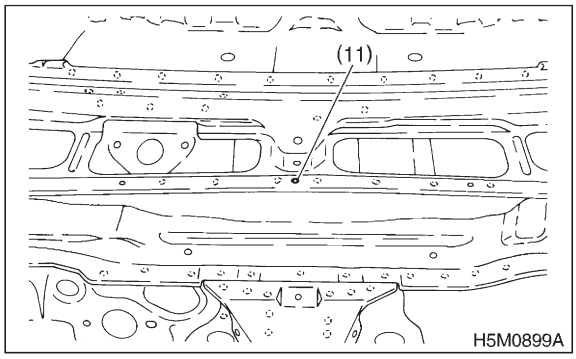


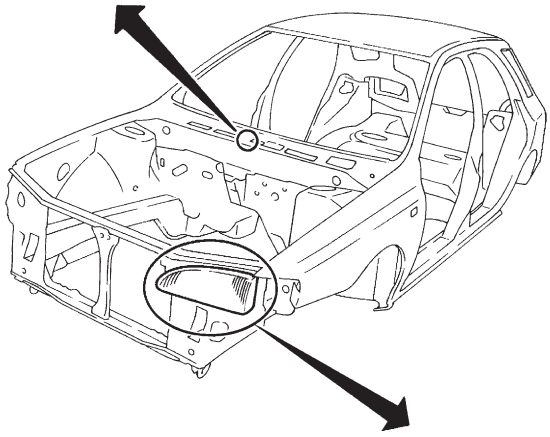
Unit: mm (in)

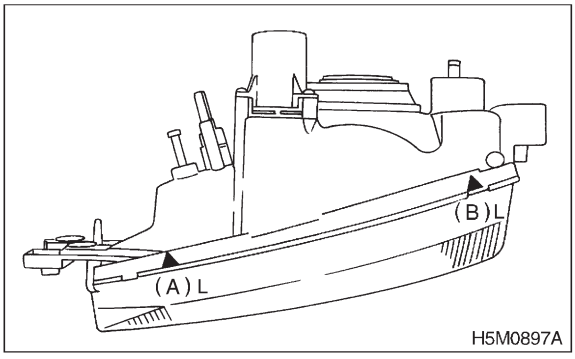
Point to point	Dimension		Point to point	Dimension
(41) to (65) R	1,122 (44.17)		(41) to (43) R	1,237 (48.70)
(41) to (65) L	1,122 (44.17)		(41) to (43) L	1,237 (48.70)
(41) to (45) R	1,225 (48.23)		(48) to (46) R	971 (38.23)
(41) to (45) L	1,225 (48.23)		(48) to (46) L	971 (38.23)
(41) to (48)	1,446 (56.93)		(65) R to (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.





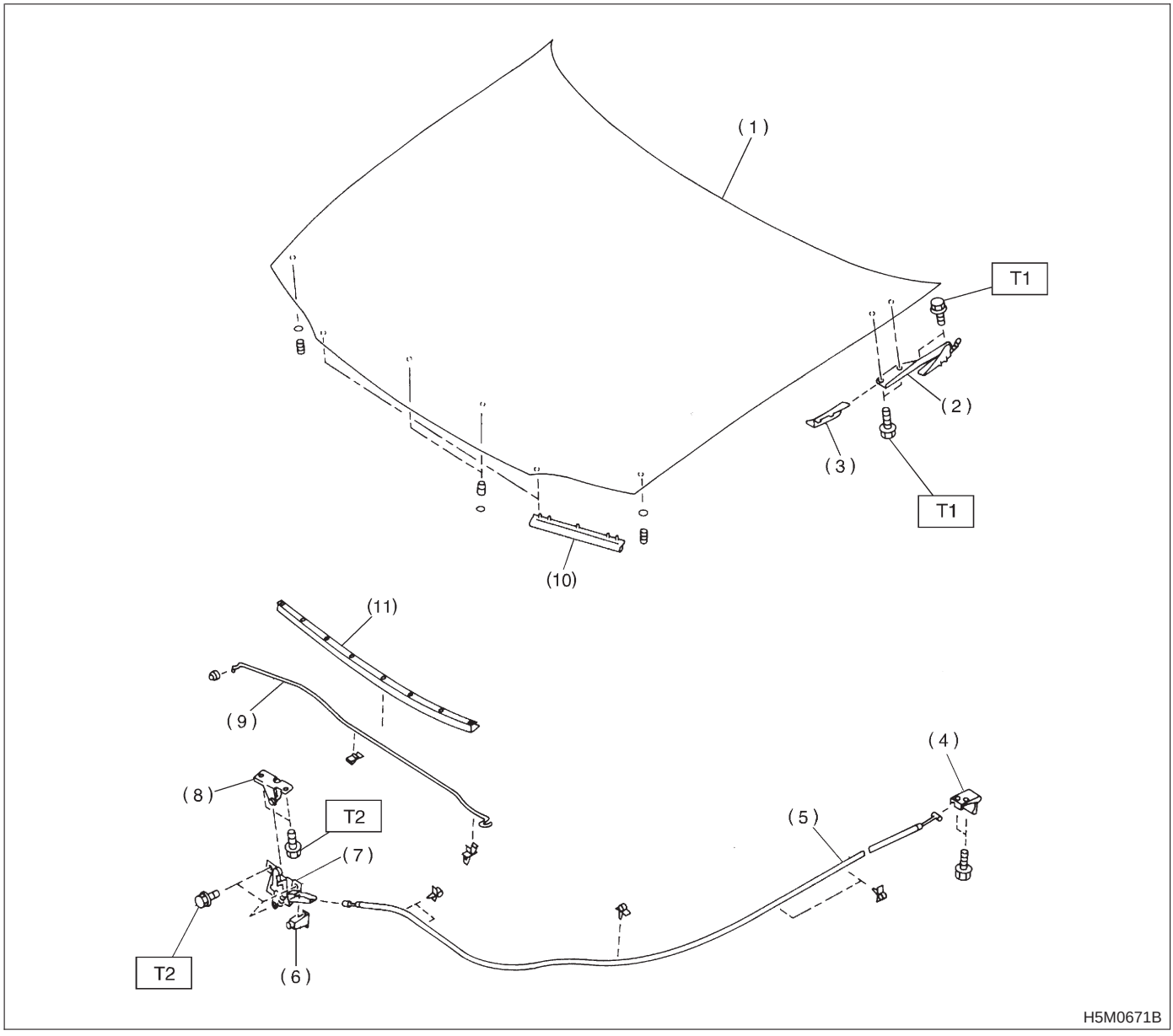


H5M0898A

Unit: mm (in)

Point to point	Dimension		Point to point	Dimension
(11) to (A) L	993 (39.09)		(11) to (B) L	1,048 (41.26)
(11) to (A) R	993 (39.09)		(11) to (B) R	1,048 (41.26)

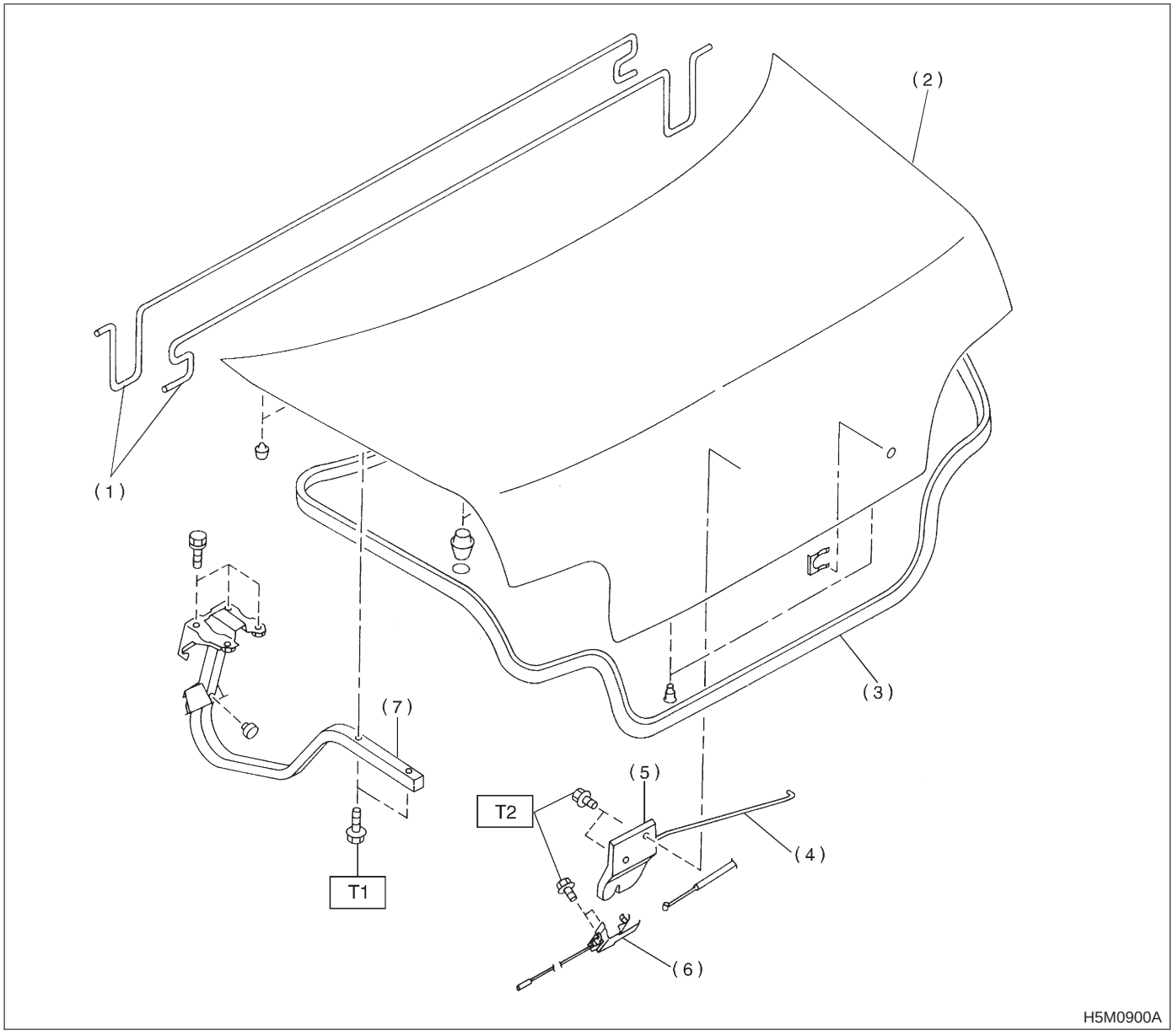
1. Front Hood and Hood Lock



(1) Front hood
(2) Hinge (RH, LH)
(3) Hood hinge cover (RH, LH)
(4) Lever ASSY
(5) Cable
(6) Stopper
(7) Hood lock ASSY
(8) Striker
(9) Front hood stay
(10) Seal (Front hood) SD
(11) Seal (Front hood) CTR

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)

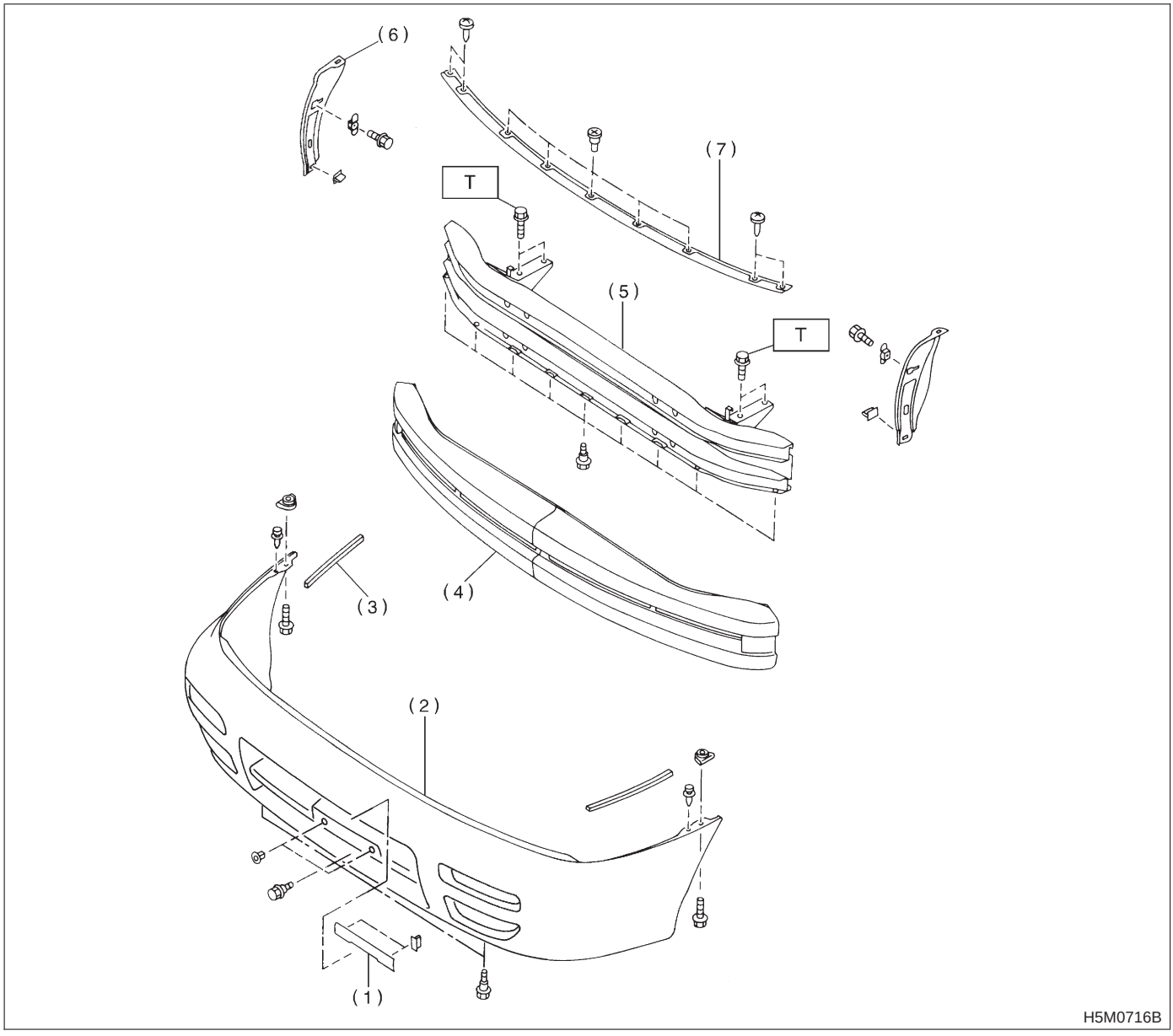
2. Trunk Lid



(1) Torsion bar
(2) Trunk lid
(3) Weatherstrip
(4) Rod
(5) Trunk lid lock ASSY
(6) Striker
(7) Hinge ASSY

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)

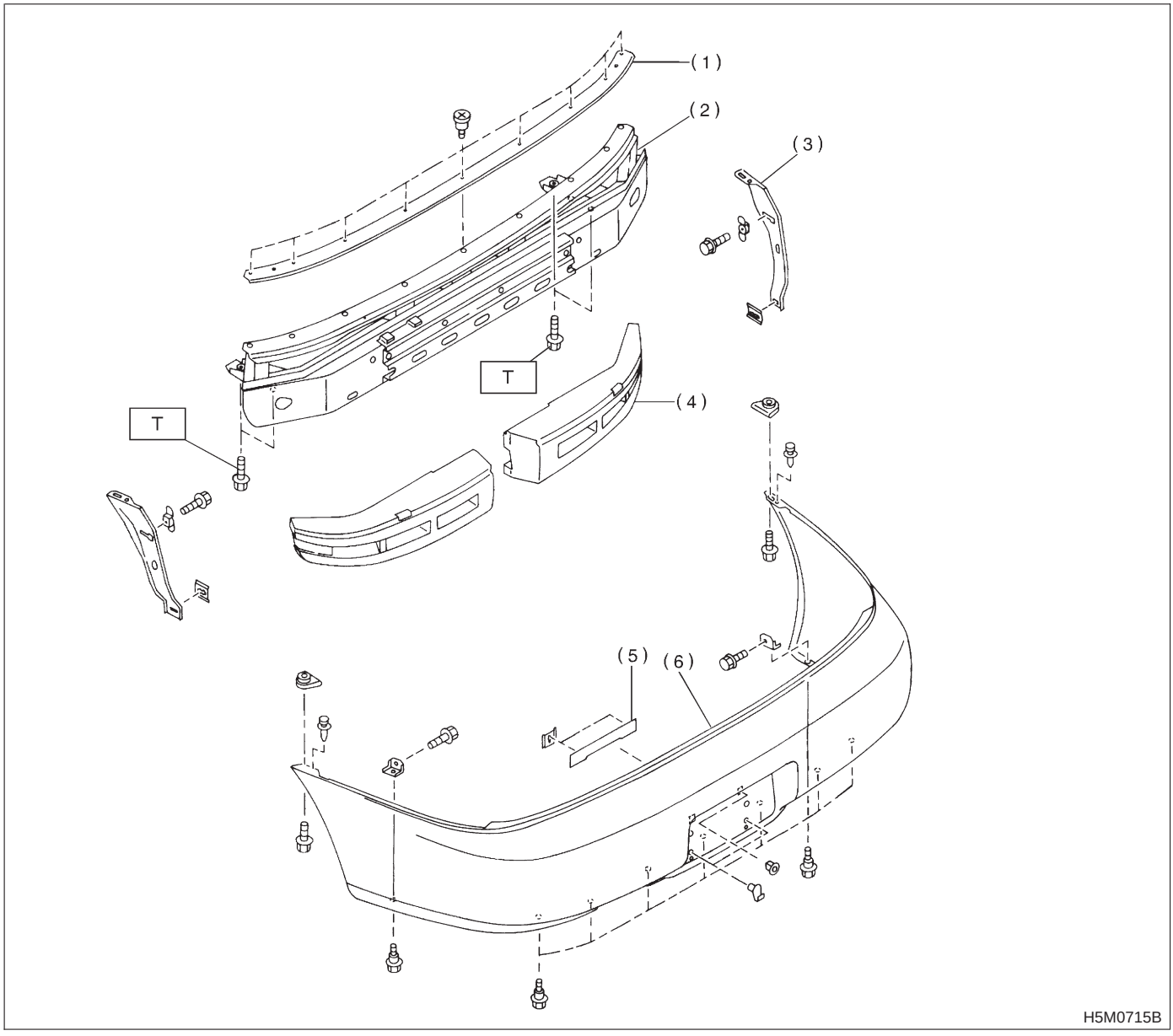
3. Front Bumper



(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)

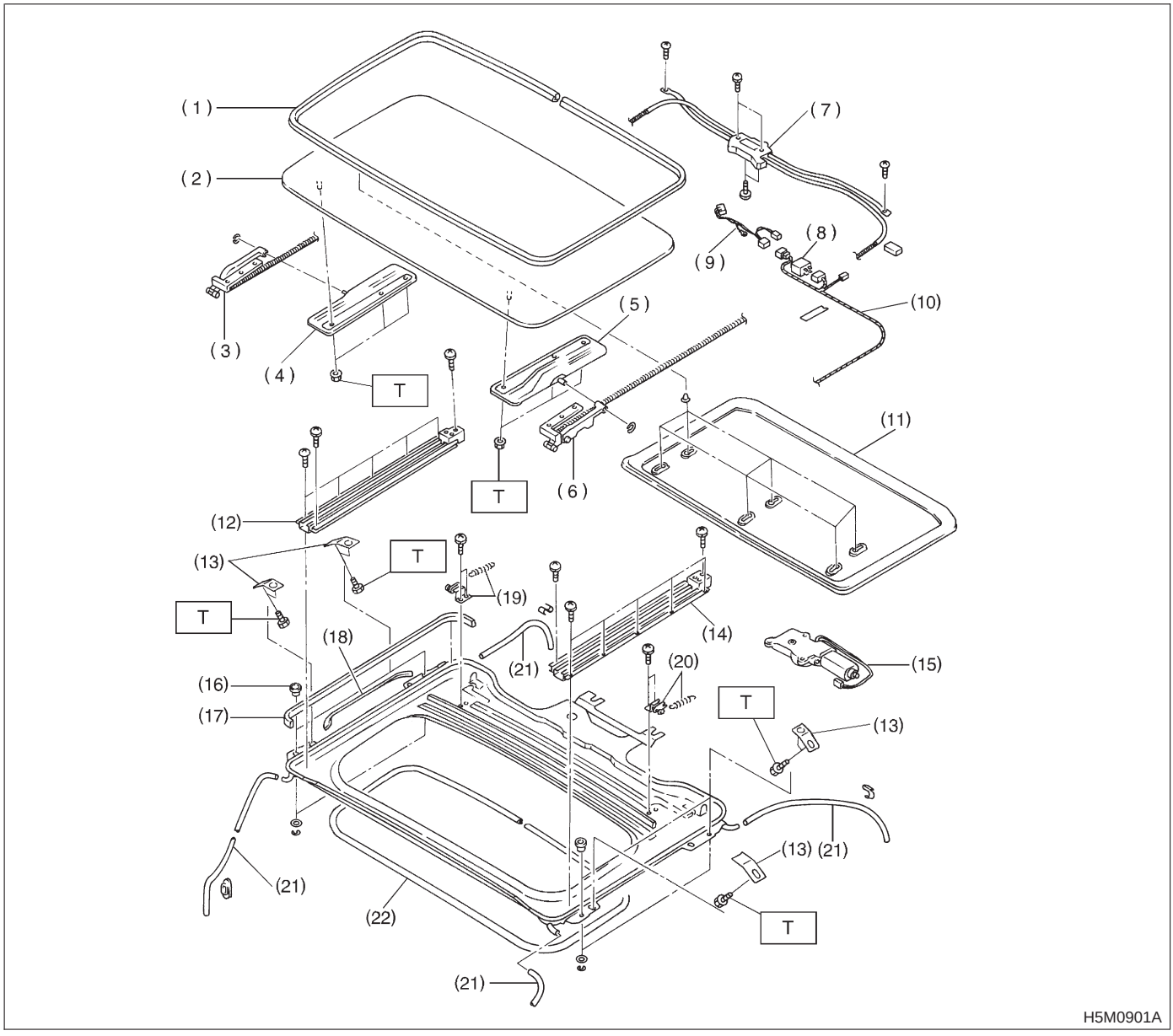
4. Rear Bumper



(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)

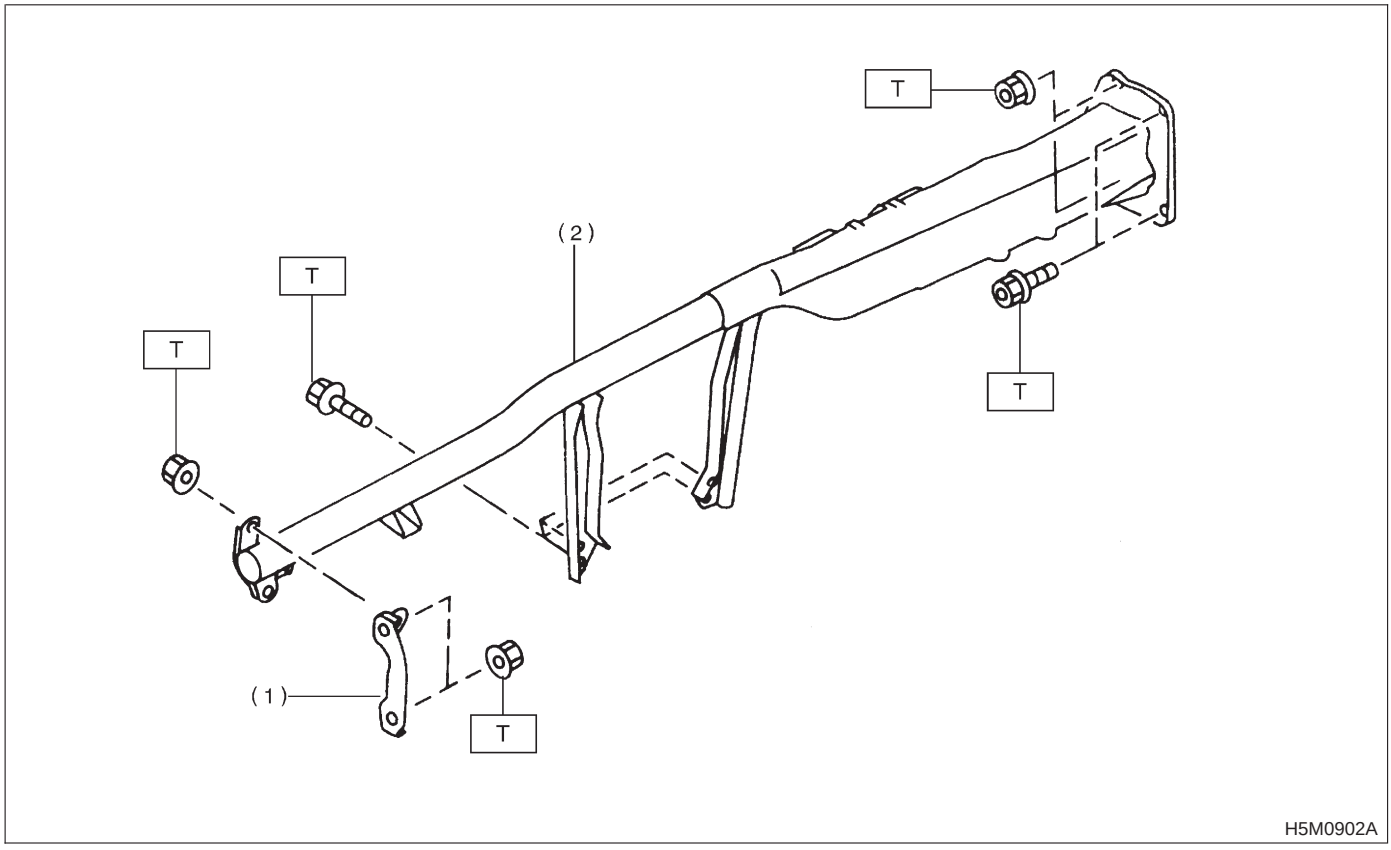
5. Sunroof



(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)

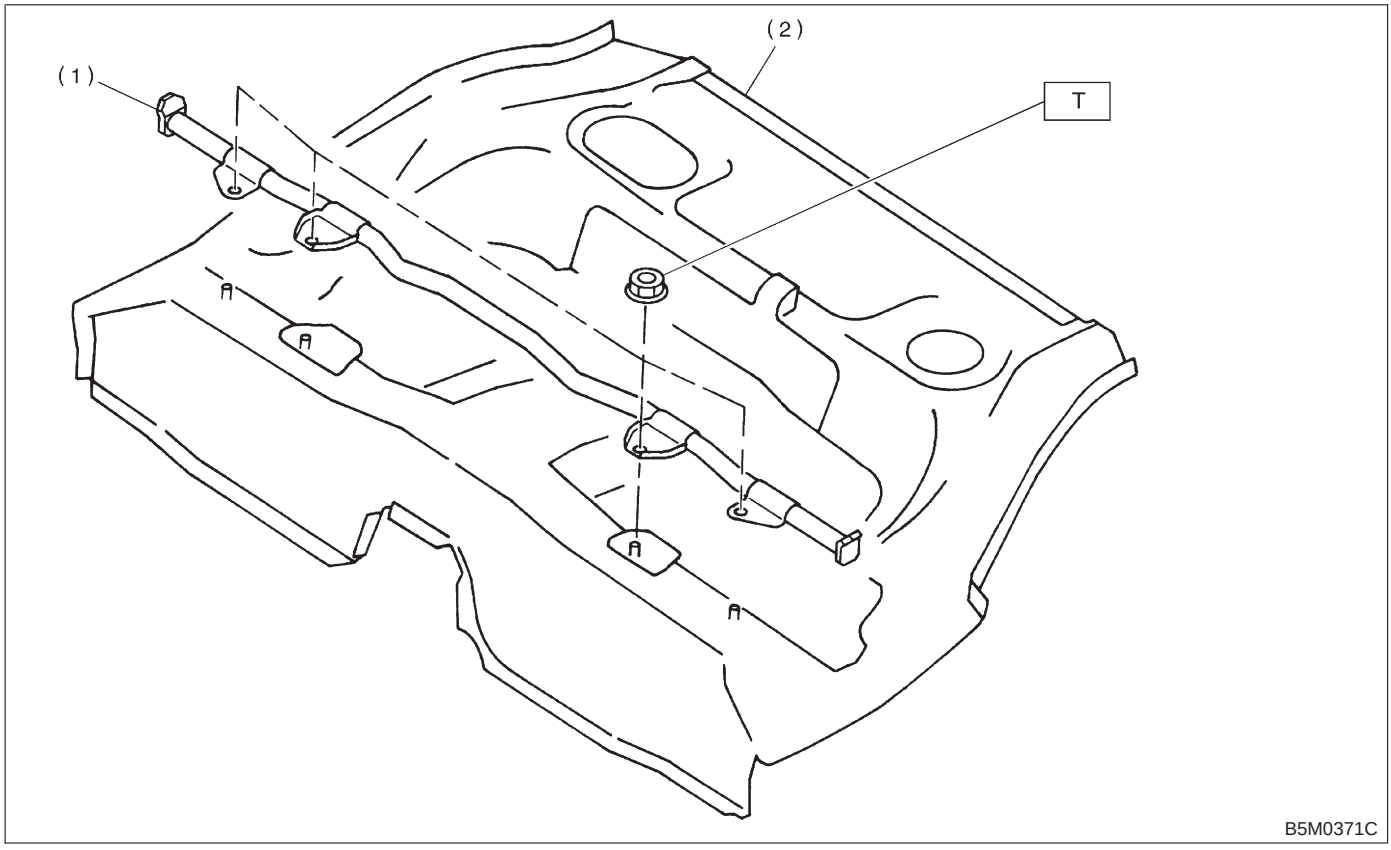
6. Steering Support Beam



(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



(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)

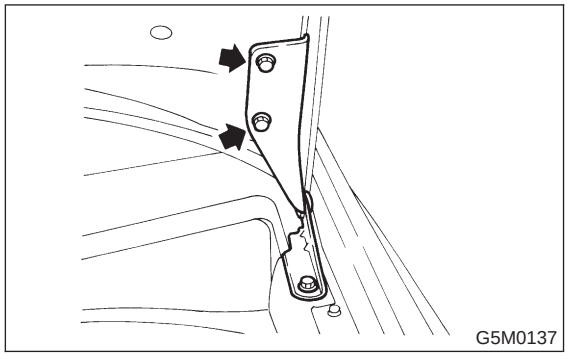
1. Hood

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.

1. HOOD

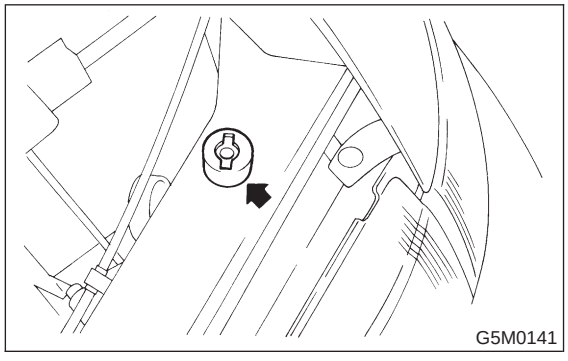
1) Open front hood, and remove washer hose.
2) Remove attaching bolts.


G5M0137

3) Detach front hood from hinges.
4) Installation is in the reverse order of removal.

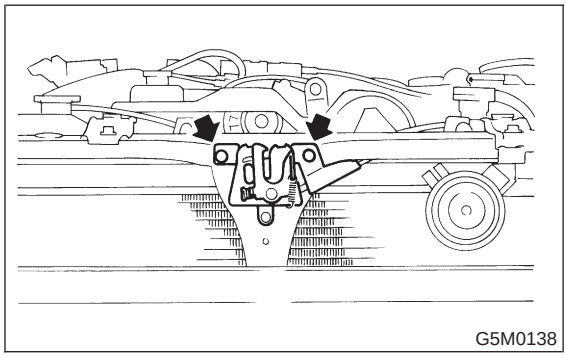
CAUTION:
Adjust buffer assembly on each end so that main lock is applied securely when hood is released from a height of approx. 20 mm (0.79 in).

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.


G5M0141

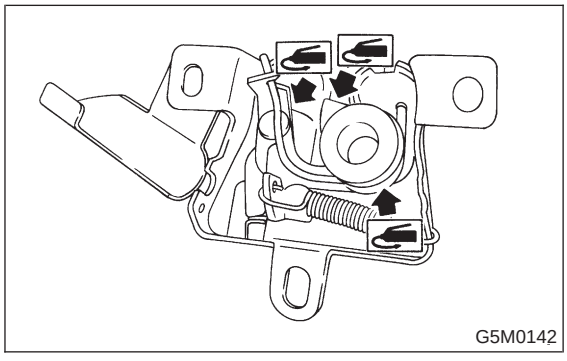
2. HOOD LOCK

1) Open front hood and remove front grille.
2) Remove bolts which secure lock assembly to radiator panel, and remove lock assembly.


G5M0138

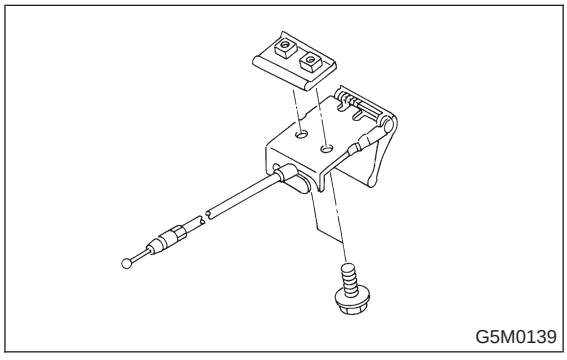
3) Disconnect release cable from lock assembly
4) Installation is in the reverse order of removal.

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.


G5M0142

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.

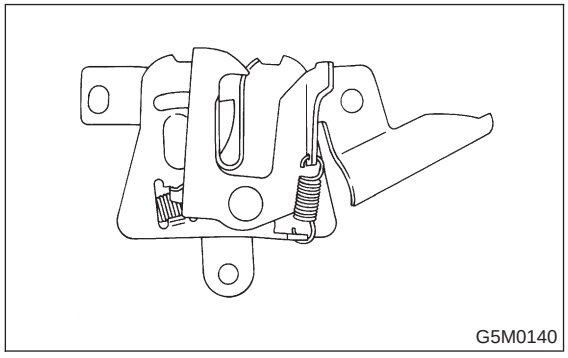

G5M0139

5) Installation is in the reverse order of removal.

B: POINTS TO CHECK

1) Check striker for bending or abnormal wear.
2) Check safety lever for improper movement.

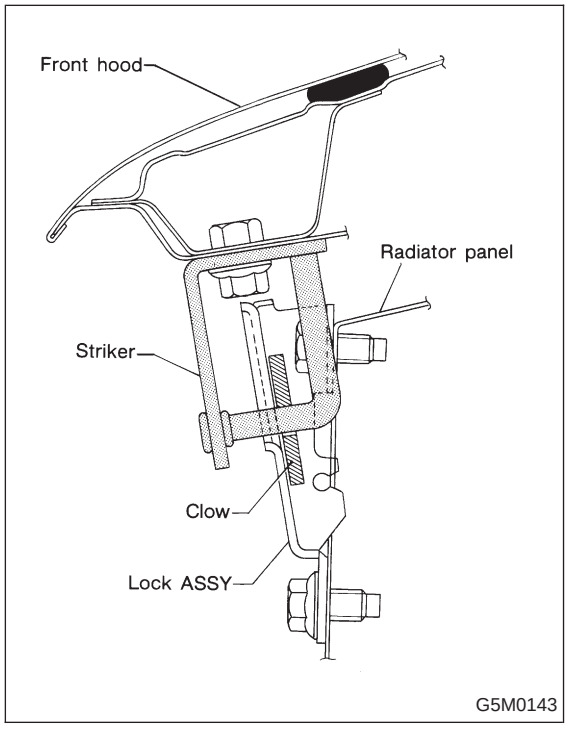
3) Check other levers and spring for rust formation and unsmooth movement.



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.



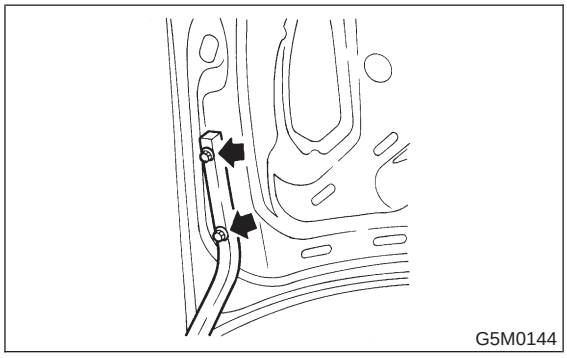
2) Up-down adjustment
Make up-and-down adjustment of striker only when hood does not properly contact buffer or hood is not flush with fender, or when release cable does not properly operate. Adjustment can be made by adjusting the stroke length of striker after lock assembly mounting screws are removed.

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.

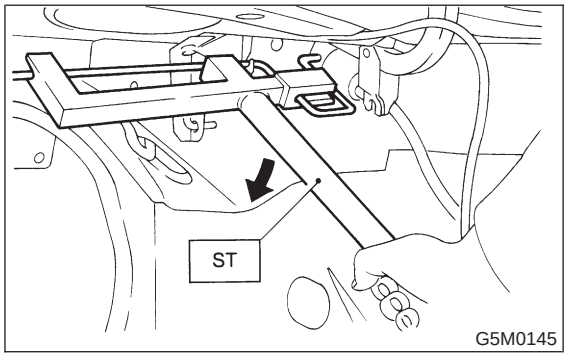


3) Installation is in the reverse order of removal.

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.

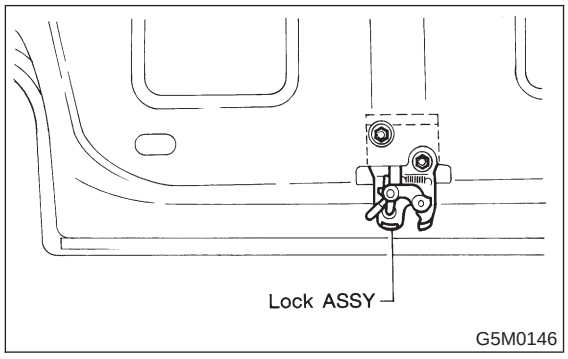
NOTE:
Apply a coat of grease to the rotary section of hinges and contact surfaces of torsion bars.

3. TRUNK LID LOCK ASSEMBLY AND KEY CYLINDER

1) Remove rod of lock assembly from rod holder of key lock assembly.

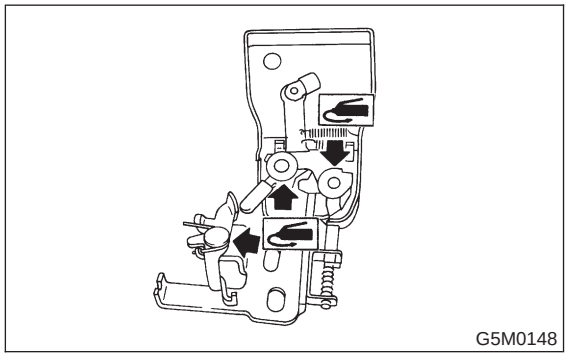
2) Remove bolts which hold lock assembly and remove lock assembly.

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.

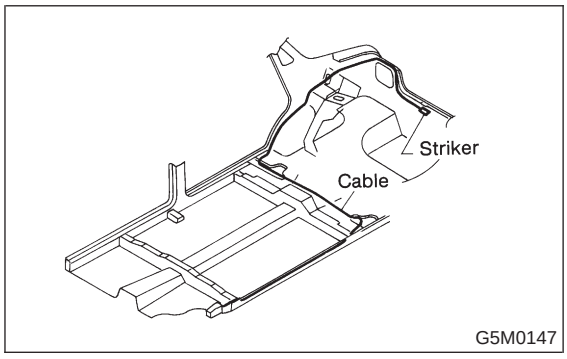
NOTE:
Apply grease to sliding surfaces of lock assembly and striker.



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.

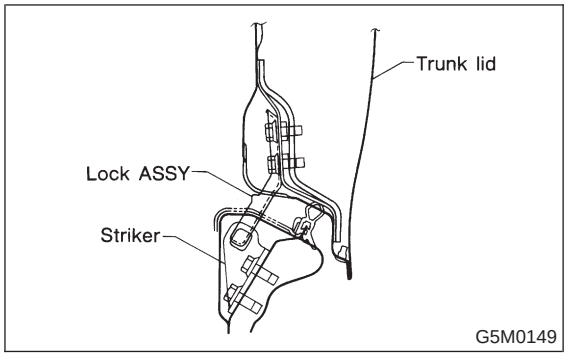
CAUTION:
- **When installing cover to pull handle assembly, observe the following:**
  - **Be careful not to catch harness.**
  - **Engage pull handle assembly pawls firmly.**

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.

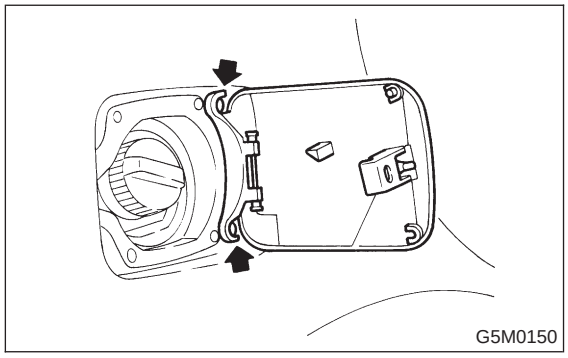


3. Fuel Flap

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.

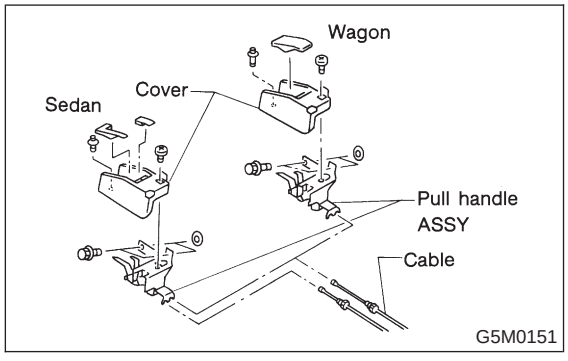


2) Installation is in the reverse order of removal.

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.



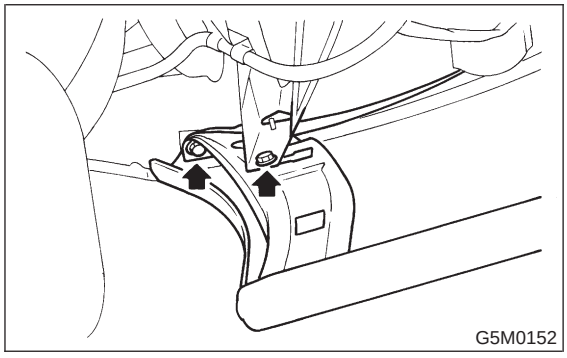
5) Detach fuel lock holder by turning it.
6) Installation is in the reverse order of removal.

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.

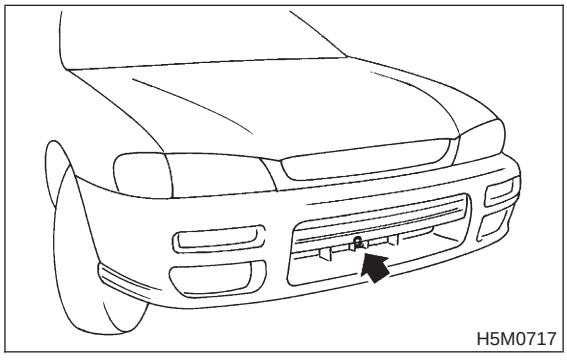
4. Front Bumper

A: REMOVAL AND INSTALLATION

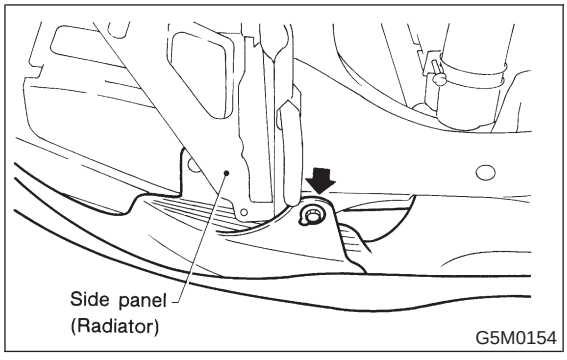
1) Disconnect the ground cable from the battery.
2) Remove the canister.
3) Remove the front grille.
4) Remove the parking light and headlight LH.
5) Remove the mud guard.
6) Remove bolts from side of bumper.



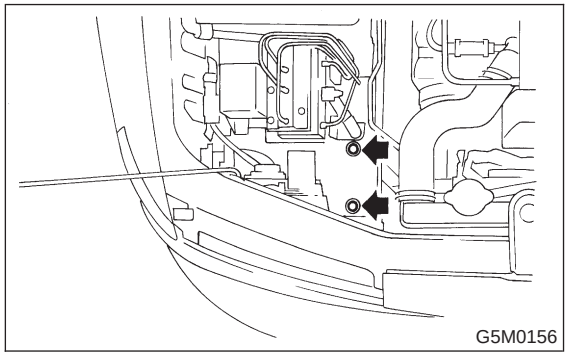
7) Remove bolt from lower center of bumper.



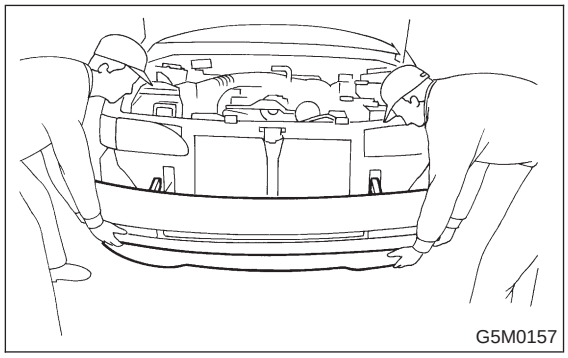
8) Remove bolts from lower side of bumper.



9) Remove bolts (engine compartment side) from bumper stays.


G5M0156

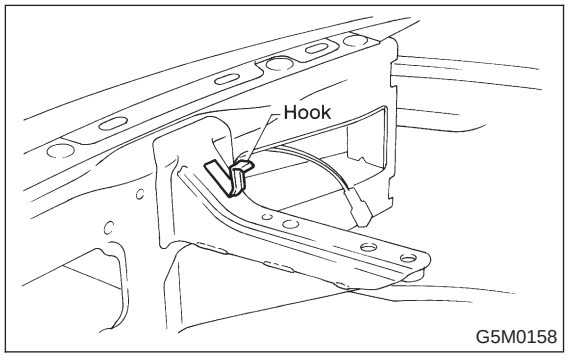
10) Remove turn signal light connector.
11) Remove bumper assembly.


G5M0157

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.
● When installing canister, insert air vent hose of canister into the hole on body.

NOTE:
To facilitate installation of front bumper, attach hook (located at stay) to body panel.



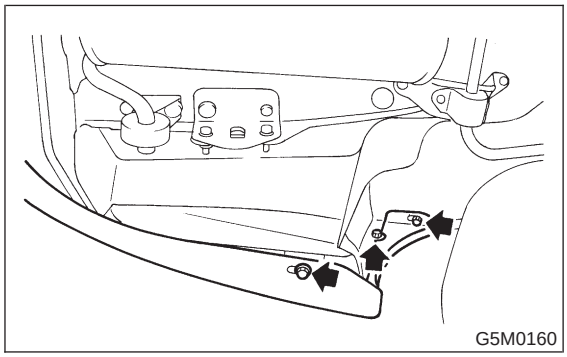
G5M0158

5. Rear Bumper

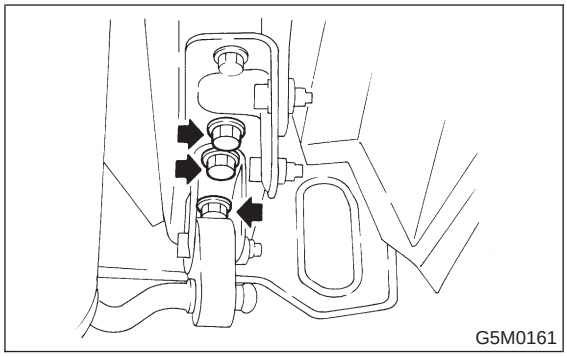
A: REMOVAL AND INSTALLATION

1. SEDAN

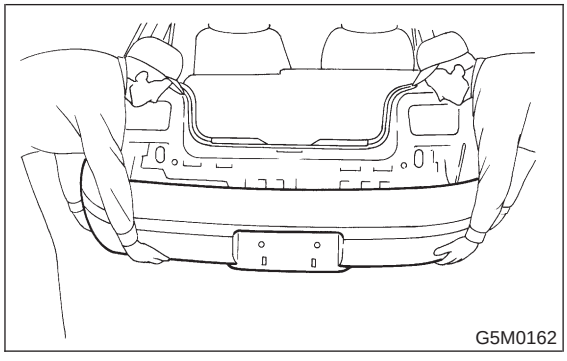
1) Open trunk lid. Remove trunk trim panel clips and detach trim.
2) Disconnect license plate light connector.
3) Remove bolts from side of bumper.


G5M0160

4) Remove bolts from bumper stay.


G5M0161

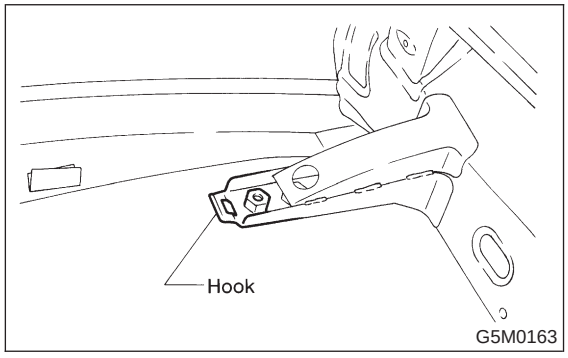
5) Remove rear bumper.


G5M0162

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.

NOTE:
To facilitate installation of rear bumper, attach hook (located at stay) to body panel.



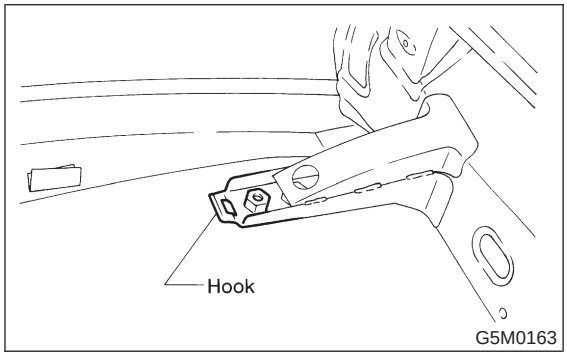
2. WAGON

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.

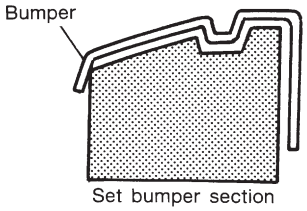
CAUTION:
● Be extremely careful to prevent scratches on bumper face as it is made of resin.
● Be careful not to scratch the body when removing or installing bumper.

NOTE:
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.	 G5M0164
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.

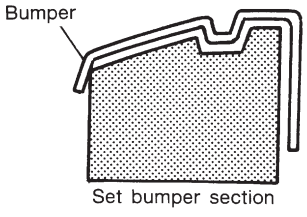
A dent cannot be repaired but a whitened or swelled part can be removed.

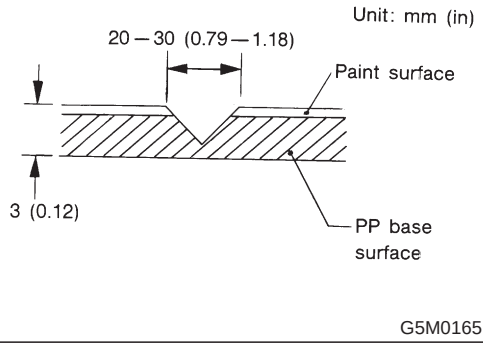
Process No.	Process name	Job contents	
1	Cleaning	Clean damaged area with water.	
2	Removal of damaged area	Cut off protruding area, if any, due to collision, using a putty knife.	
3	Sanding	Grind the affected area with #100 to #500 sandpaper.	
4	Finish	Resin section	Coated section
		Same as Process No. 3 in the “(1)” section.	Perform Process No. 12 and subsequent operations in the “(3)” section.

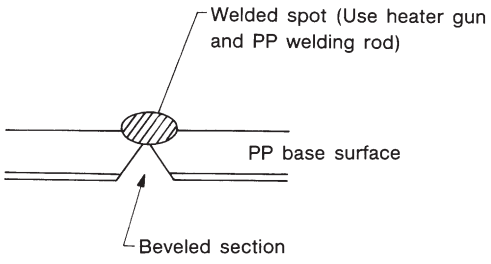
C: DEEP DAMAGE SUCH AS A BREAK OR HOLE THAT REQUIRES FILLING

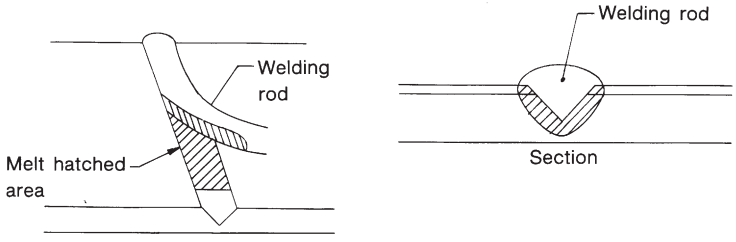
Much of the peripheral grained surface must be sacrificed for repair, and the degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)

Recommended repair kit: PP Part Repair Kit (NRM)

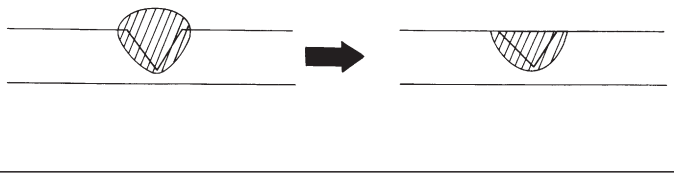
Process No.	Process name	Job contents	
1	Job contents	Remove bumper as required.	
2	Part removal	Remove parts built into bumper as required.	
3	Bumper placement	Place bumper on a paint worktable as required. It is recommended that contour of worktable accommodate internal shape of bumper.	 G5M0164

<table>
<tr><th>Process No.</th><th>Process name</th><th>Job contents</th></tr>
<tr><td>4</td><td>Surface preparation</td><td>Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 Precleno, white gasoline, or alcohol).</td></tr>
<tr><td>5</td><td>Cutting</td><td>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.
 

G5M0165</td></tr>
<tr><td>6</td><td>Sanding (I)</td><td>Grind beveled surface with sandpaper (#40 to #60) to smooth finish.</td></tr>
<tr><td>7</td><td>Cleaning</td><td>Clean the sanded surface with the same solvent as used in Process No. 4.</td></tr>
<tr><td>8</td><td>Temporary welding</td><td>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.
 

G5M0166
NOTE:
● Do not melt welding rod until it flows out. This results in reduced strength.
● Leave the welded spot unattended until it cools completely.</td></tr>
<tr><td>9</td><td>Welding</td><td>Using a heater gun and PP welding rod, weld the beveled spot while melting the rod and damaged area.
 

G5M0167
NOTE:
● 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.</td></tr>
</table>

Process No.	Process name	Job contents	
10	Sanding (II)	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.	
		 G5M0168	
		Sand the welded spot smooth with #240 sand paper.	
11	Masking	Mask the black substrate section using masking tape. Recommended masking tape: Nichiban No. 533 or equivalent	
12	Cleaning/ degreasing	Completely clean the entire coated area, using solvent similar to that used in Process No. 4.	
13	Primer coating	Apply a coat of primer to the repaired surface and its surrounding areas. Mask these areas, if necessary. Recommended primer: Mp/ 364 PP Primer NOTE: Be sure to apply one coat of primer at a spraying pressure of 245 to 343 kPa (2.5 to 3.5 kg/cm^2, 36 to 50 psi) with a spray gun.	
14	Leave unattended.	Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry. NOTE: If dirt or dust comes in contact with the coated area, wipe it off with a cloth dampended with alcohol. (Do not use thinner since the coated area tends to melt.)	
15	Primer surfacer coating	Apply a coat of primer surfacer to the repaired area two or three times at an interval of 3 to 5 minutes. Recommended surfacer: ● UPS 300 Flex Primer ● No. 303 UPS 300 Exclusive hardener ● NPS 725 Exclusive Reducer (thinner) ● Mixing ratio: 2 : 1 (UPS 300: No. 303) ● Viscosity: 12 — 14 sec/20°C (68°F) ● Coated film thickness: 40 — 50µ	
16	Drying	Allow the coated surface to dry for 60 minutes at 20°C (68°F) [or 30 minutes at 60°C (140°F)].	
17	Sanding (III)	Sand the coated surface and its surrounding areas using #400 sandpaper and water.	
18	Cleaning/ degreasing	Same as Process No. 12.	
19	Top coat (I)	Solid color	Metallic color
		Use a “block” coating method. ● 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/cm^2, 36 — 50 psi)	Use a “block” coating method. ● 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/cm^2, 36 — 50 psi)

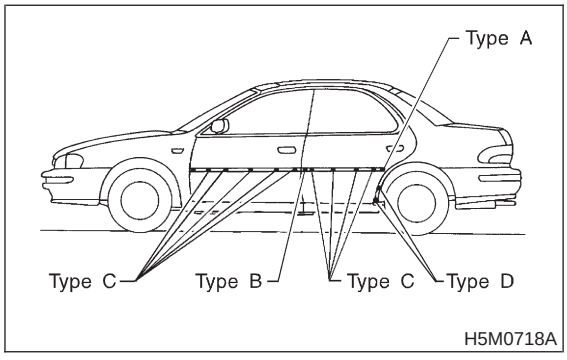
Process No.	Process name	Job contents	
20	Leave unattended.	Not required.	Leave unattended at 20°C (68°F) for at least 10 minutes until the topcoated area is half-dry. NOTE: Be careful to keep dust or dirt from coming in contact with the affected area.
21	Top coat (II)	Not required.	Apply a clear coat three times at an interval of 3 to 5 minutes. ● 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/cm^2, 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.	

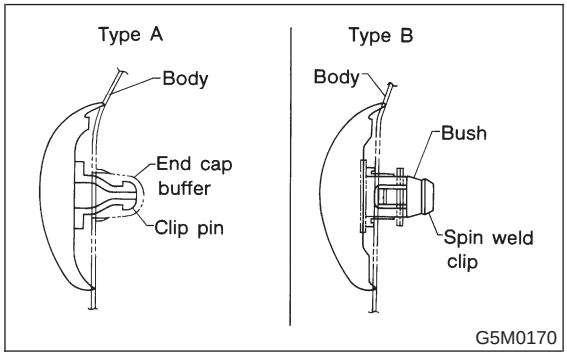
8. Side Protector

A: REMOVAL AND INSTALLATION

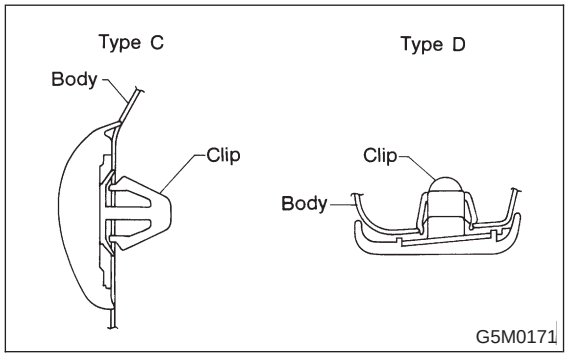
NOTE:
Do not re-use protector.

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.



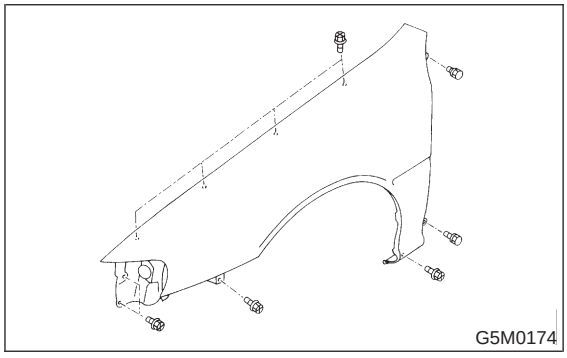
4) Installation is in the reverse order of removal.

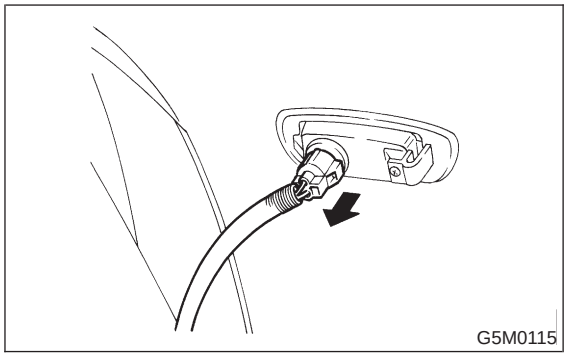
NOTE:
- Type A: Insert clip pins into holes in body, then fit end cap buffers into place.
- Type B: Insert spin weld clips into holes in body, then fit bushings into place.
- Type C and D: Align the clips with holes in body and insert them.
- Install clips in standard holes first.

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.



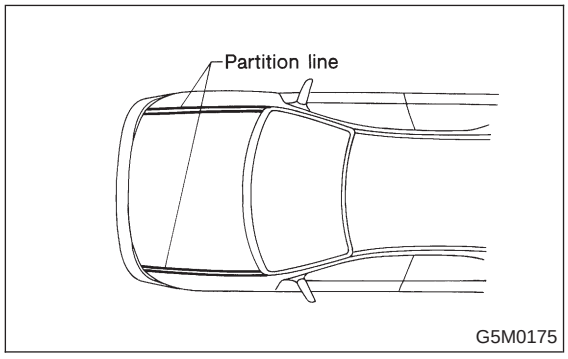


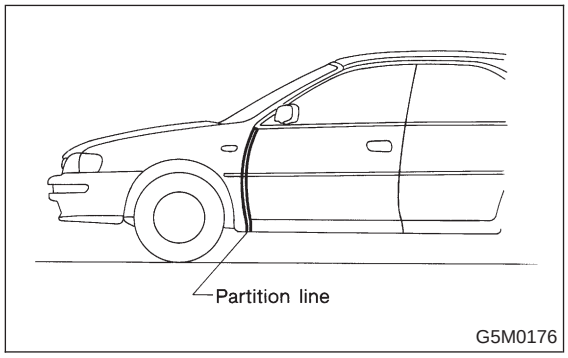
6) Remove body protector. (This step may be skipped if fender is to be reused.)
7) Remove attaching bolt to remove fender.

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.



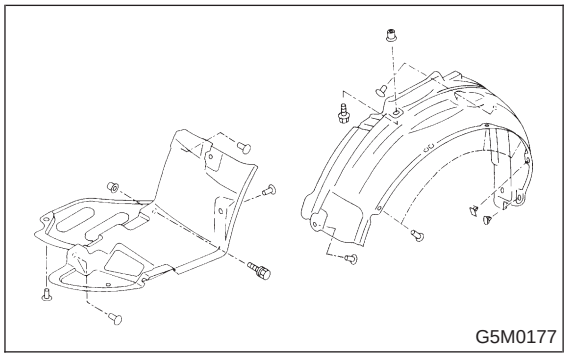


10. Mud Guard and Rear Arch Protector

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.

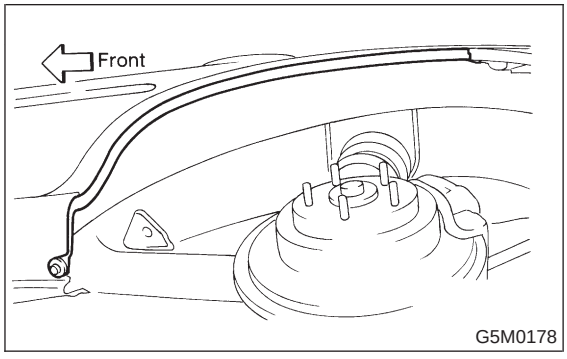


3) Installation is in the reverse order of removal.

CAUTION:
Only use new nuts and clips.

2. REAR ARCH PROTECTOR

1) Remove clip and screws.



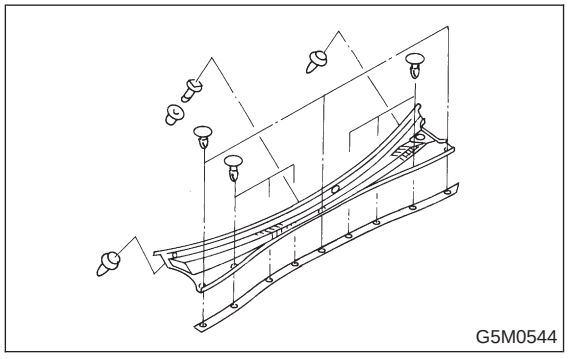
2) Remove arch protectors.
3) Installation is in the reverse order of removal.

CAUTION:
Only use new nuts and clips.

11. Cowl Panel

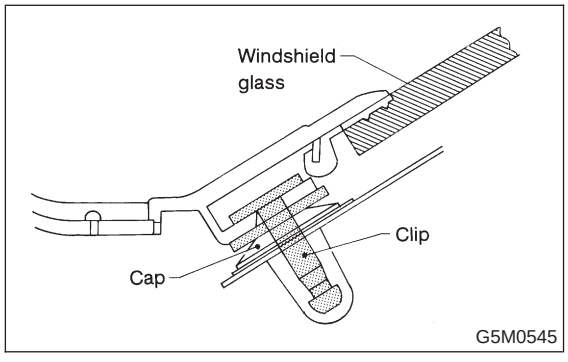
A: REMOVAL AND INSTALLATION

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.

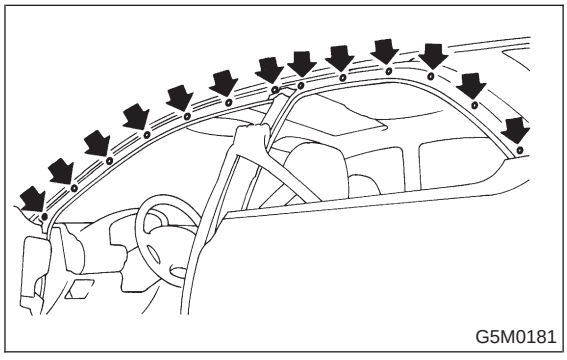
NOTE:
Install middle clip and other clips in that order.



12. Molding and Retainer

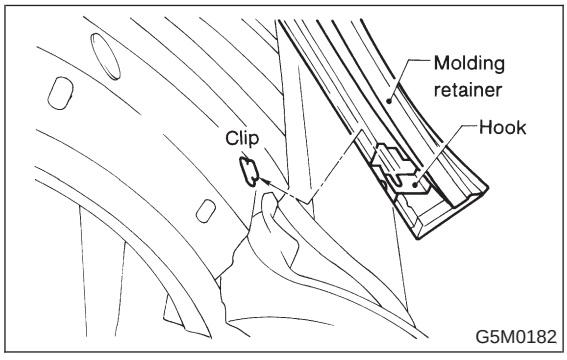
A: REMOVAL AND INSTALLATION

1) Remove weatherstrip.
2) Remove tapping screws.



3) Installation is in the reverse order of removal.

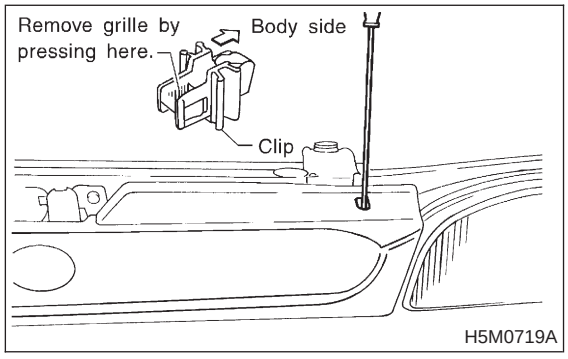
NOTE:
Insert clips onto hooks, then fasten with screws.



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.

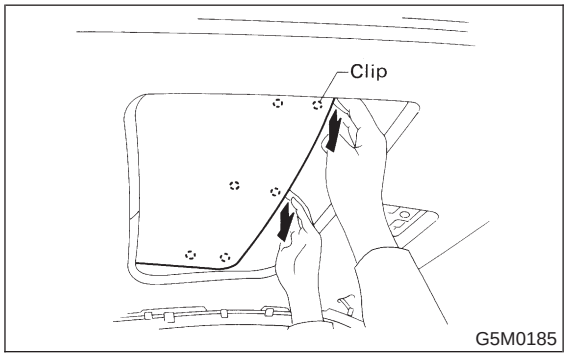
NOTE:
Attach all clips to grille. Align them with clip hole in body and push them into place.

14. Sunroof

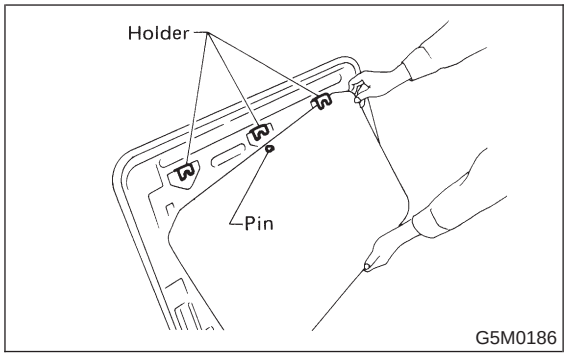
A: REMOVAL

1. SUNROOF PANEL

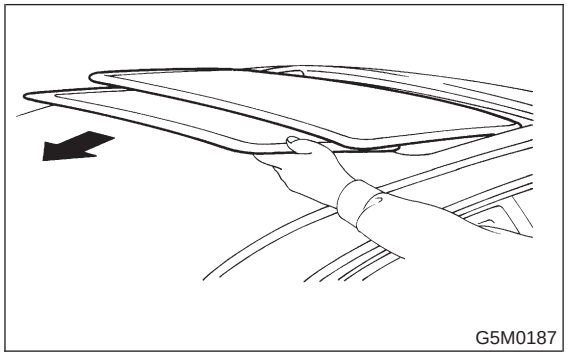
1) Open sunroof approx. 1/3.
2) Remove clips attached to front side of sunroof trim by pulling trim from inside of compartment.



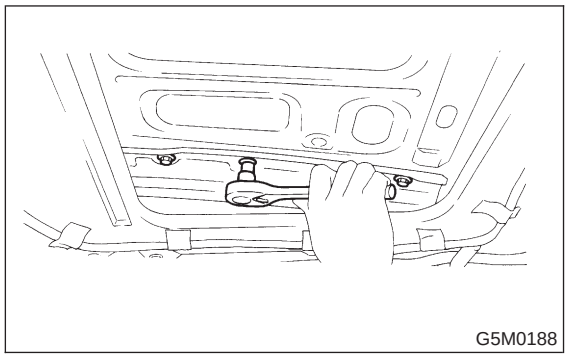
3) Move trim forward, and detach trim end from holder.



4) Detach trim.



5) Close sunroof and remove nuts.

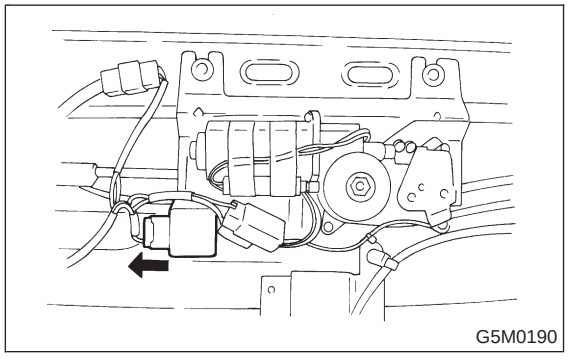

G5M0188

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

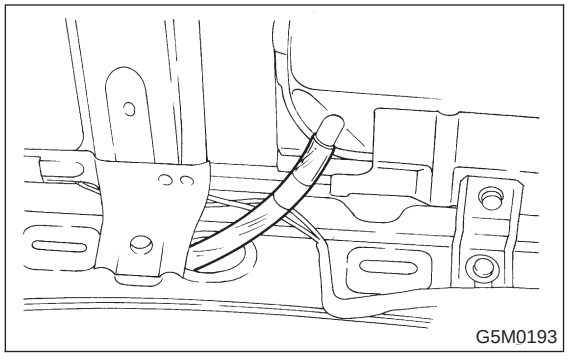
1) Remove roof trim, rear quarter trim, pillar trim, etc.
<Ref. to 5-3 [W500].>
2) Remove screw.
3) Disconnect connector.


G5M0190

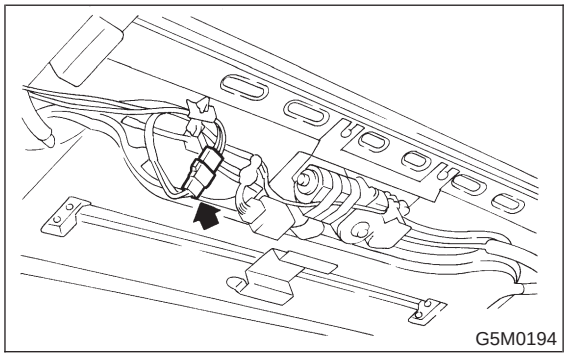
4) Remove relay by pulling it out.

3. SUNROOF FRAME

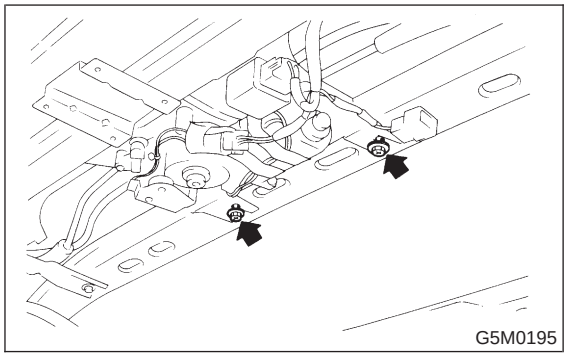
1) Remove roof trim, rear quarter trim, pillar trim, etc.
<Ref. to 5-3 [W500].>
2) Remove sunroof panel.
3) Disconnect front and rear drain tubes.


G5M0193

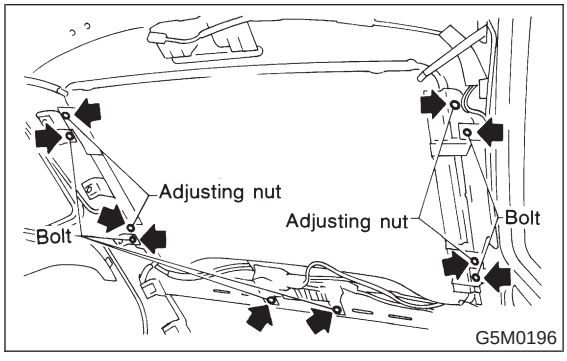
4) Disconnect connector between body harness and sunroof harness.


G5M0194

5) Loosen two mounting bolts near motor. (Do not remove bolts.)

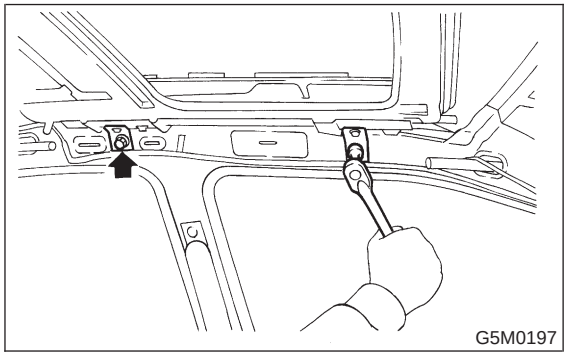

G5M0195

6) Remove six bolts, and four adjusting nuts.



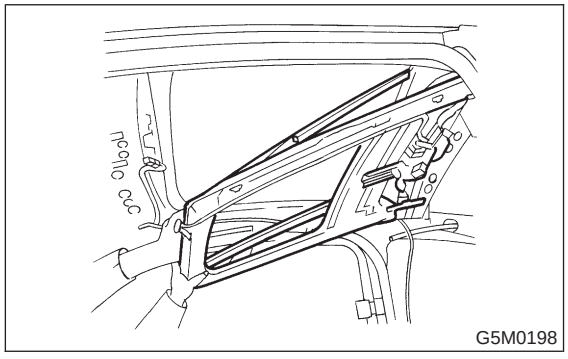
G5M0196

7) Remove sunroof frame.
8) Loosen set bracket mounting bolt.

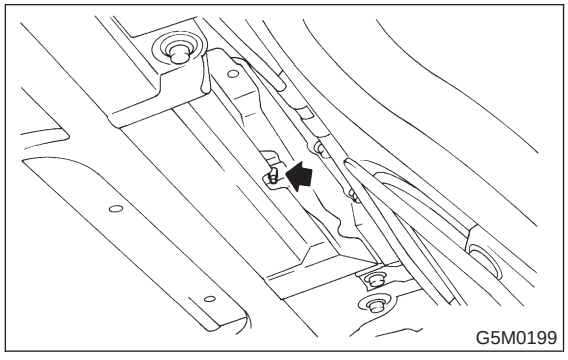

G5M0197

B: INSTALLATION

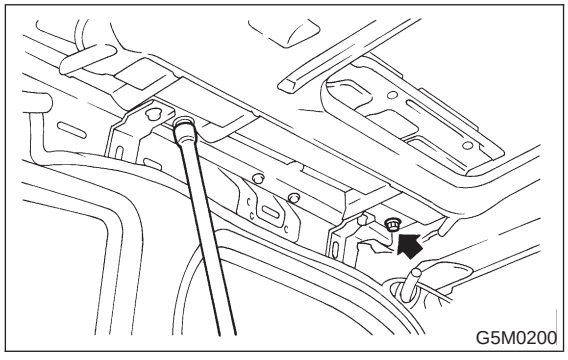
1) Insert frame rear end slit to two bolts fitted temporarily to roof brace.



2) Align frame to reference pin installed on roof.



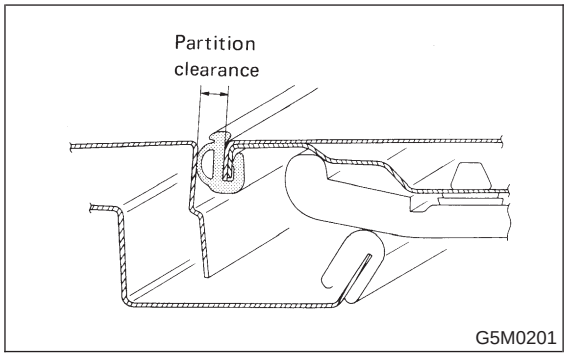
3) Tighten adjusting nut (that is, set frame at highest position).
Temporarily tighten bolts.



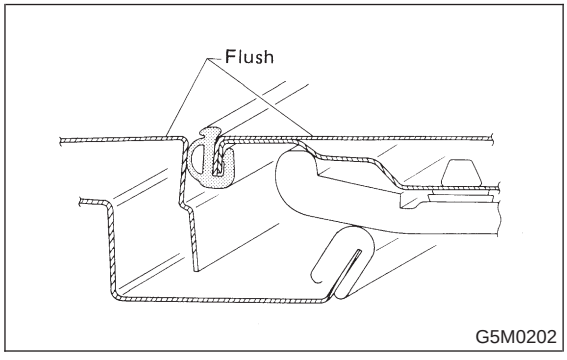
4) Install sunroof panel.

5) Adjust height by turning adjusting nut.
Also adjust front, rear, right, and left side partitions.

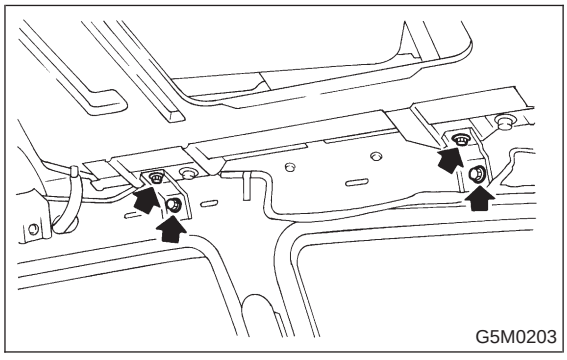
Partition clearance:
5.9±0.5 mm (0.232±0.020 in)



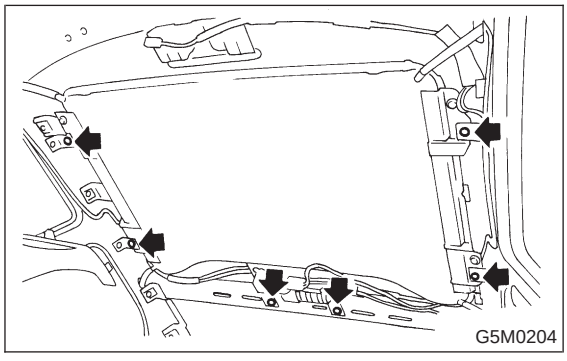
Difference in height between roof panel and sunroof panel:
0±1.0 mm (0±0.039 in)



6) Tighten set bracket mounting bolts.



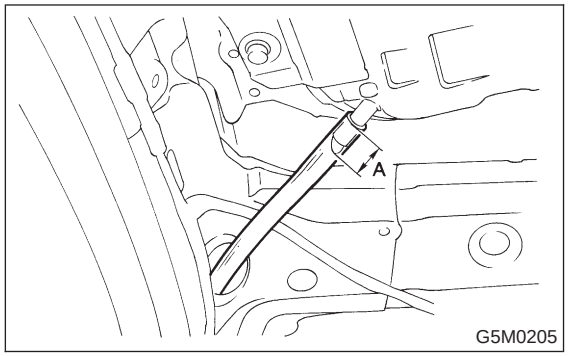
7) Tighten bolts.



8) Install drain tubes.

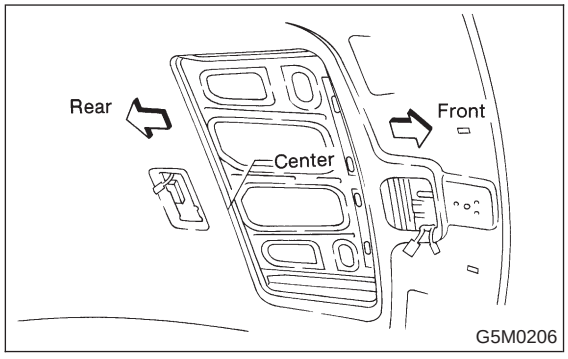
CAUTION:
Insert drain tube securely into drain pipe.

Length: A
Approx. 20 mm (0.79 in)



9) Install roof trim.
10) Install garnish.

NOTE:
Place garnish joint at rear center of body.



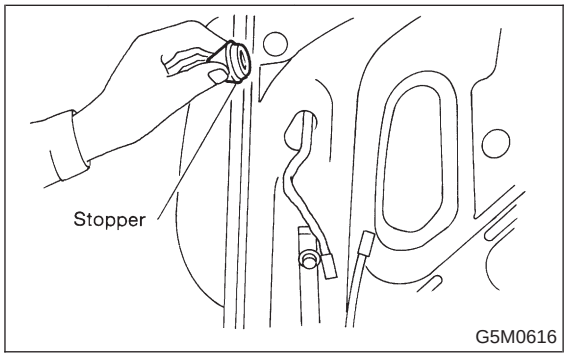
11) Install sunroof trim, pillar trim, rear quarter trim etc.
12) Check the following items after assembling all parts;
(1) Garnish must be free from waves.
(2) When sunroof is fully closed, must be no clearance between garnish and sunroof trim.
(3) Sunroof must be free from slack and noise when it is fully opened and closed.

15. Rear Spoiler

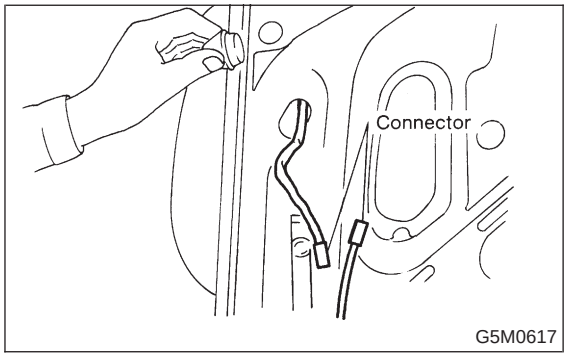
A: REMOVAL AND INSTALLATION

1. COUPE

1) Remove stoppers from both sides of trunk lid.

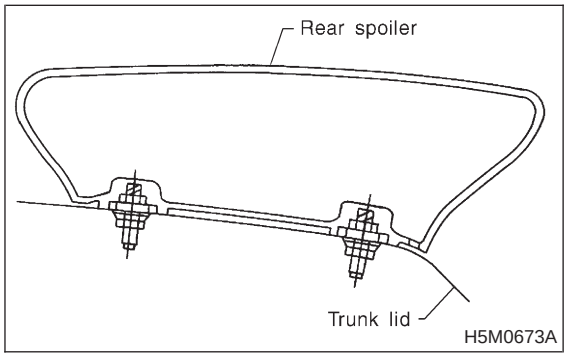


2) Disconnect high-mount stop light connector.



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.

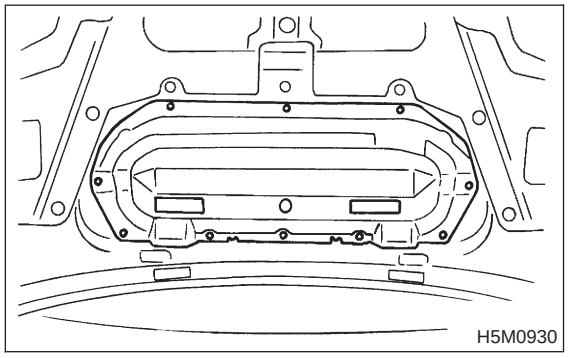
Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

16. Hood Duct

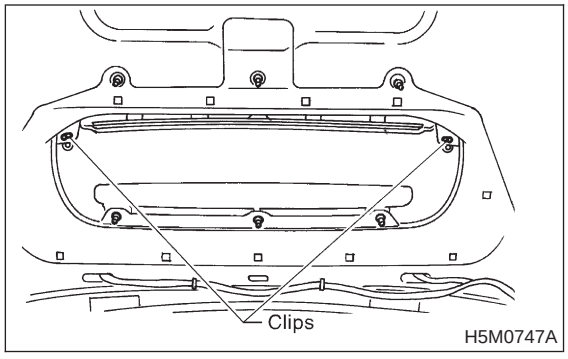
A: REMOVAL AND INSTALLATION

1. CENTER DUCT

1) Open the hood.
2) Remove clip and screws, then remove brace cover.



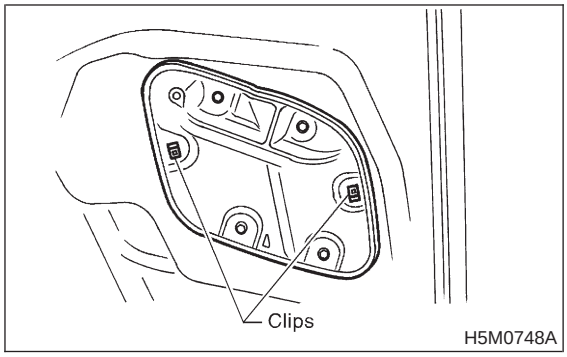
3) Remove six nuts.
4) Disconnect the two clips from hood, then remove hood duct grille.



5) Installation is in the reverse order of removal.

2. SIDE DUCT

1) Open the hood.
2) Remove four nuts.
3) Disconnect the two clips from brace cover, then remove brace cover.



4) Remove duct grille.
5) Installation is in the reverse order of removal.

1. Sunroof

Entry of water into compartment	(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	(1) Check roof panel and roof panel for improper clearance. (2) Check sunroof trim and roof trim for improper clearance.
Abnormal motor noise	(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.)	(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.)	(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.

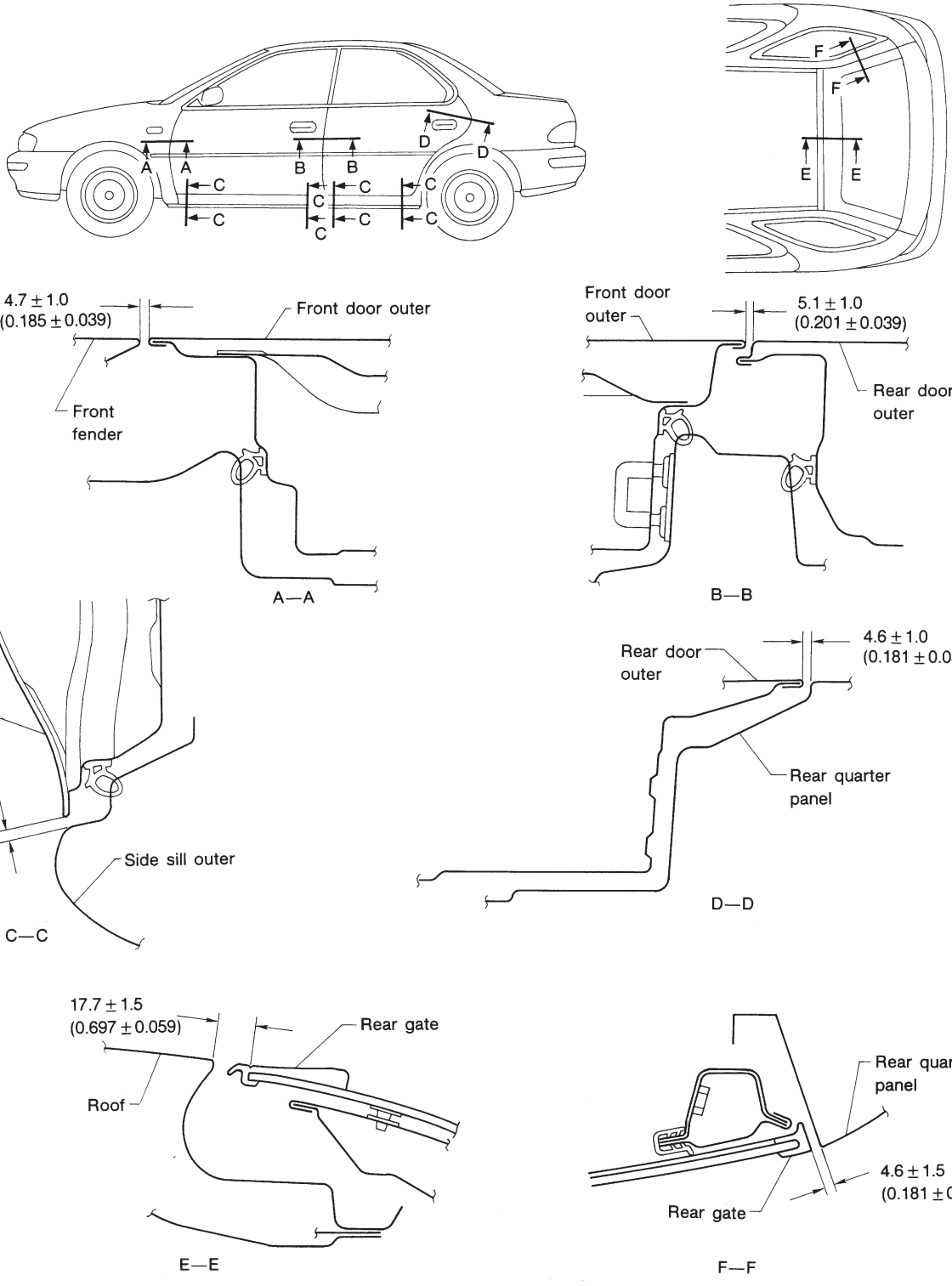
DOORS AND WINDOWS 5-2

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1. Door Alignment

A: SEDAN AND WAGON MODEL

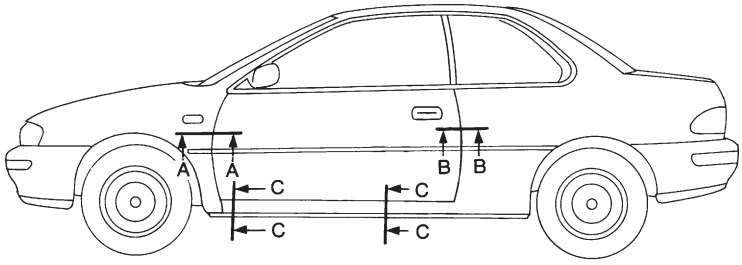


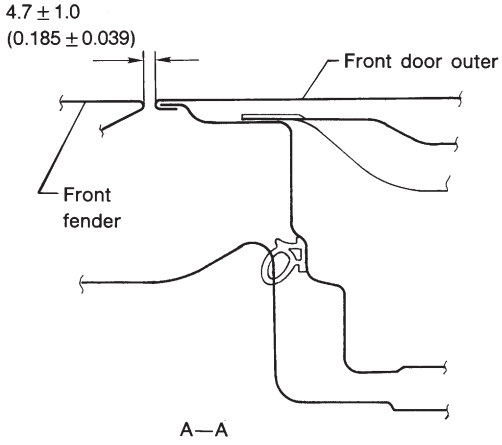
- Front door
  Front part:
  5.2 ± 1.5
  (0.205 ± 0.059)
  Back part:
  5.4 ± 1.5
  (0.213 ± 0.059)
- Rear door
  Front part:
  5.4 ± 1.5
  (0.213 ± 0.059)
  Back part:
  6.1 ± 1.5
  (0.240 ± 0.059)

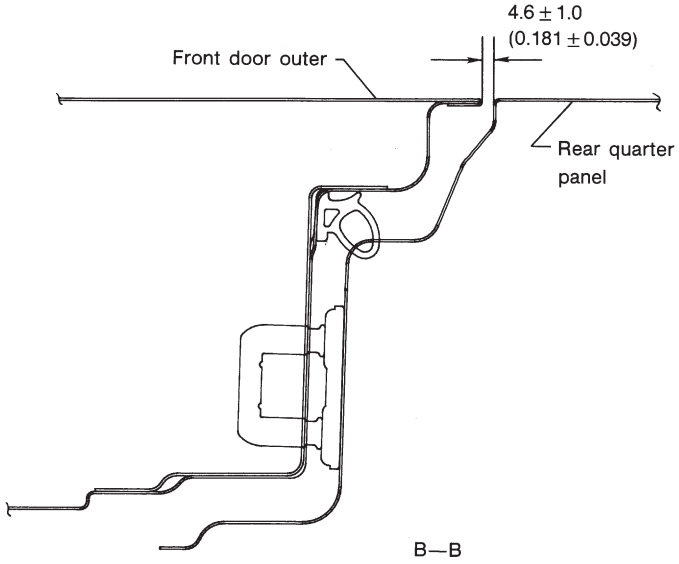
Unit: mm (in)

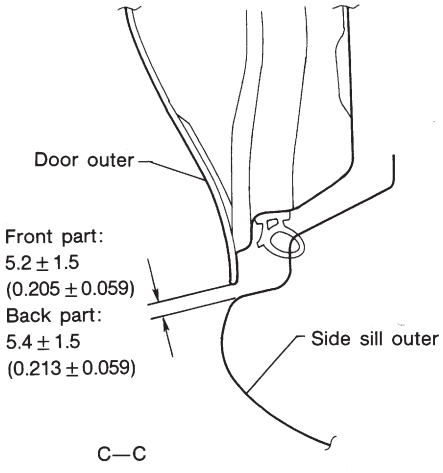
G5M0485

B: COUPE MODEL





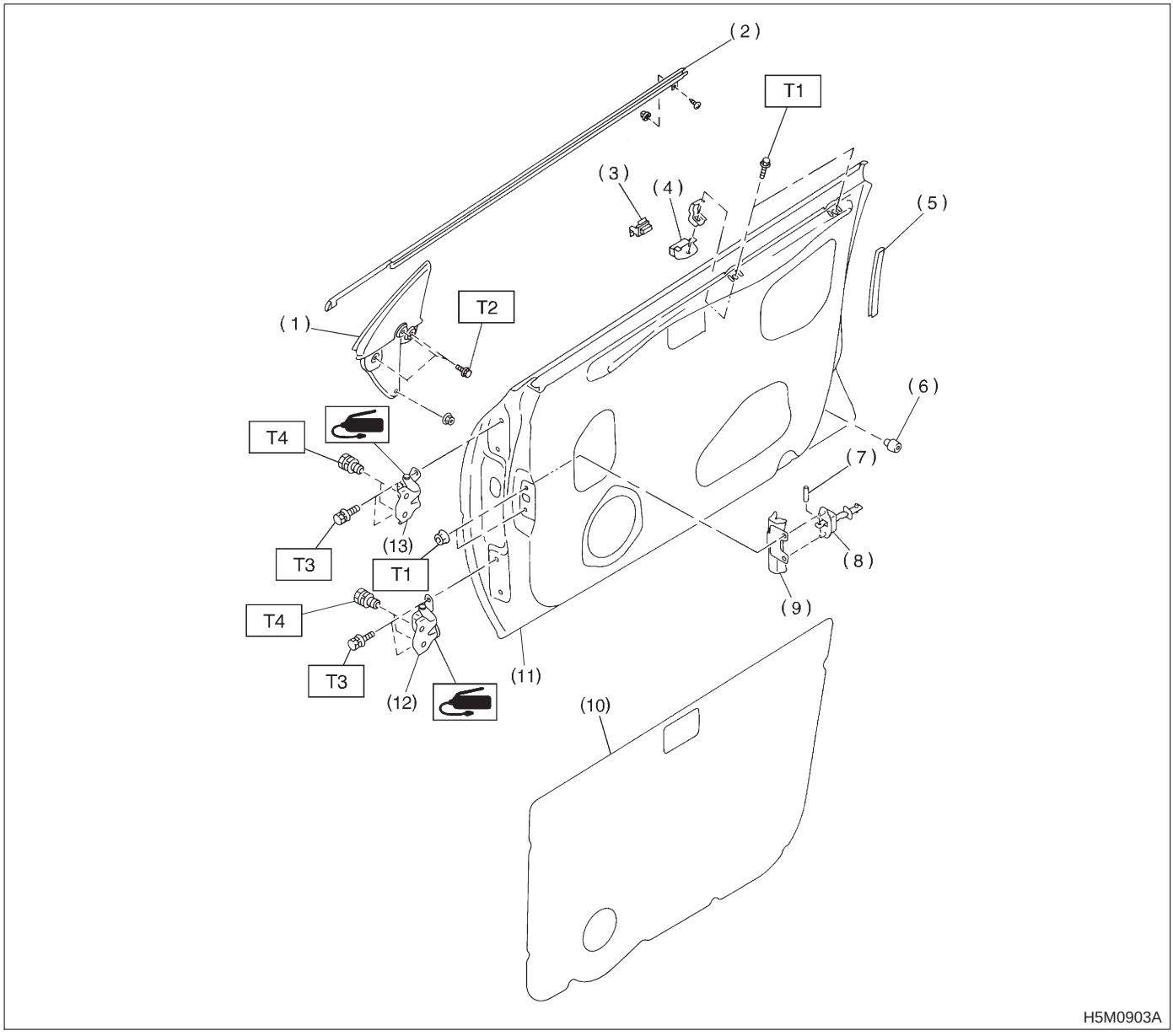




Unit: mm (in)

G5M0637

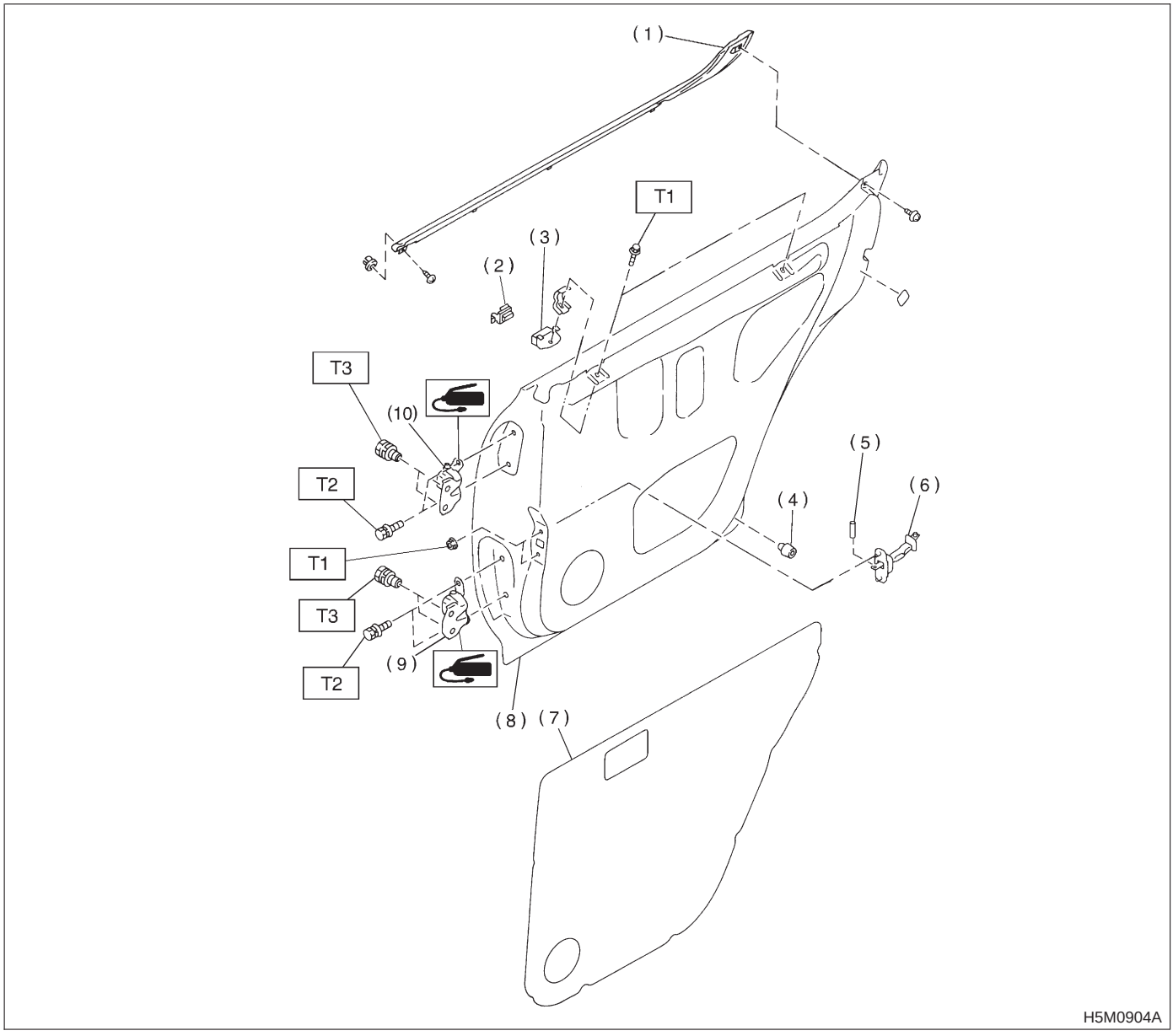
1. Front Door



(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)

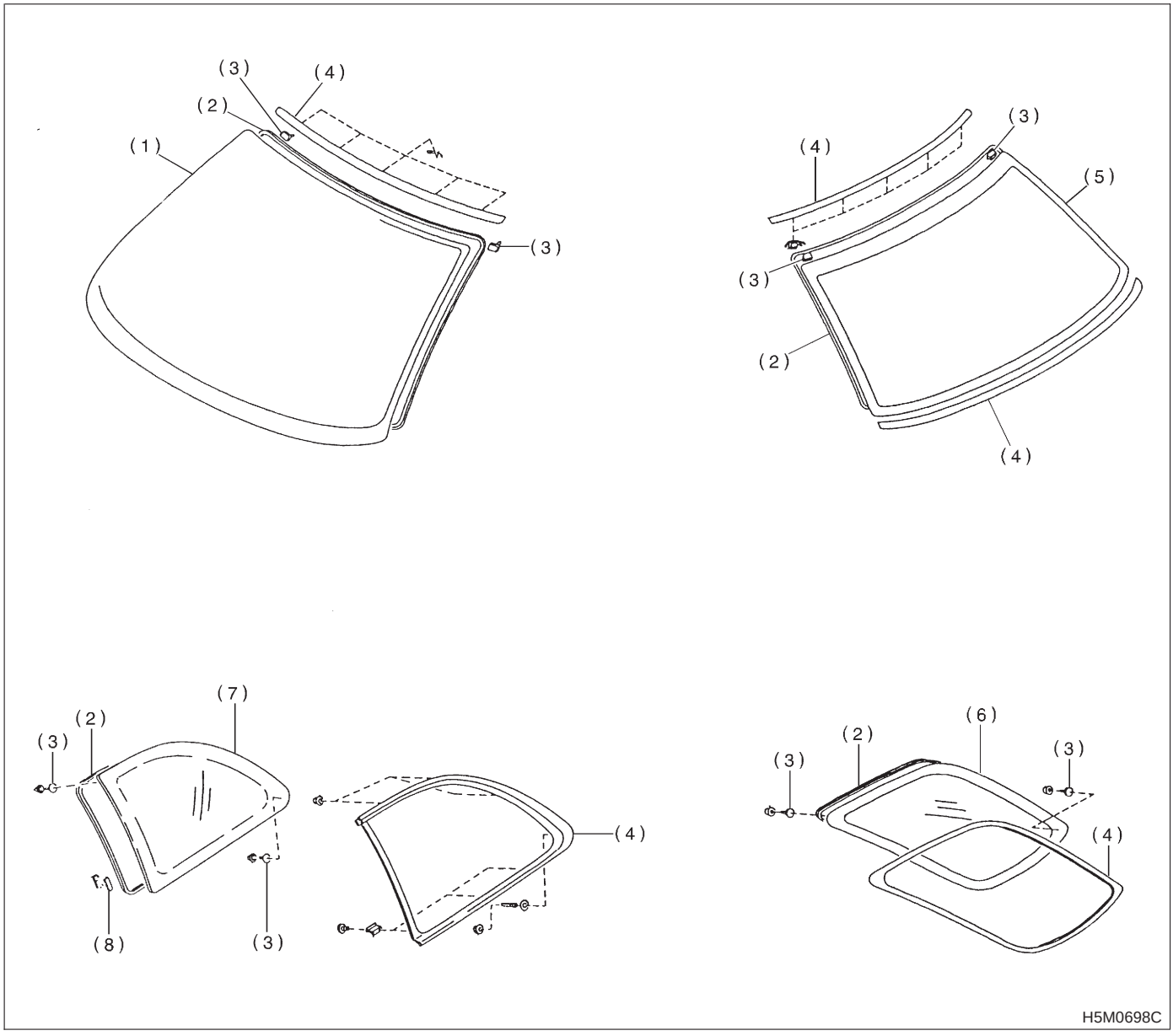
2. Rear Door



(1) Weatherstrip
(2) Stabilizer (Outer)
(3) Stabilizer (Inner)
(4) Stopper
(5) Knock pin
(6) Checker
(7) Seating cover
(8) Door panel
(9) Lower hinge
(10) Upper hinge

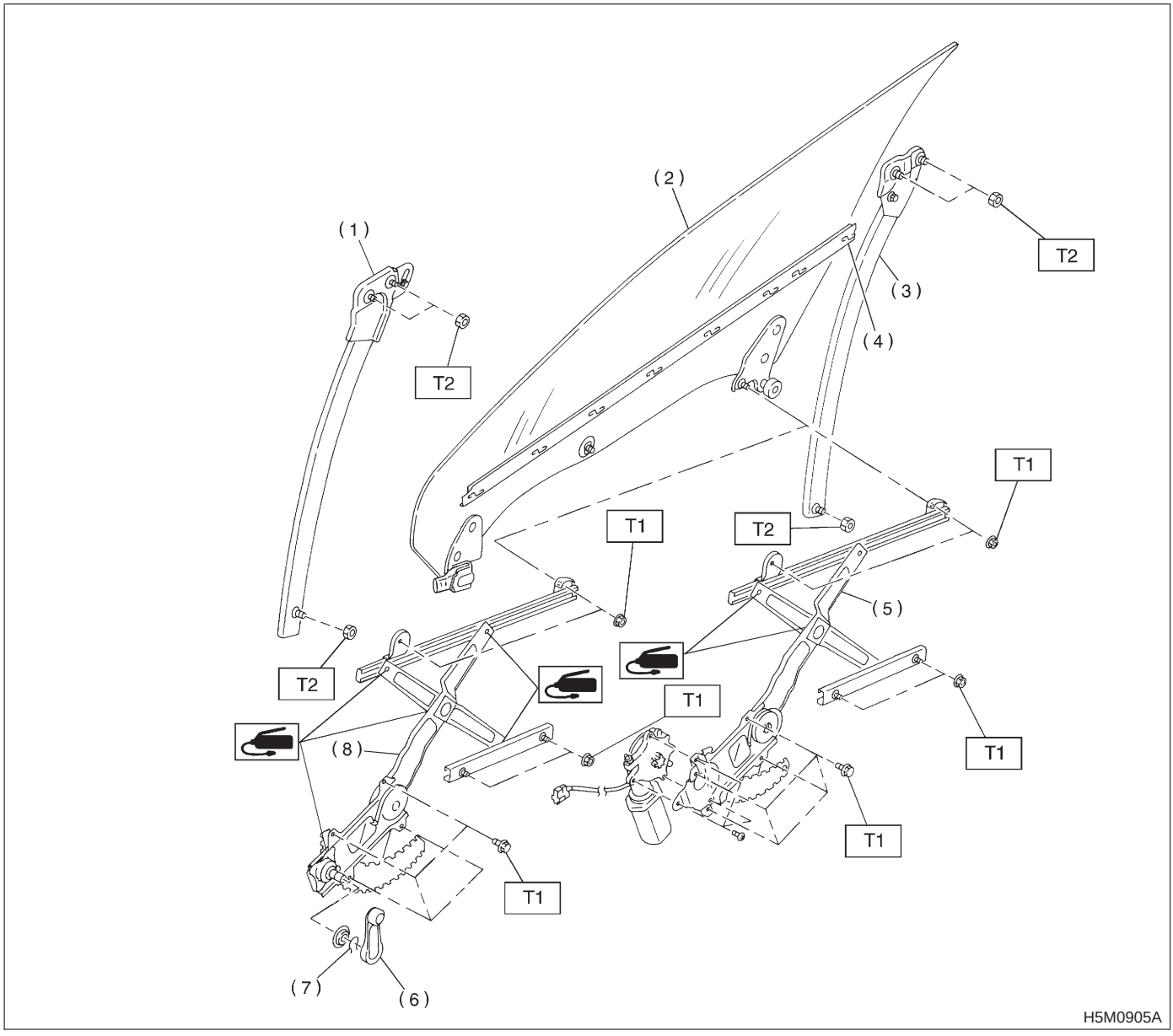
Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 25±3 (2.5±0.3, 18.1±2.2)
T3: 29±5 (3.0±0.5, 21.7±3.6)

3. Fixed Glass



(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

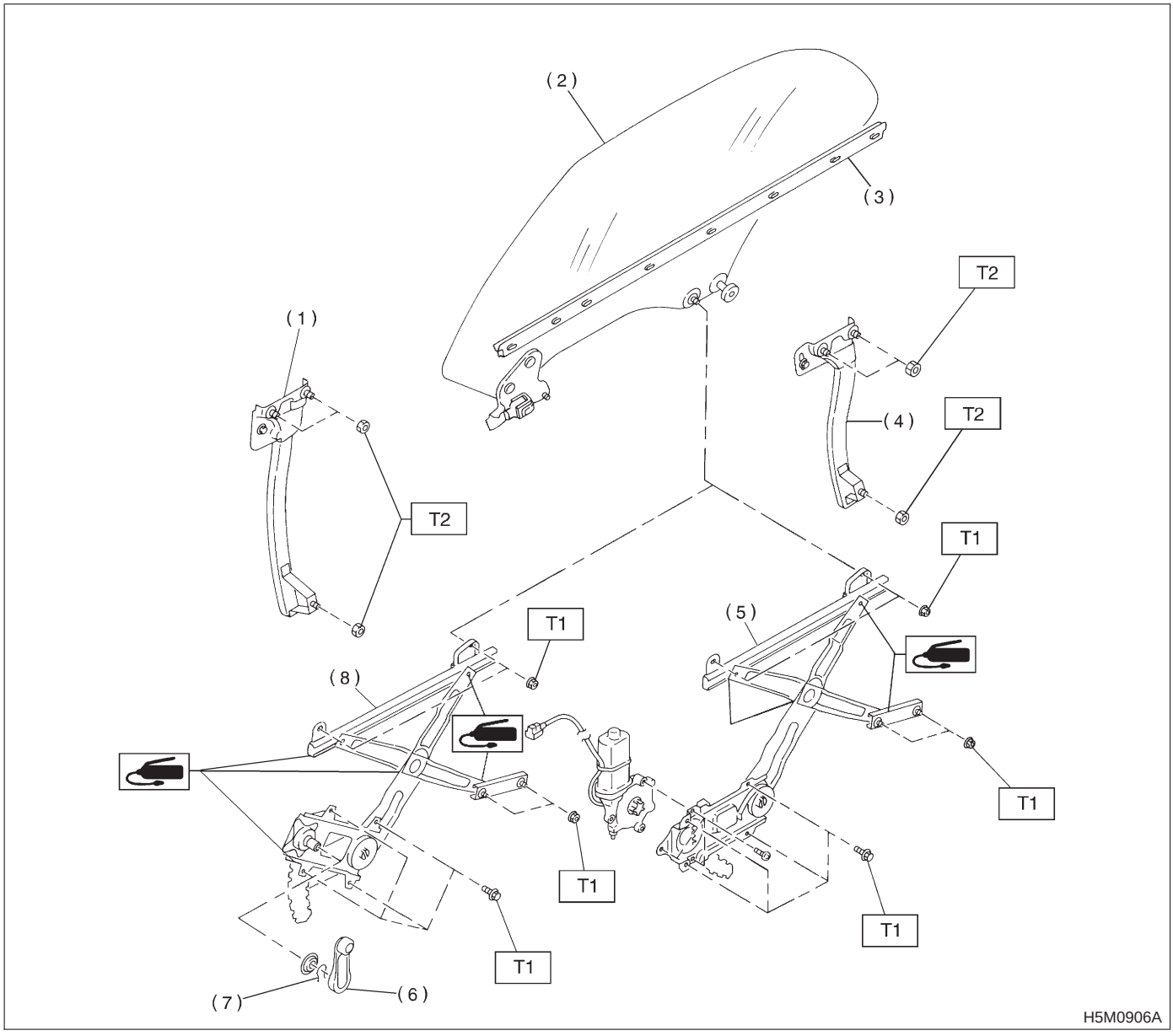
4. Front Door Glass



(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)

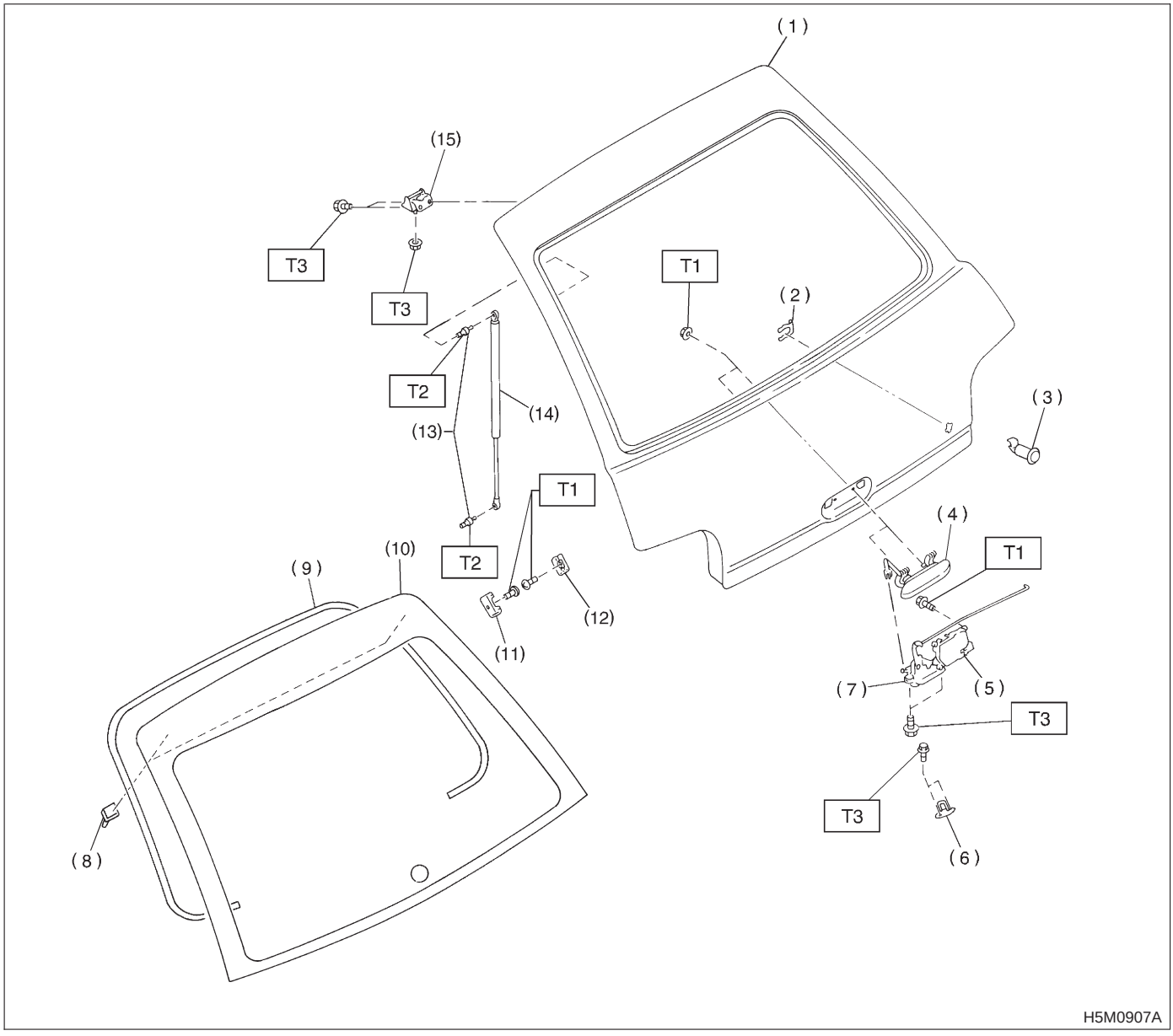
5. Rear Door Glass



(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

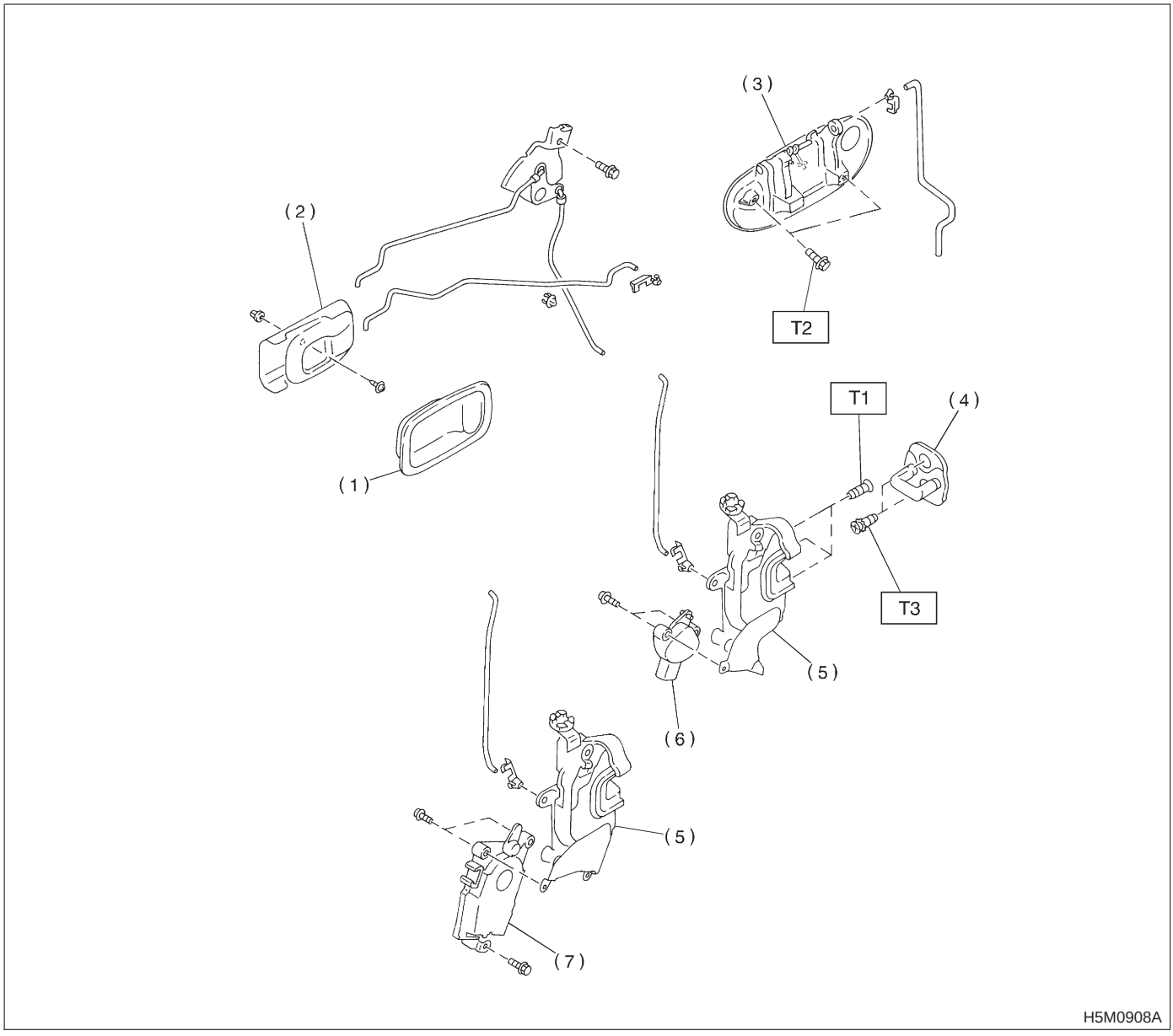


(1) Rear gate
(2) Clip
(3) Key cylinder
(4) Outer handle
(5) Auto-door lock actuator
(6) Striker
(7) Latch
(8) Glass pin
(9) Trim
(10) Glass
(11) Buffer
(12) Rear gate side buffer
(13) Stud
(14) Gas stay
(15) Hinge

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

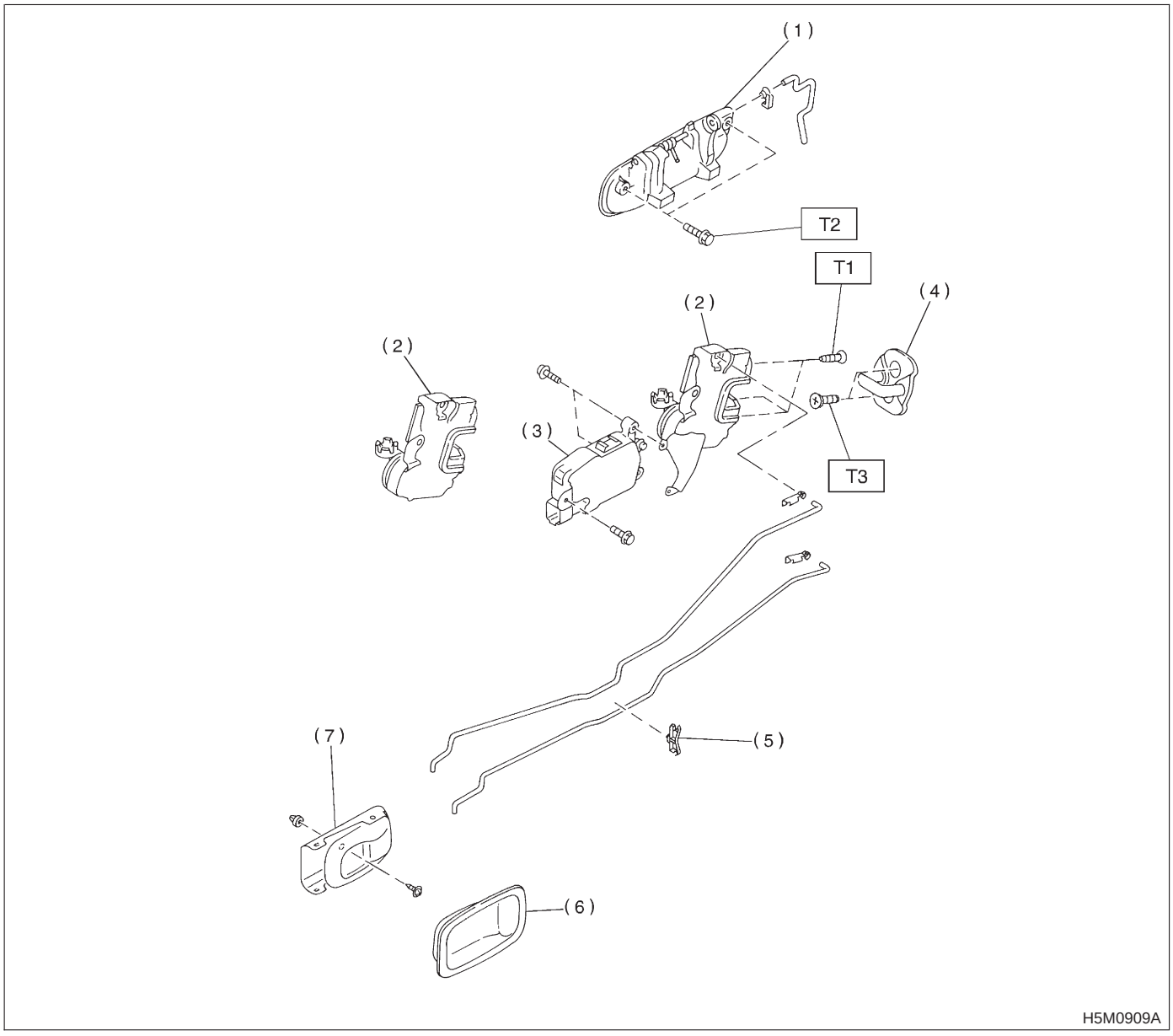
A: FRONT DOOR



(1) Cover
(2) Inner remote ASSY
(3) Door outer handle
(4) Striker
(5) Door latch
(6) Switch ASSY
(7) Auto-door lock actuator

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)

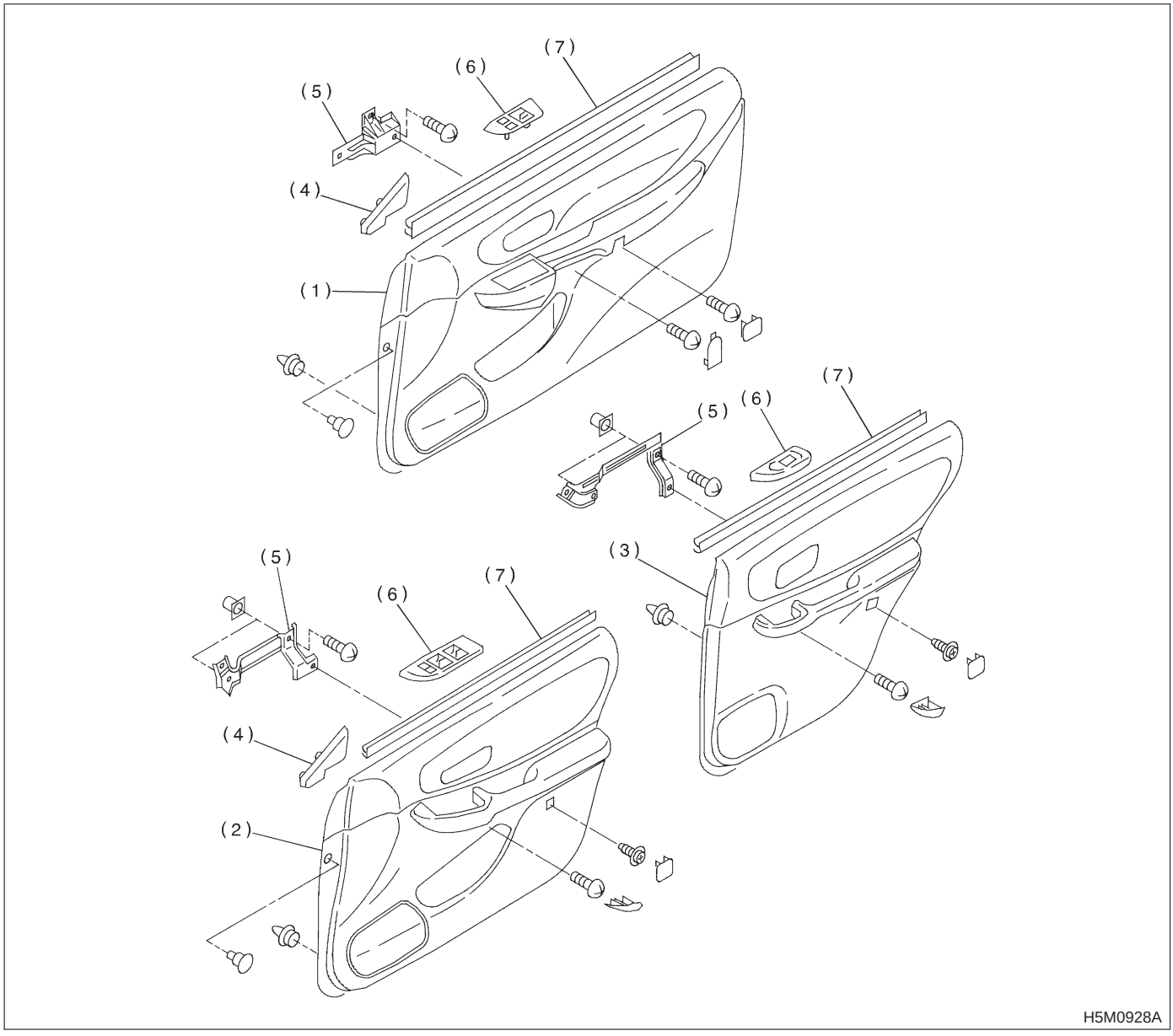
B: REAR DOOR



(1) Door outer handle
(2) Door latch
(3) Auto-door lock actuator
(4) Striker
(5) Rod holder
(6) Cover
(7) Inner remote ASSY

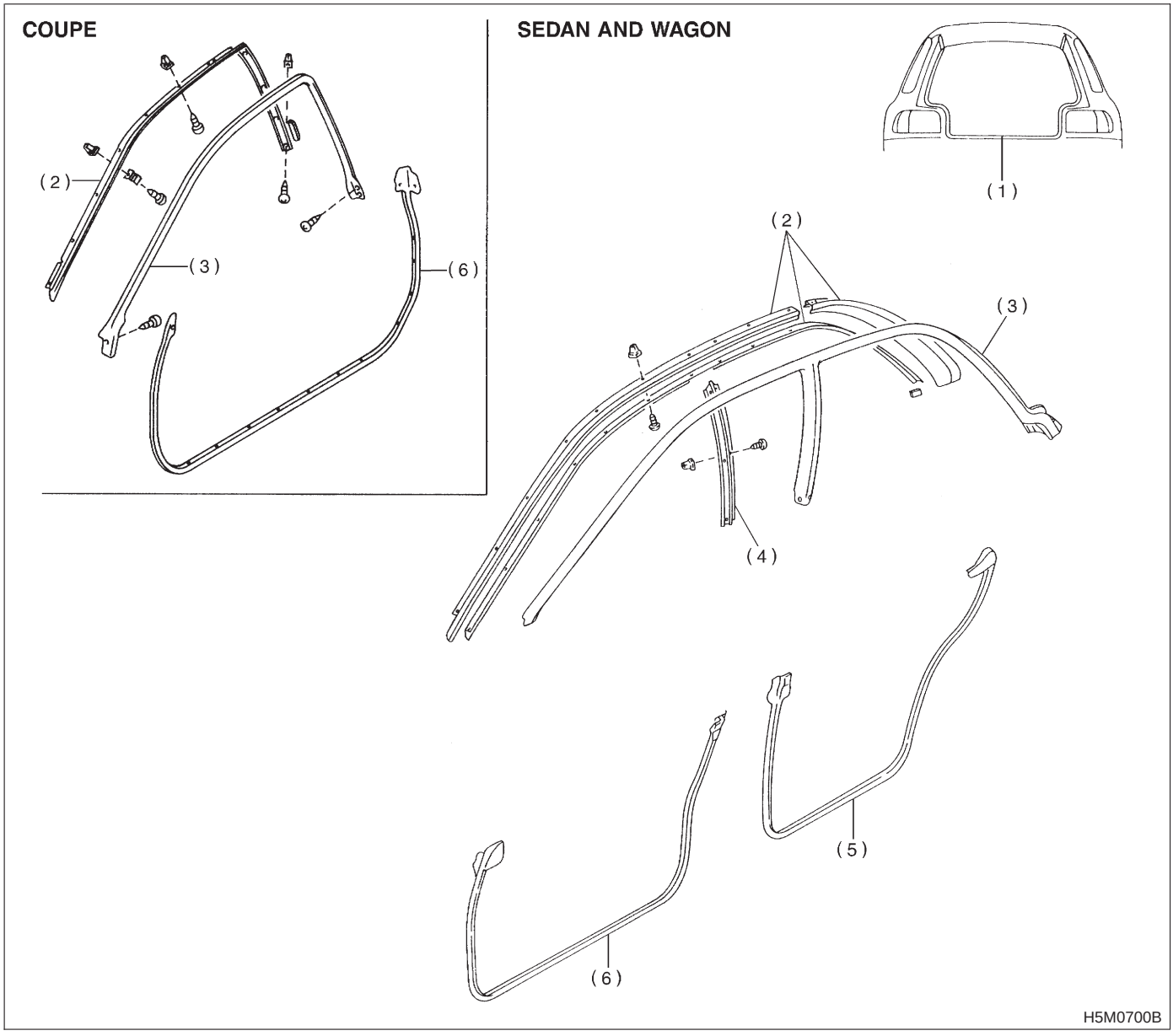
Tightening torque: N·m (kg-m, ft-lb)
T1: 6.4±2.0 (0.65±0.2, 4.7±1.4)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 14±4 (1.4±0.4, 10.1±2.9)

8. Door Trim



(1) Trim panel (Coupe)
(2) Trim panel (Except coupe/front)
(3) Trim panel (Except coupe/rear)
(4) Gusset cover
(5) Bracket
(6) Cover
(7) Weatherstrip

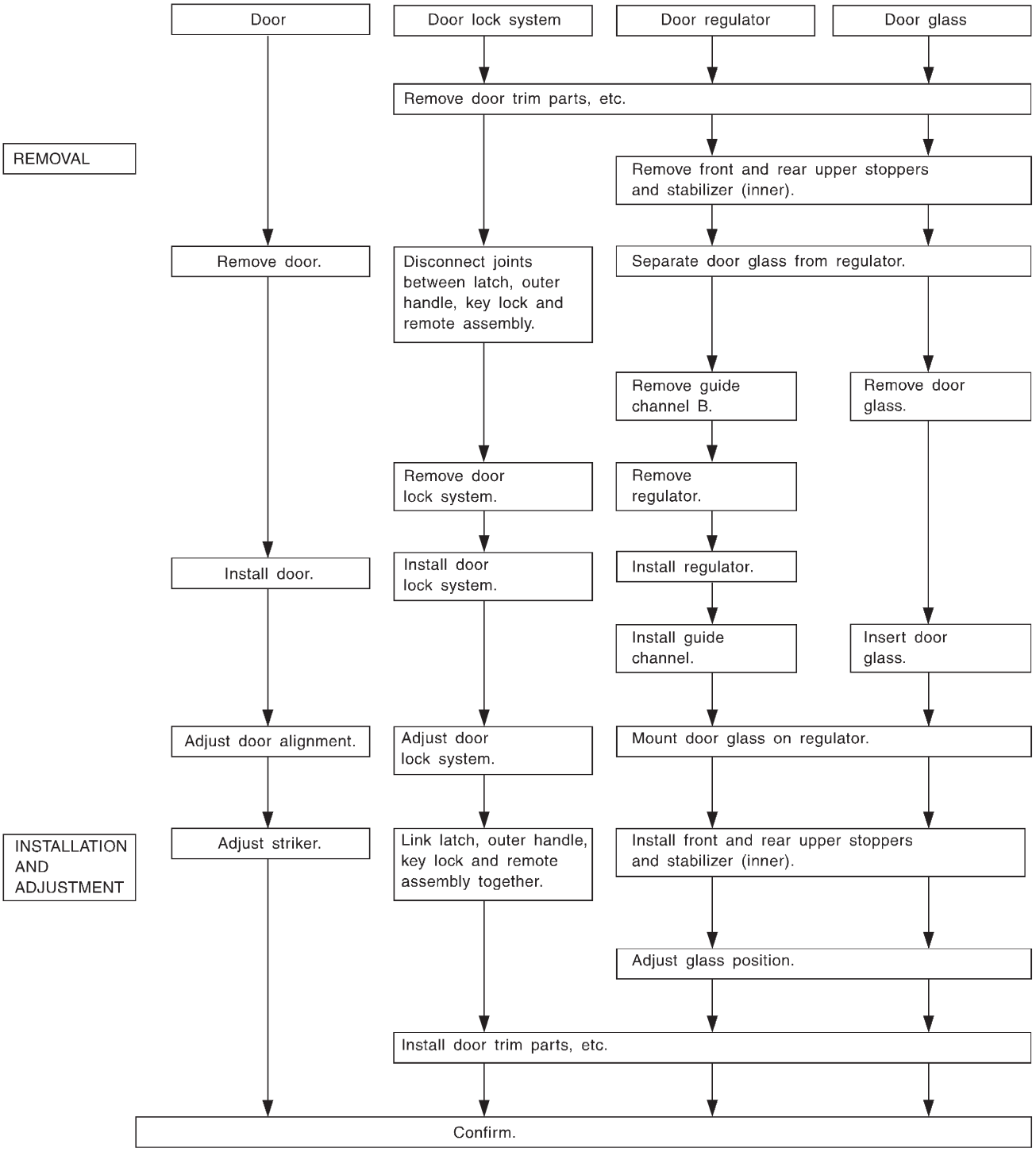
9. Weatherstrip



(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.



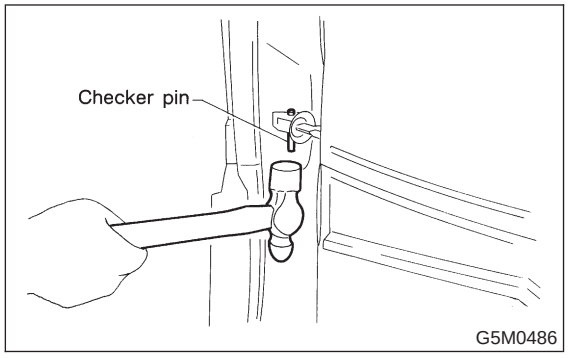
H5M0910A

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.



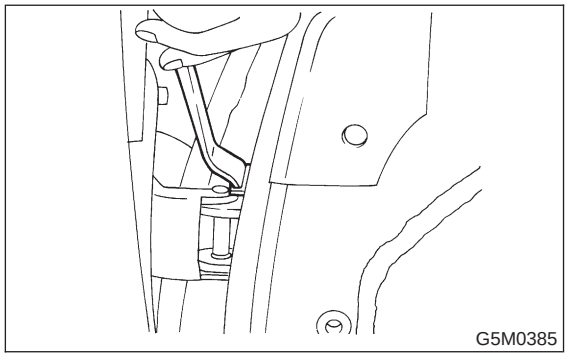
4) Remove bolts (M8) securing upper and lower hinges to door, and remove door from hinges.

Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)

5) Remove hinges by loosening hinges mounting bolt (M8) off of body.

Tightening torque:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)

CAUTION:
Work carefully to avoid damaging door.

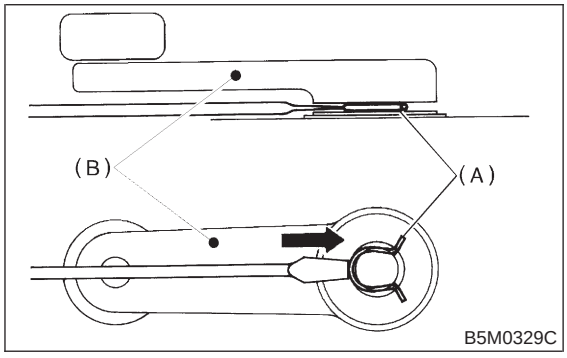


6) Installation is in the reverse order of removal.

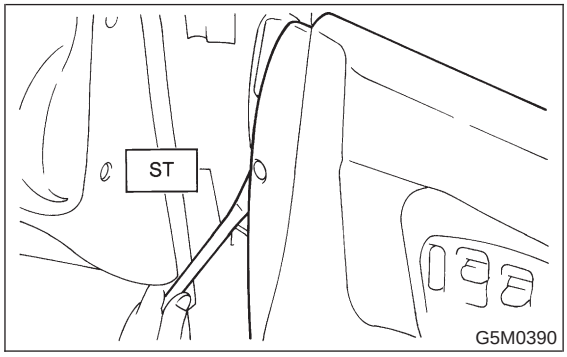
NOTE:
Apply grease to moving parts of door hinges.

2. TRIM PANEL

1) Press retainer spring (A) with a thin flat-bladed screwdriver and then remove regulator handle (B). (models without power window)

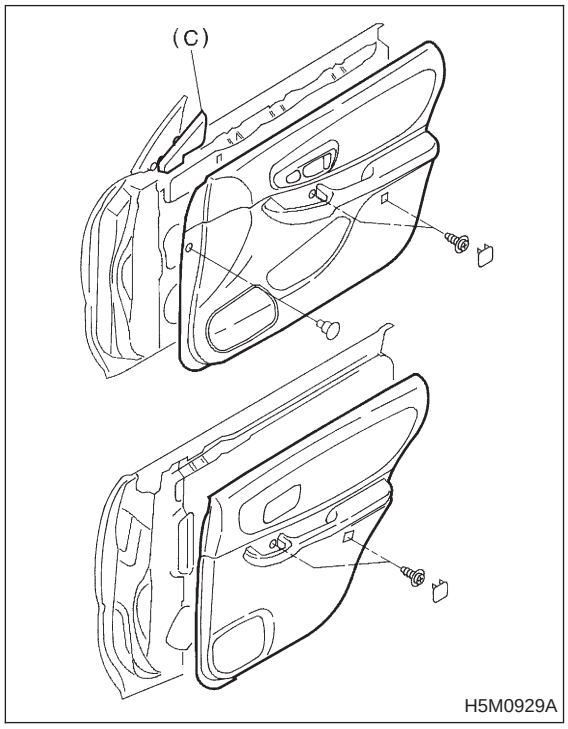


2) Using ST, disengage the clip.
ST 925580000 PULLER



3) Remove gusset cover (C) and screws.
4) Remove trim panel and then disconnect connector. (models with power window)

CAUTION:
Be careful not to break clip by applying undue force.

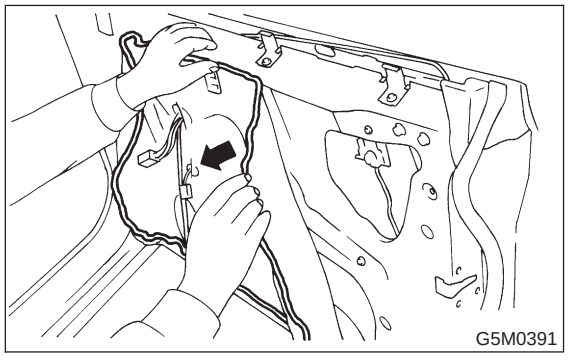


5) Installation is in the reverse order of removal.

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.

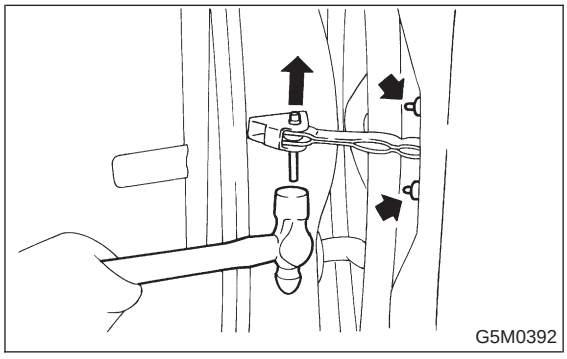
Sealer:
CEMEDINE 5430L

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.

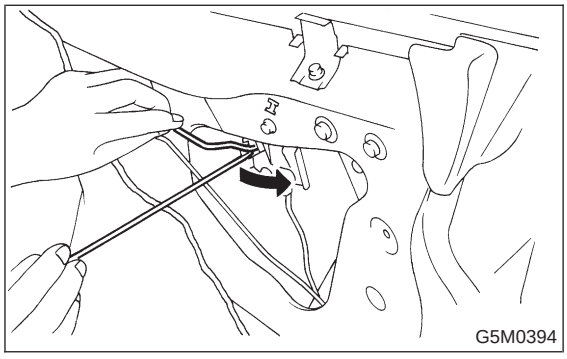


4) Completely close door glass.
5) Loosen two nuts securing checker, and take out checker through access hole in underside.
6) Installation should be made in the reverse order of removal.

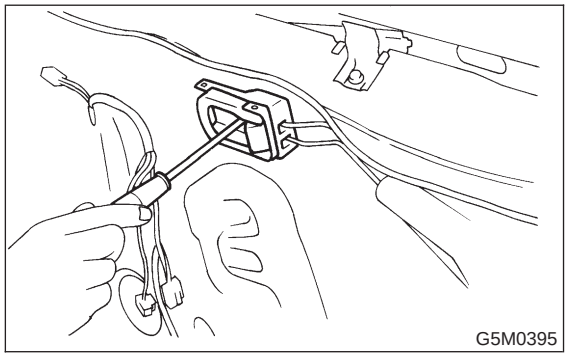
Tightening torque:
7.5±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

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.

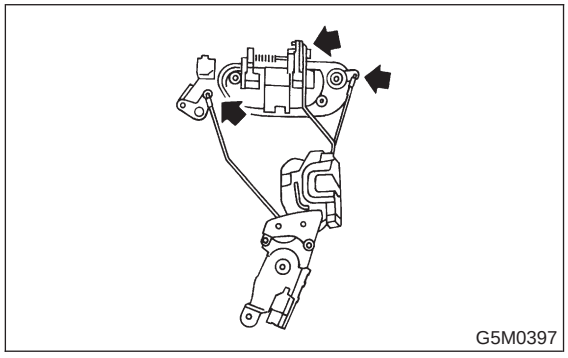

G5M0395

6) Installation is in the reverse order of removal.

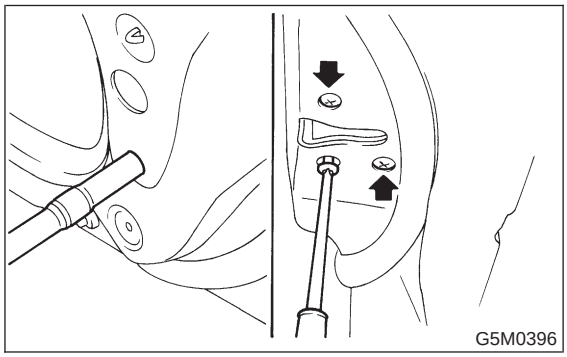
NOTE:
If rear door is equipped with child safety lock, check that child lock lever moves without dragging.

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.
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.


G5M0397

6) Loosen screws securing both latch and actuator, then remove latch and actuator assembly through service hole in bottom.


G5M0396

7) Installation is in the reverse order of removal.

Tightening torque (screw):
6.4±2.0 N·m (0.65±0.2 kg-m, 4.7±1.4 ft-lb)

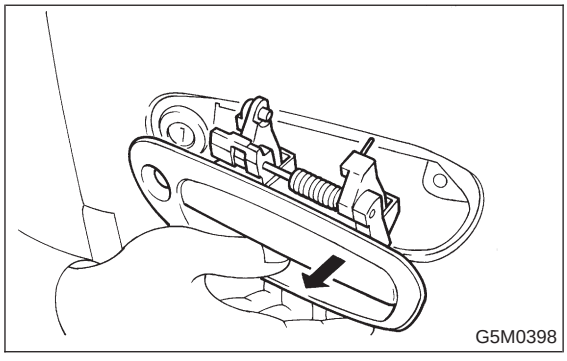
NOTE:
- Check operation of each part.
- Check each sliding part for proper lubrication.

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.


G5M0398

5) 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)

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

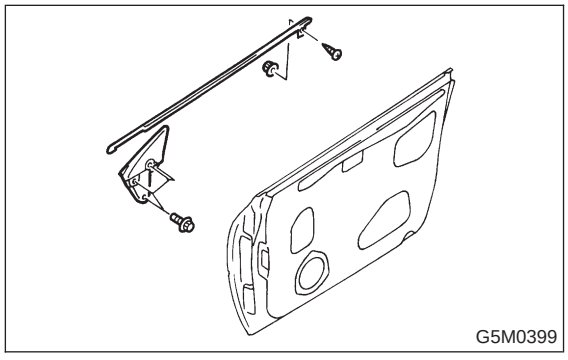
1) Be sure window is all the way down.
2) Remove gusset cover.
3) Remove trim panel.
4) Remove door rearview mirror.
5) Remove outer weatherstrip.
6) Remove sealing cover.

NOTE:
Be careful not to drop nuts on the “IN” side.

7) Remove bolts and nuts which secure gusset.

Tightening torque: Bolt
3±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)

Tightening torque: Nut
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)


G5M0399

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



G5M0487

2) Loosen screw one complete rotation, and adjust opening/closing direction of door using a hammer covered with a cloth.

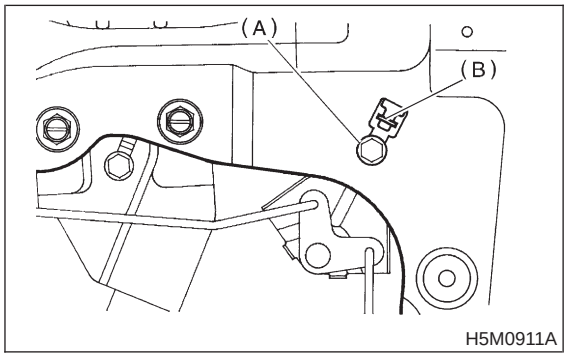
CAUTION:
Be careful not to damage striker.

Hinge tightening torque (body side):
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)

Striker tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)

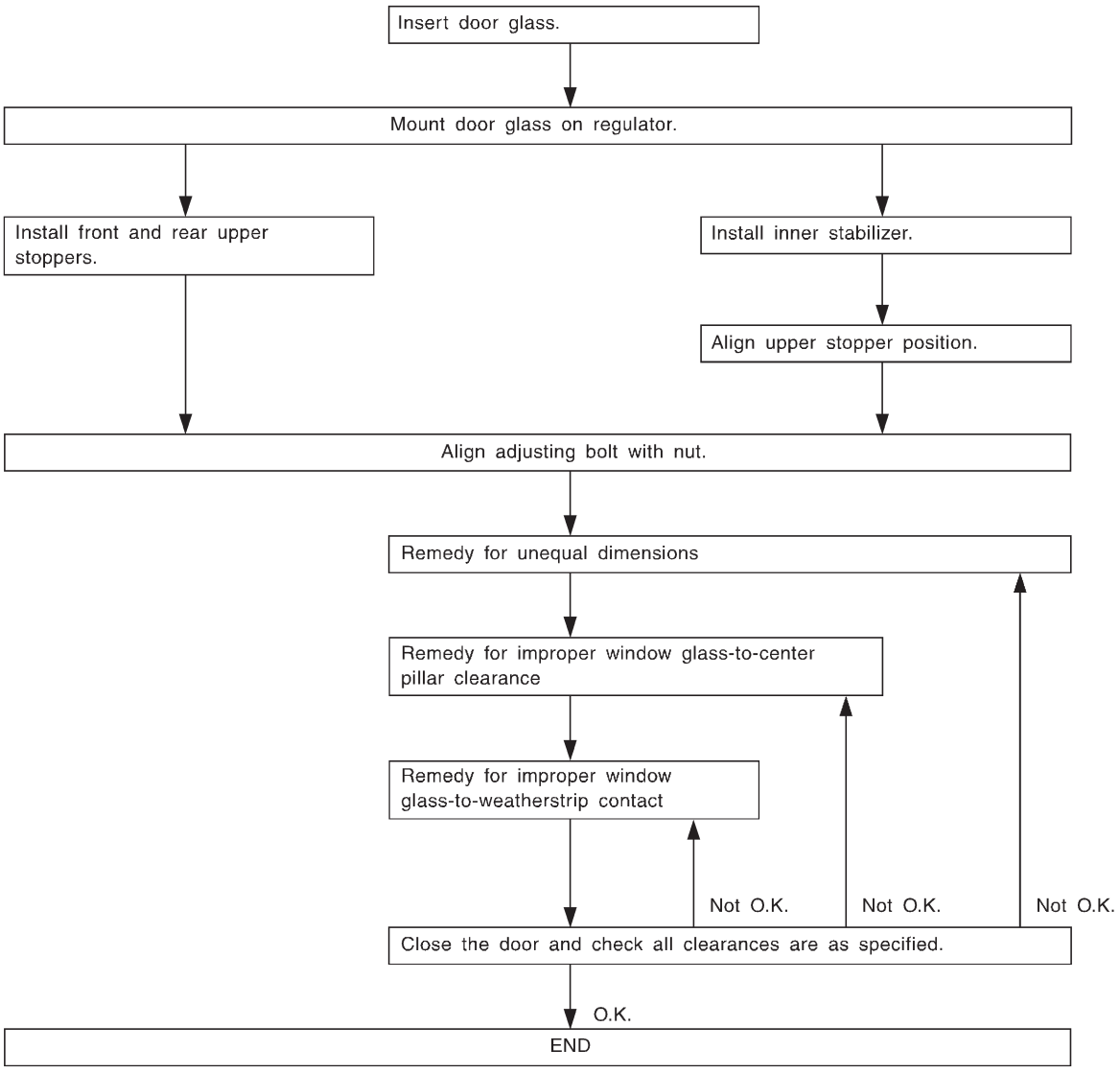
2. INNER REMOTE

1) Lock the door.
2) Loosen bolt (A).
3) Lower bell crank (B) and then tighten bolt (A).



H5M0911A

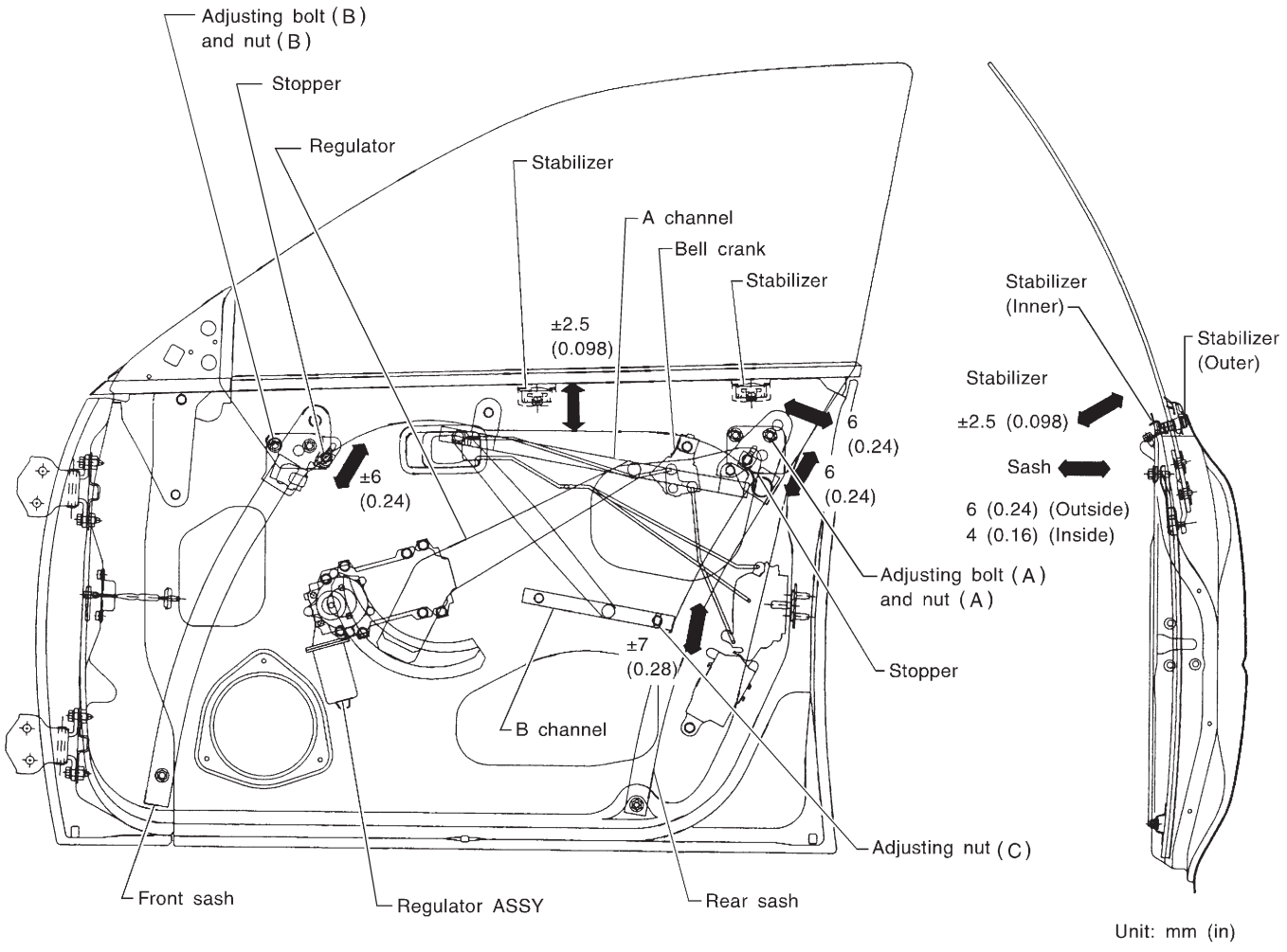
3. PROCEDURE CHART FOR ADJUSTING DOOR GLASS

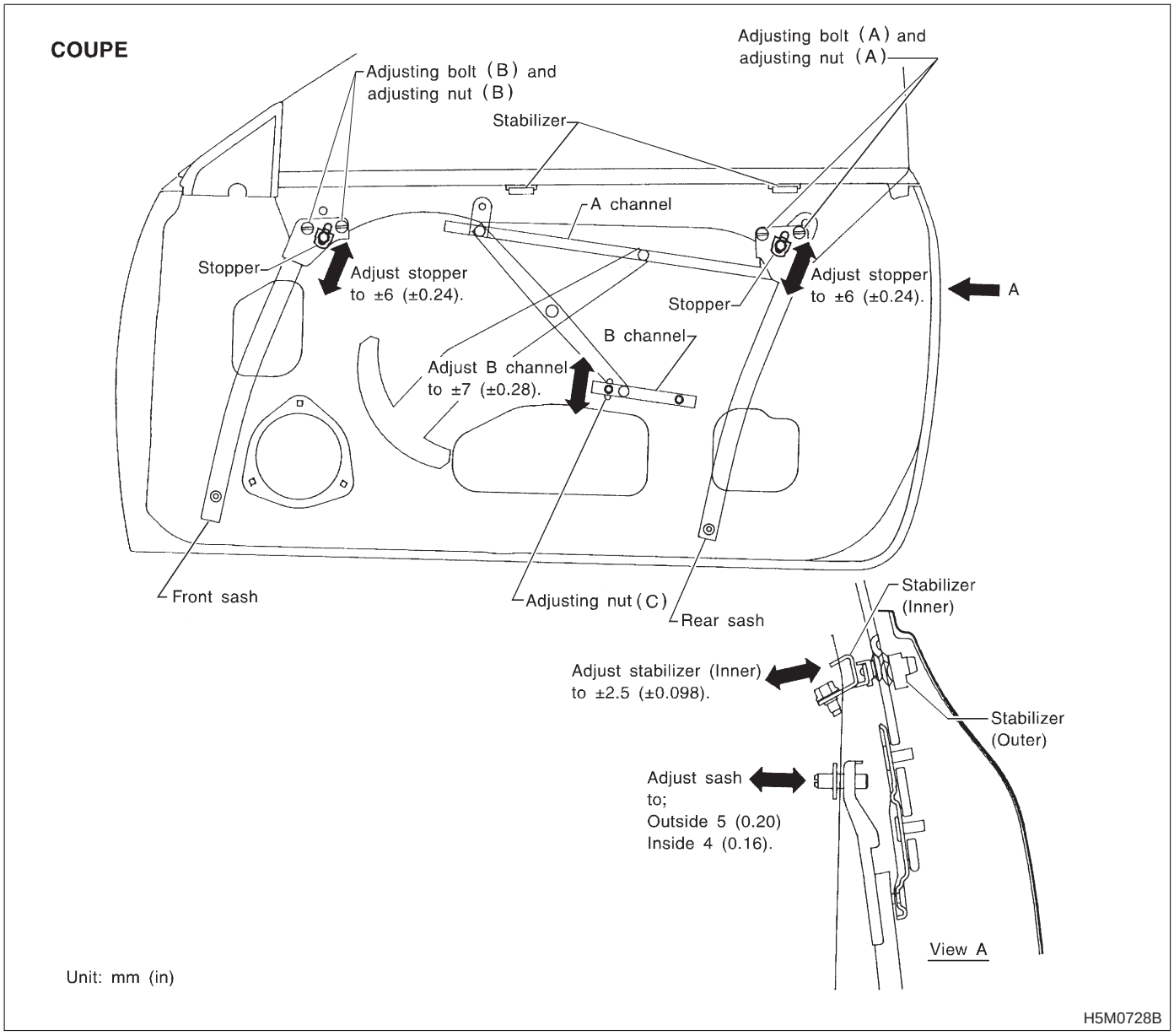


H5M0912A

4. FRONT DOOR GLASS

SEDAN AND WAGON





● 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) emporarily tighten one of the two rear sash adjusting bolts, at midpoint of oblong hole on inner panel.

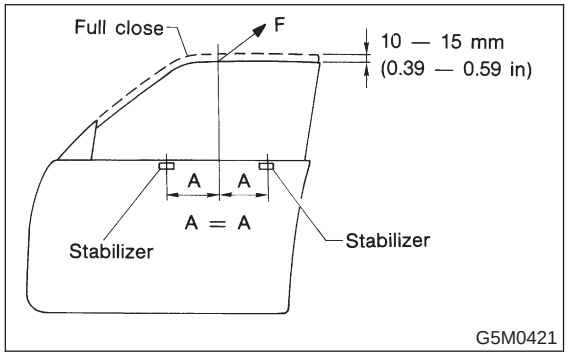
2) Temporarily tighten regulator B channel at a position slightly lower than midpoint of oblong hole on inner panel.

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 mid-point of two outer stabilizers, press inner stabilizer until it just touches the glass, then secure it.

Load: F

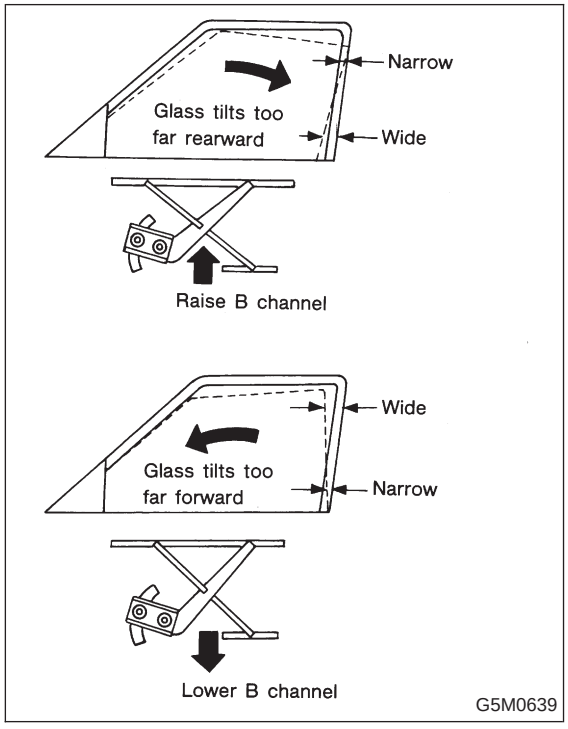
Front door glass 44.1±4.9 N (4.5±0.5 kg, 9.9±1.1 lb)

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

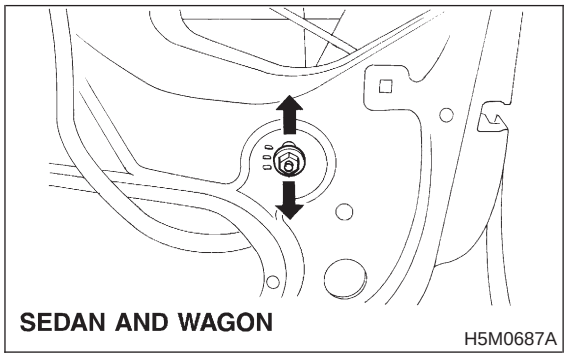
1) Close front door and raise door glass.
2) Make sure of unequal dimensions.

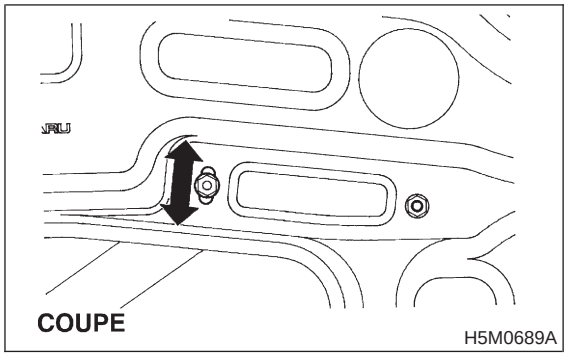


3) If glass tilts to far rearward, loosen adjusting nut (0C) and adjust glass to be parallel with center pillar, then after adjustment, tighten adjusting nut (0C).

Tightening torque:

7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

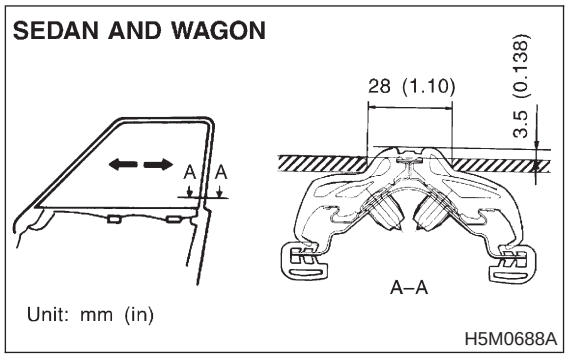


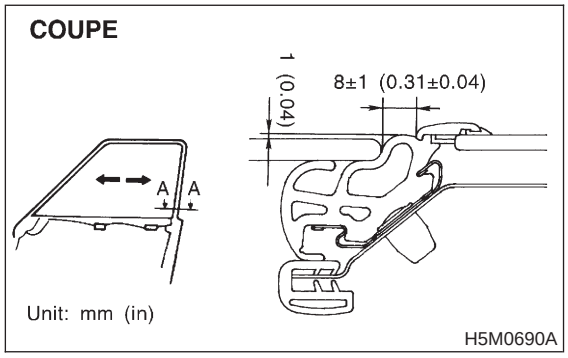


● Remedy for improper glass to center pillar clearance

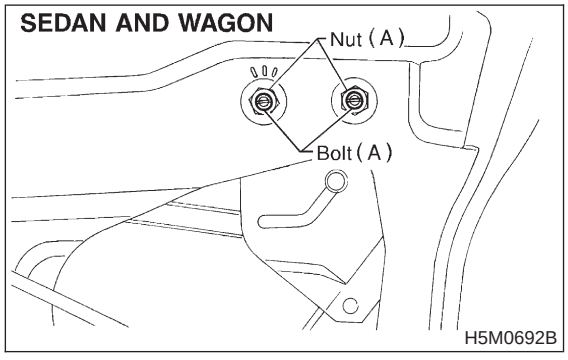
1) Close front door and raise door glass.

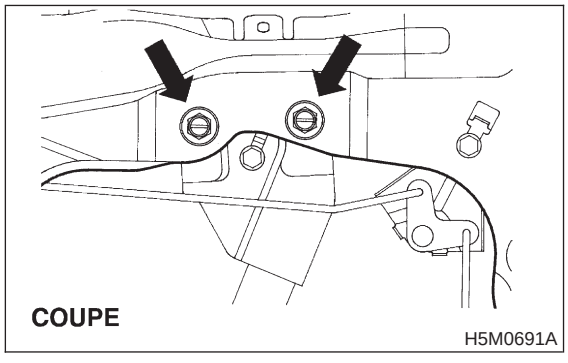
2) Make sure of improper clearance.





3) If clearance is improper, loosen adjusting nut (A), bolt (A) and adjust glass to center pillar.

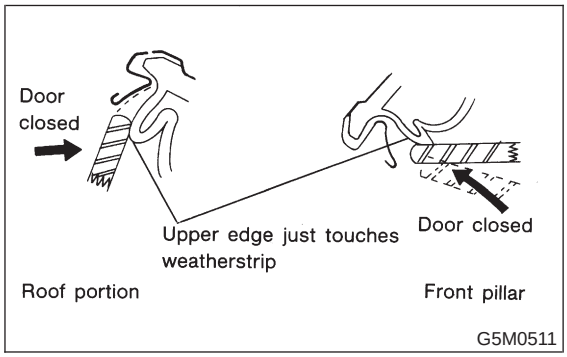




● Remedy for improper upper stop point of door glass

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.

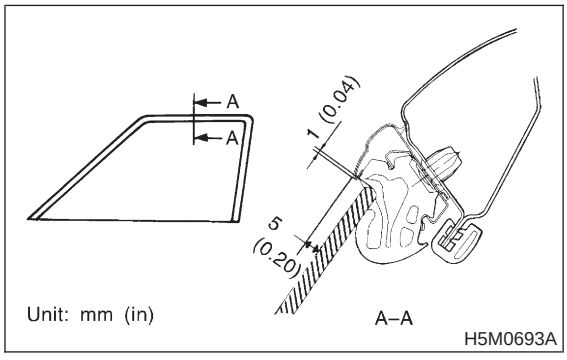


3) After adjustment, temporarily tighten stoppers.

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).



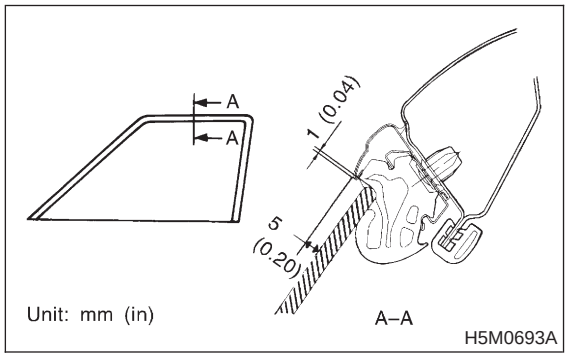
● Fit adjustment

Door glass fit is adjusted by displacing the glass front edge with a stabilizer.

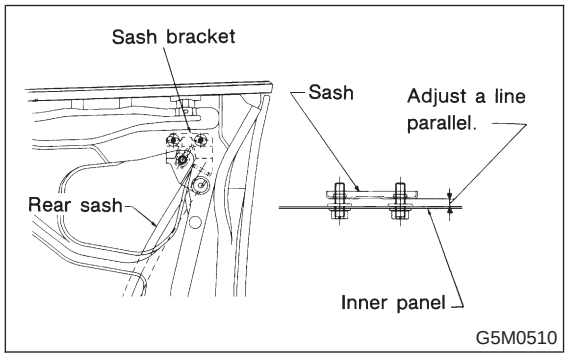
NOTE:
Before adjusting glass fit, visually check to determine relative adjusting positions of retainer and molding (on roof side) and glass surface.

1) Alternately adjust two rear sash adjusting bolts (0A) 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 (0A) 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.



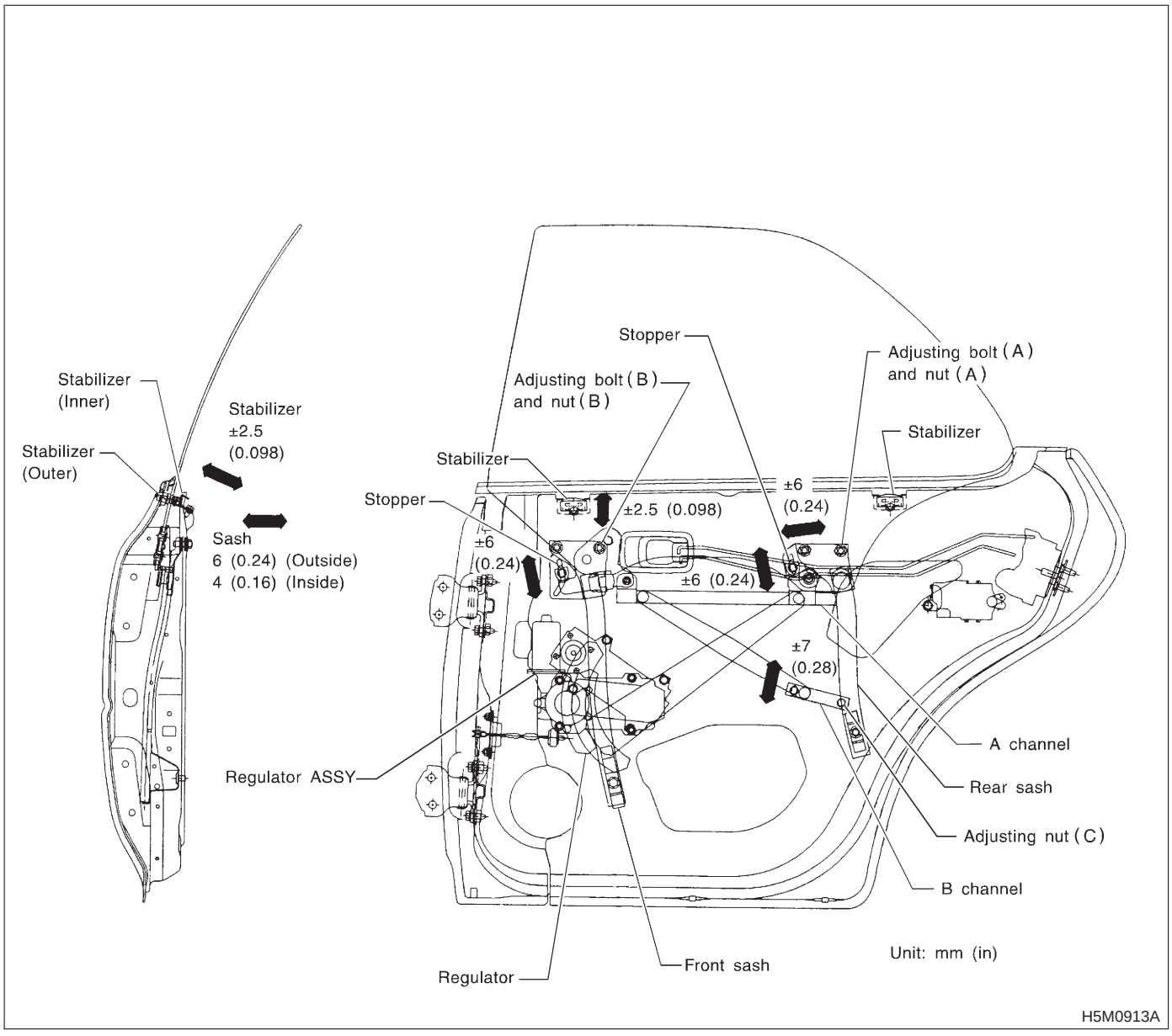
2) Adjust front sash fit using rear sash adjustment procedure outlined in the former procedure as a guide. Two adjusting bolts must be adjusted by the same amount.

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

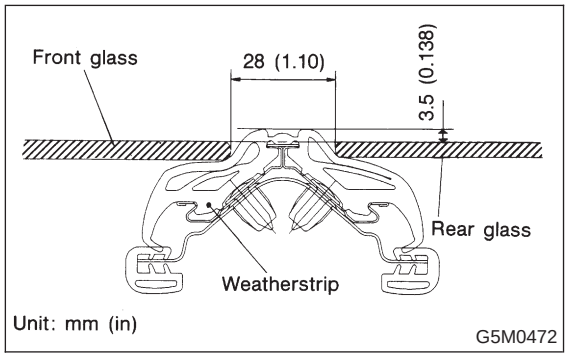
Alignment of rear door glass is basically the same as for the front door glass. Due to slight difference in adjustment dimensions for fore-aft, up-down, and in-out alignments, key points for rear door adjustment are described.



● **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.

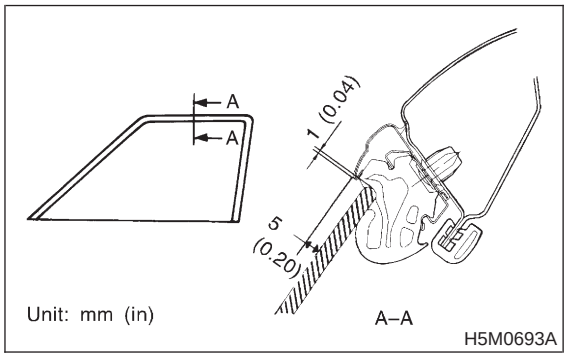
NOTE:
If dimensions are smaller than those indicated, glass will be caught in weatherstrip and may not raise to the fully closed position.



2) After making fore-aft adjustment, raise and lower glass to ensure it is free from any binding.

● **Fit adjustment**

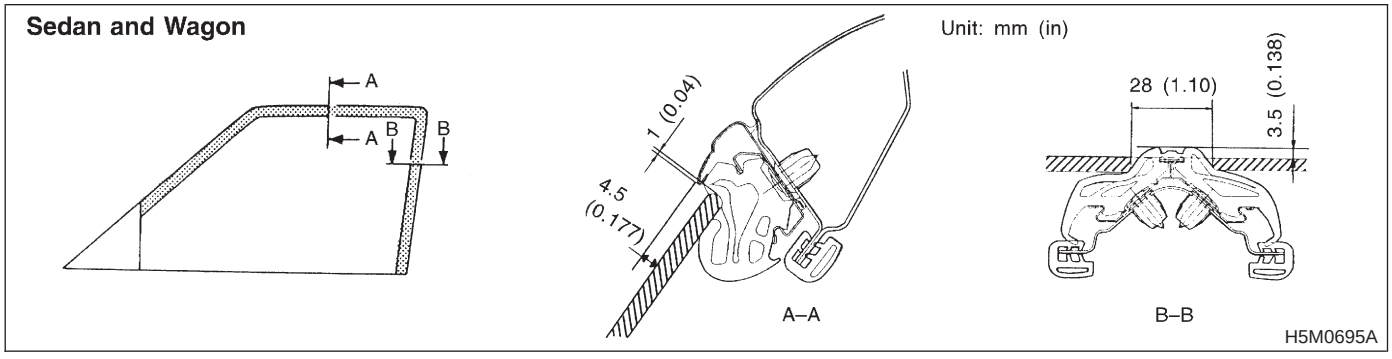
Increasing contact pressure causes rear door glass to be caught in center pillar upper and lower weatherstrip; this will cause premature weatherstrip wear. For this reason, always use dimensions indicated in figure as a guide during glass fit adjustment.

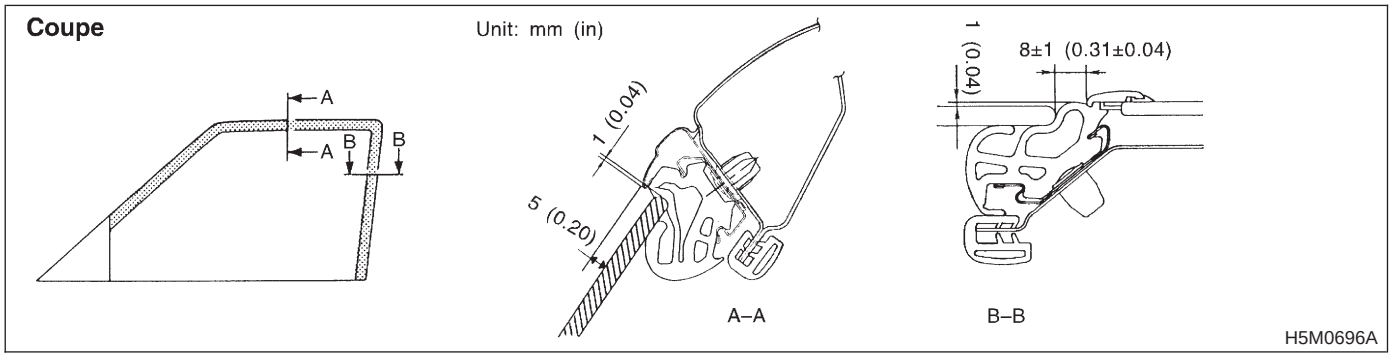


C: INSPECTION

1. FRONT DOOR GLASS

1) Close front door and make sure of all clearances.





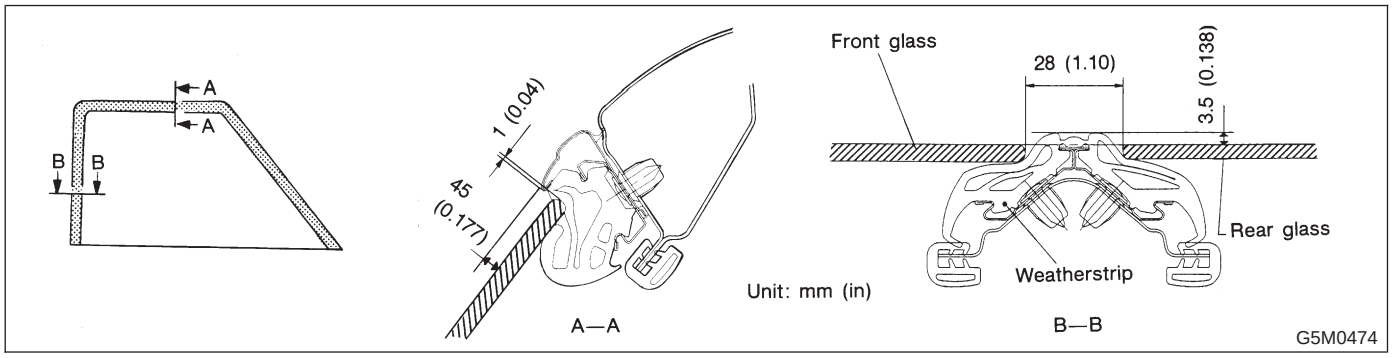
2) If any clearance is not correct, adjust affected parts. Re-check that all clearances are correct.

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

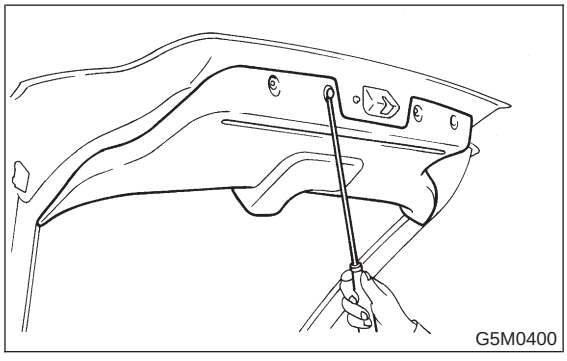
A: REMOVAL AND INSTALLATION

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.

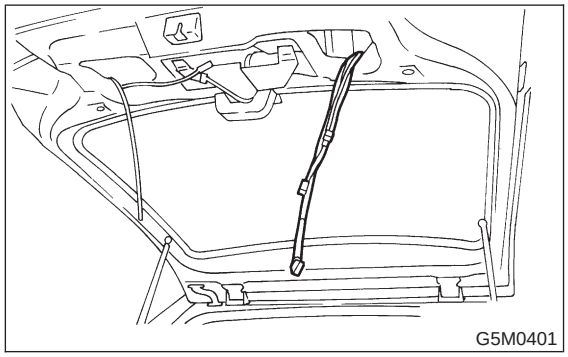
CAUTION:
Be careful not to damage clips or their holes.



2) Disconnect connectors and terminal.
3) Disconnect rear washer hose from wiper motor.
4) Remove high-mounted stop light.

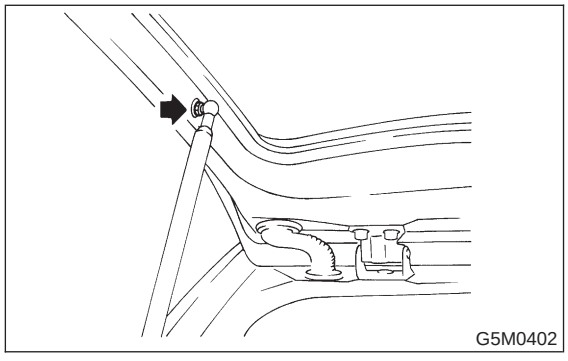
5) If disconnected harness is re-used, tie connector with a string and place on the upper side of rear gate for ready use.

CAUTION:
Do not forcefully pull cords, lead wires, etc. since damage may result; carefully extract them in a wavy motion while holding connectors.

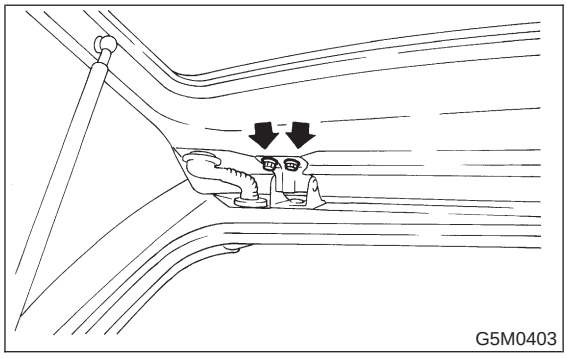

G5M0401

6) Remove rear wiper. <Ref. to 6-2 [W6B0].>
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.

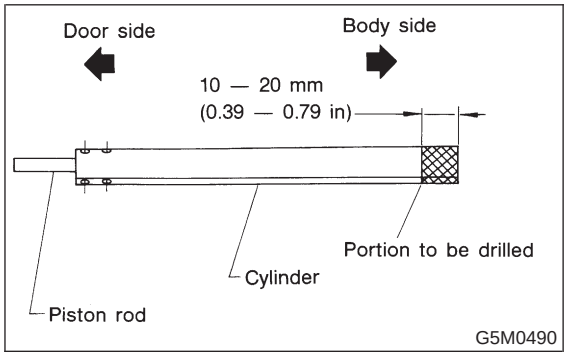

G5M0402

9) Remove the bolts which hold rear gate to hinge and then detach rear gate.


G5M0403

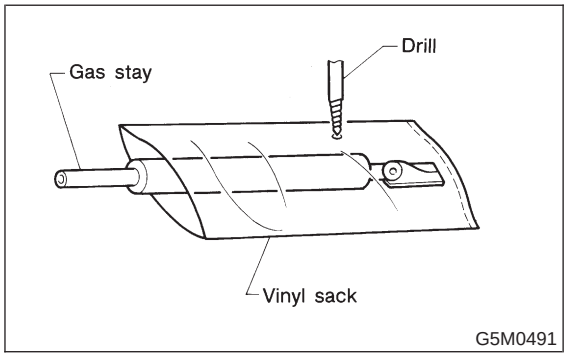
10) General precautions in handling rear gate gas stay

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.)



G5M0490

● 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.



G5M0491

● Be careful not to scratch the exposed section of piston rod or allow oil or paint to come in contact with it.

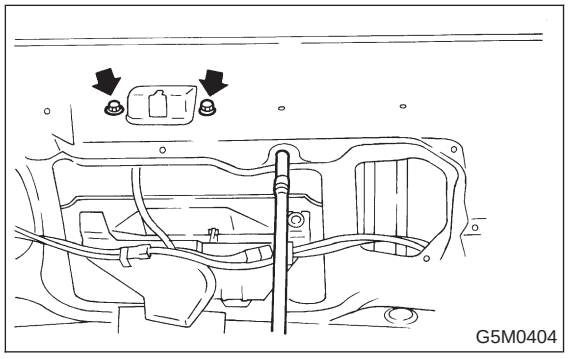
● Do not attempt to rotate the extended piston rod.

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.



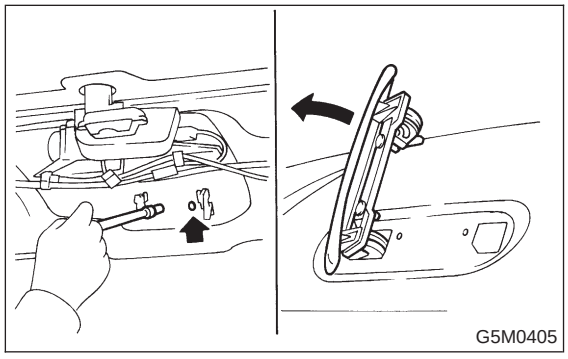
5) Disconnect rear gate switch connector.
6) Disconnect auto-door lock actuator connector.
7) Detach latch.
8) Installation is in the reverse order of removal.

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.

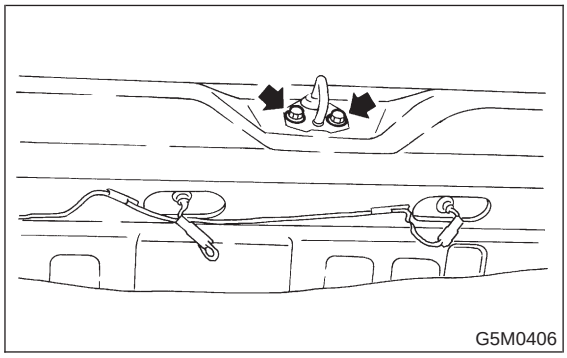
CAUTION:
Completely insert latch pin into handle lever.

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

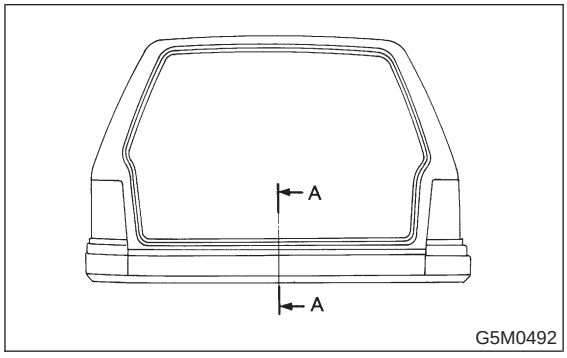
1) Remove rear skirt trim.
2) Remove two bolts from striker and detach striker.



3) Installation is in the reverse order of removal.

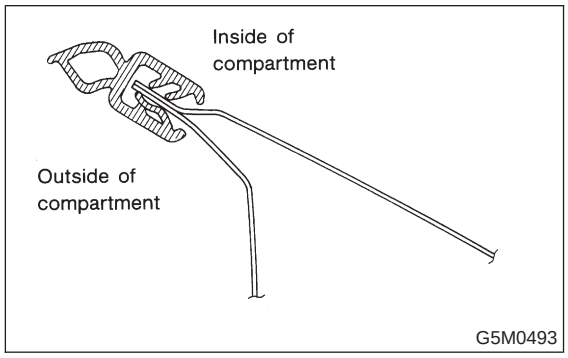
6. WEATHERSTRIP

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.



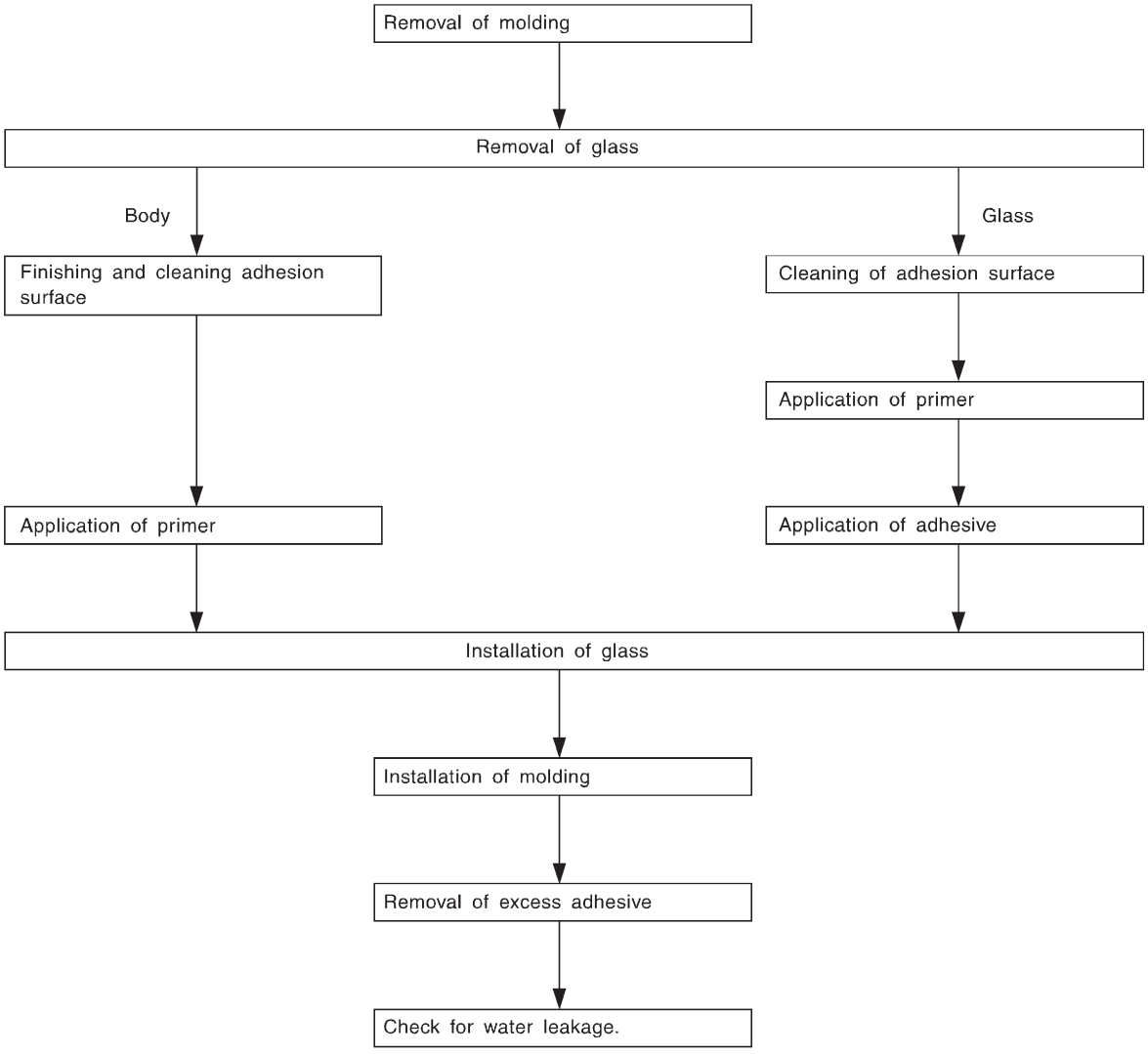
2) Tap along entire length with a rubber hammer to firmly insert body flange into weatherstrip.

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



H5M0914A

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

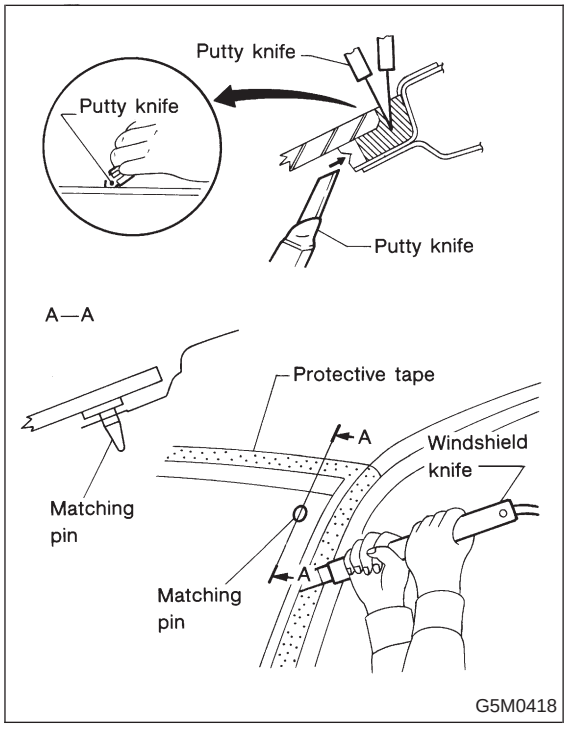
5. Windshield

A: REMOVAL

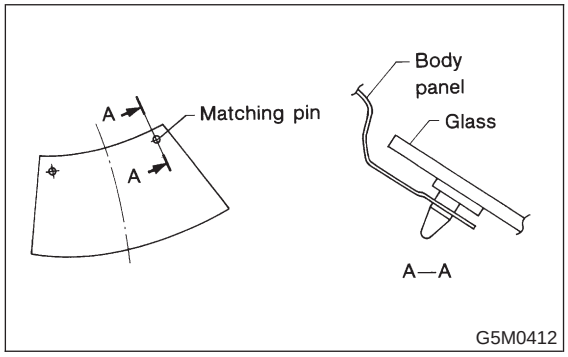
1. USING WINDSHIELD KNIFE

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.

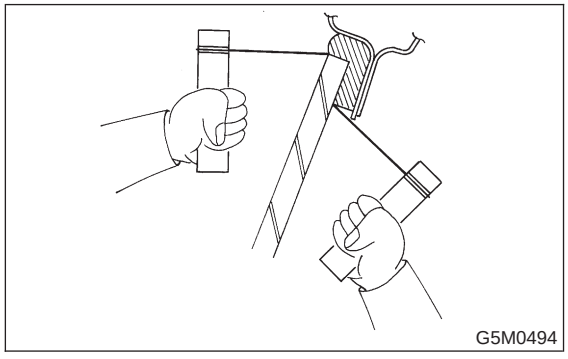


NOTE:
A matching pin is cemented to corners of glass on compartment side. Use a piano wire when cutting each pin.



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.



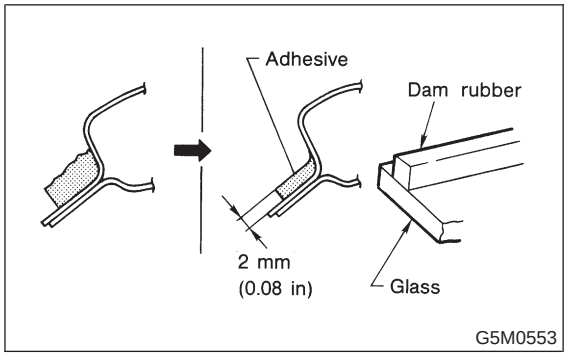
   (4) Cut adhesive layer with the wire by pulling it back and forth.

CAUTION:
When making through-hole into adhesive layer and cutting the adhesive, be careful not to damage interior and exterior parts.

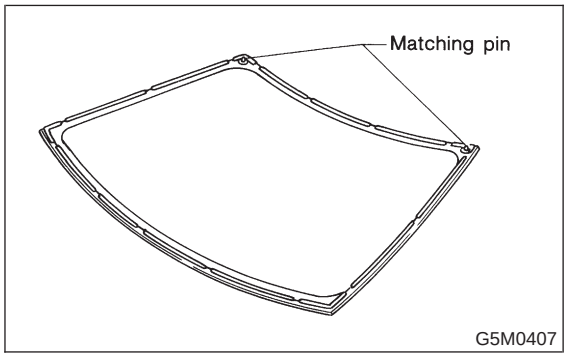
B: INSTALLATION

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.



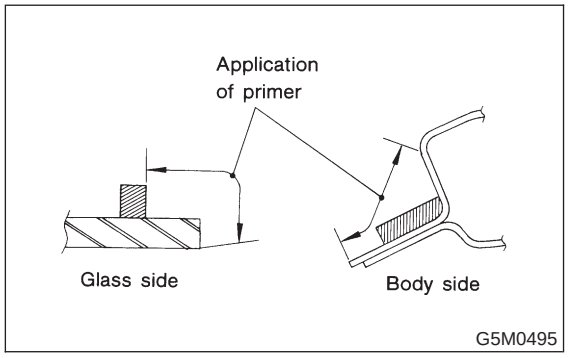
3) Cleaning body surface:
   (1) Thoroughly remove chips, dirt and dust from body surface.
   (2) Clean body wall surface and upper surface of layer of adhesive with a solvent such as alcohol or white gasoline.
4) Positioning glass:
   (1) Mount glass on body.
   (2) Adjust position of glass so that gap between body and glass is uniform on all sides.
   (3) Put matching pin on body and glass in several places.



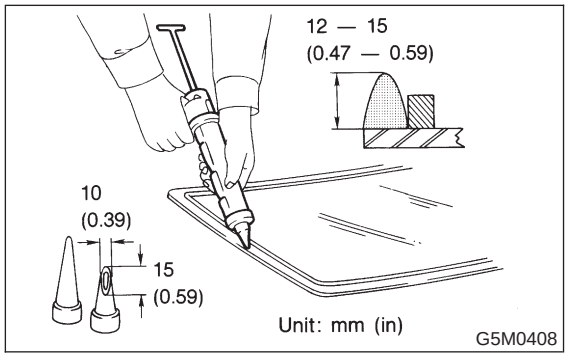
5) Cleaning glass:
   (1) Dismount glass from body.
   (2) Clean surface of glass to be adhered with alcohol or white gasoline.

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.

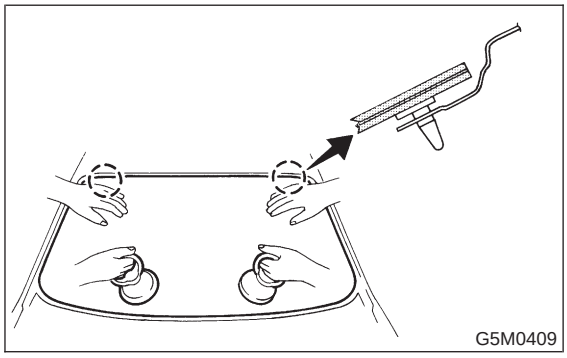


7) Application of adhesive:
(1) Cut nozzle tip of cartridge as shown in figure.



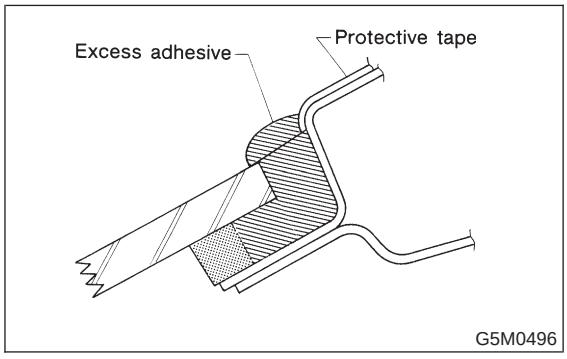
(2) Open cartridge and put it into a gun with nozzle attached.
(3) Apply adhesive uniformly to all sides of adhesion surface while operating gun along glass end face.

8) Installation of glass:
(1) Hold glass with rubber suction cups.
(2) Mount glass on body with matching pin aligned.



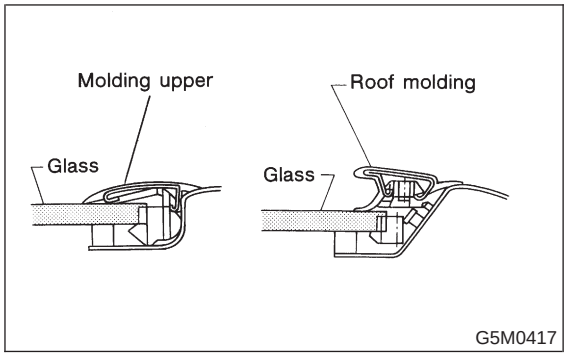
(3) Stick them fast by pressing all sides lightly.

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.

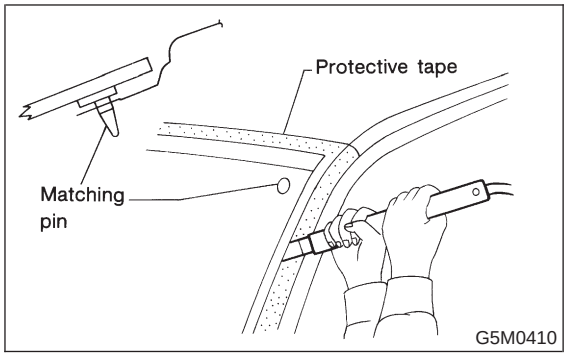
12) Install cowl panel and wiper arm.

6. Rear Window Glass

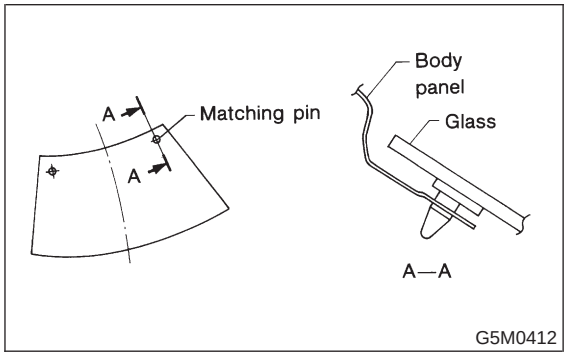
A: REMOVAL

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.



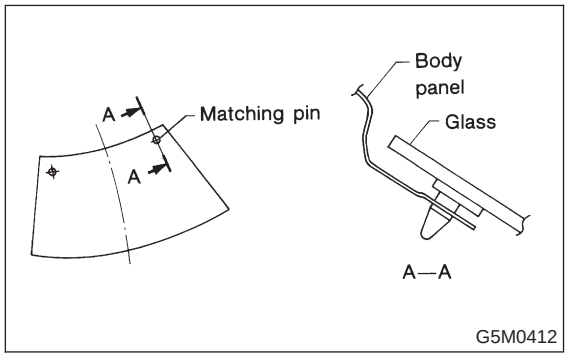
2. WAGON MODEL

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.

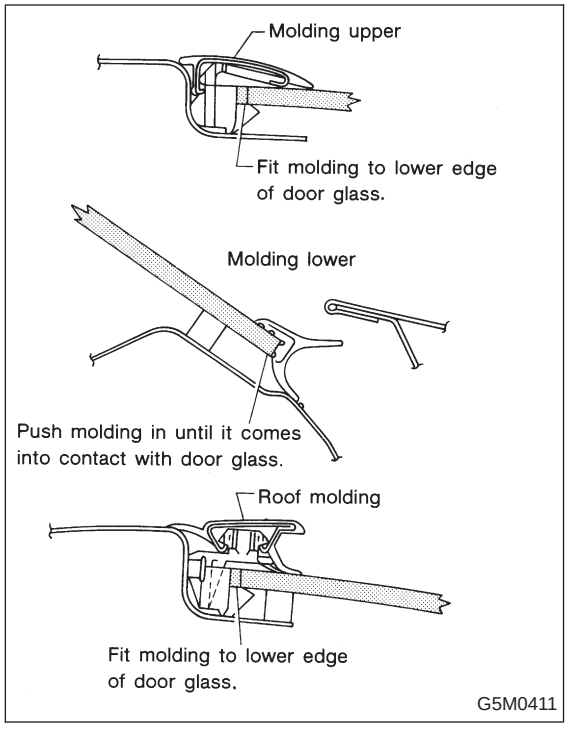
NOTE:
A matching pin is cemented to corners of glass on compartment side. Use a piano wire when cutting each pin.



B: INSTALLATION

1. SEDAN AND COUPE MODEL

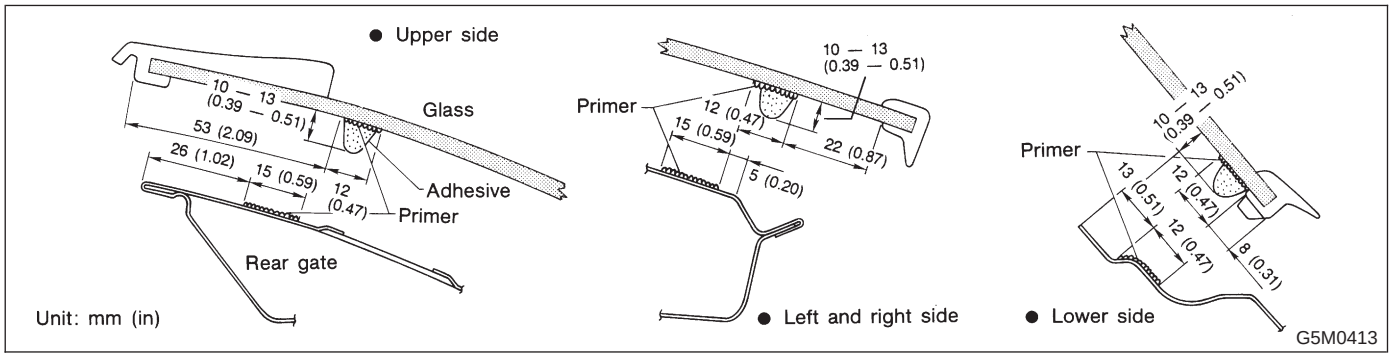
1) Install glass in same manner as in windshield.
2) Firstly, press-fit molding upper, then lower and lastly, roof molding.



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.



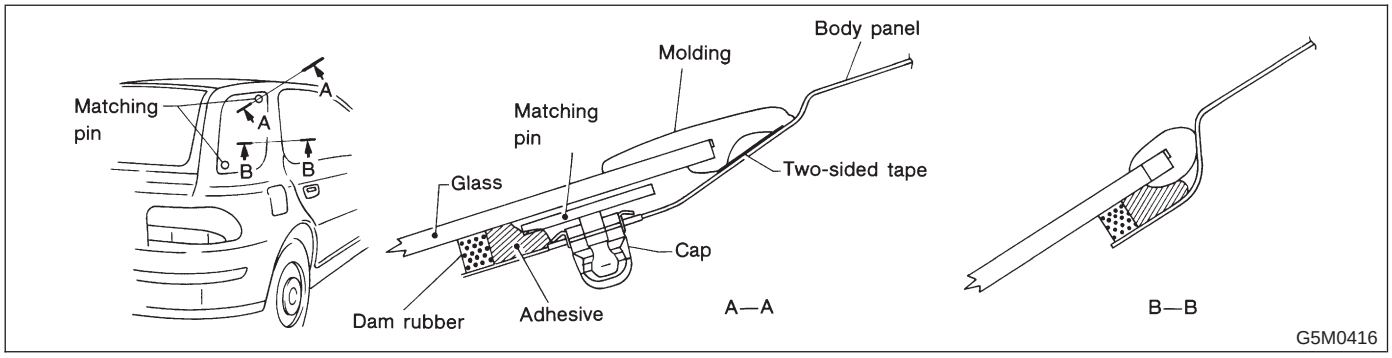
3) About one hour after installation, test for water leakage. Leave vehicle for 24 hours before using it.
4) Connect rear defogger connections.
5) Install high mount stop light and rear wiper.

7. Rear Quarter Glass

A: REMOVAL

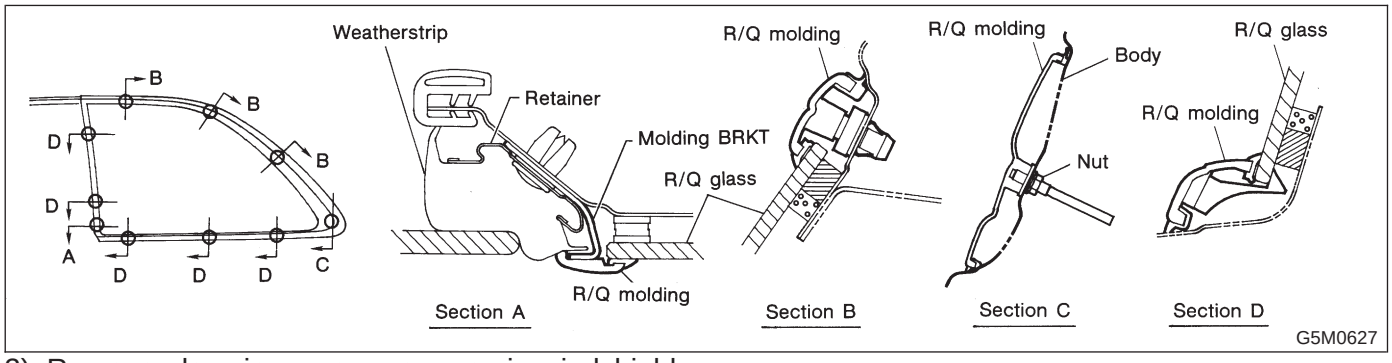
1. WAGON MODEL

1) Remove rear quarter molding on corner.
2) Remove glass in same manner as in windshield.

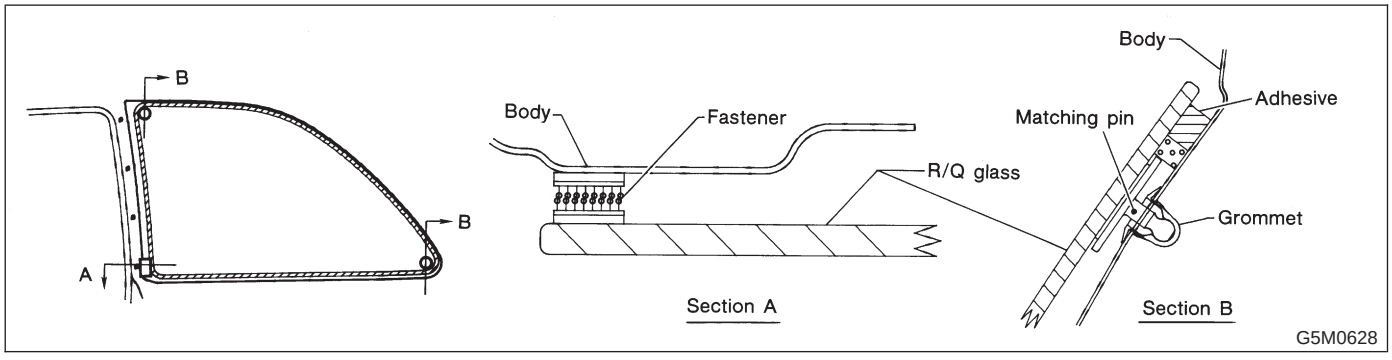


2. COUPE MODEL

1) Remove rear quarter molding.



2) Remove glass in same manner as in windshield.

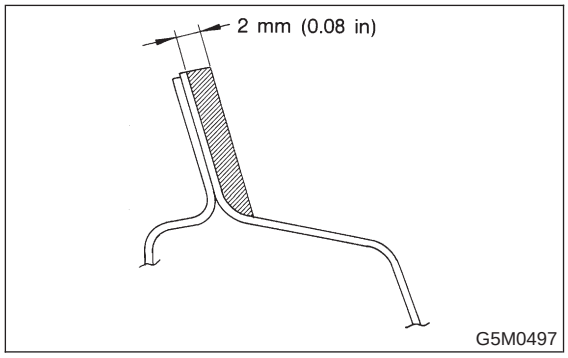


B: INSTALLATION

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.

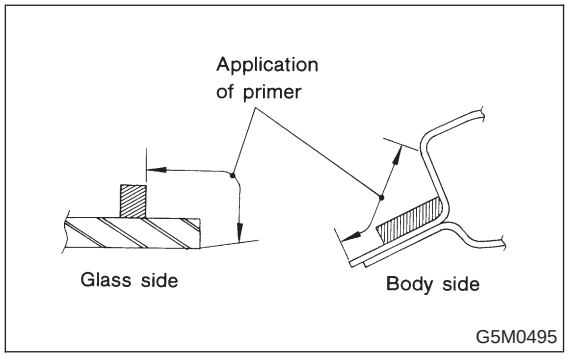


2) Cleaning of body surface:
(1) Remove chips, dirt and dust from body surface.
(2) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.

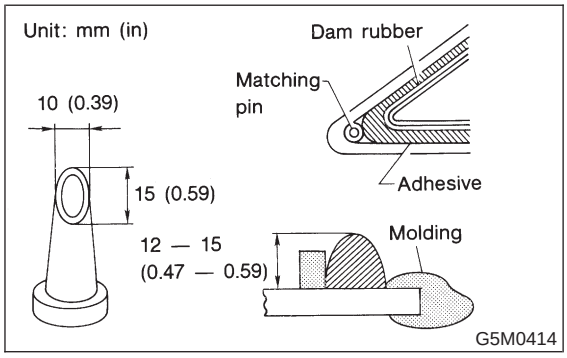
3) Cleaning glass:
(1) Remove dirt and dust from surface of glass to be adhered.
(2) Clean surface of glass to be adhered with alcohol or white gasoline.

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.

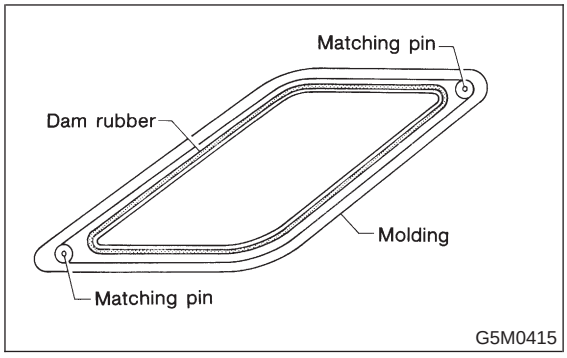


5) Application of adhesive:
(1) Cut nozzle tip as shown in figure.



(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.

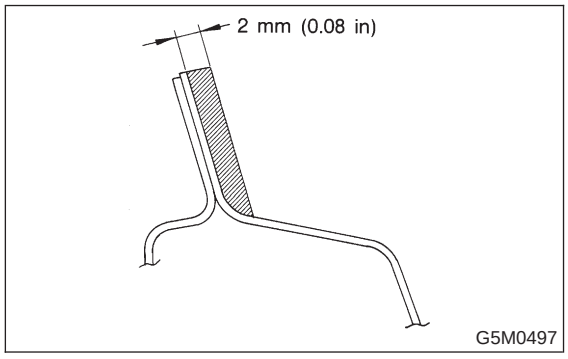
8) Spontaneous drying:
After completing all operations, leave vehicle alone for 24 hours.

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

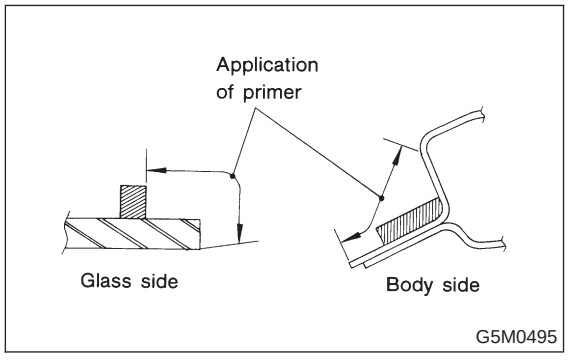
1) Finish surface of adhesive layer on body: Using a putty knife, etc., cut layer of adhesive stick firmly to body and finish it into a smooth surface of about 2 mm (0.08 in) in thickness.

CAUTION:
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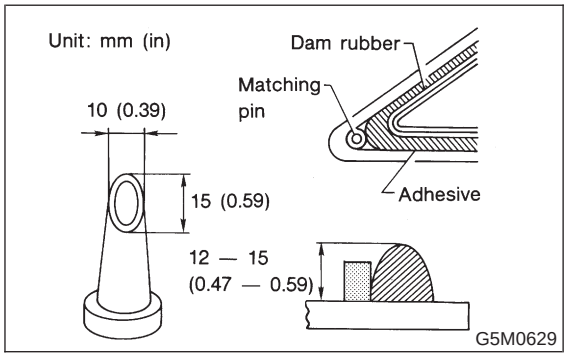


2) Cleaning of body surface:
   (1) Remove chips, dirt and dust from body surface.
   (2) Clean body wall surface and upper surface of adhesive layer with a solvent such as alcohol or white gasoline.
3) Cleaning glass:
   (1) Remove dirt and dust from surface of glass to be adhered.
   (2) Clean surface 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.
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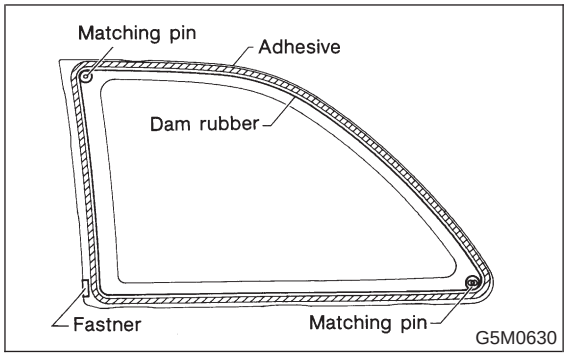
CAUTION:
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● Primer must not project from black frame of glass.
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5) Application of adhesive:
   (1) Cut nozzle tip as shown in figure.



   (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.



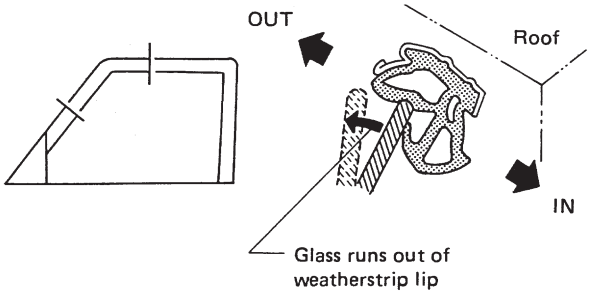
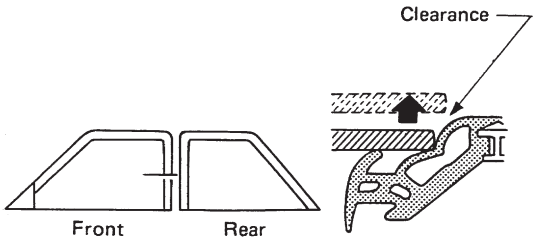
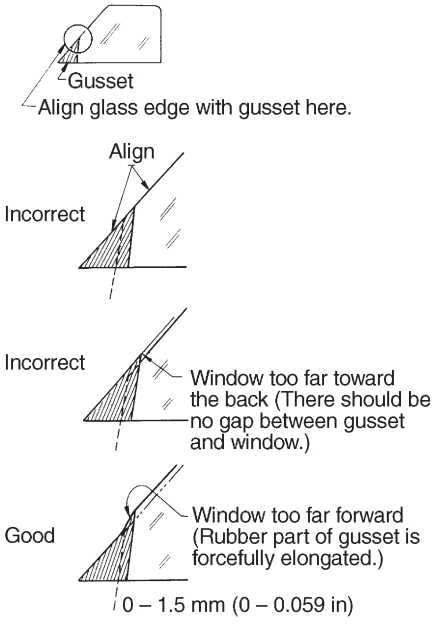
   (3) Stick them fast by pressing all sides lightly.
7) Water leakage test:
After installing glass, test for water leakage after about one hour.

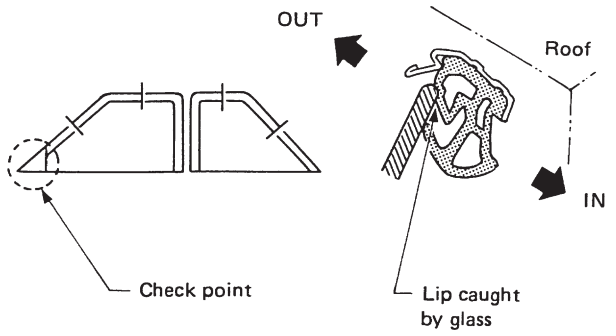
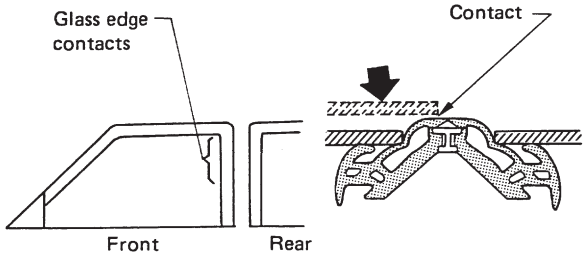
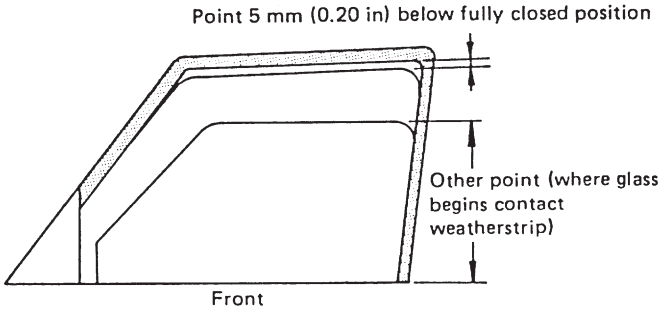
CAUTION:
● Move vehicle slowly.
● When opening and closing door, lower door glass and move door gently.
● Do not squirt strong hose stream on vehicle.

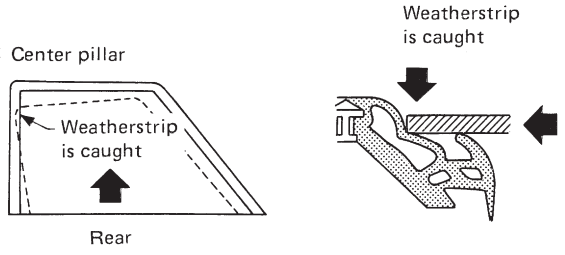
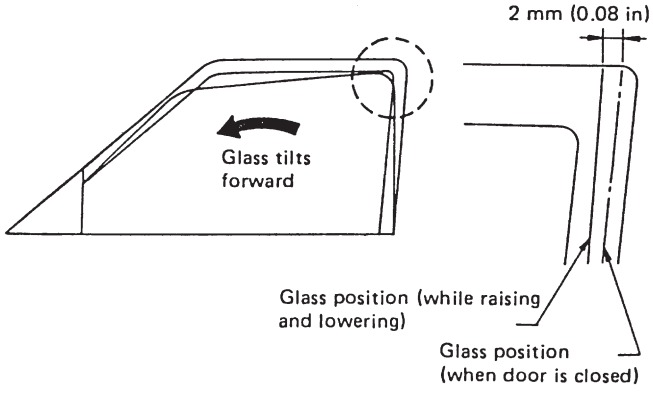
8) Spontaneous drying:
After completing all operations, leave vehicle alone for 24 hours.

CAUTION:
When delivering vehicle to user, tell him or her that vehicle should not be subjected to heavy shocks for at least three days. DIAGNOSTICS

1. Door Glass

	Condition	Apparent cause/Correction
Glass in fully closed position	1) Glass runs out of weatherstrip lip when considerable hand pressure is applied to it from inside.  G5M0502 (This condition may cause wind/booming noise during high- speed operation.)	● Insufficient upward travel of glass Increase upward travel of glass.
	2) Clearance exists between glass and weatherstrip when light hand pressure is applied to it at center and rear pillar locations.  G5M0503 (This condition may cause wind noise and/or water leakage.)	● Insufficient glass-to-door weatherstrip contact Check stabilizer and glass for proper contact. Increase contact using upper sash adjustment bolt. ● Insufficient glass-to-door weatherstrip contact Check stabilizer and glass for proper contact. Increase contact using upper sash adjustment bolt.
	3) Adjust door glass so that it is aligned with door rearview mirror gusset  H5M0672A	● 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 loosing all bolts and nuts witch tightening it.

	Condition	Apparent cause/Correction
Door in fully closed/ open position	1) Glass rides over weatherstrip lip when door is closed.  G5M0505 (This condition increases wind/booming noise, leakage and/or effort required to close door.)	● 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.
	2) Edge of glass contacts retainer when door is fully closed.  G5M0506	● 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.
Raise or lower window glass	1) Considerable effort or time is required to operate regulator. Standard operating effort: ● 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)  G5M0507	● 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
Raise or lower window glass	2) Center pillar weatherstrip is caught by rear window glass when glass is raised.  G5M0508	● Improper fore-aft or in-out alignment of window glass Lower regulator “B” channel to tilt window glass back.
	3) Glass tilts forward by more than 2 mm (0.08 in).  G5M0509 (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.	● 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			
	All windows do not move.	The window of driver side does not move.	The window of driver side does not move “AUTO” down.	The window of each passenger sides does not move.
Battery	(1)			
Fuse in fuse box	(2)			
Circuit breaker and relay	(3)			
Main switch	(4)	(1)	(1)	(1)
Sub switch of each passenger sides				(2)
Motor of driver side		(2)	(2)	
Motor of each passenger sides				(3)
Regulator assembly of each windows				(4)
Power supply line of main switch	(5)	(3)	(3)	
Ground line	(6)			
Haness and connector	(7)	(4)	(4)	(5)
				(): Figures in a parenthesis refer to diagnostics procedures.

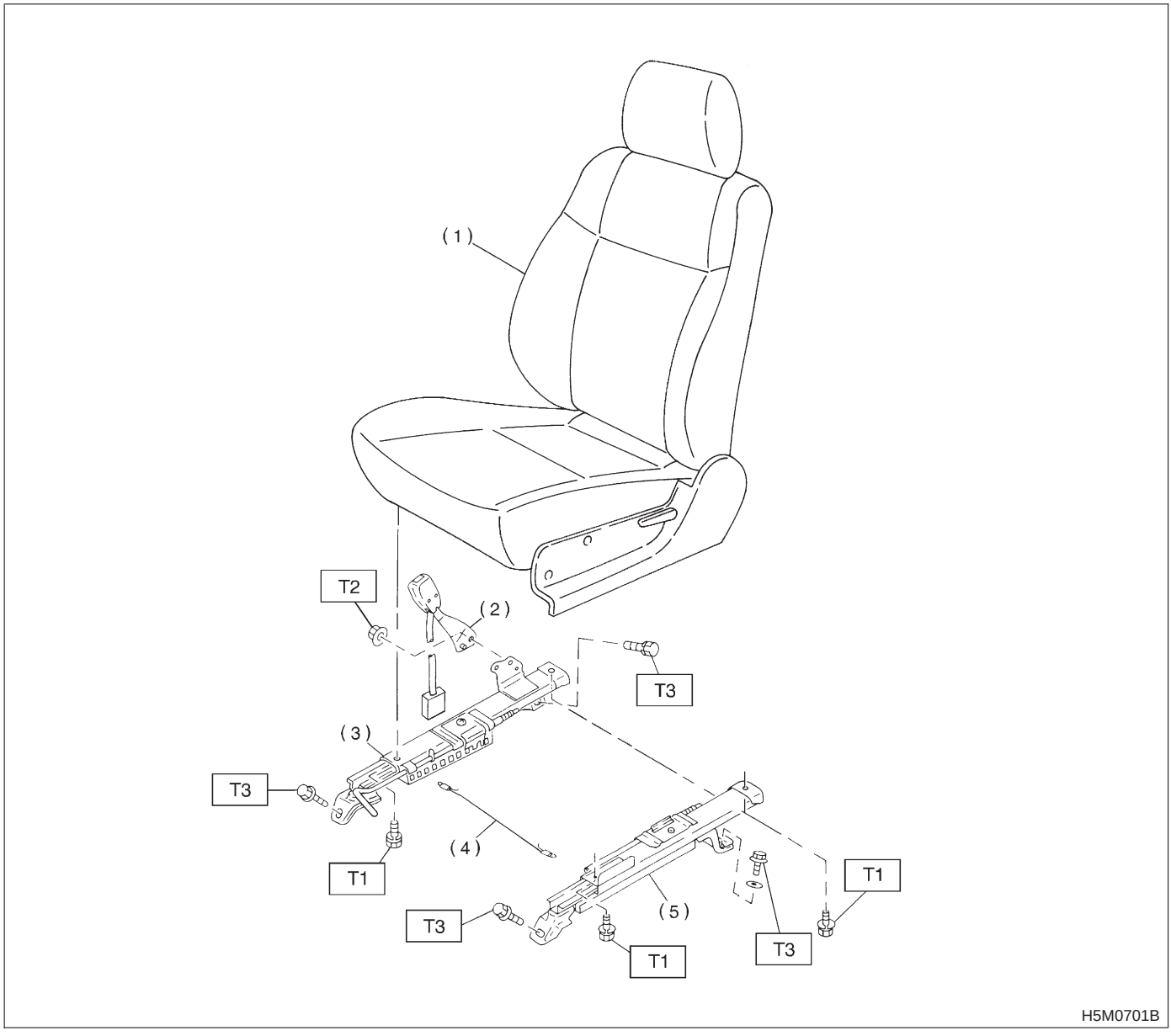
SEAT, SEAT BELTS AND INTERIOR 5-3

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- 3. Front Seat Belt 5
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- 6. Inner Trim 8

W **SERVICE PROCEDURE** 9
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- 4. Rear Seat Belt 13
- 5. Inner Trim Panel 15

1. Front Seat

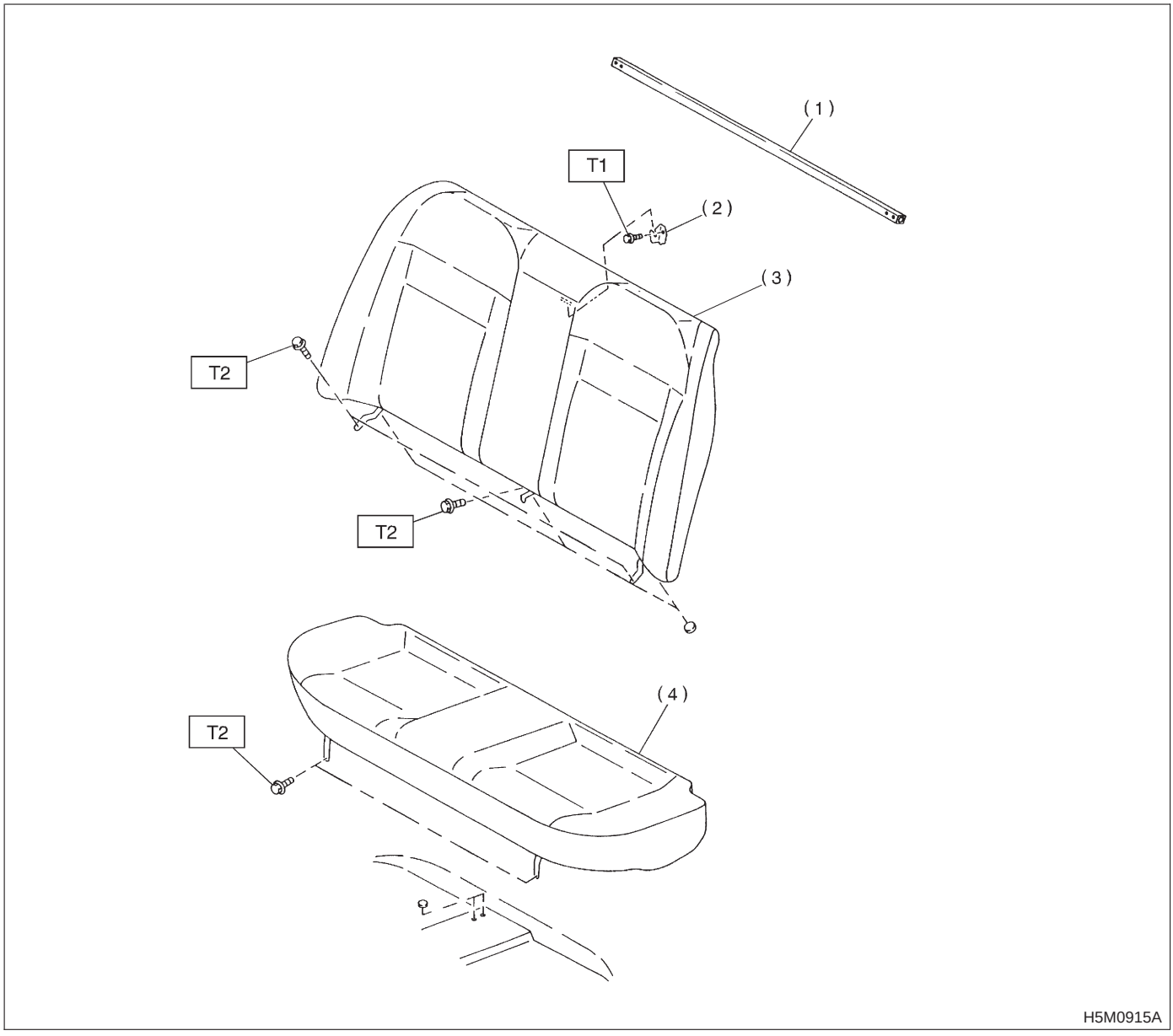


(1) Front seat ASSY
(2) Inner belt ASSY
(3) Inner slide rail ASSY
(4) Connect wire
(5) Outer slide rail ASSY

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

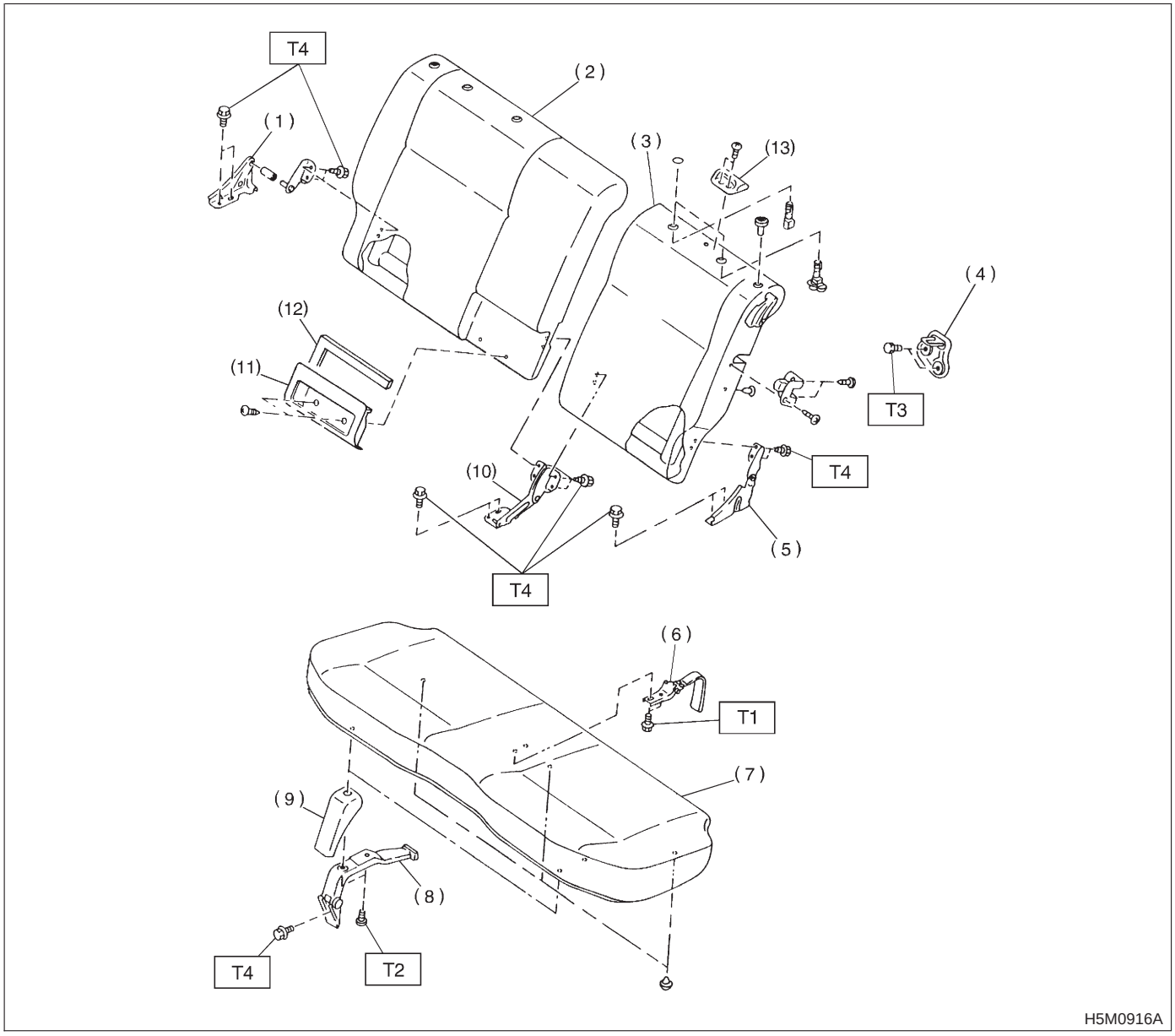
A: SEDAN AND COUPE MODEL



(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)

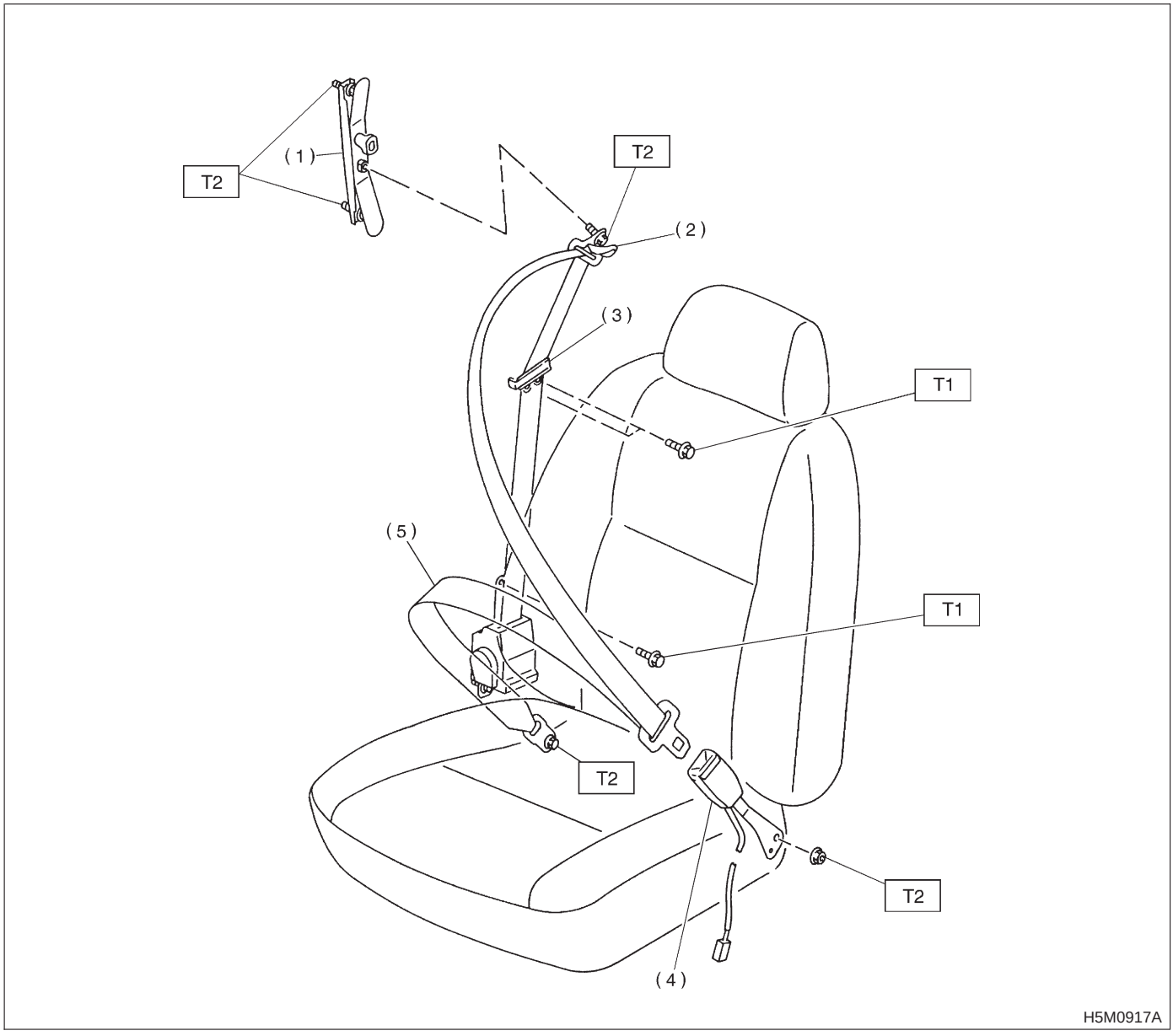
B: WAGON MODEL



(1) Hinge bracket (RH)
(2) Hinge bracket (RH)
(3) Backrest (LH)
(4) Striker
(5) Hinge bracket (LH)
(6) Lock hinge
(7) Rear cushion
(8) Hinge
(9) Hinge cover
(10) Backrest center hinge
(11) Belt pocket
(12) Pad ASSY pocket
(13) Hook

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)

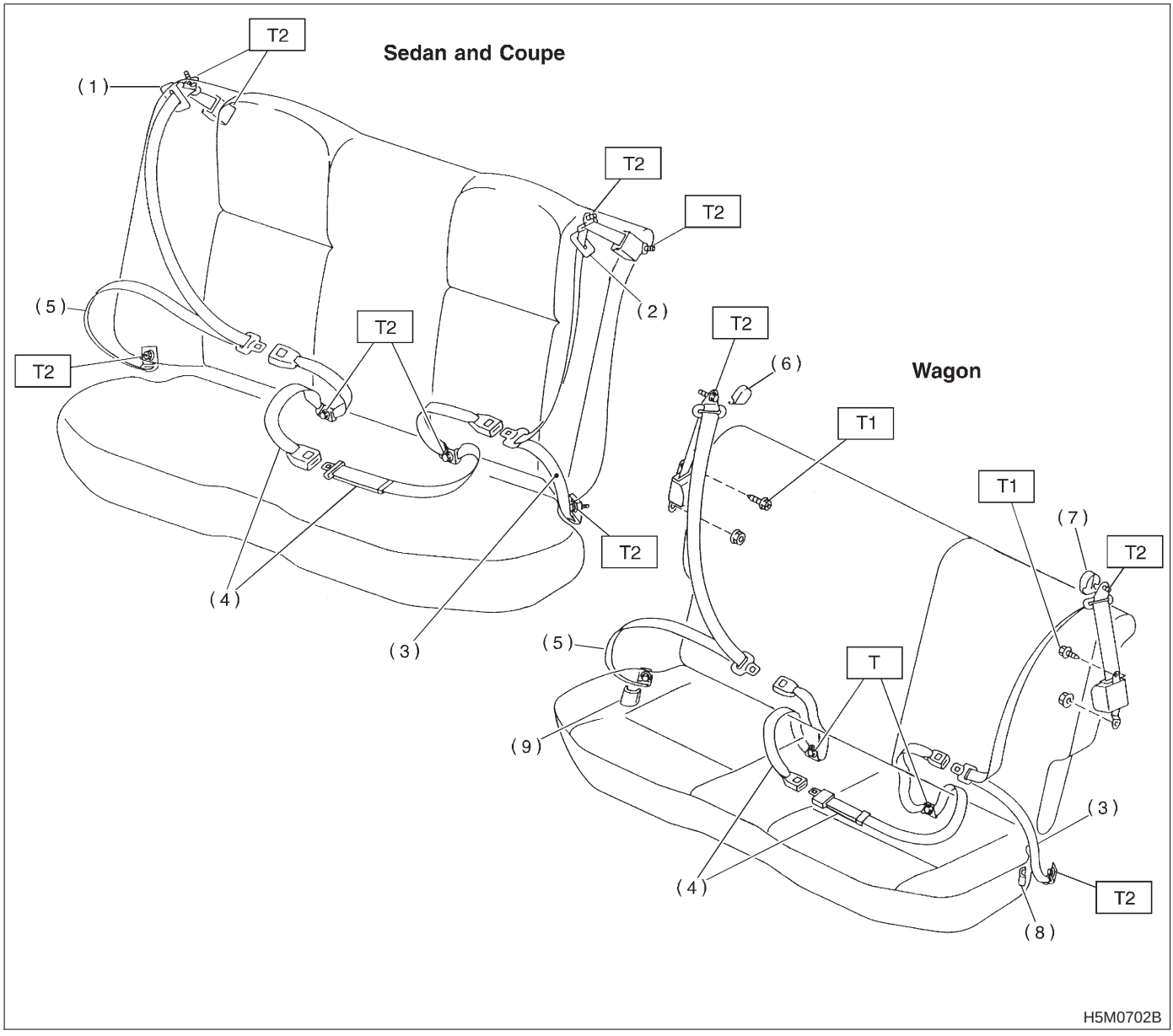
3. Front Seat Belt



(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)

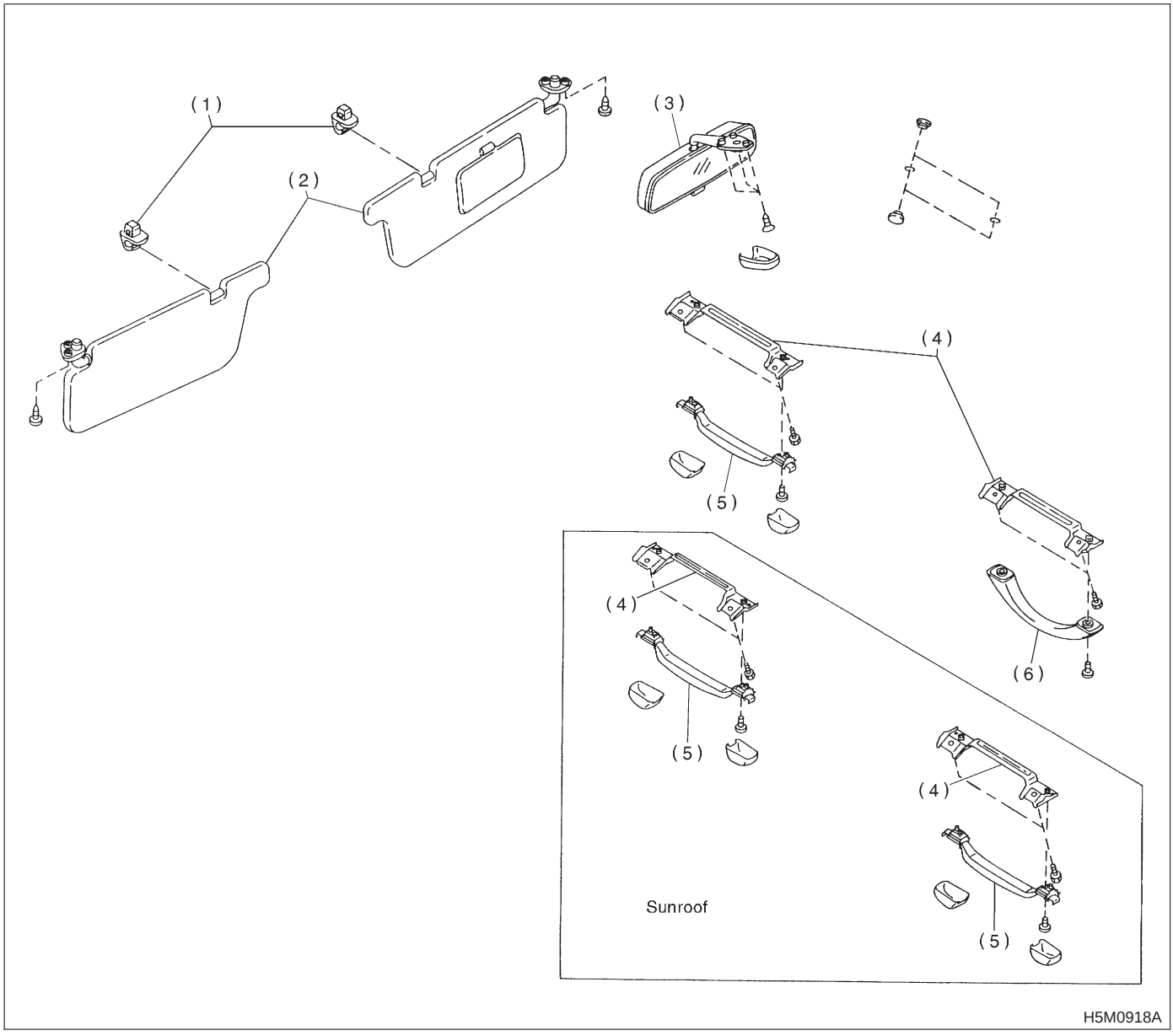
4. Rear Seat Belt



(1) Webbing cover (RH)
(2) Webbing cover (LH)
(3) Outer seat belt (LH)
(4) Center seat belt
(5) Outer seat belt (RH)
(6) Through cap (RH)
(7) Through cap (LH)
(8) Lap anchor cover (LH)
(9) Lap anchor cover (RH)

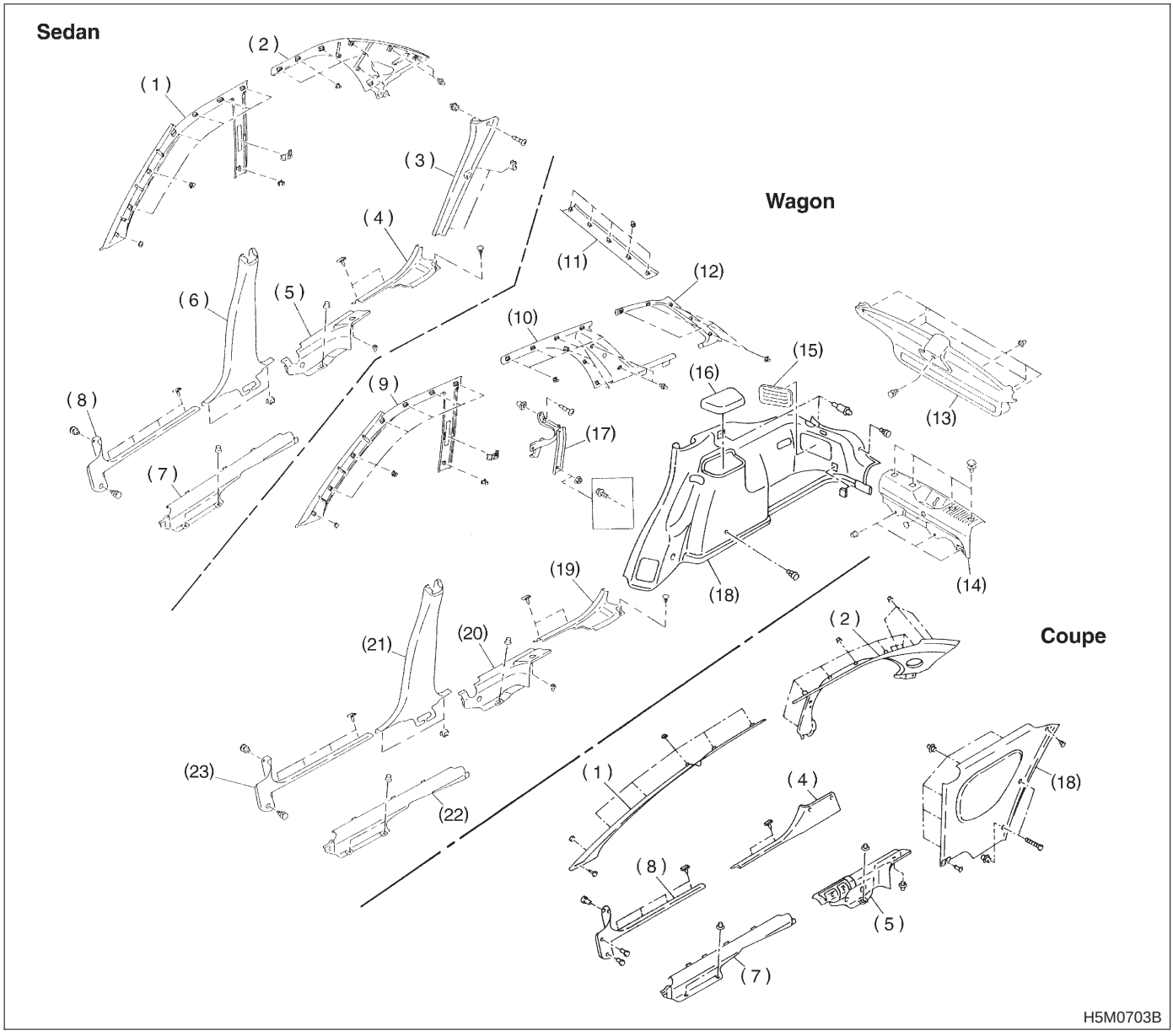
Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 35±13 (3.6±1.3, 26±9)

5. Inner Accessories



(1) Hook
(2) Sun visor
(3) Rearview mirror
(4) Assist rail bracket
(5) Assist grip (retractable)
(6) Assist grip (fixed)

6. Inner Trim

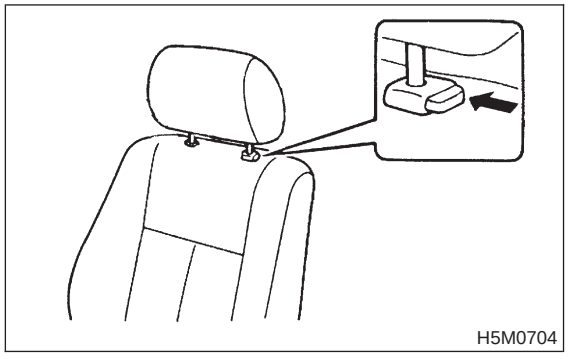


(1) Front pillar upper trim
(2) Rear pillar upper trim
(3) Rear pillar lower trim
(4) Side sill rear upper cover
(5) Side sill rear lower cover
(6) Center pillar lower trim
(7) Side sill front lower cover
(8) Front pillar lower trim
(9) Front pillar upper trim
(10) Rear quarter upper front trim
(11) 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

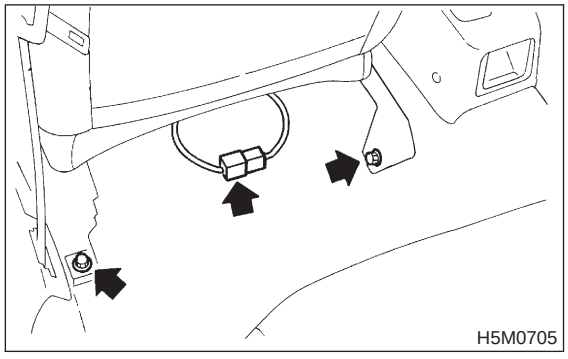
1. Front Seat

A: REMOVAL

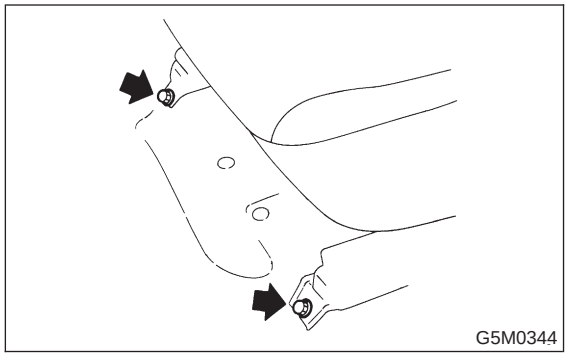
1) While operating button (located on top of backrest), lift headrest out with hand placed between backrest and headrest.



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.

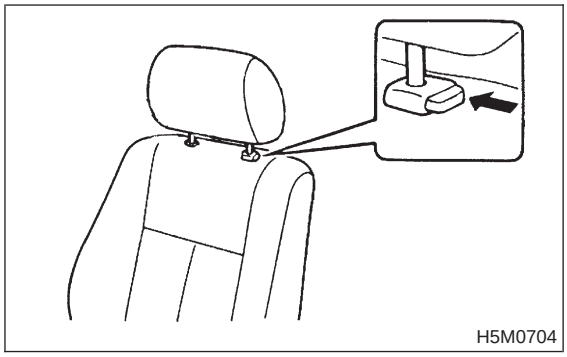


8) Remove front seat from vehicle.

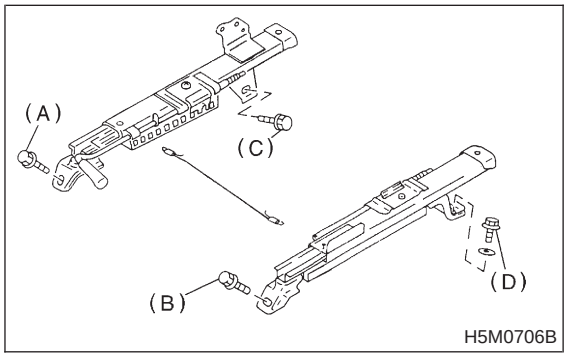
CAUTION:
Be careful not to scratch seat when removing it from vehicle.

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.
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 (A) and (B) 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 (C) and (D).



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 (C) and (D), slide seat as required, insert all lock plate pawls into holes in slide rail brackets, and tighten bolts (C) and (D) in that order.
10) Install bolt cover on rear end of slide rail.
11) Install headrest on backrest.

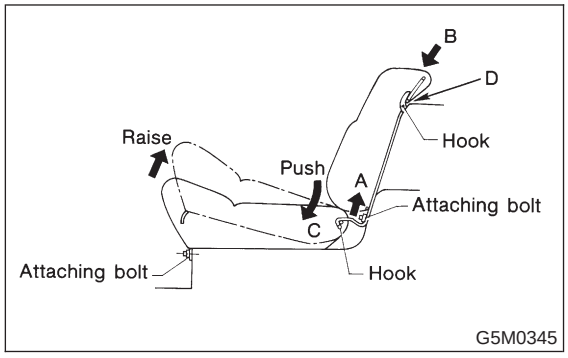
NOTE:
Tighten bolts in the designated order.

2. Rear Seat

A: REMOVAL

1. SEDAN AND COUPE MODEL

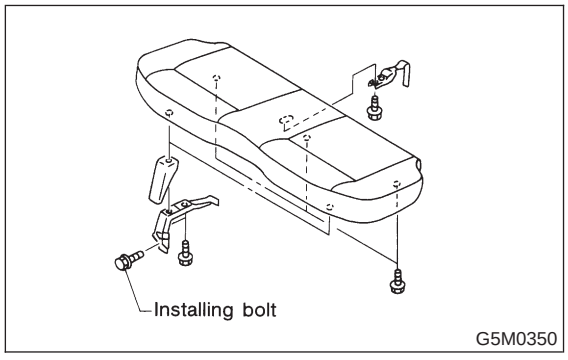
1) Remove bolts securing hinges (located at front of cushion) to body.
2) Slightly raise front of cushion while pushing down on cushion in the direction of “C”. With cushion held in that position, move it forward until it is unhooked.



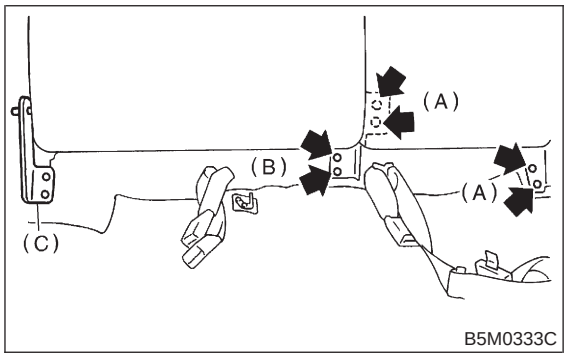
3) Remove bolts securing lower portion of backrest to body.
4) Lift rear seat backrest in direction “A” until it is released from upper hooks.

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 and then remove backrest (LH side).
5) Remove the bolt and then remove backrest (RH side) from hinge bracket.

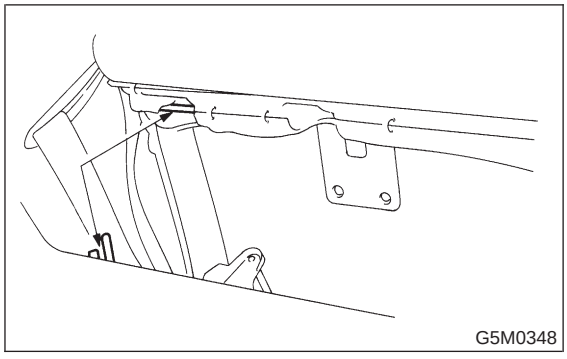


(A) Bolt (LH side)
(B) Bolt (Rh side)
(C) Hinge bracket

B: INSTALLATION

1. SEDAN AND COUPE MODEL

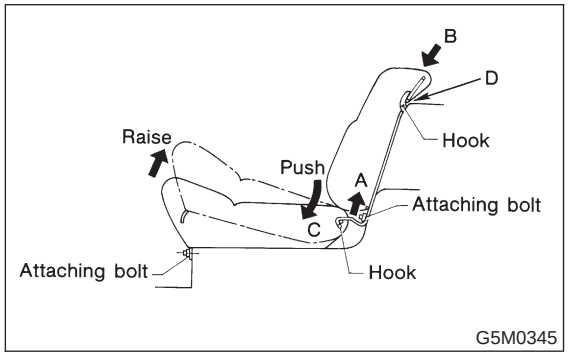
1) Before installing backrest, ensure that trim panel, insulator and seat belt are properly installed.
2) Transfer outer seat belt webbing to front of backrest and fold backrest forward. Attach seat belt webbing to upper hooks (2 places), and move pillow in the direction of “B” until backrest is aligned with lower mounting holes in body.



3) Secure lower center and both sides of backrest to body with bolts.

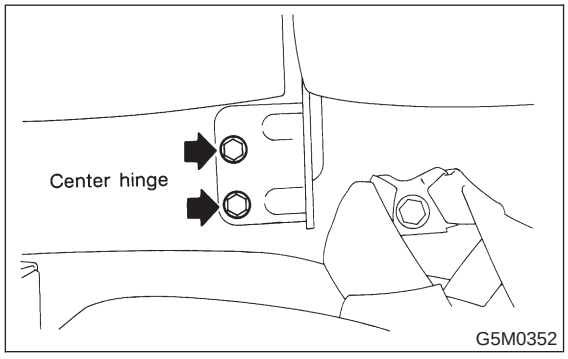
4) Slightly raise front section of cushion while pushing down on cushion in the direction of “C”. With cushion held in that position, attach rear section of cushion to hooks at lower frame location.
5) Secure front of cushion to body with bolts.

CAUTION:
● Before installing seat, ensure that seat belt is placed on cushion.
● Confirm that winding of three-point type seat belt can operate regularly.



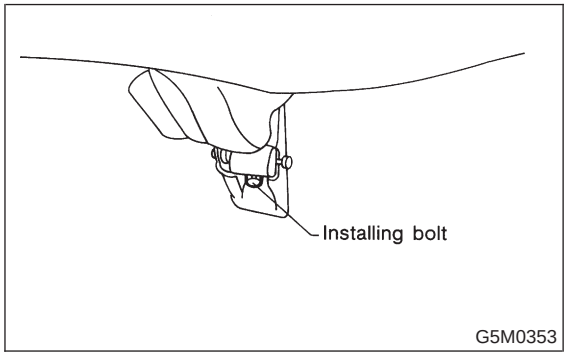
2. WAGON MODEL

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.

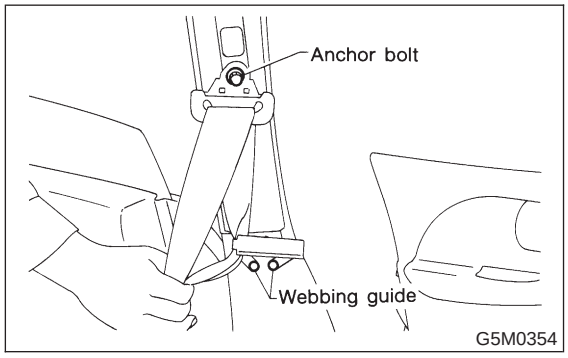
CAUTION:
● Do not allow center seat belt to get under cushion when folding cushion.
● Ensure that side seat belt tongue is free from cushion and trim panel.
● Lift front of cushion to ensure that cushion is properly locked.

3. Front Seat Belt

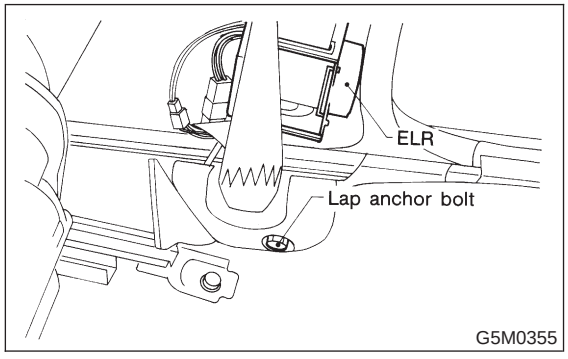
A: REMOVAL AND INSTALLATION

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.

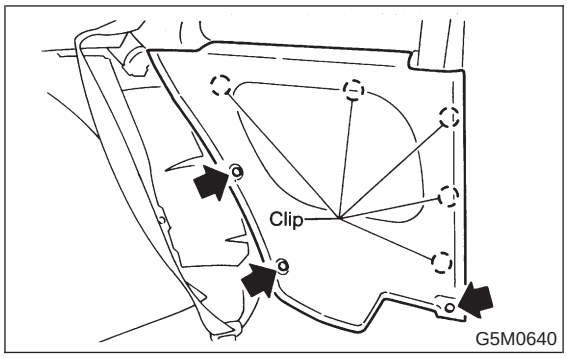


8) Remove belt retractor and outer belt.
9) Installation is in the reverse order of removal.

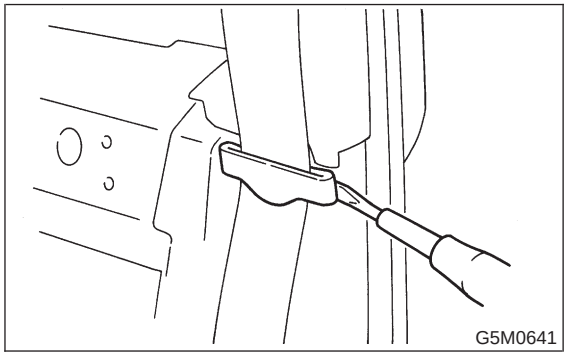
CAUTION:
● The left and right ELR's are not mutually interchangeable because different sensors are used.
● Be careful not to twist belts during installation.

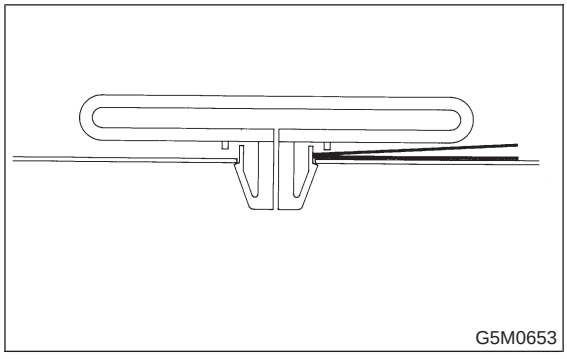
2. OUTER BELT (coupe)

1) Remove rear seat cushion and backrest.
<Ref. to 5-3 [W2A1].>
2) Remove rear quarter trim.



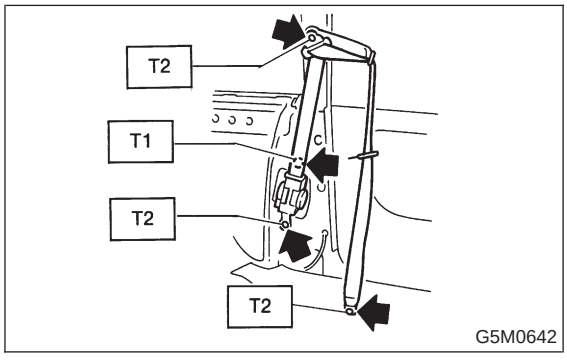
3) Remove webbing guide.





4) Remove anchor cover cap.
5) Remove four bolts and then belt retractor and outer belt. Tightening torque:
6) Installation is in the reverse order of removal.

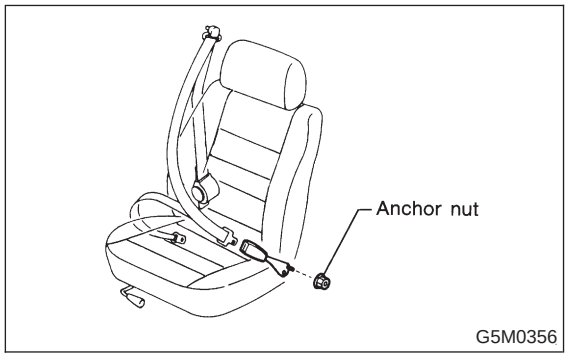
Tightening torque:
T1: 13±3 N·m (1.3±0.3 kg-m, 9.4±2.2 ft-lb)
T2: 35±13 N·m (3.6±1.3 kg-m, 26±9 ft-lb)



CAUTION:
● The left and right ELR's are not mutually interchangeable because different sensors are used.
● Be careful not to twist belts during installation.

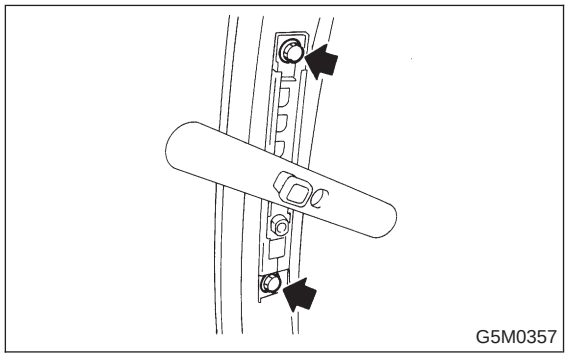
3. INNER BELT

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.



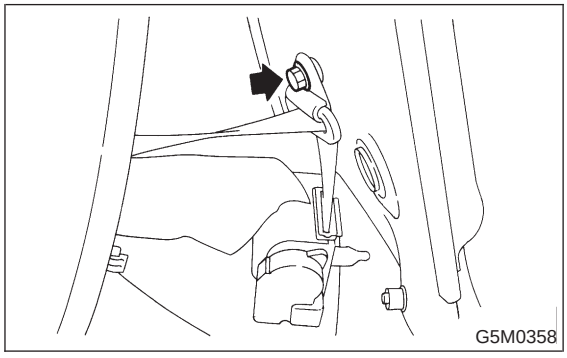
5) Installation is in the reverse order of removal.

4. Rear Seat Belt

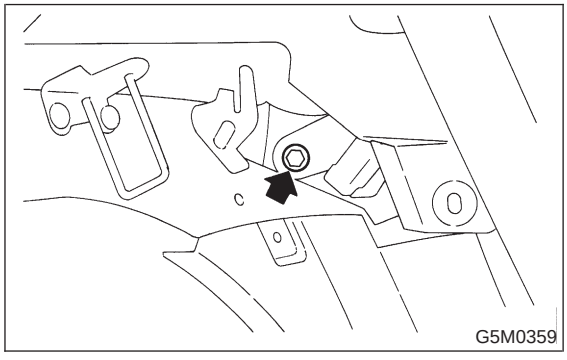
A: REMOVAL AND INSTALLATION

1. SEDAN AND COUPE MODEL

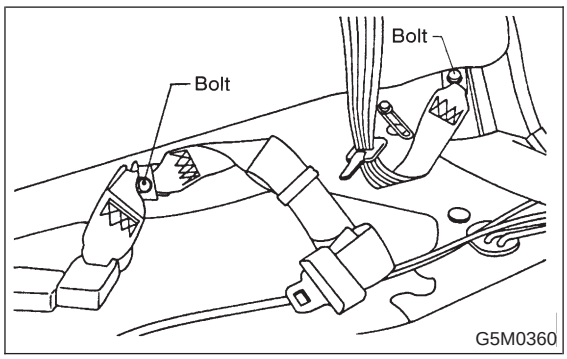
1) Remove rear cushion from body.
2) Remove rear backrest from body.
3) Remove screw from lower side of rear quarter trim, and lift-up lower side of rear quarter trim.
4) Remove trim panel rear bracket upper.
5) Remove rear quarter trim.
6) Remove outer anchor bolts.



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.



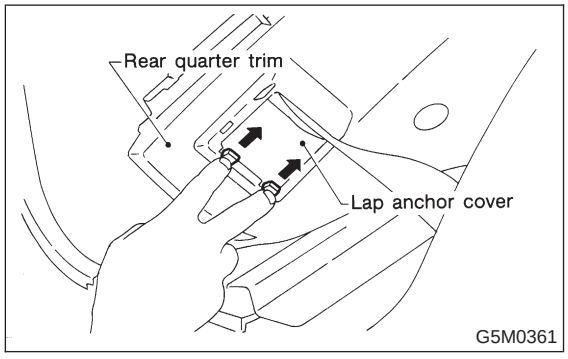
12) Remove washer from bolt, and remove bolt, belt assembly and anchor plate bracket.

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.

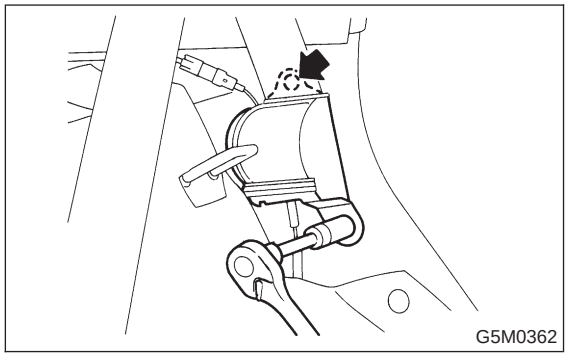
2. WAGON MODEL

1) Raise rear cushion.
2) Remove rear backrest from body.
3) Remove shoulder anchor cover and anchor bolt.
4) Remove lower portion of rear quarter trim.
5) Remove lap anchor cover and bolt.



6) 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.



7) Installation is in the reverse order of removal. Ensure that seat belt is properly reeled on and off after installation of ELR.

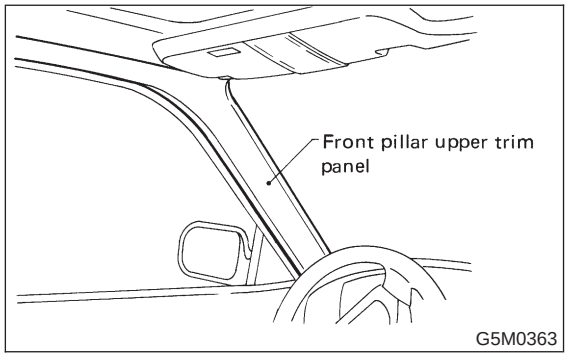
CAUTION:
● Be extremely careful not to confuse center seat anchor plate with outer seat anchor plate during installation.
● Ensure that seat belts are free from twisting after installation.
● Ensure that tongues, buckles and belts are properly placed on seat.

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.

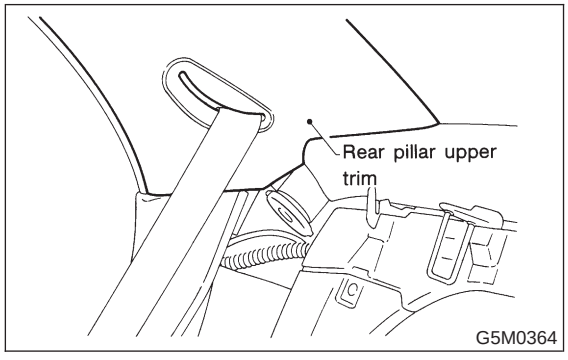


5) Installation is in the reverse order of removal.

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.

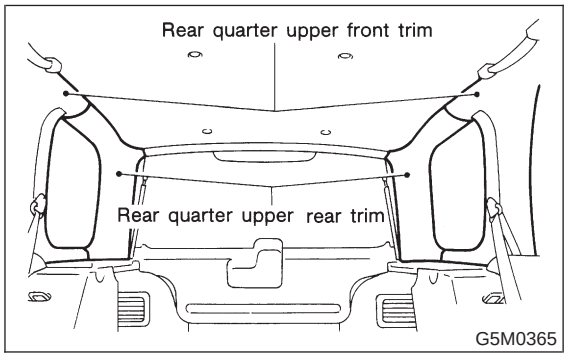


6) Installation is in the reverse order of removal.

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.

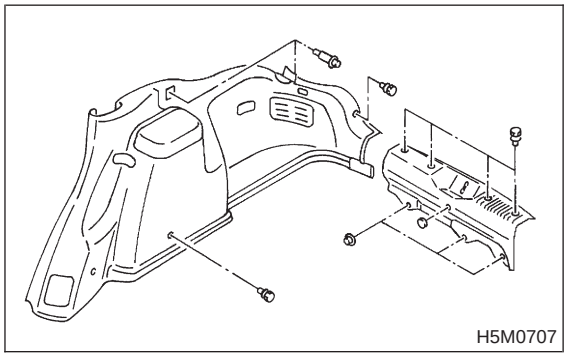


7) Installation is in the reverse order of removal.

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.

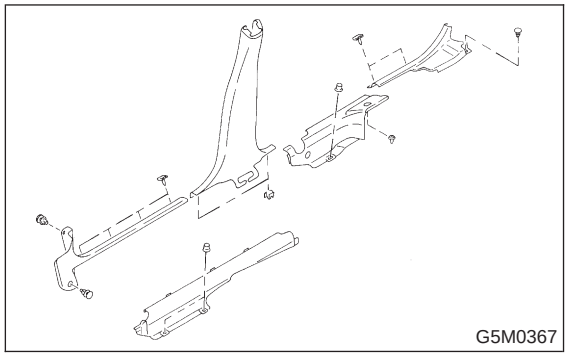
CAUTION:
Be careful not to ride trim panel over harness, insulators, etc.

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.

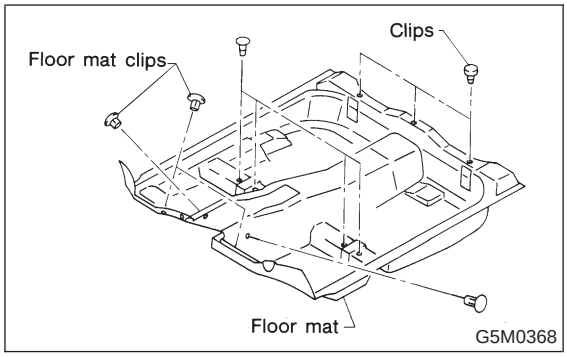
1) Remove front seats.
2) Remove rear seat cushion.
3) Remove center tray, indicator cover, cover assembly, and console box, depending on the specifications.
4) Remove front pillar lower trim panel.
5) Remove center pillar lower trim panel.
6) Remove three clips under rear seat cushion.
7) Remove rear cover side plate and rear pillar lower trim.
8) Pull out edge in the groove of side sill cover.


G5M0367

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.

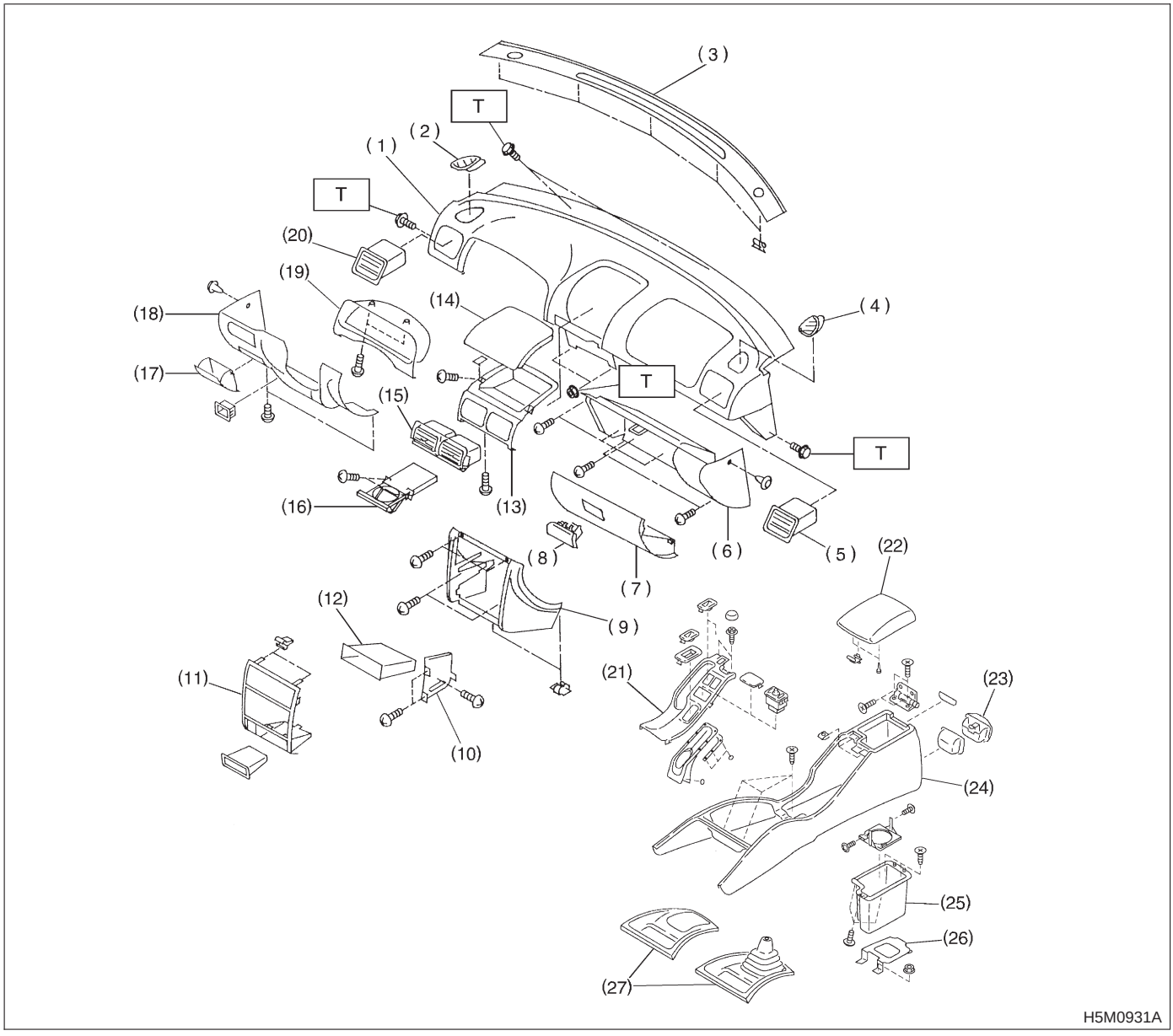
NOTE:
● Secure mat firmly with hook and velcro tape.
● Insert mat edge firmly into the groove of side sill cover.

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



(1) Pad & frame
(2) Grille side (D)
(3) Front def. grille
(4) Grille side (P)
(5) Grille vent (P)
(6) Glove box panel
(7) Glove box lid
(8) Knob
(9) Instrument panel center console
(10) BRKT (Radio)
(11) Center console cover
(12) Pocket
(13) Panel center
(14) Center pocket lid
(15) Grille center
(16) Cup holder
(17) Side pocket
(18) Lower cover ASSY
(19) Meter visor
(20) Grille vent (D)
(21) Console cover
(22) Console lid
(23) Ash tray
(24) Console box
(25) Console pocket
(26) Rear console BRKT
(27) Front cover

Tightening torque: N·m (kg-m, ft-lb)
T: 7±1 (0.7±0.1, 5.1±0.7)

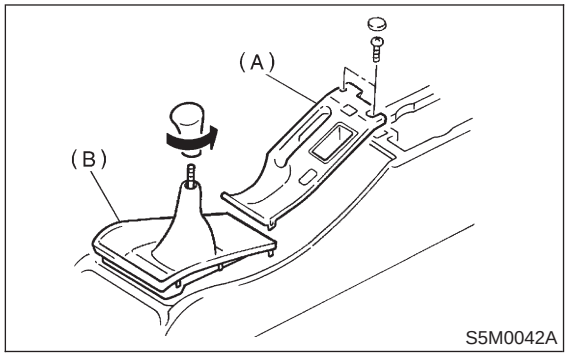
1. Instrument Panel AIRBAG

A: REMOVAL

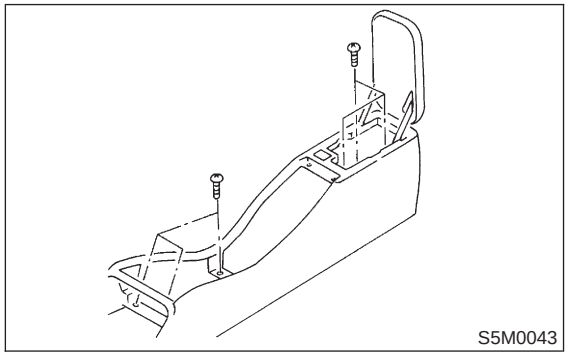
Airbag system wiring harness is routed on steering support beam.

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
● Be careful not to damage Airbag system wiring harness when servicing the instrument panel.

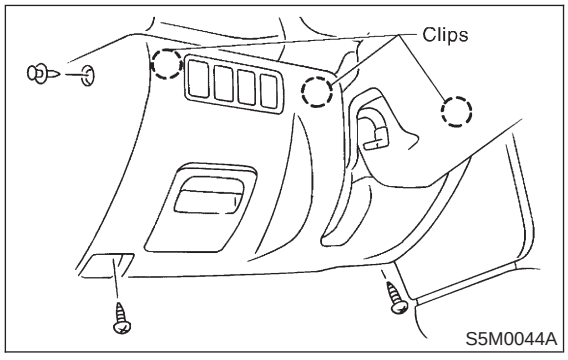
1) Disconnect GND cable from battery.
2) Remove shift knob (MT model).
3) Remove console cover (A) and front cover (B).



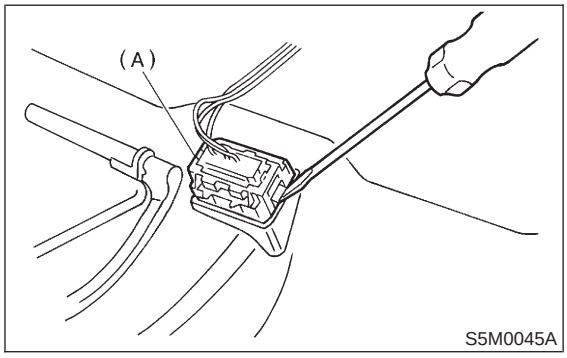
4) Remove console box.



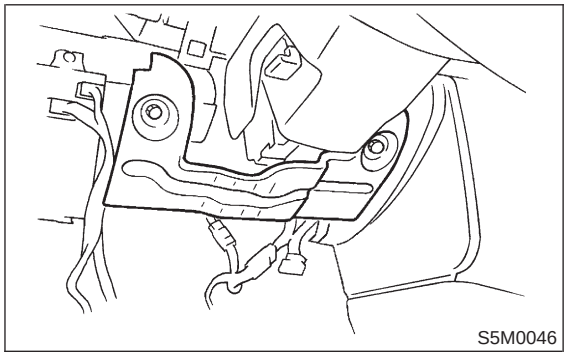
5) Remove lower cover and then disconnect connector.



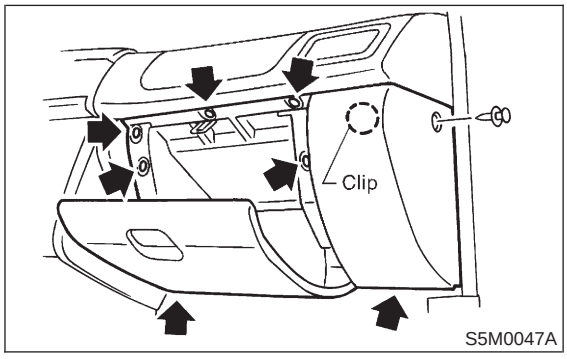
6) Disconnect data link connector (A) from lower cover.



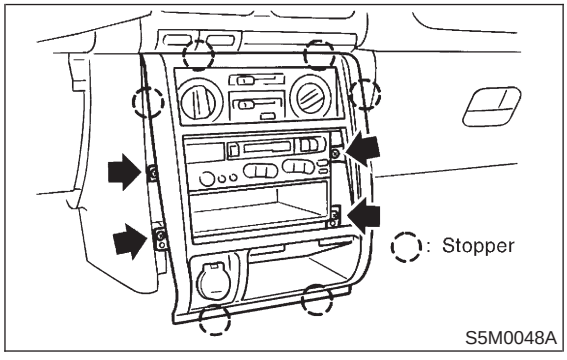
7) Remove knee panel.



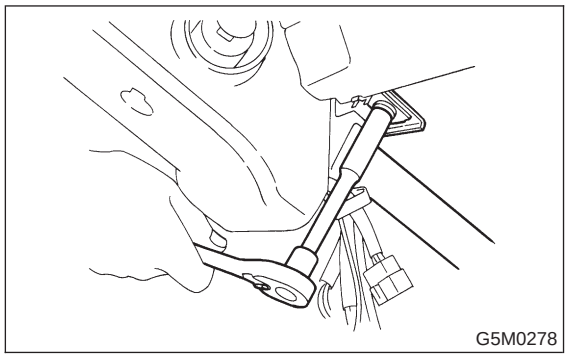
8) Remove glove box.



9) Remove center panel and disconnect connector.
10) Remove audio.



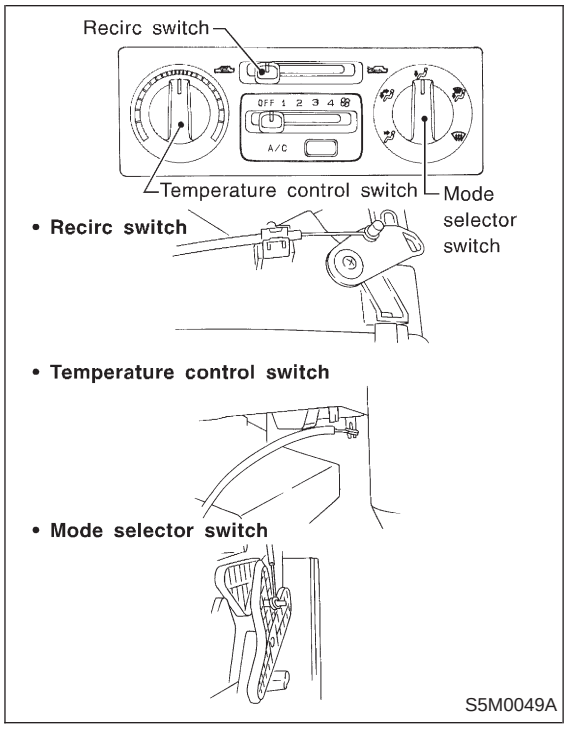
11) Remove two bolts and lower steering column.



12) Set temperature control switch to “FULL HOT”, mode selector switch to “DEF” position and recirc switch to “FRESH” position.

13) Disconnect temperature control cable and mode control cable from heater unit then disconnect recirc control cable from intake unit.

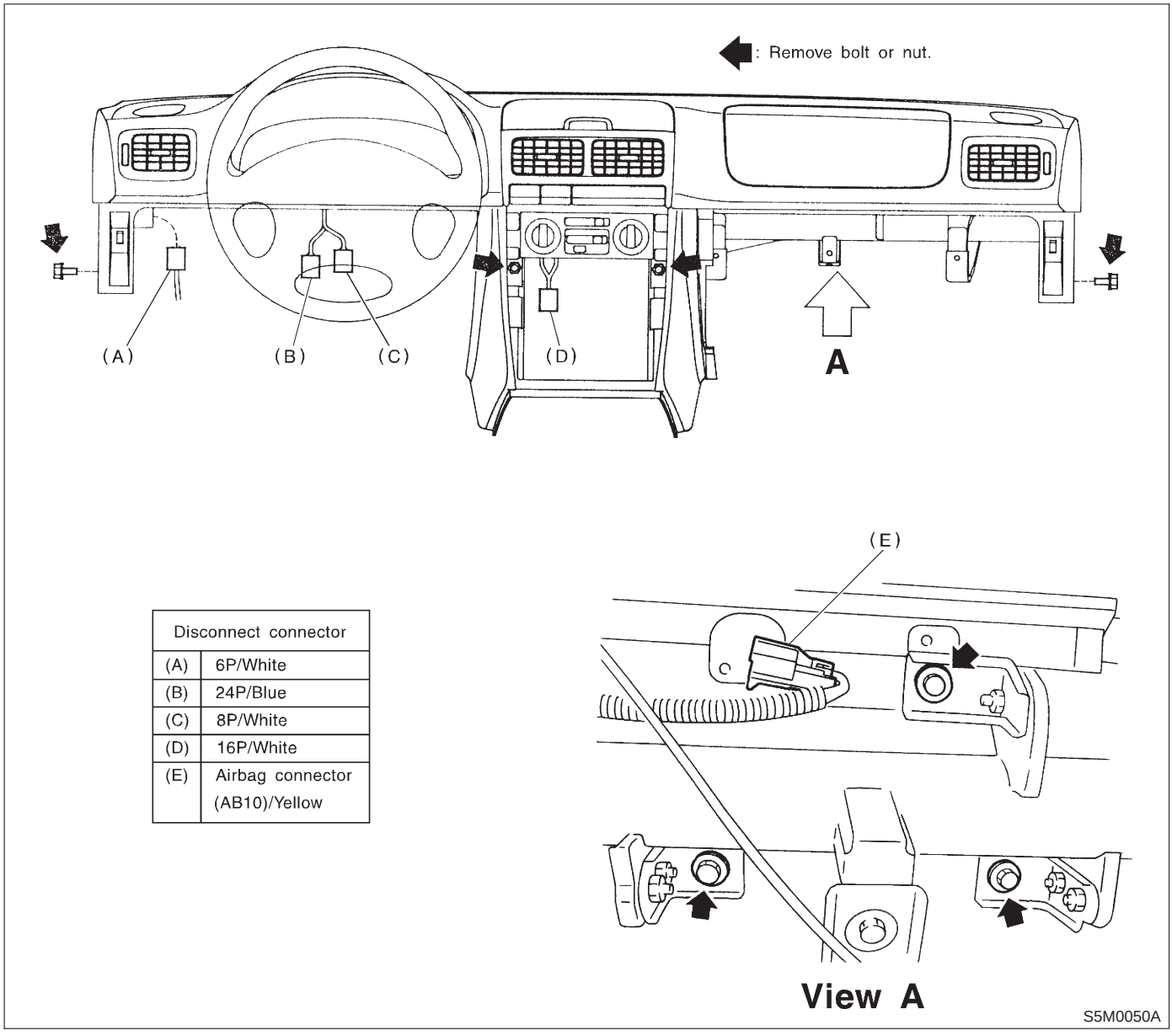
NOTE:
Do not move switch and link when installing.



14) Disconnect harness connectors and then remove the installing bolts and nuts.

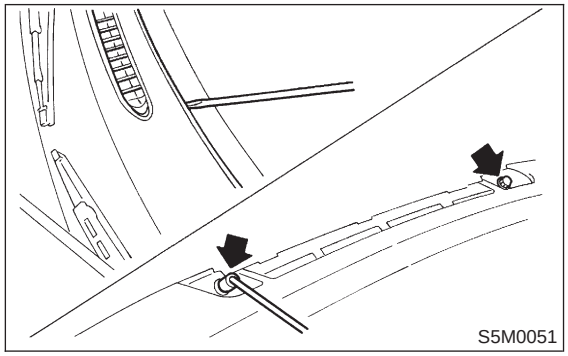
CAUTION:
Be sure to hold socket section and not harness when disconnecting.

NOTE:
Put matching mark, if necessary, for easy reassembly.



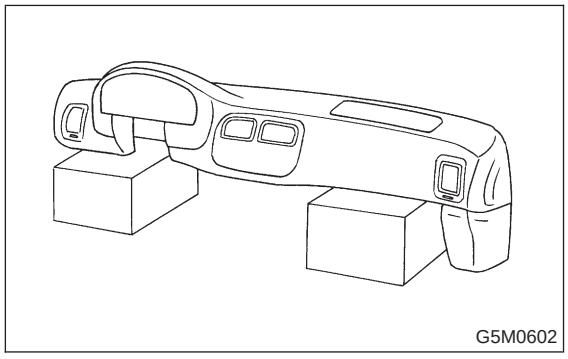
Disconnect connector	
(A)	6P/White
(B)	24P/Blue
(C)	8P/White
(D)	16P/White
(E)	Airbag connector (AB10)/Yellow

15) Remove front defroster grille and two bolts.



16) Remove instrument panel carefully from the body.

CAUTION:
- **Take care not to scratch the instrument panel and related parts.**
- **When storing removed instrument panel with passenger airbag module, place it standing up on the floor.**

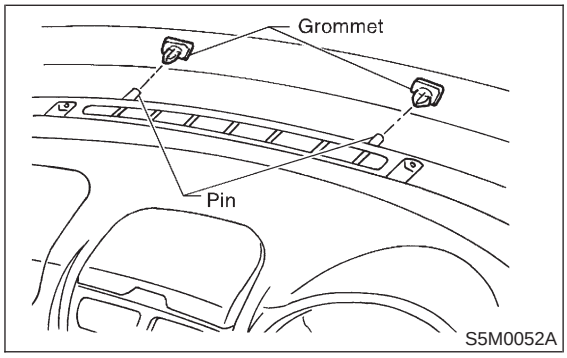


B: INSTALLATION

Installation is in the reverse order of removal.

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.**

NOTE:
When setting instrument panel into position, push two pins into grommet on body panel.

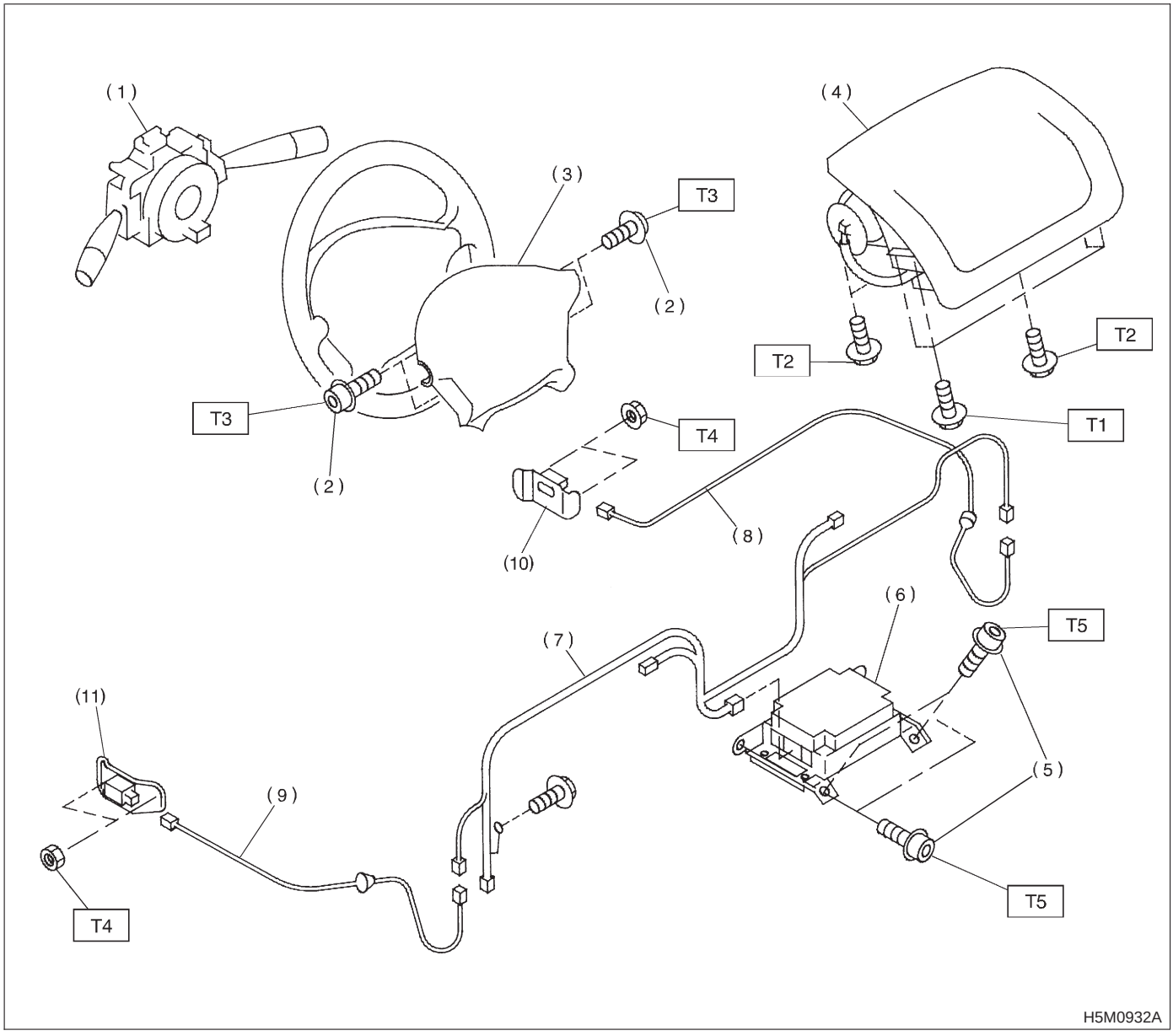


SUPPLEMENTAL RESTRAINT SYSTEM 5-5

Page

C **COMPONENT PARTS** 2
1. SRS Airbag 2
W **SERVICE PROCEDURE** 3
1. General 3
2. Inspection and Replacement Standards 5
3. Airbag Module 7
4. Main Harness 10
5. Airbag Control Module 11
6. Combination Switch 12
7. Front Sub Sensor 13

1. SRS Airbag



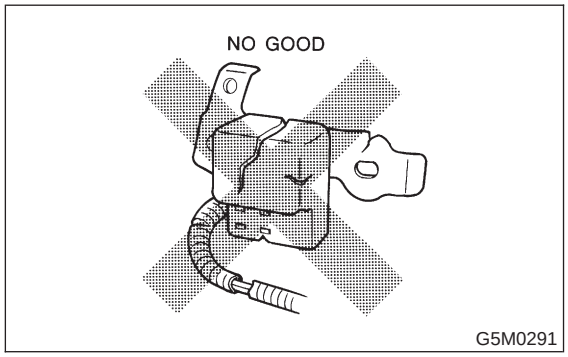
(1) Combination switch ASSY with roll connector
(2) TORX® bolt T30
(3) Airbag module ASSY (Driver)
(4) Airbag module ASSY (Passenger)
(5) TORX® bolt T40
(6) Airbag control module
(7) Airbag main harness
(8) Front sub sensor harness (RH)
(9) Front sub sensor harness (LH)
(10) Front sub sensor (RH)
(11) Front sub sensor (LH)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 10±2 (1.0±0.2, 7.2±1.4)
T4: 20±4 (2.0±0.4, 14.5±2.9)
T5: 25±2 (2.5±0.2, 18.1±1.4)

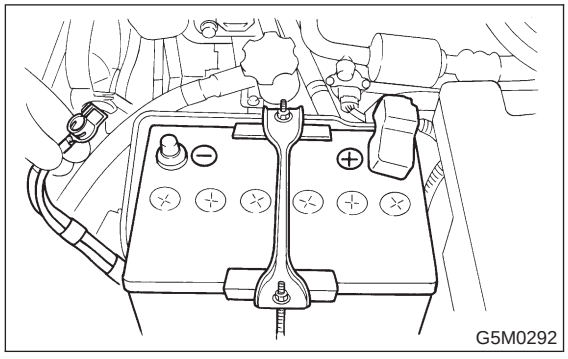
1. General

A: PRECAUTION

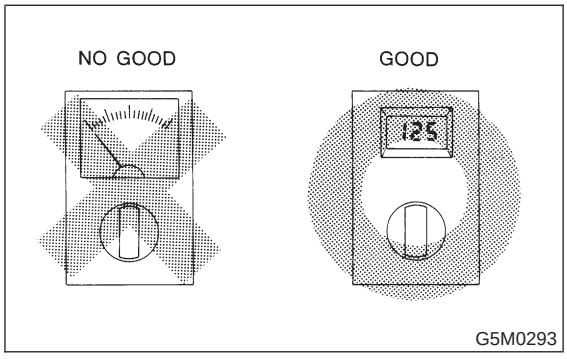
● If any of the airbag system parts such as sensors, airbag module, airbag control module and harness are damaged or deformed, replace with new genuine parts.

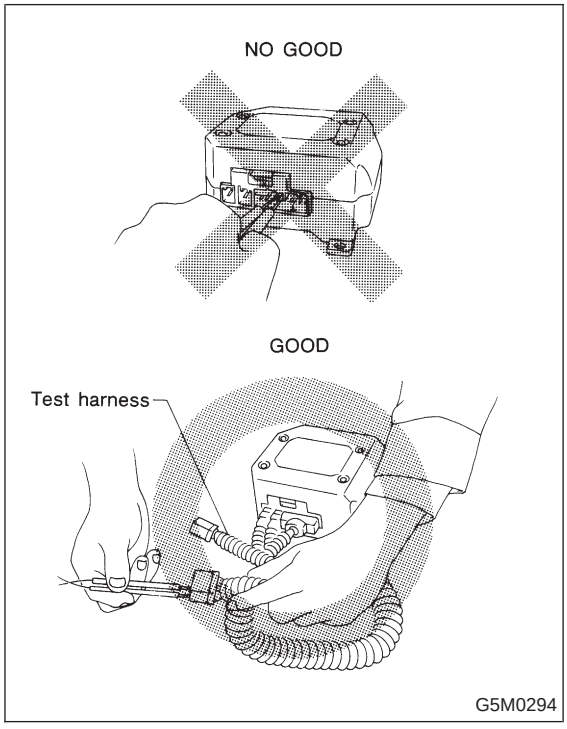


● When servicing, be sure to turn the ignition switch off, disconnect the negative (−) battery terminal then the positive (+) terminal in advance, and wait for more than 20 seconds before starting work.

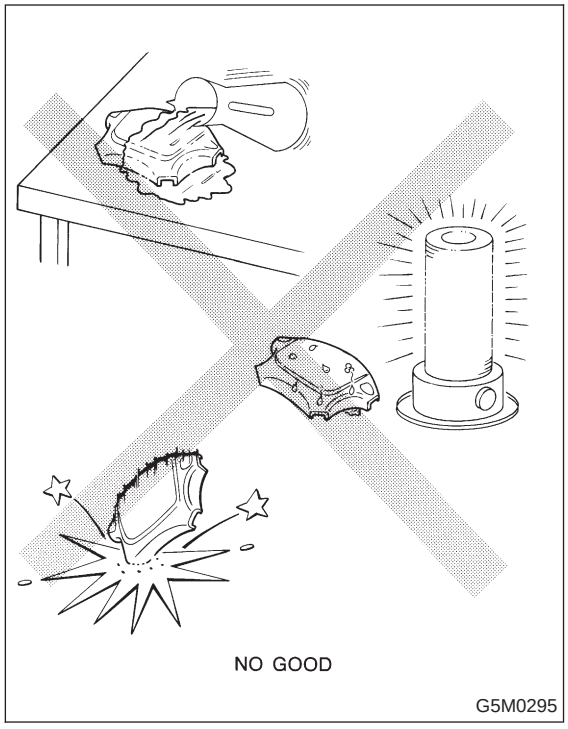


● When checking the system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously. Do not directly apply the tester probe to any connector terminal of the airbag. When checking, use a test harness.

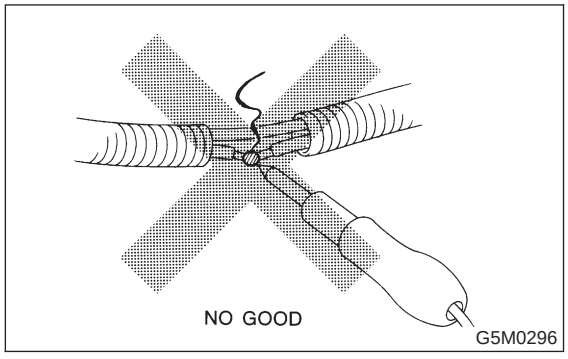




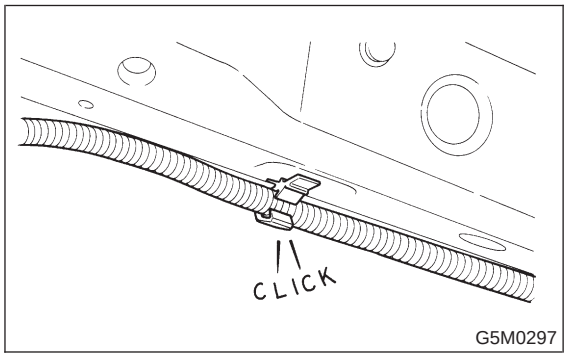
● Do not drop the airbag modulator parts, subject it to high temperatures over 90°C (194°F), or apply oil, grease, or water to it; otherwise, the internal parts may be damaged and its reliability greatly lowered.



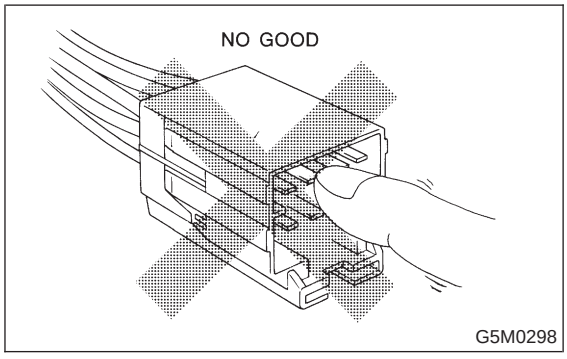
● If any damage or open is found on the SRS airbag system wire harness, do not attempt to repair using soldering, etc. Be sure to replace the faulty harness with a new genuine part.



● 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.



● When cpnnecting or disconnecting airbag connector, make sure ignition switch is OFF.

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.

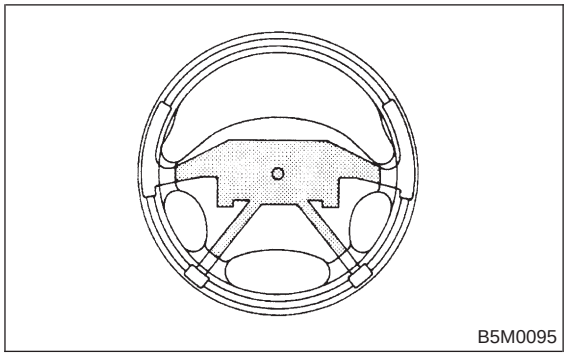
F: STEERING WHEEL

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
● 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.


B5M0095

G: STEERING COLUMN ASSEMBLY

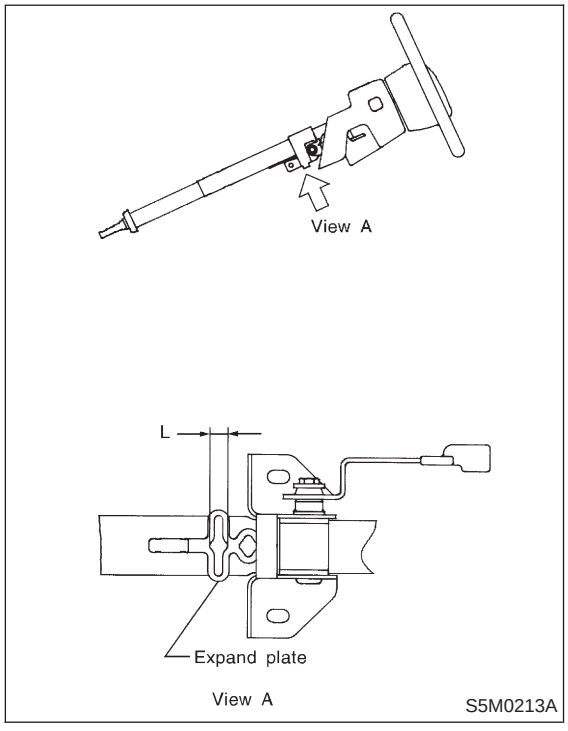
1. INSPECTION STANDARD

● A vehicle damaged in a collision (regardless of whether or not airbag is deployed).

2. REPLACEMENT STANDARD

● Check to ensure that clearance of expand plate on steering column under side is within specifications.

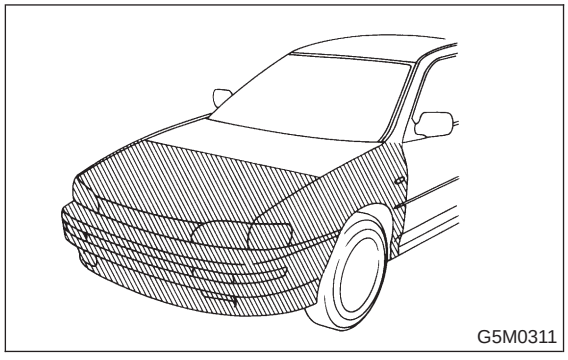
Clearance of expand plate: L
More than 15 mm (0.59 in)



H: FRONT SUB SENSOR

1. INSPECTION STANDARD

● Check the front section (Refer to shaded area of vehicle in figure) for damage, regardless of whether or not airbag is deployed.



● The designated trouble code is output during self-diagnosis. <Ref. to 5-5 [T4A0].>

2. REPLACEMENT STANDARD

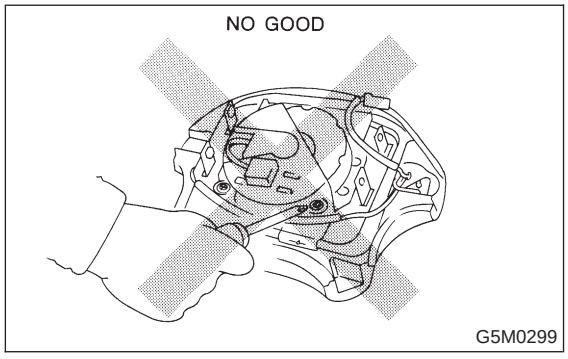
● Bracket is deformed.
● Housing is cracked or deformed.
● The label (that identifies the manufacturing number) is peeled or deteriorated.
● Harness circuit is broken, lead wire is exposed, corrugated tube is cracked, etc.
● Front sub sensor determined as faulty as a result of Diagnostics.
● Airbag is deployed.
● Front sub sensor dropped to the floor/ground.

3. Airbag Module

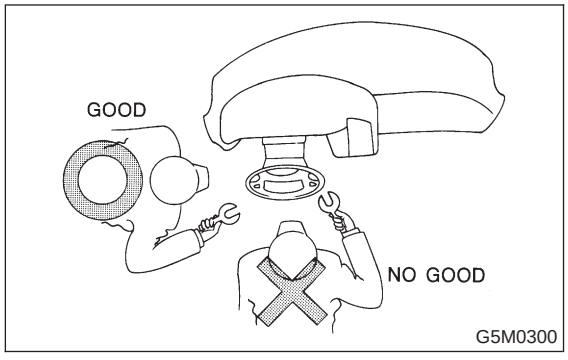
A: REMOVAL AND INSTALLATION

CAUTION:

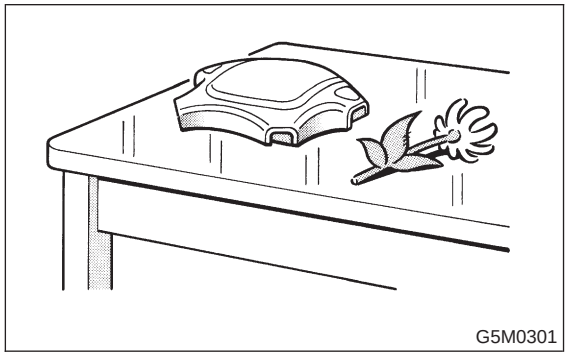
● The airbag module (driver side and passenger side) must not be disassembled. The airbag module cannot be used again once inflated.



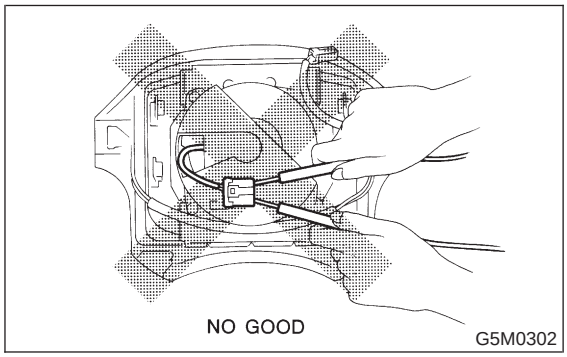
● When removing and installing the airbag module (driver side and passenger side), the operator should stand, as much as possible, on the side of the airbag module.



● 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.



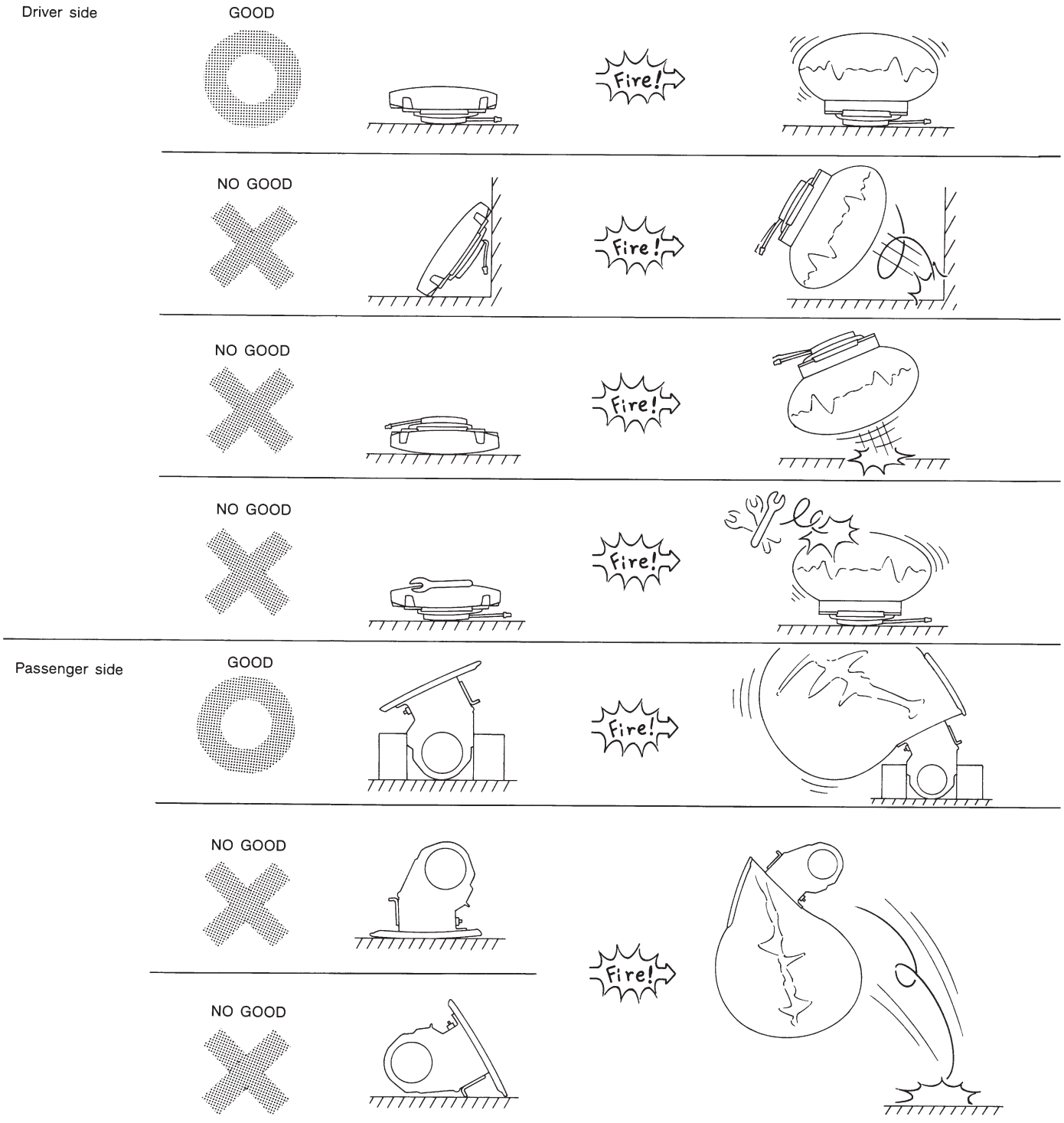
● Do not check airbag module (driver side and passenger side) continuity with airbag removed from the vehicle body.



● 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.

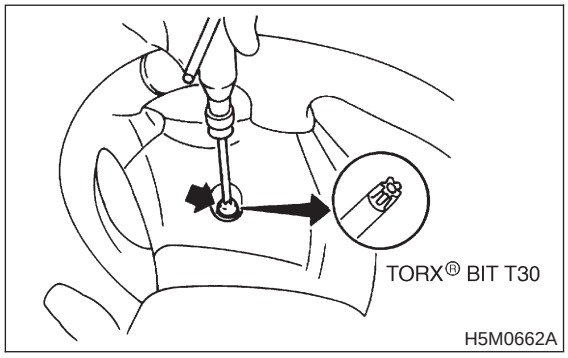


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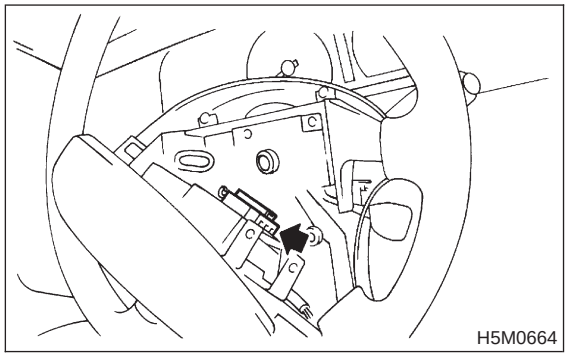
1. DRIVER SIDE

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 [M2F2].>

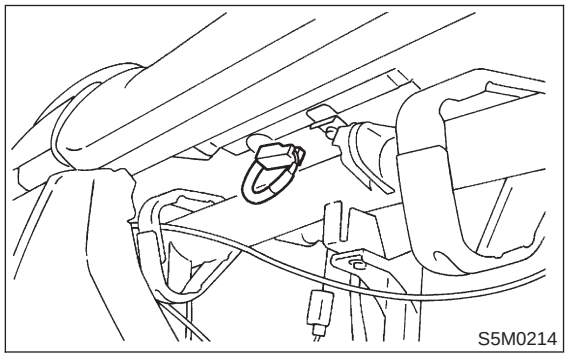


6) Refer to "**CAUTION:**" for handling of a removed airbag module. <Ref. to 5-5 [W3A0].>
7) Installation is in the reverse order of removal.

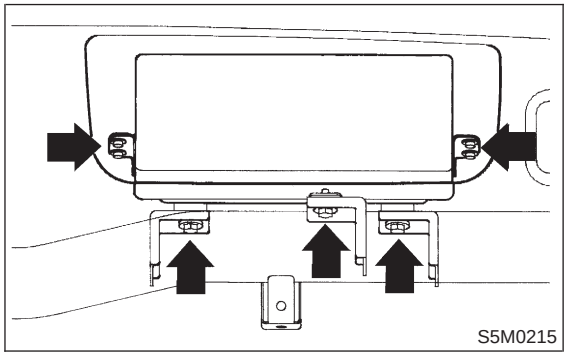
CAUTION:
Do not allow harness and connectors to interfere or get caught with other parts.

2. PASSENGER SIDE

1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove glove box. <Ref. to 5-4 [W1A0].>
4) Disconnect airbag connector. <Ref. to 5-5 [M2F2].>



5) Remove seven bolts and then carefully remove airbag module.



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.

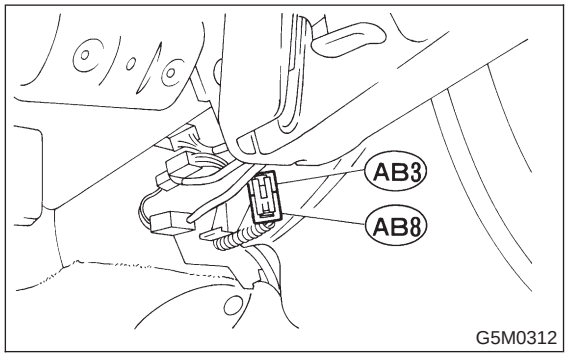
CAUTION:
Do not allow harness and connectors to interfere or get caught with other parts.

4. Main Harness

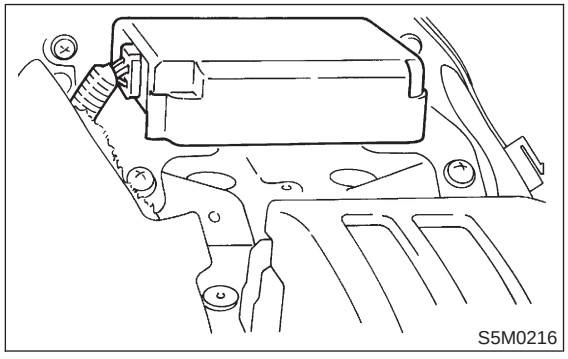
A: REMOVAL AND INSTALLATION

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].>
4) Disconnect airbag connector (AB3) and (AB8) below steering column. <Ref. to 5-5 [M2F2].>

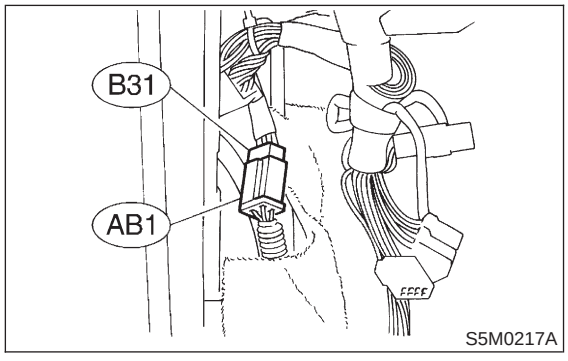
CAUTION:
Do not reconnect airbag connector at steering column until main harness are securely re-installed.



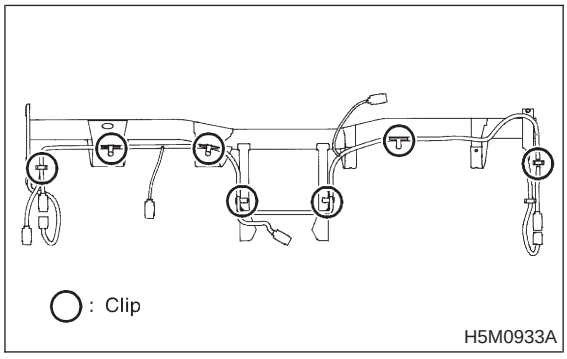
5) Remove instrument panel. <Ref. to 5-4 [W1A0].>
6) Disconnect connector from airbag control module.



7) Disconnect body harness connector (B31) from connector (AB1).



8) Disconnect front sub sensor connector from airbag main harness.
9) Detach clips from steering support beam and remove main harness.

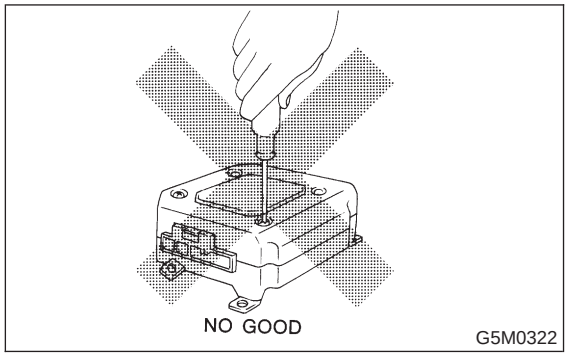


10) Installation is in the reverse order of removal.

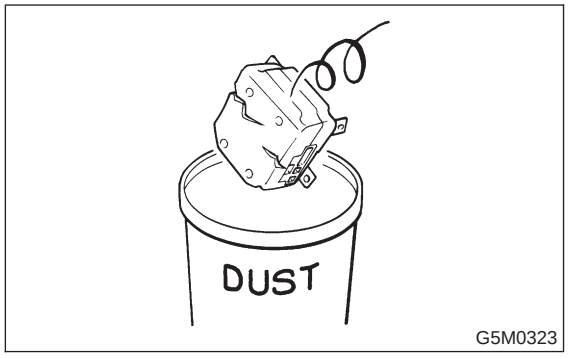
5. Airbag Control Module

A: REMOVAL AND INSTALLATION

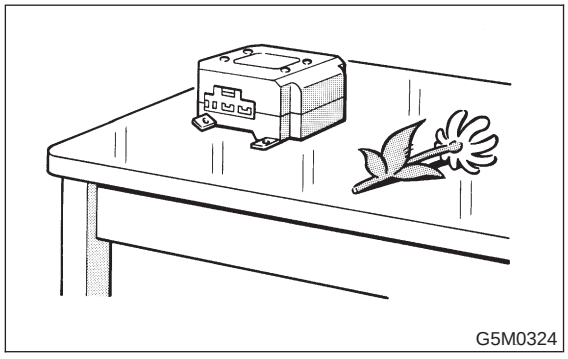
CAUTION:
● Do not disassemble the airbag control module.



● If the airbag control module is deformed, or if water damage is suspected, replace the airbag control module with a new genuine part.

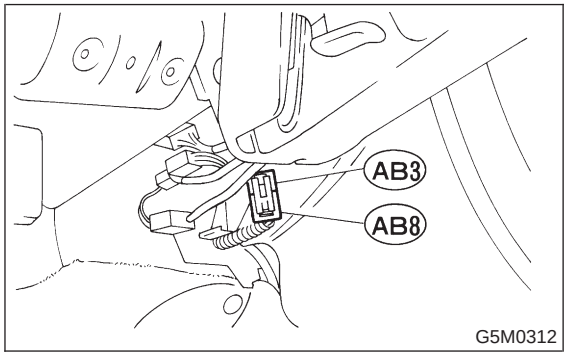


● After removal, keep the airbag control module on a dry, clean surface away from heat and light sources, and moisture and dust.



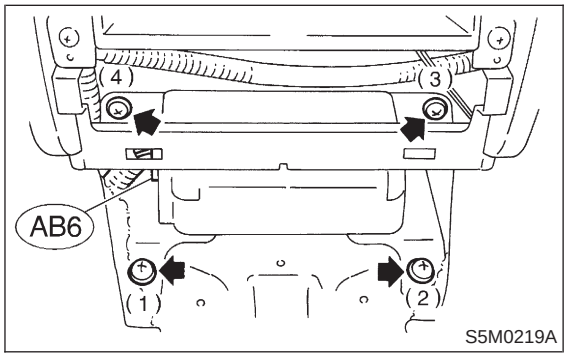
1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove lower cover. <Ref. to 5-4 [W1A0].>
4) Disconnect airbag connector (AB3) and (AB8) below steering column.

CAUTION:
Do not reconnect airbag connector at steering column until airbag control module is securely re-installed.



5) Remove instrument panel console. <Ref. to 5-4 [W1A0].>
6) Disconnect connector from airbag control module.
7) Using T40 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.



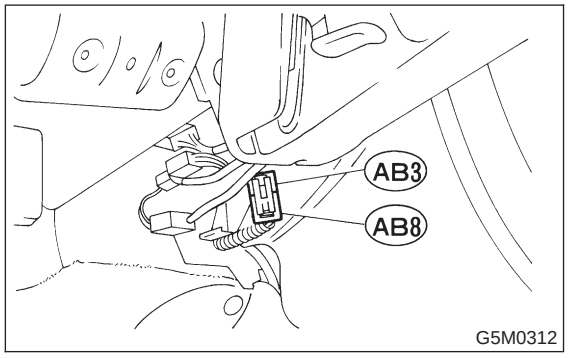
8) Installation is in the reverse order of removal.

6. Combination Switch

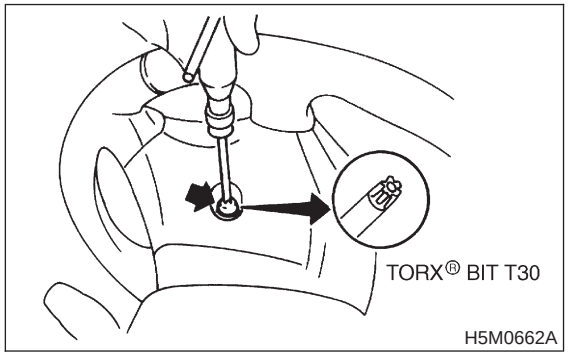
A: REMOVAL

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.

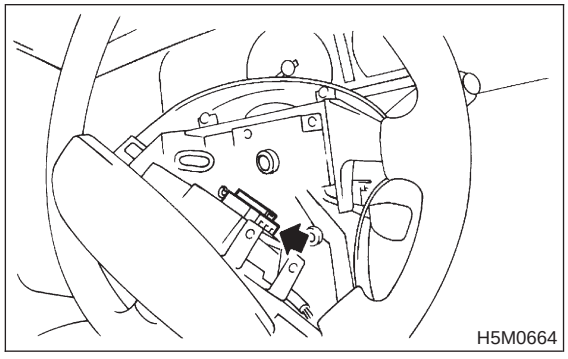
CAUTION:
Do not reconnect airbag connector at steering column until combination switch is securely re-installed.



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.

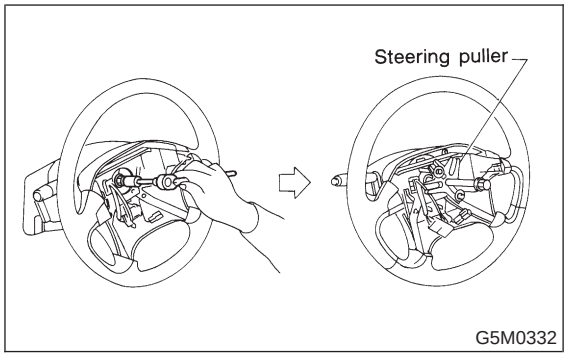


6) Disconnect airbag connector on back of airbag module. Remove airbag module, and place it with pad side facing upward. <Ref. to 5-5 [W3A0].>

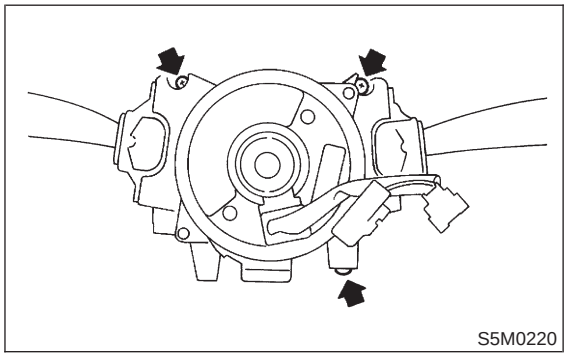


7) Using steering puller, remove steering wheel.

CAUTION:
Do not allow connector to interfere when removing steering wheel.



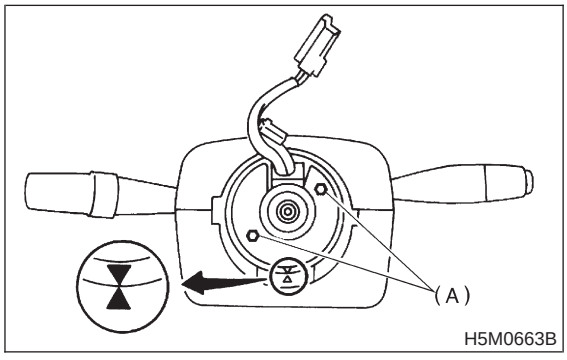
8) Remove steering column covers.
9) Removing three retaining screws, remove combination switch.



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 (A) clockwise until it stops.
3) Then, back off roll connector pin (A) approximately 2.65 turns until "▲" marks aligned.

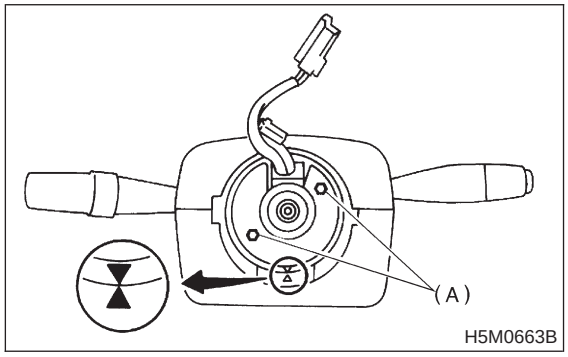


C: INSTALLATION

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 (A) into hole on steering wheel.

NOTE:
If steering wheel angle requires fine adjustment, adjust tie-rod. <Ref. to 4-3 [W3F0].>

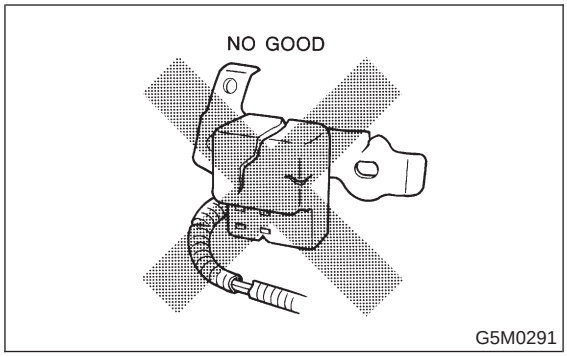


4) Install airbag module and lower cover in the reverse order of removal.

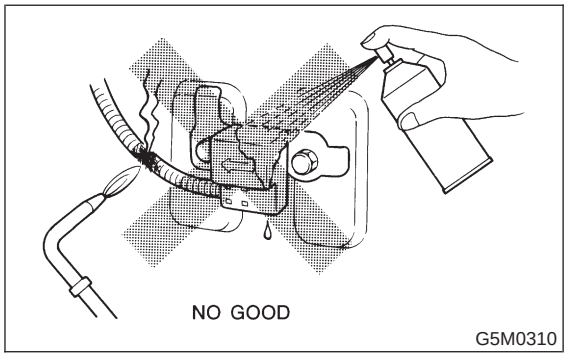
7. Front Sub Sensor

A: REMOVAL AND INSTALLATION

CAUTION:
● If the front end of the vehicle body is damaged by a collision, be sure to check the left and right front sub sensors, even if the airbag was not inflated. If any damage to the sensor or any deformation of the sensor mount is found, replace with a new genuine part.



● When painting or performing sheet metal work on the front part of vehicle body, including the front wheel apron, front fender and front side frame, take utmost care not to apply dryer heat, painting mist, or the flame of the welding burner directly to the front sub sensors and wire harness of the airbag system.

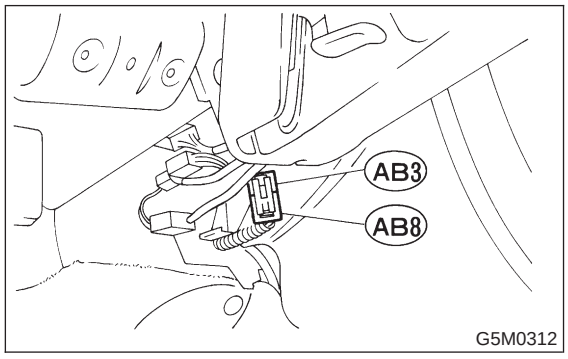


1. FRONT SUB SENSOR HARNESS

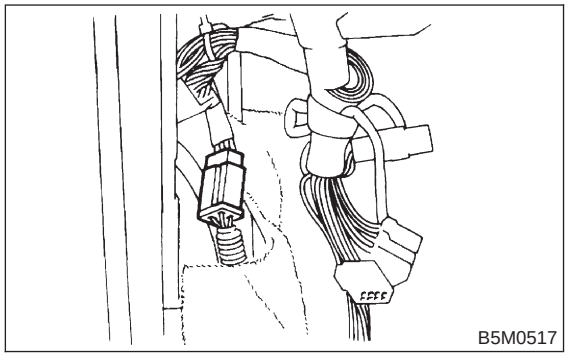
1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove lower cover. <Ref. to 5-4 [W1A0].>

4) Disconnect airbag connector (AB3) and (AB8) below steering column.

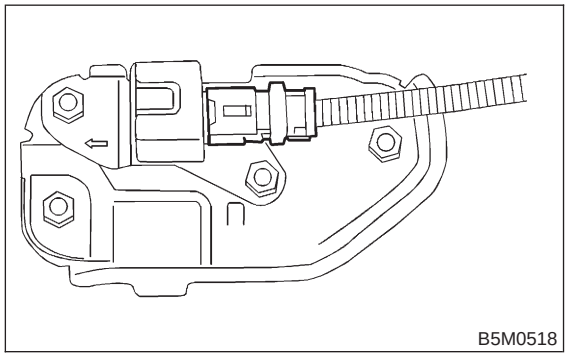
CAUTION:
Do not reconnect airbag connector at steering column until front sub sensors are securely re-installed.



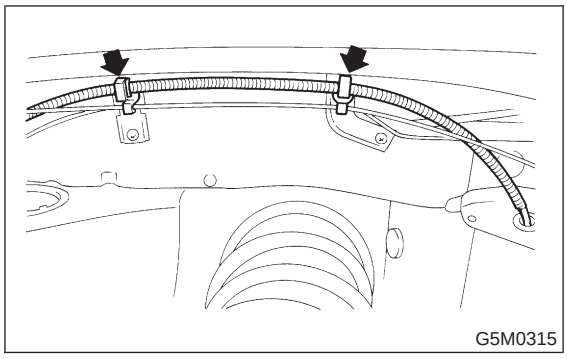
5) Remove front side sill cover and then disconnect front sub sensor connector. <Ref. to 5-5 [M2F2].>



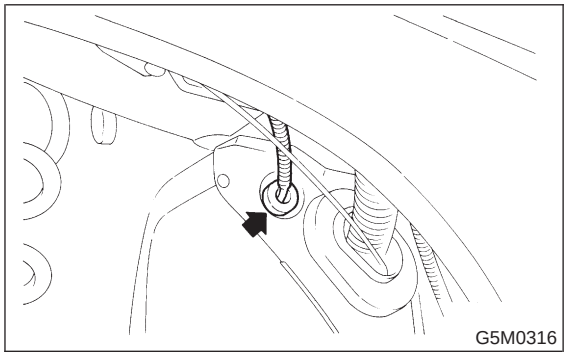
6) Remove front wheel and mud guard.
7) Disconnect connector from front sub sensor assembly. <Ref. to 5-5 [M2F3].>



8) Remove wiring harness clips.

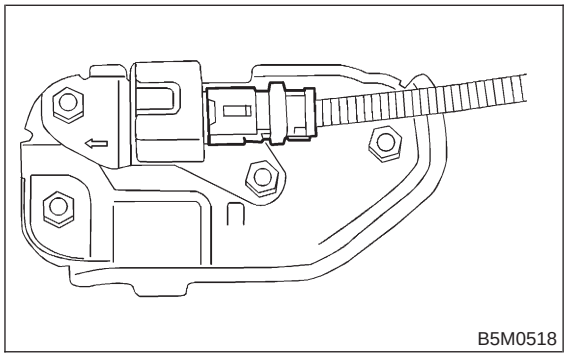


9) Remove grommet and then detach front sub sensor harness.

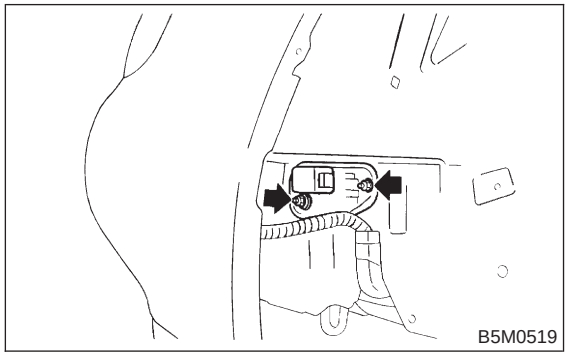


2. FRONT SUB SENSOR ASSEMBLY

1) Turn ignition switch off.
2) Disconnect ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove front wheel and mud guard.
4) Disconnect connector from front sub sensor assembly. <Ref. to 5-5 [M2F3].>



5) Remove front sub sensor.



6) Installation is in the reverse order of removal.

MEMO:

ENGINE ELECTRICAL SYSTEM 6-1

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1. Specifications

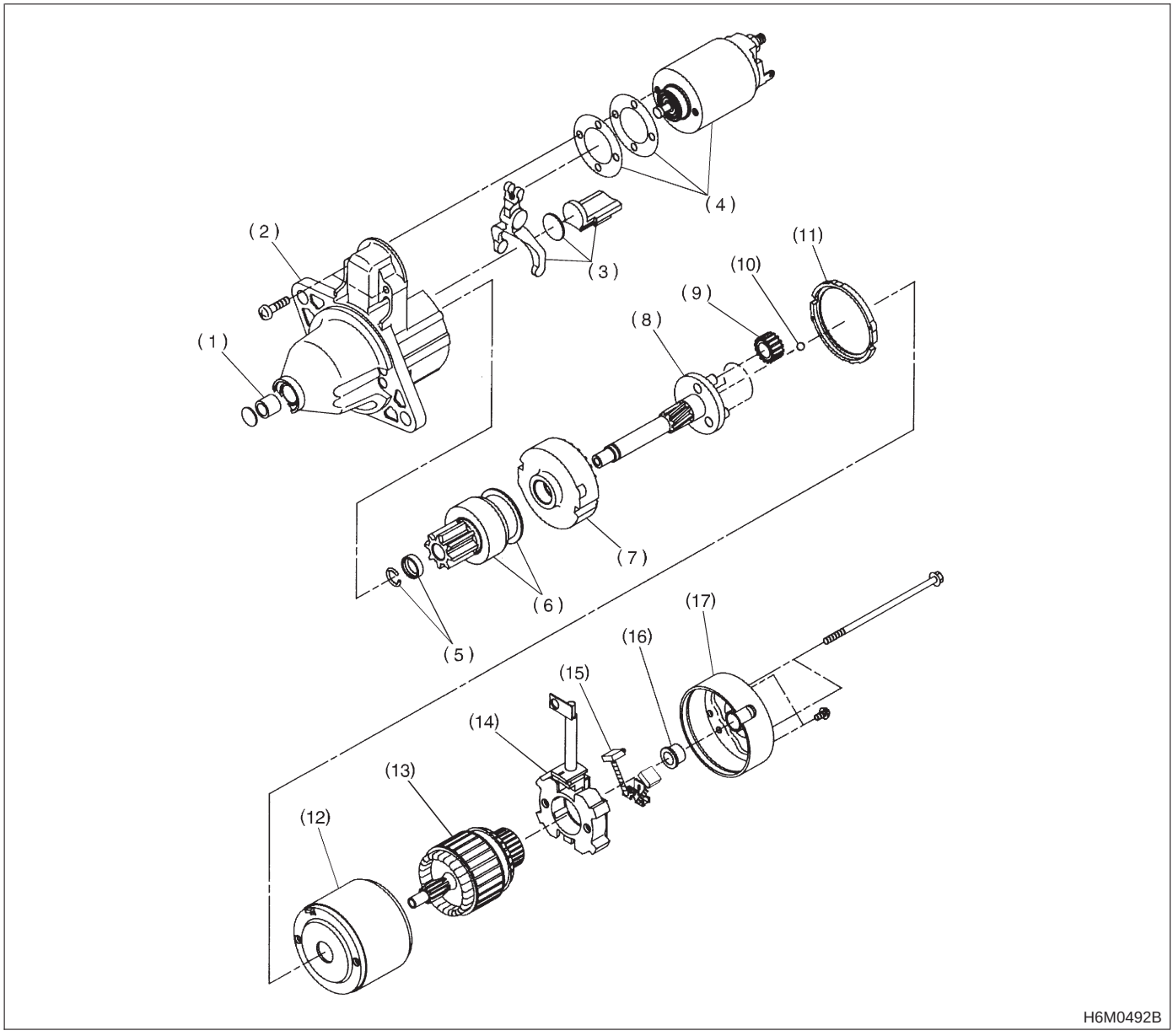
A: 2200 cc MODEL

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)	9.8 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	Standard	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)	

B: 2500 cc MODEL

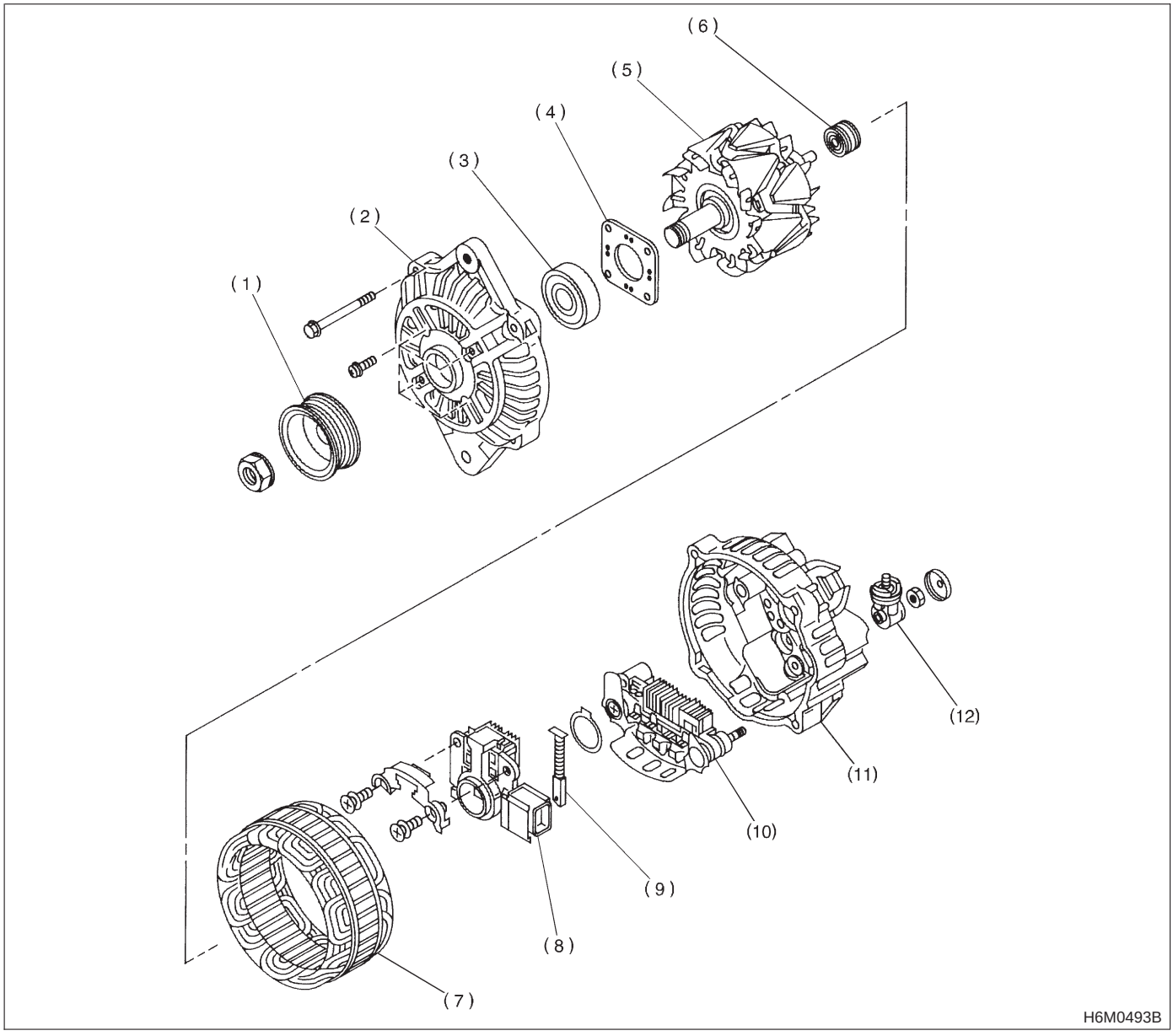
Item			Designation	
Starter	Type		Reduction type	
	Vehicle type		MT vehicles	AT vehicles
	Model		M000T81681	M000T84481, M001T84481
	Manufacturer		Mitsubishi Electric	
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW
	Direction of rotation		Counterclockwise (when observed from pinion)	
	Number of pinion teeth		8	9
	No-load characteristics	Voltage	11 V	
		Current	90 A or less	
		Rotating speed	2,800 rpm or more	2,400 rpm or more
	Load characteristics	Voltage	7.5 V	7.7 V
		Current	300 A	400 A
		Torque	8.73 N·m (0.89 kg-m, 6.4 ft-lb) or more	16.0 N·m (1.63 kg-m, 11.8 ft-lb) or more
		Rotating speed	890 rpm or more	740 rpm or more
	Lock characteristics	Voltage	4 V	3.5 V
		Current	780 A or less	940 A or less
		Torque	15.7 N·m (1.60 kg-m, 11.6 ft-lb) or more	28.9 N·m (2.95 kg-m, 21.3 ft-lb) or more
Generator	Type		Rotating-field three-phase type, Voltage regulator built-in type, with load response control system	Rotating-field three-phase type, Voltage regulator built-in type, without load response control system
	Model		A2TA7691	
	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		14.1 — 14.8 V [20°C (68°F)]	
Ignition coil	Model		F-569-01R	
	Manufacturer		Diamond	
	Primary coil resistance		0.69 Ω±10%	
	Secondary coil resistance		21.0 Ω±15%	
	Insulation resistance between primary terminal and case		More than 10 MΩ	
Spark plug	Type and manufacturer		PFR5B-11 ..... NGK, RC10PYP4A ..... Champion	
	Thread size	mm	14, P = 1.25	
	Spark gap	mm (in)	1.0 — 1.1 (0.039 — 0.043)	

1. Starter



(1) Sleeve bearing
(2) Front bracket
(3) Lever set
(4) Magnet switch ASSY
(5) Stopper set
(6) Over running clutch
(7) Internal gear ASSY
(8) Shaft ASSY
(9) Gear ASSY
(10) Ball
(11) Packing
(12) Yoke
(13) Armature
(14) Brush holder
(15) Brush
(16) Sleeve bearing
(17) Rear bracket

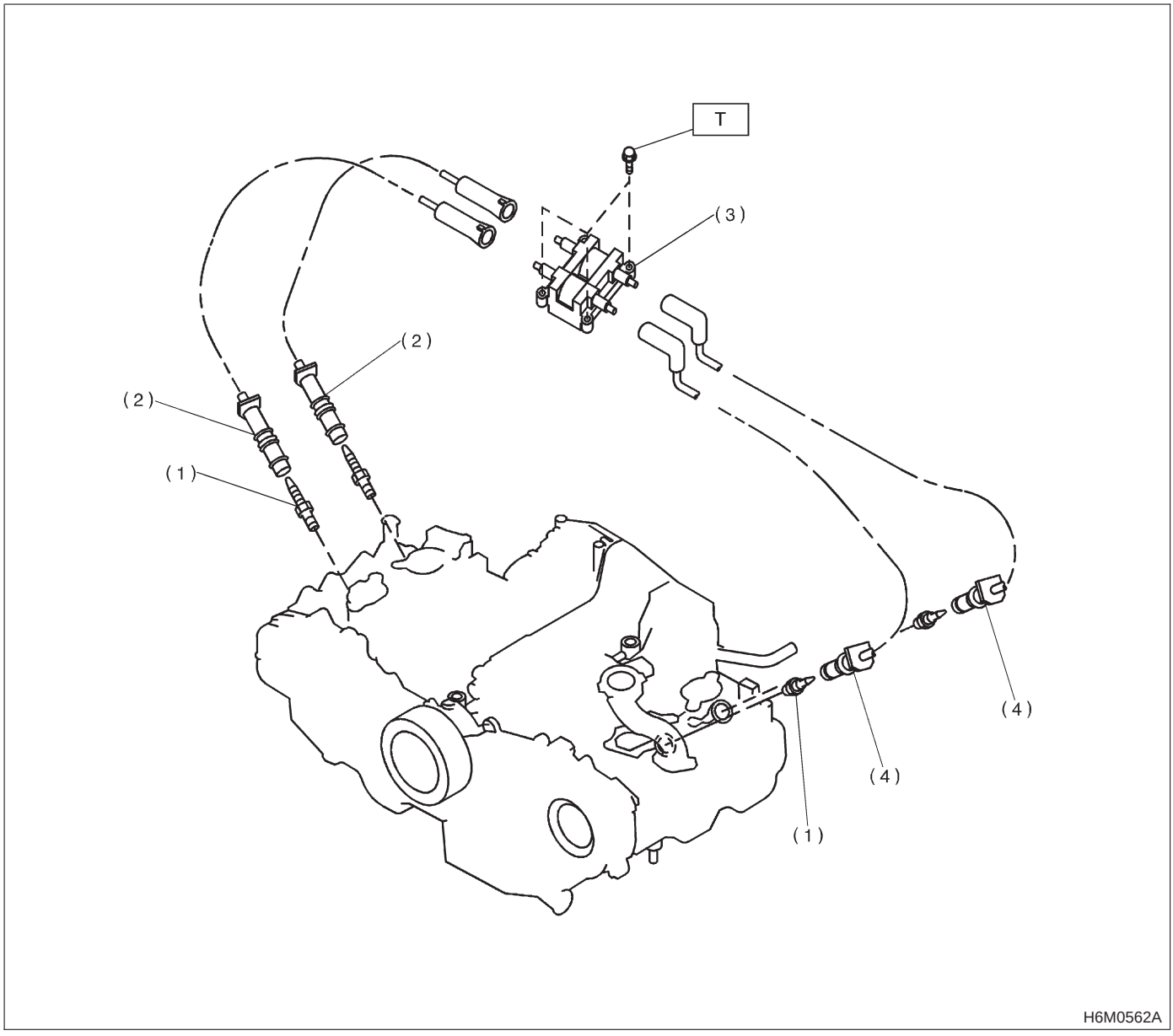
2. Generator



(1) Pulley
(2) Front cover
(3) Ball bearing
(4) Bearing retainer
(5) Rotor
(6) Bearing
(7) Stator coil
(8) IC regulator with brush
(9) Brush
(10) Rectifier
(11) Rear cover
(12) Terminal

3. Ignition System

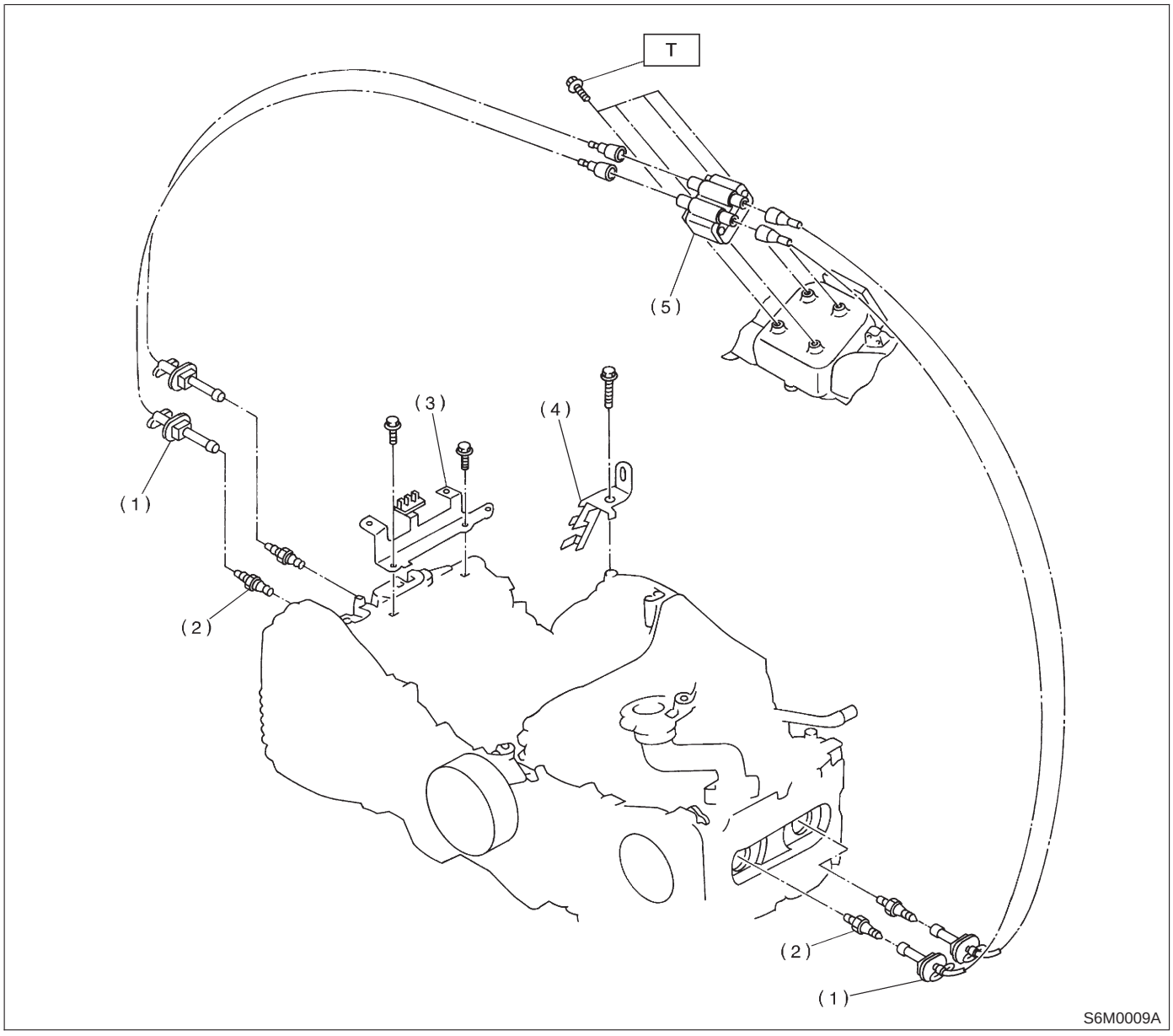
A: 2200 cc MODEL



(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil and ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kg-m, ft-lb)
T: 22±2 (2.2±0.2, 15.9±1.4)

B: 2500 cc MODEL



(1) Spark plug cord
(2) Spark plug
(3) Spark plug cord guide
(4) Engine harness guide
(5) Ignition coil

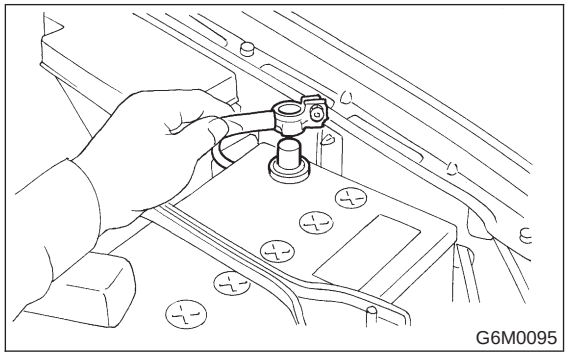
Tightening torque: N·m (kg-m, ft-lb)
T: 22±2 (2.2±0.2, 15.9±1.4)

1. Starter

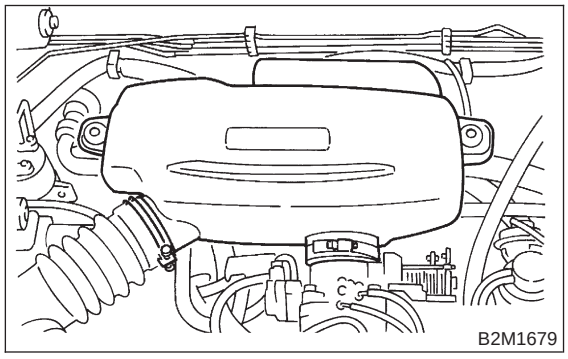
A: REMOVAL AND INSTALLATION

1. 2200 cc MODEL

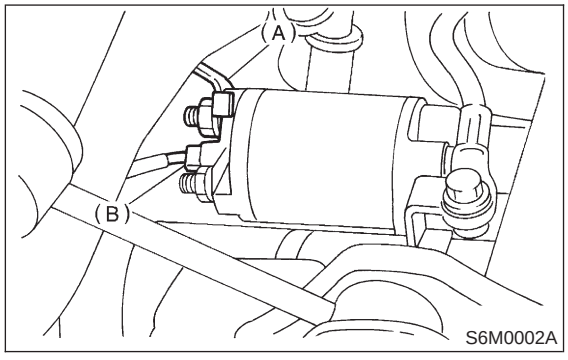
1) Disconnect battery ground cable.



2) Remove air intake chamber. <Ref. to 2-7 [W18A0].>

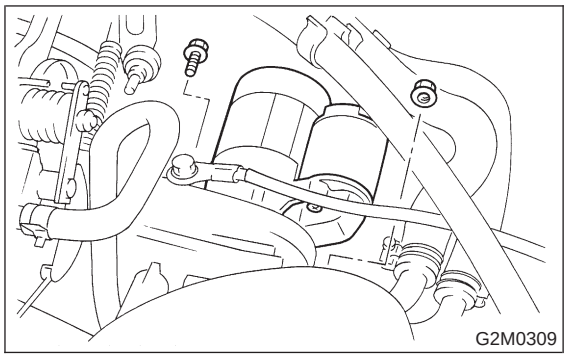


3) Disconnect connector and terminal from starter.



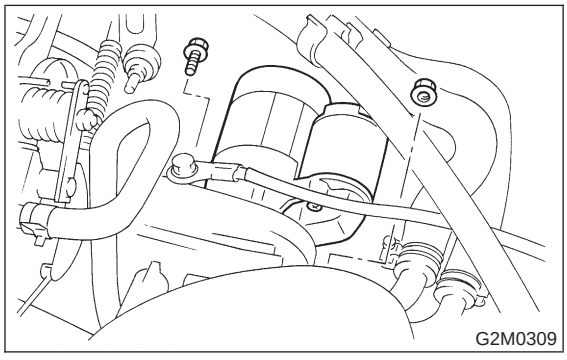
(A) Terminal
(B) Connector

4) Remove starter from transmission.



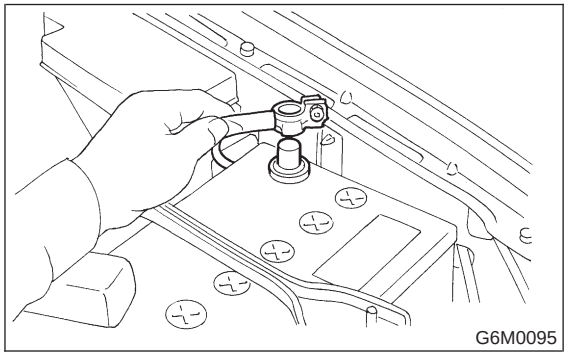
5) Installation is in the reverse order of removal.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)

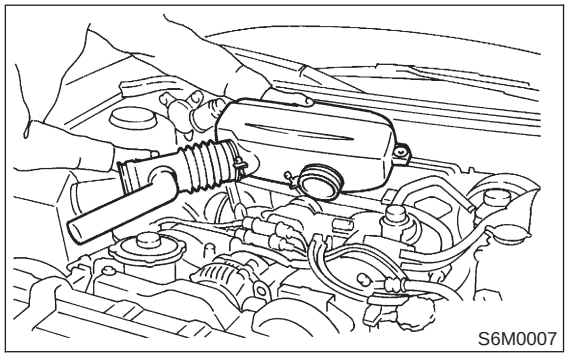


2. 2500 cc MODEL

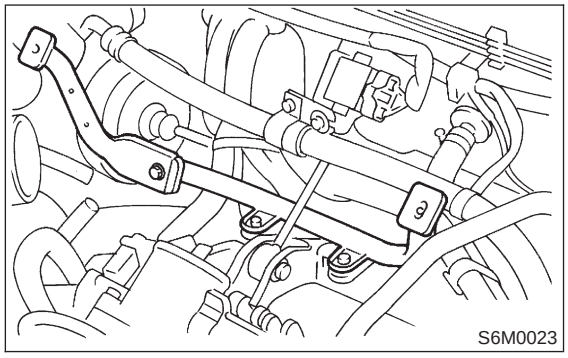
1) Disconnect battery ground cable.



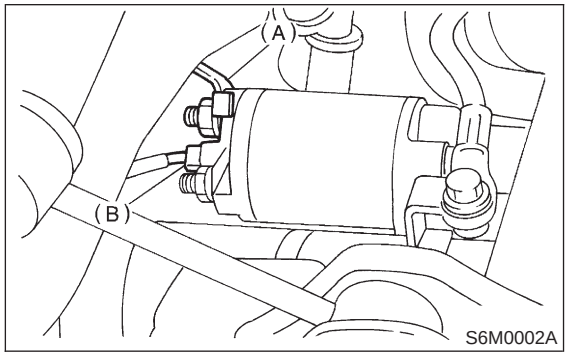
2) Remove air intake chamber. <Ref. to 2-7 [W18A0].>


S6M0007

3) Remove air intake chamber stay. (AT vehicles only)


S6M0023

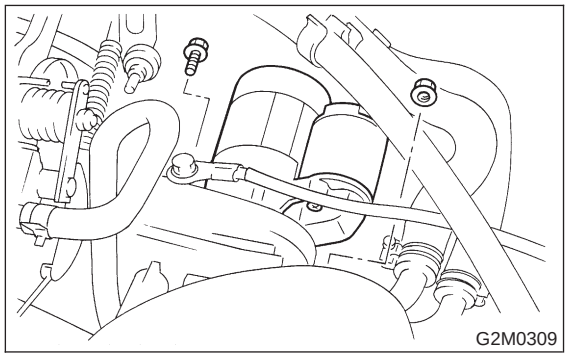
4) Disconnect connector and terminal from starter.



S6M0002A

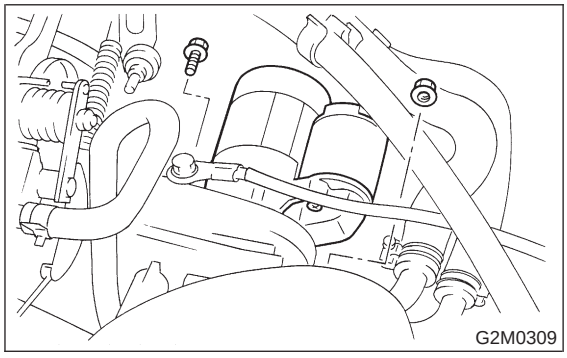
(A) Terminal
(B) Connector

5) Remove starter from transmission.


G2M0309

6) Installation is in the reverse order of removal.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)


G2M0309

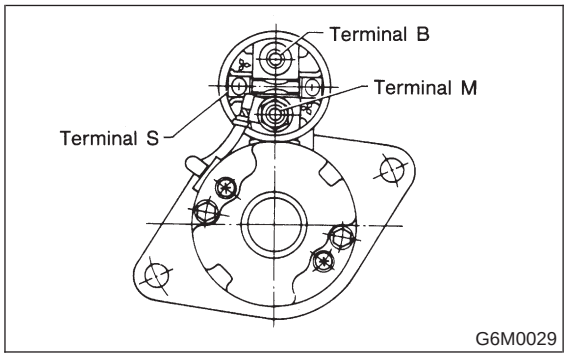
B: TEST

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.

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.

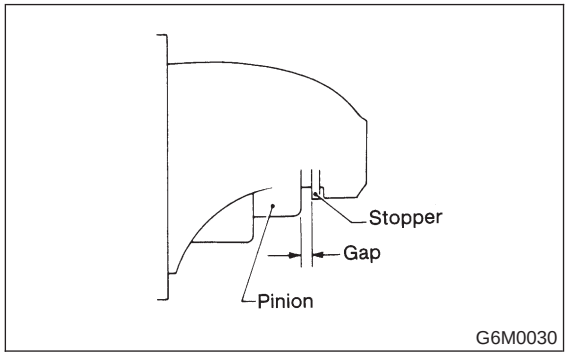


G6M0029

2. PINION GAP

1) With pinion forced endwise on shaft, as outlined in step 1) before <Ref. to 6-1 [W1B1].>, measure pinion gap.

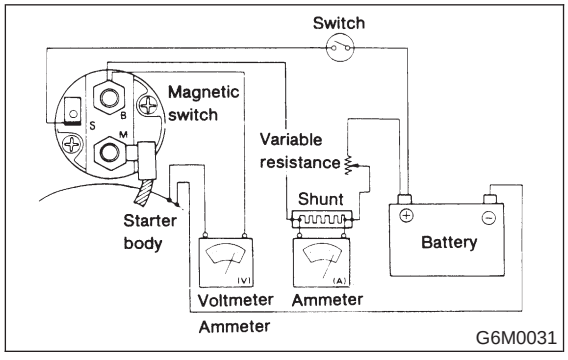
Pinion gap:
0.5 — 2.0 mm (0.020 — 0.079 in)



2) 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.
3) 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
- ***MT vehicles 2,800 rpm or more***
- ***AT vehicles 2,400 rpm or more***

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
  7.5 V / 8.73 N·m (0.89 kg-m, 6.4 ft-lb)
  Current / Speed
  300 A / 890 rpm or more

- ***AT vehicles***
  Voltage / Load
  7.7 V / 16.00 N·m (1.63 kg-m, 11.8 ft-lb)
  Current / Speed
  400 A max. / 740 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
  15.7 N·m (1.60 kg-m, 11.6 ft-lb) or more

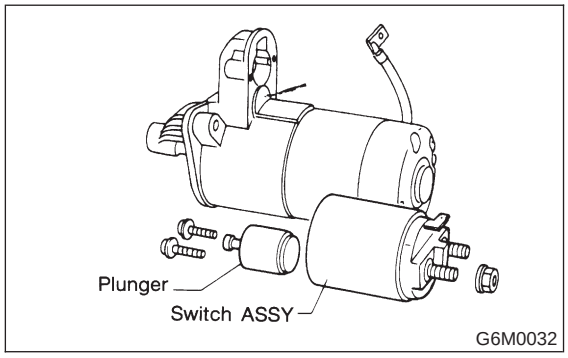
- ***AT vehicles***
  Voltage / Current
  3.5 V / 940 A or less
  Torque
  28.9 N·m (2.95 kg-m, 21.3 ft-lb) or more

C: DISASSEMBLY

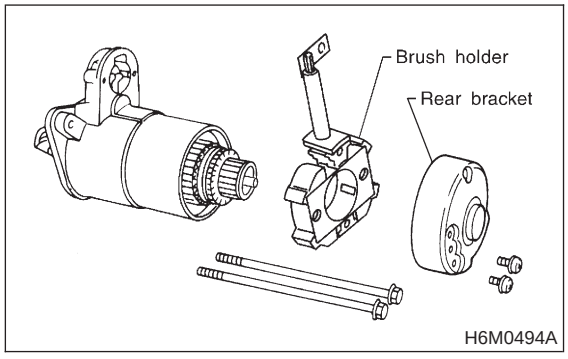
1. STARTER ASSEMBLY

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.

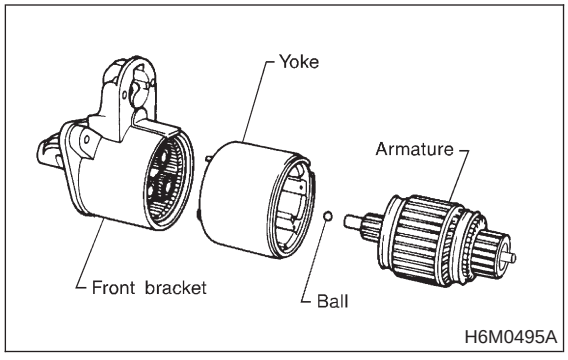


3) Remove both through-bolts and brush holder screws, and detach rear bracket and brush holder.

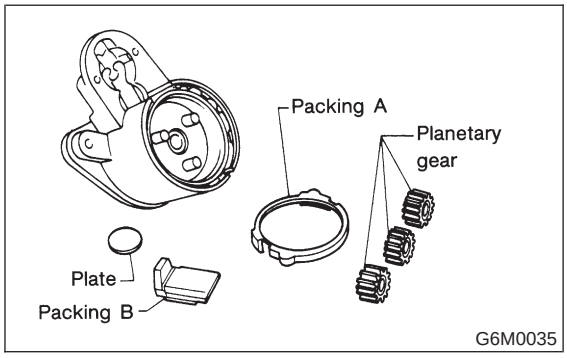


4) Remove armature and yoke. Ball used as a bearing will then be removed from the end of armature.

CAUTION:
Be sure to mark an alignment mark on yoke and front bracket before removing yoke.

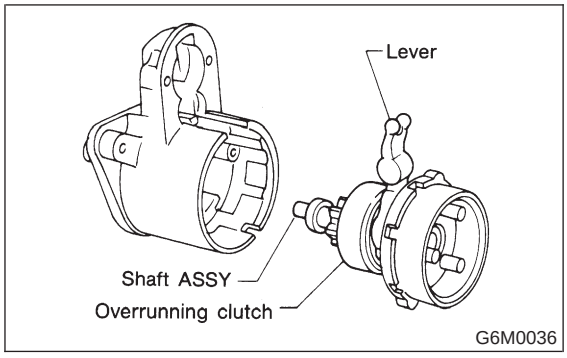


5) Remove packing A, three planetary gears, packing B and plate.

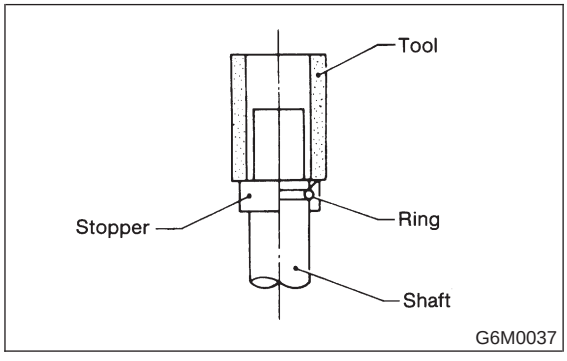


6) Remove shaft assembly and overrunning clutch as a unit.

CAUTION:
Record the direction of lever before removing.



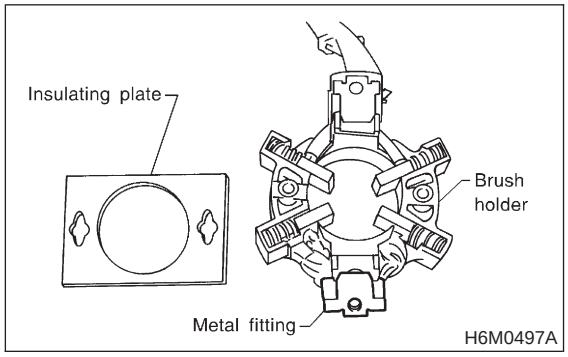
7) Remove overrunning clutch from shaft assembly as follows:
(1) Remove stopper from ring by lightly tapping a fit tool placed on stopper.
(2) Remove ring, stopper and clutch from shaft.



2. BRUSH HOLDER

Slightly open the metal fitting holding the insulating plate to the brush holder. Remove the insulating plate.

NOTE:
The brush and spring can be easily removed from the brush holder at this time.

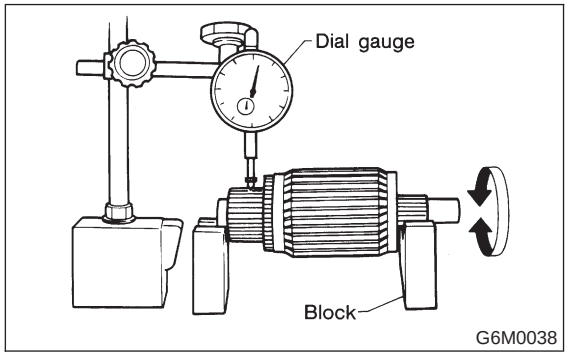


D: INSPECTION

1. ARMATURE

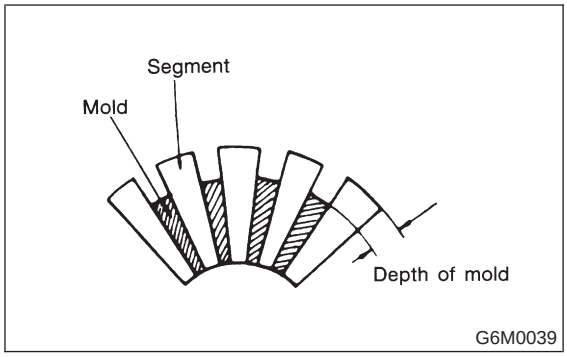
1) Check commutator for any sign of burns of rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.
2) Run-out test
Check the commutator run-out and replace if it exceeds the limit.

Commutator run-out:
Standard
0.05 mm (0.0020 in)
Service limit
Less than 0.10 mm (0.0039 in)

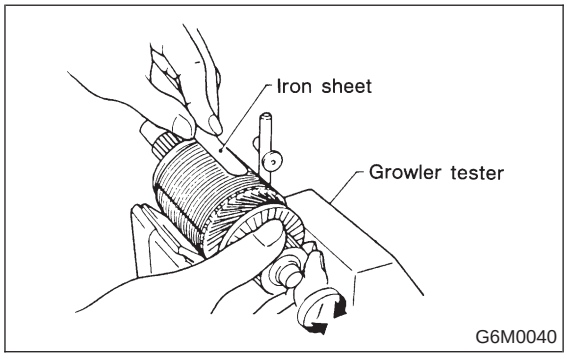


3) Depth of segment mold
Check the depth of segment mold.

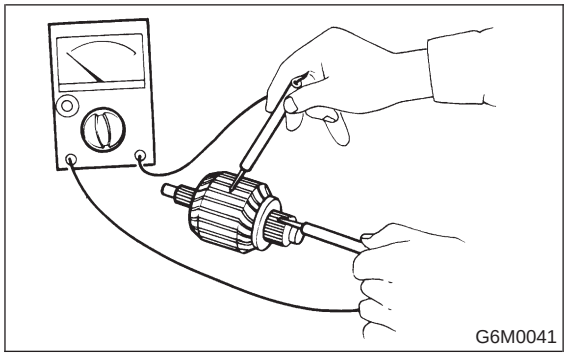
Depth of segment mold:
0.5 mm (0.020 in)



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

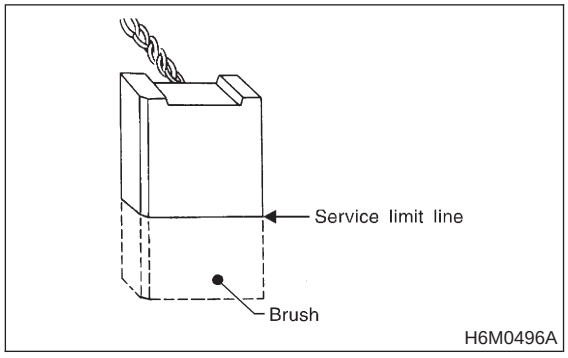
Inspect teeth of pinion for wear and damage. Replace if it damaged. Rotate pinion in direction of rotation (clockwise). It should rotate smoothly. But in opposite direction, it should be locked.

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)



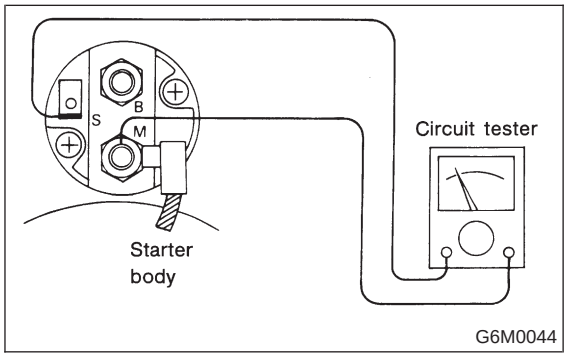
2) Brush movement
Be sure brush moves smoothly inside brush holder.
3) Brush spring force
Measure brush spring force with a spring scale. If it is less than the service limit, replace brush spring.

Brush spring force:
Standard
21.6 N (2.2 kg, 4.9 lb) (when new)
Service limit
5.9 N (0.6 kg, 1.3 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 / Continuity
S—Ground / Continuity
M—B / No continuity



E: ASSEMBLY

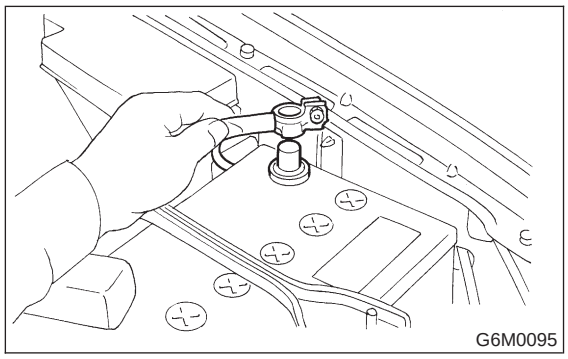
Assembly is in the reverse order of disassembly procedures. Observe the following:
1) Carefully assemble all parts in the order of assembly and occasionally inspect nothing has been overlooked.
2) Apply grease to the following parts during assembly.
- Front bracket sleeve bearing
- Armature shaft gear
- 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.

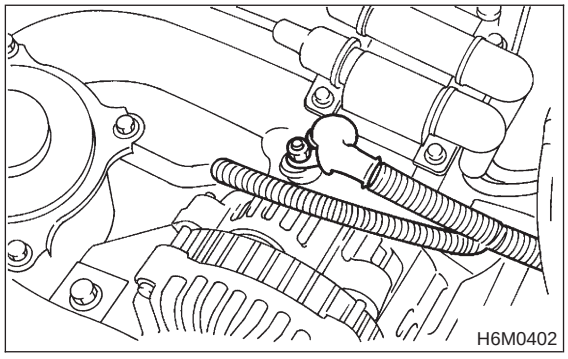
2. Generator

A: REMOVAL AND INSTALLATION

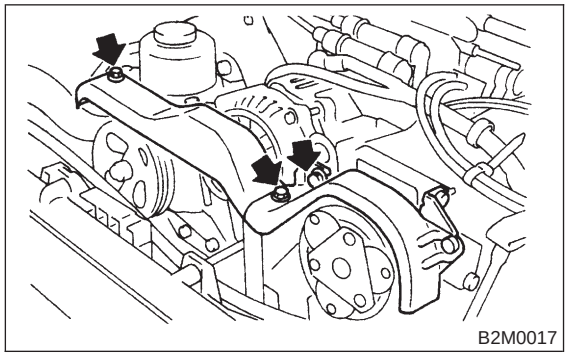
1) Disconnect battery ground cable.



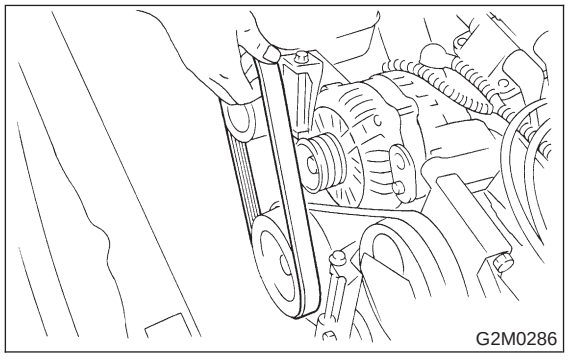
2) Disconnect connector and terminal from generator.



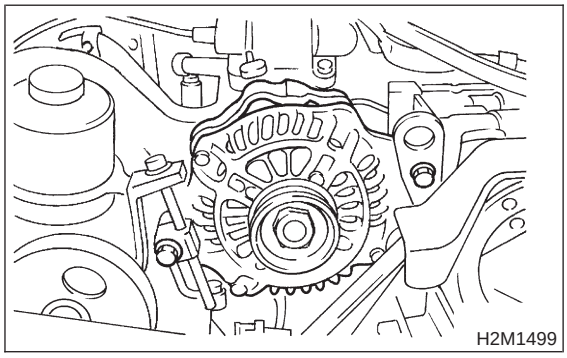
3) Remove V-belt cover.



4) Remove front side V-belt.

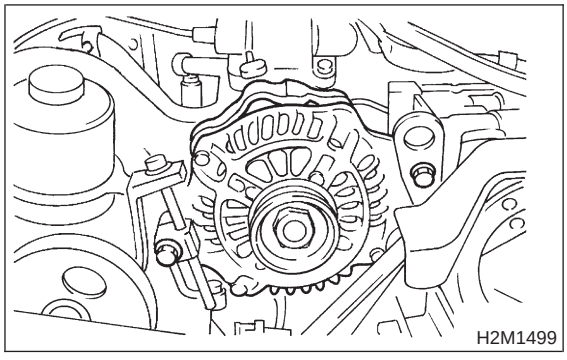


5) Remove bolts which install generator onto bracket.



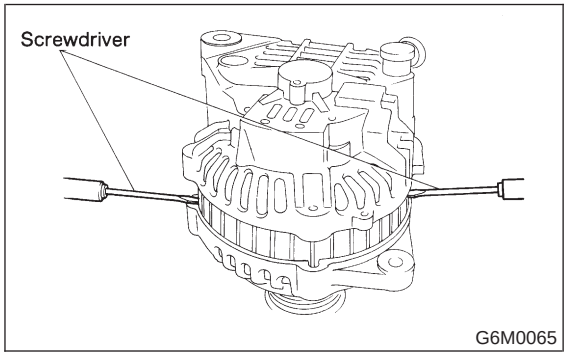
6) Installation is in the reverse order of removal.

CAUTION:
Check and adjust V-belt tension. <Ref. to 1-5 [G2A0].>

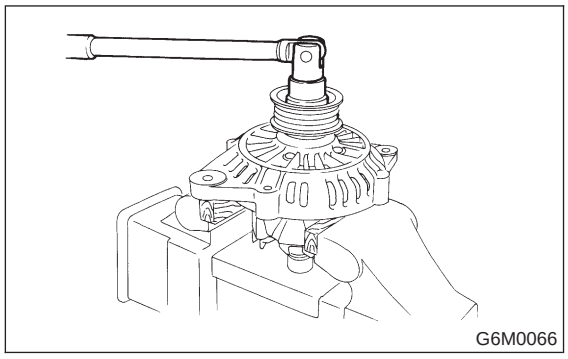


B: DISASSEMBLY

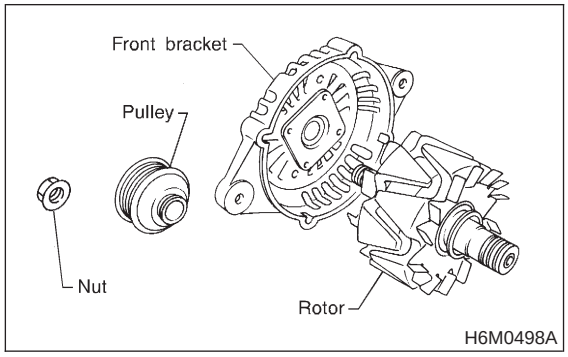
1) Remove the four through bolts. Then insert the tip of a flat-head screwdriver into the gap between the stator core and front bracket. Pry then apart to disassemble.



2) Hold rotor with a vise and remove pulley nut.

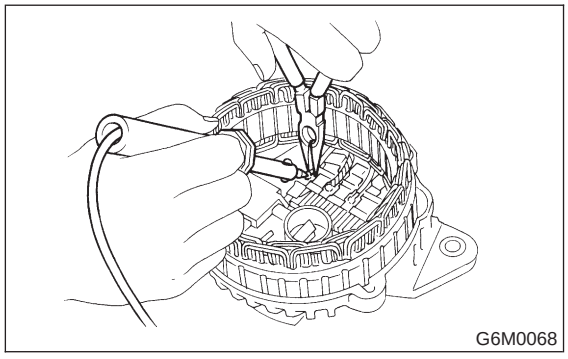


CAUTION:
When holding rotor with vise, insert aluminum plates or wood pieces on the contact surfaces of the vise to prevent rotor from damage.

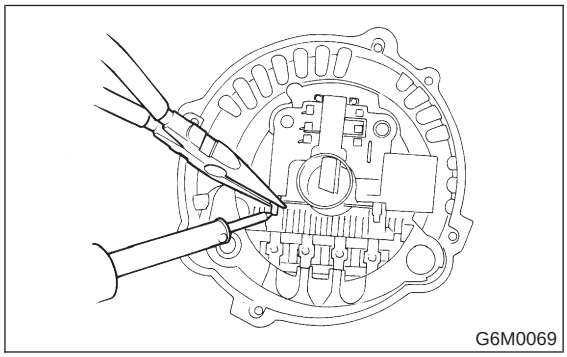


3) Unsolder connection between rectifier and stator coil to remove stator coil.

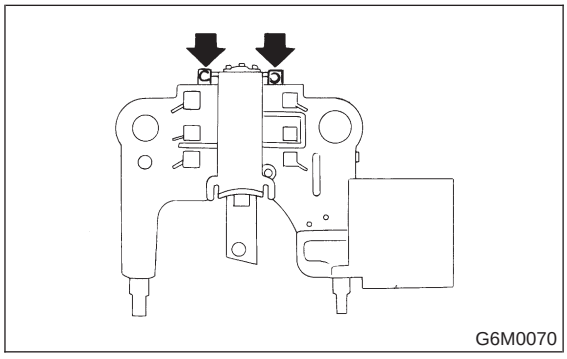
CAUTION:
Finish the work rapidly (less than three seconds) because the rectifier cannot withstand heat very well.



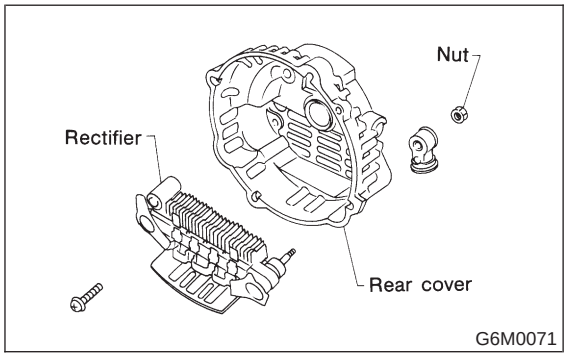
4) Remove screws which secure IC regulator to rear cover, and unsolder connection between IC regulator and rectifier to remove IC regulator.



5) Remove the brushes by unsoldering at the pigtails.



6) Remove the nut and insulating bushing at terminal B. Remove rectifier.

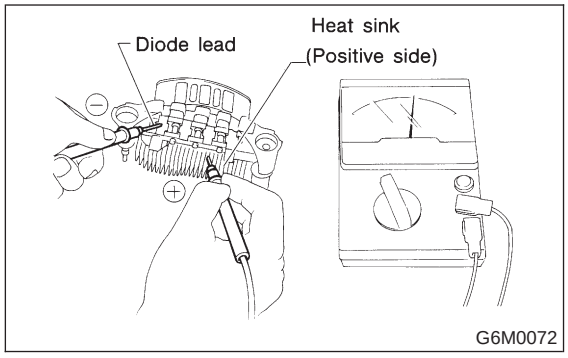


C: INSPECTION AND REPAIR

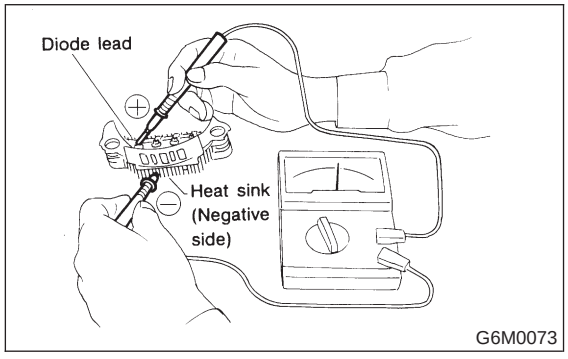
1. DIODE

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.



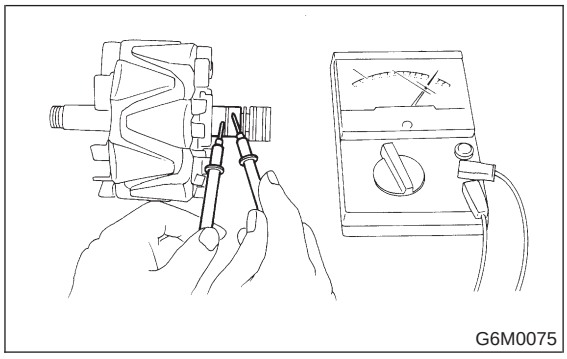
2. ROTOR

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.

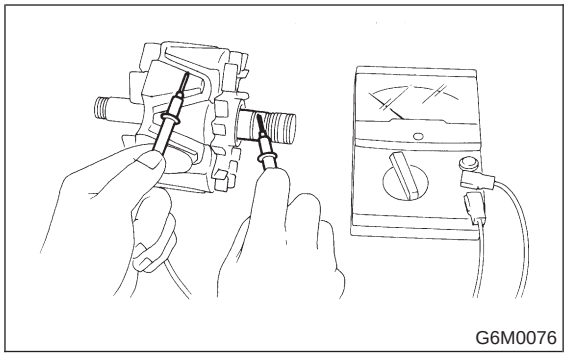
Slip ring outer diameter:
Standard
22.7 mm (0.894 in)
Limit
22.1 mm (0.870 in)

3) Continuity test
Check resistance between slip rings using circuit tester. If the resistance is not within specification, replace rotor assembly.

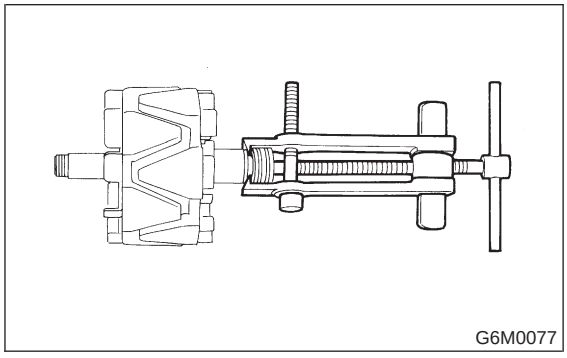
Specified resistance:
Approx. 2.7 — 3.2 Ω



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.

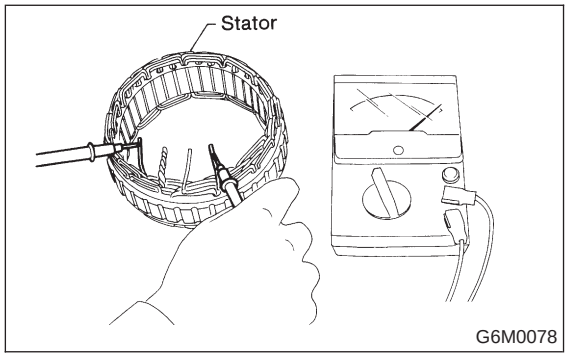


5) Ball bearing (rear side)
(1) Check rear ball bearing. Replace if it is noisy or if rotor does not turn smoothly.
(2) The rear bearing can be removed by using common bearing puller.

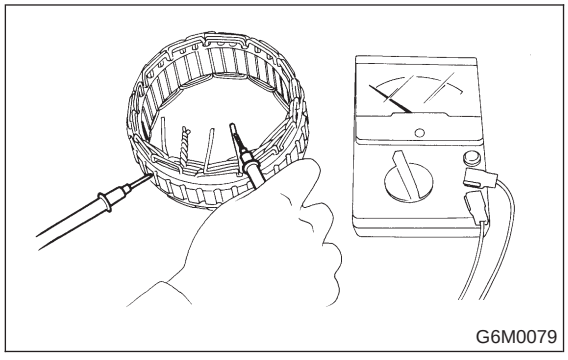


3. STATOR

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.



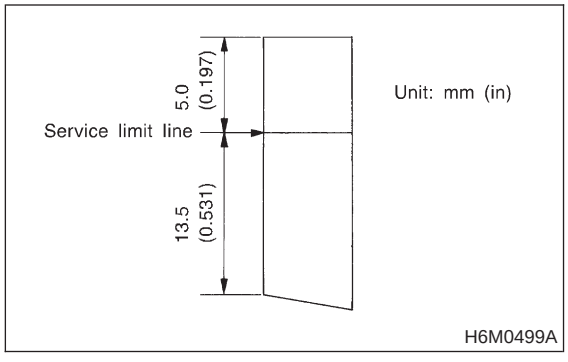
2) Insulation test
Inspect stator coil for continuity between stator core and each end of the lead wire. If there is continuity, the stator coil is short-circuited, and so replace stator assembly.



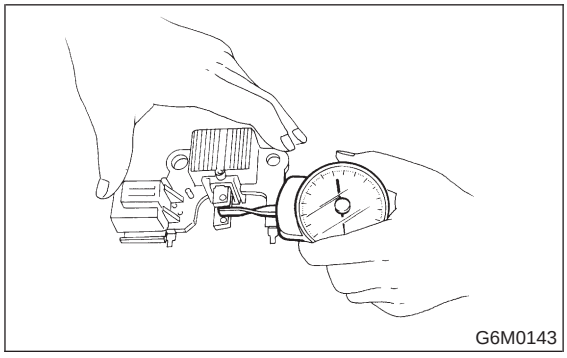
4. BRUSH

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
18.5 mm (0.728 in)
Service limit
5.0 mm (0.197 in)

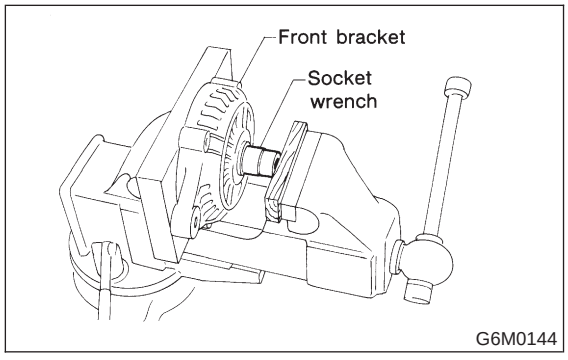


2) Checking brush spring for proper pressure
Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of the brush spring. If the pressure is less than 2.648 N (270 g, 9.52 oz), replace the brush spring with a new one. The new spring must have a pressure of 4.609 to 5.786 N (470 to 590 g, 16.58 to 20.81 oz).

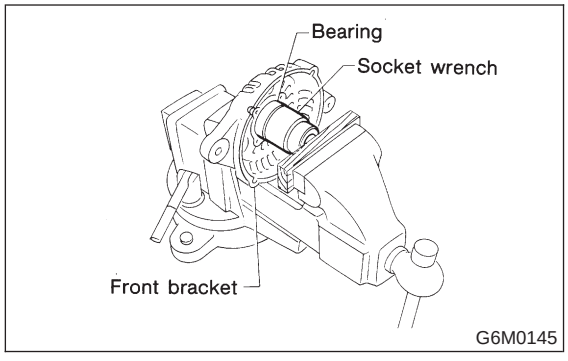


5. BEARING (FRONT SIDE)

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.



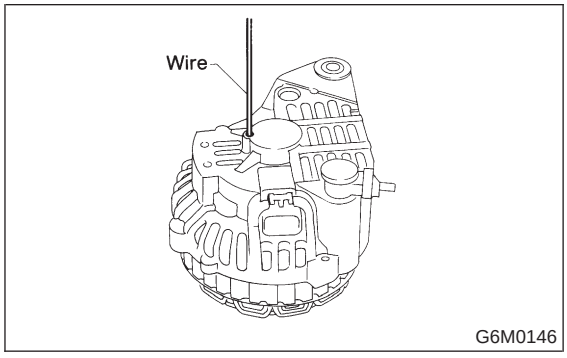
   (3) Set a new bearing and closely install a fit tool on the bearing outer race. Press the bearing down into place with a hand press or vise. A socket wrench can serve as the tool.
   (4) Install front bearing retainer.



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.

CAUTION:
Grease should not be applied for the rear bearing.
Remove oil completely if it is found on the bearing box.

3) After reassembly, turn the pulley by hand to check that the rotor turns smoothly.

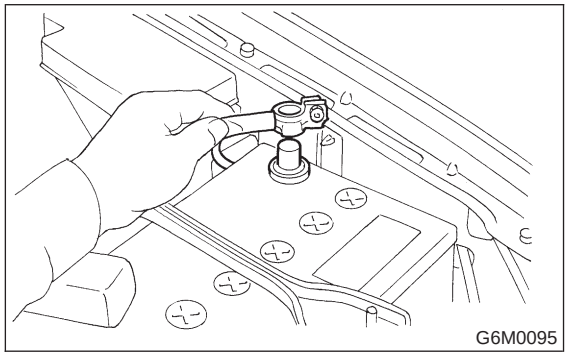
3. Spark Plug

A: REMOVAL AND INSTALLATION (2200 cc MODEL)

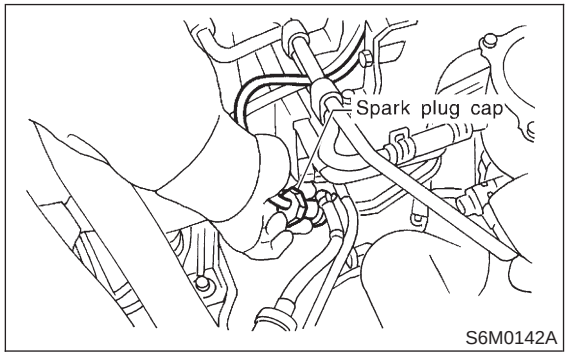
CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

Spark plug:
(Standard)
CHAMPION: RC8YC4, RC10YC4
(Alternate)
NGK: BKR6E-11
NIPPONDENSO: K20PR-U11

1) Disconnect battery ground cable.



2) Remove spark plug cords by pulling boot, not cord itself.



3) Remove spark plugs.
4) When installing spark plugs on cylinder head, use spark plug wrench.

Tightening torque (Spark plug):
21±3 N·m (2.1±0.3 kg-m, 15.2±2.2 ft-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.

5) Connect spark plug cords.

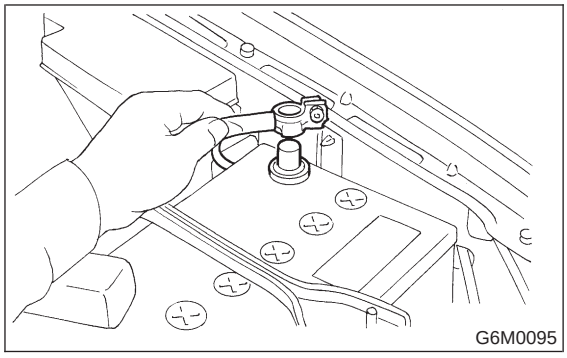
B: REMOVAL (2500 cc MODEL)

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

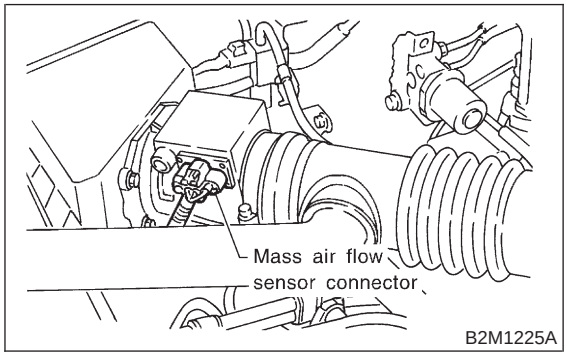
Spark plug:
NGK: PFR5B-11
Champion: RC10PYP4A

1. #1 SPARK PLUG

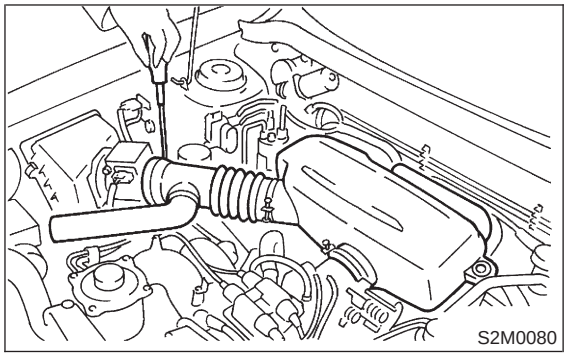
1) Disconnect battery ground cable.



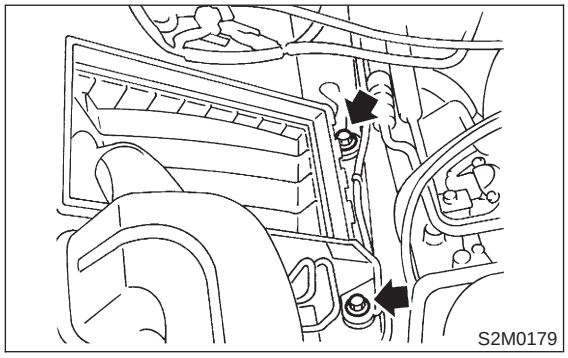
2) Disconnect mass air flow sensor connector.



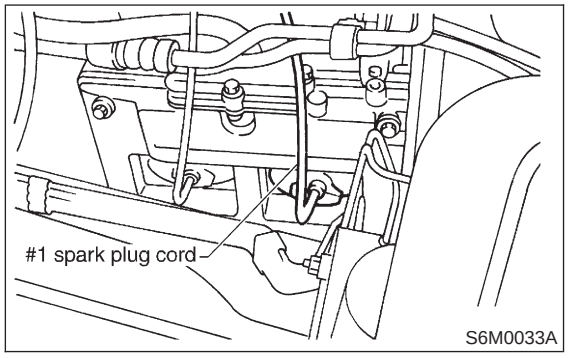
3) Remove four clips securing air cleaner upper cover.
4) Loosen the clamp screw and separate air cleaner upper cover from air intake duct.



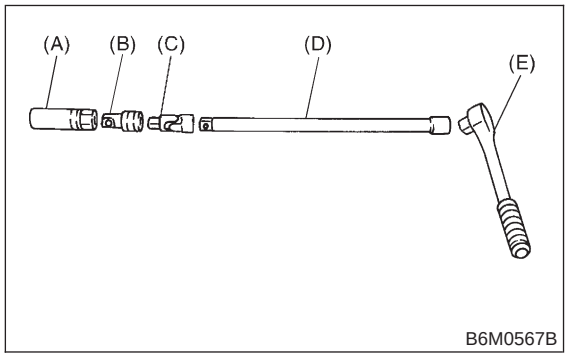
5) Remove air cleaner element and air cleaner case.



6) Remove #1 spark plug cord by pulling boot, not cord itself.



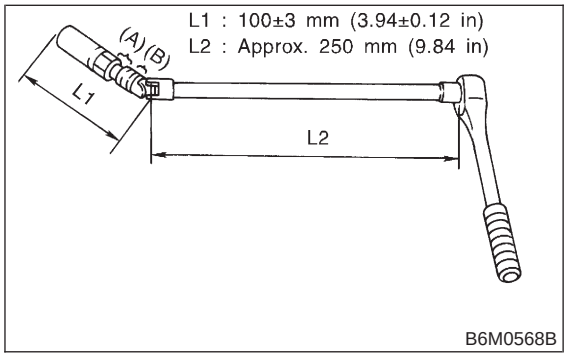
7) After connecting (A) spark plug socket, (B) extension and (C) Universal Joint to each other, securely set them over the spark plug in cylinder head.



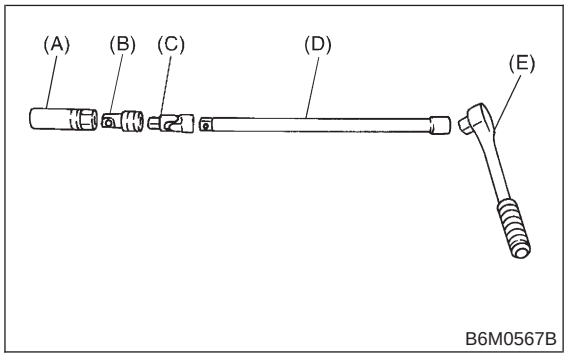
(A) Spark plug socket 16 mm (5/8 in)
(B) Extension
(C) Universal Joint
(D) Extension
(E) Ratchet

8) Cover ABS pipes with a rag to prevent damage.

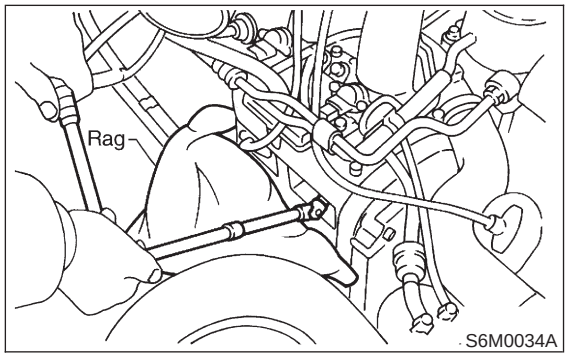
NOTE:
● Length L1 is important in making for easy removal.
● It may be necessary to wrap points (A) and (B) with vinyl tape to prevent them separating while working.
If they do separate, spark plug socket is left on the spark plug and it is very difficult to remove.
● An approximately 250 mm (9.84 in) long extension is recommended to be connected to ratchet.
● For spark plug socket, extension and Universal Joint, it is recommended to use the following tools.
Spark plug socket : PROTO 5020-50
Extension : SNAP-ON FX1
Universal Joint : SNAP-ON FU80B



9) Set (D) extension and (E) ratchet in turn onto the connected tools in plug hole, and remove spark plug using them.

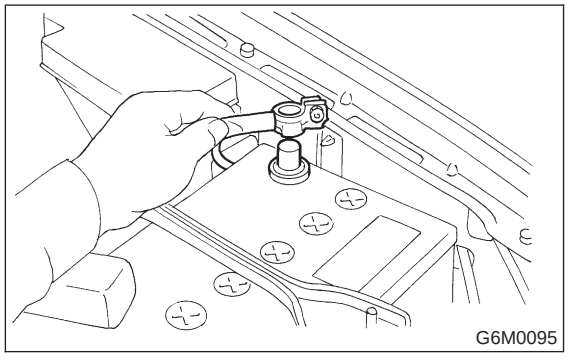


(A) Spark plug socket 16 mm (5/8 in)
(B) Extension
(C) Universal Joint
(D) Extension
(E) Ratchet

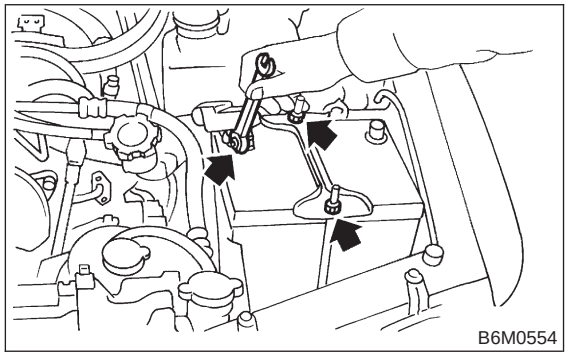


2. #2 SPARK PLUG

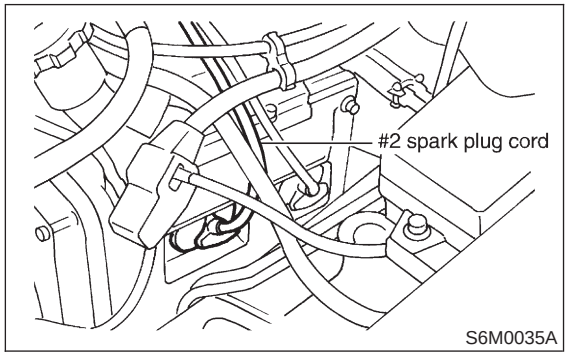
1) Disconnect battery ground cable.



2) Remove battery.



3) Remove #2 spark plug cord by pulling boot, not cord itself.

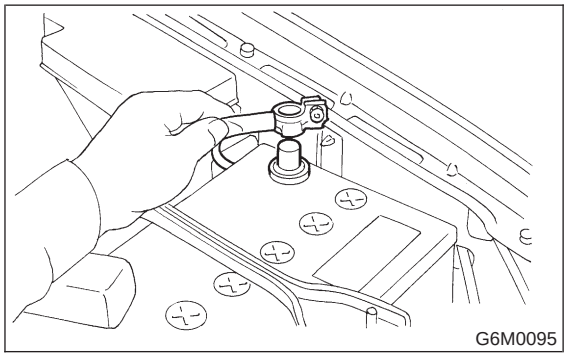


4) For subsequent procedures, refer to the procedure for #1 spark plug. <Ref. to 6-1 [W3B1].>

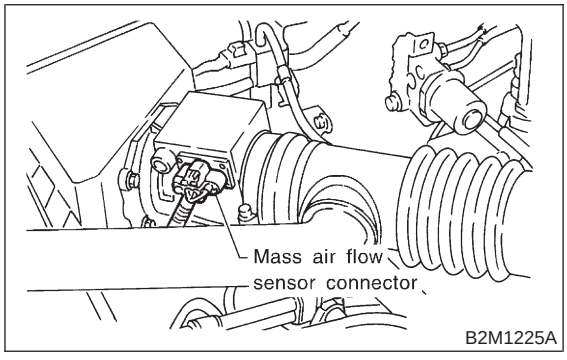
CAUTION:
When removing spark plug, cover the ATF cooling pipes with a rag to prevent damage.

3. #3 SPARK PLUG

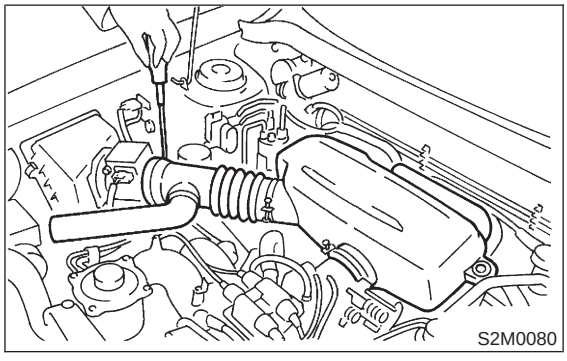
1) Disconnect battery ground cable.



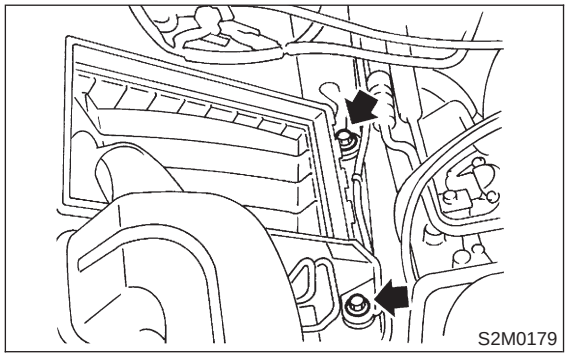
2) Disconnect mass air flow sensor connector.



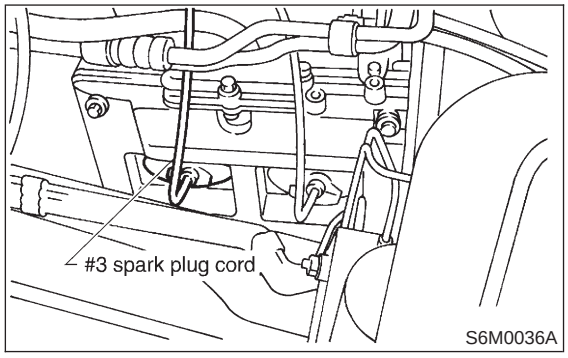
3) Remove four clips securing air cleaner upper cover.
4) Loosen the clamp screw and separate air cleaner upper cover from air intake duct.



5) Remove air cleaner element and air cleaner case.



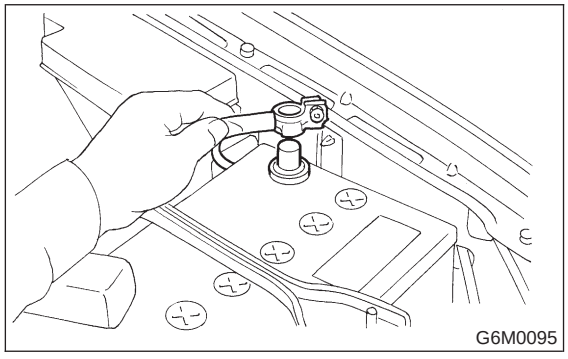
6) Remove #3 spark plug cord by pulling boot, not cord itself.



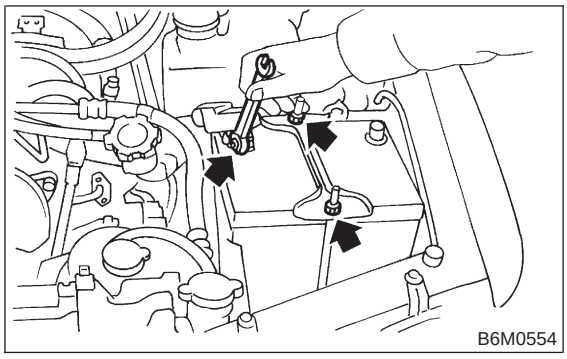
7) For subsequent procedures, refer to the procedure for #1 spark plug. <Ref. to 6-1 [W3B1].>

4. #4 SPARK PLUG

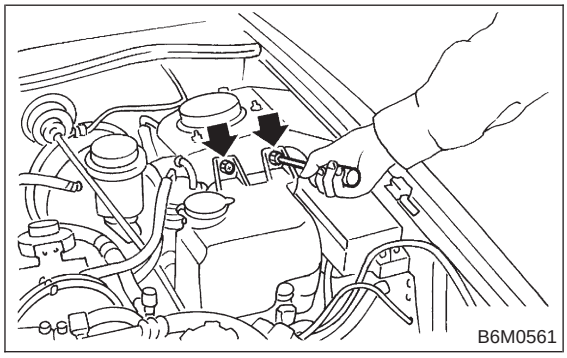
1) Disconnect battery ground cable.



2) Remove battery.

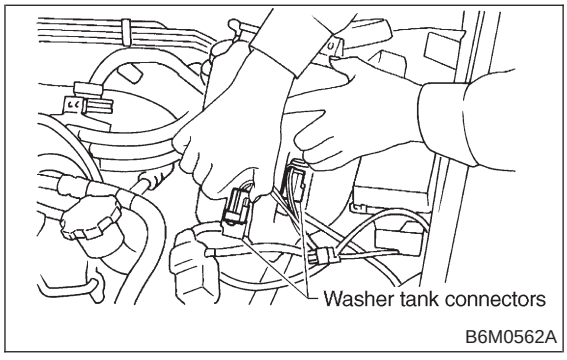


3) Remove washer tank mounting bolts.



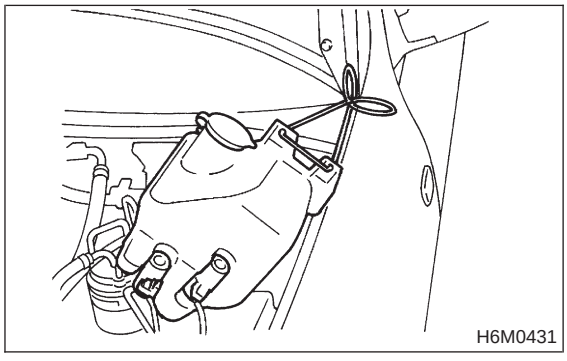
4) Disconnect washer tank connectors.

CAUTION:
Do not disconnect washer tank hoses as washer fluid will leak out from washer tank.

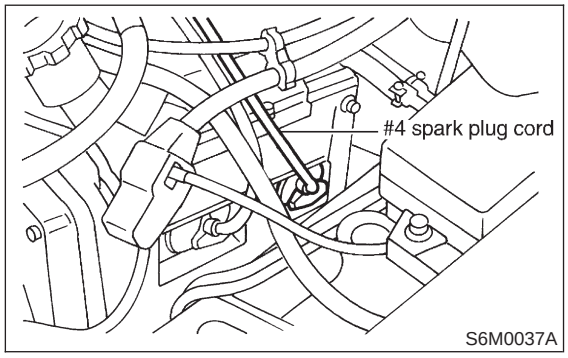


5) Move washer tank upward.

CAUTION:
Secure the washer tank with wire.



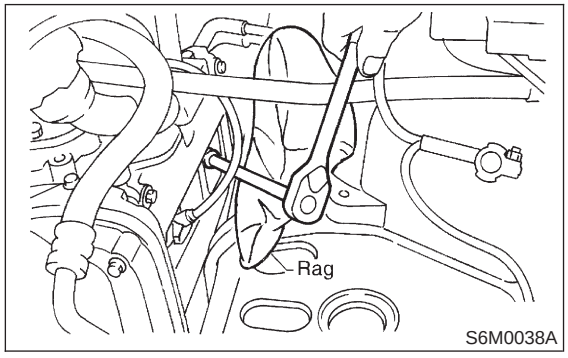
6) Remove #4 spark plug cord by pulling boot, not cord itself.



7) For subsequent procedures, refer to the procedure for #1 spark plug. <Ref. to 6-1 [W3B1].>

CAUTION:
When removing spark plug, cover the ATF coolig pipes with a rag to prevent damage.

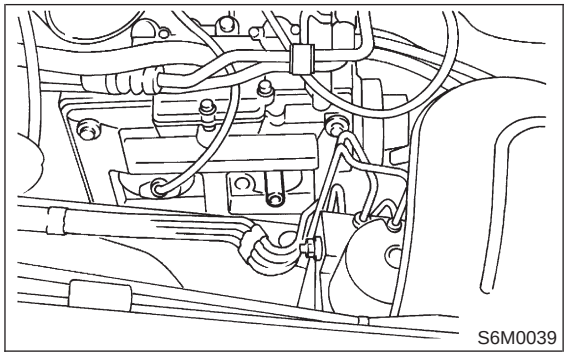
NOTE:
For easier removal of spark plug, diagonally insert the tools from the direction of battery stand into plug hole as shown in figure.



C: INSTALLATION (2500 cc MODEL)

1. #1 SPARK PLUG

1) After setting spark plug in spark plug socket, connect the spark plug socket, extension and Universal Joint to each other. <Ref. to 6-1 [W3B1].>
2) Screw spark plug into cylinder head using the connected tools above mentioned. At this point, it is necessary to support the rear end of the tools with fingertips.

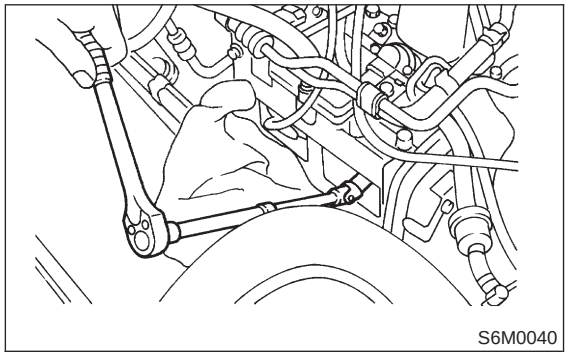


3) When spark plug is screwed in two or three turns, temporarily disconnect the tools connected in the first step.
4) Confirm that spark plug is screwed into the cylinder head properly by touching it with finger. If it is difficult to reach it by hand, confirm its condition by using mirror and suchlike.
5) Cover ABS pipes with rag to prevent damage.
6) Re-insert the tools disconnected in three steps before into plug hole, and set them again over the spark plug.

7) Set extension and ratchet in turn onto the connected tools in plug hole, and tighten spark plug to the specified torque.

Tightening torque (spark plug):
20.6±2.9 N·m (2.10±0.30 kg-m, 15.19±2.14 ft-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 over-stressing.


S6M0040

8) The subsequent procedures are in reverse order of #1 spark plug removal. <Ref. to 6-1 [W3B1].>

2. #2 SPARK PLUG

CAUTION:
When installing spark plug, cover the ATF cooling pipes with a rag to prevent damage.

1) Carry out #1 spark plug installation procedure. <Ref. to 6-1 [W3C1].>
2) Proceed in reverse order of #2 spark plug removal. <Ref. to 6-1 [W3B2].>

3. #3 SPARK PLUG

1) Carry out #1 spark plug installation procedure. <Ref. to 6-1 [W3C1].>
2) Proceed in reverse order of #3 spark plug removal. <Ref. to 6-1 [W3B3].>

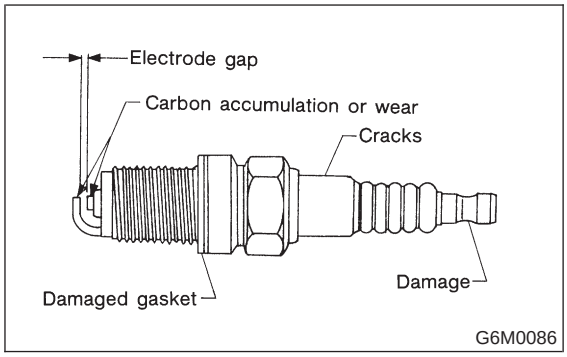
4. #4 SPARK PLUG

CAUTION:
When installing spark plug, cover the ATF cooling pipes with a rag to prevent damage.

1) Carry out #1 spark plug installation procedure. <Ref. to 6-1 [W3C1].>
2) Proceed in reverse order of #4 spark plug removal. <Ref. to 6-1 [W3B4].>

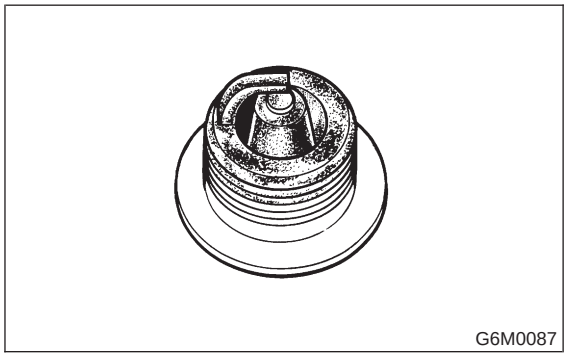
D: INSPECTION

Check electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.

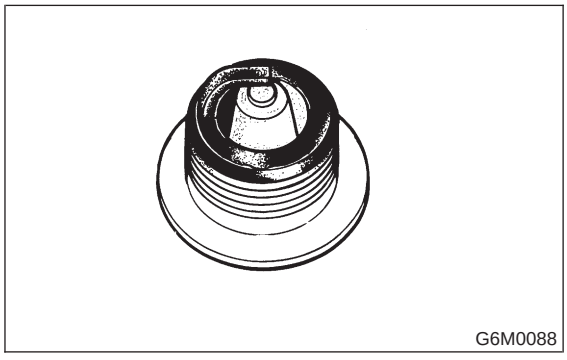


G6M0086

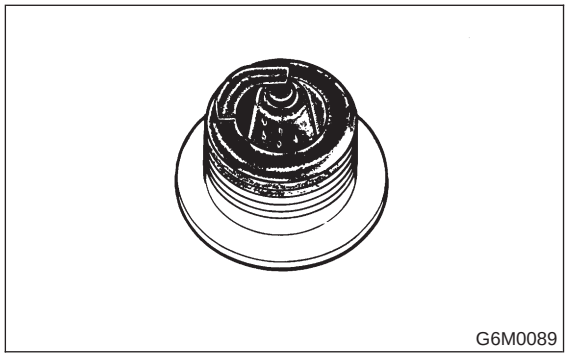
1) Normal
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.


G6M0087

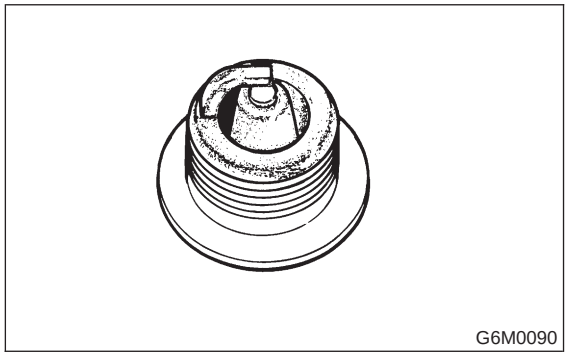
2) Carbon fouled
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.


G6M0088

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.


G6M0089

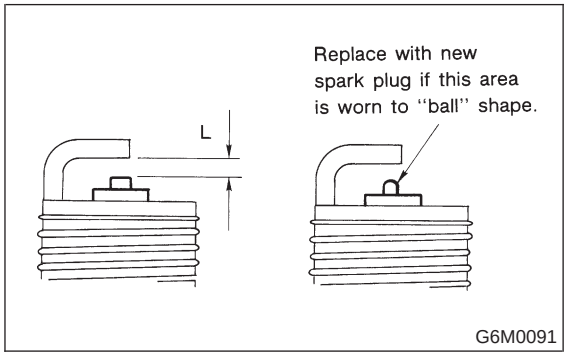
4) Overheating
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.


G6M0090

E: 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)



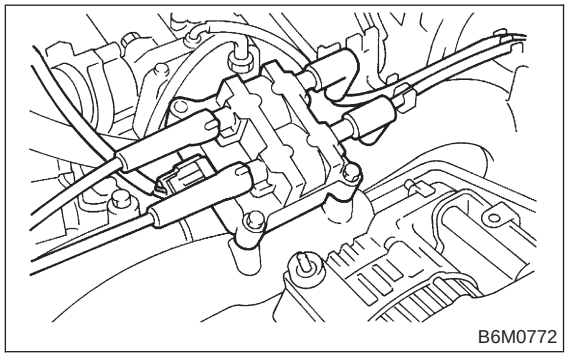
G6M0091

4. Ignition Coil

A: REMOVAL AND INSTALLATION

1. 2200 cc MODEL

1) Disconnect battery ground cable.
2) Disconnect connector from ignition coil.
3) Disconnect spark plug cords from ignition coil.



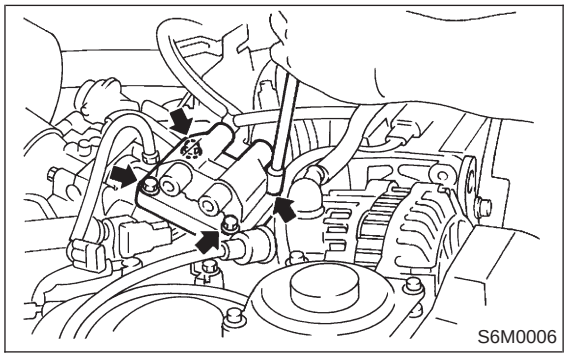
4) Remove ignition coil.
5) Installation is in the reverse order of removal.

Tightening torque:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)

CAUTION:
Be sure to connect wires to their proper positions. Failure to do so will damage unit.

2. 2500 cc MODEL

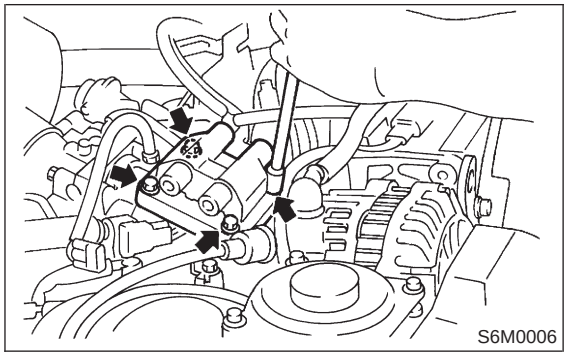
1) Disconnect battery ground cable.
2) Disconnect connector from ignition coil.
3) Remove ignition coil.



4) Installation is in the reverse order of removal.

Tightening torque:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)

CAUTION:
Be sure to connect wires to their proper positions. Failure to do so will damage unit.



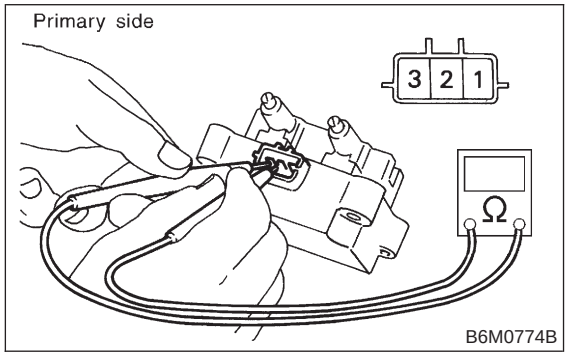
B: INSPECTION

1. 2200 cc MODEL

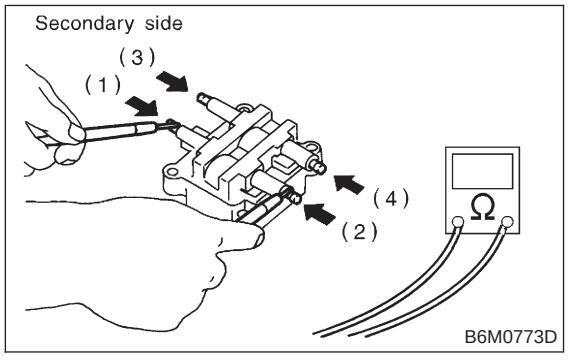
Using accurate tester, inspect the following items, and replace if defective.
1) Primary resistance
2) Secondary coil resistance

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 Ω±10%



[Secondary side]
Between (1) and (2)
Between (3) and (4)
12.8 kΩ±15%



3) Insulation between primary terminal and case: 10 MΩ or more.

2. 2500 cc MODEL

Using accurate tester, inspect the following items, and replace if defective.
1) Primary resistance
2) Secondary coil resistance

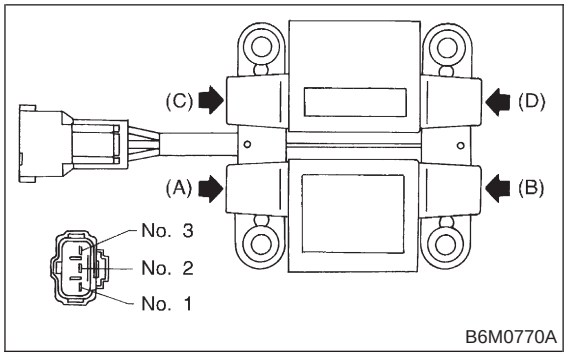
CAUTION:
If the resistance is extremely low, this indicates the presence of a short-circuit.

Specified resistance:

[Primary side]
Between No. 1 and No. 2
0.69 Ω±10%
Between No. 2 and No. 3
0.69 Ω±10%

[Secondary side]
Between terminal (A) and (B)
21.0 kΩ±15%
Between terminal (C) and (D)
21.0 kΩ±15%

[Insulation]
Between primary terminal and case
10 MΩ or more



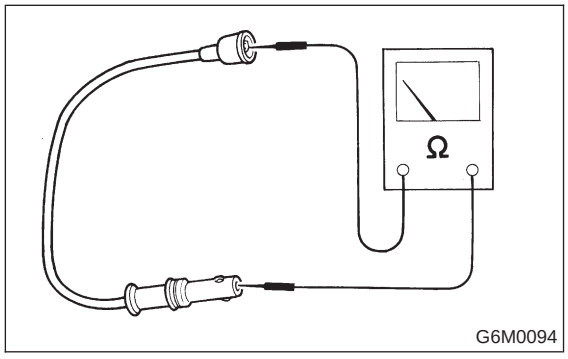
5. Spark Plug Cord

A: INSPECTION

1. 2200 cc MODEL

Check for:
1) Damage to cords, deformation, buring or rust formation of terminals
2) Resistance values of cords

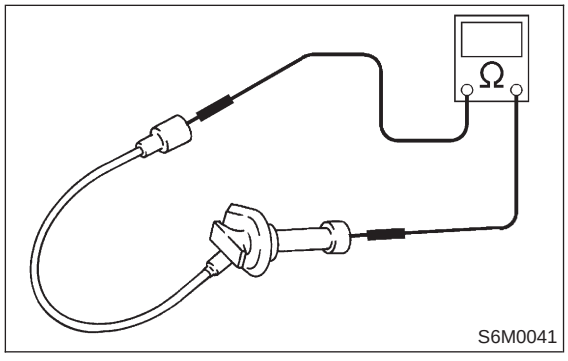
Resistance value:
5.12 — 12.34 kΩ



2. 2500 cc MODEL

Check for:
1) Damage to cords, deformation, burning or rust formation of terminals
2) Resistance values of cords

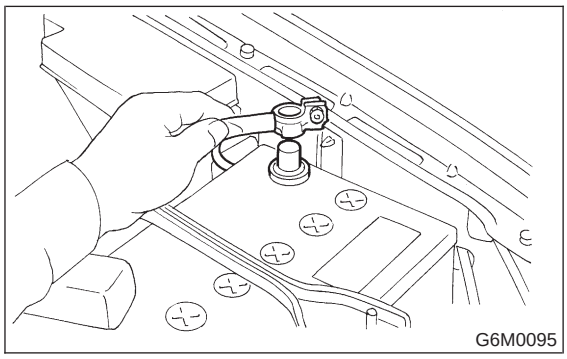
Resistance value:
#1 5.95 — 13.89 kΩ
#2 and #3 6.24 — 14.56 kΩ
#4 6.67 — 15.57 kΩ



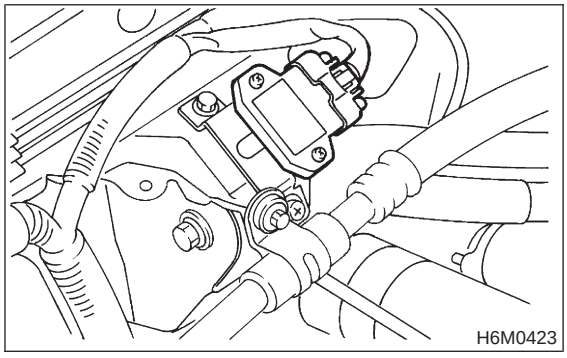
6. Ignitor

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.

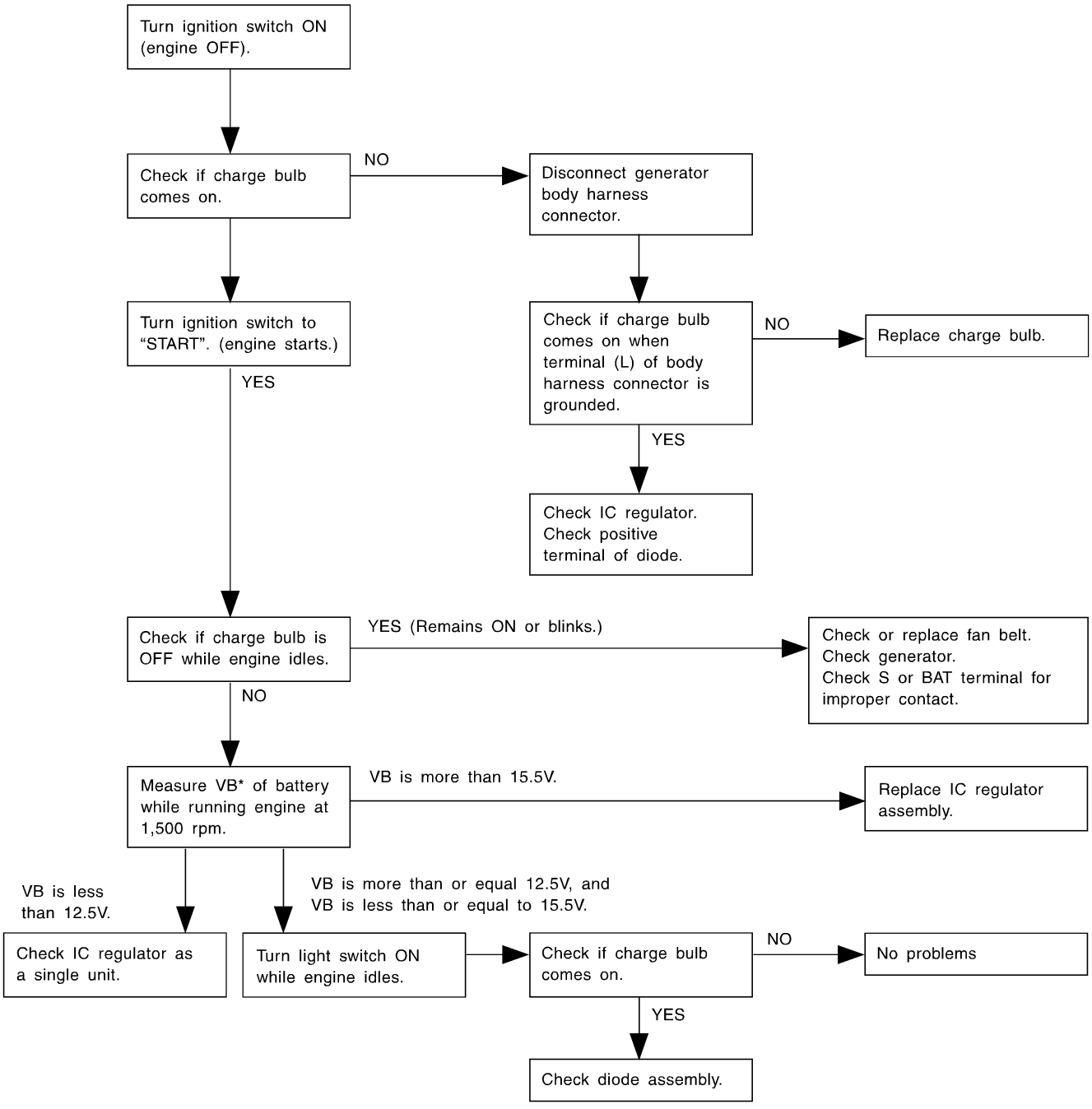


5) Installation is in the reverse order of removal.

1. 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.

2. Generator



*: Terminal voltage

B6M0771

BODY ELECTRICAL SYSTEM 6-2

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K DIAGNOSTICS 19
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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		Electric pulse 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 — 1.4 W	
	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 fog light			12 V — 55 W	
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 — 27 W	
		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	
Accessory socket	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. Precautions

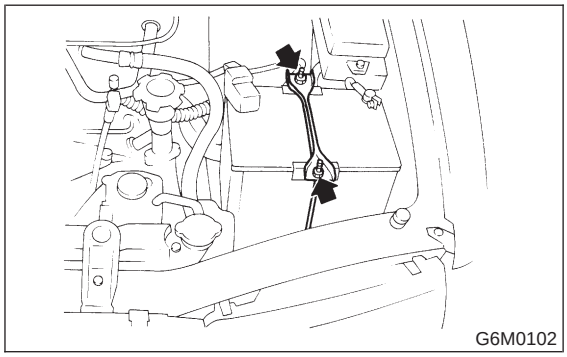
● Before disassembling or reassembling parts, always disconnect battery ground cable. When repairing radio, control units, etc. which are provided with memory functions, record memory contents before disconnecting battery ground cable. Otherwise, these contents are cancelled upon disconnection.
● Reassemble 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 circuits.
● 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±1.0 N·m (0.35±0.1 kg-m, 2.5±0.7 ft-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.

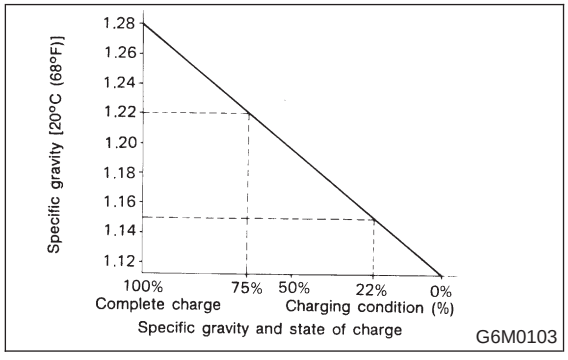
B: INSPECTION

WARNING:
● Electrolyte has toxicity; be careful handling the fluid.
● Avoid contact with skin, eyes or clothing. Especially at contact with eyes, blush 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} = St + 0.0007 x (t − 20)
S_{20}:Specific gravity corrected at electrolyte temperature of 20°C
St :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.

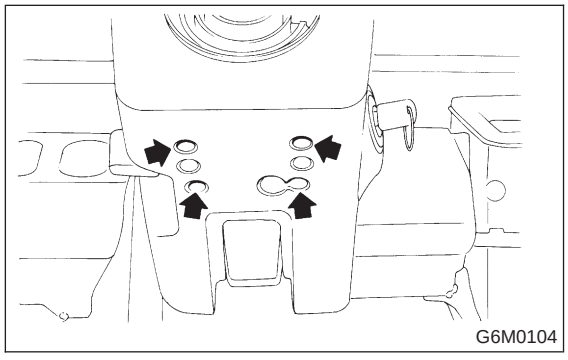
4. CHECK HYDROMETER FOR STATE OF CHARGE

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.		

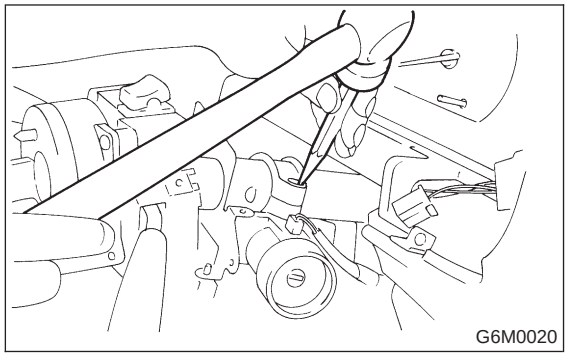
3. Ignition Switch

A: REMOVAL AND INSTALLATION

1) Remove screws, separate upper column cover and lower column cover.

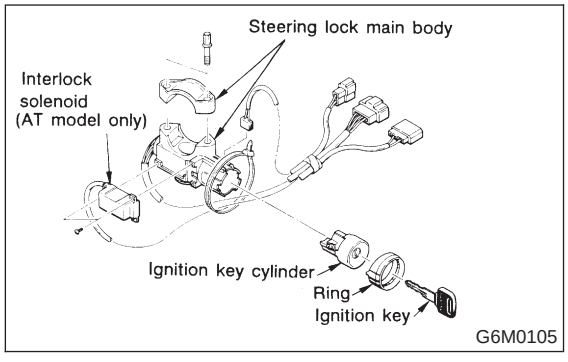

G6M0104

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.


G6M0020

6) Installation is in the reverse order of removal.

NOTE:
When installing, tighten the connecting bolt until its head twists off.



G6M0105

4. Lighting

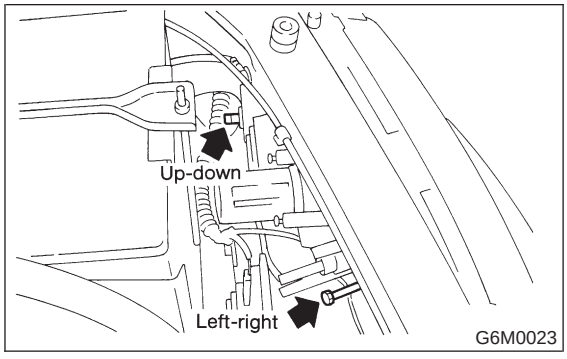
A: ADJUSTMENT

1. HEADLIGHT AIMING

1) Adjust the headlight aiming by turning the adjusting screws.

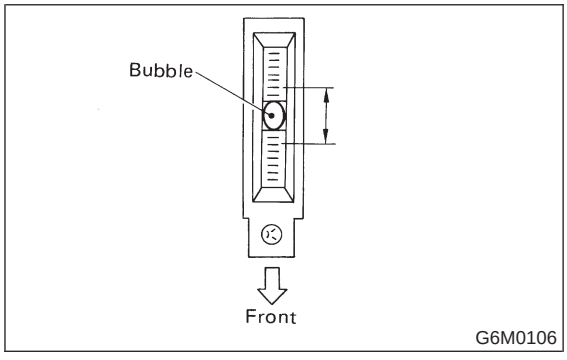
CAUTION:
Before checking the headlight aiming, be sure of the following:
- **Turn off the light before adjusting headlight aiming. If the light is necessary to check aiming, do not turn on for more than two minutes.**
- **The area around the headlight has not sustained any accident, damage or other type 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.



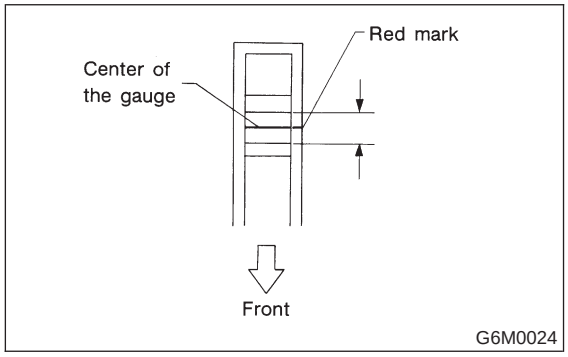
G6M0023

2) Look at the beam angle gauge (vertical movement). The bubble on the gauge should not deviate from the center of the gauge.



G6M0106

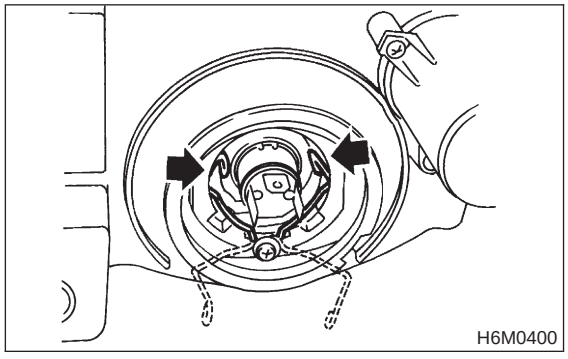
3) Look at the beam angle gauge (horizontal movement). The center mark (the red line on the inner scale) should not deviate from the red line on the outer case.



B: REMOVAL AND INSTALLATION

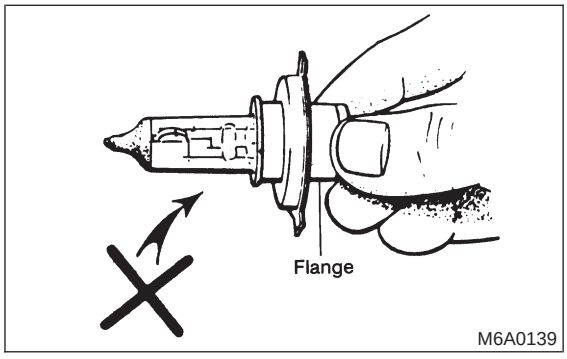
1. HEADLIGHT BULB

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.

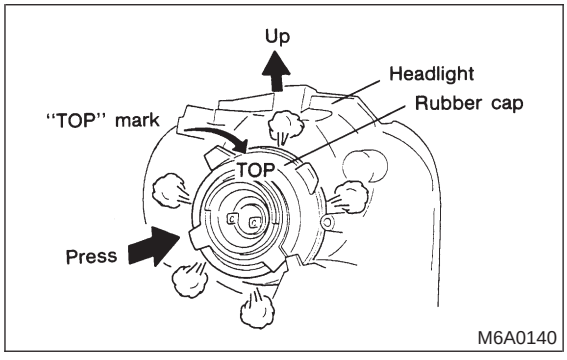


4) Replace the bulb with a new one and hook the spring.
5) Attach the rubber cap and connect the connector.

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.



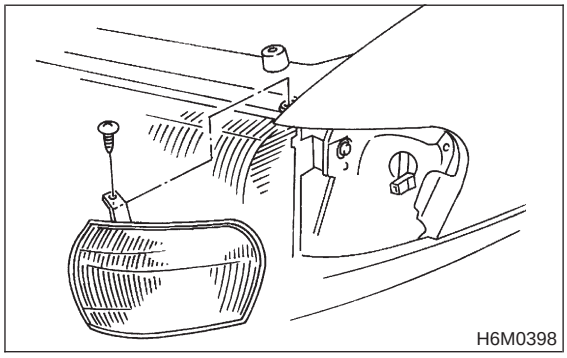
● Attach the rubber cap with letters TOP on the top so that the drain hole will be on the lower side.



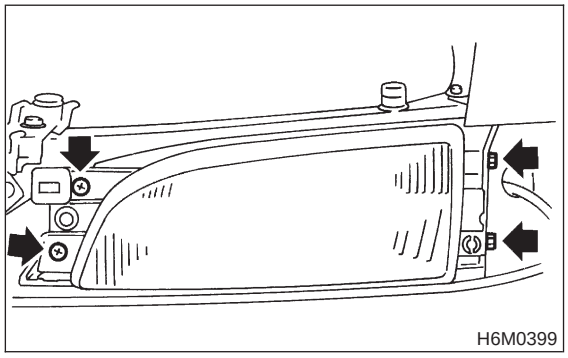
● To keep water out, correctly engage the groove portion of the rubber cap.

2. HEADLIGHT AND SIDE MARKER LIGHT

1) Remove front grille and disconnect connector from headlight.
2) Remove screw then remove side marker light while disconnecting connector.



3) Remove screws and bolts which secure headlight and remove headlight.


H6M0399

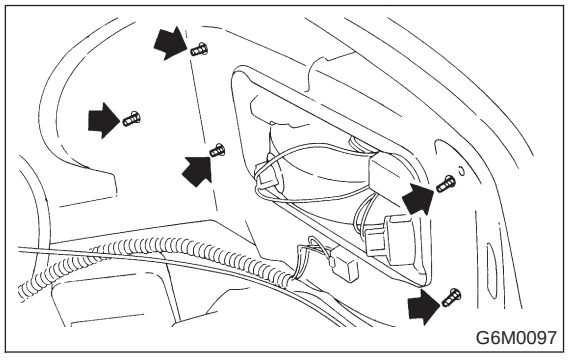
4) Installation is in the reverse order of removal.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

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.


G6M0097

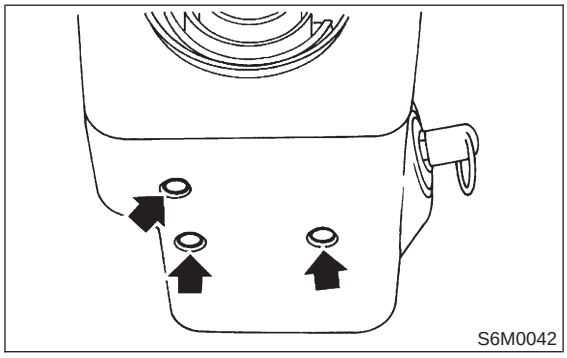
3) Attach adhesive cloth tape to body area around rear combination light.
4) Using a standard screwdriver, carefully pry rear combination light off and away from the front of vehicle.
5) Installation is in the reverse order of removal.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

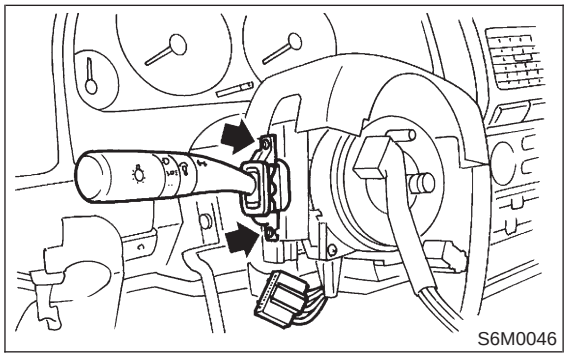
CAUTION:
● Do not pry rear combination light forcefully as this may scratch vehicle body.
● Remove all traces of adhesive tape from body before installation.
● Attach butyl rubber tape to back of rear combination light before installing rear combination light on body for sealing purposes.

4. COMBINATION SWITCH

1) Remove instrument panel lower cover. <Ref. to 5-4 [W1A0].>
2) Remove screws which secure upper column cover to lower column cover.


S6M0042

3) Disconnect connector from combination switch.
4) Remove screws which secure switch and remove switch.


S6M0046

5) Installation is in the reverse order of removal.

C: INSPECTION

1. COMBINATION SWITCH (LIGHTING)

Move combination switch to respective positions and check continuity between terminals.

• LIGHTING SWITCH

Terminal / Switch position	16	14	13
OFF			
Tail	○	○	
Head	○	○	○

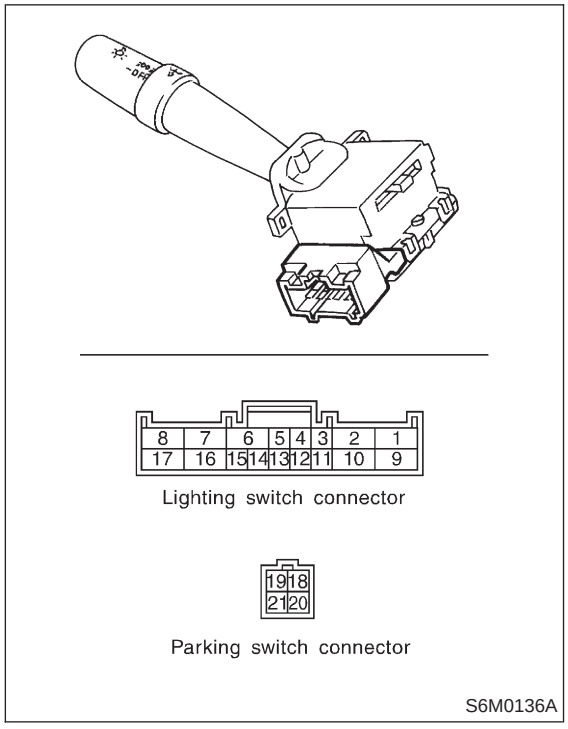
• PARKING SWITCH

Terminal / Switch position	19	21	18
OFF	○	○	
ON		○	○

• DIMMER AND PASSING SWITCH

Terminal / Switch position	16	17	7	8
Flash	○		○	○
Low beam	○	○		
HI-beam	○		○	

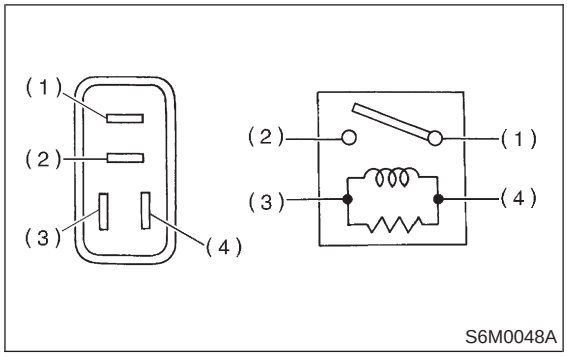
H6M0500B



2. HEADLIGHT RELAY

Check continuity between terminals when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

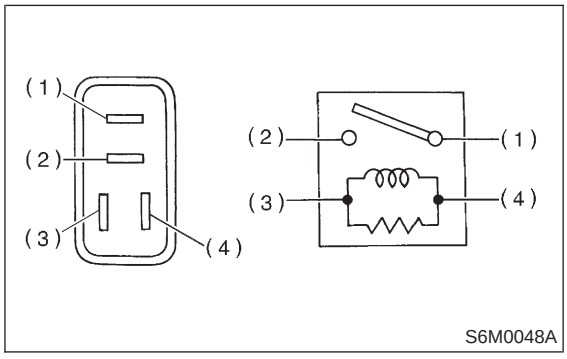
When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.



3. TAIL AND ILLUMINATION RELAY

Check continuity between terminals (indicated in table below) when terminal No. 4 is connected to battery and terminal No. 3 is grounded.

When current flows.	Between terminals No. 1 and No. 2	Continuity exists.
When current does not flow.	Between terminals No. 1 and No. 2	Continuity does not exist.
	Between terminals No. 3 and No. 4	Continuity exists.

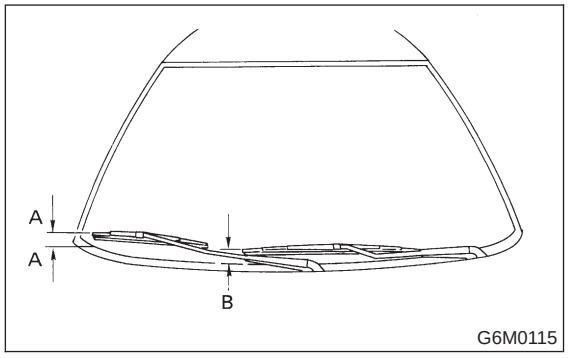


5. Front Wiper and Washer

A: ADJUSTMENT

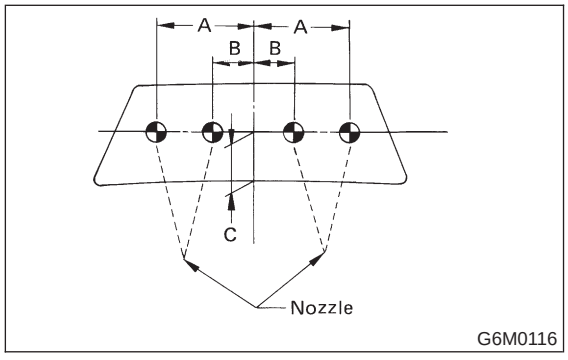
1) Turn the wiper switch to OFF position.
2) Adjust blades in original position as shown in figure by changing wiper arm installation.

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.

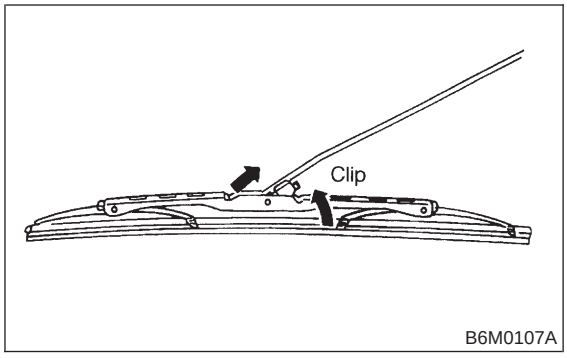
Ejecting point:
A: 375 mm (14.76 in)
B: 150 mm (5.91 in)
C: 350 mm (13.78 in)



B: REMOVAL AND INSTALLATION

1. BLADE

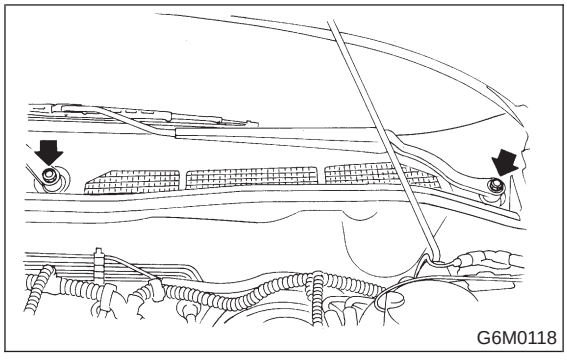
1) Pull out blade following the arrow direction, from arm while pushing up locking clip.



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±2N·m (1.4±0.2 kg-m, 10.1±1.4 ft-lb)

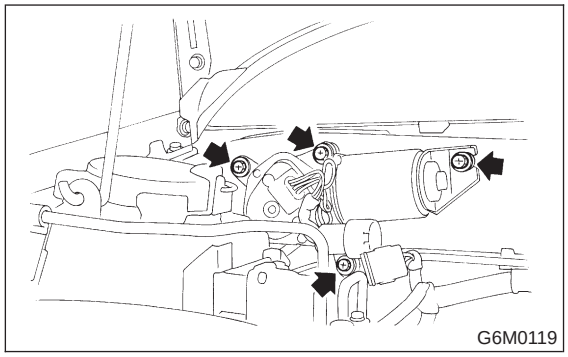
3. WIPER MOTOR AND LINK

1) Detach weatherstrip and cowl panel. <Ref. to 5-1 [W11A0].>

NOTE:
Apply silicone oil or soap water to both sides of cowl net to facilitate removal.

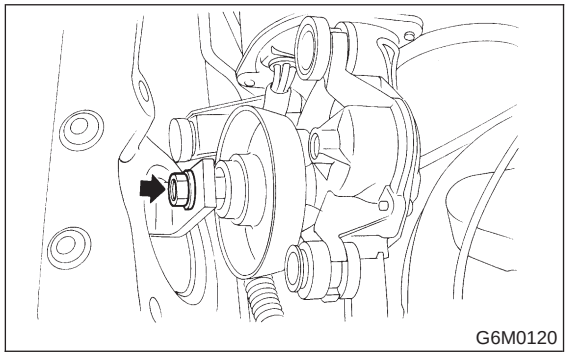
2) Disconnect electric connector, and remove motor attaching bolts.

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)


G6M0119

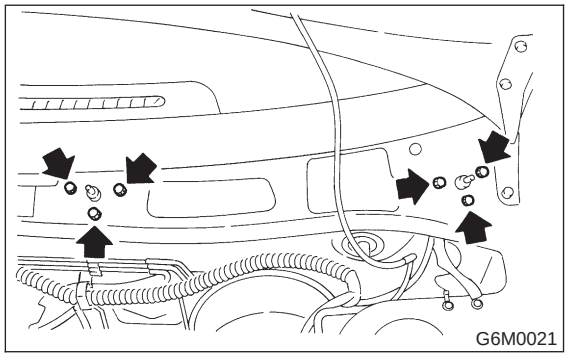
3) Remove nut securing motor link on the back side of motor.

Tightening torque:
15±3 N·m (1.5±0.3 kg-m, 10.8±2.2 ft-lb)

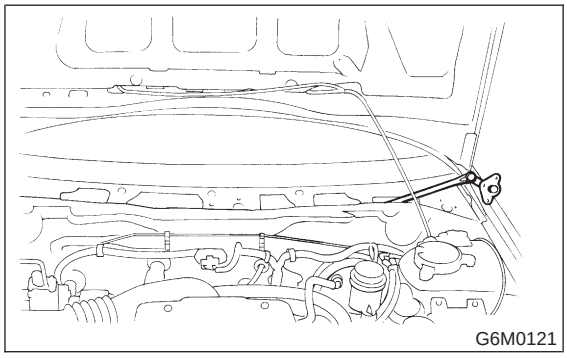

G6M0120

4) Remove nuts which secure sleeve unit.

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)


G6M0021

5) Remove wiper link from service hole in front panel.


G6M0121

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.

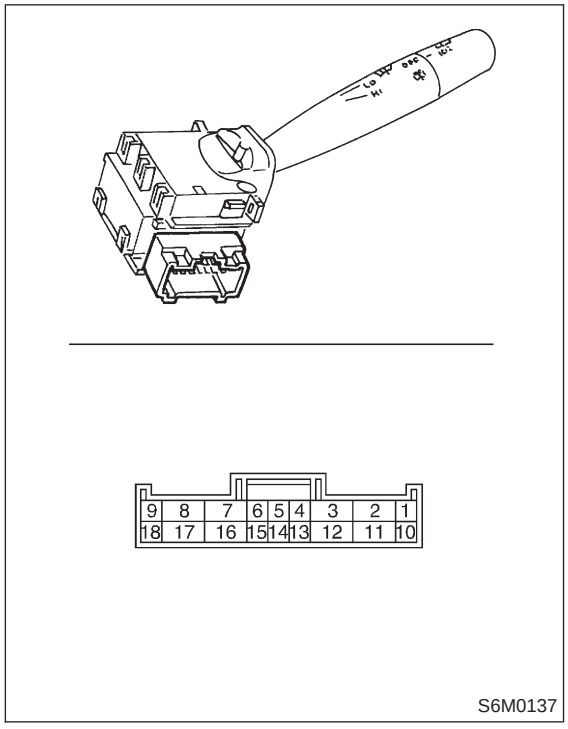
• Wiper switch

Terminal / Switch position		16	7	17	8	INT1	INT2
OFF	OFF	○	○				
		×		×			
	MIST		○	○			
INT	OFF	○	○			○	○
		×		×			
	MIST		○	○		○	○
		×		×			
LO	OFF		○	○			
	MIST		○	○			
HI	OFF			○	○		
	MIST		○	○	○		

• Washer switch

Terminal / Switch position	11	2
OFF		
ON	○	○

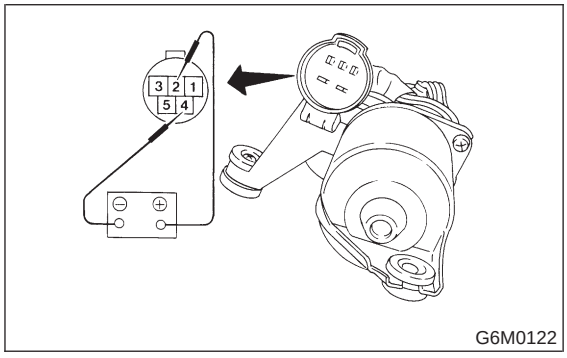
H6M0501B



S6M0137

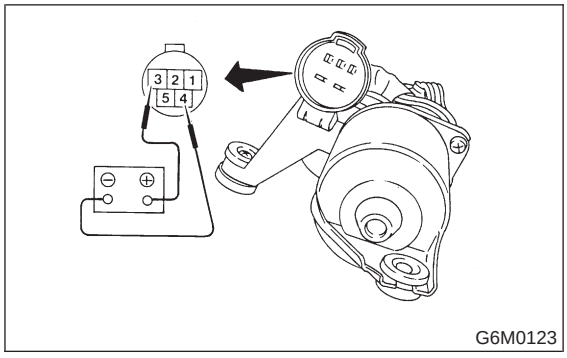
2. WIPER MOTOR

1) Check wiper motor operation at low speed: Connect battery to wiper motor. Check wiper motor for proper operation at low speed.



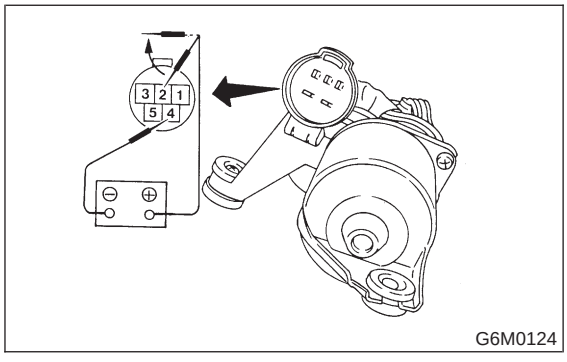
G6M0122

2) Check wiper motor operation at high speed: Connect battery wiper motor. Check wiper motor for proper operation at high speed.



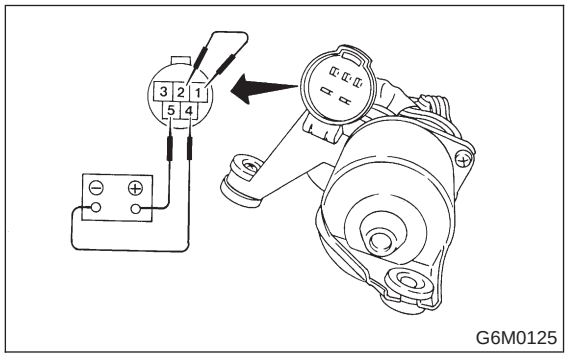
G6M0123

3) Check wiper motor for proper stoppage: Connect battery to wiper motor. After operating wiper motor at low speed, disconnect battery to stop it.



G6M0124

4) Reconnect battery and ensure that wiper motor stops at “AUTO STOP” after operating at low speed.



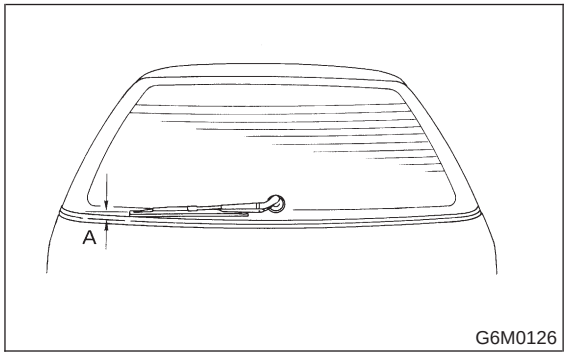
6. Rear Wiper and Washer

A: ADJUSTMENT

1) Adjust wiper blade in original position as shown in figure by changing wiper arm installation.

Original position:

A: 30±5 mm (1.18±0.20 in)

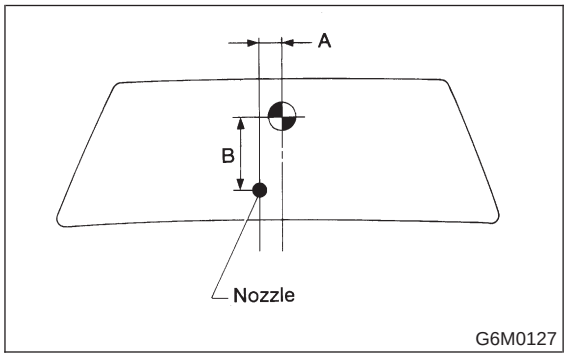


2) Adjust washer ejecting point on rear gate window as shown in figure when the vehicle stops.

Ejecting point:

A: 25 mm (0.98 in)

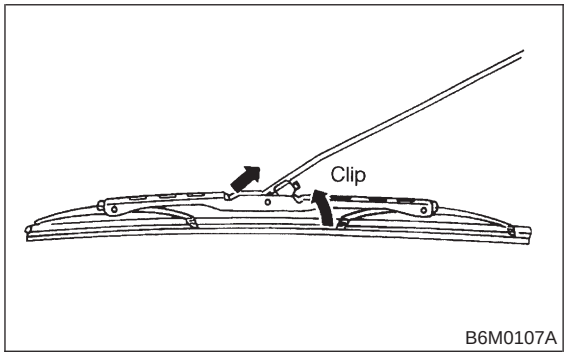
B: 200 — 300 mm (7.87 — 11.81 in)



B: REMOVAL AND INSTALLATION

1. BLADE

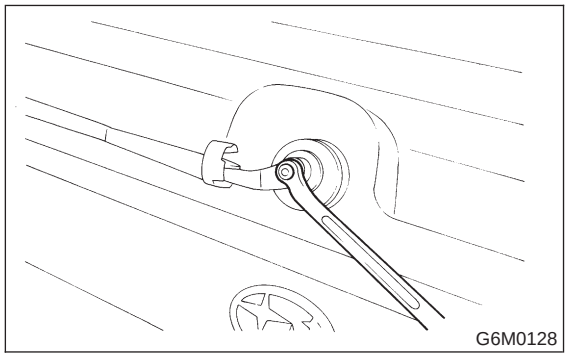
1) Pull out blade following the arrow direction, from arm while pushing up locking clip.



2) Installation is in the reverse order of removal.

2. WIPER ARM

1) Remove head cover.
2) Remove nut and wiper arm.


G6M0128

3) Installation is in the reverse order of removal.

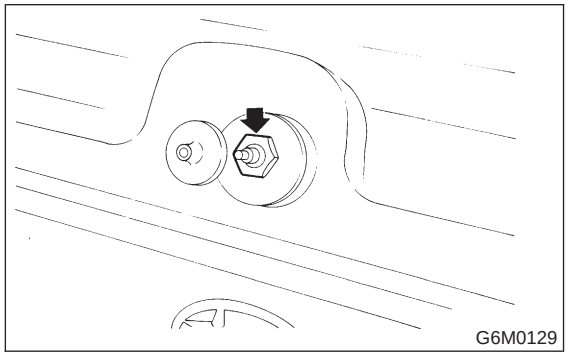
Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)

3. WIPER MOTOR

1) Remove cap and special nut.

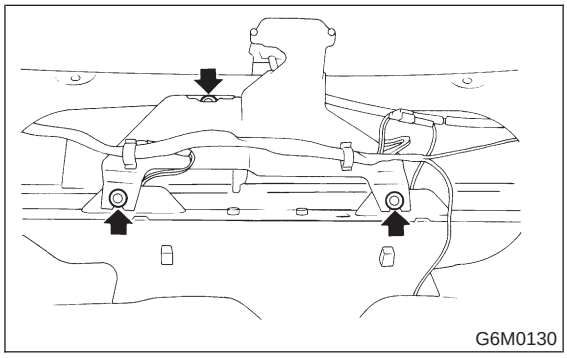
CAUTION:
Be careful not to strike service tool against nozzle during removal.

Tightening torque:
7.4±1.5 N·m (0.75±0.15 kg-m, 5.4±1.1 ft-lb)


G6M0129

2) Remove rear gate trim. <Ref. to 5-2 [W3A0].>
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.

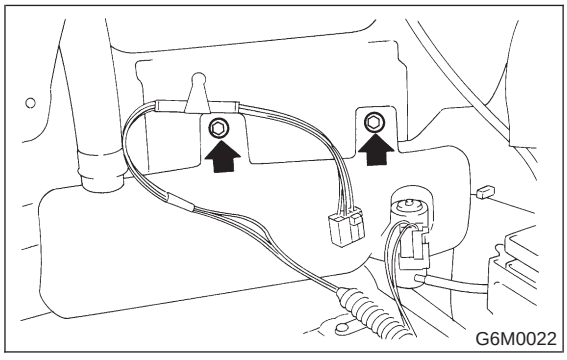

G6M0130

6) 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)

4. WASHER TANK

1) Remove rear quarter trim.
2) Disconnect washer hose and connector.
3) Remove attaching bolts.


G6M0022

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

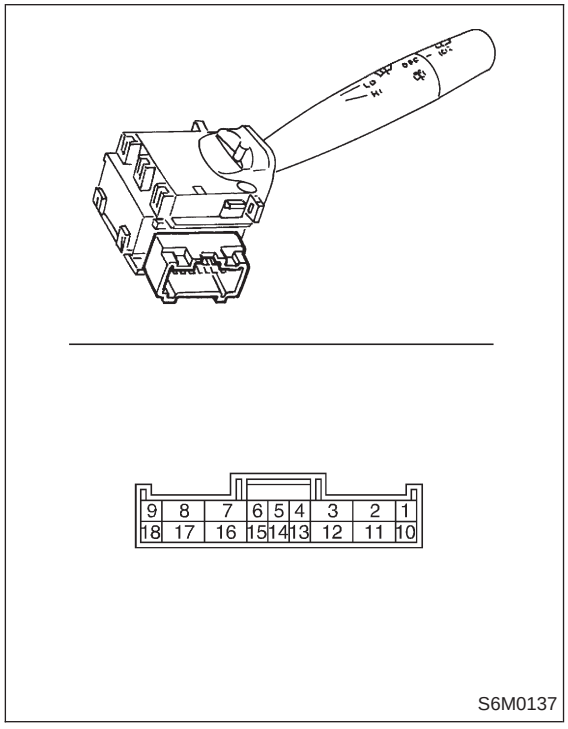
1. COMBINATION SWITCH (ON-CAR)

Set rear wiper and washer switch to each position and check continuity between terminals.

• **WITHOUT INTERMITTENT REAR WIPER**

Terminal / Switch position	10	12		2
WASH	○	○		○
OFF				
ON	○			○
WASH	○	○		○

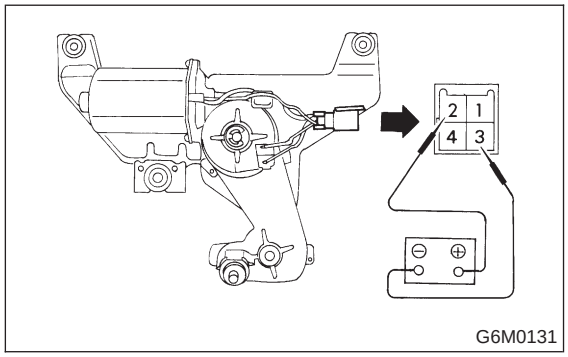
H6M0502B



S6M0137

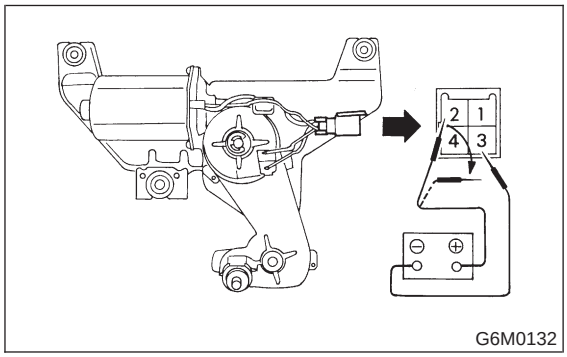
2. WIPER MOTOR

1) Operational check:
Connect battery to wiper motor and check operation of wiper motor.



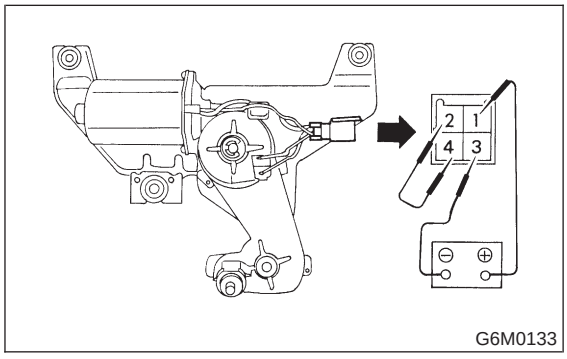
G6M0131

2) Check wiper motor for proper stoppage:
After operating wiper motor, disconnect battery from wiper motor.



G6M0132

3) Reconnect battery and ensure that wiper motor stops at “AUTO STOP” after it has been operated.

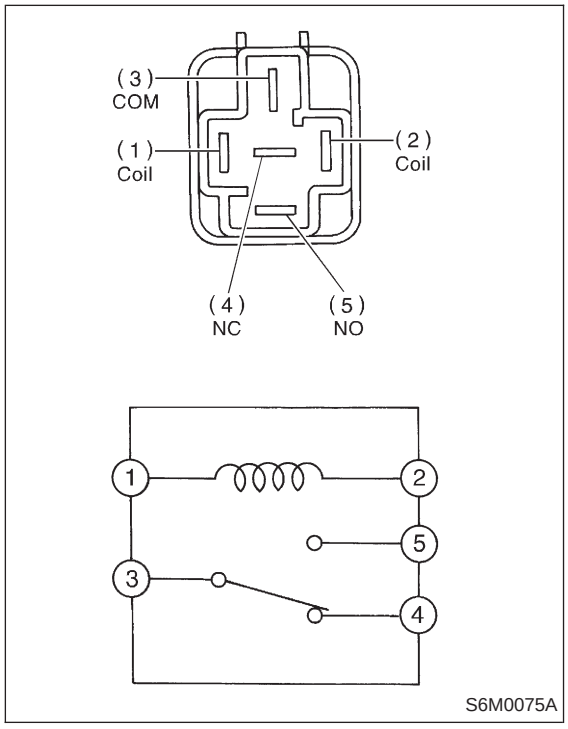


G6M0133

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. 4	Continuity does not exist.
	Between terminals No. 3 and No. 5	Continuity exists.
When current does not flow.	Between terminals No. 3 and No. 4	Continuity exists.
	Between terminals No. 3 and No. 5	Continuity does not exist.
	Between terminals No. 1 and No. 2	Continuity exists.



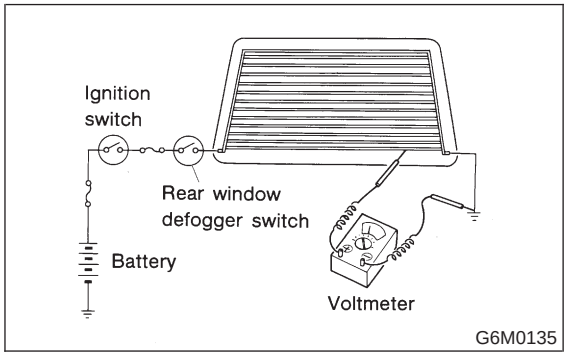
7. Rear Window Defogger

A: INSPECTION

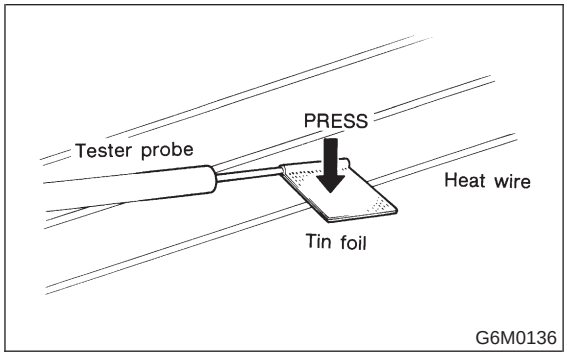
1. HEAT WIRES

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.

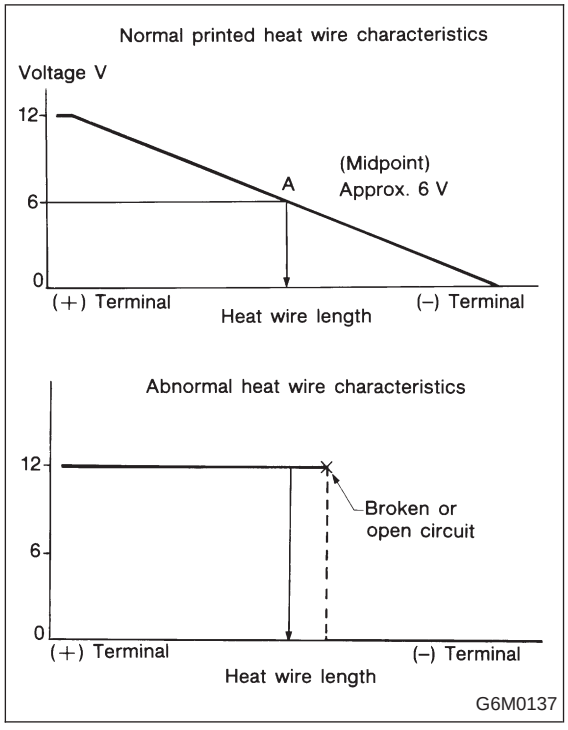
NOTE:
- Normal indication is about 6 volts.



- 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.

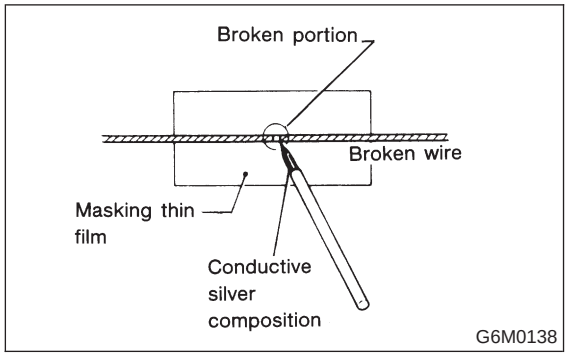


4) When tester indicates 12 volts when its probe reaches point “A”, a broken circuit occurs between point “A” and the negative terminal. Slowly move tester probe toward the negative terminal while contacting it on heat wire to locate point where tester indication changes abruptly (0 volts). This is the 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.

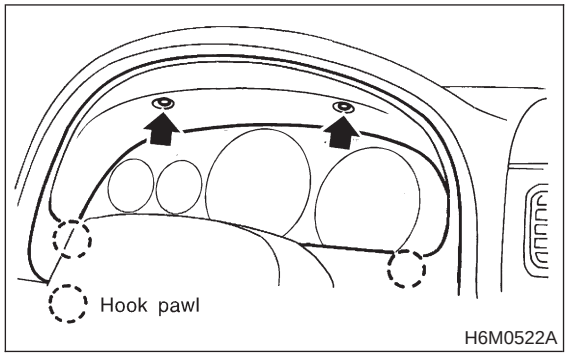


4) Dry out the deposited portion.
5) Inspect the repaired wire for continuity.

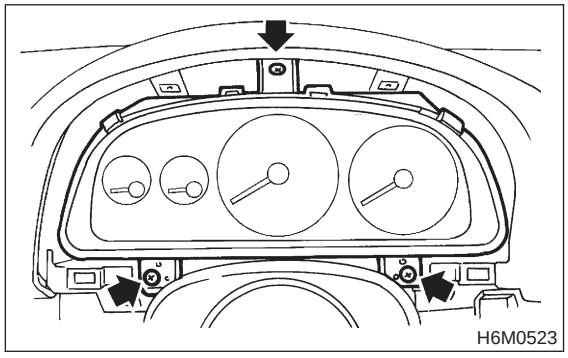
8. Combination Meter

A: REMOVAL AND INSTALLATION

1) Move steering wheel most down.
2) Remove screws which secure visor and remove visor.



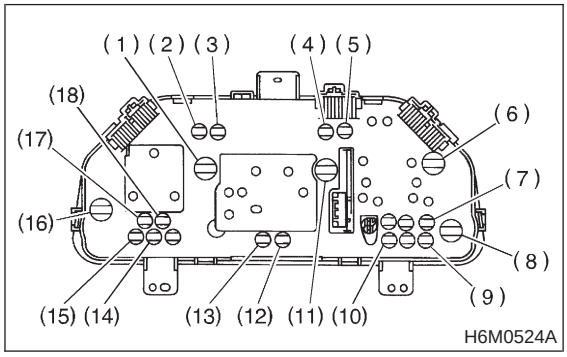
3) Remove screws which secure combination meter, and pull combination meter out.



4) Disconnect connector from back of combination meter.
5) Installation is in the reverse order of removal.

CAUTION:
When installing combination meter, be sure to connect connectors to backside of combination meter.

B: BULB REPLACEMENT



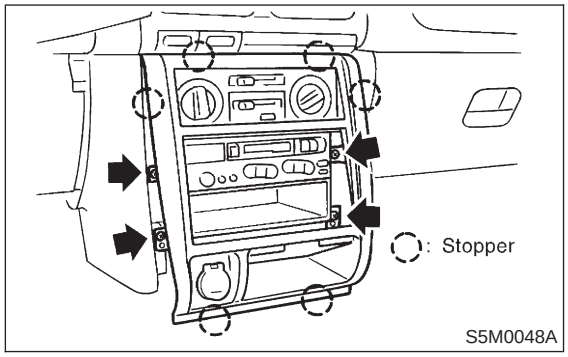
(1) Speedometer and tachometer
(2) HI-beam
(3) Turn RH
(4) Turn LH
(5) Airbag
(6) Temperature gauge
(7) ABS
(8) Low fuel
(9) FWD
(10) AT oil temp.
(11) Speedometer and temperature gauge
(12) Seat belt
(13) Door open
(14) Check engine
(15) Charge
(16) Tachometer
(17) Brake
(18) Oil pressure

9. Radio, Speaker and Antenna

A: REMOVAL AND INSTALLATION

1. RADIO BODY

1) Remove console box. <Ref. to 5-4 [W1A0].>
2) Remove AT cover (AT model).
3) Remove center panel.
4) Remove fitting screws, and slightly pull radio out from center console.



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 (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.

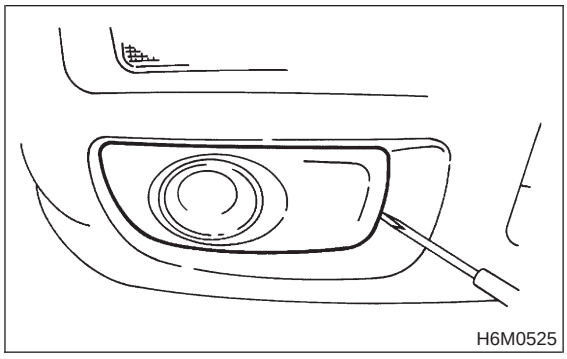
4. REAR SPEAKER (WAGON)

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.

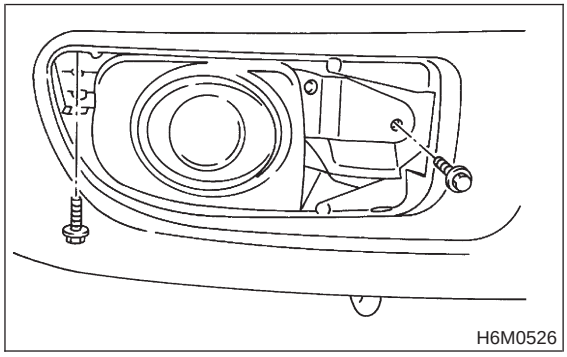
10. Front Fog Light

A: REMOVAL AND INSTALLATION

1) Disconnect ground cable from battery.
2) Remove front fog light cover.



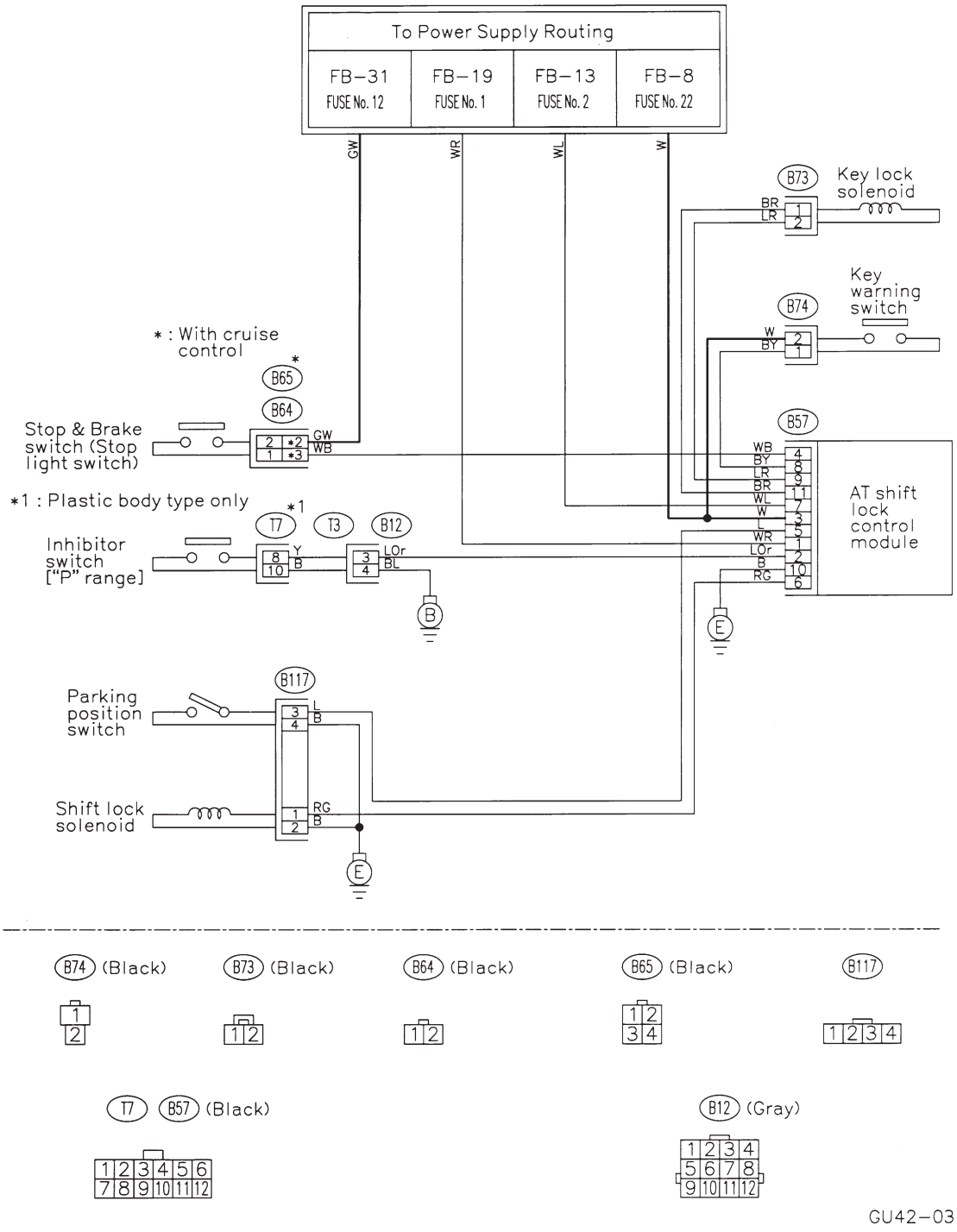
3) Remove the two screws, then draw out the front fog light from front bumper.



4) Disconnect the connector.
5) Installation is in the reverse order of removal.

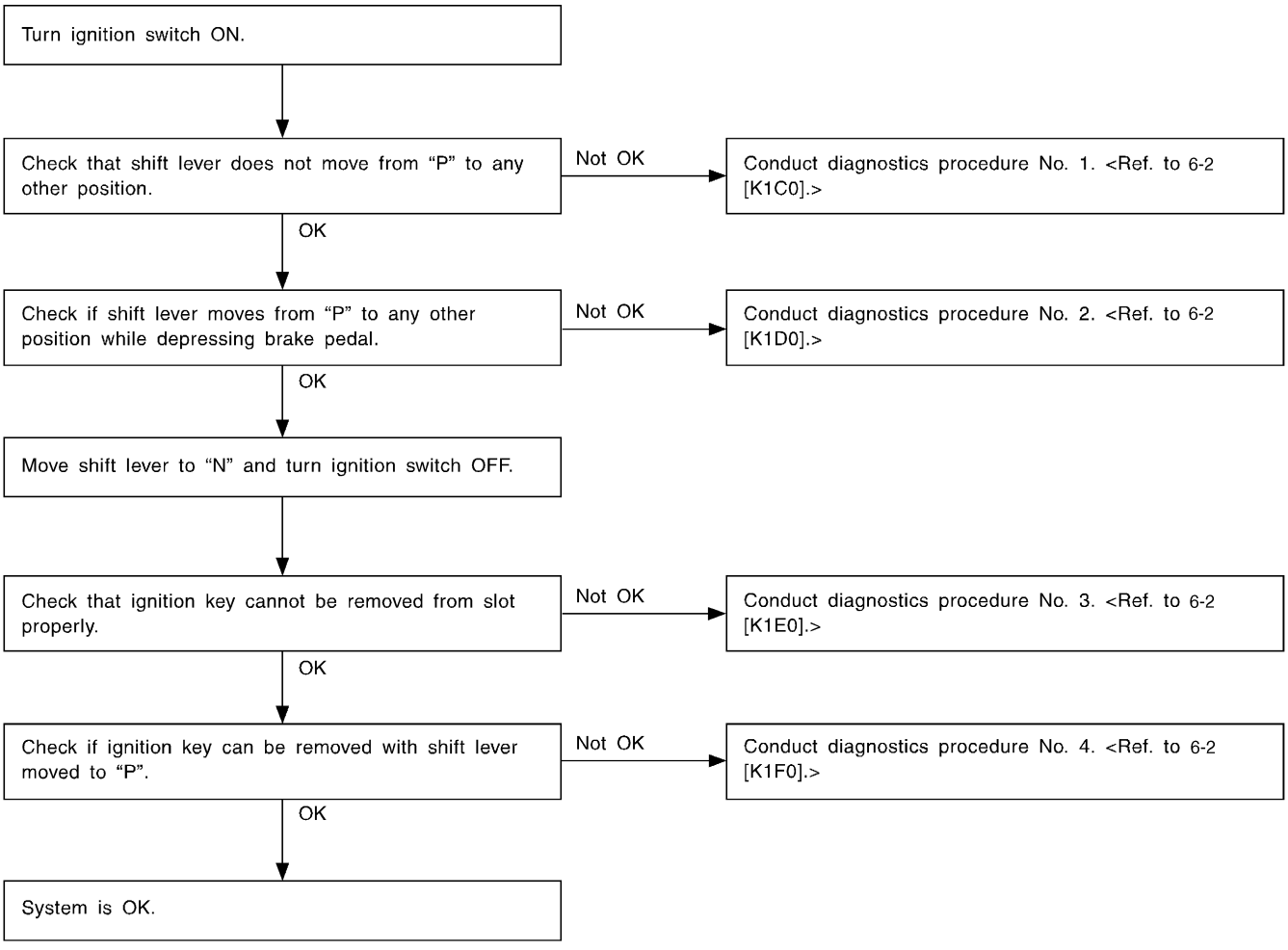
1. AT Shift Lock System

A: WIRING DIAGRAM



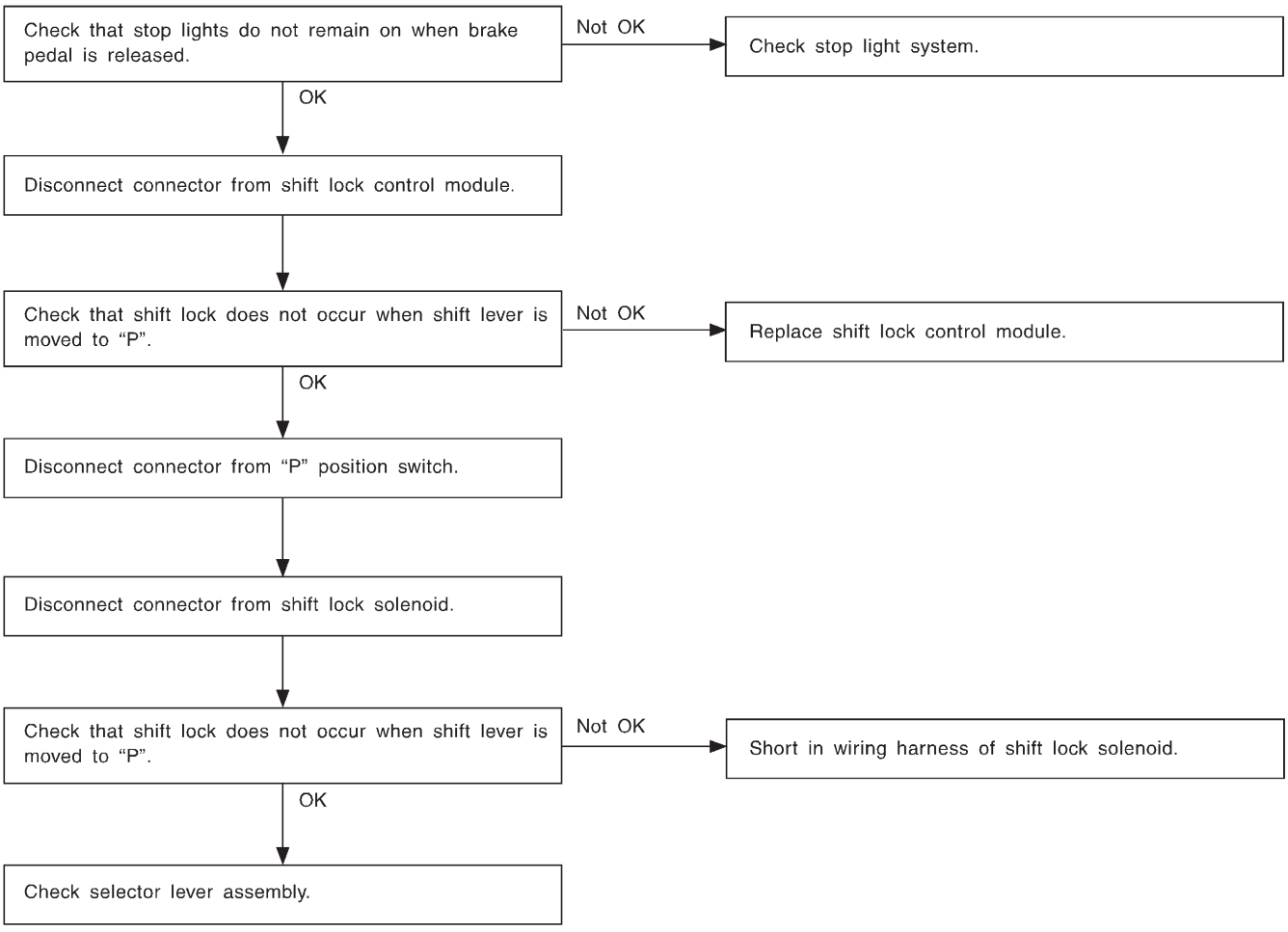
H6M0503

B: BASIC DIAGNOSTICS CHART



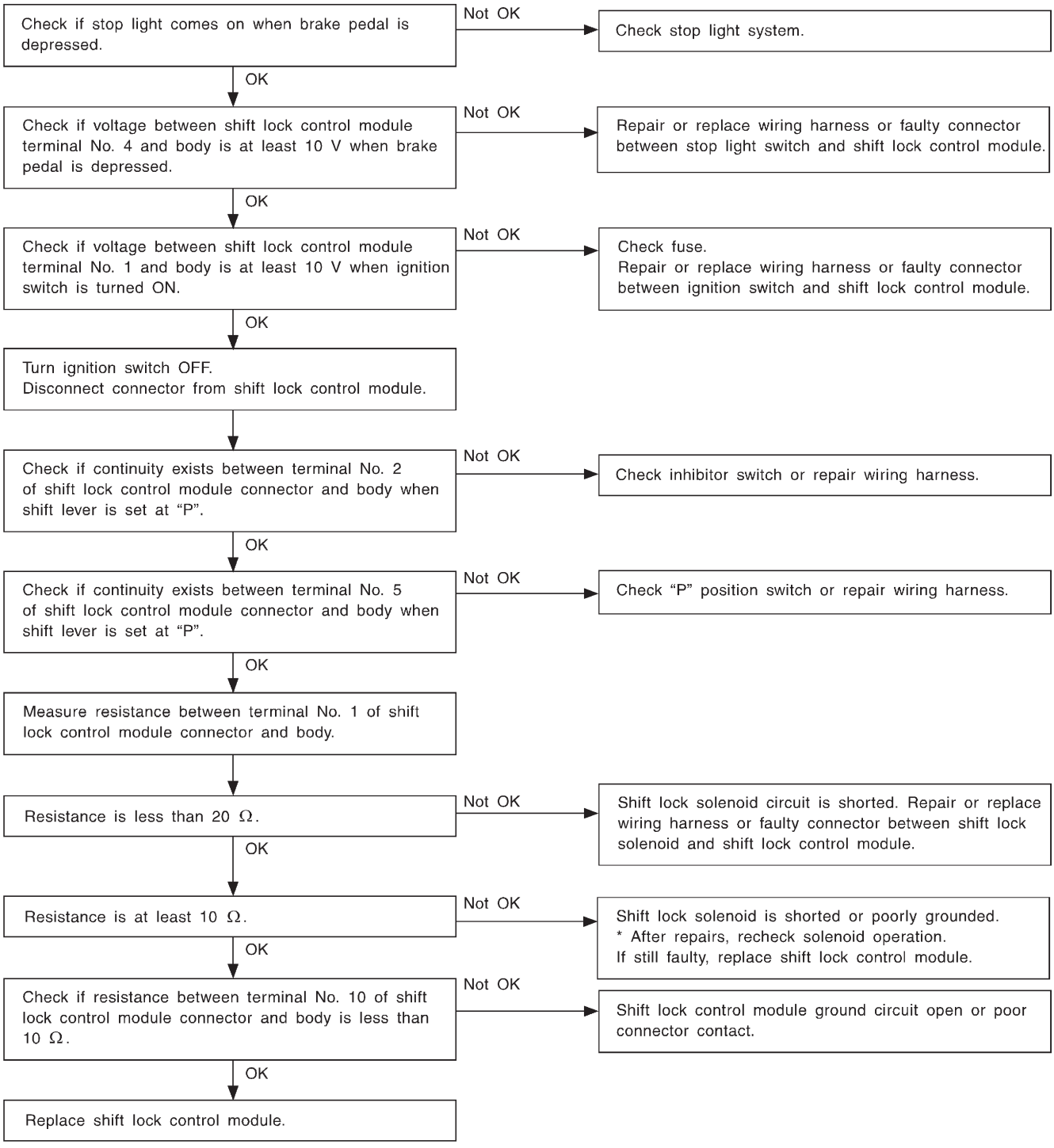
EPA0117

C: DIAGNOSTICS PROCEDURE NO. 1



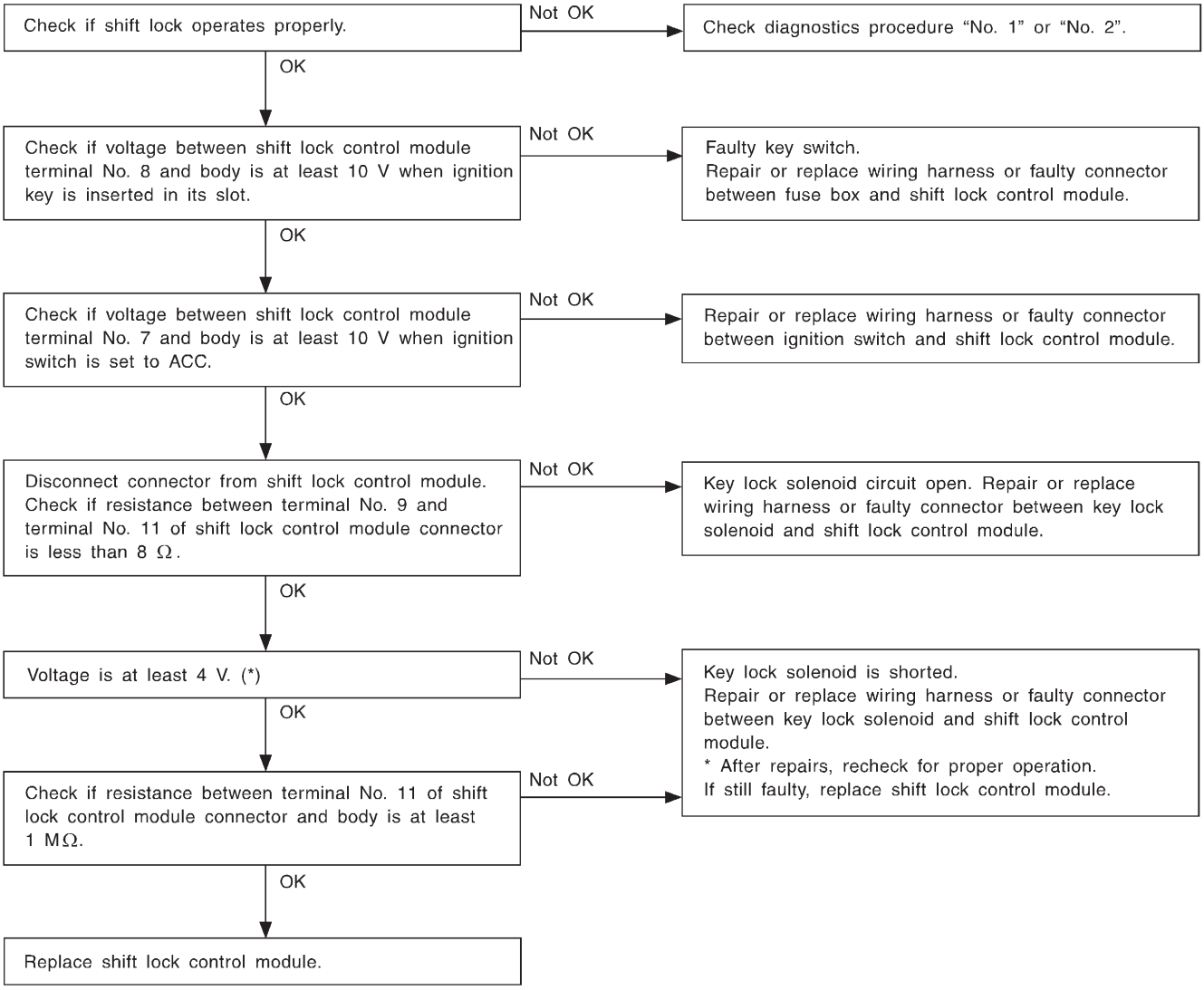
H6M0505

D: DIAGNOSTICS PROCEDURE NO. 2 (SHIFT LOCK DOES NOT RELEASE.)



H6M0506

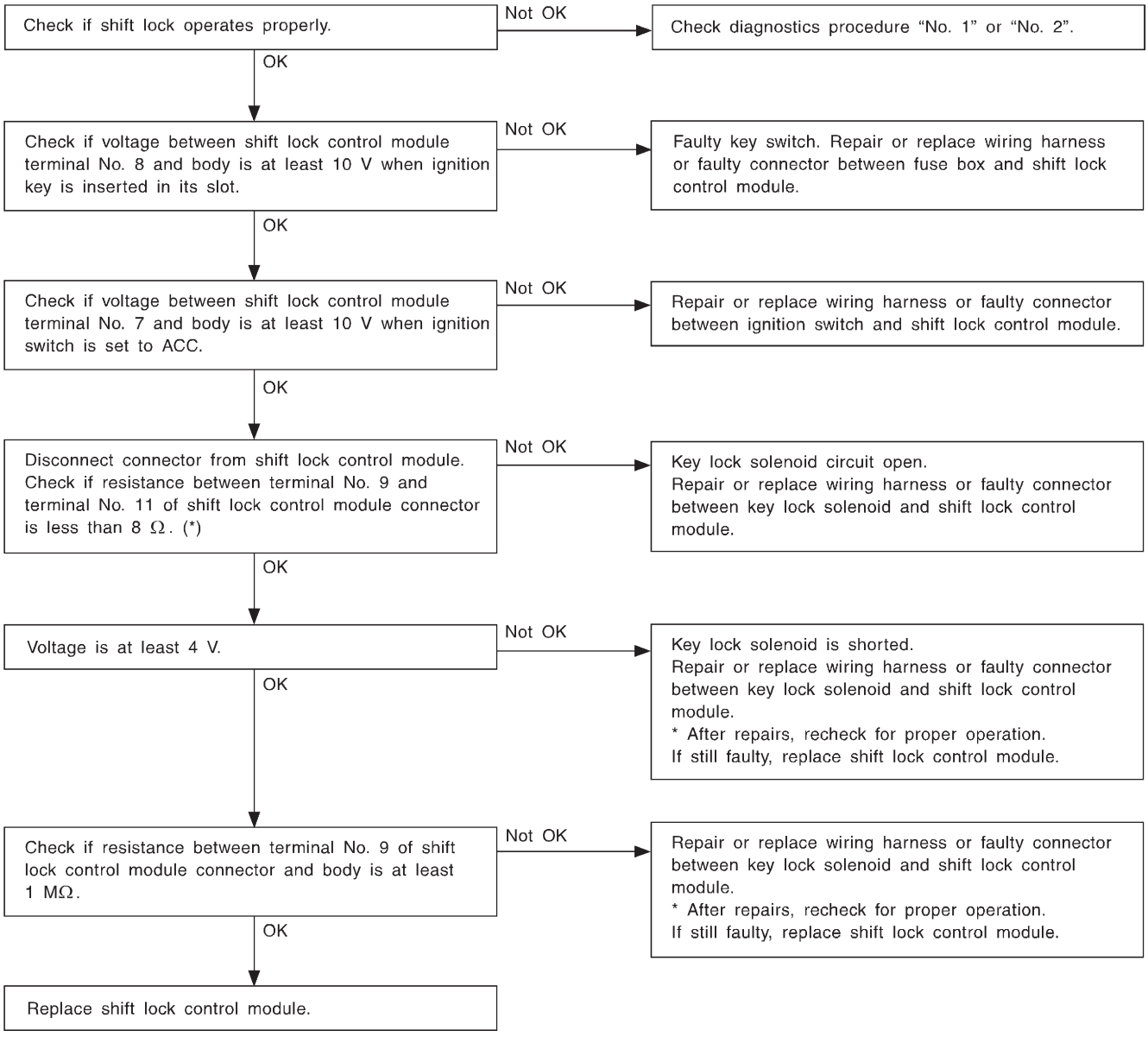
E: DIAGNOSTICS PROCEDURE NO. 3 (KEY INTERLOCK DOES NOT OPERATE.)



***: 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.**

H6M0507

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.**

H6M0508

2. Combination Meter

A: DIAGNOSTICS PROCEDURE

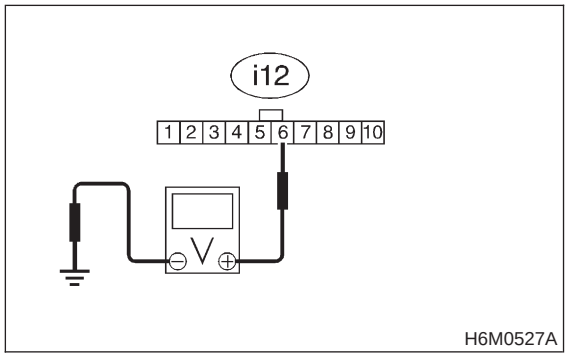
If speedometer does not operate, or operates abnormally, check combination meter circuit.

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.

Connector & terminal
(i12) No. 6 (+) — Chassis ground (−):



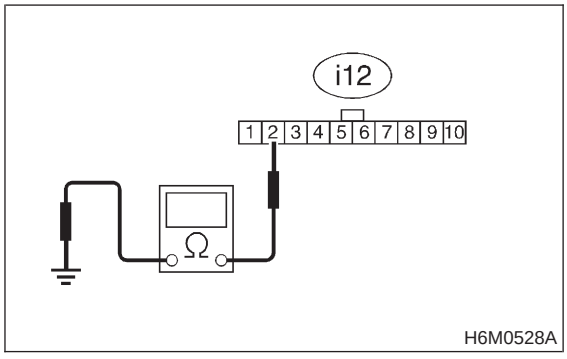
CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **2A2**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
● Open circuit in harness between combination meter and battery.
● Poor contact in coupling connectors (i12) 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.

Connector & terminal
(i12) No. 2 (+) — Chassis ground (−):

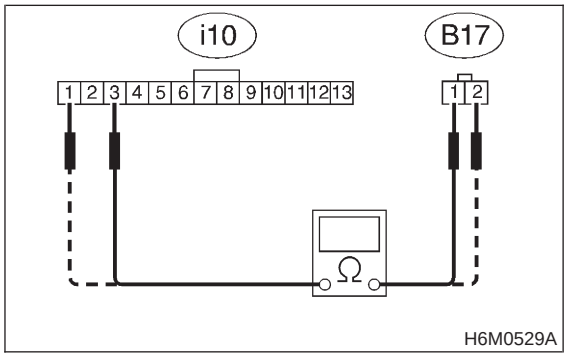


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **2A3**.
NO : Repair harness and connector.

2A3 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND VEHICLE SPEED SENSOR 2.

1) Disconnect connector from vehicle speed sensor 2.
2) Measure resistance between combination meter connector and vehicle speed sensor 2 connector.

Connector & terminal
(B17) No. 1 — (i10) No. 3:

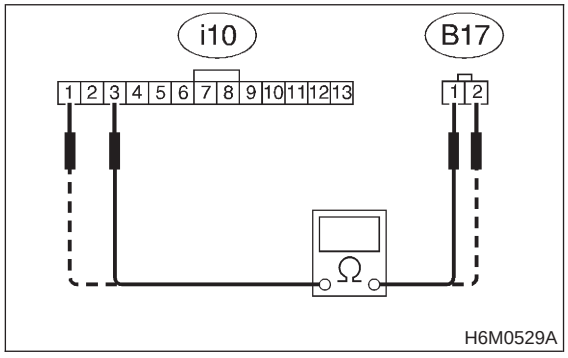


CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **2A4**.
NO : Repair or replace wiring harness between combination meter and vehicle speed sensor 2.

2A4 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND VEHICLE SPEED SENSOR 2.

Measure resistance between vehicle speed sensor 2 connector and combination meter connector.

Connector & terminal
(B17) No. 2 — (i10) No. 1:



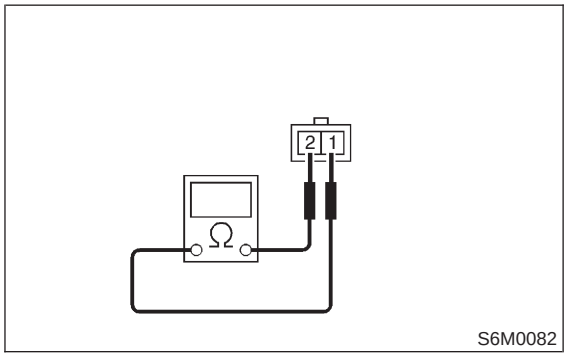
CHECK : ***Is the resistance less than 10 Ω?***
YES : Go to step **2A5**.
NO : Repair or replace wiring harness between combination meter and vehicle speed sensor 2.

2A5 : 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 and voltage between terminals of vehicle speed sensor 2 is out of specification, mechanical trouble may be present between vehicle speed sensor 2 and speedometer shaft in transmission.

1) Disconnect connector from vehicle speed sensor 2.
2) Measure resistance between terminals of vehicle speed sensor 2.

Terminals
No. 1 — No. 2:



CHECK : ***Is the resistance between 350 Ω and 450 Ω?***
YES : Go to step **2A6**.
NO : Replace vehicle speed sensor 2.

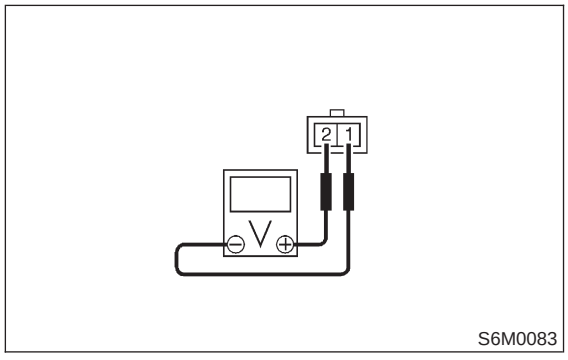
2A6 : CHECK VEHICLE SPEED SENSOR 2.

1) Set the vehicle on free roller, or lift-up the vehicle and support with safety stands.

WARNING:
Be careful not to be caught up by the running wheels.

2) Drive the vehicle at speed greater than 20 km/h (12 MPH).
3) Measure voltage between terminals of vehicle speed sensor 2.

Terminals
No. 1 — No. 2:



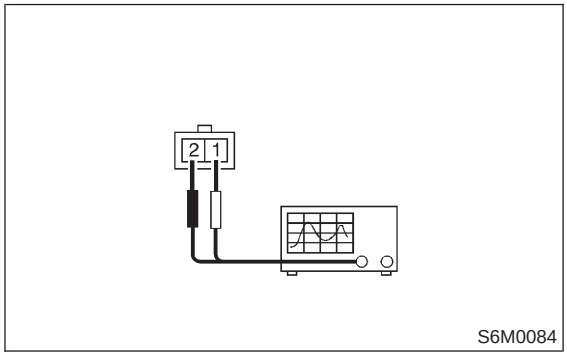
CHECK : ***Is the voltage more than 5 V? (AC range)***
YES : Repair or replace speedometer.
NO : Replace vehicle speed sensor 2.

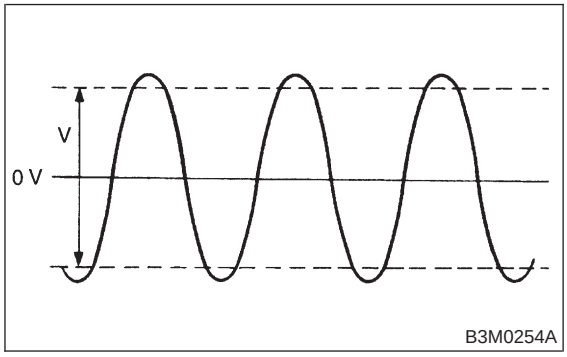
2A7 : CHECK VEHICLE SPEED SENSOR 2.

NOTE:
Using an oscilloscope:

1) Turn ignition switch to OFF.
2) Set oscilloscope to vehicle speed sensor 2.
3) Drive the vehicle at speed greater than 20 km/h (12 MPH).
4) Measure signal voltage.

Terminals
No. 1 — No. 2:





CHECK : ***Is the voltage more than 5 V?***
YES : Repair or replace speedometer.
NO : Replace vehicle speed sensor 2.

MEMO:

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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ON-BOARD DIAGNOSTICS II SYSTEM	2-7
AUTOMATIC TRANSMISSION AND DIFFERENTIAL	3-2
BRAKES	4-4
SUPPLEMENTAL RESTRAINT SYSTEM	5-5

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EMISSION CONTROL SYSTEM AND VACUUM FITTING 2-1

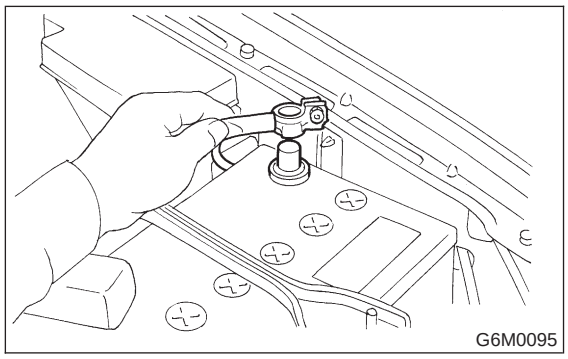
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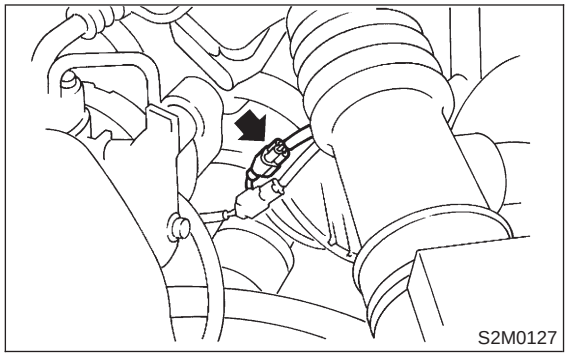
1. Front Catalytic Converter

A: REMOVAL

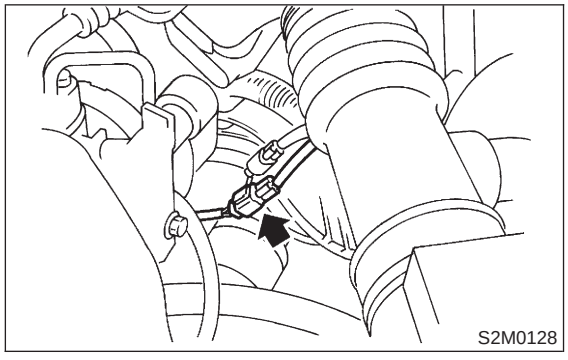
1) Disconnect battery ground cable.



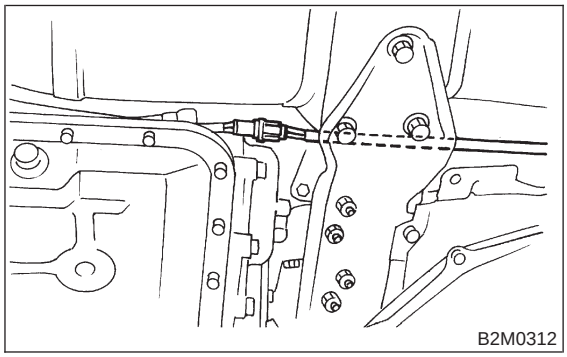
2) Disconnect front oxygen sensor connector.



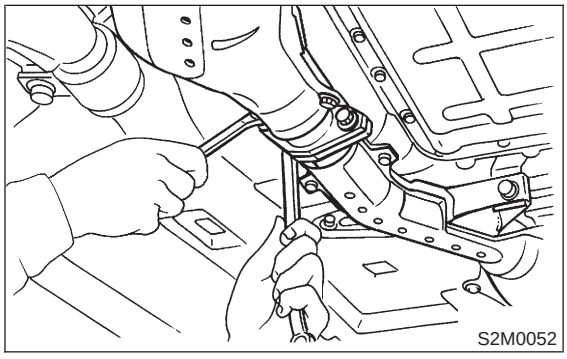
3) Disconnect rear oxygen sensor connector. (California spec. vehicles)



4) Lift-up the vehicle.
5) Disconnect rear oxygen sensor connector. (Except California spec. vehicles)

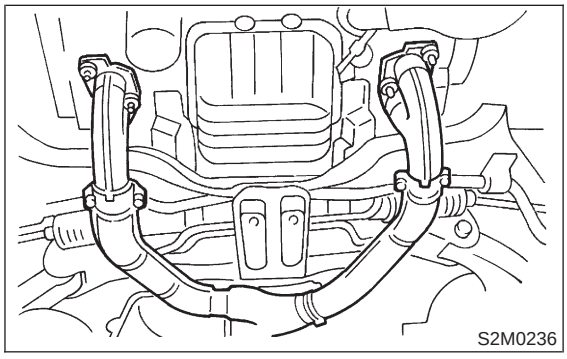


6) Separate center exhaust pipe from front catalytic converter.

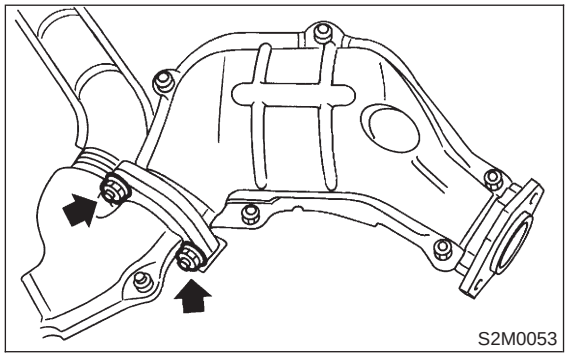


7) Remove bolts which hold front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down front exhaust pipe and center exhaust pipe.



8) Separate front catalytic converter from front exhaust pipe.

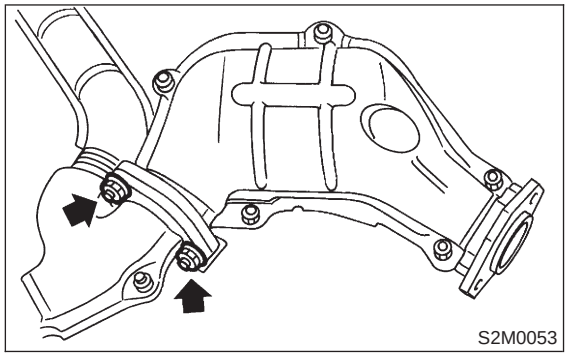


B: INSTALLATION

CAUTION:
Replace gaskets with new ones.

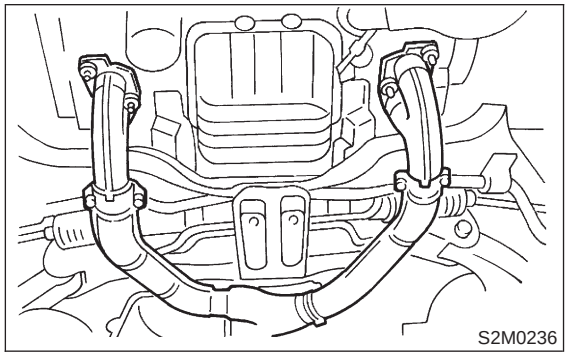
1) Install front catalytic converter to front exhaust pipe and center exhaust pipe.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)



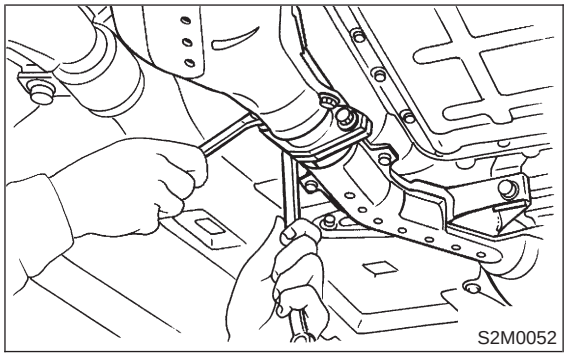
2) Tighten bolts which hold front exhaust pipe onto cylinder heads.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)

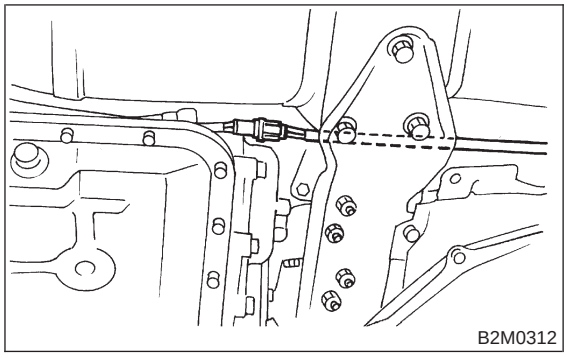


3) Install center exhaust pipe to front catalytic converter.

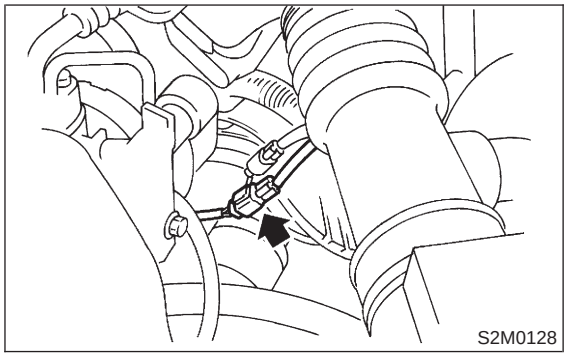
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)



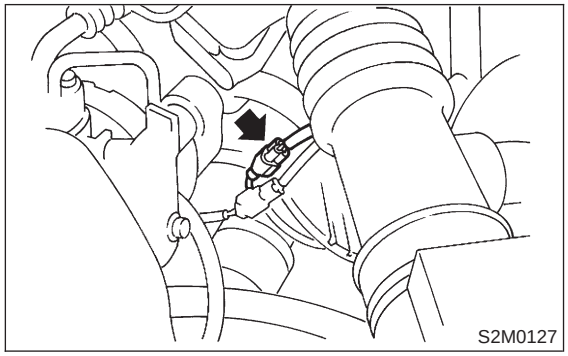
4) Connect rear oxygen sensor connector. (Except California spec. vehicles)



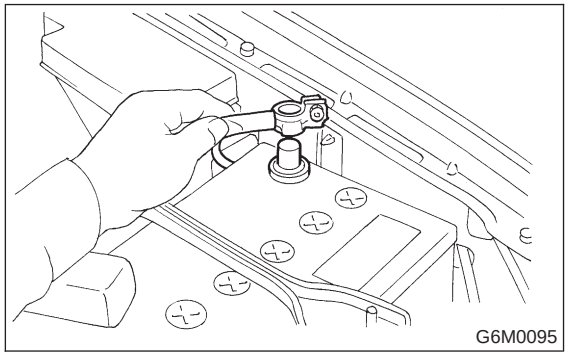
5) Lower the vehicle.
6) Connect rear oxygen sensor connector. (California spec. vehicles)



7) Connect front oxygen sensor connector.


S2M0127

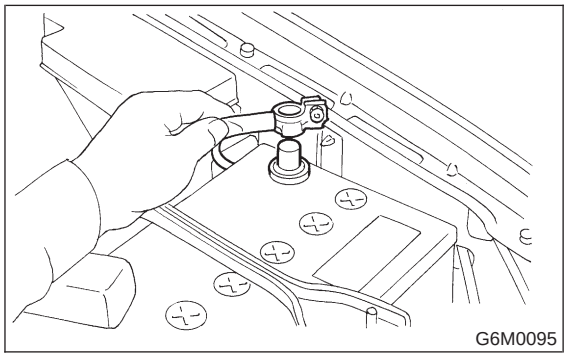
8) Connect battery ground cable.


G6M0095

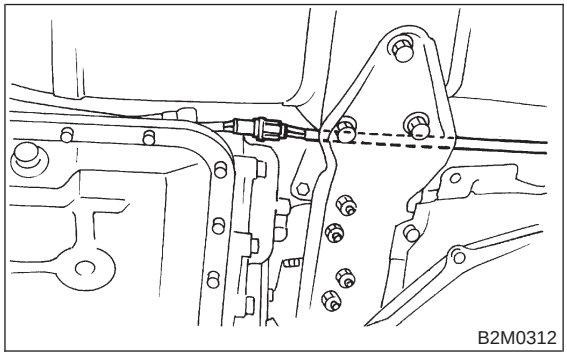
2. Rear Catalytic Converter

A: REMOVAL

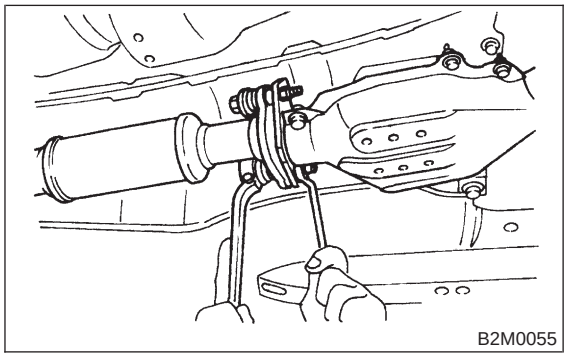
1) Disconnect battery ground cable.


G6M0095

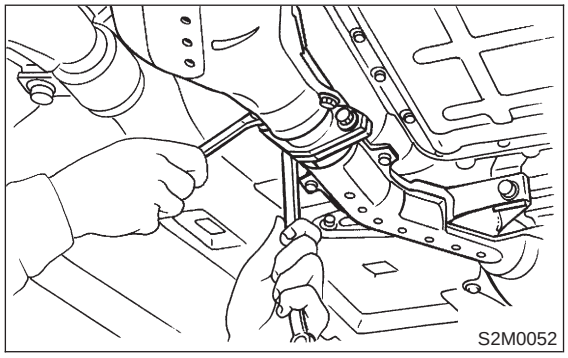
2) Lift-up the vehicle.
3) Disconnect rear oxygen sensor connector. (Except California spec. vehicles)


B2M0312

4) Separate center exhaust pipe and rear catalytic converter assembly from rear exhaust pipe.

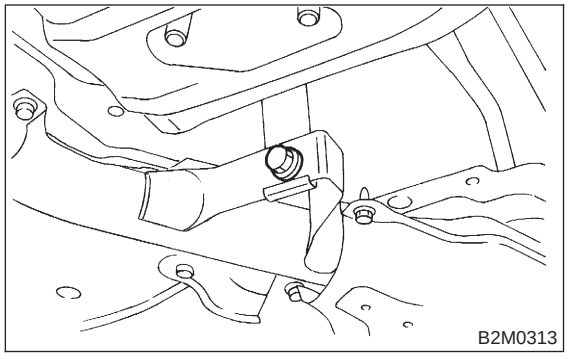

B2M0055

5) Separate center exhaust pipe and rear catalytic converter assembly from front catalytic converter.


S2M0052

6) Remove center exhaust pipe and rear catalytic converter assembly from hanger bracket.

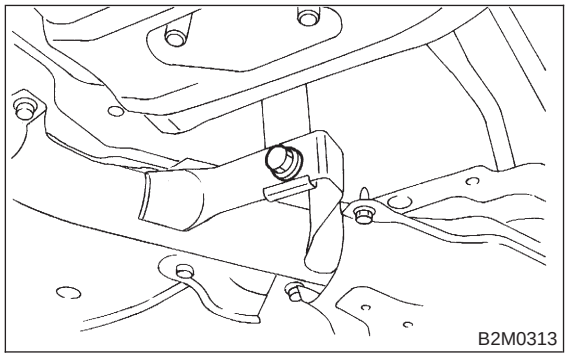
CAUTION:
● Be careful not to pull down center exhaust pipe.
● After removing center exhaust pipe, do not apply excessive pulling force on front catalytic converter and front exhaust pipe.


B2M0313

B: INSTALLATION

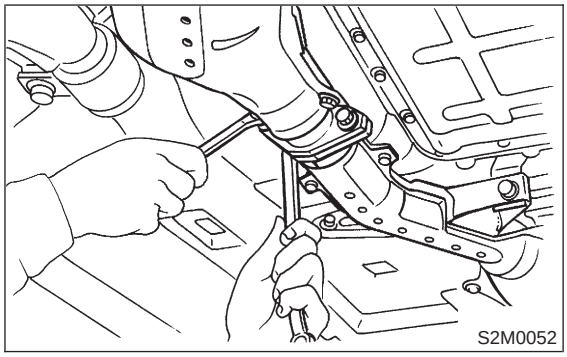
CAUTION:
Replace gaskets with new ones.

1) Install center exhaust pipe and rear catalytic converter assembly.
Temporarily tighten bolt which installs center exhaust pipe to hanger bracket.


B2M0313

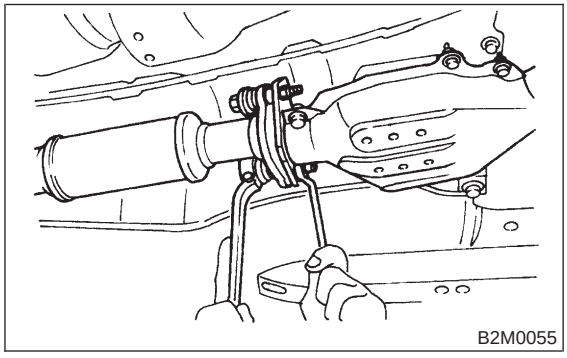
2) Install center exhaust pipe to front catalytic converter.

Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)


S2M0052

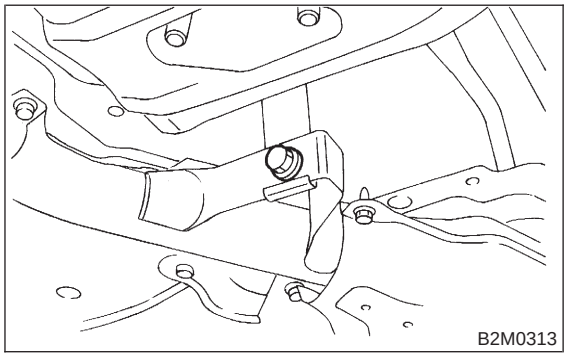
3) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

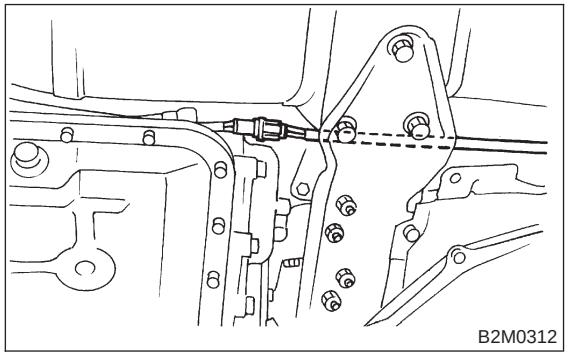

B2M0055

4) Tighten bolt which holds center exhaust pipe to hanger bracket.

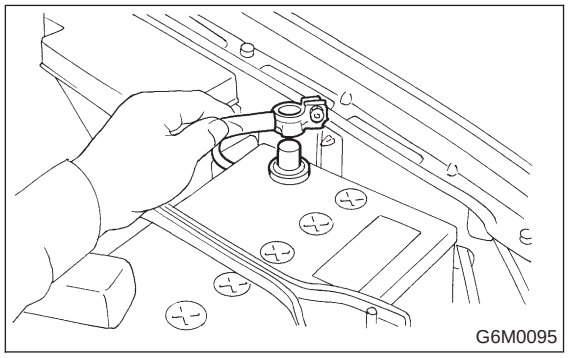
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)


B2M0313

5) Connect rear oxygen sensor connector. (Except California spec. vehicles)



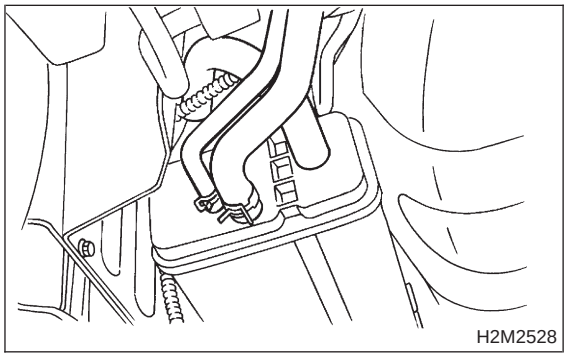
6) Lower the vehicle.
7) Connect battery ground cable.



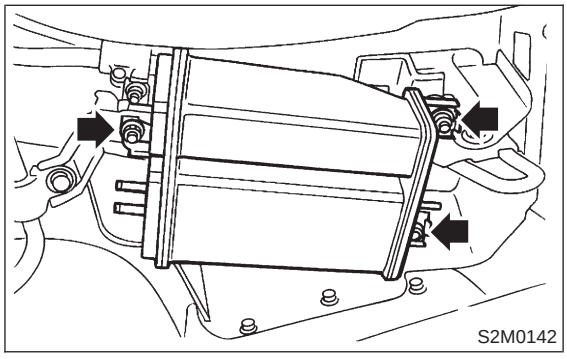
3. Canister

A: REMOVAL AND INSTALLATION

1) Lift-up the vehicle.
2) Disconnect evaporation hoses from canister.

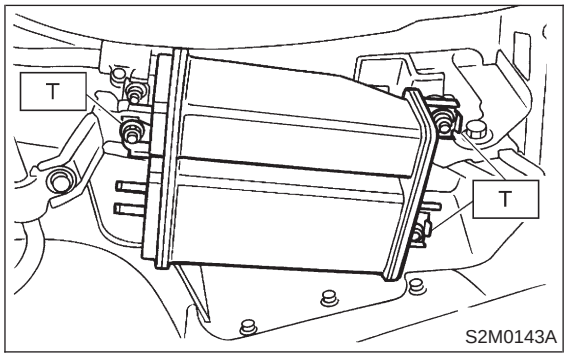


3) Remove canister from body.



4) Installation is in the reverse order of removal.

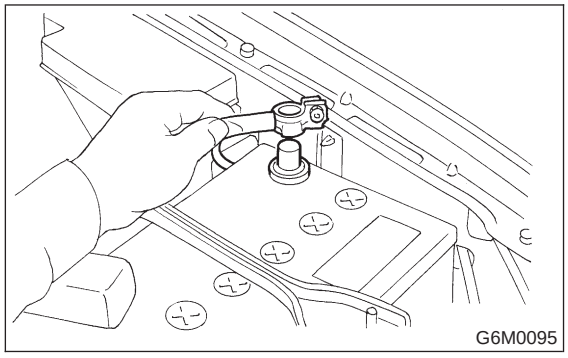
Tightening torque:
22.5±7 N·m (2.3±0.7 kg-m, 16.6±5.1 ft-lb)



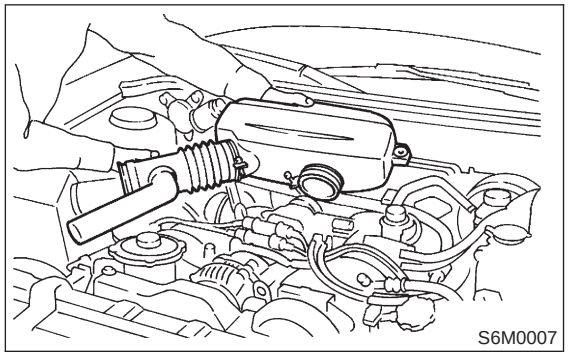
4. Purge Control Solenoid Valve

A: REMOVAL AND INSTALLATION

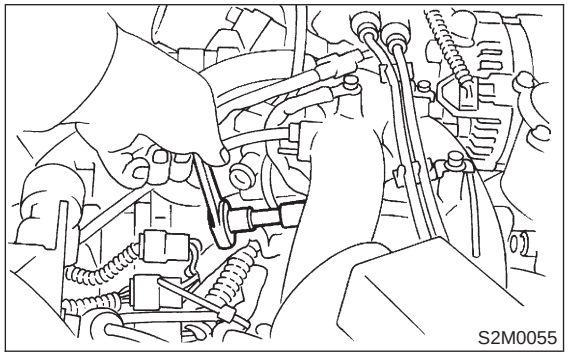
1) Disconnect battery ground cable.


G6M0095

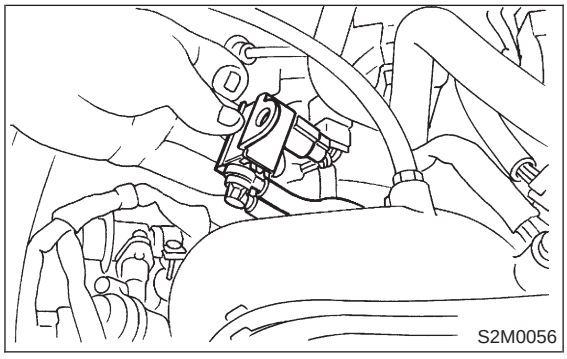
2) Remove air intake chamber and air intake duct as a unit. <Ref. to 2-7 [W18A0].>


S6M0007

3) Remove bolt which installs purge control solenoid valve to intake manifold.

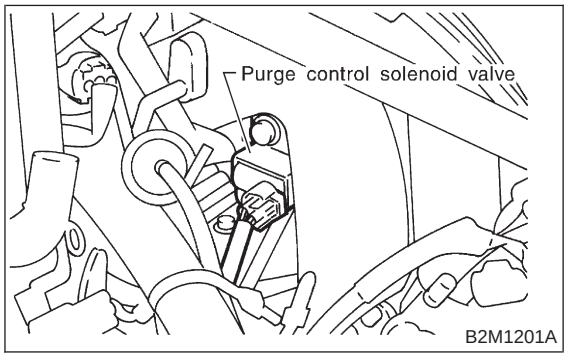

S2M0055

4) Take out purge control solenoid valve.
5) Disconnect connector from purge control solenoid valve.
6) Disconnect vacuum hoses from purge control solenoid valve.


S2M0056

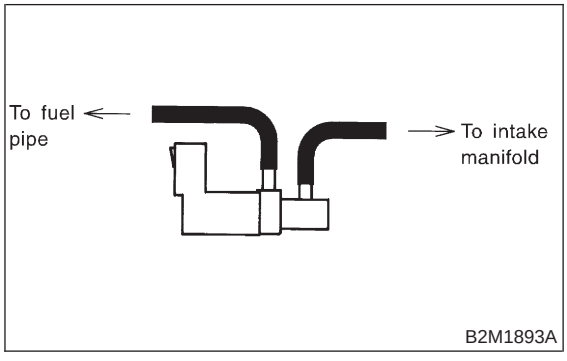
7) Installation is in the reverse order of removal.

Tightening torque:
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)



B2M1201A

CAUTION:
Carefully connect the evaporation hoses.

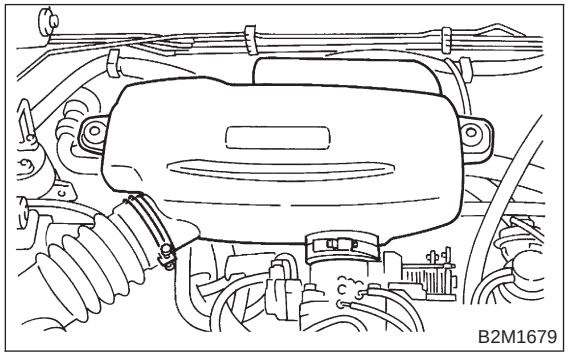


B2M1893A

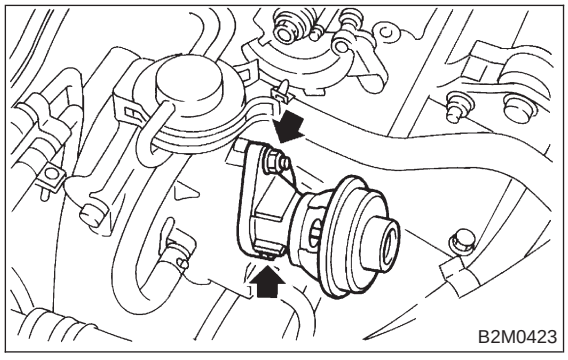
5. EGR Valve (Except 2200 cc MT Vehicles)

A: REMOVAL AND INSTALLATION

1) Remove air intake chamber. <Ref. to 2-7 [W18A0].>



2) Disconnect vacuum hose from EGR valve.
3) Remove bolts which install EGR valve onto intake manifold.



4) Installation is in the reverse order of removal.

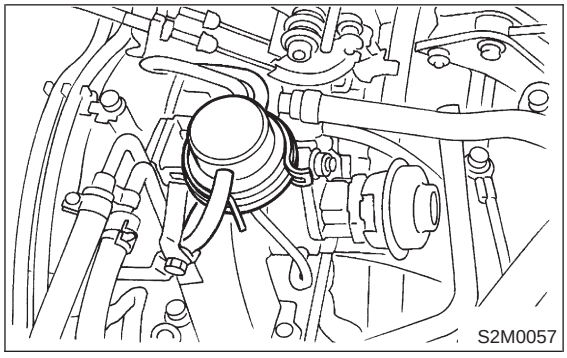
CAUTION:
Replace gasket with a new one.

Tightening torque:
18.6±1.5 N·m (1.9±1.5 kg-m, 13.7±1.1 ft-lb)

6. Back-Pressure Transducer (BPT) (Except 2200 cc MT Vehicles)

A: REMOVAL AND INSTALLATION

1) Disconnect vacuum hoses from BPT.
2) Remove BPT from bracket.



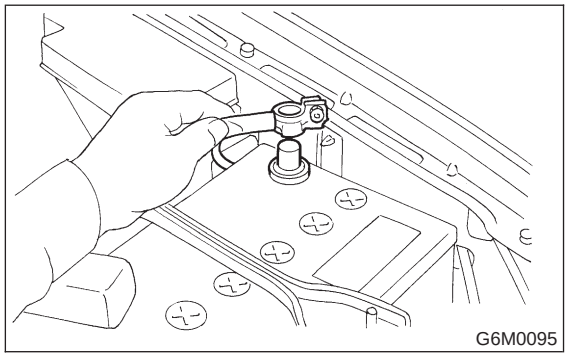
3) Installation is in the reverse order of removal.

7. EGR Solenoid Valve (Except 2200 cc MT Vehicles)

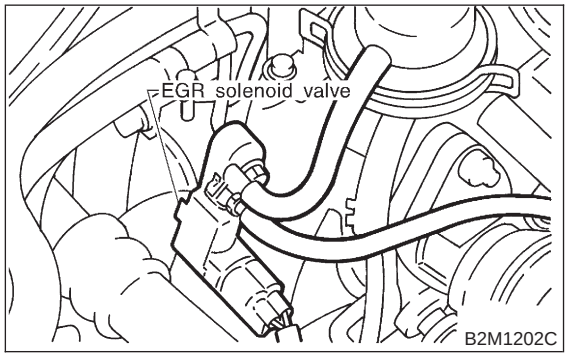
A: REMOVAL AND INSTALLATION

1. 2200 cc AT VEHICLES

1) Disconnect battery ground cable.



2) Disconnect connector from EGR solenoid valve.
3) Disconnect vacuum hoses from EGR solenoid valve.
4) Remove bolt which installs EGR solenoid valve onto intake manifold.

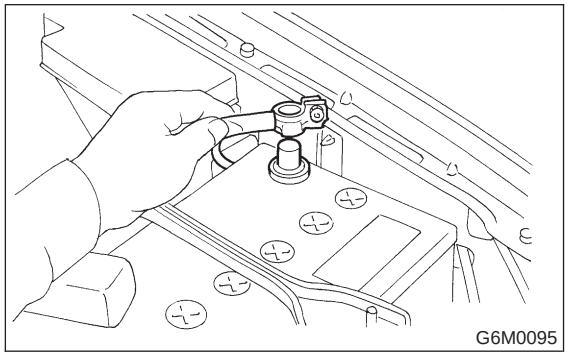


5) Installation is in the reverse order of removal.

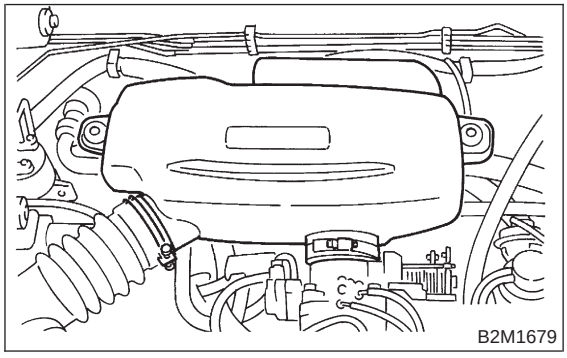
Tightening torque:
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)

2. 2500 cc MODEL

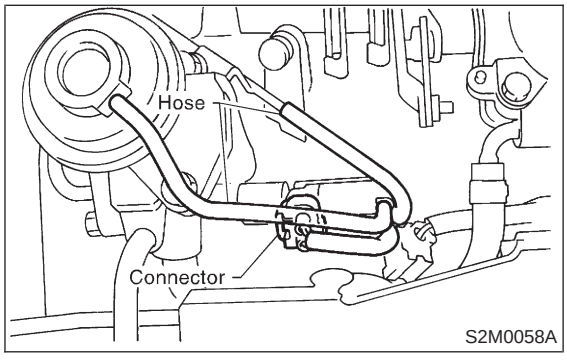
1) Disconnect battery ground cable.



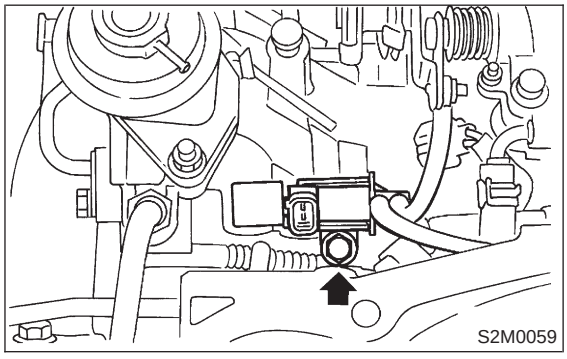
2) Remove air intake chamber. <Ref. to 2-7 [W18A0].>



3) Disconnect vacuum hoses from EGR solenoid valve.
4) Disconnect connector from EGR solenoid valve.



5) Remove bolt which installs EGR solenoid valve onto intake manifold.



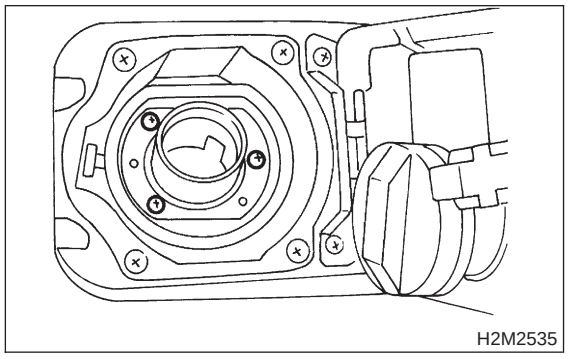
6) Installation is in the reverse order of removal.

Tightening torque:
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)

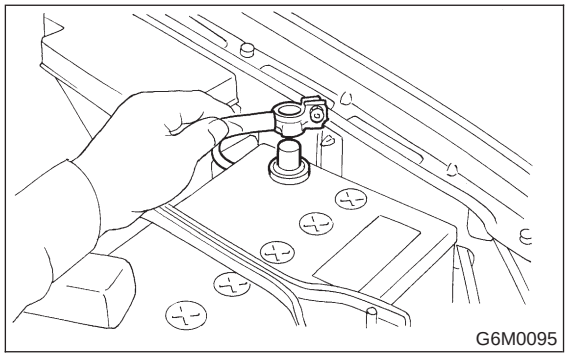
8. Fuel Temperature Sensor

A: REMOVAL

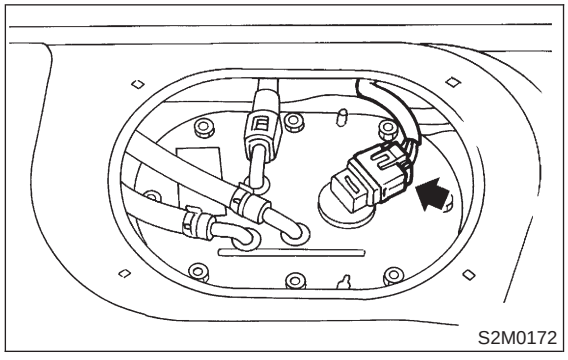
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel filler lid, and remove fuel filler cap.


H2M2535

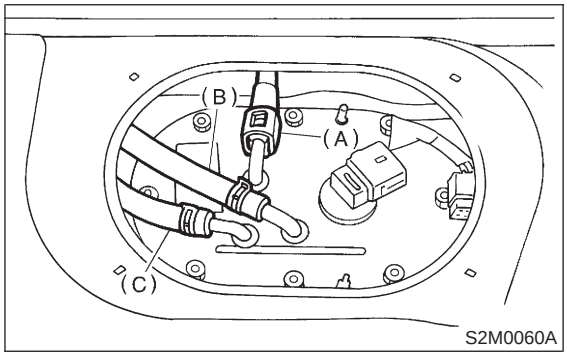
3) Disconnect battery ground cable.


G6M0095

4) Disconnect connector from fuel pump.

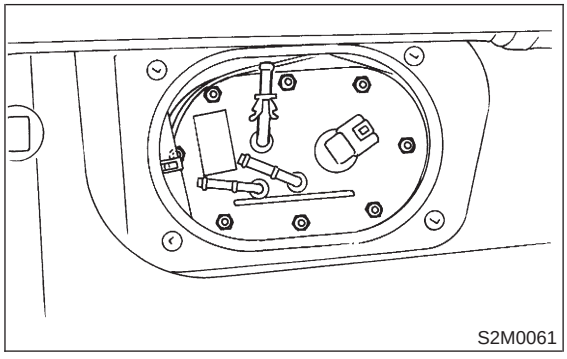

S2M0172

5) Move clips, and then disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).
6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>

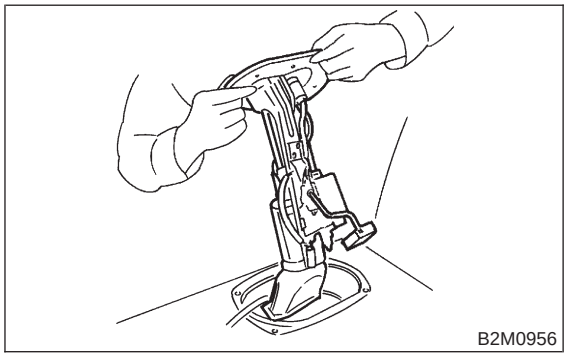


S2M0060A

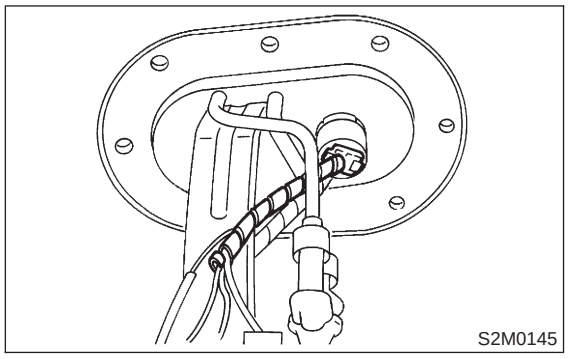
7) Remove nuts which install fuel pump assembly onto fuel tank.


S2M0061

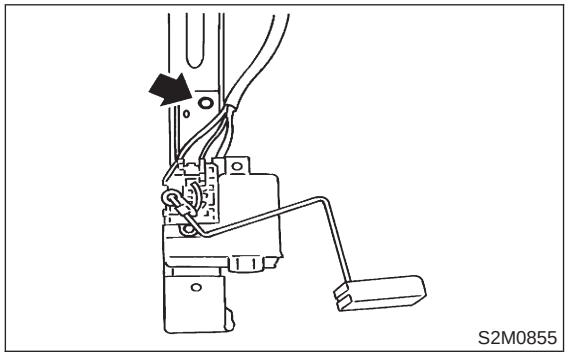
8) Take off fuel pump assembly from fuel tank.


B2M0956

9) Disconnect connector from fuel pump bracket.



10) Remove main fuel level sensor from fuel pump assembly. <Ref. to 2-1 [W12A0].>



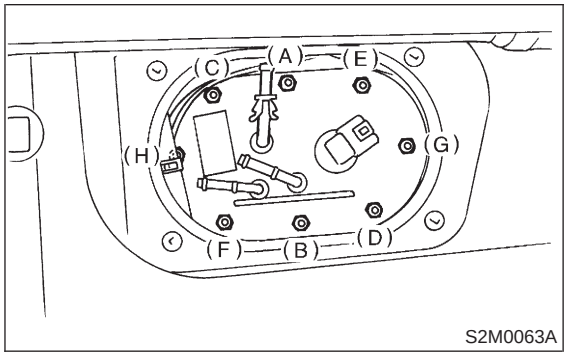
NOTE:
Fuel temperature sensor is a unit with fuel pump. If replacing it, replace as a fuel pump.

B: INSTALLATION

CAUTION:
Leave fuel filler cap open when tightening nuts, to prevent fuel from flowing out through fuel delivery and return pipes. Close fuel filler cap after tightening nuts.

Installation is in the reverse order of removal. Do the following:
(1) Always use new gaskets.
(2) Ensure sealing portion is free from fuel or foreign particles before installation.
(3) Tighten nuts in alphabetical sequence shown in figure to specified torque.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

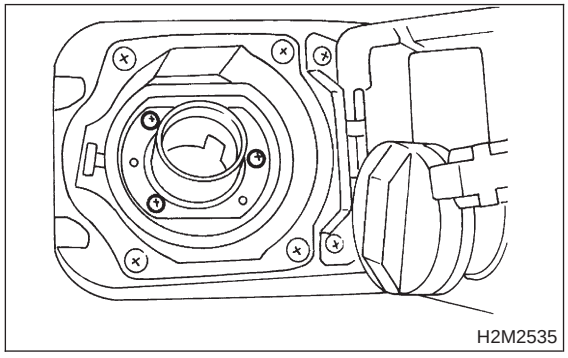


9. Fuel Tank Pressure Sensor

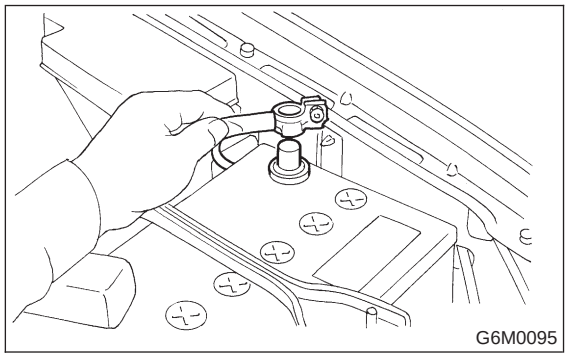
A: REMOVAL AND INSTALLATION

1. 2200 cc MODEL

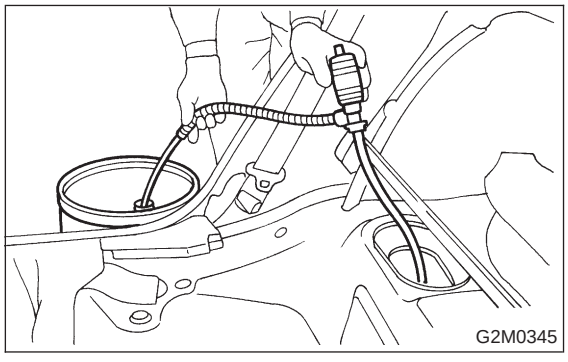
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


H2M2535

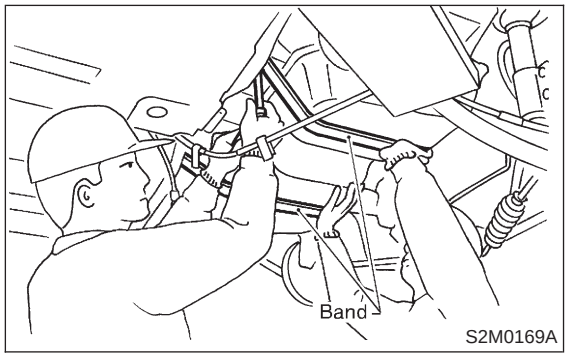
3) Disconnect battery ground cable.


G6M0095

4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>

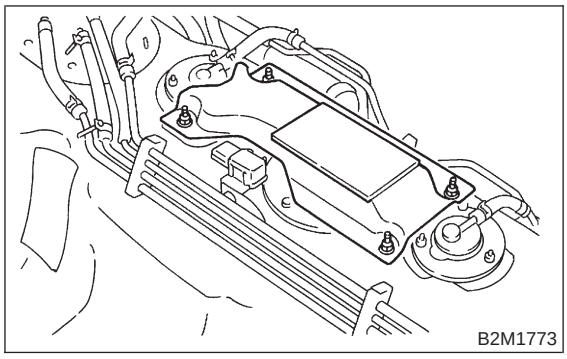

G2M0345

5) Remove fuel tank. <Ref. to 2-8 [W2A0].>

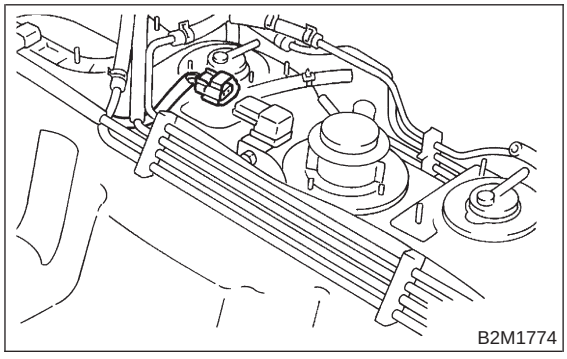


S2M0169A

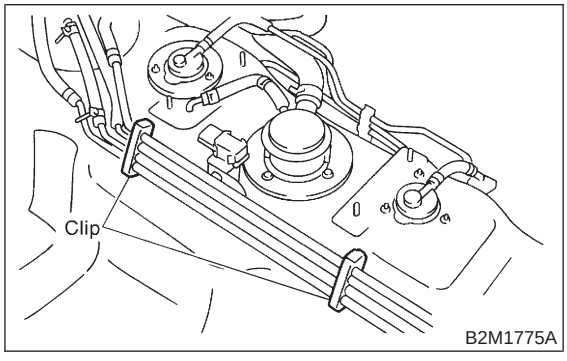
6) Remove protector cover.


B2M1773

7) Disconnect connector from fuel tank pressure sensor.

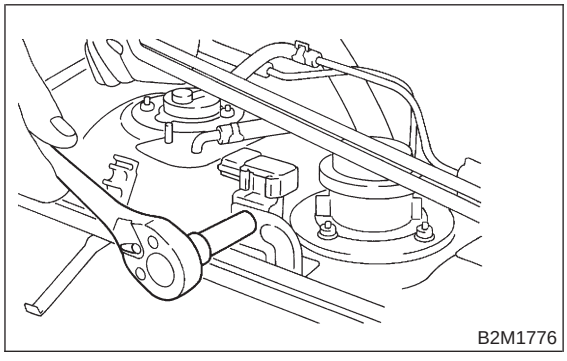

B2M1774

8) Release clips which hold fuel pipes onto fuel tank.

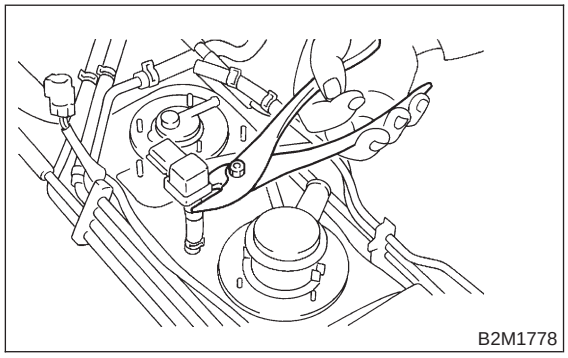


B2M1775A

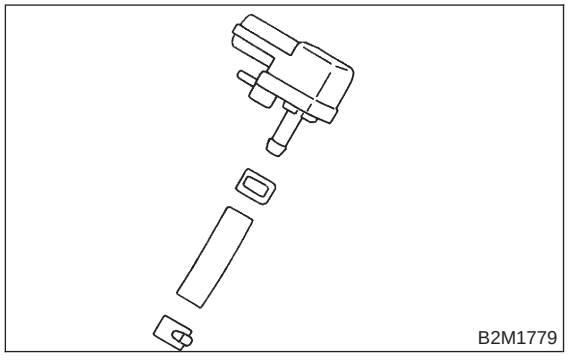
9) Move two fuel pipes to upper side, and remove bolt which install fuel tank pressure sensor to bracket.


B2M1776

10) Move clip, and disconnect pressure hose from fuel tank.

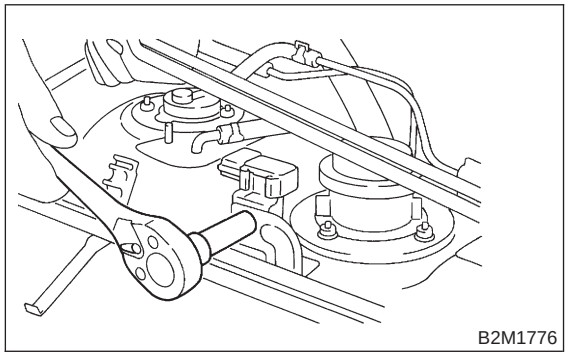

B2M1778

11) Disconnect pressure hose from fuel tank pressure sensor.


B2M1779

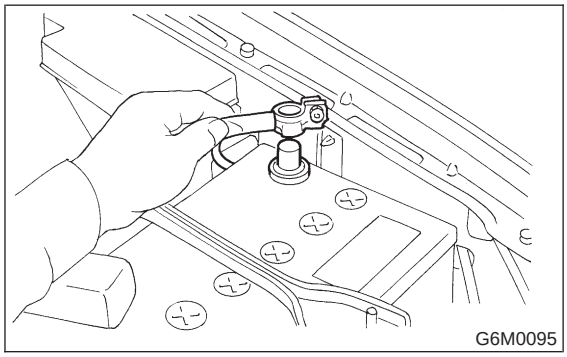
12) Installation is in the reverse order of removal.

Tightening torque:
7.35±1.96 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)


B2M1776

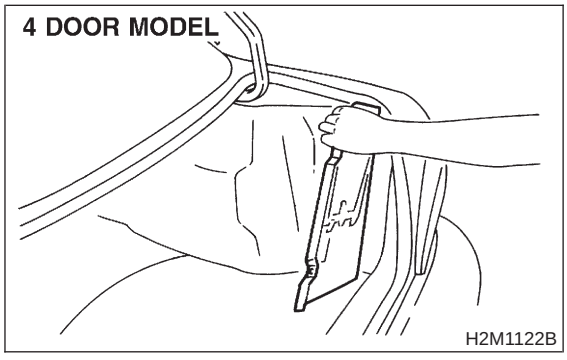
2. 2500 cc MODEL

1) Disconnect battery ground cable.


G6M0095

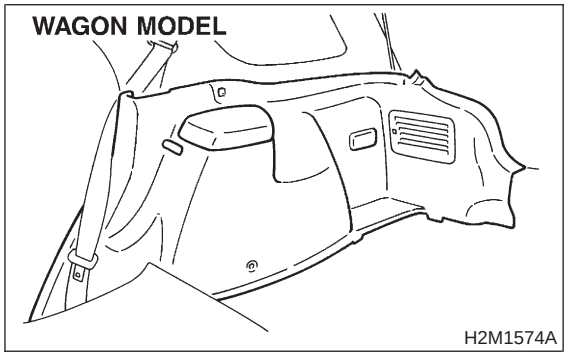
2) Remove trims.
- 4 door model:

Remove right trunk side trim.



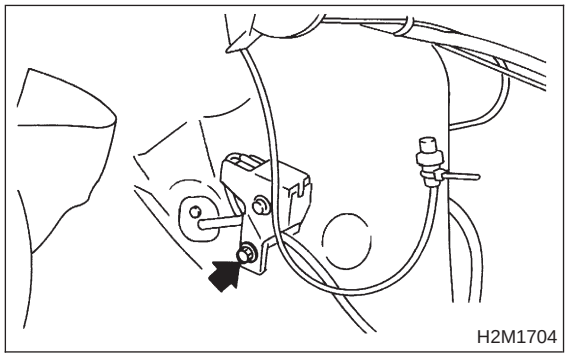
H2M1122B

- Wagon model:
  (1) Remove right rear quarter upper rear trim.
  (2) Remove right strut cap.
  (3) Remove right rear quarter pillar lower trim.

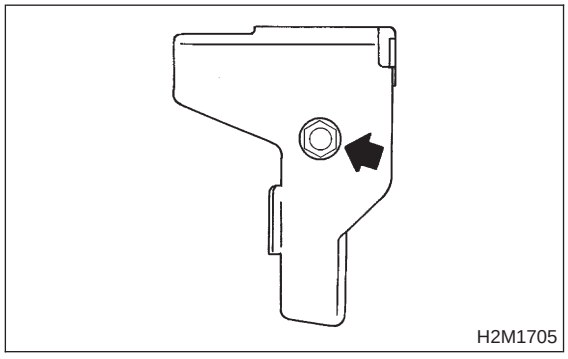


H2M1574A

3) Disconnect connector from fuel tank pressure sensor.
4) Remove bolts which install fuel tank pressure sensor bracket on body.


H2M1704

5) Disconnect hose from fuel tank pressure sensor.
6) Remove fuel tank pressure sensor from bracket.


H2M1705

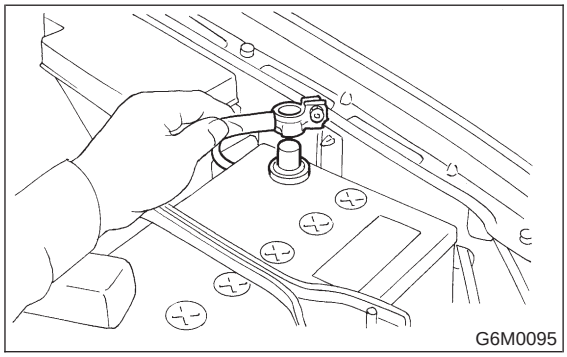
7) Installation is in the reverse order of removal.

10. Pressure Control Solenoid Valve

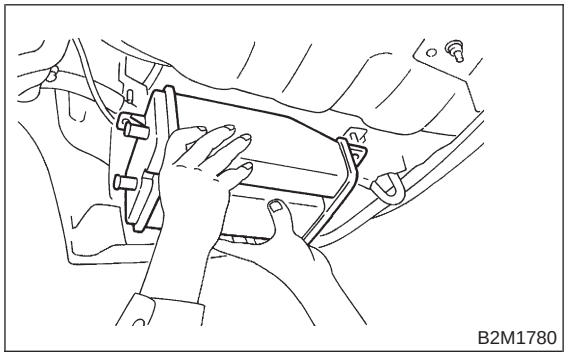
A: REMOVAL AND INSTALLATION

1. 2200 cc MODEL

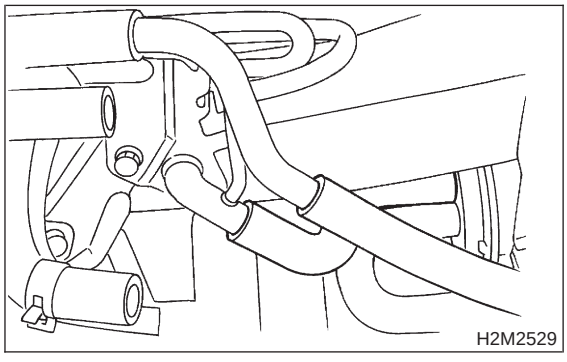
1) Disconnect battery ground cable.


G6M0095

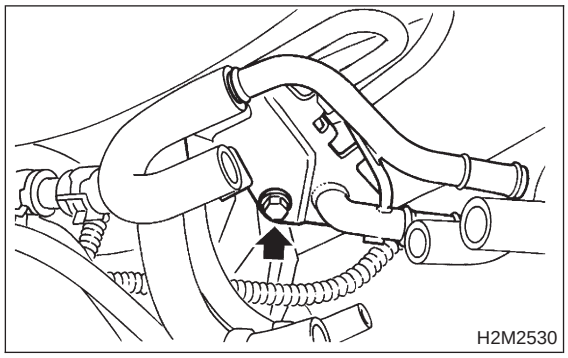
2) Remove canister. <Ref. to 2-1 [W3A0].>


B2M1780

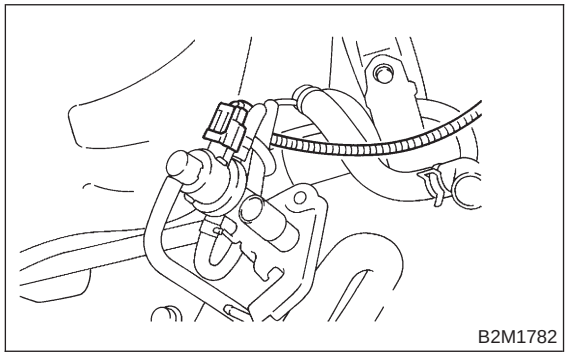
3) Disconnect evaporation hoses from joint pipes.


H2M2529

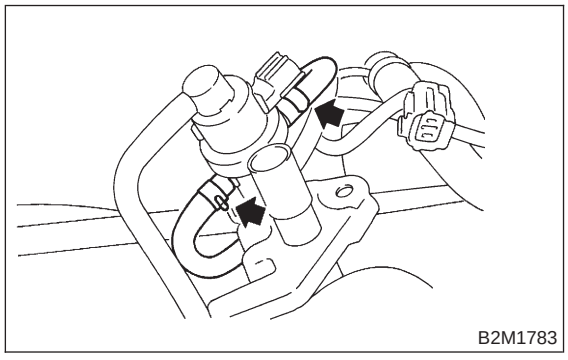
4) Remove bolt which installs pressure control solenoid valve holding bracket on body.



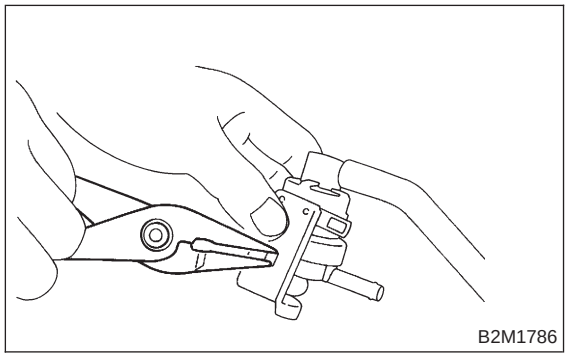
5) Disconnect connector from pressure control solenoid valve.



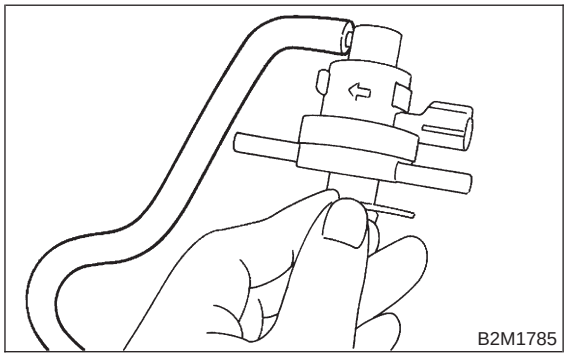
6) Disconnect two evaporation hoses from pressure control solenoid valve.
7) Remove pressure control solenoid valve with bracket.



8) Remove pressure control solenoid valve from bracket.

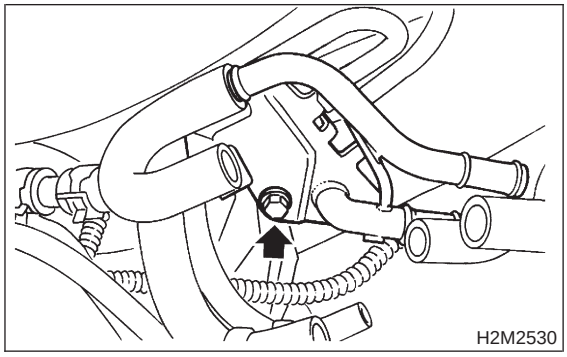


9) Disconnect vacuum hose from pressure control solenoid valve.



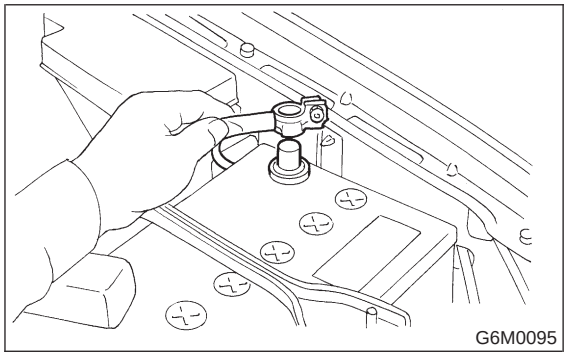
10) Installation is in the reverse order of removal.

Tightening torque:
17.6±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

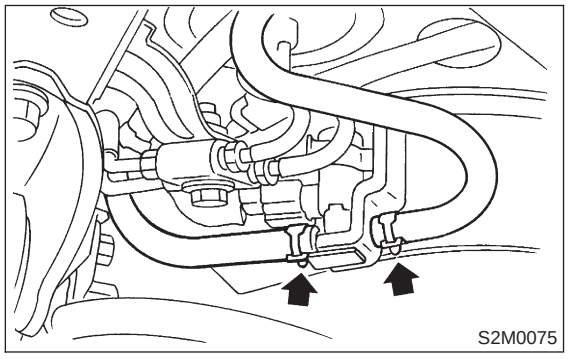


2. 2500 cc MODEL

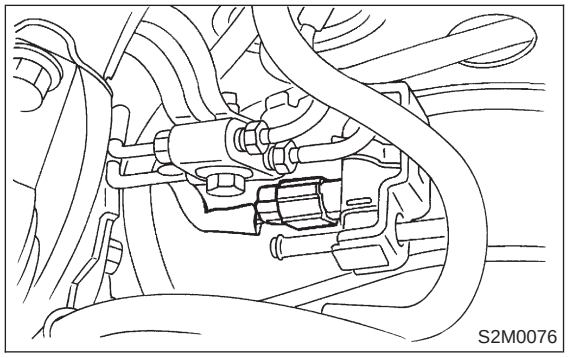
1) Disconnect battery ground cable.



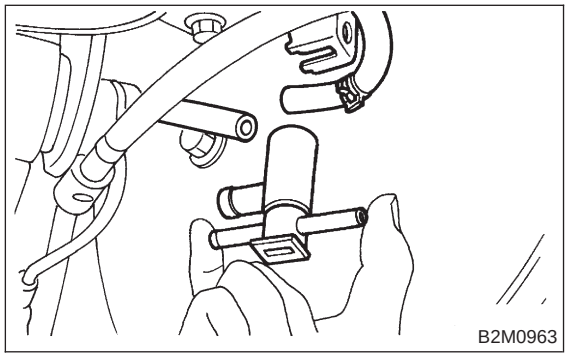
2) Lift-up the vehicle.
3) Disconnect evaporation hoses from pressure control valve.


S2M0075

4) Disconnect connector from pressure control valve.


S2M0076

5) Remove pressure control valve from bracket.

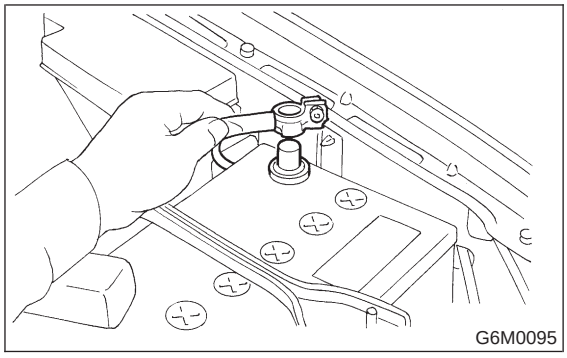

B2M0963

6) Installation is in the reverse order of removal.

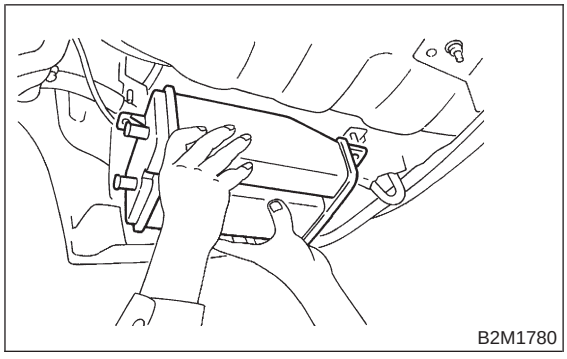
11. Vent Control Solenoid Valve (2500 cc Model)

A: REMOVAL

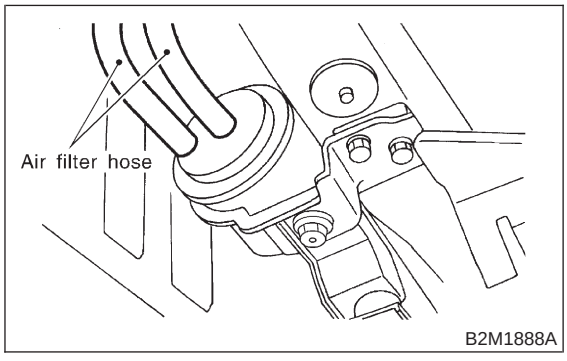
1) Disconnect battery ground cable.


G6M0095

2) Lift-up the vehicle.
3) Remove canister. <Ref. to 2-1 [W3A0].>

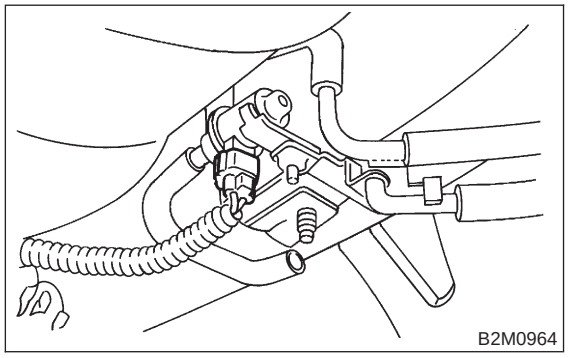

B2M1780

4) Disconnect two hoses from air filter.

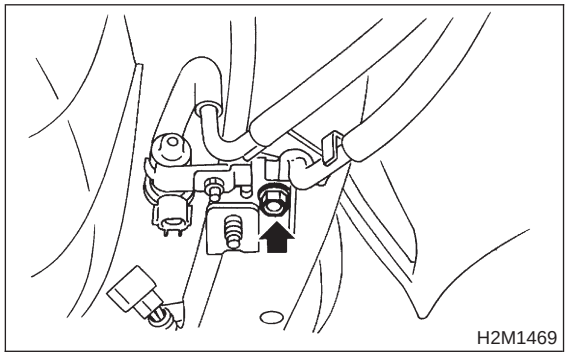


B2M1888A

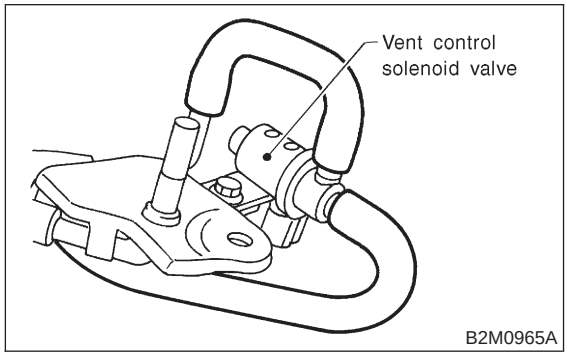
5) Disconnect connector from vent control solenoid valve.



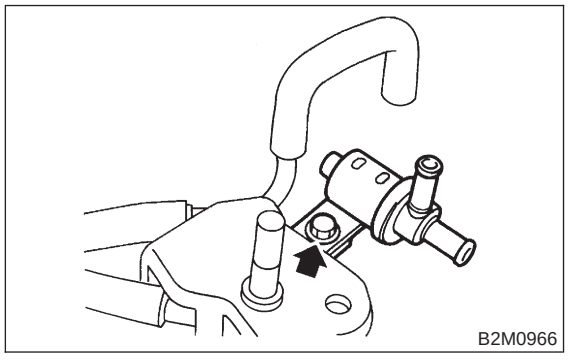
6) Remove one bolt fixing bracket on the body.



7) Remove two vacuum hoses from vent control solenoid valve.



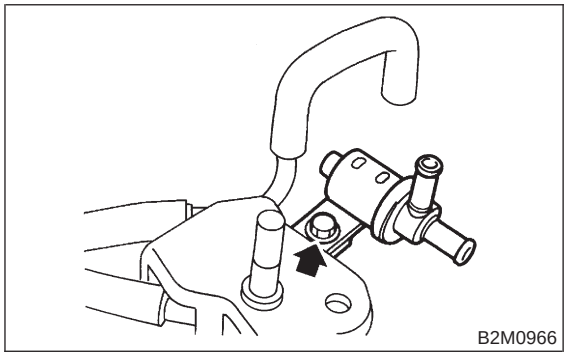
8) Remove one bolt fixing vent control solenoid valve on bracket.



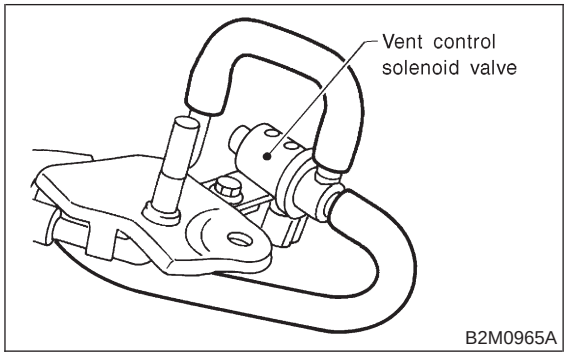
9) Remove vent control solenoid valve.

B: INSTALLATION

1) Install the bolt fixing vent control solenoid valve on bracket.

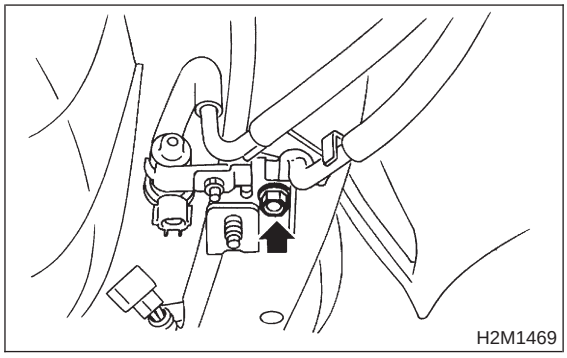


2) Install two vacuum hoses to vent control solenoid valve.

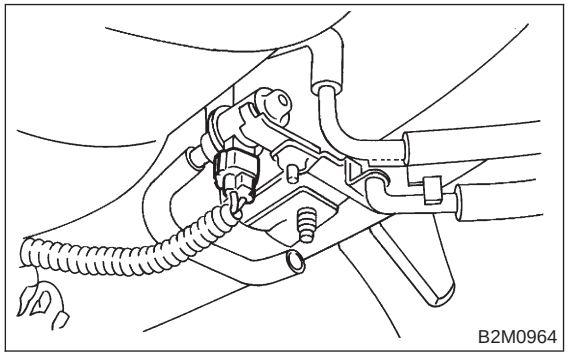


3) Install the bolt fixing bracket on the body.

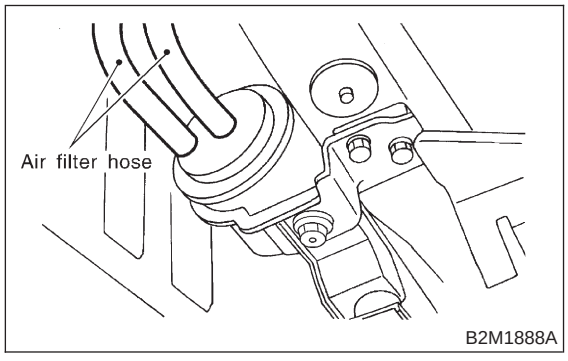
Tightening torque:
25±7 N·m (2.5±0.7 kg-m, 18.1±5.1 ft-lb)



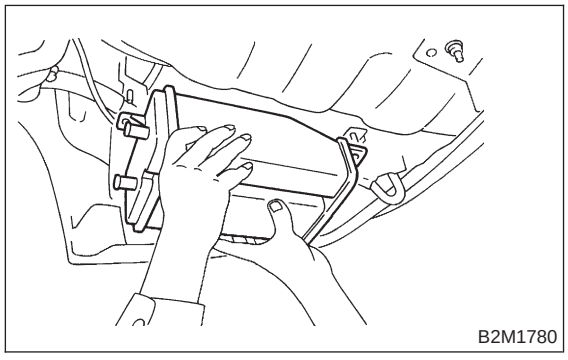
4) Connect connector to vent control solenoid valve.



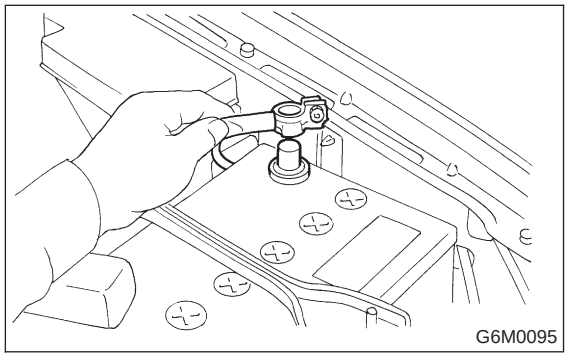
5) Connect two hoses to air filter.



6) Install canister. <Ref. to 2-1 [W3A0].>



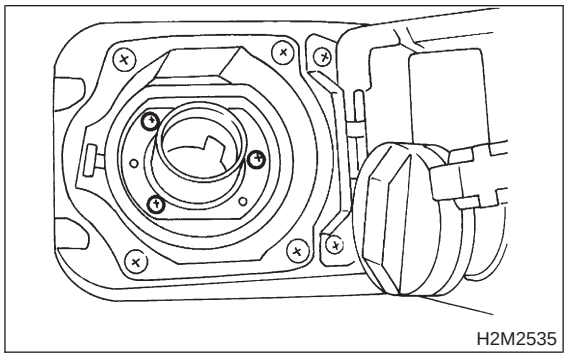
7) Lower the vehicle.
8) Connect battery ground cable.



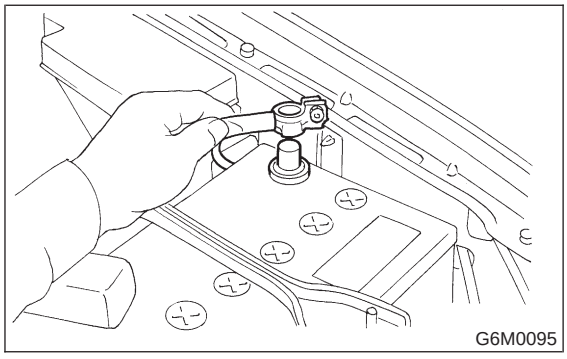
12. Main Fuel Level Sensor

A: REMOVAL

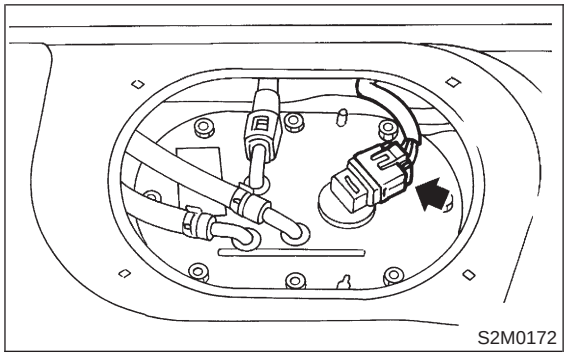
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



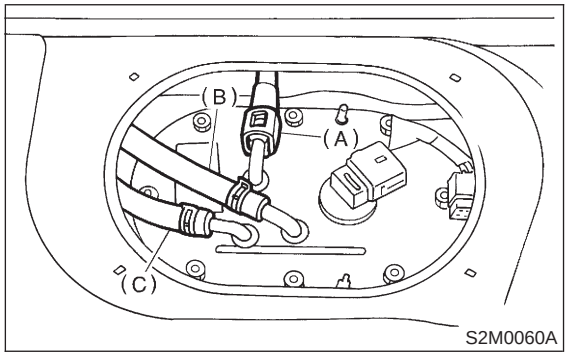
3) Disconnect battery ground cable.



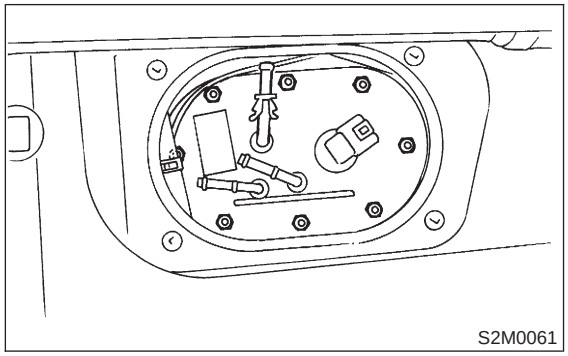
4) Disconnect connector from fuel pump.



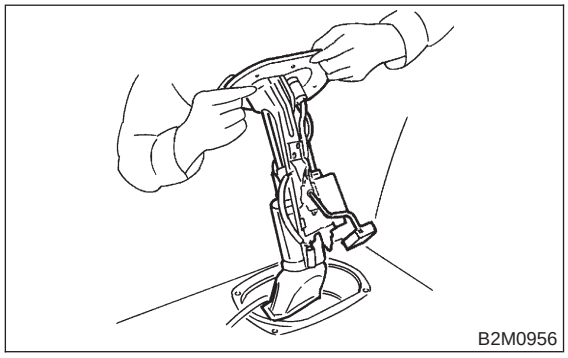
5) Move clips, and then disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).
6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>



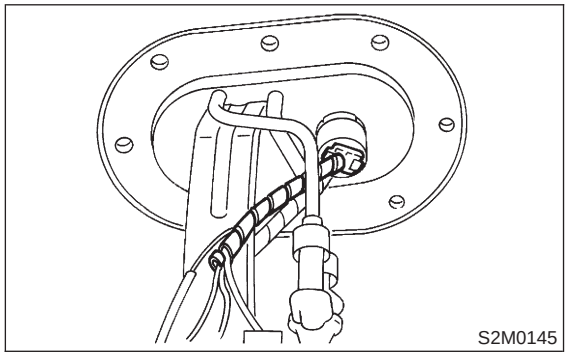
7) Remove nuts which install fuel pump assembly onto fuel tank.



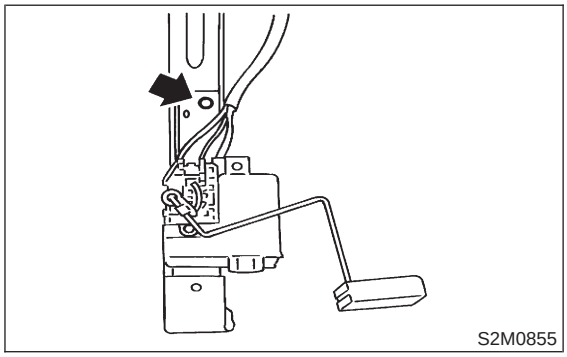
8) Take off fuel pump assembly from fuel tank.



9) Disconnect connector from fuel pump bracket.



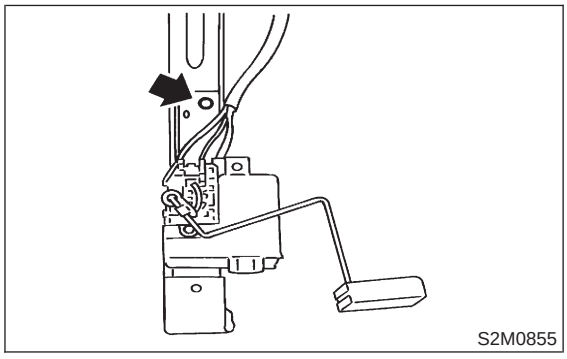
10) Remove bolt which installs fuel level sensor on mounting bracket.



B: INSTALLATION

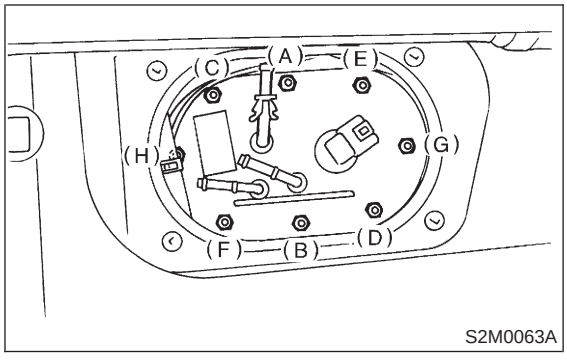
CAUTION:
Leave fuel filler cap open when tightening nuts, to prevent fuel from flowing out through fuel delivery and return pipes. Close fuel filler cap after tightening nuts.

Installation is in the reverse order of removal. Do the following:
(1) Install the fuel level sensor onto the mounting bracket.



(2) Always use new gaskets.
(3) Ensure sealing portion is free from fuel or foreign particles before installation.
(4) Tighten nuts in alphabetical sequence shown in figure to specified torque.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

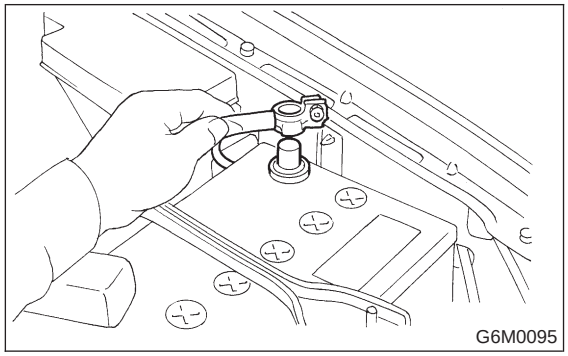


13. Air Filter

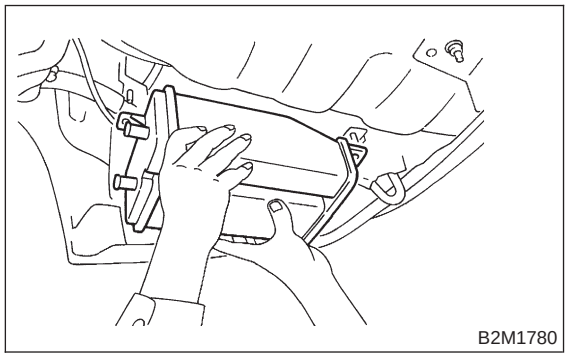
A: REMOVAL AND INSTALLATION

1. 2200 cc MODEL

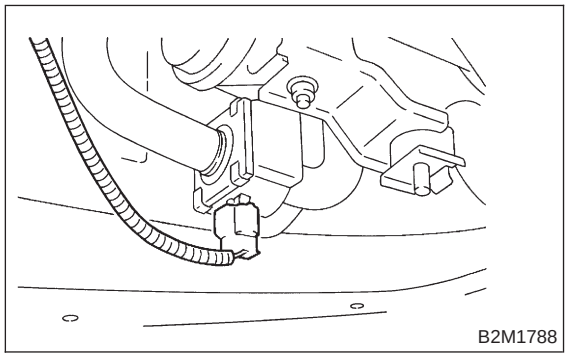
1) Disconnect battery ground cable.


G6M0095

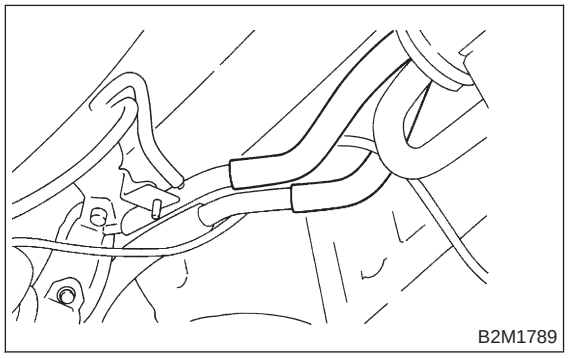
2) Lift-up the vehicle.
3) Remove canister. <Ref. to 2-1 [W3A0].>


B2M1780

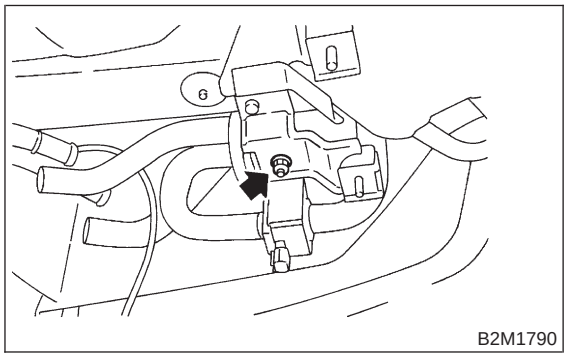
4) Disconnect connector from drain valve.


B2M1788

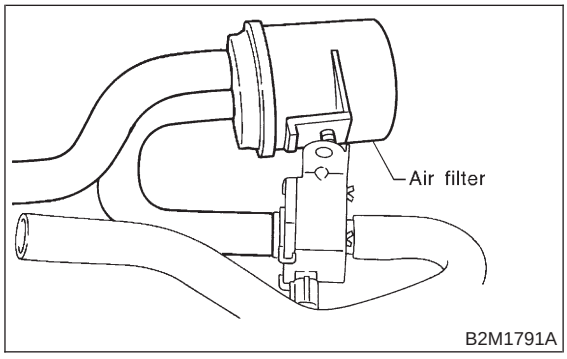
5) Disconnect evaporation hoses from joint pipes.


B2M1789

6) Remove nut which installs air filter and drain valve brackets on body, and remove them as a unit.


B2M1790

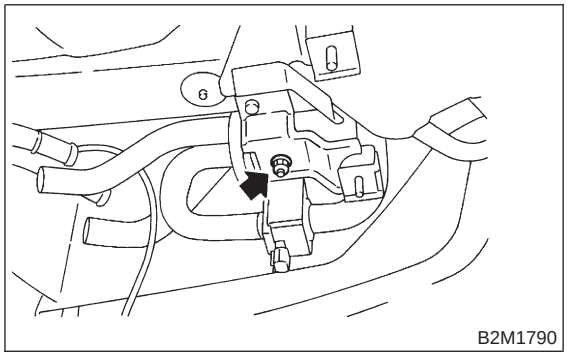
7) Disconnect evaporation hoses, and remove air filter.



B2M1791A

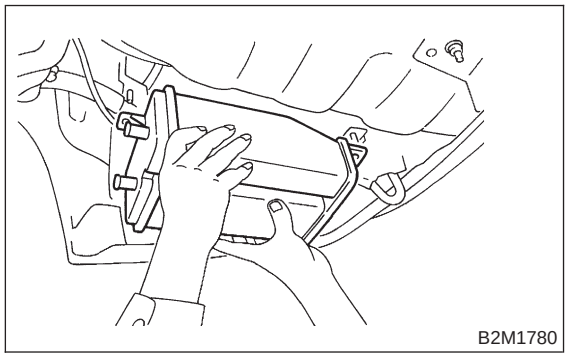
8) Installation is in the reverse order of removal.

Tightening torque:
22.5±7 N·m (2.3±0.7 kg-m, 16.6±5.1 ft-lb)

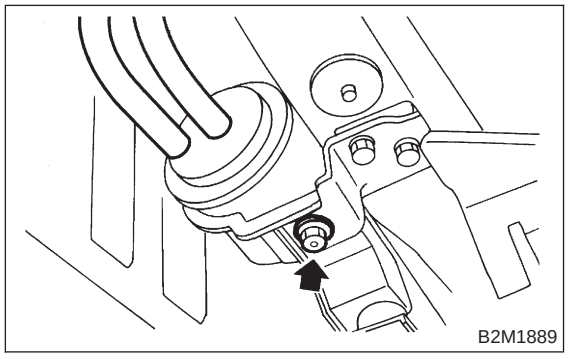

B2M1790

2. 2500 cc MODEL

1) Remove canister. <Ref. to 2-1 [W3A0].>



2) Disconnect two hoses from air filter.
3) Remove flange nut from bracket.



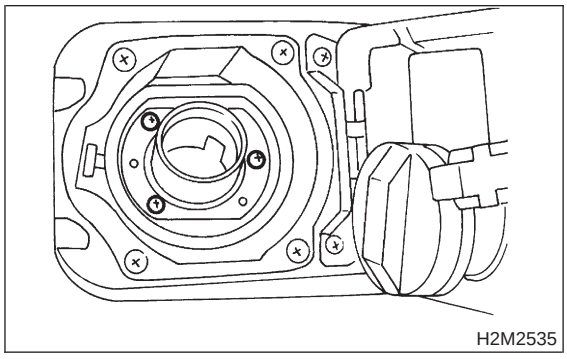
4) Installation is in the reverse order of removal.

Tightening torque:
22.5±7 N·m (2.3±0.7 kg-m, 16.6±5.1 ft-lb)

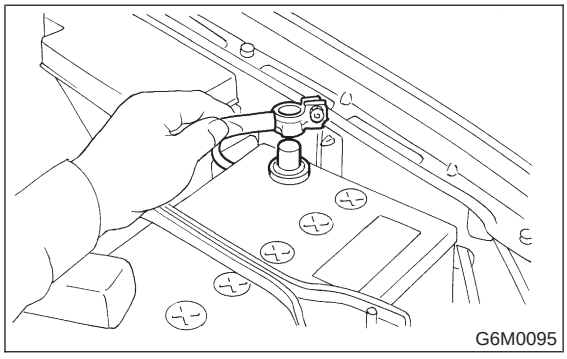
14. Sub Fuel Level Sensor

A: REMOVAL AND INSTALLATION

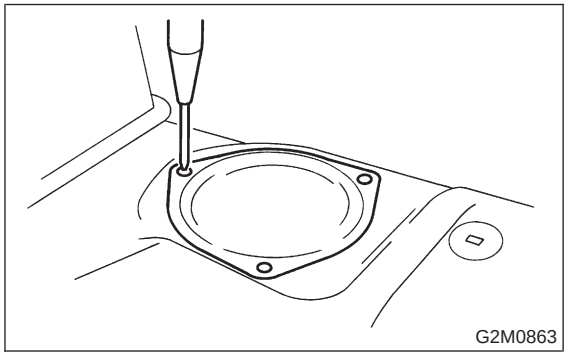
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



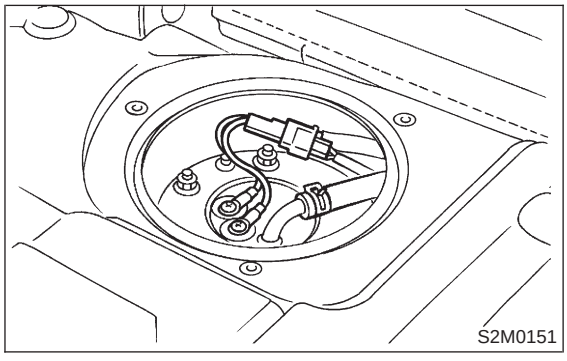
3) Disconnect battery ground cable.



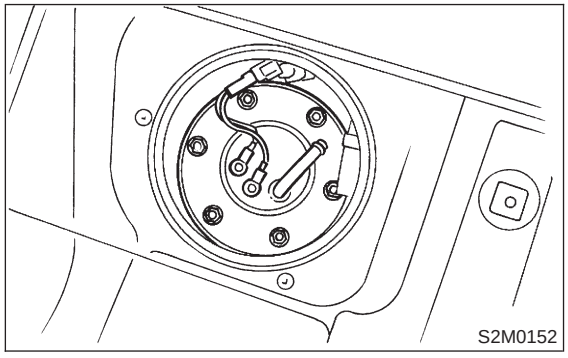
4) Remove service hole cover.



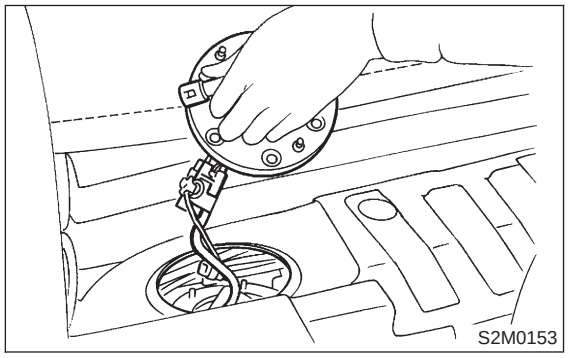
5) Disconnect connector from fuel sub meter, and disconnect jet pump hose.



6) Remove bolts which install sub fuel level sensor on fuel tank.

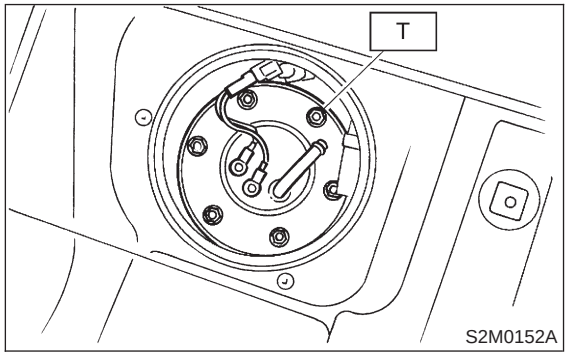

S2M0152

7) Remove sub fuel level sensor.


S2M0153

8) Installation is in the reverse order of removal.

Tightening torque:
T: 4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

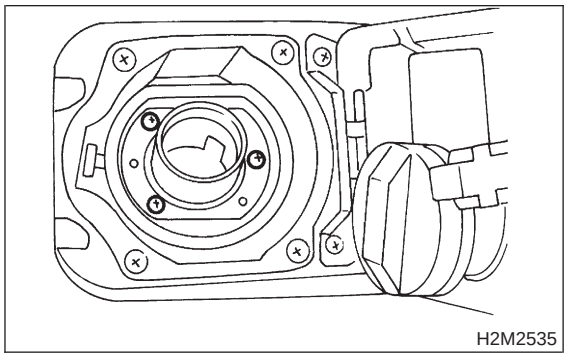


S2M0152A

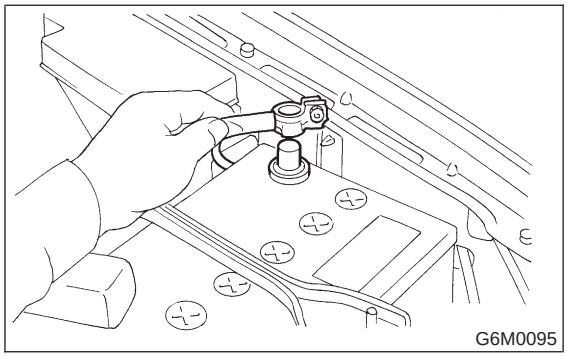
15. Vent Valve (2200 cc Model)

A: REMOVAL AND INSTALLATION

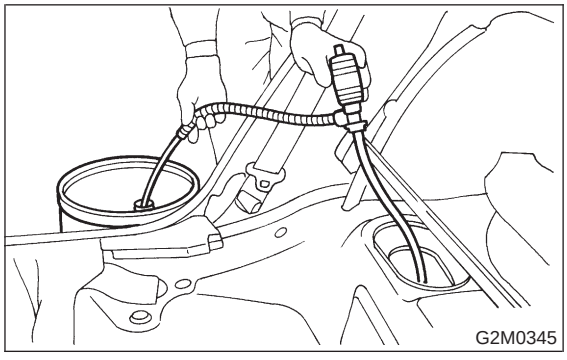
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filer cap.


H2M2535

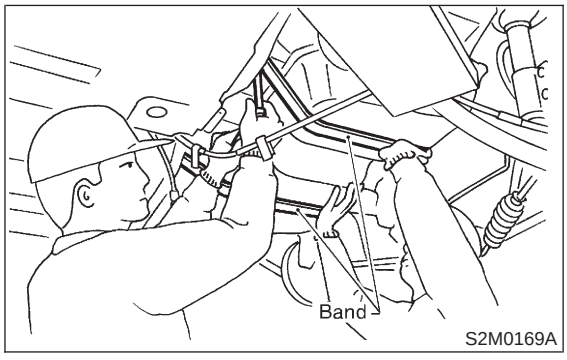
3) Disconnect battery ground cable.


G6M0095

4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>

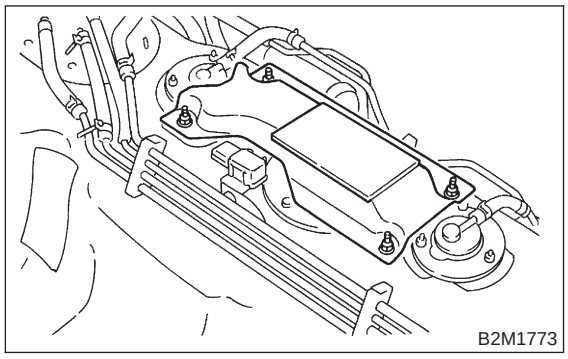

G2M0345

5) Remove fuel tank. <Ref. to 2-8 [W2A0].>

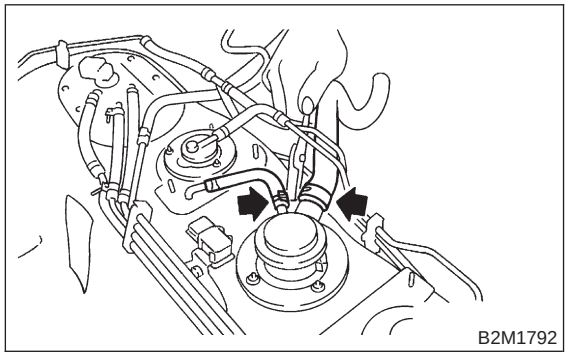


S2M0169A

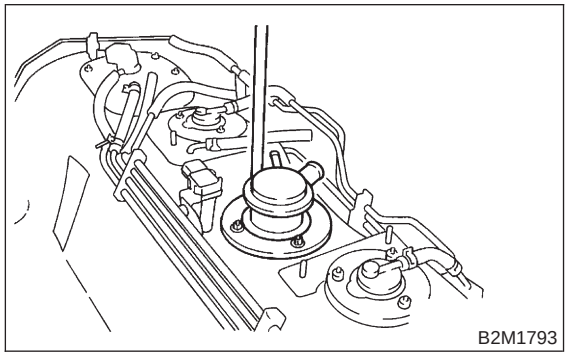
6) Remove protector cover.



7) Move clips, and disconnect hoses from vent valve.



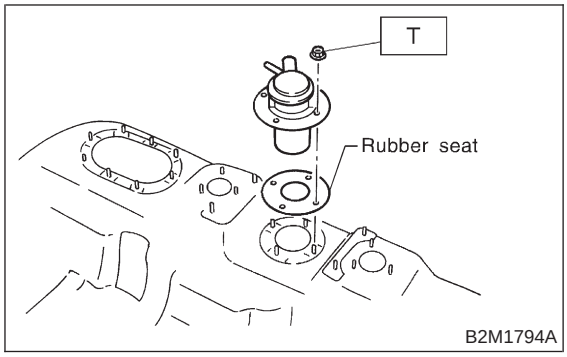
8) Remove nuts which install vent valve on fuel tank.



9) Installation is in the reverse order of removal.

CAUTION:
Replace rubber seat with a new one.

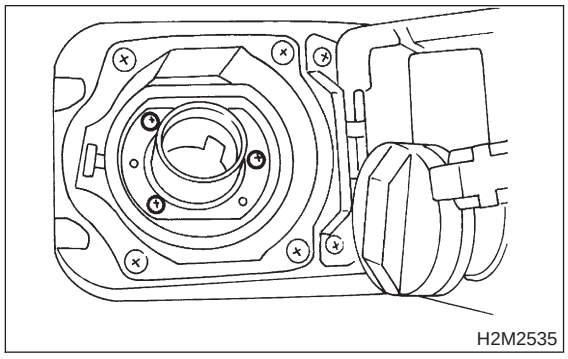
Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



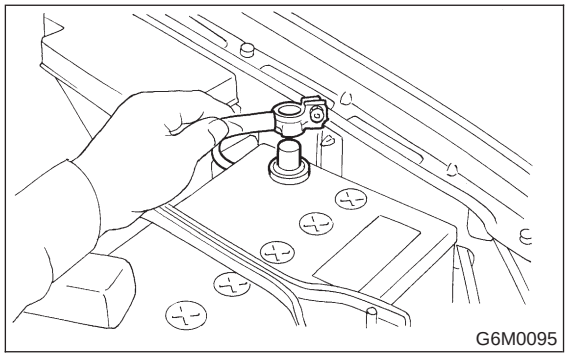
16. Shut Valve (2200 cc Model)

A: REMOVAL AND INSTALLATION

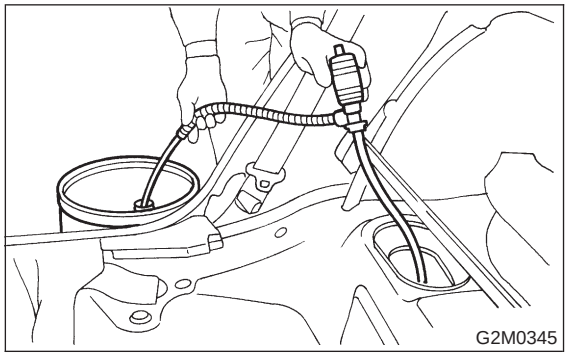
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filer cap.


H2M2535

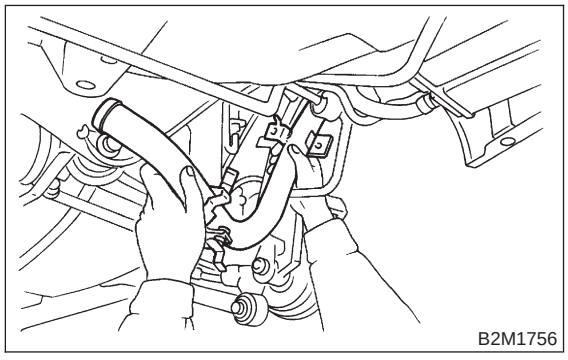
3) Disconnect battery ground cable.


G6M0095

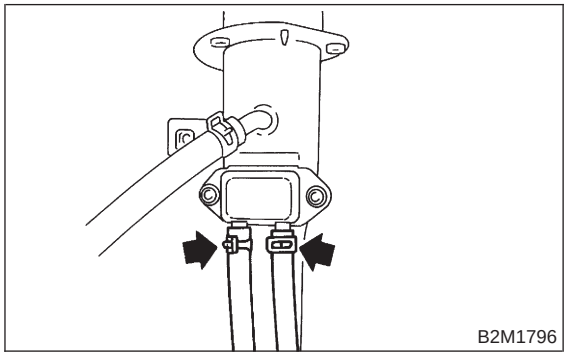
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>


G2M0345

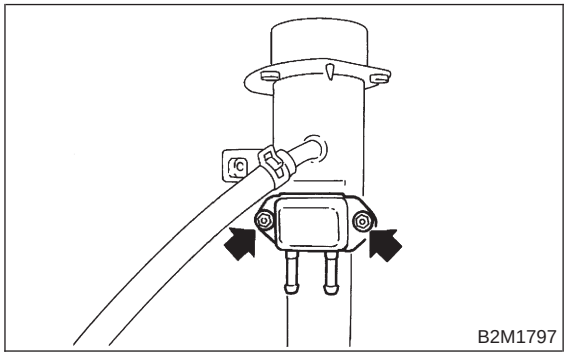
5) Remove fuel filler pipe. <Ref. to 2-8 [W3A0].>


B2M1756

6) Disconnect evaporation hoses from shut valve.

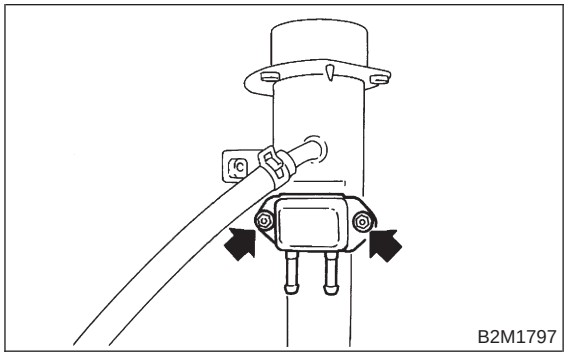

B2M1796

7) Remove shut valve from fuel filler pipe.


B2M1797

8) Installation is in the reverse order of removal.

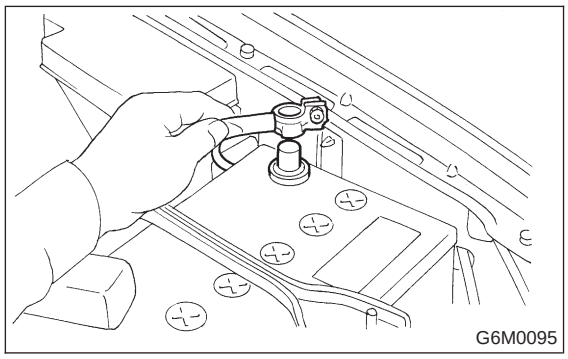
Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)


B2M1797

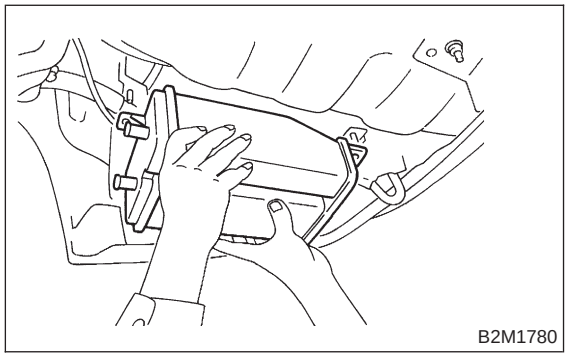
17. Drain Valve (2200 cc Model)

A: REMOVAL AND INSTALLATION

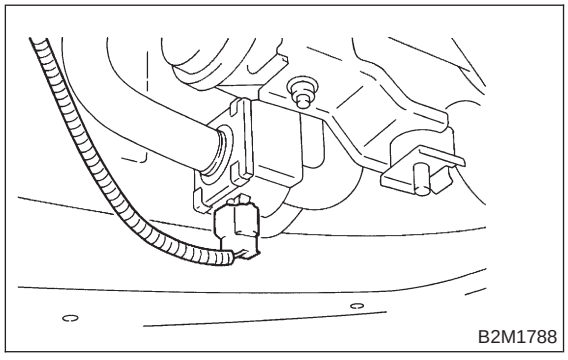
1) Disconnect battery ground cable.



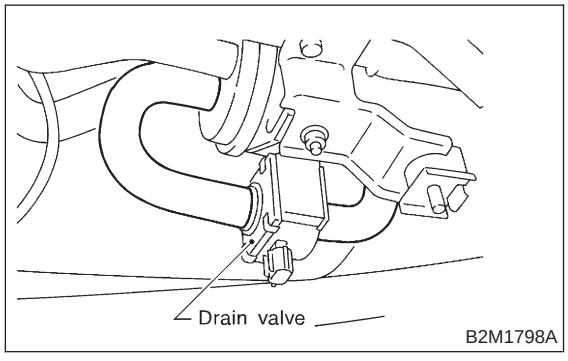
2) Lift-up the vehicle.
3) Remove canister. <Ref. to 2-1 [W3A0].>



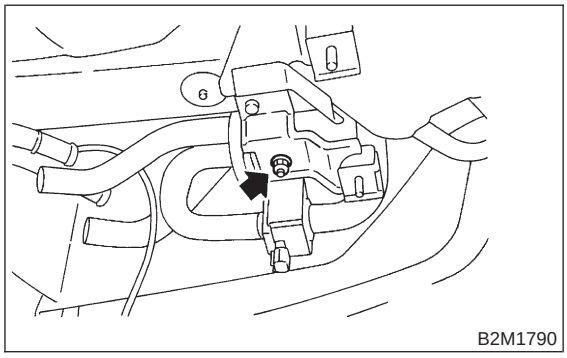
4) Disconnect connector from drain valve.



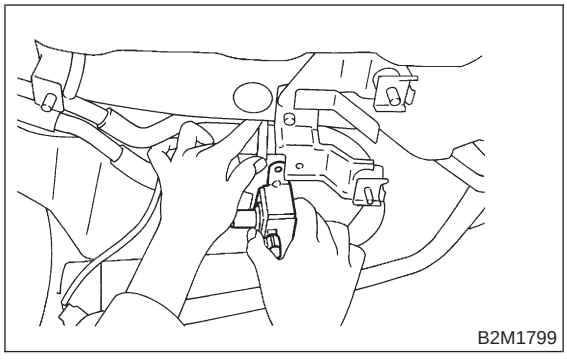
5) Disconnect evaporation hoses from drain valve.



6) Remove bolt which installs air filter and drain valve brackets on body.

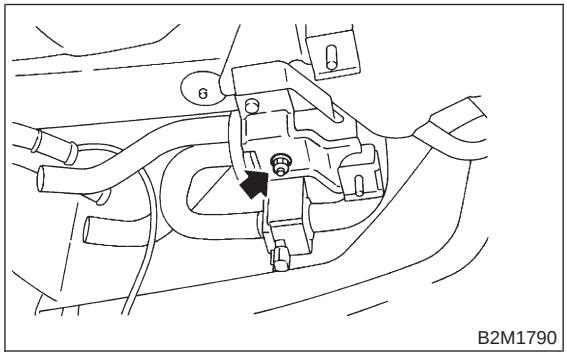


7) Move air filter to upper side, and remove drain valve with bracket.



8) Installation is in the reverse order of removal.

Tightening torque:
22.5±7 N·m (2.3±0.7 kg-m, 16.6±5.1 ft-lb)



MEMO:

ON-CAR SERVICES 2-2

Page

W SERVICE PROCEDURE 2
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2. Ignition Timing 2
3. Engine Idle Speed 3
4. Engine Compression 4
5. Intake Manifold Vacuum 5
6. Engine Oil Pressure 5
7. Valve Clearance 7

1. Foreword

This chapter describes major inspection and service procedures for the engine mounted on the body. For procedures not found in this chapter, refer to the service procedure section in the applicable chapter.

2. Ignition Timing

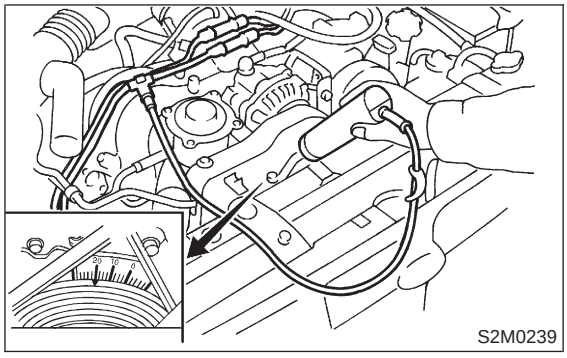
A: IGNITION TIMING

1. MEASUREMENT

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) Warm-up the engine.
2) To check the ignition timing, connect a timing light to #1 cylinder spark plug cord, and illuminate the timing mark with the timing light.
3) Start the engine at idle speed and check the ignition timing.
If the timing is not correct, check the ignition control system. <Refer to 2-7 On-board Diagnostic II System.>

Ignition timing [BTDC/rpm]:
14°±8°/700 (2200 cc MT vehicles)
20°±8°/700 (2200 cc AT vehicles)
15°±8°/700 (2500 cc models)

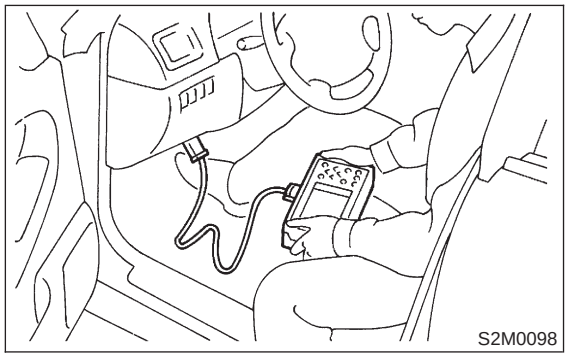


NOTE:
To improve stability, ignition timing while engine is idling is also controlled. For this reason specified ignition timing range is increased somewhat, to ±8°.

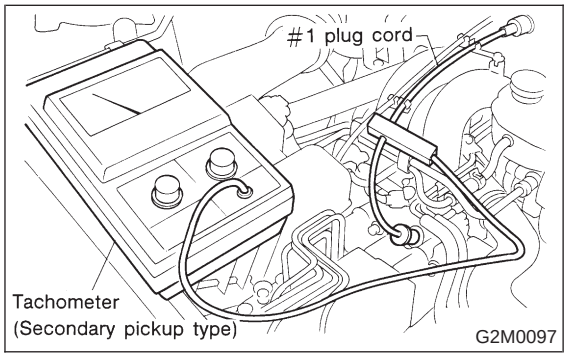
3. Engine Idle Speed

A: MEASUREMENT

1) Before checking idle speed, check the following:
(1) Ensure that air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and that hoses are connected properly.
(2) Ensure that malfunction indicator light (CHECK ENGINE light) does not illuminate.
2) Warm-up the engine.
3) Stop the engine, and turn igintion switch to OFF.
4) When using SUBARU SELECT MONITOR;
(1) Insert the cartridge to SUBARU SELECT MONITOR.
(2) Connect SUBARU SELECT MONITOR to the data link connector.
(3) Turn igintion switch to ON, and SUBARU SELECT MONITOR switch to ON.
(4) Select {2. Each System Check} in Main Menu.
(5) Select {EGI/EMPI} in Selection Menu.
(6) Select {1. Current Data Display & Save} in EGI/EMPI Diagnosis.
(7) Select {1.12 Data Display} in Data Display Menu.
(8) Start the engine, and read engine idle speed.


S2M0098

5) When using tachometer (Secondary pick-up type).
(1) Attach the pick-up clip to No. 1 cylinder spark plug cord.
(2) Start the engine, and read engine idle speed.



NOTE:
● When using the OBD-II general scan tool, carefully read its operation manual.
● This ignition system provides simultaneous ignition for #1 and #2 plugs. It must be noted that some tachometers may register twice that of actual engine speed.

6) Check idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, air conditioning, etc. OFF)

Idle speed (No load and gears in neutral (MT), or N or P (AT) position):
700±100 rpm

7) Check idle speed when loaded. (Turn air conditioning switch to “ON” and operate compressor for at least one minute before measurement.)

Idle speed [A/C “ON”, no load and gears in neutral (MT) or N or P (AT) position]:
850±50 rpm

CAUTION:
Never rotate idle adjusting screw. If idle speed is out of specifications, refer to General On-board Diagnosis Table under “2-7 On-Board Diagnostics II System”.

4. Engine Compression

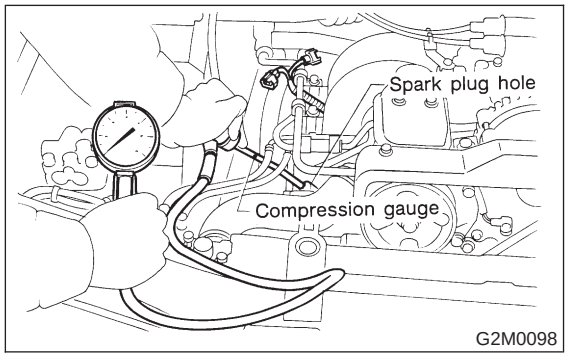
A: ENGINE COMPRESSION

1. MEASUREMENT

1) After warming-up the engine, turn ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Disconnect battery ground cable.
4) Remove all the spark plugs.
5) Disconnect connectors from fuel injectors.
6) Connect battery ground cable.
7) Fully open throttle valve.
8) Check the starter motor for satisfactory performance and operation.
9) Hold the compression gauge tight against the spark plug hole.

CAUTION:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

10) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



11) Perform at least two measurements per cylinder, and make sure that the values are correct.

2200 cc models:

Compression (200 — 300 rpm and fully open throttle):
Standard:
1,079 — 1,275 kPa (11.0 — 13.0 kg/cm^2, 156 — 185 psi)
Limit:
883 kPa (9.0 kg/cm^2, 128 psi)
Difference between cylinders:
196 kPa (2.0 kg/cm^2, 28 psi)

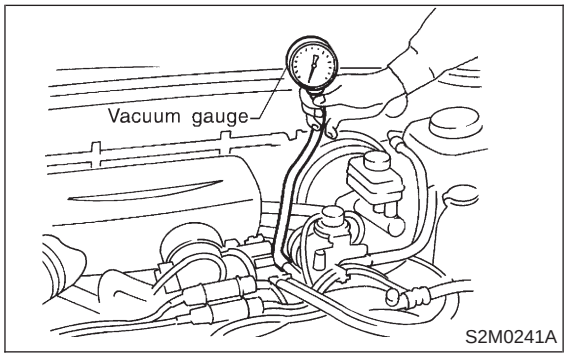
2500 cc models:

Compression (350 rpm and fully open throttle):
Standard;
1,216 kPa (12.4 kg/cm^2, 176 psi)
Limit;
941 kPa (9.6 kg/cm^2, 137 psi)
Difference between cylinders;
49 kPa (0.5 kg/cm^2, 7 psi), or less

5. Intake Manifold Vacuum

A: MEASUREMENT

1) Warm-up the engine.
2) Disconnect the brake vacuum hose and install the vacuum gauge to the hose fitting on the manifold.
3) Keep the engine at the idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.



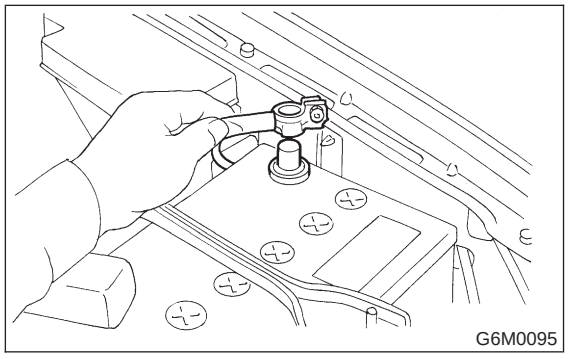
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 inHg)

Diagnosis of engine condition by measurement of manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket or disconnection or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Back pressure too high, or exhaust system clogged
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Sticky valves
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

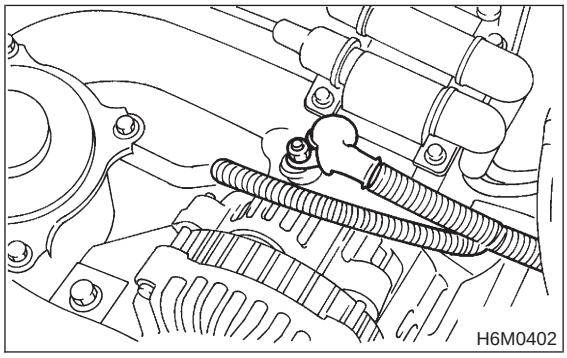
6. Engine Oil Pressure

A: MEASUREMENT

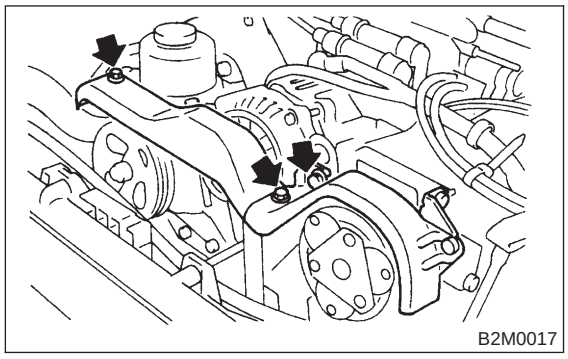
1) Disconnect battery ground cable.



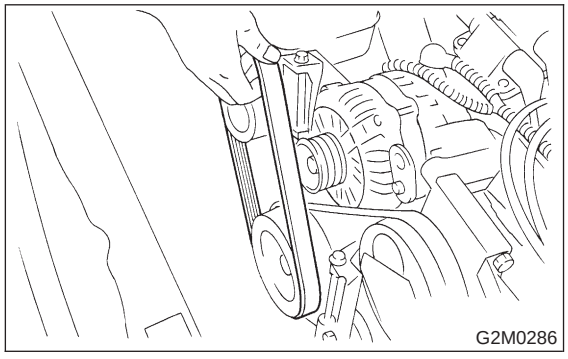
2) Remove generator from bracket.
(1) Disconnect connector and terminal from generator.



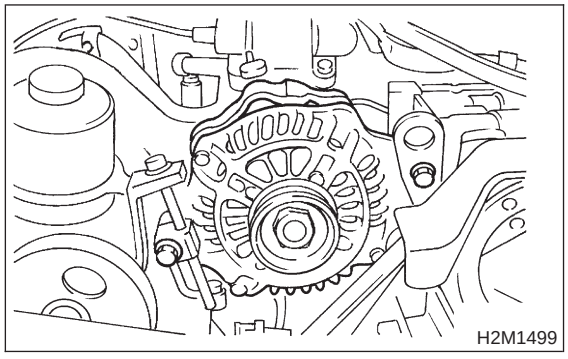
(2) Remove V-belt cover


B2M0017

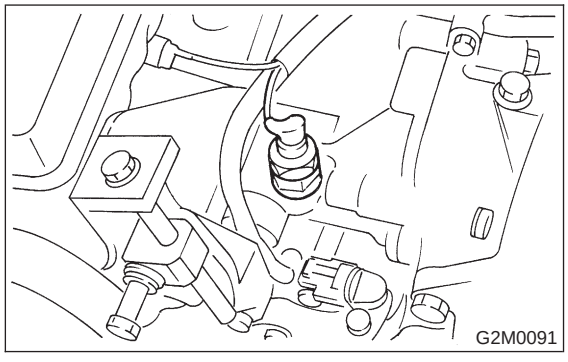
(3) Loosen lock bolt and slider bolt, and remove front side V-belt.


G2M0286

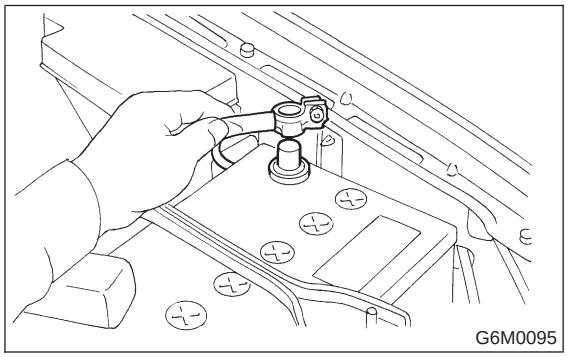
(4) Remove generator lock bolt.
(5) Remove bolt which install generator on bracket.


H2M1499

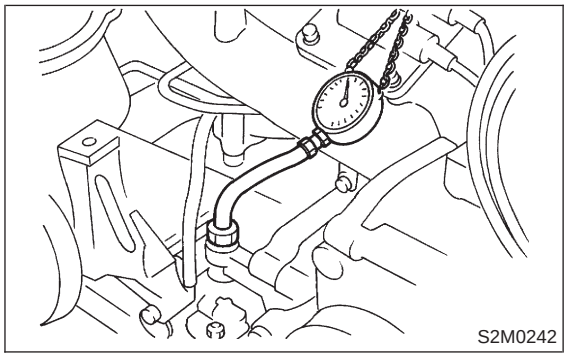
3) Disconnect connector from oil pressure switch.
4) Remove oil pressure switch from engine cylinder block. <Ref. to 2-4 [W3A0].>


G2M0091

5) Connect oil pressure gauge hose to cylinder block.
6) Connect battery ground cable.


G6M0095

7) Start the engine, and measure oil pressure.


S2M0242

Oil pressure:
98 kPa (1.0 kg/cm^2,14 psi) or more at 800 rpm
294 kPa (3.0 kg/cm^2, 43 psi) or more at 5,000 rpm

CAUTION:
● If oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to 2-4 ENGINE LUBRICATION SYSTEM.>
● If oil pressure warning light is turned ON and oil pressure is in specification, replace oil pressure switch. <Ref. to 2-4 ENGINE LUBRICATION SYSTEM.>

NOTE:
The specified data is based on an engine oil temperature of 80°C (176°F).

8) After measuring oil pressure, install oil pressure switch. <Ref. to 2-4 [W3B0].>

Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)

9) Install generator and V-belt in the reverse order of removal, and adjust the V-belt deflection. <Ref. to 1-5 [G2A0].>

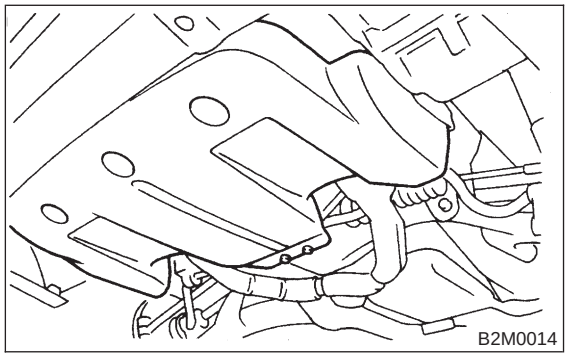
7. Valve Clearance

A: INSPECTION

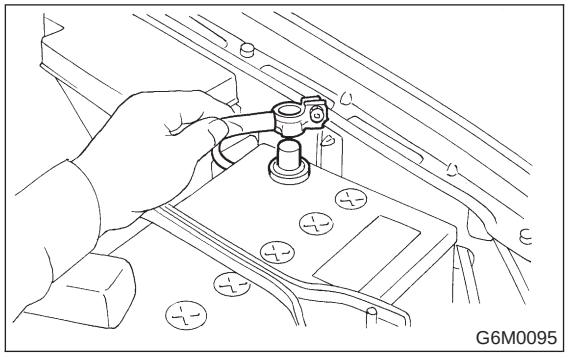
1. 2200 cc MODEL

CAUTION:
Inspection and adjustment of valve clearance should be performed while engine is cold.

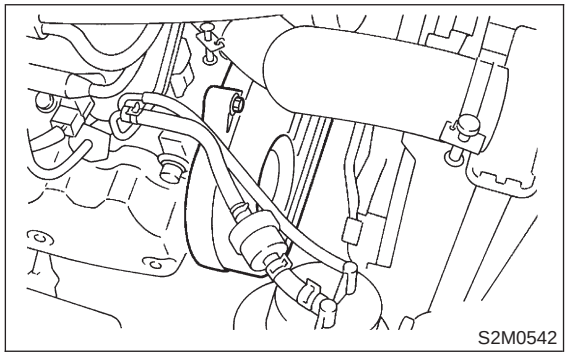
1) Set the vehicle onto the lift.
2) Lift-up the vehicle.
3) Remove under cover.



4) Disconnect battery ground cable.



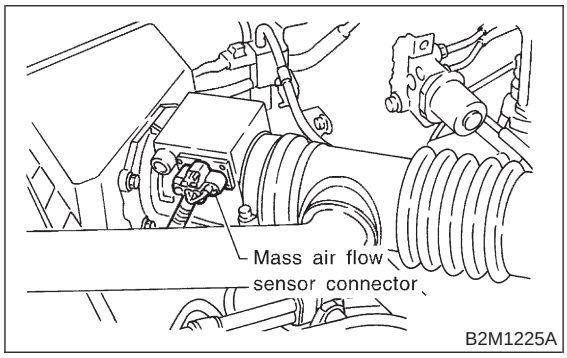
5) Lower the vehicle.
6) Remove timing belt cover (RH).



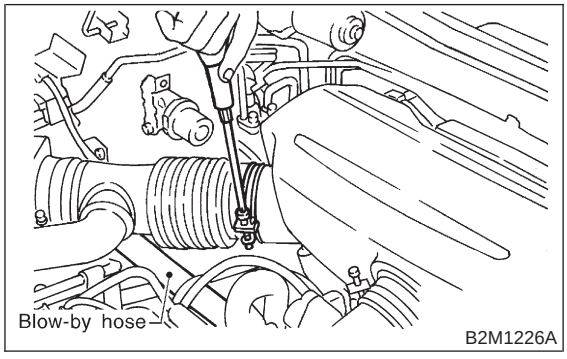
7) Remove rocker cover.

- When inspecting #1 and #3 cylinders;

(1) Disconnect connector from mass air flow sensor.



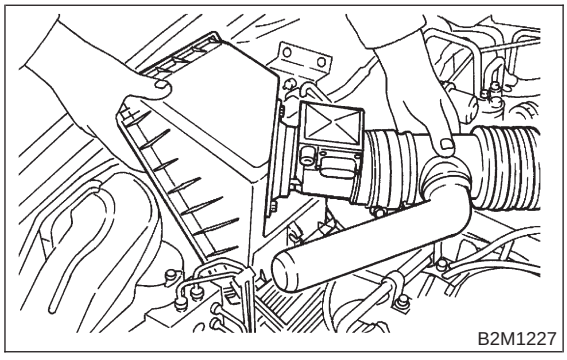
(2) Loosen clamp which connectors air intake duct to air intake chamber.



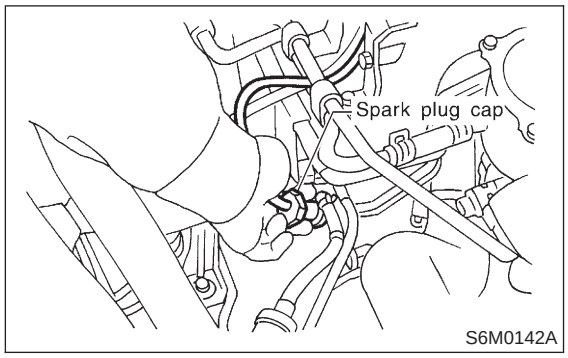
(3) Remove the two clips from air cleaner upper cover.

CAUTION:
Before installing air cleaner upper cover, align hole(s) with protruding portions of air cleaner lower case, then secure upper cover.

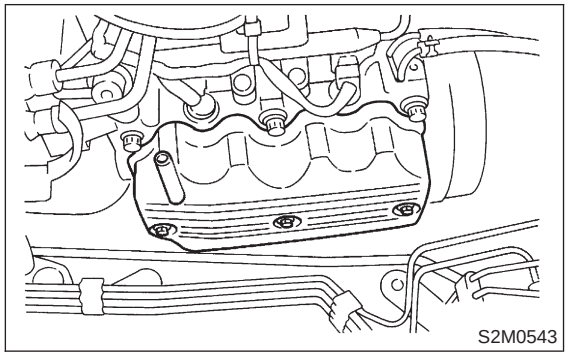
(4) Disconnect blow-by hose from air intake duct.
(5) Remove air intake duct and air cleaner upper cover as a unit.



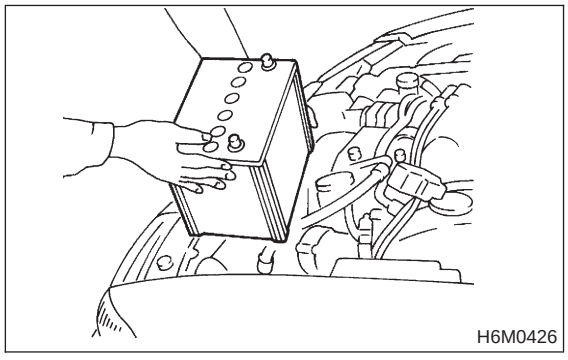
(6) Disconnect spark plug cords from spark plugs (#1 and #3 cylinders).



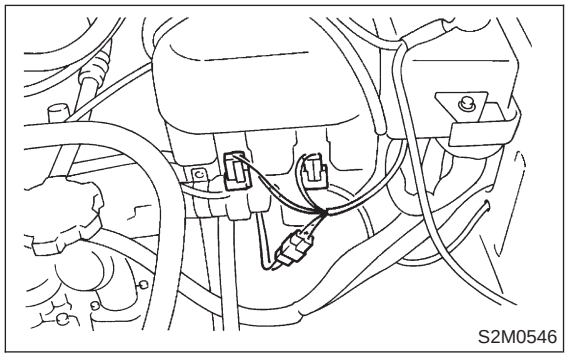
(7) Disconnect PCV hose from rocker cover (RH).
(8) Remove bolts, then remove rocker cover (RH).



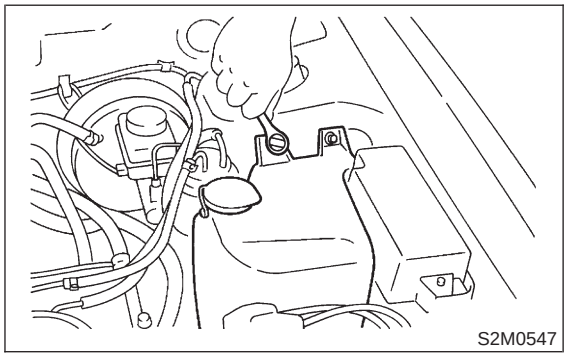
- When inspecting #2 and #4 cylinders;
  (1) Disconnect battery cables, and then remove battery and battery carrier.



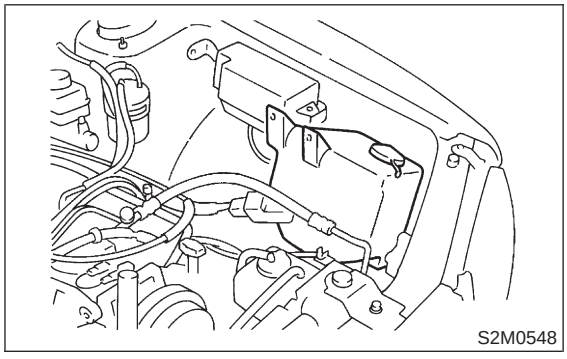
(2) Disconnect washer motor connectors.



(3) Remove the two bolts which hold washer tank.



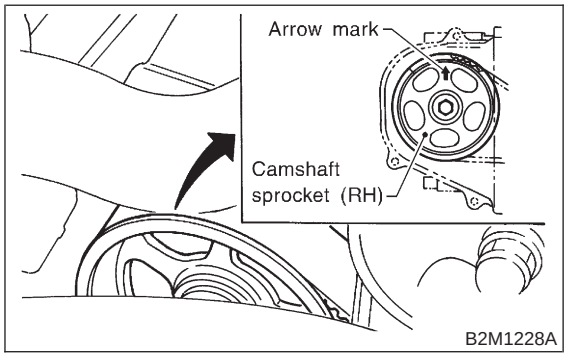
(4) Move washer tank to forward.



(5) Disconnect spark plug cords from spark plugs (#2 and #4 cylinders).
(6) Disconnect PCV hose from rocker cover (LH).
(7) Remove bolts, then remove rocker cover (LH).

8) Set #1 cylinder piston to top dead center of compression stroke by rotating crankshaft pulley clockwise.

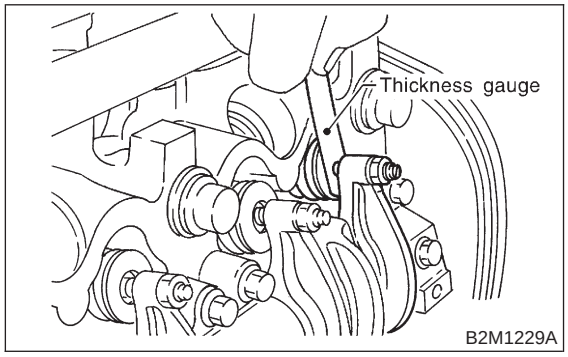
NOTE:
When arrow mark on camshaft sprocket (RH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.



9) Measure #1 cylinder valve clearance by using thickness gauge.

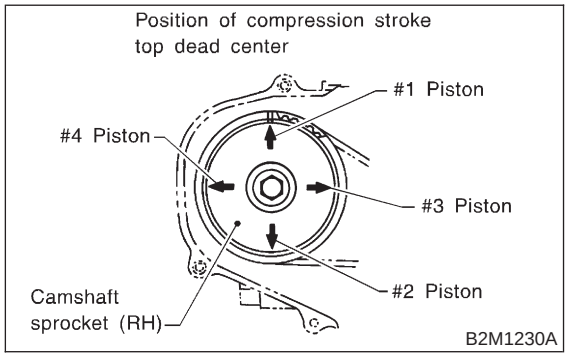
CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the valve stem end face.
● Measure exhaust valve clearances while lifting-up the vehicle.

Valve clearance:
Intake:
0.20±0.02 mm (0.0079±0.0008 in)
Exhaust:
0.25±0.02 mm (0.0098±0.0008 in)



10) If necessary, adjust the valve clearance. <Ref. to 2-2 [W7B1].>
11) Similar to measurement procedures used for #1 cylinder, measure #2, #3 and #4 cylinder valve clearances.

NOTE:
● Be sure to set cylinder pistons to their respective top dead centers on compression stroke before measuring valve clearances.
● To set #3, #2 and #4 cylinder pistons to their top dead centers on compression stroke, turn crankshaft pulley clockwise 90° at a time starting with arrow mark on right-hand camshaft sprocket facing up.

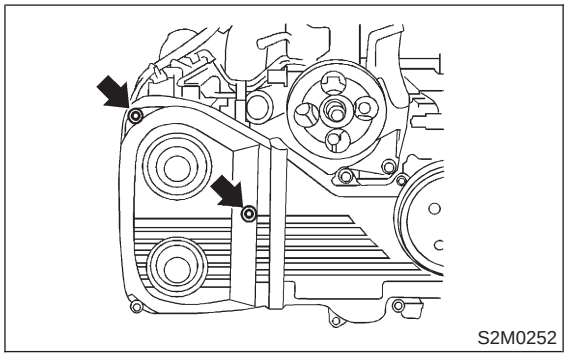


12) After inspection, install the related parts in the reverse order of removal.

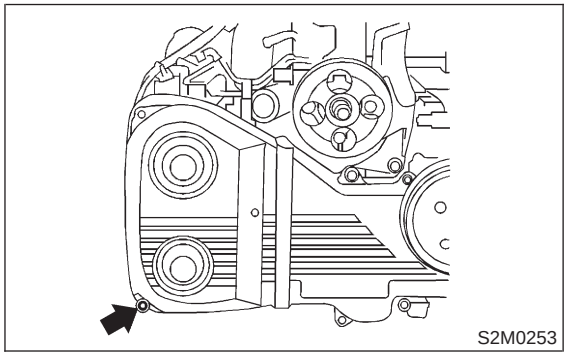
2. 2500 cc MODEL

CAUTION:
Inspection and adjustment of valve clearance should be performed while engine is cold.

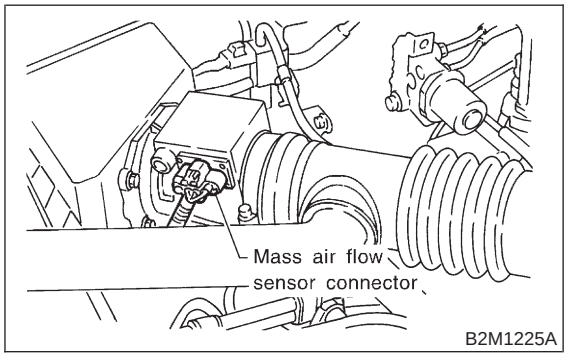
1) Set the vehicle onto the lift.
2) Disconnect battery ground cable.
3) Remove bolts which secure the upper and center side of timing belt cover (RH).



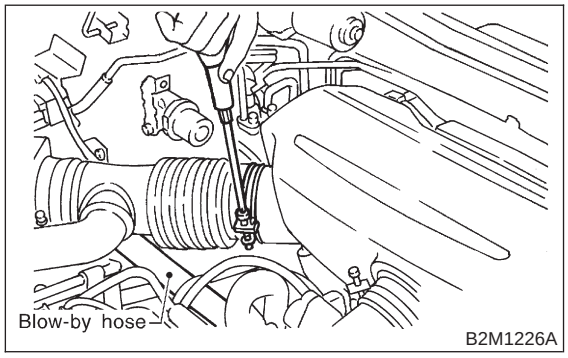
4) Lift-up the vehicle.
5) Remove under cover.
6) Remove bolt which secures the under side of timing belt cover (RH), then remove belt cover.



7) Lower the vehicle.
8) Remove rocker cover.
● When inspecting #1 and #3 cylinders;
(1) Disconnect connector from mass air flow sensor.



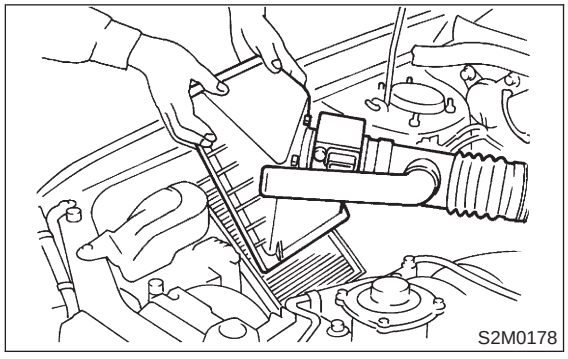
(2) Loosen clamp which connects air intake duct to air intake chamber.



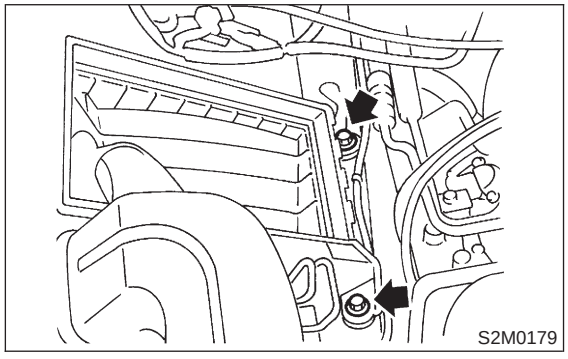
(3) Remove the two clips from air cleaner upper cover.

CAUTION:
Before installing air cleaner upper cover, align hole(s) with protruding portions of air cleaner lower case, then secure upper cover.

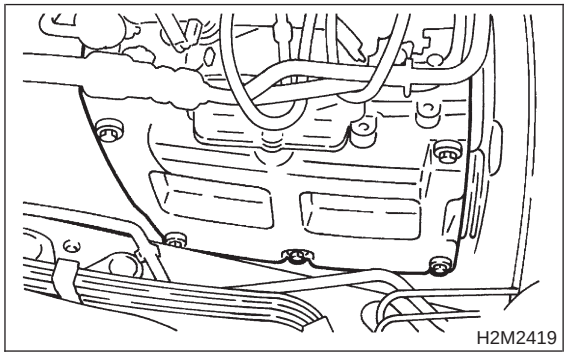
(4) Disconnect blow-by hose from air intake duct.
(5) Remove air intake duct and air cleaner upper cover as a unit.



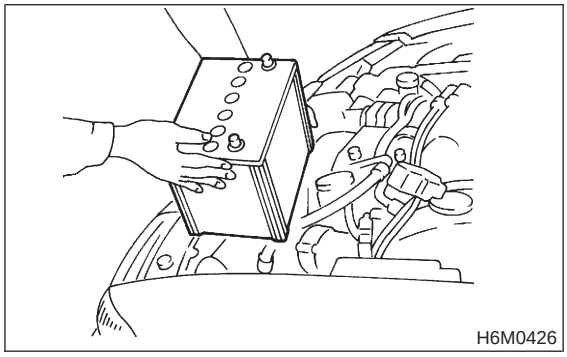
(6) Remove air cleaner element.
(7) Remove air cleaner lower case.



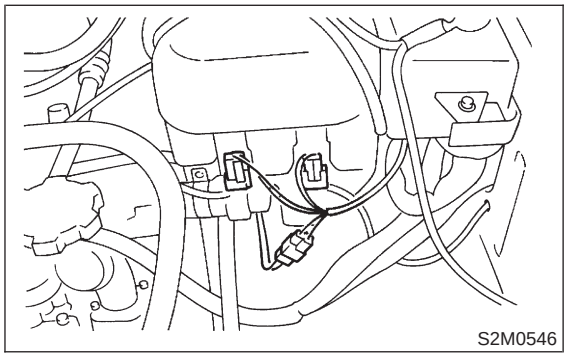
(8) Disconnect spark plug cords from spark plugs (#1 and #3 cylinders).
(9) Place suitable container under the vehicle.
(10) Disconnect PCV hose from rocker cover (RH).
(11) Remove bolts, then remove rocker cover (RH).



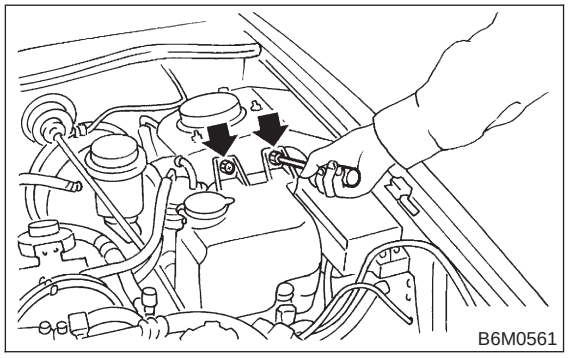
- When inspecting # 2 and #4 cylinders;
  (1) Disconnect battery cables, and then remove battery and battery carrier.



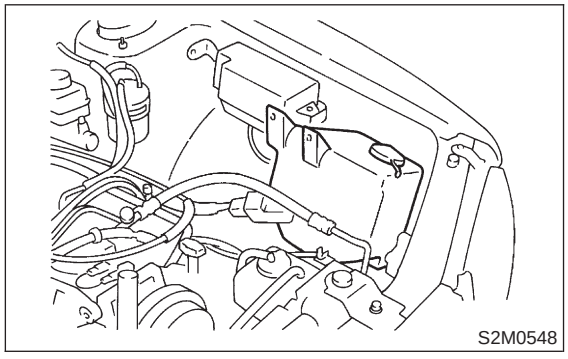
(2) Disconnect washer motor connectors.



(3) Remove bolts which install washer tank to body.



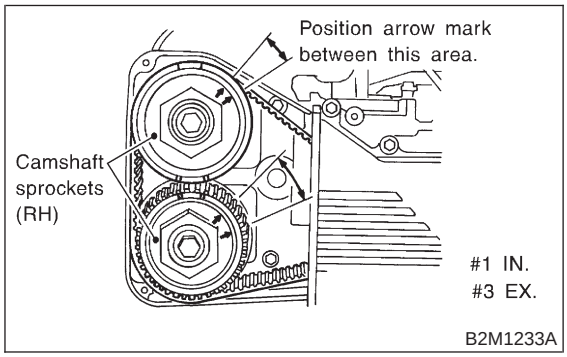
(4) Move washer tank to forward.



(5) Disconnect spark plug cords from spark plugs (#2 and #4 cylinders).
(6) Place suitable container under the vehicle.
(7) Disconnect PCV hose from rocker cover (LH).
(8) Remove bolts, then remove rocker cover (LH).



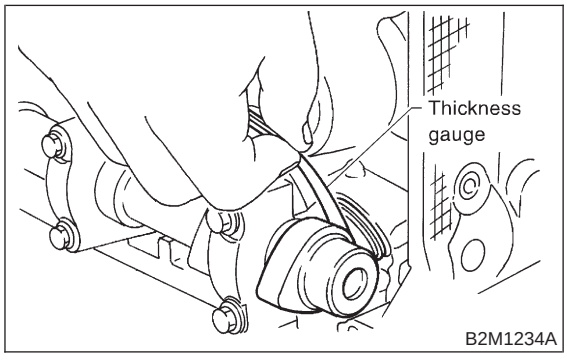
9) Turn crankshaft pulley clockwise until arrow mark on camshaft sprocket is set to position shown in figure.



10) Measure #1 cylinder intake valve and #3 cylinder exhaust valve clearances by using thickness gauge.

CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the shim.
● Measure exhaust valve clearances while lifting-up the vehicle.

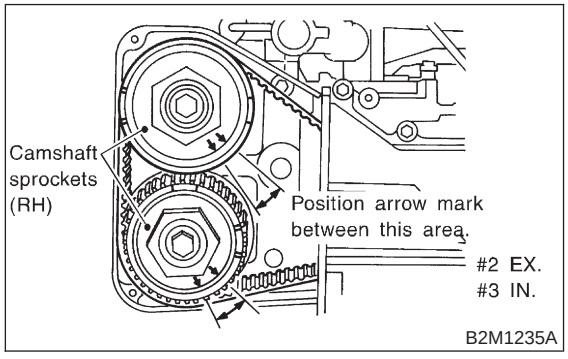
Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.25±0.02 mm (0.0098±0.0008 in)



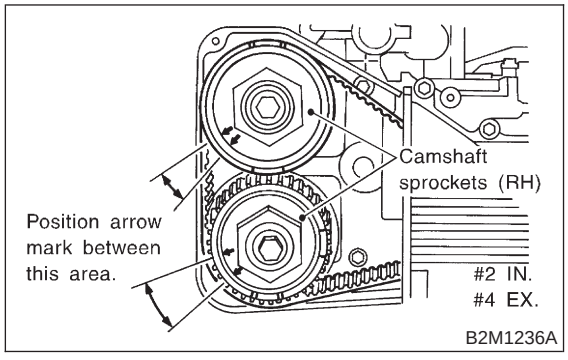
11) If necessary, adjust the valve clearance. <Ref. to 2-2 [W7B2].>

12) Further turn crankshaft pulley clockwise. Using the same procedures as in step 10) above, measure valve clearances.

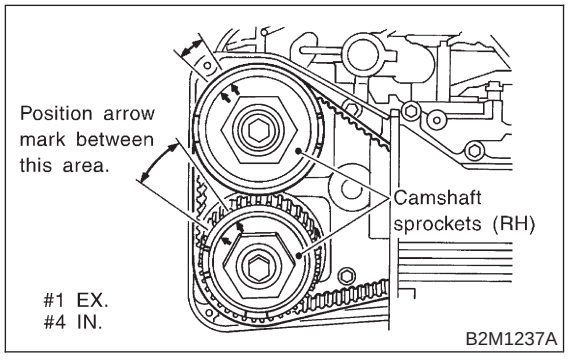
(1) Set arrow mark on camshaft sprocket to position shown in figure, and measure #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



(2) Set arrow mark on camshaft sprocket to position shown in figure, and measure #2 cylinder intake valve and #4 cylinder exhaust valve clearances.



(3) Set arrow mark on camshaft sprocket to position shown in figure, and measure #1 cylinder exhaust valve and #4 cylinder intake valve clearances.



13) After inspection, install the related parts in the reverse order of removal.

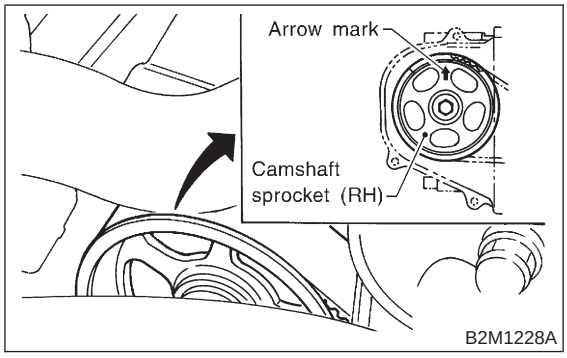
B: ADJUSTMENT

1. 2200 cc MODEL

CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Set #1 cylinder piston to top dead center of compression stroke by rotating crankshaft pulley clockwise.

NOTE:
When arrow mark on camshaft sprocket (RH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.

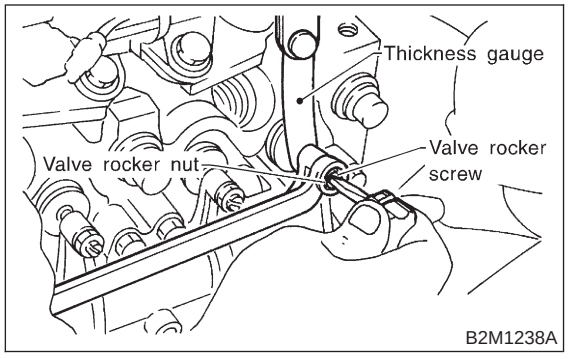


2) Adjust the #1 cylinder valve clearance.
(1) Loosen the valve rocker nut and screw.
(2) Place suitable thickness gauge.
(3) While noting valve clearance, tighten valve rocker adjust screw.
(4) When specified valve clearance is obtained, tighten valve rocker nut.

Tightening torque:
10±1 N·m (1.0±0.1 kg-m, 7.2±0.7 ft-lb)

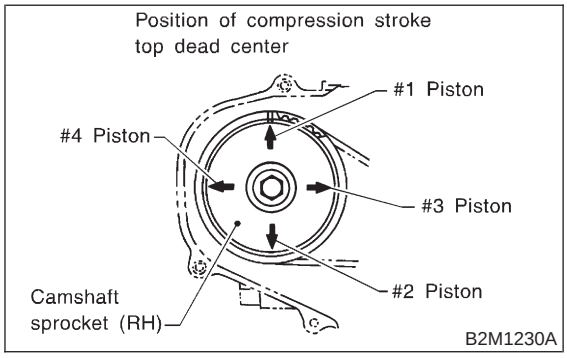
CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the valve stem end face.
● Adjust exhaust valve clearances while lifting-up the vehicle.

Valve clearance:
Intake:
0.20±0.02 mm (0.0079±0.0008 in)
Exhaust:
0.25±0.02 mm (0.0098±0.0008 in)



3) Ensure that valve clearances are within specifications.
4) Turn crankshaft two complete rotations until #1 cylinder piston is again set to top dead center on compression stroke.
5) Ensure that valve clearances are within specifications. If necessary, re-adjust valve clearances.
6) Similar to adjustment procedures used for #1 cylinder, adjust #2, #3 and #4 cylinder valve clearances.

NOTE:
● Be sure to set cylinder pistons to their respective top dead centers on compression stroke before adjusting valve clearances.
● To set #3, #2 and #4 cylinder pistons to their top dead centers on compression stroke, turn crankshaft pulley clockwise 90° at a time starting with arrow mark on right-hand camshaft sprocket facing up.

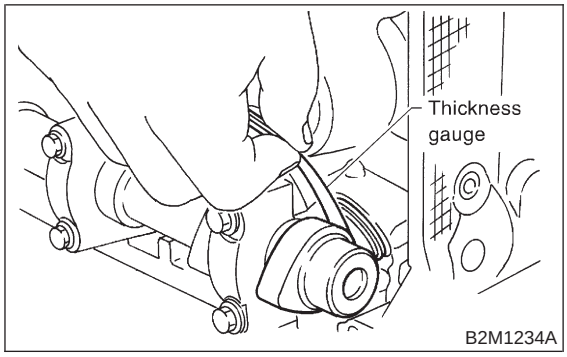


2. 2500 cc MODEL

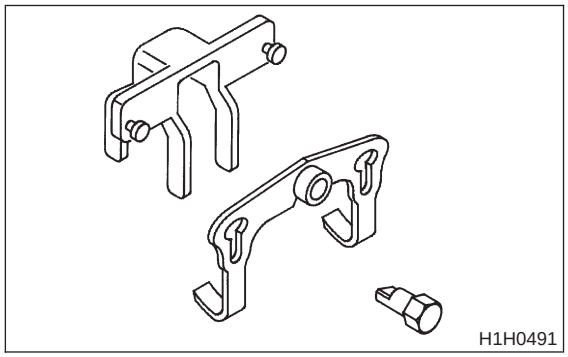
CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Measure all valve clearances. <Ref. to 2-2 [W7A2].>

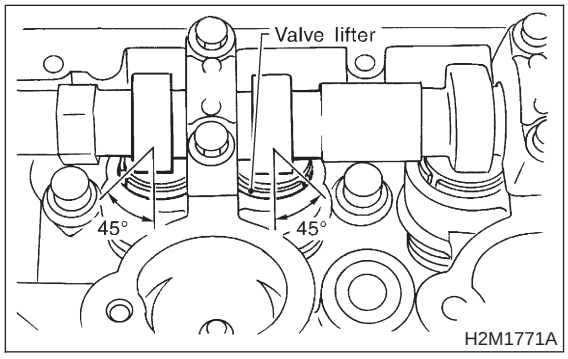
NOTE:
Record each valve clearance after it has been measured.



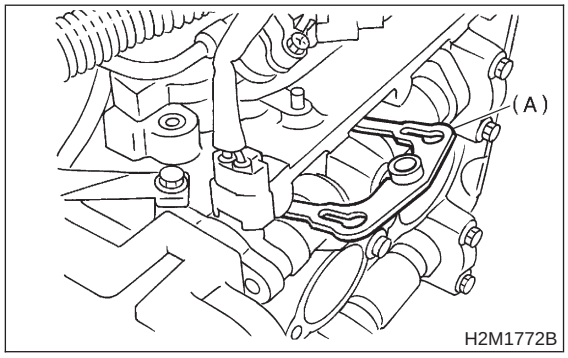
2) Remove shim of intake side.
(1) Prepare the ST.
ST 498187100 SHIM REPLACER KIT



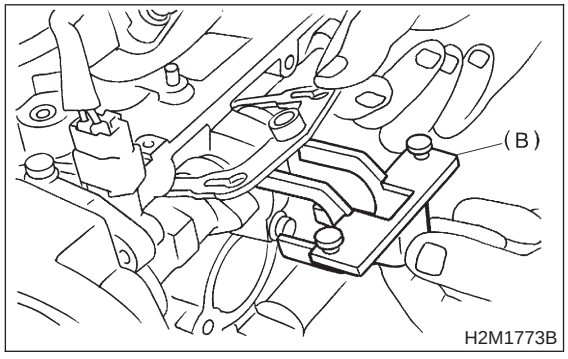
(2) Rotate the notch of the valve lifter outward by 45°.



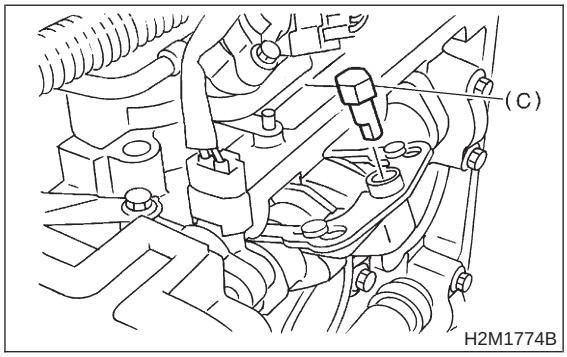
(3) Set REPLACER No. 1 (A) to intake camshaft.



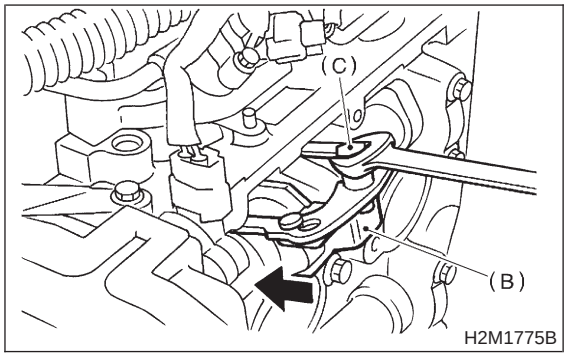
(4) Set REPLACER No. 2 (B).



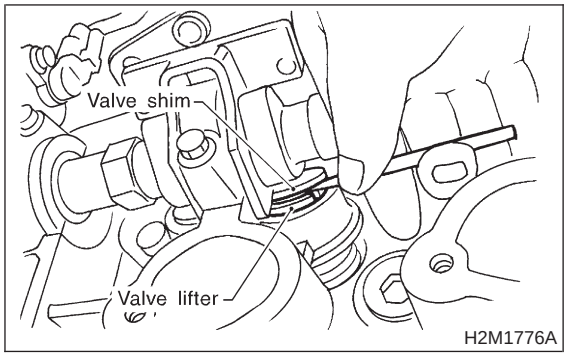
(5) Set REPLACER No. 3 (C) to hole of REPLACER No. 1.



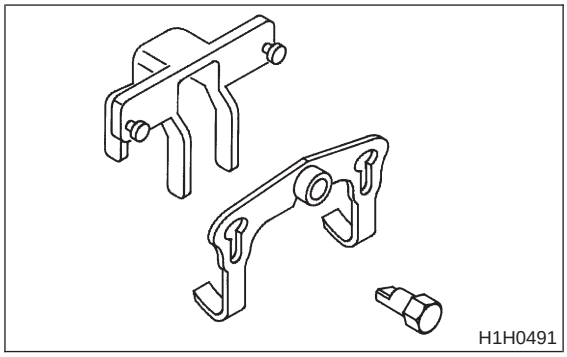
(6) Rotate REPLACER No. 3 (C) until REPLACER No. 2 (B) pushes away valve lifter.



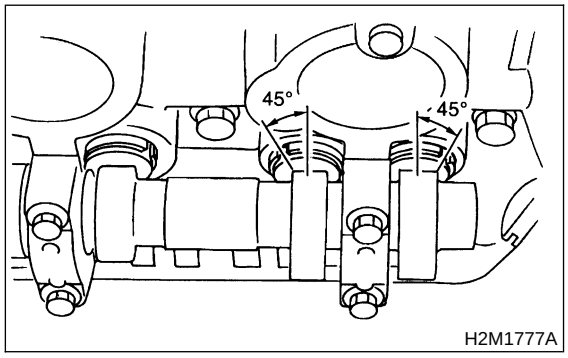
(7) Insert tweezers into the notch of the valve lifter, and take the shim out.



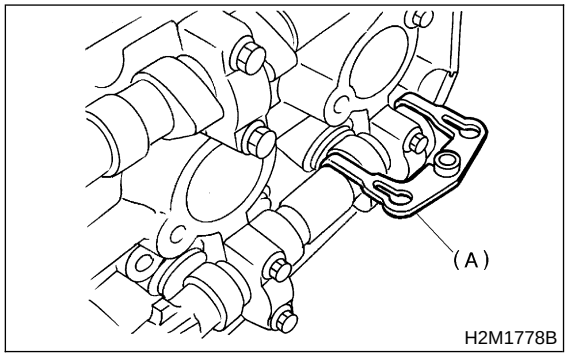
3) Remove shim of exhaust side.
(1) Prepare the ST.
ST 498187100 SHIM REPLACER KIT



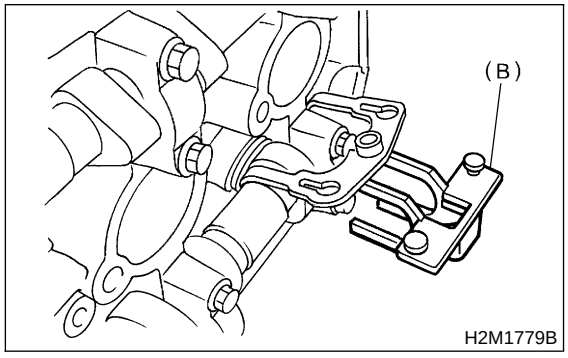
(2) Rotate the notch of the valve lifter outward by 45°.



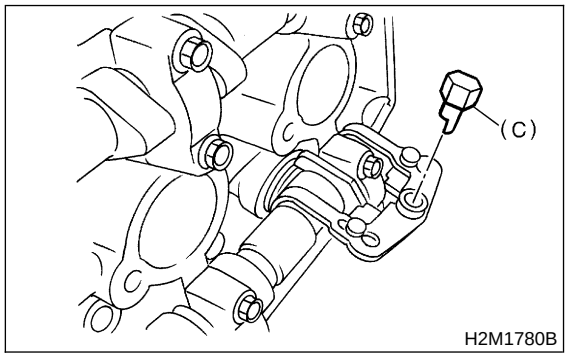
(3) Set REPLACER No. 1 (A) to exhaust camshaft.



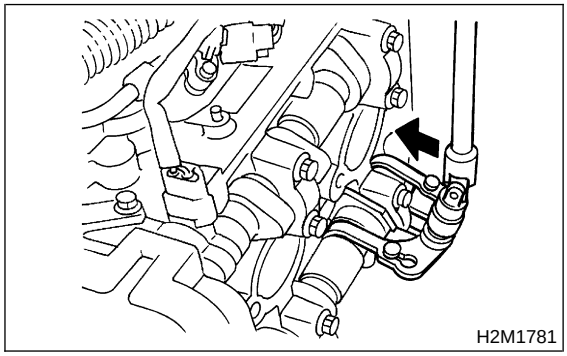
(4) Set REPLACER No. 2 (B).



(5) Set REPLACER No. 3 (C) to hole of REPLACER No. 1.

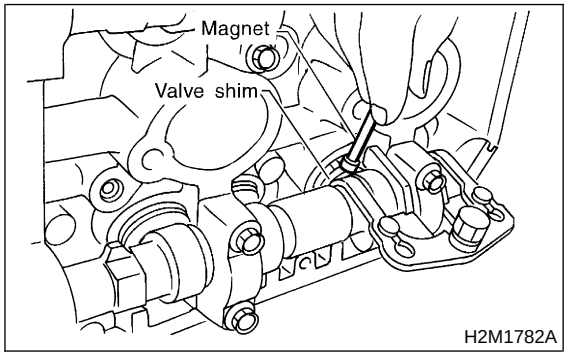


(6) Rotate REPLACER No. 3 until REPLACER No. 2 pushes away valve lifter.

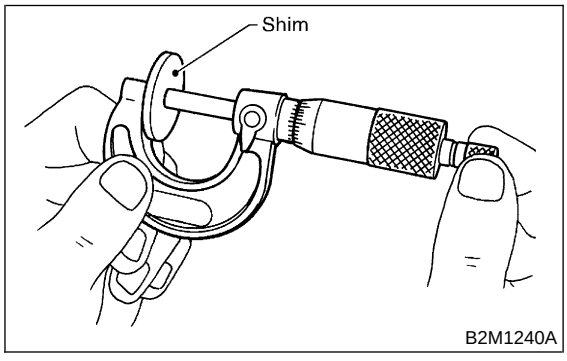


(7) Insert tweezers into the notch of the valve lifter, and take the shim out.

NOTE:
By using a magnet, the shim can be taken out without dropping it.



4) Measure thickness of shim with micrometer.



5) Select a shim of suitable thickness using measured valve clearance and shim thickness, using the following table.

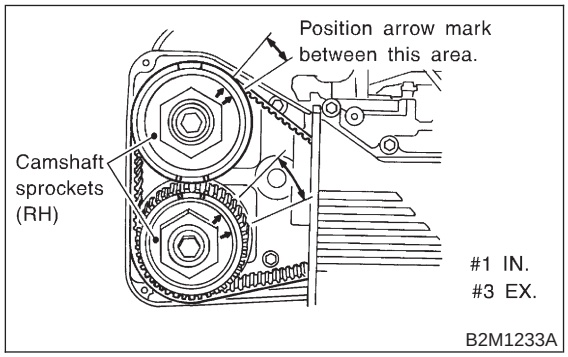
Intake valve (mm): S = (V + T) − 0.20
Exhaust valve (mm): S = (V + T) − 0.25

S: Shim thickness to be used
V: Measured valve clearance
T: Shim thickness required

Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
13218AC230	2.22 (0.0874)	13218AC480	2.52 (0.0992)
13218AE000	2.23 (0.0878)	13218AC490	2.53 (0.0996)
13218AC240	2.24 (0.0882)	13218AC500	2.54 (0.1000)
13218AE010	2.25 (0.0886)	13218AC510	2.55 (0.1004)
13218AC250	2.26 (0.0890)	13218AC520	2.56 (0.1008)
13218AE020	2.27 (0.0894)	13218AC530	2.57 (0.1012)
13218AC260	2.28 (0.0898)	13218AC540	2.58 (0.1016)
13218AE030	2.29 (0.0902)	13218AC550	2.59 (0.1020)
13218AC270	2.30 (0.0906)	13218AC560	2.60 (0.1024)
13218AE040	2.31 (0.0909)	13218AC570	2.61 (0.1028)
13218AC280	2.32 (0.0913)	13218AC580	2.62 (0.1031)
13218AC290	2.33 (0.0917)	13218AC590	2.63 (0.1035)
13218AC300	2.34 (0.0921)	13218AC600	2.64 (0.1039)
13218AC310	2.35 (0.0925)	13218AC610	2.65 (0.1043)
13218AC320	2.36 (0.0929)	13218AC620	2.66 (0.1047)
13218AC330	2.37 (0.0933)	13218AC630	2.67 (0.1051)
13218AC340	2.38 (0.0937)	13218AC640	2.68 (0.1055)
13218AC350	2.39 (0.0941)	13218AC650	2.69 (0.1059)
13218AC360	2.40 (0.0945)	13218AC660	2.70 (0.1063)
13218AC370	2.41 (0.0949)	13218AE050	2.71 (0.1067)
13218AC380	2.42 (0.0953)	13218AC670	2.72 (0.1071)
13218AC390	2.43 (0.0957)	13218AE060	2.73 (0.1075)
13218AC400	2.44 (0.0961)	13218AC680	2.74 (0.1079)
13218AC410	2.45 (0.0965)	13218AE070	2.75 (0.1083)
13218AC420	2.46 (0.0969)	13218AC690	2.76 (0.1087)
13218AC430	2.47 (0.0972)	13218AE080	2.77 (0.1091)
13218AC440	2.48 (0.0976)	13218AC700	2.78 (0.1094)
13218AC450	2.49 (0.0980)	13218AE090	2.79 (0.1098)
13218AC460	2.50 (0.0984)	13218AC710	2.80 (0.1102)
13218AC470	2.51 (0.0988)	13218AE100	2.81 (0.1106)

6) Set suitable shim selected in one step before, to valve lifter.

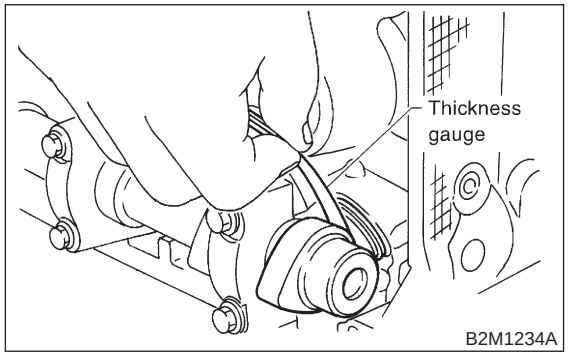
7) Turn crankshaft pulley clockwise until arrow mark on camshaft sprocket is set to position shown in figure.



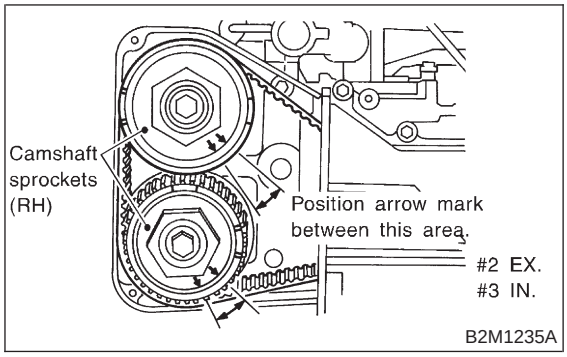
8) Ensure that #1 cylinder intake valve and #3 cylinder exhaust valve are adjusted to specifications.

CAUTION:
● Insert the thickness gauge in as horizontal a direction as possible with respect to the shim.
● Adjust exhaust valve clearances while lifting-up the vehicle.

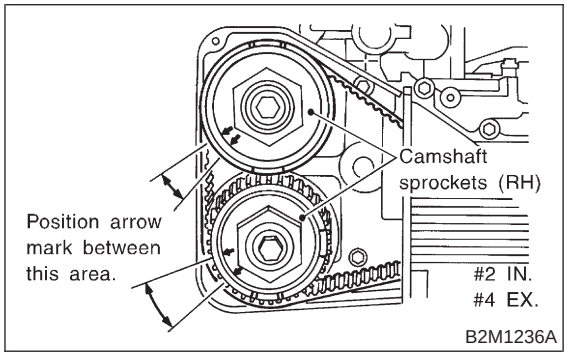
Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.25±0.02 mm (0.0098±0.0008 in)



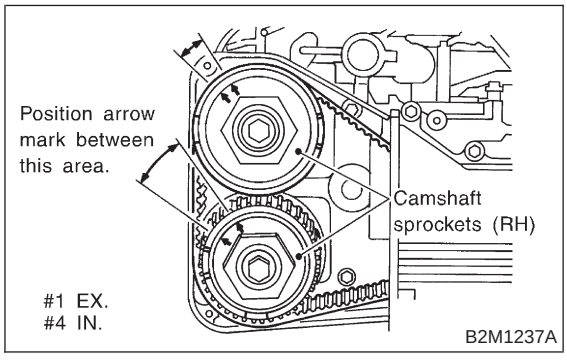
9) Turn crankshaft two complete rotations. Check again to ensure that #1 cylinder intake valve and #3 cylinder exhaust valve clearances are within specifications. If necessary, re-adjust valve clearances.
10) Further turn crankshaft pulley clockwise. Using the same procedures as in two steps before, measure valve clearances.
(1) Set arrow mark on camshaft sprocket to position shown in figure, and check #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



(2) Set arrow mark on camshaft sprocket to position shown in figure, and check #2 cylinder intake valve and #4 cylinder exhaust valve clearances.



(3) Set arrow mark on camshaft sprocket to position shown in figure, and check #1 cylinder exhaust valve and #4 cylinder intake valve clearances.



MEMO:

ENGINE (SOHC) 2-3a

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1. Engine

A: SPECIFICATIONS

ENGINE	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement			Belt driven, single over-head camshaft, 4-valve/cylinder
	Bore × Stroke		mm (in)	96.9 × 75.0 (3.815 × 2.953)
	Piston displacement		cm^3 (cu in)	2,212 (135.0)
	Compression ratio			9.7
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm^2, psi)	1,079 — 1,275 (11.0 — 13.0, 156 — 185)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening		4° BTDC
		Closing		52° ABDC
	Exhaust valve timing	Opening		48° BBDC
		Closing		12° ATDC
	Valve clearance	Intake	mm (in)	0.20±0.02 (0.0079±0.0008)
		Exhaust	mm (in)	0.25±0.02 (0.0098±0.0008)
	Idling speed [At neutral position on MT, or “P” or “N” position on AT]		rpm	700±100 (No load) 850±50 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4
	Ignition timing		BTDC/rpm	AT: 20°±8°/700 MT: 14°±8°/700

B: SERVICE DATA

Belt tensioner adjuster	Protrusion of adjuster rod				15.4 — 16.4 mm	(0.606 — 0.646 in)
Belt tensioner	Spacer O.D.				16 mm	(0.63 in)
	Tensioner bush I.D.				16.16 mm	(0.6362 in)
	Clearance between spacer and bush			STD	0.117 — 0.180 mm	(0.0046 — 0.0071 in)
				Limit	0.230 mm	(0.0091 in)
	Side clearance of spacer			STD	0.37 — 0.54 mm	(0.0146 — 0.0213 in)
				Limit	0.8 mm	(0.031 in)
Valve rocker arm	Clearance between shaft and arm			STD	0.020— 0.054 mm	(0.0008 — 0.0021 in)
				Limit	0.10 mm	(0.0039 in)
Camshaft	Bend limit				0.025 mm	(0.0010 in)
	Thrust clearance			STD	0.030 — 0.260 mm	(0.0012 — 0.0102 in)
				Limit	0.35 mm	(0.0138 in)
	Cam lobe height		Intake	STD	32.244 — 32.344 mm	(1.2694 — 1.2734 in)
				Limit	32.094 mm	(1.2635 in)
			Exhaust	STD	31.964 — 32.064 mm	(1.2584 — 1.2624 in)
				Limit	31.814 mm	(1.2525 in)
	Camshaft journal O.D.	RH	Front	Rear	31.935 — 31.950 mm	(1.2573 — 1.2579 in)
			Center	Center	37.435 — 37.450 mm	(1.4738 — 1.4744 in)
			Rear	Front	37.935 — 37.950 mm	(1.4935 — 1.4941 in)
	Camshaft journal hole I.D.	RH	Front	Rear	32.005 — 32.025 mm	(1.2600— 1.2608 in)
			Center	Center	37.505 — 37.525 mm	(1.4766 — 1.4774 in)
			Rear	Front	38.005 — 38.025 mm	(1.4963 — 1.4970 in)
	Oil clearance			STD	0.055 — 0.090 mm	(0.0022 — 0.0035 in)
				Limit	0.10 mm	(0.0039 in)

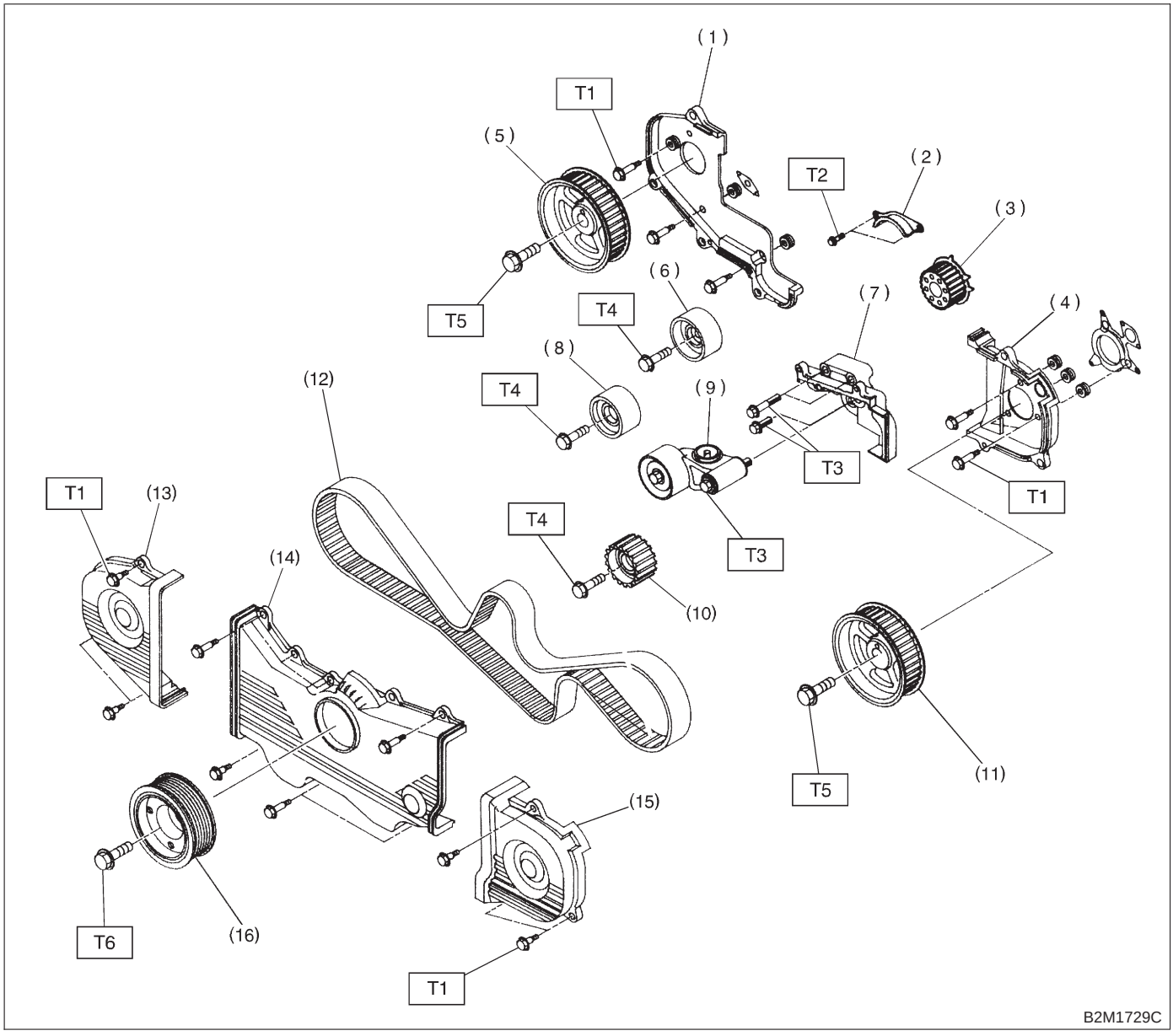
Cylinder head	Surface warpage limit			0.05 mm	(0.0020 in)
	Surface grinding limit			0.1 mm	(0.004 in)
	Standard height			98.3 mm	(3.870 in)
Valve set	Refacing angle			90°	
	Contacting width	Intake	STD	0.7 mm	(0.028 in)
			Limit	1.4 mm	(0.055 in)
		Exhaust	STD	1.4 mm	(0.055 in)
			Limit	1.8 mm	(0.071 in)
Valve guide	Inner diameter			6.000 — 6.012 mm	(0.2362 — 0.2367 in)
	Protrusion above head			17.5 — 18.0 mm	(0.689 — 0.709 in)
Valve	Head edge thickness	Intake	STD	1.0 mm	(0.039 in)
			Limit	0.8 mm	(0.031 in)
		Exhaust	STD	1.2 mm	(0.047 in)
			Limit	0.8 mm	(0.031 in)
	Stem diameter		Intake	5.950 — 5.965 mm	(0.2343 — 0.2348 in)
			Exhaust	5.945 — 5.960 mm	(0.2341 — 0.2346 in)
	Stem oil clearance	STD	Intake	0.035 — 0.062 mm	(0.0014 — 0.0024 in)
			Exhaust	0.040 — 0.067 mm	(0.0016 — 0.0026 in)
		Limit	—	0.15 mm	(0.0059 in)
	Overall length		Intake	101.0 mm	(3.976 in)
			Exhaust	101.2 mm	(3.984 in)
Valve spring	Free length			44.05 mm	(1.7342 in)
	Squareness			2.5°, 1.9 mm	(0.075 in)
	Tension/spring height			174.6 — 200.1 N (17.8 — 20.4 kg, 39.2 — 45.0 lb)/36.0 mm (1.417 in) 405.0 — 458.0 N (41.3 — 46.7 kg, 91.1— 103.0 lb)/28.2 mm (1.110 in)	
Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm	(0.0020 in)
	Surface grinding limit			0.1 mm	(0.004 in)
	Cylinder bore	STD	A	96.905 — 96.915 mm	(3.8151 — 3.8155 in)
			B	96.895 — 96.905 mm	(3.8148 — 3.8151 in)
	Taper		STD	0.015 mm	(0.0006 in)
			Limit	0.050 mm	(0.0020 in)
	Out-of-roundness		STD	0.010 mm	(0.0004 in)
			Limit	0.050 mm	(0.0020 in)
	Piston clearance		STD	0.010 — 0.030 mm	(0.0004 — 0.0012 in)
			Limit	0.050 mm	(0.0020 in)
	Enlarging (boring) limit			0.5 mm	(0.020 in)
Piston	Outer diameter	STD	A	96.885 — 96.895 mm	(3.8144 — 3.8148 in)
			B	96.875 — 96.885 mm	(3.8140 — 3.8144 in)
		0.25 mm (0.0098 in) OS		97.115 — 97.145 mm	(3.8234 — 3.8246 in)
		0.50 mm (0.0197 in) OS		97.365 — 97.395 mm	(3.8333 — 3.8344 in)
Piston pin	Standard clearance between piston pin and hole in piston	STD		0.004 — 0.010 mm	(0.0002 — 0.0004 in)
		Limit		0.020 mm	(0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).	

Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.35 mm	(0.0079 — 0.0138 in)
			Limit	1.0 mm	(0.039 in)
		Second ring	STD	0.20 — 0.50 mm	(0.0079 — 0.0197 in)
			Limit	1.0 mm	(0.039 in)
		Oil ring	STD	0.20 — 0.70 mm	(0.0079 — 0.0276 in)
			Limit	1.5 mm	(0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm	(0.0016 — 0.0031 in)
			Limit	0.15 mm	(0.0059 in)
		Second ring	STD	0.030 — 0.070 mm	(0.0012 — 0.0028 in)
			Limit	0.15 mm	(0.0059 in)
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm	(0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm	(0.0028 — 0.0130 in)
			Limit	0.4 mm	(0.016 in)
Connecting rod bearing	Oil clearance		STD	0.015 — 0.045 mm	(0.0006 — 0.0018 in)
			Limit	0.05 mm	(0.0020 in)
	Thickness at center portion		STD	1.492 — 1.501 mm	(0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.510 — 1.513 mm	(0.0594 — 0.0596 in)
			0.05 mm (0.0020 in) US	1.520 — 1.523 mm	(0.0598 — 0.0600 in)
			0.25 mm (0.0098 in) US	1.620 — 1.623 mm	(0.0638 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm	(0 — 0.0009 in)
			Limit	0.030 mm	(0.0012 in)

Crank-shaft	Bend limit			0.035 mm	(0.0014 in)
	Crankpin and crank journal		Out-of-roundness	0.030 mm (0.0012 in) or less	
			Grinding limit	0.250 mm	(0.0098 in)
	Crankpin outer diameter		STD	51.984 — 52.000 mm	(2.0466 —; 2.0472 in)
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm	(2.0454 — 2.0461 in)
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm	(2.0446 — 2.0453 in)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm	(2.0368 — 2.0374 in)
	Crank journal outer diameter	#1, #5	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm	(2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.934 — 59.950 mm	(2.3596 — 2.3602 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm	(2.3520 — 2.3527 in)
		#2, #3, #4	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.954 — 59.970 mm	(2.3604 — 2.3610 in)
			0.05 mm (0.0020 in) US	59.934 — 59.950 mm	(2.3596 — 2.3602 in)
			0.25 mm (0.0098 in) US	59.734 — 59.750 mm	(2.3517 — 2.3524 in)
	Thrust clearance		STD	0.030 — 0.115 mm	(0.0012 — 0.0045 in)
			Limit	0.25 mm	(0.0098 in)
	Oil clearance	#1, #5	STD	0.003 — 0.030 mm	(0.0001 — 0.0012 in)
		#2, #3, #4	STD	0.010 — 0.033 mm	(0.0004 — 0.0013 in)
		#1, #3, #5	Limit	0.040 mm	(0.0016 in)
		#2, #4	Limit	0.035 mm	(0.0014 in)
Crank-shaft bearing	Crankshaft bearing thickness	#1, #5	STD	1.998 — 2.011 mm	(0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm	(0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm	(0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm	(0.0837 — 0.0839 in)
		#2, #3, #4	STD	2.000 — 2.013 mm	(0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm	(0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm	(0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm	(0.0838 — 0.0839 in)

STD: Standard I.D.: Inner Diameter O.D.: Outer US: Undersize OS: Oversize

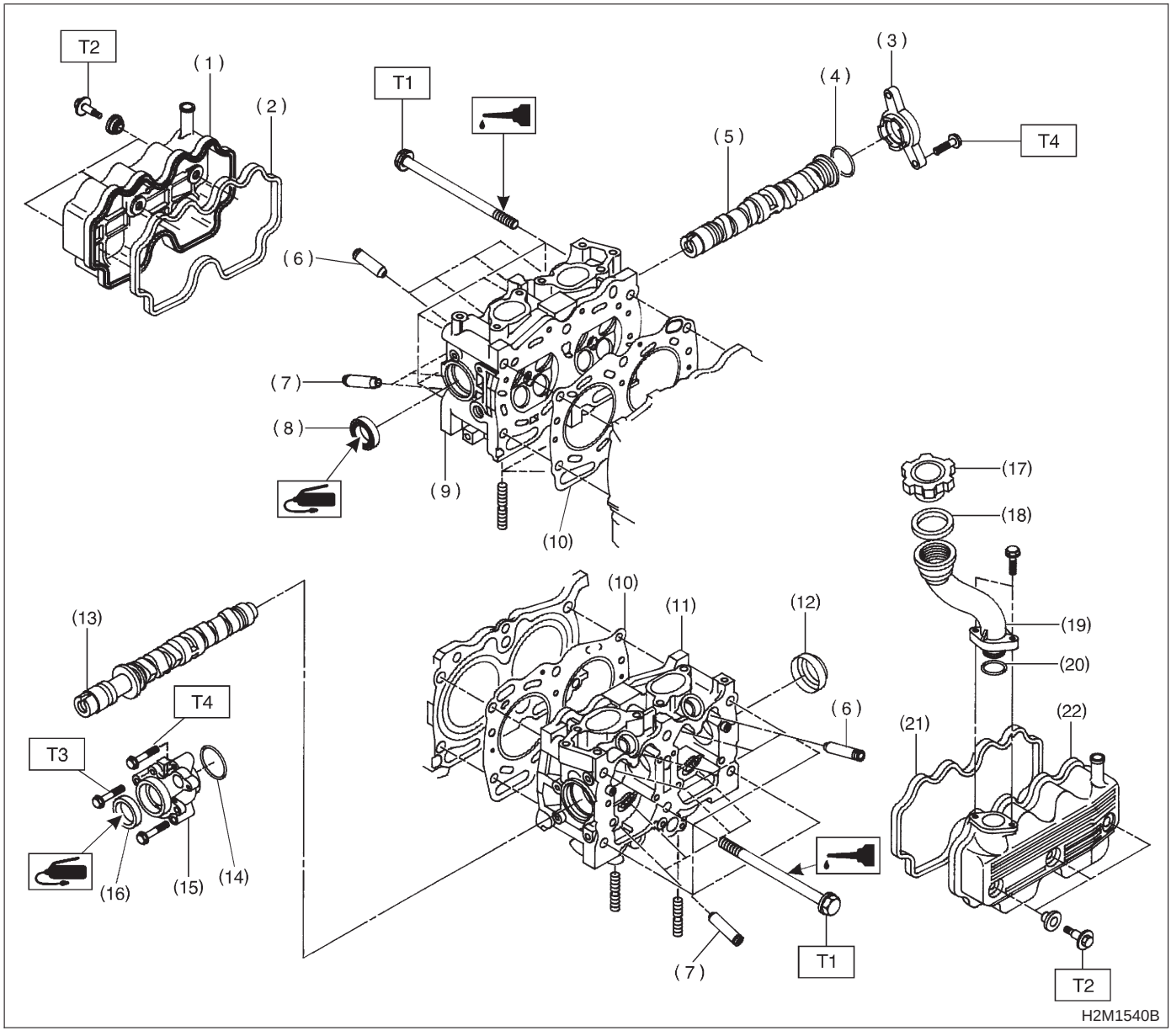
1. Timing Belt



(1) Belt cover No. 2 (RH)
(2) Timing belt guide (MT vehicles only)
(3) Crankshaft sprocket
(4) Belt cover No. 2 (LH)
(5) Camshaft sprocket No. 1
(6) Belt idler (No. 1)
(7) Tensioner bracket
(8) Belt idler (No. 2)
(9) Automatic belt tension adjuster ASSY
(10) Belt idler No. 2
(11) Camshaft sprocket No. 2
(12) Timing belt
(13) Belt cover (RH)
(14) Front belt cover
(15) Belt cover (LH)
(16) Crankshaft pulley

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 9.8±1.0 (1.0±0.1, 7.2±0.7)
T3: 25±3 (2.5±0.3, 18.1±2.2)
T4: 39±4 (4.0±0.4, 28.9±2.9)
T5: 78±5 (8.0±0.5, 57.9±3.6)
T6: 127^{+10}_{-5} ($13.0^{+1.0}_{-0.5}$, $94^{+7.2}_{-3.6}$)

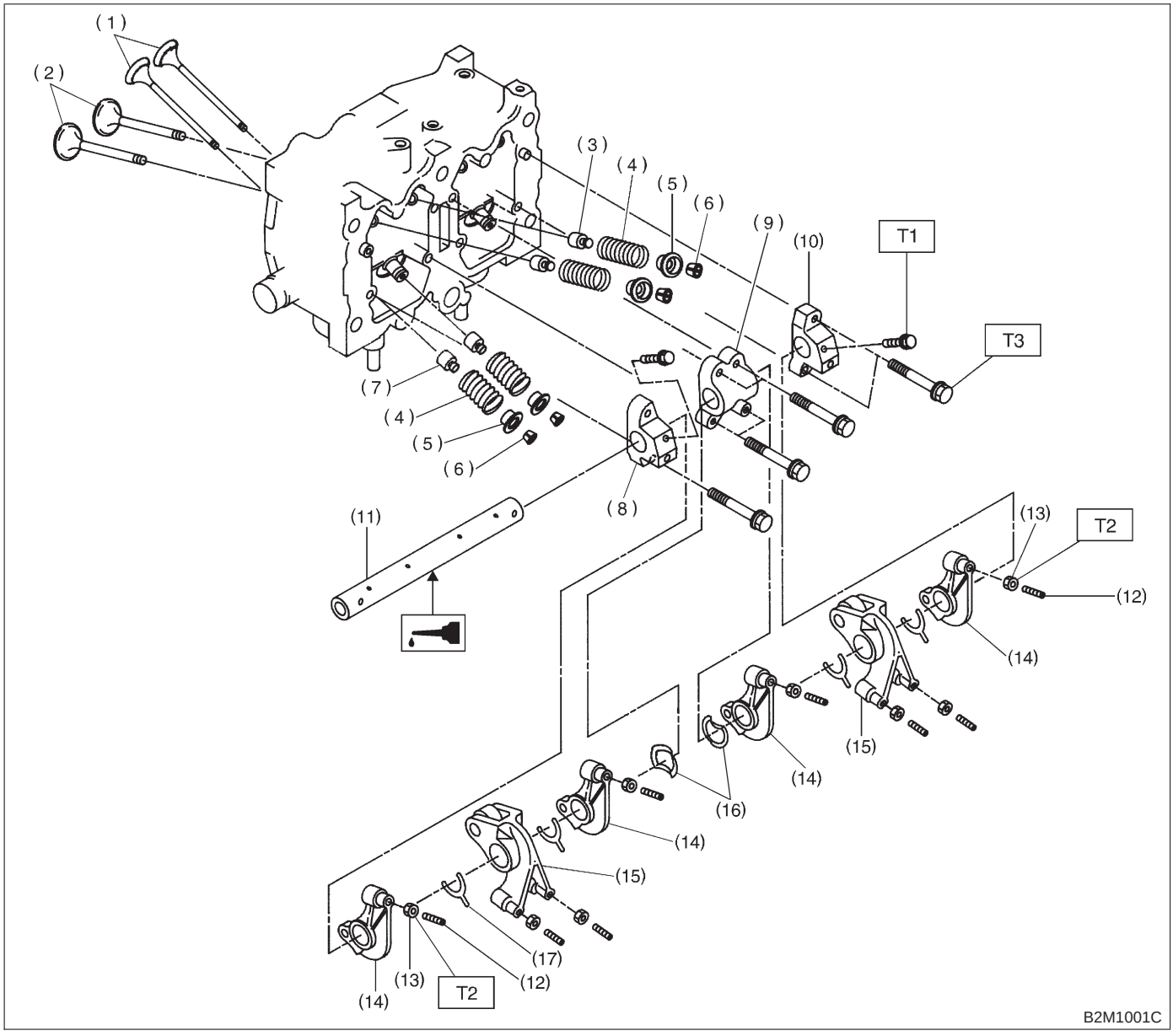
2. Cylinder Head and Camshaft



(1) Rocker cover (RH)
(2) Rocker cover gasket
(3) Camshaft support (RH)
(4) O-ring
(5) Camshaft (RH)
(6) Intake valve guide
(7) Exhaust valve guide
(8) Oil seal
(9) Cylinder head (RH)
(10) Cylinder head gasket
(11) Cylinder head (LH)
(12) Plug
(13) Camshaft (LH)
(14) O-ring
(15) Camshaft support (LH)
(16) Oil seal
(17) Oil filler cap
(18) Gasket
(19) Oil filler pipe
(20) O-ring
(21) Rocker gasket
(22) Rocker cover (LH)

Tightening torque: N·m (kg-m, ft-lb)
T1: <Ref. to 2-3a [W5E1].>
T2: 5±1 (0.5±0.1, 3.6±0.7)
T3: 10 (1.0, 7)
T4: 16 (1.6, 12)

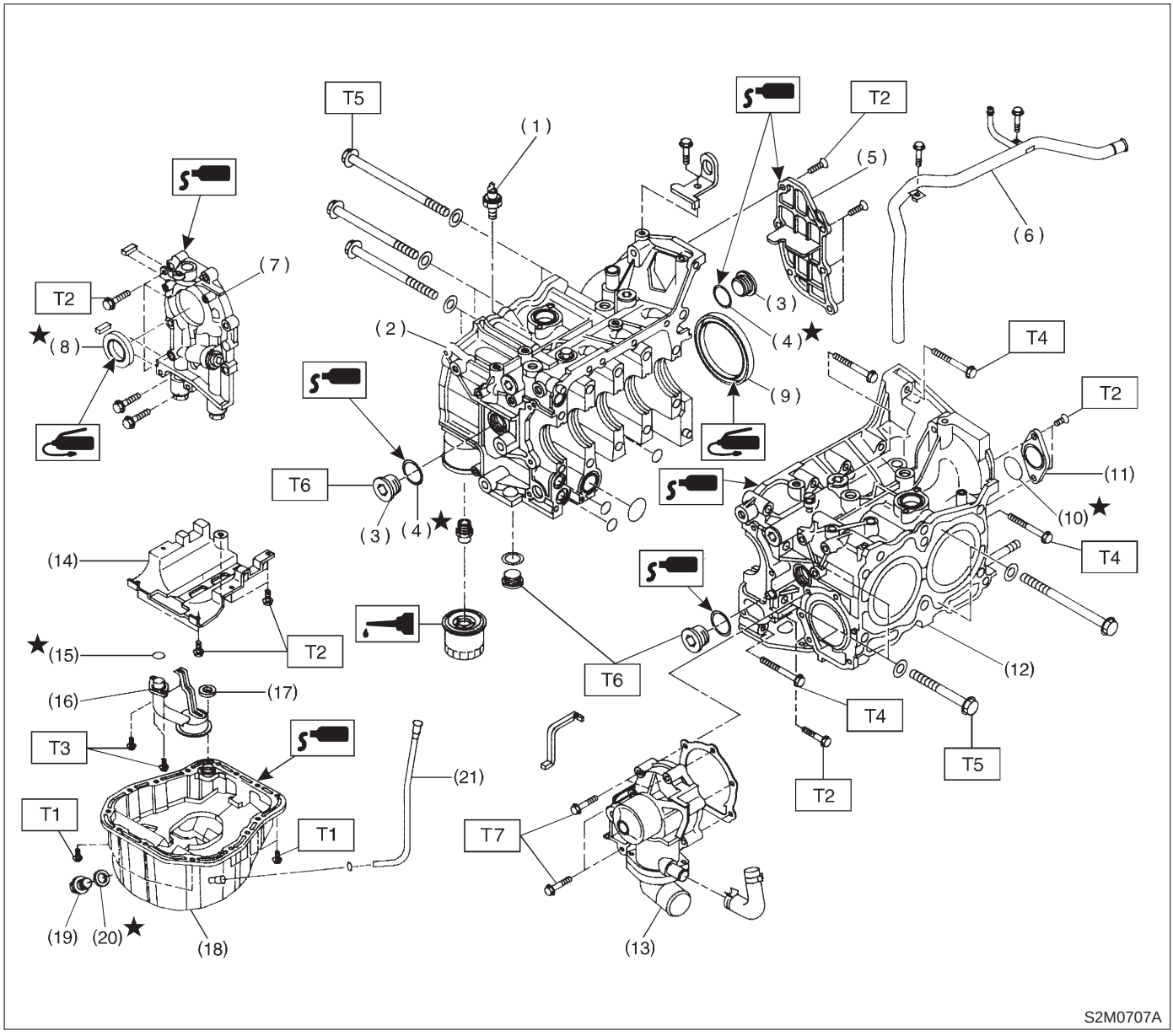
3. Cylinder Head and Valve Assembly



(1) Exhaust valve
(2) Intake valve
(3) Intake valve oil seal
(4) Valve spring
(5) Retainer
(6) Retainer key
(7) Exhaust valve oil seal
(8) Rocker shaft support
(9) Rocker shaft support
(10) Rocker shaft support
(11) Rocker shaft
(12) Valve rocker adjust screw
(13) Valve rocker nut
(14) Intake valve rocker arm
(15) Exhaust valve rocker arm
(16) Spring
(17) Plate

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: 12±1 (1.2±0.1, 8.7±0.7)

4. Cylinder Block

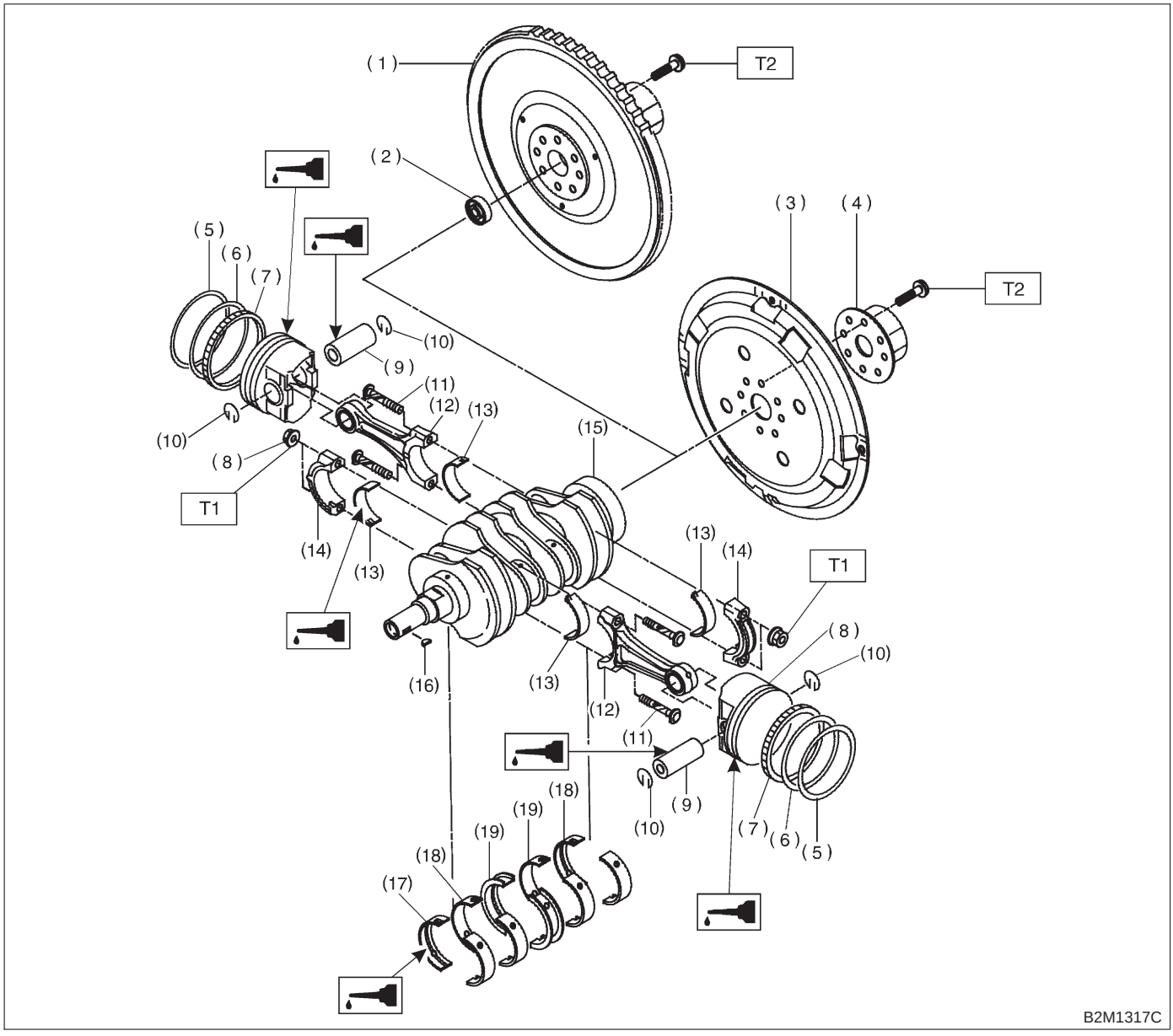


S2M0707A

(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) O-ring
(16) Oil strainer
(17) Gasket
(18) Oil pan
(19) Oil drain plug
(20) Gasket
(21) Oil filler pipe

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 25±2 (2.5±0.2, 18.1±1.4)
T5: 47±3 (4.8±0.3, 34.7±2.2)
T6: 69±7 (7.0±0.7, 50.6±5.1)
T7: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

5. Crankshaft and Piston



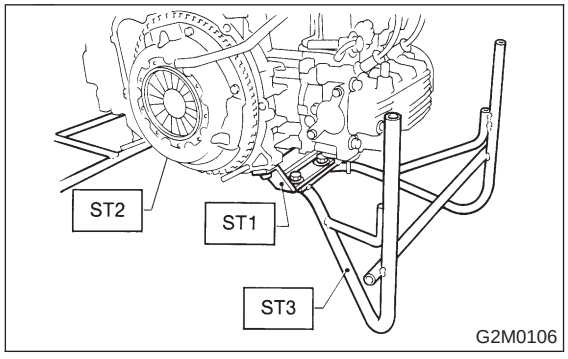
(1) Flywheel (MT vehicles)
(2) Bell bearing (MT vehicles)
(3) Drive plate (AT vehicles)
(4) Reinforcement (AT vehicles)
(5) Top ring
(6) Second ring
(7) Oil ring
(8) Piston
(9) Piston pin
(10) Circlip
(11) Connecting rod bolt
(12) Connecting rod
(13) Connecting rod bearing
(14) Connecting rod cap
(15) Crankshaft
(16) Woodruff key
(17) Crankshaft bearing #1, #5
(18) Crankshaft bearing #2, #4
(19) Crankshaft bearing #3

Tightening torque: N·m (kg-m, ft-lb)
T1: 44±2 (4.5±0.2, 32.5±1.4)
T2: 72±3 (7.3±0.3, 52.8±2.2)

1. General Precautions

1) Before disassembling engine, place it on ST3.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817000	ENGINE STAND

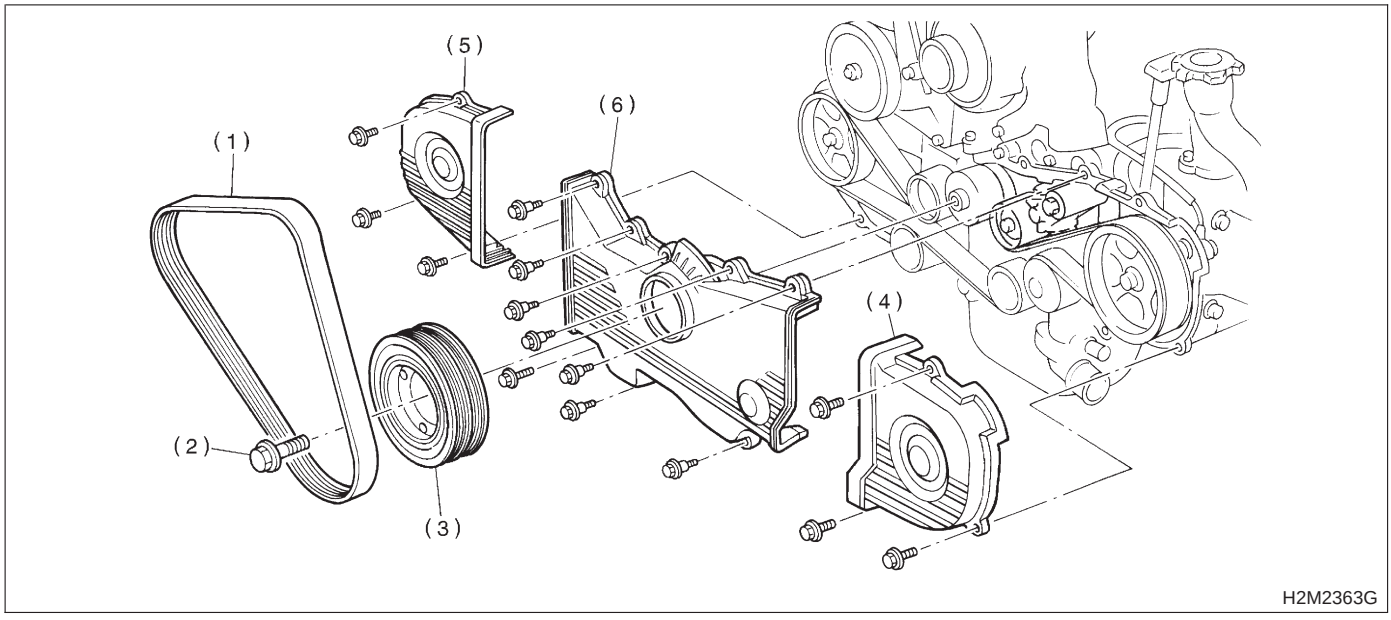


2) All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
3) Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
4) Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
5) All removed parts, if to be reused, should be reinstalled in the original positions and directions.
6) Gaskets and lock washers must be replaced with new ones. Liquid gasket should be used where specified to prevent leakage.
7) Bolts, nuts and washers should be replaced with new ones as required.
8) Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.

2. Timing Belt

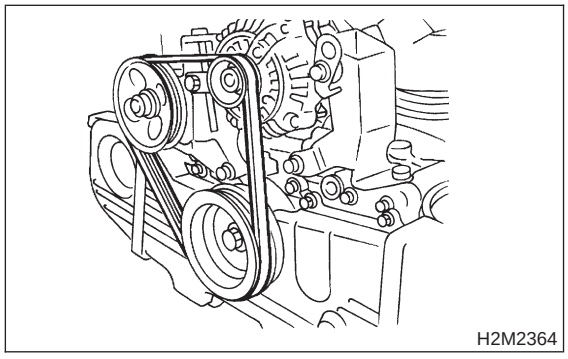
A: REMOVAL

1. CRANKSHAFT PULLEY AND BELT COVER

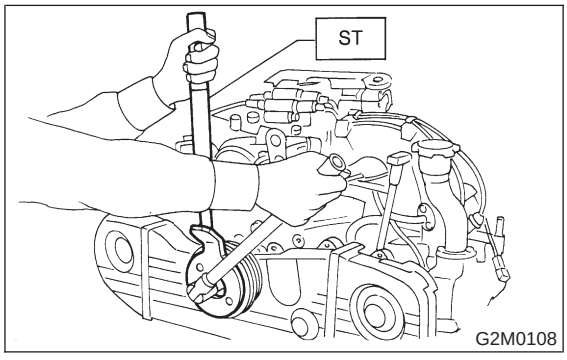


(1) V-belt
(2) Crankshaft pulley bolt
(3) Crankshaft pulley
(4) Belt cover (LH)
(5) Belt cover (RH)
(6) Front belt cover

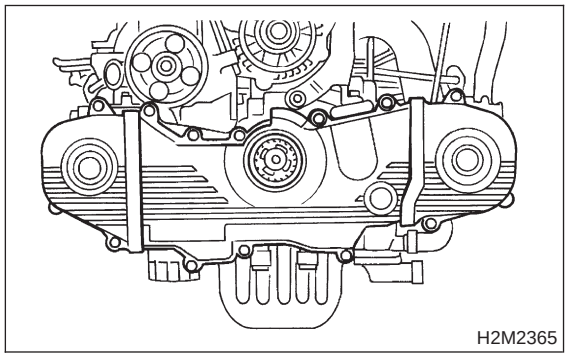
1) Remove V-belt.



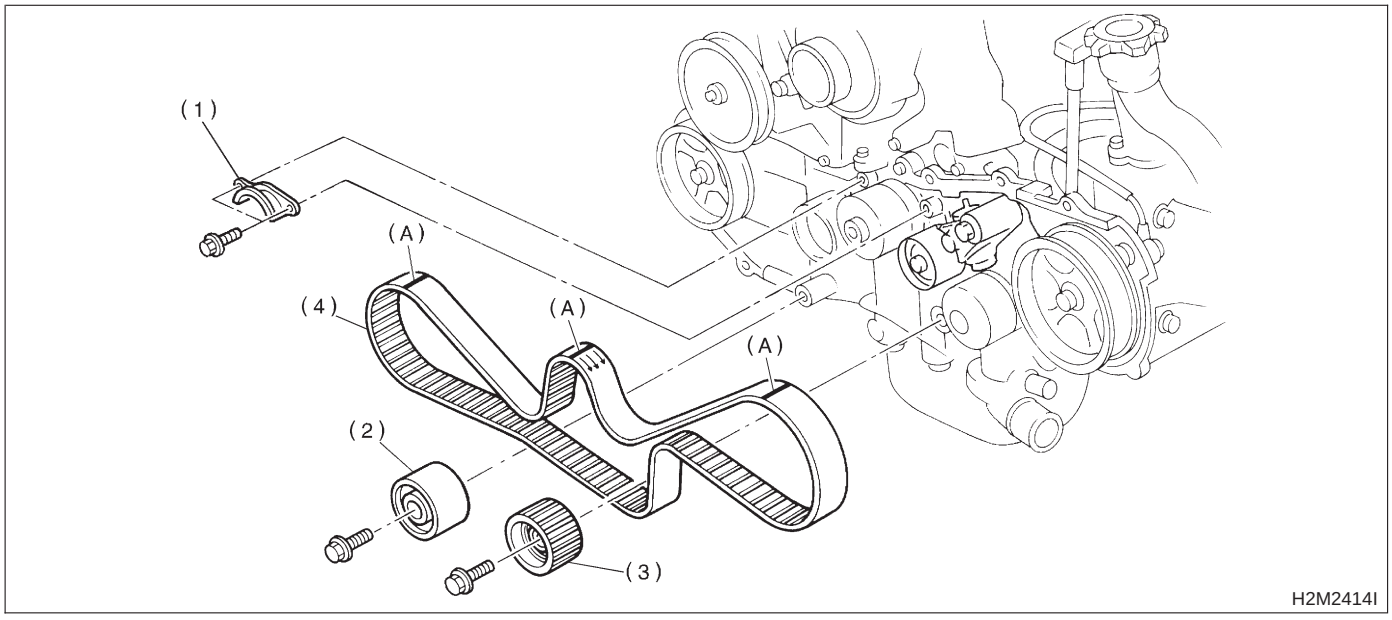
2) Remove crankshaft pulley bolt. To lock crankshaft use ST.
ST 499977000 CRANKSHAFT PULLEY WRENCH
3) Remove crankshaft pulley.



4) Remove belt cover (LH).
5) Remove belt cover (RH).
6) Remove front belt cover.

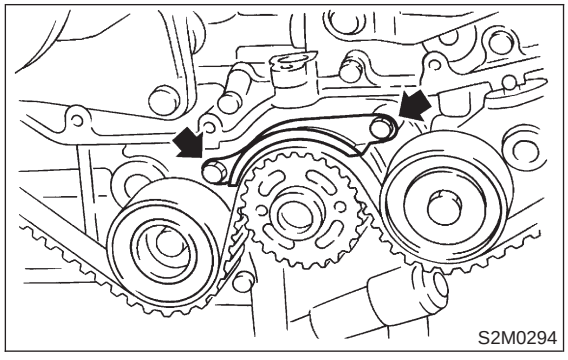


2. TIMING BELT

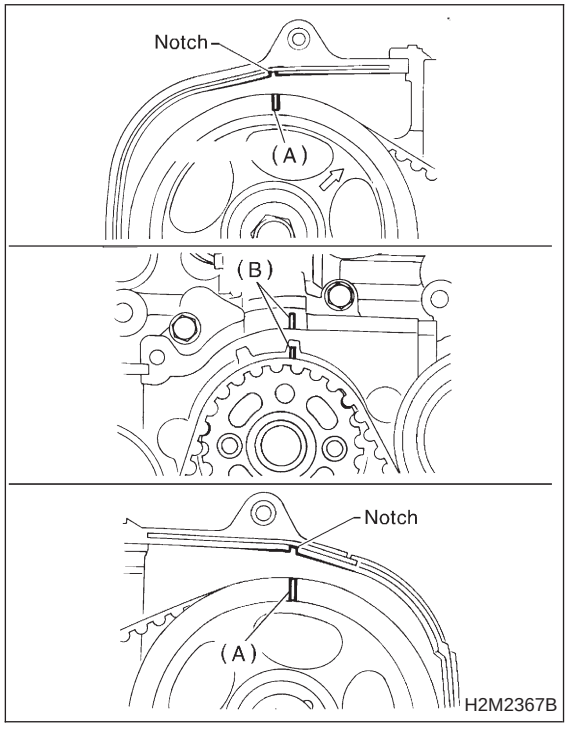


(A) Alignment mark
(1) Timing belt guide (MT vehicles only)
(2) Belt idler (No. 2)
(3) Belt idler No. 2
(4) Timing belt

1) Remove timing belt guide. (MT vehicles only)

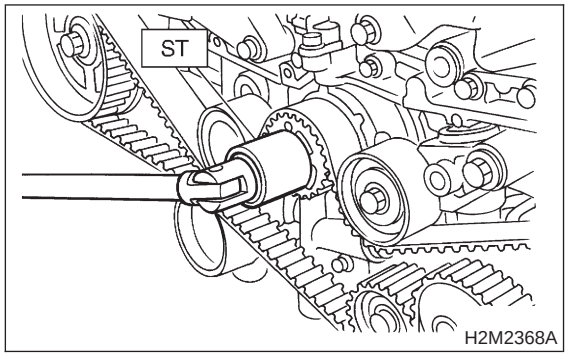


2) If alignment mark (A) and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as follows:



(1) Turn crankshaft, and align alignment marks (B) on crankshaft sprocket, and left and right camshaft sprockets with notches of belt cover and cylinder block.

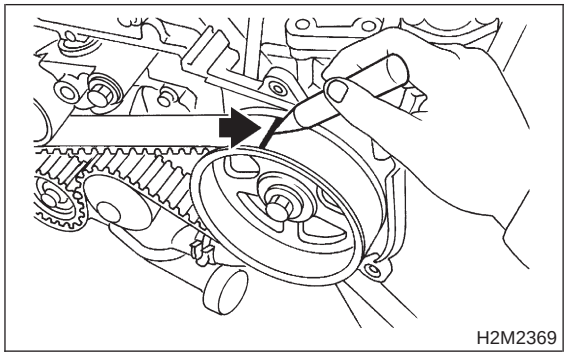
ST 499987500 CRANKSHAFT SOCKET

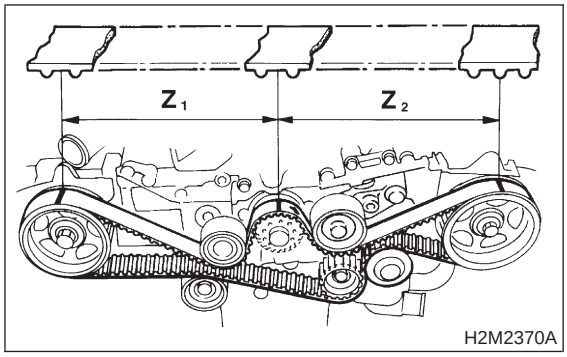


(2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.

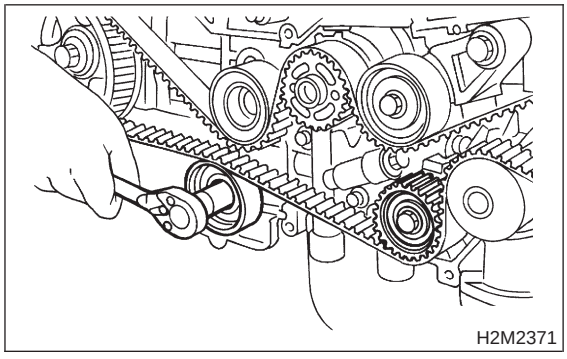
Z_1: 44 tooth length

Z_2: 40.5 tooth length

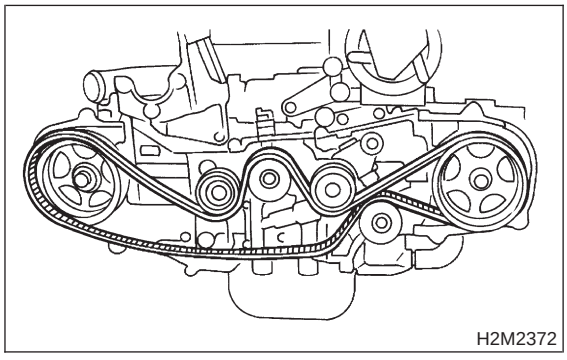




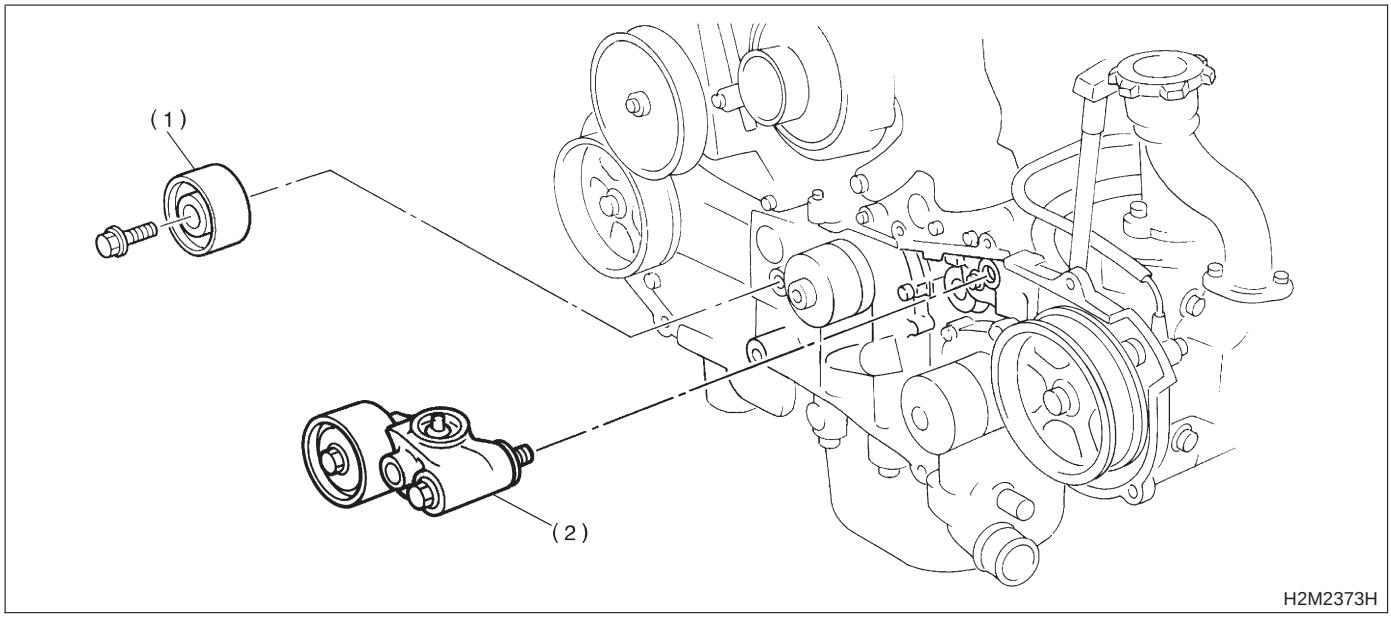
3) Remove belt idler (No. 2).
4) Remove belt idler No. 2.



5) Remove timing belt.

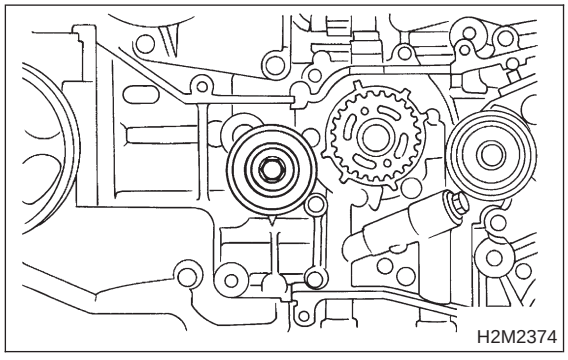


3. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

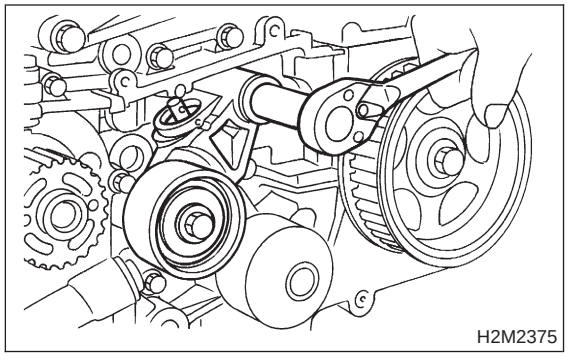


(1) Belt idler (No. 1)
(2) Automatic belt tension adjuster ASSY

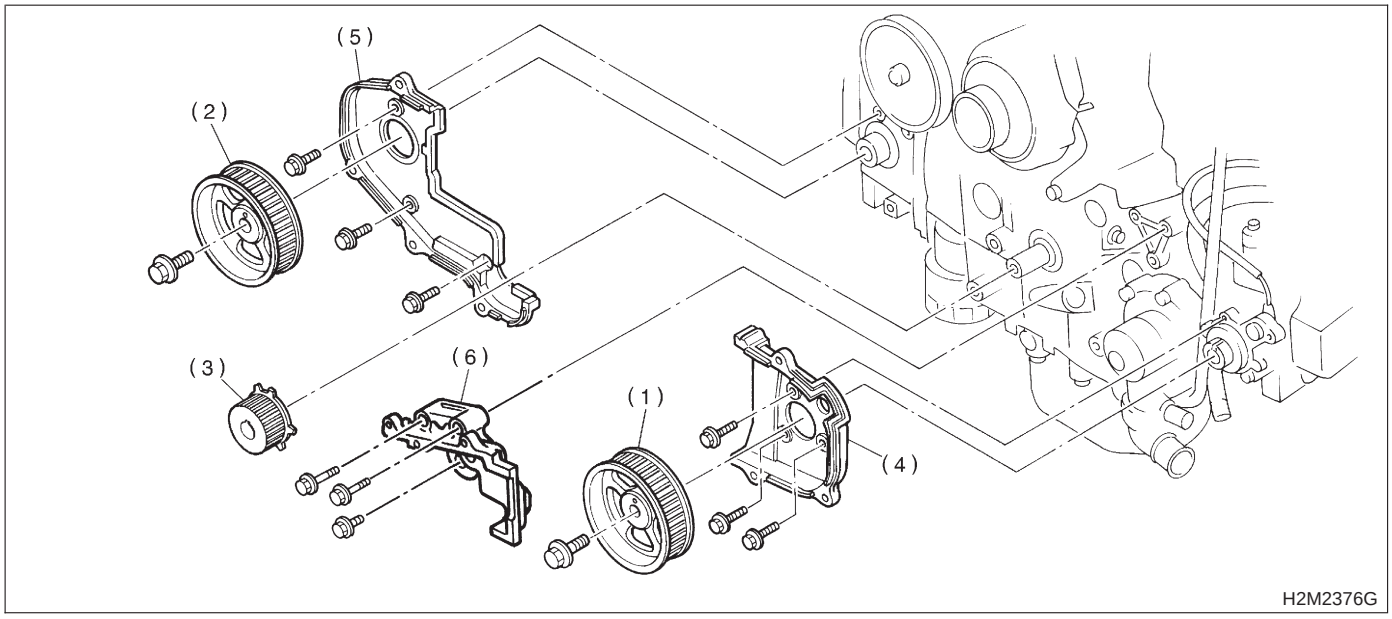
1) Remove belt idler (No. 1).



2) Remove automatic belt tension adjuster assembly.

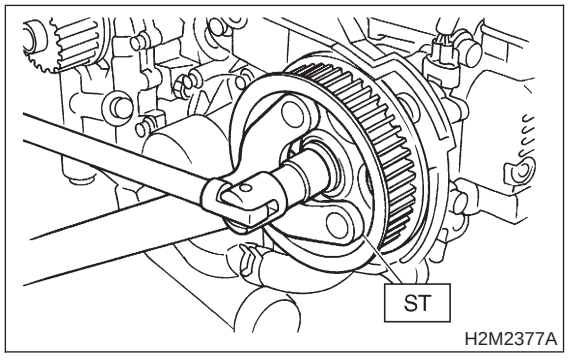


4. SPROCKET

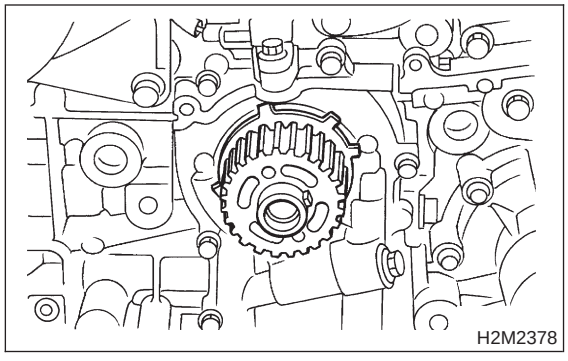


(1) Camshaft sprocket No. 2
(2) Camshaft sprocket No. 1
(3) Crankshaft sprocket
(4) Belt cover No. 2 (LH)
(5) Belt cover No. 2 (RH)
(6) Tensioner bracket

1) Remove camshaft sprocket No. 1 and No. 2. To lock camshaft use ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH

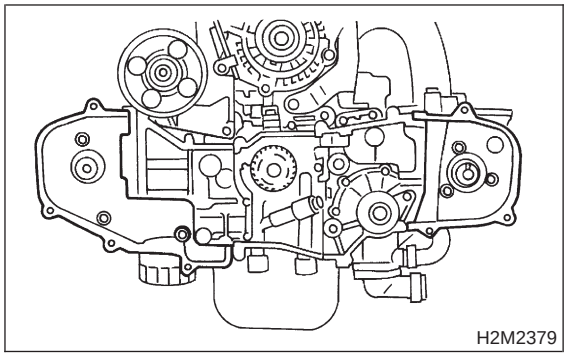


2) Remove crankshaft sprocket.

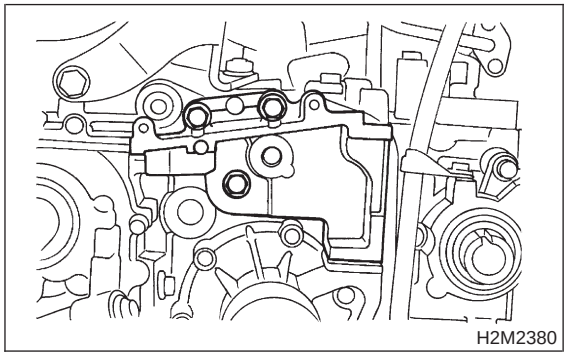


3) Remove belt cover No. 2 (LH).
4) Remove belt cover No. 2 (RH).

CAUTION:
Do not damage or lose the seal rubber when removing belt covers.



5) Remove tensioner bracket.



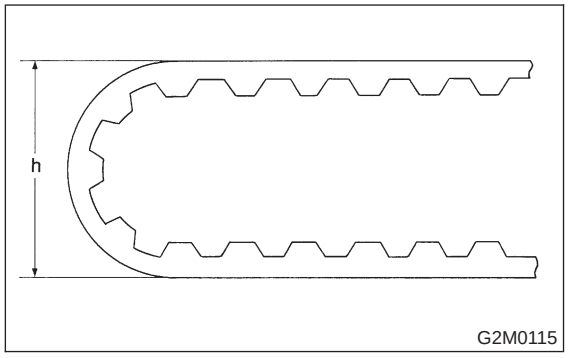
B: INSPECTION

1. TIMING BELT

1) Check timing belt teeth for breaks, cracks, and wear. If any fault is found, replace belt.
2) Check the condition of back side of belt; if any crack is found, replace belt.

CAUTION:
● Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
● Do not bend the belt sharply.

Bending radius: h
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace faulty parts.

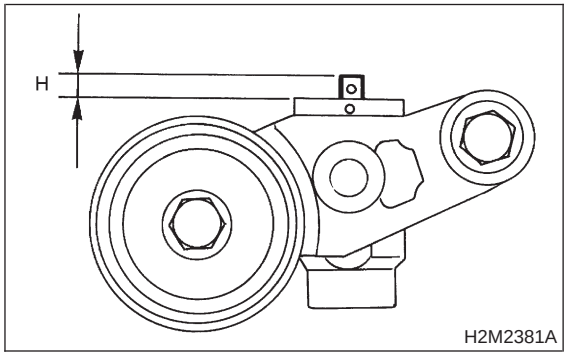
CAUTION:
Slight traces of oil at rod's oil seal does not indicate a problem.

2) Check that the adjuster rod does not move when a pressure of 294 N (30 kg, 66 lb) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kg, 66 lb), check it using the following procedures:
(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kg, 66 lb) to it. Check adjuster rod stiffness.
(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
● Always use a vertical type pressing tool to move the adjuster rod down.
● Do not use a lateral type vise.
● Push adjuster rod vertically.
● Press-in the push adjuster rod gradually taking more than three minutes.
● Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).
● Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

Rod extension: H
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace belt tension pulley if faulty.
2) Check belt tension pulley for smooth rotation. Replace if noise or excessive play is noted.
3) Check belt tension pulley for grease leakage.

4. BELT IDLER

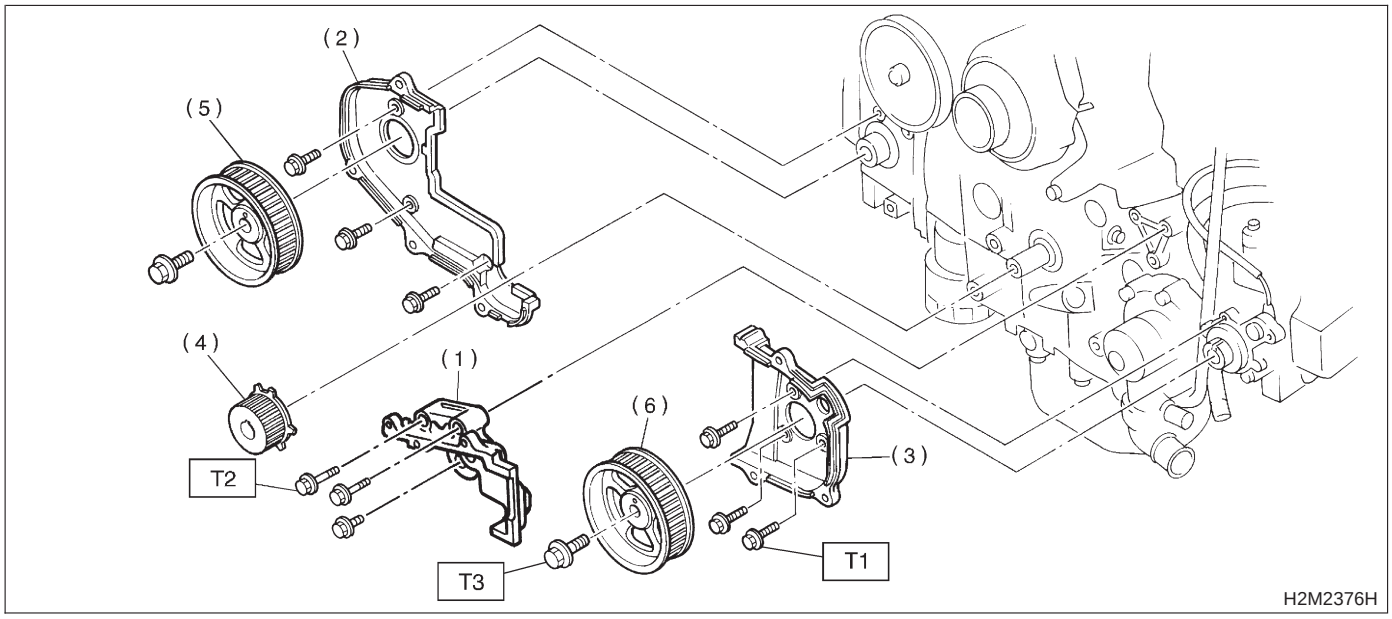
1) Check belt idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check belt idler for grease leakage.

5. CAMSHAFT AND CRANKSHAFT SPROCKET

1) Check sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

C: INSTALLATION

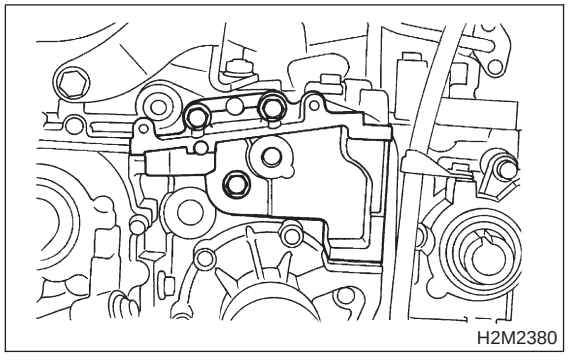
1. CAMSHAFT AND CRANKSHAFT SPROCKET



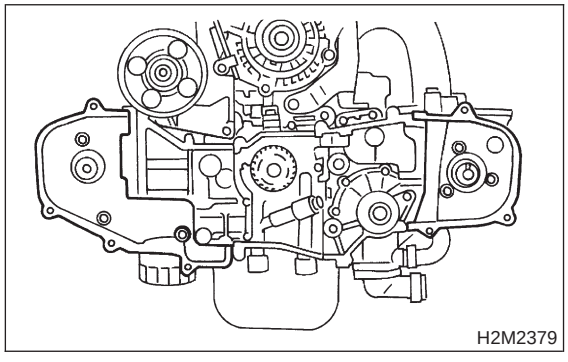
(1) Tensioner bracket
(2) Belt cover No. 2 (RH)
(3) Belt cover No. 2 (LH)
(4) Crankshaft sprocket
(5) Camshaft sprocket No. 1
(6) Camshaft sprocket No. 2

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 25±3 (2.5±0.3, 18.1±2.2)
T3: 78±5 (8.0±0.5, 57.9±3.6)

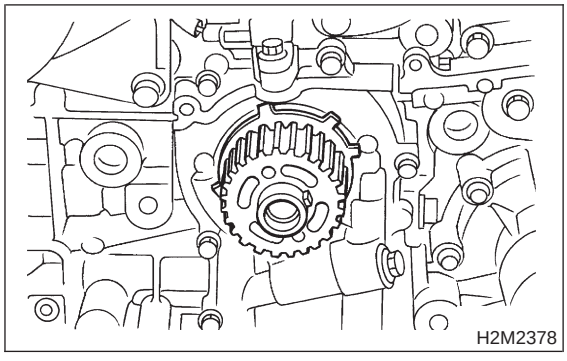
1) Install tensioner bracket.



2) Install belt cover No. 2 (RH).
3) Install belt cover No. 2 (LH).

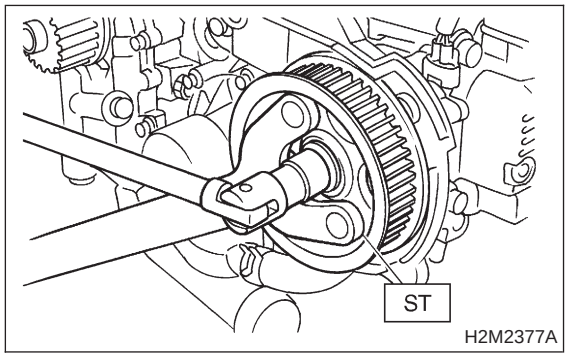


4) Install crankshaft sprocket.

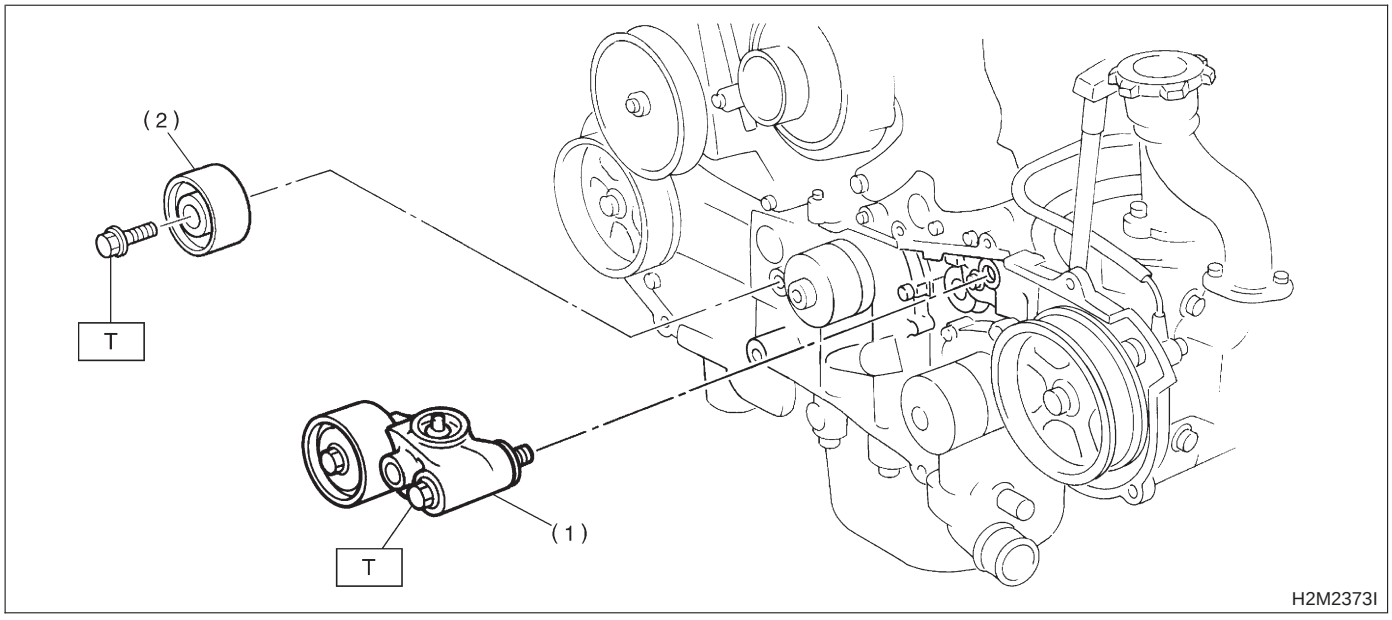


5) Install camshaft sprocket No. 1 and camshaft sprocket No. 2. To lock camshaft use ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH

CAUTION:
Do not confuse left and right side camshaft sprockets during installation. The camshaft sprocket No. 2 is identified by a projection used to monitor camshaft position sensor.



2. BELT TENSIONER AND IDLER



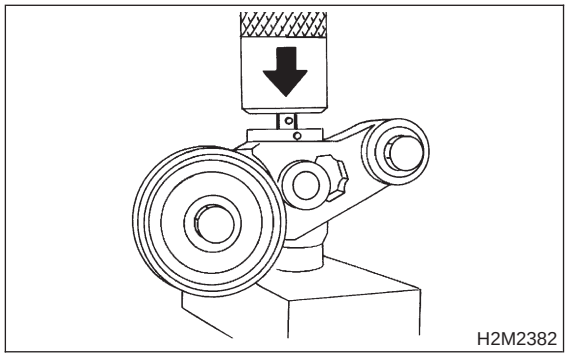
(1) Automatic belt tension adjuster ASSY
(2) Belt idler (No. 1)

Tightening torque: N·m (kg-m, ft-lb)
T: 39±4 (4.0±0.4, 28.9±2.9)

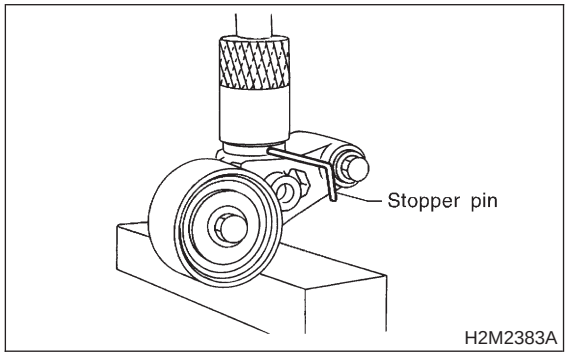
1) Preparation for installation of automatic belt tension adjuster assembly;

CAUTION:
- **Always use a vertical type pressing tool to move the adjuster rod down.**
- **Do not use a lateral type vise.**
- **Push adjuster rod vertically.**
- **Be sure to slowly move the adjuster rod down applying a pressure of 294 N (30 kg, 66 lb).**
- **Press-in the push adjuster rod gradually taking more than three minutes.**
- **Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).**
- **Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.**
- **Do not release press pressure until stopper pin is completely inserted.**

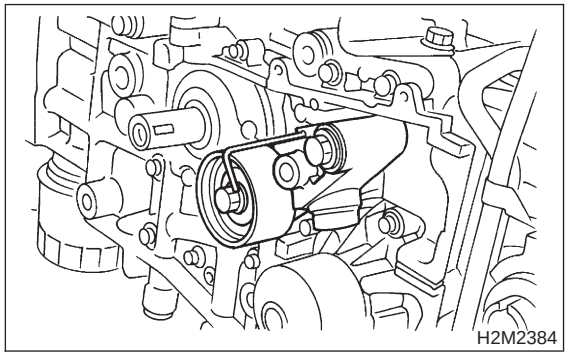
(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kg, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.



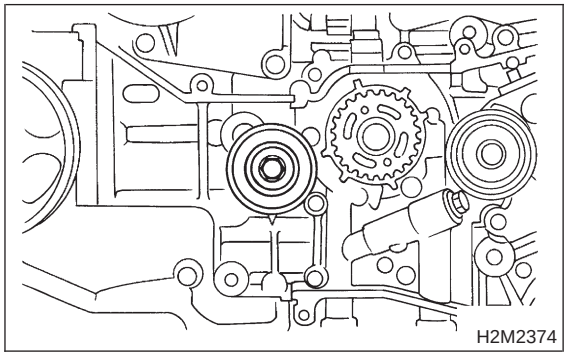
(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.



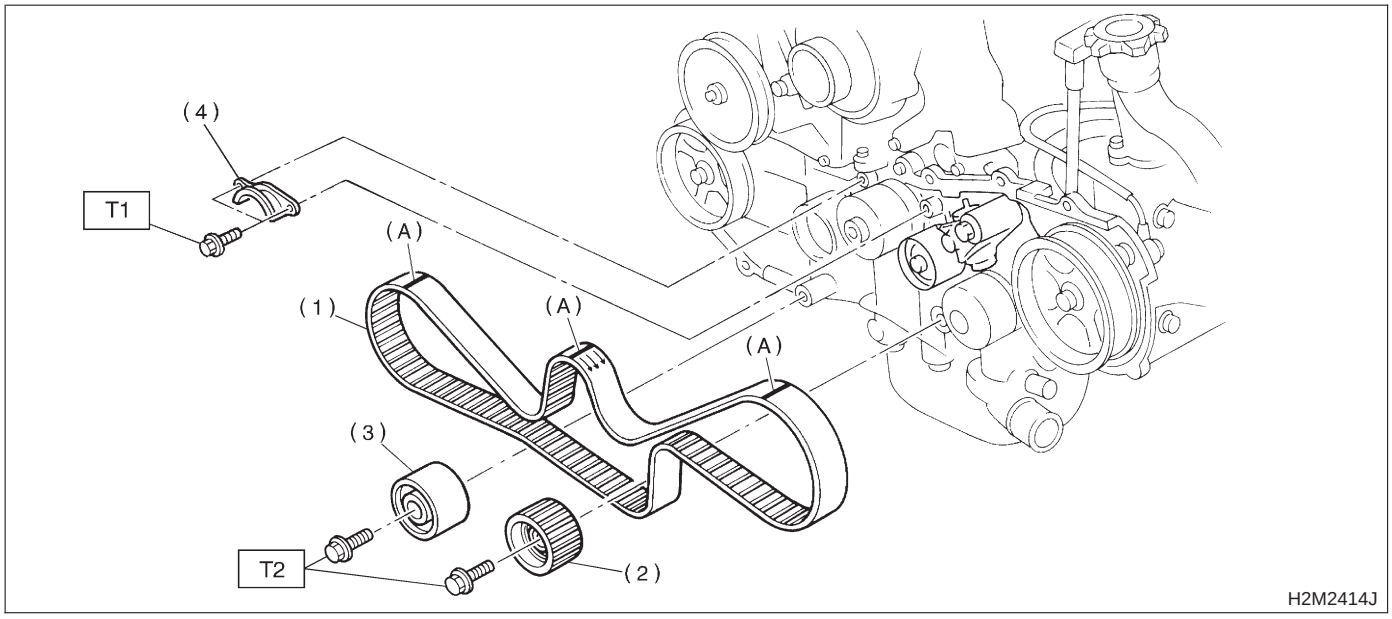
2) Install automatic belt tension adjuster assembly.



3) Install belt idler (No. 1).



3. TIMING BELT

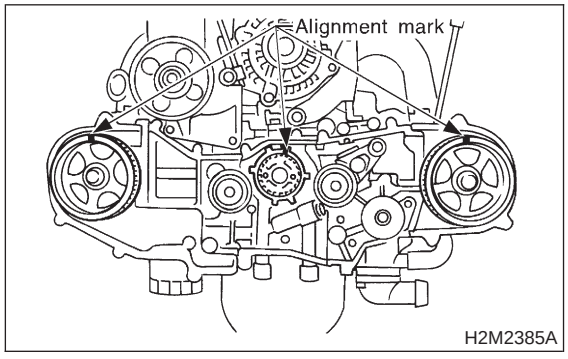


(A) Alignment mark
(1) Timing belt
(2) Belt idler No. 2
(3) Belt idler (No. 2)
(4) Timing belt guide (MT vehicles only)

Tightening torque: N·m (kg-m, ft-lb)
T1: 9.8±1.0 (1.0±0.1, 7.2±0.7)
T2: 39±4 (4.0±0.4, 28.9±2.9)

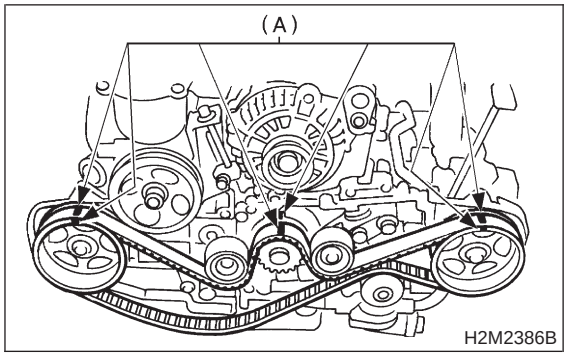
1) Installation of timing belt.
(1) Using ST, turn left and right camshaft sprockets so that their alignment marks come to top positions.

ST 499207100 CAMSHAFT SPROCKET WRENCH

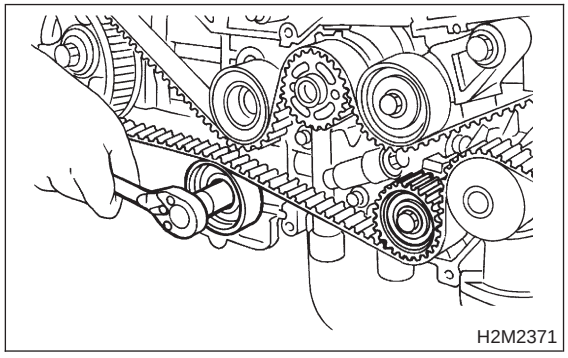


(2) While aligning alignment mark (A) on timing belt with marks on sprockets, position timing belt properly.

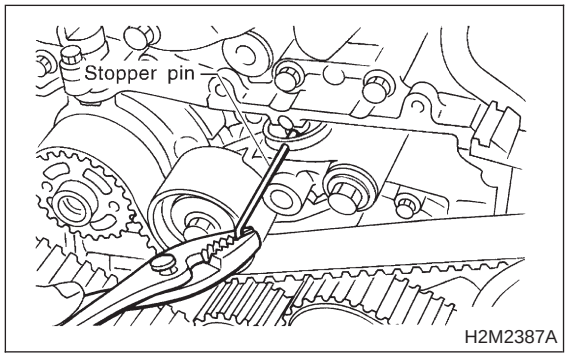
CAUTION:
Ensure belt's rotating direction is correct.



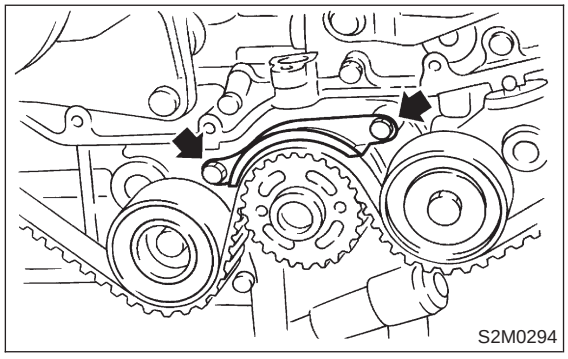
2) Install belt idler No. 2.
3) Install belt idler (No. 2).



4) After ensuring that the marks on timing belt and camshaft sprockets are aligned, remove stopper pin from automatic belt tension adjuster.

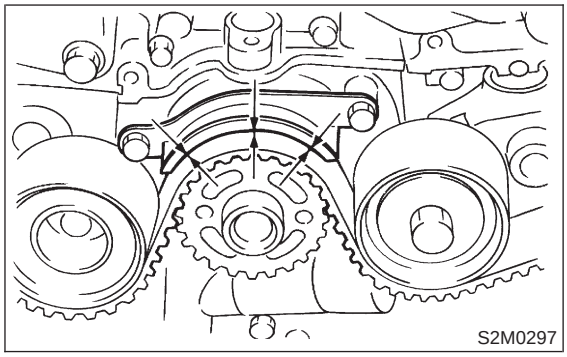


5) Install timing belt guide. (MT vehicles only)
(1) Temporarily tighten remaining bolts.

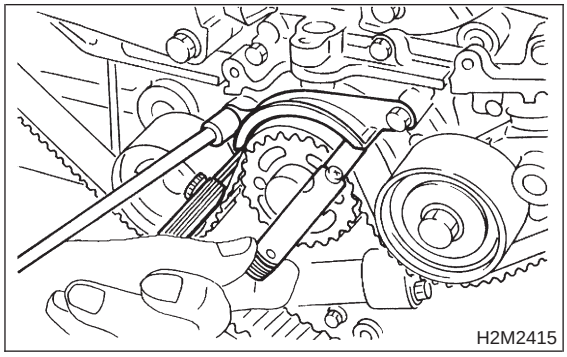


(2) Check and adjust clearance between timing belt and timing belt guide.

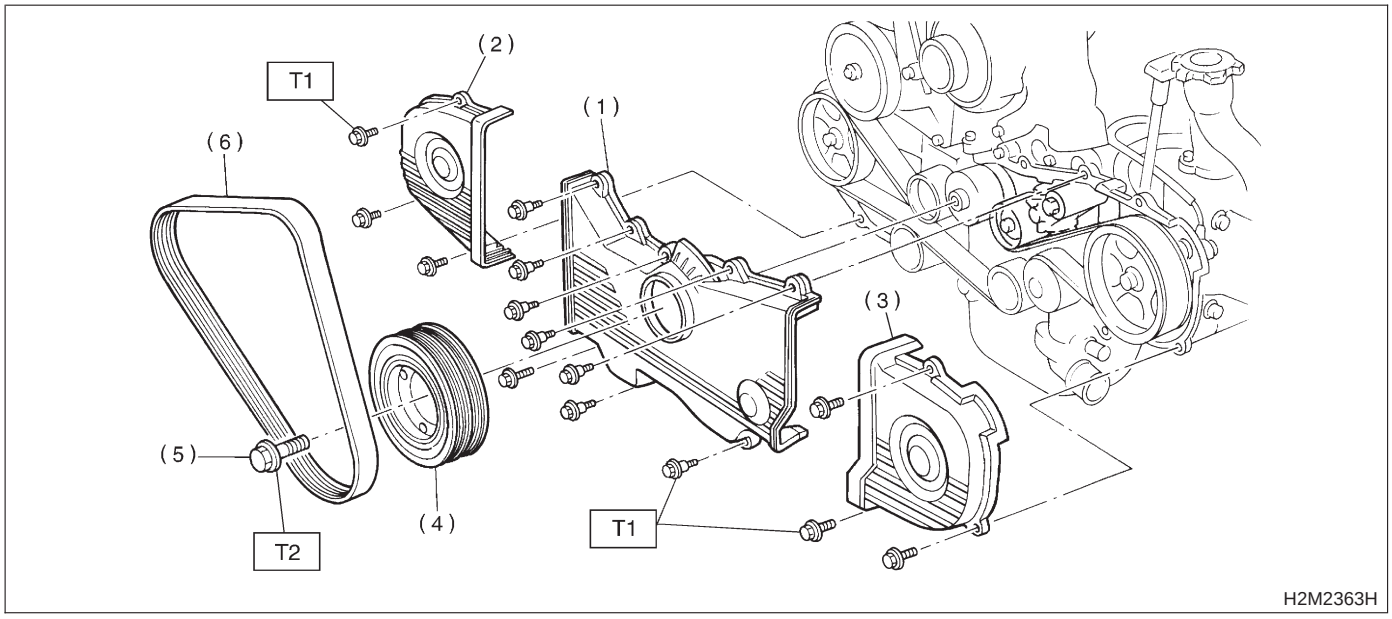
Clearance:
1.0±0.5 mm (0.039±0.020 in)



(3) Tighten remaining bolts.



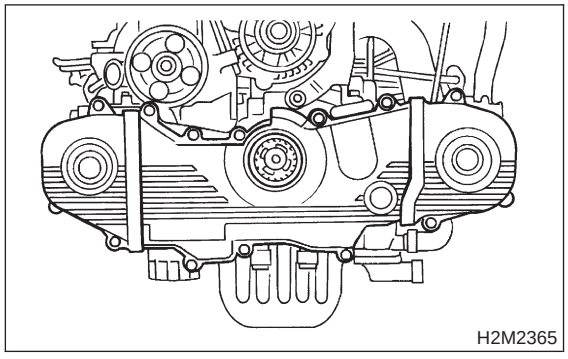
4. CRANKSHAFT PULLEY AND BELT COVER



(1) Front belt cover
(2) Belt cover (RH)
(3) Belt cover (LH)
(4) Crankshaft pulley
(5) Crankshaft pulley bolt
(6) V-belt

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 127^{+10}_{-5} ($13.0^{+1.0}_{-0.5}$, $94^{+7.2}_{-3.6}$)

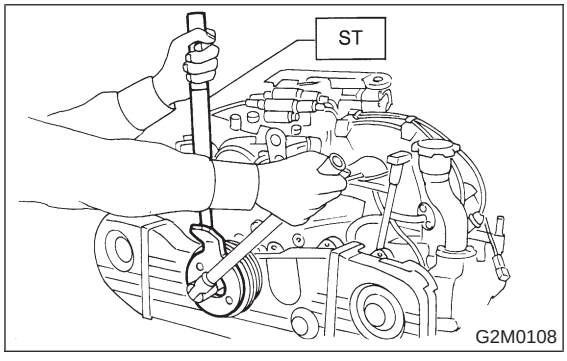
1) Install front belt cover.
2) Install belt cover (RH).
3) Install belt cover (LH).



4) Install crankshaft pulley.
5) Install pulley bolt.

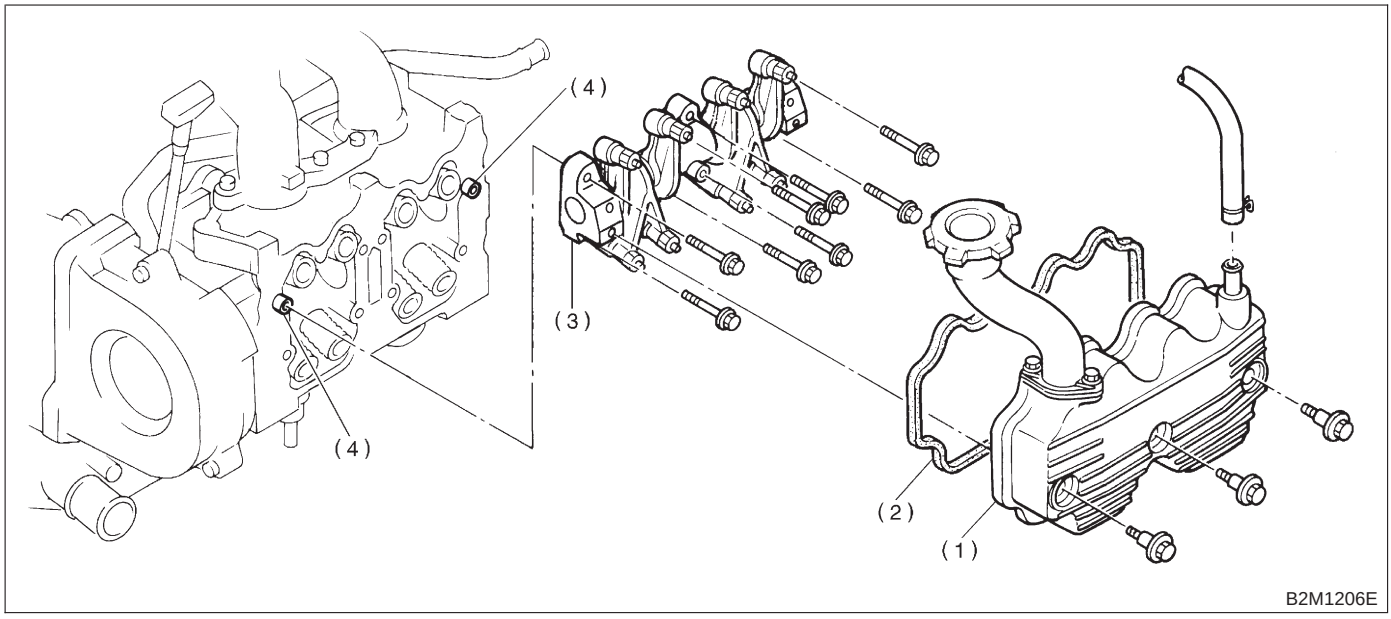
To lock crankshaft, use ST.

ST 499977000 CRANKSHAFT PULLEY WRENCH



3. Valve Rocker Assembly

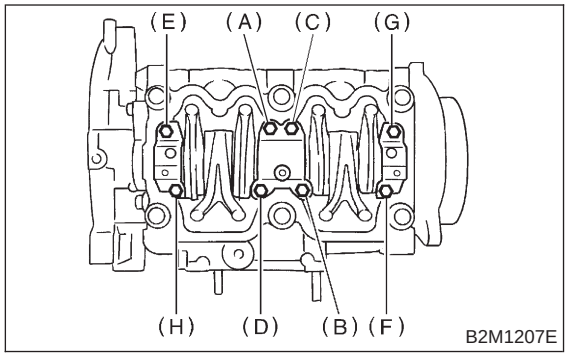
A: REMOVAL



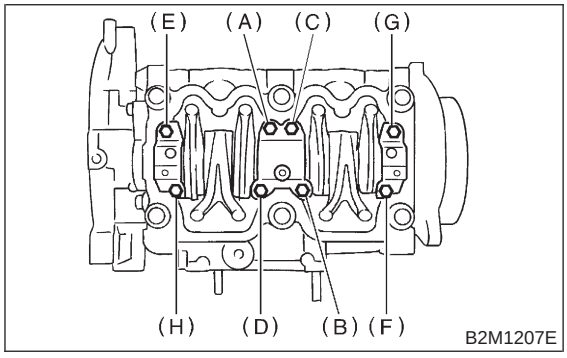
(1) Rocker cover
(2) Rocker cover gasket
(3) Valve rocker ASSY
(4) Knock pin

1) Disconnect PCV hose and remove rocker cover.
2) Removal of valve rocker assembly
(1) Remove bolts (A) through (D) in alphabetical sequence.

CAUTION:
Leave two or three threads of bolt (A) engaged to retain valve rocker assembly.

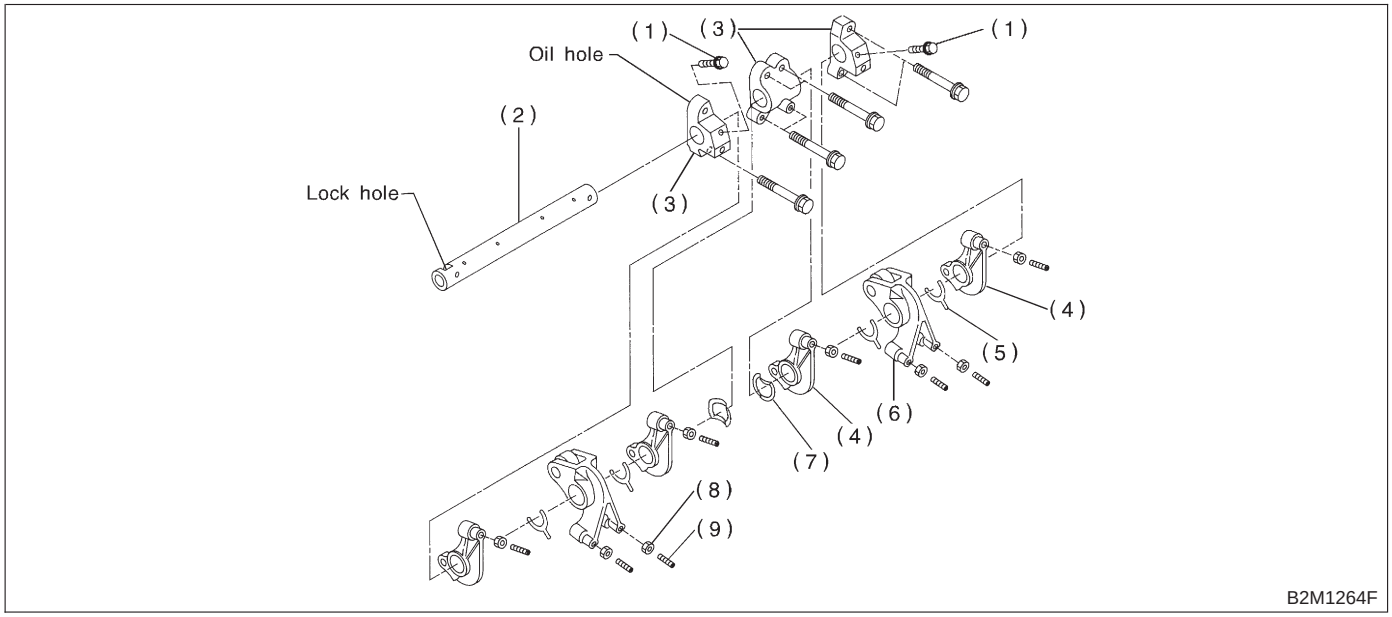


(2) Equally loosen bolts (E) through (H) all the way, being careful that knock pin is not gouged.



(3) Remove valve rocker assembly.

B: DISASSEMBLY



(1) Bolt
(2) Rocker shaft
(3) Rocker shaft sprocket
(4) Intake valve rocker arm
(5) Plate
(6) Exhaust valve rocker arm
(7) Spring
(8) Valve rocker nut
(9) Valve rocker adjust screw

1) Remove bolts which secure rocker shaft.
2) Extract rocker shaft. Remove valve rocker arms, plates, springs and shaft supports from rocker shaft.

CAUTION:
Arrange all removed parts in order so that they can be installed in their original positions.

3) Loosen valve rocker nut, and then remove valve rocker adjust screw and nut from valve rocker arm.

CAUTION:
Do not remove valve rocker adjust screw and valve rocker nut unless necessary.

C: INSPECTION

1. VALVE ROCKER ARM

1) Measure inside diameter of valve rocker arm and outside diameter of valve rocker shaft, and determine the difference between the two (= oil clearance).

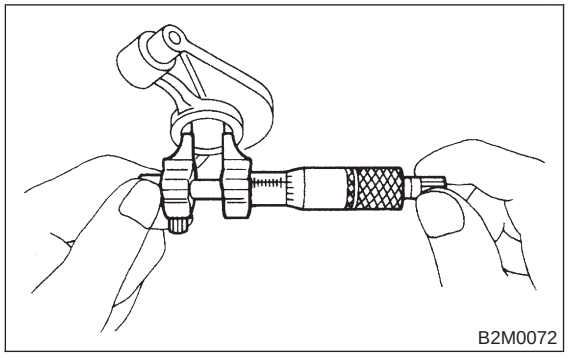
Clearance between arm and shaft:
Standard
0.020 — 0.054 mm (0.0008 — 0.0021 in)
Limit
0.10 mm (0.0039 in)

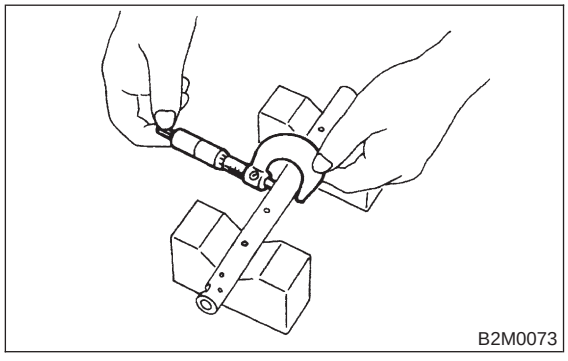
If oil clearance exceeds specifications, replace valve rocker arm or shaft.

NOTE:
Replace valve rocker arm or shaft, whichever shows greater amount of wear.

Rocker arm inside diameter:
22.020 — 22.041 mm (0.8669 — 0.8678 in)

Rocker shaft diameter:
21.987 — 22.000 mm (0.8656 — 0.8661 in)


B2M0072


B2M0073

2) Measure inside diameter of rocker shaft support and outside diameter of valve rocker shaft, and determine the difference between the two (= oil clearance).

Clearance between support and shaft:
Standard
0.005 — 0.039 mm (0.0002 — 0.0015 in)
Limit
0.05 mm (0.0020 in)

If oil clearance exceeds specifications, replace rocker shaft support or shaft.

NOTE:
Replace rocker shaft support or shaft, whichever shows greater amount of wear.

Rocker shaft support inside diameter:
22.005 — 22.026 mm (0.8663 — 0.8672 in)

Rocker shaft diameter:
21.987 — 22.000 mm (0.8656 — 0.8661 in)

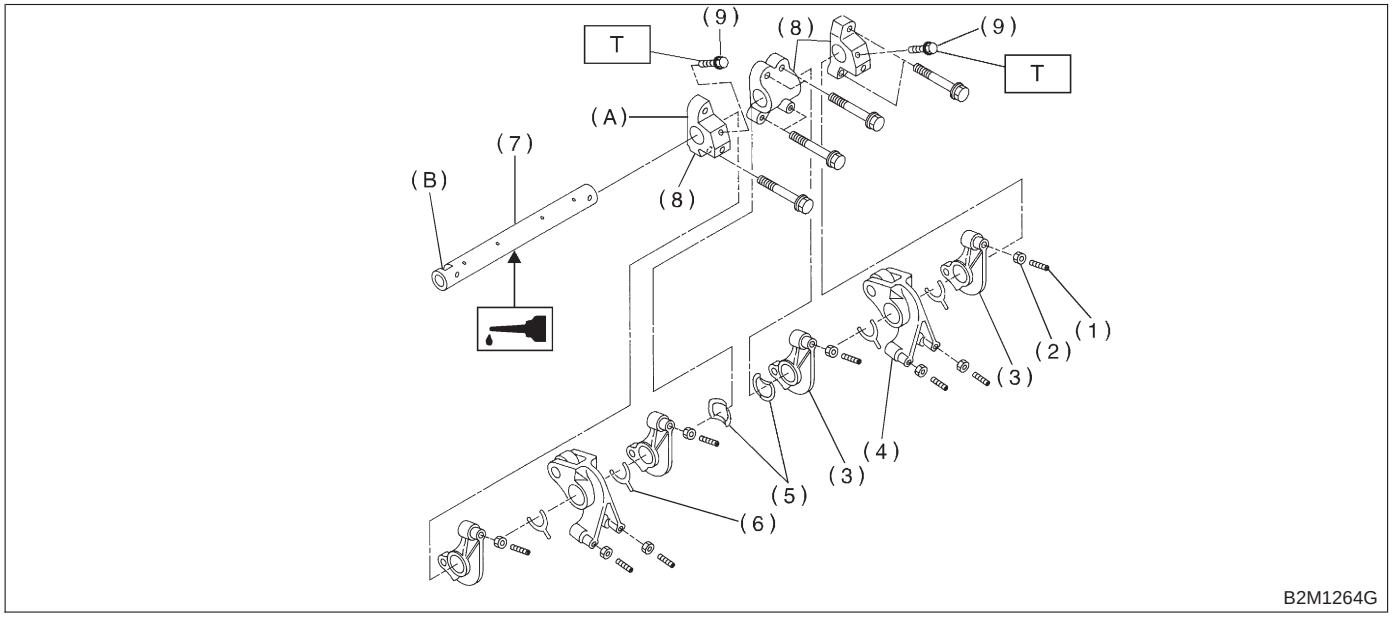
3) If cam or valve contact surface of valve rocker arm is worn or dented excessively, replace valve rocker arm.
4) Check that valve rocker arm roller rotates smoothly. If not, replace valve rocker arm.

2. VALVE ROCKER SHAFT

Visually check oil relief valve of shaft end for any of the following abnormalities.
- Breaks in check ball body
- Foreign particles caught in valve spring
- Oil leaks at check ball

CAUTION:
Repair or replace valve rocker shaft as necessary.

D: ASSEMBLY



(1) Valve rocker adjust screw
(2) Valve rocker nut
(3) Intake valve rocker arm
(4) Exhaust valve rocker arm
(5) Spring
(6) Plate
(7) Rocker shaft
(8) Rocker shaft support
(9) Bolt
(A) Oil hole
(B) Lock hole

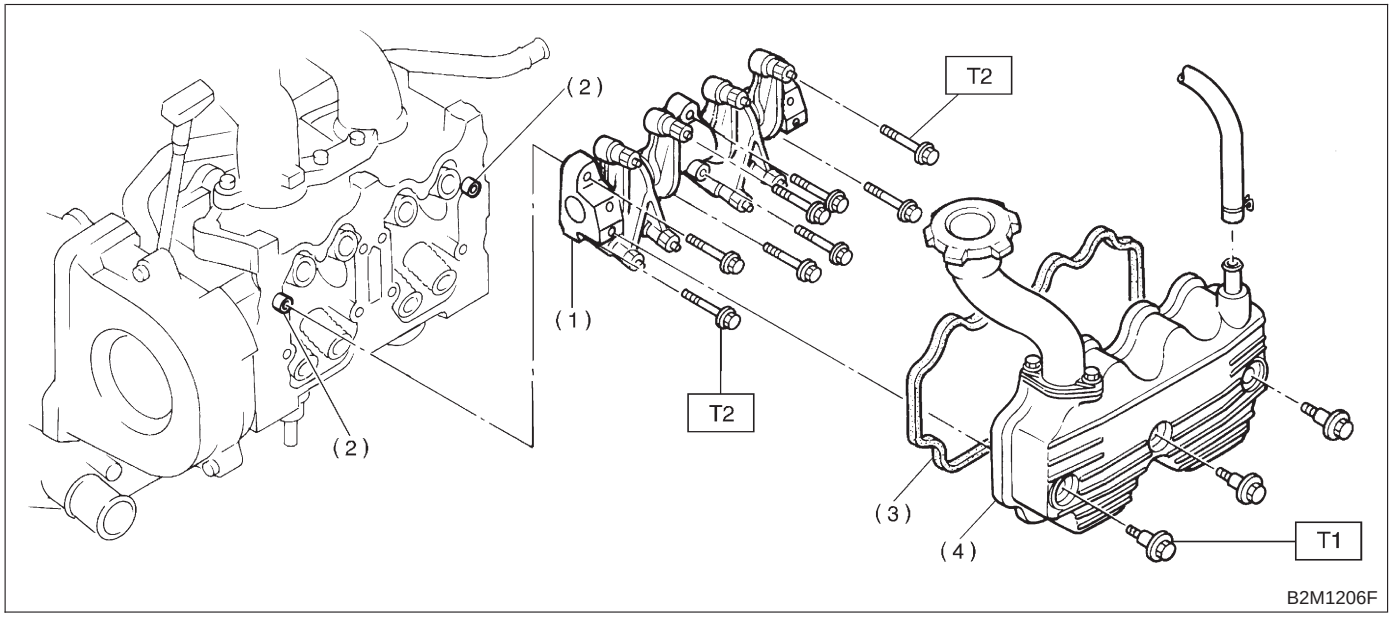
Tightening torque: N·m (kg-m, ft-lb)
T: 5±1 (0.5±0.1, 3.6±0.7)

1) Install valve rocker adjust screw and valve rocker nut to valve rocker arm, and loosely tighten nut.
2) Arrange valve rocker arms, plates, springs and rocker shaft supports in assembly order and insert valve rocker shaft. Ensure that cutout portion of rocker shaft faces oil holes (A) in rocker shaft supports.

CAUTION:
Valve rocker arms, rocker shaft and rocker shaft supports have identification marks. Ensure parts with same markings are properly assembled.

3) Install valve rocker shaft securing bolts while aligning shaft “lock” holes (B) with bolts.

E: INSTALLATION



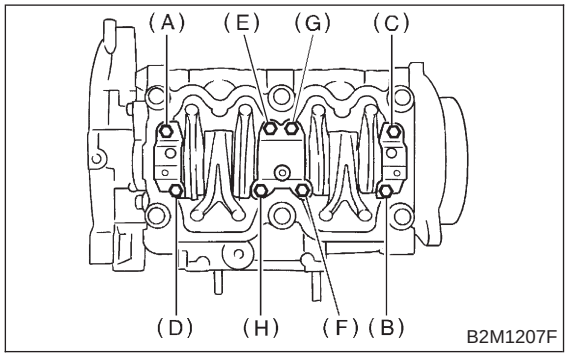
(1) Valve rocker ASSY
(2) Knock pin
(3) Rocker cover gasket
(4) Rocker cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 12±1 (1.2±0.1, 8.7±0.7)

1) Installation of valve rocker assembly
(1) Temporarily tighten bolts (A) through (D) equally as shown in Figure.

CAUTION:
Do not allow valve rocker assembly to gouge knock pins.

(2) Tighten bolts (E) through (H) to specified torque.
(3) Tighten bolts (A) through (D) to specified torque.



2) Adjust the valve clearances. <Ref. to 2-2 [W7B1].>
3) Install rocker cover and connect PCV hose.

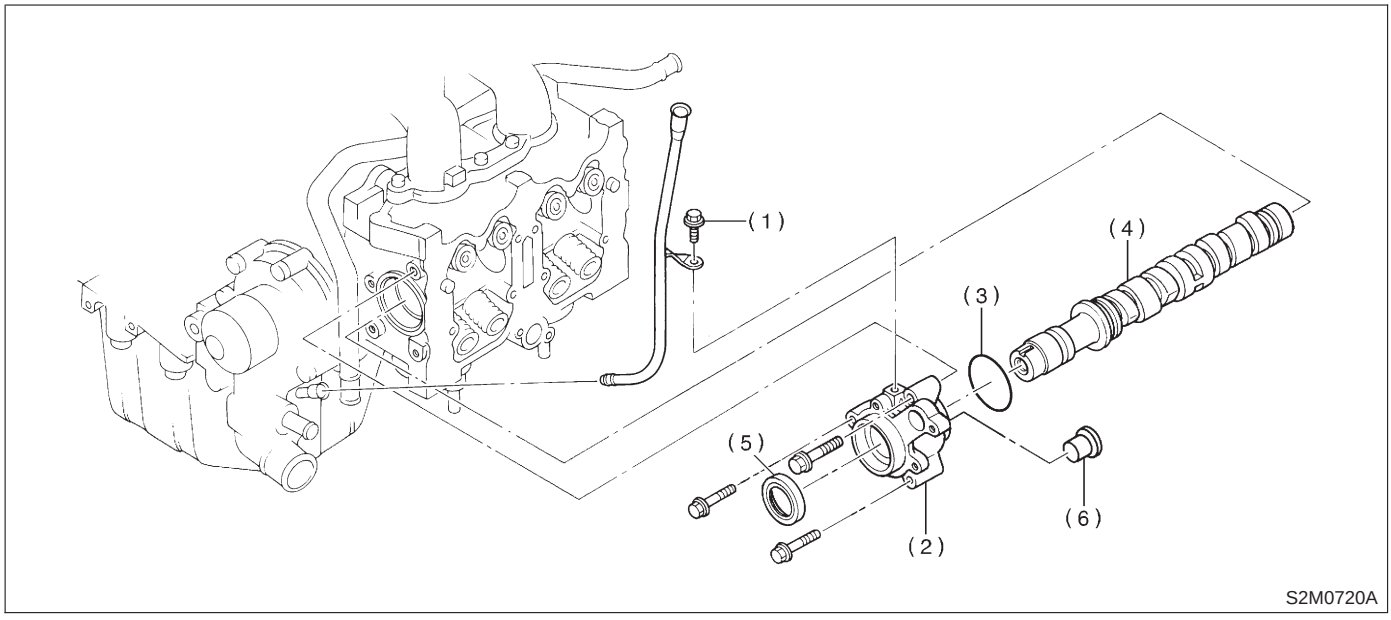
4. Camshaft

A: REMOVAL

1. RELATED PARTS

1) Remove timing belt, camshaft sprockets and related parts.

2. CAMSHAFT (LH)



(1) Bolt
(2) Camshaft support (LH)
(3) O-ring
(4) Camshaft (LH)
(5) Oil seal
(6) Belt cover sling

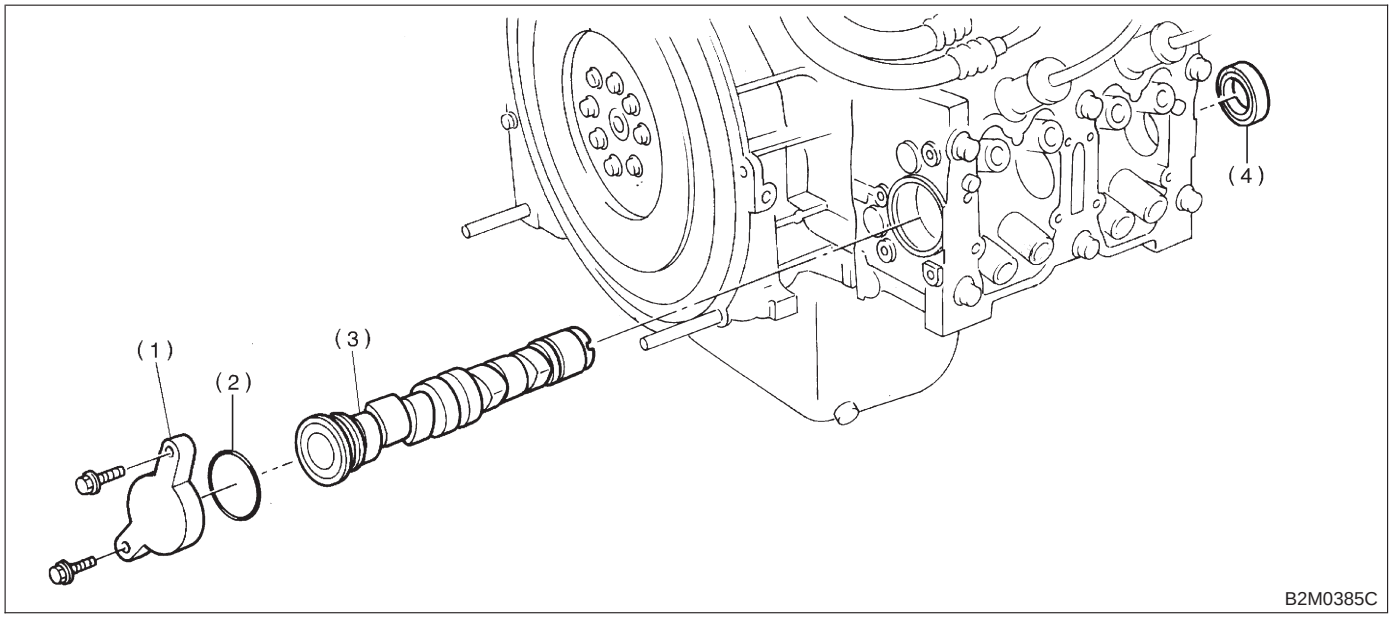
1) Remove belt cover sling.

CAUTION:
Do not damage the camshaft position sensor.

2) Remove oil level gauge guide attaching bolt.
3) Remove camshaft support (LH).
4) Remove O-ring.
<Ref. to 2-3a [W2A0].>
2) Remove valve rocker assembly.
<Ref. to 2-3a [W3A0].>
5) Remove camshaft (LH).
6) Remove oil seal.

CAUTION:
- **Do not remove oil seal unless necessary.**
- **Do not scratch journal surface when removing oil seal.**

3. CAMSHAFT (RH)



(1) Camshaft support (RH)
(2) O-ring
(3) Camshaft (RH)
(4) Oil seal

1) Remove camshaft support (RH).
2) Remove O-ring.
3) Remove camshaft (RH).
4) Remove oil seal.

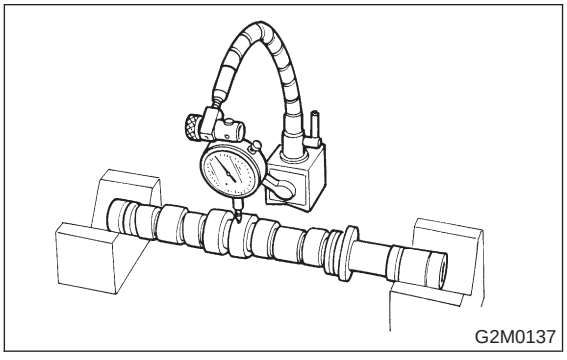
CAUTION:
- **Do not remove oil seal unless necessary.**
- **Do not scratch journal surface when removing oil seal.**

B: INSPECTION

1. CAMSHAFT

1) Measure the bend, and repair or replace if necessary.

Limit:
0.025 mm (0.0010 in)



2) Check journal for damage and wear. Replace if faulty.

3) Measure outside diameter of camshaft journal and inside diameter of cylinder head journal, and determine the difference between the two (= oil clearance). If oil clearance exceeds specifications, replace camshaft or cylinder head as necessary.

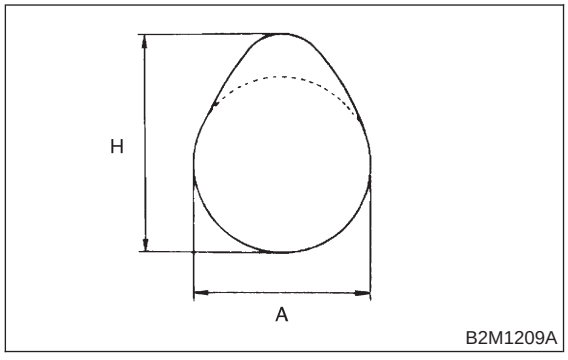
Unit: mm (in)

Item				
	Right-hand camshaft	Front	Center	Rear
	Left-hand camshaft	Rear	Center	Front
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)		
	Limit	0.10 (0.0039)		
Camshaft journal O.D.		31.935 — 31.950 (1.2573 — 1.2579)	37.435 — 37.450 (1.4738 — 1.4744)	37.935 — 37.950 (1.4935 — 1.4941)
Journal hole I.D.		32.005 — 32.025 (1.2600 — 1.2608)	37.505 — 37.525 (1.4766 — 1.4774)	38.005 — 38.025 (1.4963 — 1.4970)

4) Check cam face condition; remove minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

Cam height: H
Standard
IN: 32.244 — 32.344 mm (1.2694 — 1.2734 in)
EX: 31.964 — 32.064 mm (1.2584 — 1.2624 in)
Limit
IN: 32.064 mm (1.2624 in)
EX: 31.784 mm (1.2513 in)

Cam base circle diameter A:
IN: 27.5 mm (1.083 in)
EX: 27.0 mm (1.063 in)

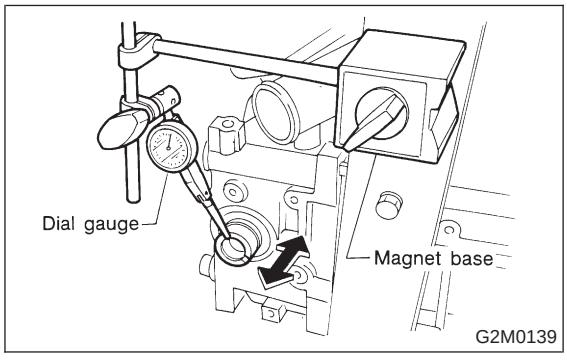


2. CAMSHAFT SUPPORT

Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace camshaft support.

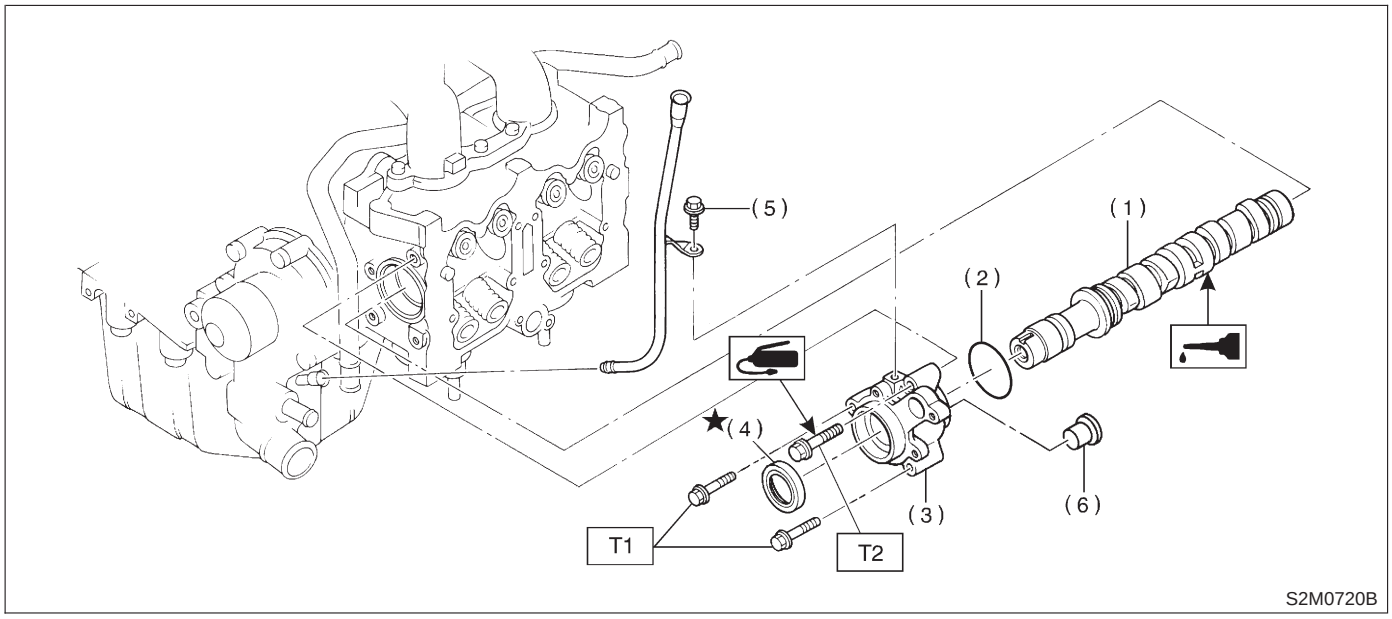
Standard:
0.03 — 0.26 mm (0.0012 — 0.0102 in)

Limit:
0.35 mm (0.0138 in)



C: INSTALLATION

1. CAMSHAFT (LH)



(1) Camshaft
(2) O-ring
(3) Camshaft support (LH)
(4) Oil seal
(5) Bolt
(6) Belt cover sling
★: Replacement part

Tightening torque: N·m (kg-m, ft-lb)
T1: 10 (1.0, 7)
T2: 16 (1.6, 12)

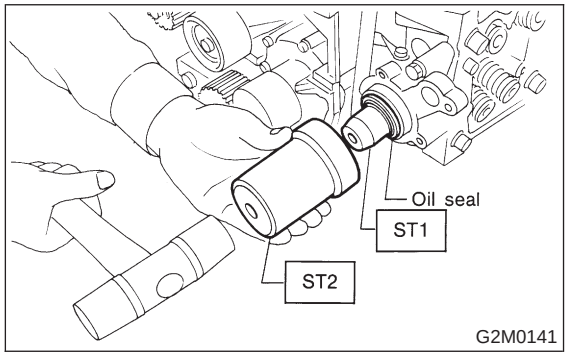
1) Apply a coat of engine oil to camshaft journals and install camshaft (LH).
2) Apply a coat of engine oil or grease to O-ring.
3) Install O-ring to camshaft support (LH).

CAUTION:
Use a new O-ring.

4) Install camshaft support (LH).
5) Apply a coat of grease to oil seal lips and install oil seal on camshaft support (LH) by using ST1 and ST2.

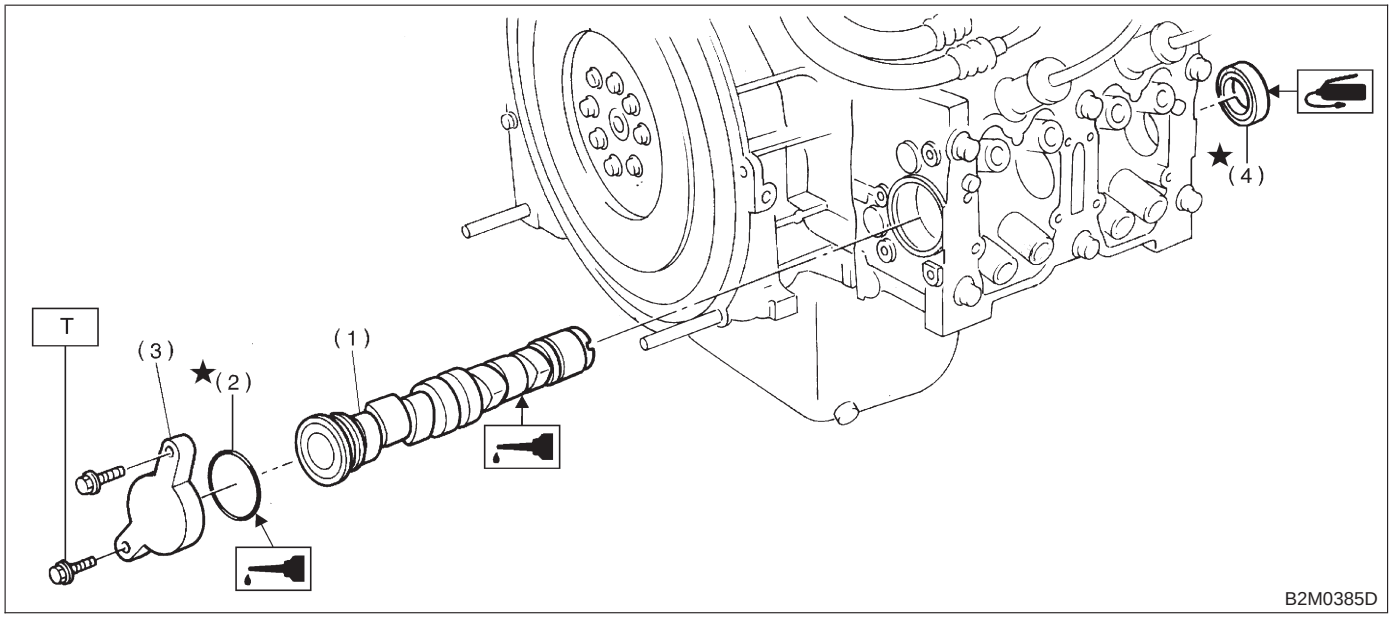
CAUTION:
Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE
ST2 499587100 OIL SEAL INSTALLER
6) Install oil level gauge guide bolt.



7) Install belt cover sling.

2. CAMSHAFT (RH)



(1) Camshaft (RH)
(2) O-ring
(3) Camshaft support (RH)
(4) Oil seal
★: Replacement part

Tightening torque: N·m (kg-m, ft-lb)
T: 16 (1.6, 12)

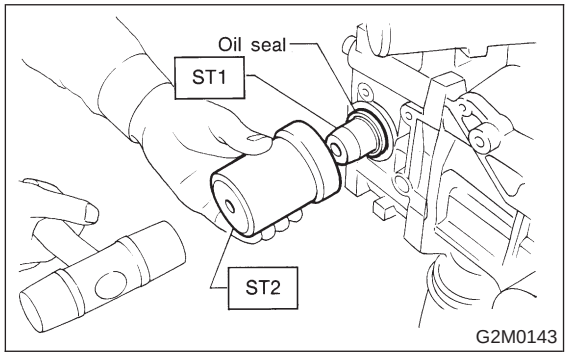
1) Apply a coat of engine oil to camshaft journals and install camshaft (RH).
2) Apply a coat of engine oil or grease to O-ring.
3) Install O-ring to camshaft support (RH).

CAUTION:
Use a new O-ring.

4) Install camshaft support (RH).
5) Install oil seal by using ST1 and ST2.

CAUTION:
Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE
ST2 499587100 OIL SEAL INSTALLER



3. RELATED PARTS

1) Install valve rocker assembly.
<Ref. to 2-3a [W3E0].>
2) Install timing belt, camshaft sprockets and related parts. <Ref. to 2-3a [W2C0].>

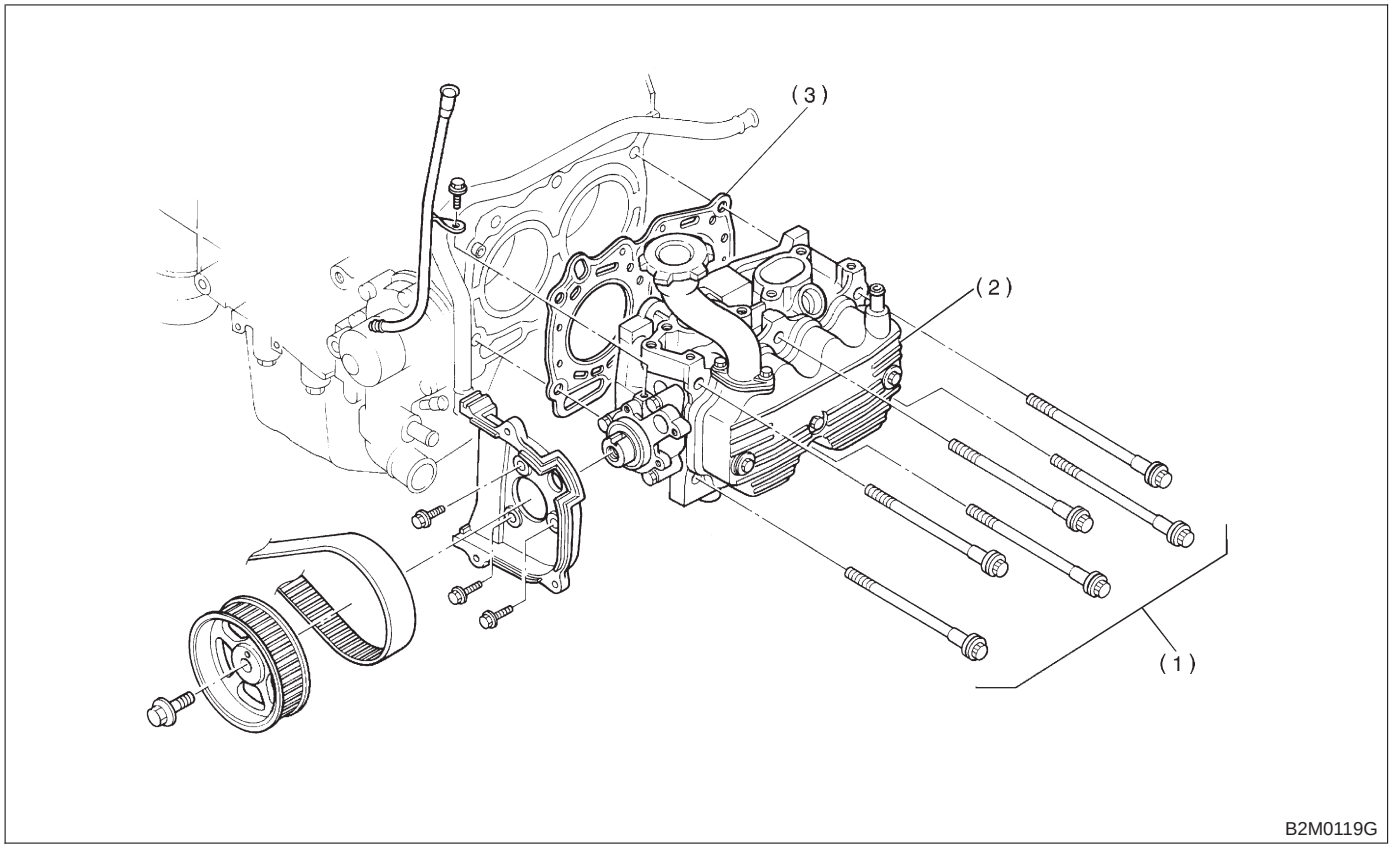
5. Cylinder Head

A: REMOVAL

1. RELATED PARTS

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Drain engine coolant. <Ref. to 2-5 [W1A1].>
3) Remove V-belt.
4) Remove generator and bracket.
5) Disconnect spark plug cords.
6) Remove connector bracket attaching bolt.
7) Remove crankshaft position sensor and belt cover sling.
8) Disconnect oil pressure switch connector.
9) Disconnect blow-by hose.
10) Remove intake manifold and gasket. <Ref. to 2-7 [W4A0].>
11) Remove water pipe. <Ref. to 2-5 [W8A0].>

2. CYLINDER HEAD

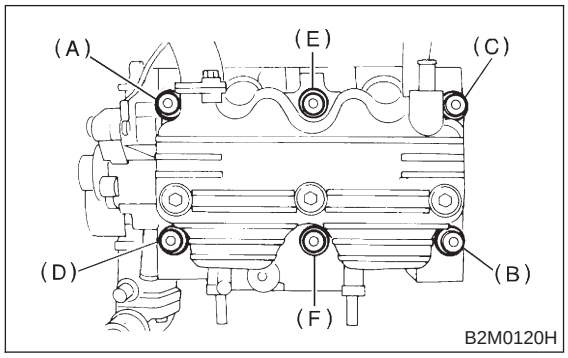


(1) Cylinder head bolt (2) Cylinder head (3) Cylinder head gasket

1) Remove timing belt, camshaft sprocket and related parts.
<Ref. to 2-3a [W2A0].>
2) Remove oil level gauge guide attaching bolt (left hand only).

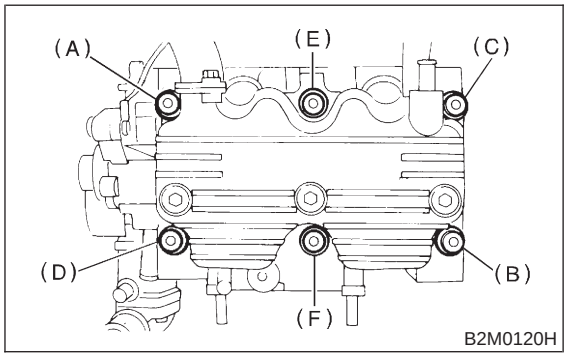
3) Remove cylinder head bolts in alphabetical sequence shown in Figure.

CAUTION:
Leave bolts (A) and (C) engaged by three or four threads to prevent cylinder head from falling.



4) While tapping cylinder head with a plastic hammer, separate it from cylinder block.

5) Remove bolts (A) and (C) to remove cylinder head.

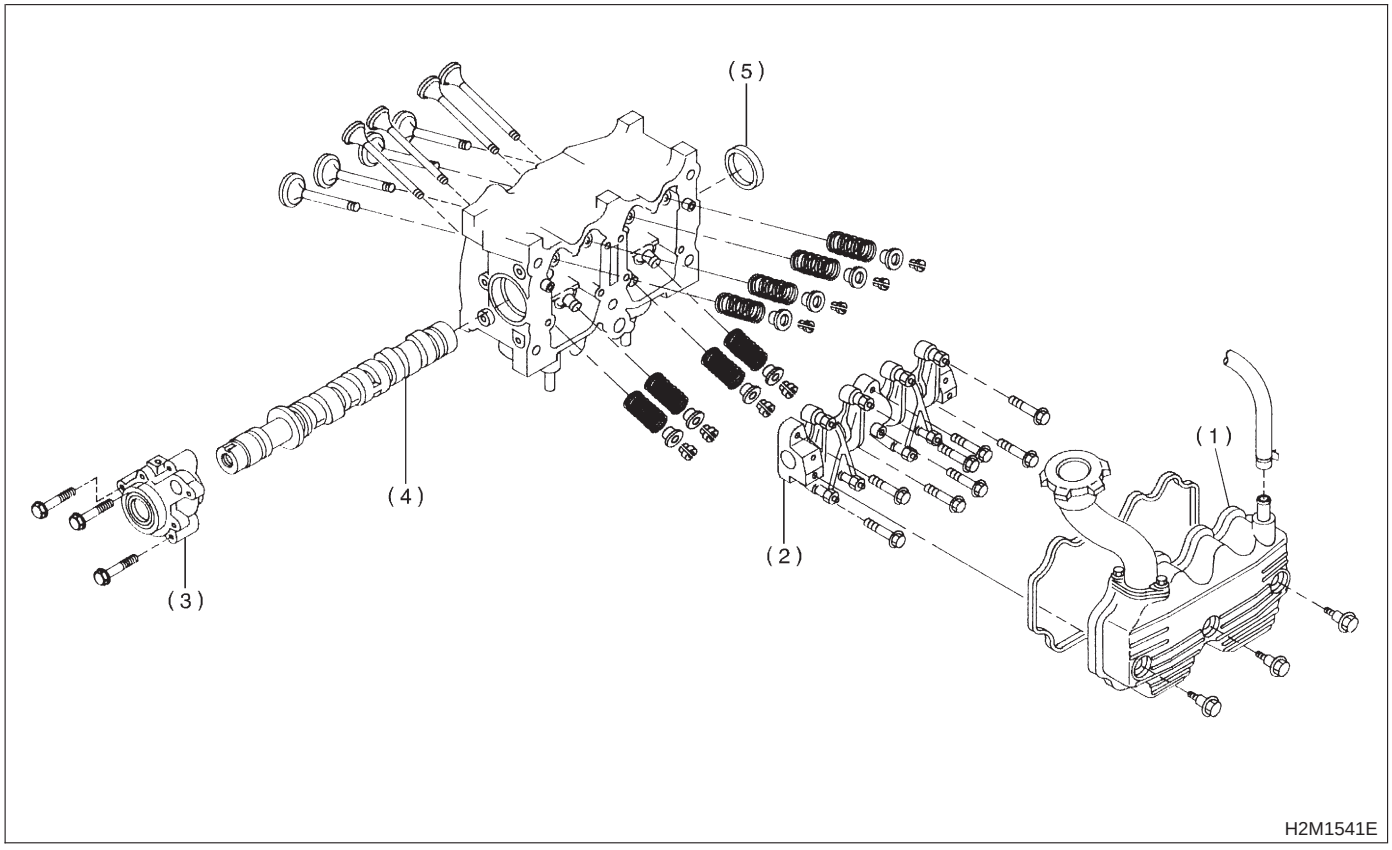


6) Remove cylinder head gasket.

CAUTION:
Do not scratch the mating surface of cylinder head and cylinder block.

7) Similarly, remove right side cylinder head.

B: DISASSEMBLY

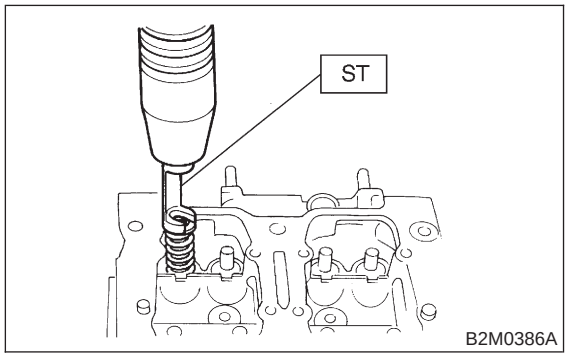


(1) Rocker cover
(2) Valve rocker ASSY
(3) Camshaft support
(4) Camshaft
(5) Oil seal

1) Remove rocker cover.
2) Remove valve rocker assembly.
<Ref. to 2-3a [W3A0].>
3) Remove camshaft and support.
<Ref. to 2-3a [W4A0].>
4) Place cylinder head on ST.
ST 498267200 CYLINDER HEAD TABLE

5) Set ST on valve spring. Compress valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST 499718000 VALVE SPRING REMOVER

CAUTION:
- **Mark each valve to prevent confusion.**
- **Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.**



6) Removal of plug (cylinder head LH).

CAUTION:
Do not remove plug unless necessary.

C: INSPECTION

1. CYLINDER HEAD

1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red lead check.
Also make sure that gasket installing surface shows no trace of gas nor water leaks.
2) Place cylinder head on ST.
ST 498267200 CYLINDER HEAD TABLE

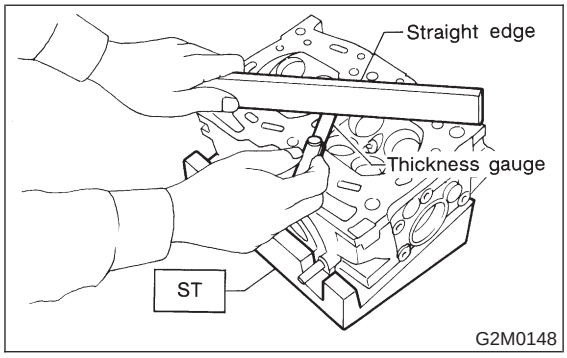
3) Measure the warping of the cylinder head surface that mates with crankcase by using a straight edge and thickness gauge.
If the warping exceeds 0.05 mm (0.0020 in), regrind the surface with a surface grinder.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder head:
98.3 mm (3.870 in)

CAUTION:
Uneven torque for the cylinder head nuts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.



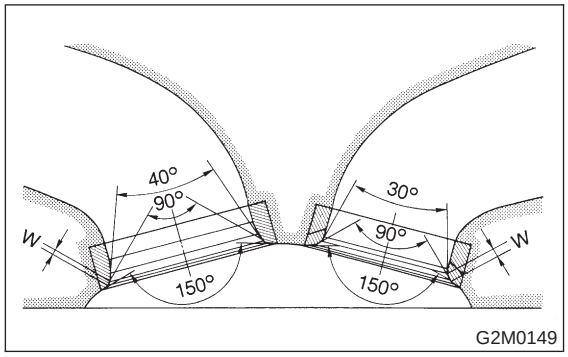
2. VALVE SEAT

Inspect intake and exhaust valve seats, and correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

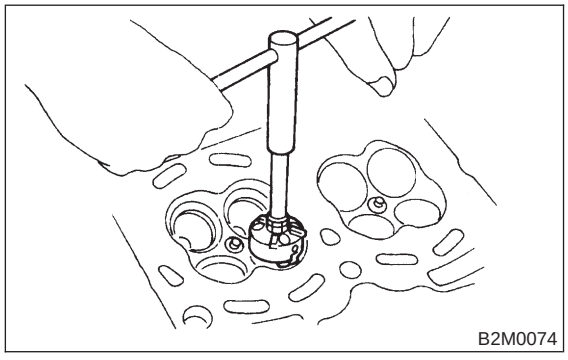
Valve seat width: W

Intake
Standard
0.7 mm (0.028 in)
Limit
1.4 mm (0.055 in)

Exhaust
Standard
1.0 mm (0.039 in)
Limit
1.8 mm (0.071 in)



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3. VALVE GUIDE

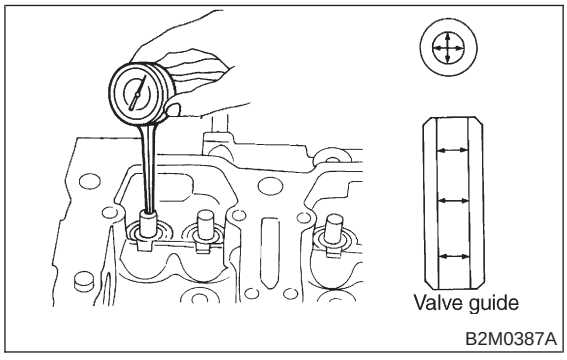
1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

Clearance between the valve guide and valve stem:

Standard
Intake
0.035 — 0.062 mm (0.0014 — 0.0024 in)
Exhaust
0.040 — 0.067 mm (0.0016 — 0.0026 in)

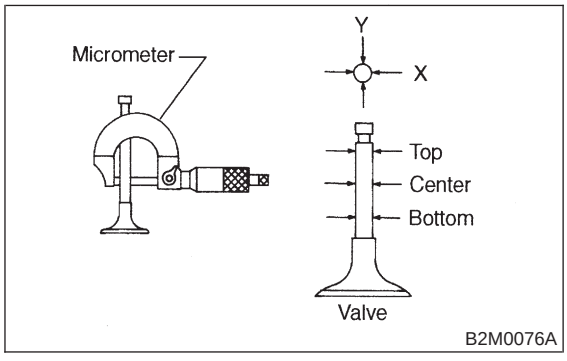
Limit
0.15 mm (0.0059 in)

Valve guide inner diameter:
6.00 — 6.012 mm (0.2362 — 0.2367 in)



B2M0387A

Valve stem outer diameters:
Intake
5.950 — 5.965 mm (0.2343 — 0.2348 in)
Exhaust
5.945 — 5.960 mm (0.2341 — 0.2346 in)



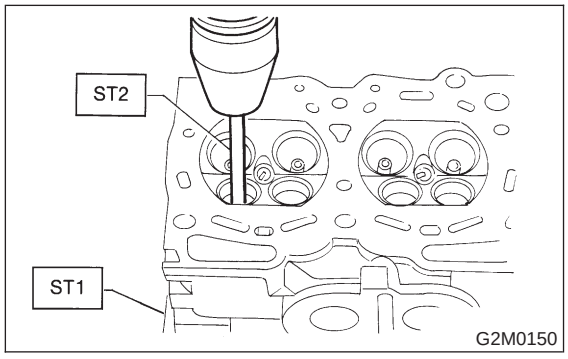
B2M0076A

2) If the clearance between valve guide and stem exceeds the specification, replace guide as follows:

(1) Place cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.

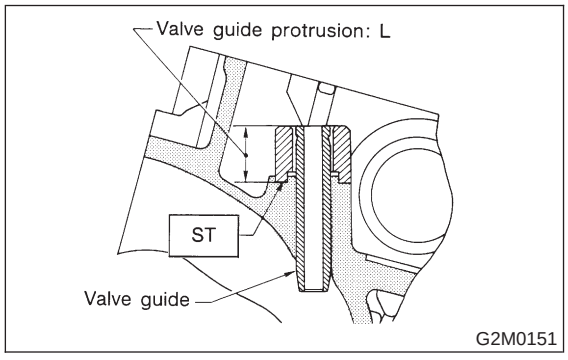
(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 498267200 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn cylinder head upside down and place ST as shown in the Figure.

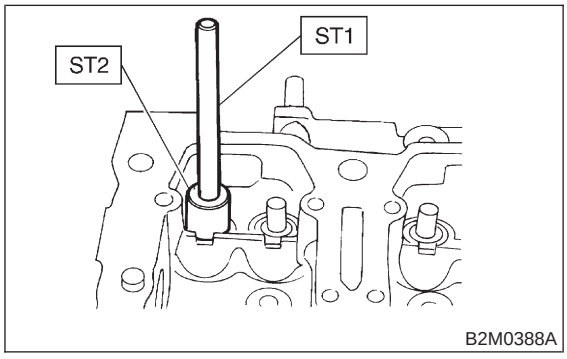
ST 499767000 VALVE GUIDE ADJUSTER



(4) Before installing new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

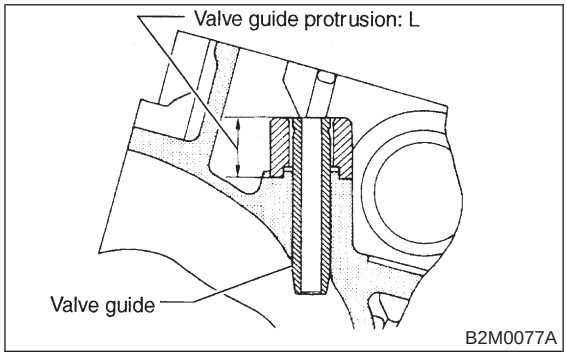
(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
ST2 499767000 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

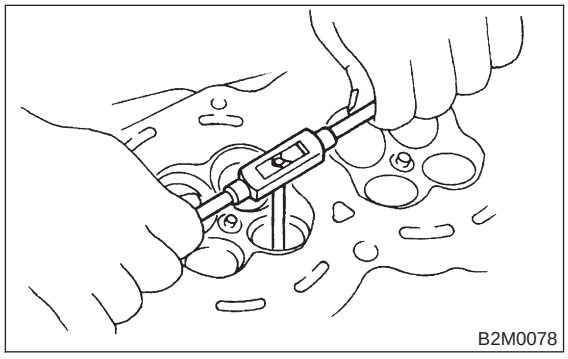
Valve guide protrusion: L
17.5 — 18.0 mm (0.689 — 0.709 in)



(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into valve guide, and return it also rotating clockwise. After reaming, clean valve guide to remove chips.

CAUTION:
● Apply engine oil to the reamer when reaming.
● If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
● If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

ST 499767400 VALVE GUIDE REAMER



(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE

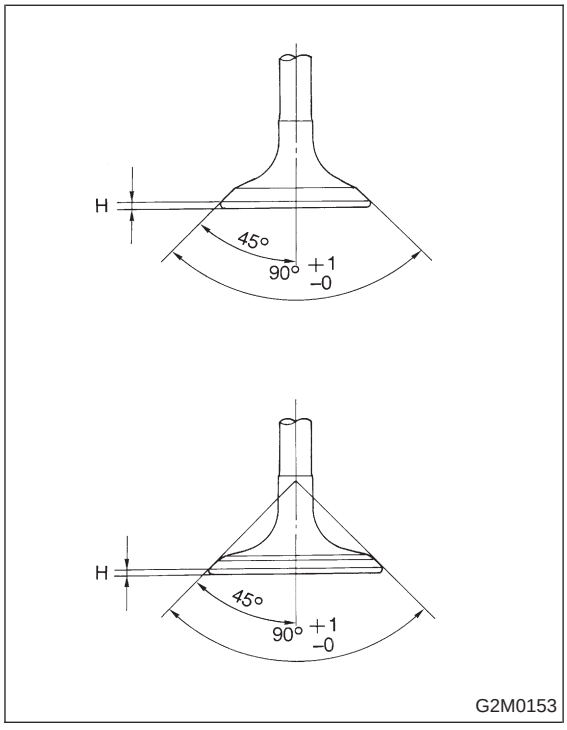
1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if “H” is less than the specified limit.

H:

Intake
Standard
1.0 mm (0.039 in)
Limit
0.8 mm (0.031 in)

Exhaust
Standard
1.2 mm (0.047 in)
Limit
0.8 mm (0.031 in)

Valve overall length:
Intake
101.0 mm (3.976 in)
Exhaust
101.2 mm (3.984 in)

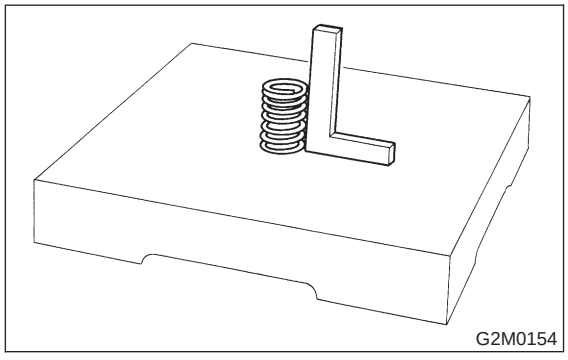


2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Also refer to “2. VALVE SEAT” at this time <Ref. to 2-3a [W5C2].>. Install a new intake valve oil seal after lapping.

5. VALVE SPRINGS

1) Check valve springs for damage, free length, and tension. Replace valve spring if it is not to the specifications presented below.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

Free length	44.05 mm (1.7342 in)
Squareness	2.5°, 1.9 mm (0.075 in)
Tension/spring height	174.6 — 200.1 N (17.8 — 20.4 kg, 39.2 — 45.0 lb)/36.0 mm (1.417 in)
	405.0 — 458.0 N (41.3 — 46.7 kg, 91.1 — 103.0 lb)/ 28.2 mm (1.110 in)


G2M0154

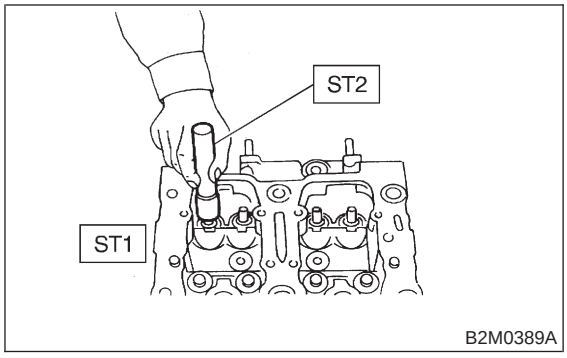
6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.
1) Place cylinder head on ST1.
2) Press in oil seal to the specified dimension indicated in the Figure by using ST2.
ST1 498267200 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

CAUTION:
● Apply engine oil to oil seal before force-fitting.
● When press-fitting oil seal, do not use a hammer or strike into position.
● Differentiate between intake valve oil seal and exhaust valve oil seal by noting their difference in color.

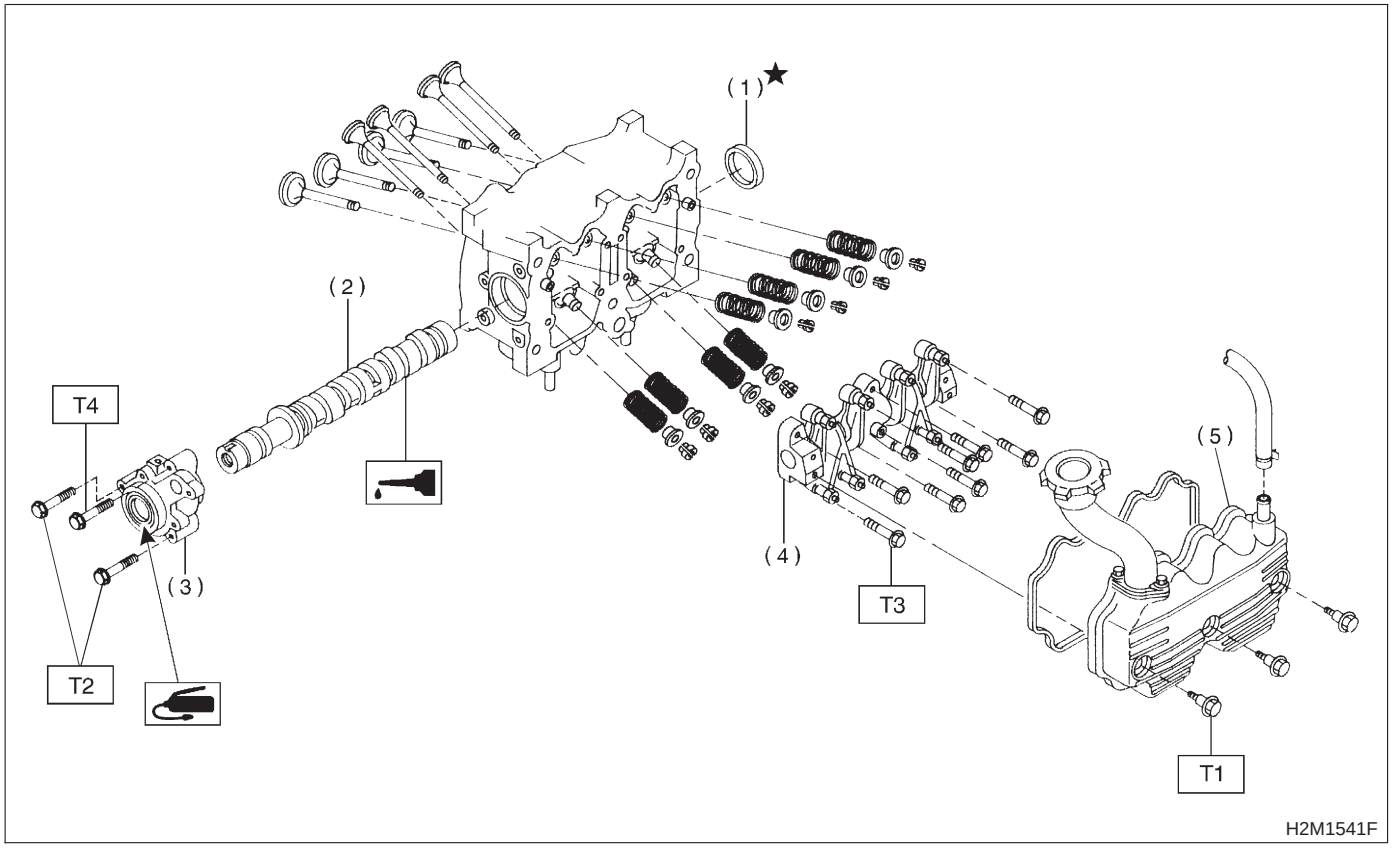
Color of rubber part:
Intake [Black]
Exhaust [Brown]

Color of spring part:
Intake [White]
Exhaust [White]



B2M0389A

D: ASSEMBLY



(1) Oil seal
(2) Camshaft
(3) Camshaft support
(4) Valve rocker ASSY
(5) Rocker cover
★: Replacement part

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 10 (1.0, 7)
T3: 12±1 (1.2±0.1, 8.7±0.7)
T4: 16 (1.6, 12)

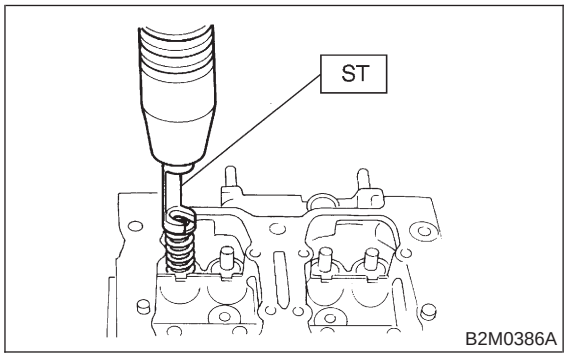
1) Install plug (cylinder head LH) by using ST.
ST 499587100 OIL SEAL INSTALLER
2) Installation of valve spring and valve
(1) Place cylinder head on ST.
ST 498267200 CYLINDER HEAD TABLE
(2) Coat stem of each valve with engine oil and insert valve into valve guide.

CAUTION:
When inserting valve into valve guide, use special care not to damage the oil seal lip.

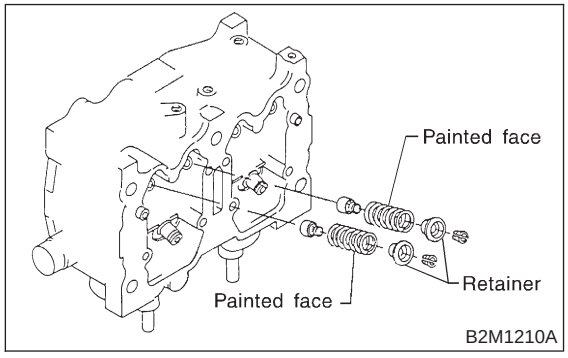
(3) Install valve spring and retainer.

CAUTION:
Be sure to install the valve springs with their painted facing towards the valve spring retainer.

(4) Set ST on valve spring.
ST 499718000 VALVE SPRING REMOVER



(5) Compress valve spring and fit valve spring retainer key.

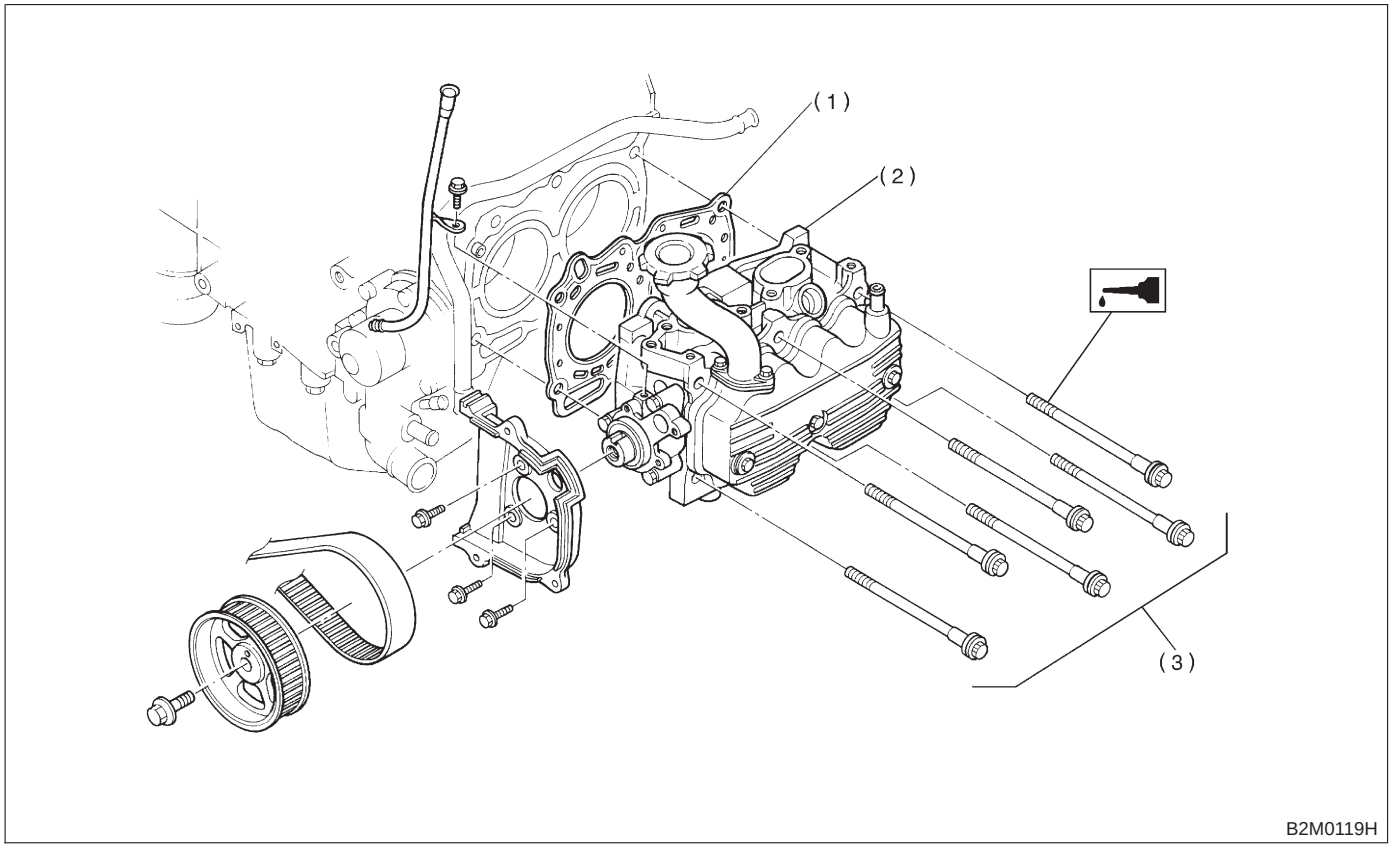


(6) After installing, tap valve spring retainers lightly with wooden hammer for better seating.

3) Install camshaft and support.
<Ref. to 2-3a [W4C0].>
4) Install valve rocker assembly.
<Ref. to 2-3a [W3E0].>
5) Install rocker cover.

E: INSTALLATION

1. CYLINDER HEAD



(1) Cylinder head gasket (2) Cylinder head (3) Cylinder head bolt

1) Install cylinder head and gaskets on cylinder block.

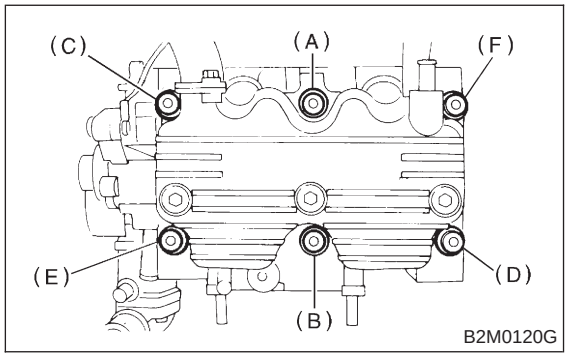
CAUTION:
Use new cylinder head gaskets.

2) Tighten cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb) in alphabetical order shown in Figure.
Then tighten all bolts to 69 N·m (7.0 kg-m, 51 ft-lb) in alphabetical order.
(3) Back off all bolts by 180° first; back them off by 180° again.
(4) Tighten bolts (A) and (B) to 34 N·m (3.5 kg-m, 25 ft-lb).
(5) Tighten bolts (C), (D), (E) and (F) to 15 N·m (1.5 kg-m, 11 ft-lb).
(6) Tighten all bolts by 80 to 90° in alphabetical sequence.

CAUTION:
Do not tighten bolts more than 90°.

(7) Further tighten all bolts by 80 to 90° in alphabetical sequence.

CAUTION:
Ensure that the total "re-tightening angle" [in the former two steps] do not exceed 180°.



3) Install oil level gauge guide attaching bolt (left side only).
4) Install timing belt, camshaft sprocket and related parts. <Ref. to 2-3a [W2C0].>

2. RELATED PARTS

CAUTION:
Use dry compressed air to remove foreign particles before installing each solenoid valve and sensor.

1) Install water pipe. <Ref. to 2-5 [W8B0].>
2) Install intake manifold. <Ref. to 2-7 [W4D0].>
3) Connect blow-by hose.
4) Connect oil pressure switch connector.
5) Install crankshaft position sensor and belt cover sling.
6) Install connector bracket attaching bolt.
7) Connect spark plug cords.
8) Connect PCV hose.
9) Install generator and bracket.
10) Install V-belt.
11) Remove ENGINE STAND.

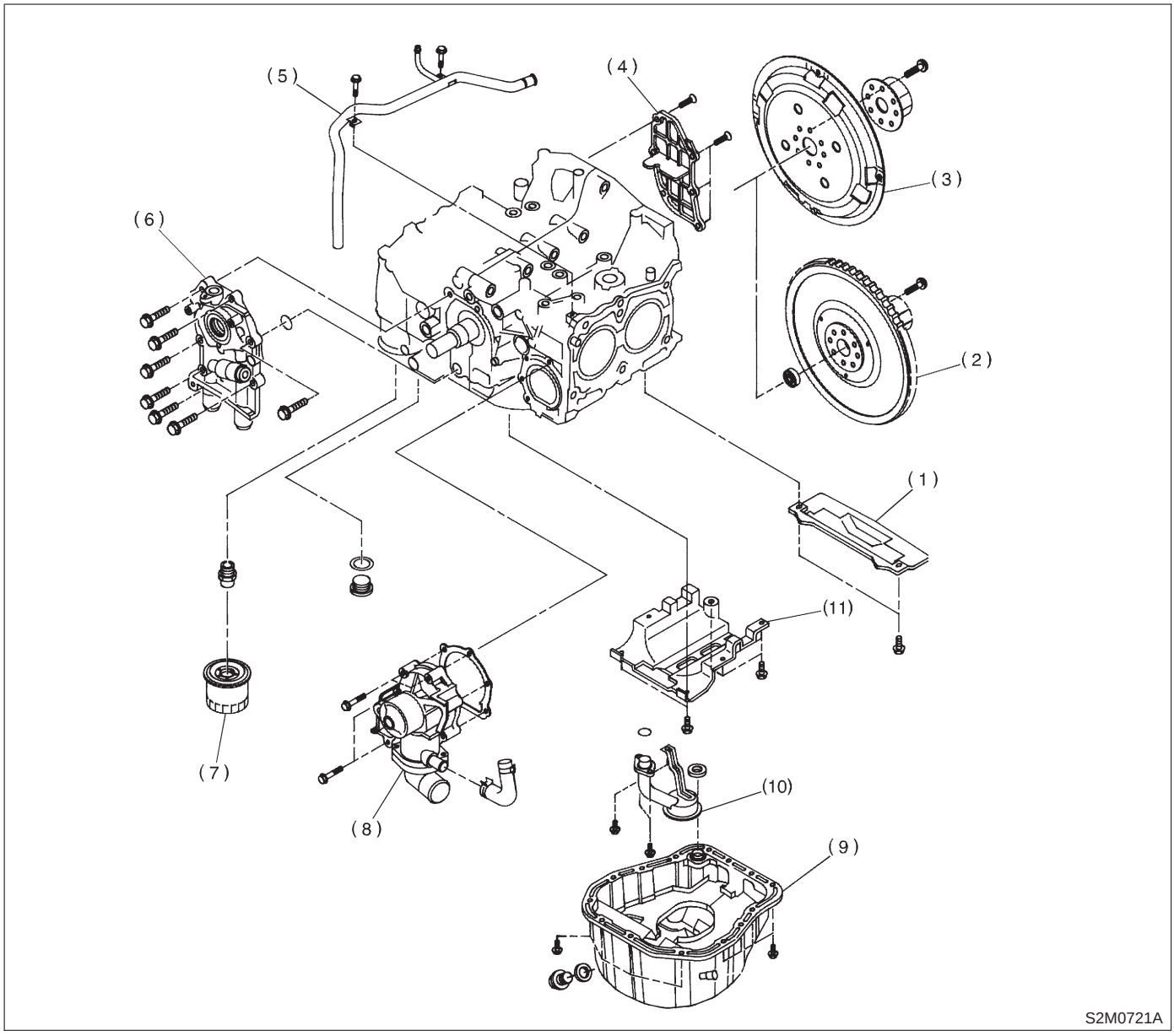
6. Cylinder Block

A: REMOVAL

1. RELATED PARTS

1) Remove timing belt, camshaft sprocket and related parts.
<Ref. to 2-3a [W2A0].>
2) Remove intake manifold.
<Ref. to 2-7 [W4A0].>
3) Remove cylinder heads.
<Ref. to 2-3a [W5A0].>

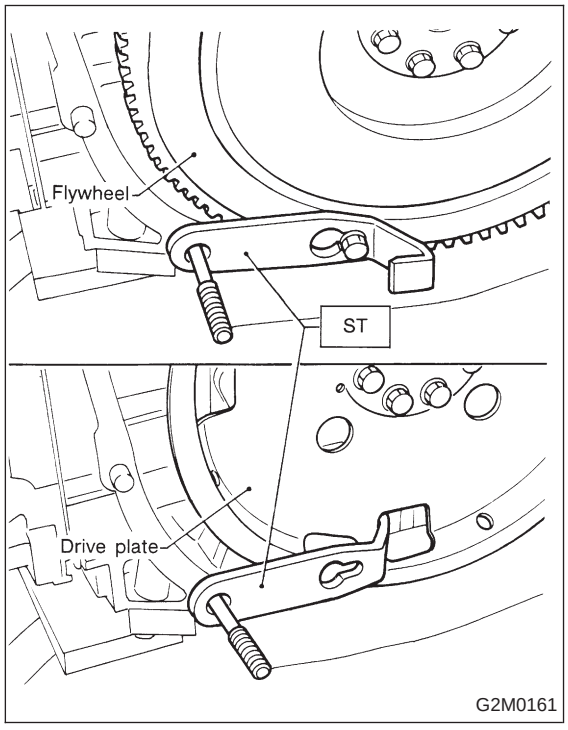
2. OIL PUMP AND WATER PUMP



(1) Clutch housing cover (MT vehicles)
(2) Flywheel (MT vehicles)
(3) Drive plate (AT vehicles)
(4) Oil separator cover
(5) Water by-pass pipe
(6) Oil pump
(7) Oil filter
(8) Water pump
(9) Oil pan
(10) Oil strainer
(11) Baffle plate

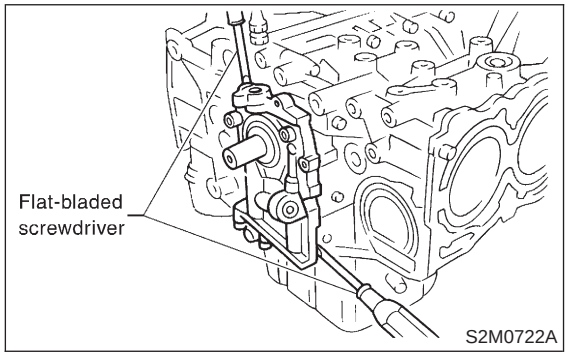
1) Remove clutch housing cover (MT vehicles only).

2) Remove flywheel (MT) or drive plate (AT).
To lock crankshaft use ST.
ST 498497100 CRANKSHAFT STOPPER



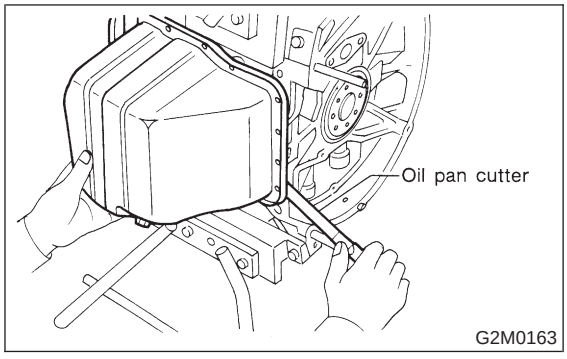
3) Remove oil separator cover.
4) Remove water pipe and water by-pass pipe.
5) Remove water pump.
6) Remove oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in Figure when removing oil pump.

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.



7) Removal of oil pan.
(1) Turn cylinder block with #2 and #4 piston sides facing upward.
(2) Remove bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove oil pan.

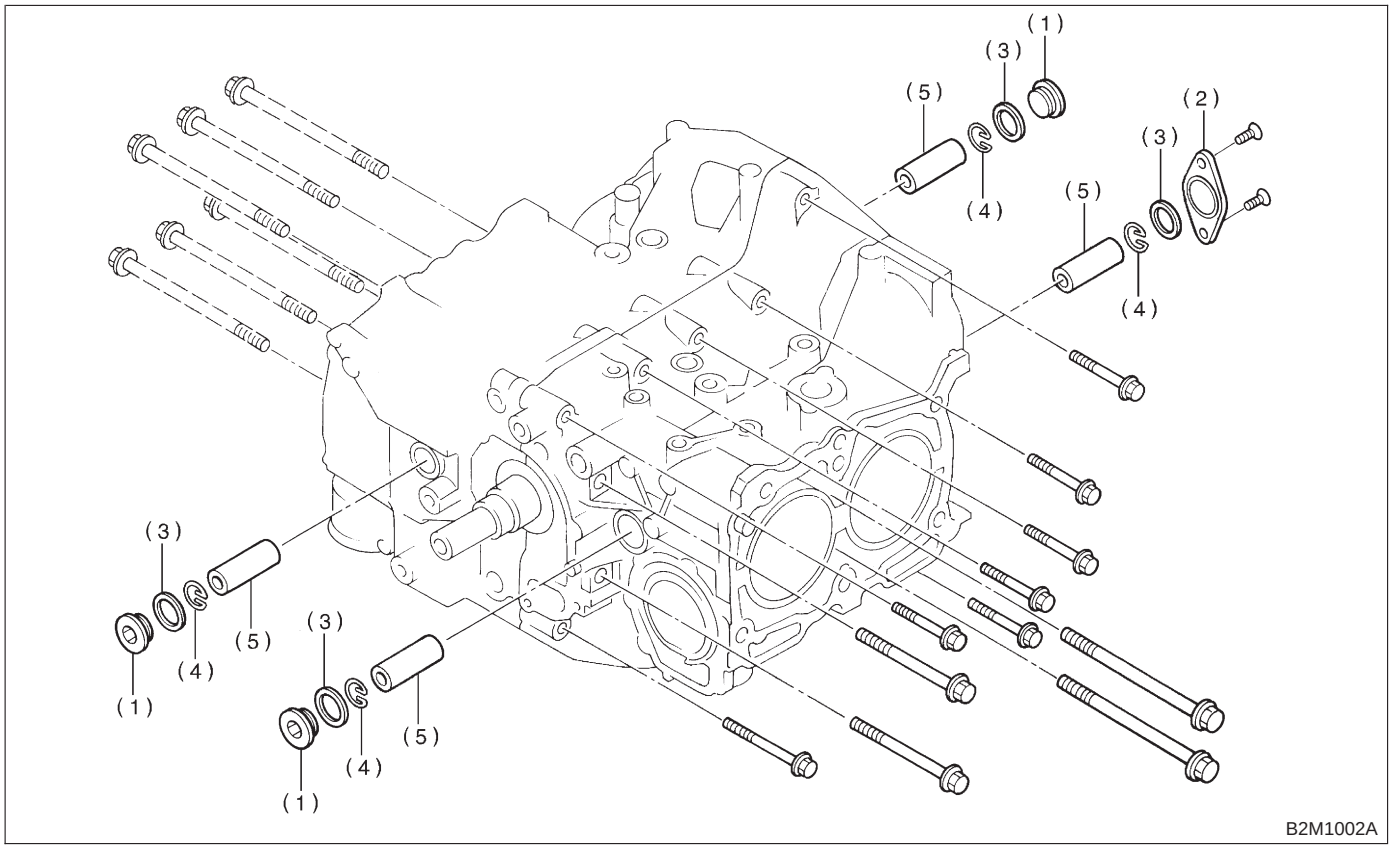
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter blade.



8) Remove oil strainer stay.
9) Remove oil strainer.
10) Remove baffle plate.
11) Remove oil filter.

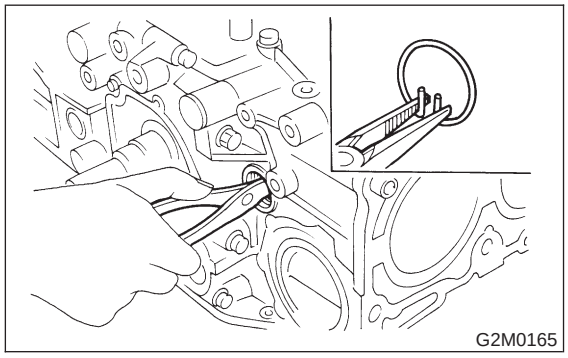
B: DISASSEMBLY

1. PISTON PIN AND CYLINDER BLOCK CONNECTING BOLT



(1) Service hole plug
(2) Service hole cover
(3) Gasket
(4) Circlip
(5) Piston pin

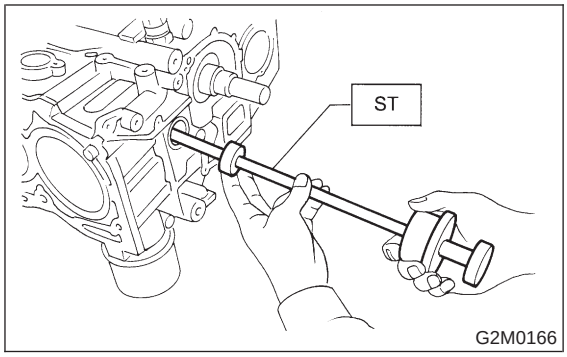
1) Remove service hole cover and service hole plugs using hexagon wrench (14 mm).
2) Rotate crankshaft to bring #1 and #2 pistons to BDC position, then remove piston circlip through service hole of #1 and #2 cylinders



3) Draw out piston pin from #1 and #2 pistons by using ST.
ST 499097500 PISTON PIN REMOVER

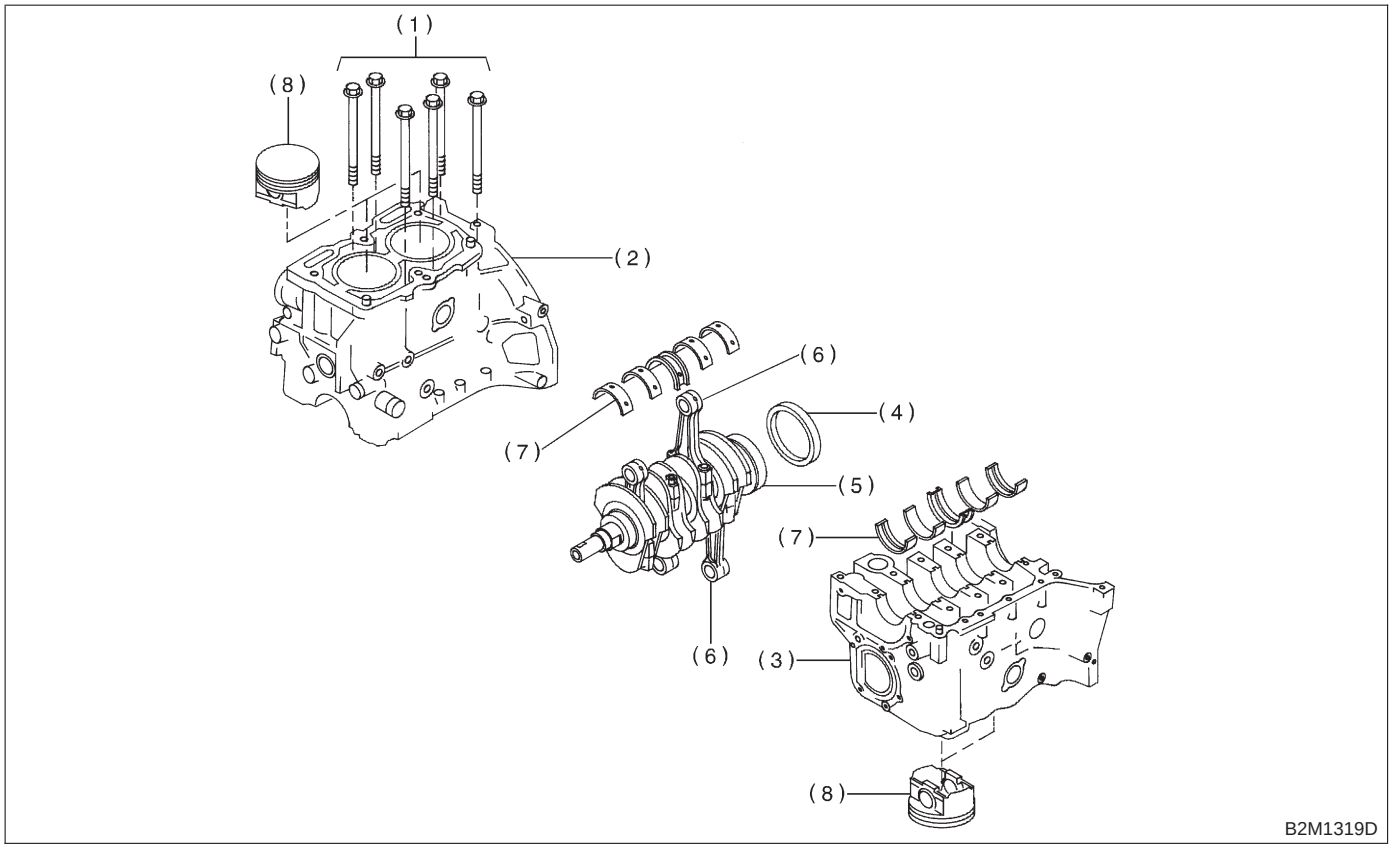
CAUTION:
Be careful not to confuse original combination of piston, piston pin and cylinder.

4) Similarly remove piston pins from #3 and #4 pistons by using ST.
ST 499097500 PISTON PIN REMOVER



5) Remove bolts which connect cylinder block on the side of #2 and #4 cylinders.
6) Back off bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.

2. CYLINDER BLOCK



(1) Bolt
(2) Cylinder block (RH)
(3) Cylinder block (LH)
(4) Rear oil seal
(5) Crankshaft
(6) Connecting rod
(7) Crankshaft bearing
(8) Piston

1) Set up cylinder block so that #1 and #3 cylinders are on the upper side, then remove cylinder block connecting bolts.
2) Separate left-hand and right-hand cylinder blocks.

CAUTION:
When separating cylinder block, do not allow the connecting rod to fall and damage the cylinder block.

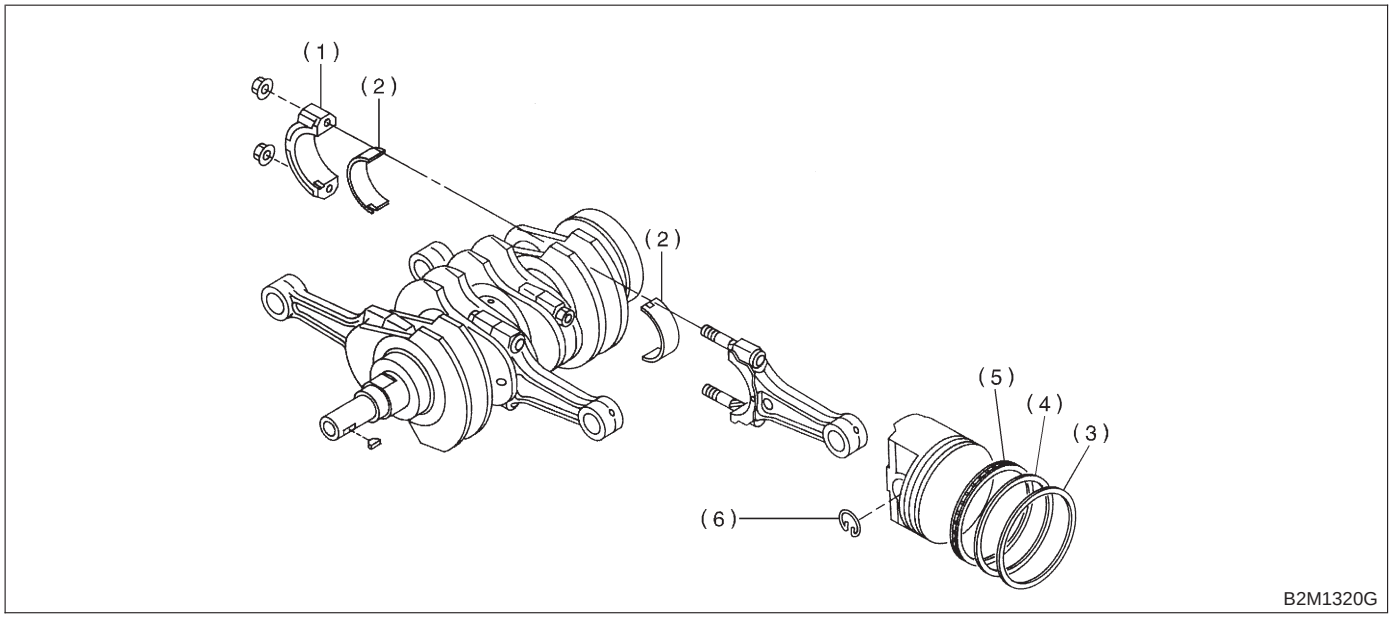
3) Remove rear oil seal.
4) Remove crankshaft together with connecting rod.
5) Remove crankshaft bearings from cylinder block using hammer handle.

CAUTION:
Do not confuse combination of crankshaft bearings. Press bearing at the end opposite to locking lip.

6) Draw out each piston from cylinder block using wooden bar or hammer handle.

CAUTION:
Do not confuse combination of piston and cylinder.

3. CRANKSHAFT AND PISTON



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Circlip

1) Remove connecting rod cap.
2) Remove connecting rod bearing.

CAUTION:
Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove piston top and second rings using the piston ring expander.
4) Remove the oil ring by hand.

CAUTION:
Arrange the removed piston rings in good order to prevent confusion.

5) Remove circlip.

C: INSPECTION

1. CYLINDER BLOCK

1) Check for cracks and damage visually. Especially, inspect important parts by means of red lead check.
2) Check the oil passages for clogging.
3) Inspect crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.05 mm (0.0020 in)

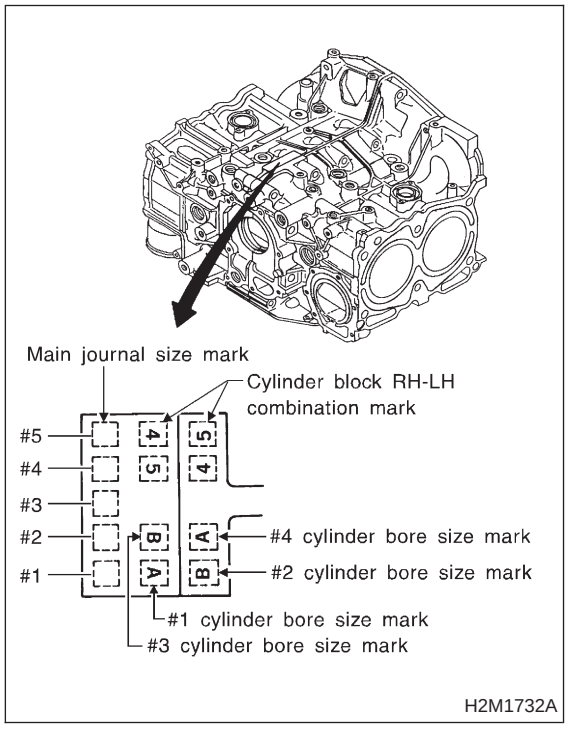
Grinding limit:
0.1 mm (0.004 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

NOTE:
Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guideline in selecting a standard piston.

Standard diameter:
A: 96.905 — 96.915 mm (3.8151 — 3.8155 in)
B: 96.895 — 96.905 mm (3.8148 — 3.8151 in)

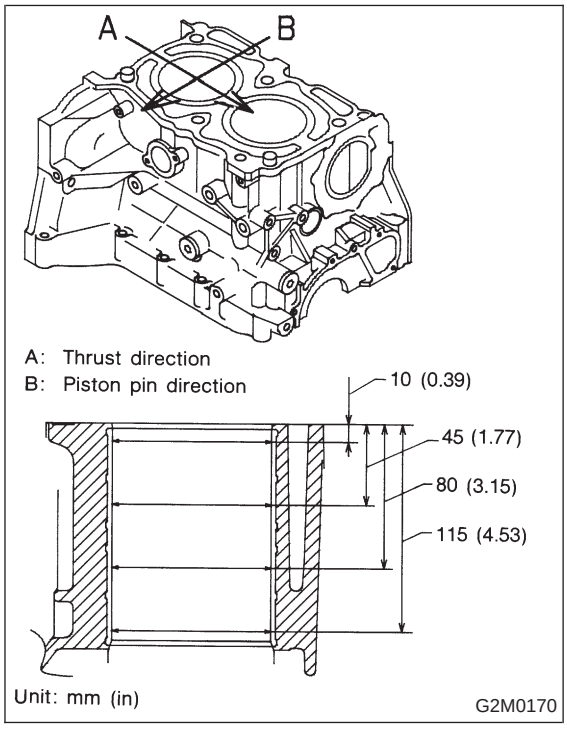


2) How to measure the inner diameter of each cylinder Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in the Figure, using a cylinder bore gauge.

CAUTION:
Measurement should be performed at a temperature 20°C (68°F).

Taper:
Standard
0.015 mm (0.0006 in)
Limit
0.050 mm (0.0020 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)
Limit
0.050 mm (0.0020 in)



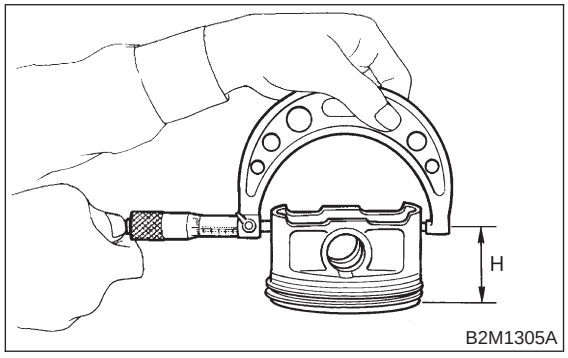
3) When piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

4) How to measure the outer diameter of each piston
Measure the outer diameter of each piston at the height shown in the Figure. (Thrust direction)

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
40.0 mm (1.575 in)

Piston outer diameter:
Standard
A: 96.885 — 96.895 mm (3.8144 — 3.8148 in)
B: 96.875 — 96.885 mm (3.8140 — 3.8144 in)
0.25 mm (0.0098 in) oversize
97.115 — 97.145 mm (3.8234 — 3.8246 in)
0.50 mm (0.0197 in) oversize
97.365 — 97.395 mm (3.8333 — 3.8344 in)



5) Calculate the clearance between cylinder and piston.

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.050 mm (0.0020 in)

6) Boring and honing
(1) If the value of taper, out-of-roundness, or cylinder- to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

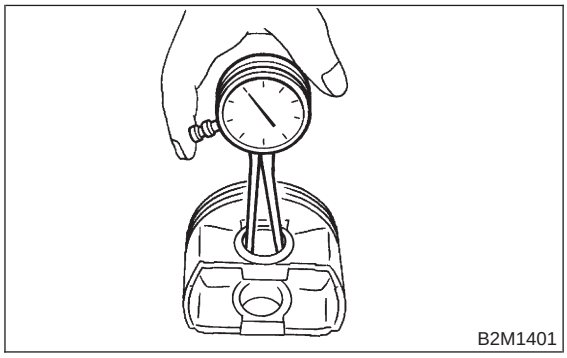
CAUTION:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

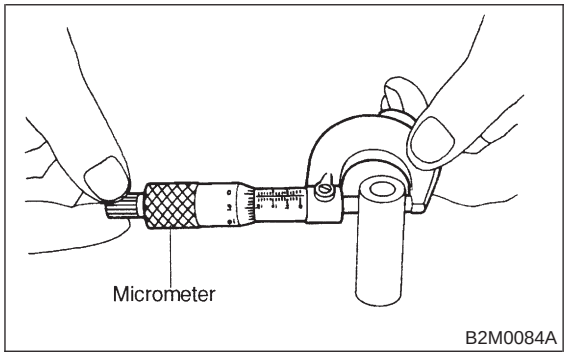
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

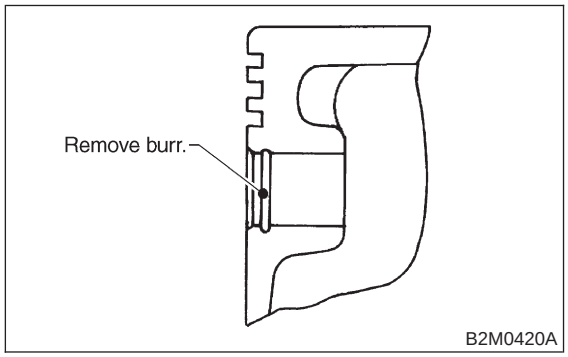
1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder as instructed in “2. CYLINDER AND PISTON”. <Ref. to 2-3a [W6C2].> If any of the clearances is not to specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.010 mm (0.0002 — 0.0004 in)
Limit
0.020 mm (0.0008 in)





4) Check circlip installation groove on the piston for burr. If necessary, remove burr from the groove so that piston pin can lightly move.

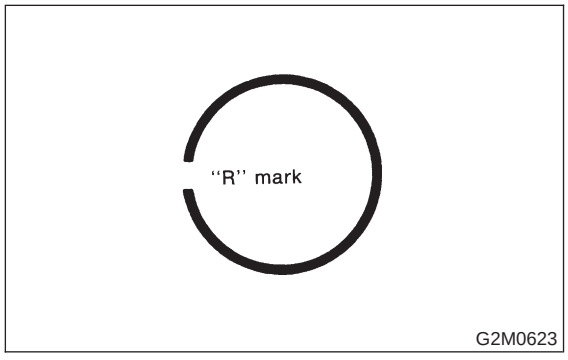


5) Check piston pin circlip for distortion, cracks and wear.

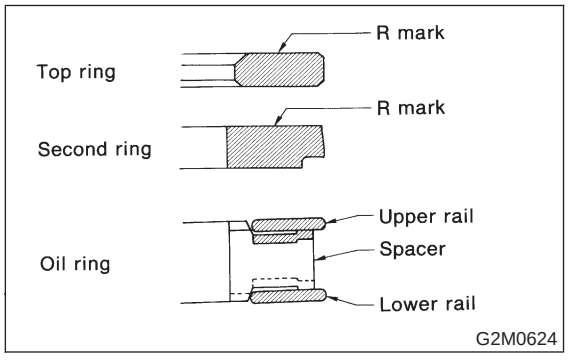
4. PISTON RING

1) If piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace piston ring with a new one of the same size as the piston.

CAUTION:
● "R" is marked on the end of the top and second rings. When installing the rings to the piston, face this mark upward.

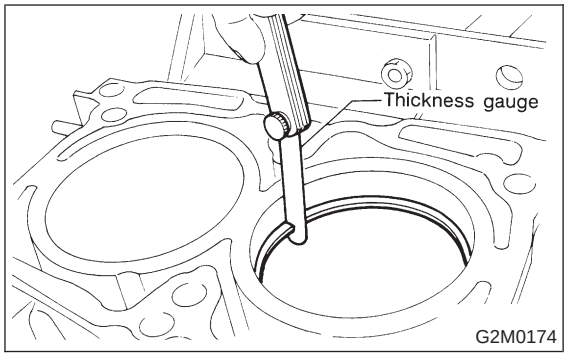


● The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.



2) Squarely place piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

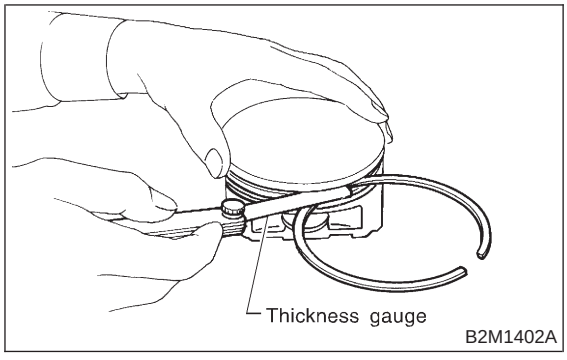
Item		Unit: mm (in)	
		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)	1.0 (0.039)
	Second ring	0.20 — 0.50 (0.0079 — 0.0197)	1.0 (0.039)
	Oil ring rail	0.20 — 0.70 (0.0079 — 0.0276)	1.5 (0.059)



3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

CAUTION:
Before measuring the clearance, clean the piston ring groove and piston ring.

Item		Unit: mm (in)	
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)

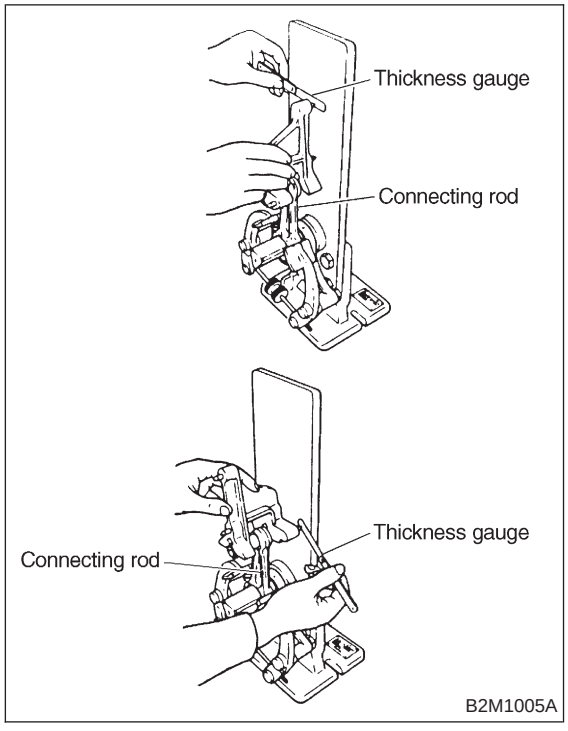


5. CONNECTING ROD

1) Replace connecting rod, if the large or small

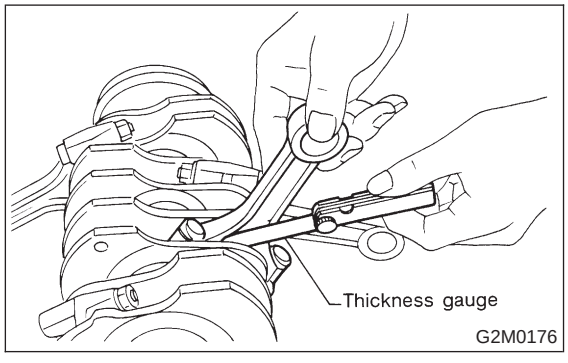
end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace connecting rod if the bend or twist exceeds the limit.

Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



3) Install connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). Replace connecting rod if the side clearance exceeds the specified limit.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)
Limit
0.4 mm (0.016 in)



4) Inspect connecting rod bearing for scar, peeling, seizure, melting, wear, etc.
5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary.

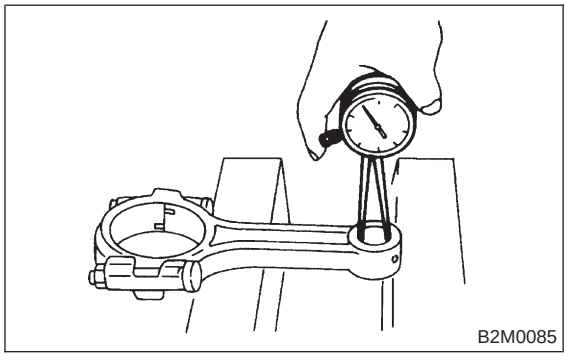
Connecting rod oil clearance:
Standard
0.015 — 0.045 mm (0.0006 — 0.0018 in)
Limit
0.05 mm (0.0020 in)

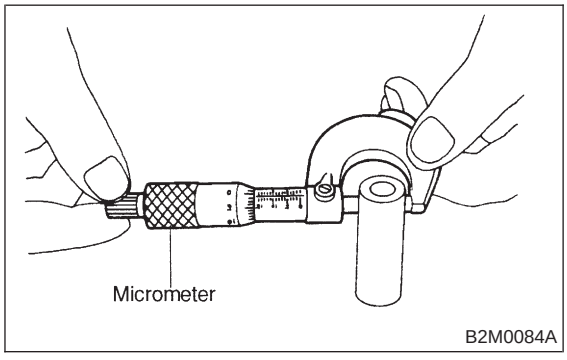
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

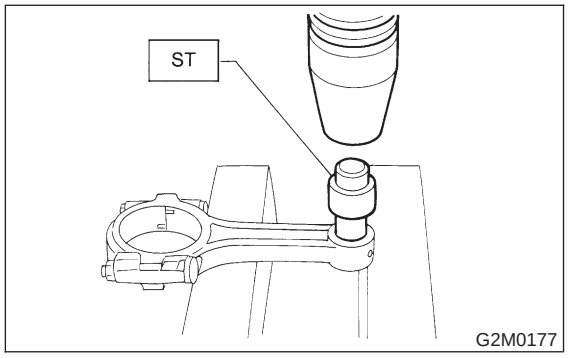
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)





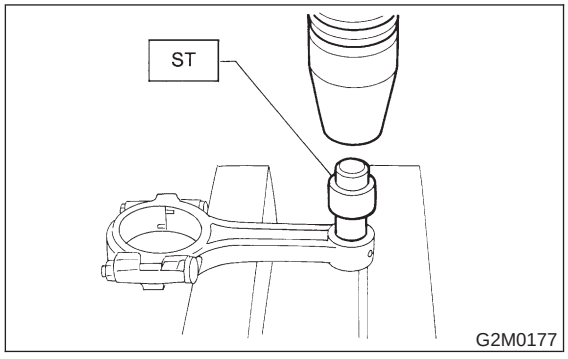
7) Replacement procedure is as follows.
(1) Remove bushing from connecting rod with ST and press.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



(2) Press bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean bushing to remove chips.

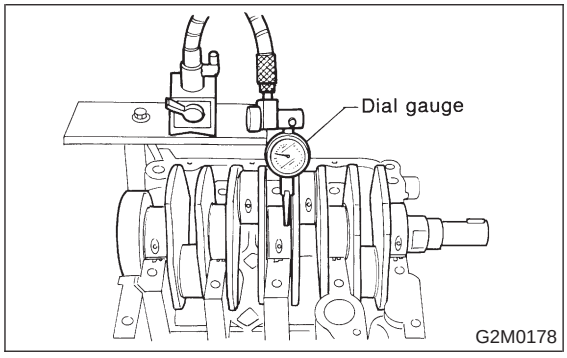
6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.

2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

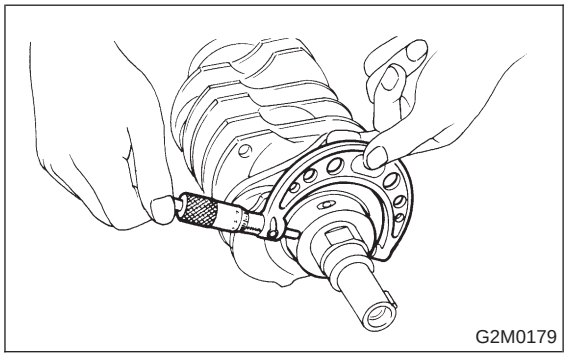
CAUTION:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position crankshaft on these bearings and measure crankshaft bend using a dial gauge.

Crankshaft bend limit:
0.035 mm (0.0014 in)



3) Inspect the crank journal and crank pin for wear. If not to specifications, replace bearing with an undersize one, and replace or recondition crankshaft as necessary. When grinding crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:
Out-of-roundness
0.030 mm (0.0012 in) or less
Taper limit
0.07 mm (0.0028 in)
Grinding limit
0.25 mm (0.0098 in)



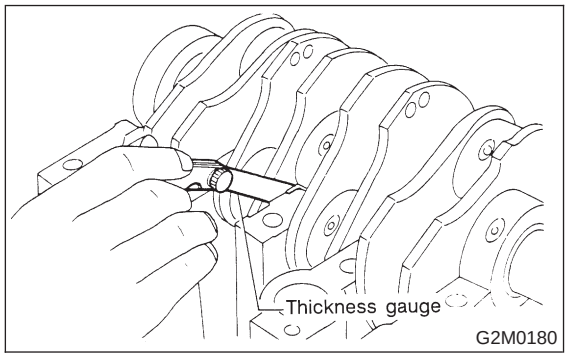
Unit: mm (in)

		Crank journal diameter		Crank pin diameter
		#1, #5	#2, #3, #4	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.954 — 59.970 (2.3604 — 2.3610)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.934 — 59.950 (2.3596 — 2.3602)	59.934 — 59.950 (2.3596 — 2.3602)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.734 — 59.750 (2.3517 — 2.3524)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)

O.D. ... Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)
Limit
0.25 mm (0.0098 in)



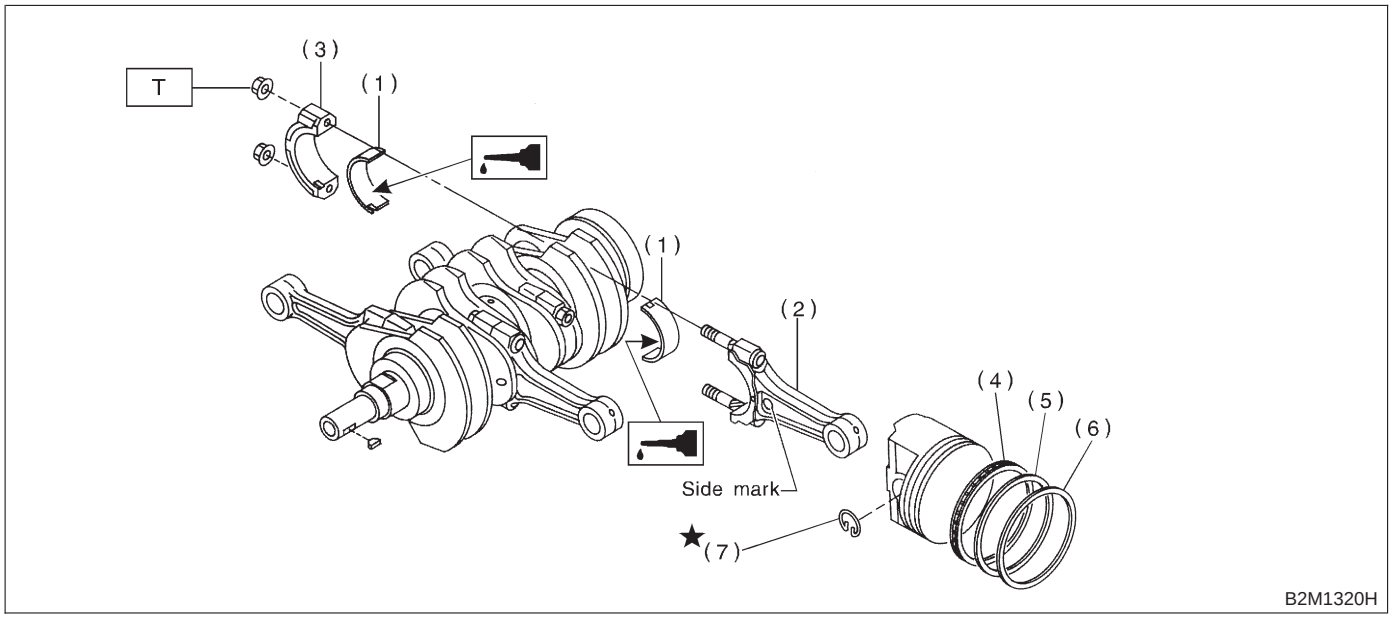
5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.
6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace defective bearing with an undersize one, and replace or recondition crankshaft as necessary.

Unit: mm (in)

Crankshaft oil clearance		
Standard	#1, #5	0.003 — 0.030 (0.0001 — 0.0012)
	#2, #3, #4	0.010 — 0.033 (0.0004 — 0.0013)
Limit	#1, #3, #5	0.040 (0.0016)
	#2, #4	0.035 (0.0014)

D: ASSEMBLY

1. CRANKSHAFT AND PISTON



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Circlip
★: Replacement part

Tightening torque: N·m (kg-m, ft-lb)
T: 44±2 (4.5±0.2, 32.5±1.4)

1) Install connecting rod bearings on connecting rods and connecting rod caps.

CAUTION:
Apply oil to the surfaces of the connecting rod bearings.

2) Install connecting rod on crankshaft.

CAUTION:
Position each connecting rod with the side marked facing forward.

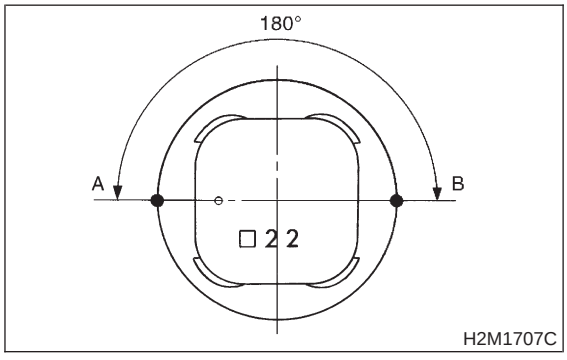
3) Install connecting rod cap with connecting rod nut. Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
● Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
● When tightening the connecting rod nuts, apply oil on the threads.

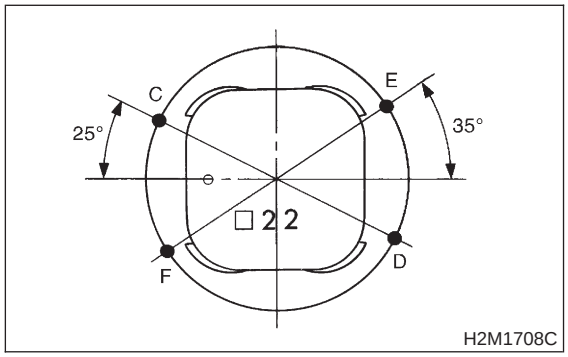
4) Installation of piston rings and oil ring

CAUTION:
● Ensure ring gaps do not face the same direction.
● Ensure ring gaps are not within the piston skirt area.

(1) Install oil ring spacer, upper rail and lower rail in this order by hand. Then install second ring and top ring with a piston ring expander.
(2) Position the top ring gap at A or B in the Figure.
(3) Position the second ring gap at 180° on the reverse side for the top ring gap.



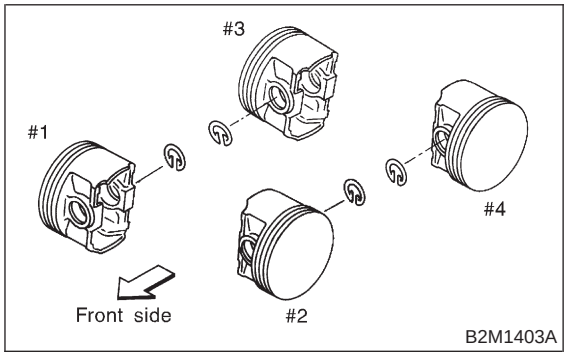
(4) Position the upper rail gap at C or D in the Figure.
(5) Position the expander gap at 180° of the reverse side for the upper rail gap.
(6) Position the lower rail gap at E or F in the Figure.



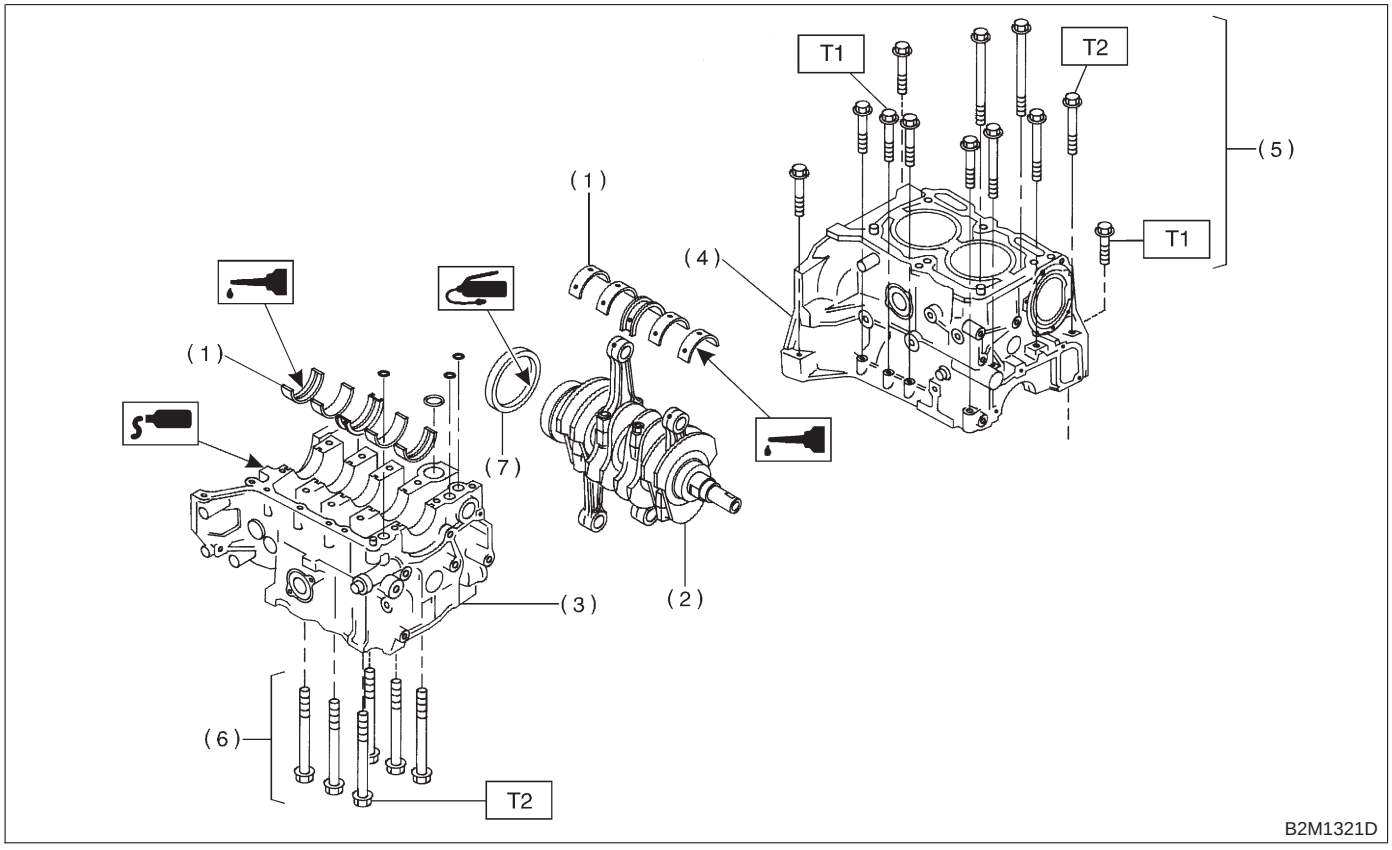
5) Install circlip.
Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

CAUTION:
Use new circlips.

NOTE:
Piston front mark "◯" facer toward front of engine.



2. CYLINDER BLOCK



(1) Crankshaft bearing
(2) Crankshaft ASSY
(3) Cylinder block (LH)
(4) Cylinder block (RH)
(5) Bolt
(6) Bolt
(7) Rear oil seal

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±2 (2.5±0.2, 18.1±1.4)
T2: 47±3 (4.8±0.3, 34.7±2.2)

1) Install ST to cylinder block, then install crankshaft bearings.

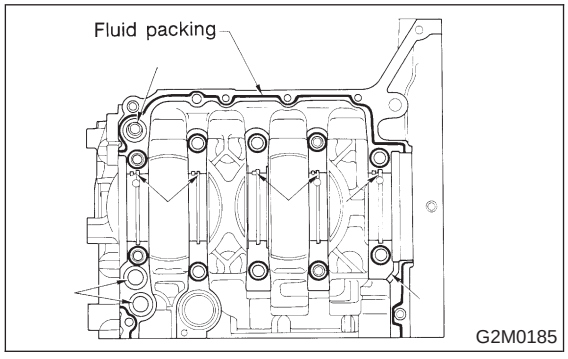
ST 499817000 ENGINE STAND

CAUTION:
Remove oil the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

2) Position crankshaft on the cylinder block (LH).
3) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

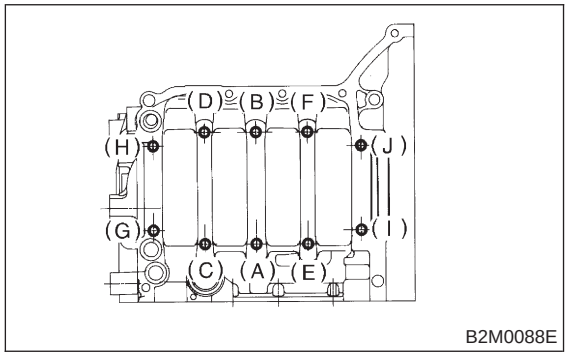
CAUTION:
Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.

Fluid packing:
THREE BOND 1215 or equivalent



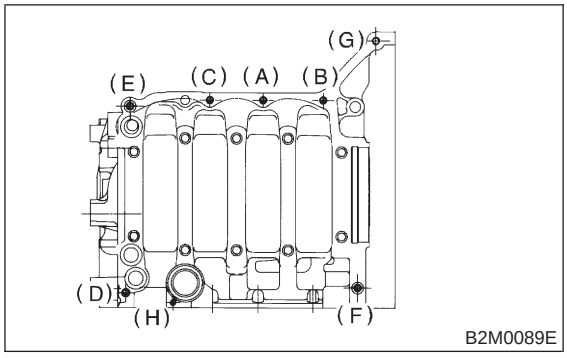
4) Temporarily tighten 10 mm cylinder block connecting bolts in alphabetical order shown in Figure.
5) Tighten 10 mm cylinder block connecting bolts in alphabetical order.

Tightening torque:
47±3 N·m (4.8±0.3 kg-m, 34.7±2.2 ft-lb)

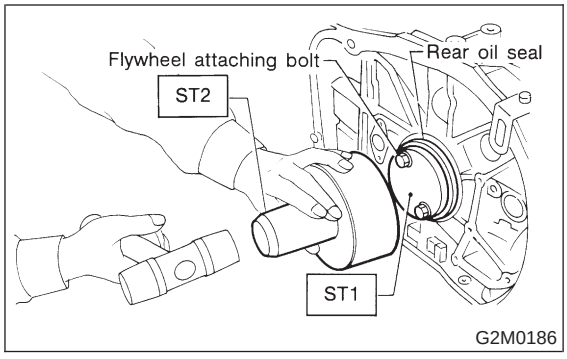


6) Tighten 8 mm and 6 mm cylinder block connecting bolts in alphabetical order shown in Figure.

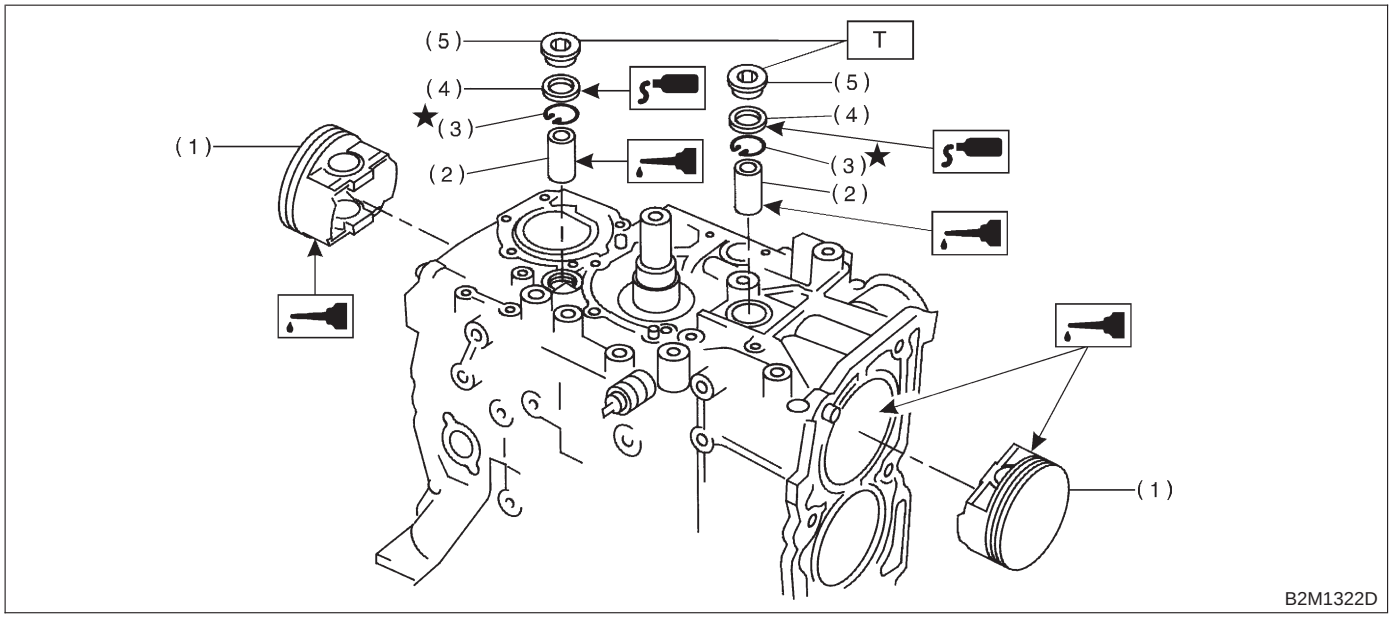
Tightening torque:
(A) — (G):
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
(H):
6.4 N·m (0.65 kg-m, 4.7 ft-lb)



7) Install rear oil seal by using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER



3. PISTON AND PISTON PIN (#1 AND #2)



(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
★: Replacement part

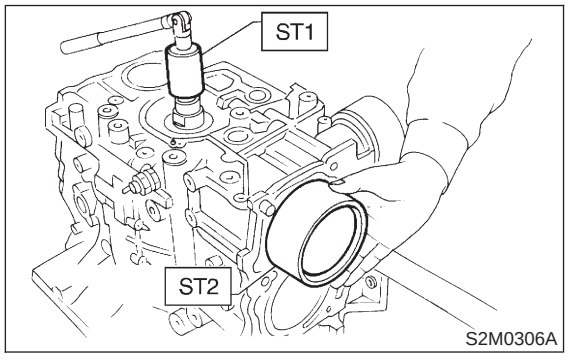
Tightening torque: N·m (kg-m, ft-lb)
T: 69±7 (7.0±0.7, 50.6±5.1)

1) Installing piston
(1) Turn cylinder block so that #1 and #2 cylinders face upward.
(2) Using ST1, turn crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

(3) Apply a coat of engine oil to pistons and cylinders and insert pistons in their cylinders by using ST2.

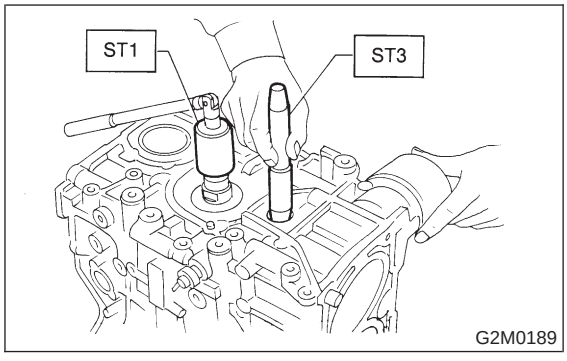
ST2 398744300 PISTON GUIDE



2) Installing piston pin
(1) Insert ST3 into service hole to align piston pin hole with connecting rod small end.

CAUTION:
Apply a coat of engine oil to ST3 before insertion.

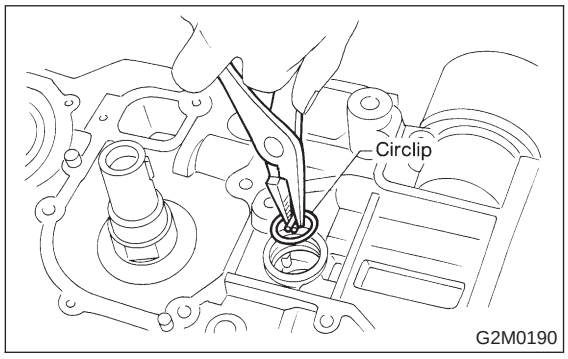
ST3 499017100 PISTON PIN GUIDE



(2) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod through service hole.

(3) Install circlip.

CAUTION:
Use a new circlip.

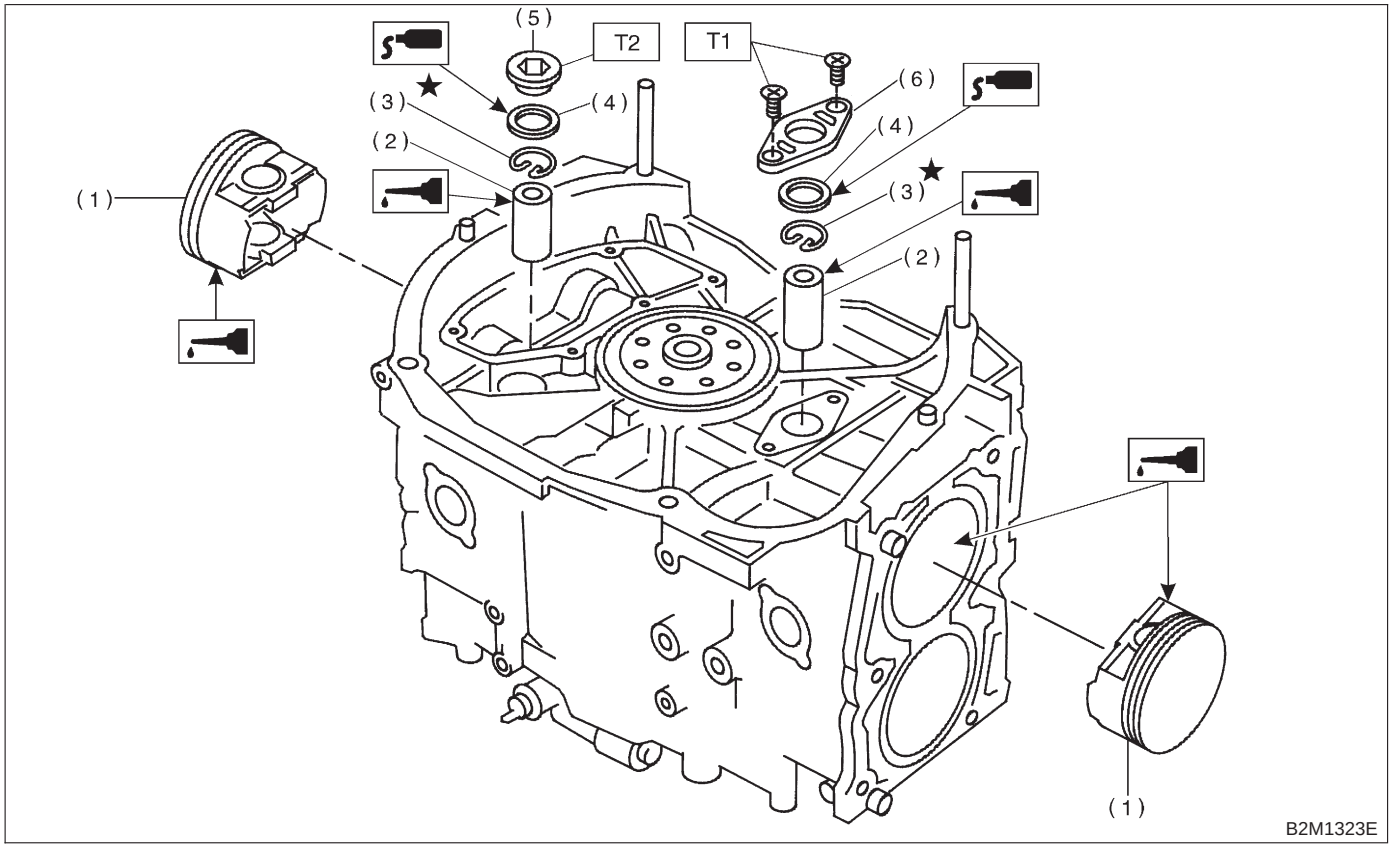


(4) Install service hole plug and gasket.

CAUTION:
Use a new gasket and apply a coat of fluid packing to it before installation.

Fluid packing:
THREE BOND 1215 or equivalent

4. PISTON AND PISTON PIN (#3 AND #4)



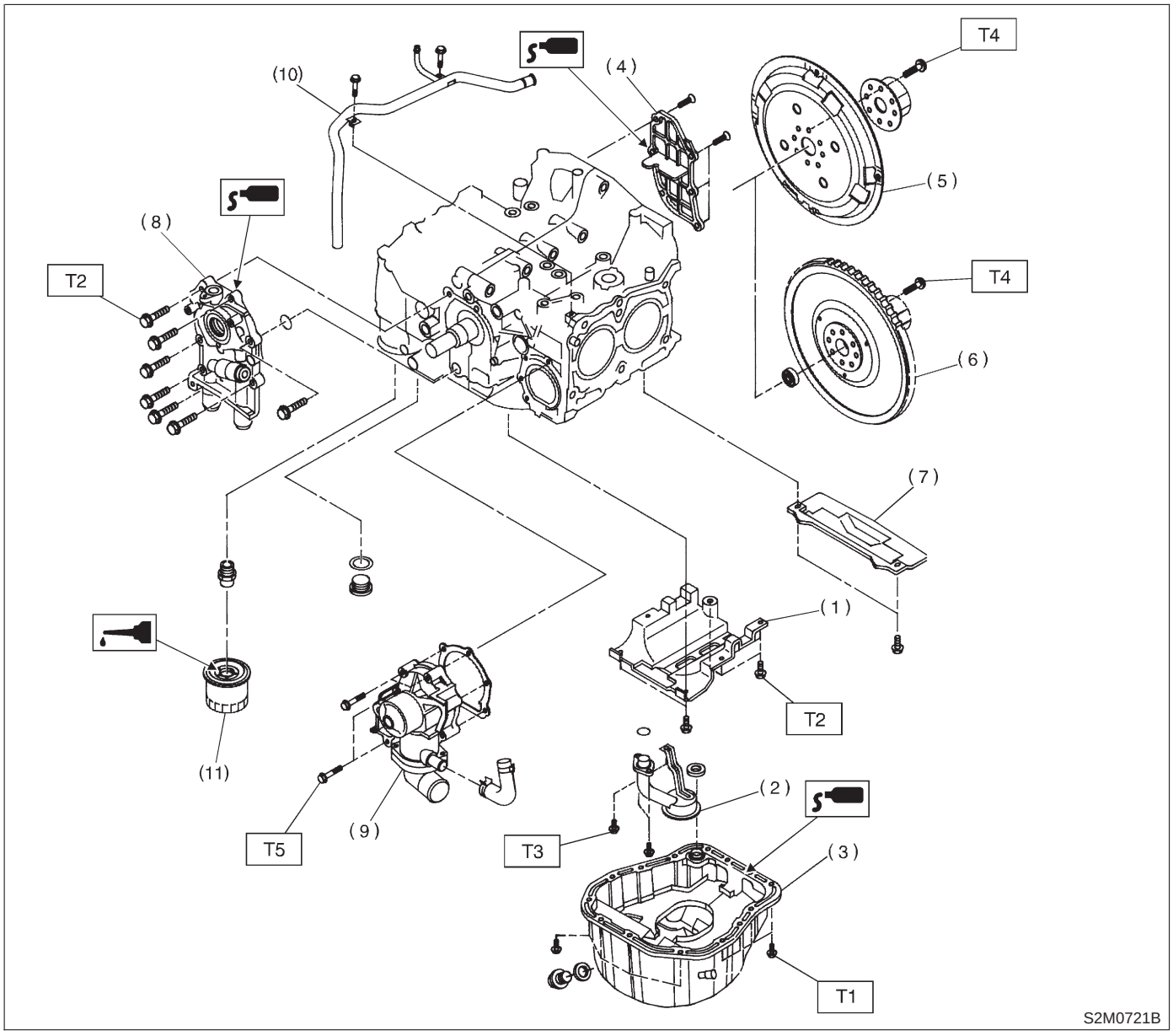
(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover
★: Replacement part

Tightening torque: N·m (kg-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 69±7 (7.0±0.7, 50.6±5.1)

Turn cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install pistons and piston pins.

E: INSTALLATION

1. OIL PUMP AND WATER PUMP

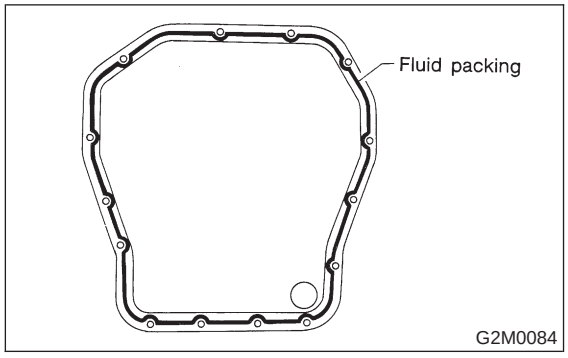


(1) Baffle plate
(2) Oil strainer
(3) Oil pan
(4) Oil strainer cover
(5) Drive plate (AT vehicles)
(6) Flywheel (MT vehicles)
(7) Clutch housing (MT vehicles)
(8) Oil pump
(9) Water pump
(10) Water by-pass pipe
(11) Oil filter

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 72±3 (7.3±0.3, 52.8±2.2)
T5: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

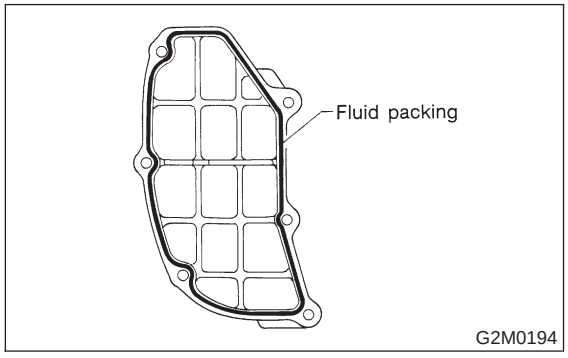
1) Install baffle plate.
2) Install oil strainer and O-ring.
3) Install oil strainer stay.
4) Apply fluid packing to matching surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent

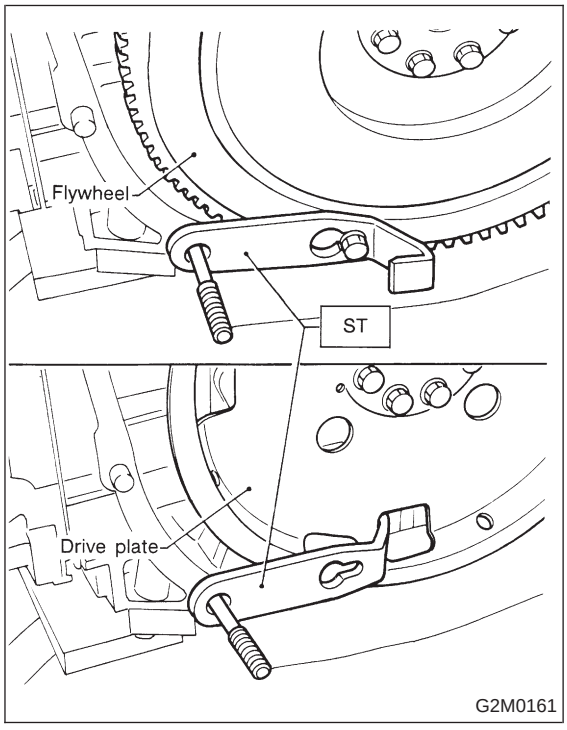


5) Apply fluid packing to matching surfaces and install oil separator cover.

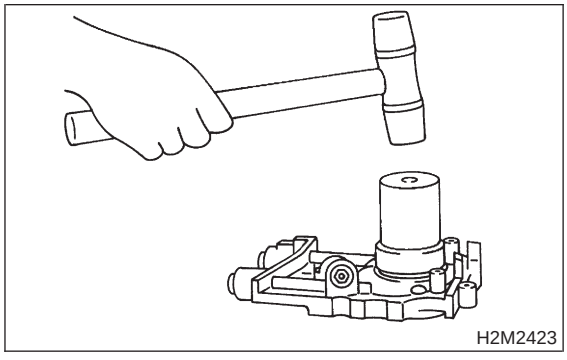
Fluid packing:
THREE BOND 1215 or equivalent



6) Install flywheel or drive plate.
To lock crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

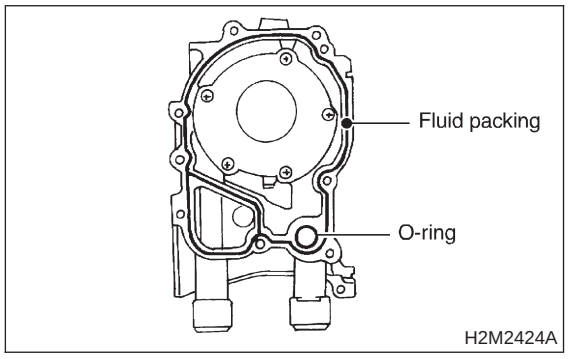


7) Install housing cover.
8) Installation of oil pump.
(1) Discard front oil seal after removal. Replace with a new one by using ST.
ST 499587100 OIL SEAL INSTALLER



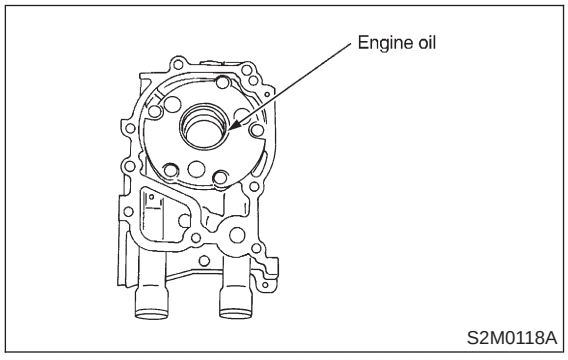
(2) Apply fluid packing to matching surface of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent



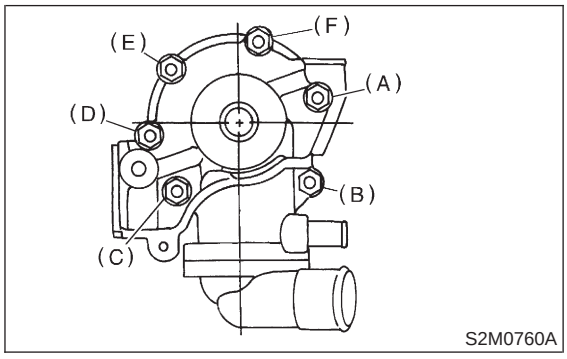
(3) Apply a coat of engine oil to the inside of the oil seal.
(4) Install oil pump on cylinder block. Be careful not to damage oil seal during installation.

CAUTION:
● Do not forget to install O-ring and seal when installing oil pump.
● Align flat surface of oil pump's inner rotor with crankshaft before installation.



9) Install water pump and gasket.

CAUTION:
● Be sure to use a new gasket.
● When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in Figure.



10) Install water pipe and water by-pass pipe.
11) Install oil filter.

2. RELATED PARTS

1) Install cylinder head and intake manifold.
<Ref. to 2-3a [W5E0].>
2) Install timing belt, camshaft sprocket and related parts.
<Ref. to 2-3a [W2C0].>

1. Engine Trouble in General

NOTE:
"RANK" shown in the chart refer to the possibility of reason for the trouble in order ("Very often" to "Rarely")
A — Very often
B — Sometimes
C — Rarely

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
1. Engine will not start.			
1) Starter does not turn.	● Starter	● Defective battery-to-starter harness	B
		● Defective starter switch	C
		● Defective inhibitor switch or neutral switch	C
		● Defective starter	B
	● Battery	● Poor terminal connection	A
		● Run-down battery	A
		● Defective charging system	B
	● Friction	● Seizure of crankshaft and connecting rod bearing	C
		● Seized camshaft	C
		● Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	● Starter	● Defective starter	C
	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Fuel line	● Defective fuel pump and relay	A
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3) Initial combustion occurs.	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of/or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
4) Engine stalls after initial combustion.	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Loosened or cracked intake duct	B
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	C
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Dirty air cleaner element	C
	● Fuel line	● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
2. Rough idle and engine stall	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	C
		● Loosened oil filler cap	B
		● Dirty air cleaner element	C
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of/or insufficient fuel	B
	● Belt	● Defective timing	C
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
		● Defective rocker cover gasket	C
	● Cooling system	● Overheating	C
	● Others	● Malfunction of evaporative emission control system	A
		● Stuck or damaged throttle valve	B
		● Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	B
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filler cap	B
		● Dirty air cleaner element	A
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of/or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
	● Cooling system	● Overheating	C
		● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	A

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
4. Surging	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filler cap	B
		● Dirty air cleaner element	B
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of/or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	C
5. Engine does not return to idle.	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Loosened or cracked vacuum hose	A
	● Others	● Stuck or damaged throttle valve	A
		● Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Cooling system	● Overheating	B
	● Others	● Accelerator cable out of adjustment	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
7. After burning in exhaust system	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Loosened or cracked intake duct	C
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	B
		● Defective PCV valve	B
		● Loosened oil filler cap	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	C
8. Knocking	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Loosened oil filler cap	B
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Incorrect valve timing	B
	● Cooling system	● Overheating	A
9. Excessive engine oil consumption	● Intake system	● Loosened or cracked PCV hose	A
		● Defective PCV valve	B
		● Loosened oil filler cap	C
	● Compression	● Defective valve stem	A
		● Worn or stuck piston rings, cylinder and piston	A
	● Lubrication system	● Loosened oil pump attaching bolts and defective gasket	B
		● Defective oil filter seal	B
		● defective crankshaft oil seal	B
		● Defective rocker cover gasket	B
		● Loosened oil drain plug or defective gasket	B
		● Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	● Fuel injection system (Ref. to 2-7 On-Board Diagnostics II System)		A
	● Intake system	● Dirty air cleaner element	A
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken spring	C
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	B
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Accelerator cable out of adjustment	B

2. Engine Noise

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	● Valve mechanism is defective. ● Incorrect valve clearance ● Worn valve rocker ● Worn camshaft ● Broken valve spring
Heavy and dull clank	Oil pressure is low.	● Worn crankshaft main bearing ● Worn connecting rod bearing (big end)
	Oil pressure is normal.	● Loose flywheel mounting bolts ● Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	● Ignition timing advanced ● Accumulation of carbon inside combustion chamber ● Wrong spark plug ● Improper gasoline
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	● Worn crankshaft main bearing ● Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm.	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	● Worn cylinder liner and piston ring ● Broken or stuck piston ring ● Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	● Worn camshaft journal bore in crankcase
Squeaky sound	—	● Insufficient generator lubrication
Rubbing sound	—	● Defective generator brush and rotor contact
Gear scream when starting engine	—	● Defective ignition starter switch ● Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	● Loose drive belt ● Defective water pump shaft
Hissing sound	—	● Loss of compression ● Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	● Loose timing belt ● Belt contacting case/adjacent part
Valve tappet noise	—	● Incorrect valve clearance

NOTE*:
● When disconnecting fuel injector connector, Malfunction Indicator Light (CHECK ENGINE light) illuminates and trouble code is stored in ECM memory.
● Therefore, carry out the CLEAR MEMORY MODE <Ref. to 2-7 [T3D0].> and INSPECTION MODE <Ref. to 2-7 [T3E0].> after connecting fuel injector connector.

ENGINE (DOHC) 2-3b

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1. Engine

A: SPECIFICATIONS

Engine	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement			Belt driven, double over-head camshaft, 4-valve/ cylinder
	Bore × Stroke		mm (in)	99.5 × 79.0 (3.917 × 3.110)
	Displacement		cm^3 (cu in)	2,457 (149.93)
	Compression ratio			9.7
	Compression pressure (at 200 — 300 rpm)	Standard	kPa (kg/cm^2, psi) − rpm	1,245 (12.7, 181) − 350
		Limit	kPa (kg/cm^2, psi) − rpm	991 (10.1, 144) − 350
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening		6° BTDC
		Closing		50° ABDC
	Exhaust valve timing	Opening		Front: 54° BBDC, Rear: 30° BBDC (Position in degrees)
		Closing		Front: 10° ATDC, Rear: 10° ATDC (Position in degrees)
	Valve clearance	Intake	mm (in)	0.20±0.02 (0.0079±0.0008)
		Exhaust	mm (in)	0.25±0.02 (0.0098±0.0008)
	Idling speed [At neutral position on MT, or “P” or “N” position on AT]		rpm	700±100 (No load) 850±50 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4
Ignition timing			BTDC/rpm	15°±8°/700 rpm

B: SERVICE DATA

NOTE:
STD: Standard, I.D.: Inner Diameter, O.D.: Outer Diameter, OS: Oversize, US: Undersize

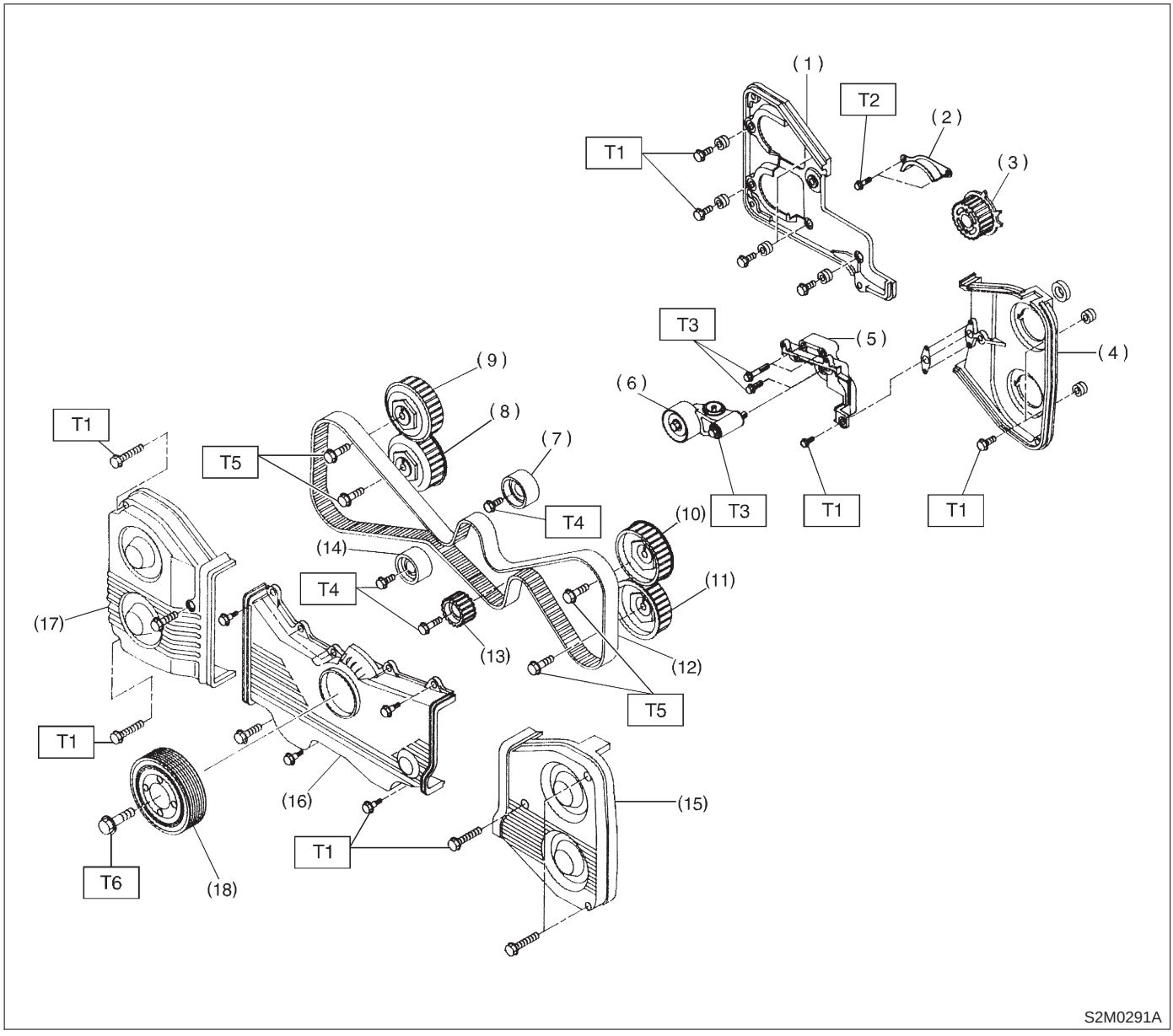
Belt tension adjuster	Protrusion of adjuster rod			0 — 5.7 mm	(0 — 0.224 in)
Belt tensioner	Spacer O.D.			16 mm	(0.63 in)
	Tensioner bush I.D.			16.16 mm	(0.6362 in)
	Clearance between spacer and bush		STD	0.117 — 0.180 mm	(0.0046 — 0.0071 in)
			Limit	0.230 mm	(0.0091 in)
	Side clearance of spacer		STD	0.37 — 0.54 mm	(0.0146 — 0.0213 in)
			Limit	0.8 mm	(0.031 in)
Camshaft	Bend limit			0.020 mm	(0.0008 in)
	Thrust clearance		STD	0.040 — 0.065 mm	(0.0016 — 0.0026 in)
			Limit	0.10 mm	(0.0039 in)
	Cam lobe height	Intake	STD	42.20 — 42.30 mm	(1.6614 — 1.6654 in)
			Limit	42.05 mm	(1.6555 in)
		Exhaust	STD	Front: 42.50 — 42.60 mm Rear: 41.40 — 41.50 mm	(1.6732 — 1.6772 in) (1.6299 — 1.6339 in)
			Limit	Front: 42.35 mm Rear: 41.25 mm	(1.6673 in) (1.6240 in)
	Camshaft journal O.D.		Front	31.946 — 31.963 mm	(1.2577 — 1.2584 in)
			Center	27.946 — 27.963 mm	(1.1002 — 1.1009 in)
			Rear	27.946 — 27.963 mm	(1.1002 — 1.1009 in)
	Camshaft journal hole I.D.		Front	32.000 — 32.018 mm	(1.2598 — 1.2605 in)
			Center	28.000 — 28.018 mm	(1.1024 — 1.1031 in)
			Rear	28.000 — 28.018 mm	(1.1024 — 1.1031 in)
	Oil clearance		STD	0.037 — 0.072 mm	(0.0015 — 0.0028 in)
			Limit	0.10 mm	(0.0039 in)
Cylinder head	Surface warpage limit			0.05 mm	(0.0020 in)
	Surface grinding limit			0.3 mm	(0.012 in)
	Standard height			127.5 mm	(5.02 in)
Valve seat	Refacing angle			90°	
	Contacting width	Intake	STD	1.0 mm	(0.039 in)
			Limit	1.7 mm	(0.067 in)
		Exhaust	STD	1.5 mm	(0.059 in)
			Limit	2.2 mm	(0.087 in)
Valve guide	Inner diameter			6.000 — 6.015 mm	(0.2362 — 0.2368 in)
	Protrusion above head			12.0 — 12.4 mm	(0.472 — 0.488 in)
Valve	Head edge thickness	Intake	STD	1.2 mm	(0.047 in)
			Limit	0.8 mm	(0.031 in)
		Exhaust	STD	1.5 mm	(0.059 in)
			Limit	0.8 mm	(0.031 in)
	Stem diameter		Intake	5.950 — 5.965 mm	(0.2343 — 0.2348 in)
			Exhaust	5.950 — 5.965 mm	(0.2343 — 0.2348 in)
	Stem oil clearance	STD	Intake	0.035 — 0.062 mm	(0.0014 — 0.0024 in)
			Exhaust	0.040 — 0.067 mm	(0.0016 — 0.0026 in)
		Limit	—	0.15 mm	(0.0059 in)
	Overall length		Intake	105.9 mm	(4.169 in)
			Exhaust	106.2 mm	(4.181 in)

Valve spring	Free length			48.04 mm	(1.8913 in)
	Squareness			2.5°, 2.1 mm	(0.083 in)
	Tension/spring height			146.1 — 167.7 N (14.9 — 17.1 kg, 32.9 — 37.7 lb)/42.0 mm (1.654 in) 455.0 — 523.7 N (46.4 — 53.4 kg, 102.3 — 117.7 lb)/33.4 mm (1.315 in)	
Cylinder block	Surface warpage limit (mating with cylinder head)			0.05 mm	(0.0020 in)
	Surface grinding limit			0.1 mm	(0.004 in)
	Cylinder bore	STD	A	99.505 — 99.515 mm	(3.9175 — 3.9179 in)
			B	99.495 — 99.505 mm	(3.9171 — 3.9175 in)
	Taper		STD	0.015 mm	(0.0006 in)
			Limit	0.050 mm	(0.0020 in)
	Out-of-roundness		STD	0.010 mm	(0.0004 in)
			Limit	0.050 mm	(0.0020 in)
	Piston clearance		STD	0.004 — 0.010 mm	(0.0002 — 0.0004 in)
			Limit	0.020 mm	(0.0008 in)
	Enlarging (boring) limit			0.5 mm	(0.020 in)
Piston	Outer diameter	STD	A	99.485 — 99.495 mm	(3.9167 — 3.9171 in)
			B	99.475 — 99.485 mm	(3.9163 — 3.9167 in)
		0.25 mm (0.0098 in) OS		99.725 — 99.735 mm	(3.9262 — 3.9266 in)
		0.50 mm (0.0197 in) OS		99.975 — 99.985 mm	(3.9360 — 3.9364 in)
Piston pin	Standard clearance between piston pin and hole in piston		STD	0.004 — 0.010 mm	(0.0002 — 0.0004 in)
			Limit	0.020 mm	(0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).	
Piston ring	Piston ring gap	Top ring	STD	0.20 — 0.35 mm	(0.0079 — 0.0138 in)
			Limit	1.0 mm	(0.039 in)
		Second ring	STD	0.37 — 0.52 mm	(0.0146 — 0.0205 in)
			Limit	1.0 mm	(0.039 in)
		Oil ring	STD	0.20 — 0.60 mm	(0.0079 — 0.0236 in)
			Limit	1.5 mm	(0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm	(0.0016 — 0.0031 in)
			Limit	0.15 mm	(0.0059 in)
		Second ring	STD	0.030 — 0.070 mm	(0.0012 — 0.0028 in)
			Limit	0.15 mm	(0.0059 in)
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit	0.10 mm	(0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm	(0.0028 — 0.0130 in)
			Limit	0.4 mm	(0.016 in)
Connecting rod bearing	Oil clearance		STD	0.010 — 0.038 mm	(0.0004 — 0.0015 in)
			Limit	0.05 mm	(0.0020 in)
	Thickness at center portion		STD	1.492 — 1.501 mm	(0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.510 — 1.513 mm	(0.0594 — 0.0596 in)
			0.05 mm (0.0020 in) US	1.520 — 1.523 mm	(0.0598 — 0.0600 in)
			0.25 mm (0.0098 in) US	1.620 — 1.623 mm	(0.0638 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm	(0 — 0.0009 in)
			Limit	0.030 mm	(0.0012 in)

Crankshaft	Bend limit			0.035 mm	(0.0014 in)
	Crank pin and crank journal	Out-of-roundness		0.020 mm (0.0008 in) or less	
		Grinding limit		0.25 mm	(0.0098 in)
	Crank pin outer diameter		STD	47.984 — 48.000 mm	(1.8891 — 1.8898 in)
			0.03 mm (0.0012 in) US	47.954 — 47.970 mm	(1.8879 — 1.8886 in)
			0.05 mm (0.0020 in) US	47.934 — 47.950 mm	(1.8872 — 1.8878 in)
			0.25 mm (0.0098 in) US	47.734 — 47.750 mm	(1.8793 — 1.8799 in)
	Crank journal outer diameter	#1, #5	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm	(2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm	(2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm	(2.3520 — 2.3527 in)
		#2, #3, #4	STD	59.992 — 60.008 mm	(2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm	(2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm	(2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm	(2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm	(0.0012 — 0.0045 in)
			Limit	0.25 mm	(0.0098 in)
	Oil clearance	#1, #5	STD	0.003 — 0.030 mm	(0.0001 — 0.0012 in)
		#2, #3, #4	STD	0.010 — 0.033 mm	(0.0004 — 0.0013 in)
		#1, #3, #5	Limit	0.040 mm	(0.0016 in)
		#2, #4	Limit	0.045 mm	(0.0018 in)

Crankshaft bearing	Crankshaft bearing thickness	#1, #5	STD	1.998 — 2.011 mm	(0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm	(0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm	(0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm	(0.0837 — 0.0839 in)
		#2, #3, #4	STD	2.000 — 2.013 mm	(0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm	(0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm	(0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm	(0.0838 — 0.0839 in)

1. Timing Belt

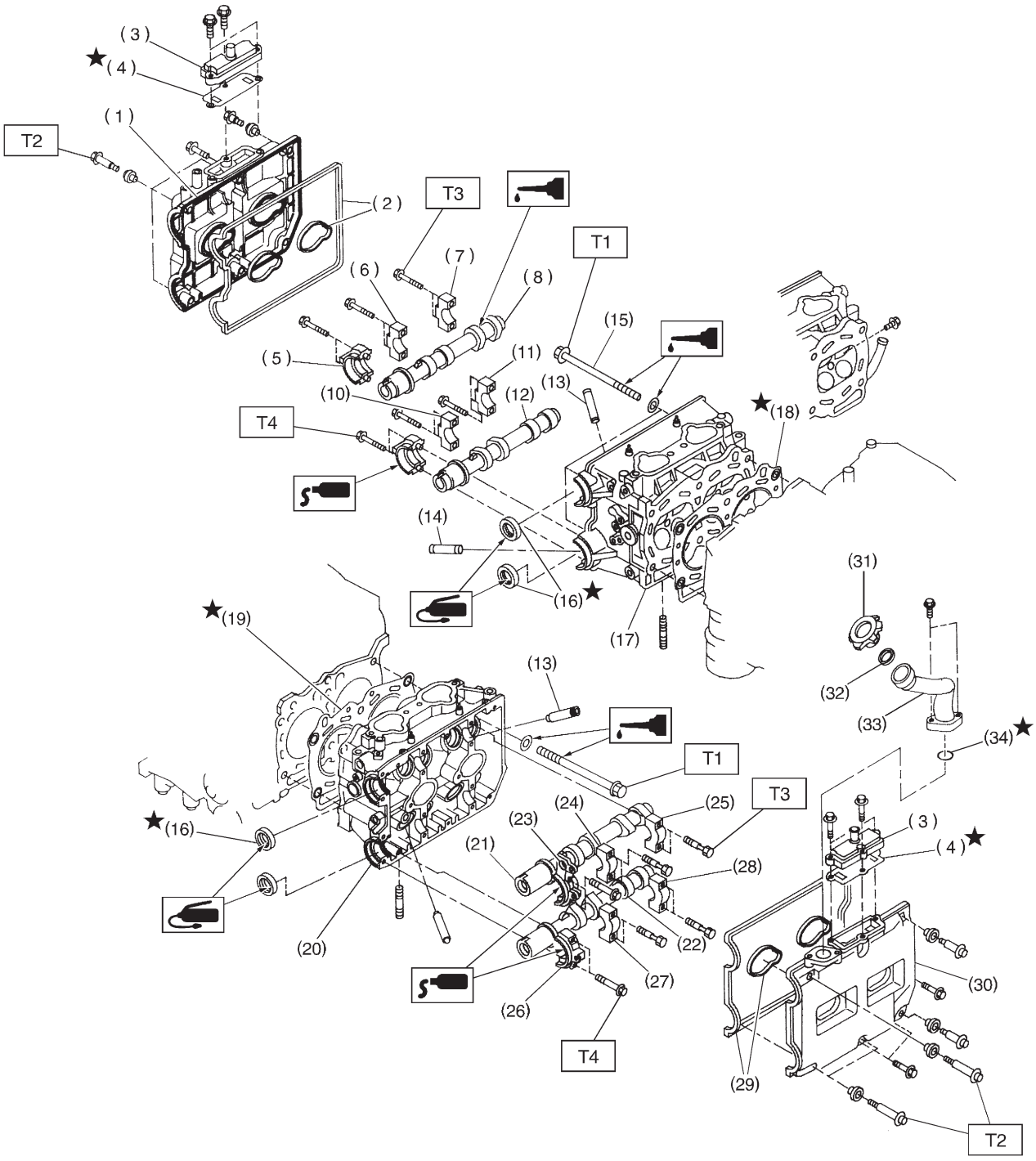


S2M0291A

(1) Right-hand belt cover No. 2
(2) Timing belt guide (MT vehicles only)
(3) Crankshaft sprocket
(4) Left-hand belt cover No. 2
(5) Tensioner bracket
(6) Automatic belt tension adjuster ASSY
(7) Belt idler
(8) Right-hand exhaust camshaft sprocket
(9) Right-hand intake camshaft sprocket
(10) Left-hand intake camshaft sprocket
(11) Left-hand exhaust camshaft sprocket
(12) Timing belt
(13) Belt idler No. 2
(14) Belt idler
(15) Left-hand belt cover
(16) Front belt cover
(17) Right-hand belt cover
(18) Crankshaft pulley

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.9±0.5 (0.5±0.05, 3.6±0.4)
T2: 9.8±1.0 (1.0±0.1, 7.2±0.7)
T3: 25±3 (2.5±0.3, 18.1±2.2)
T4: 39±4 (4.0±0.4, 28.9±2.9)
T5: 78±5 (8.0±0.5, 57.9±3.6)
T6: 177±10 (18.0±1.0, 130±7)

2. Cylinder Head and Camshaft

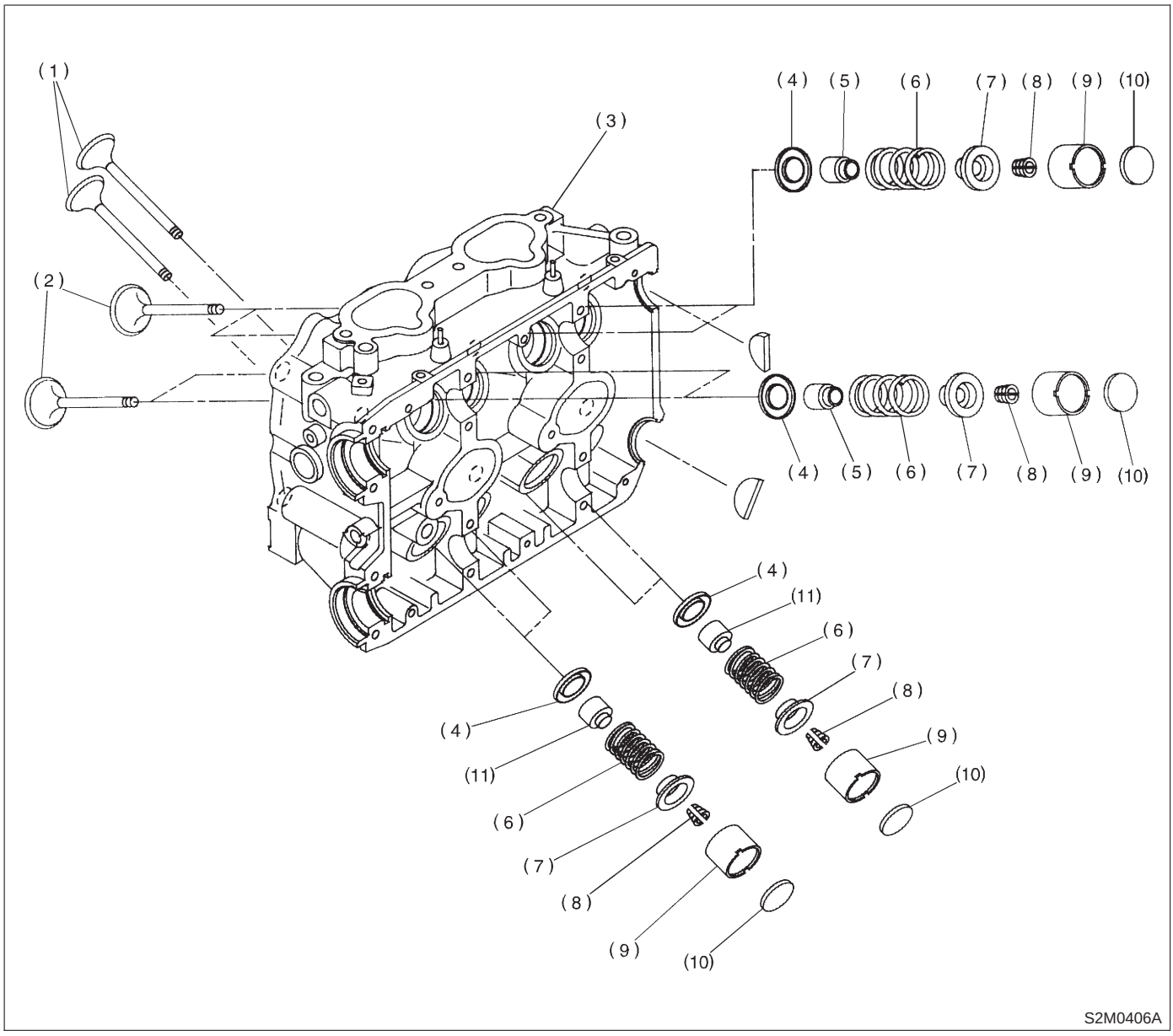


S2M0292D

(1) Rocker cover (RH)
(2) Rocker cover gasket (RH)
(3) Oil separator cover
(4) Gasket
(5) Intake camshaft cap (Front RH)
(6) Intake camshaft cap (Center RH)
(7) Intake camshaft cap (Rear RH)
(8) Intake camshaft (RH)
(9) Exhaust camshaft cap (Front RH)
(10) Exhaust camshaft cap (Center RH)
(11) Exhaust camshaft cap (Rear RH)
(12) Exhaust camshaft (RH)
(13) Intake valve guide
(14) Exhaust valve guide
(15) Cylinder head bolt
(16) Oil seal
(17) Cylinder head (RH)
(18) Cylinder head gasket (RH)
(19) Cylinder head gasket (LH)
(20) Cylinder head (LH)
(21) Intake camshaft (LH)
(22) Exhaust camshaft (LH)
(23) Intake camshaft cap (Front LH)
(24) Intake camshaft cap (Center LH)
(25) Intake camshaft cap (Rear LH)
(26) Exhaust camshaft (Front LH)
(27) Exhaust camshaft cap (Center LH)
(28) Exhaust camshaft cap (Rear LH)
(29) Rocker cover gasket (LH)
(30) Rocker cover (LH)
(31) Oil filler cap
(32) Gasket
(33) Oil filler duct
(34) O-ring

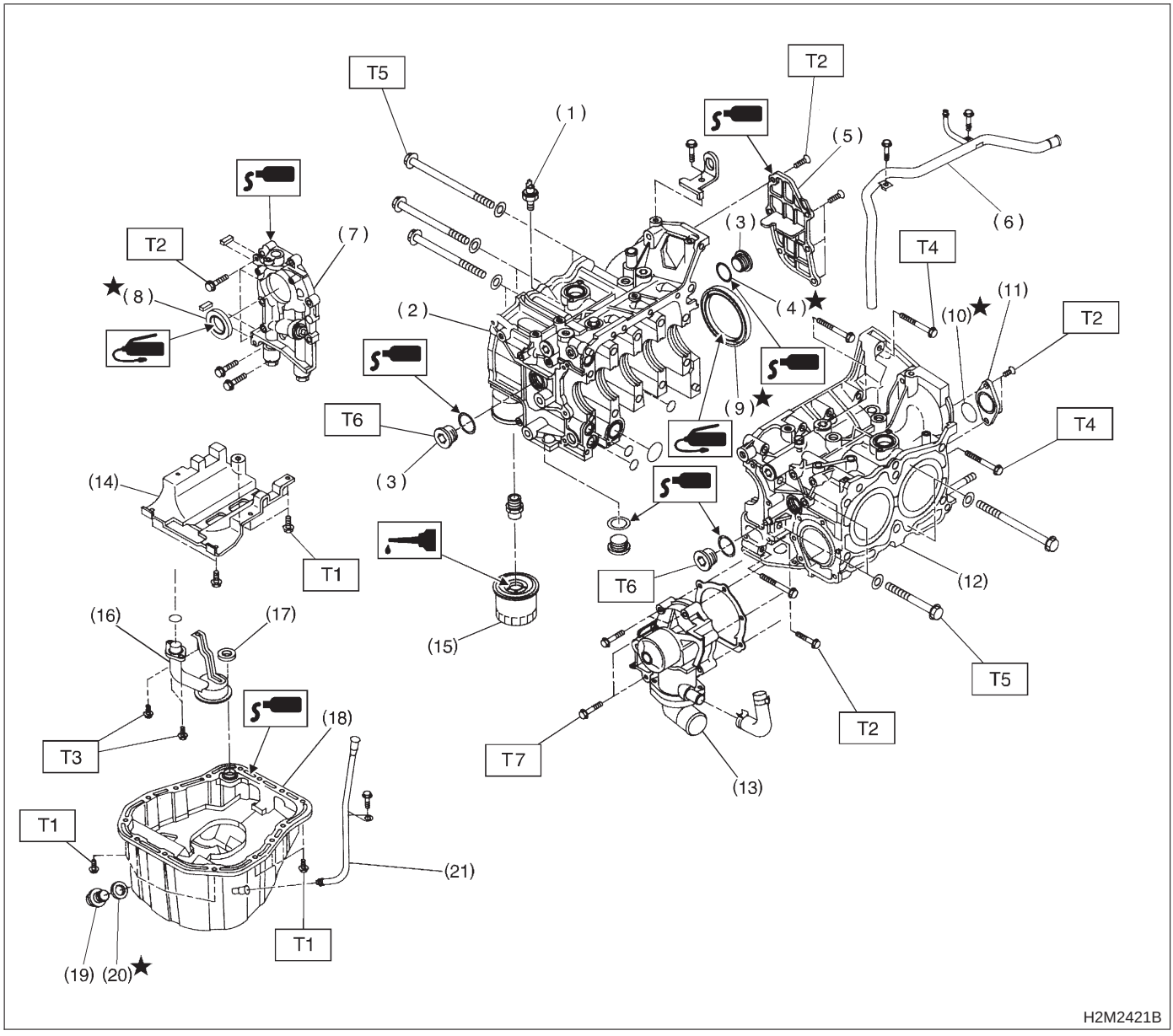
Tightening torque: N·m (kg-m, ft-lb)
T1: <Ref. to 2-3b [W4E1].>
T2: 5±0.5 (0.5±0.05, 3.6±0.4)
T3: 9.8±0.7 (1.0±0.07, 7.2±0.5)
T4: 20±2 (2.0±0.2, 14.5±1.4)

3. Cylinder Head and Valve Assembly



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Shim
(11) Exhaust valve oil seal

4. Cylinder Block

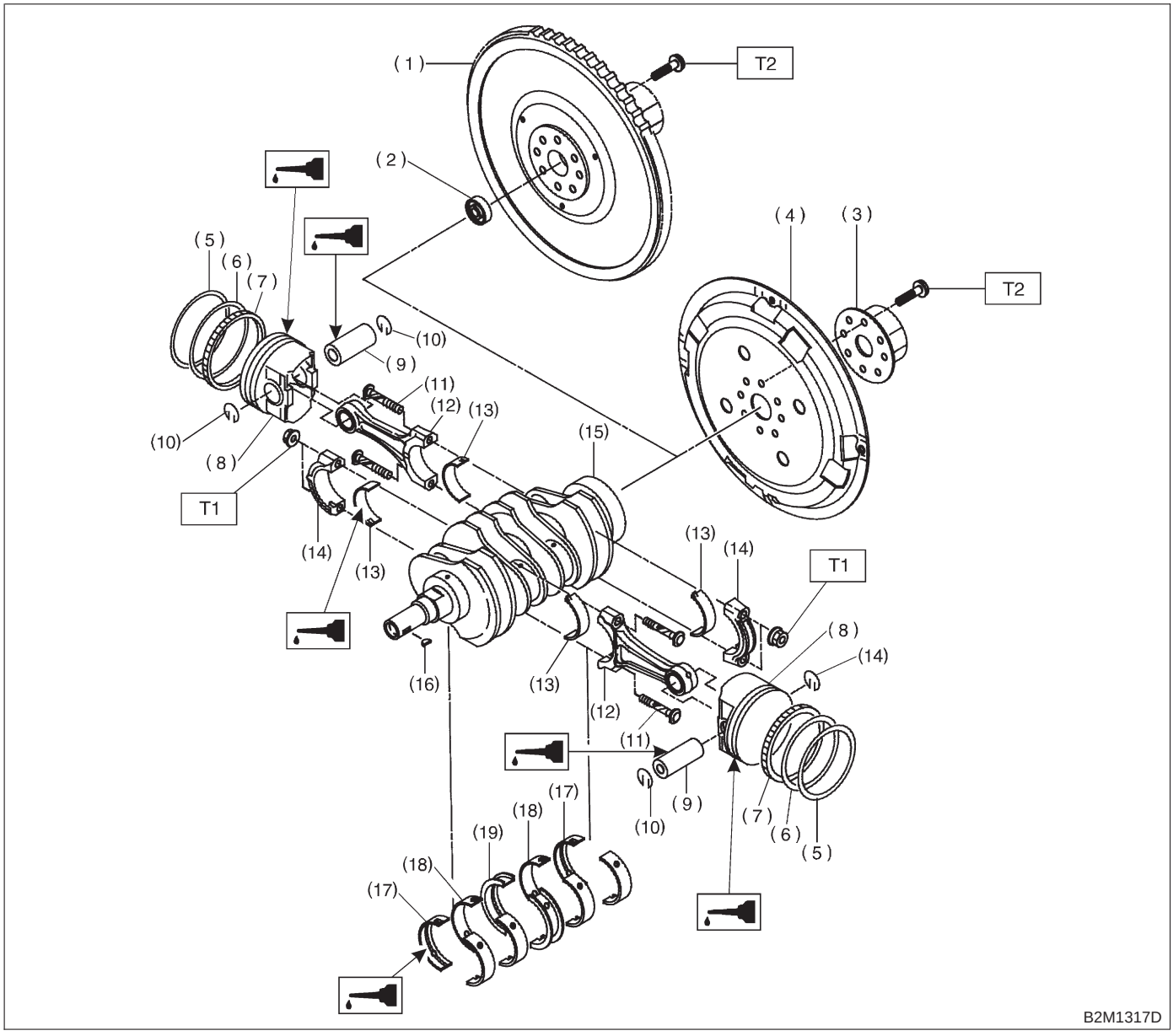


H2M2421B

(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil filter
(16) Oil strainer
(17) Gasket
(18) Oil pan
(19) Drain plug
(20) Metal gasket
(21) Oil level gauge guide

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 25±2 (2.5±0.2, 18.1±1.4)
T5: 47±3 (4.8±0.3, 34.7±2.2)
T6: 69±7 (7.0±0.7, 50.6±5.1)
T7: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

5. Crankshaft and Piston



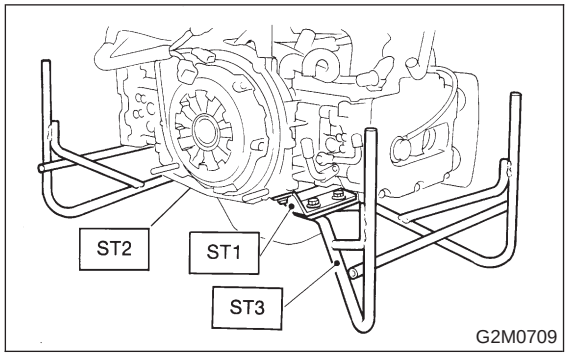
(1) Flywheel (MT vehicles only)
(2) Bell bearing (MT vehicles only)
(3) Reinforcement (AT vehicles only)
(4) Drive plate (AT vehicles only)
(5) Top ring
(6) Second ring
(7) Oil ring
(8) Piston
(9) Piston pin
(10) Circlip
(11) Connecting rod bolt
(12) Connecting rod
(13) Connecting rod bearing
(14) Connecting rod cap
(15) Crankshaft
(16) Woodruff key
(17) Crankshaft bearing #1, #5
(18) Crankshaft bearing #2, #4
(19) Crankshaft bearing #3

Tightening torque: N·m (kg-m, ft-lb)
T1: 44±2 (4.5±0.2, 32.5±1.4)
T2: 72±3 (7.3±0.3, 52.8±2.2)

1. General Precautions

(1) Before disassembling engine, place it on ST3.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817000	ENGINE STAND



(2) All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.

(3) Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.

(4) Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.

(5) All removed parts, if to be reused, should be reinstalled in the original positions and directions.

(6) Gaskets and lock washers must be replaced with new ones. Liquid gasket should be used where specified to prevent leakage.

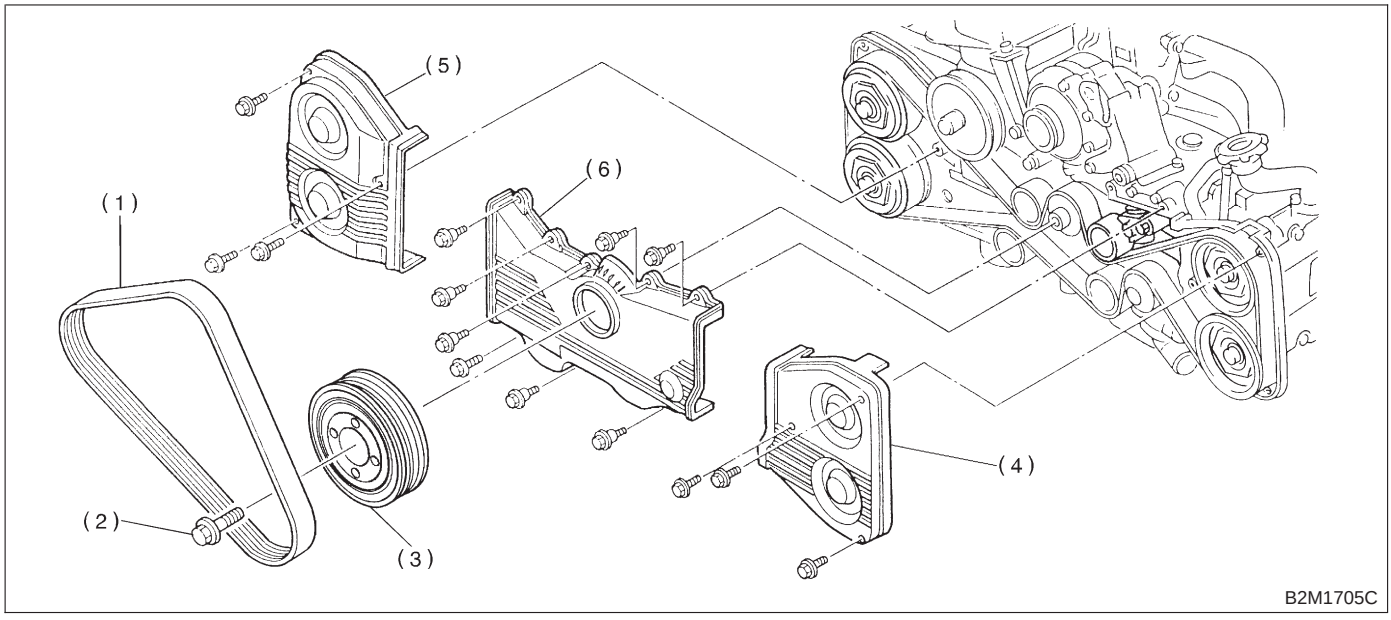
(7) Bolts, nuts and washers should be replaced with new ones as required.

(8) Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.

2. Timing Belt

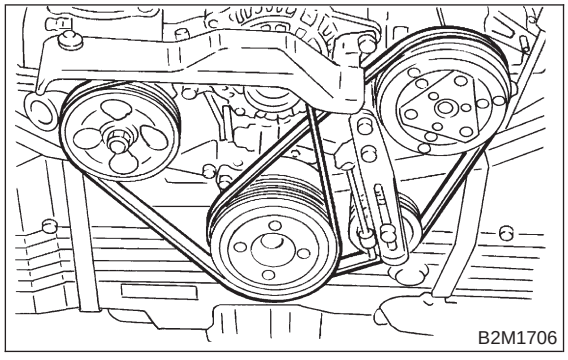
A: REMOVAL

1. CRANKSHAFT PULLEY AND BELT COVER

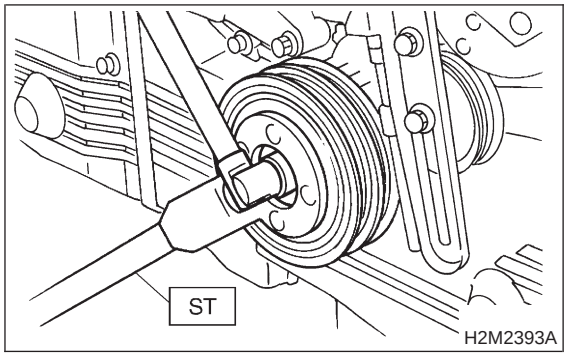


(1) V-belt
(2) Crankshaft pulley bolt
(3) Crankshaft pulley
(4) Left-hand belt cover No. 1
(5) Right-hand belt cover No. 1
(6) Front belt cover

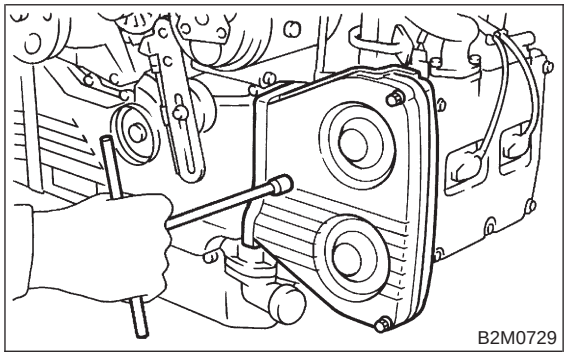
1) Remove V-belt cover, V-belt and air conditioning compressor drive belt tensioner. <Ref. to 1-5 [G200].>



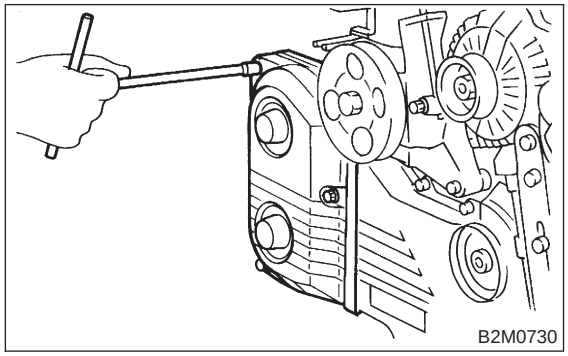
2) Remove pulley bolt. To lock crankshaft, use ST.
ST 499977100 CRANKSHAFT PULLEY WRENCH



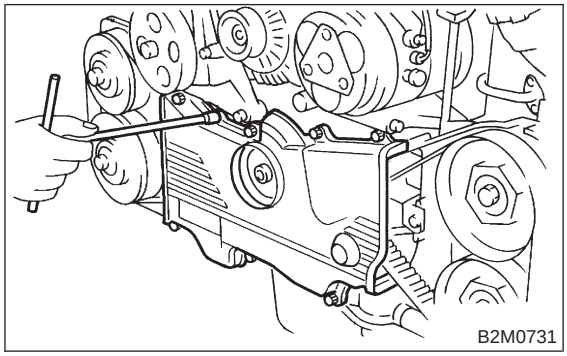
3) Remove crankshaft pulley.
4) Remove left-hand belt cover.



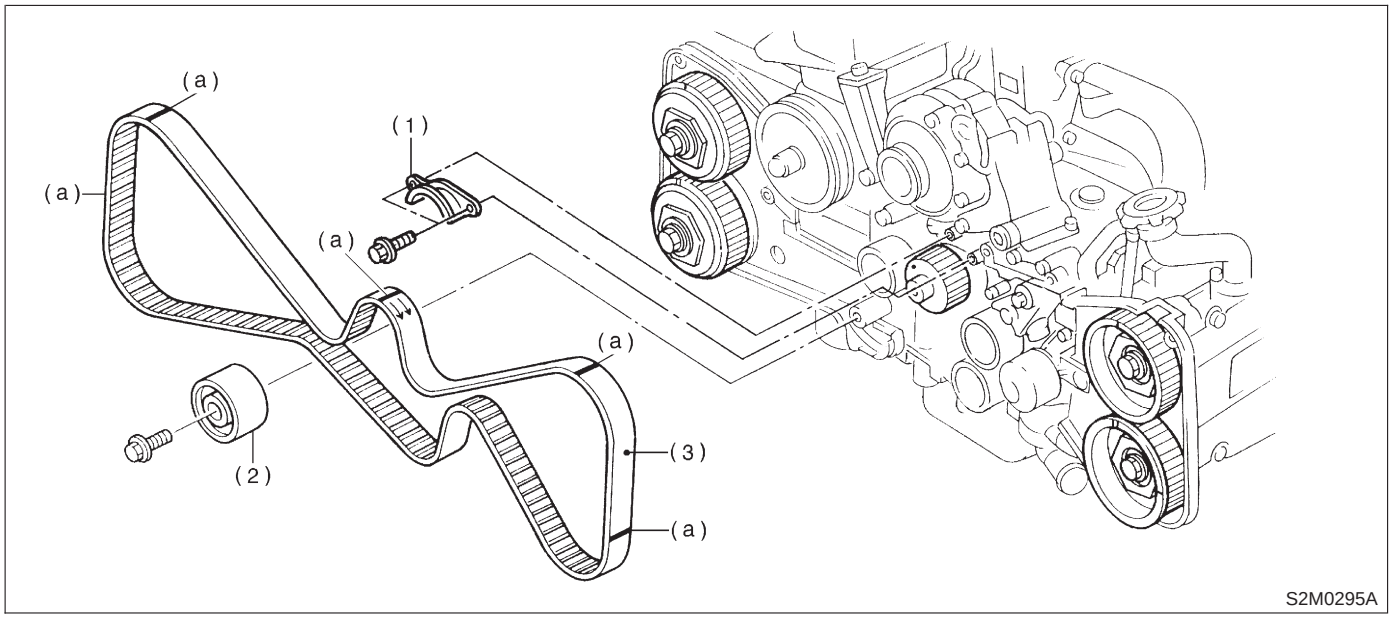
5) Remove right-hand belt cover.



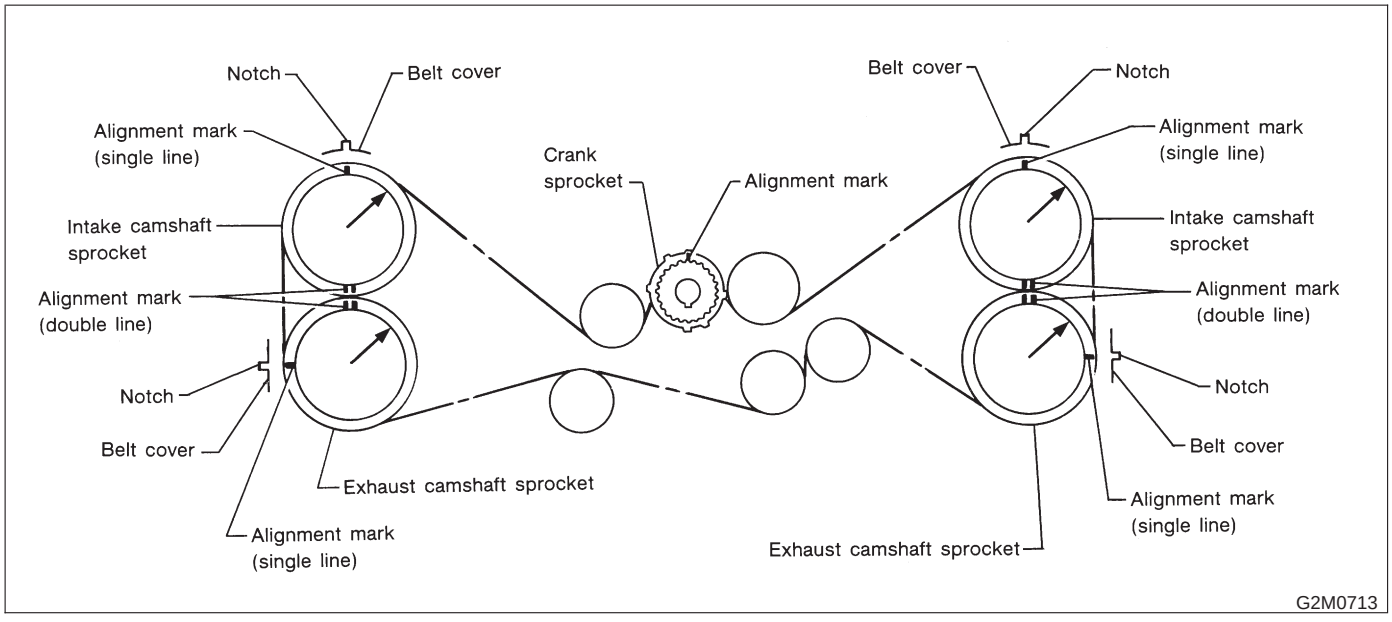
6) Remove front belt cover.



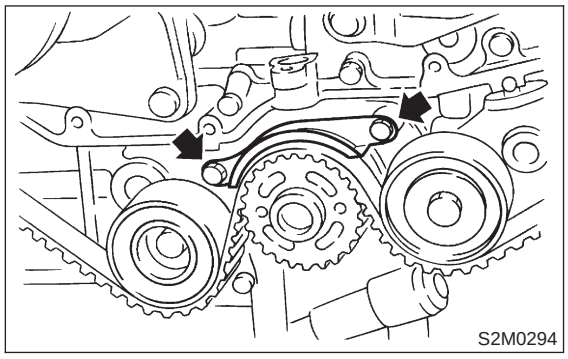
2. TIMING BELT



(1) Timing belt guide (MT vehicles only)
(2) Belt idler
(3) Timing belt
(a) Alignment marks



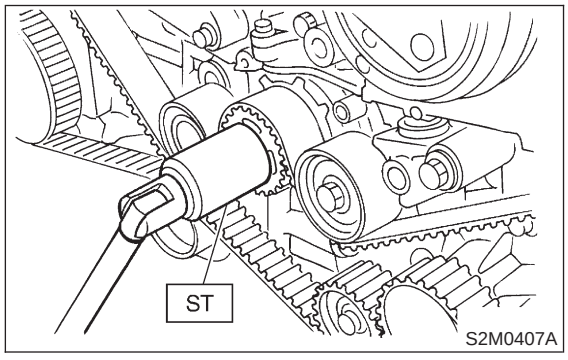
1) Remove timing belt guide. (MT vehicles only)


S2M0294

2) If alignment mark and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing timing belt as follows:

(1) Turn crankshaft using ST, and align alignment marks on crankshaft sprocket, left-hand intake camshaft sprocket, left-hand exhaust camshaft sprocket, right-hand intake camshaft sprocket and right hand exhaust camshaft sprocket with notches of belt cover and cylinder block.

ST 499987500 CRANKSHAFT SOCKET



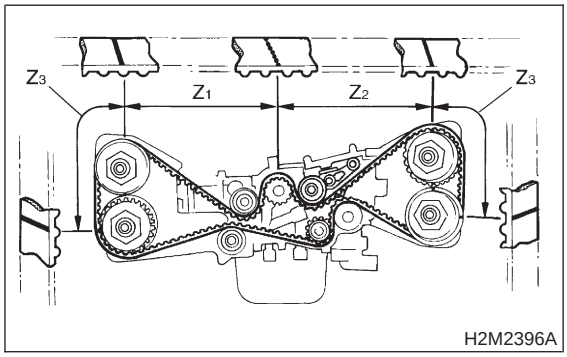
S2M0407A

(2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the sprockets.

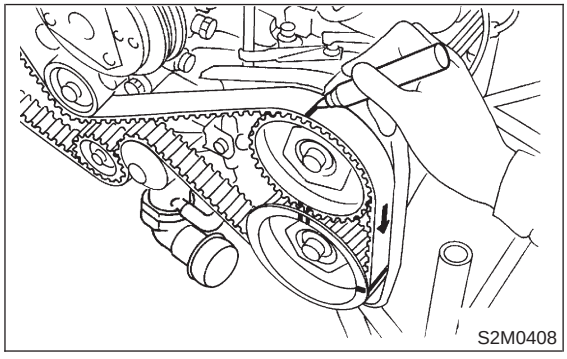
Z_1: 54.5 tooth length

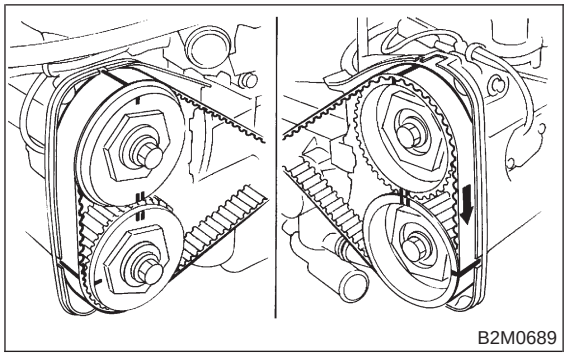
Z_2: 51 tooth length

Z_3: 28 tooth length

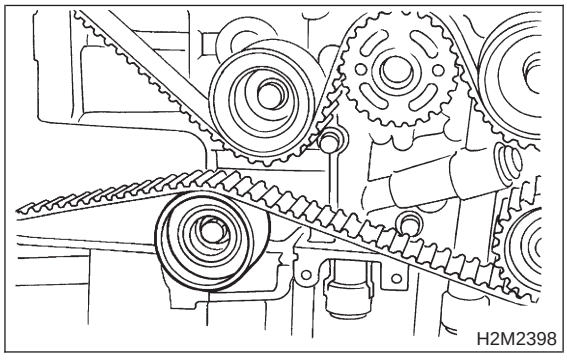


H2M2396A


S2M0408

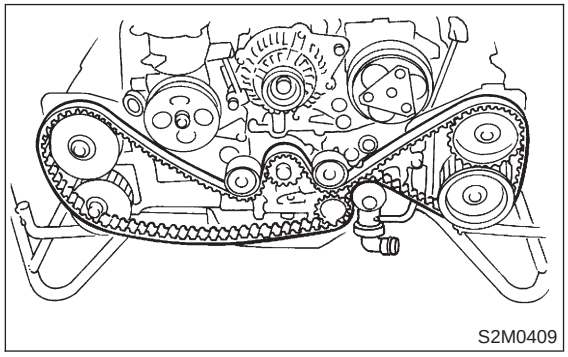

B2M0689

3) Remove belt idler.

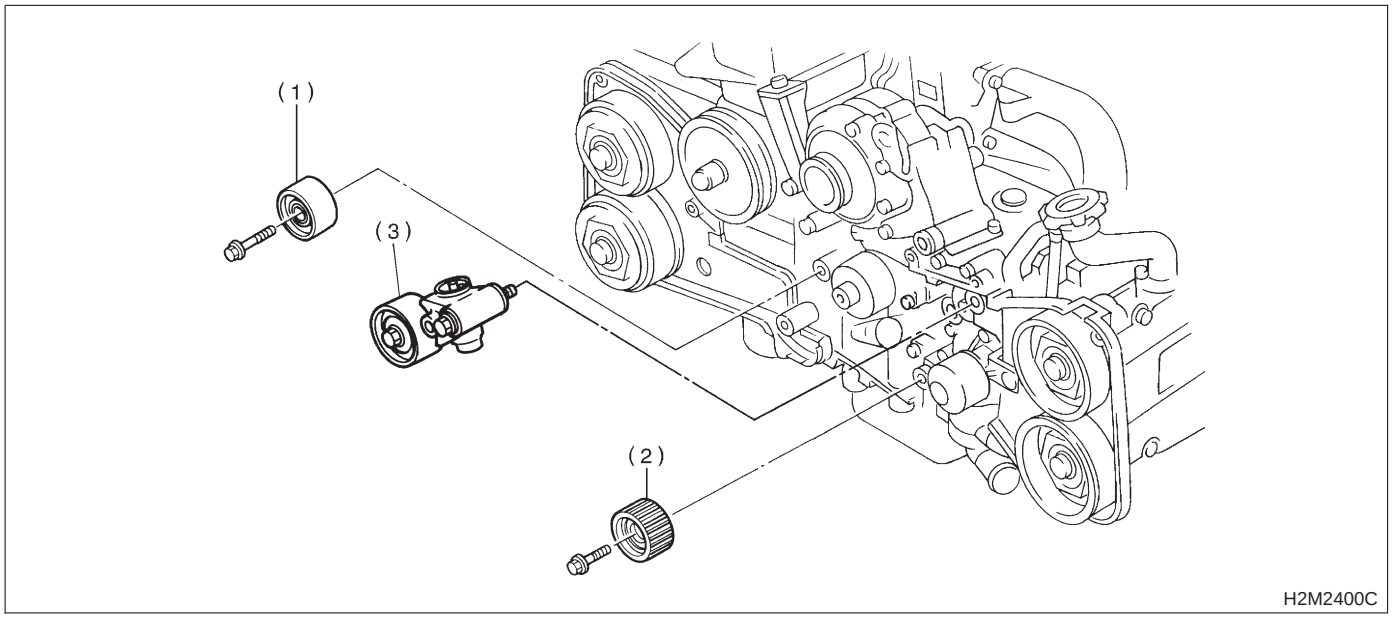

H2M2398

4) Remove timing belt.

CAUTION:
After timing belt has been removed, never rotate intake and exhaust, camshaft sprocket. If camshaft sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.


S2M0409

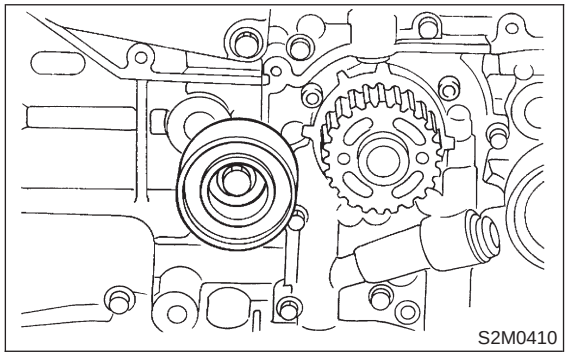
3. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY



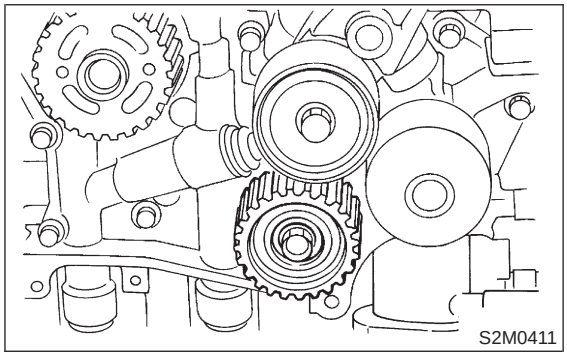
H2M2400C

(1) Belt idler
(2) Belt idler No. 2
(3) Automatic belt tension adjuster ASSY

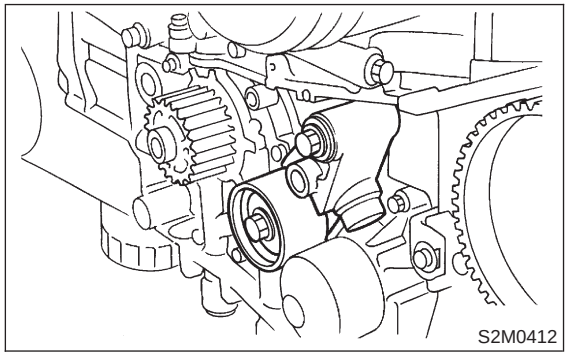
1) Remove belt idler.


S2M0410

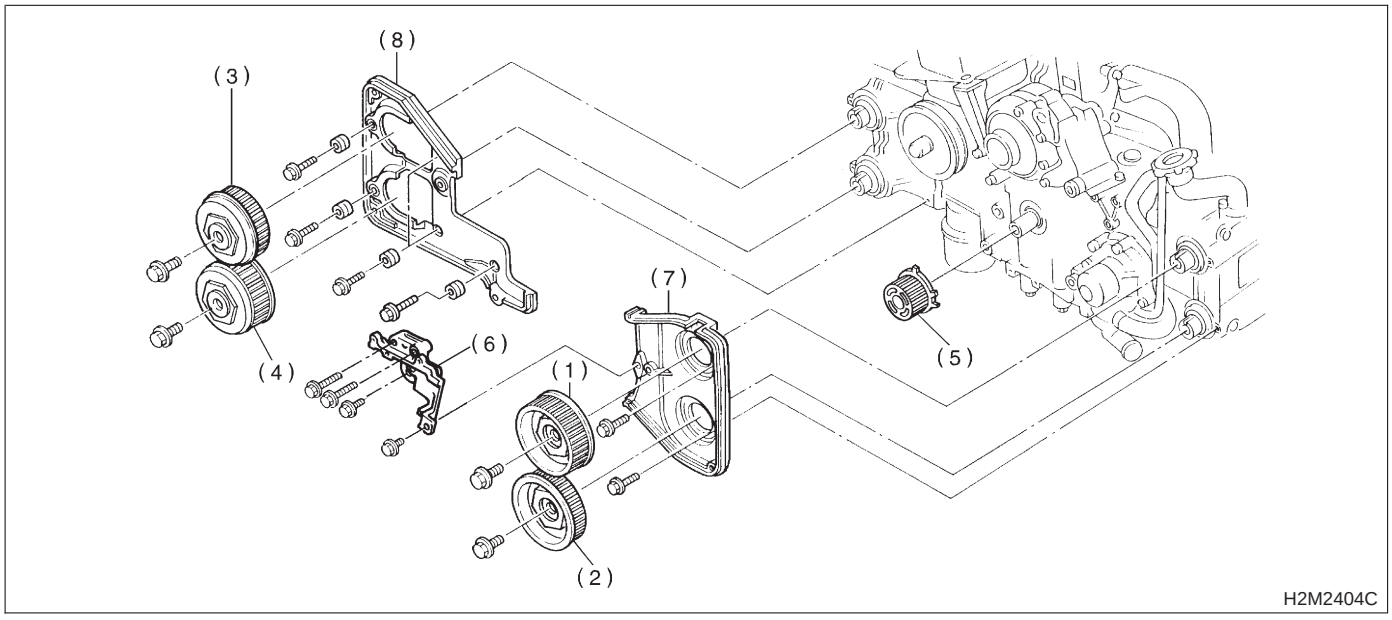
2) Remove belt idler No. 2.


S2M0411

3) Remove automatic belt tension adjuster assembly.



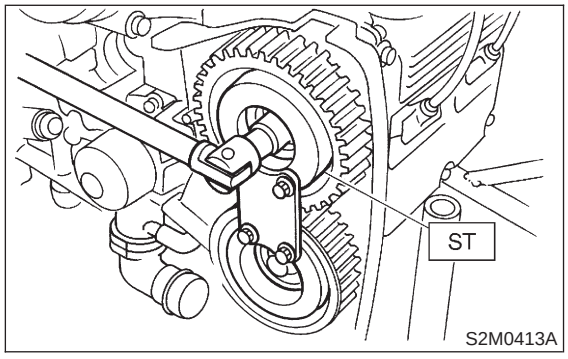
4. SPROCKET



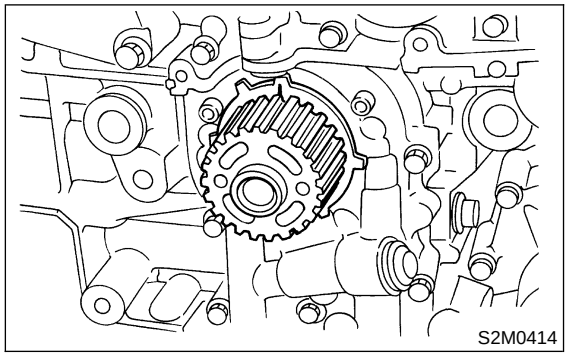
(1) Left-hand intake camshaft sprocket
(2) Left-hand exhaust camshaft sprocket
(3) Right-hand intake camshaft sprocket
(4) Right-hand exhaust camshaft sprocket
(5) Crankshaft sprocket
(6) Tensioner bracket
(7) Left-hand belt cover No. 2
(8) Right-hand belt cover No. 2

1) Remove left-hand intake camshaft sprocket.
2) Remove left-hand exhaust camshaft sprocket.
3) Remove right-hand intake camshaft sprocket.
4) Remove right-hand exhaust camshaft sprocket.

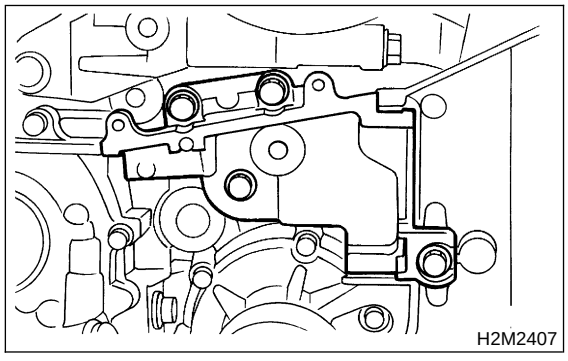
ST 499207300 CAMSHAFT SPROCKET WRENCH



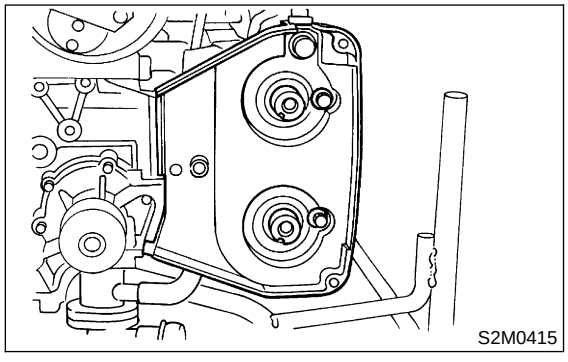
5) Remove crankshaft sprocket.



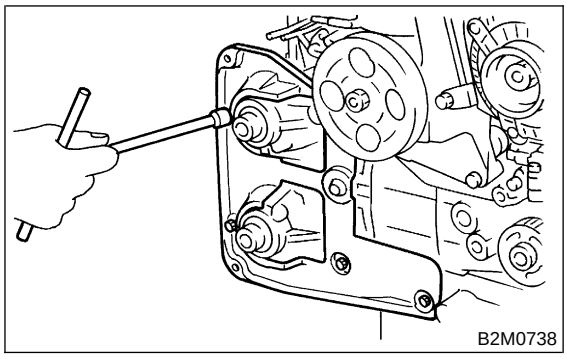
6) Remove tensioner bracket.



7) Remove left-hand belt cover No. 2.



8) Remove right-hand belt cover No. 2.



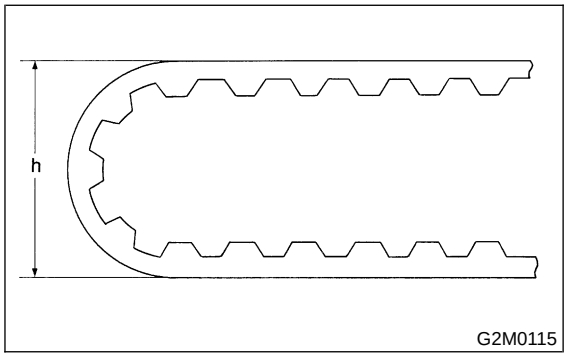
B: INSPECTION

1. TIMING BELT

1) Check timing belt teeth for breaks, cracks and wear. If any fault is found, replace belt.
2) Check the condition of back side of belt; if any crack is found, replace belt.

CAUTION:
● Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
● Do not bend the belt sharply.

Bending radius: h
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace automatic belt tension adjuster assembly.

CAUTION:
Slight traces of oil at rod's oil seal does not indicate a problem.

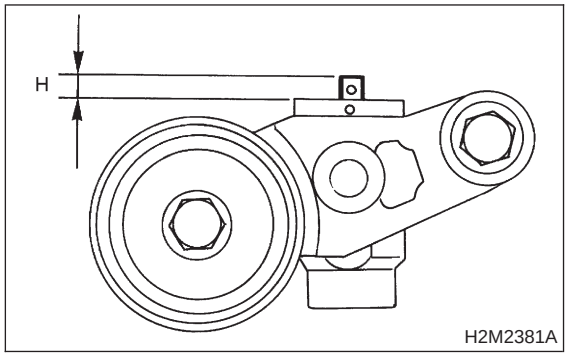
2) Check that the adjuster rod does not move when a pressure of 294 N (30 kg, 66 lb) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kg, 66 lb), check it using the following procedures:

(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kg, 66 lb) to it. Check adjuster rod stiffness.
(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
● Always use a vertical type pressing tool to move the adjuster rod down.
● Do not use a lateral type vise.
● Push adjuster rod vertically.
● Press-in the push adjuster rod gradually taking more than three minutes.
● Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).
● Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

Rod extension: H
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace belt tension pulley if faulty.
2) Check belt tension pulley for smooth rotation. Replace if noise or excessive play is noted.
3) Check belt tension pulley for grease leakage.

4. BELT IDLER

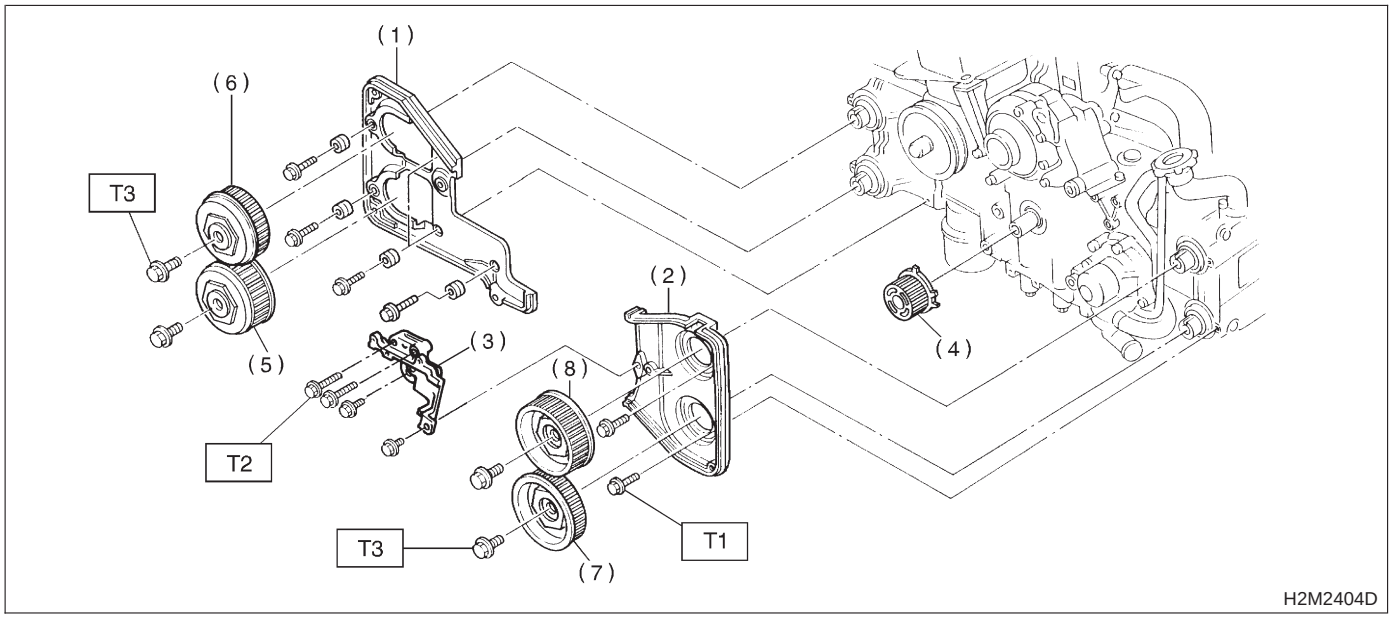
1) Check idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check idler for grease leakage.

5. SPROCKET

1) Check sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check crankshaft sprocket notch for sensor for damage and contamination of foreign matter.

C: INSTALLATION

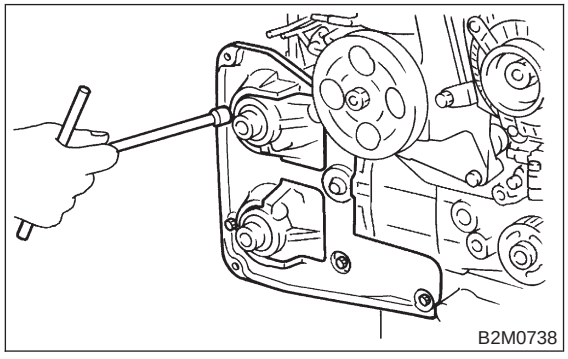
1. SPROCKET



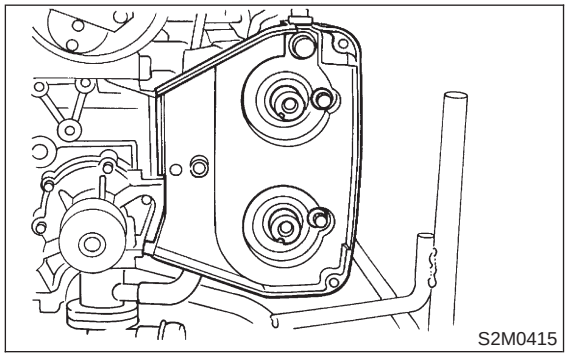
(1) Right-hand belt cover No. 2
(2) Left-hand belt cover No. 2
(3) Tensioner bracket
(4) Crankshaft sprocket
(5) Right-hand exhaust camshaft sprocket
(6) Right-hand intake camshaft sprocket
(7) Left-hand exhaust camshaft sprocket
(8) Left-hand intake camshaft sprocket

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.9±0.5 (0.5±0.05, 3.6±0.4)
T2: 25±2 (2.5±0.2, 18±1.4)
T3: 78±5 (8.0±0.5, 58±3.6)

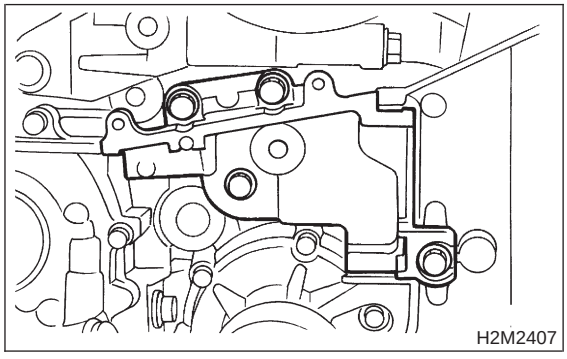
1) Install right-hand belt cover No. 2.



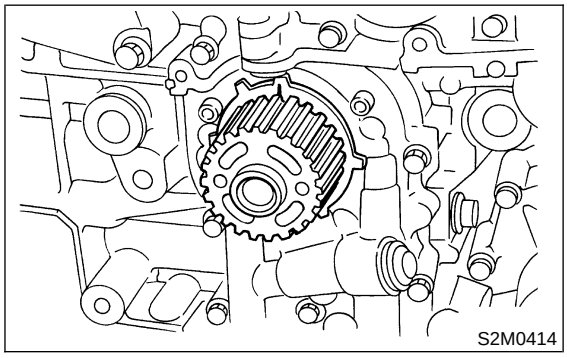
2) Install left-hand belt cover No. 2.



3) Install tensioner bracket.

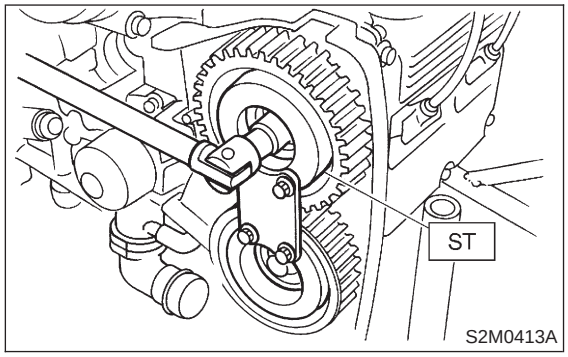


4) Install crankshaft sprocket.

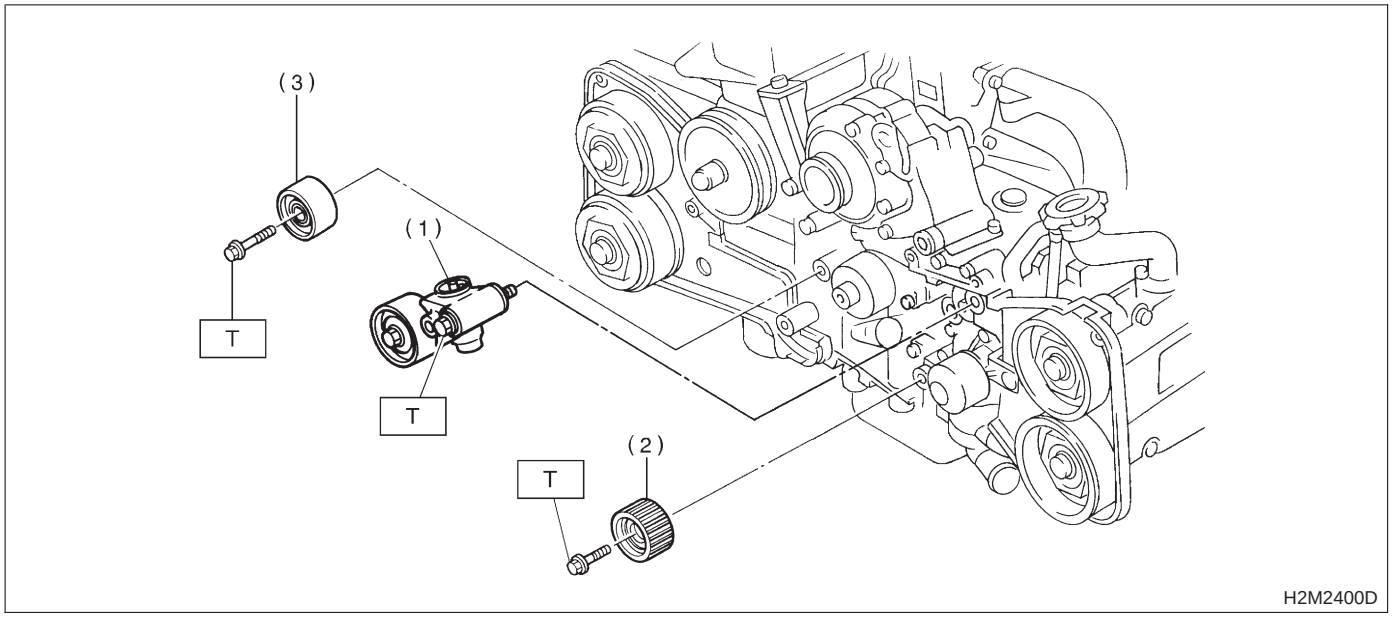


5) Install right-hand exhaust camshaft sprocket. To lock camshaft, use ST.
6) Install right-hand intake camshaft sprocket using ST.
7) Install left-hand exhaust camshaft sprocket using ST.
8) Install left-hand intake camshaft sprocket using ST.

ST 499207300 CAMSHAFT SPROCKET WRENCH



2. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER



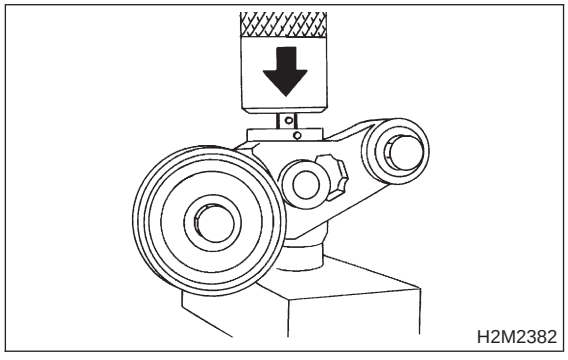
(1) Automatic belt tension adjuster ASSY
(2) Belt idler No. 2
(3) Belt idler

Tightening torque: N·m (kg-m, ft-lb)
T: 39±4 (4.0±0.4, 29±2.9)

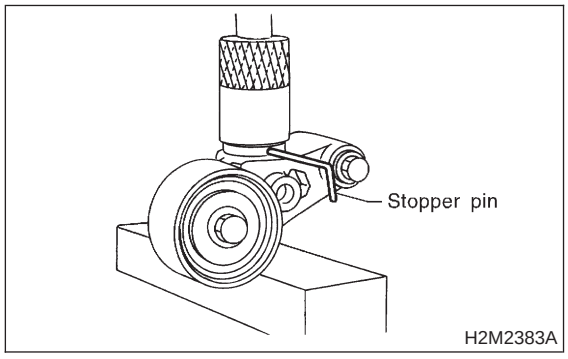
1) Preparation for installation of automatic belt tension adjuster assembly:

CAUTION:
- **Always use a vertical type pressing tool to move the adjuster rod down.**
- **Do not use a lateral type vise.**
- **Push adjuster rod vertically.**
- **Be sure to slowly move the adjuster rod down applying a pressure of 294 N (30 kg, 66 lb).**
- **Press-in the push adjuster rod gradually taking more than three minutes.**
- **Do not allow press pressure to exceed 9,807 N (1,000 kg, 2,205 lb).**
- **Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.**
- **Do not release press pressure until stopper pin is completely inserted.**

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kg, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.

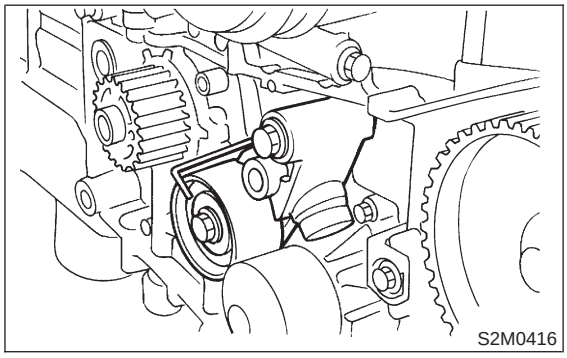

H2M2382

(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.

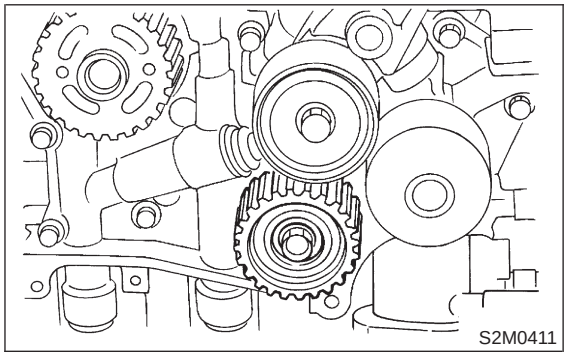


H2M2383A

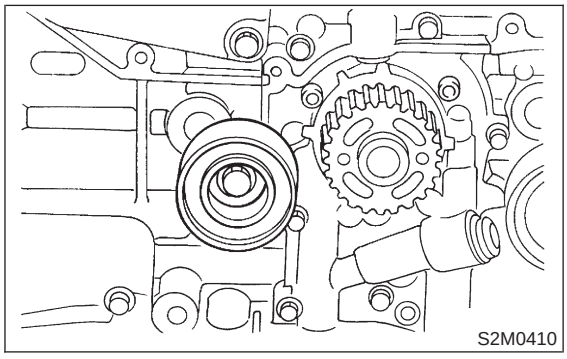
2) Install Automatic belt tension adjuster assembly.


S2M0416

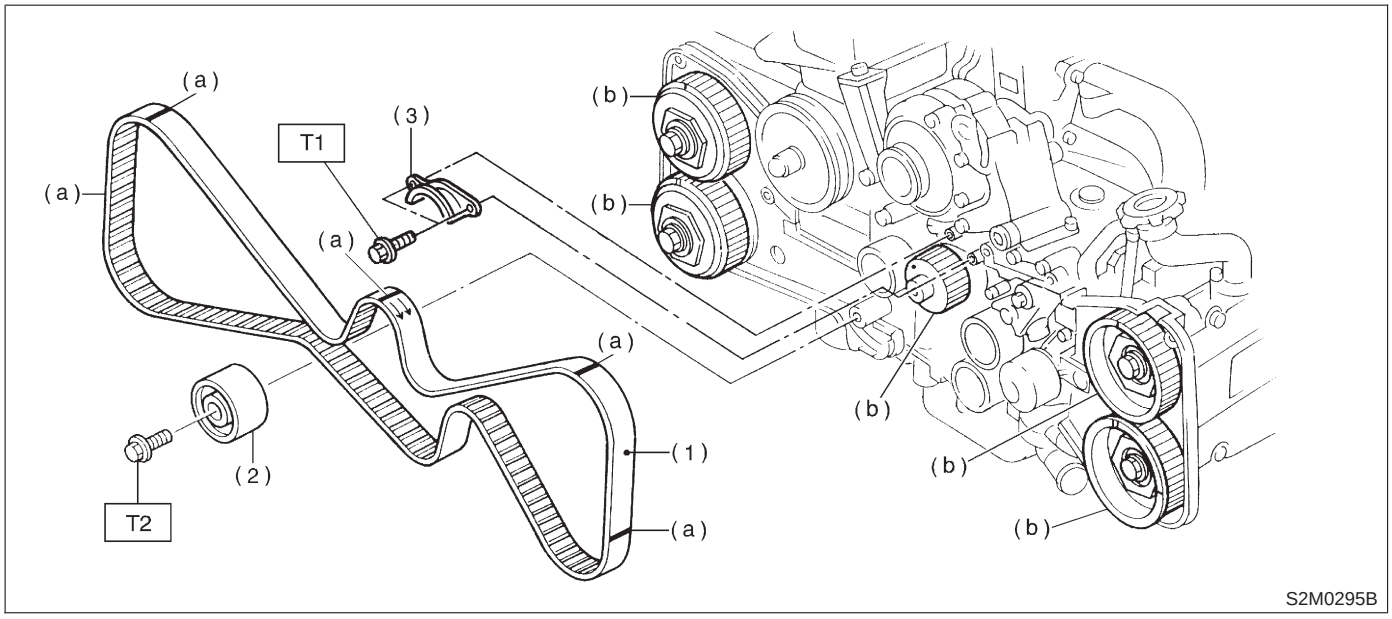
3) Install belt idler No. 2.


S2M0411

4) Install belt idler.


S2M0410

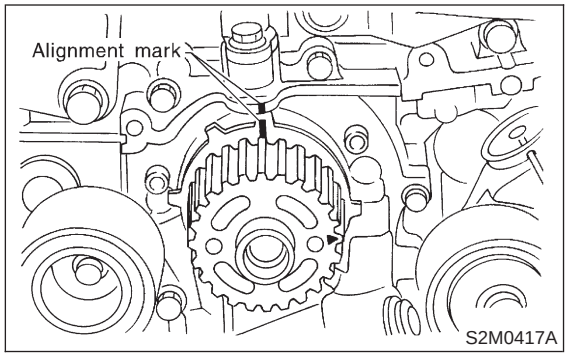
3. TIMING BELT



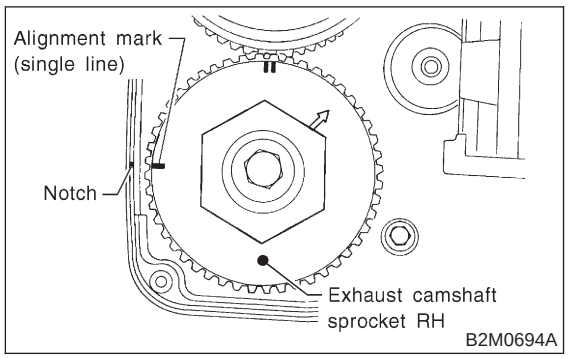
(1) Timing belt
(2) Belt idler
(3) Timing belt guide (MT vehicles only)
(a) Alignment mark (Timing belt side)
(b) Alignment mark (Sprocket side)

Tightening torque: N·m (kg-m, ft-lb)
T1: 9.8±1.0 (1.0±0.1, 7.2±0.7)
T2: 39±4 (4.0±0.4, 29±2.9)

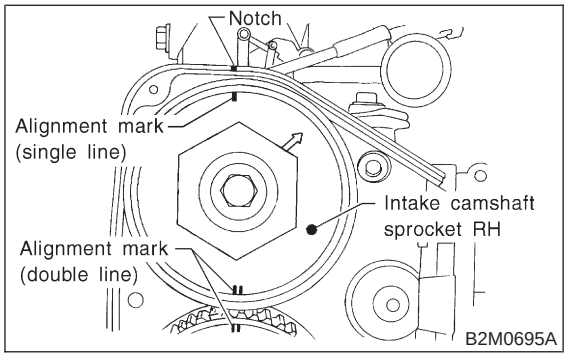
1) Crankshaft and camshaft sprocket alignment.
(1) Align mark on crankshaft sprocket with mark on the oil pump cover at cylinder block.



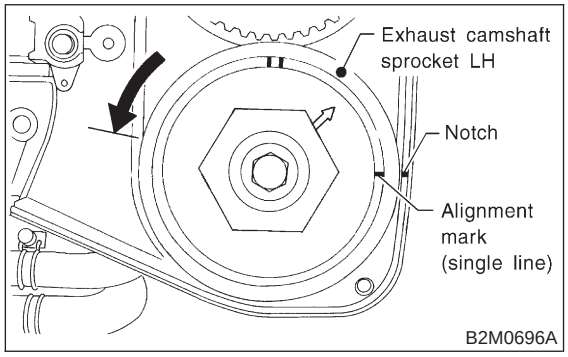
(2) Align single line mark on right-hand exhaust camshaft sprocket with notch on belt cover.



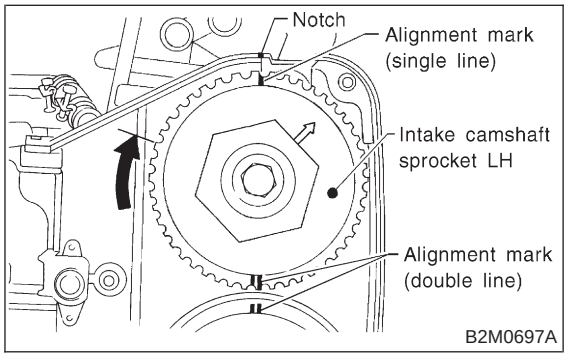
(3) Align single line mark on right-hand exhaust camshaft sprocket with notch on belt cover. (Make sure double lines on intake camshaft and exhaust camshaft sprockets are aligned.)



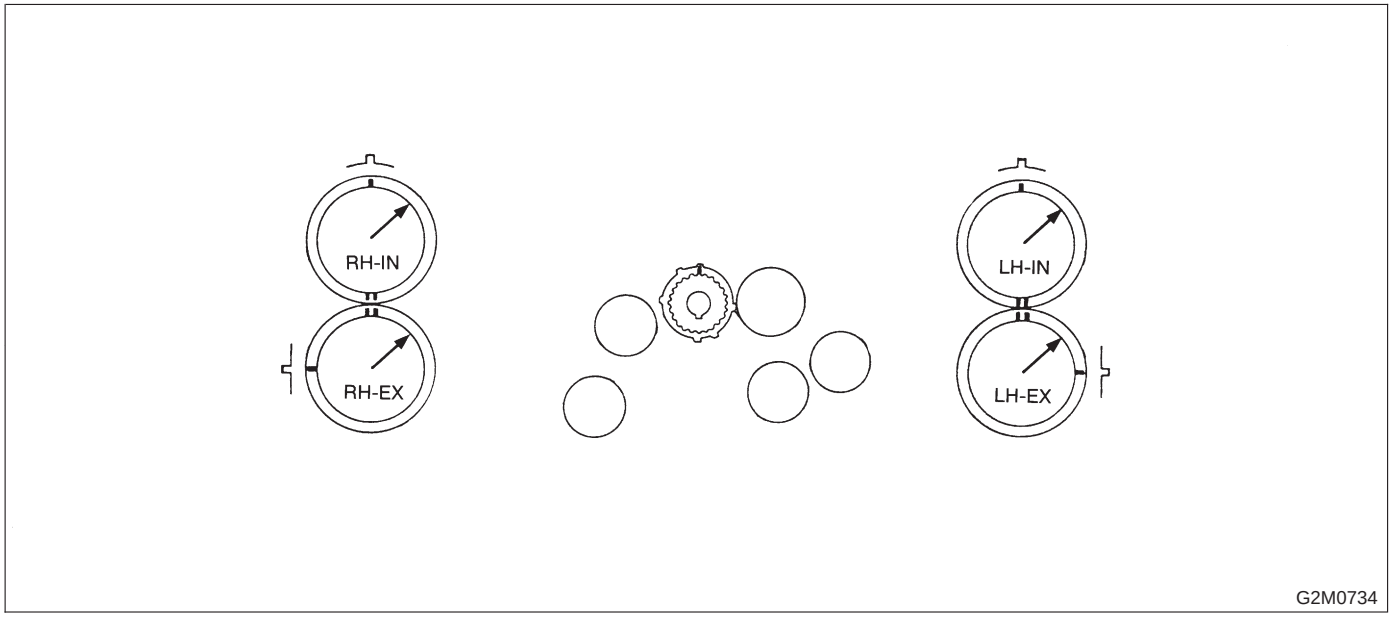
(4) Align single line mark on left-hand exhaust camshaft sprocket with notch on belt cover by turning sprocket counter-clockwise (as viewed from front of engine).



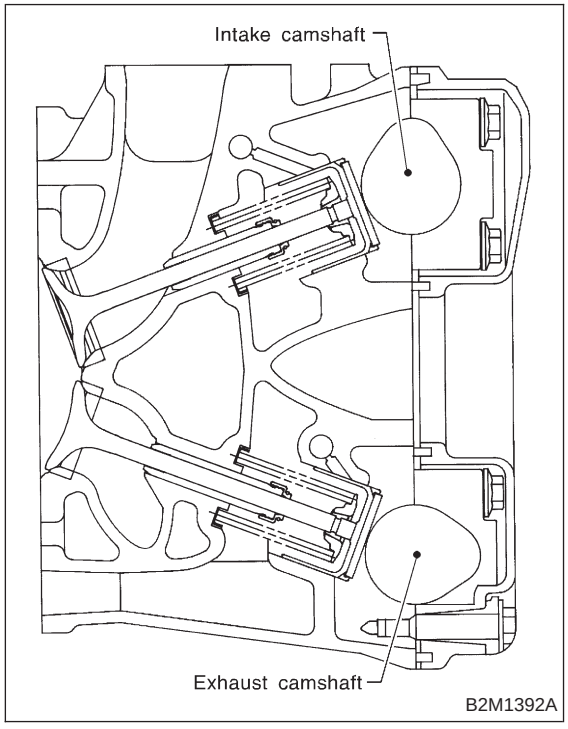
(5) Align single line mark on left-hand intake camshaft sprocket with notch on belt cover by turning sprocket clockwise (as viewed from front of engine).
Ensure double lines on intake and exhaust camshaft sprockets are aligned.



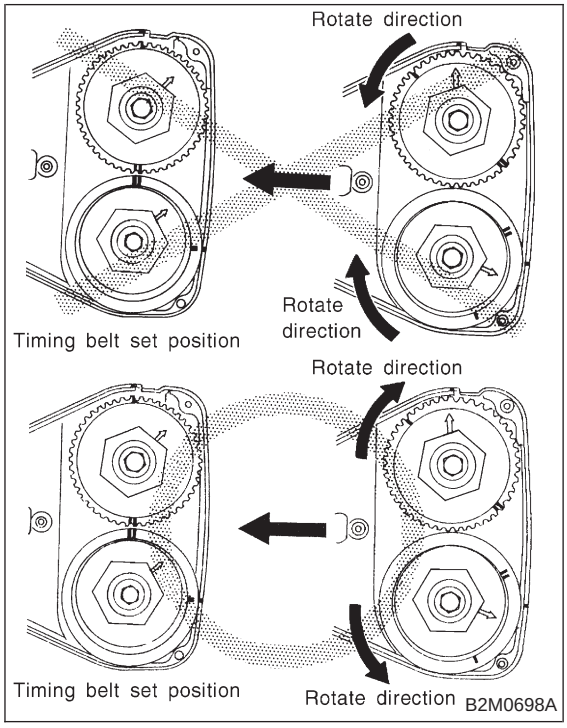
(6) Ensure camshaft and crankshaft sprockets are positioned as shown.



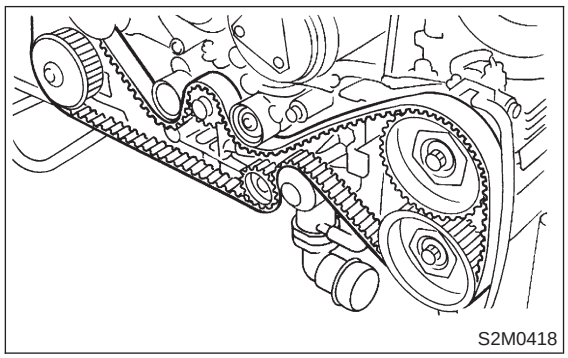
CAUTION:
● Intake and exhaust camshafts for this DOHC engine can be independently rotated with timing belts removed. As can be seen from the figure, if intake and exhaust valves are lifted simultaneously, their heads will interfere with each other, resulting in bent valves.



● When timing belts are not installed, four camshafts are held at the "zero-lift" position, where all cams on camshafts do not push intake and exhaust valves down. (Under this condition, all valves remain unlifted.)
● When camshafts are rotated to install timing belts, #2 intake and #4 exhaust cam of left-hand camshafts are held to push their corresponding valves down. (Under this condition, these valves are held lifted.) Right-side camshafts are held so that their cams do not push valves down.
● Left-hand camshafts must be rotated from the "zero-lift" position to the position where timing belt is to be installed at as small an angle as possible, in order to prevent mutual interference of intake and exhaust valve heads.
● Do not allow camshafts to rotate in the direction shown in the figure as this causes both intake and exhaust valves to lift simultaneously, resulting in interference with their heads.

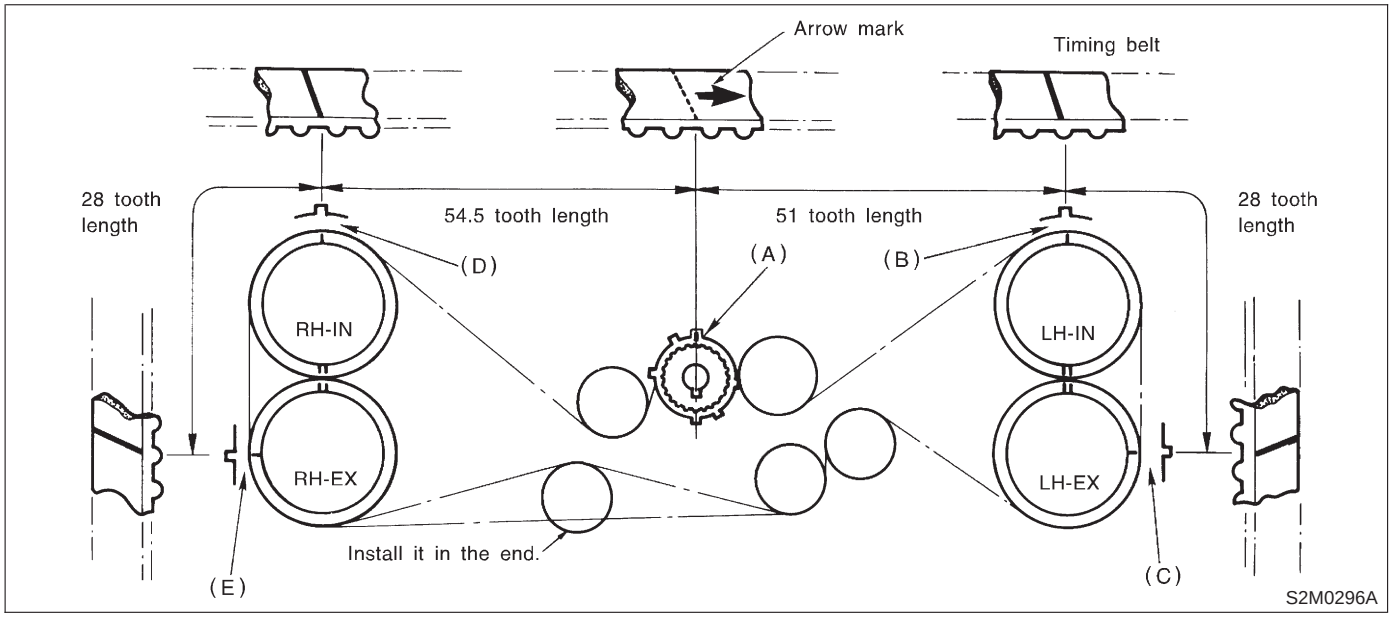


2) Installation of timing belt



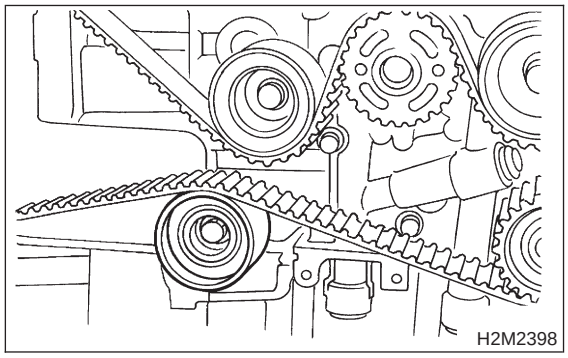
Align alignment mark on timing belt with marks on sprockets in the numerical order shown in figure. While aligning marks, position timing belt properly.

CAUTION:
- **Disengagement of more than three timing belt teeth may result in interference between the valve and piston.**
- **Ensure belt's rotating direction is correct.**

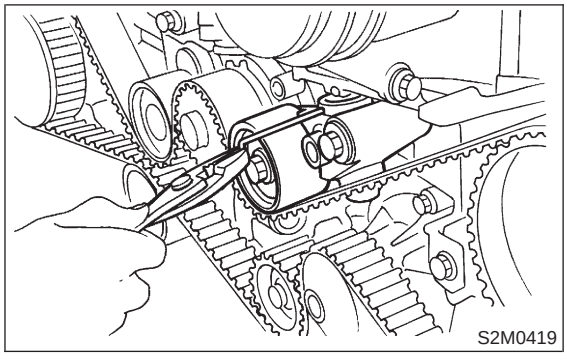


3) Install belt idler.

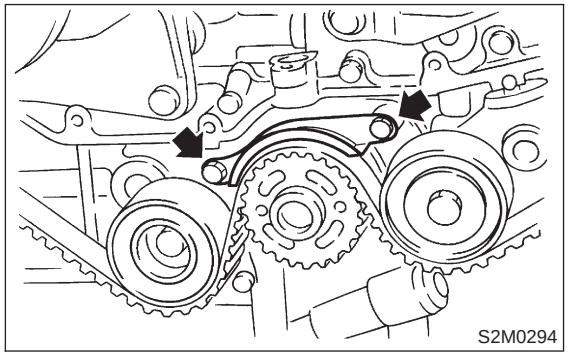
CAUTION:
Make sure that the marks on timing belt and sprockets are aligned.



4) After ensuring that the marks on timing belt and sprockets are aligned, remove stopper pin from tensioner adjuster.

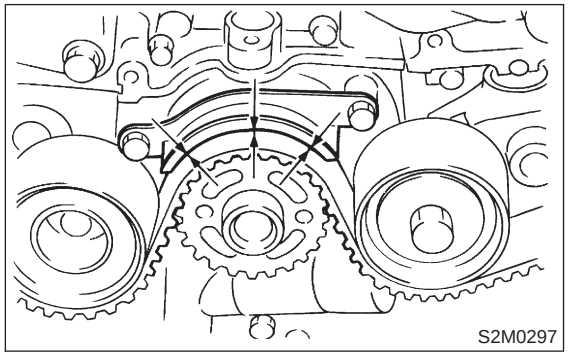


5) Install timing belt guide. (MT vehicles only)
(1) Temporarily tighten remaining bolts.

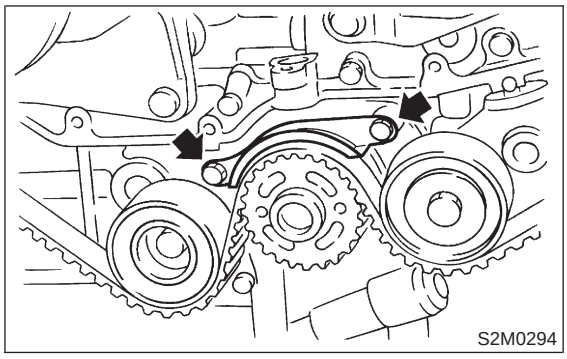


(2) Check and adjust clearance between timing belt and timing belt guide.

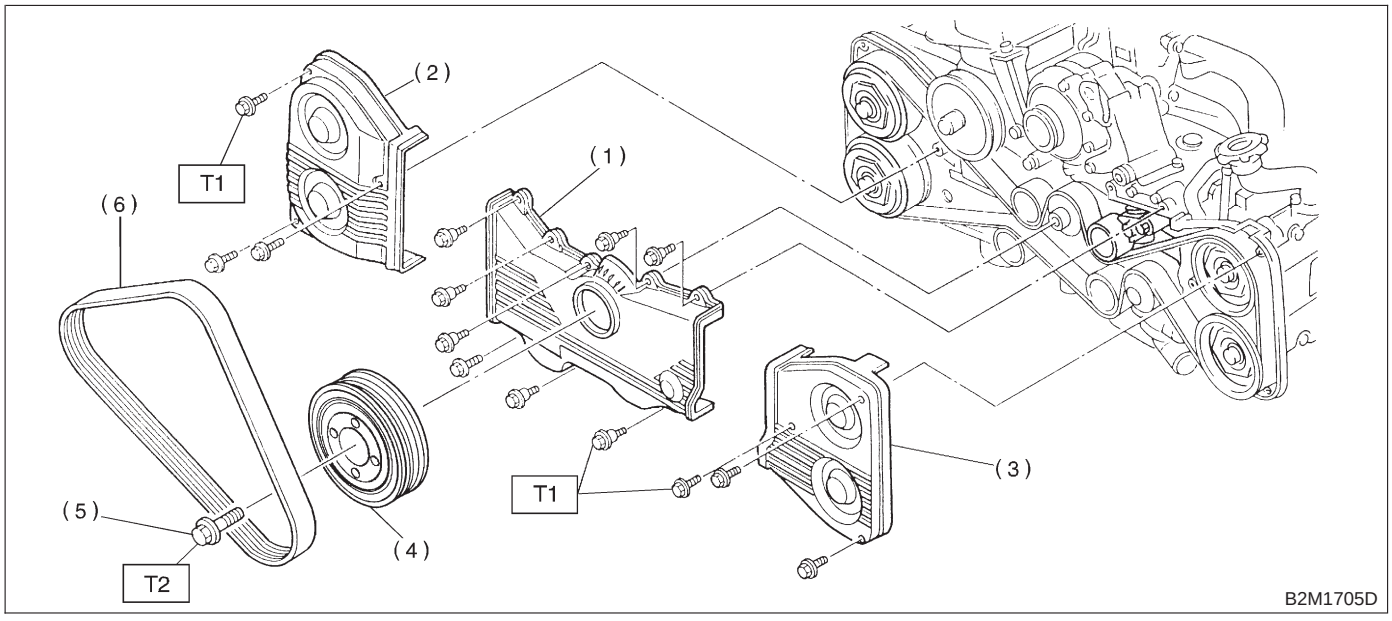
Clearance:
1.0±0.5 mm (0.039±0.020 in)



(3) Tighten remaining bolts.



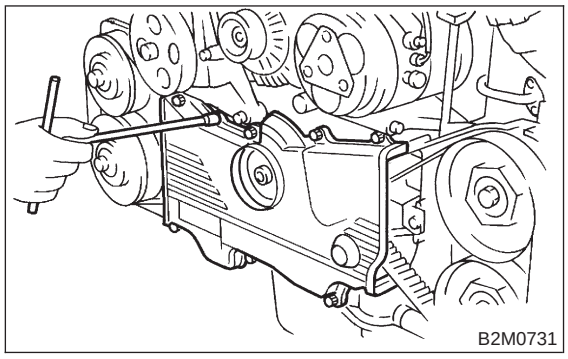
4. CRANKSHAFT PULLEY AND BELT COVER



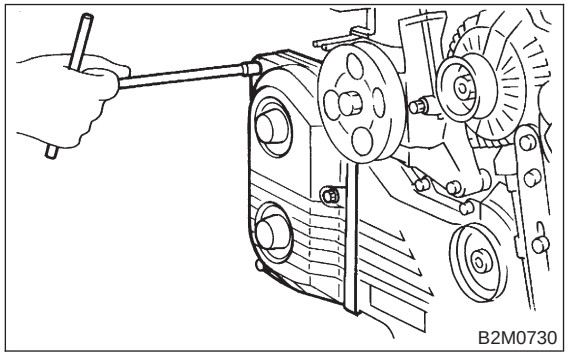
(1) Front belt cover
(2) Right-hand belt cover No. 1
(3) Left-hand belt cover No. 1
(4) Crankshft pulley
(5) Crankshaft pulley bolt
(6) V-velt

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±0.5 (0.5±0.05, 3.6±0.4)
T2: 177±10 (18.0±1.0, 130±7)

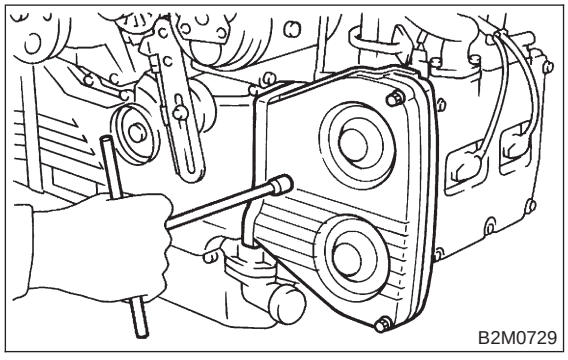
1) Install front belt cover.



2) Install right-hand belt cover.

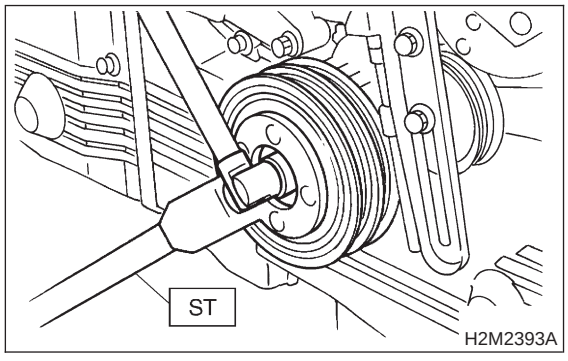


3) Install left-hand belt cover.



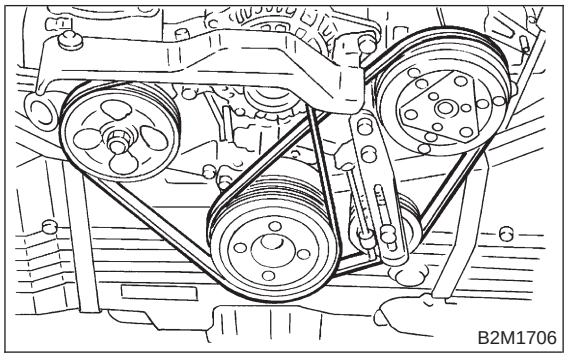
4) Install crankshaft pulley.
5) Tighten pulley bolt by using ST.

ST 499977100 CRANKSHAFT PULLEY WRENCH



6) Install V-belt, air conditioning compressor drive belt tensioner and V-belt cover. <Ref. to 1-5 [G200].>

CAUTION:
After installing V-belt, check and adjust V-belt tension.



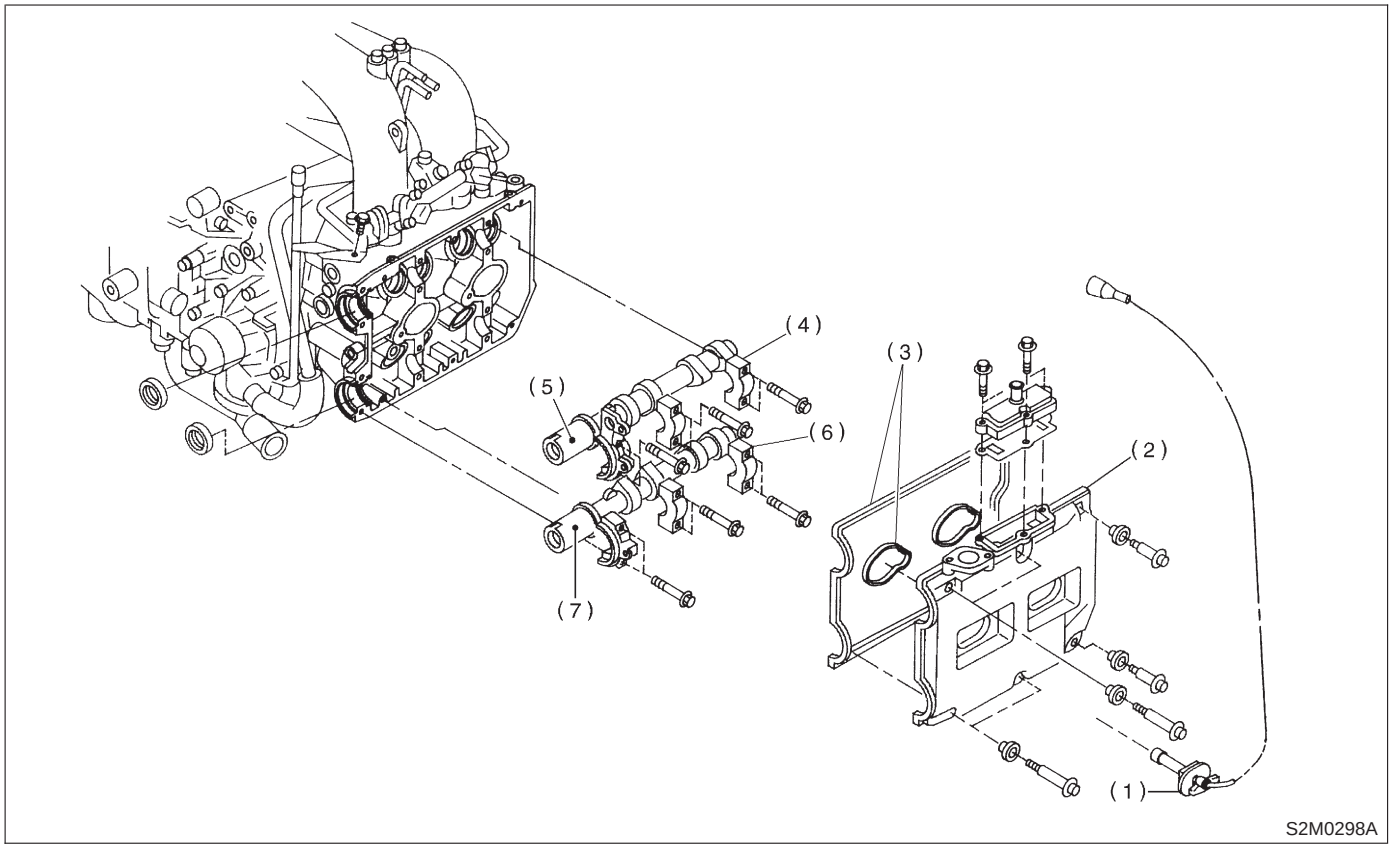
3. Camshaft

A: REMOVAL

1. RELATED PARTS

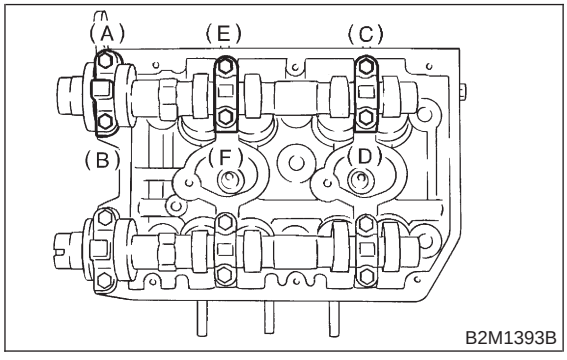
Remove timing belt, camshaft sprockets and related parts.
<Ref. to 2-3b [W2A0].>

2. CAMSHAFT



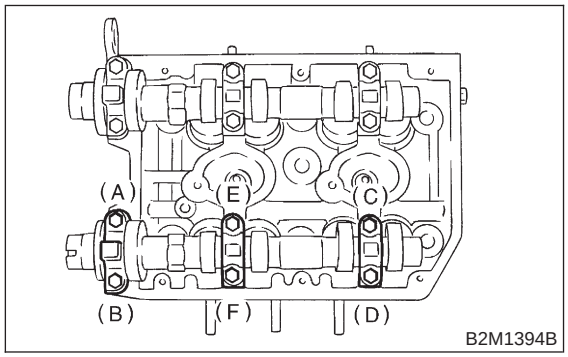
(1) Spark plug cord
(2) Rocker cover (LH)
(3) Rocker cover gasket (LH)
(4) Intake camshaft cap (LH)
(5) Intake camshaft (LH)
(6) Exhaust camshaft cap (LH)
(7) Exhaust camshaft (LH)

1) Remove camshaft position sensor (LH side only).
2) Remove spark plug cord.
3) Remove rocker cover and gasket.
4) Loosen intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in figure.



5) Remove camshaft caps and intake camshaft.

6) Loosen exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in figure.



7) Remove camshaft caps and exhaust camshaft.

CAUTION:
Arrange camshaft caps in order so that they can be installed in their original positions.

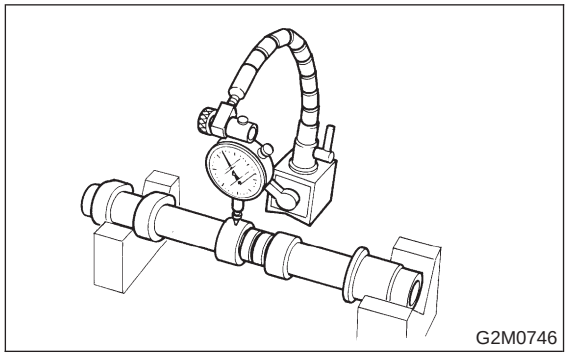
8) Similarly, remove right-hand camshafts and related parts.

B: INSPECTION

1. CAMSHAFT

1) Measure the bend, and repair or replace if necessary.

Limit:
0.020 mm (0.0008 in)



2) Check journal for damage and wear. Replace if faulty.
3) Measure outside diameter of camshaft journal. If the journal diameter is not as specified, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard	31.946 — 31.963 mm (1.2577 — 1.2584 in)	27.946 — 27.963 mm (1.1002 — 1.1009 in)

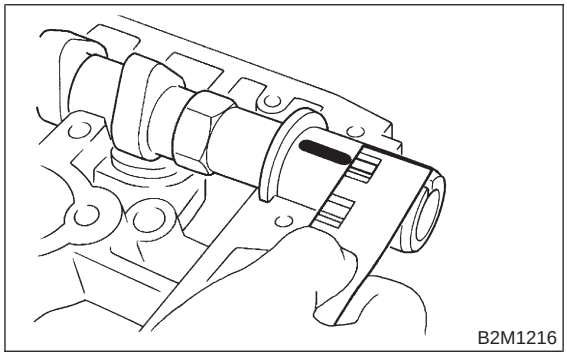
4) Measurement of the camshaft journal oil clearance
(1) Clean the bearing caps and camshaft journals.
(2) Place the camshafts on the cylinder head. (Without installing valve rocker.)
(3) Place plastigauge across each of the camshaft journals.
(4) Install the bearing caps.
<Ref. to 2-3b [W3C1].>

CAUTION:
Do not turn the camshaft.

(5) Remove the bearing caps.
(6) Measure the widest point of the plastigauge on each journal.
If the oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

Standard oil clearance:
0.037 — 0.072 mm (0.0015 — 0.0028 in)

Limit:
0.10 mm (0.0039 in)



(7) Completely remove the plastigauge.

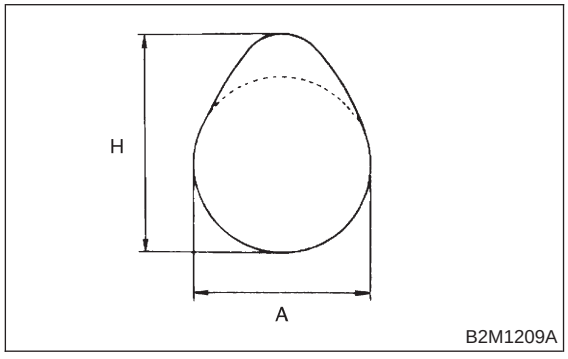
5) Check cam face condition; remove minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

Cam height: H

Standard:
Intake:
42.20 — 42.30 mm (1.6614 — 1.6654 in)
Exhaust:
Front: 42.50 — 42.60 mm (1.6732 — 1.6772 in)
Rear: 41.40 — 41.50 mm (1.6299 — 1.6339 in)

Limit:
Intake:
42.05 mm (1.6555 in)
Exhaust:
Front: 42.35 mm (1.6673 in)
Rear: 41.25 mm (1.6240 in)

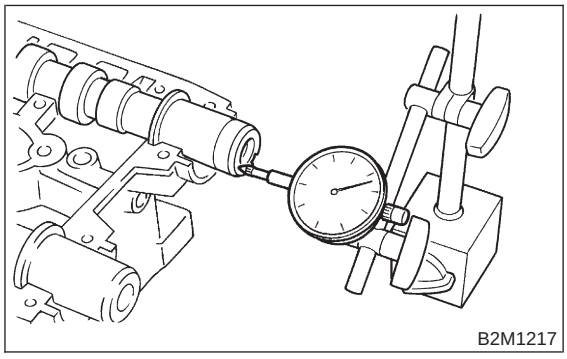
Cam base circle diameter A:
28.0 mm (1.102 in)



6) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace caps and cylinder head as a set. If necessary replace camshaft.

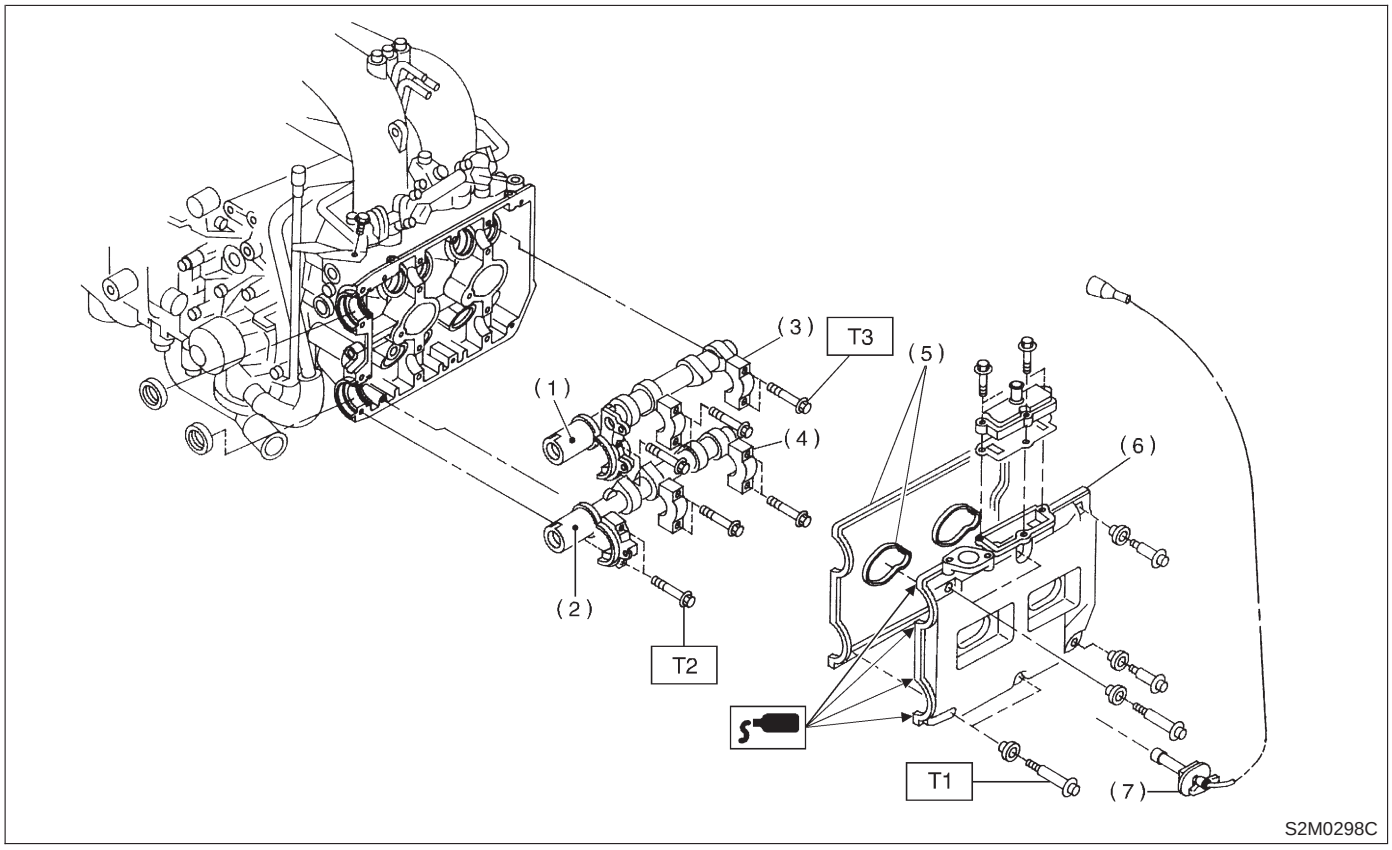
Standard:
0.040 — 0.080 mm (0.0016 — 0.0031 in)

Limit:
0.1 mm (0.004 in)



C: INSTALLATION

1. CAMSHAFT

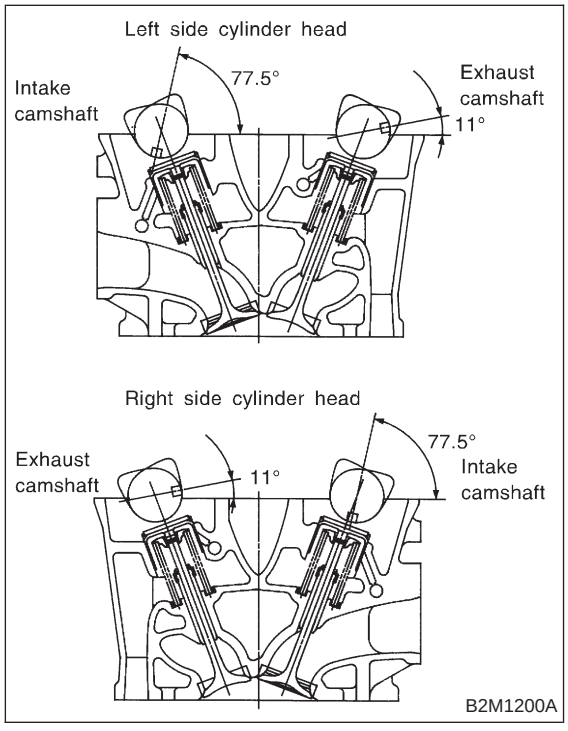


(1) Intake camshaft (LH)
(2) Exhaust camshaft (LH)
(3) Intake camshaft cap (LH)
(4) Exhaust camshaft cap (LH)
(5) Rocker cover gasket (LH)
(6) Rocker cover (LH)
(7) Spark plug cord

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±0.5 (0.5±0.05, 3.6±0.4)
T2: 9.8±0.7 (1.0±0.07, 7.2±0.5)
T3: 20±2 (2.0±0.2, 14.5±1.4)

1) Camshaft installation
Apply engine oil to cylinder head at camshaft bearing location before installing camshaft. Install camshaft so that rocker arm is close to or in contact with “base circle” of cam lobe.

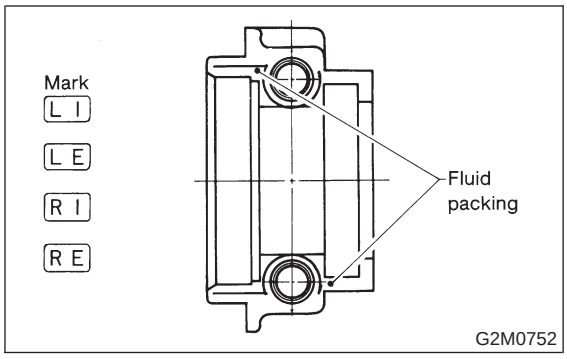
CAUTION:
● When camshafts are positioned as shown in figure, camshafts need to be rotated at a minimum to align with timing belt during installation.
● Right-hand camshaft need not be rotated when set at position shown in figure.
Left-hand intake camshaft: Rotate 80° clockwise.
Left-hand exhaust camshaft: Rotate 45° counter-clockwise.



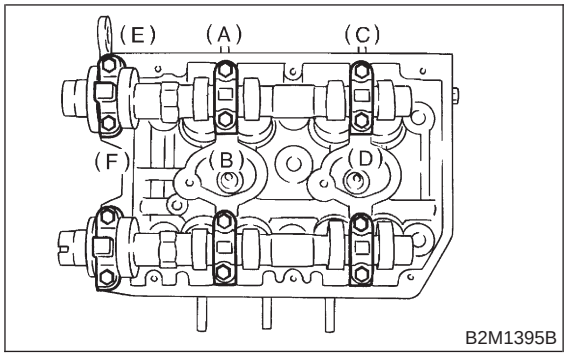
2) Camshaft cap installation
(1) Apply fluid packing sparingly to cap mating surface.

CAUTION:
Do not apply fluid packing excessively. Failure to do so may cause excess packing to come out and flow toward oil seal, resulting in oil leaks.

Fluid packing:
THREE BOND 1215 or equivalent



(2) Apply engine oil to cap bearing surface and install cap on camshaft as shown by identification mark.
(3) Gradually tighten cap in at least two stages in alphabetical sequence shown in figure, and then tighten to specified torque.

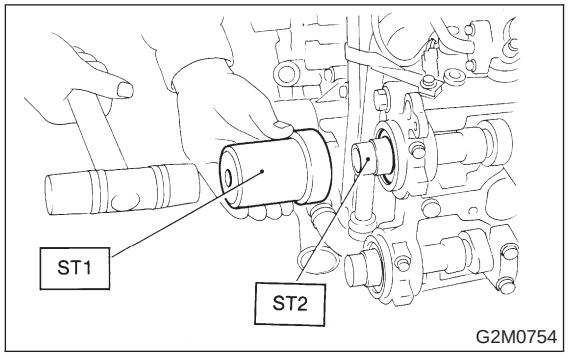


(4) Similarly, tighten cap on exhaust side.
After tightening cap, ensure camshaft rotates only slightly while holding it at “base” circle.

3) Camshaft oil seal installation
Apply grease to new oil seal lips and press onto front end of camshaft by using ST1 and ST2.

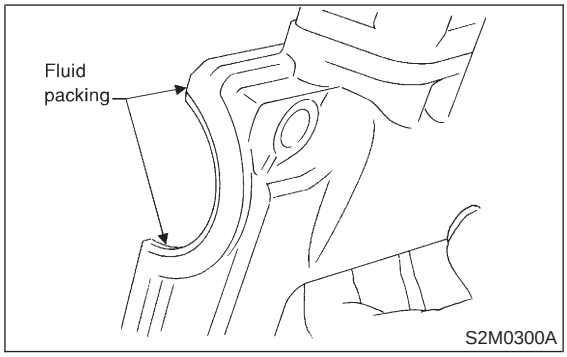
CAUTION:
Use a new oil seal.

ST1 499587100 OIL SEAL INSTALLER
ST2 499597000 OIL SEAL GUIDE



4) Rocker cover installation
(1) Install gasket on rocker cover.
Install peripheral gasket and ignition coil gasket.
(2) Apply fluid packing to four front open edges of peripheral gasket.

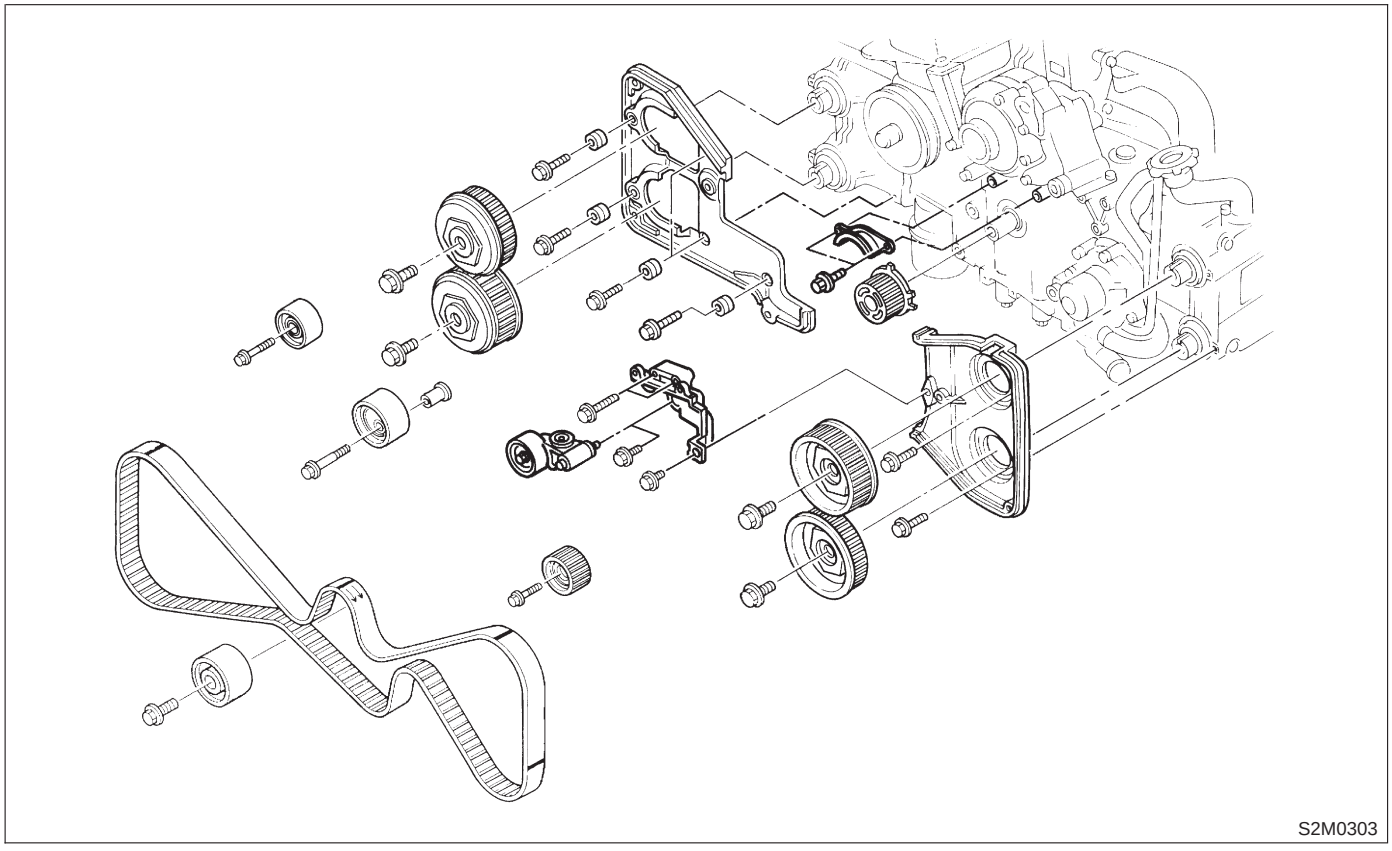
Fluid packing:
THREE BOND 1215 or equivalent



(3) Install rocker cover on cylinder head. Ensure gasket is properly positioned during installation.
5) Install ignition coil.
6) Install cam angle sensor.
7) Similarly, install parts on right-hand side.

2. RELATED PARTS

Install timing belt, camshaft sprockets and related parts.
<Ref. to 2-3b [W2C0].>



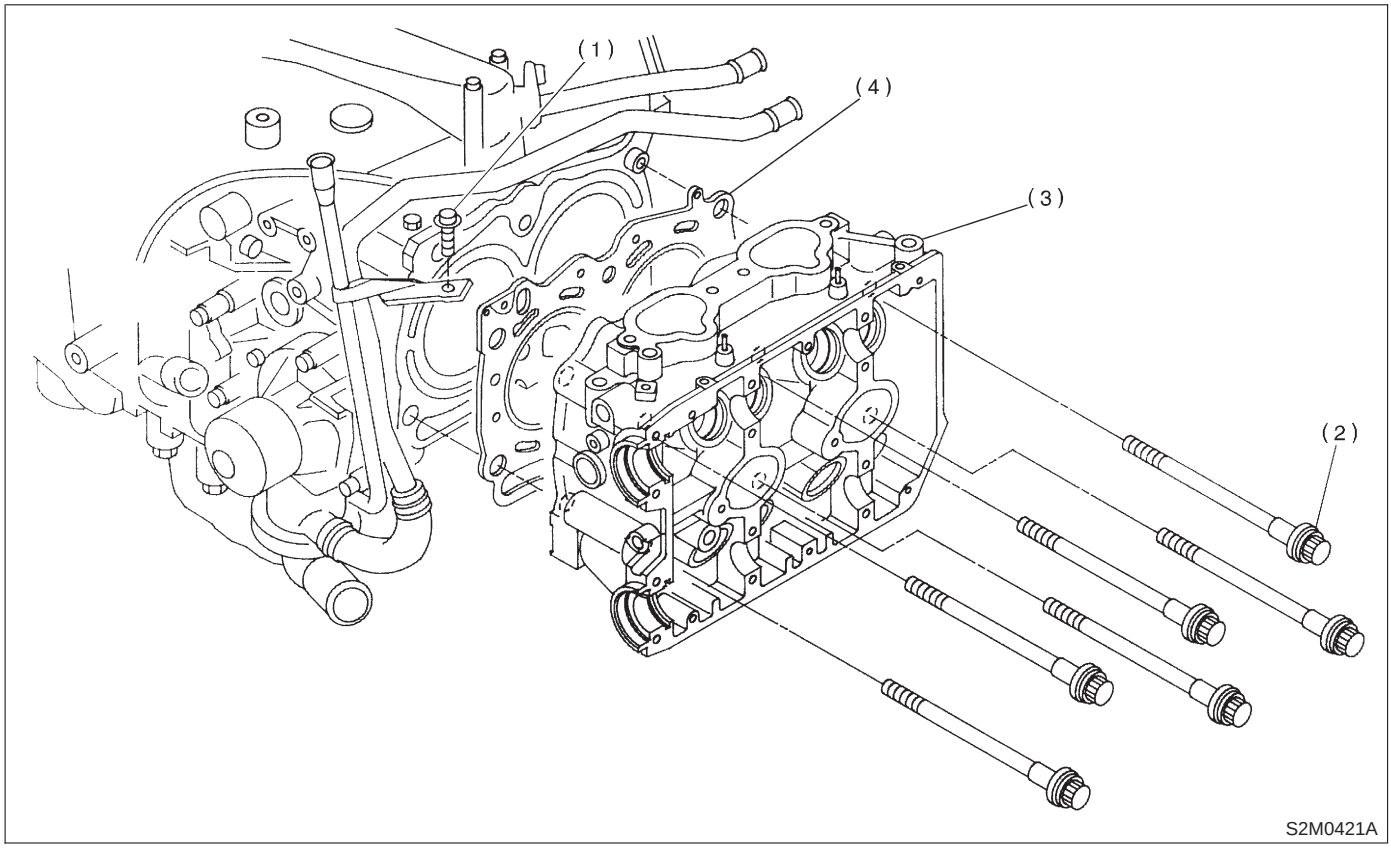
4. Cylinder Head

A: REMOVAL

1. RELATED PARTS

1) Remove V-belt.
2) Remove generator, air conditioner compressor and brackets.
3) Remove hoses and tubes from cylinder block.
4) Disconnect each connector and/or remove connector bracket.
5) Remove intake manifold assembly and gasket.
6) Remove camshaft position sensor.
7) Remove timing belt, camshaft sprockets and related parts.
<Ref. to 2-3b [W2A0].>
8) Remove rocker cover, camshafts and related parts.
<Ref. to 2-3b [W3A0].>

2. CYLINDER HEAD

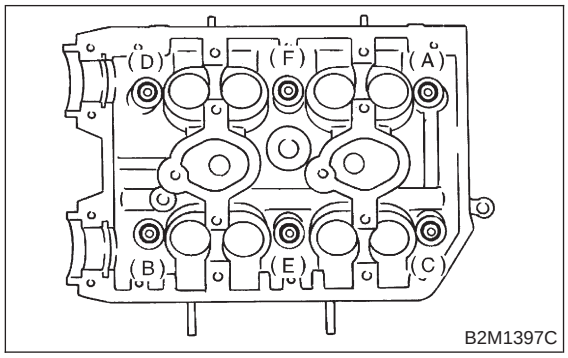


(1) Bolt
(2) Cylinder head bolt
(3) Cylinder head
(4) Cylinder head gasket

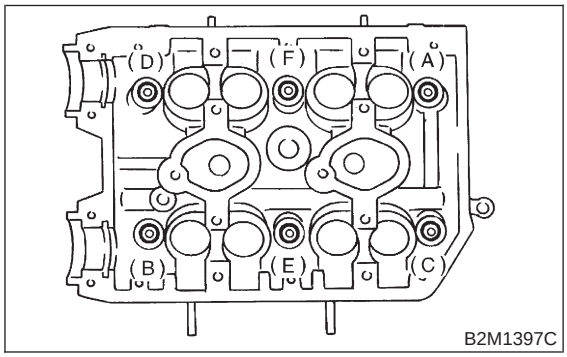
1) Remove oil level gauge guide attaching bolt (LH side only).

2) Remove cylinder head bolts in alphabetical sequence shown in figure.

CAUTION:
Leave bolts (A) and (D) engaged by three or four threads to prevent cylinder head from falling.

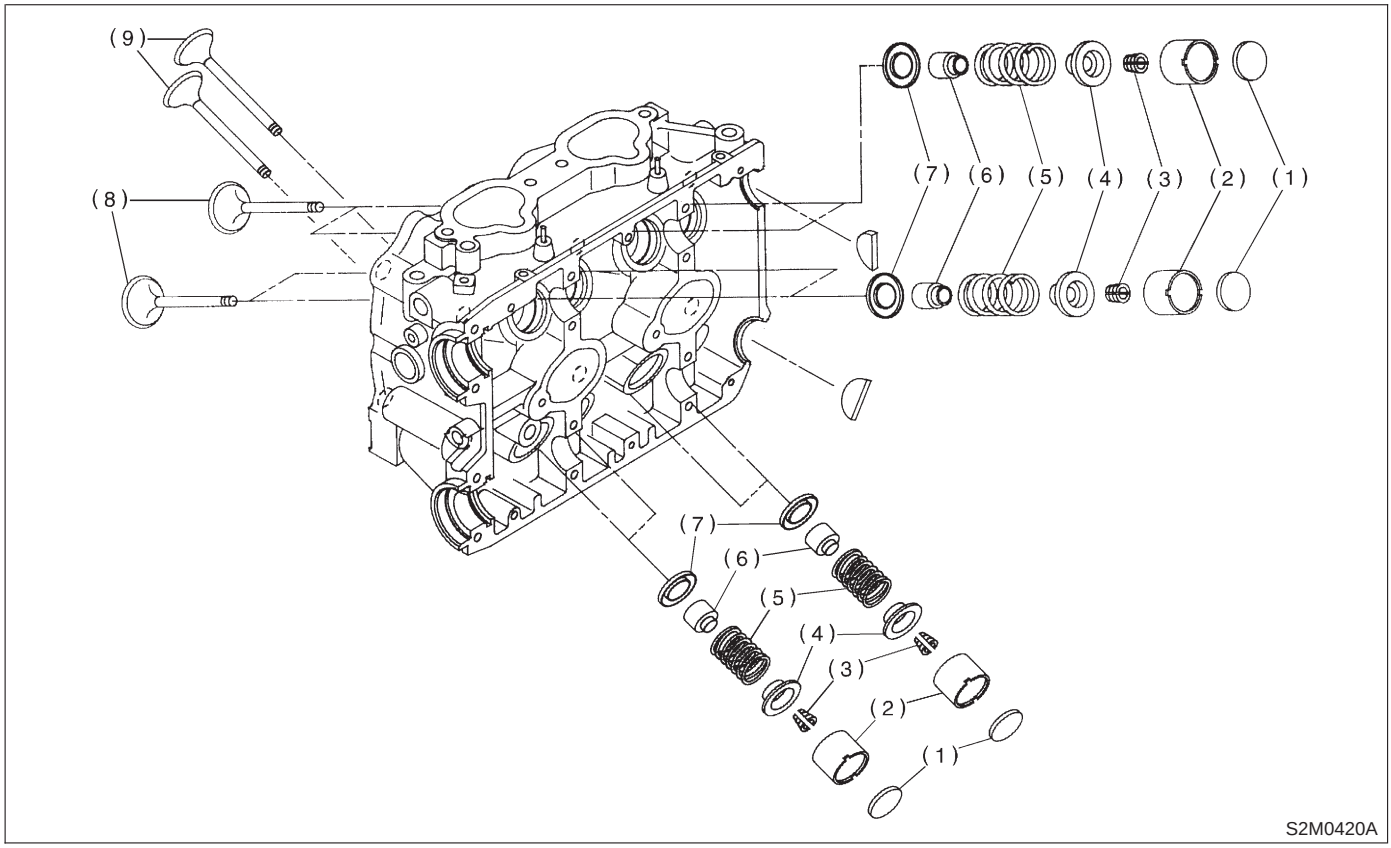


3) While tapping cylinder head with a plastic hammer, separate it from cylinder block.
Remove bolts (A) and (D) to remove cylinder head.



4) Remove cylinder head gasket.
5) Similarly, remove right-hand cylinder head.

B: DISASSEMBLY

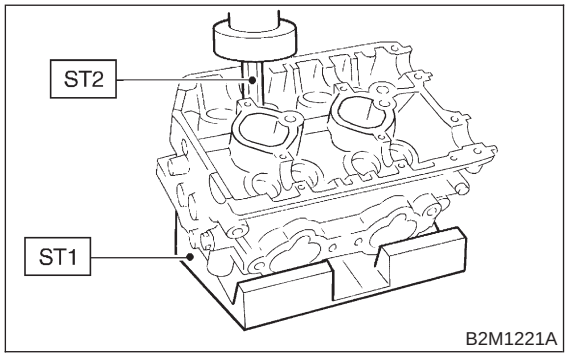


(1) Valve shim
(2) Valve lifter
(3) Valve retainer key
(4) Valve retainer
(5) Valve spring
(6) Valve oil seal
(7) Valve spring seat
(8) Intake valve
(9) Exhaust valve

1) Remove valve shims and valve lifters.

2) Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

CAUTION:
● Keep removed parts in order for re-installing in their original positions.
● Mark each valve to prevent confusion.
● Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.



C: INSPECTION

1. CYLINDER HEAD

1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of red check.

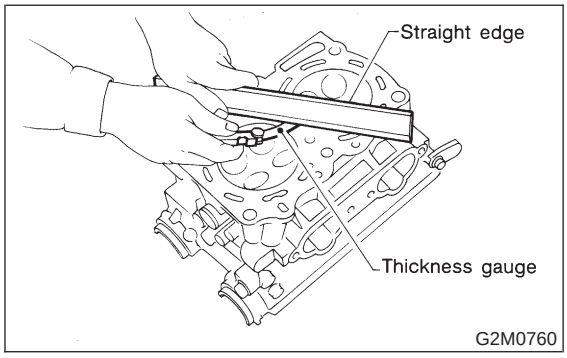
2) Measure the warping of the cylinder head surface that mates with crankcase by using a straight edge and thickness gauge.
If the warping exceeds 0.05 mm (0.0020 in), regrind the surface with a surface grinder.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.3 mm (0.012 in)

Standard height of cylinder head:
127.5 mm (5.02 in)

CAUTION:
Uneven torque for the cylinder head nuts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.



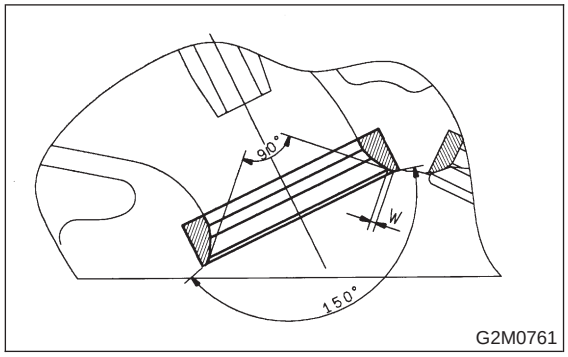
2. VALVE SEAT

Inspect intake and exhaust valve seats, and correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width: W

Intake
Standard
1.0 mm (0.039 in)
Limit
1.7 mm (0.067 in)

Exhaust
Standard
1.5 mm (0.059 in)
Limit
2.2 mm (0.087 in)



3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

Clearance between the valve guide and valve stem:

Standard
Intake
0.035 — 0.062 mm (0.0014 — 0.0024 in)
Exhaust
0.040 — 0.067 mm (0.0016 — 0.0026 in)

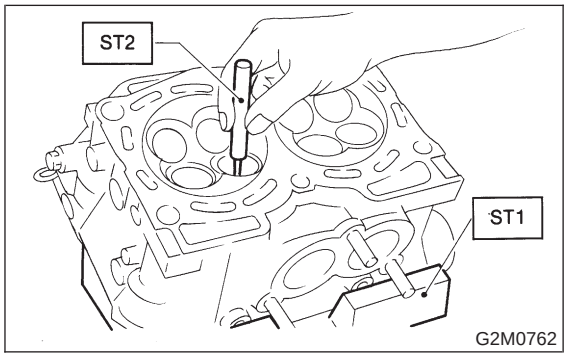
Limit
0.15 mm (0.0059 in)

Valve guide inner diameter:
6.000 — 6.015 mm (0.2362 — 0.2368 in)

Valve stem outer diameter:
Intake
5.950 — 5.965 mm (0.2343 — 0.2348 in)
Exhaust
5.950 — 5.965 mm (0.2343 — 0.2348 in)

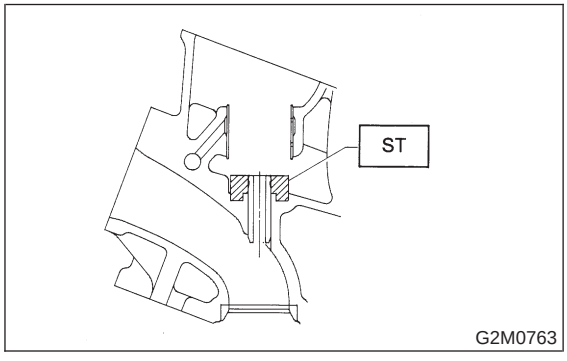
2) If the clearance between valve guide and stem exceeds the specification, replace guide as follows:
(1) Place cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.
(2) Insert ST2 into valve guide and press it down to remove valve guide.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn cylinder head upside down and place ST as shown in the figure.

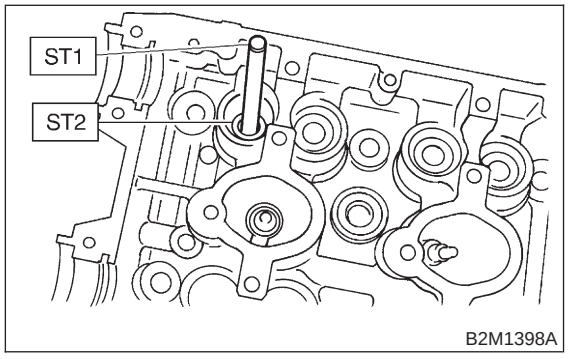
ST 498267700 VALVE GUIDE ADJUSTER



(4) Before installing new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

(5) Put new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
ST2 498267700 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion: L
12.0 — 12.4 mm (0.472 — 0.488 in)

(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into valve guide, and return it also rotating clockwise. After reaming, clean valve guide to remove chips.

ST 499767400 VALVE GUIDE REAMER

CAUTION:
● Apply engine oil to the reamer when reaming.
● If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
● If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE

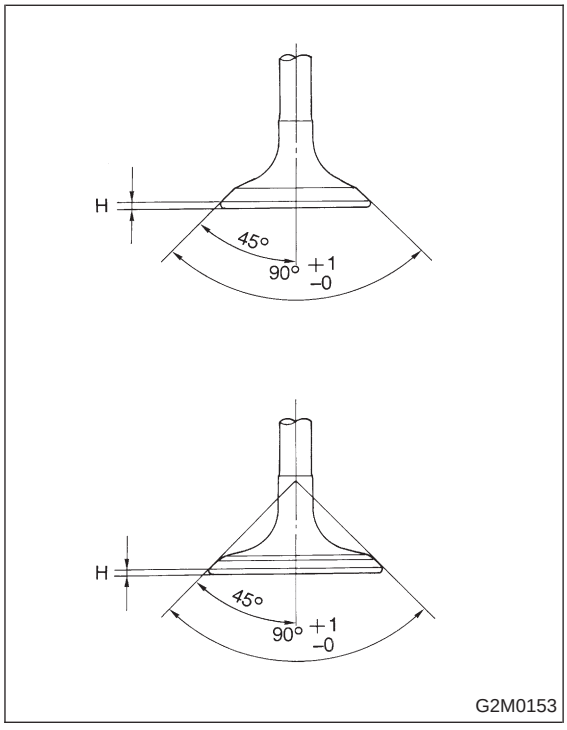
1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if “H” is less than the specified limit.

H:

Intake
Standard
1.2 mm (0.047 in)
Limit
0.8 mm (0.031 in)

Exhaust
Standard
1.5 mm (0.059 in)
Limit
0.8 mm (0.031 in))

Valve overall length:
Intake
105.9 mm (4.169 in)
Exhaust
106.2 mm (4.181 in)

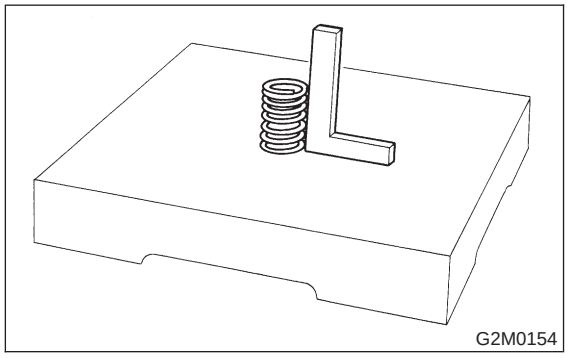


2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

5. VALVE SPRINGS

1) Check valve springs for damage, free length, and tension. Replace valve spring if it is not to the specifications presented in the table.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

	Valve spring
Free length	48.04 mm (1.8913 in)
Tension/spring height	146.1 — 167.7 N (14.9 — 17.1 kg, 32.9 — 37.7 lb)/42.0 mm (1.654 in)
	455.0 — 523.7 N (46.4 — 53.4 kg, 102.3 — 117.7 lb)/33.4 mm (1.315 in)
Squareness	2.5°, 2.1 mm (0.083 in)


G2M0154

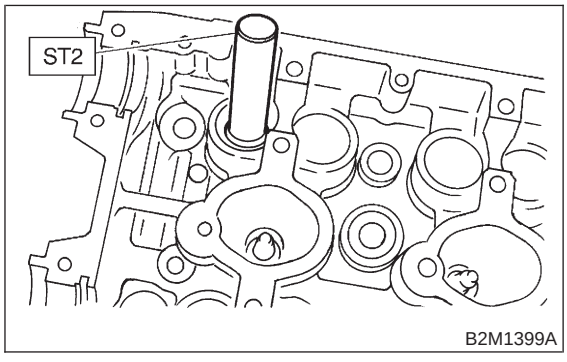
6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.
1) Place cylinder head on ST1.
2) Press in oil seal to the specified dimension indicated in the figure by using ST2.
ST1 498267600 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

CAUTION:
● Apply engine oil to oil seal before force-fitting.
● Differentiate between intake valve oil seal and exhaust valve oil seal by noting their difference in color.

Color of rubber part:
Intake [Black]
Exhaust [Brown]

Color of spring part:
Intake [Silver]
Exhaust [Silver]

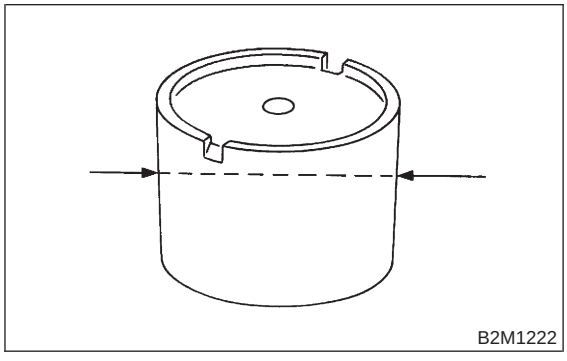


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7. VALVE LIFTER

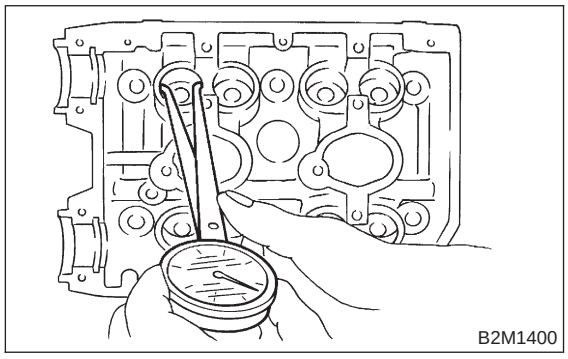
1) Check valve lifter visually.
2) Measure outer diameter of valve lifter.

Outer diameter:
32.959 — 32.975 mm (1.2976 — 1.2982 in)


B2M1222

3) Measure inner diameter of valve lifter mating part on cylinder head.

Inner diameter:
32.994 — 33.016 mm (1.2990 — 1.2998 in)

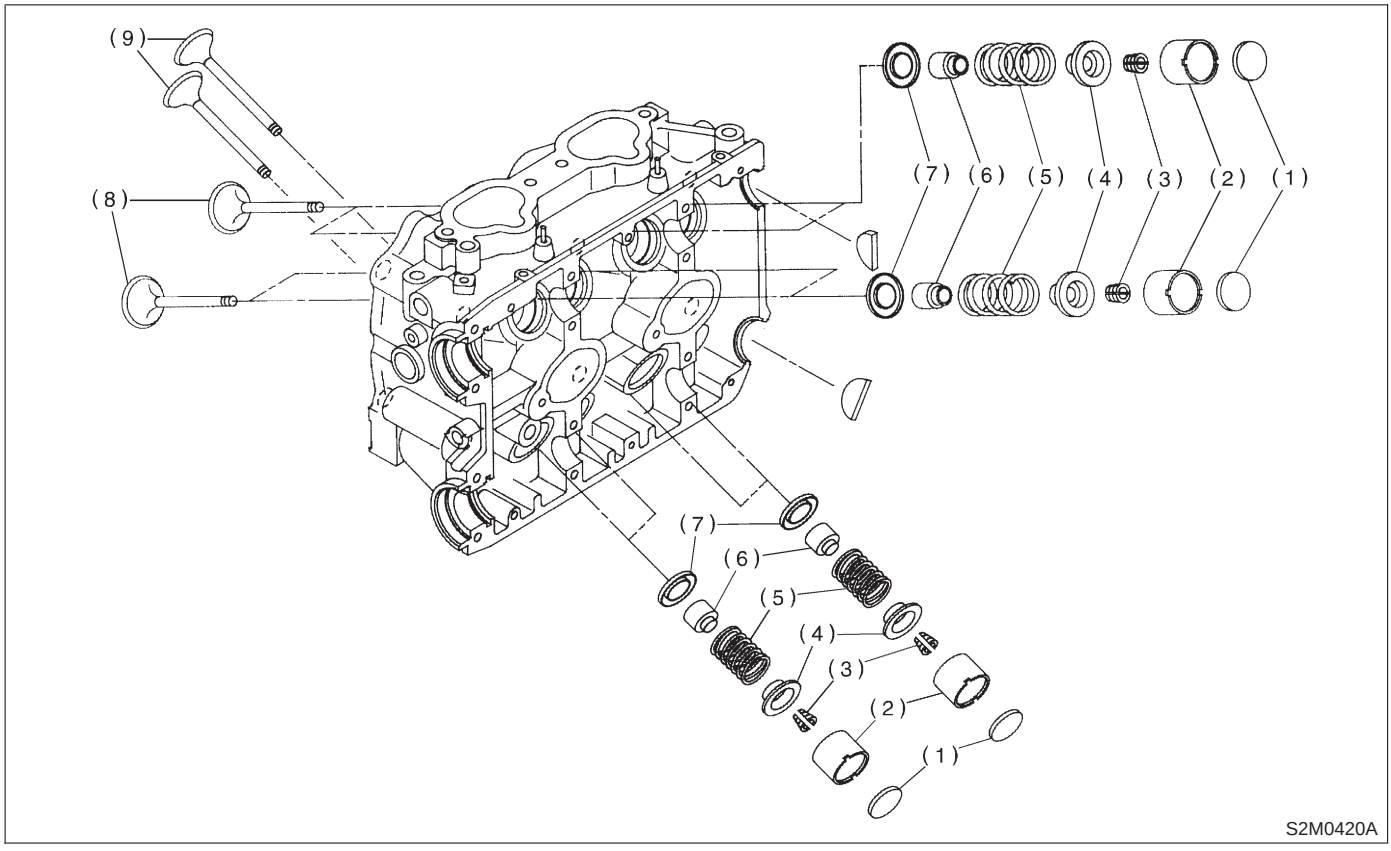


CAUTION:
If difference between outer diameter of valve lifter and inner diameter of valve lifter mating part is over the limit, replace cylinder head.

Standard:
0.019 — 0.057 mm (0.0007 — 0.0022 in)

Limit:
0.100 mm (0.0039 in)

D: ASSEMBLY



(1) Valve shim
(2) Valve lifter
(3) Valve retainer key
(4) Valve retainer
(5) Valve spring
(6) Valve oil seal
(7) Valve spring seat
(8) Intake valve
(9) Exhaust valve

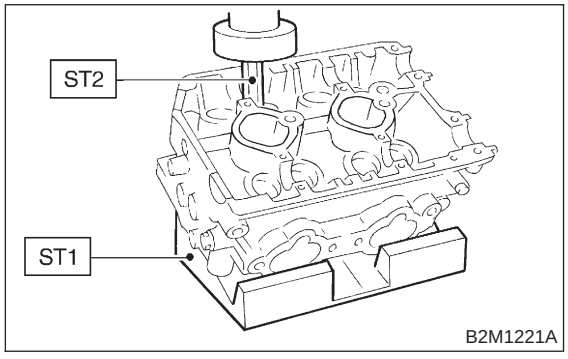
1) Installation of valve spring and valve
   (1) Coat stem of each valve with engine oil and insert valve into valve guide.

CAUTION:
When inserting valve into valve guide, use special care not to damage the oil seal lip.

   (2) Set cylinder head on ST1.
   (3) Install valve spring and retainer using ST2.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

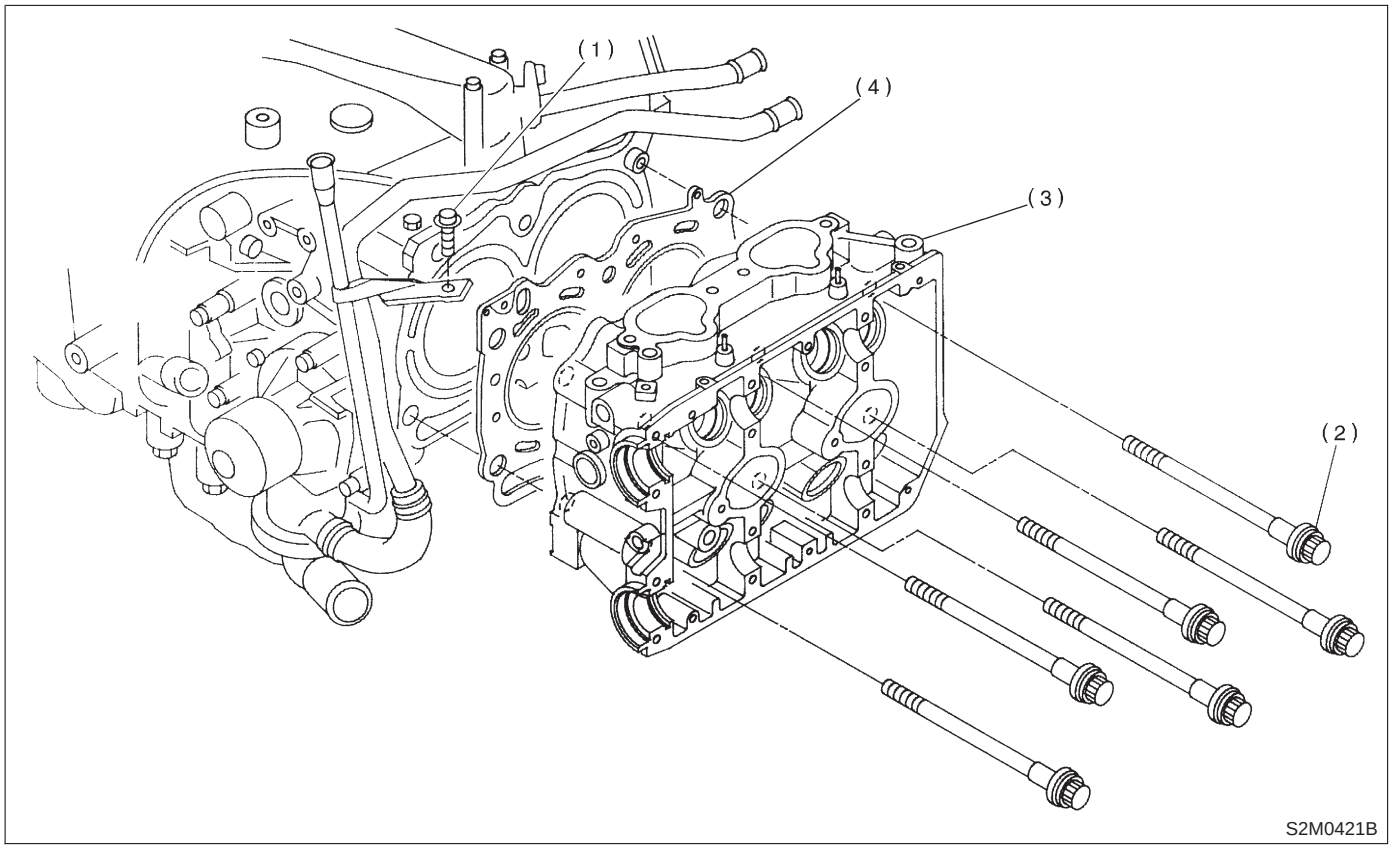
CAUTION:
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.



   (4) Compress valve spring and fit valve spring retainer key.
   (5) After installing, tap valve spring retainers lightly with wooden hammer for better seating.
2) Install valve lifter and valve shim.

E: INSTALLATION

1. CYLINDER HEAD



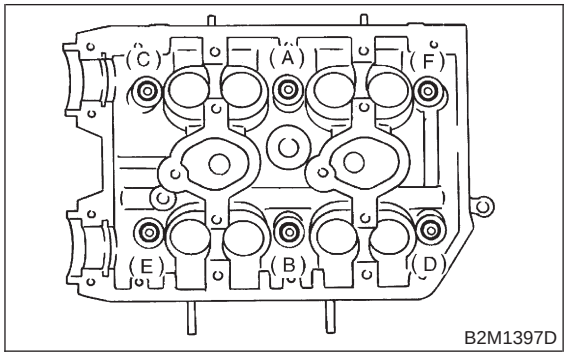
(1) Bolt
(2) Cylinder head bolt
(3) Cylinder head
(4) Cylinder head gasket

1) Install cylinder head and gaskets on cylinder block.

CAUTION:
Use new cylinder head gaskets.

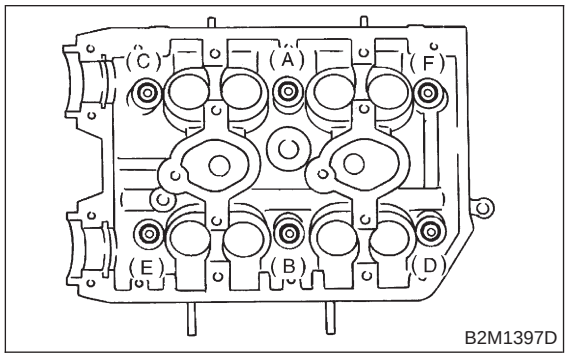
2) Tighten cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb) in alphabetical sequence.
Then tighten all bolts to 69 N·m (7.0 kg-m, 51 ft-lb) in alphabetical sequence.
(3) Back off all bolts by 180° first; back them off by 180° again.
(4) Tighten all bolts to 39 N·m (4.0 kg-m, 29 ft-lb) in alphabetical sequence.
(5) Tighten all bolts by 80 to 90° in alphabetical sequence.
(6) Tighten all bolts by 40 to 45° in alphabetical sequence.

CAUTION:
Do not tighten bolts more than 45°.



(7) Further tighten bolts (A) and (B) by 40 to 45°.

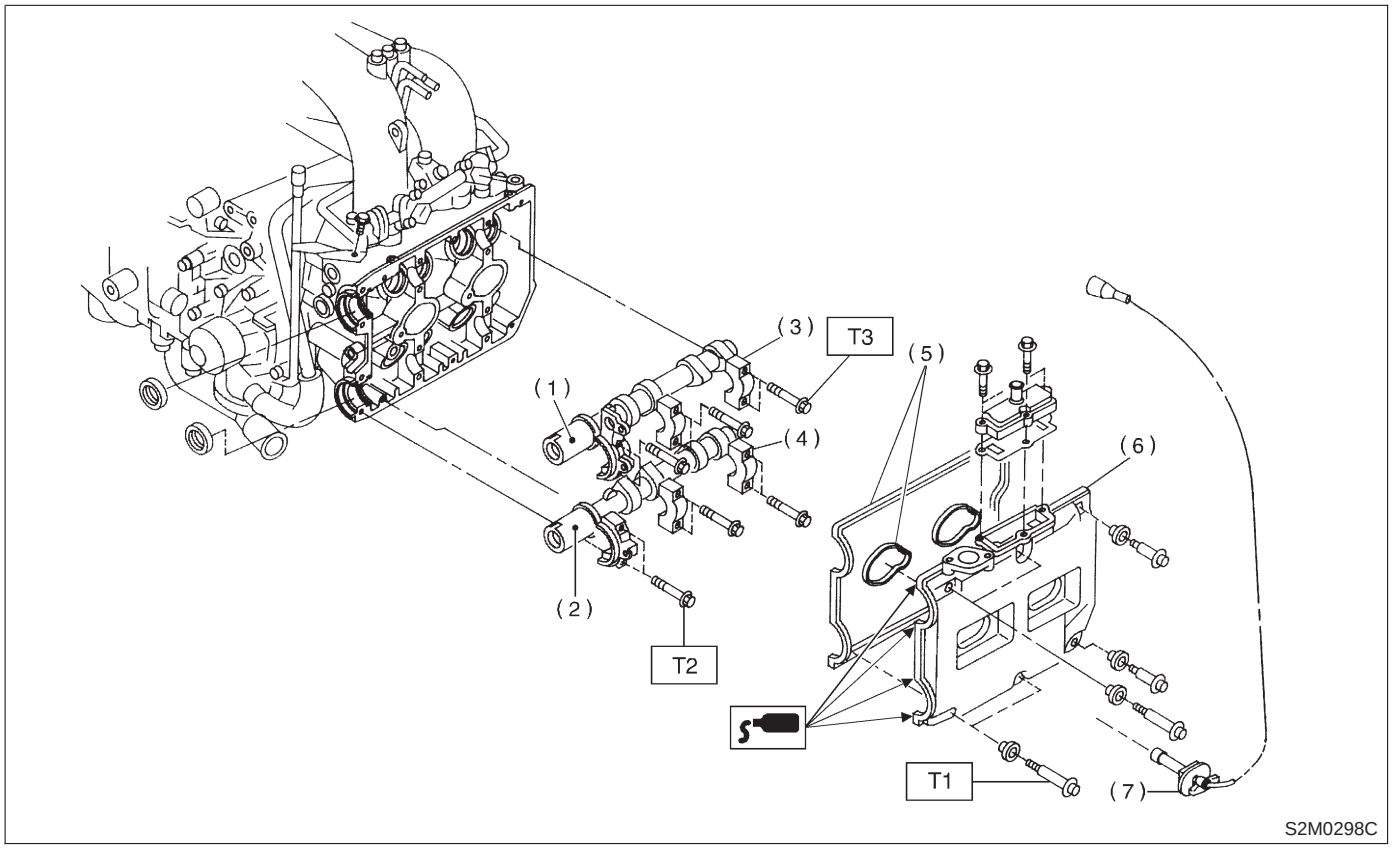
CAUTION:
Ensure that the total "re-tightening angle" [in the two previous steps] do not exceed 90°.



3) Install oil level gauge guide attaching bolt (LH side only).

2. RELATED PARTS

1) Install camshafts, rocker cover and related parts.
<Ref. to 2-3b [W3C0].>

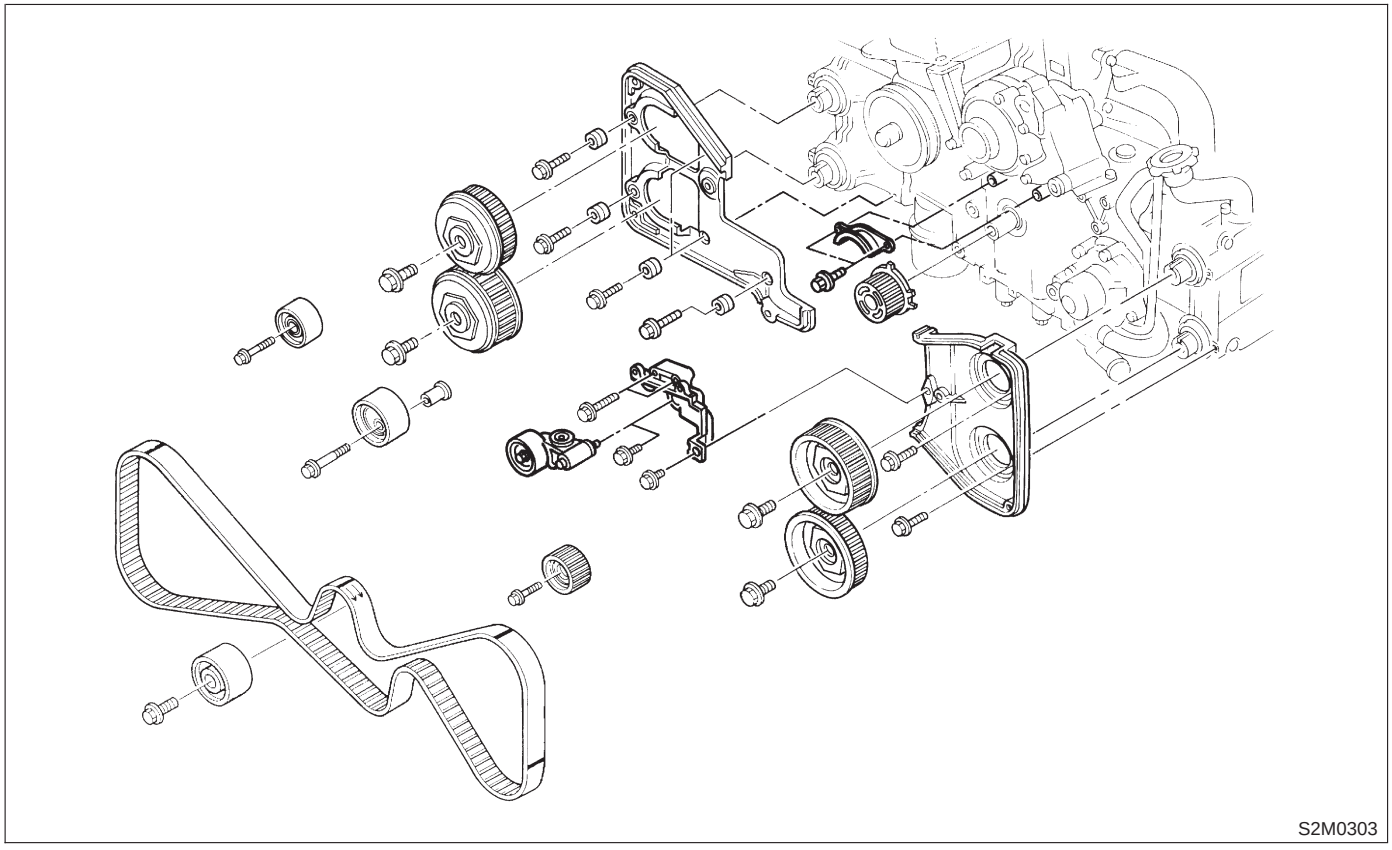


(1) Intake camshaft (LH)
(2) Exhaust camshaft (LH)
(3) Intake camshaft cap (LH)
(4) Exhasut camshaft cap (LH)
(5) Rocker cover gasket (LH)
(6) Rocker cover (LH)
(7) Spark plug cord

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±0.5 (0.5±0.05, 3.6±0.4)
T2: 9.8±0.7 (1.0±0.07, 7.2±0.5)
T3: 20±2 (2.0±0.2, 14.5±1.4)

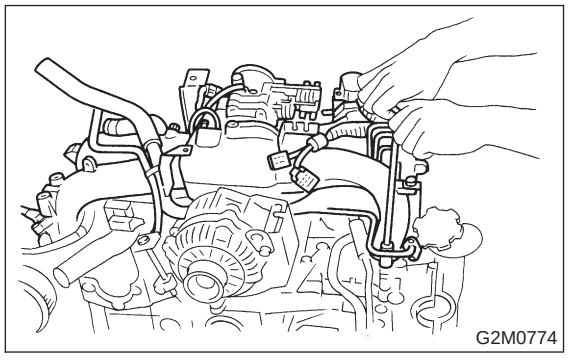
2) Similarly, install parts on right-hand side.

3) Install camshaft sprockets, timing belt and related parts.
<Ref. to 2-3b [W2C0].>



4) Install intake manifold.

CAUTION:
Use new gaskets.



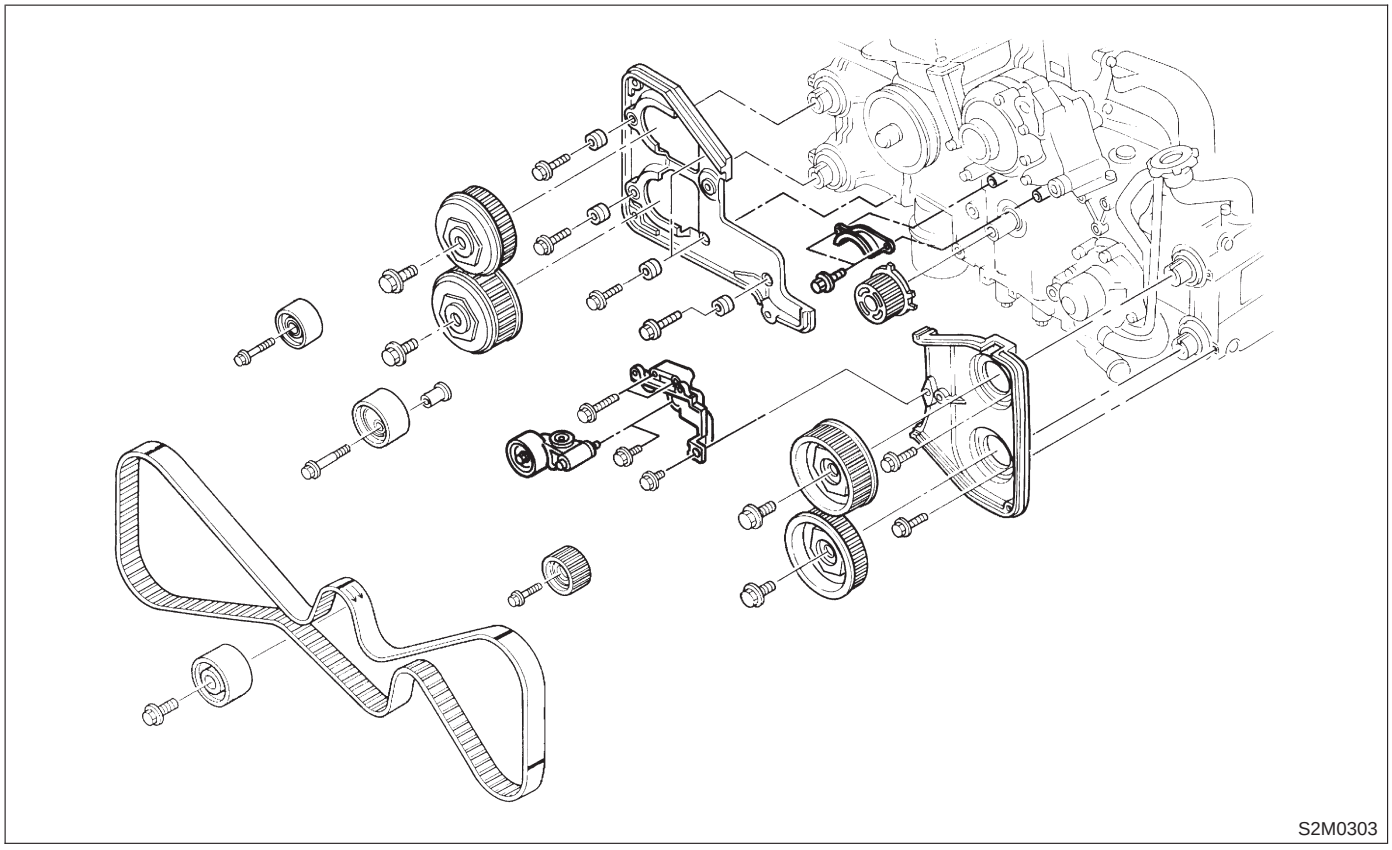
5) Install camshaft position sensor. Use dry compressed air to remove foreign particles before installing sensor.
6) Connect each connector and/or install connector bracket.
7) Connect hoses and tubes to cylinder block.
8) Install brackets, generator and air conditioner compressor.
9) Install V-belt.

5. Cylinder Block

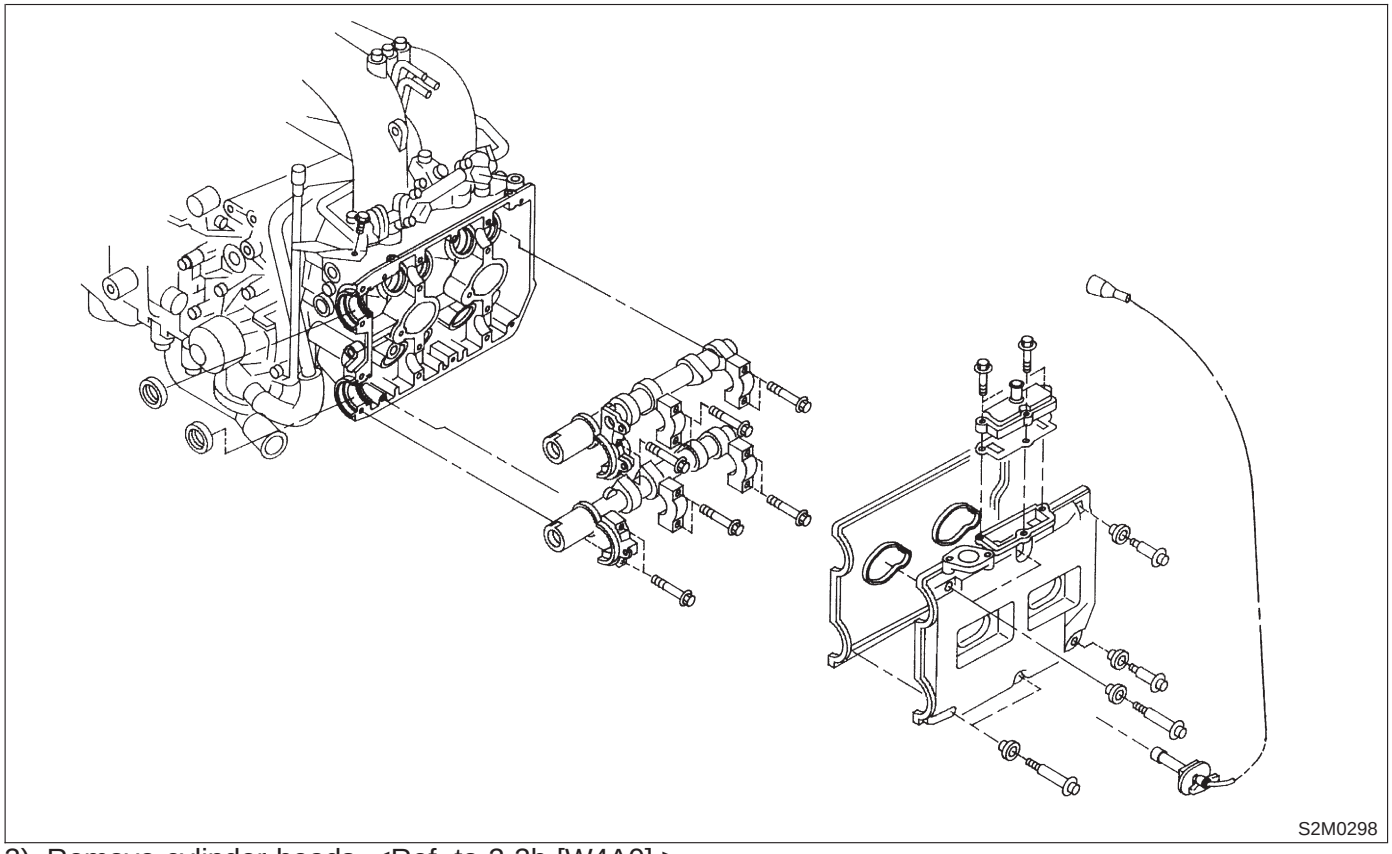
A: REMOVAL

1. RELATED PARTS

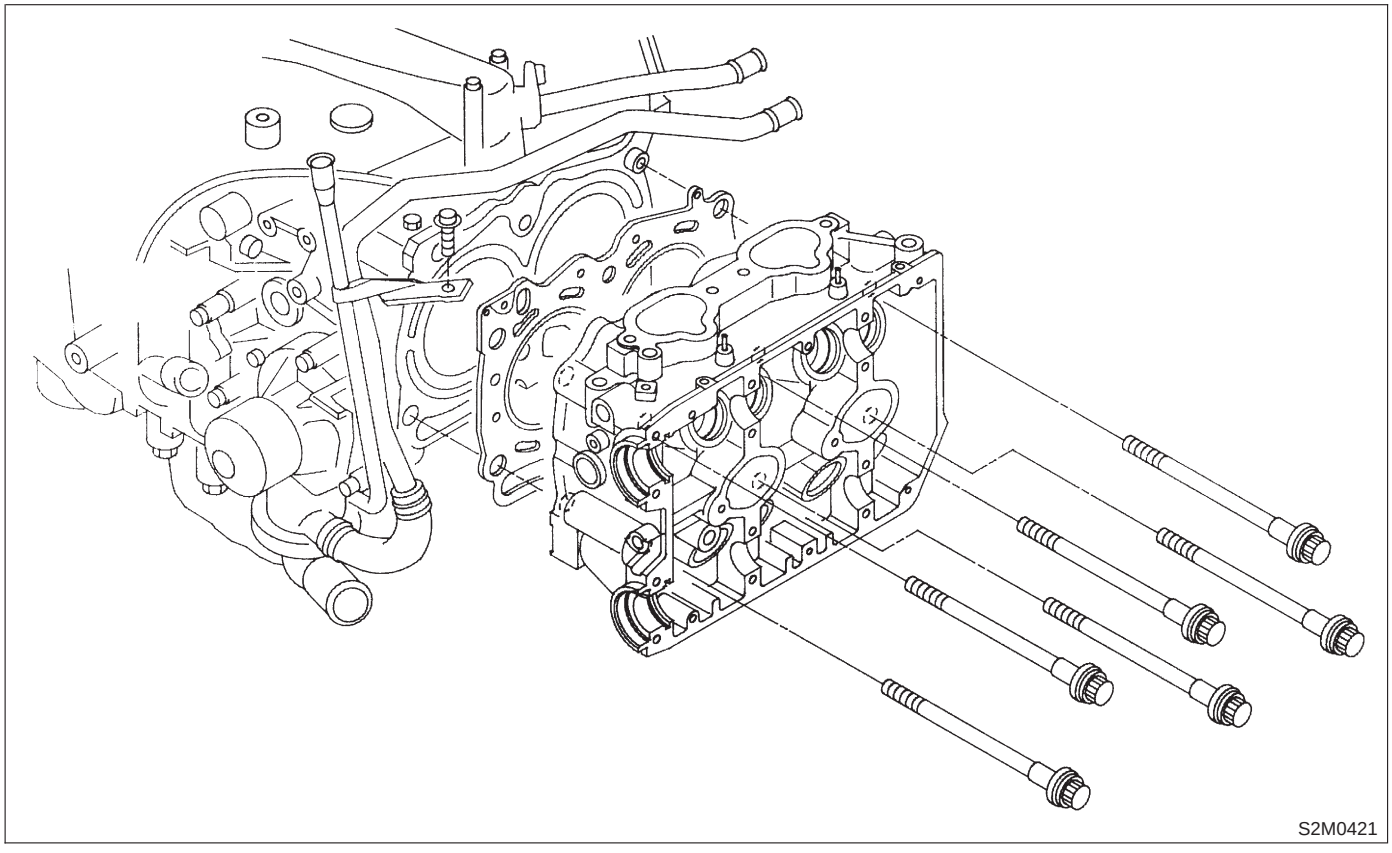
1) Remove timing belt, camshaft sprockets and related parts.
<Ref. to 2-3b [W2A0].>



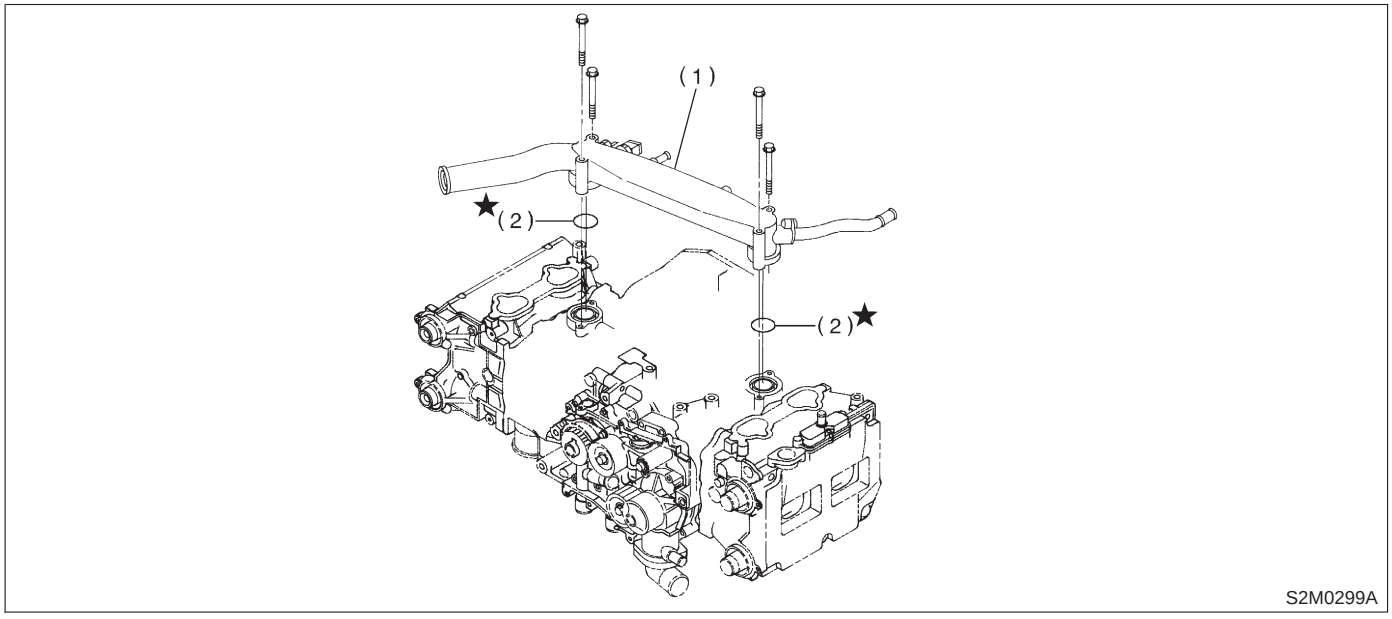
2) Remove rocker cover, camshafts and related parts. <Ref. to 2-3b [W3A0].>



3) Remove cylinder heads. <Ref. to 2-3b [W4A0].>

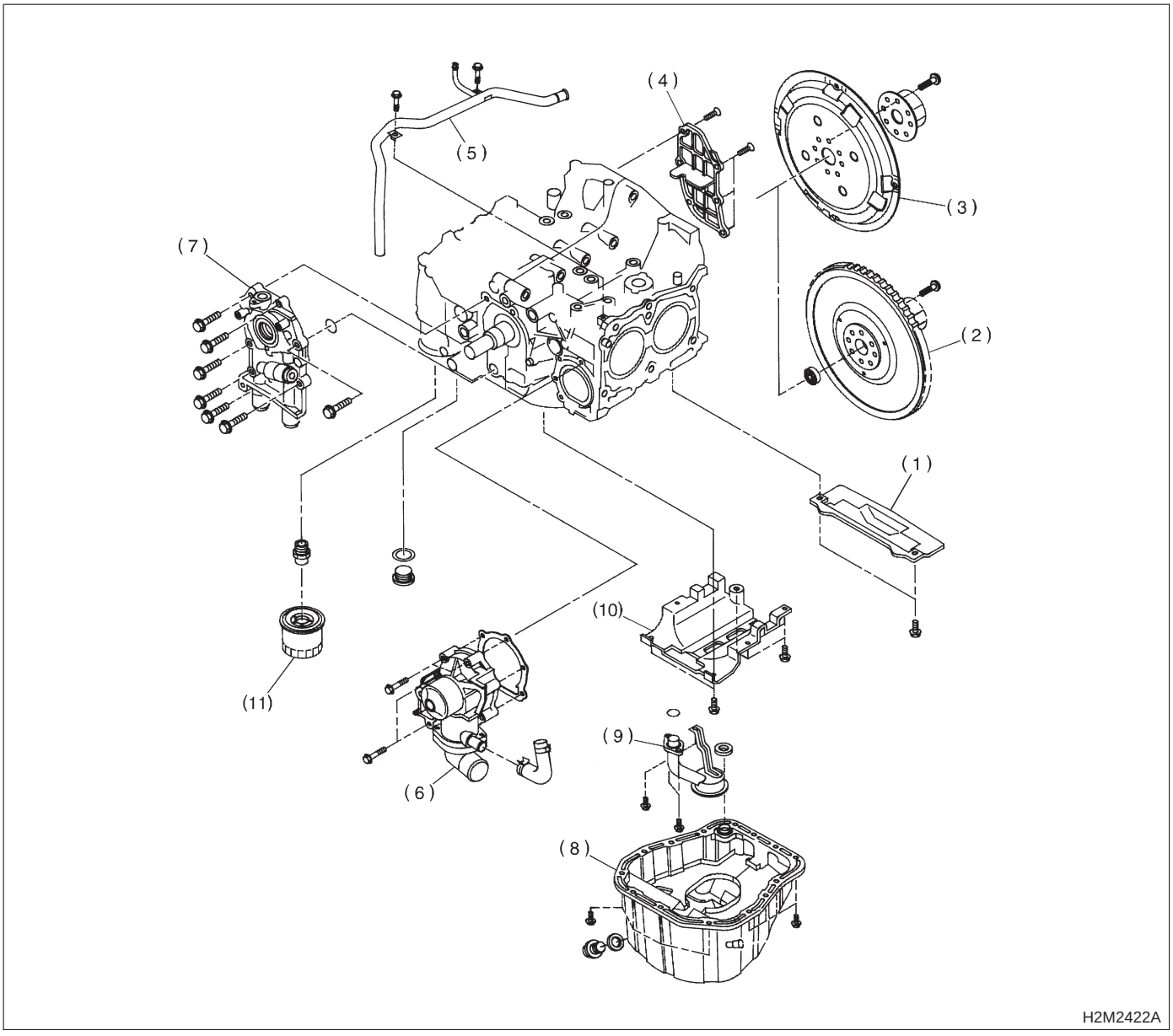


4) Remove water pipe. <Ref. to 2-5 [W8A0].>



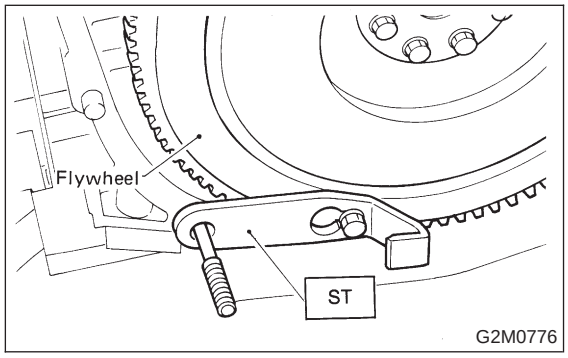
(1) Water pipe
(2) O-ring

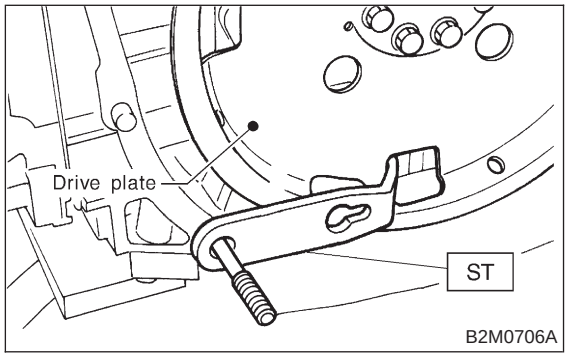
2. OIL PUMP AND WATER PUMP



(1) Clutch housing cover (MT vehicles only)
(2) Flywheel (MT vehicles only)
(3) Drive plate (AT vehicles only)
(4) Oil separator cover
(5) Water by-pass pipe
(6) Water pump
(7) Oil pump
(8) Oil pan
(9) Oil strainer
(10) Baffle plate
(11) Oil filter

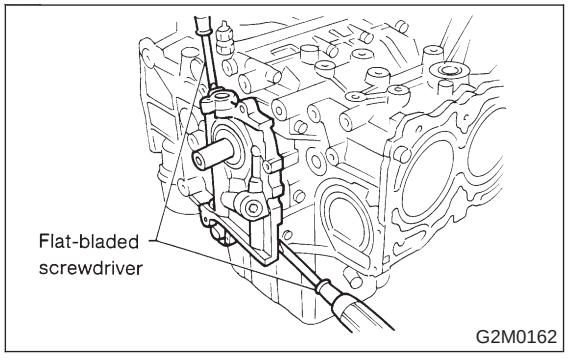
1) Remove clutch housing cover (MT vehicles only).
2) Remove flywheel (MT vehicles only) or drive plate (AT vehicles only).
Using ST, lock crankshaft.
ST 498497100 CRANKSHAFT STOPPER





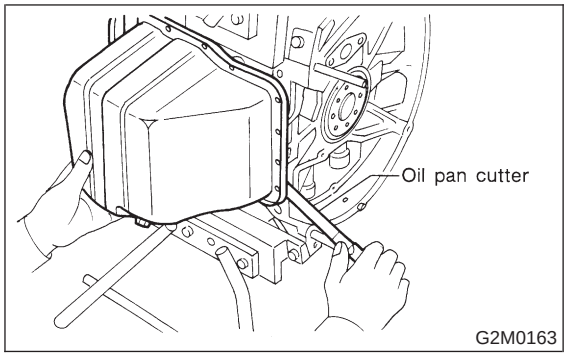
3) Remove oil separator cover.
4) Remove water by-pass pipe for heater.
5) Remove water pump.
6) Remove oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in figure when removing oil pump.

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.



7) Removal of oil pan
(1) Turn cylinder block with #2 and #4 piston sides facing upward.
(2) Remove bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove oil pan.

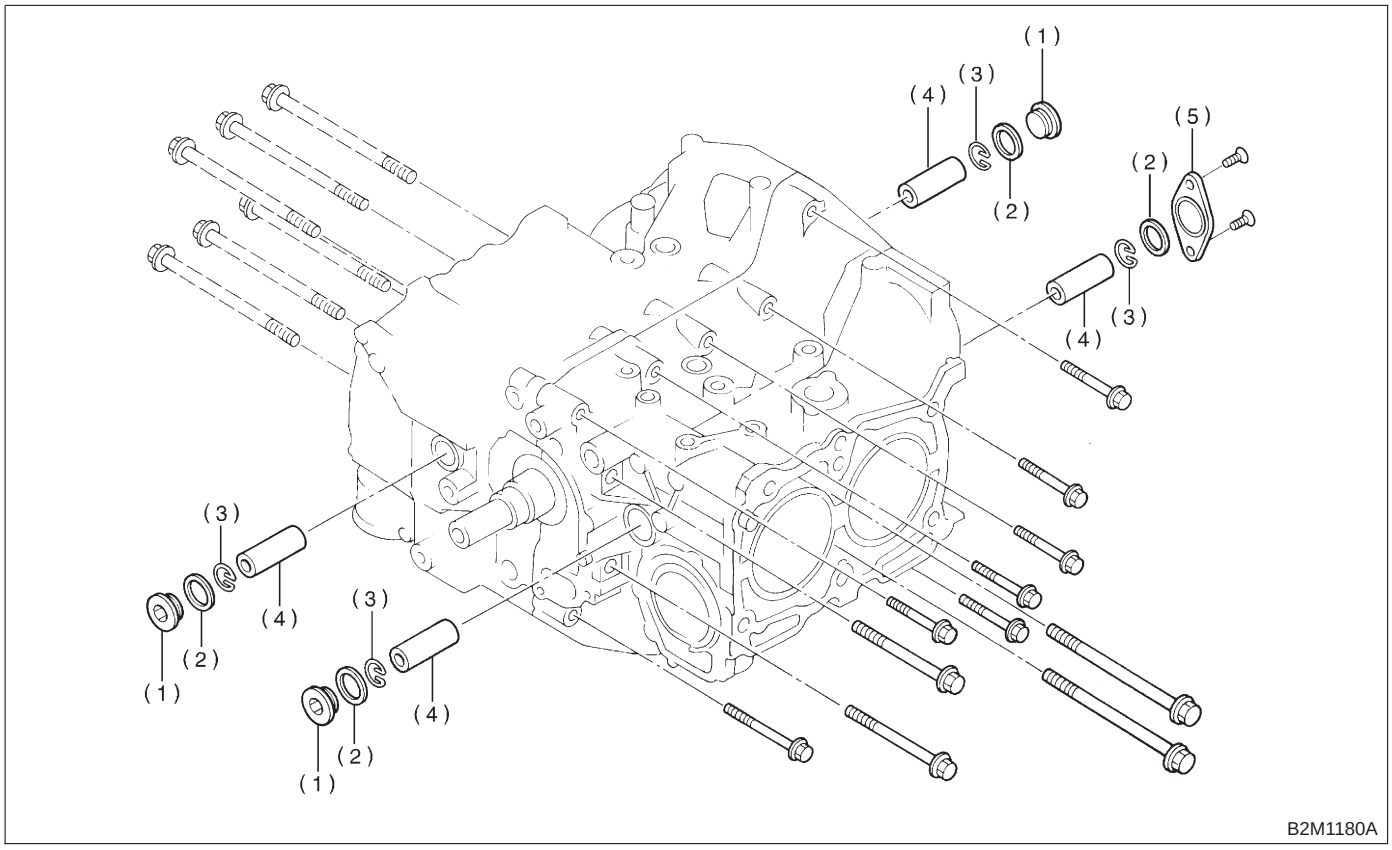
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.



8) Remove oil strainer stay.
9) Remove oil strainer.
10) Remove baffle plate.
11) Remove oil filter.

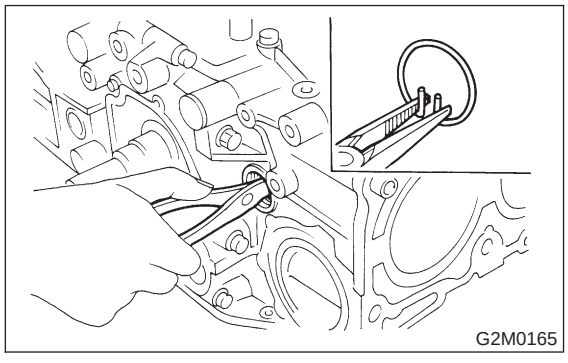
B: DISASSEMBLY

1. PISTON PIN AND CYLINDER BLOCK CONNECTING BOLT



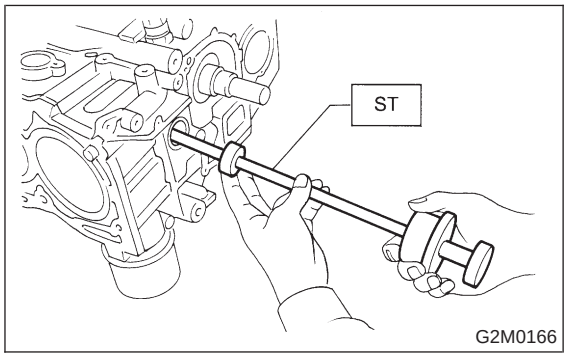
(1) Service hole plug
(2) Gasket
(3) Circlip
(4) Piston pin
(5) Service hole cover

1) Remove service hole cover and service hole plugs using hexagon wrench (14 mm).
2) Rotate crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove piston circlip through service hole of #1 and #2 cylinders.



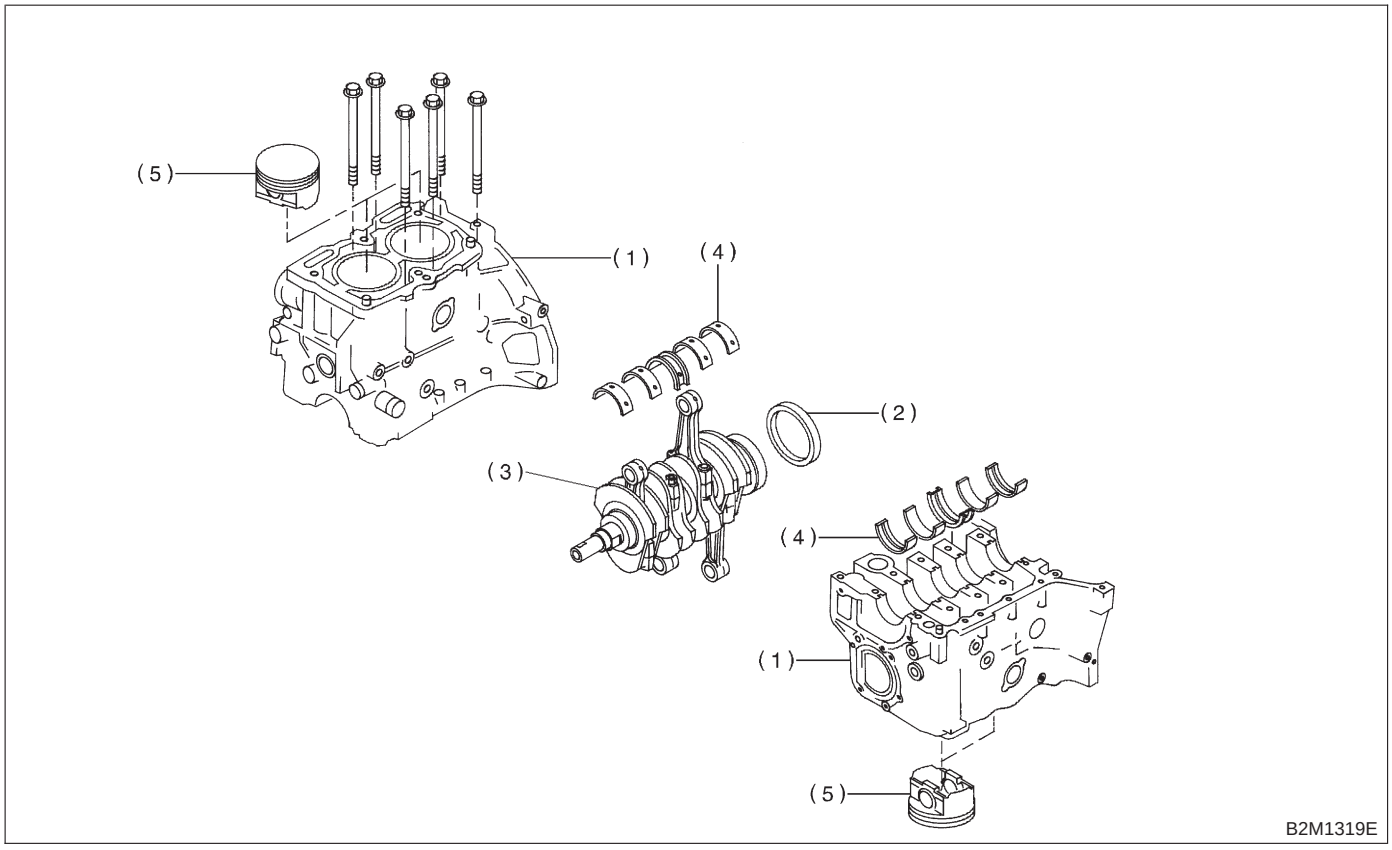
3) Draw out piston pin from #1 and #2 pistons by using ST.
ST 499097700 PISTON PIN REMOVER

CAUTION:
Be careful not to confuse original combination of piston, piston pin and cylinder.



4) Similarly remove piston pins from #3 and #4 pistons.
5) Remove bolts which connect cylinder block on the side of #2 and #4 cylinders.
6) Back off bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.

2. CYLINDER BLOCK



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

1) Set up cylinder block so that #1 and #3 cylinders are on the upper side, then remove cylinder block connecting bolts.
2) Separate left-hand and right-hand cylinder blocks.

CAUTION:
When separating cylinder block, do not allow the connecting rod to fall and damage the cylinder block.

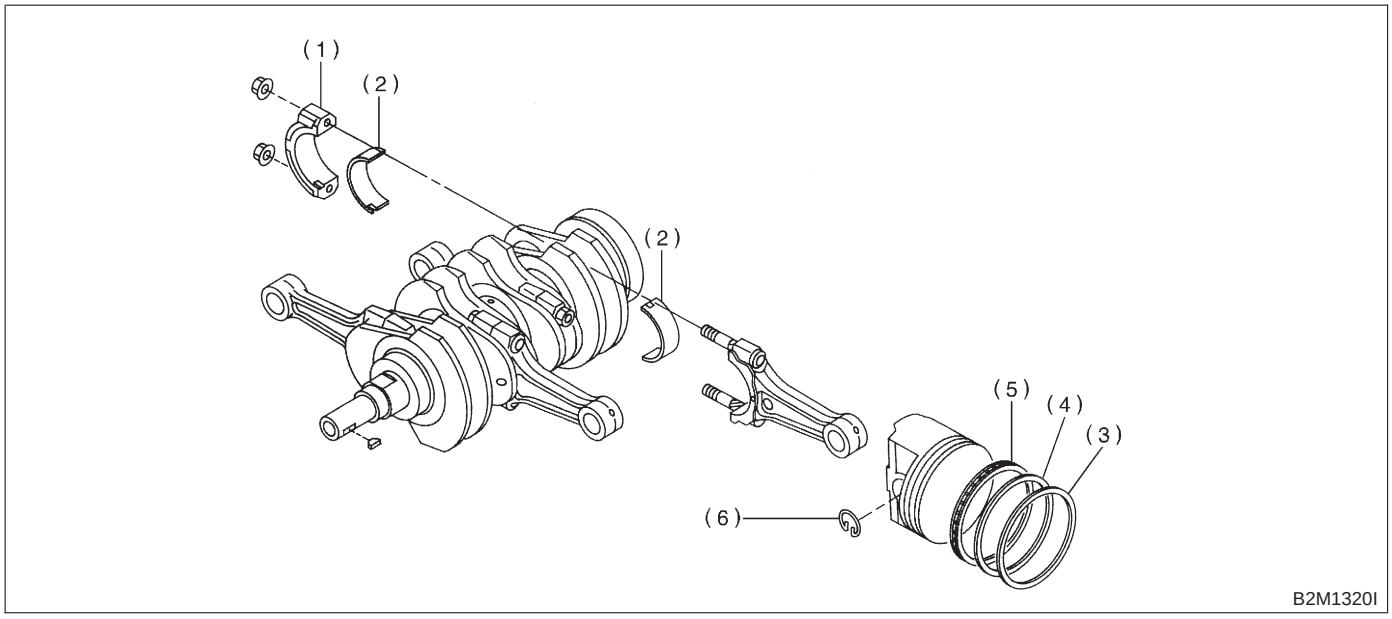
3) Remove rear oil seal.
4) Remove crankshaft together with connecting rod.
5) Remove crankshaft bearings from cylinder block using hammer handle.

CAUTION:
Do not confuse combination of crankshaft bearings. Press bearing at the end opposite to locking lip.

6) Draw out each piston from cylinder block using wooden bar or hammer handle.

CAUTION:
Do not confuse combination of piston and cylinder.

3. CRANKSHAFT AND PISTON



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Circlip

1) Remove connecting rod cap.
2) Remove connecting rod bearing.

CAUTION:
Arrange removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove piston rings using the piston ring expander.
4) Remove the oil ring by hand.

CAUTION:
Arrange the removed piston rings in good order to prevent confusion.

5) Remove circlip.

C: INSPECTION

1. CYLINDER BLOCK

1) Check for cracks and damage visually. Especially, inspect important parts by means of red lead check.
2) Check the oil passages for clogging.
3) Inspect crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.05 mm (0.0020 in)

Grinding limit:
0.1 mm (0.004 in)

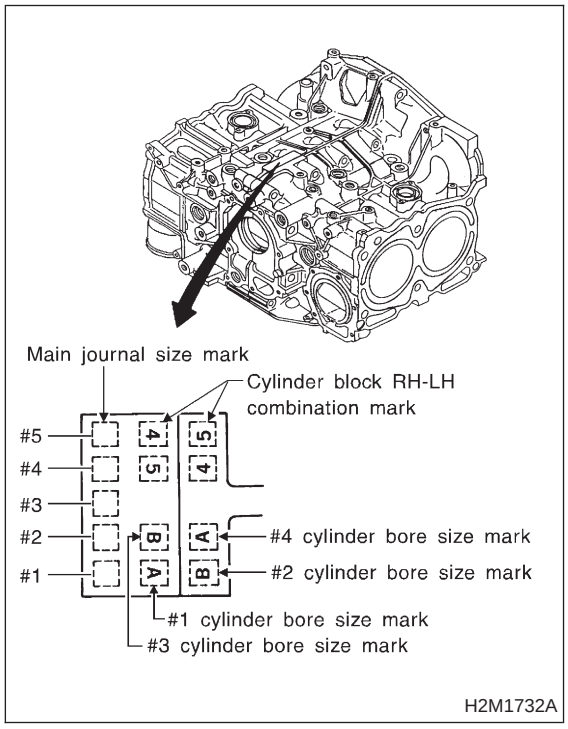
Standard height of cylinder block:
201.0 mm (7.91 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

NOTE:
Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guide line in selecting a standard piston.

Standard diameter:
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)

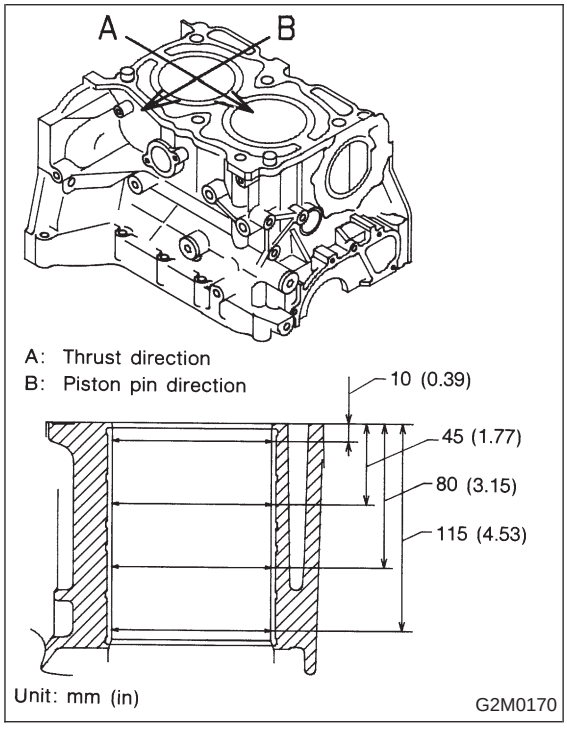


2) How to measure the inner diameter of each cylinder
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in figure, using a cylinder bore gauge.

CAUTION:
Measurement should be performed at a temperature 20°C (68°F).

Taper:
Standard
0.015 mm (0.0006 in)
Limit
0.050 mm (0.0020 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)
Limit
0.050 mm (0.0020 in)



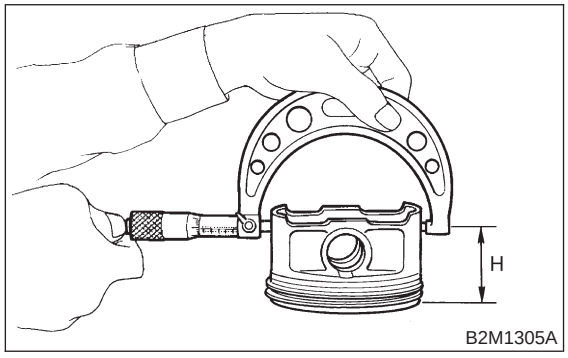
3) When piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

4) How to measure the outer diameter of each piston
Measure the outer diameter of each piston at the height shown in figure. (Thrust direction)

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
37.0 mm (1.457 in)

Piston outer diameter:
Standard
A: 99.485 — 99.495 mm (3.9167 — 3.9171 in)
B: 99.475 — 99.485 mm (3.9163 — 3.9167 in)
0.25 mm (0.0098 in) oversize
99.725 — 99.735 mm (3.9262 — 3.9266 in)
0.50 mm (0.0197 in) oversize
99.975 — 99.985 mm (3.9360 — 3.9364 in)



5) Calculate the clearance between cylinder and piston.

CAUTION:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
0.004 — 0.010 mm (0.0002 — 0.0004 in)
Limit
0.020 mm (0.0008 in)

6) Boring and honing
(1) If the value of taper, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

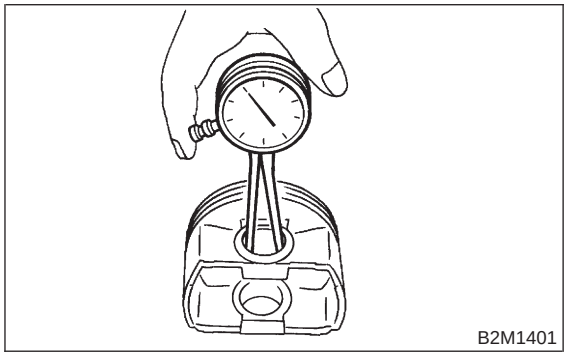
CAUTION:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

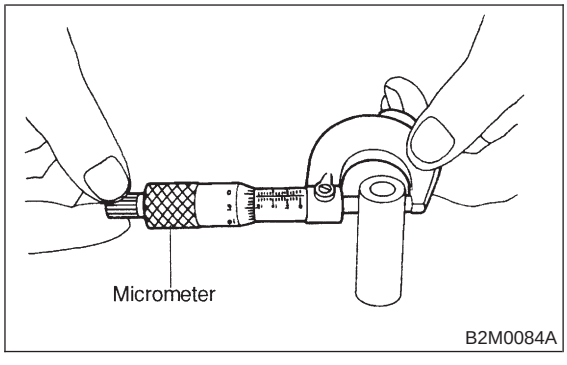
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

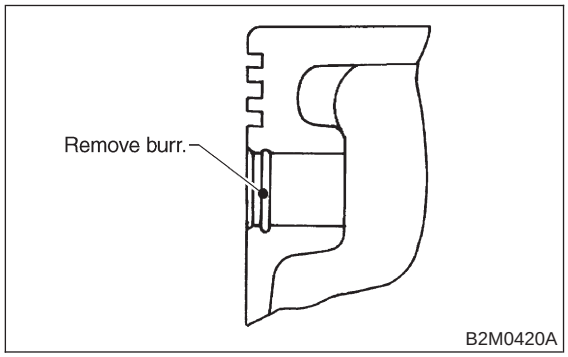
1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder.
<Ref. to 2-3b [W5C2].>
If any of the clearances is not to specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.010 mm (0.0002 — 0.0004 in)
Limit
0.020 mm (0.0008 in)





4) Check circlip installation groove on the piston for burr. If necessary, remove burr from the groove so that piston pin can lightly move.

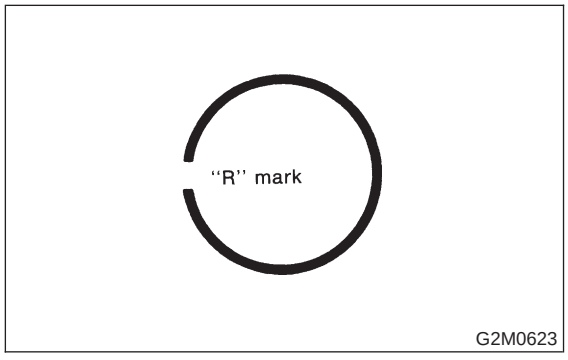


5) Check piston pin circlip for distortion, cracks and wear.

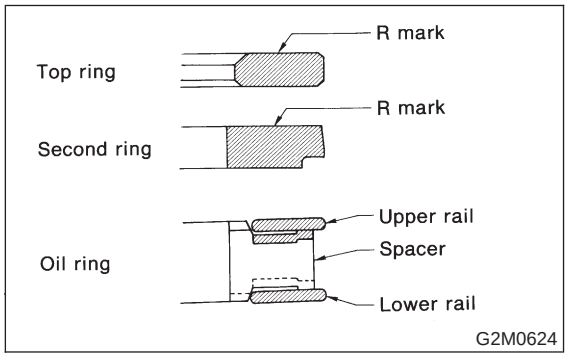
4. PISTON RING

1) If piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace piston ring with a new one of the same size as the piston.

CAUTION:
● "R" is marked on the end of the top and second rings. When installing the rings to the piston, face this mark upward.

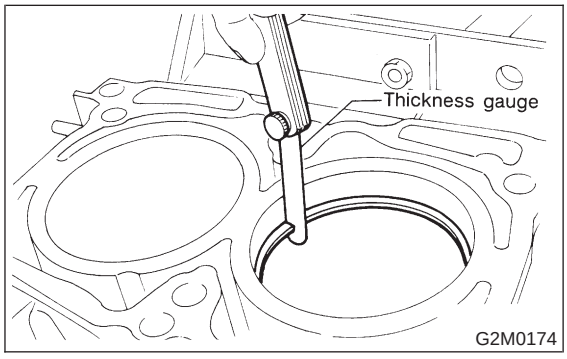


● The oil ring is a combined ring consisting of two rails and a spacer in between. When installing, be careful to assemble correctly.



2) Squarely place piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

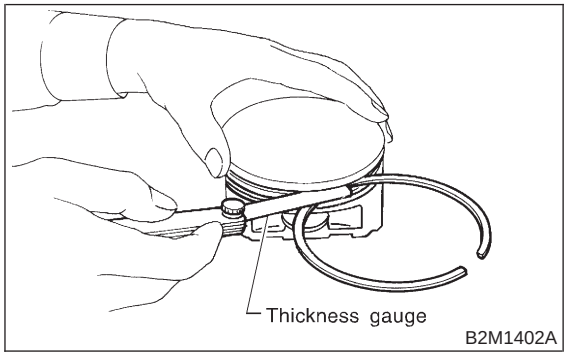
		Unit: mm (in)	
		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)	1.0 (0.039)
	Second ring	0.37 — 0.52 (0.0146 — 0.0205)	1.0 (0.039)
	Oil ring rail	0.20 — 0.60 (0.0079 — 0.0236)	1.5 (0.059)



3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

CAUTION:
Before measuring the clearance, clean the piston ring groove and piston ring.

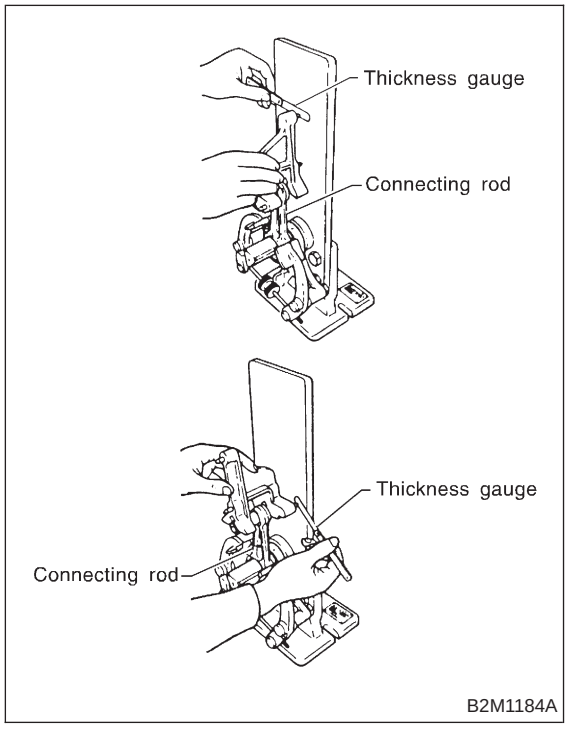
		Unit: mm (in)	
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 —0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 —0.0028)	0.15 (0.0059)



5. CONNECTING ROD

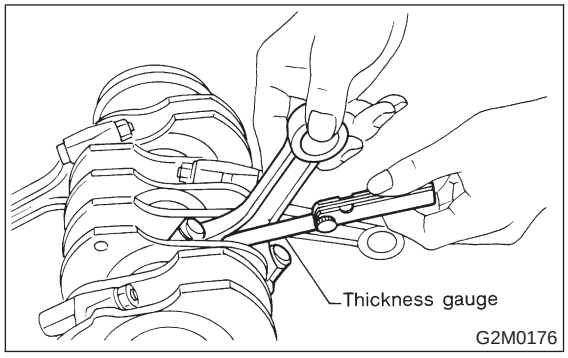
1) Replace connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace connecting rod if the bend or twist exceeds the limit.

Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



3) Install connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). Replace connecting rod if the side clearance exceeds the specified limit.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)
Limit
0.4 mm (0.016 in)



4) Inspect connecting rod bearing for scar, peeling, seizure, melting, wear, etc.

5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table.)

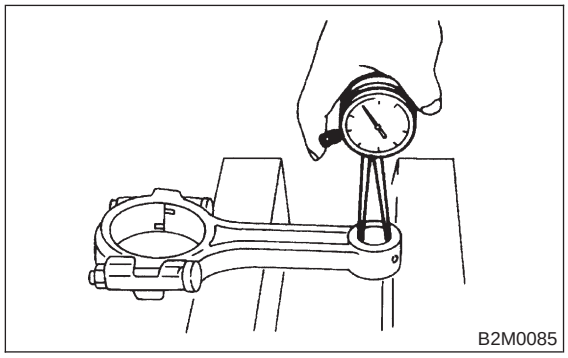
Connecting rod oil clearance:
Standard
0.010 — 0.038 mm (0.0004 — 0.0015 in)
Limit
0.05 mm (0.0020 in)

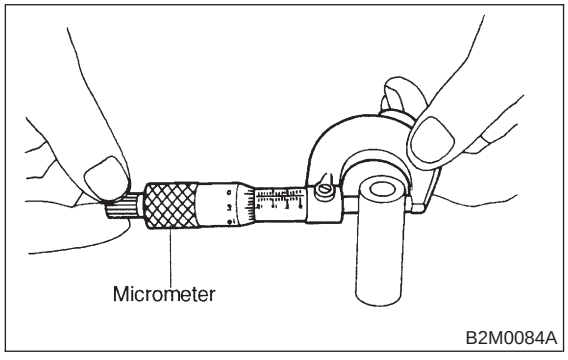
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	47.984 — 48.000 (1.8891 — 1.8898)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	47.954 — 47.970 (1.8879 — 1.8886)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	47.934 — 47.950 (1.8872 — 1.8878)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	47.734 — 47.750 (1.8793 — 1.8799)

6) Inspect bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)

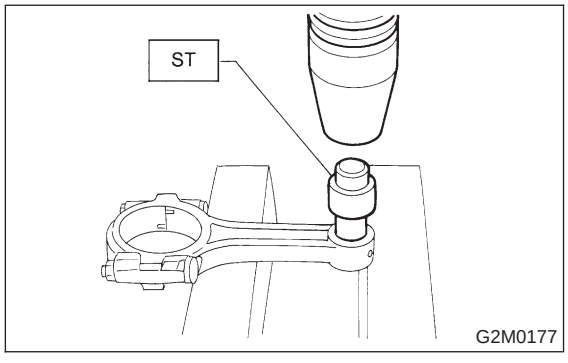

B2M0085



B2M0084A

7) Replacement procedure is as follows.
(1) Remove bushing from connecting rod with ST and press.
(2) Press bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



G2M0177

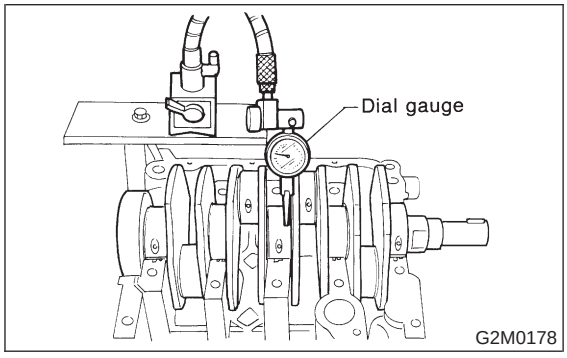
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.
2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

CAUTION:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position crankshaft on these bearings and measure crankshaft bend using a dial gauge.

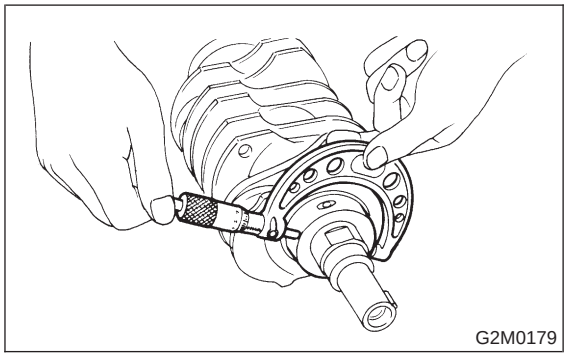
Crankshaft bend limit:
0.035 mm (0.0014 in)



G2M0178

3) Inspect the crank journal and crank pin for wear. If not to specifications, replace bearing with an undersize one, and replace or recondition crankshaft as necessary. When grinding crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:
Out-of-roundness
0.020 mm (0.0008 in) or less
Taper limit
0.07 mm (0.0028 in)
Grinding limit
0.25 mm (0.0098 in)


G2M0179

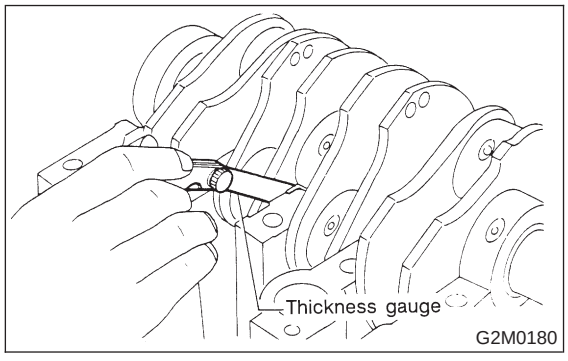
Unit: mm (in)

		Crank journal diameter		Crank pin diameter
		#1, #5	#2, #3, #4	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	47.984 — 48.000 (1.8891 — 1.8898)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	47.954 — 47.970 (1.8879 — 1.8886)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.942— 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	47.934 — 47.950 (1.8872 — 1.8878)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	47.734 — 47.750 (1.8793 — 1.8799)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)

O.D. ... Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)
Limit
0.25 mm (0.0098 in)



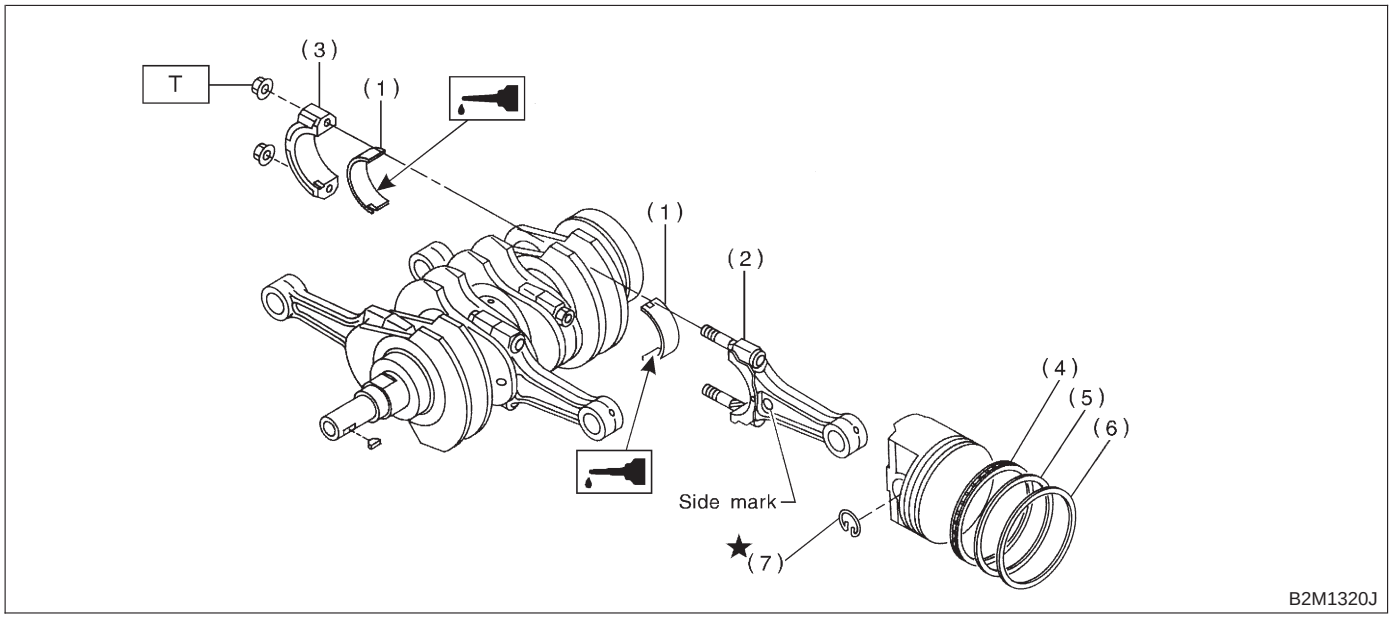
5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.
6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace defective bearing with an undersize one, and replace or recondition crankshaft as necessary.

Unit: mm (in)

Crankshaft oil clearance		
Standard	#1, #5	0.003 — 0.030 (0.0001 — 0.0012)
	#2, #3, #4	0.010 — 0.033 (0.0004 — 0.0013)
Limit	#1, #3, #5	0.040 (0.0016)
	#2, #4	0.045 (0.0018)

D: ASSEMBLY

1. CRANKSHAFT AND PISTON



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Circlip

Tightening torque: N·m (kg-m, ft-lb)
T: 44±2 (4.5±0.2, 32.5±1.4)

1) Install connecting rod bearings on connecting rods and connecting rod caps.

CAUTION:
Apply oil to the surfaces of the connecting rod bearings.

2) Install connecting rod on crankshaft.

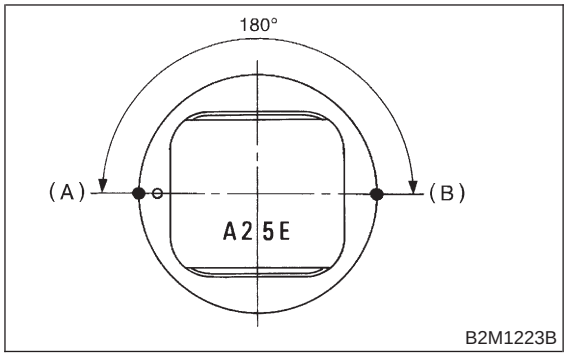
CAUTION:
Position each connecting rod with the side marked facing forward.

3) Install connecting rod cap with connecting rod nut.
Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
● Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
● When tightening the connecting rod nuts, apply oil on the threads.

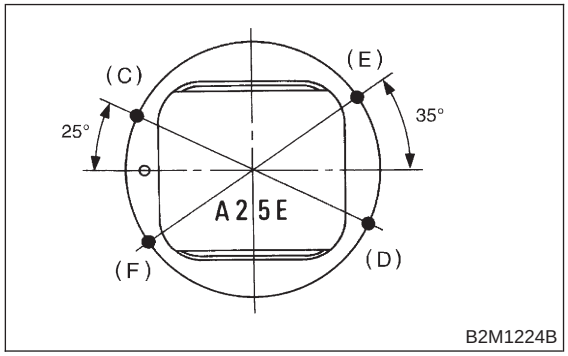
4) Installation of piston rings and oil ring
(1) Install oil ring spacer, upper rail and lower rail in this order by hand. Then install second ring and top ring with a piston ring expander.

(2) Position the top ring gap at (A) or (B) in the figure.



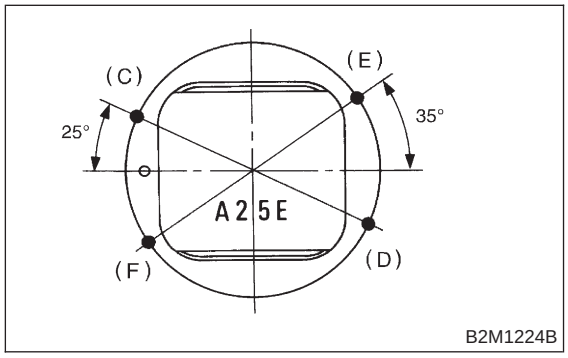
(3) Position the second ring gap at 180° on the reverse side for the top ring gap.

(4) Position the upper rail gap at (C) or (D) in the figure.



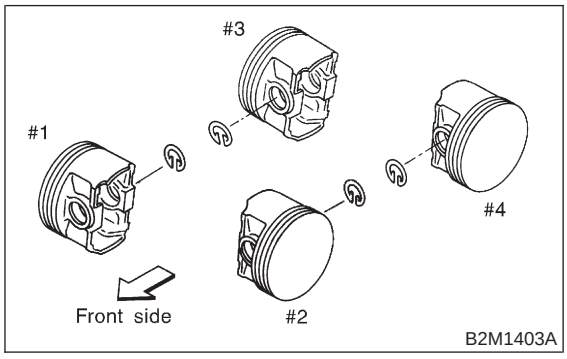
(5) Position the expander gap at 180° of the reverse side for the upper rail gap.
(6) Position the lower rail gap at (E) or (F) in the figure.

CAUTION:
● Ensure ring gaps do not face the same direction.
● Ensure ring gaps are not within the piston skirt area.

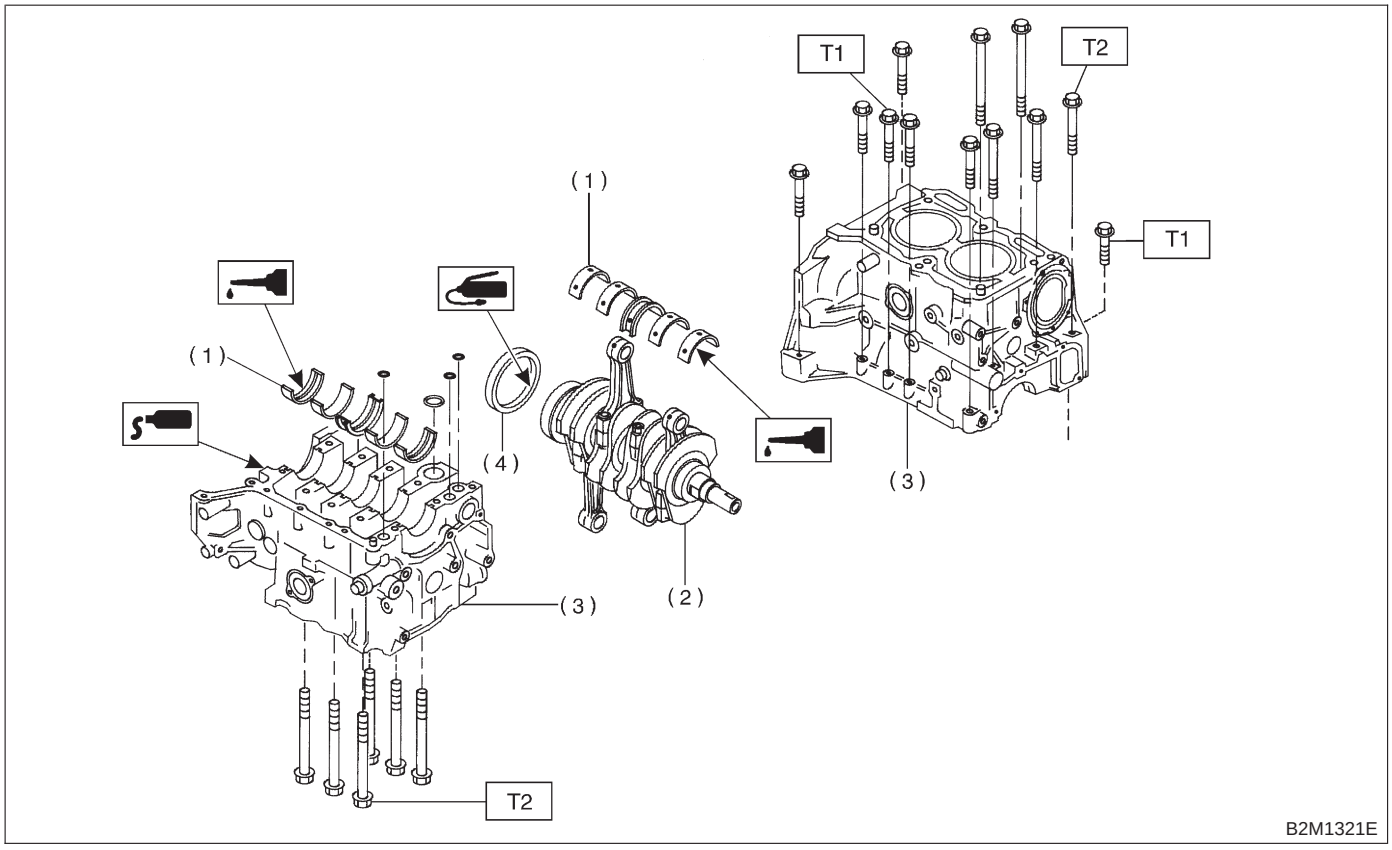


5) Install circlip.
Install circlips in piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

CAUTION:
Use new circlips.



2. CYLINDER BLOCK



(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±2 (2.5±0.2, 18.1±1.4)
T2: 47±3 (4.8±0.3, 34.7±2.2)

1) Install ST to cylinder block, then install crankshaft bearings.
ST 499817000 ENGINE STAND

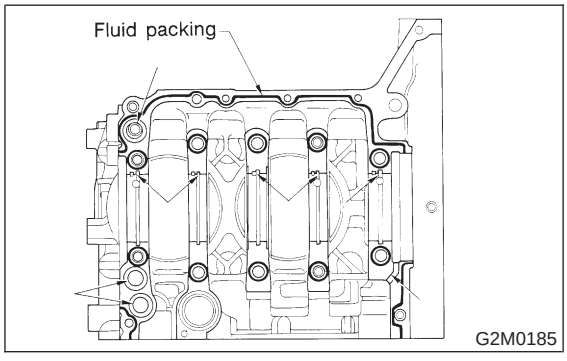
CAUTION:
Remove oil the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

2) Position crankshaft on the #2 and #4 cylinder block.

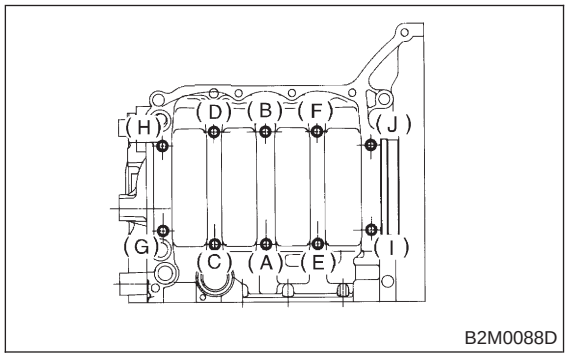
3) Apply fluid packing to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

Fluid packing:
THREE BOND 1215 or equivalent

CAUTION:
Do not allow fluid packing to jut into O-ring grooves, oil passages, bearing grooves, etc.

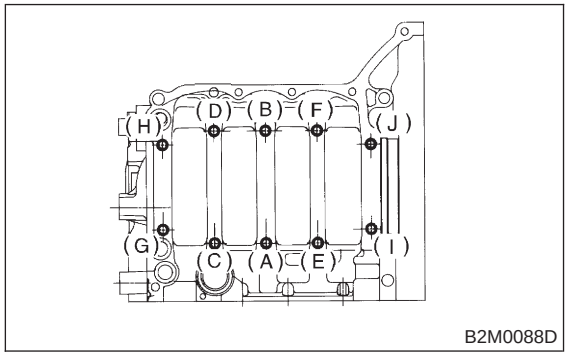


4) Temporarily tighten 10 mm cylinder block connecting bolts in alphabetical sequence shown in figure.



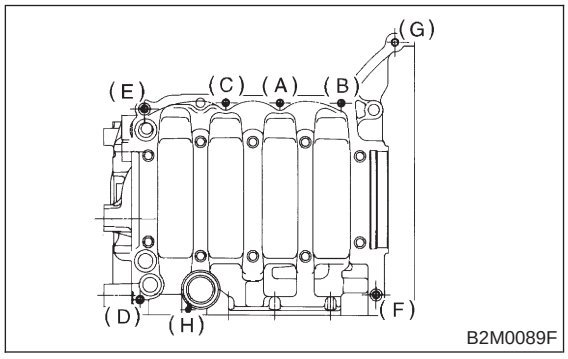
5) Tighten 10 mm cylinder block connecting bolts in alphabetical sequence.

Tightening torque:
47±3 N·m (4.8±0.3 kg-m, 34.7±2.2 ft-lb)

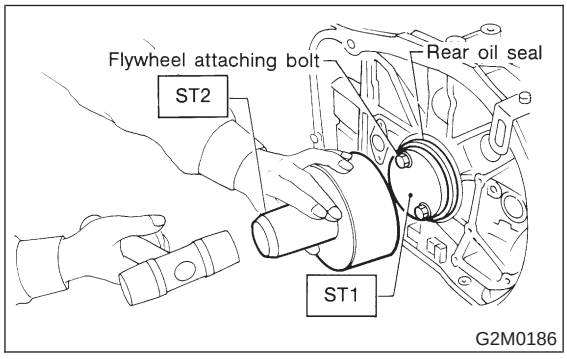


6) Tighten 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in figure.

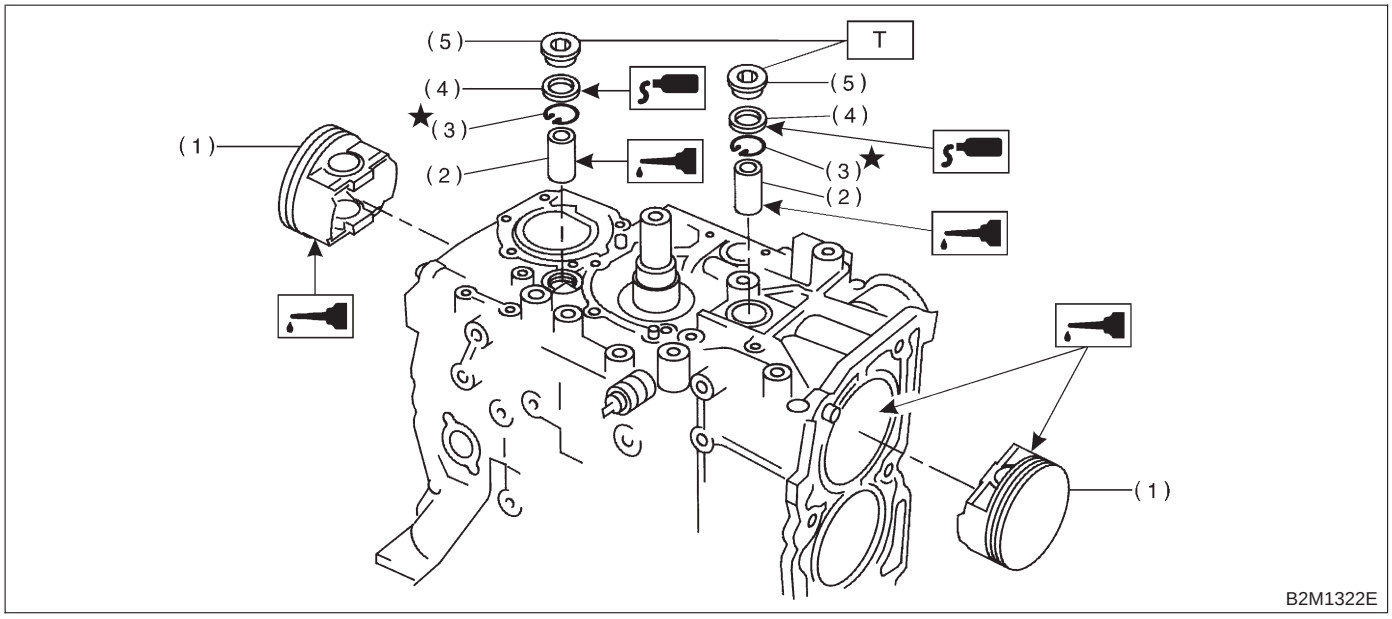
Tightening torque:
(A) — (G): 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
(H): 6.4 N·m (0.65 kg-m, 4.7 ft-lb)



7) Install rear oil seal by using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER



3. PISTON AND PISTON PIN (#1 AND #2)



(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug

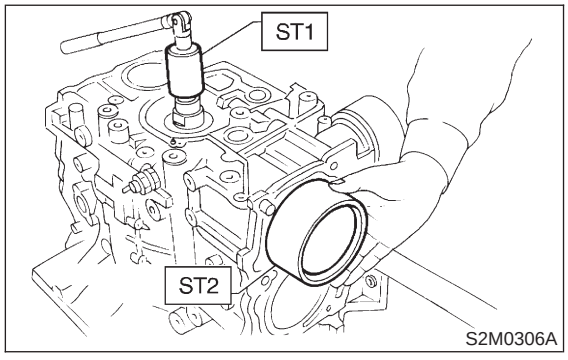
Tightening torque: N·m (kg-m, ft-lb)
T: 69±7 (7.0±0.7, 50.6±5.1)

1) Installing piston
(1) Turn cylinder block so that #1 and #2 cylinders face upward.
(2) Using ST1, turn crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

(3) Apply a coat of engine oil to pistons and cylinders and insert pistons in their cylinders by using ST2.

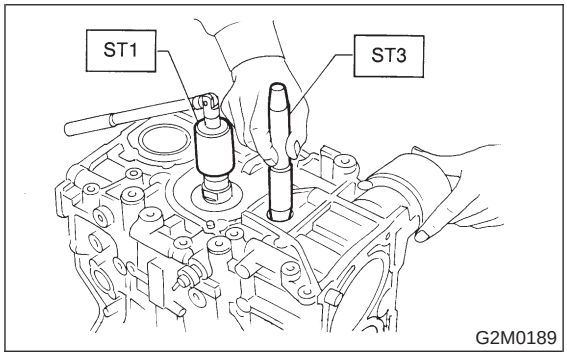
ST2 498747300 PISTON GUIDE



2) Installing piston pin
(1) Insert ST3 into service hole to align piston pin hole with connecting rod small end.

CAUTION:
Apply a coat of engine oil to ST3 before insertion.

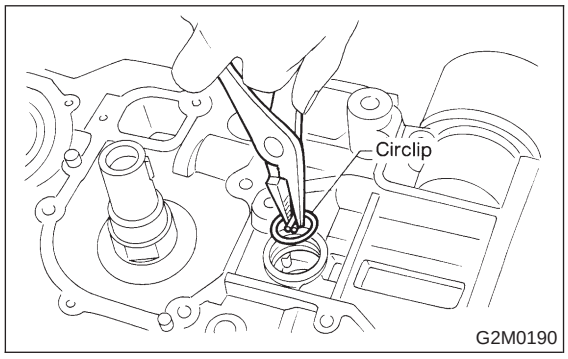
ST3 499017100 PISTON PIN GUIDE



(2) Apply a coat of engine oil to piston pin and insert piston pin into piston and connecting rod through service hole.

(3) Install circlip.

CAUTION:
Use new circlips.

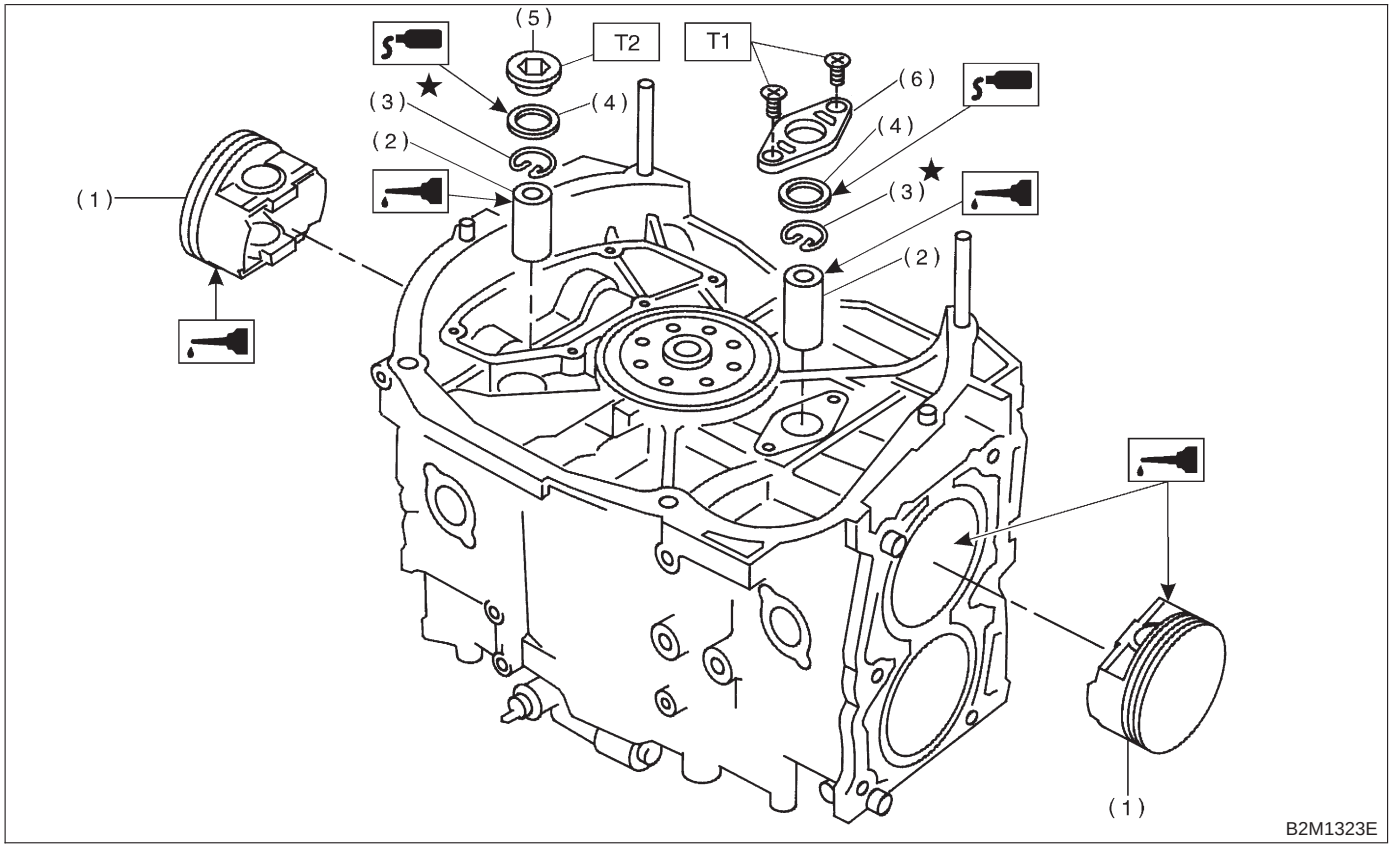


(4) Install service hole plug and gasket.

CAUTION:
Use a new gasket and apply a coat of fluid packing to it before installation.

Fluid packing:
THREE BOND 1215 or equivalent

4. PISTON AND PISTON PIN (#3 AND #4)



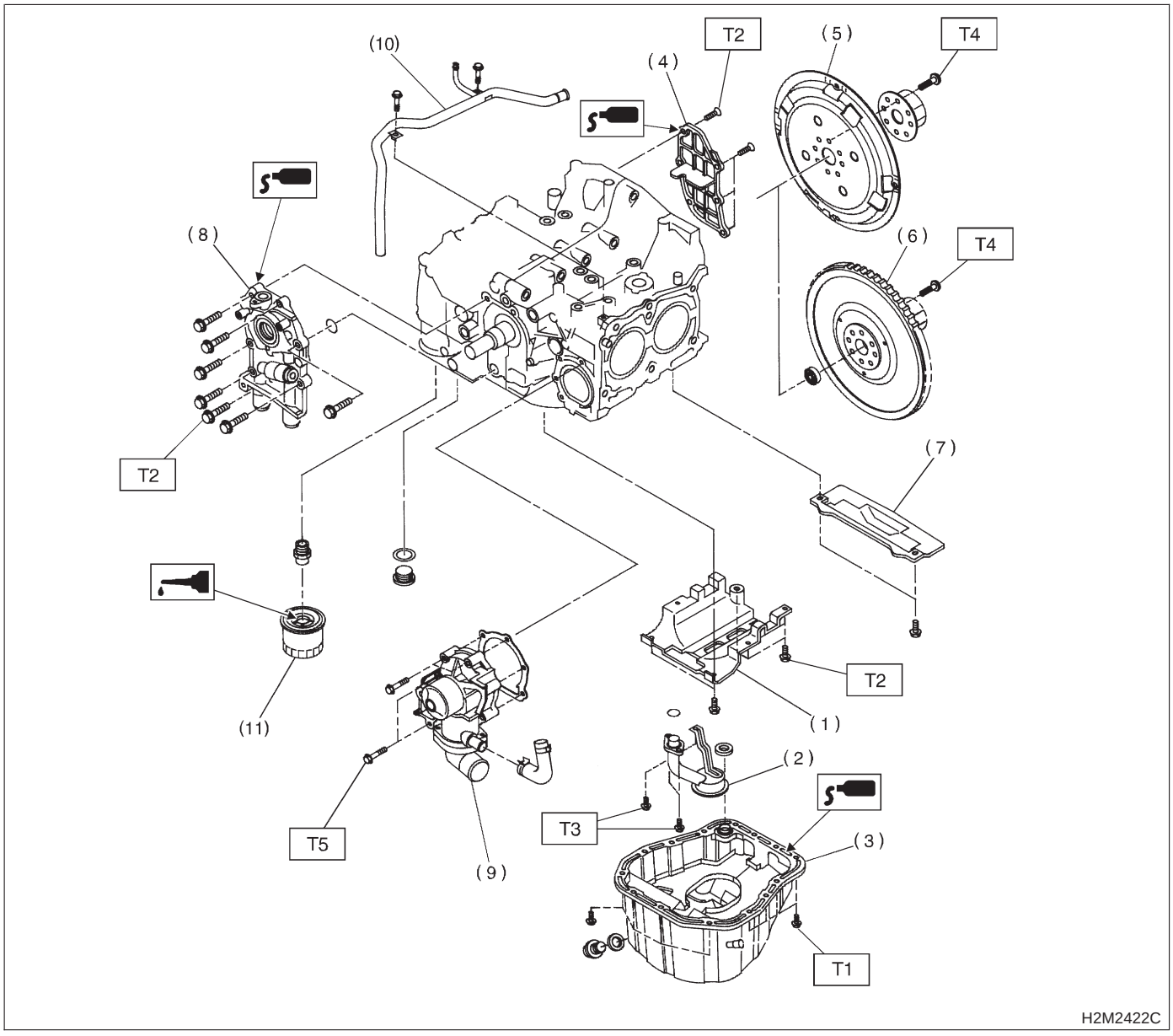
(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 69±7 (7.0±0.7, 50.6±5.1)

Turn cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install pistons and piston pins.

E: INSTALLATION

1. OIL PUMP AND WATER PUMP

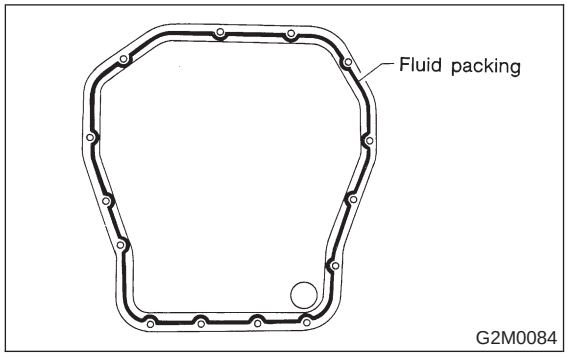


(1) Baffle plate
(2) Oil strainer
(3) Oil pan
(4) Oil separator cover
(5) Drive plate (AT vehicles only)
(6) Flywheel (MT vehicles only)
(7) Clutch housing cover (MT vehicles only)
(8) Oil pump
(9) Water pump
(10) Water by-pass pipe
(11) Oil filter

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7)
T4: 72±3 (7.3±0.3, 52.8±2.2)
T5: First 12±2 (1.2±0.2, 8.7±1.4)
Second 12±2 (1.2±0.2, 8.7±1.4)

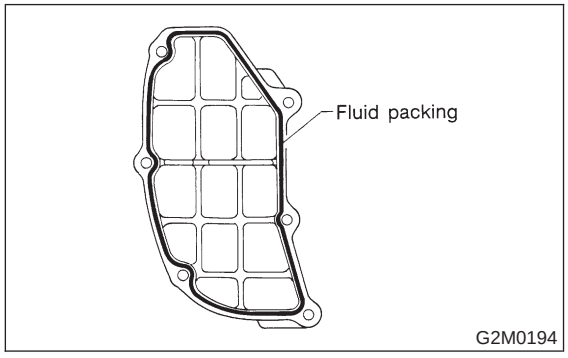
1) Install baffle plate.
2) Install oil strainer and O-ring.
3) Install oil strainer stay.
4) Apply fluid packing to matching surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent

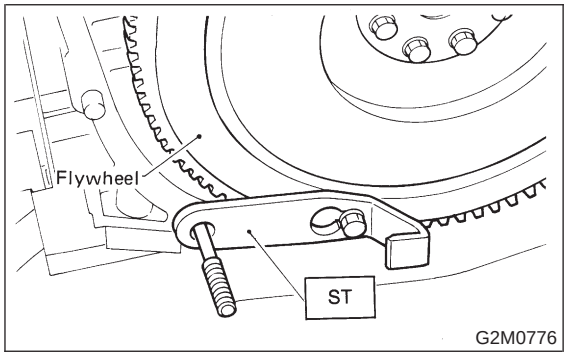


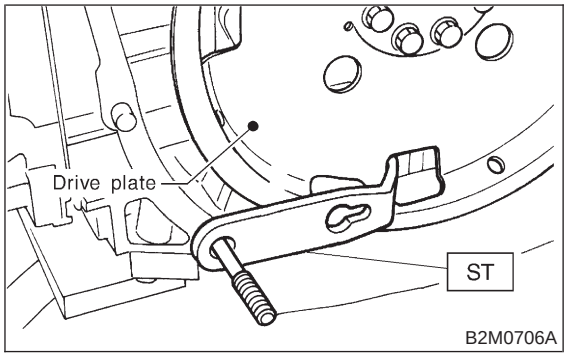
5) Apply fluid packing to matching surfaces and install oil separator cover.

Fluid packing:
THREE BOND 1215 or equivalent

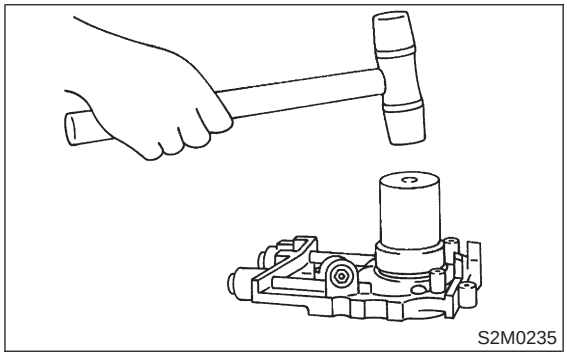


6) Install flywheel (MT vehicles only) or drive plate (AT vehicles only).
To lock crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER



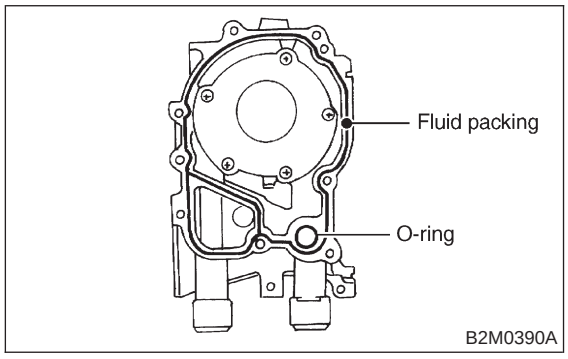


7) Install clutch housing cover. (MT vehicles only)
8) Installation of oil pump
(1) Discard front oil seal after removal. Replace with a new one by using ST.
ST 499587100 OIL SEAL INSTALLER



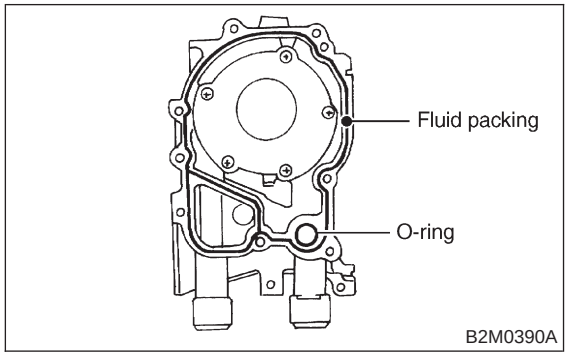
(2) Apply fluid packing to matching surface of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent



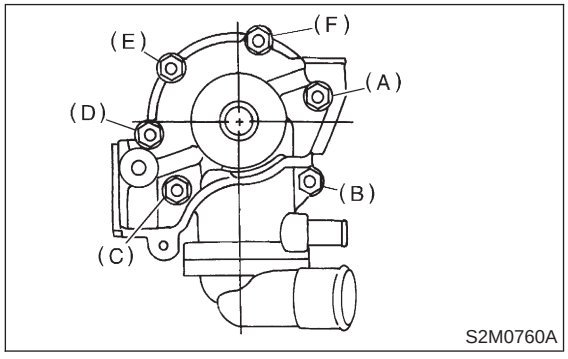
(3) Install oil pump on cylinder block. Be careful not to damage oil seal during installation.

CAUTION:
● Do not forget to install O-ring and seal when installing oil pump.
● Align flat surface of oil pump's inner rotor with crankshaft before installation.



9) Install water pump and gasket.

CAUTION:
● Be sure to use a new gasket.
● When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.

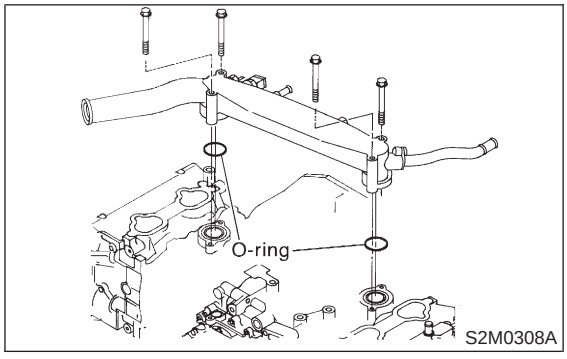


10) Install water by-pass pipe for heater.
11) Install oil filter.

2. RELATED PARTS

1) Install water pipe. <Ref. to 2-5 [W8B0].>

CAUTION:
Always use a new O-ring.



2) Install cylinder heads.
<Ref. to 2-3b [W4E0].>
3) Install camshafts, rocker cover and related parts.
<Ref. to 2-3b [W3C0].>
4) Install camshaft sprockets, timing belt and related parts.
<Ref. to 2-3b [W2C0].>

1. Engine Trouble in General

NOTE:
A, B and C shown in the RANK of table refer to the possibility of reason for the trouble in order (“Very often” to “Rarely”).

A : Very often
B : Sometimes
C : Rarely

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
1. Engine will not start.			
1) Starter does not turn.	● Starter	● Defective battery-to-starter harness	B
		● Defective starter switch	C
		● Defective inhibitor switch or neutral switch	C
		● Defective starter	B
	● Battery	● Poor terminal connection	A
		● Run-down battery	A
		● Defective charging system	B
	● Friction	● Seizure of crankshaft and connecting rod bearing	C
		● Seized camshaft	C
		● Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	● Starter	● Defective starter	C
	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Fuel line	● Defective fuel pump and relay	A
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
3) Initial combustion occurs.	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of/or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
4) Engine stalls after initial combustion.	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Loosened or cracked intake duct	B
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	C
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Dirty air cleaner element	C
	● Fuel line	● Clogged fuel line	C
		● Lack of or insufficient fuel	B
	● Belt	● Defective	B
		● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	B
		● Improper engine oil (low viscosity)	B
2. Rough idle and engine stall	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	C
		● Loosened oil filler cap	B
		● Dirty air cleaner element	C
	● Fuel line	● Defective fuel pump and relay	C
		● Clogged fuel line	C
		● Lack of/or insufficient fuel	B
	● Belt	● Defective timing	C
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
		● Defective rocker cover gasket	C
	● Cooling system	● Overheating	C
	● Others	● Malfunction of evaporative emission control system	A
		● Stuck or damaged throttle valve	B
		● Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	B
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filler cap	B
		● Dirty air cleaner element	A
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of/or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	B
		● Loosened cylinder head bolts or defective gasket	B
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	B
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Lubrication system	● Incorrect oil pressure	B
	● Cooling system	● Overheating	C
		● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	A
4. Surging	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Loosened or cracked intake duct	A
		● Loosened or cracked PCV hose	A
		● Loosened or cracked vacuum hose	A
		● Defective intake manifold gasket	B
		● Defective throttle body gasket	B
		● Defective PCV valve	B
		● Loosened oil filler cap	B
		● Dirty air cleaner element	B
	● Fuel line	● Defective fuel pump and relay	B
		● Clogged fuel line	B
		● Lack of/or insufficient fuel	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	C
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
		● Improper engine oil (low viscosity)	B
	● Cooling system	● Overheating	B
	● Others	● Malfunction of evaporative emission control system	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
5. Engine does not return to idle.	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Loosened or cracked vacuum hose	A
	● Others	● Stuck or damaged throttle valve	A
		● Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Cooling system	● Overheating	B
	● Others	● Accelerator cable out of adjustment	B
7. After burning in exhaust system	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Loosened or cracked intake duct	C
		● Loosened or cracked PCV hose	C
		● Loosened or cracked vacuum hose	B
		● Defective PCV valve	B
		● Loosened oil filler cap	C
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken valve spring	C
		● Worn or stuck piston rings, cylinder and piston	C
		● Incorrect valve timing	A
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Malfunction of evaporative emission control system	C
8. Knocking	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Loosened oil filler cap	B
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	C
		● Incorrect valve timing	B
	● Cooling system	● Overheating	A
9. Excessive engine oil consumption	● Intake system	● Loosened or cracked PCV hose	A
		● Defective PCV valve	B
		● Loosened oil filler cap	C
	● Compression	● Defective valve stem	A
		● Worn or stuck piston rings, cylinder and piston	A
	● Lubrication system	● Loosened oil pump attaching bolts and defective gasket	B
		● Defective oil filter seal	B
		● Defective crankshaft oil seal	B
		● Defective rocker cover gasket	B
		● Loosened oil drain plug or defective gasket	B
		● Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	● Fuel injection system <Ref. to 2-7 On-Board Diagnostics II System.>		A
	● Intake system	● Dirty air cleaner element	A
	● Belt	● Defective timing	B
	● Compression	● Incorrect valve clearance	B
		● Loosened spark plugs or defective gasket	C
		● Loosened cylinder head bolts or defective gasket	C
		● Improper valve seating	B
		● Defective valve stem	C
		● Worn or broken spring	C
		● Worn or stuck piston rings, cylinder and piston	B
		● Incorrect valve timing	B
	● Lubrication system	● Incorrect oil pressure	C
	● Cooling system	● Over cooling	C
	● Others	● Accelerator cable out of adjustment	B

2. Engine Noise

If noise still exists, conduct diagnostics procedures in accordance with the following table.

CAUTION:
Do not disconnect spark plug cord while engine is running.

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	Valve mechanism is defective. ● Incorrect valve clearance ● Worn camshaft ● Broken valve spring
Heavy and dull clank	Oil pressure is low.	● Worn crankshaft main bearing ● Worn connecting rod bearing (big end)
	Oil pressure is normal.	● Loose flywheel mounting bolts ● Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	● Ignition timing advanced ● Accumulation of carbon inside combustion chamber ● Wrong spark plug ● Improper gasoline
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	● Worn crankshaft main bearing ● Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm.	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	● Worn cylinder liner and piston ring ● Broken or stuck piston ring ● Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	● Unusually worn valve lifter ● Worn camshaft journal bore in crankcase
Squeaky sound	—	● Insufficient generator lubrication
Rubbing sound	—	● Defective generator brush and rotor contact
Gear scream when starting engine	—	● Defective ignition starter switch ● Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	● Loose drive belt ● Defective engine coolant pump shaft
Hissing sound	—	● Loss of compression ● Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	● Loose timing belt ● Belt contacting case/adjacent part
Valve tappet noise	—	● Incorrect valve clearance

NOTE*:
When disconnecting fuel injector connector, Malfunction Indicator Lamp (CHECK ENGINE lamp) illuminates and trouble code is stored in ECM memory.
Therefore, carry out the CLEAR MEMORY MODE and INSPECTION MODE after connecting fuel injector connector. (Ref. to 2-7 On-Board Diagnostics II System.)

ENGINE LUBRICATION SYSTEM 2-4

Page

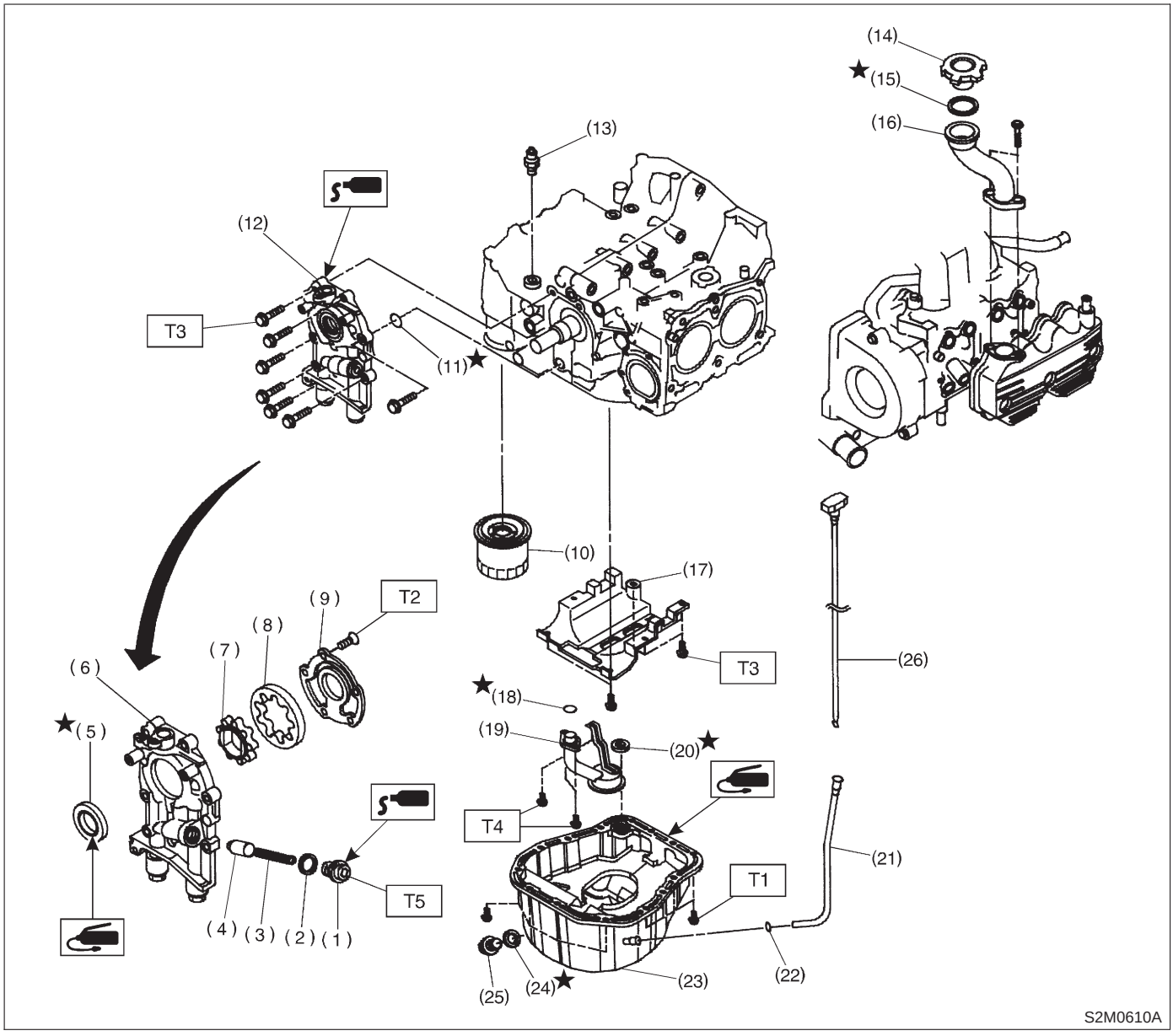
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1. Specifications

Lubrication method					Forced lubrication	
Oil pump	Pump type				Trochoid type	
	Number of teeth		Inner rotor		9	
			Outer rotor		10	
	Outer rotor diameter × thickness				78 × 9 mm (3.07 × 0.35 in)	
	Tip clearance between inner and outer rotor			STANDARD	0.04 — 0.14 mm (0.0016 — 0.0055 in)	
				LIMIT	0.18 mm (0.0071 in)	
	Side clearance between inner rotor and pump case			STANDARD	0.02 — 0.07 mm (0.0008 — 0.0028 in)	
				LIMIT	0.15 mm (0.0059 in)	
	Case clearance between outer rotor and pump case			STANDARD	0.10 — 0.175 mm (0.0039 — 0.0069 in)	
				LIMIT	0.20 mm (0.0079 in)	
	Capacity at 80°C (176°F)	600 rpm	Discharge	- pressure	98 kPa (1.0 kg/cm^2, 14 psi) or more	
				- quantity	2200 cc	4.2 ℓ (4.4 US qt, 3.7 Imp qt)/min.
					2500 cc	4.6 ℓ (4.9 US qt, 4.0 Imp qt)/min.
		5,000 rpm	Discharge	- pressure	294 kPa (3.0 kg/cm^2, 43 psi) or more	
				- quantity	2200 cc	42.0 ℓ (11.10 US gal, 9.24 Imp gal)/min.
					2500 cc	47.0 ℓ (12.4 US gal, 10.3 Imp gal)/min.
	Relief valve operation pressure				2200 cc	490 kPa (5.0 kg/cm^2, 71 psi)
					2500 cc	588 kPa (6.0 kg/cm^2, 85 psi)
Oil filter	Type				Full-flow filter type	
	Filtration area				1,000 cm^2 (155 sq in)	
	By-pass valve opening pressure				156 kPa (1.6 kg/cm^2, 23 psi)	
	Outer diameter × width				80 × 70 mm (3.15 × 2.76 in)	
	Oil filter to engine thread size				M 20 x 1.5	
Relief valve (on rocker shaft) operation pressure					69 kPa (0.7 kg/cm^2, 10 psi)	
Oil pressure switch	Type				Immersed contact point type	
	Working voltage — wattage				12 V — 3.4 W or less	
	Warning light activation pressure				14.7 kPa (0.15 kg/cm^2, 2.1 psi)	
	Proof pressure				More than 981 kPa (10 kg/cm^2, 142 psi)	
Oil capacity (at replacement)					2200 cc	4.0 ℓ (4.2 US qt, 3.5 Imp qt)
					2500 cc	4.5 ℓ (4.8 US qt, 4.0 Imp qt)

1. Lubrication System

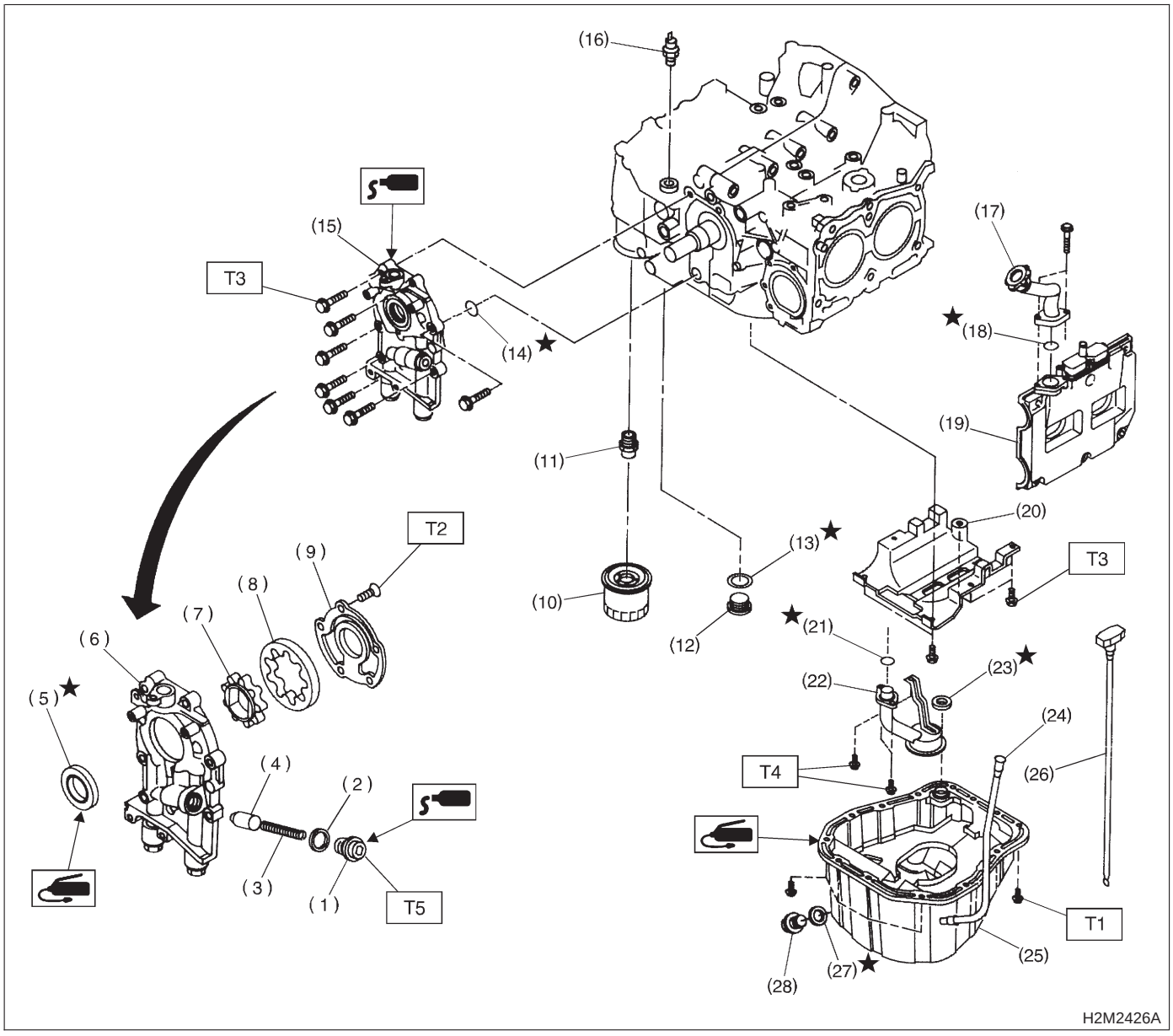
A: 2200 cc MODEL



(1) Plug
(2) Washer
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) O-ring
(12) Oil pump ASSY
(13) Oil pressure switch
(14) Oil filler cap
(15) O-ring
(16) Oil filler duct
(17) Baffle plate
(18) O-ring
(19) Oil strainer
(20) Gasket
(21) Oil level gauge
(22) O-ring
(23) Oil pan
(24) Washer
(25) Drain plug
(26) Oil level gauge

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 5 — 6 (0.5 — 0.6, 3.6 — 4.3)
T3: 6.4 (0.65, 4.7)
T4: 10 (1.0, 7.0)
T5: 40.7 — 47.6 (4.15 — 4.85, 30.0 — 35.1)

B: 2500 cc MODEL



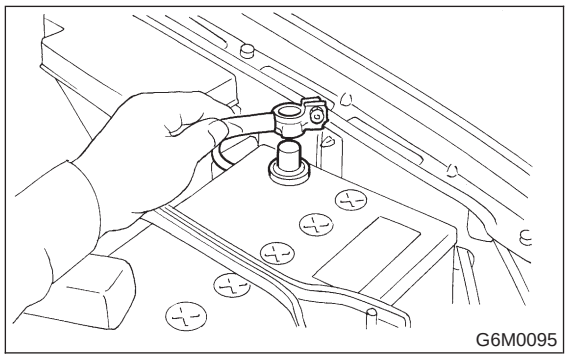
(1) Plug
(2) Washer
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) Oil filter connector
(12) Connector
(13) Gasket
(14) O-ring
(15) Oil pump ASSY
(16) Oil pressure switch
(17) Oil filler duct
(18) O-ring
(19) Cylinder head cover
(20) Baffle plate
(21) O-ring
(22) Oil strainer
(23) Gasket
(24) Oil level gauge guide
(25) Oil pan
(26) Oil level gauge
(27) Metal gasket
(28) Drain plug

Tightening torque: N·m (kg-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: $5^{+1}/_{-0}$ ($0.5^{+0.1}/_{-0}$, $3.6^{+0.7}/_{-0}$)
T3: 6.4 (0.65, 4.7)
T4: 10 (1.0, 7.0)
T5: 44.1±3.4 (4.5±0.35, 32.5±2.5)

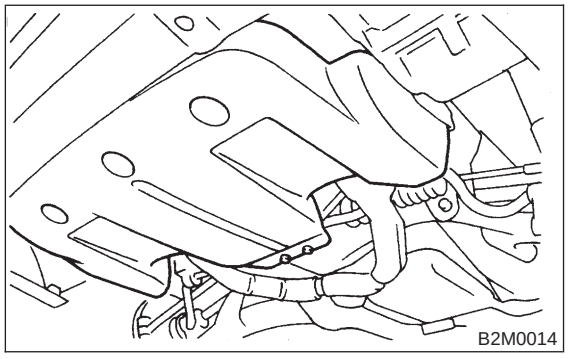
1. Oil Pump

A: REMOVAL

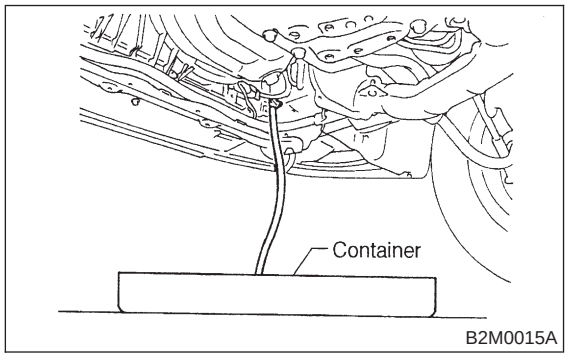
1) Disconnect battery ground cable.



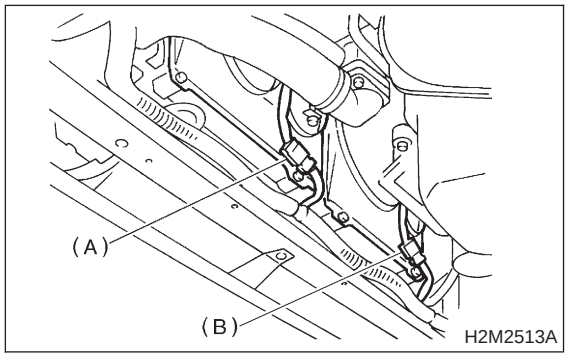
2) Lift-up the vehicle.
3) Remove under cover.



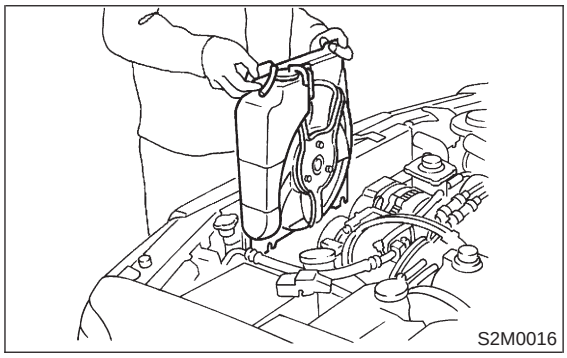
4) Drain coolant. <Ref. to 2-5 [W1A0].>



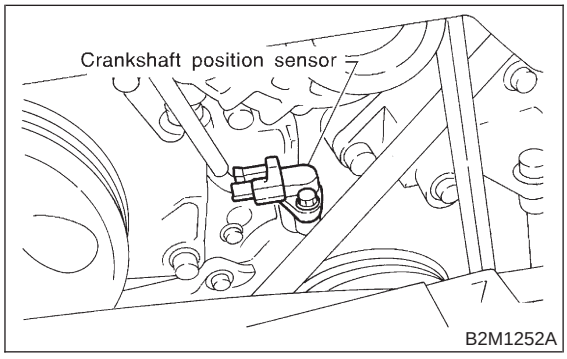
5) Disconnect connectors from radiator main fan (A) and sub fan (B) motors.



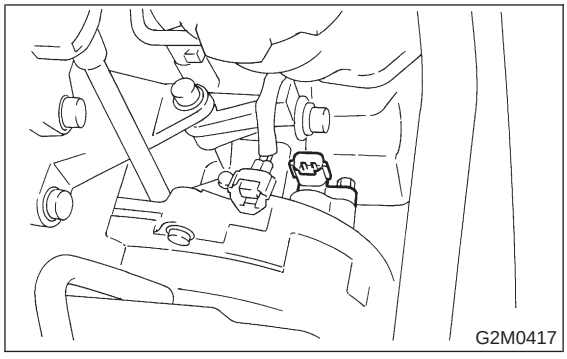
6) Lower the vehicle.
7) Remove radiator main fan and sub fan assemblies. <Ref. to 2-5 [W6A0].> and <Ref. to 2-5 [W7A0].>



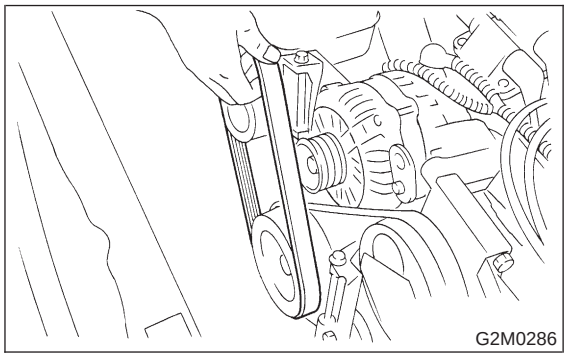
8) Remove crankshaft position sensor.



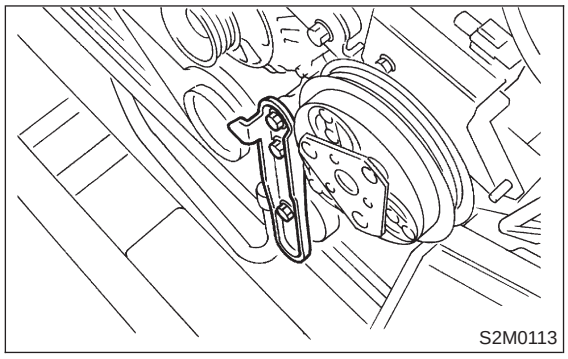
9) Remove camshaft position sensor.



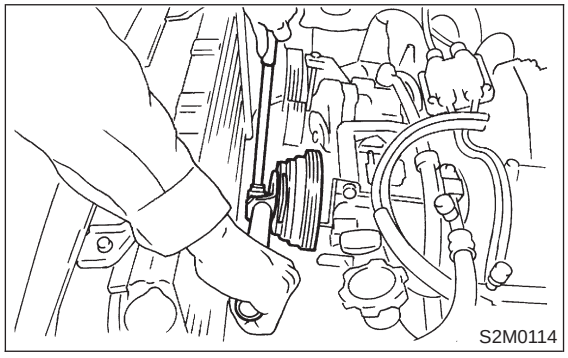
10) Remove V-belts. <Ref. to 1-5 [G200].>



11) Remove rear side V-belt tensioner.


S2M0113

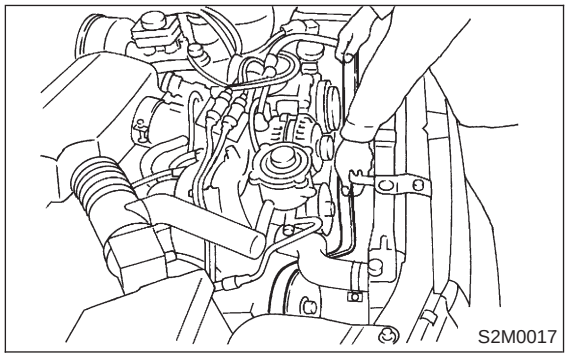
12) Remove crankshaft pulley by using ST.
ST 49997700 CRANKSHAFT PULLEY WRENCH


S2M0114

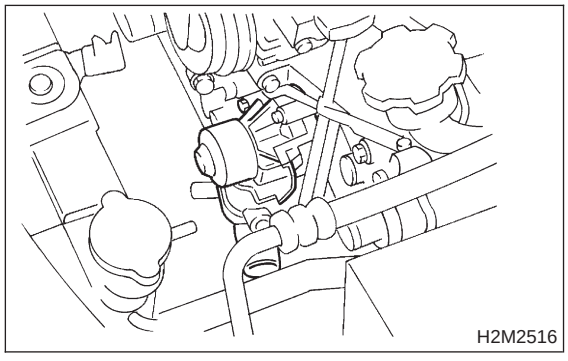
13) Remove timing belt.
- SOHC:

<Ref. to 2-3a [W2A0].>
- DOHC:

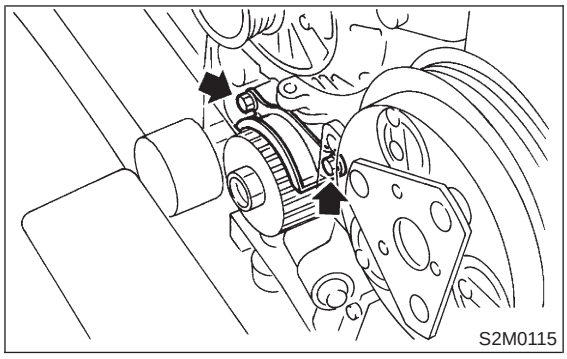
<Ref. to 2-3b [W2A0].>


S2M0017

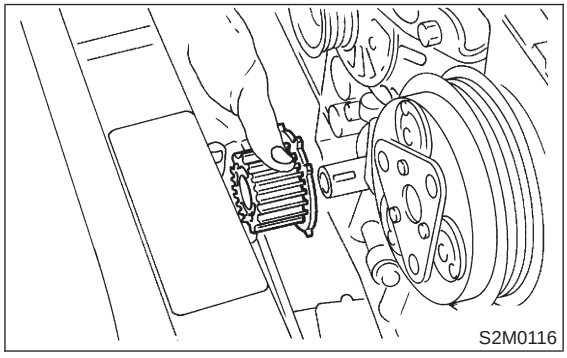
14) Remove water pump. <Ref. to 2-5 [W2A0].>


H2M2516

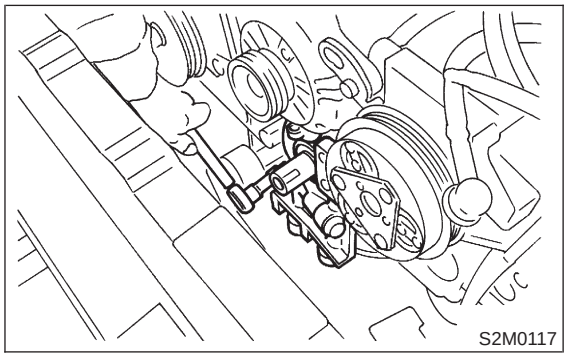
15) Remove timing belt guide. (MT vehicles only)


S2M0115

16) Remove crankshaft sprocket.

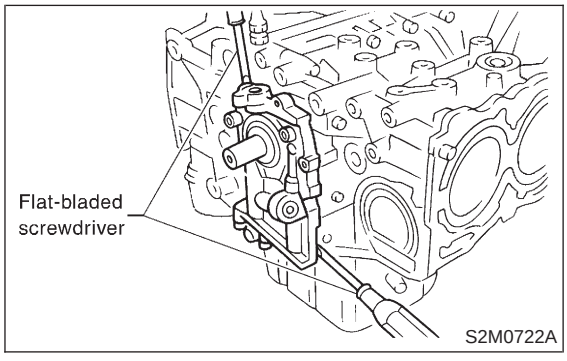

S2M0116

17) Remove bolts which install oil pump onto cylinder block.


S2M0117

18) Remove oil pump by using flat bladed screwdriver.

CAUTION:
Be careful not to scratch mating surfaces of cylinder block and oil pump.

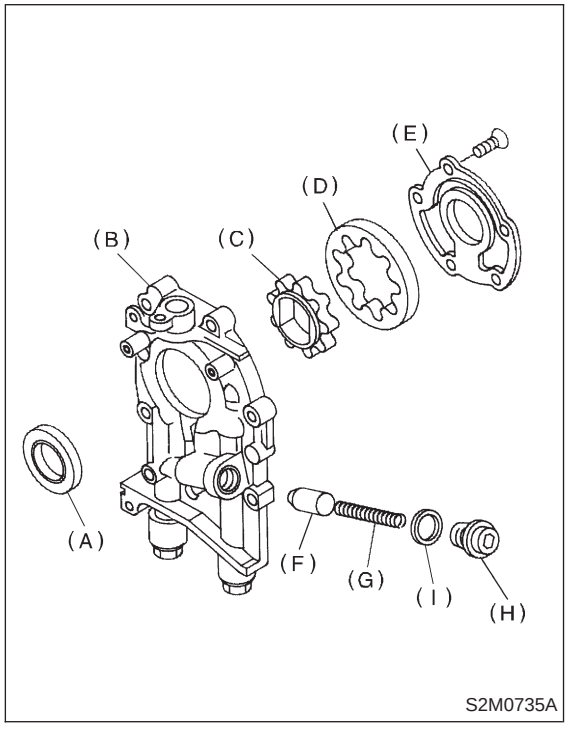


S2M0722A

B: DISASSEMBLY

Remove screws which secure oil pump cover and disassemble oil pump.
Inscribe alignment marks on inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:
Before removing relief valve, loosen plug when removing oil pump from cylinder block.



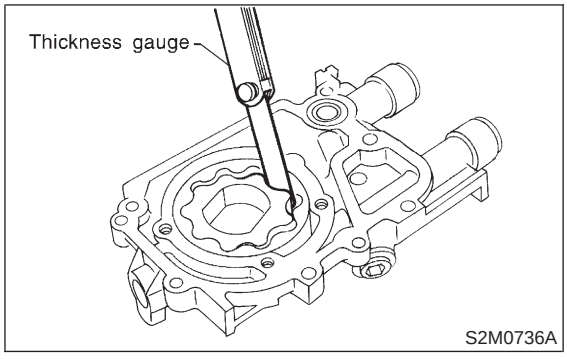
(A) Oil seal
(B) Pump case
(C) Inner rotor
(D) Outer rotor
(E) Pump cover
(F) Relief valve
(G) Relief spring
(H) Plug
(I) Washer

C: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If the clearance exceeds the limit, replace rotors as a matched set.

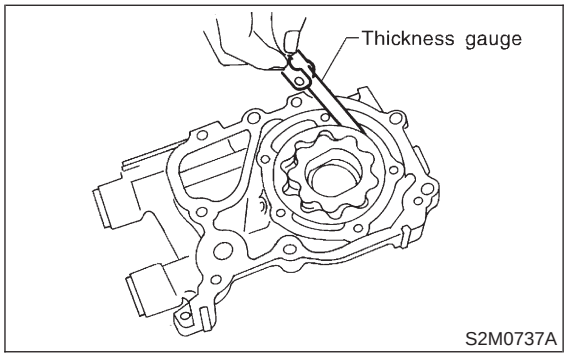
Tip clearance:
Standard
0.04 — 0.14 mm (0.0016 — 0.0055 in)
Limit
0.18 mm (0.0071 in)



2. CASE CLEARANCE

Measure the clearance between the outer rotor and the cylinder block rotor housing. If the clearance exceeds the limit, replace the rotor.

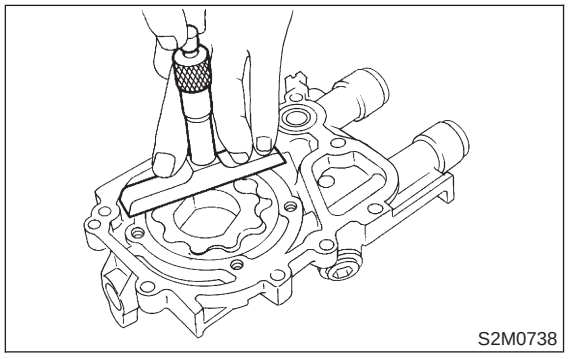
Case clearance:
Standard
0.10 — 0.175 mm (0.0039 — 0.0069 in)
Limit
0.20 mm (0.0079 in)



3. SIDE CLEARANCE

Measure clearance between oil pump inner rotor and pump cover. If the clearance exceeds the limit, replace rotor or pump body.

Side clearance:
Standard
0.02 — 0.07 mm (0.0008 — 0.0028 in)
Limit
0.15 mm (0.0059 in)


S2M0738

4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:
Free length; 71.8 mm (2.827 in)
Installed length; 54.7 mm (2.154 in)
Load when installed; 77.08 N (7.86 kg, 17.33 lb)

5. OIL PUMP CASE

Check the oil pump case for worn shaft hole, clogged oil passage, worn rotor chamber, cracks, and other faults.

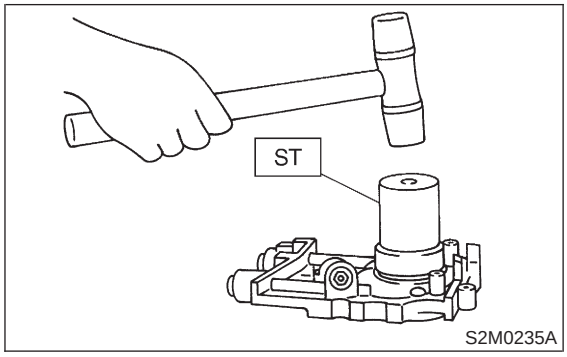
6. OIL SEAL

Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

D: ASSEMBLY

1) Install front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

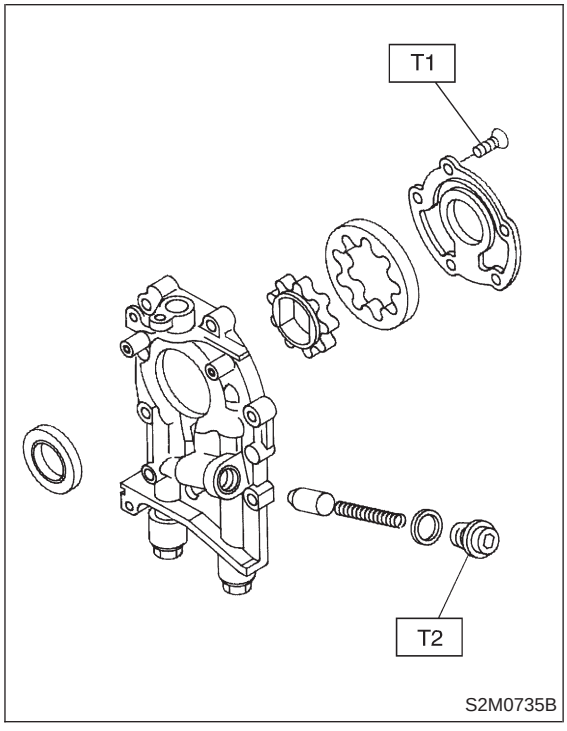
CAUTION:
Use a new oil seal.



S2M0235A

2) Install inner and outer rotors in their original positions.
3) Install oil relief valve and relief spring.
4) Install oil pump cover.

Tightening torque:
T1: 5 — 6 N·m (0.5 — 0.6 kg-m, 3.6 — 4.3 ft-lb)
T2: 40.7 — 47.6 N·m (4.15 — 4.85 kg-m, 30.0 — 35.1 ft-lb)

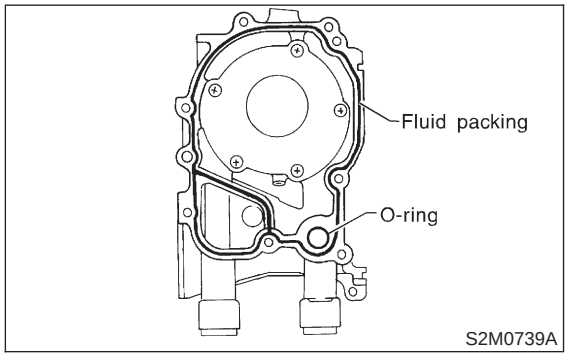


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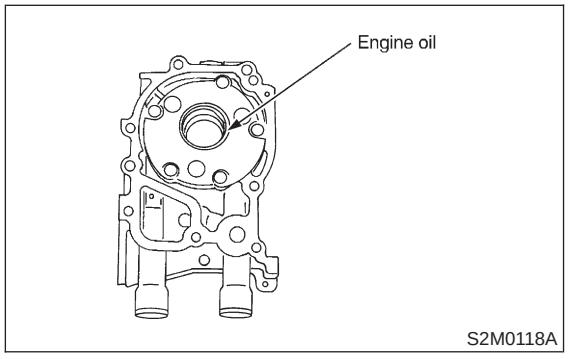
E: INSTALLATION

Installation is in the reverse order of removal.
Observe the following:
1) Apply fluid packing to matching surfaces of oil pump.

Fluid packing:
THREE BOND 1215 or equivalent



2) Replace O-ring with a new one.
3) Apply a coat of engine oil to the inside of the oil seal.

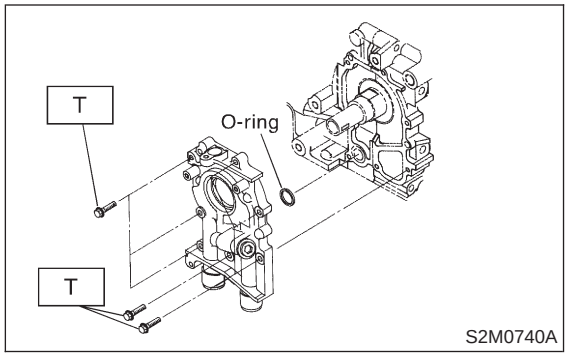


4) Be careful not to scratch oil seal when installing oil pump on cylinder block.
5) Position the oil pump, aligning the notched area with the crankshaft, and push the oil pump straight.

CAUTION:
Make sure the oil seal lip is not folded.

6) Install oil pump.

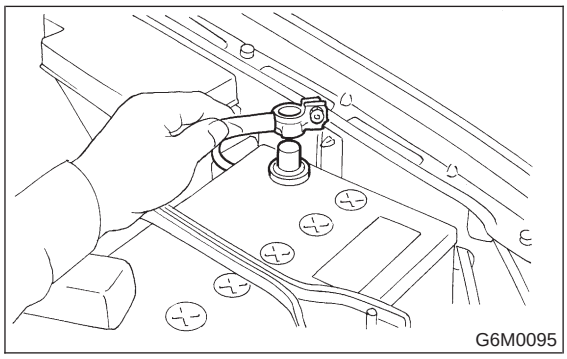
Tightening torque:
6.4 N·m (0.65 kg-m, 4.7 ft-lb)



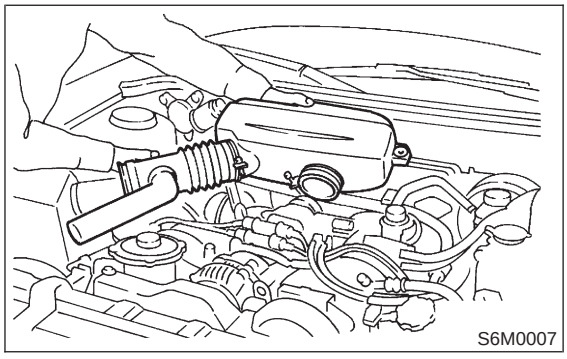
2. Oil Pan and Oil Strainer

A: REMOVAL

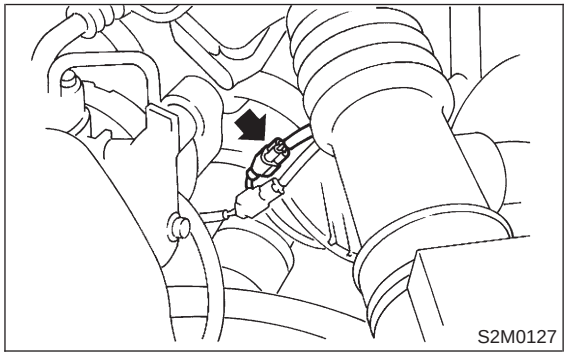
1) Disconnect battery ground cable.



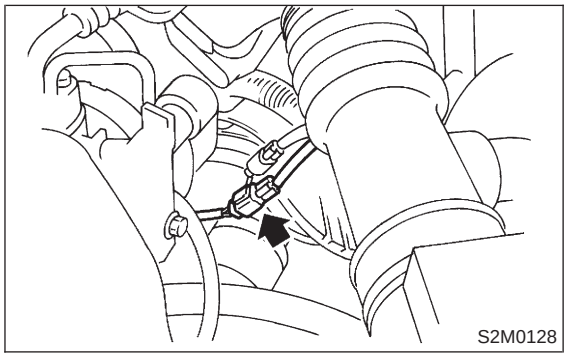
2) Remove front wheels.
3) Remove air intake duct and air intake chamber.



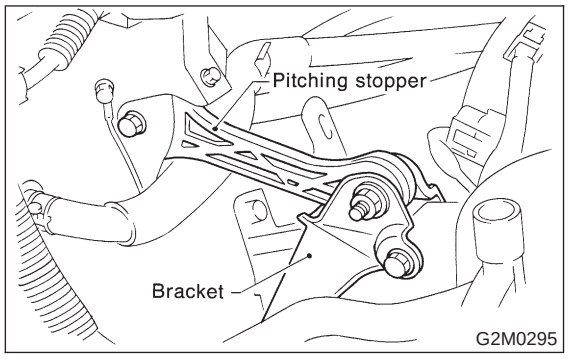
4) Disconnect front oxygen sensor connector.



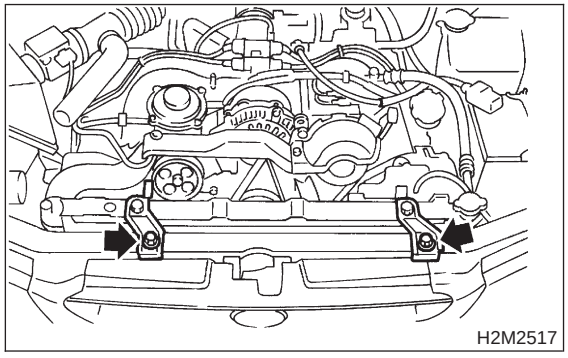
5) Disconnect rear oxygen sensor connector. (California spec. vehicles)



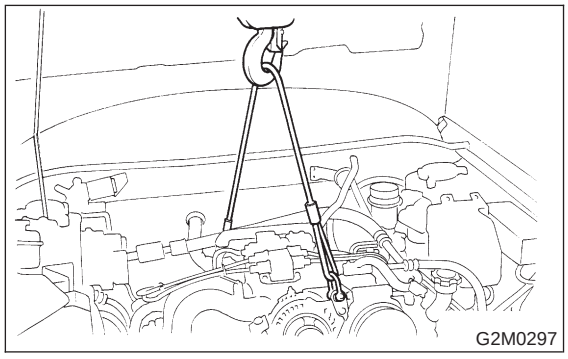
6) Remove pitching stopper.



7) Remove radiator upper bracket.



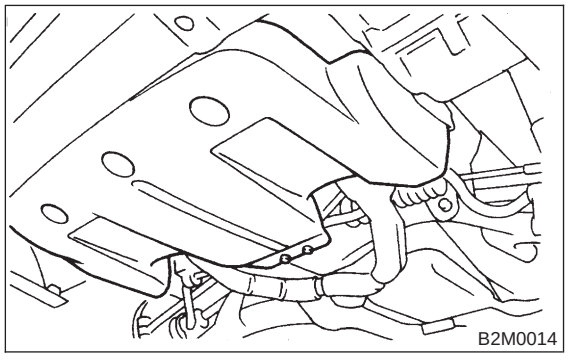
8) Support engine with a lifting device and wire ropes.



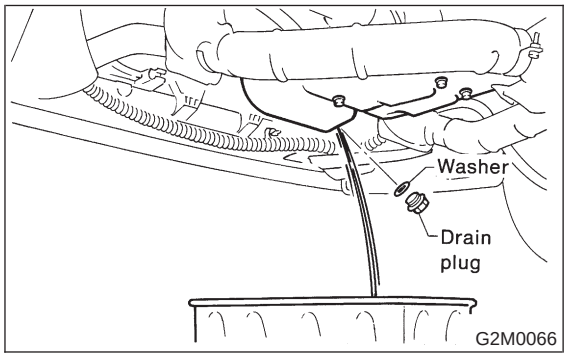
9) Lift-up the vehicle.

CAUTION:
At this time, raise up wire ropes.

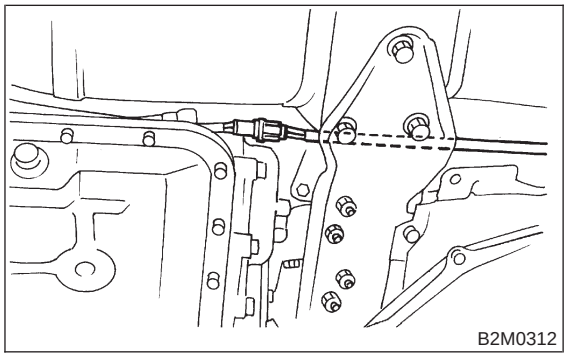
10) Remove under cover.



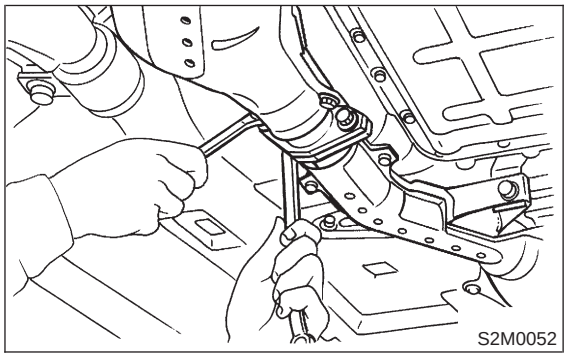
11) Drain engine oil.
Set container under the vehicle, and remove drain plug from oil pan.



12) Disconnect connector from rear oxygen sensor. (Except California spec. vehicles)

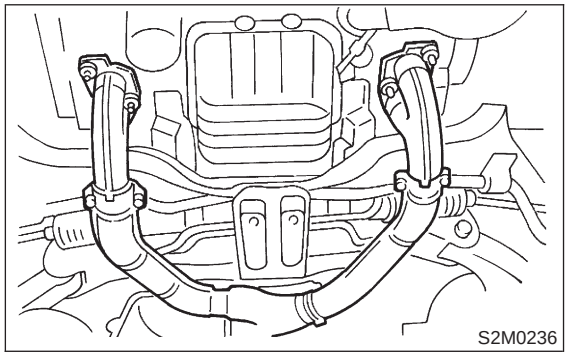


13) Remove front exhaust pipe.
(1) Separate front catalytic converter from center exhaust pipe.

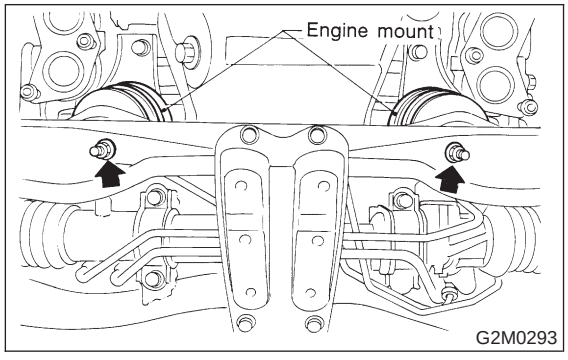


(2) Remove front exhaust pipe from engine.

CAUTION:
Be careful not to pull down front exhaust pipe.

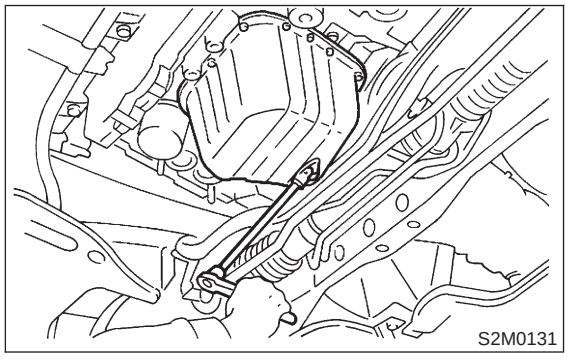

S2M0236

14) Remove nuts which install front cushion rubber onto front crossmember.



G2M0293

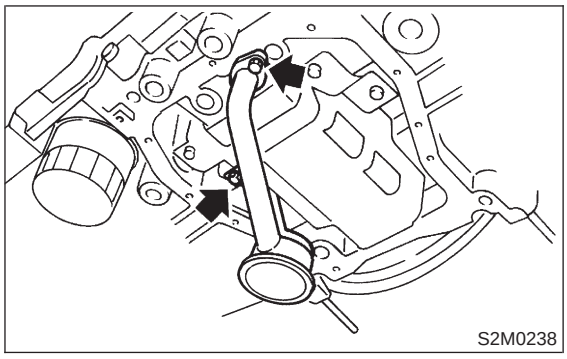
15) Remove bolts which install oil pan on cylinder block while raising up engine.


S2M0131

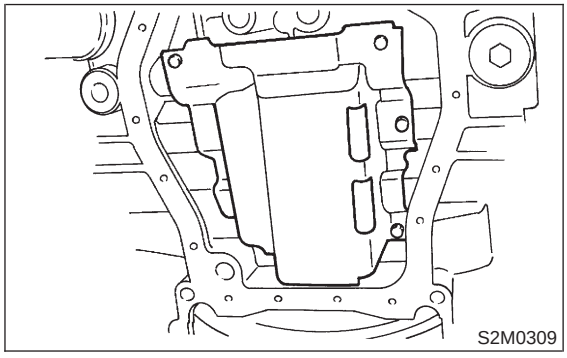
16) Insert oil pan cutter blade between cylinder block-to-oil pan clearance.

CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.

17) Remove oil strainer.


S2M0238

18) Remove baffle plate.


S2M0309

B: INSPECTION

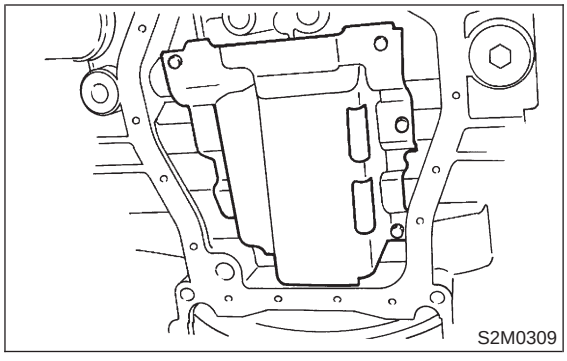
By visual check make sure oil pan, oil strainer and baffle plate are not damaged.

C: INSTALLATION

CAUTION:
Before installing oil pan, clean sealant from oil pan and engine block.

1) Install baffle plate.

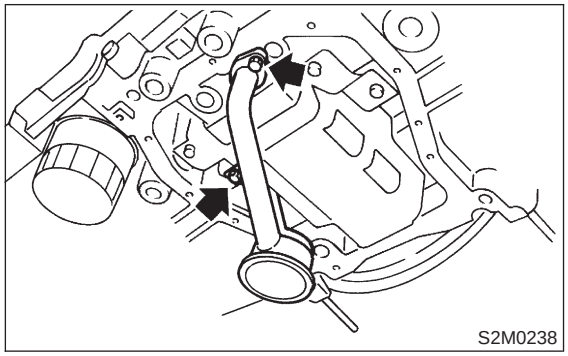
Tightening torque:
6.4 N·m (0.65 kg-m, 4.7 ft-lb)


S2M0309

2) Install oil strainer onto baffle plate.

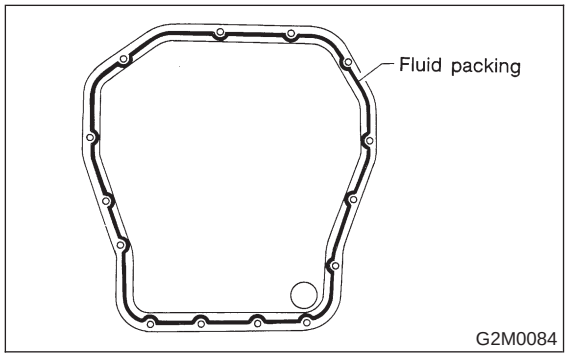
CAUTION:
Replace O-ring with a new one.

Tightening torque:
10 N·m (1.0 kg-m, 7 ft-lb)



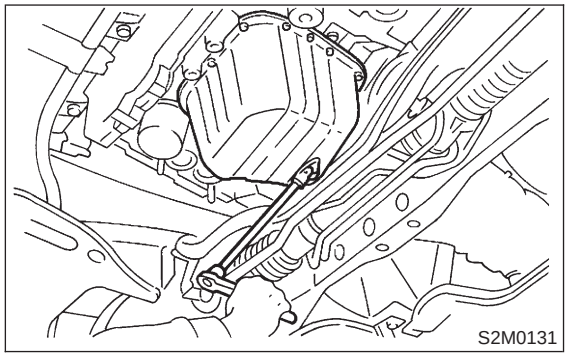
3) Apply fluid packing to mating surfaces and install oil pan.

Fluid packing:
THREE BOND 1215 or equivalent



4) Tighten bolts which install oil pan onto engine block.

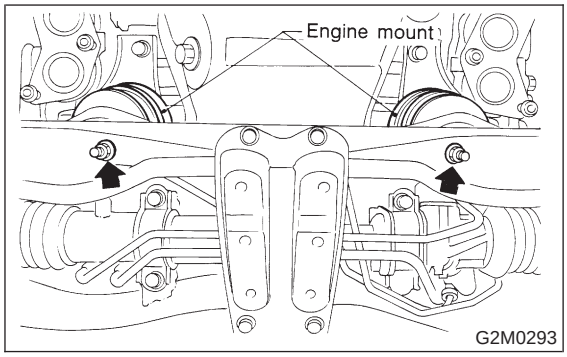
Tightening torque:
5 N·m (0.5 kg-m, 3.6 ft-lb)



5) Lower engine onto front crossmember.

6) Tighten nuts which install front cushion rubber onto front crossmember.

Tightening torque:
69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)

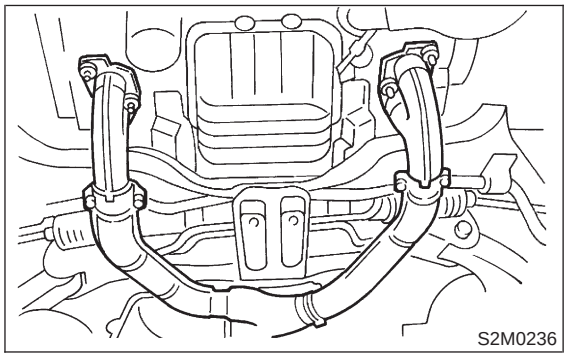


7) Install front exhaust pipe.

CAUTION:
Always use the new gaskets.

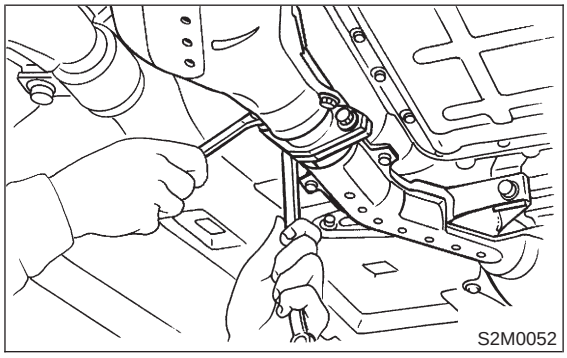
(1) Place front exhaust pipe on bracket.
(2) Tighten nuts which install front exhaust pipe on engine.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)

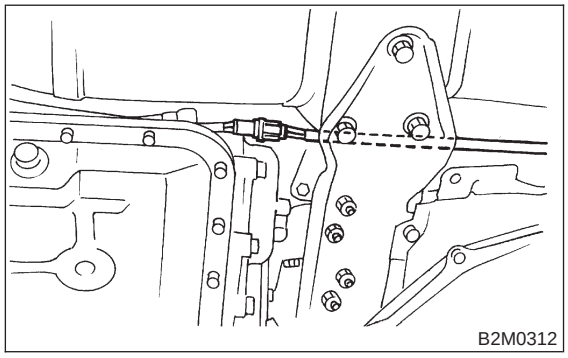


(3) Tighten nuts which install front catalytic converter to center exhaust pipe.

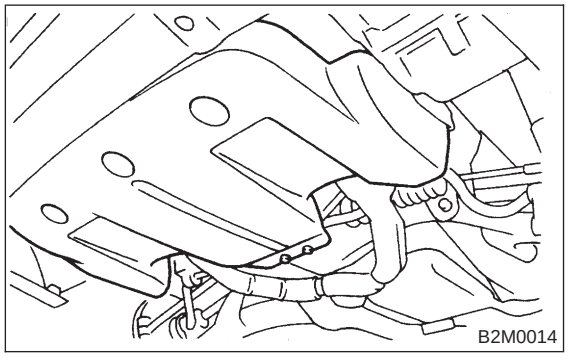
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)



8) Connect connector to rear oxygen sensor. (Except California spec. vehicles)


B2M0312

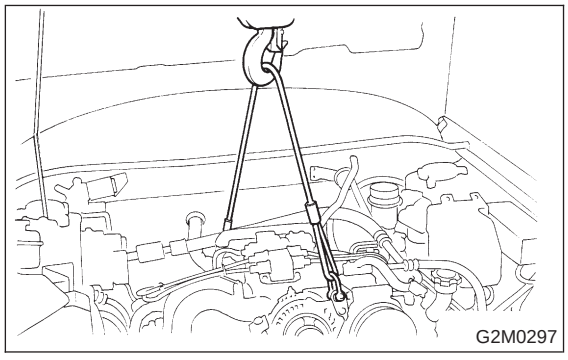
9) Install under cover.


B2M0014

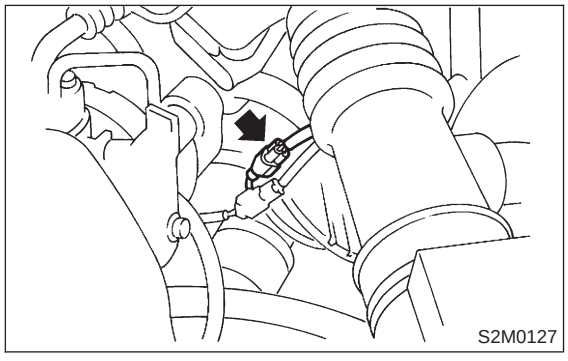
10) Lower the vehicle.

CAUTION:
At this time, lower lifting device and release steel cables.

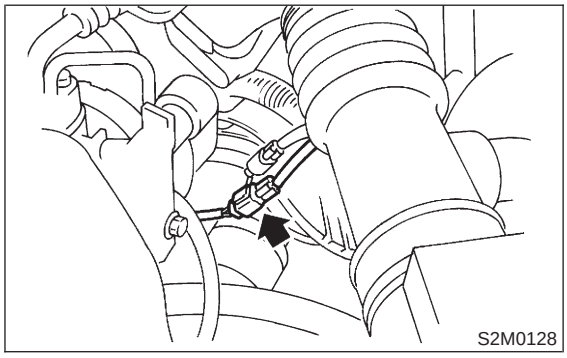
11) Remove lifting device and steel cables.


G2M0297

12) Connect connector to front oxygen sensor.

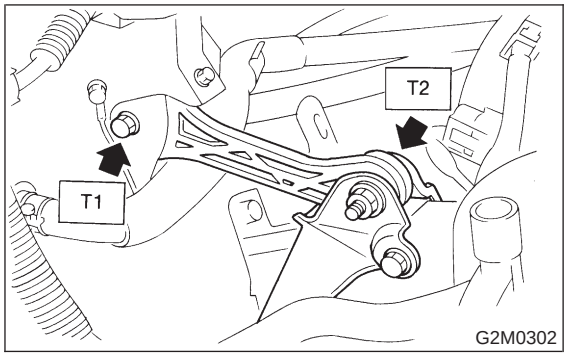

S2M0127

13) Connect connector to rear oxygen sensor. (California spec. vehicles)


S2M0128

14) Install pitching stopper.

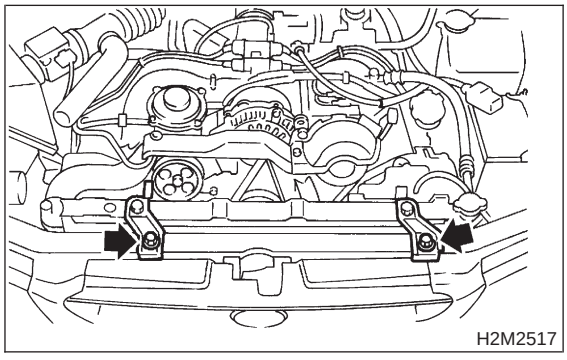
Tightening torque:
T1: 49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)
T2: 57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)



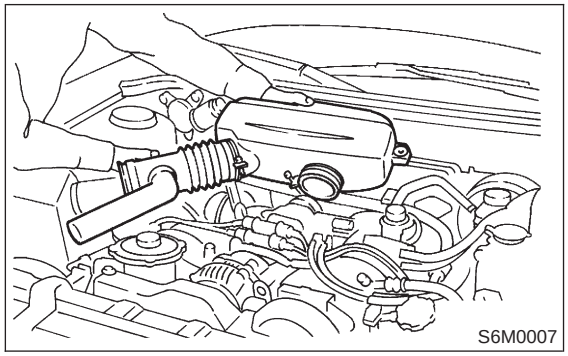
G2M0302

15) Install radiator upper brackets.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13±4 ft-lb)

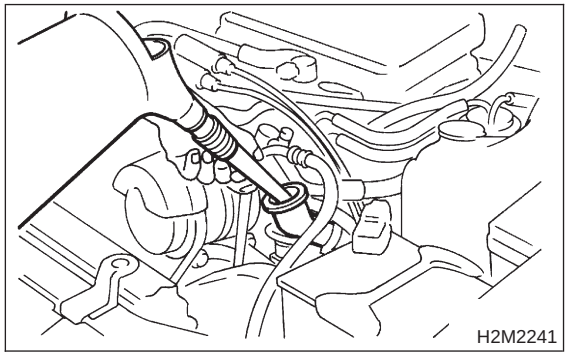

H2M2517

16) Install air intake duct and air intake chamber.


S6M0007

17) Fill engine oil. <Ref. to 1-5 [G400].>

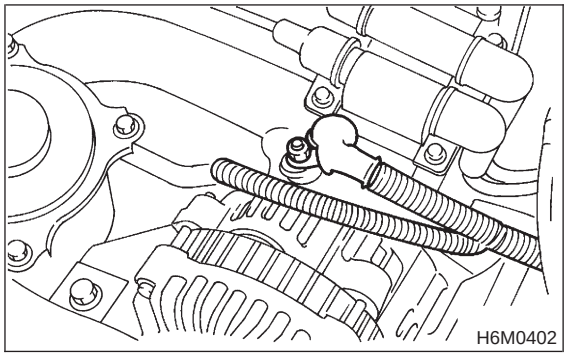
Oil capacity
2200 cc model:
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
2500 cc model:
4.5 ℓ (4.8 US qt, 4.0 Imp qt)


H2M2241

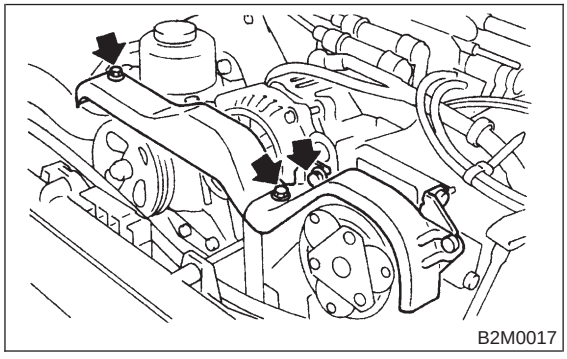
3. Oil Pressure Switch

A: REMOVAL

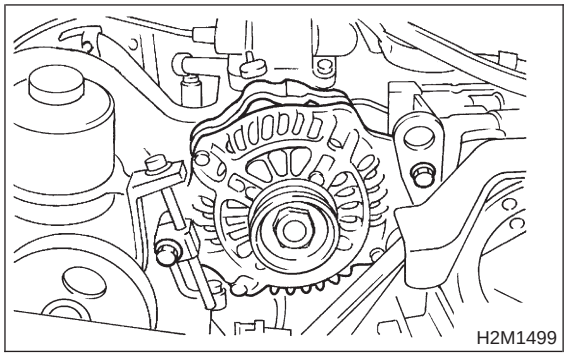
1) Remove alternator from bracket.
(1) Disconnect connector and terminal from generator.


H6M0402

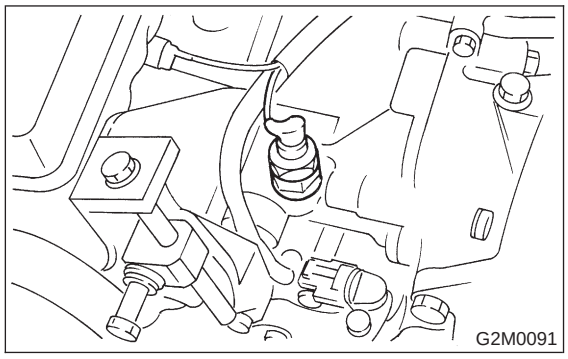
(2) Remove V-belt cover.


B2M0017

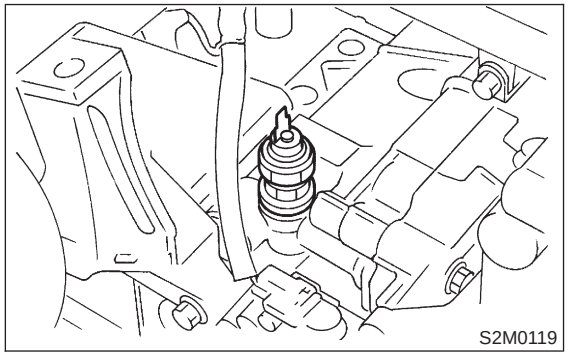
(3) Loosen lock bolt and slider bolt, and remove front side V-belt.
(4) Remove bolts which install generator on bracket.


H2M1499

2) Disconnect terminal from oil pressure switch.



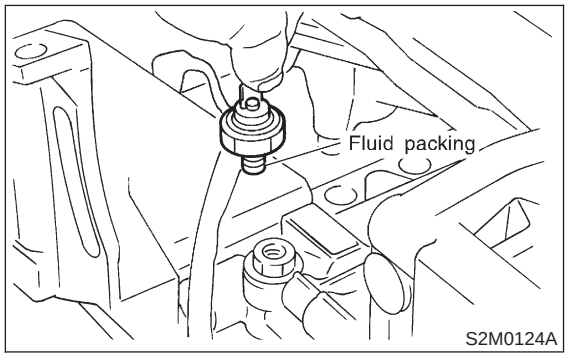
3) Remove oil pressure switch.



B: INSTALLATION

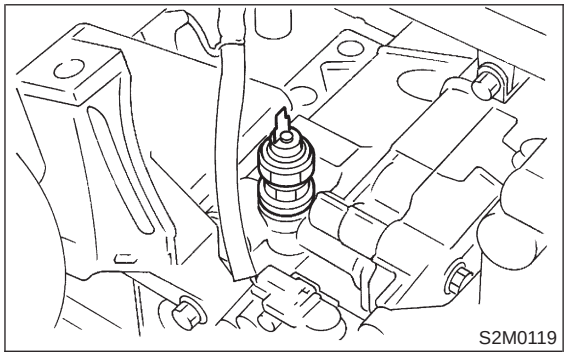
1) Apply fluid packing to oil pressure switch threads before installation.

Fluid packing:
THREE BOND 1215 or equivalent

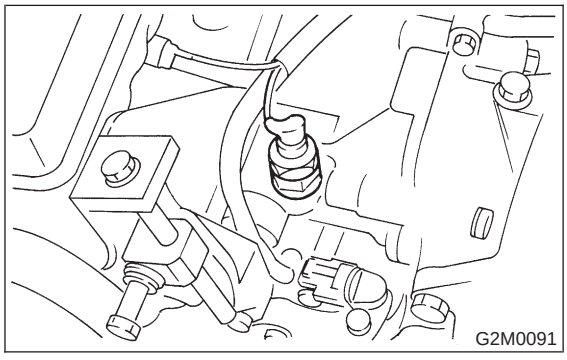


2) Install oil pressure switch onto engine block.

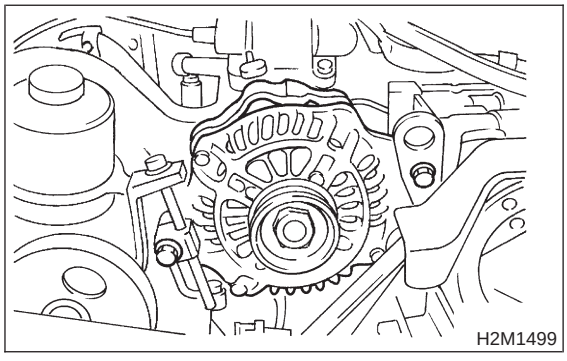
Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)



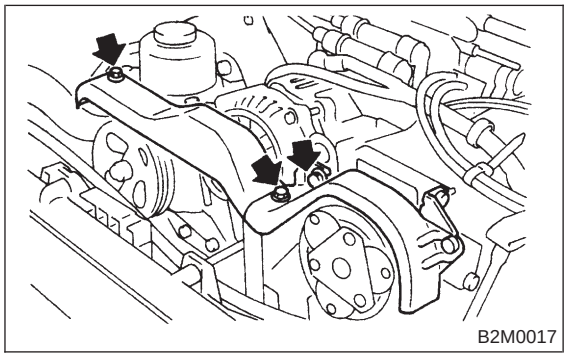
3) Connect terminal of oil pressure switch.



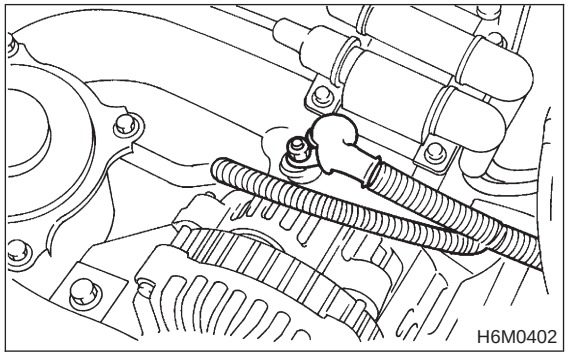
4) Install generator on bracket and temporary tighten installing bolts.



5) Install front side V-belt and adjust it. <Ref. to 1-5 [G200].>
6) Install V-belt cover.



7) Connect connector and terminal to generator.



1. Engine Lubrication System Trouble in General

NOTE:
Before troubleshooting, make sure that the engine oil level is correct and no oil leakage exists.

Trouble	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogged oil filter	Replace.
		Malfunction of oil by-pass valve of oil filter	Clean or replace.
		Malfunction of oil relief valve of oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not go on.	1) Burn-out bulb		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1.—2)

MEMO:

ENGINE COOLING SYSTEM 2-5

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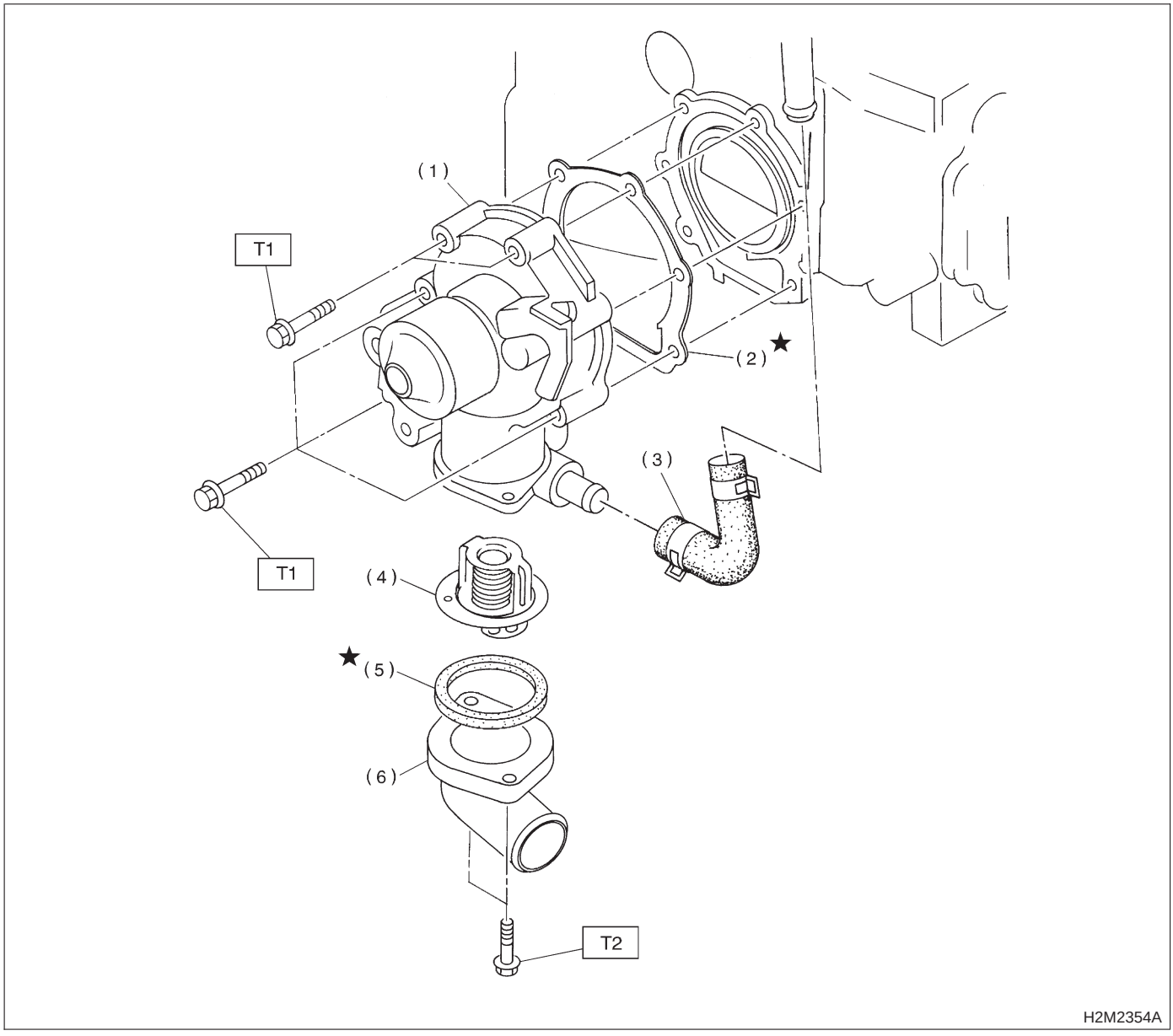
1. Specifications

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)		2200 cc	5.8 (6.1, 5.1)
		2500 cc	MT: Approx. 6.0 (6.3, 5.3) AT: Approx. 6.2 (6.6, 5.5)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge	20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed—total engine coolant head	760 rpm — 0.3 mAq (1.0 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance II	Discharge	100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed—total engine coolant head	3,000 rpm — 5.0 mAq (16.4 ftAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance III	Discharge	200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed—total engine coolant head	6,000 rpm — 23.0 mAq (75.5 ftAq)
		Engine coolant temperature	85°C (185°F)
	Impeller diameter		76 mm (2.99 in)
	Number of impeller vanes		8
	Pump pulley diameter		60 mm (2.36 in)
Thermostat	Type		Wax pellet type
	Starts to open		76 — 80°C (169 — 176°F)
	Fully opened		91°C (196°F)
	Valve lift		9.0 mm (0.354 in) or more
	Valve bore		35 mm (1.38 in)
Radiator fan	Motor		90 W (main fan) 90 W (sub fan)
	Fan diameter × Blade		320 mm (12.60 in) × 5 (main fan) 320 mm (12.60 in) × 7 (sub fan)
Radiator	Type		Cross flow, pressure type
	Core dimensions	2200 cc	691 × 340 × 16 mm (27.20 × 13.39 × 0.63 in)
		2500 cc	672.6 × 394.5 × 16 mm (26.48 × 15.53 × 0.63 in)
	Pressure range in which cap valve is open		Above: 88±10 kPa (0.9±0.1 kg/cm^2, 12.8±1.4 psi) Below: −9.8 to −4.9 kPa (−0.1 to −0.05 kg/cm^2, −1.4 to −0.7 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.55 ℓ (0.6 US qt, 0.5 Imp qt)

2. Service Data

Water pump	Clearance between impeller and case	Standard	0.5 — 0.7 mm (0.020 — 0.028 in)
		Limit	1.0 mm (0.039 in)
	“Thrust” runout of impeller end		0.5 mm (0.020 in)

1. Water Pump

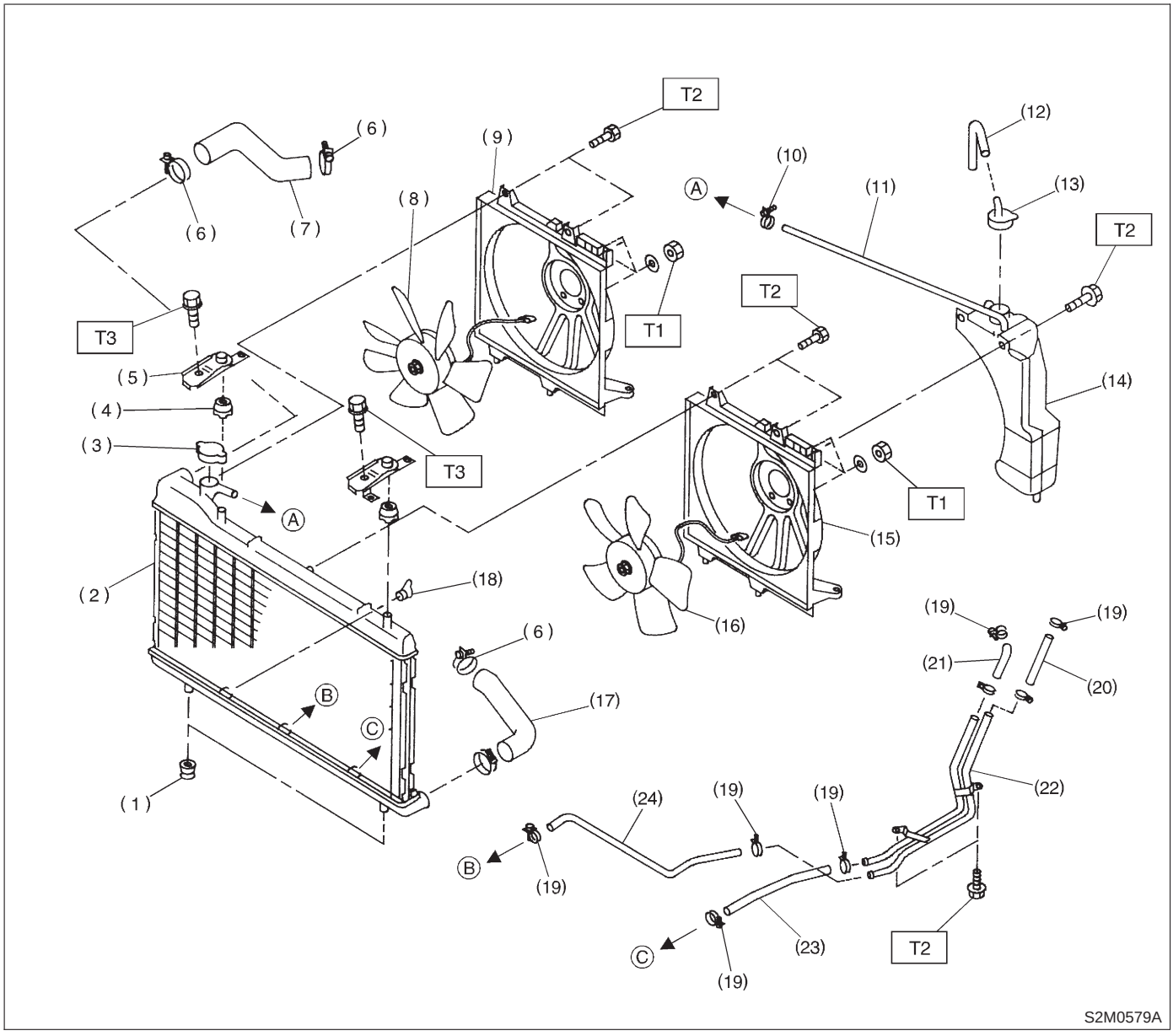


(1) Water pump ASSY
(2) Gasket
(3) Heater hose
(4) Thermostat
(5) Gasket
(6) Thermostat case

Tightening torque: N·m (kg-m, ft-lb)
T1: First 10^{+4}_{-0} ($1.0^{+0.4}_{-0}$, $7.2^{+2.9}_{-0}$)
Second 10^{+4}_{-0} ($1.0^{+0.4}_{-0}$, $7.2^{+2.9}_{-0}$)
T2: 6.4±0.5 (0.65±0.05, 4.7±0.4)

2. Radiator and Radiator Fan

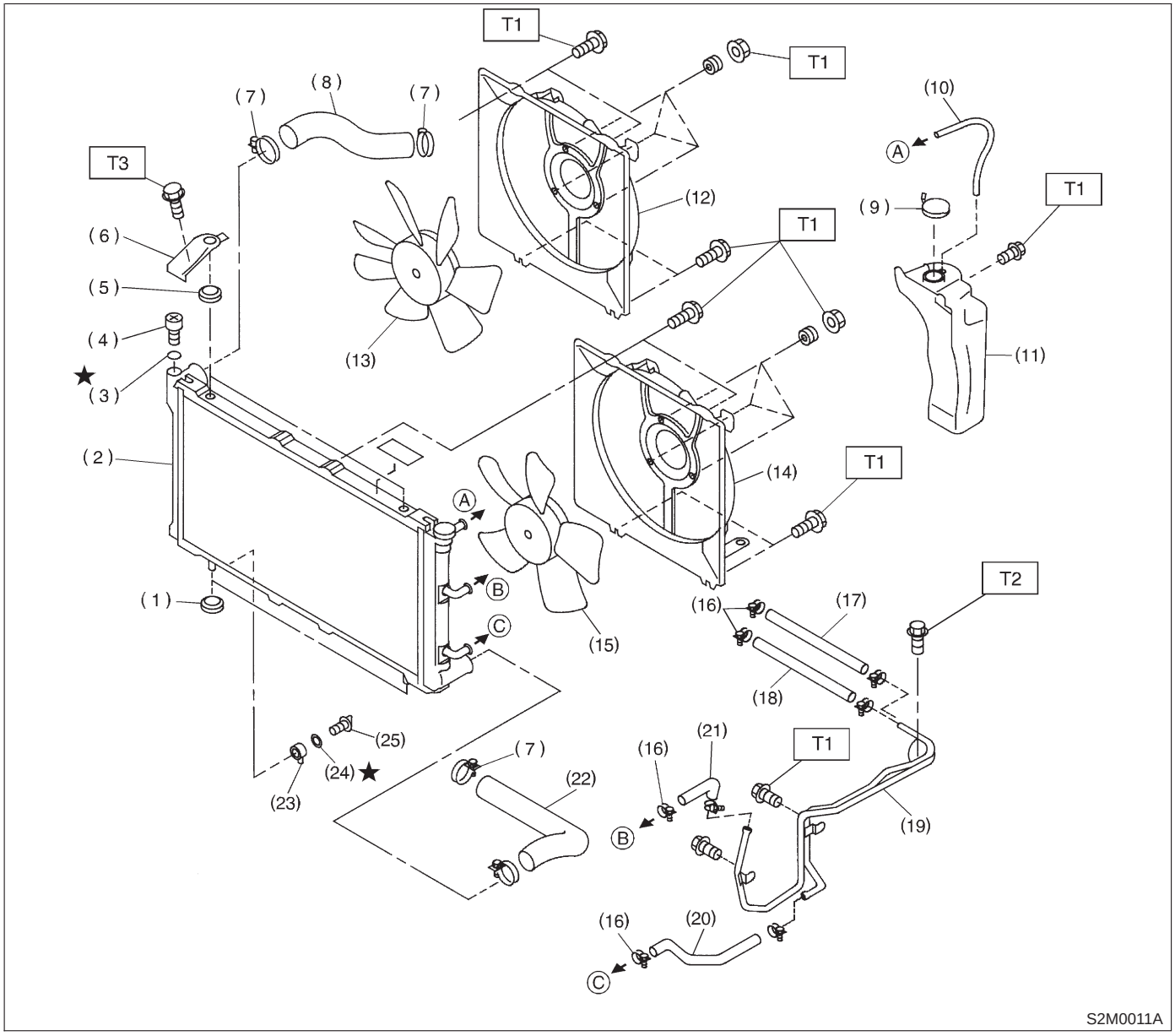
A: 2200 cc MODEL



(1) Radiator lower cushion
(2) Radiator
(3) Radiator cap
(4) Radiator upper cushion
(5) Radiator upper bracket
(6) Clamp
(7) Radiator inlet hose
(8) Radiator sub fan motor ASSY
(9) Radiator sub fan shroud
(10) Clamp
(11) Over flow hose
(12) Air vent hose
(13) Engine coolant reservoir tank cap
(14) Engine coolant reservoir tank
(15) Radiator main fan shroud
(16) Radiator main fan motor ASSY
(17) Radiator outlet hose
(18) Radiator drain plug
(19) ATF hose clamp (AT vehicles only)
(20) ATF inlet hose A (AT vehicles only)
(21) ATF outlet hose A (AT vehicles only)
(22) ATF pipe (AT vehicles only)
(23) ATF outlet hose B (AT vehicles only)
(24) ATF inlet hose B (AT vehicles only)

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±0.5 (0.45±0.05, 3.3±0.4)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 18±8 (1.8±0.8, 13.0±5.8)

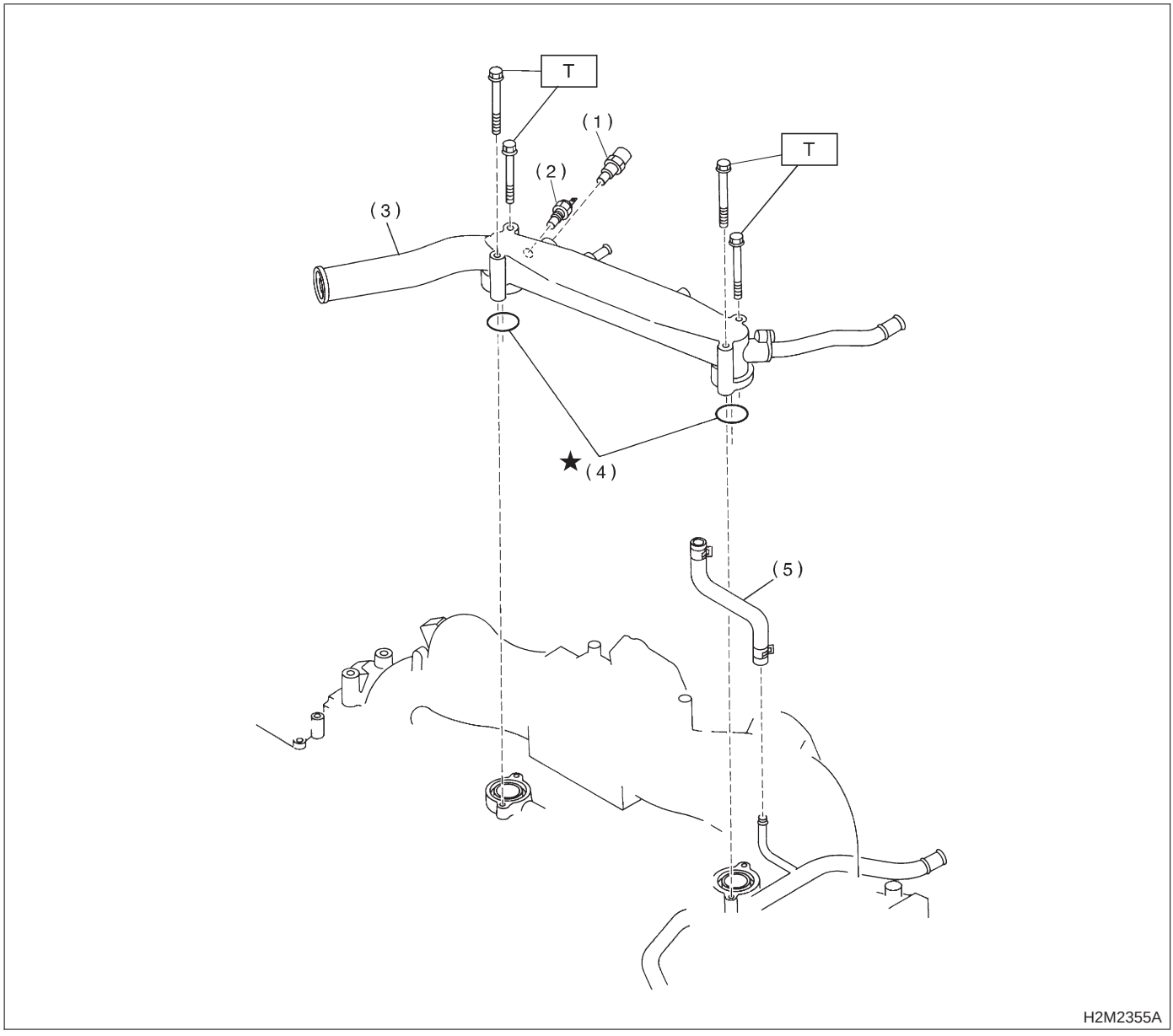
B: 2500 cc MODEL



(1) Radiator lower cushion
(2) Radiator
(3) O-ring
(4) Air vent plug
(5) Radiator upper cushion
(6) Radiator upper bracket
(7) Clamp
(8) Radiator inlet hose
(9) Engine coolant reservoir tank cap
(10) Over flow hose
(11) Engine coolant reservoir tank
(12) Sub fan shroud
(13) Radiator sub fan ASSY
(14) Main fan shroud
(15) Radiator main fan ASSY
(16) ATF hose clamp (AT vehicles only)
(17) ATF inlet hose A (AT vehicles only)
(18) ATF outlet hose A (AT vehicles only)
(19) ATF pipe (AT vehicles only)
(20) ATF outlet hose B (AT vehicles only)
(21) ATF inlet hose B (AT vehicles only)
(22) Radiator outlet hose
(23) Radiator drain pipe
(24) Gasket
(25) Radiator drain plug

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.20, 5.4±1.4)
T2: 12±3 (1.2±0.3, 8.7±2.2)
T3: 18±5 (1.8±0.5, 13.0±3.6)

3. Water Pipe



(1) Engine coolant temperature sensor
(2) Engine coolant temperature gauge
(3) Water pipe
(4) O-ring
(5) By-pass hose

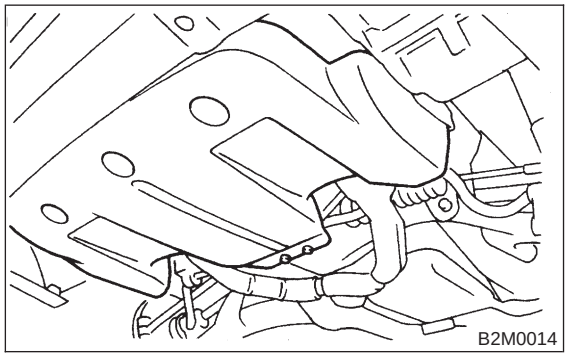
Tightening torque: N·m (kg-m, ft-lb)
T: 6.4±0.5 (0.65±0.05, 4.7±0.4)

1. On-car Services

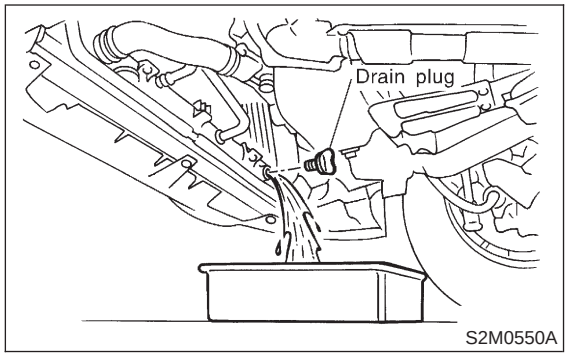
A: DRAINING OF ENGINE COOLANT

1. 2200 cc MODEL

1) Lift-up the vehicle.
2) Remove under cover.



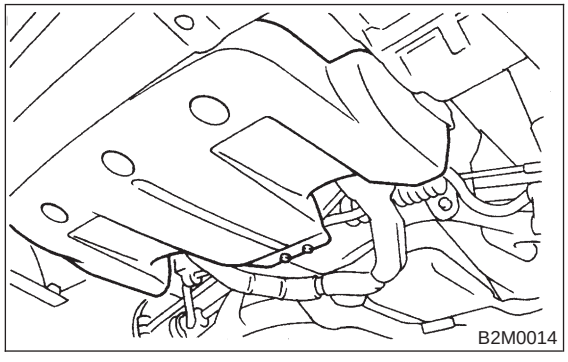
3) Loosen drain cock to drain engine coolant into container.



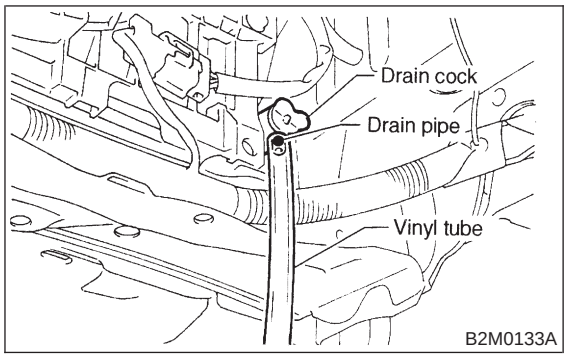
NOTE:
Remove radiator cap so that engine coolant will drain faster.

2. 2500 cc MODEL

1) Lift-up the vehicle.
2) Remove under cover.

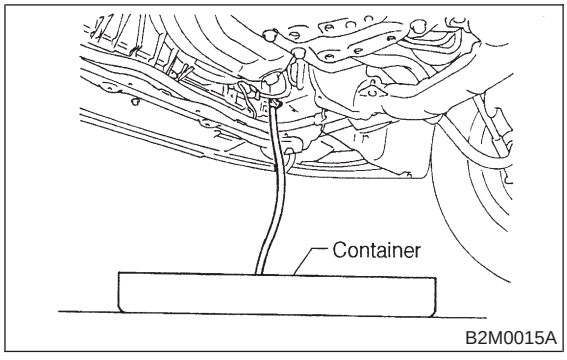


3) Fit vinyl tube to drain pipe.



4) Loosen drain cock to drain engine coolant into container.

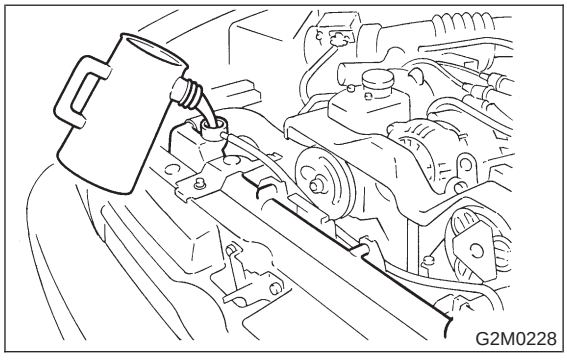
NOTE:
Remove radiator cap so that engine coolant will drain faster.



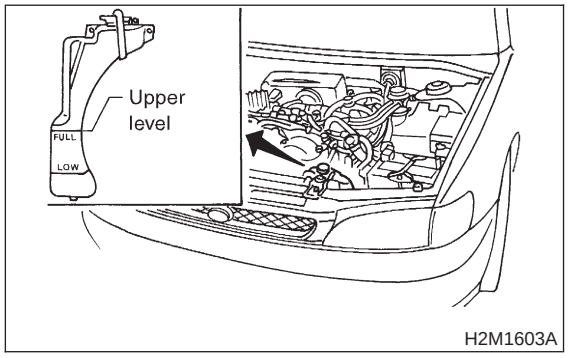
B: FILLING OF ENGINE COOLANT

1. 2200 cc MODEL

1) Fill engine coolant into radiator up to filler neck position.



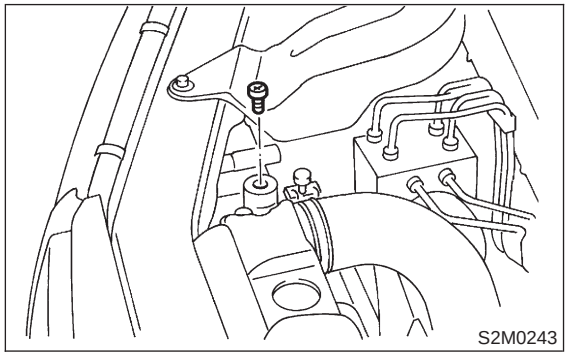
2) Fill engine coolant into reservoir tank up to upper level.



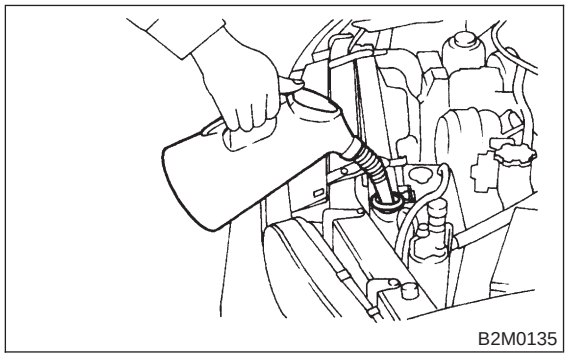
3) Attach radiator cap and reservoir tank cap properly.
4) Warm-up engine completely for more than five minutes at 2,000 to 3,000 rpm.
5) Stop engine and wait until temperature drops to a safe level.
6) If engine coolant level drops in radiator, add engine coolant to filler neck position.
7) If engine coolant level drops from upper level of reservoir tank, add engine coolant to upper level.
8) Attach radiator cap and reservoir tank cap properly.

2. 2500 cc MODEL

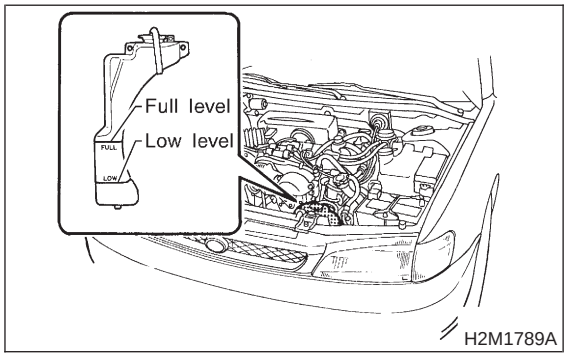
1) Remove air vent plug from radiator.



2) Fill engine coolant into radiator up to filler neck position.



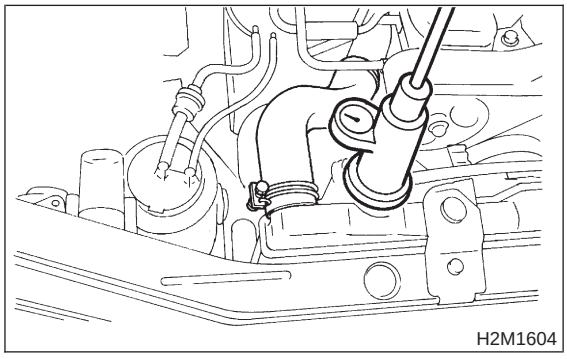
3) Fill engine coolant into reservoir tank up to upper level.



4) Attach radiator cap and reservoir tank cap properly.
5) Install air vent plug.
6) Warm-up engine completely for more than five minutes at 2,000 to 3,000 rpm.
7) Stop engine and wait until temperature drops to a safe level.
8) If engine coolant level drops in radiator, add engine coolant to filler neck position.
9) If engine coolant level drops from upper level of reservoir tank, add engine coolant to upper level.
10) Attach radiator cap and reservoir tank cap properly.

C: CHECKING OF COOLING SYSTEM

1) Remove radiator cap, top off radiator, and attach tester to radiator in place of cap.
2) Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to radiator to check if:
   (1) Engine coolant leaks at/around radiator.
   (2) Engine coolant leaks at/around hoses or connections.



CAUTION:
- **Engine should be off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful to prevent engine coolant from spurting out when removing tester.**

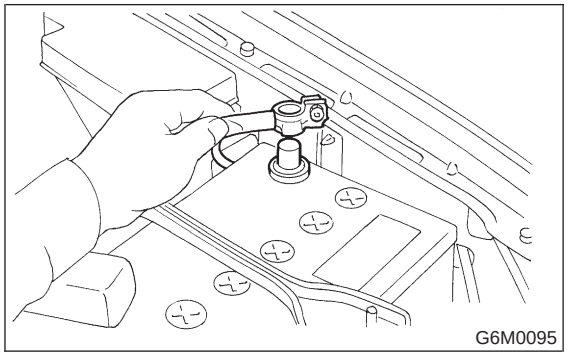
● Be careful also not to deform filler neck of radiator when installing or removing tester.

2. Water Pump

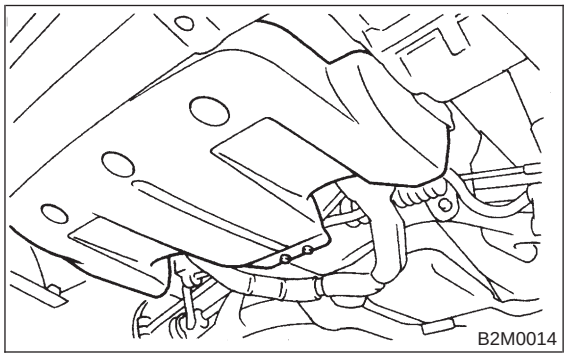
A: REMOVAL AND INSTALLATION

1. 2200 cc MODEL

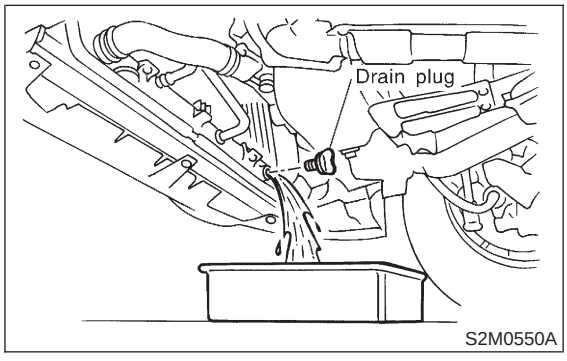
1) Disconnect ground cable from battery.



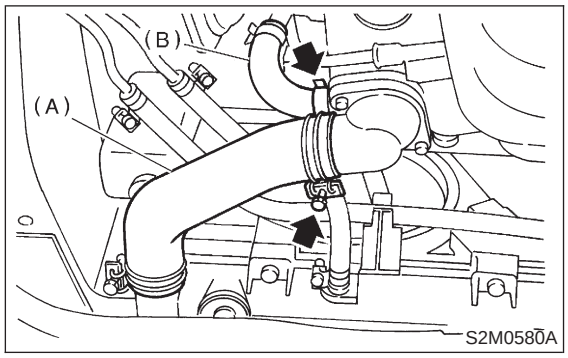
2) Lift-up the vehicle.
3) Remove under cover.



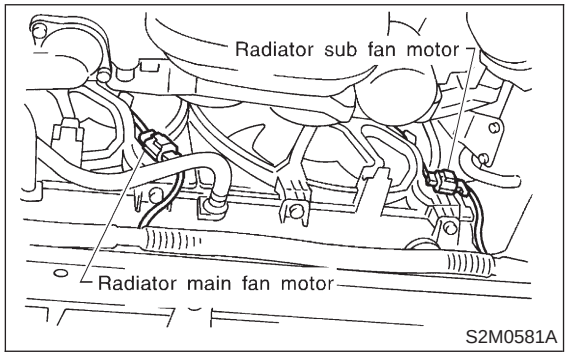
4) Drain engine coolant completely. <Ref. to 2-5 [W1A1].>



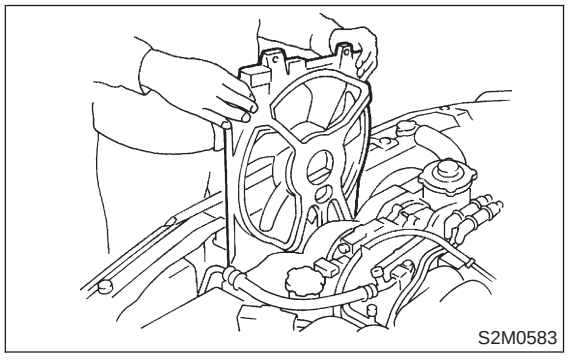
5) Disconnect radiator outlet hose (A) and heater by-pass hose (B) from water pump.



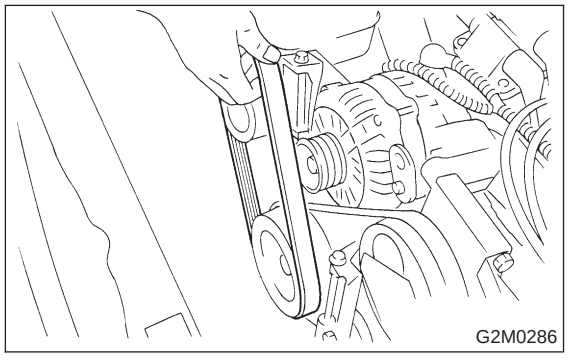
6) Disconnect connectors from radiator main fan (A) and sub fan (B) motors.



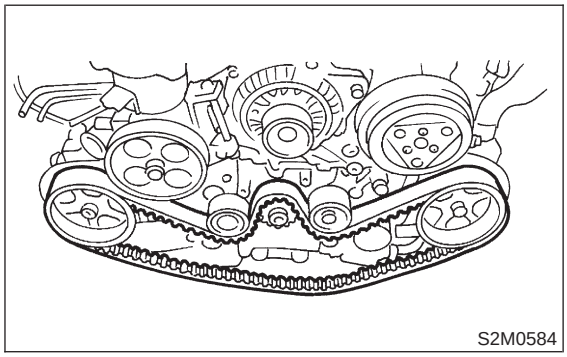
7) Lower the vehicles.
8) Remove radiator main fan and sub fan motor assembly.
<Ref. to 2-5 [W6A0].> and <Ref. to 2-5 [W7A0].>



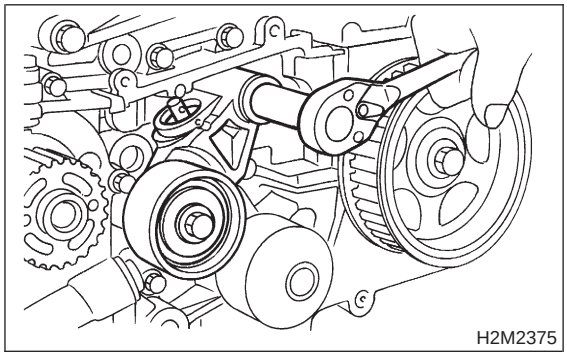
9) Remove V-belts.
<Ref. to 1-5 [G200].>



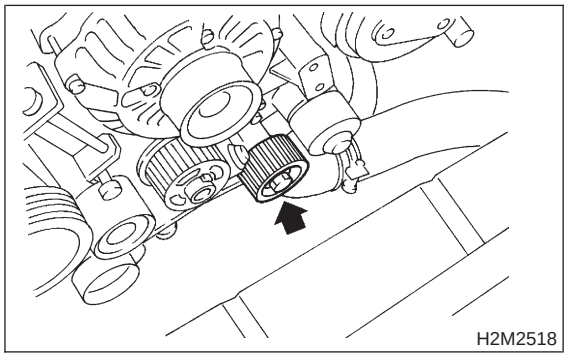
10) Remove timing belt.
<Ref. to 2-3a [W2A0].>



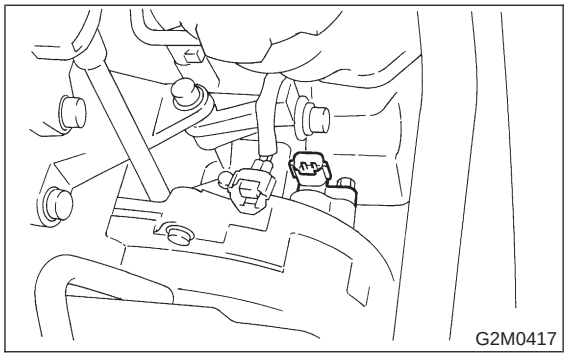
11) Remove automatic belt tension adjuster.



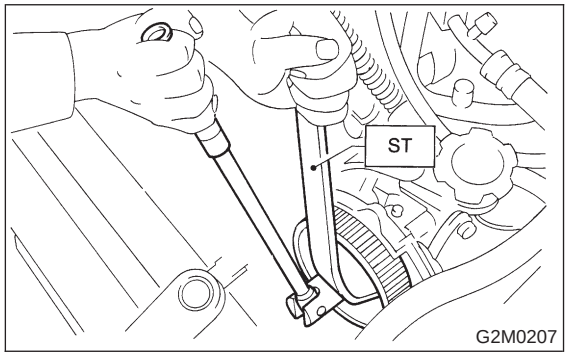
12) Remove belt idler No. 2.



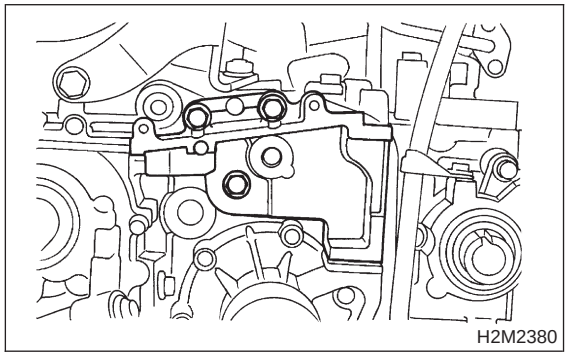
13) Remove camshaft position sensor.
<Ref. to 2-7 [W10A0].>



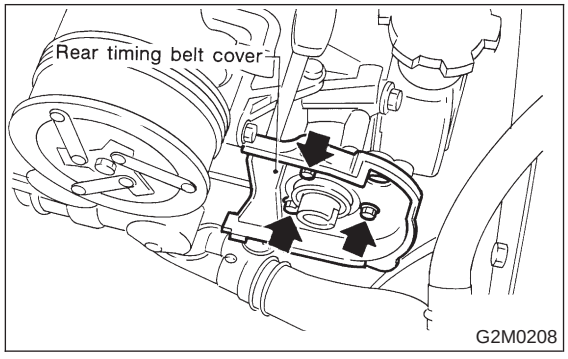
14) Remove left-hand camshaft sprocket by using ST.
ST 499207100 CAMSHAFT SPROCKET WRENCH



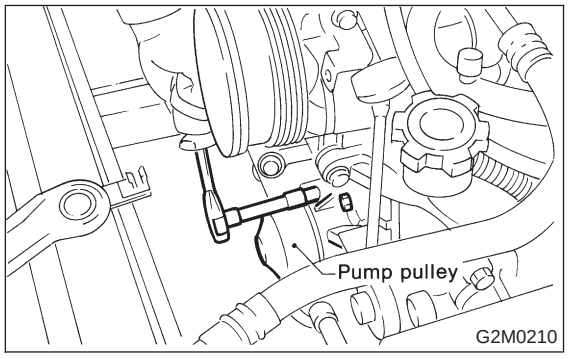
15) Remove tensioner bracket.



16) Remove left-hand belt cover No. 2.



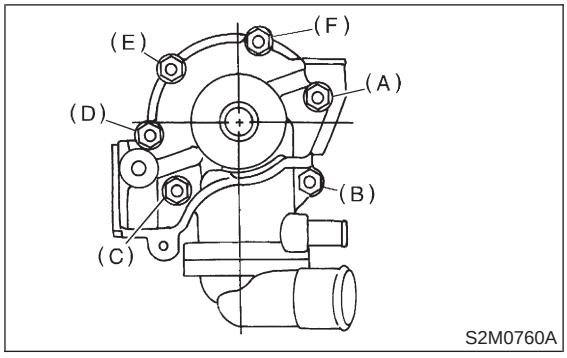
17) Remove tensioner bracket.
18) Disconnect heater hose from water pump.
19) Remove water pump.



20) Installation is in the reverse order of removal.

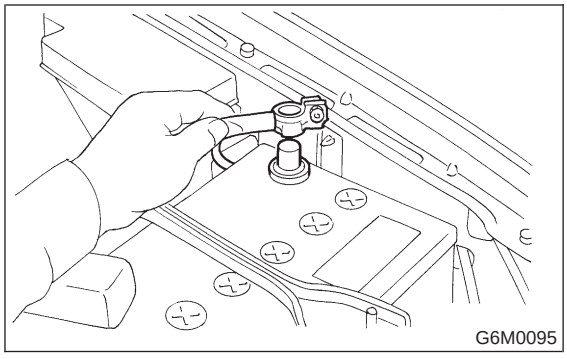
CAUTION:
- **Replace gasket with a new one.**
- **When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.**

Tightening torque:
$10^{+4}/_{-0}$ N·m ($1.0^{+0.4}/_{-0}$ kg-m, $7.2^{+2.9}/_{-0}$ ft-lb)

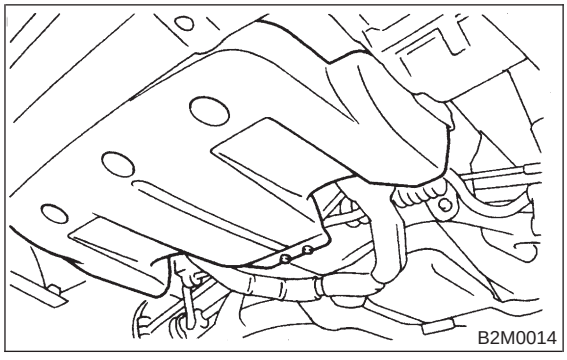


2. 2500 cc MODEL

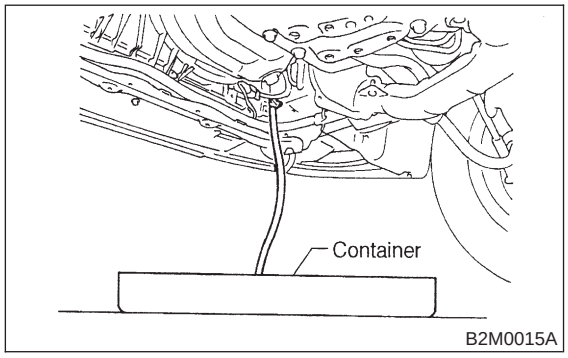
1) Disconnect ground cable from the battery.



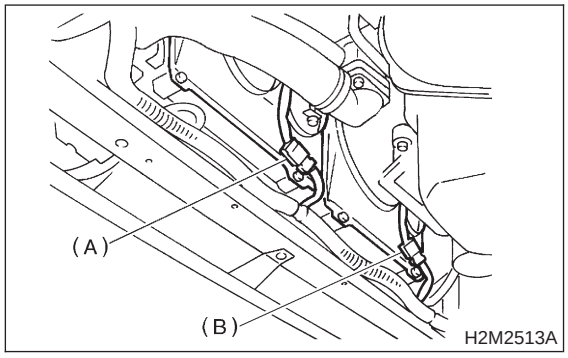
2) Lift-up the vehicle.
3) Remove under cover.



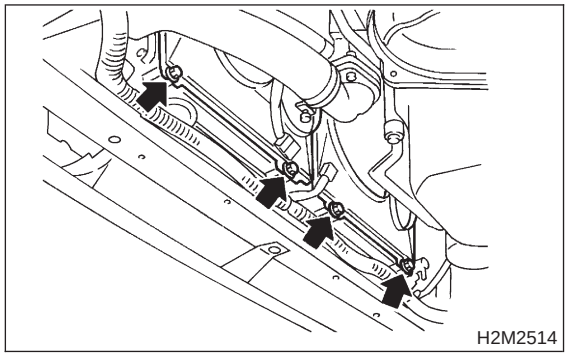
4) Drain engine coolant completely.
<Ref. to 2-5 [W1A2].>



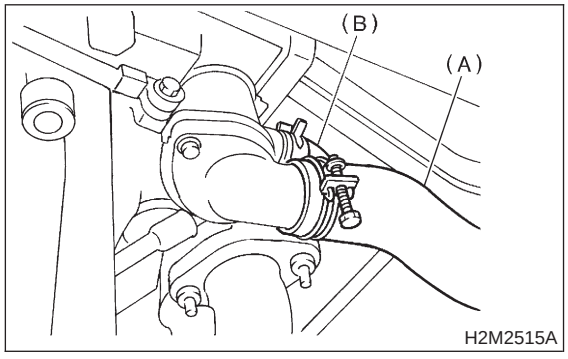
5) Disconnect connectors from radiator main fan (A) and sub fan (B) motors.



6) Loosen bolts which hold lower side of radiator main fan and sub fan shrouds.

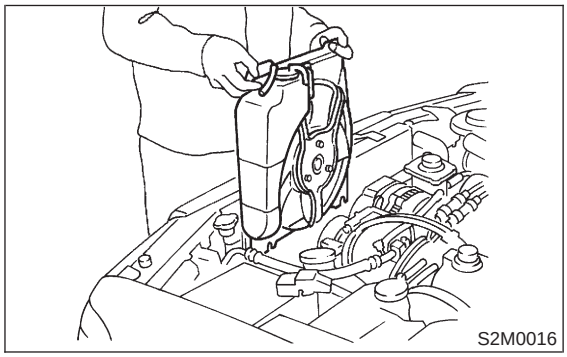


7) Disconnect radiator outlet hose (A) and heater by-pass hose (B) from water pump.

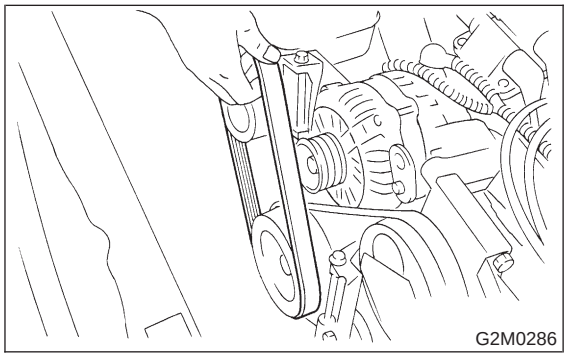


8) Lower the vehicle.

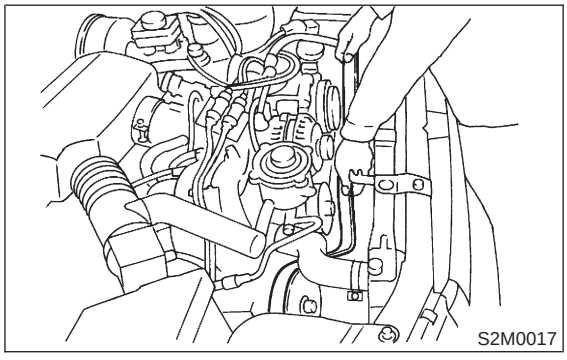
9) Remove radiator main fan and sub fan assemblies. <Ref. to 2-5 [W6A0].> and <Ref. to 2-5 [W7A0].>



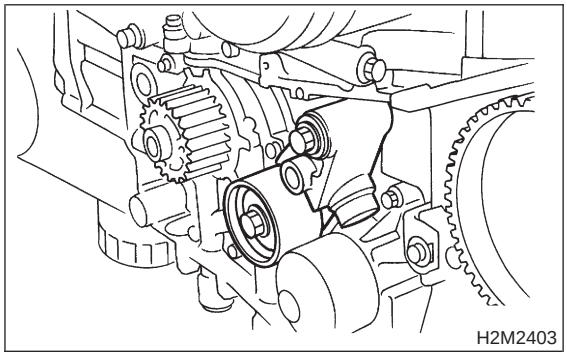
10) Remove V-belts.
<Ref. to 1-5 [G200].>



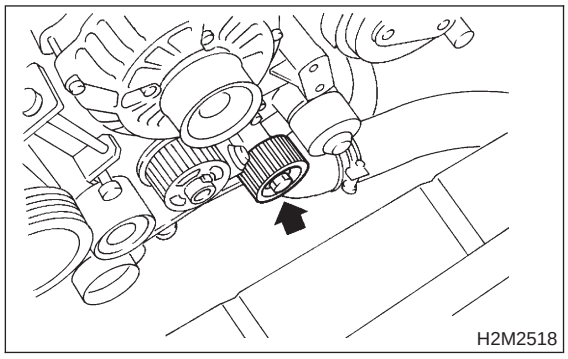
11) Remove timing belt.
<Ref. to 2-3b [W2A0].>



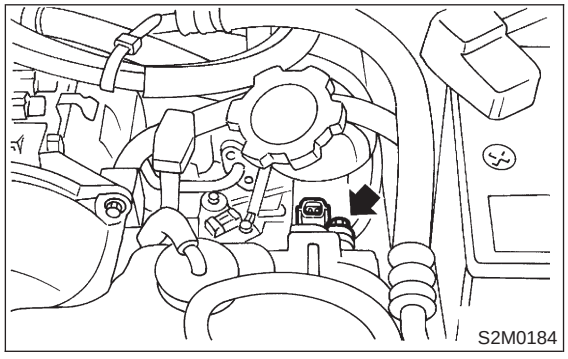
12) Remove automatic belt tension adjuster.



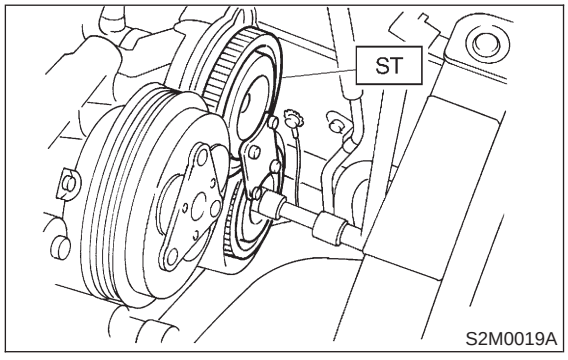
13) Remove belt idler No. 2.



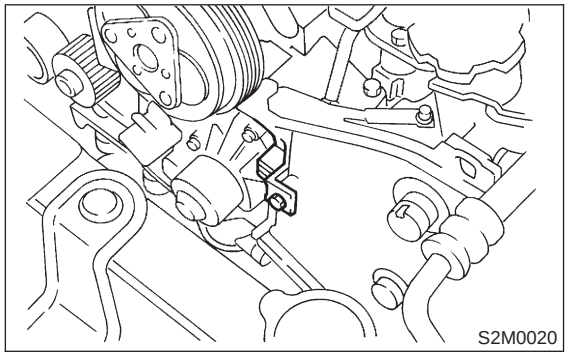
14) Remove camshaft position sensor.
<Ref. to 2-7 [W10A0].>



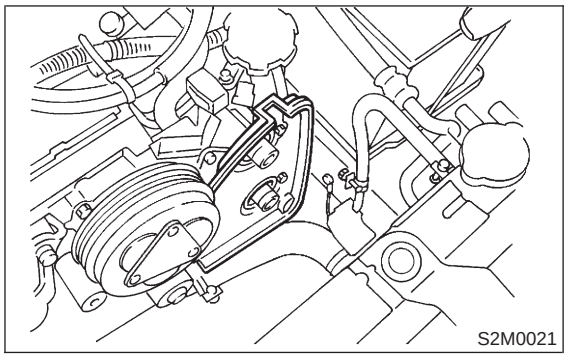
15) Remove left-hand camshaft sprockets by using ST.
ST 499207300 CAMSHAFT SPROCKET WRENCH



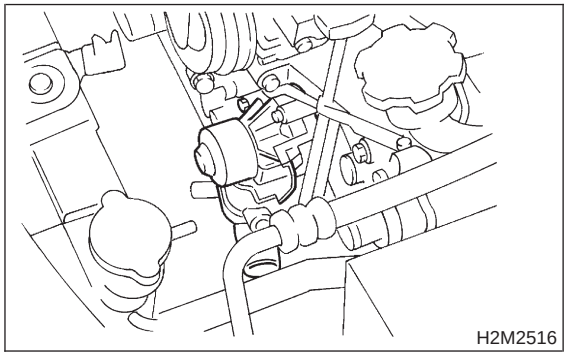
16) Remove tensioner bracket.



17) Remove left-hand belt cover No. 2.



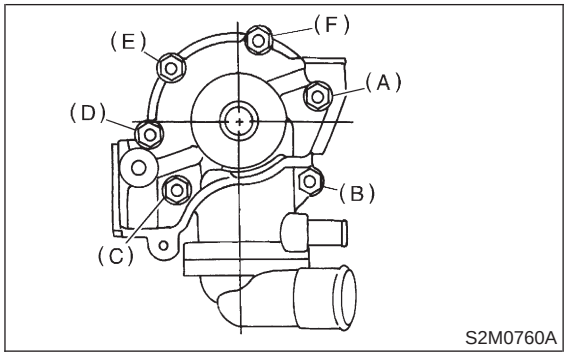
18) Remove water pump.



19) Installation is in the reverse order of removal.

CAUTION:
- **Replace gasket with a new one.**
- **When installing water pump, tighten bolts in two stages in alphabetical sequence as shown in figure.**

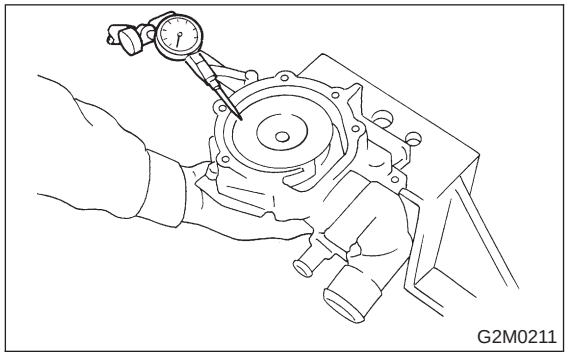
Tightening torque:
$10^{+4}/_{-0}$ N·m ($1.0^{+0.4}/_{-0}$ kg-m, $7.2^{+2.9}/_{-0}$ ft-lb)



B: INSPECTION

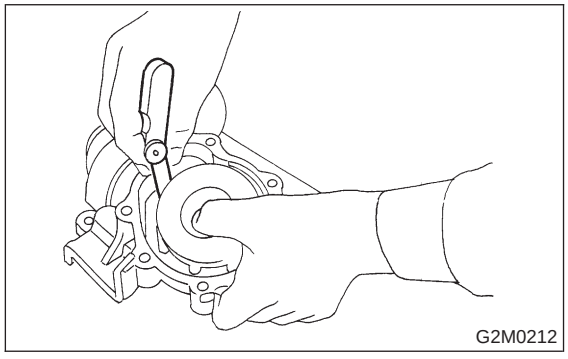
1) Check water pump bearing for smooth rotation.
2) Check water pump pulley for abnormalities.
3) Using a dial gauge, measure impeller runout in thrust direction while rotating the pulley.

"Thrust" runout limit:
0.5 mm (0.020 in)



4) Check clearance between impeller and pump case.

Clearance between impeller and pump case:
Standard
0.5 — 0.7 mm (0.020 — 0.028 in)
Limit
1.0 mm (0.039 in)

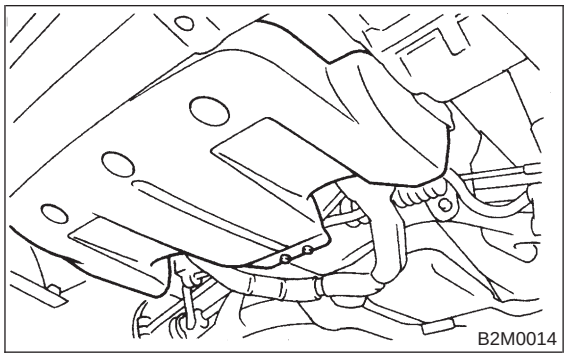


5) After water pump installation, check pulley shaft for engine coolant leaks. If leaks are noted, replace water pump assembly.

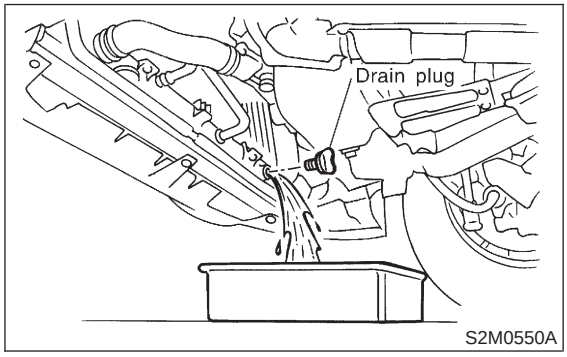
3. Thermostat

A: REMOVAL AND INSTALLATION

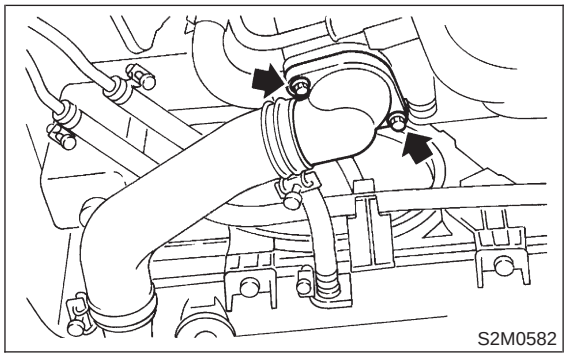
1) Lift-up the vehicle.
2) Remove under cover.



3) Drain engine coolant completely. <Ref. to 2-5 [W1A0].>

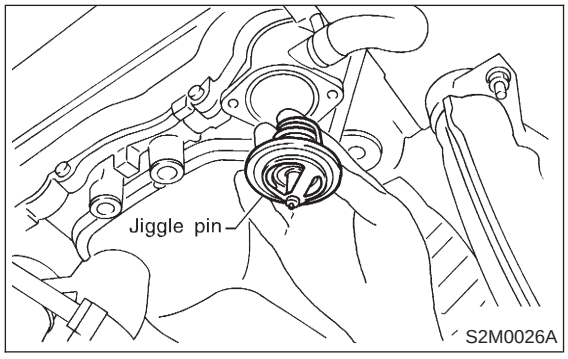


4) Remove thermostat cover and gasket, and pull out the thermostat.



5) Install the thermostat in the intake manifold, and install the thermostat cover together with a gasket.

CAUTION:
● When reinstalling the thermostat, use a new gasket.
● The thermostat must be installed with the jiggle pin upward.
● In this time, set the jiggle pin of thermostat for front side.

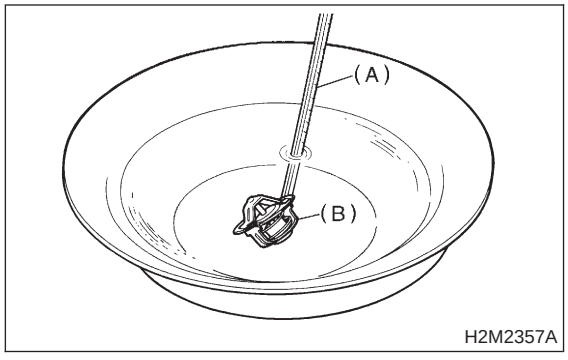


B: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.
Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starts to open:
76.0 — 80.0°C (169 — 176°F)

Fully opens:
91°C (196°F)



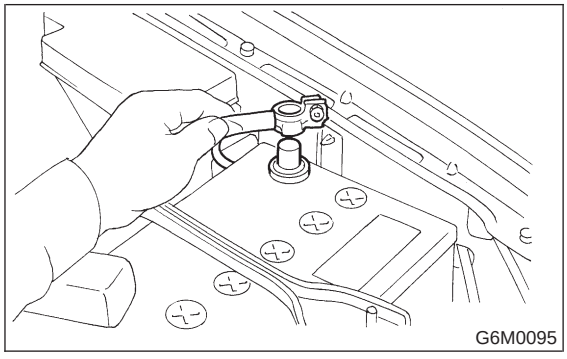
(A) Thermometer
(B) Thermostat

4. Radiator

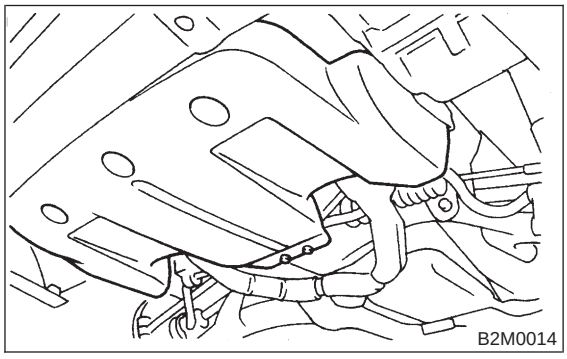
A: REMOVAL

1. 2200 cc MODEL

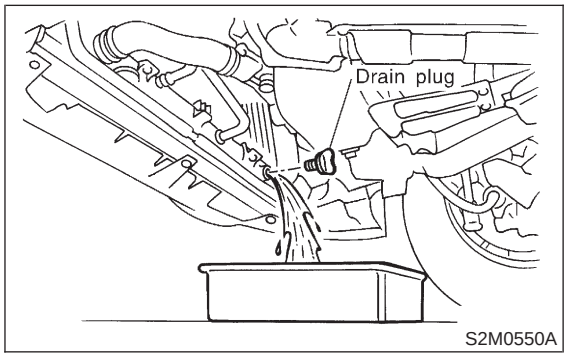
1) Disconnect battery cables ground cable.



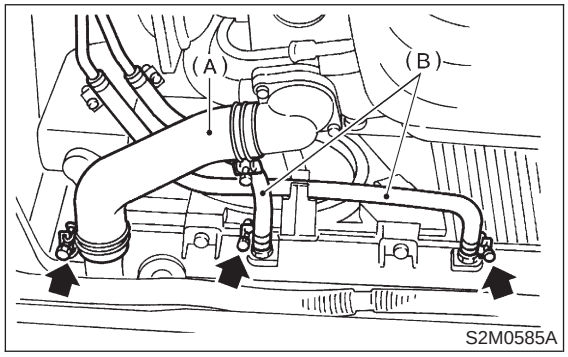
2) Lift-up the vehicle.
3) Remove under cover.



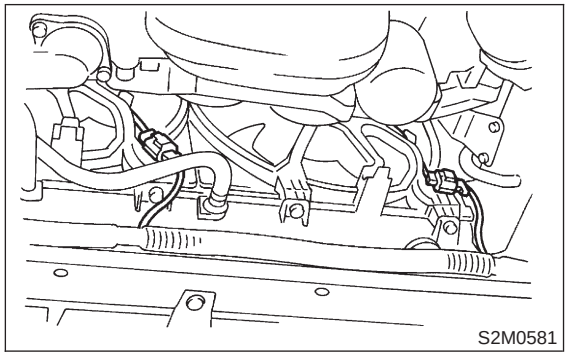
4) Drain engine coolant completely. <Ref. to 2-5 [W1A1].>



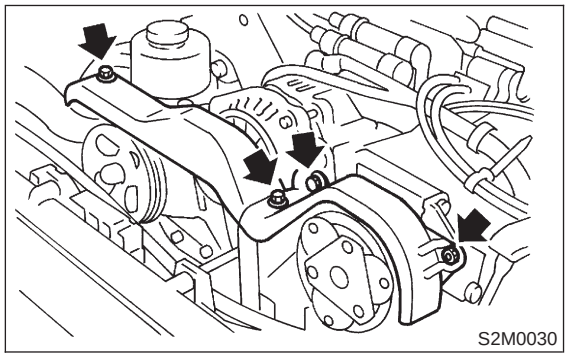
5) Disconnect radiator outlet hose (A) from water pump.
6) Disconnect ATF cooler hoses (B) from radiator. (AT vehicles only)



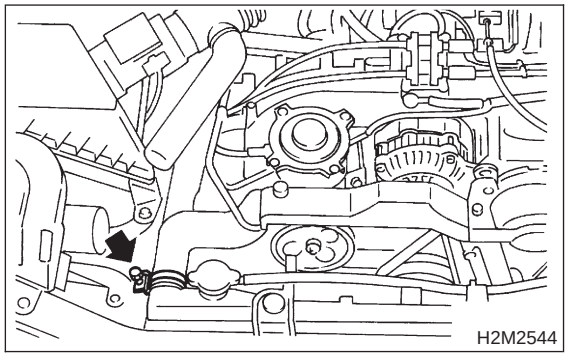
7) Disconnect connectors of radiator main fan and sub fan motor.



8) Lower the vehicle.
9) Remove V-belt covers.

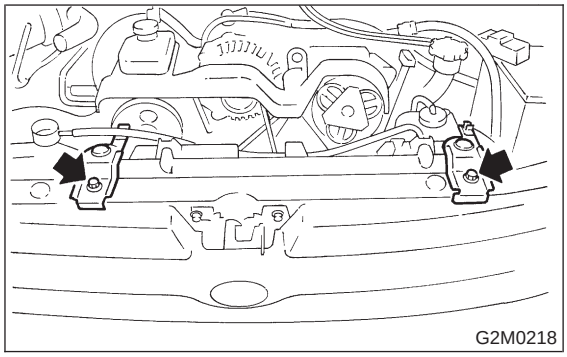


10) Disconnect inlet hose from radiator.

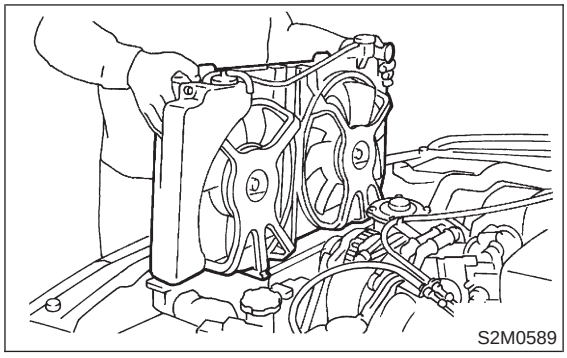


11) Remove radiator upper brackets.

NOTE:
Place left upper radiator bracket between grille and body.

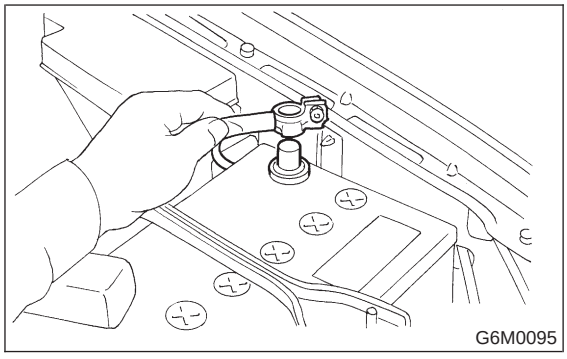


12) While slightly lifting radiator, slide it to left.
13) Lift radiator up and away from vehicle.

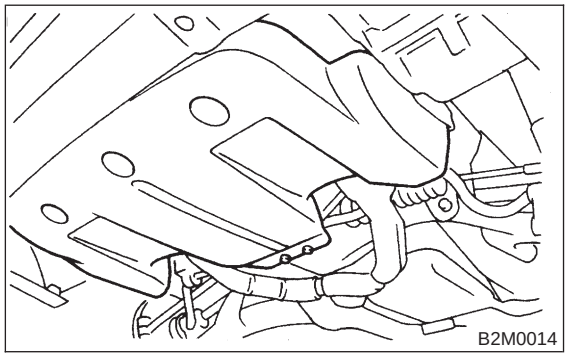


2. 2500 cc MODEL

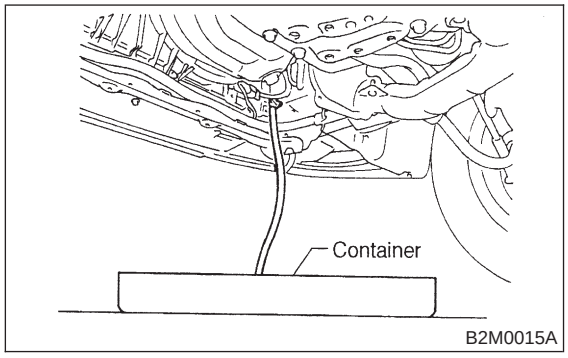
1) Disconnect battery ground cable.



2) Lift-up the vehicle.
3) Remove under cover.

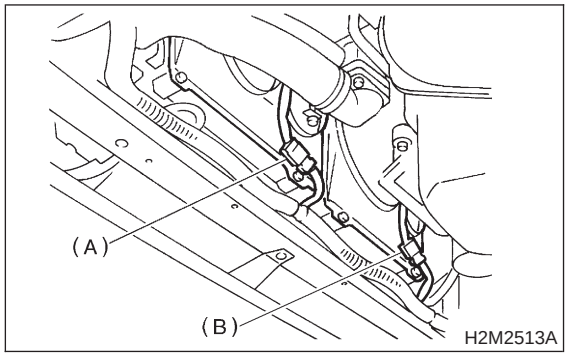

B2M0014

4) Drain engine coolant completely. <Ref. to 2-5 [W1A2].>



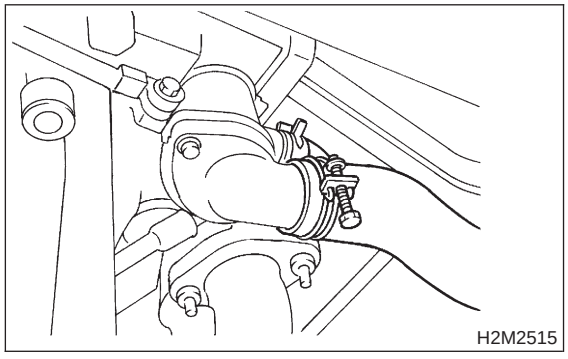
B2M0015A

5) Disconnect connectors of radiator main fan (A) and sub fan (B) motors.

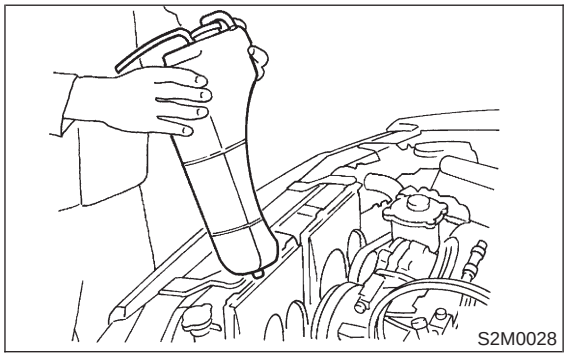


H2M2513A

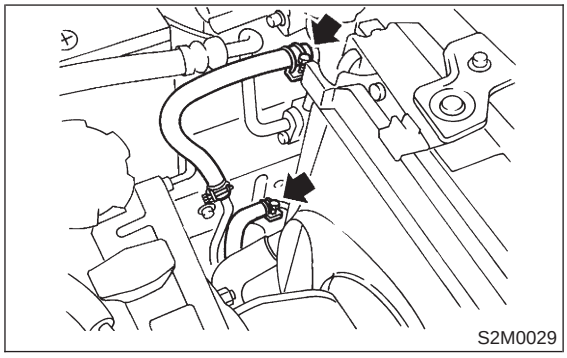
6) Disconnect radiator outlet hose from thermostat cover.


H2M2515

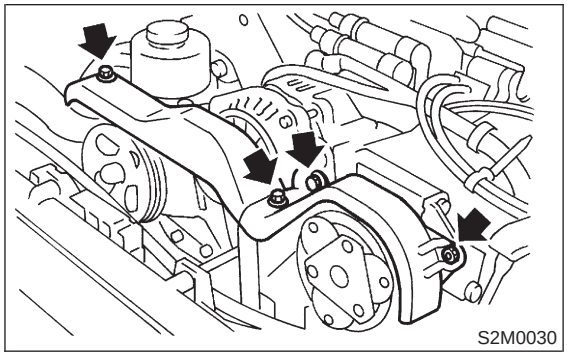
7) Lower the vehicle.
8) Remove reservoir tank.


S2M0028

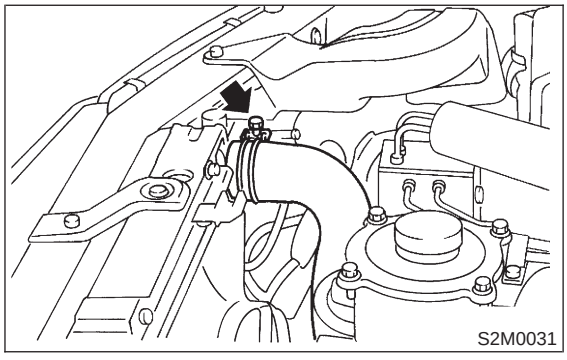
9) Disconnect ATF cooler hoses from radiator. (AT vehicles only)


S2M0029

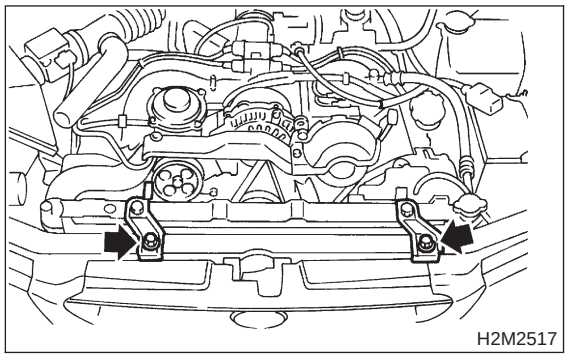
10) Remove V-belt covers.


S2M0030

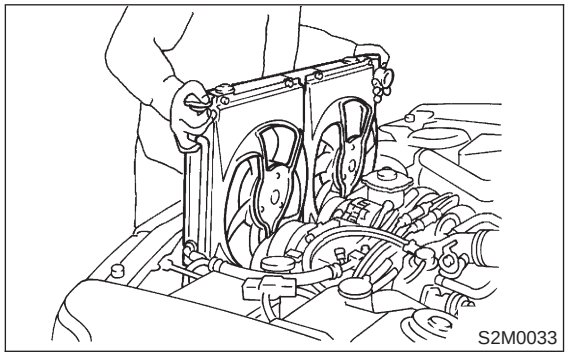
11) Disconnect radiator inlet hose from radiator.


S2M0031

12) Remove radiator upper brackets.


H2M2517

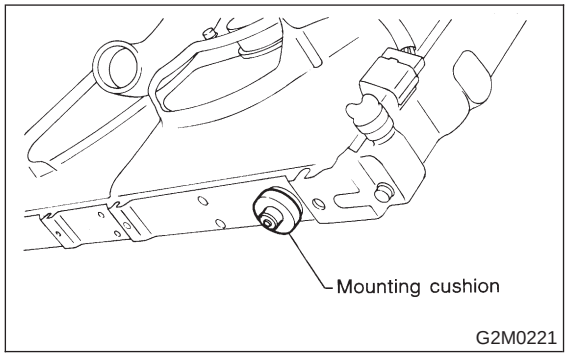
13) While slightly lifting radiator, slide it to left.
14) Lift radiator up and away from vehicle.


S2M0033

B: INSTALLATION

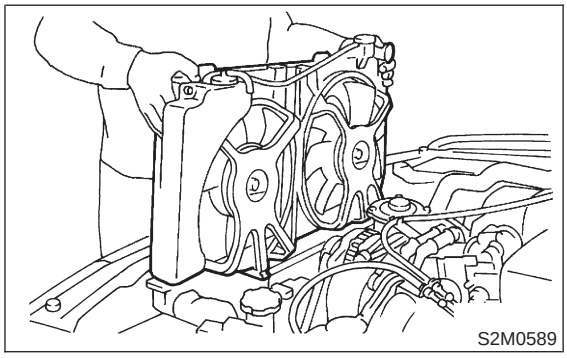
1. 2200 cc MODEL

1) Attach radiator mounting cushions to pins on the lower side of radiator.

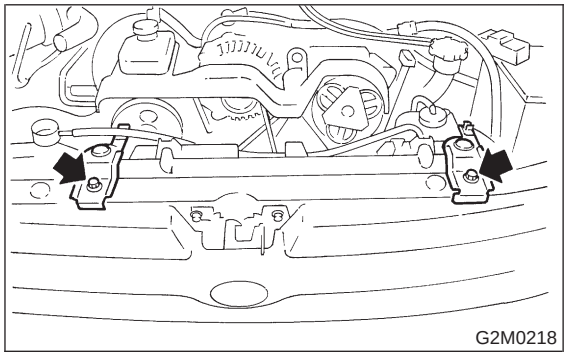


G2M0221

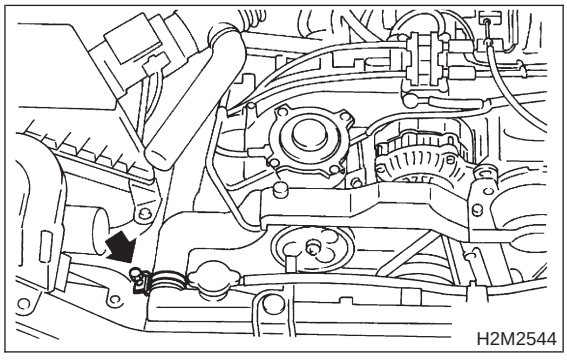
2) Fit cushions on lower side of radiator, into holes on body side and install radiator.


S2M0589

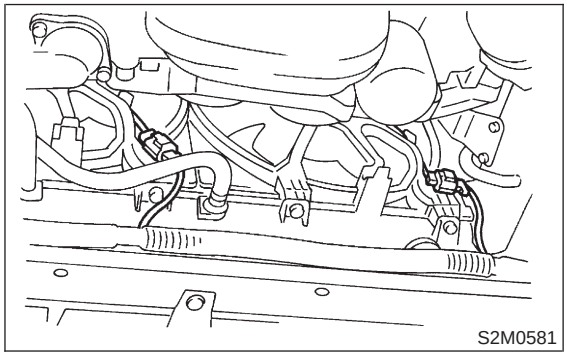
3) Install radiator brackets and tighten bolts.


G2M0218

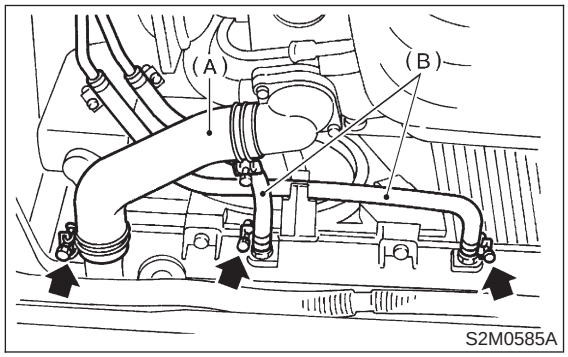
4) Connect radiator inlet hose.


H2M2544

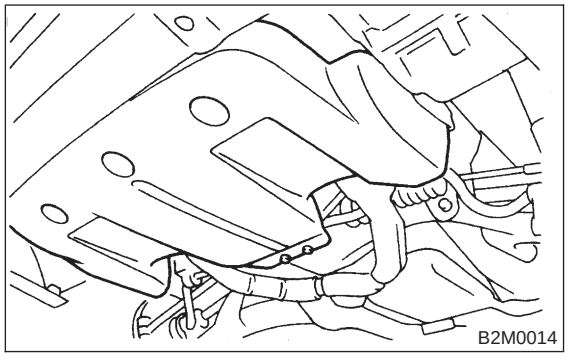
5) Lift-up the vehicle.
6) Connect connector of radiator main fan motor and sub fan motor.


S2M0581

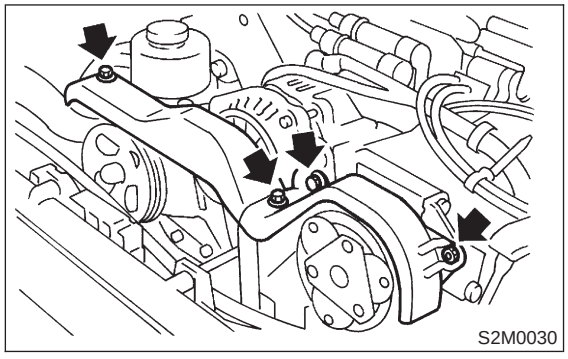
7) Connect radiator outlet hose (A).
8) Connect ATF cooler hoses (B). (AT vehicles only)



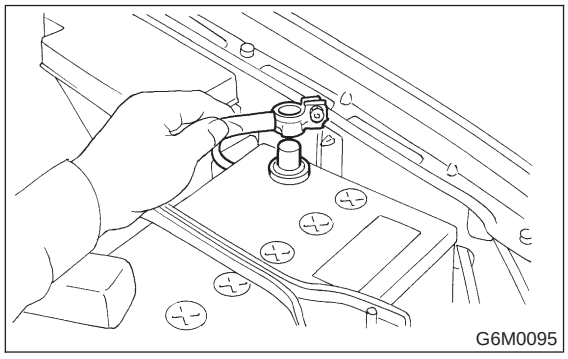
9) Install under cover.



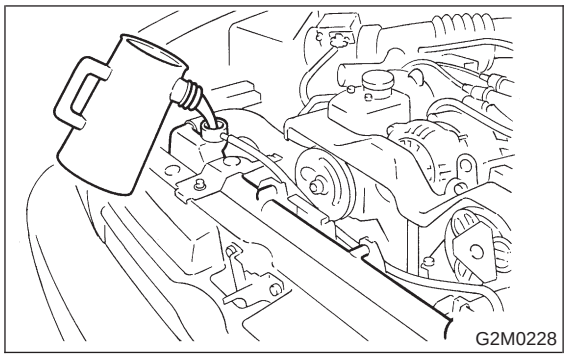
10) Lower the vehicle.
11) Install V-belt cover.



12) Connect ground cable to battery.

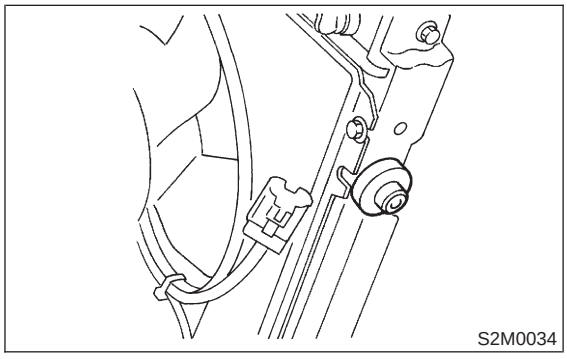


13) Fill coolant. <Ref. to 2-5 [W1B1].>



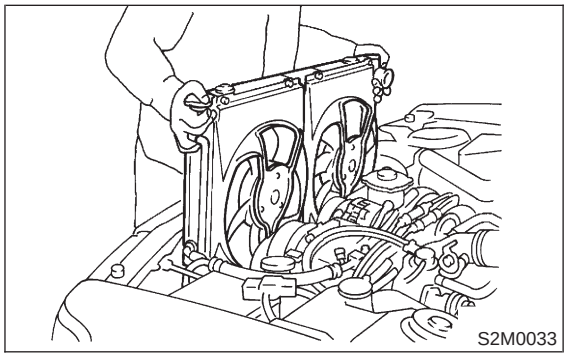
2. 2500 cc MODEL

1) Attach radiator mounting cushions to pins on the lower side of radiator.



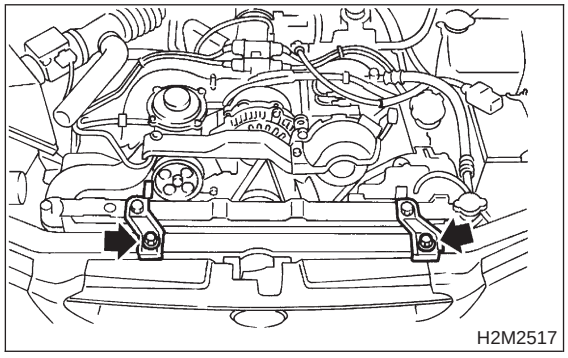
2) Install radiator while fitting radiator pins to cushions.

NOTE:
Fit cushion on lower side of radiator into holes on body side.

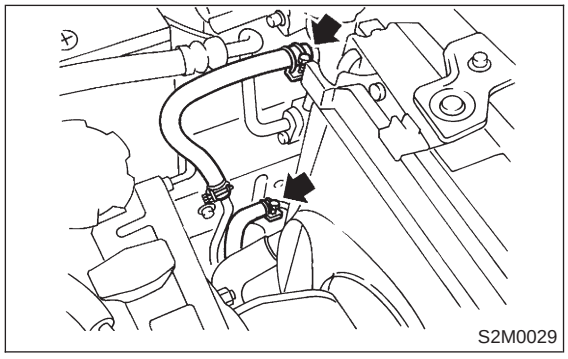


3) Install radiator brackets and tighten bolts.

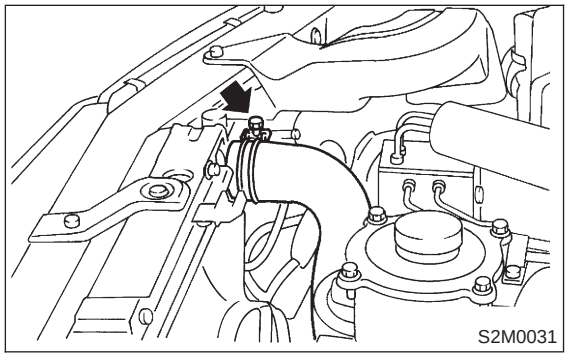
Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)


H2M2517

4) Connect ATF cooler hoses. (AT vehicles only)

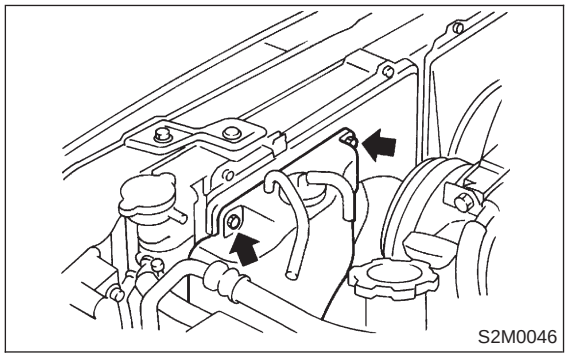

S2M0029

5) Connect radiator inlet hose.


S2M0031

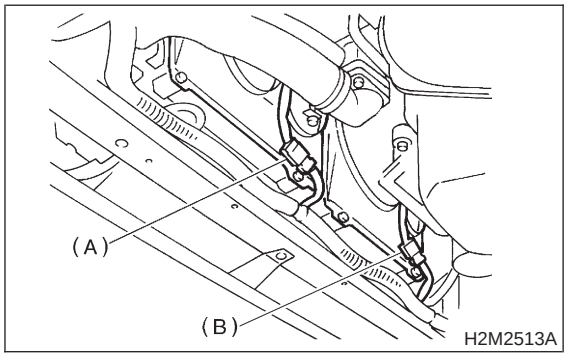
6) Install reservoir tank.

Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)


S2M0046

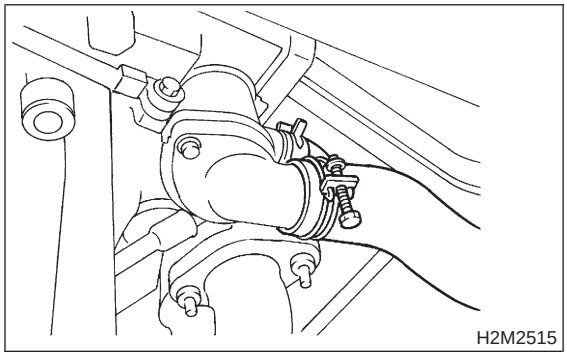
7) Lift-up the vehicle.

8) Connect connectors to radiator main fan (A) and sub fan (B) motors.

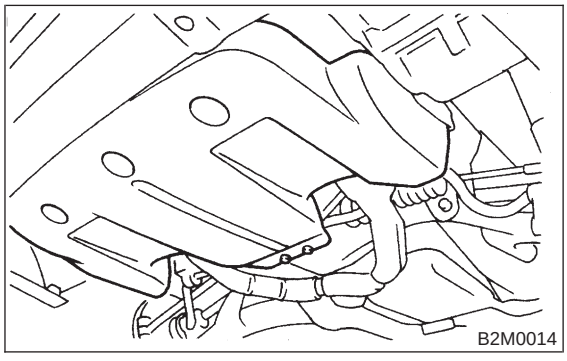


H2M2513A

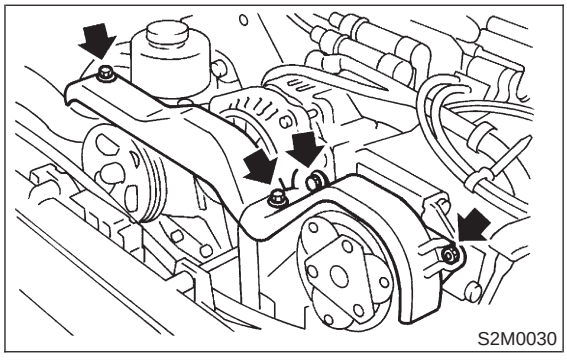
9) Connect radiator outlet hose.


H2M2515

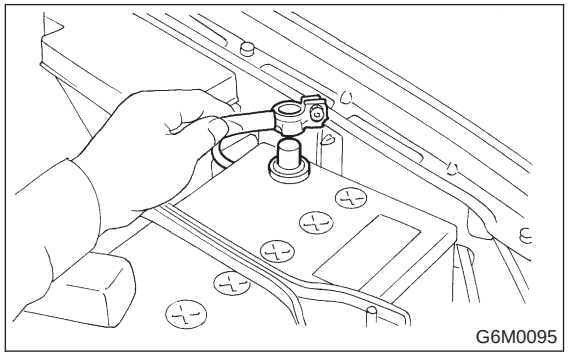
10) Install under cover.


B2M0014

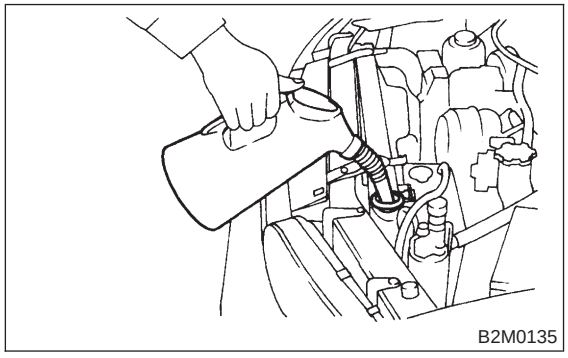
11) Lower the vehicle.
12) Install V-belt covers.


S2M0030

13) Connect battery ground cable.



14) Fill coolant. <Ref. to 2-5 [W1B2].>



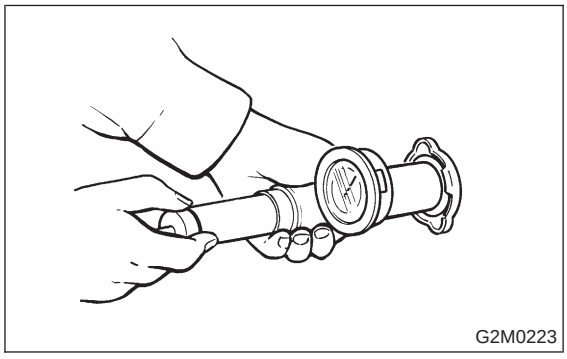
5. Radiator Cap

A: INSPECTION

1) Attach radiator cap to tester.
2) Increase pressure until tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

Standard pressure:
78 — 98 kPa (0.8 — 1.0 kg/cm^2, 11 — 14 psi)

Service limit pressure:
69 kPa (0.7 kg/cm^2, 10 psi)



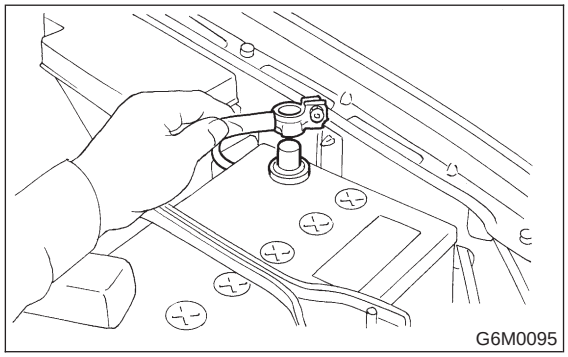
CAUTION:
Be sure to remove foreign matter and rust from the cap in advance; otherwise, results of pressure test will be incorrect.

6. Radiator Main Fan and Fan Motor

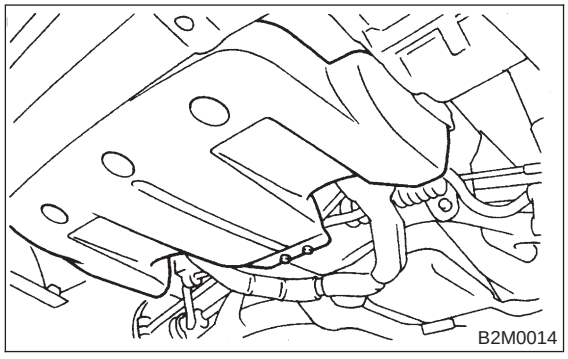
A: REMOVAL AND INSTALLATION

1. 2200 cc MODEL

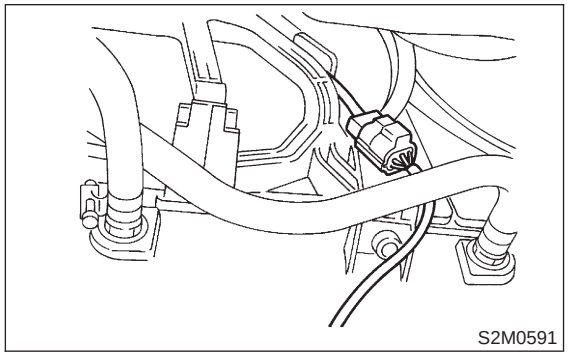
1) Disconnect battery ground cable.


G6M0095

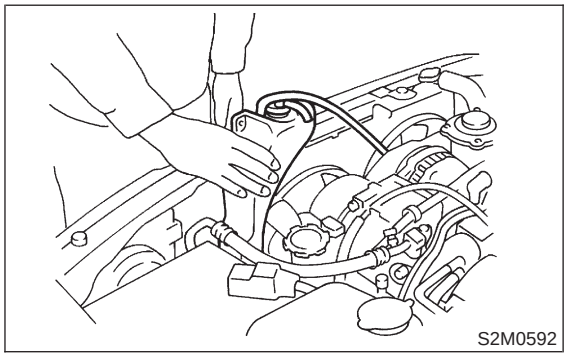
2) Lift-up the vehicle.
3) Remove under cover.


B2M0014

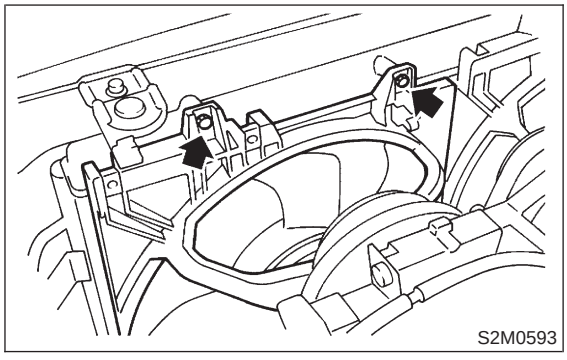
4) Disconnect connector of main fan motor.


S2M0591

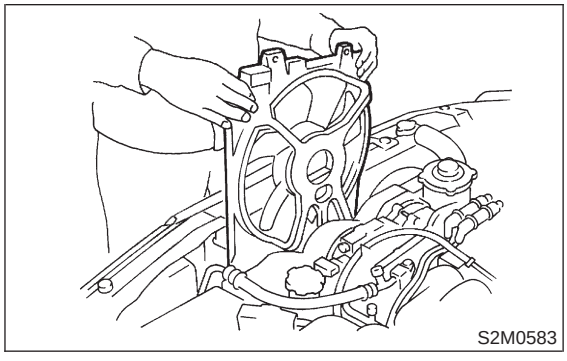
5) Lower the vehicle.
6) Remove reservoir tank. <Ref. to 2-5 [W9A0].>


S2M0592

7) Remove two bolts holding shroud to radiator upper side.

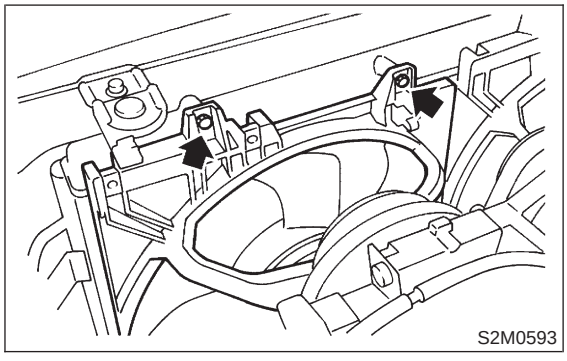

S2M0593

8) Remove radiator fan motor assembly.


S2M0583

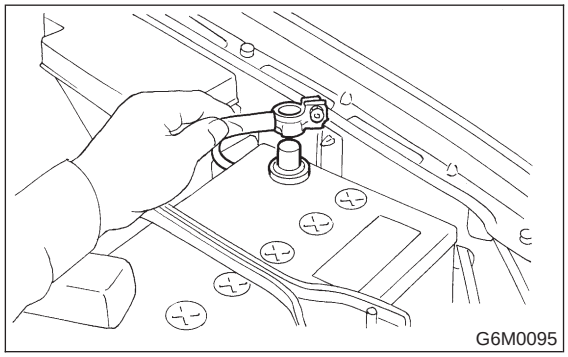
9) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)

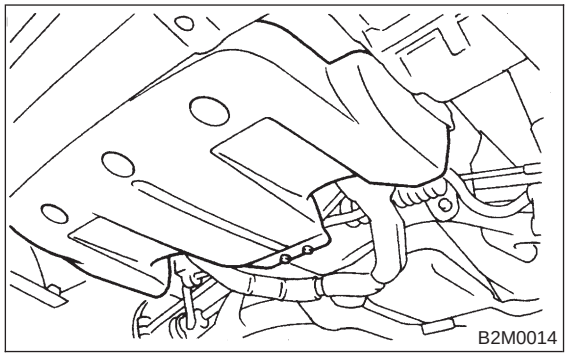

S2M0593

2. 2500 cc MODEL

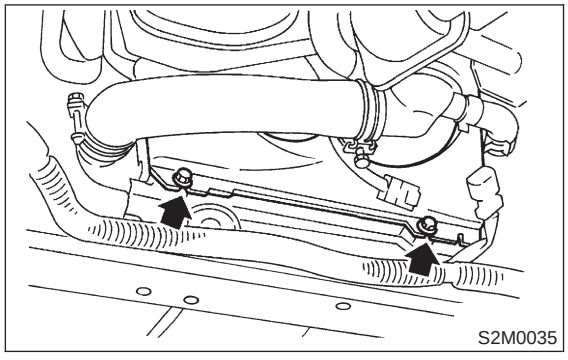
1) Disconnect battery ground cable.


G6M0095

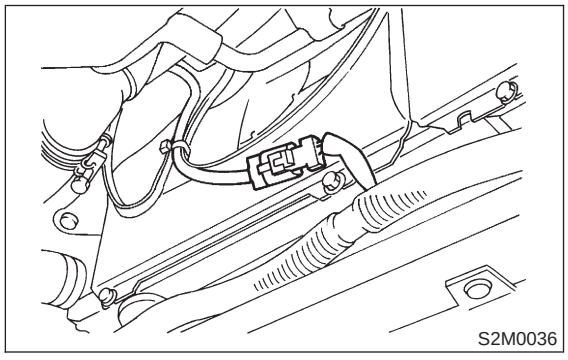
2) Lift-up the vehicle.
3) Remove under cover.


B2M0014

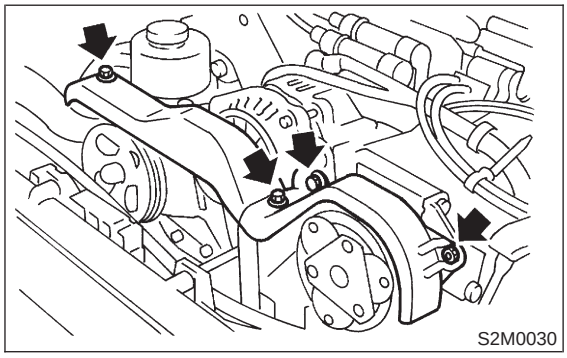
4) Loosen bolts which install the lower side of radiator main fan shroud.


S2M0035

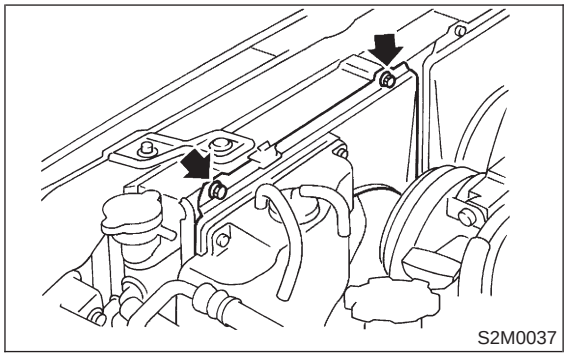
5) Disconnect connector of main fan motor.


S2M0036

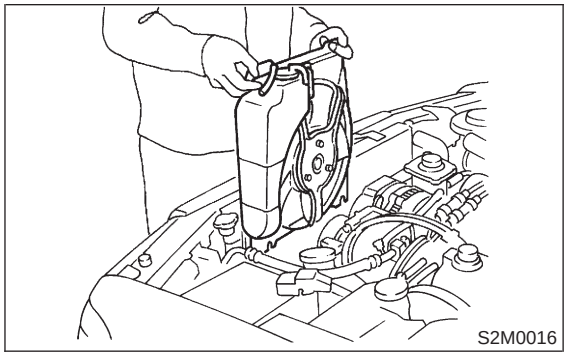
6) Lower the vehicle.
7) Remove V-belt covers.


S2M0030

8) Remove bolts which hold main fan shroud to radiator.

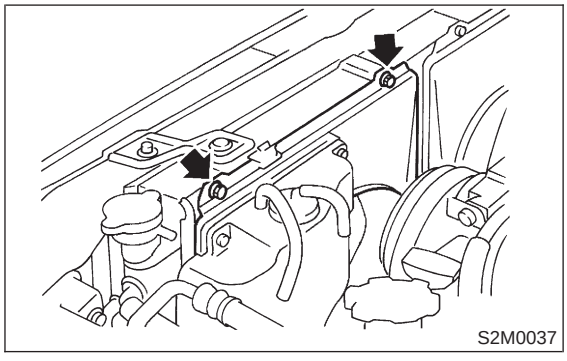

S2M0037

9) Remove radiator main fan motor assembly.


S2M0016

10) Installation is in the reverse order of removal.

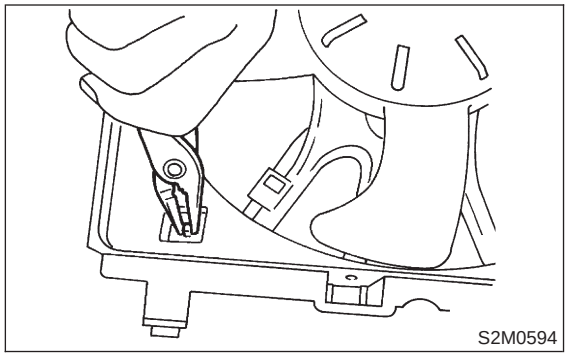
Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)


S2M0037

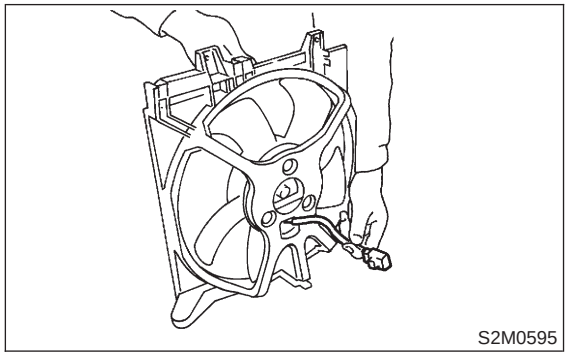
B: DISASSEMBLY AND ASSEMBLY

1. 2200 cc MODEL

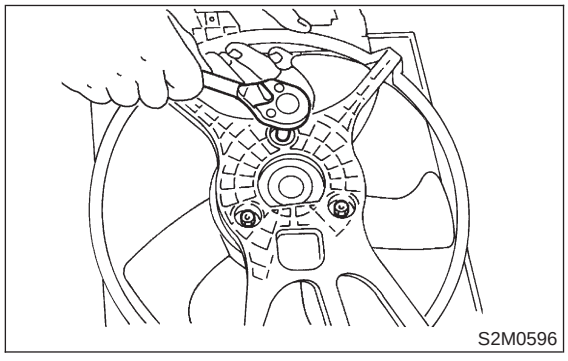
1) Remove clip which holds motor harness onto shroud.



2) Release harness from shroud.

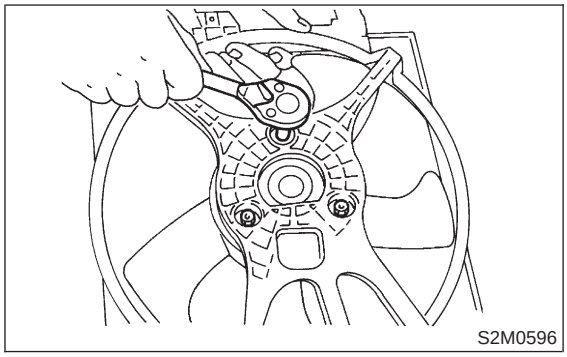


3) Remove nuts which install fan motor onto shroud.



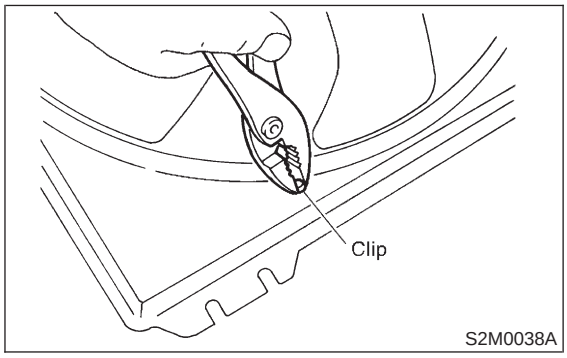
4) Assembly is in the reverse order of disassembly.

Tightening torque:
4.4±0.5 N·m (0.45±0.05 kg-m, 3.3±0.4 ft-lb)

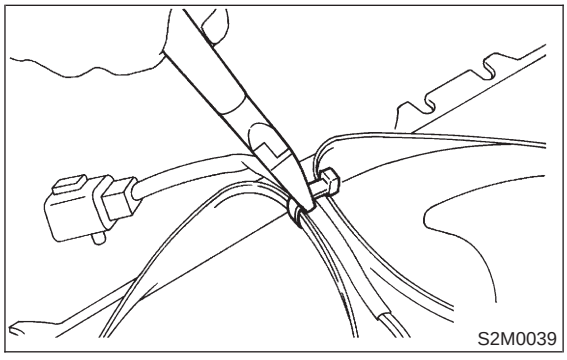


2. 2500 cc MODEL

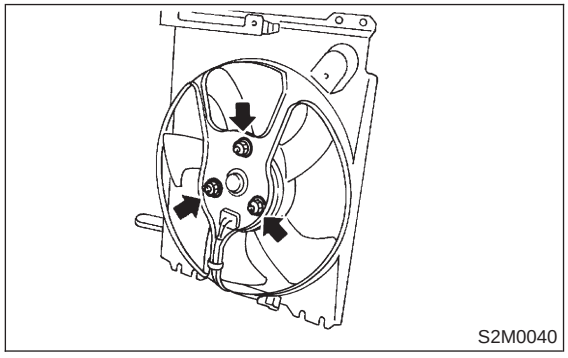
1) Remove clip which holds motor harness onto shroud.



2) Cut band which holds motor harness on shroud.

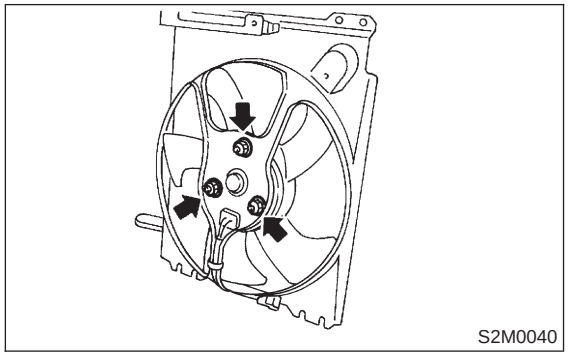


3) Remove bolts which install fan motor onto shroud.


S2M0040

4) Assembly is in the reverse order of disassembly.

Tightening torque:
4.4±0.5 N·m (0.45±0.05 kg-m, 3.3±0.4 ft-lb)

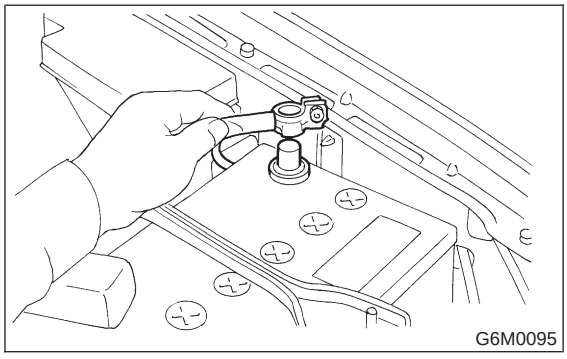

S2M0040

7. Radiator Sub Fan and Fan Motor

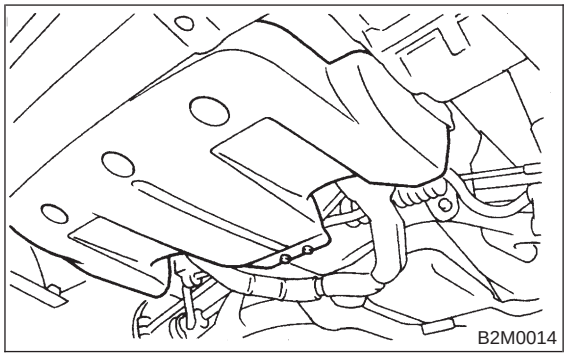
A: REMOVAL AND INSTALLATION

1. 2200 cc MODEL

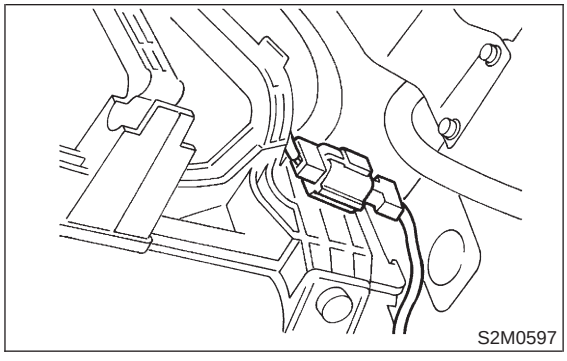
1) Disconnect battery ground cable.


G6M0095

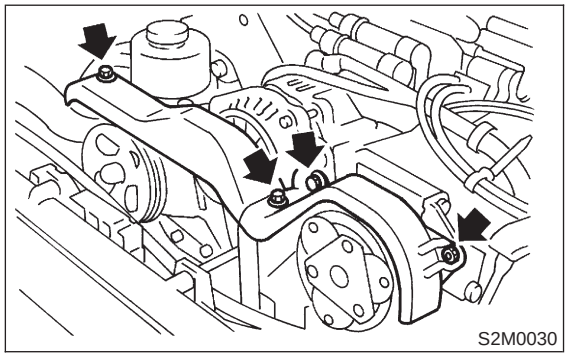
2) Lift-up the vehicle.
3) Remove under cover.


B2M0014

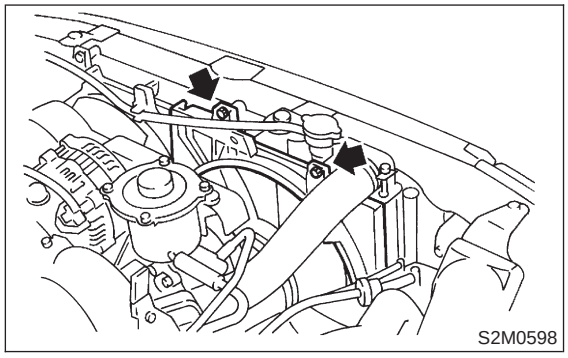
4) Disconnect connector of sub fan motor.


S2M0597

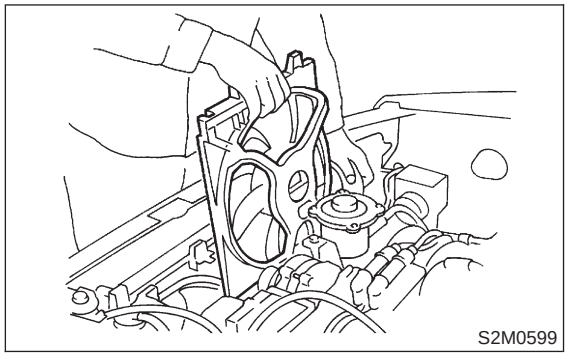
5) Lower the vehicle.
6) Remove V-belt covers.



7) Remove two bolts holding shroud to radiator upper side.

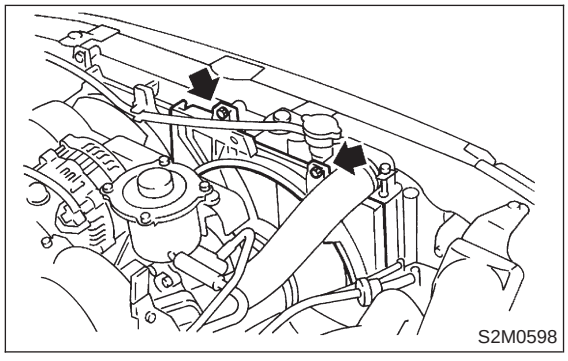


8) Move radiator inlet hose slightly upward, and remove radiator sub fan motor assembly.



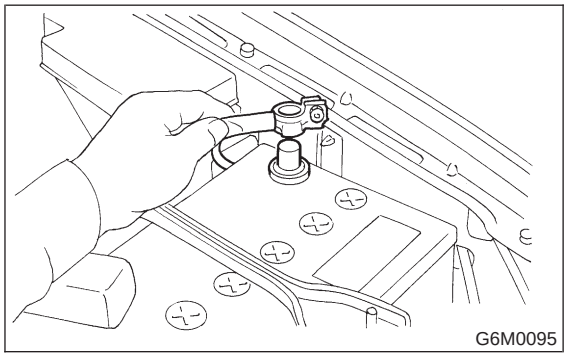
9) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)

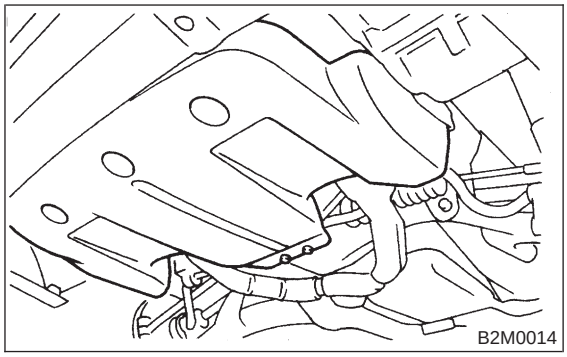


2. 2500 cc MODEL

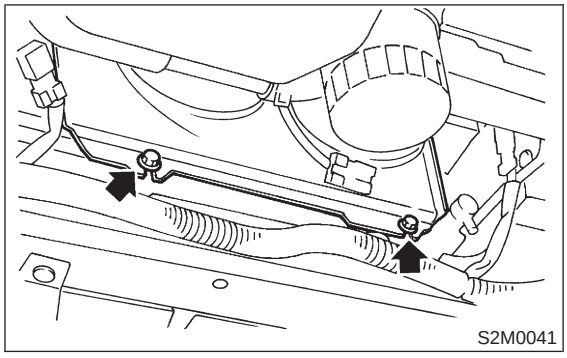
1) Disconnect battery ground cable.



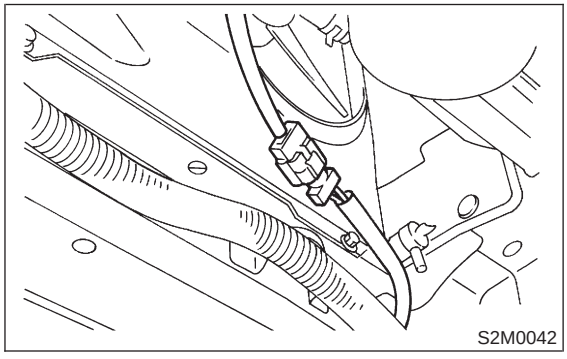
2) Lift-up the vehicle.
3) Remove under cover.



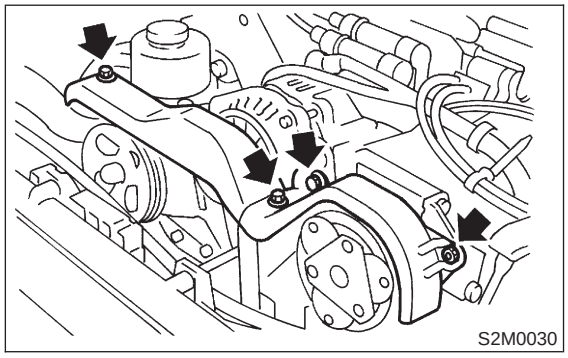
4) Loosen bolts which install the lower side of radiator sub fan shroud.



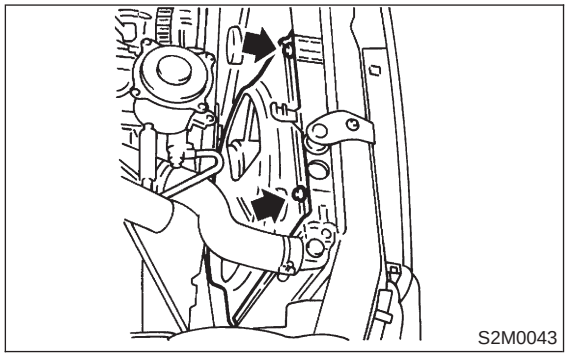
5) Disconnect connector of sub fan motor.



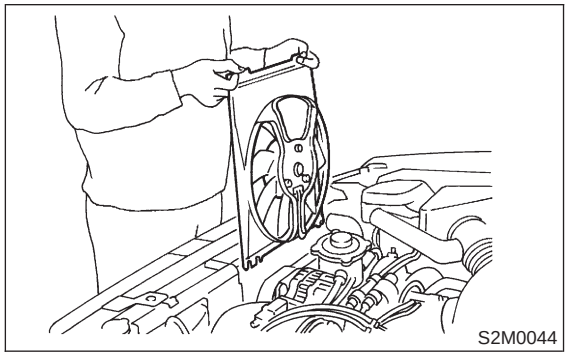
6) Lower the vehicle.
7) Remove V-belt covers.


S2M0030

8) Remove bolts which hold sub fan shroud to radiator.

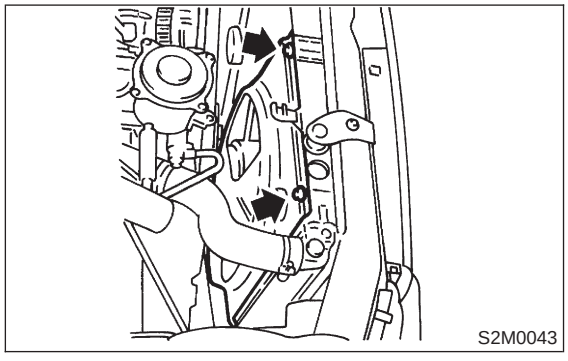

S2M0043

9) Remove radiator sub fan motor assembly.


S2M0044

10) Installation is in the reverse order of removal.

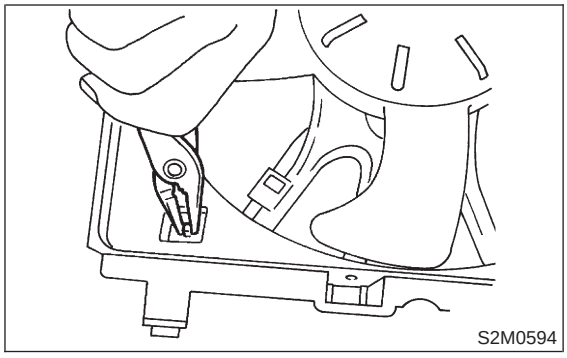
Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)


S2M0043

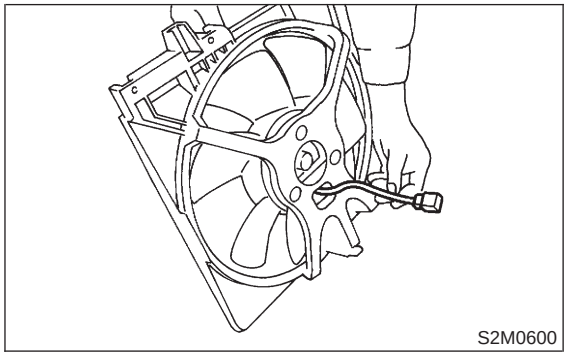
B: DISASSEMBLY AND ASSEMBLY

1. 2200 cc MODEL

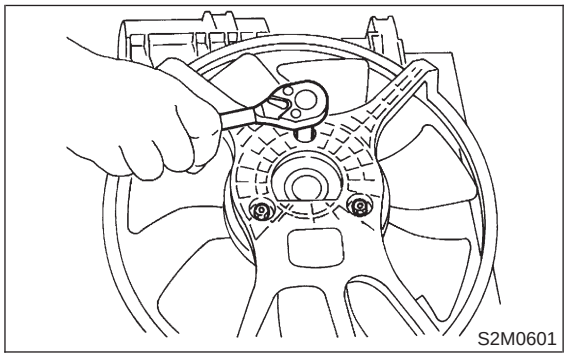
1) Remove clip which holds motor harness onto shroud.


S2M0594

2) Release motor harness from shroud.

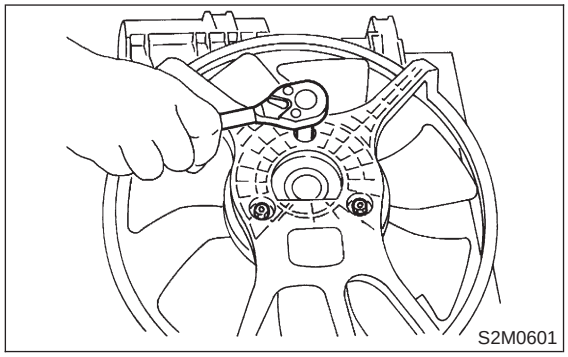

S2M0600

3) Remove nuts which install fan motor onto shroud.


S2M0601

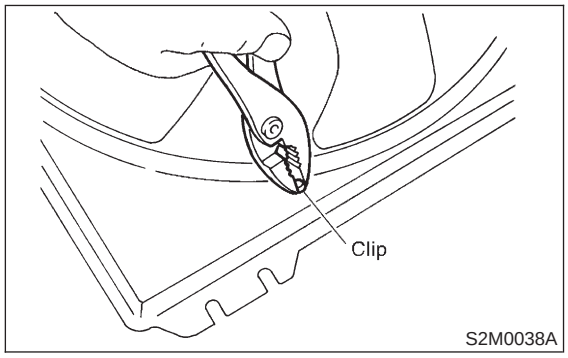
4) Assembly is in the reverse order of disassembly.

Tightening torque:
4.4±0.5 N·m (0.45±0.05 kg-m, 3.3±0.4 ft-lb)


S2M0601

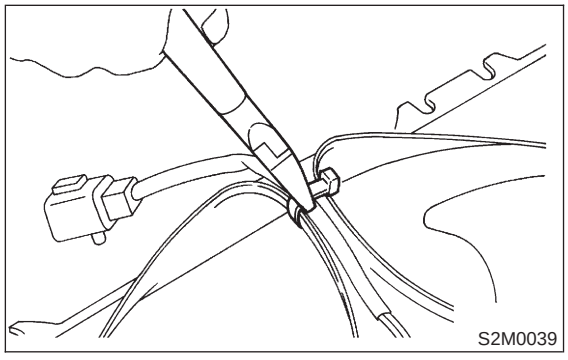
2. 2500 cc MODEL

1) Remove clip which holds motor harness onto shroud.

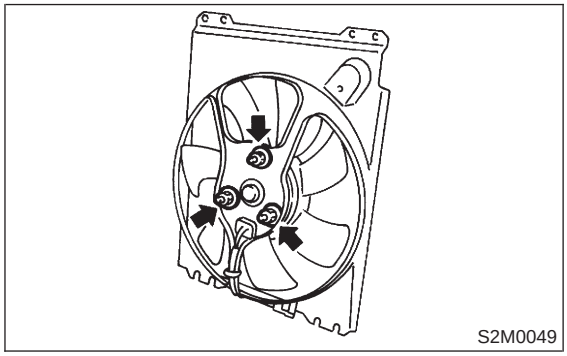


S2M0038A

2) Cut band which holds motor harness on shroud.

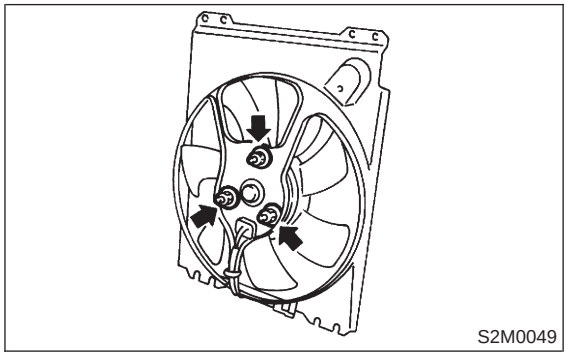

S2M0039

3) Remove bolts which install fan motor onto shroud.


S2M0049

4) Assembly is in the reverse order of disassembly.

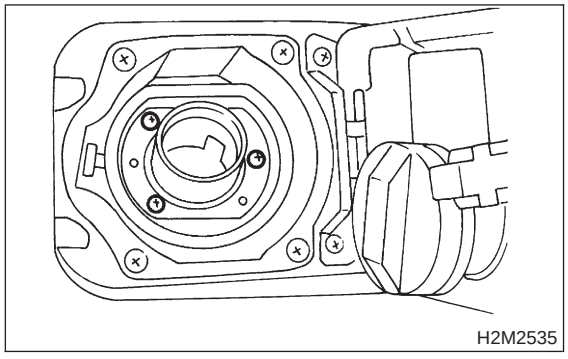
Tightening torque:
4.4±0.5 N·m (0.45±0.05 kg-m, 3.3±0.4 ft-lb)


S2M0049

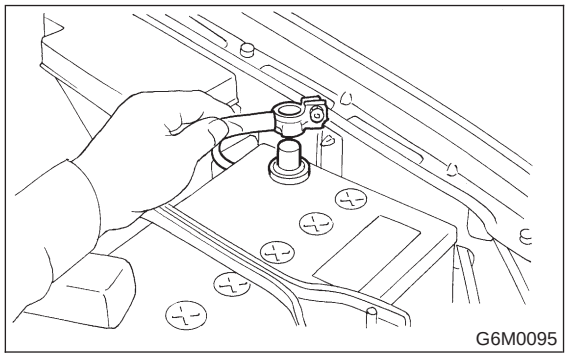
8. Water Pipe

A: REMOVAL

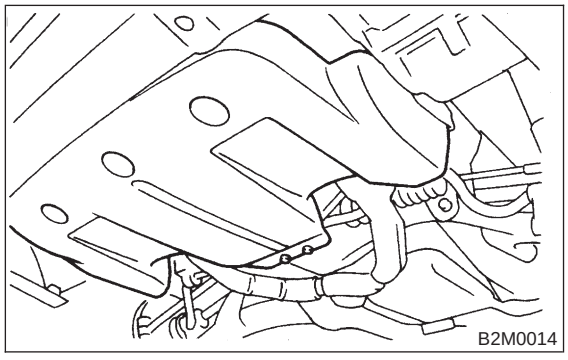
1) Release fuel pressure.
<Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


H2M2535

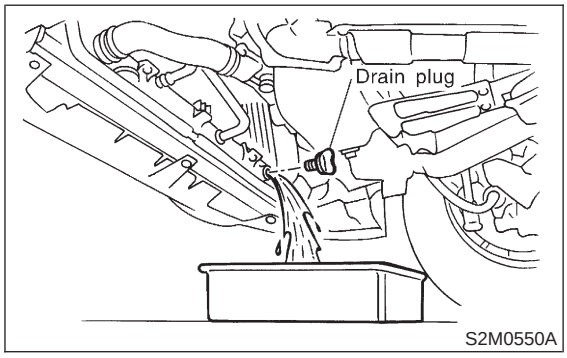
3) Disconnect ground cable from battery.


G6M0095

4) Lift-up the vehicle.
5) Remove under cover.

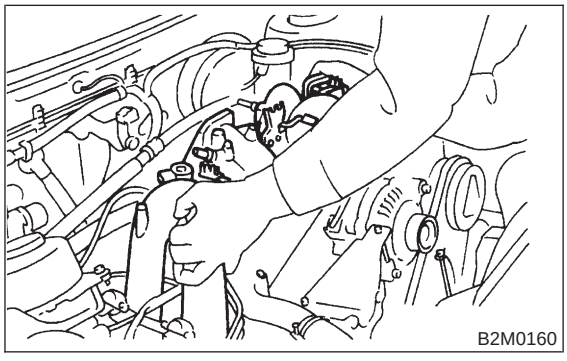

B2M0014

6) Drain engine coolant completely.
<Ref. to 2-5 [W1A0].>

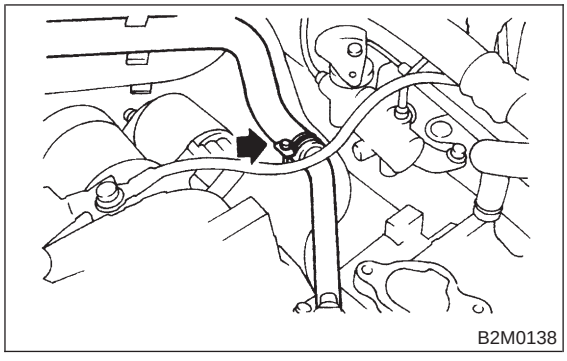


S2M0550A

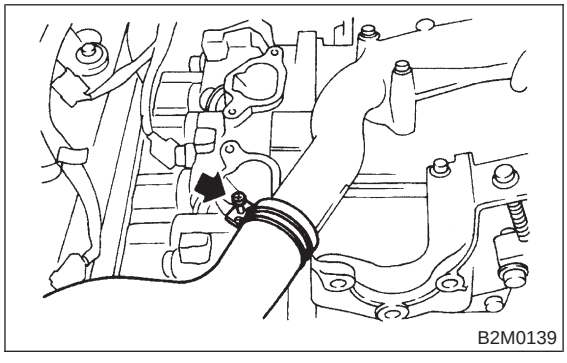
7) Lower the vehicle.
8) Remove intake manifold.
<Ref. to 2-7 [W4A0].>


B2M0160

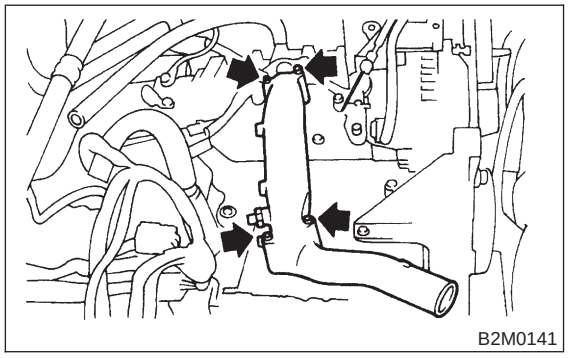
9) Disconnect heater inlet hose.


B2M0138

10) Disconnect radiator inlet hose from water pipe.


B2M0139

11) Remove bolts which install water pipe on cylinder block.

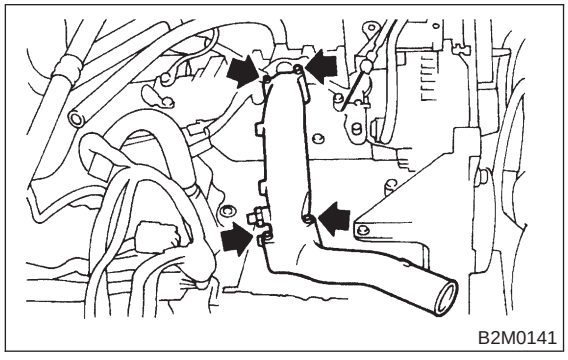

B2M0141

B: INSTALLATION

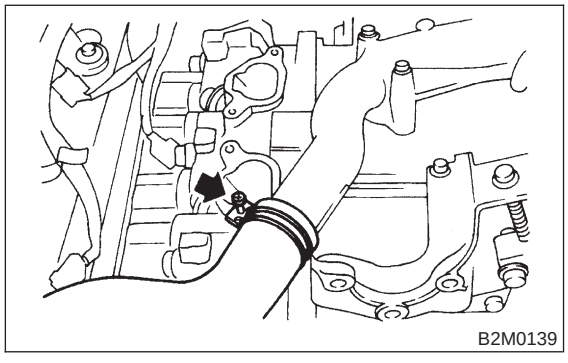
1) Install water pipe on cylinder block.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

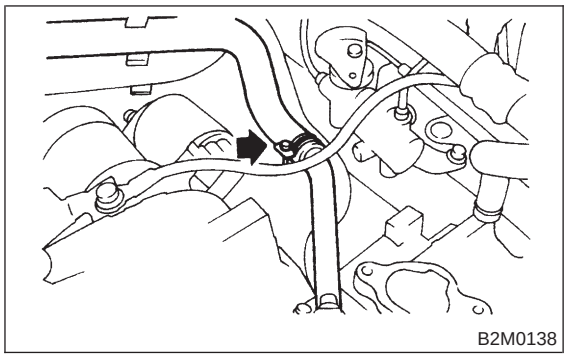
CAUTION:
Use a new O-ring.


B2M0141

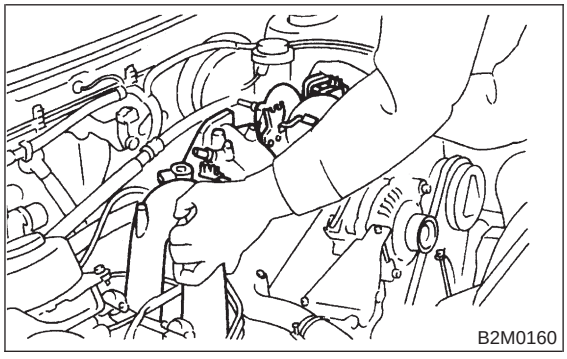
2) Connect radiator inlet hose.


B2M0139

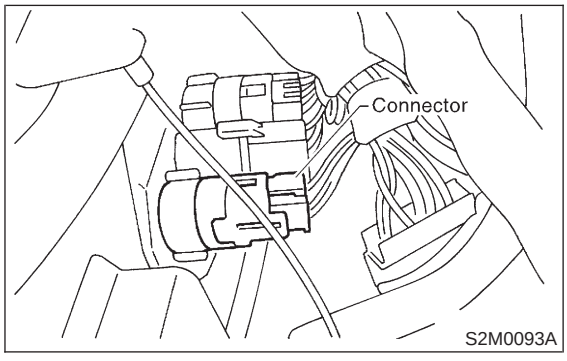
3) Connect heater inlet hose.


B2M0138

4) Install intake manifold.
<Ref. to 2-7 [W4D0].>

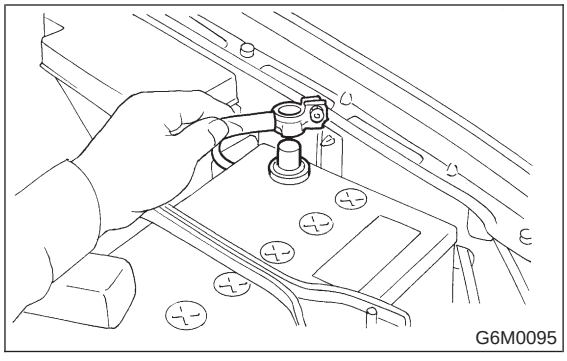

B2M0160

5) Connect connector to fuel pump relay.

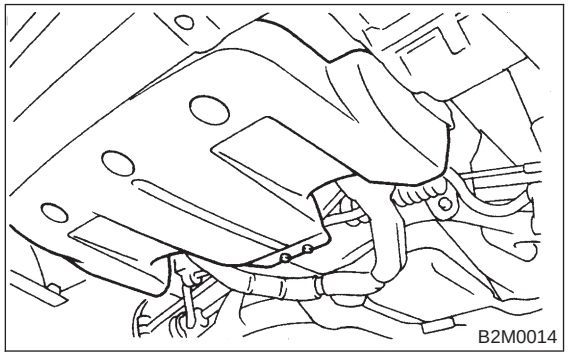


S2M0093A

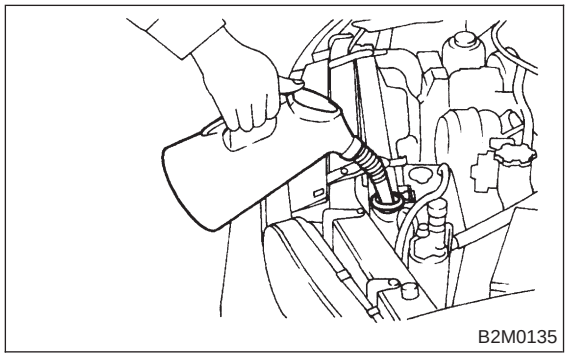
6) Connect ground cable to battery.


G6M0095

7) Lift-up the vehicle.
8) Install under cover.


B2M0014

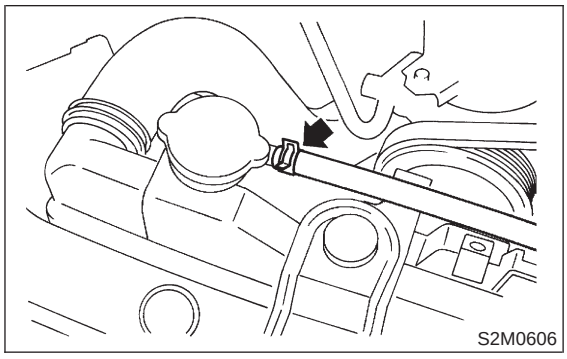
9) Lower the vehicle.
10) Fill coolant.
<Ref. to 2-5 [W1B0].>


B2M0135

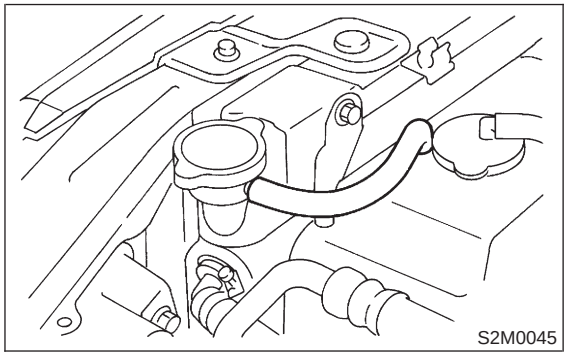
9. Reservoir Tank

A: REMOVAL AND INSTALLATION

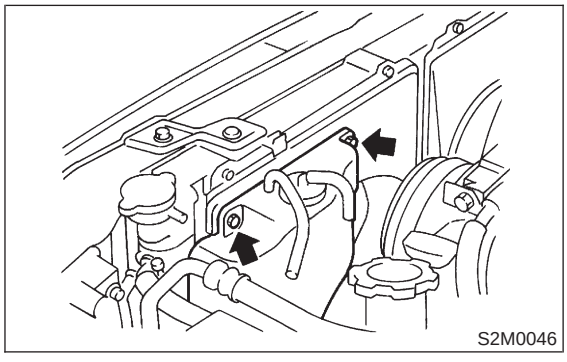
1) Move clip, and disconnect over flow hose from radiator filler neck position. (2200 cc model only)


S2M0606

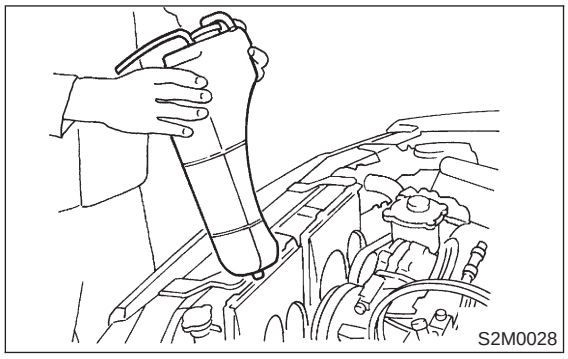
2) Disconnect over flow hose from radiator filler neck position. (2500 cc model only)


S2M0045

3) Remove bolts which install reservoir tank onto radiator main fan shroud.

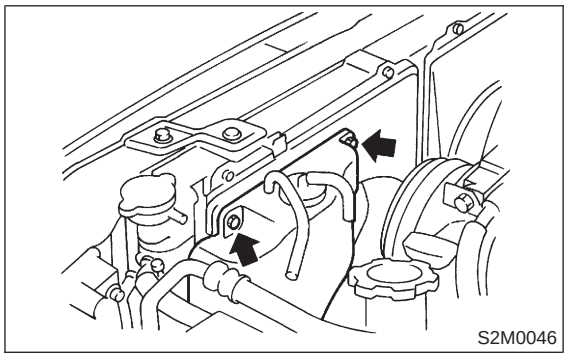

S2M0046

4) Remove reservoir tank.



5) Installation is in the reverse order of removal.

Tightening torque:
7.4±2.0 N·m (0.75±0.20 kg-m, 5.4±1.4 ft-lb)



1. Engine Cooling System Trouble in General

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair.
	b. Loose timing belt	Repair or replace timing belt tensioner.
	c. Oil on drive belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair ignition control system. Refer to “2-7 On-Board Diagnostics II System”.
	h. Clogged or leaking radiator	Clean or repair, or replace.
	i. Improper engine oil in engine coolant	Replace engine coolant.
	j. Air/fuel mixture ratio too lean	Inspect and repair fuel injection system. Refer to “2-7 On-Board Diagnostics II System”.
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Repair or replace.
	n. Dragging brake	Adjust.
	o. Improper transmission oil	Replace.
	p. Defective thermostat	Replace.
	q. Malfunction of electric fan	Inspect radiator fan relay, engine coolant temperature sensor or radiator motor and replace there.
Over-cooling	a. Atmospheric temperature extremely low	Partly cover radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks.	a. Loosened or damaged connecting units on hoses	Repair or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Repair or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Repair or replace.
	f. Damaged or cracked thermostat case	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Noise	a. Defective drive belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.

MEMO:

FUEL INJECTION SYSTEM 2-7

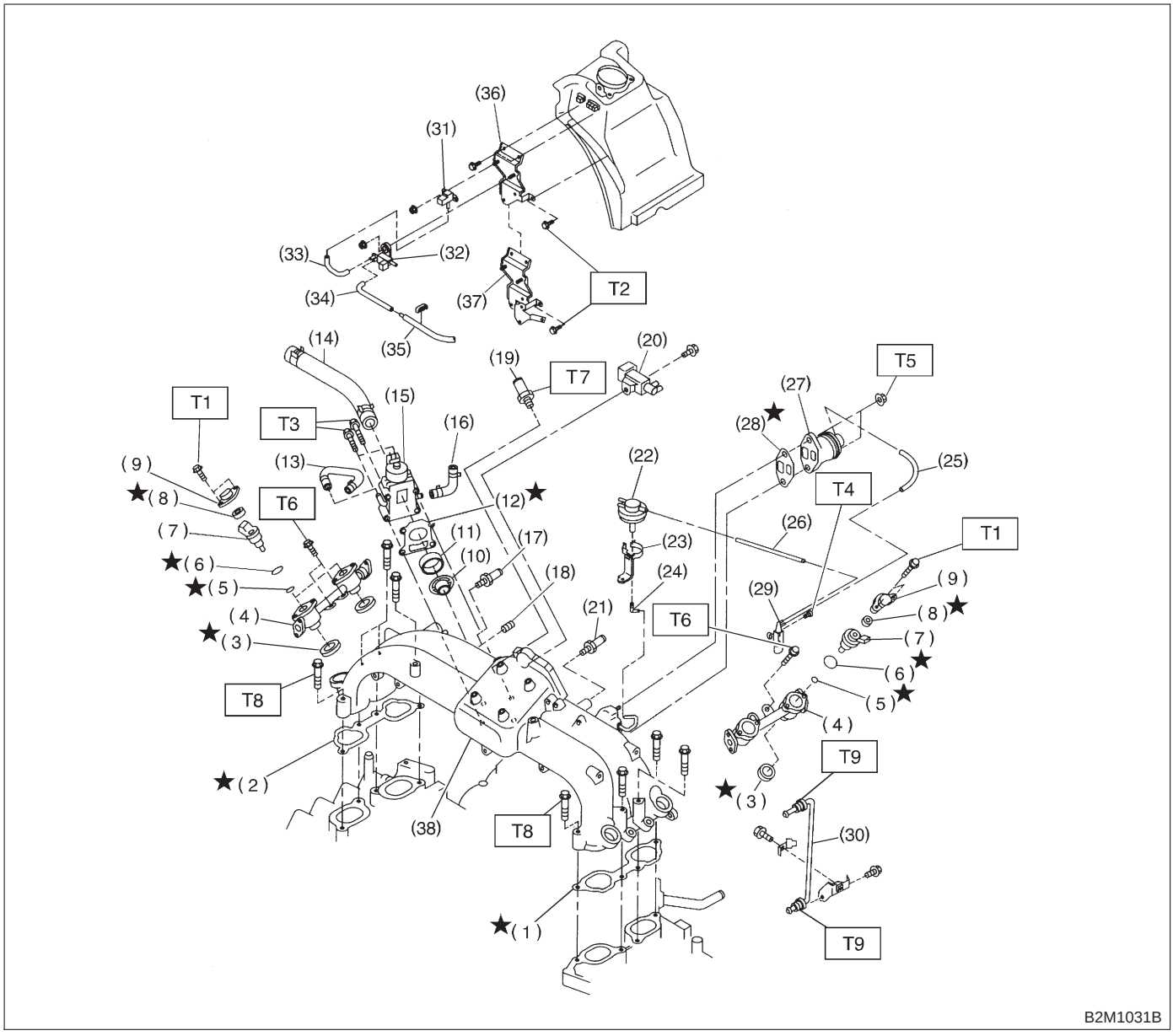
Page

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2. Air Intake System 6
3. Air Cleaner 7

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3. Throttle Body 10
4. Intake Manifold 12
5. Engine Coolant Temperature Sensor 25
6. Crankshaft Position Sensor 26
7. Front Oxygen Sensor 27
8. Rear Oxygen Sensor 29
9. Throttle Position Sensor 31
10. Camshaft Position Sensor 34
11. Pressure Sensor 34
12. Idle Air Control Solenoid Valve 35
13. Pressure Sources Switching Solenoid Valve 38
14. Fuel Injector 38
15. Engine Control Module 39
16. Main Relay 40
17. Fuel Pump Relay 41
18. Air Intake Chamber 42
19. Knock Sensor 42

1. Intake Manifold

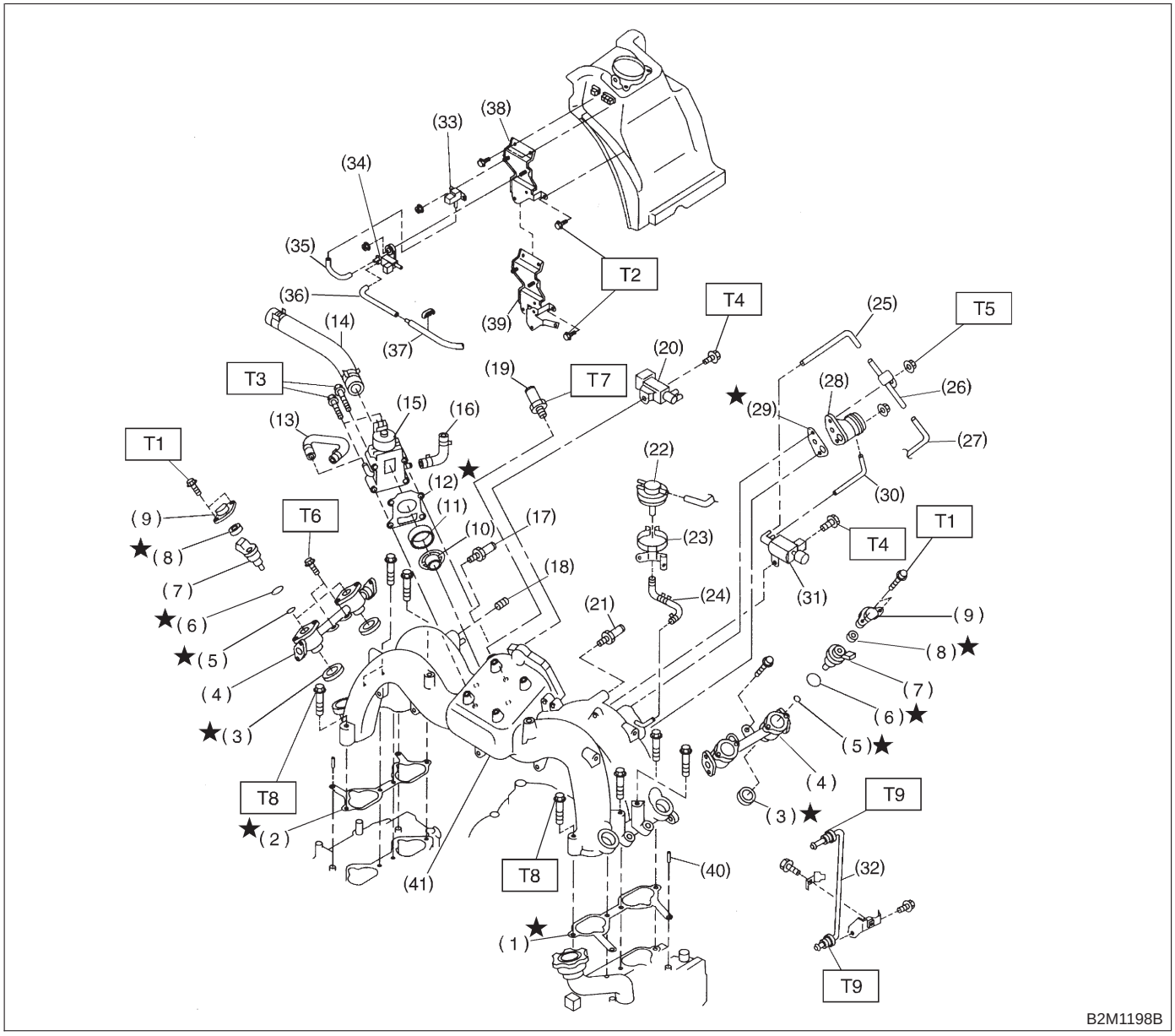
A: 2200 cc MODEL



(1) Intake manifold gasket LH
(2) Intake manifold gasket RH
(3) Fuel injector pipe insulator
(4) Fuel injector pipe
(5) O-ring A
(6) O-ring B
(7) Fuel injector
(8) Insulator
(9) Fuel injector cap
(10) Plate
(11) Sealing
(12) Gasket
(13) Engine coolant hose B
(14) Air by-pass hose
(15) Idle air control solenoid valve
(16) Engine coolant hose A
(17) Nipple (AT vehicles)
(18) Plug
(19) PCV valve
(20) Purge control solenoid valve
(21) Nipple
(22) BPT (Except MT vehicles)
(23) BPT holder bracket (Except MT vehicles)
(24) Back pressure hose (Except MT vehicles)
(25) EGR vacuum hose A (Except MT vehicles)
(26) EGR vacuum hose B (Except MT vehicles)
(27) EGR valve (Except MT vehicles)
(28) Gasket (Except MT vehicles)
(29) EGR solenoid valve (Except MT vehicles)
(30) EGR pipe (Except MT vehicles)
(31) Pressure sensor
(32) Pressure sources switching solenoid valve
(33) Vacuum hose A
(34) Vacuum hose B
(35) Vacuum hose C
(36) Bracket (Except Canada spec. vehicles)
(37) Bracket (For Canada spec. vehicles)
(38) Intake manifold

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 (0.5±0.05, 3.6±0.4)
T3: 6.4±0.5 (0.65±0.05, 4.7±0.4)
T4: 16±1.5 (1.6±0.15, 11.6±1.1)
T5: 19±1.5 (1.9±0.15, 13.7±1.1)
T6: 19±2 (1.9±0.2, 13.7±1.4)
T7: 23±3 (2.3±0.3, 16.6±2.2)
T8: 25±2 (2.5±0.2, 18.1±1.4)
T9: 34±2 (3.5±0.2, 25.3±1.4)

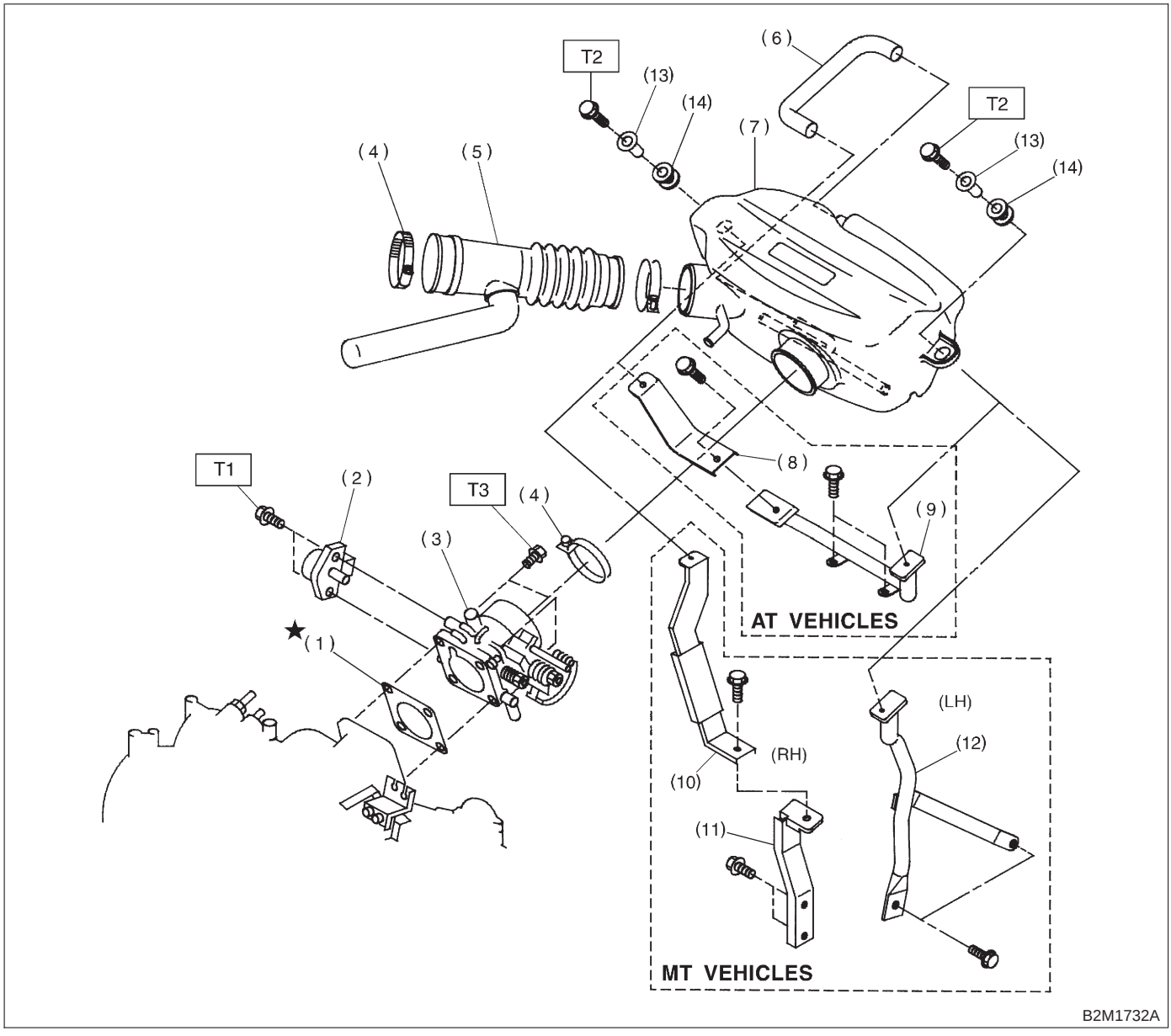
B: 2500 cc MODEL



(1) Intake manifold gasket LH
(2) Intake manifold gasket RH
(3) Fuel injector pipe insulator
(4) Fuel injector pipe
(5) O-ring A
(6) O-ring B
(7) Fuel injector
(8) Insulator
(9) Fuel injector cap
(10) Plate
(11) Sealing
(12) Gasket
(13) Engine coolant hose B
(14) Air by-pass hose
(15) Idle air control solenoid valve
(16) Engine coolant hose A
(17) Nipple (AT vehicles)
(18) Plug
(19) PCV valve
(20) Purge control solenoid valve
(21) Nipple
(22) BPT
(23) BPT holder bracket
(24) Back pressure hose
(25) EGR vacuum hose A
(26) EGR vacuum pipe
(27) EGR vacuum hose C
(28) EGR valve
(29) Gasket
(30) EGR vacuum hose B
(31) EGR solenoid valve
(32) EGR pipe
(33) Pressure sensor
(34) Pressure sources switching solenoid valve
(35) Vacuum hose A
(36) Vacuum hose B
(37) Vacuum hose C
(38) Bracket (Except Canada spec. vehicles)
(39) Bracket (For Canada spec. vehicles)
(40) Collar
(41) Intake manifold

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 (0.5±0.05, 3.6±0.4)
T3: 6.4±0.5 (0.65±0.05, 4.7±0.4)
T4: 16±1.5 (1.6±0.15, 11.6±1.1)
T5: 19±1.5 (1.9±0.15, 13.7±1.1)
T6: 19±2 (1.9±0.2, 13.7±1.4)
T7: 23±3 (2.3±0.3, 16.6±2.2)
T8: 25±2 (2.5±0.2, 18.1±1.4)
T9: 34±2 (3.5±0.2, 25.3±1.4)

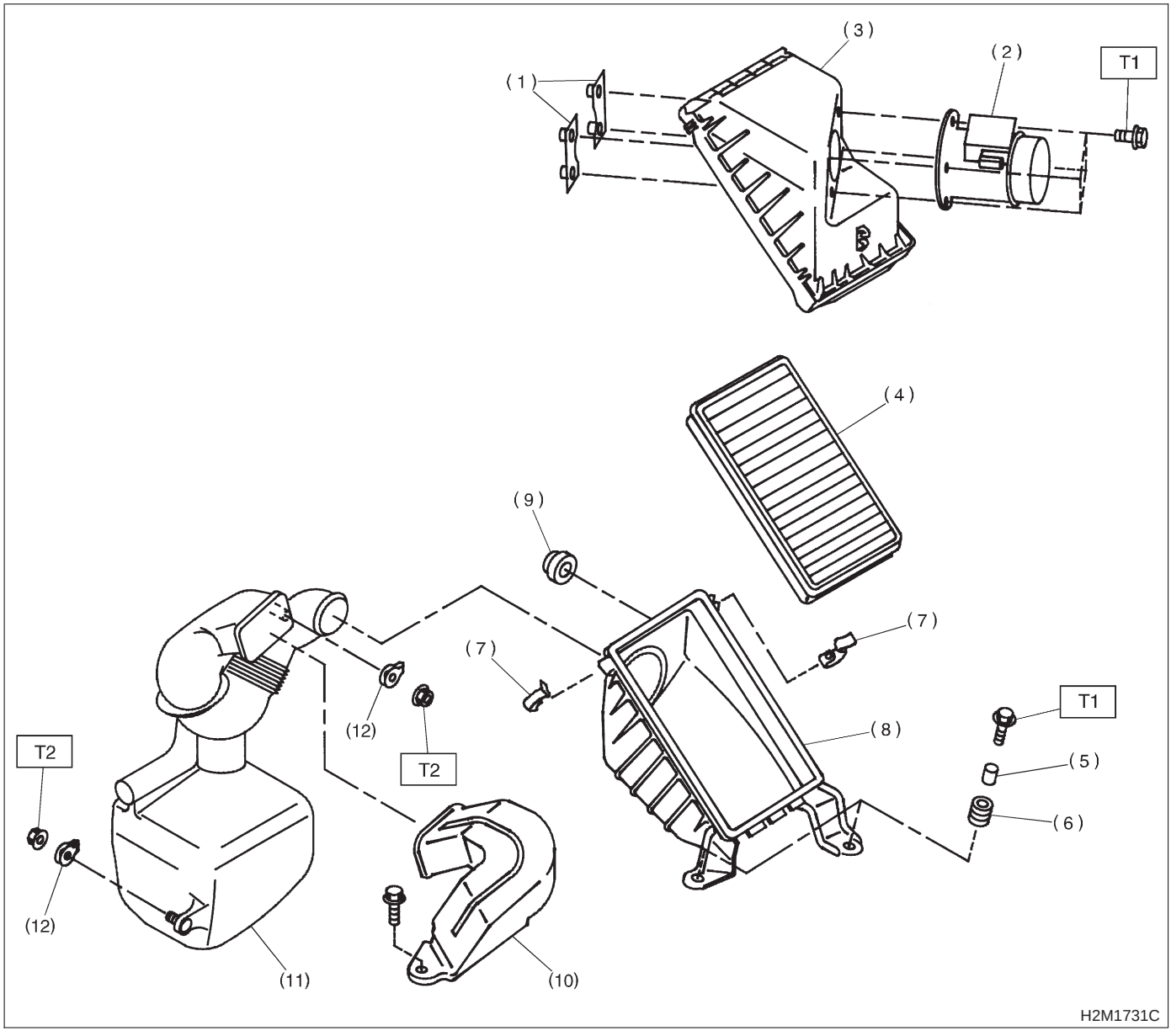
2. Air Intake System



(1) Gasket
(2) Throttle position sensor
(3) Throttle body
(4) Clamp
(5) Air intake duct
(6) By-pass hose
(7) Air intake chamber
(8) Stay A (AT vehicles)
(9) Stay B (AT vehicles)
(10) Stay C (MT vehicles)
(11) Stay D (MT vehicles)
(12) Spacer
(13) Bush

Tightening torque: N·m (kg-m, ft-lb)
T1: 2.2±0.2 (0.22±0.02, 1.6±0.1)
T2: 4.9±0.5 (0.5±0.05, 3.6±0.4)
T3: 22±2 (2.2±0.2, 15.9±1.4)

3. Air Cleaner



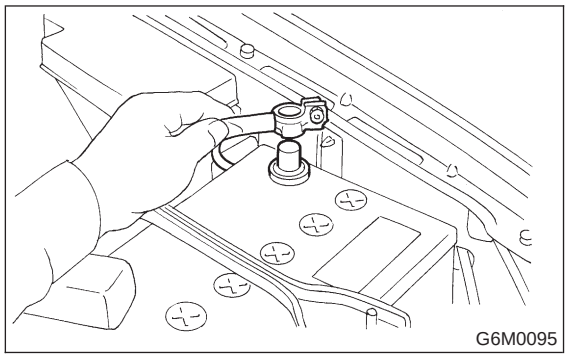
(1) Mass air flow sensor bracket
(2) Mass air flow sensor ASSY
(3) Air cleaner upper cover
(4) Air cleaner element
(5) Spacer
(6) Bush
(7) Clip
(8) Air cleaner case
(9) Cushion rubber
(10) Air intake duct
(11) Resonator chamber ASSY
(12) Clip

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T2: 33±10 (3.4±1.0, 25±7)

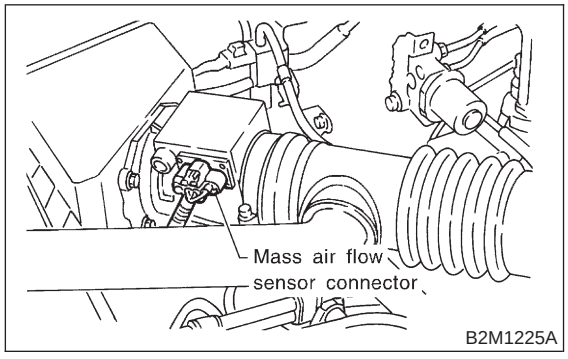
1. Air Cleaner and Air Intake Duct

A: REMOVAL AND INSTALLATION

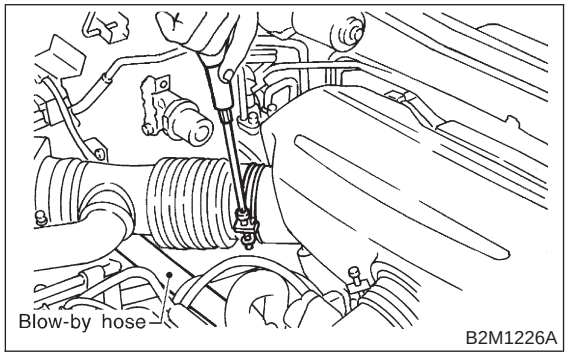
1) Disconnect battery ground cable.



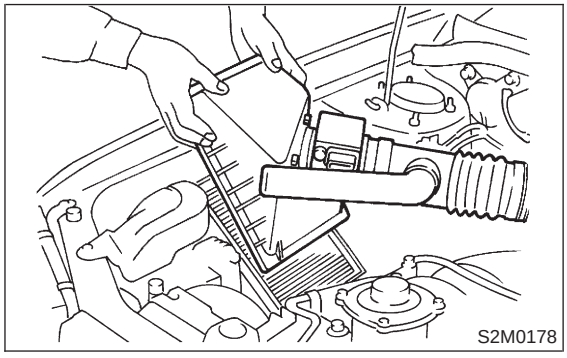
2) Disconnect connector from mass air flow sensor.



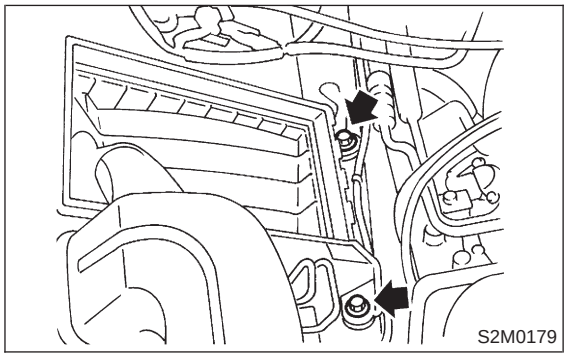
3) Loosen clamp which connects air intake duct to air intake chamber.



4) Remove two clips of air cleaner upper cover.
5) Disconnect blow-by hose from air intake duct.
6) Remove air intake duct and air cleaner upper cover as a unit.

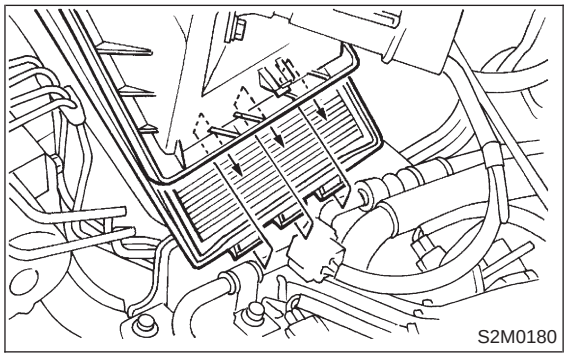


7) Remove air cleaner element.
8) Remove air cleaner lower case.



9) Installation is in the reverse order of removal.

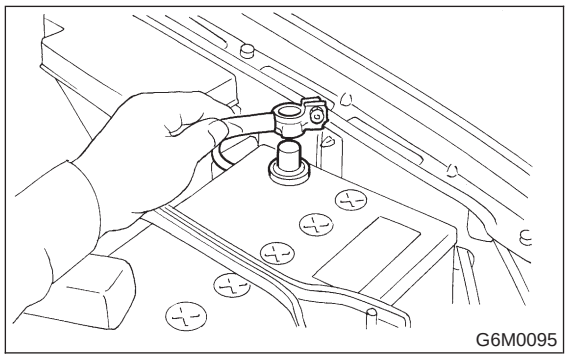
CAUTION:
Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.



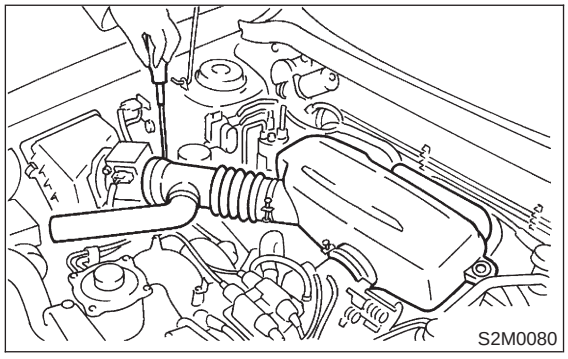
2. Mass Air Flow Sensor

A: REMOVAL AND INSTALLATION

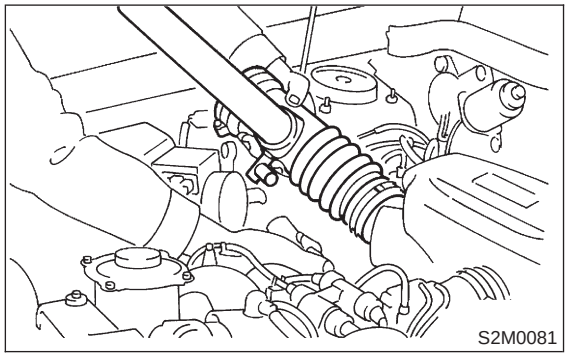
1) Disconnect battery ground cable.


G6M0095

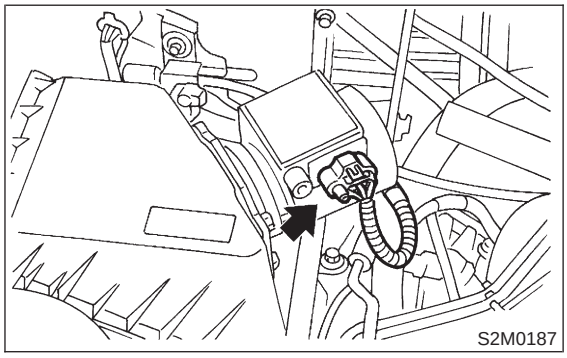
2) Loosen clamps which connect air intake duct to air intake chamber and mass air flow sensor.


S2M0080

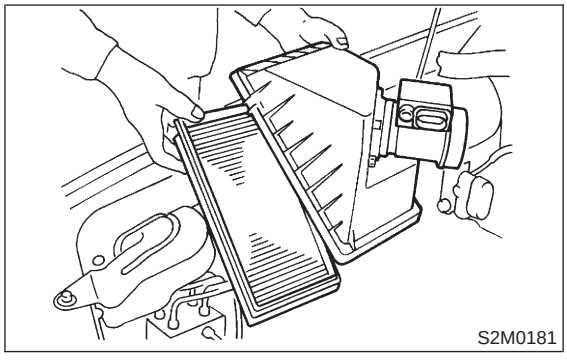
3) Disconnect blow-by hose from air intake duct.
4) Remove air intake duct.


S2M0081

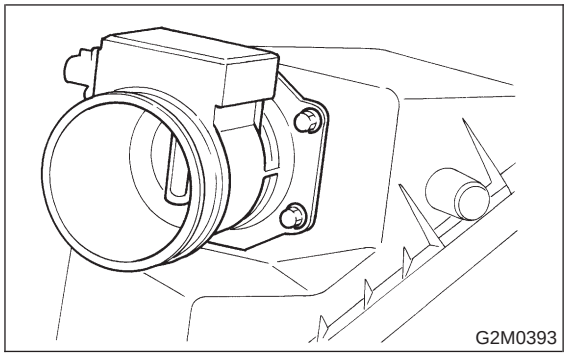
5) Disconnect connector from mass air flow sensor.


S2M0187

6) Remove two clips, then remove air cleaner upper cover.


S2M0181

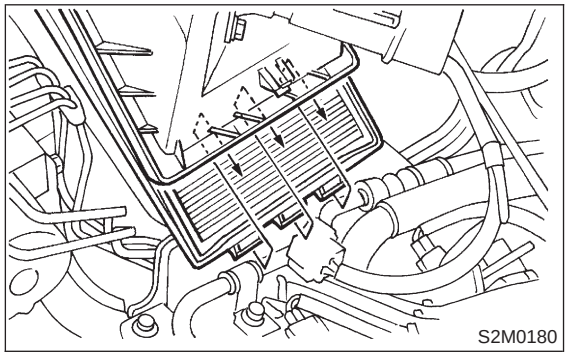
7) Remove mass air flow sensor from air cleaner upper cover.


G2M0393

8) 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)

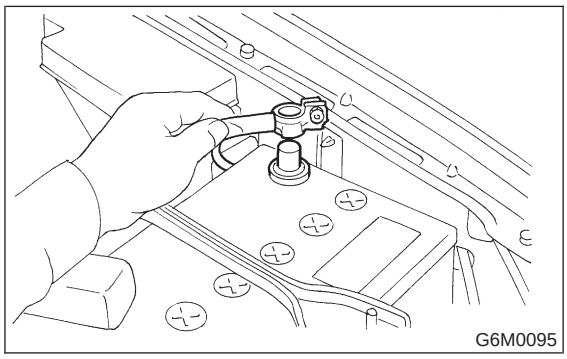
CAUTION:
Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.


S2M0180

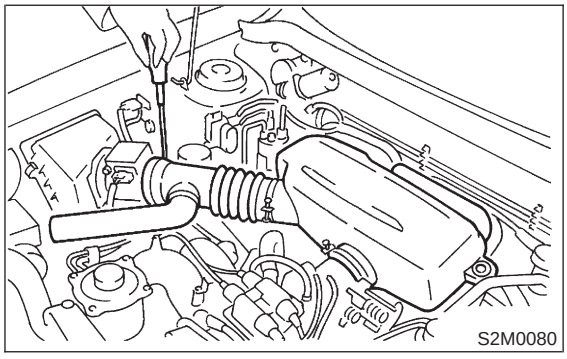
3. Throttle Body

A: REMOVAL AND INSTALLATION

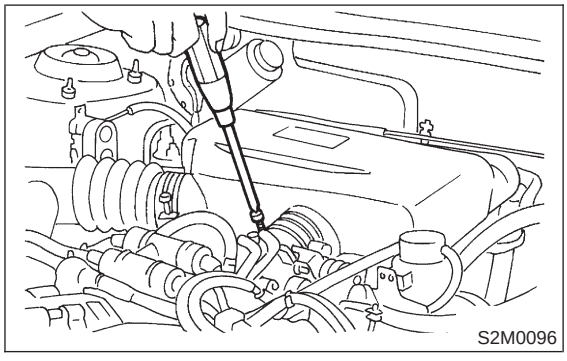
1) Disconnect battery ground cable.


G6M0095

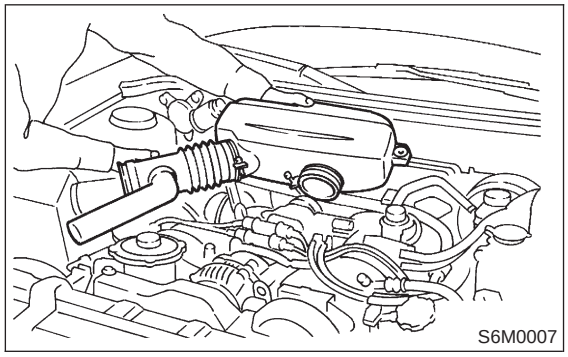
2) Loosen clamps which connect air intake duct to air intake chamber and mass air flow sensor.


S2M0080

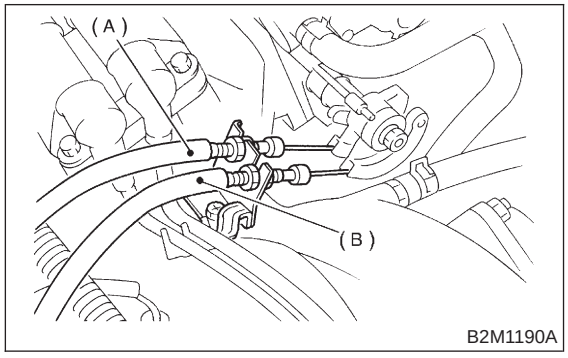
3) Loosen clamp which connects air intake chamber to throttle body.


S2M0096

4) Disconnect blow-by hose and air hoses, and remove air intake chamber and air intake duct as a unit.

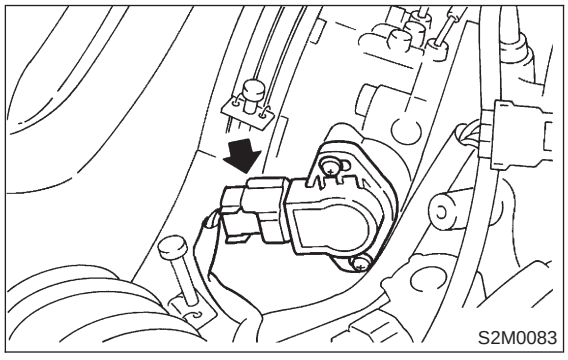

S6M0007

5) Disconnect accelerator cable (A).
6) Disconnect cruise control cable (B). (With cruise control model)

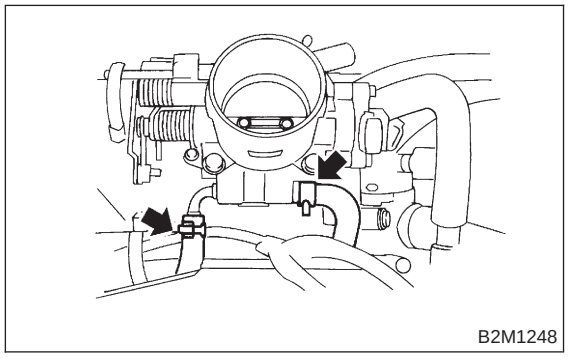


B2M1190A

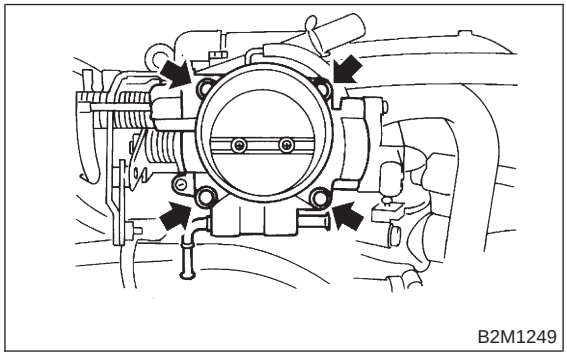
7) Disconnect connector from throttle position sensor.


S2M0083

8) Disconnect engine coolant hoses from throttle body.


B2M1248

9) Remove bolts which install throttle body to intake manifold.


B2M1249

10) Installation is in the reverse order of removal.

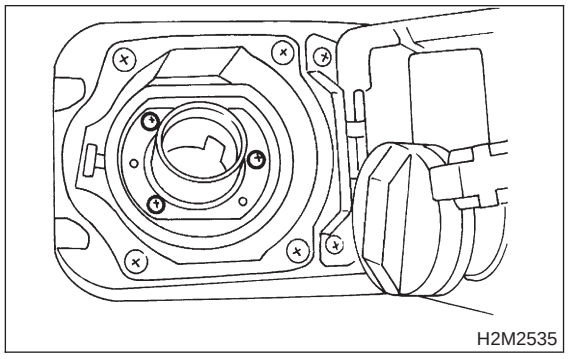
CAUTION:
- **Always use a new gasket.**
- **Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.**

Tightening torque:
Throttle body:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)
Air intake chamber:
4.9±0.5 N·m (0.5±0.05 kg-m, 3.6±0.4 ft-lb)

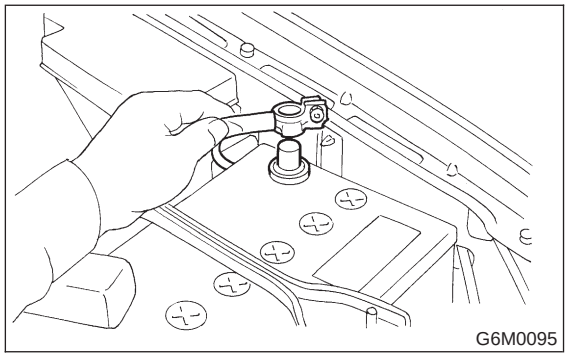
4. Intake Manifold

A: REMOVAL

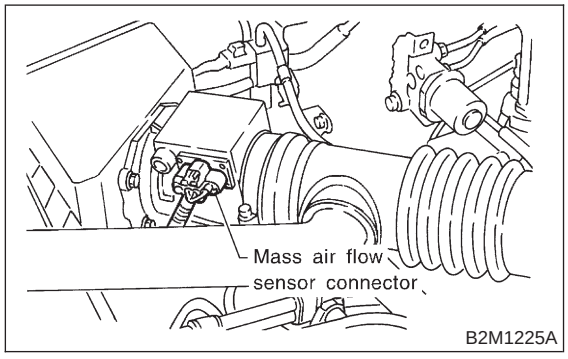
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


H2M2535

3) Disconnect battery ground cable.

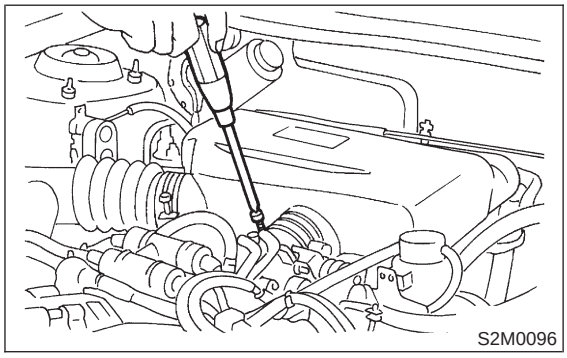

G6M0095

4) Disconnect connector from mass air flow sensor.

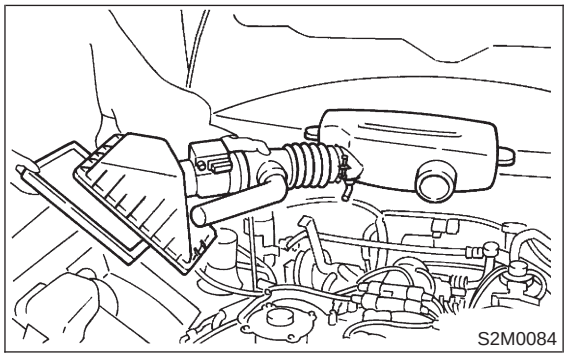


B2M1225A

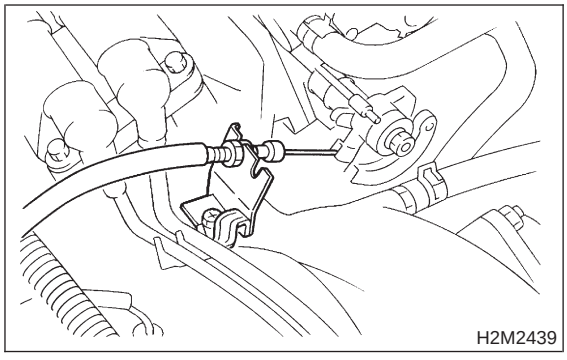
5) Loosen clamp which connects air intake chamber to throttle body.


S2M0096

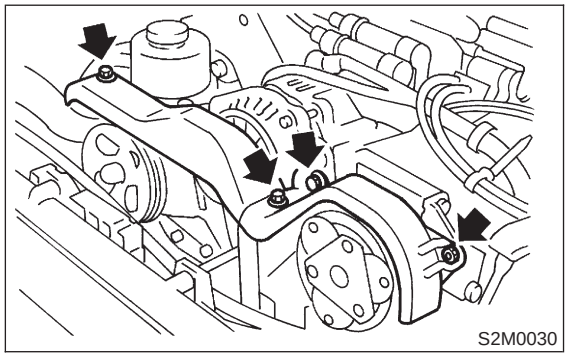
6) Remove two clips of air cleaner upper cover.
7) Disconnect blow-by hose from air intake duct.
8) Disconnect air hoses, and remove air intake chamber.
9) Remove air intake duct, air cleaner upper cover and air intake chamber as a unit.
10) Remove air cleaner element.


S2M0084

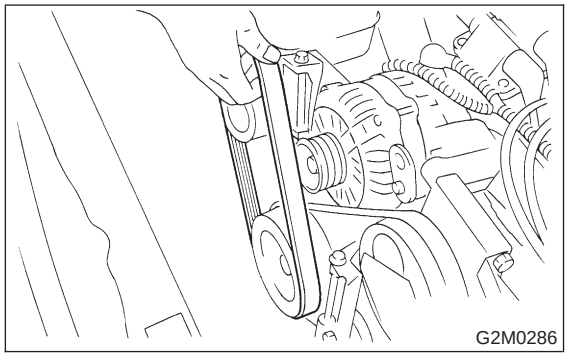
11) Disconnect accelerator cable.


H2M2439

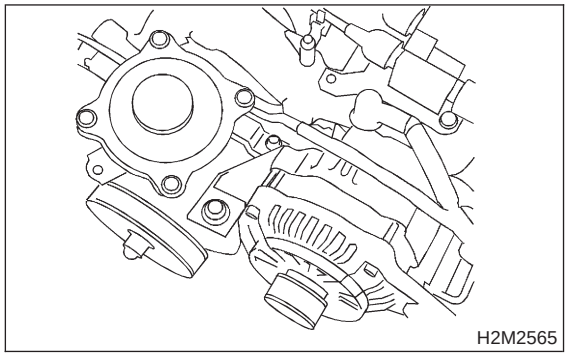
12) Remove power steering pump from bracket.
(1) Remove V-belt covers.


S2M0030

(2) Loosen lock bolt and slider bolt, and remove power steering pump drive V-belt.

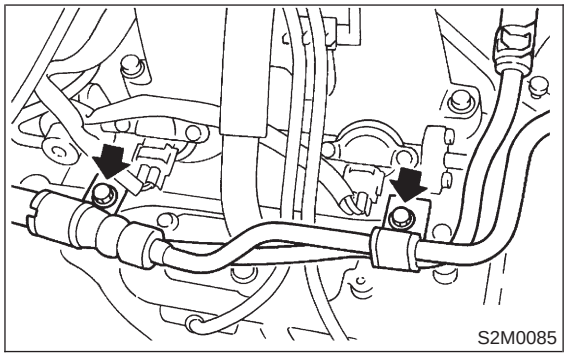

G2M0286

(3) Remove bolt which installs power steering pump stiffener on cylinder block.

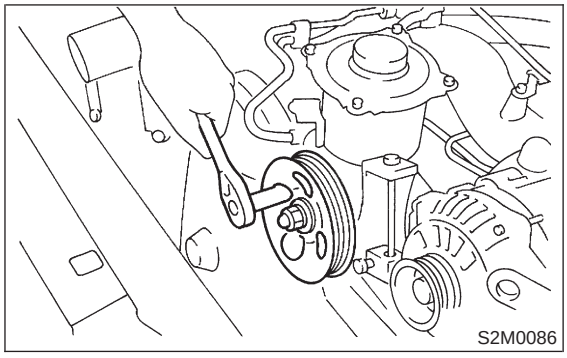

H2M2565

(4) Remove bolts which secure power steering pipe brackets to intake manifold.

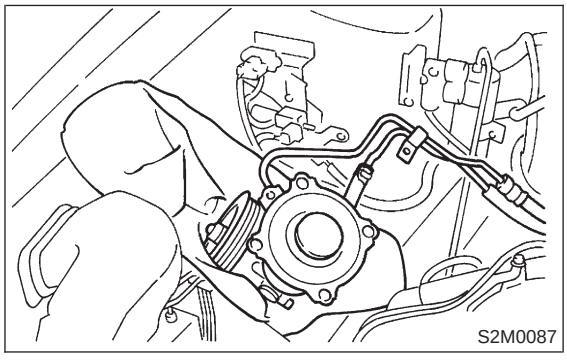
NOTE:
Do not disconnect power steering hose.


S2M0085

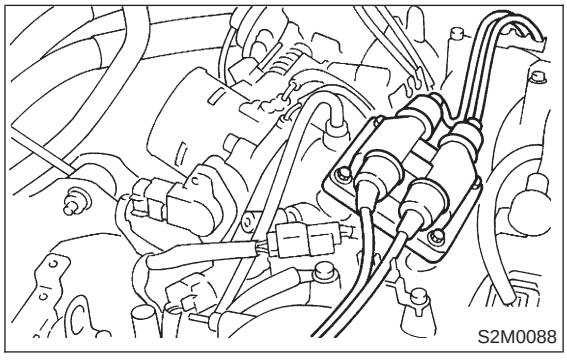
(5) Remove bolts which install power steering pump to bracket.


S2M0086

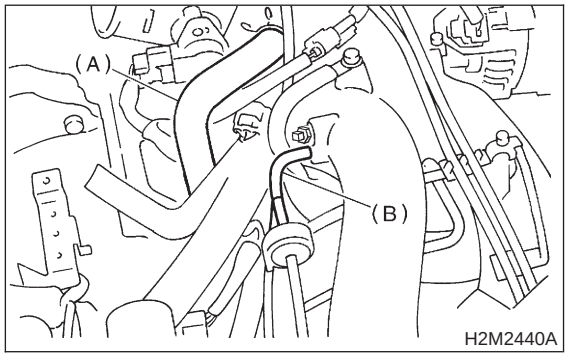
(6) Place power steering pump on the right side wheel apron.


S2M0087

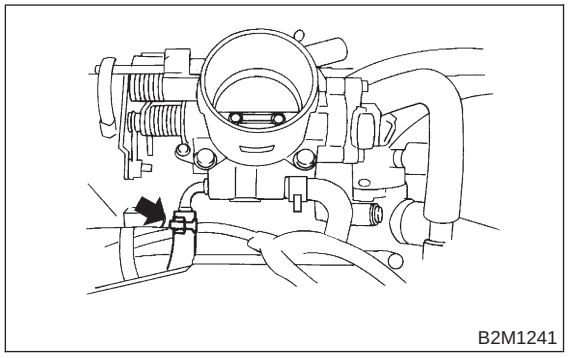
13) Disconnect spark plug cords from ignition coil.


S2M0088

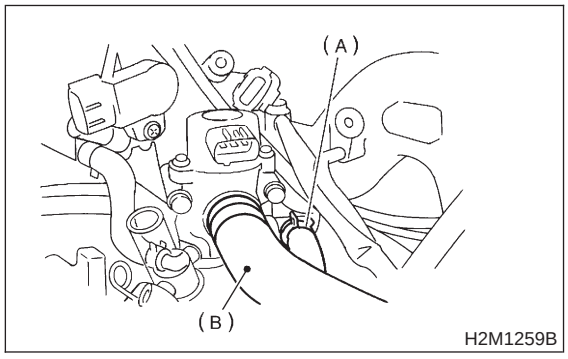
14) Disconnect PCV hose (A) and vacuum hose (B) from intake manifold.



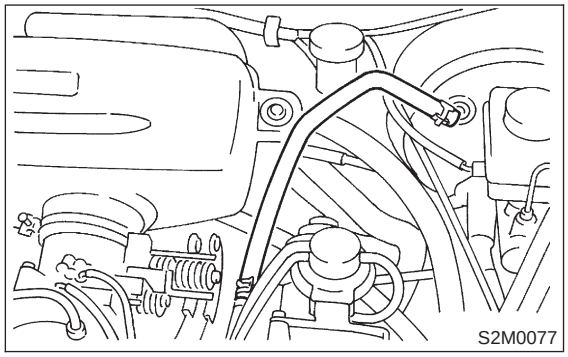
15) Disconnect engine coolant hose from throttle body.



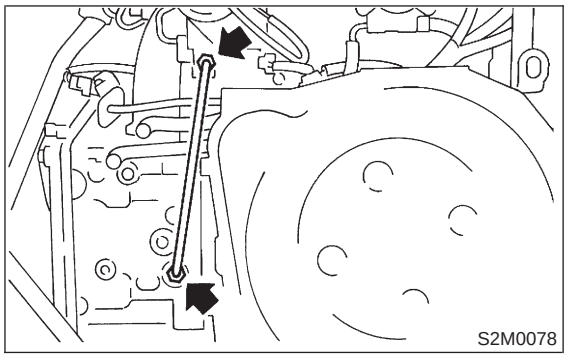
16) Disconnect engine coolant hose (A) from idle air control solenoid valve.
17) Disconnect air by-pass hose (B) from idle air control solenoid valve.



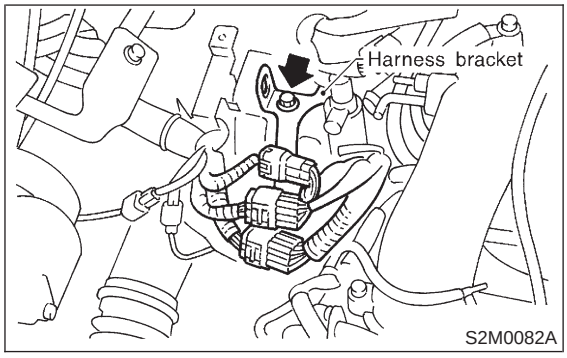
18) Disconnect brake booster hose.



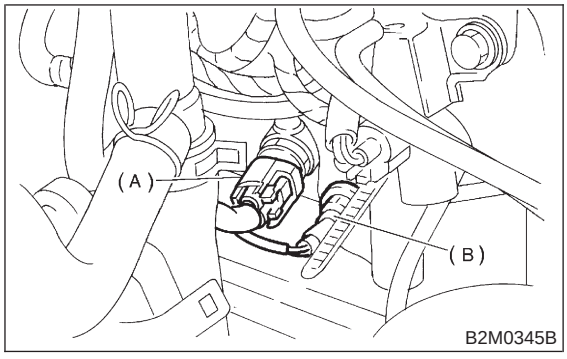
19) Remove EGR pipe.



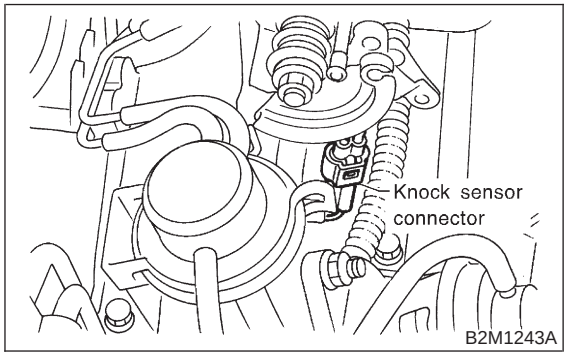
20) Remove engine harness bracket from transmission housing, and disconnect engine harness connectors from bulkhead harness connectors.



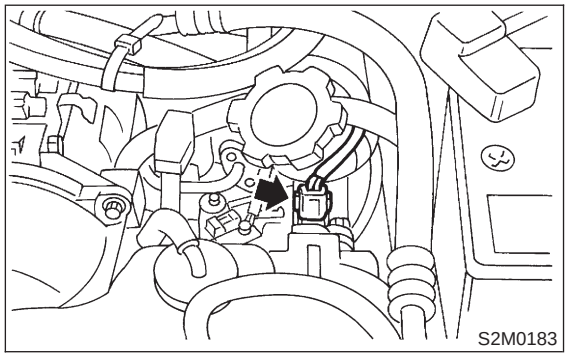
21) Disconnect connectors from engine coolant temperature sensor (A) and thermometer (B).



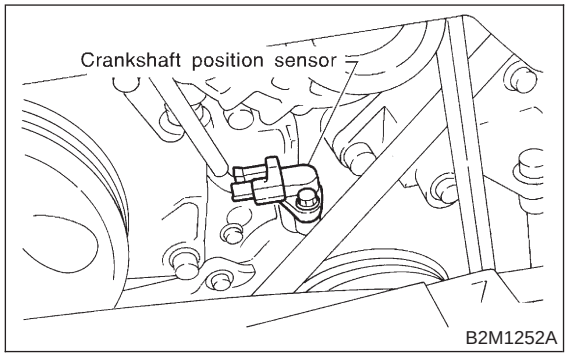
22) Disconnect knock sensor connector.



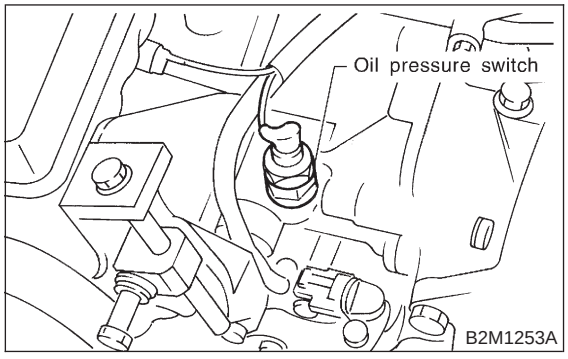
23) Disconnect connector from camshaft position sensor.



24) Disconnect connector from crankshaft position sensor.

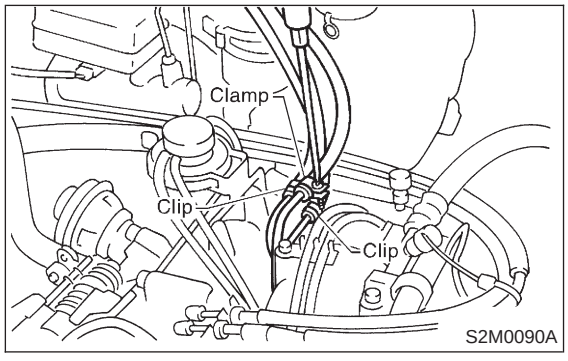


25) Disconnect connector from oil pressure switch.

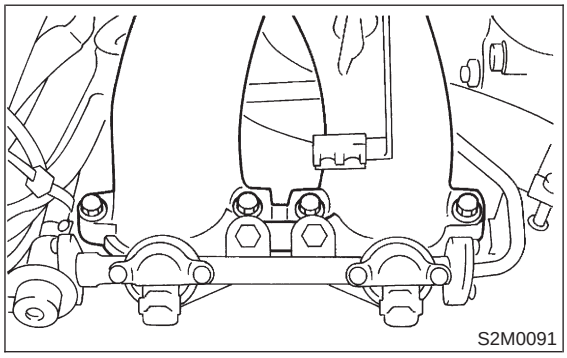


26) Disconnect fuel hoses from fuel pipes.

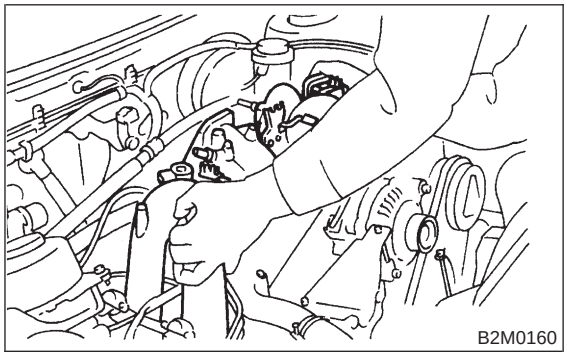
WARNING:
Catch fuel from hoses in a container.



27) Remove bolts which hold intake manifold onto cylinder heads.



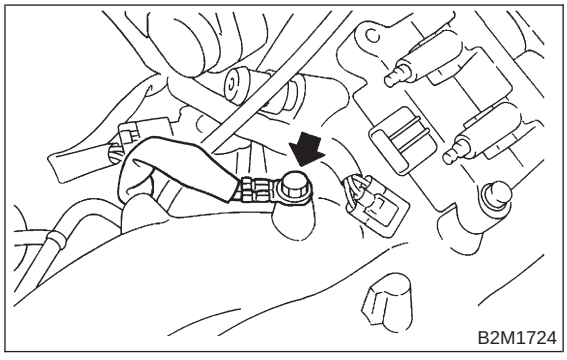
28) Remove intake manifold.



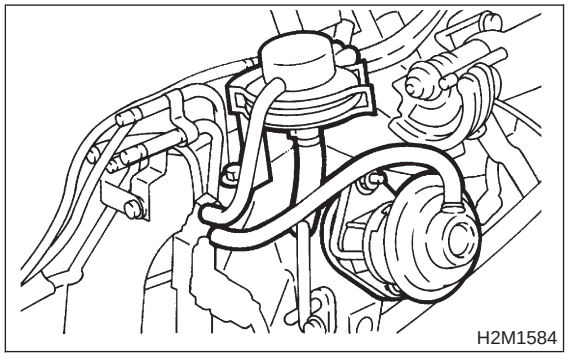
B: DISASSEMBLY

1. 2200 cc MODEL

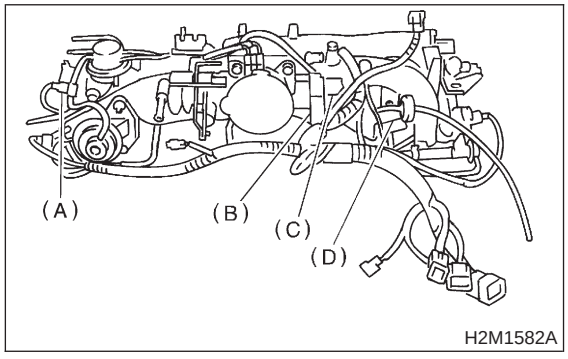
1) Disconnect engine ground terminal from intake manifold.



2) Disconnect EGR vacuum hose from EGR valve. (AT vehicles)
3) Disconnect back pressure hose from pipe. (AT vehicles)
4) Disconnect BPT hoses from EGR solenoid valve and intake manifold. (AT vehicles)
5) Remove BPT with BTP holder bracket. (AT vehicles)
6) Remove EGR valve. (AT vehicles)


H2M1584

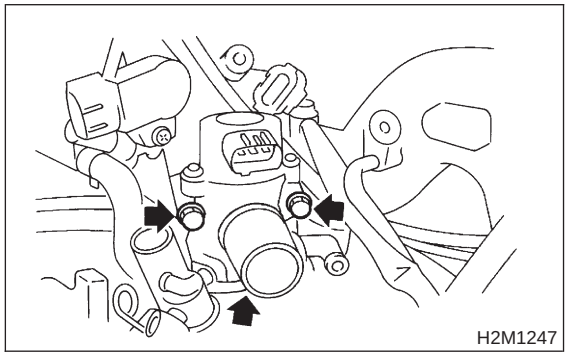
7) Disconnect connectors from throttle position sensor, ignition coil, fuel injectors, idle air control solenoid valve, purge control solenoid valve and EGR solenoid valve. (AT vehicles)
8) Remove engine harness from intake manifold.



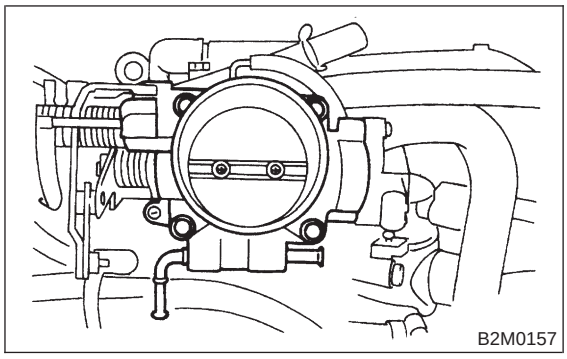
H2M1582A

(A) EGR solenoid valve (AT vehicles)
(B) Throttle position sensor
(C) Idle air control solenoid valve
(D) Purge control solenoid valve

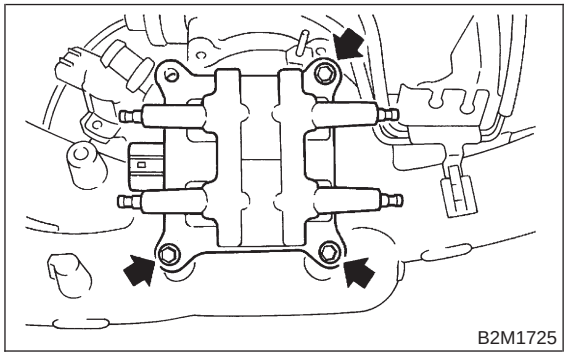
9) Remove idle air control solenoid valve from intake manifold.


H2M1247

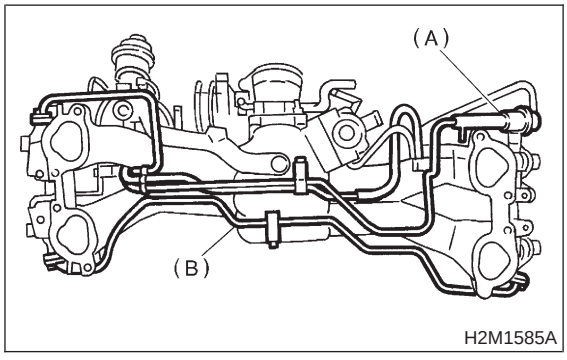
10) Remove throttle body from intake manifold.


B2M0157

11) Remove ignition coil.


B2M1725

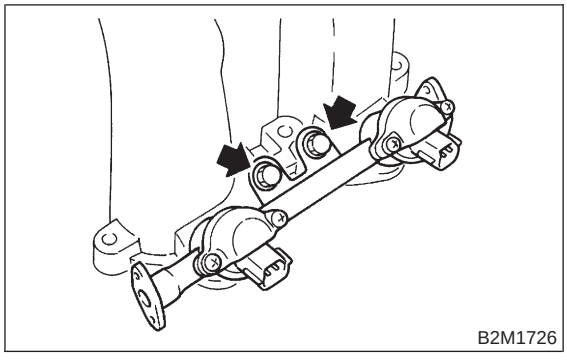
12) Remove fuel pipes, etc. from intake manifold.



H2M1585A

(A) Pressure regulator
(B) Fuel pipe ASSY

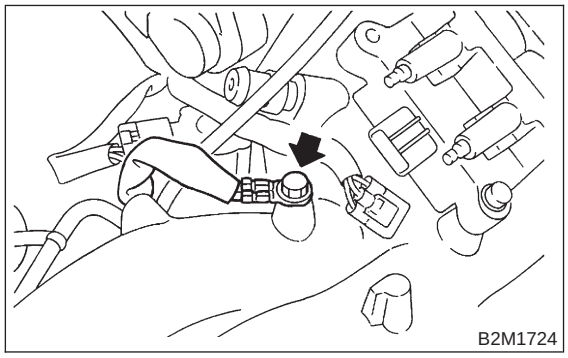
13) Remove fuel injector pipes.


B2M1726

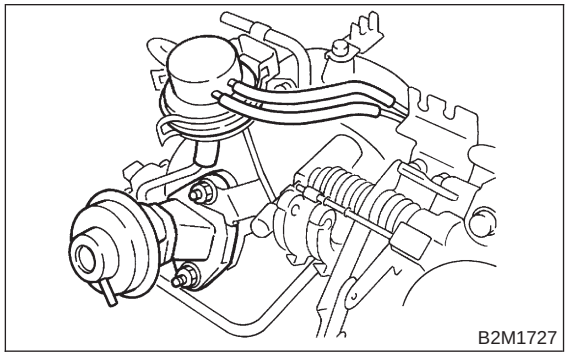
14) Remove EGR solenoid valve (AT vehicles) and purge control solenoid valve.

2. 2500 cc MODEL

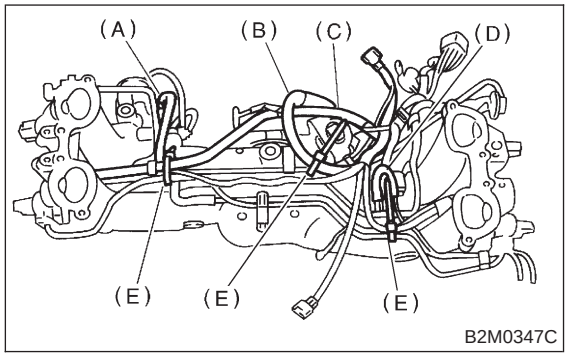
1) Disconnect engine ground terminal from intake manifold.



2) Disconnect EGR vacuum hose from EGR valve.
3) Disconnect back pressure hose from pipe.
4) Disconnect BPT hoses from EGR solenoid valve and intake manifold.
5) Remove BPT with BTP holder bracket.
6) Remove EGR valve.



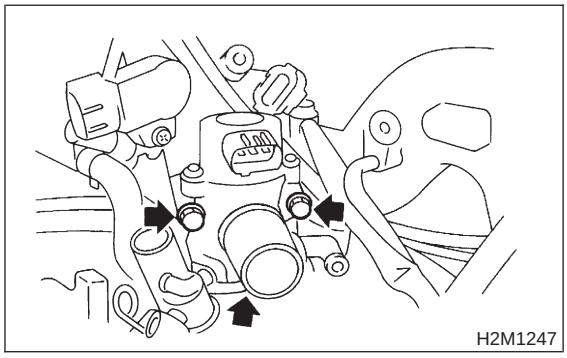
7) Disconnect connectors from throttle position sensor, ignition coil, fuel injectors, idle air control solenoid valve, purge control solenoid valve and EGR solenoid valve.



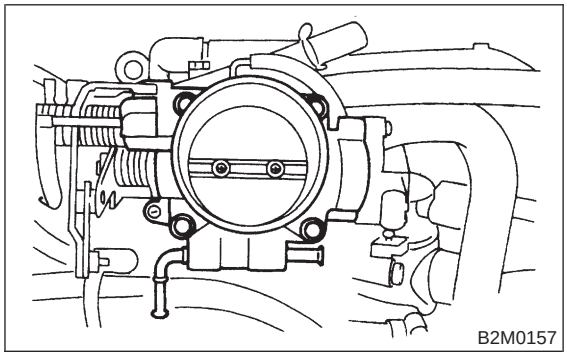
(A) EGR solenoid valve
(B) Throttle position sensor
(C) Idle air control solenoid valve
(D) Purge control solenoid valve
(E) Harness band

8) Remove engine harness from intake manifold.

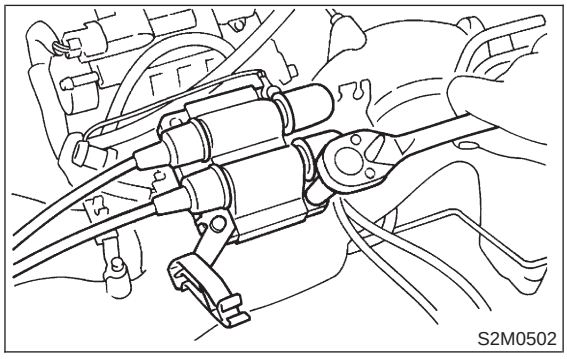
9) Remove idle air control solenoid valve from intake manifold.



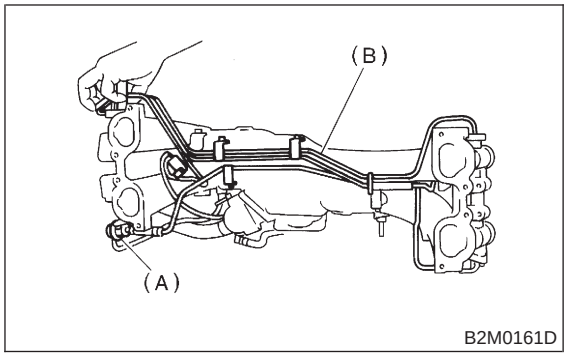
10) Remove throttle body from intake manifold.



11) Remove ignition coil.

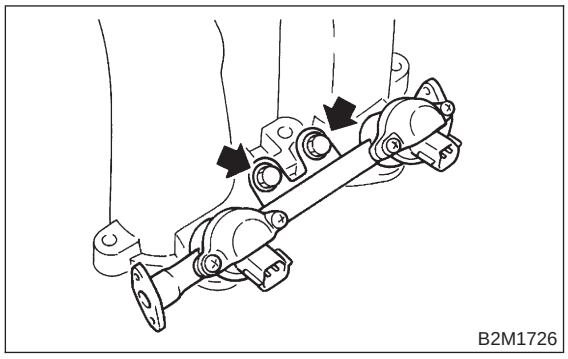


12) Remove fuel pipes, etc. from intake manifold.



(A) Pressure regulator
(B) Fuel pipe ASSY

13) Remove fuel injector pipes.

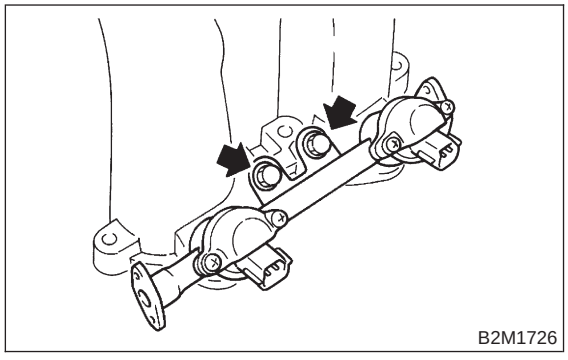


14) Remove EGR solenoid valve and purge control solenoid valve.

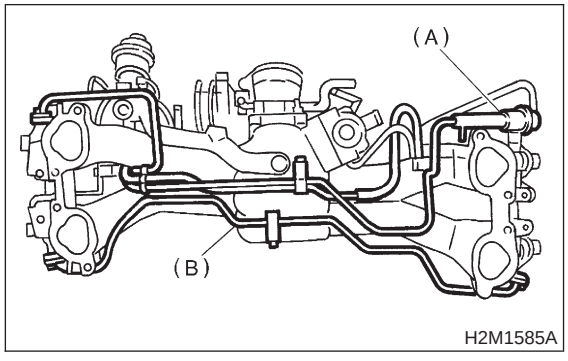
C: ASSEMBLY

1. 2200 cc MODEL

1) Install EGR solenoid valve (AT vehicles) and purge control solenoid valve.
2) Install fuel injector pipes.

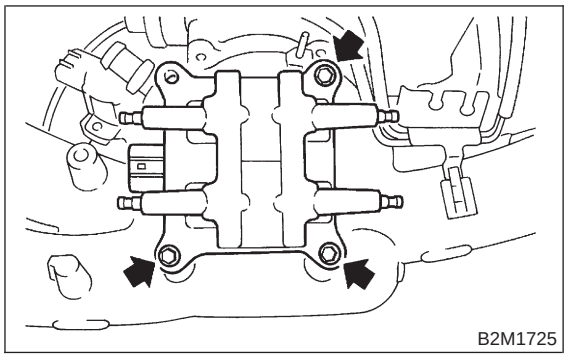


3) Assemble fuel pipes, etc. to intake manifold.



(A) Pressure regulator
(B) Fuel pipe ASSY

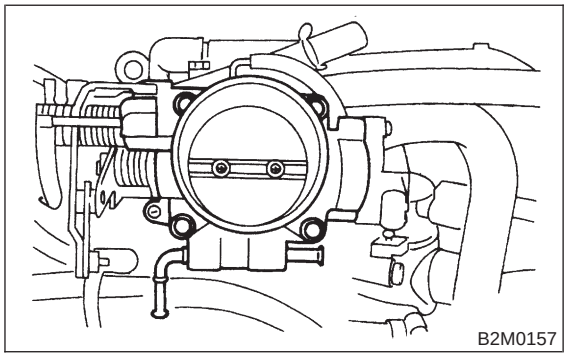
4) Install ignition coil.



5) Assemble throttle body to intake manifold.

CAUTION:
Replace gasket with a new one.

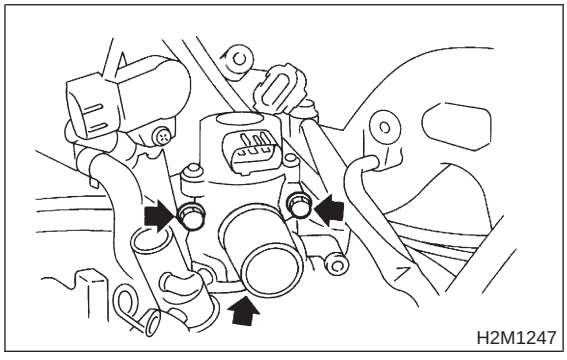
Tightening torque:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)



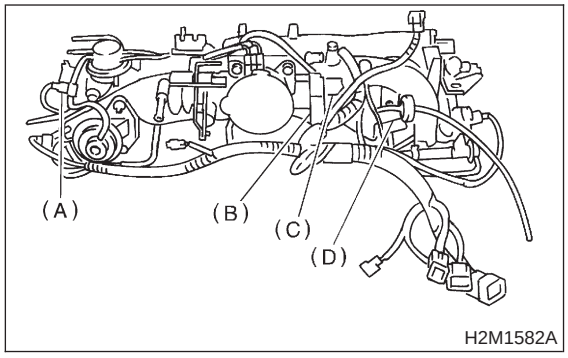
6) Install idle air control solenoid valve to intake manifold.

CAUTION:
Replace gasket with a new one.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



7) Install engine harness onto intake manifold.
8) Connect connectors to throttle position sensor, ignition coil, fuel injectors, idle air control solenoid valve, purge control solenoid valve and EGR solenoid valve. (AT vehicles)



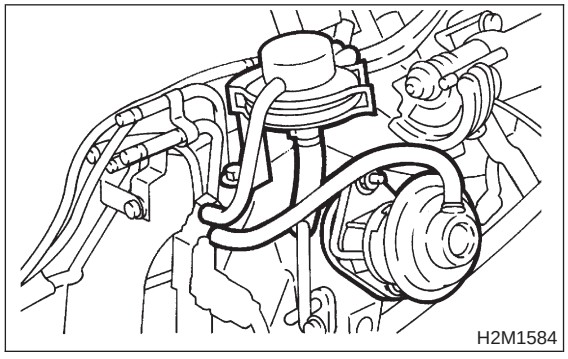
(A) EGR solenoid valve (AT vehicles)
(B) Throttle position sensor
(C) Idle air control solenoid valve
(D) Purge control solenoid valve

9) Install EGR valve. (AT vehicles)

CAUTION:
Replace gasket with a new one.

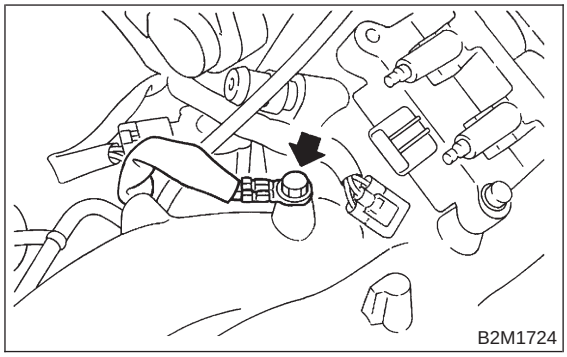
Tightening torque:
19±1.5 N·m (1.9±0.15 kg-m, 13.7±1.1 ft-lb)

10) Install BPT with BPT holder bracket. (AT vehicles)
11) Connect BPT hoses from EGR solenoid valve and intake manifold. (AT vehicles)
12) Connect back pressure hose from pipe. (AT vehicles)
13) Connect EGR vacuum hose from EGR vale. (AT vehicles)



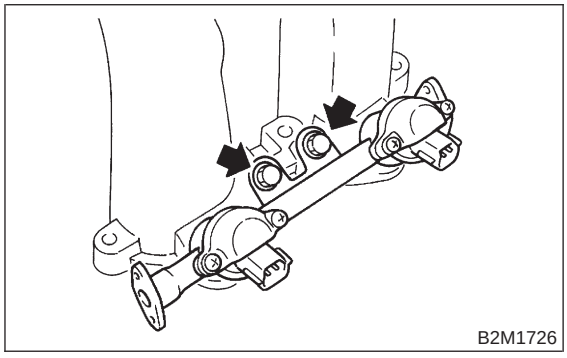
14) Connect engine ground terminal to intake manifold.

Tightening torque:
19±1.5 N·m (1.9±0.15 kg-m, 13.7±1.1 ft-lb)

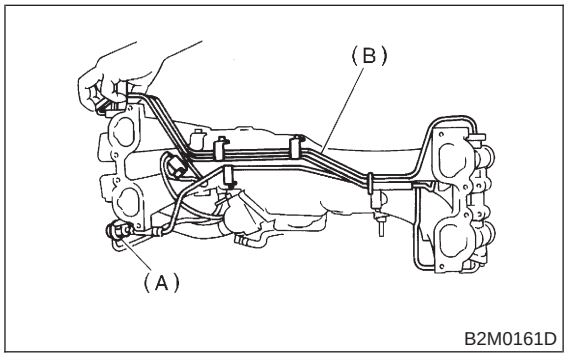


2. 2500 cc MODEL

1) Install EGR solenoid valve and purge control solenoid valve.
2) Install fuel injector pipes.

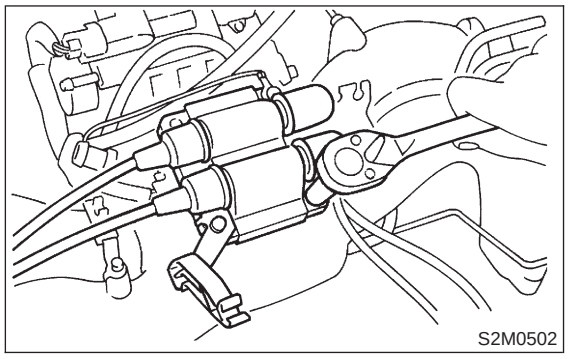


3) Assemble fuel pipes, etc. to intake manifold.



(A) Pressure regulator
(B) Fuel pipe ASSY

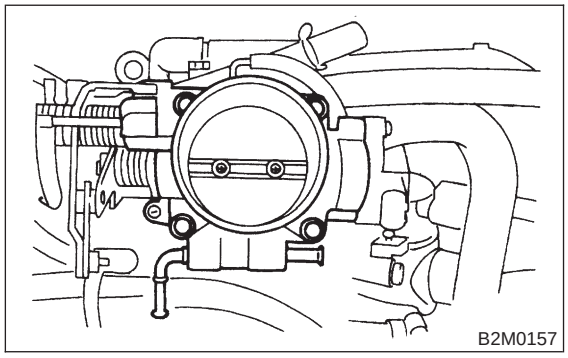
4) Install ignition coil.


S2M0502

5) Assemble throttle body to intake manifold.

CAUTION:
Replace gasket with a new one.

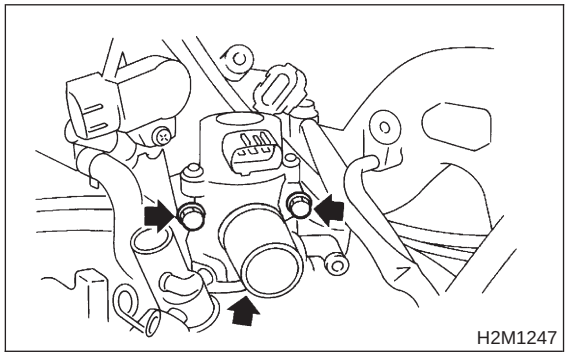
Tightening torque:
22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)


B2M0157

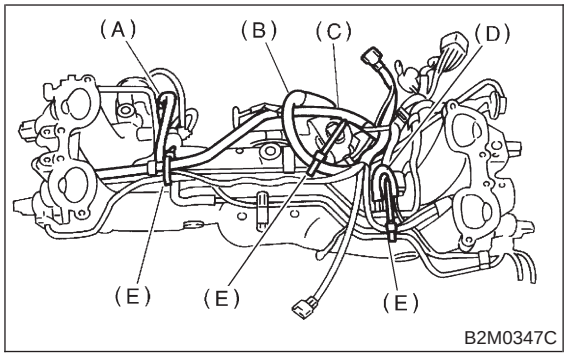
6) Install idle air control solenoid valve to intake manifold.

CAUTION:
Replace gasket with a new one.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)


H2M1247

7) Install engine harness onto intake manifold.
8) Connect connectors to throttle position sensor, ignition coil, fuel injectors, idle air control solenoid valve, purge control solenoid valve and EGR solenoid valve.



B2M0347C

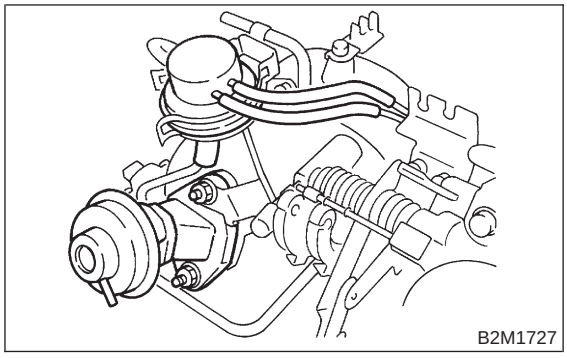
(A) EGR solenoid valve
(B) Throttle position sensor
(C) Idle air control solenoid valve
(D) Purge control solenoid valve
(E) Harness band

9) Install EGR valve.

CAUTION:
Replace gasket with a new one.

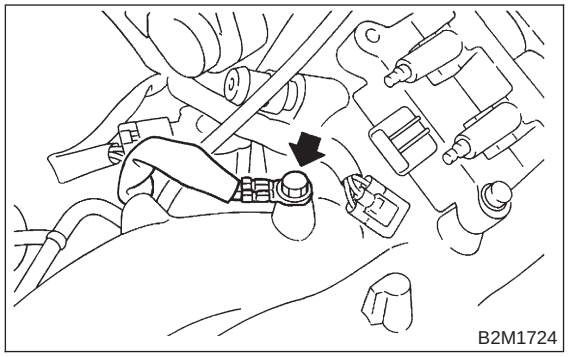
Tightening torque:
19±1.5 N·m (1.9±0.15 kg-m, 13.7±1.1 ft-lb)

10) Install BPT with BPT holder bracket.
11) Connect BPT hoses from EGR solenoid valve and intake manifold.
12) Connect back pressure hose from pipe.
13) Connect EGR vacuum hose from EGR valve.


B2M1727

14) Connect engine ground terminal to intake manifold.

Tightening torque:
19±1.5 N·m (1.9±0.15 kg-m, 13.7±1.1 ft-lb)

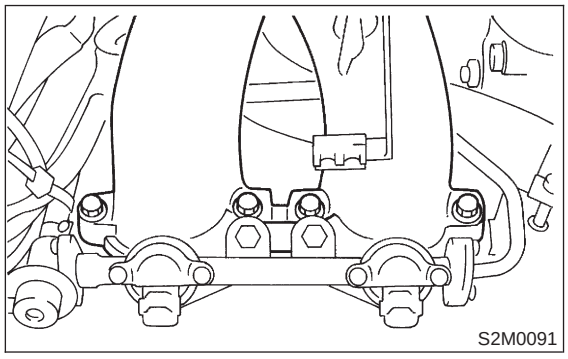


D: INSTALLATION

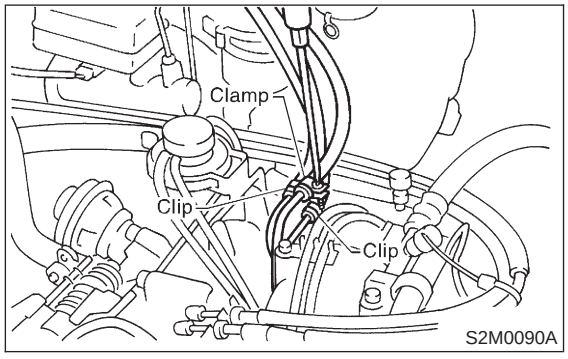
1) Install intake manifold onto cylinder heads.

CAUTION:
Always use new gaskets.

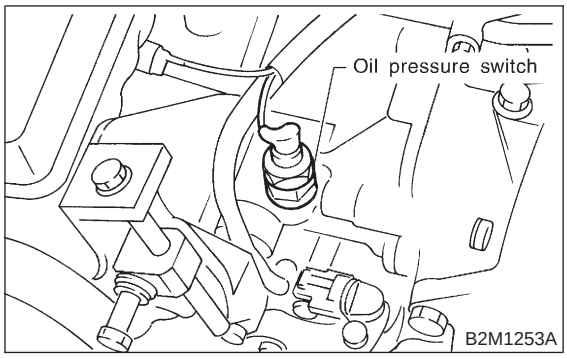
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



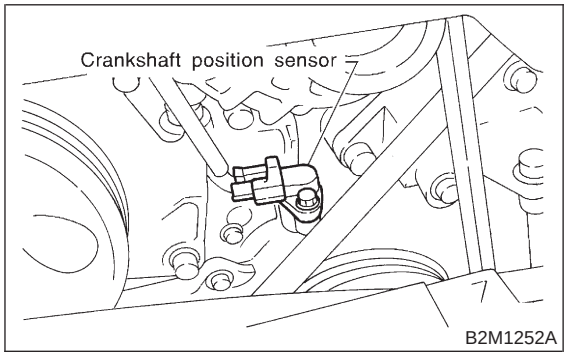
2) Connect fuel hoses.



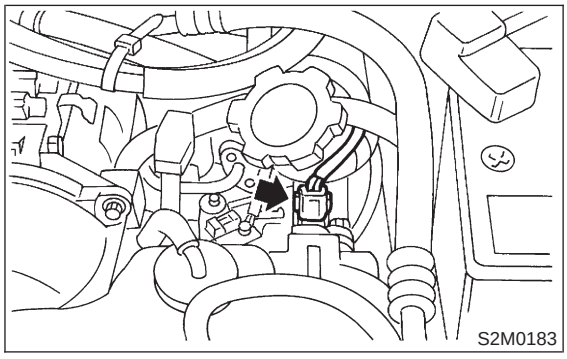
3) Connect connector to oil pressure switch.



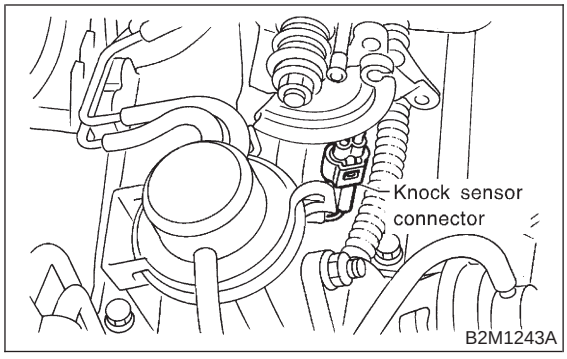
4) Connect connector to crankshaft position sensor.



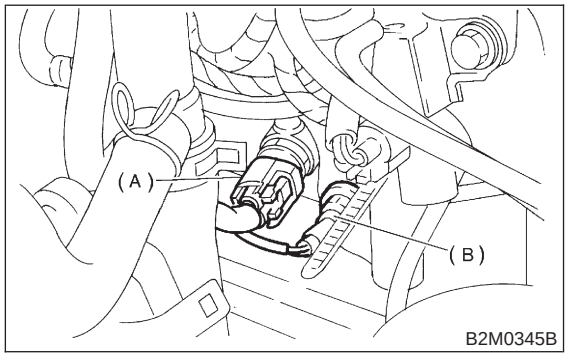
5) Connect connector to camshaft position sensor.



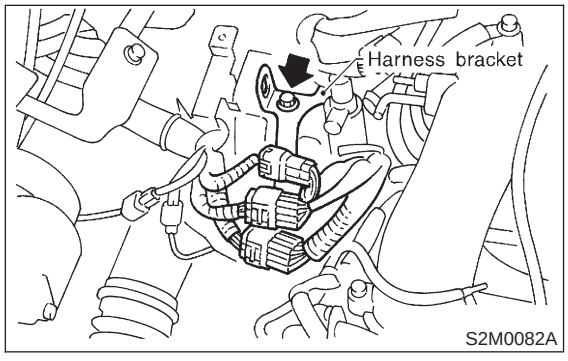
6) Connect knock sensor connector.



7) Connect connectors to engine coolant temperature sensor (A) and thermometer (B).

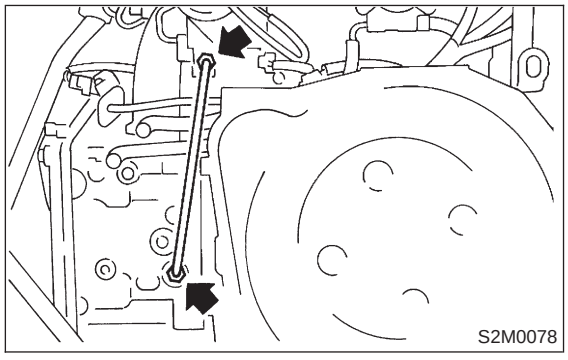


8) Install engine harness bracket, and connect engine harness connectors to bulkhead connectors.

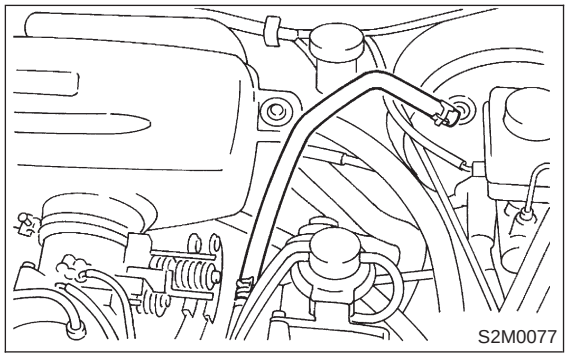


9) Install EGR pipe.

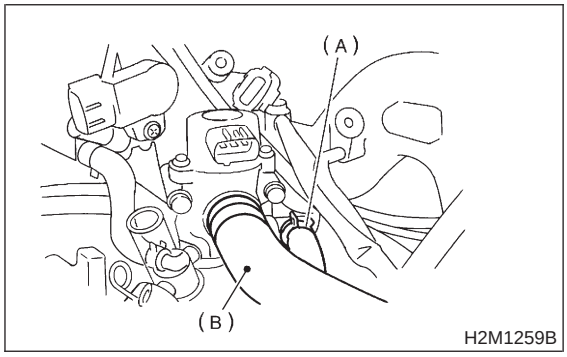
Tightening torque:
34±2 N·m (3.5±0.2 kg-m, 25.3±1.4 ft-lb)



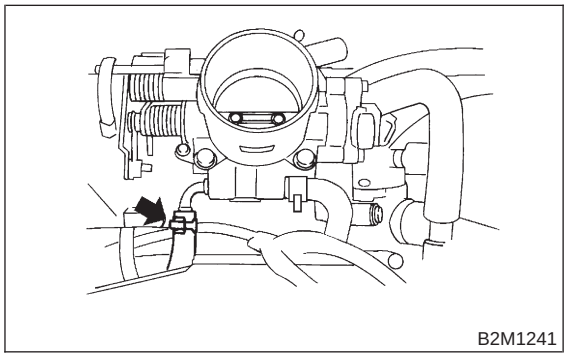
10) Connect brake booster hose.



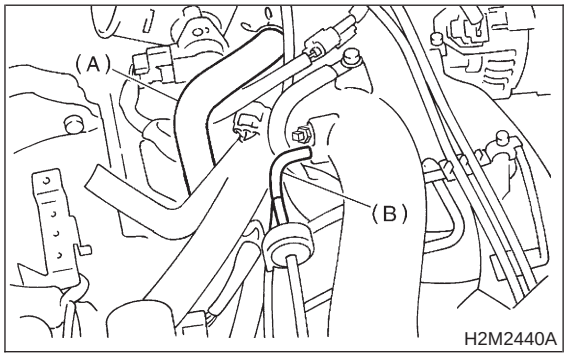
11) Connect engine coolant hose (A) to idle air control solenoid valve.
12) Connect air by-pass hose (B) to idle air control solenoid valve.



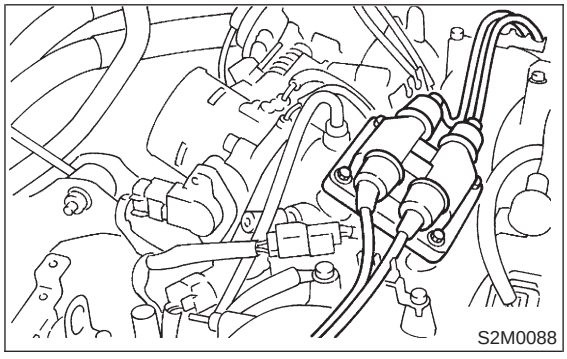
13) Connect engine coolant hose to throttle body.



14) Connect PCV hose (A) and vacuum hose (B) to intake manifold.

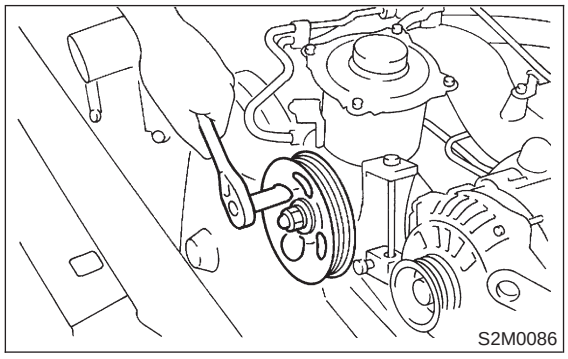


15) Connect spark plug cords to ignition coil.

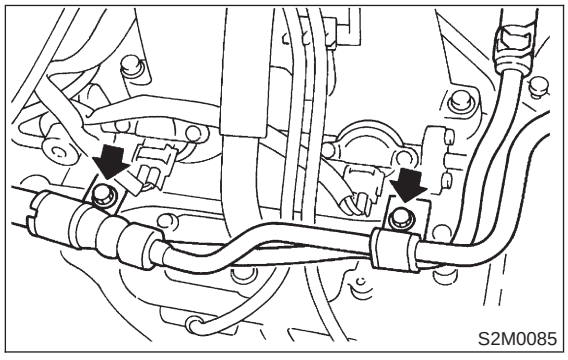


16) Install power steering pump on bracket.
(1) Install power steering pump on bracket, and tighten bolts.

Tightening torque:
20.1±2.5 N·m (2.05±0.25 kg-m, 14.8±1.8 ft-lb)

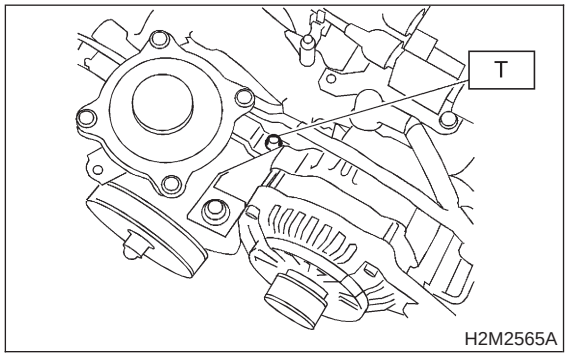

S2M0086

(2) Install power steering pipe brackets on right side intake manifold.


S2M0085

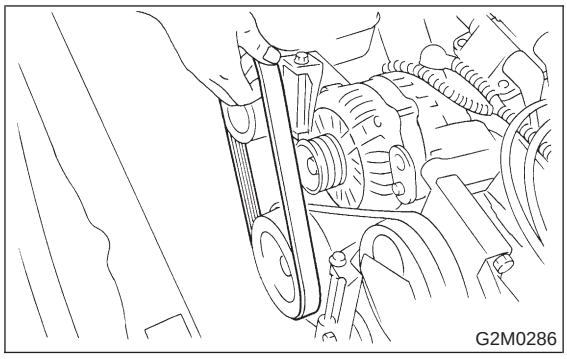
(3) Tighten bolt which installs power steering pump stiffener on cylinder block.

Tightening torque:
T: 22±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)

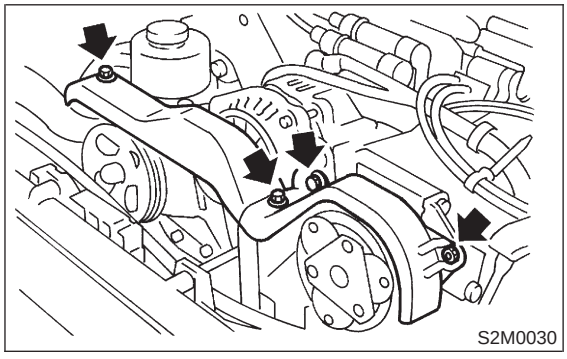


H2M2565A

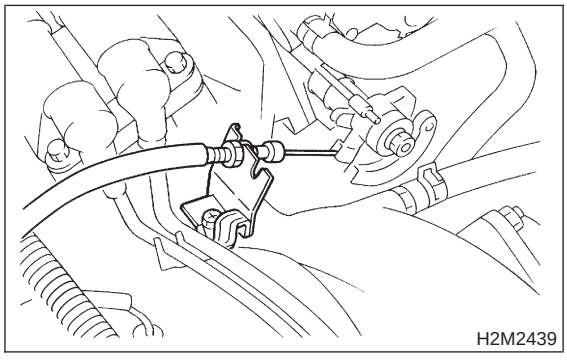
(4) Install power steering pump drive V-belt.


G2M0286

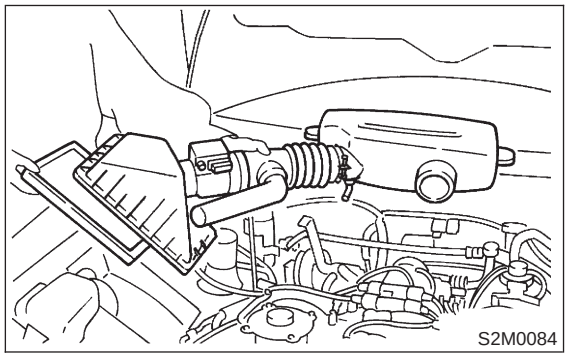
(5) Adjust V-belt. <Ref. to 1-5 [G200].>
(6) Install V-belt covers.


S2M0030

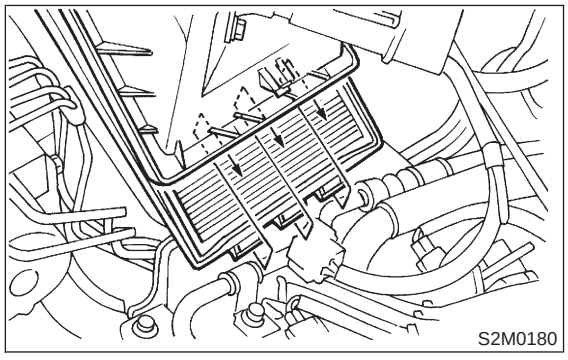
17) Connect accelerator cable.


H2M2439

18) Install air cleaner element.
19) Install air cleaner upper cover, air intake duct and air intake chamber as a unit.

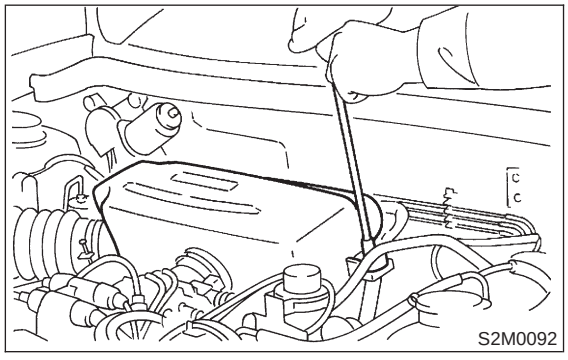

S2M0084

CAUTION:
Before installing air cleaner upper cover, align holes with protruding portions of air cleaner lower case, then secure upper cover to lower case.

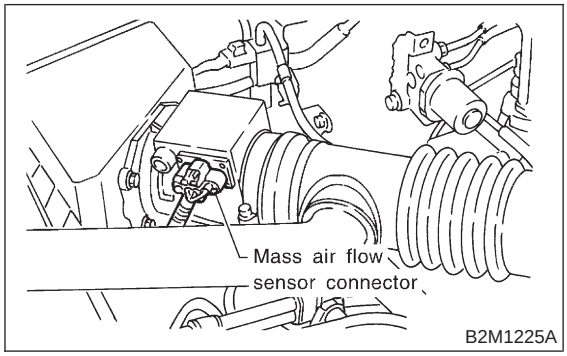

S2M0180

20) Tighten bolts which install air intake chamber to stays.

Tightening torque:
4.9±0.5 N·m (0.5±0.05 kg-m, 3.6±0.4 ft-lb)

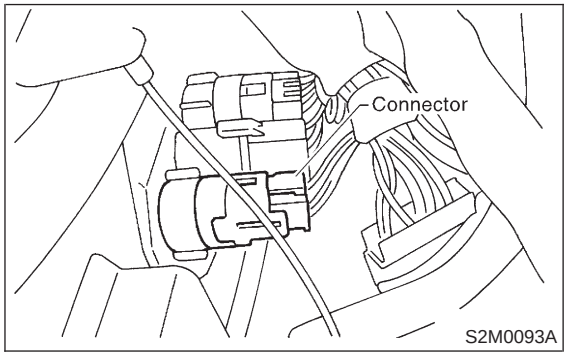

S2M0092

21) Connect connector to mass air flow sensor.



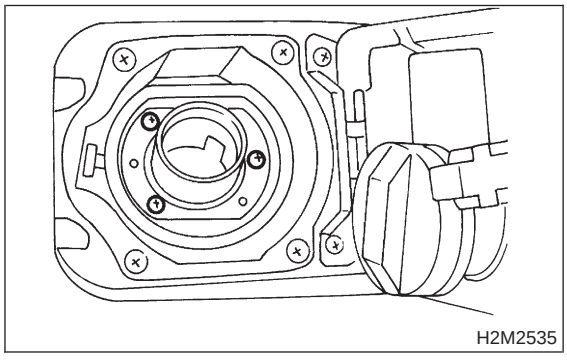
B2M1225A

22) Connect connector to fuel pump relay.

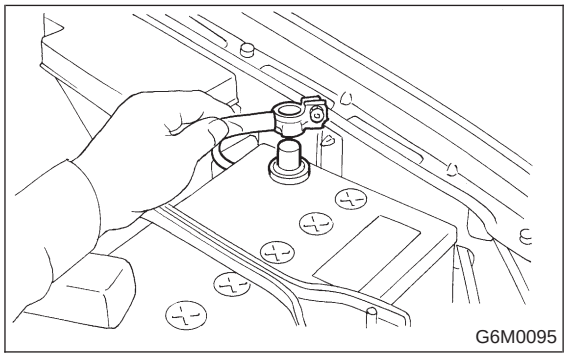


S2M0093A

23) Install fuel filler cap.


H2M2535

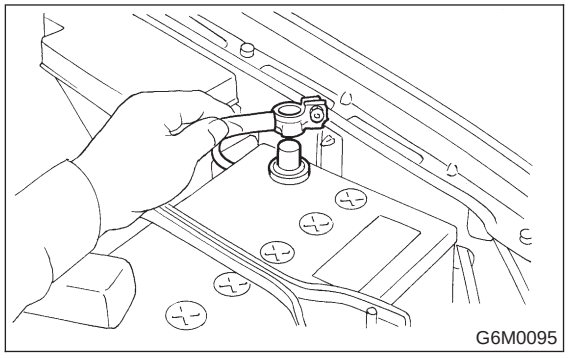
24) Connect battery ground cable.


G6M0095

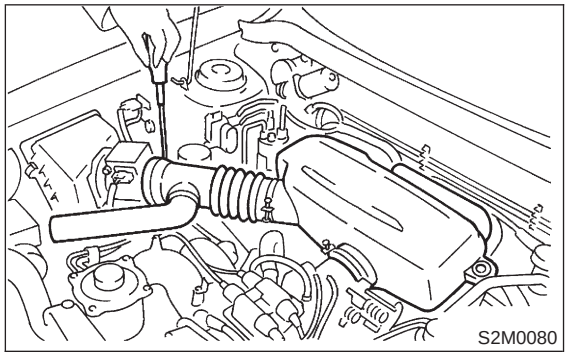
5. Engine Coolant Temperature Sensor

A: REMOVAL AND INSTALLATION

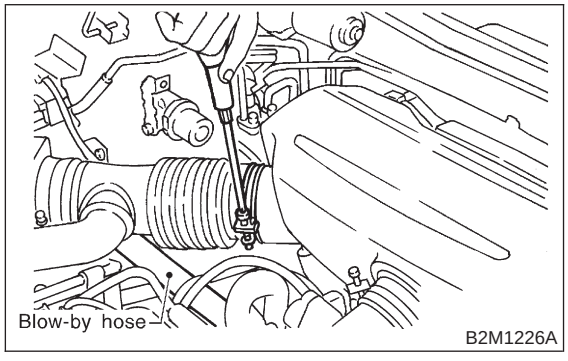
1) Disconnect battery ground cable.



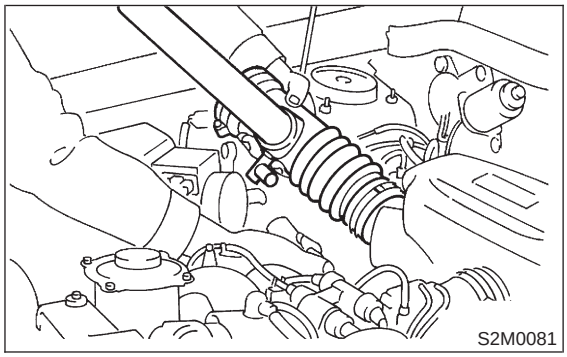
2) Loosen clamp which connects air intake duct to mass air flow sensor.



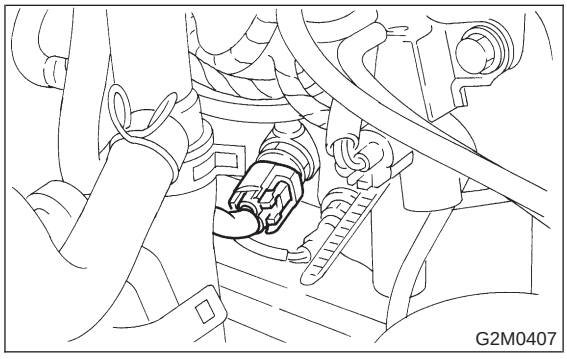
3) Loosen clamp which connects air intake duct to air intake chamber.



4) Disconnect emission hoses from air intake duct.
5) Remove air intake duct.

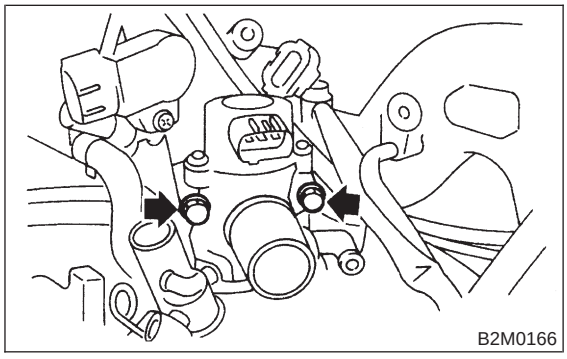


6) Disconnect connector from engine coolant temperature sensor.



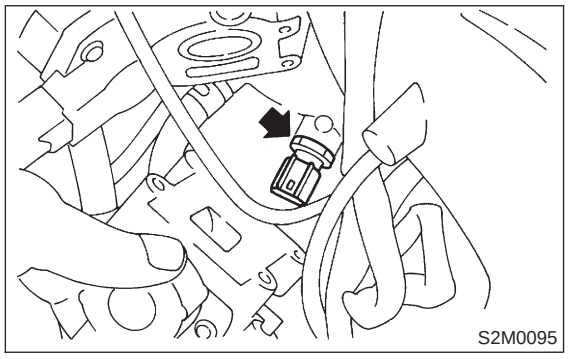
7) Remove bolts which install idle air control solenoid valve, and move it. <Ref. to 2-7 [W12A0].>

NOTE:
At this time, do not disconnect engine coolant hoses from idle air control solenoid valve.



8) Remove engine coolant temperature sensor.
9) Installation is in the reverse order of removal.

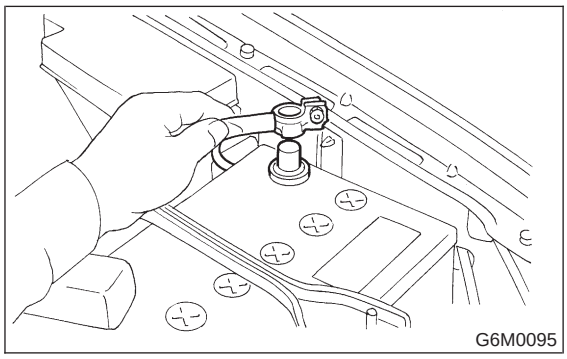
Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)


S2M0095

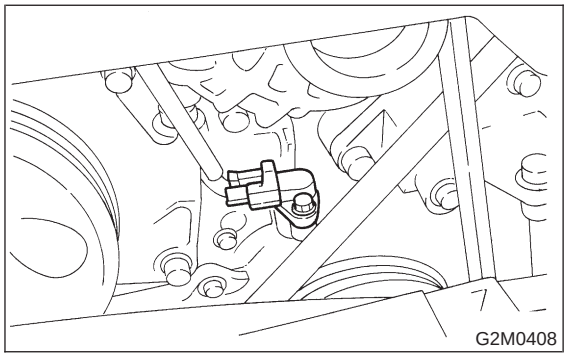
6. Crankshaft Position Sensor

A: REMOVAL AND INSTALLATION

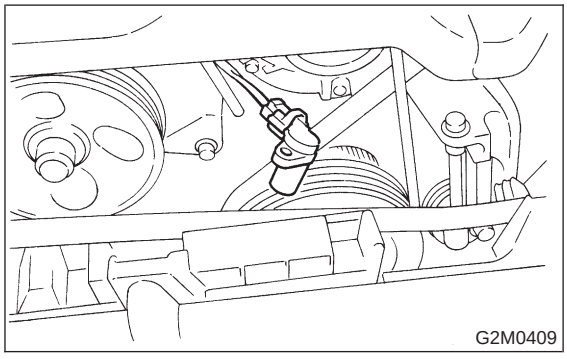
1) Disconnect battery ground cable.


G6M0095

2) Remove bolt which install crankshaft position sensor to cylinder block.

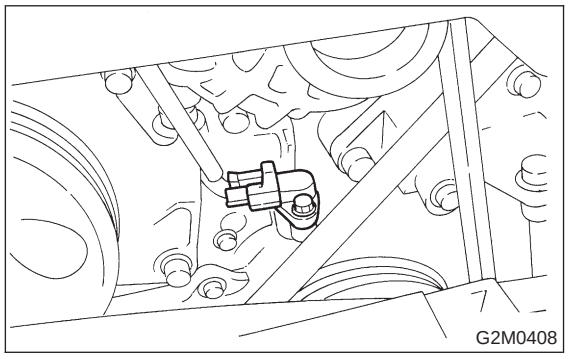

G2M0408

3) Remove crankshaft position sensor, and disconnect connector from it.


G2M0409

4) Installation is in the reverse order of removal.

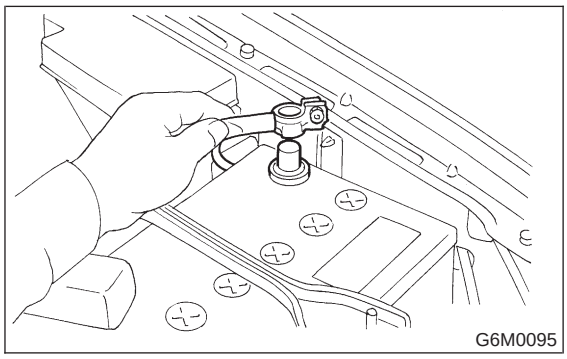
Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)


G2M0408

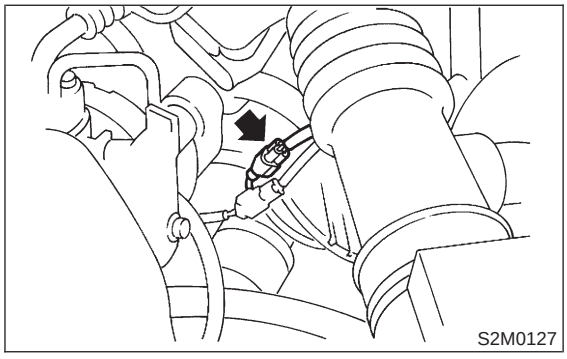
7. Front Oxygen Sensor

A: REMOVAL

1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector from front oxygen sensor.

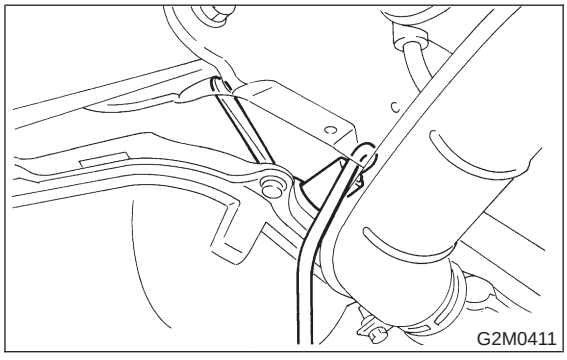

S2M0127

3) Lift-up the vehicle.
4) Apply SUBARU CRC or its equivalent to threaded portion of front oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

5) Remove front oxygen sensor.

CAUTION:
When removing oxygen sensor, do not force oxygen sensor especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.

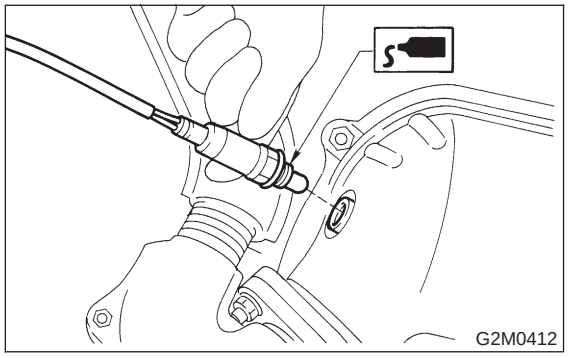

G2M0411

B: INSTALLATION

1) Before installing front oxygen sensor, apply anti-seize compound only to threaded portion of front oxygen sensor to make the next removal easier.

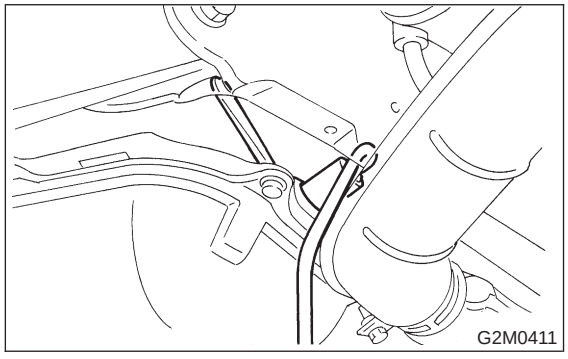
Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to protector of front oxygen sensor.

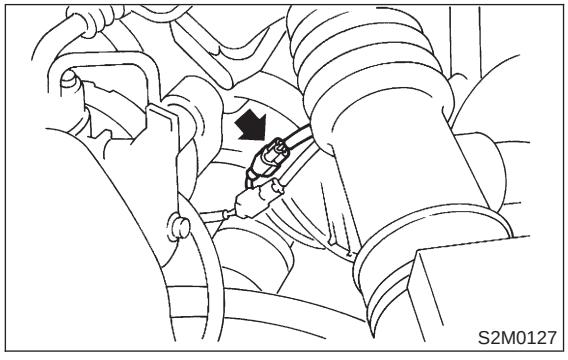


2) Install front oxygen sensor.

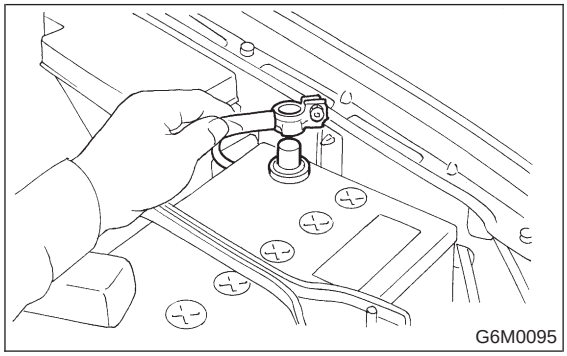
Tightening torque:
21±3 N·m (2.1±0.3 kg-m, 15.2±2.2 ft-lb)



3) Lower the vehicle.
4) Connect connector of front oxygen sensor.



5) Connect battery ground cable.

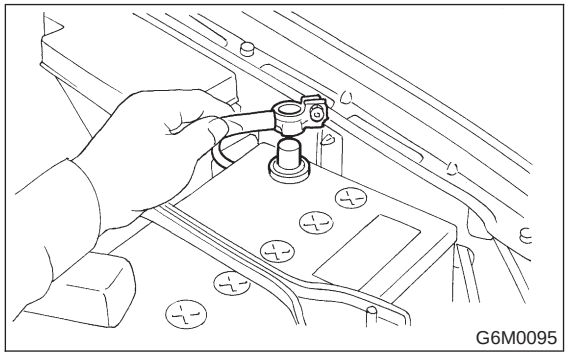


8. Rear Oxygen Sensor

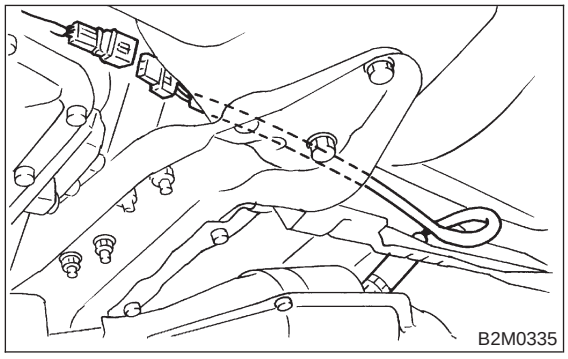
A: REMOVAL

1. EXCEPT CALIFORNIA SPEC. VEHICLES

1) Disconnect battery ground cable.


G6M0095

2) Lift-up the vehicle.
3) Disconnect connector from rear oxygen sensor.

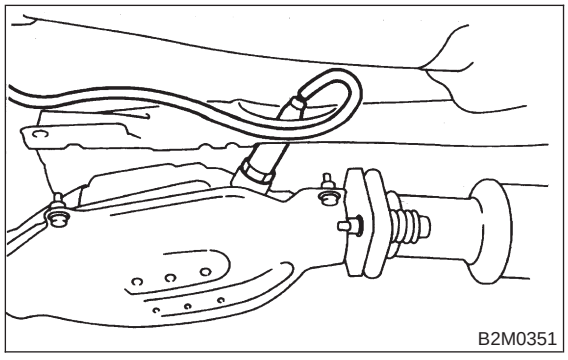

B2M0335

4) Apply SUBARU CRC or its equivalent to threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

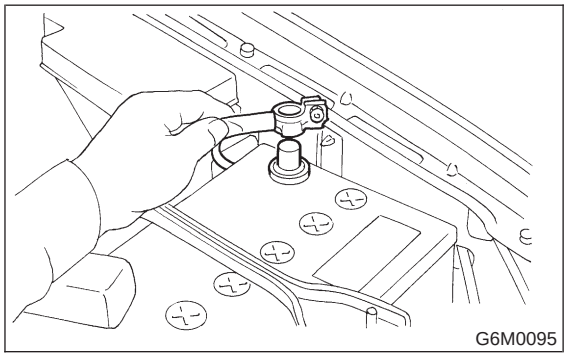
5) Remove rear oxygen sensor.

CAUTION:
When removing rear oxygen sensor, do not force rear oxygen sensor especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.

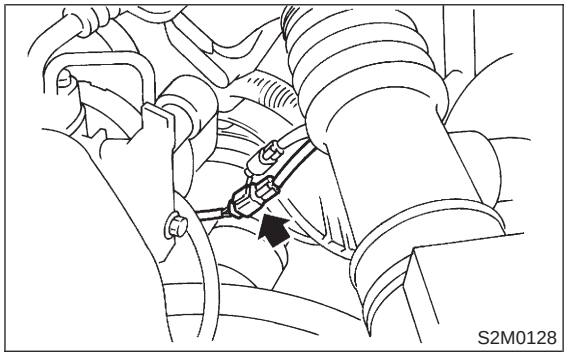

B2M0351

2. CALIFORNIA SPEC. VEHICLES

1) Disconnect battery ground cable.


G6M0095

2) Disconnect connector from rear oxygen sensor.

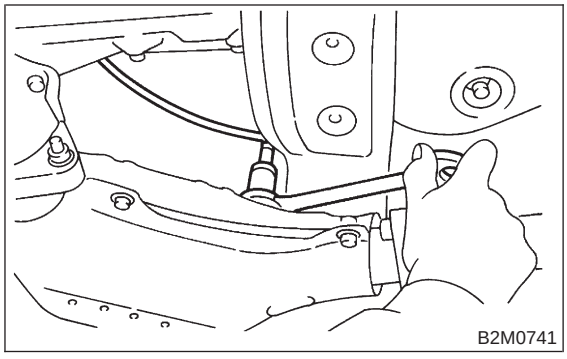

S2M0128

3) Lift-up the vehicle.
4) Apply SUBARU CRC or its equivalent to threaded portion of rear oxygen sensor, and leave it for one minute or more.

SUBARU CRC (Part No. 004301003)

5) Remove rear oxygen sensor.

CAUTION:
When removing rear oxygen sensor, do not force rear oxygen sensor especially when exhaust pipe is cold, otherwise it will damage exhaust pipe.


B2M0741

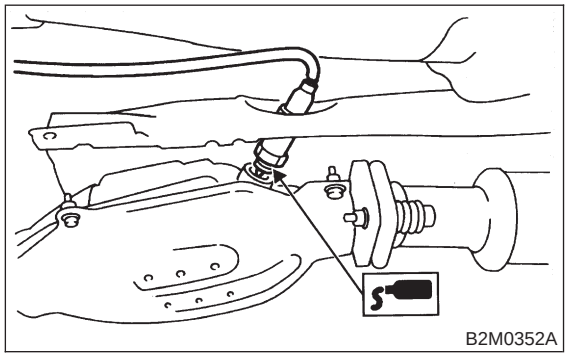
B: INSTALLATION

1. EXCEPT CALIFORNIA SPEC. VEHICLES

1) Before installing rear oxygen sensor, apply anti-seize compound only to threaded portion of rear oxygen sensor to make the next removal easier.

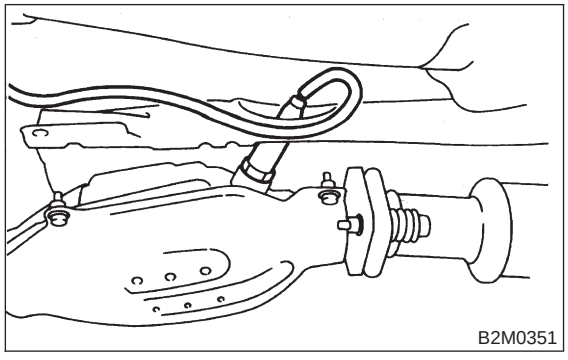
Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to protector of rear oxygen sensor.

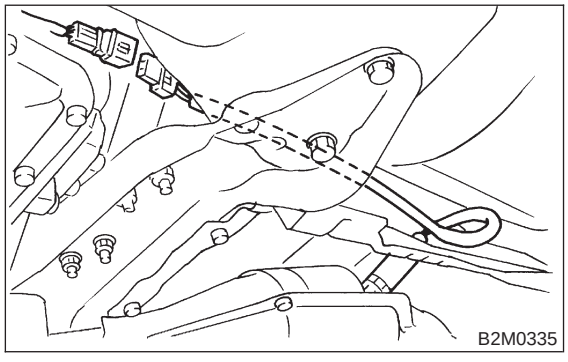

B2M0352A

2) Install rear oxygen sensor.

Tightening torque:
21±3 N·m (2.1±0.3 kg-m, 15.2±2.2 ft-lb)

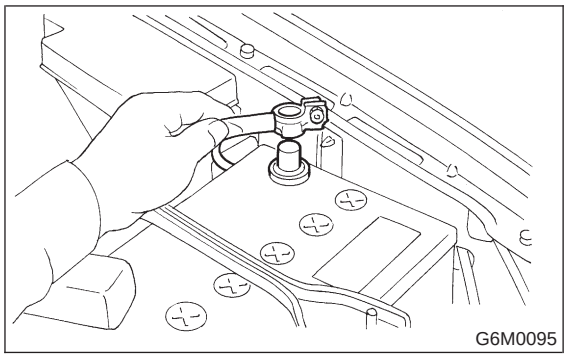

B2M0351

3) Connect connector of rear oxygen sensor.


B2M0335

4) Lower the vehicle.

5) Connect battery ground cable.

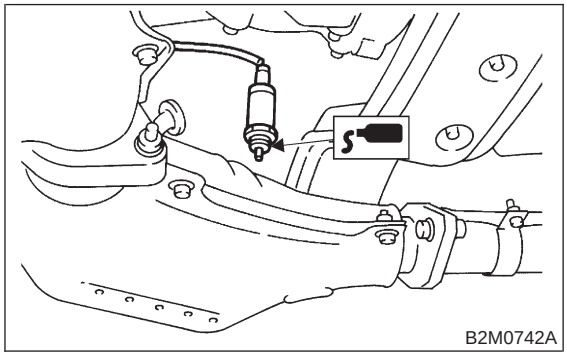

G6M0095

2. CALIFORNIA SPEC. VEHICLES

1) Before installing rear oxygen sensor, apply anti-seize compound only to threaded portion of rear oxygen sensor to make the next removal easier.

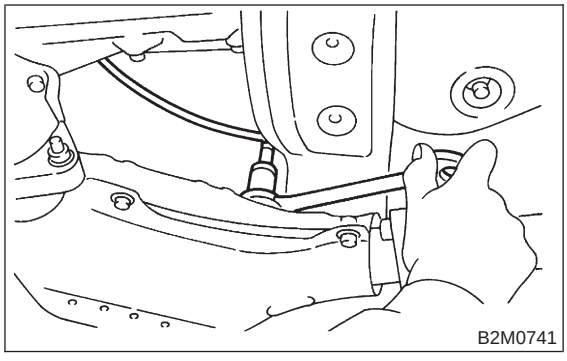
Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to protector of rear oxygen sensor.

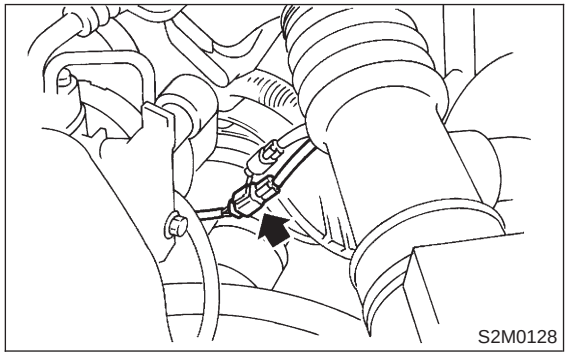

B2M0742A

2) Install rear oxygen sensor.

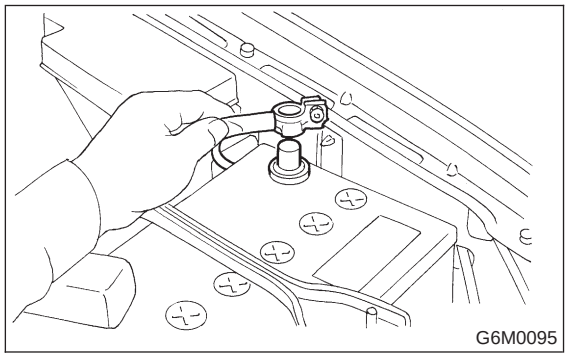
Tightening torque:
21±3 N·m (2.1±0.3 kg-m, 15.2±2.2 ft-lb)


B2M0741

3) Lower the vehicle.
4) Connect connector to rear oxygen sensor.



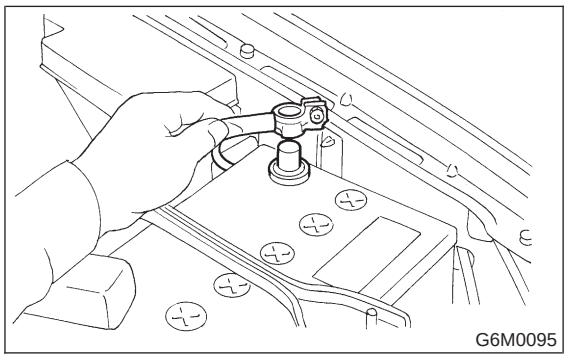
5) Connect battery ground cable.



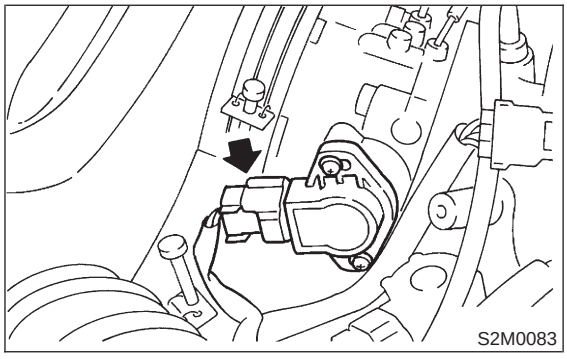
9. Throttle Position Sensor

A: REMOVAL AND INSTALLATION

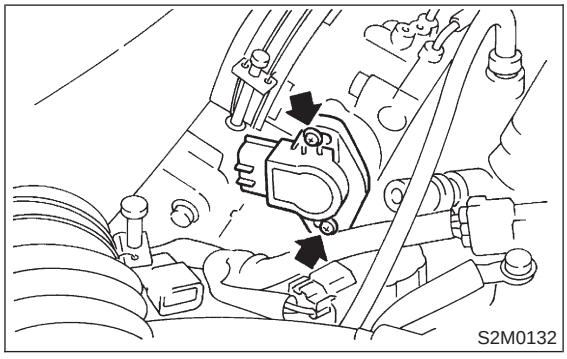
1) Disconnect battery ground cable.



2) Disconnect connector from throttle position sensor.



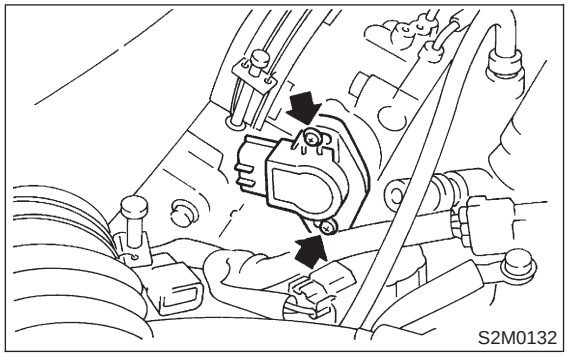
3) Remove throttle position sensor holding screws, and remove it.



4) Installation is in the reverse order of removal.

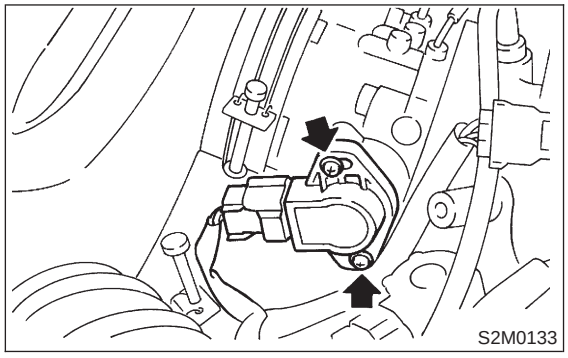
Tightening torque:
2.2±0.2 N·m (0.22±0.02 kg-m, 1.6±0.1 ft-lb)

CAUTION:
When installing throttle position sensor, adjust to the specified data.



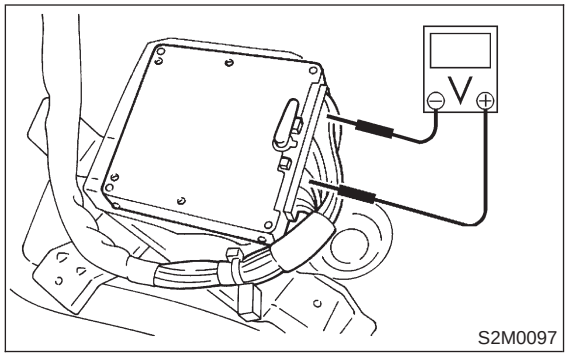
B: ADJUSTMENT

1) Turn ignition switch to OFF.
2) Loosen throttle position sensor holding screws.



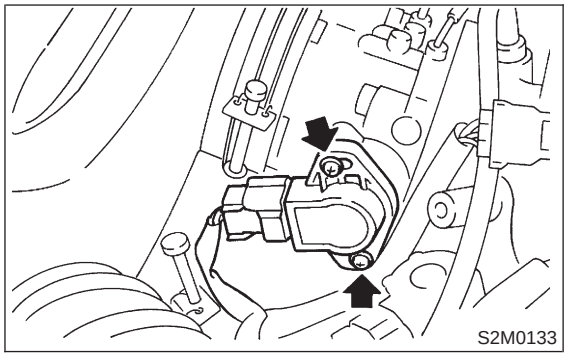
3) When using voltage meter;
   (1) Take out ECM.
   (2) Turn ignition switch to ON.
   (3) Adjust throttle position sensor so that signal voltage to ECM may be in specification.

Connector & terminal / Specified voltage
(B84) No. 6 — (B84) No. 20 / 0.45 — 0.55 V
[Fully closed.]



(4) Tighten throttle position sensor holding screws.

Tightening torque:
2.2±0.2 N·m (0.22±0.02 kg-m, 1.6±0.1 ft-lb)

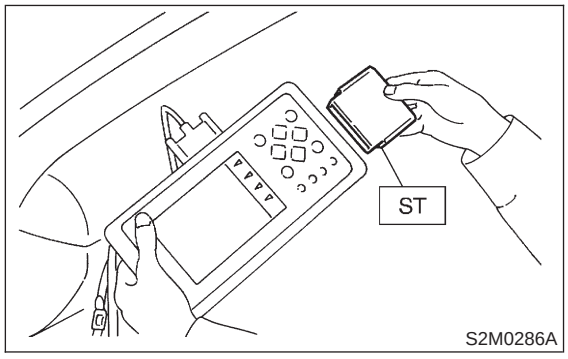


4) When using SUBARU SELECT MONITOR;

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

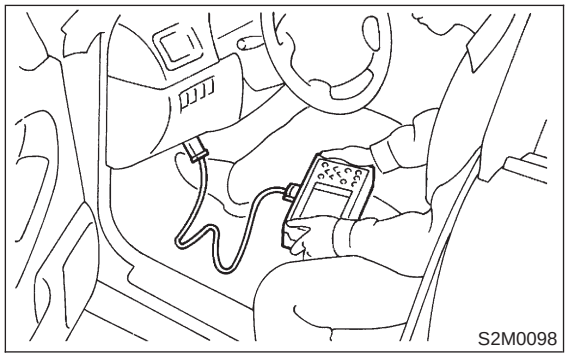
(1) Insert the cartridge to SUBARU SELECT MONITOR.

ST 24082AA030 CARTRIDGE



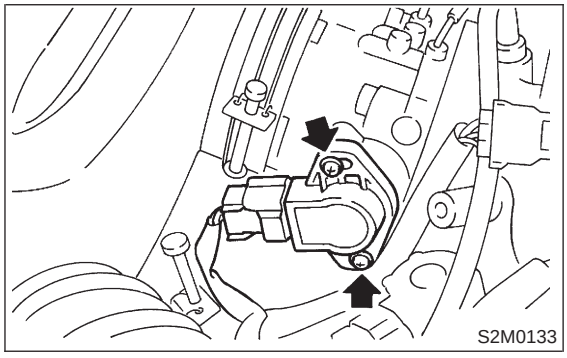
(2) Connect SUBARU SELECT MONITOR to the data link connector.
(3) Turn ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
(4) Select {2. Each System Check} in Main Menu.
(5) Select {EGI/EMPI} in Selection Menu.
(6) Select {1. Current Data Display & Save} in EGI/EMPI Diagnosis.
(7) Select {1.12 Data Display} in Data Display Menu.
(8) Adjust throttle position sensor to the following specifications.

Condition: Throttle fully closed
Throttle opening angle 0.00%
Throttle sensor voltage 0.50 V



(9) Tighten throttle position sensor holding screws.

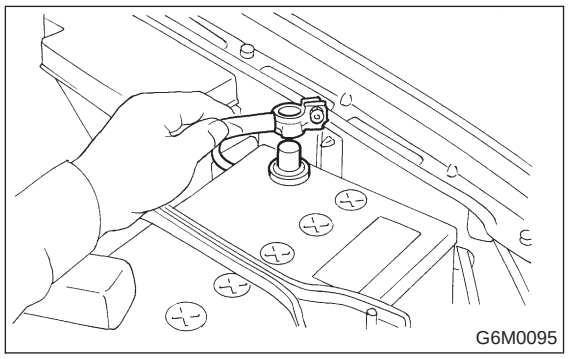
Tightening torque:
2.2±0.2 N·m (0.22±0.02 kg-m, 1.6±0.1 ft-lb)



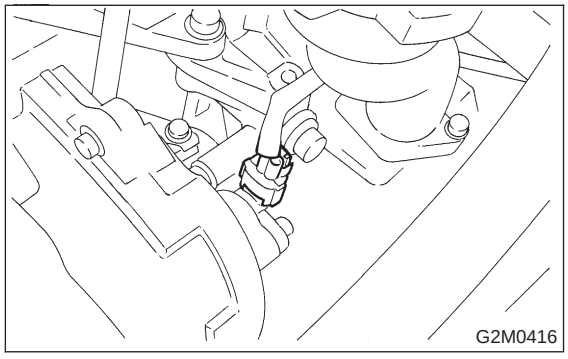
10. Camshaft Position Sensor

A: REMOVAL AND INSTALLATION

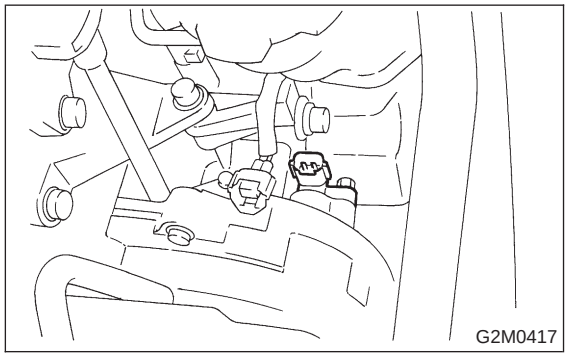
1) Disconnect battery ground cable.



2) Disconnect connector from camshaft position sensor.



3) Remove camshaft position sensor from camshaft support LH.



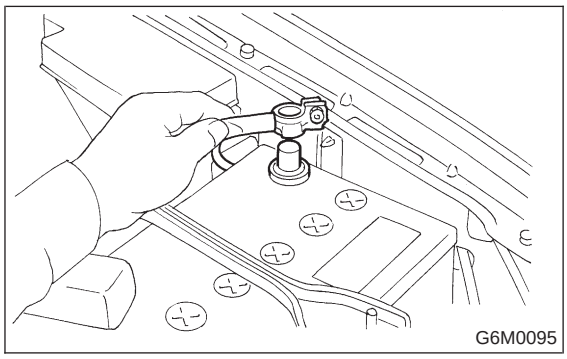
4) Installation is in the reverse order of removal.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

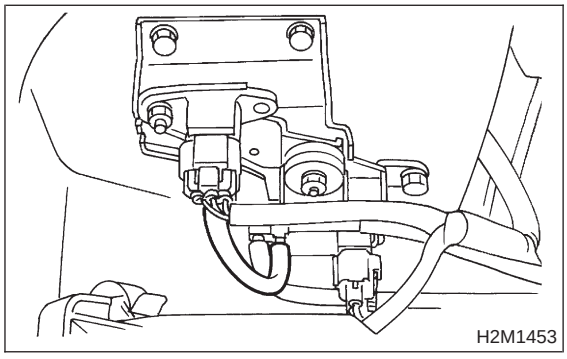
11. Pressure Sensor

A: REMOVAL AND INSTALLATION

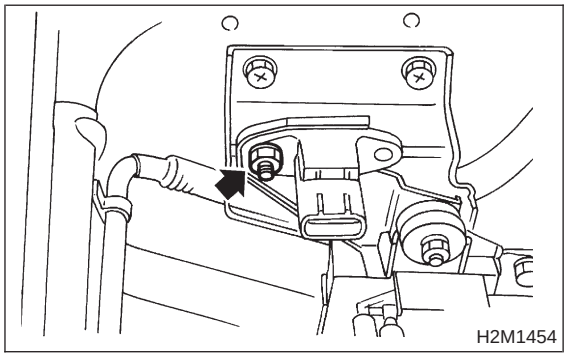
1) Disconnect battery ground cable.



2) Disconnect connector from pressure sensor.
3) Disconnect hose from pressure sensor.



4) Remove pressure sensor from bracket.



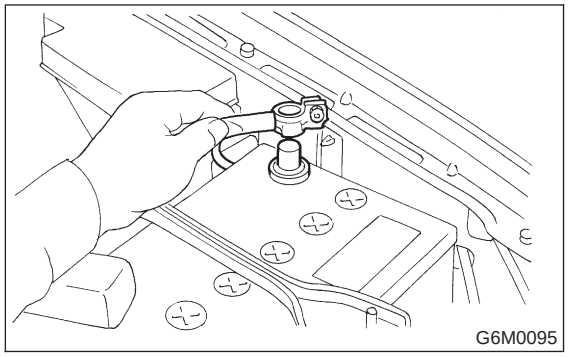
5) Installation is in the reverse order of removal.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

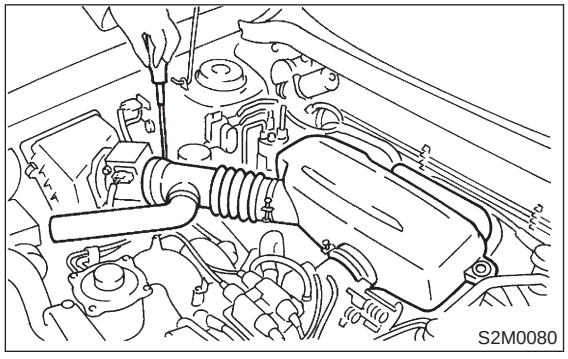
12. Idle Air Control Solenoid Valve

A: REMOVAL AND INSTALLATION

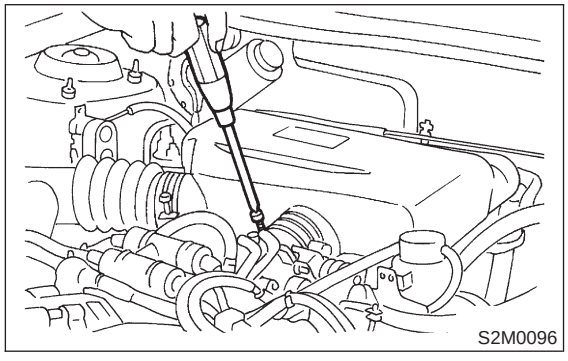
1) Disconnect battery ground cable.



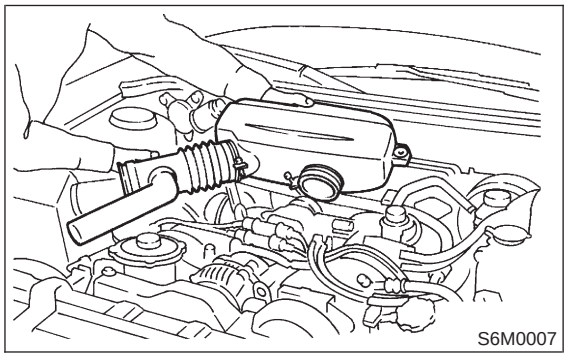
2) Loosen clamp which connects air intake duct to mass air flow sensor.



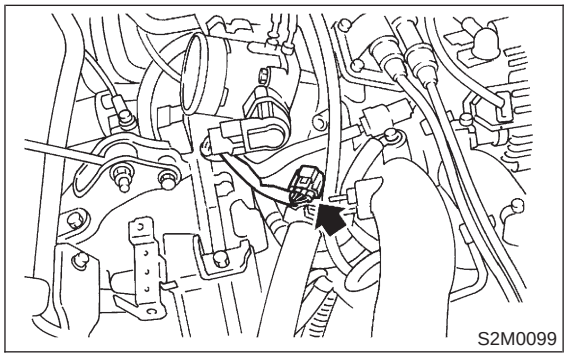
3) Loosen clamp which connects air intake chamber to throttle body.



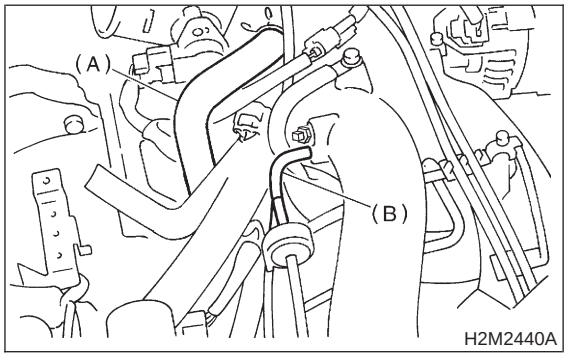
4) Disconnect blow-by hose and air hose, and remove air intake chamber and air intake duct as a unit.



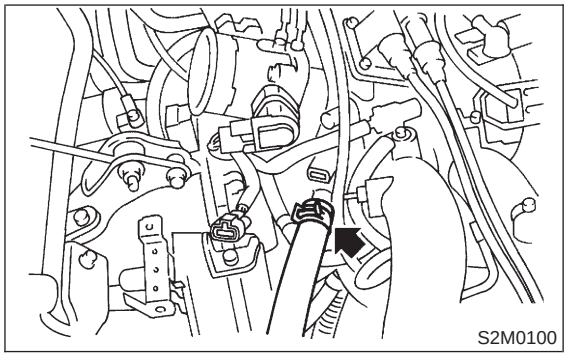
5) Disconnect connector from idle air control solenoid valve.



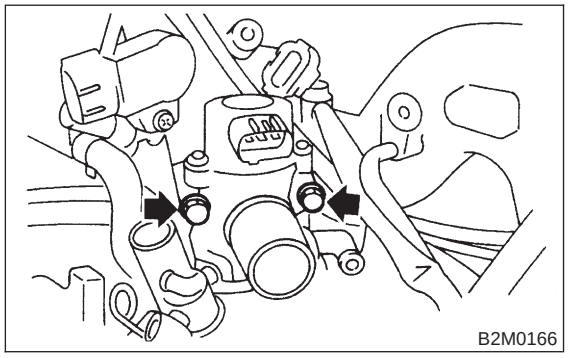
6) Disconnect PCV hose (A) and pressure regulator vacuum hose (B).



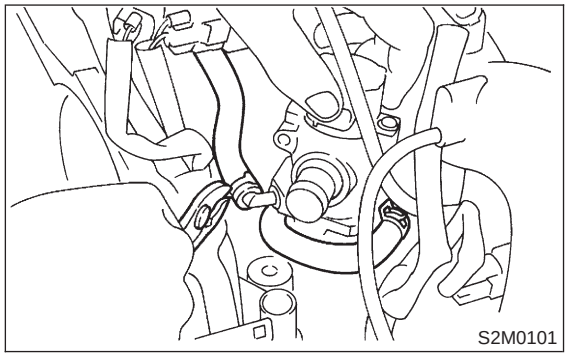
7) Disconnect air by-pass hose from idle air control solenoid valve.



8) Remove bolts which install idle air control solenoid valve to throttle body.


B2M0166

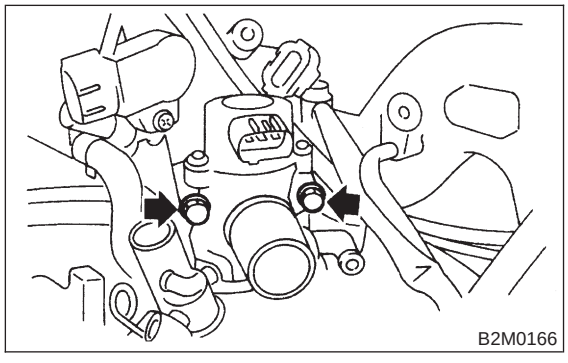
9) Disconnect engine coolant hoses from idle air control solenoid valve, and take them off.


S2M0101

10) Installation is in the reverse order of removal.

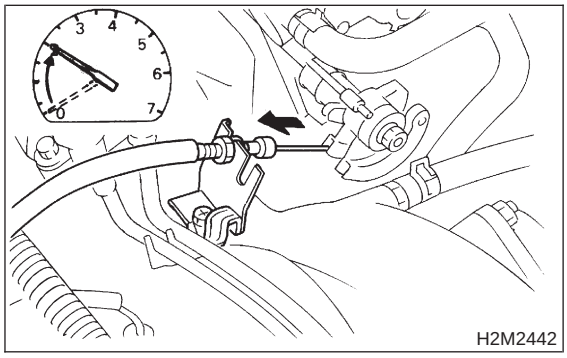
CAUTION:
Replace gasket with a new one.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

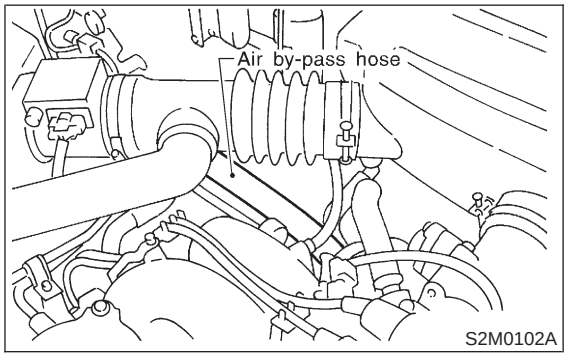

B2M0166

B: CLEANING

1) Start and warm-up the engine until radiator fan operates.
2) Hold throttle valve so that engine speed is at 2,000 rpm.


H2M2442

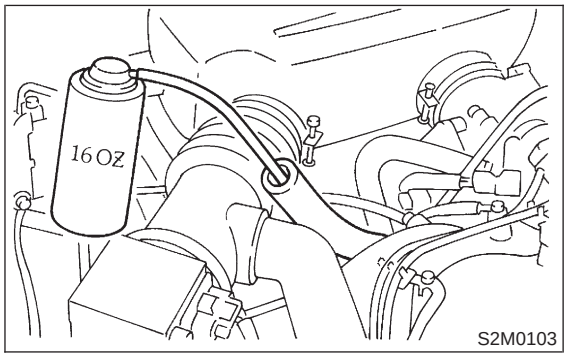
3) Disconnect air by-pass hose from air intake duct.



S2M0102A

4) Slowly pour one can (16 oz) of cleaner into by-pass air hole.

Cleaner:
Part No. 1050002 GM Top Engine Cleaner
Part No. X66-A AC Delco Carburetor Tune-up Conditioner

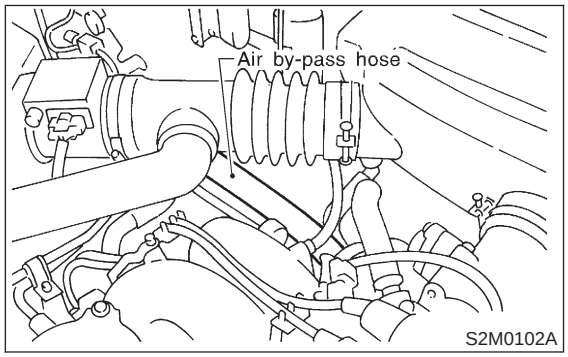


S2M0103

5) Leave the engine running for five minutes.

NOTE:
White smoke comes out of the muffler until the cleaner is used up.

6) Stop the engine.
7) Release the throttle valve.
8) Connect air by-pass hose to air intake duct.

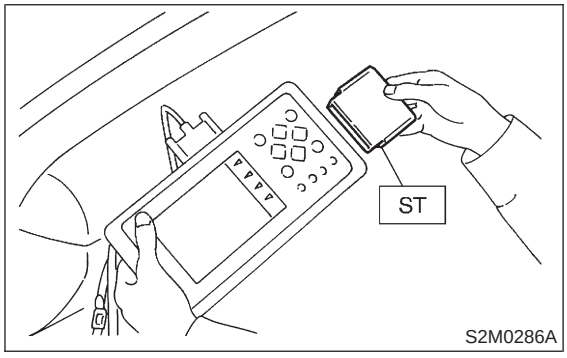


9) Check duty ratio of idle air control solenoid valve using SUBARU SELECT MONITOR.

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

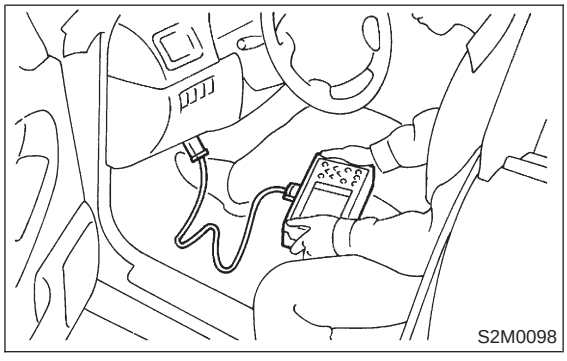
(1) Insert the cartridge to SUBARU SELECT MONITOR.

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(2) Connect SUBARU SELECT MONITOR to the data link connector.
(3) Turn ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
(4) Select {2. Each System Check} in Main Menu.
(5) Select {EGI/EMPI} in Selection Menu.
(6) Select {1. Current Data Display & Save} in EGI/EMPI Diagnosis.
(7) Select {1.12 Data Display} in Data Display Menu.
(8) Adjust throttle position sensor to the following specification.

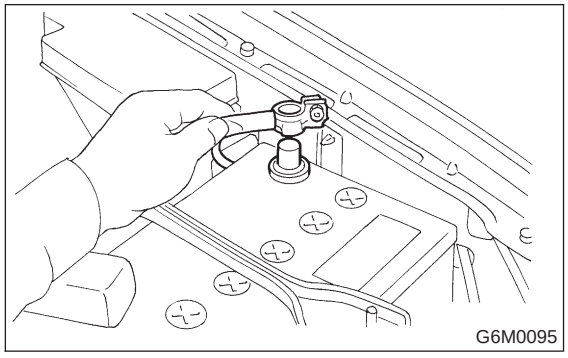
ISC valve duty ratio: 25 — 40%



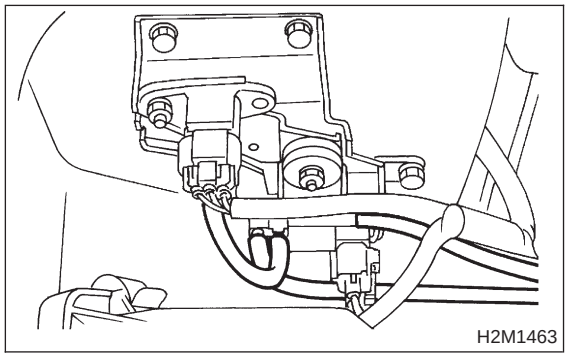
13. Pressure Sources Switching Solenoid Valve

A: REMOVAL AND INSTALLATION

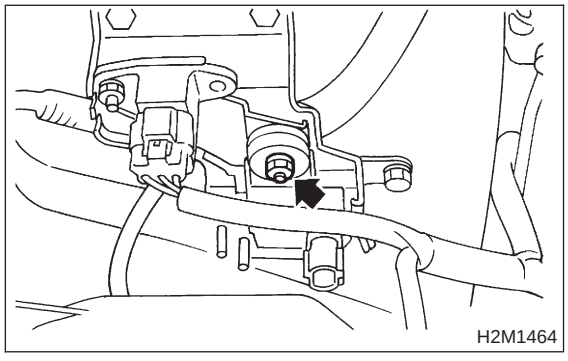
1) Disconnect battery ground cable.



2) Disconnect connector from pressure sources switching solenoid valve.
3) Disconnect hoses from pressure sources switching solenoid valve.



4) Remove pressure sources switching solenoid valve from bracket.



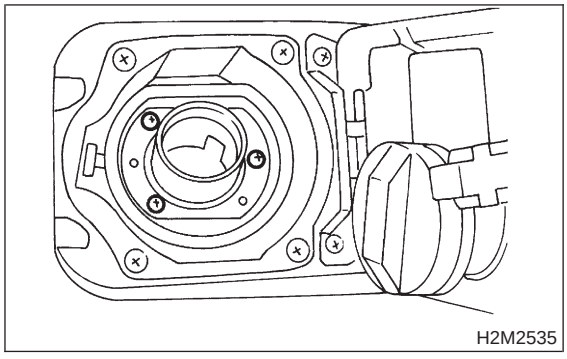
5) Installation is in the reverse order of removal.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)

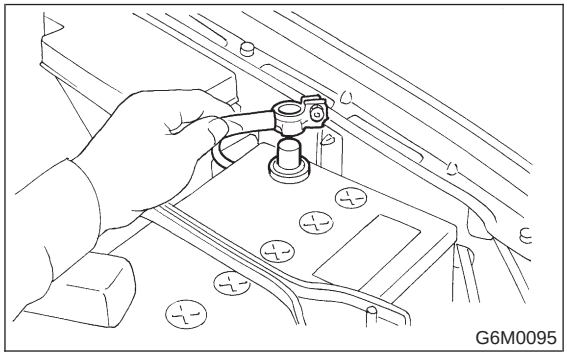
14. Fuel Injector

A: REMOVAL AND INSTALLATION

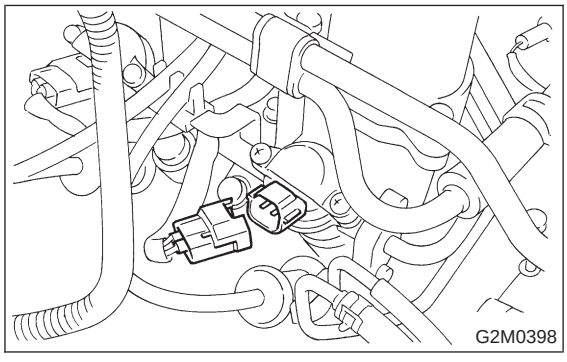
1) Release fuel pressure.
<Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



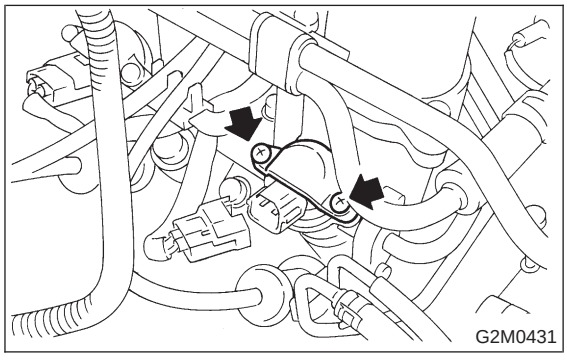
3) Disconnect battery ground cable.



4) Disconnect connector from fuel injector.



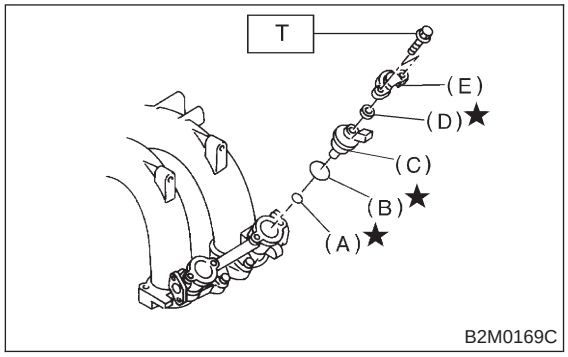
5) Remove fuel injector from fuel pipe assembly.



6) Installation is in the reverse order of removal.

CAUTION:
Replace O-rings and insulator.

Tightening torque:
T: 3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

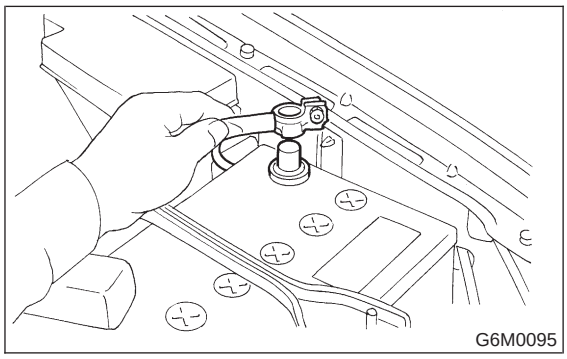


(A) O-ring B
(B) O-ring A
(C) Fuel injector
(D) Insulator
(E) Fuel injector cup
★: Replacement part

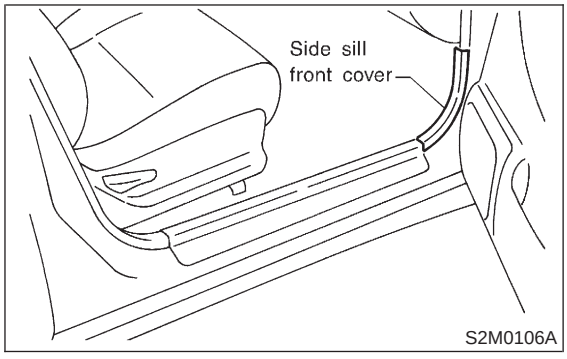
15. Engine Control Module

A: REMOVAL AND INSTALLATION

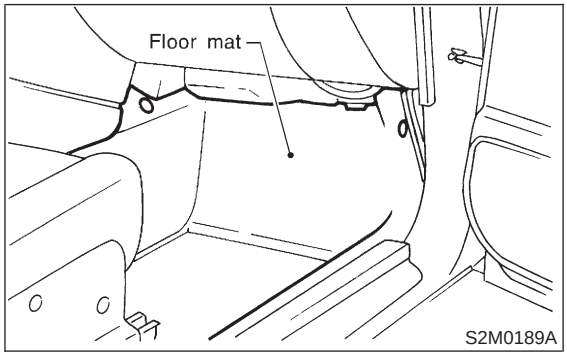
1) Disconnect battery ground cable.



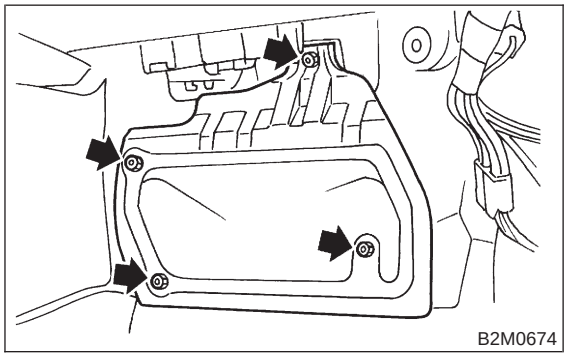
2) Remove side sill front cover.



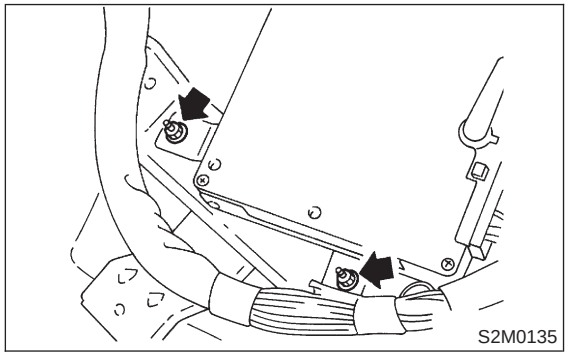
3) Detach floor mat of front passenger seat.



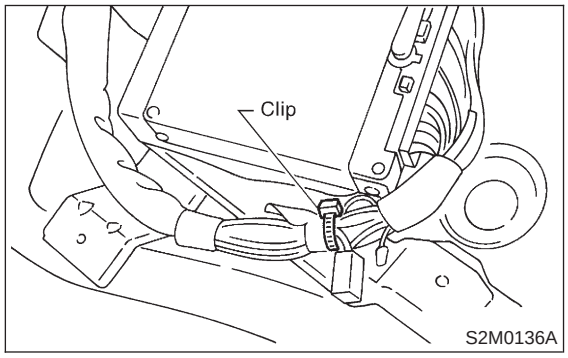
4) Remove protect cover.



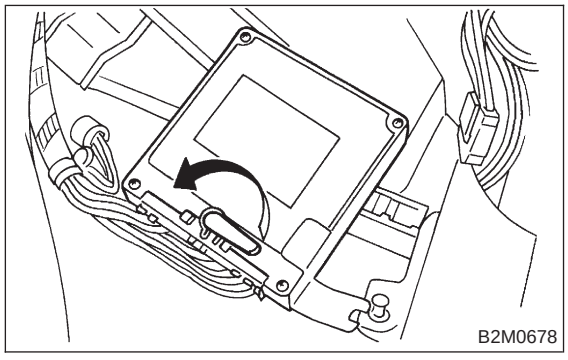
5) Remove vinyl cover and nuts which attach ECM to bracket.



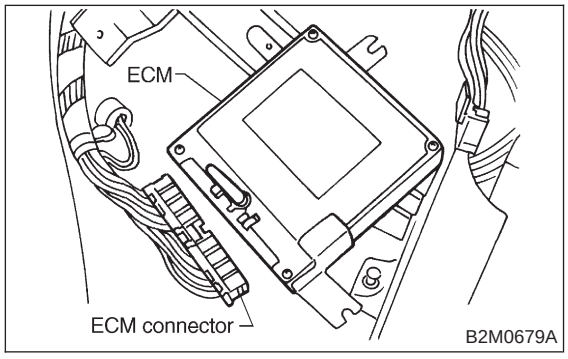
6) Detach clip from bracket.



7) Disconnect ECM connector.



8) Take out ECM.

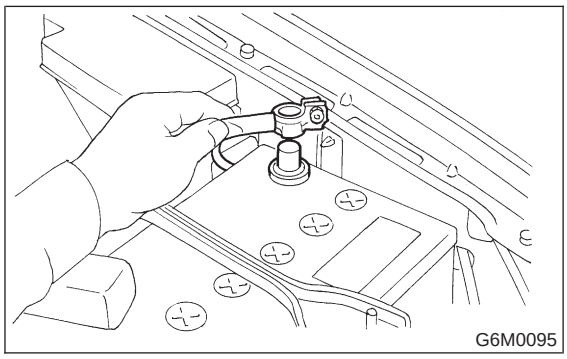


9) Installation is in the reverse order of removal.

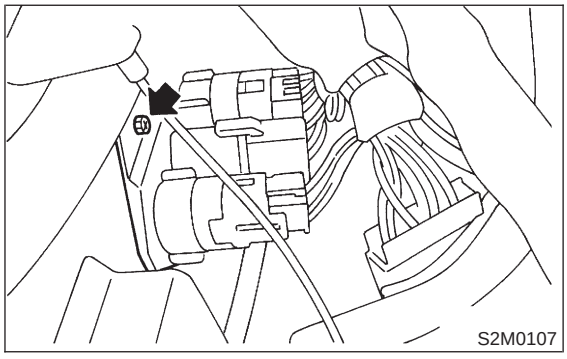
16. Main Relay

A: REMOVAL AND INSTALLATION

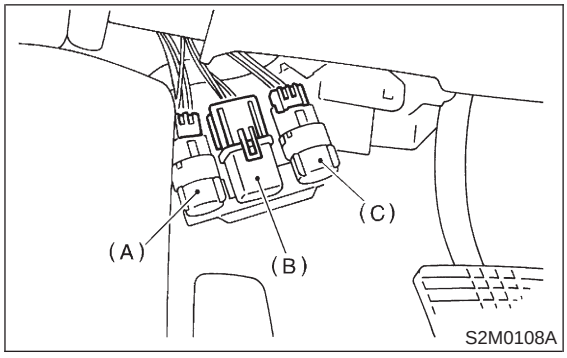
1) Disconnect battery ground cable.



2) Remove bolt which holds bracket of main relay and fuel pump relay.

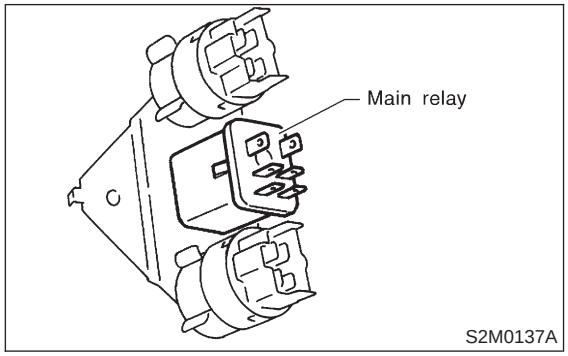


3) Disconnect connectors from relays.



(A) Rear accessory power supply relay
(B) Main relay
(C) Fuel pump relay

4) Remove main relay from mounting bracket.

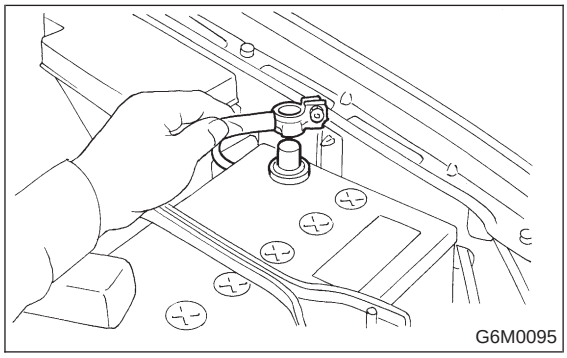


5) Installation is in the reverse order of removal.

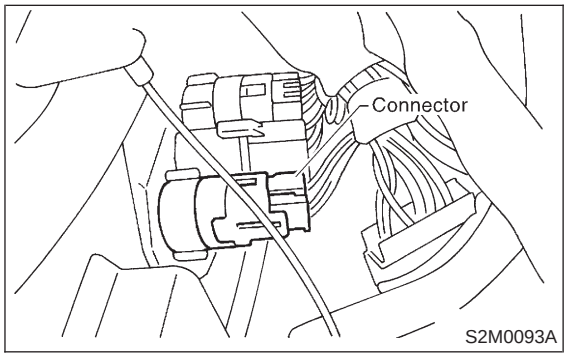
17. Fuel Pump Relay

A: REMOVAL AND INSTALLATION

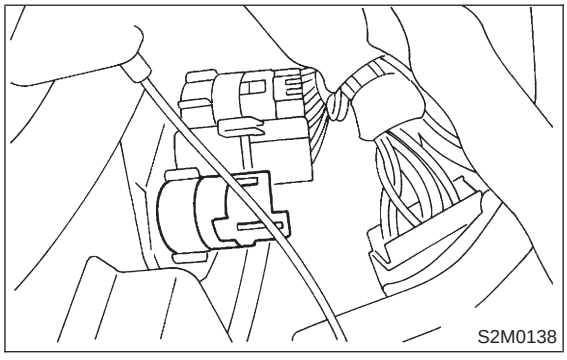
1) Disconnect battery ground cable.



2) Disconnect connector from fuel pump relay.



3) Remove fuel pump relay from mounting bracket.

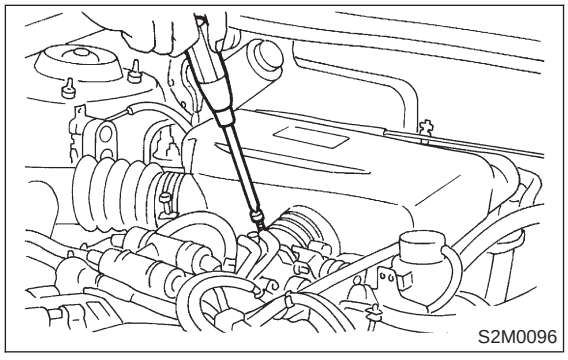


4) Installation is in the reverse order of removal.

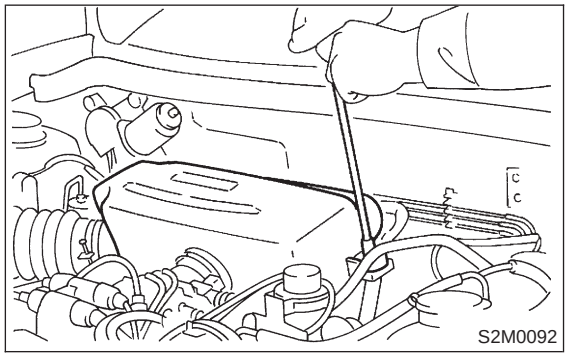
18. Air Intake Chamber

A: REMOVAL AND INSTALLATION

1) Loosen clamps which connect air intake chamber to throttle body and air intake duct.



2) Disconnect air hoses from air intake chamber.
3) Remove bolts which secure air intake chamber to stays.



4) Remove air intake chamber.
5) Installation is in the reverse order of removal.

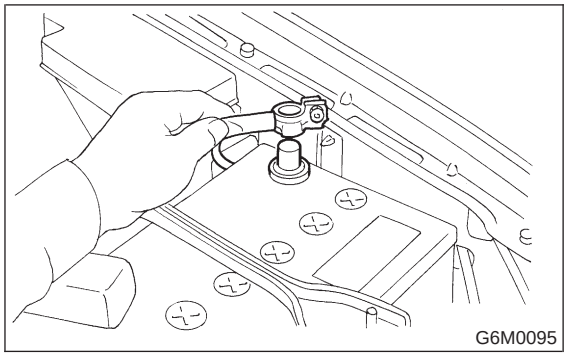
Tightening torque:
4.9±0.5 N·m (0.5±0.05 kg-m, 3.6±0.4 ft-lb)

19. Knock Sensor

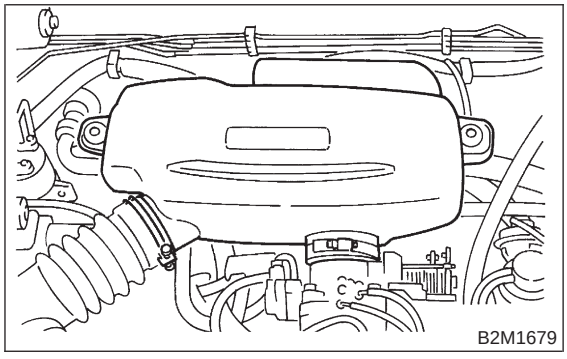
A: REMOVAL

1. 2200 cc MODEL

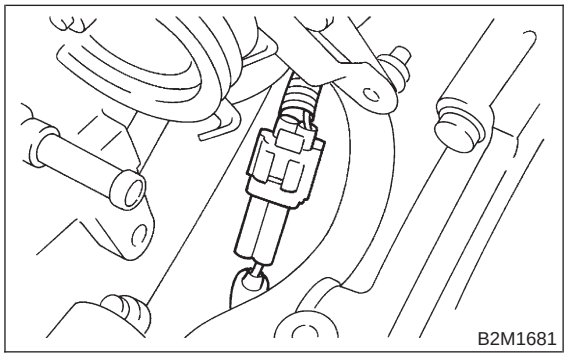
1) Disconnect battery ground cable from battery ground terminal.



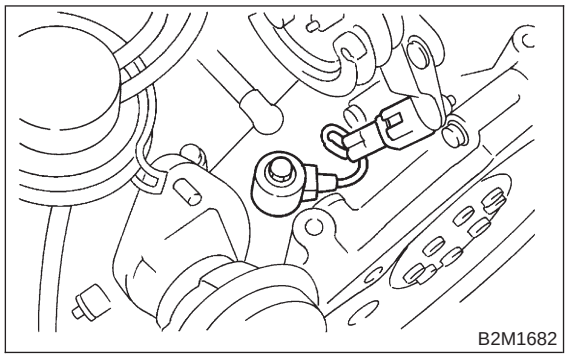
2) Remove air intake chamber.
<Ref. to 2-7 [W18A0].>



3) Disconnect knock sensor connector.

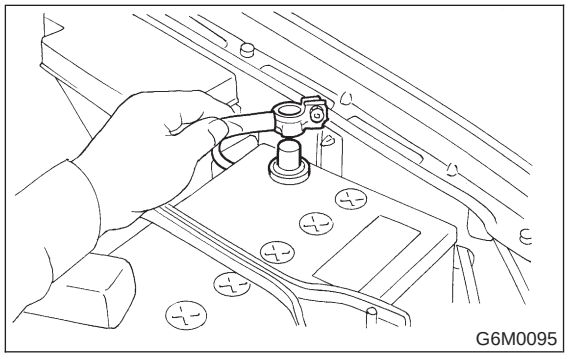


4) Remove knock sensor from cylinder block.

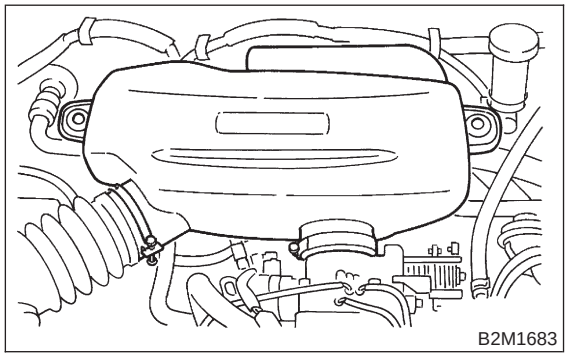

B2M1682

2. 2500 cc MODEL

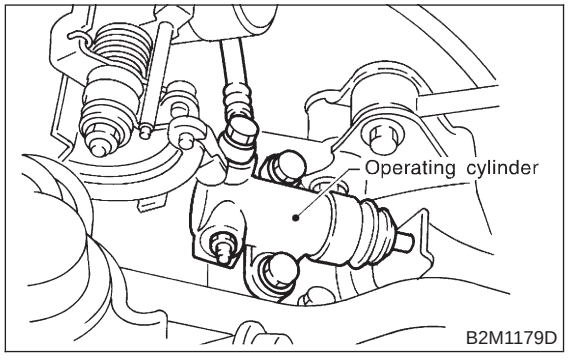
1) Disconnect battery ground cable from battery ground terminal.


G6M0095

2) Remove air intake chamber.
<Ref. to 2-7 [W18A0].>

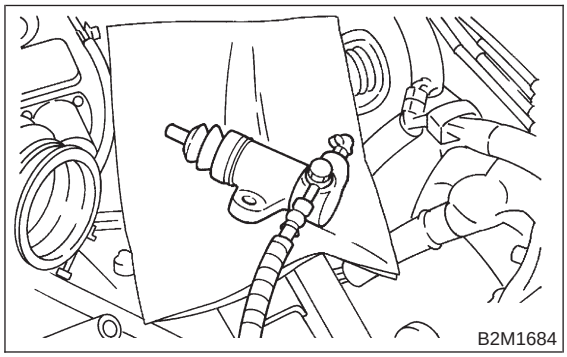

B2M1683

3) Remove operating cylinder. (MT vehicle only)
<Ref. to 2-10 [W5A0].>

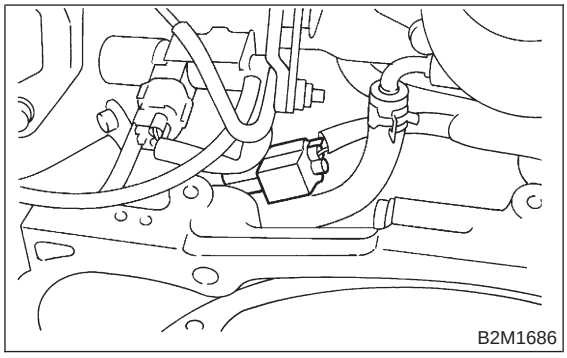


B2M1179D

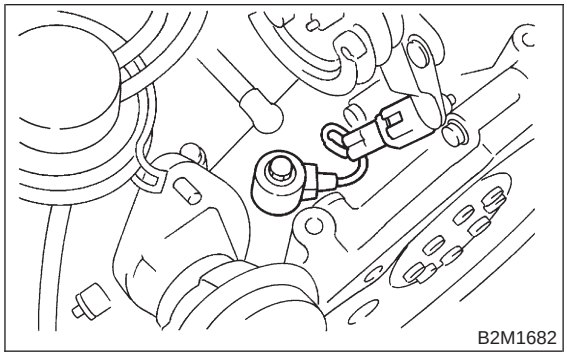
NOTE:
Place the operating cylinder where it will not interfere with the work in process.


B2M1684

4) Disconnect knock sensor connector.


B2M1686

5) Remove knock sensor from cylinder block.


B2M1682

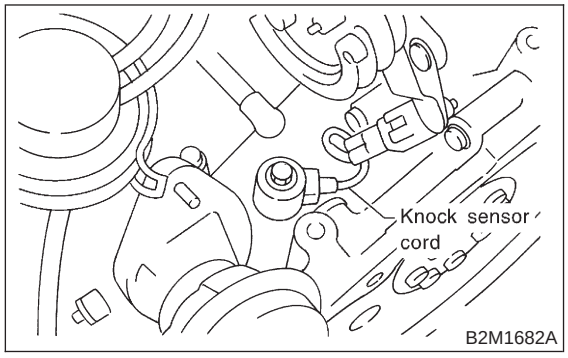
B: INSTALLATION

1. 2200 cc MODEL

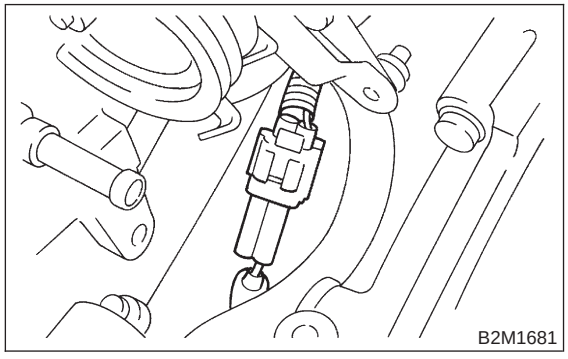
1) Install knock sensor to cylinder block.

Tightening torque:
23.5±2.9 N·m (2.4±0.3 kg-m, 17.3±2.1 ft-lb)

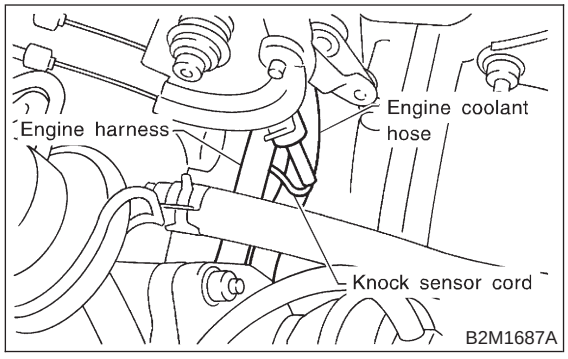
NOTE:
The extraction area of the knock sensor cord must be positioned at a 45° angle relative to the engine rear.



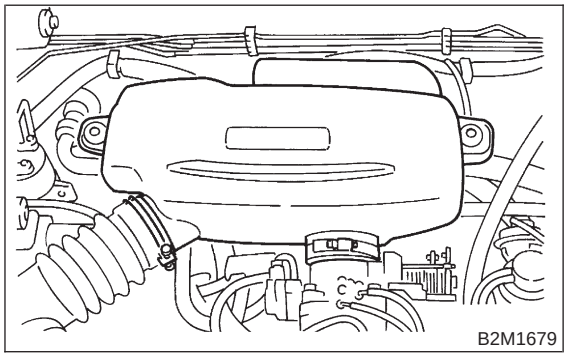
2) Connect knock sensor connector.



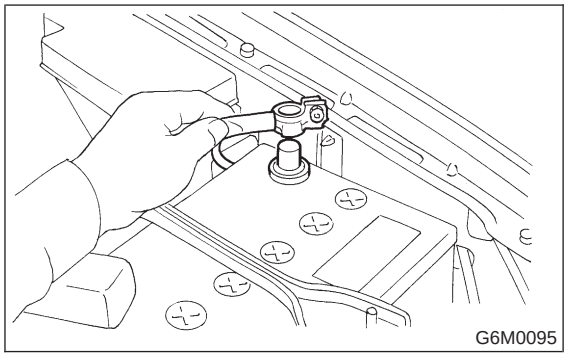
NOTE:
The knock sensor cord must pass between the engine harness and engine coolant hose.



3) Install air intake chamber. <Ref. to 2-7 [W18A0].>



4) Connect battery ground cable to battery ground terminal.

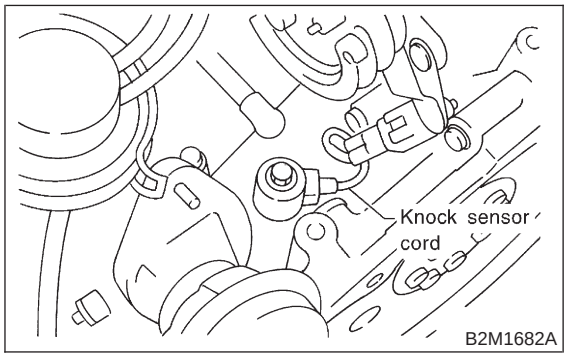


2. 2500 cc MODEL

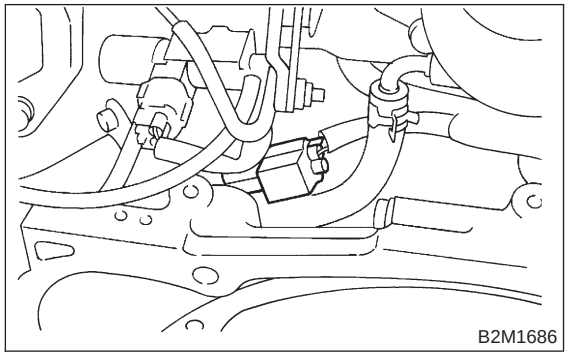
1) Install knock sensor to cylinder block.

Tightening torque:
23.5±2.9 N·m (2.4±0.3 kg-m, 17.3±2.1 ft-lb)

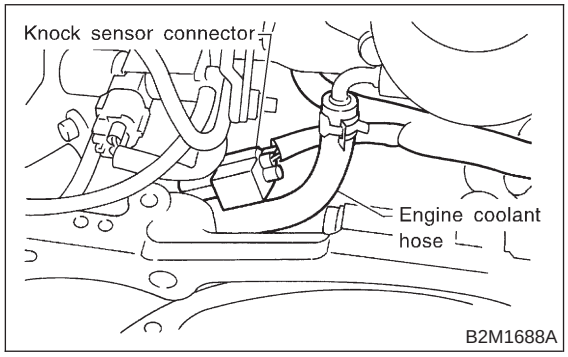
NOTE:
The extraction area of the knock sensor cord must be positioned at a 45° angle relative to the engine rear.

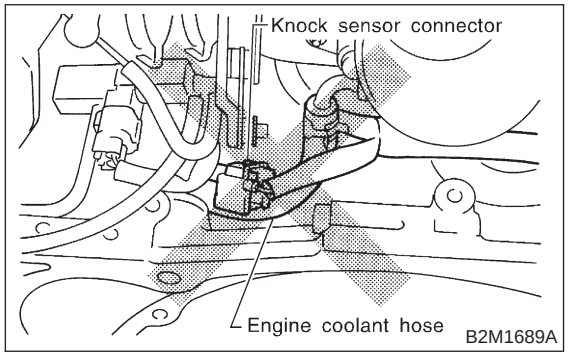


2) Connect knock sensor connector.



NOTE:
The connector must be connected to the engine front end of the engine coolant hose.

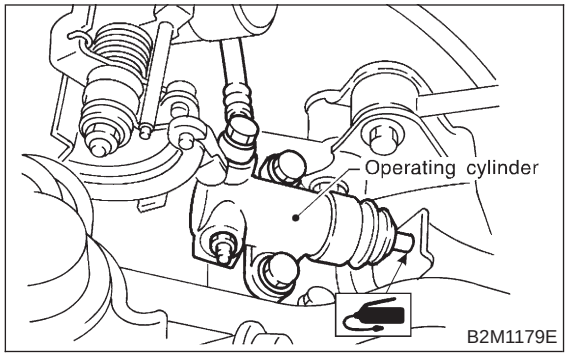




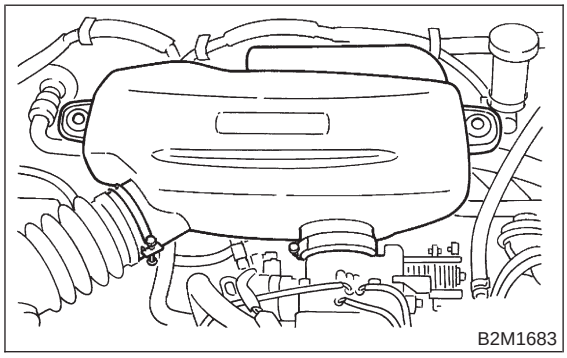
3) Install operating cylinder. (MT vehicle only)

Tightening torque:
37±3 N·m (3.8±0.3 kg-m, 27.3±2.2 ft-lb)

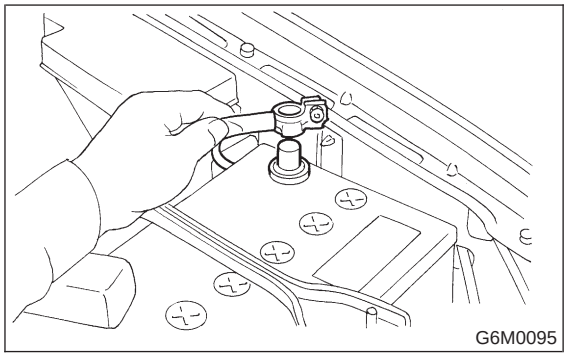
NOTE:
Apply grease to contact point of release lever and operating cylinder rod. <Ref. to 2-10 [W5A0].>



4) Install air intake chamber. <Ref. to 2-7 [W18A0].>



5) Connect battery ground cable to battery ground terminal.



MEMO:

FUEL SYSTEM 2-8

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4. Fuel Filter 36
5. Fuel Pump 37
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7. Fuel Delivery, Return and Evaporation Lines 40
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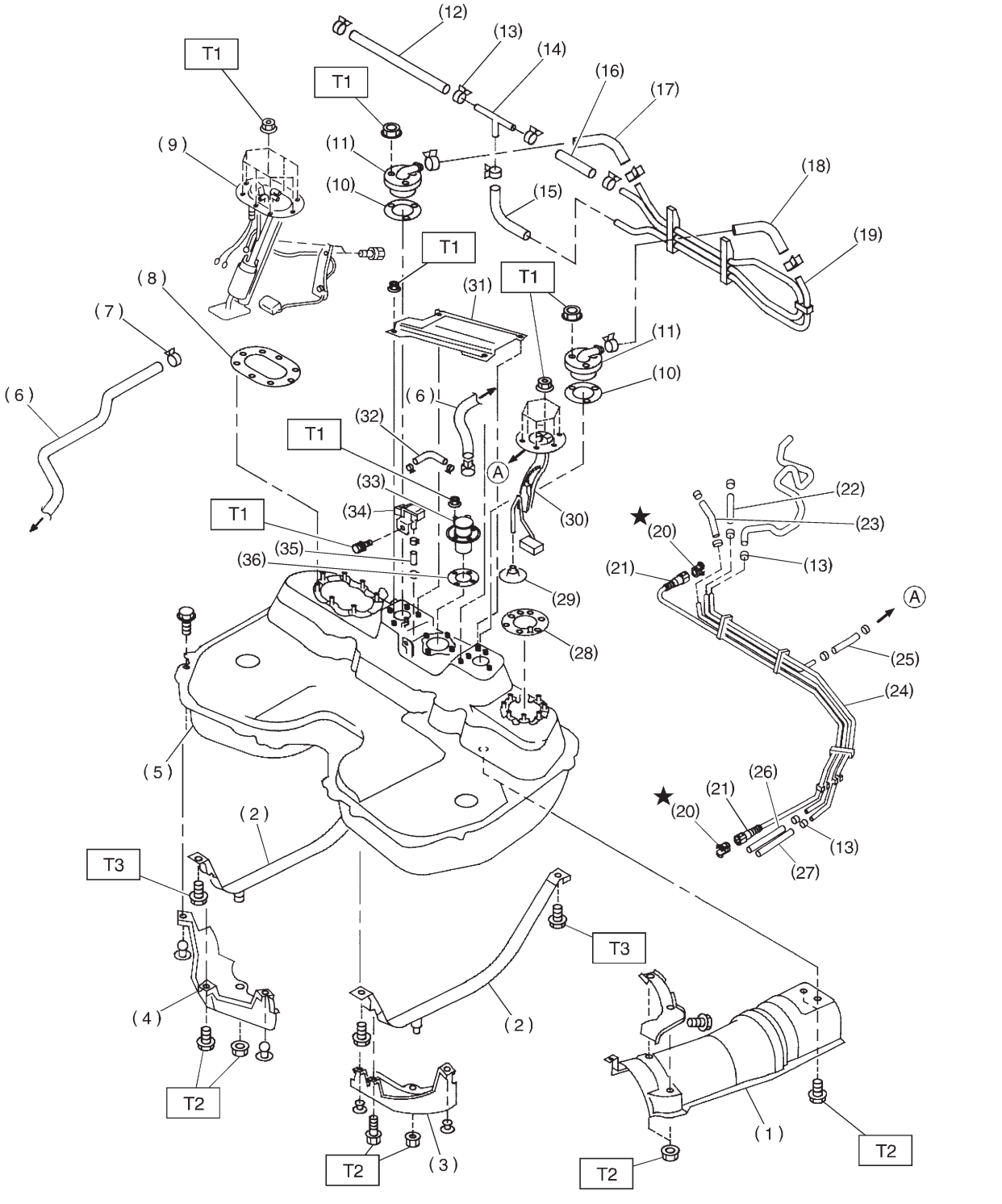
1. Fuel System

Model		2200 cc	2500 cc
Fuel tank	Capacity	60 ℓ (15.9 US gal, 13.2 Imp gal)	
	Location	Under rear seat	
Fuel pump	Type	Impeller	
	Discharge pressure	250.1 kPa (2.55 kg/cm^2, 36.3 psi)	
	Discharge flow	More than 80 ℓ (21.1 US gal, 17.6 Imp gal)/h [12 V at 250.1 kPa (2.55 kg/cm^2, 36.3 psi)]	More than 80 ℓ (21.1 US gal, 17.6 Imp gal)/h [12 V at 300 kPa (3.06 kg/cm^2, 43.5 psi)]
Fuel filter		Cartridge type	

MEMO:

1. Fuel Tank

A: 2200 cc MODEL

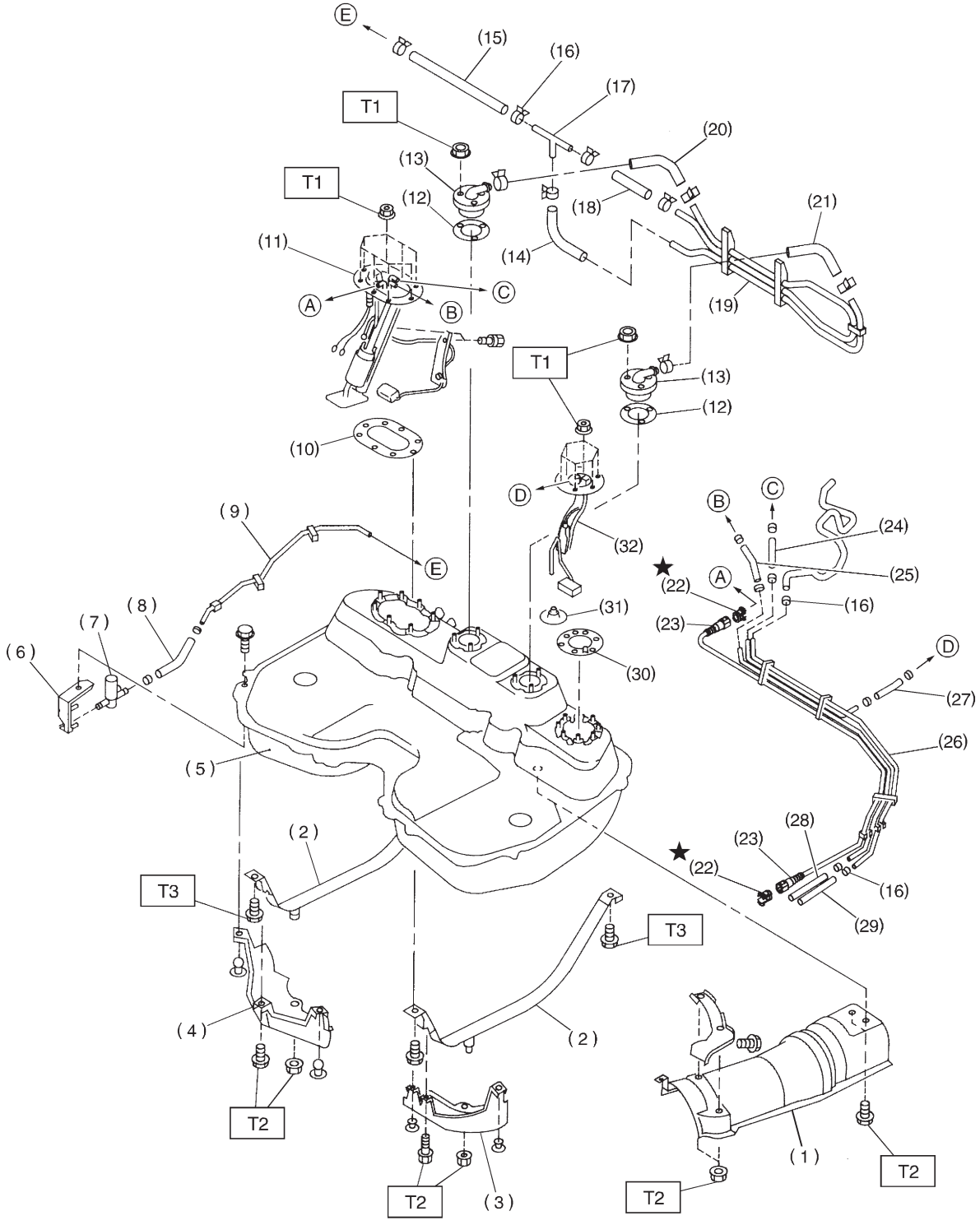


H2M2533A

(1) Heat seated cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Canister hose A
(7) Clip
(8) Fuel pump gasket
(9) Fuel pump ASSY
(10) Fuel cut valve gasket
(11) Fuel cut valve
(12) Fuel delivery hose A
(13) Clip
(14) Joint pipe
(15) Evaporation hose C
(16) Evaporation hose B
(17) Evaporation hose D
(18) Evaporation hose E
(19) Evaporation pipe ASSY
(20) Retainer
(21) Quick connector
(22) Jet pump hose A
(23) Fuel return hose A
(24) Fuel pipe ASSY
(25) Jet pump hose B
(26) Fuel return hose B
(27) Evaporation hose F
(28) Fuel sub meter gasket
(29) Jet pump filter
(30) Fuel sub meter unit
(31) Protector cover
(32) Vent valve hose
(33) Vent valve
(34) Fuel tank pressure sensor
(35) Fuel tank pressure sensor hose
(36) Vent valve gasket

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 33±10 (3.4±1.0, 25±7)

B: 2500 cc MODEL



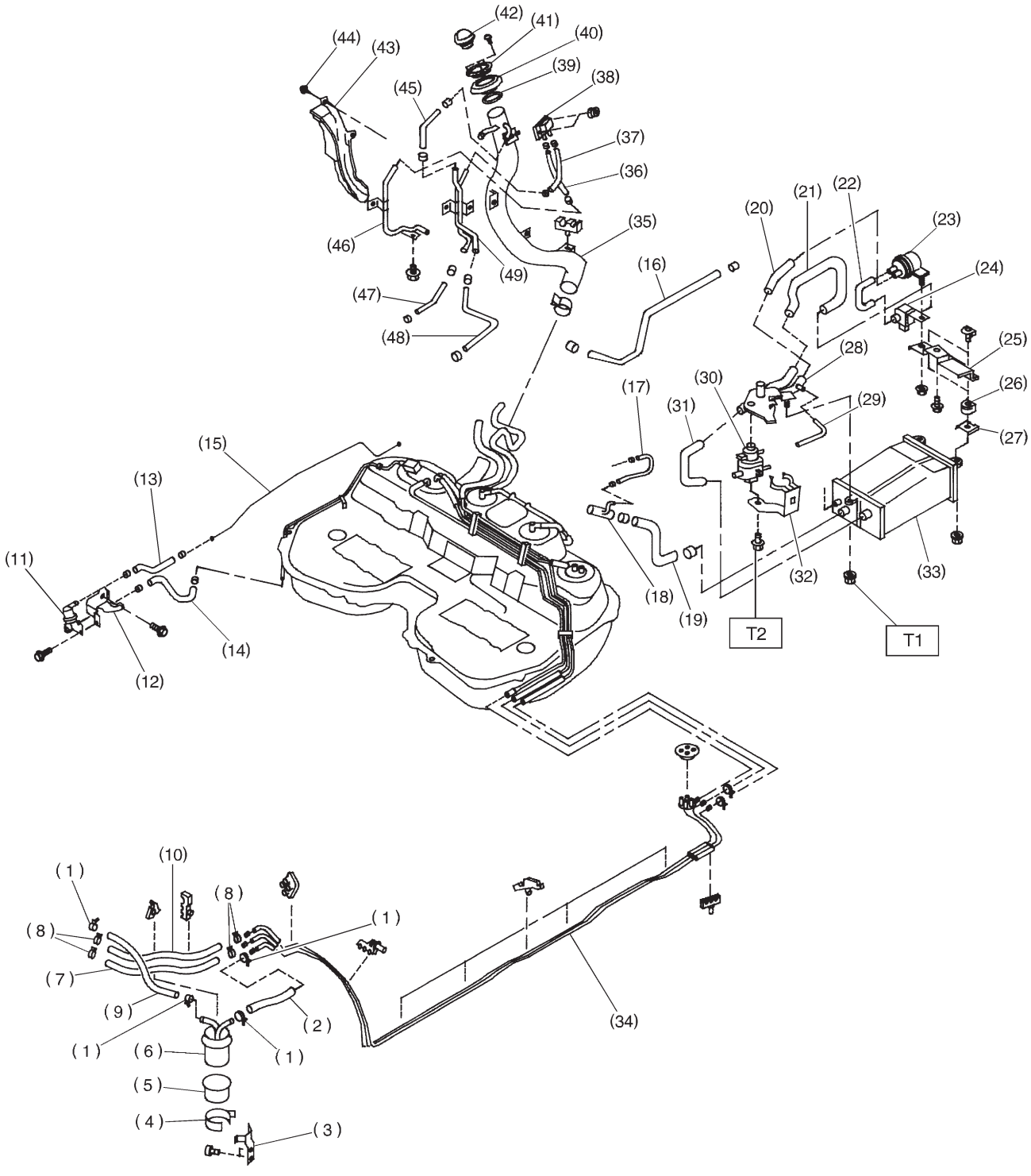
S2M0192A

(1) Heat sealed cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Pressure control solenoid valve bracket
(7) Pressure control solenoid valve
(8) Evaporation hose G
(9) Evaporation pipe A
(10) Fuel pump gasket
(11) Fuel pump ASSY
(12) Fuel cut valve gasket
(13) Fuel cut valve
(14) Evaporation hose C
(15) Evaporation hose A
(16) Clip
(17) Joint pipe
(18) Evaporation hose B
(19) Evaporation pipe ASSY
(20) Evaporation hose D
(21) Evaporation hose E
(22) Retainer
(23) Quick connector
(24) Jet pump hose A
(25) Fuel return hose A
(26) Fuel pipe ASSY
(27) Jet pump hose B
(28) Fuel return hose B
(29) Evaporation hose F
(30) Fuel sub meter gasket
(31) Jet pump filter
(32) Fuel sub meter unit

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 7.4±2.0 (0.75±0.2, 5.4±1.4)
T3: 33±10 (3.4±1.0, 25±7)

2. Fuel Line

A: 2200 cc MODEL

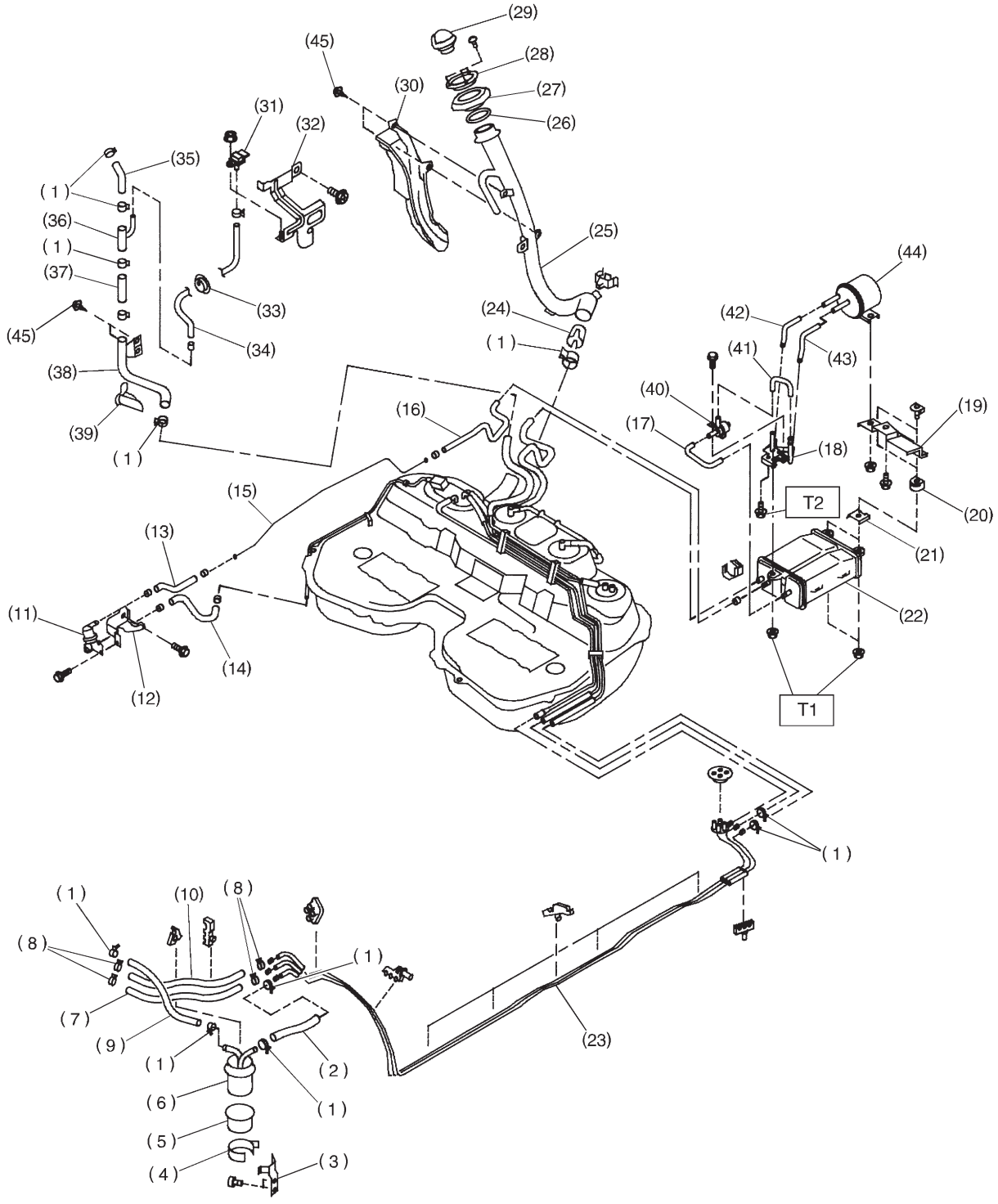


H2M2532A

(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Clip
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Roll over valve
(12) Roll over valve bracket
(13) Evaporation hose H
(14) Evaporation hose I
(15) Evaporation pipe B
(16) Evaporation hose J
(17) Evaporation hose K
(18) Joint pipe
(19) Canister hose A
(20) Air filter hose A
(21) Drain valve hose
(22) Air filter hose B
(23) Air filter
(24) Drain valve
(25) Canister upper bracket
(26) Cushion rubber
(27) Canister lower bracket
(28) Canister holder
(29) Evaporation hose L
(30) Pressure control solenoid valve
(31) Canister hose B
(32) Pressure control solenoid valve holder
(33) Canister
(34) Fuel pipe ASSY
(35) Fuel filler pipe
(36) Evaporation hose M
(37) Evaporation hose N
(38) Shut valve
(39) Packing
(40) Ring A
(41) Ring B
(42) Fuel filler cap
(43) Fuel filler pipe protector
(44) Tapping screw
(45) Evaporation hose O
(46) Joint pipe
(47) Evaporation hose P
(48) Evaporation hose Q
(49) Evaporation pipe

Tightening torque: N·m (kg-m, ft-lb)
T1: 23±7 (2.3±0.7, 16.6±5.1)
T2: 25±7 (2.5±0.7, 18.1±5.1)

B: 2500 cc MODEL



S2M0186A

(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Clip
(9) Fuel delivery hose B
(10) Fuel return hose
(11) Roll over valve
(12) Roll over valve bracket
(13) Evaporation hose H
(14) Evaporation hose I
(15) Evaporation pipe B
(16) Canister hose A
(17) Canister hose B
(18) Canister holder
(19) Canister upper bracket
(20) Cushion rubber
(21) Canister lower bracket
(22) Canister
(23) Fuel pipe ASSY
(24) Fuel filler valve
(25) Fuel filler pipe
(26) Packing
(27) Ring A
(28) Ring B
(29) Fuel filler cap
(30) Fuel filler pipe protector
(31) Fuel tank pressure sensor
(32) Fuel tank pressure sensor bracket
(33) Grommet
(34) Fuel tank pressure sensor hose
(35) Air ventilator hose A
(36) Air ventilator pipe A
(37) Air ventilator hose B
(38) Air ventilator pipe B
(39) Air ventilator pipe protector
(40) Vent control solenoid valve
(41) Vent control solenoid valve hose
(42) Air filter hose A
(43) Air filter hose B
(44) Air filter
(45) Tapping screw

Tightening torque: N·m (kg-m, ft-lb)
T1: 23±7 (2.3±0.7, 17±5.1)
T2: 25±7 (2.5±0.7, 18±5.1)

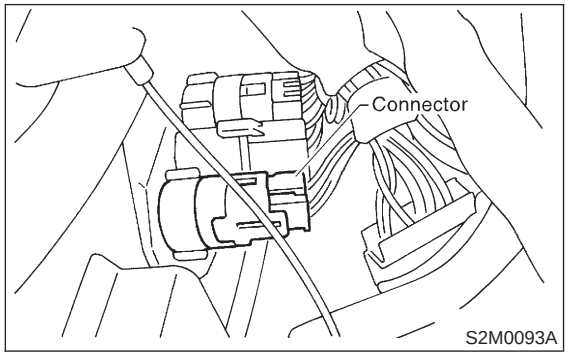
1. On-car Services

A: PRECAUTIONS

WARNING:
- **Place “No fire” signs near the working area.**
- **Disconnect ground terminal from battery.**
- **Be careful not to spill fuel on the floor.**

B: RELEASING OF FUEL PRESSURE

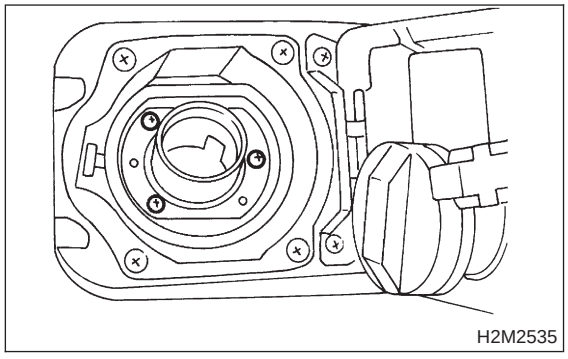
1) Disconnect connector from fuel pump relay.



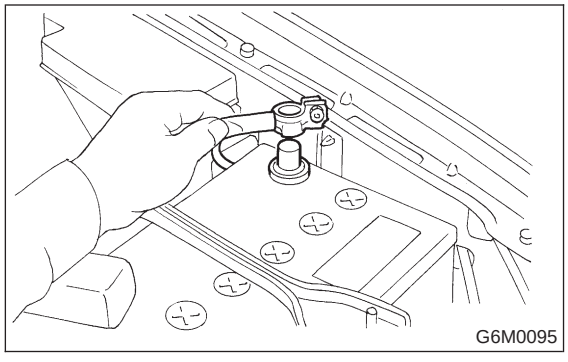
2) Start the engine, and run it until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn ignition switch OFF.

C: DRAINING OF FUEL

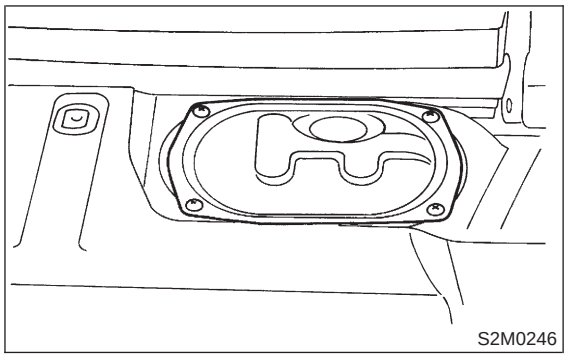
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



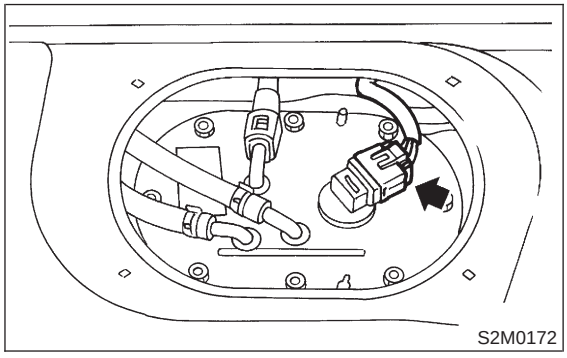
3) Disconnect battery ground cable.



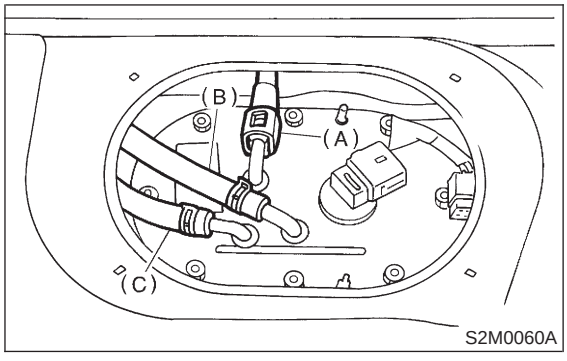
4) Remove access hole lid.



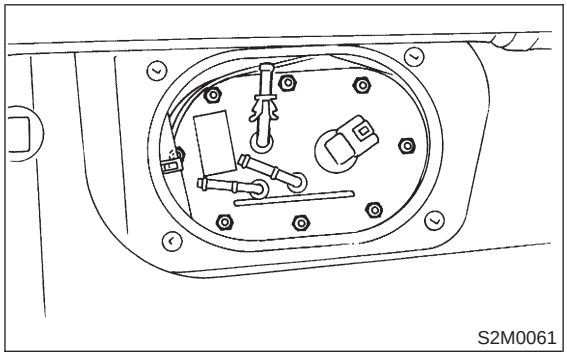
5) Disconnect connector from fuel pump.



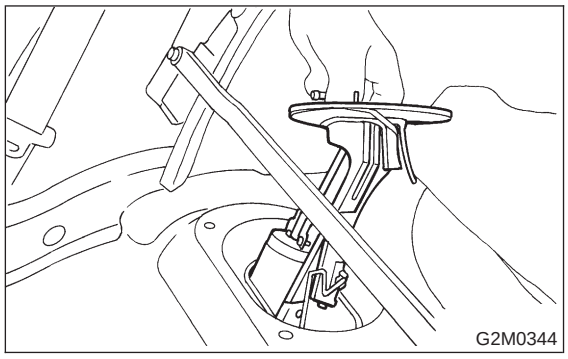
6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>
7) Move clips, and then disconnect fuel return hose (B) and jet pump hose (C).



8) Remove nuts which install fuel pump assembly onto fuel tank.

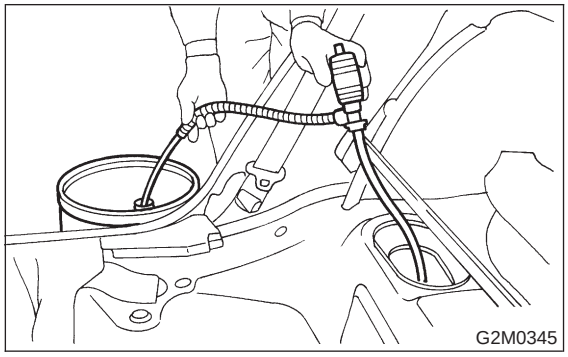


9) Take off fuel pump from fuel tank.

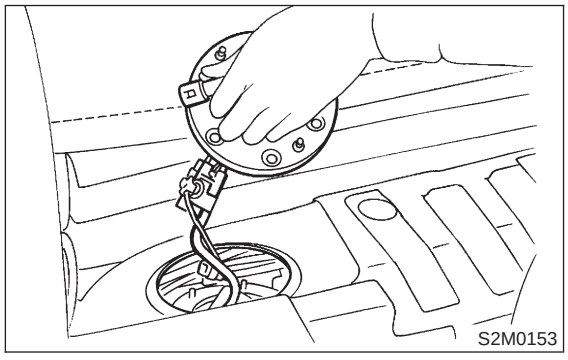


10) Drain fuel from fuel tank by using a hand pump.

WARNING:
Do not use a motor pump when draining fuel.

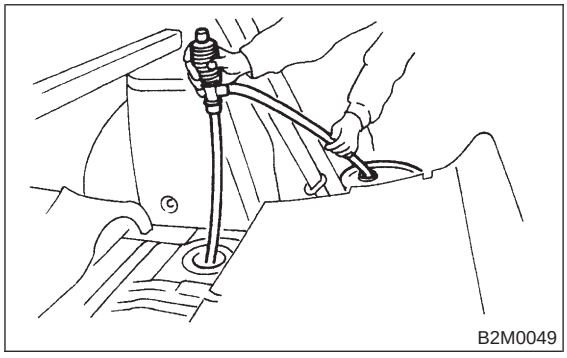


11) Remove fuel sub meter unit. <Ref. to 2-8 [W10A0].>



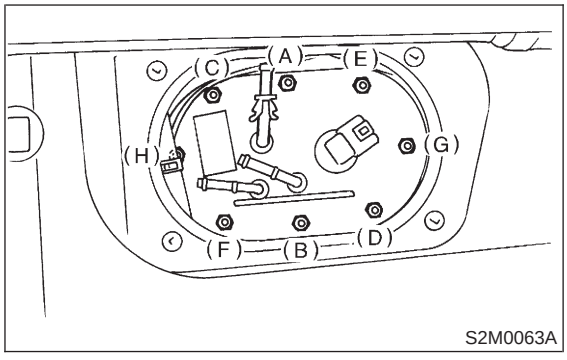
12) Drain fuel from there.

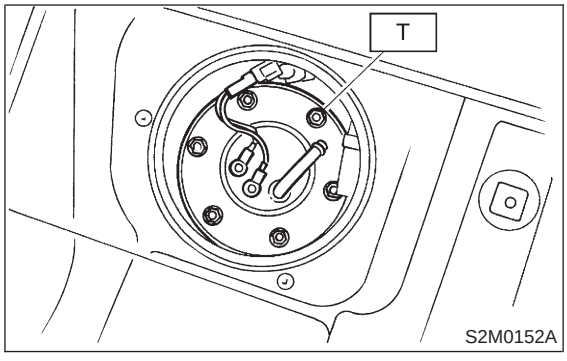
WARNING:
Do not use a motor pump when draining fuel.



13) After draining fuel, reinstall fuel pump and fuel sub meter unit.
Tighten nuts of fuel pump in numerical sequence shown in figure to specified torque.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)





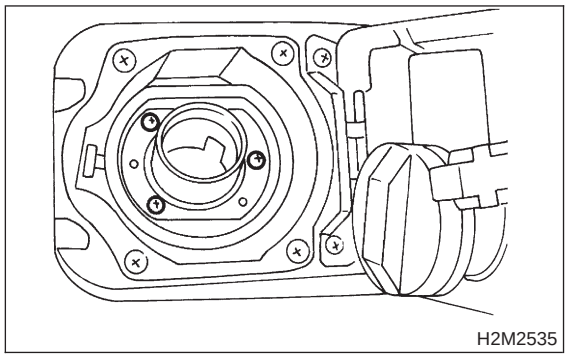
D: MEASUREMENT OF FUEL PRESSURE

WARNING:
Before removing fuel pressure gauge, release fuel pressure.

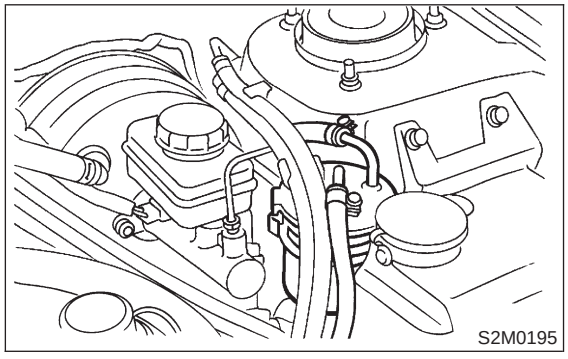
NOTE:
If out of specification, check or replace pressure regulator and pressure regulator vacuum hose.

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>

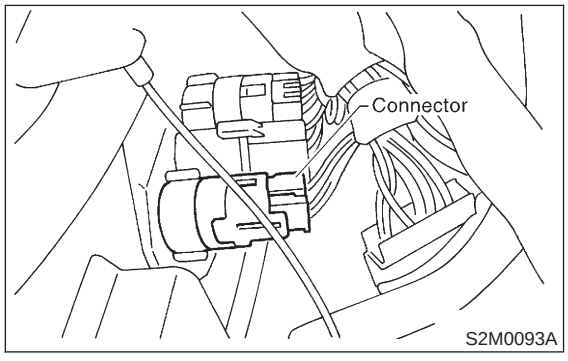
2) Open fuel flap lid, and remove fuel filler cap.



3) Disconnect fuel delivery hoses from fuel filter, and connect fuel pressure gauge.



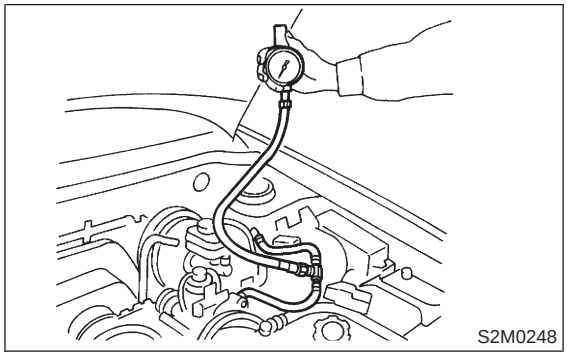
4) Connect connector to fuel pump relay.



5) Start the engine.

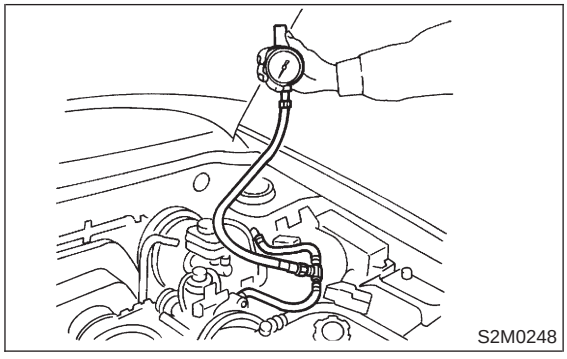
6) Measure fuel pressure while disconnecting pressure regulator vacuum hose from collector chamber.

Fuel pressure:
235 — 265 kPa (2.4 — 2.7 kg/cm^2, 34 — 38 psi)



7) After connecting pressure regulator vacuum hose, measure fuel pressure.

Fuel pressure:
177 — 206 kPa (1.8 — 2.1 kg/cm^2, 26 — 30 psi)

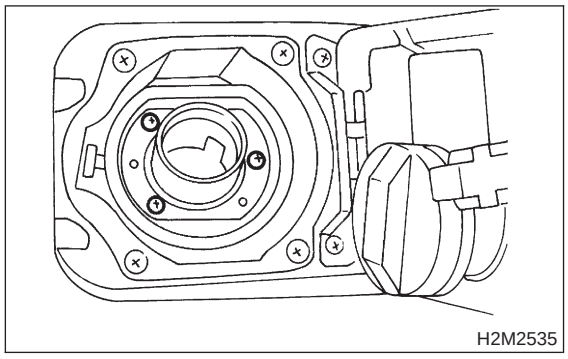


2. Fuel Tank

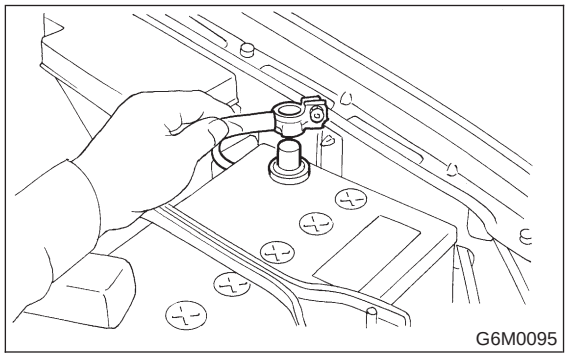
A: REMOVAL

1. 2200 cc MODEL

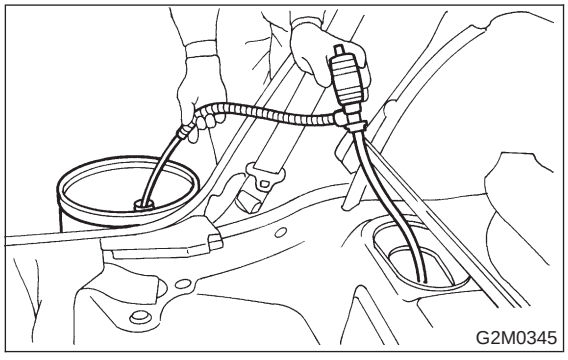
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


H2M2535

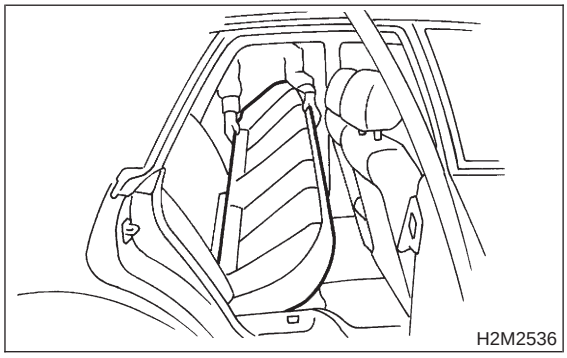
3) Disconnect battery ground cable.


G6M0095

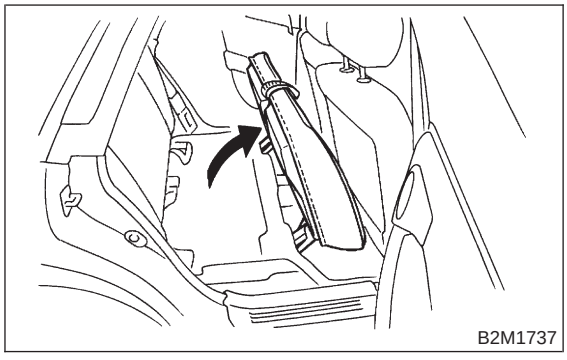
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>


G2M0345

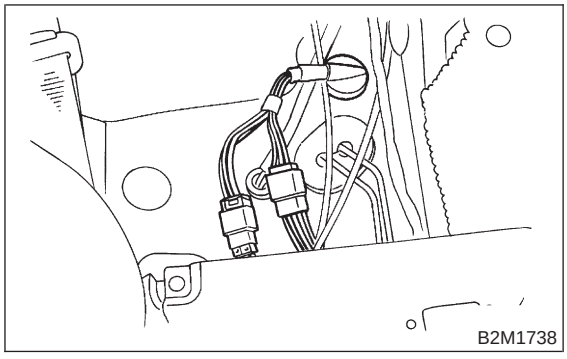
5) Remove rear seat cushion. (Sedan model) <Ref. to 5-3 [W2A1].>


H2M2536

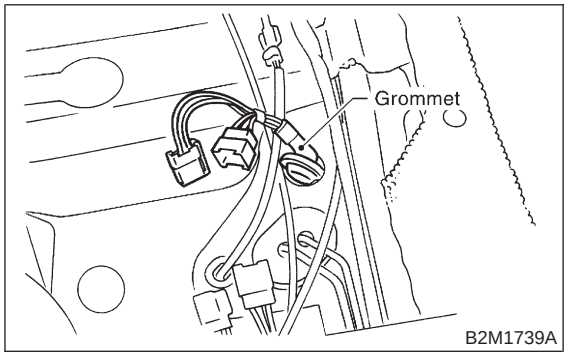
6) Move rear seat cushion forward. (Wagon model) <Ref. to 5-3 [W2A2].>


B2M1737

7) Disconnect connector of fuel tank cord from rear harness.


B2M1738

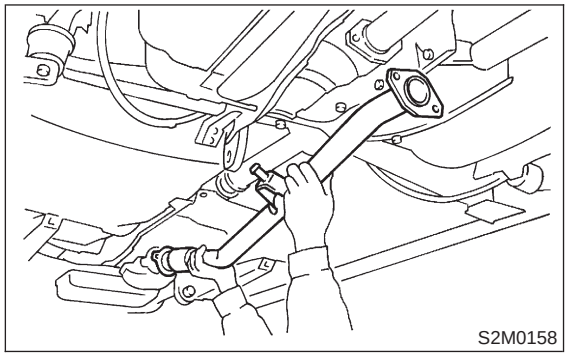
8) Push grommet which holds fuel tank cord on floor panel into under the body.



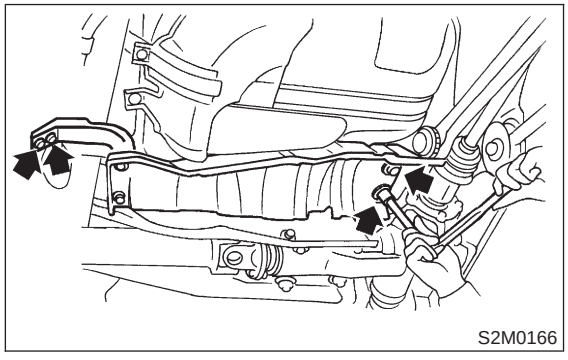
B2M1739A

9) Lift-up the vehicle.
10) Remove rear exhaust pipe.
(1) Separate rear exhaust pipe from center exhaust pipe.
(2) Separate rear exhaust pipe from muffler.
(3) Remove bracket from rubber cushion, and remove exhaust pipe.

NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003). <Ref. to 2-9 [W3A0].>

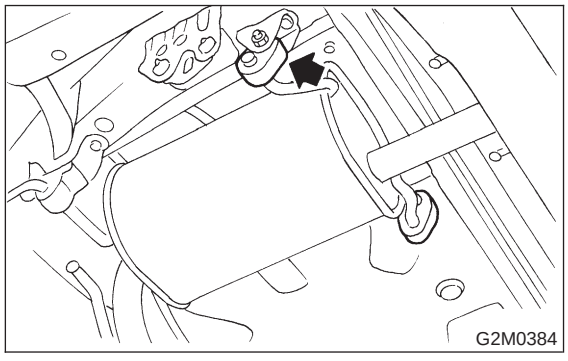

S2M0158

11) Remove heat sealed cover.

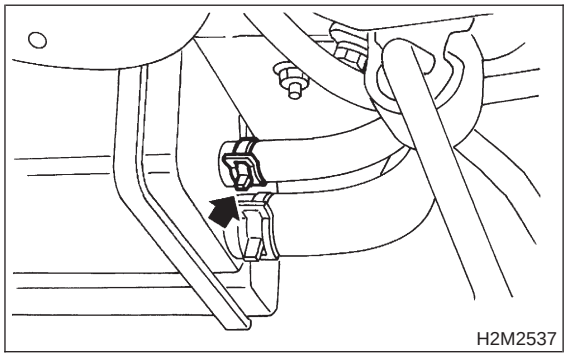

S2M0166

12) Remove muffler assembly.
<Ref. to 2-9 [W4A0].>

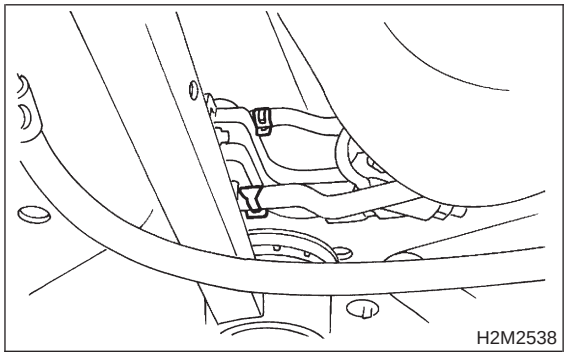
NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003).


G2M0384

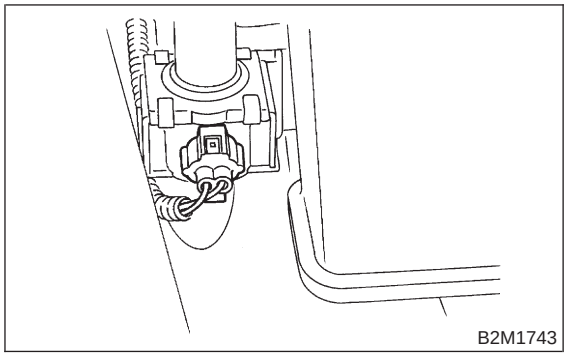
13) Move clip, and disconnect evaporation hose from canister.


H2M2537

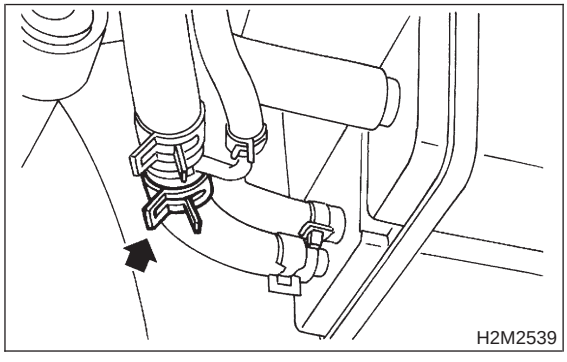
14) Disconnect hose from joint pipe.


H2M2538

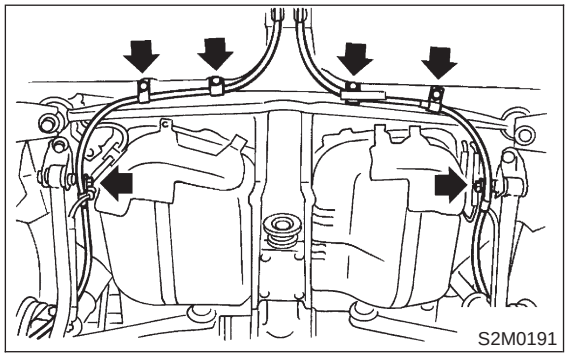
15) Disconnect connector from pressure control solenoid valve.
16) Disconnect connector from drain valve.


B2M1743

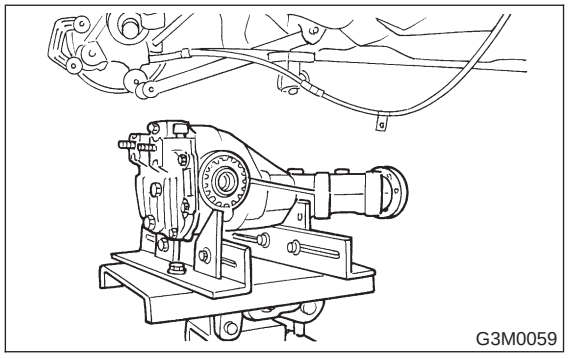
17) Disconnect hoses from roll over valve.


H2M2539

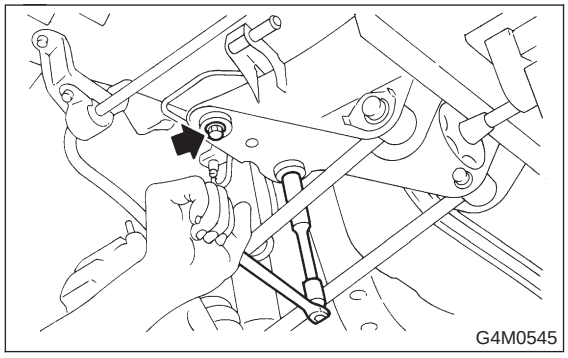
18) Remove bolts which hold parking brake cable holding bracket.



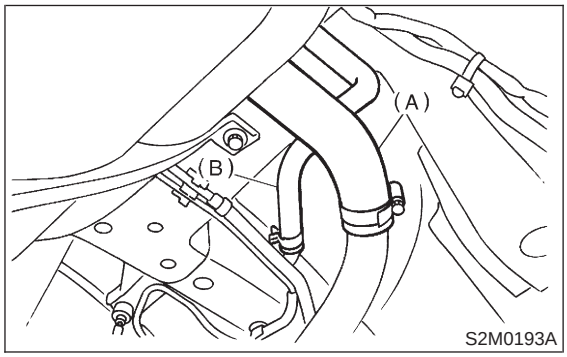
19) Remove rear differential assembly.
(1) Remove rear axle shafts from rear differential assembly.
(2) Remove rear differential front cover.
(3) Remove propeller shaft.
(4) Remove lower differential bracket.
(5) Set transmission jack under rear differential.
(6) Remove bolts which install rear differential onto rear crossmember.
<Ref. to 3-4 [W2B0].> and <Ref. 3-4 [W3B0].>



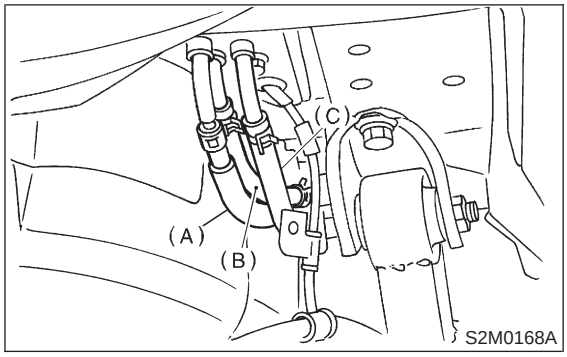
20) Remove rear crossmember.
<Ref. to 4-1 [W10A0].>



21) Loosen clamp, and disconnect fuel filler hose (A) and air vent hose (B) from fuel filler pipe and air vent pipe.

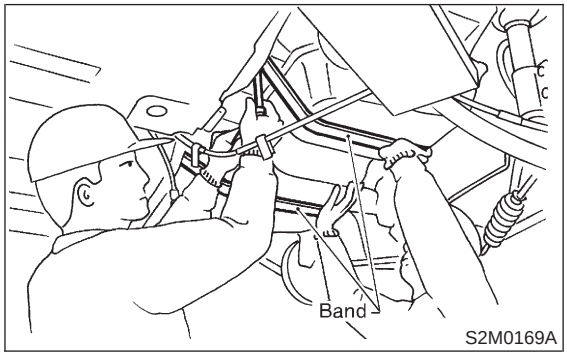


22) Move clips, and disconnect fuel return hose (B) and evaporation hose (C).
23) Disconnect quick connector, and then disconnect fuel delivery hose (A).



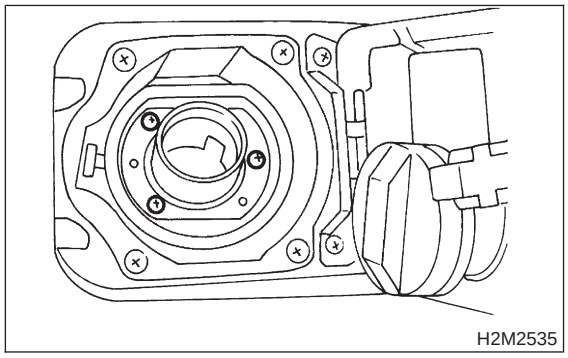
24) While holding fuel tank, remove bolts from bands and dismount fuel tank.

WARNING:
A helper is required to perform this work.

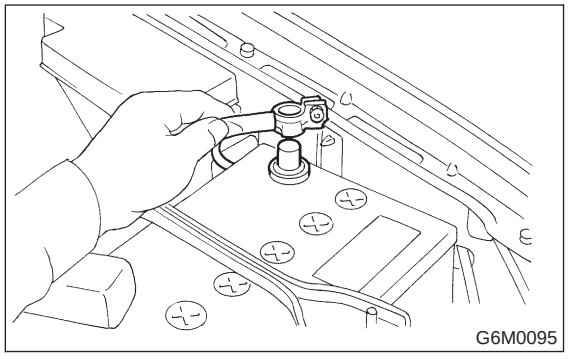


2. 2500 cc MODEL

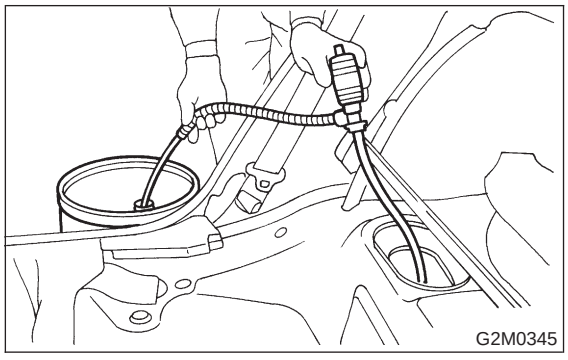
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


H2M2535

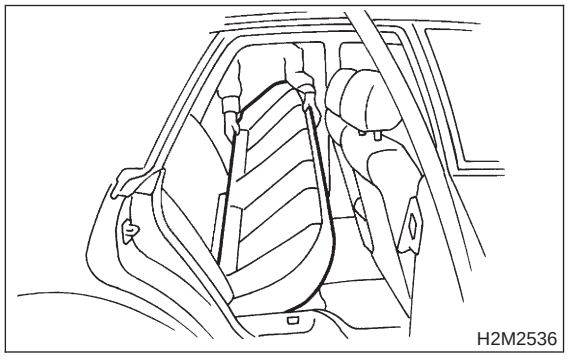
3) Disconnect battery ground cable.


G6M0095

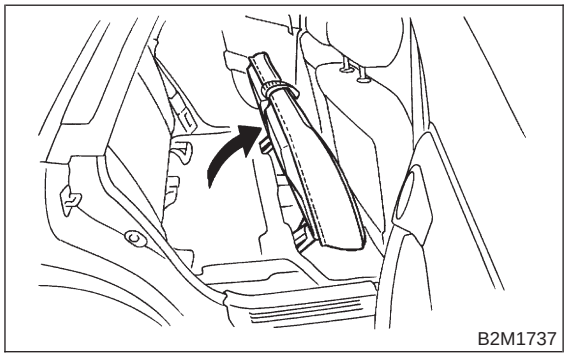
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>


G2M0345

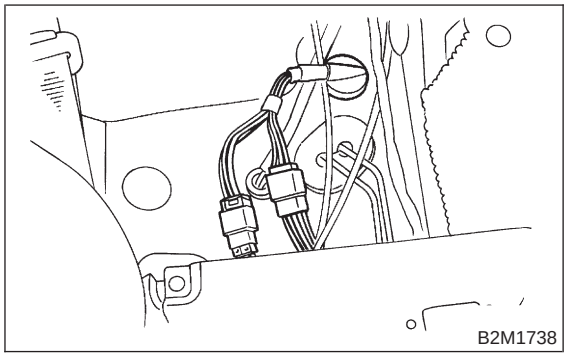
5) Remove rear seat cushion. (Sedan model) <Ref. to 5-3 [W2A1].>


H2M2536

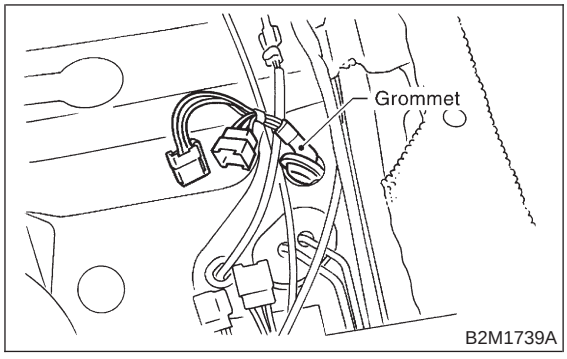
6) Move rear seat cushion forward. (Wagon model) <Ref. to 5-3 [W2A2].>


B2M1737

7) Disconnect connector of fuel tank cord from rear harness.


B2M1738

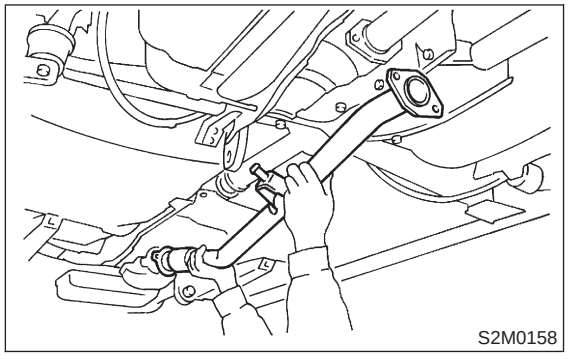
8) Push grommet which holds fuel tank cord on floor panel into under the body.



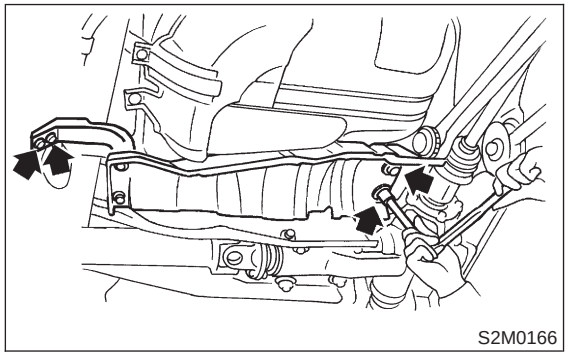
B2M1739A

9) Lift-up the vehicle.
10) Remove rear exhaust pipe.
(1) Separate rear exhaust pipe from center exhaust pipe.
(2) Separate rear exhaust pipe from muffler.
(3) Remove bracket from rubber cushion, and remove exhaust pipe.

NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003). <Ref. to 2-9 [W3A0].>

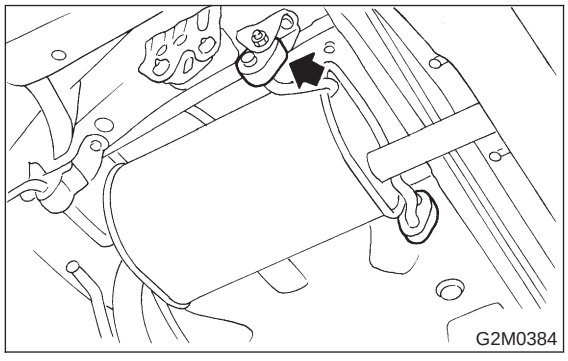

S2M0158

11) Remove heat sealed cover.

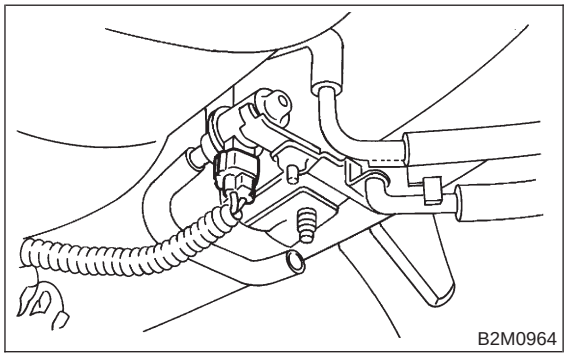

S2M0166

12) Remove muffler assembly.
<Ref. to 2-9 [W4A0].>

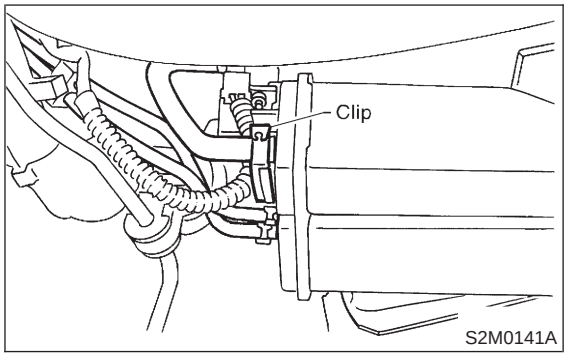
NOTE:
To facilitate the removal of parts, apply a coat of SUBARU CRC5-56 (Part No. 004301003).


G2M0384

13) Disconnect connector from vent control solenoid valve.

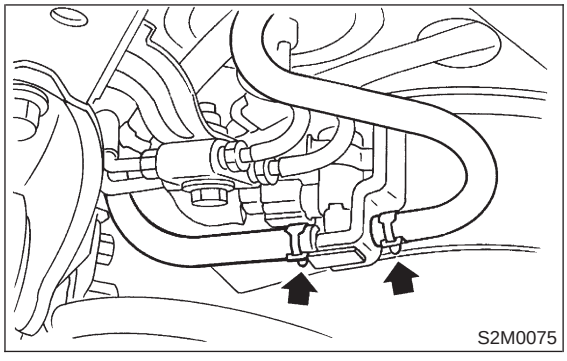

B2M0964

14) Remove clip, and disconnect evaporation hose from canister.

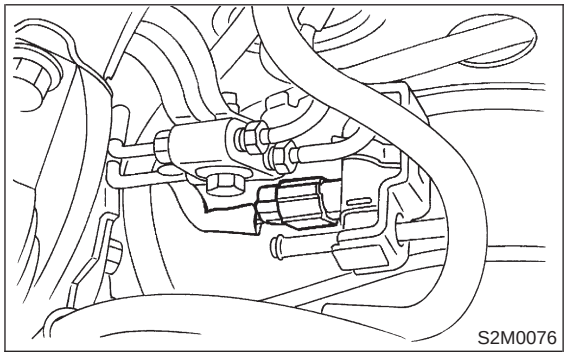


S2M0141A

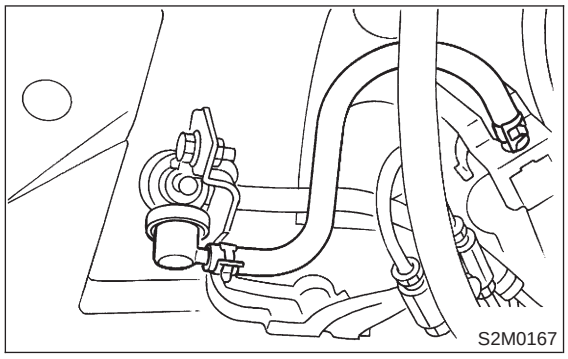
15) Disconnect hoses from pressure control solenoid valve.


S2M0075

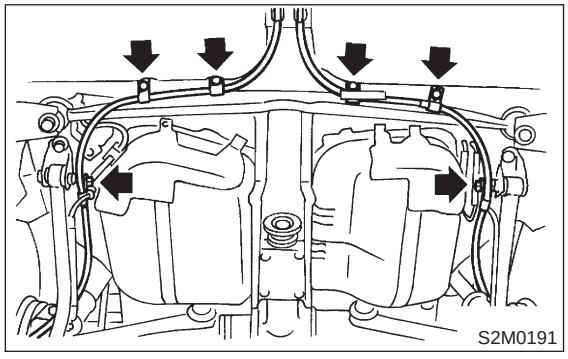
16) Disconnect connector of pressure control solenoid valve.


S2M0076

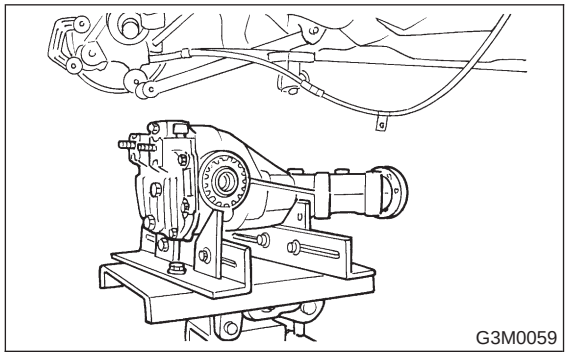
17) Disconnect hoses from roll over valve.



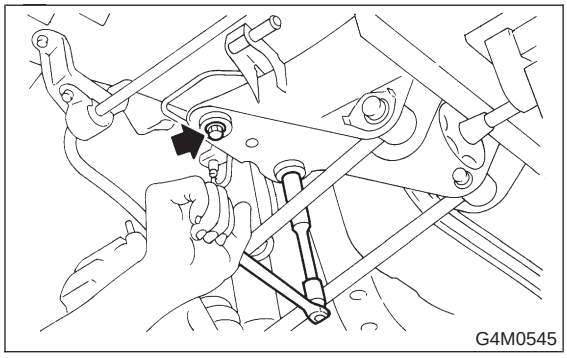
18) Remove bolts which hold parking brake cable holding bracket.



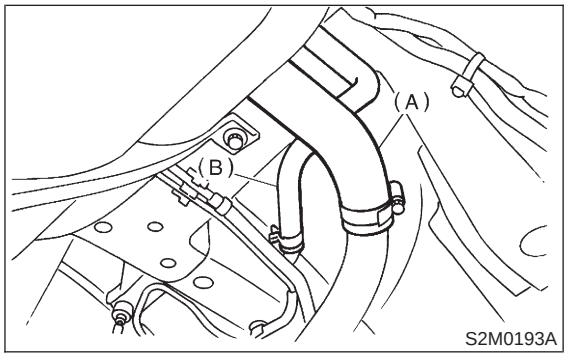
19) Remove rear differential assembly.
(1) Remove rear axle shafts from rear differential assembly.
(2) Remove rear differential front cover.
(3) Remove propeller shaft.
(4) Remove lower differential bracket.
(5) Set transmission jack under rear differential.
(6) Remove bolts which install rear differential onto rear crossmember.
<Ref. to 3-4 [W2B0].> and <Ref. to 3-4 [W3B0].>



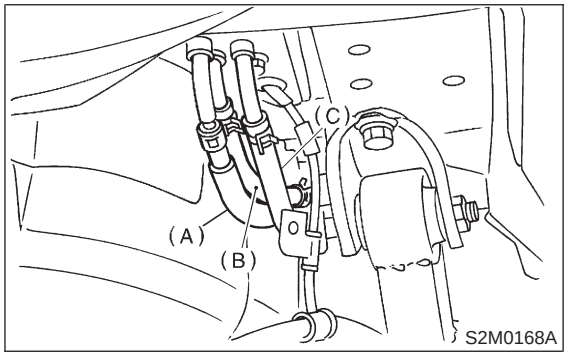
20) Remove rear crossmember.
<Ref. to 4-1 [W10A0].>



21) Loosen clamp, and disconnect fuel filler hose (A) and air vent hose (B) from fuel filler pipe and air vent pipe.

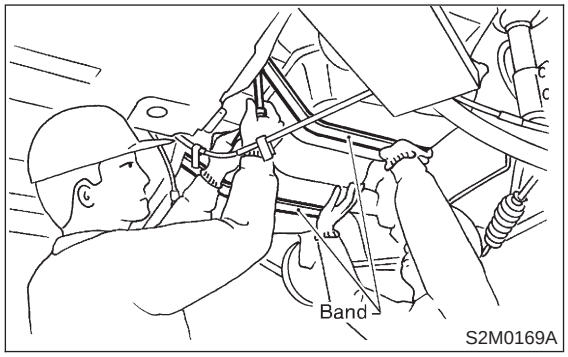


22) Move clips, and disconnect fuel return hose (B) and evaporation hose (C).
23) Disconnect quick connector, and then disconnect fuel delivery hose (A).



24) While holding fuel tank, remove bolts from bands and dismount fuel tank.

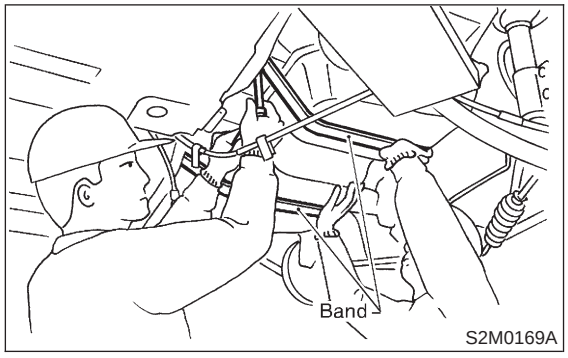
WARNING:
A helper is required to perform this work.



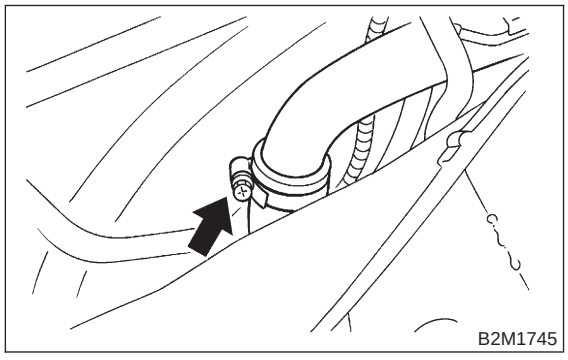
B: INSTALLATION

1. 2200 cc MODEL

1) While a helper holds fuel tank, push fuel tank harness into access hole with grommet.
2) Set fuel tank, and temporary tighten bolts for installing fuel tank bands.

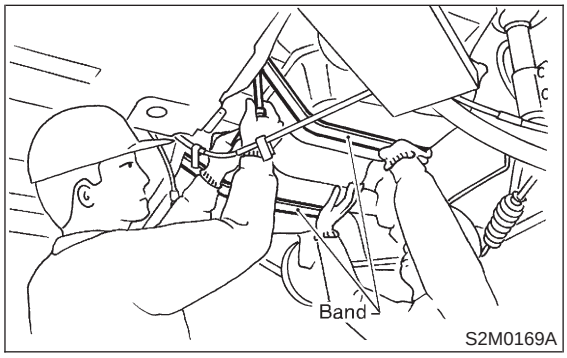


3) Connect fuel filler hose, and tighten clamp.

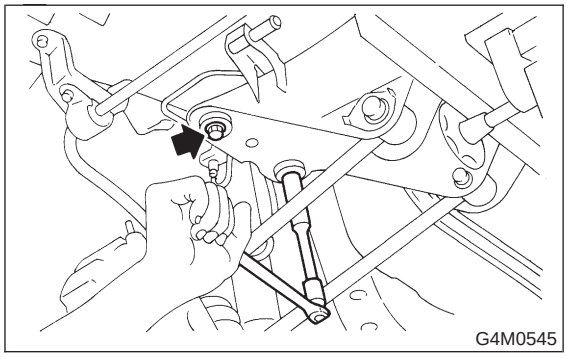


4) Connect fuel hoses, and hold then with clips and quick connector. <Ref. to 2-8 [W7B0].>
5) Tighten band mounting bolts.

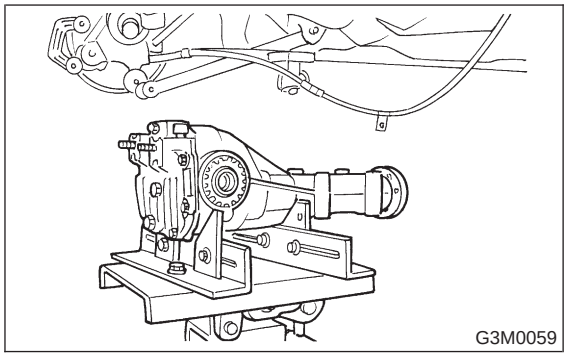
Tightening torque:
33±10 N·m (3.4±1.0 kg-m, 25±7 ft-lb)



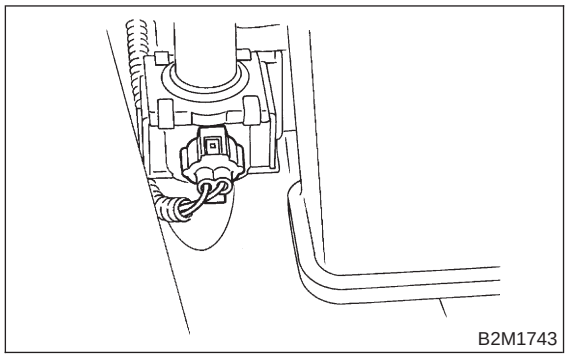
6) Install rear crossmember. <Ref. to 4-1 [W10C0].>



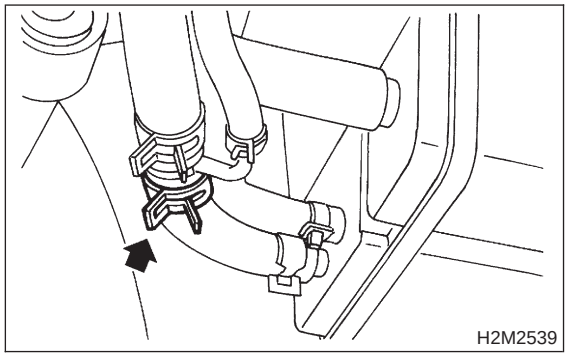
7) Install rear differential assembly. <Ref. to 3-4 [W2F0].> and <Ref. to 3-4 [W3F0].>



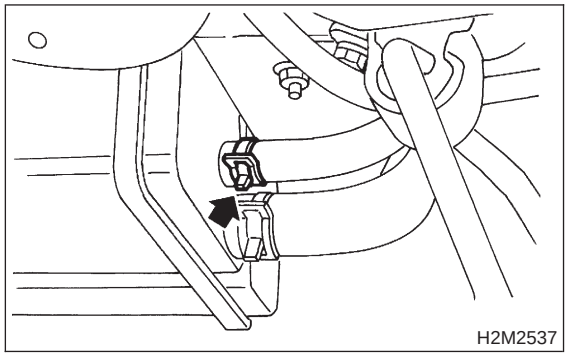
8) Connect connector to drain valve.



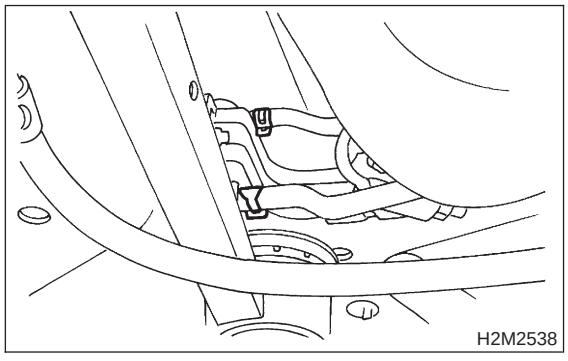
9) Connect connector to pressure control solenoid valve.
10) Connect hose to joint pipe.



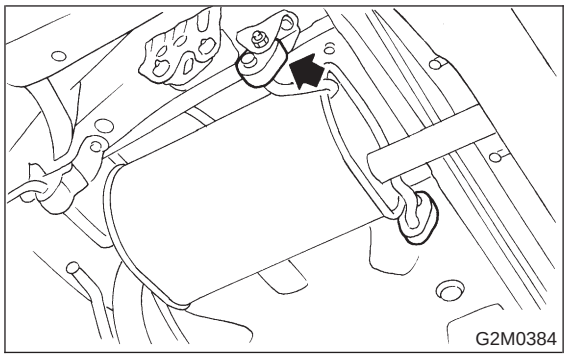
11) Connect evaporation hose to canister, and hold them with clip.



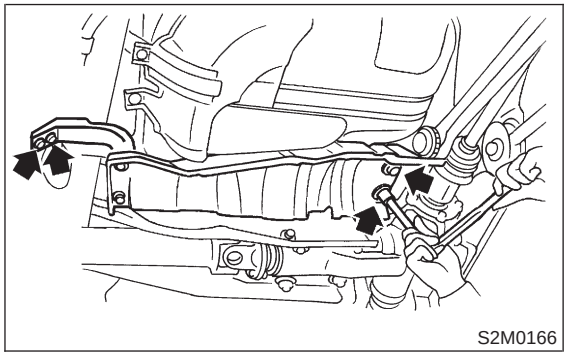
12) Connect hoses to roll over valve.



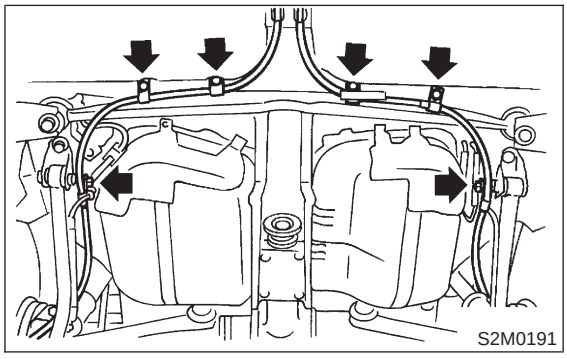
13) Install muffler assembly. <Ref. to 2-9 [W4A0].>



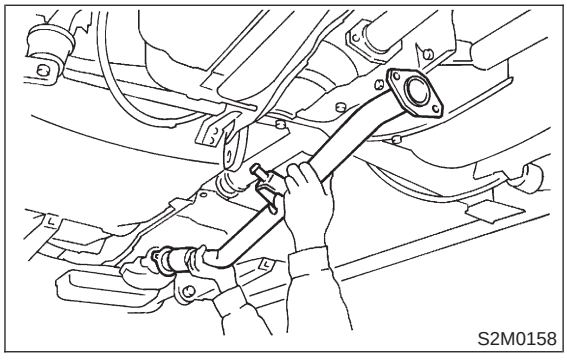
14) Install heat sealed cover.



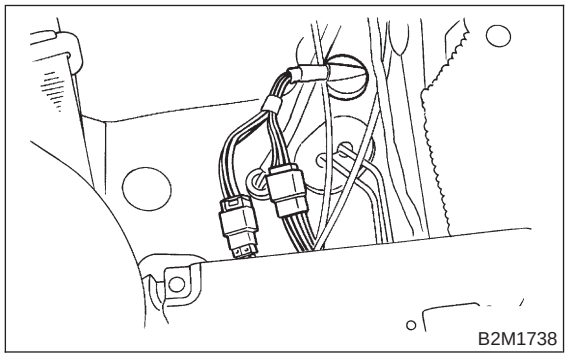
15) Install bolts which hold parking brake holding bracket.



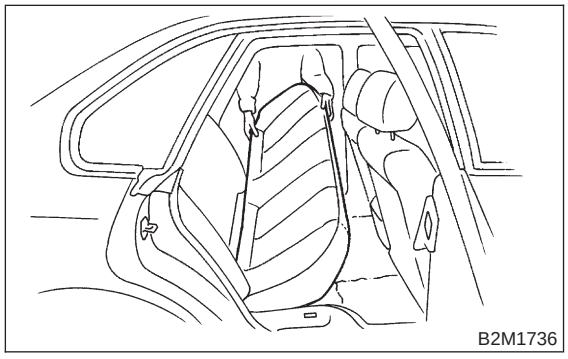
16) Install rear exhaust pipe. <Ref. to 2-9 [W3B0].>



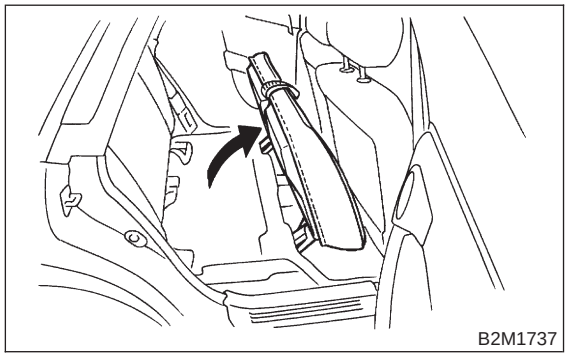
17) Lower the vehicle.
18) Connect connectors to fuel tank harness, and plug access hole with grommet.



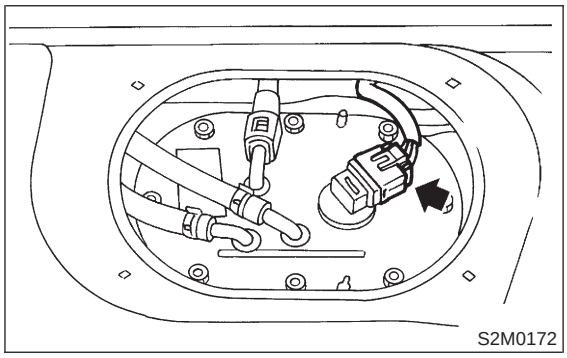
19) Install rear seat cushion. (Sedan model) <Ref. to 5-3 [W2B1].>



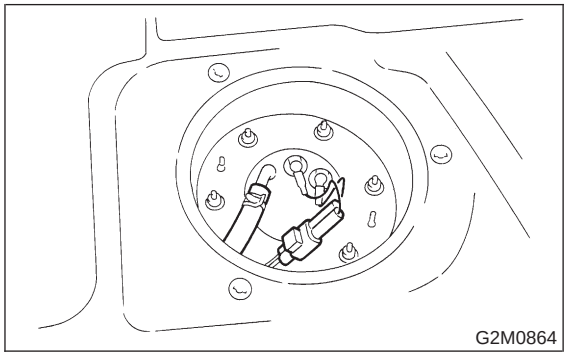
20) Set rear seat cushion. (Wagon model) <Ref. to 5-3 [W2B2].>



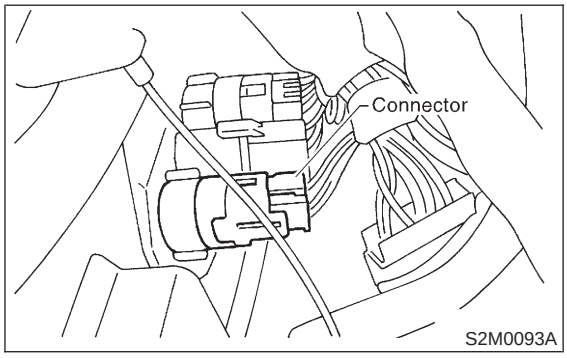
21) Install fuel filler cap.
22) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].> and <Ref. to 2-8 [W7B0].>



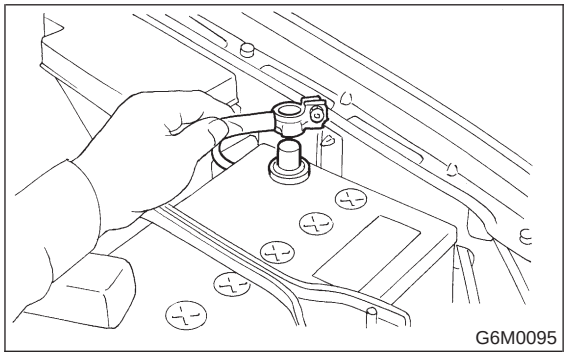
23) Install fuel sub meter unit, and connect connector and jet pump hose. <Ref. to 2-8 [W10A0].>



24) Connect connector to fuel pump relay.

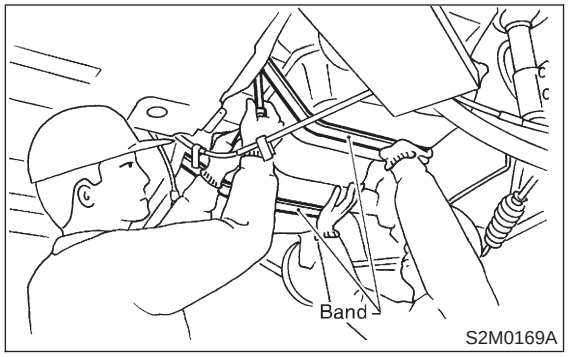


25) Connect battery ground cable.

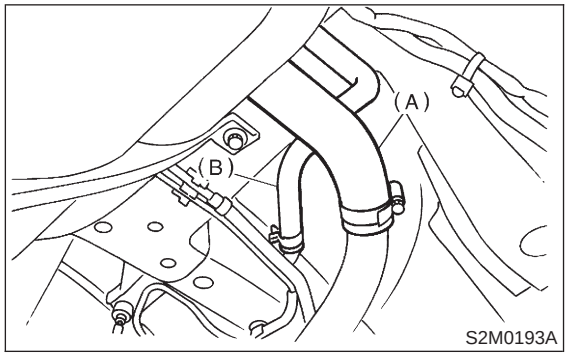


2. 2500 cc MODEL

1) While a helper holds fuel tank, push fuel tank harness into access hole with grommet.
2) Set fuel tank, and temporary tighten bolts for installing fuel tank bands.

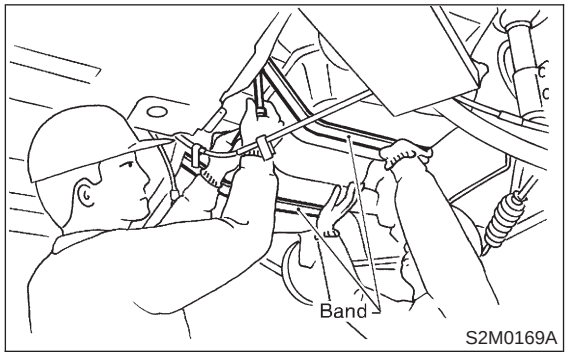


3) Connect fuel filler hose (A) and air vent hose (B).

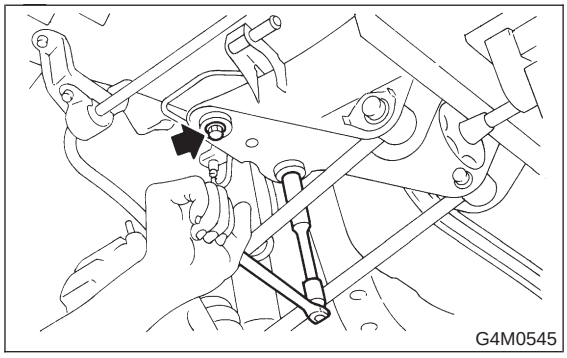


4) Connect fuel hoses, and hold them with clips and quick connector. <Ref. to 2-8 [W7B0].>
5) Tighten band mounting bolts.

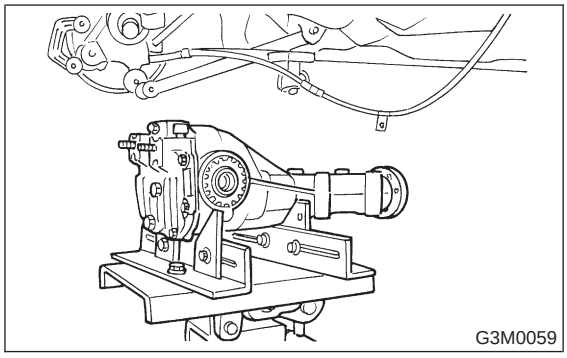
Tightening torque:
33±10 N·m (3.4±1.0 kg-m, 25±7 ft-lb)



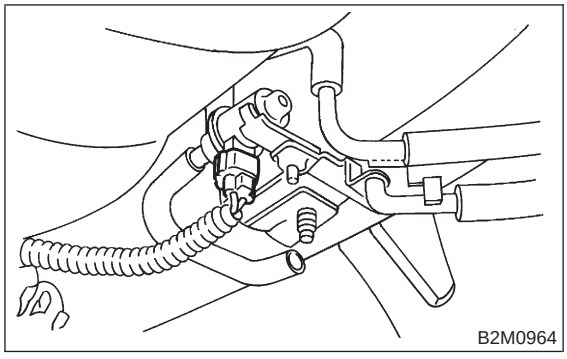
6) Install rear crossmember. <Ref. to 4-1 [W10C0].>



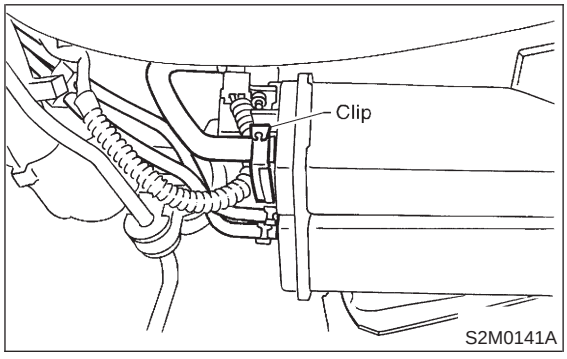
7) Install rear differential assembly. <Ref. to 3-4 [W2F0].> and <Ref. to 3-4 [W3F0].>



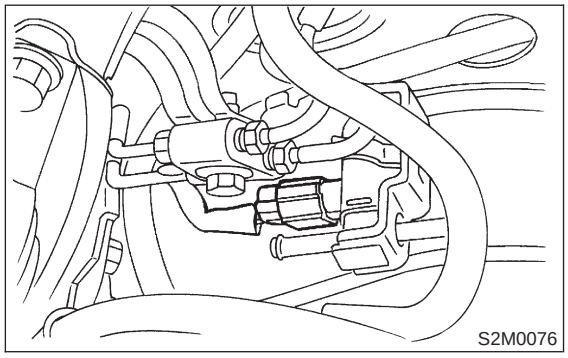
8) Connect connector to vent control solenoid valve.



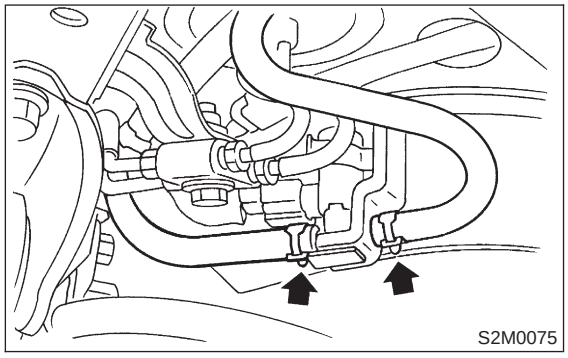
9) Connect evaporation hose to canister, and hold them with clip.



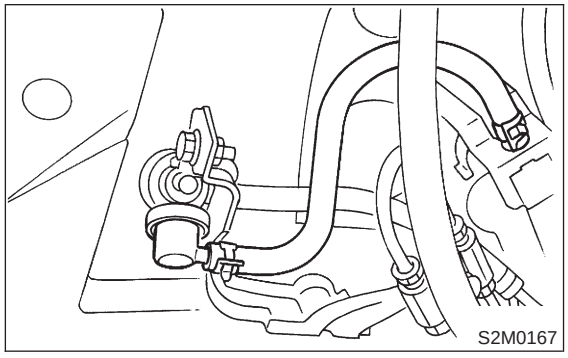
10) Connect connector to pressure control solenoid valve.


S2M0076

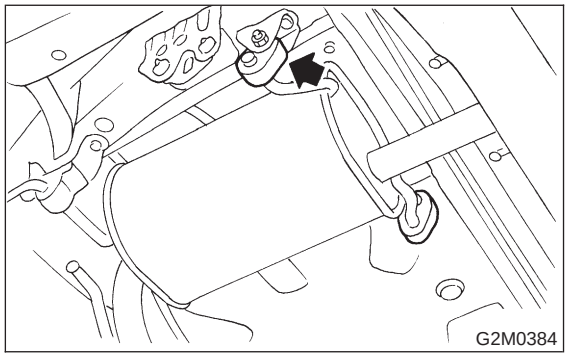
11) Connect hoses to pressure control solenoid valve.


S2M0075

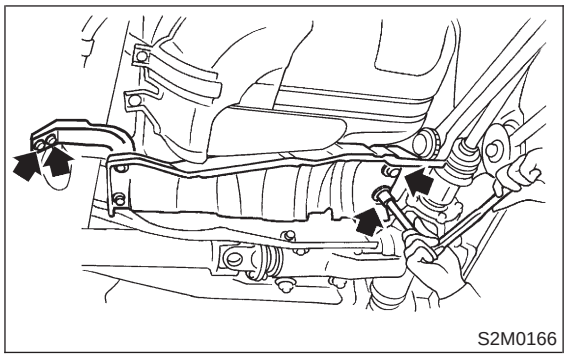
12) Connect hoses to roll over valve.


S2M0167

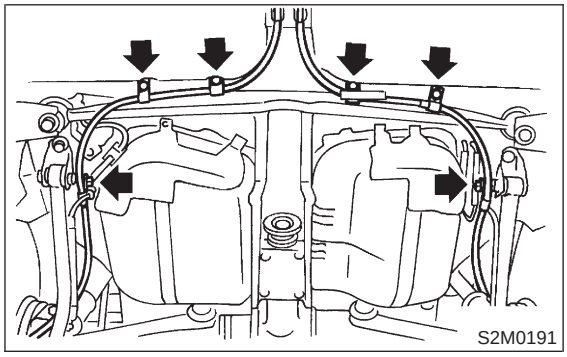
13) Install muffler assembly. <Ref. to 2-9 [W4A0].>


G2M0384

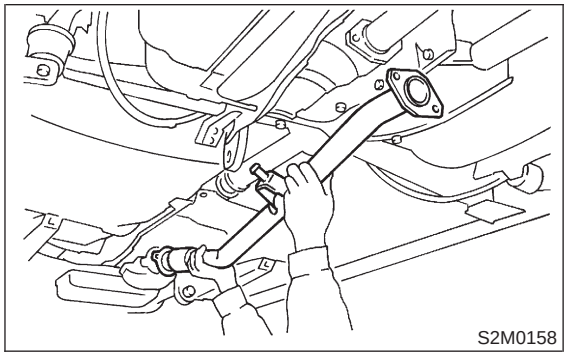
14) Install heat sealed cover.


S2M0166

15) Install bolts which hold parking brake holding bracket.

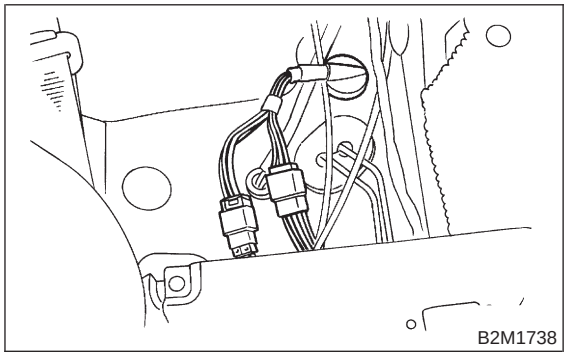

S2M0191

16) Install rear exhaust pipe. <Ref. to 2-9 [W3B0].>

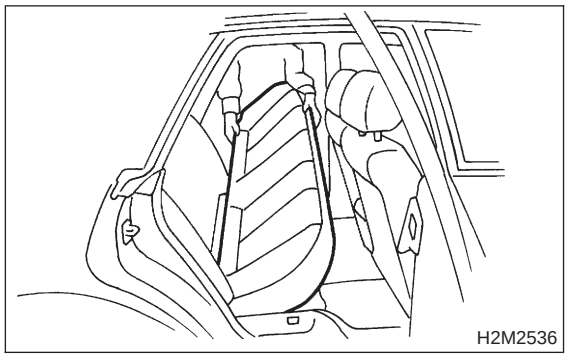

S2M0158

17) Lower the vehicle.

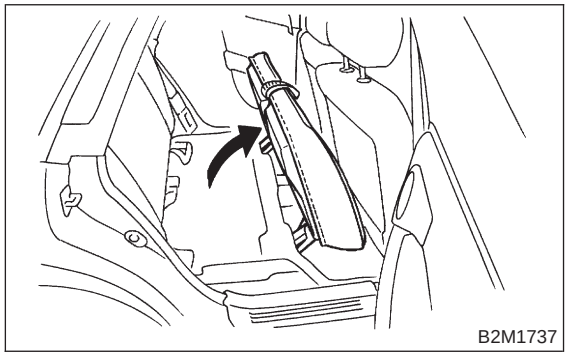
18) Connect connectors to fuel tank harness, and plug access hole with grommet.


B2M1738

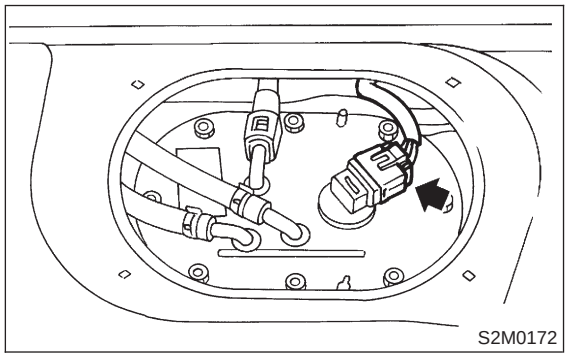
19) Install rear seat cushion. (Sedan model) <Ref. to 5-3 [W2B1].>



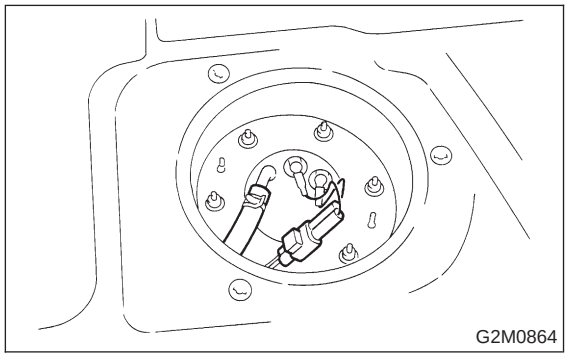
20) Set rear seat cushion. (Wagon model) <Ref. to 5-3 [W2B2].>



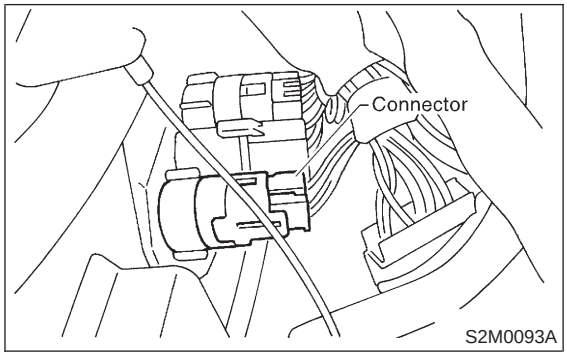
21) Install fuel filler cap.
22) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].> and <Ref. to 2-8 [W7B0].>



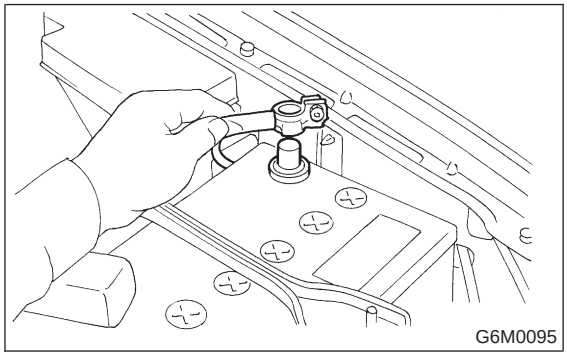
23) Install fuel sub meter unit, and connect connector and jet pump hose. <Ref. to 2-8 [W10A0].>



24) Connect connector to fuel pump relay.



25) Connect battery ground cable.

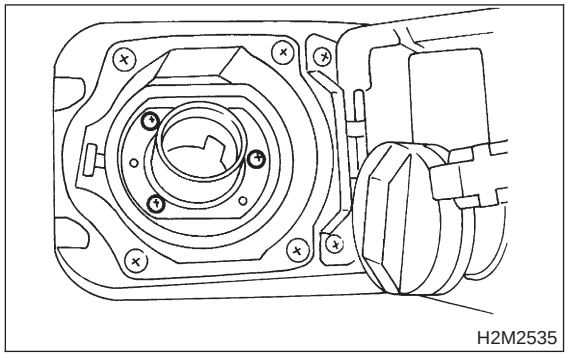


3. Fuel Filler Pipe

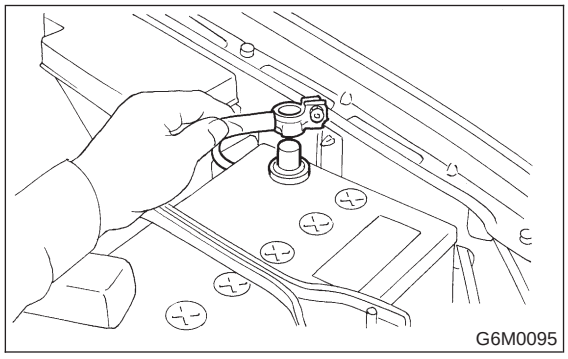
A: REMOVAL

1. 2200 cc MODEL

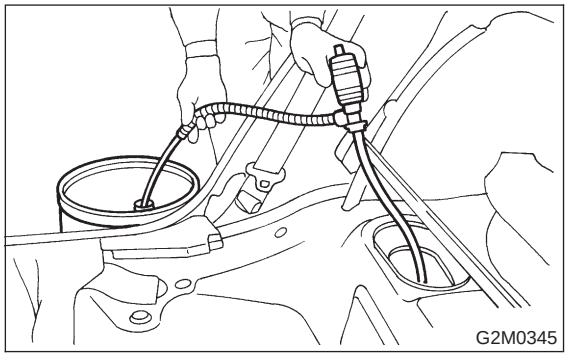
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


H2M2535

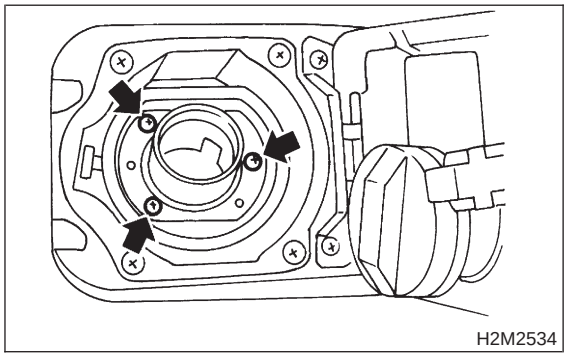
3) Disconnect battery ground cable.


G6M0095

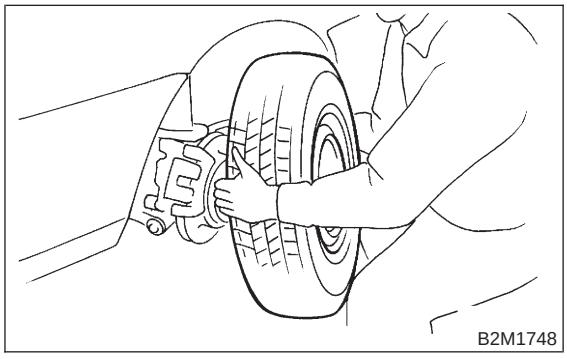
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>


G2M0345

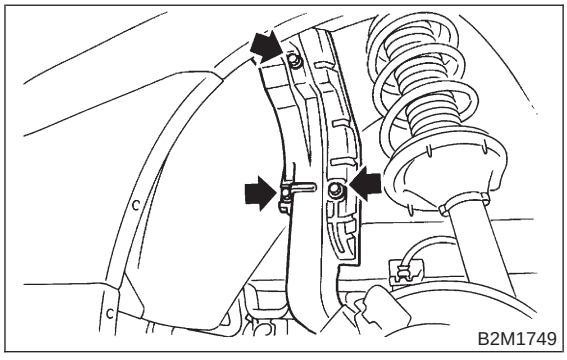
5) Remove screws which install fuel filler pipe on filler lid open.


H2M2534

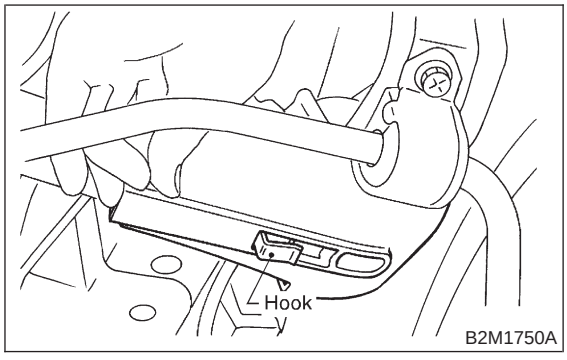
6) Remove wheel nuts of rear right side.
7) Lift-up the vehicle.
8) Remove rear right side wheel.


B2M1748

9) Remove bolts which install protector cover on body.

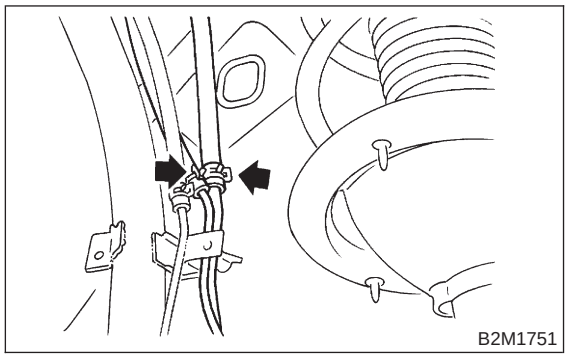

B2M1749

10) While releasing the under side of protector cover from hook, remove it.

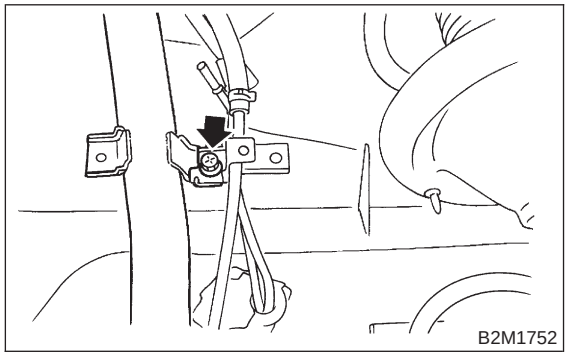


B2M1750A

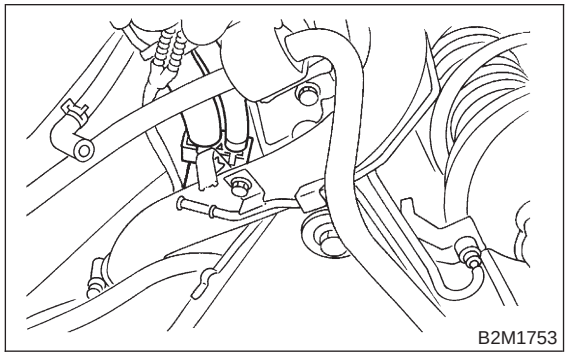
11) Disconnect evaporation hoses from pipes.


B2M1751

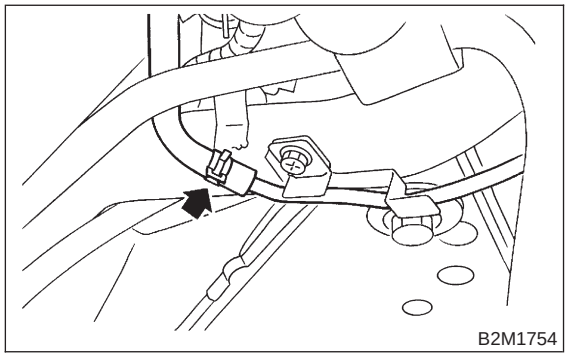
12) Remove bolts which hold fuel filler pipe bracket.


B2M1752

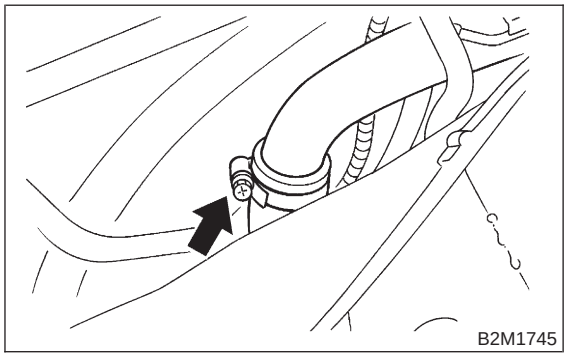
13) Lift-up the vehicle more.
14) Remove two evaporation hoses from clip.


B2M1753

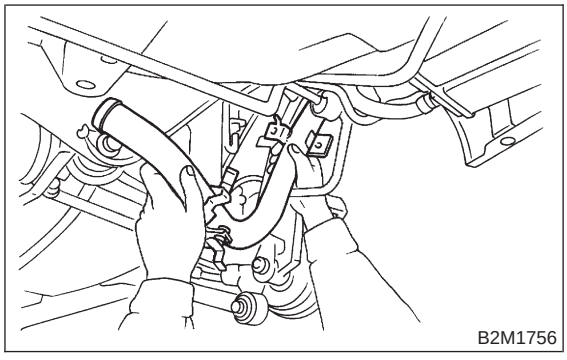
15) Disconnect evaporation hose from joint pipe.


B2M1754

16) Loosen clamp, and disconnect fuel filler hose from fuel filler pipe.

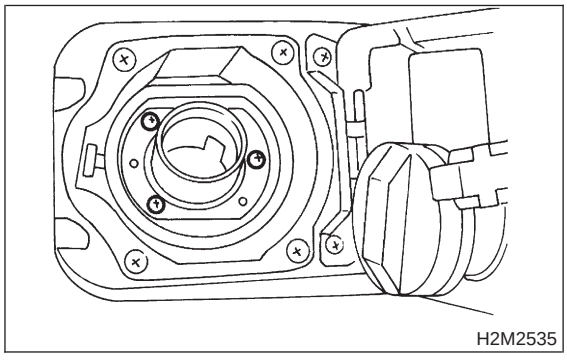

B2M1745

17) Remove fuel filler pipe to under side of vehicle.

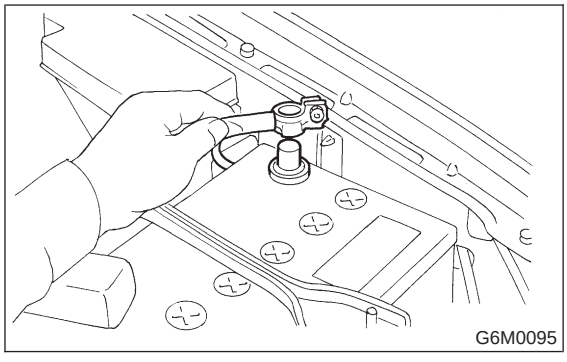

B2M1756

2. 2500 cc MODEL

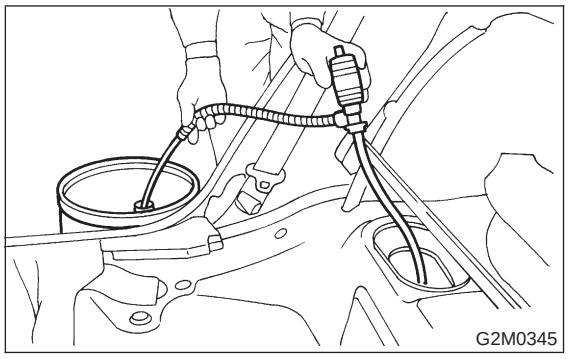
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.


H2M2535

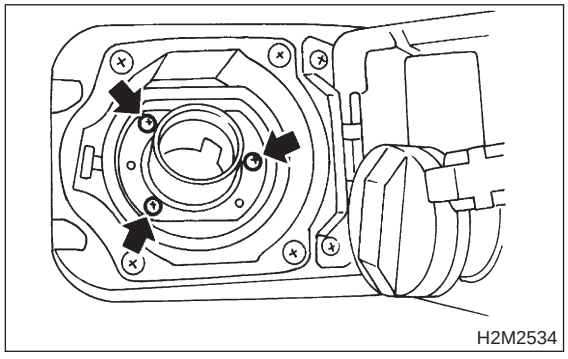
3) Disconnect battery ground cable.


G6M0095

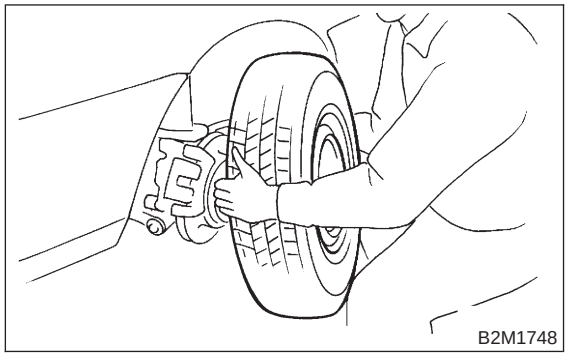
4) Drain fuel from fuel tank. <Ref. to 2-8 [W1C0].>



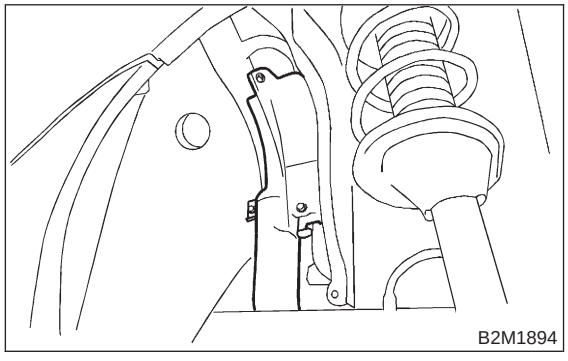
5) Remove screws which install fuel filler pipe on filler lid open.



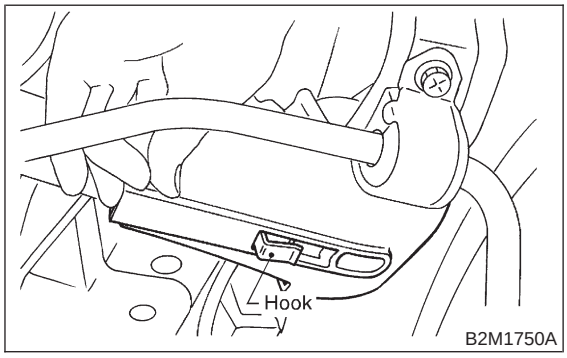
6) Remove wheel nuts of rear right side.
7) Lift-up the vehicle.
8) Remove rear right side wheel.



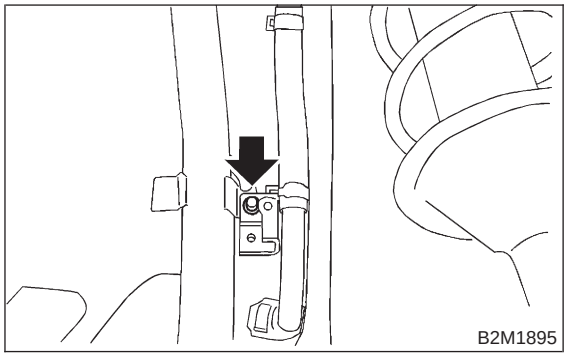
9) Remove bolts which install protector cover on body.



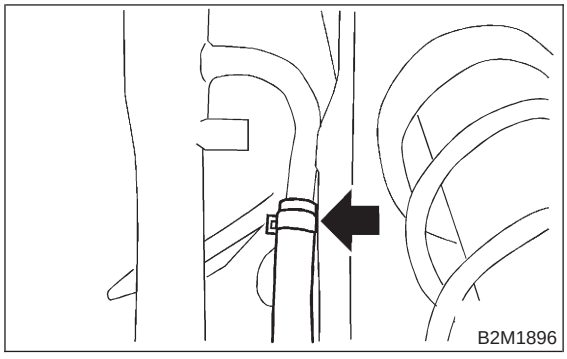
10) While releasing the under side of protector cover from hook, remove it.



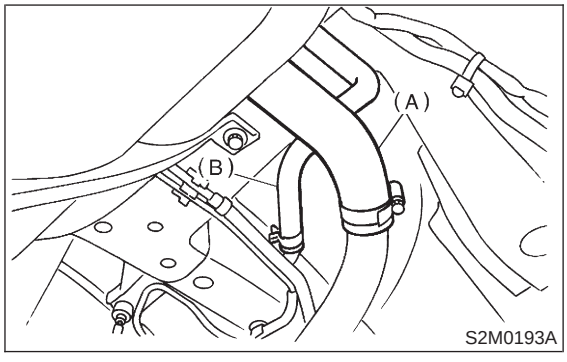
11) Remove bolts which hold fuel filler pipe bracket.



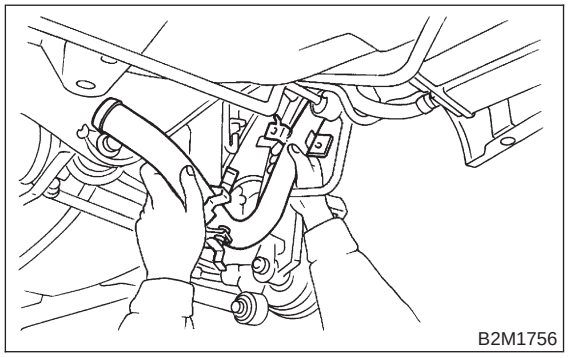
12) Move clip, and disconnect air vent hose from air vent pipe.



13) Loosen clamp, and separate air vent hose (B) and fuel filler hose (A) from air vent and fuel filler pipe.



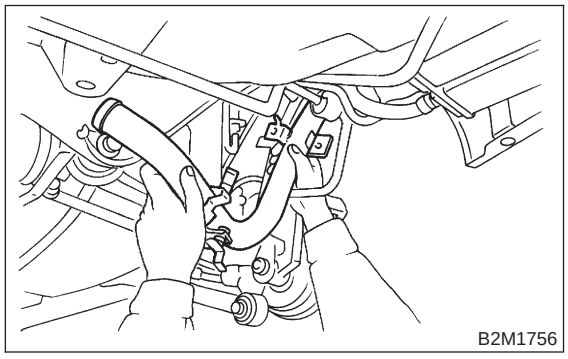
14) Remove fuel filler pipe to under side of the vehicle.


B2M1756

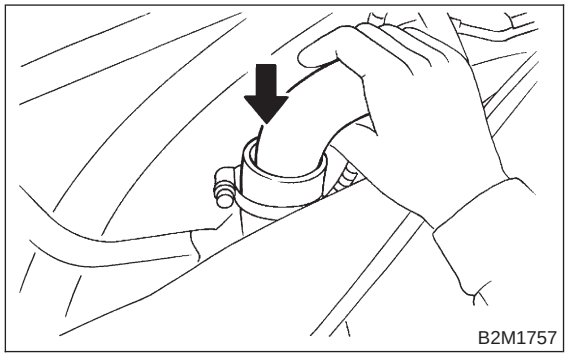
B: INSTALLATION

1. 2200 cc MODEL

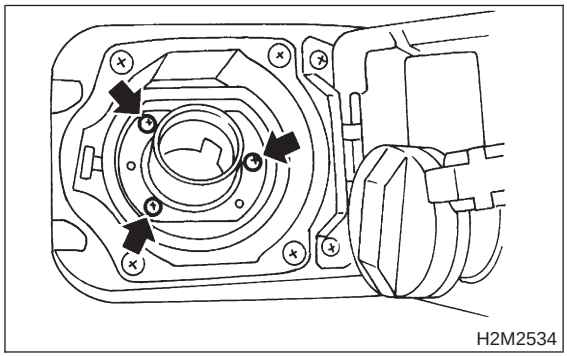
1) Set fuel filler pipe from under side of vehicle, and hold it on fuel filler flap open.


B2M1756

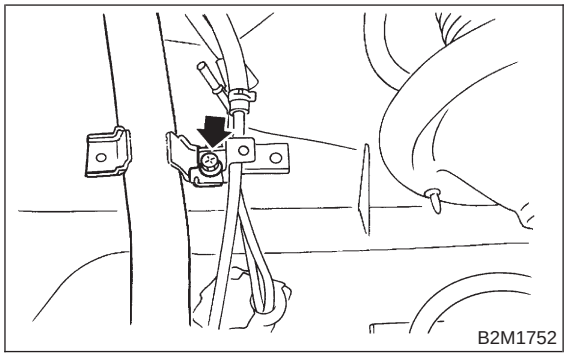
2) Connect fuel filler pipe into fuel filler hose.


B2M1757

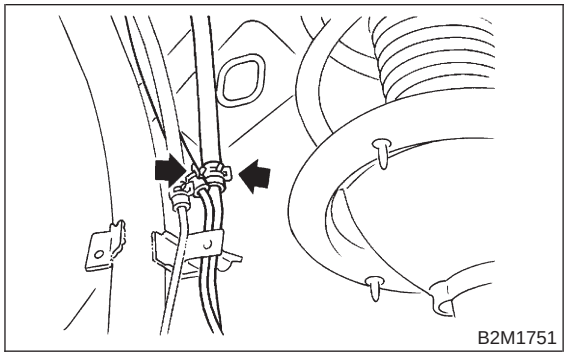
3) Lower the vehicle.
4) Temporarily tighten screws which install fuel filler pipe on filler lid open.


H2M2534

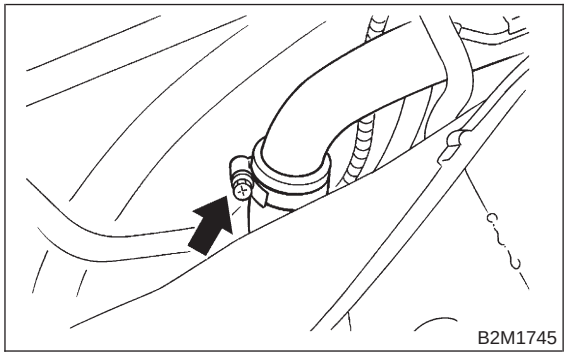
5) Tighten bolt which holds fuel filler pipe on body.


B2M1752

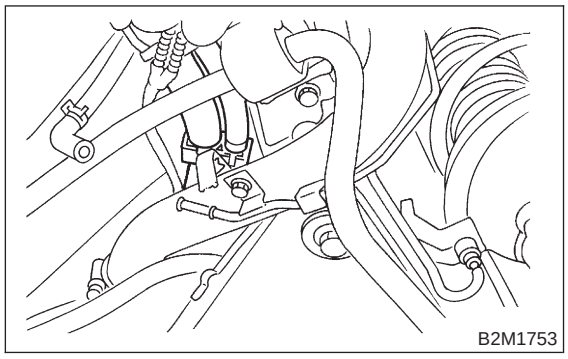
6) Connect evaporation hoses to pipes.


B2M1751

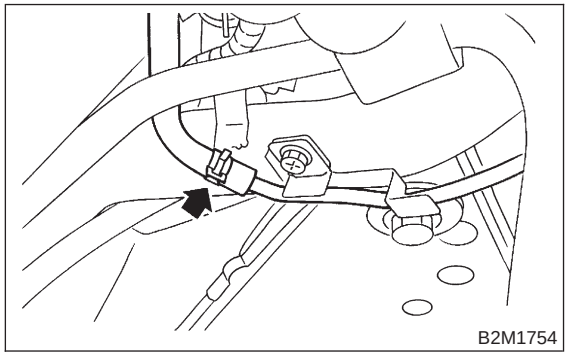
7) Lift-up the vehicle.
8) Tighten clamp bolt which holds fuel filler hose.


B2M1745

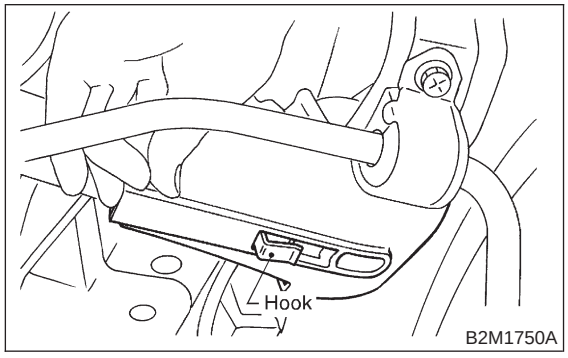
9) Install two evaporation hoses to clip.


B2M1753

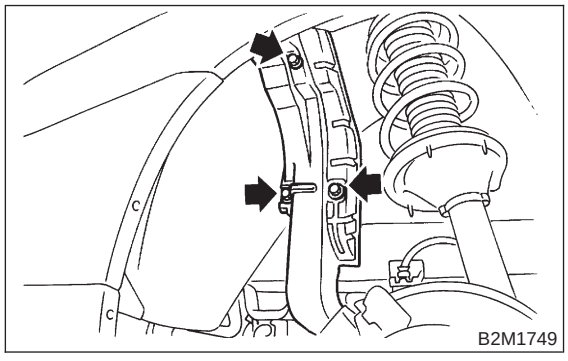
10) Connect evaporation hose to joint pipe.


B2M1754

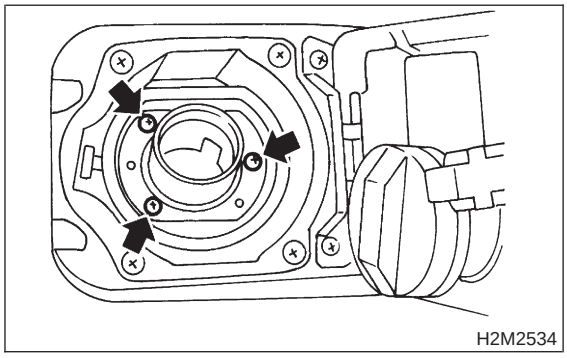
11) Lower the vehicle.
12) While holding the under side of protector cover on bracket, install it.



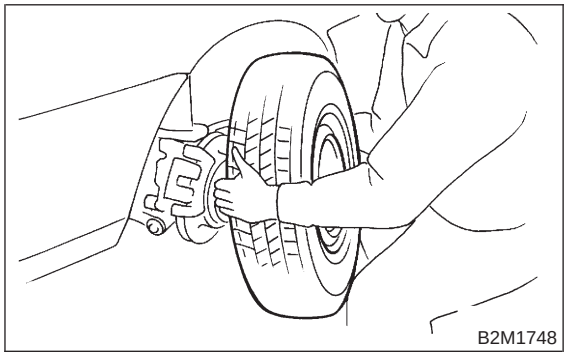
13) Tighten bolts which install protector cover on body.


B2M1749

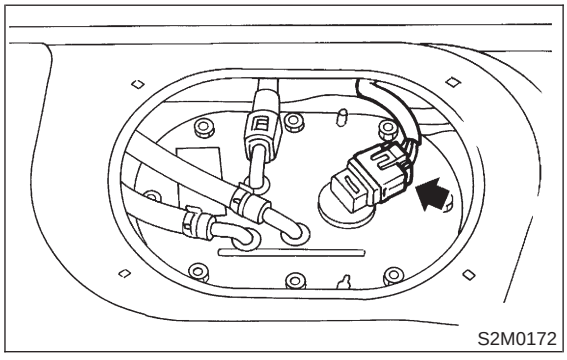
14) Tighten screws which install fuel filler pipe on filler lid open.


H2M2534

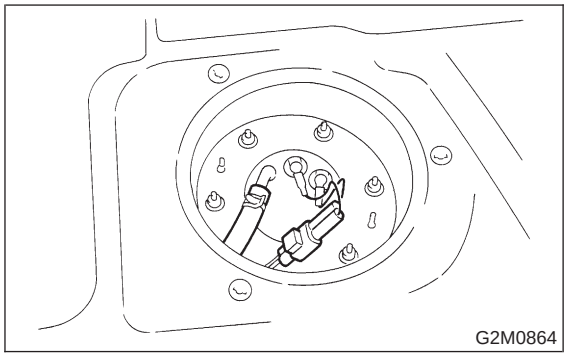
15) Install rear right wheel.


B2M1748

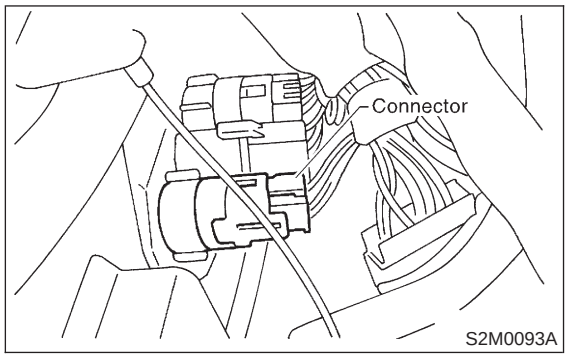
16) Install fuel filler cap.
17) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].> and <Ref. to 2-8 [W7B0].>


S2M0172

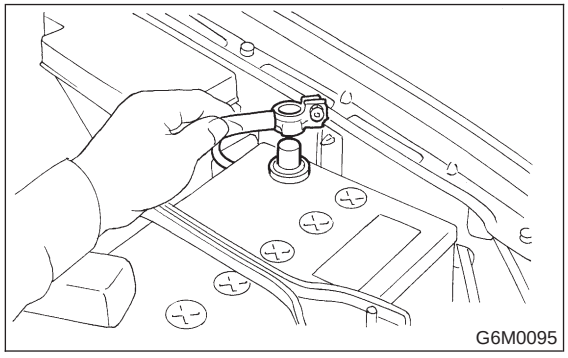
18) Install fuel sub meter unit, and connect connector and jet pump hose. <Ref. to 2-8 [W10A0].>


G2M0864

19) Connect connector to fuel pump relay.

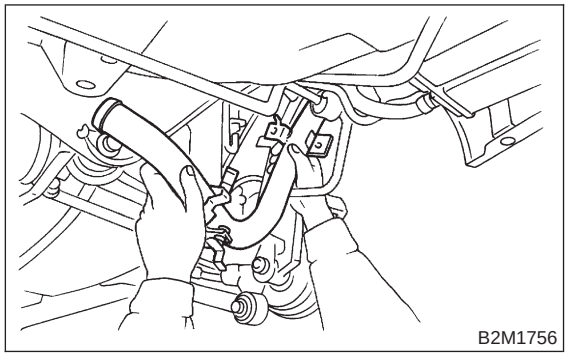


20) Connect battery ground terminal.



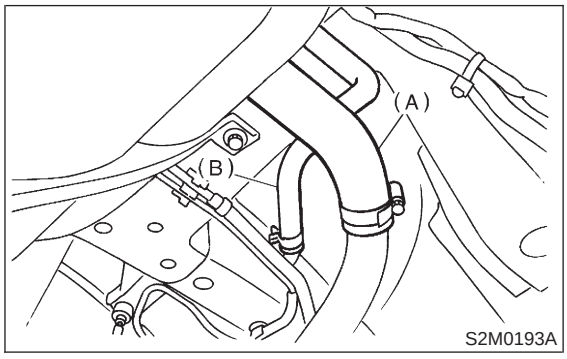
2. 2500 cc MODEL

1) Set fuel filler pipe from under side of vehicle, and hold it on fuel filler flap open.



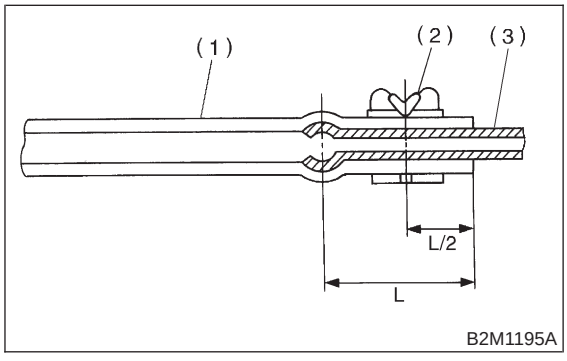
2) Insert fuel filler hose (A) approximately 25 to 30 mm (0.98 to 1.18 in) over the lower end of fuel filler pipe and tighten clamp.

CAUTION:
Do not allow clips to touch air vent hose (B) and rear suspension crossmember.



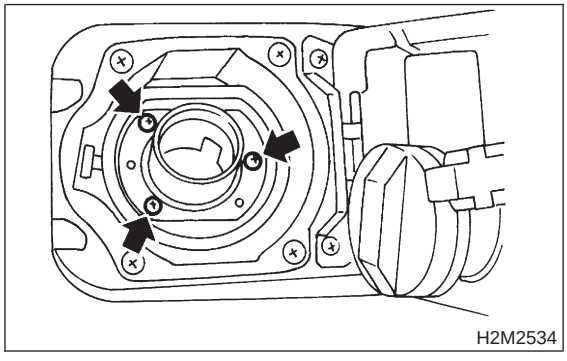
3) Insert air vent hose approximately 25 to 30 mm (0.98 to 1.18 in) into the lower end of air vent pipe and hold clip.

L = 25 — 30 mm (0.98 — 1.18 in)

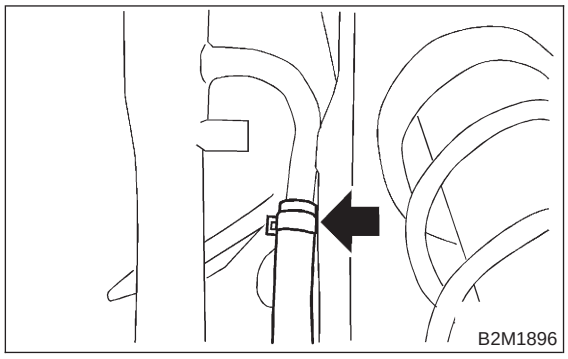


(1) Hose
(2) Clip
(3) Pipe

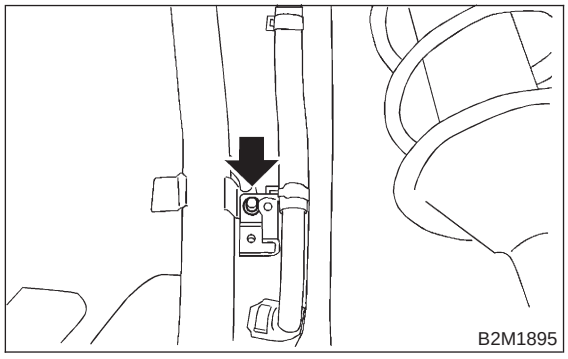
4) Lower the vehicle.
5) Temporarily tighten screws which install fuel filler pipe on filler lid open.



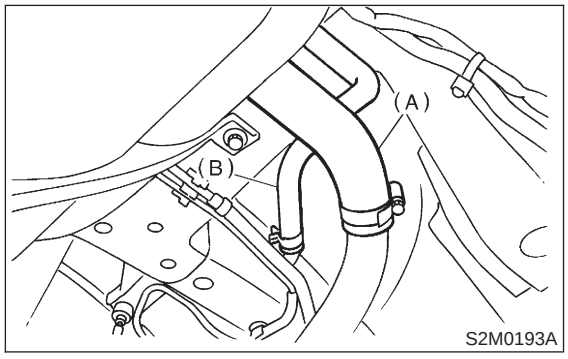
6) Connect air vent hose to air vent pipe.



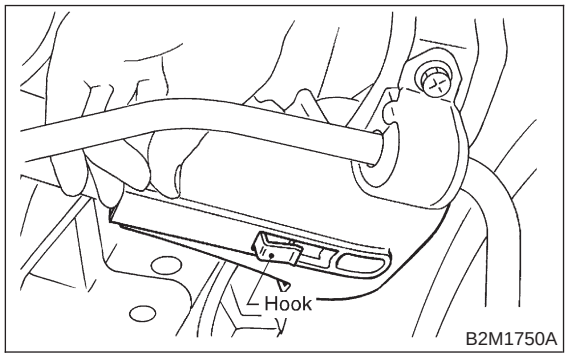
7) Tighten bolt which holds fuel filler pipe on body.



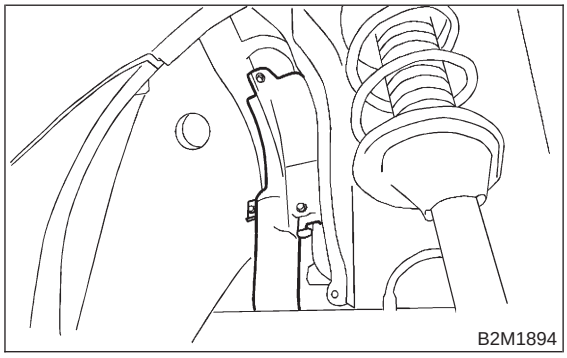
8) Lift-up the vehicle.
9) Tighten clamp bolt which holds fuel filler hose.



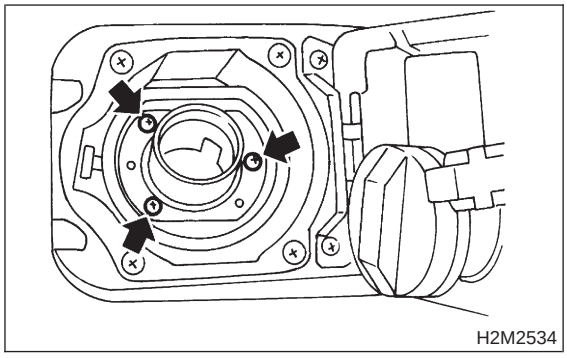
10) Lower the vehicle.
11) While holding the under side of protector cover on bracket, install protector cover.



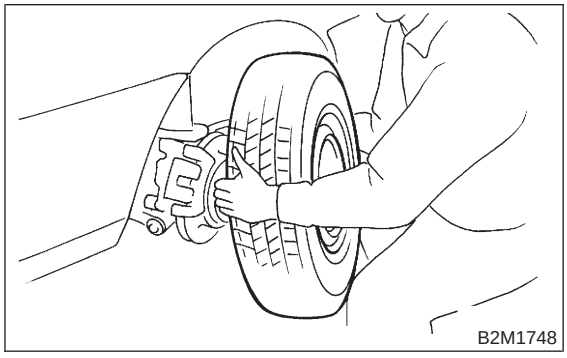
12) Tighten bolts which install protector cover on body.



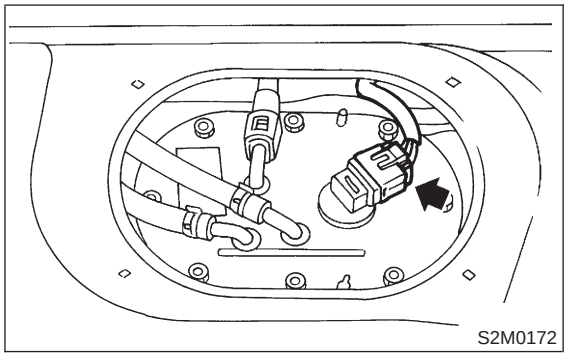
13) Tighten screws which install fuel filler pipe on filler lid open.



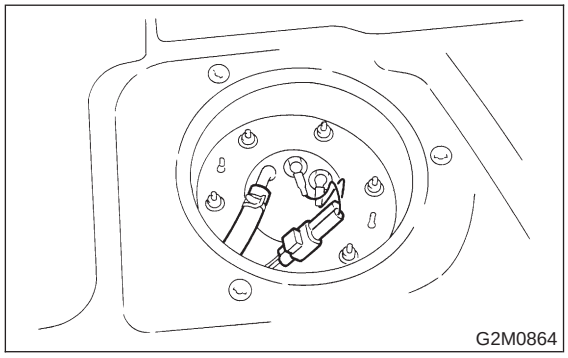
14) Install rear right wheel.



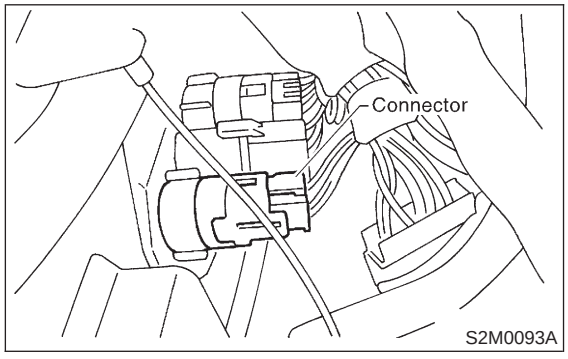
15) Install fuel filler cap.
16) Install fuel pump, and connect connector and fuel hoses. <Ref. to 2-8 [W5C0].> and <Ref. to 2-8 [W7B0].>



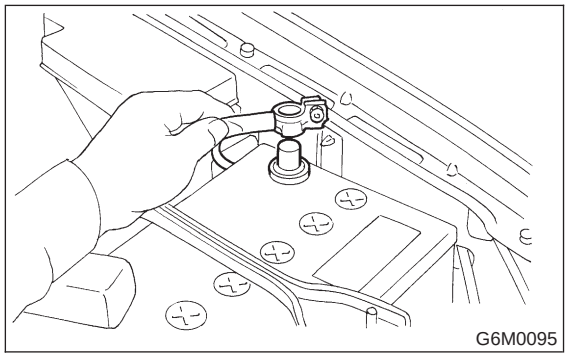
17) Install fuel sub meter unit, and connect connector and jet pump hose. <Ref. 2-8 [W10A0].>



18) Connect connector to fuel pump relay.

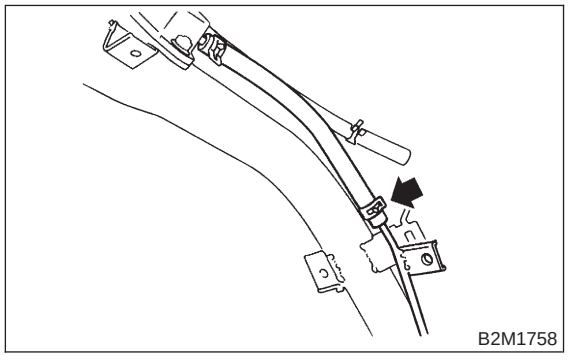


19) Connect battery ground terminal.

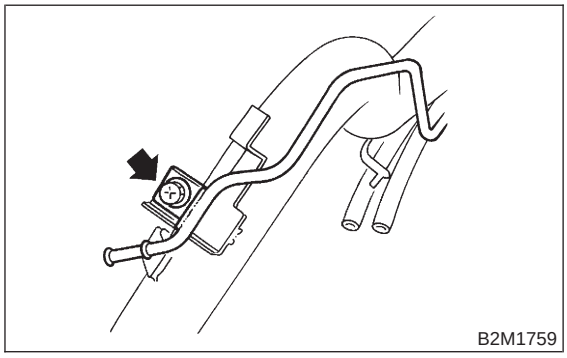


C: DISASSEMBLY (2200 cc MODEL)

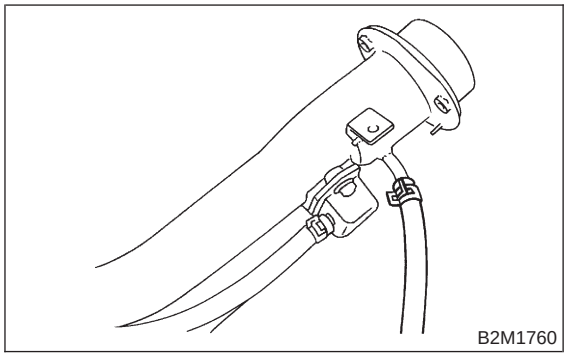
1) Move clip, and disconnect evaporation hose from joint pipe.



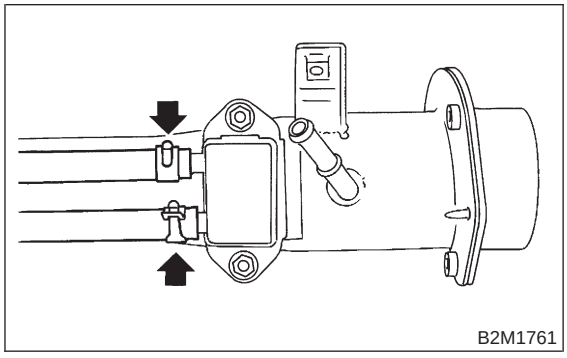
2) Remove bolt which installs joint pipe on fuel filler pipe.



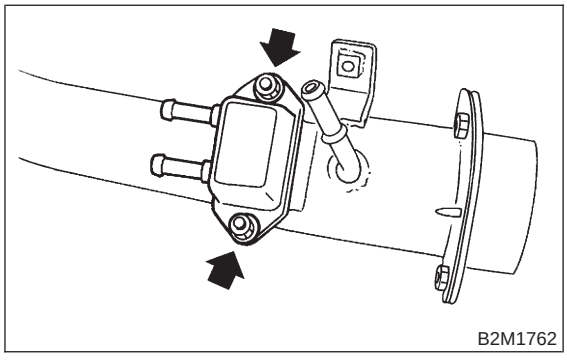
3) Disconnect evaporation hose from fuel filler pipe.



4) Disconnect evaporation hoses from shut valve.



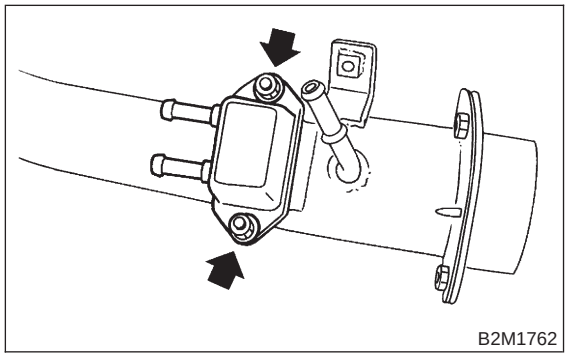
5) Remove shut valve from fuel filler pipe.



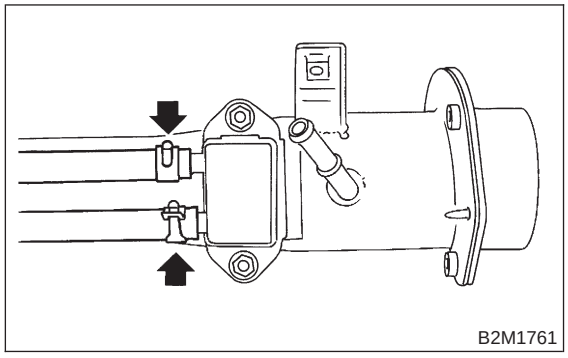
D: ASSEMBLY (2200 cc MODEL)

1) Install shut valve on fuel filler pipe.

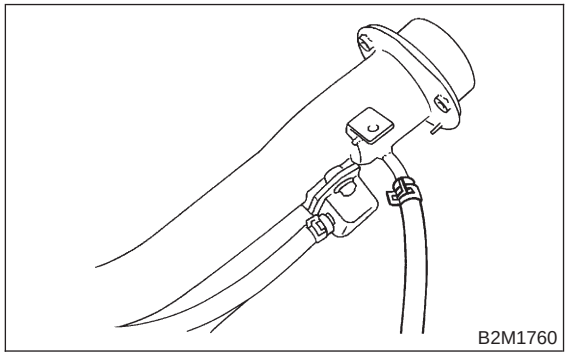
Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)


B2M1762

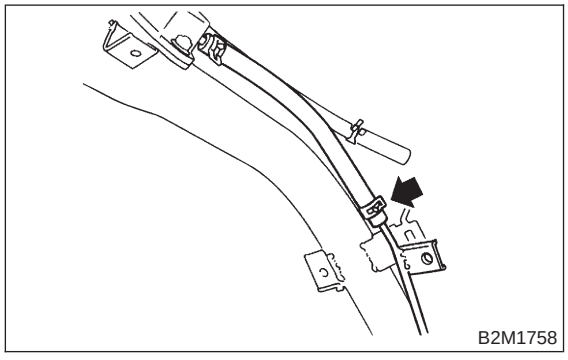
2) Connect evaporation hoses to shut valve.


B2M1761

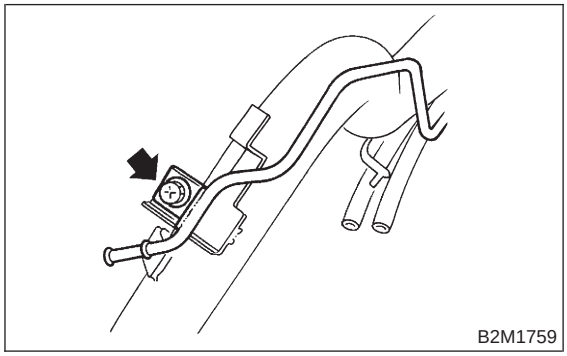
3) Connect evaporation hose to fuel filler pipe.


B2M1760

4) Connect evaporation hose to evaporation pipe.


B2M1758

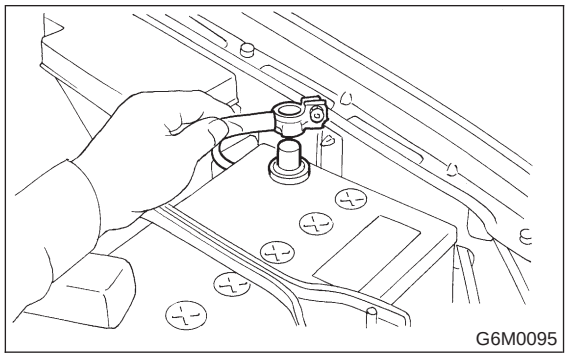
5) Install evaporation pipe to fuel filler pipe.


B2M1759

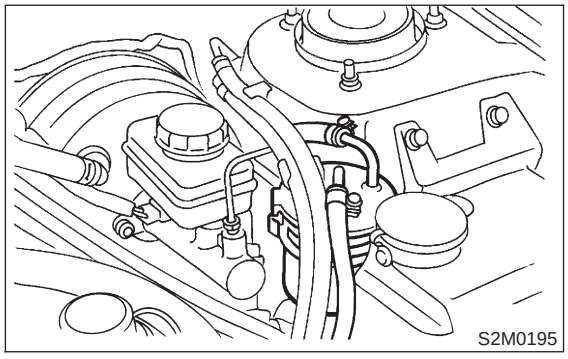
4. Fuel Filter

A: REMOVAL

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Disconnect battery ground cable.



3) Disconnect fuel delivery hoses from fuel filter.



4) Remove filter from holder.

B: INSPECTION

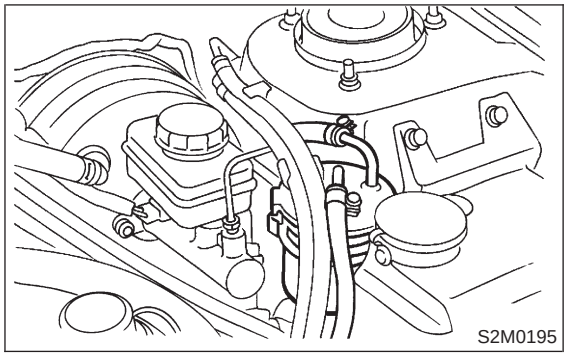
1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from inlet port.

C: INSTALLATION

CAUTION:
● If fuel hoses are damaged at the connecting portion, replace it with a new one.
● If clamps are badly damaged, replace with new ones.

1) Installation is in the reverse order of removal.
2) Tighten hose clamp screws.

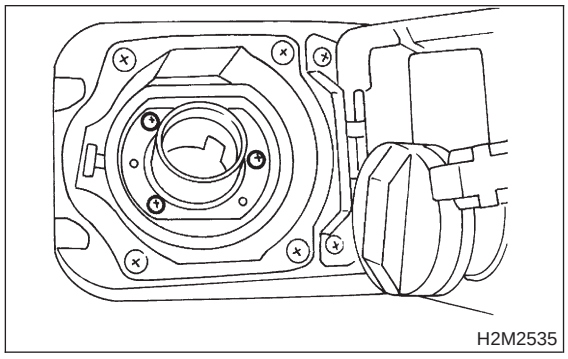
Tightening torque:
1.0 $^{+0.5}/_{-0}$ N·m (0.1$^{+0.05}/_{-0}$ kg-m, 0.7$^{+0.4}/_{-0}$ ft-lb)



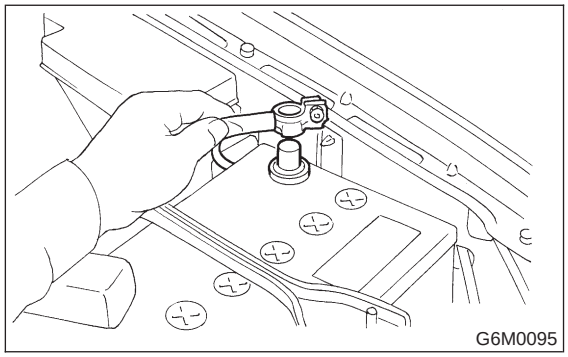
5. Fuel Pump

A: REMOVAL

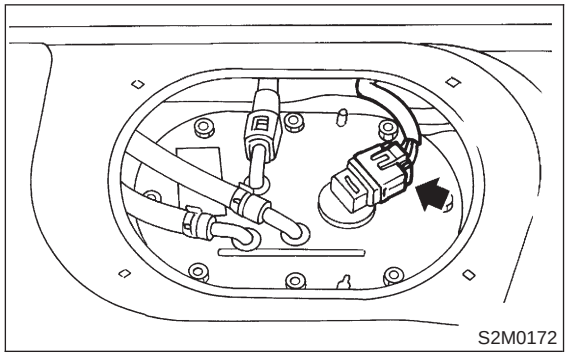
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



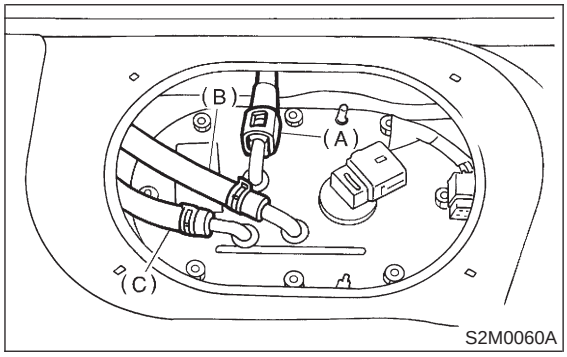
3) Disconnect battery ground cable.



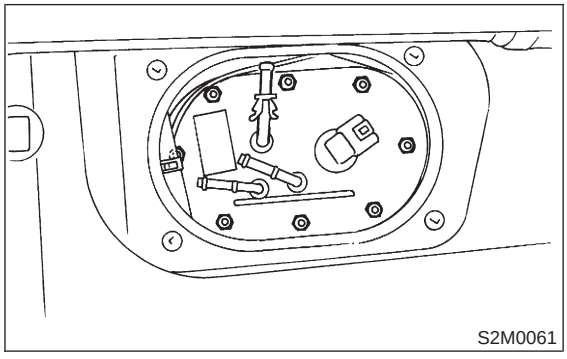
4) Disconnect connector from fuel pump.



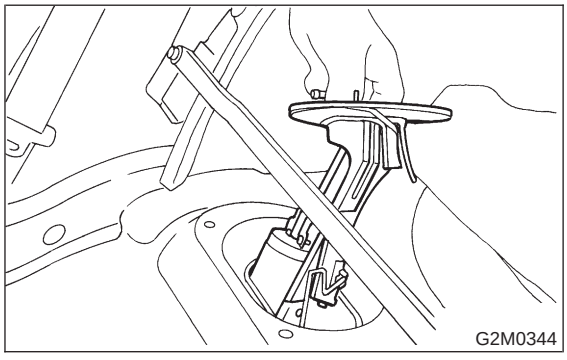
5) Move clips, and then disconnect fuel delivery hose (A), return hose (B) and jet pump hose (C).
6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>



7) Remove nuts which install fuel pump assembly onto fuel tank.



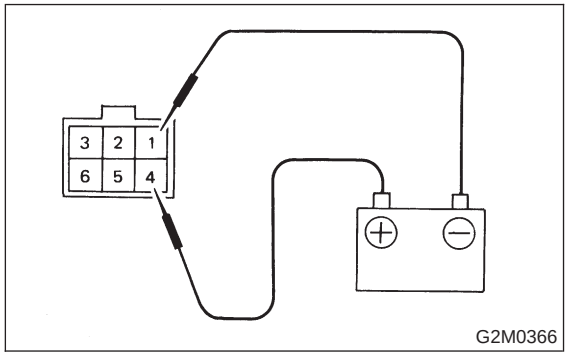
8) Take off fuel pump from fuel tank.



B: INSPECTION

Connect lead harness to connector terminal of fuel pump, and apply battery power supply to check whether the pump operate.

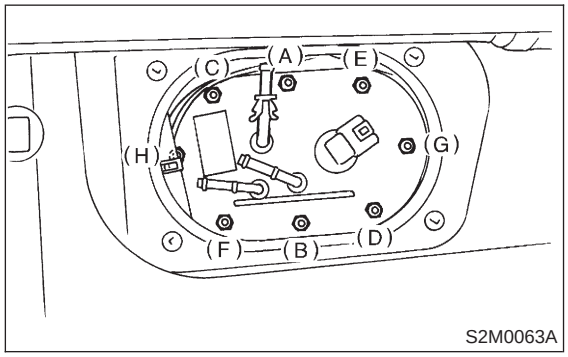
WARNING:
- **Wipe off the fuel completely.**
- **Keep battery as far apart from fuel pump as possible.**
- **Be sure to turn the battery supply ON and OFF on the battery side.**
- **Do not run fuel pump for a long time under non-load condition.**



C: INSTALLATION

Installation is in the reverse order of removal. Do the following:
(1) Always use new gaskets.
(2) Ensure sealing portion is free from fuel or foreign particles before installation.
(3) Tighten nuts in numerical sequence shown in Figure to specified torque.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

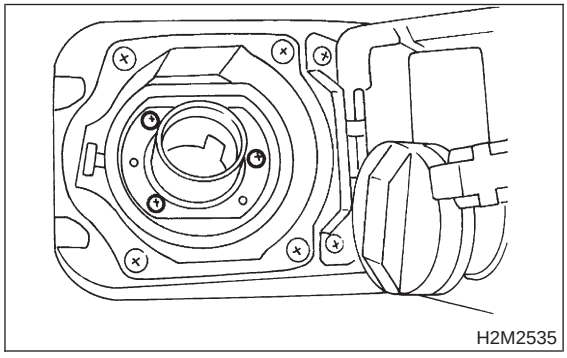


6. Fuel Meter Unit

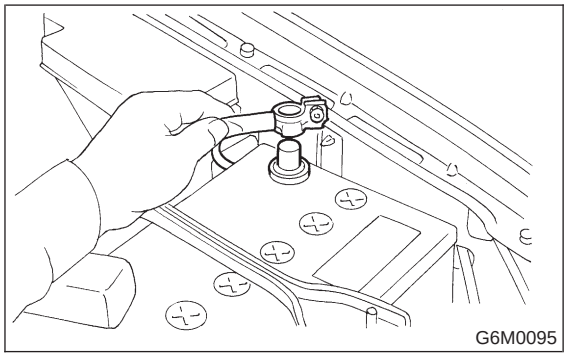
A: REMOVAL

NOTE:
Fuel meter unit is built in fuel pump assembly.

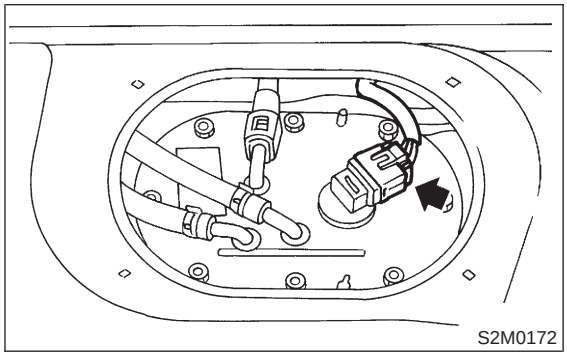
1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.



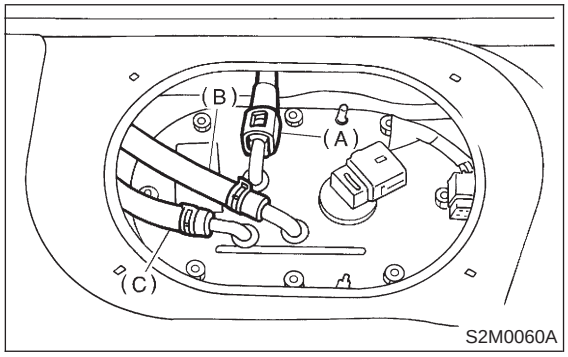
3) Disconnect battery ground cable.



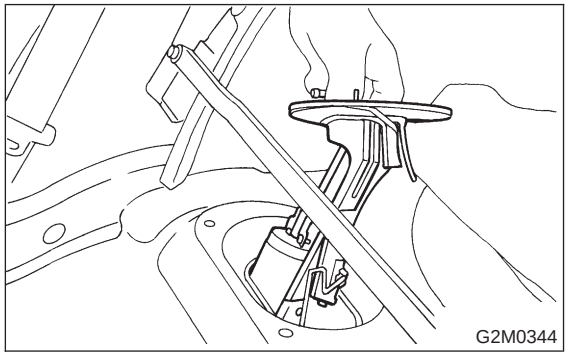
4) Disconnect connector from fuel pump.



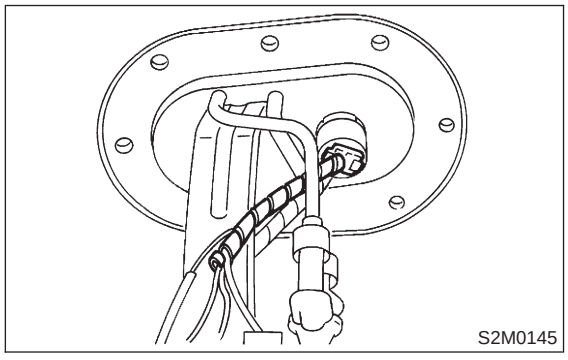
5) Move clips, and then disconnect fuel return hose (B) and jet pump hose (C).
6) Disconnect quick connector, and then disconnect fuel delivery hose (A). <Ref. to 2-8 [W7A0].>



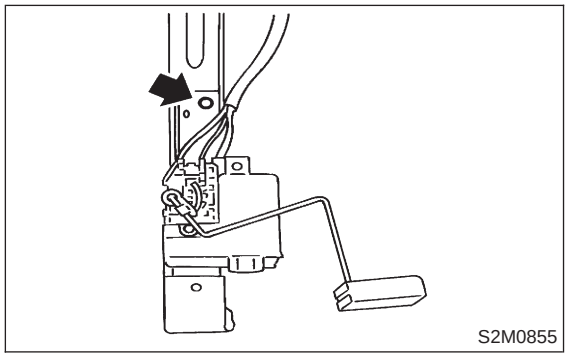
7) Remove nuts which install fuel pump assembly onto fuel tank.
8) Take off fuel pump assembly.



9) Disconnect connector from fuel pump bracket.

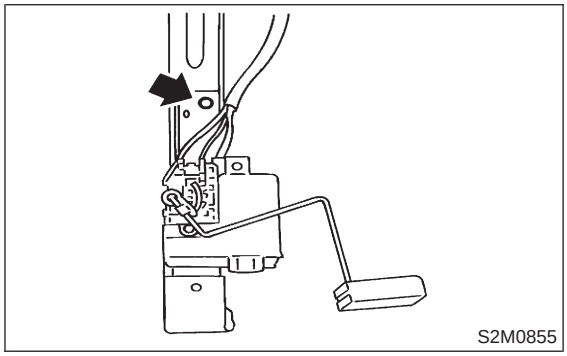


10) Remove bolt which installs fuel meter unit on mounting bracket.



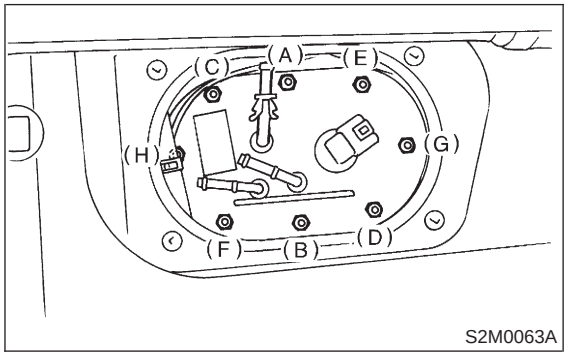
B: INSTALLATION

Installation is in the reverse order of removal. Do the following:
(1) Install the fuel meter unit on mounting bracket.



(2) Always use new gaskets.
(3) Ensure sealing portion is free from fuel or foreign particles before installation.
(4) Tighten nuts in alphabetical sequence shown in Figure to specified torque.

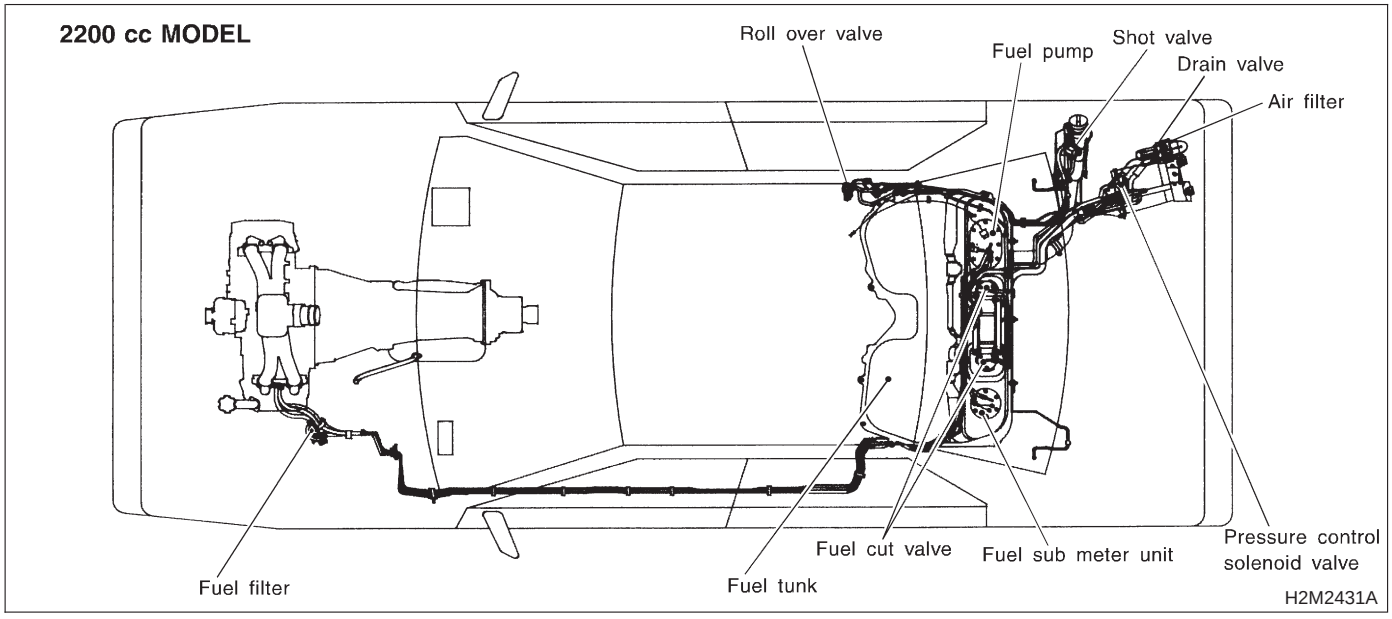
Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

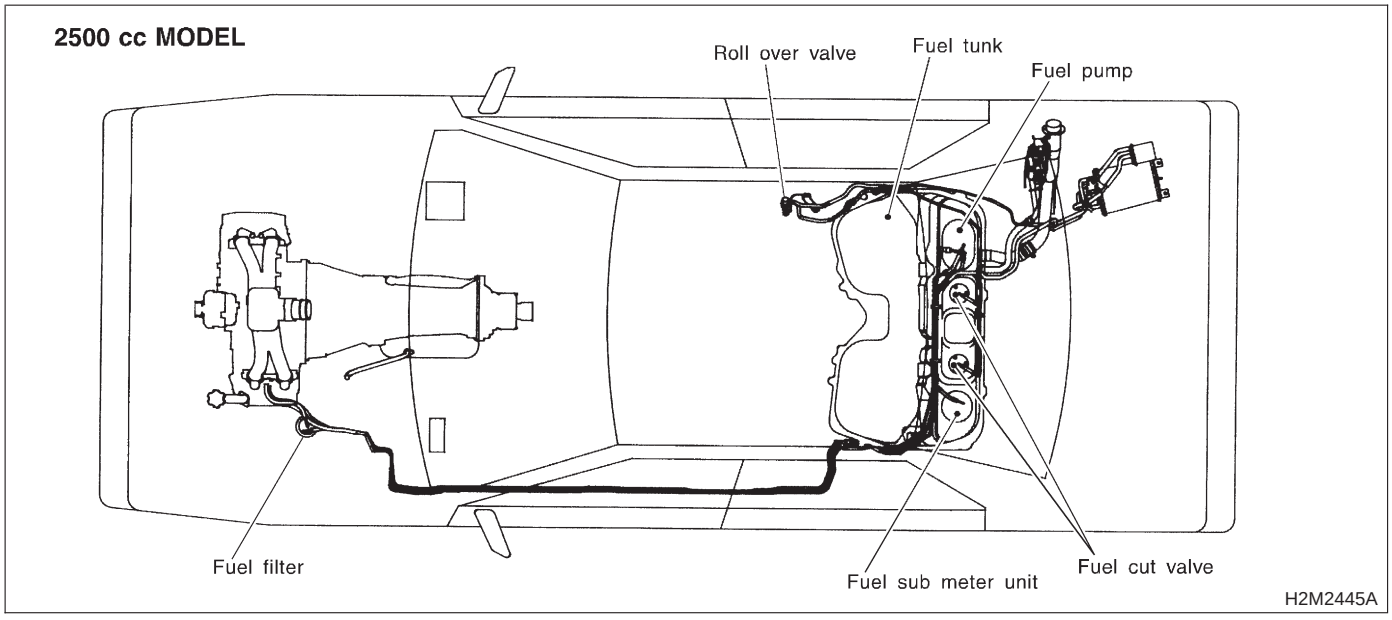


7. Fuel Delivery, Return and Evaporation Lines

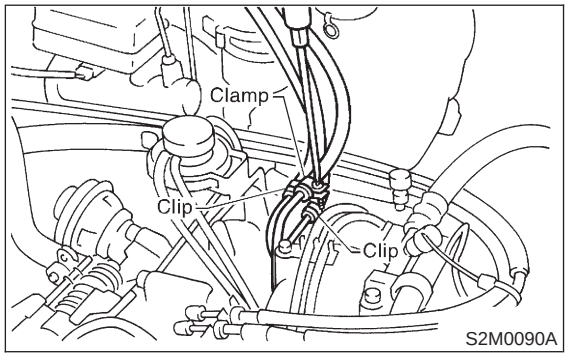
A: REMOVAL

1) Release fuel pressure. <Ref. to 2-8 [W1B0].>
2) Open fuel flap lid, and remove fuel filler cap.
3) Remove inner trim, insulator and rear seat.
4) Remove fuel delivery pipes and hoses, fuel return pipes and hoses, and evaporation pipes and hoses.



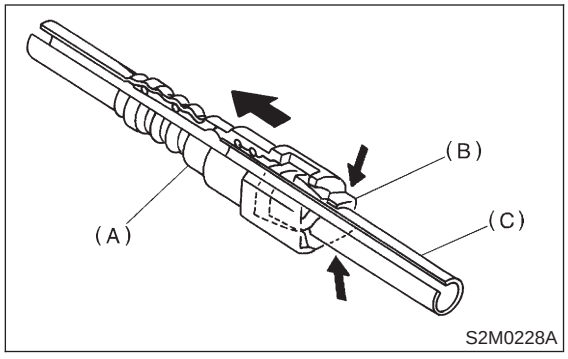


5) In engine compartment, detach fuel delivery hose, return hose and evaporation hose.



6) Separate quick connector on fuel deliverly line.
(1) Clean pipe and connector, if they are covered with dust.
(2) Hold connector (A) and push retainer (B) down.
(3) Pull out connector (A) from retainer (B).

CAUTION:
Replace retainer with new ones.

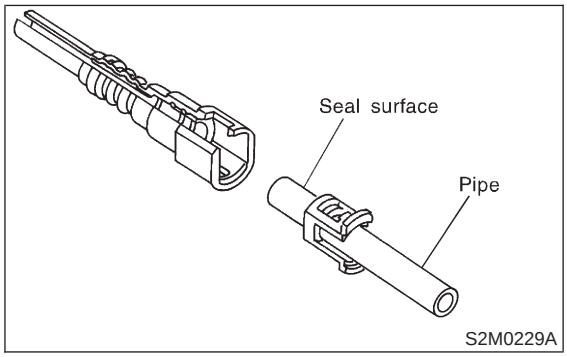


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

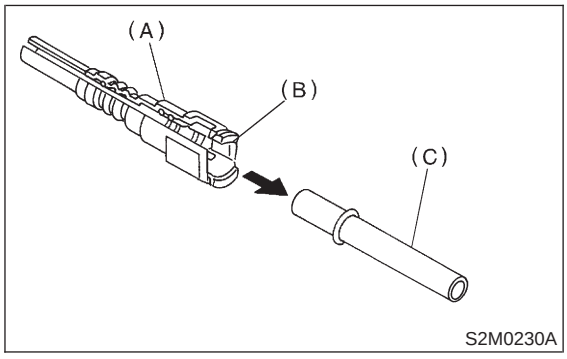
Installation is in the reverse order of removal.
1) Connect quick connector on fuel delivery line.

CAUTION:
- **Always use a new retainer.**
- **Make sure that the connected portion is not damaged or has dust. If necessary, clean seal surface of pipe.**



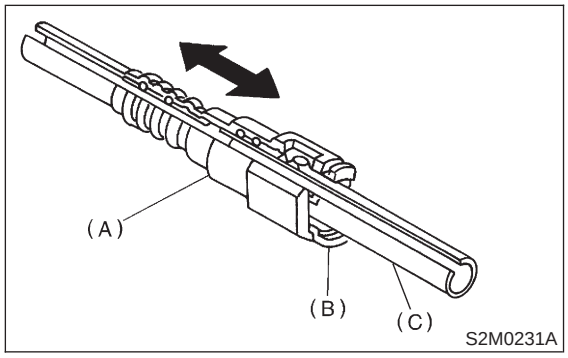
(1) Set new retainer (B) to connector (A).
(2) Push pipe into connector completely.

NOTE:
At this time, two clicking sounds are heard.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
- **Pull the connector to ensure it is connected securely.**
- **Ensure the two retainer pawls are engaged in their mating positions in the connector.**
- **Be sure to inspect hoses and their connections for any leakage of fuel.**

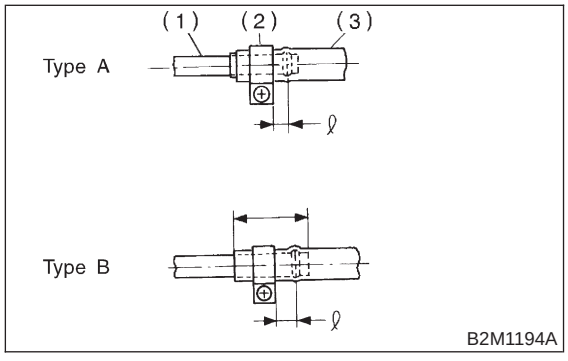


(A) Connector
(B) Retainer
(C) Pipe

2) Connect fuel delivery hose to pipe in engine compartment with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When fitting length is specified.
Type B: When fitting length is not specified.

ℓ : 1.0 — 4.0 mm (0.039 — 0.157 in)

L: 20 — 25 mm (0.79 — 0.98 in)



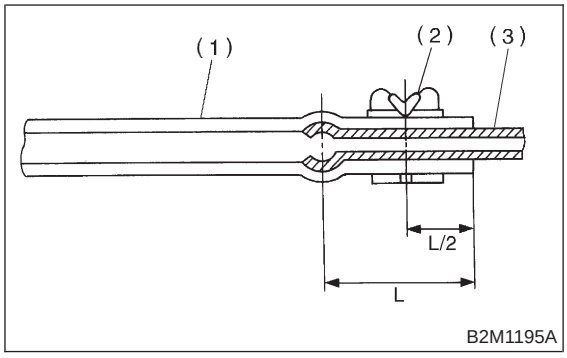
(1) Fitting
(2) Clamp
(3) Hose

3) Connect return hose and evaporation hose to pipe by approx. 15 mm (0.59 in) from hose end.

Fuel return hose:
L = 20 — 25 mm (0.79 — 0.98 in)

Fuel evaporation hose:
L = 15 — 20 mm (0.59 — 0.79 in)

CAUTION:
Be sure to inspect hoses and their connections for any leakage of fuel.

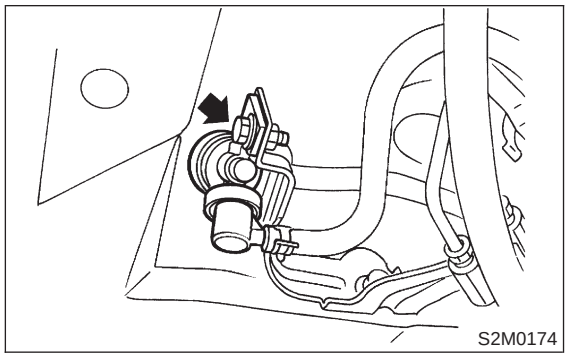


(1) Hose
(2) Clip
(3) Pipe

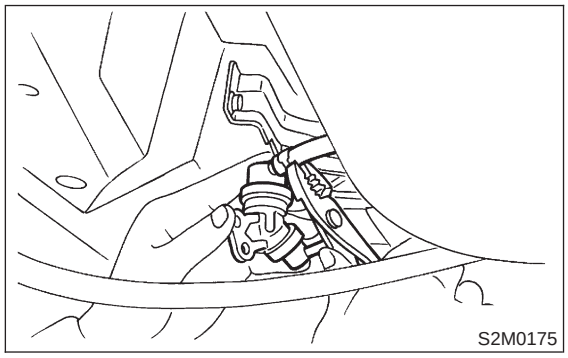
8. Roll Over Valve

A: REMOVAL AND INSTALLATION

1) Lift-up the vehicle.
2) Remove roll over valve from bracket.

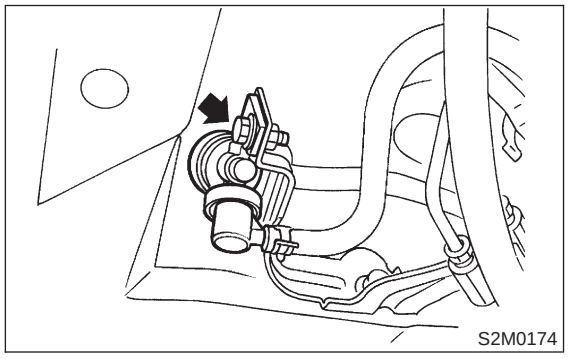


3) Disconnect hoses from roll over valve, and remove it from bracket.



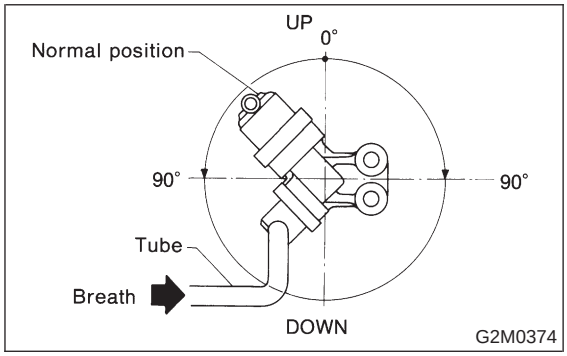
4) Installation is in the reverse order of removal.

CAUTION:
- **Do not install top side of valve down.**
- **Before installing bracket on body, securely fit concave part of bracket to hole in body.**



B: INSPECTION

1) Connect hoses to roll over valve as shown in Figure.

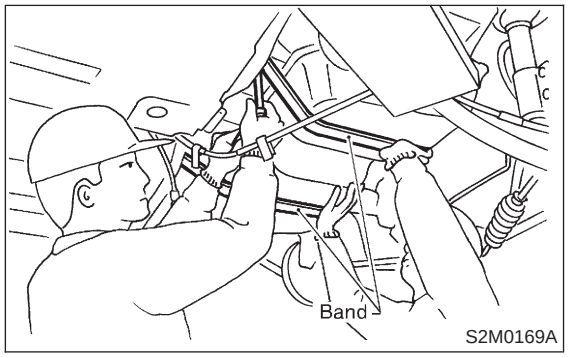


2) While blowing through open end of hose, tilt valve at least 90° left and right from normal position.
3) Ensure that there is no air flow when hose is tilted greater than 90°.

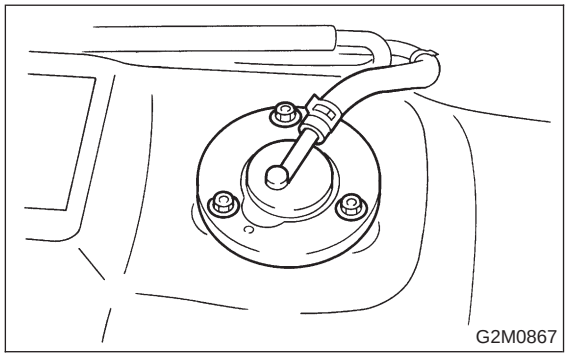
9. Fuel Cut Valve

A: REMOVAL AND INSTALLATION

1) Remove fuel tank. <Ref. to 2-8 [W2A0].>



2) Disconnect evaporation hose from fuel cut valve.
3) Remove fuel cut valve.



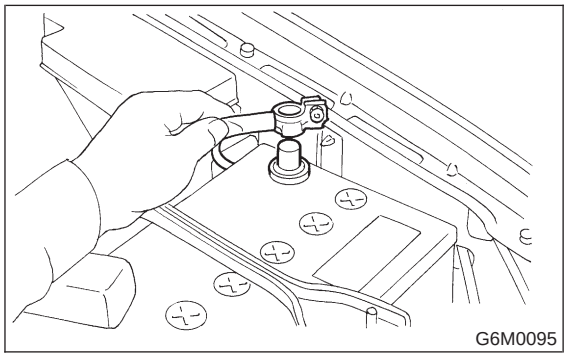
4) Installation is in the reverse order of removal procedure.

Tightening torque:
4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)

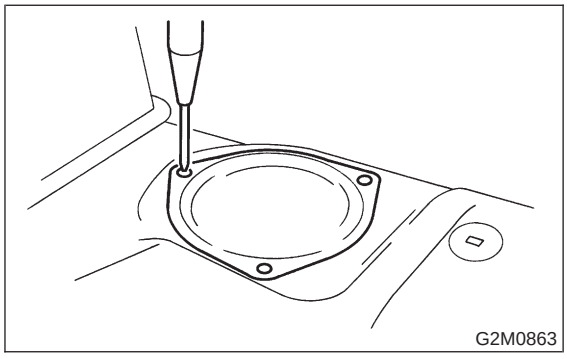
10. Fuel Sub Meter Unit

A: REMOVAL AND INSTALLATION

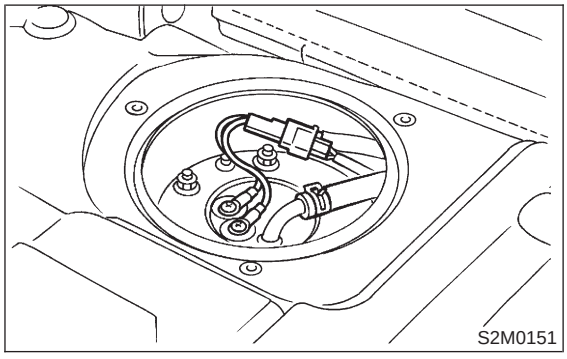
1) Disconnect battery ground cable.



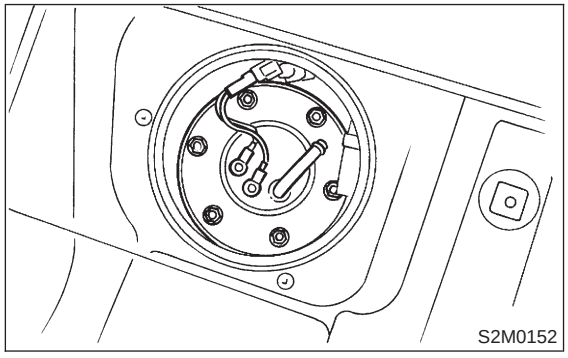
2) Remove fuel filler cap.
3) Remove service hole cover.



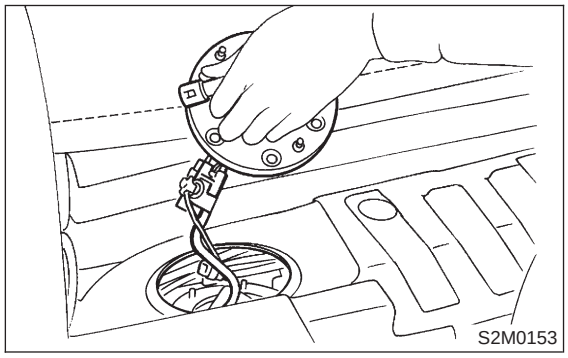
4) Disconnect connector from fuel sub meter, and disconnect jet pump hose.



5) Remove bolts which install fuel sub meter unit on fuel tank.

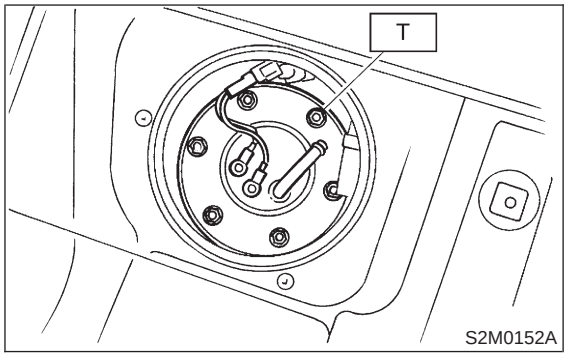


6) Remove fuel sub meter unit.



7) Installation is in the reverse order of removal.

Tightening torque:
T: 4.4±1.5 N·m (0.45±0.15 kg-m, 3.3±1.1 ft-lb)



1. Fuel System Trouble in General

Trouble and possible cause			Corrective action
1. Insufficient fuel supply to the injector			
1)	Fuel pump will not operate.		
	○	Defective terminal contact.	Inspect connections, especially ground, and tighten securely.
	○	Trouble in electromagnetic or electronic circuit parts.	Replace fuel pump.
2)		Lowering of fuel pump function.	Replace fuel pump.
3)		Clogged dust or water in the fuel filter.	Replace fuel filter, clean or replace fuel tank.
4)		Clogged or bent fuel pipe or hose.	Clean, correct or replace fuel pipe or hose.
5)		Air is mixed in the fuel system.	Inspect or retighten each connection part.
6)		Clogged or bent breather tube or pipe.	Clean, correct or replace air breather tube or pipe.
7)		Damaged diaphragm of pressure regulator.	Replace.
2. Leakage or blow out fuel			
1)		Loosened joints of the fuel pipe.	Retightening.
2)		Cracked fuel pipe, hose and fuel tank.	Replace.
3)		Defective welding part on the fuel tank.	Replace.
4)		Defective drain packing of the fuel tank.	Replace.
5)		Clogged or bent air breather tube or air vent tube.	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment			
1)		Loose joints at air breather tube, air vent tube and fuel filler pipe.	Retightening.
2)		Defective packing air tightness on the fuel saucer.	Correct or replace packing.
3)		Cracked fuel separator.	Replace separator.
4)		Inoperable fuel pump modulator or circuit.	Replace.
4. Defective fuel meter indicator			
1)		Defective operation of fuel meter unit.	Replace.
2)		Defective operation of fuel meter.	Replace.
5. Noise			
1)		Large operation noise or vibration of fuel pump.	Replace.

NOTE:
When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank.
(1) To prevent water condensation:
- Top off the fuel tank or drain the fuel completely.
- Drain water condensation from the fuel filter.

(2) Refilling the fuel tank:
Refill the fuel tank while there is still some fuel left in the tank.
(3) Protecting the fuel system against freezing and water condensation:
- Cold areas

In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use an anti-freeze solution in the cooling system. Refueling will also complement the effect of anti-freeze solution each time the fuel level drops to about one-half. After the winter season, drain water which may have accumulated in the fuel filter and fuel tank in the manner same as that described under Affected areas below.
- Affected areas

When water condensation is notched in the fuel filter, drain water from both the fuel filter and fuel tank or use a water removing agent (or anti-freeze solution) in the fuel tank.
(4) Observe the instructions, notes, etc., indicated on the label affixed to the anti-freeze solution (water removing agent) container before use.

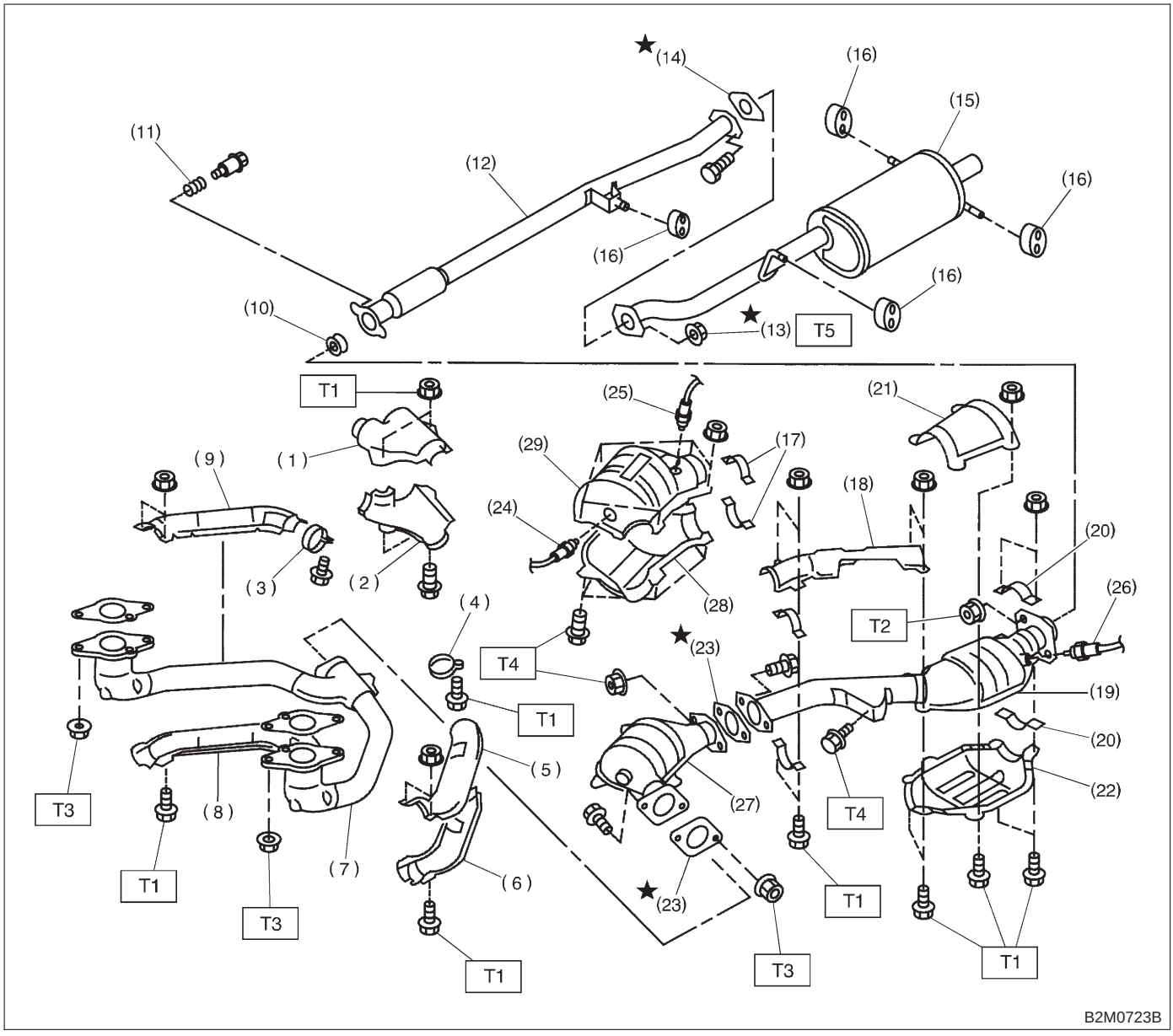
EXHAUST SYSTEM 2-9

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C **COMPONENT PARTS** 2
1. Exhaust System 2
W **SERVICE PROCEDURE** 5
1. Front Exhaust Pipe 5
2. Center Exhaust Pipe 7
3. Rear Exhaust Pipe 9
4. Muffler 10

1. Exhaust System

A: 2200 cc MODEL



(1) Upper front exhaust pipe cover CTR
(2) Lower front exhaust pipe cover CTR
(3) Band RH
(4) Band LH
(5) Upper front exhaust pipe cover LH
(6) Lower front exhaust pipe cover LH
(7) Front exhaust pipe
(8) Lower front exhaust pipe cover RH
(9) Upper front exhaust pipe cover RH
(10) Gasket
(11) Spring
(12) Rear exhaust pipe
(13) Self-locking nut
(14) Gasket
(15) Muffler
(16) Cushion rubber
(17) Clamp
(18) Upper center exhaust pipe cover
(19) Center exhaust pipe
(20) Clamp B
(21) Upper rear catalytic converter cover
(22) Lower rear catalytic converter cover
(23) Gasket
(24) Front oxygen sensor
(25) Rear oxygen sensor (California spec. vehicles)
(26) Rear oxygen sensor (Except California spec. vehicles)
(27) Front catalytic converter
(28) Lower front catalytic converter cover
(29) Upper front catalytic converter cover

Tightening torque: N·m (kg-m, ft-lb)

T1: 13±3 (1.3±0.3, 9.4±2.2)

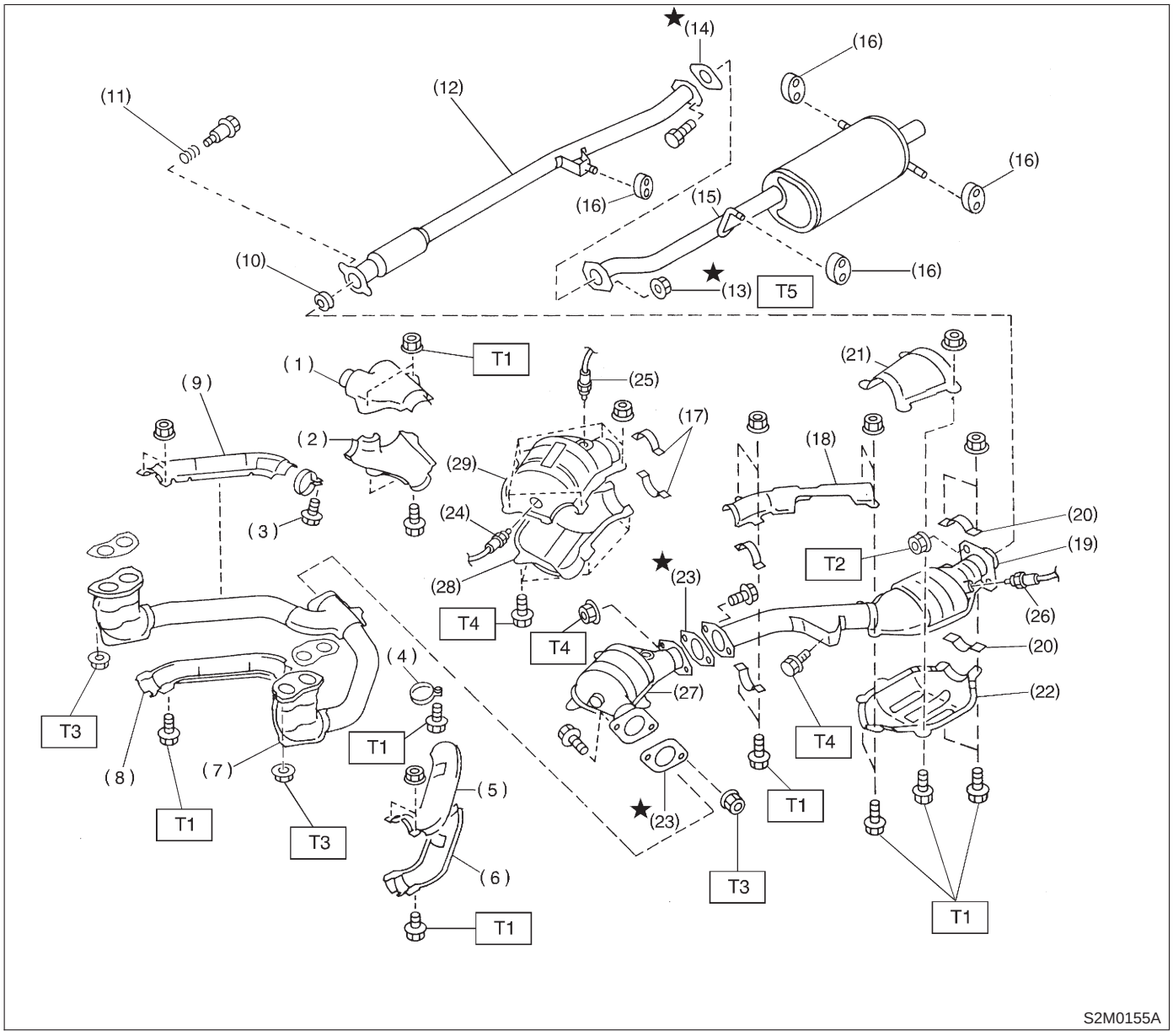
T2: 18±5 (1.8±0.5, 13.0±3.6)

T3: 30±5 (3.1±0.5, 22.4±3.6)

T4: 35±5 (3.6±0.5, 26.0±3.6)

T5: 48±5 (4.9±0.5, 35.4±3.6)

B: 2500 cc MODEL



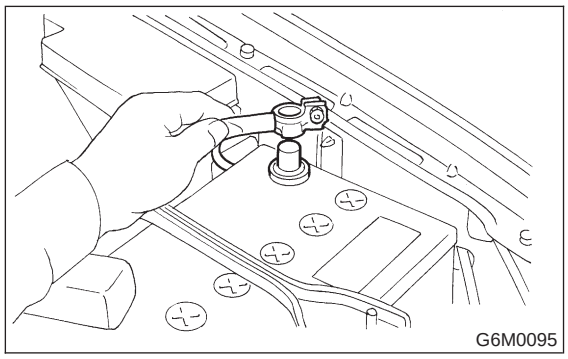
(1) Upper front exhaust pipe cover CTR
(2) Lower front exhaust pipe cover CTR
(3) Band RH
(4) Band LH
(5) Upper front exhaust pipe cover LH
(6) Lower front exhaust pipe cover LH
(7) Front exhaust pipe
(8) Lower front exhaust pipe cover RH
(9) Upper front exhaust pipe cover RH
(10) Gasket
(11) Spring
(12) Rear exhaust pipe
(13) Self-locking nut
(14) Gasket
(15) Muffler
(16) Cushion rubber
(17) Clamp
(18) Upper center exhaust pipe cover
(19) Center exhaust pipe
(20) Clamp B
(21) Upper rear catalytic converter cover
(22) Lower rear catalytic converter cover
(23) Gasket
(24) Front oxygen sensor
(25) Rear oxygen sensor (California spec. vehicles)
(26) Rear oxygen sensor (Except California spec. vehicles)
(27) Front catalytic converter
(28) Lower front catalytic converter cover
(29) Upper front catalytic converter cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±3 (1.3±0.3, 9.4±2.2)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 30±5 (3.1±0.5, 22.4±3.6)
T4: 35±5 (3.6±0.5, 26.0±3.6)
T5: 48±5 (4.9±0.5, 35.4±3.6)

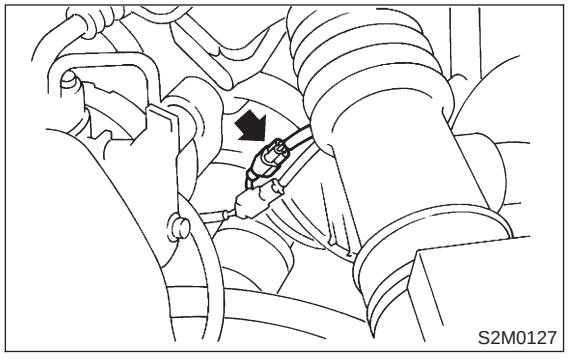
1. Front Exhaust Pipe

A: REMOVAL

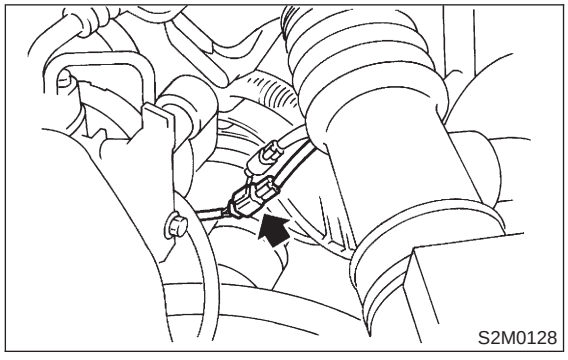
1) Disconnect battery ground cable.



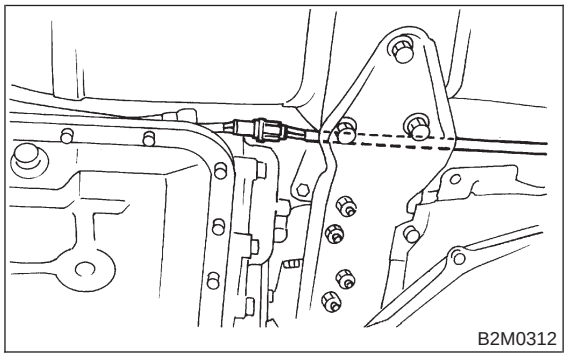
2) Disconnect front oxygen sensor connector.



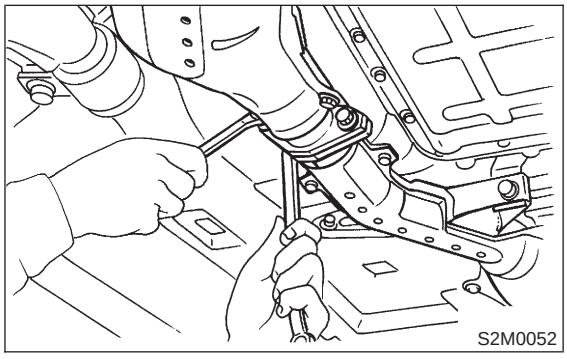
3) Disconnect rear oxygen sensor connector. (California spec. vehicles)



4) Lift-up the vehicle.
5) Disconnect rear oxygen sensor connector. (Except California spec. vehicles)

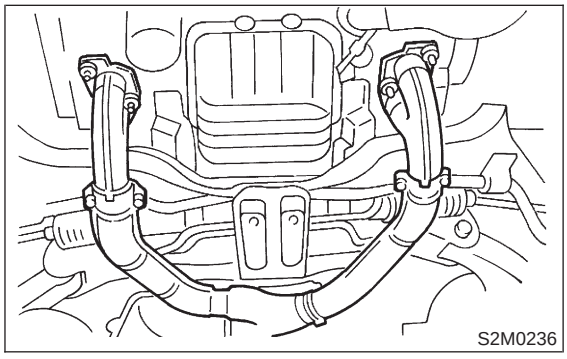


6) Separate center exhaust pipe from front exhaust pipe.

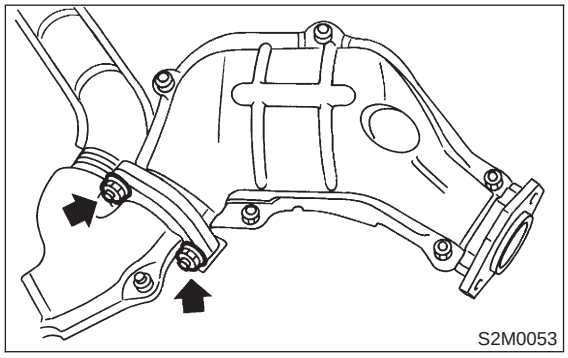


7) Remove bolts which hold front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down front exhaust pipe and center exhaust pipe.



8) Separate front exhaust pipe from front catalytic converter.

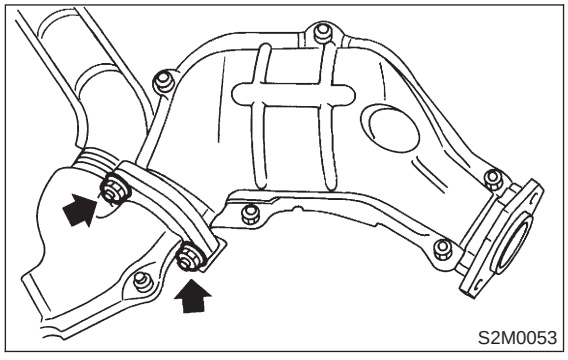


B: INSTALLATION

1) Install front catalytic converter to front exhaust pipe.

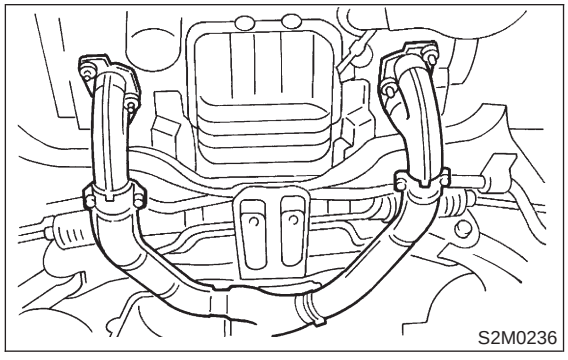
CAUTION:
Replace gaskets with new ones.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)



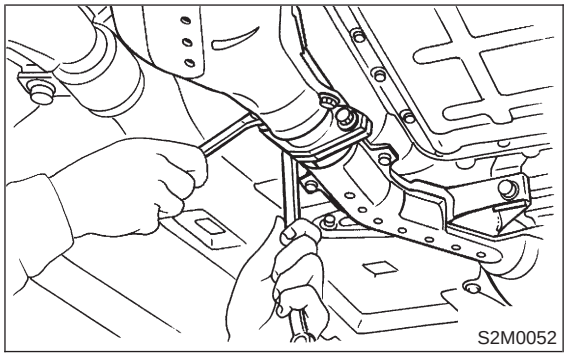
2) Tighten bolts which hold front exhaust pipe onto cylinder heads.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)

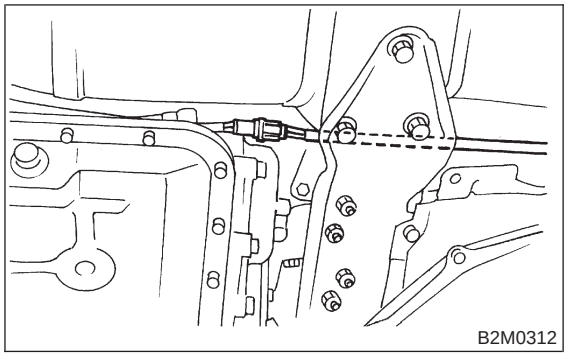


3) Install center exhaust pipe to front exhaust pipe.

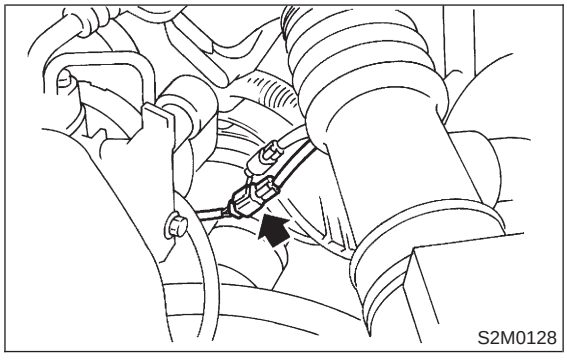
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)



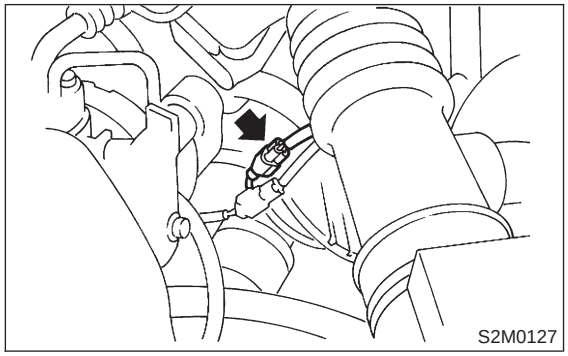
4) Connect rear oxygen sensor connector. (Except California spec. vehicles)



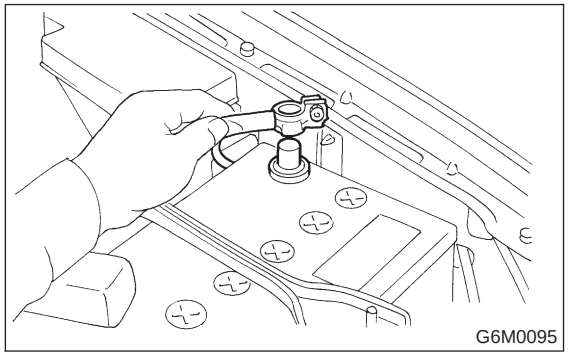
5) Lower the vehicle.
6) Connect rear oxygen sensor connector. (California spec. vehicles)



7) Connect front oxygen sensor connector.



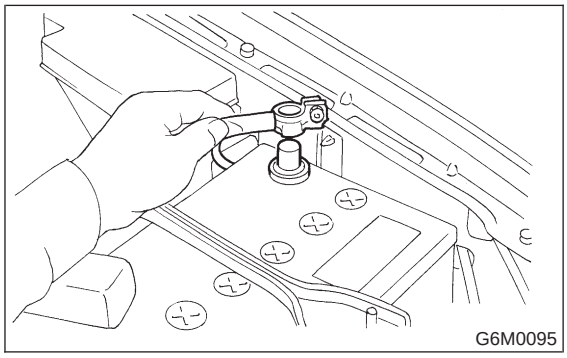
8) Connect battery ground cable.



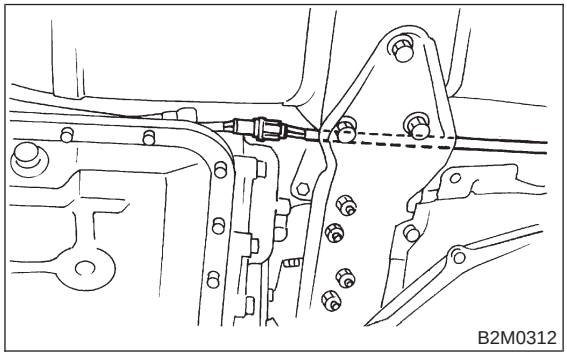
2. Center Exhaust Pipe

A: REMOVAL

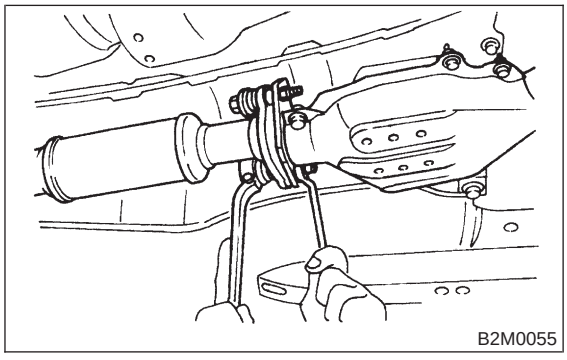
1) Disconnect battery ground cable.



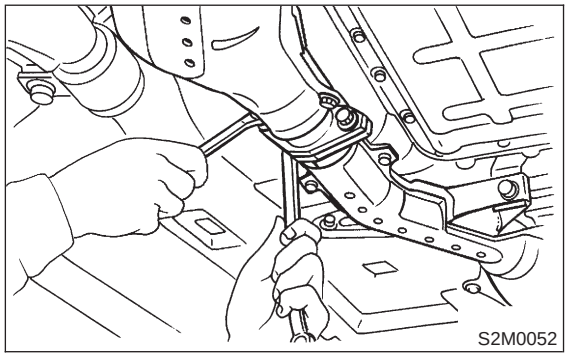
2) Lift-up the vehicle.
3) Disconnect rear oxygen sensor connector. (Except California spec. vehicles)



4) Separate center exhaust pipe and rear catalytic converter assembly from rear exhaust pipe.

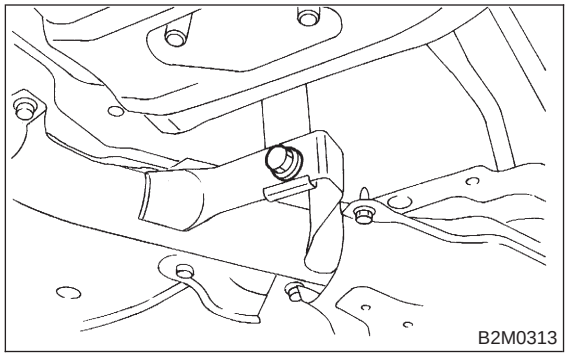


5) Separate center exhaust pipe and rear catalytic converter assembly from front catalytic converter.


S2M0052

6) Remove center exhaust pipe and rear catalytic converter assembly from hanger bracket.

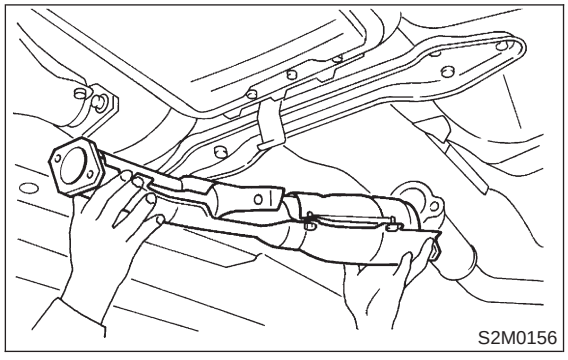
CAUTION:
● Be careful not to pull down center exhaust pipe.
● After removing center exhaust pipe, do not apply excessive pulling force on front catalytic converter and front exhaust pipe.


B2M0313

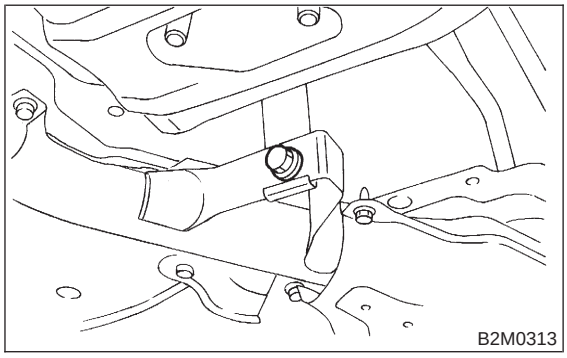
B: INSTALLATION

CAUTION:
Replace gaskets with new ones.

1) Install center exhaust pipe and rear catalytic converter assembly.

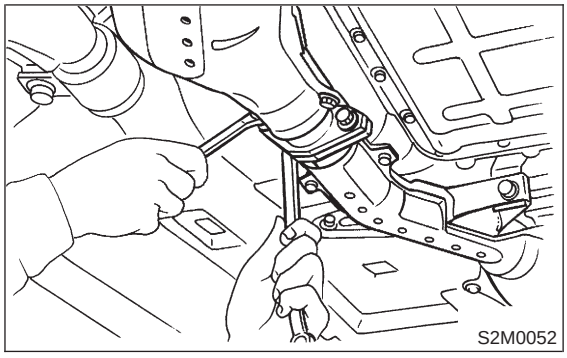

S2M0156

2) Temporarily tighten bolt which installs center exhaust pipe to hanger bracket.


B2M0313

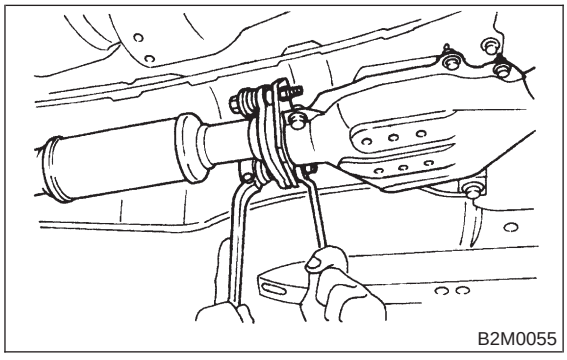
3) Install center exhaust pipe to front catalytic converter.

Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)


S2M0052

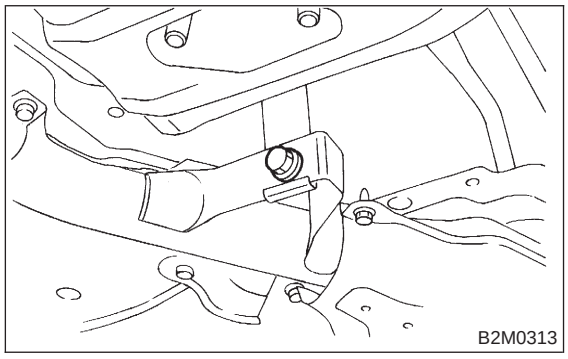
4) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

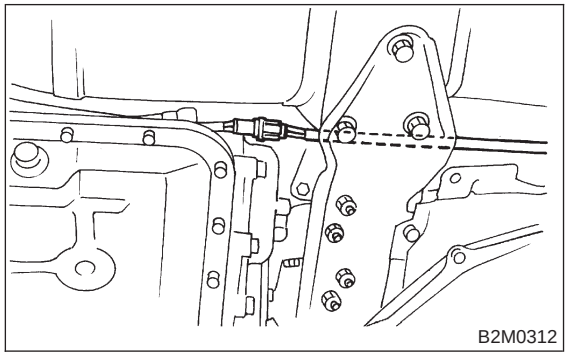

B2M0055

5) Tighten bolt which holds center exhaust pipe to hanger bracket.

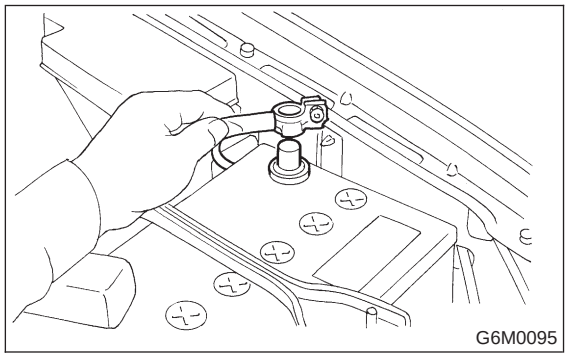
Tightening torque:
35±5 N·m (3.6±0.5 kg-m, 26.0±3.6 ft-lb)


B2M0313

6) Connect rear oxygen sensor connector. (Except California spec. vehicles)


B2M0312

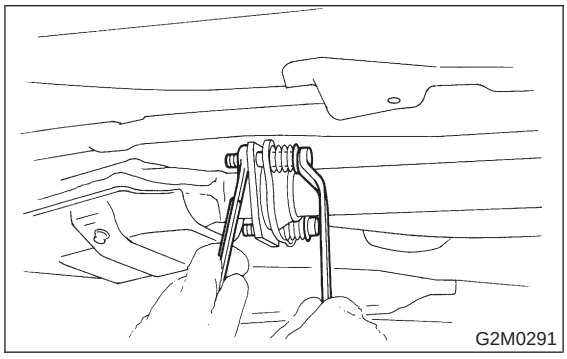
7) Lower the vehicle.
8) Connect battery ground cable.


G6M0095

3. Rear Exhaust Pipe

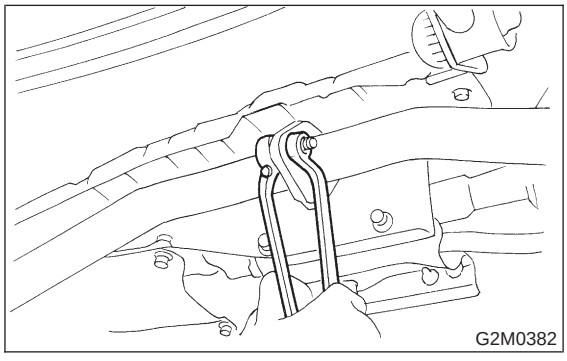
A: REMOVAL

1) Separate rear exhaust pipe from front catalytic converter.


G2M0291

2) Separate rear exhaust pipe from muffler.

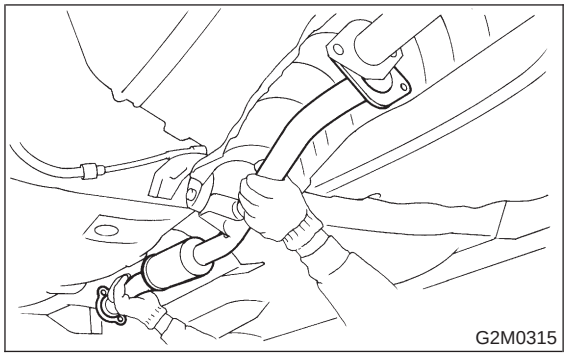
CAUTION:
Be careful not to pull down front exhaust pipe and front catalytic converter.


G2M0382

3) Remove rear exhaust pipe bracket from rubber cushion.

NOTE:
To facilitate removal, apply a coat of SUBARU CRC to pipe bracket in advance.

SUBARU CRC (Part No. 004301003)


G2M0315

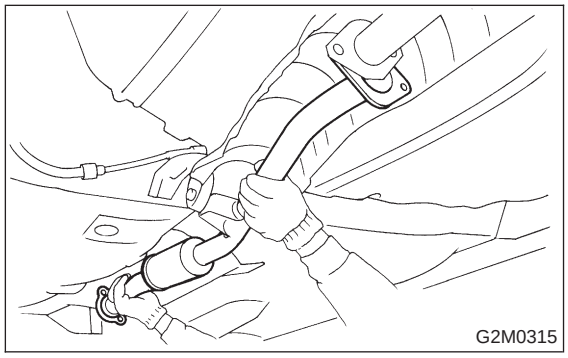
B: INSTALLATION

CAUTION:
Replace gaskets with new ones.

1) Install rear exhaust pipe bracket to rubber cushion.

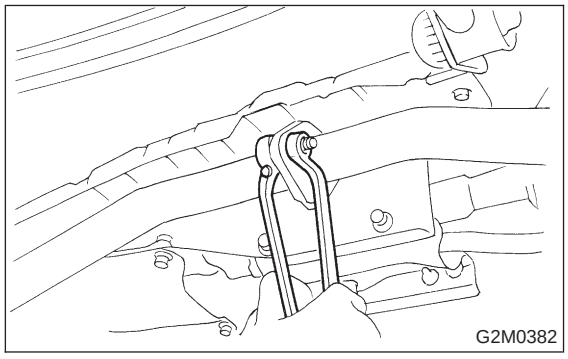
NOTE:
To facilitate installation, apply a coat of SUBARU CRC to mating area of rubber cushion in advance.

SUBARU CRC (Part No. 004301003)


G2M0315

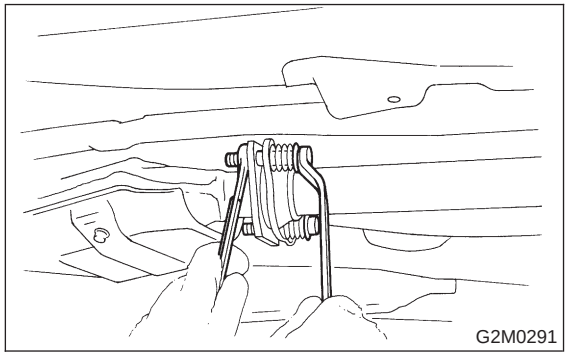
2) Install rear exhaust pipe to muffler.

Tightening torque:
48±5 N·m (4.9±0.5 kg-m, 35.4±3.6 ft-lb)


G2M0382

3) Install rear exhaust pipe to front catalytic converter.

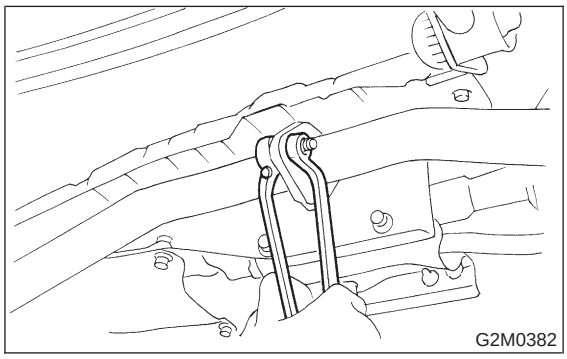
Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)


G2M0291

4. Muffler

A: REMOVAL AND INSTALLATION

1) Separate muffler from rear exhaust pipe.

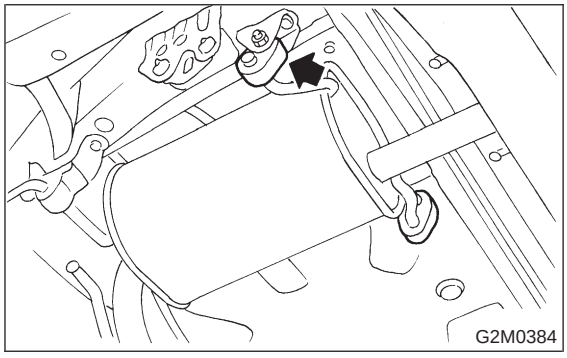

G2M0382

2) Remove left and right rubber cushions.

CAUTION:
Be careful not to pull down front exhaust pipe and front catalytic converter.

NOTE:
To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushions in advance.

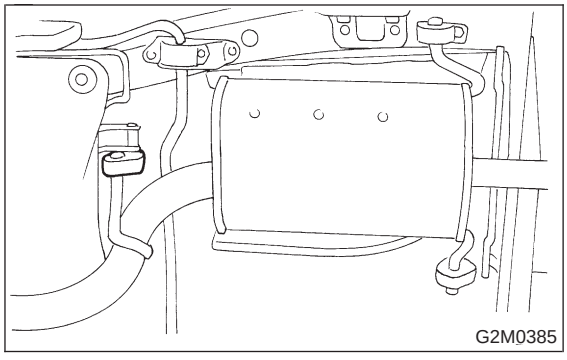
SUBARU CRC (Part No. 004301003)


G2M0384

3) Remove front rubber cushion, and detach muffler assembly.

NOTE:
To facilitate removal, apply a coat of SUBARU CRC to mating area of rubber cushion in advance.

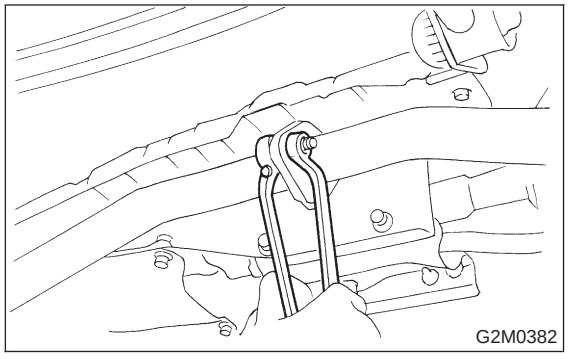
SUBARU CRC (Part No. 004301003)


G2M0385

4) Installation is in the reverse order of removal.

CAUTION:
Replace gasket with a new one.

Tightening torque:
48±5 N·m (4.9±0.5 kg-m, 35.4±3.6 ft-lb)



MEMO:

CLUTCH 2-10

Page

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C COMPONENT PARTS 3
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2. Master Cylinder and Reservoir Tank 5
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3. Release Bearing and Lever 8
4. Clutch Disc and Cover 11
5. Operating Cylinder 14
6. Master Cylinder and Reservoir Tank 15
7. Brake Fluid 17
K DIAGNOSTICS 18
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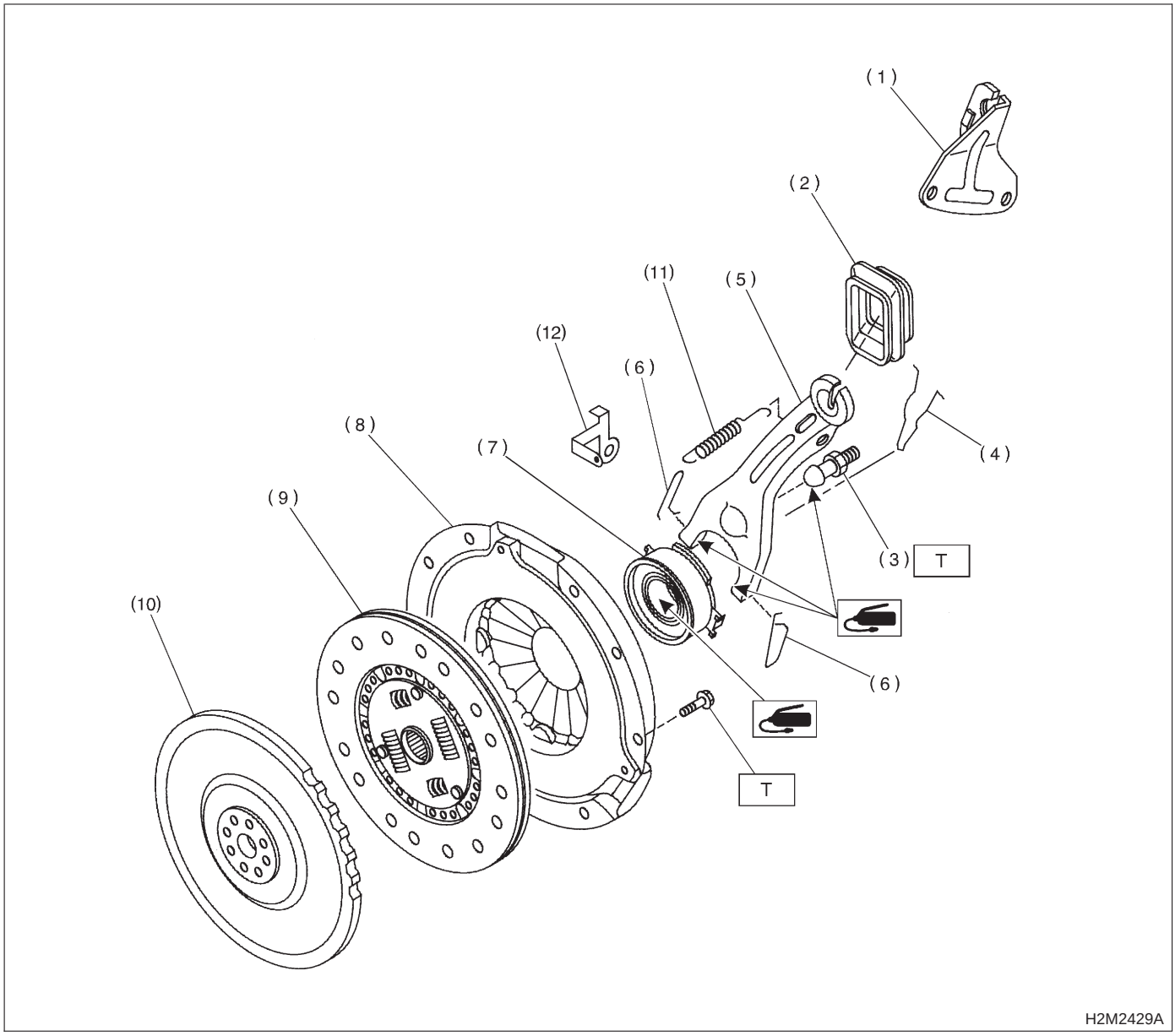
1. Specifications

				2200 cc	2500 cc
Clutch cover	Diaphragm set load		kg (lb)	450 (992)	550 (1,213)
Clutch disc	Facing material			Woven	
	O.D. × I.D. × thickness		mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)	
	Spline O.D. (No. of teeth)		mm (in)	25.2 (0.992) (24)	
	Depth of rivet head mm (in)	Standard		1.3 — 1.9 (0.051 — 0.075)	
		Limit of sinking		0.3 (0.012)	
	Limit for runout		mm (in)	1.0 (0.039) at R = 107 (4.21)	
Clutch release lever ratio				3.0	1.6
Release lever	Stroke		mm (in)	24 — 26 (0.94 — 1.02)	11 — 13 (0.43 — 0.51)
	Play at release lever center		mm (in)	3 — 4 (0.12 — 0.16)	
Release bearing				Grease-packed self-aligning	
Clutch pedal	Full stroke		mm (in)	140 — 145 (5.51 — 5.71)	130 — 135 (5.12 — 5.31)

O.D.; Outer Diameter I.D.; Inner Diameter

1. Clutch System

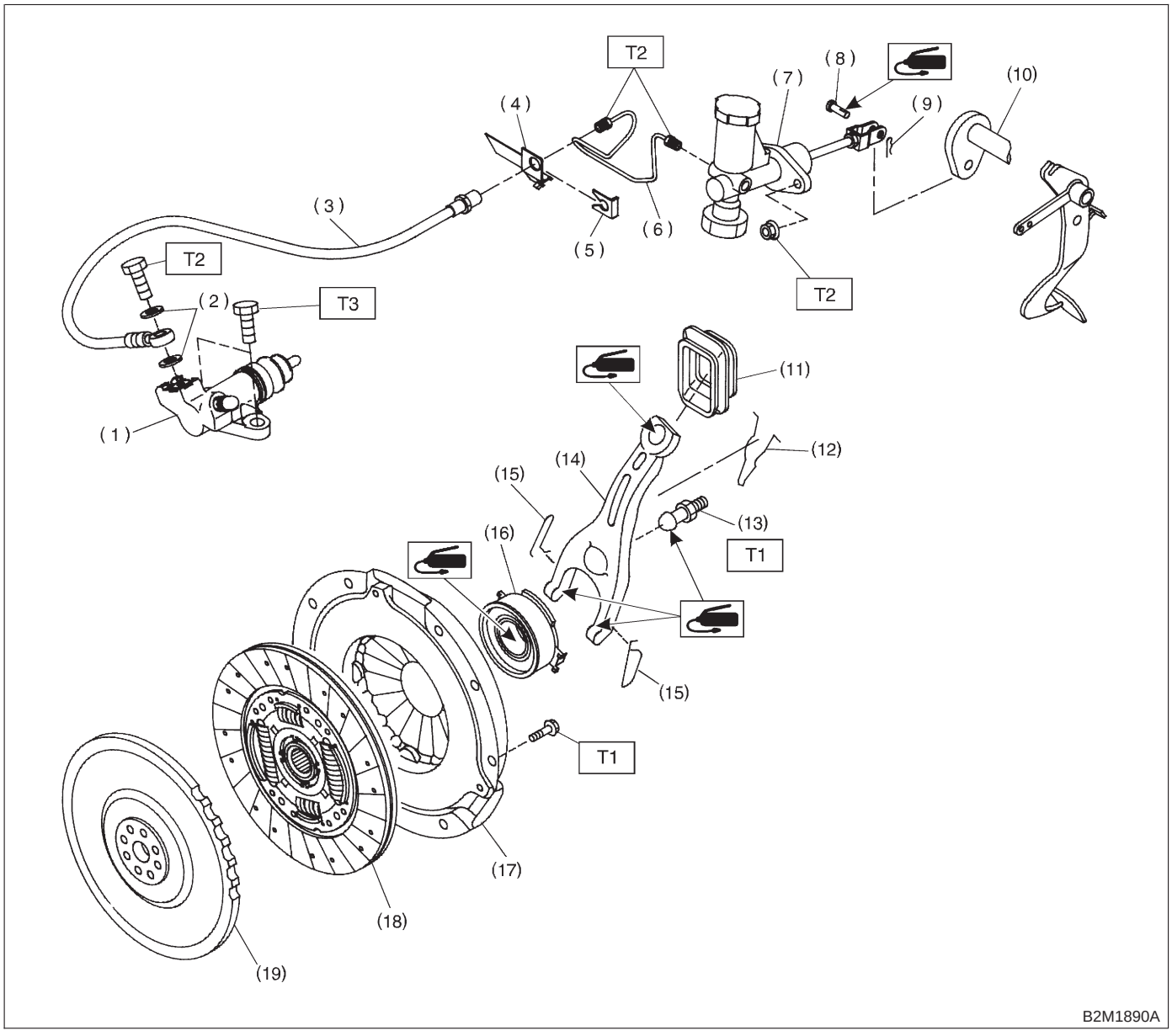
A: MECHANICAL APPLICATION TYPE



(1) Clutch cable bracket
(2) Clutch release lever sealing
(3) Pivot
(4) Retainer spring
(5) Clutch release lever
(6) Clip
(7) Clutch release bearing
(8) Clutch cover
(9) Clutch disc
(10) Flywheel
(11) Return spring
(12) Clutch return spring bracket

Tightening torque: N·m (kg-m, ft-lb)
T: 15.7±1.5 (1.6±0.15, 11.6±1.1)

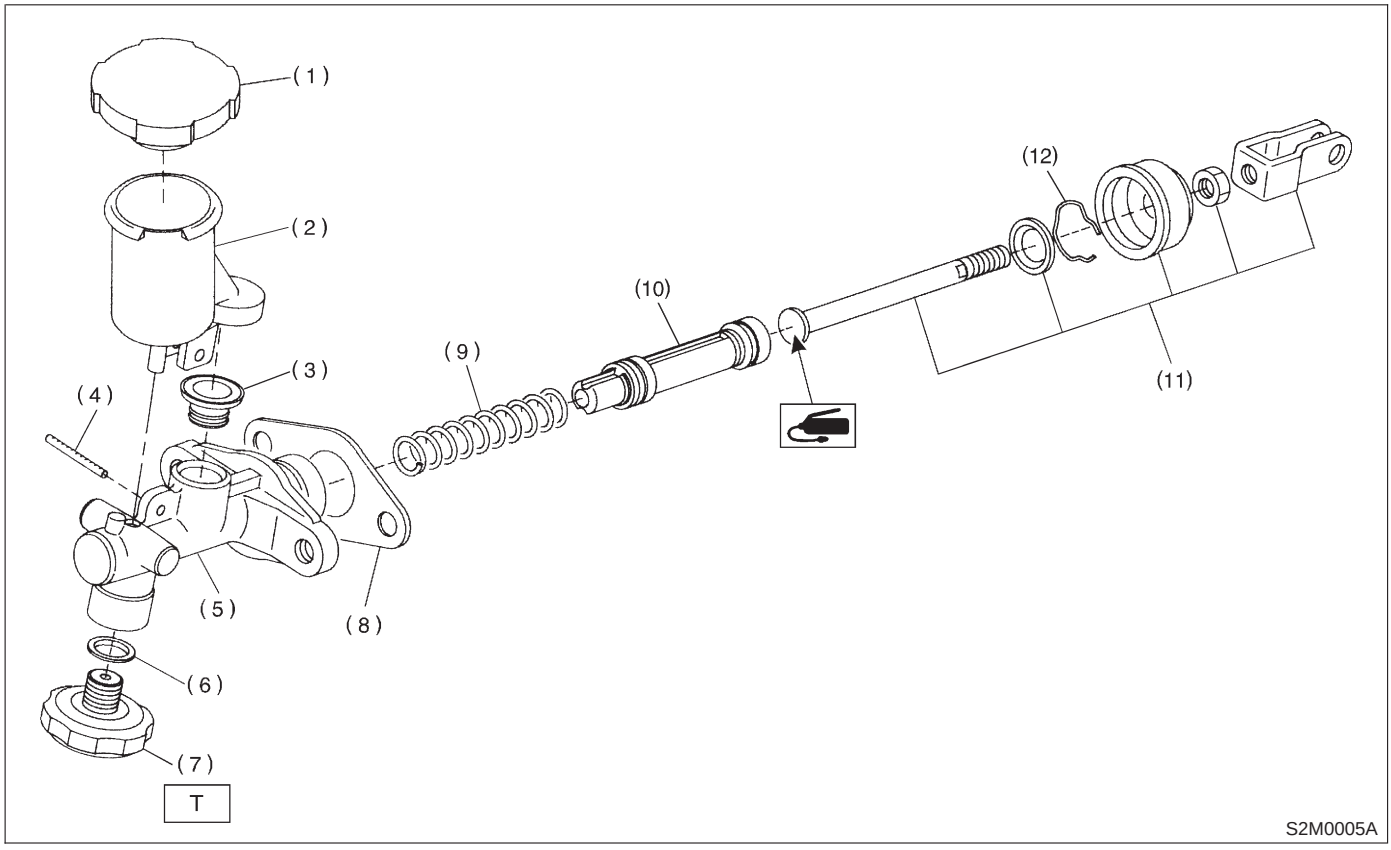
B: HYDRAULIC APPLICATION TYPE



(1) Operating cylinder
(2) Washer
(3) Clutch hose
(4) Bracket
(5) Clamp
(6) Pipe
(7) Master cylinder ASSY
(8) Clevis pin
(9) Snap pin
(10) Lever
(11) Clutch release lever sealing
(12) Retainer spring
(13) Pivot
(14) Release lever
(15) Clip
(16) Release bearing
(17) Clutch cover
(18) Clutch disc
(19) Flywheel

Tightening torque: N·m (kg-m, ft-lb)
T1: 15.7±1.5 (1.6±0.15, 11.6±1.1)
T2: 18±3 (1.8±0.3, 13.0±2.2)
T3: 37±3 (3.8±0.3, 27.5±2.2)

2. Master Cylinder and Reservoir Tank



(1) Reservoir cap
(2) Reservoir tank
(3) Oil seal
(4) Straight pin
(5) Master cylinder
(6) Washer
(7) Diaphragm spring
(8) Seat
(9) Return spring
(10) Piston
(11) Push rod
(12) Piston stop ring

Tightening torque: N·m (kg-m, ft-lb)
T: 46.6±7.4 (4.75±0.75, 34.4±5.4)

1. General

A: PRECAUTION

1. MECHANICAL APPLICATION TYPE

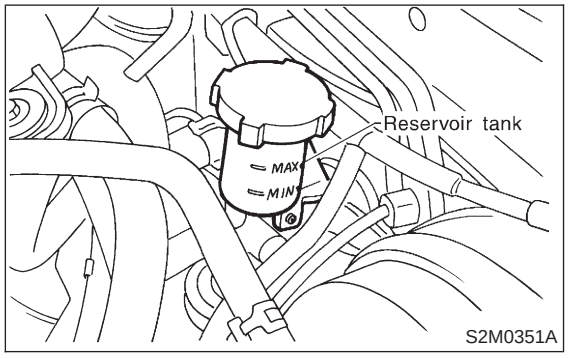
When servicing clutch system, pay attention to the following items.
1) Check the routing of clutch cable for smoothness.
2) Excessive tightness or looseness of clutch cable have a bad influence upon the cable durability.
3) Apply grease sufficiently to the connecting portion of clutch pedal.
4) Apply grease sufficiently to the release lever portion.
5) Position clutch cable through the center of toe board hole and route it smoothly. Adjustment is done by moving the outer cable.
6) Make sure not to let the clutch chatter when starting forward or rearward. If clutch chattering occurs, readjust so that the bend of clutch outer cable becomes flatter.

2. HYDRAULIC APPLICATION TYPE

When servicing clutch system, pay attention to the following items.
1) Check fluid level using a scale on outside of reservoir tank. If the level is below “MIN”, add brake fluid to bring it up to “MAX”.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or DOT4 brake fluid

CAUTION:
● Avoid mixing different brakes of brake fluid to prevent degradation of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.
● Use fresh DOT3 or DOT4 brake fluid when refilling fluid.



2) Make sure that brake fluid does not leak from master cylinder, operating cylinder and piping.
3) Apply grease sufficiently to the release lever pinion.
4) Check for proper clutch disengagement and clutch pedal return ability.

2. On-car Service

A: ADJUSTMENT

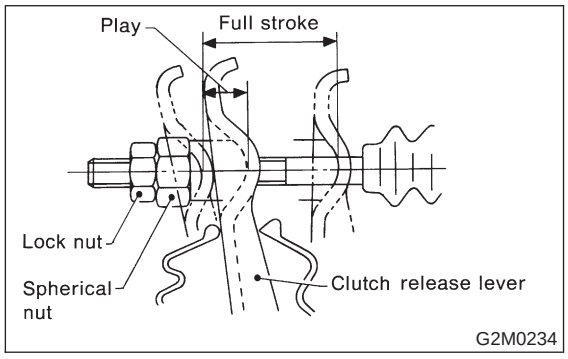
1. MECHANICAL APPLICATION TYPE

1) Remove release lever return spring from lever.
2) Adjust spherical nut so that the play is within the specified value at the lever end (center of spherical nut).

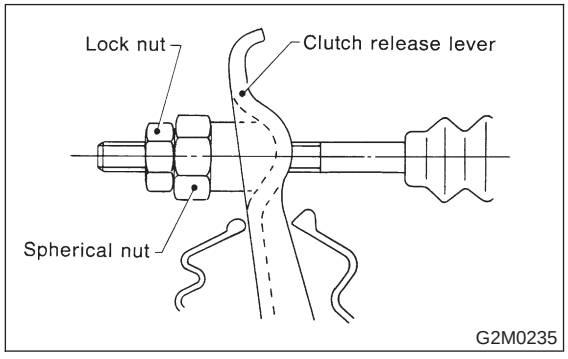
CAUTION:
Take care not to twist the cable during adjustment.

Play: 3 — 4 mm (0.12 — 0.16 in)

Full stroke: 24 — 26 mm (0.94 — 1.02 in)



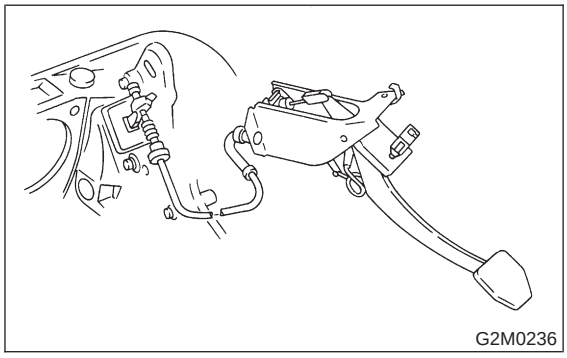
3) Upon completion of adjustment, securely lock spherical nut with lock nut.



4) Install return spring on lever.

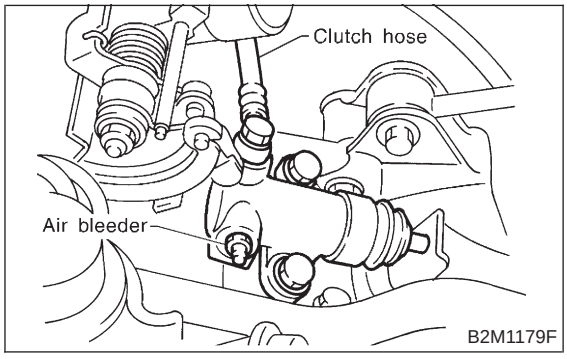
NOTE:
Hook the long hook side of the return spring with the lever.

5) Depress clutch pedal to assure there is no abnormality in the clutch system.

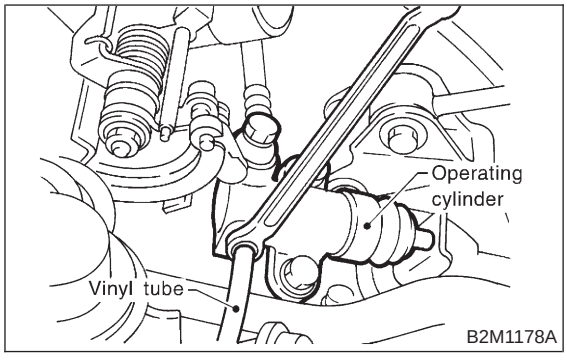


2. HYDRAULIC APPLICATION TYPE

Bleed air from oil line with the help of a co-worker.
1) Remove air chamber.
2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.

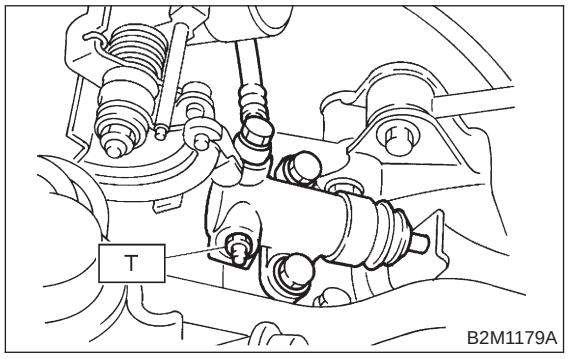


4) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:
Cover bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

5) Tighten air bleeder.

Tightening torque:
T: 18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)



6) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
7) After bleeding air from system, ensure that clutch operates properly.

3. Release Bearing and Lever

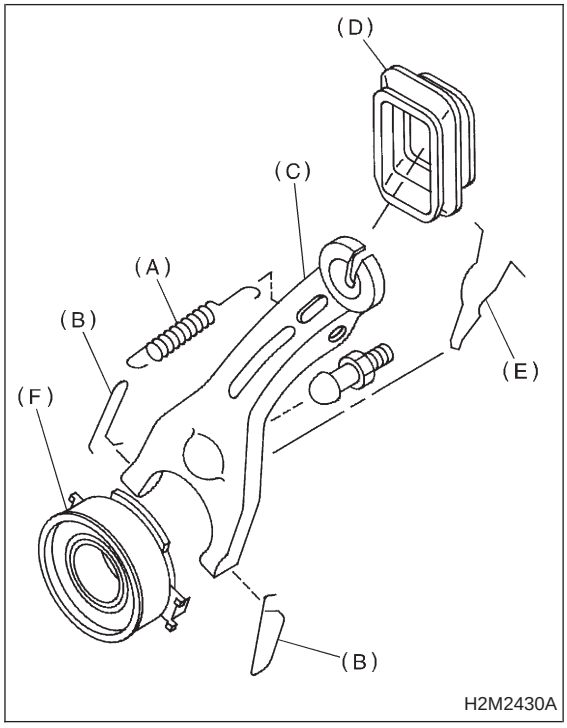
A: REMOVAL

1. MECHANICAL APPLICATION TYPE

1) Remove release lever return spring.
2) Remove the two clips from clutch release lever and remove release bearing.

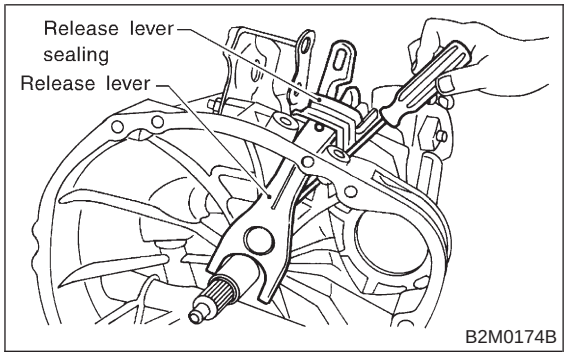
CAUTION:
Be careful not to deform clips.

3) Remove release lever seal.



(A) Release lever return spring
(B) Clip
(C) Release lever
(D) Release lever seal
(E) Retainer spring
(F) Clutch release lever bearing

4) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.

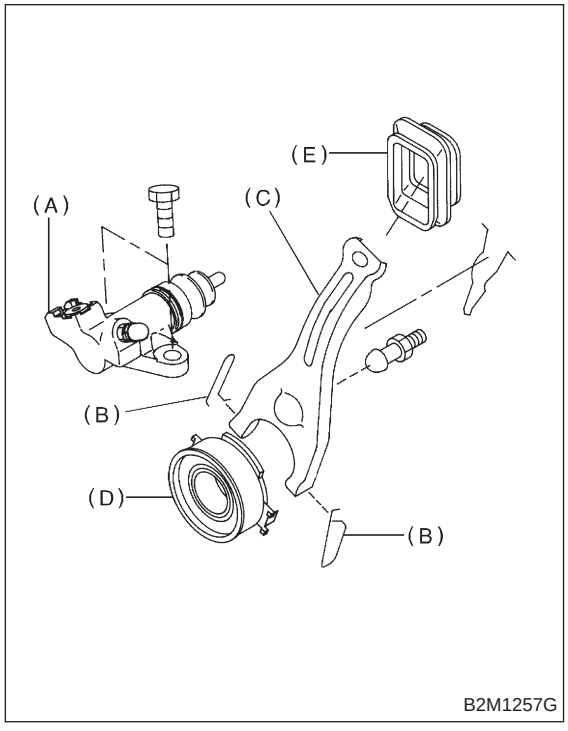


2. HYDRAULIC APPLICATION TYPE

1) Remove transmission assembly from vehicle body.
<Ref. to 2-11 [W2B0].>
2) Remove the two clips from clutch release lever and remove release bearing.

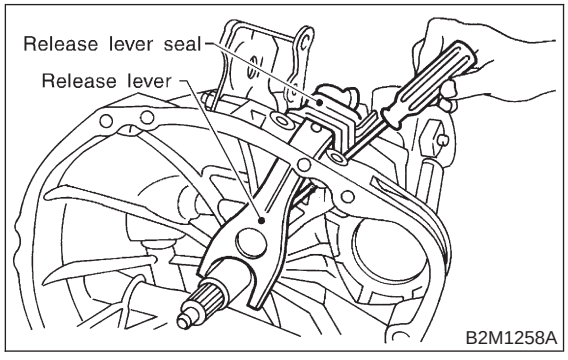
CAUTION:
Be careful not to deform clips.

3) Remove release lever seal.



(A) Operating cylinder
(B) Clip
(C) Clutch release lever
(D) Release bearing
(E) Release lever seal

4) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.



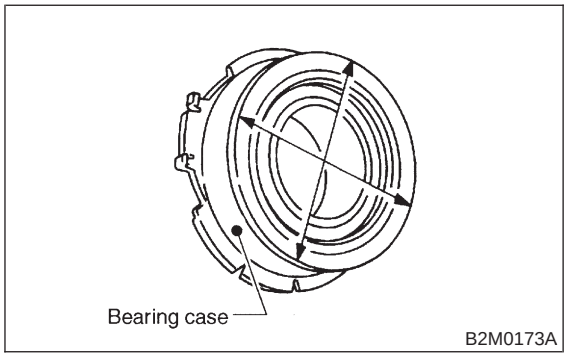
B: INSPECTION

1. RELEASE BEARING

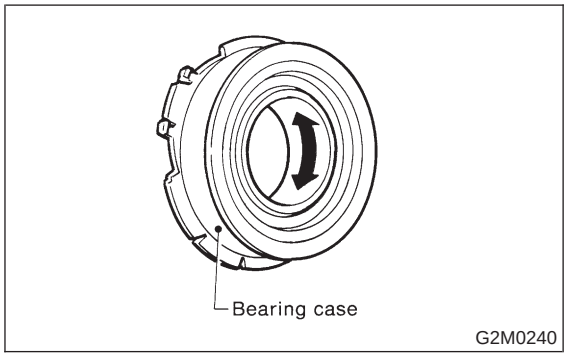
CAUTION:
Since this bearing is grease sealed and is of a nonlubrication type, do not wash with gasoline or any solvent when servicing the clutch.

1) Check the bearing for smooth movement by applying force in the radial direction.

Radial direction stroke:
Approx. 1.4 mm (0.055 in)



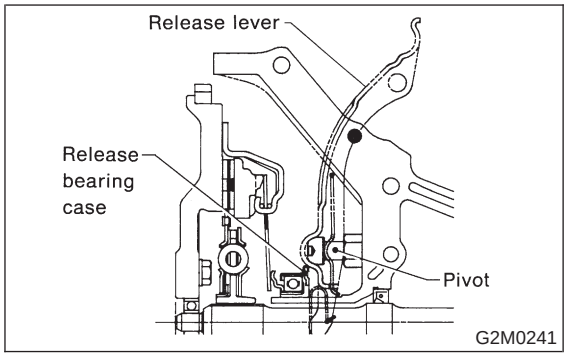
2) Check the bearing for smooth rotation by applying pressure in the thrust direction.



3) Check wear and damage of bearing case surface contacting with lever.

2. RELEASE LEVER

Check lever pivot portion and the point of contact with release bearing case for wear.



C: INSTALLATION

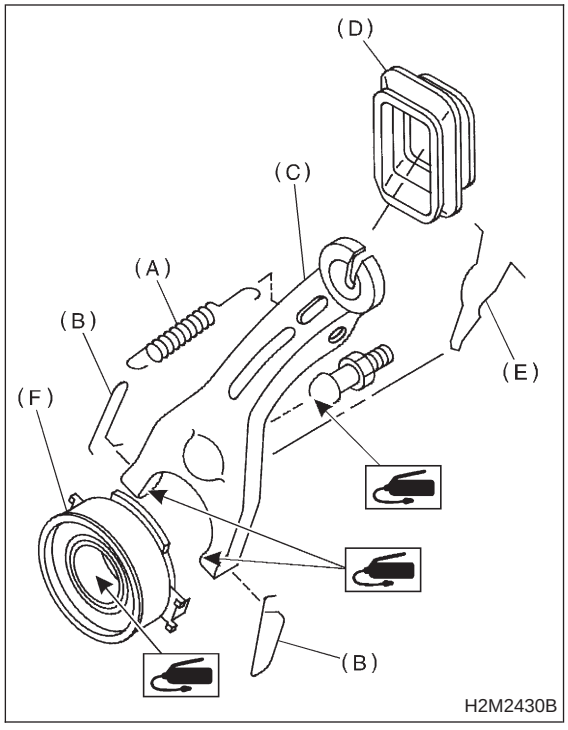
1. MECHANICAL APPLICATION TYPE

CAUTION:
Before or during assembling, lubricate the following points with a light coat of grease.
- **Inner groove of release bearing**
- **Contact surface of lever and pivot**
- **Contact surface of lever and bearing**
- **Transmission main shaft spline (Use grease containing molybdenum disulphide.)**

1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:
Confirm that retainer spring is securely fitted by observing it through the main case hole.

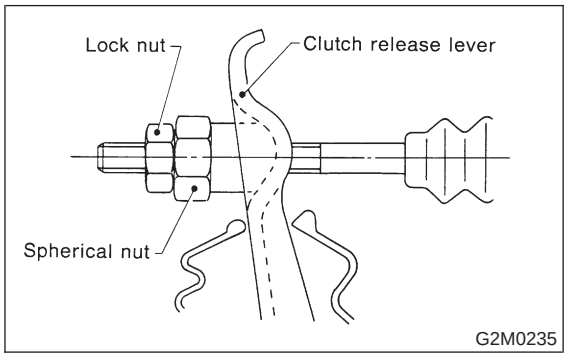
2) Install release bearing and fasten it with two clips.
3) Install release lever seal.



(A) Release lever return spring
(B) Clip
(C) Release lever
(D) Release lever seal
(E) Retainer spring
(F) Clutch release lever bearing

4) After remounting engine and transmission on body, make adjustment of the clutch release lever end play.

CAUTION:
Take care not to twist the cable during adjustment.



5) Install release lever return spring.

NOTE:
Hook up the return spring to right side hole of the release lever.

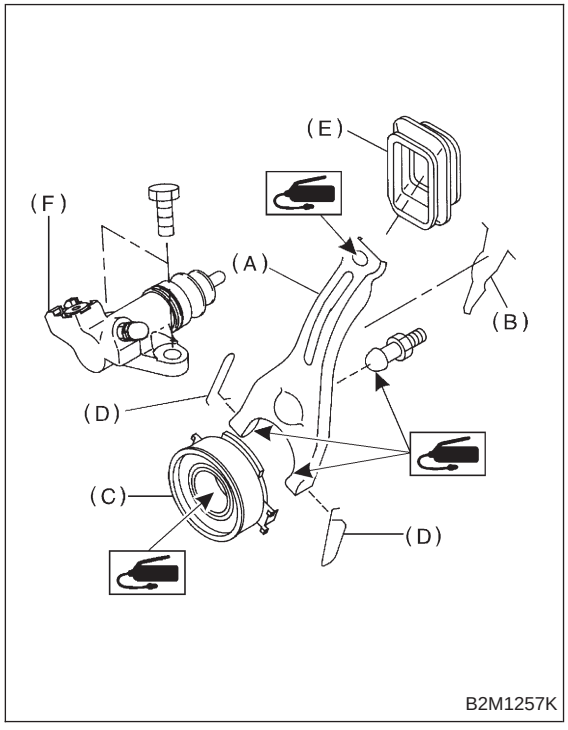
2. HYDRAULIC APPLICATION TYPE

CAUTION:
Before or during assembling, lubricate the following points with a light coat of grease.
- **Inner groove of release bearing**
- **Contact surface of lever and pivot**
- **Contact surface of lever and bearing**
- **Transmission main shaft spline (Use grease containing molybdenum disulphide.)**

1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:
● Apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.
● Confirm that retainer spring is securely fitted by observing it through the main case hole.

2) Install release bearing and fasten it with two clips.
3) Install release lever seal.



(A) Release lever
(B) Retainer spring
(C) Release bearing
(D) Clip
(E) Release lever seal
(F) Operating cylinder

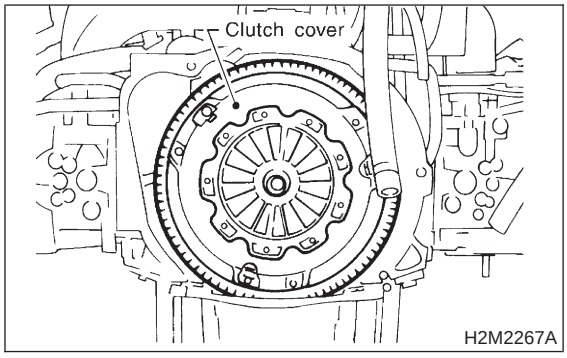
4) After remounting engine and transmission on body.
<Ref. to 2-11 [W2C0].>
5) Bleed air from oil line with the help of a coworker.
<Ref. to 2-10 [W2A2].>

4. Clutch Disc and Cover

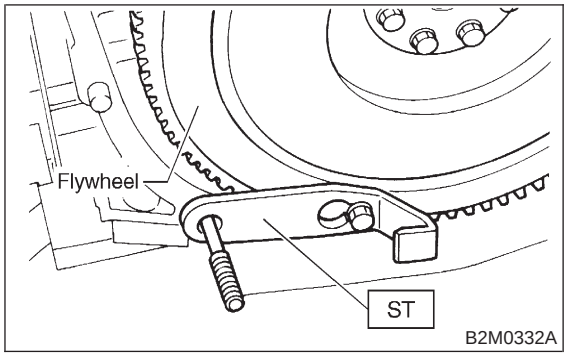
A: REMOVAL

1) Remove clutch cover and clutch disc.

CAUTION:
● Take care not to allow oil on the clutch disc facing.
● Do not disassemble either clutch cover or clutch disc.



2) Install ST on flywheel.
ST 498497100 CRANKSHAFT STOPPER



3) Remove flywheel.

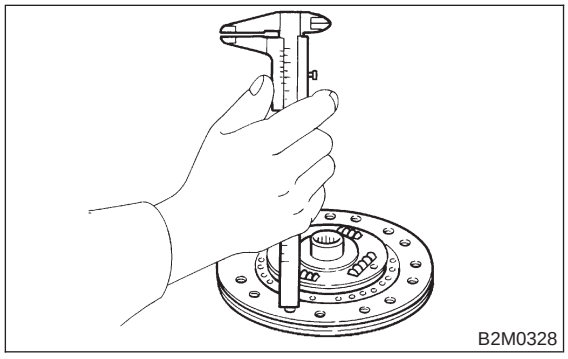
B: INSPECTION

1. CLUTCH DISC

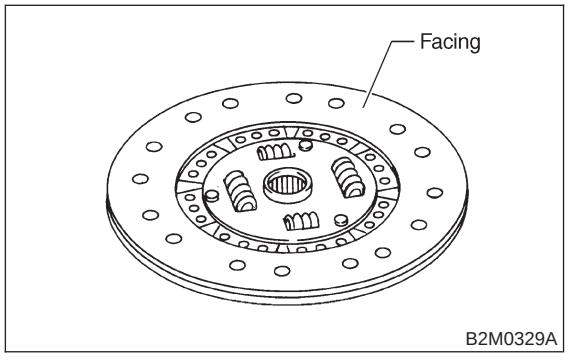
1) Facing wear
Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

CAUTION:
Do not wash clutch disc with any cleaning fluid.

Depth of rivet head:
Standard value
1.3 — 1.9 mm (0.051 — 0.075 in)
Limit of sinking
0.3 mm (0.012 in)

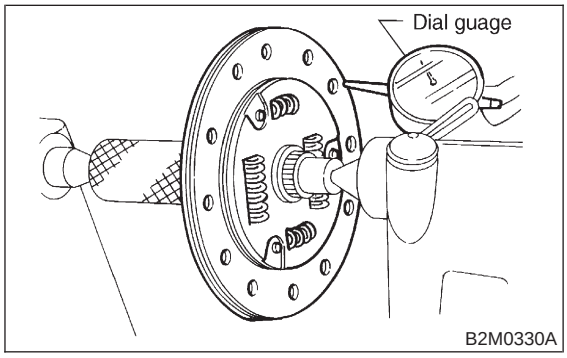


2) Hardened facing
Correct by using emery paper or replace.
3) Oil soakage on facing
Replace clutch disc and inspect transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.

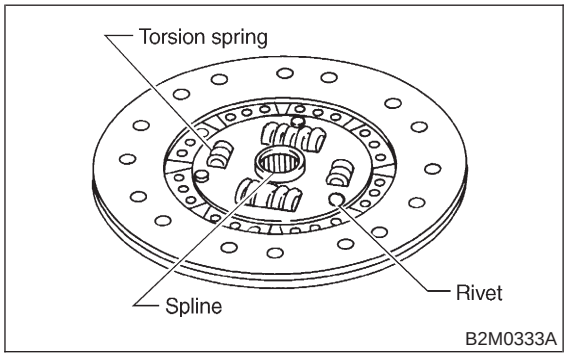


4) Deflection on facing
If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

Limit for deflection:
1.0 mm (0.039 in) at R = 107 mm (4.21 in)

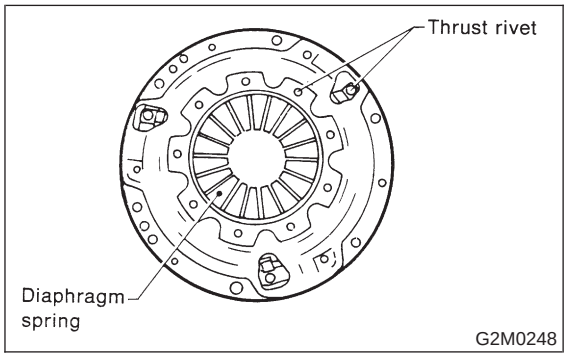


5) Worn spline, loose rivets and torsion spring failure Replace defective parts.

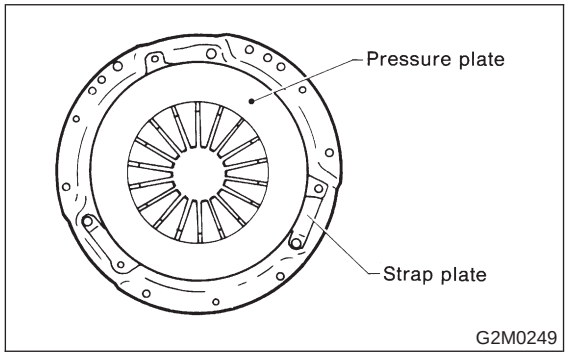


2. CLUTCH COVER

Visually check for the following items without disassembling, and replace or repair if defective.
1) Loose thrust rivet.
2) Damaged or worn bearing contact area at center of diaphragm spring.



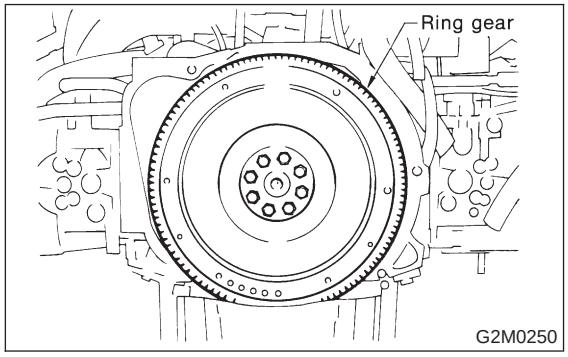
3) Damaged or worn disc contact surface of pressure plate.
4) Loose strap plate setting bolt.
5) Worn diaphragm sliding surface.



3. FLYWHEEL

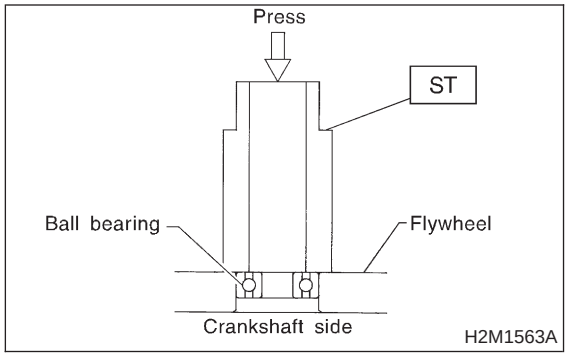
CAUTION:
Since this bearing is grease sealed and is of a nonlubrication type, do not wash with gasoline or any solvent.

1) Damage of facing and ring gear
If defective, replace flywheel.



2) Smoothness of rotation
Rotate ball bearing applying pressure in thrust direction. If noise or excessive play is noted, replace ball bearing as follows:
(1) Drive out ball bearing from flywheel.
(2) Press bearing into flywheel until bearing end surface is flush with clutch disc contact surface of flywheel. Do not press inner race.

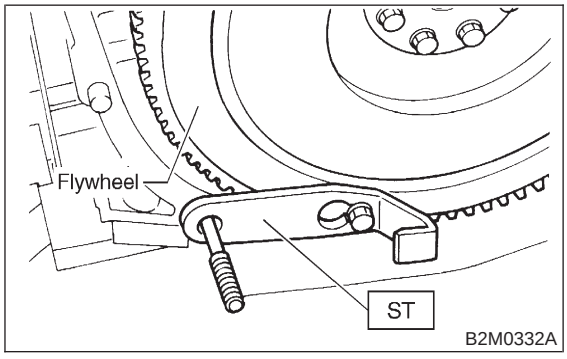
ST 899754112 SNAP RING PRESS



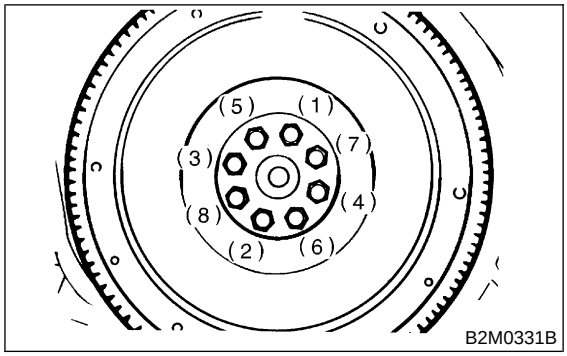
C: INSTALLATION

1) Install flywheel.
2) Install ST, and tighten the flywheel attaching bolts to the specified torque.
ST 498497100 CRANKSHAFT STOPPER

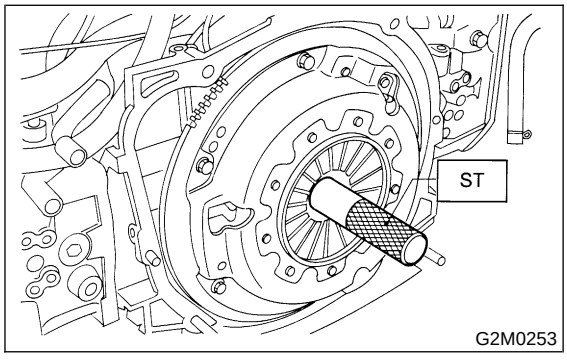
Tightening torque:
72±3 N·m (7.3±0.3 kg-m, 52.8±2.2 ft-lb)



NOTE:
Tighten flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.



3) Insert ST into the clutch disc and install them on the flywheel by inserting the ST end into the pilot bearing.
ST 499747100 CLUTCH DISC GUIDE

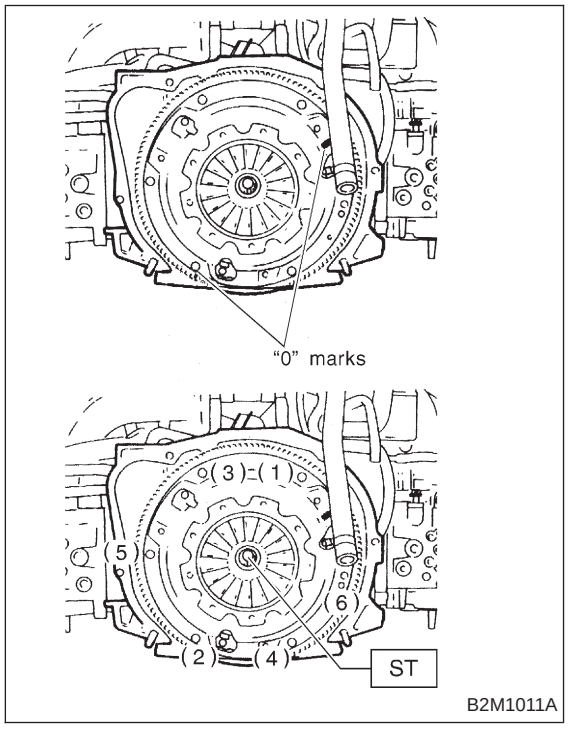


4) Install clutch cover on flywheel and tighten bolts to the specified torque.

NOTE:
● When installing the clutch cover on the flywheel, position the clutch cover so that there is a gap of 120° or more between “0” marks on the flywheel and clutch cover. (“0” marks indicate the directions of residual unbalance.)
● Note the front and rear of the clutch disc when installing.
● Tighten clutch cover installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)

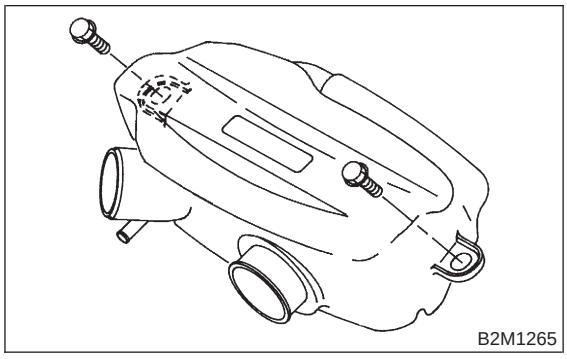
5) Remove ST.
ST 499747100 CLUTCH DISC GUIDE



5. Operating Cylinder

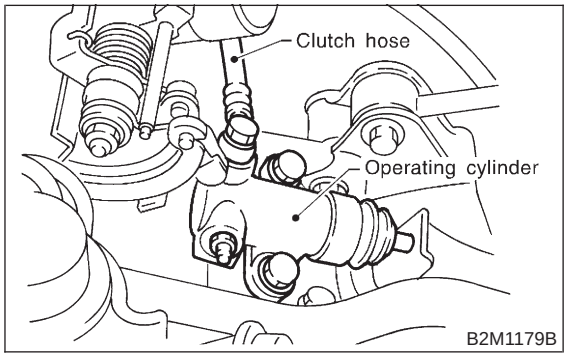
A: REMOVAL AND INSTALLATION

1) Remove air chamber.
<Ref. to 2-7 [W18A0].>

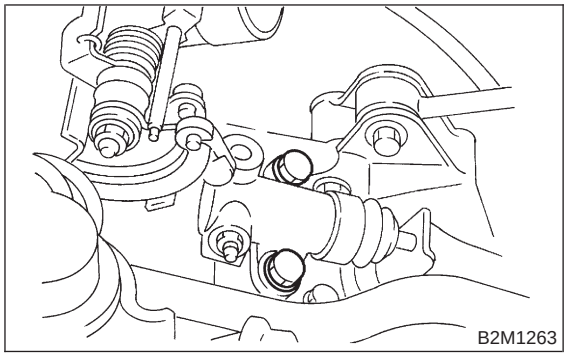


2) Remove clutch hose from operating cylinder.

CAUTION:
Cover hose joint to prevent brake fluid from flowing out.



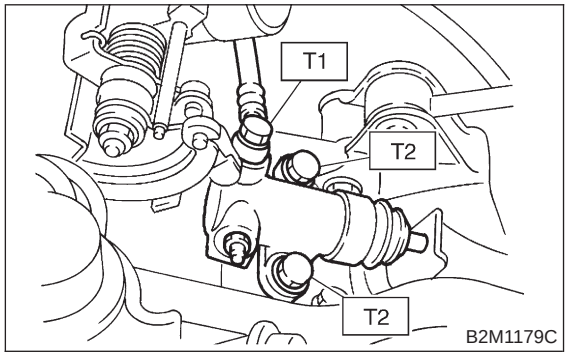
3) Remove operating cylinder from transmission.



4) Installation is in the reverse order of removal.

NOTE:
Before installing operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.

Tightening torque:
T1: 18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)
T2: 37±3 N·m (3.8±0.3 kg-m, 27.5±2.2 ft-lb)

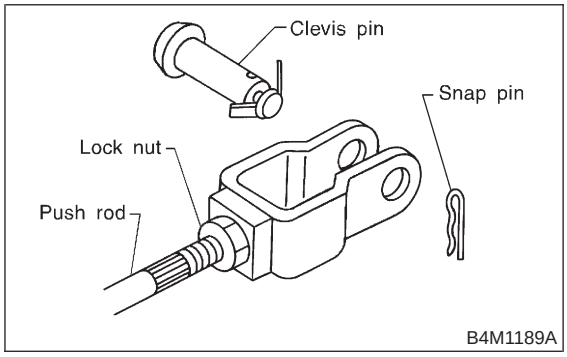


5) After bleeding air from operating cylinder, ensure that clutch operates properly.
<Ref. to 2-10 [W2A2].>

6. Master Cylinder and Reservoir Tank

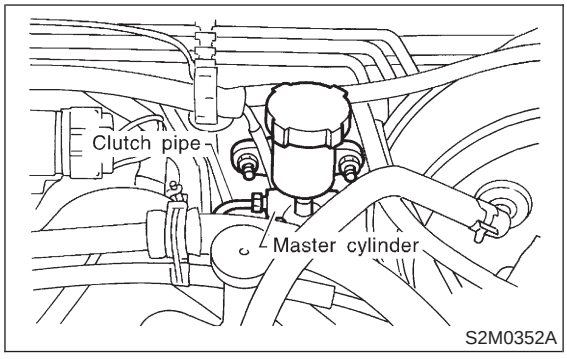
A: REMOVAL

1) Thoroughly drain brake fluid from reservoir tank.
2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



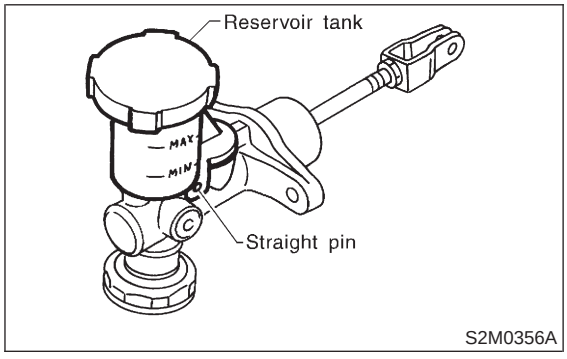
3) Remove clutch pipe from master cylinder.
4) Remove master cylinder with reservoir tank.

CAUTION:
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.

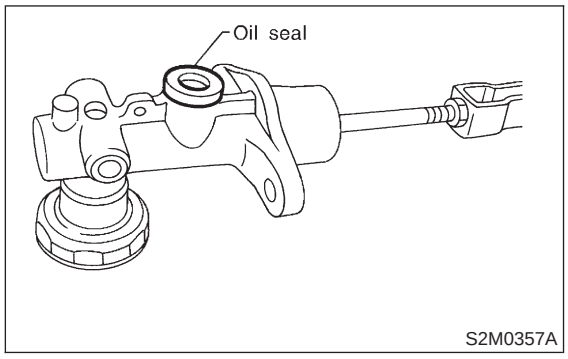


B: DISASSEMBLY

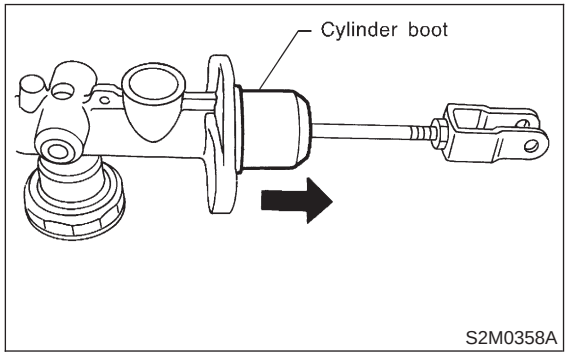
1) Remove straight pin and reservoir tank.



2) Remove oil seal.



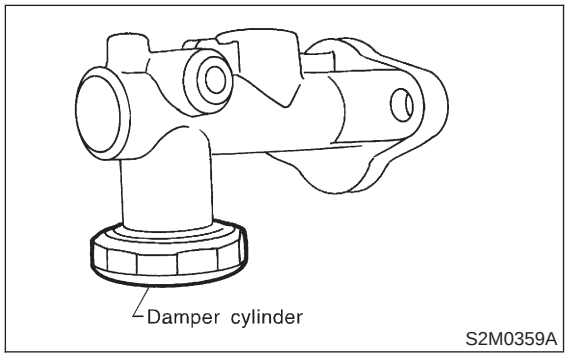
3) Move the cylinder boot backward.



4) Remove snap ring.

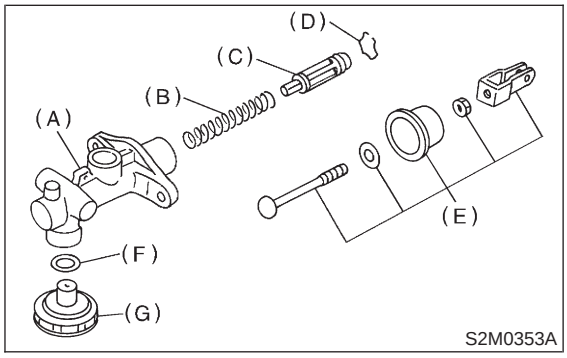
CAUTION:
Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

5) Remove damper cylinder from master cylinder body.



C: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring and gasket, replace the faulty part.



(A) Master cylinder body
(B) Return spring
(C) Piston
(D) Snap ring
(E) Rod assy
(F) Washer
(G) Damper cylinder

D: ASSEMBLY

CAUTION:
Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

1) To assemble the master cylinder reverse the sequence of disassembly procedure.
2) Install damper cylinder washer. Install damper cylinder and tighten to the specified torque.

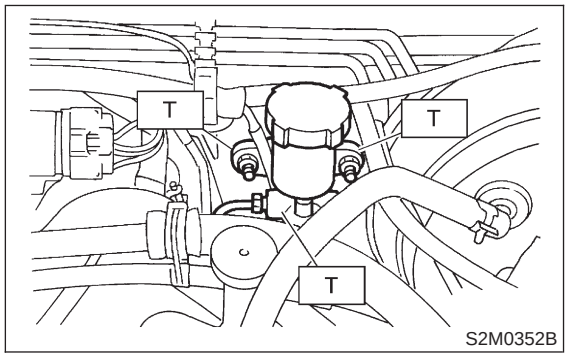
Tightening torque:
T: 46.6±7.4 N·m (4.75±0.75 kg-m, 34.4±5.4 ft-lb)

E: INSTALLATION

1) Install master cylinder to body, and install clutch pipe to master cylinder.

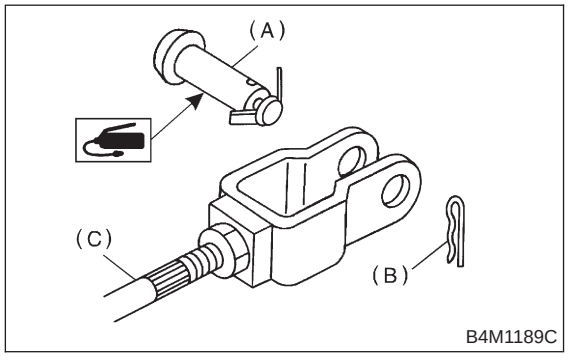
CAUTION:
Check that pipe is routed properly.

Tightening torque:
T: 18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)



2) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.

NOTE:
Apply grease to clevis pin.



(A) Clevis pin
(B) Snap pin
(C) Push rod

3) After bleeding air from system, ensure that clutch operates properly.
<Ref. to 2-10 [W2A2].>

7. Brake Fluid

A: REPLACEMENT

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 clutch reserve tank filled with brake fluid to eliminate entry of air.
● Clutch 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 70 mℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch 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 reserve tank with syringe.
4) Refill reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

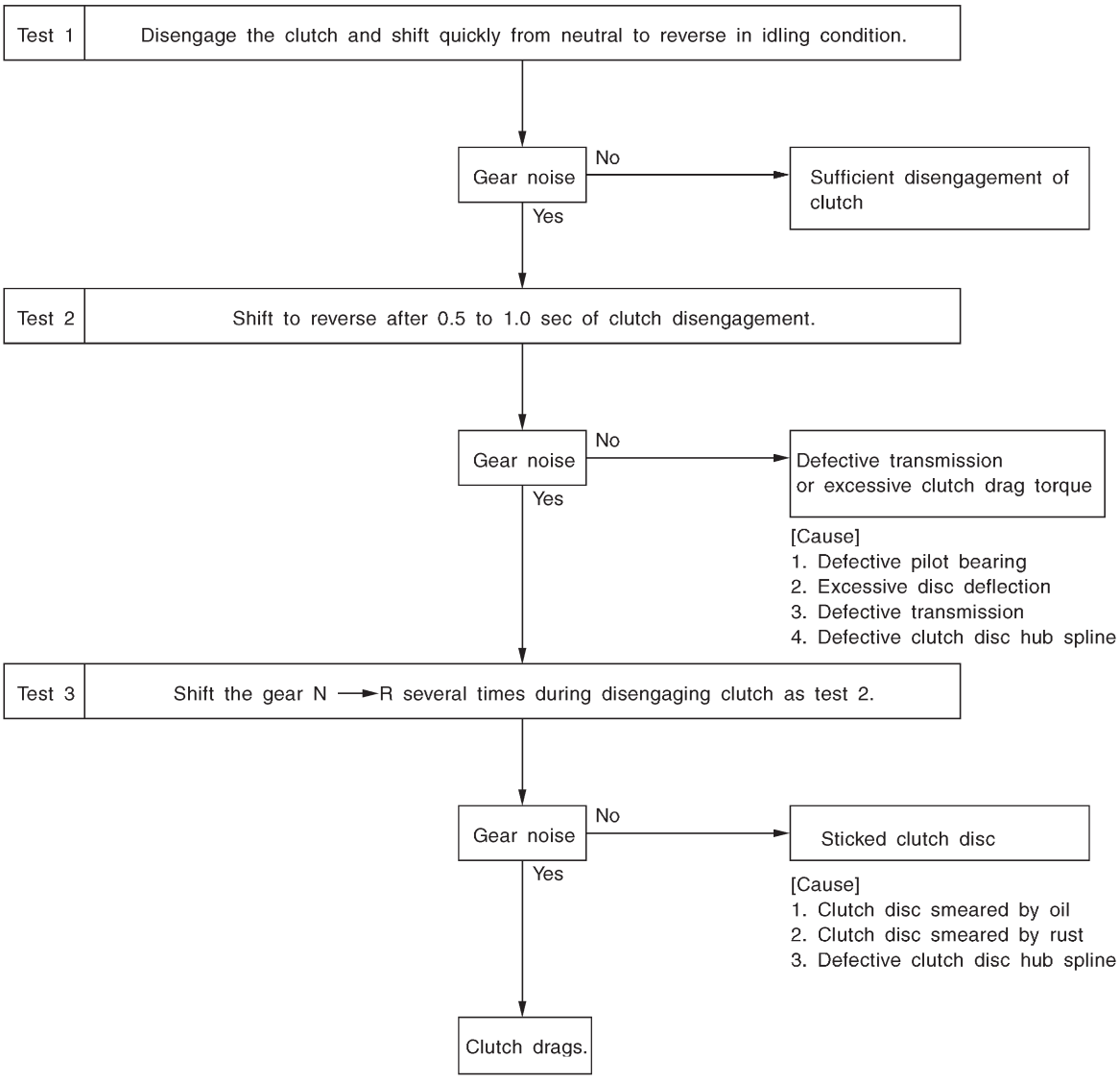
5) Bleed air from oil line with the help of a co-worker.
<Ref. to 2-10 [W2A2].>

1. Clutch Trouble in General

Symptom	Possible cause	Corrective action
1. Clutch slippage It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms. ● Engine revs up when shifting. ● High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. ● Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. ● Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.	(a) No clutch pedal play	Readjust.
	(b) No release lever end play	Readjust.
	(c) Clutch facing smeared by oil	Replace.
	(d) Worn clutch facing	Replace.
	(e) Deteriorated diaphragm spring	Replace.
	(f) Distorted pressure plate or flywheel	Correct or replace.
	(g) Defective release bearing holder	Correct or replace.
	(h) Defective pedal and cable system	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after. ● Method of testing: <Ref. to 2-10 [K1A0].> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Excessive clutch pedal play	Readjust.
	(b) Excessive clutch release lever play	Readjust.
	(c) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(d) Excessive deflection of clutch disc facing	Correct or replace.
	(e) Seized crankshaft pilot needle bearing	Replace.
	(f) Malfunction of pedal and cable system	Correct or replace.
	(g) Cracked clutch disc facing	Replace.
	(h) Sticked clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Improper clutch cable routing	Correct.
	(b) Adhesion of oil on the facing	Replace clutch disc.
	(c) Weak or broken torsion spring	Replace clutch disc.
	(d) Defective facing contact or excessive disc	Replace clutch disc defection.
	(e) Warped pressure plate or flywheel	Correct or replace.
	(f) Loose disc rivets	Replace clutch disc.
	(g) Loose engine mounting	Retighten or replace mounting.
	(h) Improper adjustment of pitching stopper	Adjustment.
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace clutch disc.
	(d) Loose torsion spring retainer	Replace clutch disc.
	(e) Deteriorated or broken torsion spring	Replace clutch disc.

Symptom	Possible cause	Corrective action
5. Clutch grabs. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace clutch disc.
	(b) Deteriorated cushioning spring	Replace clutch disc.
	(c) Worn or rusted spline of clutch disc or main	Take off rust, apply grease or replace clutch shaft disc or mainshaft.
	(d) Deteriorated or broken torsion spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

A: DIAGNOSTIC DIAGRAM OF CLUTCH DRAG



[Cause]
1. Cracked clutch disc facing
2. Damaged or worn clutch cover
3. Malfunction of clutch release system
4. Insufficient clutch release amount
5. Excessive clutch pedal play

B2M1012A

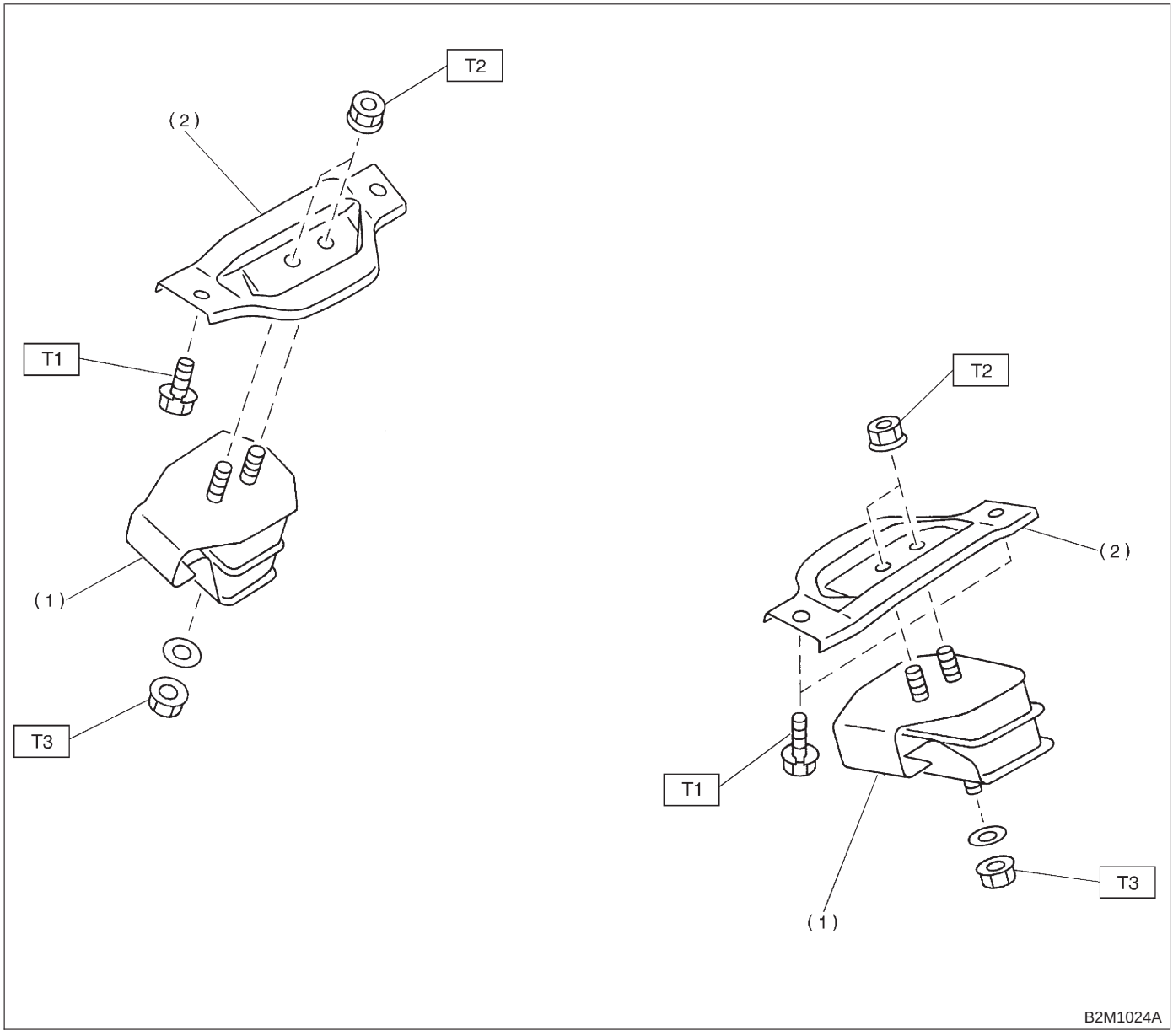
ENGINE AND TRANSMISSION MOUNTING SYSTEM 2-11

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1. Engine Mounting 2
2. Transmission Mounting 3

W SERVICE PROCEDURE 5
1. Engine 5
2. Transmission 19

1. Engine Mounting

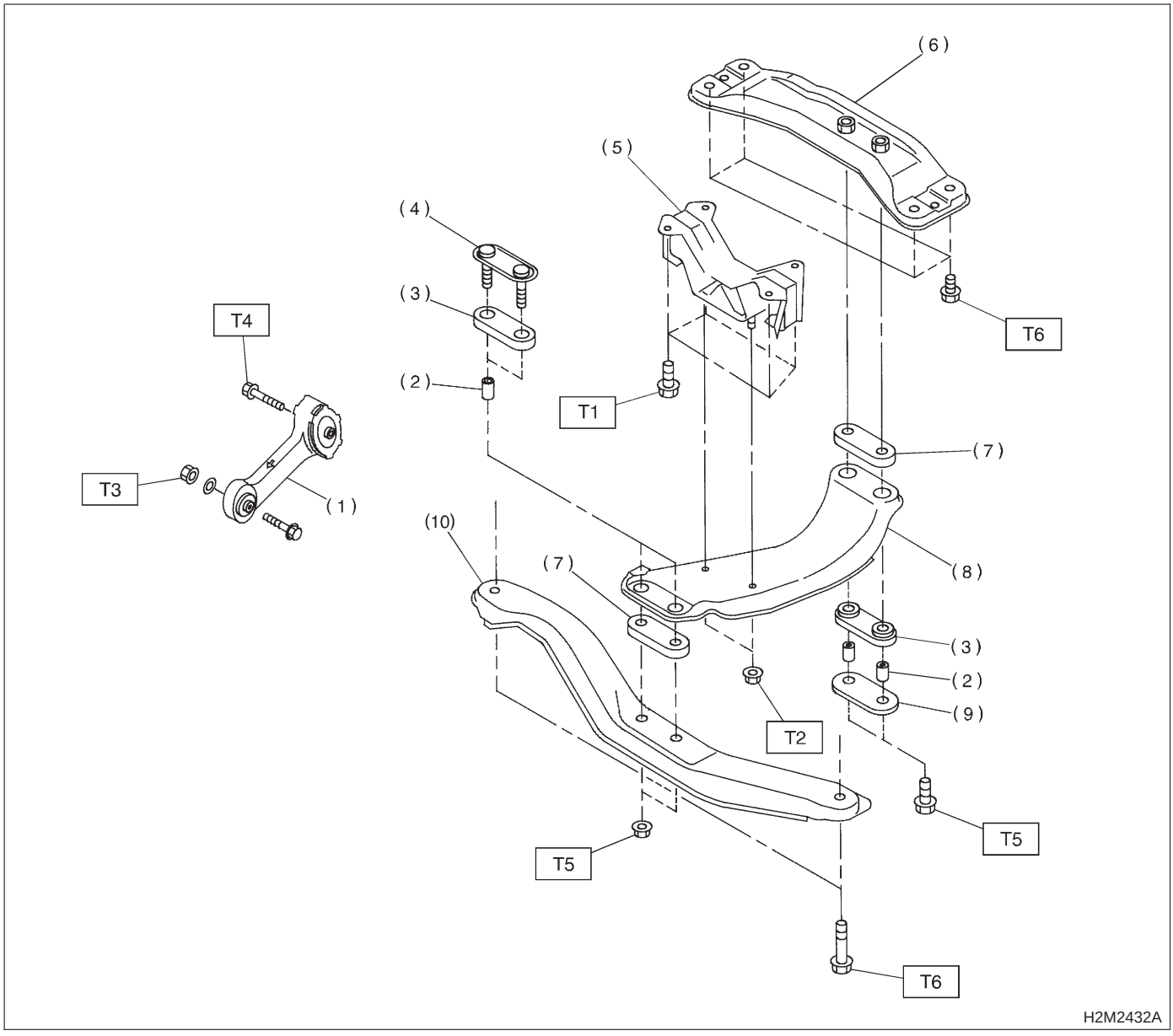


(1) Front cushion rubber
(2) Front engine mounting bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 26±7 (2.7±0.7, 19.5±5.1)
T2: 41±10 (4.2±1.0, 30±7)
T3: 83±15 (8.5±1.5, 61±11)

2. Transmission Mounting

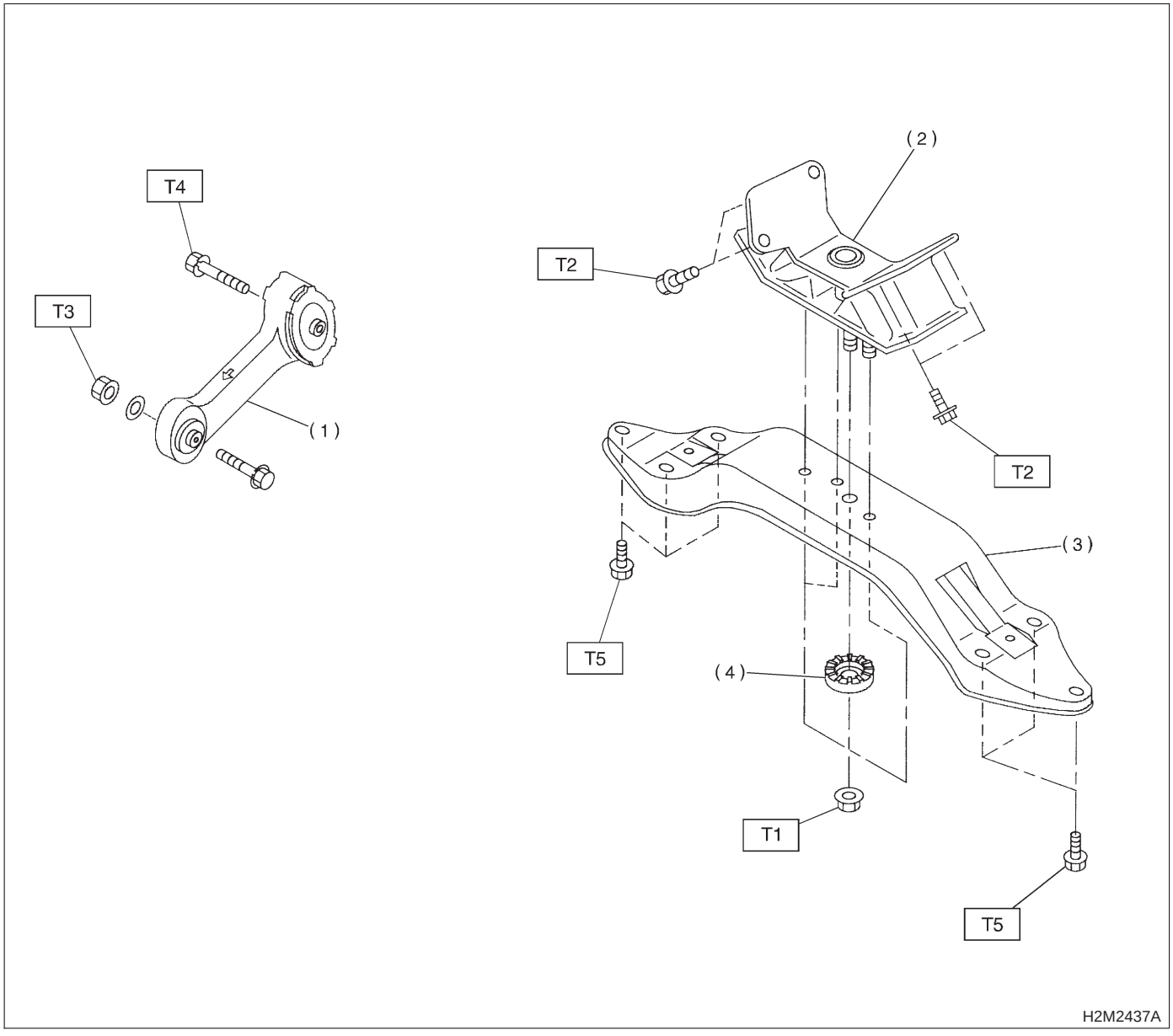
A: MT MODEL



(1) Pitching stopper
(2) Spacer
(3) Cushion C
(4) Front plate
(5) Rear cushion rubber
(6) Rear crossmember
(7) Cushion D
(8) Center crossmember
(9) Rear plate
(10) Front crossmember

Tightening torque: N·m (kg-m, ft-lb)
T1: 33±5 (3.4±0.5, 24.6±3.6)
T2: 37±10 (3.8±1.0, 27±7)
T3: 49±5 (5.0±0.5, 36.2±3.6)
T4: 57±10 (5.8±1.0, 42±7)
T5: 69±15 (7.0±1.5, 51±11)
T6: 137±20 (14±2, 101±14)

B: AT MODEL



(1) Pitching stopper
(2) Rear cushion rubber
(3) Crossmember
(4) Stopper

Tightening torque: N·m (kg-m, ft-lb)
T1: 37±10 (3.8±1.0, 27±7)
T2: 38±15 (3.9±1.5, 28±11)
T3: 49±5 (5.0±0.5, 36.2±3.6)
T4: 57±10 (5.8±1.0, 42±7)
T5: 69±15 (7.0±1.5, 51±11)

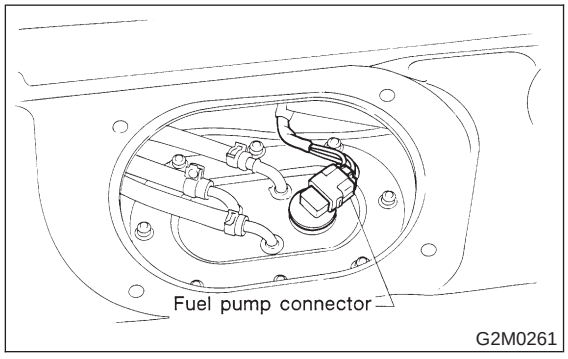
1. Engine

A: GENERAL PRECAUTION

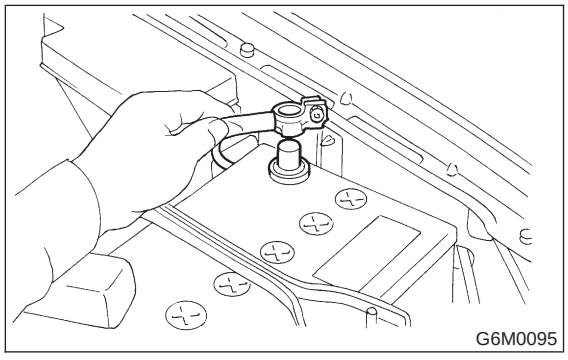
1) Remove or install engine in an area where chain hoists, lifting devices, etc. are available for ready use.
2) Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
3) Prior to starting work, prepare the following: Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
4) Lift-up or lower the vehicle when necessary. Make sure to support the correct positions. <Ref. to 1-3 [G7B0].>

B: REMOVAL

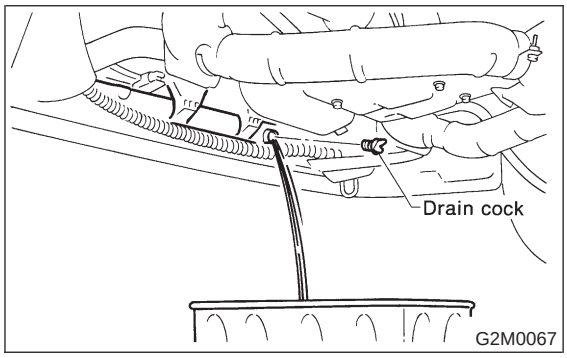
1) Set the vehicle on lift arms.
2) Open front hood fully and support with stay.
3) Release fuel pressure.
   (1) Disconnect fuel pump connector.



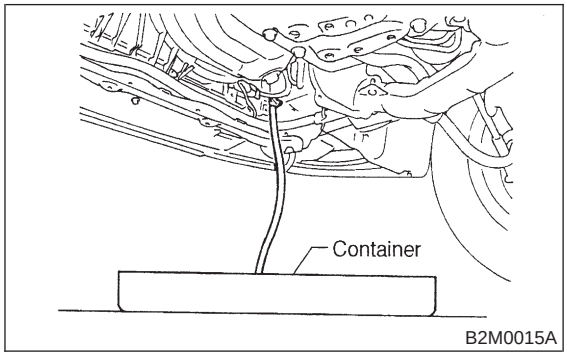
   (2) Start the engine, and run until it stalls.
   (3) After the engine stalls, crank it for five seconds more.
   (4) Turn ignition switch to “OFF”.
   (5) Remove filler cap.
4) Disconnect battery cables and remove battery from vehicle.



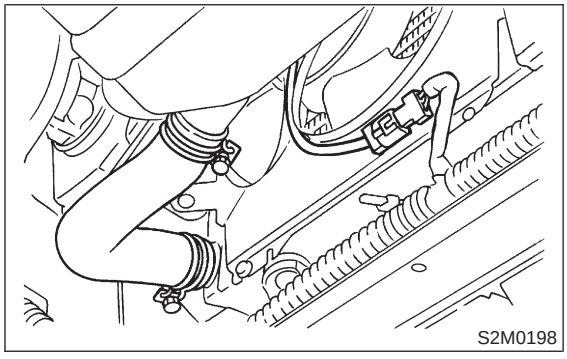
5) Drain coolant.
   (1) Set container under the vehicle, and remove drain cock from radiator. (2200 cc vehicles)



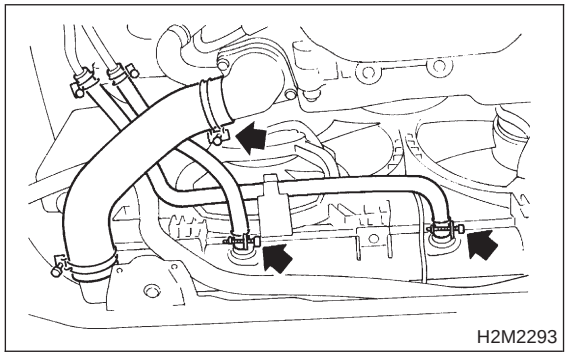
   (2) Set container under the vehicle, and loose drain cock from radiator. (2500 cc vehicles)



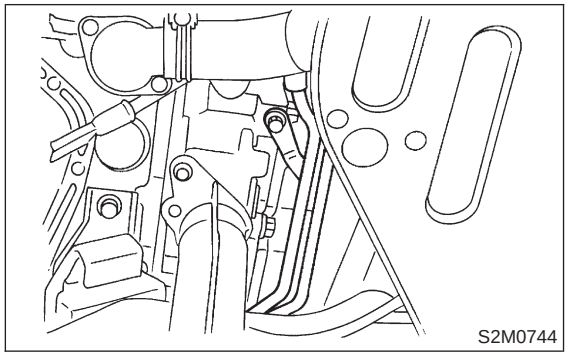
6) Remove cooling system.
   (1) Disconnect connectors from radiator main fan and sub fan motors.



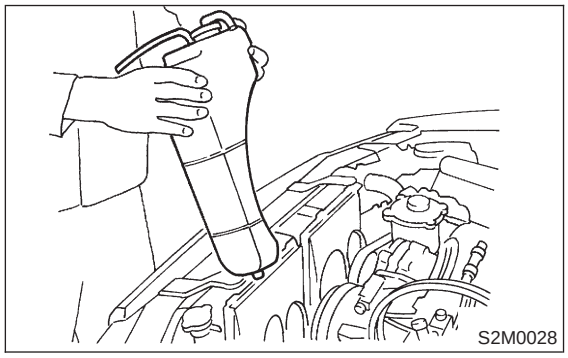
(2) Disconnect radiator outlet hose from thermostat cover.
(3) Disconnect ATF cooler hoses from radiator. (2200 cc AT vehicle)


H2M2293

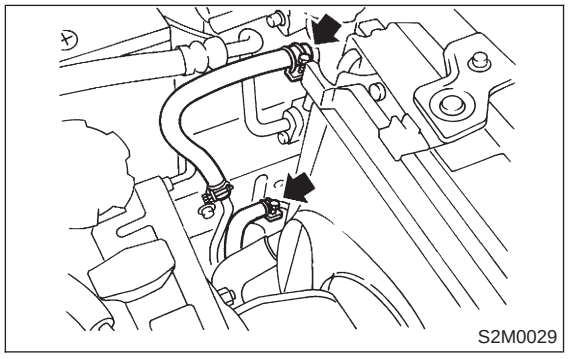
(4) Remove ATF cooler pipe from cylinder head. (2200 cc AT vehicle)


S2M0744

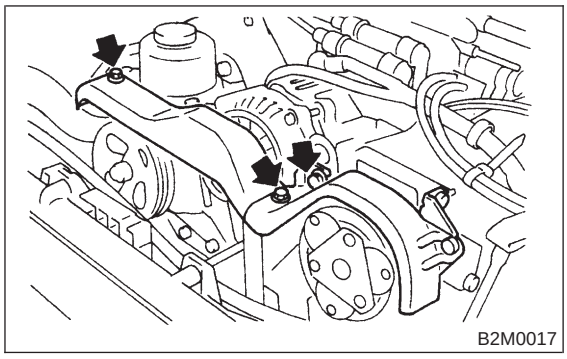
(5) Remove reservoir tank. (2500 cc AT vehicle)


S2M0028

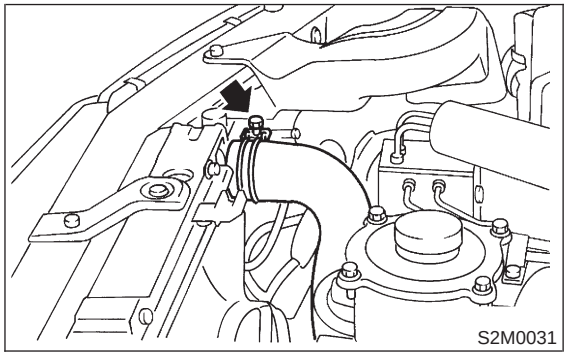
(6) Disconnect ATF cooler hoses from radiator. (2500 cc AT vehicle)


S2M0029

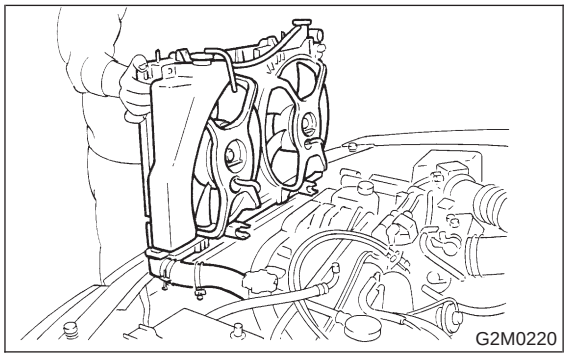
(7) Remove V-belt cover.


B2M0017

(8) Disconnect radiator inlet hose from radiator.

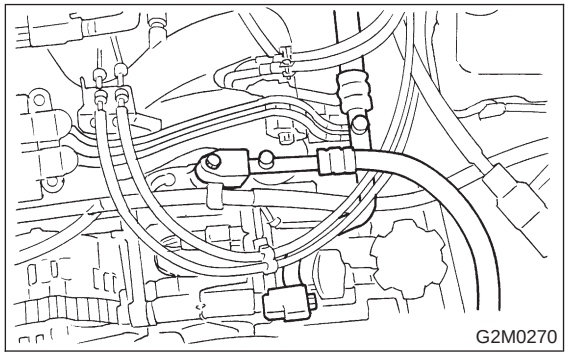

S2M0031

(9) Remove radiator upper bracket, and remove radiator assembly from vehicle.

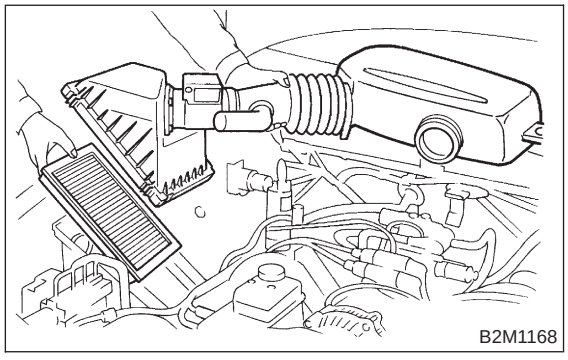

G2M0220

7) Collect refrigerant, and remove pressure hoses. (With A/C)
(1) Place and connect the attachment hose to the refrigerant recycle system.
(2) Collect refrigerant from A/C system.

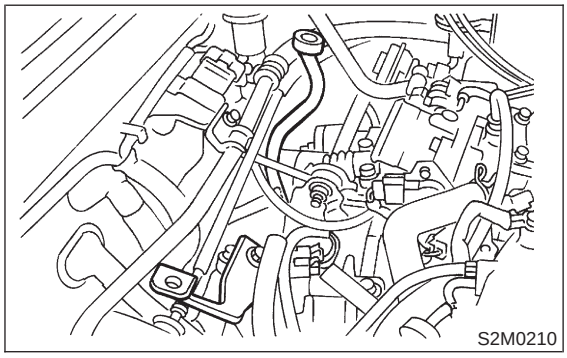
(3) Disconnect A/C flexible hoses from A/C compressor.


G2M0270

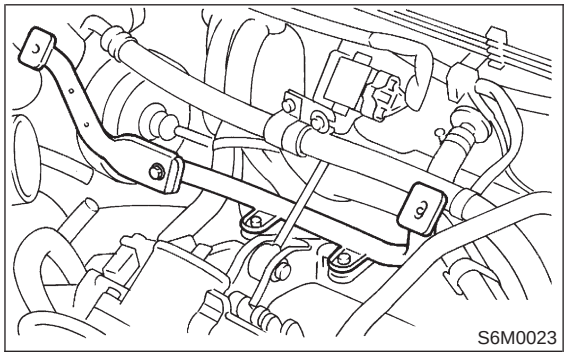
8) Remove air intake system.
(1) Disconnect connector from mass air flow sensor.
(2) Remove air intake duct with air cleaner upper cover, and remove air cleaner element.


B2M1168

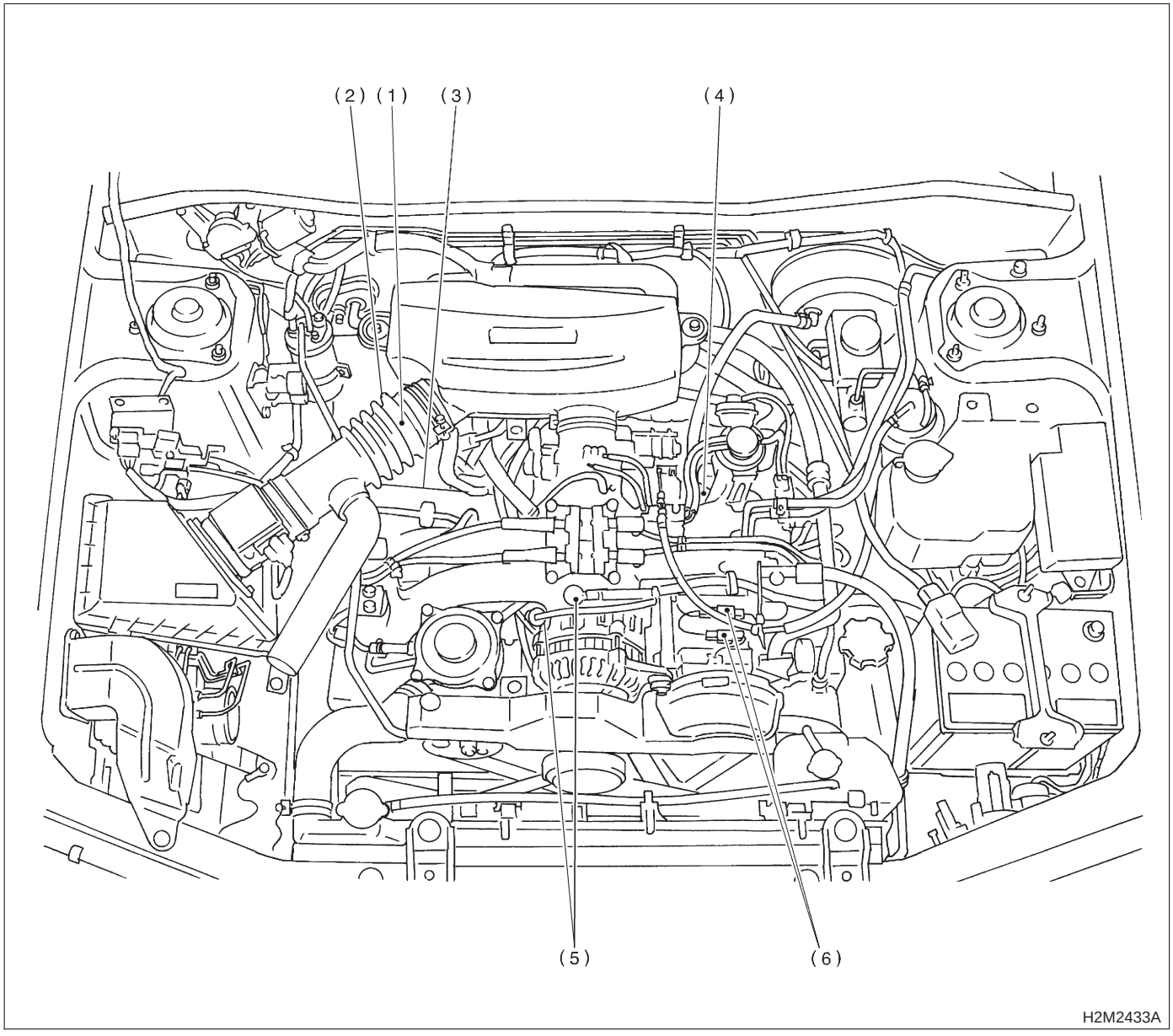
9) Remove chamber stay.
- MT vehicles


S2M0210

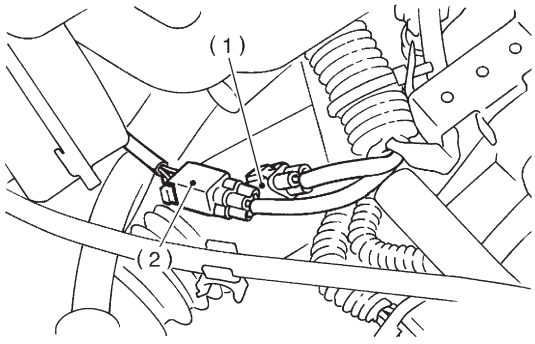
- AT vehicles


S6M0023

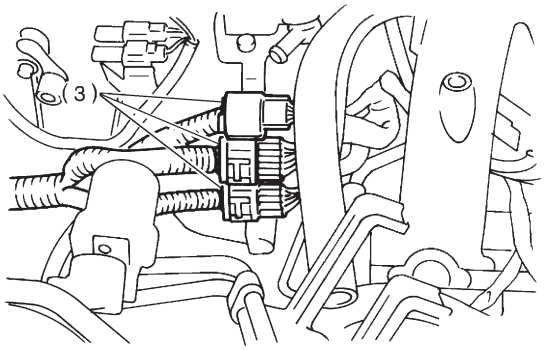
10) Disconnect connectors, cables and hoses.
(1) Disconnect the following connectors.



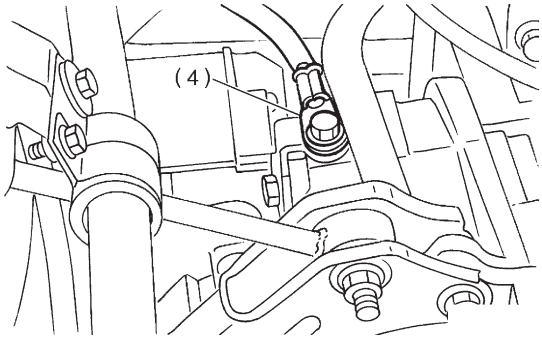
(1) Front oxygen sensor connector
(2) Rear oxygen sensor connector
(3) Engine harness connectors
(4) Engine ground terminal stay
(5) Alternator connector and terminal
(6) A/C compressor connectors (With A/C)



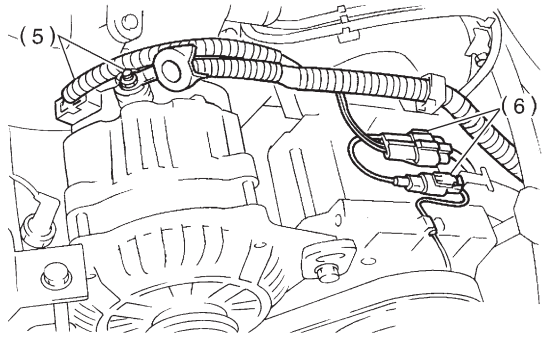
S2M0200A



B2M0019E

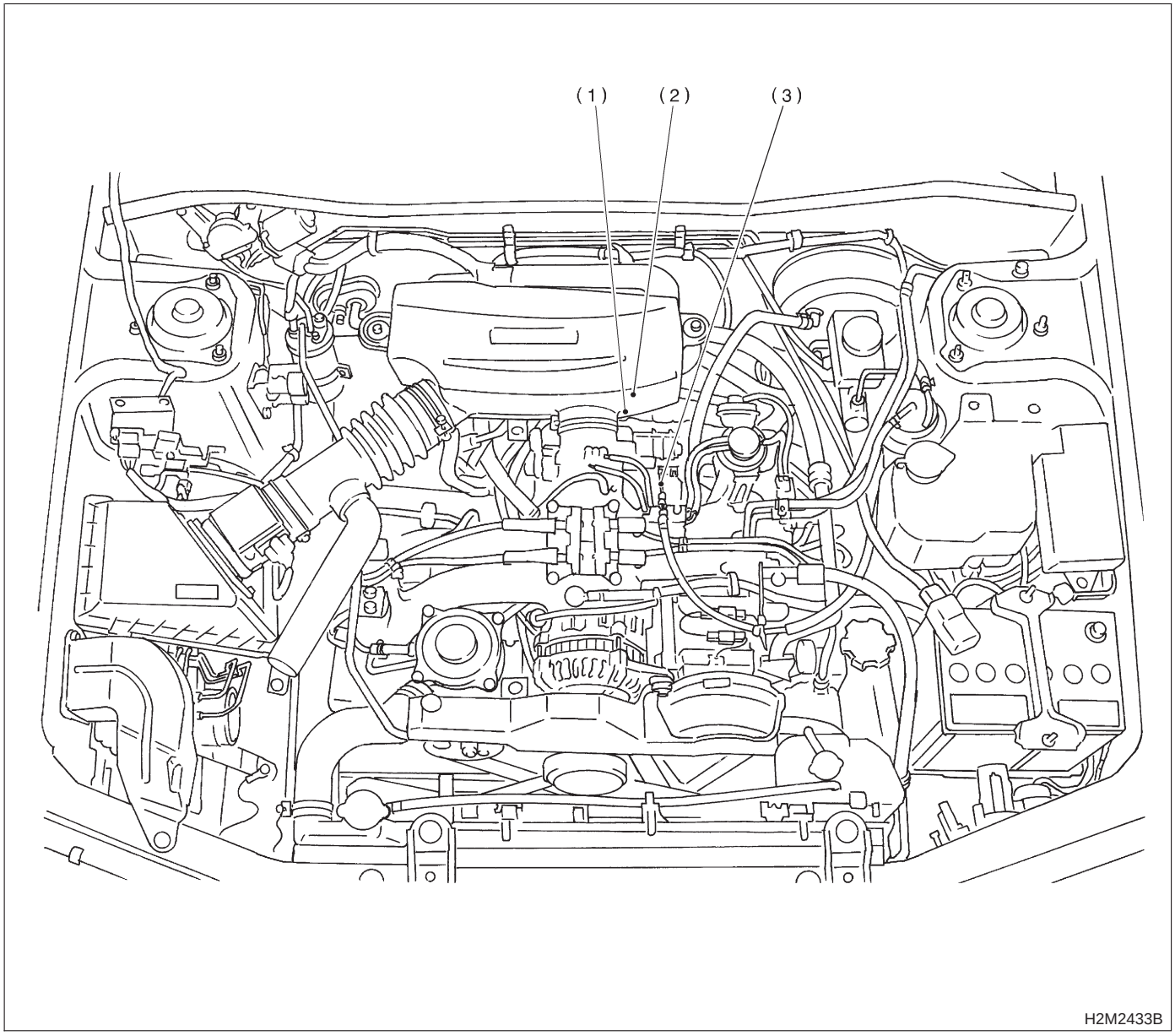


S2M0201A

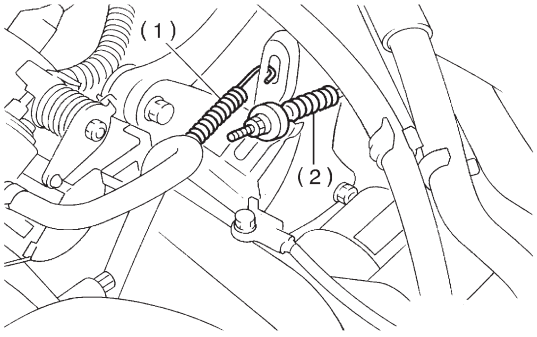


B2M1291E

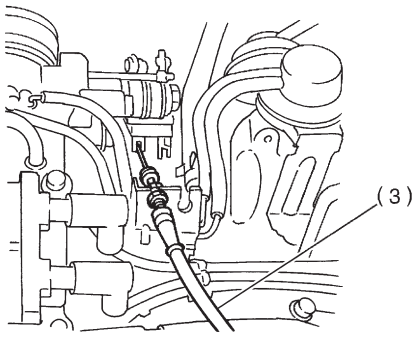
(2) Disconnect the following cables.



(1) Clutch release spring (2200 cc MT vehicle)
(2) Clutch cable (2200 cc MT vehicle)
(3) Accelerator cable

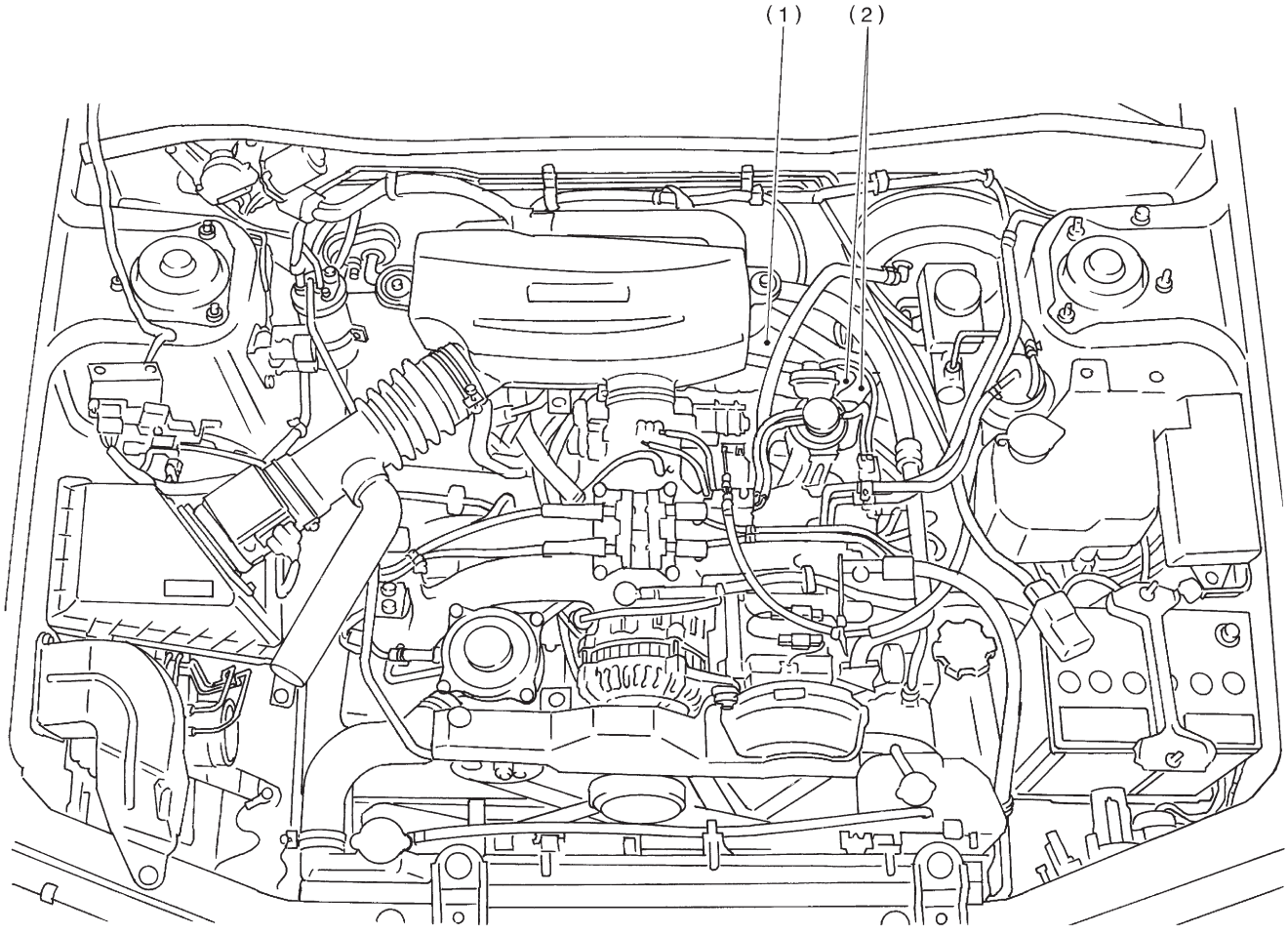


B2M1302C



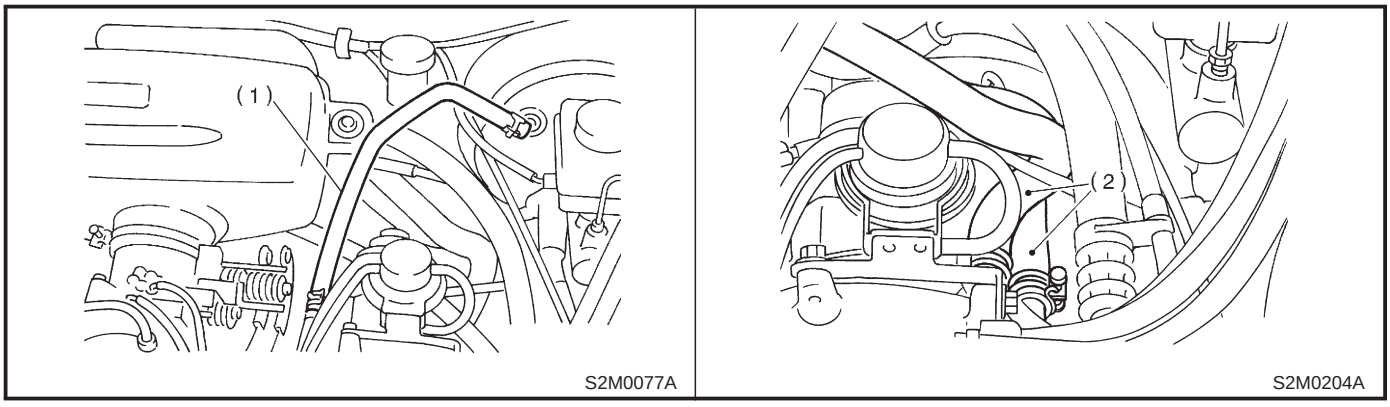
H2M2434A

(3) Disconnect the following hoses.

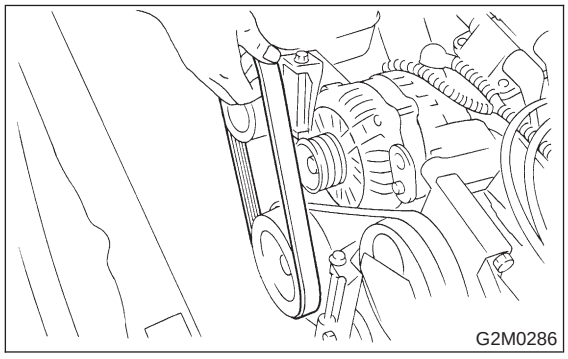


H2M2433C

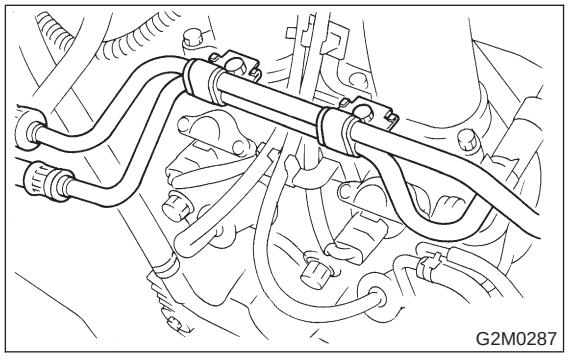
(1) Brake booster vacuum hose (2) Heater inlet and outlet hoses



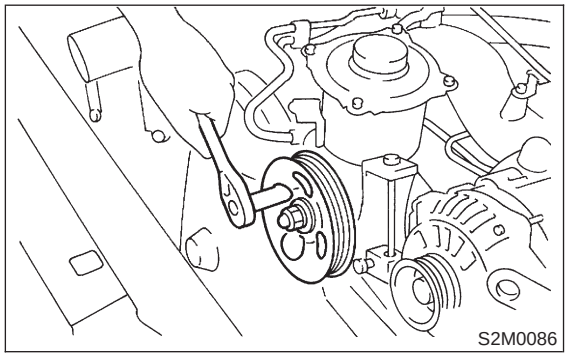
11) Remove power steering pump from bracket.
(1) Loosen lock bolt and slider bolt, and remove front side V-belt.



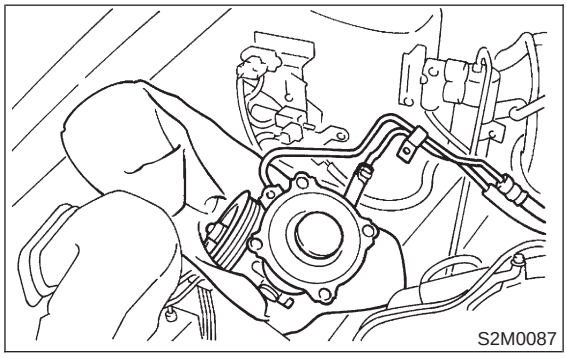
(2) Remove pipe with bracket from intake manifold.



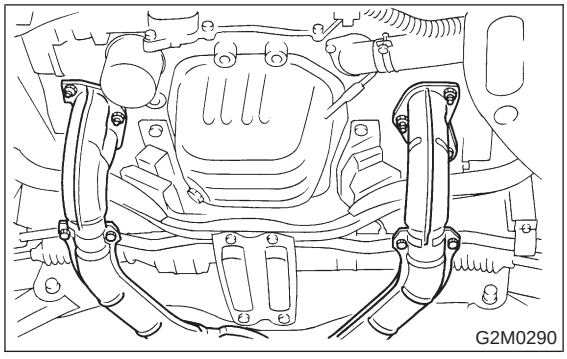
(3) Remove bolts which install power steering pump from bracket.



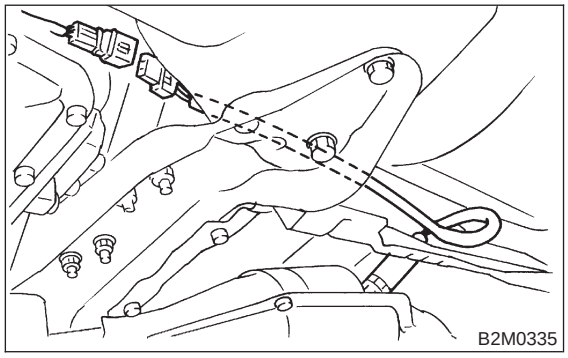
(4) Place power steering pump on the right side wheel apron.



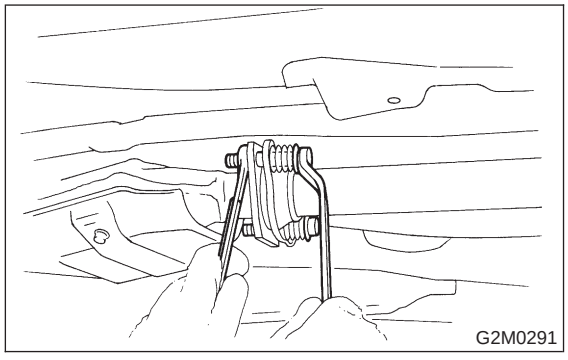
12) Remove front exhaust pipe and center exhaust pipe.
(1) Lift-up the vehicle.
(2) Remove nuts which install front exhaust pipe onto engine.



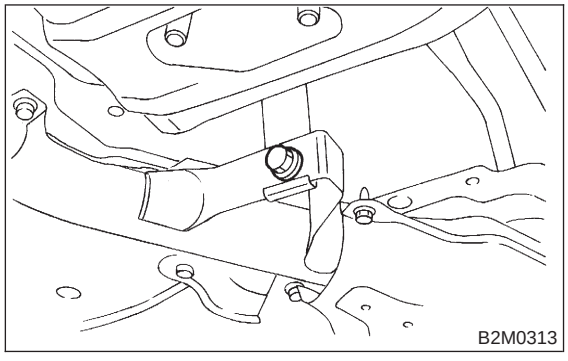
(3) Disconnect connector from rear oxygen sensor. (Except California spec. vehicle)


B2M0335

(4) Separate center exhaust pipe from rear exhaust pipe.


G2M0291

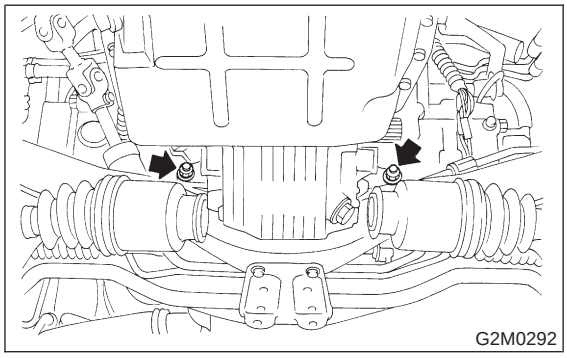
(5) Remove bolt which installs center exhaust pipe on hunger bracket.


B2M0313

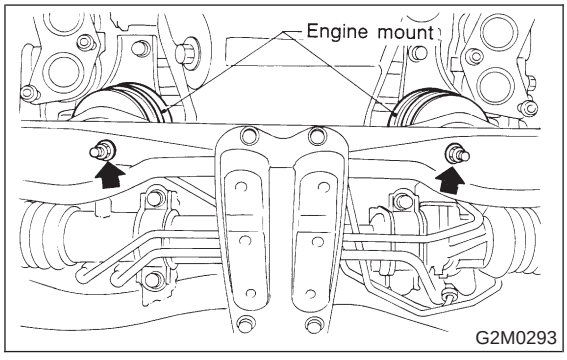
(6) Take off front and center exhaust pipes.

CAUTION:
Exhaust pipe will drop when all bolts are removed. So, hold it when removing the last bolt.

13) Remove nuts which hold lower side of transmission to engine.


G2M0292

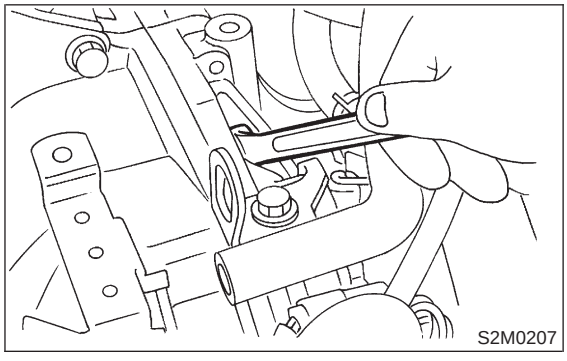
14) Remove nuts which install front cushion rubber onto front crossmember.



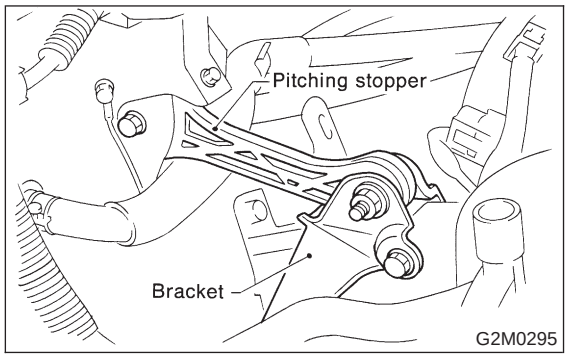
G2M0293

15) Separate torque converter from drive plate. (AT model)
(1) Lower the vehicle.
(2) Remove service hole plug.
(3) Remove bolts which hold torque converter to drive plate.
(4) Remove other bolts while rotating the engine using ST.

ST 499977000 CRANK PULLEY WRENCH

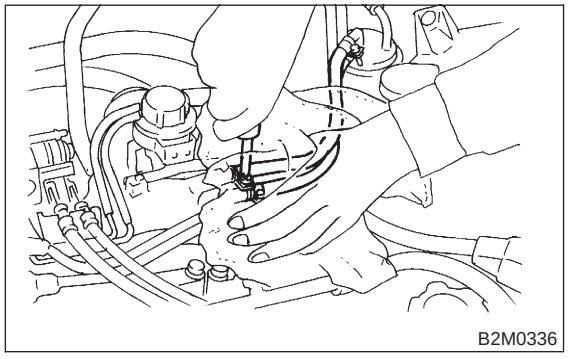

S2M0207

16) Remove pitching stopper.

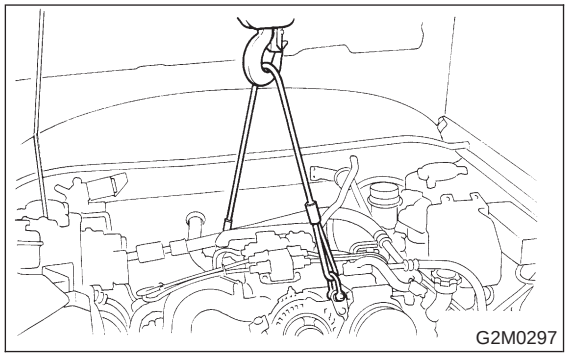


17) Disconnect fuel delivery hose, return hose and evaporation hose.

CAUTION:
● Disconnect hose with its end wrapped with cloth to prevent fuel from splashing.
● Catch fuel from hose into container.

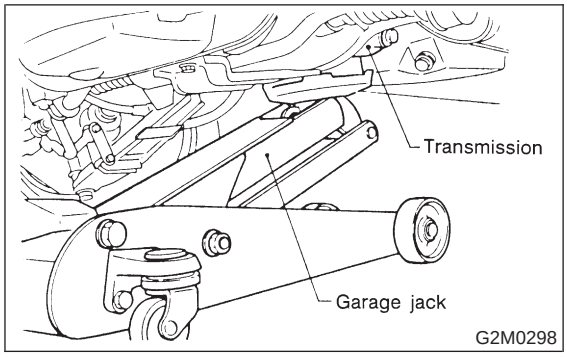


18) Support engine with a lifting device and wire ropes.

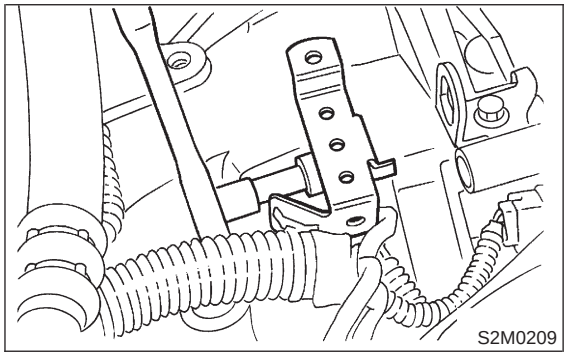


19) Support transmission with a garage jack.

CAUTION:
Before moving engine away from transmission, check to be sure no work has been overlooked. Doing this is very important in order to facilitate re-installation and because transmission lowers under its own weight.

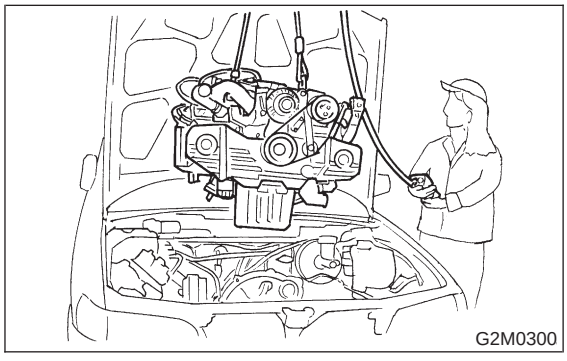


20) Remove bolts which holds upper side of transmission to engine.



21) Remove engine from vehicle.
(1) Slightly raise engine.
(2) Raise transmission with garage jack.
(3) Move engine horizontally until mainshaft is withdrawn from clutch cover.
(4) Slowly move engine away from engine compartment.

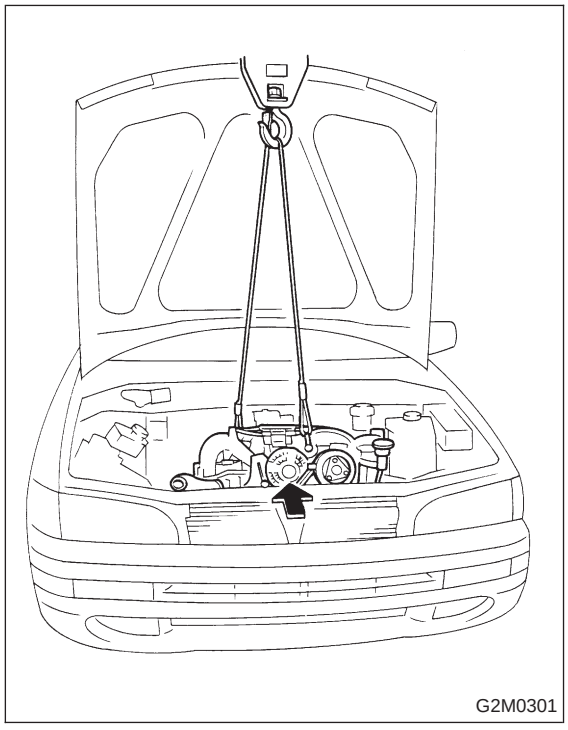
CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.



C: INSTALLATION

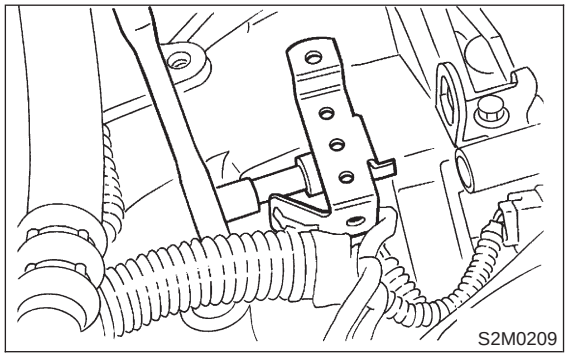
1) Install engine onto transmission.
   (1) Position engine in engine compartment and align it with transmission.

CAUTION:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

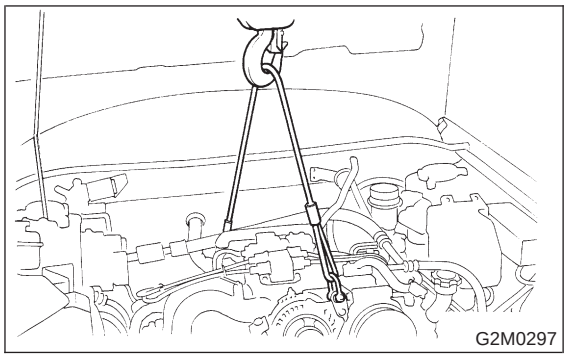

G2M0301

   (2) Apply a small amount of grease to splines of mainshaft.
2) Tighten bolts which hold upper side of transmission to engine.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)

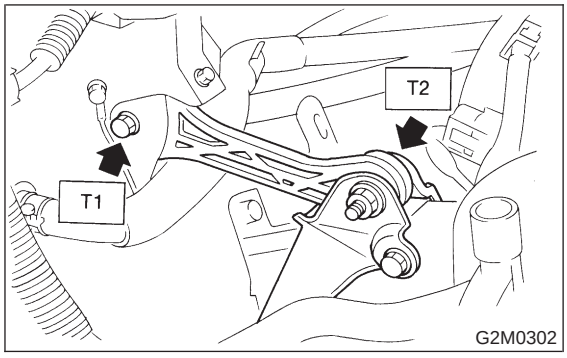

S2M0209

3) Remove lifting device and wire ropes.


G2M0297

4) Remove garage jack.
5) Install pitching stopper.

Tightening torque:
T1: 57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)
T2: 49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)



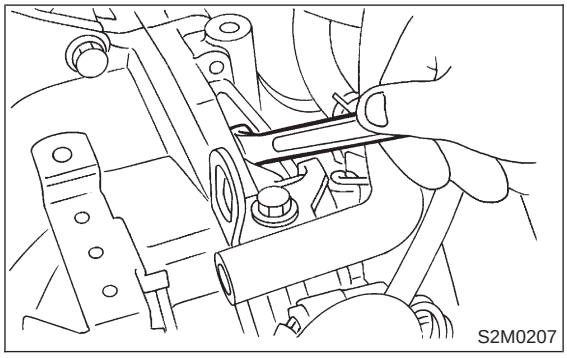
G2M0302

6) Install torque converter onto drive plate. (AT model)
   (1) Tighten bolts which hold torque converter to drive plate.
   (2) Tighten other bolts while rotating the engine by using ST.

ST 499977000 CRANK PULLEY WRENCH

CAUTION:
Be careful not to drop bolts into torque converter housing.

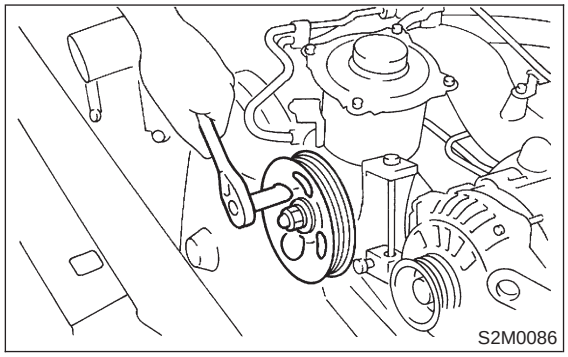
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)


S2M0207

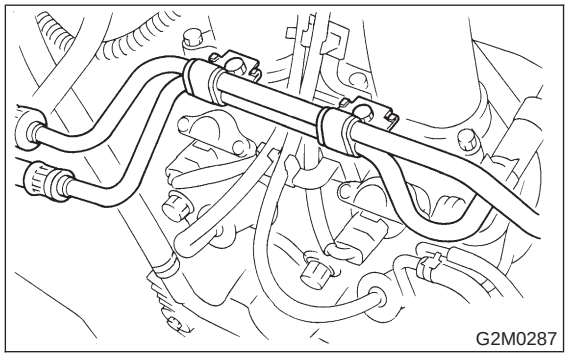
   (3) Clog plug onto service hole.
7) Install power steering pump on bracket.

(1) Install power steering pump on bracket, and tighten bolts.

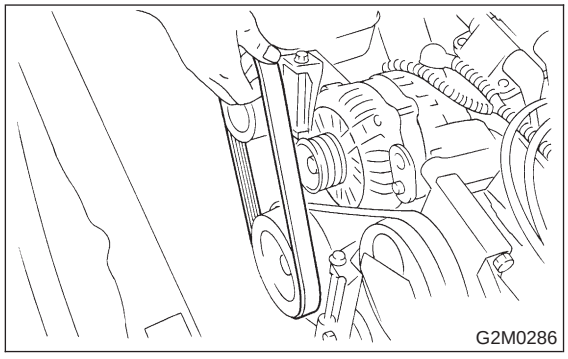
Tightening torque:
39±10 N·m (4.0±1.0 kg-m, 29±7 ft-lb)


S2M0086

(2) Install power steering pipe bracket on right side intake manifold, and install spark plug codes.

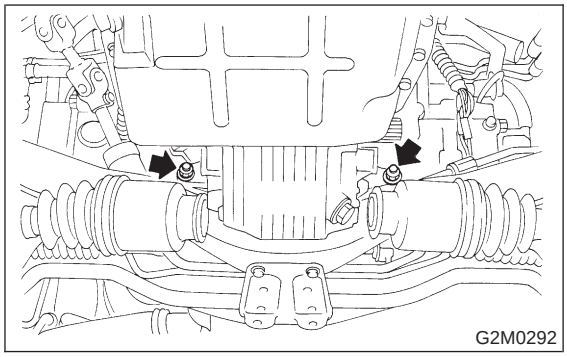

G2M0287

(3) Install front side V-belt, and adjust it. <Ref. to 1-5 [G200].>


G2M0286

8) Tighten nuts which hold lower side of transmission to engine.

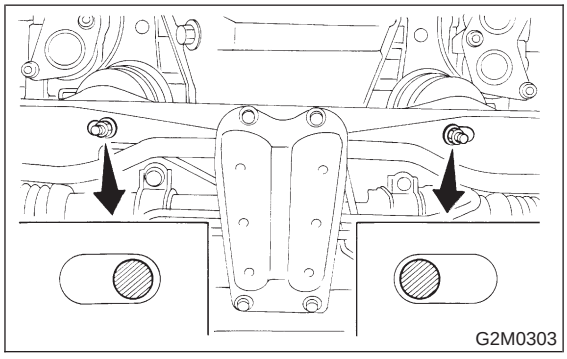
Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)


G2M0292

9) Tighten nuts which install front cushion rubber onto crossmember.

Tightening torque:
69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)

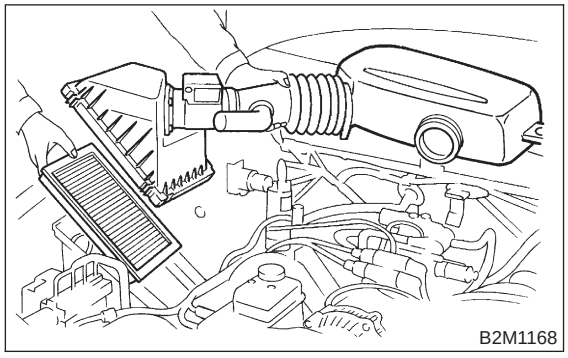
CAUTION:
Be sure to tighten front cushion rubber mounting bolts in the innermost elliptical hole in the front crossmember.


G2M0303

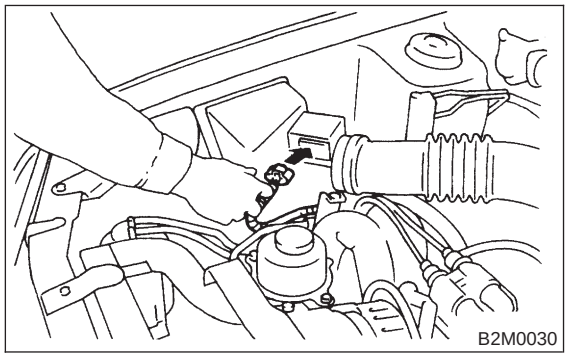
10) Install front exhaust pipe and center exhaust pipe. <Ref. to 2-9 [W1B0].> and <Ref. to 2-9 [W2B0].>
11) Connect rear oxygen sensor connector. (Except California spec. vehicle)
12) Connect the following hoses.
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
13) Connect the following connectors.
(1) Engine ground terminal
(2) Engine harness connectors
(3) Front oxygen sensor connector
(4) Alternator connector and terminal
(5) A/C compressor connectors (With A/C)
14) Connect the following cables.
(1) Accelerator cable
(2) Clutch cable (2200 cc MT vehicle)
(3) Clutch release spring (2200 cc MT vehicle)

CAUTION:
After connecting each cable, adjust them.

15) Install air intake system.
(1) Install air cleaner element.
(2) Install air intake duct with air cleaner upper cover.
(3) Install air intake chamber.


B2M1168

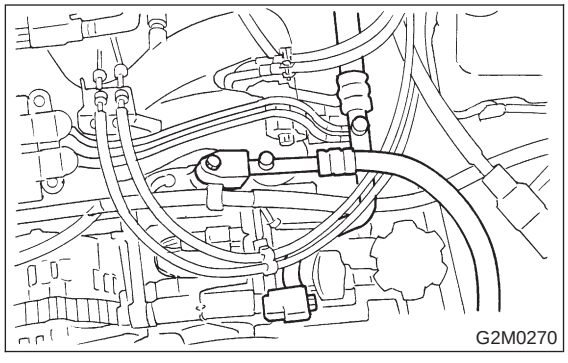
(4) Connect connector to mass air flow sensor.


B2M0030

16) Install A/C flexible hoses. (With A/C) <Ref. to 4-7 [W16A0].>

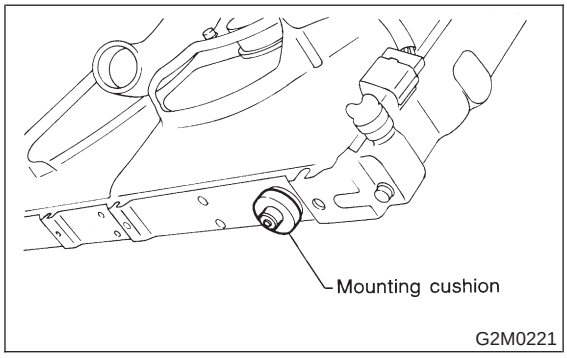
CAUTION:
Use new O-rings.

Tightening torque:
25±7 N·m (2.5±0.7 kg-m, 18.1±5.1 ft-lb)


G2M0270

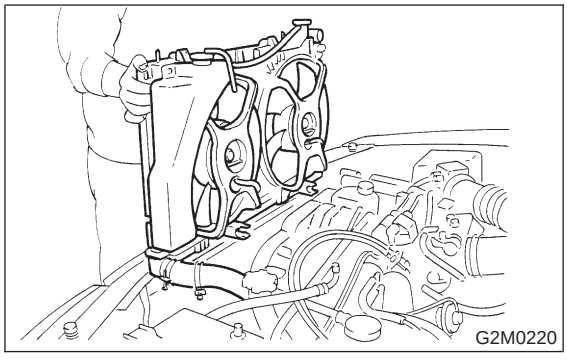
17) Install cooling system.

(1) Attach radiator mounting cushions to pins on lower side of radiator.



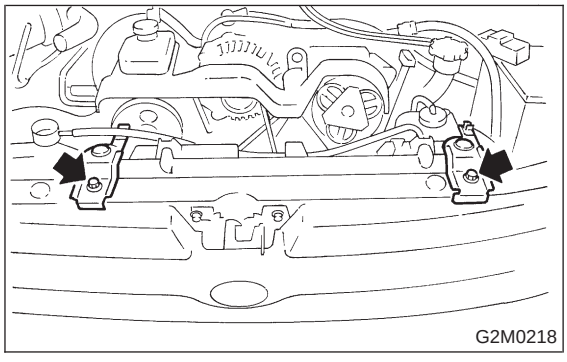
G2M0221

(2) Fit cushions on lower side of radiator, into holes on body side and install radiator.

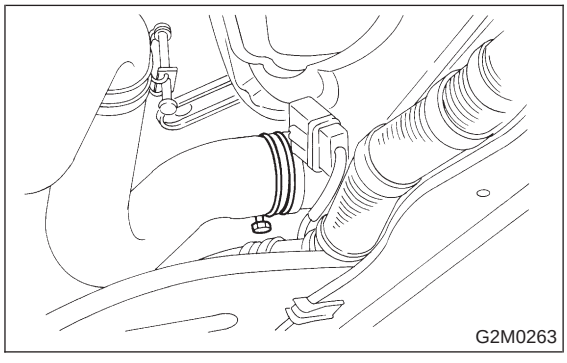

G2M0220

(3) Install radiator brackets and tighten bolts.

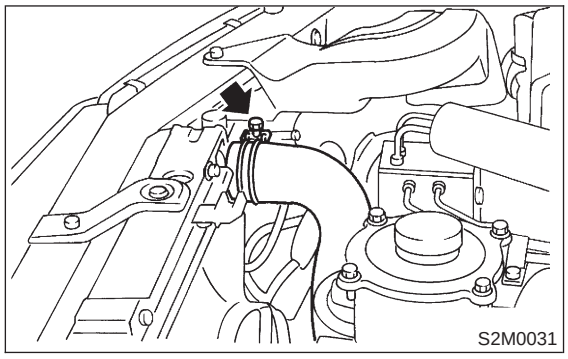
Tightening torque:
13.7±1.5 N·m (1.4±0.15 kg-m, 10.1±1.1 ft-lb)


G2M0218

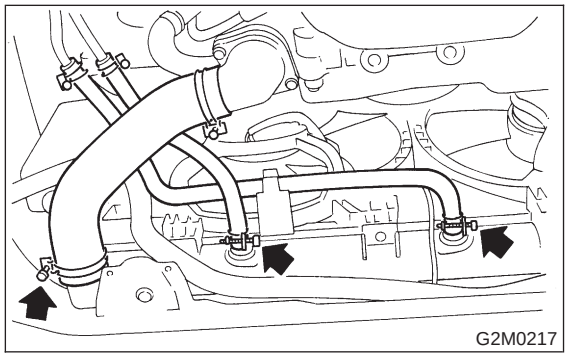
(4) Connect radiator fan motor connector.


G2M0263

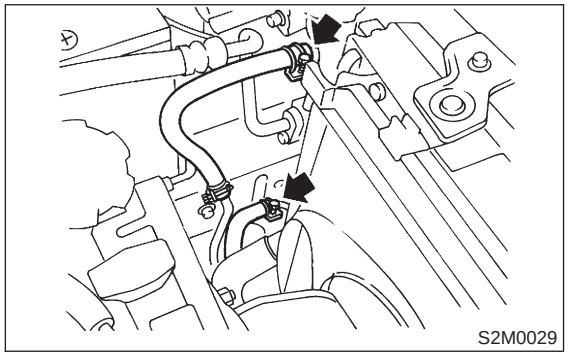
(5) Connect radiator inlet hose.



(6) Connect radiator outlet hose. (2200 cc vehicles)
(7) Connect ATF cooler hoses. (2200 cc AT model)

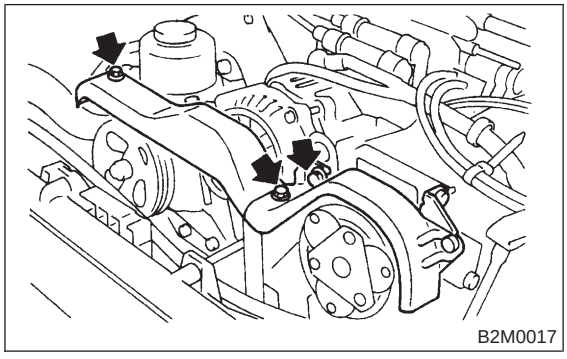


(8) Install ATF cooler pipe to cylinder head. (2200 cc AT vehicle)
(9) Connect ATF cooler hose. (2500 cc AT vehicle)



(10) Install reservoir tank. (2500 cc AT vehicle)

(11) Install V-belt cover.



18) Install battery in the vehicle, and connect cables.
19) Fill coolant.
<Ref. to 2-5 [W1B0].>

Engine coolant capacity:
5.8ℓ (6.1 US qt, 5.1 Imp qt)

20) Check ATF level and correct if necessary. (AT model)
<Ref. to 3-2 [W1B1].>
21) Charge A/C system with refrigerant.
<Ref. to 4-7 [W700].>
22) Remove front hood stay, and close front hood.
23) Remove the vehicle from lift arms.

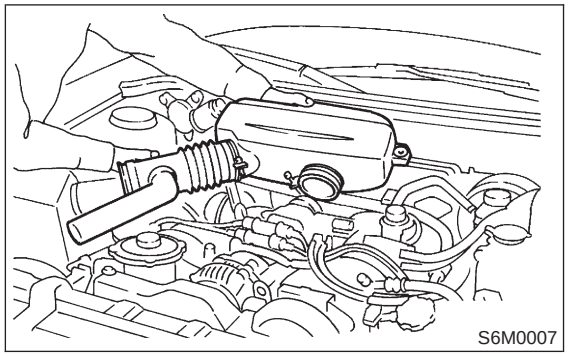
2. Transmission

A: GENERAL PRECAUTION

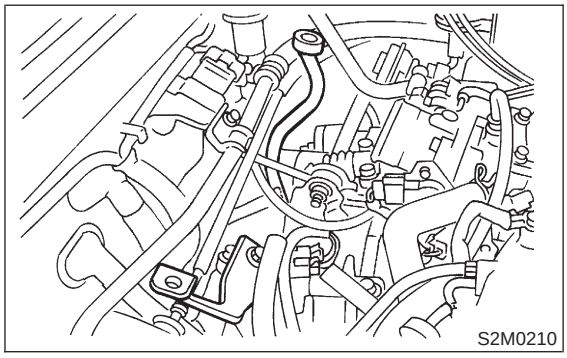
1) Remove or install transmission in an area where chain hoists, lifting devices, etc. are available for ready use.
2) Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
3) Prior to starting work, prepare the following: Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
4) Lift-up or lower the vehicle when necessary. Make sure to support the correct positions. <Ref. to 1-3 [G7B0].>

B: REMOVAL

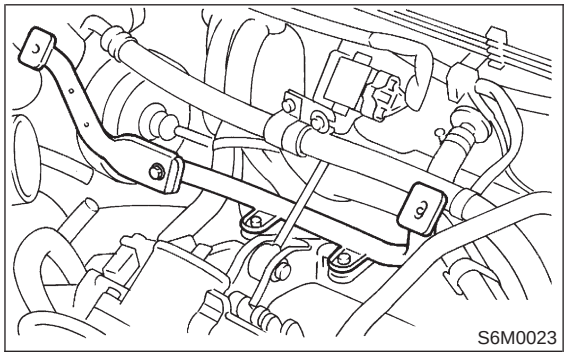
1) Open front hood fully, and support with stay.
2) Disconnect battery ground terminal.
3) Remove air intake duct and chamber.


S6M0007

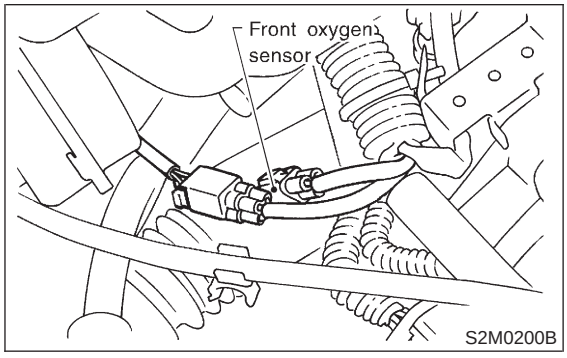
4) Remove chamber stay.
- MT vehicles


S2M0210

- AT vehicles

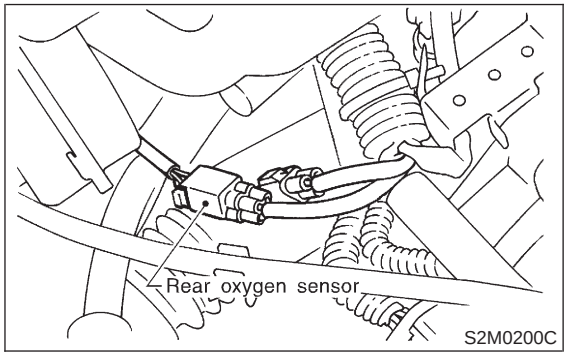

S6M0023

5) Disconnect the following connectors.
(1) Front oxygen sensor connector



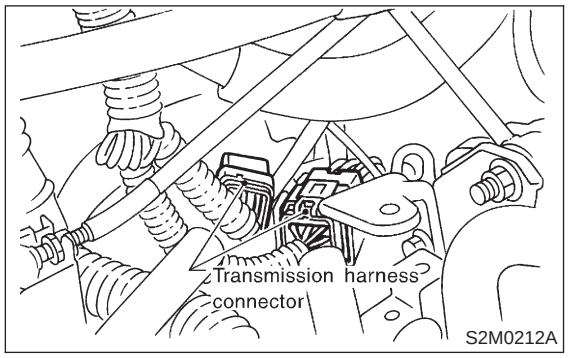
S2M0200B

(2) Rear oxygen sensor connector (California spec. vehicle)

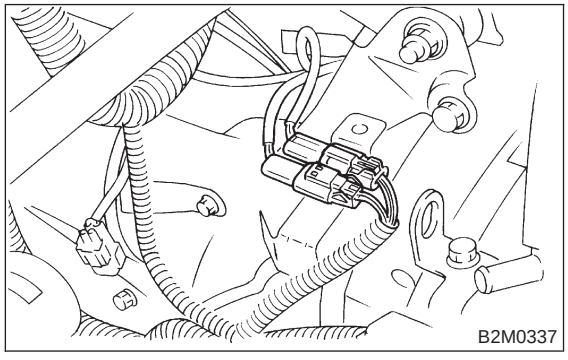


S2M0200C

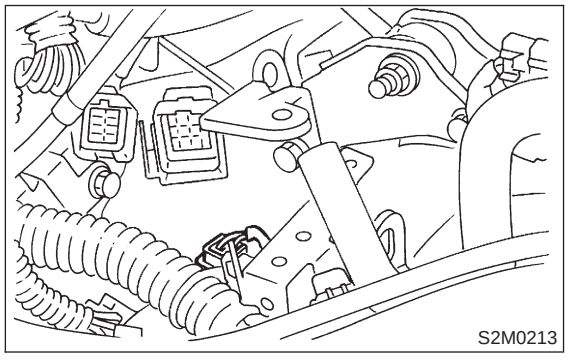
(3) Transmission harness connector (AT vehicles)



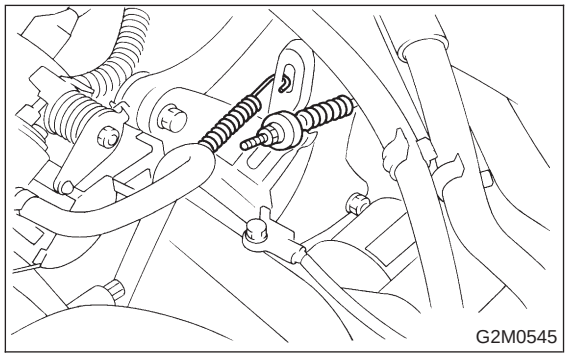
(4) Transmission ground terminal
(5) Neutral position switch connector (MT vehicles)
(6) Back-up light switch connector (MT vehicles)



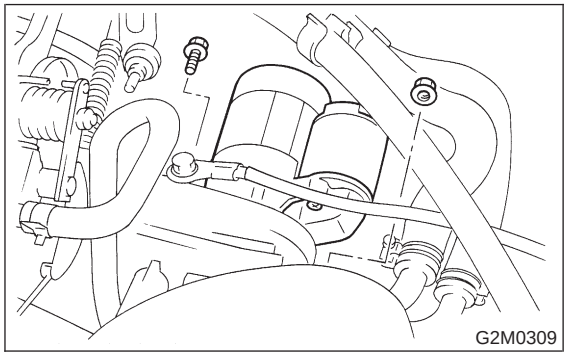
(7) Vehicle speed sensor 2



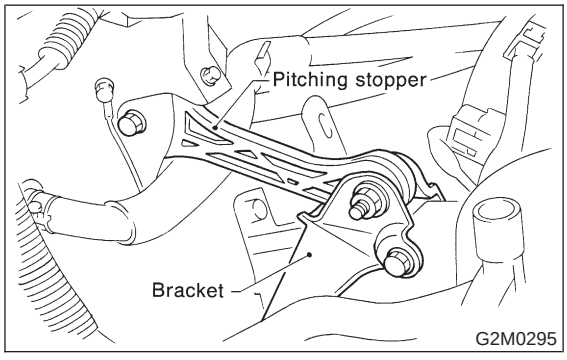
6) Disconnect the following cable. (2200 cc MT vehicle)



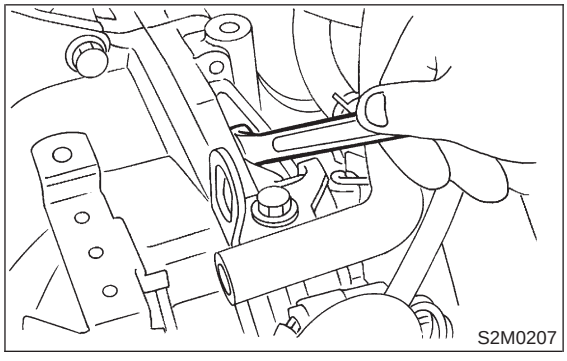
7) Remove starter.
(1) Disconnect connectors and terminal from starter.
(2) Remove bolt which installs upper side of starter.
(3) Remove nut which installs lower side of starter, and remove starter from transmission.



8) Remove pitching stopper.



9) Separate torque converter from drive plate. (AT vehicles)
(1) Remove service hole plug.
(2) Remove bolts which hold torque converter to drive plate.



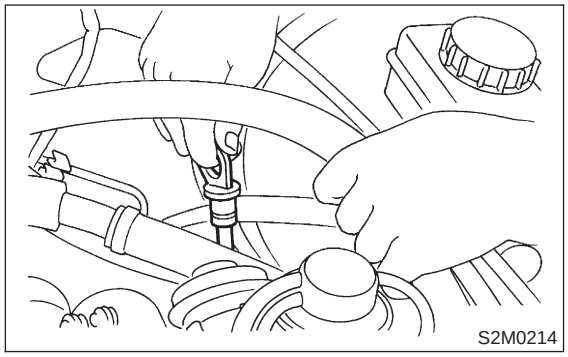
(3) While rotating the engine, remove other bolts using ST.

ST 499977000 CRANK PULLEY WRENCH

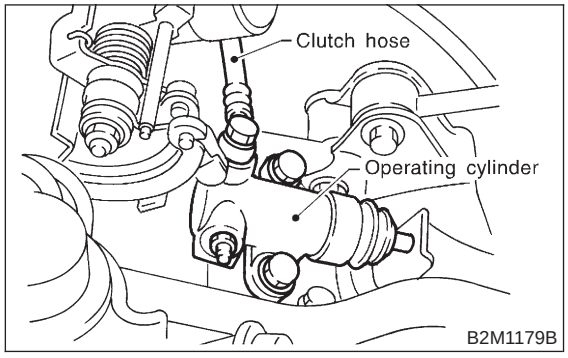
CAUTION:
Be careful not to drop bolts into torque converter housing.

10) Remove ATF level gauge. (AT vehicles)

CAUTION:
Plug opening to prevent entry of foreign particles into transmission fluid.


S2M0214

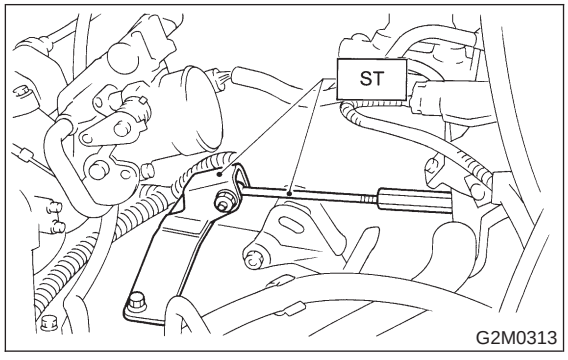
11) Remove operating cylinder. (2500 cc MT vehicle)



B2M1179B

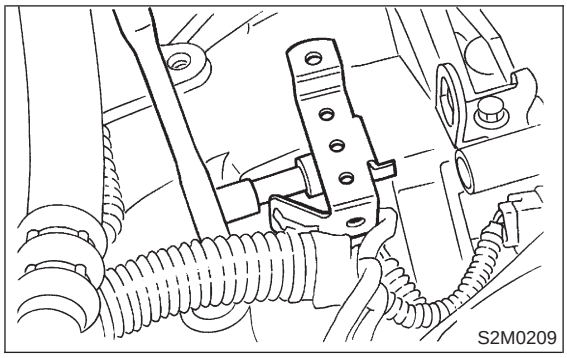
12) Set ST.
ST 41099AA020 ENGINE SUPPORT ASSY

NOTE:
Also is available Part No. 927670000.

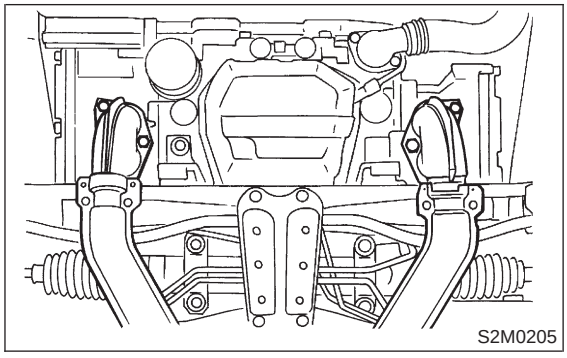


G2M0313

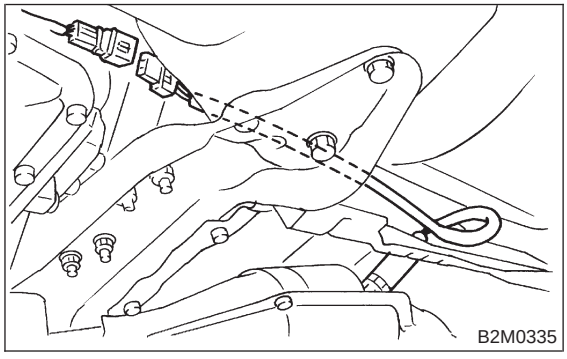
13) Remove bolt which holds right upper side of transmission to engine.


S2M0209

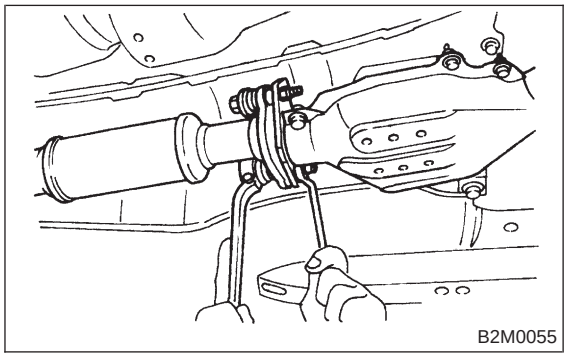
14) Remove exhaust system.
(1) Lift-up the vehicle.
(2) Remove nuts which install front exhaust pipe onto engine.


S2M0205

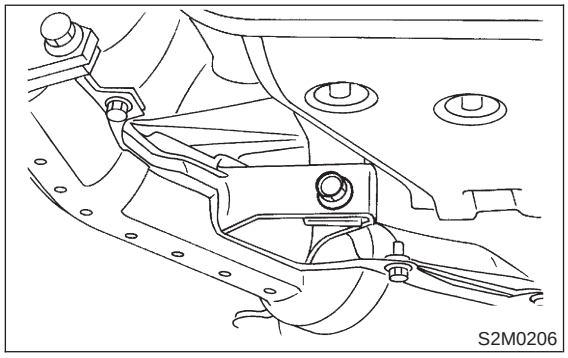
(3) Disconnect connector from rear oxygen sensor. (Except California spec. vehicle)


B2M0335

(4) Separate center exhaust pipe from rear exhaust pipe.

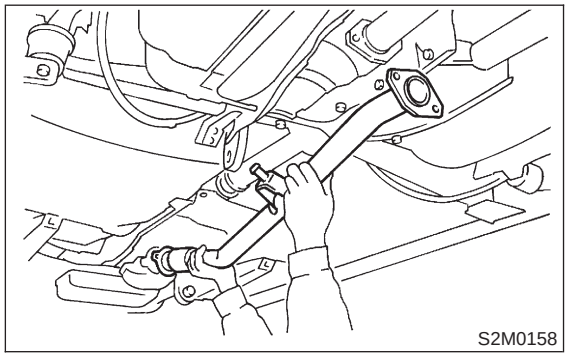

B2M0055

(5) Remove bolt which installs center exhaust pipe to hanger bracket.

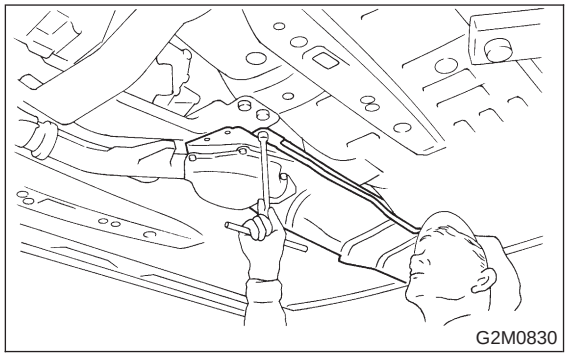

S2M0206

(6) Take off front and center exhaust pipes.
(7) Remove rear exhaust pipe.

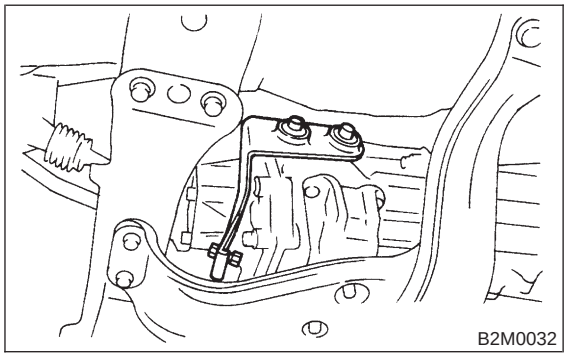
CAUTION:
When removing exhaust pipes, be careful each exhaust pipe does not drop out.


S2M0158

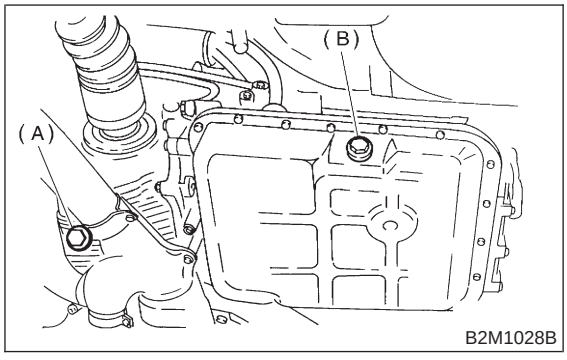
(8) Remove heat shield cover of rear exhaust pipe.


G2M0830

(9) Remove hanger bracket from right side of transmission.


B2M0032

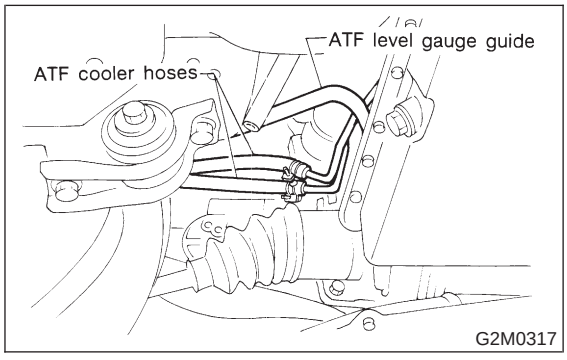
15) Drain ATF to remove ATF drain plug. (AT vehicles)



B2M1028B

(A) Front differential oil drain plug
(B) ATF drain plug

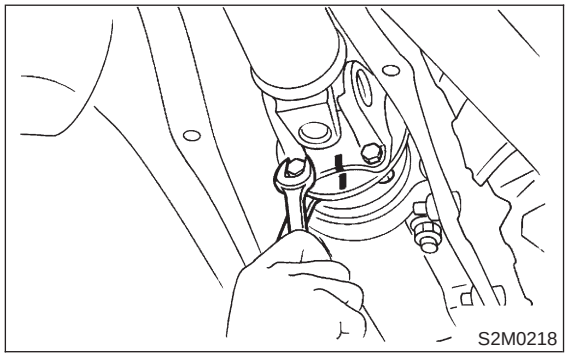
16) Disconnect ATF cooler hoses from pipes of transmission side, and remove ATF level gauge guide. (AT vehicles)



G2M0317

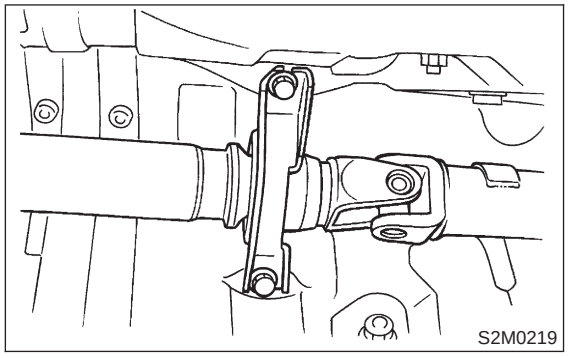
17) Remove propeller shaft.
(1) Remove front cover of rear differential mount.

(2) Separate propeller shaft from rear differential.



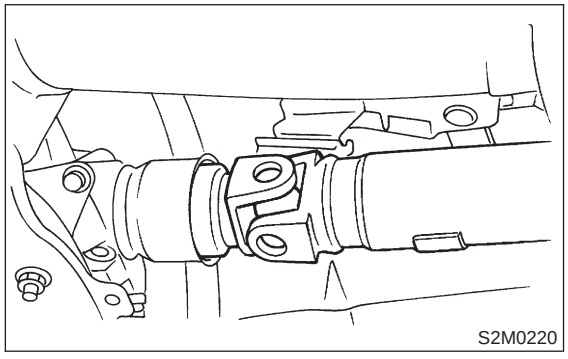
(3) Remove bolts which hold center bearing onto body.

CAUTION:
Be careful not to drop propeller shaft.

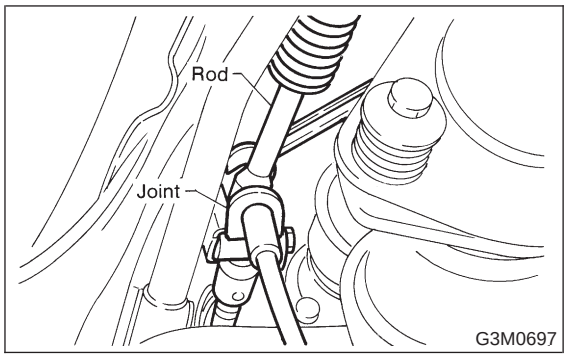


(4) Remove propeller shaft from transmission.

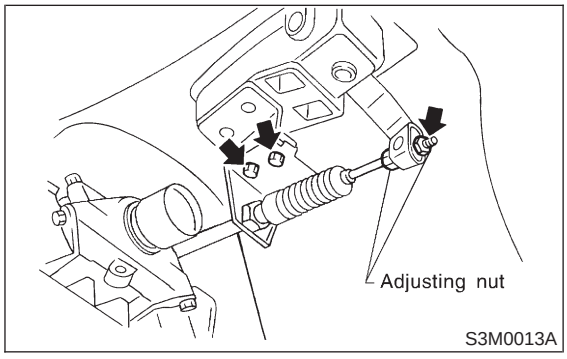
CAUTION:
● Be sure to use an empty container to catch oil flowing out when removing propeller shaft.
● Be sure not to damage oil seals and the frictional surface of sleeve yoke.
● Be sure to plug the opening in transmission after removal of propeller shaft.



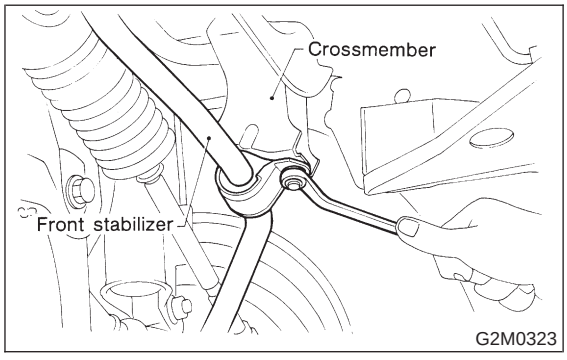
18) Remove gear shift rod and stay from transmission. (MT vehicles)
(1) Remove spring.
(2) Disconnect stay from transmission.
(3) Disconnect rod from transmission.



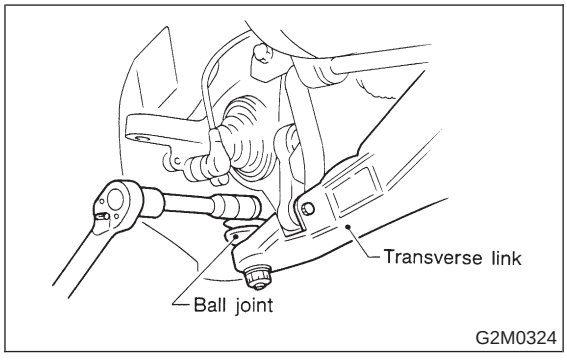
19) Remove shift selector cable. (AT vehicles)
(1) Disconnect shift selector cable from selector lever.
(2) Remove cable bracket from body.



20) Remove bolts which install stabilizer clamps onto crossmember.

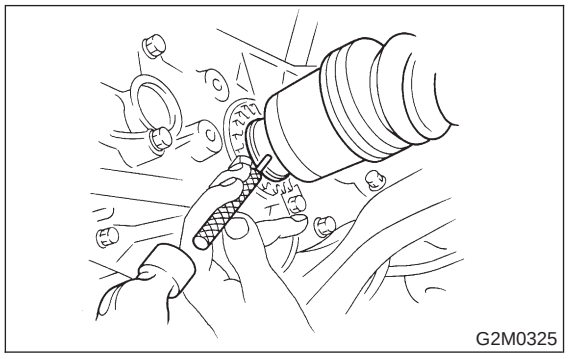


21) Remove front drive shafts from transmission.
(1) Remove transverse link from housing.

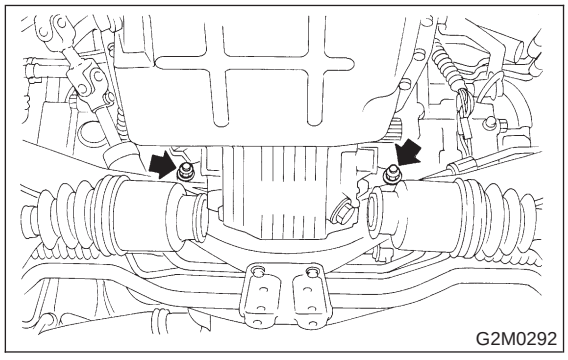


(2) Lower transverse link.
(3) Remove spring pins and separate front drive shafts from each side of the transmission.

CAUTION:
Discard removing spring pin. Replace with a new one.

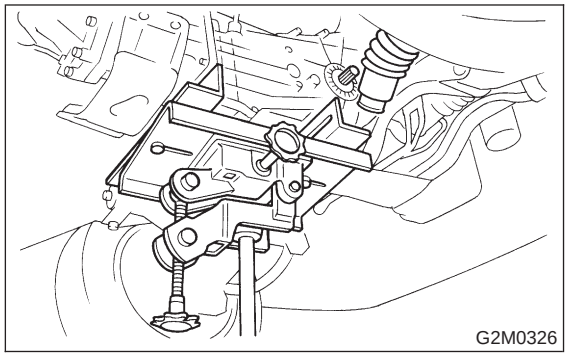

G2M0325

22) Remove nuts which hold lower side of transmission to engine.

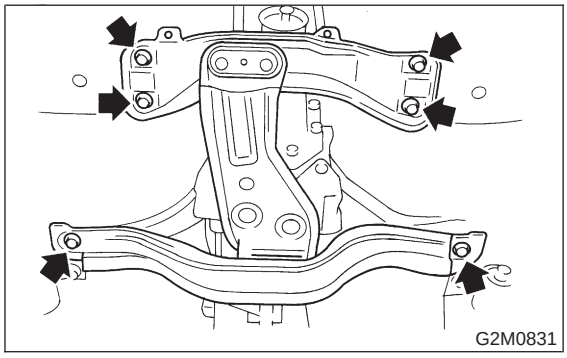

G2M0292

23) Place transmission jack under transmission.

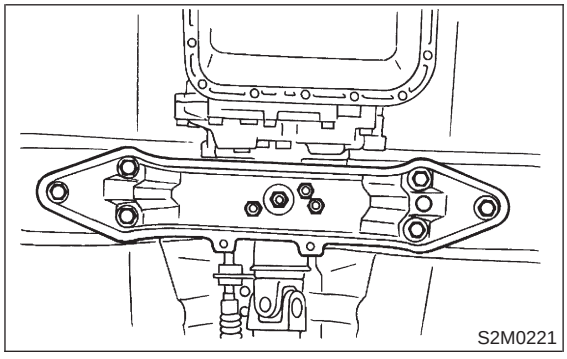
CAUTION:
● Always support transmission case with a transmission jack.
● On AT vehicles, make sure that the support plates of transmission jack don't touch the oil pan.


G2M0326

24) Remove transmission rear crossmember.
● MT vehicles

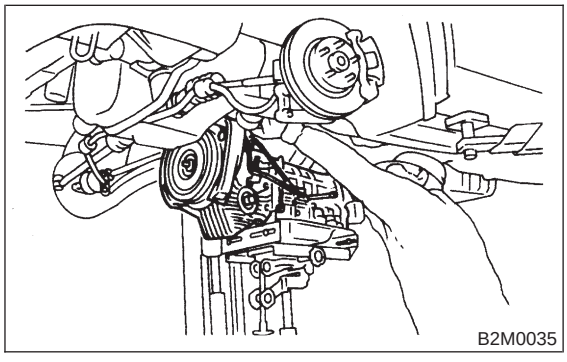

G2M0831

● AT vehicles


S2M0221

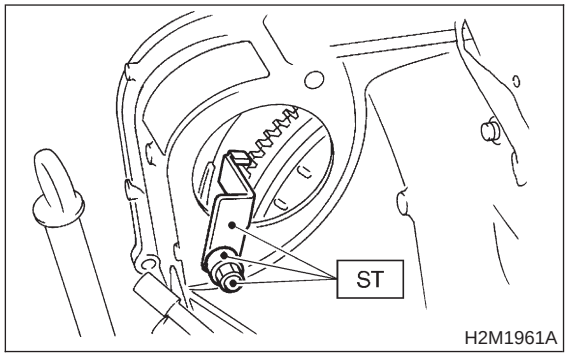
25) Remove transmission.

CAUTION:
● Move transmission jack toward rear until mainshaft is withdrawn from clutch cover. (MT vehicles)
● Move transmission and torque converter as a unit away from engine. (AT vehicles)

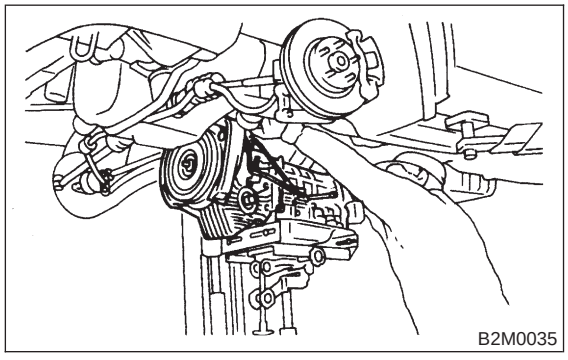

B2M0035

C: INSTALLATION

1) Install ST to torque converter clutch case. (AT vehicles)
ST 498277200 STOPPER SET



2) Install transmission to engine.
(1) Gradually raise transmission with transmission jack.



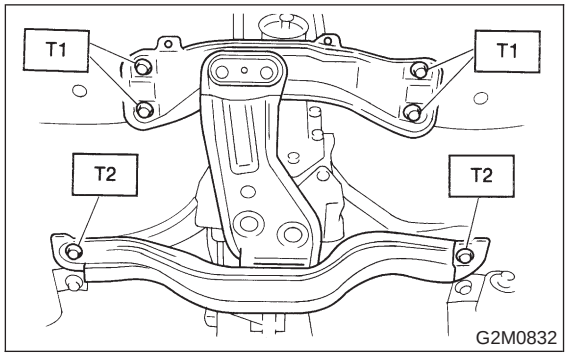
(2) Engage them at splines.

CAUTION:
Be careful not to strike mainshaft against clutch cover. (MT vehicles)

3) Install transmission rear crossmember.

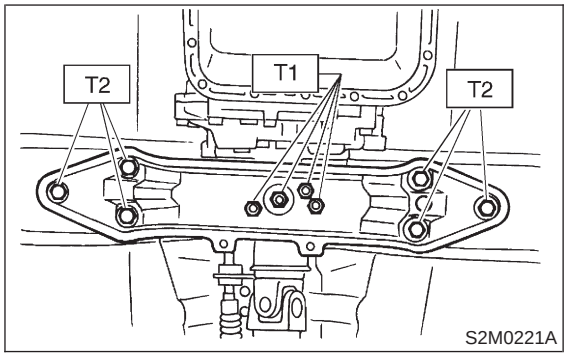
- **MT vehicles**

Tightening torque:
T1: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)
T2: 137±20 N·m (14±2 kg-m, 101±14 ft-lb)



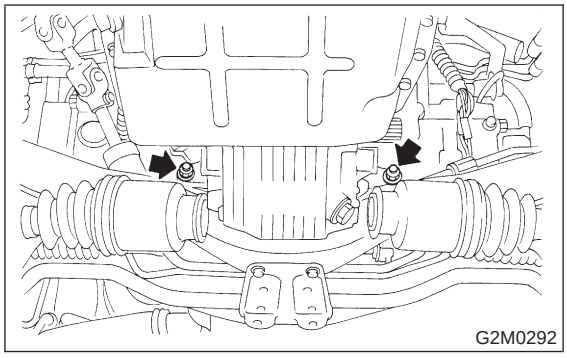
- **AT vehicles**

Tightening torque:
T1: 37±10 N·m (3.8±1.0 kg-m, 27±7 ft-lb)
T2: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)



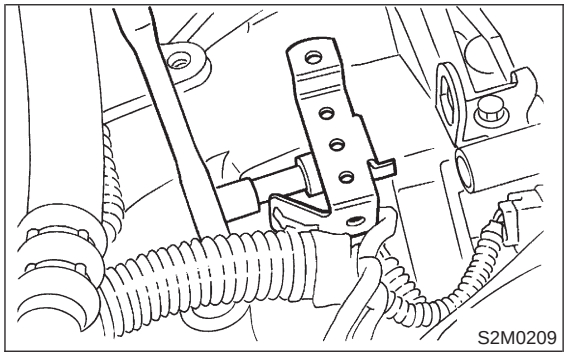
4) Take off transmission jack.
5) Tighten nuts which hold lower side of transmission to engine.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)



6) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:
50±4 N·m (5.1±0.4 kg-m, 36.9±2.9 ft-lb)

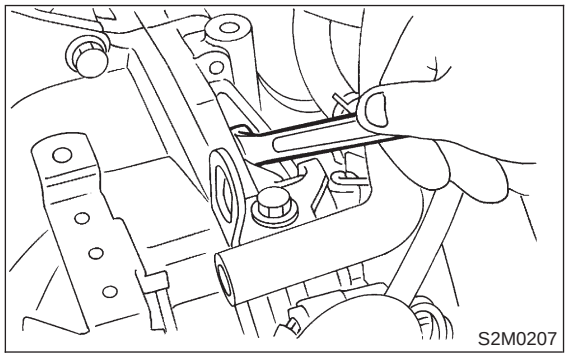


7) Install torque converter to drive plate. (AT vehicles)
(1) Tighten bolts which hold torque converter to drive plate.
(2) Tighten other bolts while rotating the engine by using ST.

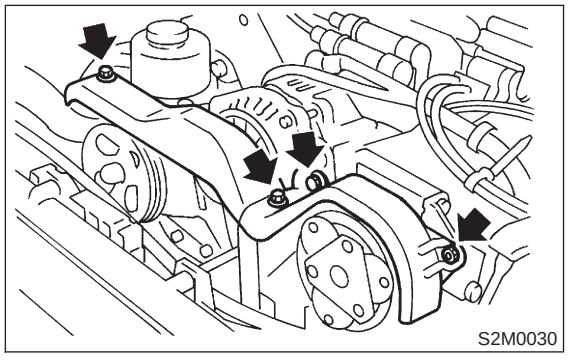
ST 499977000 CRANK PULLEY WRENCH

CAUTION:
Be careful not to drop bolts into torque converter housing.

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

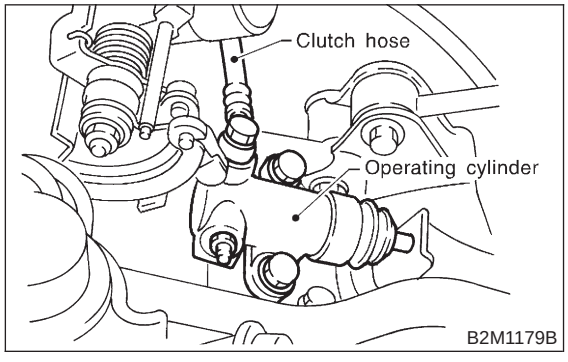

S2M0207

(3) Clog plug onto service hole.
(4) Install V-belt covers.


S2M0030

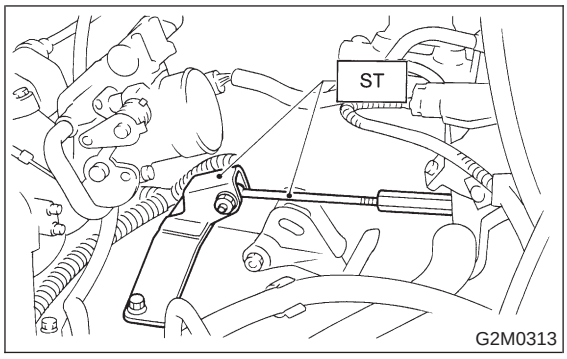
8) Install operating cylinder. (2500 cc MT vehicle)

Tightening torque:
37±3 N·m (3.8±0.3 kg-m, 27.5±2.2 ft-lb)



B2M1179B

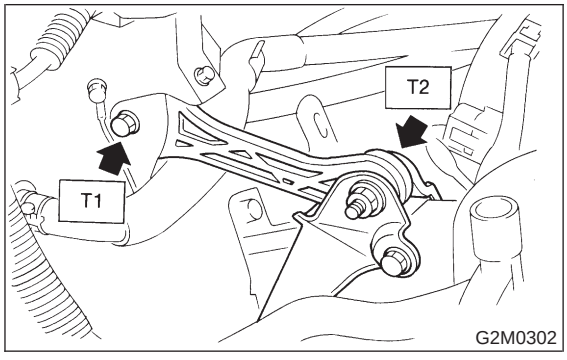
9) Remove special tools.



G2M0313

10) Install pitching stopper.

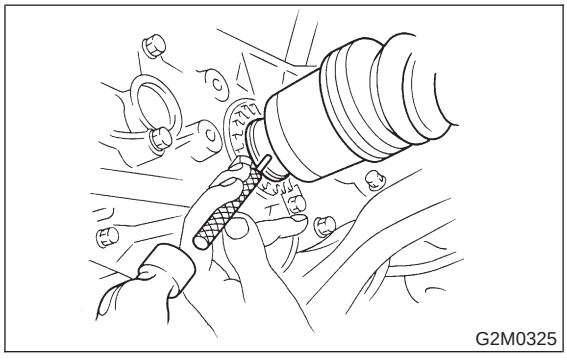
Tightening torque:
T1: 57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)
T2: 49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)



G2M0302

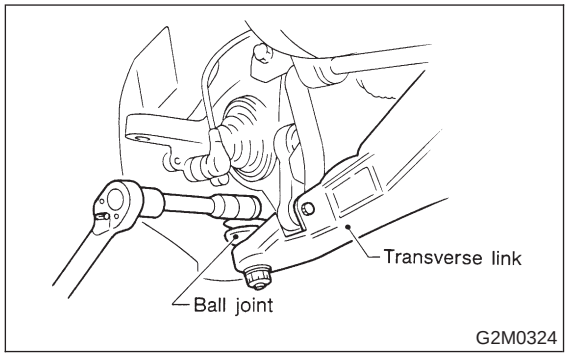
11) Install front drive shafts into transmission.
(1) Lift-up the vehicle.
(2) Install front drive shaft into transmission.
(3) Drive spring pin into chamfered hole of drive shaft.

CAUTION:
Always use a new spring pin.


G2M0325

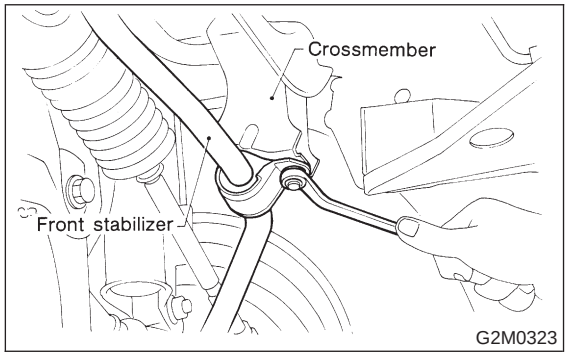
(4) Install ball joints of lower arm into knuckle arm of housing, and tighten installing bolts.

Tightening torque:
49±10 N·m (5.0±1.0 kg-m, 36±7 ft-lb)

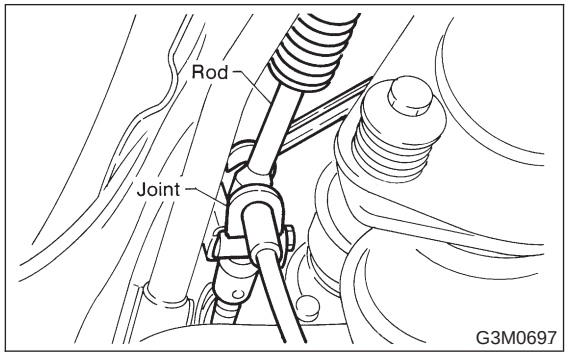


12) Install stabilizer clamps onto front crossmember.

Tightening torque:
25±4 N·m (2.5±0.4 kg-m, 18.1±2.9 ft-lb)



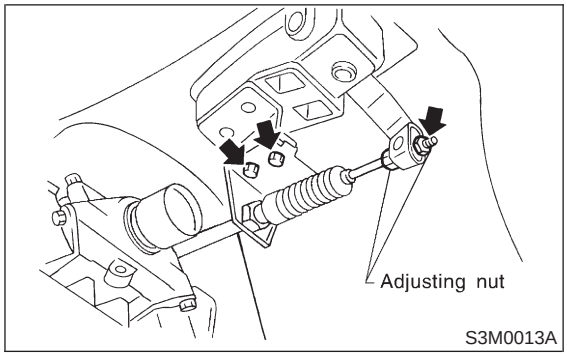
13) Install gear shift rod and stay. (MT vehicles)
(1) Install gear shift rod onto transmission.



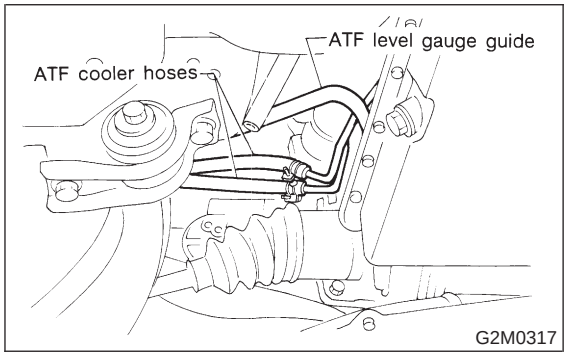
(2) Install stay onto transmission.
(3) Install spring.

14) Install shift selector cable onto selector lever. (AT vehicles)
(1) Install selector cable into selector lever.
(2) Install cable bracket onto body.

NOTE:
Tighten selector cable adjusting and lock nut after checking selector lever operation.

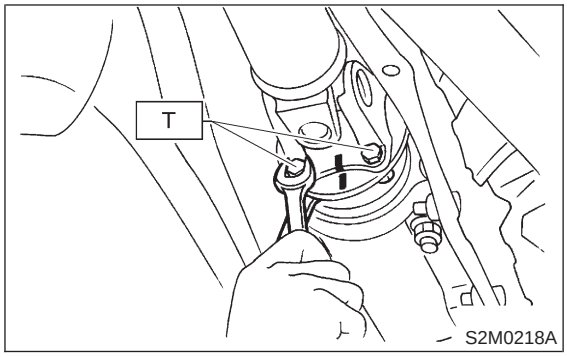


15) Install ATF level gauge guide, and ATF cooler hoses onto pipe. (AT vehicles)



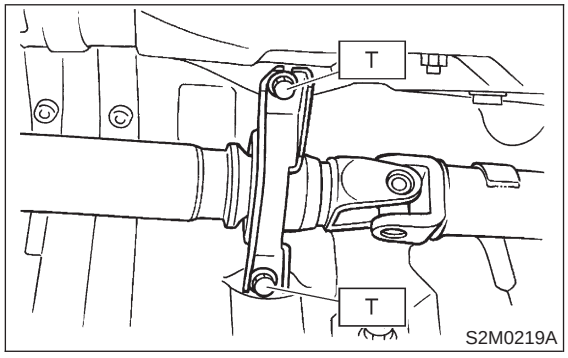
16) Install propeller shaft.
(1) Install propeller shaft into transmission.
(2) Tighten bolts which install propeller shaft onto companion flange of rear differential.

Tightening torque:
T: 31±8 N·m (3.2±0.8 kg-m, 23.1±5.8 ft-lb)

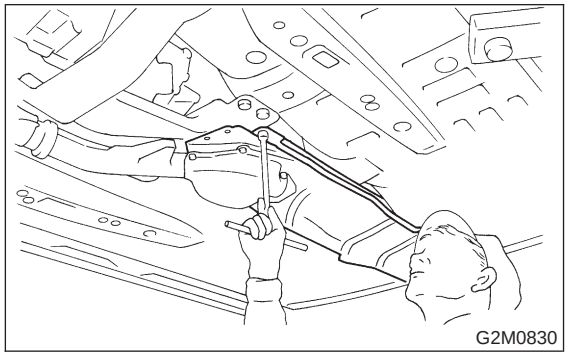


(3) Install center bearing bracket on body.

Tightening torque:
T: 52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)

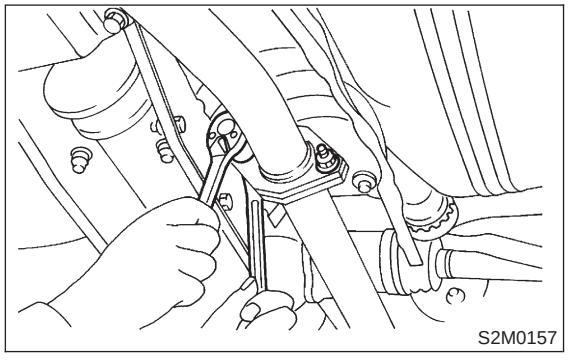


17) Install exhaust system.
(1) Install heat shield cover.

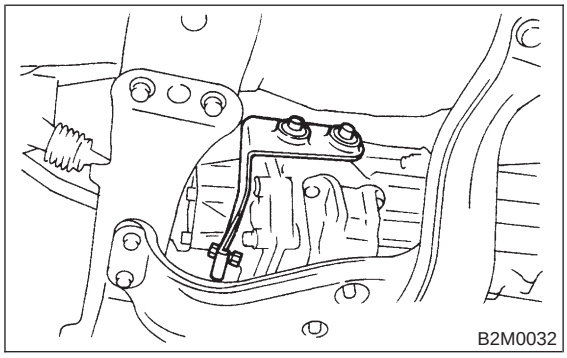


(2) Install rear exhaust pipe to muffler.

Tightening torque:
48±9 N·m (4.9±0.9 kg-m, 35.4±6.5 ft-lb)

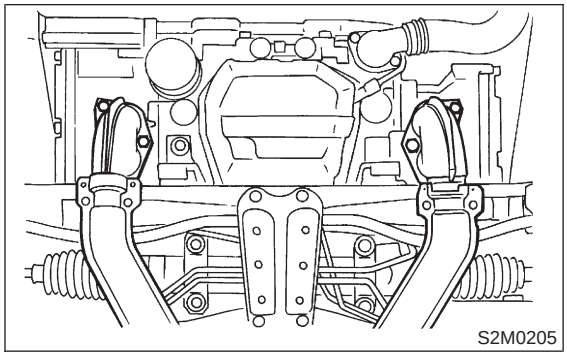


(3) Install hanger bracket on right side of transmission.



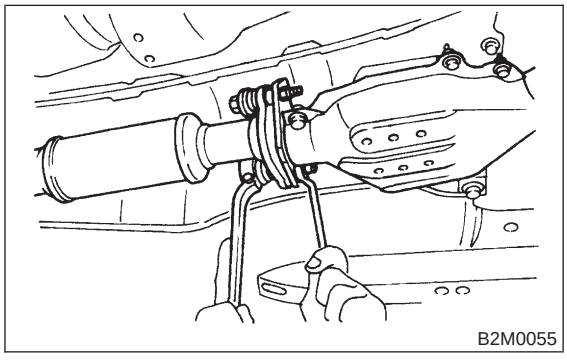
(4) Install front exhaust pipe onto engine.

Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)



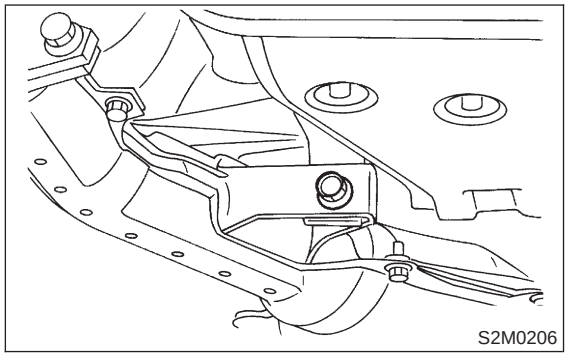
(5) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

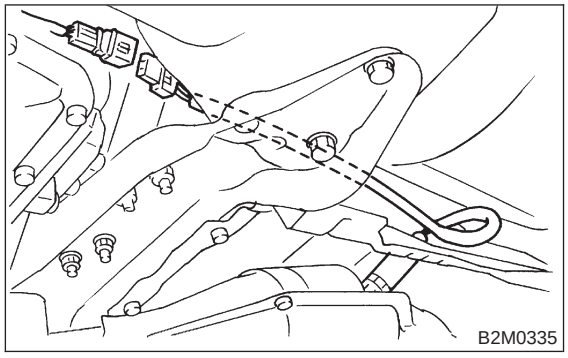


(6) Tighten bolt which installs center exhaust pipe to hanger bracket.

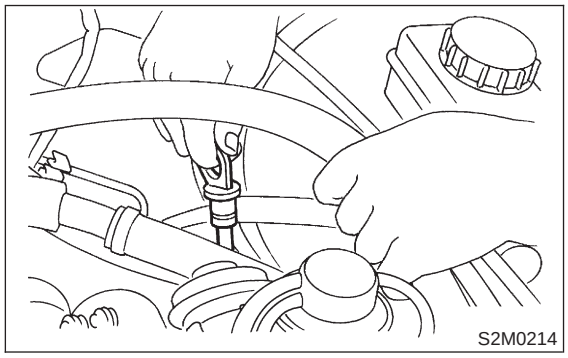
Tightening torque:
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)


S2M0206

(7) Connect connector to rear oxygen sensor. (Except California spec. vehicle)


B2M0335

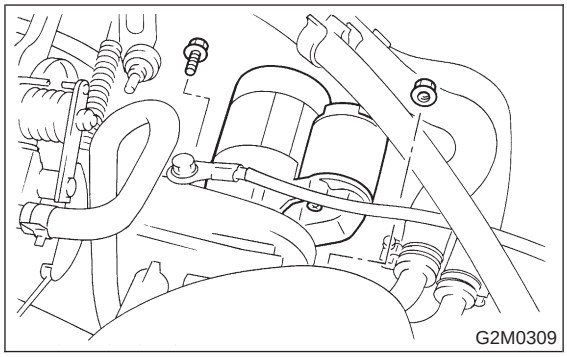
18) Install ATF level gauge. (AT vehicles)


S2M0214

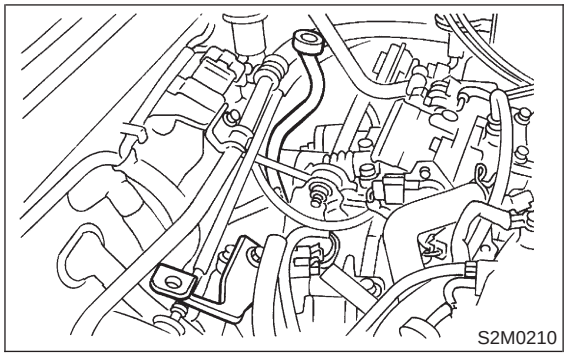
19) Connect the following connectors.
(1) Transmission harness connectors
(2) Transmission ground terminal
(3) Front oxygen sensor connector
(4) Rear oxygen sensor connector (California spec. vehicle)
(5) Vehicle speed sensor 2 connector
(6) Neutral position switch connector (MT vehicles)
(7) Back-up light switch connector (MT vehicles)

20) Install starter.
(1) Install starter onto transmission case, and connect connectors and terminals.
(2) Tighten bolt and nut which install starter onto transmission.

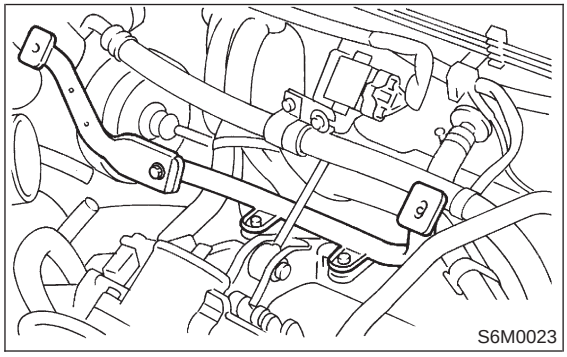
Tightening torque:
40±4 N·m (4.1±0.4 kg-m, 29.7±2.9 ft-lb)


G2M0309

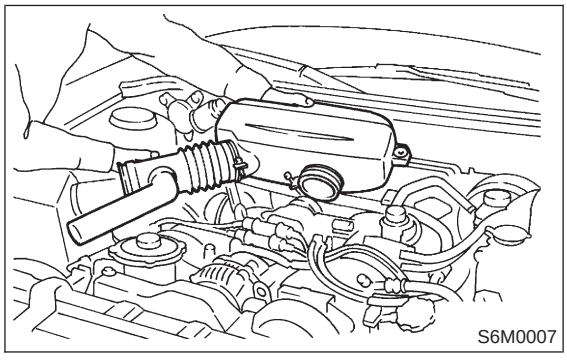
21) Install chamber stay.
- MT vehicles


S2M0210

- AT vehicles


S6M0023

22) Install air intake duct and chamber.


S6M0007

23) Connect battery ground cable.

24) Fill ATF and differential gear oil. (AT vehicles) <Ref. to 3-2 [S1A0].>
25) Check selector lever operation. (AT vehicles) <Ref. to 3-2 [T2C0].>
26) Take off vehicle from lift arms.
27) Check the vehicle on road tester. (AT vehicles) <Ref. to 3-2 [W7A0].>

SUSPENSION 4-1

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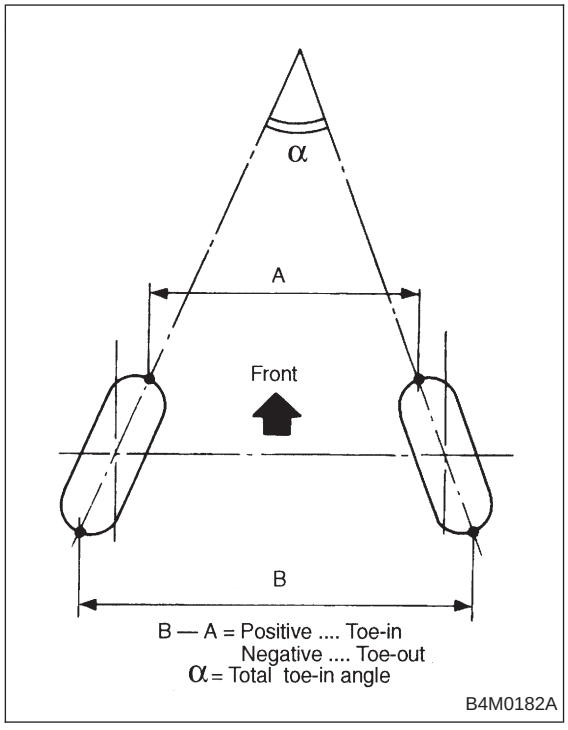
1. Stabilizer

Model		Bar dia. mm (in)	
		Front	Rear
COUPE	AWD	19 (0.75)	13 (0.51)
SEDAN	AWD	19 (0.75)	13 (0.51)
WAGON	AWD	19 (0.75)	13 (0.51)
OUTBACK	AWD	19 (0.75)	13 (0.51)

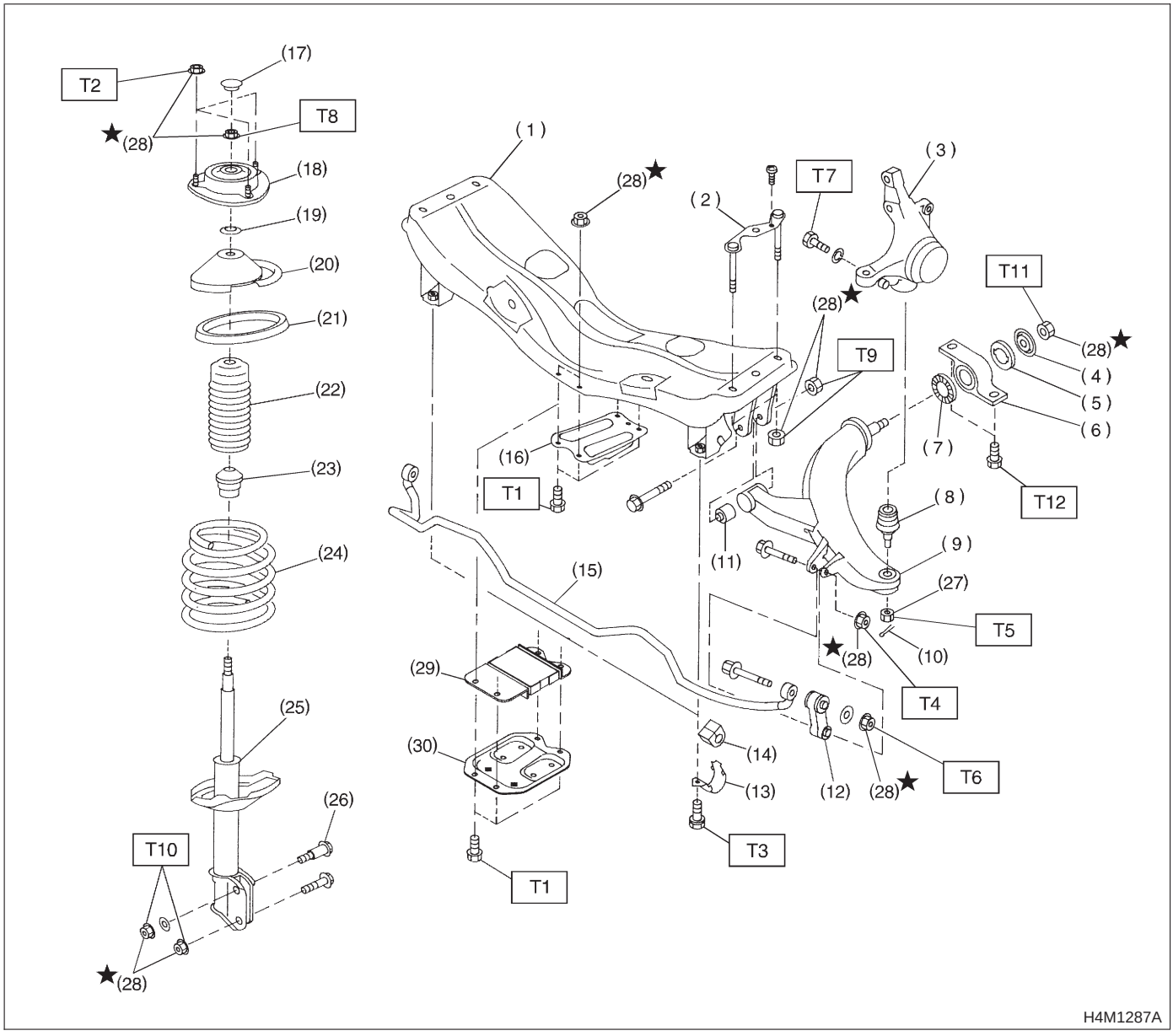
2. Wheel Alignment

			2200 cc			2500 cc
			Sedan, Coupe	Wagon	OUTBACK	Coupe
			AWD	AWD	AWD	AWD
Front	Camber (tolerance: ±0°30′)		0°	0°	0°	−0°25′
	Caster (common difference: ±1°)		3°	3°	3°	3°05′
	Toe-in	mm (in)	0±3 (0±0.12) Toe-in angle: −0°09′ [when toe-in is −3 (−0.12)] Toe-out angle: 0°09′ [when toe-out is 3 (0.12)]			
	Kingpin angle		14°	14°	14°	14°
	Wheel arch height [tolerance: $^{+12}/_{-24}$ mm ($^{+0.47}/_{-0.94}$ in)]	mm (in)	391 (15.39)	391 (15.39)	394 (15.51)	371 (14.61)
Rear	Camber (tolerance: ±0°45′)		−0°55′	−0°55′	−0°55′	−1°10′
	Toe-in	mm (in)	0±3 (0±0.12) Total toe angle: 0°±18′			
	Wheel arch height [tolerance: ±10 mm (±0.39 in)]	mm (in)	379 (14.92)	379 (14.92)	386 (15.20)	363 (14.29)
	Thrust angle (tolerance: 0°±20′)		0°	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.



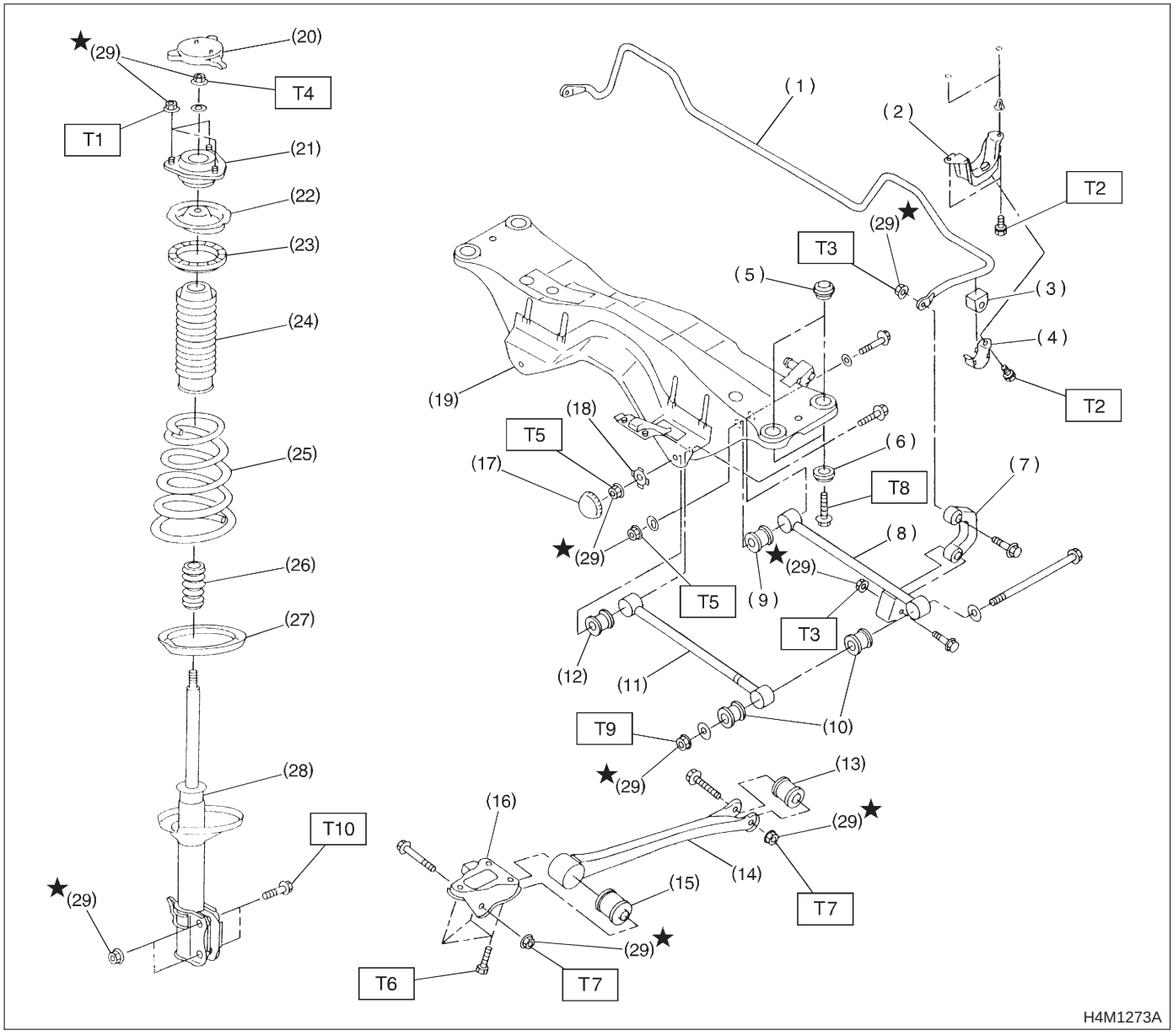
1. Front Suspension



(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 (Except 2500 cc MT model)
(17) Dust seal
(18) Strut mount
(19) Spacer
(20) Upper spring seat
(21) Rubber seat
(22) Dust cover
(23) Helper
(24) Coil spring
(25) Damper strut
(26) Adjusting bolt
(27) Castle nut
(28) Self-locking nut
(29) Dynamic damper (2500 cc MT model)
(30) Jack-up plate (2500 cc MT model)

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 20±6 (2.0±0.6, 14.5±4.3)
T3: 25±4 (2.5±0.4, 18.1±2.9)
T4: 29±5 (3.0±0.5, 21.7±3.6)
T5: 39 (4, 29)
T6: 44±6 (4.5±0.6, 32.5±4.3)
T7: 49±10 (5.0±1.0, 36±7)
T8: 54±5 (5.5±0.5, 39.8±3.6)
T9: 98±15 (10.0±1.5, 72±11)
T10: 152±20 (15.5±2.0, 112±14)
T11: 186±10 (19.0±1.0, 137±7)
T12: 245±49 (25.0±5.0, 181±36)

2. Rear Suspension



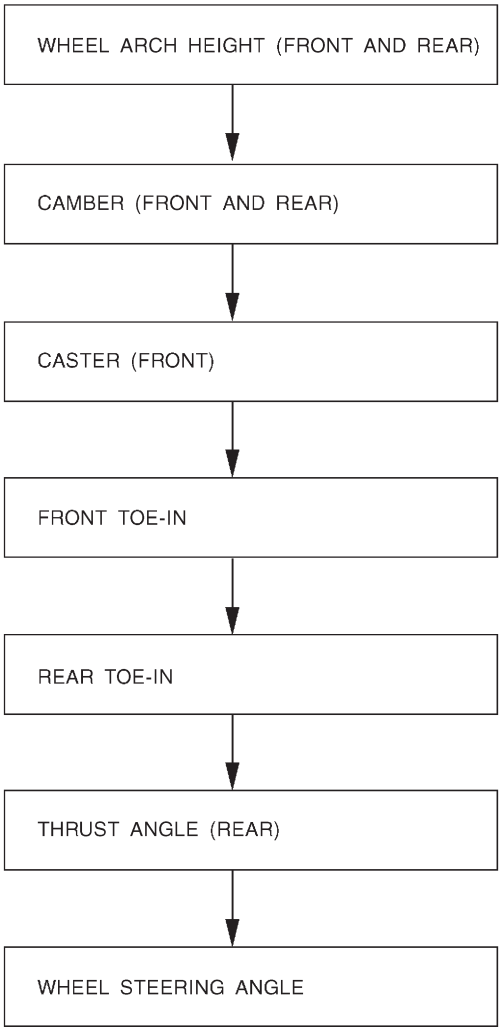
(1) Stabilizer
(2) Stabilizer bracket
(3) Stabilizer bushing
(4) Clamp
(5) Floating bushing
(6) Stopper
(7) Stabilizer link
(8) Rear lateral link
(9) Bushing (C)
(10) Bushing (A)
(11) Front lateral link
(12) Bushing (B)
(13) Trailing link rear bushing
(14) Trailing link
(15) Trailing link front bushing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

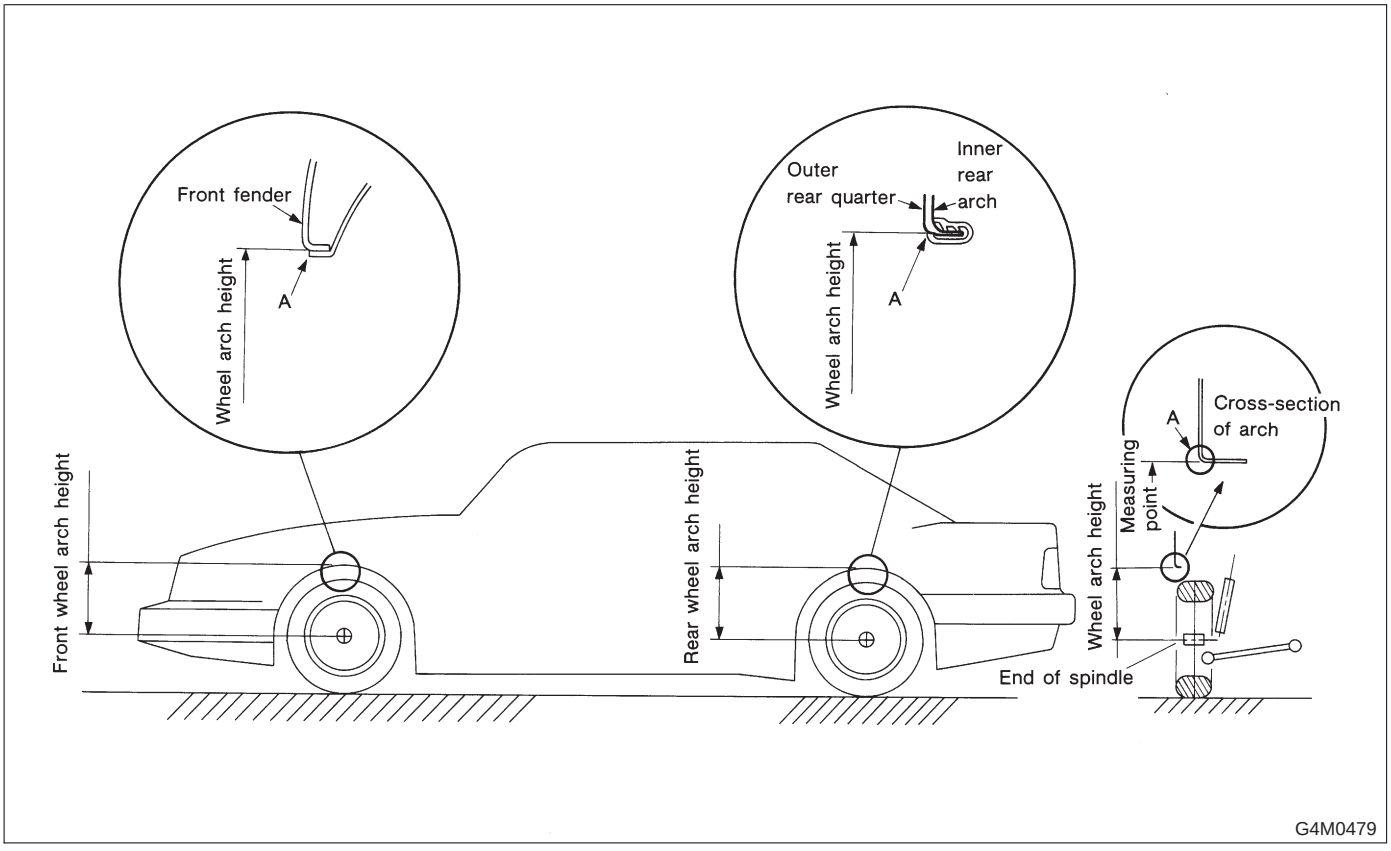


B4M1088A

B: INSPECTION AND ADJUSTMENT

1. WHEEL ARCH HEIGHT (FRONT AND REAR)

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



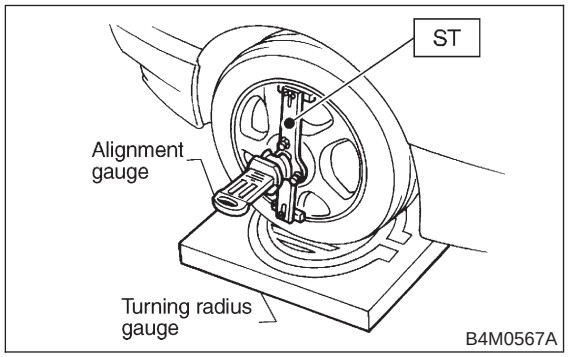
Vehicles			Specified wheel arch height mm (in)	
			Front	Rear
2200 cc	Coupe, Sedan	AWD	$391^{+12}/_{-24}(15.39^{+0.47}/_{-0.94})$	$379^{+12}/_{-24}(14.92^{+0.47}/_{-0.94})$
	Wagon	AWD	$391^{+12}/_{-24}(15.39^{+0.47}/_{-0.94})$	$379^{+12}/_{-24}(14.92^{+0.47}/_{-0.94})$
	OUTBACK	AWD	$394^{+12}/_{-24}(15.51^{+0.47}/_{-0.94})$	$386^{+12}/_{-24}(15.20^{+0.47}/_{-0.94})$
2500 cc	Coupe	AWD	$371^{+12}/_{-24}(14.61^{+0.47}/_{-0.94})$	$363^{+12}/_{-24}(14.29^{+0.47}/_{-0.94})$

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 [S200].>

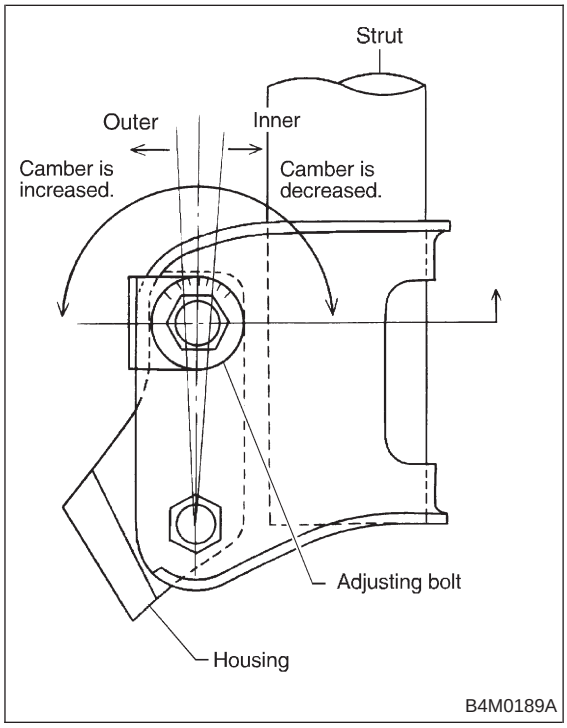
● Front camber adjustment

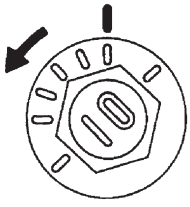
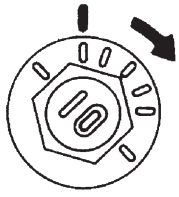
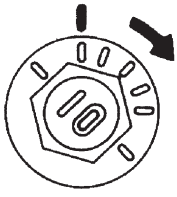
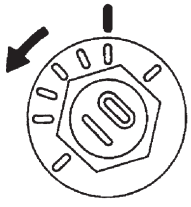
1) Loosen two self-locking nuts located at lower front portion of strut.

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

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

NOTE:
Moving the adjusting bolt by one scale graduation changes camber by approximately 0°10′.



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

3) Tighten the two self-locking nuts.

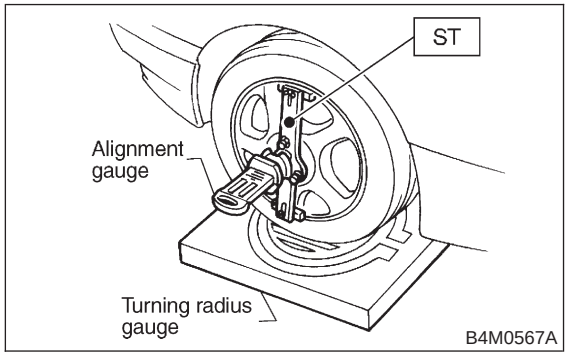
Tightening torque:
152±20 N·m (15.5±2.0 kg-m, 112±14 ft-lb)

3. CASTER (FRONT)

● Inspection

1) Place front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.
2) Set ST into the center of the wheel, and then install the wheel alignment gauge.
ST 927380000 ADAPTER

NOTE:
Refer to the “SPECIFICATIONS AND SERVICE DATA” for the caster value. <Ref. to 4-1 [S200].>



4. FRONT WHEEL TOE-IN

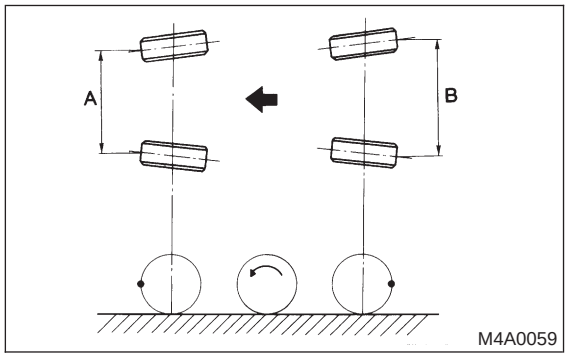
● Inspection

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

Toe-in: 0±3 mm (0±0.12 in)

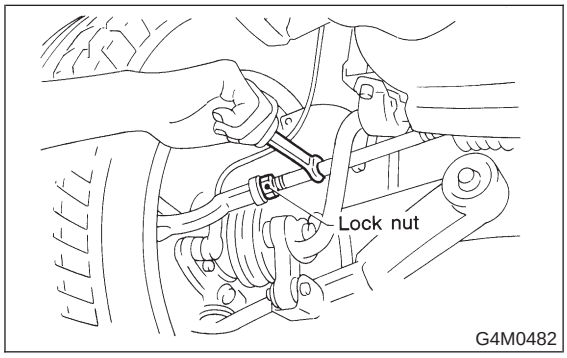
2) Mark rear sides of left and right tires at height corresponding to center of spindles and measure distance “B” between marks.
3) Move vehicle forward so that marks line up with front sides at height corresponding to center of spindles.
4) Measure distance “A” between left and right marks. Toe-in can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

B − A = Toe-in



● Adjustment

1) Loosen 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±5 N·m (8.5±0.5 kg-m, 61.5±3.6 ft-lb)

CAUTION:
Correct tie-rod boot, if it is twisted.

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

5. REAR WHEEL TOE-IN

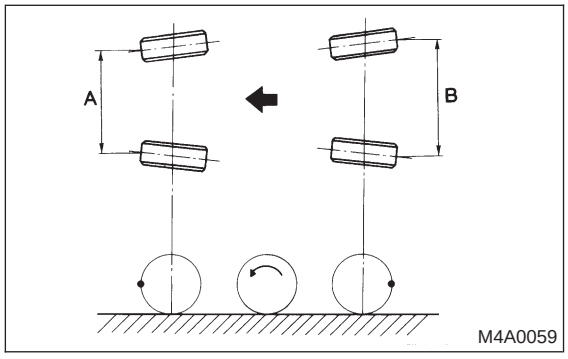
● Inspection

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

Toe-in: 0±3 mm (0±0.12 in)

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

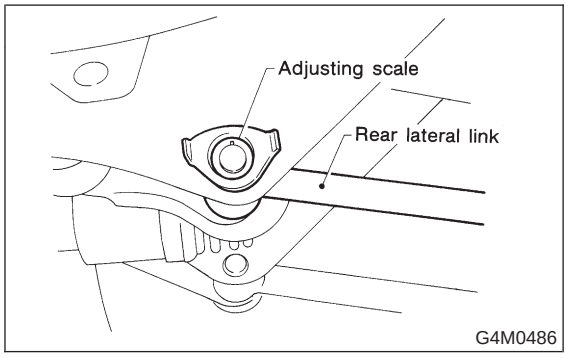
B − A = Toe-in



● Adjustment

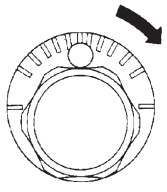
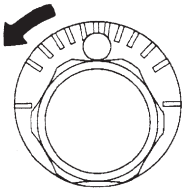
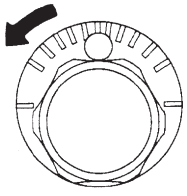
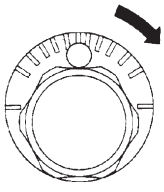
1) Loosen self-locking nut on inner side of rear lateral link.

CAUTION:
● When loosening or tightening adjusting bolt, hold bolt head and turn self-locking nut.
● Discard loosened self-locking nut and replace with a new one.



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

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

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

3) Tighten self-locking nut.

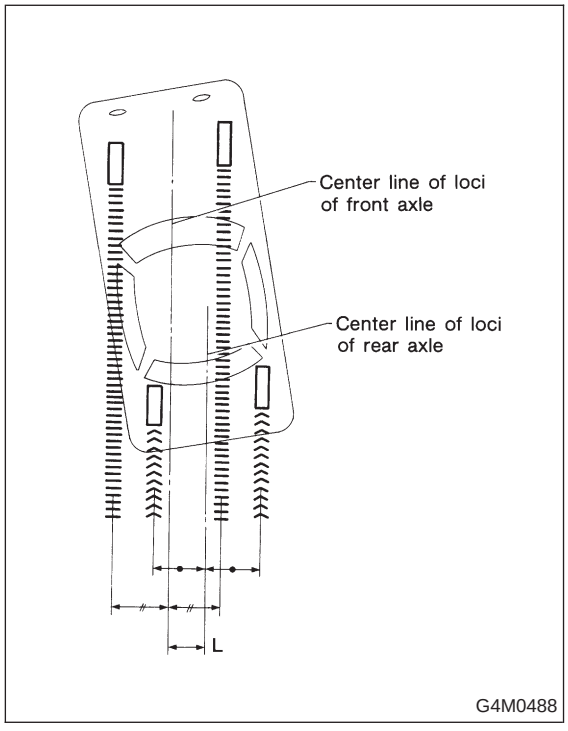
Tightening torque:
98±15 N·m (10±1.5 kg-m, 72±11 ft-lb)

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

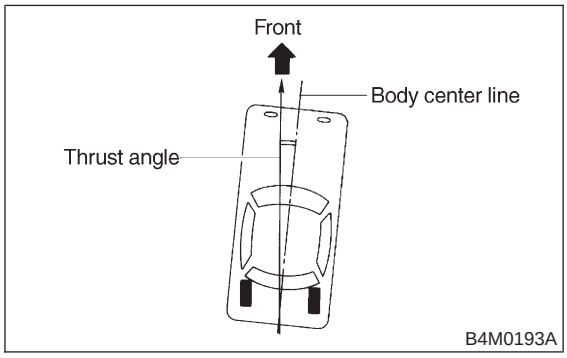
1) Make thrust angle adjustments by turning toe-in adjusting bolts of rear suspension equally in the same direction.

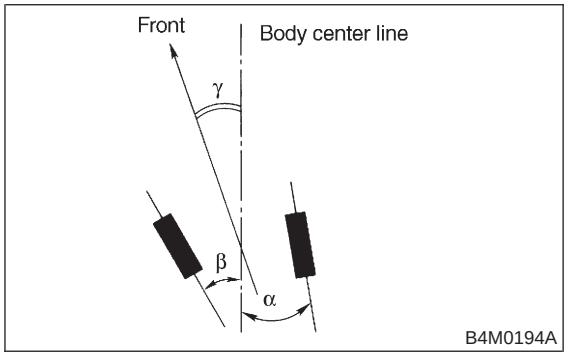
NOTE:
On FWD models, turn adjusting wheels one by one, by the some amount in the opposite direction of the adjusting bolts.

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 = (α − β) / 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

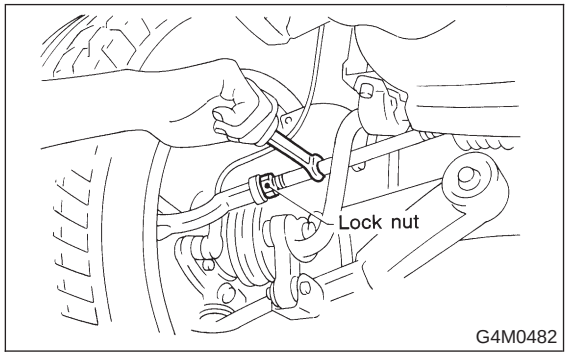
1) Place vehicle on a turning radius gauge.
2) While depressing brake pedal, turn steering wheel fully to the left and right. With steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

Steering angle:
Inner wheel 37.4°±1.5°
Outer wheel 32.5°±1.5°

● **Adjustment**

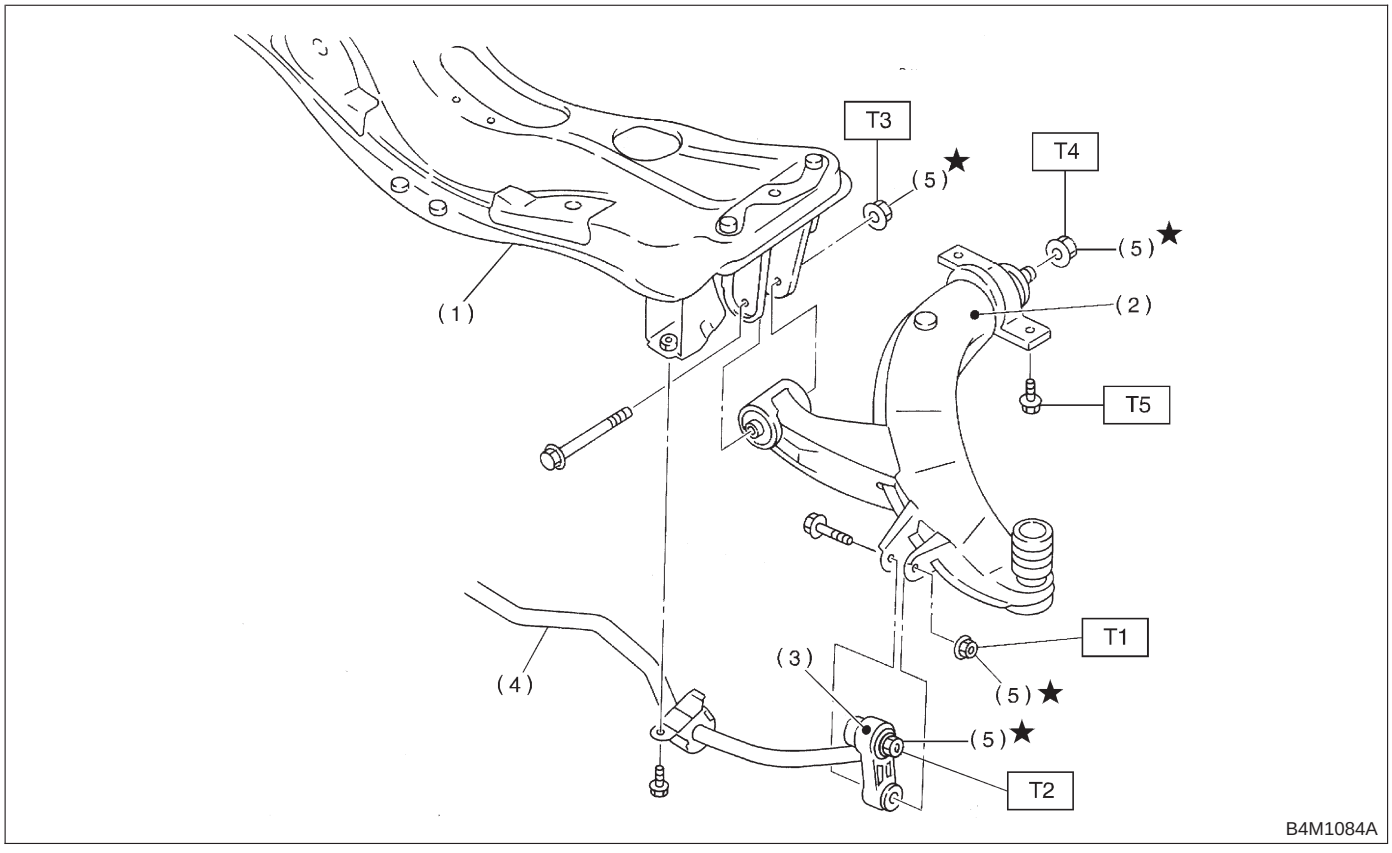
Turn tie-rod to adjust steering angle of both inner and outer wheels.

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



2. Front Transverse Link

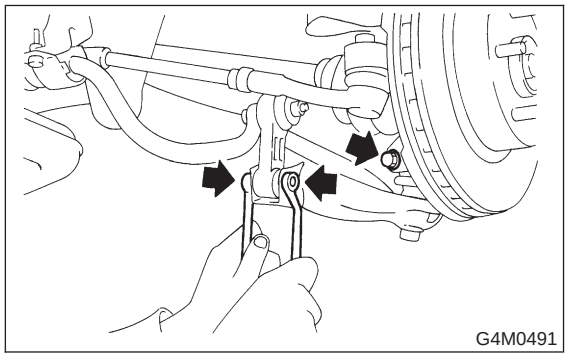
A: REMOVAL



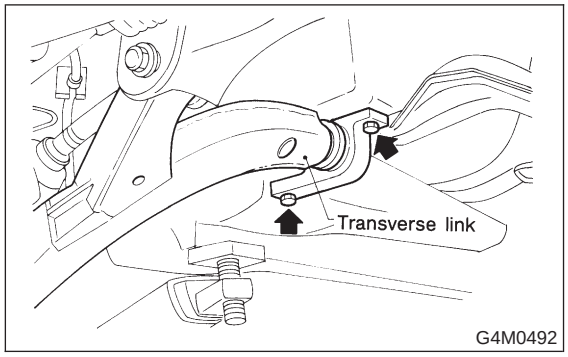
(1) Front crossmember
(2) Transverse link
(3) Stabilizer link
(4) Front stabilizer
(5) Self-locking nut

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.

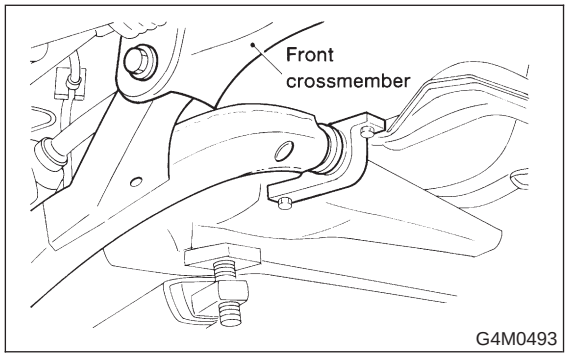

G4M0491

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.



G4M0492

5) Extract ball joint from housing.
6) Remove bolts securing transverse link to crossmember and extract transverse link from crossmember.

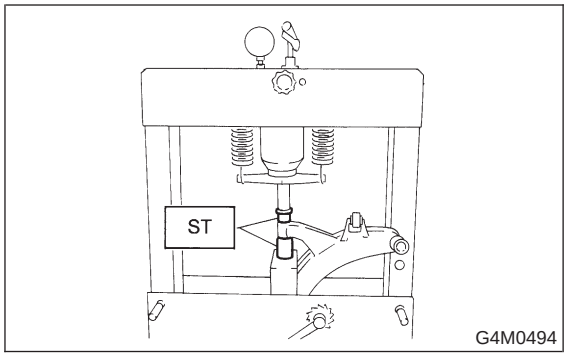


G4M0493

B: DISASSEMBLY

1. FRONT BUSHING

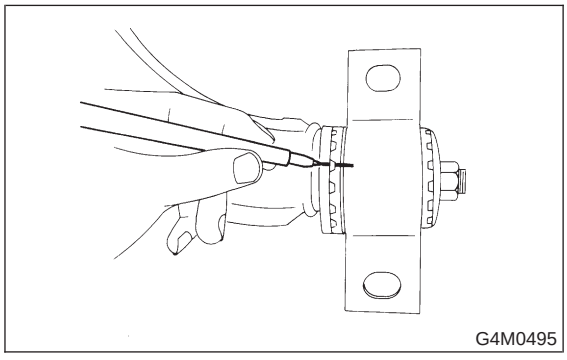
Using ST, press front bushing out of place.
ST 927680000 INSTALLER & REMOVER SET



G4M0494

2. REAR BUSHING

1) Scribe an aligning mark on transverse link and rear bushing.


G4M0495

2) Loosen nut and remove rear bushing.

C: INSPECTION

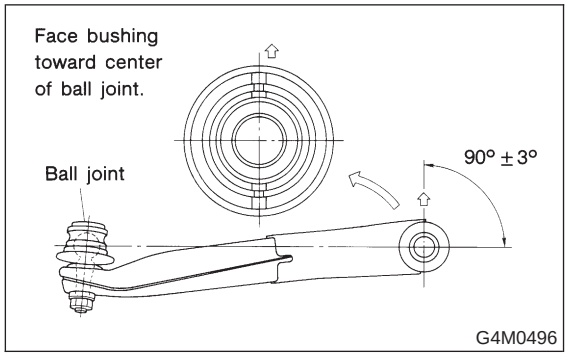
1) Check transverse link for wear, damage and cracks, and correct or replace if defective.
2) Check bushings for cracks, fatigue or damage.
3) Check rear bushing for oil leaks.

D: ASSEMBLY

1. FRONT BUSHING

To reassemble, reverse disassembly procedures.

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



2. REAR BUSHING

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

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

Tightening torque:
196±25 N·m (20.0±2.5 kg-m, 145±18 ft-lb)

E: INSTALLATION

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

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

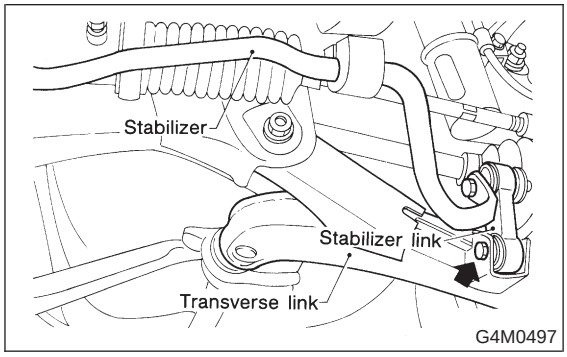
2) Install bolts used to connect transverse link to crossmember and temporarily tighten with nuts.

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 afterward when wheels are in full contact with the ground and vehicle is curb weight.
(1) Transverse link and stabilizer

Tightening torque:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)

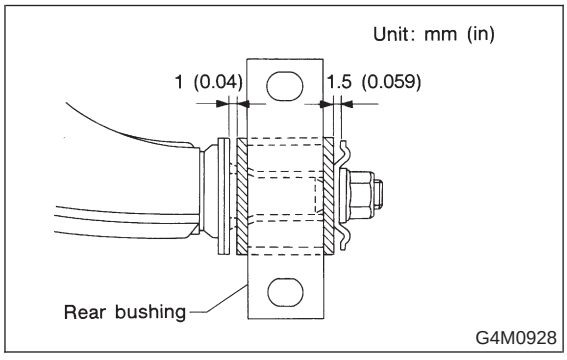
(2) Transverse link and crossmember

Tightening torque:
98±15 N·m (10.0±1.5 kg-m, 72±11 ft-lb)

(3) Transverse link rear bushing and body

Tightening torque:
245±49 N·m (25±5 kg-m, 181±36 ft-lb)

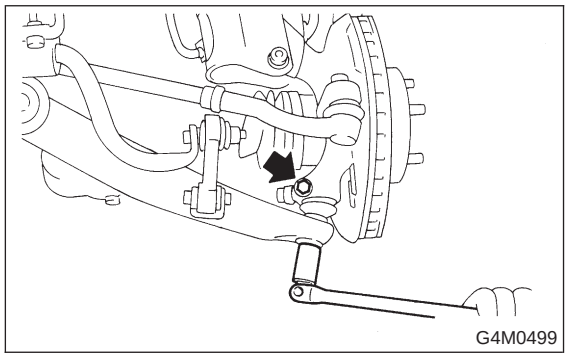
NOTE:
● Move rear bushing back and forth until transverse link- to-rear bushing clearance is established (as indicated in figure.) before tightening.
● Check wheel alignment and adjust if necessary.



3. Front Ball Joint

A: REMOVAL

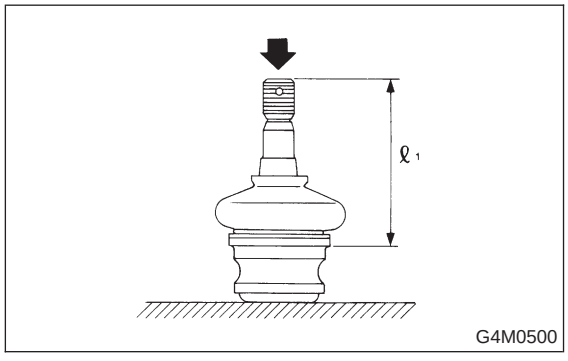
1) Remove the wheels.
2) Pull out the cotter pin from the ball stud, remove the castle nut, and extract the ball stud from the transverse link.
3) Remove the bolt securing the ball joint to the housing.



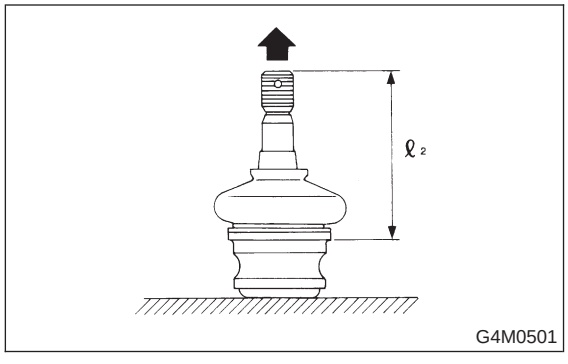
4) Extract the ball joint from the housing.

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.
$S = \ell_2 - \ell_1$
(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.

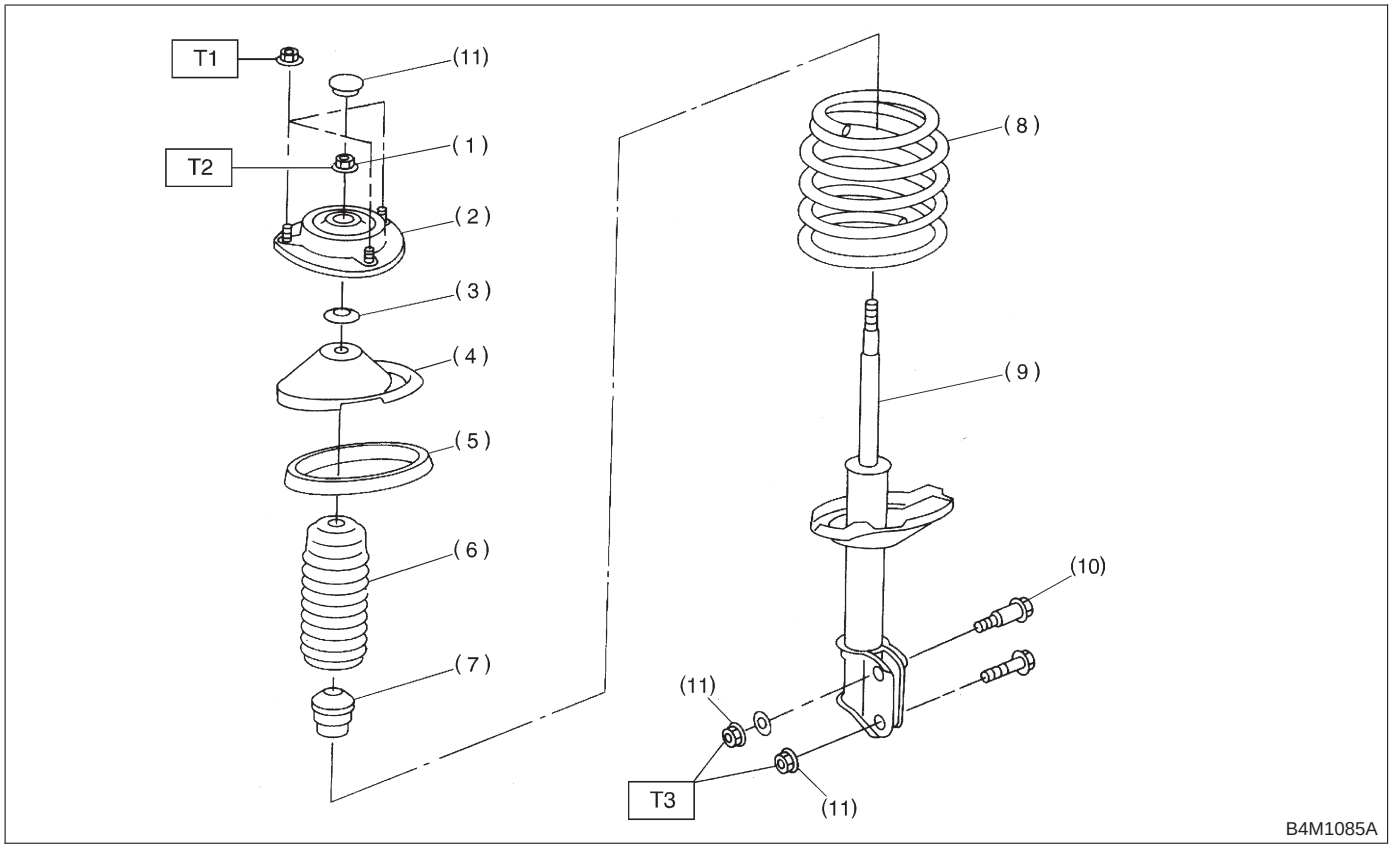
2) Connect ball joint to transverse link.

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

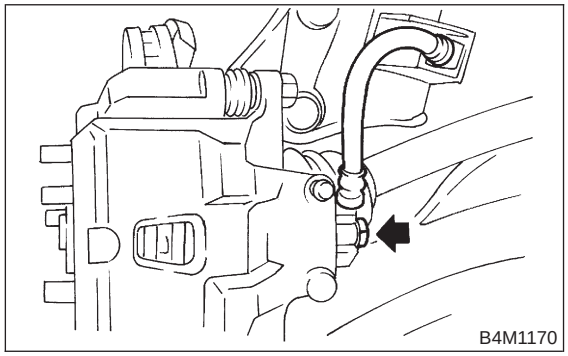


(1) Dust seal
(2) Strut mount
(3) Spacer
(4) Upper spring seat
(5) Rubber seat
(6) Dust cover
(7) Helper
(8) Coil spring
(9) Damper strut
(10) Adjusting bolt
(11) Self-locking nut

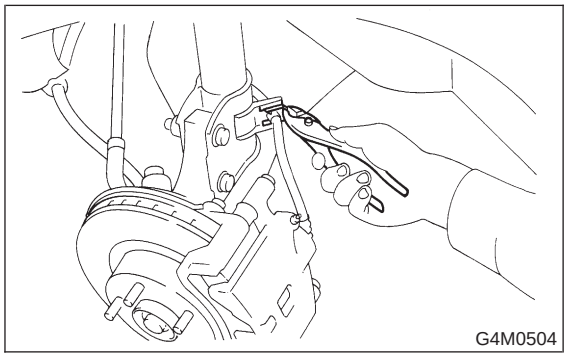
Tightening torque: N·m (kg-m, ft-lb)
T1: 20±6 (2.0±0.6, 14.5±4.3)
T2: 49^{+10}_{-0} ($5.0^{+1.0}_{-0}$, 36^{+7}_{-0})
T3: 152±20 (15.5±2.0, 112±14)

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.

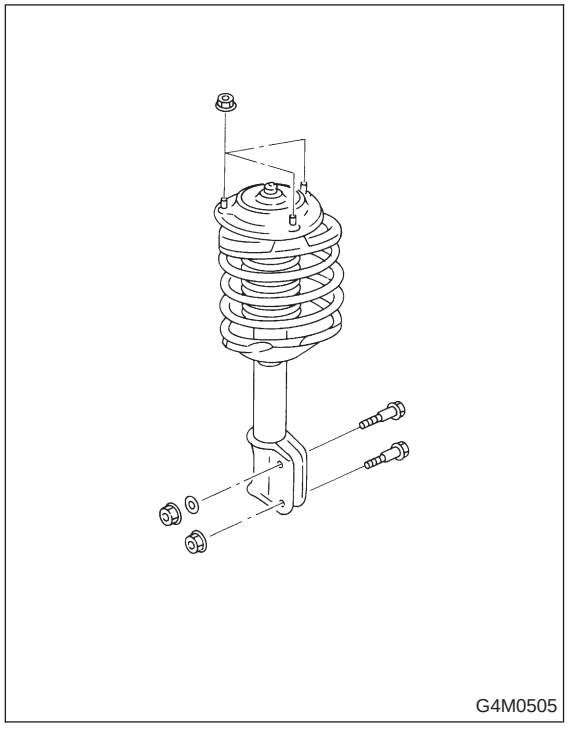


5) Scribe an alignment mark on the camber adjusting bolt which secures strut to housing.
6) Remove bolt securing the ABS sensor harness on models equipped with ABS.

7) Remove two bolts securing housing to strut.

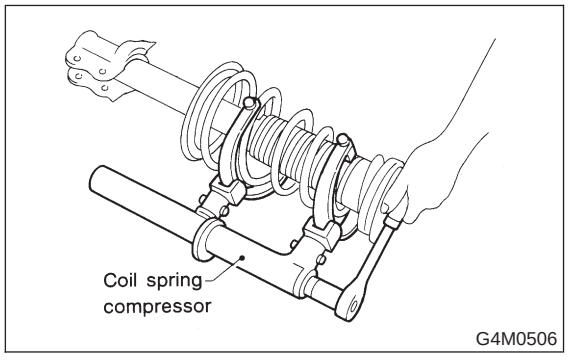
CAUTION:
While holding head of adjusting bolt, loosen self-locking nut.

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


G4M0505

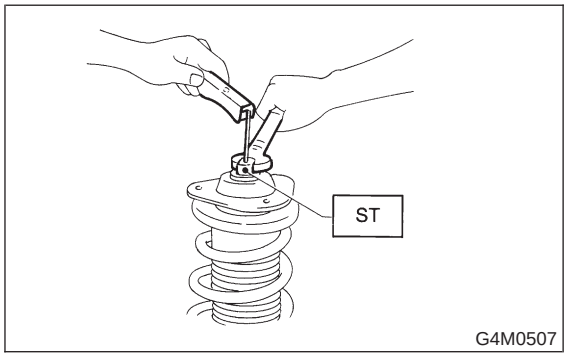
B: DISASSEMBLY

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



G4M0506

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



G4M0507

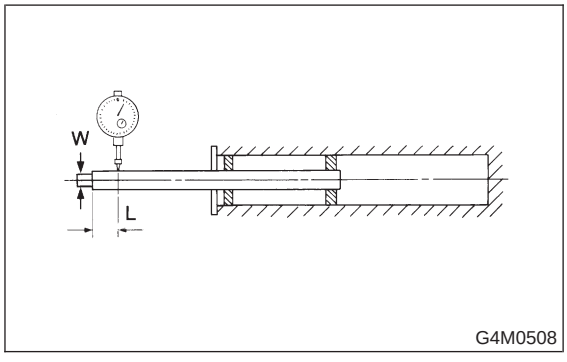
3) Remove strut mount, upper spring seat and rubber seat from strut.
4) Gradually decreasing compression force, and remove coil spring.
5) Remove dust cover and helper spring.

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.



G4M0508

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.

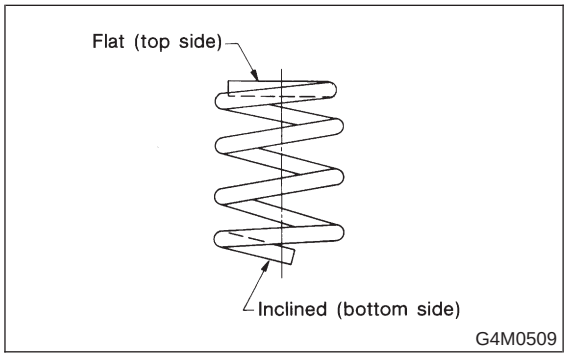
D: ASSEMBLY

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 the former four steps, 3 or 4 times.

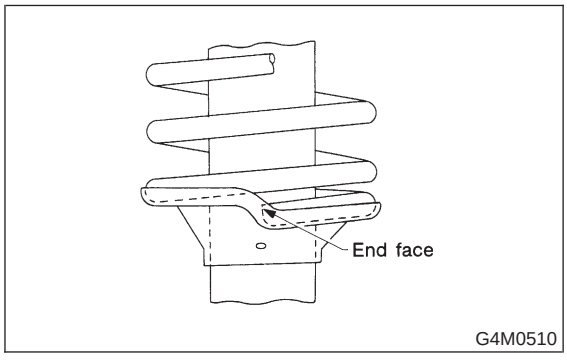
NOTE:
After completely purging air from the strut, be sure to place the strut with the piston rod facing up. If it is laid down, check for entry of air in the strut as outlined under “Cheking for the presence of air”.

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

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

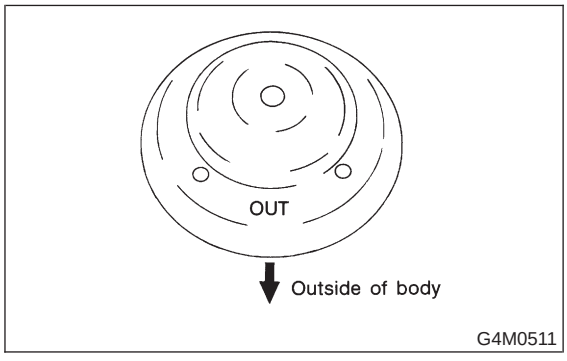


5) Set the coil spring correctly so that its end face fits well into the spring seat as shown.
6) Install helper and dust cover to the piston rod.



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

NOTE:
Ensure that upper spring seat is positioned with “OUT” mark facing outward.



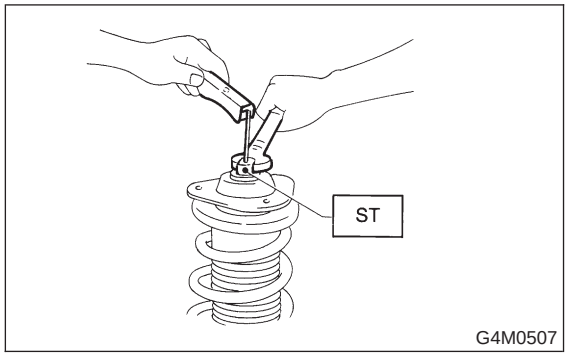
8) Install strut mount to the piston rod, and tighten the self-locking nut temporarily.

CAUTION:
Be sure to use a new self-locking nut.

9) 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



10) Loosen the coil spring carefully.

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.

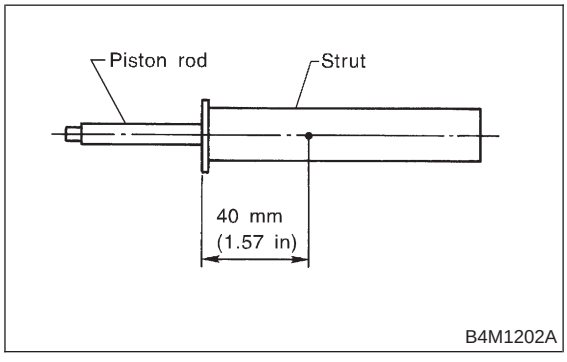
NOTE:
Check wheel alignment and adjust if necessary.

F: DISPOSAL PROCEDURES FOR GAS FILLED STRUT

CAUTION:
● On struts which have "GAS FILLED" marked on outer housing under spring seat, completely discharge gas before disposing, following the methods below.
● Do not disassemble strut damper or place into a fire.
● Drill holes before disposing of gas filled struts.
● Before handling gas filled struts, be sure to wear goggles to protect eyes from gas, oil and/or filings.

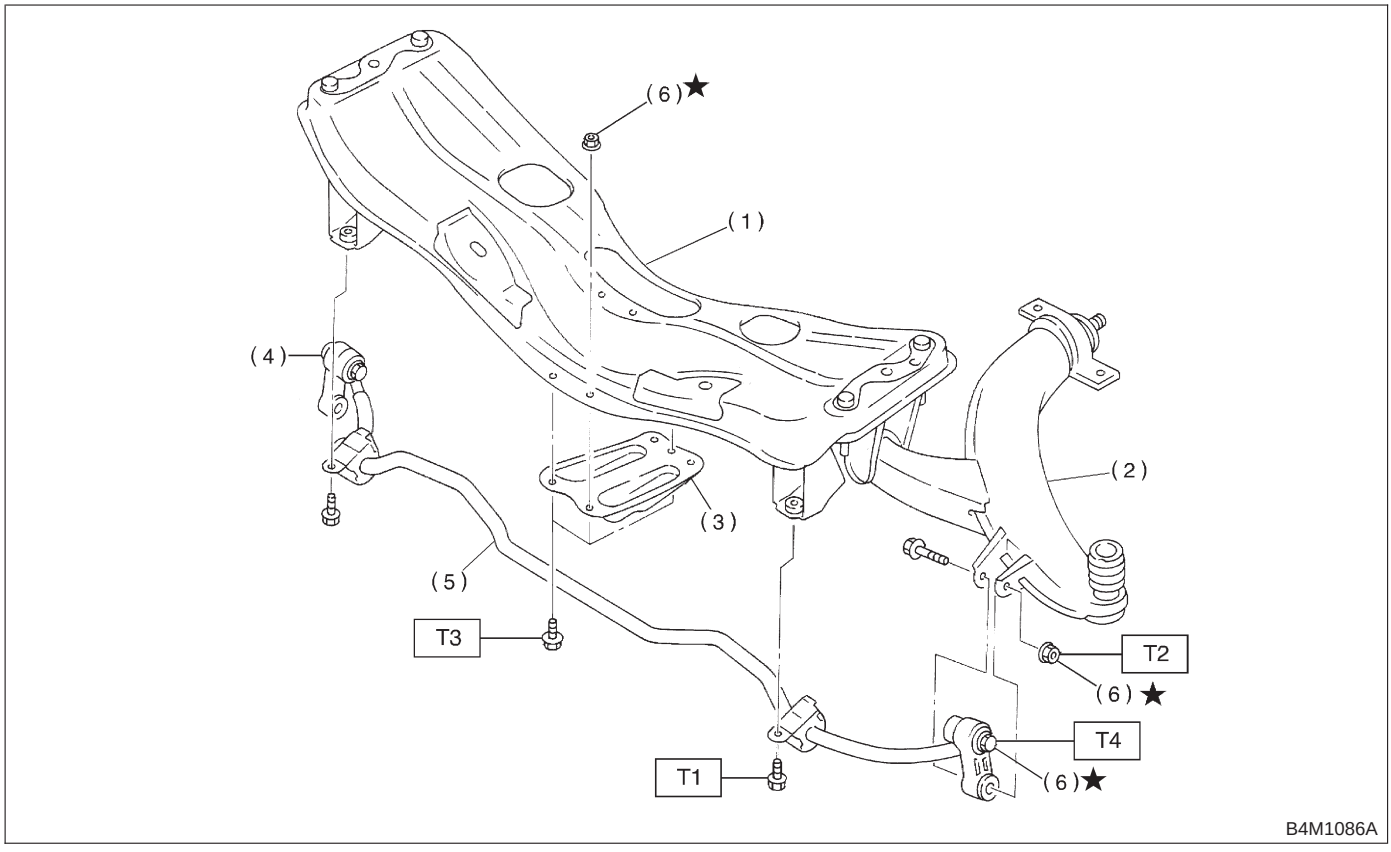


1) Place gas filled strut on a flat and level surface with piston rod fully extended.
2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, make holes in areas shown in the figure.



5. Front Stabilizer

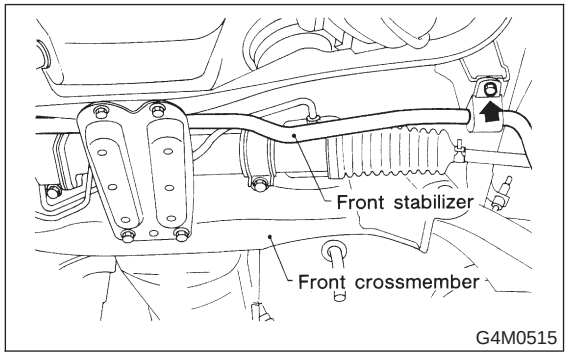
A: REMOVAL



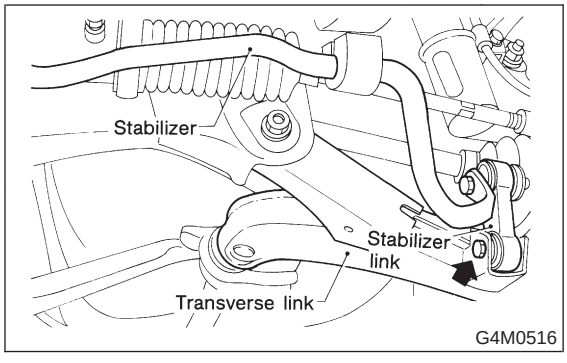
(1) Front crossmember
(2) Transverse link
(3) Jack-up plate
(4) Stabilizer link
(5) Front stabilizer
(6) Self-locking nut

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)

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.

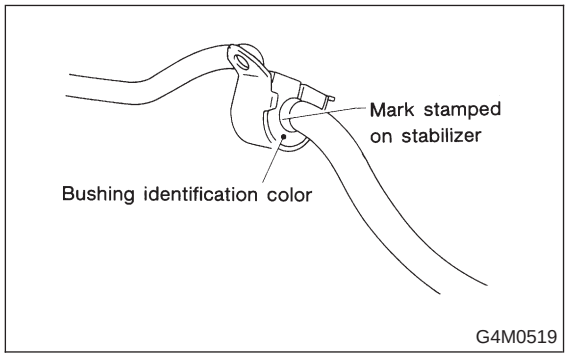
B: INSPECTION

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.



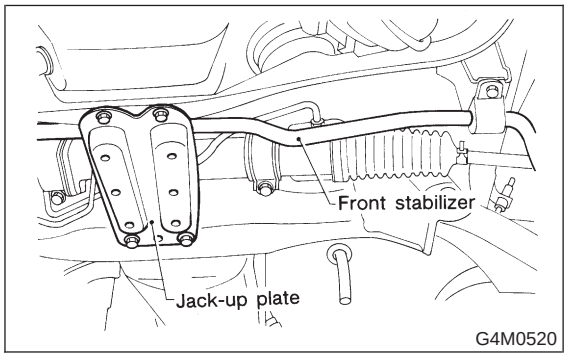
2) Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:
Jack-up plate to crossmember:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)
Stabilizer link to front transverse link:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)
Stabilizer to crossmember:
25±4 N·m (2.5±0.4 kg-m, 18.1±2.9 ft-lb)

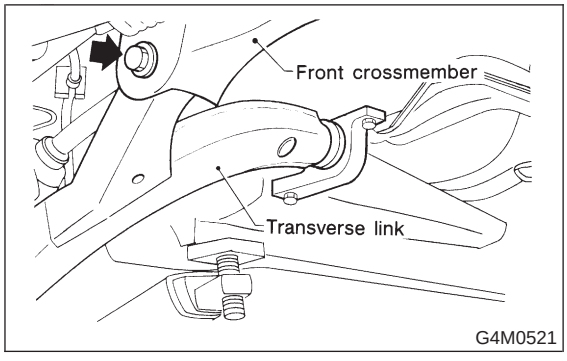
6. Front Crossmenber

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 and body.



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.

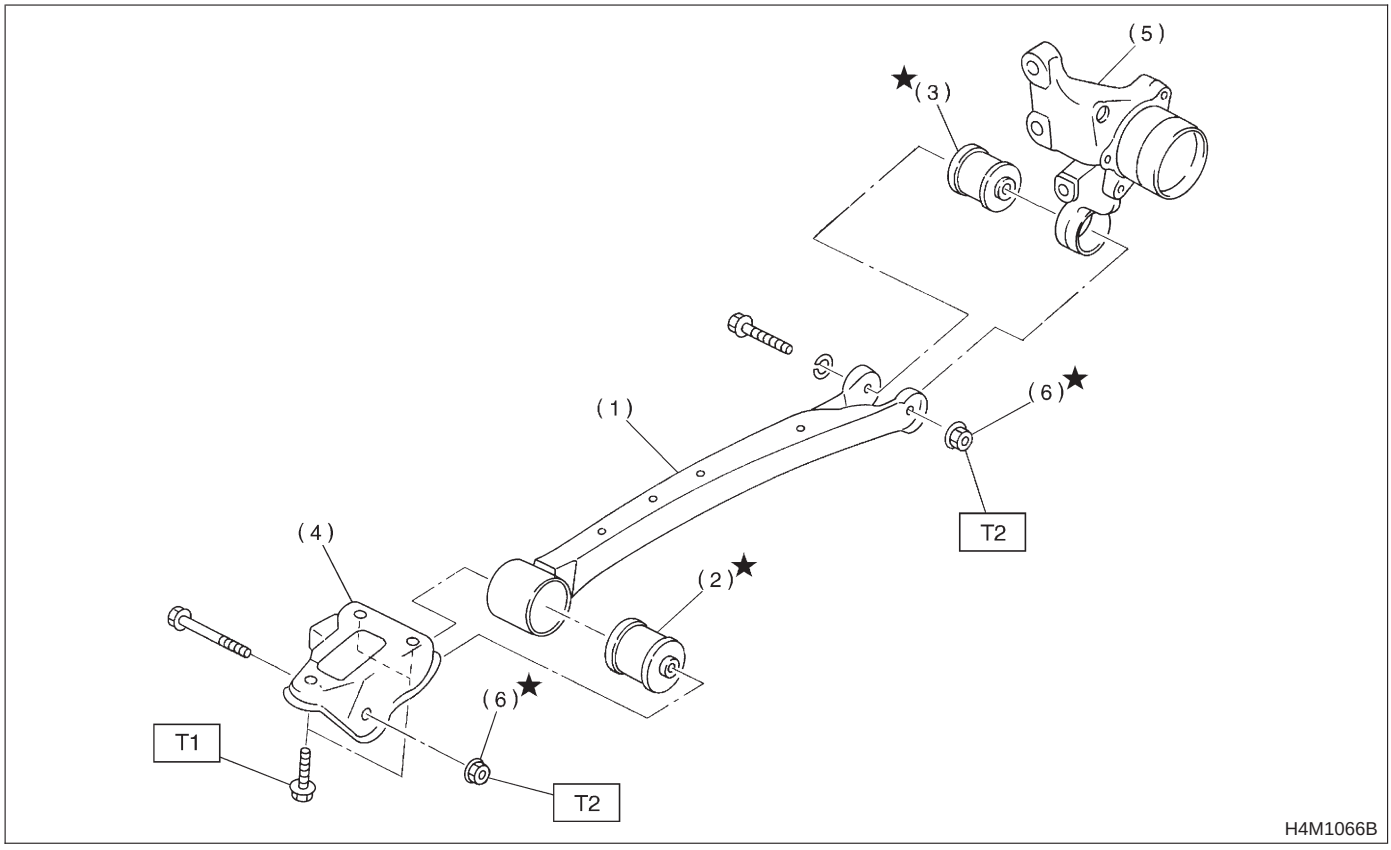
Tightening torque:
Transverse link bushing to crossmember:
98±15 N·m (10.0±1.5 kg-m, 72±11 ft-lb)
Stabilizer to bush:
25±4 N·m (2.5±0.4 kg-m, 18.1±2.9 ft-lb)
Tie-rod end to housing:
27.0±2.5 N·m (2.75±0.25 kg-m, 19.9±1.8 ft-lb)
Front cushion rubber to crossmember:
69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)
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)

2) Purge air from power steering system.

NOTE:
Check wheel alignment and adjust if necessary.

7. Rear Trailing Link

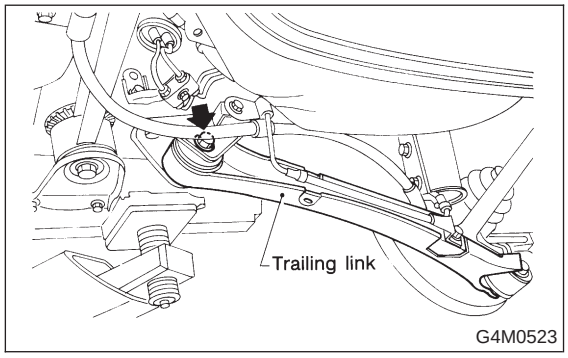
A: REMOVAL



(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)
4) Remove bolt which secure trailing link to trailing link bracket.

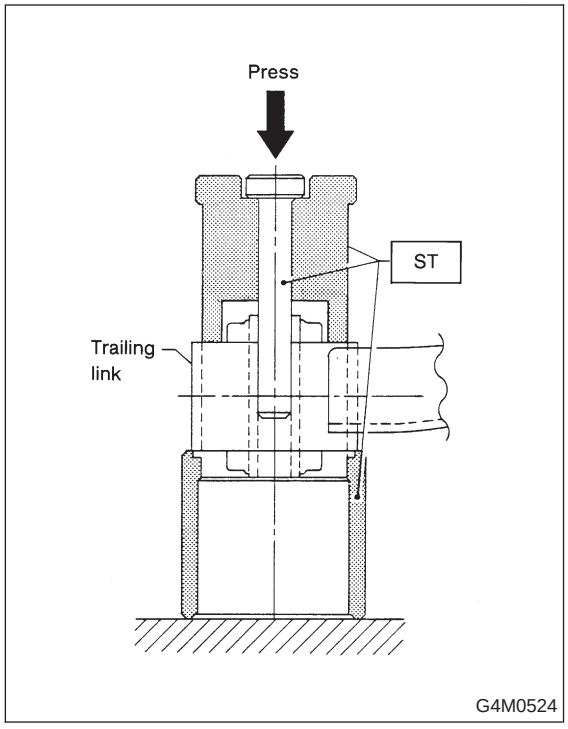


5) Remove bolt which secure trailing link to rear housing.

B: DISASSEMBLY

1. FRONT BUSHING

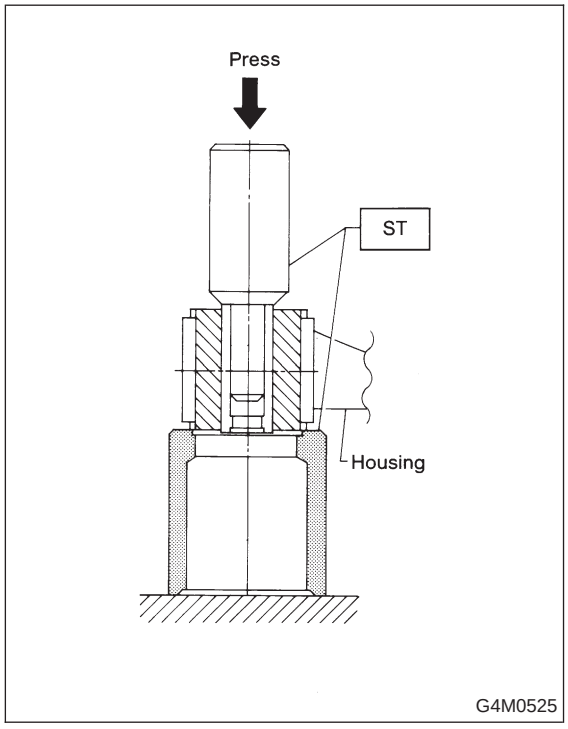
Using ST, press front bushing out of place.
ST 927720000 INSTALLER & REMOVER SET



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



C: INSPECTION

Check trailing links for bends, corrosion or damage.

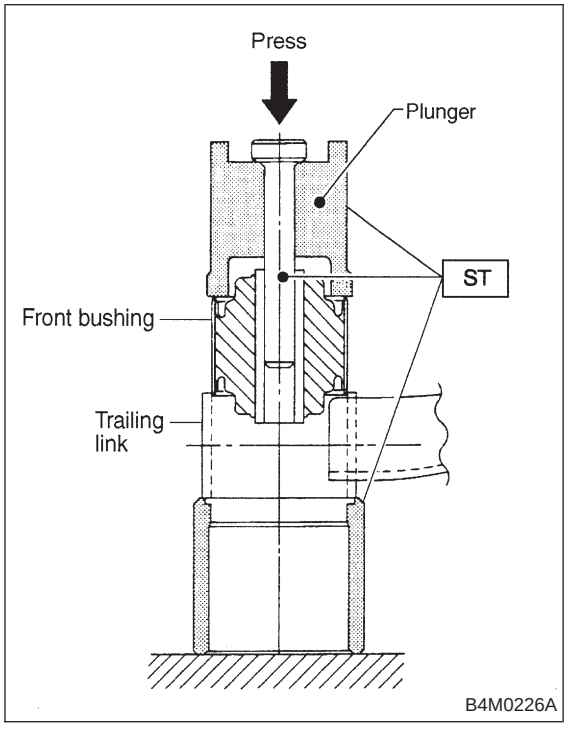
D: ASSEMBLY

To assemble, reverse the disassembly procedures.

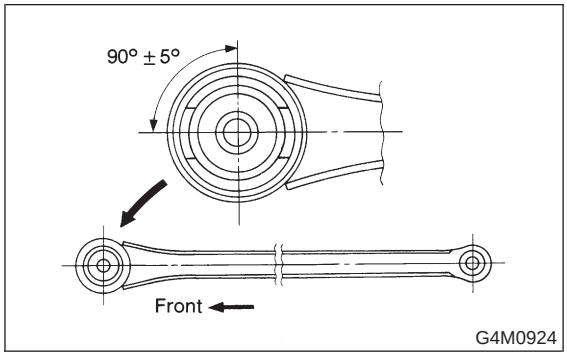
1. FRONT BUSHING

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

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



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

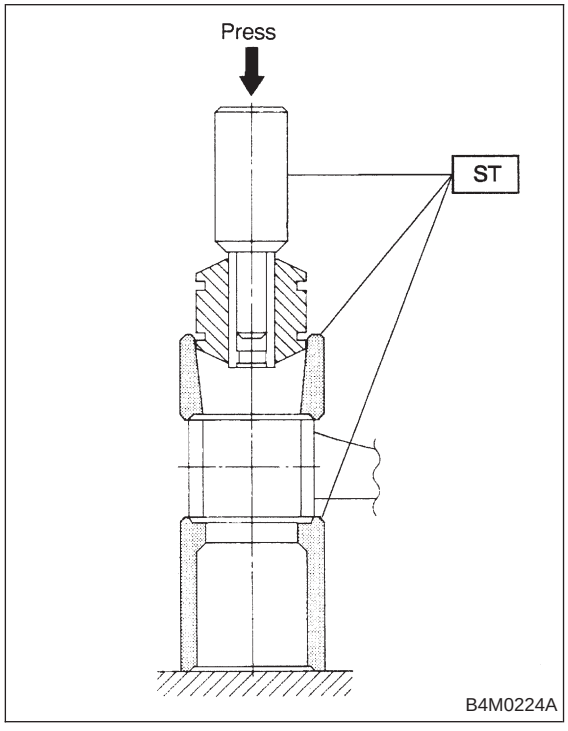


2. REAR BUSHING

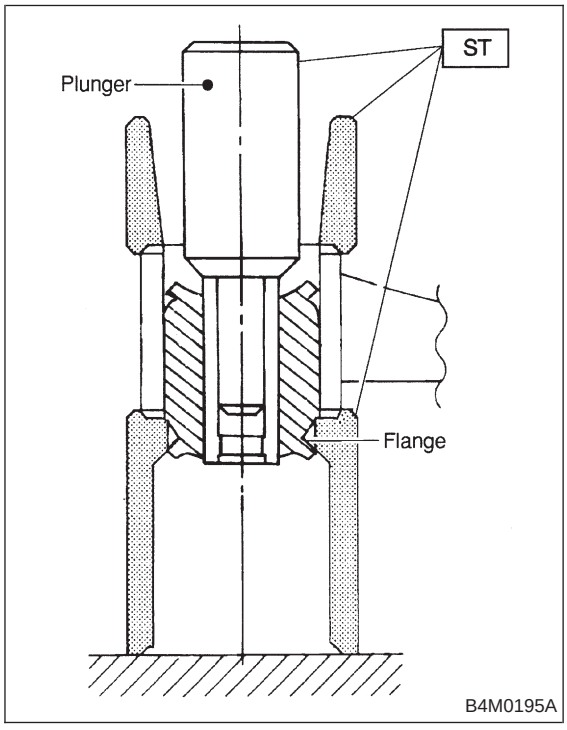
1) Using ST, press bushing into trailing link.
ST 927730000 INSTALLER & REMOVER SET

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.

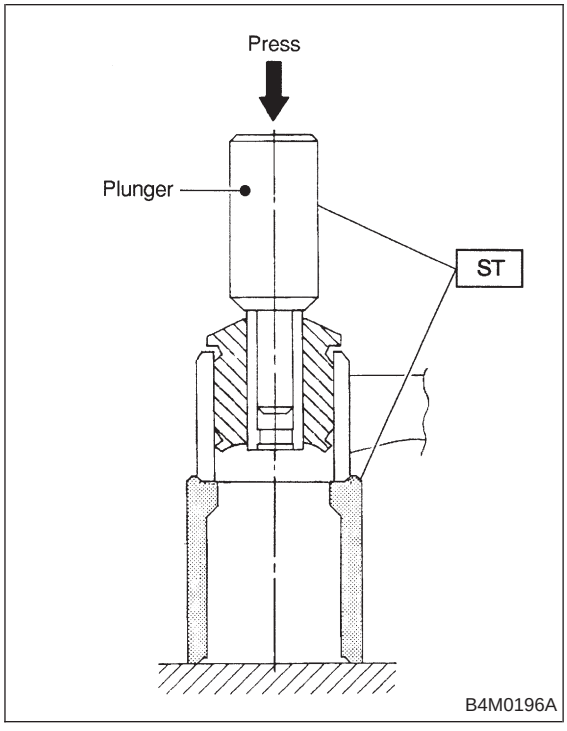
Specified lubricant:
TIRE LUBE : water = 1 : 3



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 the former procedure until bushing is correctly positioned in trailing link.
ST 927730000 INSTALLER & REMOVER SET



E: INSTALLATION

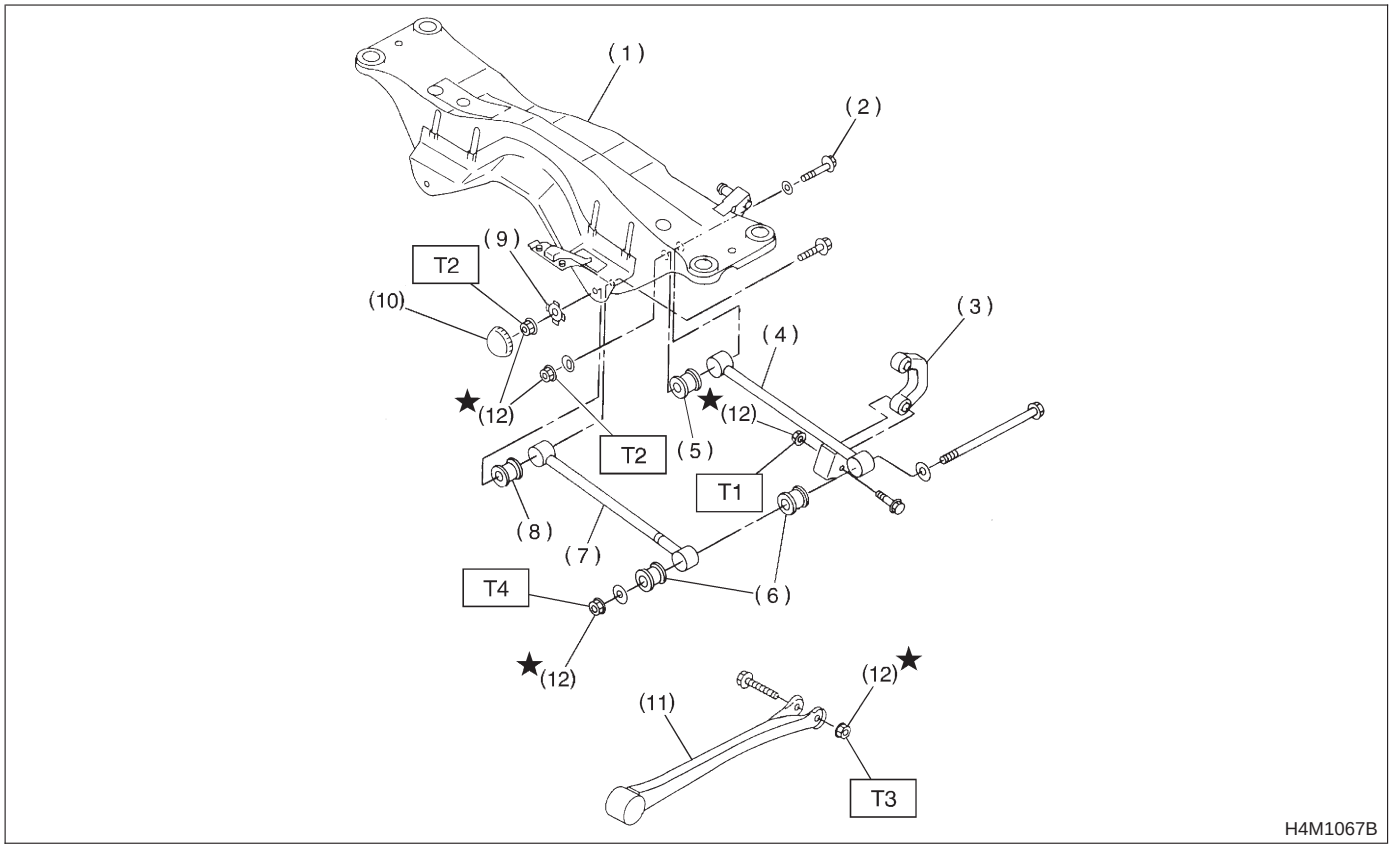
Installation is in the reverse order of removal.

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

A: REMOVAL



(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)

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.

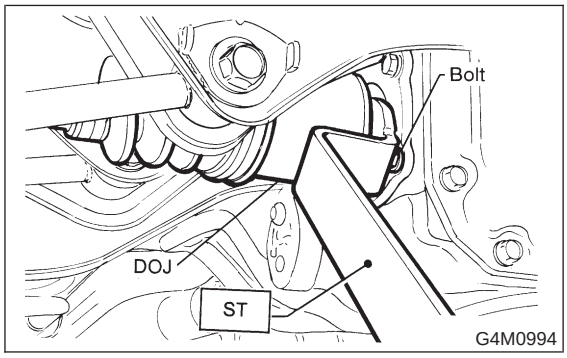
CAUTION:
Discard old self-locking nut. Replace with a new one.

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

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

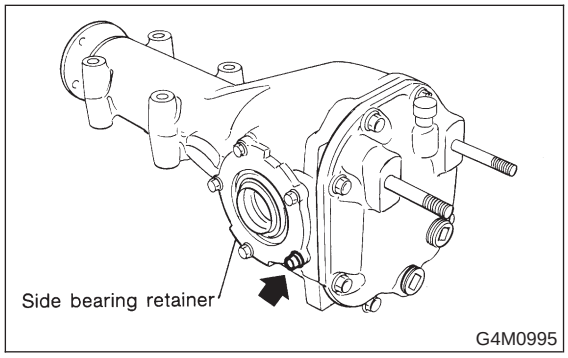
6) Remove DOJ from rear differential using ST. (2200 cc MT model)
ST 28099PA100 DRIVE SHAFT REMOVER

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



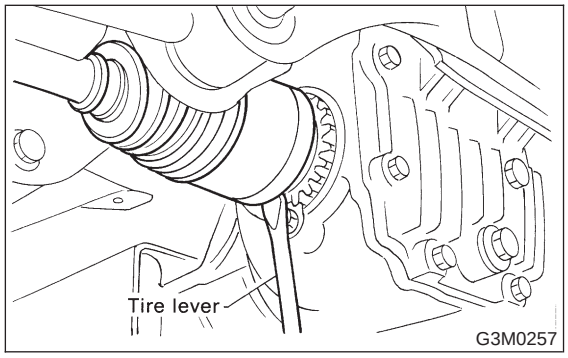
CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

ST 28099PA100 DRIVE SHAFT REMOVER

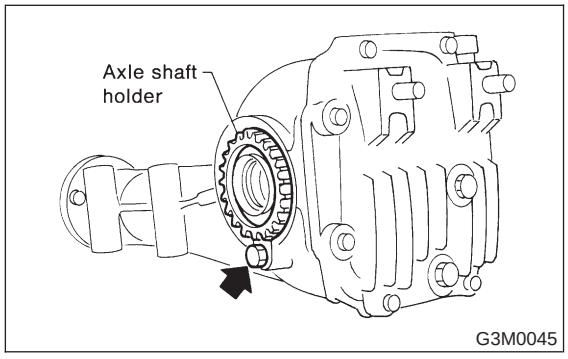


7) Remove DOJ from rear differential using tire lever. (Except 2200 cc MT model)

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.

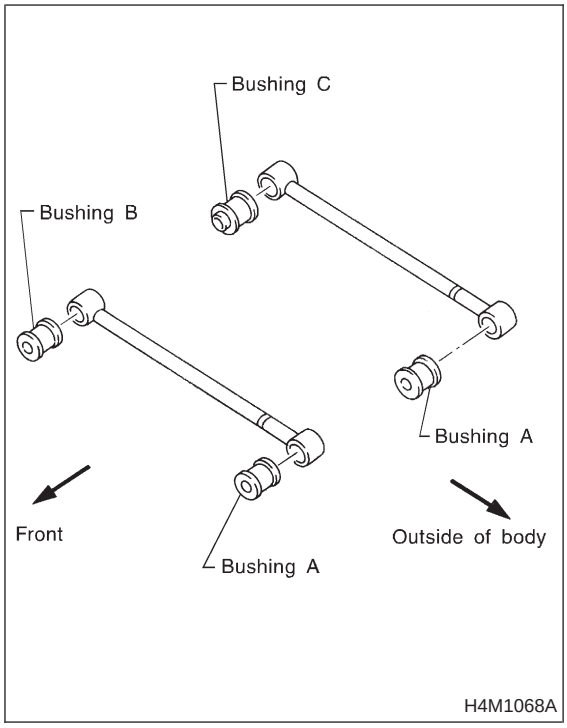
CAUTION:
To loosen adjusting bolt, always loosen nut while holding the head of adjusting bolt.

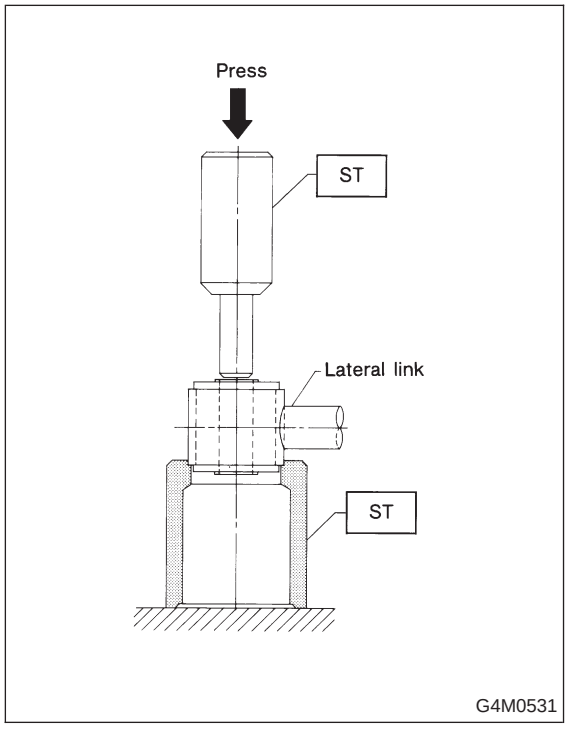
B: DISASSEMBLY

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.

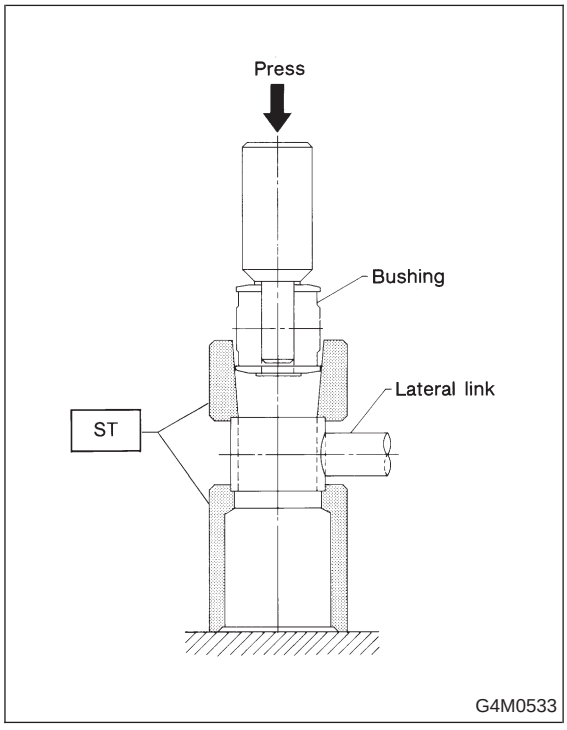
D: ASSEMBLY

1) Using ST, press bushing into place.

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

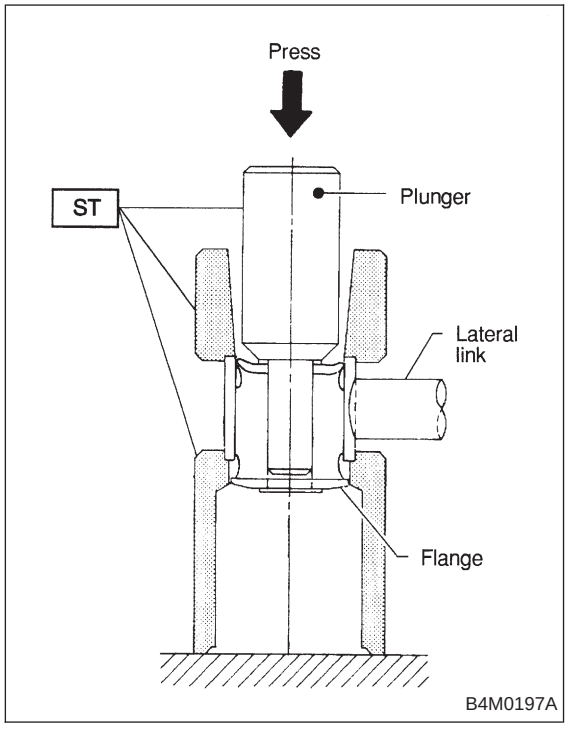
NOTE:
● Use the same ST as that used during disassembly.
● If it is difficult to press bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

Specified lubricant:
TIRE LUBE : water = 1 : 3



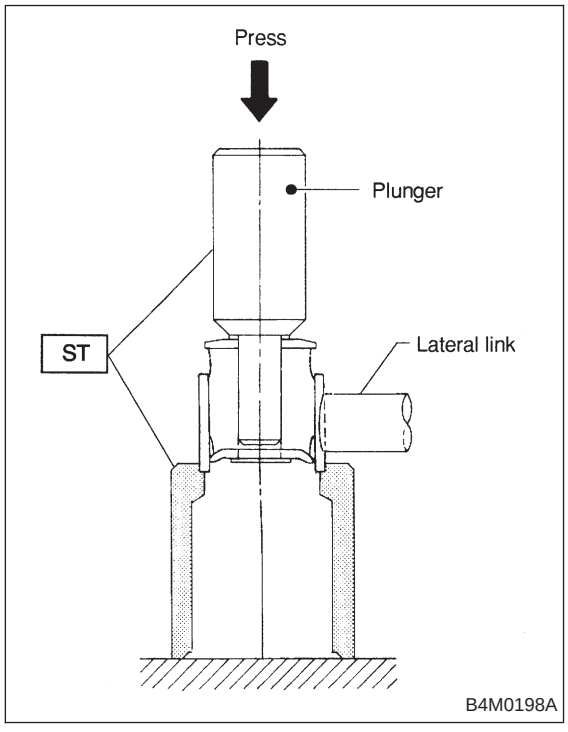
2) Press ST plunger until bushing flange protrudes beyond lateral link.

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 the former procedure 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:

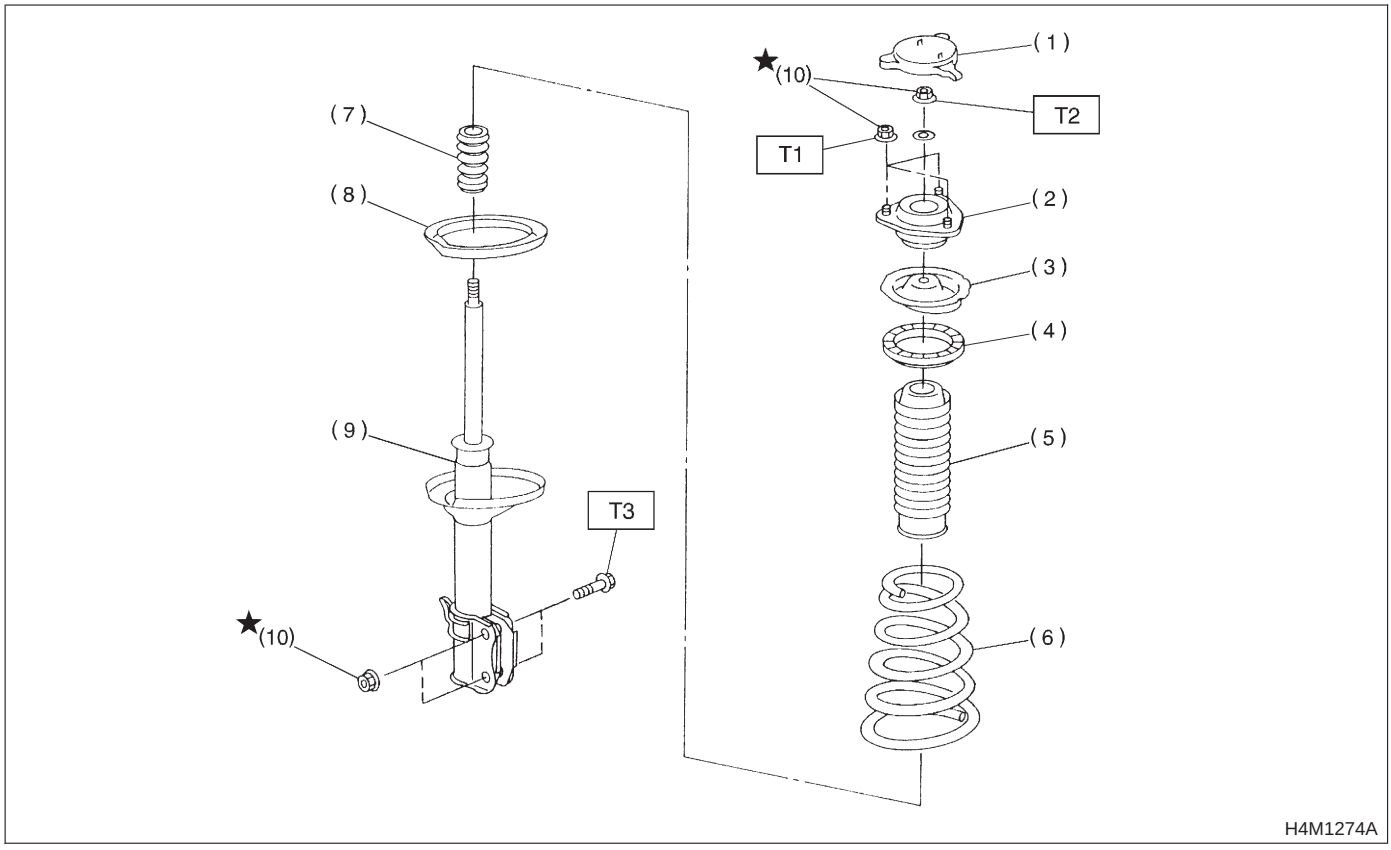
- **Do not allow DOJ splines to damage side oil seal.**
- **Always tighten rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.**
- **Tighten nut when installing adjusting bolt.**
- **Replace self-locking nut and DOJ circlip with new ones.**

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

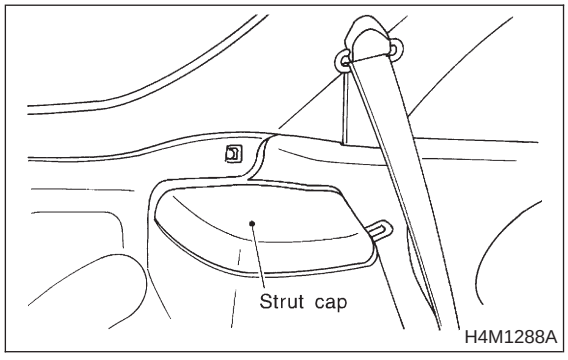
A: REMOVAL



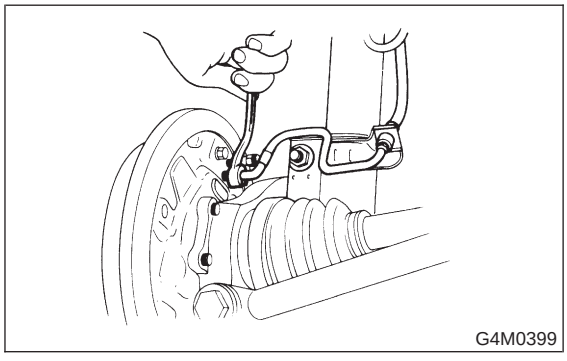
(1) Cap (Only Wagon model)
(2) Strut mount
(3) Spring seat
(4) Rubber seat upper
(5) Dust cover
(6) Coil spring
(7) Helper
(8) Rubber seat lower
(9) Damper strut
(10) Self-locking nut

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})

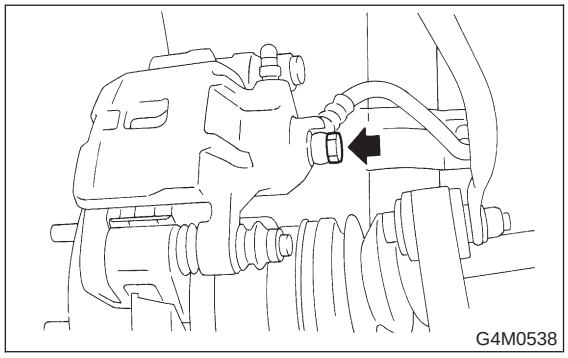
1) Depress brake pedal and secure it in that position using a wooden block, etc.
2) Remove rear seat cushion and backrest. (Sedan model)
3) Remove strut cap of quarter trim. (Wagon model)



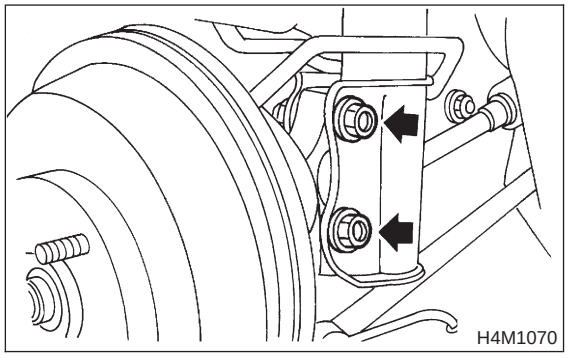
4) Remove strut mount cap. (Only Wagon model)
5) Loosen rear wheel nuts.
6) Jack-up vehicle, support it with safety stands (rigid racks) and remove rear wheels.
7) Remove brake hose clip.
8) Models equipped with rear drum brakes:
Disconnect brake hose from brake pipe from strut, and disconnect brake pipe from drum brake.



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



10) Remove bolts which secure rear strut to housing.



11) 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].>

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±6 N·m (2.0±0.6 kg-m, 14.5±4.3 ft-lb)

2) Tighten bolts which secure rear strut to housing.

Tightening torque:
196^{+39}_{-10} N·m
($20.0^{+4.0}_{-1.0}$ kg-m, 145^{+29}_{-7} ft-lb)

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

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

Tightening torque:
18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)

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

Tightening torque:
15^{+3}_{-2} N·m
($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

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±10 N·m (9±1 kg-m, 65±7 ft-lb)

7) Install strut mount cap.
8) (Sedan model)
Install rear seat backrest and rear seat cushion.
(Wagon model)
Install strut cap to rear quarter trim.

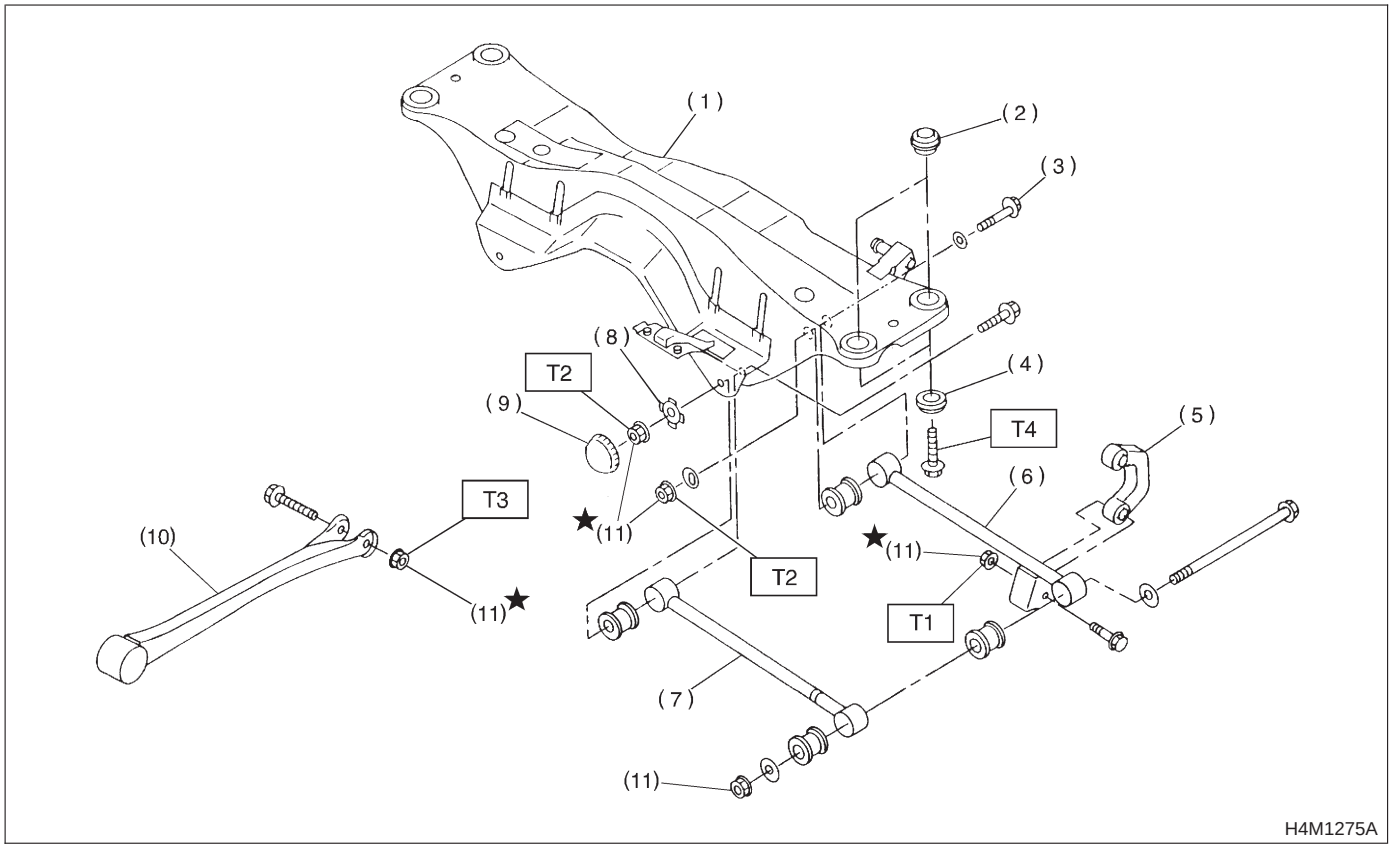
NOTE:
Check wheel alignment and adjust if necessary.

F: DISPOSAL PROCEDURES FOR GAS FILLED STRUT

Refer to 4. Front Strut as a guide for disposal procedures. <Ref. to 4-1 [W4F0].>

10. Rear Crossmember

A: REMOVAL

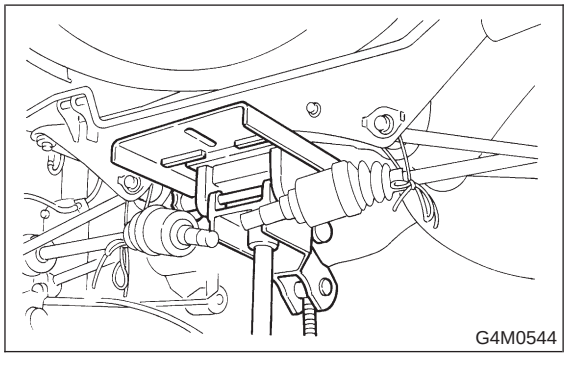


(1) Crossmember
(2) Floating bushing
(3) Adjusting bolt
(4) Stopper
(5) Stabilizer link
(6) Rear lateral link
(7) Front lateral link
(8) Washer
(9) Cap
(10) Trailing link
(11) Self-locking nut

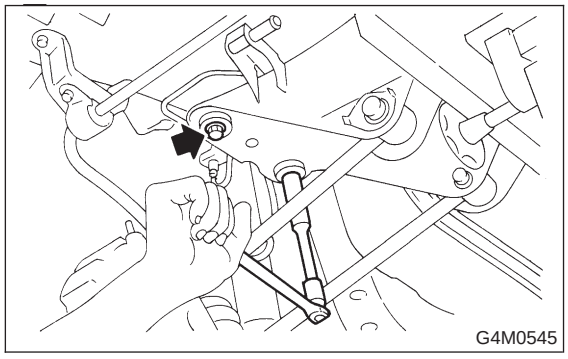
Tightening torque: N·m (kg-m, ft-lb)
T1: 44±6 (4.5±0.6, 32.5±4.3)
T2: 98±15 (10.0±1.5, 72±11)
T3: 113±15 (11.5±1.5, 83±11)
T4: 127±20 (13.0±2.0, 94±14)

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 <Ref. to 3-4 [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.

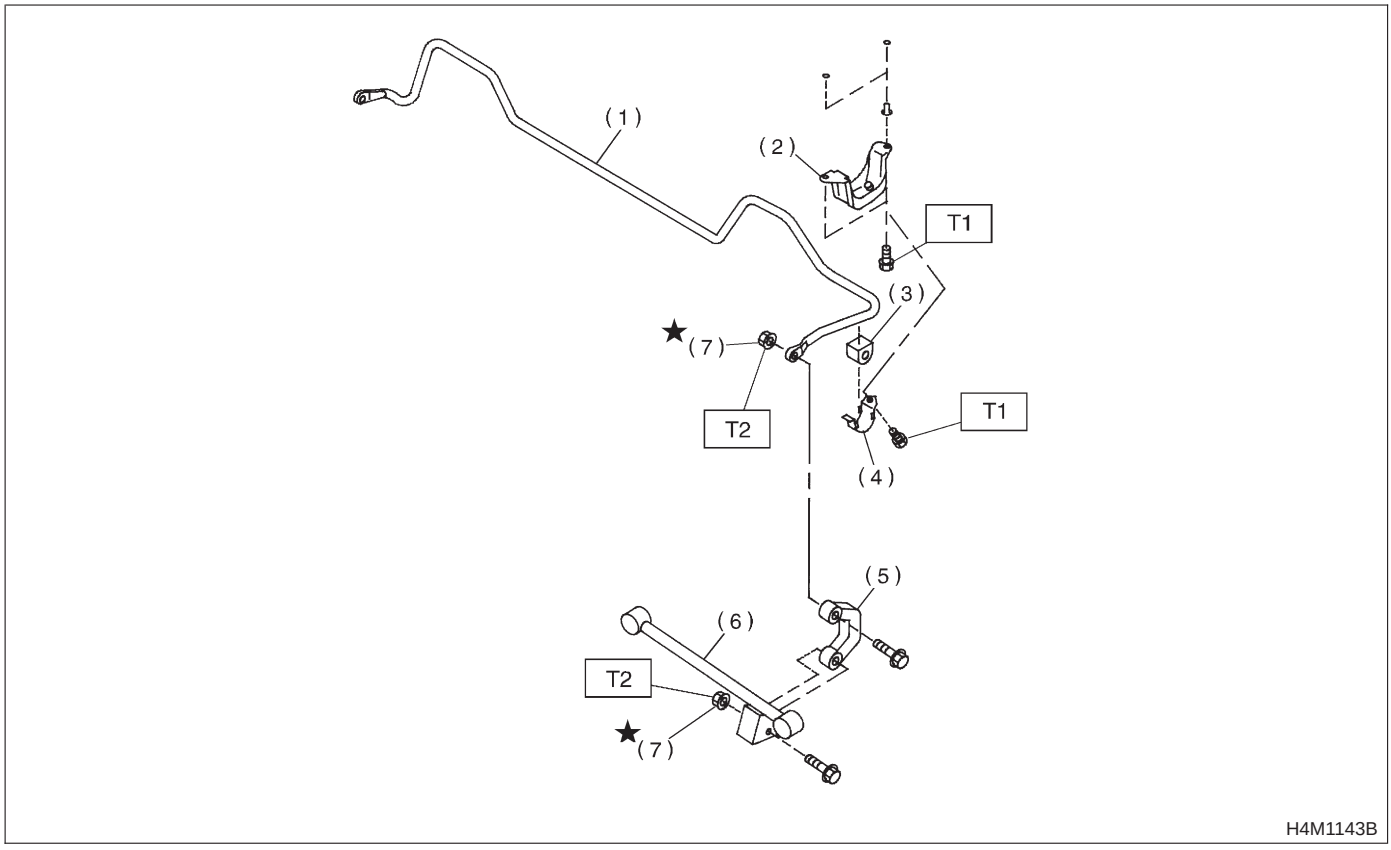
C: INSTALLATION

1) Install in reverse order of removal.
2) Install rear differential. <Ref. to 3-4 [W2F0].> or <Ref. to 3-4 [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

A: REMOVAL



(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)

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.

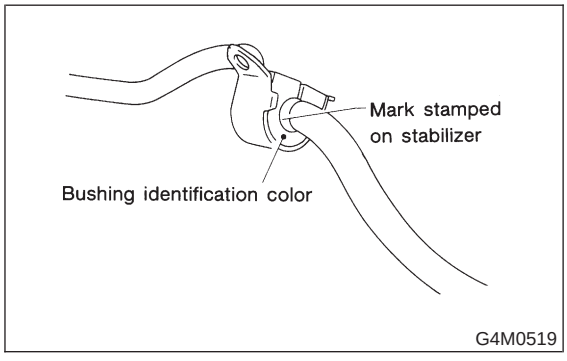
B: INSPECTION

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.

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

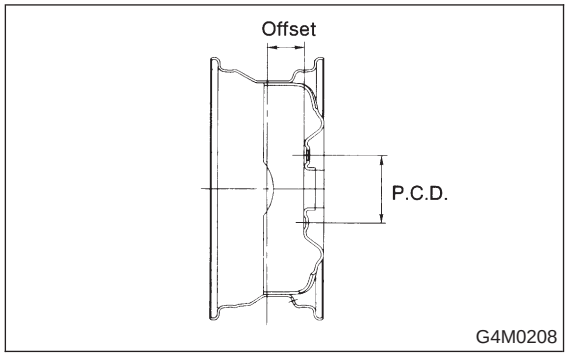
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1. Tire and Wheel Size



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)
2200 cc	COUPE SEDAN WAGON	P195/60R15 87H	15 × 6JJ	55 (2.17)	100 (3.94) dia.	T135/70D16	16 × 4T	50 (1.97)
	OUT-BACK	P205/60R15 90S P205/60R15 90H						
2500 cc	COUPE	P205/55R16 87V	16 × 7JJ	53 (2.09)	100 (3.94) dia.			

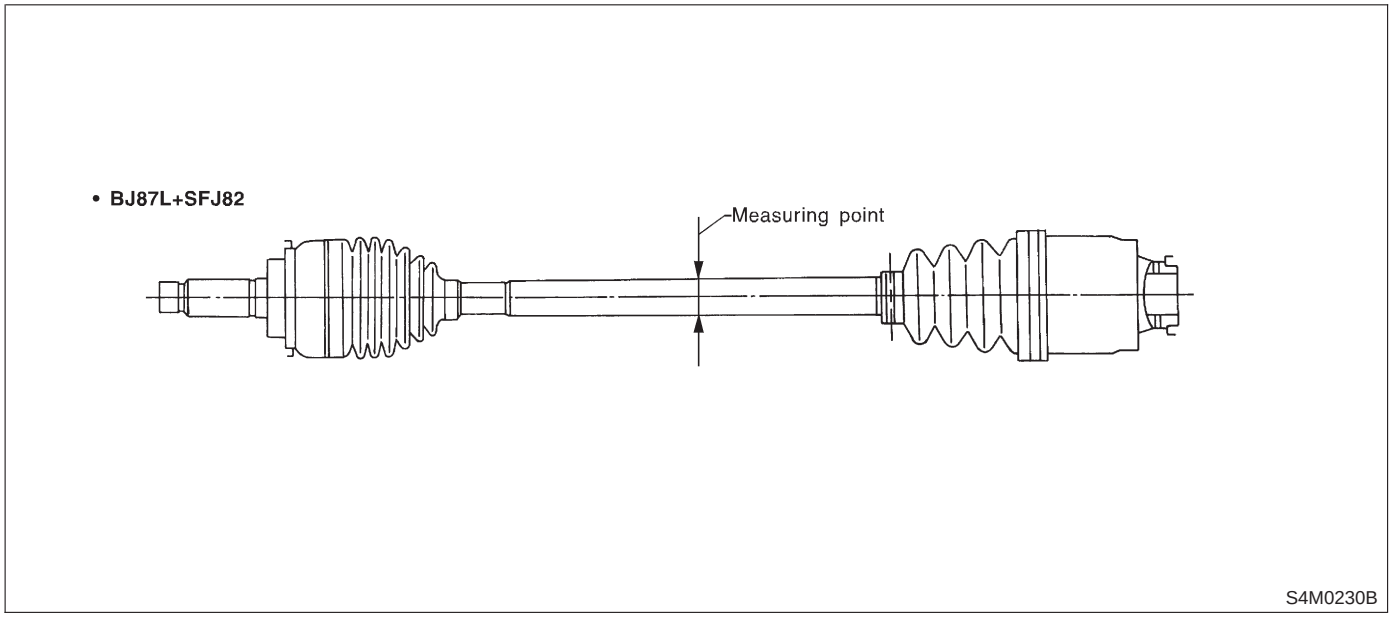
NOTE: “T-type” tire for temporary use is supplied as a spare tire.

2. Tire Inflation Pressure

Tire size	Tire inflation pressure kPa (kg/cm^2, psi)	
	Light load	Full load
P195/60R15 87H P205/60R15 90S P205/60R15 90H P205/55R16 87V	Ft: 220 (2.2, 31) Rr: 200 (2.0, 25)	
T135/70D16	412 (4.2, 60)	

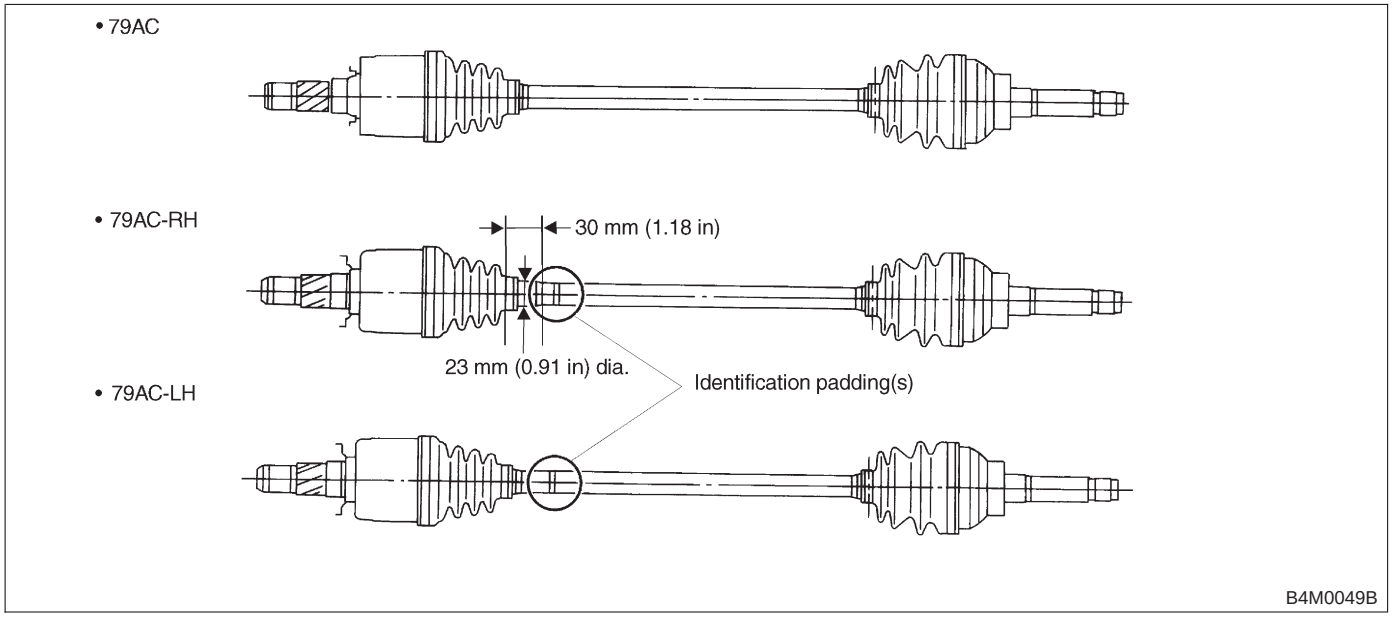
3. Front Drive Shaft Assembly

Model	Type of drive shaft assembly	SHAFT
		Shaft diameter
All models	BJ87L+SFJ82	26 mm (1.02 in)



4. Rear Drive Shaft Assembly

Type of axle shaft assembly	SHAFT
	No. of identification paddings on shaft
79AC	None
79AC-RH	1 (One)
79AC-LH	1 (One)



5. Application Table

Model	Power unit	Front drive shaft	Rear drive shaft	
			5MT	4AT
AWD	2200 cc	BJ87L + SFJ82	79AC-RH 79AC-LH	79AC
AWD	2500 cc	BJ87L + SFJ82	79AC-RH 79AC-LH	79AC-RH 79AC-LH

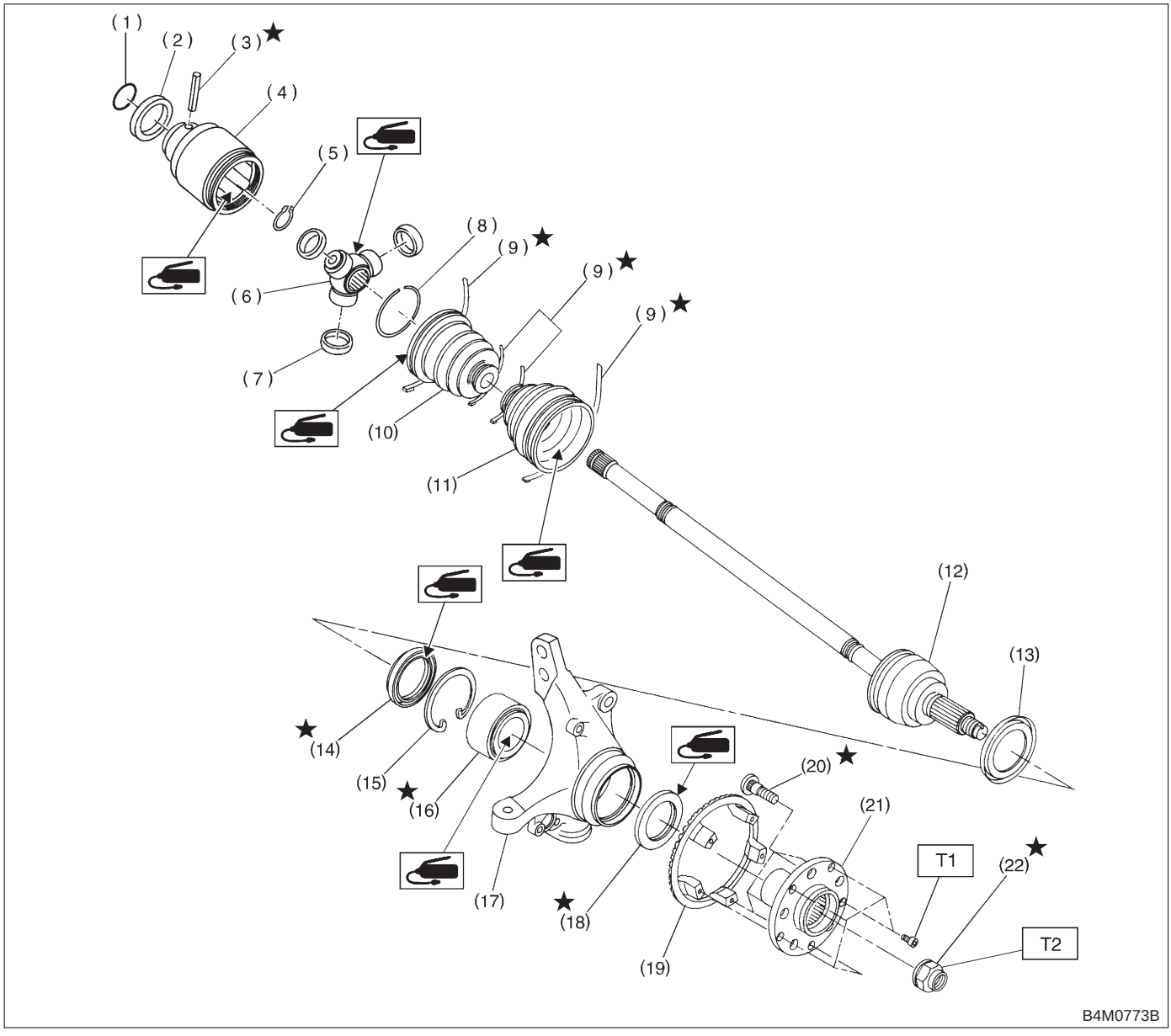
6. Wheel Balance

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

Balance weight part number (For steel wheel)	Weight 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)

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

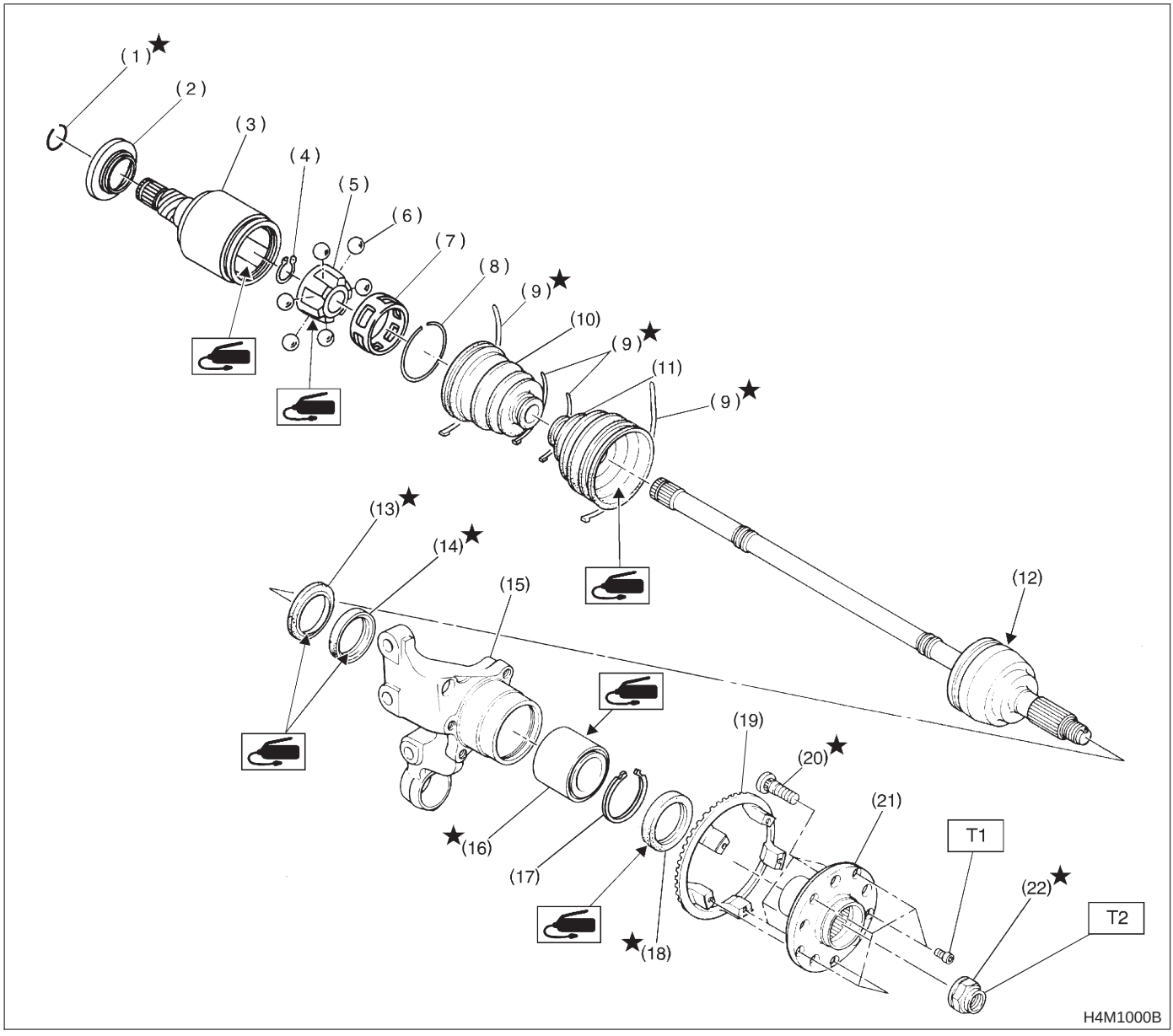
1. Front Axle



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



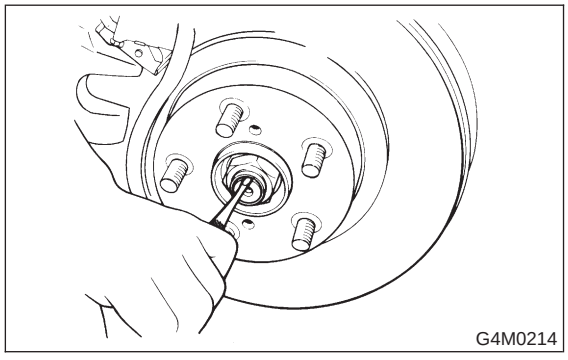
(1) Circlip (2200 cc AT model)
(2) Baffle plate (DOJ)
(3) Outer race (DOJ)
(4) Snap ring
(5) Inner race
(6) Ball
(7) Cage
(8) Circlip
(9) Boot band
(10) Boot (DOJ)
(11) Boot (BJ)
(12) BJ ASSY
(13) Oil seal (IN. No. 2)
(14) Oil seal (IN. No. 3)
(15) Housing
(16) Bearing
(17) Snap ring
(18) Oil seal (OUT)
(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

A: REMOVAL

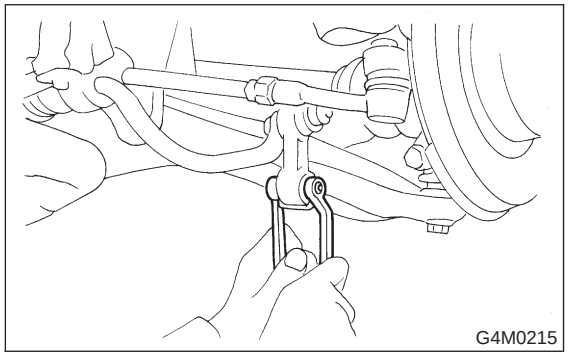
1) Disconnect ground cable from battery.
2) Jack-up vehicle, support it with safety stands, and remove front wheels.
3) Unlock axle nut.



4) Remove axle nut using a socket wrench.

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

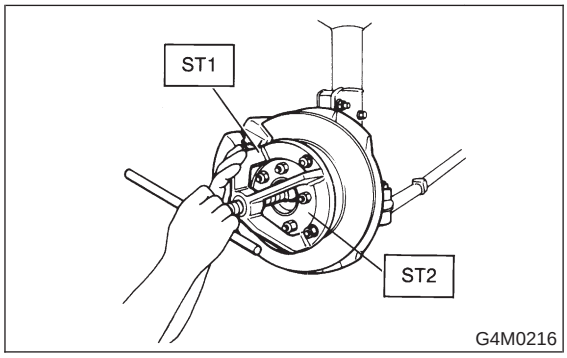
5) Remove stabilizer link.



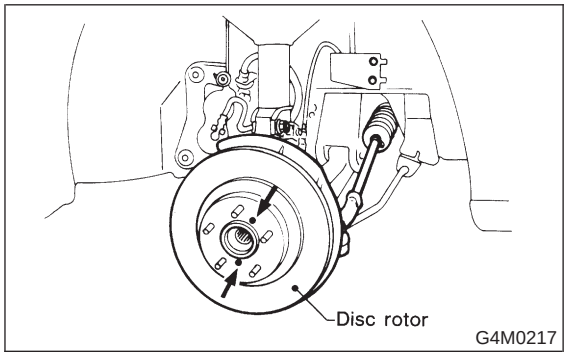
6) Remove disc brake caliper from housing, and suspend it from strut using a wire.

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

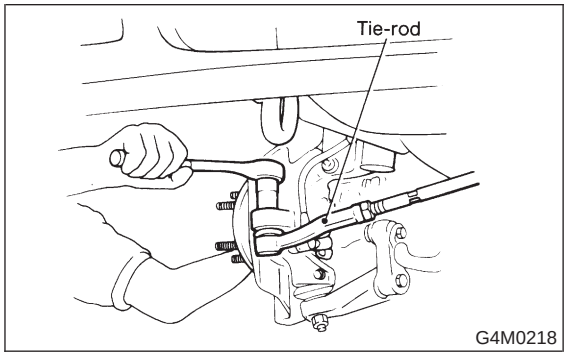
CAUTION:
● Be careful not to damage oil seal lip when removing front drive shaft.
● When replacing front drive shaft, also replace inner oil seal.



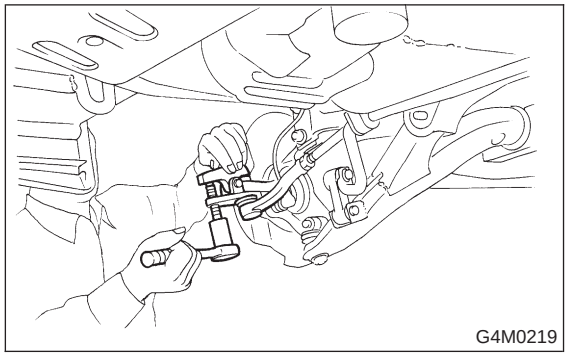
8) Remove disc rotor from hub.
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on the rotor.



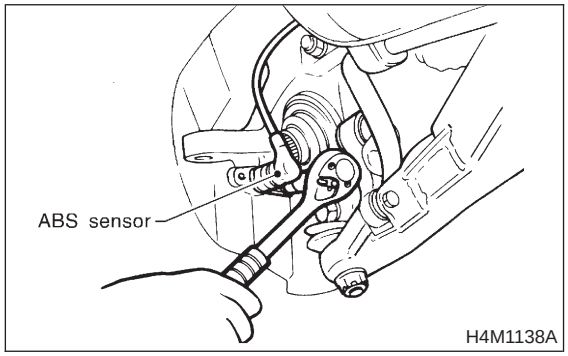
9) Remove cotter pin and castle nut which secure tie-rod end to housing knuckle arm.



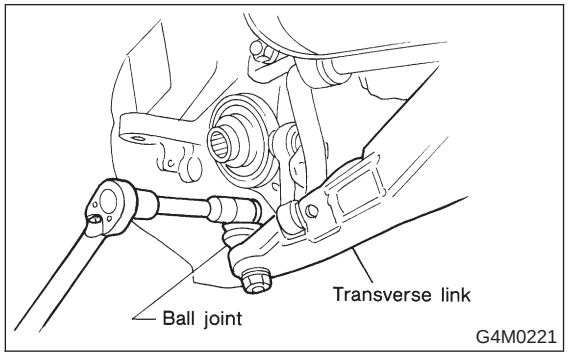
10) Using a puller, remove tie rod ball joint from knuckle arm.



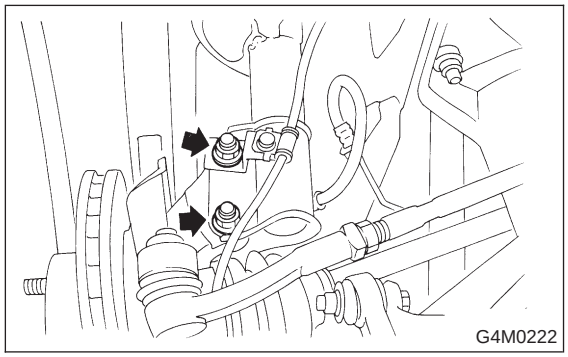
11) On ABS equipped models, remove ABS sensor assembly and harness in advance.



12) Remove transverse link ball joint from housing.



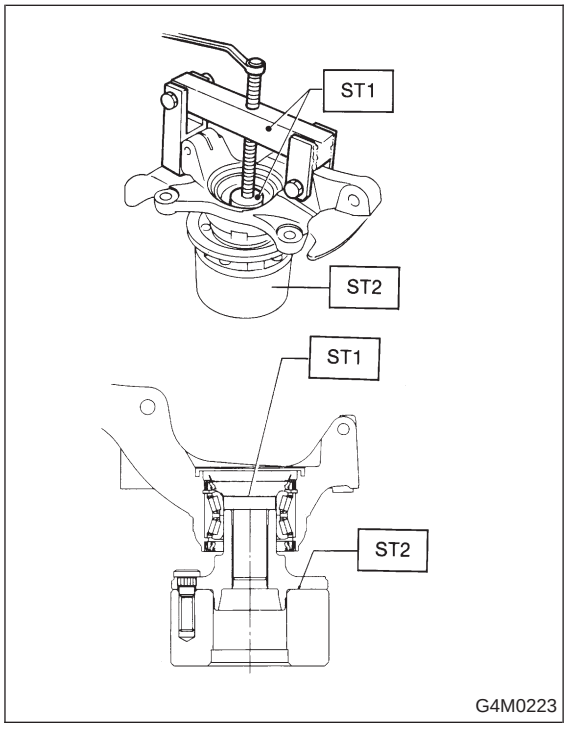
13) After scribing an alignment mark on camber adjusting bolt head, remove bolts which connect housing and strut, and disconnect housing from strut.



B: DISASSEMBLY

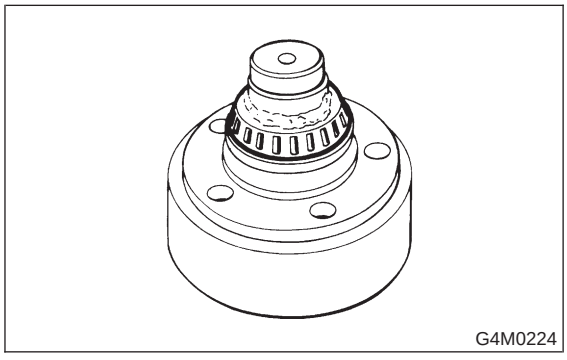
1) Using ST1, support housing and hub securely.
2) Attach ST2 to housing and drive hub out.

ST1 927060000 HUB REMOVER
ST2 927080000 HUB STAND

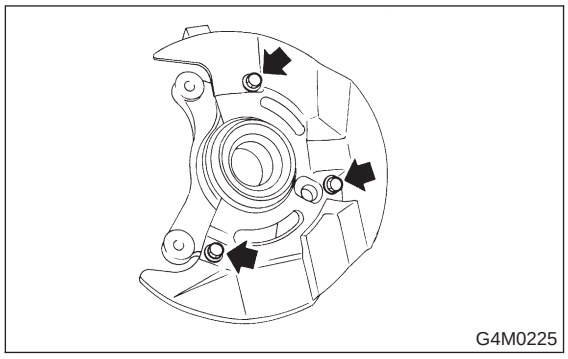


If inner bearing race remains in the hub, remove it with a suitable tool (commercially available).

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.



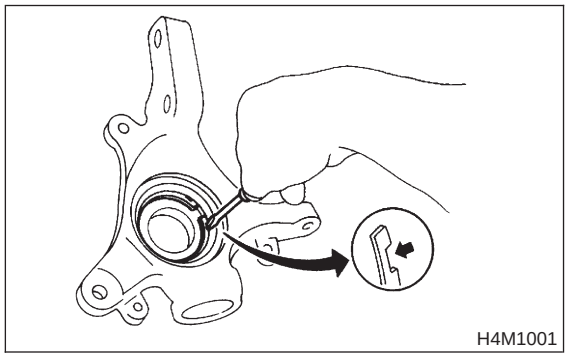
3) Remove disc cover from housing.



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

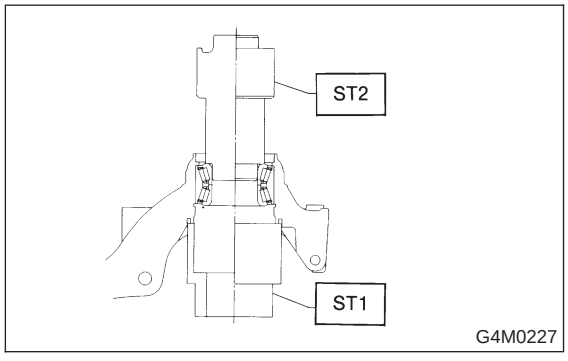
CAUTION:
Do not use old oil seals.

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

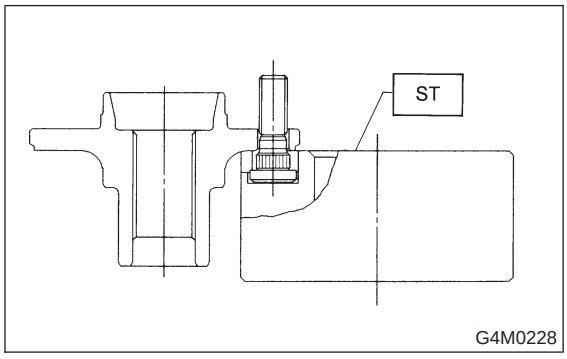
CAUTION:
- **Do not remove outer race unless it is faulty.**
- **Discard outer race after removal.**
- **Do not replace inner or outer race separately; always replace as a unit.**



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

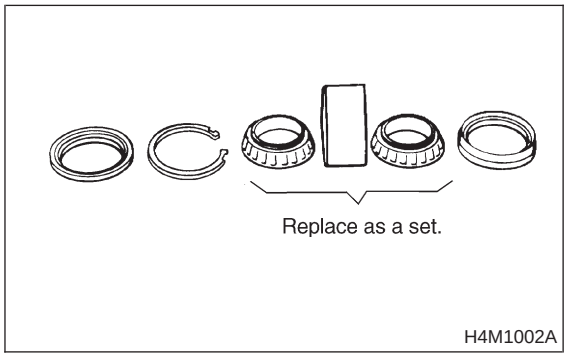
CAUTION:
Be careful not to hammer hub bolts. This may deform hub.



C: INSPECTION

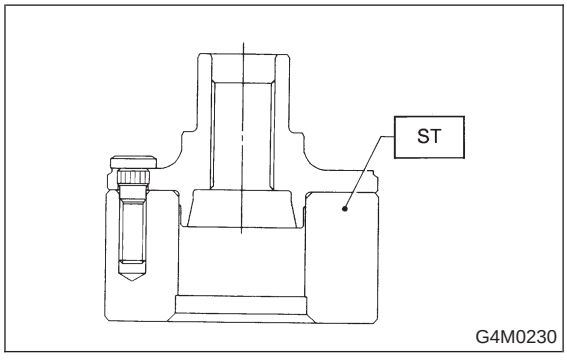
Check the removed parts for wear and damage. If defective, replace with a new one.

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



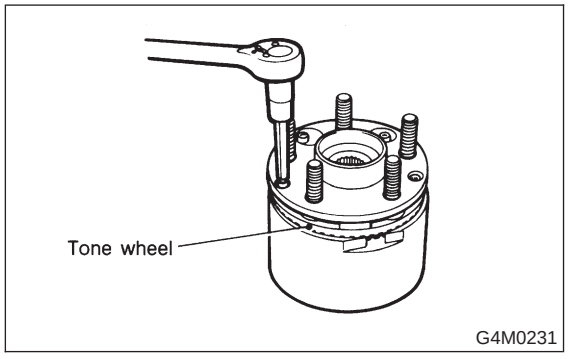
2) Using a hydraulic press, press new hub bolts into place.

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.

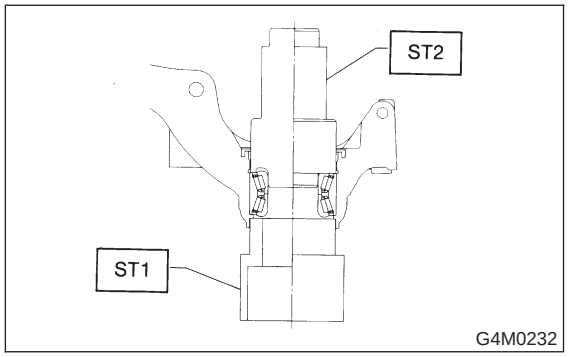
3) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

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



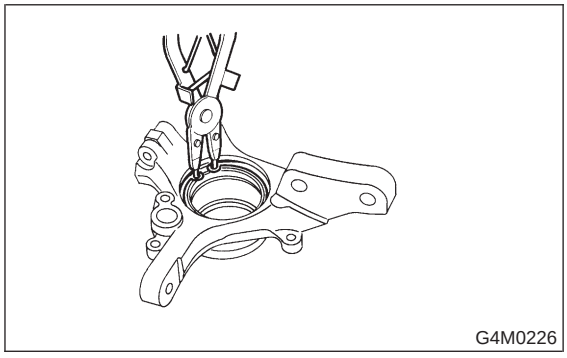
4) Clean dust or foreign particles from inside the housing.
5) Using ST1 and ST2, press a new bearing into place.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING REMOVER

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.**

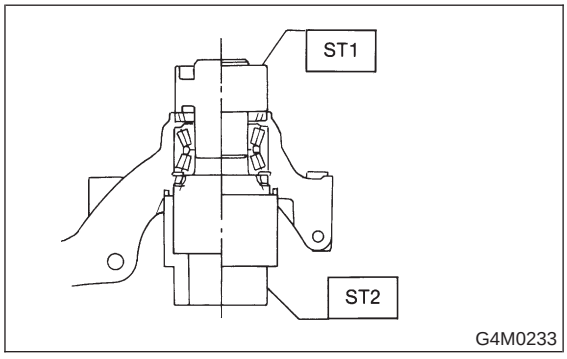


6) Using pliers, install snap ring in its groove.

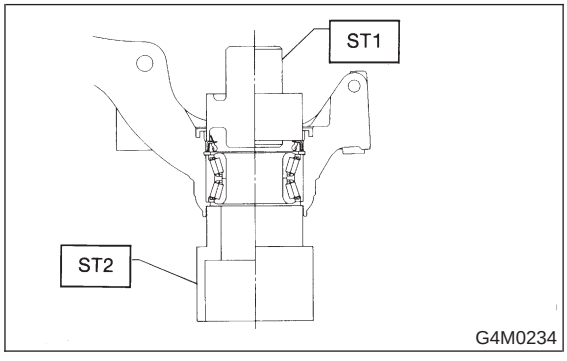
CAUTION:
Make sure to install it firmly to groove.



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.

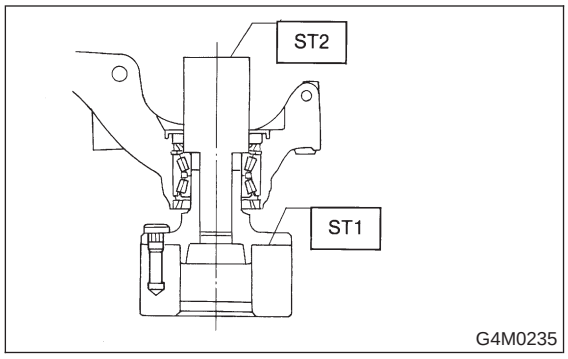
Specified grease
SHELL 6459N

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±6 N·m (4.5±0.6 kg-m, 32.5±4.3 ft-lb)

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

CAUTION:
Use a new self-locking nut.

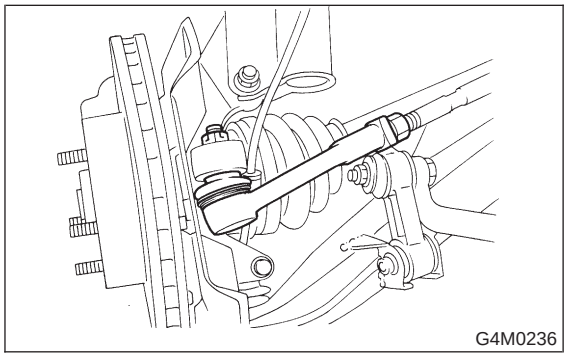
Tightening torque:
147±15 N·m (15±1.5 kg-m, 108±11 ft-lb)

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±10 N·m (6±1 kg-m, 43±7 ft-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.

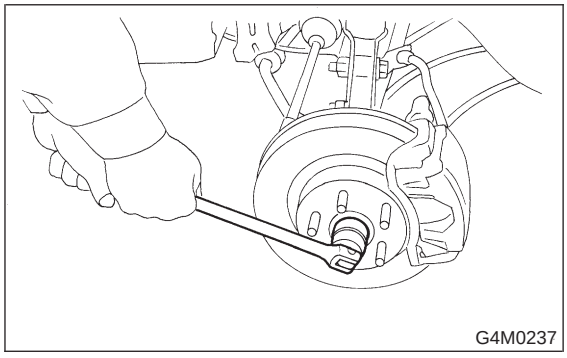
Tightening torque:
27.0±2.5 N·m (2.75±0.25 kg-m, 19.9±1.8 ft-lb)



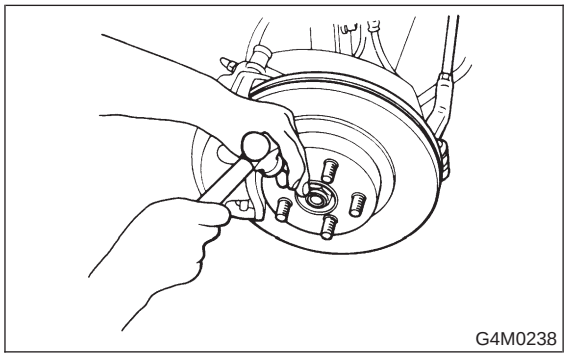
9) While depressing brake pedal, tighten axle nut and lock it securely.

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.

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



10) After tightening axle nut, lock it securely.



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

Tightening torque:
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

2. Rear Axle

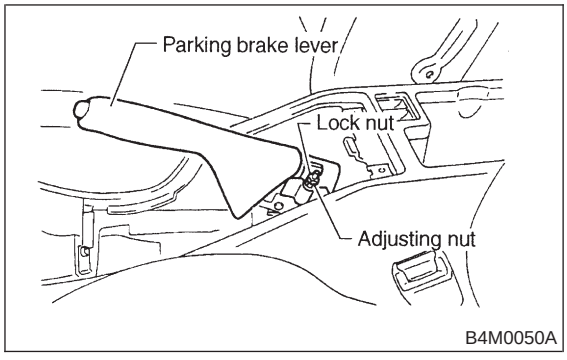
A: REMOVAL

1. DISC BRAKE

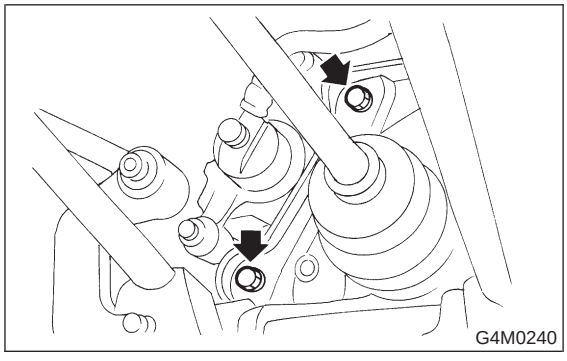
1) Disconnect ground cable from battery.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

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

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



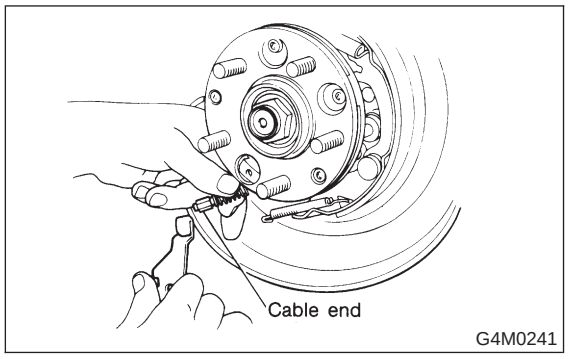
6) Remove disc brake caliper from back plate, and suspend it from strut using a piece of wire.



7) Remove disc rotor from hub.

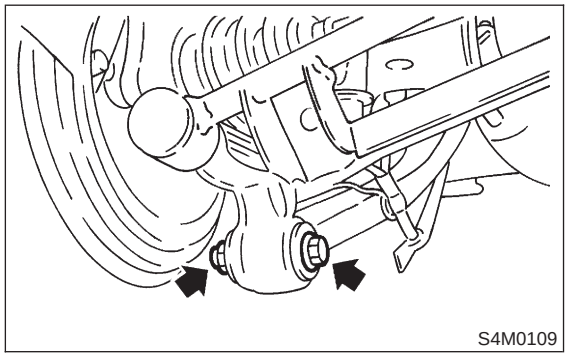
NOTE:
If disc rotor seizes up within hub, drive it out by installing an 8-mm bolt into bolt hole in disc rotor.

8) Disconnect parking brake cable end.



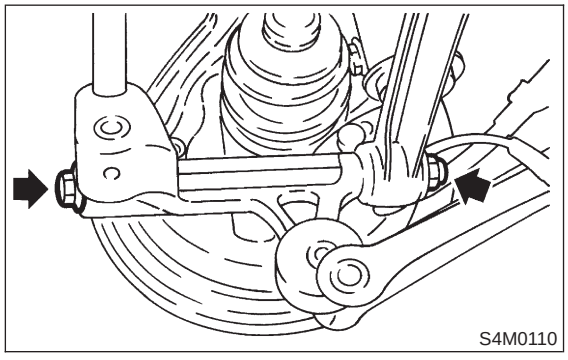
9) Disconnect rear stabilizer from rear lateral link.
10) Remove bolts which secure trailing link assembly to rear housing.

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



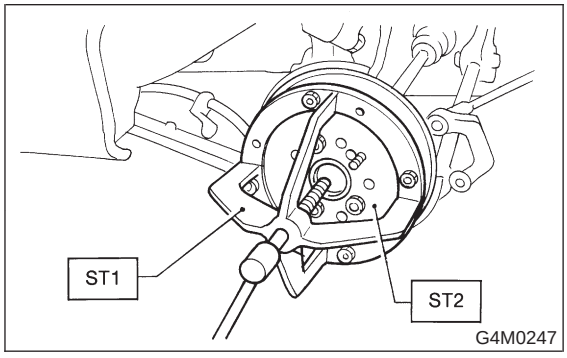
11) Remove bolts which secure lateral link assembly to rear housing.

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

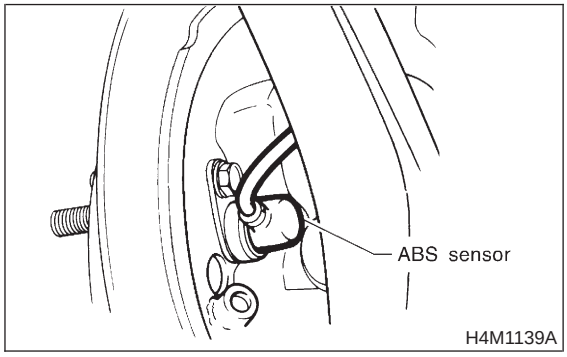


12) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

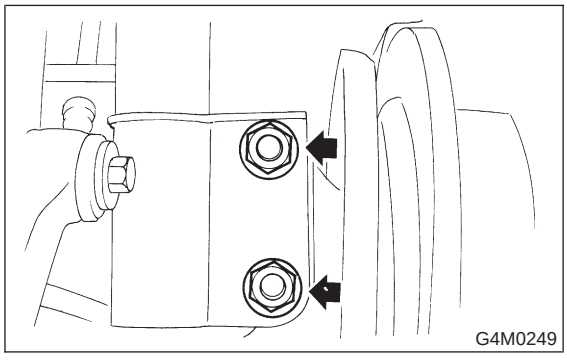
CAUTION:
- **Be careful not to damage oil seal lip when removing rear drive shaft.**
- **When rear drive shaft is to be replaced, also replace inner oil seal with a new one.**



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



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

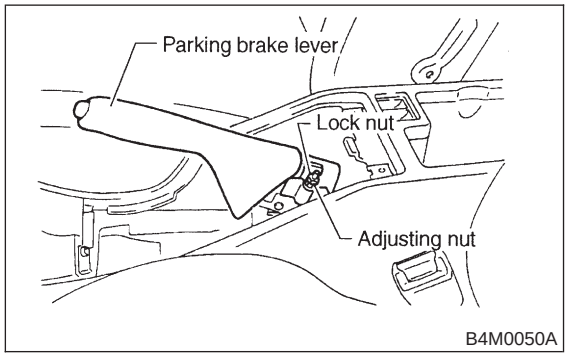


2. DRUM BRAKE

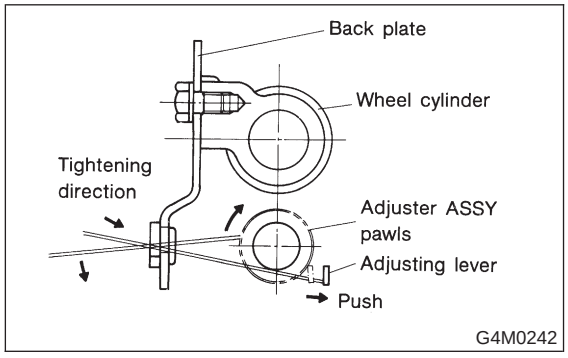
1) Disconnect ground cable from battery.
2) Jack-up vehicle, and remove rear wheel cap and wheels.

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

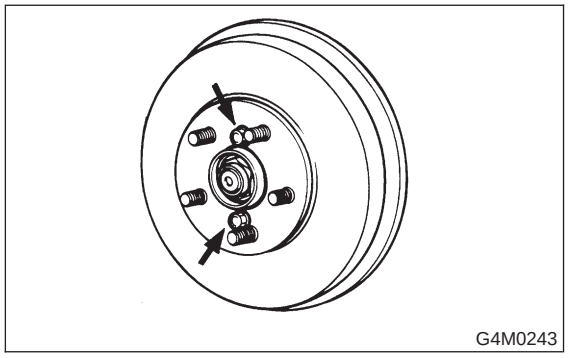
3) Unlock axle nut.
4) Remove axle nut using a socket wrench.
5) Return parking brake lever and loosen adjusting nut.



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

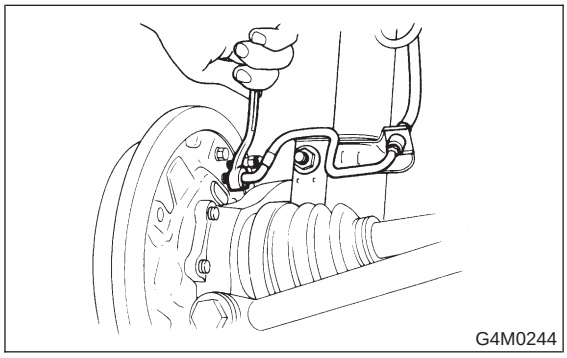


NOTE:
If brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.

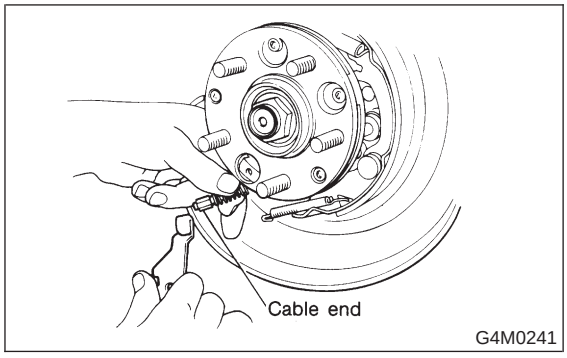


8) Using a flare-nut wrench, disconnect brake pipe from wheel cylinder.

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

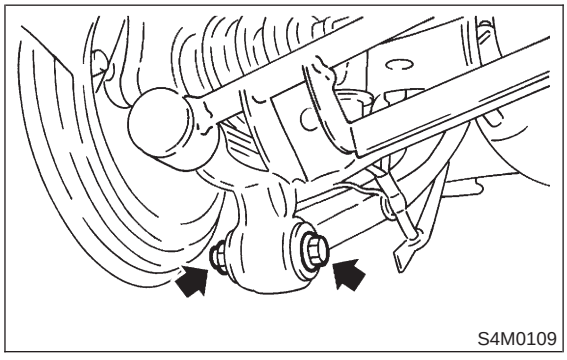


9) Disconnect parking brake cable end.



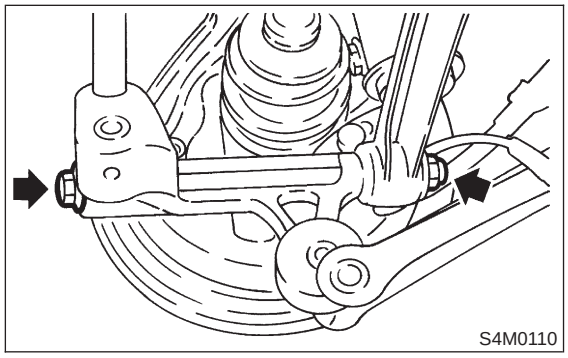
10) Disconnect rear stabilizer from rear lateral link.
11) Remove bolts which secure trailing link assembly to rear housing.

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



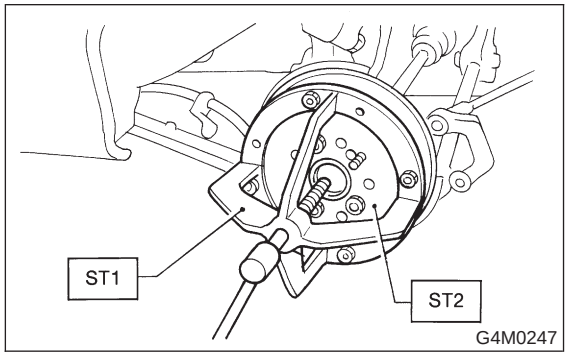
12) Remove bolts which secure lateral link assembly to rear housing.

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


S4M0110

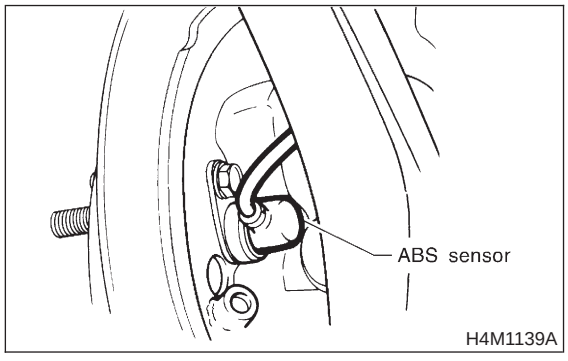
13) Disengage BJ from housing splines, and remove rear drive shaft assembly. If it is hard to remove, use STs.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 PLATE

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



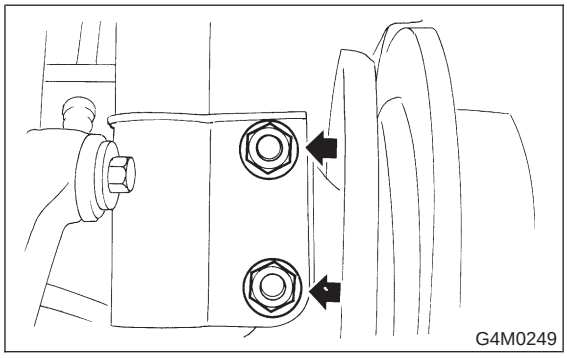
G4M0247

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



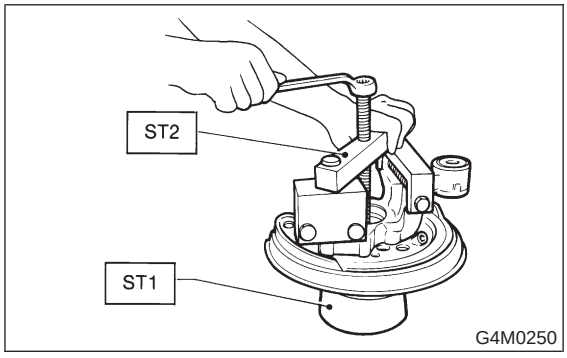
H4M1139A

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


G4M0249

B: DISASSEMBLY

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

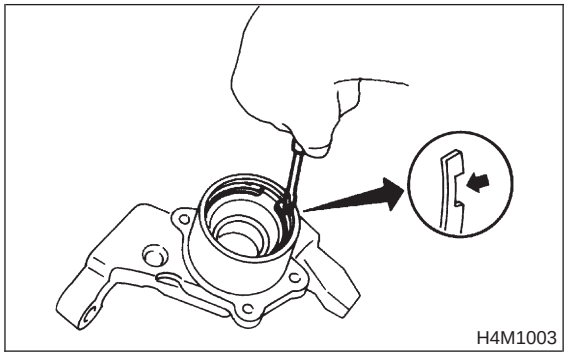


G4M0250

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

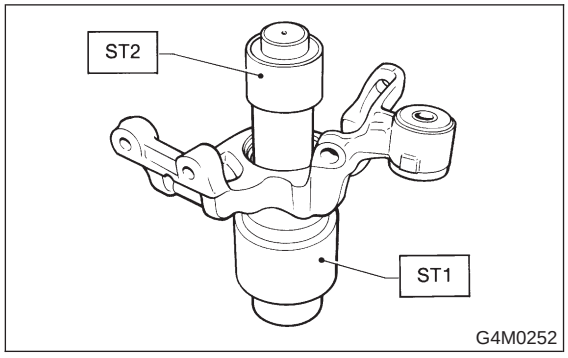
CAUTION:
Use new oil seals.

4) Using flat bladed screwdriver, remove snap ring.


H4M1003

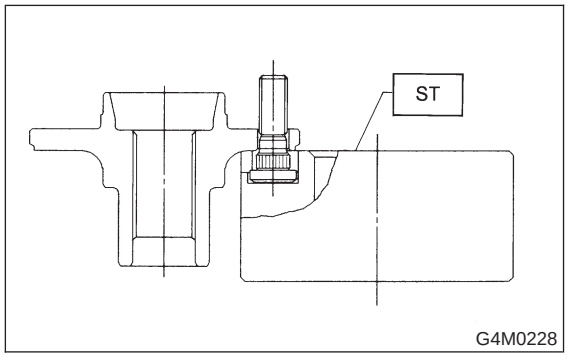
5) Using ST1 and ST2, remove bearing by pressing inner race.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

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

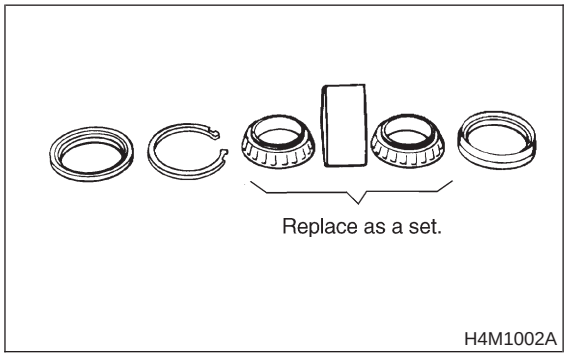
CAUTION:
Be careful not to hammer hub bolts. This may deform hub.



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.**

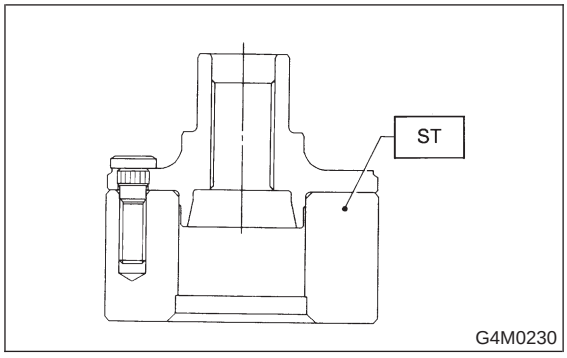


D: ASSEMBLY

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

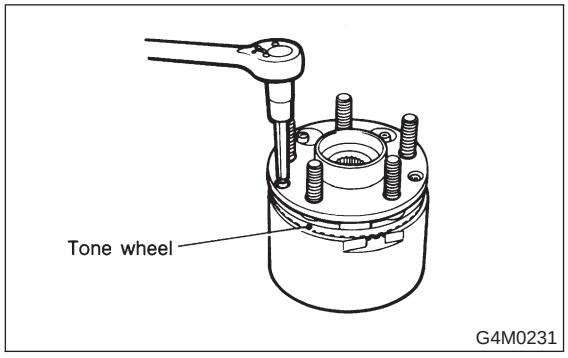
CAUTION:
- **Ensure hub bolt closely contacts hub.**
- **Use a 12 mm (0.47 in) hole in the ST to prevent hub bolt from tilting during installation.**

ST 927080000 HUB STAND



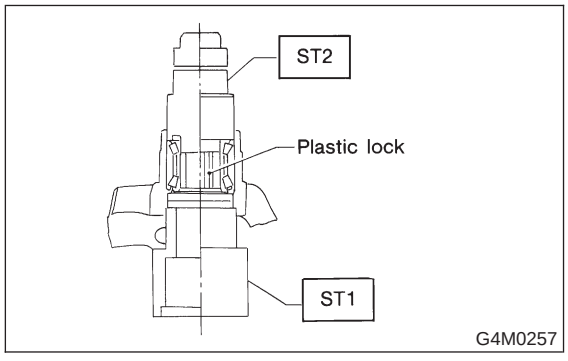
2) Remove foreign particles (dust, rust, etc.) from mating surfaces of hub and tone wheel, and install tone wheel to hub (only vehicle equipped with ABS).

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



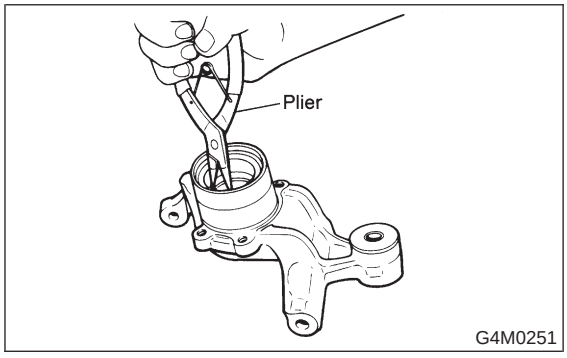
3) Clean housing interior completely. Using ST1 and ST2, press bearing into housing.
ST1 927430000 HOUSING STAND
ST2 927440000 BEARING REMOVER

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.**

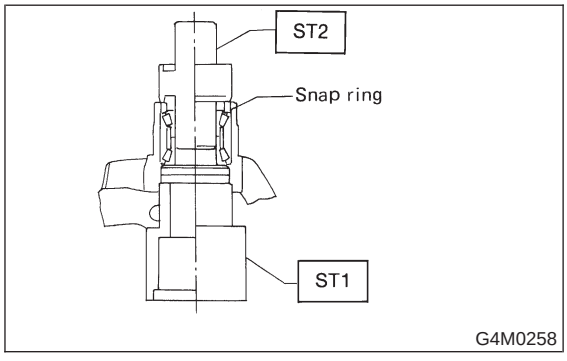


4) Using plier, install snap ring.

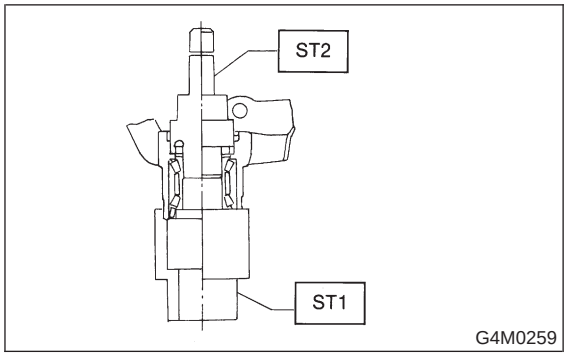
CAUTION:
Ensure snap ring fits in groove properly.



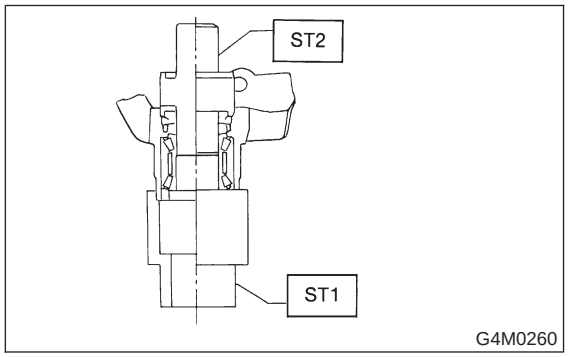
5) Using ST1 and ST2, press outer oil seal until it comes in contact with snap ring.
ST1 927430000 HOUSING STAND
ST2 927460000 OIL SEAL INSTALLER



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.

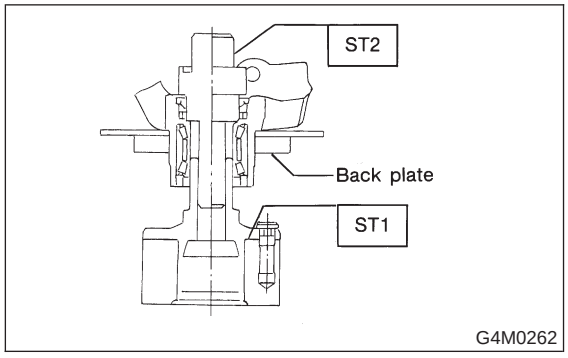
Specified grease:
SHELL 6459N

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±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)

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



E: INSTALLATION

1. DISC BRAKE

1) Connect rear housing assembly and strut assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
147±15 N·m (15±1.5 kg-m, 108±11 ft-lb)

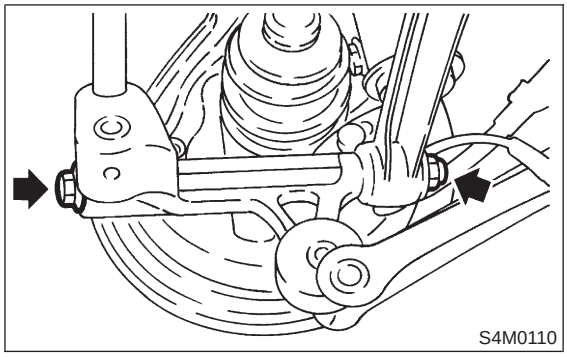
2) Fit BJ (bell joint) to rear housing splines.

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

3) Connect rear housing assembly to lateral link assembly.

CAUTION:
Use a new self-locking nut.

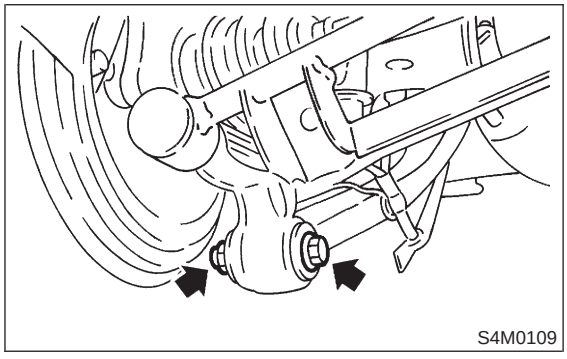
Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)



4) Connect rear housing assembly to trailing link assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
98 — 127 N·m (10 — 13 kg-m, 72 — 94 ft-lb)



5) Connect rear stabilizer to rear lateral link.

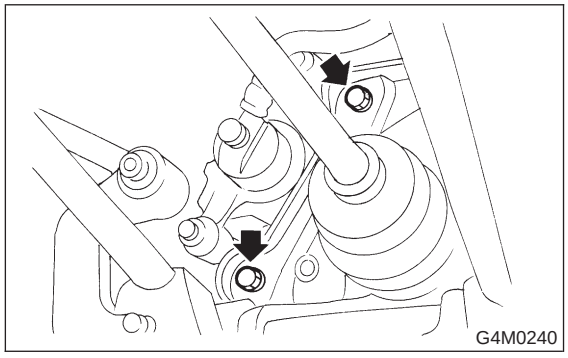
CAUTION:
Use a new self-locking nut.

Tightening torque:
44±6 N·m (4.5±0.6 kg-m, 32.5±4.3 ft-lb)

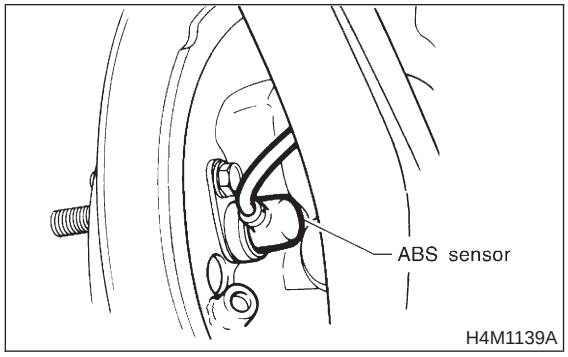
6) Connect parking brake cable to parking brake.
7) Install disc rotor on rear housing assembly.

8) Install disc brake caliper on back plate.

Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)



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



10) Bleed air from brake system. <Ref. to 4-4 [W10B0].>
11) Adjust parking brake lever stroke by turning adjuster.
12) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

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

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

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

Tightening torque:
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

2. DRUM BRAKE

1) Connect rear housing assembly and strut assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
147±15 N·m (15±1.5 kg-m, 108±11 ft-lb)

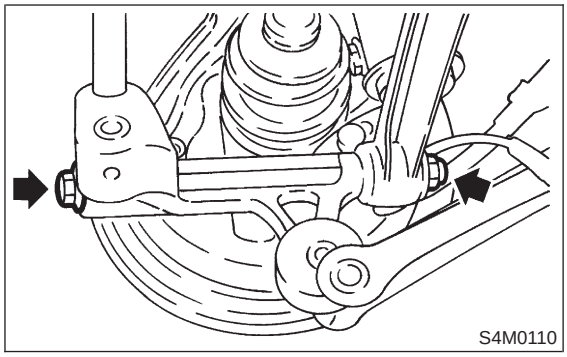
2) Fit BJ (bell joint) to rear housing splines.

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

3) Connect rear housing assembly to lateral link assembly.

CAUTION:
Use a new self-locking nut.

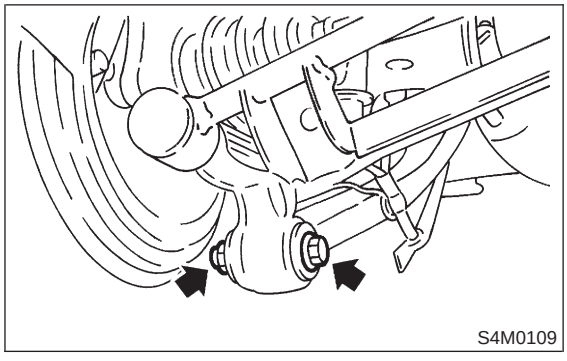
Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)



4) Connect rear housing assembly to trailing link assembly.

CAUTION:
Use a new self-locking nut.

Tightening torque:
98 — 127 N·m (10 — 13 kg-m, 72 — 94 ft-lb)



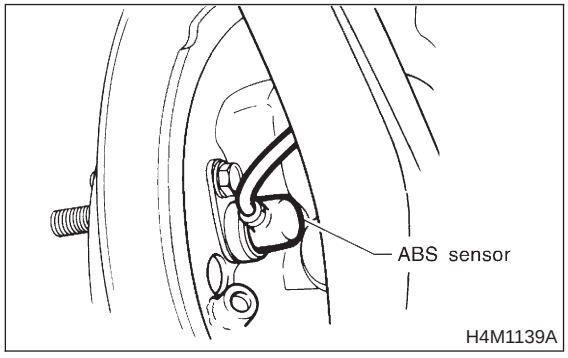
5) Connect rear stabilizer to rear lateral link.

CAUTION:
Use a new self-locking nut.

Tightening torque:
44±6 N·m (4.5±0.6 kg-m, 32.5±4.3 ft-lb)

6) Connect parking brake cable to parking brake.
7) Clean brake pipe connection. Using a flare-nut wrench, connect brake pipe to wheel cylinder.

8) Connect rear ABS sensor to back plate (only vehicle equipped with ABS).



9) Connect parking brake cable to lever.
10) Install brake drum on rear housing assembly.
11) Bleed air from brake system. <Ref. to 4-4 [W10B0].>
12) Adjust parking brake lever stroke by turning adjuster.
13) Move brake lever back to apply brakes. While depressing brake pedal, tighten axle nut using a socket wrench. Lock axle nut after tightening.

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

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

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

Tightening torque:
88±10 N·m (9±1 kg-m, 65±7 ft-lb)

3. Front and Rear Drive Shafts

A: REMOVAL

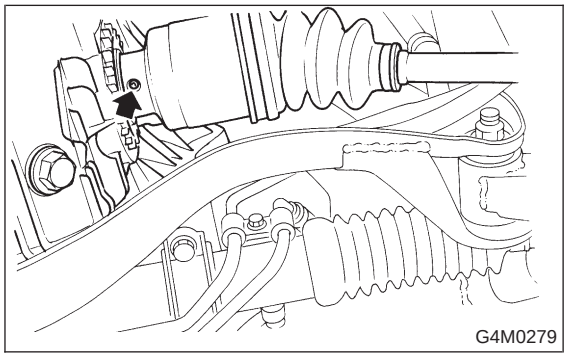
1. FRONT DRIVE SHAFT

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

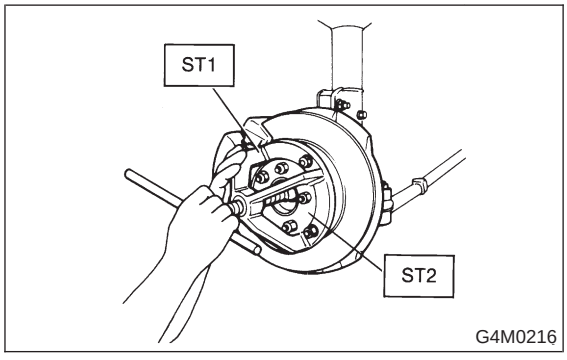
5) Disconnect transverse link from housing.
6) Remove spring pin which secures transmission spindle to SFJ.

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.

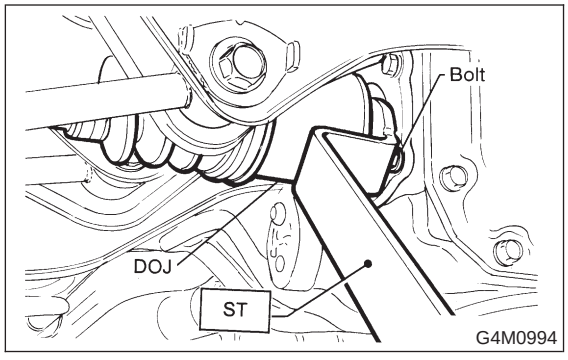
CAUTION:
Discard old self-locking nut. Replace with a new one.

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

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

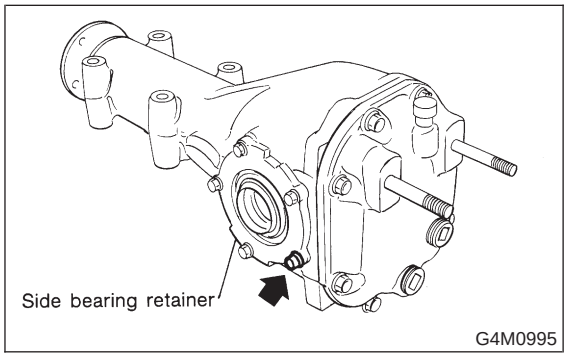
8) Remove DOJ from rear differential using ST. (Except 2200 cc AT vehicles)
ST 28099PA100 DRIVE SHAFT REMOVER

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



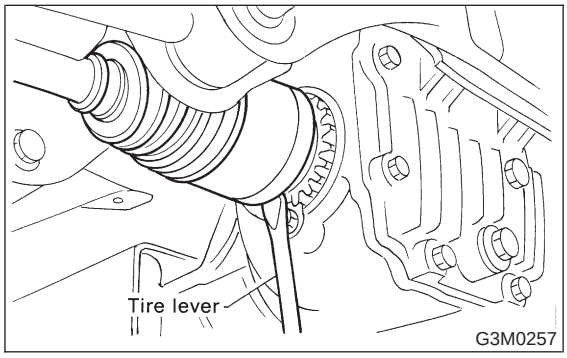
CAUTION:
Be careful not to damage side bearing retainer. Always use bolt as shown in figure, as supporting point for ST during removal.

ST 28099PA100 DRIVE SHAFT REMOVER

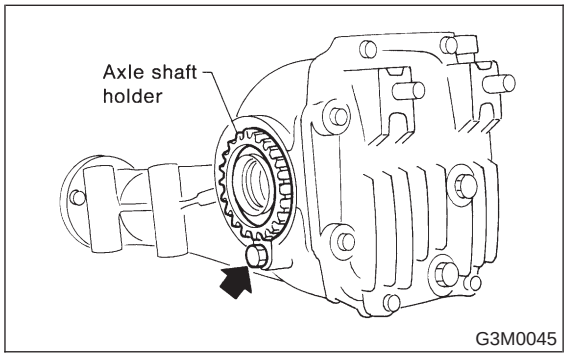


9) Remove DOJ from rear differential using tire lever. (2200 cc AT vehicles)

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

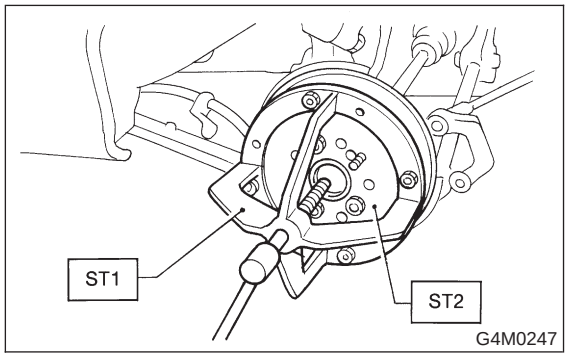


CAUTION:
When removing the DOJ from the rear differential, fit tire lever to the bolt as shown in figure so as not to damage the axle shaft holder.



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

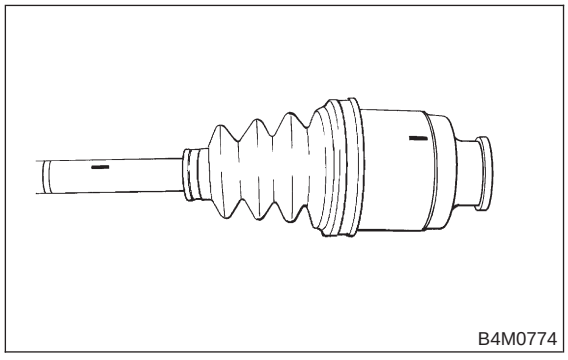
CAUTION:
● Be careful not to damage oil seal lip when removing rear drive shaft.
● When rear drive shaft is to be replaced, also replace inner oil seal with a new one.



B: DISASSEMBLY

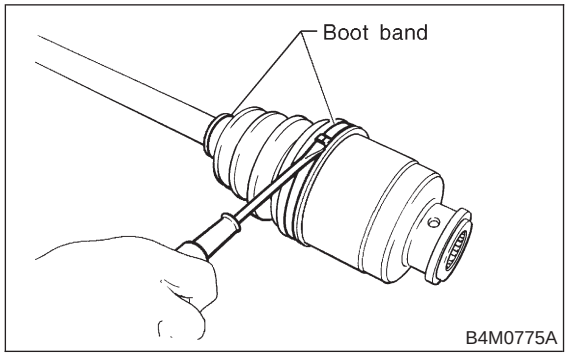
1. FRONT DRIVE SHAFT

1) Place alignment marks on shaft and outer race.

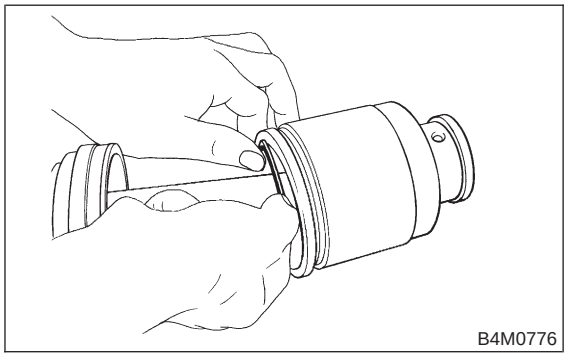


2) Remove SFJ boot band and boot.

CAUTION:
Be careful not to damage boot.



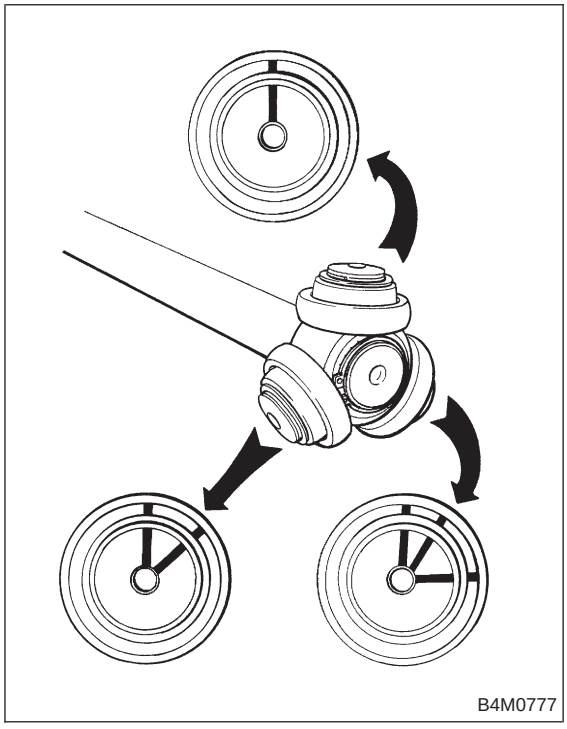
3) Remove circlip from SFJ outer race using screwdriver.



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

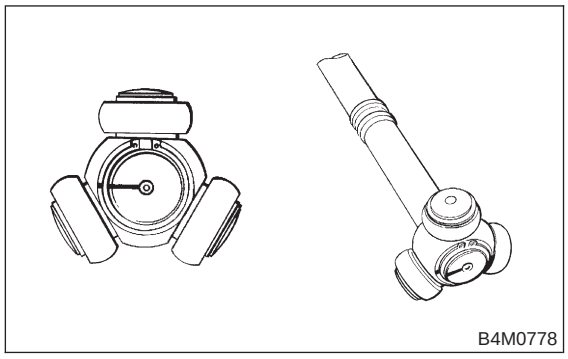
CAUTION:
The grease is a special grease. Do not confuse with other greases.

6) Place alignment mark on free ring and trunnion.

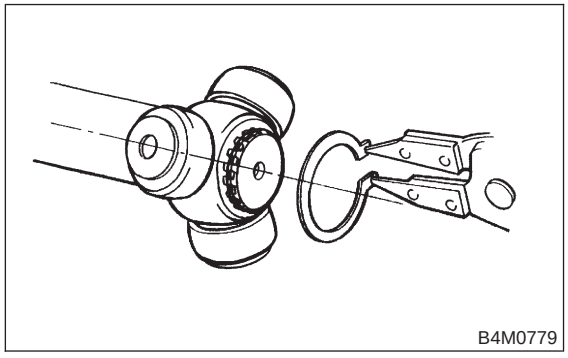


7) Remove free ring from trunnion.

8) Place alignment mark on trunnion and shaft.



9) Remove snap ring and trunnion.

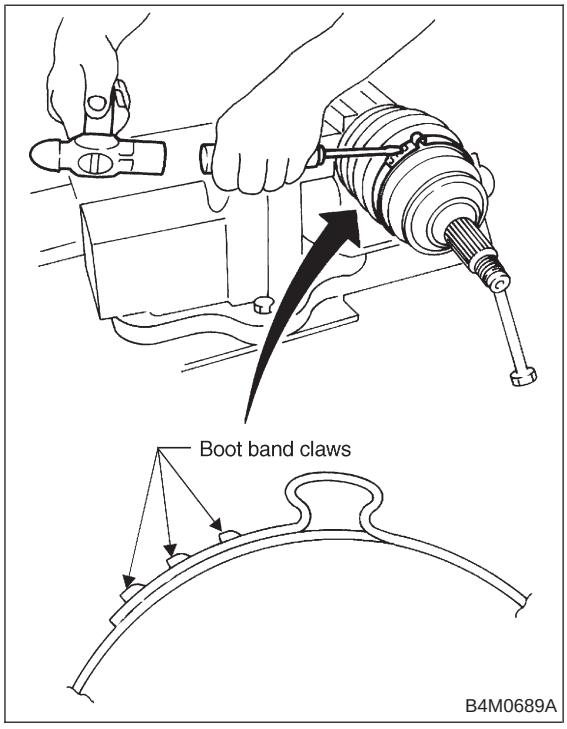


CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

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

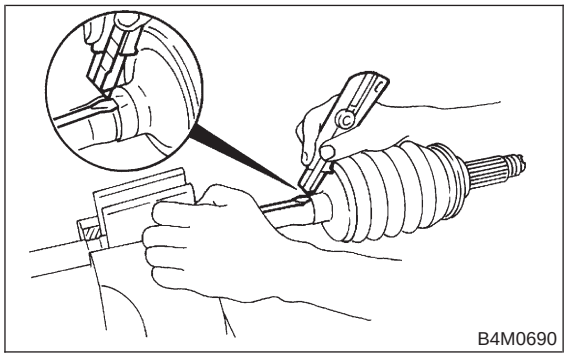
CAUTION:
Do not place drive shaft directly in the vise; use wooden block.

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



13) Cut and remove the boot.

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

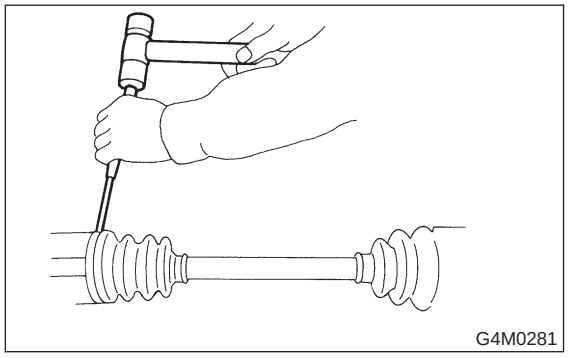


14) Thus, disassembly of axle is completed, but BJ cannot be disassembled.

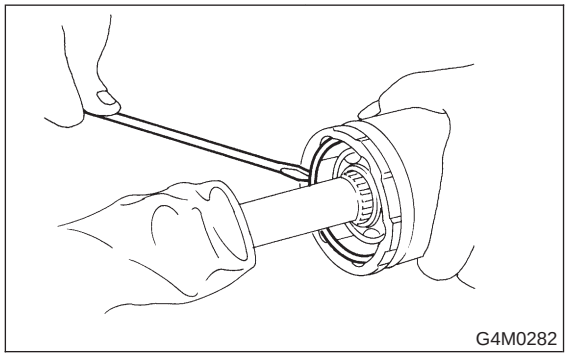
2. REAR DRIVE SHAFT

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

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


G4M0281

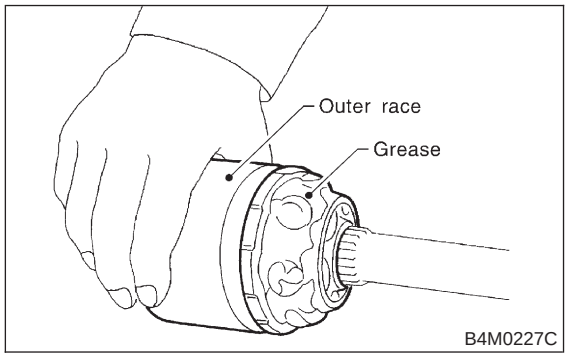
3) Remove boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.
5) Pry and remove round circlip located at the neck of DOJ outer race with a screwdriver.


G4M0282

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

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

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



B4M0227C

8) To remove the cage from the inner race, turn the cage by a half pitch to the track groove of the inner race and shift the cage.
9) Remove snap ring, which fixes inner race to shaft, by using pliers.
10) Take out DOJ inner race.
11) Take off DOJ cage from shaft and remove DOJ boot.

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

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

C: INSPECTION

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

D: ASSEMBLY

1. FRONT DRIVE SHAFT

CAUTION:
Use specified grease.

BJ side:
NTG2218 (Part No. 28093AA020)

SFJ side:
NTG30B (Part No. 28095AC000)

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

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

2) Place drive shaft in a vise.

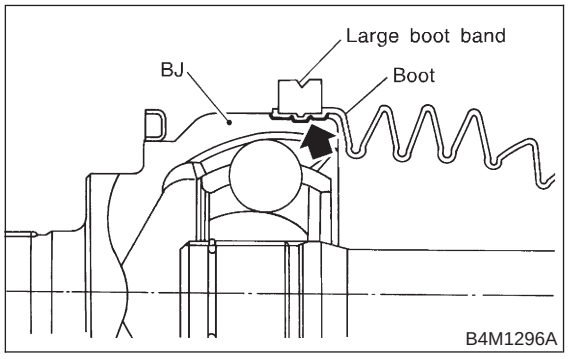
CAUTION:
Do not place drive shaft directly in the vise; use wooden blocks.

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

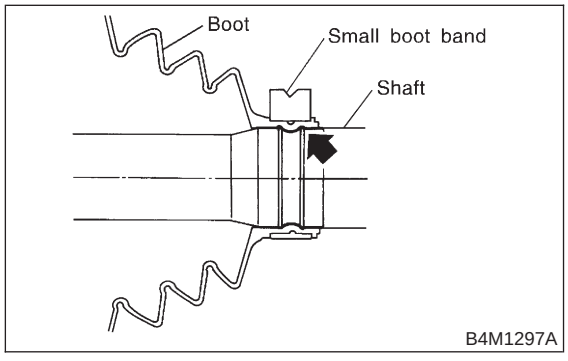
4) Apply an even coat of specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.

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

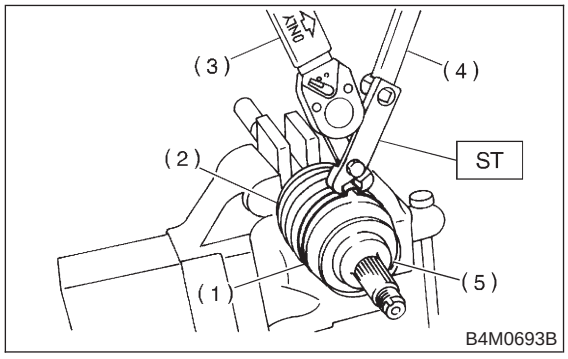
5) Install boot projecting portion to BJ groove.



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



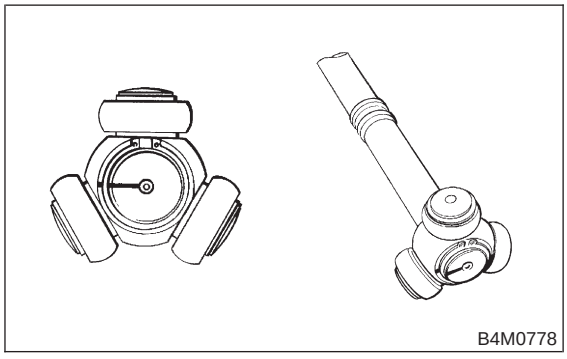
8) Tighten boot bands using ST, torque wrench and socket flex handle.
ST 28099AC000 BOOT BAND PLIER



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

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

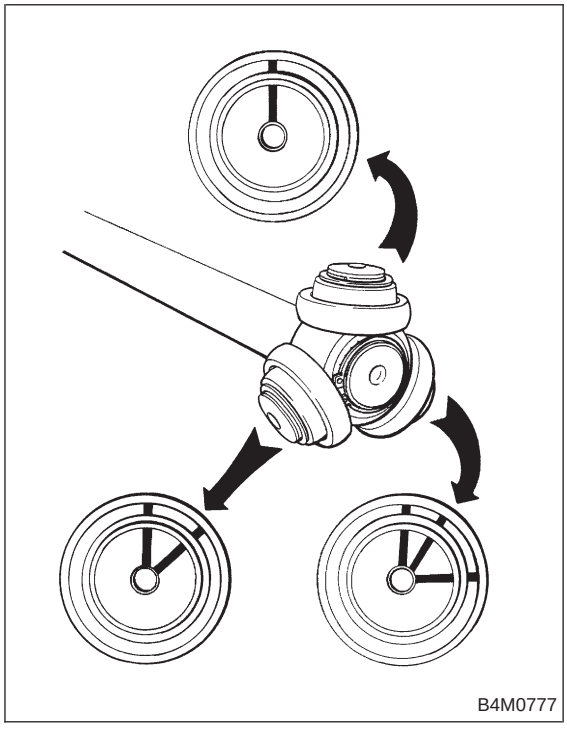
9) Place SFJ boot at the center of shaft.
10) Align alignment marks and install trunnion on shaft.



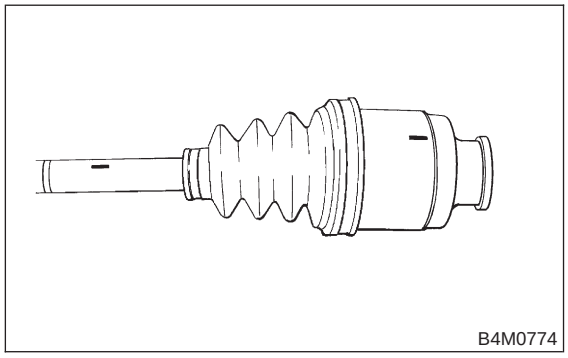
11) Install snap ring to shaft.

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

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



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


B4M0774

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

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

17) Apply an even coat of the specified grease 30 to 40 g (1.06 to 1.41 oz) to the entire inner surface of boot.
18) Install SFJ boot taking care not to twist it.

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

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

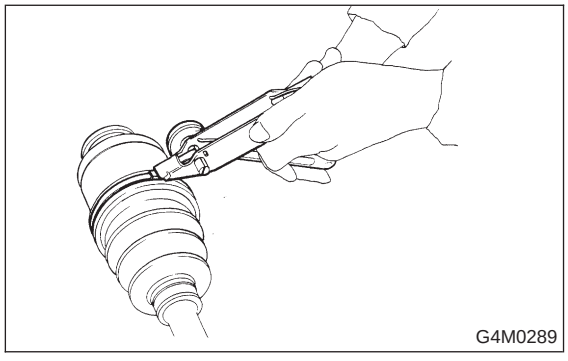
CAUTION:
Use a new band.

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

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

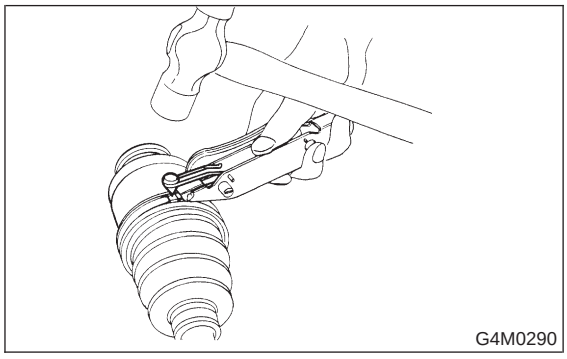
21) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

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


G4M0289

22) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

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


G4M0290

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

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

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

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

2. REAR DRIVE SHAFT

CAUTION:
Use specified grease.

BJ side:
Molylex No. 2 (Part No. 723223010) or Sunlight TB2-A

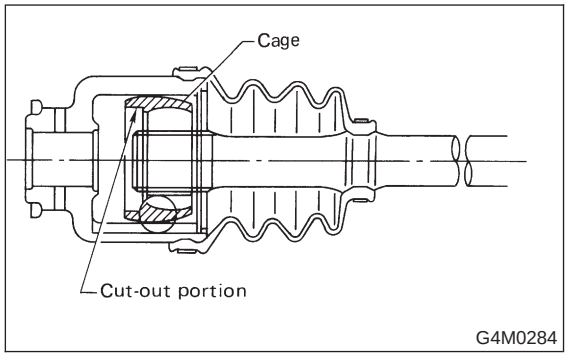
DOJ side:
VU-3A702 (Yellow) (Part No. 23223GA050)

1) Install BJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.
2) Place DOJ boot at the center of shaft.

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

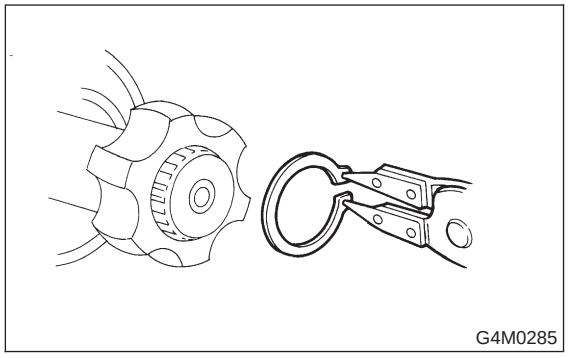
3) Insert DOJ cage onto shaft.

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



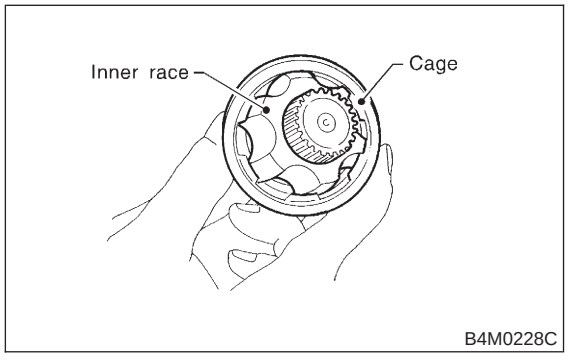
4) Install DOJ inner race on shaft and fit snap ring with pliers.

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

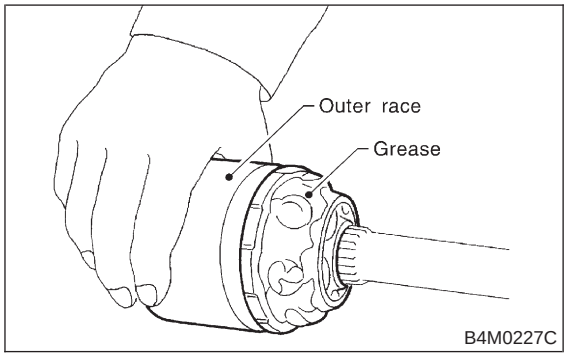


5) Install cage, which was previously fitted, to inner race fixed upon shaft.

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

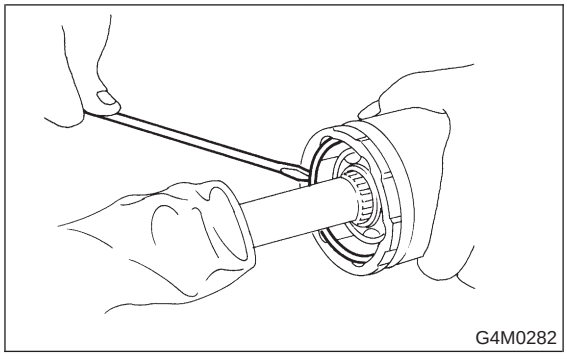


6) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.
7) Apply a coat of specified grease to the cage pocket and six balls.
8) Insert six balls into the cage pocket.
9) Align the outer race track and ball positions and place in the part where shaft, inner race,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



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

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



11) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.
12) Install DOJ boot taking care not to twist it.

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

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

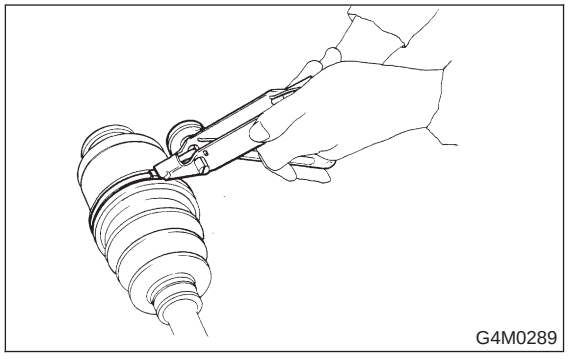
CAUTION:
Use a new band.

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

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

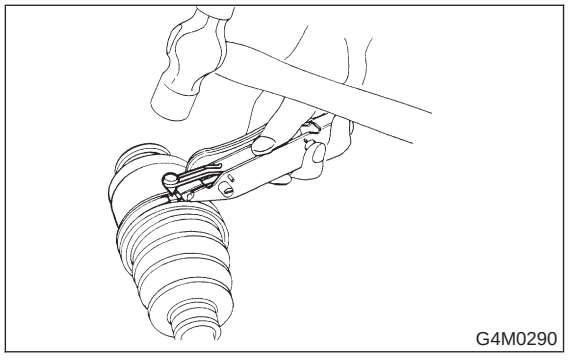
15) Tighten band by using ST.
ST 925091000 BAND TIGHTENING TOOL

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


G4M0289

16) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

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


G4M0290

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

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

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

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

E: INSTALLATION

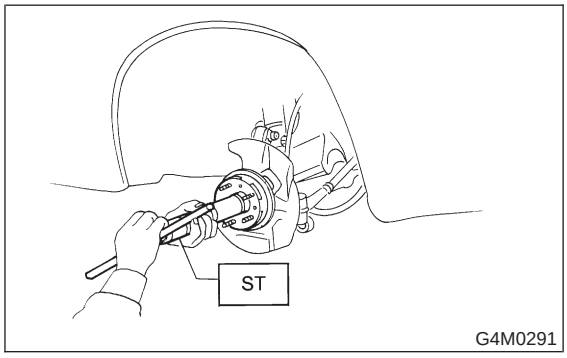
1. FRONT DRIVE SHAFT

1) Insert BJ into hub splines.

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

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

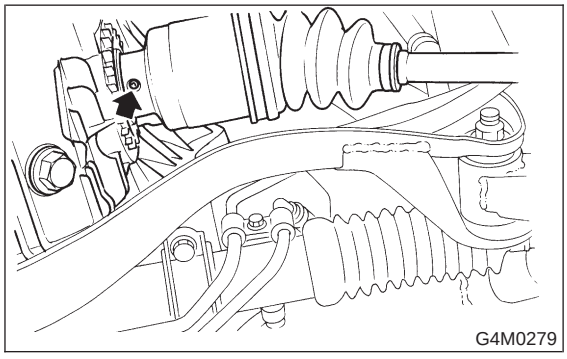
CAUTION:
Do not hammer drive shaft when installing it.



G4M0291

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

CAUTION:
Always use a new spring pin.


G4M0279

5) Connect transverse link to housing.

Torque (self-locking nut):
49±10 N·m (5.0±1.0 kg-m, 36±7 ft-lb)

CAUTION:
Use a new self-locking nut.

6) Install stabilizer bracket.
7) While depressing brake pedal, tighten axle nut to the specified torque.

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

CAUTION:
- **Use a new axle nut.**
- **Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.**

● Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

8) After tightening axle nut, lock it securely.

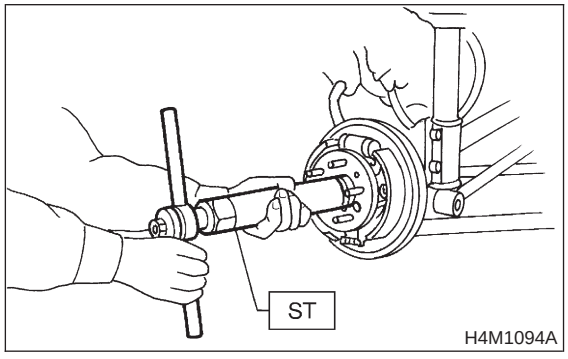
2. REAR DRIVE SHAFT

1) Insert BJ into rear housing splines.

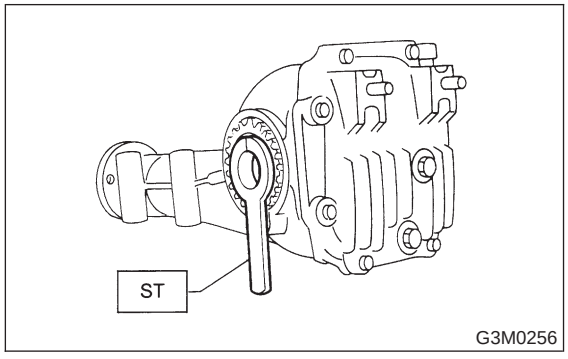
CAUTION:
Be careful not to damage inner oil seal lip.

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.



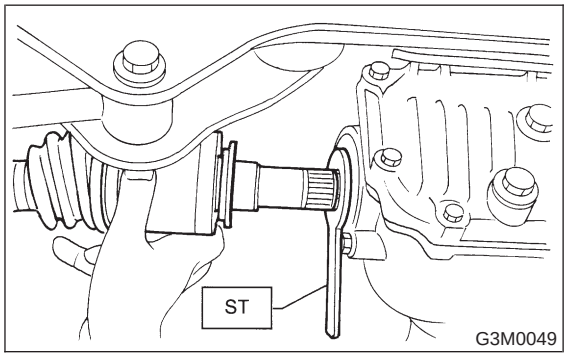
3) Tighten axle nut temporarily.
4) Replace circlips from DOJ spline with new one. (2200 cc AT model only)
5) Using ST, install DOJ into differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



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

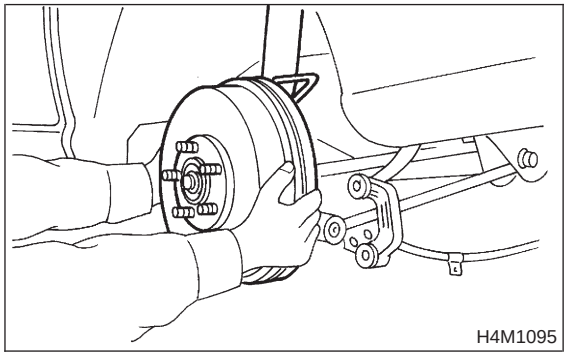
CAUTION:
Do not allow DOJ splines to damage side oil seal.

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±15 N·m (11.5±1.5 kg-m, 83±11 ft-lb)

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

Tightening torque:
137±20 N·m (14±2 kg-m, 101±14 ft-lb)

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

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

CAUTION:
● Use a new axle nut.
● Always tighten axle nut before installing wheel on vehicle. If wheel is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.

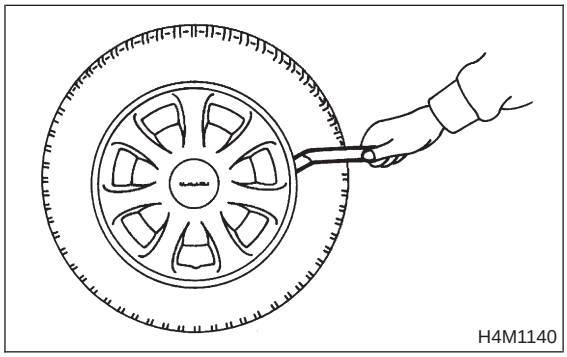
● Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

13) After tightening axle nut, lock it securely.

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.

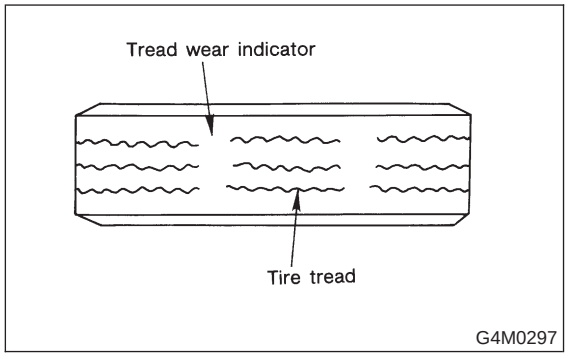
5. Steel Wheel and Tire

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:

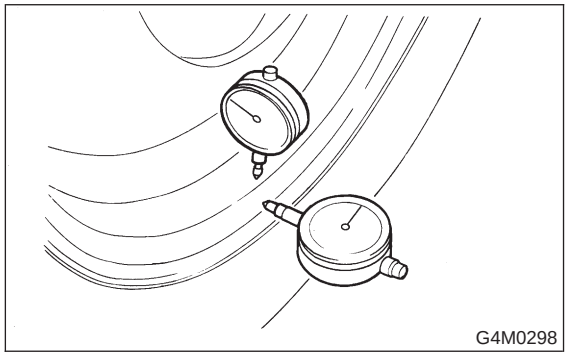
CAUTION:
● When replacing a tire, make sure to use only the same size, construction and load range as originally installed.
● Avoid mixing radial, belted bias or bias tires on the vehicle.

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

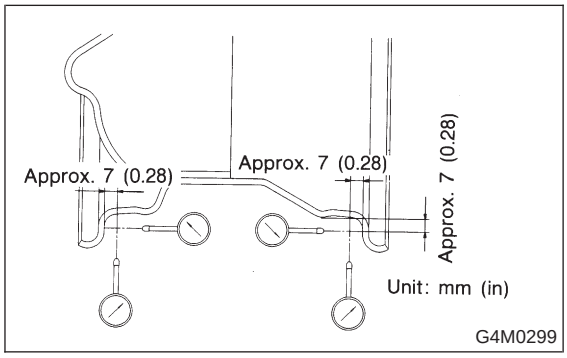


1. INSPECTION OF WHEEL RUNOUT

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)	



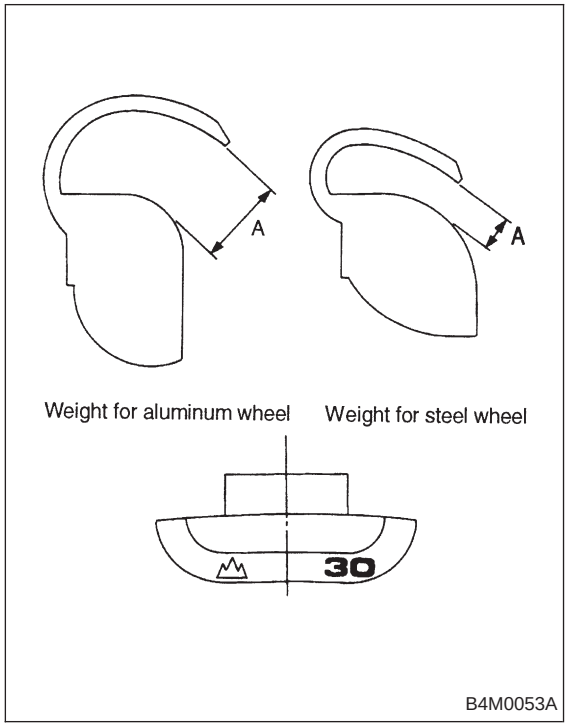
3) If rim runout exceeds specifications, remove tire from rim and check runout while attaching dial gauge to positions shown in figure.
4) If measured runout still exceeds specifications, replace the wheel.

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.

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

Service limit: A
Weight for steel wheel;
1.6 — 2.0 mm (0.063 — 0.079 in)
Weight for aluminum wheel;
4.6 — 5.4 mm (0.181 — 0.213 in)



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±10 N·m (9±1 kg-m, 65±7 ft-lb)

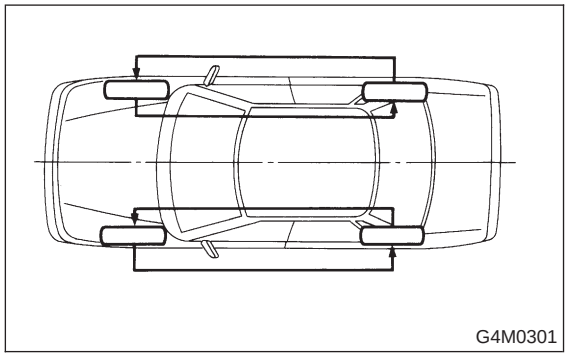
CAUTION:
● Tighten the wheel nuts in two or three steps by gradually increasing the torque and working diagonally, until the specified torque is reached. For drum brake models, excess tightening of wheel nuts may cause wheels to "judder".
● Do not depress the wrench with a foot; Always use both hands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

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

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/cm^2, 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.

10. Aluminum Wheel

A: INSPECTION

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

B: PRECAUTIONS

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

STEERING SYSTEM 4-3

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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)	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)	0.3 (0.3, 0.3)
		Total	ℓ (US qt, Imp qt)	0.7 (0.7, 0.6)

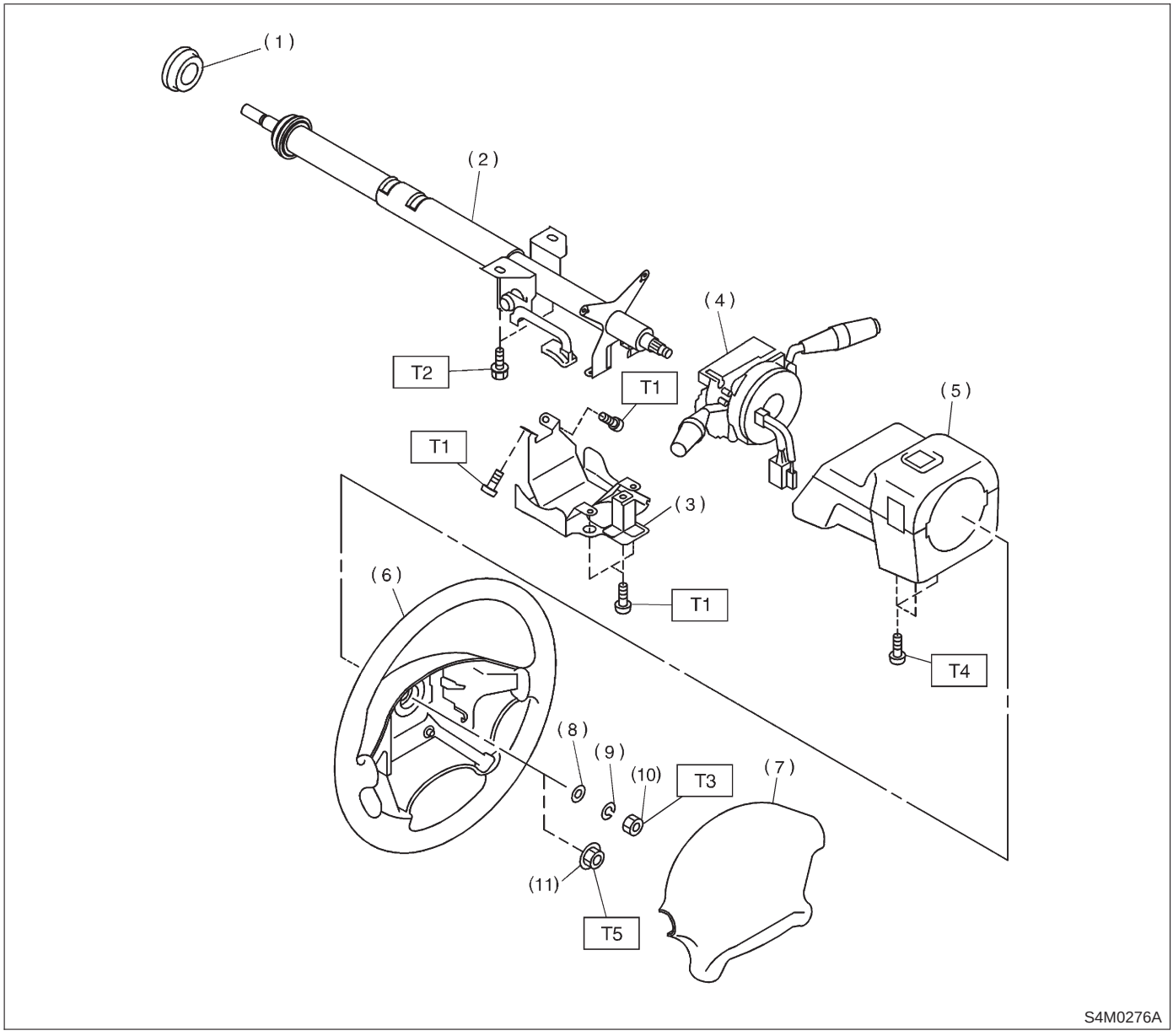
B: SERVICE DATA

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)	304 (31.0, 68.4) or less
	Rack shaft play in radial direction	Right-turn steering	mm (in)	0.15 (0.0059) or less
		Left-turn steering	mm (in)	Horizontal movement: 0.15 (0.0059) or less Vertical movement: 0.15 (0.0059) or less
	Input shaft play	In radial direction	mm (in)	0.18 (0.0071) or less
		In axial direction	mm (in)	0.1 (0.004) or less
	Turning resistance		N (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	Radial play	mm (in)	0.4 (0.016) or less
		Axial play	mm (in)	0.9 (0.035) or less
	Pulley	Ditch deflection	mm (in)	1.0 (0.039) or less
		Resistance to rotation	N (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)	7,355 (75, 1,067)
Steering wheel effort (Power steering system)	At standstill with engine idling on a concrete road		N (kg, lb)	29.4 (3.0, 6.6) or less
	At standstill with engine stalled on a concrete road		N (kg, lb)	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

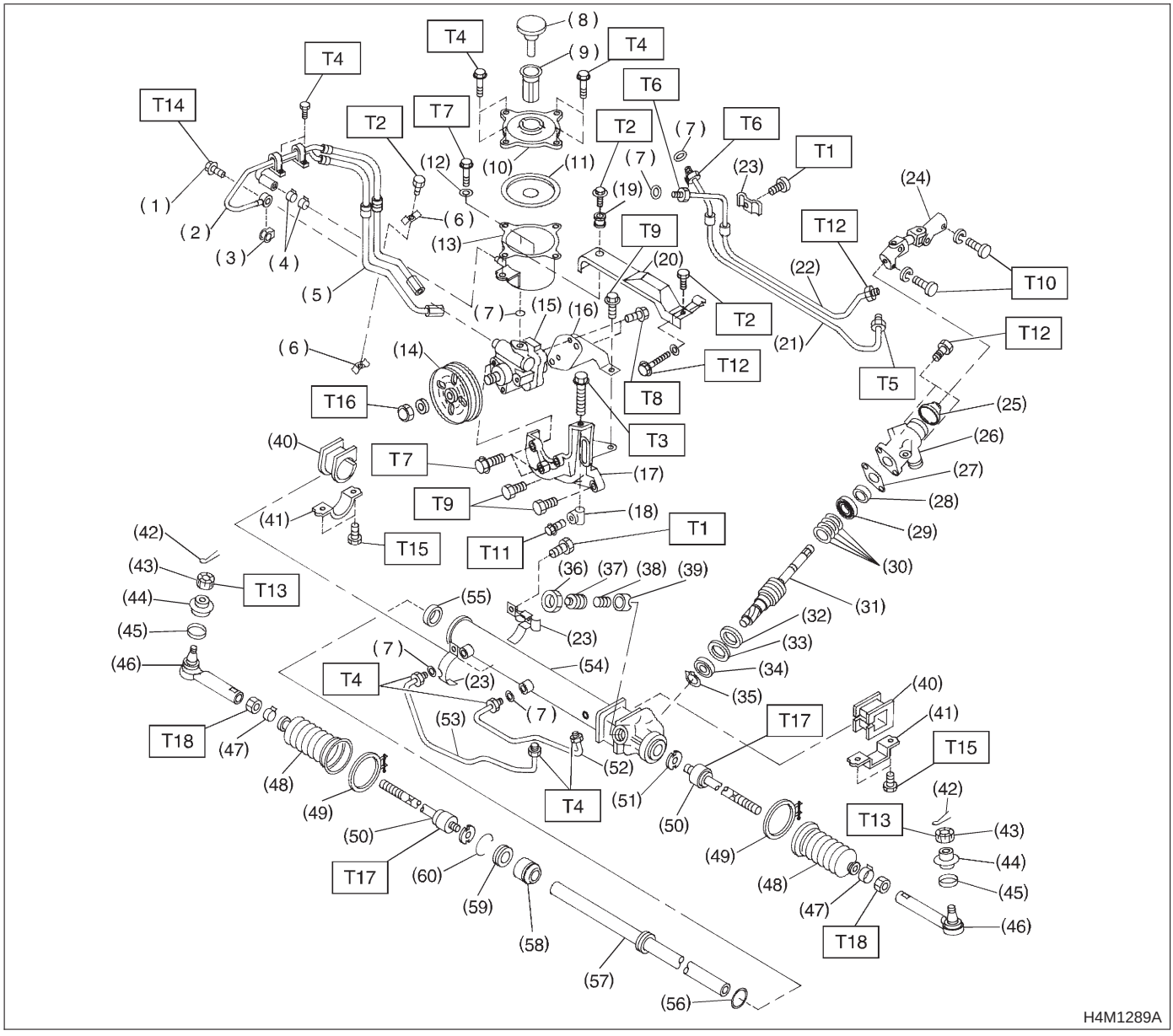
1. Steering Wheel and Column



(1) Bushing
(2) Steering shaft
(3) Knee protector
(4) Steering roll connector
(5) Column cover
(6) Steering wheel
(7) Airbag module
(8) Plain washer
(9) Spring washer
(10) Nut
(11) Flange nut

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)
T4: 1.2±0.2 (0.12±0.02, 0.9±0.1)
T5: 44±5 (4.5±0.5, 32.5±3.6)

2. Power Steering System

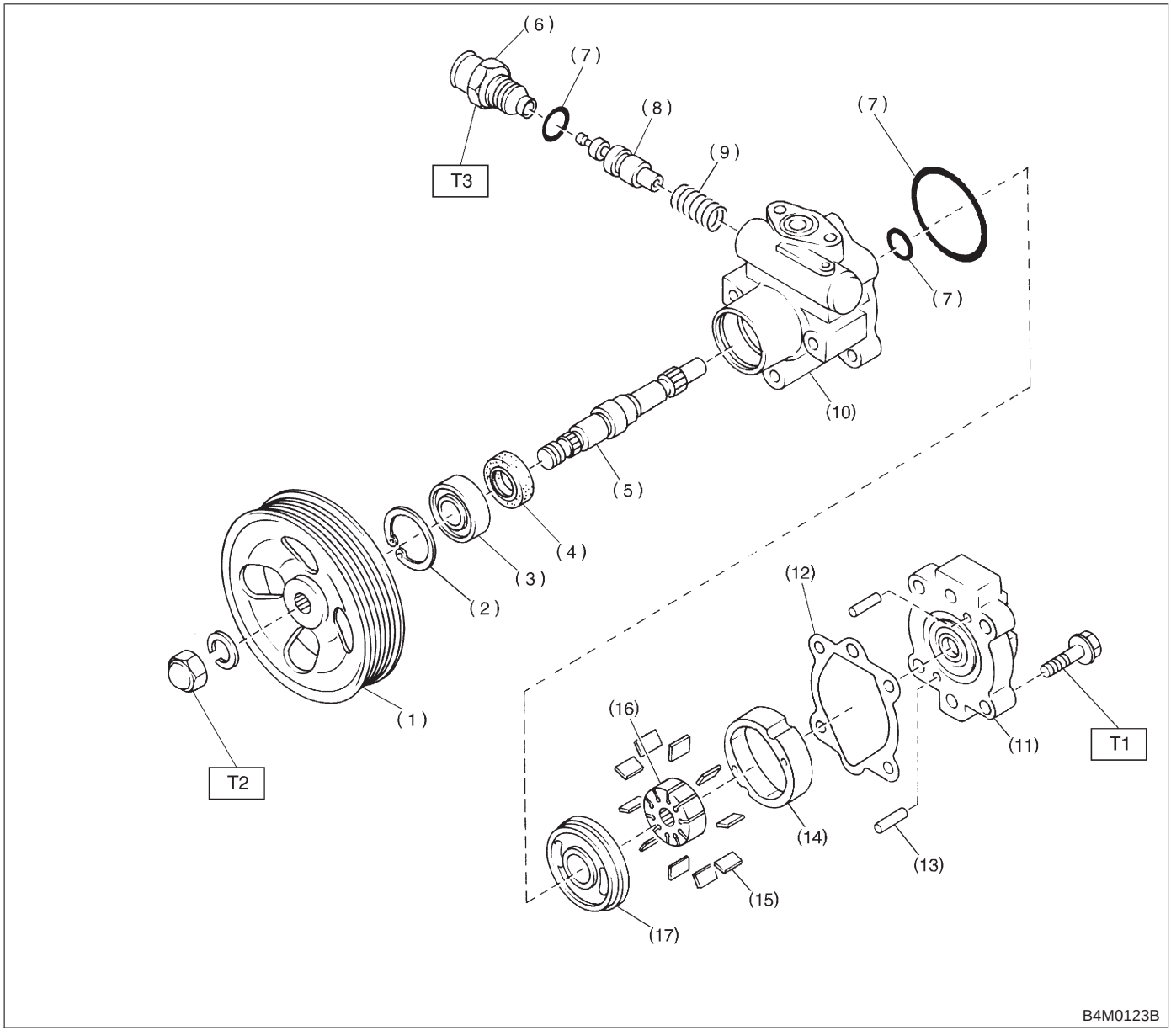


COMPONENT PARTS

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

Tightening torque: N·m (kg-m, ft-lb)
T1: 6±1 (0.6±0.1, 4.3±0.7)
T2: 7.4±2.0 (0.75±0.20, 5.4±1.4)
T3: 8±2 (0.8±0.2, 5.8±1.4)
T4: 13±3 (1.3±0.3, 9.4±2.2)
T5: 15±3 (1.5±0.3, 10.8±2.2)
T6: 15±5 (1.5±0.5, 10.8±3.6)
T7: 18^{+5}_{0} ($1.8^{+0.5}_{0}$, $13.0^{+3.6}_{0}$)
T8: 20.1±2.5 (2.05±0.25, 14.8±1.8)
T9: 22±2 (2.2±0.2, 15.9±1.4)
T10: 24±3 (2.4±0.3, 17.4±2.2)
T11: 25±2 (2.5±0.2, 18.1±1.4)
T12: 25±5 (2.5±0.5, 18.1±3.6)
T13: 27.0±2.5 (2.75±0.25, 19.9±1.8)
T14: 39±5 (4.0±0.5, 28.9±3.6)
T15: 59±12 (6.0±1.2, 43±9)
T16: 61±7 (6.2±0.7, 44.8±5.1)
T17: 78±10 (8.0±1.0, 58±7)
T18: 83±5 (8.5±0.5, 61.5±3.6)

3. Power Steering Oil Pump



(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. Supplement Restraint System "Airbag" AIRBAG

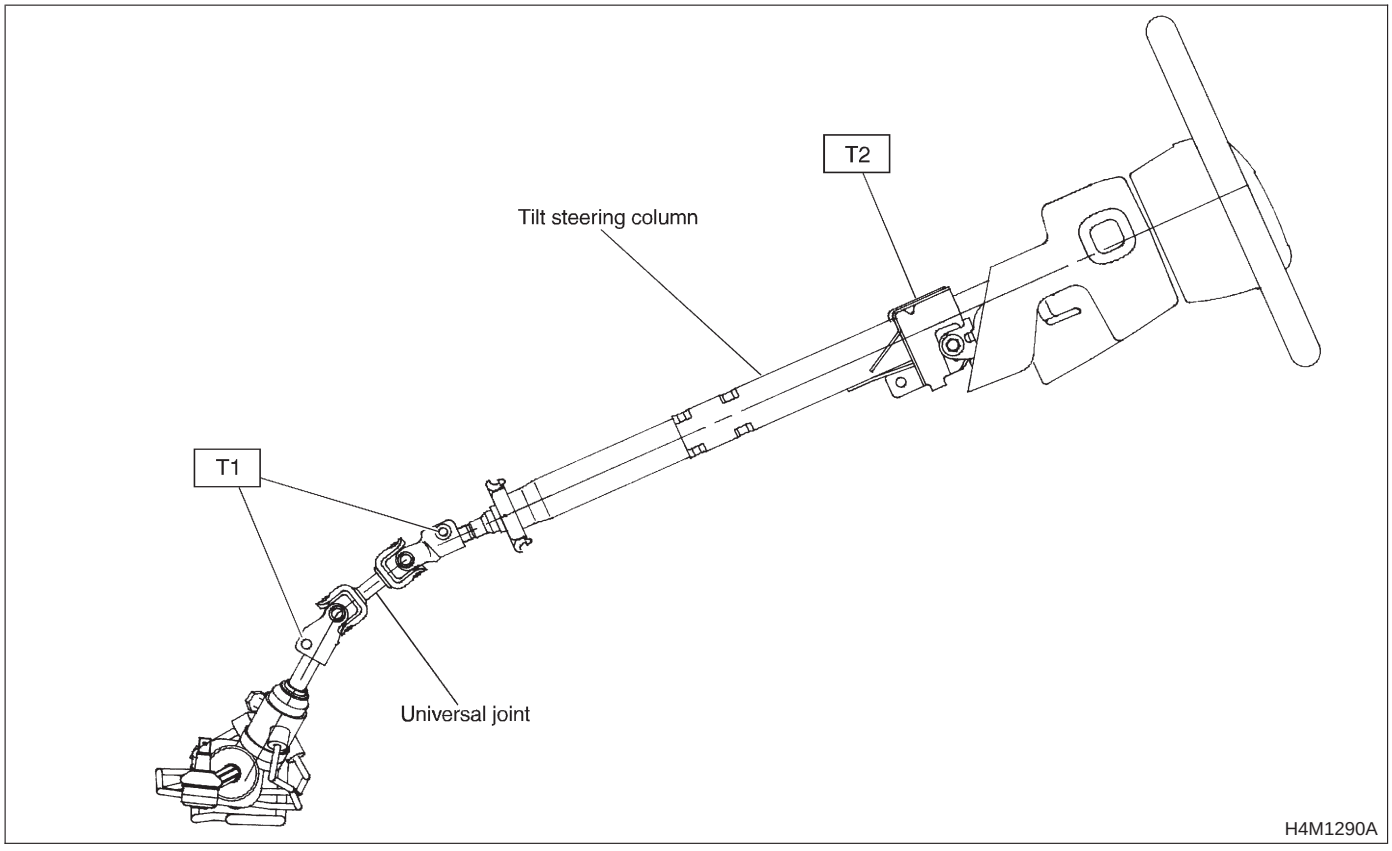
A: PRECAUTION

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

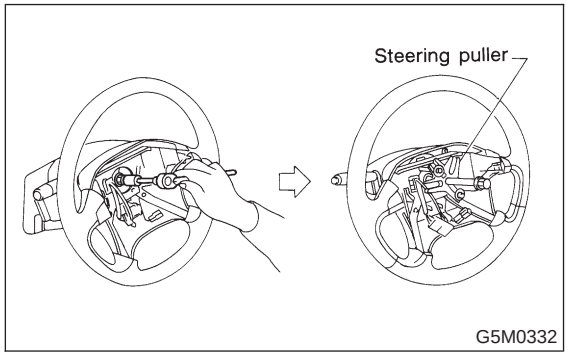


Tightening torque: N·m (kg-m, ft-lb)
T1: 24±3 (2.4±0.3, 17.4±2.2)
T2: 25±5 (2.5±0.5, 18.1±3.6)

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

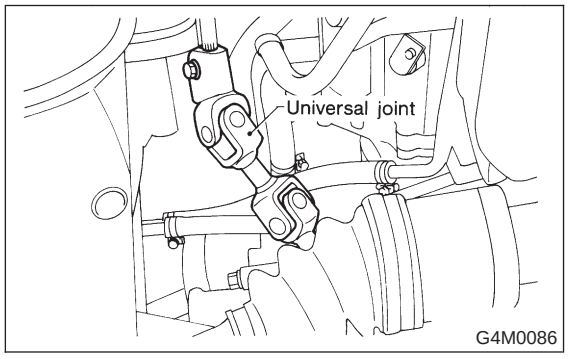
WARNING:
Always refer to "5-5 Supplemental Restraint System" before performing airbag module service (if so equipped). <Ref. to 5-5 [W1A0].>

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

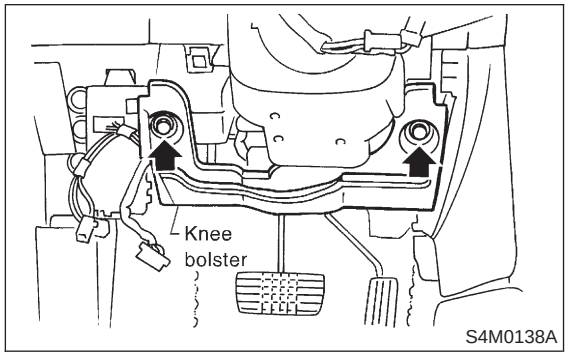


5) Remove universal joint bolts and then remove universal joint.

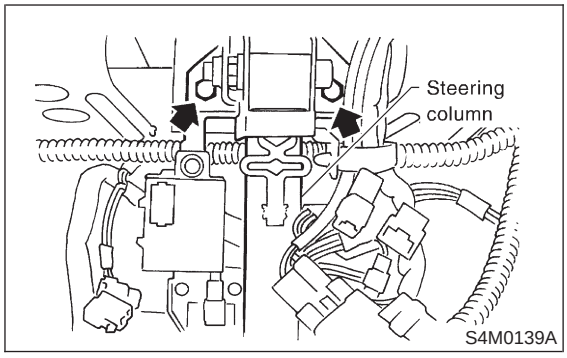
CAUTION:
Scribe alignment marks on universal joint so that it can be reassembled at the original serration.



6) Remove trim panel under instrument panel.
7) Remove knee bolster.



8) Disconnect connectors for ignition switch and combination switch wiring harness under instrument panel.
9) Remove the two bolts under instrument panel securing steering column.



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

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

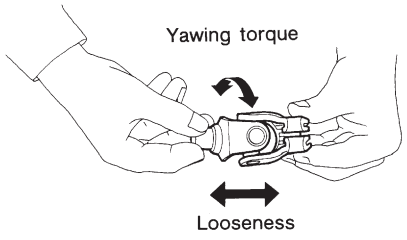
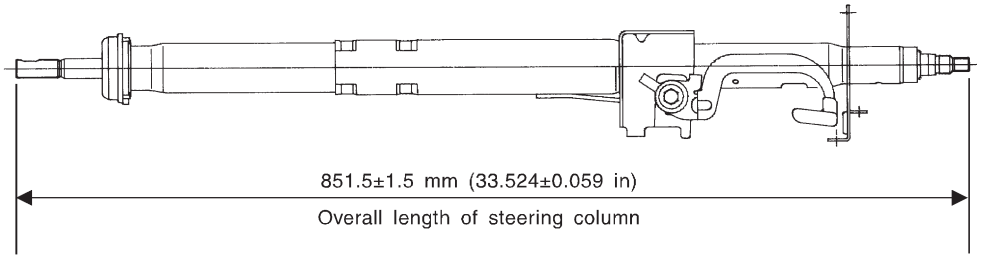
B: DISASSEMBLY

1) Remove the three 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	• Free play • Swinging torque Yawing torque Looseness  G4M0089 **Standard value of universal joint free play: 0 mm (0 in)** **Max. value of universal joint swinging torque: 0.3 N·m (0.03 kg-m, 0.2 ft-lb)**	Replace if faulty.
Steering column	• Overall length of steering column Measure overall length of steering column. Standard overall length of steering column:  H4M1309A	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 [W2F0].>

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±0.2 N·m (0.12±0.02 kg-m, 0.9±0.1 ft-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±5 N·m (2.5±0.5 kg-m, 18.1±3.6 ft-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

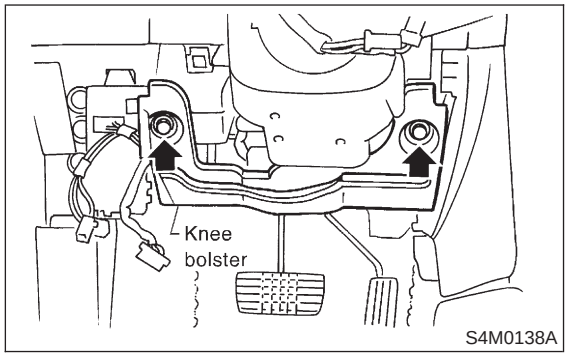
section of gearbox assembly. Lower universal joint completely.
(3) Temporarily tighten bolt on the short yoke side. Raise universal joint to make sure the bolt is properly passing through the cutout at the serrated section.
(4) Tighten bolt on the long yoke side, then that on the short yoke side.

Tightening torque:
24±3 N·m (2.4±0.3 kg-m, 17.4±2.2 ft-lb)

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

Standard clearance between gearbox to DOJ:
Over 15 mm (0.59 in)

6) Install knee bolster.



7) Align center of roll connector. (with airbag model) <Ref. to 5-5 [W6B1].>

CAUTION:
Ensure that front wheels are set in straight forward direction.

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

CAUTION:
When using a flange nut, do not use a plain washer or a spring washer.

Tightening torque:

● ***When using plain washer, spring washer and nut;***
34±5 N·m (3.5±0.5 kg-m, 25.3±3.6 ft-lb)

● ***When using flange nut;***
44±5 N·m (4.5±0.5 kg-m, 32.5±3.6 ft-lb)

Column cover-to-steering wheel clearance:
2 — 4 mm (0.08 — 0.16 in)

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

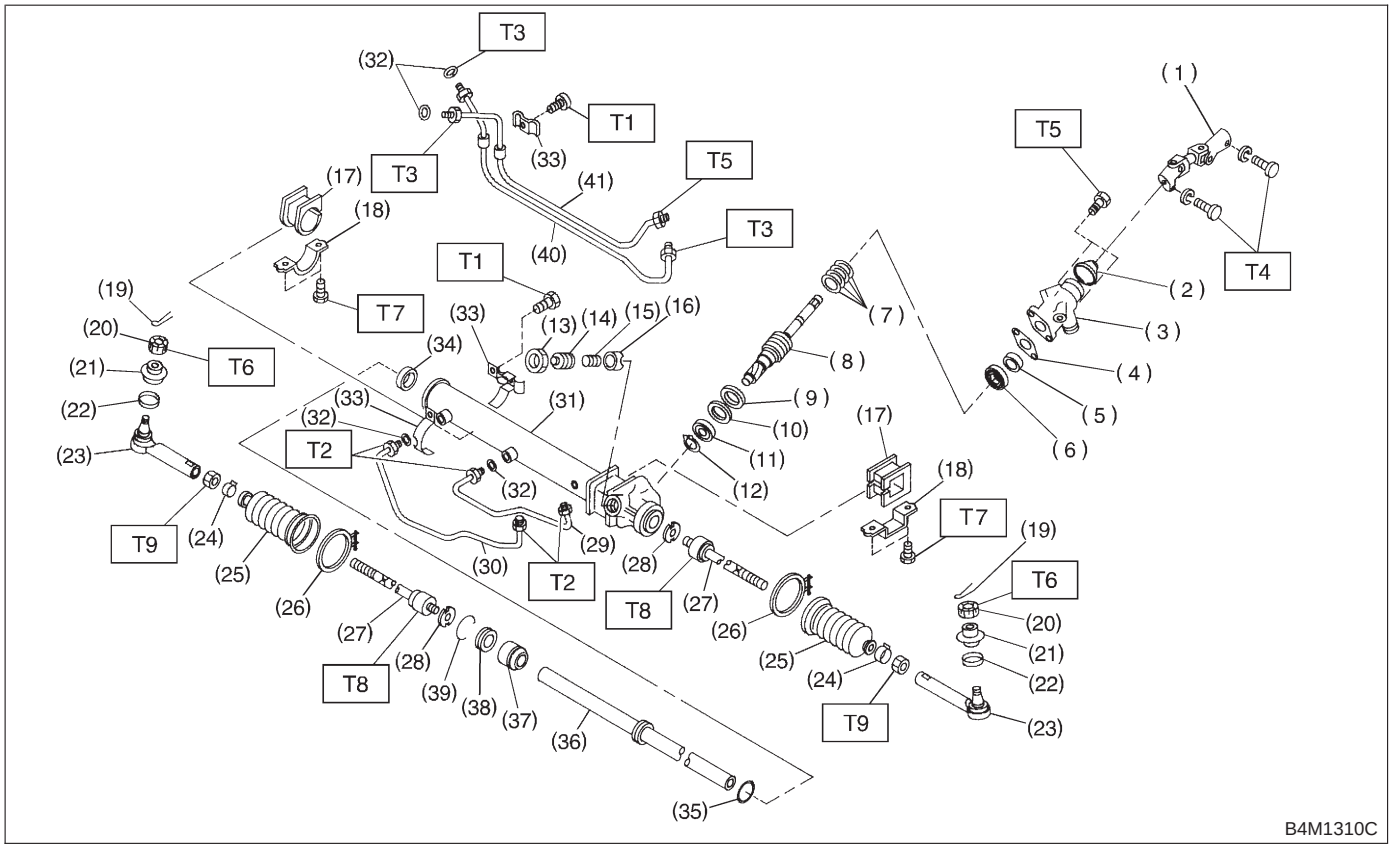
9) Install airbag module to steering wheel. (with airbag model)

WARNING:
Always refer to 5-5 Supplemental Restraint System before performing the service operation. <Ref. to 5-5 [W3A1].>

3. Steering Gearbox (Power Steering System)

A: REMOVAL

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



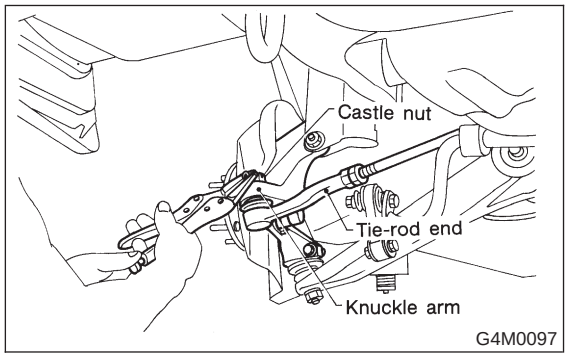
(1) Universal joint
(2) Dust cover
(3) Valve housing
(4) Gasket
(5) Oil seal
(6) Special bearing
(7) Seal ring
(8) Pinion and valve ASSY
(9) Oil seal
(10) Back-up washer
(11) Ball bearing
(12) Snap ring
(13) Lock nut
(14) Adjusting screw
(15) Spring
(16) Sleeve
(17) Adapter
(18) Clamp
(19) Cotter pin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

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

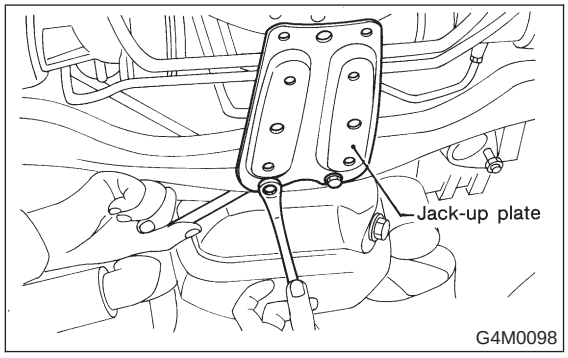
1) Disconnect battery minus terminal.
2) Loosen front wheel nut.
3) Lift vehicle and remove front wheels.
4) Remove front exhaust pipe assembly.

WARNING:
Be careful, exhaust pipe is hot.

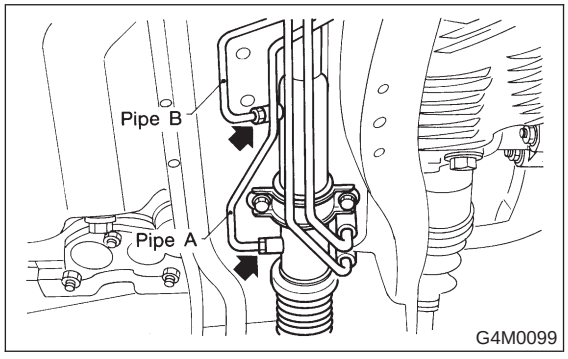
5) Using a puller, remove tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



6) Remove jack-up plate and front stabilizer.

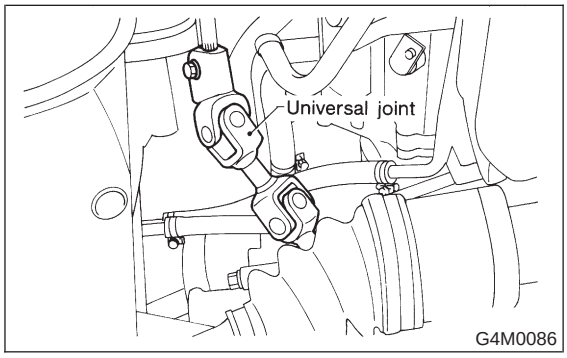


7) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.



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

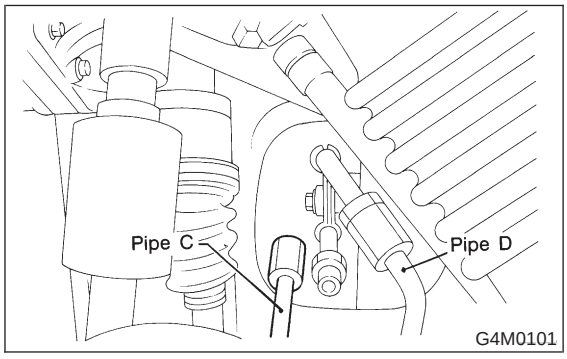
NOTE:
Place a mark on the joint and mating serration so that they can be re-installed at the original position.



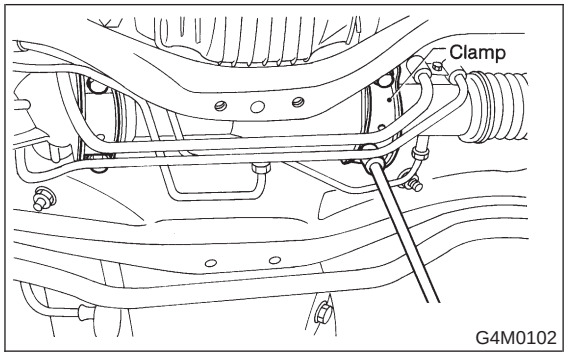
9) Disconnect pipes C and D from pipe of gearbox.

CAUTION:
Be careful not to damage these pipes.

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



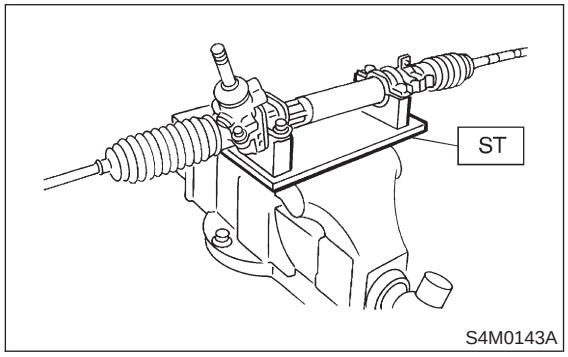
10) Remove clamp bolts securing gearbox to crossmember, and remove gearbox.



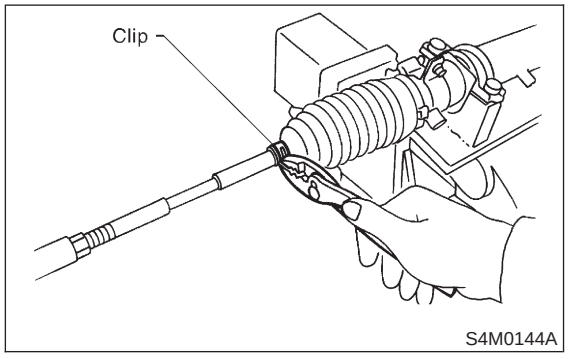
B: DISASSEMBLY

1) Disconnect four pipes from gearbox.
2) Secure gearbox removed from vehicle in vice using ST.
ST 926200000 STAND

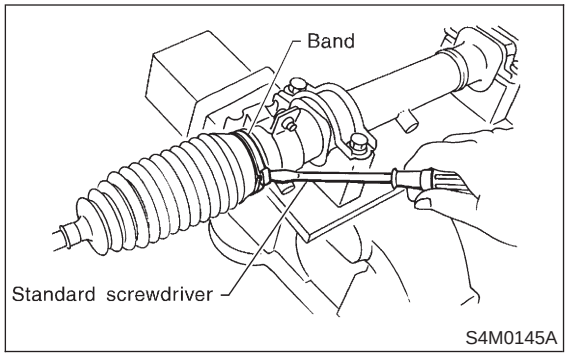
CAUTION:
Secure the gearbox in a vice using the ST as shown. Do not attempt to secure it without this ST.



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.

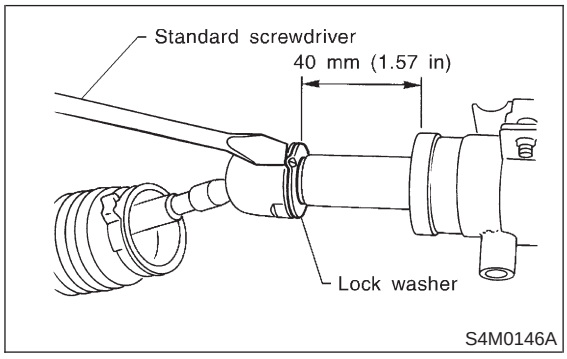


5) Using standard screwdriver, remove band from boot.

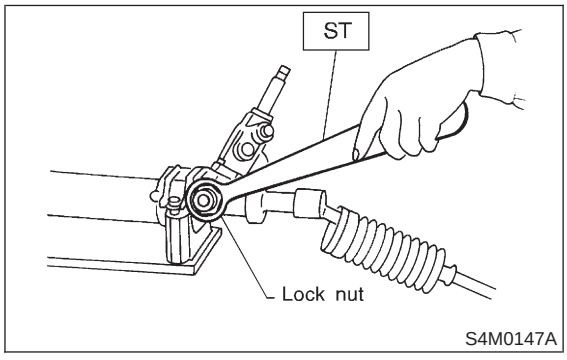


6) Extend rack approximately 40 mm (1.57 in) out. Unlock lock wire at lock washer on each side of tie-rod end using a standard screwdriver.

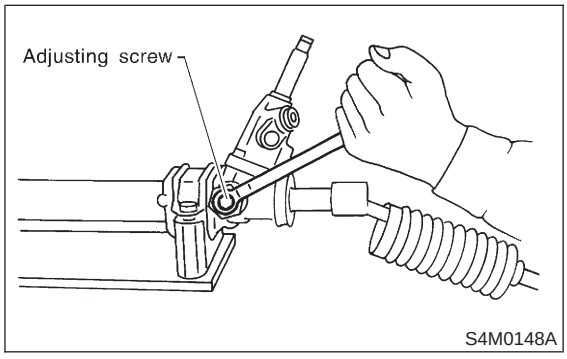
CAUTION:
Be careful not to scratch rack surface as oil leaks may result.



7) Using ST, loosen lock nut.
ST 926230000 SPANNER

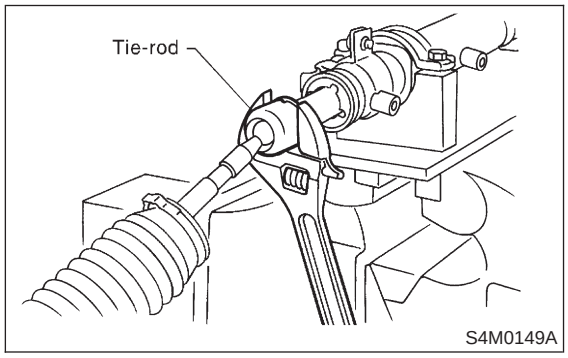


8) Tighten adjusting screw until it no longer tightens.



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

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



10) Loosen adjusting screw and remove spring and sleeve.

CAUTION:
Replace spring and/or sleeve if damaged.

C: INSPECTION

1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.
2) When disassembling, check inside of gearbox for water. If any water is found, carefully check boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

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

1. SERVICE LIMIT

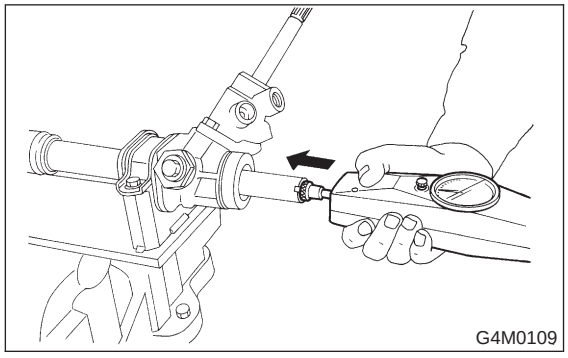
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

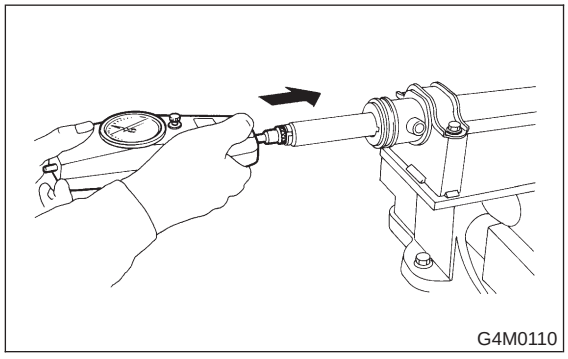
NOTE:
When making a measurement, vise gearbox by using ST. Never vise gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit
304.0 N (31.0 kg, 68.4 lb) or less


G4M0109

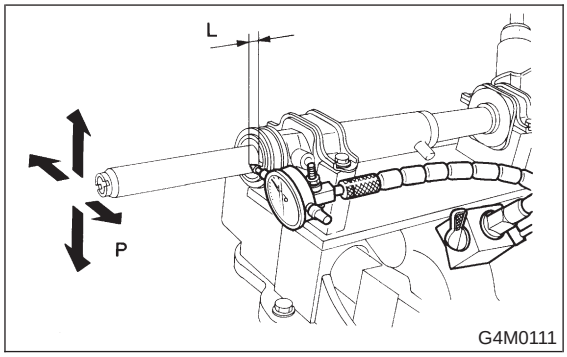

G4M0110

2. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:

Service limit
0.15 mm (0.0059 in) or less

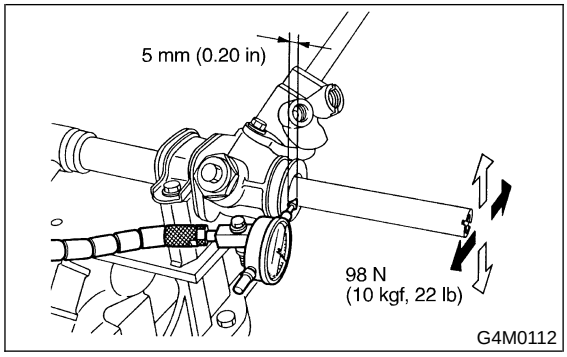
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kg, 22 lb)



G4M0111

Left-turn steering:

Service limit
Direction ⇦ ⇨
0.15 mm (0.0059 in) or less
Direction ⬅ ➡
0.15 mm (0.0059 in) or less



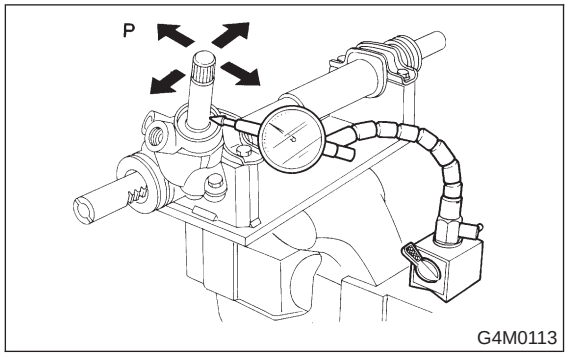
G4M0112

3. INPUT SHAFT PLAY

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

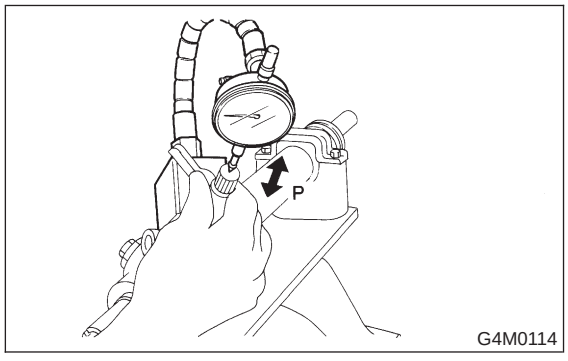
On condition
P: 98 N (10 kg, 22 lb)



In axial direction:

Service limit
0.1 mm (0.004 in) or less

On condition
P: 20 — 49 N (2 — 5 kg, 4 — 11 lb)

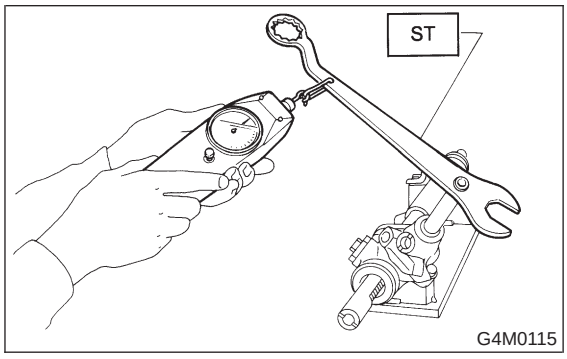


4. TURNING RESISTANCE OF GEARBOX

Using ST, measure gearbox turning resistance.

ST 926230000 SPANNER

Service limit:
Straight-ahead position within 30 mm (1.18 in) from rack center
Less than 11.18 N (1.14 kg, 2.51 lb)
Maximum allowable resistance
12.7 N (1.3 kg, 2.9 lb)



D: ASSEMBLY

CAUTION:
Use only SUBARU genuine grease for gearbox.

Grease:
VALIANT GREASE M2
[Part No. 003608001, net 0.5 kg (1.1 lb)]

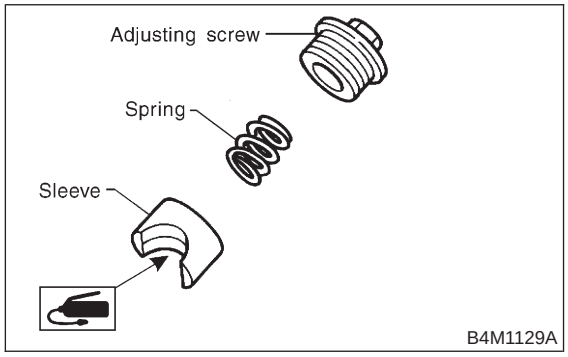
1) Clean all parts and tools before reassembling.
2) Apply grease to teeth of rack so that grease applied is about as high as teeth, and also apply a thin film of grease to sliding portion of rack shaft.

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

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

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

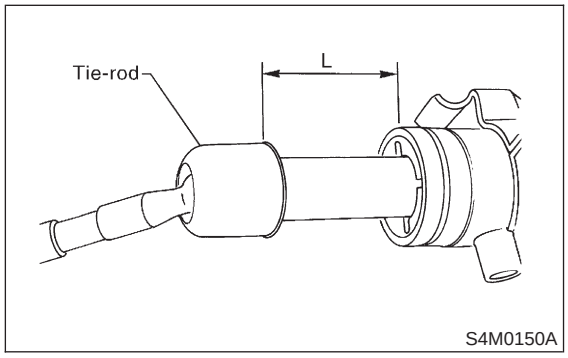
5) Apply grease to sliding surface of sleeve and spring seat, then insert sleeve into pinion housing. Fit spring into sleeve screw, pack grease inside of screw, then install the screw.



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

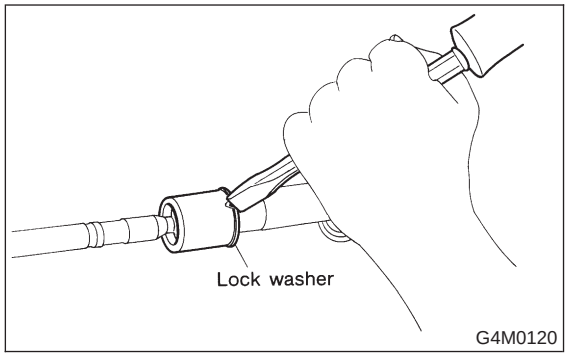
On condition
L: Approximately 40 mm (1.57 in)

Tightening torque:
78±10 N·m (8.0±1.0 kg-m, 58±7 ft-lb)

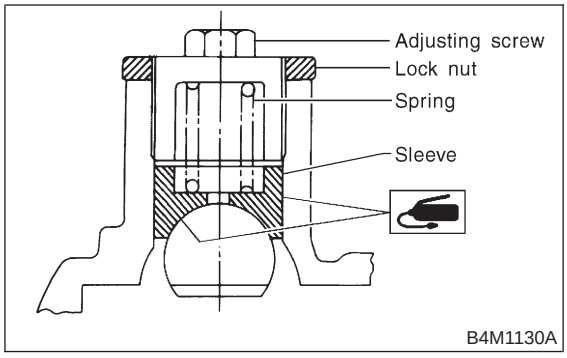


7) Bend lock washer using a chisel.

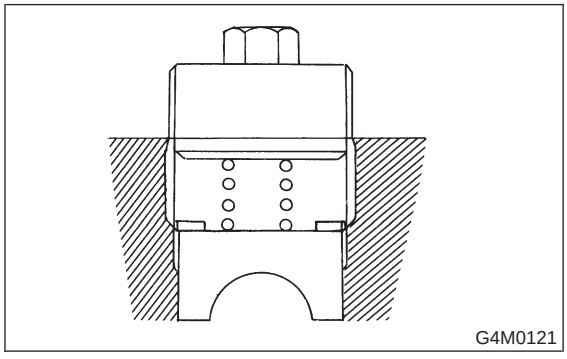
CAUTION:
Be careful not to scratch rack when bending lock washer.



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.

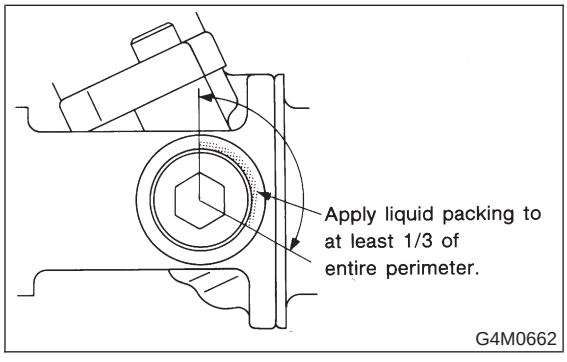


(4) Tighten adjusting screw by two threads.



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

Liquid packing:
THREE BOND 1141



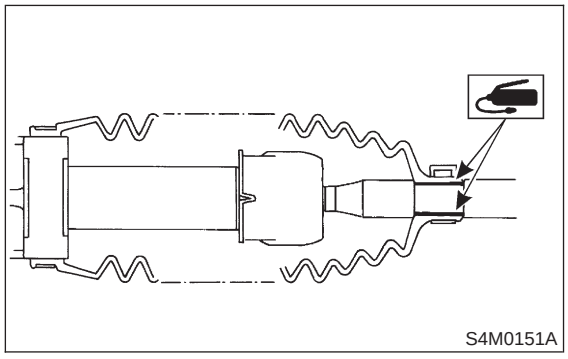
(6) Tighten adjusting screw to 7.4 N·m (0.75 kg-m, 5.4 ft-lb) and back off 25°.
(7) Install lock nut. While holding adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

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.

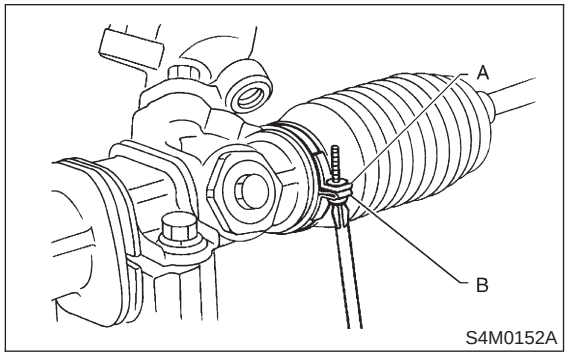
9) Check for service limit as per article of "Service limit". <Ref. to 4-3 [W3C1].> Make replacement and adjustment if necessary.
10) Install boot to housing.

NOTE:
● Before installing boot, be sure to apply grease to the groove of tie-rod.
● Install fitting portions of boots to the following portions in both sides of assembled steering gear-box.
The groove on gearbox
The groove on the rod
● Make sure that boot is installed without unusual inflation or deflation.


S4M0151A

11) Using a screwdriver, tighten the screw until the ends "A" and "B" of the band come into contact with each other.

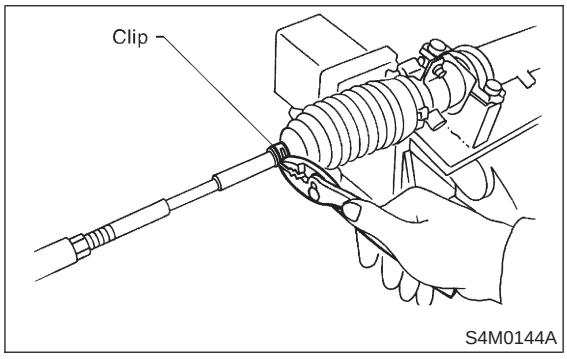
NOTE:
Always tighten the band from the underside of the gear box.



S4M0152A

12) Fix boot end with clip (small).

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

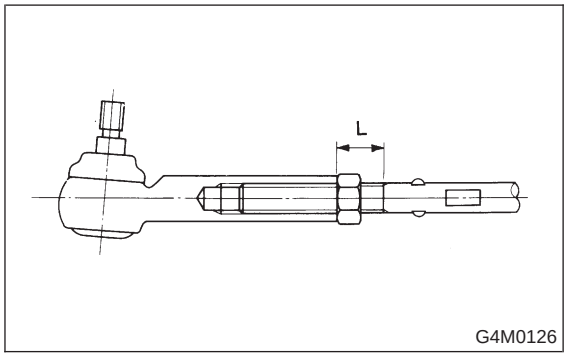


S4M0144A

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

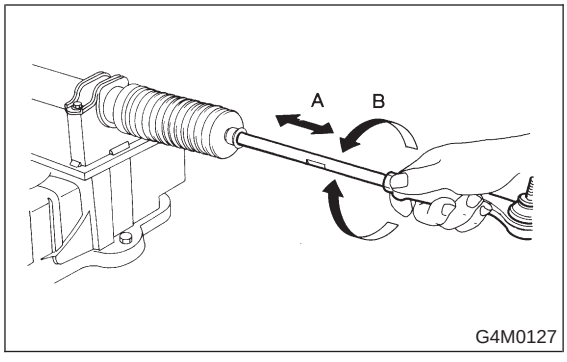
Installed tie-rod length: L
15 mm (0.59 in)

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



G4M0126

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



G4M0127

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

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

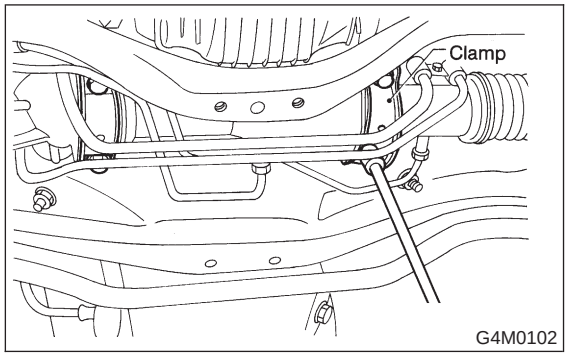
(2) Connect pipes C and D to gearbox.
Connect lower pipe C first, and upper pipe D second.

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

E: INSTALLATION

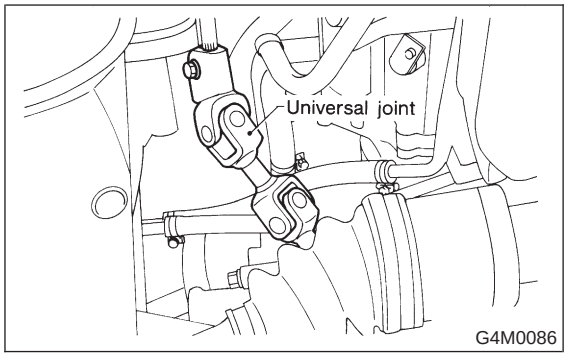
1) Insert gearbox into crossmember, being careful not to damage gearbox boot.
2) Tighten gearbox to crossmember bracket via clamp with bolt to the specified torque.

Tightening torque:
59±12 N·m (6.0±1.2 kg-m, 43±9 ft-lb)



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

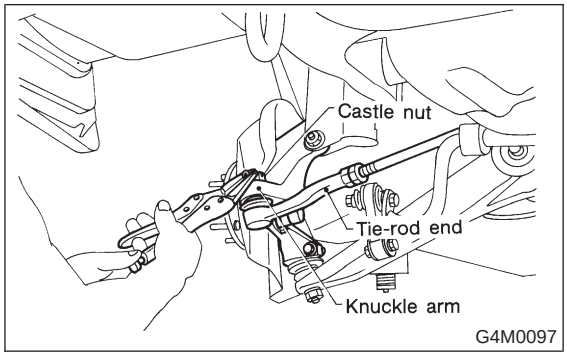
Tightening torque:
24±3 N·m (2.4±0.3 kg-m, 17.4±2.2 ft-lb)



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±2.5 N·m (2.75±0.25 kg-m, 19.9±1.8 ft-lb), and tighten further within 60° until cotter pin hole is aligned with a slot in the nut.

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



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±10 N·m (9.0±1.0 kg-m, 65±7 ft-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.

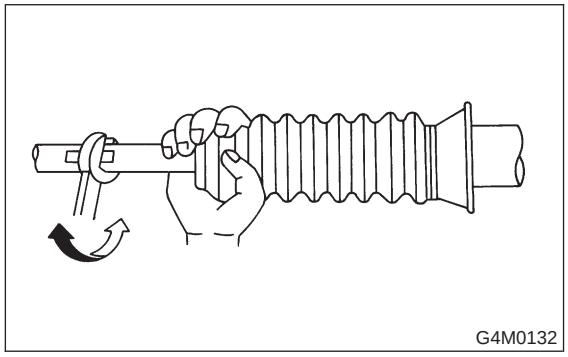
WARNING:
Be careful, exhaust manifold is hot.

13) Lower vehicle.

14) Check fluid level in oil tank.
15) After adjusting toe-in and steering angle, tighten lock nut on tie-rod end.

Tightening torque:
83±5 N·m (8.5±0.5 kg-m, 61.5±3.6 ft-lb)

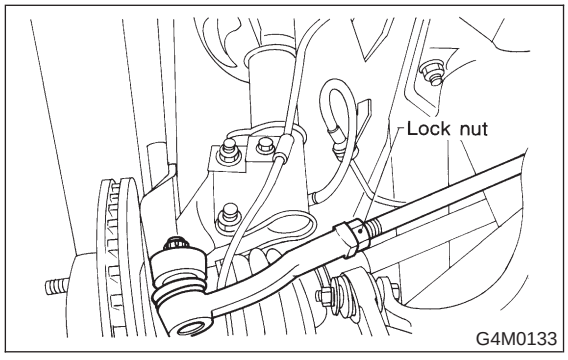
CAUTION:
When adjusting toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.


G4M0132

F: ADJUSTMENT

1) Adjust front toe.

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



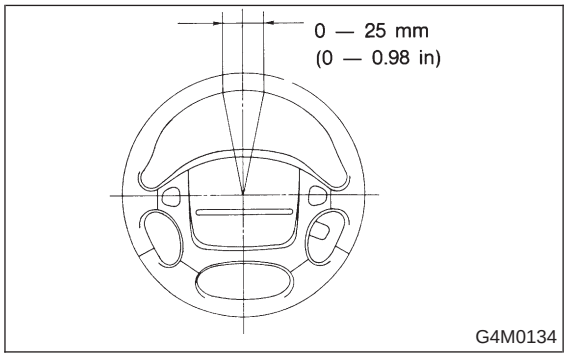
G4M0133

2) Adjust steering angle of wheels.

Inner wheel: 37.4°±1.5°

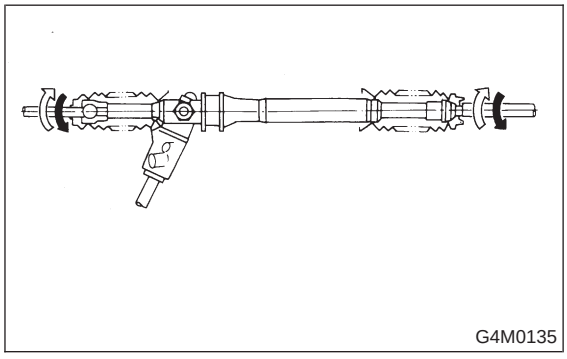
Outer wheel: 32.5°±1.5°

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



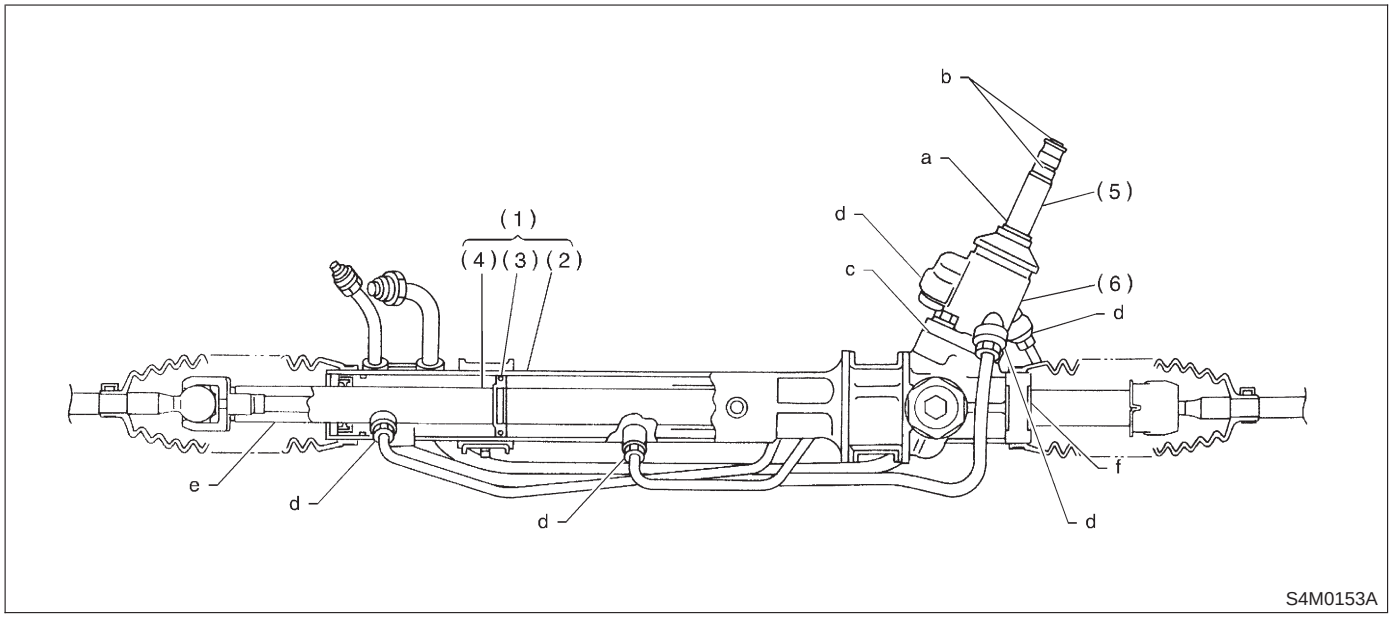
G4M0134

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


G4M0135

4. Control Valve (Power Steering Gearbox)

A: CHECKING OIL LEAKING POINTS



(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack axle
(5) Input shaft
(6) Valve housing

1. OIL LEAKING POINTS

1) If leak point is other than a, b, c, or d, perform the 5th step in “OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS” before dismounting gearbox from vehicle. <Ref. to 4-3 [W4A2].> If gearbox is dismounted without confirming where the leak is, it must be mounted again to locate the leak point.
2) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the oil from the suspected portion and turn the steering wheel from lock to lock about 30 to 40 times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.
3) Before starting oil leak repair work, be sure to clean the gearbox, hoses, pipes, and surrounding parts. After completing repair work, clean these areas again.

2. OIL LEAK CHECK PROCEDURE AND REPLACEMENT PARTS

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

1) Leakage from “a”
The oil seal is damaged. Replace valve assembly with a new one.
2) Leakage from “b”
The torsion bar O-ring is damaged. Replace valve assembly with a new one.
3) Leakage from “c”
The oil seal is damaged. Replace valve assembly or oil seal with a new one.
4) Leakage from “d”
The pipe is damaged. Replace the faulty pipe or O-ring.
5) If leak is other than a, b, c, or d, and if oil is leaking from the gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove oil from the surrounding portions. Then, turn the steering wheel from lock to lock 30 to 40 times with the engine running, then make comparison of the leaked portion immediately after and several hours after this operation.
(1) Leakage from “e”
The cylinder seal is damaged. Replace rack bush with a new one.
(2) Leakage from “f”

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

ST 926420000 PLUG

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

CAUTION:

- **If leakage from "f" is noted again:**

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

- **If oil stops leaking from "f":**

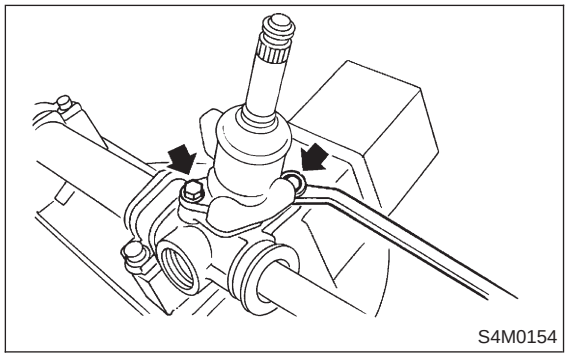
The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

B: DISASSEMBLY

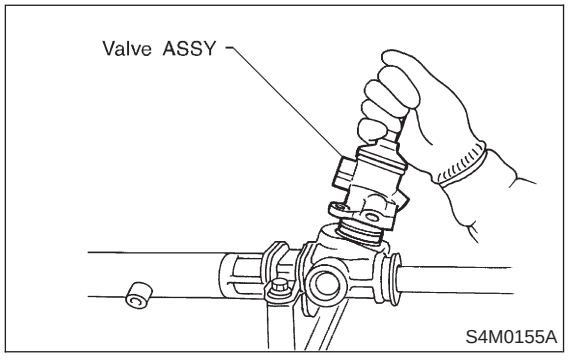
NOTE:
This section focuses on the disassembly and reassembly of control valve. For the inspection and adjustment and the service procedures for associated parts, refer to "Steering Gearbox" <Ref. to 4-3 [W3A0].>

1. VALVE ASSEMBLY

1) Remove two bolts securing valve assembly.

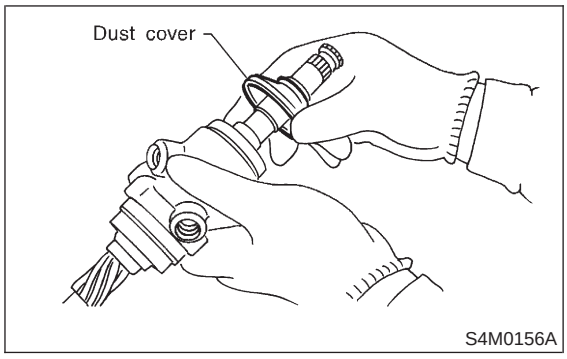

S4M0154

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



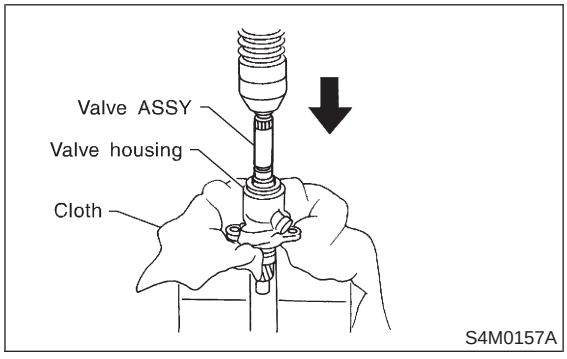
S4M0155A

3) Slide dust cover out.



S4M0156A

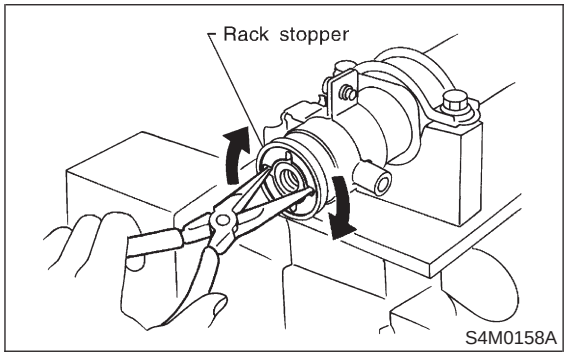
4) Using a press remove pinion and valve assembly from valve housing.



S4M0157A

2. RACK ASSEMBLY

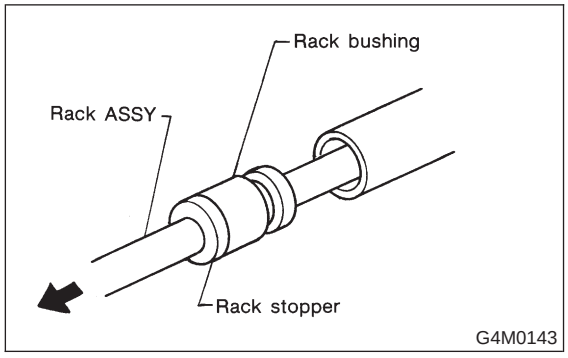
1) Using a sharp pointed pliers, rotate the rack stopper in the direction of the arrow until the end of the circlip comes out of the stopper. Rotate the circlip in the opposite direction and pull it out.



S4M0158A

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

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



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

CAUTION:
Do not reuse removed rack bushing and circlip.

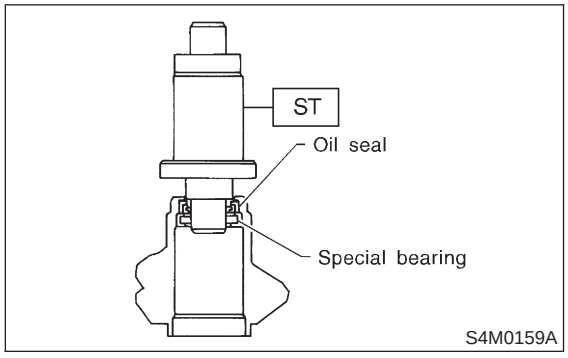
C: REPLACEMENT OF SEAL AND PACKING

1. VALVE HOUSING OIL SEAL

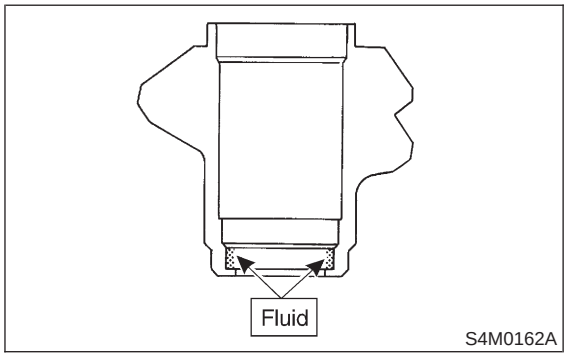
Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

1) Using ST and press, remove dust seal, oil seal and special bearing from valve housing.
ST 34099FA120 INSTALLER & REMOVER SEAL

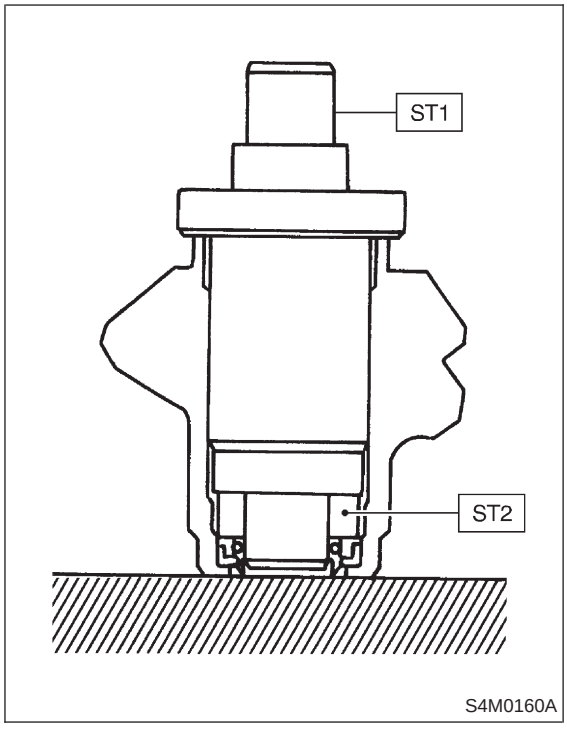
CAUTION:
- **Do not apply a force to end surface of valve housing.**
- **Do not reuse oil seal after removal.**



2) Apply a coat of specified power steering fluid to inner wall of valve housing.

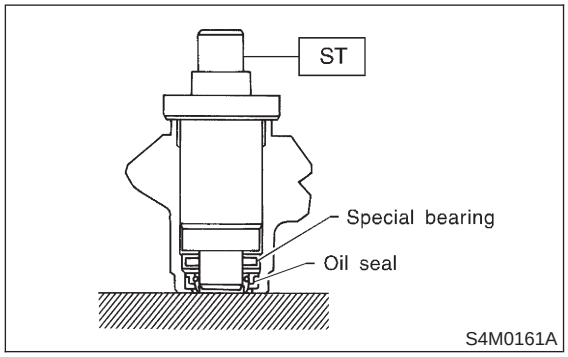


3) Attach ST2 to ST1, and press oil seal into place using a press.
ST1 34099FA120 INSTALLER & REMOVER SEAL
ST2 34099FA130 INSTALLER SEAL
(1) Face oil seal in the direction shown in figure when installing.
(2) To avoid scratching oil seal, apply a coat of grease to contact surface of installer and oil seal.
(3) To facilitate installation, attach oil seal to installer and position in valve housing before pressing into place.



4) Using ST and press, install special bearing in valve housing.
ST 34099FA120 INSTALLER & REMOVER SEAL

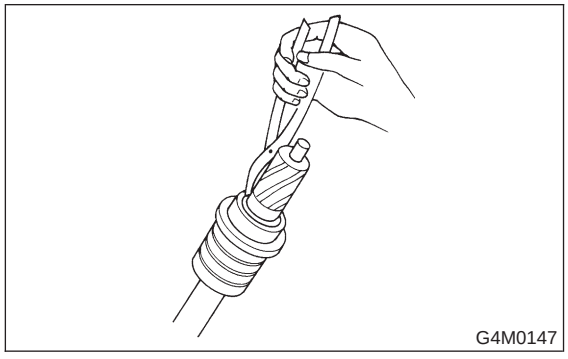
NOTE:
To facilitate installation, attach ball bearing to remover and position in valve housing before pressing it into place.



2. PINION AND VALVE ASSEMBLY

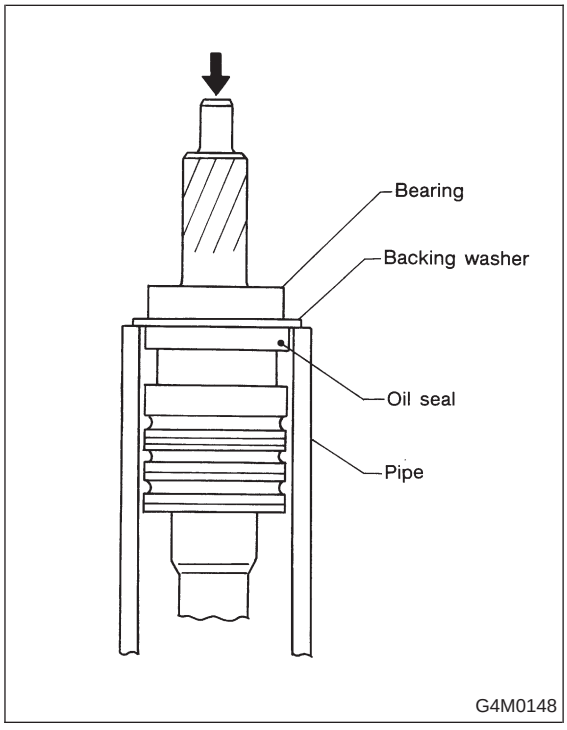
1) Remove snap ring using snap ring pliers.

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



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

CAUTION:
Do not reuse removed bearing.



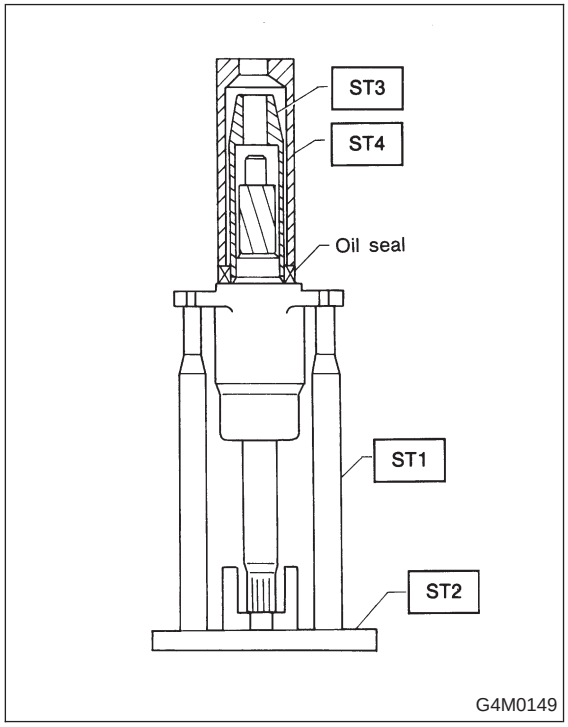
3) Remove oil seal.

CAUTION:
Do not reuse removed oil seal.

4) Put vinyl tape around pinion shaft splines to protect oil seal from damage.
5) Fit pinion and valve assembly into valve housing.

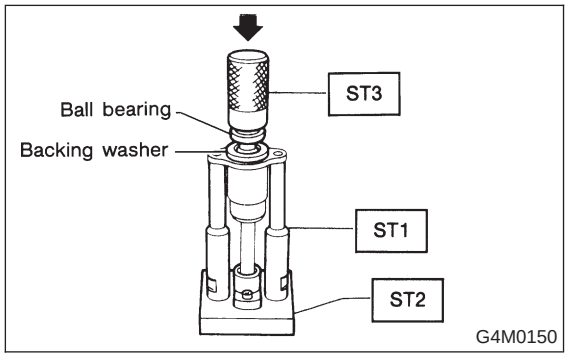
NOTE:
Apply specified power steering fluid to outer diameter surface of input shaft and outer surface of valve body seal ring, and pay special attention not to damage seal when inserting pinion and valve assembly.

6) Secure valve assembly to ST1 and ST2.
7) Put ST3 over pinion, and insert oil seal, then force-fit oil seal into housing using ST4.
ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 926360000 INSTALLER A
ST4 927620000 INSTALLER B



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

8) Remove ST3, and fit backing washer.
9) Force-fit ball bearing using ST3.
ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 927640000 INSTALLER B



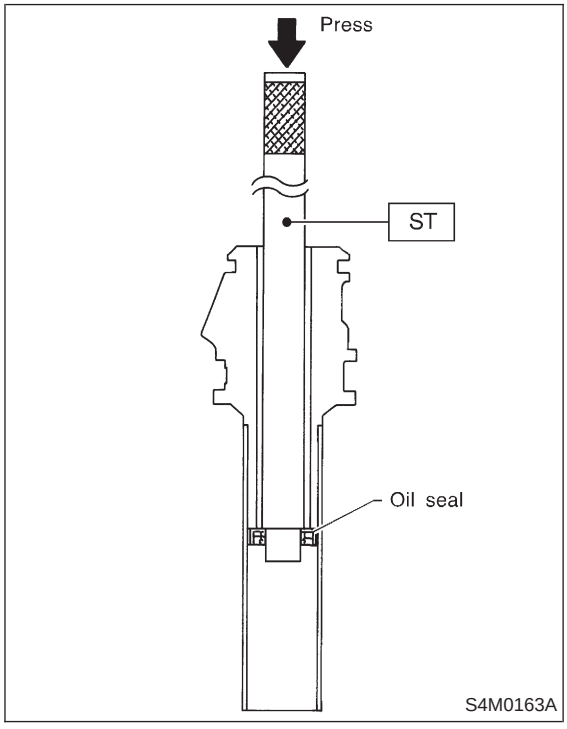
NOTE:
Be careful not to tilt ball bearing during installation.

10) Install snap ring using snap ring pliers.

NOTE:
Rotate snap ring to check for proper installation.

3. RACK HOUSING OIL SEAL

1) Insert ST from pinion housing side and remove oil seal using a press.
ST 34099FA140 REMOVER OIL SEAL

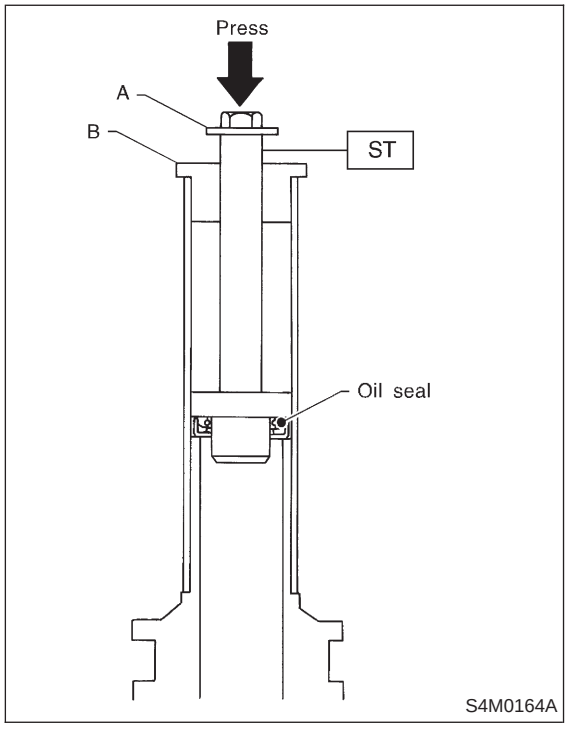


NOTE:
Discard removed oil seal.

2) Force-fit oil seal using ST.
ST 34099FA110 INSTALLER

CAUTION:
Be careful not to damage or scratch cylinder inner wall.

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



D: ASSEMBLY

1. RACK ASSEMBLY

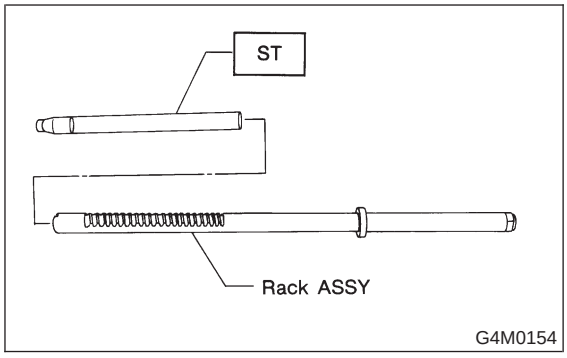
CAUTION:
Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

1) Fixing rack housing
Fix rack housing in vice using ST.
ST 926200000 STAND

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

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



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

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

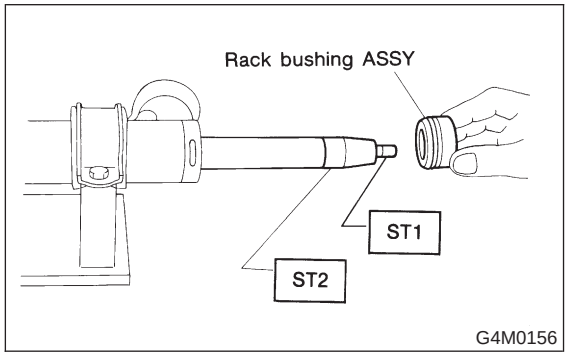
4) Insert rack assembly into rack housing from cylinder side, and remove ST after it has passed completely through oil seal.

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

ST 926390001 COVER AND REMOVER

5) Fit ST1 and ST2 over the end of rack, and install rack bushing.
ST1 926400000 GUIDE
ST2 927660000 GUIDE

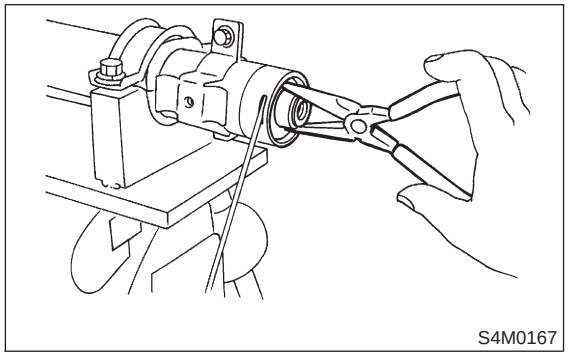
CAUTION:
● If burrs, or nicks are found on this guide and rack shaft portion, remove by filing.
● Dip rack bushing in specified power steering fluid before installing, and pay attention not to damage O-ring and oil seal.



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 a sharp pointed pliers to secure rack stopper in position.

CAUTION:
Be careful not to scratch rack while winding circlip.

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



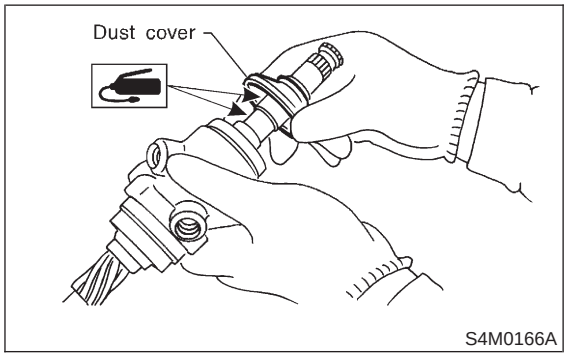
8) Fit mounting rubber onto rack housing.

2. VALVE ASSEMBLY

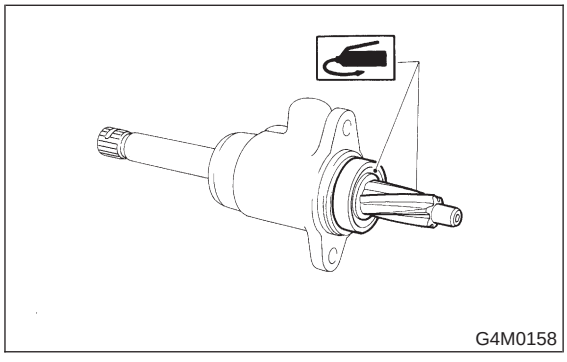
CAUTION:
Use only SUBARU genuine grease for gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

1) Apply specified grease to dust cover.



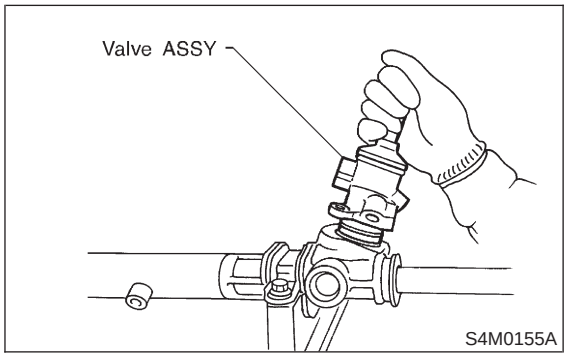
2) Install dust cover on valve assembly.
3) Apply genuine grease to pinion gear and bearing of valve assembly.



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

CAUTION:
Be sure to use a new gasket.

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



5) Tighten bolts alternately to secure valve assembly.

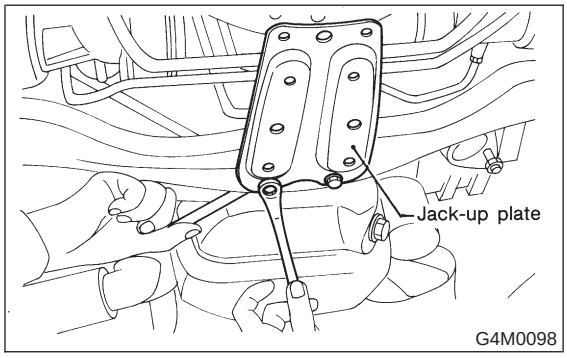
Tightening torque:
25±5 N·m (2.5±0.5 kg-m, 18.1±3.6 ft-lb)

CAUTION:
Be sure to alternately tighten bolts.

5. Pipe Assembly (Power Steering System)

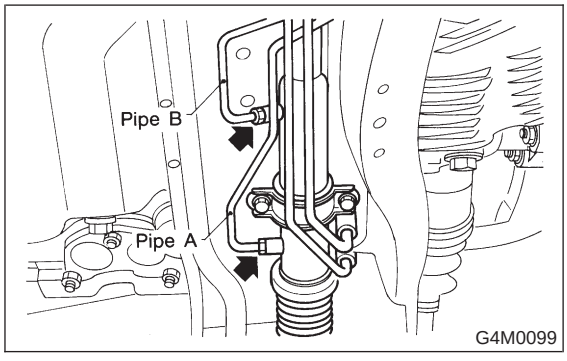
A: REMOVAL

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

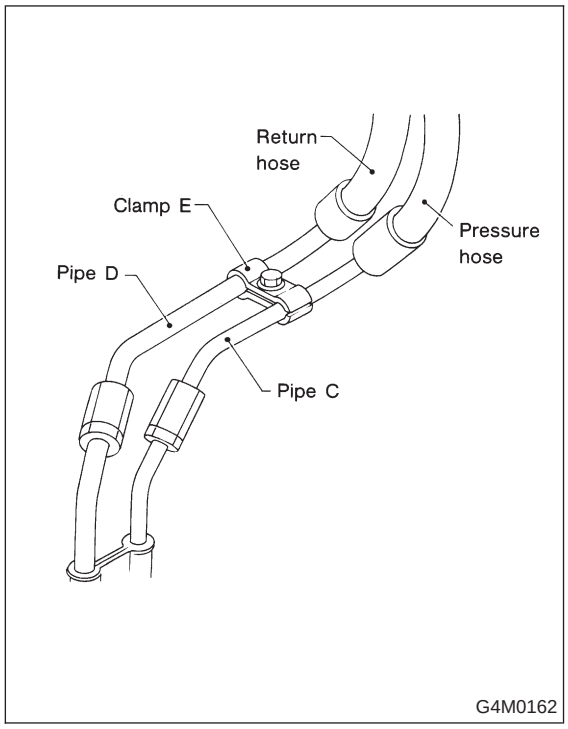


3) Remove one pipe joint at the center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.

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

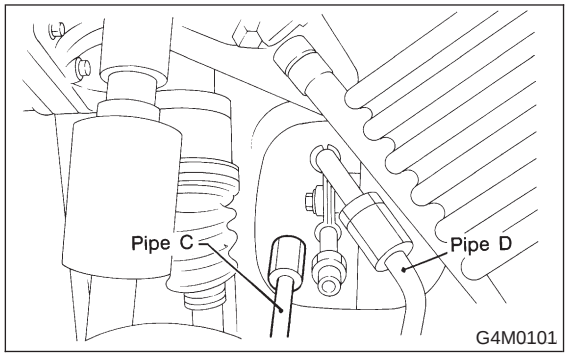


4) Remove clamp E from pipes C and D.



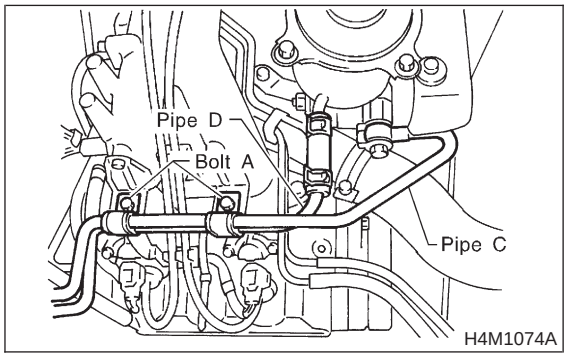
5) Disconnect pipe C from pipe (on the gearbox side).

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.

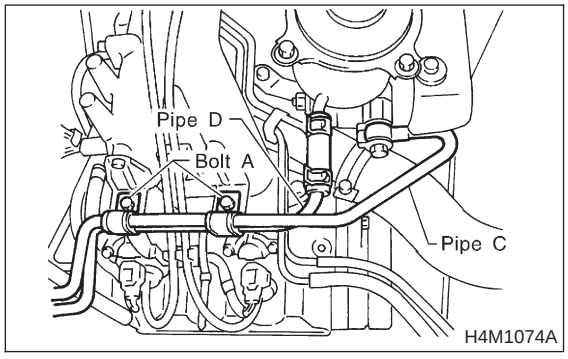
Part name	Inspection	Remedy
Pipe	● O-ring fitting surface for damage ● Nut for damage ● Pipe for damage	Replace with new one.
Clamp B Clamp C Clamp E	● Clamps for weak clamping force	Replace with new one.
Hose	● Flared surface for damage ● Flare nut for damage ● Outer surface for cracks ● Outer surface for wear ● Clip for damage ● End coupling or adapter for degradation	Replace with new one.

C: INSTALLATION

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)

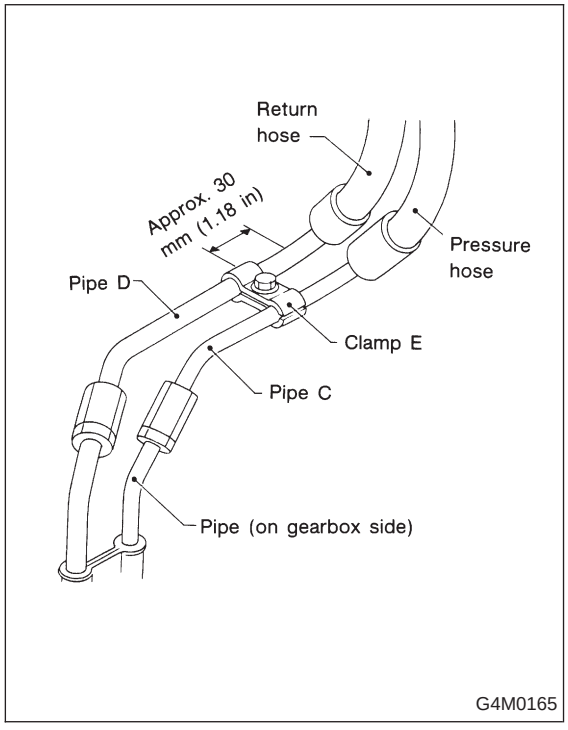
CAUTION:
Visually check that hose between tank and pipe D is free from bending or twisting.



2) Tighten bolt A.

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

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.

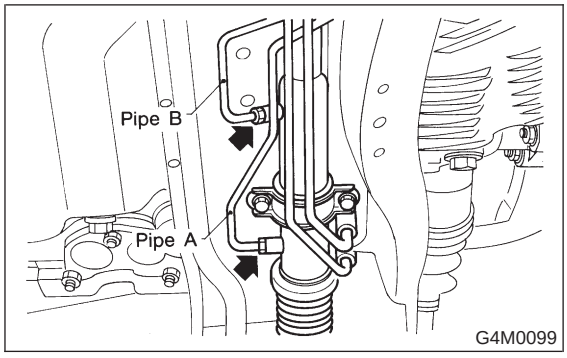
Tightening torque:
15±5 N·m (1.5±0.5 kg-m, 10.8±3.6 ft-lb)

6) Tighten clamp E firmly.

Tightening torque:
5.4±1.5 N·m (0.55±0.15 kg-m, 4.0±1.1 ft-lb)

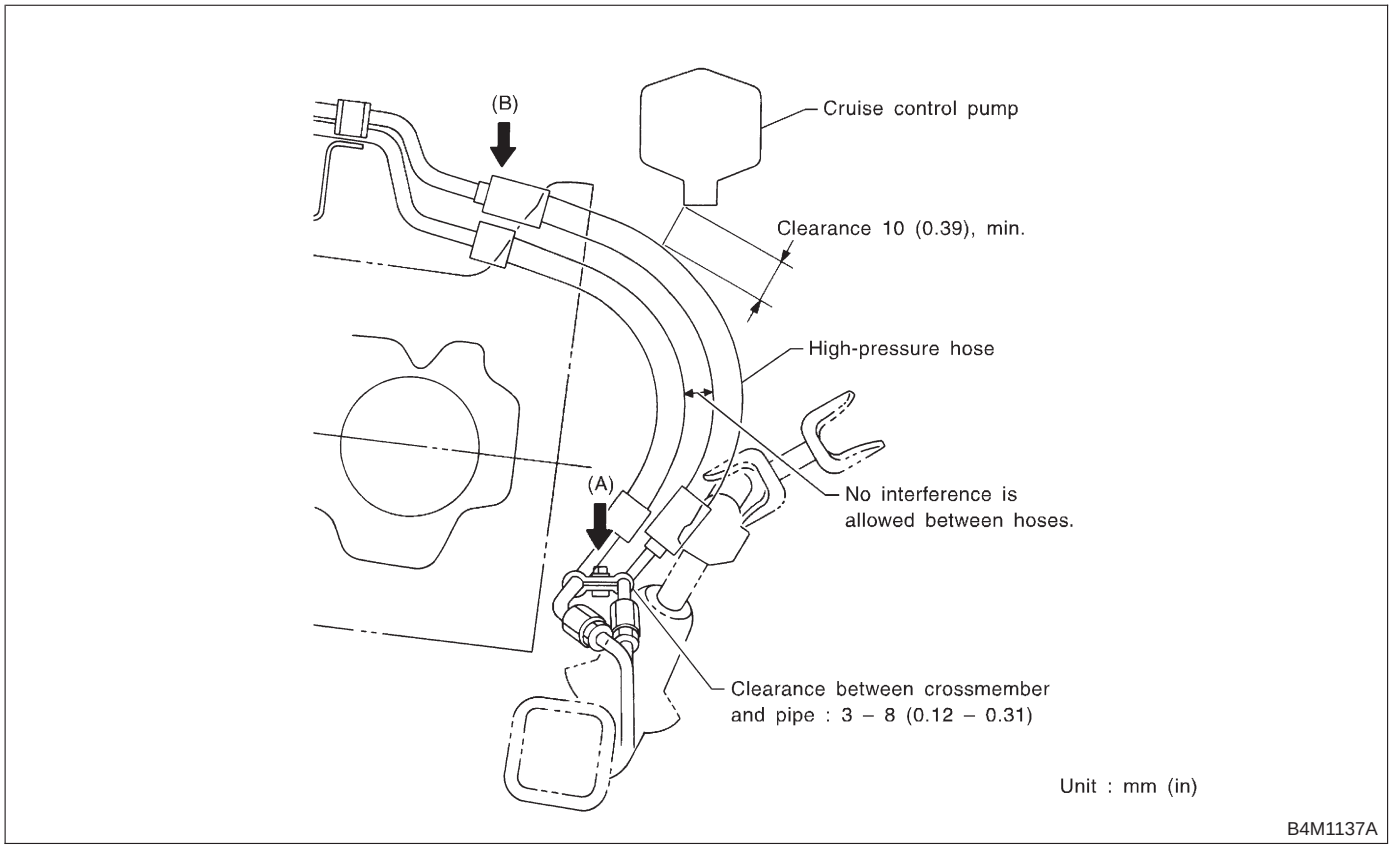
7) Connect pipes A and B to four pipe joints of gearbox. Connect upper pipe B first, and lower pipe A second.

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



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

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

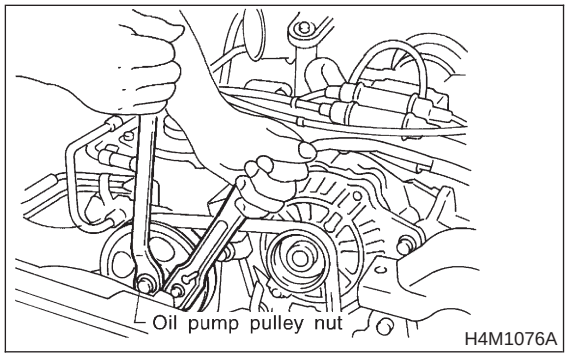
(1) Move clamped section (A) (refer to figure) down to a point where pipe is close to crossmember (pipe-to-crossmember clearance: 10 mm (0.39 in), min.).

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

6. Oil Pump (Power Steering System)

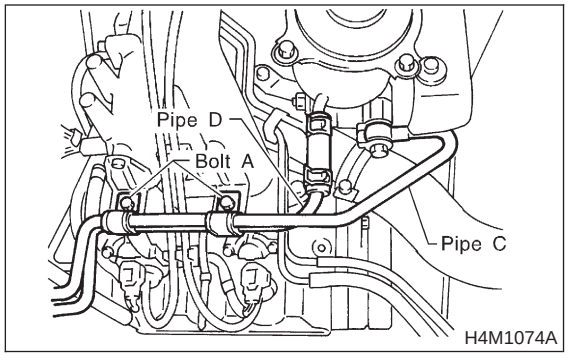
A: REMOVAL

1) Remove ground cable from battery.
2) 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.

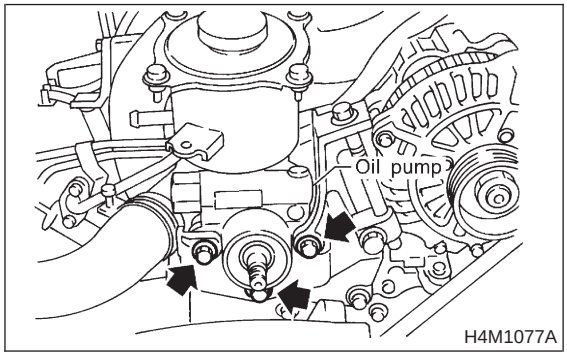


5) Loosen pulley belt(s).
6) Remove the nut and detach oil pump pulley.
7) Disconnect pipe C from oil pump. Disconnect pipe D from oil tank.

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

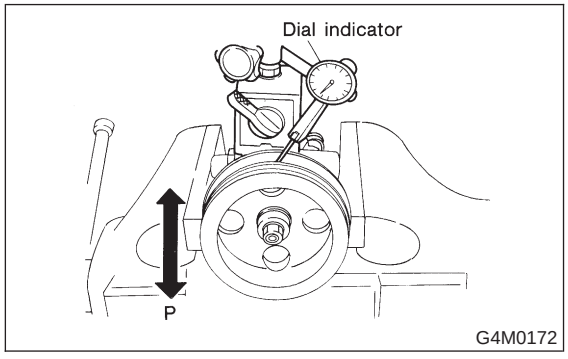
Make a measurement as follows. If it exceeds the specified service limit, replace the parts with new ones.

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.

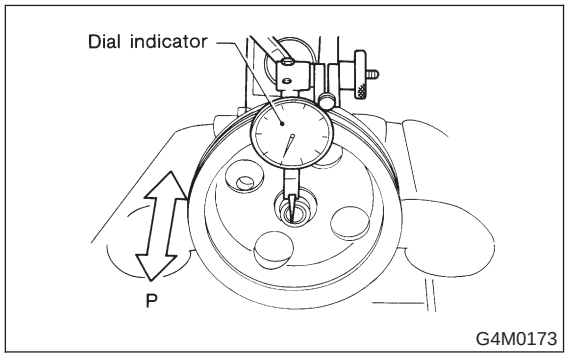
● Play of pulley shaft

On condition:
P: 9.8 N (1.0 kg, 2.2 lb)

Service limit:
Radial play (Direction ⟷)
0.4 mm (0.016 in) or less



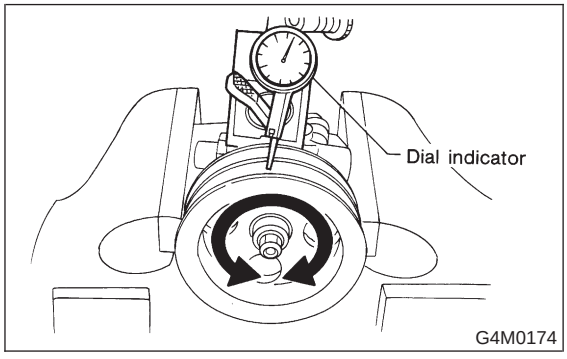
Axial play (Direction ⟺)
0.9 mm (0.035 in) or less



● Ditch deflection of pulley

Service limit:
1.0 mm (0.039 in) or less

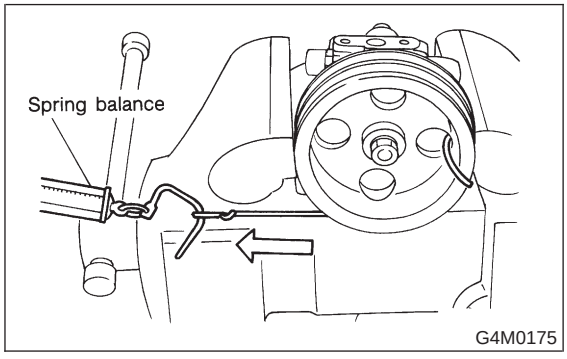
NOTE:
Read the value for one surface of V ditch, and then the value for another off the dial.



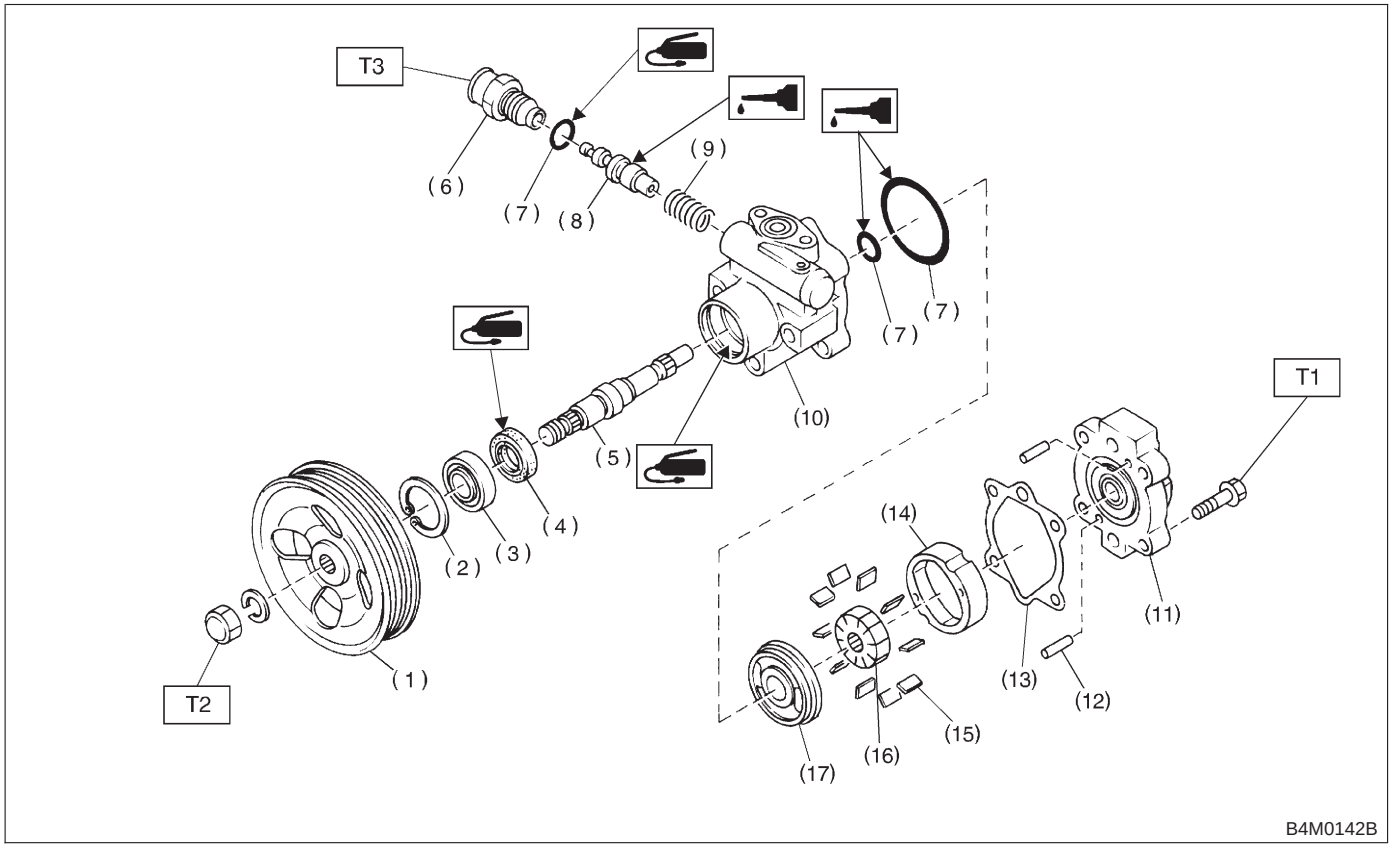
● Resistance to rotation of pulley

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

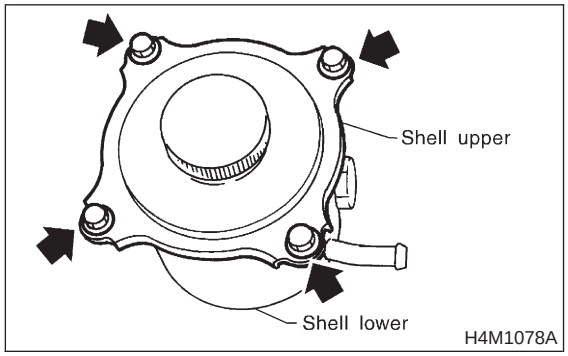


(1) Pulley
(2) Snap ring
(3) Bearing
(4) Oil seal
(5) Shaft
(6) Connector
(7) O-ring
(8) Spool valve
(9) Spring
(10) Front casing
(11) Rear cover
(12) Knock pin
(13) Seal washer
(14) Cam ring
(15) Vane
(16) Rotor
(17) Side plate

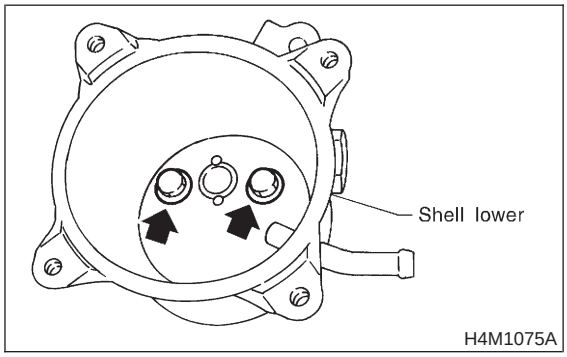
Tightening torque: N·m (kg-m, ft-lb)
T1: 16±2 (1.6±0.2, 11.6±1.4)
T2: 61±7 (6.2±0.7, 44.8±5.1)
T3: 74±5 (7.5±0.5, 54.2±3.6)

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.

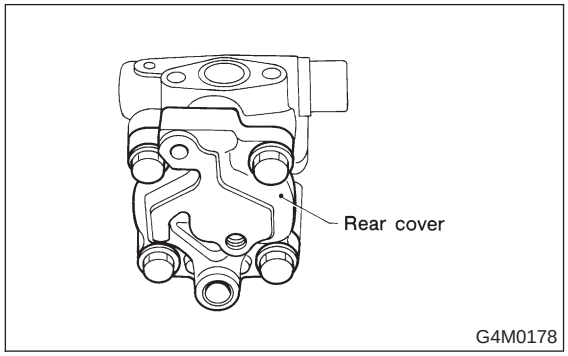


(2) Remove shell lower from oil pump.

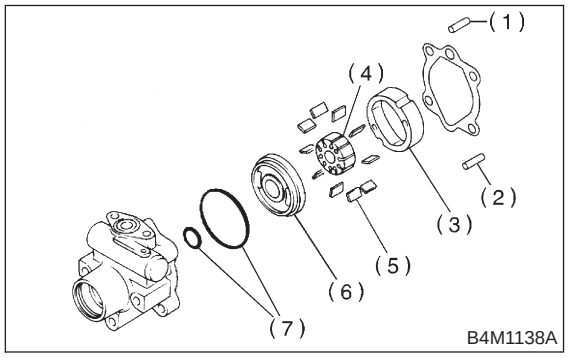


(3) Remove stay from oil pump.

(4) Remove four bolts which secure rear cover.



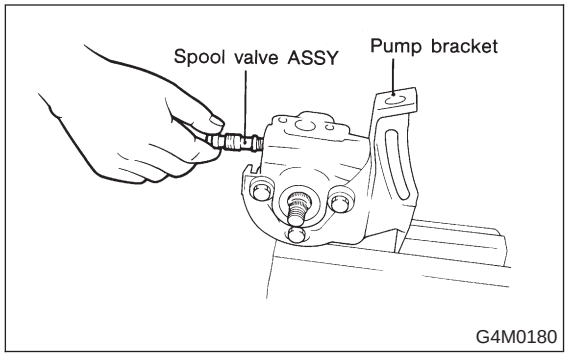
(5) Remove the following parts from front casing.



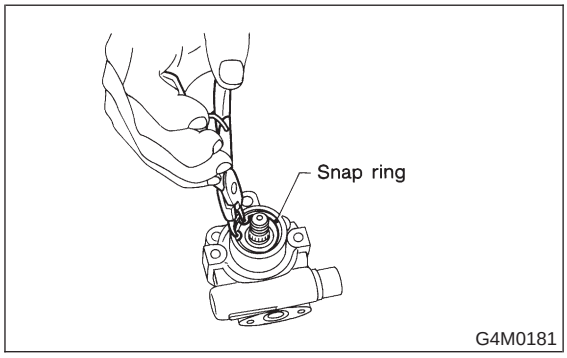
(1) Seal washer
(2) Knock pin: 2 ea.
(3) Cam ring
(4) Rotor
(5) Vane: 10 ea.
(6) Side plate
(7) O-ring: 2 ea.

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

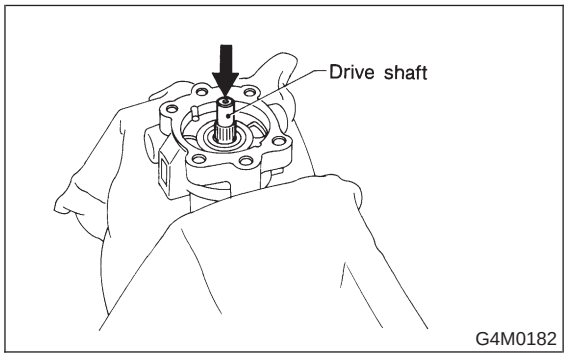


3) Shaft
(1) Remove snap ring from front casing.



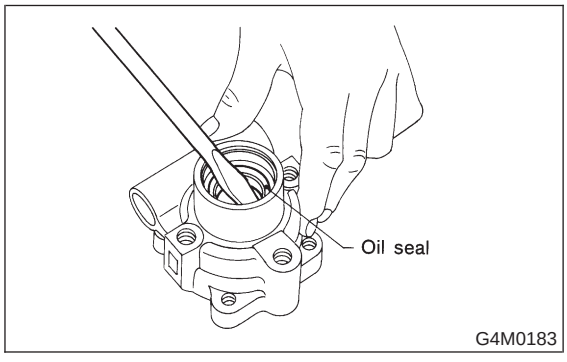
(2) Remove shaft using a hand press.

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)	
	3) Damage resulting from snap ring removal	Correct with oil stone. If damage is serious, replace with a new cartridge assembly.
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

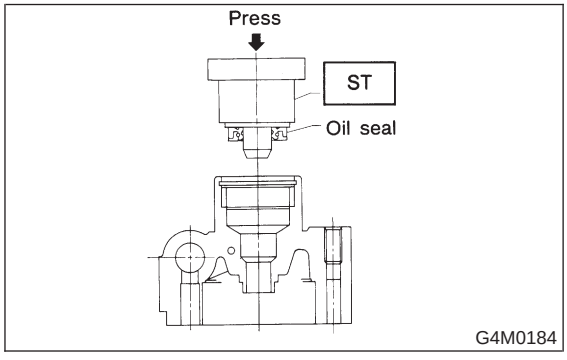
1) Reassembly precautions
   (1) Whenever O-rings, oil seals, and snap rings are removed, they must be replaced with new ones.
   (2) Thoroughly wash parts and allow to dry. They must be kept free from cleaning oil and dust.
   (3) Reassembly procedure must be performed in clean place. Ensure that parts 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.

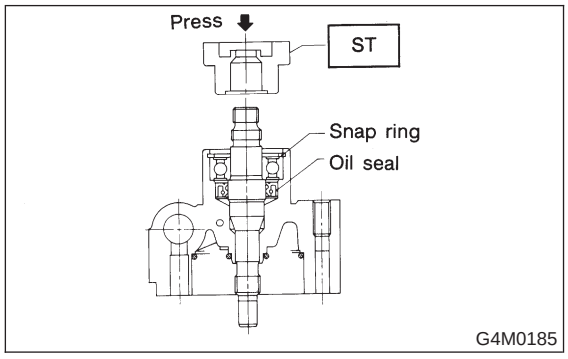
NOTE:
Orient oil seal toward correct direction.



(3) Using ST, press-fit shaft assembly into front body and mount snap ring.

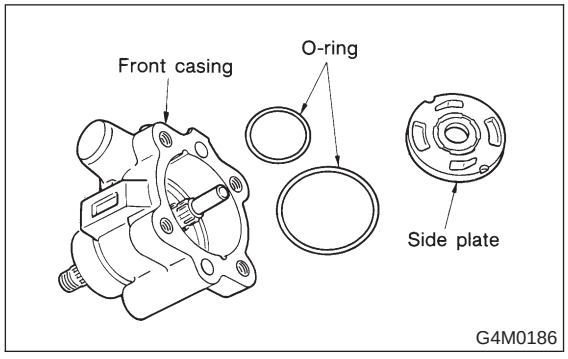
ST 340099AA020 INSTALLER

NOTE:
Turn snap ring to ensure that it fits right into the groove.



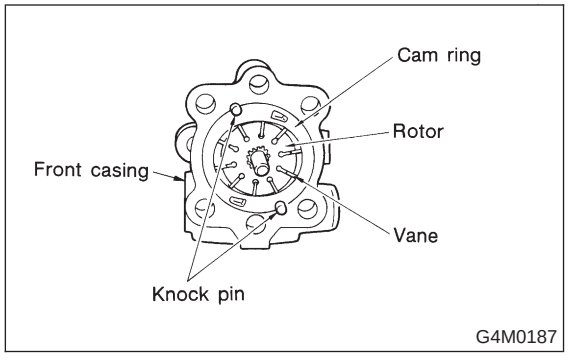
3) Cartridge assembly
(1) Apply specified power steering fluid to O-rings and fit them into front casing.
(2) Install side plate to front casing.

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.

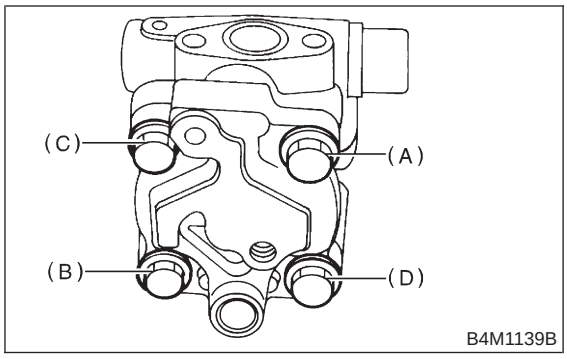
CAUTION:
Do not use hammer to fit knock pins in position.



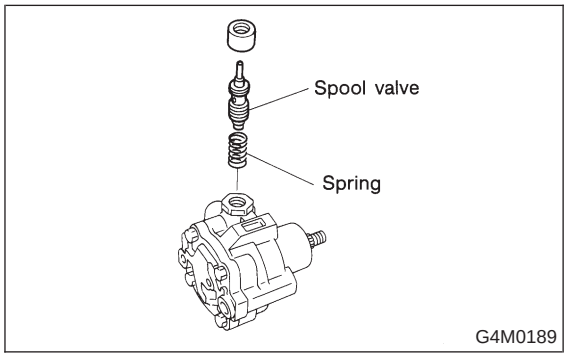
4) Rear cover
(1) Mount seal washer on front casing.
(2) With knock pin positions aligned, install rear cover.

Tightening torque:
16±2 N·m (1.6±0.2 kg-m, 11.6±1.4 ft-lb)

CAUTION:
Loosely tighten bolts in the sequence (A), (B), (C), and (D) 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±5 N·m (7.5±0.5 kg-m, 54.2±3.6 ft-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±2 N·m (2.2±0.2 kg-m, 15.9±1.4 ft-lb)

2) Install oil pump on oil tank as follows outside the vehicle:

NOTE:
Prior to installation, make sure that all oil is removed from oil pump, oil tank and pipe.

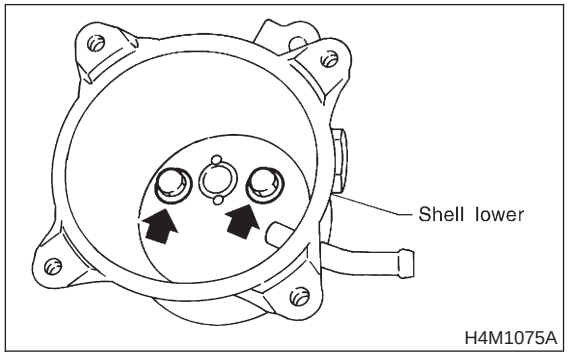
(1) Place oil pump in a vise and install stay to oil pump.

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

Tightening torque:
15.7±2.4 N·m (1.60±0.24 kg-m, 11.6±1.7 ft-lb)

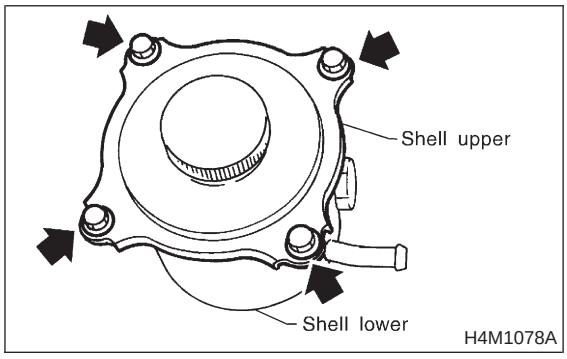
(2) Install shell lower to oil pump.

Tightening torque:
$18^{+5}/_{0}$ N·m ($1.8^{+0.5}/_{0}$ kg-m, $13.0^{+3.6}/_{0}$ ft-lb)



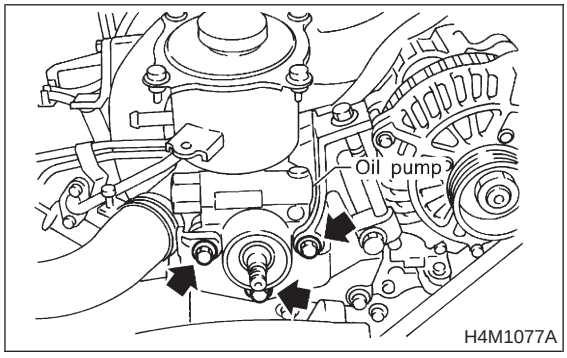
(3) Install shell upper and baffle to shell lower.

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



3) Install oil pump, previously assembled to oil tank, on bracket.

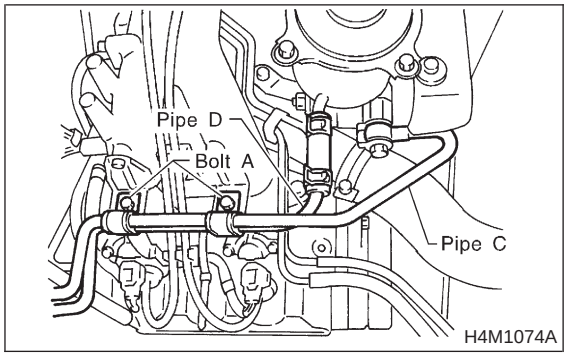
Tightening torque:
20.1±2.5 N·m (2.05±0.25 kg-m, 14.8±1.8 ft-lb)



4) Place oil pump pulley and tighten pulley nut temporarily.
5) 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:
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±10 N·m (5.3±1.0 kg-m, 38±7 ft-lb)

8) Check pulley belt tension. <Ref. to 1-5 [G2A0].>
9) Tighten bolt belt tension.

Tightening torque:
8±2 N·m (0.8±0.2 kg-m, 5.8±1.4 ft-lb)

10) Install pulley belt cover bracket.
11) Connect minus terminal of battery.
12) Feed the specified power steering fluid and discharge air.<Ref. to 4-3 [W7A0].>

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

7. Power Steering Fluid

A: RECOMMENDED POWER STEERING FLUID AND AIR BLEEDING

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.

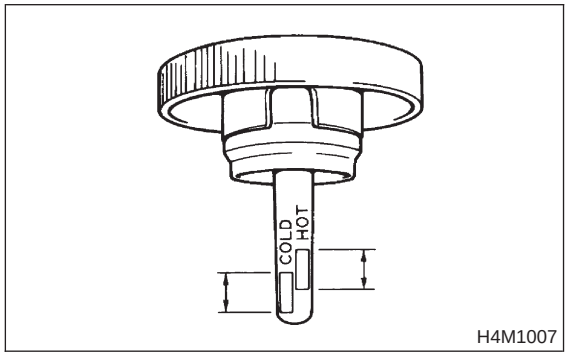
CAUTION:
● Before checking, wipe off any fluid on flare nuts and piping.
● In case the fluid leaks from flare nut, it is caused by dust (or the like) and/or damage between flare and tapered seat in piping.
● So remove the flare nut, tighten again it to the specified torque after cleaning flare and tapered 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
● Heavy steering effort in all ranges ● Heavy steering effort at stand still ● Steering wheel surges when turning.	1. Pulley belt ● Unequal length of pulley belts ● Adhesion of oil and grease ● Loose or damage of pulley belt ● Poor uniformity of pulley belt cross section ● Pulley belt touches to pulley bottom ● Poor revolution of pulleys except oil pump pulley ● Poor revolution of oil pump pulley	Adjust or replace.
	2. Tire and rim ● Improper tires out of specification ● Improper rims out of specification ● Tires not properly inflated*1	Replace or reinflate.
	3. Fluid ● Low fluid level ● Aeration ● Dust mix ● Deterioration of fluid ● Poor warming-up of fluid *2	Refill, bleed air, replace or instruct customer.
	4. Idling speed ● Lower idling speed ● Excessive drop of idling speed at start or at turning steering wheel *3	Adjust or instruct customer.
	5. Measure hydraulic pressure. <Ref. to 4-3 [K1B0].>	Replace problem parts.
	6. Measure steering effort. <Ref. to 4-3 [K1C0].>	Adjust or replace.
● Vehicle leads to one side or the other. ● Poor return of steering wheel to center ● Steering wheel surges when turning.	1. Fluid line ● Folded hose ● Flattened pipe	Reform or replace.
	2. Tire and rim ● Flat tire ● Mix use of different tires ● Mix use of different rims ● Abnormal wear of tire ● Unbalance of remained grooves ● Unbalance of tire pressure	Fix or replace.
	3. Front alignment ● Improper or unbalance caster ● Improper or unbalance toe-in ● Loose connection of suspension	Adjust or retighten.
	4. Others ● Damaged joint assembly ● Unbalanced height ● One-sided weight	Replace, adjust or instruct customer.
	5. Measure steering effort. <Ref. to 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

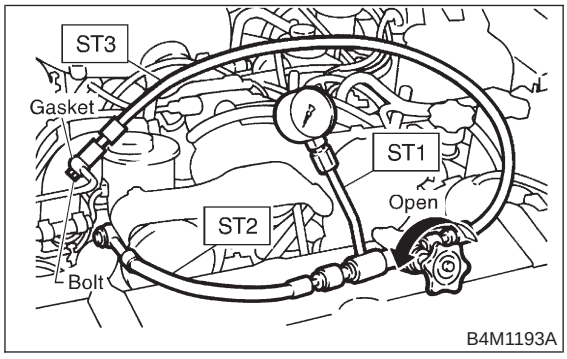
CAUTION:
● Be sure to complete all items aforementioned in "STEERING CONDITION", prior to measuring hydraulic pressure. Otherwise, pressure can not be measured correctly. <Ref. to 4-3 [K1A0].>
● Do not leave the valve of pressure gauge closed or hold the steering wheel at stop end for 5 seconds or more 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).

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

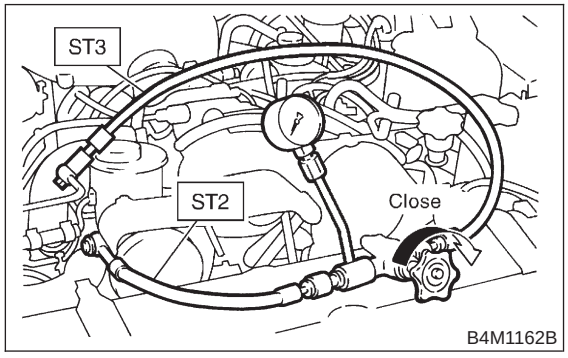


   (4) Replenish power steering fluid up to specified level.
2) Open valve, and start the engine.
3) Measure regular pressure.

CHECK : ***Is pressure 981 kPa (10 kg/cm^2, 142 psi) or less?***
YES : Go to step **1B2**.
NO : Trouble may be due to crushed pipe or hose, leakage from fluid line, foreign particles in fluid line, etc. Replace faulty parts with new ones.

1B2 : MEASURE RELIEF PRESSURE.

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



2) Close valve.

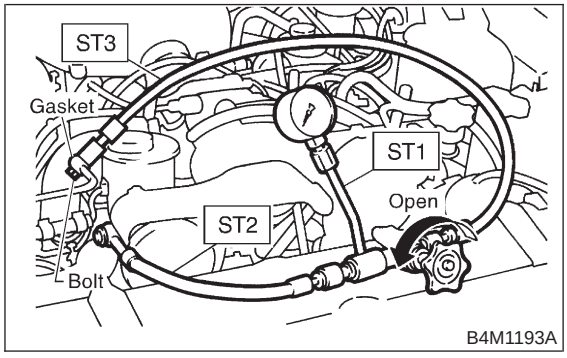
CHECK : ***Is pressure 7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)?***

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



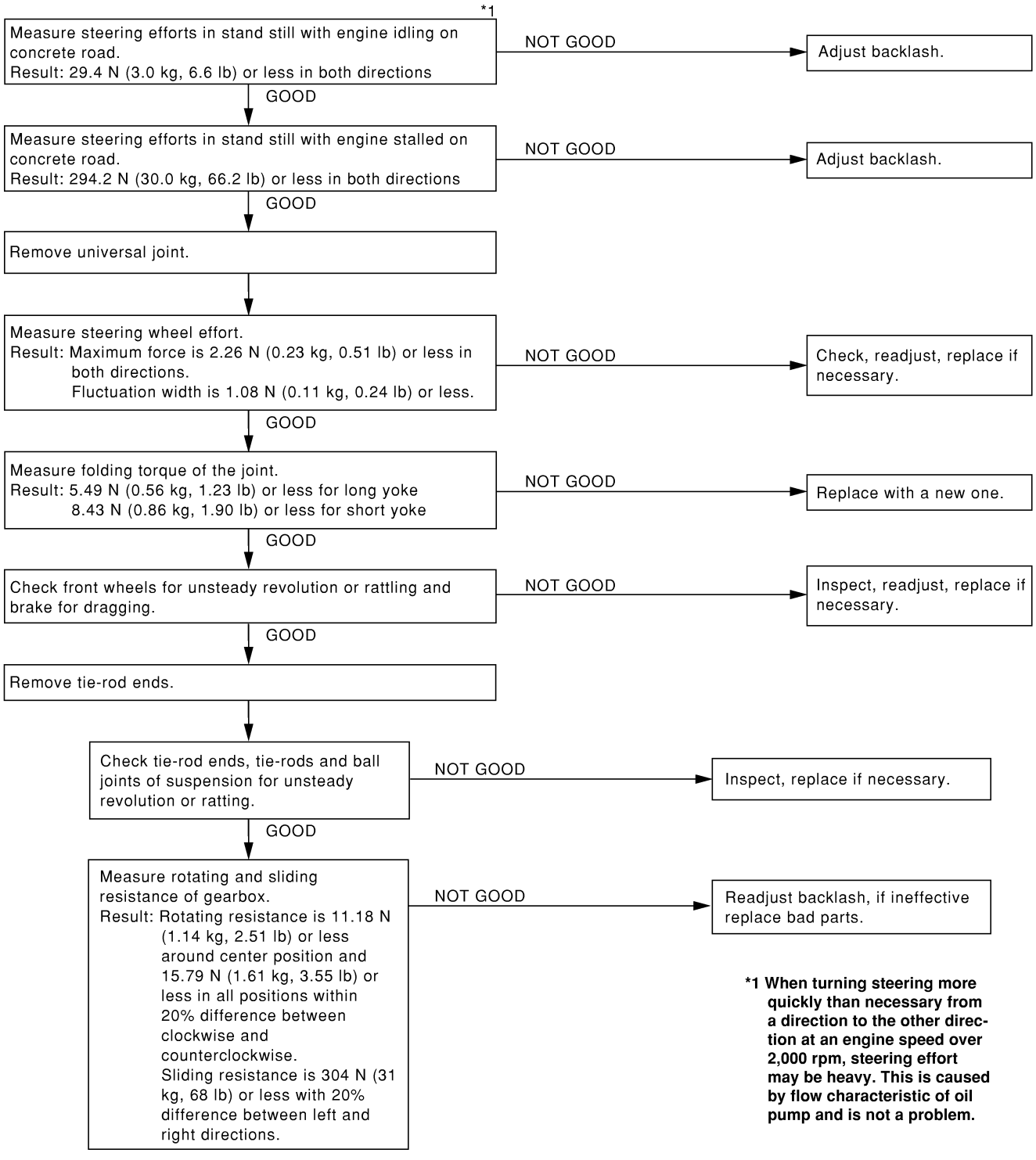
2) Open valve.
3) Measure working pressure of control valve by turning wheel from stop to stop.

CHECK : ***Is pressure 7,159 — 7,748 kPa (73 — 79 kg/cm^2, 1,038 — 1,123 psi)?***

YES : Measure steering force. <Ref. to 4-3 [K1C0].>

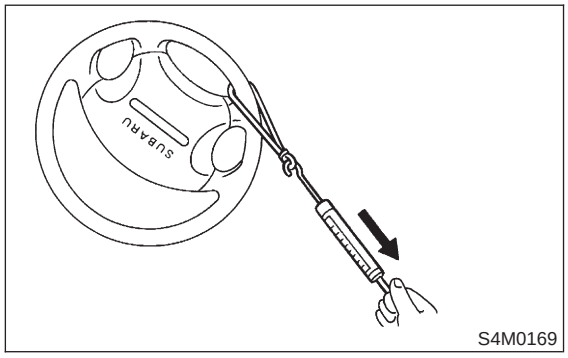
NO : Control valve is inoperative. Replace control valve itself or control valve and pinion as a single unit with new ones.

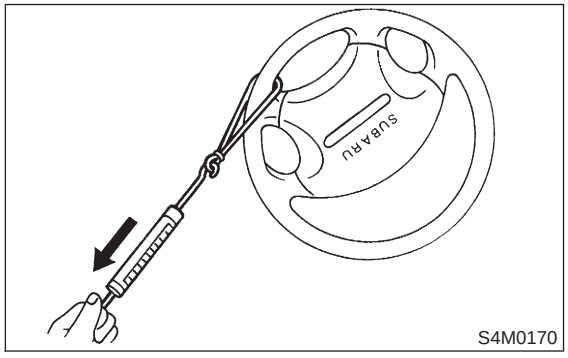
C: MEASUREMENT OF STEERING EFFORT



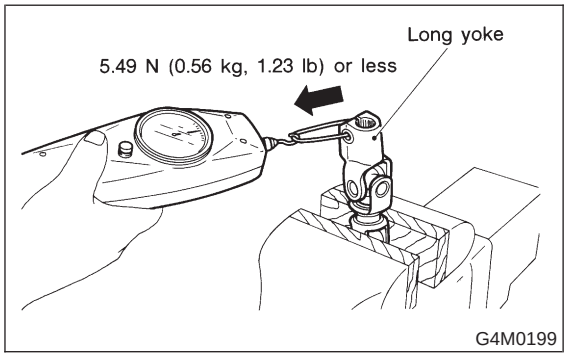
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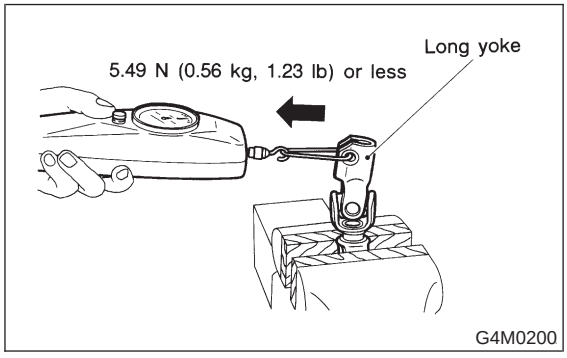
1) Measurement of steering effort is as shown in the figures.

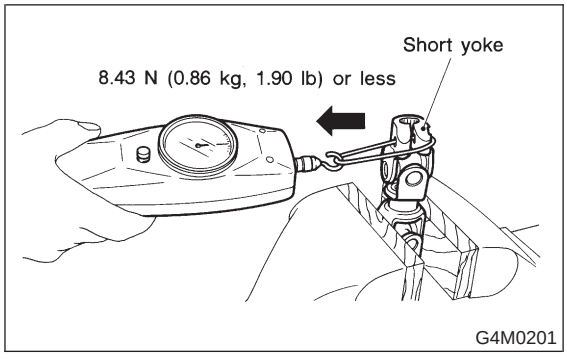


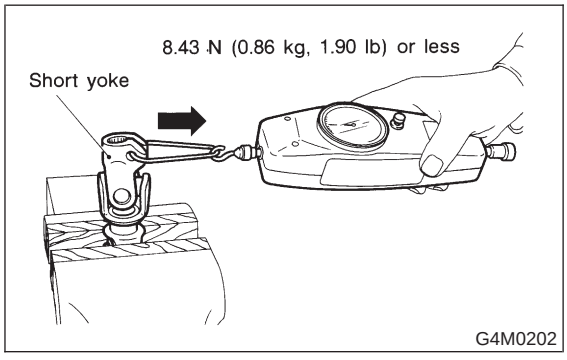


2) Measurement of folding torque of universal joint is as shown in the figures.



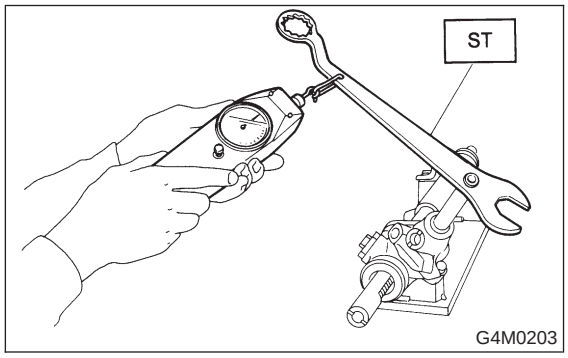




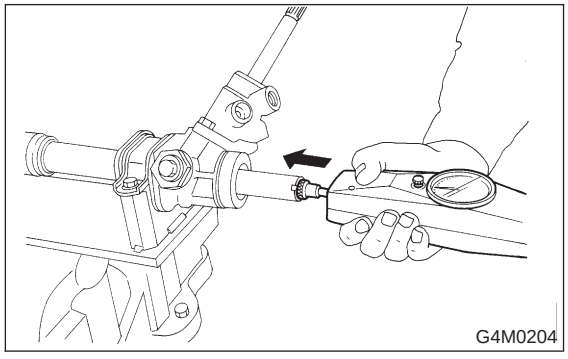


3) Using ST, measure resistances of gearbox.
ST 926230000 SPANNER

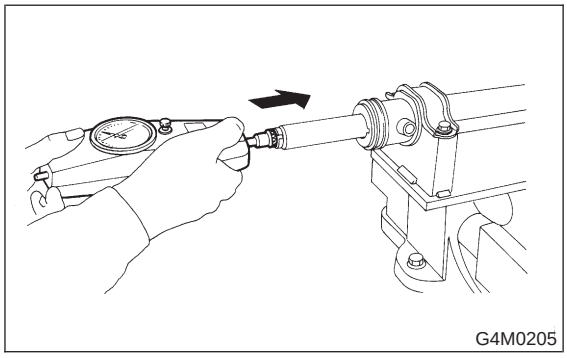
Rotating resistance:
Straight-ahead position within 30 mm (1.18 in) from rack center;
Less than 11.18 N (1.14 kg, 2.51 lb)
Maximum allowable torque;
12.7 N (1.3 kg, 2.9 lb)



Sliding resistance:
Right-turn steering;
304 N (31 kg, 68 lb) or less

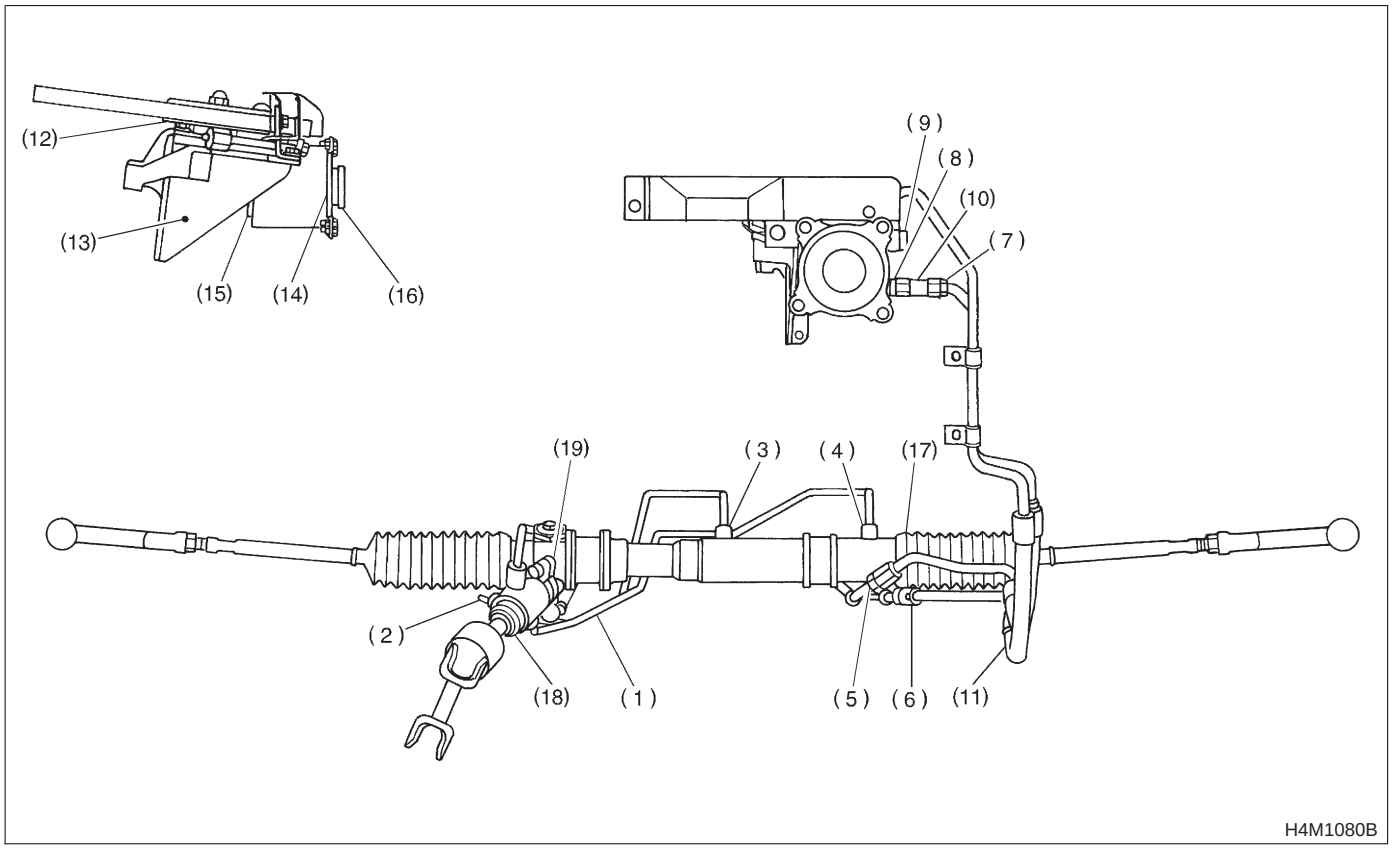


Left-turn steering;
304 N (31 kg, 68 lb) or less



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.



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.

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

E: NOISE AND VIBRATION

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

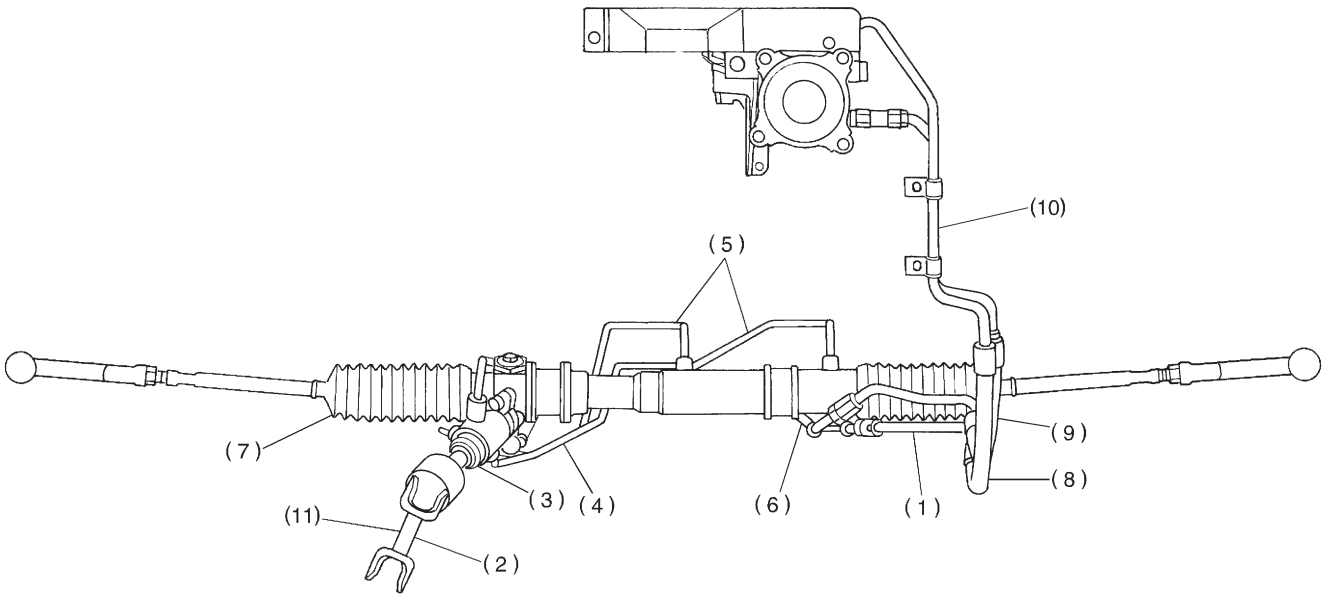
NOTE:
● Grinding noise may be heard immediately after the engine start in extremely cold condition. In this case, if the noise goes off during warm-up there is no abnormal function in the system. This is due to the fluid characteristic in extremely cold condition.
● Oil pump makes whine or growl noise slightly due to its mechanism. Even if the noise can be heard when steering wheel is turned at stand still there is no abnormal function in the system provided that the noise eliminates when the vehicle is running.
● When stopping with service brake and/or parking brake applied, power steering can be operated easily due to its light steering effort. If doing so, the disk rotates slightly and makes creaking noise. The noise is generated by creaking between the disk and pads. If the noise goes off when the brake is released, there is no abnormal function in the system.
● There may be a little vibration around the steering devices when turning steering wheel at standstill, even though the component parts are properly adjusted and have no defects.
Hydraulic systems are likely to generate this kind of vibration as well as working noise and fluid noise because of combined conditions, i.e., road surface and tire surface, engine speed and turning speed of steering wheel, fluid temperature and braking condition.
This phenomena does not indicate there is some abnormal function in the system.
The vibration can be known when steering wheel is turned repeatedly at various speeds from slow to rapid step by step with parking brake applied on concrete road and in "D" range for automatic transmission vehicle.

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

F: CLEARANCE TABLE

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

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



H4M1081B

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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1. Brakes

A: SPECIFICATIONS

1. 2200 cc MODEL

	Engine (cc)		2200	
	Driving system		AWD	
			Without ABS	With ABS
Front brake	Type		Disc (Floating type, ventilated)	
	Effective disc diameter	mm (in)	210 (8.27)	
	Disc thickness × outer diameter	mm (in)	24 × 260 (0.94 × 10.24)	
	Effective cylinder diameter	mm (in)	57.15 (2.2500)	
	Pad dimensions (length × width × thickness)	mm (in)	112.4 × 44.3 × 11.0 (4.43 × 1.744 × 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 × width × thickness)	mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	
	Clearance adjustment		Automatic adjustment	
Parking brake	Type		Mechanical on rear brake drums	
	Effective drum diameter	mm (in)	228.6 (9)	
	Lining dimensions (length × width × thickness)	mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	
	Clearance adjustment		Automatic adjustment	
Master cylinder	Type		Tandem	
	Effective diameter	mm (in)	23.81 (0.9374)	25.40 (1)
	Reservoir type		Sealed type	
	Brake fluid reservoir capacity	cm^3 (cu in)	205 (12.51)	
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. 2500 cc MODEL

	Engine (cc)		2500
	Driving system		AWD
			With ABS
Front brake	Type		Disc (Floating type, ventilated)
	Effective disc diameter	mm (in)	228 (8.98)
	Disc thickness × Outer diameter	mm (in)	24 × 277 (0.94 × 10.91)
	Effective cylinder diameter	mm (in)	42.8 (1.687) × 2
	Pad dimensions (length × width × thickness)	mm (in)	112.3 × 50.0 × 11.0 (4.42 × 1.969 × 0.433)
	Clearance adjustment		Automatic adjustment
Rear brake	Type		Disc (Floating type)
	Effective disc diameter	mm (in)	230 (9.06)
	Disc thickness × Outer diameter	mm (in)	10 × 266 (0.39 × 10.47)
	Effective cylinder diameter	mm (in)	38.1 (1.500)
	Pad dimensions (length × width × thickness)	mm (in)	92.4 × 33.7 × 10.0 (3.638 × 1.327 × 0.394)
	Clearance adjustment		Automatic adjustment
Parking brake	Type		Mechanical on rear brakes, drum in disc
	Effective drum diameter	mm (in)	170 (6.69)
	Lining dimensions (length × width × thickness)	mm (in)	162.6 × 30.0 × 3.2 (6.40 × 1.181 × 0.126)
	Clearance adjustment		Manual adjustment
Master cylinder	Type		Tandem
	Effective diameter	mm (in)	25.40 (1)
	Reservoir type		Sealed type
	Brake fluid reservoir capacity	cm^3 (cu in)	205 (12.51)
Brake booster	Type		Vacuum suspended
	Effective diameter	mm (in)	180 + 205 (7.09 + 8.07)
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

B: SERVICE DATA

ITEM		STANDARD	SERVICE LIMIT
Front brake	Pad thickness (including back metal)	17 mm (0.67 in)	7.5 mm (0.295 in)
	Disc thickness	24 mm (0.94 in)	22 mm (0.87 in)
	Disc runout	—	0.075 mm (0.0030 in)
Rear brake (Disc type)	Pad thickness (including back metal)	15 mm (0.59 in)	6.5 mm (0.256 in)
	Disc thickness	10 mm (0.39 in)	8.5 mm (0.335 in)
	Disc runout	—	0.10 mm (0.0039 in)
Rear brake (Drum type)	Inside diameter	228.6 mm (9 in)	230.6 mm (9.08 in)
	Lining thickness	4.1 mm (0.161 in)	1.5 mm (0.059 in)
Rear brake (Disc type parking)	Inside diameter	170 mm (6.69 in)	171 mm (6.73 in)
	Lining thickness	3.2 mm (0.126 in)	1.5 mm (0.059 in)
Parking brake	Lever stroke	7 to 8 notches/196 N (20 kg,44 lb)	

			Without ABS	With ABS
Brake booster		Brake pedal force	Fluid pressure	
	Brake fluid pressure without engine running	147 N (15 kg, 33 lb)	785 kPa (8 kg/cm^2, 114 psi)	588 kPa (6 kg/cm^2, 85 psi)
		294 N (30 kg, 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)	147 N (15 kg, 33 lb)	5,492 kPa (56 kg/cm^2, 796 psi)	5,394 kPa (55 kg/cm^2, 782 psi)
		294 N (30 kg, 66 lb)	8,434 kPa (86 kg/cm^2, 1,223 psi)	9,219 kPa (94 kg/cm^2, 1,337 psi)

C: RECOMMENDED BRAKE FLUID

FMVSS No. 116, fresh DOT3 or 4 brake fluid

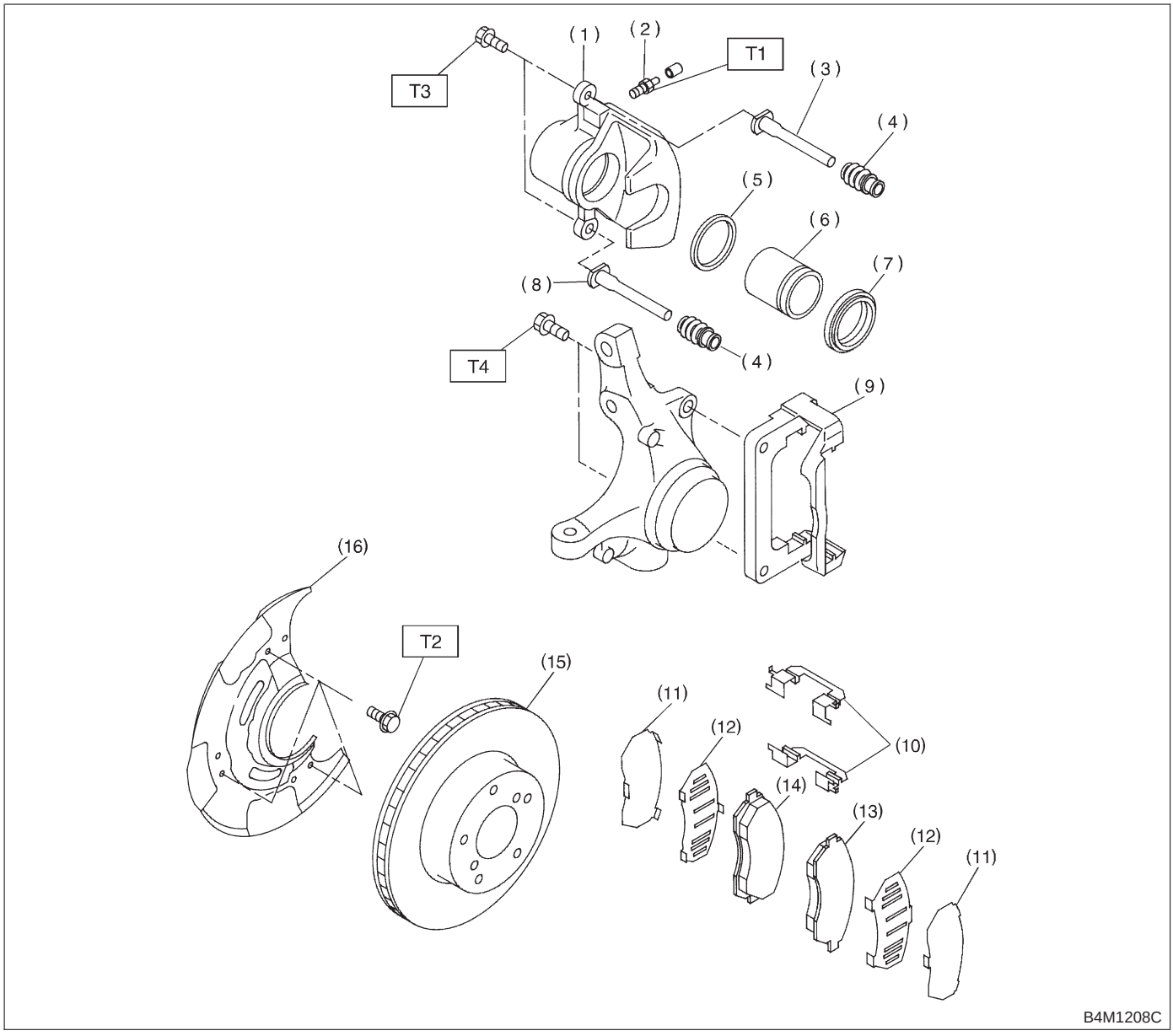
CAUTION:
- **Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading.**
- **When brake fluid is supplemented, be careful not to allow any dust into the reservoir.**
- **Use fresh DOT3 or 4 brake fluid when replacing or refilling the fluid.**

D: BRAKE FLUID LEVEL INDICATOR

Reserve tank with level indicator:
Residual fluid quantity at light ON
Approx. 80 cm^3 (80 cc, 4.88 cu in)
Tank capacity
205 cm^3 (205 cc, 12.51 cu in)

1. Front Disc Brake

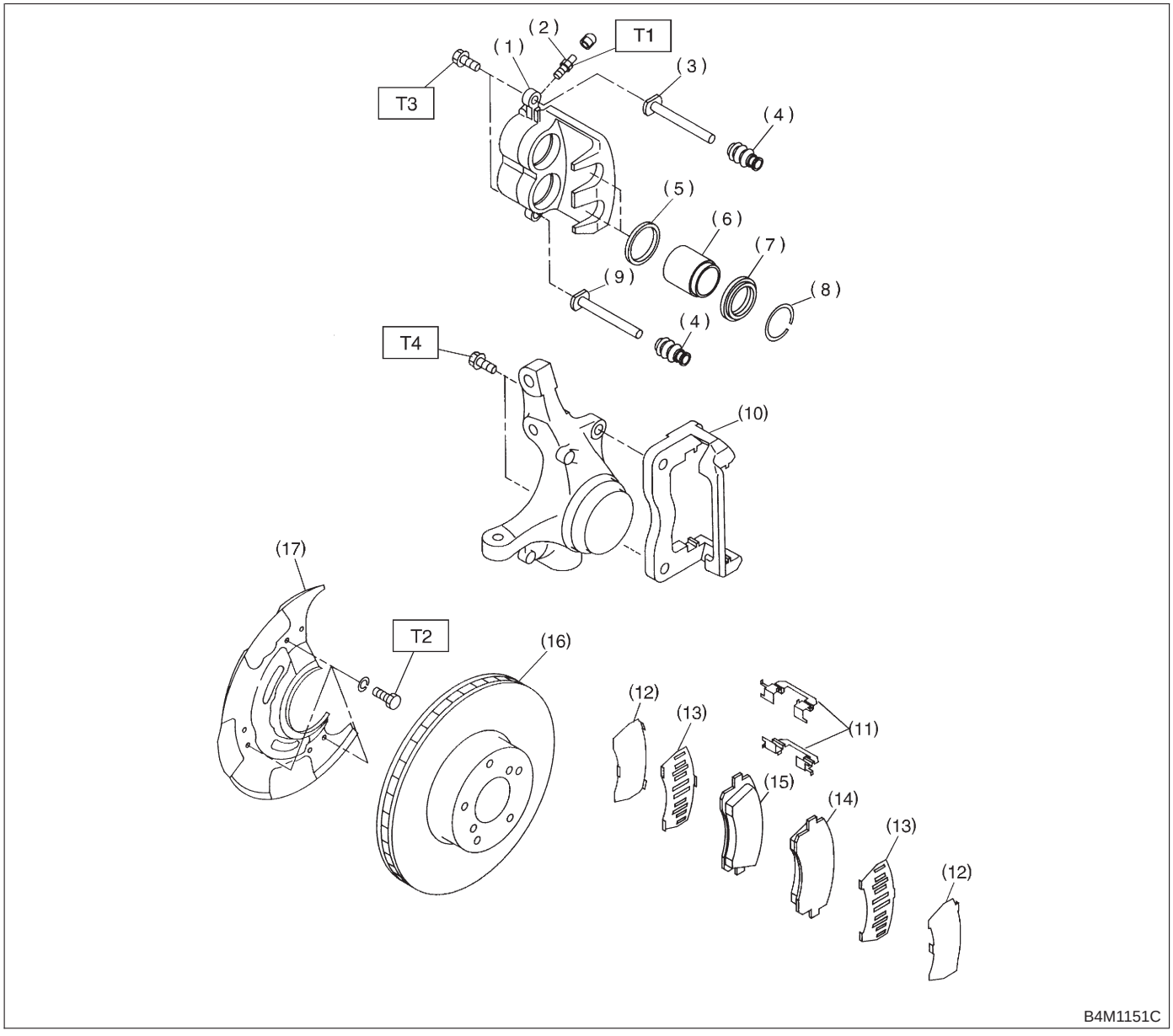
A: EXCEPT 2500 cc MODEL



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover

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

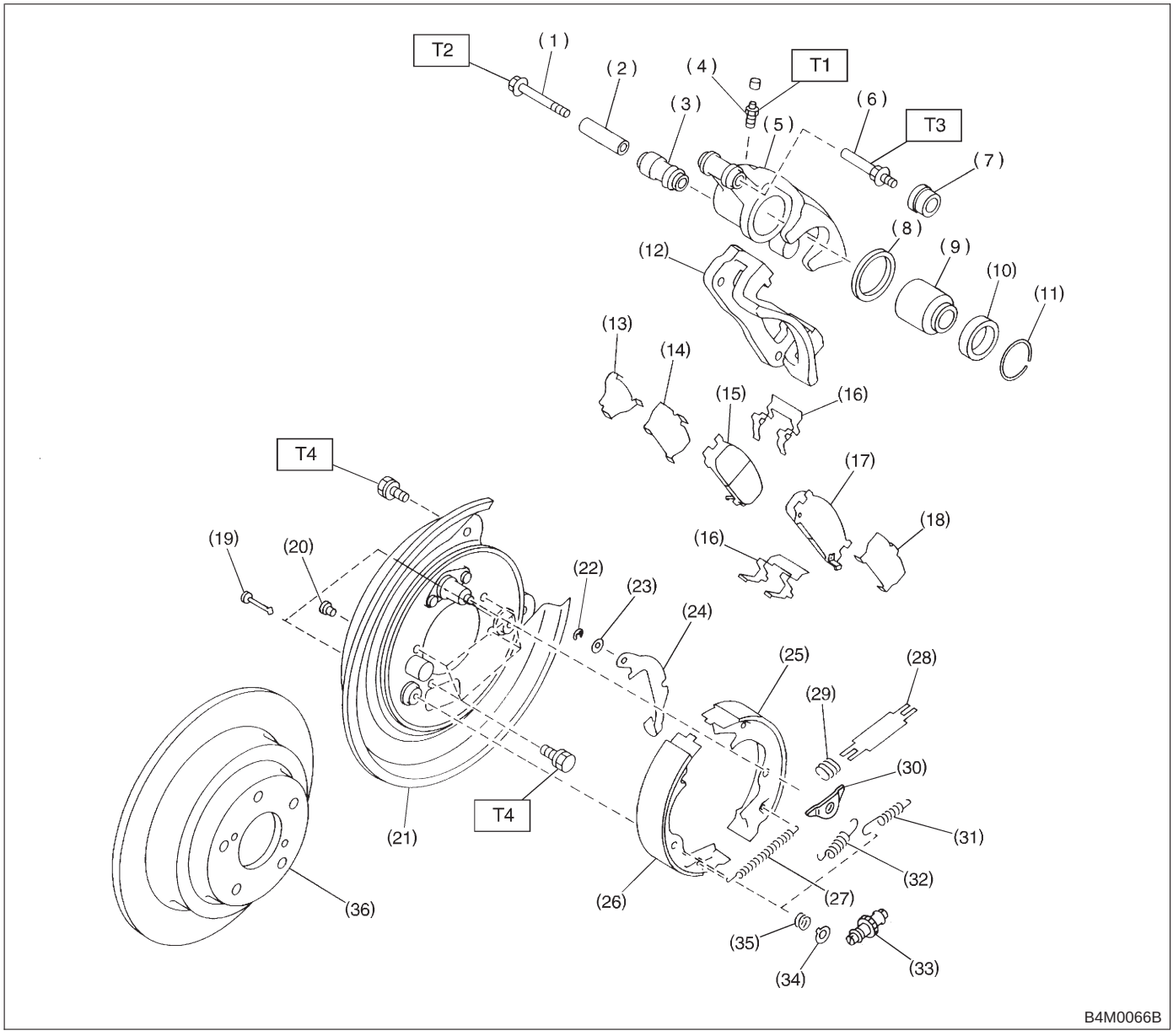
B: 2500 cc MODEL



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Boot ring
(9) Lock pin (Yellow)
(10) Support
(11) Pad clip
(12) Outer shim
(13) Inner shim
(14) Pad (Outside)
(15) Pad (Inside)
(16) Disc rotor
(17) Disc cover

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

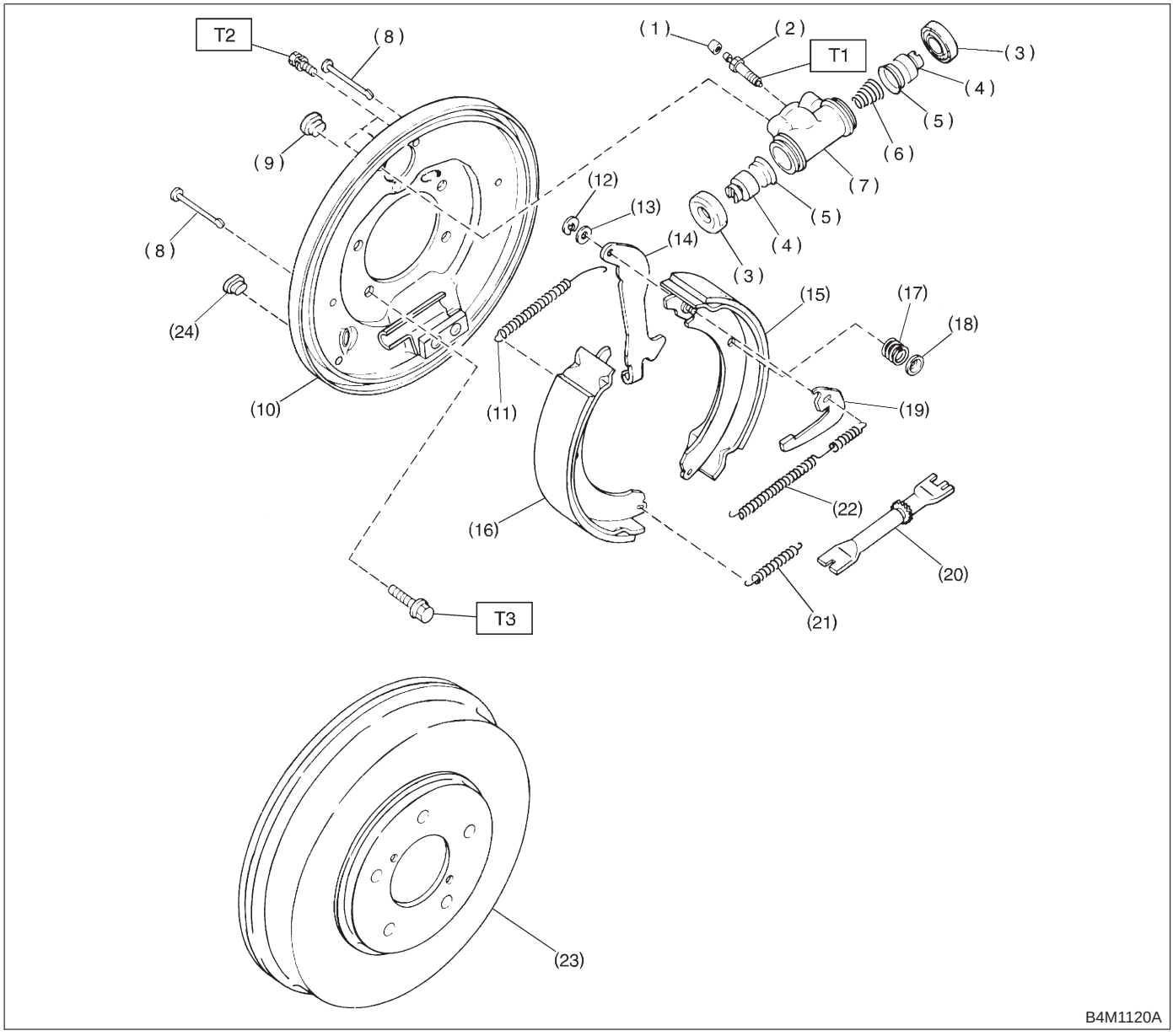
2. Rear Disc Brake



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

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 20±4 (2.0±0.4, 14.5±2.9)
T3: 26±5 (2.7±0.5, 19.5±3.6)
T4: 52±6 (5.3±0.6, 38.3±4.3)

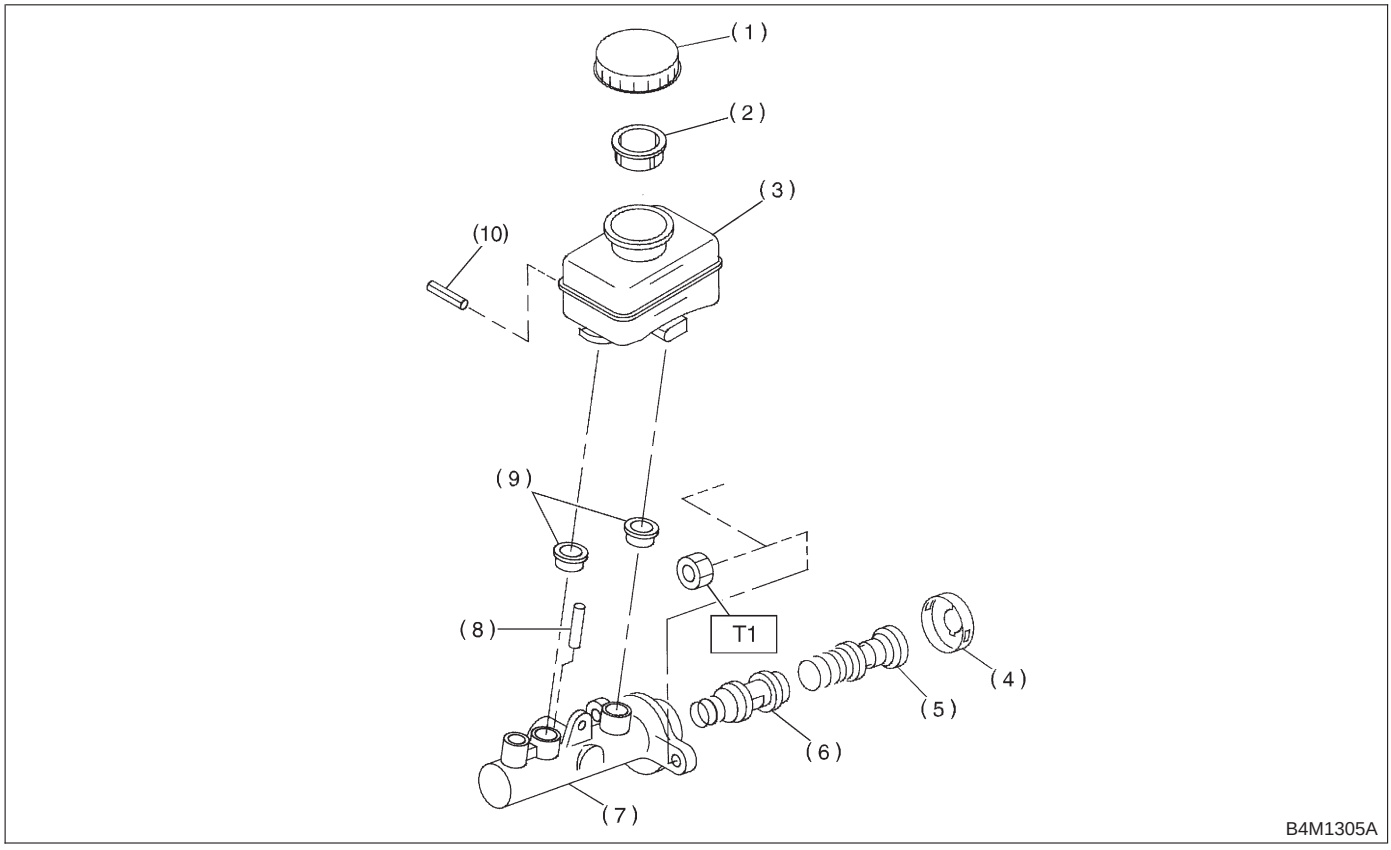
3. Rear Drum Brake



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

Tightening torque: N·m (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)

4. Master Cylinder

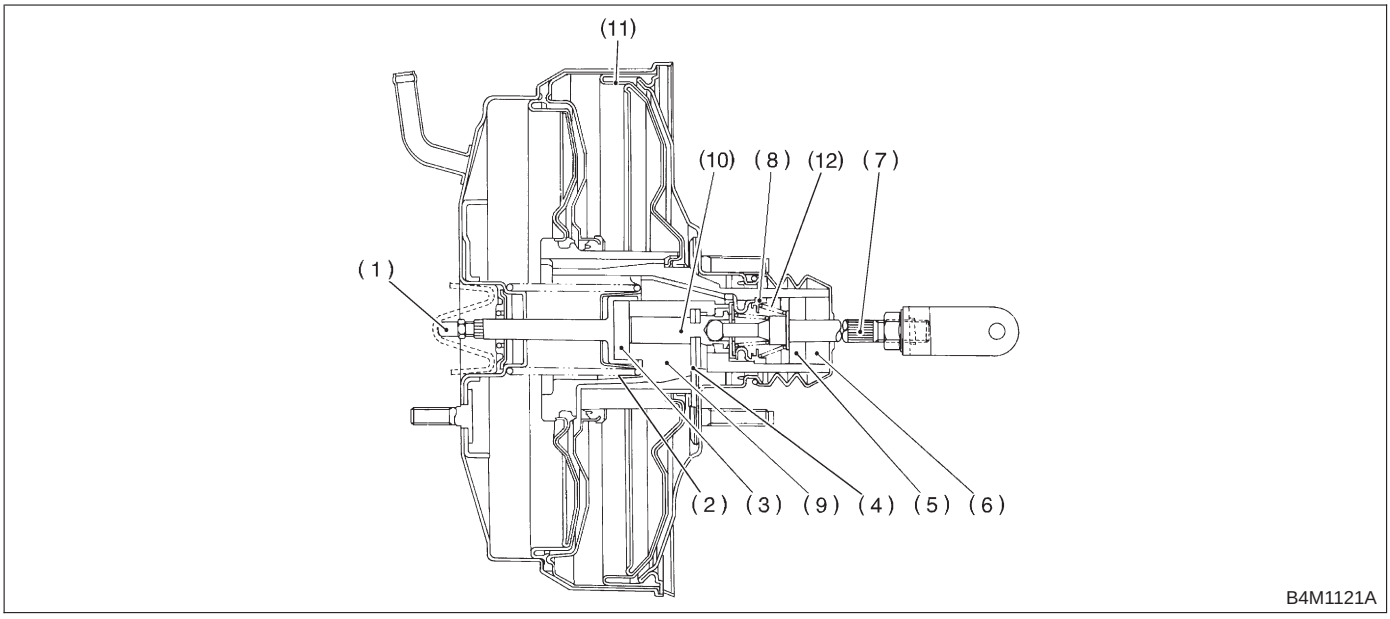


(1) Cap
(2) Filter
(3) Reservoir tank
(4) Piston retainer
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin (With ABS)
(9) Seal
(10) Pin

Tightening torque: N·m (kg-m, ft-lb)
T1: 14±4 (1.4±0.4, 10.1±2.9)

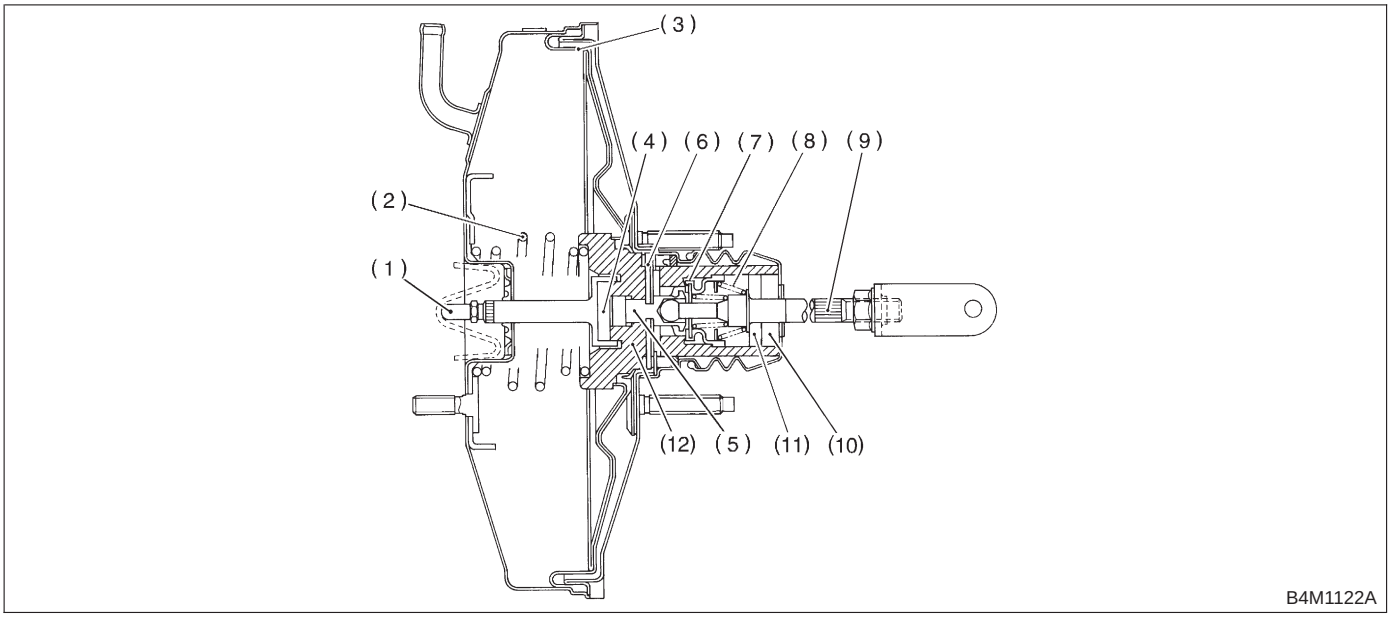
5. Brake Booster

A: MODELS WITH ABS



(1) Push rod
(2) Return spring
(3) Reaction disc
(4) Key
(5) Filter
(6) Silencer
(7) Operating rod
(8) Poppet valve
(9) Valve body
(10) Plunger valve
(11) Diaphragm plate
(12) Valve return spring

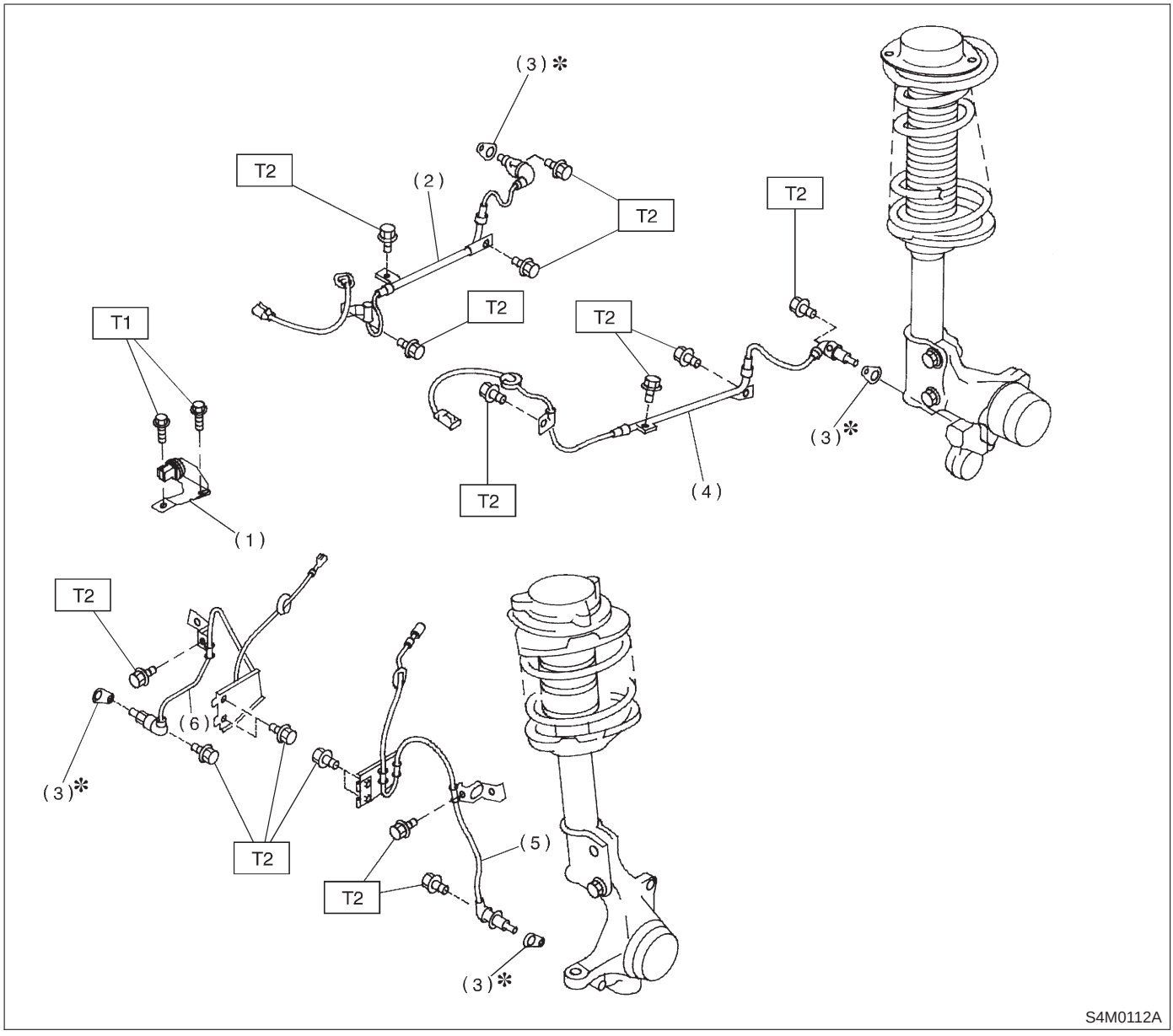
B: MODELS WITHOUT ABS



(1) Push rod
(2) Return spring
(3) Diaphragm plate
(4) Reaction disc
(5) Plunger valve
(6) Key
(7) Poppet valve
(8) Valve return spring
(9) Operating rod
(10) Silencer
(11) Filter
(12) Valve body

6. ABS System

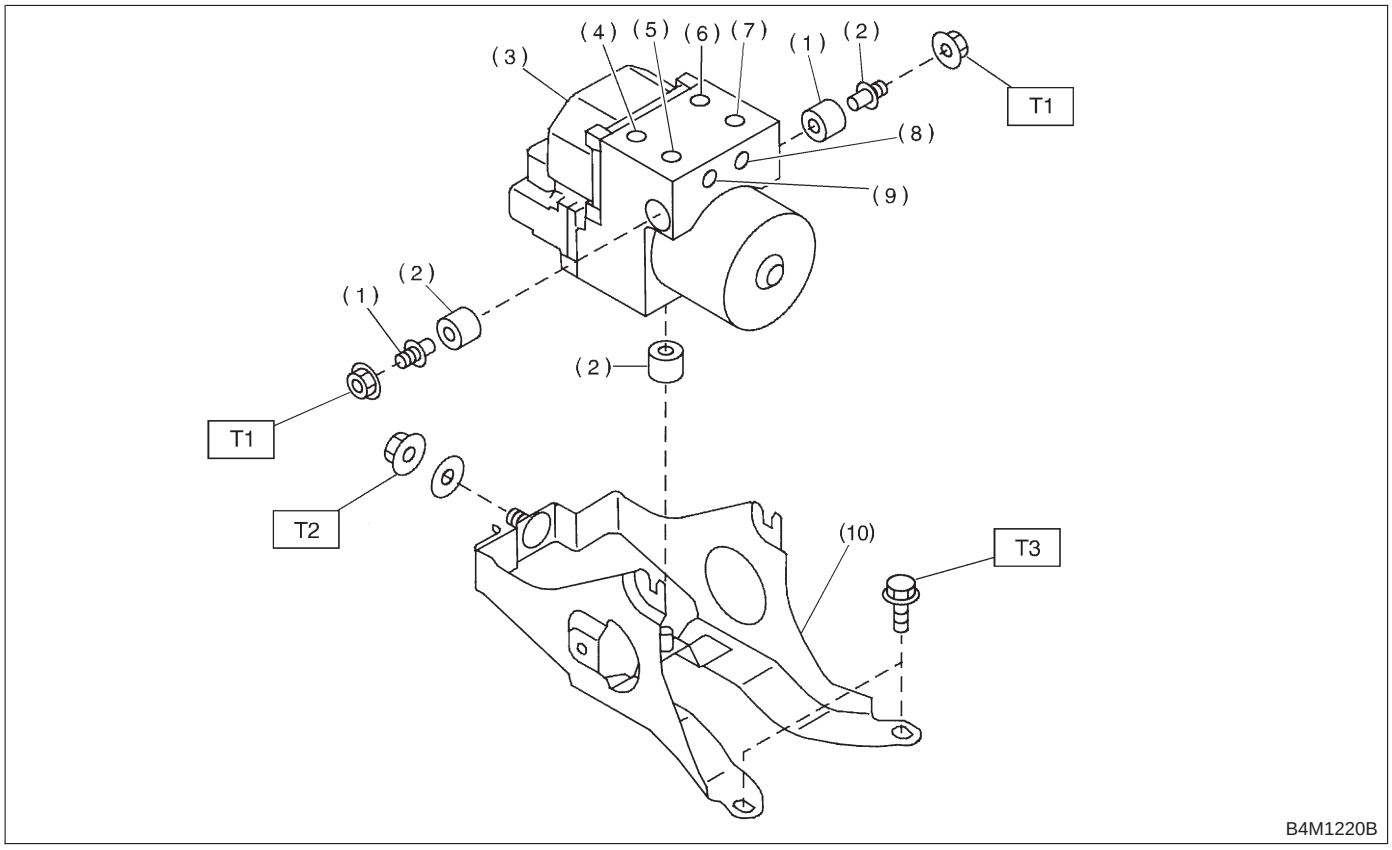
A: SENSOR



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

Tightening torque: N·m (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)

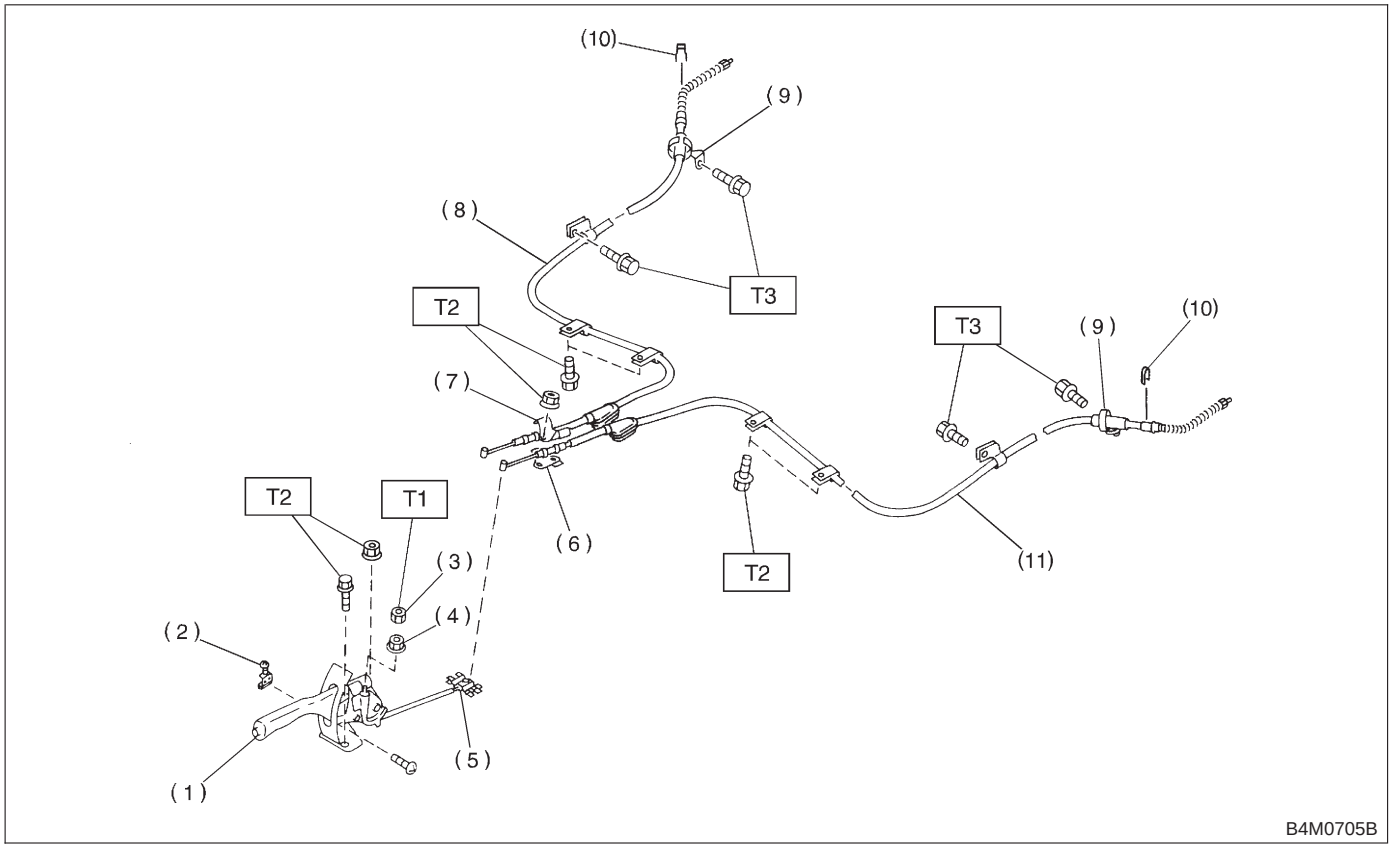
B: ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)



(1) Stud bolt
(2) Damper
(3) ABS control module and hydraulic control unit
(4) Front-LH outlet
(5) Secondary inlet
(6) Front-RH outlet
(7) Primary inlet
(8) Rear-LH outlet
(9) Rear-RH outlet
(10) Bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 29±7 (3.0±0.7, 21.7±5.1)
T3: 32±10 (3.3±1.0, 24±7)

7. Parking Brake



(1) Parking brake lever
(2) Parking brake switch
(3) Lock nut
(4) Adjusting nut
(5) Equalizer
(6) Bracket
(7) Clamp
(8) Parking brake cable RH
(9) Cable guide
(10) Clamp (Rear disc brake model only)
(11) Parking brake cable LH

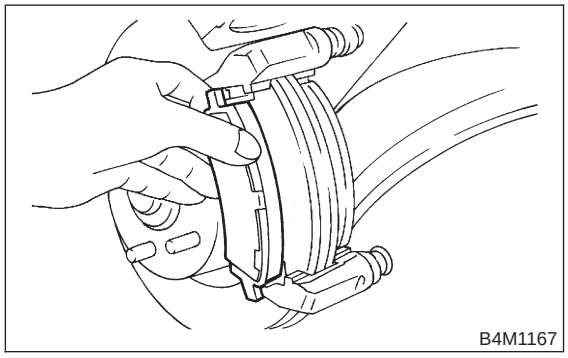
Tightening torque: N·m (kg-m, ft-lb)
T1: 5.9±1.5 (0.60±0.15, 4.3±1.1)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 32±10 (3.3±1.0, 24±7)

1. Front Disc Brake

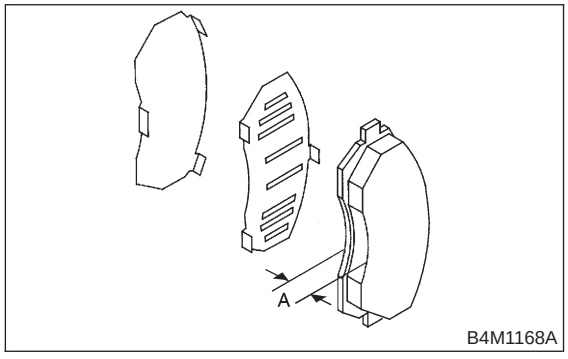
A: ON-CAR SERVICE

1. PAD

1) Remove lock pin.
2) Raise caliper body.
3) Remove pad.


B4M1167

4) Check pad thickness A.

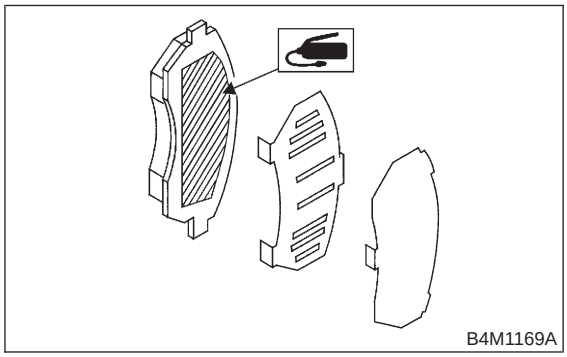


B4M1168A

Pad thickness (including back metal)	Standard value	17 mm (0.67 in)
	Wear limit	7.5 mm (0.295 in)

CAUTION:
● Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
● A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
● Replace pad if there is oil or grease on it.

5) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.

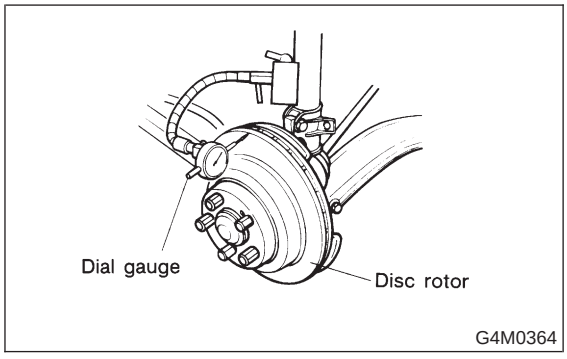

B4M1169A

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.

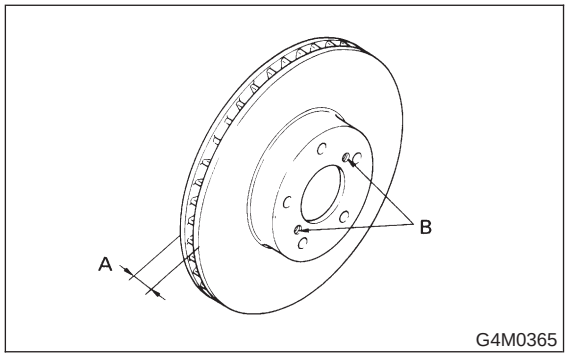


G4M0364

NOTE:
Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:
0.075 mm (0.0030 in)

3) Measure disc rotor thickness.

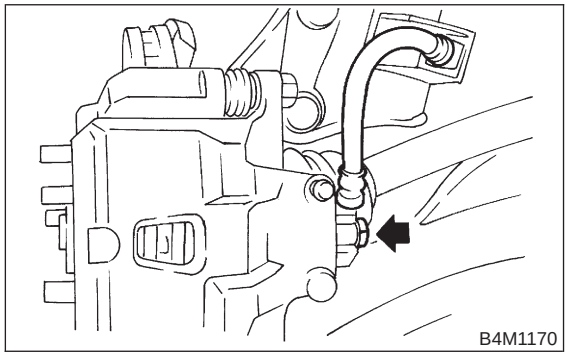


NOTE:
Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

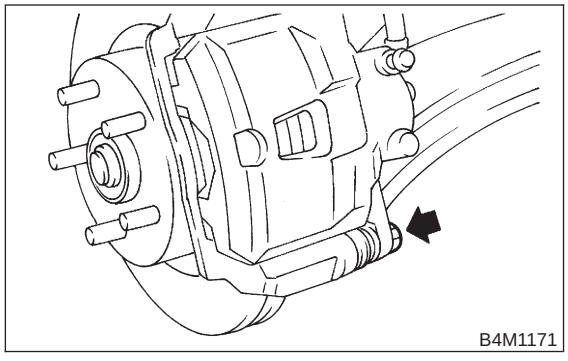
	Standard value	Service limit
Disc rotor thickness A	24.0 mm (0.945 in)	22.0 mm (0.866 in)

B: REMOVAL

1) Remove union bolt and disconnect brake hose from caliper body assembly.



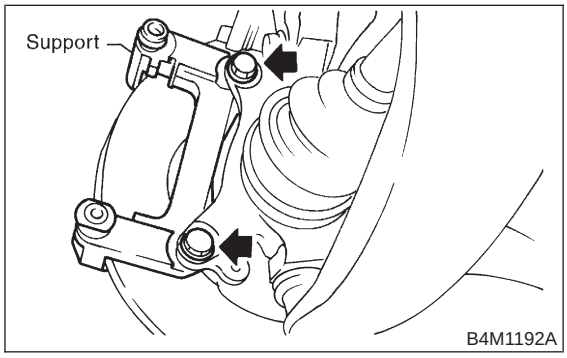
2) Remove bolt securing lock pin to caliper body.



3) Raise caliper body and move it toward vehicle center to separate it from support.

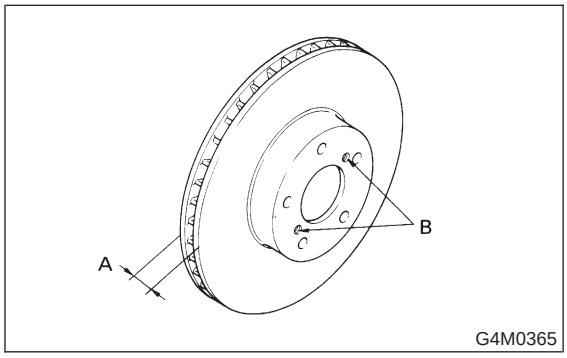
4) Remove support from housing.

NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.



5) Remove disc rotor from hub.

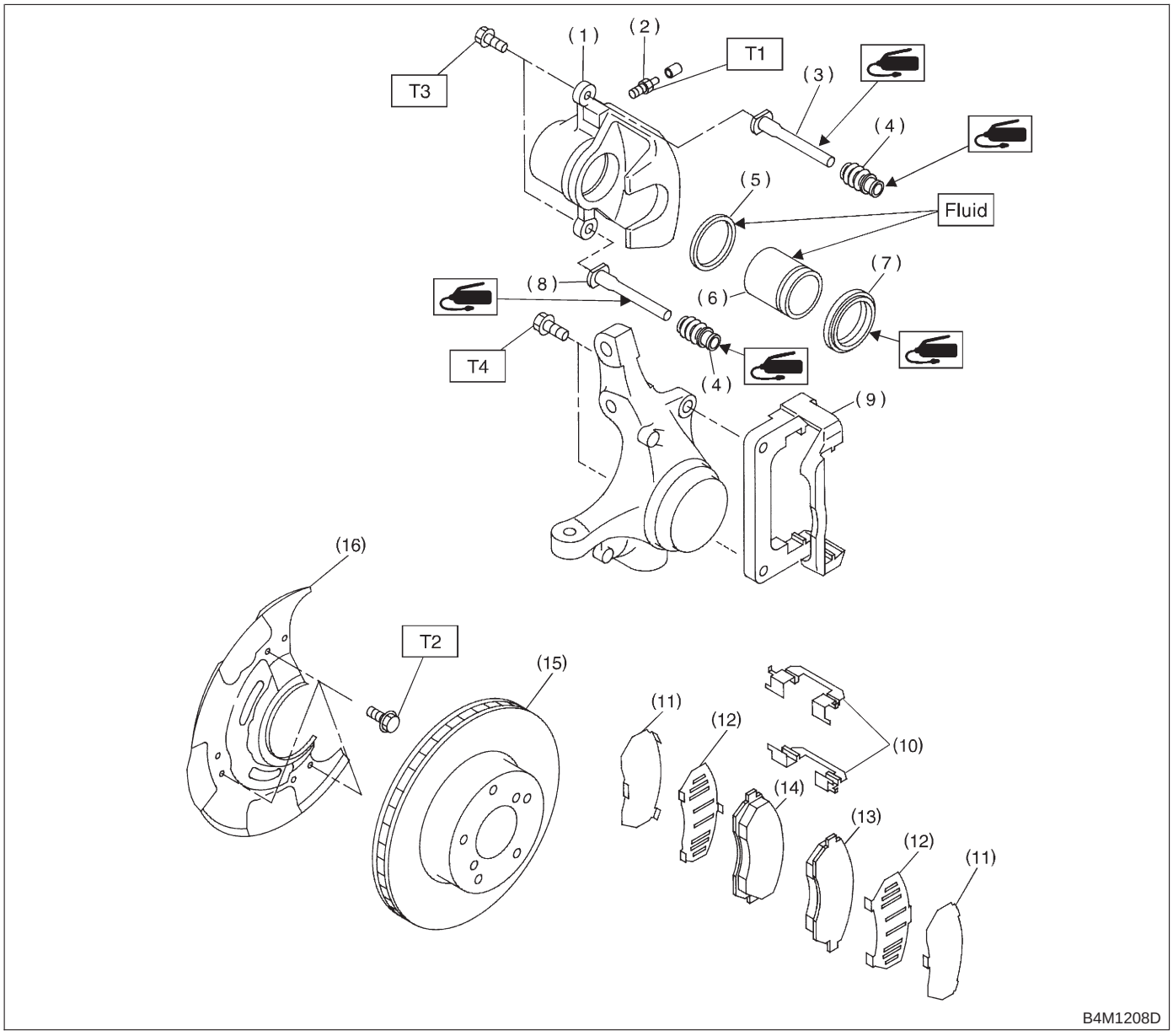
NOTE:
If disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in holes B on the rotor.



6) Clean mud and foreign particles from caliper body assembly and support.

C: DISASSEMBLY

1. EXCEPT 2500 cc MODEL



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover

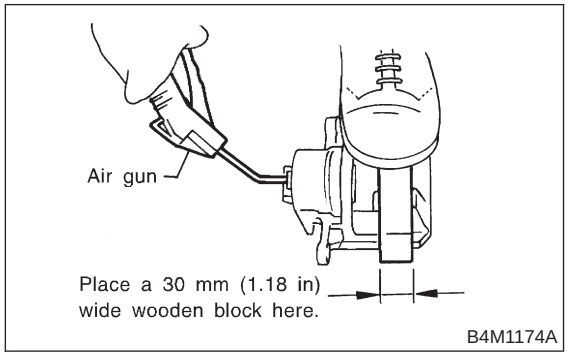
Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 37±5 (3.8±0.5, 27.5±3.6)
T4: 78±10 (8.0±1.0, 58±7)

1) Clean mud and foreign particles from caliper body assembly and support.

CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

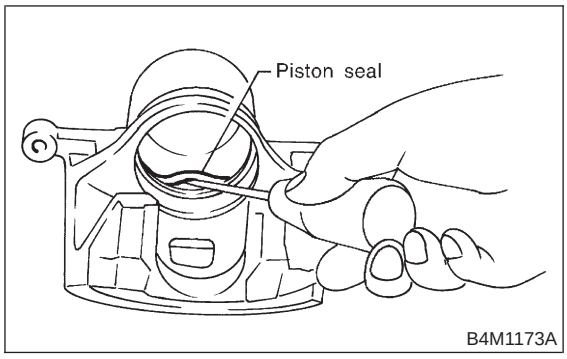
2) Gradually supply compressed air via caliper body brake hose to force piston out.

CAUTION:
- **Place a wooden block as shown in Figure to prevent damage to piston.**
- **Do not apply excessively high-pressure.**



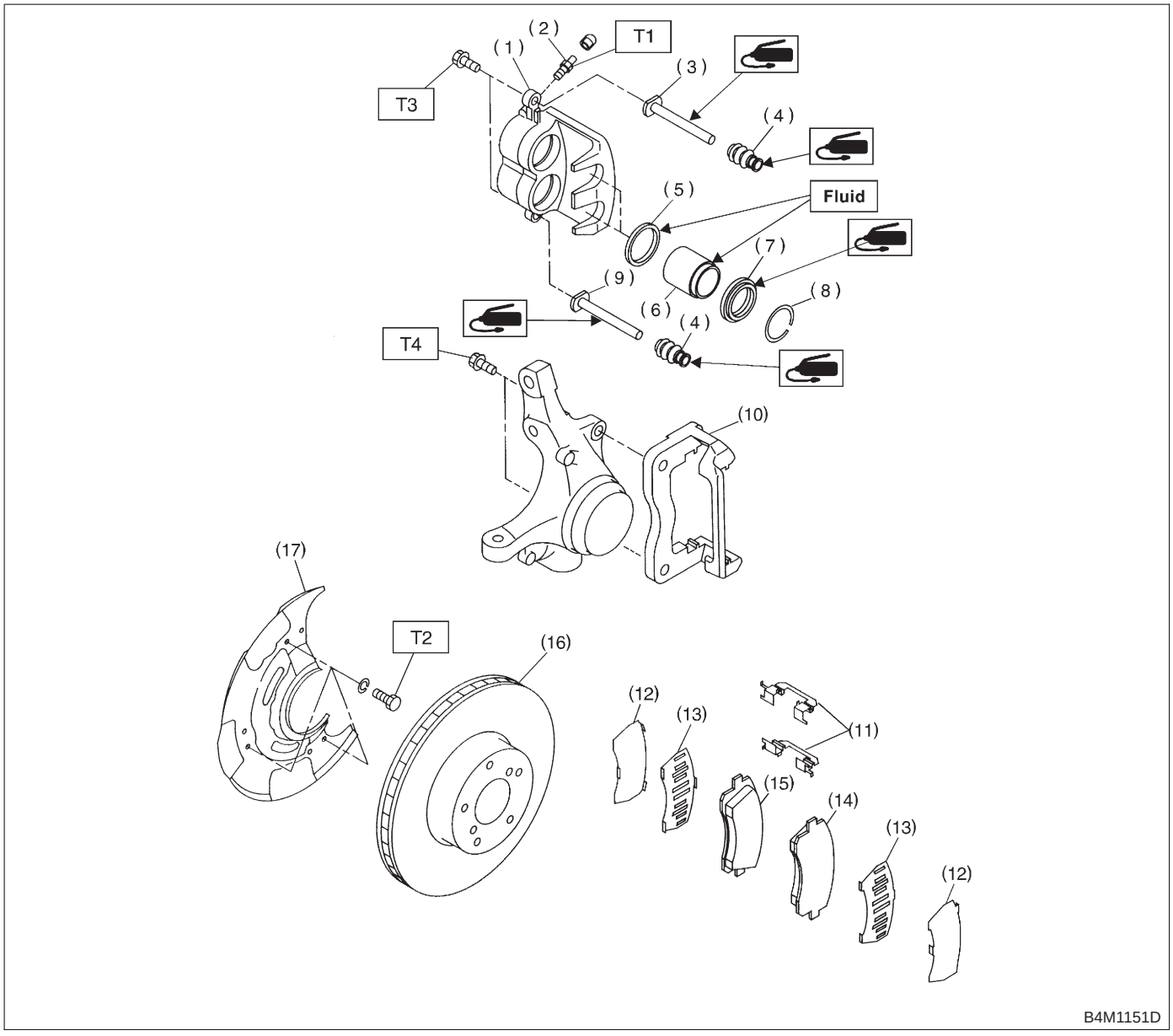
3) Remove piston boot.

4) Remove piston seal from caliper body cylinder.



5) Remove guide pin and boot from caliper body.

2. 2500 cc MODEL



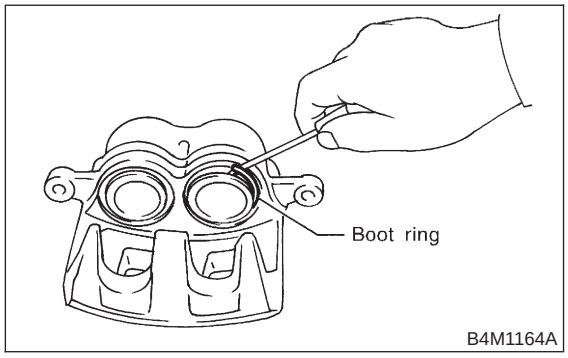
(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Boot ring
(9) Lock pin (Yellow)
(10) Support
(11) Pad clip
(12) Outer shim
(13) Inner shim
(14) Pad (Outside)
(15) Pad (Inside)
(16) Disc rotor
(17) Disc cover

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 18±5 (1.8±0.5, 13.0±3.6)
T3: 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.

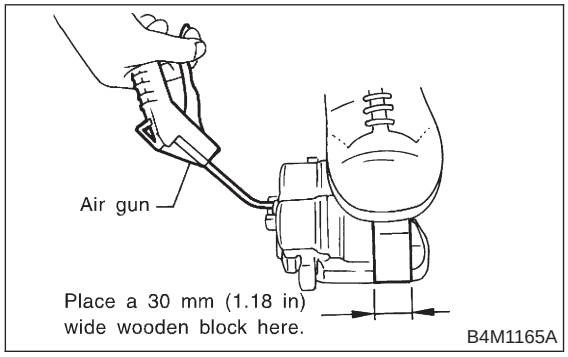
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

2) Using a standard screwdriver, remove boot ring from piston.

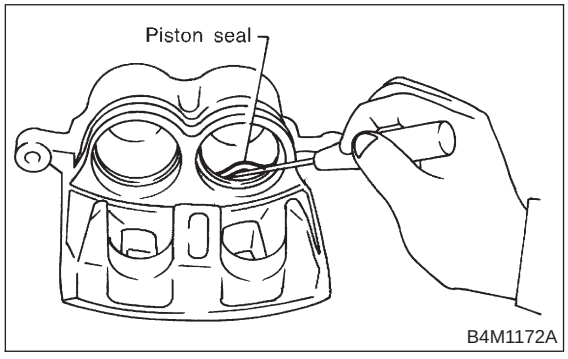


3) Remove boot from piston end.
4) Gradually supply compressed air via caliper body brake hose to force piston out.

CAUTION:
Place a wooden block as shown in Figure to prevent damage to piston.



5) Remove piston seal from caliper body cylinder.



6) Remove lock pin boot and guide pin boot.

D: INSPECTION

1) Repair or replace faulty parts.
2) Check caliper body and piston for uneven wear, damage or rust.
3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

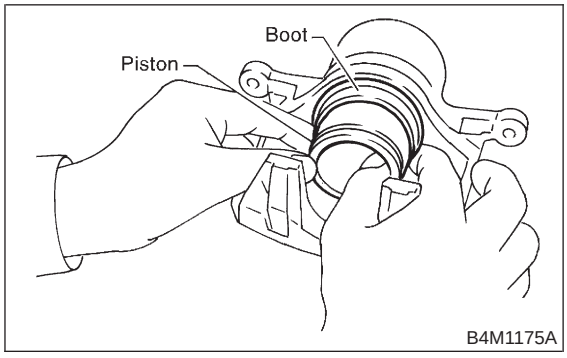
1. EXCEPT 2500 cc MODEL

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.

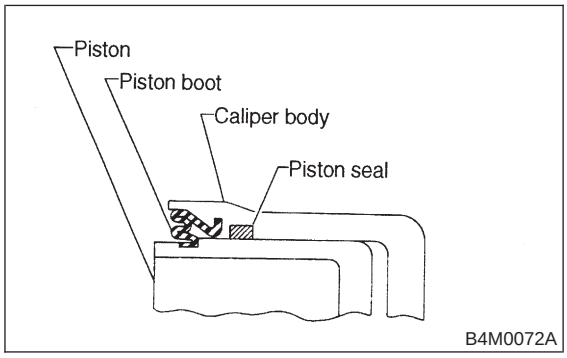
Grease:
NIGLUBE RX-2 (Part No. 003606000)

5) Insert piston into cylinder.

CAUTION:
Do not force piston into cylinder.

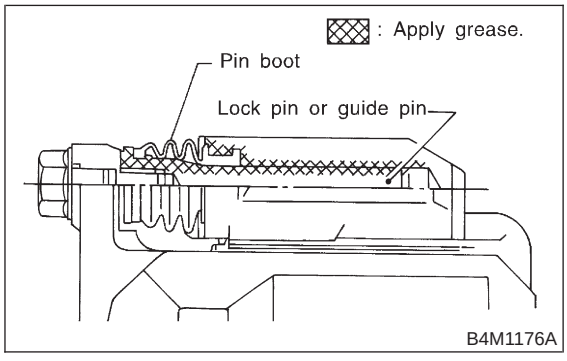


6) Position boot in grooves on cylinder and piston.



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)

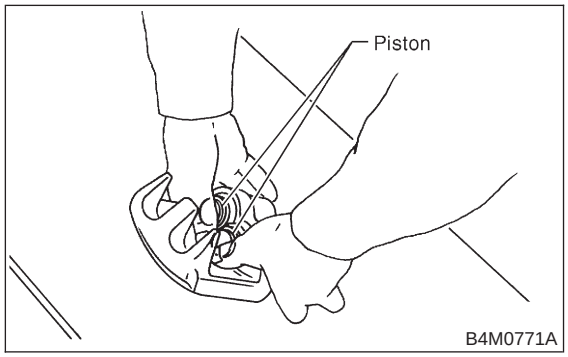


8) Install lock and guide pin boot on support.

2. 2500 cc MODEL

1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert piston into cylinder.

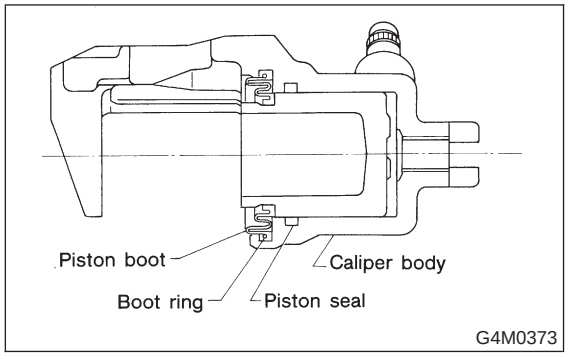
CAUTION:
Do not force piston into cylinder.



5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

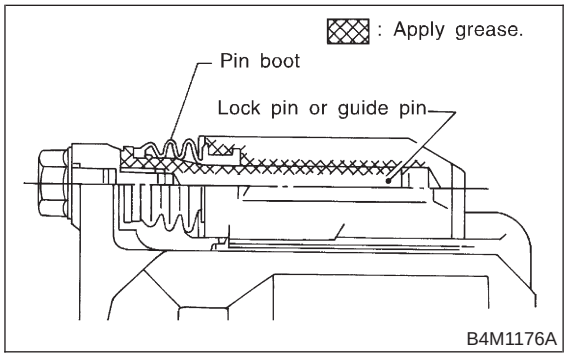
Grease:
NIGLUBE RX-2 (Part No. 003606000)

To facilitate installation, fit boot starting with piston end.



6) Position boot in grooves on cylinder and piston.
7) Install boot ring. Be careful not scratch boot.
8) Apply a coat of specified grease to lock pin and guide pin, outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. 003606000)



9) Install lock pin boot and guide pin boot on support.

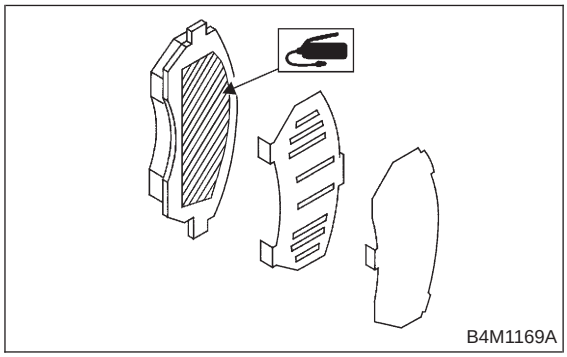
F: INSTALLATION

1) Install disc rotor on hub.
2) Install support on housing.

Tightening torque:
78±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.**

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.

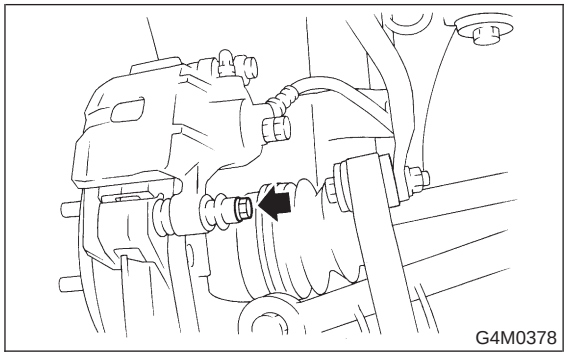
7) Bleed air from brake system.

2. Rear Disc Brake

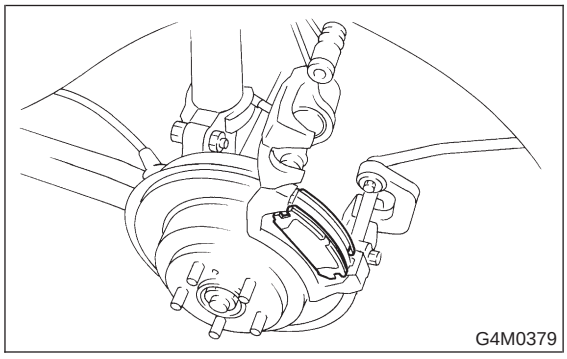
A: ON-CAR SERVICE

1. PAD

1) Remove lock pin.

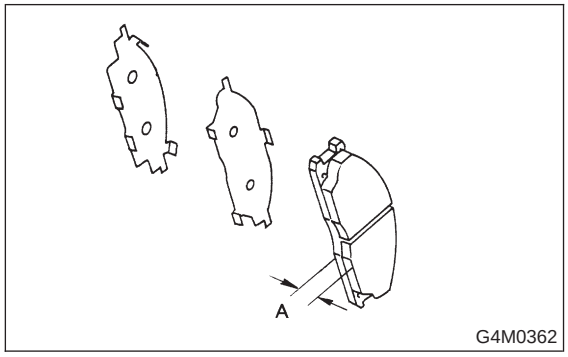


2) Raise caliper body.
3) Remove pad from support.



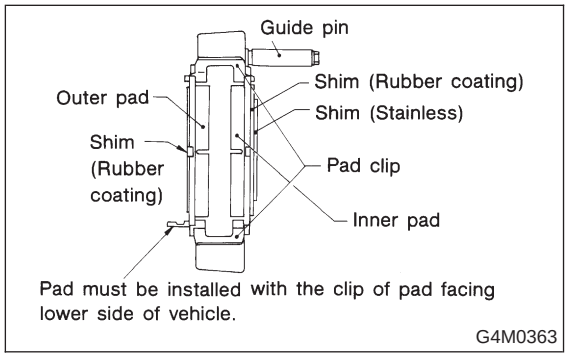
4) Check pad thickness (including back metal).

Pad thickness: A
Standard value
15.0 mm (0.591 in)
Wear limit
6.5 mm (0.256 in)



CAUTION:
● Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
● A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
● Replace pad if there is oil or grease on it.

5) Apply thin coat of PBC GREASE (Part No. 03607000) to the frictional portion between pad and pad clip.
6) Install pad on support.



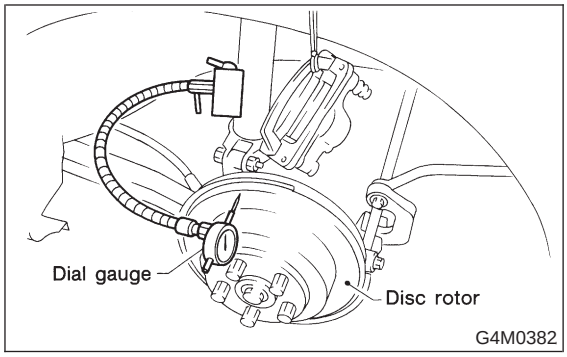
7) Install caliper body on support.

Tightening torque:
20±4 N·m (2.0±0.4 kg-m, 14.5±2.9 ft-lb)

NOTE:
If it is difficult to push piston during pad replacement, loosen air bleeder to facilitate work.

2. DISC ROTOR

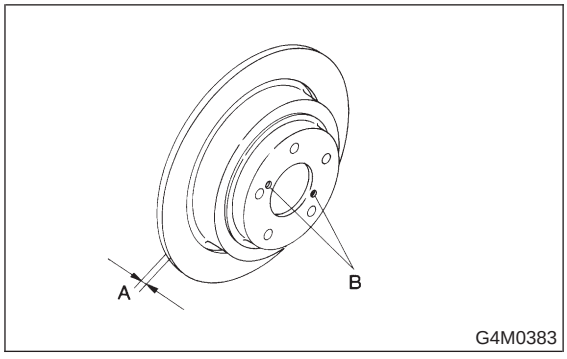
1) Install disc rotor by tightening the five wheel nuts.
2) Set a dial gauge on the disc rotor. Turn disc rotor to check runout.



NOTE:
Make sure that dial gauge is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor runout limit:
0.1 mm (0.004 in)

3) Measure disc rotor thickness.

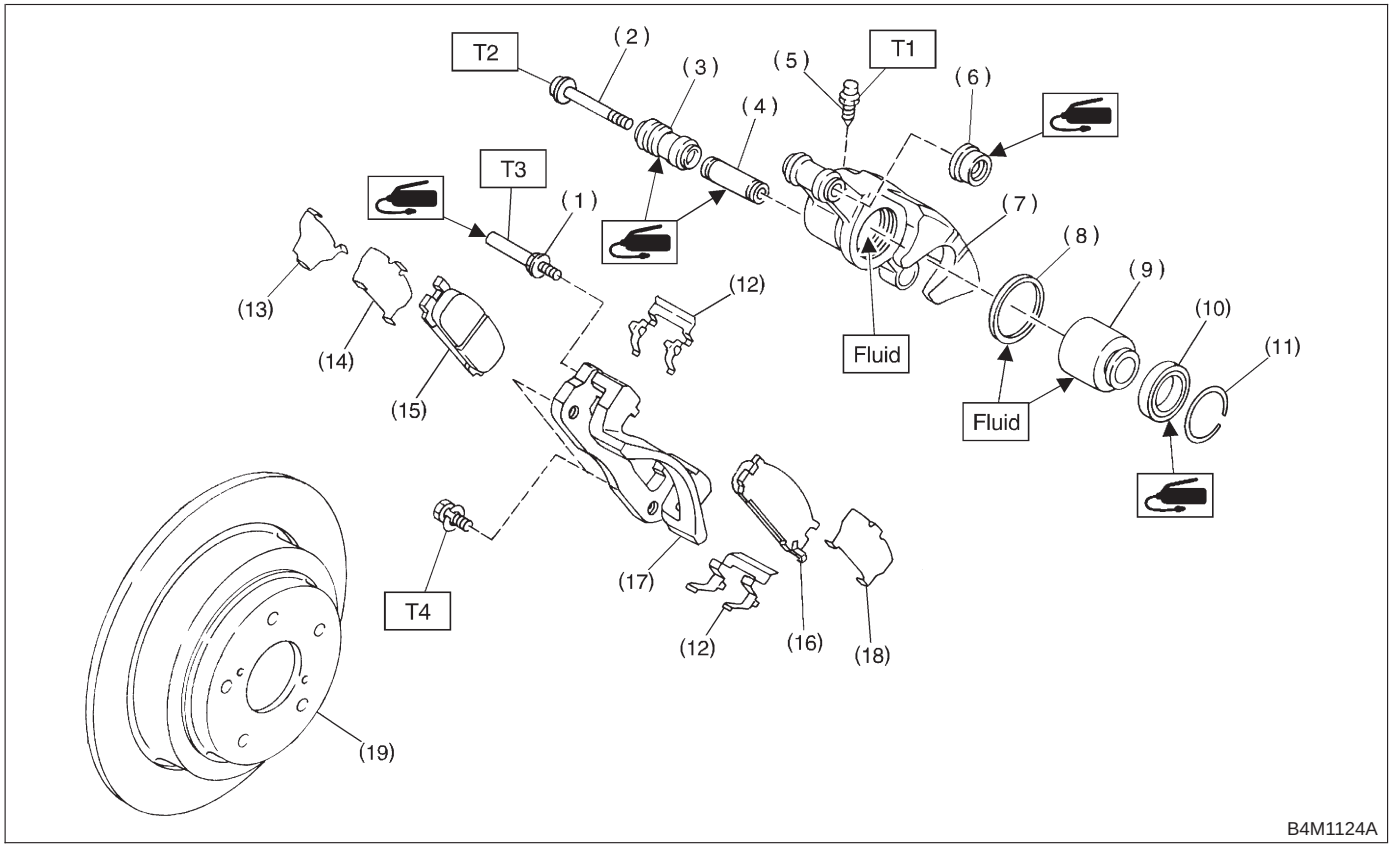


NOTE:
Make sure that micrometer is set 5 mm (0.20 in) inward of rotor outer perimeter.

Disc rotor thickness: A
Standard value
10 mm (0.39 in)
Service limit
8.5 mm (0.335 in)

NOTE:
When removing disc rotor, refer to instructions under Parking Brake. <Ref. to 4-4 [W4A0].>

B: REMOVAL



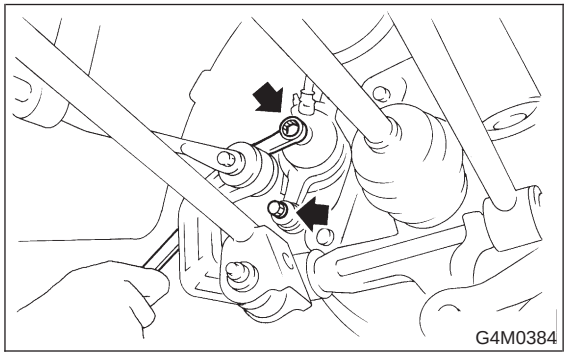
(1) Guide pin
(2) Lock pin
(3) Lock pin boot
(4) Lock pin sleeve
(5) Air bleeder screw
(6) Guide pin boot
(7) Caliper body
(8) Piston seal
(9) Piston
(10) Piston boot
(11) Boot ring
(12) Pad clip
(13) Shim
(14) Inner shim
(15) Inner pad
(16) Outer pad
(17) Support
(18) Outer shim
(19) Disc rotor

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 20±4 (2.0±0.4, 14.5±2.9)
T3: 26±5 (2.7±0.5, 19.5±3.6)
T4: 52±6 (5.3±0.6, 38.3±4.3)

1) Lift-up vehicle and remove wheels.

2) Disconnect brake hose from caliper body assembly.

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wipe off completely if spilled.



3) Remove lock pin.

4) Raise caliper body and move it toward vehicle center to separate it from support.
5) Remove support from back plate.

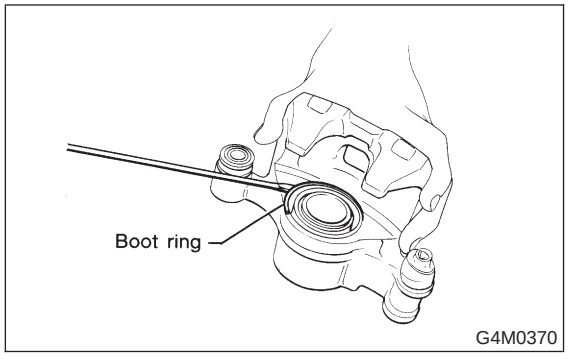
NOTE:
Remove support only when replacing it or the rotor. It need not be removed when servicing caliper body assembly.

6) Clean mud and foreign particles from caliper body assembly and support.

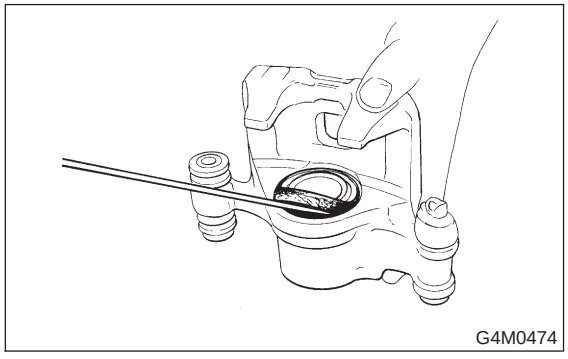
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

C: DISASSEMBLY

1) Remove the boot ring.

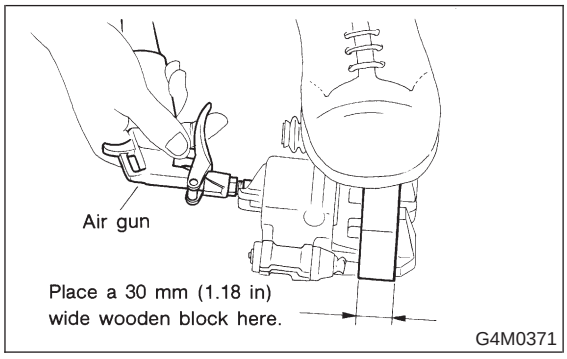


2) Remove the piston boot.

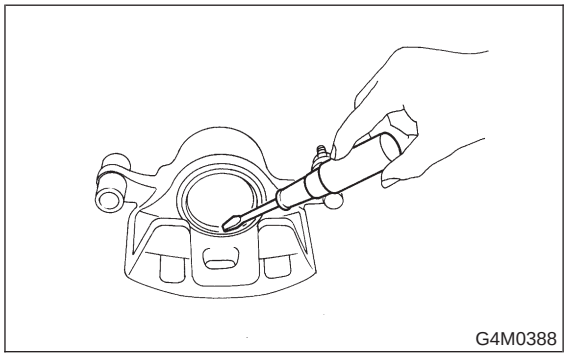


3) Gradually supply compressed air via inlet of caliper body to force piston out.

CAUTION:
- **Place a wooden block as shown in Figure to prevent damage to piston.**
- **Do not apply excessively high-pressure.**



4) Remove piston seal from caliper body cylinder.



5) Remove lock pin sleeve and boot from caliper body.
6) Remove guide pin boot.

D: INSPECTION

1) Repair or replace faulty parts.
2) Check caliper body and piston for uneven wear, damage or rust.
3) Check rubber parts for damage or deterioration.

E: ASSEMBLY

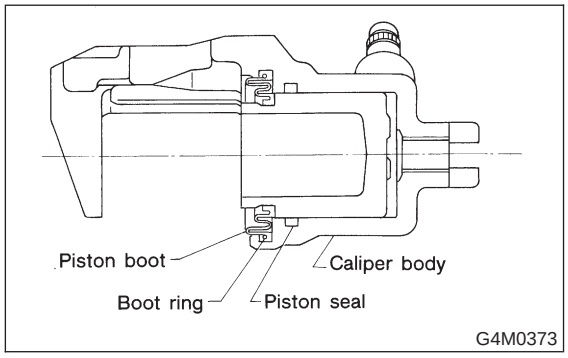
1) Clean caliper body interior using brake fluid.
2) Apply a coat of brake fluid to piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert piston into cylinder.

CAUTION:
Do not force piston into cylinder.

5) Apply a coat of specified grease to boot and fit in groove on ends of cylinder and piston.

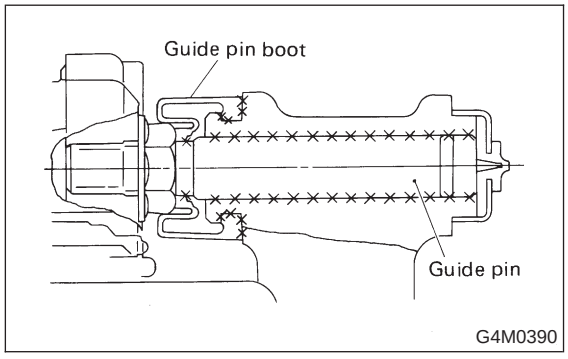
Grease
NIGLUBE RX-2 (Part No. 003606000)

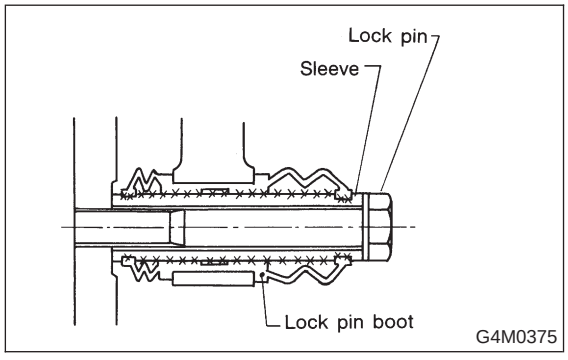
6) Install the piston boot to the caliper body, and attach boot ring.



7) Apply a coat of specified grease to guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

Grease
NIGLUBE RX-2 (Part No. 003606000)





8) Install guide pin boot on caliper body.
9) Install lock pin boot on caliper body and insert lock pin sleeve into place.

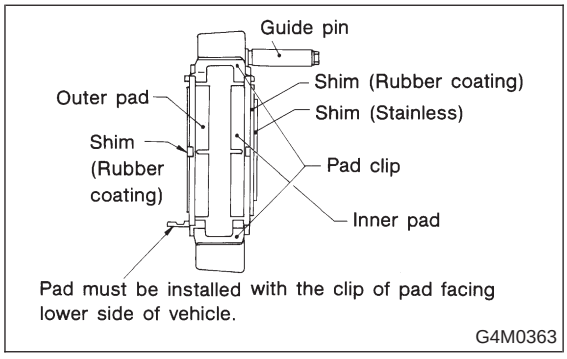
F: INSTALLATION

1) Install disc rotor on hub.
2) Install support on back plate.

Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)

CAUTION:
● Always replace the pads for both the left and right wheels at the same time. Also replace pad clips if they are twisted or worn.
● A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of the wear indicator contacts the disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
● Replace pads if there is oil or grease on them.

3) Apply thin coat of PBC GREASE (Part No. 003607000) to the frictional portion between pad and pad clip.
4) Install pads on support.



5) Install caliper body on support.

Tightening torque:
20±4 N·m (2.0±0.4 kg-m, 14.5±2.9 ft-lb)

6) Connect brake hose.

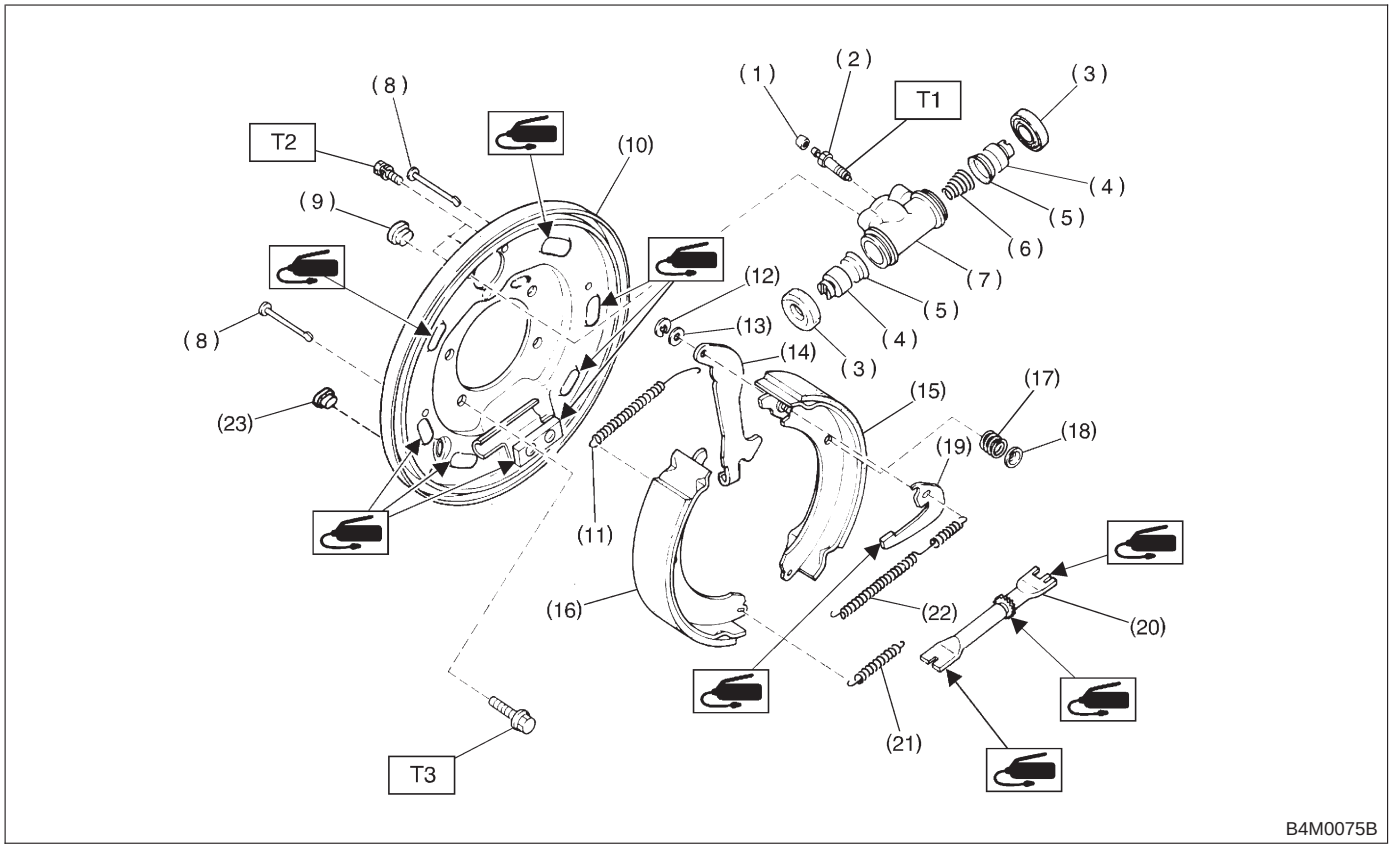
Tightening torque:
18±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)

CAUTION:
● The brake hose must be connected without any twist.
● Replace brake hose gaskets with new ones.

7) Bleed air from brake system.

3. Rear Drum Brake

A: REMOVAL

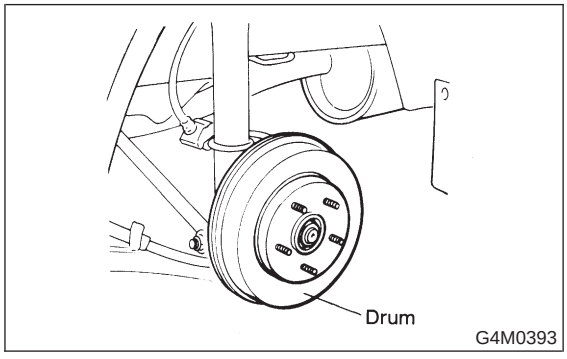


(1) Air bleeder cap
(2) Air bleeder screw
(3) Boot
(4) Piston
(5) Cup
(6) Spring
(7) Wheel cylinder body
(8) Pin
(9) Plug
(10) Back plate
(11) Upper shoe return spring
(12) Retainer
(13) Washer
(14) Parking brake lever
(15) Brake shoe (Trailing)
(16) Brake shoe (Leading)
(17) Shoe hold-down spring
(18)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

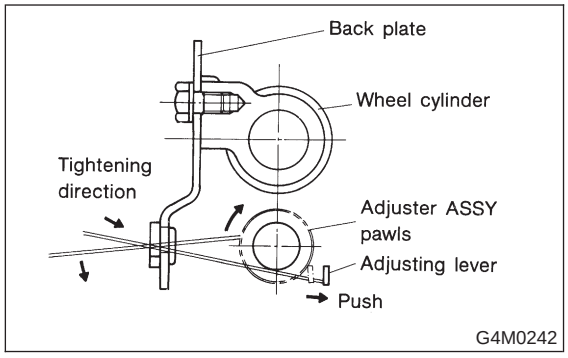
Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 10±2 (1.0±0.2, 7.2±1.4)
T3: 52±6 (5.3±0.6, 38.3±4.3)

1. BRAKE DRUM AND SHOE

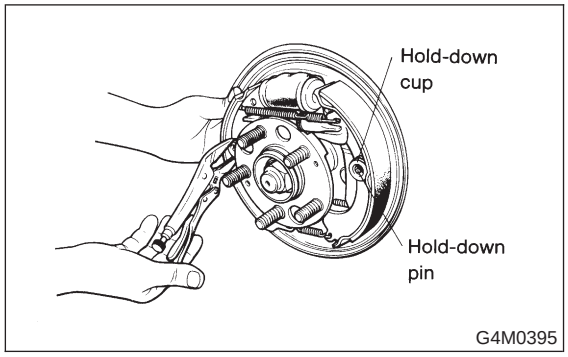
1) Loosen wheel nuts, jack-up vehicle, support it with rigid racks, and remove wheel.
2) Release parking brake.
3) Remove brake drum from brake assembly.



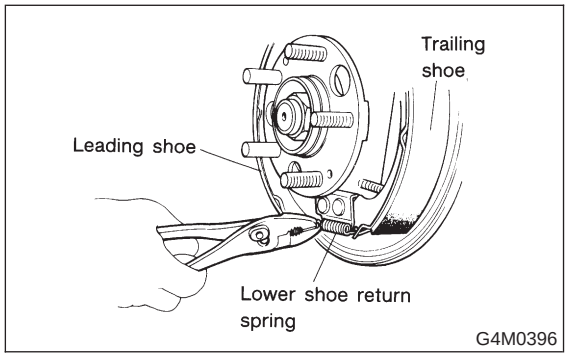
NOTE:
If it is difficult to remove brake drum, remove adjusting hole cover from back plate, and then, turn adjusting screw using a slot-type screwdriver until brake shoe separates from the drum.



4) Hold hold-down pin by securing rear of back plate with your hand.

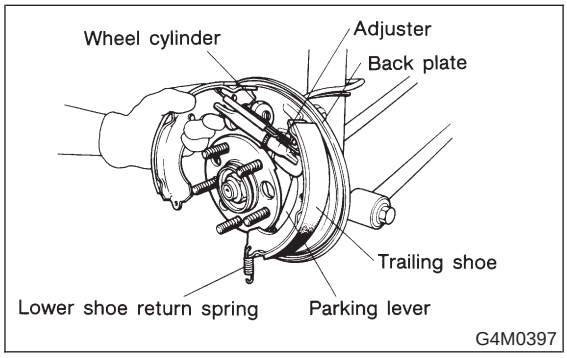


5) Disconnect hold-down cup from hold-down pin by rotating hold-down cup.
6) Disconnect lower shoe return spring from shoes.

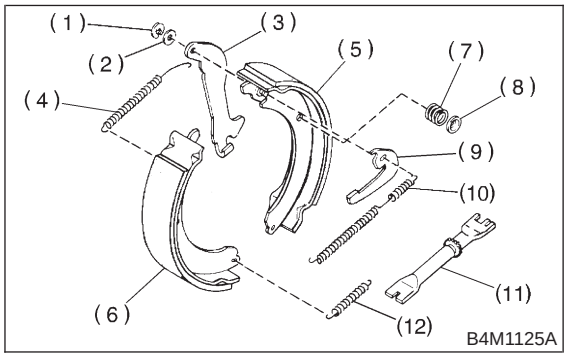


7) Remove shoes one by one from back plate with adjuster.

CAUTION:
Be careful not to bend parking brake cable excessively when removing brake shoes.



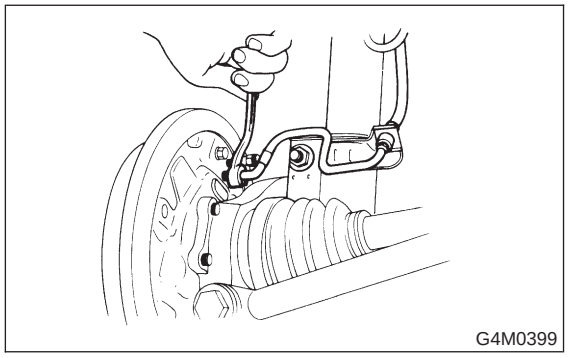
8) Disconnect parking brake cable from parking lever.
9) Remove the following.



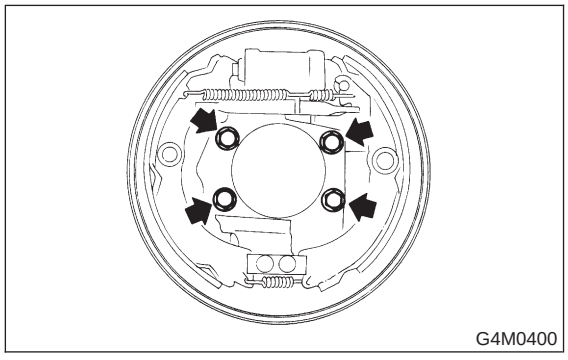
(1) Retainer
(2) Washer
(3) Parking lever
(4) Upper shoe return spring
(5) Trailing shoe
(6) Leading shoe
(7) Shoe hold-down spring
(8) Shoe hold-down cup
(9) Adjusting lever
(10) Adjuster spring
(11) Adjuster
(12) Lower shoe return spring

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.

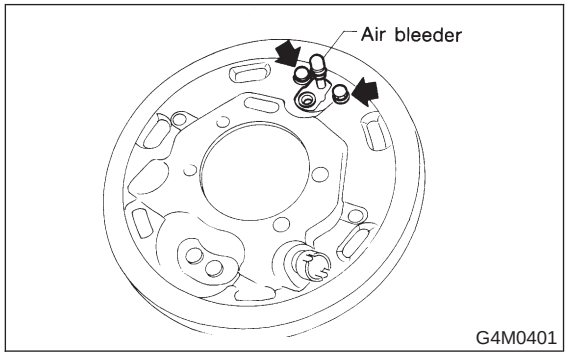


5) Remove hub. <Ref. to 4-2 [W2A2].>
6) Remove the bolts installing back plate, and then, remove brake assembly.



3. WHEEL CYLINDER

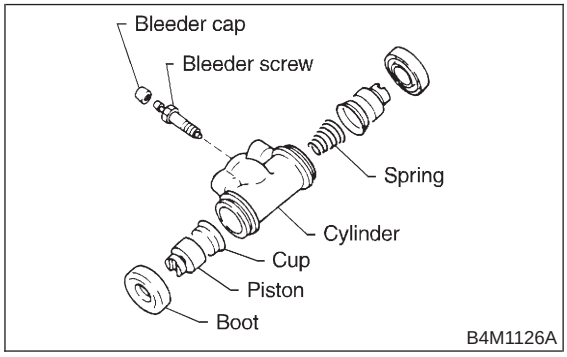
1) Remove brake drum and shoes.
2) Unscrew brake pipe flare nut; and disconnect brake pipe.
3) Remove the bolts installing wheel cylinder on back plate, and remove it.



B: DISASSEMBLY

1. WHEEL CYLINDER

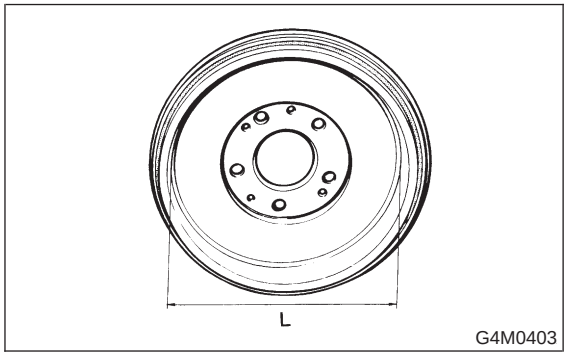
1) Remove right and left dust boots from wheel cylinder.
2) Remove piston, cup, spring and air bleeder screw and cap.



C: INSPECTION

1) If the inside surface of brake drum is streaked, correct the surface. And, if it is unevenly worn, taperingly streaked, or the outside surface of brake drum is damaged, correct or replace it.
2) Measure the drum inner diameter.

Drum inner diameter: "L"
Standard: 228.6 mm (9 in)
Service limit: 230.6 mm (9.08 in)



3) Measure the lining thickness.

Lining thickness:
Standard: 4.1 mm (0.161 in)
Service limit: 1.5 mm (0.059 in)

4) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
5) When the shoe return spring tension is excessively weakened, replace it, taking care to identify upper and lower springs.

D: ASSEMBLY

1. WHEEL CYLINDER

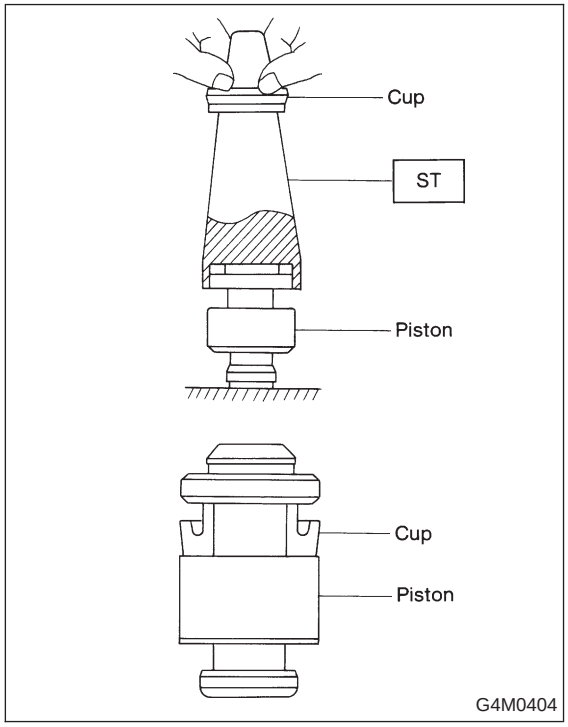
1) Clean all parts in brake fluid. Check and replace faulty parts.
- Cup and boot for damage or fatigue
- Cylinder, piston and spring or damage or rust formation

2) Assembly is the reverse order of disassembly.
   (1) When installing the cup, use ST, apply brake fluid to the frictional surface for smooth installation and pay attention to cup direction.
   (2) STs are available in different sizes.

CAUTION:
- **When replacing the repair kit, make sure that the sizes of cylinder and cup are the same as those which were replaced.**
- **Use only the tool of the correct size.**

ST: ADAPTER	
Applicable size	Part No.
19.05 mm (3/4 in)	926460000

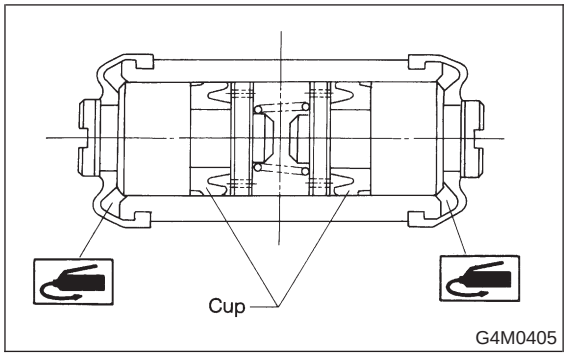
CAUTION:
While assembling, be careful to prevent any metal chip, dust or dirt from entering the wheel cylinder.



3) Apply rubber grease to the boot inside as shown in Figure.

Grease:
NIGLUBE RX-2 (Part No. 003606000)

CAUTION:
Never use brake grease.

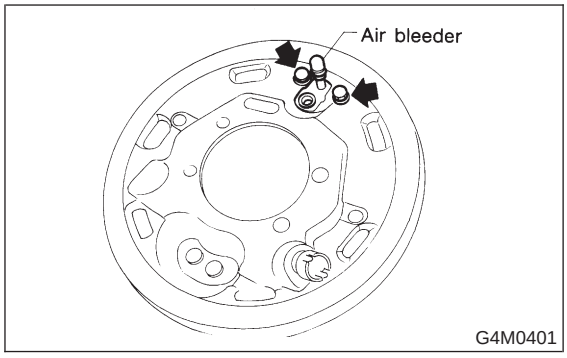


E: INSTALLATION

1. WHEEL CYLINDER

Install wheel cylinder on back plate, and tighten bolts.

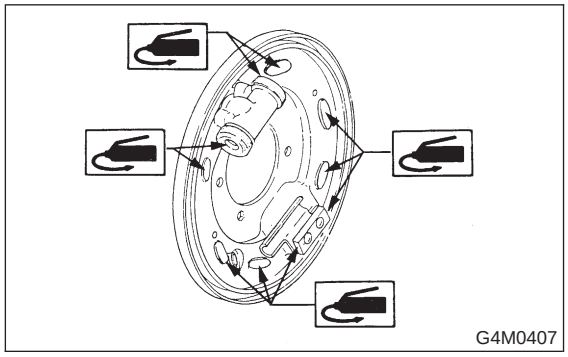
Tightening torque:
10±2 N·m (1.0±0.2 kg-m, 7.2±1.4 ft-lb)



2. BRAKE DRUM AND SHOE

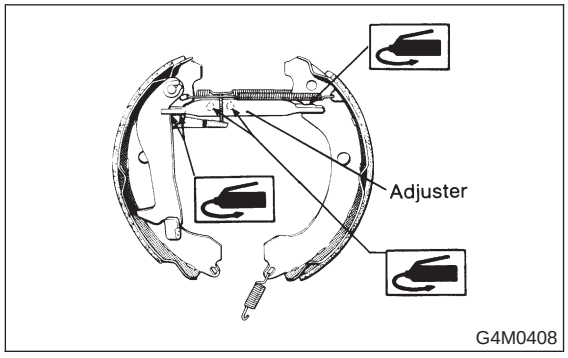
1) Clean back plate and wheel cylinder.
2) Apply grease to portions indicated by arrows in Figure.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 725191460)

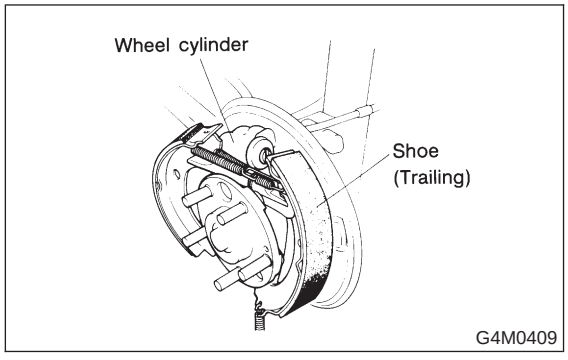


3) Apply grease to adjusting screw and both ends of adjuster.

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.

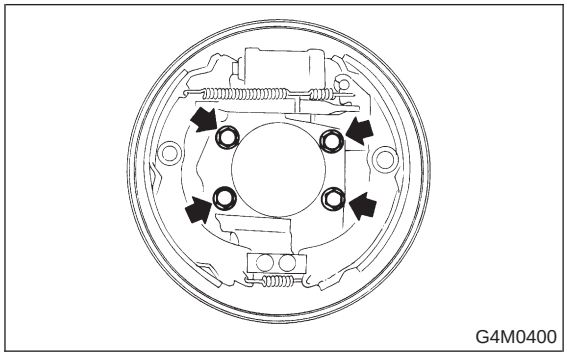


6) Connect lower shoe return spring.
7) Fix shoes by connecting hold-down cup to hold-down pin.

3. BRAKE ASSEMBLY

1) Install brake assembly on housing, and tighten bolts to install back plate.

Tightening torque:
52±6 N·m (5.3±0.6 kg-m, 38.3±4.3 ft-lb)



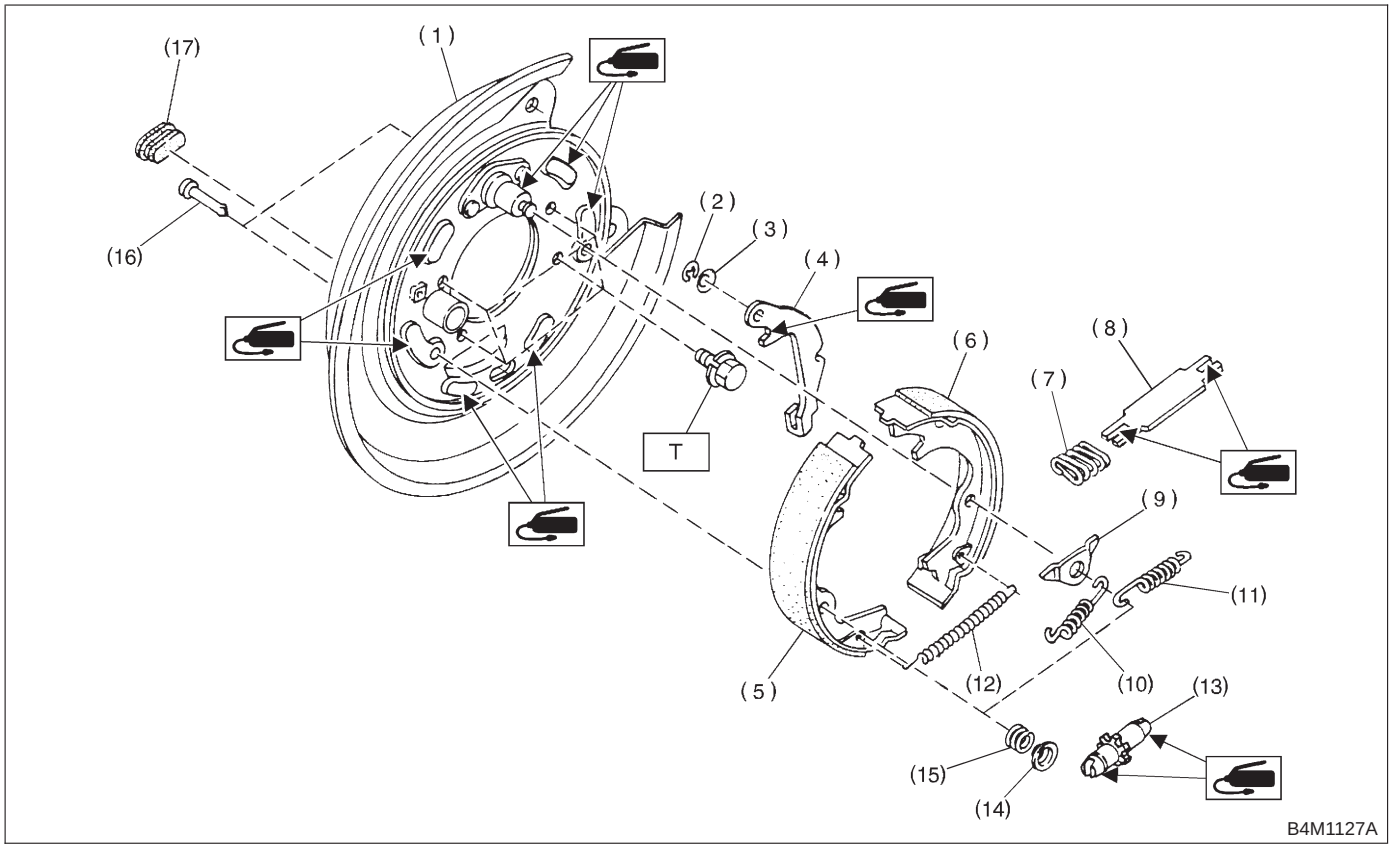
2) Install hub. <Ref. to 4-2 [W2E0].>
3) Connect brake pipe, and tighten brake pipe flange nut.

Tightening torque:
$14.7^{+3}/_{-2}$ N·m($1.5^{+0.3}/_{-0.2}$ kg-m, $10.8^{+2.2}/_{-1.4}$ ft-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.

4. Parking Brake (Rear Disc Brake)

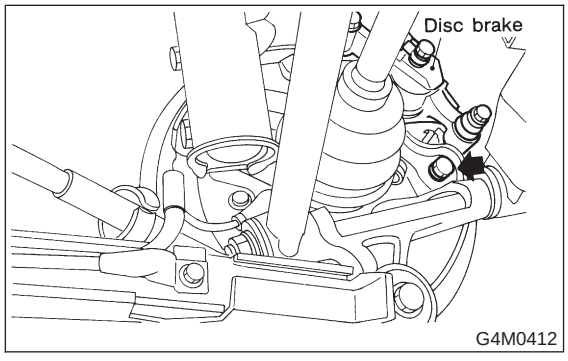
A: REMOVAL



(1) Back plate
(2) Retainer
(3) Spring washer
(4) Lever
(5) Parking brake shoe (Primary)
(6) Parking brake show (Secondary)
(7) Strut spring
(8) Strut
(9) Shoe guide plate
(10) Primary return spring
(11) Secondary return spring
(12) Adjusting spring
(13) Adjuster
(14) Shoe hold-down cup
(15) Shoe hold down spring
(16) Shoe hold down pin
(17) Adjusting hole cover

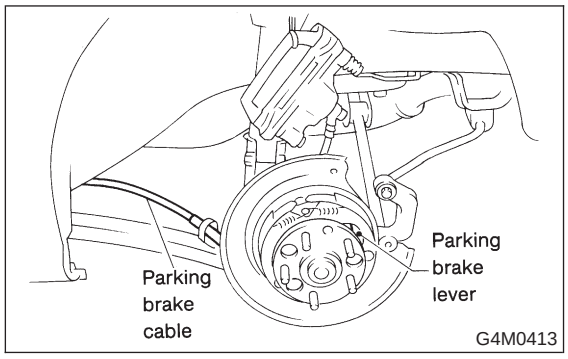
Tightening torque: N·m(kg-m, ft-lb)
T: 52±6 (5.3±0.6, 38.3±4.3)

1) Remove the two mounting bolts to the disc brake assembly and remove the disc brake assembly.



2) Suspend the disc brake assembly so that the hose is not stretched.
3) Remove the disc rotor.
4) Remove shoe return spring from parking brake assembly.
5) Remove front shoe hold down spring and pin with pliers.
6) Remove strut and strut spring.
7) Remove adjuster assembly from parking brake assembly.
8) Remove brake shoe.
9) Remove rear shoe hold-down spring and pin with pliers.

10) Remove parking cable from parking lever.



11) Using a standard screwdriver, raise retainer. Remove parking lever and washer from brake shoe.

B: INSPECTION

1) Measure brake disc inside diameter. If the disc is scored or worn, replace the brake disc.

Disc inside diameter:
Standard
170 mm (6.69 in)
Service limit
171 mm (6.73 in)

2) Measure the lining thickness. If it exceeds the limit, replace shoe assembly.

Lining thickness:
Standard
3.2 mm (0.126 in)
Service limit
1.5 mm (0.059 in)

CAUTION:
Replace the brake shoes on the right and left brake assembly at the same time.

C: INSTALLATION

CAUTION:
Be sure lining surface is free from oil contamination.

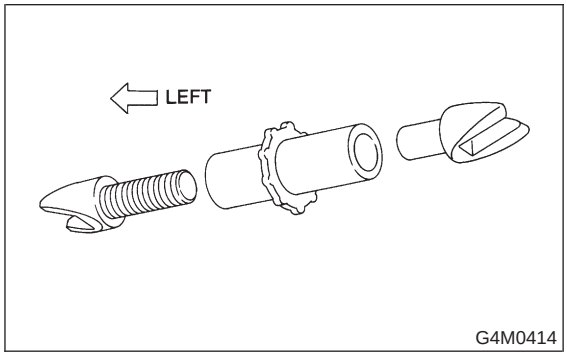
Brake grease:
Dow Corning Molykote No 7439 (Part No. 725191460)

1) Apply brake grease to the following places.
- Six contact surfaces of shoe rim and back plate packing
- Contact surface of shoe wave and anchor pin
- Contact surface of lever and strut
- Contact surface of shoe wave and adjuster assembly
- Contact surface of shoe wave and strut
- Contact surface of lever and shoe wave

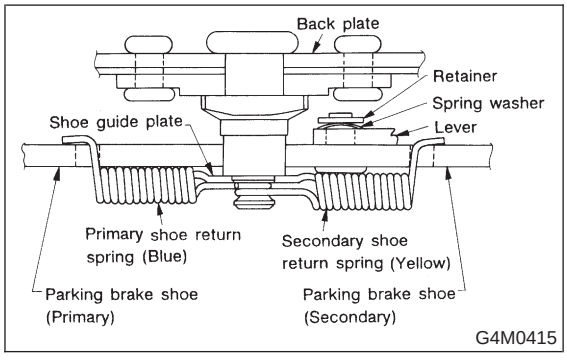
2) Installation is in reverse order of removal.

CAUTION:
- **Use new retainers and clinch them when installing brake shoes to levers.**
- **Ensure that parking lever moves smoothly.**
- **Do not confuse left parking lever with right one.**
- **Do not confuse left strut with right one.**

NOTE:
Ensure that adjuster assembly is securely installed with screw in the left side, facing vehicle front.



NOTE:
Ensure that shoe return spring is installed as shown in Figure.



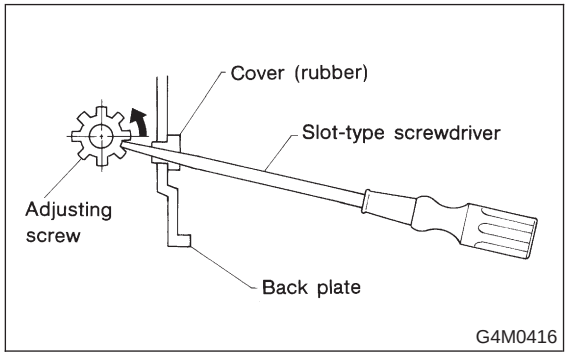
3) Adjust parking brakes. <Ref. to 4-4 [W4D0].>

CAUTION:
After replacing parking brake lining, be sure to drive vehicle for “break-in” purposes.
(1) Drive the vehicle about 35 km/h (22 MPH).
(2) With the parking brake release button pushed in, pull the parking brake lever gently, pulling with a force of approximately 147 N (15 kg, 33 lb).
(3) Drive the vehicle for about 200 m (0.12 mile) in this condition.
(4) Wait 5 to 10 minutes for the parking brake to cool down. Repeat this procedure once more.
(5) After breaking-in, re-adjust parking brakes.

D: ADJUSTMENT

1. SHOE CLEARANCE

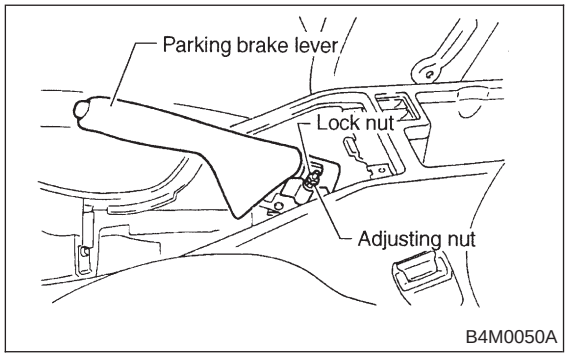
1) Remove adjusting hole cover from back plate.
2) Turn adjusting screw using a slot-type screwdriver until brake shoe is in close contact with disc rotor.



3) Turn back (downward) adjusting screw 3 or 4 notches.
4) Install adjusting hole cover to back plate.

2. LEVER STROKE

1) Remove console box lid.
2) Forcibly pull parking brake lever 3 to 5 times.
3) Adjust parking brake lever by turning adjusting nut 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±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)

5. Master Cylinder

A: REMOVAL

1) Thoroughly drain brake fluid from reservoir tank.
2) Disconnect fluid level indicator harness connector.
3) Remove brake pipes from master cylinder.
4) Remove master cylinder mounting nuts, and take out master cylinder from brake booster.

CAUTION:
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the painted surface; wipe it off quickly if spilt.

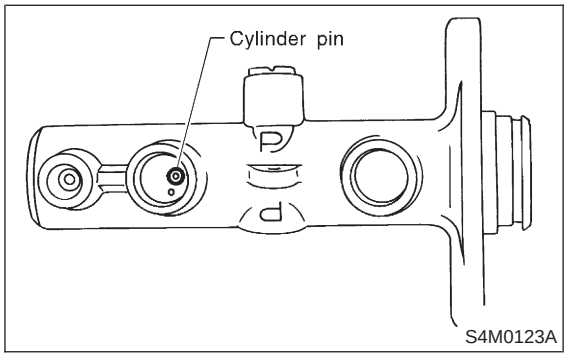
B: DISASSEMBLY

1. PRECAUTIONS FOR DISASSEMBLING

1) Remove mud and dirt from the surface of brake master cylinder.
2) Prepare tools necessary for disassembly operation, and arrange them neatly on work bench.
3) Clean work bench.

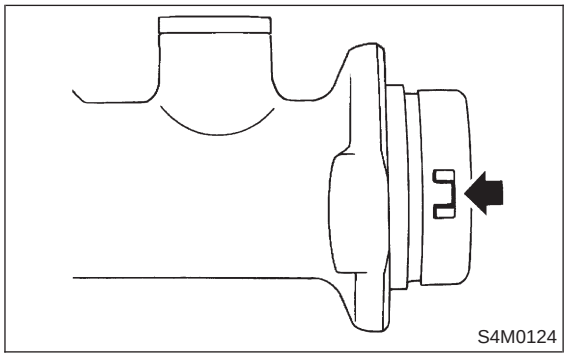
2. DISASSEMBLING PROCEDURE

1) Remove reserve tank.
2) Remove cylinder pin. (only vehicle equipped with ABS)



3) Pry up the pawl and remove the piston retainer.

NOTE:
Piston may jump out from master cylinder.



4) Extract primary piston assembly and secondary piston assembly.

CAUTION:
● Do not disassemble the piston assembly; otherwise, the spring set value may be changed.
● Use brake fluid or methanol to wash inside wall of cylinder, pistons and piston cups. Be careful not to damage parts when washing. If methanol is used for washing, do not dip rubber parts, such as piston cups, in it for more than 30 seconds; otherwise, they may become swelled.

C: INSPECTION

If any damage, deformation, wear, swelling, rust, and other faults are found on the primary piston assembly, secondary piston assembly, supply valve stopper, or gasket, replace the faulty part.

CAUTION:
● The primary and secondary pistons must be replaced as complete assemblies.
● The service limit of the clearance between each piston and the master cylinder inner dia. is 0.11 mm (0.0043 in).
● When handling parts, be extremely careful not to damage or scratch the parts, or let any foreign matter get on them.

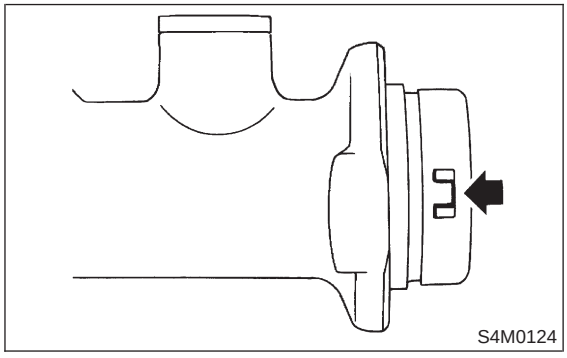
D: ASSEMBLY

1. PRECAUTIONS FOR ASSEMBLING

1) When assembling, be sure to use recommended brake fluid.
2) Ensure that the inside wall of cylinder, pistons, and piston cups are free from dirt when assembling.
3) Be extremely careful not to damage, scratch, or dent cylinder inside wall, pistons, and piston cups.
4) Do not drop parts. Never attempt to use any part that has been dropped accidentally.

2. ASSEMBLING OPERATION

1) Assembling piston assembly:
Apply recommended brake fluid to inside wall of cylinder, and to outer surface of piston assembly, and install piston assemblies carefully into cylinder.
2) Assembling cylinder pin:
3) Press the pawl and install the piston retainer into the master cylinder.



E: INSTALLATION

To install the master cylinder to the body, reverse the sequence of removal procedure.

Tightening torque:
Master cylinder mounting nut
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)
Piping flare nut
$15^{+3}/_{-2}$ N·m ($1.5^{+0.3}/_{-0.2}$ kg-m, $10.8^{+2.2}/_{-1.4}$ ft-lb)

CAUTION:
Be sure to use recommended brake fluid.

6. Brake Booster

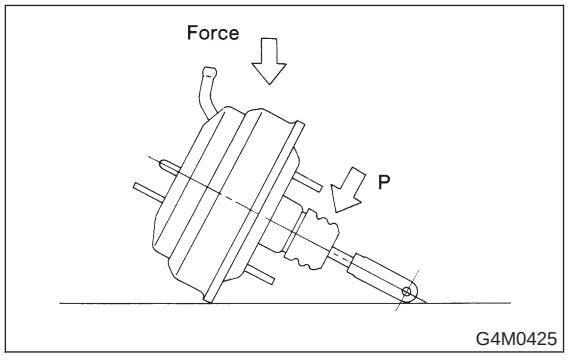
A: REMOVAL

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

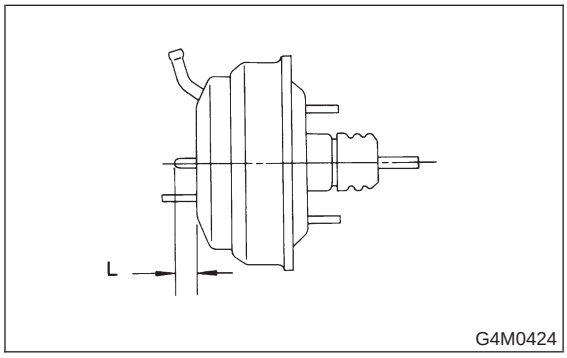
1) Be careful not to drop brake booster. Brake booster should be discarded if it has been dropped.
2) Use special care when handling operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of ±3°, it may result in damage to the power piston cylinder.
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.



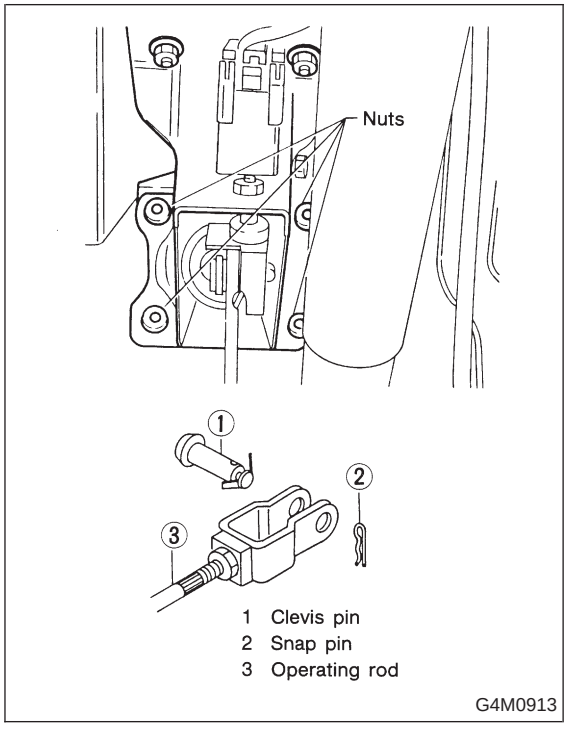
4) Do not change the push rod length. If it has been changed, reset the projected length "L" to the standard length.

Standard:
L = 10 mm (0.39 in)

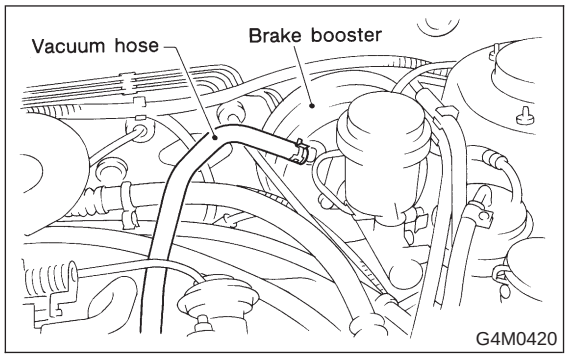


C: INSTALLATION

1) Mount brake booster in position.
2) Connect operating rod to brake pedal with clevis pin and snap pin.



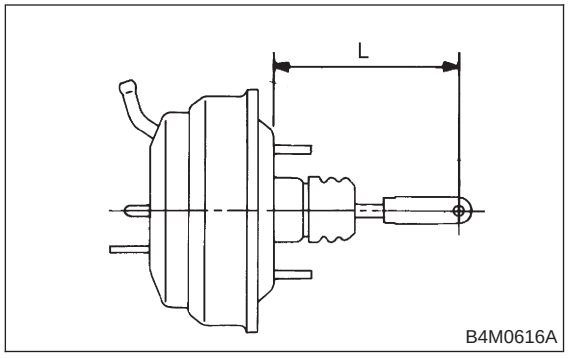
3) Connect vacuum hose to brake booster.



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)

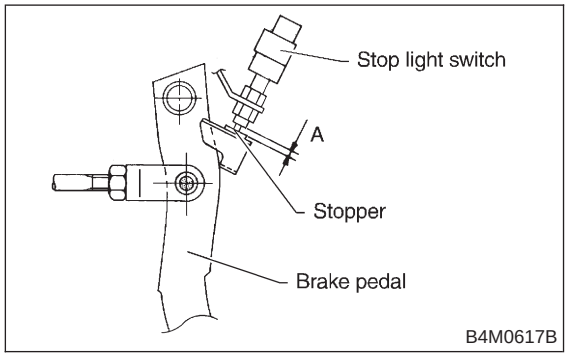
If it is not in specified value, adjust it by adjusting brake booster operating rod.



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.

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.

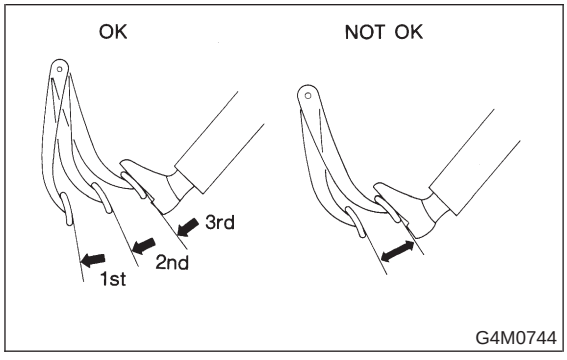
1. CHECKING WITHOUT USING GAUGES

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.

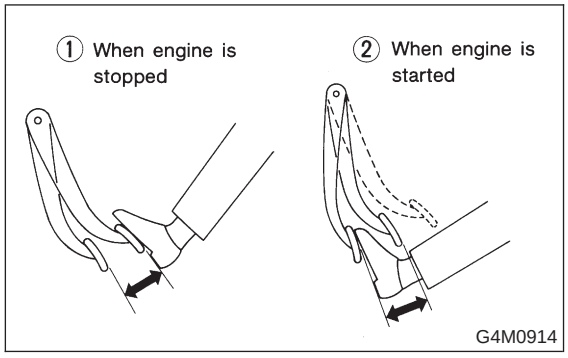
NOTE:
● In the event of defective operation, inspect the condition of the check valve and vacuum hose.
● Replace them if faulty and conduct the test again.
● If no improvement is observed, check precisely with gauges.



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.

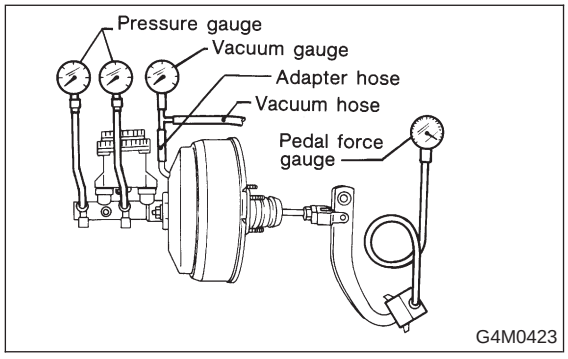
NOTE:
If faulty, check precisely with gauges.

E: OPERATION CHECK (WITH GAUGES)

CAUTION:
When checking operation, be sure to securely apply the hand brake.

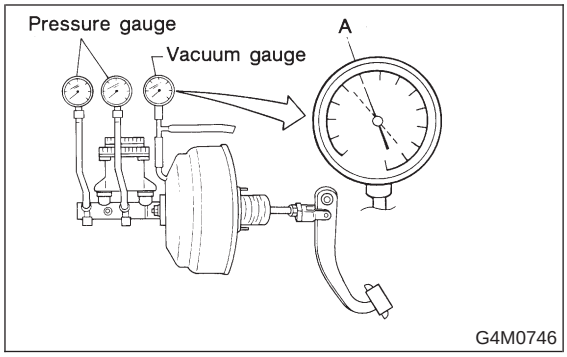
1. CHECKING WITH GAUGES

Connect gauges as shown in Figure. After bleeding air from pressure gauges, proceed to each check.



2. AIR TIGHTNESS CHECK

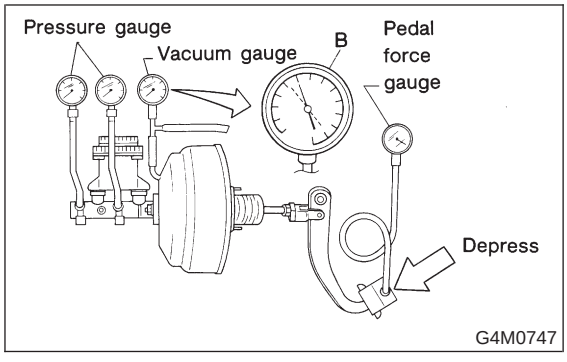
1) Start engine and keep it running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress brake pedal.



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 [W6E2].>

4. LACK OF BOOSTING ACTION CHECK

Turn off engine, and set the vacuum gauge reading at “0”. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed 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

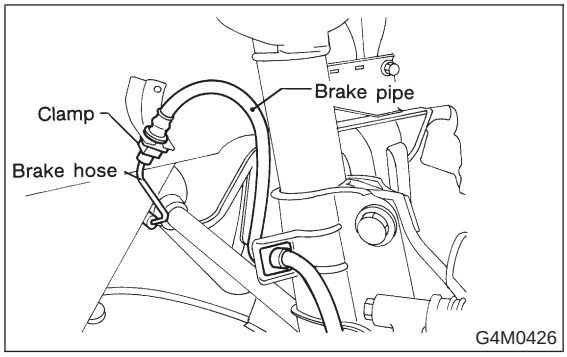
Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed below.

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)

7. Brake Hose

A: REMOVAL

1) Separate brake pipe from brake hose.
(Always use flare nut wrench and be careful not to deform flare nut.)



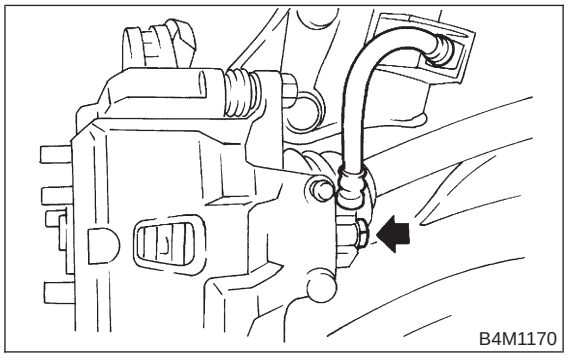
2) Pull out clamp to remove brake hose.
3) Remove clamp at strut and union bolt.

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±3 N·m (1.8±0.3 kg-m, 13.0±2.2 ft-lb)



3) Secure middle fitting of brake hose to bracket at strut location using a clamp.
4) Position disc in straight-forward direction and route brake hose through hole in bracket on wheel apron side.

CAUTION:
Be sure brake hose is not twisted.

5) Temporarily tighten flare nut to connect brake pipe and hose.
6) Fix brake hose with clamp at wheel apron bracket.

7) While holding hexagonal part of brake hose fitting with a wrench, tighten flare nut to the specified torque.

Torque (Brake pipe flare nut):
14.7^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)

8) Bleed air from the brake system.

2. REAR BRAKE HOSE

1) Pass brake hose through the hole of bracket, and lightly tighten flare nut to connect brake pipe.
2) Insert clamp upward to fix brake hose.
3) Perform the same procedures as before mentioned in steps 7) and 8).

8. Parking Brake Lever

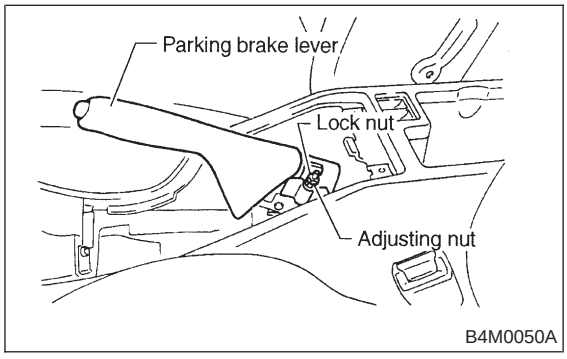
A: REPLACEMENT

1) Remove console box from front floor.
2) Disconnect electric connector for parking brake switch.
3) Loosen parking brake adjuster, and remove inner cable end from equalizer.
4) Remove parking brake lever.
5) Install parking brake lever in the reverse order of removal.

Tightening torque (Lever installing bolt and nut):
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

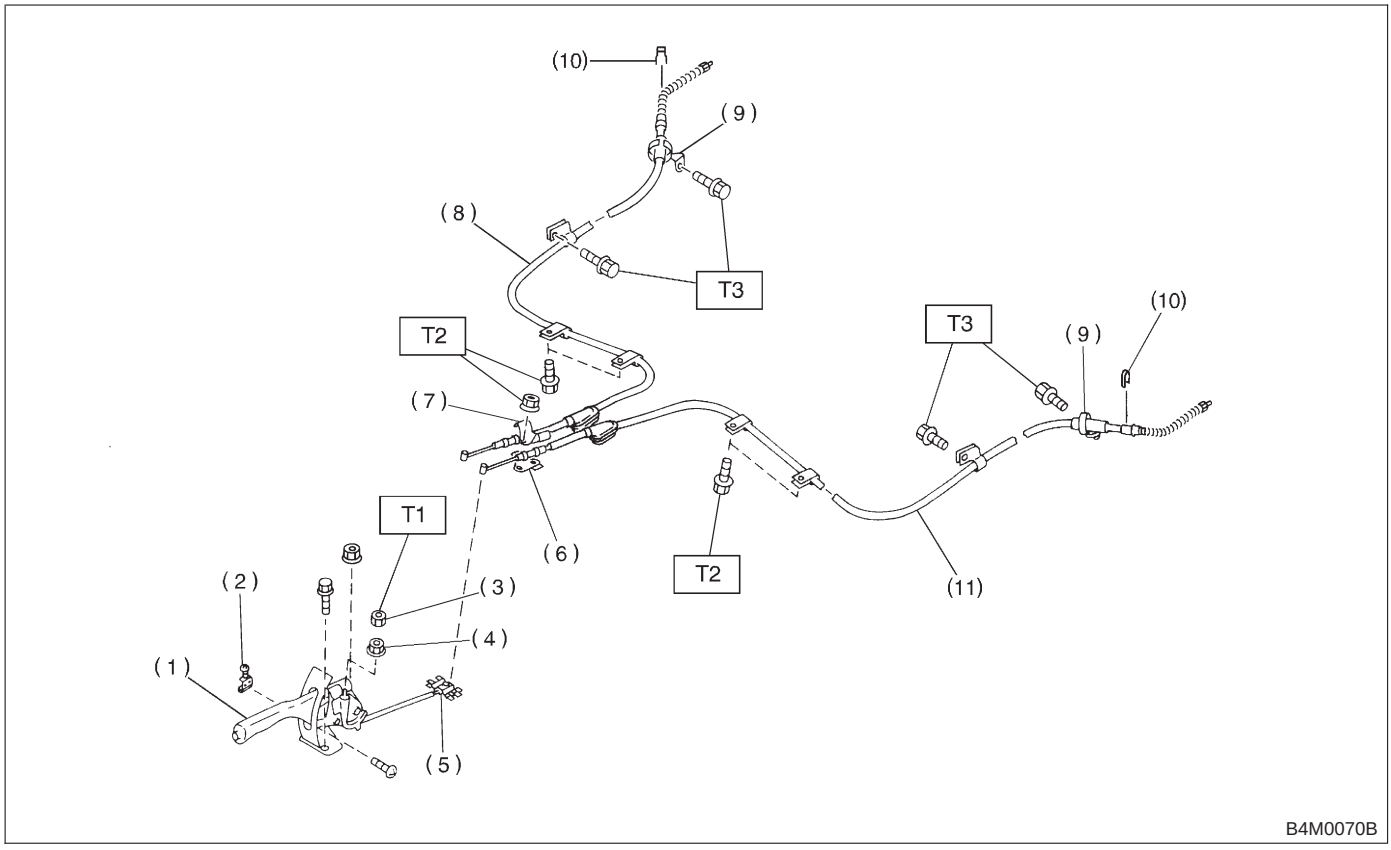
6) Adjust parking brake lever by turning adjusting nut until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
7) Tighten lock nut.

Tightening torque (Lock nut):
5.9±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)



9. Parking Brake Cable

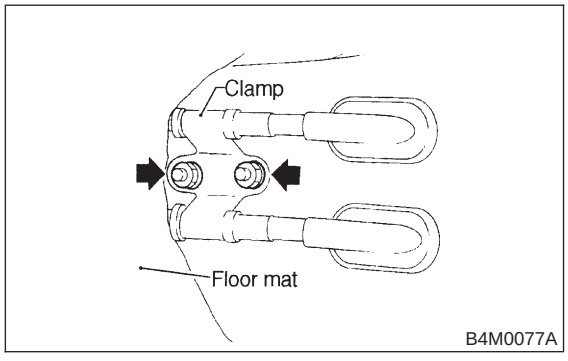
A: REPLACEMENT



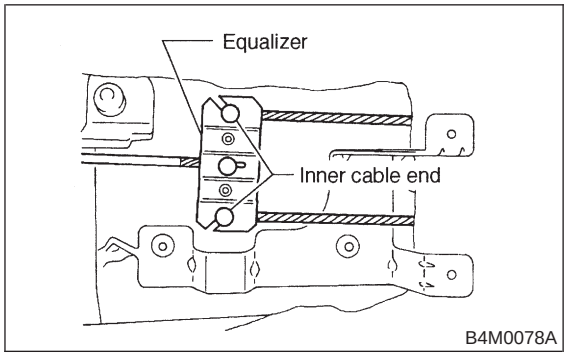
(1) Parking brake lever
(2) Parking brake switch
(3) Lock nut
(4) Adjusting nut
(5) Equalizer
(6) Bracket
(7) Clamp
(8) Parking brake cable RH
(9) Cable guide
(10) Clamp (Rear disc brake model only)
(11) Parking brake cable LH

Tightening torque: N·m (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 wheels.
3) Remove rear cushion.
4) Remove console box from front floor.
5) Loosen parking cable adjusting nut.
6) Roll up floor mat and remove clamps.

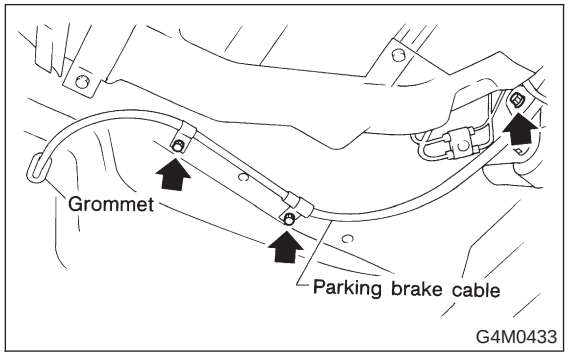


7) Remove inner cable end from equalizer.



8) Pull out parking brake cable from parking brake assembly. <Ref. to 4-4 [W4A0].> or <Ref. to 4-4 [W3A0].>
9) Pull out clamp from parking brake assembly.
10) Remove bolt and bracket from trailing link bracket.

11) Remove bolt and clamp from rear floor.

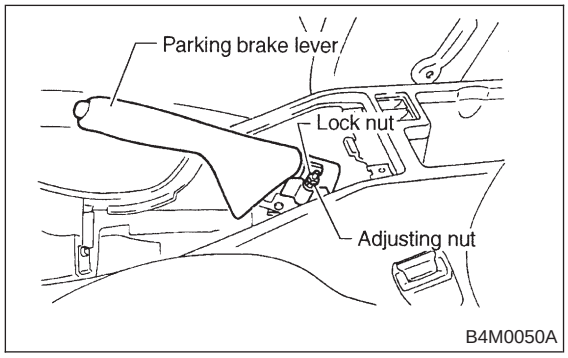


12) Detach grommet from rear floor.
13) Remove cable assembly from cabin by forcibly pulling it backward.
14) Detach parking brake cable from cable guide at rear trailing link.
15) Install parking brake assembly in the reverse order of removal.

NOTE:
● Be sure to pass cable through cable guide inside the tunnel.
● Be sure to adjust the shoe clearance. (Rear disc brake only) <Ref. to 4-4 [W4D1].>

16) Adjust parking brake lever by turning adjusting nut until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kg, 44 lb).
17) Tighten lock nut.

Tightening torque (Lock nut):
5.9±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)



10. Air Bleeding

A: GENERAL RULES FOR EFFECTIVE BLEEDING

1) Start with the brakes (wheels) connecting to the secondary chamber of the master cylinder.
2) The time interval between two brake pedal operations (from the time when the pedal is released to the time when it is depressed another time) shall be approximately 3 seconds.
3) The air bleeder on each brake shall be released for 1 to 2 seconds.

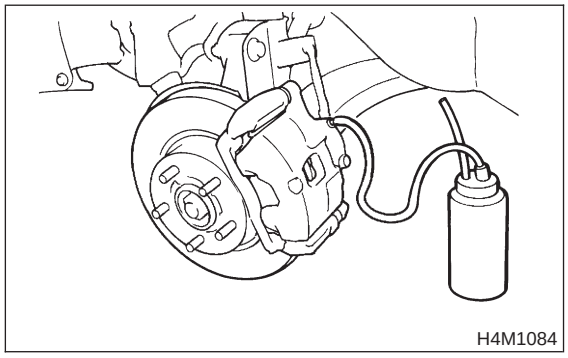
B: BLEEDING PROCEDURE

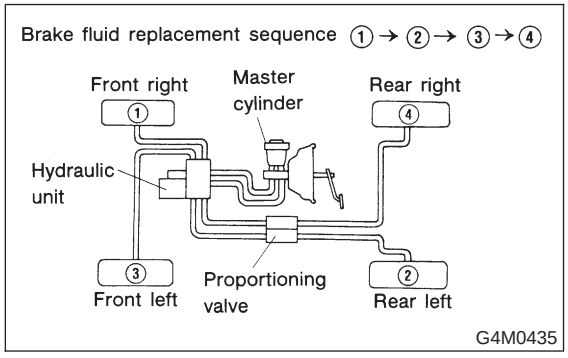
CAUTION:
● The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
● Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
● Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:
● During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
● Brake pedal operating must be very slow.
● For convenience and safety, it is advisable to have two 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.

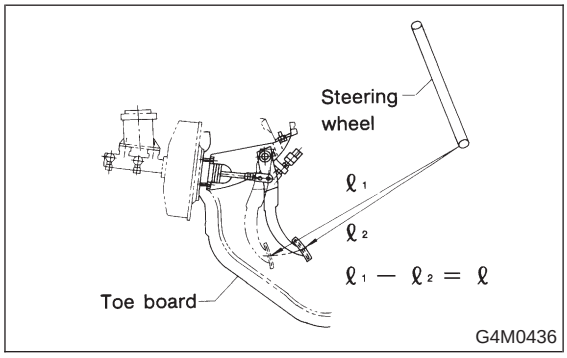
NOTE:
Brake pedal operating must be very slow.

4) Tighten air bleeder securely when no air bubbles are visible.

Air bleeder tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

5) Perform these steps for the brakes connecting to the secondary chamber of master cylinder, first, and then for the ones connecting to primary chamber. With all procedures completed, fully depress the brake pedal and keep it in that position for approximately 20 seconds to make sure that there is no leak evident in the entire system.
6) Perform sequence control. (With ABS model) <Ref. to 4-4 [W14D0].>

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 [W14D0].>
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.

11. Brake Fluid

A: REPLACEMENT

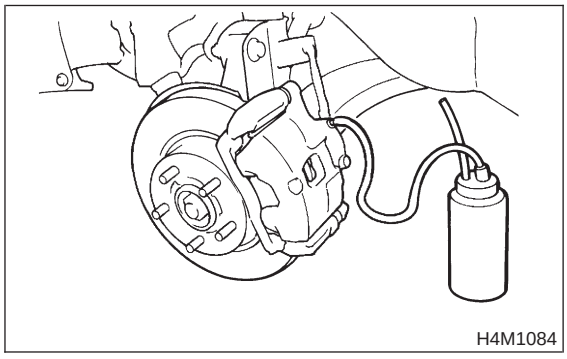
CAUTION:
● To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
● The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
● Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
● Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
● Be careful not to allow dirt or dust to get into the reservoir tank.

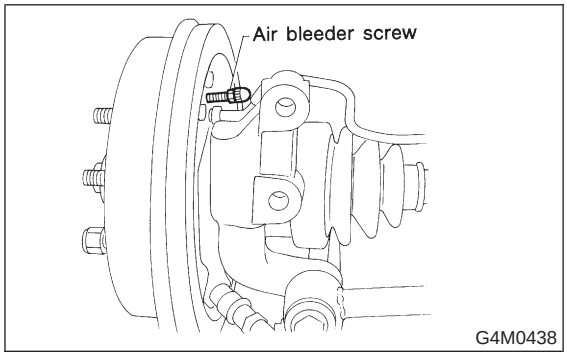
NOTE:
● During bleeding operation, keep the brake reserve tank filled with brake fluid to eliminate entry of air.
● Brake pedal operating must be very slow.
● For convenience and safety, it is advisable to have two men working.
● The amount of brake fluid required is approximately 500 mℓ (16.9 US fl 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.

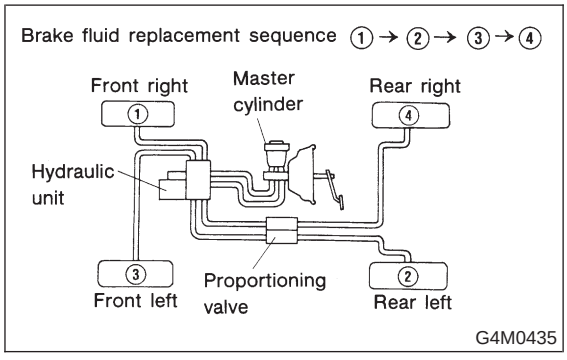
Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

5) Install one end of a vinyl tube onto the air bleeder and insert the other end of the tube into a container to collect the brake fluid.


H4M1084



G4M0438



G4M0435

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 again from the two former procedures 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.

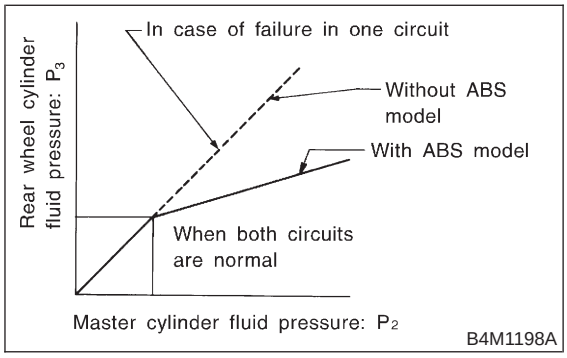
Tightening torque (Bleeder screw):
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

10) Bleed air from each wheel cylinder using the same procedures as described in steps 6) through 7) above.
11) Depress brake pedal with a force of approximately 294 N (30 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.

12. Proportioning Valve

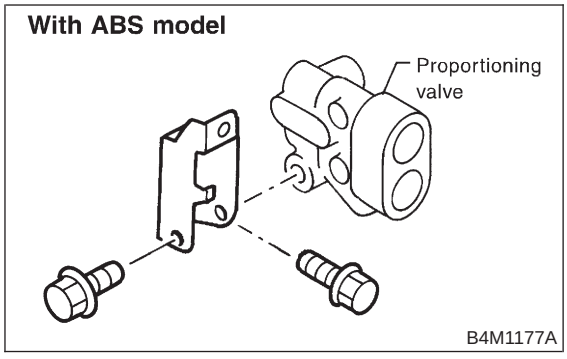
A: INSPECTION

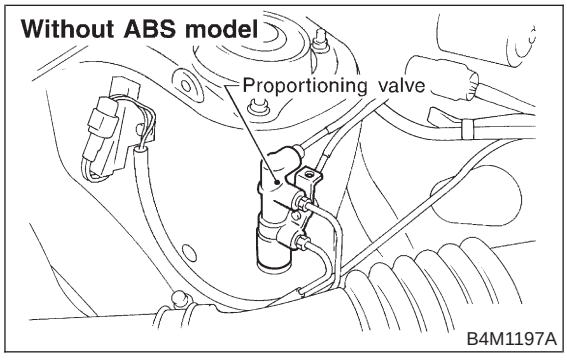
1) Install the oil pressure gauges to measure the master cylinder fluid pressure (front wheel brake fluid pressure) and rear wheel cylinder fluid pressure.
2) Bleed air from the oil pressure gauges.
3) Check the master cylinder fluid pressure and rear wheel cylinder fluid pressure.
The standard values are shown in Figure.



4) For the oil pressure in case of split point, <Ref. to 4-4 [S1A0].>

B: REMOVAL





1) Remove brake pipe from proportioning valve at four places.
2) Remove proportioning valve from its bracket.

CAUTION:
Do not disassemble or adjust the proportioning valve. (The proportioning valve must be replaced as an assembly.)

C: INSTALLATION

1) Install proportioning valve to bracket.
2) Connect brake pipes correctly to proportioning valve.
3) Bleed air, then check each joint of brake pipe for oil leaks.

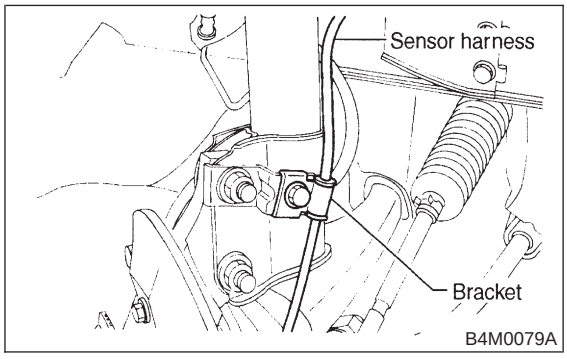
Tightening torque:
Proportioning valve to brake pipe flare nut:
15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)
Proportioning valve to bracket (Normal brake vehicle):
22±4.4 N·m (2.25±0.45 kg-m, 16.3±3.3 ft-lb)
Proportioning valve to bracket (ABS equipped vehicle):
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

13. ABS Sensor

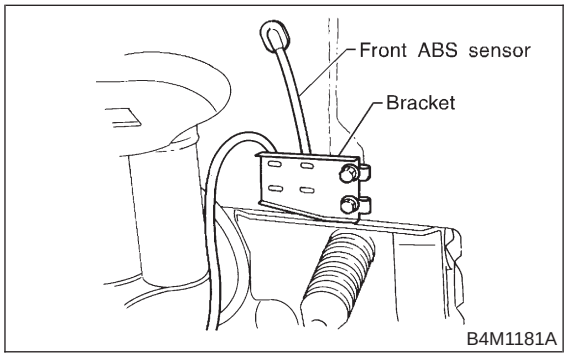
A: REMOVAL

1. FRONT ABS SENSOR

1) Disconnect front ABS sensor connector located in engine compartment.
2) Remove bolts which secure sensor harness to strut.

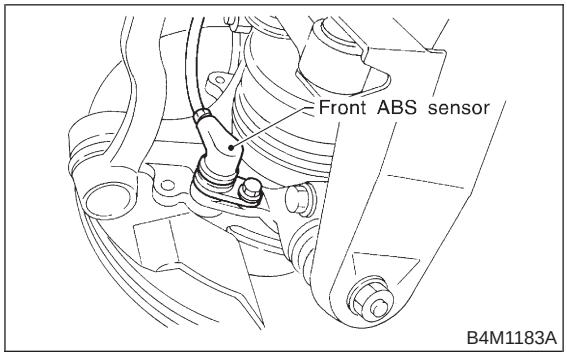


3) Remove bolts which secure sensor harness to body.



4) Remove bolts which secure front ABS sensor to housing, and remove front ABS sensor.

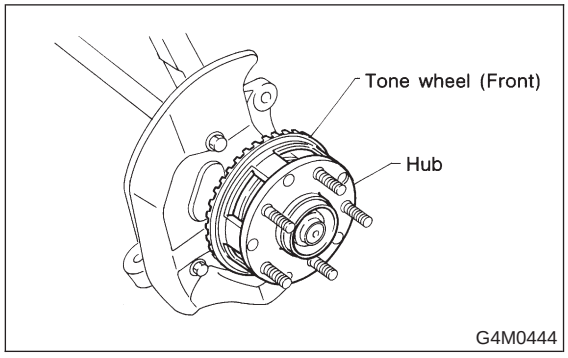
CAUTION:
- **Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.**
- **Do not pull sensor harness during removal.**



5) Remove front disc brake caliper and disc rotor from housing after removing front tire.

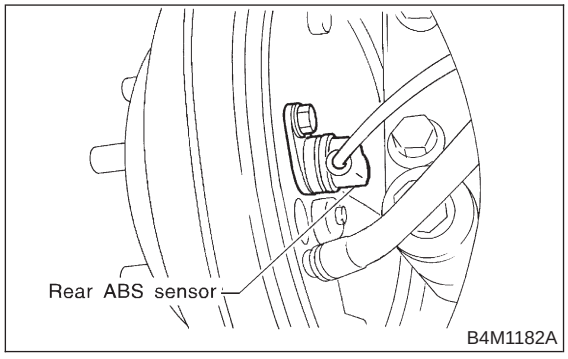
6) Remove front drive shaft and housing and hub assembly. <Ref. to 4-2 [W1A0].>
7) Remove tone wheel while removing hub from housing and hub assembly. <Ref. to 4-2 [W1B0].>

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].> and <Ref. to 4-2 [W2B0].>

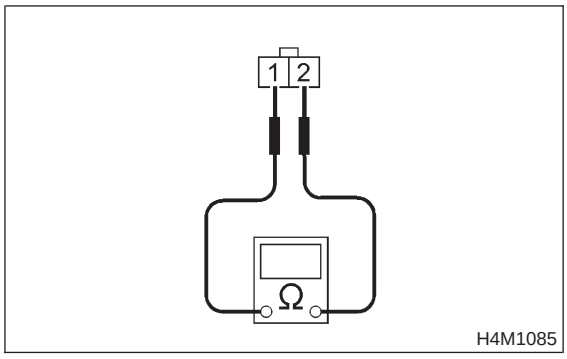
CAUTION:
- **Be careful not to damage pole piece located at tip of the sensor and teeth faces during removal.**
- **Do not pull sensor harness during removal.**

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	

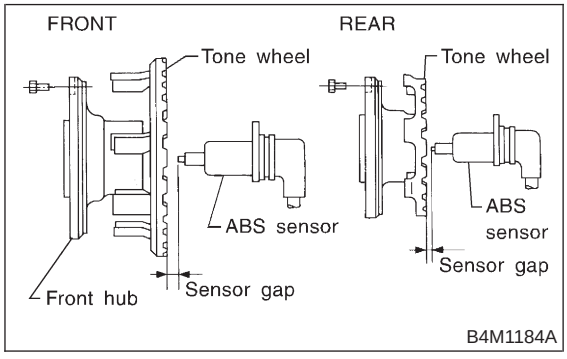
CAUTION:
If resistance is outside the standard value, replace ABS sensor with new one.

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)

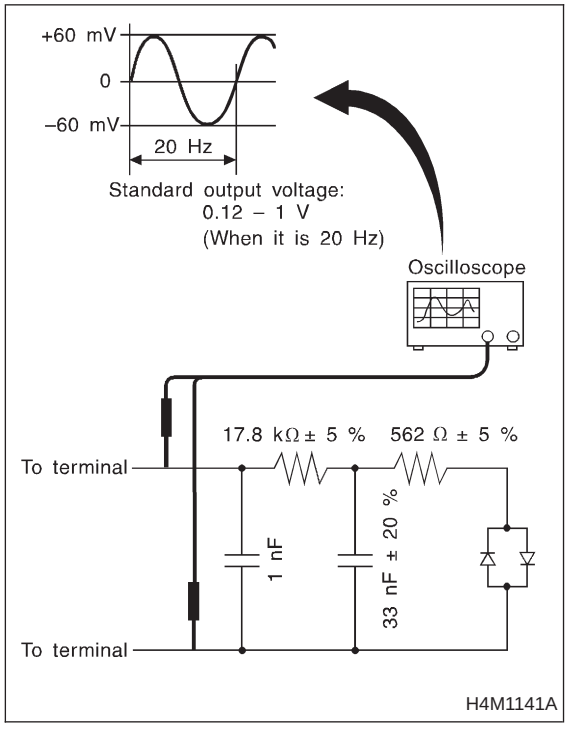


NOTE:
- If clearance is narrow, adjust by using spacer (Part No. 26755AA000).
- If clearance is wide, check the outputted voltage then replace ABS sensor or tone wheel if the outputted voltage is outside the specification.

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.

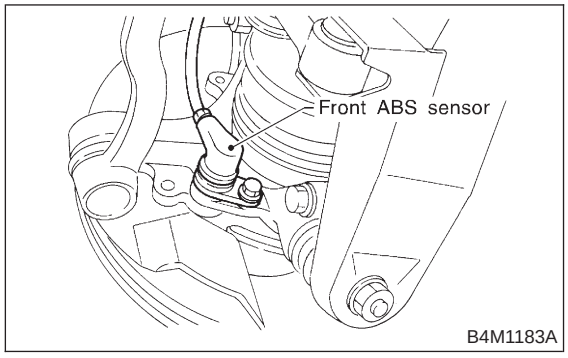


C: INSTALLATION

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.

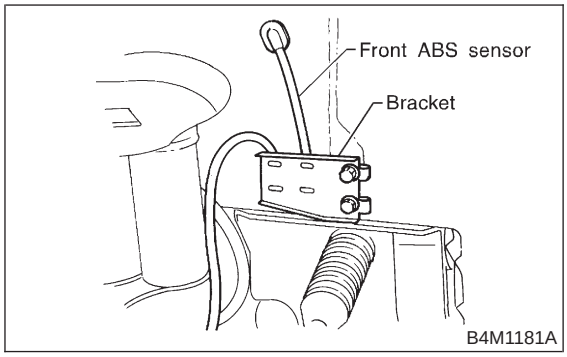
CAUTION:
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



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±10 N·m (3.3±1.0 kg-m, 24±7 ft-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 mm (0.035 — 0.055 in)

Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

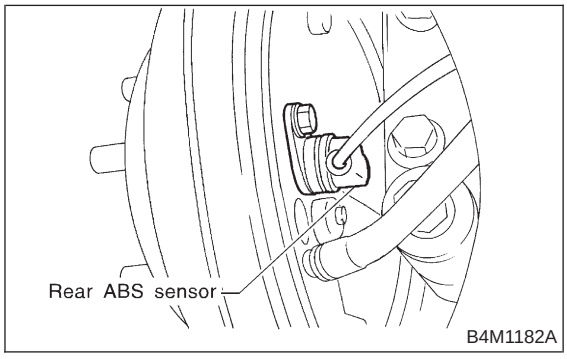
CAUTION:
Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:
If the clearance is outside specifications, readjust.

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.

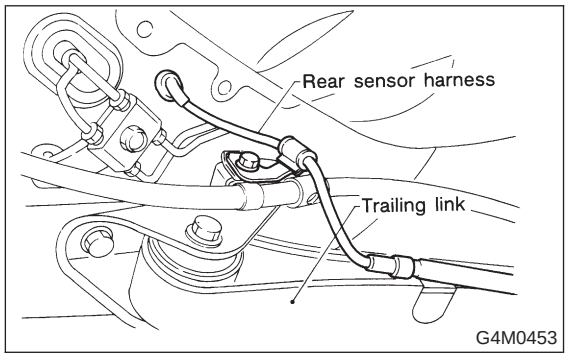
CAUTION:
Be careful not to strike ABS sensor's pole piece and tone wheel's teeth against adjacent metal parts during installation.



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±10 N·m (3.3±1.0 kg-m, 24±7 ft-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 mm (0.028 — 0.047 in)

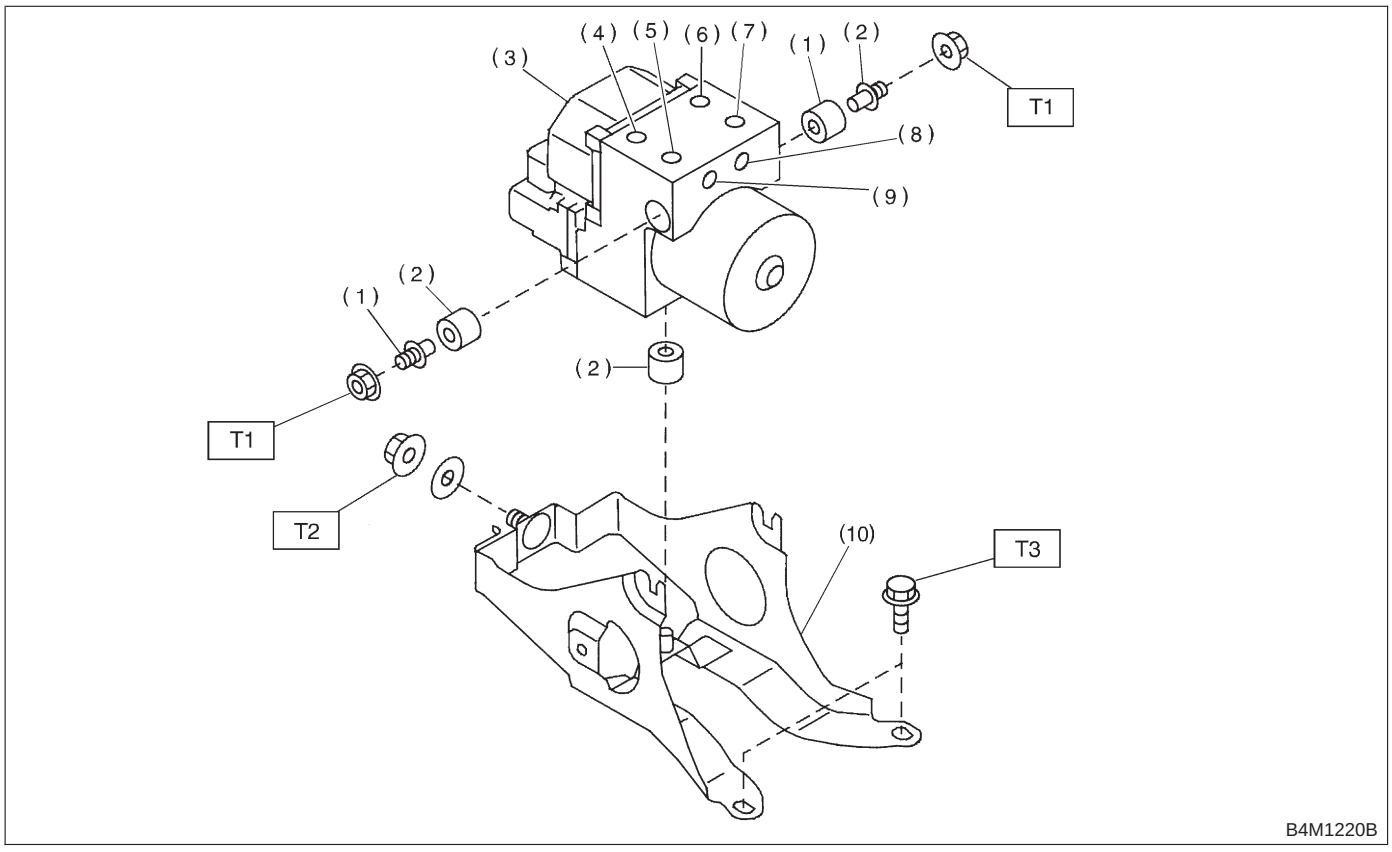
Tightening torque:
32±10 N·m (3.3±1.0 kg-m, 24±7 ft-lb)

CAUTION:
Check the marks on the harness to make sure that no distortion exists. (RH: white, LH: yellow)

NOTE:
If the clearance is outside specifications, readjust.

14. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U) [ABS 5.3i Type]

A: REMOVAL



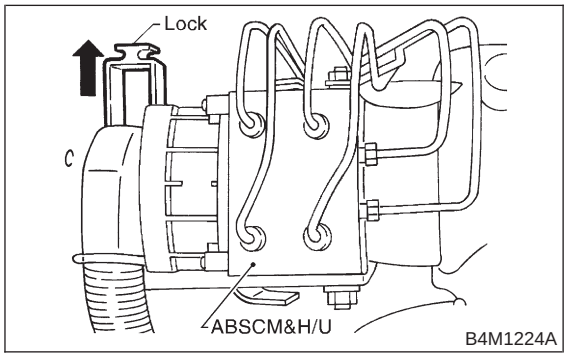
(1) Stud bolt
(2) Damper
(3) ABS control module and hydraulic control unit
(4) Front-LH outlet
(5) Secondary inlet
(6) Front-RH outlet
(7) Primary inlet
(8) Rear-LH outlet
(9) Rear-RH outlet
(10) Bracket

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 29±7 (3.0±0.7, 21.7±5.1)
T3: 32±10 (3.3±1.0, 24±7)

1) Disconnect ground cable from battery.
2) Remove air intake duct from engine compartment to facilitate removal of ABSCM&H/U.
3) Use an air-gun to get rid of water around the ABSCM&H/U.

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

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



5) Disconnect connector from ABSCM&H/U.

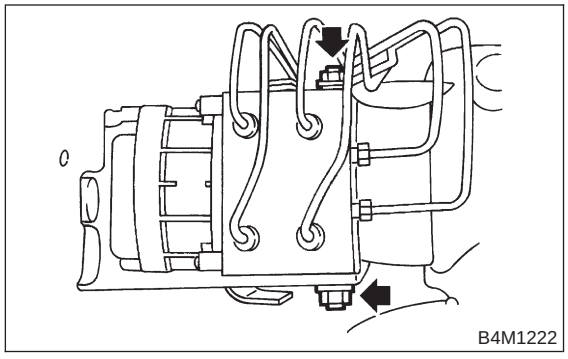
CAUTION:
Be careful not to let water or other foreign matter contact the ABSCM&H/U terminal.

6) Unlock cable clip.
7) Disconnect brake pipes from ABSCM&H/U.

CAUTION:
Wrap brake pipes with vinyl bag to avoid spilling brake fluid on vehicle body.

8) Remove ABSCM&H/U from engine compartment.

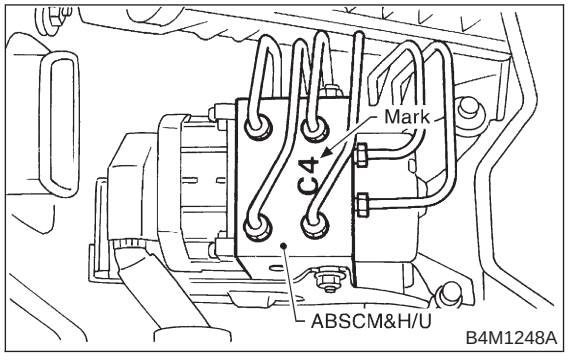
CAUTION:
● ABSCM&H/U cannot be disassembled. Do not attempt to loosen bolts and nuts.
● Do not drop or bump ABSCM&H/U.
● Do not turn the ABSCM&H/U upside down or place it on its side.
● Be careful to prevent foreign particles from getting into ABSCM&H/U.
● Apply a coat of rust-preventive wax (Nippeco LT or GB) to bracket attaching bolt after tightening.
● Do not pull harness disconnecting harness connector.


B4M1222

B: INSPECTION

1) Check connected and fixed condition of connector.
2) Check specifications of the mark with ABSCM&H/U.

Mark	Model
C3	AWD AT
C4	AWD MT



B4M1248A

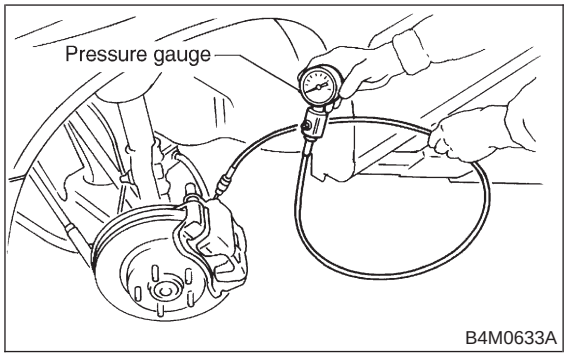
C: CHECKING THE HYDRAULIC UNIT ABS OPERATION

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.



B4M0633A

4) Bleed air from the pressure gauges.
5) Perform ABS sequence control.
<Ref. to 4-4 [W14D0].>
6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.
7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Also check if any irregular brake pedal tightness is felt.

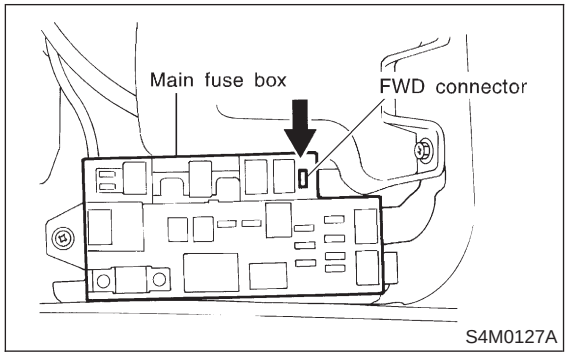
	Front wheel	Rear wheel
Initial value	3,432 kPa (35 kg/cm^2, 498 psi)	3,432 kPa (35 kg/cm^2, 498 psi)
When decompressed	490 kPa (5 kg/cm^2, 71 psi) or less	490 kPa (5 kg/cm^2, 71 psi) or less
When compressed	3,432 kPa (35 kg/cm^2, 498 psi) or more	3,432 kPa (35 kg/cm^2, 498 psi) or more

8) Remove pressure gauges from FL and FR caliper bodies.

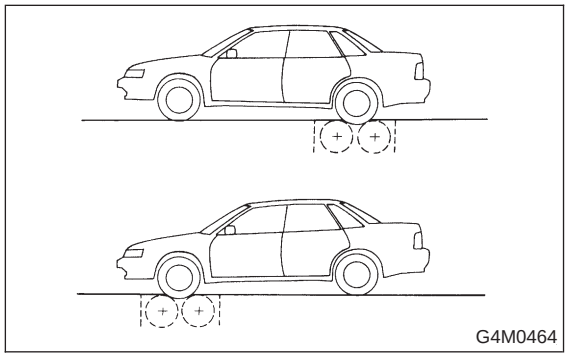
9) Remove air bleeder screws from the RL and RR caliper bodies.
10) Connect the air bleeder screws to the FL and FR caliper bodies.
11) Connect two pressure gauges to the RL and RR caliper bodies.
12) Bleed air from the pressure gauges and the FL and FR caliper bodies.
13) Perform ABS sequence control.
<Ref. to 4-4 [W14D0].>
14) When the hydraulic unit begins to work, at first the RR side performs decompression, holding, and compression, and then the RL side performs decompression, holding, and compression.
15) Read values indicated on the pressure gauges and check if they meet the standard value.
16) After checking, remove the pressure gauges from caliper bodies.
17) Connect the air bleeder screws to RL and RR caliper bodies.
18) Bleed air from brake line.

2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER

1) In the case of AWD AT vehicles, install a spare fuse with the FWD connector in the main fuse box to simulate FWD vehicles.



2) Prepare for operating ABS sequence control. <Ref. to 4-4 [W14D1].> or <Ref. to 4-4 [W14D2].>
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 [W14D1].> or <Ref. to 4-4 [W14D2].>
6) Hydraulic unit begins to work; and check the following working sequence.
(1) The FL wheel performs decompression, holding, and compression in sequence, and subsequently the FR wheel repeats the cycle.
(2) The RR wheel performs decompression, holding, and compression in sequence, and subsequently the RL wheel repeats the cycle.
7) Read values indicated on the brake tester and check if the fluctuation of values, when decompressed and compressed, meet the standard values.

	Front wheel	Rear wheel
Initial value	981 N (100 kg, 221 lb)	981 N (100 kg, 221 lb)
When decompressed	490 N (50 kg, 110 lb) or less	490 N (50 kg, 110 lb) or less
When compressed	981 N (100 kg, 221 lb) or more	981 N (100 kg, 221 lb) or more

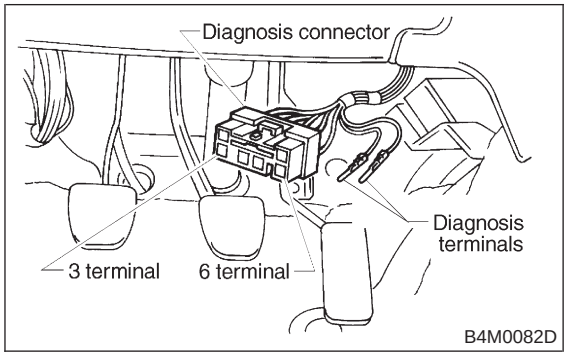
8) After checking, also check if any irregular brake pedal tightness is felt.

D: ABS SEQUENCE CONTROL

1) Under the ABS sequence control, after the hydraulic unit solenoid valve is driven, the operation of the hydraulic unit can be checked by means of the brake tester or pressure gauge.
2) ABS sequence control can be started by diagnosis connector or select monitor.

1. OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR

1) Connect diagnosis terminals to terminals No. 3 and No. 6 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

NOTE:
- In the event of any trouble, the sequence control may not be operative. In such a case, activate the sequence control, referring to “OPERATIONAL GUIDELINES OF THE ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR”. <Ref. to 4-4 [W14D1].>
- When the diagnosis terminal is connected to the diagnosis connector, the sequence control will not operate.

1) Connect select monitor to data link connector beside driver’s seat instrument panel lower cover.
2) Turn ignition switch ON.
3) Turn select monitor switch ON.
4) Put select monitor to {ABS/TCS} mode.
5) When {Function check sequence} is selected, ‘ABS sequence control’ will start.
6) The message ‘Press Brake Pedal Firmly’ is displayed as follows:
   (1) When using the brake tester, depress brake pedal with braking force of 981 N (100 kg, 221 lb).
   (2) When using the pressure gauge, depress brake pedal so as to make the pressure gauge indicate 3,432 kPa (35 kg/cm^2, 498 psi).

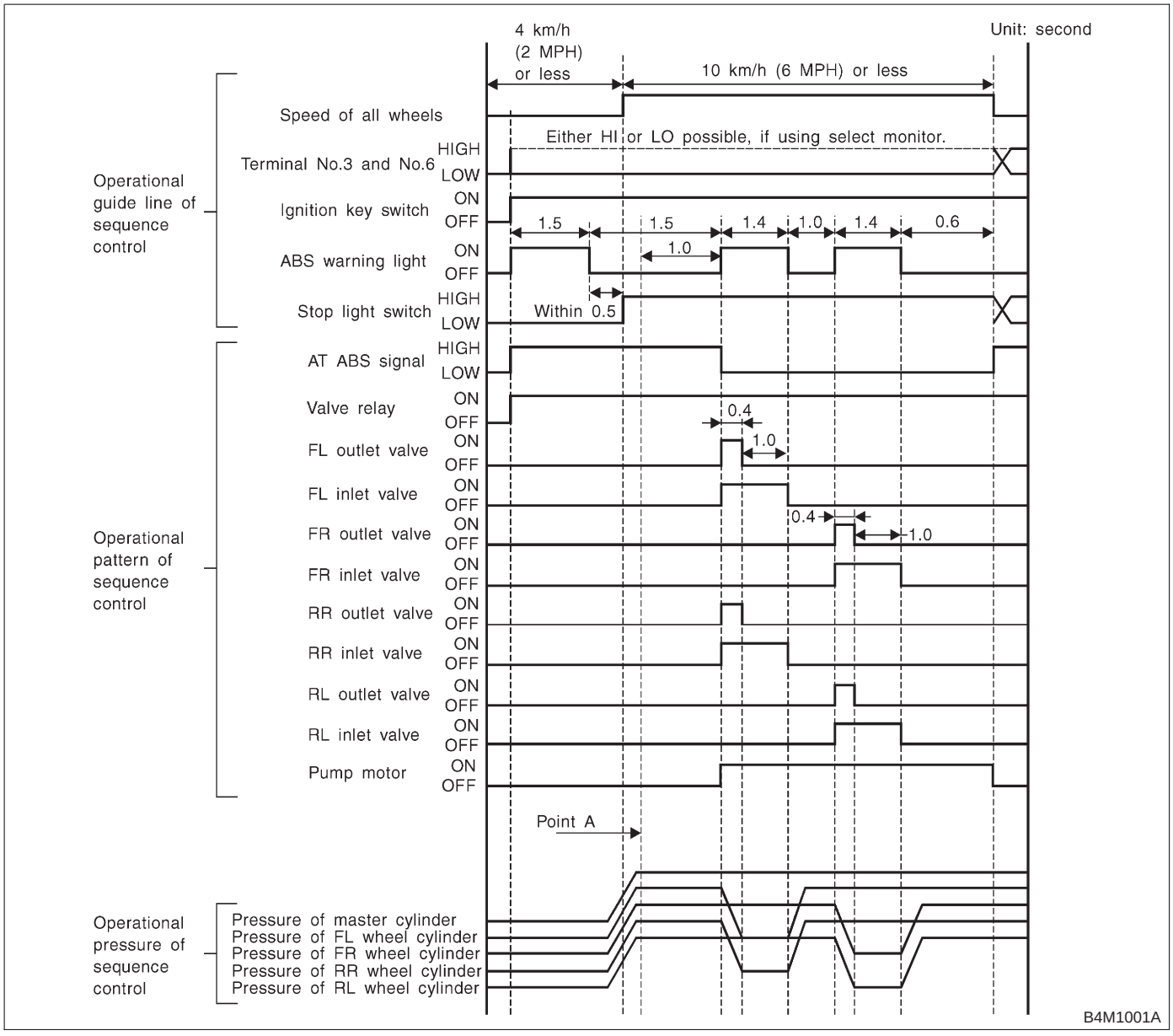
CAUTION:
Do not depress the clutch pedal.

7) When the message “Press YES” is displayed, press YES key.
8) Operation points will be displayed on select monitor.

3. CONDITIONS FOR 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.)

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

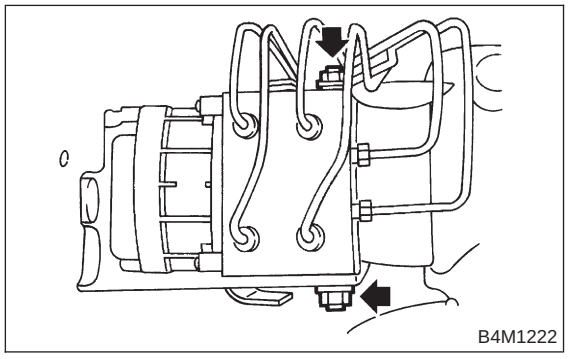
1) Install ABSCM&H/U.

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

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

2) Connect brake pipes to their correct ABSCM&H/U connections.

Brake pipe tightening torque:
15^{+3}_{-2} N·m ($1.5^{+0.3}_{-0.2}$ kg-m, $10.8^{+2.2}_{-1.4}$ ft-lb)



3) Using cable clip, secure ABSCM&H/U harness to bracket.
4) Connect connector to ABSCM&H/U.

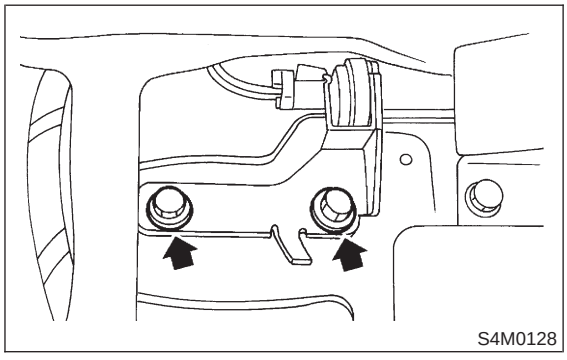
CAUTION:
● Be sure to remove all foreign matter from inside the connector before connecting.
● Ensure that the ABSCM&H/U connetor is securely locked.

5) Install air intake duct.
6) Connect ground cable to battery.
7) Bleed air from the brake system.

15. G Sensor

A: REMOVAL AND INSTALLATION

1) Turn ignition switch to OFF.
2) Remove console cover. <Ref. to 5-4 [W1A0].>
3) Disconnect connector from G sensor.
4) Remove G sensor from body.



5) To install, reverse the removal procedure.

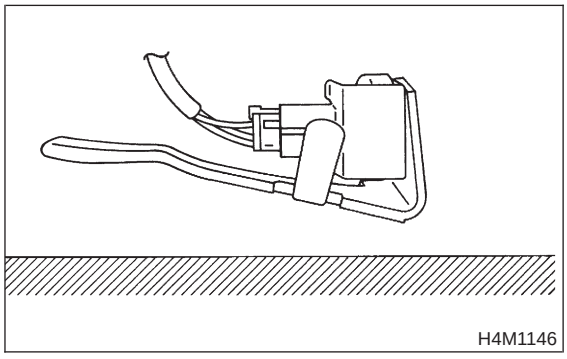
CAUTION:
Do not drop or bump G sensor.

B: INSPECTION WITH CIRCUIT TESTER

15B1 : CHECK G SENSOR.

1) Turn ignition switch to OFF.
2) Remove G sensor from vehicle.
3) Connect connector to G sensor.
4) Turn ignition switch to ON.
5) Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 3 (−)

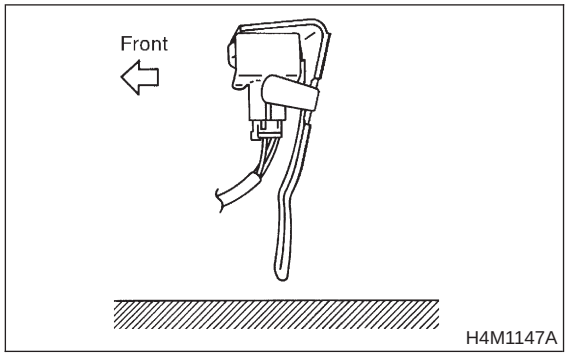


CHECK : ***Is the voltage 2.3±0.2 V when G sensor is horizontal?***
YES : Go to step **15B2**.
NO : Replace G sensor.

15B2 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 3 (−)

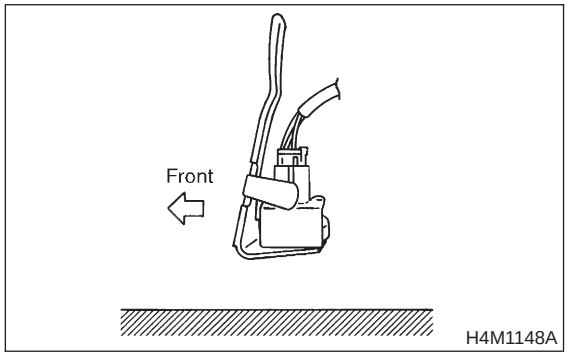


CHECK : ***Is the voltage 3.9±0.2 V when G sensor is inclined forwards to 90°?***
YES : Go to step **15B3**.
NO : Replace G sensor.

15B3 : CHECK G SENSOR.

Measure voltage between G sensor connector terminals.

Connector & terminal
(R70) No. 2 (+) — No. 3 (−)



CHECK : ***Is the voltage 0.7±0.2 V when G sensor is inclined backwards to 90°?***
YES : G sensor is normal.
NO : Replace G sensor.

C: INSPECTION WITH SELECT MONITOR

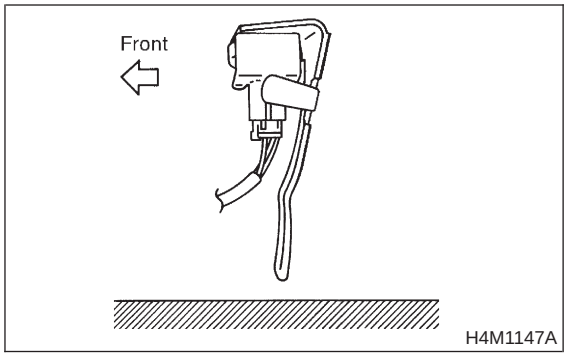
15C1 : CHECK G SENSOR.

1) Turn ignition switch to OFF.
2) Connect select monitor connector to data link connector.
3) Turn select monitor into {ABS/TCS} mode.
4) Set the display in the {Current Data Display & Save} mode.
5) Read the G sensor output voltage.

CHECK : ***Is the indicated reading 2.3±0.2 V when the vehicle is in horizontal position?***
YES : Go to step **15C2**.
NO : Replace G sensor.

15C2 : CHECK G SENSOR.

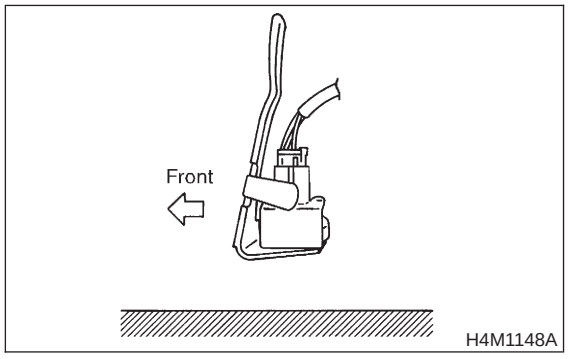
1) Remove console box.
2) Remove G sensor from vehicle. (Do not disconnect connector.)
3) Read the select monitor display.



CHECK : ***Is the indicated reading 3.9±0.2 V when G sensor is inclined forwards to 90°?***
YES : Go to step **15C3**.
NO : Replace G sensor.

15C3 : CHECK G SENSOR.

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.

16. Brake Pipe AIRBAG

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the center brake pipe.

CAUTION:
● All Airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
● Be careful not to damage Airbag system wiring harness when servicing the center brake pipe.

B: REMOVAL AND INSTALLATION

CAUTION:
● When removing and installing the brake pipe, make sure that it is not bent.
● After installing the brake pipe and hose, bleed the air.
● After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.

Brake pipe tightening torque:
$15^{+3}/_{-2}$ N·m ($1.5^{+0.3}/_{-0.2}$ kg-m, $10.8^{+2.2}/_{-1.4}$ ft-lb)

1. Entire Brake System

Trouble and possible cause	Corrective action
1. Insufficient braking	
(1) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
(2) Entry of air into the hydraulic mechanism	Bleed the air.
(3) Excessively wide shoe clearance	Adjust the clearance.
(4) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
(5) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	
(1) Fluid on the lining, drum or rotor	Eliminate cause of fluid leakage, clean, or replace.
(2) Drum or rotor eccentricity	Correct or replace the drum or rotor.
(3) Worn brake drum, or damage to the drum caused by sand	Correct by grinding, or replace.
(4) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
(5) Deformed back plate	Correct or replace.
(6) Improper tire inflation	Inflate to correct pressure.
(7) Disordered wheel alignment	Adjust alignment.
(8) Loosened back plate or the support installing bolts	Retighten.
(9) Loosened wheel bearing	Retighten to normal tightening torque or replace.
(10) Trouble in the hydraulic system	Replace the cylinder, brake pipe or hose.
(11) Uneven effect of the parking brake	Check, adjust, or replace the rear brake and cable system.
3. Excessive pedal stroke	
(1) Entry of air into the hydraulic mechanism	Bleed the air.
(2) Excessive play in the master cylinder push rod	Adjust.
(3) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
(4) Improperly adjusted shoe clearance	Adjust.
(5) Improper lining contact or worn lining	Correct or replace.
4. Brake dragging or improper brake return	
(1) Insufficient pedal play	Adjust play.
(2) Improper master cylinder return	Clean or replace the cylinder.
(3) Clogged hydraulic system	Replace.
(4) Improper return or adjustment of parking brake	Correct or adjust.
(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
(6) Excessively narrow shoe clearance	Adjust the clearance.
(7) Improper disc caliper operation	Correct or replace.
(8) Improper adjusted wheel bearing	Adjust or replace.
5. Brake noise (1) (creak sound)	
(1) Hardened or deteriorated lining	Replace the shoe assembly or pad.
(2) Worn lining	Replace the shoe assembly or pad.
(3) Loosened back plate or the support installing bolts	Retighten.
(4) Loose wheel bearing	Retighten to normal tightening torque.
(5) Dirty drum or rotor	Clean the drum or rotor, or clean and replace the brake assembly.
6. Brake noise (2) (hissing sound)	
(1) Worn lining	Replace the shoe assembly or pad.
(2) Improper installed shoe or pad	Correct or replace the shoe assembly or pad.
(3) Loose or bent drum or rotor	Retighten or replace.

Trouble and possible cause	Corrective action
7. Brake noise (3) (click sound)	
In the case of the disc brake:	
(1) Excessively worn pad or the support	Replace the pad or the support.
In the case of the drum brake:	
(1) Excessively worn shoe ridge	Replace the back plate.
(2) Lack of oil on the shoe ridge surface and anchor	Add more grease.

PEDAL SYSTEM AND CONTROL CABLES 4-5

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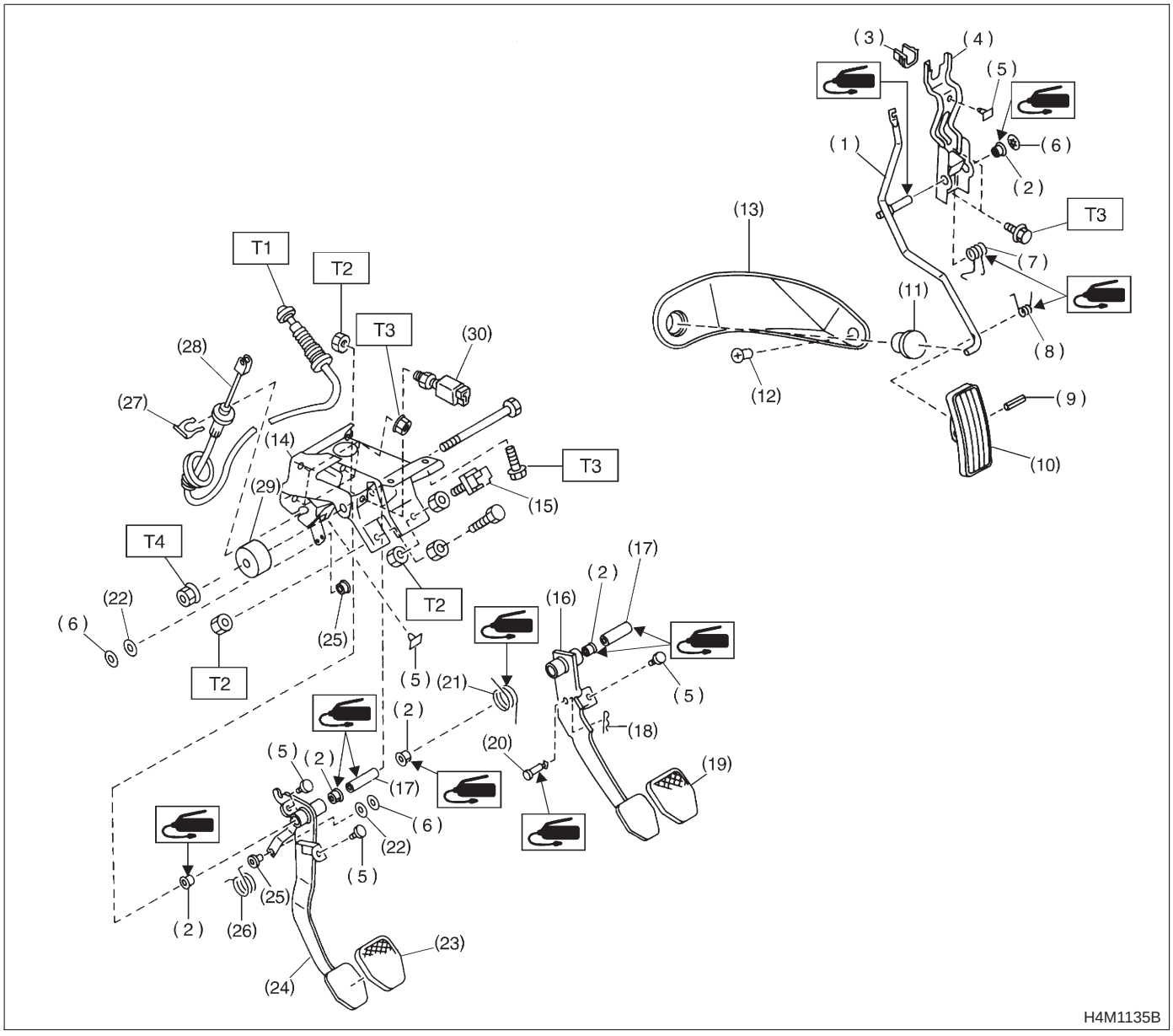
1. Pedal System

Brake pedal	Free play		1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kg, 2 lb).]
Clutch pedal	Free play	At clutch pedal pad	Except 2500 cc model: 10 — 20 mm (0.39 — 0.79 in) 2500 cc model: 4 — 13 mm (0.16 — 0.51 in)
	Full stroke	At clutch pedal pad	Except 2500 cc model: 140 — 145 mm (5.51 — 5.71 in) 2500 cc model: 130 — 135 mm (5.12 — 5.31 in)
Accelerator pedal	Free play	At pedal pad	1 — 4 mm (0.04 — 0.16 in)
	Stroke	At pedal pad	50 — 55 mm (1.97 — 2.17 in)

1. Pedal

A: MT MODEL

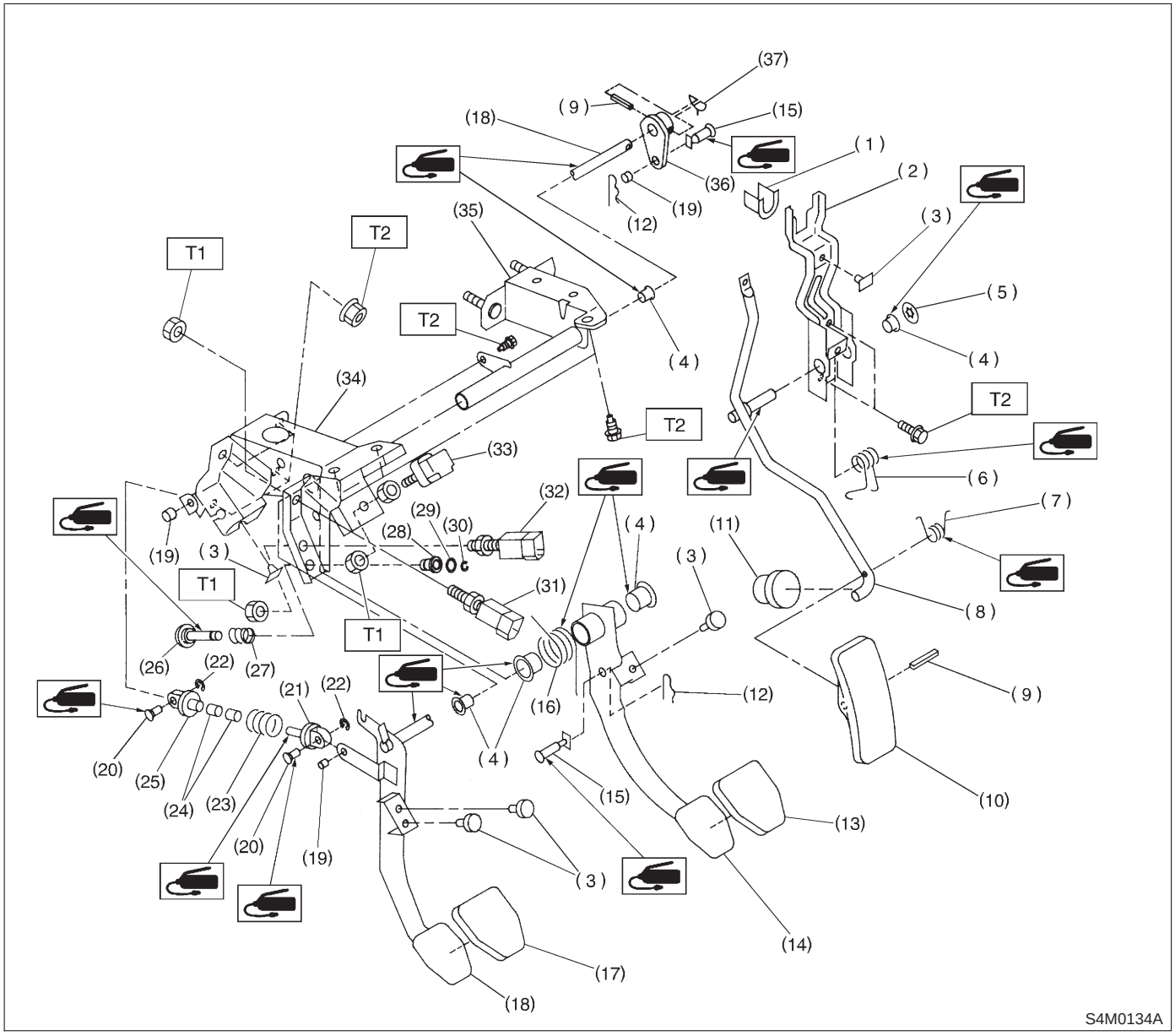
1. 2200 cc MODEL



(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 pad
(11) Accelerator stopper
(12) Clip
(13) Accelerator plate
(14) Pedal bracket
(15) Stop light switch
(16) Brake pedal
(17) Spacer
(18) Snap pin
(19) Brake pedal pad
(20) Clevis pin
(21) Brake pedal spring
(22) Washer
(23) Clutch pedal pad
(24) Clutch pedal
(25) Bushing assist
(26) Spring assist
(27) Clutch cable clamp
(28) Clutch cable
(29) Mass damper
(30) Clutch switch (Starter interlock)

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)

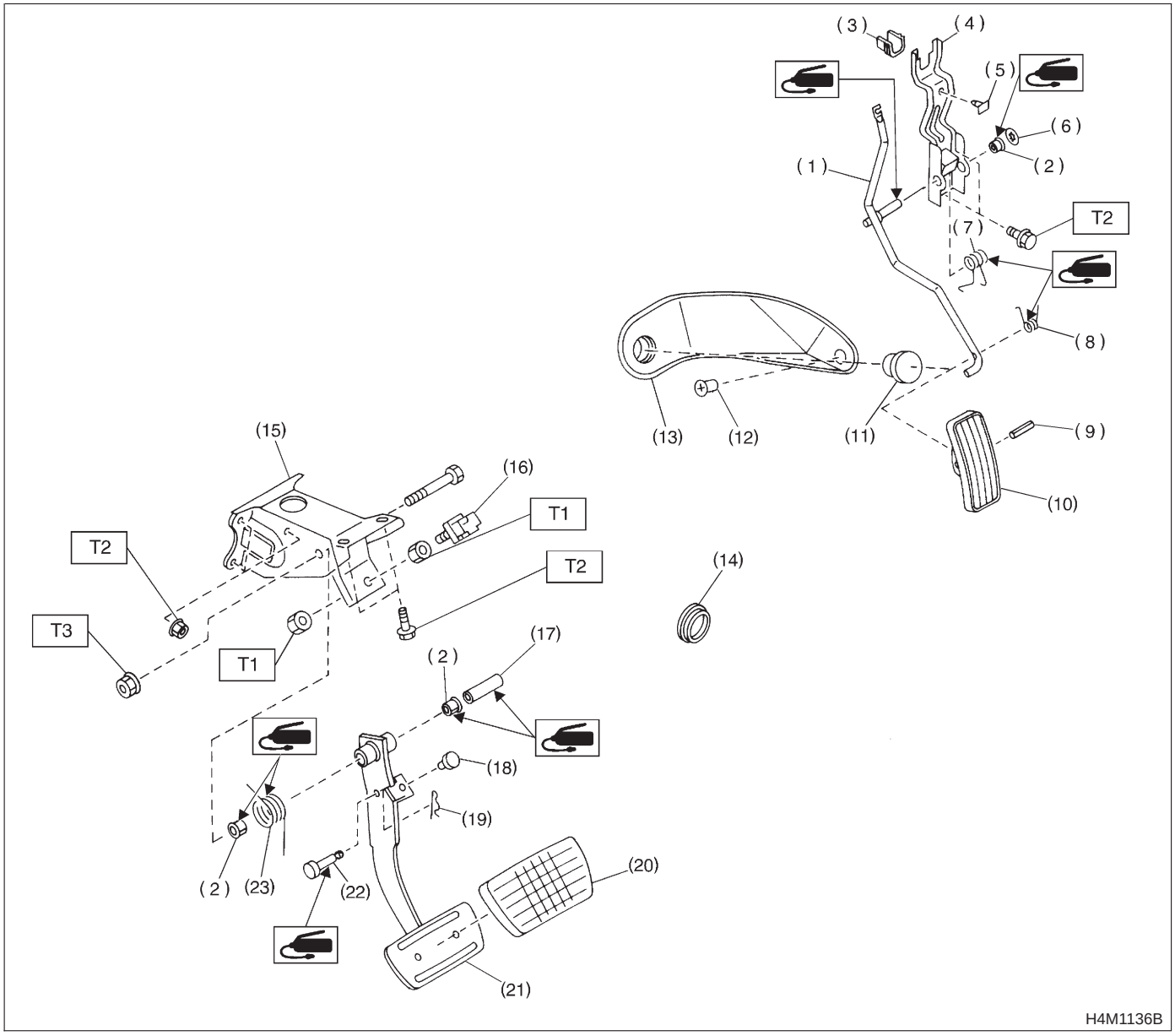
2. 2500 cc MODEL



(1) Holder
(2) Accelerator bracket
(3) Stopper
(4) Bushing
(5) Clip
(6) Accelerator spring
(7) Accelerator pedal spring
(8) Accelerator pedal
(9) Spring pin
(10) Accelerator pedal pad
(11) Accelerator stopper
(12) Snap pin
(13) Brake pedal pad
(14) Brake pedal
(15) Clevis pin
(16) Brake pedal spring
(17) Clutch pedal pad
(18) Clutch pedal
(19) Bushing C
(20) Clutch clevis pin
(21) Assist rod A
(22) Clip
(23) Assist spring
(24) Assist bushing
(25) Assist rod B
(26) Rod S
(27) Spring S
(28) Bushing S
(29) O-ring
(30) Clip
(31) Clutch switch (Starter interlock)
(32) Clutch switch (With cruise control)
(33) Stop light switch
(34) Pedal bracket
(35) Clutch master cylinder bracket
(36) Lever
(37) Lock wire

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±2 (0.8±0.2, 5.8±1.4)
T2: 18±5 (1.8±0.5, 13.0±3.6)

B: AT MODEL



(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)

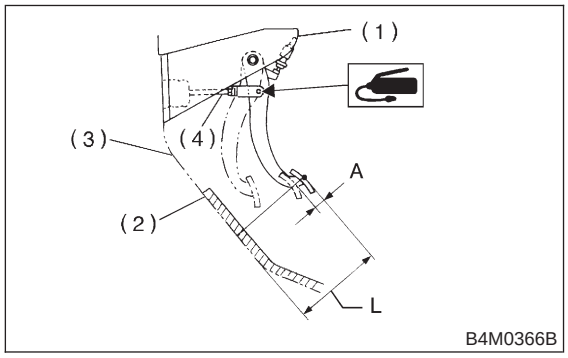
1. Pedal

A: ON-CAR SERVICE

1. BRAKE PEDAL

1) Check position of pedal pad.

Pedal height: L
148 mm (5.83 in)

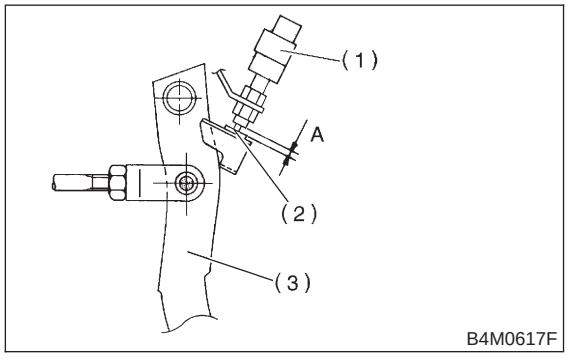


(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

2) If it is not in specified value, adjust it by adjusting brake booster operating rod length.
3) Measure the clearance between threaded end of stop light switch and stopper. If it is not in specified value, adjust it by adjusting position of stop light switch.

CAUTION:
Be careful not to rotate stop light switch.

Stop light switch clearance: A
0.3 mm (0.012 in)



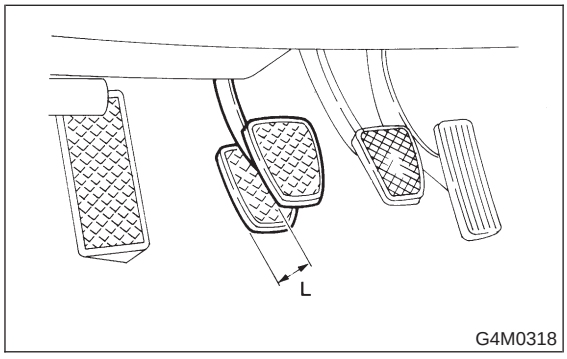
(1) Stop light switch
(2) Stopper
(3) Brake pedal

4) Apply grease to operating rod connecting pin to prevent it from wearing.

2. CLUTCH PEDAL (2200 cc MODEL)

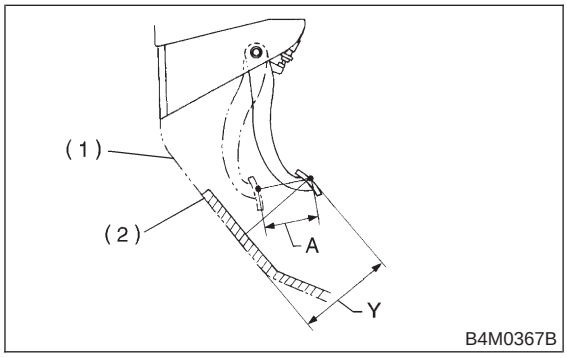
1) Check clutch pedal free play by operating pedal by hand.

Free play: L (At clutch pedal pad)
10 — 20 mm (0.39 — 0.79 in)



Pedal height: Y
158 mm (6.22 in)

Pedal stroke: A
140 — 145 mm (5.51 — 5.71 in)

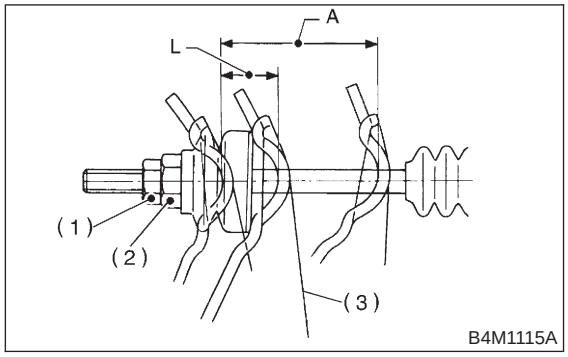


(1) Toe board
(2) Mat

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)



(1) Lock nut
(2) Adjusting nut
(3) Release fork

3) Apply grease to connecting portion of clutch pedal and clutch cable.

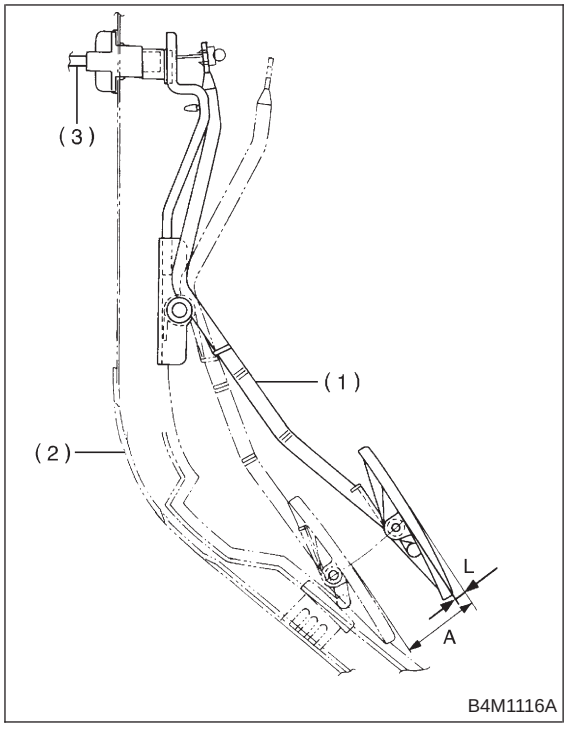
Lock nut tightening torque:
5.9±1.5 N·m (0.60±0.15 kg-m, 4.3±1.1 ft-lb)

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)

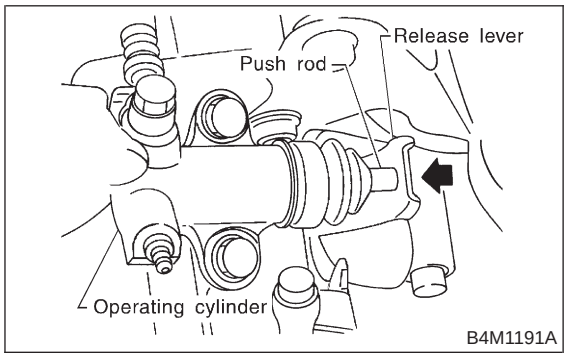


(1) Accelerator pedal
(2) Toe board
(3) Accelerator cable

Accelerator cable lock nut tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)

4. CLUTCH PEDAL (2500 cc MODEL)

1) Push release fork until operating cylinder push rod retracts. Check that clutch fluid level in reservoir tank increases.



2) If clutch fluid level increases, hydraulic clutch play is correct.
3) If clutch fluid level does not increase or push rod does not retract, clutch pedal must be adjusted. <Ref. to 4-5 [W1F1].>
4) Check the fluid level on the outside of the clutch master cylinder tank. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.

Recommended clutch fluid:
FMVSS No. 116, fresh DOT 3 or DOT 4 brake fluid

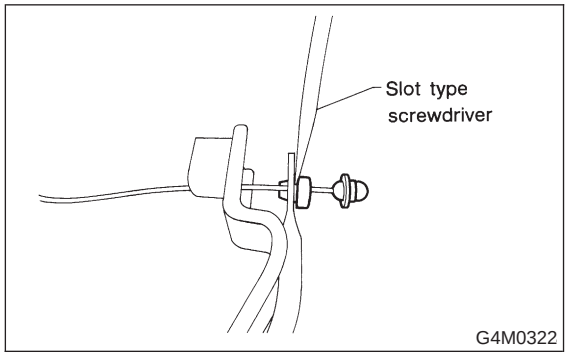
B: REMOVAL

1. ACCELERATOR PEDAL

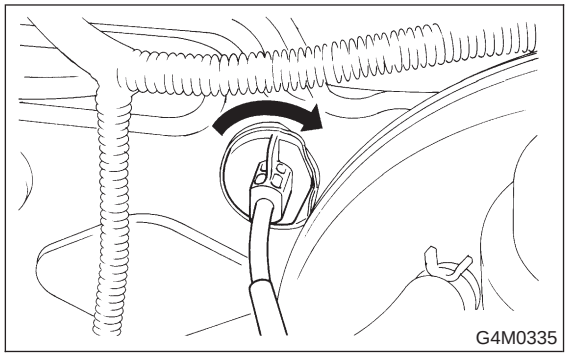
1) Disconnect ground cable from battery.
2) Disconnect accelerator cable from throttle body.

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.

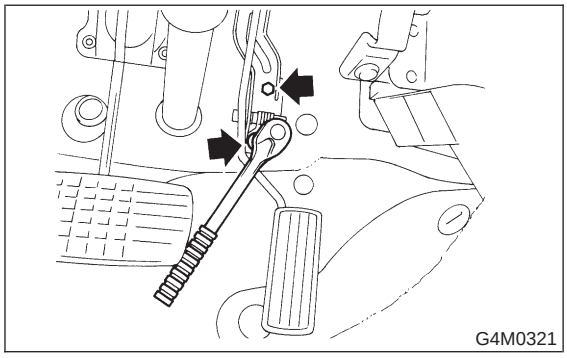


5) Working inside engine compartment, remove casing cap out of the toe board by turning it clockwise.



6) Pull out the cable from the toe board hole.

7) Remove accelerator pedal connecting bolt from accelerator pedal bracket.

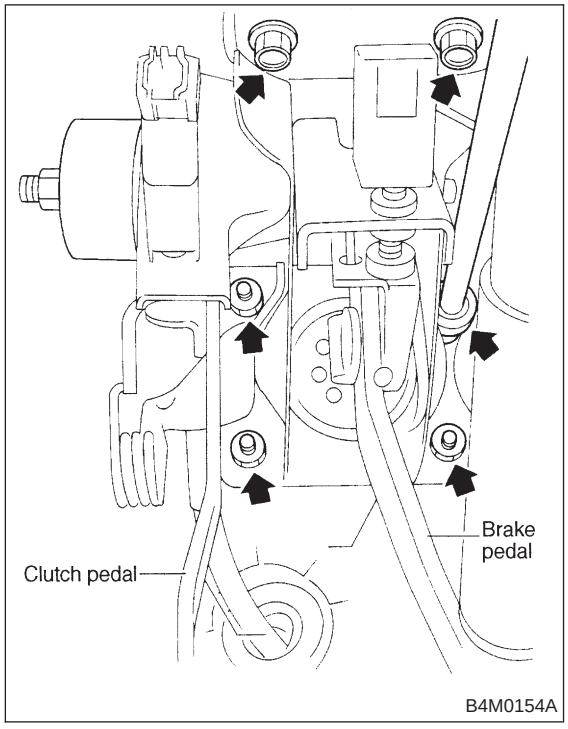


2. BRAKE AND CLUTCH PEDAL (2200 cc MODEL)

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.

6) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal bracket and clutch cable as a unit.

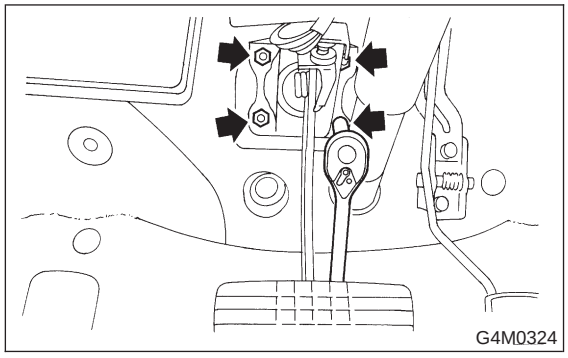
CAUTION:
Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.



7) Depress clutch pedal, disconnect clutch cable from clutch pedal.

3. BRAKE PEDAL

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.



4. BRAKE AND CLUTCH PEDAL (2500 cc MODEL)

1) Remove steering bolts.
2) Raise vehicle on hoist and remove the two bolts which secure steering unit to underside of body.
3) Lower vehicle to floor.
4) Remove instrument panel lower cover from instrument panel.
5) Disconnect the following parts from pedal bracket.
- Operating rod of brake booster
- Electrical connectors (for stop light switch, etc.)

6) Remove clevis pin which secures lever to push rod.
7) Remove nut which secures clutch master cylinder.
8) Remove steering assembly.
9) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

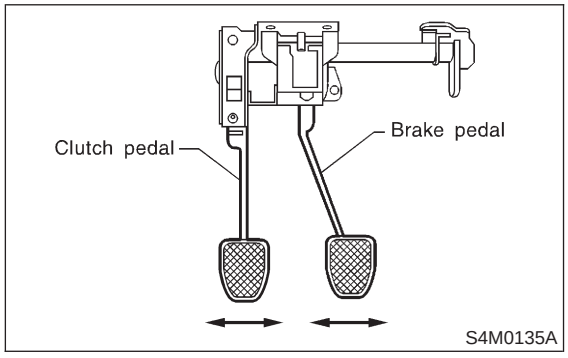
C: INSPECTION

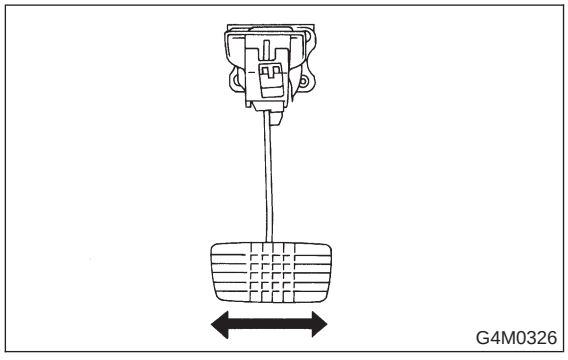
1. BRAKE AND CLUTCH PEDALS

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.



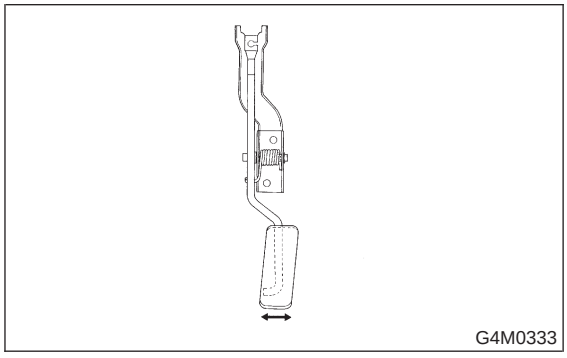


2. ACCELERATOR PEDAL

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

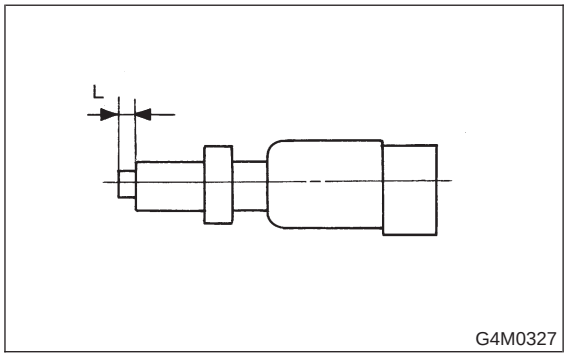
CAUTION:
If excessive deflection is noted, replace bushing and clip with new ones.



3. STOP LIGHT SWITCH

If stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: L
$2^{+1.5}/_{0}$ mm (0.079 $^{+0.059}/_{0}$ in)



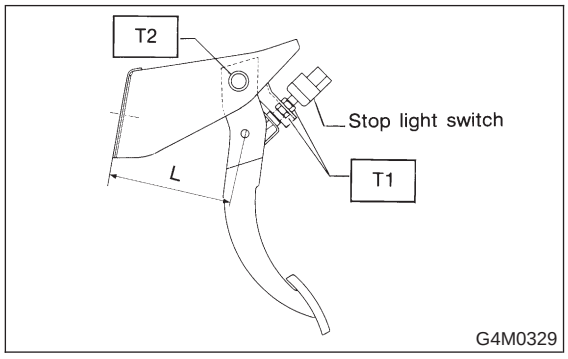
D: ASSEMBLY

1. BRAKE AND CLUTCH 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, 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)

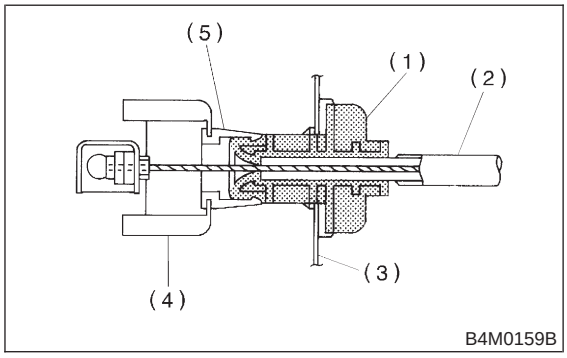
2. ACCELERATOR PEDAL

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) Adjust clutch pedal (2500 cc model) <Ref. to 4-5 [W1F1].>
3) Adjustment after pedal installation <Ref. to 4-5 [W1A0].>

F: ADJUSTMENT

1. CLUTCH PEDAL (2500 cc MODEL)

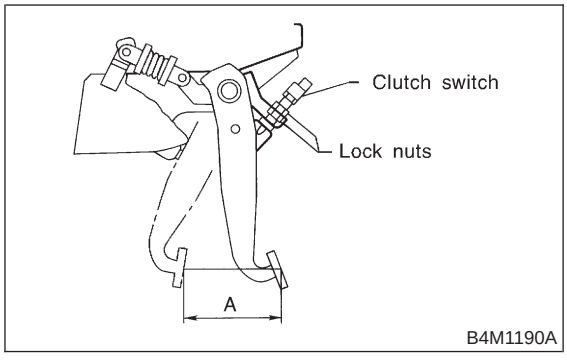
1) Turn cruise control clutch switch lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:
Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.

NOTE:
If lock nuts cannot adjust clutch pedal full stroke length to specifications, turn master cylinder push rod to adjust it.

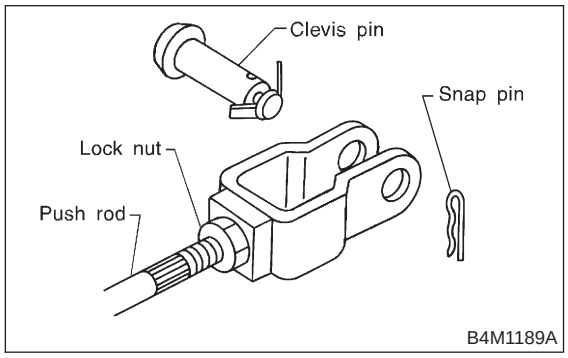
Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):
8±2 N·m (0.8±0.2 kg-m, 5.8±1.4 ft-lb)



2) Turn master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

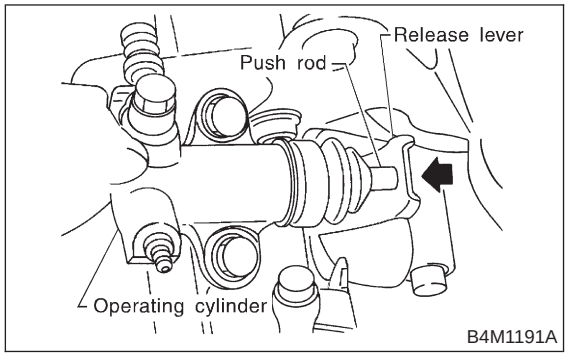
Tightening torque (Push rod lock nut):
8±2 N·m (0.8±0.2 kg-m, 5.8±1.4 ft-lb)



3) Depress and release clutch pedal 2 to 3 times to ensure that clutch pedal and release fork operate smoothly. If clutch pedal and release fork do not operate smoothly, bleed air from clutch hydraulic system. <Ref. to 2-10 [W2A2].>
4) Measure clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

Specified clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

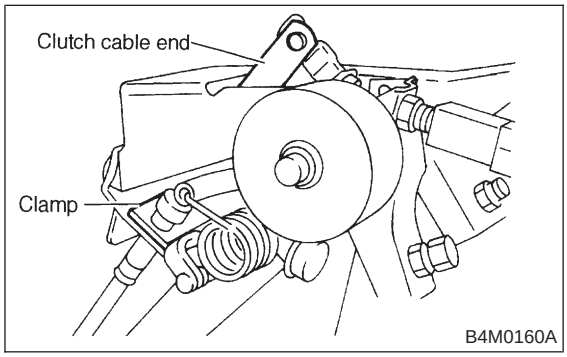
5) Move clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.
6) Push release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace master cylinder with new one. <Ref. to 2-10 [W6A0].>



2. Clutch Cable

A: REMOVAL

1) Disconnect clutch cable from release lever.
2) Remove clutch cable clamp from pedal bracket.

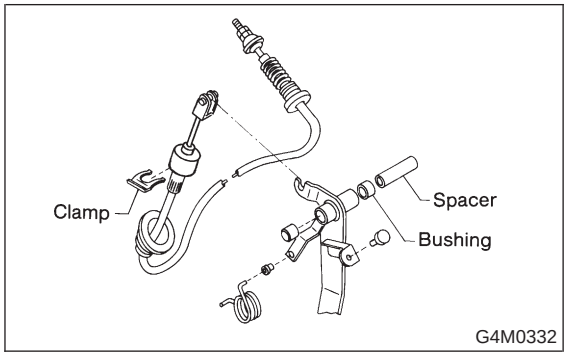


3) Disconnect clutch cable from pedal bracket and pedal end.
4) Remove clutch cable from body.

CAUTION:
Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.

B: INSTALLATION

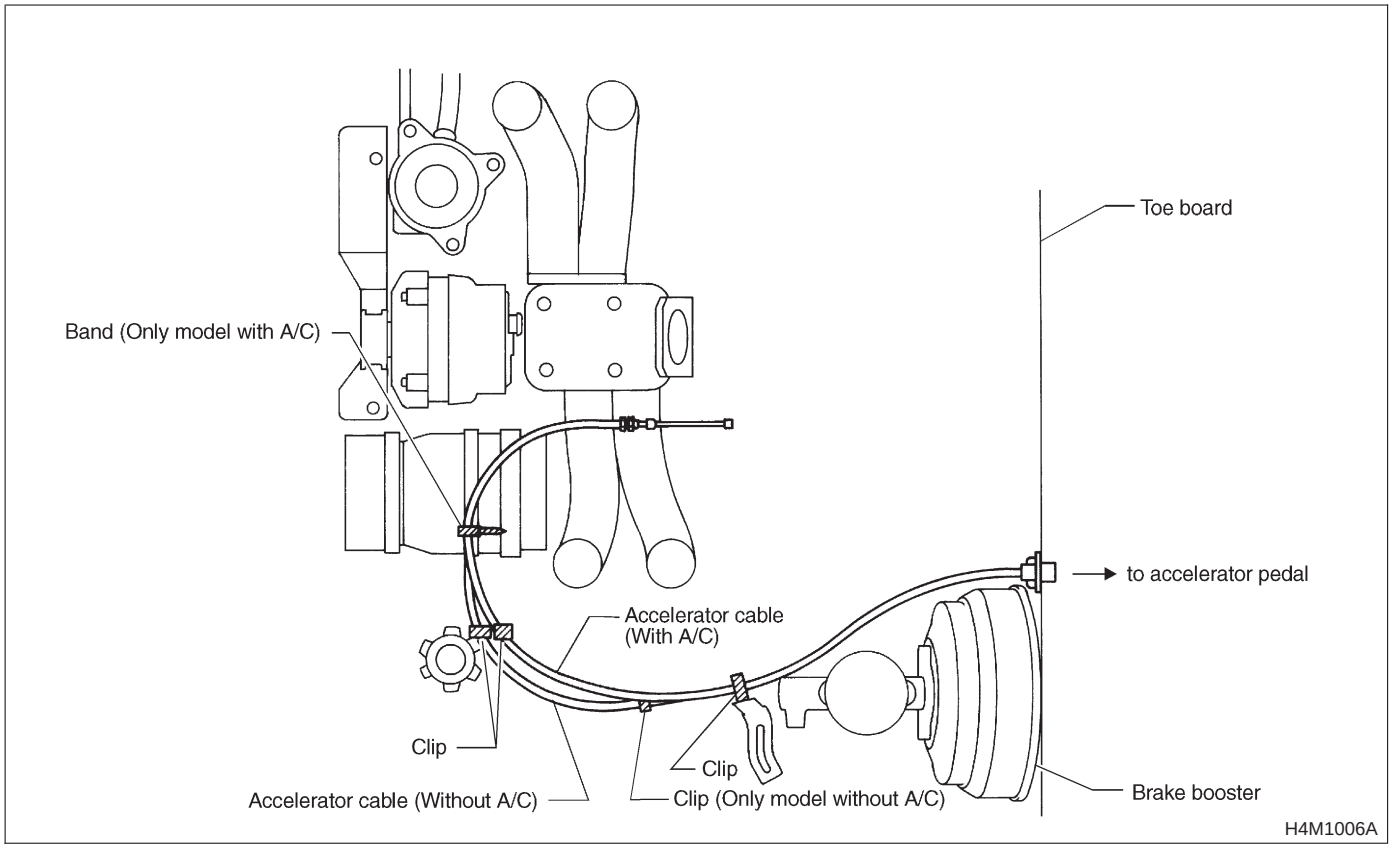
1) Clean clutch pedal fitting hole, and apply grease. Connect clutch cable to clutch pedal.



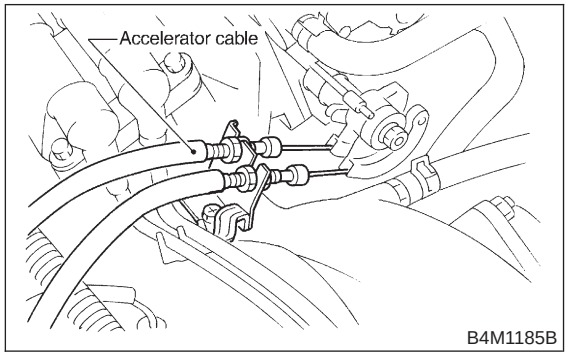
2) Fit clutch pedal to pedal bolt, and connect clutch cable to bracket with clamp.
3) Connect clutch cable end to pedal end.
4) Connect clutch cable from release lever.
5) Install grommet to toe board.
6) Adjust after cable installation. <Ref. to 4-5 [W1A2].>

3. Accelerator Cable

A: REMOVAL



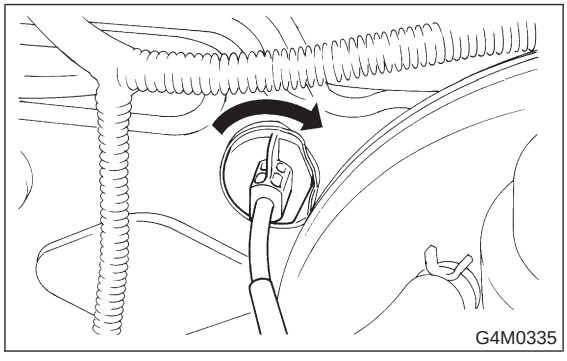
1) Disconnect accelerator cable from connector inside engine compartment first.
2) Remove lock nut from accelerator cable bracket.
3) Separate accelerator cable from bracket, then unlock inner cable.



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.



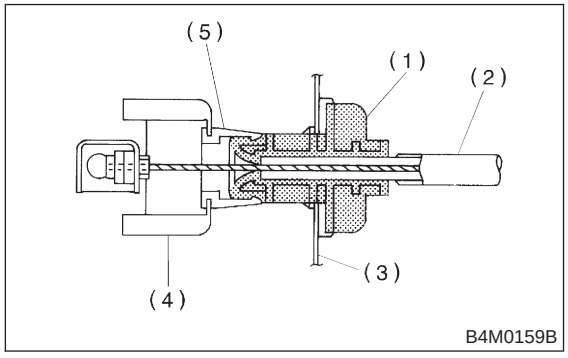
8) Pull out the cable from the toe board hole.

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) Adjust after cable installation. <Ref. to 4-5 [W1A3].>

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.
Stop light switch does not light up.	Adjust position of stop light switch.
Stop light switch is not smooth and/or stroke is not correct.	Replace.
Insufficient pedal play	Adjust pedal play.
Clutch and/or brake pedal free play insufficient	Adjust pedal free play.
Maladjustment of brake pedal or booster push rod	Inspect and adjust.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

MEMO:

HEATER AND VENTILATOR 4-6

Page

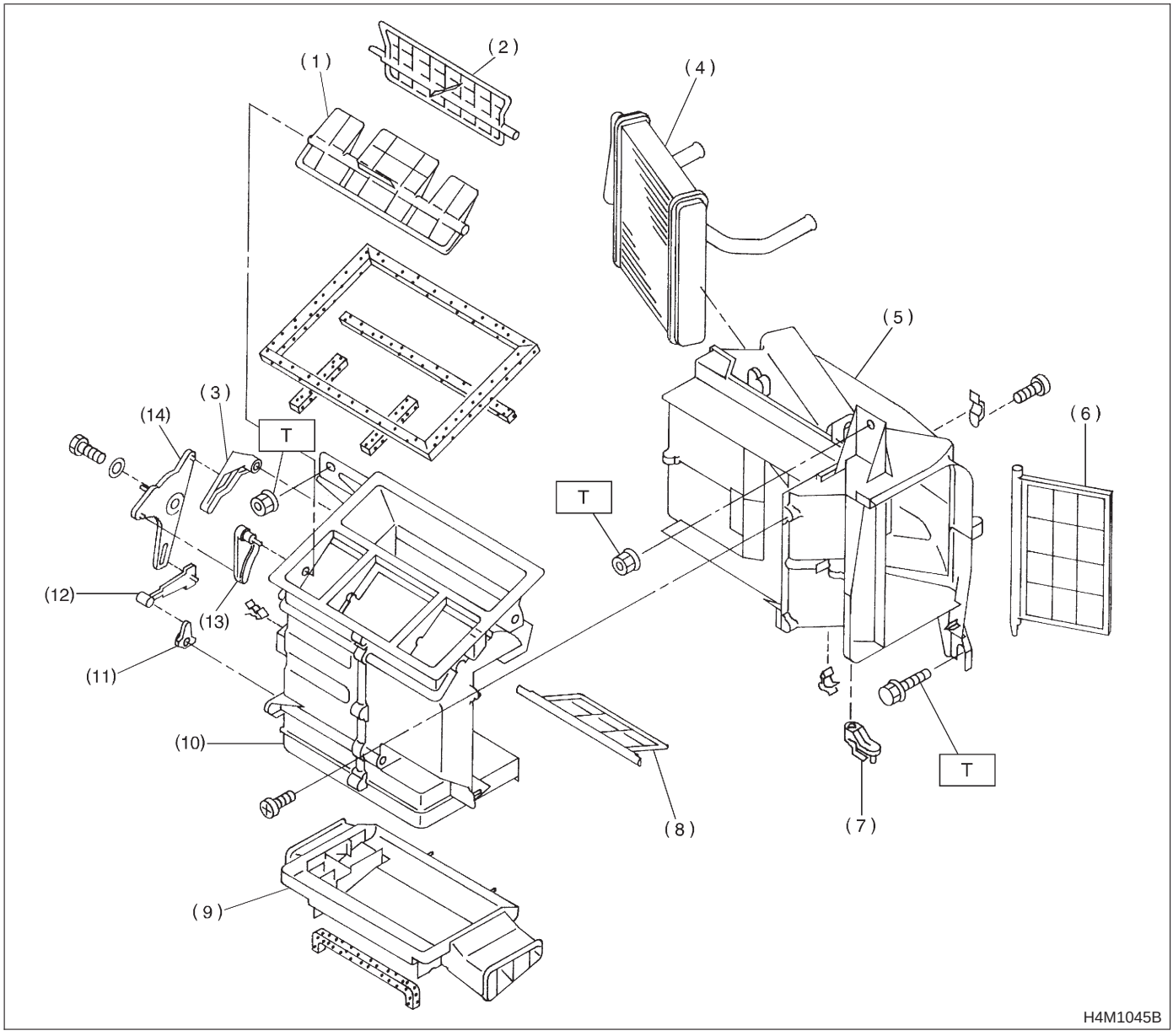
S SPECIFICATIONS AND SERVICE DATA 2
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C COMPONENT PARTS 3
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2. Intake Unit 4
3. Control Unit 5
W SERVICE PROCEDURE 6
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2. Heater Unit 6
3. Blower Motor 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)	—	

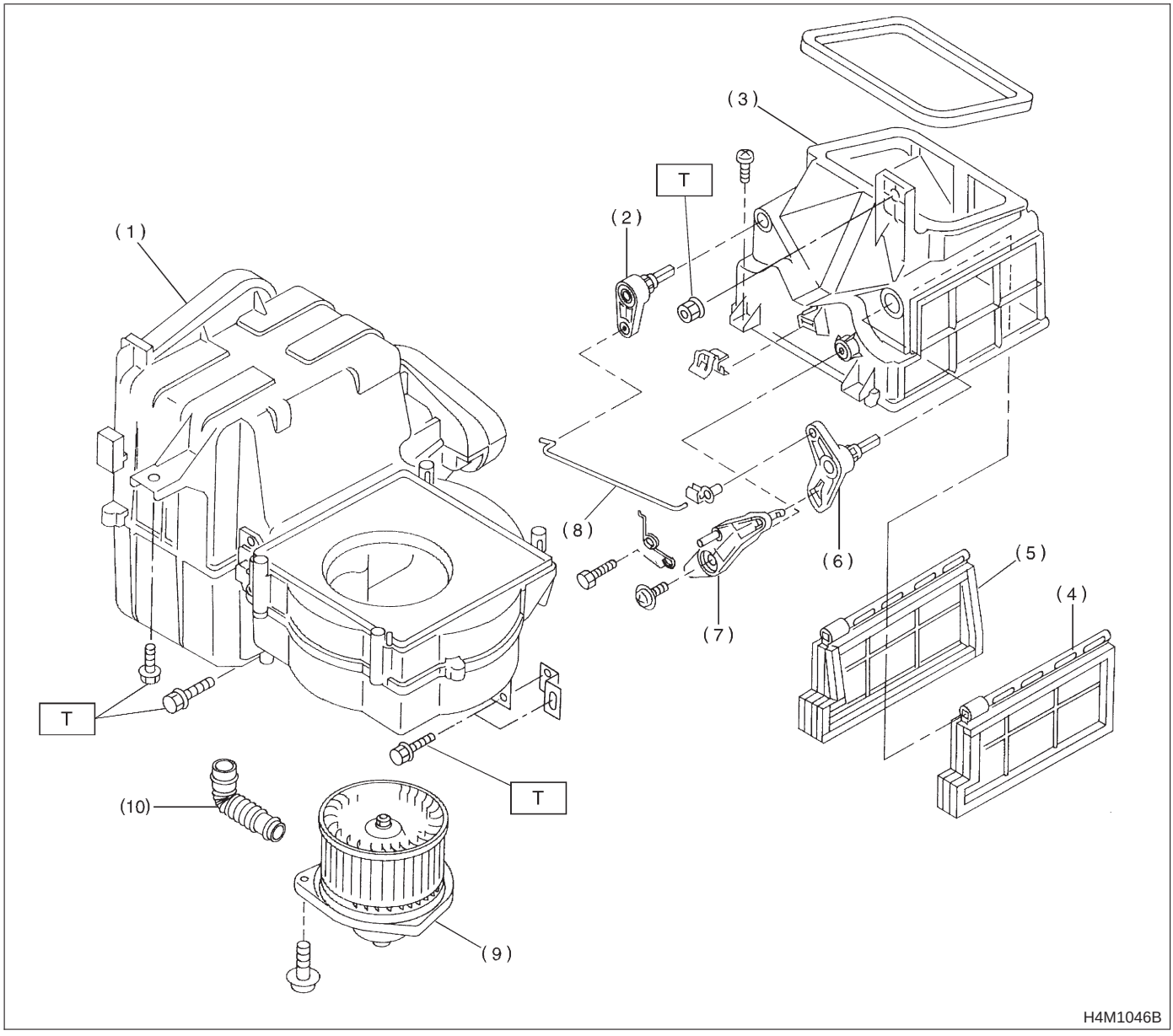
1. Heater Unit



(1) Vent door
(2) DEF door
(3) DEF lever
(4) Heater core
(5) Heater case FRONT
(6) Mix door
(7) Mix lever
(8) Foot door
(9) Foot duct
(10) Heater case REAR
(11) Foot lever lower
(12) Foot lever upper
(13) Vent 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)

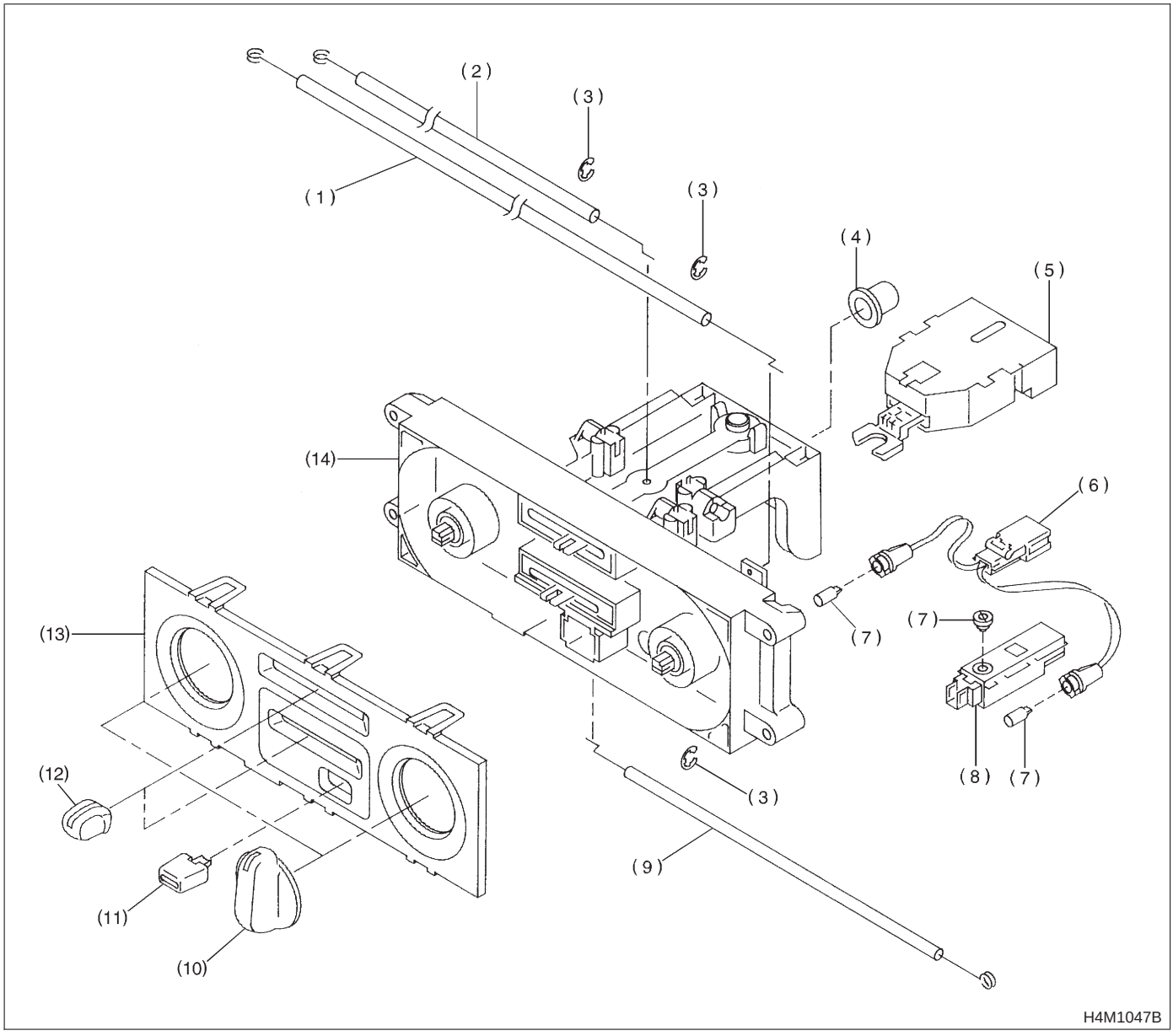
2. Intake Unit



(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



(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.

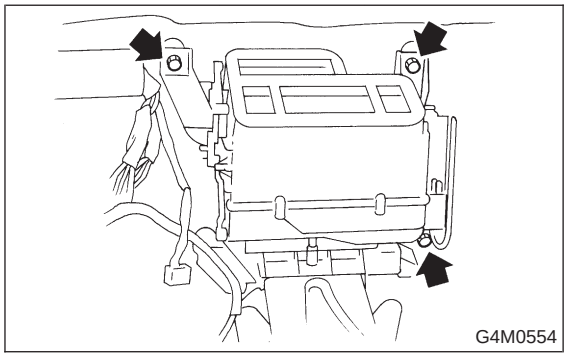
2. Heater Unit

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 [W1A0].>

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.

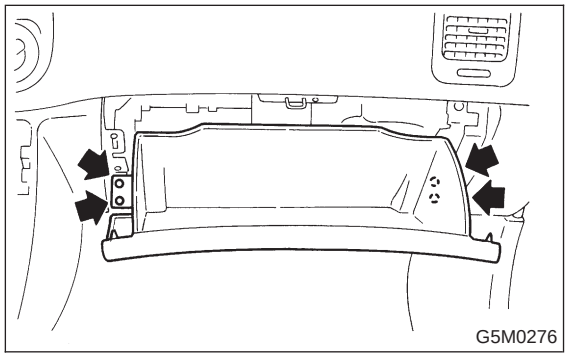
Fitted length of heater hose over pipe:
27.5±2.5 mm (1.083±0.098 in)

8) Pour coolant.
<Ref. to 2-5 [W1B0].>

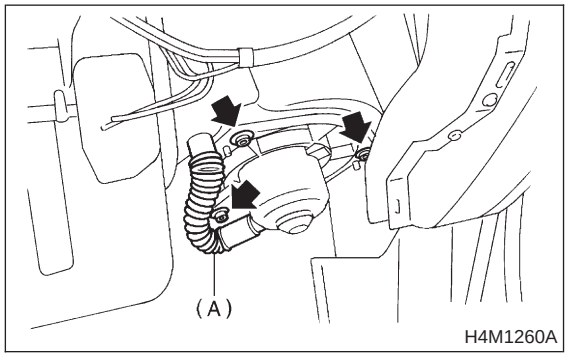
3. Blower Motor Assembly

A: REMOVAL AND INSTALLATION

1) Disconnect GND cable from battery.
2) Remove glove box.



3) Disconnect blower motor harness connector.
4) Disconnect aspirator pipe (A).
5) Remove blower motor mounting screw.



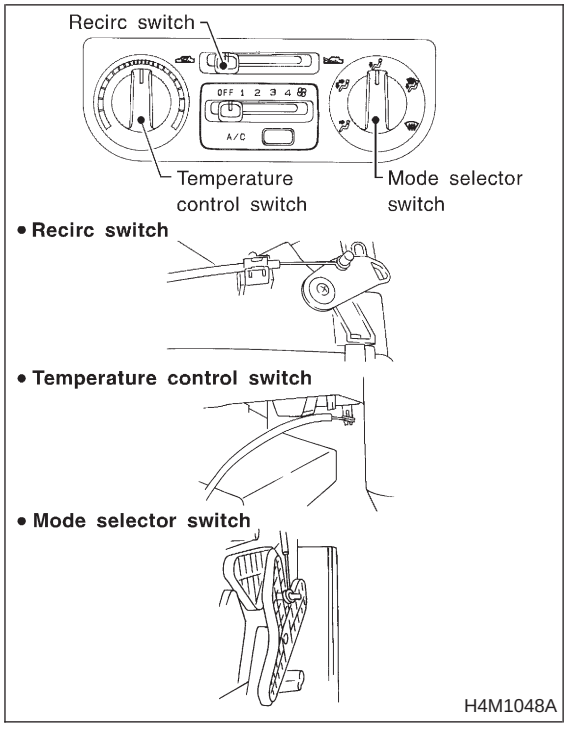
6) Remove blower motor assembly.
7) Installation is in the reverse order of removal.

4. Control Unit

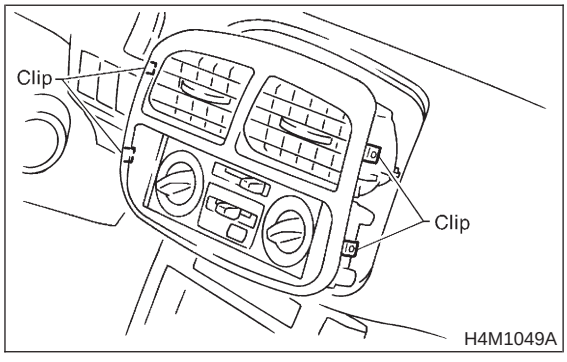
A: REMOVAL AND INSTALLATION

1) Disconnect GND cable from battery.
2) 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.

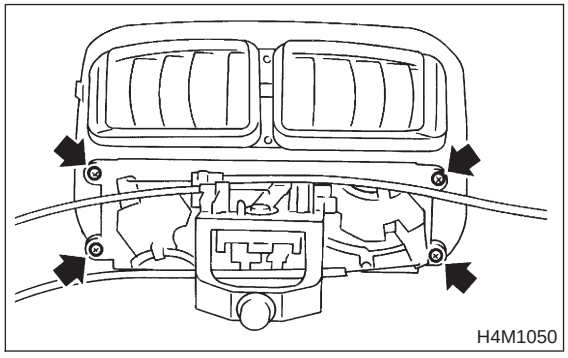
NOTE:
Do not attempt to move links during installation.



4) Remove center panel from instrument panel then disconnect connectors.



5) Remove control unit assembly from center panel.


H4M1050

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.

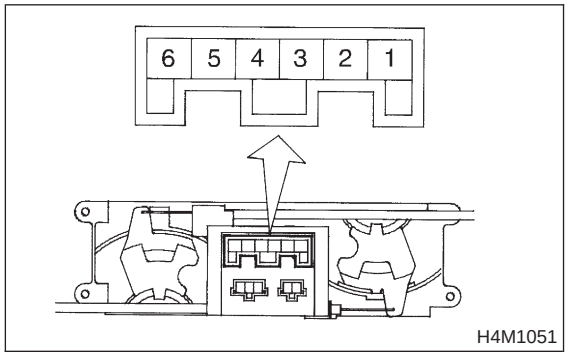
B: INSPECTION

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

H5M1280A



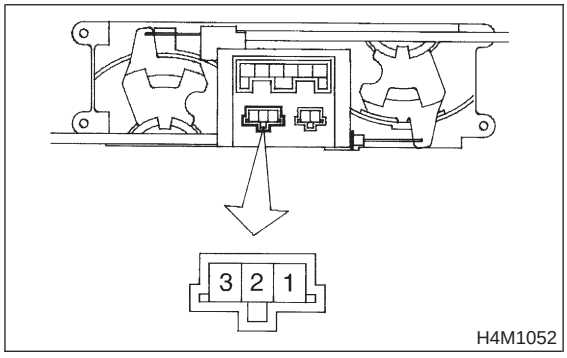
H4M1051

2. A/C SWITCH

Check A/C switch continuity between each terminal.

Terminal	Switch ON	Illumi.
1		○
2	○	○
3	○	○

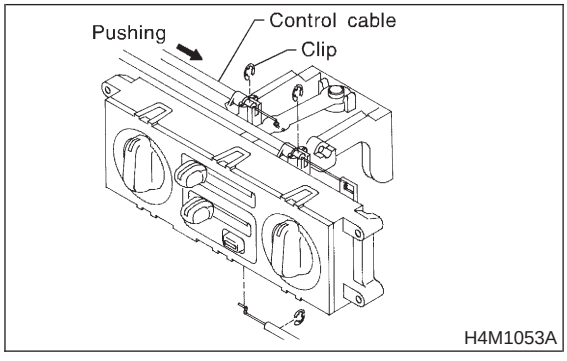
H5M1281A



H4M1052

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.



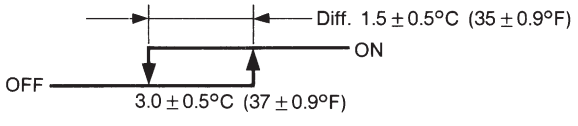
H4M1053A

AIR CONDITIONING SYSTEM 4-7

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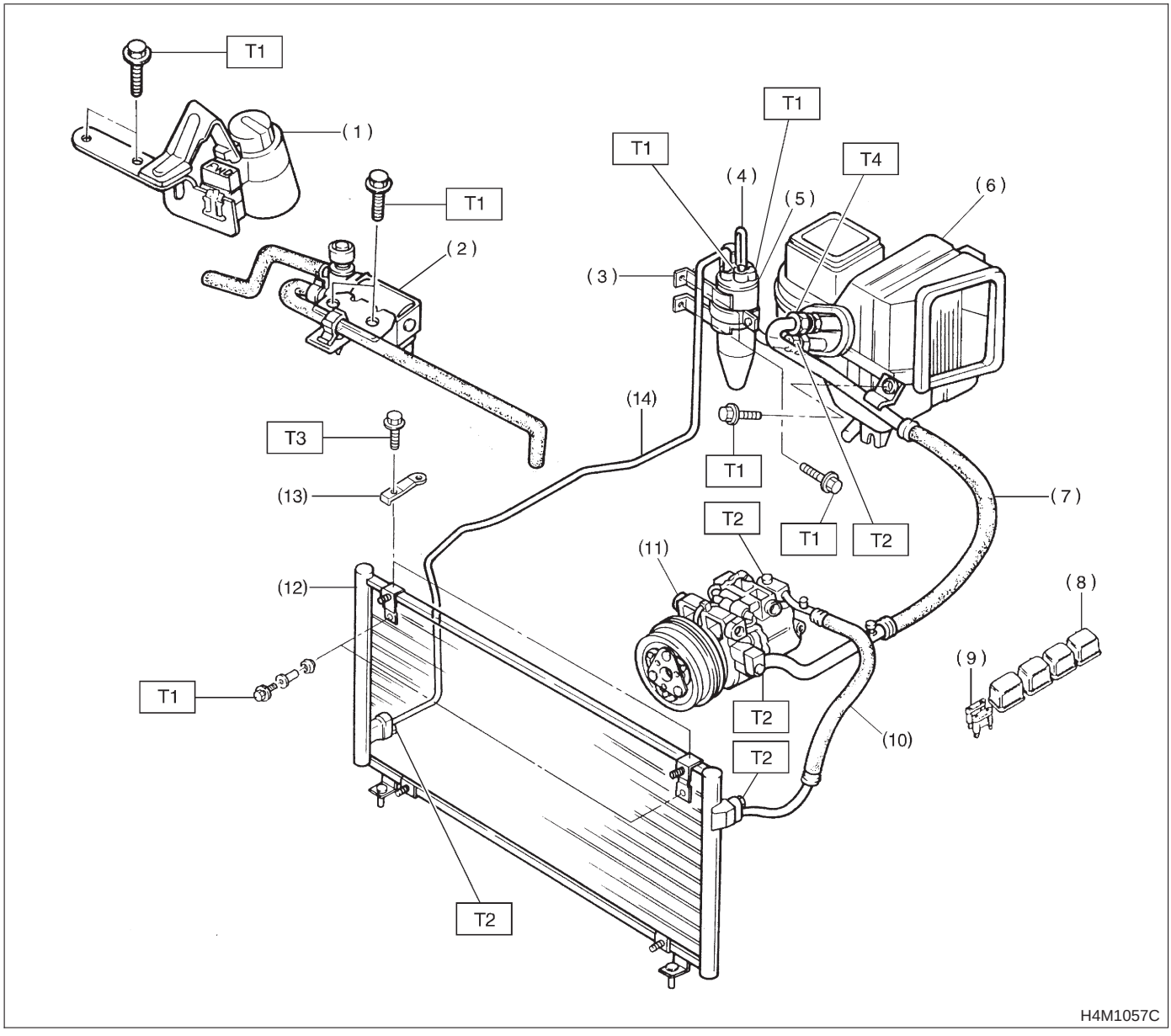
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1. Specifications

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_2FCF_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)
		Pulley ratio	2.0/1.8 model: 1.064, 1.6 model: 0.88
Condenser		Type	Corrugated fin (Multi-flow)
		Core face area	0.211 m^2 (2.27 sq ft)
		Core thickness	19 mm (0.75 in)
		Radiation area	5.76 m^2 (62 sq ft)
Receiver drier		Effective inner capacity	250 cm^3 (15.26 cu in)
Expansion valve		Type	Internal equalizing
Evaporator		Type	Single tank
		Dimensions (W × H × T)	74 × 222 × 235 mm (2.91 × 8.74 × 9.25 in)
Blower fan		Fan type	Sirocco fan
		Outer diameter × width	150 × 75 mm (5.91 × 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)			
Compressor thermocut temperature			140±5°C (284±9°F) Diff. 15±5°C (59±9°F)

G4M0938

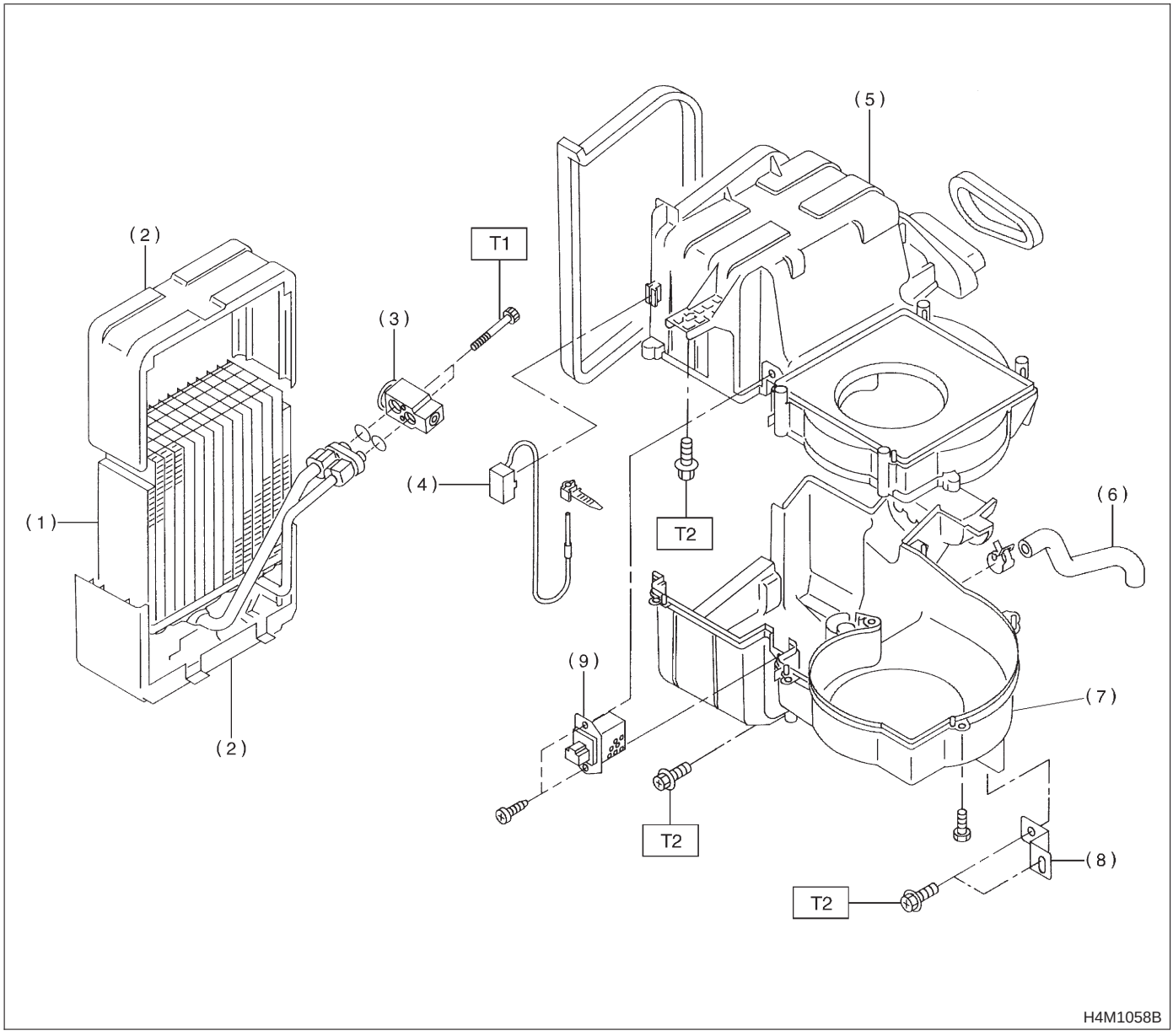
1. Air Conditioning System



(1) A/C cut relay
(2) FICD (1800 cc model)
(3) Receiver drier bracket
(4) Pipe (Receiver drier — C/unit)
(5) Receiver drier
(6) Cooling unit
(7) Hose (Low-pressure)
(8) A/C relay
(9) Fuse
(10) Hose (High-pressure)
(11) Compressor
(12) Condenser
(13) Radiator bracket
(14) Pipe (Condenser — Receiver drier)

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)

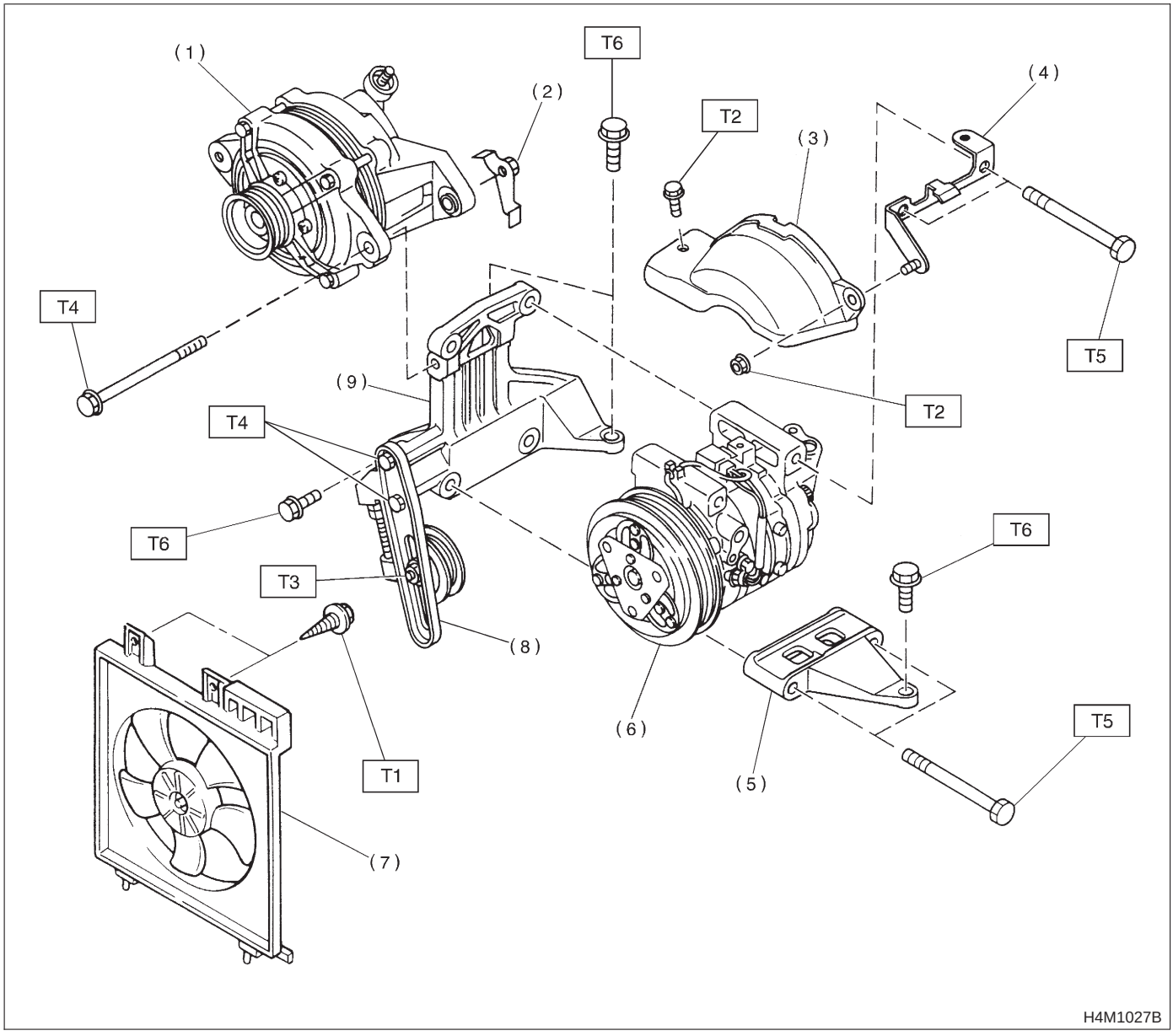
2. Intake Unit with Evaporator



(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



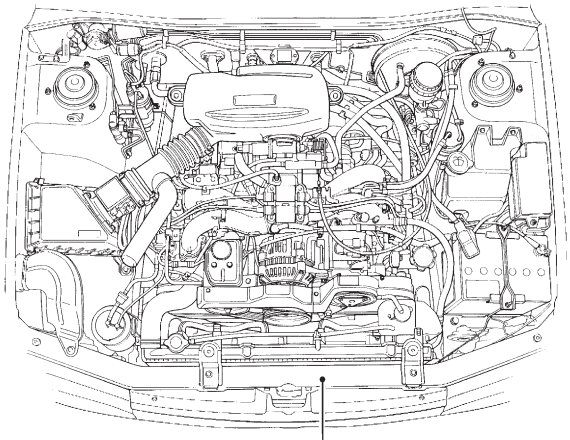
(1) Alternator
(2) Alternator bracket nut
(3) Compressor belt cover
(4) Bracket
(5) Compressor bracket lower
(6) Compressor
(7) Condenser fan motor ASSY
(8) Idler pulley ASSY
(9) Compressor bracket upper

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 KLIMAANLAGE 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.

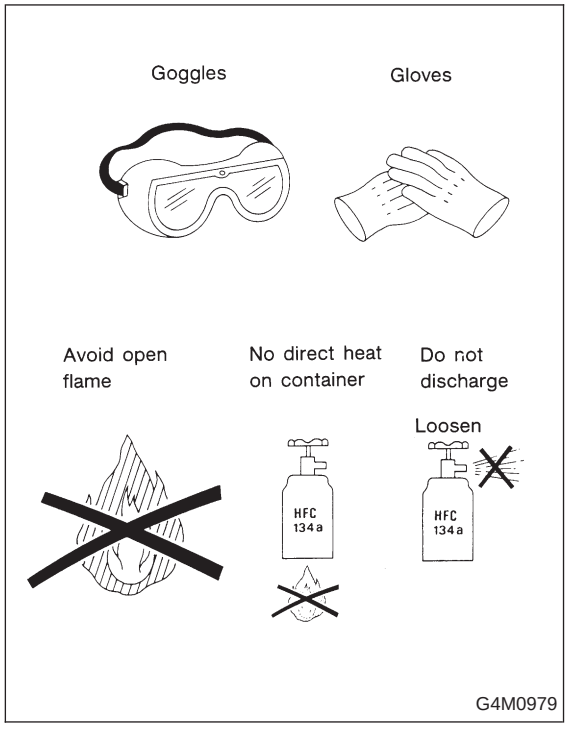
Because HFC-134a compressor oil is very hygroscopic (easily absorbs moisture), when parts of the air conditioning system are being removed, quickly install a blind plug to prevent contact with the outside air. Also, always make sure that the service container for compressor oil is tightly closed except 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.

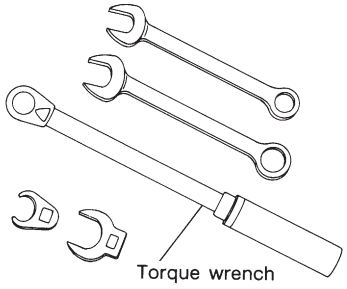
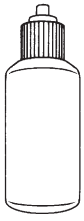
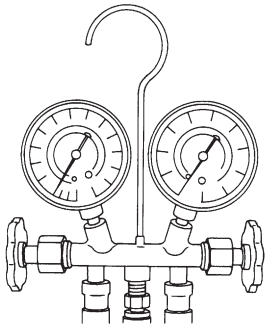
Vacuum level required to boil water (at sea level)	
Temperature °C (°F)	Vacuum kPa (mmHg, inHg)
1.7 (35)	100.9 (757, 29.8)
7.2 (45)	100.6 (754, 29.7)
12.8 (55)	99.9 (749, 29.5)
18.3 (65)	99.2 (744, 29.3)
23.9 (75)	98.5 (739, 29.1)
29.4 (85)	97.2 (729, 28.7)
35 (95)	95.8 (719, 28.3)

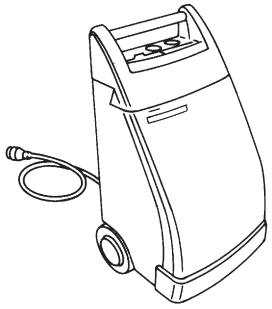
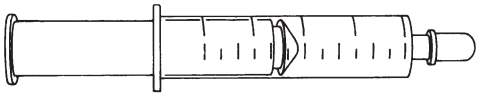
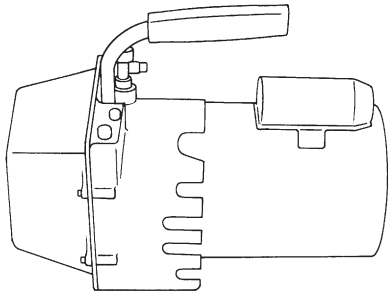
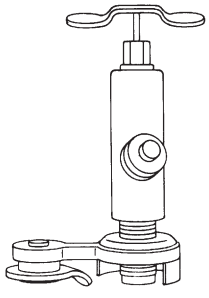
3. Tools and Equipment

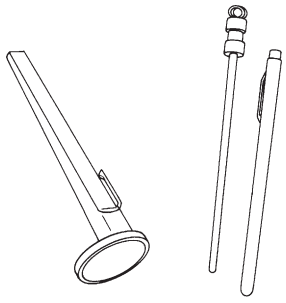
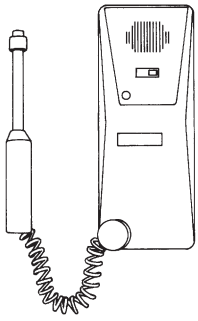
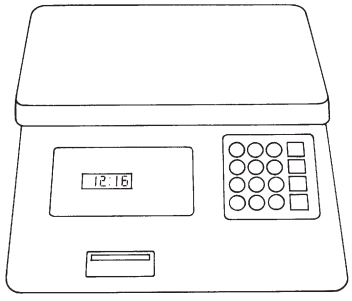
The following section provides information about the tools and equipment that will be necessary to properly service the A/C system.
Since equipment may vary slightly depending on the manufacturer, it is important to always read and follow the manufacturer's instructions.

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
● WRENCH 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.	 G4M0571
● APPLICATOR BOTTLE A small **APPLICATOR BOTTLE** is recommended to apply refrigerant oil to the various parts. They can be obtained at a hardware or drug store.	 G4M0572
● MANIFOLD GAUGE SET A **MANIFOLD GAUGE SET** (with hoses) can be obtained from either a commercial refrigeration supply house or from an auto shop equipment supplier.	 G4M0573

Tools and Equipment	Description
● REFRIGERANT RECOVERY SYSTEM 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.	 G4M0574
● SYRINGE 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.	 G4M0575
● VACUUM PUMP 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.	 G4M0576
● CAN TAP A **CAN TAP** for the 397 g (14 oz) can is available from an auto supply store.	 G4M0577

Tools and Equipment	Description
● THERMOMETER Pocket **THERMOMETERS** are available from either industrial hardware store or commercial refrigeration supply houses.	 G4M0578
● ELECTRONIC LEAK DETECTOR An **ELECTRONIC LEAK DETECTOR** can be obtained from either a specialty tool supply or an A/C equipment supplier.	 G4M0579
● WEIGHT SCALE 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.	 G4M0580

4. O-ring Connections

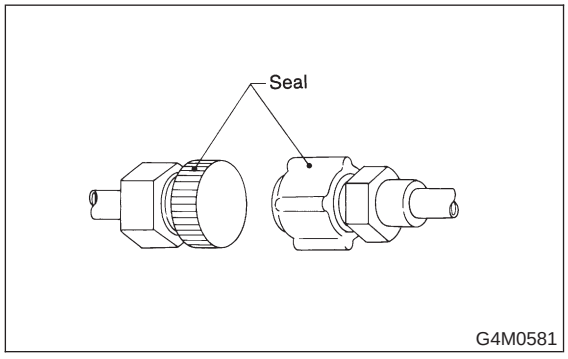
A: GENERAL

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.

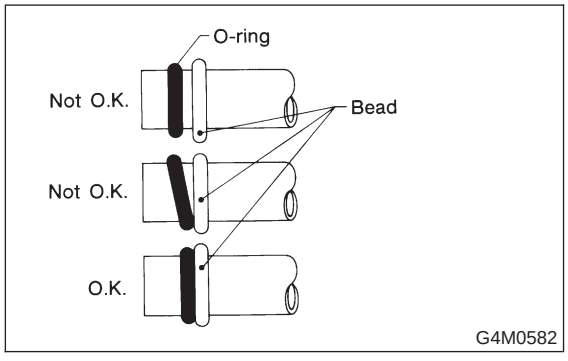
B: REMOVE PROTECTIVE SEALS

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.

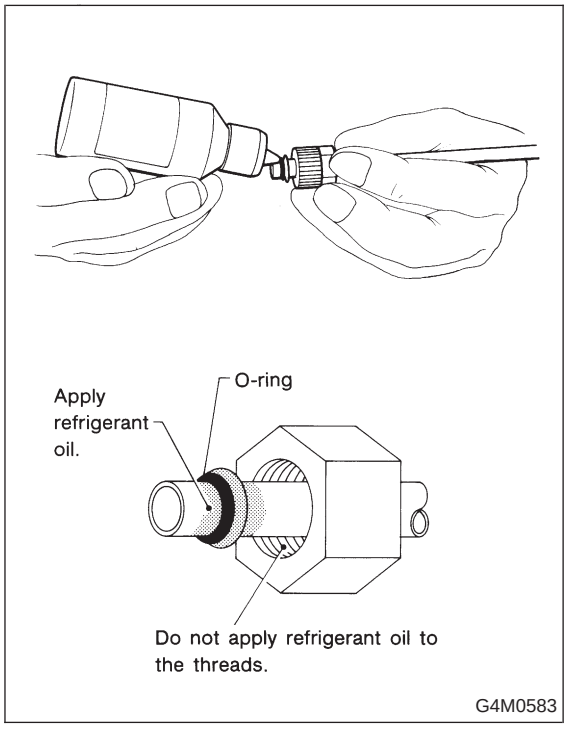


2) Visually inspect the O-ring surface, the O-ring mating surface, the threads and the connection points. If a defective part is found, replace it.
The O-ring must sit square against the tube bead. If necessary, slide the O-ring into proper position with clean hands.



C: LUBRICATE THE COMPONENTS

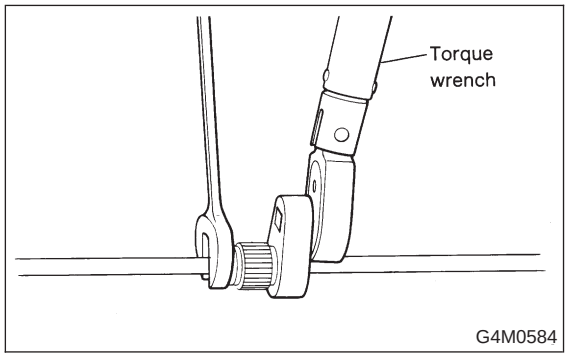
For lubrication of the components, use only refrigerant oil as described in the appropriate service manual. Apply oil from an oil squirt gun or other closed container. Do not use your finger to spread the oil over the O-ring.
Apply a small amount of refrigerant oil to the top and sides of the O-ring. The area covered by oil should include the O-ring and the tube bead.



D: TORQUE THE FITTING

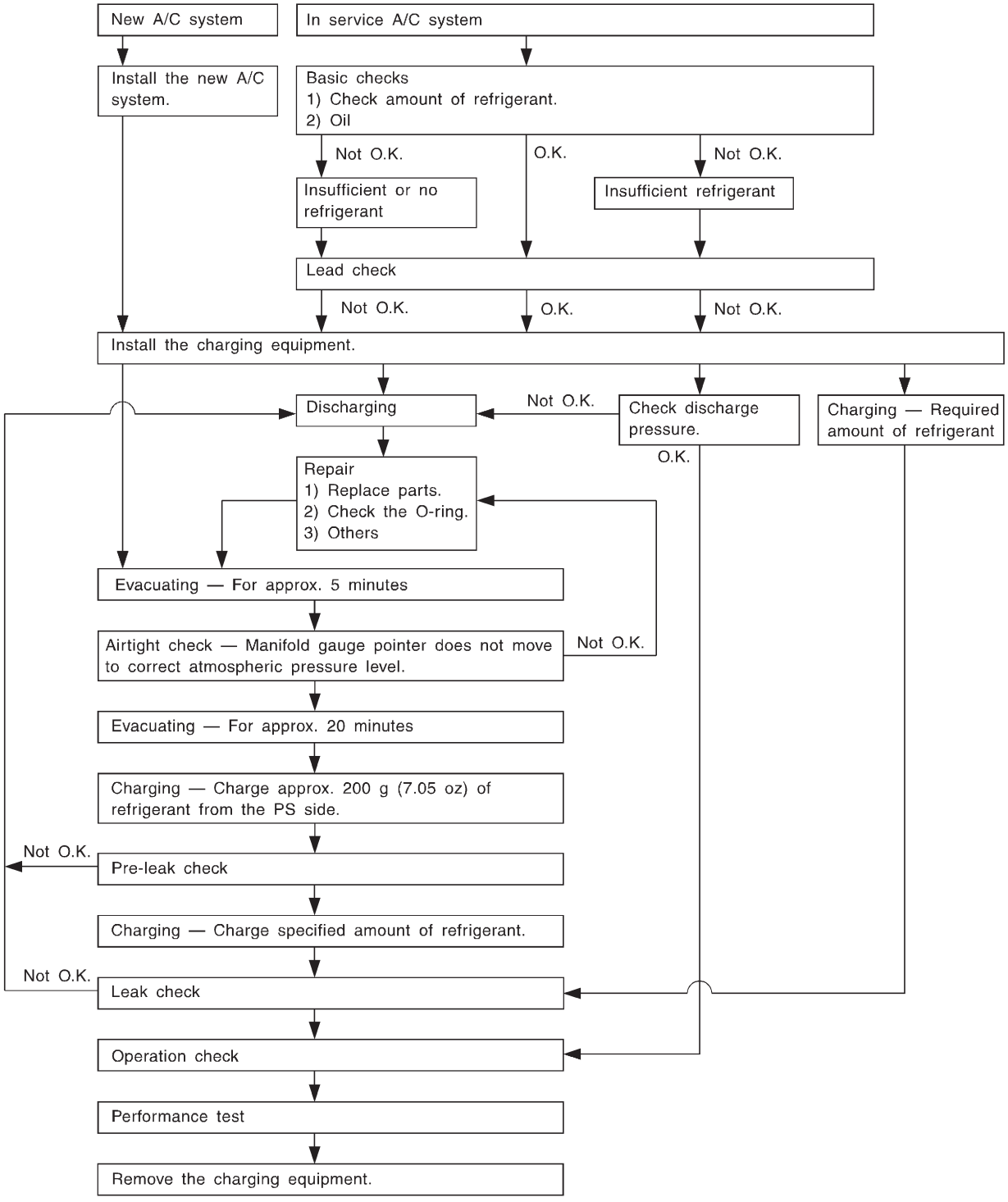
Using a back-up wrench in conjunction with a calibrated torque wrench, torque the connection to the midrange of the specification.
After completion of torquing, use a clean shop towel to remove any excess oil from the connection or any oil that may have dripped on the vehicle body or other parts.

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



H4M1261A

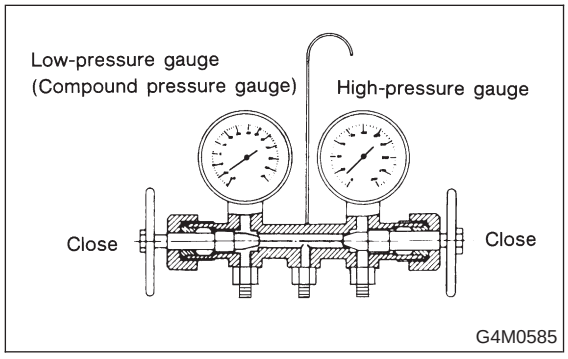
6. Discharge the System

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.**

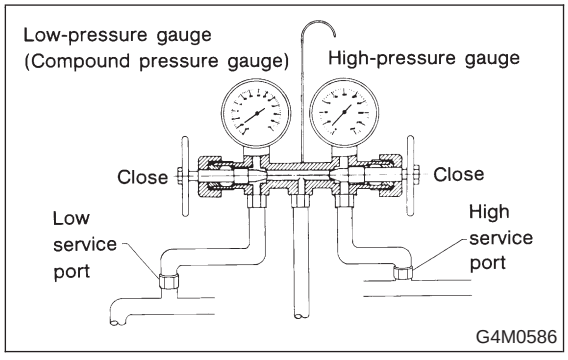
NOTE:
Refer to that refrigerant recovery system instruction manual for operating procedures.

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.

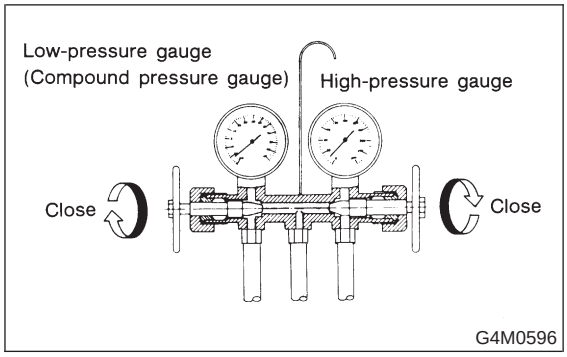
7. Evacuating and Charging

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.

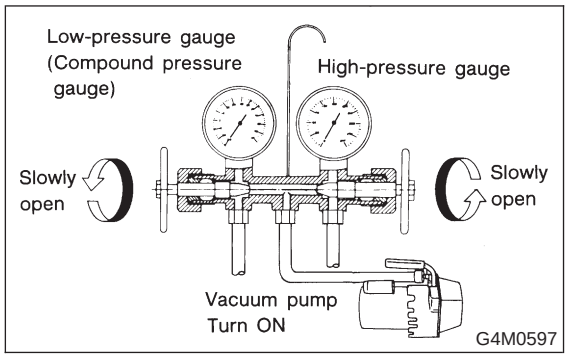
A: CONNECT THE GAUGE SET

1) Close the high- and low-pressure manifold valves



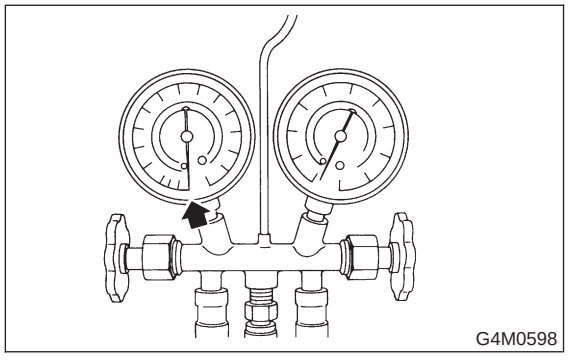
2) Attach the low-pressure manifold hose to the low-pressure service port on the vehicle. Check the low-pressure gauge. If more than 68.6 kPa (0.70 kg/cm^2, 10 psi) is indicated, discharge the system prior to charging.
3) Attach the high-pressure manifold hose to the high- pressure service port on the 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.



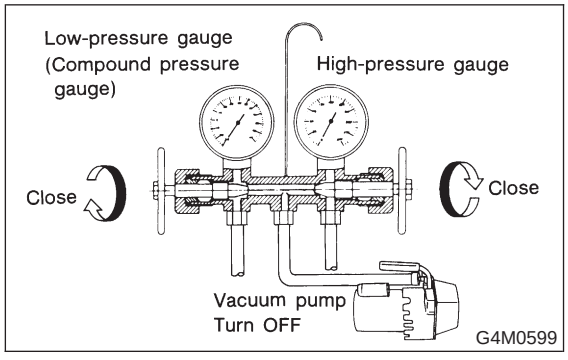
7) When the low-pressure gauge reaches approximately 66.43 kPa (498.3 mmHg, 19.62 inHg), slowly open the high- pressure manifold valve.
8) Maintain a minimum vacuum level of 100.56 kPa (754.4 mmHg, 29.70 inHg) for a minimum of 15 minutes on a new system or 30 minutes for an in-service system.

NOTE:
The gauge will read 4 kPa (25 mmHg, 1 inHg) less for every 304.8 m (1,000 ft) above sea level.



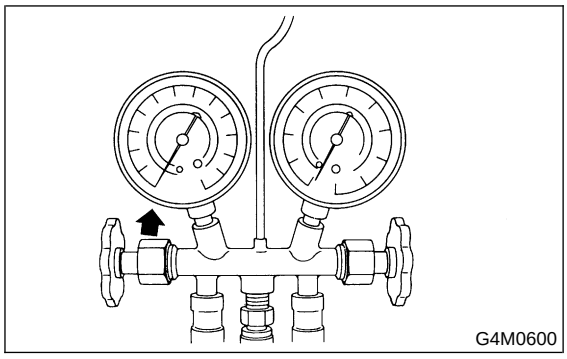
B: PERFORM A VACUUM LEAK TEST

1) After 15 minutes (or more) of evacuation, close the high-pressure manifold valve.
2) Close the low-pressure manifold valve.

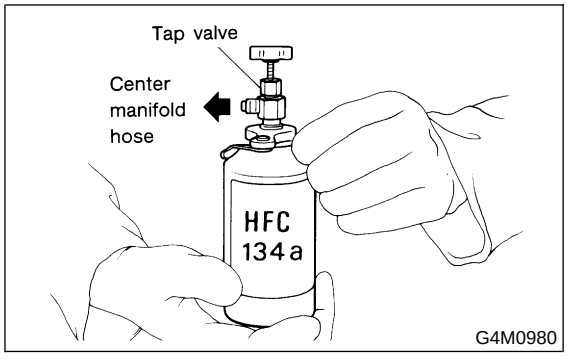


3) Turn off the vacuum pump.

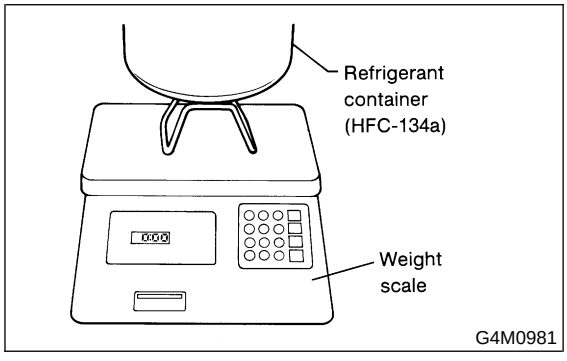
4) Note the low side gauge reading.



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.



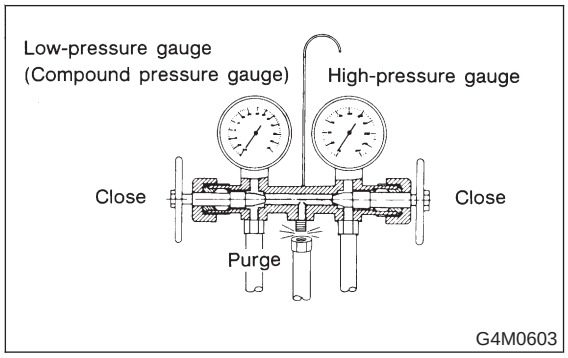
7) Disconnect the center manifold hose from the vacuum pump and connect the hose to the tap valve.
8) If a 13.6 kg (30 lb) container of refrigerant is used a weight scale will be needed. This scale is to determine the amount of refrigerant that is used. Connect the center hose from the manifold to the valve. Place the 13.6 kg (30 lb) container on the scale, valve end down.



C: PURGE THE CENTER HOSE

CAUTION:
Be certain that goggle and glove are worn.

1) Verify that all three hose connections are tight at the manifold gauge set.

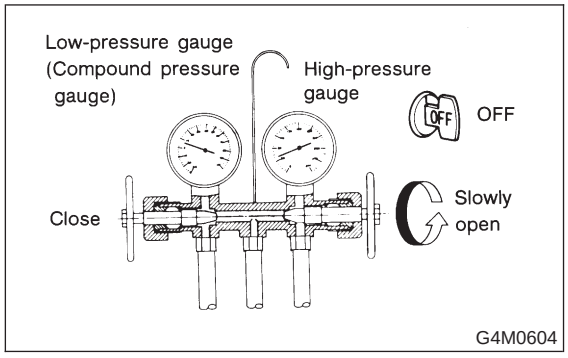


2) Open the valve on the HFC-134a source.
3) Loosen the center hose connection at the manifold and allow the HFC-134a to escape for no more than two or three seconds, then quickly retighten the hose fitting at the manifold.

D: INITIAL CHARGING THROUGH THE HIGH SIDE

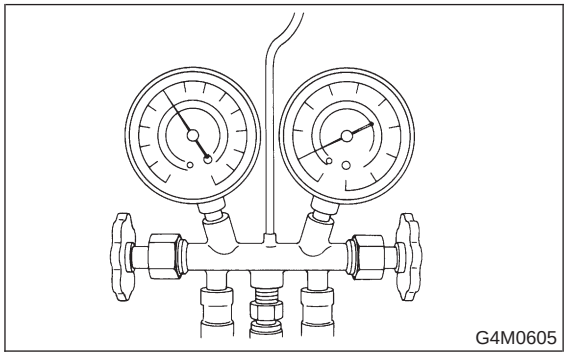
1) Connect a tachometer to the engine.
2) With the engine off, start charging by slowly opening the high-pressure manifold valve.

NOTE:
The initial charge rate can be increased by immersing the can in lukewarm [below 38°C (100°F)] water for a short time.



E: CHECK THE GAUGE READINGS

When both the high- and low-pressure gauge readings are about equal, or the HFC-134a source is empty, or the system has been filled to specifications, close the high- pressure manifold valve.

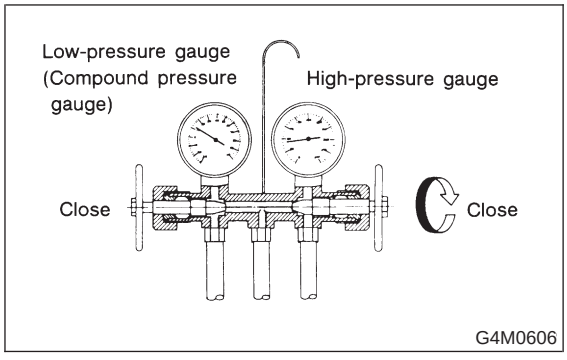


F: ADD ADDITIONAL CANS

If the HFC-134a source is exhausted, first close the high- pressure manifold valve, second, close the can tap valve, then slowly purge the refrigerant from the service hose by loosening the fitting at the can tap.

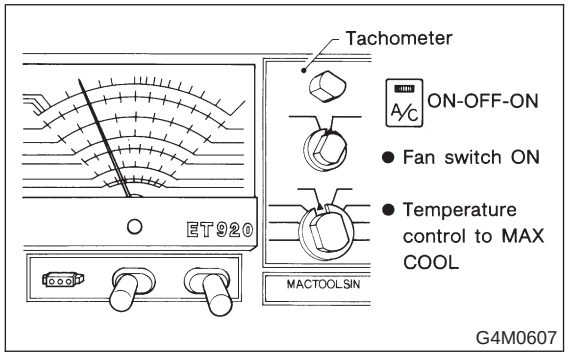
G: COMPLETE CHARGING THROUGH THE LOW SIDE

1) Verify that the high-pressure manifold valve is closed (should have already been closed).
2) Verify that the low-pressure manifold valve is closed (should have already been closed).



3) With the A/C switch off and the windows rolled down, start the engine and run at idle rpm.
4) Set the A/C controls on maximum cool and set the blower speed on the highest setting.

5) Quickly turn the A/C switch on-off-on-off a few times to prevent initial compressor damage due to “load shock.” Finish this operation with the A/C switch in the ON position.

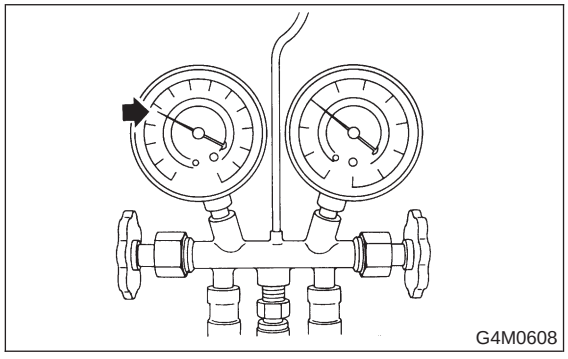


6) Raise engine rpm to approximately 1,500 rpm.

H: CHARGE THE SYSTEM

1) With the refrigerant source connected and the service hose purged, slowly open the low-pressure manifold valve, while checking the low-pressure gauge reading.

CAUTION:
The refrigerant source must be positioned for vapor (valve up).



2) Keep the low side pressure below 276 kPa (2.81 kg/cm^2, 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

		Unit: kg (lb)
Refrigerant	Minimum	Maximum
HFC-134a	0.55 (1.21)	0.65 (1.43)

I: COMPLETE ALL SYSTEM CHECKS

1) Evaluate the system performance. <Ref. to 4-7 [K200].>
2) Perform leak detection test. <Ref. to 4-7 [W8A0].>

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.

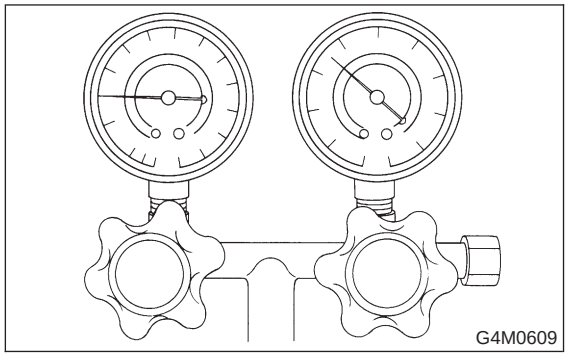
8. Leak Testing

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/cm^2, 100 psi). If not, evacuate and charge the system before leak checking. <Ref. to 4-7 [W700].>


G4M0609

2. CLEAN CONNECTIONS BEFORE TESTING

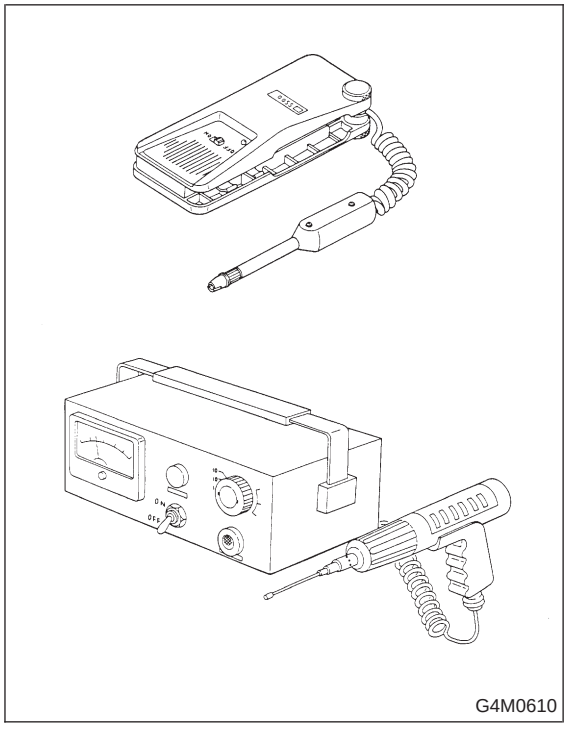
Before testing, use a clean shop towel to wipe off refrigerant oil, dirt, or foreign material from all of the connections and components to be tested.

NOTE:
Since refrigerant oil absorbs refrigerant, excess oil on or near a connection may falsely signal a leak.

3. CALIBRATE LEAK DETECTOR

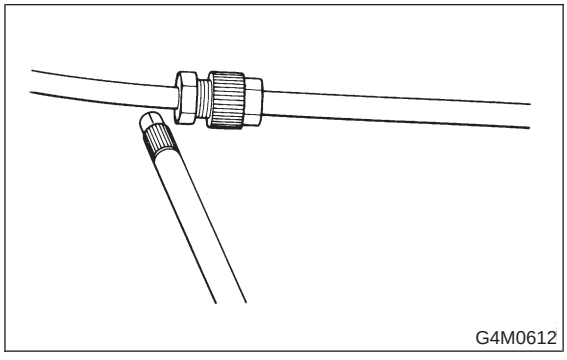
Refer to the manufacturer's instructions for the particular type of detector used and calibrate the instrument.

CAUTION:
Always make sure that the probe tip filter is clean and free of contamination.

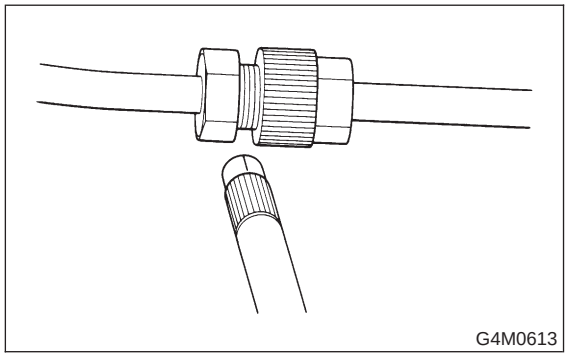

G4M0610

4. LEAK TEST — HIGH-PRESSURE SIDE

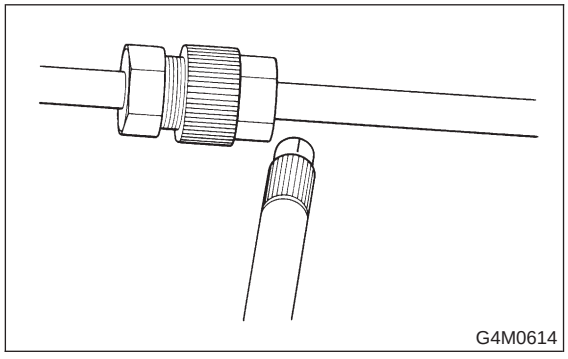
Operate the A/C system for approx. 10 minutes, then turn the engine off and begin the leak test.
1) Begin at the connection of the high-pressure tube to the evaporator, and work your way along the high- pressure side of the system to the compressor. There are three places to check each tube connection.
2) Check the area.
- Check the area where the fitting meets the tube.


G4M0612

● Check the area where the two parts of the fitting join each other.


G4M0613

● Check the area where the nut meets the tube.


G4M0614

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.

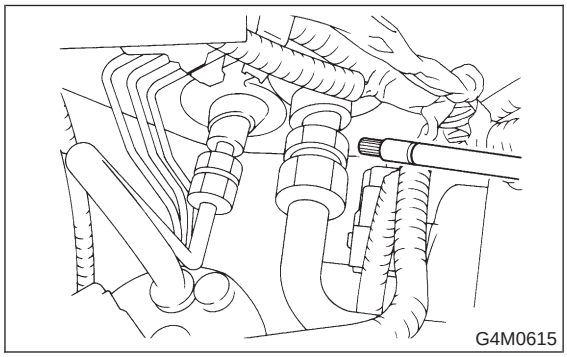
5) Check the area where the hoses attach to the compressor.
6) Check around the machined portions of the compressor (where the compressor sections join each other).
7) If equipped, check the thermal limiter on the compressor housing.
8) Check the compressor shaft seal by probing near the center of the compressor clutch pulley.

NOTE:
Some shaft seals have a very slight amount of normal leakage [approximately 28 g (1.0 oz) per year].

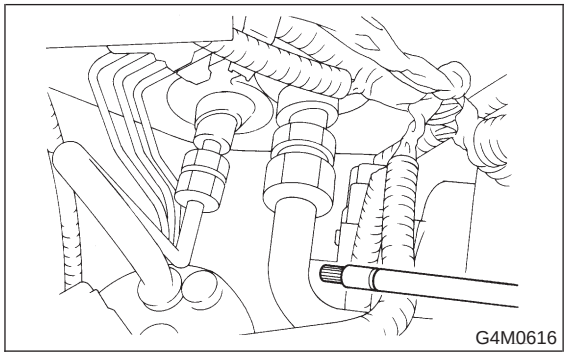
5. LEAK TEST — LOW-PRESSURE SIDE

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.


G4M0615

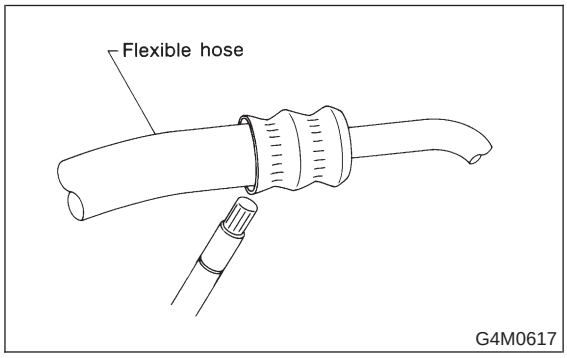
(2) Check the area where the two parts of the fitting join each other.
(3) Check the area where the nut joins the tube.


G4M0616

6. CHECK THE FLEXIBLE HOSES

Visually inspect the rubber portions of the flexible hoses for cracking. Probe the rubber section, including the ends of any insulators or protectors which may cover sections of the rubber hose, and near the ends where the rubber meets the metal collar.

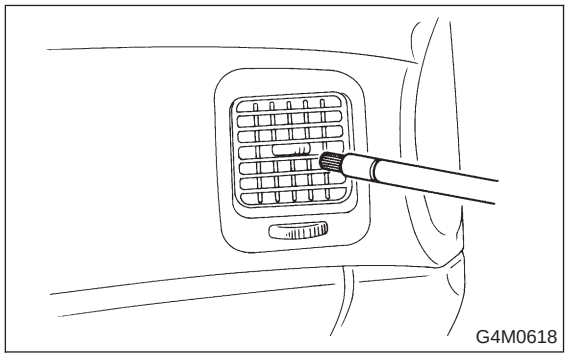
NOTE:
Be certain to move the probe slowly [approximately 25 mm (1 in) per second] when probing along any length of hose or tube.



G4M0617

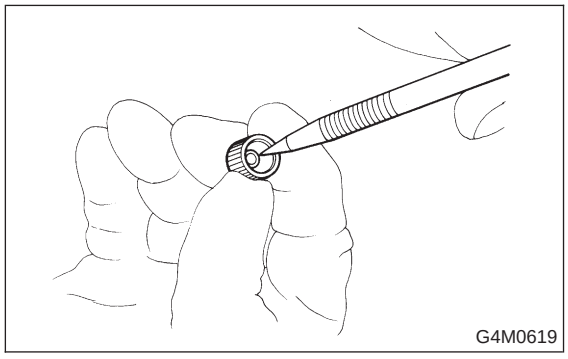
7. CHECK THE EVAPORATOR ASSEMBLY

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, an 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/cm^2, 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/cm^2, 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.

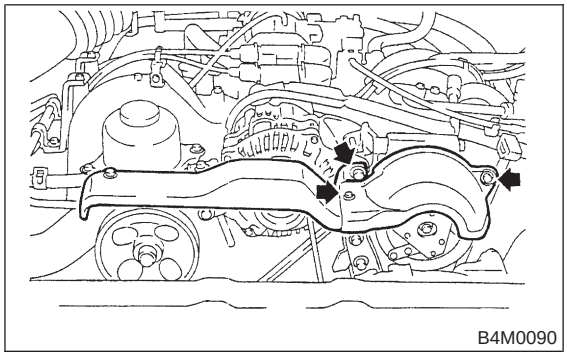
11. Compressor

A: INSPECTION

1. COMPRESSOR CLUTCH

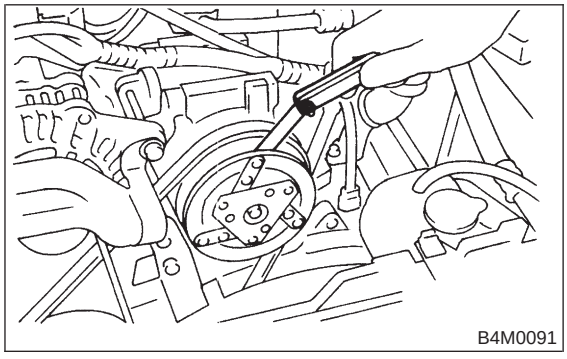
NOTE:
- Compressor is a 5-vane rotary type. When trouble occurs, replace compressor as a single unit.
- Compressor clutch trouble is often caused by clutch slippage and noise. Check and take corrective measures, as required.

1) Remove belt cover.


B4M0090

2) Check that clearance between drive plate and pulley over the entire perimeter is within specifications.

Clearance:
0.45±0.15 mm (0.0177±0.0059 in)


B4M0091

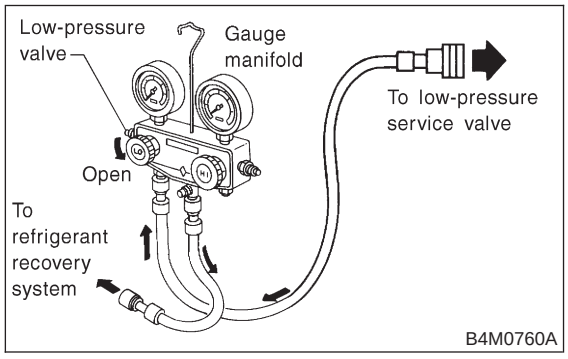
3) Check that voltage applied to magnetic coil is at least 10.5 volts.
4) When noise is noted, check that it originates in either compressor or pulley bearing.

B: REMOVAL

1) Disconnect ground cable from battery.

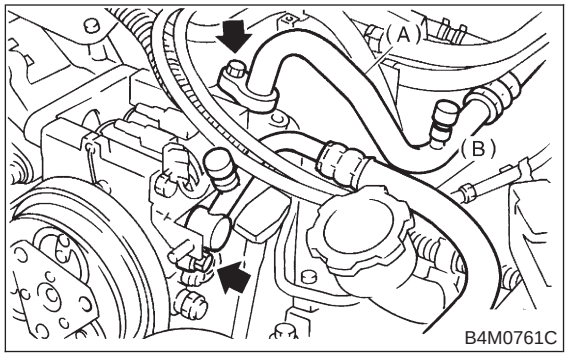
2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
(1) Fully close low-pressure valve of manifold gauge.
(2) Connect low-pressure charging hose of manifold gauge to low-pressure service valve.
(3) Open low-pressure manifold gauge valve slightly, and slowly discharge refrigerant from system.

CAUTION:
Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.

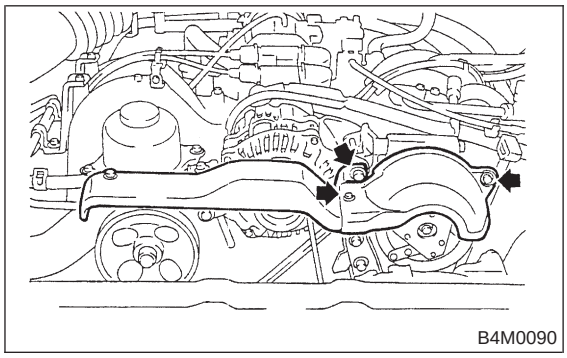


3) Remove low-pressure hose (A) (Flexible hose Ps) and high-pressure hose (B) (Flexible hose Pd).

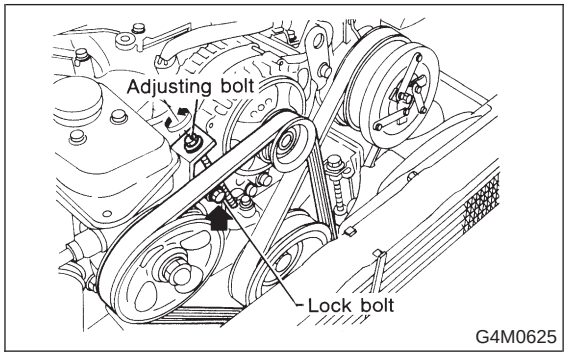
CAUTION:
● Be careful not to lose O-ring of low-pressure hose.
● Plug the opening to prevent foreign matter from entering.



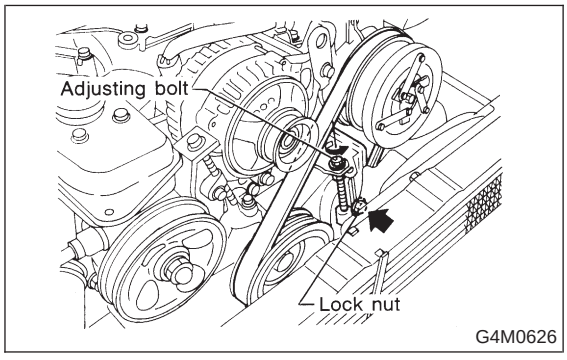
4) Compressor belt cover and generator belt cover:
Remove bolts which secure belt covers.



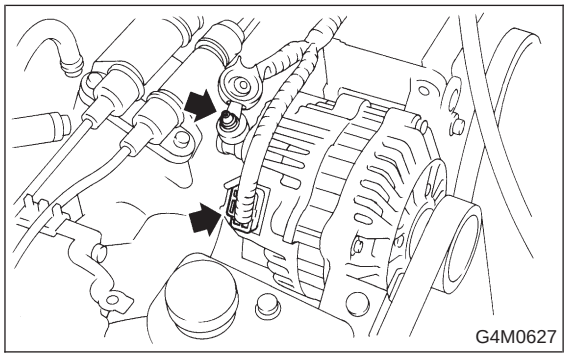
5) Remove alternator V-belt:
(1) Loosen lock bolt on generator bracket.
(2) Turn adjusting bolt and remove V-belt.



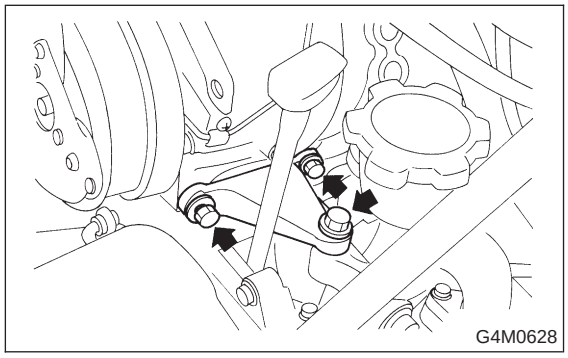
6) Remove compressor V-belt:
(1) Loosen lock bolt on idler pulley.
(2) Turn adjusting bolt and remove V-belt.



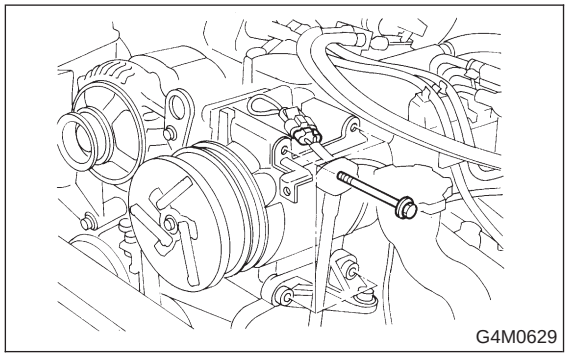
7) Disconnect alternator harness.



8) Disconnect compressor harness:
Disconnect compressor harness from body harness.
9) Remove lower bracket:
Remove bolts which secure lower compressor bracket.

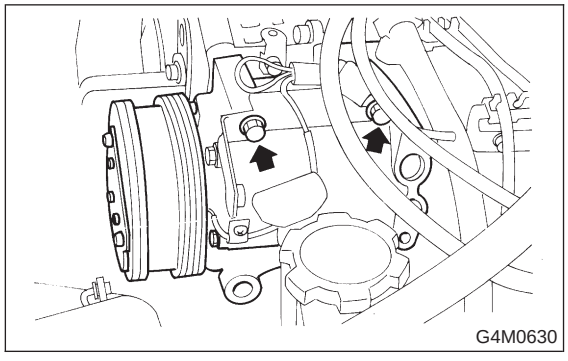

G4M0628

10) Remove compressor:
(1) Remove bolts which secure compressor.
(2) Remove compressor from bracket.

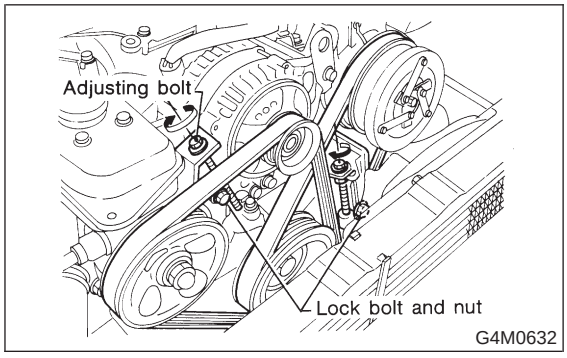

G4M0629

C: INSTALLATION

1) Install compressor:
Install compressor on bracket.


G4M0630

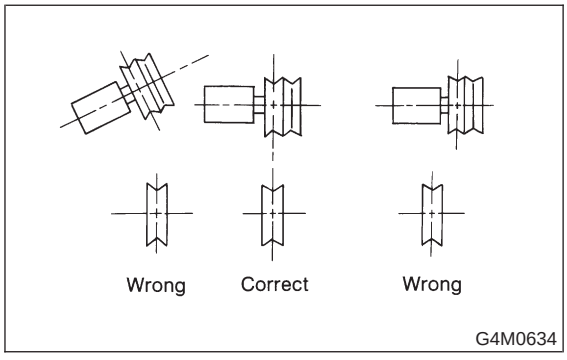
2) Connect compressor harness.
3) Connect alternator harness.
4) Install compressor V-belt (Rear):
After adjusting belt tension, tighten tension pulley lock bolt securely.
5) Install alternator V-belt:
After adjusting V-belt tension, tighten generator bracket lock bolt securely.



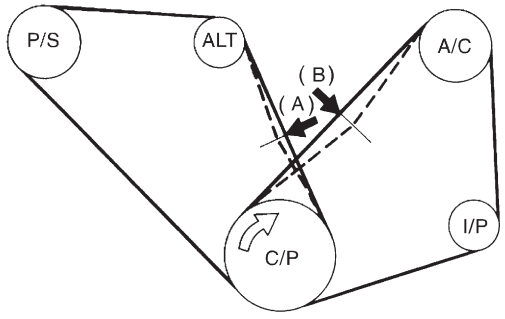
G4M0632

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.**



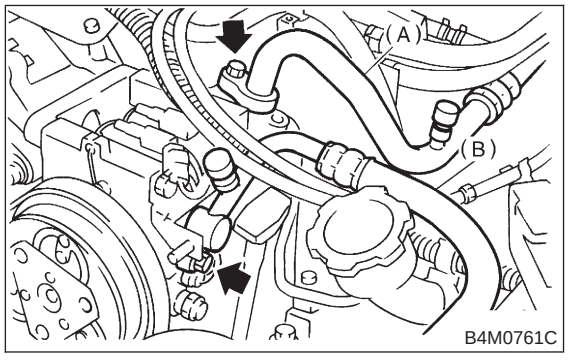
G4M0634

Pulley arrangement	Tension mm (in)/98N (10 kg, 22 lb)	
	(A)	(B)
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	*New belt: 7.0 – 9.0 (0.276 – 0.354) Existing belt: 9.0 – 11.0 (0.354 – 0.433)	*New belt: 7.5 – 8.5 (0.295 – 0.335) Existing belt: 9.0 – 10.0 (0.354 – 0.394)
	*When replacing belts with new ones, adjust tensions to specification and then readjust to the same specification after running engine for 5 minutes.	

B4M1098A

7) Install high-pressure hose (B) (Flexible hose Pd) and low-pressure hose (A) (Flexible hose Ps): Connect high-pressure hose (B) and low-pressure hose (A) with compressor.

CAUTION:
Be sure to apply compressor oil to the periphery of O-ring.



B4M0761C

8) Install belt cover.

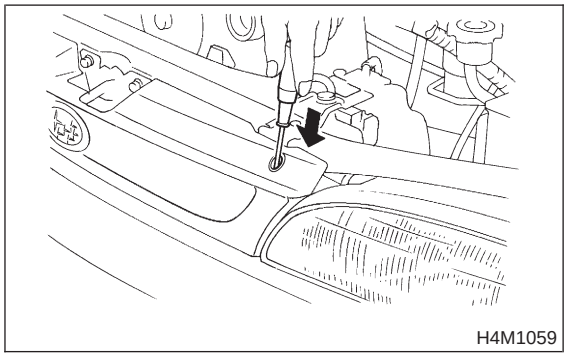
CAUTION:
- **After installing belt cover, make sure it is not misaligned or twisted.**
- **After installing belt cover, check the clearance between pulley and belt cover.**

9) Connect ground cable to negative terminal of battery.
10) Charging refrigerant. <Ref. to 4-7 [W700].>

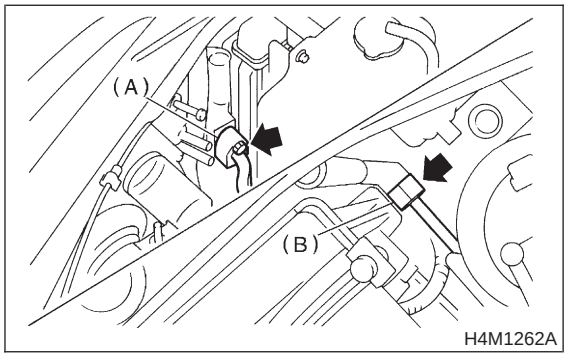
12. Condenser

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.

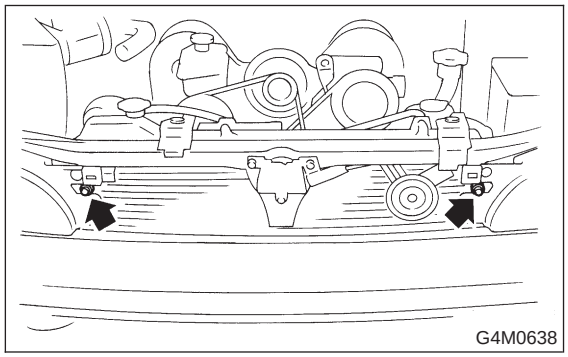

H4M1059

4) Remove the radiator bracket.
5) Disconnect high-pressure hose (A) and high-pressure pipe (B) from condenser.



H4M1262A

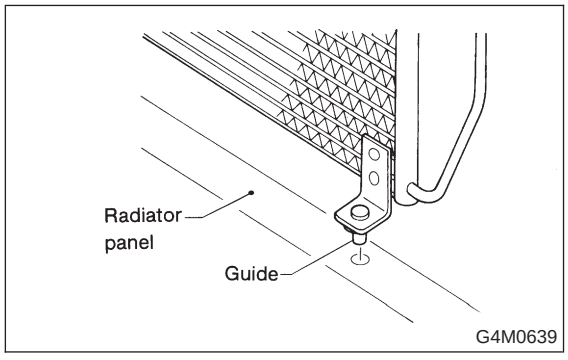
6) Remove the two bolts which secure condenser. While lifting condenser, remove it through space between radiator and radiator panel.



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.

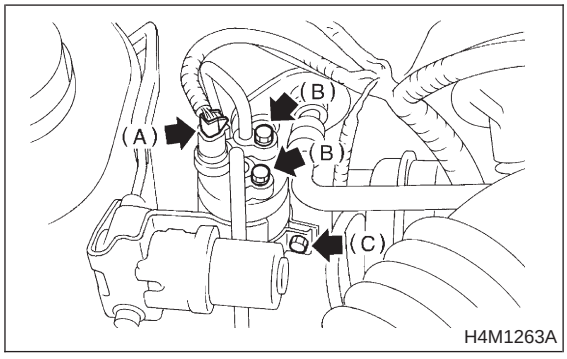
2) Check the condenser to see if it shows any sign of oil. If oil ooze or gas leak occur from the condenser, replace it with a new one.

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 connector (A).
4) Disconnect pipes (B).
5) Remove mounting bolt (C) and remove receiver drier.

CAUTION:
The receiver drier contains a desiccant. Be sure to put a blind plug in the detached receiver drier to protect it from moisture.

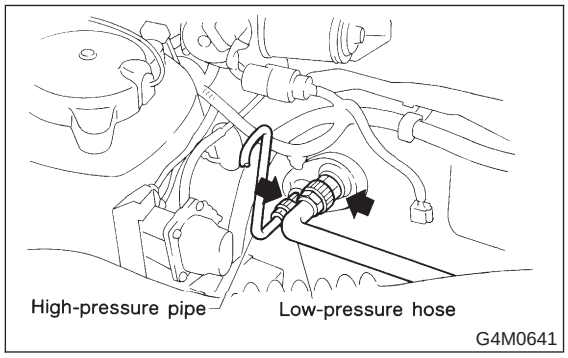


6) Install the receiver drier in the reverse order of removal.
7) Charge refrigerant. <Ref. to 4-7 [W700].>

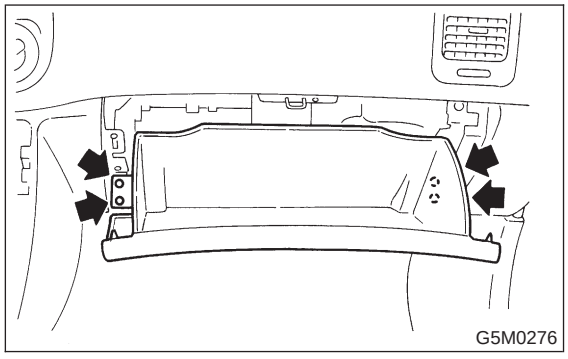
14. Intake Unit with Evaporator

A: REMOVAL AND INSTALLATION

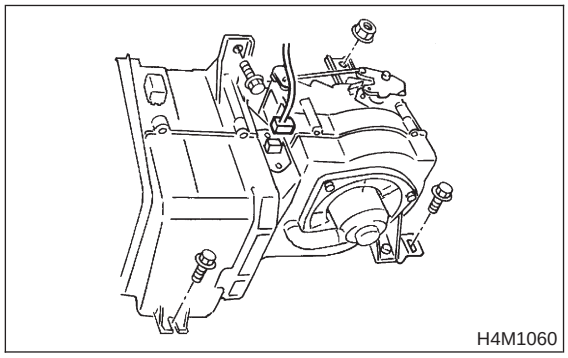
1) Disconnect battery negative terminal.
2) Discharge refrigerant using refrigerant recovery system. <Ref. to 4-7 [W600].>
3) Disconnect discharge pipe, suction pipe and grommets.



4) Remove glove box.



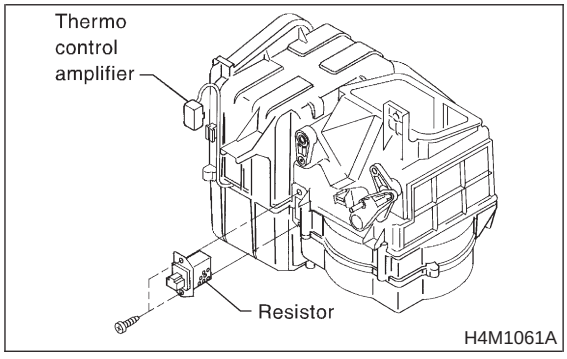
5) Disconnect the harness connector from evaporator.
6) Disconnect drain hose.
7) Remove intake unit mounting bolt and nut.



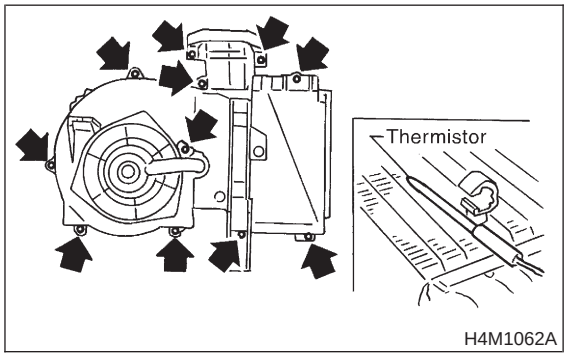
8) Install the intake unit in the reverse order of removal.
9) Charge refrigerant. <Ref. to 4-7 [W700].>

B: DISASSEMBLY AND ASSEMBLY

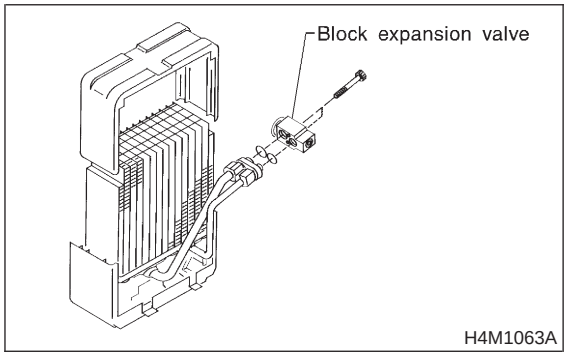
1) Remove resistor assembly and remove thermo control amplifier from intake unit case.



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.



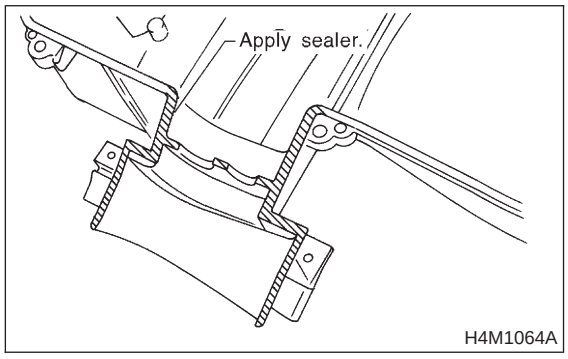
5) Check to see if the evaporator fins are clogged. If they are, clean them with compressed air.

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



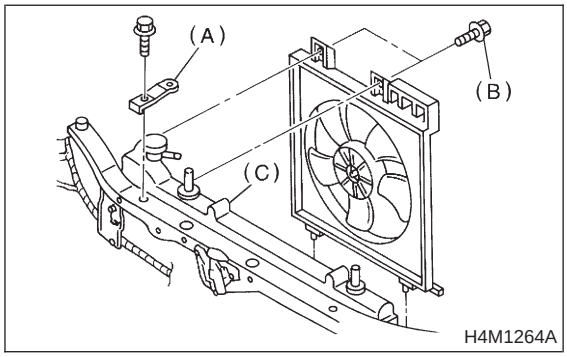
8) Reassemble the intake unit in the reverse order of disassembly.

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) (A) and remove condenser fan bolt (B) from radiator (C).



4) Pull condenser fan assembly.
5) Install the condenser fan assembly in the reverse order of removal.

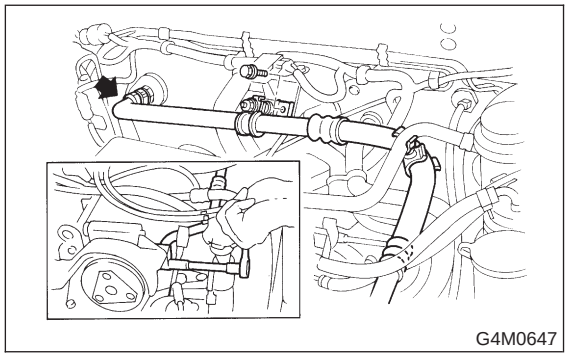
16. Flexible Hose

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.

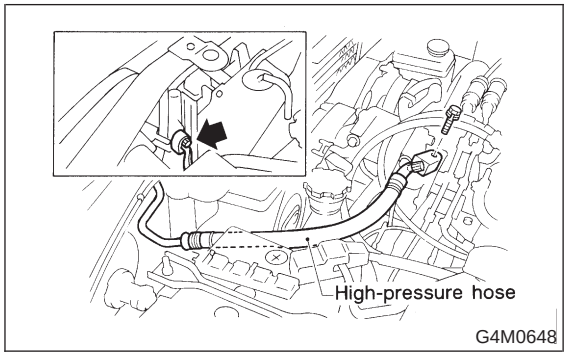
(3) Disconnect the connector at evaporator unit.

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.



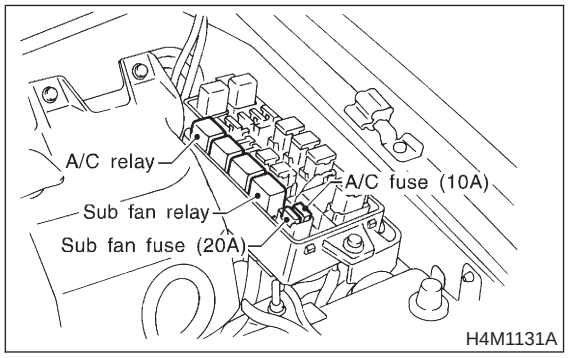
5) Installation is in the reverse order of removal.
6) Charge refrigerant. <Ref. to 4-7 [W700].>

17. Relay and Fuse

A: LOCATION

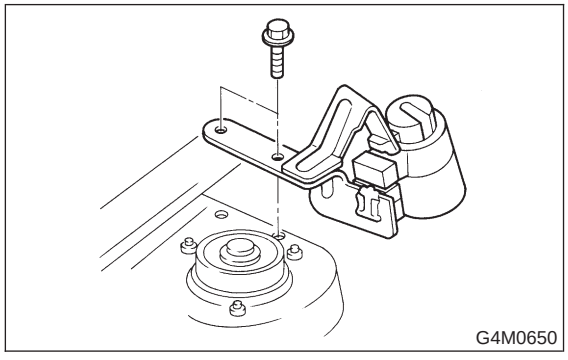
Relays used with A/C system are located as shown in figure.

- A/C relay
- Sub fan (condenser fan) relay
- Fuses (10 A and 20 A)



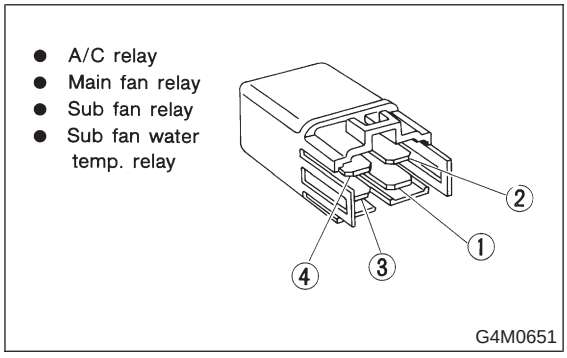
- A/C cut relay

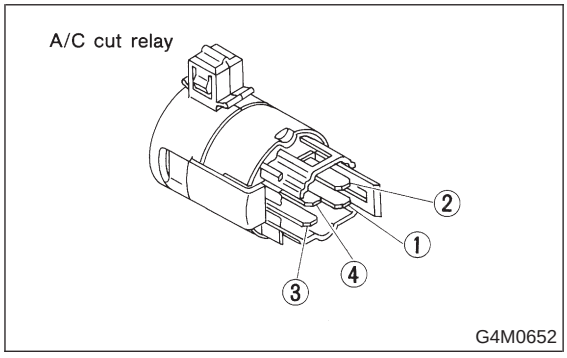
A/C cut relay is attached by a bolt to top of front suspension bracket (RH) via a bracket.



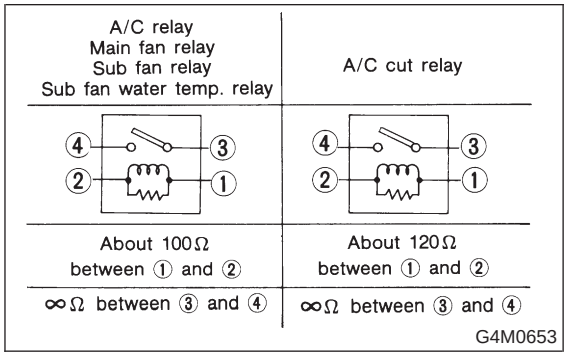
B: INSPECTION

1) Check conduction with a circuit tester (ohm range) according to the following table in figure.





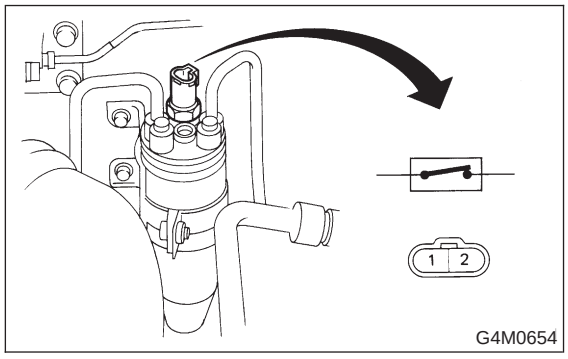
2) Replace relays which do not meet specifications.



18. Pressure Switch (Dual Switch)

A: INSPECTION

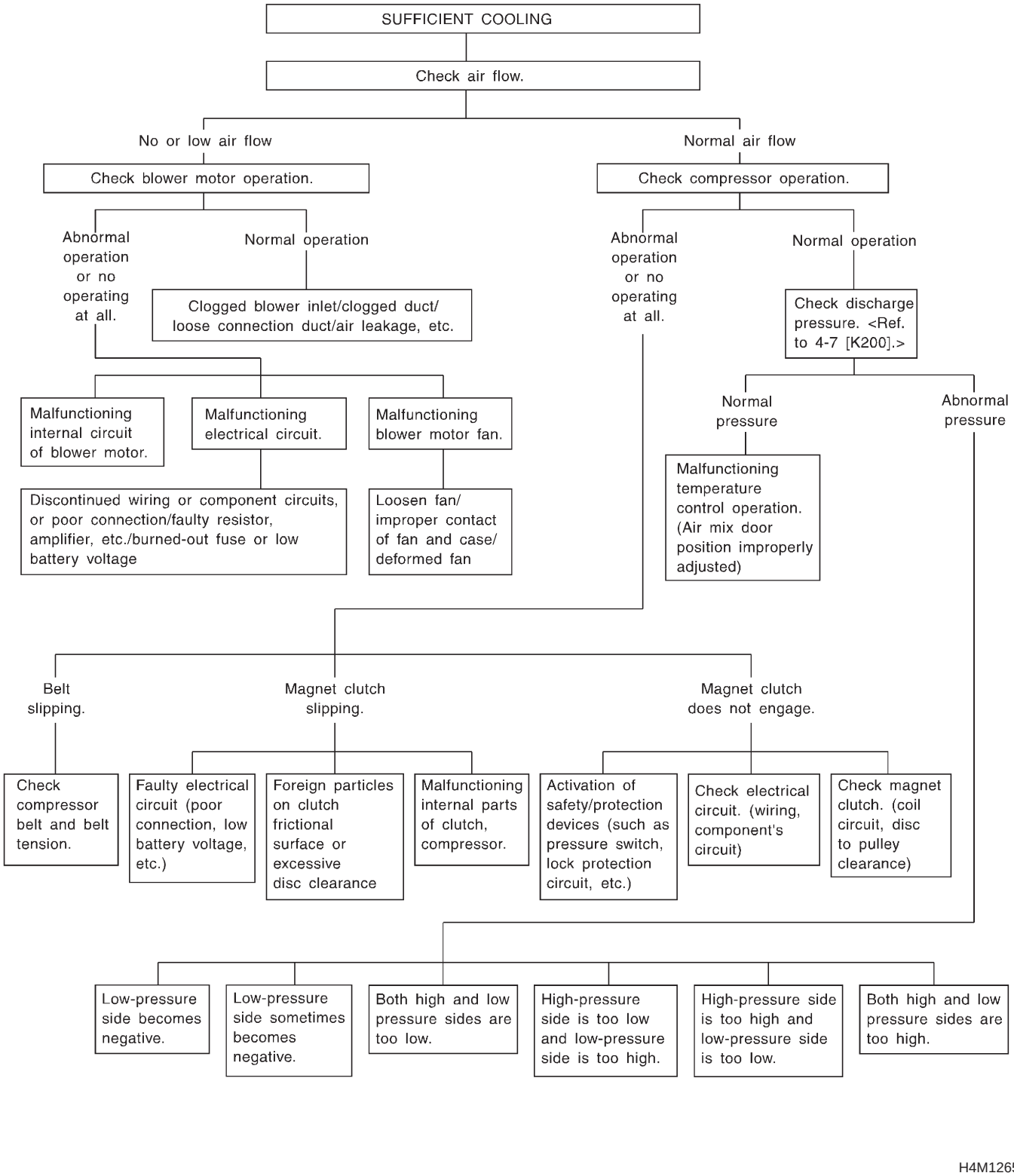
NOTE:
Pressure switch is attached to receiver dryer. It has two built-in switches.



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

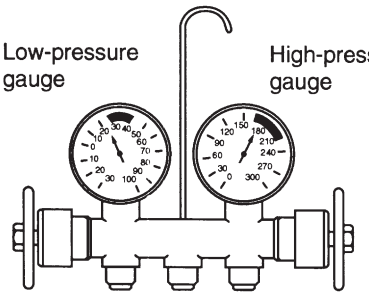
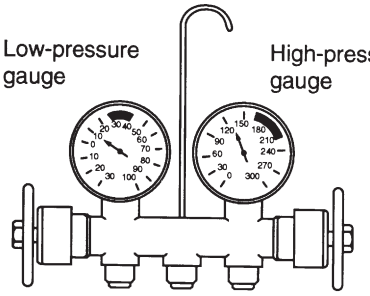
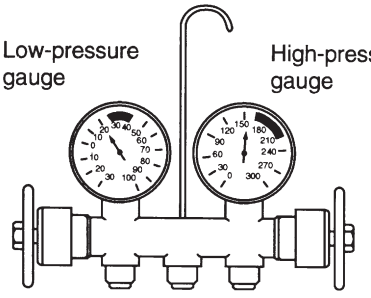


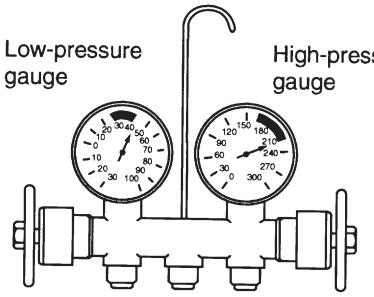
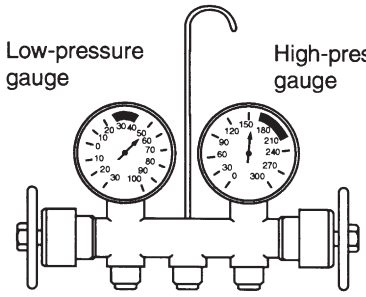
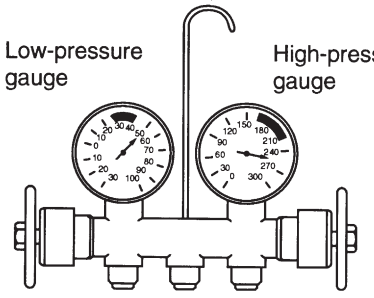
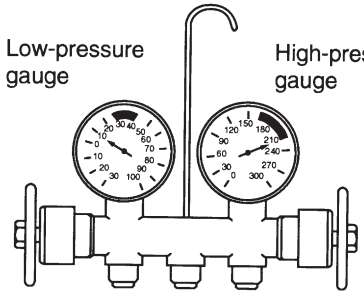
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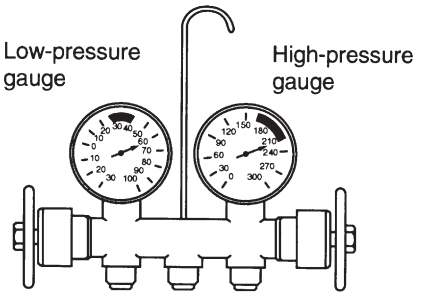
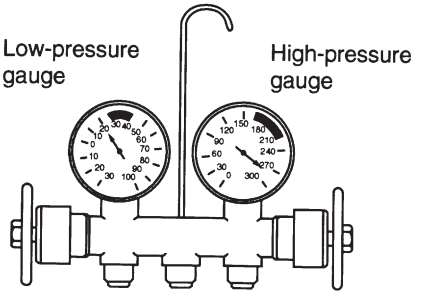
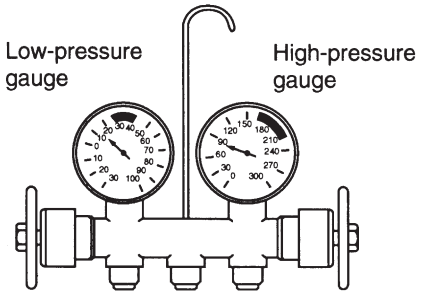
2. Performance Test Diagnosis

If various conditions caused to other air conditioning system, the characteristics revealed on manifold gauge reading are shown in the following.

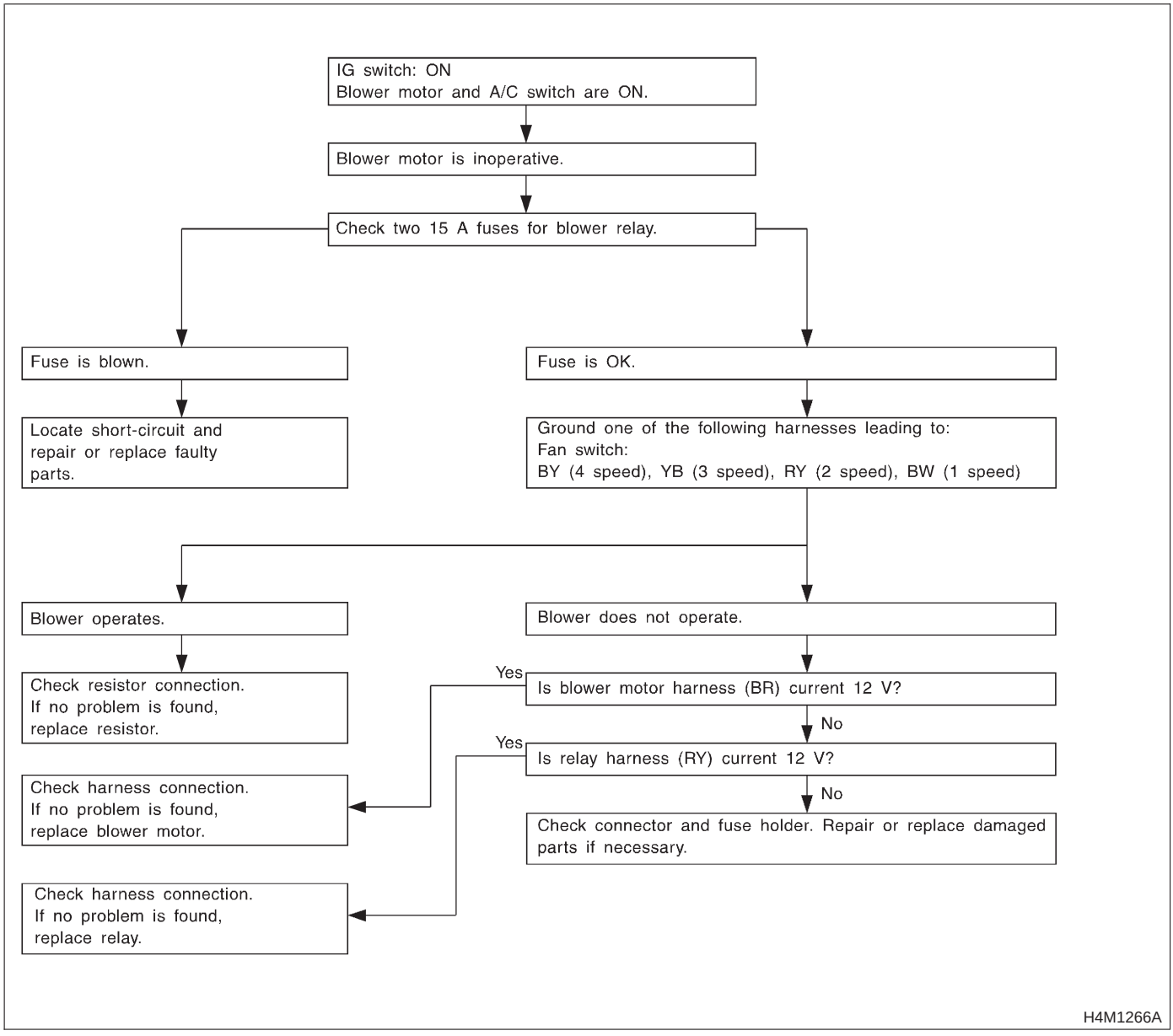
As to the method of a performance test, refer to the item of “Performance Test”.
Each shaded area on the following tables indicates a reading of the normal system when the temperature of outside air is 32.5°C (91°F).

Condition		Probable cause	Corrective action
INSUFFICIENT REFRIGERANT CHARGE  G4M0673	Insufficient cooling.	Refrigerant is small, or leaking a little.	1. Leak test. 2. Repair leak. 3. Charge system. Evacuate, as necessary, and recharge system.
ALMOST NO REFRIGERANT  G4M0674	No cooling action.	Serious refrigerant leak.	Stop compressor immediately. 1. Leak test. 2. Discharge system. 3. Repair leak(s). 4. Replace receiver drier if necessary. 5. Check oil level. 6. Evacuate and recharge system.
FAULTY EXPANSION VALVE  G4M0675	Slight cooling. Sweating or frosted expansion valve inlet.	Expansion valve restricts refrigerant flow. ● Expansion valve is clogged. ● Expansion valve is inoperative. ● Valve stuck closed. Thermal bulb has lost charge.	If valve inlet reveals sweat or frost: 1. Discharge system. 2. Remove valve and clean it. Replace it if necessary. 3. Evacuate system. 4. Charge system. If valve does not operate: 1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

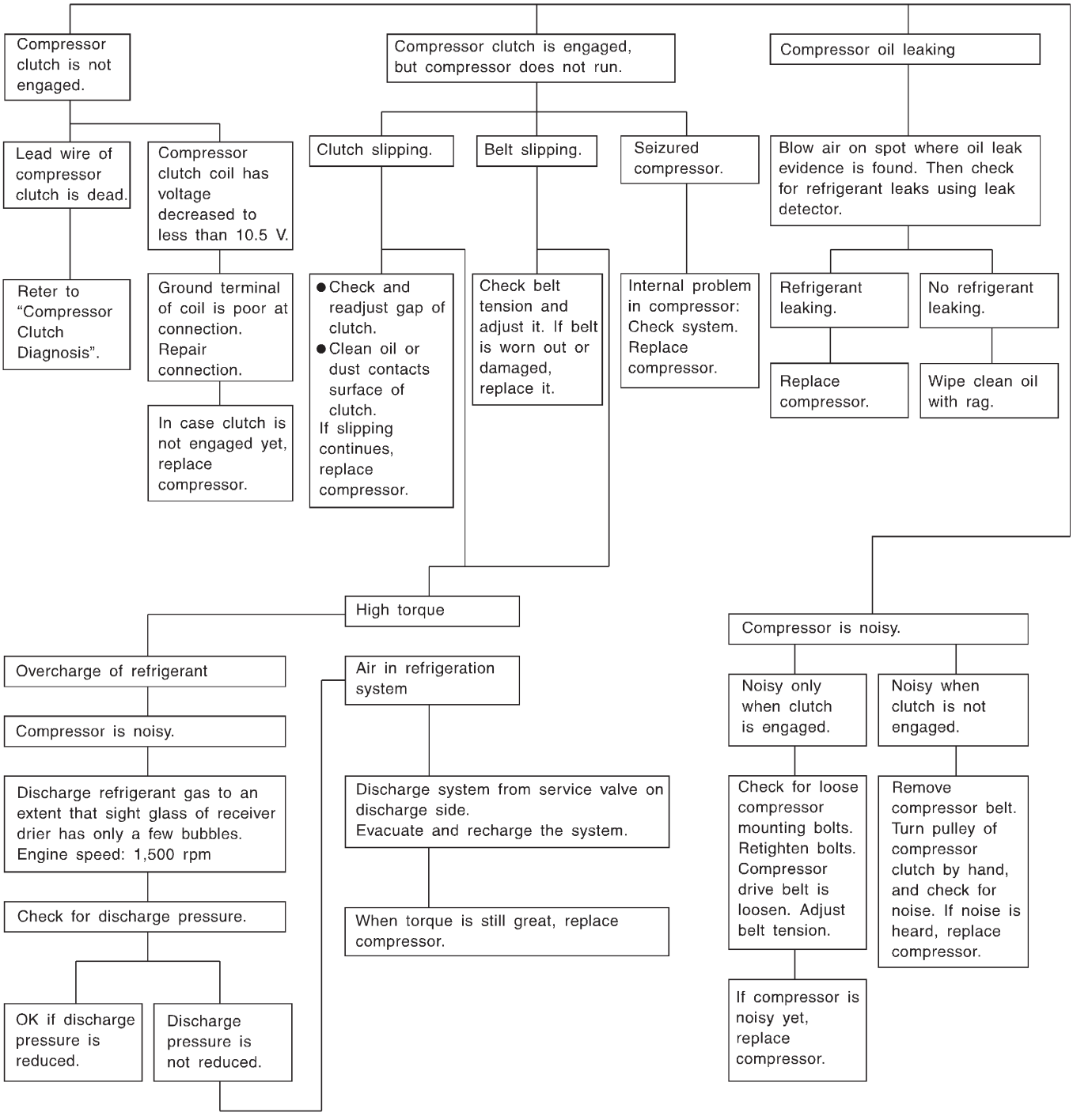
Condition		Probable cause	Corrective action
 G4M0676  G4M0677	Insufficient cooling. Sweated suction line. No cooling. Sweating or frosted suction line.	Expansion valve allows too much refrigerant through evaporator. Faulty seal of O-ring in expansion valve.	Check valve for operation. If suction side does not show a pressure decrease, replace valve. 1. Discharge system. 2. Remove expansion valve and replace O-ring. 3. Evacuate and replace system.
AIR IN SYSTEM  G4M0678	Insufficient cooling.	Air mixed with refrigerant in system.	1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.
MOISTURE IN SYSTEM  G4M0679	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/cm^2, 6 psi) vibration.	Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.	1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely (Repeat 30 minute evacuating three times.). 4. Recharge system.

Condition		Probable cause	Corrective action
FAULTY CONDENSER  G4M0680	No cooling action. Engine may overheat. Suction line is very hot.	Condenser is often found not functioning well.	● Check condenser cooling fan. ● Check condenser for dirt accumulation. ● Check engine cooling system for overheat. ● Check for refrigerant overcharge. If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.
HIGH-PRESSURE LINE BLOCKED  G4M0681	Insufficient cooling. Frosted high-pressure liquid line.	Drier clogged, or restriction in high-pressure line.	1. Discharge system. 2. Remove receiver drier or strainer and replace it. 3. Evacuate and charge system.
FAULTY COMPRESSOR  G4M0682	Insufficient cooling.	Internal problem in compressor, or damaged gasket and valve.	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

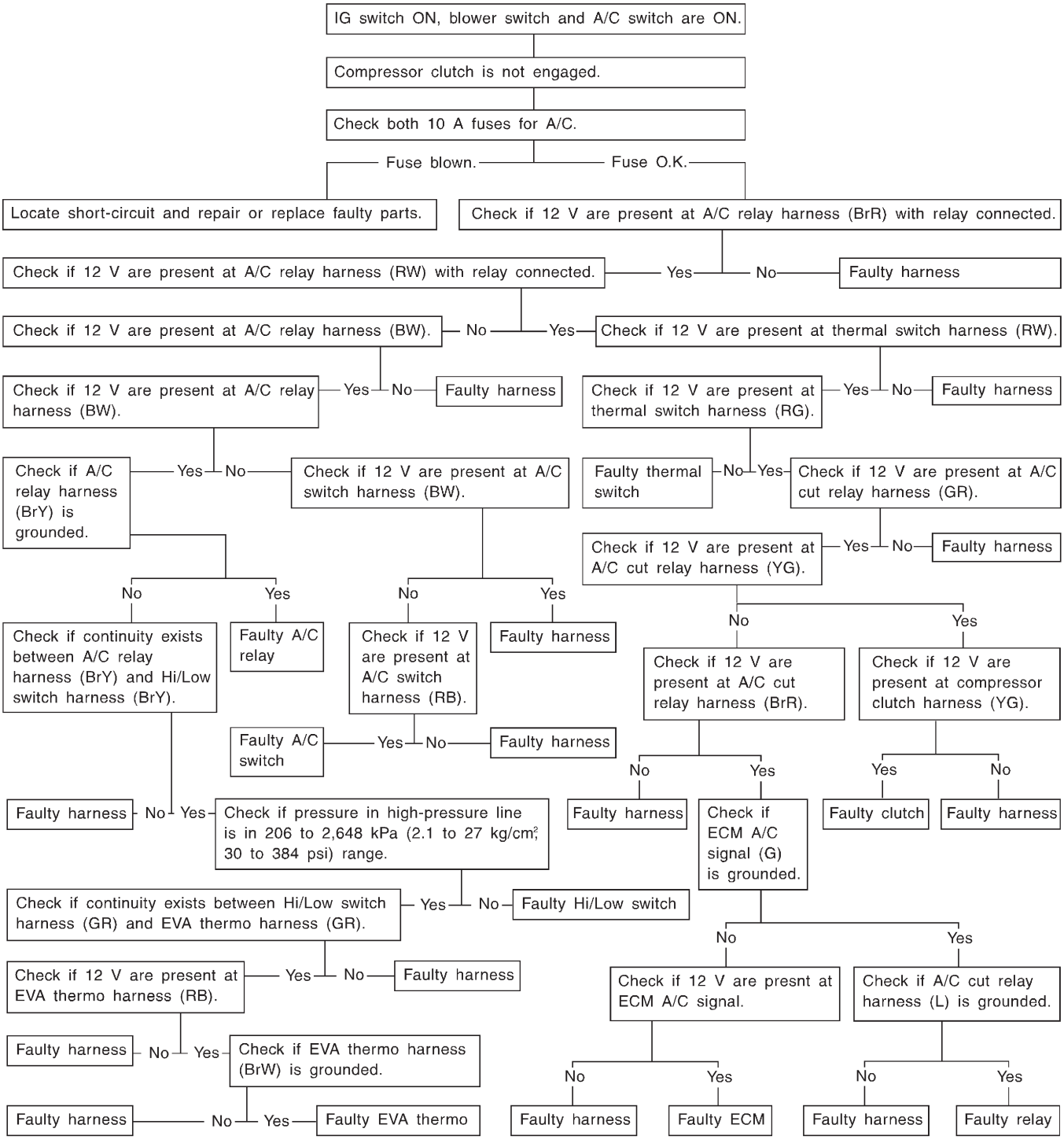


4. Compressor Diagnosis



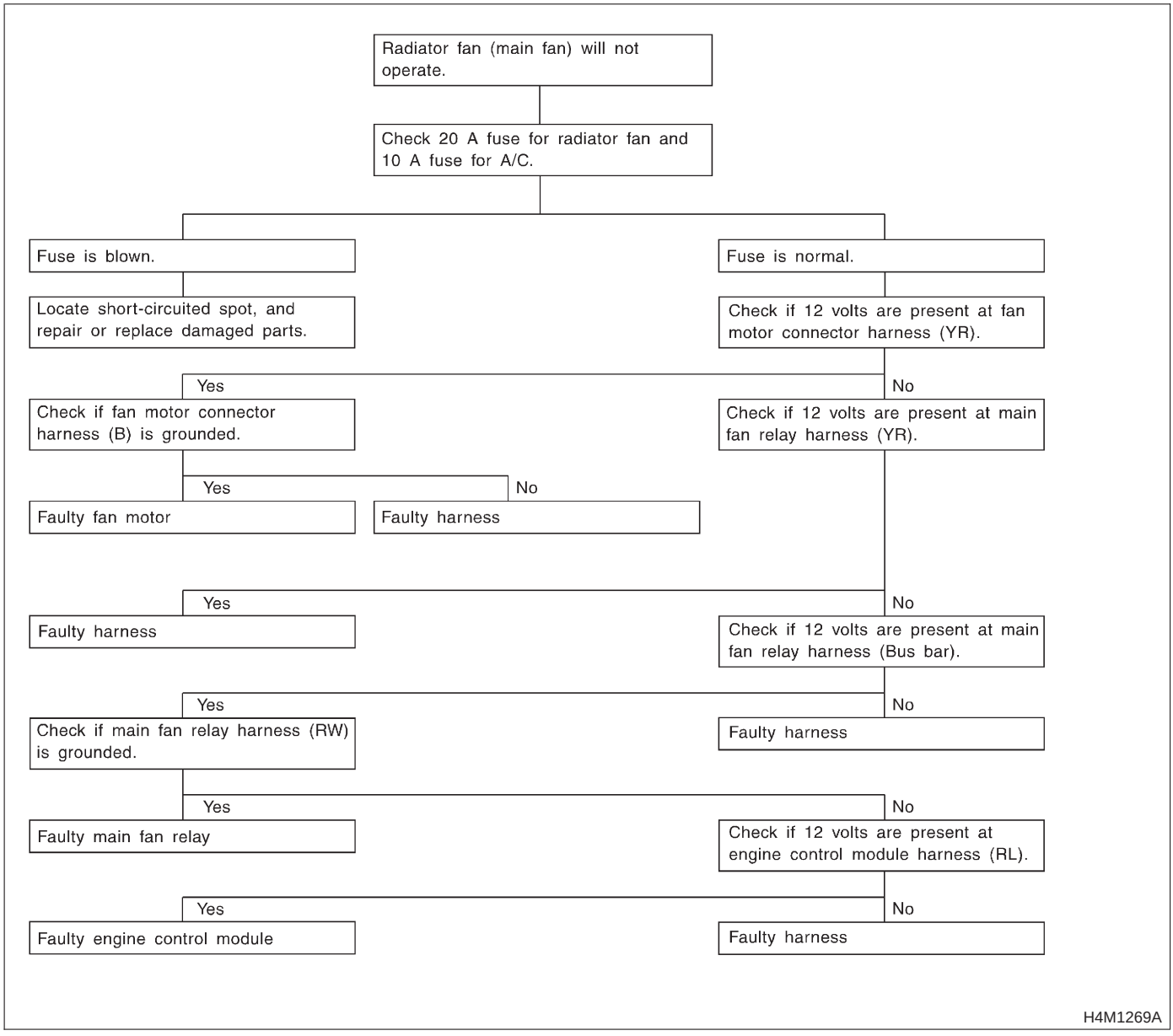
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5. Compressor Clutch Diagnosis

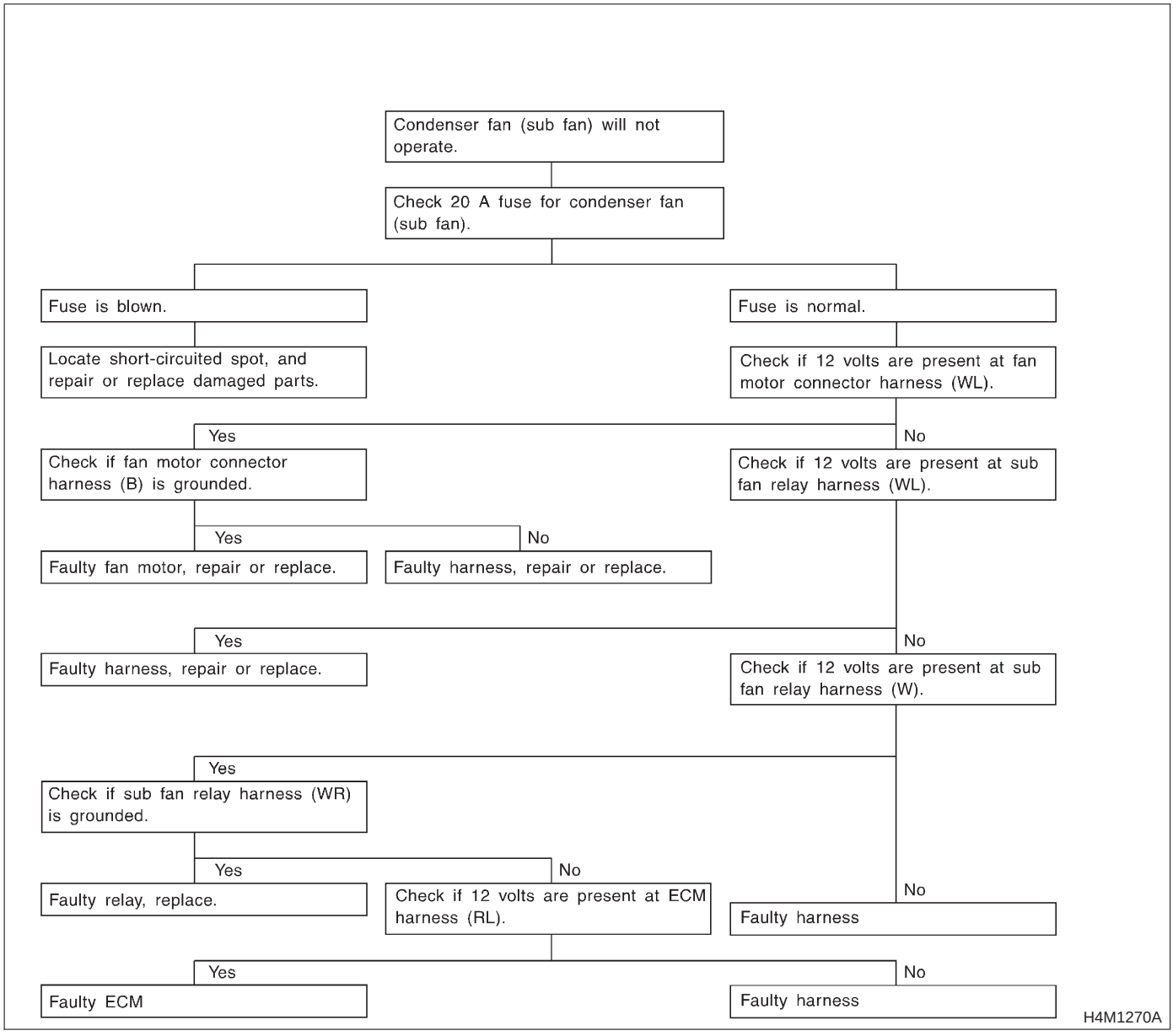


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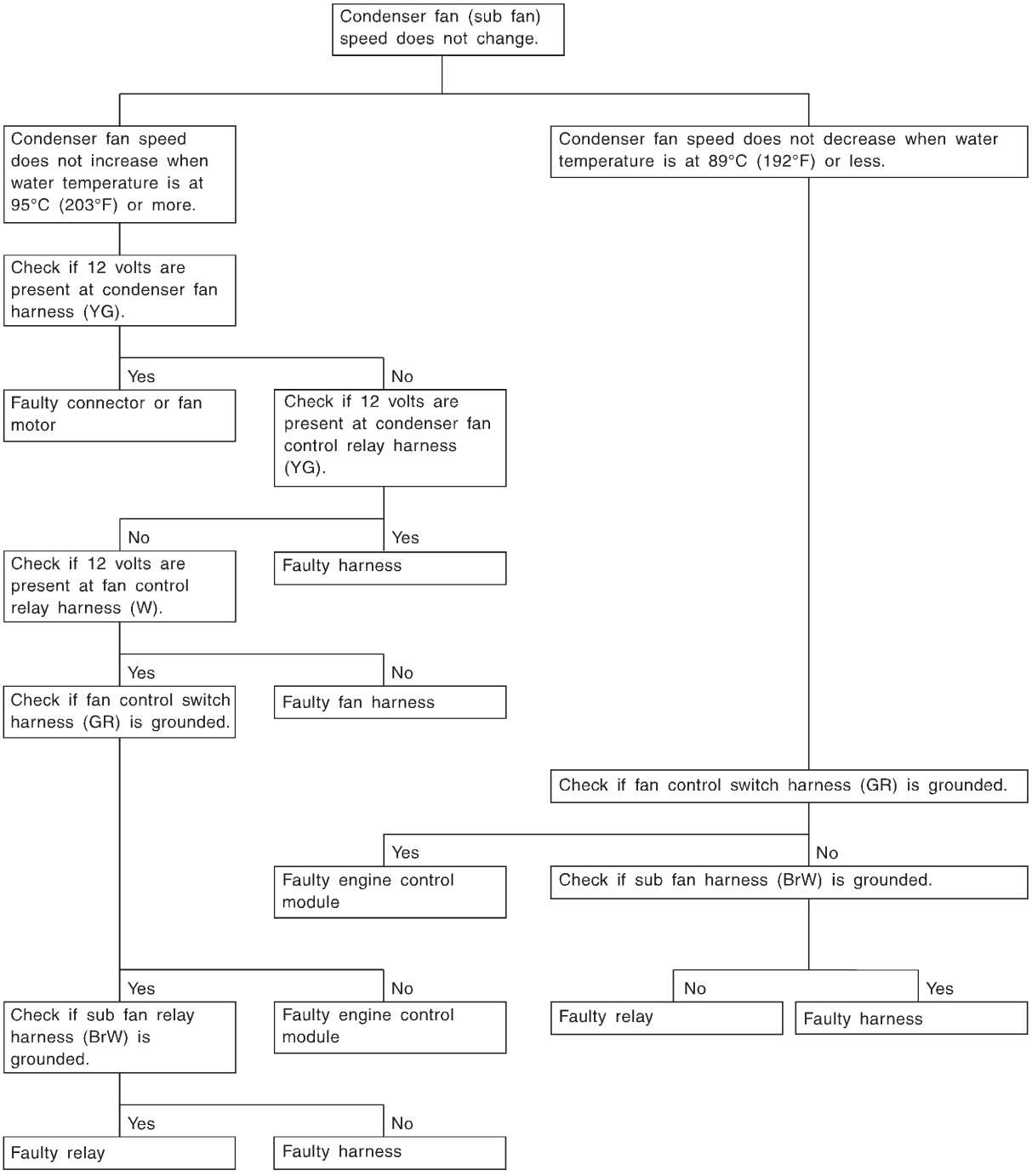
6. Radiator Fan (Main Fan) Diagnosis



7. Condenser Fan (Sub Fan) Diagnosis (I)



8. Condenser Fan (Sub Fan) Diagnosis (II)



H4M1271A

MANUAL TRANSMISSION AND DIFFERENTIAL 3-1

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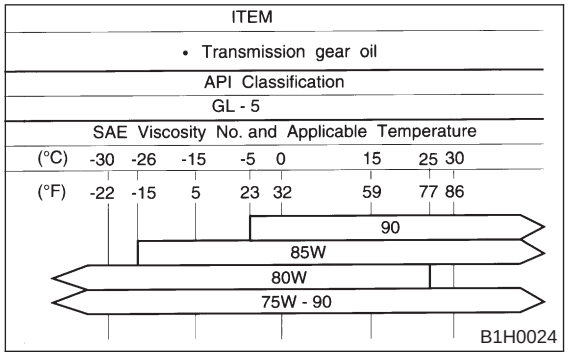
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1. Manual Transmission and Differential

Item			Model	
			AWD	
			2200 cc	2500 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	0.780	
		Reverse	3.416	
Front reduction gear	Final	Type of gear	Hypoid	
		Gear ratio	3.900	4.111
Rear reduction gear	Transfer	Type of gear	Helical	
		Gear ratio	1.000	
	Final	Type of gear	Hypoid	
		Gear ratio	3.900	4.111
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. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

Drive pinion shim adjustment
Hypoid gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

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)

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

4. Drive Pinion Assembly

Preload adjustment of thrust bearing
Starting torque
0.3 — 0.8 N·m
(0.03 — 0.08 kg-m, 0.2 — 0.6 ft-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

5. 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 × 26 × 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)	—	—

6. 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.
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)

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
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	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)

7. 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.

8. 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)

9. Extension Assembly

Thrust washer (52 × 61 × t) to ball bearing side clearance
0.05 — 0.30 mm (0.0020 — 0.0118 in)

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

10. Front Differential

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

Washer (38.1 × 50 × 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)

11. Center Differential

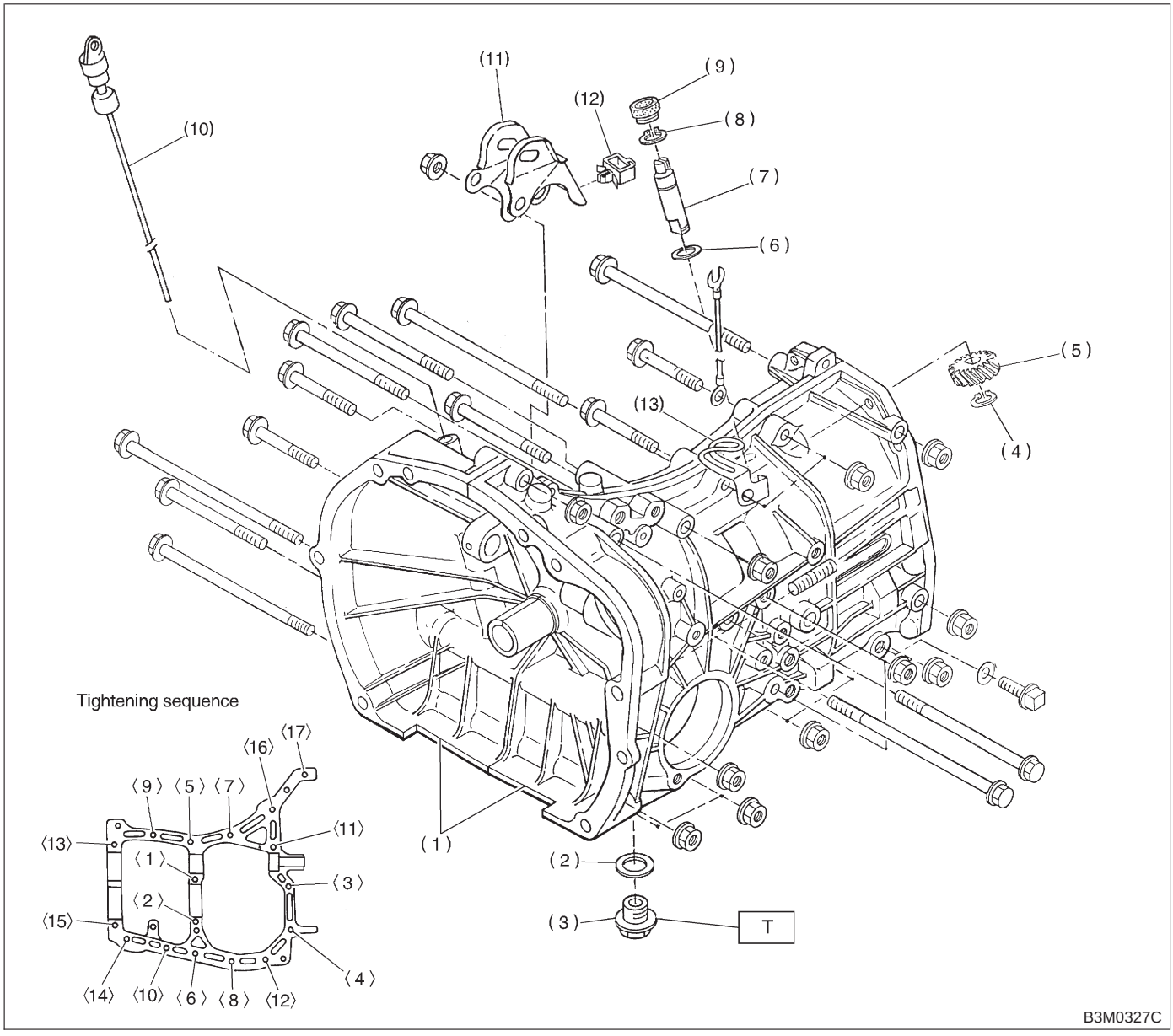
Snap ring (Inner-110) to center differential case clearance
0 — 0.15 mm (0 — 0.0059 in)

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 × 62 × 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



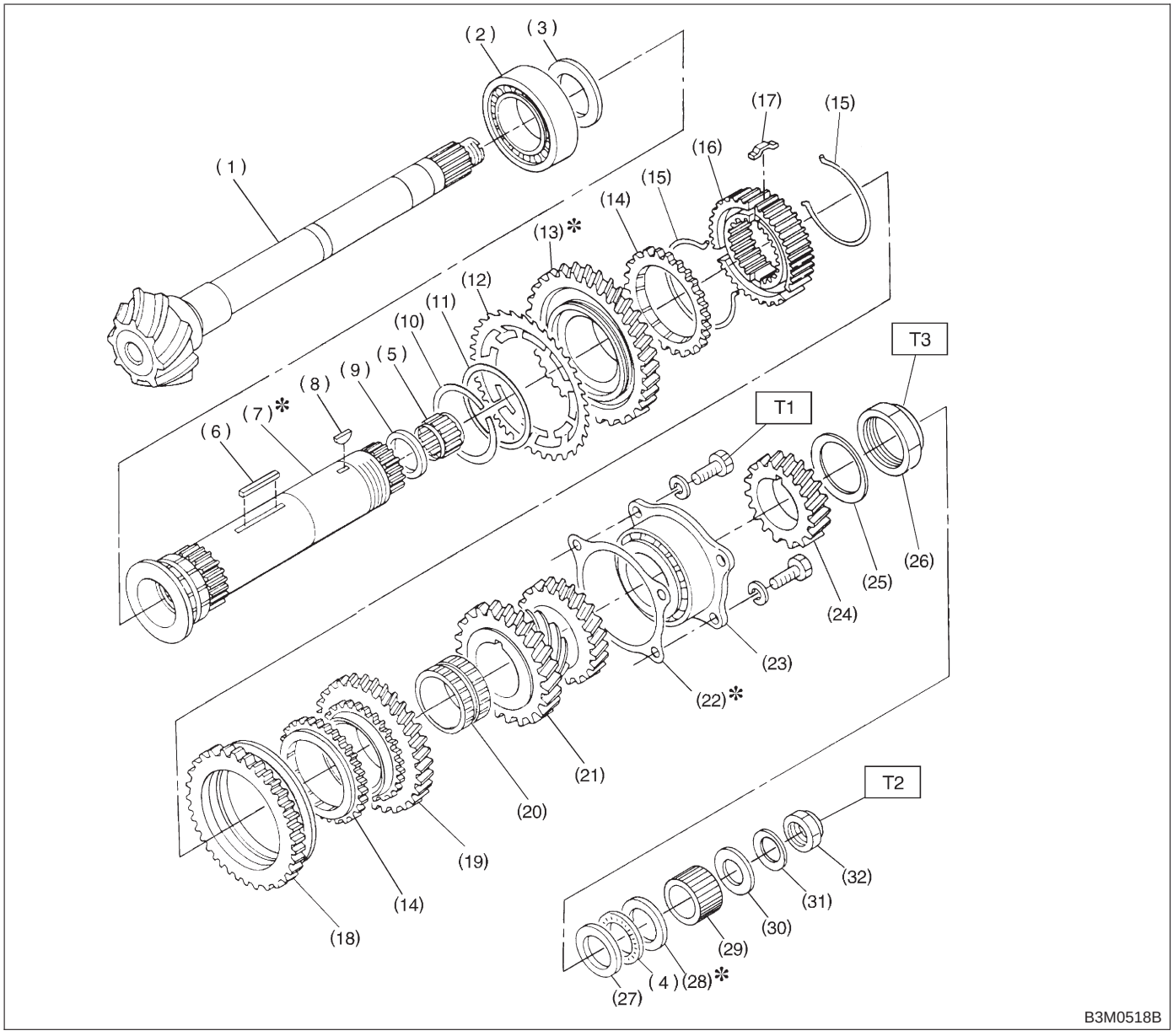
(1) Transmission case ASSY
(2) Gasket
(3) Drain plug
(4) Snap ring (Outer)
(5) Speedometer driven gear
(6) Washer
(7) Speedometer shaft
(8) Snap ring (Outer)
(9) Oil seal
(10) Oil level gauge
(11) Pitching stopper bracket
(12) Clamp
(13) Clip

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

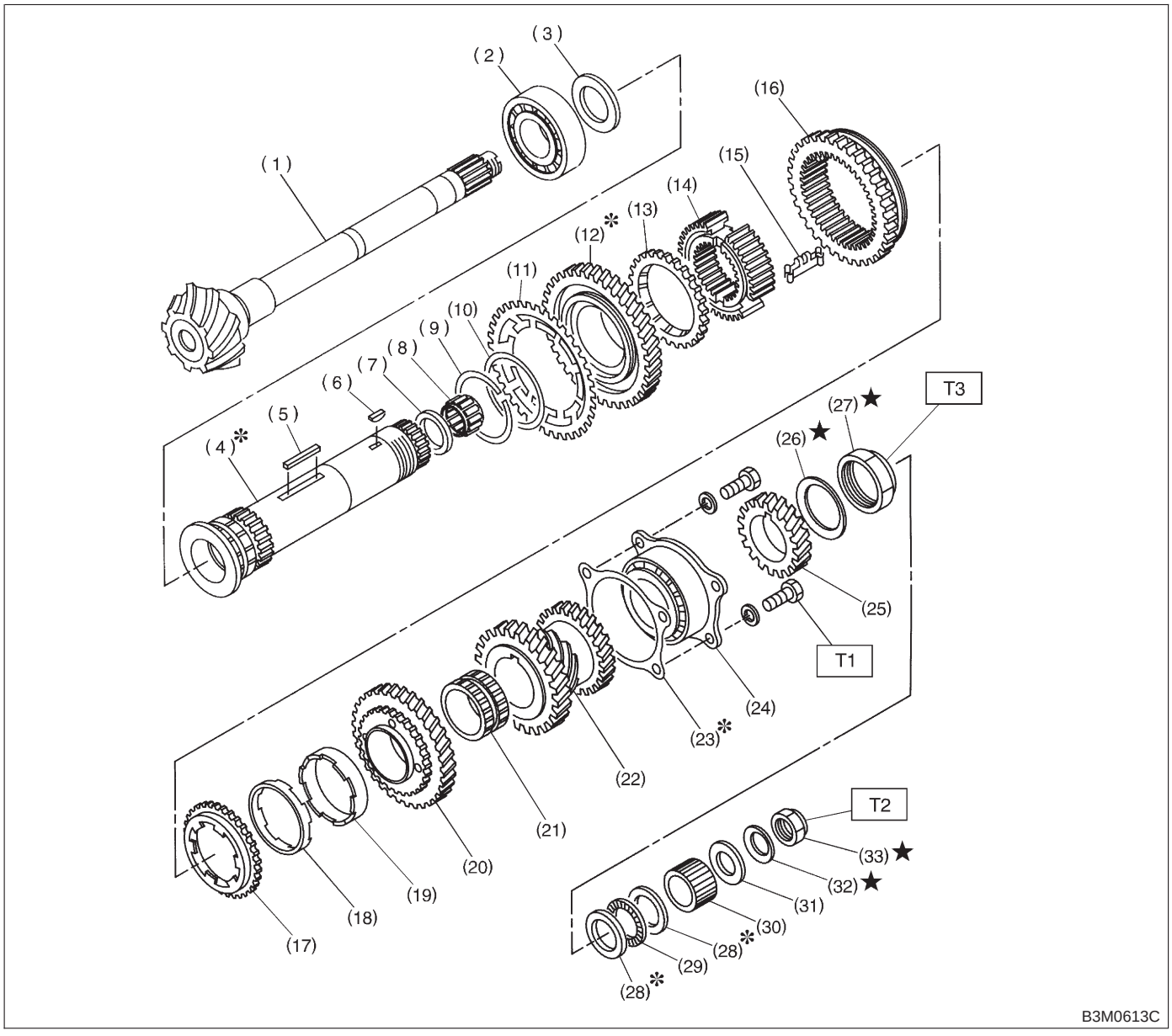
A: 2200 cc MODEL



(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Thrust bearing
(5) Needle bearing
(6) Key
(7) Driven shaft
(8) Woodruff key
(9) Drive pinion collar
(10) Snap ring (Outer)
(11) Washer
(12) Sub gear
(13) 1st driven gear
(14) Baulk ring
(15) Spring
(16) 1st-2nd synchronizer hub
(17) Insert
(18) Reverse driven gear
(19) 2nd driven gear
(20) 2nd driven gear bush
(21) 3rd-4th driven gear
(22) Driven pinion shim
(23) Roller bearing
(24) 5th driven gear
(25) Lock washer
(26) Lock nut
(27) Adjusting washer No. 2
(28) Adjusting washer No. 1
(29) Differential bevel gear sleeve
(30) Washer
(31) Lock washer
(32) Lock nut

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)

B: 2500 cc MODEL

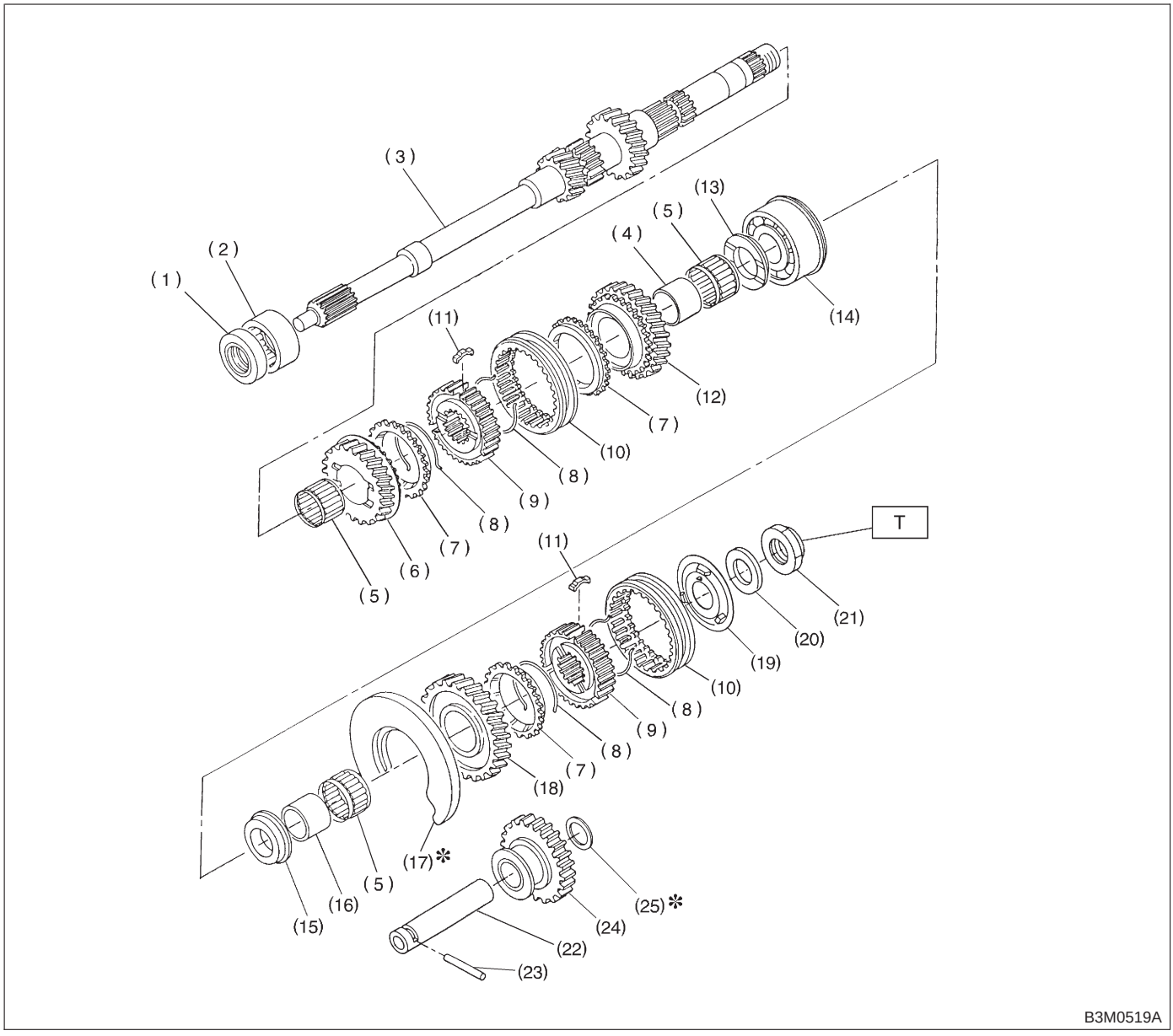


(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Driven shaft
(5) Key
(6) Woodruff key
(7) Drive pinion collar
(8) Needle bearing
(9) Snap ring (Outer)
(10) Washer
(11) Sub gear
(12) 1st driven gear
(13) Baulk ring
(14) 1st-2nd synchronizer hub
(15) Insert key
(16) Reverse driven gear
(17) Outer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

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

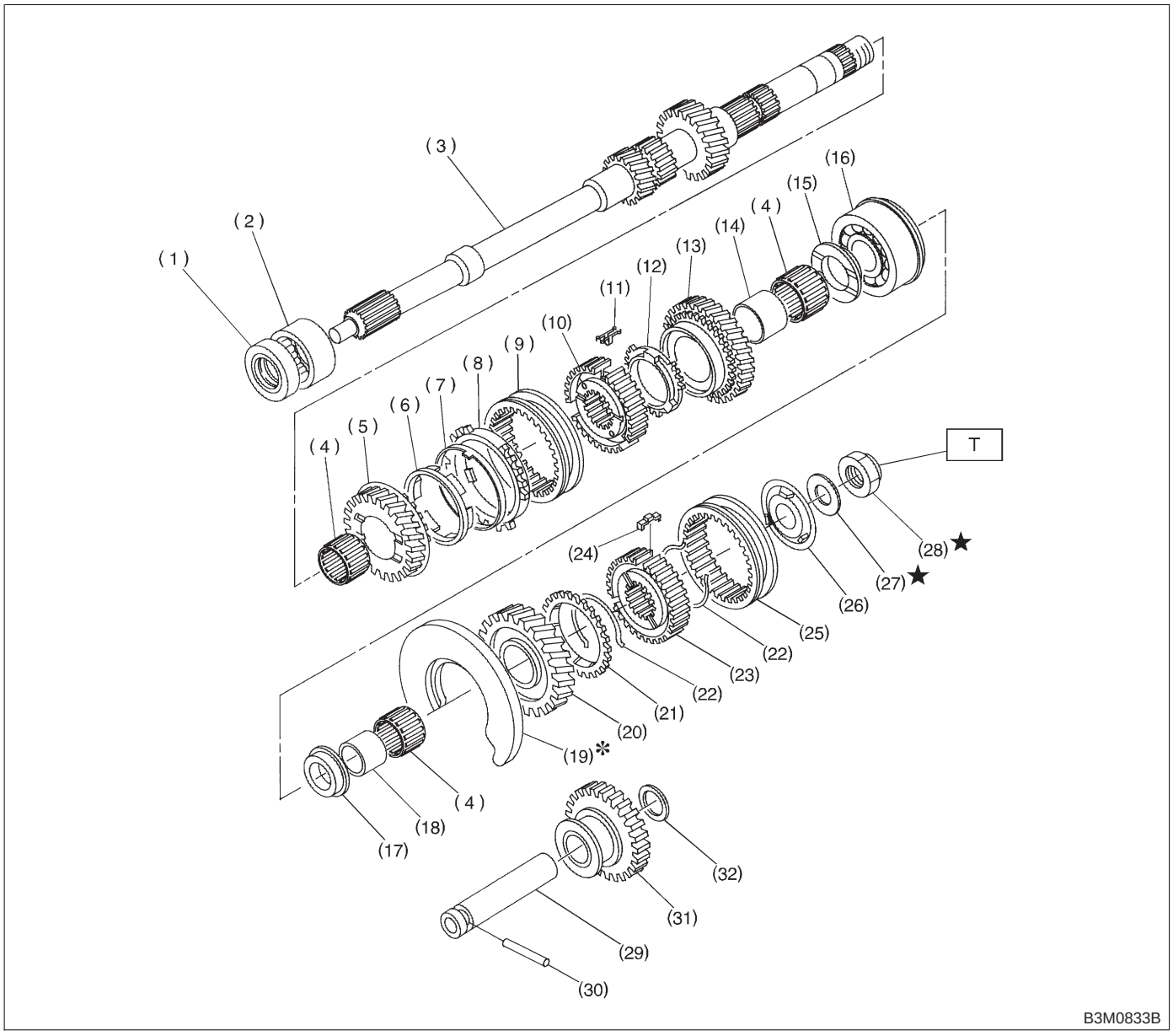
A: 2200 cc MODEL



(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)

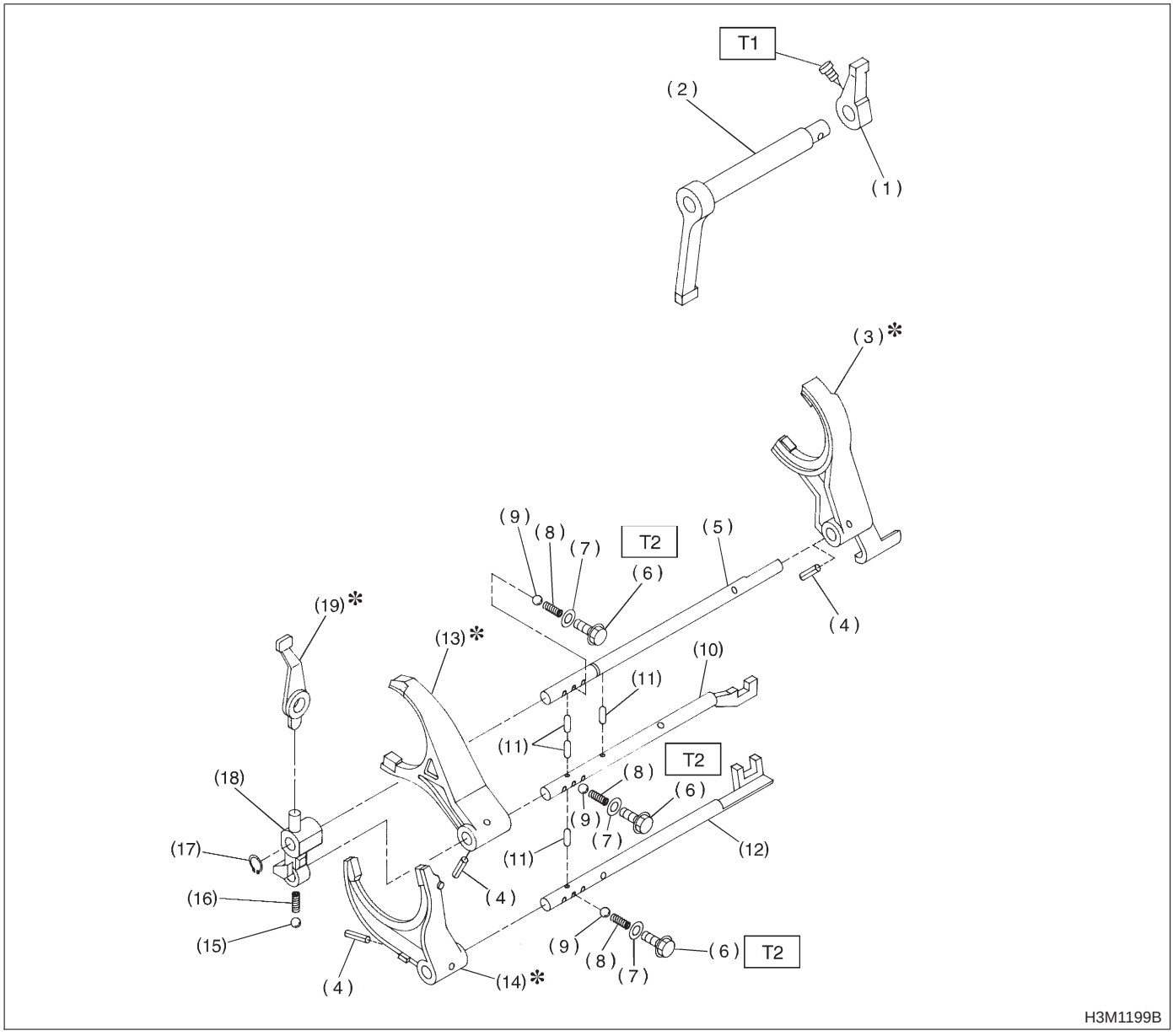
B: 2500 cc MODEL



(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) Inner baulk ring
(7) Synchro cone
(8) Outer baulk ring
(9) Coupling sleeve
(10) Synchronizer hub
(11) Insert key
(12) 4th baulk ring
(13) 4th drive gear
(14) 4th needle bearing race
(15) 4th gear thrust washer
(16) Ball bearing
(17) 5th gear thrust washer
(18) 5th needle bearing race
(19) Main shaft rear plate
(20) 5th drive gear
(21) 5th baulk ring
(22) Synchronizer spring
(23) Synchronizer hub
(24) Shifting insert
(25) Coupling sleeve
(26) Insert stopper plate
(27) Lock washer
(28) Lock nut
(29) Reverse idler gear shaft
(30) Straight pin
(31) Reverse idler gear
(32) Washer

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

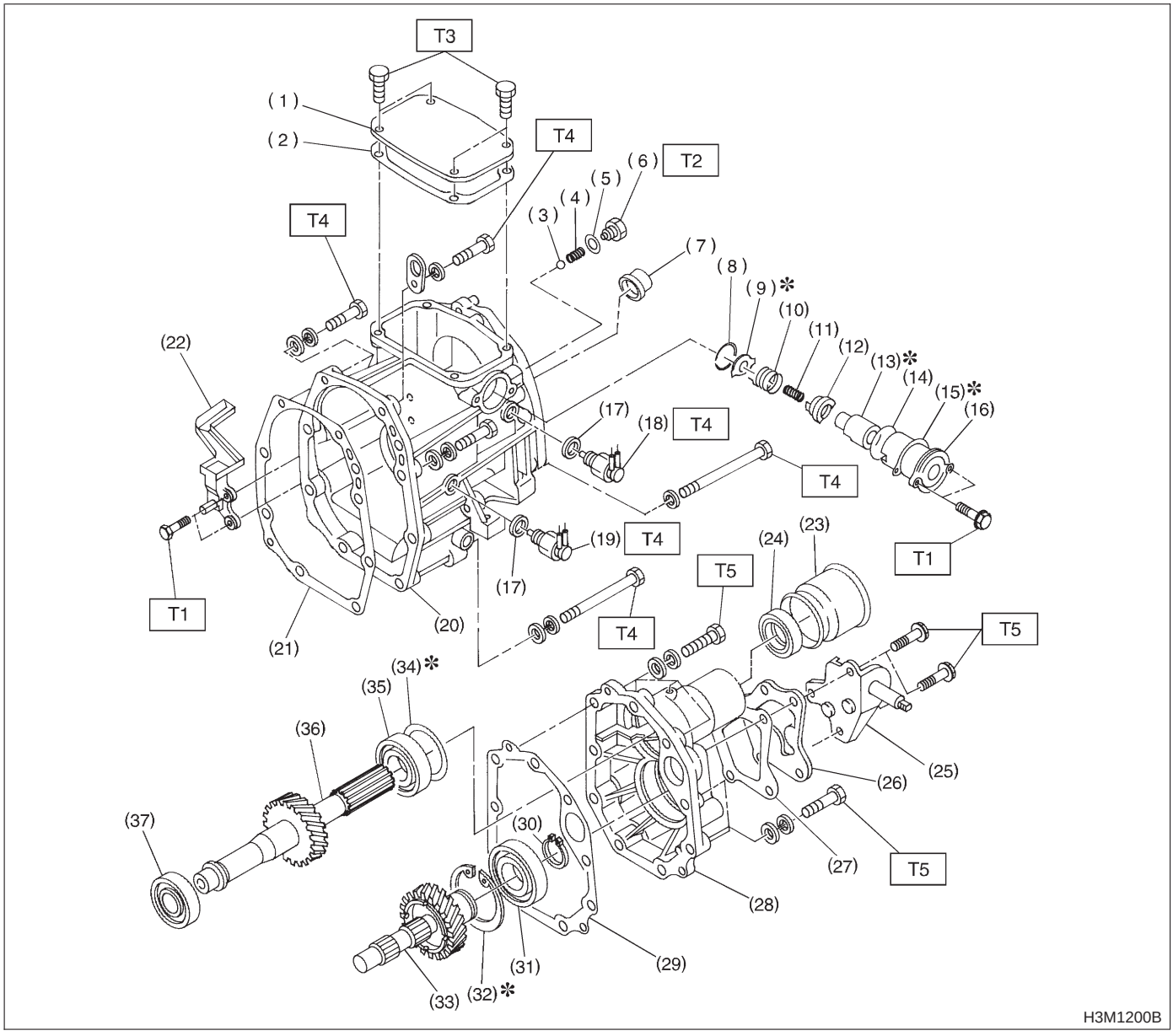
4. Shifter Fork and Shifter Rod



(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 fork rod arm
(19) 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

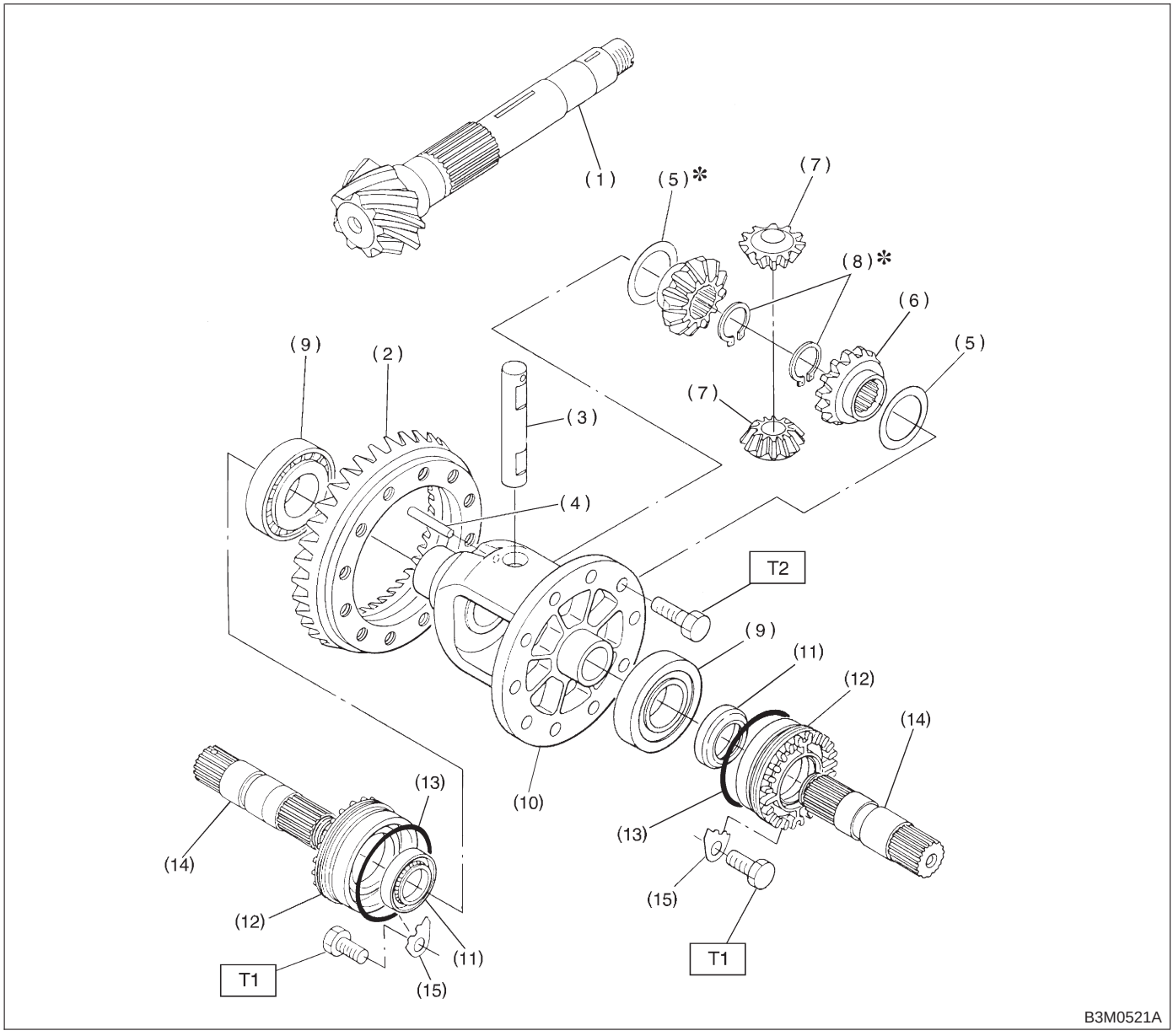


H3M1200B

(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)

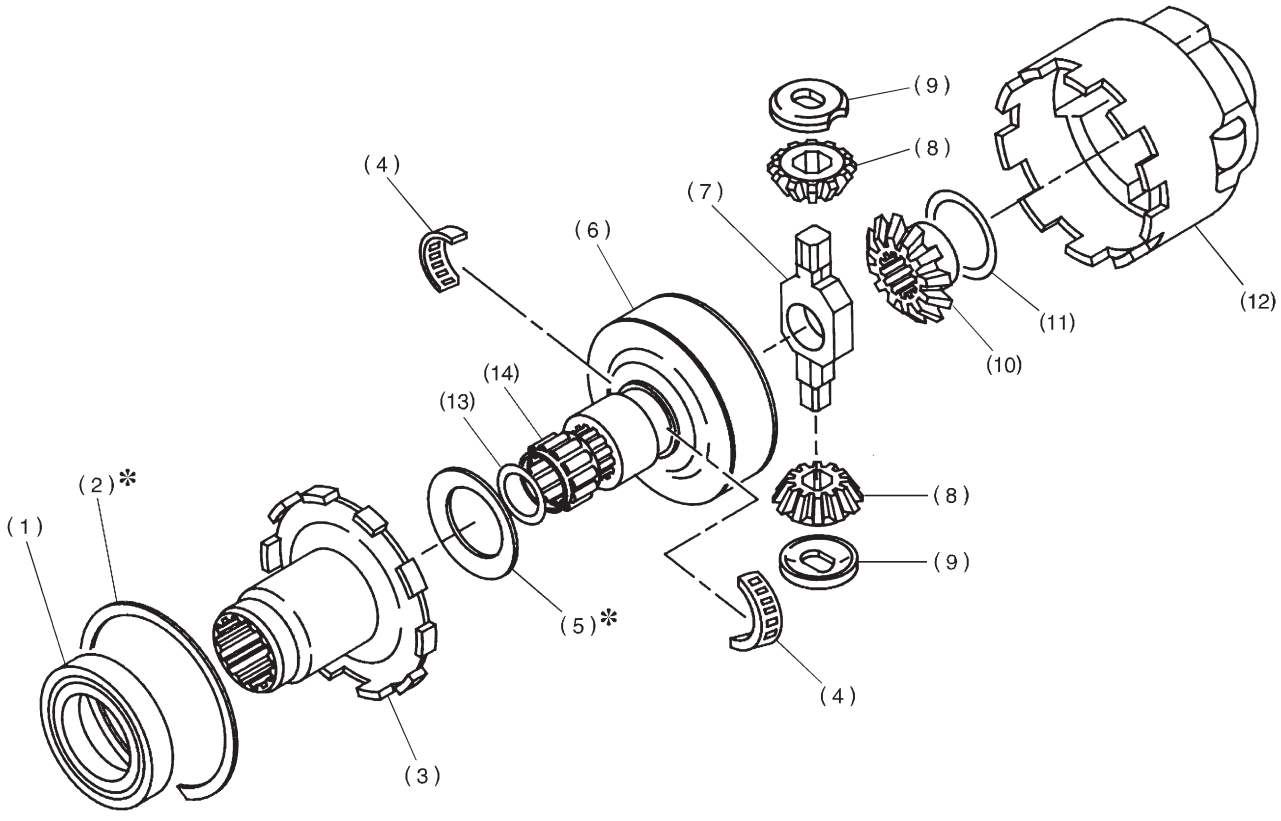
6. Front Differential



(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



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

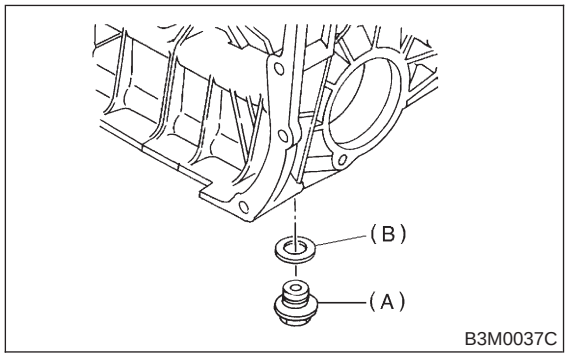
1. General

A: PRECAUTIONS

1) The following job should be followed before disassembly:
(1) Clean oil, grease, dirt and dust from transmission.
(2) Remove drain plug to drain oil. After draining, retighten it as before.

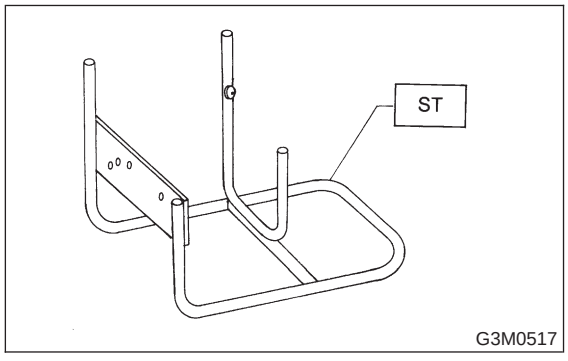
CAUTION:
Replace gasket with a new one.

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



(A) Drain plug
(B) Washer

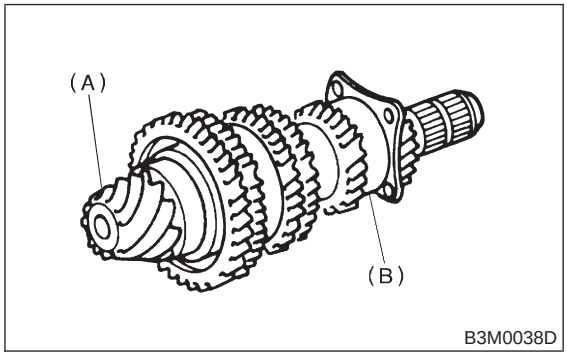
(3) Attach transmission to ST.
ST 499937100 TRANSMISSION STAND SET



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 [G9A1].>

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 on the rear side of the drive pinion shaft 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.

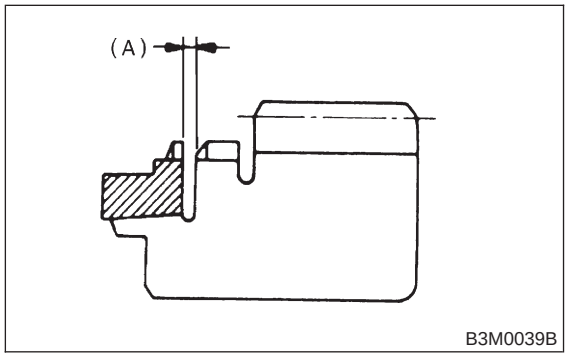


(A) Drive pinion shaft
(B) Ball bearing

● Bearings having other defects
2) Bushing (each gear)
Replace the bushing in the following cases:
● When the sliding surface is damaged or abnormally worn.
● When the inner wall is abnormally worn.
3) Gears
● Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
● Correct or replace if the cone that contacts the baulk ring is rough or damaged.
● 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.

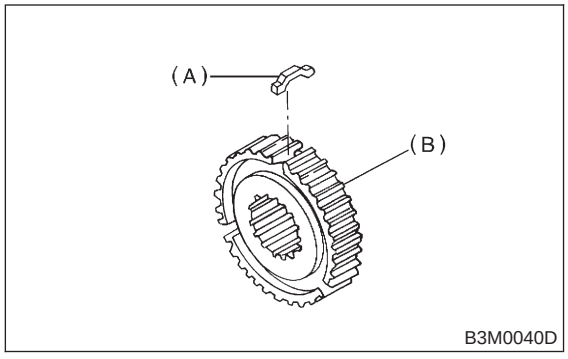
● If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



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

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



(A) Shifting insert
(B) Synchronizer hub

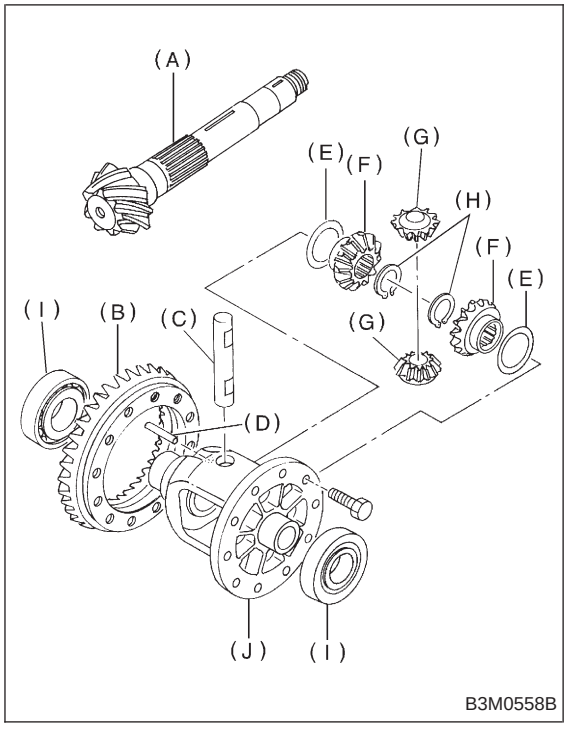
6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

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:

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

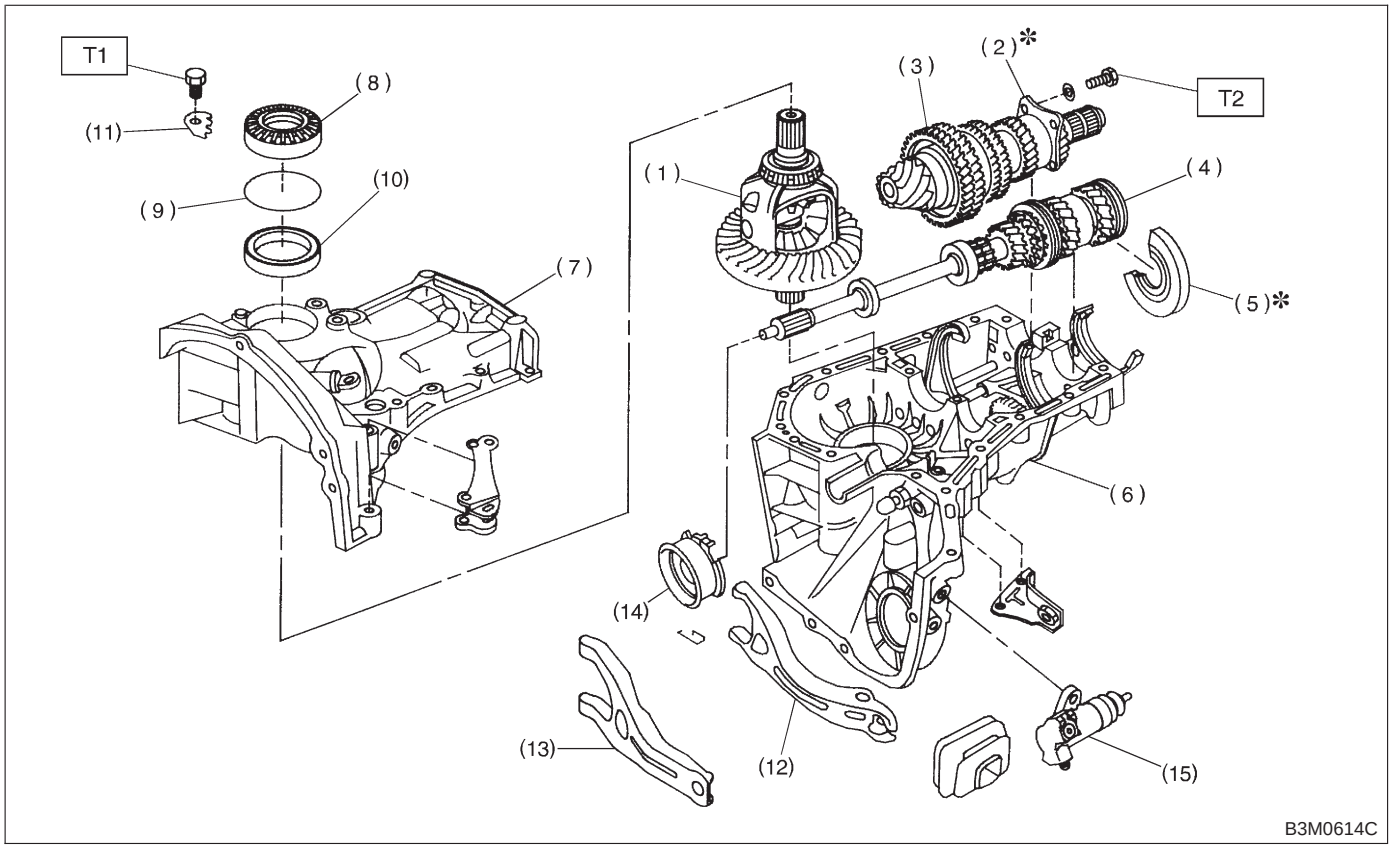


(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Snap ring
(I) Roller bearing
(J) Differential case

2. Transmission Case

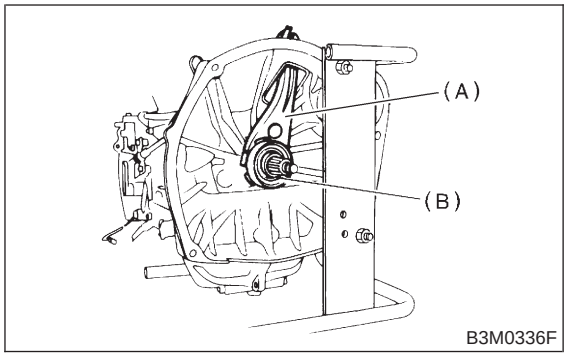
A: DISASSEMBLY

1. SEPARATION OF TRANSMISSION



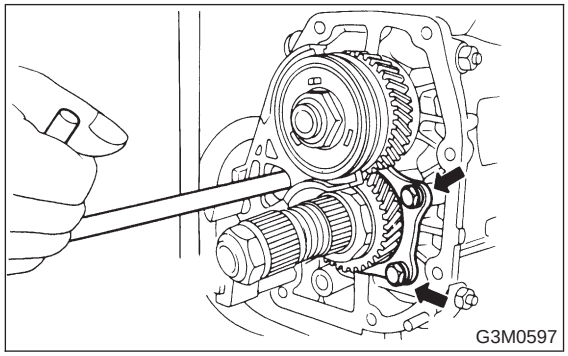
(1) Operating cylinder
(2) Release lever (2200 cc model)
(3) Release lever (2500 cc model)
(4) Release bearing
(5) Release lever sealing
(6) Bolt
(7) Main shaft rear plate
(8) Transmission case (LH)
(9) Transmission case (RH)
(10) Main shaft ASSY
(11) Drive pinion ASSY
(12) Front differential

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 and bearing. Mechanical application type; <Ref. to 2-10 [W3A1].> Hydraulic application type; <Ref. to 2-10 [W3A2].>

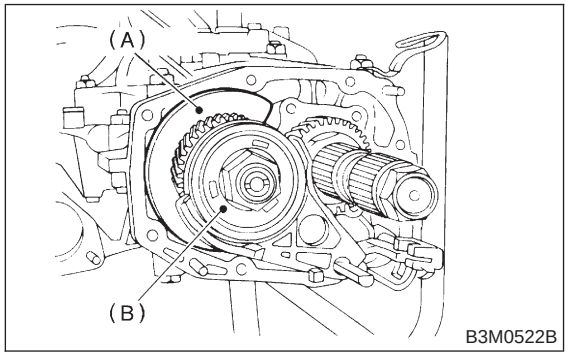


(A) Clutch release lever
(B) Clutch release bearing

5) Remove bearing mounting bolts.


G3M0597

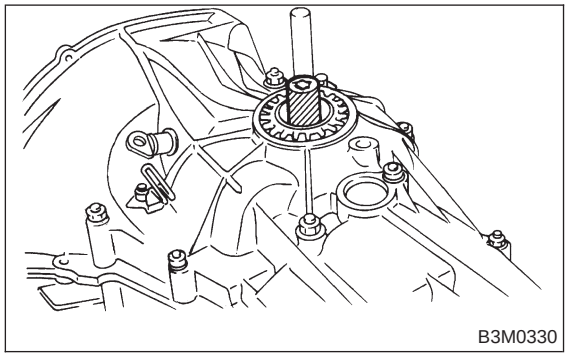
6) Remove main shaft rear plate.



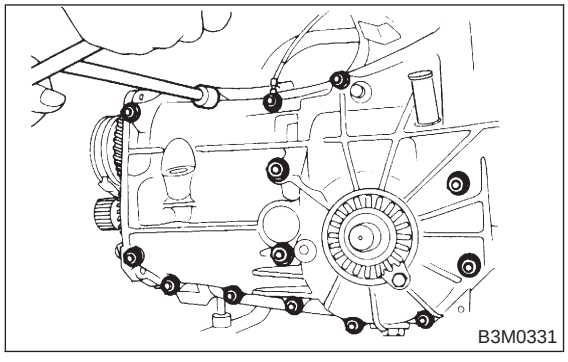
B3M0522B

(A) Main shaft rear plate
(B) Main shaft ASSY

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


B3M0330

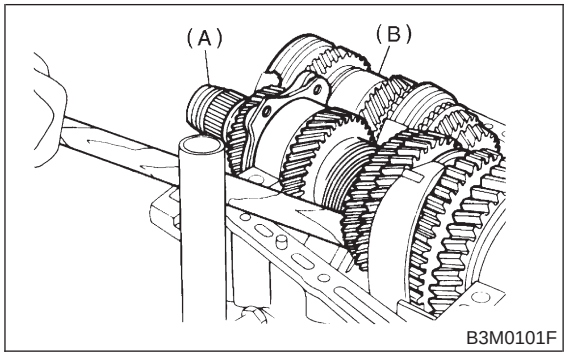
(2) Separate transmission case into right and left cases by loosening seventeen coupling bolts and nuts.


B3M0331

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

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

9) Remove main shaft assembly.

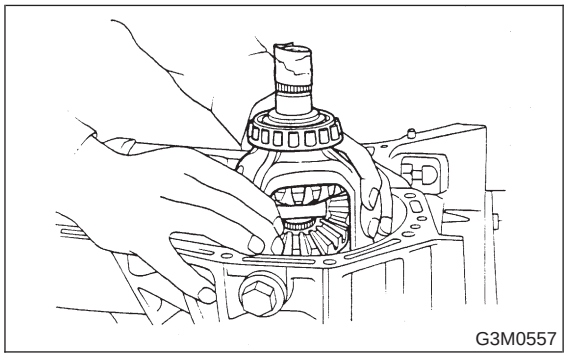


B3M0101F

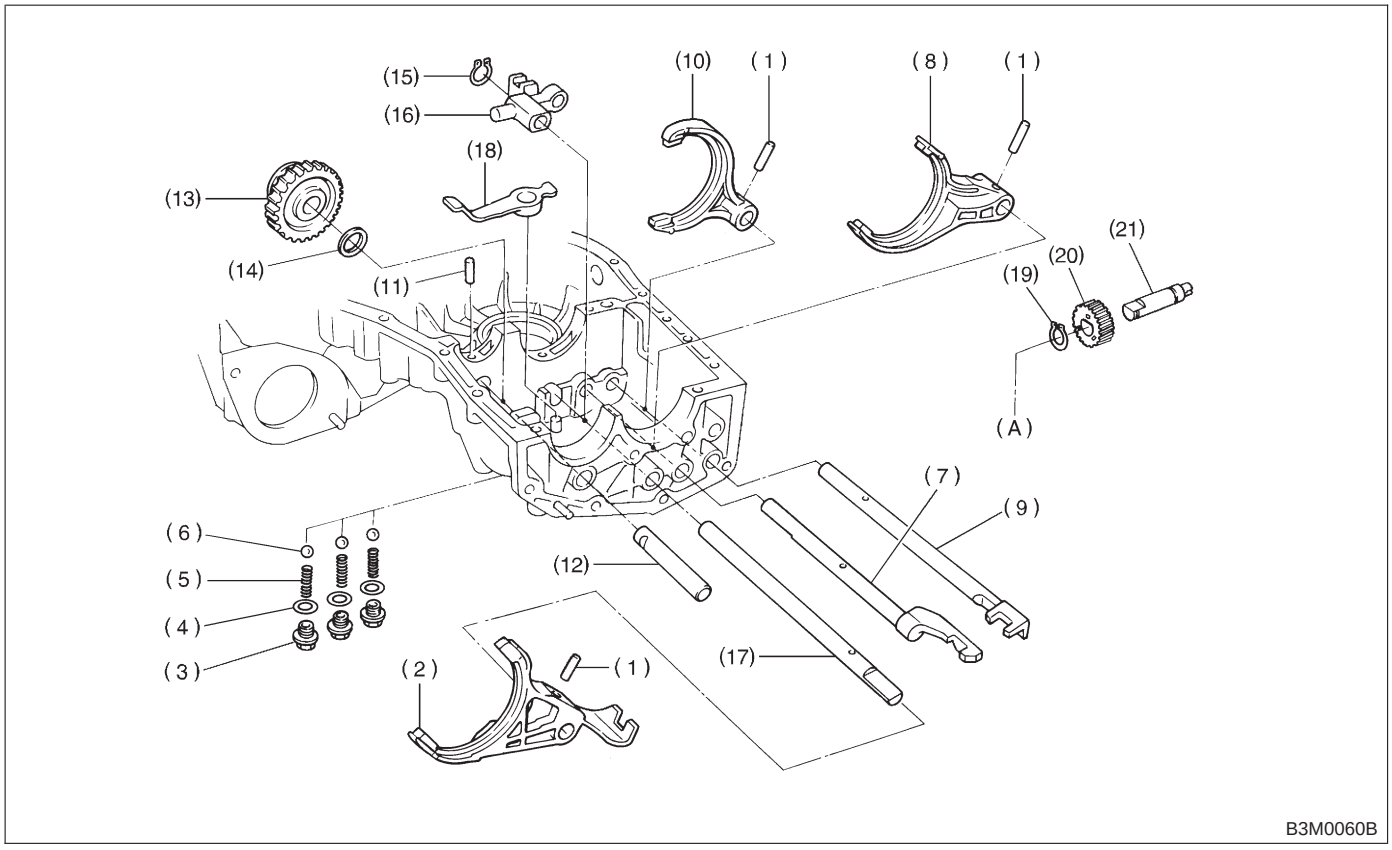
(A) Drive pinion shaft ASSY
(B) Main shaft ASSY

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.**

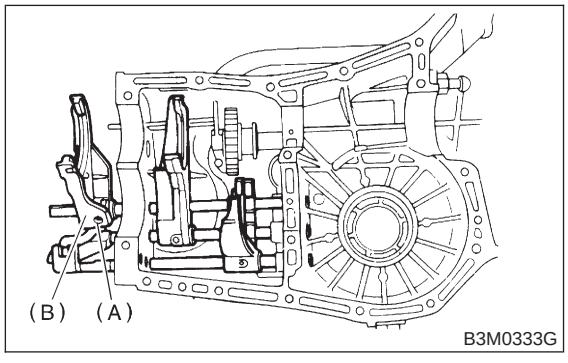

G3M0557

2. TRANSMISSION CASE



(1) Straight pin
(2) 5th shifter fork
(3) Checking ball plug
(4) Gasket
(5) Checking ball spring
(6) Ball
(7) 3rd-4th fork rod
(8) 3rd-4th shifter fork
(9) 1st-2nd fork rod
(10) 1st-2nd shifter fork
(11) Straight pin
(12) Reverse idler gear shaft
(13) Reverse idler gear
(14) Washer
(15) Snap ring
(16) Reverse fork rod arm
(17) Reverse fork rod
(18) Reverse shifter lever
(19) Snap ring (RH side)
(20) Speedmeter driven gear (RH side)
(21) Speedmeter shaft (RH side)
(A) Front right hand transmission case

1) Drive out straight pin with ST, and remove 5th shifter fork.
ST 398791700 STRAIGHT PIN REMOVER

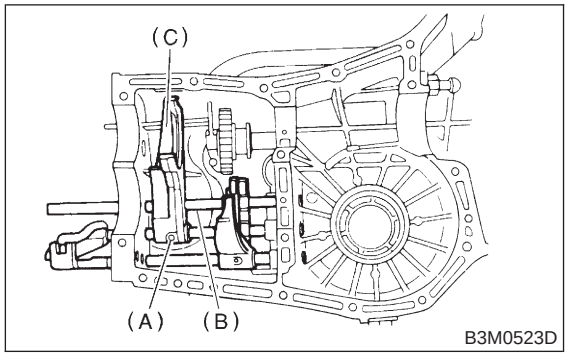


(A) Straight pin
(B) 5th shifter fork

2) Remove plugs, springs and checking balls.

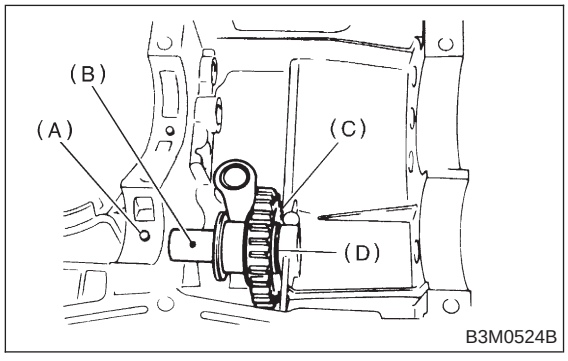
3) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

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.



(A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

4) Drive out straight pin, and pull out 1-2 fork rod and shifter fork.
5) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.

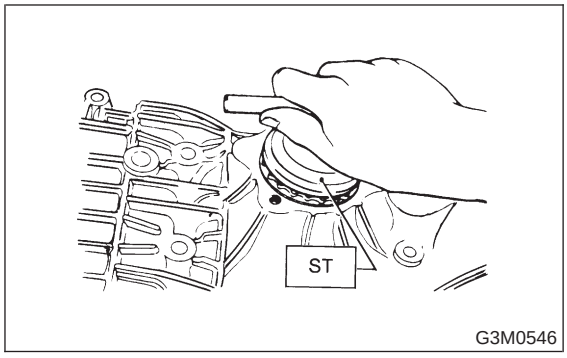


(A) Straight pin
(B) Idler gear shaft
(C) Idler gear
(D) Washer

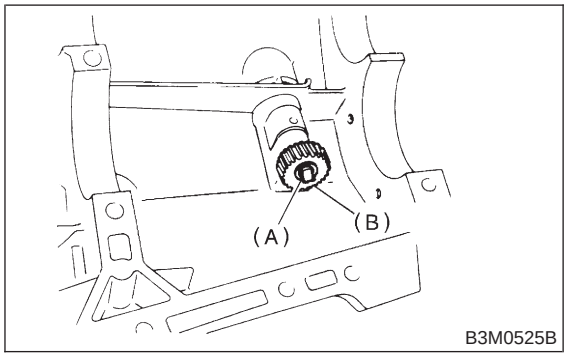
6) Remove outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out ball, spring and interlock plunger from rod.
And then remove rod.

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

7) Remove reverse shifter lever.
8) Remove differential side retainers using ST.
ST 499787000 WRENCH ASSY



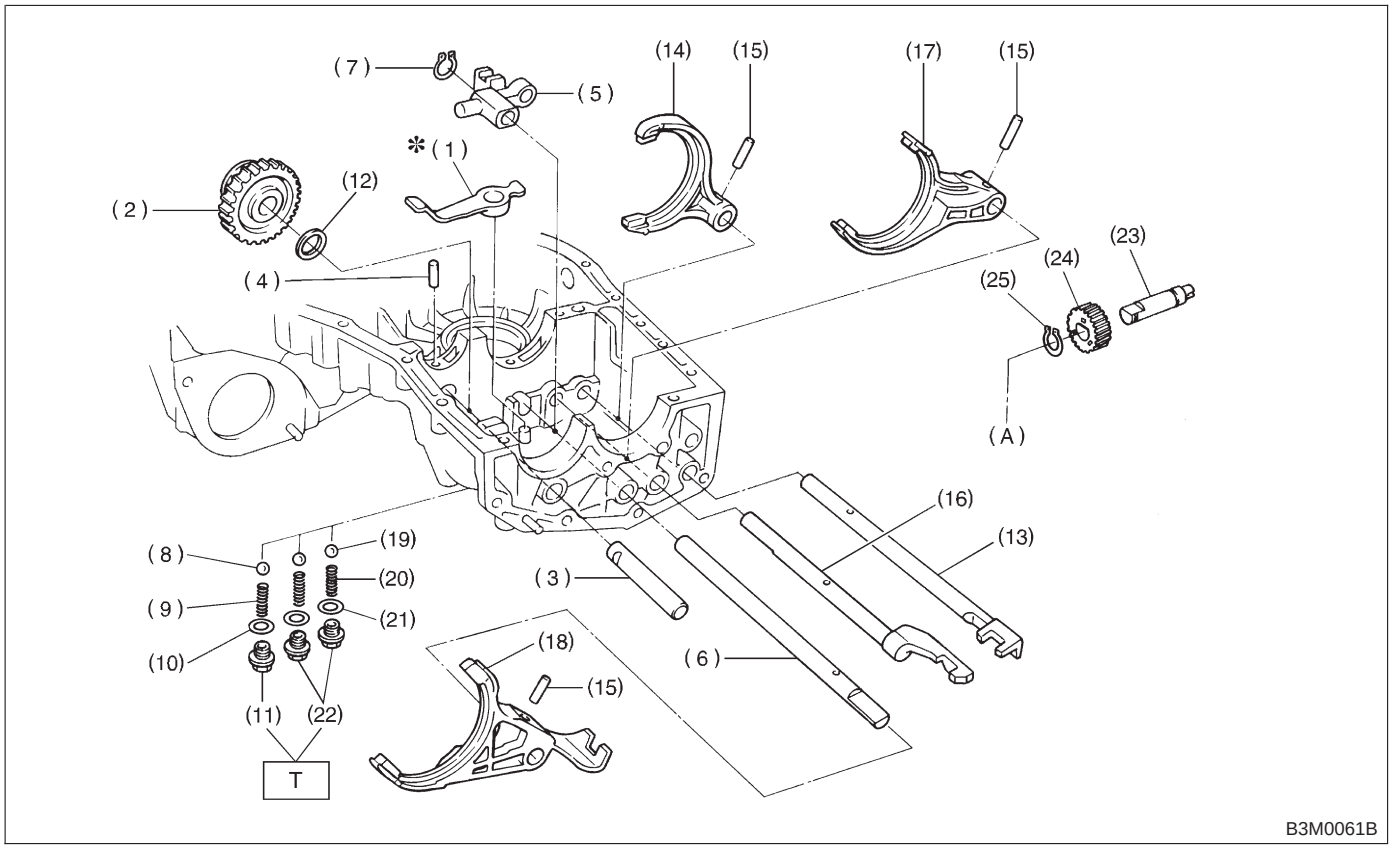
9) Remove outer snap ring and pull out speedometer driven gear. Next, remove vehicle speed sensor 2, oil seal, speedometer shaft and washer.



(A) Snap ring
(B) Speedometer shaft

B: ASSEMBLY

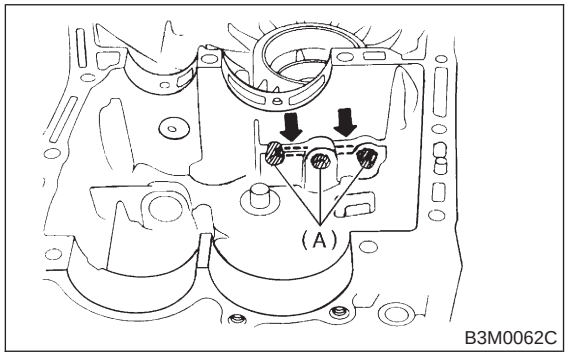
1. TRANSMISSION CASE



(1) Reverse shifter lever
(2) Reverse idler gear
(3) Reverse idler gear shaft
(4) Straight pin
(5) Reverse fork rod arm
(6) Reverse fork rod
(7) Snap ring
(8) Ball
(9) Checking ball spring
(10) Washer
(11) Checking ball plug
(12) Washer
(13) 1st-2nd fork rod
(14) 1st-2nd shifter fork
(15) Straight pin
(16) 3rd-4th fork rod
(17) 3rd-4th shifter fork
(18) 5th shifter fork
(19) Ball
(20) Checking ball spring
(21) Washer
(22) Checking ball plug
(23) Speedometer shaft
(24) Speedometer driven gear
(25) Snap ring
(A) 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)

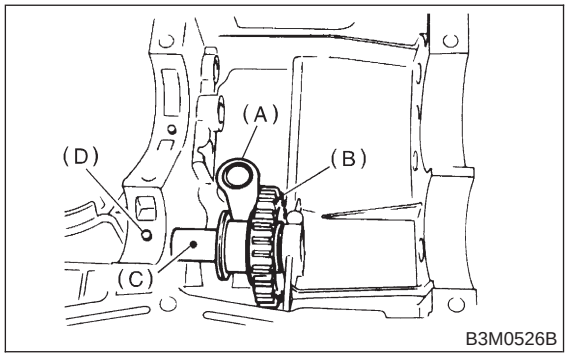
1) Position interlock plungers (5.56 × 19.6), one plunger in hole between 1-2 and 3-4 fork rod holes, and one plunger in hole between 3-4 and reverse fork rod holes.



(A) Rod holes

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

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



(A) Reverse shifter lever
(B) Reverse idler gear
(C) Reverse idler gear shaft
(D) Straight pin

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

CAUTION:
Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER

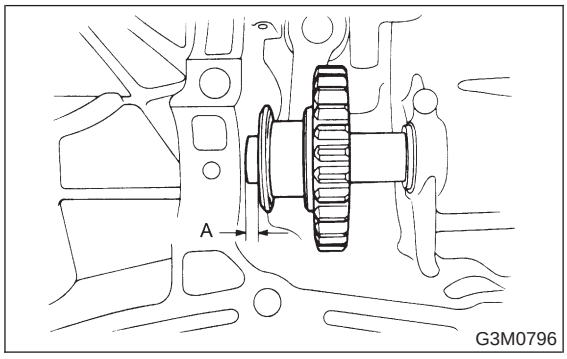
4) Position ball (7.1438), spring and gasket in reverse shifter rod hole, on left side transmission case, and tighten checking ball plug.

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.

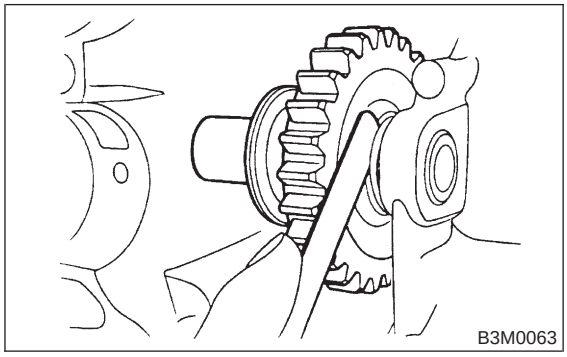
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



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 × 26 × 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 and rod
(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 × 22) into these holes using ST.

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

ST 398791700 STRAIGHT PIN REMOVER

7) Installation of 3-4 shifter fork and rod
(1) Install interlock plunger (3 × 11.9) onto 3-4 fork rod.

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

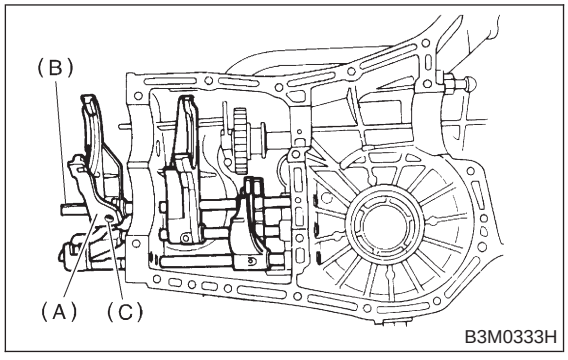
(2) Install 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.
(3) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes.

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

ST 398791700 STRAIGHT PIN REMOVER

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

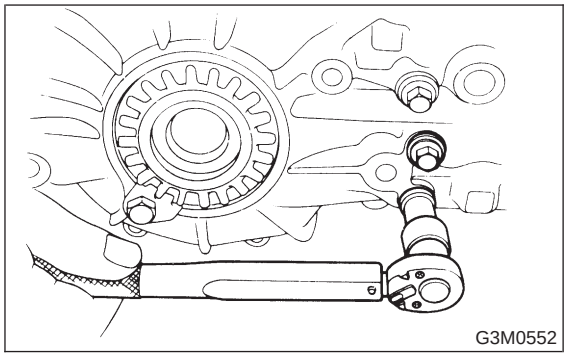
ST 398791700 STRAIGHT PIN REMOVER



(A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

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

CAUTION:
Replace gasket with a new one.

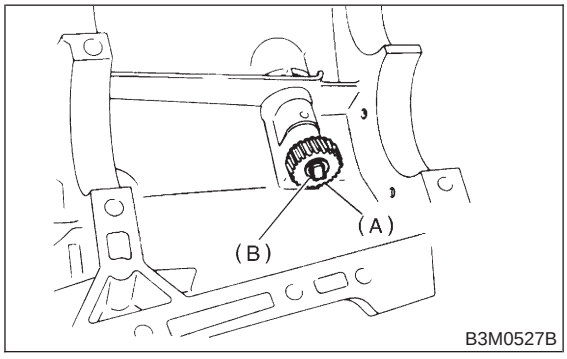


10) Installation of speedometer driven gear
(1) Install washer and speedometer shaft, and press fit oil seal with ST.

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

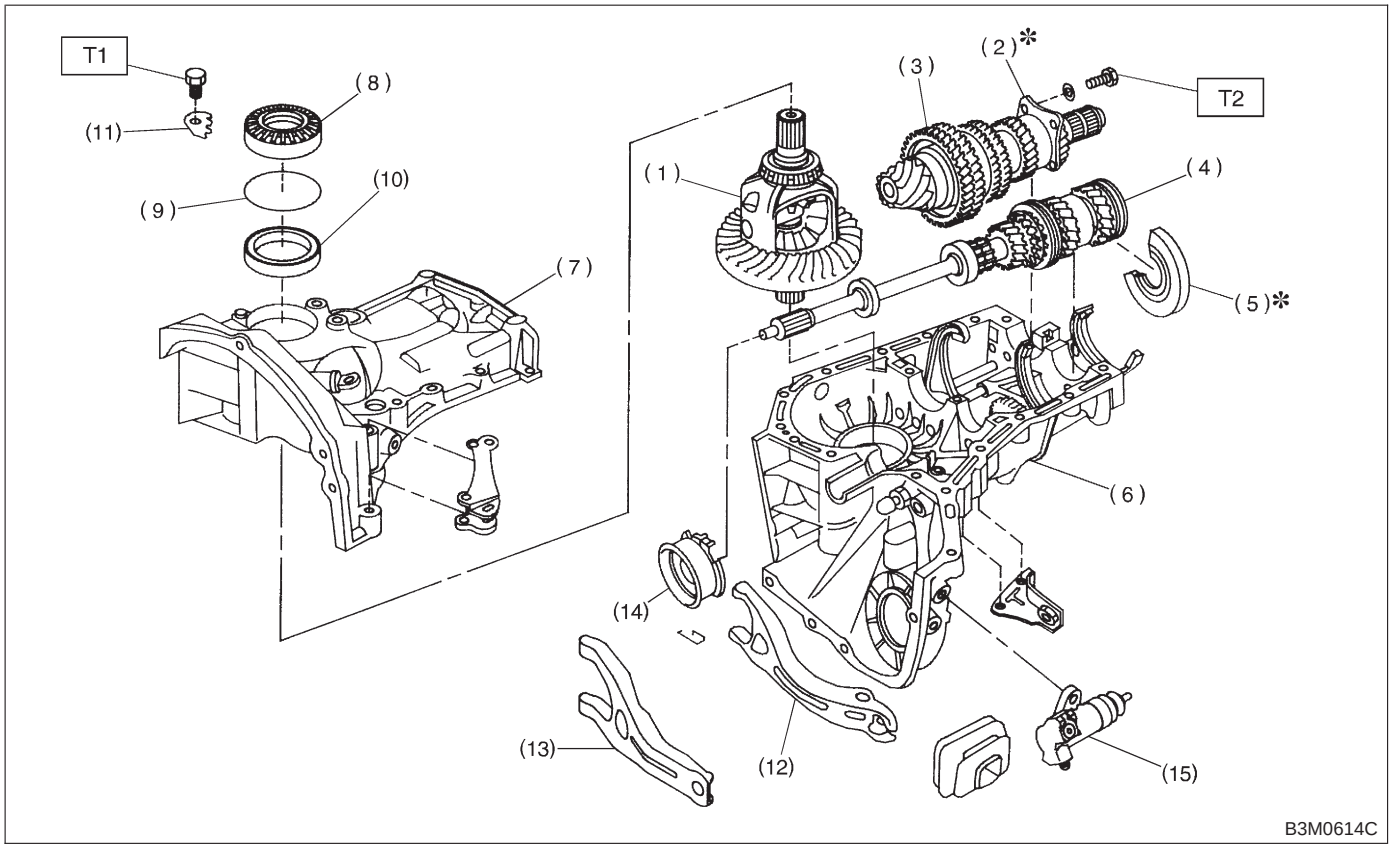
ST 899824100 or 499827000 PRESS

(2) Install speedometer driven gear and snap ring.



(A) Speedometer driven gear
(B) Snap ring

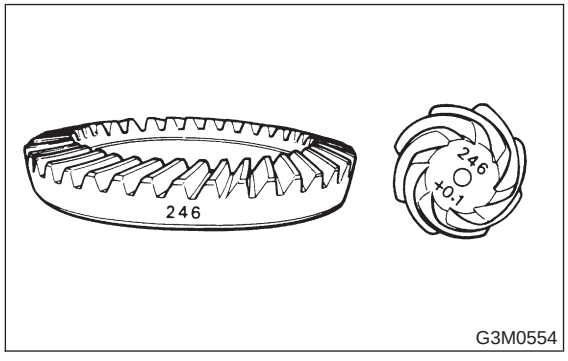
2. COMBINATION OF TRANSMISSION CASE



(1) Differential ASSY
(2) Drive pinion shim
(3) Drive pinion ASSY
(4) Main shaft ASSY
(5) Main shaft rear plate
(6) Transmission case (LH)
(7) Transmission case (RH)
(8) Differential side retainer
(9) O-ring
(10) Oil seal
(11) Retainer lock plate
(12) Release lever (2200 cc model)
(13) Release lever (2500 cc model)
(14) Release bearing
(15) Operating cylinder

Tightening torque: N·m (kg-m, ft-lb)
T1: 25 (2.5, 18)
T2: 29±3 (3.0±0.3, 21.7±2.2)

1) Alignment marks/numbers on hypoid gear set
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.



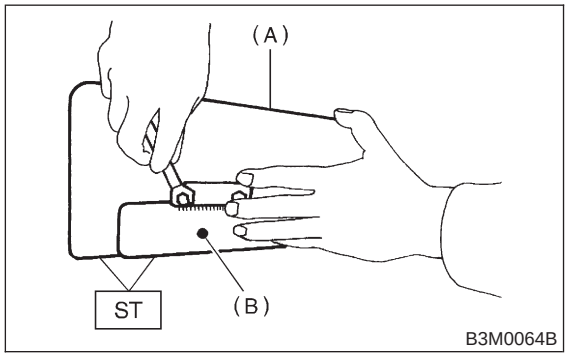
2) Adjustment of drive pinion shim

(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



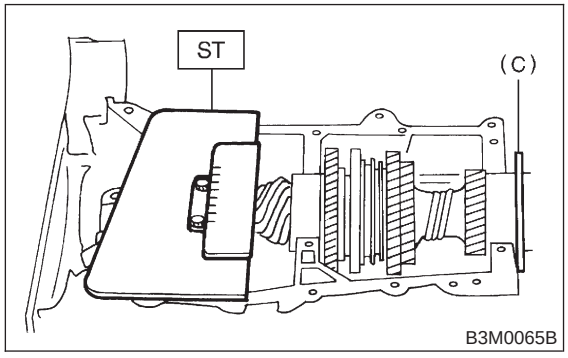
(A) Plate
(B) Scale

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

ST 499917500 DRIVE PINION GAUGE ASSY

(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.

ST 499917500 DRIVE PINION GAUGE ASSY



(C) 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

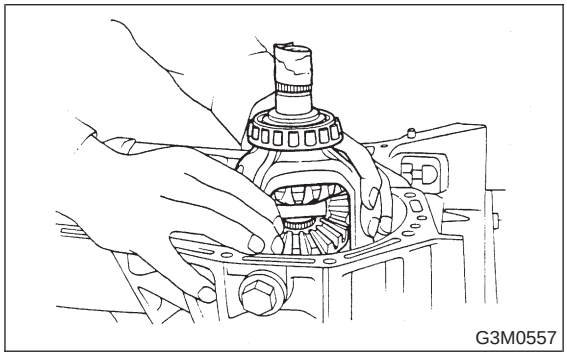
(6) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

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)

3) Install differential assembly on left hand transmission case.

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

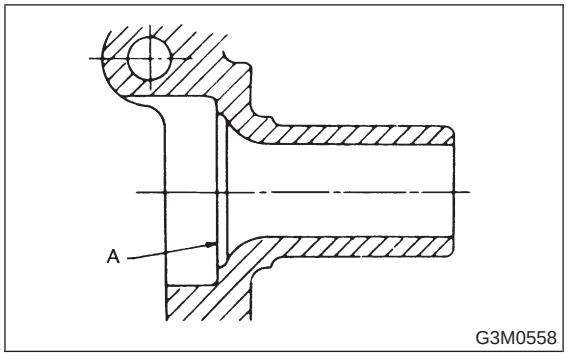
NOTE:
Wrap the left and right splined sections of axle shaft with vinyl tape to prevent scratches.



4) Install needle bearing and oil seal onto the front of transmission main shaft assembly, 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.

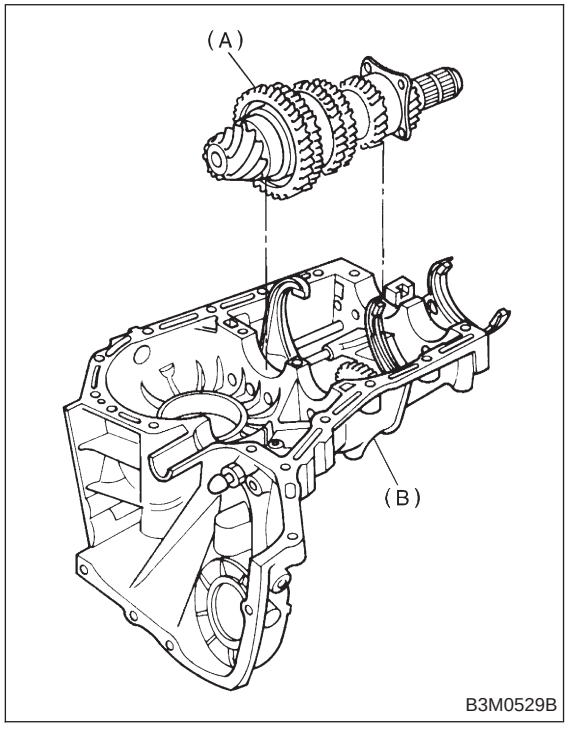
NOTE:
● Align the end face of seal with surface “A” of left side transmission main case when installing oil seal.



● 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.

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

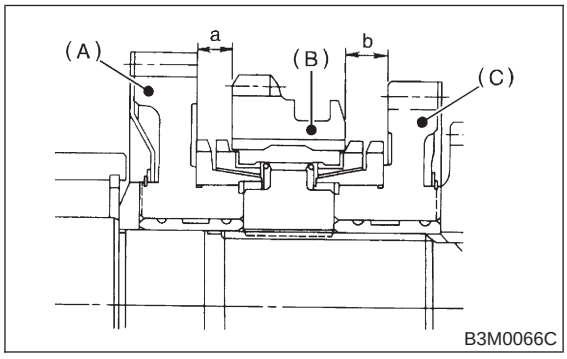
NOTE:
Ensure that the knock pin of the case is fitted into the hole in the bearing outer race.



(A) Drive pinion shaft ASSY
(B) Transmission case

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.

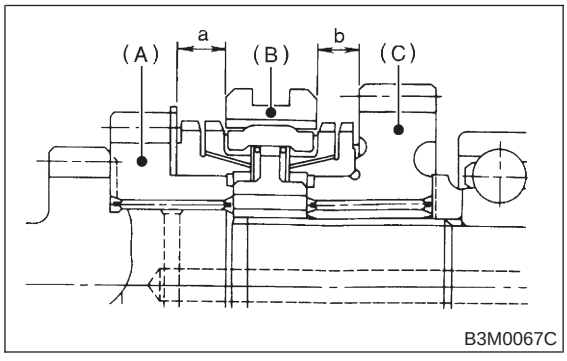
1st and 2nd clearance
a: 9.5 mm (0.374 in)
b: 9.5 mm (0.374 in)



(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

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)

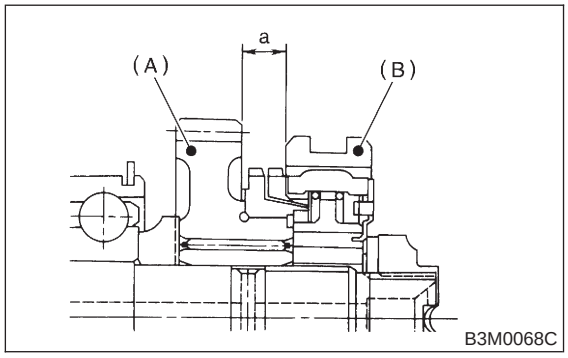
3rd and 4th clearance
a: 9.3 mm (0.366 in)
b: 9.3 mm (0.366 in)



(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

3rd-4th shifter fork		
Part No.	No.	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th clearance
a: 9.3 mm (0.366 in)

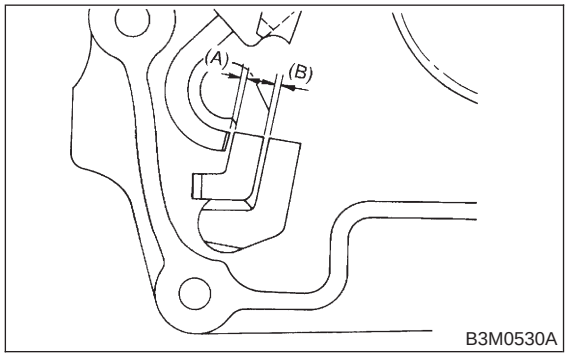


(A) 5th drive gear
(B) Coupling sleeve

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)

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)



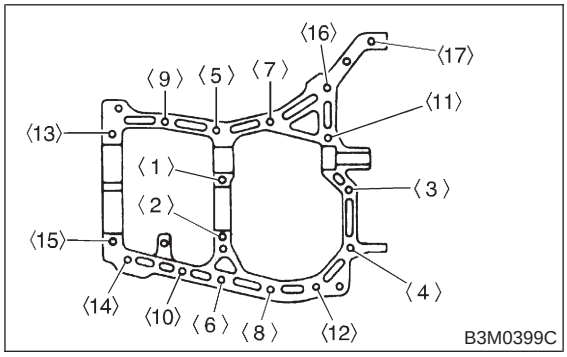
8) Combination of transmission case
(1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline, and apply liquid gasket, and then put case right side and left side together.

Liquid gasket:
THREE BOND 1215 or equivalent

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

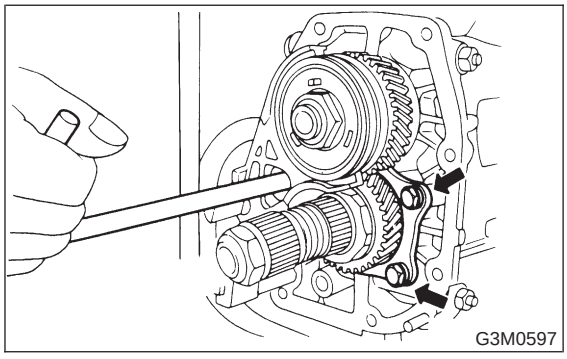
NOTE:
- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim is not caught up in between.
- Confirm that speedometer gear is meshed.

Tightening torque:
10 mm bolt (No. <1>—<4>, <16>, <17>)
39±3 N·m (4.0±0.3 kg-m, 28.9±2.2 ft-lb)
8 mm bolt (No. <5>—<15>)
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



9) Tighten ball bearing attachment bolts.

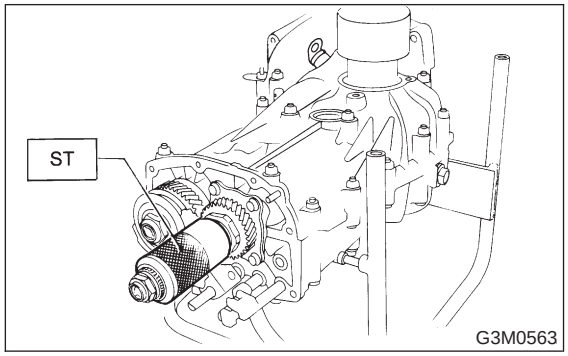
Tightening torque:
29±3 N·m (3.0±0.3 kg-m, 21.7±2.2 ft-lb)



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

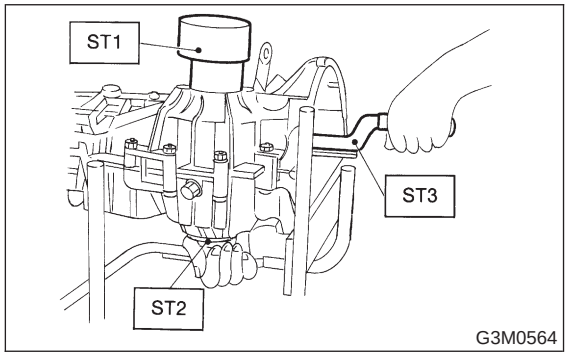
NOTE:
Support drive pinion assembly with ST.

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.

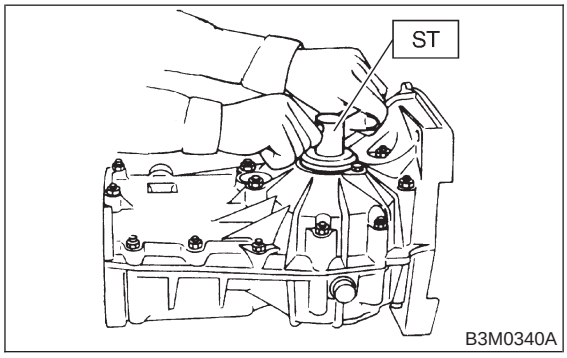
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



(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



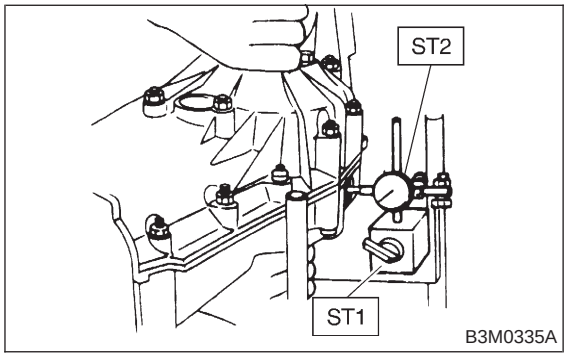
(4) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 teeth of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

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

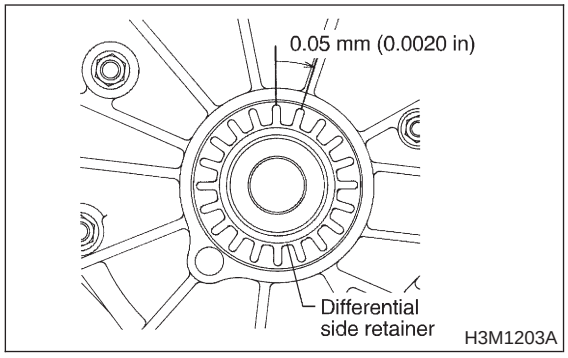
(5) Turn in the retainer on the upper side additionally by 1 tooth in order to apply preload on taper roller bearing.
(6) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.
(7) Turn transmission main shaft several times while tapping around 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)

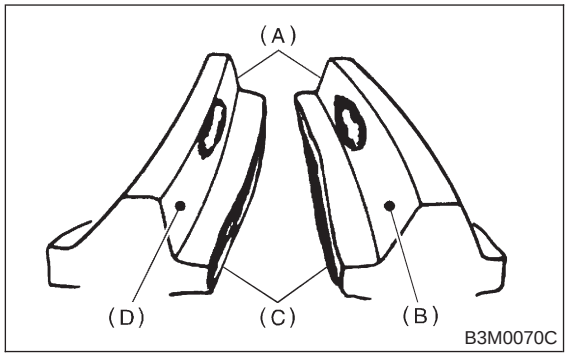


NOTE:
● If backlash is outside specified range, adjust it by turning holder in right side case.
● Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



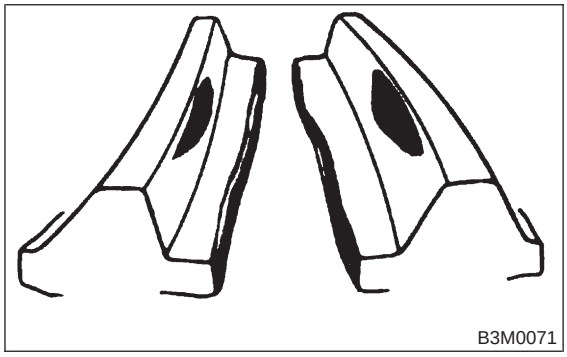
(9) Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether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

● Tooth contact is correct.

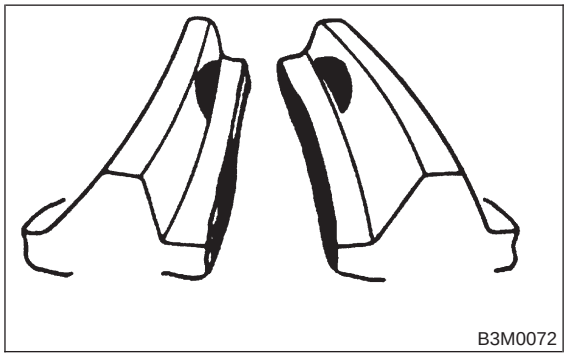


(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

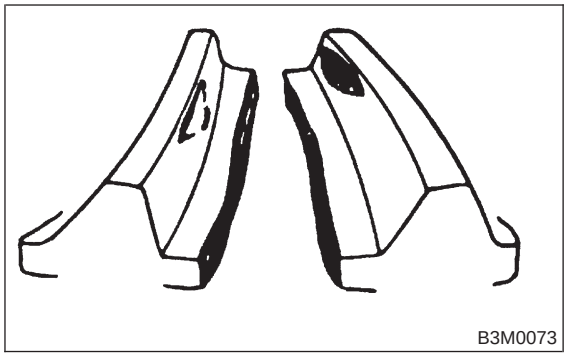
● Backlash is excessive.
To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.



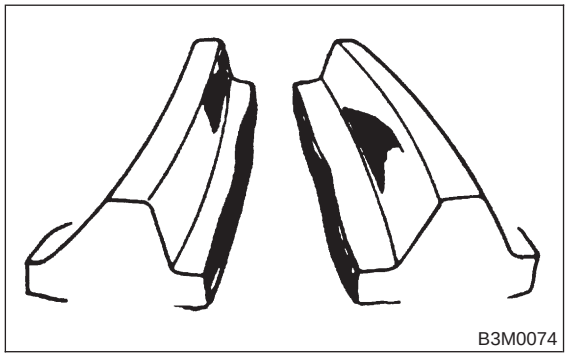
● Backlash is insufficient.
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



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



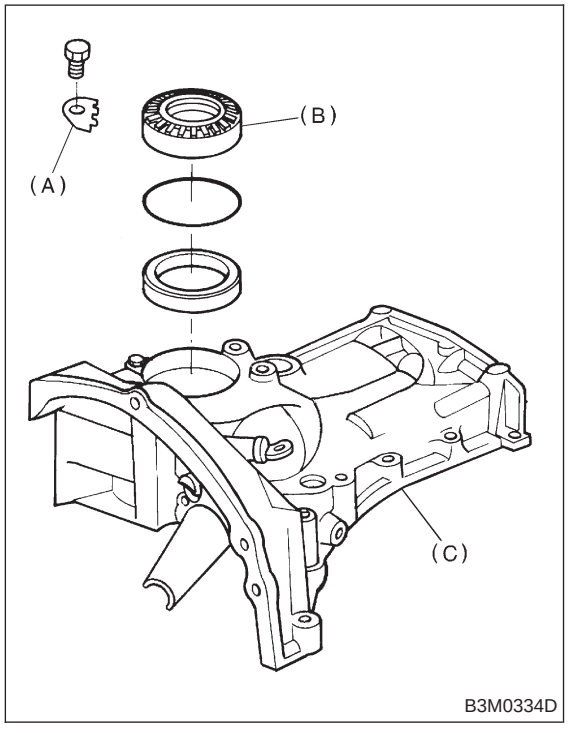
● The drive pinion shim selected before is too thin. Increase its thickness.


B3M0074

11) After checking the tooth contact of hypoid gears, remove the lock plate. 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.

NOTE:
Carry out this job on both upper and lower retainers.

Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)



B3M0334D

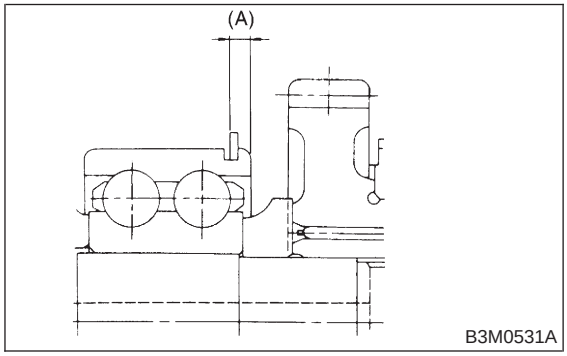
(A) Lock plate
(B) Retainer
(C) Transmission case

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:

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.

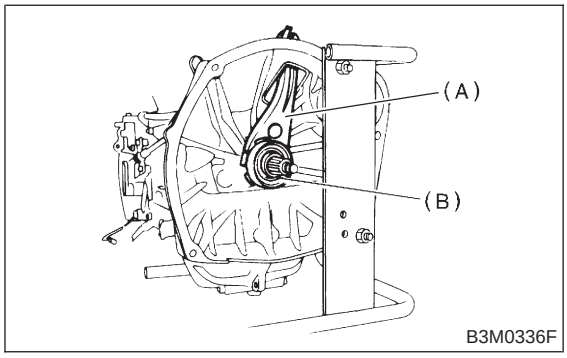
ST 498147000 DEPTH GAUGE

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



B3M0531A

13) Install clutch release lever and bearing. Mechanical application type; <Ref. to 2-10 [W3C1].> Hydraulic application type; <Ref. to 2-10 [W3C2].>



B3M0336F

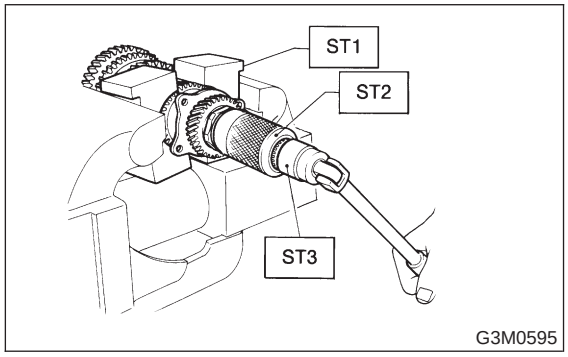
(A) Clutch release lever
(B) Clutch release bearing

3. Drive Pinion Assembly

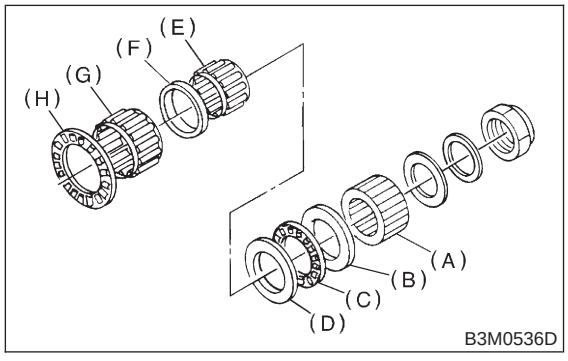
A: DISASSEMBLY

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 899988608 SOCKET WRENCH



2) Withdraw drive pinion from driven shaft.
Remove differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.

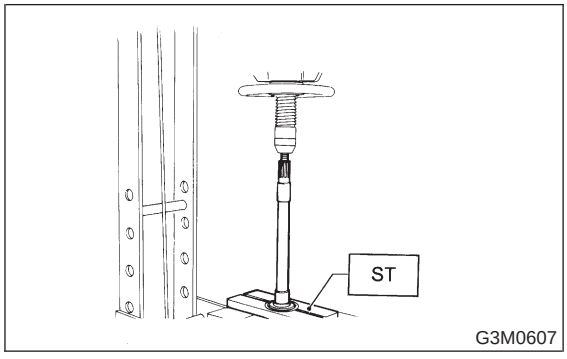


(A) Differential bevel gear sleeve
(B) Adjusting washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Adjusting washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

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

CAUTION:
Do not reuse roller bearing.

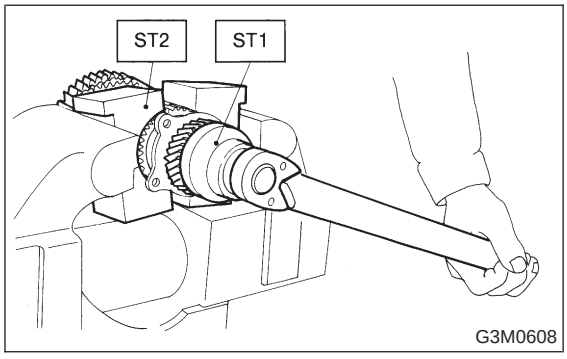
ST 498077000 REMOVER



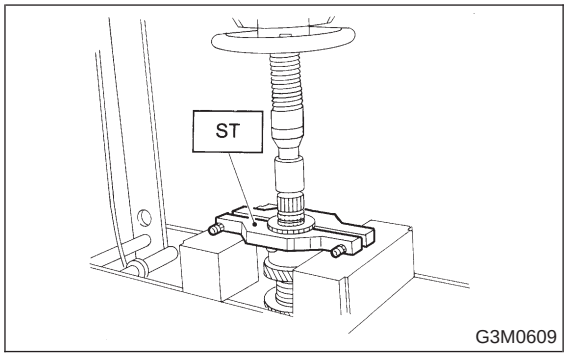
2. DRIVEN GEAR ASSEMBLY (2200 cc MODEL)

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

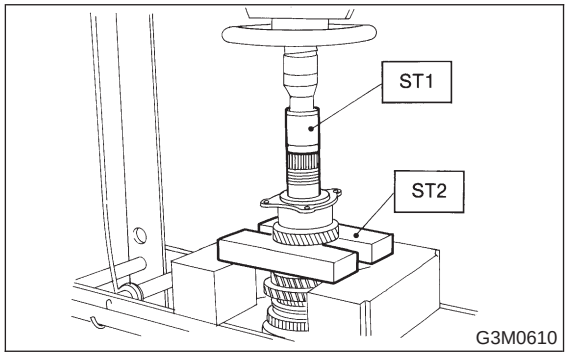


2) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

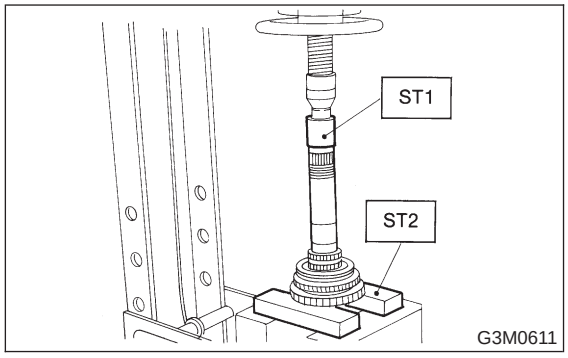


3) Remove woodruff key.

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

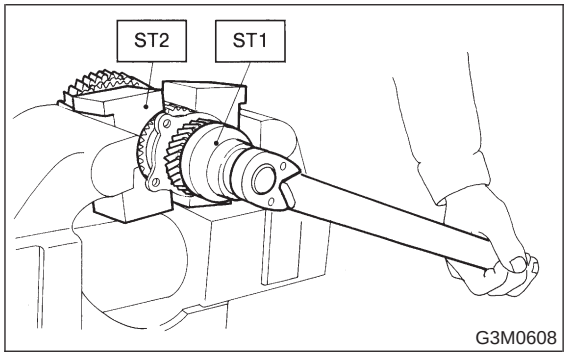


8) Remove sub gears for 1st and 2nd driven gear.

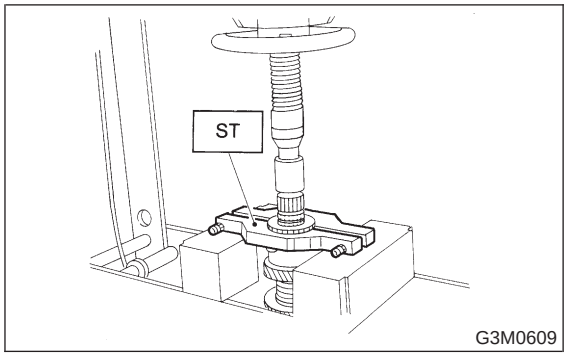
3. DRIVEN GEAR ASSEMBLY (2500 cc MODEL)

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.

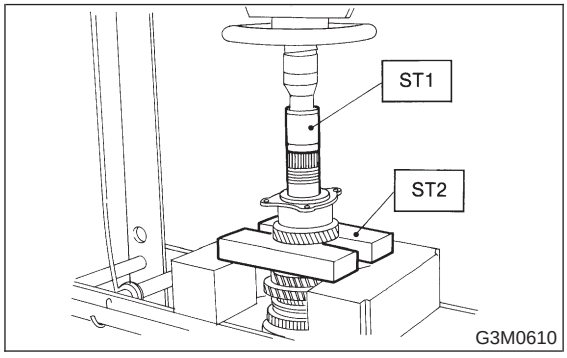
1) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER



2) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

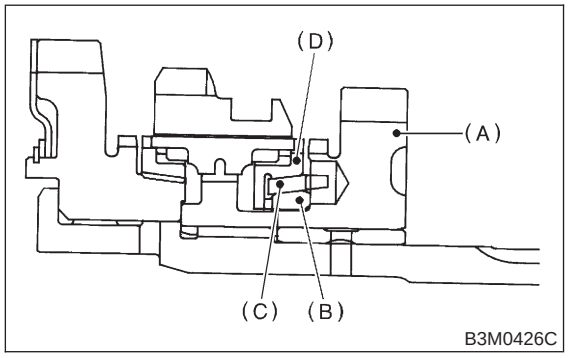


3) Remove woodruff key.
4) Remove roller bearing (42 × 74 × 40), 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER



5) Remove the key.

6) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.

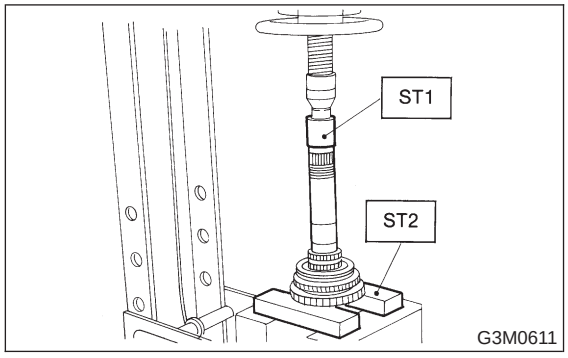


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

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

NOTE:
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

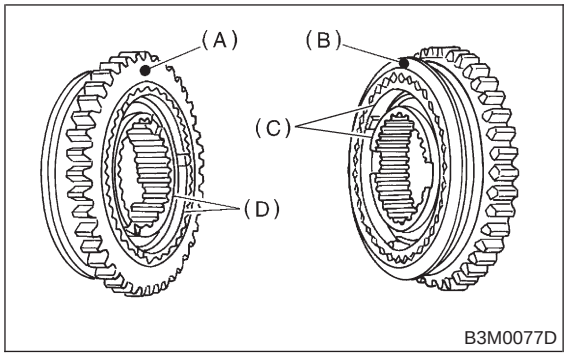


8) Remove sub gear for 1st driven gear.

B: ASSEMBLY

1. GEAR AND HUB ASSEMBLY (2200 cc MODEL)

NOTE:
Position open ends of springs 120° apart.

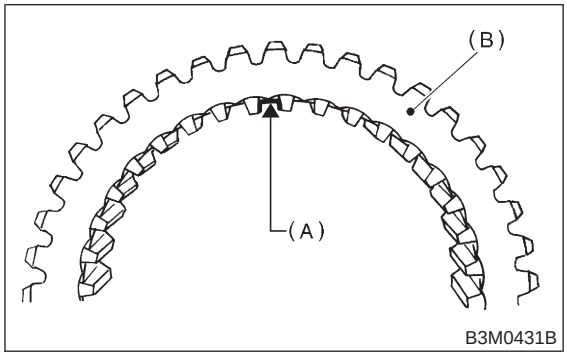


(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

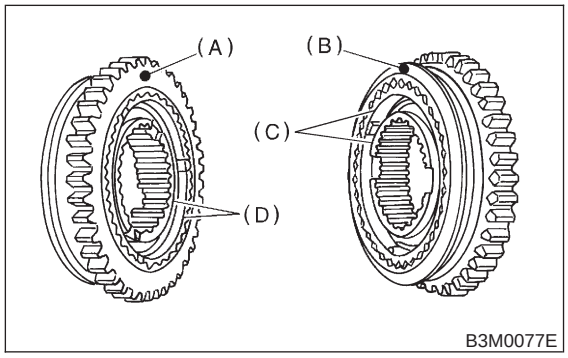
2. GEAR AND HUB ASSEMBLY (2500 cc MODEL)

Assemble gear and hub assembly.

NOTE:
- Use new gear and hub assembly, if gear or hub have been replaced.
- Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.



(A) Key grooves
(B) Reverse driven gear

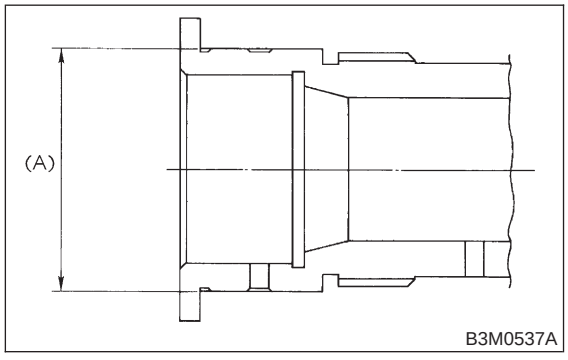


(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

3. DRIVEN GEAR ASSEMBLY (2200 cc MODEL)

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



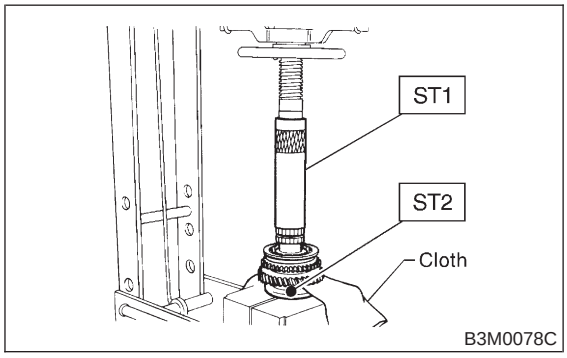
1) Install 1st driven gear, 1st-2nd baulk ring and gear and hub assembly onto driven shaft.

NOTE:
Take care to install gear hub in proper direction.

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

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

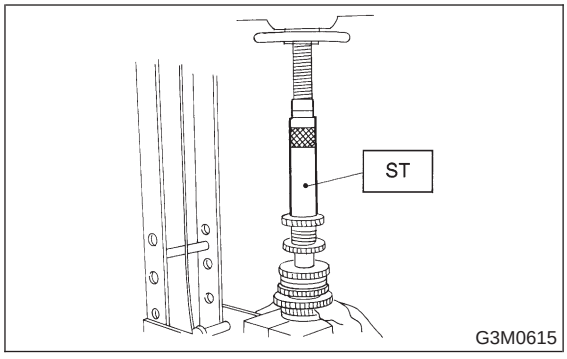
ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



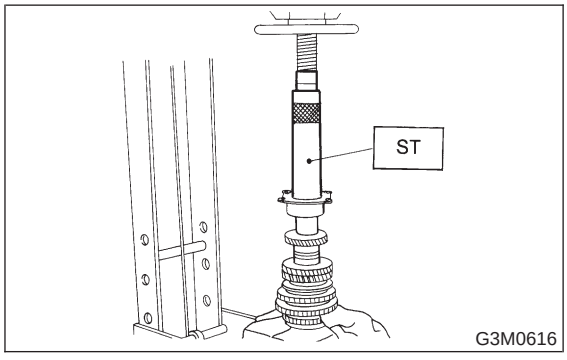
3) Install 2nd driven gear, 1st-2nd baulk ring and insert onto driven shaft. After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

CAUTION:
Align groove in baulk ring with insert.

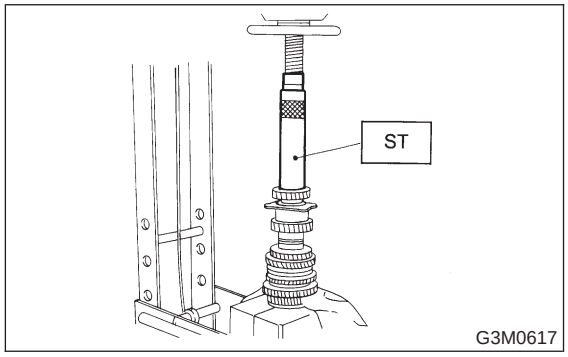
ST 499277200 INSTALLER



4) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.
ST 499277200 INSTALLER

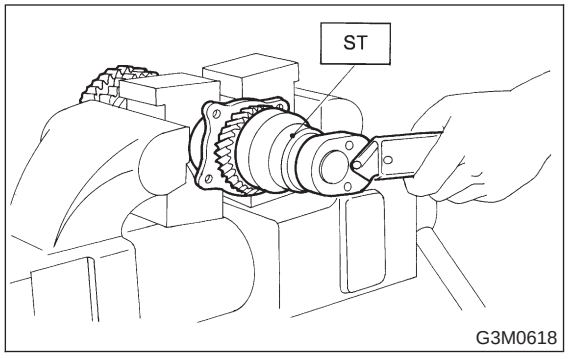


5) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.
ST 499277200 INSTALLER

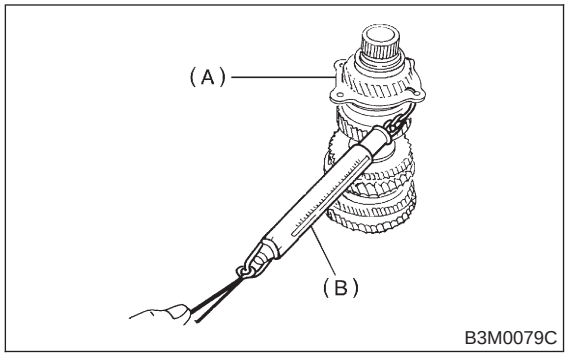


6) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.
ST 499987300 SOCKET WRENCH (50)

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 is 0.1 to 1.5 N·m (0.01 to 0.15 kg-m, 0.07 to 1.1 ft-lb).

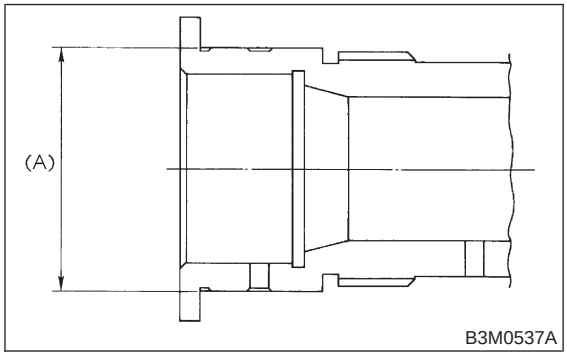


(A) Roller bearing
(B) Spring balancer

4. DRIVEN GEAR ASSEMBLY (2500 cc MODEL)

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)	32231AA290
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA280



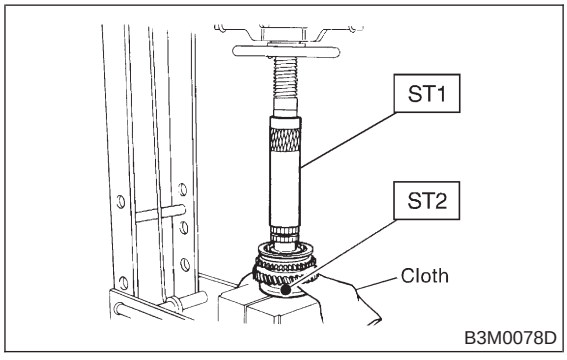
1) Install sub gear to 1st driven gear.
2) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:
Take care to install gear hub in proper direction.

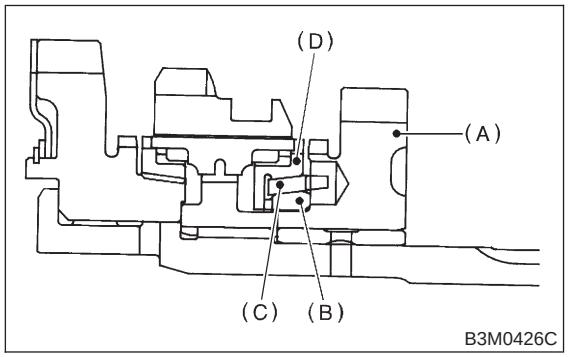
3) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.
ST1 499277200 INSTALLER
ST2 499587000 INSTALLER

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

NOTE:
When press fitting, align oil holes of shaft and bush.



4) Install 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.

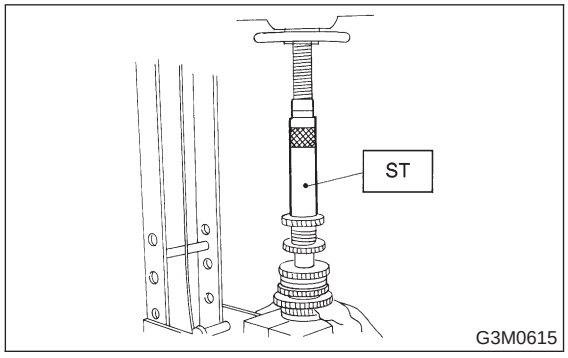


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

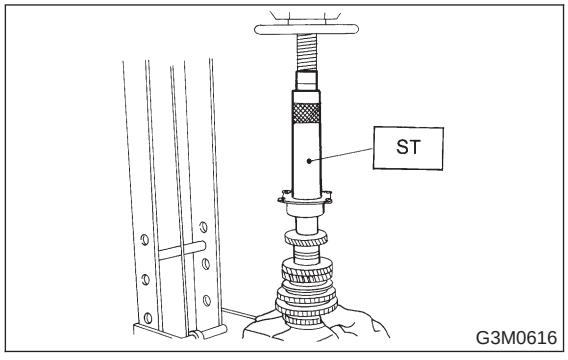
5) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

NOTE:
Align groove in baulk ring with insert.

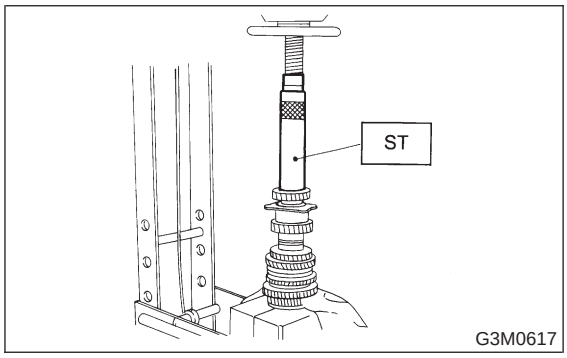
ST 499277200 INSTALLER



6) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.
ST 499277200 INSTALLER

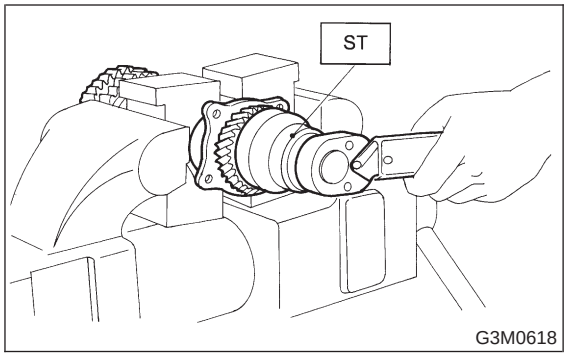


7) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.
ST 499277200 INSTALLER

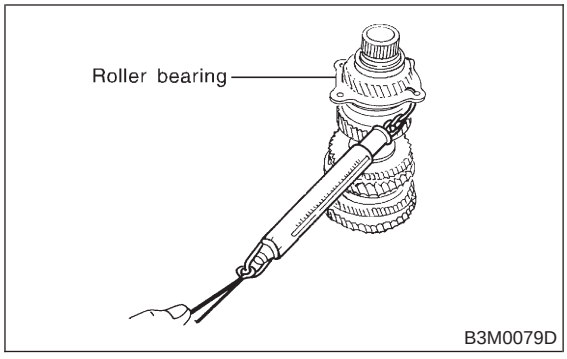


8) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.
ST 499987300 SOCKET WRENCH (50)

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

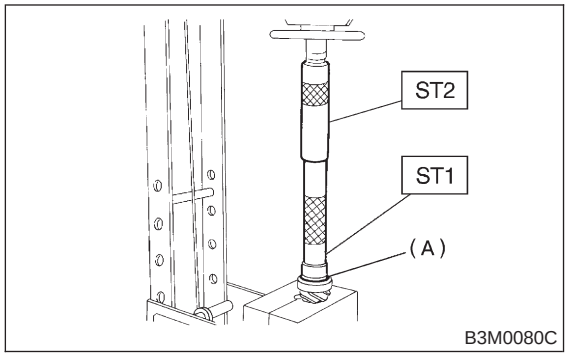


NOTE:
- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N·m (0.01 to 0.15 kg-m, 0.07 to 1.1 ft-lb).



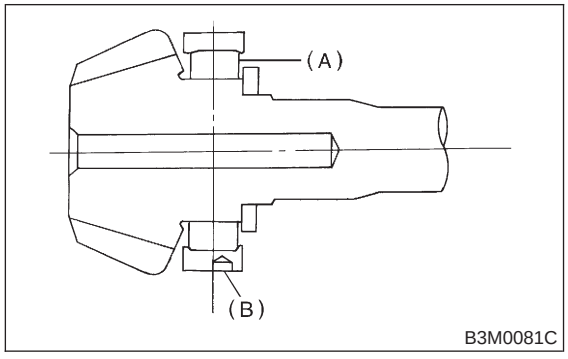
5. DRIVE PINION SHAFT

1) Install roller bearing onto drive pinion. Install washer (33 × 50 × 5) using ST1, ST2 and press.
ST1 499277100 BUSH 1-2 INSTALLER
ST2 499277200 INSTALLER



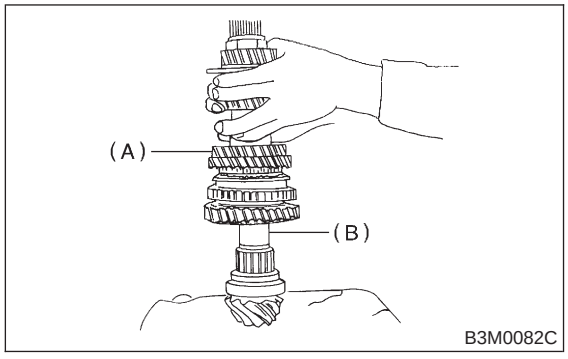
(A) Roller bearing

NOTE:
When installing roller bearing, note its directions (front and rear) because knock pin hole in outer race is offset.



(A) Roller bearing
(B) Knock pin hole

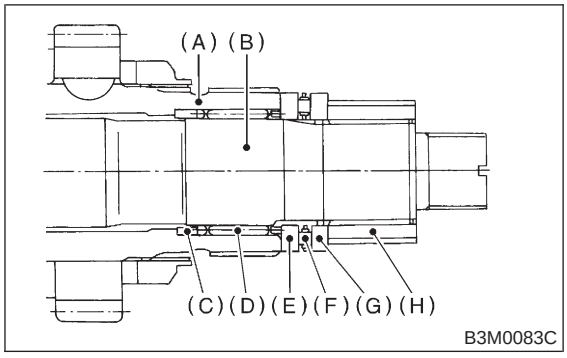
2) Install thrust bearing (33 × 50 × 3) and needle bearing (30 × 37 × 23). Install driven shaft assembly.



(A) Driven shaft
(B) Drive pinion shaft

3) Install drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:
Be careful because spacer must be installed in proper direction.

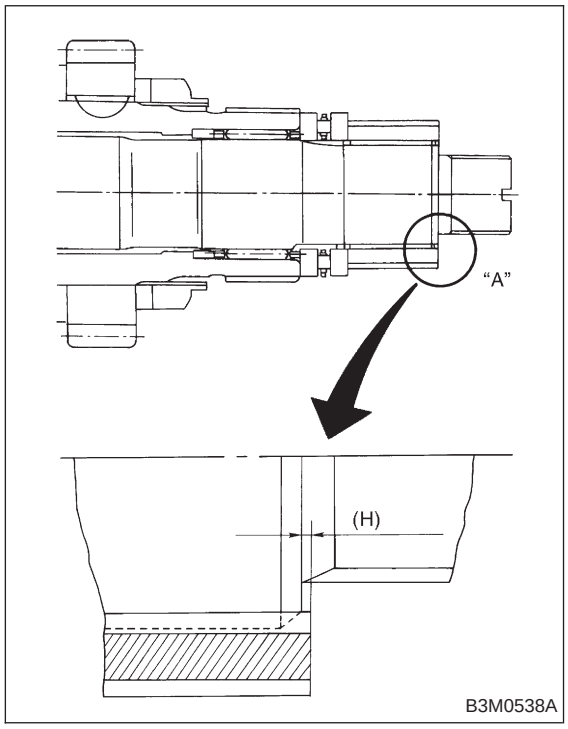


(A) Driven shaft
(B) Drive pinion shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

C: ADJUSTMENT

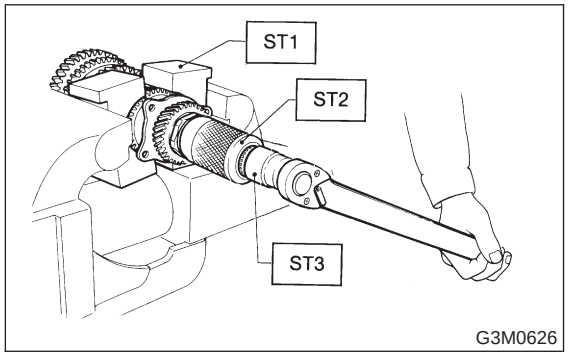
1. ADJUSTMENT OF THRUST BEARING PRELOAD

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 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



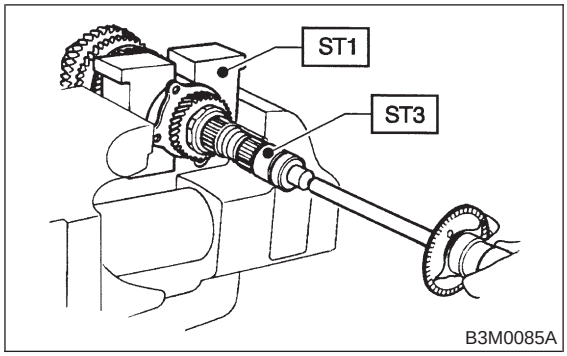
2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)

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



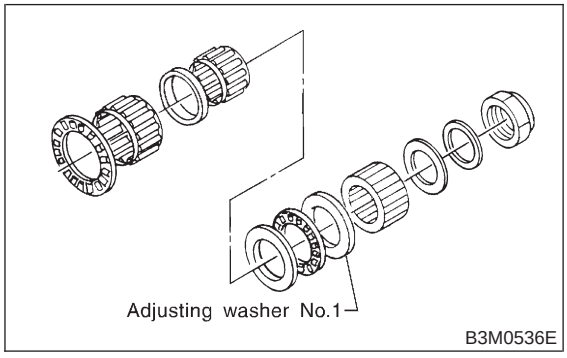
3) After removing ST2, measure starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

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 and recheck starting torque.

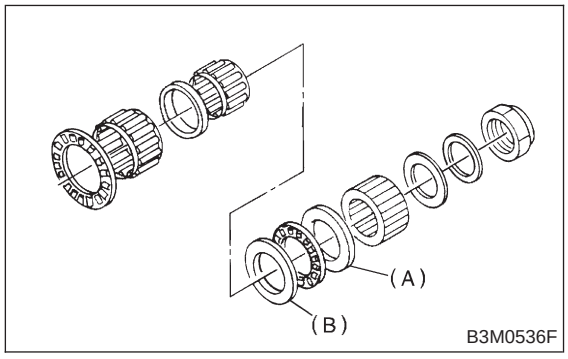
Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)



5) If specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 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)



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

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

4. Main Shaft Assembly

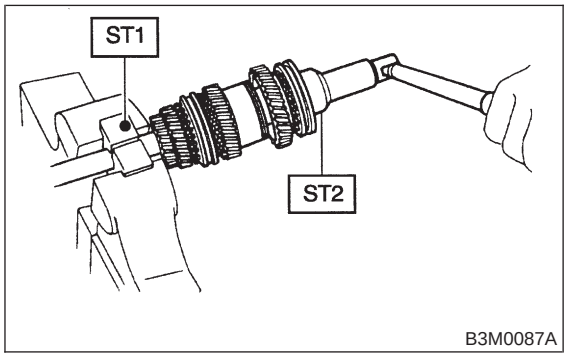
A: DISASSEMBLY

1. 2200 cc MODEL

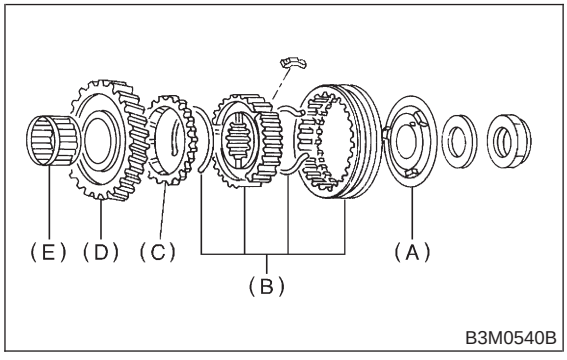
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



3) Remove insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear, and needle bearing.

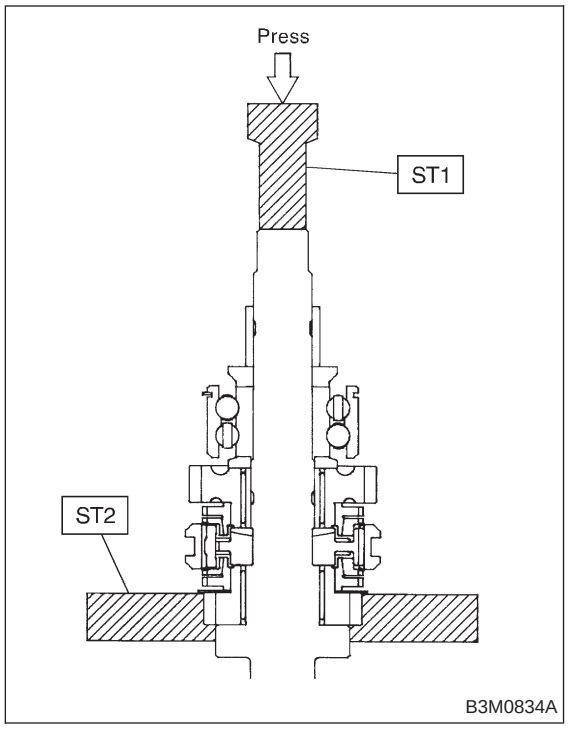


(A) Insert stopper plate
(B) Sleeve and hub ASSY No. 2
(C) Baulk ring
(D) 5th drive gear
(E) Needle bearing (32 × 36 × 25.7)

4) Using ST1, ST2 and a press, remove remaining parts.

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.

ST1 899864100 REMOVER
ST2 899714110 REMOVER



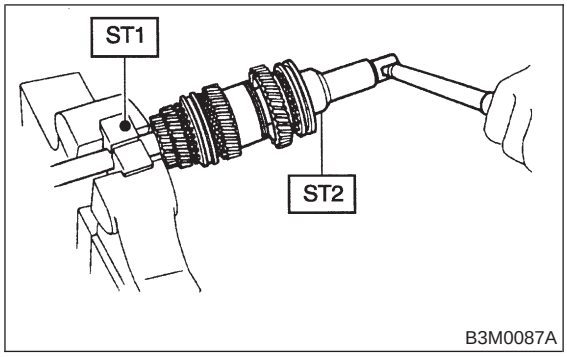
2. 2500 cc MODEL

1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.

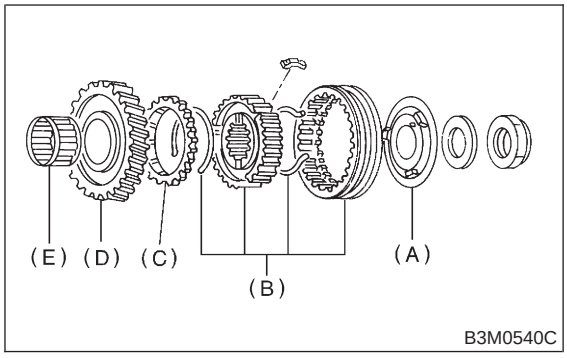
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



3) Remove insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear, and needle bearing.

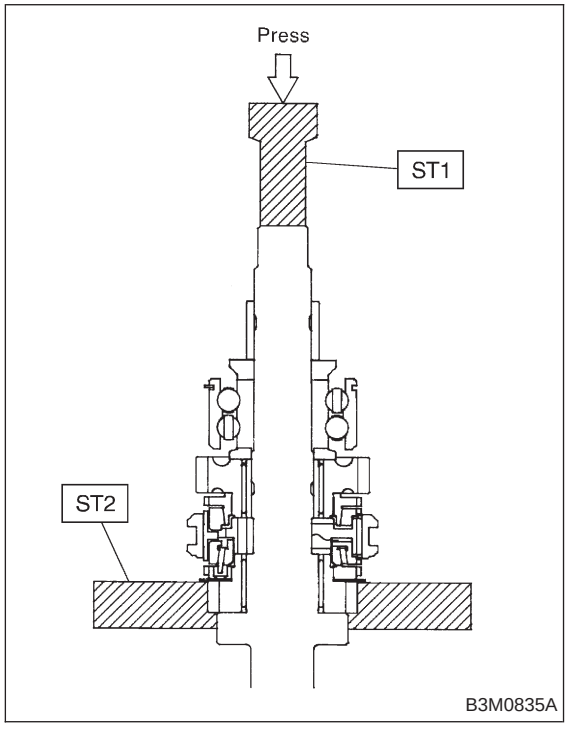


(A) Insert stopper plate
(B) Sleeve and hub assembly No. 2
(C) Baulk ring
(D) 5th drive gear
(E) Needle bearing (32 × 36 × 25.7)

4) Using ST1 and ST2, remove the rest of parts.

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, marking engagement point on splines beforehand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER

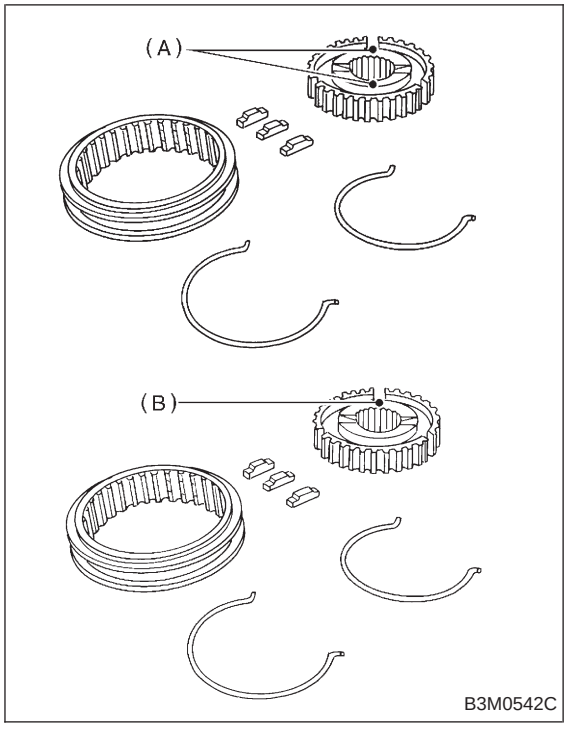


B: ASSEMBLY

1. 2200 cc MODEL

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

NOTE:
Position open ends of spring 120° apart.

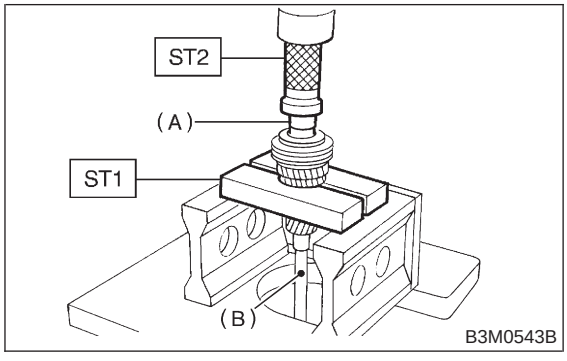


(A) Two holes for discrimination (3rd-4th hub)
(B) One hole for discrimination (5th hub)

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

NOTE:
Align groove in baulk ring with shifting insert.

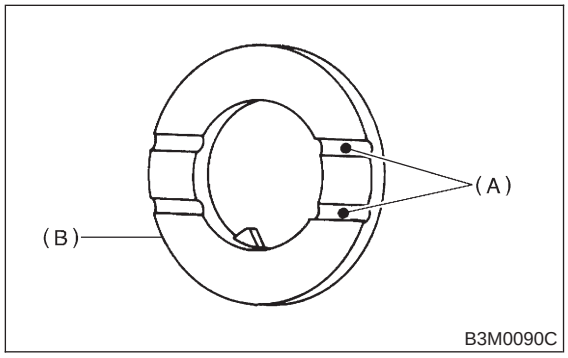
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race
(B) Transmission main shaft

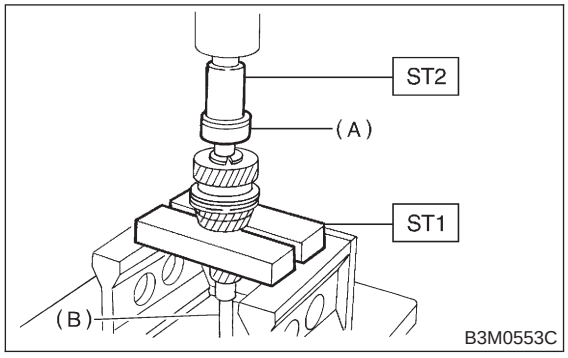
4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Face thrust washer in the correct direction.



(A) Groove
(B) 4th gear side

5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

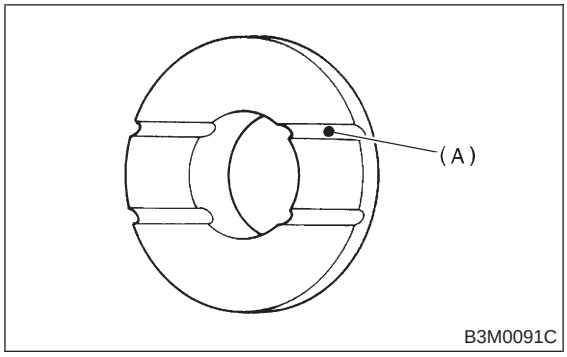


(A) Ball bearing
(B) Transmission main shaft

6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
Face thrust washer in the correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

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

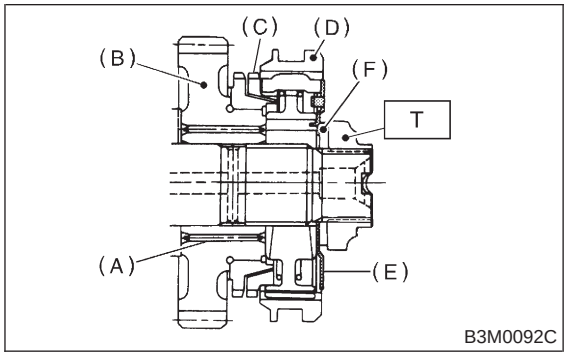
NOTE:
- Align groove in baulk ring with shifting insert.
- Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.

8) Tighten lock nut (22 × 13) to the specified torque using ST1 and ST2.

NOTE:
Secure lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

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

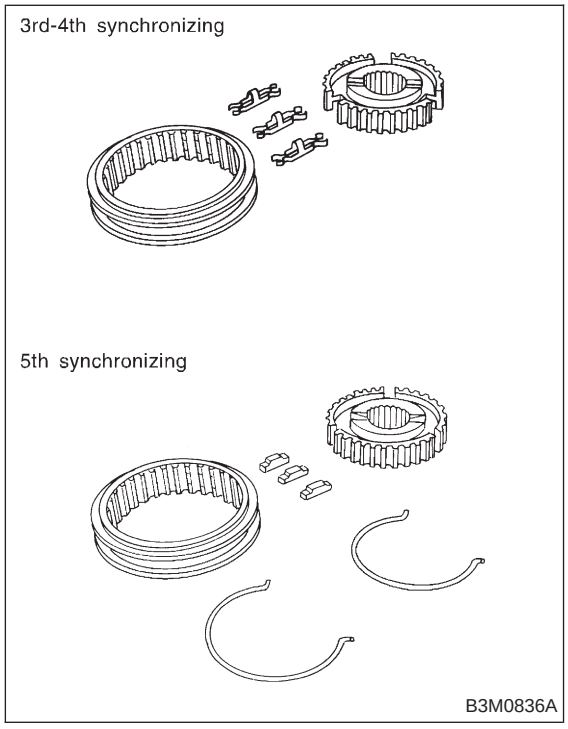


(A) Needle bearing (32 × 36 × 25.7)
(B) 5th drive gear
(C) Baulk ring
(D) Sleeve and hub ASSY
(E) Insert stopper plate
(F) Lock washer (22 × 38 × 2)

2. 2500 cc MODEL

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

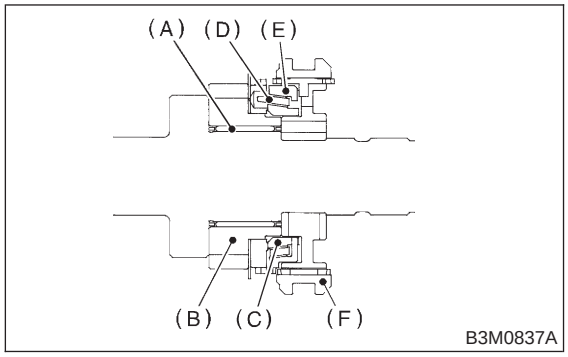
NOTE:
Position open ends of spring 120° apart.



(A) Two holes for discrimination (3rd-4th hub)
(B) One hole for discrimination (5th hub)

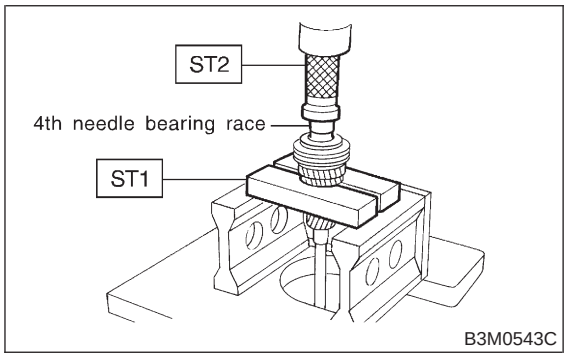
2) Install 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

NOTE:
Align groove in baulk ring with insert key.

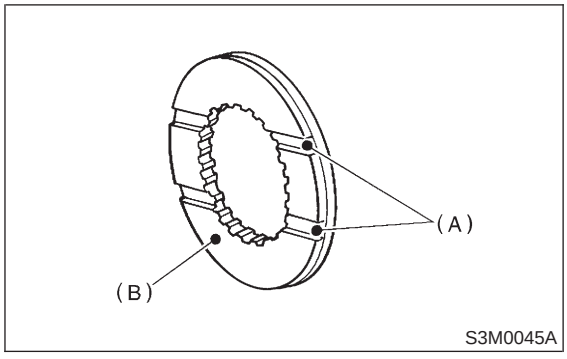


(A) 3rd needle bearing (32 × 36 × 25.7)
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve and hub ASSY

3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

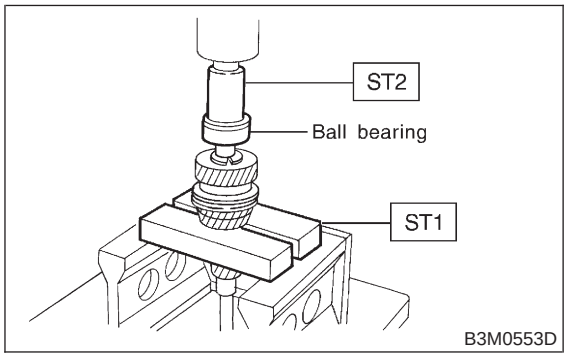


4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.



(A) Groove
(B) 4th gear side

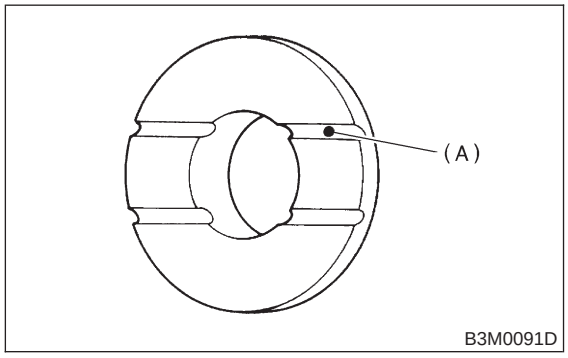
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
Face thrust washer in the correct direction.

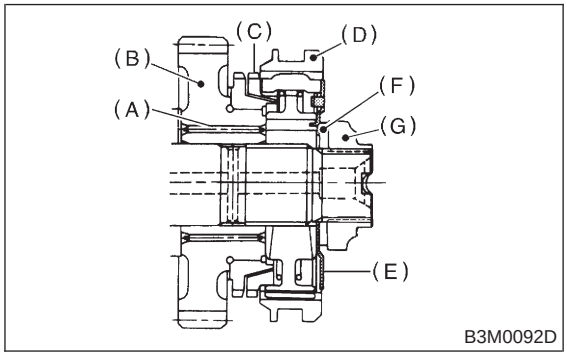
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

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

NOTE:
- Align groove in baulk ring with shifting insert.
- Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.



(A) Needle bearing (32 × 36 × 25.7)
(B) 5th drive gear
(C) Baulk ring
(D) Sleeve and hub assembly
(E) Insert stopper plate
(F) Lock washer (22 × 38 × 2)
(G) Lock nut

8) Tighten lock nuts (22 × 13) to the specified torque using ST1 and ST2.

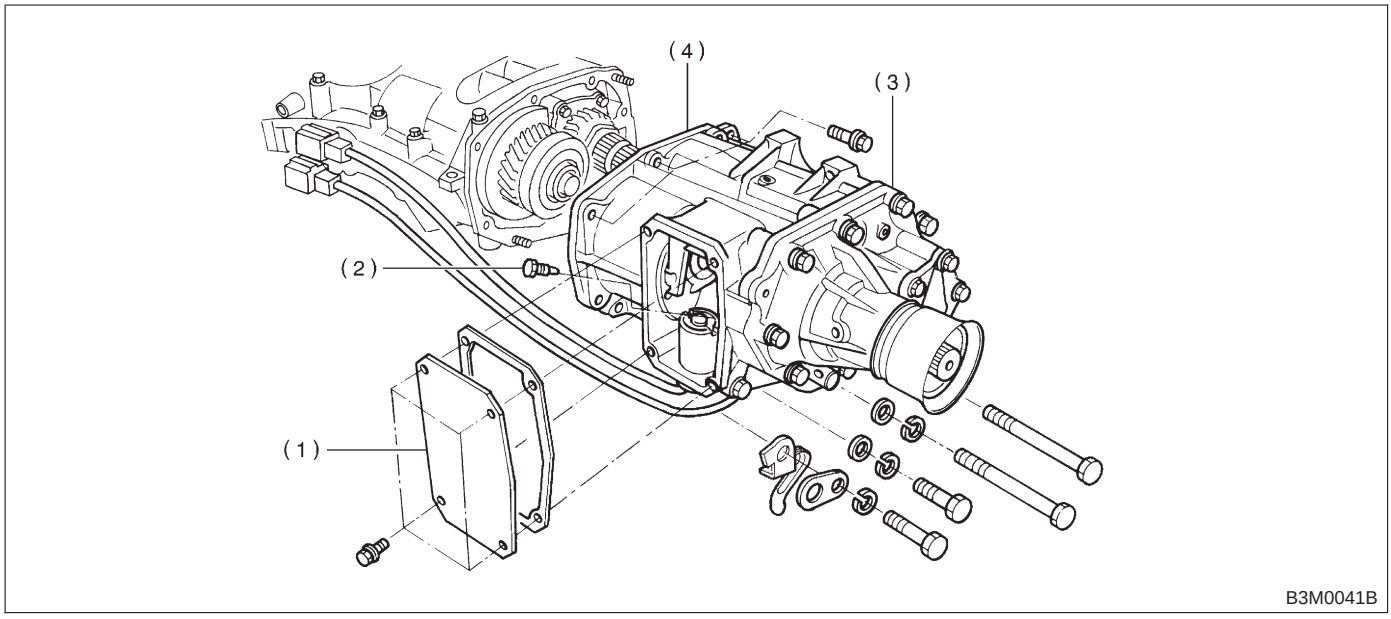
NOTE:
Secure lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

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

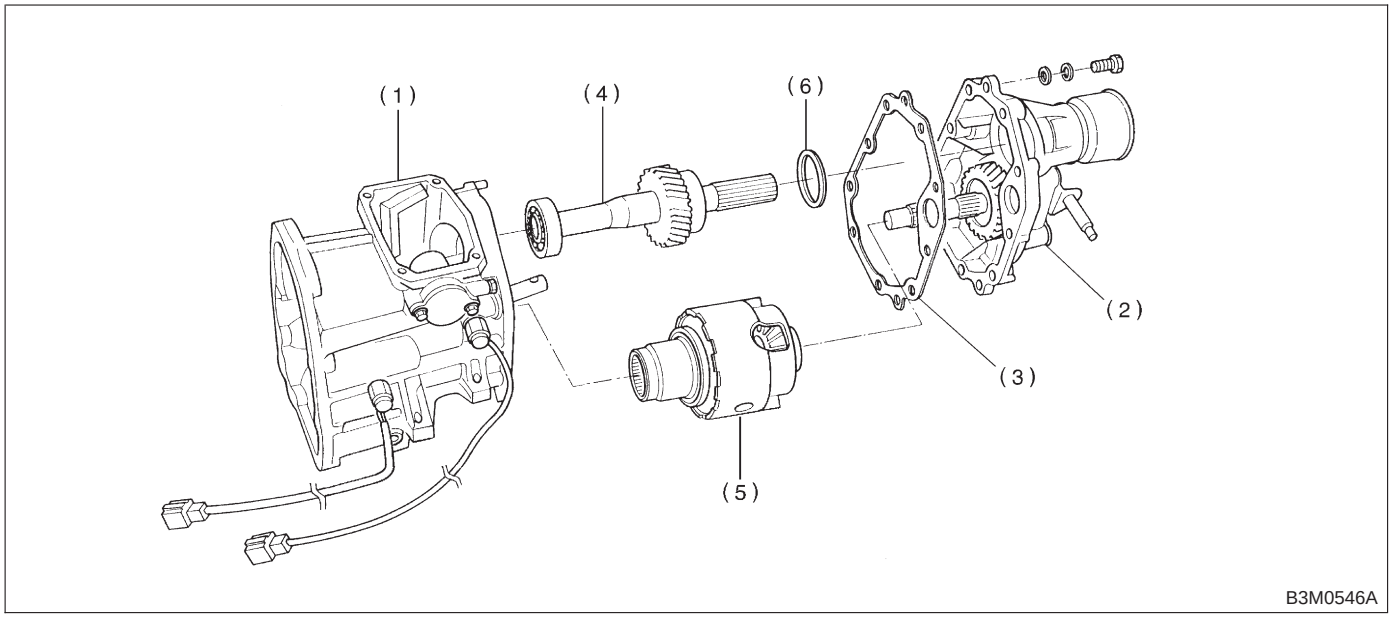


(1) Transfer cover
(2) Shifter fork screw
(3) Transfer case ASSY
(4) Extension ASSY

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

B: DISASSEMBLY

1. SEPARATION OF TRANSFER CASE AND EXTENSION ASSEMBLY



(1) Transfer case ASSY
(2) Extension ASSY
(3) Gasket
(4) Transfer driven gear
(5) Center differential
(6) Thrust washer

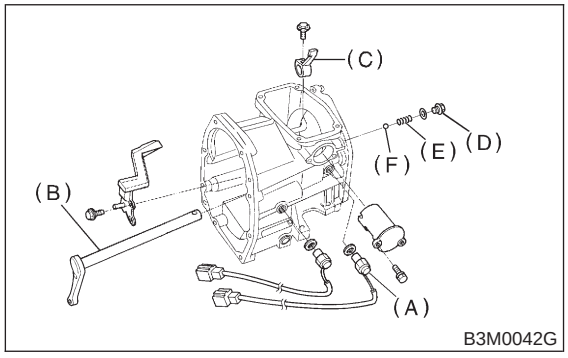
1) Separate transfer case and extension assembly.
2) Remove transfer driven gear and center differential as a set.
3) Remove thrust washer (52 × 61 × t).

2. TRANSFER CASE

1) Remove neutral switch.

NOTE:
Before removing shifter arm, disconnect neutral switch.

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



(A) Neutral switch
(B) Shifter arm
(C) Selector arm
(D) Plug
(E) Spring
(F) Reverse check ball

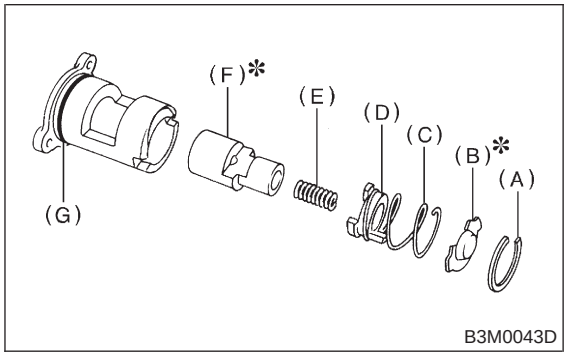
4) Remove reverse check sleeve.
Disassembly procedure is as follows:

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

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

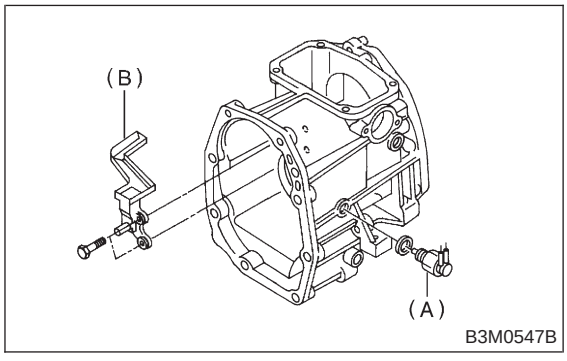
(2) Remove reverse check plate.
(3) Remove reverse check spring with cam.
(4) Remove reverse return spring.
(5) Remove reverse accent shaft.
(6) Remove O-ring.

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.



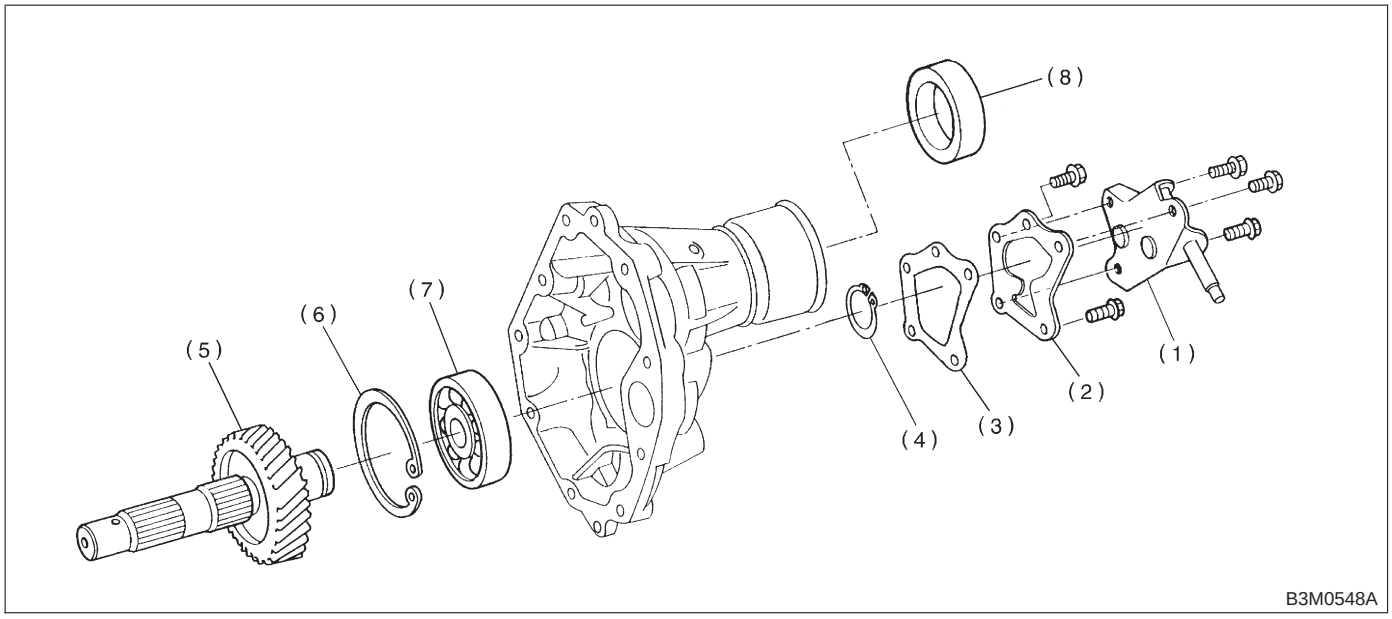
(A) Snap ring
(B) Reverse check plate
(C) Reverse check spring
(D) Reverse check cam
(E) Reverse return spring
(F) Reverse accent shaft
(G) O-ring

5) Remove back-up light switch.
6) Remove oil guide.



(A) Back-up light switch
(B) Oil guide

3. EXTENSION



(1) Shift bracket
(2) Extension
(3) Gasket
(4) Snap ring
(5) Transfer driven gear
(6) Snap ring
(7) Ball bearing
(8) Oil seal

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

CAUTION:
Do not remove ball bearing unless replacing.

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

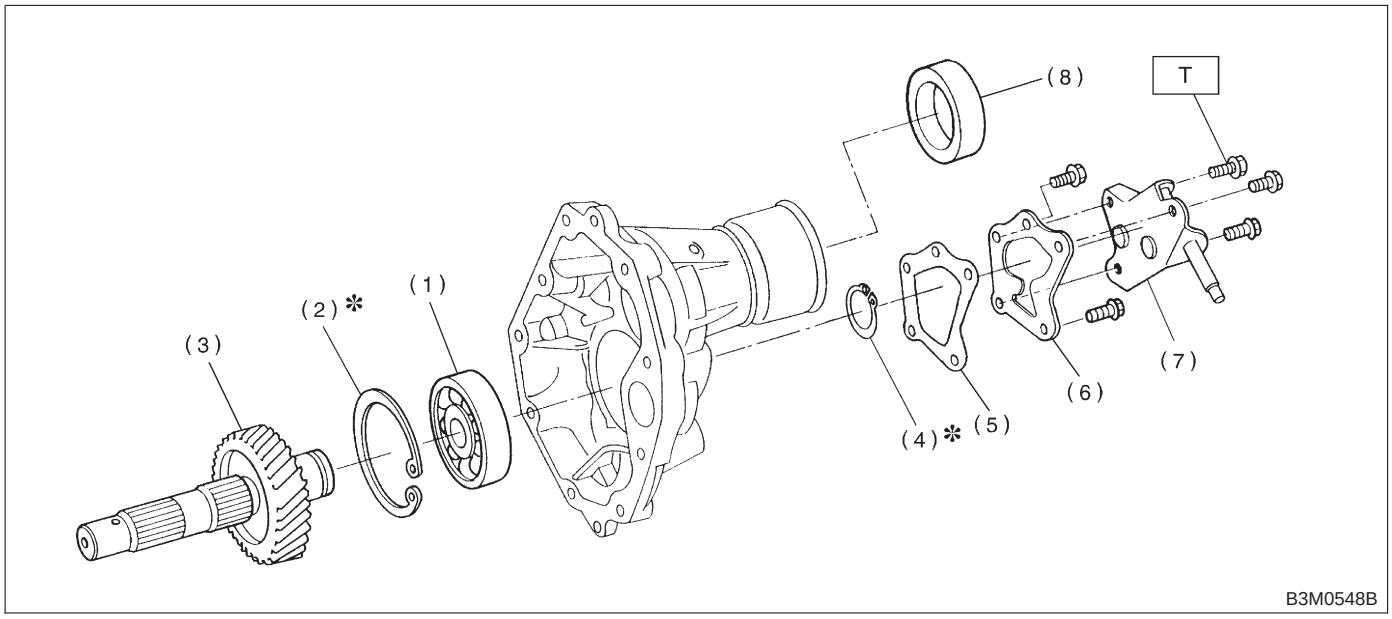
CAUTION:
Do not reuse ball bearing.

6) Remove oil seal.

CAUTION:
Do not reuse oil seal.

C: ASSEMBLY

1. EXTENSION



(1) Ball bearing
(2) Snap ring
(3) Transfer driven shaft
(4) Snap ring
(5) Gasket
(6) Extension cover
(7) Shift bracket
(8) Oil seal

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

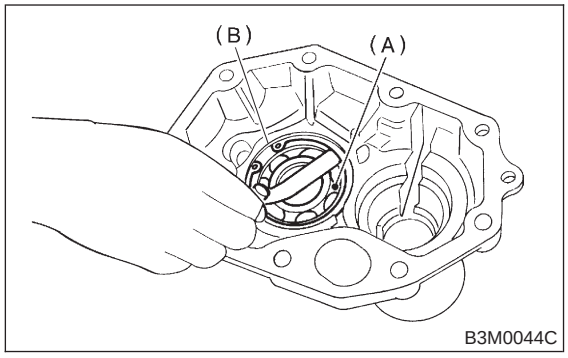
1) Installation of ball bearing and selection of snap ring (Inner-72)

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

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

CAUTION:
Replace ball bearing with a new one.

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



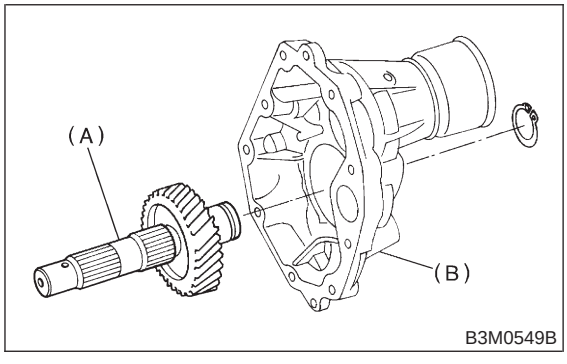
(A) Snap ring
(B) Ball bearing

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

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

Press transfer drive gear into inner race of ball bearing.



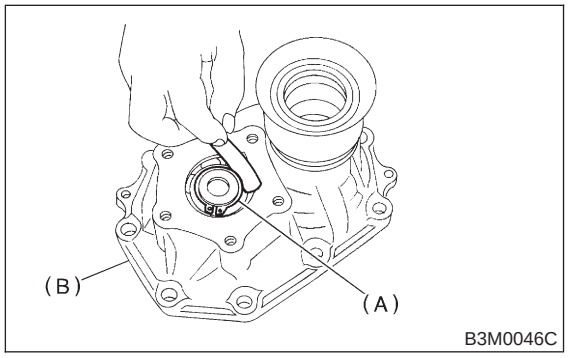
(A) Transfer drive gear
(B) Extension

3) Selection of snap ring (Outer-30)

(1) Install snap ring 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)



(A) Snap ring
(B) Extension

(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, gasket and shift bracket.

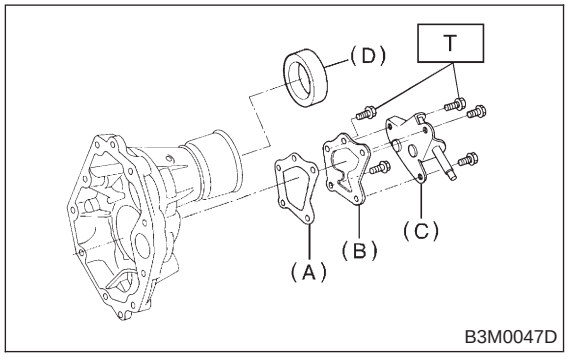
CAUTION:
Use new gasket.

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

5) Install oil seal with ST.

CAUTION:
Use new oil seal.

ST 498057300 INSTALLER



(A) Gasket
(B) Extension cover
(C) Shift bracket
(D) Oil seal

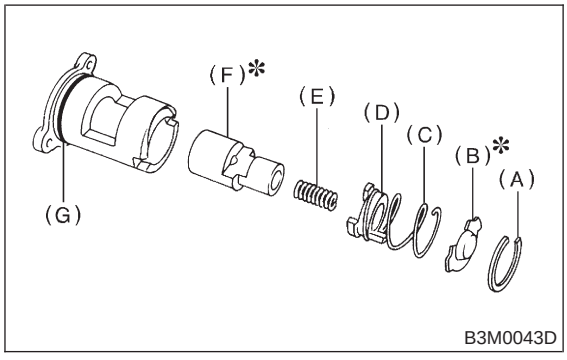
2. TRANSFER CASE

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, check cam, return spring and check spring onto reverse check sleeve.

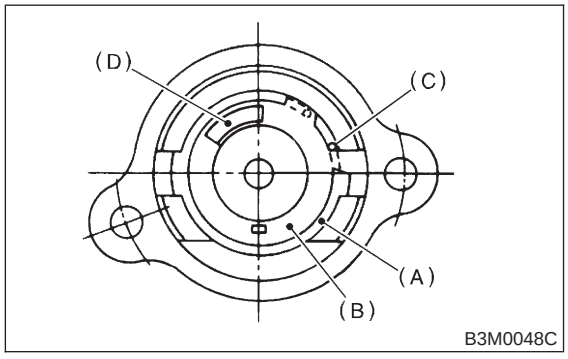
NOTE:
Be sure the bent section of reverse check spring is positioned in the groove in check cam.

(2) Hook the bent section of reverse check spring over reverse check plate.
(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 (Inner-28).
(5) Position O-ring in groove in sleeve.



(A) Snap ring
(B) Reverse check plate
(C) Reverse check spring
(D) Reverse return cam
(E) Reverse return spring
(F) Reverse accent shaft
(G) O-ring (35.4 × 1.5)

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.



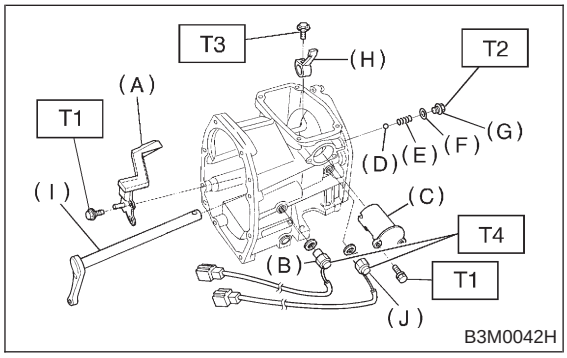
(A) Snap ring
(B) Reverse check plate
(C) Reverse check spring
(D) Reverse check cam

● Select a suitable reverse accent shaft and reverse check plate. <Ref. to 3-1 [W5E0].>

2) Installation of shifter arm and selector arm
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.

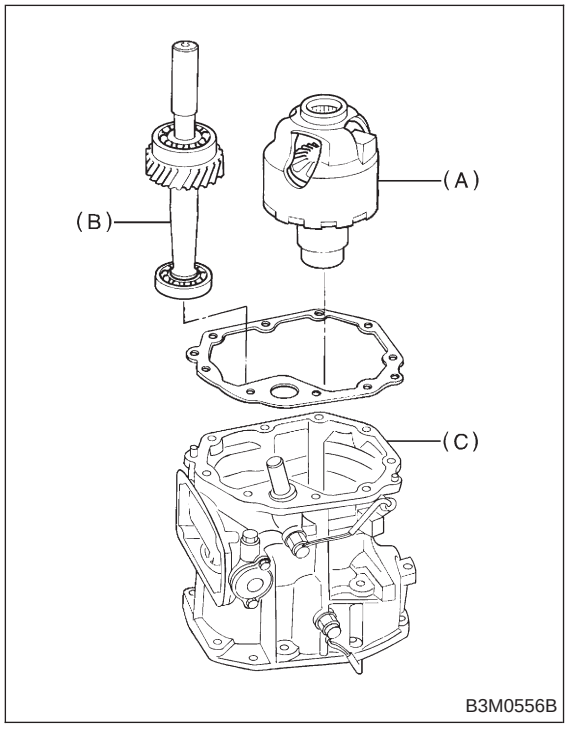
Tightening torque:
T1: 6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)
T2: 10±1 N·m (1.0±0.1 kg-m, 7.2±0.7 ft-lb)
T3: 19.6±1.5 N·m (2.00±0.15 kg-m, 14.5±1.1 ft-lb)
T4: 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



(A) Oil guide
(B) Back-up light switch
(C) Reverse check sleeve
(D) Ball
(E) Reverse accent spring
(F) Washer
(G) Plug
(H) Selector arm
(I) Shifter arm
(J) Neutral switch

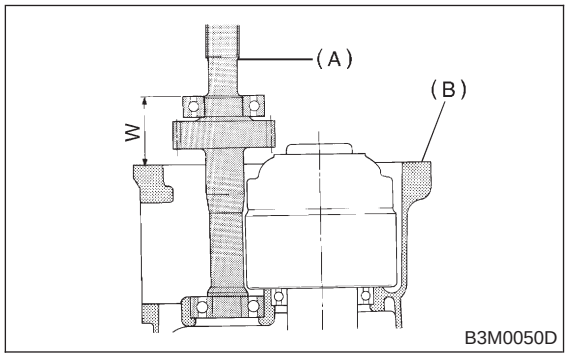
3. COMBINATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

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



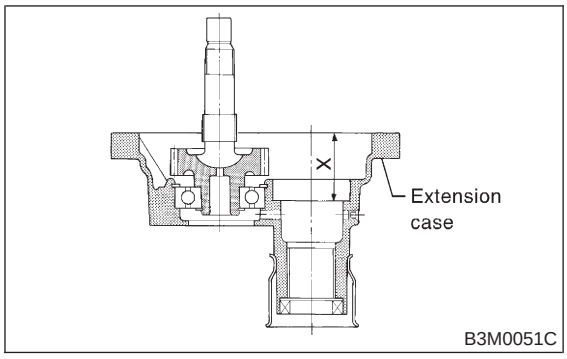
(A) Center differential
(B) Transfer driven gear
(C) Transfer case

2) Selection of thrust washer (52 × 61 × t)
(1) Measure height "W" between transfer case and ball bearing on the transfer driven gear.



(A) Transfer driven gear
(B) Transfer case

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



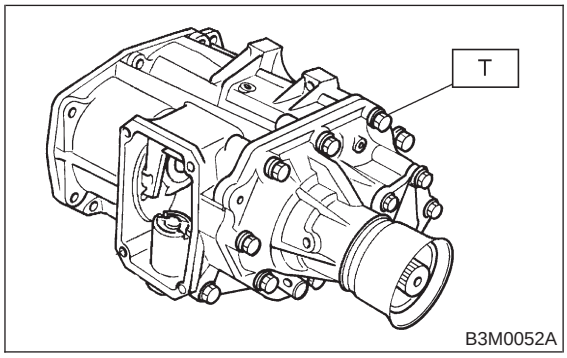
(3) Calculate space "Y" using the following equation: Y = X − W + 0.24 mm (0.0094 in) [Thickness of gasket]
(4) Select suitable washer in the following table:

Space "Y" mm (in)	Thrust washer (52 × 61 × 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)

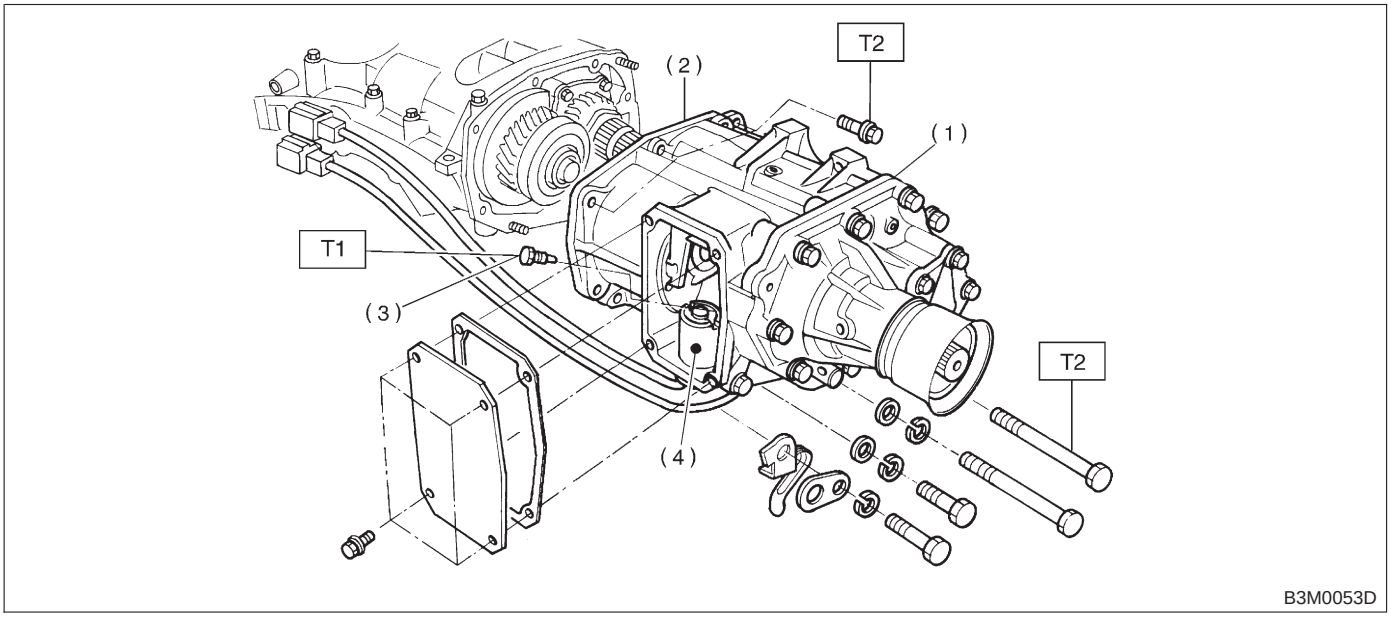
Standard clearance between thrust washer and ball bearing:
0.05 — 0.30 mm (0.0020 — 0.0118 in)

(5) Fit thrust washers on transfer drive shaft.
3) Install extension assembly into transfer case.

Tightening torque:
T: 37±3 N·m (3.8±0.3 kg-m, 27.5±2.2 ft-lb)



D: INSTALLATION



(1) Extension case
(2) Transfer case
(3) Shifter fork screw
(4) Reverse check sleeve

Tightening torque: N·m (kg-m, ft-lb)
T1: 19.6±1.5 (2.00±0.15, 14.5±1.1)
T2: 24.5±2.0 (2.50±0.20, 18.1±1.4)

1) Install transfer case with extension assembly.
2) Secure selector arm to shifter arm with shifter fork screw. Shifter arm should be caught by pawl of rod. Selector arm must be engaged with reverse check sleeve assembly.

E: ADJUSTMENT

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 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).

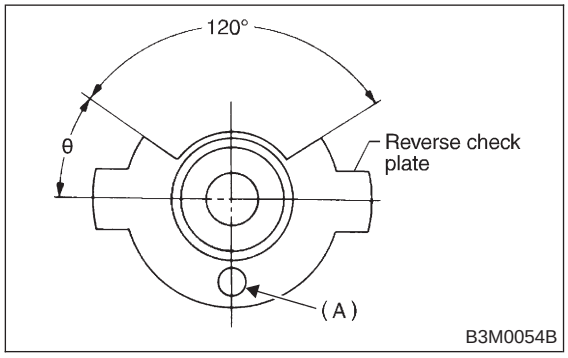
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

- 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.

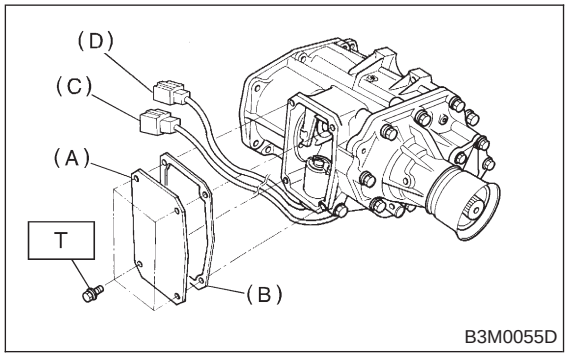
5) Reverse check plate adjustment
Shift shifter arm to “5th” and then to reverse to see if reverse check mechanism operates properly. Also check to see if arm returns to neutral when released from the reverse position. If arm does not return properly, replace reverse check plate.

Reverse check plate			
Part No.	(A): 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.



6) Install transfer cover and gasket, and connect each connector.

Tightening torque:
T: 15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)



(A) Transfer cover
(B) Gasket
(C) Neutral position switch connector
(D) Back-up light switch connector

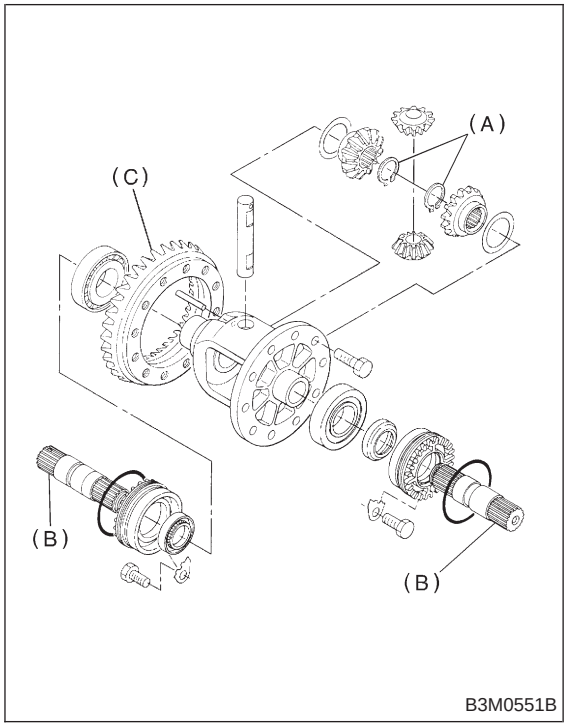
6. Front Differential

A: DISASSEMBLY

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

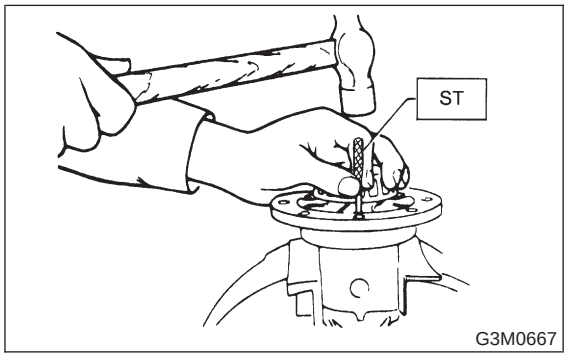
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts and remove hypoid drive gear.

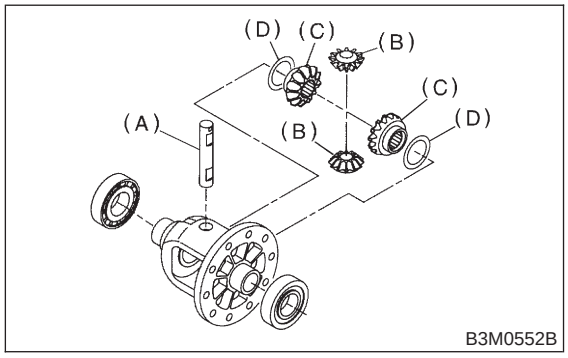


(A) Snap ring
(B) Axle drive shaft
(C) Hypoid drive gear

3) Drive out straight pin from differential assembly toward hypoid driven gear.
ST 899904100 REMOVER

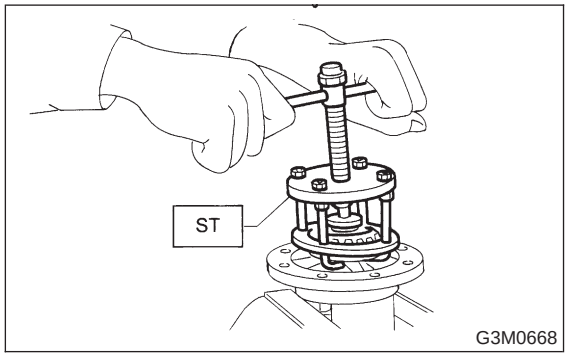


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



(A) Pinion shaft
(B) Differential bevel pinion
(C) Differential bevel gear
(D) Washer

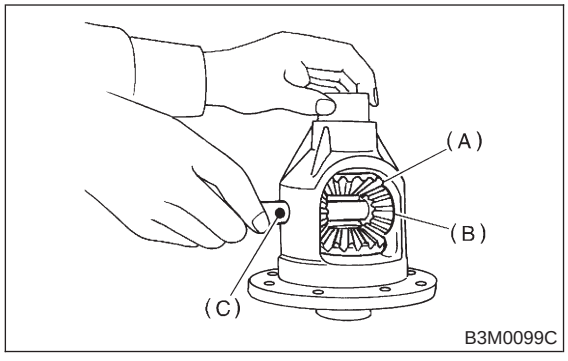
5) Remove roller bearing using ST.
ST 399527700 PULLER SET



B: ASSEMBLY

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

NOTE:
Face the chamfered side of washer toward gear.



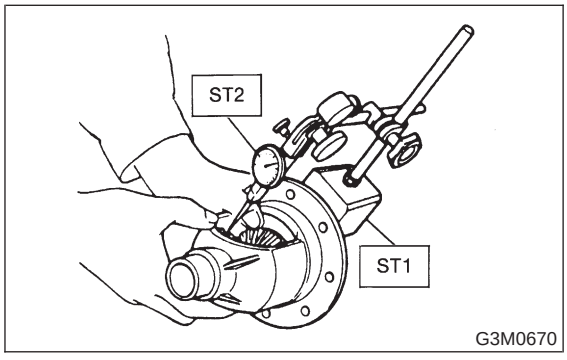
(A) Differential bevel gear
(B) Differential bevel pinion
(C) Pinion shaft

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

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

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

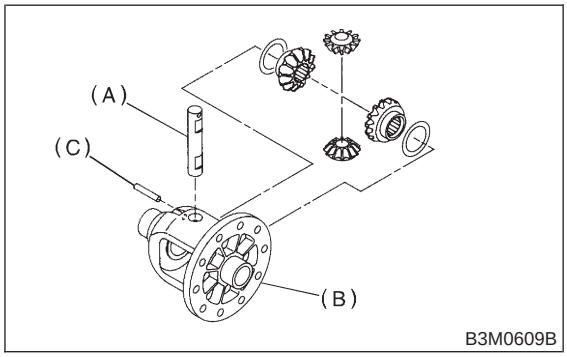


Washer (38.1 × 50 × t)	
Part No.	Thickness mm (in)
803038021	0.925 — 0.95 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

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

NOTE:
Lock straight pin after installing.

ST 899904100 REMOVER

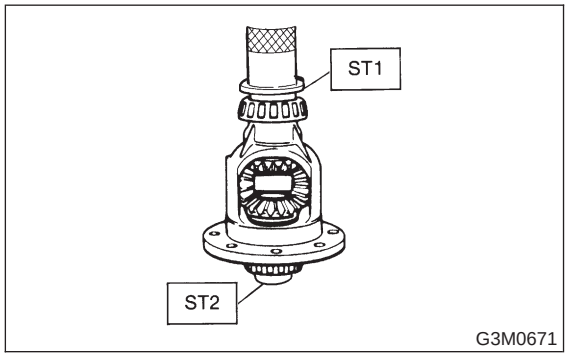


(A) Pinion shaft
(B) Differential case
(C) Straight pin

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

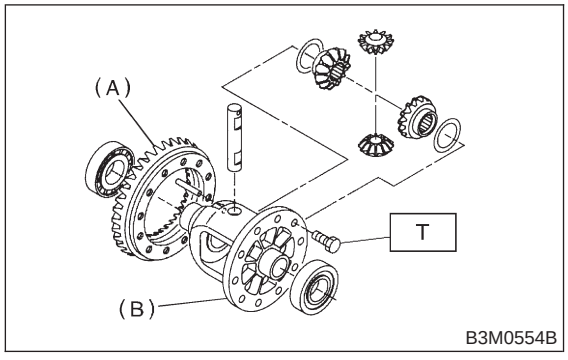
NOTE:
Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER
ST2 398497701 ADAPTER



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

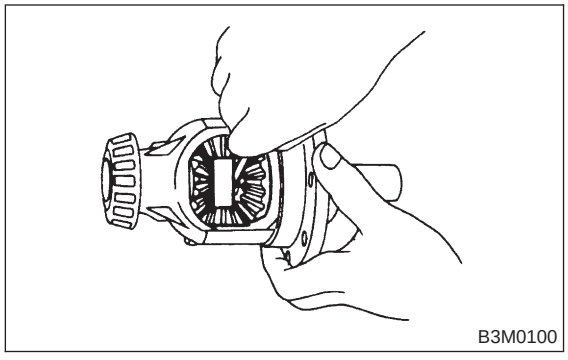
Tightening torque:
T: 62±5 N·m (6.3±0.5 kg-m, 45.6±3.6 ft-lb)



(A) Hypoid driven gear
(B) Differential case

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

Clearance:
0 — 0.2 mm (0 — 0.008 in)

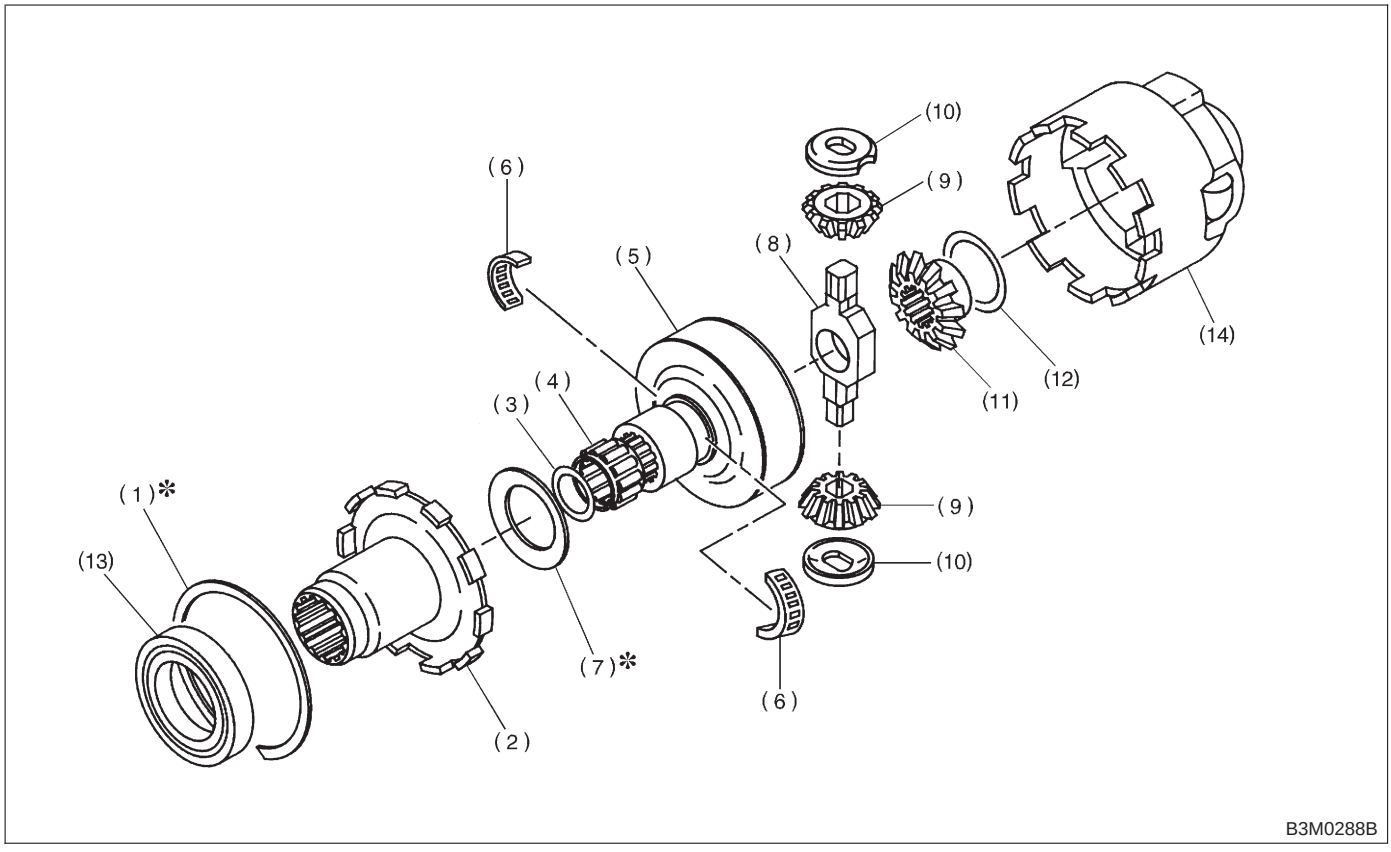


7) If it is not within specifications, replace snap ring with a suitable one.

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

7. Center Differential

A: DISASSEMBLY

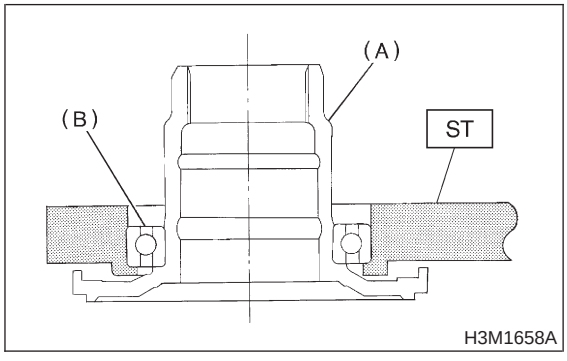


(1) Snap ring
(2) Center differential cover
(3) Roller bearing
(4) Snap ring
(5) Viscous coupling
(6) Needle bearing
(7) Adjusting washer
(8) Pinion shaft
(9) Bevel pinion
(10) Retainer
(11) Side gear
(12) Thrust washer
(13) Ball bearing
(14) Center differential case

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

CAUTION:
Do not reuse ball bearing.

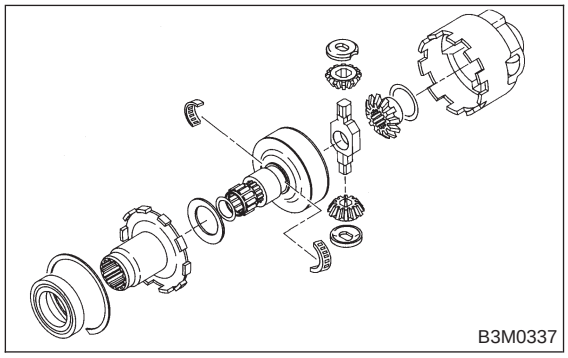
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



(A) Center differential cover
(B) Ball bearing

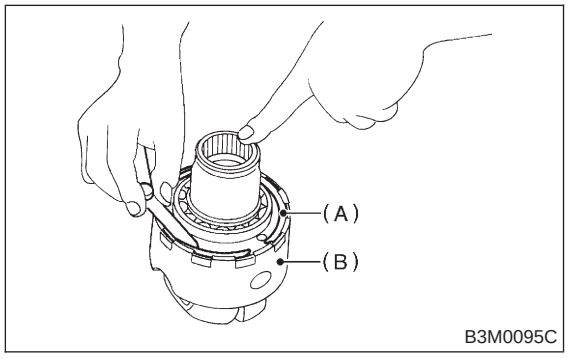
B: ASSEMBLY

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 and center differential case.

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



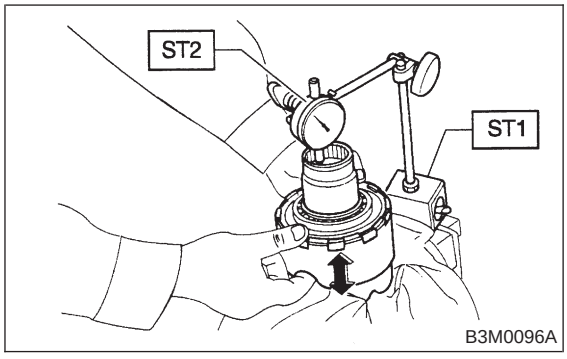
(A) Snap ring
(B) Center differential case

(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 × 62 × 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

Symptom and possible cause	Remedy
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.	
(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
(b) Worn, damaged or burred chamfer of spline of gears	Replace.
(c) Worn or scratched bushings	Replace.
(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out.	
(1) Gear slips out when coasting on rough road.	
(2) Gear slips out during acceleration.	
(a) Defective pitching stopper adjustment	Adjust.
(b) Loose engine mounting bolts	Tighten or replace.
(c) Worn fork shifter, broken shifter fork rail spring	Replace.
(d) Worn or damaged ball bearing	Replace.
(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
(g) Worn 1st driven gear, needle bearing and race	Replace.
(h) Worn 2nd driven gear, needle bearing and race	Replace.
(i) Worn 3rd drive gear and bushing	Replace.
(j) Worn 4th drive gear and bushing	Replace.
(k) Worn reverse idler gear and bushing	Replace.
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.	
(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
(b) Worn or damaged gears and bearings	Replace.
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.	

2. Differential

Symptom and possible cause	Remedy
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.	
(a) Insufficient or improper oil	Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
(c) Improper adjustment of taper roller bearing	Adjust.
(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
(e) Excessive backlash due to worn differential side gear, washer or differential pinion	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.

Symptom and possible cause	Remedy
(f) Loose hypoid driven gear clamping bolts	Tighten.
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.	
(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.	
(2) Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment	
(3) Bearing noise when driving or when coasting: Cracked, broken or damaged bearings	
(4) Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.	
(a) Insufficient oil	Lubricate.
(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
(e) Distorted hypoid driven gear or differential case	Replace.
(f) Worn washer and differential pinion shaft	Replace.

AUTOMATIC TRANSMISSION AND DIFFERENTIAL 3-2

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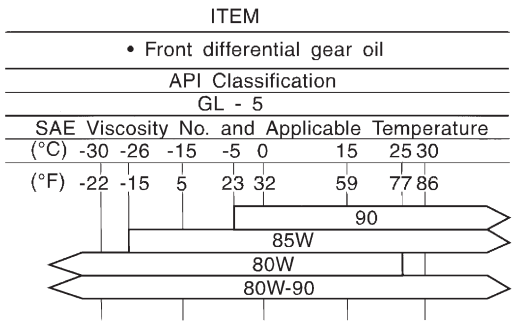
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1. Automatic Transmission and Differential

A: SPECIFICATIONS

Torque converter clutch	Type		Symmetric, 3 element, single stage, 2 phase torque converter		
	Stall torque ratio	2200 cc	2.1 — 2.3		
		2500 cc	1.8 — 2.0		
	Nominal diameter	2200 cc	236 mm (9.29 in)		
		2500 cc	246 mm (9.69 in)		
	Stall speed (at sea level)	2200 cc	2,200 — 2,600 rpm		
		2500 cc	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	2200 cc	2.785
				2500 cc	3.027
			2nd	2200 cc	1.545
				2500 cc	1.619
			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	2200 cc	42
				2200 cc	37
			Rear pinion	2200 cc	17
				2500 cc	19
			Rear internal gear		75
		Clutch number of reverse clutch	Drive plate & driven plate		2
		Clutch number of high clutch	Drive plate & driven plate		2200 cc ... 4 2500 cc ... 5
		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

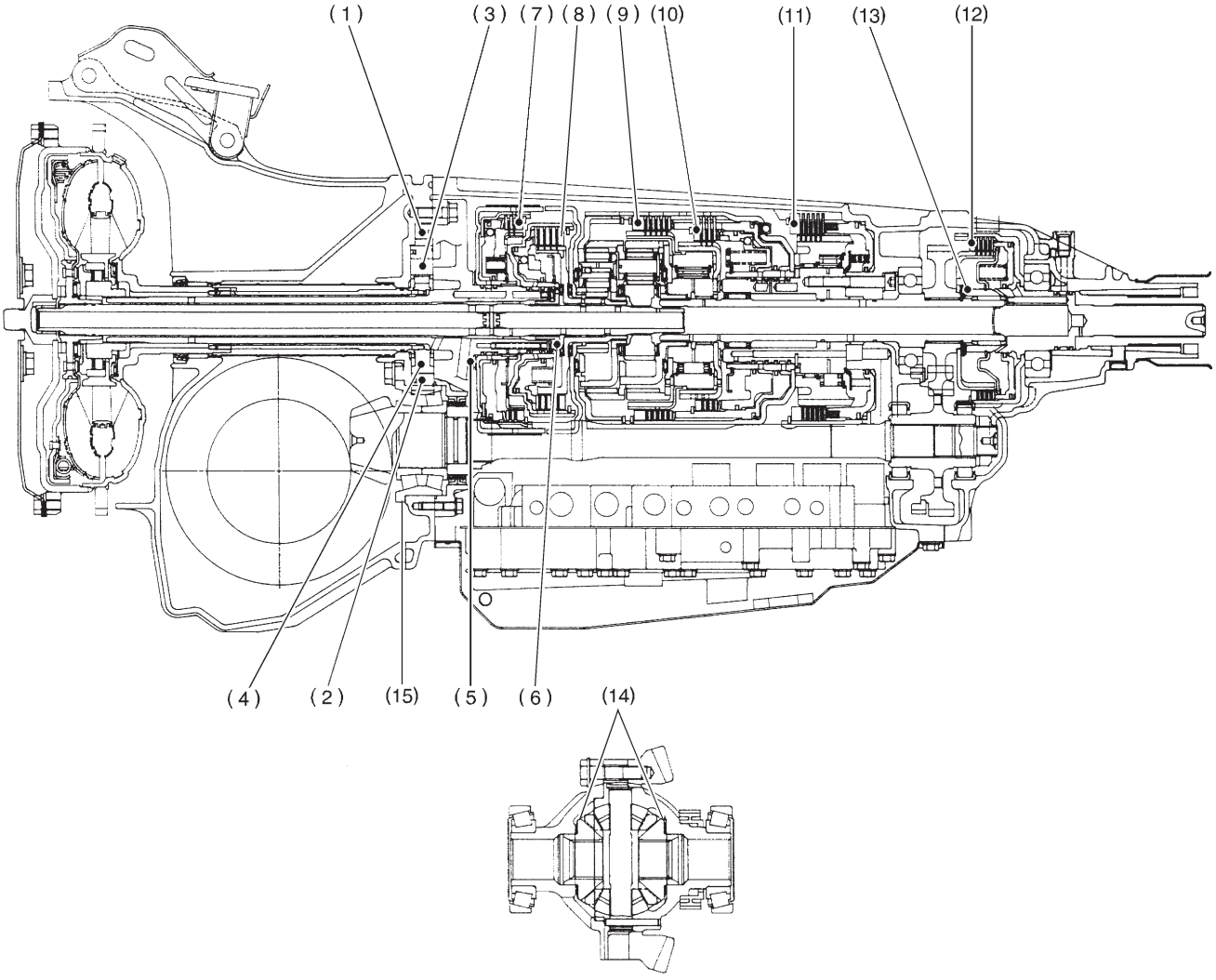
Automatic transmission	Transmission	Selector position		P (Park)	Transmission in neutral, output member immovable, and engine start possible
				R (Reverse)	Transmission in reverse for backing
				N (Neutral)	Transmission in neutral, and engine start possible
				D (Drive)	Automatic gear change 1st ←→ 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	
	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	2200 cc	7.9 ℓ (8.4 US qt, 7.0 Imp qt)	
			2500 cc	9.5 ℓ (10.0 US qt, 8.4 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		FWD ... 11 poles AWD ... 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	2200 cc	4.111 (37/9)
			2500 cc	4.444 (40/9)
	Speedometer gear ratio		2200 cc	0.83 (19/23)
			2500 cc	0.80 (20/25)
	Lubrication oil			 H3M1235A
	Oil capacity		Front drive	1.2 ℓ (1.3 US qt, 1.1 Imp qt)
	ATF cooling system		Radiation capacity	1.977 kW (1,700 kcal/h, 6,746 BTU/h)

MEMO:

B: SERVICE DATA

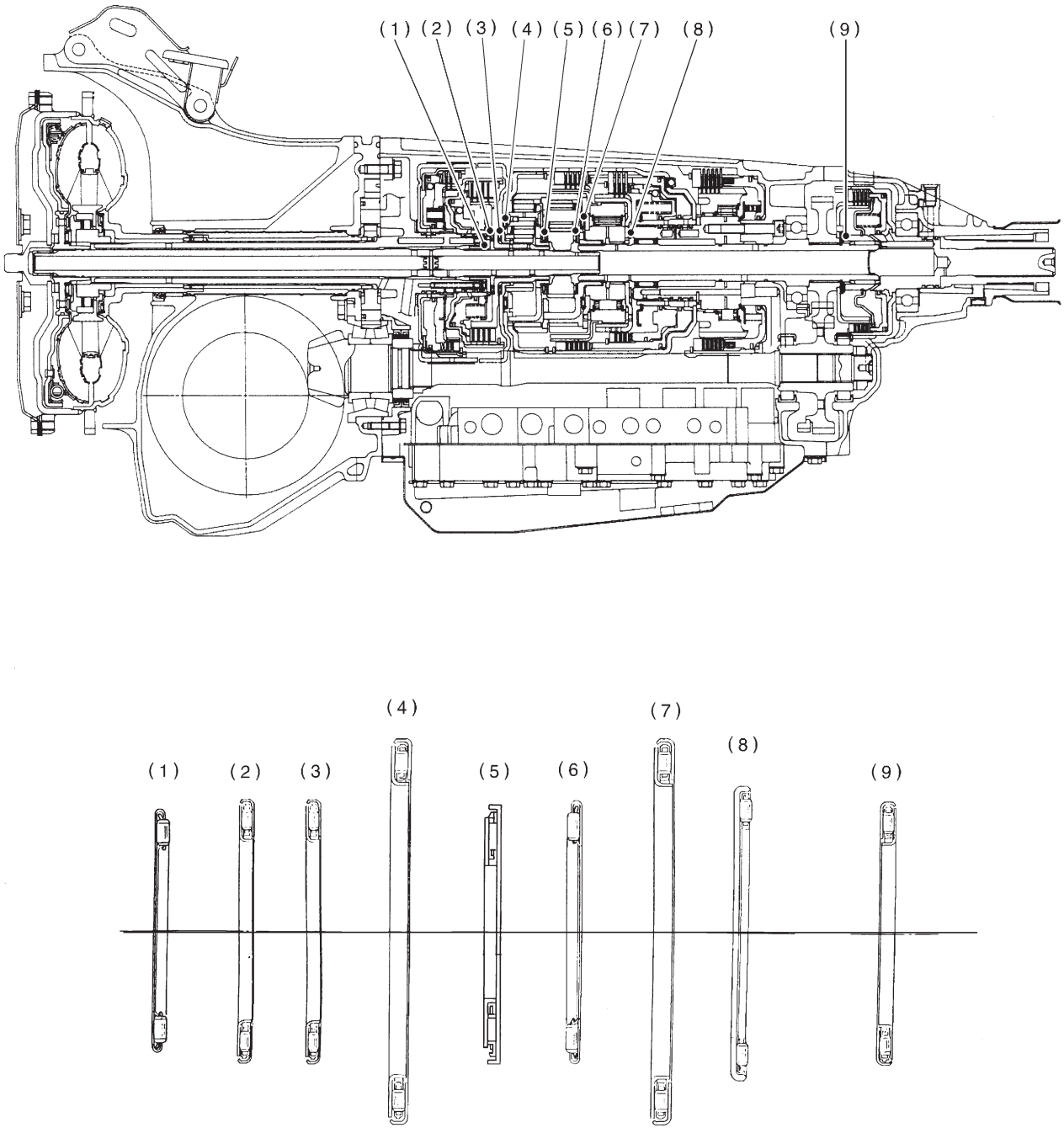
1. ADJUSTING PARTS



H3M1236B

No.	Part Name		Part Number	Dimension mm (in)	Application
(1)	Control piston	2500 cc	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
		2200 cc	31235AA040 — 070		
(2)	Cam ring		31241AA001 — 031	$17^{-0.010}_{-0.017}$ ($0.6693^{-0.0004}_{-0.0007}$), $17^{-0.003}_{-0.010}$ ($0.6693^{-0.0001}_{-0.0004}$), $17^{+0.004}_{-0.003}$ ($0.6693^{+0.0002}_{-0.0001}$), $17^{+0.011}_{+0.004}$ ($0.6693^{+0.0004}_{+0.0002}$)	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 × 53 × 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 × 50 × 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

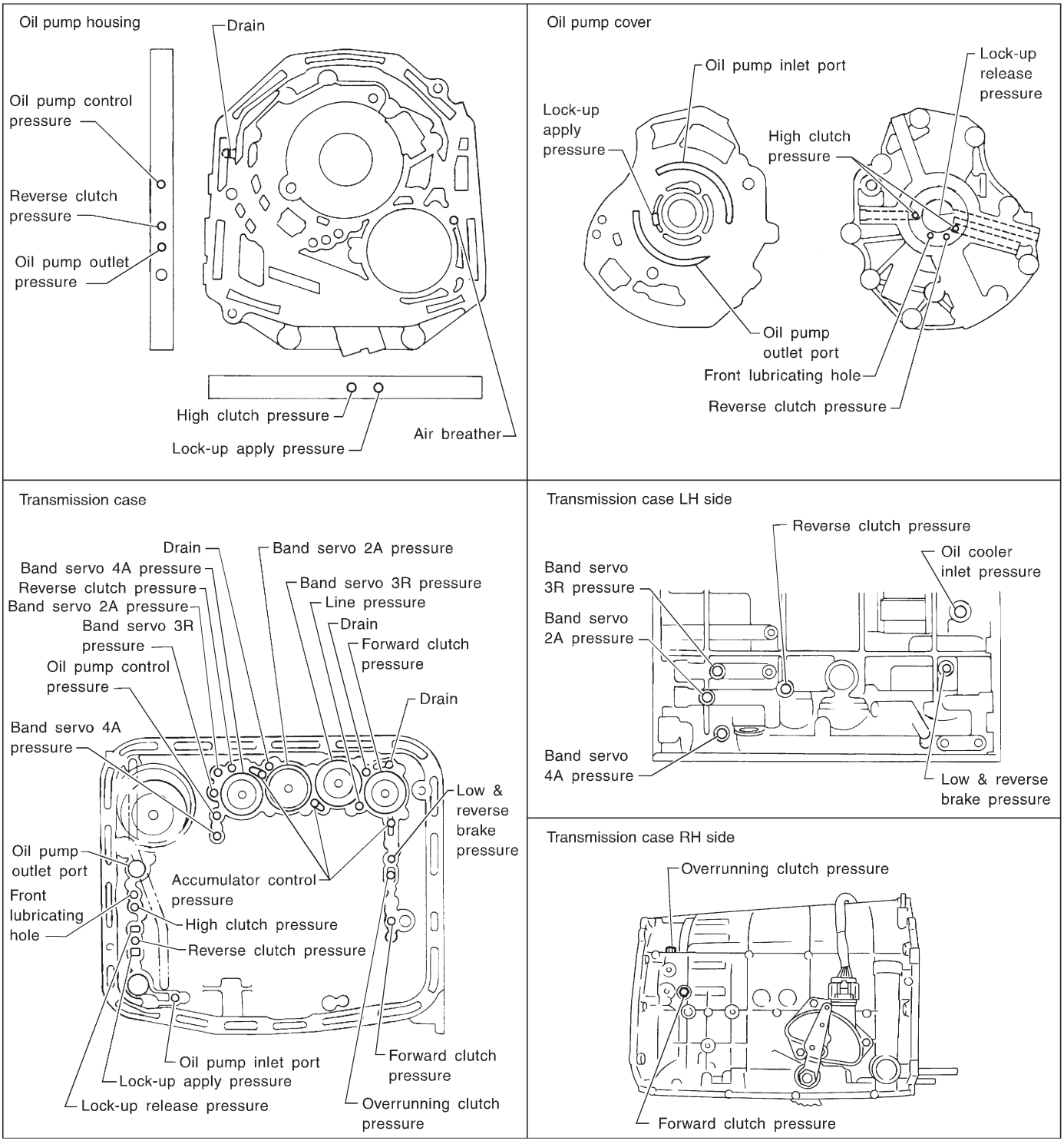
2. LOCATION AND INSTALLING DIRECTION OF THRUST NEEDLE BEARING



H3M1237B

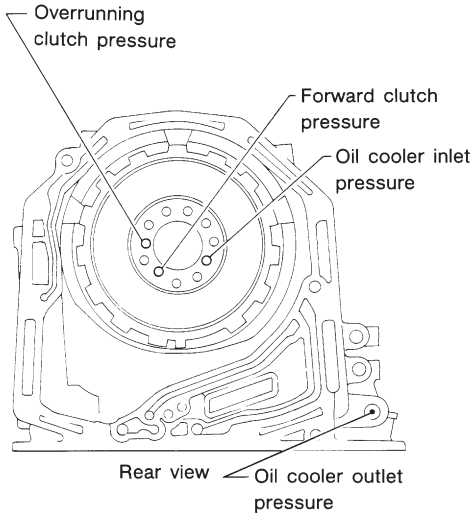
No.	Part Name	Part Number	Inside diameter mm (in)	Outside diameter mm (in)	Dimension mm (in)	Application
(1)	Thrust needle bearing	806530020	30 (1.18)	47 (1.85)	3.3 (0.130)	A place of high clutch
(2)	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of high clutch hub
(3)	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of front sun gear
(4)	Thrust needle bearing	806558020	58 (2.28)	78 (3.07)	4.0 (0.157)	A place of front planetary carrier
(5)	Thrust needle bearing	806535120	35 (1.38)	53 (2.09)	4.8 (0.189)	A place of rear sun gear
(6)	Thrust needle bearing	806534010	34 (1.34)	53 (2.09)	3.37 (0.1327)	A place of rear internal gear
(7)	Thrust needle bearing	806558020	58 (2.28)	78 (3.07)	4.0 (0.157)	A place of overrunning clutch hub
(8)	Thrust needle bearing	806542010	42 (1.65)	59 (2.32)	3.6 (0.142)	A place of low & reverse brake
(9)	Thrust needle bearing	806536020	36 (1.42)	53 (2.09)	3.8 (0.150)	Adjusting end play of transfer clutch
		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)	

3. FLUID PASSAGES

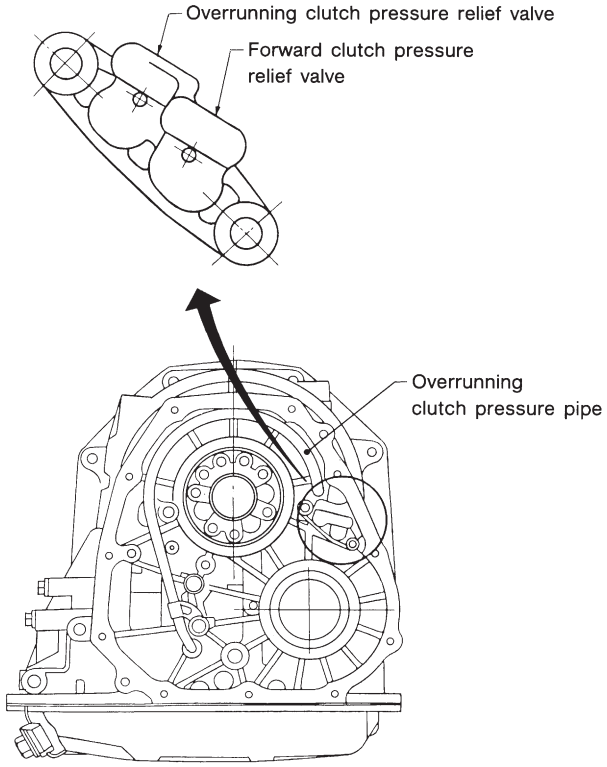


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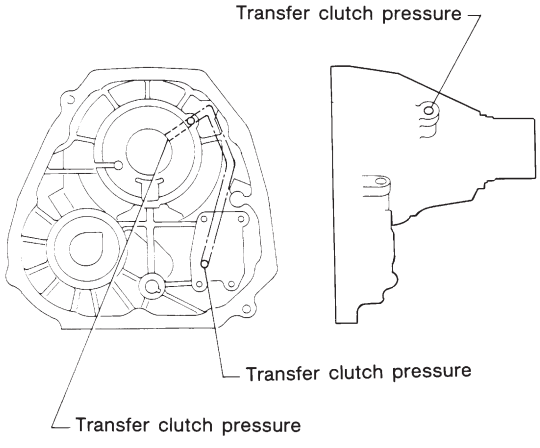
Transmission case



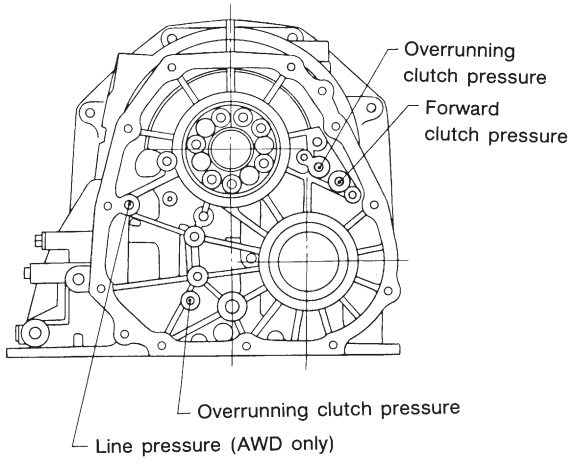
Transmission case



Extension case

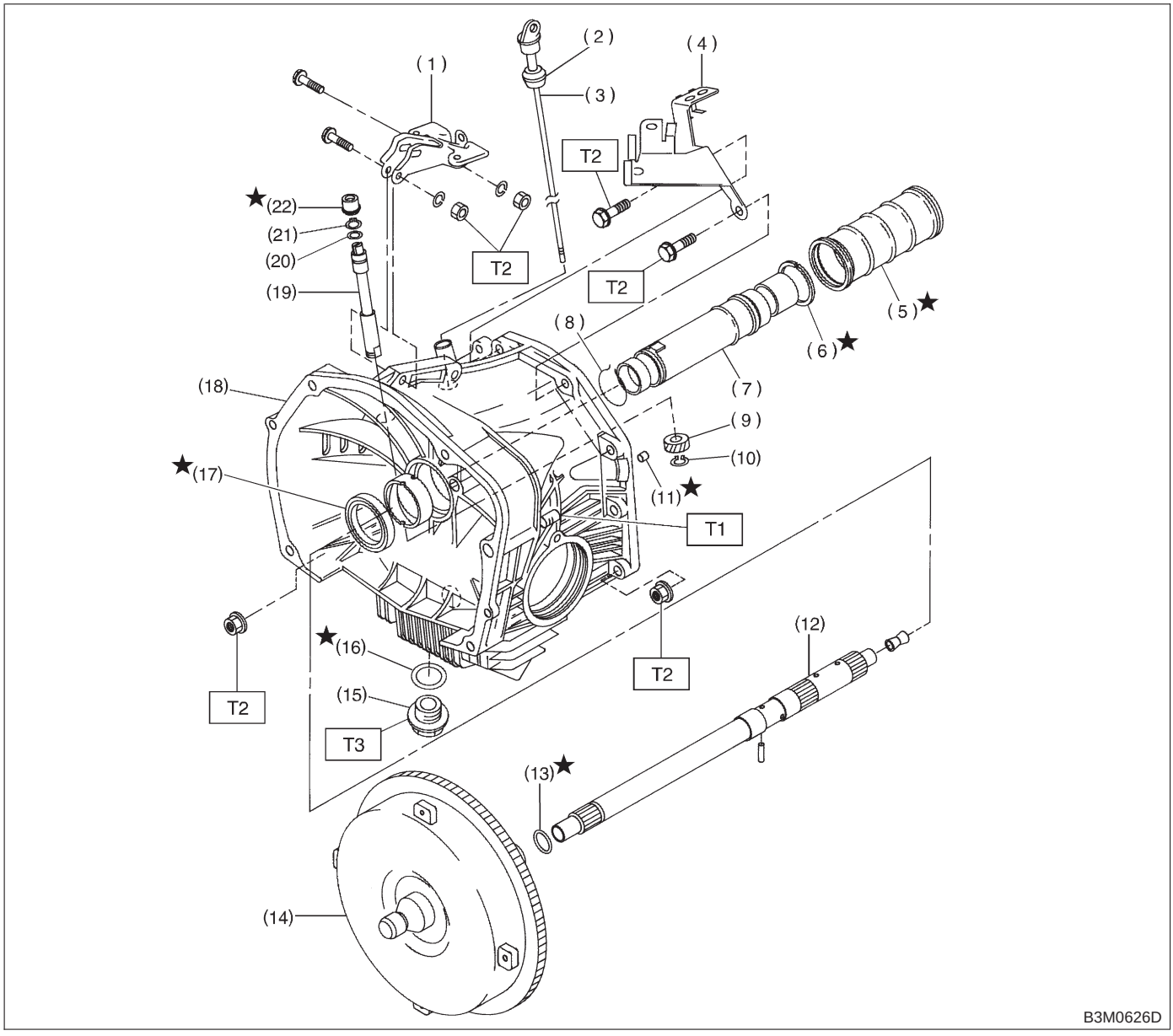


Transmission case



G3M0777

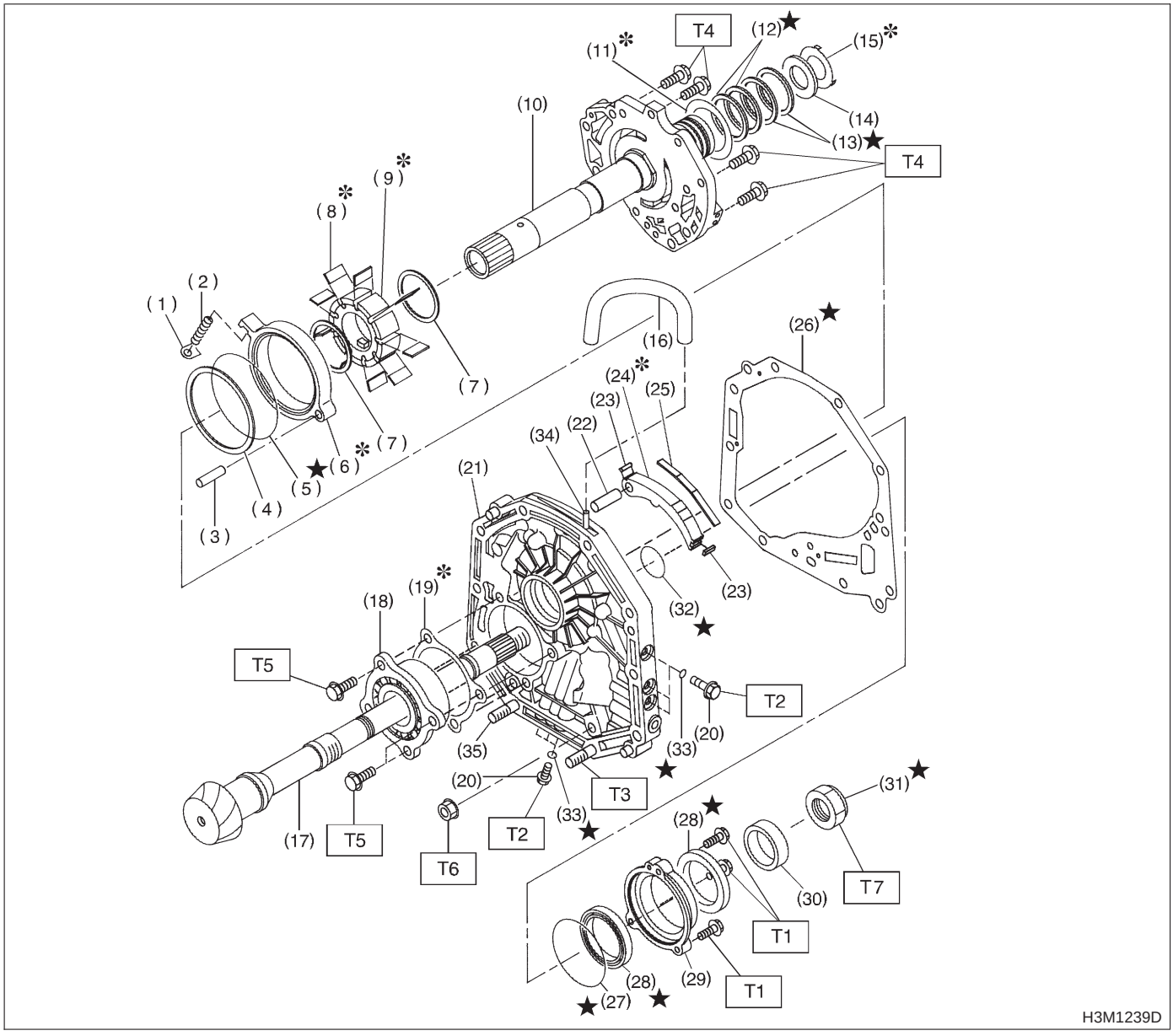
1. Torque Converter Clutch and Case



(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)

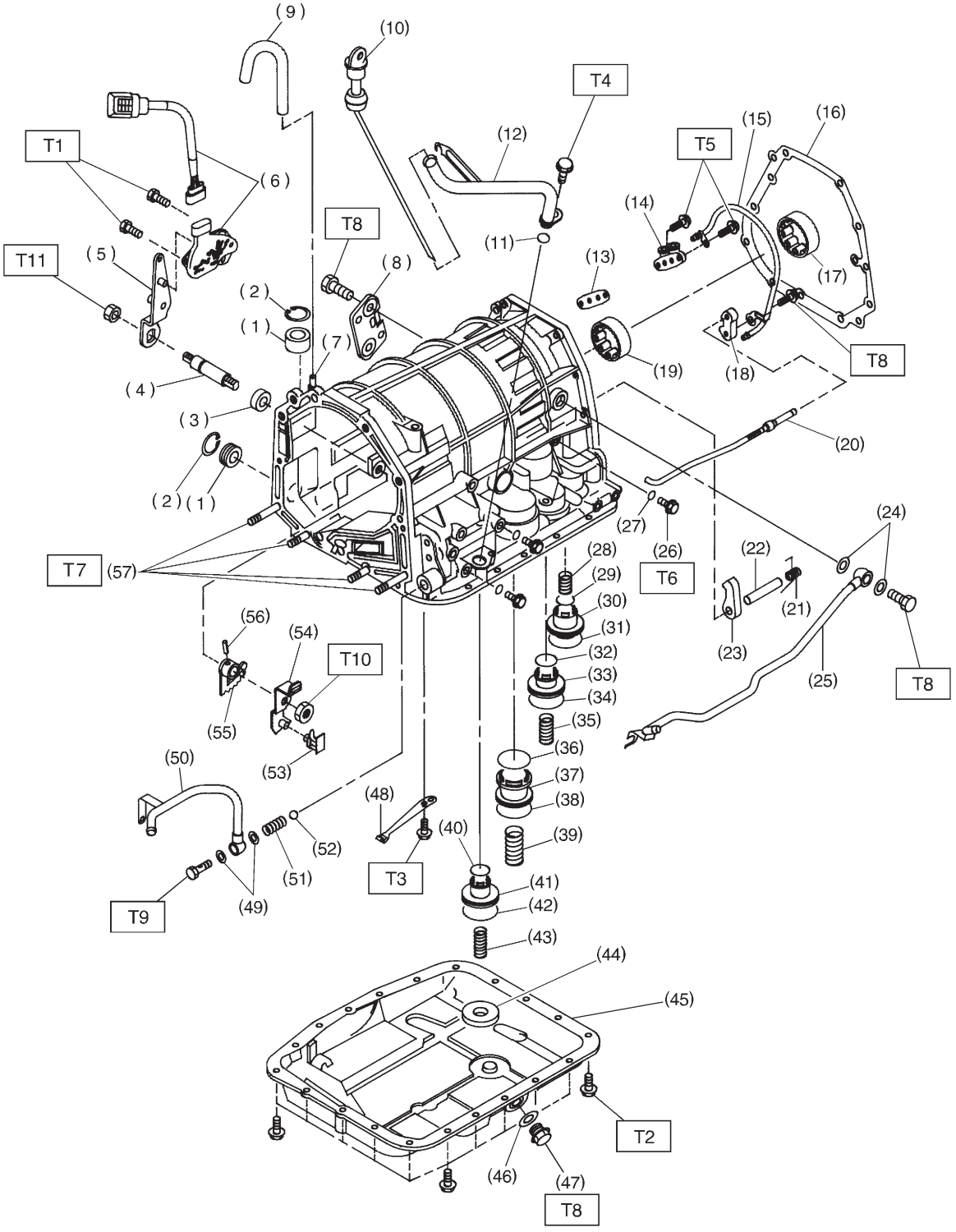
2. Oil Pump



(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



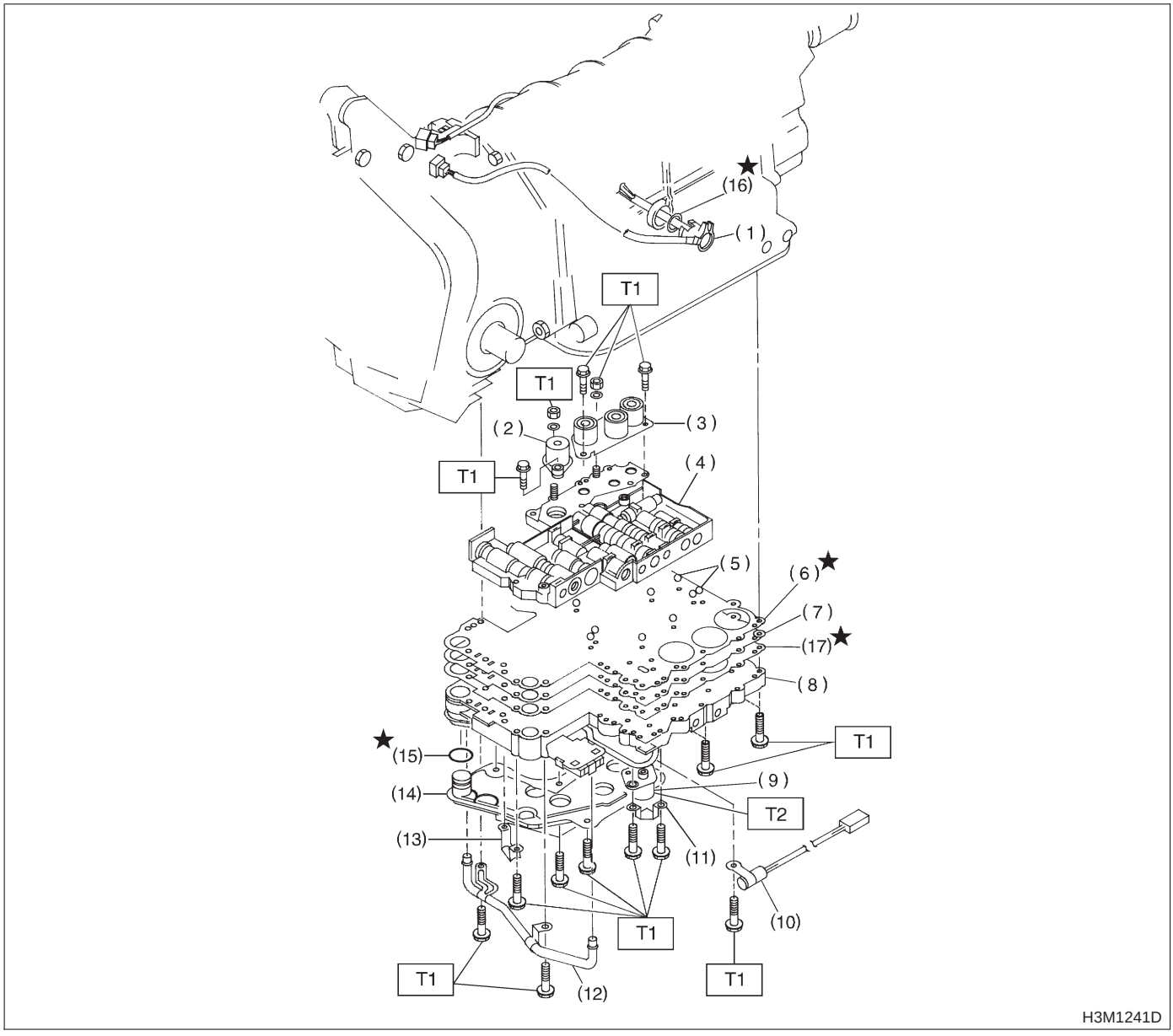
S3M0163A

(1) Plug
(2) Snap ring
(3) Oil seal
(4) Manual shaft
(5) Range select lever
(6) Inhibitor switch ASSY
(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) Roller bearing
(18) Parking support
(19) Ball bearing
(20) Parking rod
(21) Return spring
(22) Shaft
(23) Parking pawl
(24) Gasket
(25) Inlet pipe
(26) Test plug
(27) O-ring
(28) Spring
(29) O-ring
(30) Accumulator piston (N-D)
(31) O-ring
(32) O-ring
(33) Accumulator piston (2-3)
(34) O-ring
(35) Spring
(36) O-ring
(37) Accumulator piston (1-2)
(38) O-ring
(39) Spring
(40) O-ring
(41) Accumulator piston (3-4)
(42) O-ring
(43) Spring
(44) Magnet
(45) Oil pan
(46) Gasket
(47) Drain plug
(48) Detention spring
(49) Gasket
(50) Outlet pipe
(51) Spring
(52) Ball
(53) Stopper
(54) Manual lever
(55) Manual plate
(56) Spring pin
(57) Stud bolt

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)

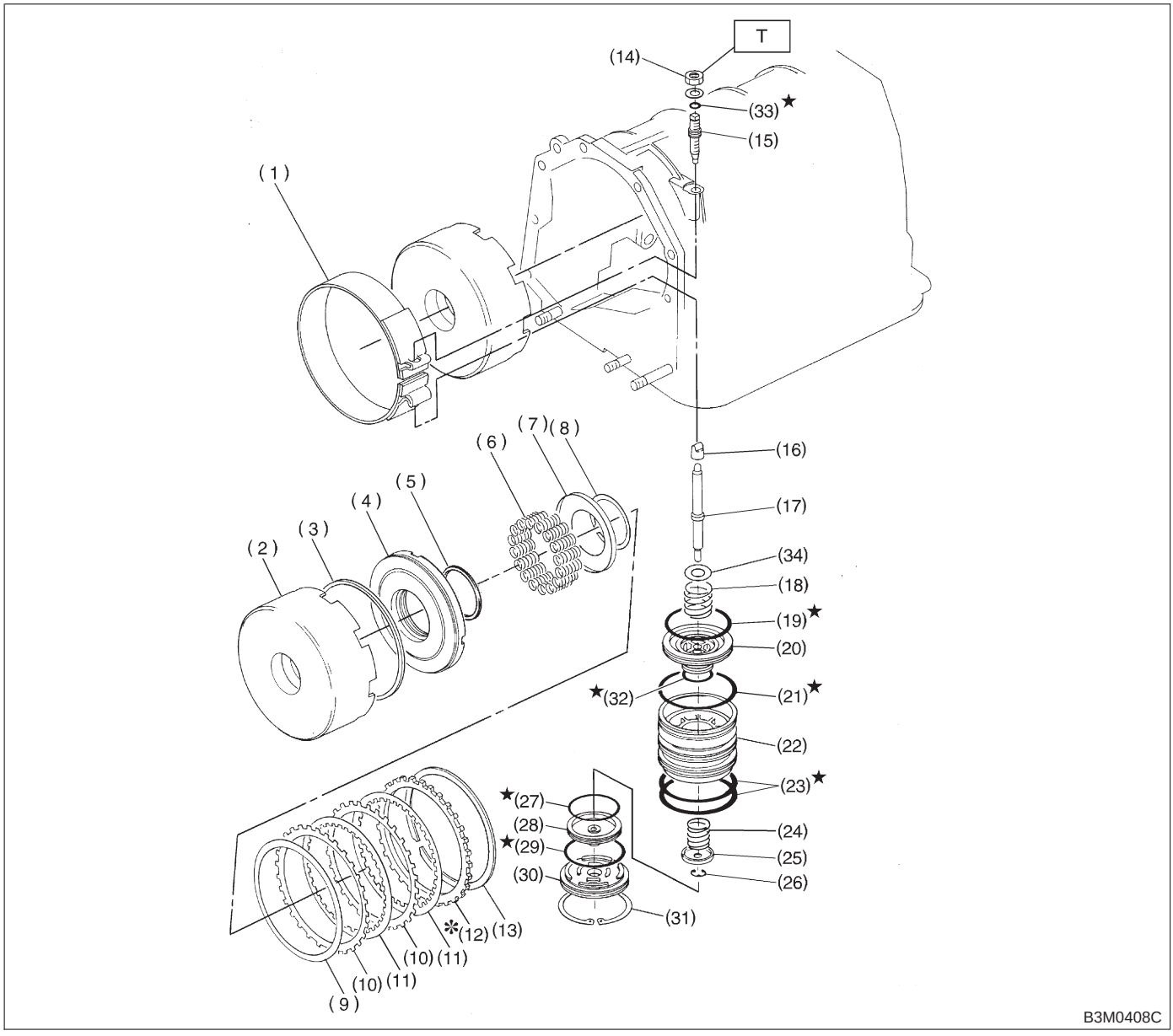
4. Control Valve and Harness Routing



(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)

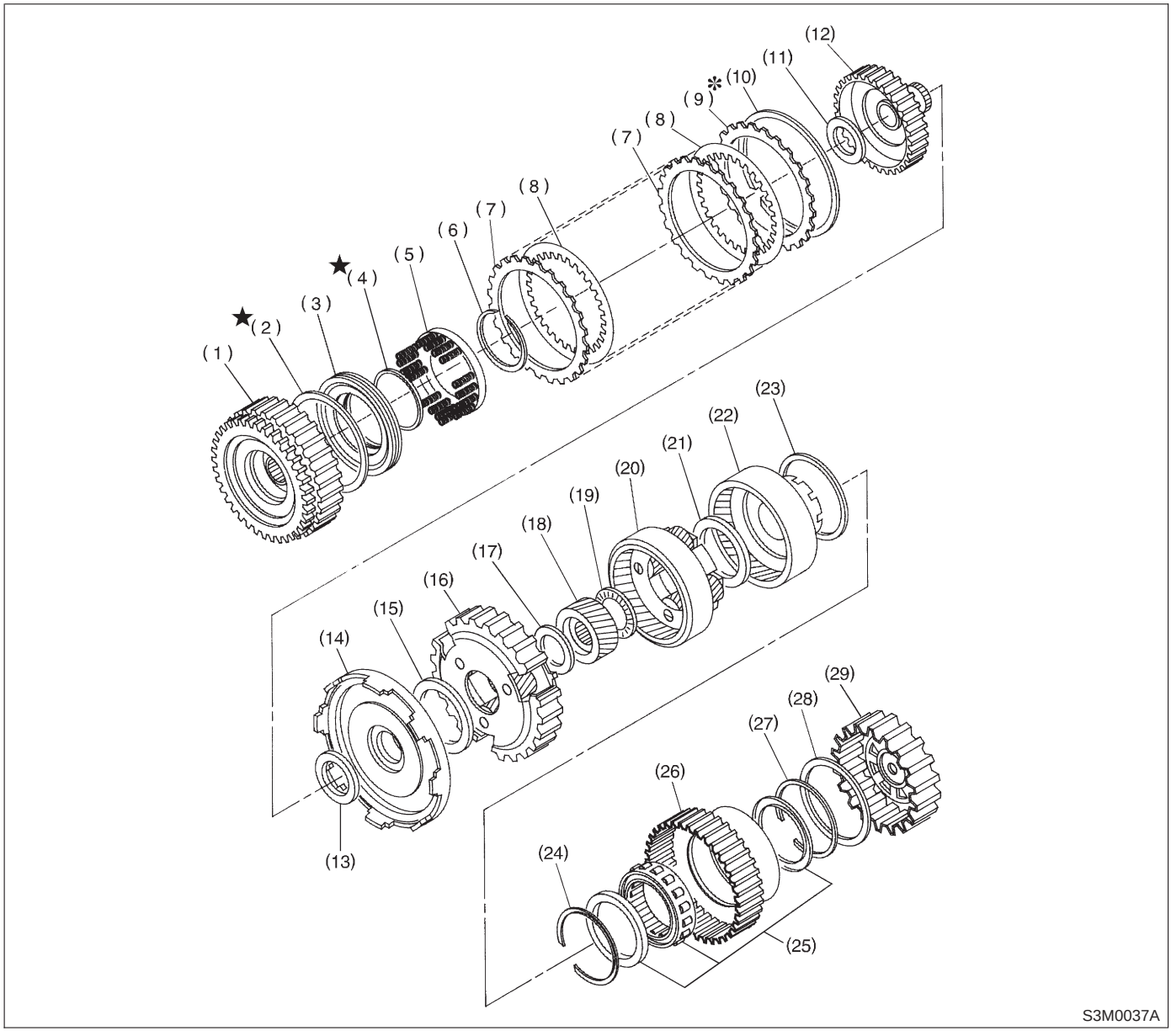
5. Reverse Clutch and Brake Band



(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

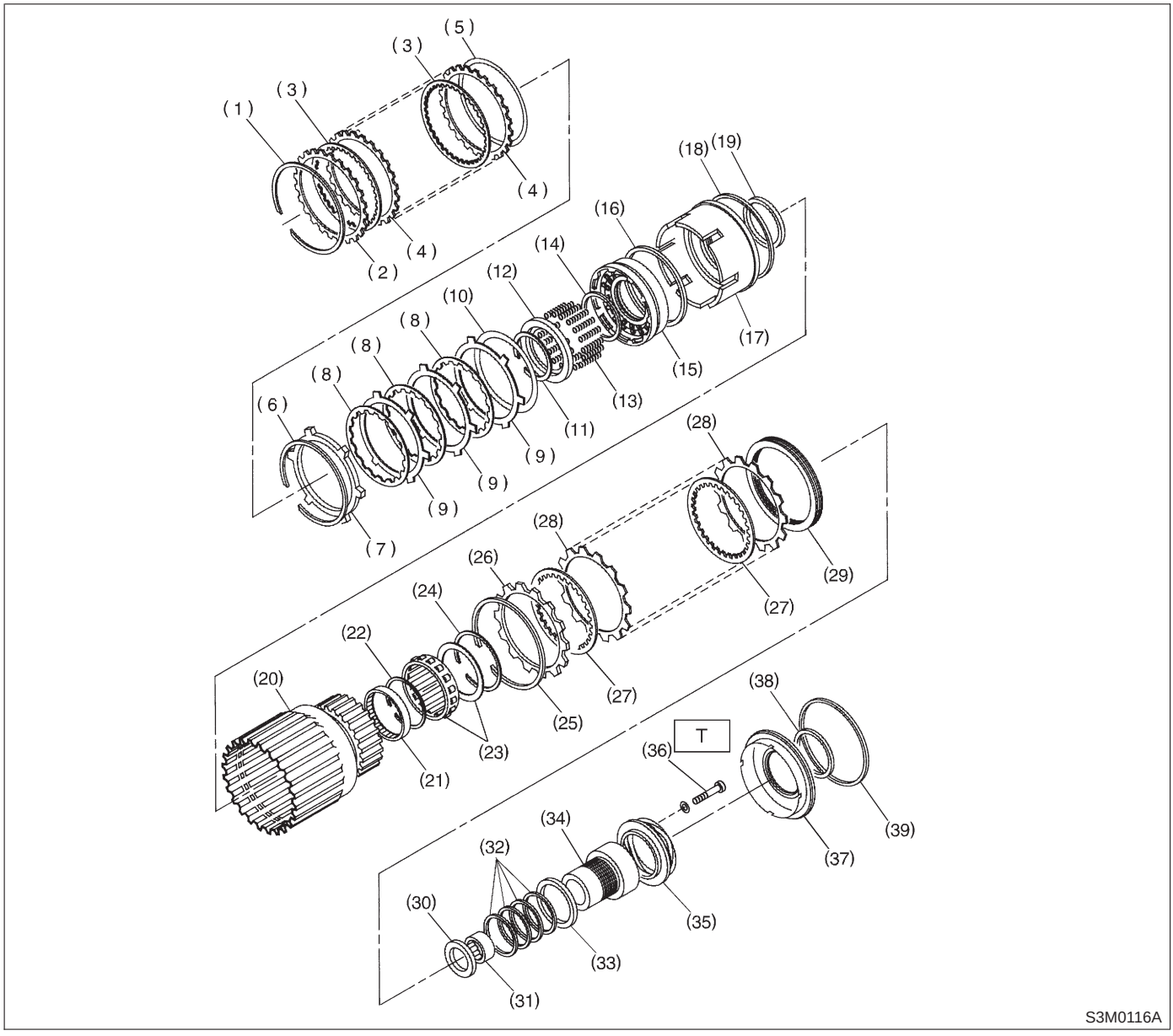
Tightening torque: N·m (kg-m, ft-lb)
T: 26±2 (2.7±0.2, 19.5±1.4)

6. High Clutch and Planetary Gear



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

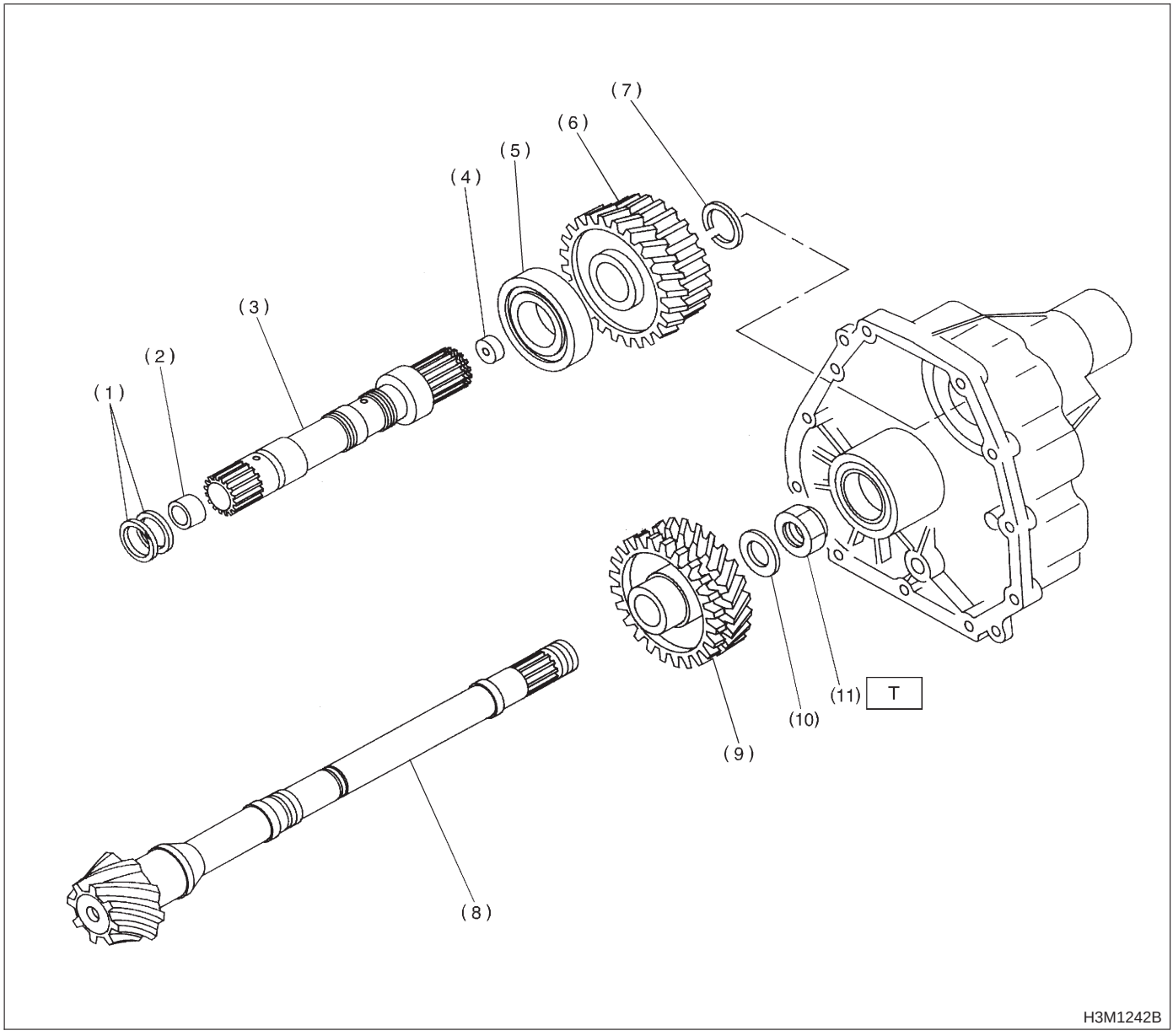
7. Forward Clutch and Low & Reverse Brake



(1) Snap ring
(2) Retaining plate
(3) Drive plate (5)
(4) Driven plate (5)
(5) Dish plate
(6) Snap ring
(7) Retaining plate
(8) Drive plate
(9) Driven plate
(10) Dish plate
(11) Snap ring
(12) Spring retainer
(13) Spring
(14) Lathe cut seal ring
(15) Overrunning piston
(16) Lathe cut seal ring
(17) Forward piston
(18) Lip seal
(19) Lathe cut seal ring
(20) Forward clutch drum
(21) Needle bearing
(22) Snap ring
(23) One-way clutch (1-2)
(24) Snap ring
(25) Snap ring
(26) Retaining plate
(27) Drive plate (6)
(28) Driven plate (6)
(29) Wave spring
(30) Thrust needle bearing
(31) Needle bearing
(32) Seal ring
(33) Thrust washer
(34) One-way clutch inner race (1-2)
(35) Spring retainer
(36) Socket bolt
(37) Low & reverse piston
(38) Lathe cut seal ring
(39) Lathe cut seal ring

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

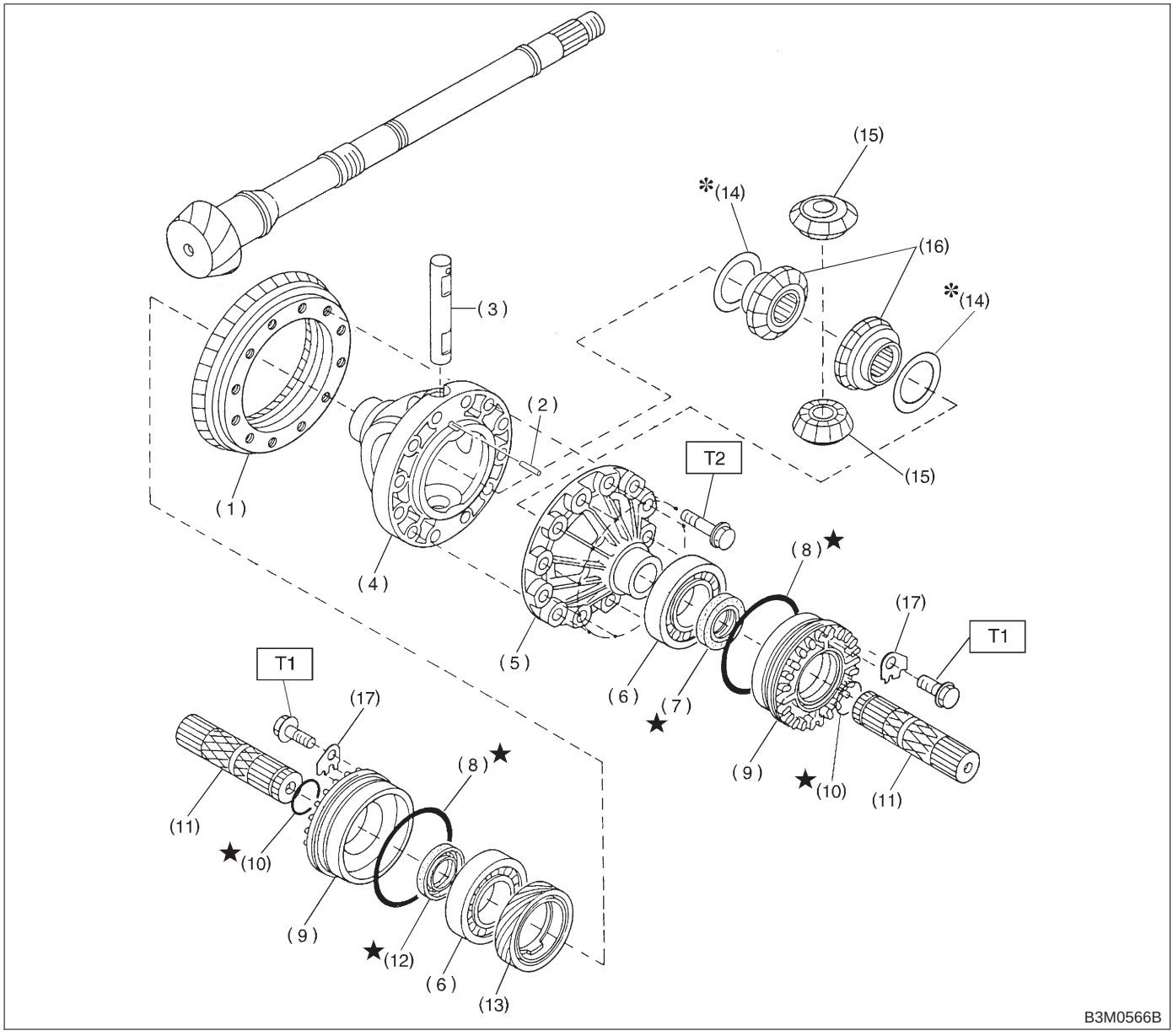
8. Reduction Gear



(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)

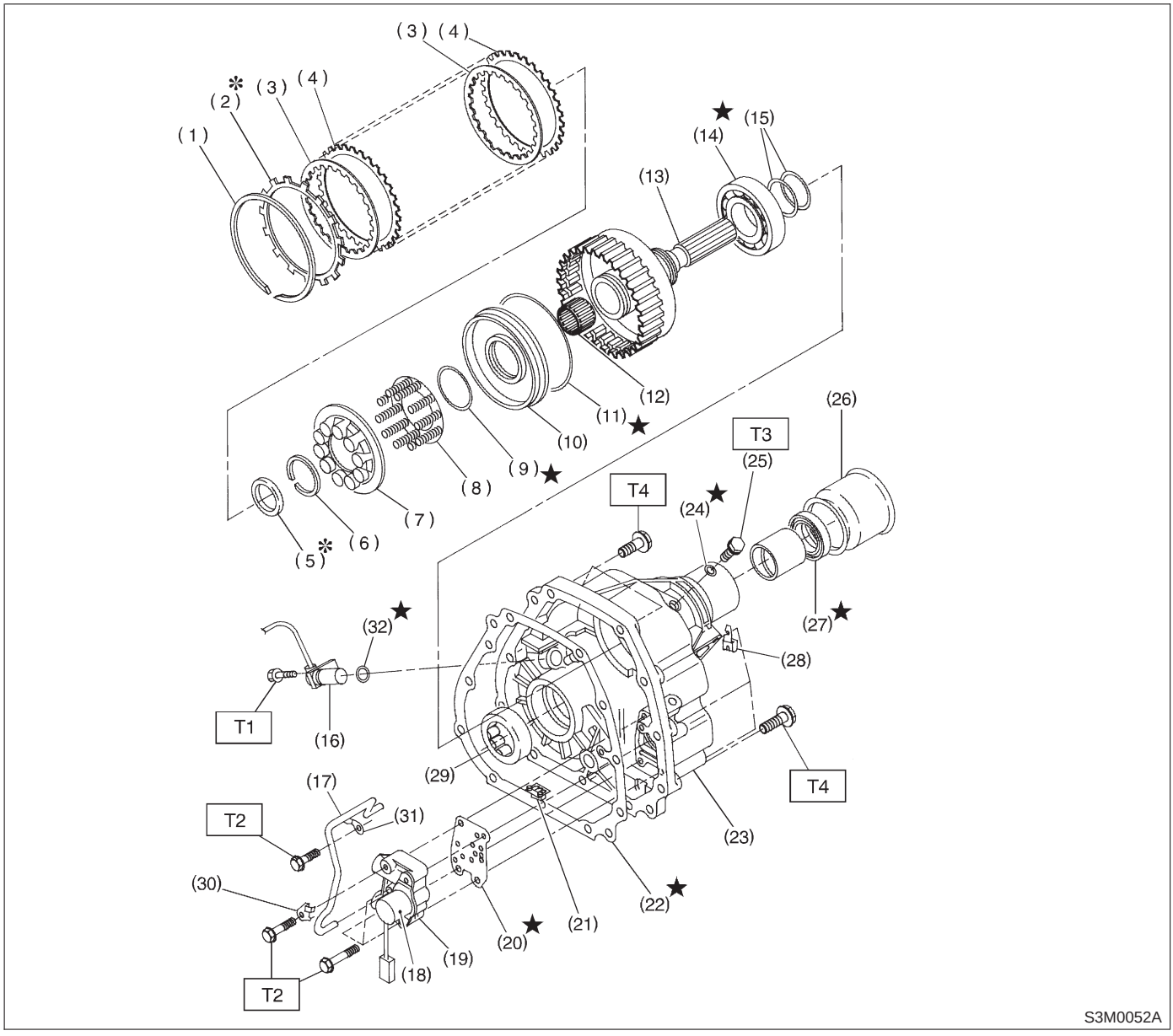
9. Differential Case



(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



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

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

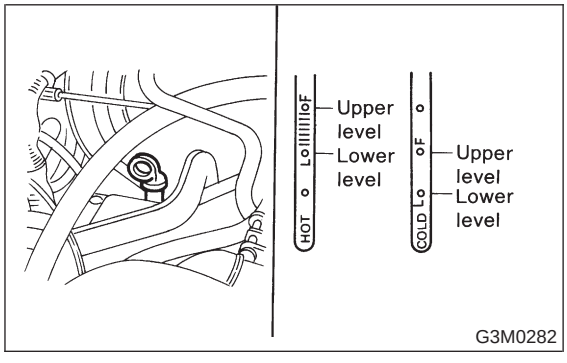
When disassembling or assembling the automatic transmission, observe the following instructions.
1) Workshop
Provide a place that is clean and free from dust. Principally the conventional workshop is suitable except for a dusty place. In a workshop where grinding work, etc. which produces fine particles is done, make independent place divided by the vinyl curtain or the equivalent.
2) Work table
The size of 1 × 1.5 m (40 × 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 leveler 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 atmos- pheric temperature of 0°C (32°F): Approx. 8 minutes
- By running the vehicle

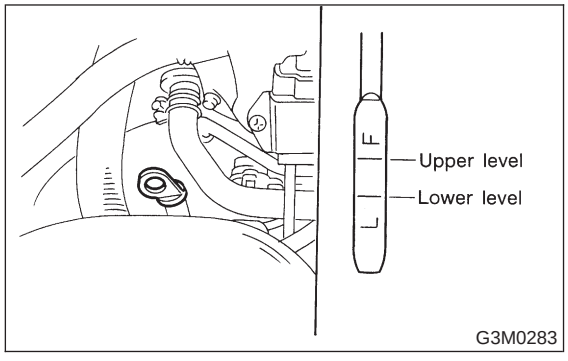
Time for temperature rise to 60°C (140°F) with atmos- pheric temperature of 0°C (32°F): More than 10 minutes
5) Method for checking fluid level upon delivery or at periodic inspection
Check fluid level after a warm-up run of approx. 10 minutes. During the warm-up period, the automatic transmission functions can also be checked.

2. DIFFERENTIAL GEAR OIL LEVEL

1) Ensure the vehicle is in safe condition.

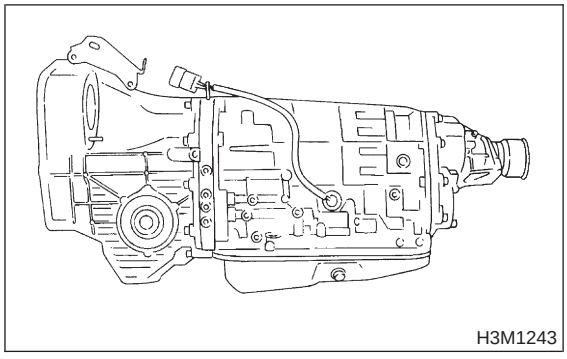
NOTE:
Do not check the oil level nor add oil to the case with the front end of the vehicle jacked-up; this will result in an incorrect reading of the oil level.

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.

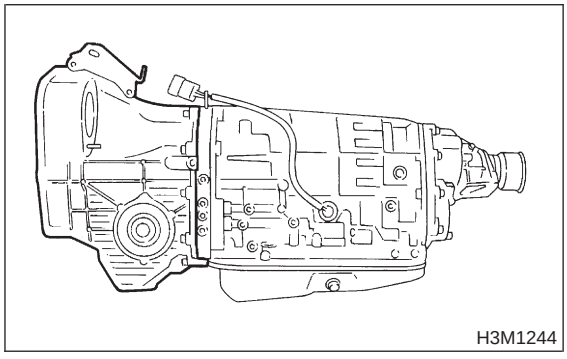


3. OIL LEAKAGE

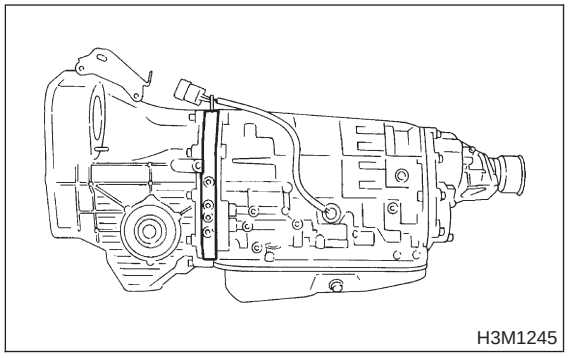
It is difficult to accurately determine the precise position of a oil leak, since the surrounding area also becomes wet with oil. The places where oil seals and gaskets are used are as follows:
1) Jointing portion of the case
- Transmission case and oil pump housing jointing portion
- Torque converter clutch case and oil pump housing jointing portion
- Transmission case and extension case jointing portion



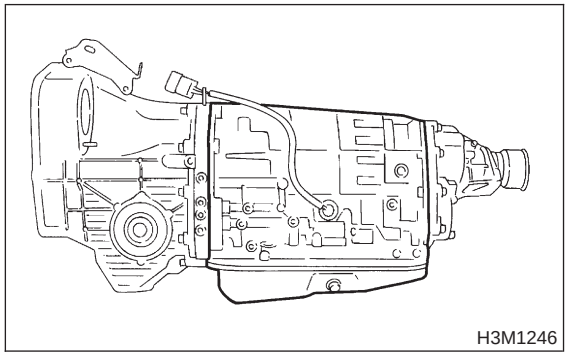
2) Torque converter clutch case
- Engine crankshaft oil seal
- Torque converter clutch impeller sleeve oil seal
- ATF cooler pipe connector
- Torque converter clutch
- Torque converter clutch case
- Axle shaft oil seal
- O-ring on the outside diameter of axle shaft oil seal holder
- O-ring on the differential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



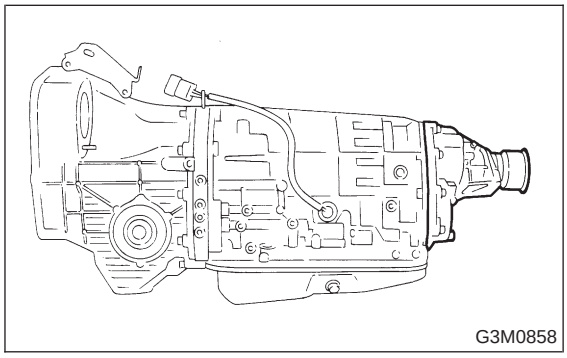
3) Oil pump housing
- Oil pump housing (Defective casting)
- O-ring on the test plugs
- Checking blind plugs
- Differential gear breather


H3M1245

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


H3M1246

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

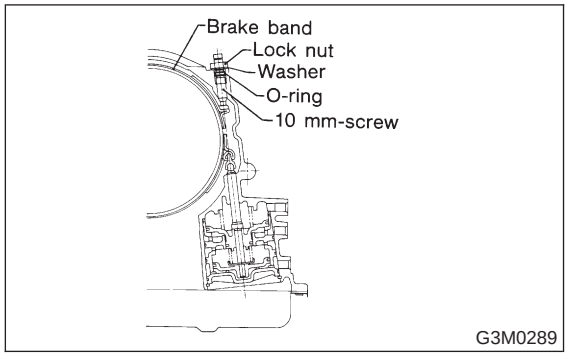

G3M0858

2. Brake Band

A: INSPECTION

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

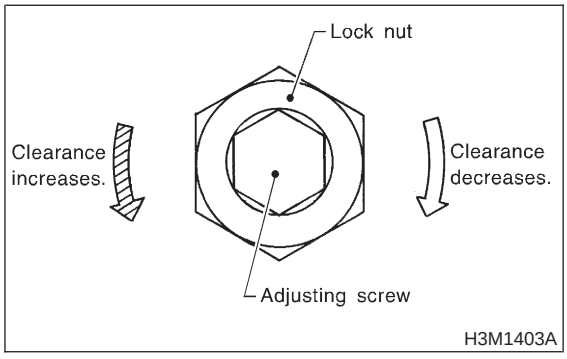
Improper brake band clearances and their symptoms	
Clearance	Problem
1. Too wide	Upshift from 1st directly to 3rd gear occurs.
2. Wide	● Engine rpm increases abruptly while upshifting from 1st to 2nd gear or 3rd to 4th gear. ● Time lag of at least one second occurs during kickdown operation from 3rd 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

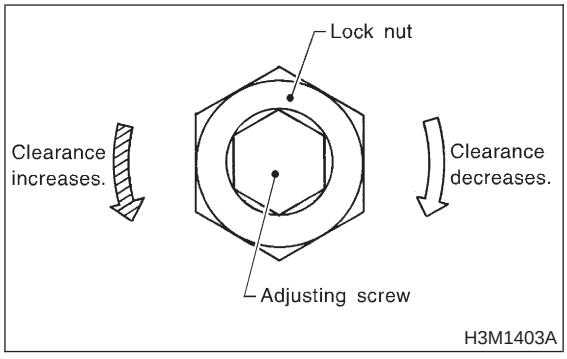
1) Immobilize the end of the 10 mm-screw projecting on the left side of the transmission case, and loosen the nut with a double-end wrench.
In the case of occurrence of problems 2. and 3. mentioned previously, perform the adjustment by loosening or tightening the nut within a range of 3/4 turn from this state.

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



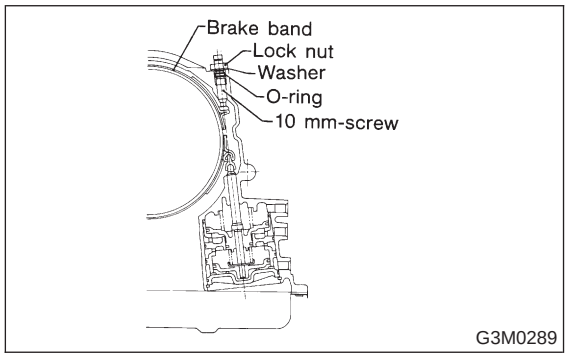
2) In case of the occurrence of problems 1. and 4. mentioned previously, perform the adjustment as follows: Adjusting procedure: Tighten adjust screw to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, then back off three turns.

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



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

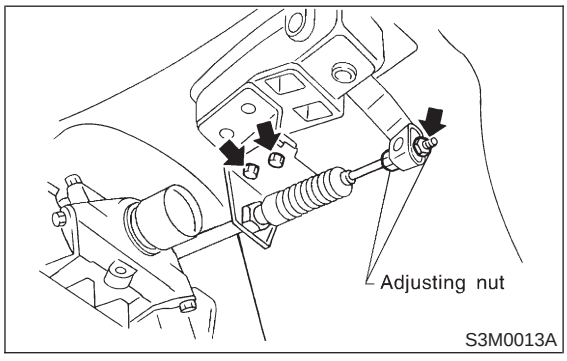
Tightening torque:
26±2 N·m (2.7±0.2 kg-m, 19.5±1.4 ft-lb)



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.

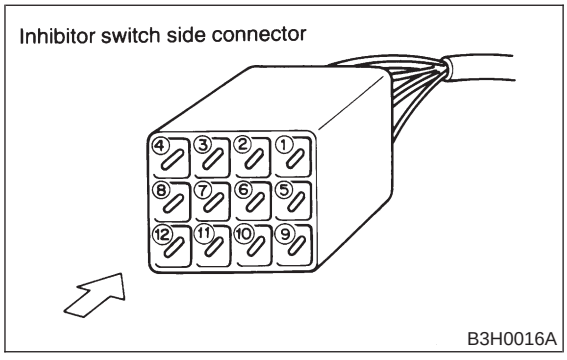


1) Disconnect cable end from select lever.
2) Disconnect inhibitor switch side connector.
3) Check continuity in inhibitor switch circuits with select lever moved to each position.

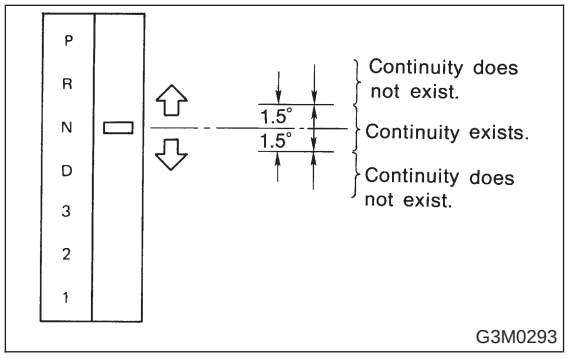
CAUTION:
Also check that continuity in ignition circuit does not exist when selector lever is in R, D, 3, 2 and 1 ranges.

NOTE:
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Position	Pin No.
Signal sent to TCM.	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9

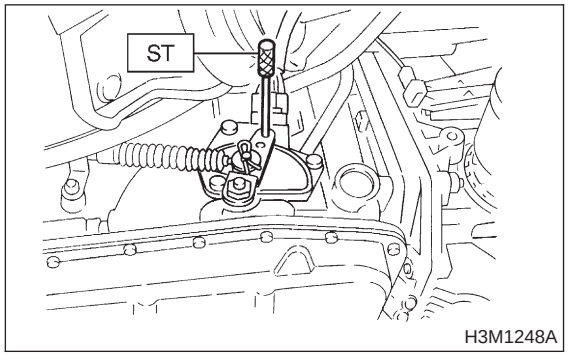


4) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from the N range.
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.



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.

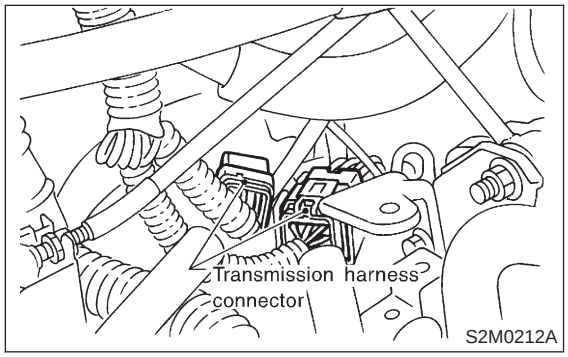
Tightening torque:
3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

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

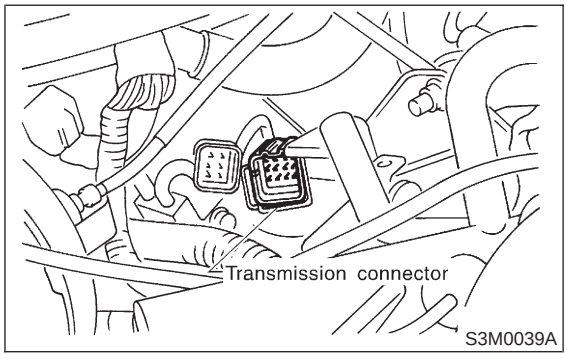
4. Sensor (in transmission)

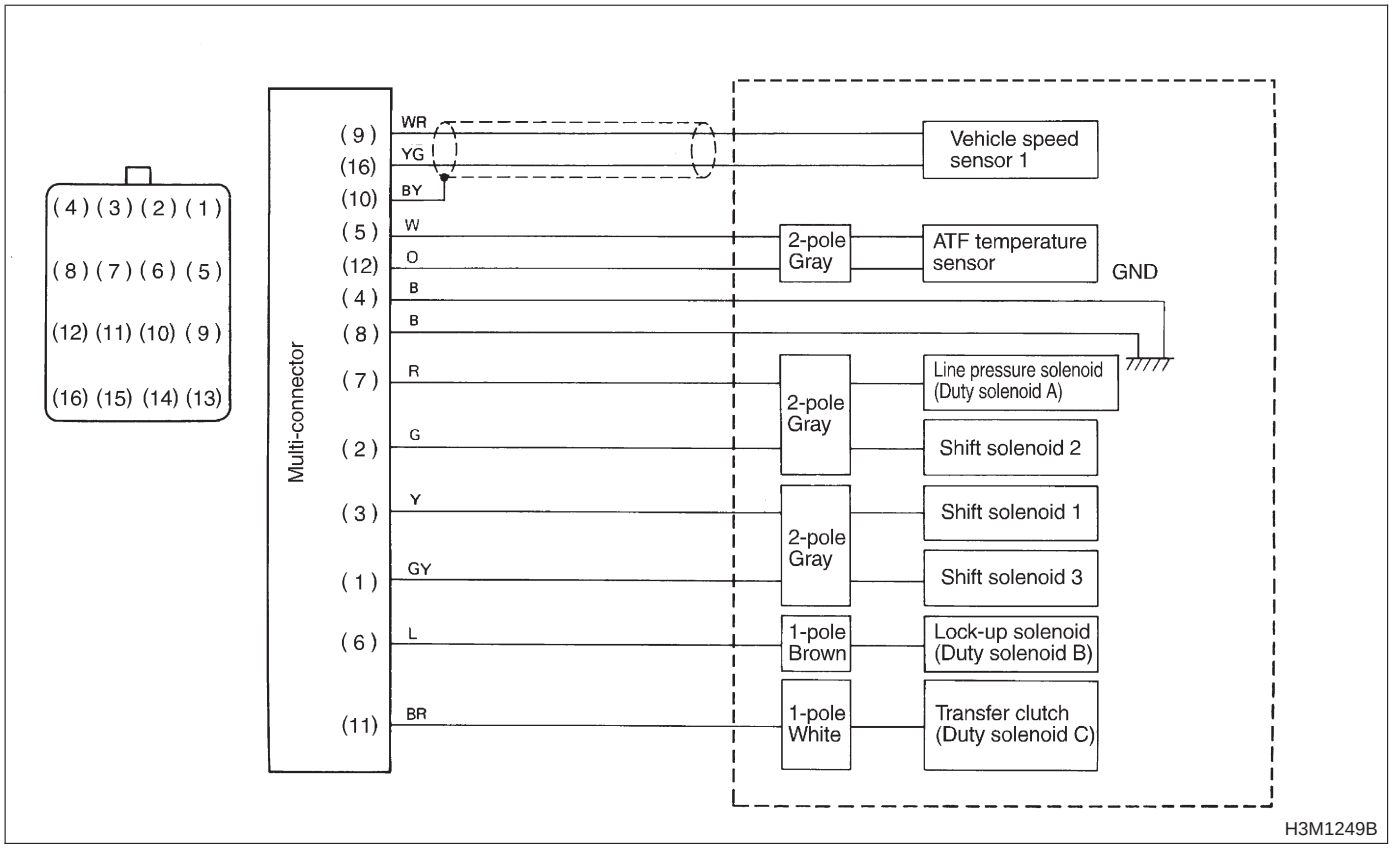
A: INSPECTION

1) Remove air intake duct and chamber.
2) Disconnect connector from transmission.



3) 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

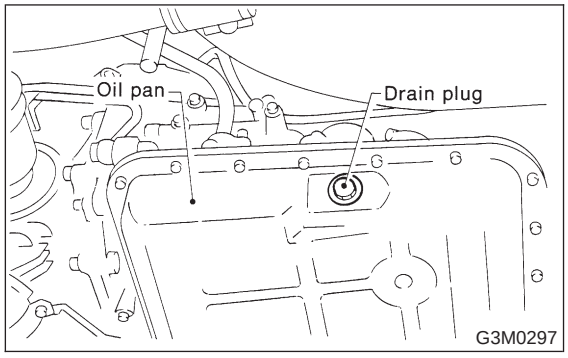
5. Shift Solenoid, Duty Solenoid and Valve Body

A: REMOVAL

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

NOTE:
Tighten ATF drain plug after draining ATF.

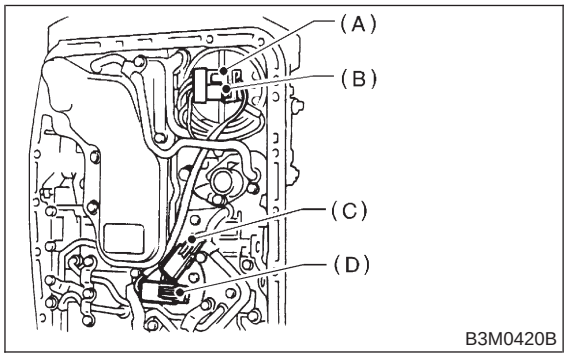
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



3) Remove oil pan and gasket.

NOTE:
Drain oil into a container.

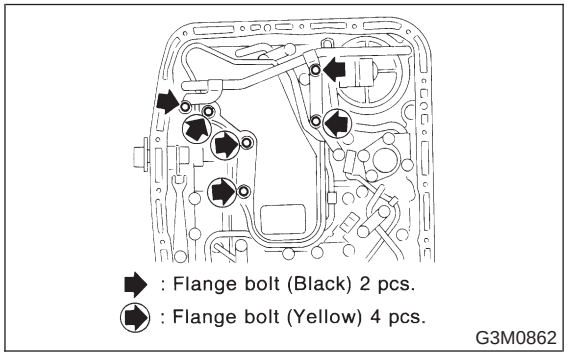
4) Disconnect solenoid valve connectors.
Remove connectors from clips and disconnect connectors at 4 places.



(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

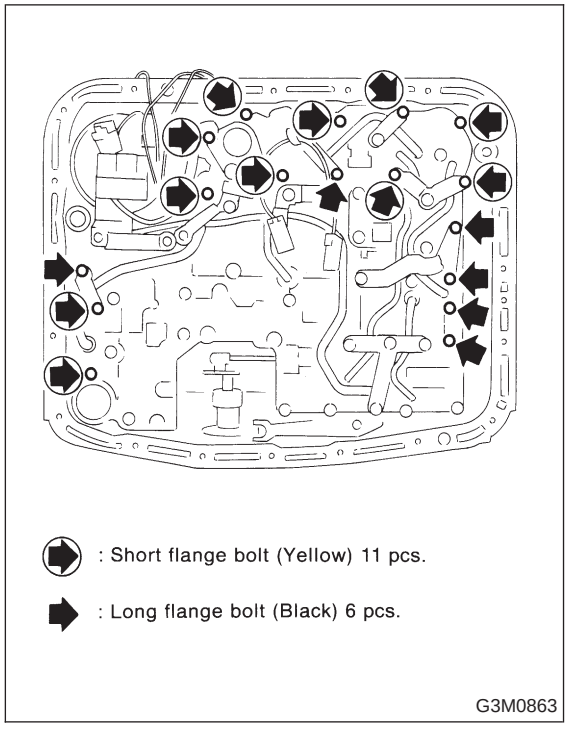
5) Remove oil strainer.
Disconnect oil pipe by removing the two bolts, and remove four bolts and oil strainer.

NOTE:
Be careful because oil flows from oil strainer.

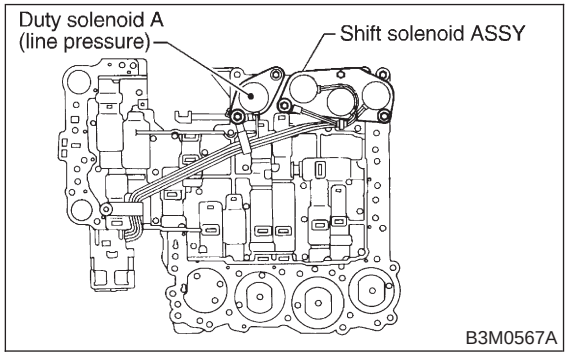


6) Remove control valve body and two brackets. Remove 6 long bolts (Black) and 11 short bolts (Yellow).

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.

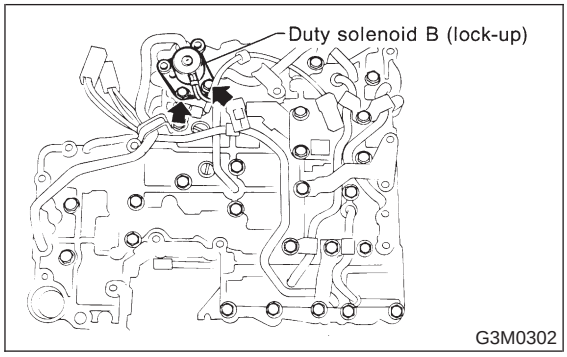


8) Remove duty solenoid B.

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)

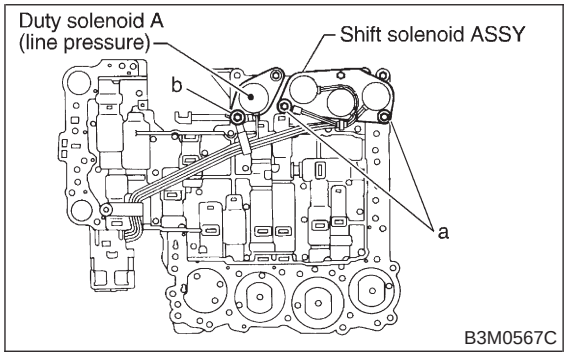


2) Install solenoid valves.
Shift solenoid assembly, and duty solenoid A (line pressure).

a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

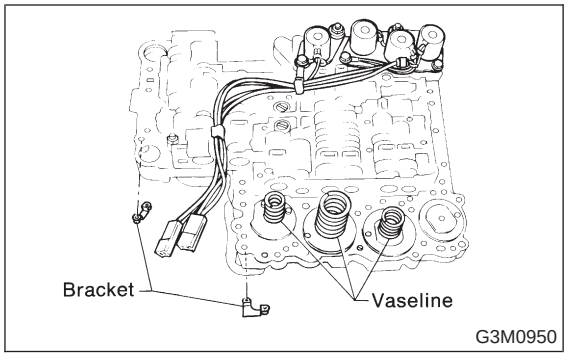
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



3) Install valve body and two brackets.

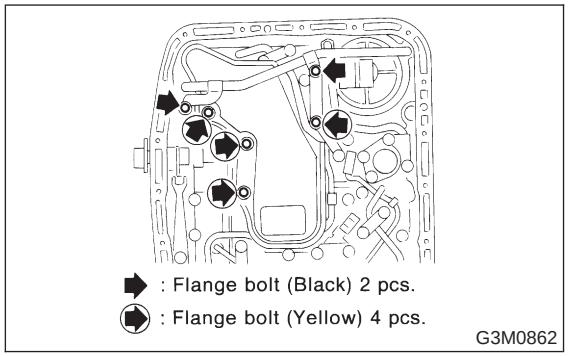
NOTE:
- Secure accumulator springs using vaseline.
- Align manual valve connections.

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

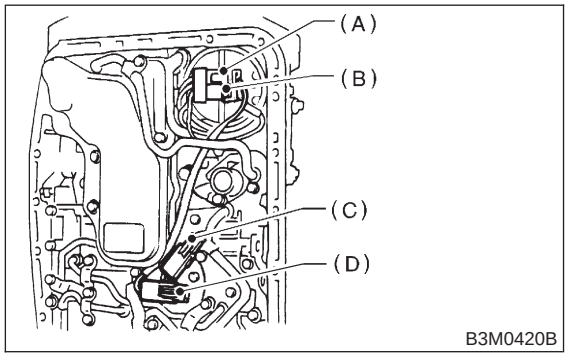


4) Install oil strainer.
Also install oil pipe and harness connector bracket.

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

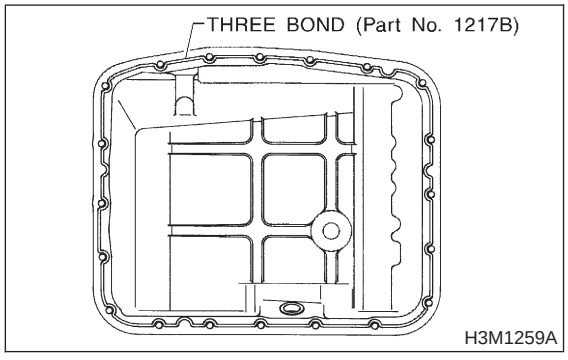


5) Connect harness connectors at 4 places.
Connect connectors of same color, and secure connectors to valve body using clips.



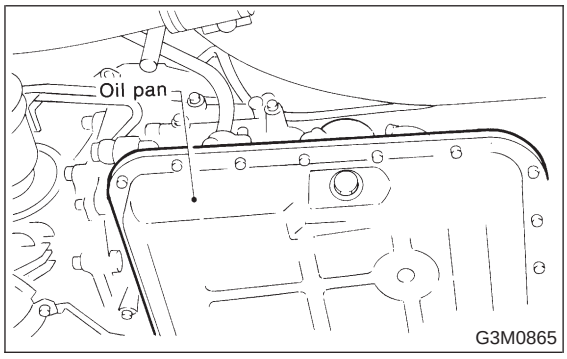
(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

6) Apply proper amount of liquid gasket (THREE BOND 1217B) to the entire oil pan mating surface.

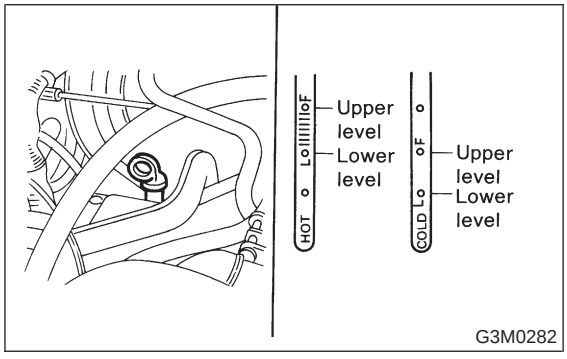


7) Install oil pan and gasket.

Tightening torque:
4.9±0.5 N·m (0.50±0.05 kg-m, 3.6±0.4 ft-lb)



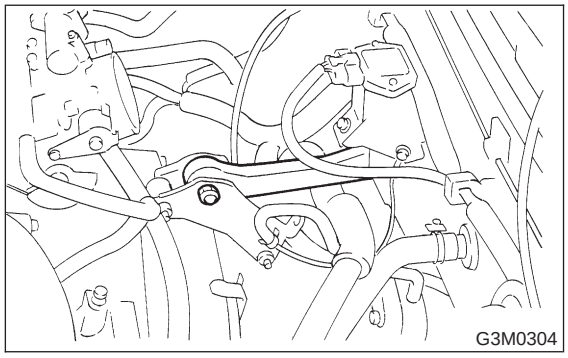
8) Add ATF and check level.



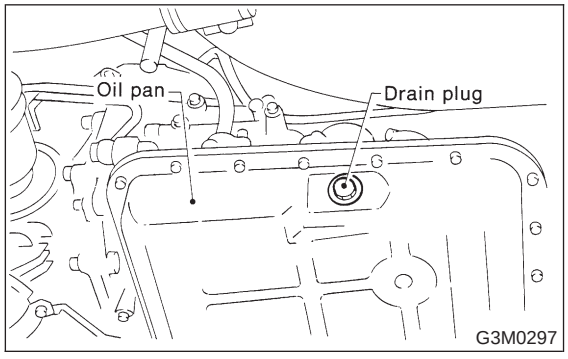
6. Duty Solenoid C and Transfer Valve Body

A: REMOVAL

1) Remove air intake chamber.
2) Remove pitching stopper.

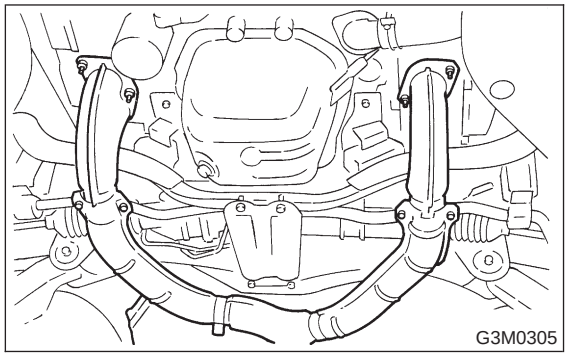

G3M0304

3) Raise vehicle and drain ATF.



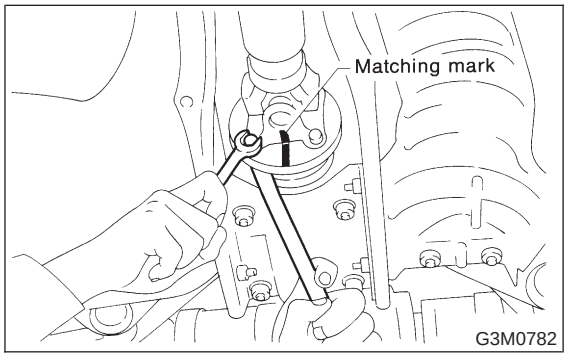
G3M0297

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


G3M0305

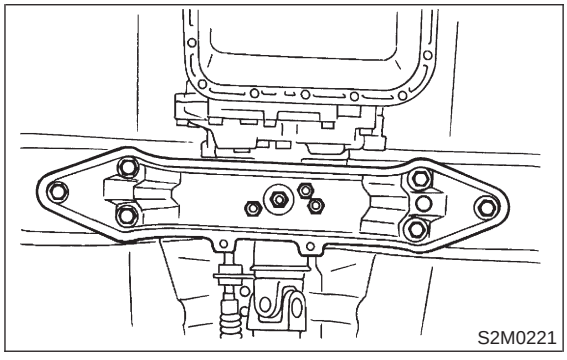
5) Remove propeller shaft.

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

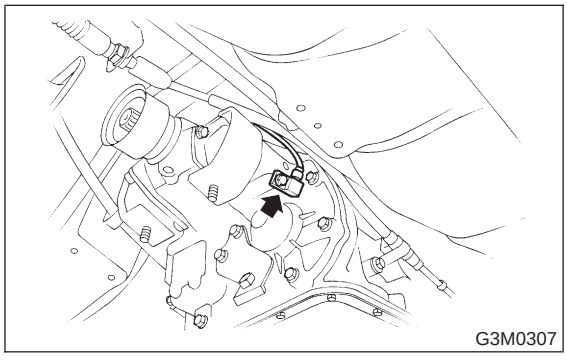


G3M0782

6) Remove rear crossmember.
(1) Support transmission using a transmission jack and raise slightly.
(2) Remove bolts and nuts as shown in Figure.

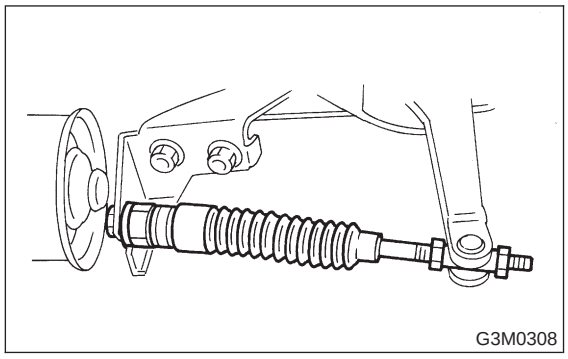

S2M0221

7) Remove vehicle speed sensor 1.


G3M0307

8) Remove extension and gasket.

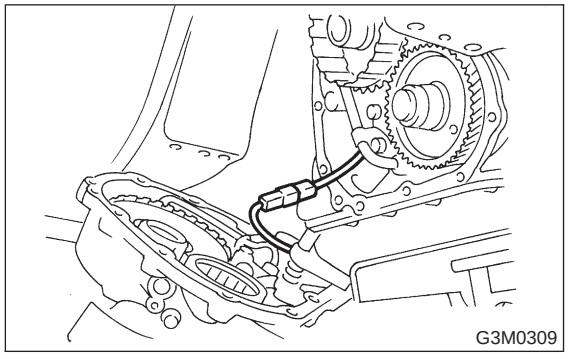
(1) Remove gear select cable nut.


G3M0308

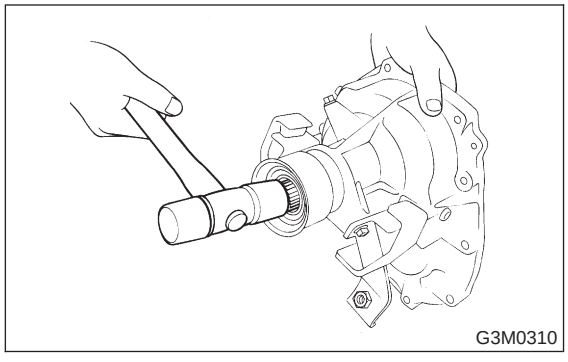
(2) Move gear select cable so that extension bolts can be removed.
(3) Remove bolts.
(4) Remove extension and disconnect duty solenoid C connector.

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

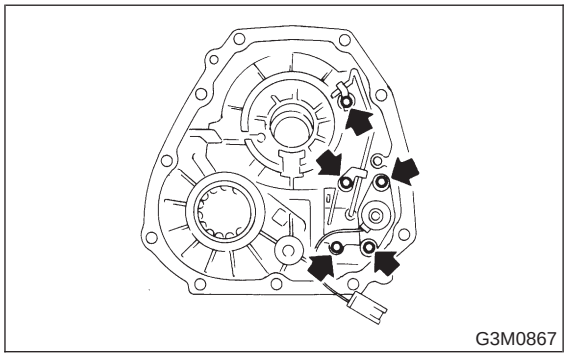
NOTE:
Use a container to catch oil flowing from extension.


G3M0309

9) Remove duty solenoid C and transfer valve body from extension.
(1) Remove transfer clutch drum.


G3M0310

(2) Remove clamp which secures pipe.
(3) Remove bolts.


G3M0867

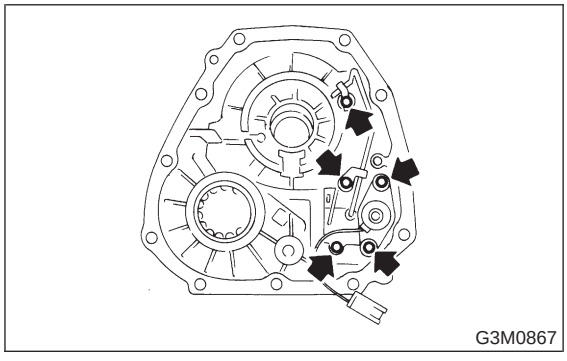
B: INSTALLATION

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

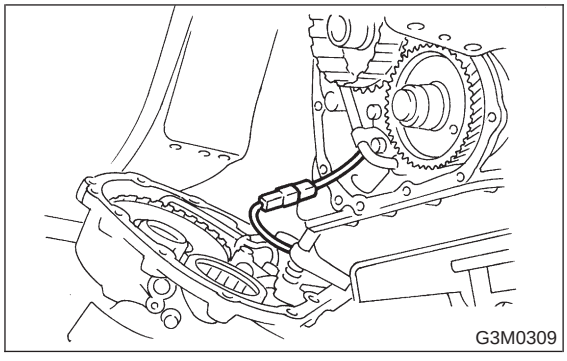
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

(2) Install pipe and clamp.

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


G3M0867

(3) Install clutch drum.
2) Install extension.
(1) Connect connector.

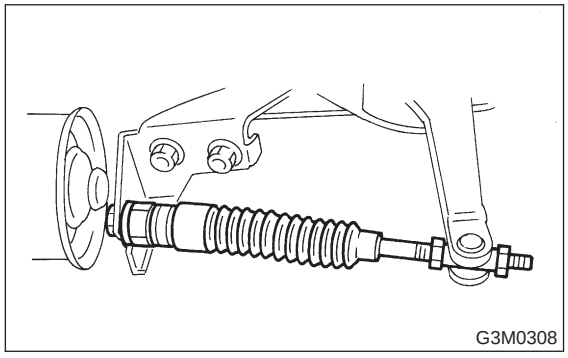

G3M0309

(2) Tighten 11 bolts.

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

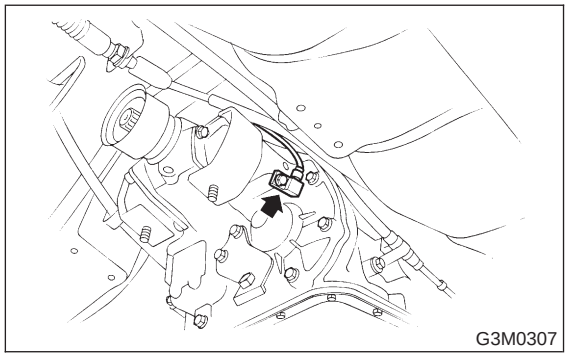
(3) Install gear select cable.

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


G3M0308

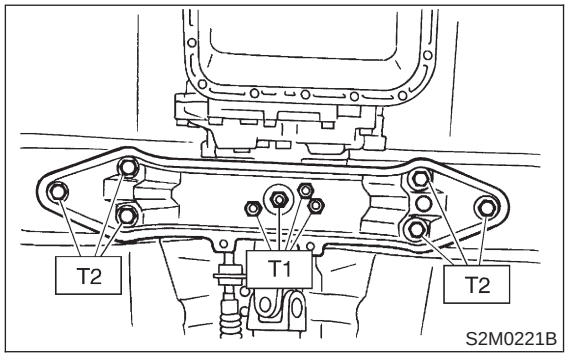
3) Install vehicle speed sensor 1.

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)


G3M0307

4) Install rear crossmember.
(1) Tighten bolts.

Tightening torque:
T1: 37±10 N·m (3.8±1.0 kg-m, 27±7 ft-lb)
T2: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)



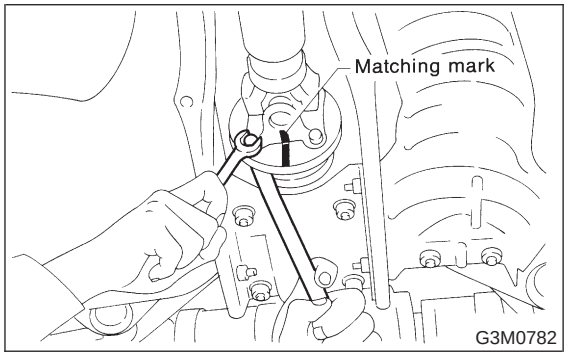
S2M0221B

(2) Lower and remove transmission jack.

5) Install propeller shaft.

Tightening torque:
At rear differential
23±5 N·m (2.3±0.5 kg-m, 16.6±3.6 ft-lb)
At center bearing
39±5 N·m (4.0±0.5 kg-m, 28.9±3.6 ft-lb)

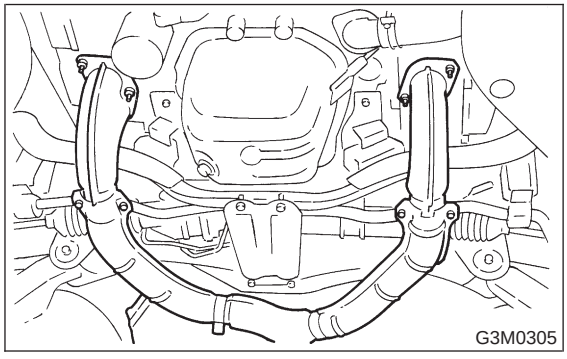
NOTE:
Align matching marks on propeller shaft and rear differential coupling.



G3M0782

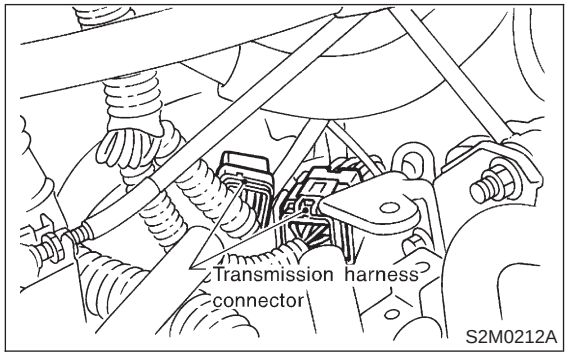
6) Install front exhaust pipe.

Tightening torque:
At engine
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)
At hanger
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)
At front and rear connections
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)


G3M0305

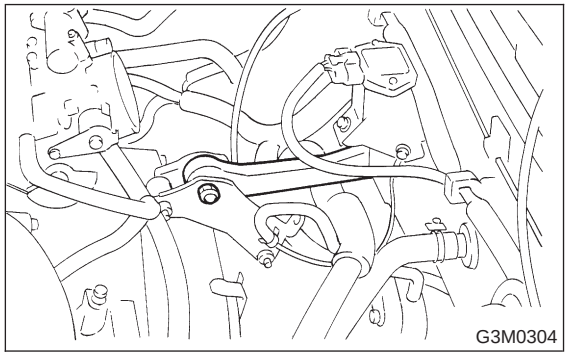
7) Lower and remove jack.
8) Connect the following parts:
(1) Oxygen sensor connector

(2) Transmission harness connector



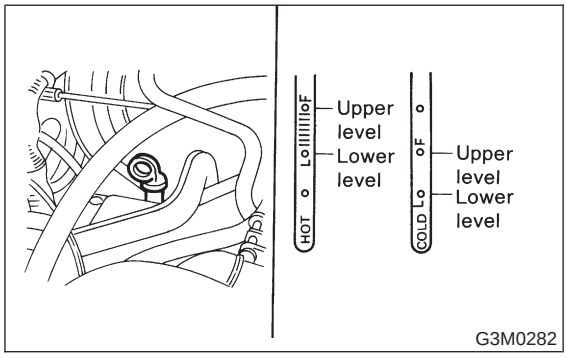
9) Install pitching stopper.

Tightening torque:
Body side
57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)
Engine side
49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)



10) Install air intake chamber.

11) 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

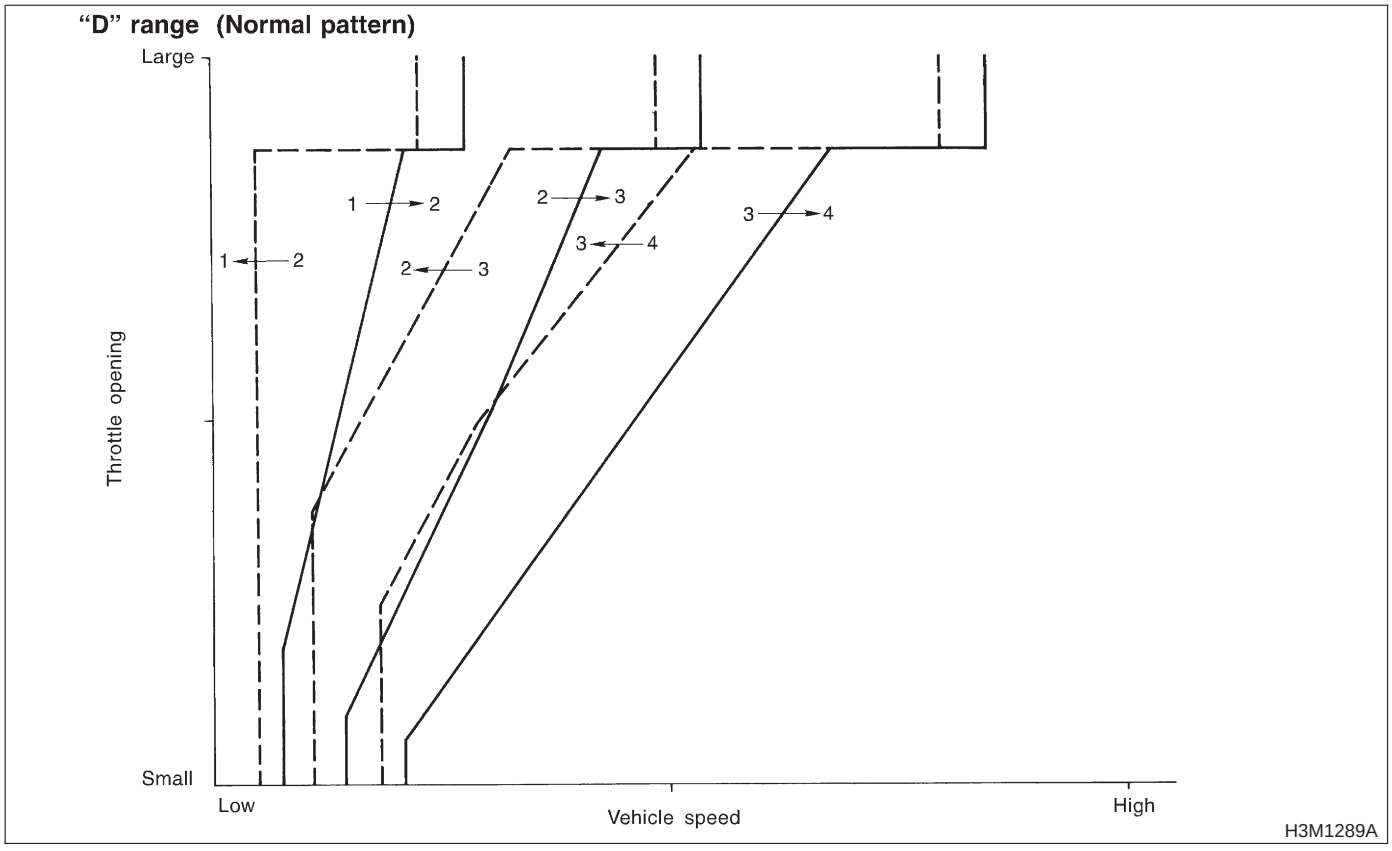
Check “kick-down”.

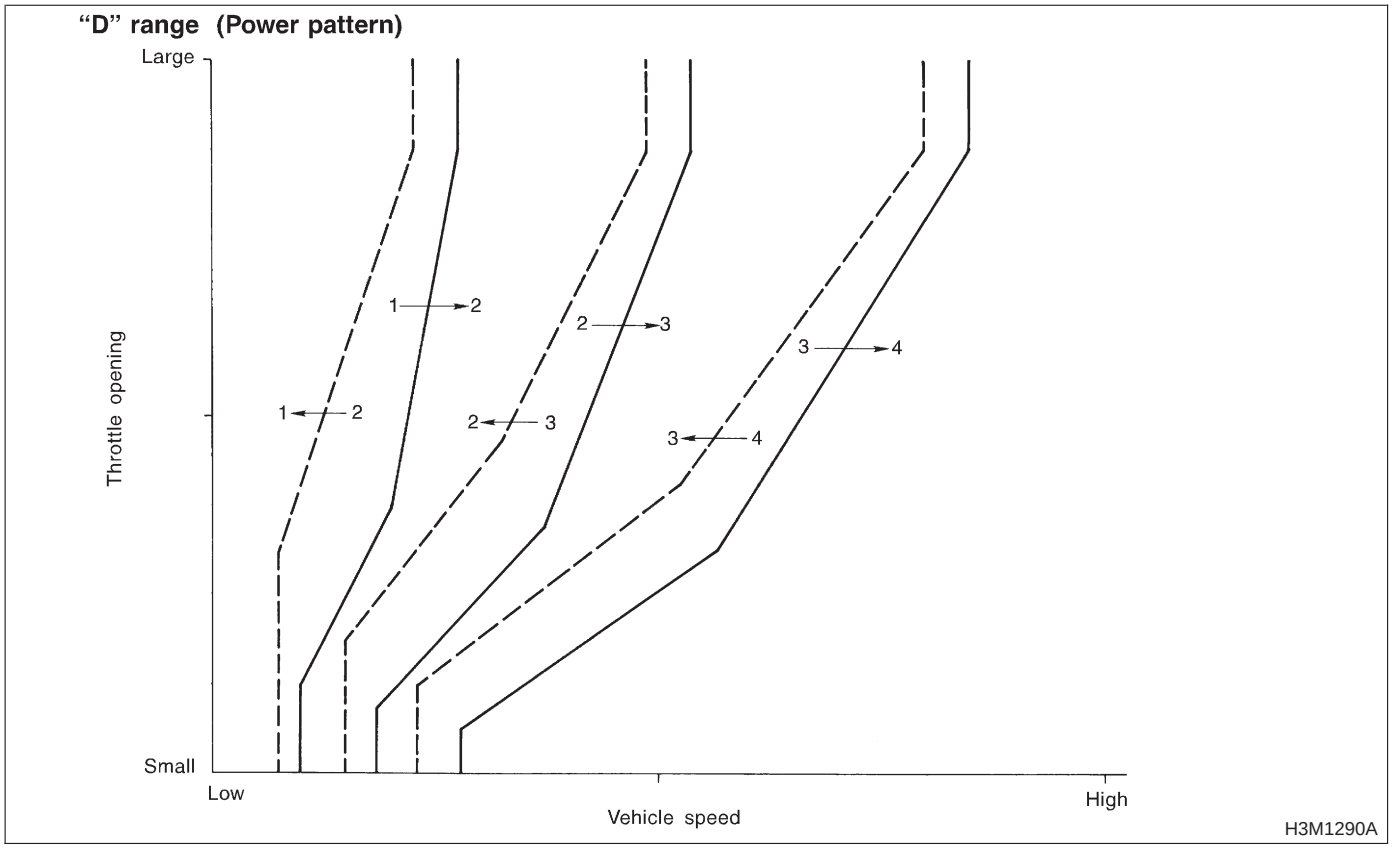
D range: 1st ←/→ 2nd ←/→ 3rd ←/→ 4th

3 range: 1st ←/→ 2nd ←/→ 3rd ← 4th

2 range: 2nd ← 3rd ← 4th

1 range: 1st ← 2nd ← 3rd ← 4th





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

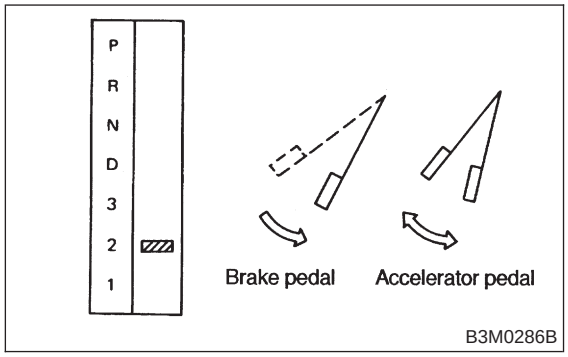
1. GENERAL INFORMATION

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.



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):
2200 cc; 2,300 — 2,700 rpm
2500 cc; 2,200 — 2,600 rpm

3. EVALUATION

Stall speed (at sea level)	Position	Cause
Less than specifications	2 R	● Throttle valve not fully open ● Erroneous engine operation ● Torque converter clutch's one-way clutch slipping
Greater than specifications	D	● Forward clutch slipping ● One-way clutch (1-2) malfunctioning
	R	● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	● 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)

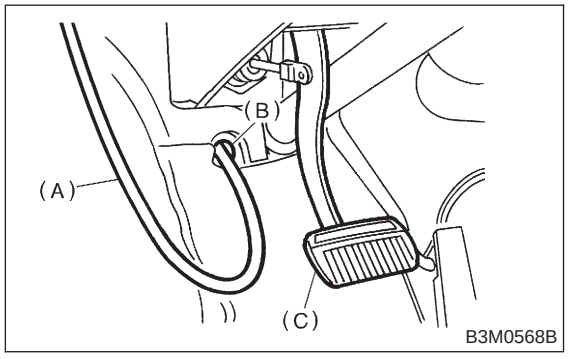
CAUTION:
- **Before measuring line pressure, jack-up all wheels.**
- **Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in “N” or “P”.)**

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”.)**

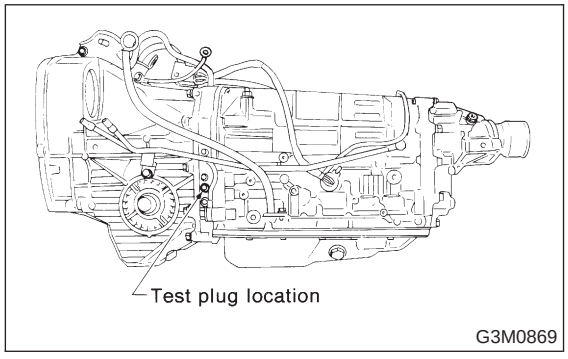
2. TEST METHODS

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



(A) Pressure gauge hose
(B) Hole in toe board (blank cap hole)
(C) 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 [T9I0].>
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)	
			2200 cc	2500 cc
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)	392 — 490 (4.0 — 5.0, 57 — 71)

11. Transfer Clutch Pressure Test

A: MEASUREMENT

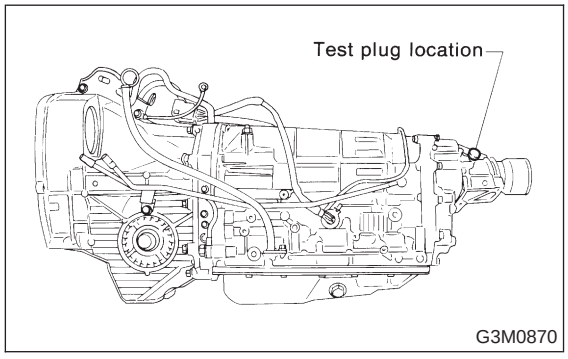
1. TEST METHODS

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.



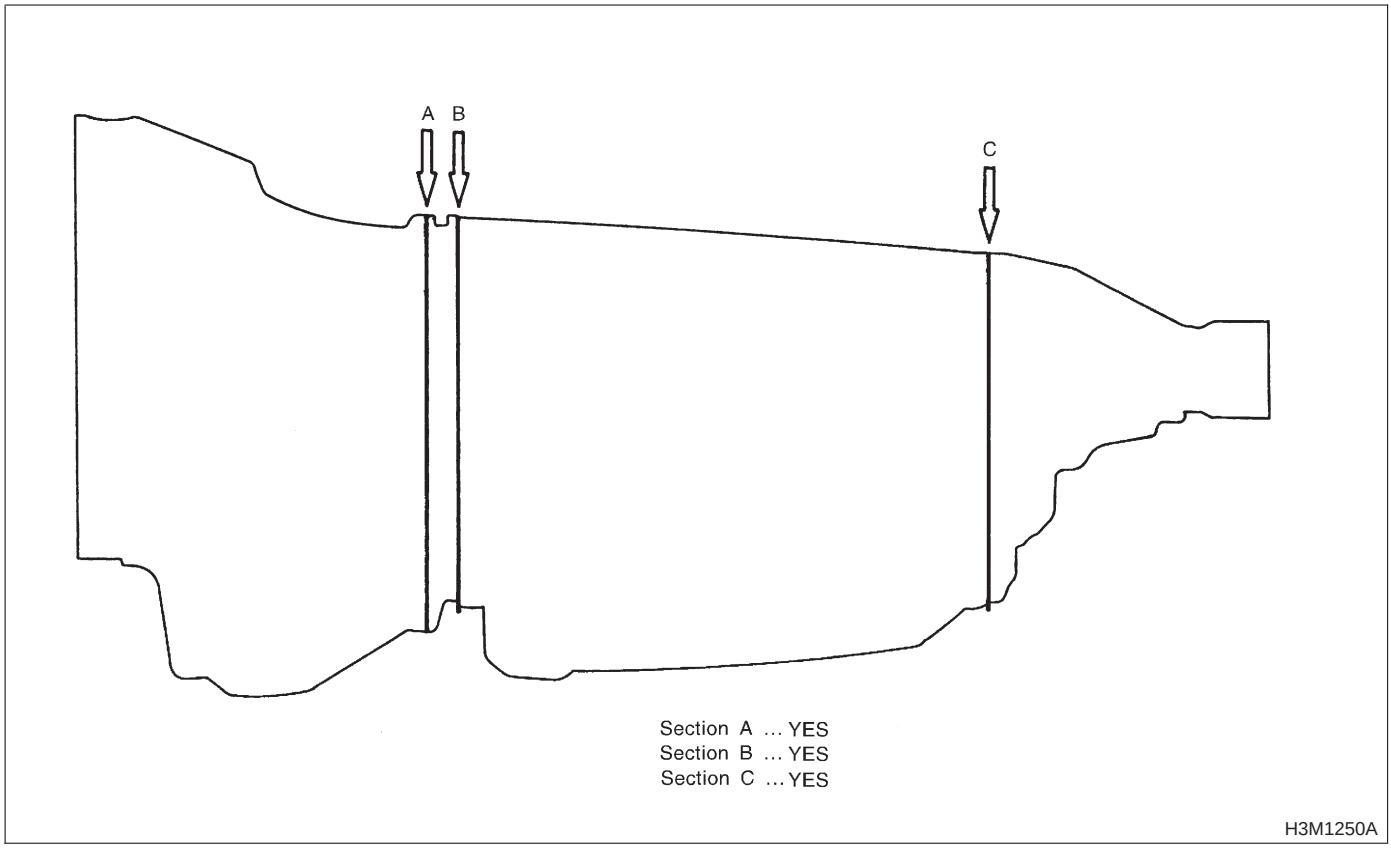
2. EVALUATION

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

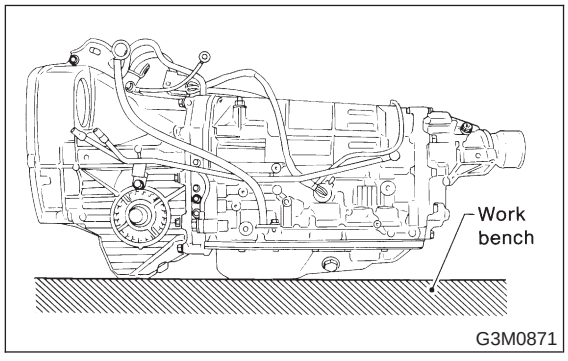


B: DISASSEMBLY

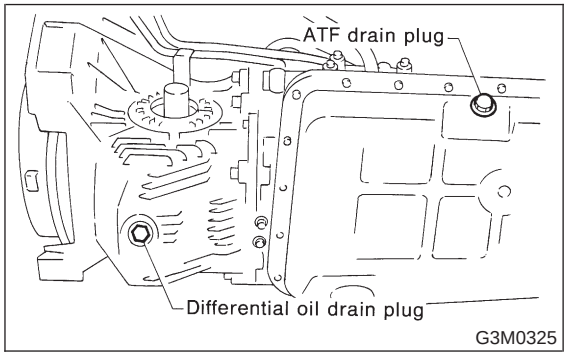
1. EXTERNAL PARTS

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

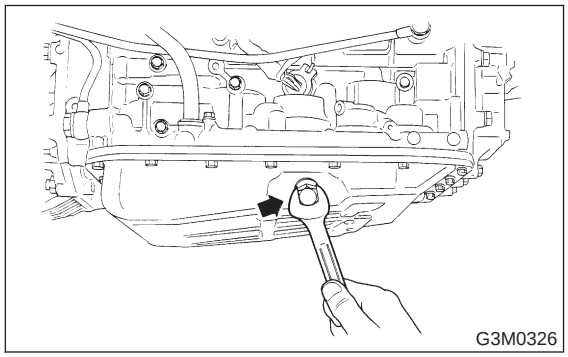
CAUTION:
Be careful not to bend or damage external parts.



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

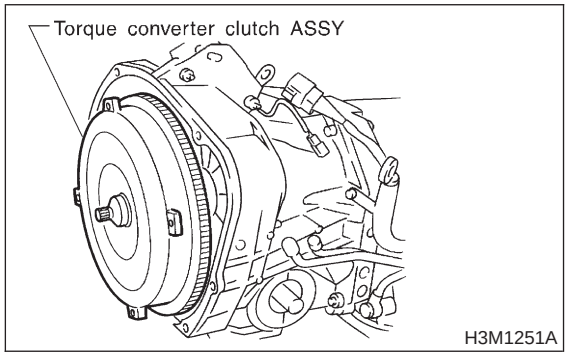


3) Remove the drain plug, and drain automatic transmission fluid (ATF). Tighten the plug temporarily after draining.


G3M0326

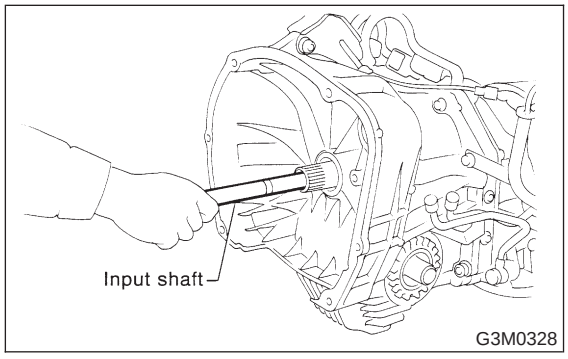
4) Extract the torque converter clutch assembly.

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.



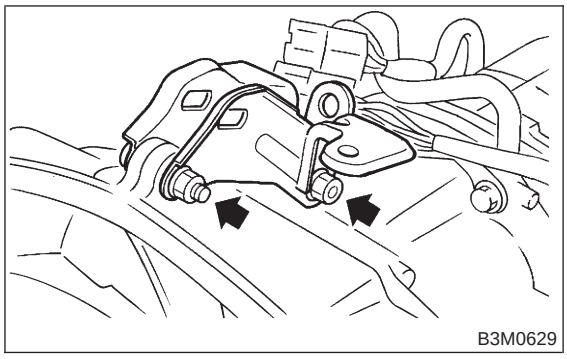
H3M1251A

5) Remove the input shaft.

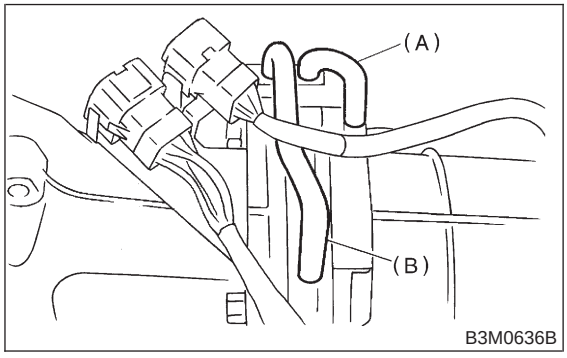


G3M0328

6) Remove the pitching stopper bracket.


B3M0629

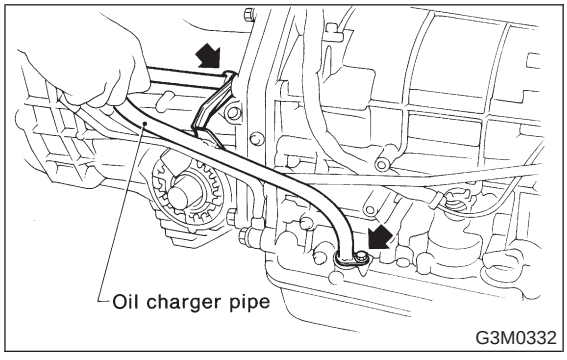
7) Disconnect the air breather hose.



B3M0636B

(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

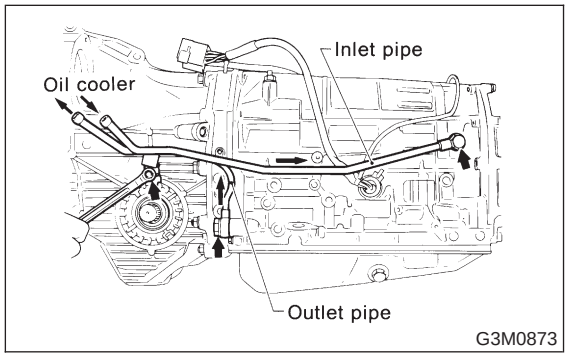
8) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe.



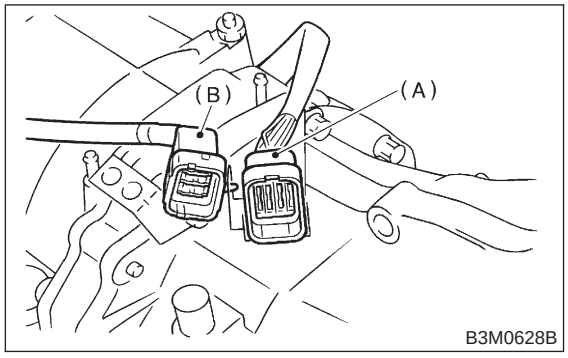
G3M0332

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.



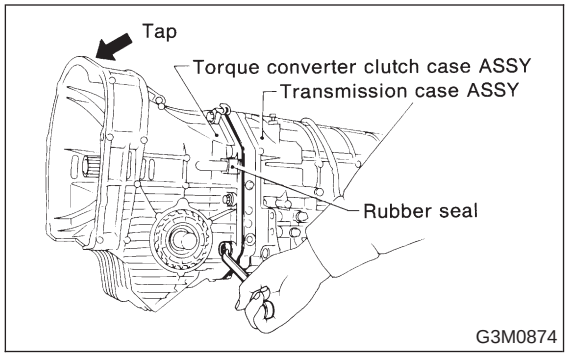
(A) Transmission harness
(B) Inhibitor switch cord

2. SEPARATION OF EACH SECTION

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

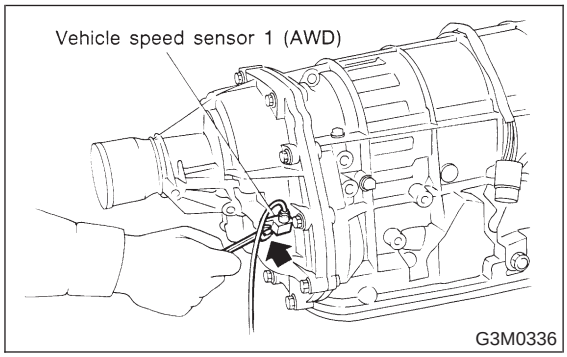
CAUTION:
● Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.
● Be careful not to lose the rubber seal.

NOTE:
Separate these cases while tapping lightly on the housing.



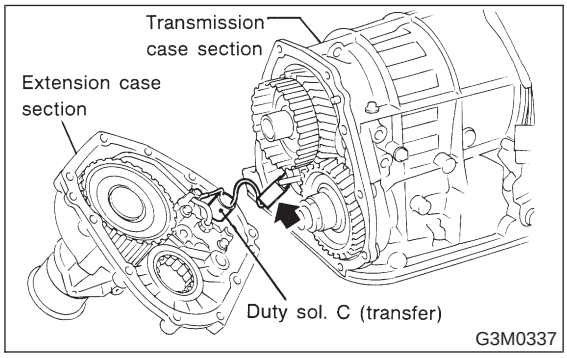
2) Separation of transmission case and extension sections

(1) Remove vehicle speed sensor 1.



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

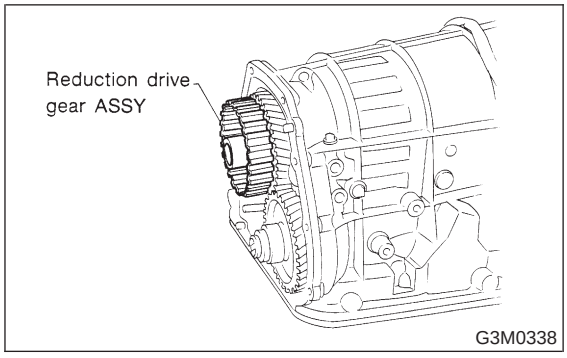
CAUTION:
Be careful not to cut the harness.



3) Separate both sections.

3. TRANSMISSION CASE SECTION

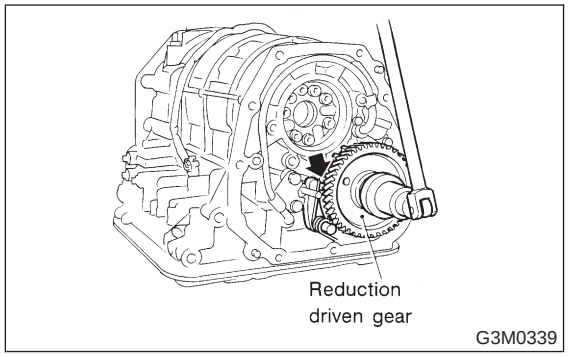
1) Remove the reduction drive gear assembly.



2) Remove the reduction driven gear.

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

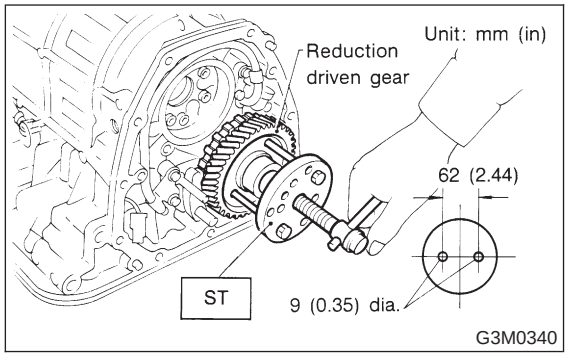
NOTE:
Set the range selector lever to “P”.



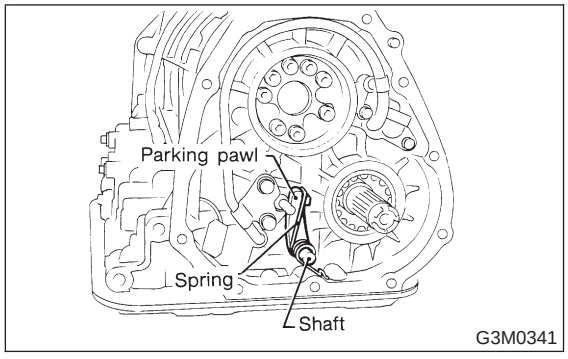
(2) Using the ST, extract the reduction driven gear.

ST 899524100 PULLER SET

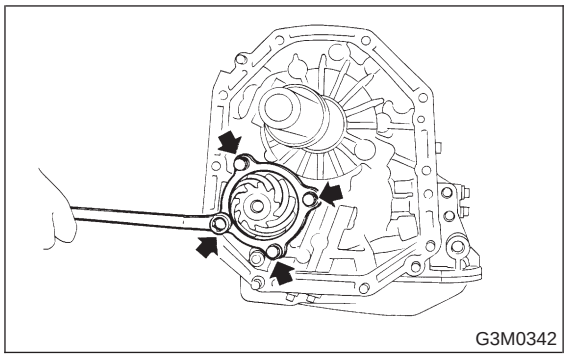
NOTE:
Drill two holes in the puller.



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

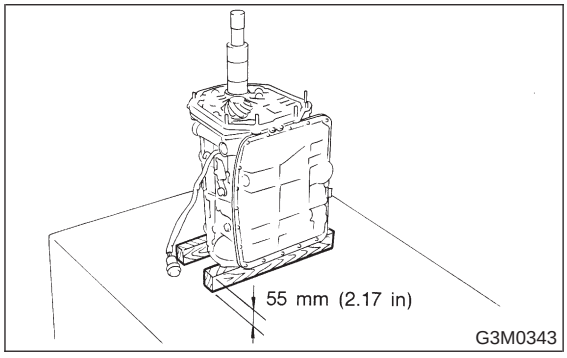


4) Loosen the taper roller bearing mounting bolts.



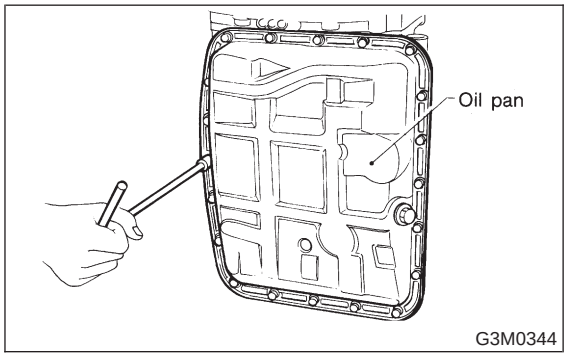
5) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

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.



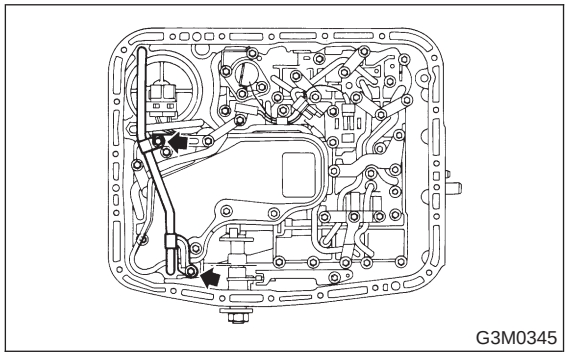
6) Remove the oil pan.

NOTE:
Tap the corners of the oil pan when removing.

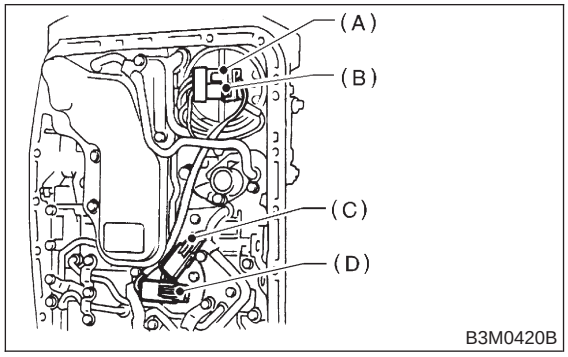


7) Remove the oil cooler outlet pipe.

CAUTION:
Be careful not to twist the pipe.



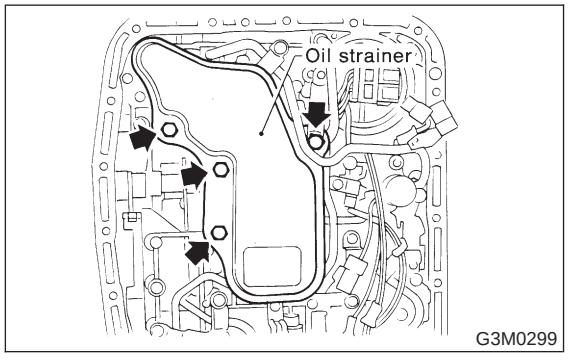
8) Disconnect the harness connectors for the solenoids and duty solenoids and the ground cord.



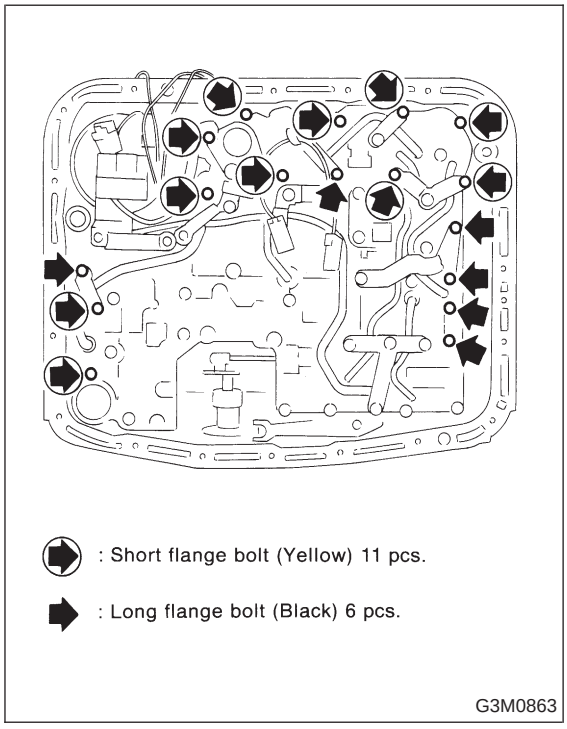
(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

9) Remove the oil strainer.

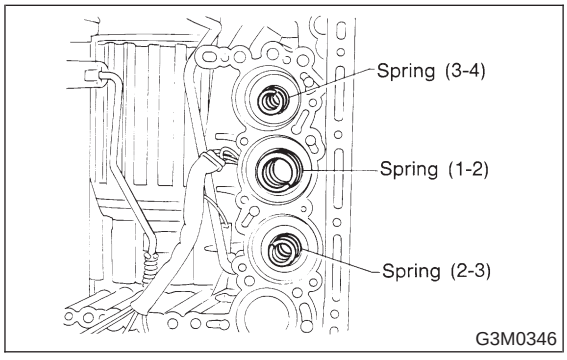
CAUTION:
Be careful not to damage O-ring on oil strainer.



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

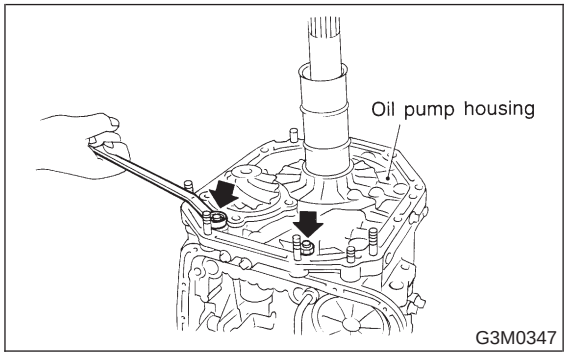


11) Remove the three accumulator springs.

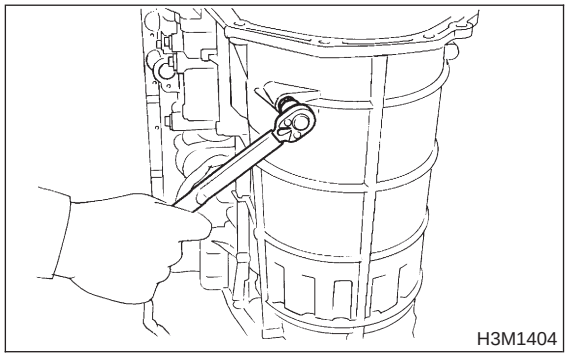


12) Loosen the reverse clutch drum lightly by turning the adjusting screw. Then remove the oil pump housing.

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

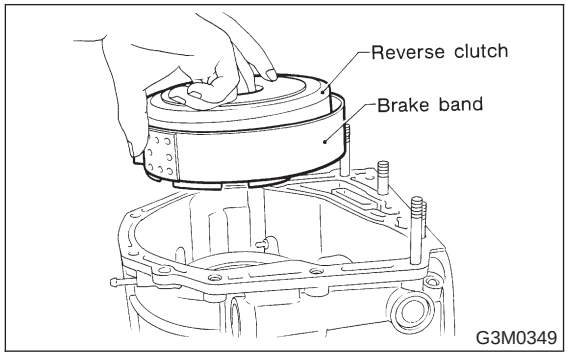


13) Loosen the brake band adjusting screw and take out the strut.



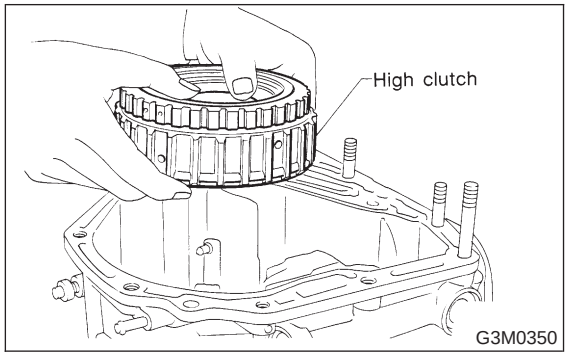
14) Remove the brake band and reverse clutch.

NOTE:
Contract the brake band with a clip.

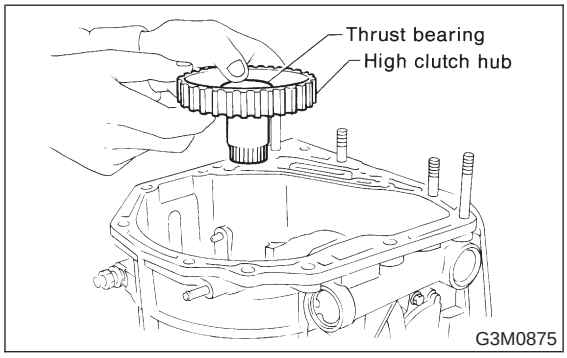


15) Take out the high clutch.

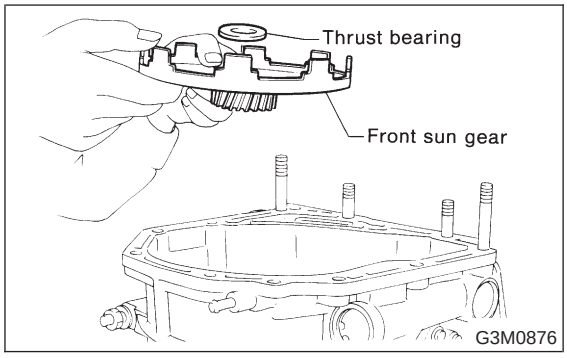
CAUTION:
Thrust needle bearing and bearing race are removed together with high clutch. Be careful not to lose them.



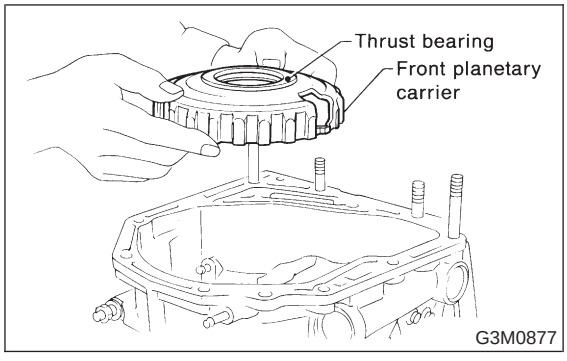
16) Take out the high clutch hub and the thrust bearing.



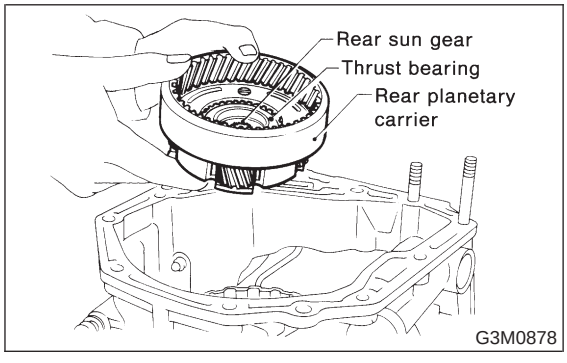
17) Take out the front sun gear and the thrust bearing.



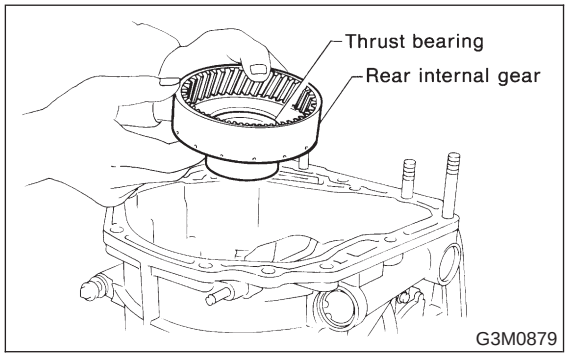
18) Take out the front planetary carrier and the thrust bearing.



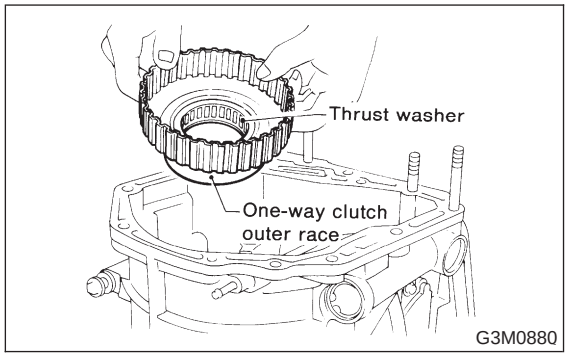
19) Take out the rear planetary carrier, rear sun gear and the thrust bearing.



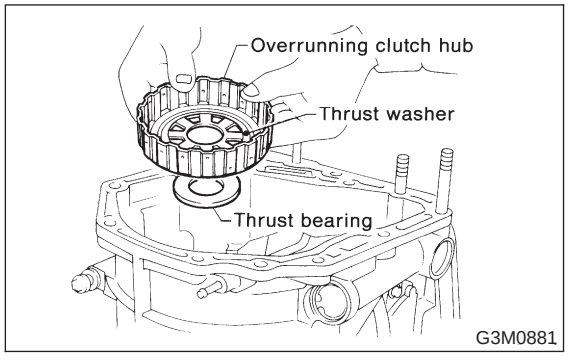
20) Take out the rear internal gear and the thrust bearing.



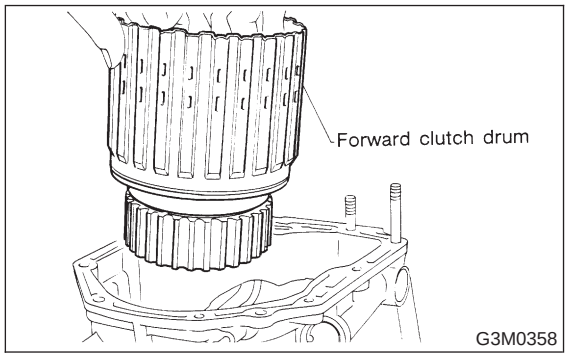
21) Take out the one-way clutch outer race and the thrust washer.



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

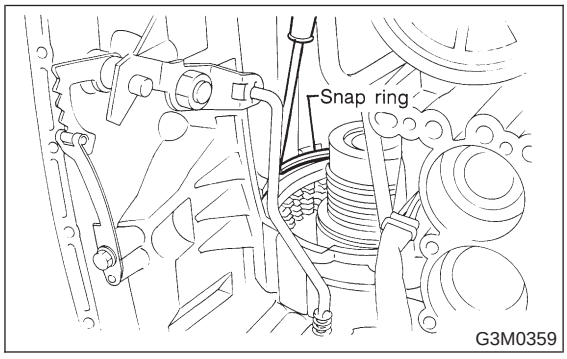


23) Take out the forward clutch drum.

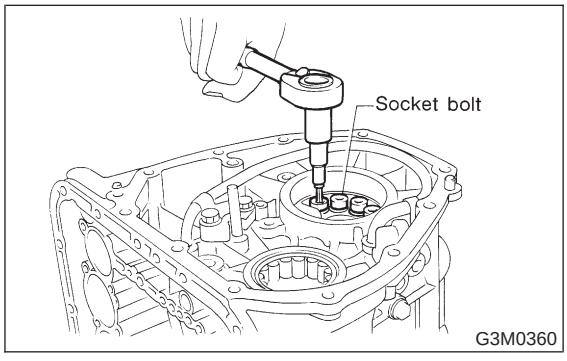


24) Take out the low & reverse brake section.

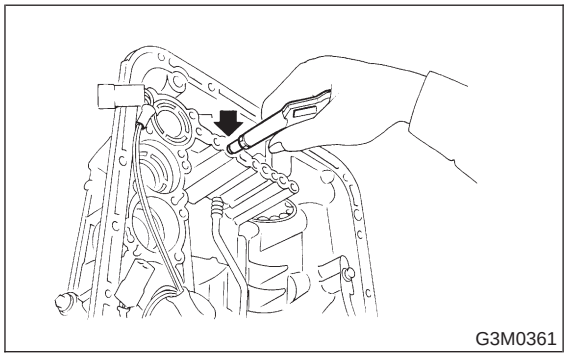
(1) Remove the snap ring. Then remove the retaining plate, drive plates, driven plates, and dish plates as a unit.



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

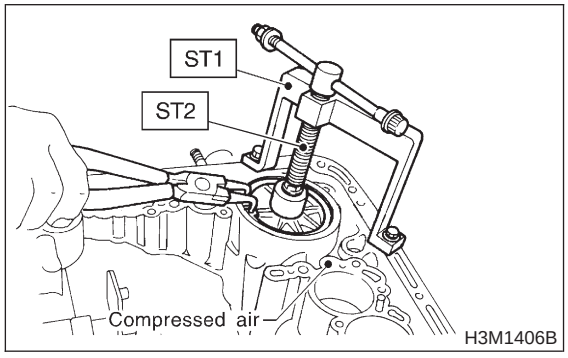


(3) Take out the low & reverse piston by applying compressed air.

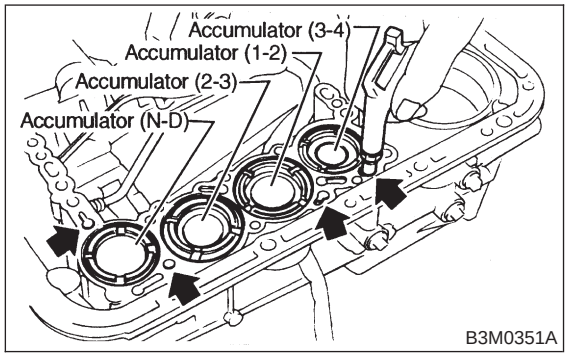


25) After removing the snap ring (inner), take out the servo piston by applying compressed air from the release pressure side.

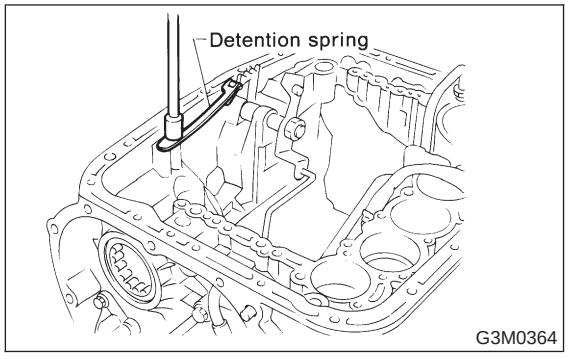
CAUTION:
Hold the servo piston with a rag so that it will not be ejected with the air pressure. In this case, do not allow your finger to be pinched between the pipe and retainer.
ST1 498677010 COMPRESSOR
ST2 399703600 PULLER ASSY



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).

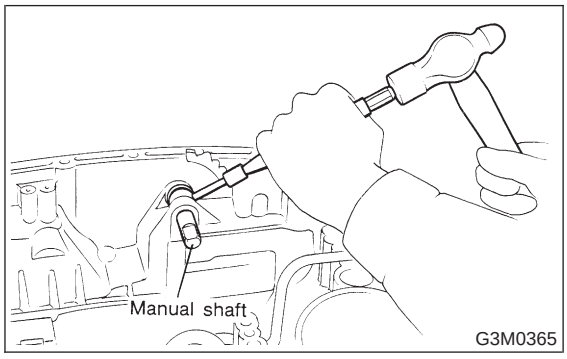


27) Remove the range select lever.
28) Remove the detention spring.

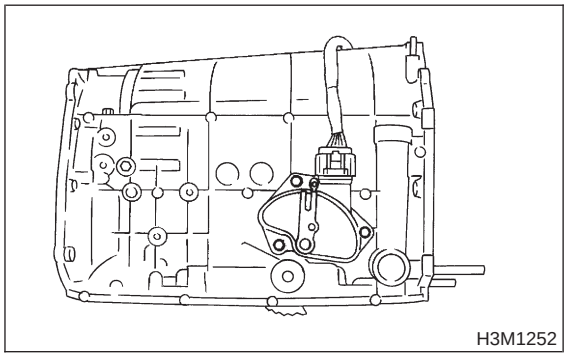


29) Remove the parking rod together with the manual lever. Then remove the manual shaft by pulling off the straight pin.

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

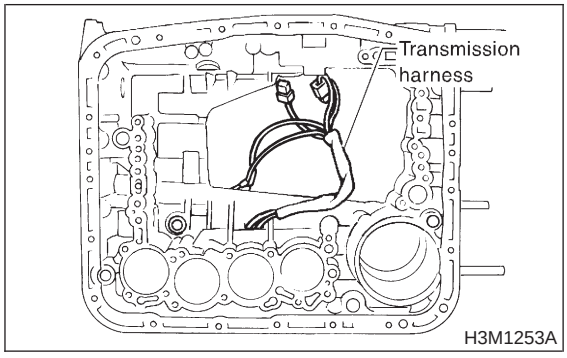


30) Remove the inhibitor switch.



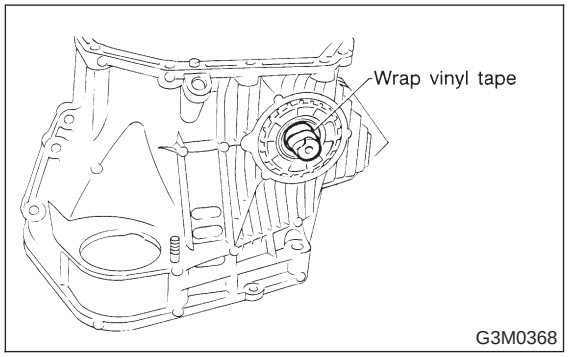
31) Remove the transmission harness.

CAUTION:
Be careful not to damage the cord insulation.



4. TORQUE CONVERTER CLUTCH CASE SECTION

1) Wrap the axle shaft serration with vinyl tape.

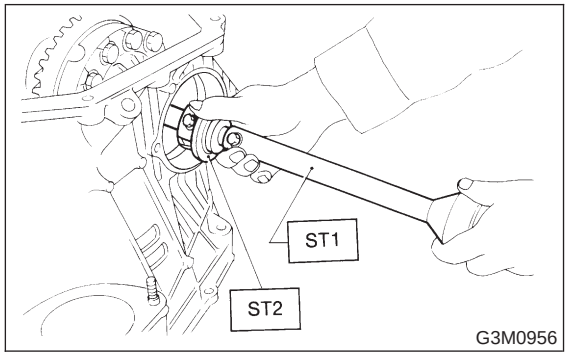


2) Remove the differential side retainer with ST.

CAUTION:
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case and speedometer gears.
ST 499787000 WRENCH ASSY

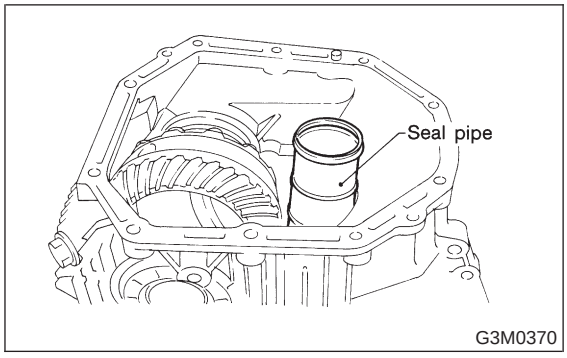
3) Extract the axle shaft with ST1 and ST2.

CAUTION:
Do not reuse the circlip.
ST1 499095500 REMOVER
ST2 499247300 INSTALLER

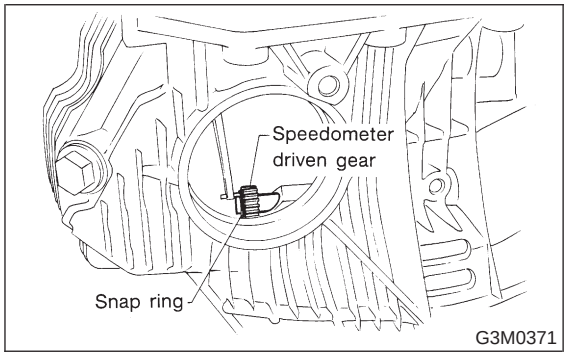


4) Remove the differential case assembly.

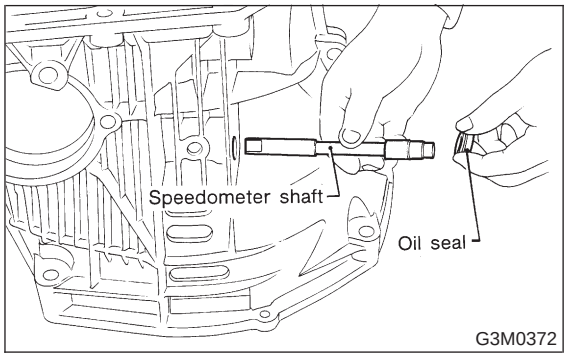
CAUTION:
- **Be careful not to damage the retainer mounting hole of the torque converter clutch case and the speedometer gears.**
- **Remove the seal pipe if it is attached. (Reusing is not allowed.)**



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



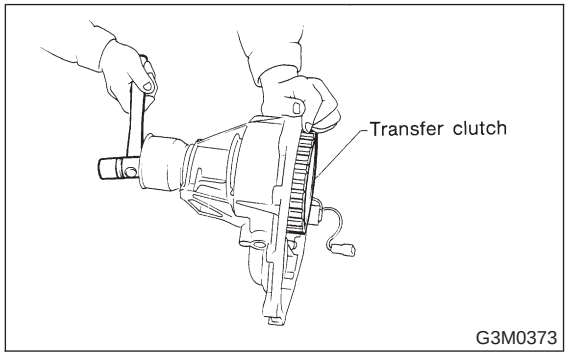
6) Tap out the speedometer shaft to the outside of the case, and remove the oil seal.



5. EXTENSION SECTION

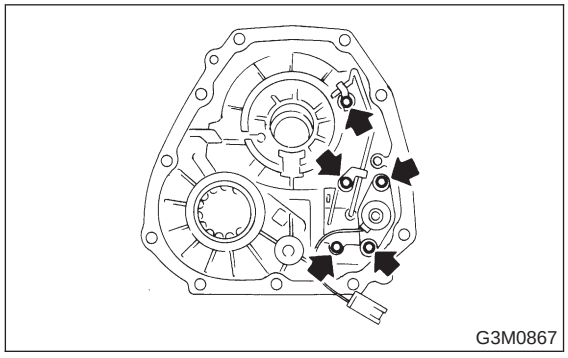
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

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

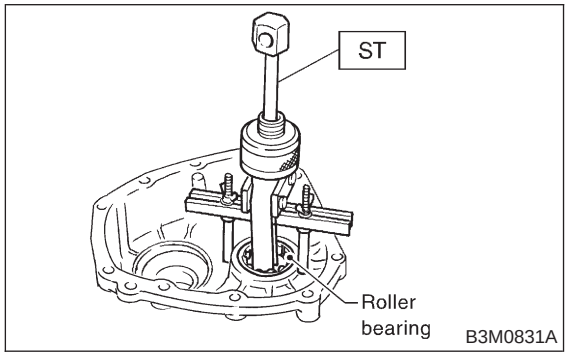


2) Remove duty solenoid C, transfer valve body and the transfer pipe.

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 inner race with ST.
ST 398527700 PULLER



4) Take out the roller bearing outer race with ST.

NOTE:
Hook ST in the inner side of the roller bearing outer race.

ST 398527700 PULLER

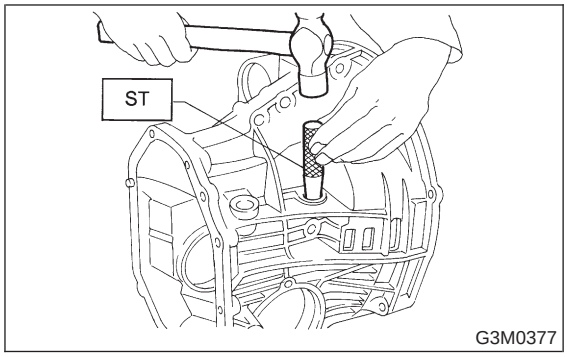
C: ASSEMBLY OF OVERALL TRANSMISSION

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.

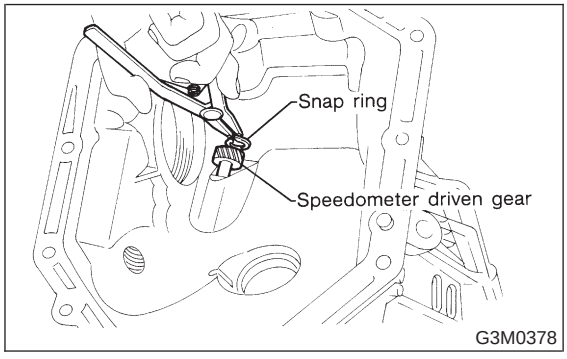
2) Install the washer and snap ring to the speedometer shaft with ST, and set the oil seal. Then force-fit the shaft to the torque converter clutch case.
ST 499827000 PRESS



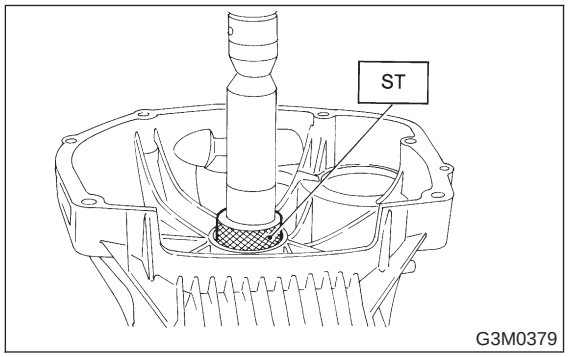
3) Install vehicle speed sensor 2.

CAUTION:
Use new vehicle speed sensor 2, if it has been removed.

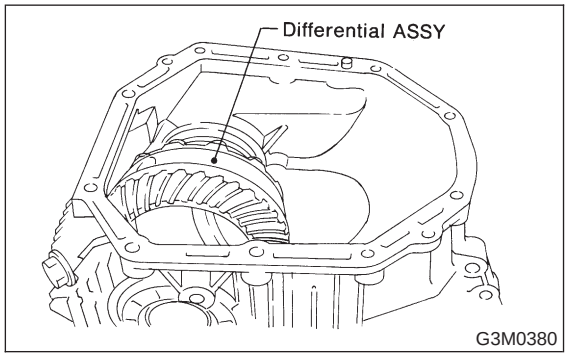
4) Install the speedometer driven gear to the speedometer shaft, and secure with a snap ring.



5) Force-fit the oil seal to the torque converter clutch case with ST.
ST 398437700 DRIFT



6) 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).

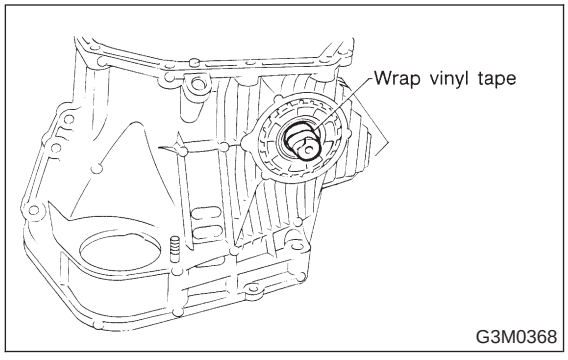


7) Install the circlip to the axle shaft, insert the shaft into the differential assembly, and tap it into position with a plastic hammer.

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.**

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

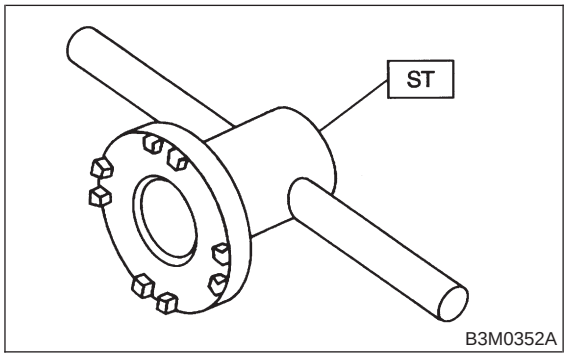


9) Install the oil seal and outer race (taper roller bearing) to the differential side retainer. Then screw in the retainer and the O-ring after coating the threads with oil.

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.**

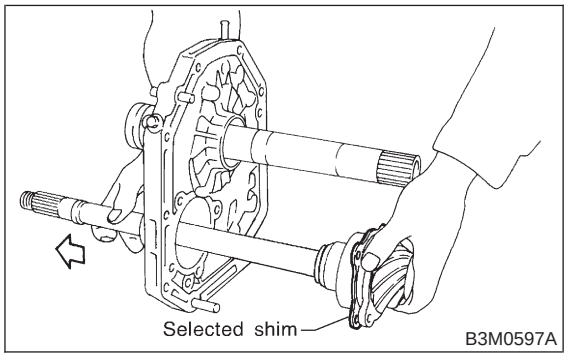
10) Using the ST, screw in the retainer until light contact is felt.
ST 499787000 WRENCH ASSY

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



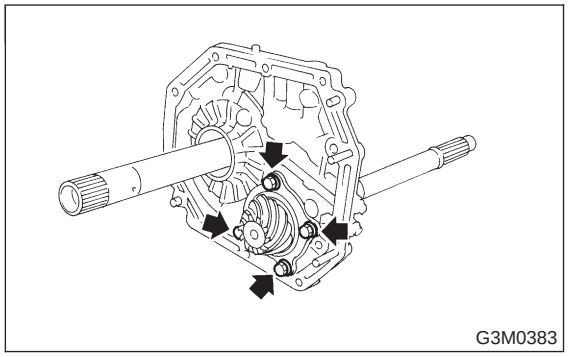
11) Hypoid gear backlash adjustment and tooth contact check
(1) Assemble the drive pinion assembly to the oil pump housing.

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.

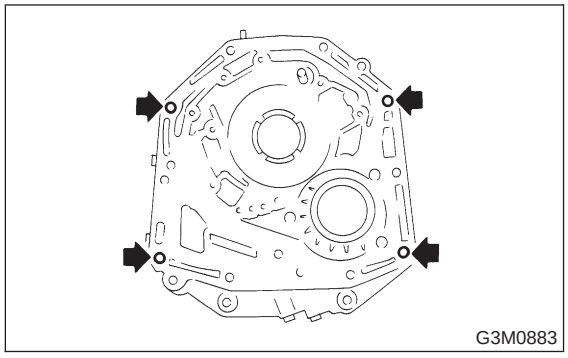
Tightening torque:
39±3 N·m (4.0±0.3 kg-m, 28.9±2.2 ft-lb)


G3M0383

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

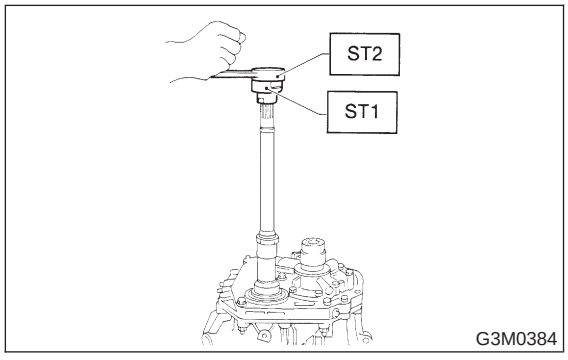
CAUTION:
● Thoroughly remove the liquid gasket from the case mating surface beforehand.
● Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

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


G3M0883

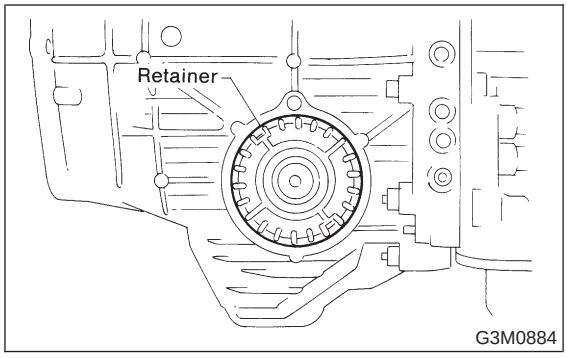
(4) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937100 HOLDER
ST2 499787100 WRENCH



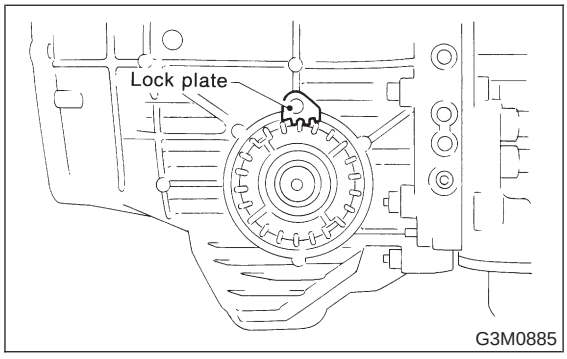
G3M0384

(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.



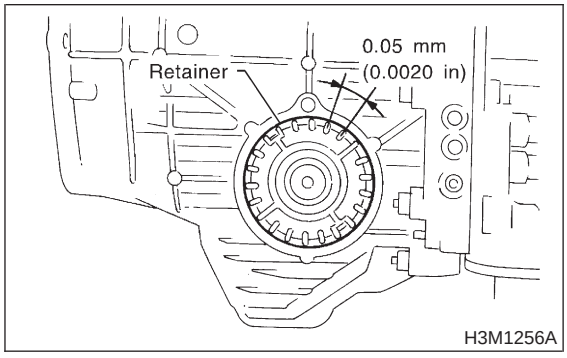
G3M0884

(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.



G3M0885

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



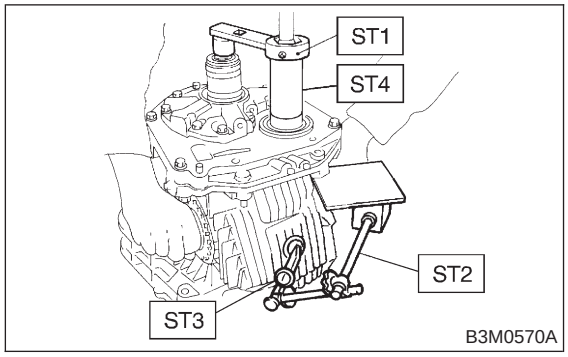
H3M1256A

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

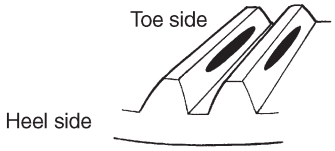
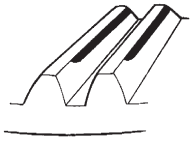
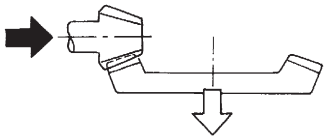
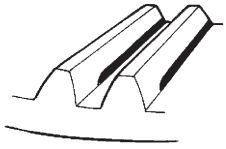
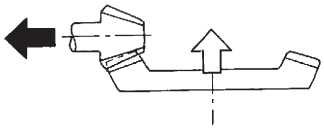
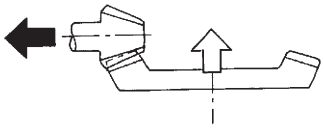
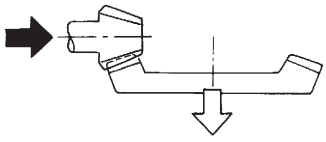
NOTE:
After confirming that the backlash is correct, check the tooth contact.

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)



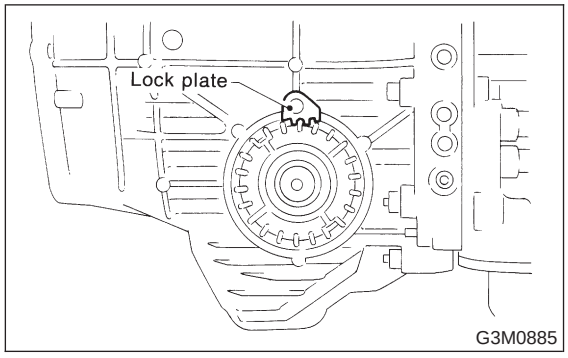
(8) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.
If tooth contact is improper, readjust the backlash or shim thickness.

Checking item	Contact pattern	Corrective action
Tooth contact Tooth contact pattern is slightly shifted toward to under no-load rotation. [When loaded, contact pattern moves toward heel.]	 B3M0317A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  B3M0319	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.  B3M0323
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  B3M0320	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  B3M0324
Toe contact (Inside end contact) Contact areas is small.	This may cause chipping at toe ends.  B3M0321	Adjust as for flank contact.  B3M0324
Heel contact (Outside end contact) Contact area is small.	This may cause chipping at heel ends.  B3M0322	Adjust as for face contact.  B3M0323

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

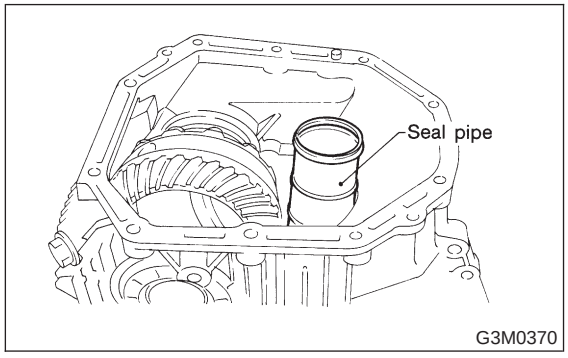
(9) If tooth contact is correct, mark the retainer position and loosen it. After fitting the O-ring, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

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



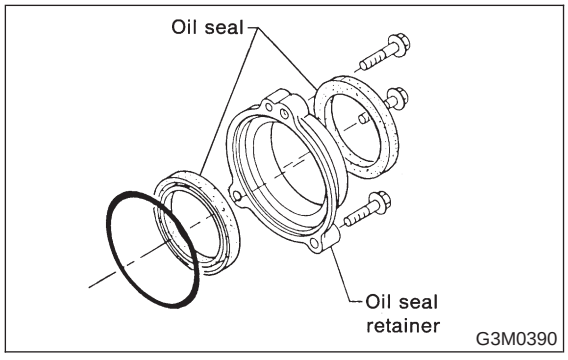
12) Install the seal pipe to the torque converter clutch case.

CAUTION:
Be sure to use a new seal pipe.



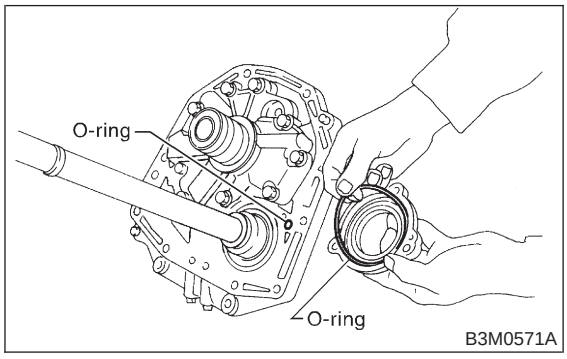
13) Install two oil seals to the oil seal retainer with ST.
ST 499247300 INSTALLER

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



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

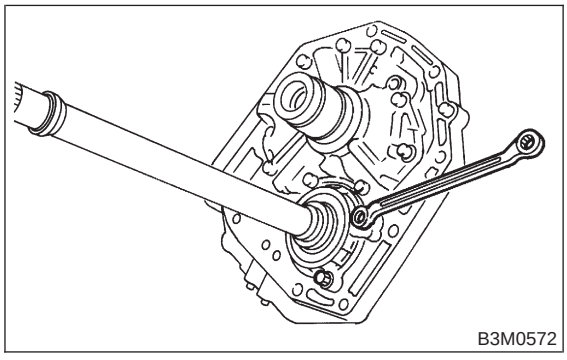
CAUTION:
Always discard old O-rings and install new ones.



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

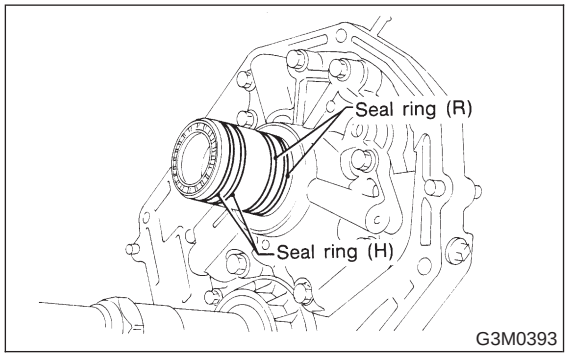
NOTE:
Make sure the O-ring is fitted correctly in position.

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)



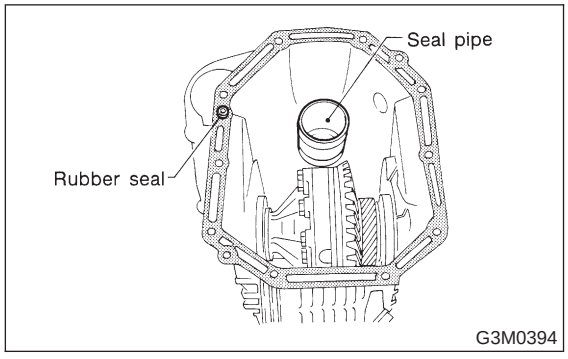
16) Apply vaseline to the groove on the oil pump cover, and install two (R) seal rings and two (H) seal rings.

NOTE:
● Fit the seal ring after compressing, and rub vaseline into the seal ring to avoid expansion.
● he “R” seal ring has a large diameter, while “H” has small diameter.



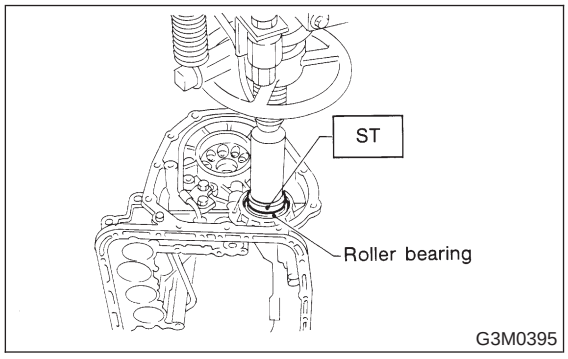
17) Install the rubber seal to the torque converter clutch case.

CAUTION:
Be careful not to lose the rubber seal.

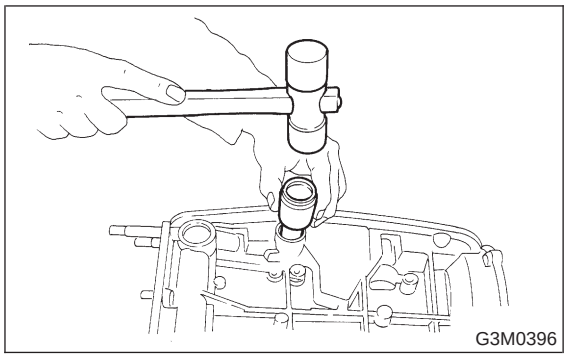


2. TRANSMISSION CASE SECTION

1) Press-fit the roller bearing to the transmission case with ST.
ST 398487700 DRIFT



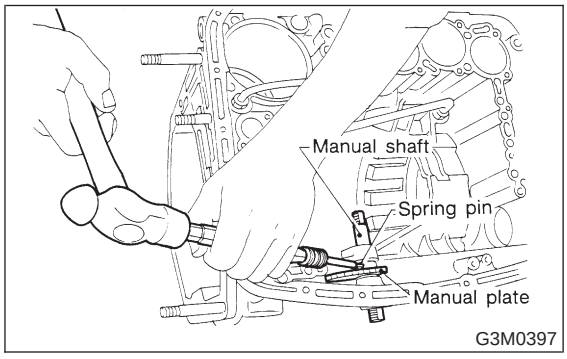
2) Using a plastic hammer, force-fit the oil seal.



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

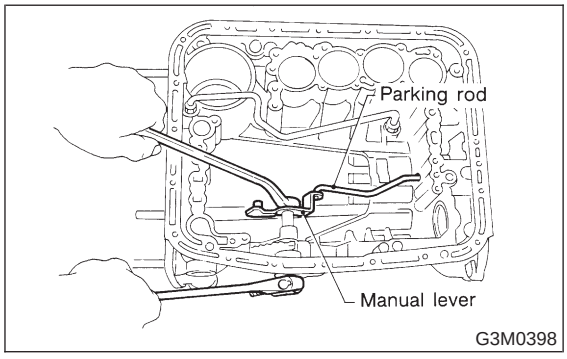
CAUTION:
Be careful not to damage the oil seal lip.

NOTE:
After installation, make sure of smooth movement.



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

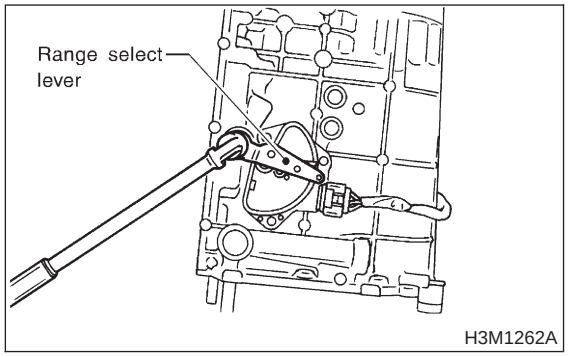
Tightening torque:
47±2 N·m (4.8±0.2 kg-m, 34.7±1.4 ft-lb)



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.

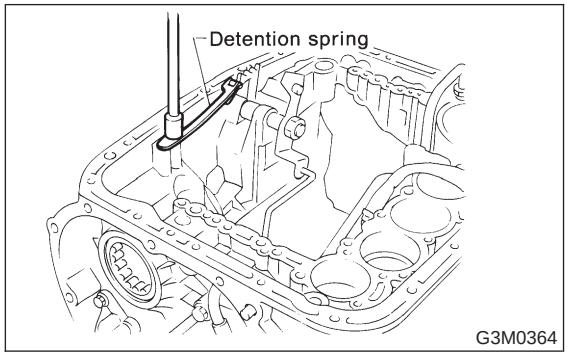
Tightening torque:
47±5 N·m (4.8±0.5 kg-m, 34.7±3.6 ft-lb)



6) Install the detention spring.

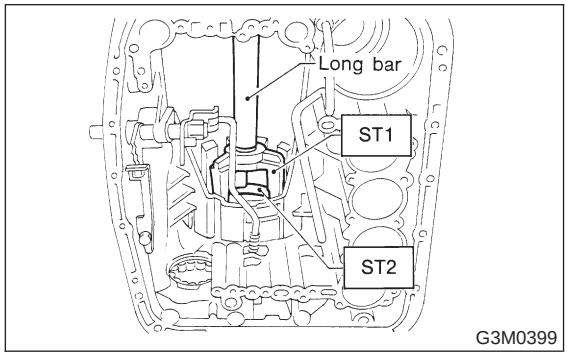
NOTE:
Position the spring so that its center is aligned with the center of the manual plate.

Tightening torque:
6±1 N·m (0.6±0.1 kg-m, 4.3±0.7 ft-lb)



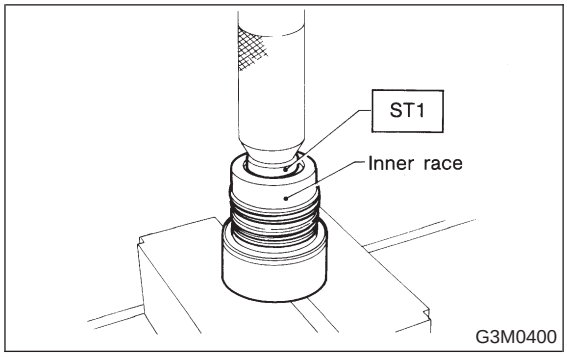
7) Install the lathe cut seal rings to the I.D./O.D. of the low and reverse piston. Then install the piston into the case with a press, ST1 and ST2.

CAUTION:
● Be careful not to tilt the piston when installing.
● Be careful not to damage the lip seal.
ST1 398673600 COMPRESSOR
ST2 498627000 SEAT



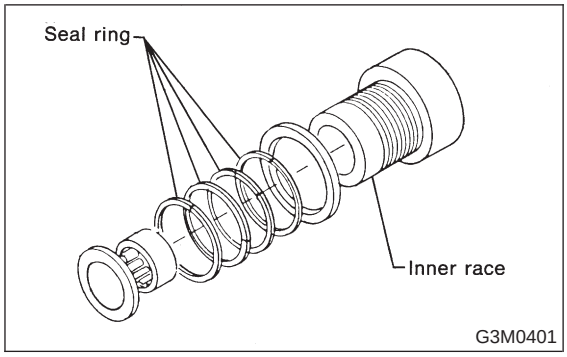
8) Install the one-way clutch inner race.
(1) Using a press and ST1, install the needle bearing to the inner race.
ST1 398497701 INSTALLER

NOTE:
Use the following ST when removing.
ST 398527700 PULLER ASSY



(2) Install four seal rings and thrust washer.

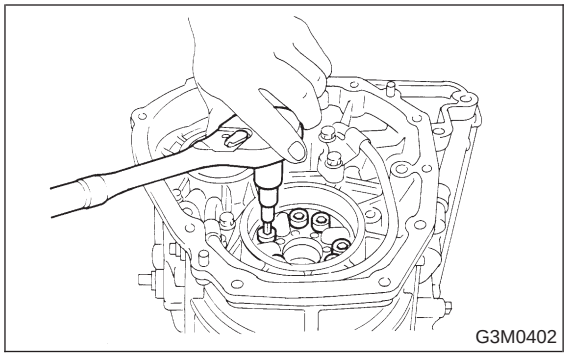
NOTE:
Apply vaseline to the groove of the inner race and to the seal ring after installation, so that the seal ring will not expand.



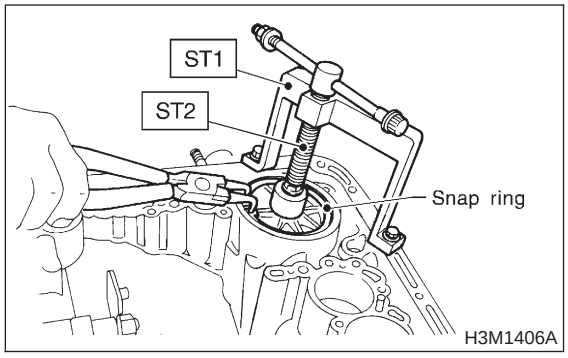
(3) Place the spring retainer on the inner race. Install the spring to the recessed portion of the piston. Then tighten eight socket head bolts from the rear side of the transmission case.

CAUTION:
Be sure to tighten evenly.

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



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.

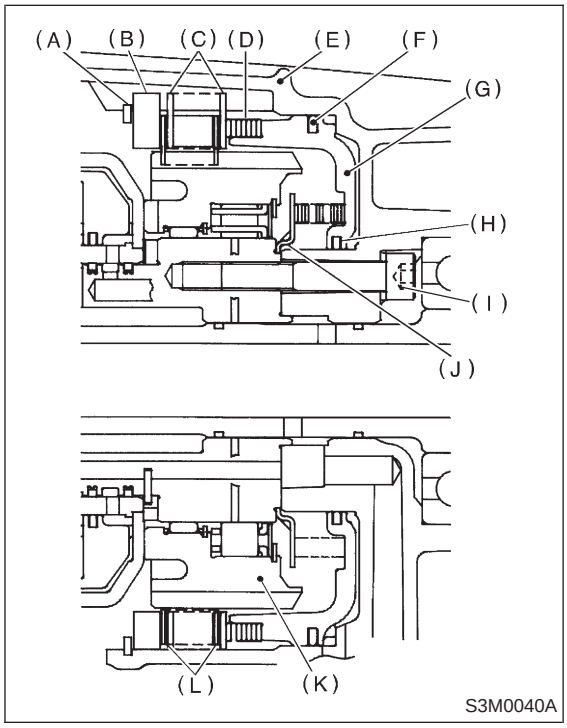
Standard value: 1.8 mm (0.071 in)

Allowable limit: 1.6 mm (0.063 in)

12) Installation of the low & reverse brake:

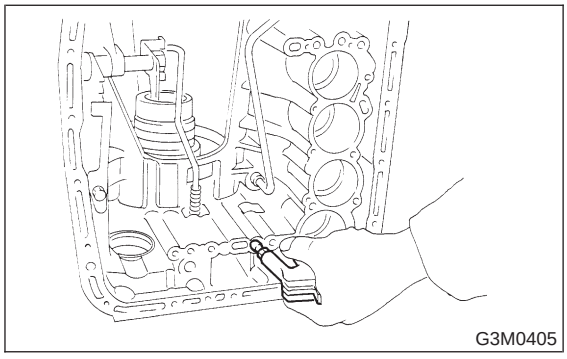
(1) Install wave spring, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

NOTE:
Pay attention to the orientation of the wave spring.



(A) Snap ring
(B) Retaining plate
(C) Driven plate
(D) Wave spring
(E) Transmission case
(F) Lathe cut seal ring
(G) Piston
(H) Lathe cut seal ring
(I) Bolt
(J) Clutch spring retainer
(K) Forward clutch drum
(L) Drive plate

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

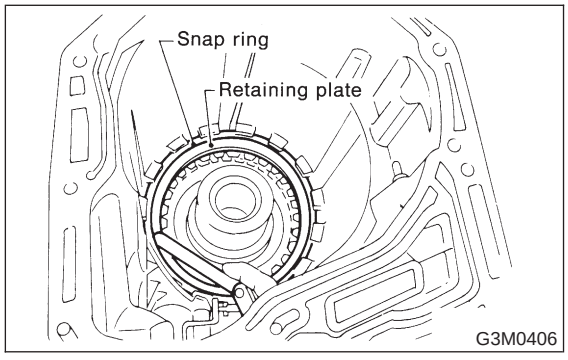


(3) Check the clearance. (Selection of retaining plate)

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

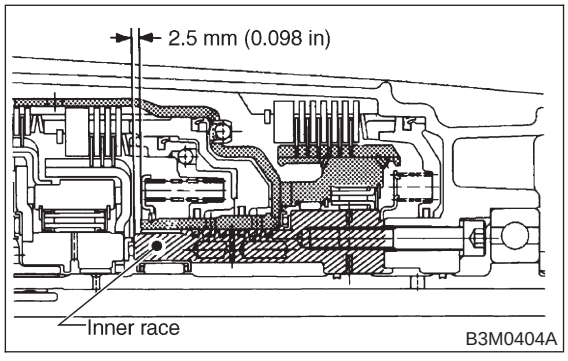
Standard value:
0.7 — 1.0 mm (0.028 — 0.039 in)

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)

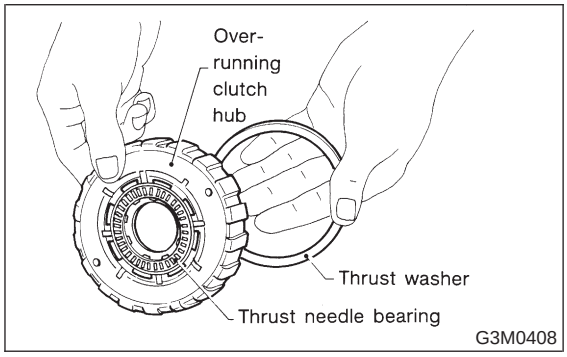
13) Install the forward clutch drum.
(1) Install carefully while rotating the forward clutch drum slowly paying special attention not to damage the seal ring.
(2) Installation is completed when the forward clutch drum recedes 2.5 mm (0.098 in) from the inner race surface.



14) Assemble the overrunning clutch hub.

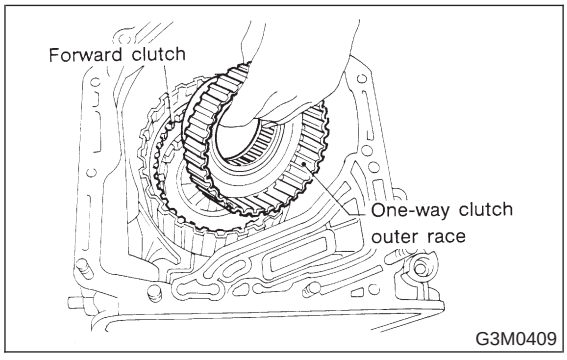
CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>

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.

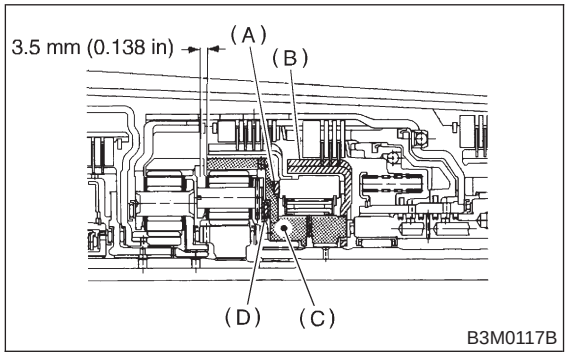
NOTE:
Make sure the forward clutch splines are engaged correctly.



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 [S1B2].>

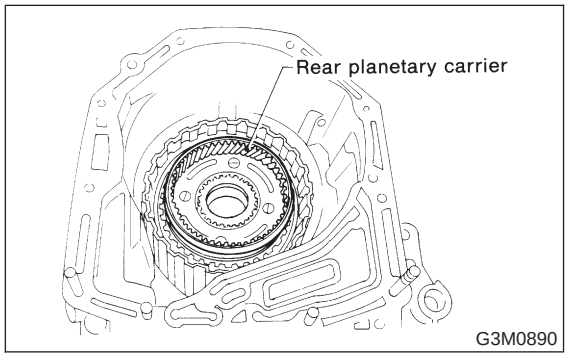
NOTE:
Installation is complete when the snap ring top surface of the forward clutch drum recedes approximately 3.5 mm (0.138 in).



(A) Thrust washer
(B) Overrunning clutch hub
(C) Rear internal gear
(D) Thrust needle bearing

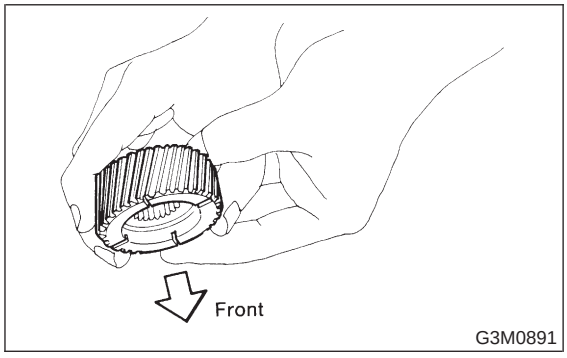
17) Install the rear planetary carrier.
Attach the thrust needle bearing to the inside of the carrier with vaseline. Then install the carrier while rotating slowly.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>



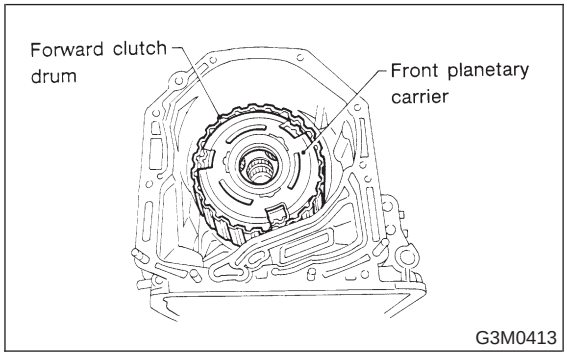
18) Install the rear sun gear.

NOTE:
Install the gear with the oil groove facing up.



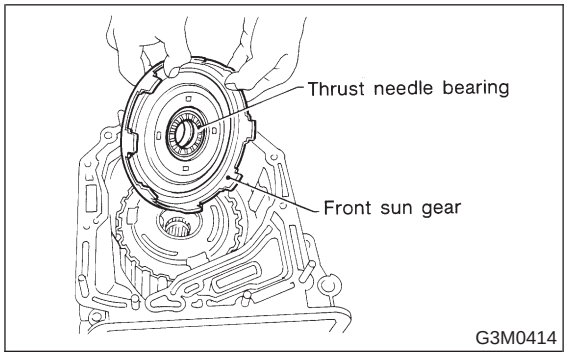
19) Install the front planetary carrier.
Attach the thrust needle bearings to both sides of the carrier with vaseline. Install the carrier carefully, while aligning with the splines of the forward clutch drum, and while rotating the pinion.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>



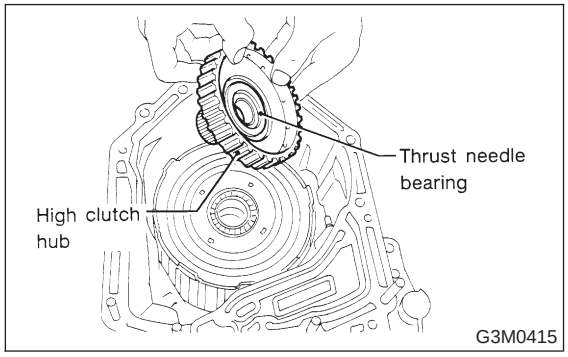
20) Install the front sun gear.
Attach the thrust needle bearing to the gear, and install the gear while turning slowly.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>



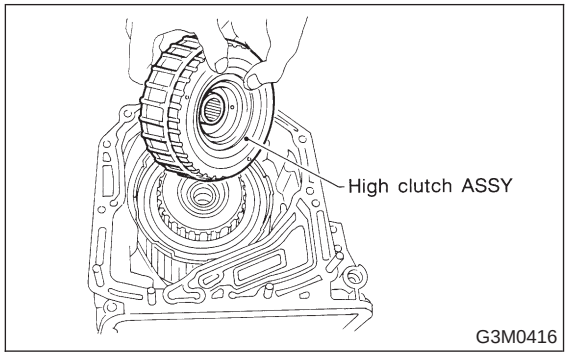
21) Install the high clutch hub.
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>



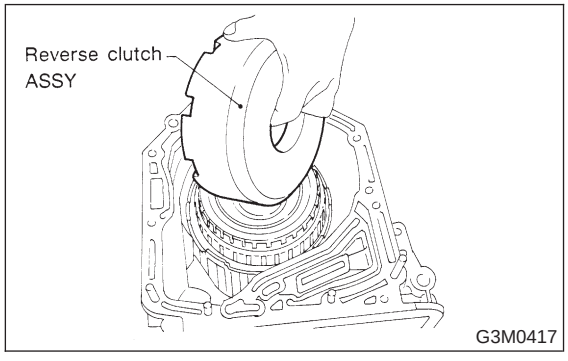
22) Install the high clutch assembly.

NOTE:
Correctly engage the high clutch hub and clutch splines.



23) Install the reverse clutch assembly.

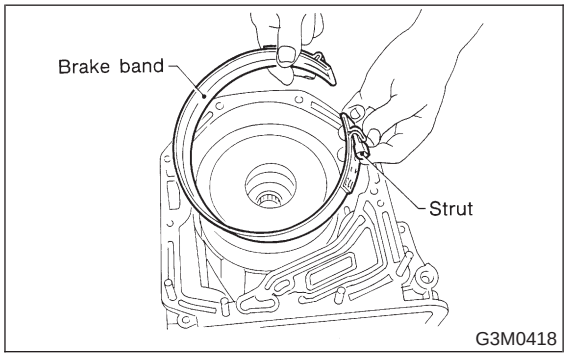
NOTE:
Engage the high clutch outer spline with the reverse clutch spline and the front sun gear with the cut-out portion of the reverse clutch drum correctly when installing.



24) Install the brake band.

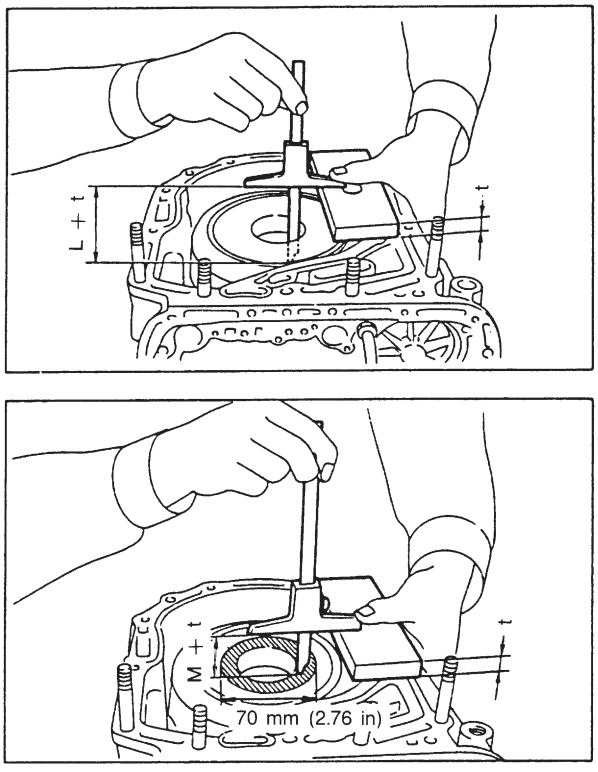
CAUTION:
Be careful not to damage the brake band when installing.

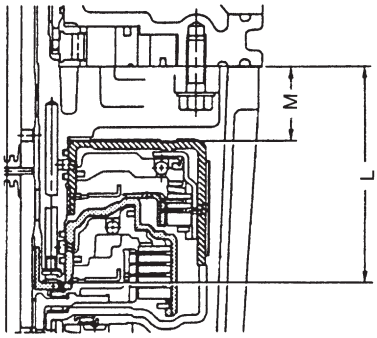
NOTE:
Install the strut to the band servo piston stem. Then tighten it temporarily to avoid tilting the band.



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

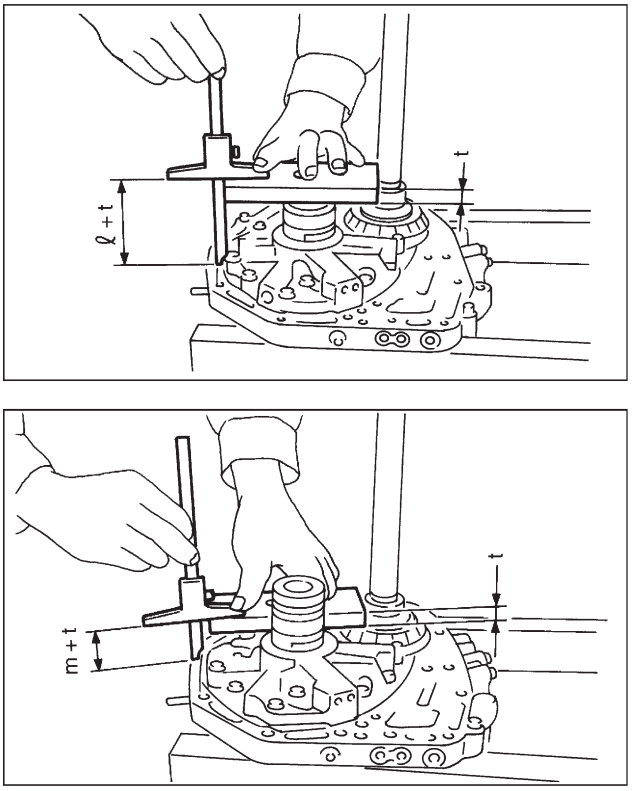
(1) Measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum “L”, and the distance to the top surface of the reverse clutch drum “M”.

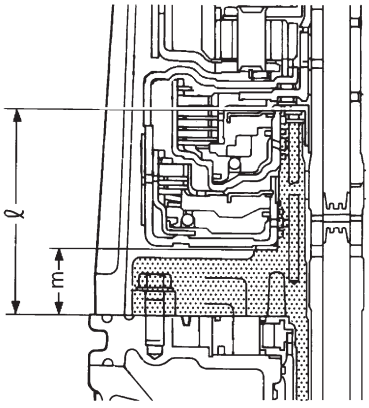




G3M0419

(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 mm) − ℓ

NOTE:
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.

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

Bearing race	
Part No.	Thickness mm (in)
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 mm) − m

NOTE:
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.

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

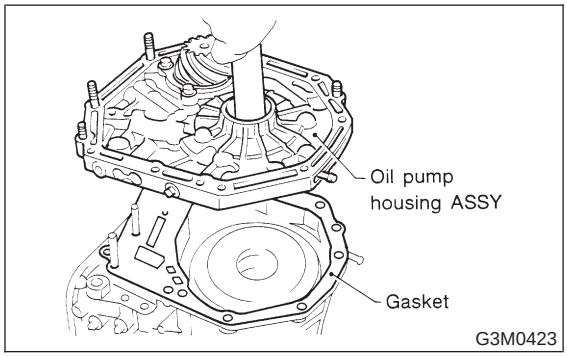
Thrust washer	
Part No.	Thickness mm (in)
31299AA000	0.7 (0.028)
31299AA010	0.9 (0.035)
31299AA020	1.1 (0.043)
31299AA030	1.3 (0.051)
31299AA040	1.5 (0.059)
31299AA050	1.7 (0.067)
31299AA060	1.9 (0.075)

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.

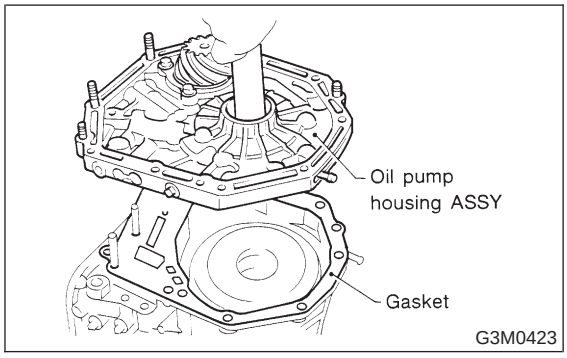
(2) After correctly installing the gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

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



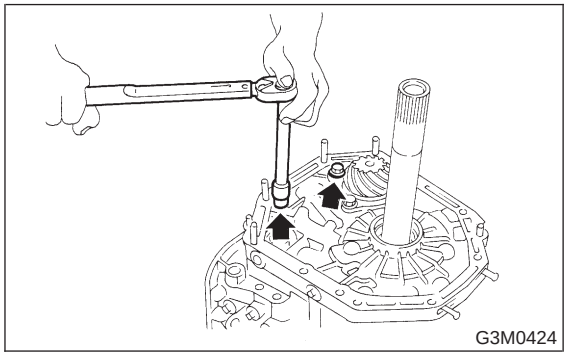
(3) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

NOTE:
Any clearance suggests a damaged seal ring.



(4) Secure the housing with two nuts.

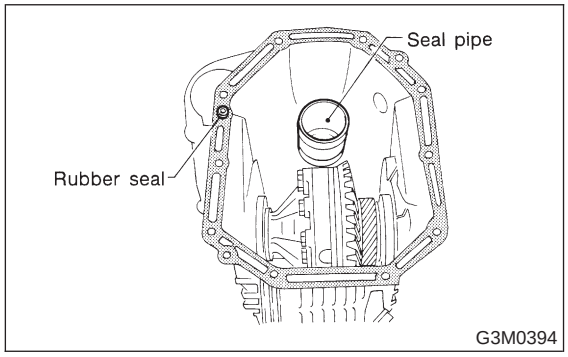
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



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.

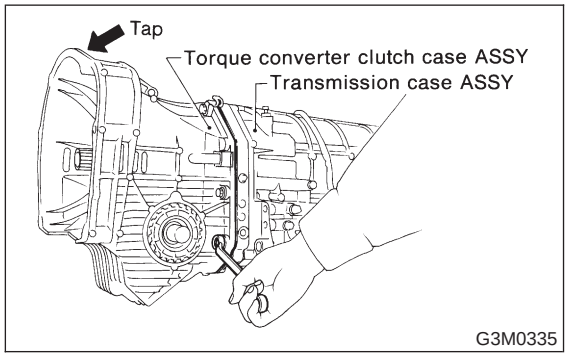
NOTE:
Make sure that the rubber seal and seal pipe are fitted in position.



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

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

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

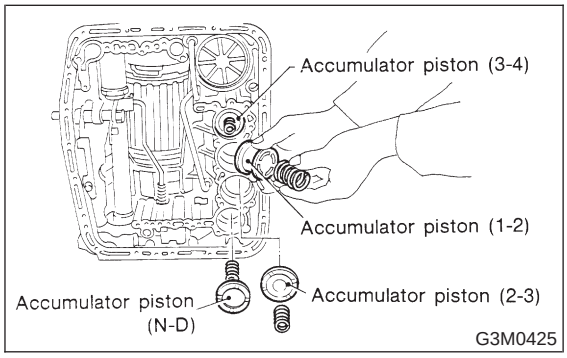


4. CONTROL VALVE AND OIL PAN

1) Install four accumulators with oil pans facing upward.

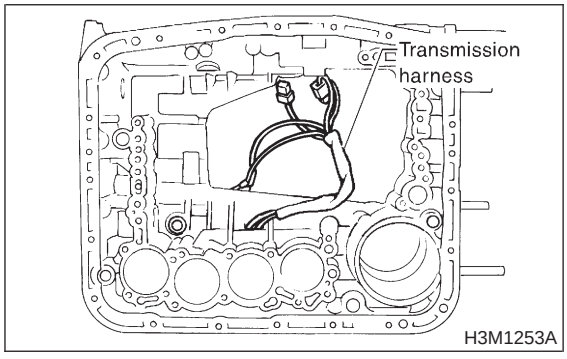
CAUTION:
Be careful not to confuse the springs and installation positions.

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.

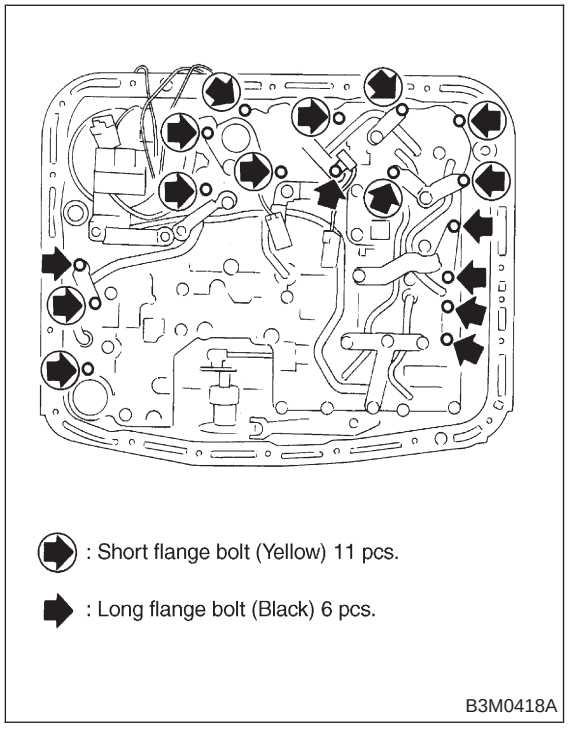


3) Install the control valve assembly.
   (1) Set the select lever in range “2”.

(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.

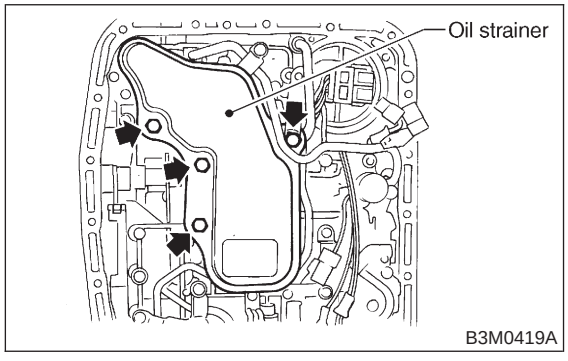
CAUTION:
● Be careful not to pinch the harness roll the gasket.
● Tighten the control valve mounting bolts evenly.

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

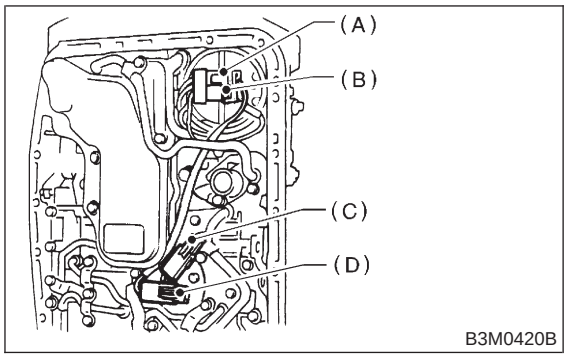


4) Install the oil strainer to the control valve. Be careful not to cut or break the O-ring. Then tighten four bolts.

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



5) Secure four solenoid valve connectors.

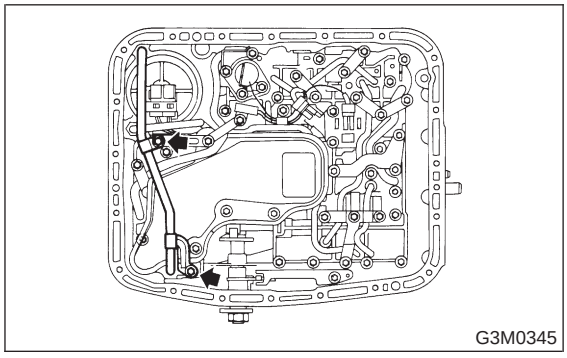


(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

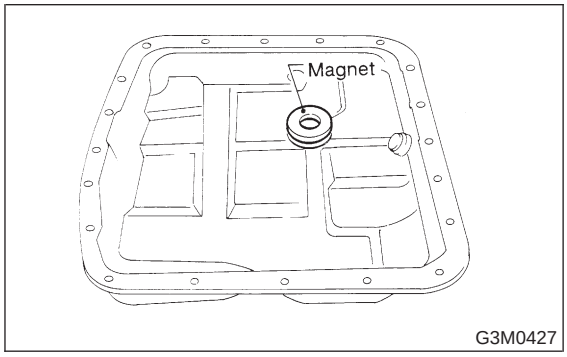
6) Install the oil cooler outlet pipe, and secure with two bolts.

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

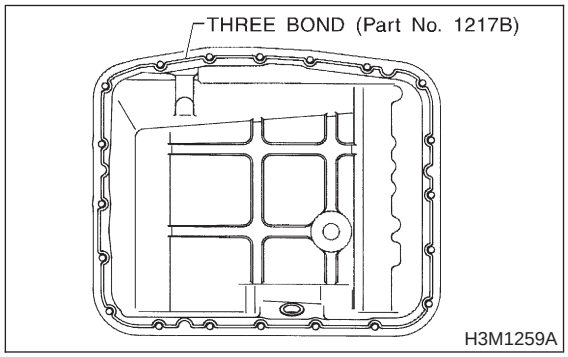
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



7) Install the oil pan.
(1) Attach the magnet at the specified position.



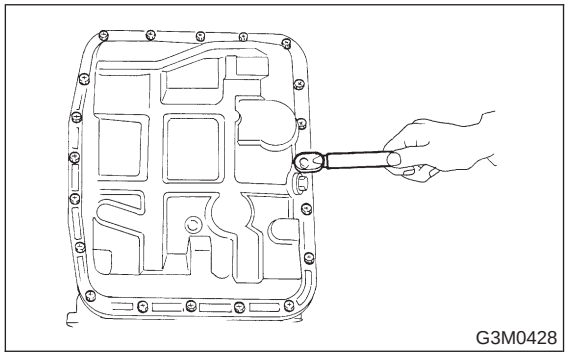
(2) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



(3) Install the oil pan to transmission case.

NOTE:
Tighten the bolts evenly.

Tightening torque:
4.9±0.5 N·m (0.50±0.05 kg-m, 3.6±0.4 ft-lb)



5. EXTENSION SECTION

NOTE:
When installing new oil seal into extension case, press it with ST.
ST 498057300 INSTALLER

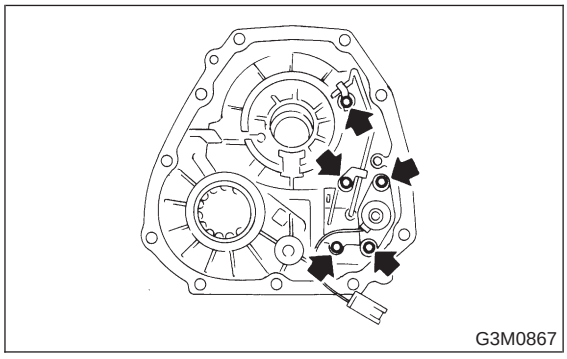
1) Install the filter in the extension case.

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.

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

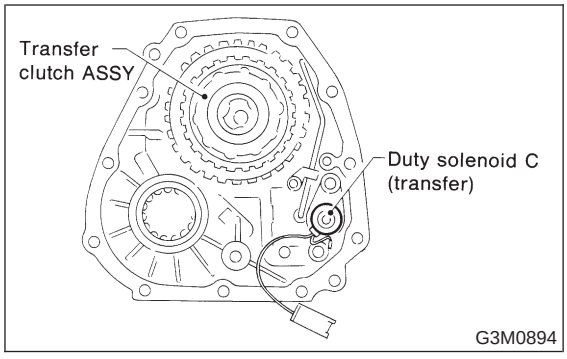
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



3) Install the transfer clutch assembly to the case.

CAUTION:
Be careful not to damage the seal rings.

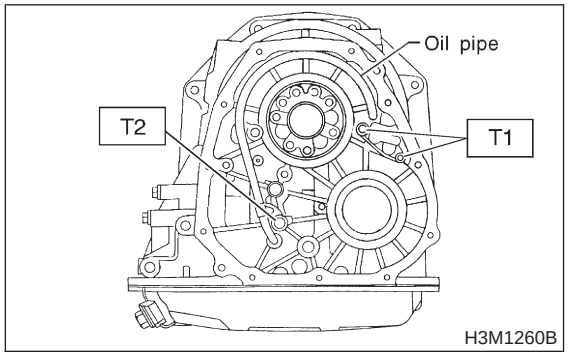
NOTE:
Insert the clutch assembly fully into position until the bearing shoulder bottoms.



6. CONNECTION OF EACH SECTION

1) Install oil pipe.

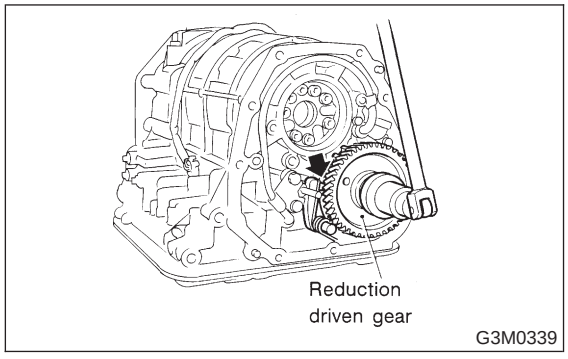
Tightening torque:
T1: 7.8±1.0 N·m (0.80±0.10 kg-m, 5.8±0.7 ft-lb)
T2: 24.5±2.0 N·m (2.50±0.20 kg-m, 18.1±1.4 ft-lb)



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.

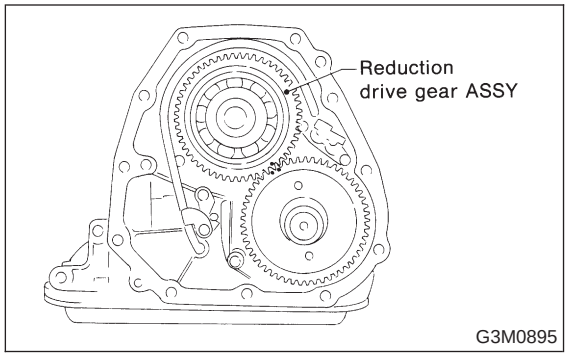
NOTE:
After tightening, stake the lock nut securely.

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

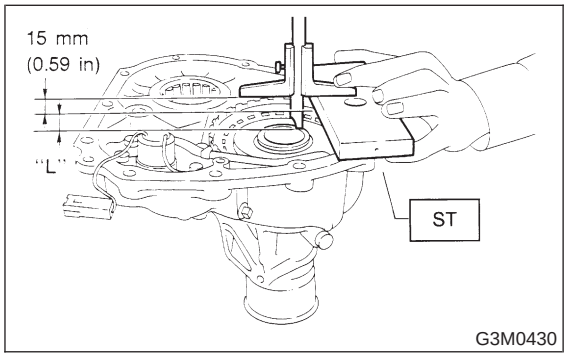


4) Install the reduction drive gear.

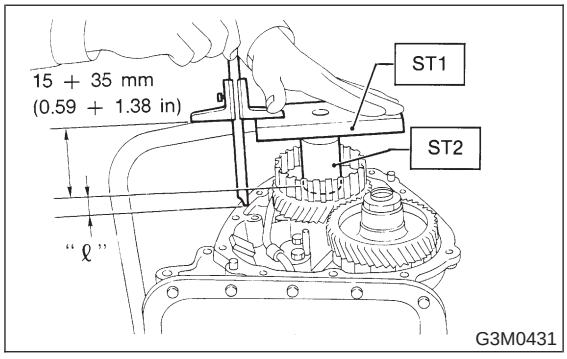
NOTE:
Insert it fully into position until the bearing shoulder bottoms.



5) Measurement and adjustment of extension end play
(1) Measure distance L from end of extension case and rear drive shaft with ST.
L = Measured value − 15 mm
ST 398643600 GAUGE



(2) Measure the distance "ℓ" from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.
ℓ = Measured value − 50 mm
ST1 398643600 GAUGE
ST2 499577000 GAUGE



(3) Calculation equation:
T = (L + 0.4 mm) − ℓ

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.

(4) 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)

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.

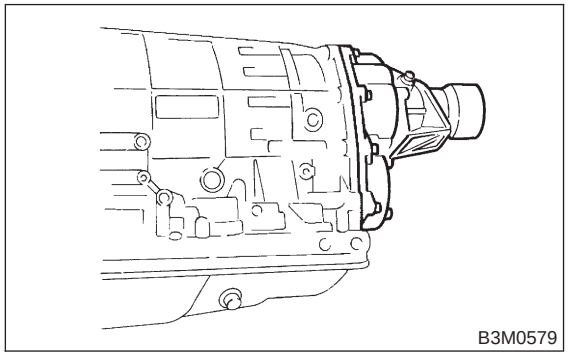
NOTE:
Be sure to engage the spline teeth correctly.

(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.**

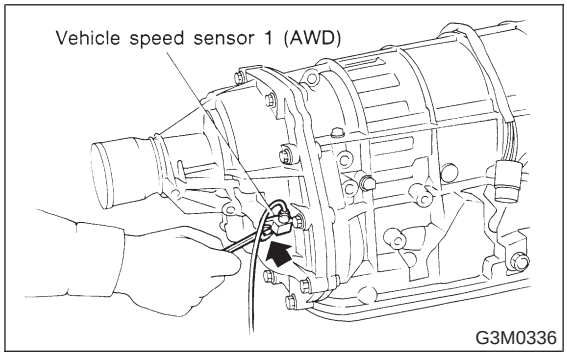
(5) Tighten bolts to secure the case.

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


B3M0579

7) Install the vehicle speed sensor 1.

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)



G3M0336

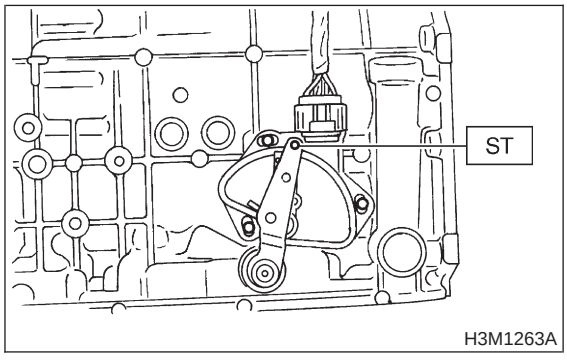
7. EXTERNAL PARTS

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.

NOTE:
Ensure that gauge moves properly.

ST 499267300 STOPPER PIN

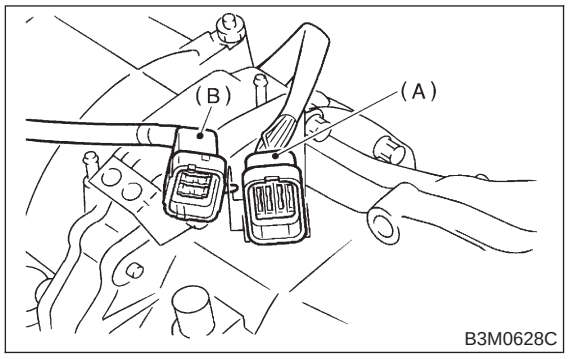


H3M1263A

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

Tightening torque:
3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

2) Clip the following cords and harness.



(A) Transmission harness
(B) Inhibitor switch cord

3) Install the oil cooler outlet pipe.

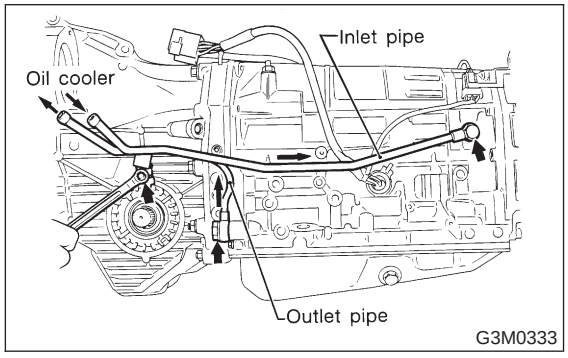
CAUTION:
Be sure to use a new aluminum washer.

Tightening torque:
34±3 N·m (3.5±0.3 kg-m, 25.3±2.2 ft-lb)

4) Install the oil cooler inlet pipe.

CAUTION:
Be sure to use a new aluminum washer.

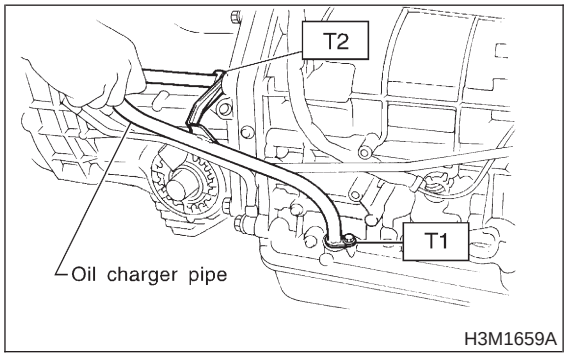
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



5) Install the oil charge pipe.

CAUTION:
Be careful not to damage the O-ring.

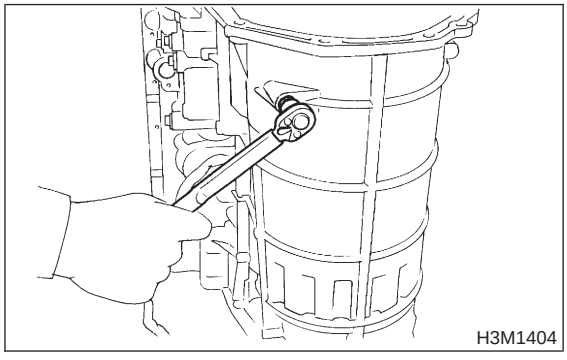
Tightening torque:
T1: 6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)
T2: 41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



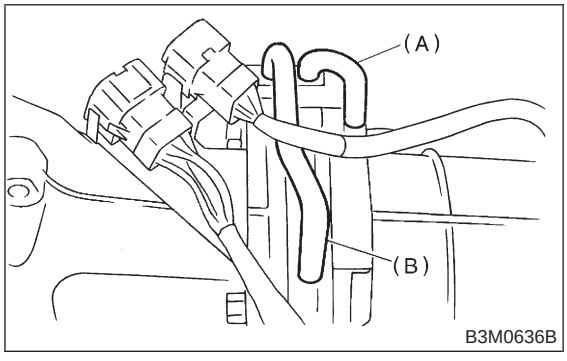
6) Adjustment of brake band
After tightening the brake band adjusting screw to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, back it off three turns. Then secure with a lock nut.

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

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



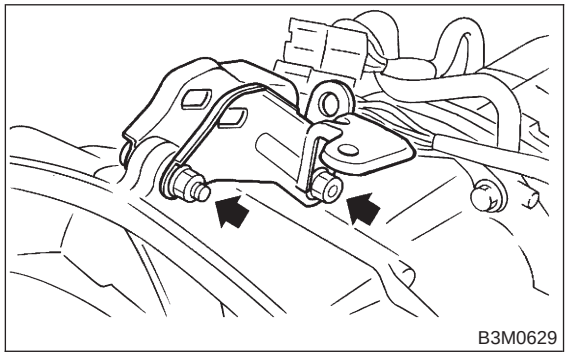
7) Install the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

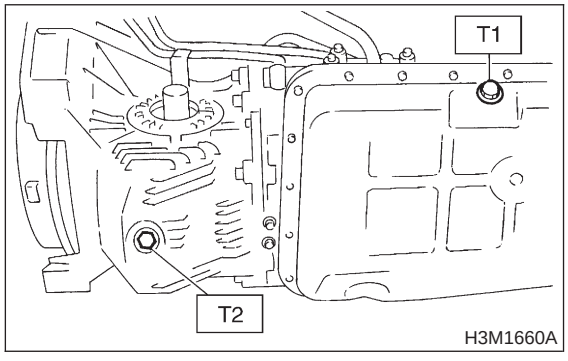
8) Install the pitching stopper bracket.

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



9) Tighten the ATF and differential gear oil drain plugs.

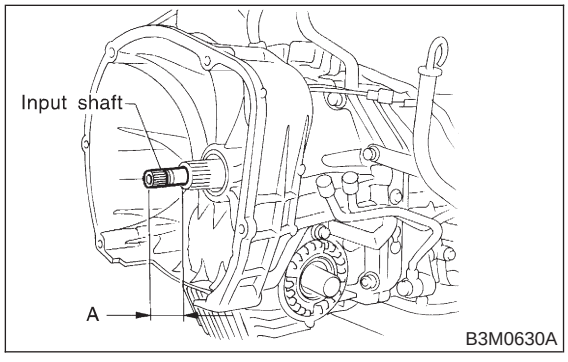
Tightening torque:
T1: 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
T2: 44±3 N·m (4.5±0.3 kg-m, 32.5±2.2 ft-lb)



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)

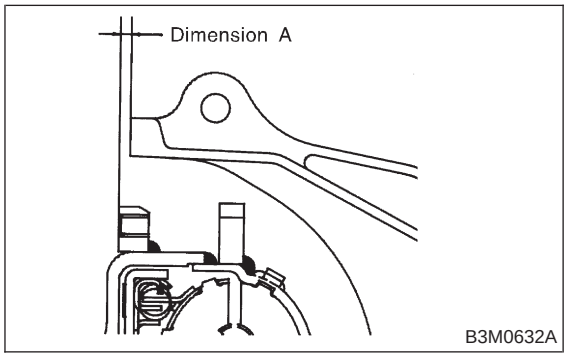


11) Install the torque converter clutch assembly.
(1) Install the oil pump shaft to the torque converter clutch.

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.

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

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:
2200 cc model;
7.9 — 8.2 ℓ (8.4 — 8.7 US qt, 7.0 — 7.2 Imp qt)
2500 cc model;
9.5 — 9.8 ℓ (10.0 — 10.4 US qt, 8.4 — 8.6 Imp qt)

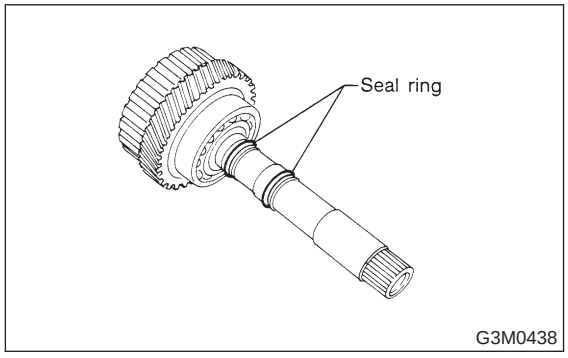
Recommended fluid:
Dexron II or Dexron III type automatic transmission

13. Reduction Drive Gear Assembly

A: DISASSEMBLY

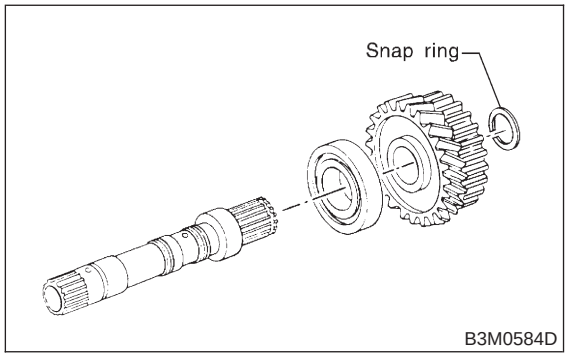
1) Take out the seal rings.

CAUTION:
Be careful not to damage the seal rings.

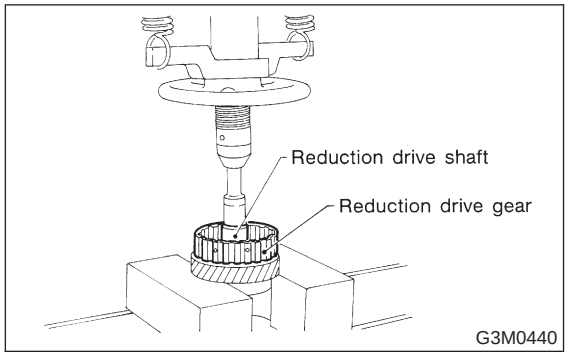


2) Take out the snap ring.

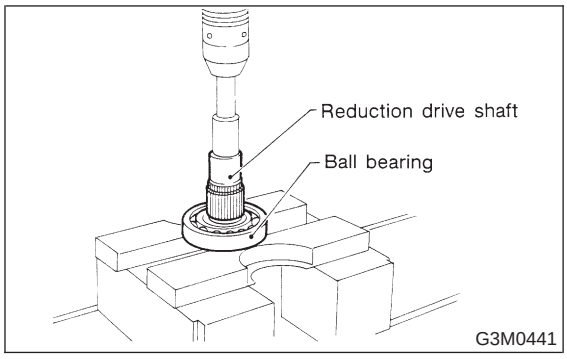
CAUTION:
Be careful not to damage the splines.



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



4) Using a press, remove the ball bearing.

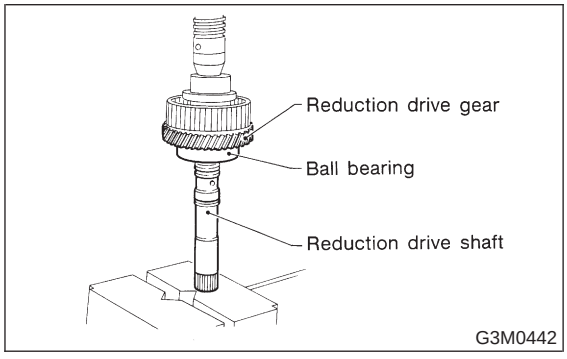


B: INSPECTION

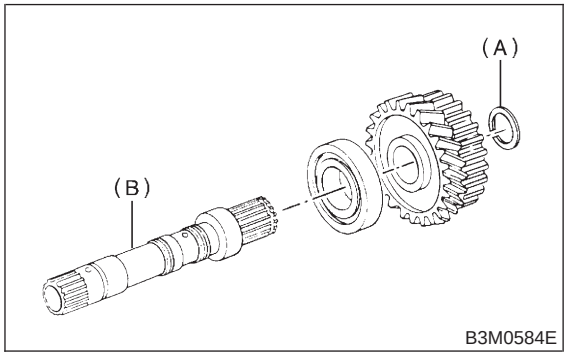
Make sure that each component is free of harmful gouges, cuts, or dust.

C: ASSEMBLY

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



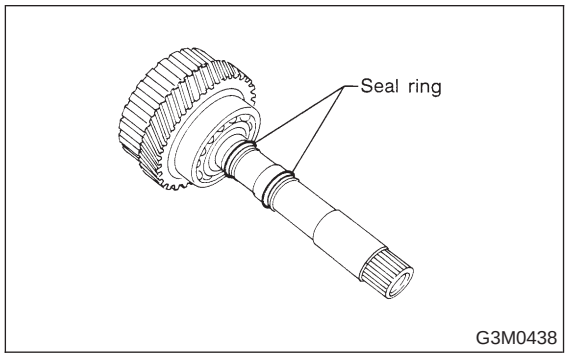
2) Fit the snap ring securely in the snap ring groove on the shaft.



(A) Snap ring
(B) Reduction drive shaft

3) Attach two seal rings.

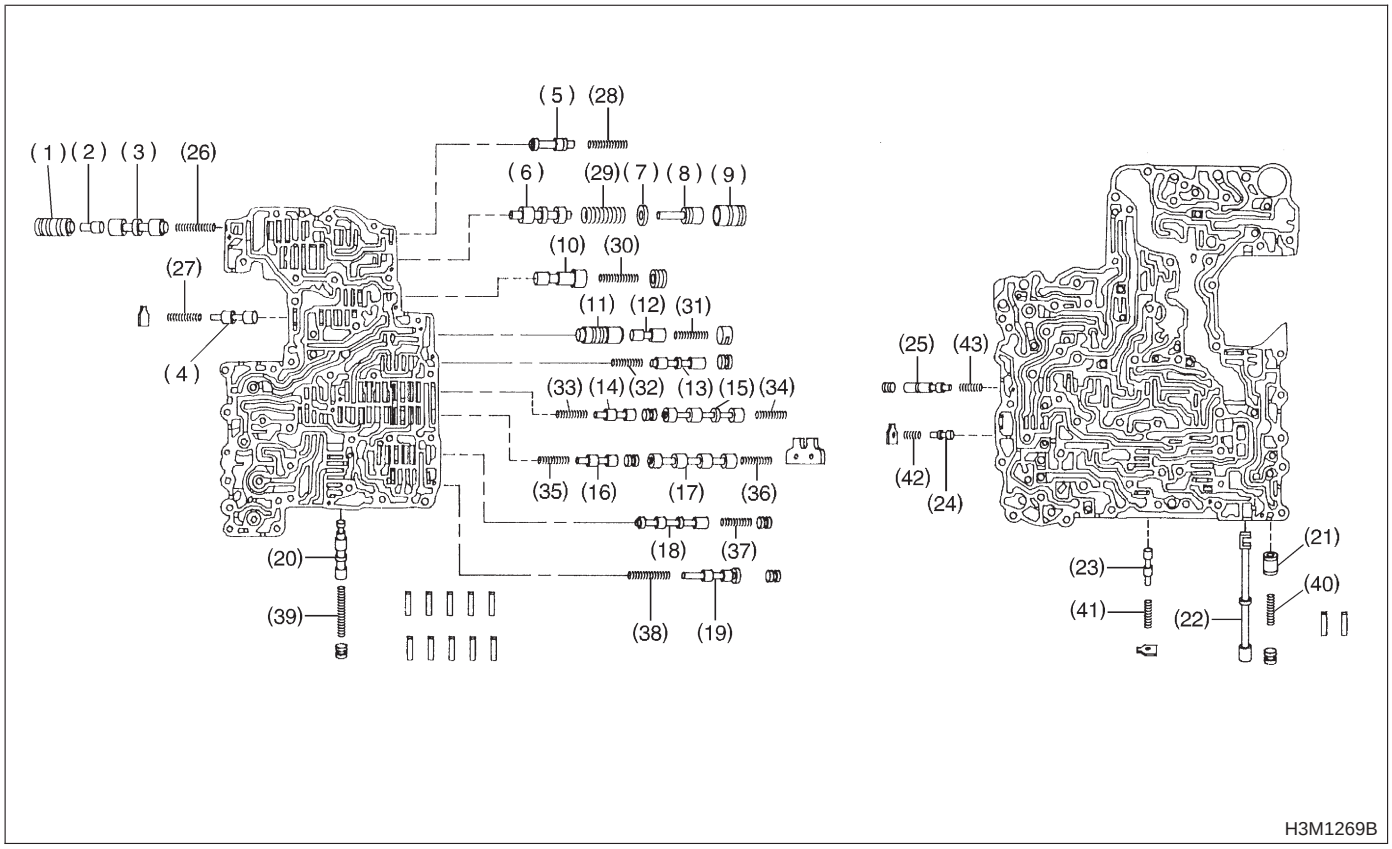
NOTE:
To make subsequent assembly easier, apply vaseline to the grooves of the shaft and to the exterior of the seal ring.



14. Control Valve Body

A: PRECAUTION

The control valve is composed of parts which are accurately machined to a high degree and should be handled carefully during disassembly and assembly. As these parts are similar in shape, they should be arranged in neat order on a table after disassembly so that they can be easily installed to their original positions. Spring loaded parts should be also handled carefully, as springs may jump out of place when the parts are disassembled or removed. Extreme care should be taken so as not to drop valves on the floor. Before assembling, the parts and valves should be dipped in a container filled with the ATF. Make sure that the valves are clean and free from any foreign material before assembly. Torque specifications should also be observed.

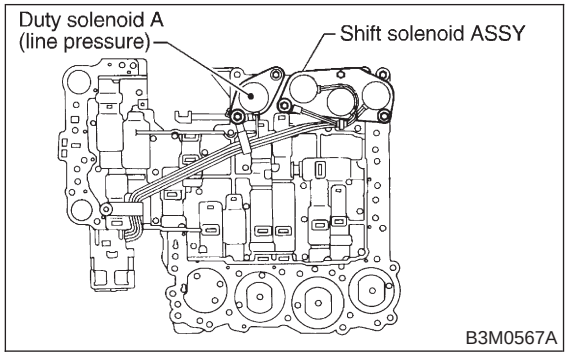


(1) Lock-up control sleeve
(2) Lock-up control plug
(3) Lock-up control valve
(4) Pilot valve
(5) Torque converter regulation valve
(6) Pressure regulator valve
(7) Washer
(8) Pressure regulator plug
(9) Pressure regulator sleeve
(10) Pressure modifier valve
(11) Accumulator control sleeve valve
(12) Accumulator control plug valve
(13) Shuttle duty shift valve
(14) 4-2 sequence valve
(15) Shift valve B
(16) 4-2 relay valve
(17) Shift valve A
(18) Overrunning clutch control valve
(19) Overrunning clutch reducing valve
(20) Shuttle shift valve
(21) Accumulator modifier piston
(22) Manual valve
(23) 1st reducing valve
(24) 3-2 timing valve
(25) Servo charger valve
(26) Lock-up control spring
(27) Pilot spring
(28) Torque converter regulator spring
(29) Pressure regulator spring
(30) Pressure modifier spring
(31) Accumulator control spring
(32) Shuttle shift spring
(33) 4-2 sequence spring
(34) Shift B spring
(35) 4-2 relay spring
(36) Shift A spring
(37) Overrunning clutch control spring
(38) Overrunning clutch reducing spring
(39) Shuttle duty shift spring
(40) Modifier accumulator spring
(41) 1st reducing spring
(42) 3-2 timing spring
(43) Servo charger spring

No.	Part name	Wire dia. mm (in)	Outer dia. mm (in)	Effective turn mm (in)	Free length mm (in)
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)

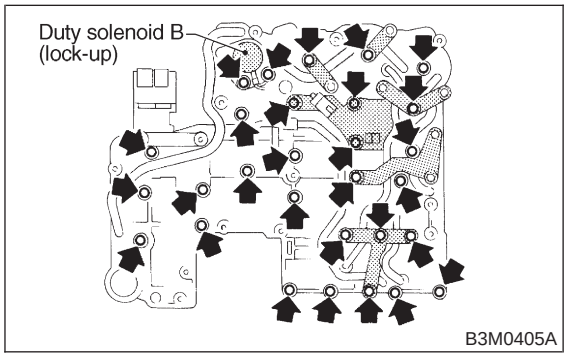
B: DISASSEMBLY

1) Remove the shift solenoid assembly and duty solenoid A from the upper valve body.

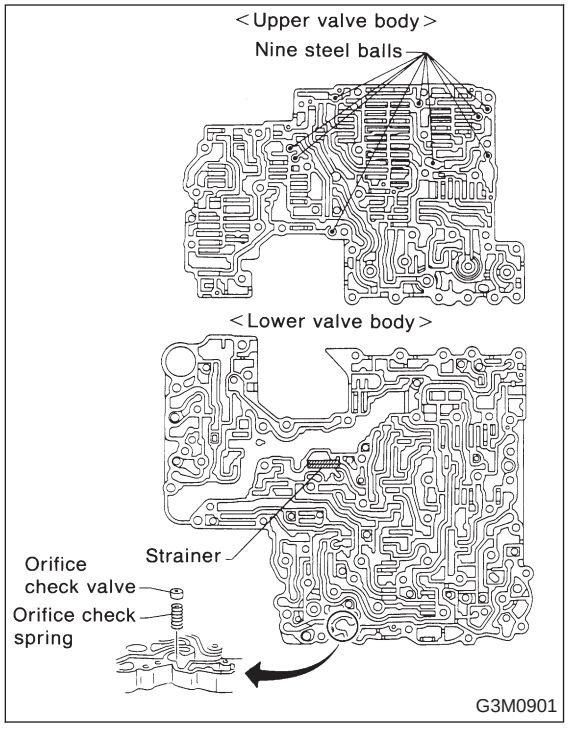


2) Remove the duty solenoid B and bracket from the lower valve body.
3) Separate the upper valve body and lower valve body.

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.



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.

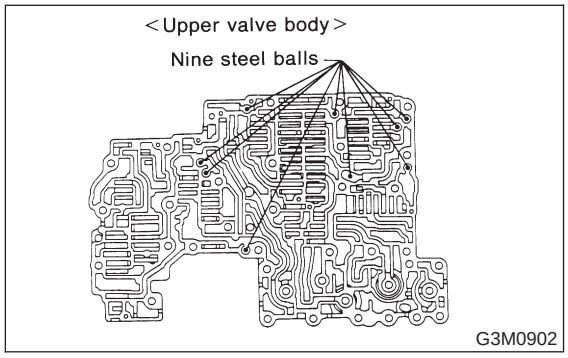


C: INSPECTION

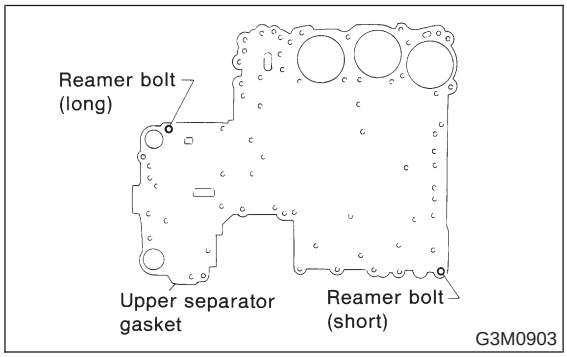
Make sure that each component is free of harmful gouges, cuts, or dust.

D: ASSEMBLY

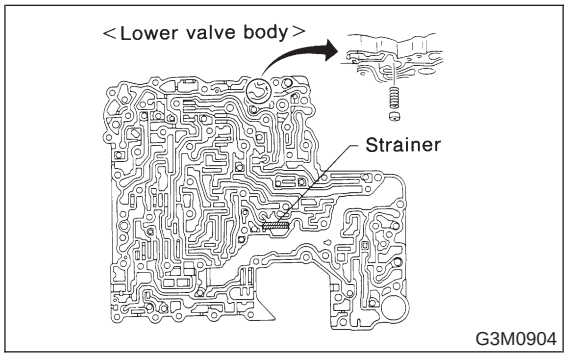
1) Install the nine steel balls to the upper valve body.



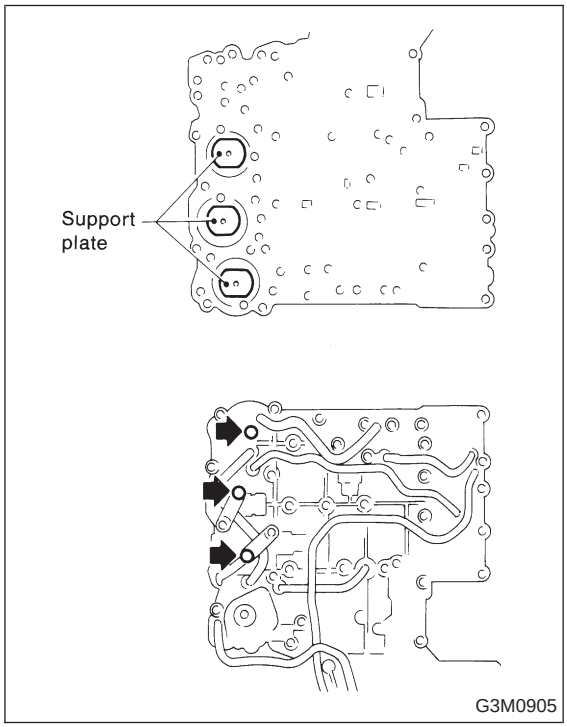
2) From under upper valve body, install two bolts using washers and position upper separator gasket.



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

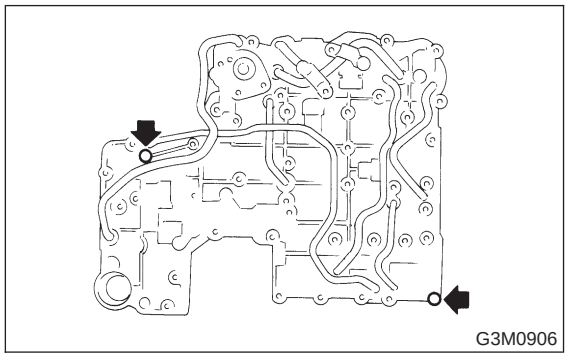


4) Install lower separate gasket and separate plate on lower body in that order, then temporarily tighten three support plates and two brackets.



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

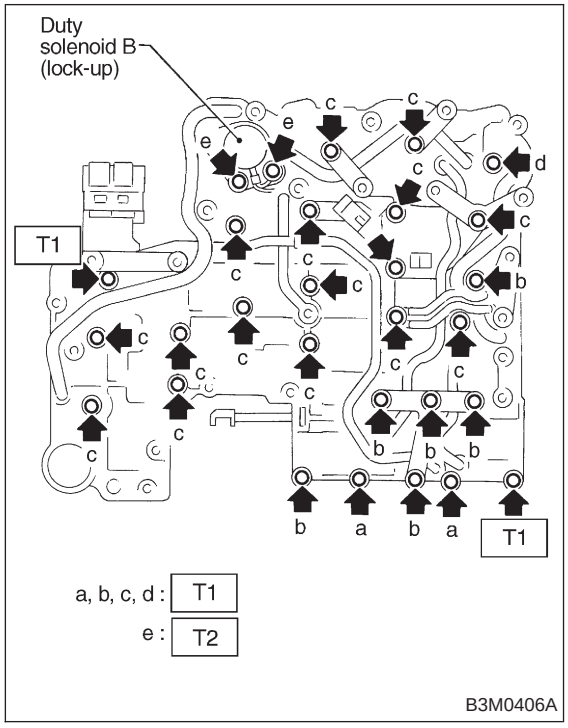
CAUTION:
Be careful not to drop the upper body interior steel ball, or the lower body interior filter, orifice check spring, or orifice check valve.



6) Install the duty solenoid B, ATF temperature sensor and the four brackets.
7) Tighten twenty seven bolts & washers and two reamer bolts.

	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

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)

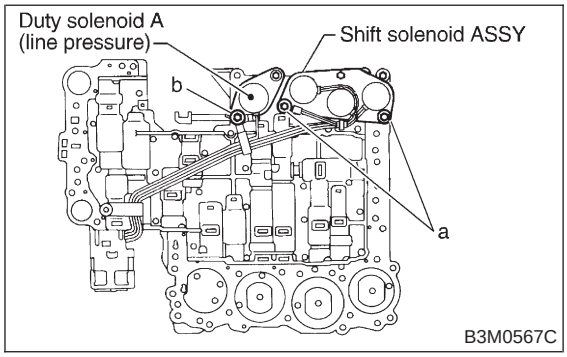


8) Install the shift solenoid assembly and duty solenoid A.

a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

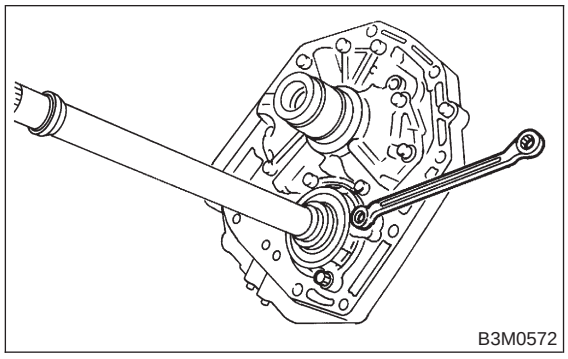
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



15. Oil Pump Assembly

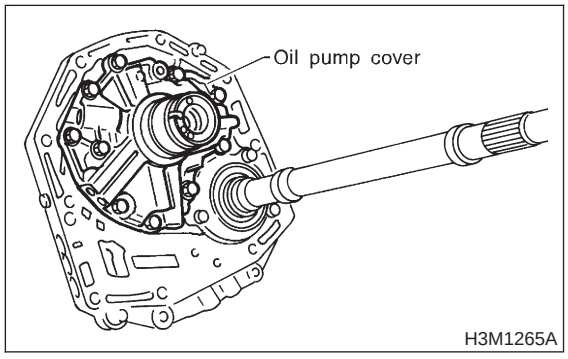
A: DISASSEMBLY

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

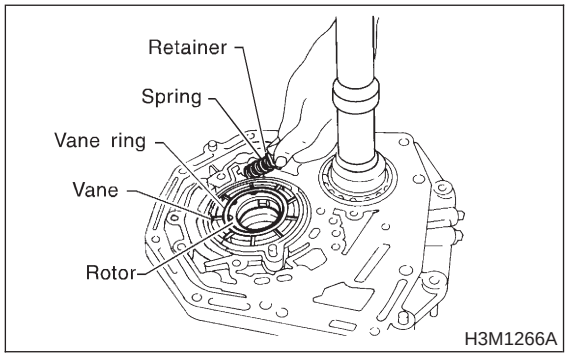


2) Remove the oil pump cover.

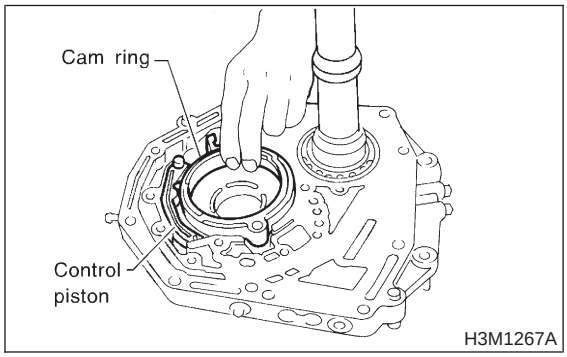
NOTE:
Lightly tap the end of the stator shaft to remove the cover.



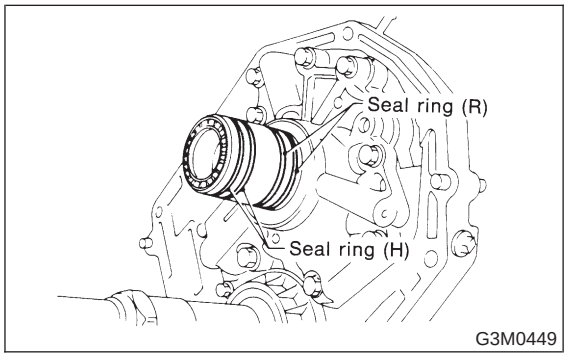
3) Remove the retainer and return spring. Then remove the rotor, two vane rings and nine vanes.



4) Remove the cam ring and control piston.
Also remove the O-ring, friction ring, two side seals, and plain seal.



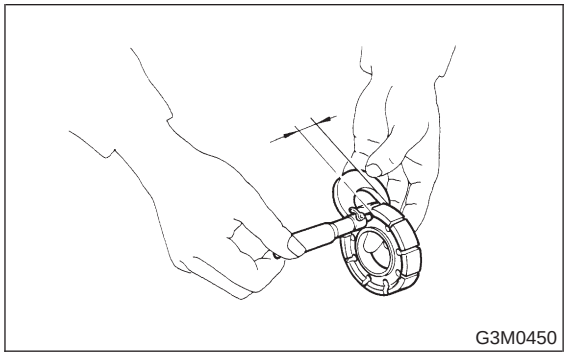
5) Remove two seal rings (R) and two seal rings (H).



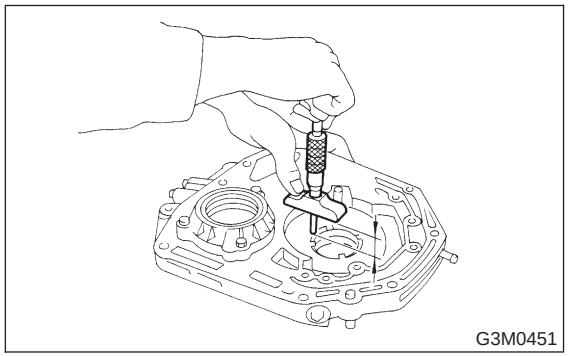
B: INSPECTION

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.



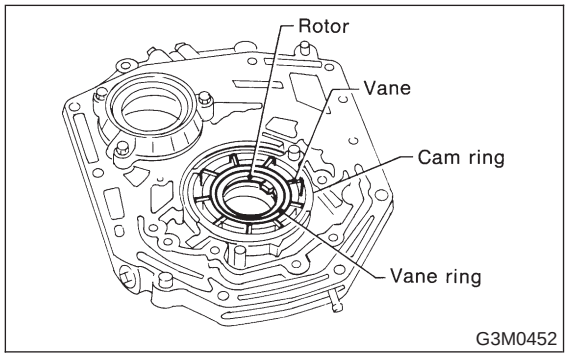
(2) Using a depth gauge, measure the depth of the oil pump housing contact and friction surfaces.


G3M0451

(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.

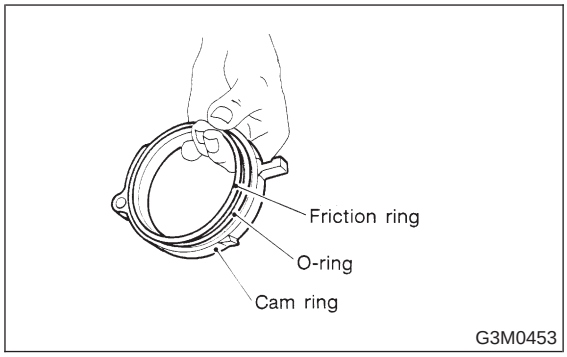
Part name	Wear limit mm (in)	Standard value mm (in)
Rotor, control piston, vanes	0.054 (0.0021)	0.030 — 0.044 (0.0012 — 0.0017)
Cam ring	0.034 (0.0013)	0.010 — 0.024 (0.0004 — 0.0009)



G3M0452

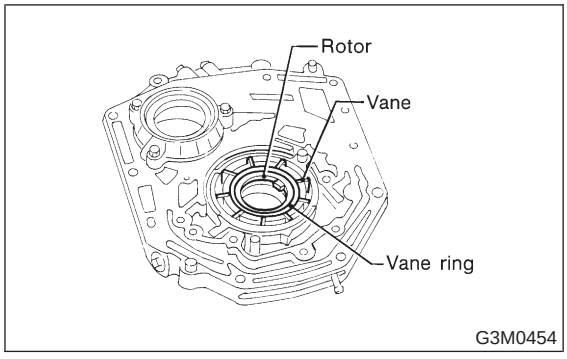
C: ASSEMBLY

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.



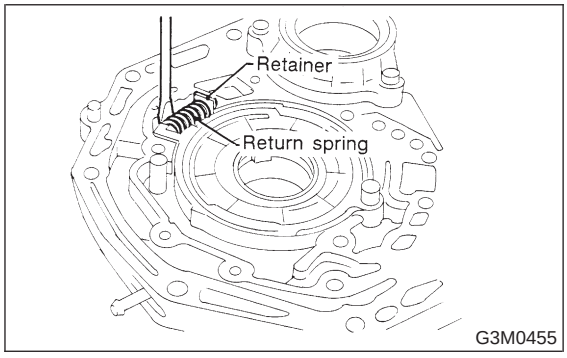
G3M0453

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



G3M0454

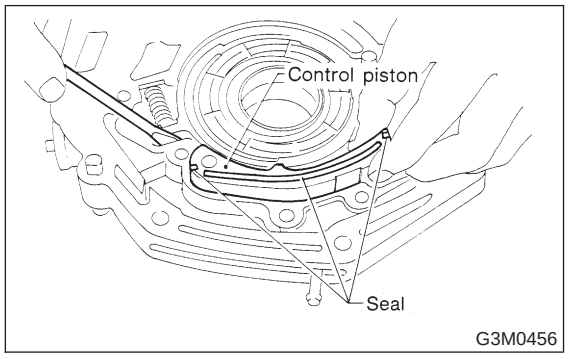
3) Install the return spring and retainer between the housing and cam ring.



G3M0455

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

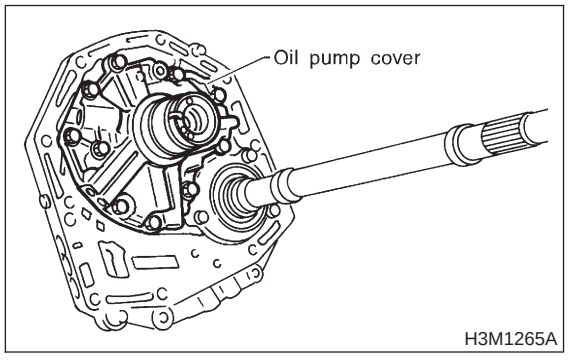
NOTE:
Fit the seal in the piston groove, with the red seals facing the top side. (Two side seals and one plain seal are attached.)



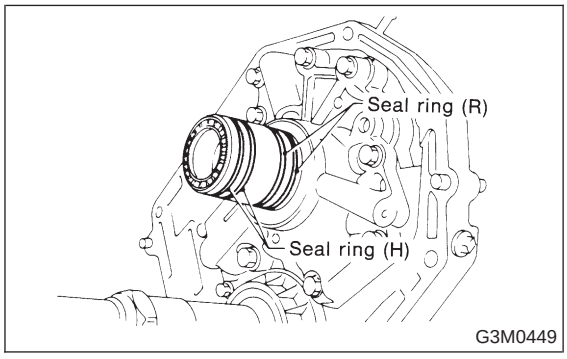
5) Set the rotor at the center of the housing bore. Apply ATF abundantly to each rotary portion.
6) Install the oil pump cover.

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.

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



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



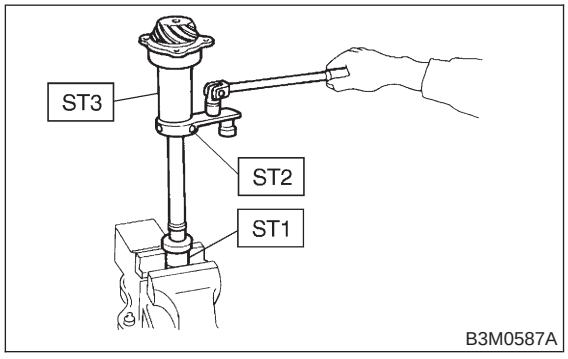
16. Drive Pinion Shaft

A: DISASSEMBLY

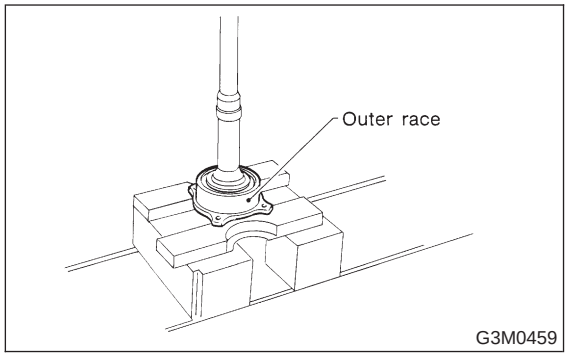
1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1, ST2 and ST3. Then pull off the drive pinion collar.

NOTE:
Remove the O-ring.

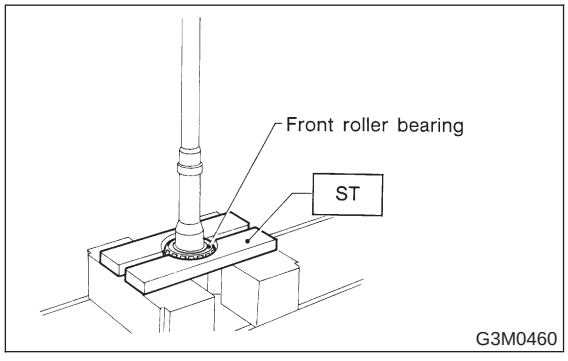
ST1 498937100 HOLDER
ST2 499787100 WRENCH
ST3 499757800 ADAPTER WRENCH



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

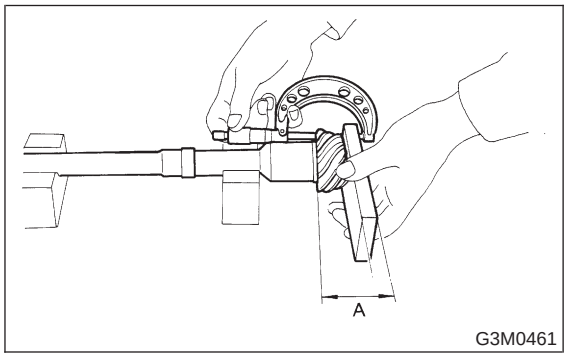


B: INSPECTION

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

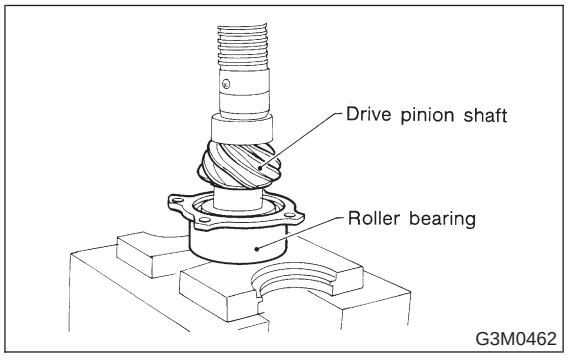
C: ASSEMBLY

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.

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

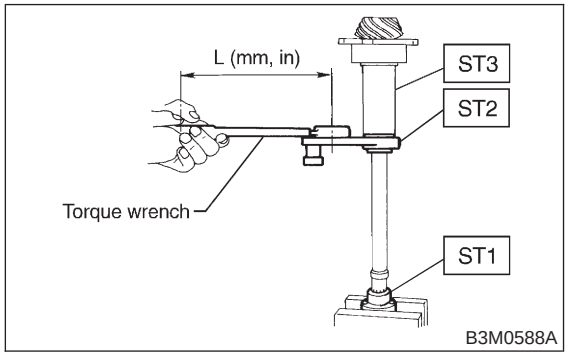
$T_1 = 72.2/L + 72.2 \times T$

T: Actual tightening torque

- Install ST2 to torque wrench as straight as possible.

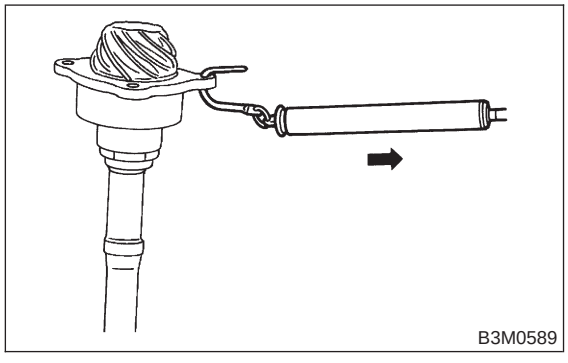
ST1 498937100 HOLDER
ST2 499787100 WRENCH
ST3 499787500 ADAPTER WRENCH

Actual tightening torque:
113±5 N·m (11.5±0.5 kg-m, 83.2±3.6 ft-lb)



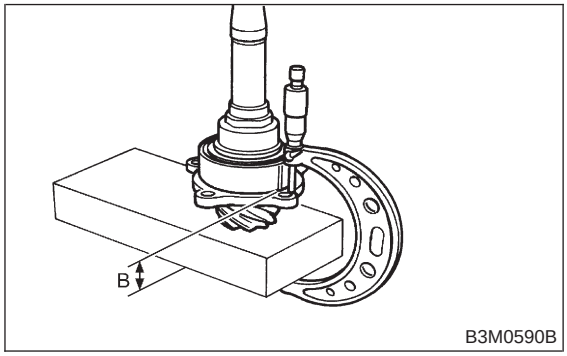
5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

Starting torque:
0.3 — 2.0 N·m (0.03 — 0.2 kg-m, 0.2 — 1.4 ft-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.

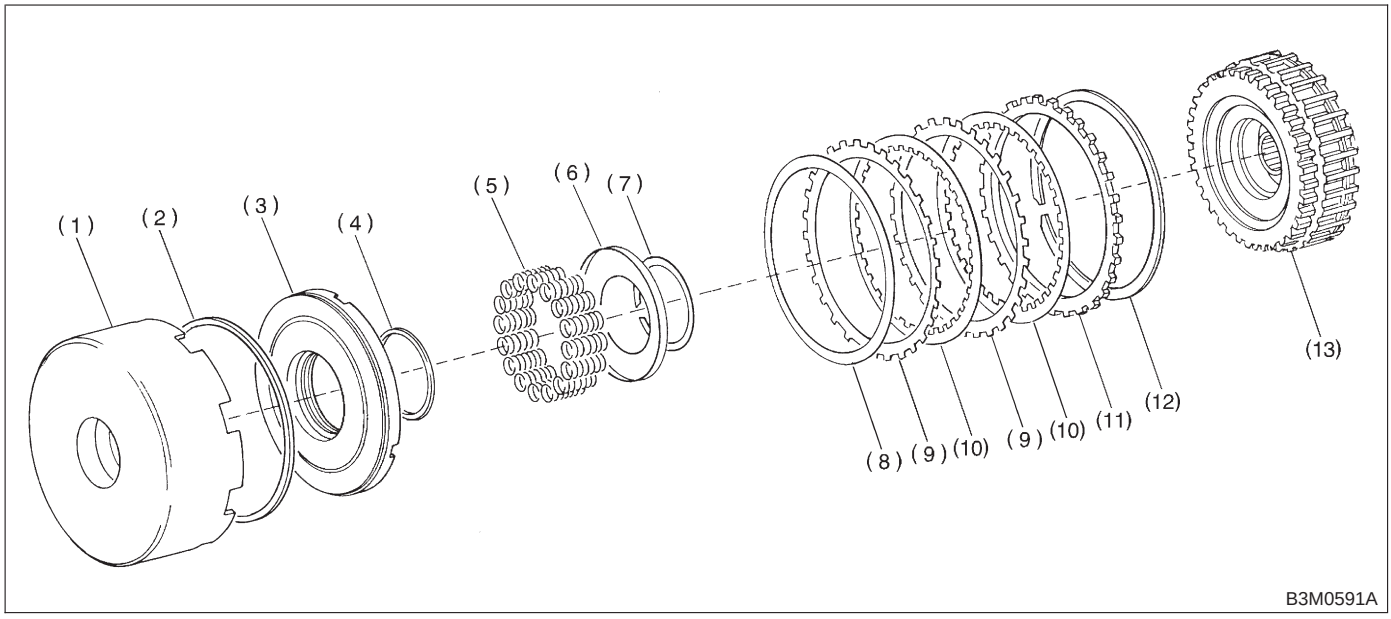
t = 6.5±0.0625 − (B − A)

NOTE:
The number of shims must be three or less.

Drive pinion shim	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
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

A: DISASSEMBLY



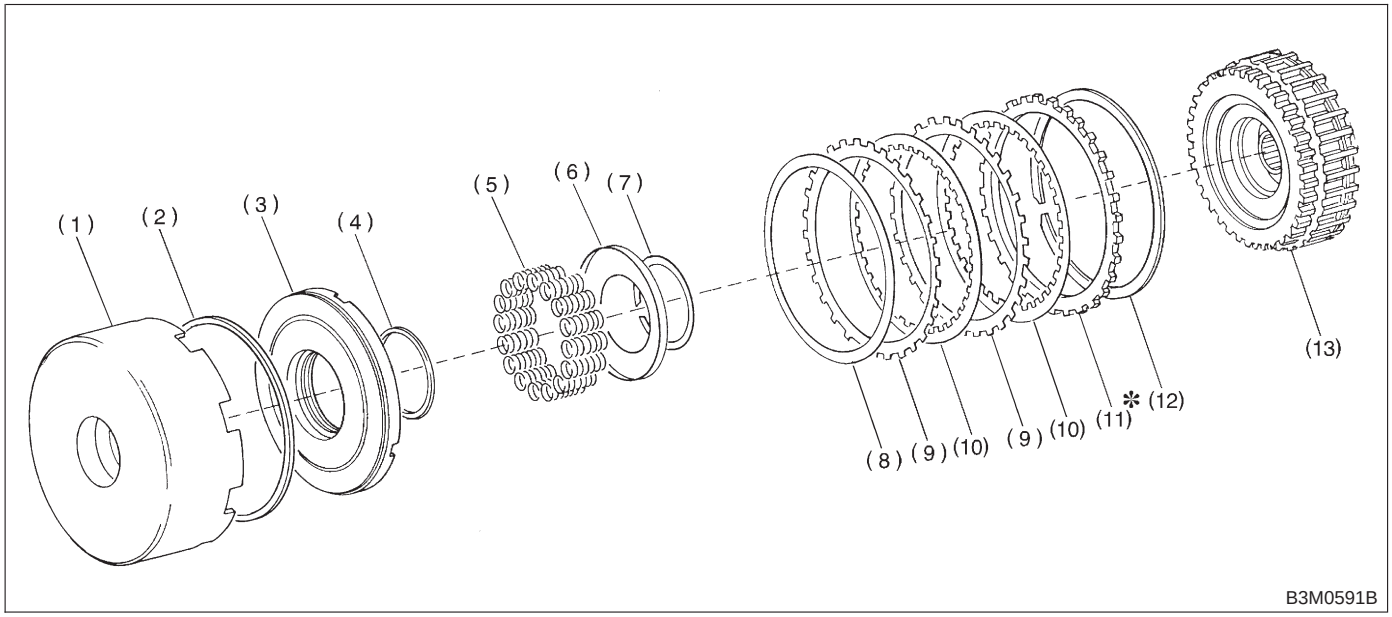
(1) Reverse clutch drum
(2) Lip seal
(3) Reverse clutch piston
(4) Lathe cut seal ring
(5) Spring
(6) Spring retainer
(7) Snap ring
(8) Dish plate
(9) Driven plate
(10) Drive plate
(11) Retaining plate
(12) Snap ring
(13) High clutch drum

1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates, and dish plate.
2) Using the ST1, ST2 and ST3, remove the snap ring and take out the spring retainer and springs.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
3) Take out the piston 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



(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

1) Using the ST1, ST2 and ST3 as those used in disassembling, assemble piston the springs, spring retainer and snap ring.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
2) Assemble the dish plate, driven plates, drive plates and retaining plate in that order and attach the snap ring.

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)

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

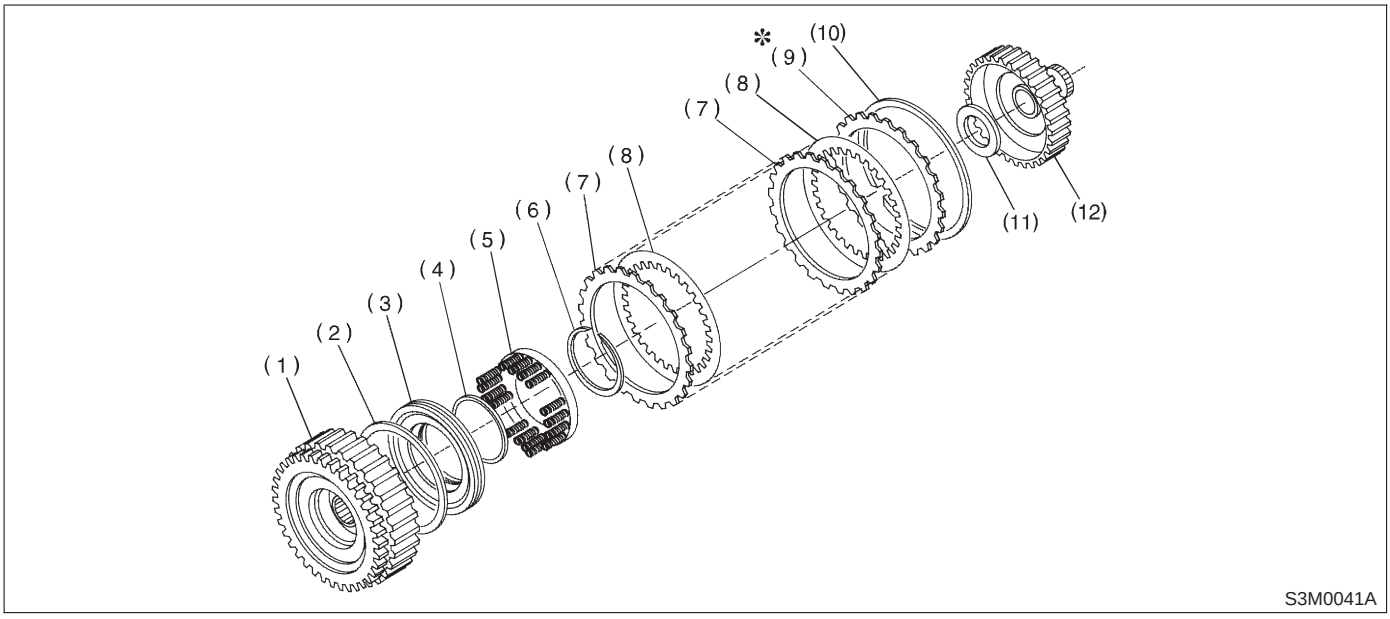
Standard value:
0.5 — 0.8 mm (0.020 — 0.031 in)

Allowable limit:
1.2 mm (0.047 in)

Retaining plates	
Part No.	Thickness mm (in)
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

A: DISASSEMBLY



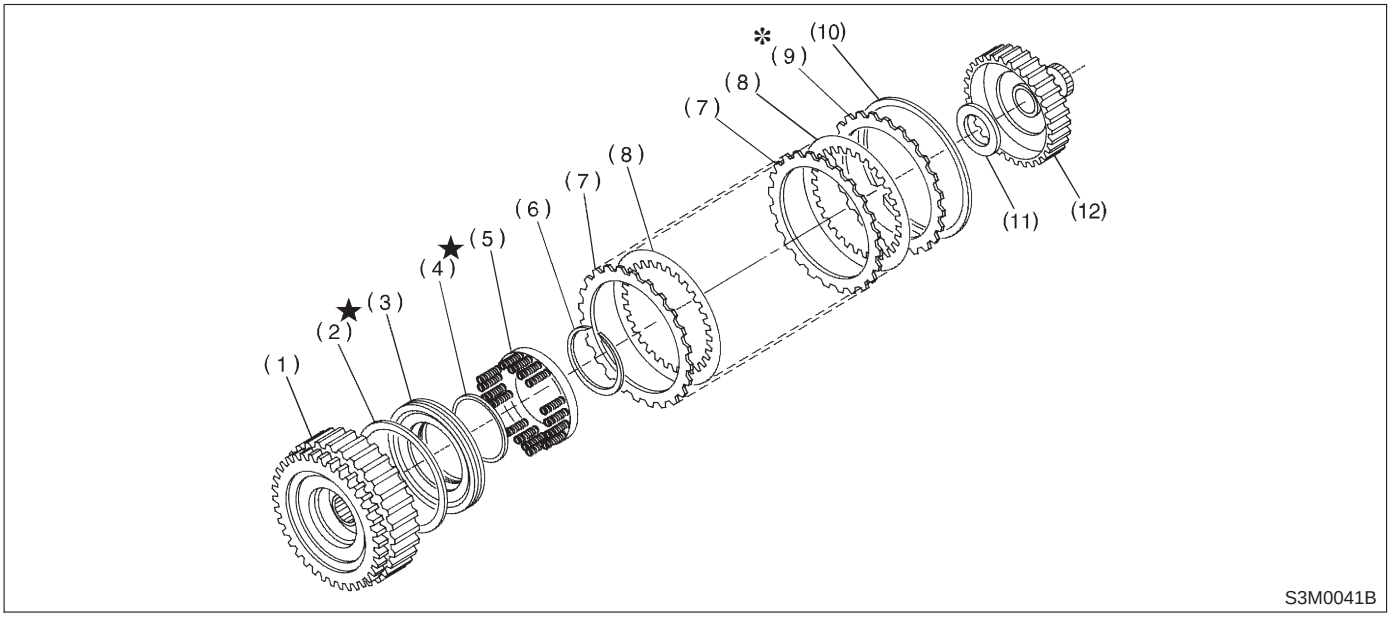
(1) High clutch drum
(2) Lathe cut seal ring
(3) High clutch piston
(4) Lathe cut seal ring
(5) Spring retainer
(6) Snap ring
(7) Driven plate
(8) Drive plate
(9) Retaining plate
(10) Snap ring
(11) Thrust needle bearing
(12) High clutch hub

1) Remove the snap ring, and take out the retaining plate, drive plates, and driven plates.
2) Using the ST1, ST2 and ST3, remove the snap ring and take out the spring retainer.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
3) Apply compressed air to the clutch drum to remove the piston.

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



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

1) Using the ST1, ST2 and ST3 as those used in disassembling, assemble the piston, spring retainer, and snap ring.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
2) Install the driven plate, drive plates, and retaining plate in that order. Then attach the snap ring.
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)

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

Standard value:
1.8 — 2.2 mm (0.071 — 0.087 in)

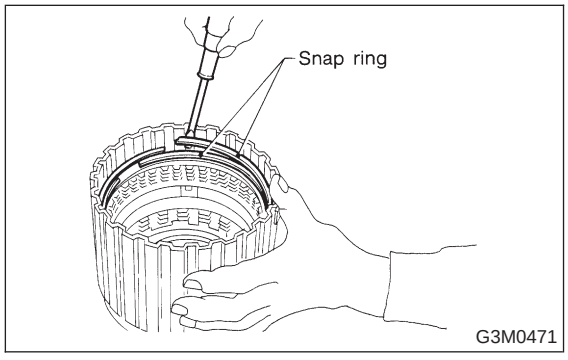
Allowable limit:
2.6 mm (0.102 in)

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)

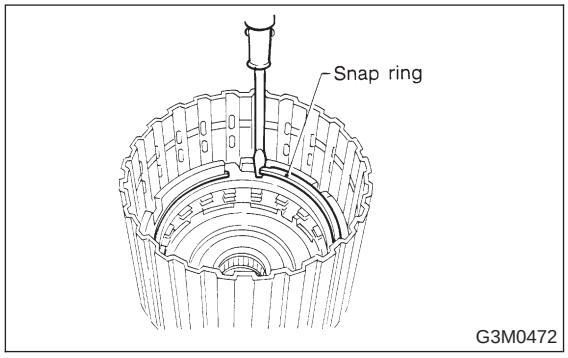
19. Forward Clutch Drum

A: DISASSEMBLY

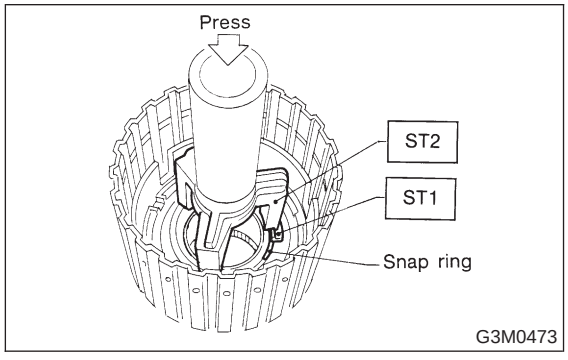
1) Remove two snap rings from the forward clutch drum.



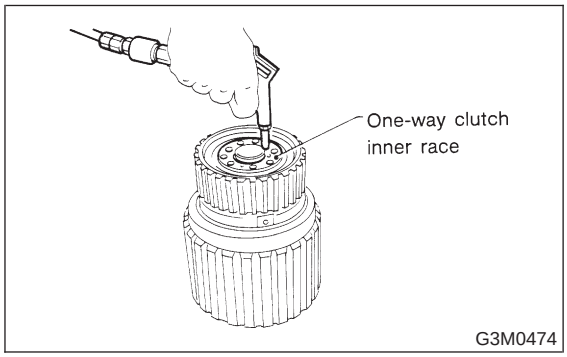
2) Remove the retaining plate, drive plates, driven plates and dish plate. (Forward clutch)
3) Remove the snap ring from the forward clutch drum.



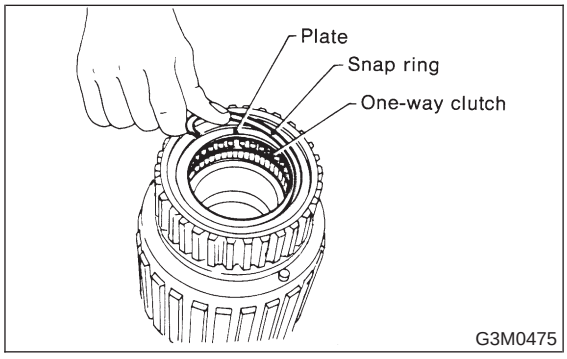
4) Remove the retaining plate, drive plates, driven plates and dish plate. (Overrunning clutch)
5) Compress the spring retainer, and remove the snap ring from the forward clutch, by using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



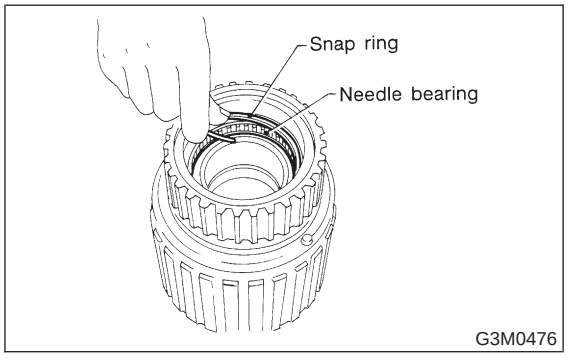
6) Install the one-way clutch inner race to the forward clutch drum, and apply compressed air to remove the overrunning piston and forward piston.



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



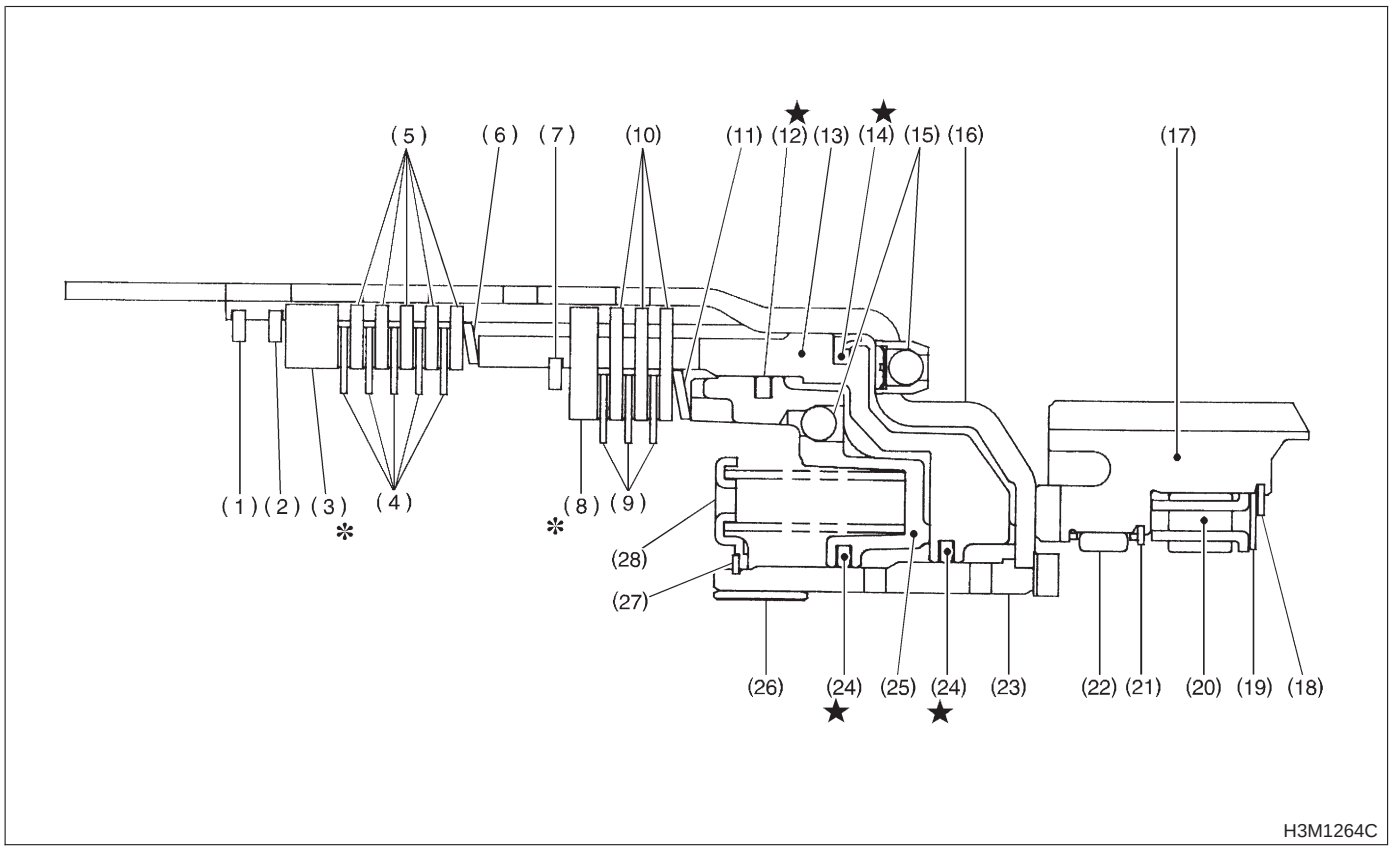
8) Remove the needle bearing after taking out the snap ring.



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

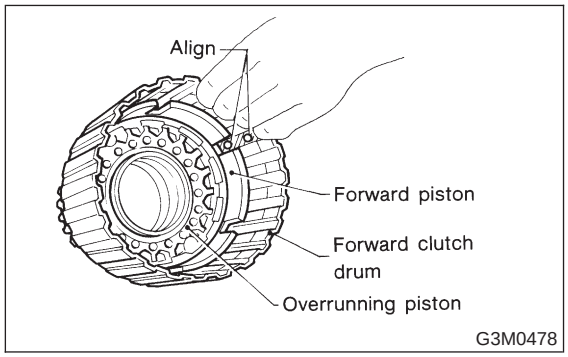
C: ASSEMBLY



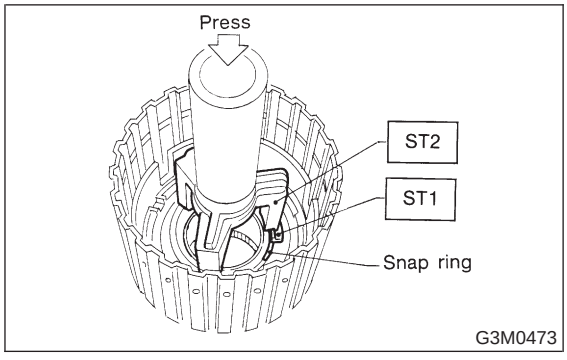
(1) Snap ring
(2) Snap ring
(3) Retaining plate
(4) Driven plate (Thinner)
(5) Driven plate (Thicker)
(6) Dish plate
(7) Snap ring
(8) Retaining plate
(9) Drive plate
(10) Driven plate
(11) Dish plate
(12) Lathe cut seal ring
(13) Forward clutch piston
(14) Lathe cut seal ring
(15) Drift ball
(16) Forward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

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.

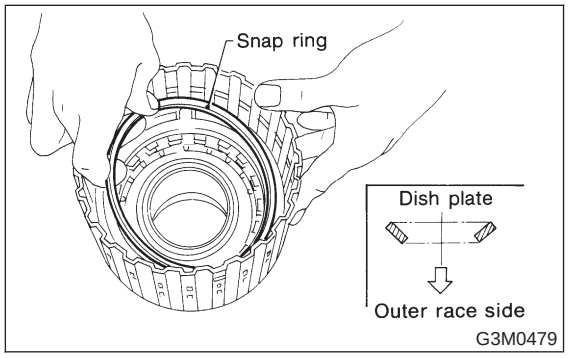


2) Set the retainer on the piston with a press using ST1 and ST2, and attach the snap ring.
ST1 498627000 SEAT
ST2 398673600 COMPRESSOR



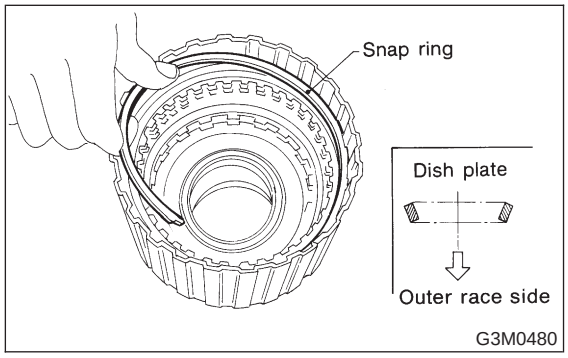
3) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Overrunning clutch)

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

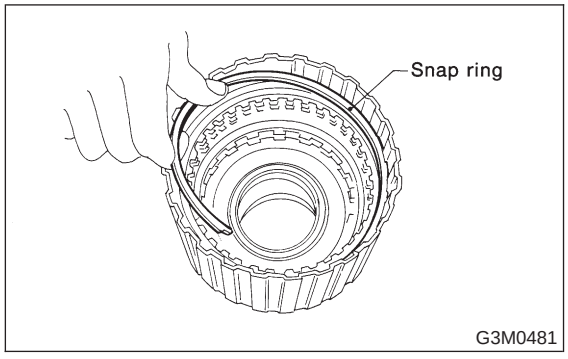


4) Install the dish plates, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Forward clutch)

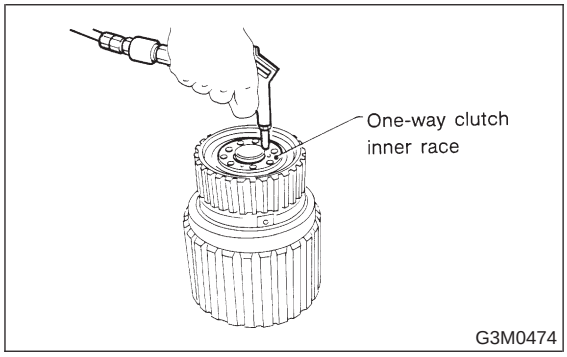
NOTE:
Pay attention to the orientation of the dish plate.



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.

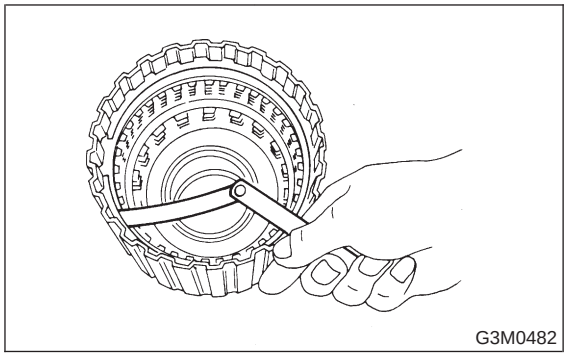


7) Checking forward clutch clearance:

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)



Retaining plates	
Part No.	Thickness mm (in)
31567AA270	4.0 (0.157)
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:

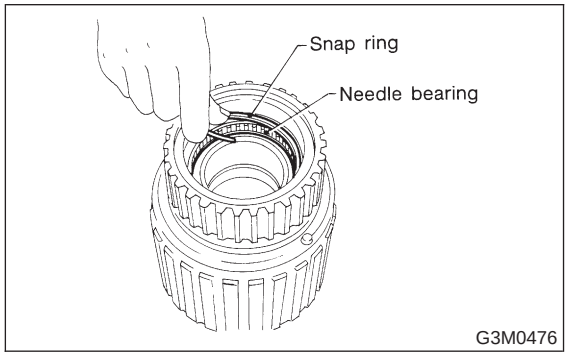
NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting. If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Standard value:
1.0 — 1.4 mm (0.039 — 0.055 in)

Allowable limit:
2.0 mm (0.079 in)

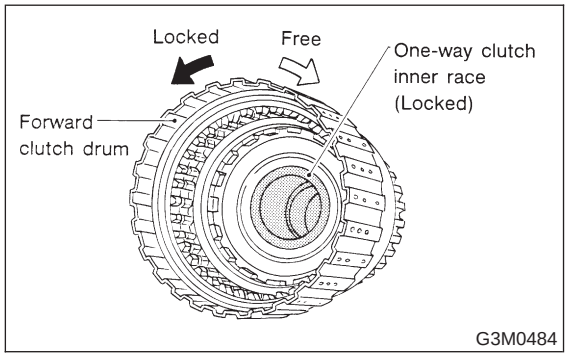
Retaining plates	
Part No.	Thickness mm (in)
31567AA120	8.0 (0.315)
31567AA130	8.2 (0.323)
31567AA140	8.4 (0.331)
31567AA150	8.6 (0.339)
31567AA160	8.8 (0.346)
31567AA170	9.0 (0.354)
31567AA180	9.2 (0.362)

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.

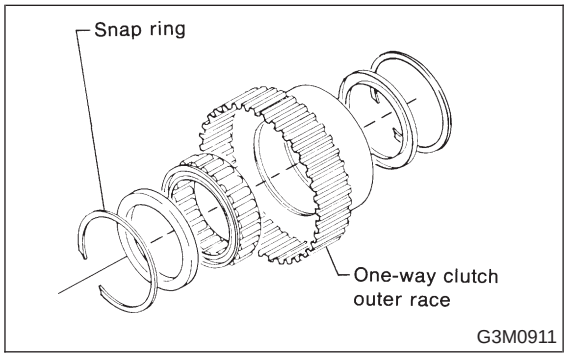
NOTE:
Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



20. One-way Clutch Outer Race

A: DISASSEMBLY

Remove the snap ring. Then remove the one-way clutch (3-4).



B: INSPECTION

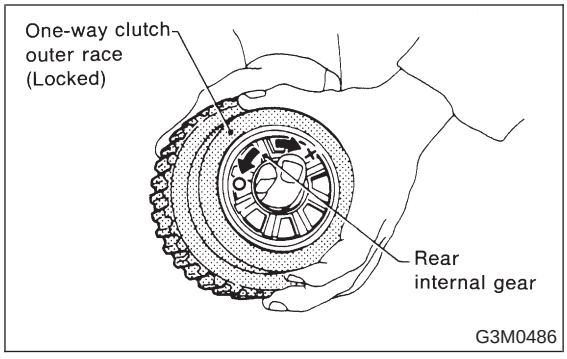
Check the sliding surface and one-way clutch (3-4) for any harmful cuts, damage, or other faults.

C: ASSEMBLY

1) Assemble the one-way clutch (3-4), and secure with the snap ring.

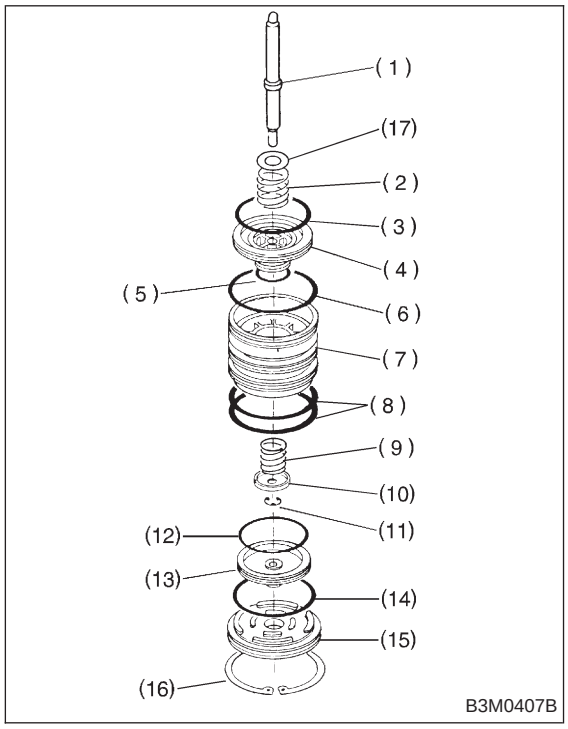
NOTE:
Pay attention to the orientation of the one-way clutch (3-4).

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

A: DISASSEMBLY



(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

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).

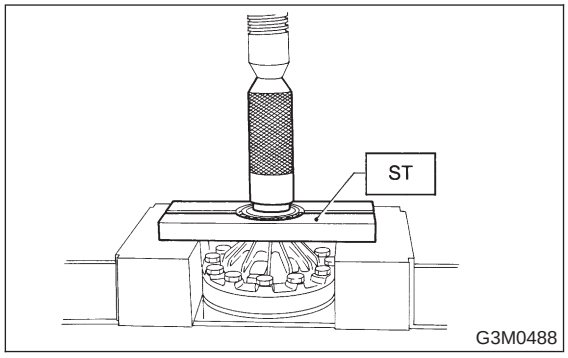
CAUTION:
● Many different O-rings and lathe cut rings are used. Be careful not to confuse them when installing.
● Be careful not to damage O-rings and lathe cut rings.

22. Differential Case Assembly

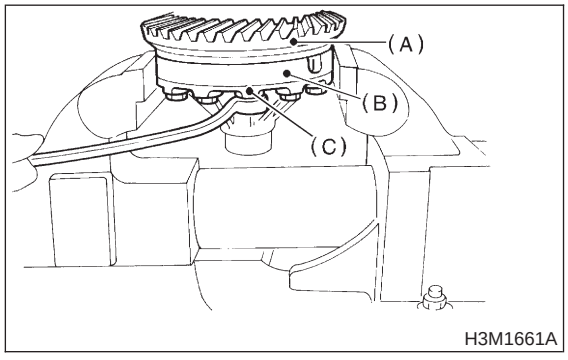
A: DISASSEMBLY

1) Using a press and ST, remove the taper roller bearing.
ST 498077000 REMOVER

CAUTION:
Be careful not to damage the speedometer drive gear.

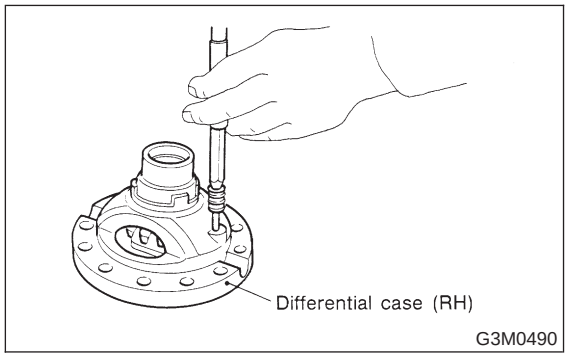


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.



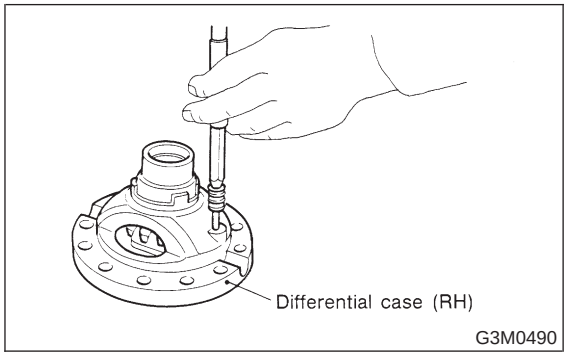
B: INSPECTION

Check each component for harmful cuts, damage and other faults.

C: ASSEMBLY

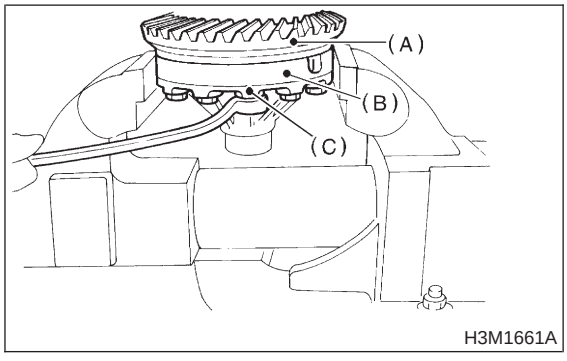
1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft, and fit the straight pin.

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 hypoid driven gear and secure by tightening the bolt.

Standard tightening torque:
62±5 N·m (6.3±0.5 kg-m, 45.6±3.6 ft-lb)



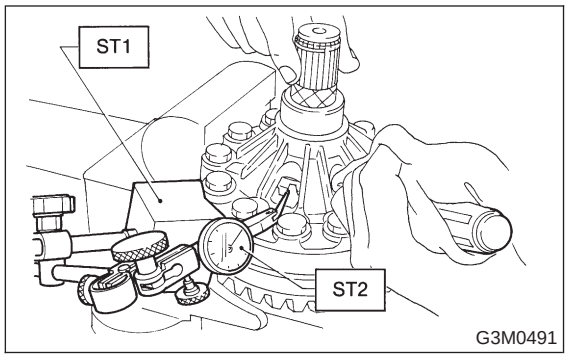
(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

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.

NOTE:
Measure the backlash by applying a pinion tooth between two bevel gear teeth.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

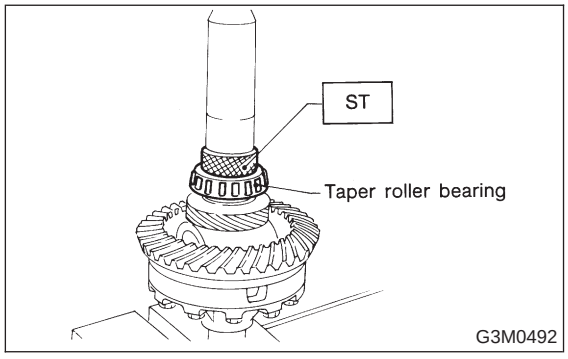
Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



5) Install the speedometer drive gear. Then force-fit the taper roller bearing with a press and ST.

CAUTION:
Be sure to position correctly the locking end of the speedometer drive gear.

ST 398487700 DRIFT

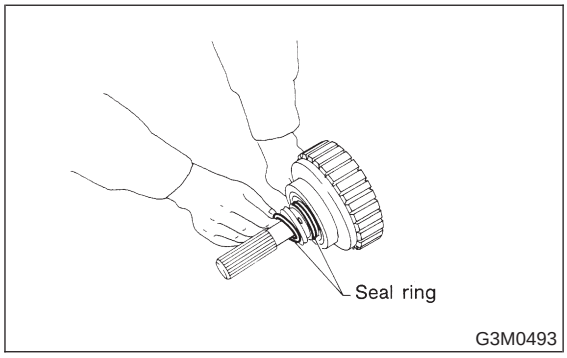


23. Transfer Clutch

A: DISASSEMBLY

1) Remove the seal ring.

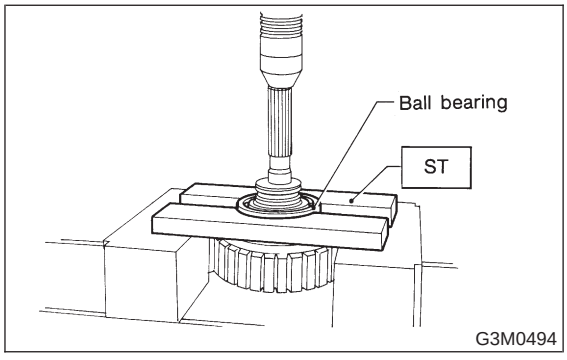
CAUTION:
Be careful not to damage the seal ring.



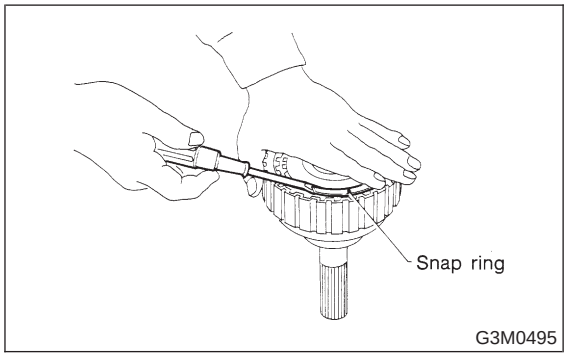
2) Using a press and ST, remove the ball bearing.

CAUTION:
Do not reuse the bearing.

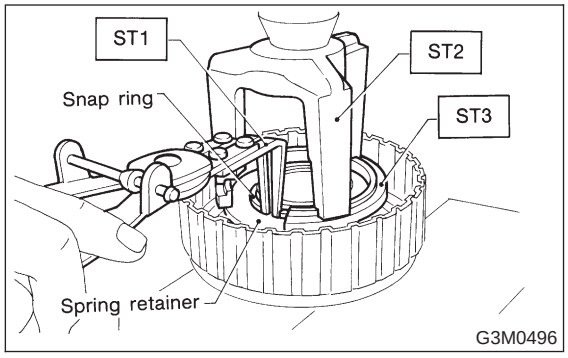
ST 498077000 REMOVER



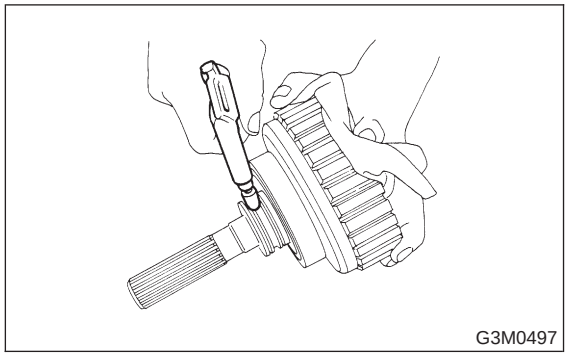
3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.



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.

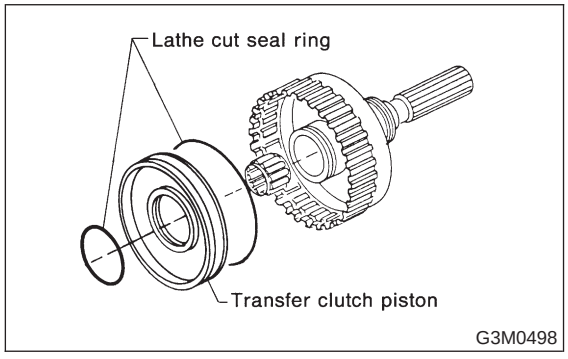


B: INSPECTION

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

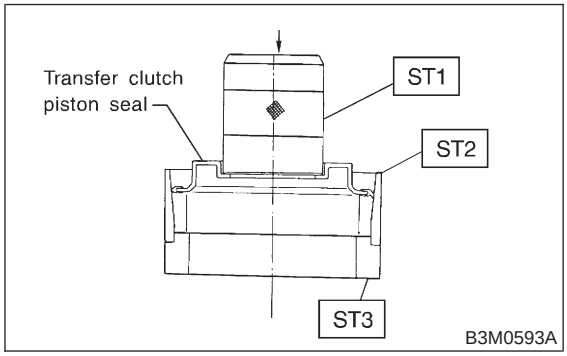
1) Install the lathe cut seal ring to the I.D./O.D. of the transfer clutch piston.



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.

CAUTION:
Be careful not to tilt transfer piston seal.

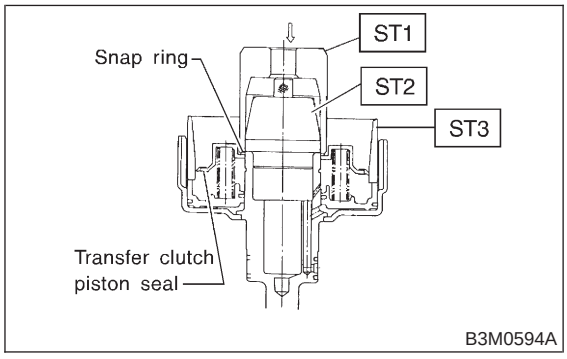
ST1 499247400 INSTALLER
ST2 499257400 PISTON GUIDE
ST3 498267400 TABLE



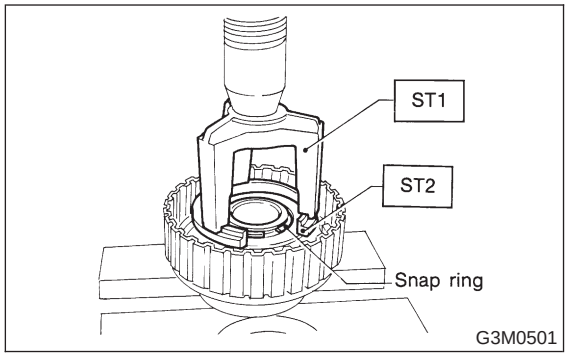
(4) Place ST3 onto rear drive shaft so that spring can be inserted into hole in transfer piston seal.
(5) Attach ST2 to rear drive shaft. Using ST1, press into place.

CAUTION:
Do not allow lip of transfer piston seal to fold back.

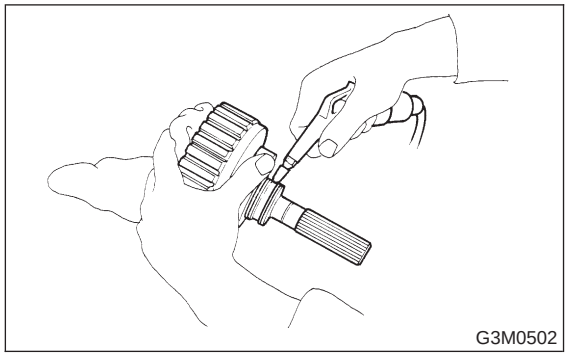
ST1 499247400 INSTALLER
ST2 499257300 SNAP RING OUTER GUIDE
ST3 499257400 PISTON GUIDE



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.

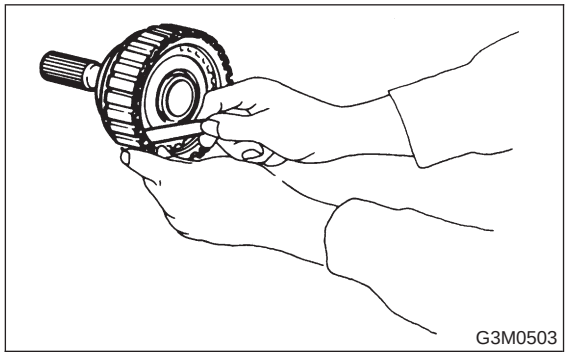


5) Check the clearance.

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.

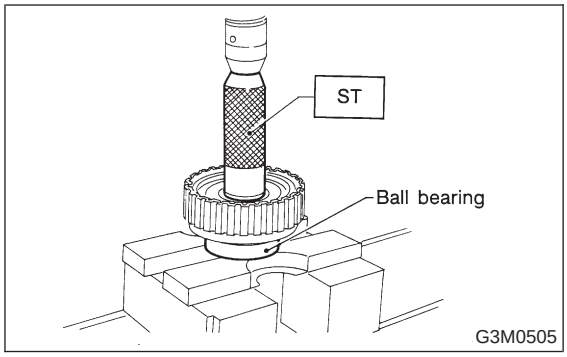
Standard value:
0.2 — 0.6 mm (0.008 — 0.024 in)

Allowable limit:
1.6 mm (0.063 in)



Pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

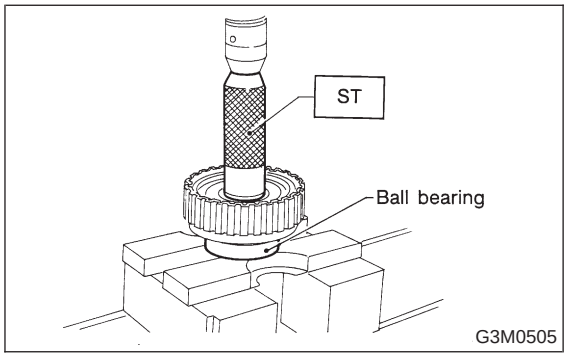
6) Press-fit the ball bearing with ST.
ST 899580100 INSTALLER



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

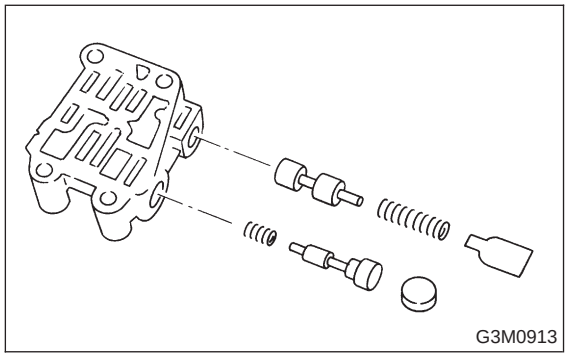


24. Transfer Valve Body

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

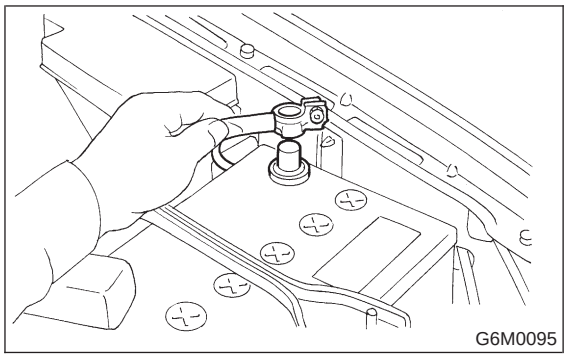
To assemble, reverse the removal sequence.

NOTE:
Make sure the valve slides smoothly after assembling.

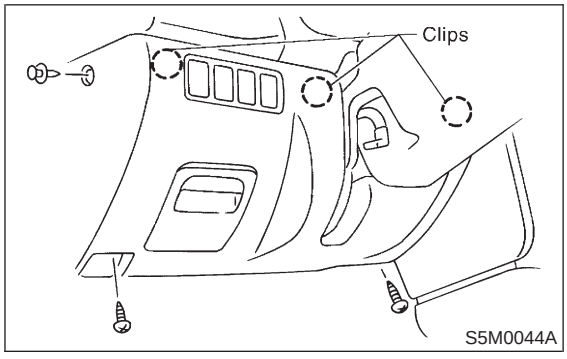
25. Transmission Control Module

A: REMOVAL

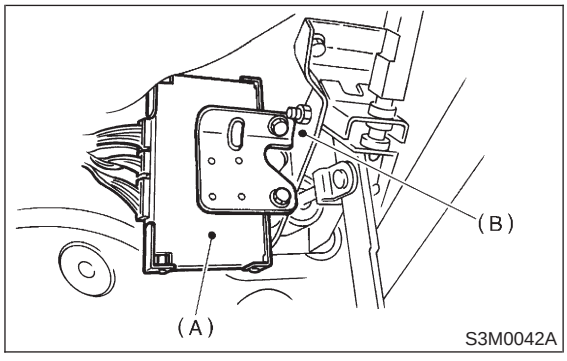
1) Disconnect battery ground cable.



2) Remove lower cover and then disconnect connector.



3) Remove transmission control module.



(A) Transmission control module
(B) Brake pedal

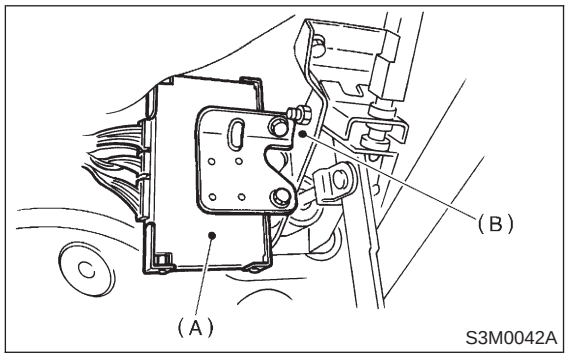
4) Disconnect connectors from transmission control module.

B: INSTALLATION

1) Connect connectors to transmission control module.

2) Install transmission control module.

Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)



(A) Transmission control module
(B) Brake pedal

3) Installing procedure hereafter is in the reverse order of removal.

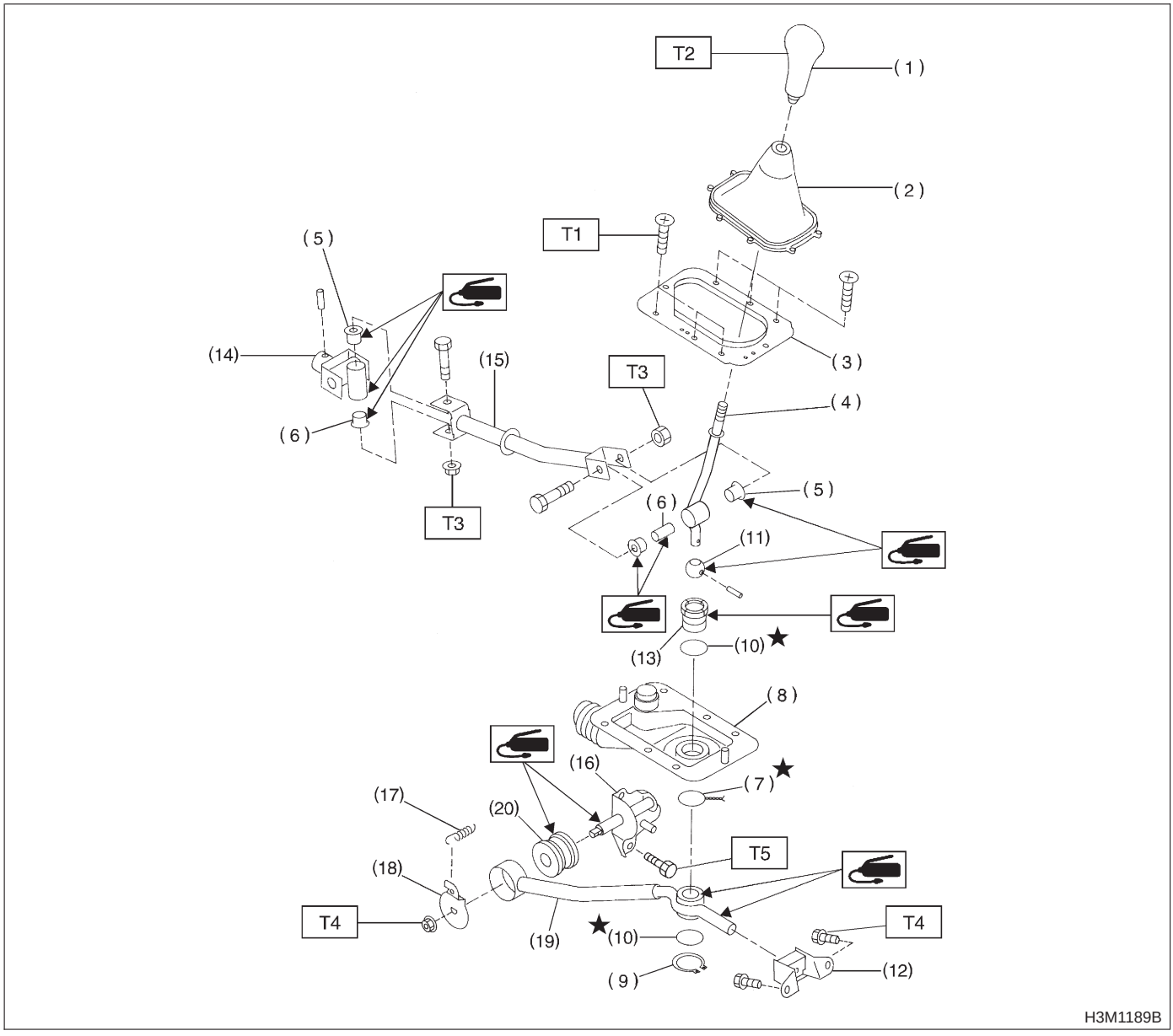
TRANSMISSION CONTROL SYSTEM 3-3

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1. Manual Transmission 2
2. Automatic Transmission 3

W SERVICE PROCEDURE 4
1. Manual Transmission 4
2. Automatic Transmission 7

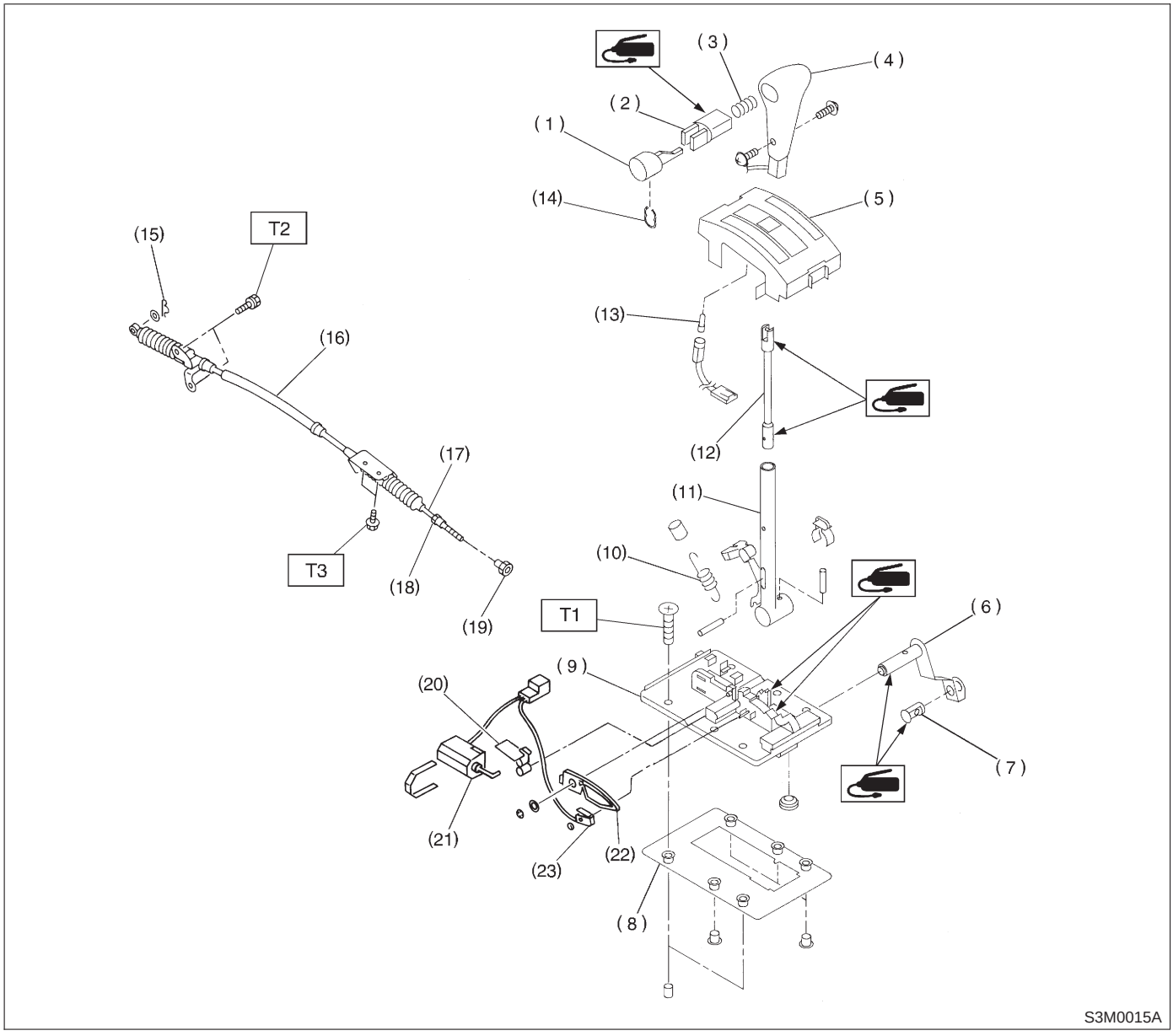
1. Manual Transmission



(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



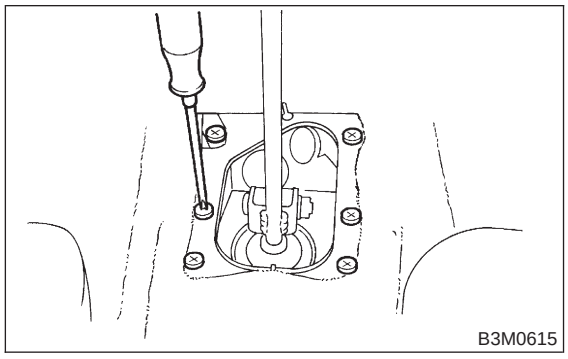
(1) Button A
(2) Button B
(3) Spring (button)
(4) Grip
(5) Indicator cover
(6) Selector lever lower
(7) Pin
(8) Packing
(9) Plate
(10) Detent spring
(11) Selector lever upper
(12) Rod
(13) Indicator light bulb
(14) Retainer spring
(15) Snap pin
(16) Outer cable
(17) Inner cable
(18) Nut (front)
(19) Nut (rear)
(20) Lock plate
(21) Shift-lock solenoid
(22) Lock arm
(23) "P" position switch

Tightening torque: N·m (kg-m, ft-lb)
T1: 5.9±1.5 (0.6±0.15, 4.3±1.1)
T2: 12±3 (1.2±0.3, 8.7±2.2)
T3: 25±7 (2.5±0.7, 18.1±5.1)

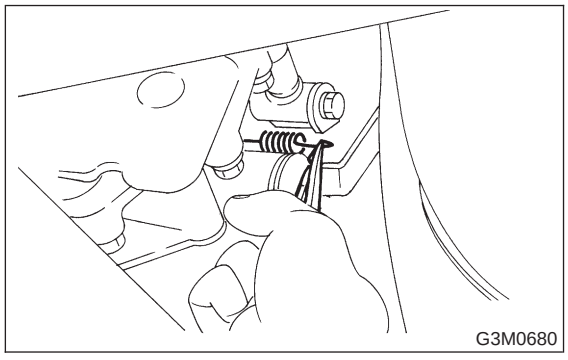
1. Manual Transmission

A: REMOVAL

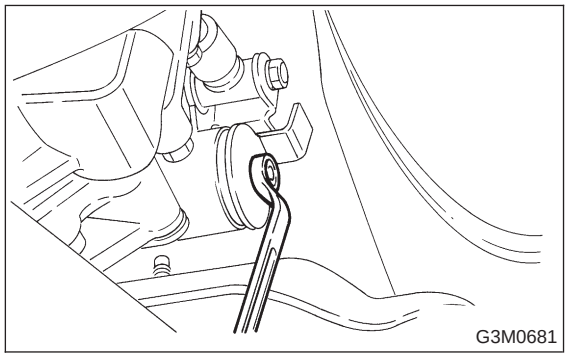
1) Remove console box. <Ref. to 5-4 [W1A0].>
2) Remove boot plate from the body.


B3M0615

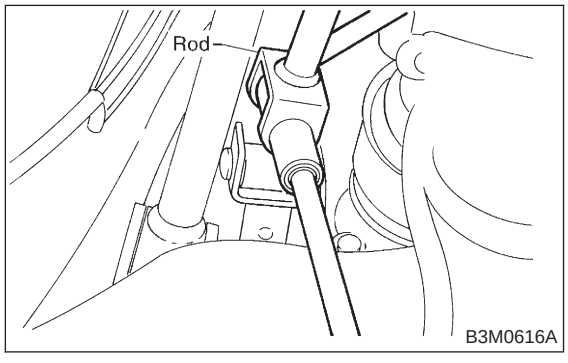
3) Remove the spring between the joint and bracket.


G3M0680

4) Remove stay from bracket.

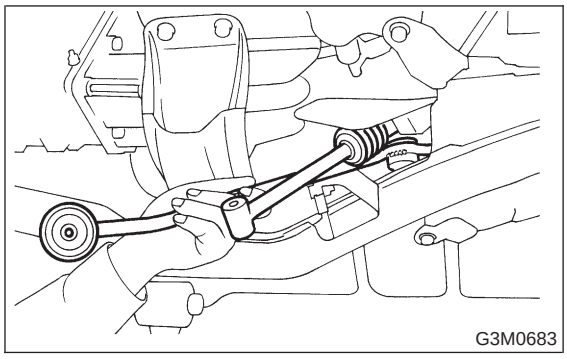

G3M0681

5) Remove rod from joint.

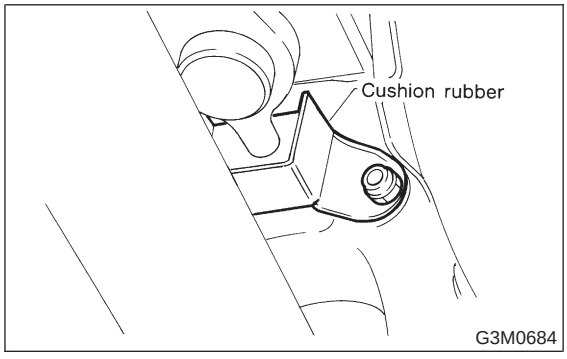


B3M0616A

6) Remove gearshift lever.


G3M0683

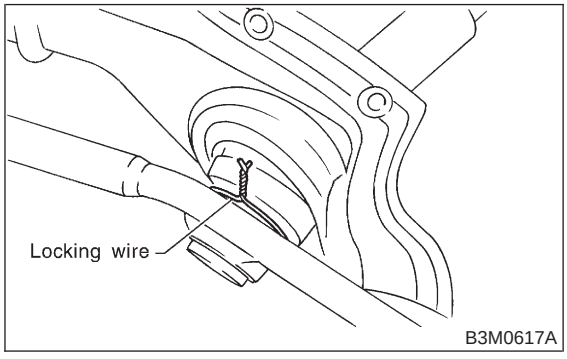
7) Remove the exhaust cover and remove cushion rubber from the body.



G3M0684

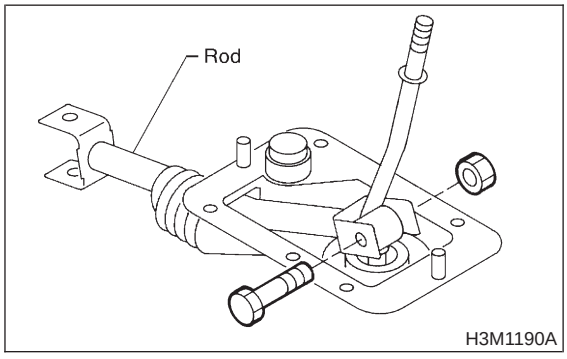
B: DISASSEMBLY

1) Disconnect locking wire.



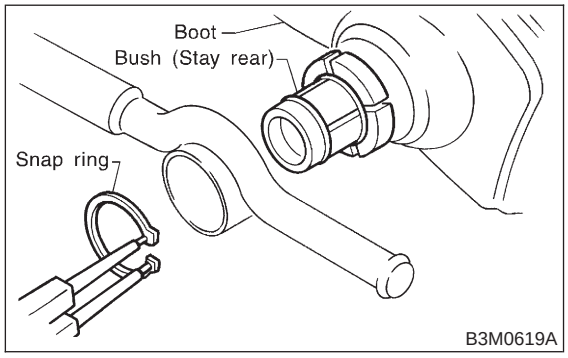
B3M0617A

2) Remove rod from gearshift lever.

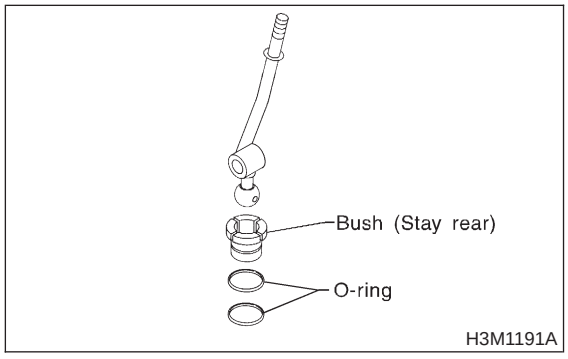


H3M1190A

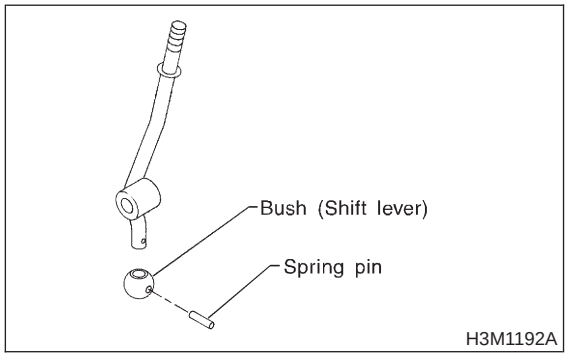
3) Remove snap ring, then disconnect gearshift lever from stay.



4) Remove boot from gearshift lever.
5) Remove O-ring, then disconnect bush (Stay rear).

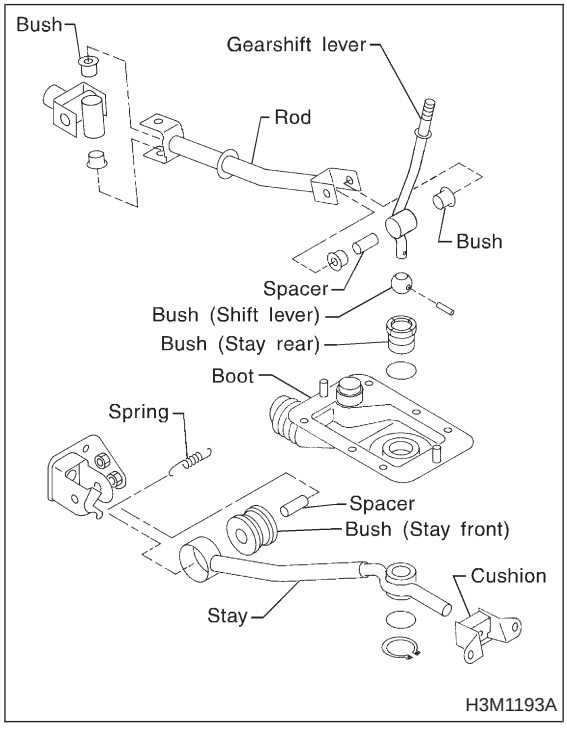


6) Draw out spring pin, then remove bush (Shift lever) from gearshift lever.



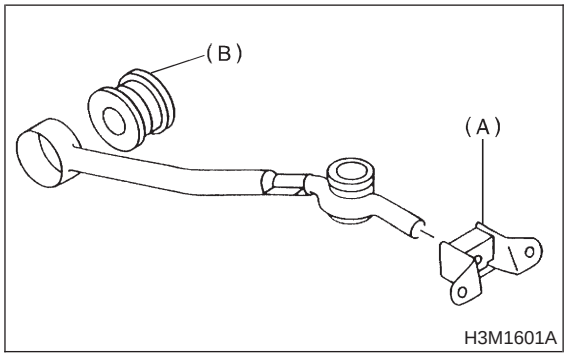
C: INSPECTION

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

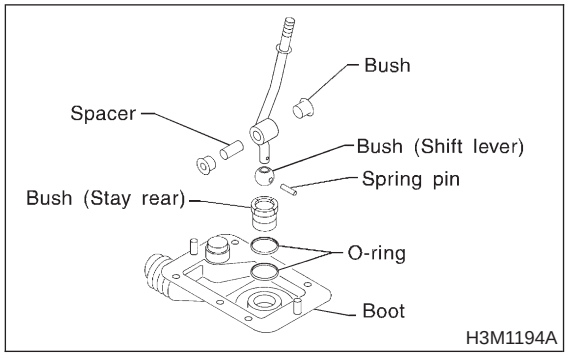
1) Clean all parts before assembly.
2) Mount the following parts on the stay.



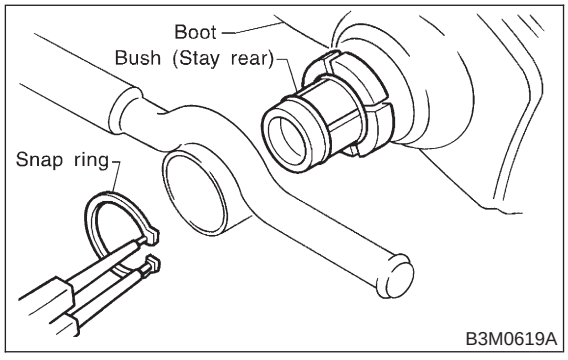
(A) Cushion rubber
(B) Bush (Stay front)

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.**

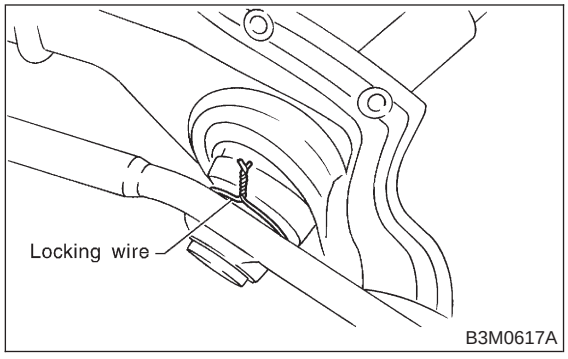


4) Insert the gearshift lever into the boot hole.
5) Mount gearshift lever on the stay.
6) Install snap ring to the bottom of the bush (Stay rear).



7) Tighten with locking wire to the extent that the boot will not come off.

CAUTION:
Always use new locking wire.

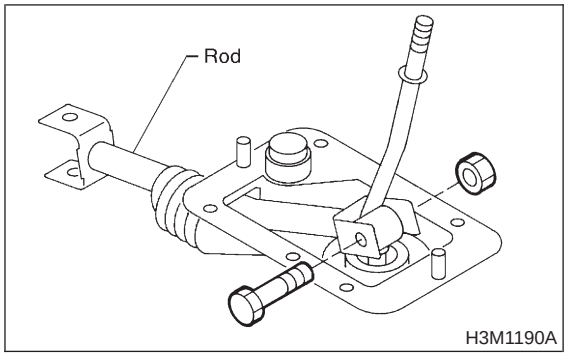


8) Insert the rod into the boot hole.

9) Connect rod to gearshift lever.

Tightening torque:
12±3 N·m (1.2±0.3 kg-m, 8.7±2.2 ft-lb)

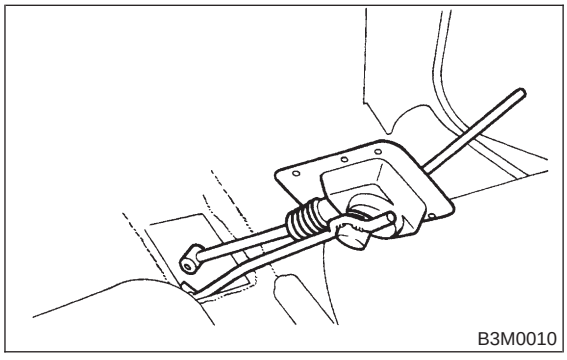
Rocking torque:
0.74±0.25 N·m (0.075±0.025 kg-m, 0.54±0.18 ft-lb) or less



10) Check that there is no excessive play and that parts move smoothly.

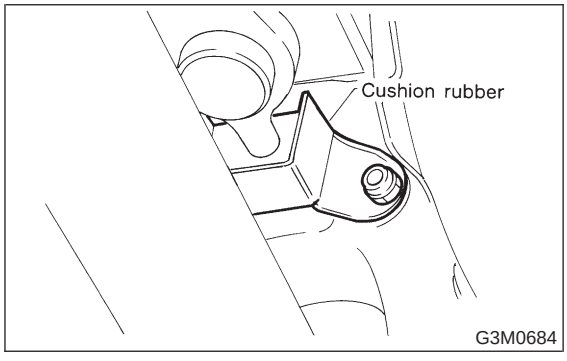
E: INSTALLATION

1) Put into gearshift lever to passenger compartment.
2) Mount boot plate on the body.
3) Install console box and gearshift knob. <Ref. to 5-4 [W1B0].>



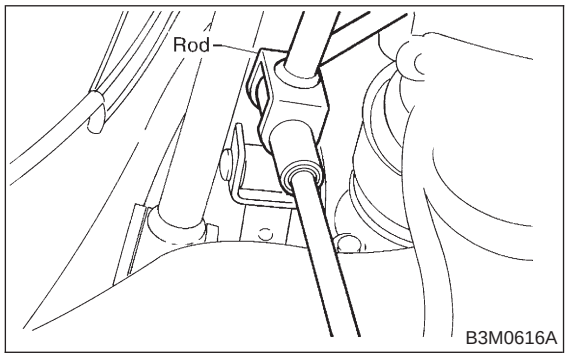
4) Mount cushion rubber on the body.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)



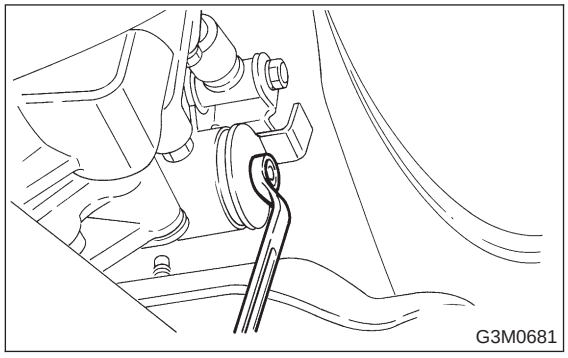
5) Connect rod to the joint.

Tightening torque:
12±3 N·m (1.2±0.3 kg-m, 8.7±2.2 ft-lb)



6) Connect stay to the bracket.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)

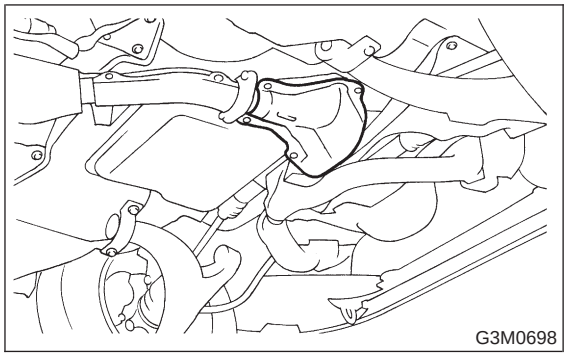


7) Install the exhaust cover.

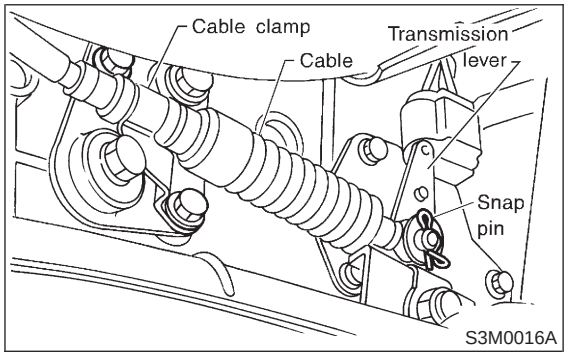
2. Automatic Transmission

A: REMOVAL

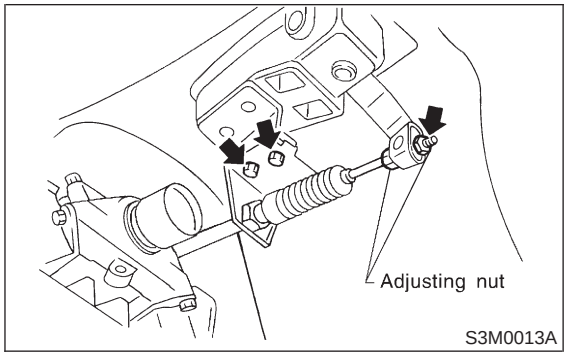
1) Remove the cable.
(1) Prior to removal, set lever to “N” position.
(2) Remove front exhaust pipe.



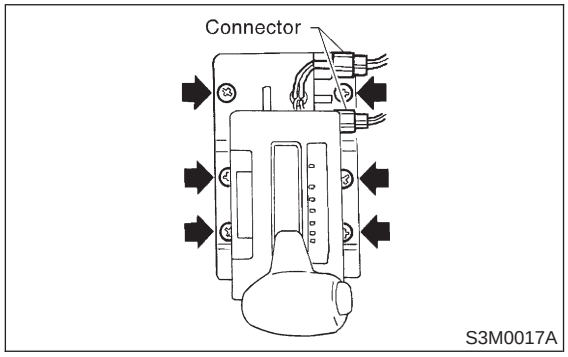
(3) Separate cable from transmission lever.
(4) Remove clamp from transmission case.



(5) Disconnect cable from selector lever and then remove cable bracket.

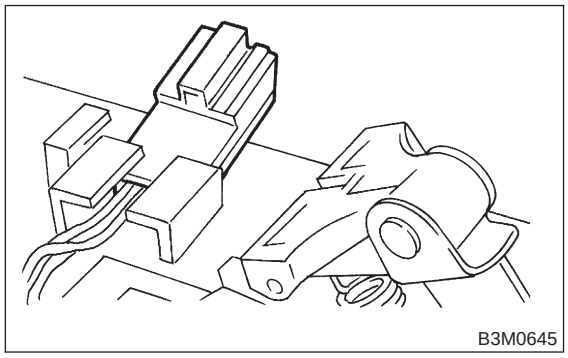


2) Remove console box. <Ref. to 5-4 [W1A0].>
3) Disconnect the connectors, then remove the six screws to take out the selector lever assembly from the body.



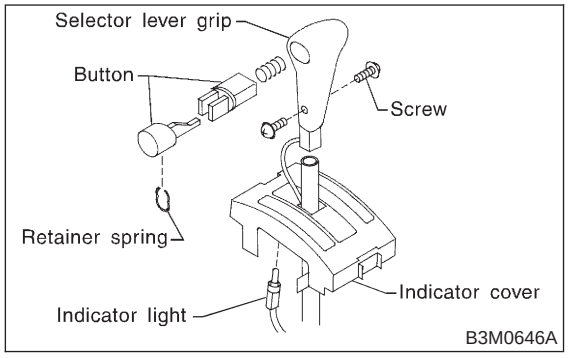
B: DISASSEMBLY

1) Remove connector from plate.

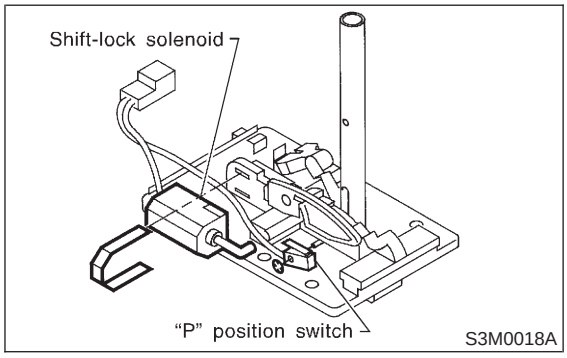


2) Remove indicator light and two screws.
3) Remove retainer spring, then pull up selector lever grip with indicator cover for holding selector lever button.

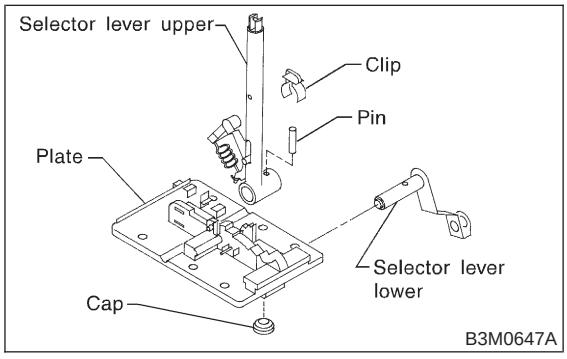
CAUTION:
Pull the selector lever grip carefully so that the selector lever button may not jump out.



4) Remove shift-lock solenoid and “P” position switch.



5) Remove cap and clip, then extract pin.
6) Remove selector lever lower then take away selector lever upper from plate.



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.

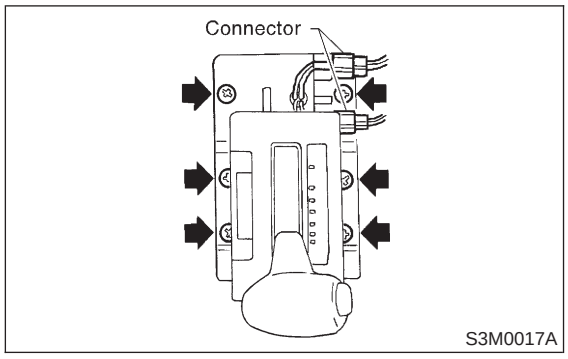
D: ASSEMBLY

1) Clean all parts before assembly.
2) Apply grease [NIGTIGHT LYW No. 2 or equivalent] to each parts. <Ref. to 3-3 [C200].>
3) Assembly is in the reverse order of disassembly.
4) After completion of fitting, transfer selector lever to range “P” — “1”, pressing the button of the grip; then check whether the indicator and selector lever agree, whether the pointer and position mark agree and what the operating force is.

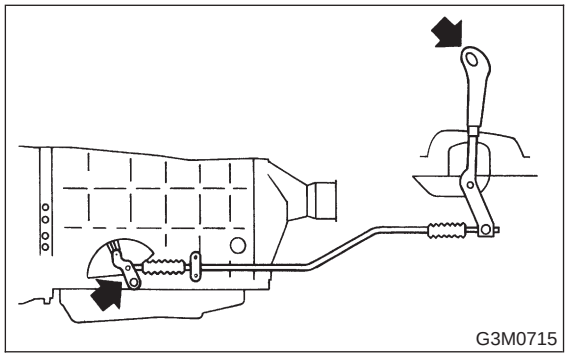
E: INSTALLATION

1) Mount the selector lever onto the vehicle body.
2) Tighten the six bolts to install the selector lever to the vehicle body, then connect connectors.

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)

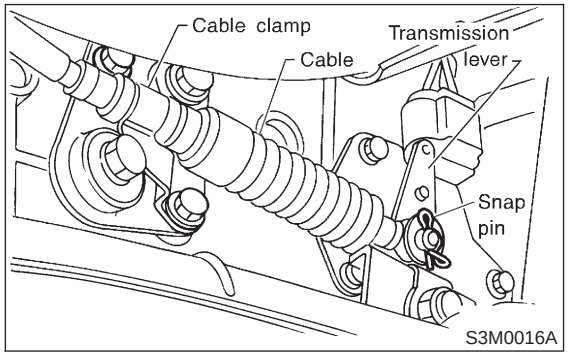


3) Install console box.
4) Set location of selector lever at “N” position.
5) Set location of selector arm installed on the transmission body at “N” position.



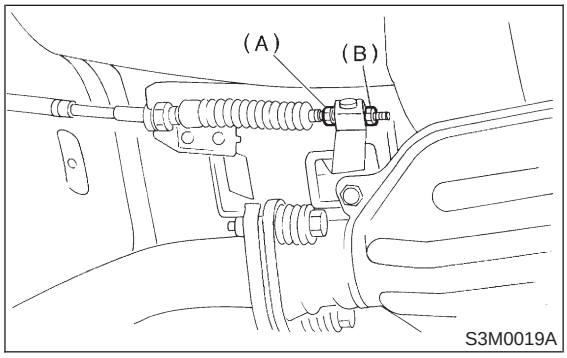
6) Pass inner cable through selector arm pin and then connect it using a washer and snap pin.
7) Attach outer cable to plate on transmission case with the bolts.

Tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-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 (A).
(2) Tighten nut (B).

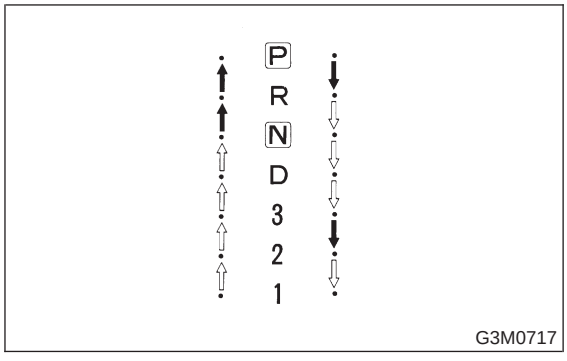
Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)



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 only from the “LOCK” position.

(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”.

AWD SYSTEM 3-4

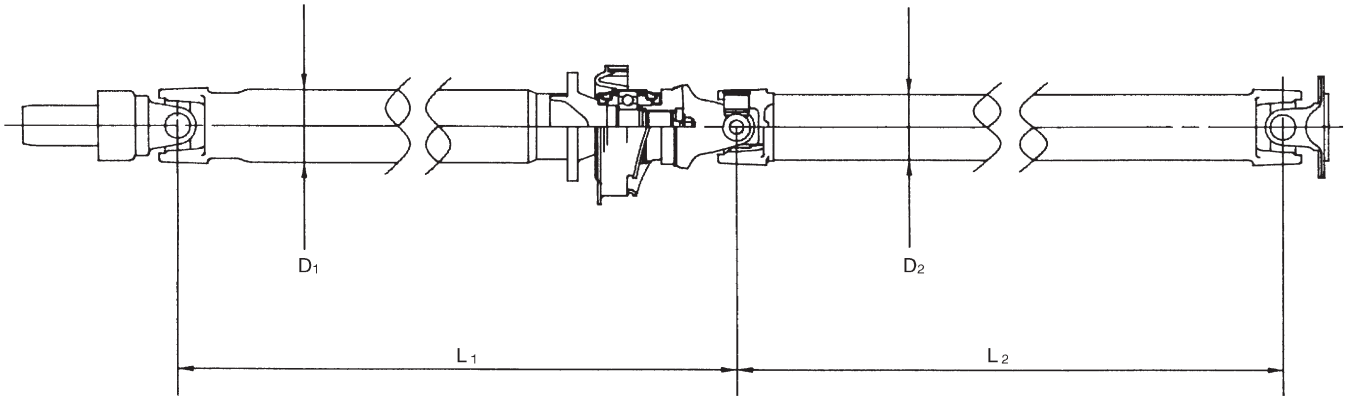
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1. Propeller Shaft

A: SPECIFICATIONS

Front propeller shaft Joint-to-joint length: L_1 mm (in)	AT	693 (27.28)
	MT	634 (24.96)
Rear propeller shaft Joint-to-joint length: L_2 mm (in)		768 (30.24)
Outside dia. of tube mm (in)	D_1	63.5 (2.500)
	D_2	57.0 (2.244)



B3M0851A

2. Rear Differential

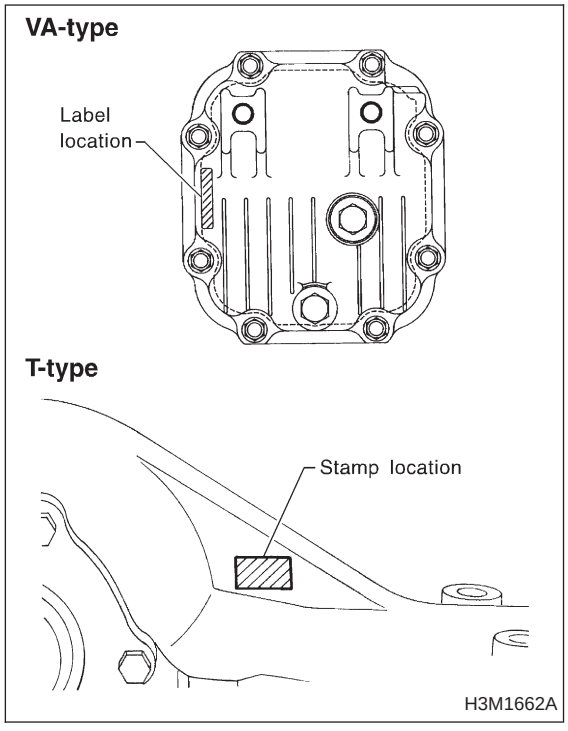
A: SPECIFICATIONS

Type of gear	Hypoid			
	MT		AT	
	2200 cc	2500 cc	2200 cc	2500 cc
Gear ratio (Number of gear teeth)	3.900 (39/10)	4.111 (37/9)	4.111 (37/9)	4.444 (40/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)			
Rear differential gear oil	GL-5			

B: IDENTIFICATION

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

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



Rear differential	Gear ratio		Stamp or label on rear differential
VA-type	2200 cc AT	4.111	 H3M1159
T-type	2200 cc MT	3.900	 B3M0124
	2500 cc MT	4.111	 B3M0127
	2500 cc AT	4.444	 B3M0421

C: SERVICE DATA

1. 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 spacer	Part No.	Length mm (in)
	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)

Preload adjusting washer	Part No.	Thickness mm (in)
	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
Pinion height adjusting shim	Part No.	Thickness mm (in)
	32295AA200	0.150 (0.0059)
	32295AA210	0.175 (0.0069)
	32295AA220	0.200 (0.0079)
	32295AA230	0.225 (0.0089)
	32295AA240	0.250 (0.0098)
	32295AA250	0.275 (0.0108)
Side gear backlash	0.05 — 0.15 mm (0.0020 — 0.0059 in)	
Side gear thrust washer	Part No.	Thickness mm (in)
	803135011	0.925 — 0.950 (0.0364 — 0.0374)
	803135012	0.950 — 0.975 (0.0374 — 0.0384)
	803135013	0.975 — 1.000 (0.0384 — 0.0394)
	803135014	1.000 — 1.025 (0.0394 — 0.0404)
	803135015	1.025 — 1.050 (0.0404 — 0.0413)
Crown gear to drive pinion backlash	Limit	0.10 — 0.15 (0.0039 — 0.0059)
Crown gear runout on its back surface		0.05 (0.0020)
Oil capacity		0.8 ℓ (0.8 US qt, 0.7 Imp qt)

2. T-TYPE

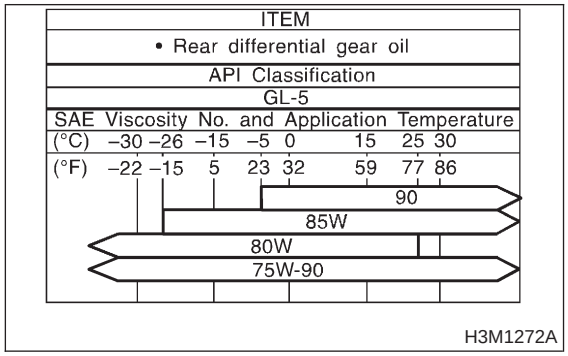
Front and rear bearing preload at companion flange bolt hole	New bearing	19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb)
Preload adjusting spacer	Part No.	Length mm (in)
	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

Preload adjusting washer	Part No.	Thickness mm (in)
	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
Pinion height adjusting shim	Part No.	Thickness mm (in)
	383495200	3.09 (0.1217)
	383505200	3.12 (0.1228)
	383515200	3.15 (0.1240)
	383525200	3.18 (0.1252)
	383535200	3.21 (0.1264)
	383545200	3.24 (0.1276)
	383555200	3.27 (0.1287)
	383565200	3.30 (0.1299)
	383575200	3.33 (0.1311)
	383585200	3.36 (0.1323)
	383595200	3.39 (0.1335)
	383605200	3.42 (0.1346)
	383615200	3.45 (0.1358)
	383625200	3.48 (0.1370)
	383635200	3.51 (0.1382)
	383645200	3.54 (0.1394)
	383655200	3.57 (0.1406)
	383665200	3.60 (0.1417)
	383675200	3.63 (0.1429)
	383685200	3.66 (0.1441)
Side gear backlash	0.10 — 0.20 mm (0.0039 — 0.0079 in)	
Side gear thrust washer	Part No.	Thickness mm (in)
	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 — 0.0354)
Side bearing standard width	20.00 (0.7874)	
Side bearing retainer shim	Part No.	Thickness mm (in)
	383475201	0.20 (0.0079)
	383475202	0.25 (0.0098 in)
	383475203	0.30 (0.0118)
	383475204	0.40 mm (0.0157)
	383475205	0.50 (0.0197)
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)

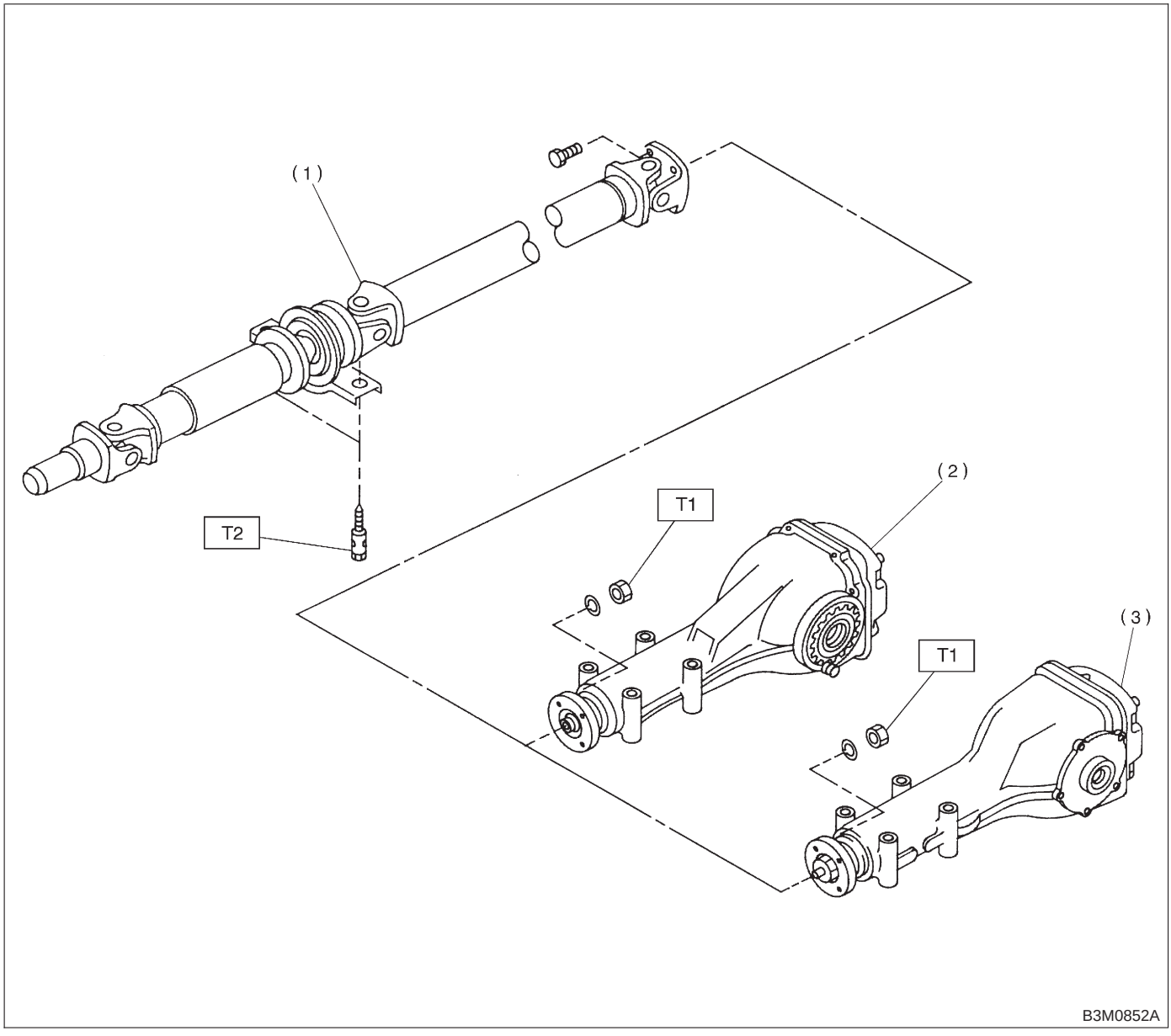
3. REAR DIFFERENTIAL GEAR OIL

- Recommended oil

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



1. Propeller Shaft

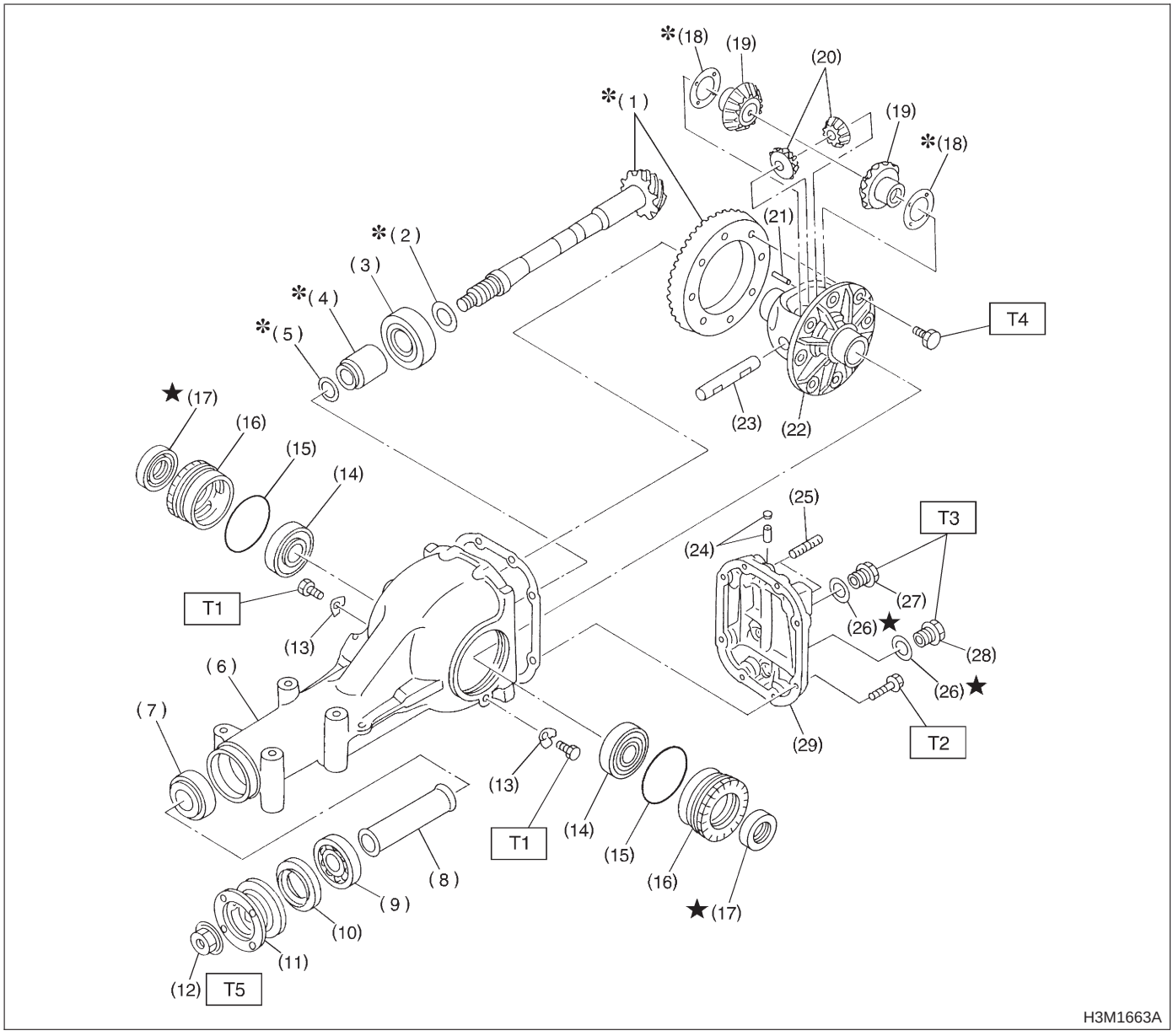


(1) Propeller shaft
(2) Rear differential (VA-type)
(3) Rear differential (T-type)

Tightening torque: N·m (kg-m, ft-lb)
T1: 31±8 (3.2±0.8, 23.1±5.8)
T2: 52±5 (5.3±0.5, 38.3±3.6)

2. Rear Differential

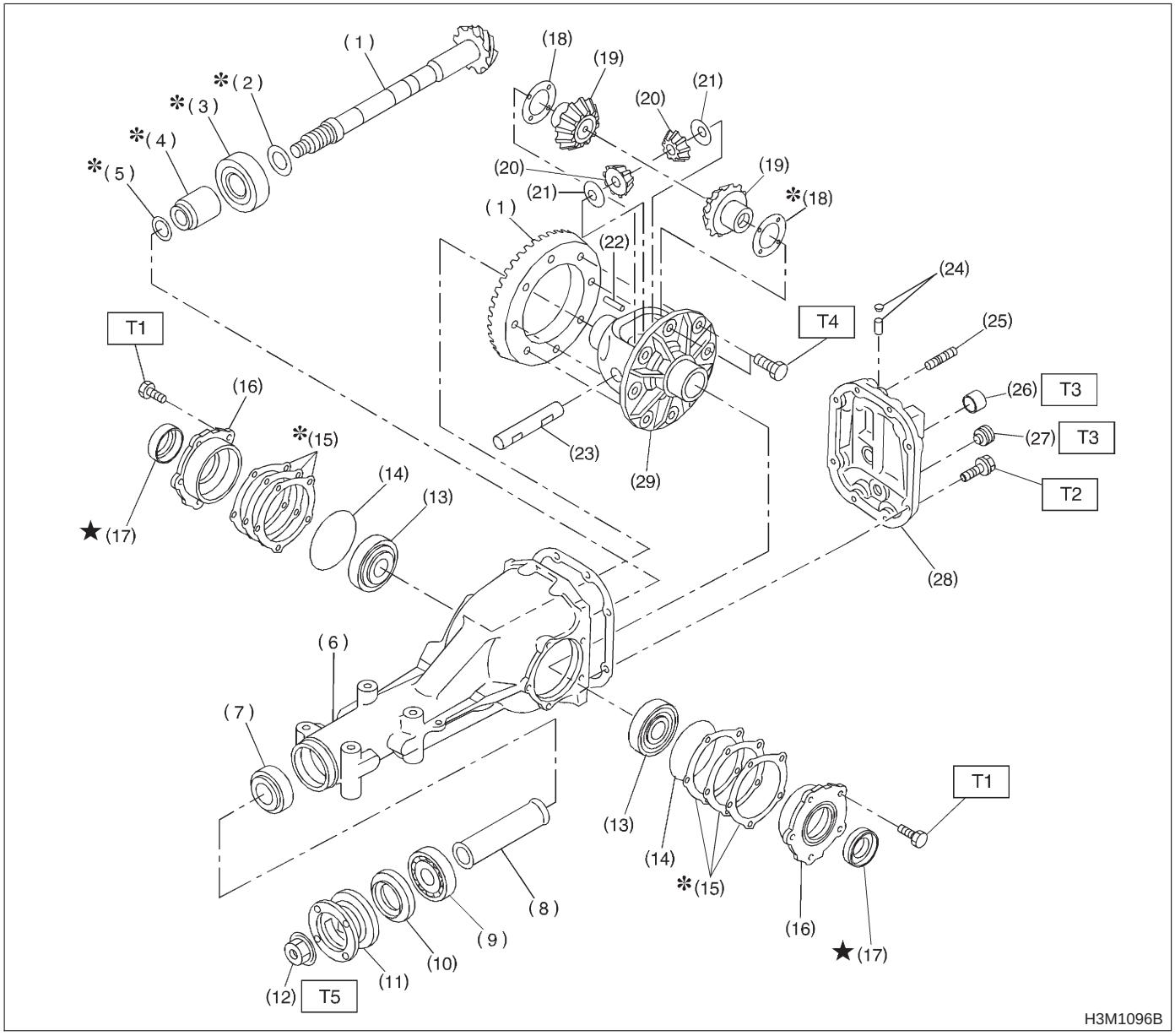
A: VA-TYPE



(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)

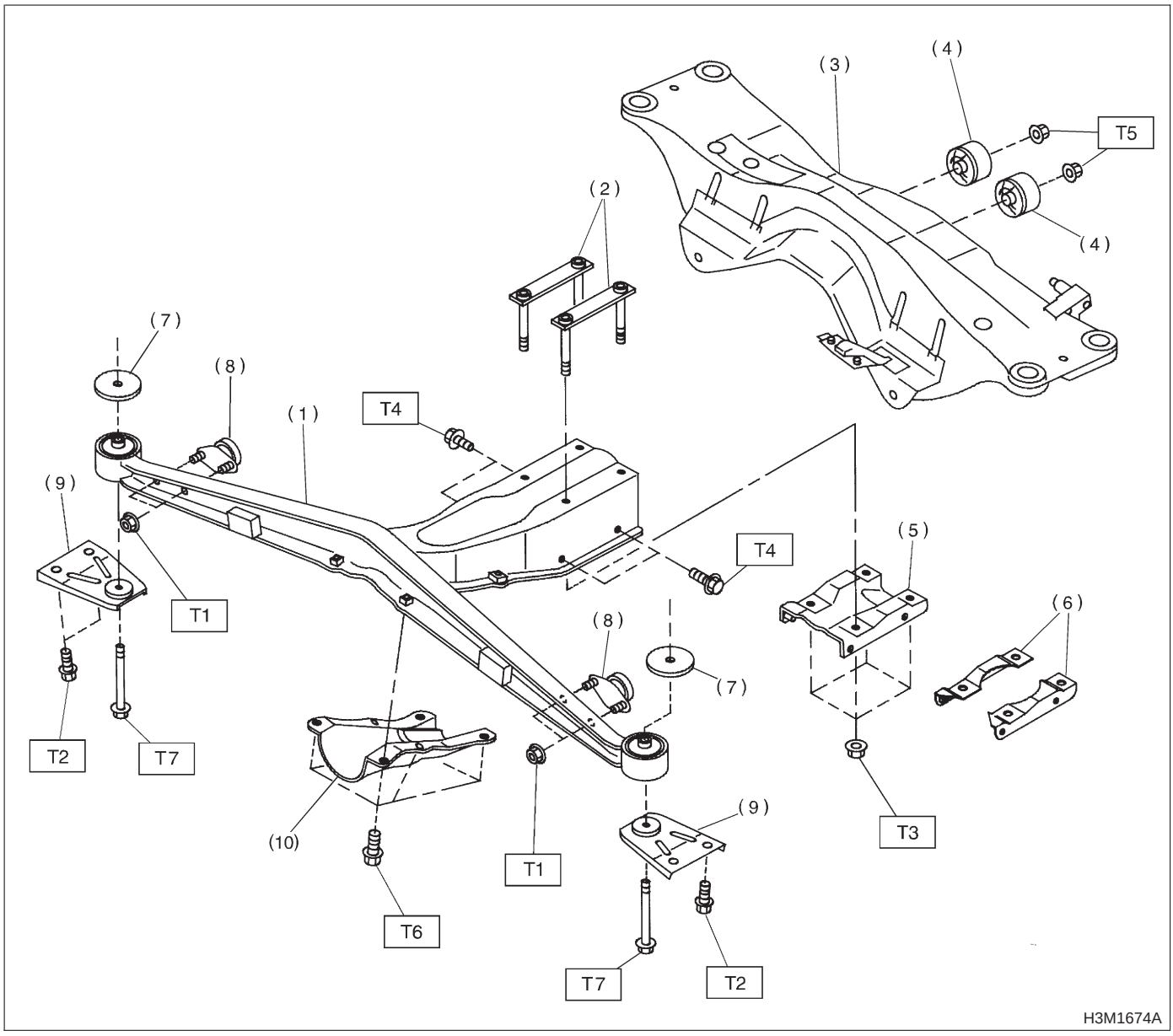
B: T-TYPE



(1) Pinion crown gear set
(2) Pinion height adjusting washer
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Spacer
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Side gear thrust washer
(19) Side gear
(20) Pinion mate gear
(21) Pinion mate gear washer
(22) Pinion shaft lock pin
(23) 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)

3. Rear Differential Mounting System



(1) Differential front member
(2) Plate
(3) Crossmember
(4) Rear bushing
(5) Differential mount lower bracket (2500 cc model)
(6) Differential mount lower bracket (2200 cc model)
(7) Stopper
(8) Dynamic damper
(9) Differential mount bracket
(10) Differential mount front cover

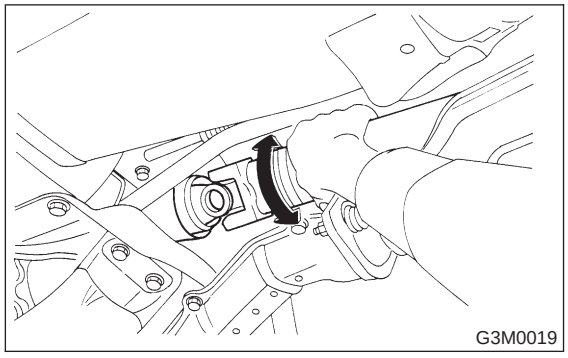
Tightening torque: N·m (kg-m, ft-lb)
T1: 20±5 (2.0±0.5, 14.5±3.6)
T2: 32±8 (3.3±0.8, 23.9±5.8)
T3: 64±8 (6.5±0.8, 47.0±5.8)
T4: 69^{+13}_{-8} ($7.0^{+1.3}_{-0.8}$, $50.6^{+9.4}_{-5.8}$)
T5: 69±10 (7.0±1.0, 51.0±7.2)
T6: 88±10 (9.0±1.0, 65.0±7.2)
T7: 98±10 (10.0±1.0, 72.0±7.2)

1. Propeller Shaft

A: ON-CAR SERVICE

Check the following points with propeller shaft installed in vehicle.

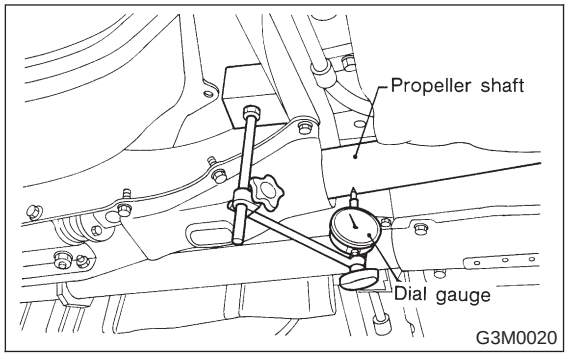
1) Joints and connections
Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.
2) Splines and bearing locations
Turn propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.


G3M0019

3) Runout of propeller shaft
Turn rear wheels by hand to check for “runout” of propeller shaft.

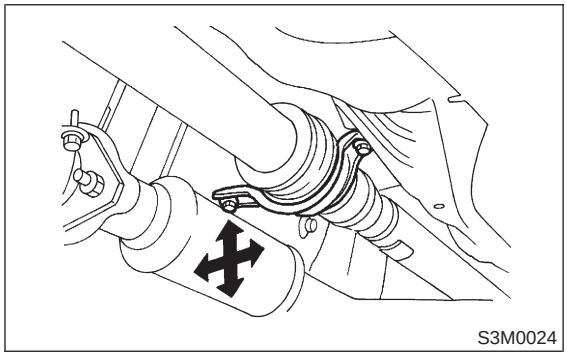
NOTE:
Measure runout with a dial gauge at the center of front and rear propeller shaft tubes.

Runout:
Limit 0.6 mm (0.024 in)



G3M0020

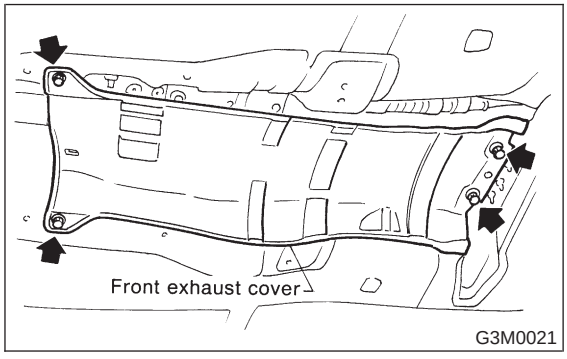
4) Center bearing free play
While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.


S3M0024

B: REMOVAL

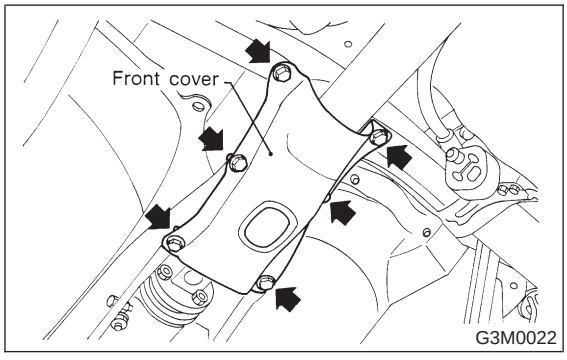
NOTE:
Before removing propeller shaft, wrap metal parts with a cloth or rubber material.

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 [W3A0].> and <Ref. to 2-9 [W4A0].>
6) Remove front exhaust cover.



G3M0021

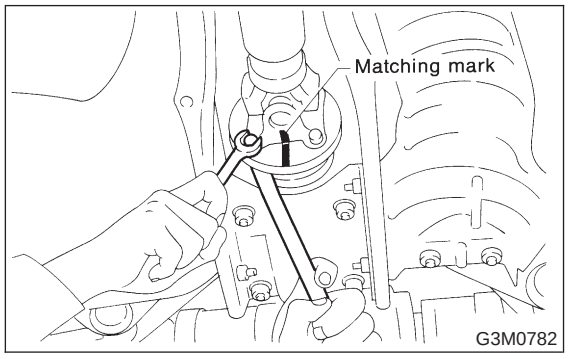
7) Remove differential mount front cover.



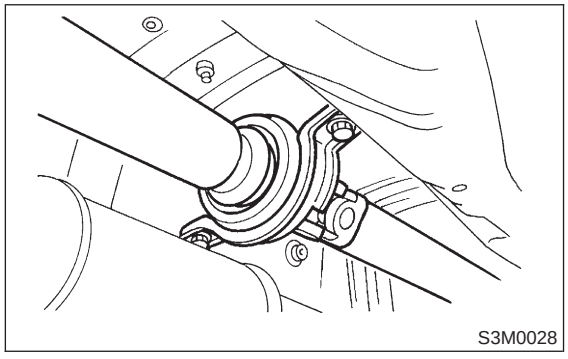
G3M0022

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.



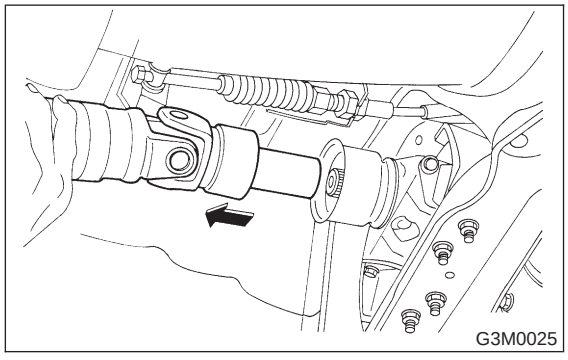
9) Remove the two bolts which hold center bearing to vehicle body.



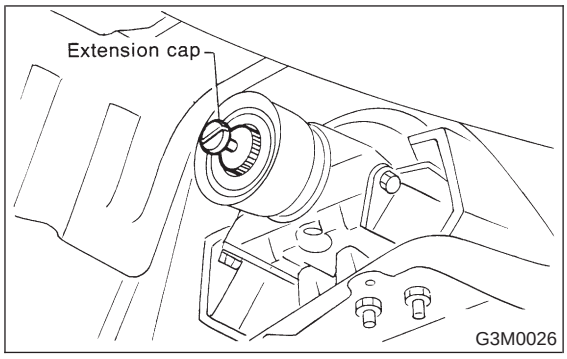
10) Remove propeller shaft from transmission.

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

NOTE:
Do not disassemble propeller shaft. It is a single unit.

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

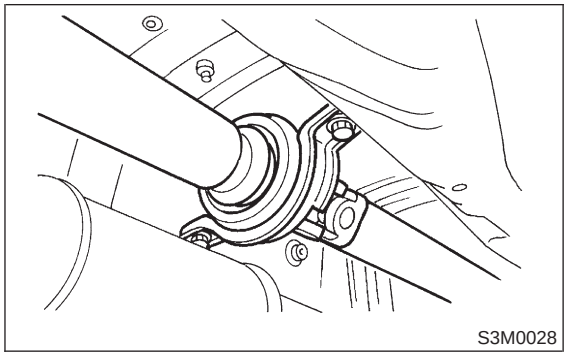
E: ASSEMBLY

NOTE:
Do not disassemble propeller shaft. It is a single unit.

F: INSTALLATION

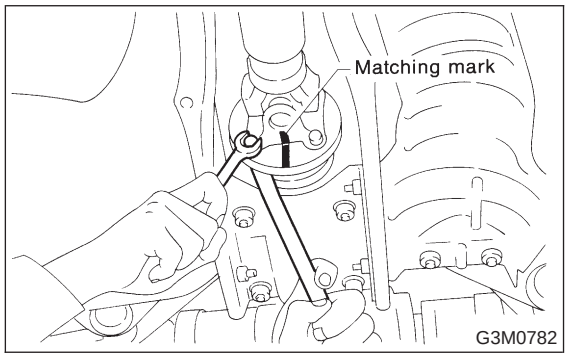
1) Insert sleeve yoke into transmission and attach center bearing to vehicle body.

Tightening torque:
52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)



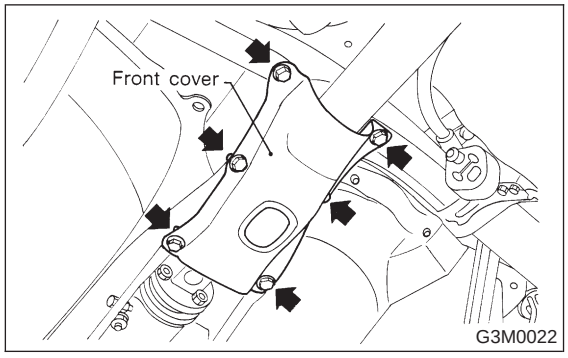
2) Align matching marks and connect flange yoke and rear differential.

Tightening torque:
31±8 N·m (3.2±0.8 kg-m, 23.1±5.8 ft-lb)

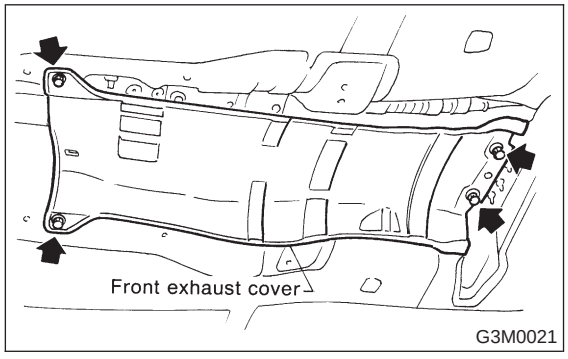


3) Install differential mount front cover.

Tightening torque:
88±10 N·m (9.0±1.0 kg-m, 65±7 ft-lb)



4) Install front exhaust cover.



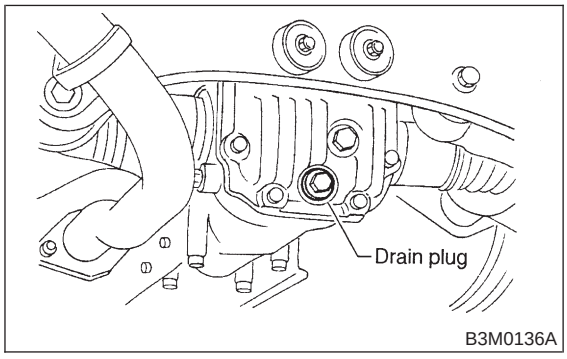
5) Install rear exhaust pipe and muffler.

2. Rear Differential (VA-Type)

A: ON-CAR SERVICE

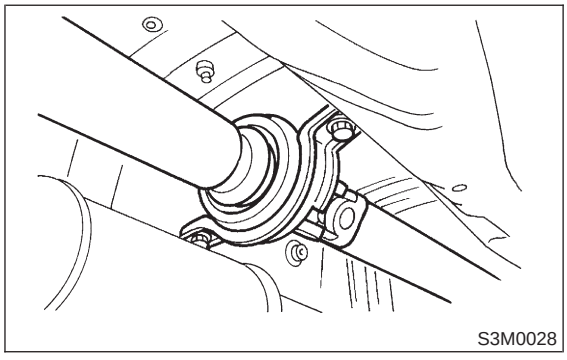
1. FRONT OIL SEAL

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.

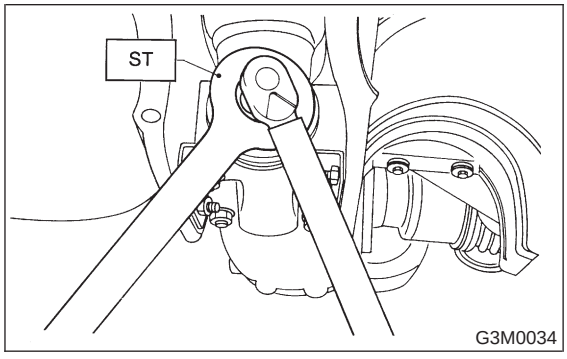


5) Jack-up rear wheels and support the vehicle body with sturdy racks.
6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>

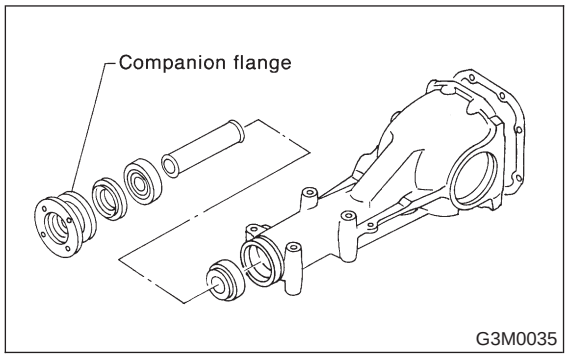
CAUTION:
Wrap metal parts with a cloth or rubber material to prevent damage from adjacent metal parts.



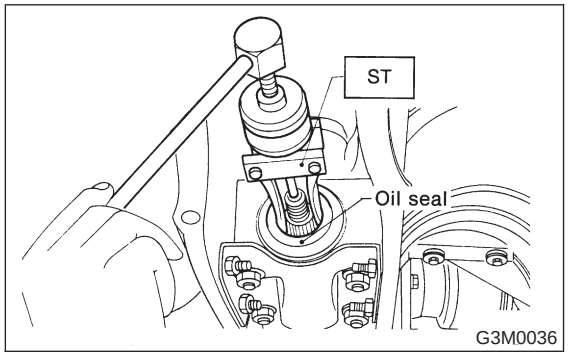
7) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



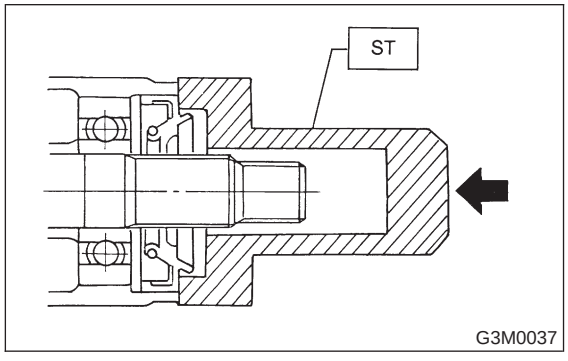
8) Extract companion flange with a puller.



9) Remove oil seal using ST.
ST 398527700 PULLER ASSY



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

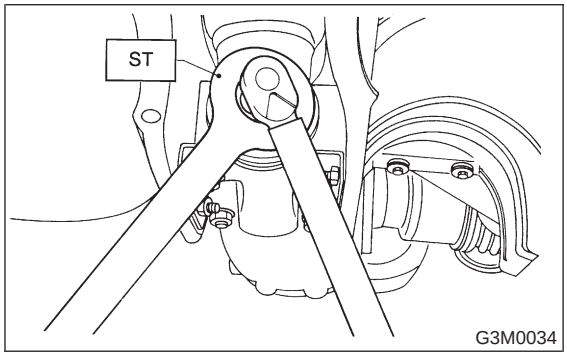


11) Install companion flange.

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.

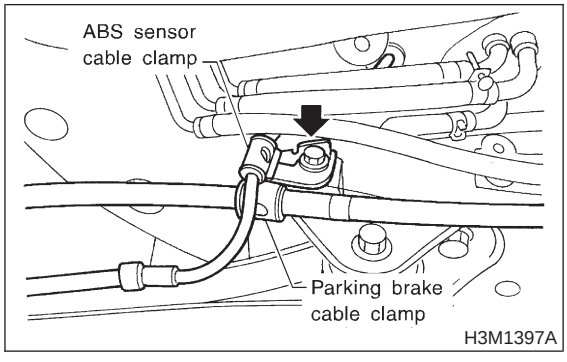
Tightening torque:
188±26 N·m (19.2±2.7 kg-m, 139±20 ft-lb)



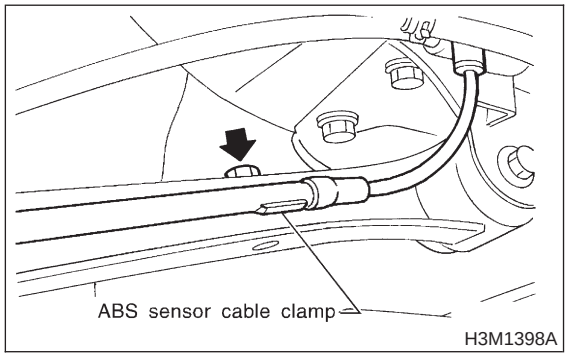
13) Reassembling procedure hereafter is the reverse of the disassembling.

2. SIDE OIL SEAL

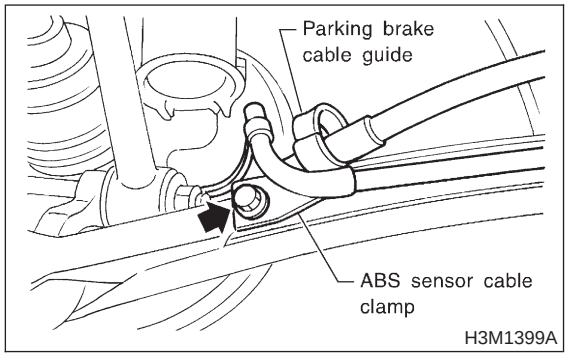
1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen both wheel nuts.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove wheels.
7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W4A0].>
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.



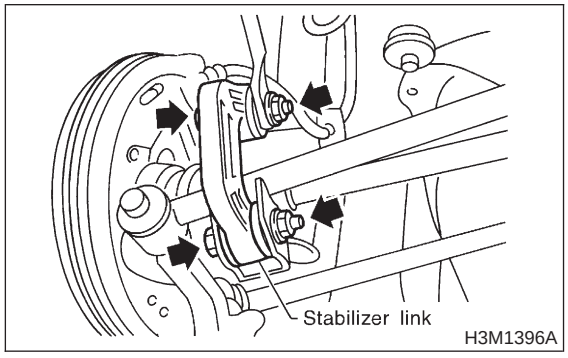
(2) Remove the ABS sensor cable clamp from the trailing link.



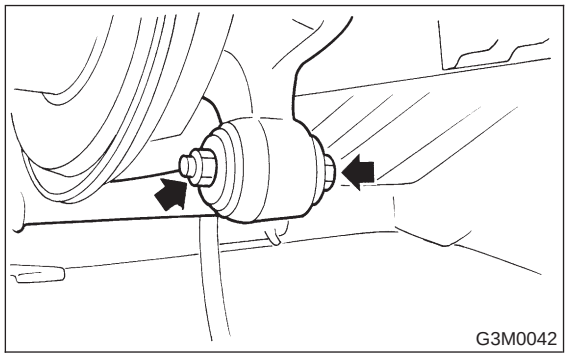
(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



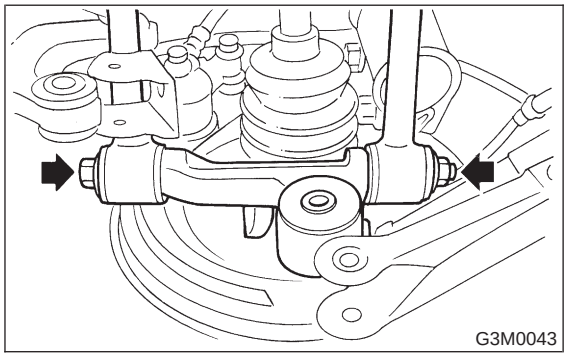
(4) Remove the rear stabilizer link.



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



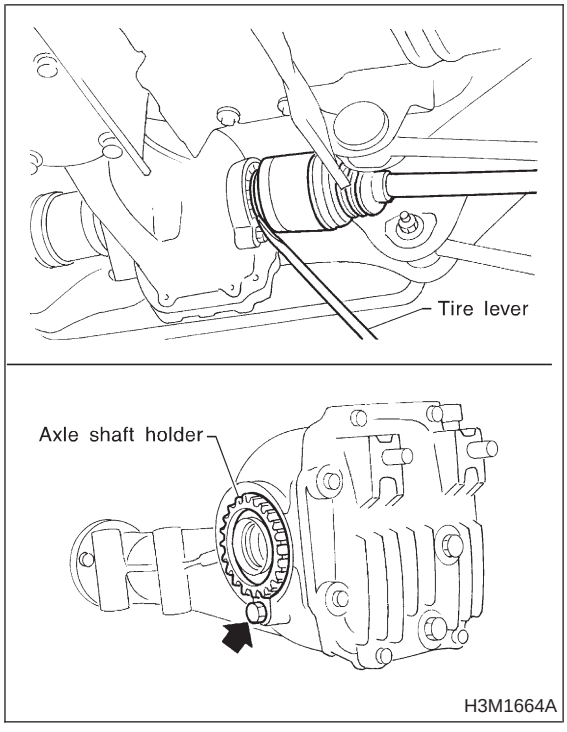
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.



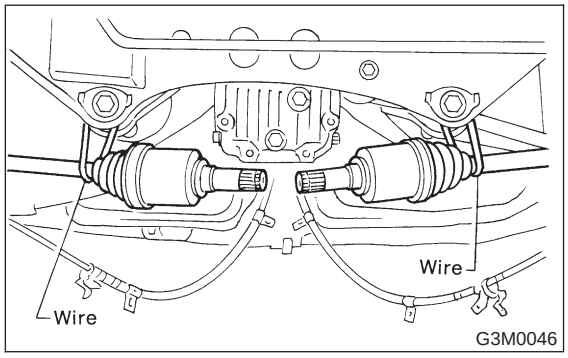
(7) Remove the DOJ from the rear differential with tire lever.

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

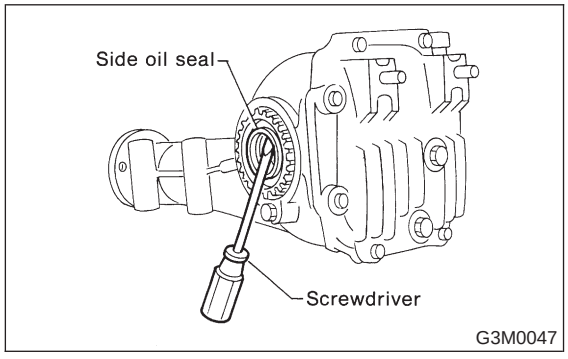
NOTE:
The side spline shaft circlip comes out together with the shaft.



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



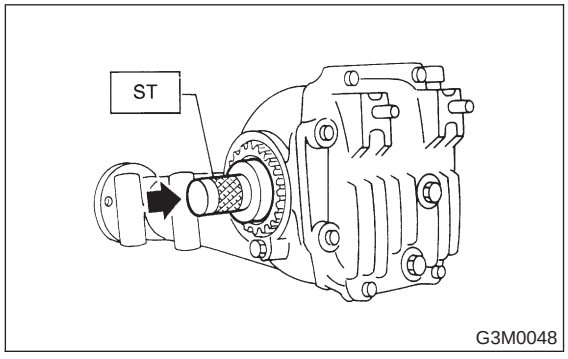
10) Remove oil seal with screwdriver.



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

CAUTION:
Apply chassis grease between the oil seal lips.

ST 498447100 OIL SEAL INSTALLER

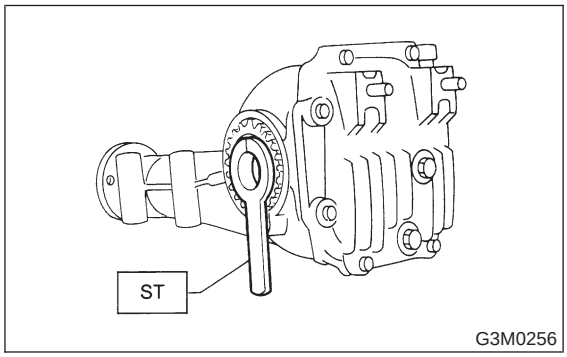


12) Insert the DOJ into rear differential.

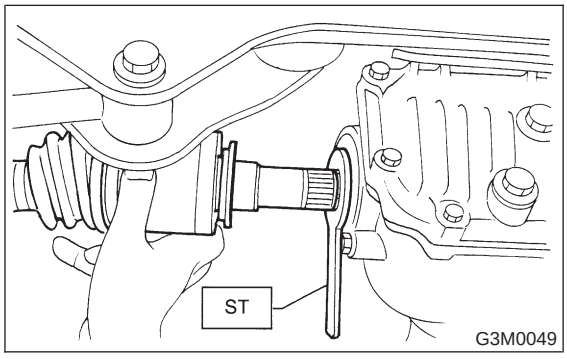
CAUTION:
Before inserting, replace the circlip at the end of the spline shaft with a new one.

(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.

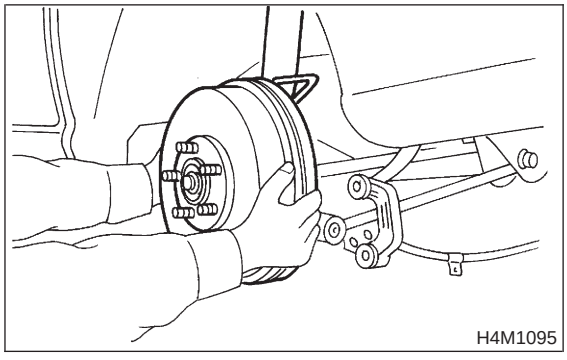


(3) Remove ST.

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.

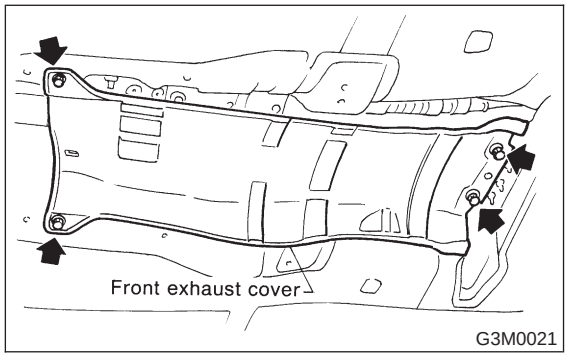


13) Hereafter, re-assemble in reverse order of disassembly.

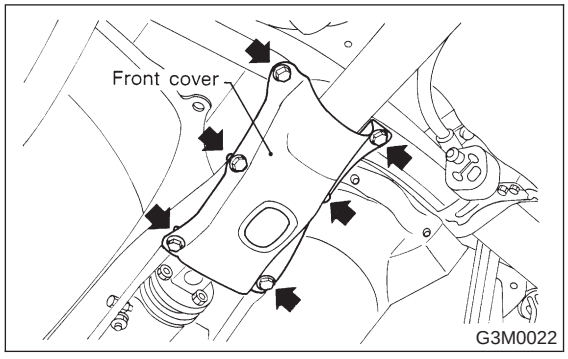
B: REMOVAL

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 [W3A0].> and <Ref. to 2-9 [W4A0].>
8) Remove front exhaust cover.



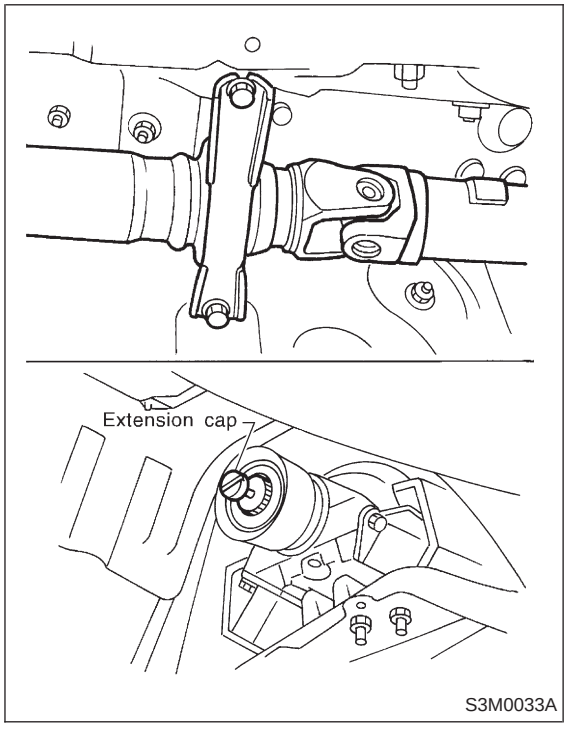
9) Remove front cover of rear differential mount.



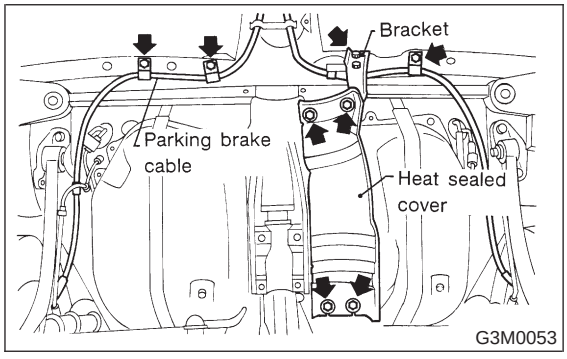
10) Remove propeller shaft.

CAUTION:
When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

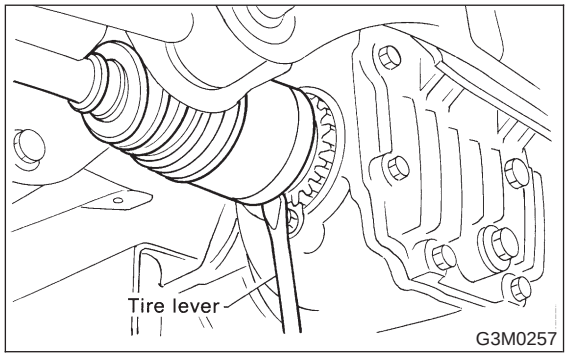
NOTE:
● Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
● Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.



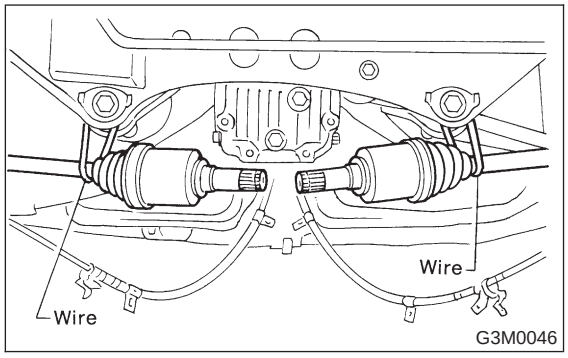
11) Remove heat sealed cover.
12) Remove clamps and bracket of parking brake cable.



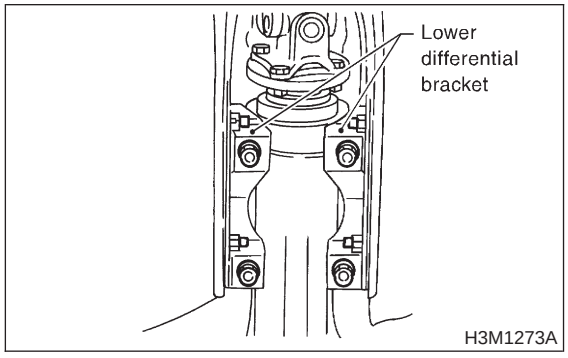
13) Remove DOJ of rear drive shaft from rear differential. <Ref. to 3-4 [W2A2].>



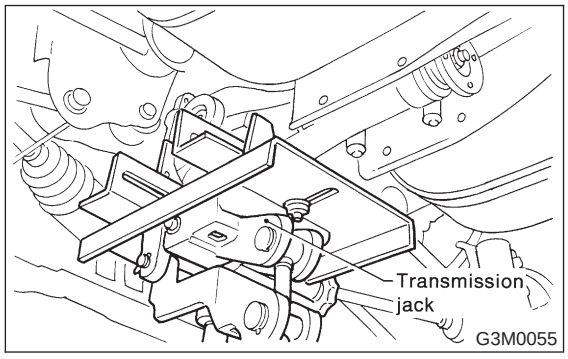
14) Secure rear drive shaft to rear crossmember using wire.



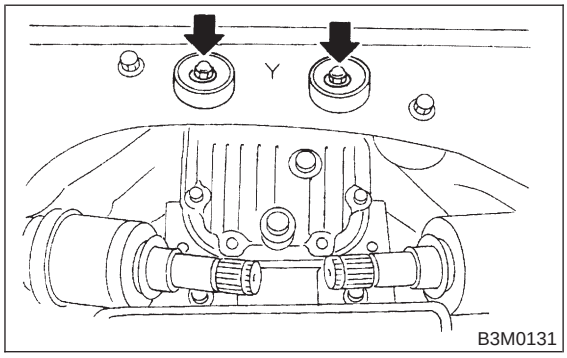
15) Remove lower differential bracket.



16) Support rear differential with transmission jack.

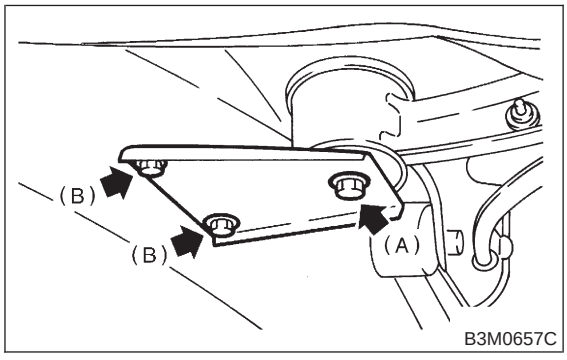


17) Remove self-locking nuts connecting rear differential to rear crossmember.



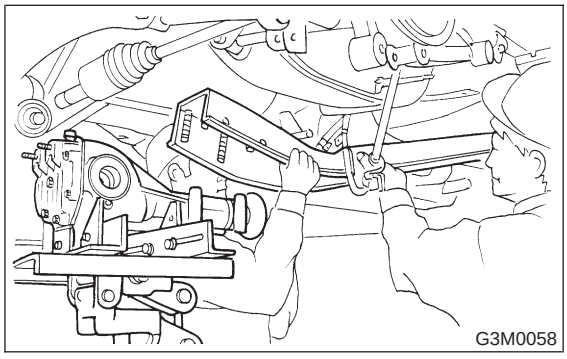
18) Remove bolts which secure rear differential front member to body. Loosen bolt A first, then removal bolts B .

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

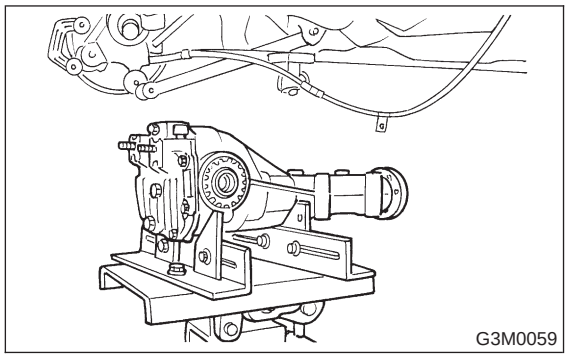


(A) Bolt A
(B) Bolt B

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



22) Remove rear differential from body.

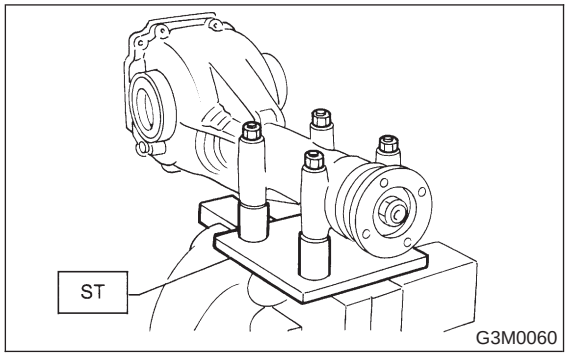


C: DISASSEMBLY

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

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

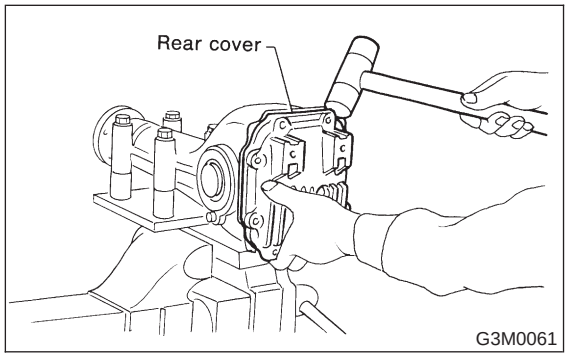
1) Set ST on vise and install the differential assembly to ST.



ST 398217700 ATTACHMENT

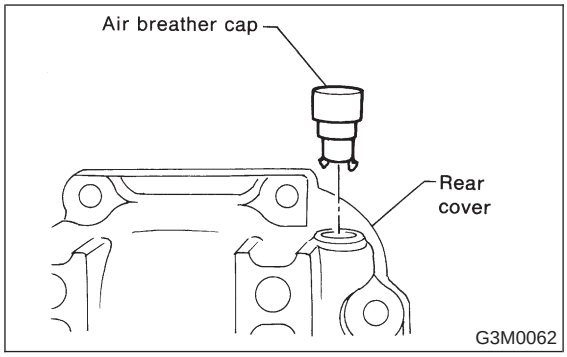
2) Drain gear oil by removing plug.

3) Remove rear cover by loosening retaining bolts.

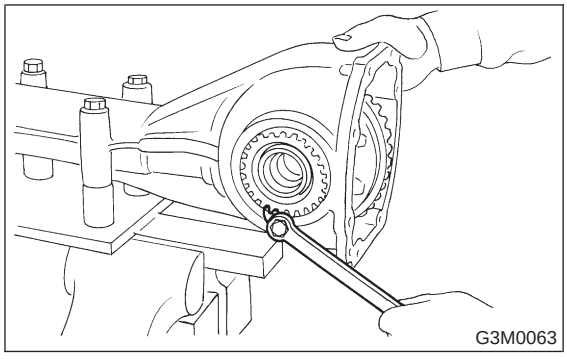


4) Replace air breather cap.

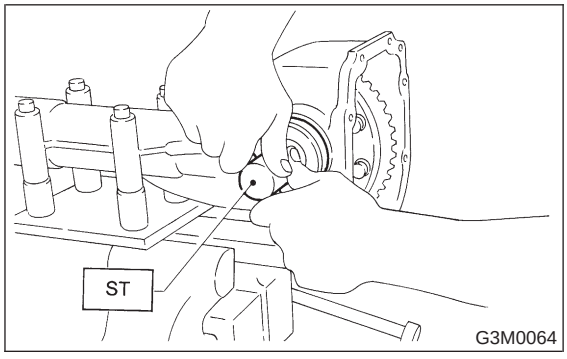
NOTE:
Do not attempt to replace the air breather cap unless necessary.



5) Remove right and left lock plates.

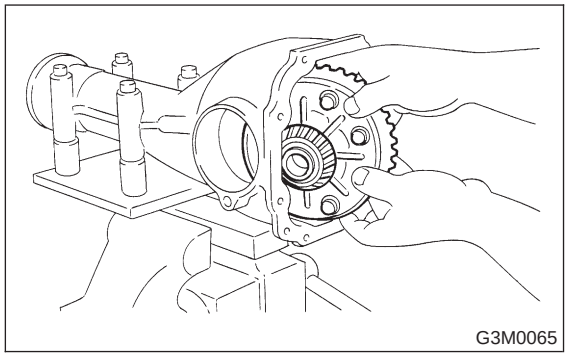


6) Remove right and left holders with ST.
ST 399780111 WRENCH



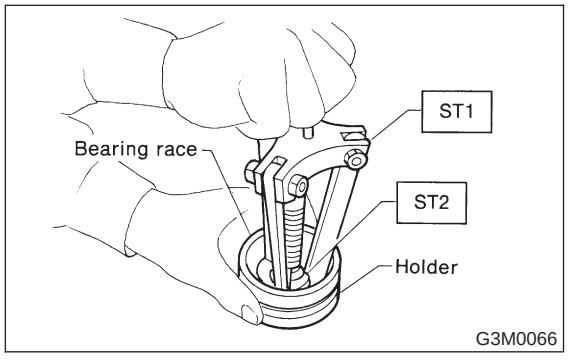
7) Pull out differential assembly from differential carrier.

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



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

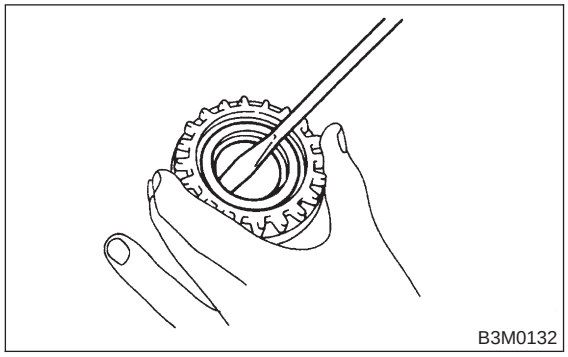
ST1 499705401 BEARING OUTER RACE PULLER ASSY
ST2 499705404 OUTER RACE PULLER SEAT



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

CAUTION:
Perform this operation only when changing oil seal.

ST 899580100 INSTALLER

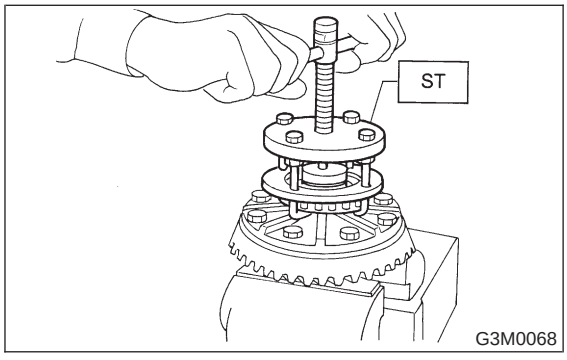


10) Extract bearing cone with ST.

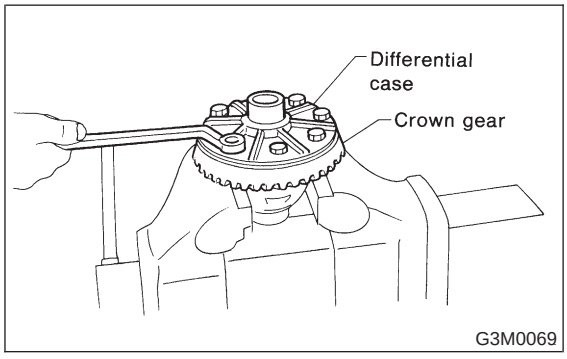
CAUTION:
Do not attempt to disassemble the parts unless necessary.

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



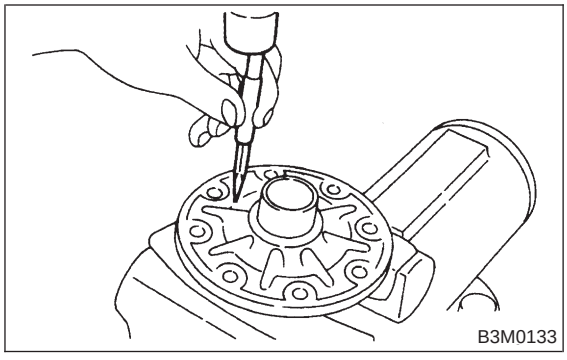
11) Remove crown gear by loosening crown gear bolts.



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

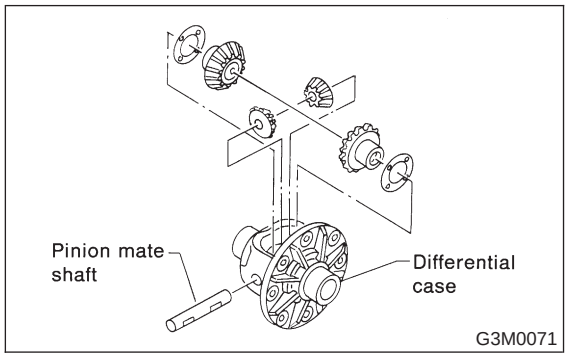
NOTE:
The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER

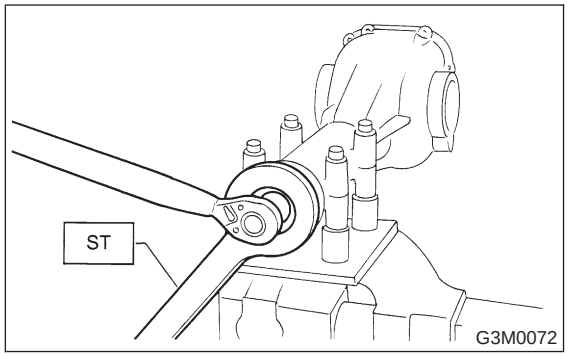


13) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

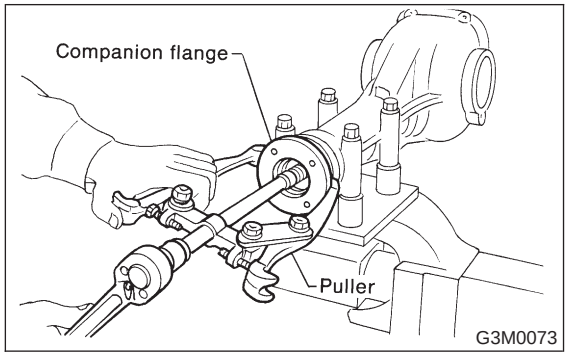
NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.



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



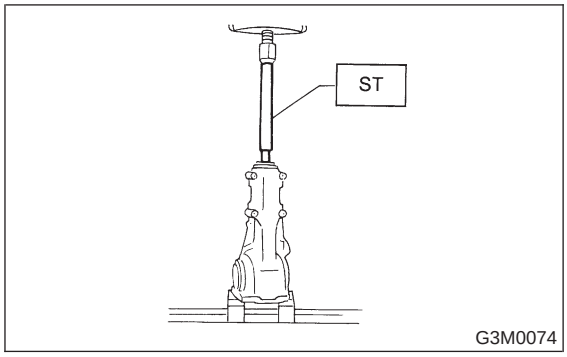
15) Extract the companion flange with a puller.



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.

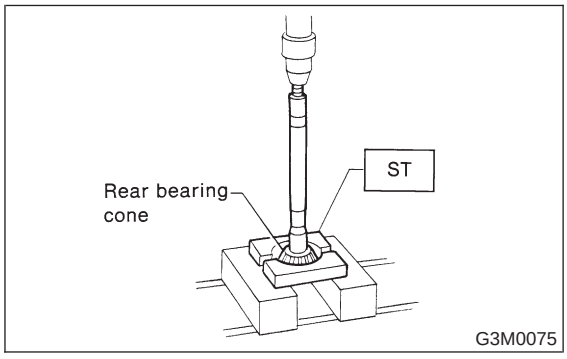
ST 398467700 DRIFT



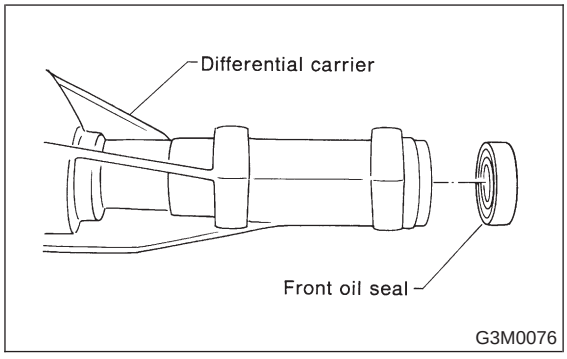
17) Remove rear bearing cone from drive pinion by supporting cone with ST.

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

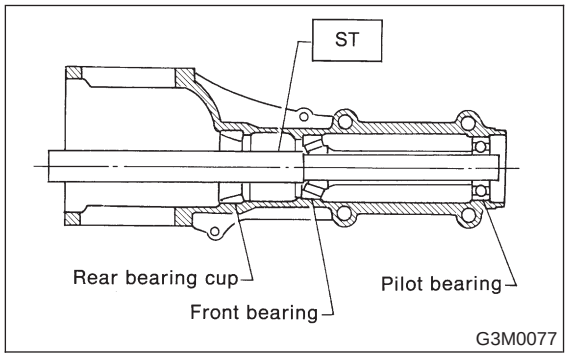
ST 498515500 REPLACER



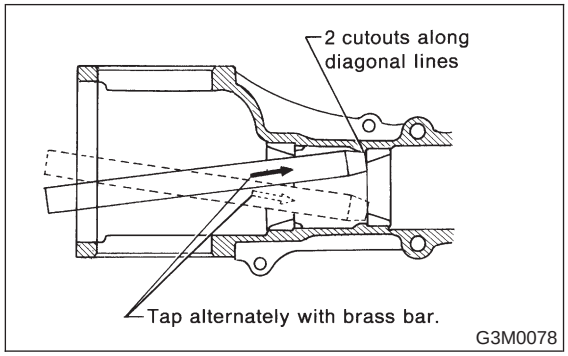
18) Remove front oil seal from differential carrier.



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.



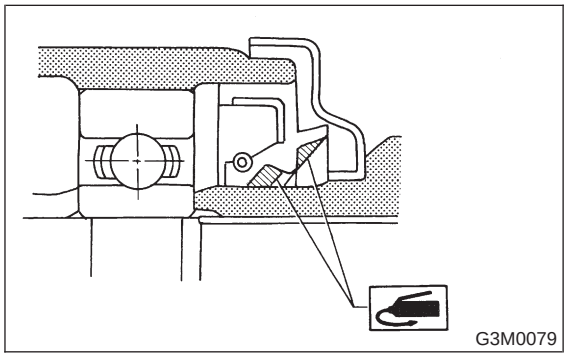
D: INSPECTION

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

E: ASSEMBLY

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



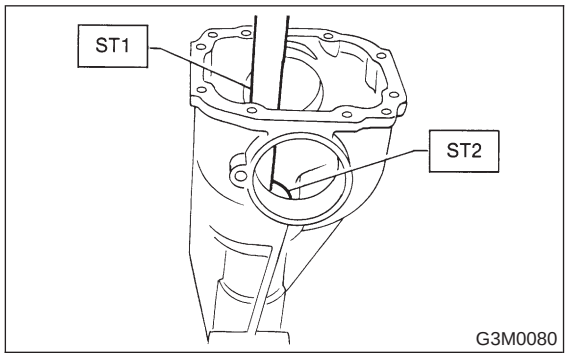
2) Adjust preload for front and rear bearings.
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

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

ST1 398477701 HANDLE
ST2 398477702 DRIFT

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

ST1 398477701 HANDLE
ST2 498447110 DRIFT



(3) Insert front bearing cone.

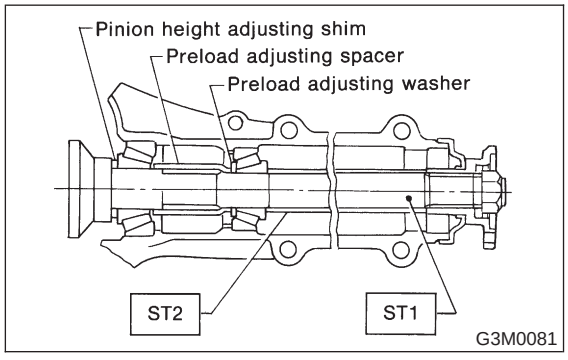
CAUTION:
Use a new front bearing cone.

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

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

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

ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR

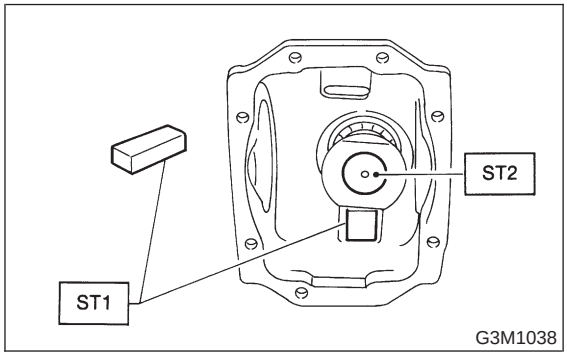


(6) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

ST1 398507704 BLOCK
ST2 498447150 DUMMY SHAFT

CAUTION:
Use a new lock nut.

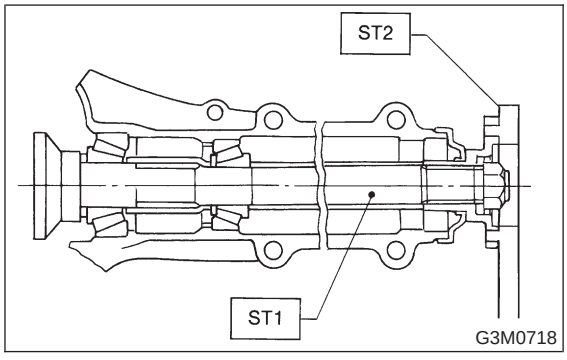
NOTE:
- Be careful not to give excessive preload.



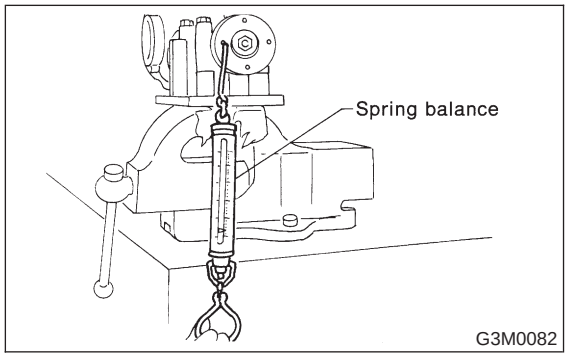
- When tightening the drive pinion nut, lock ST1 with ST2 as illustrated here.

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



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

3) Adjusting drive pinion height

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

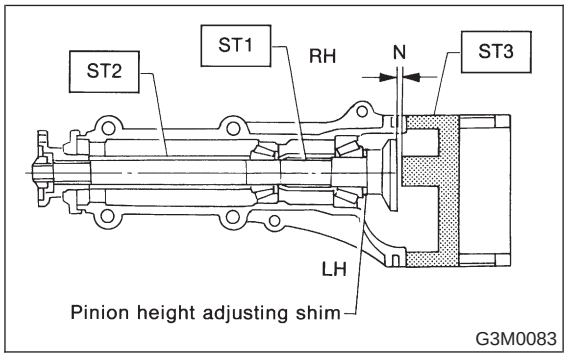
(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

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

Adjust preload for front and rear bearings.

NOTE:
At this time, install an original pinion height adjusting shim.

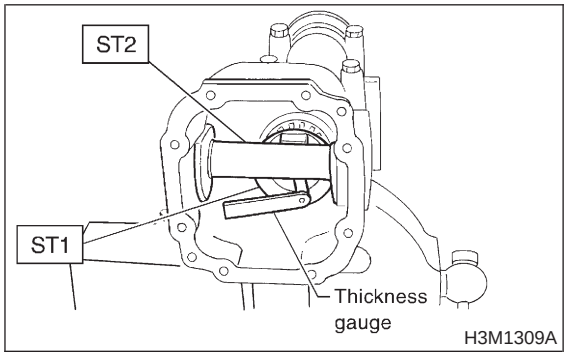
ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR
ST3 498505501 DIFFERENTIAL CARRIER GAUGE



(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



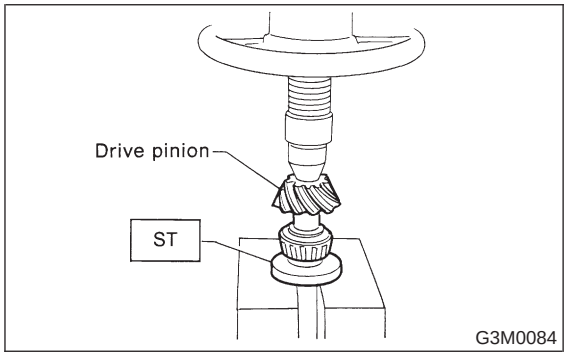
(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed shim with this one.

NOTE:

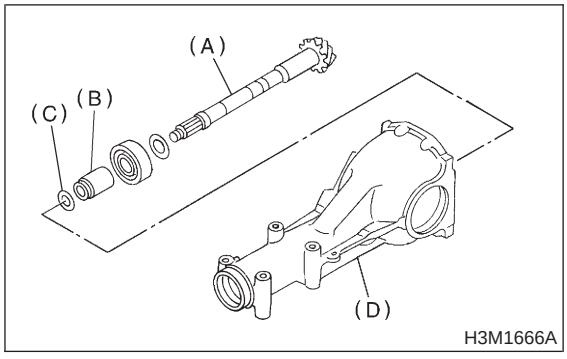
Use 1 to 3 shims as required for adjustment.
T = To + N − 0.05 (mm)
where
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim originally installed (mm)
N = Reading of thickness gauge (mm)
(Example of calculation)
To = 0.15 mm
N = 0.1 mm
T = 0.15 + 0.1 − 0.05 = 0.2 mm
Result: Thickness = 0.2 mm
Therefore use the 32295AA220.

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

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

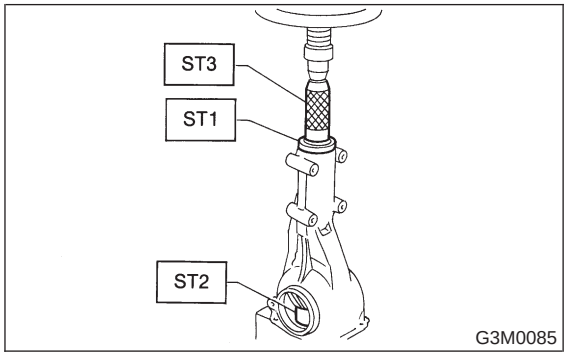


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

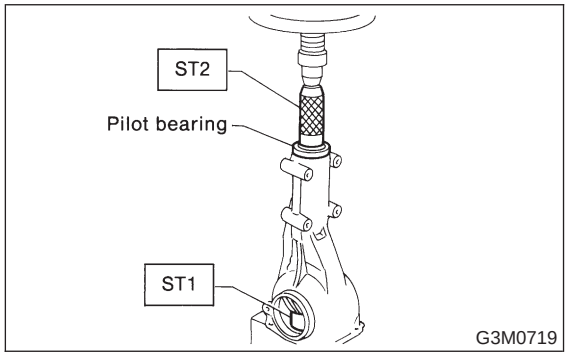


(A) Drive pinion
(B) Adjusting spacer
(C) Washer
(D) Differential carrier

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



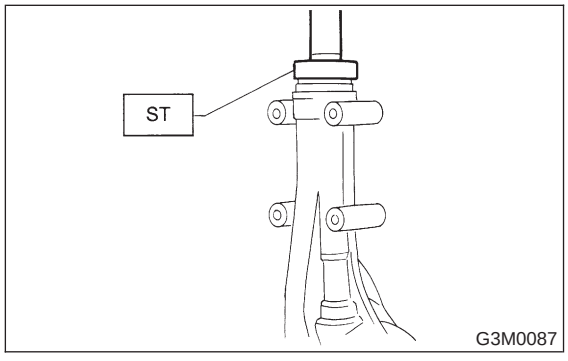
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



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.

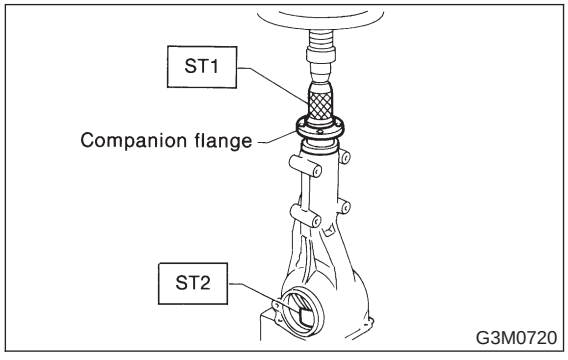
ST 498447120 OIL SEAL INSTALLER



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

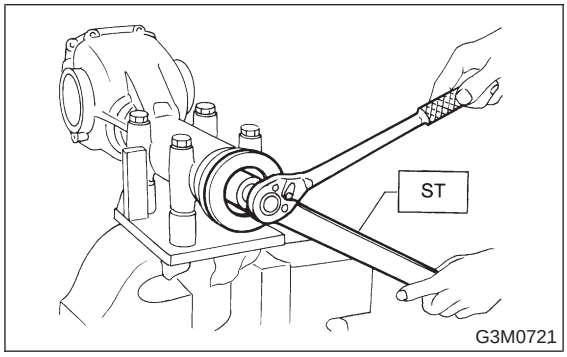
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



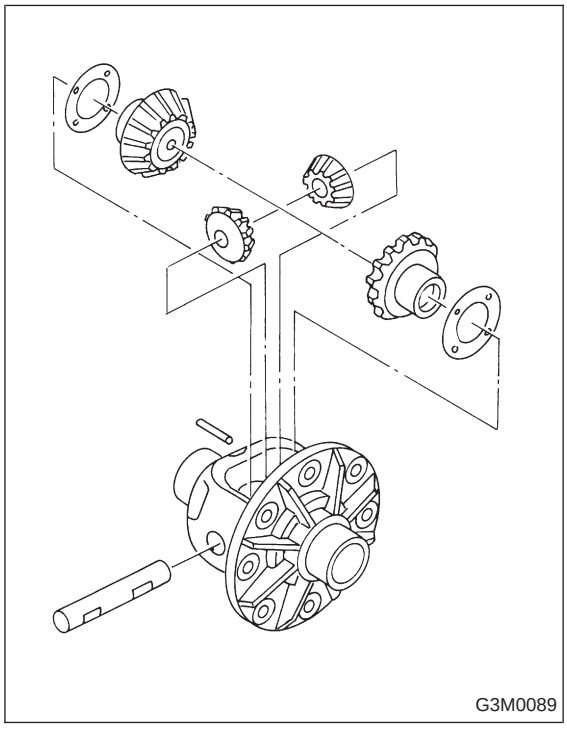
10) Install self-locking nut. Then tighten self-locking nut with ST.
ST 398427700 FLANGE WRENCH

Tightening torque:
188±26 N·m (19.2±2.7 kg-m, 139±20 ft-lb)



11) Assembling differential case
(1) 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.



(2) Measure the clearance between differential case and the back of side gear.
(3) Adjust the clearance as specified by selecting side gear thrust washer.

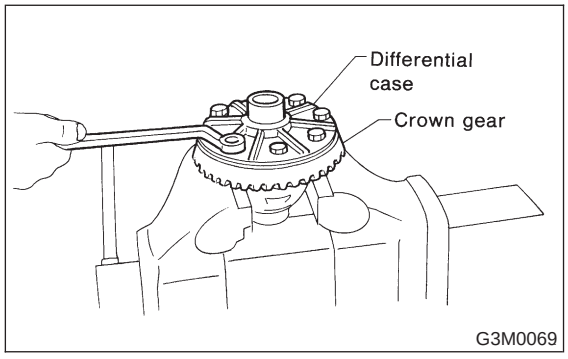
Side gear backlash:
0.05 — 0.15 mm (0.0020 — 0.0059 in)

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

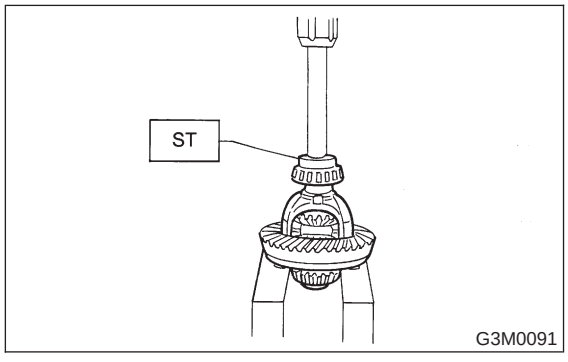
(4) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(5) After driving in pinion shaft lock pin, stake the both sides of the hole to prevent pin from falling off.
(6) Install crown gear on differential case.

NOTE:
Tighten diagonally while tapping the bolt heads.

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

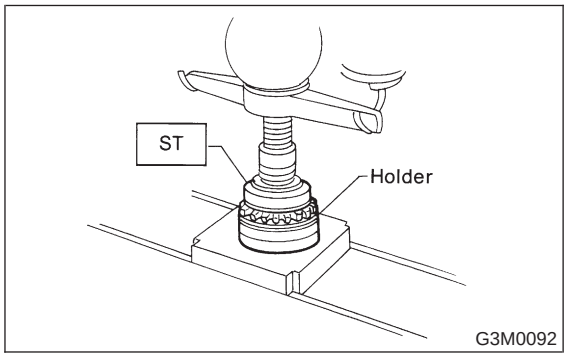


12) Press side bearing cone onto differential case with ST.
ST 498485400 DRIFT

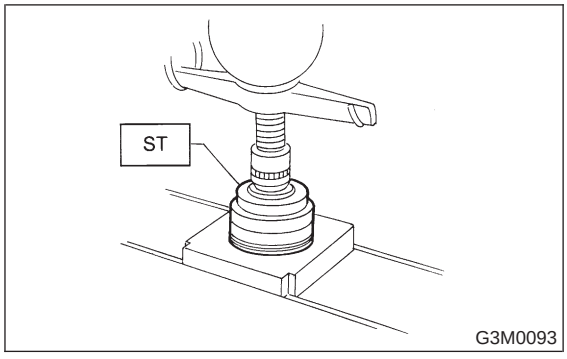


13) Assemble holders.

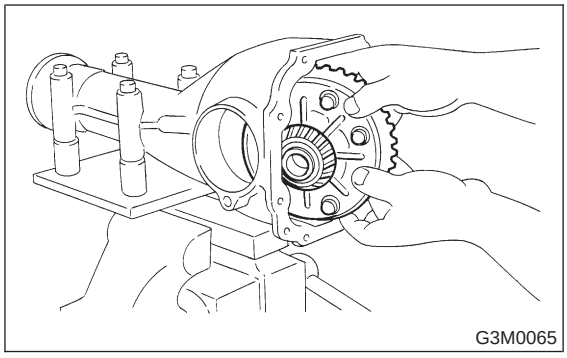
(1) Install oil seal into right and left holders.
ST 498447100 AXLE SHAFT OIL SEAL INSTALLER



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



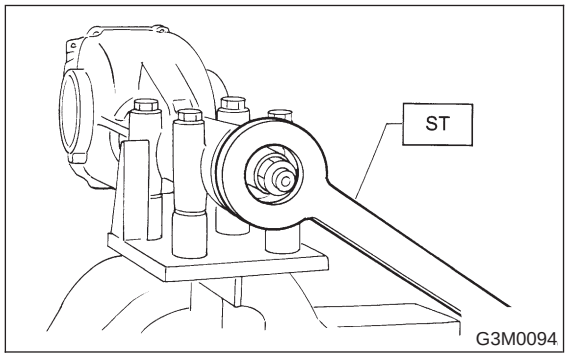
(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.



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

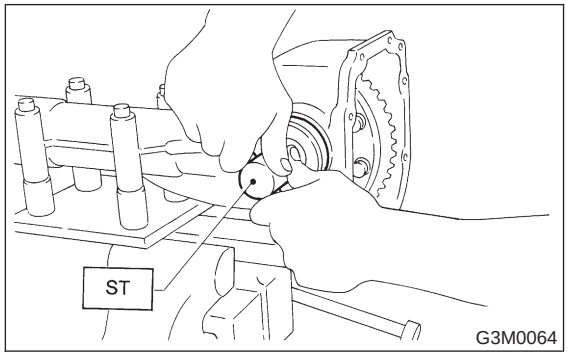
(1) Turn drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



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

ST 399780111 WRENCH

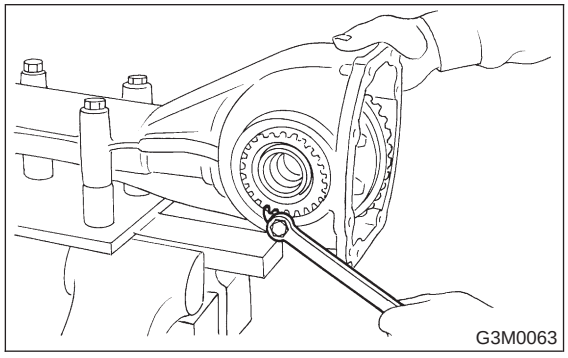


(3) Back off side (left-side) holder approximately 1 1/2 teeth of holder, and tighten left-side holder by approximately 2 teeth (approximately 1 1/2 + 1/2 teeth). [Back off amount of side (left-side) holder + 1/2 tooth].

This + 1/2 tooth gives preload.

(4) Temporarily tighten lock plate.

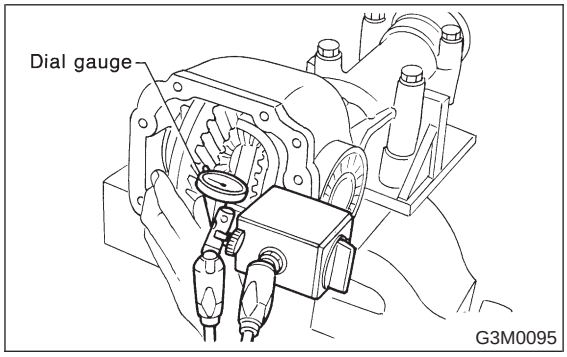
NOTE:
Turn over lock plate to displace holder 1/2 tooth.



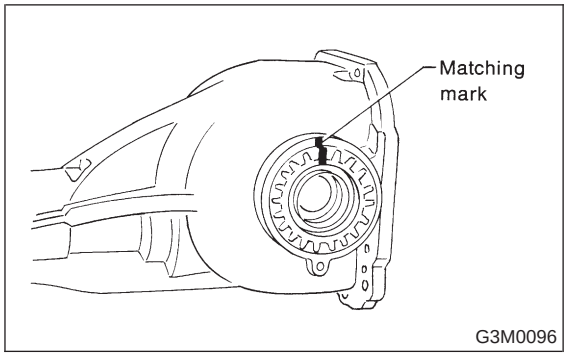
(5) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

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

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

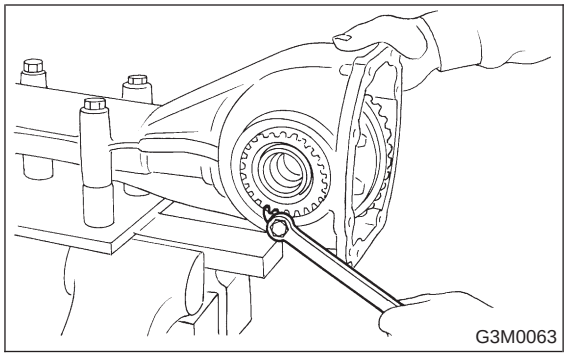


15) Draw a matching mark on both differential carrier and holder. Remove holder one side at a time. Replace in the original position after inserting an O-ring and applying grease to threaded portion.



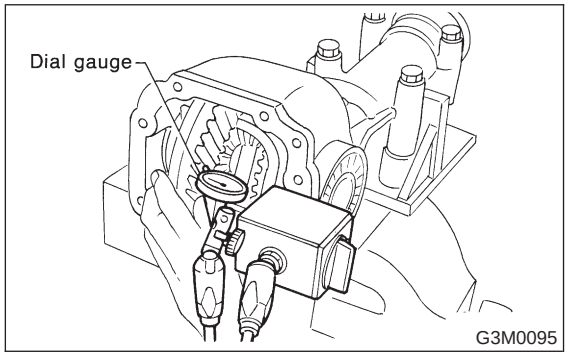
16) Tighten bolt of lock plate to specified torque.

Tightening torque:
25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)



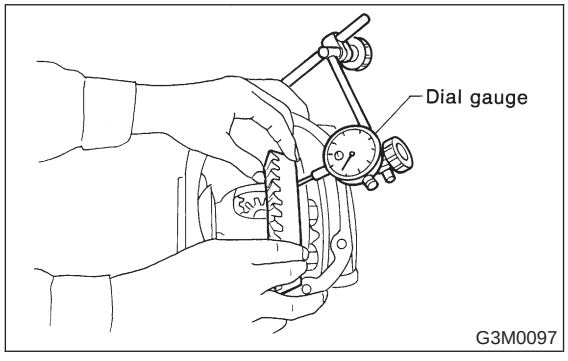
17) Re-check crown gear-to-pinion backlash.

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



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

Limit of runout:
0.05 mm (0.0020 in)

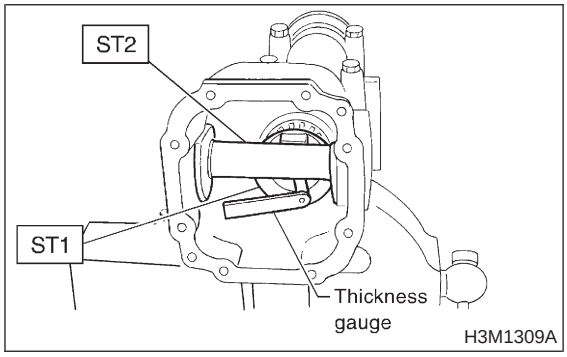


19) Checking and adjusting tooth contact of crown gear.
(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.
(2) When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

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

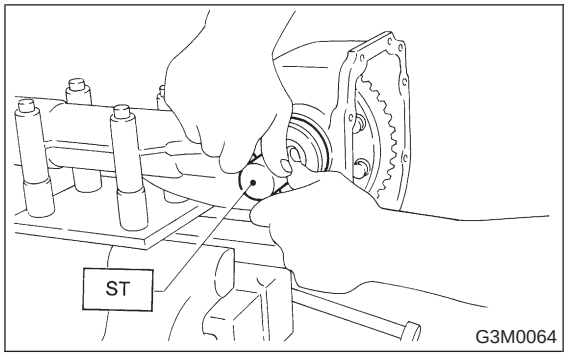
20) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (mentioned above) and the hypoid gear backlash.

(1) Drive pinion height
ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE



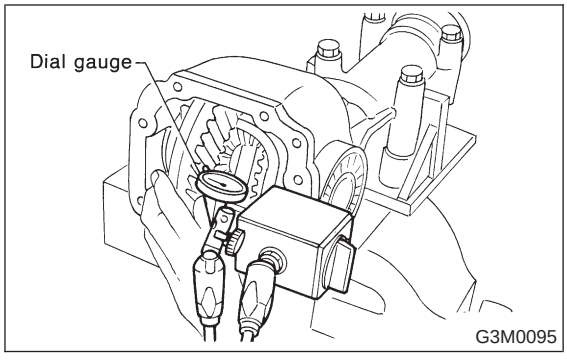
T = To + N − 0.05 (mm)
where
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim originally installed (mm)
N = Reading of thickness gauge (mm)

(2) Differential side bearing preload
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

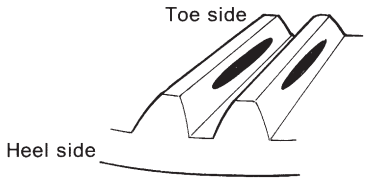
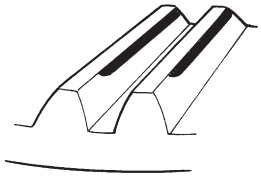
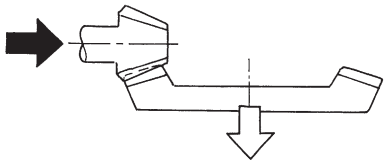
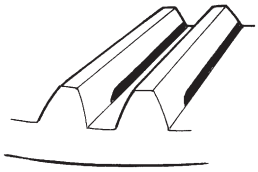
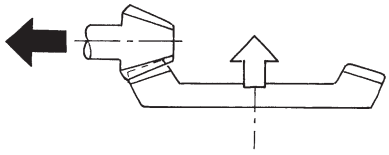
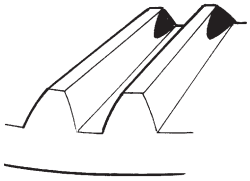
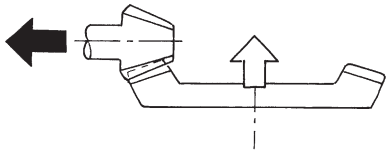
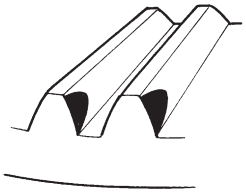
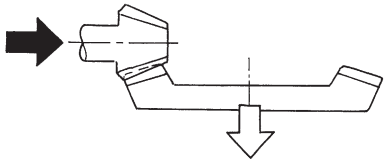


(3) Hypoid gear backlash

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

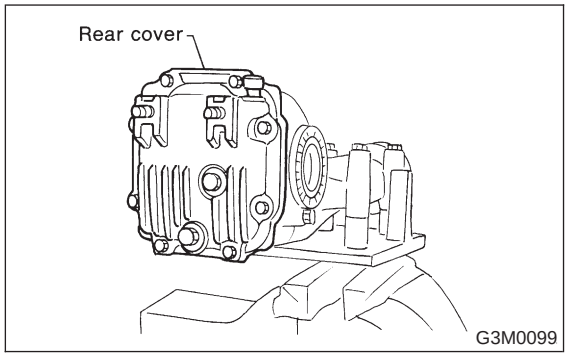


➡ Adjusting direction of drive pinion
⇨ Adjusting direction of crown gear

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

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

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



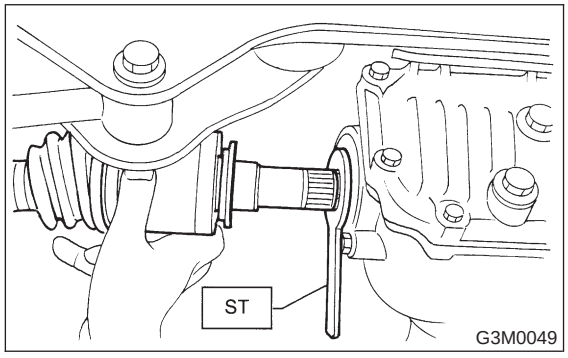
F: INSTALLATION

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

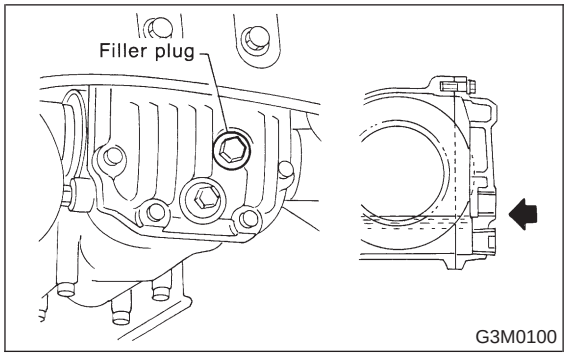


3) Installing procedure hereafter is in the reverse order of removal.

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)

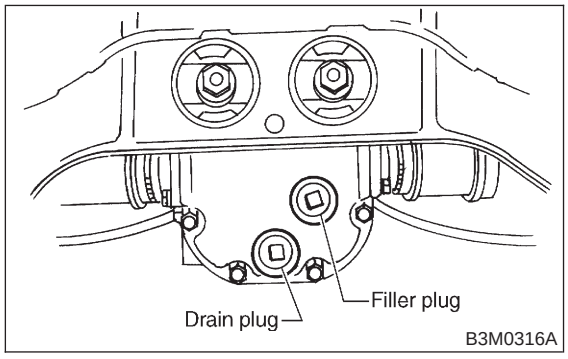


3. Rear Differential (T-Type)

A: ON-CAR SERVICE

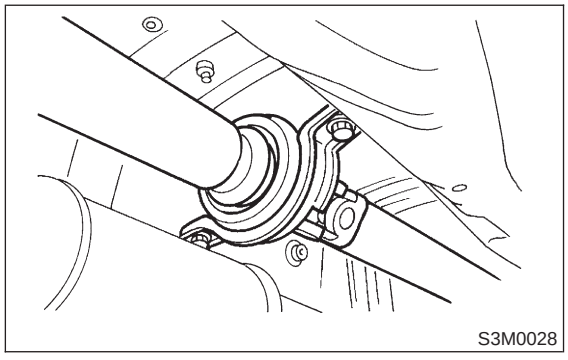
1. FRONT OIL SEAL

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

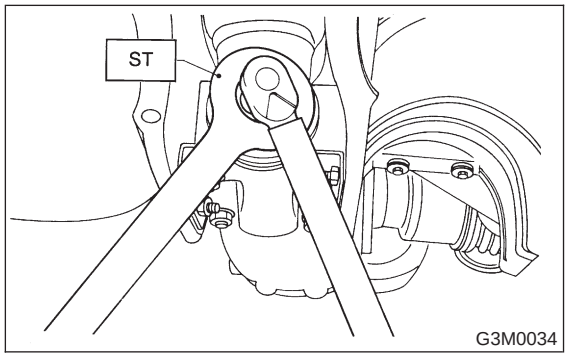


5) Jack-up rear wheels and support the vehicle body with sturdy racks.
6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>

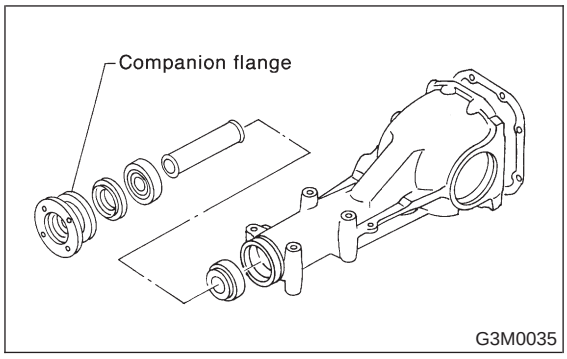
CAUTION:
Wrap metal parts with a cloth or rubber material to prevent damage from adjacent metal parts.



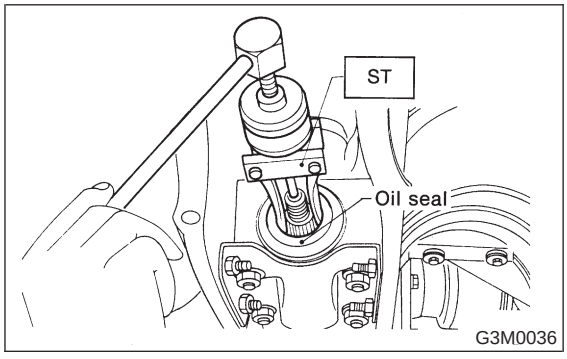
7) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



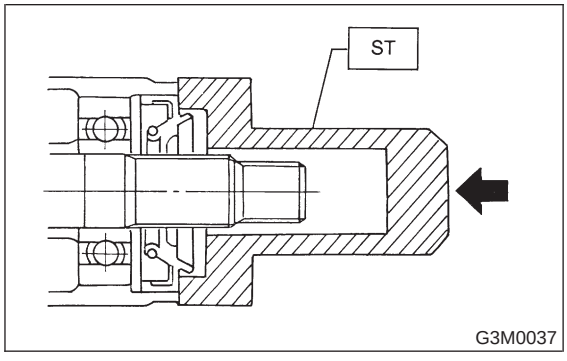
8) Extract companion flange with a puller.



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



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



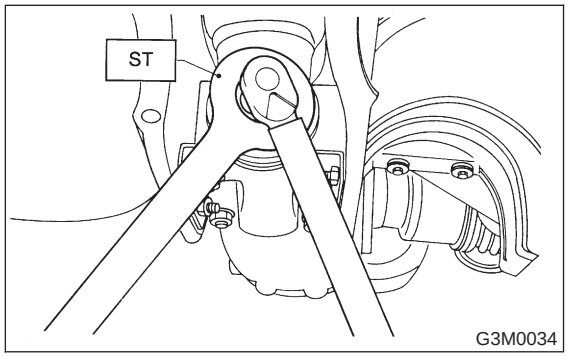
11) Install companion flange.

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.

CAUTION:
Use a new self-locking nut.

ST 498427200 FLANGE WRENCH

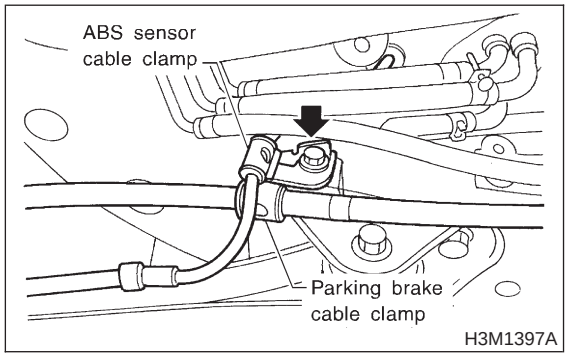
Tightening torque:
181.4±14.7 N·m (18.50±1.50 kg-m, 133.8±10.8 ft-lb)



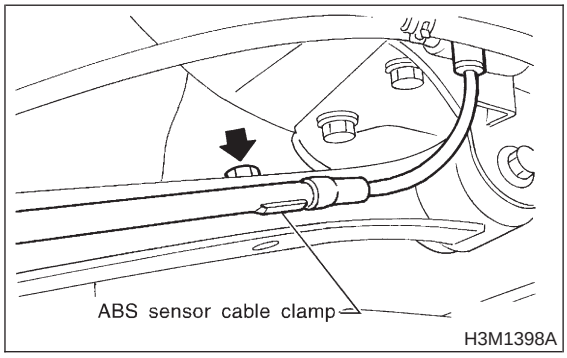
13) Reassembling procedure hereafter is the reverse of the disassembling.

2. SIDE OIL SEAL

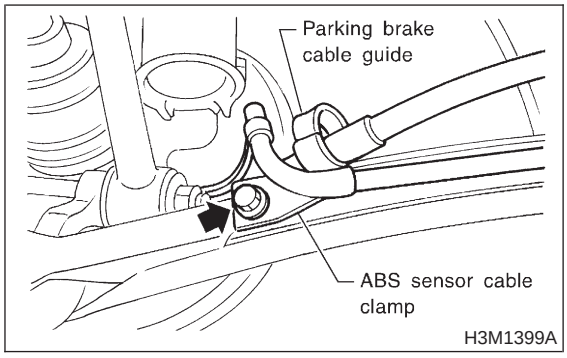
1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen both wheel nuts.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove wheels.
7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].> and <Ref. to 2-9 [W4A0].>
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.



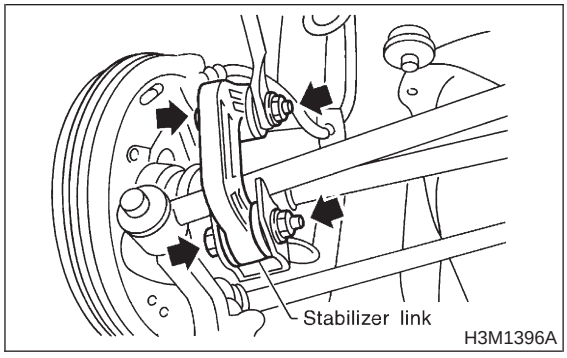
(2) Remove the ABS sensor cable clamp from the trailing link.



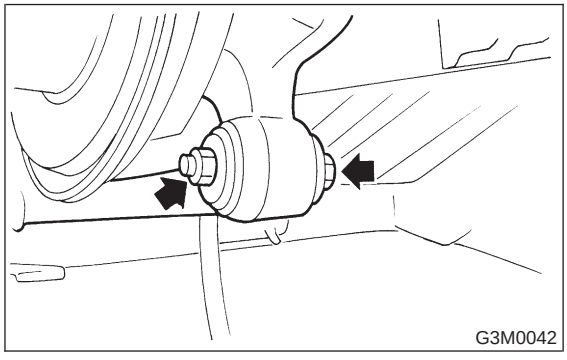
(3) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



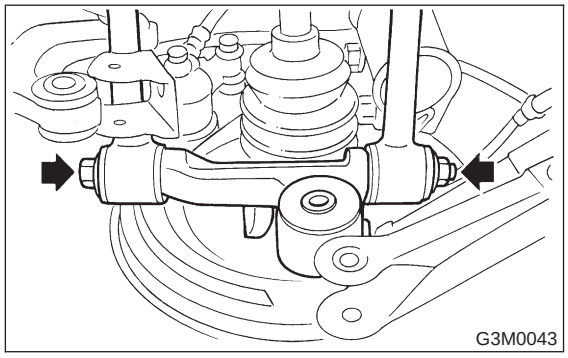
(4) Remove the rear stabilizer link.



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



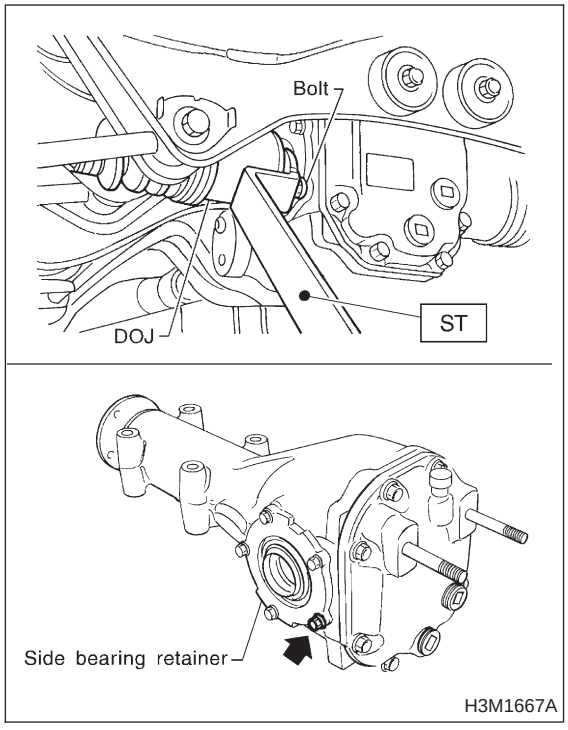
(6) Remove the bolts which secure the front and rear lateral link to the rear housing.



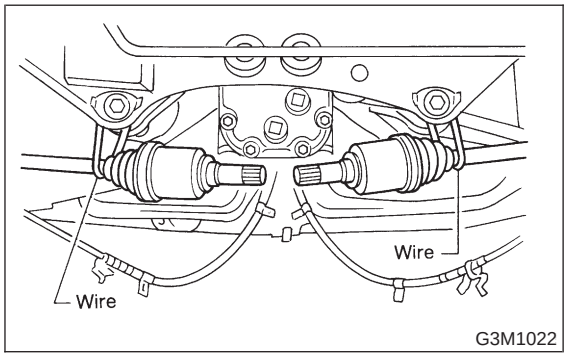
(7) Remove the DOJ from the rear differential by using ST.

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

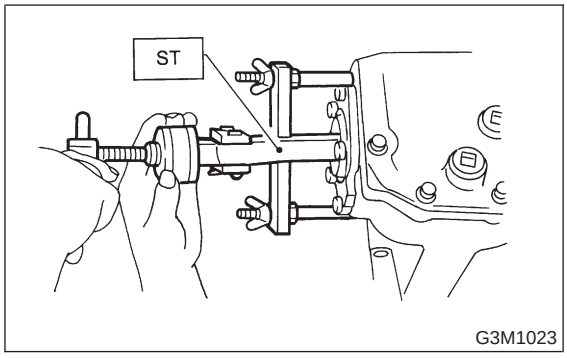
ST 208099PA100 DRIVE SHAFT REMOVER



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



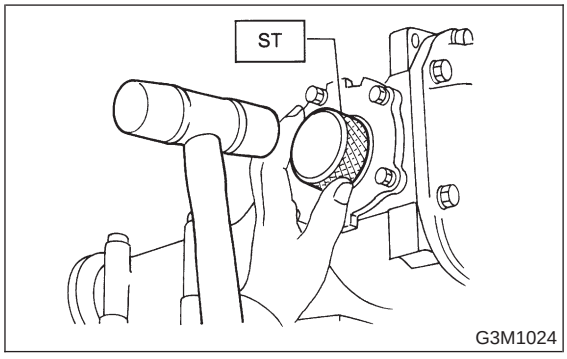
10) Remove side oil seal with ST.
ST 398527700 PULLER ASSY



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

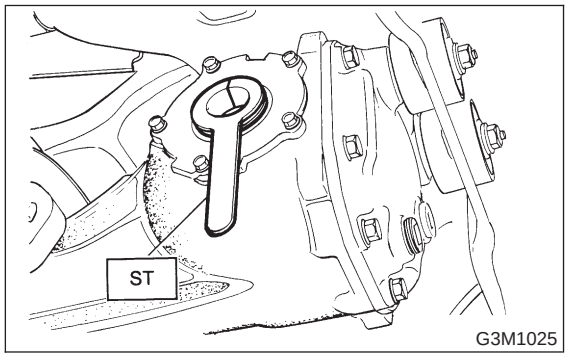
CAUTION:
Apply chassis grease between the oil seal lips.

ST 398437700 DRIFT

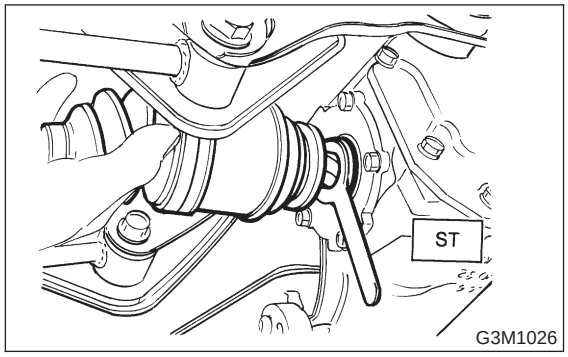


12) Insert the DOJ into rear differential.

(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 using ST.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



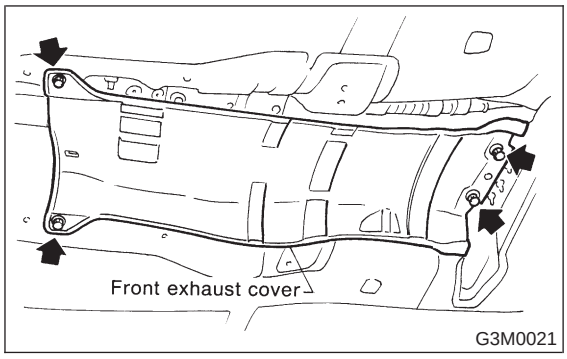
(3) Remove ST.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

13) Hereafter, re-assemble in reverse order of disassembly.

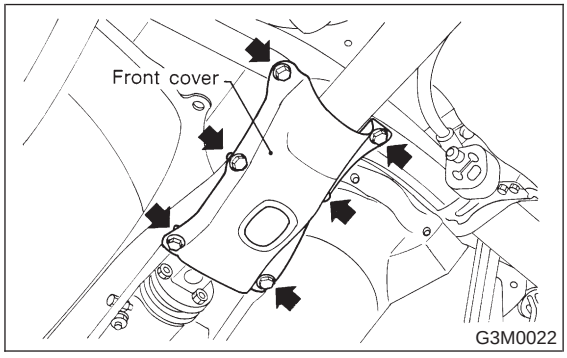
B: REMOVAL

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 [W3A0].> and <Ref. to 2-9 [W4A0].>

8) Remove front exhaust cover.



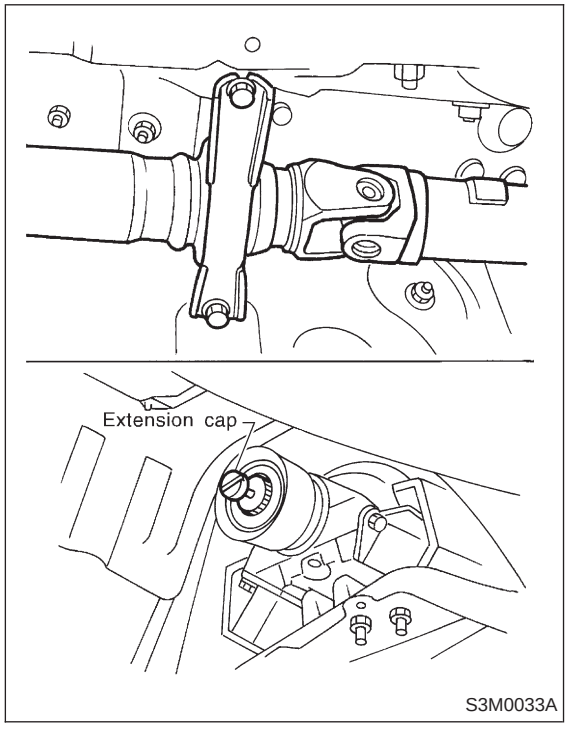
9) Remove front cover of rear differential mount.



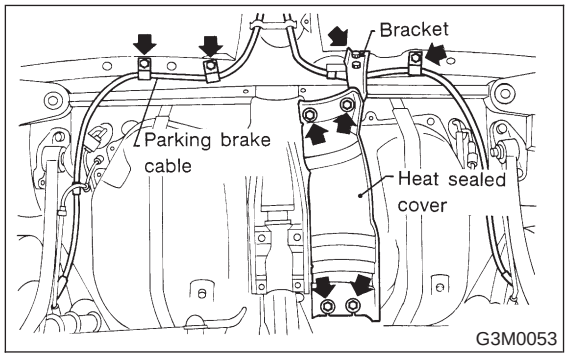
10) Remove propeller shaft.

CAUTION:
When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

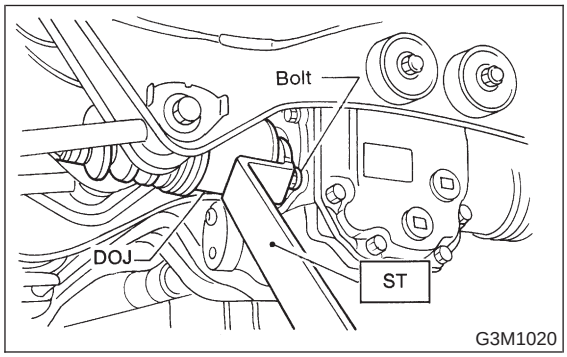
NOTE:
● Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
● Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.



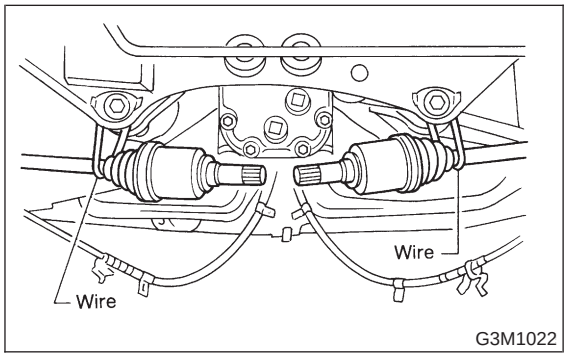
11) Remove heat sealed cover.
12) Remove clamps and bracket of parking brake cable.



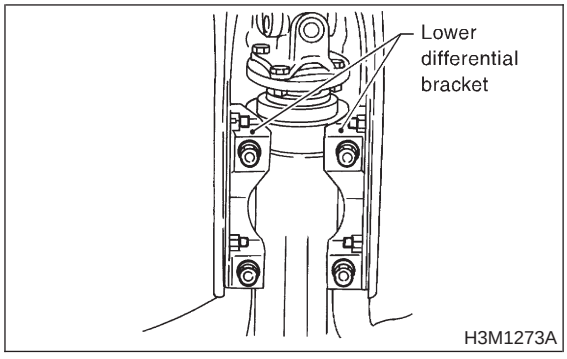
13) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to 3-4 [W3A2].>
ST 28099PA100 DRIVE SHAFT REMOVER



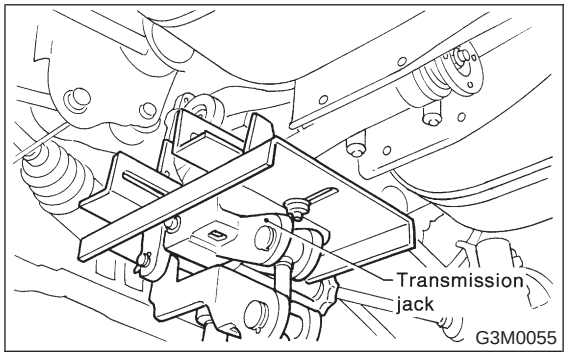
14) Secure rear drive shaft to rear crossmember using wire.



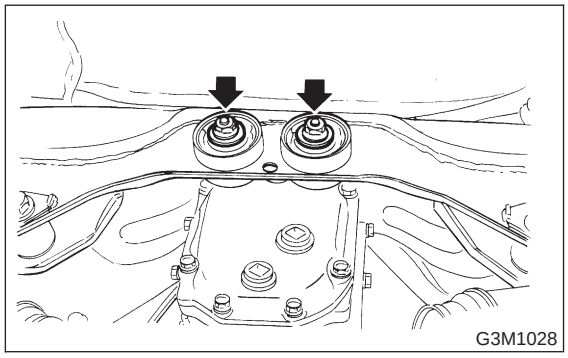
15) Remove lower differential bracket.



16) Support rear differential with transmission jack.

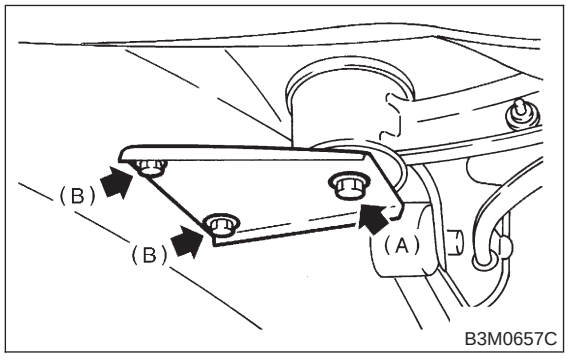


17) Remove self-locking nuts connecting rear differential to rear crossmember.


G3M1028

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

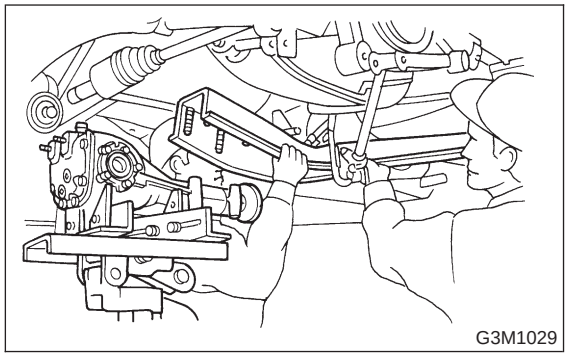
NOTE:
Support front member with the use of a helper to prevent it from dropping.



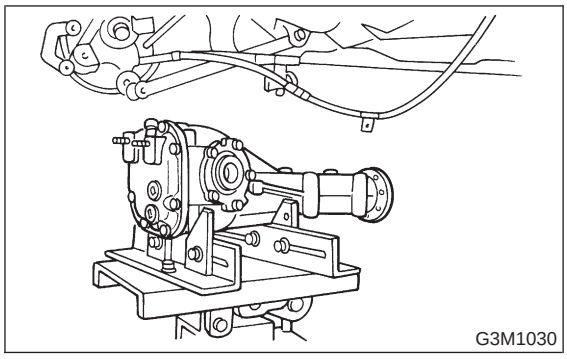
B3M0657C

(A) Bolt A
(B) Bolt B

19) Remove bolt A.
20) While slowly lowering transmission jack, move rear differential forward and remove front member and rear differential from body.


G3M1029

21) Remove rear differential from front member.

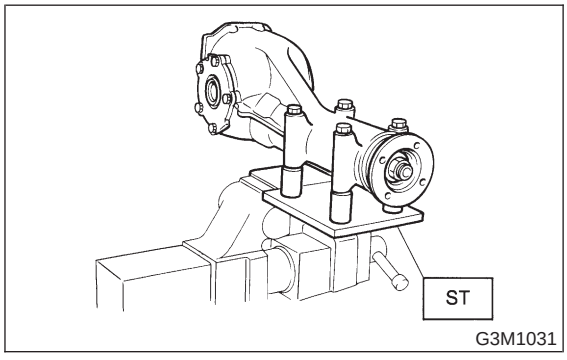

G3M1030

C: DISASSEMBLY

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

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

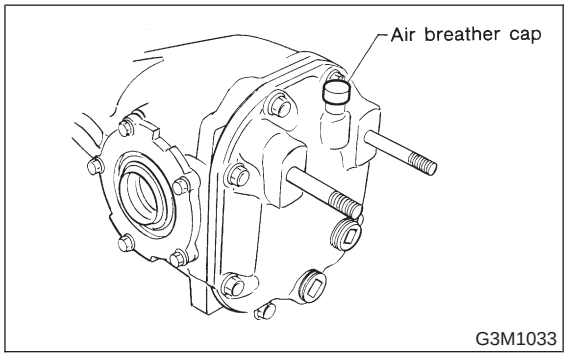
1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT



G3M1031

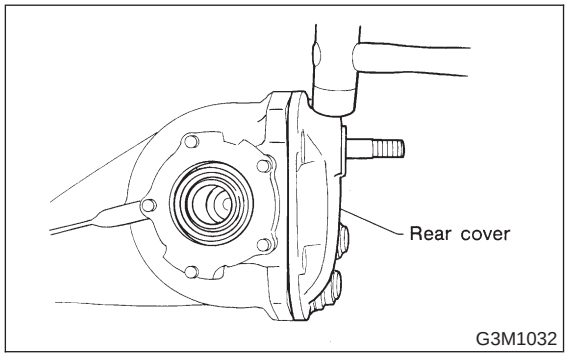
2) Drain gear oil by removing plug.
3) Remove the air breather cap.

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



G3M1033

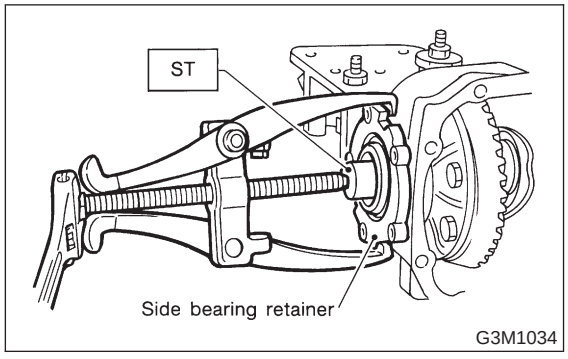
4) Remove rear cover by loosening retaining bolts.



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.

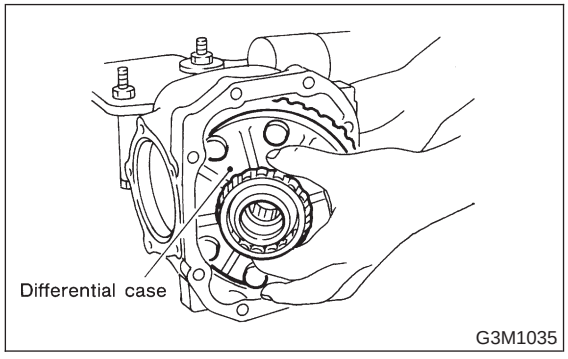
CAUTION:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT

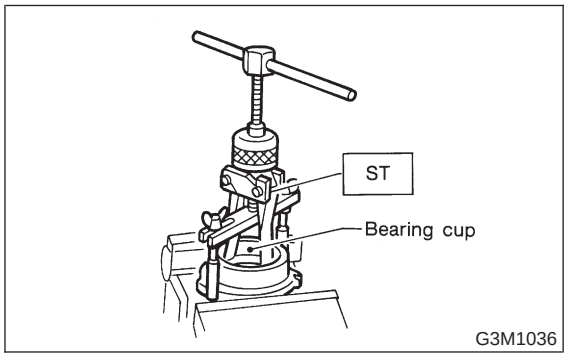


6) Pull out differential assembly from differential carrier.

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

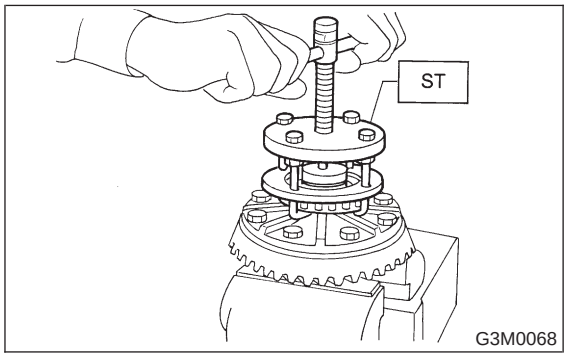


8) Extract bearing cone with ST.

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

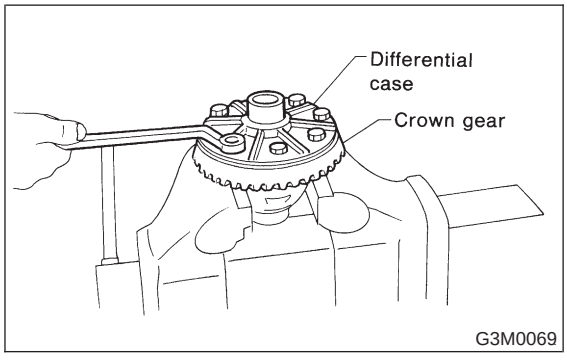
NOTE:
● Set puller so that its claw catch the edge of the bearing cone.
● Never mix up the right and left hand bearing cups and cones.

ST 399527700 PULLER SET



9) Remove crown gear by loosening crown gear bolts.

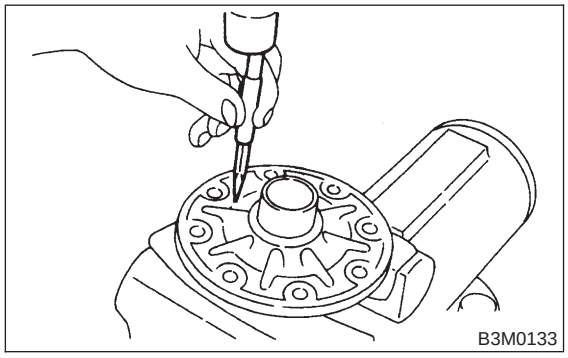
CAUTION:
Further disassembling is not allowed.



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

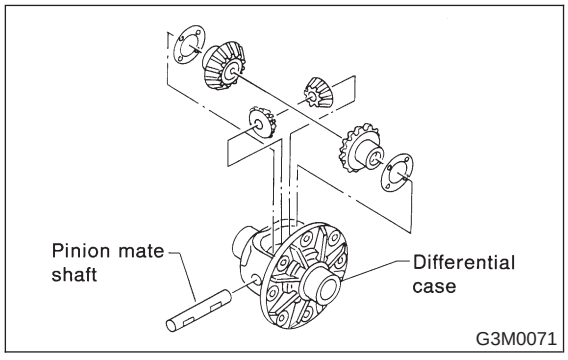
NOTE:
The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER

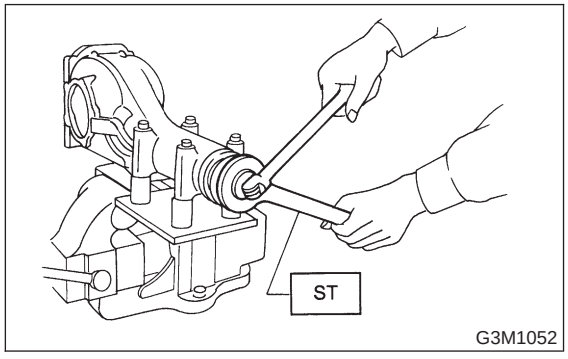


11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

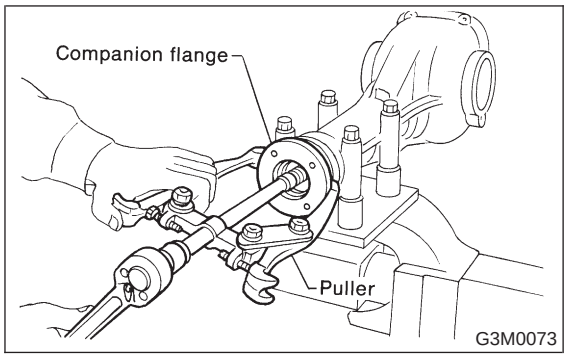
NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.



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



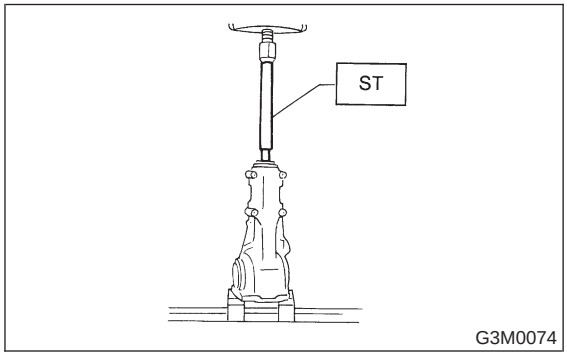
13) Extract the companion flange with a puller.



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.

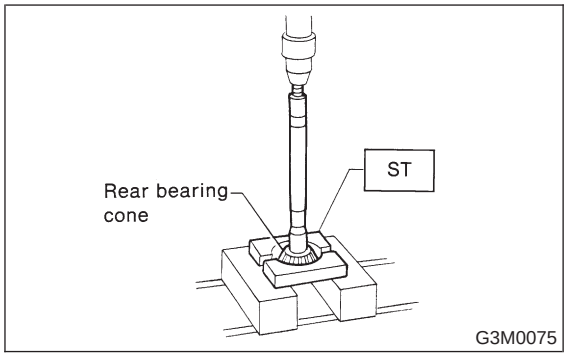
ST 398467700 DRIFT



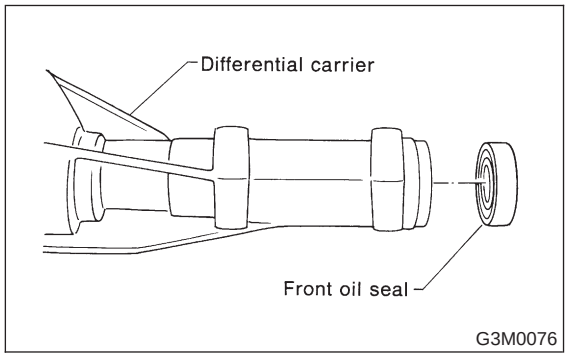
15) Remove rear bearing cone from drive pinion by supporting cone with ST.

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

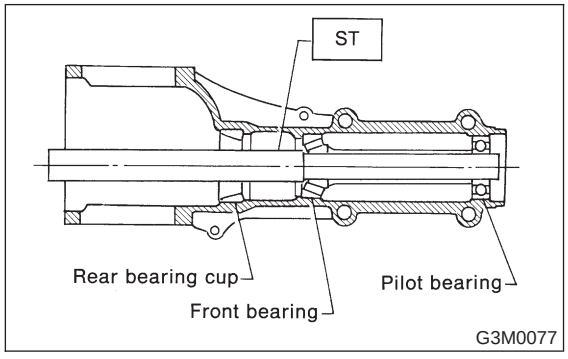
ST 498515500 REPLACER



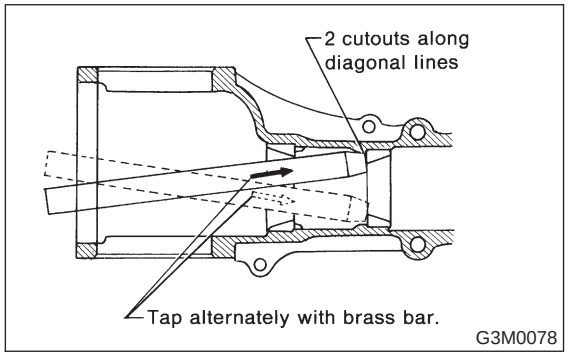
16) Remove front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY



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.



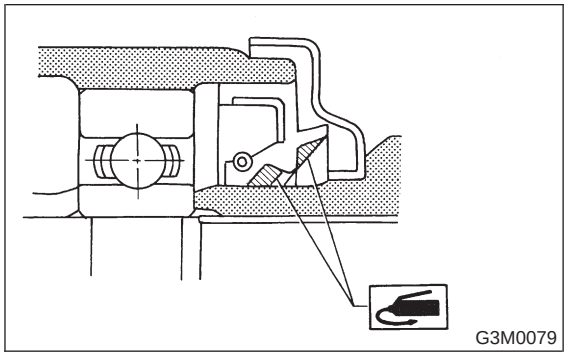
D: INSPECTION

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

E: ASSEMBLY

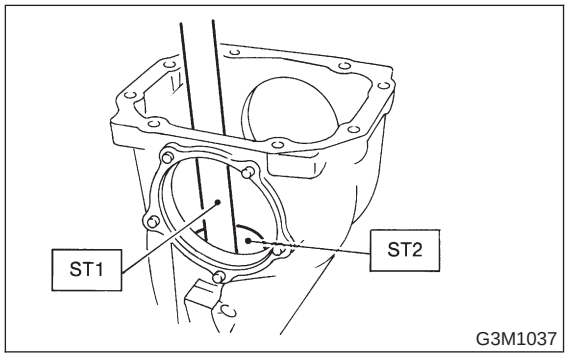
1) Precautions for assembling
● Assemble in the reverse order of disassembling.
● Check and adjust each part during assembly.
● Keep the shims and washers in order, so that they are not misinstalled.
● Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
● Apply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



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

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

ST1 398477701 HANDLE
ST2 398427703 DRIFT 2



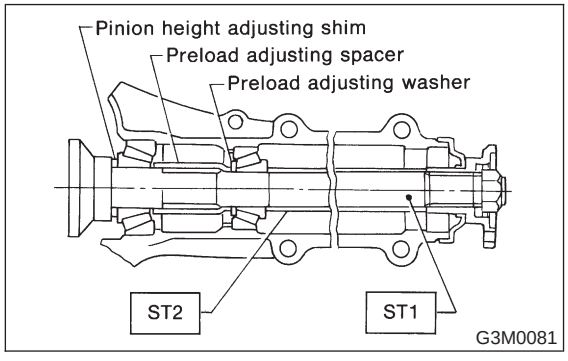
(2) Insert ST into case with pinion height adjusting washer and rear bearing cone fitted onto it.

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

ST 398507702 DUMMY SHAFT

(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



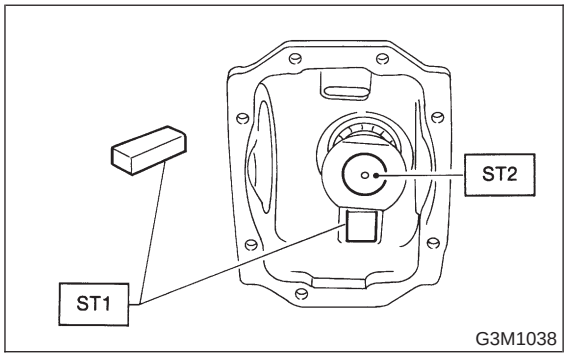
(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

CAUTION:
Use a new lock nut.

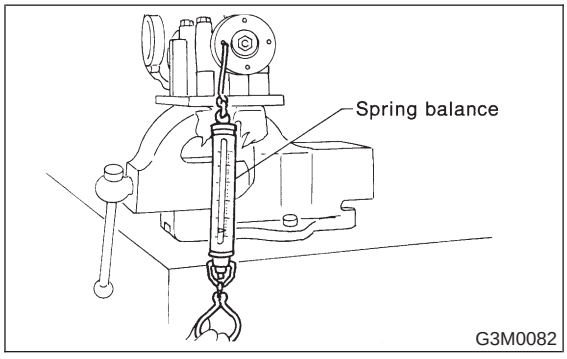
NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2.

ST1 398507704 BLOCK
ST2 398507702 DUMMY SHAFT

Tightening torque:
181±15 N·m (18.5±1.5 kg-m, 134±11 ft-lb)



Front and rear bearing preload
For new bearing: 19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb) at companion flange bolt hole



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

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

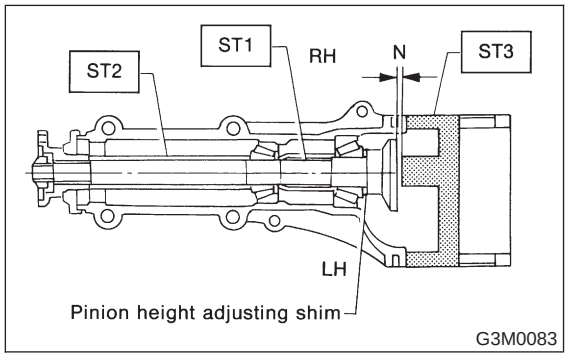
(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

Front and rear bearing preload
For new bearing: 19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb) at companion flange bolt hole

Adjust preload for front and rear bearings.

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

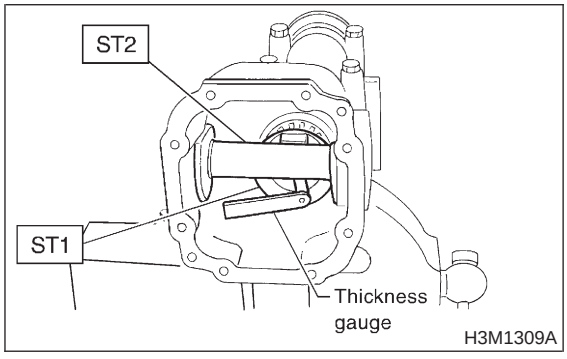
ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR
ST3 398507701 DIFFERENTIAL CARRIER GAUGE



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

NOTE:
Make sure there is no clearance between ST2 and ST1.

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 = To + N − (H x 0.01) − 0.20 (mm)

where

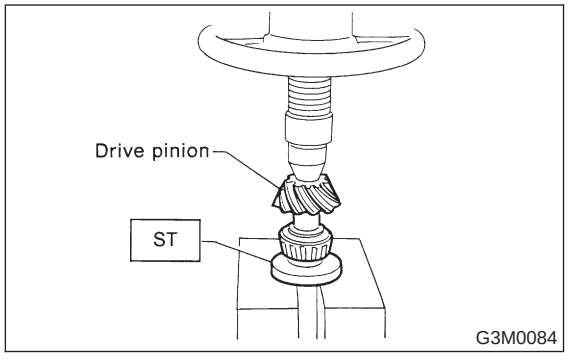
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim temporarily inserted (mm)
N = Reading of thickness gauge (mm)
H = Figure marked on drive pinion head

(Example of calculation)

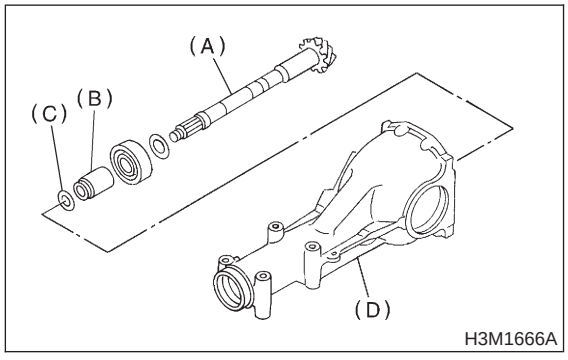
To = 2.20 + 1.20 = 3.40 mm
N = 0.23 mm H = + 1,
T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42
Result: Thickness = 3.42 mm
Therefore use the shim 383605200.

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

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

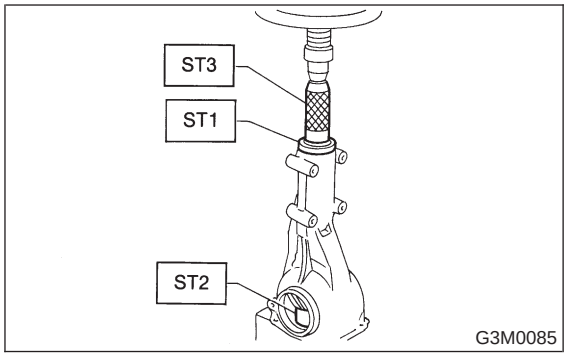


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

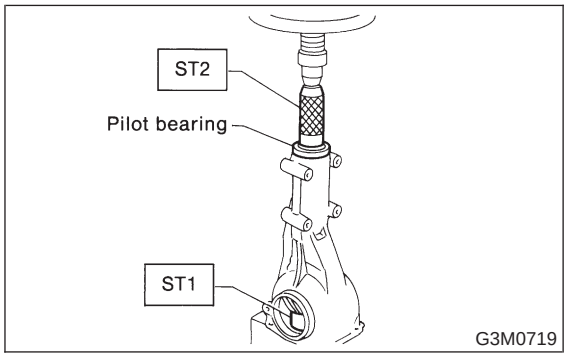


(A) Drive pinion
(B) Bearing preload adjusting spacer
(C) Washer
(D) Differential carrier

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



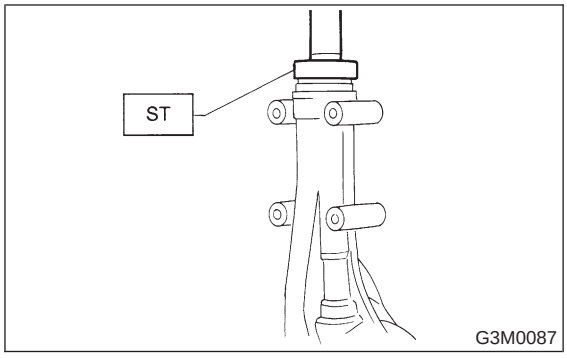
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



8) Fit a new oil seal with ST.

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

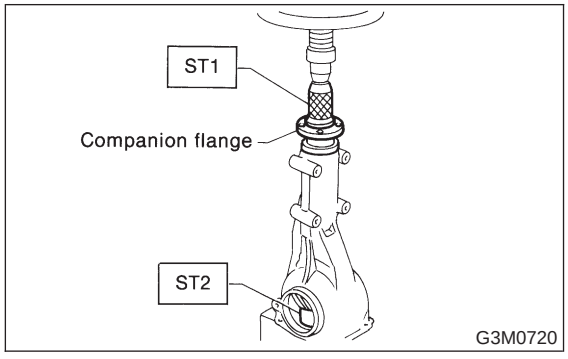
ST 498447120 OIL SEAL INSTALLER



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

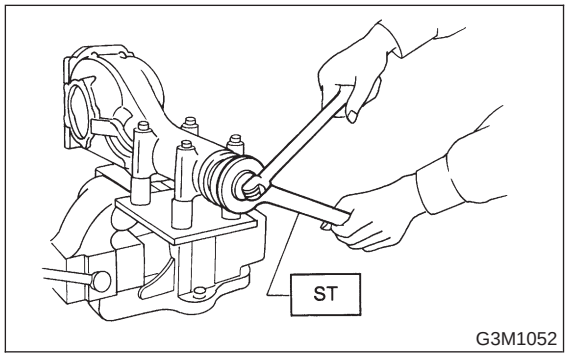
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



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

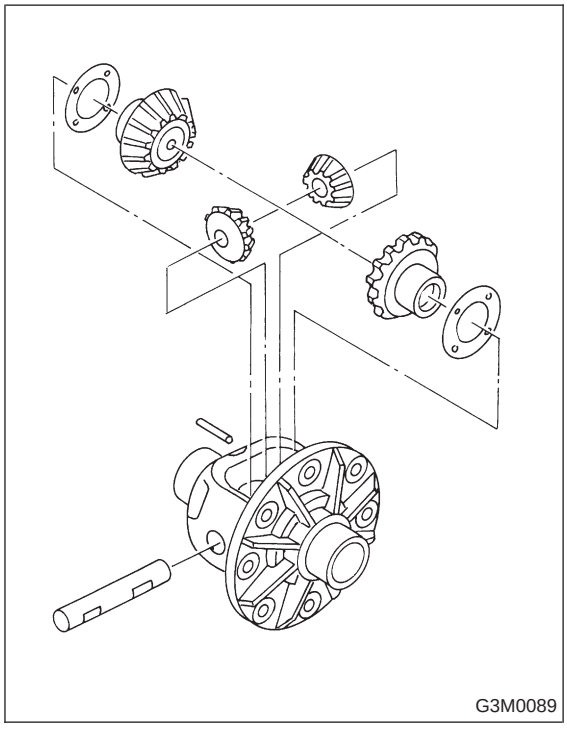
Tightening torque:
181±15 N·m (18.5±1.5 kg-m, 134±11 ft-lb)



11) Assembling differential case

(1) 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.



(2) Measure the clearance between differential case and the back of side gear.
(3) Adjust the clearance as specified by selecting side gear thrust washer.

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

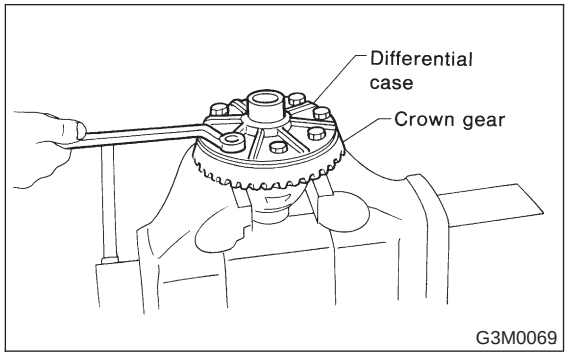
Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.8 (0.0295 — 0.0315)
383445202	0.8 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.9 (0.0335 — 0.0345)

(4) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(5) 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.

NOTE:
Tighten diagonally while tapping the bolt heads.

Tightening torque:
103±10 N·m (10.5±1.0 kg-m, 76±7 ft-lb)

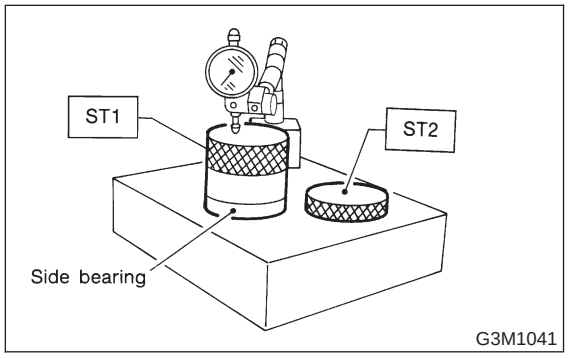


13) Before installing side bearing, measure the bearing width by using a dial gauge, ST1 and ST2.

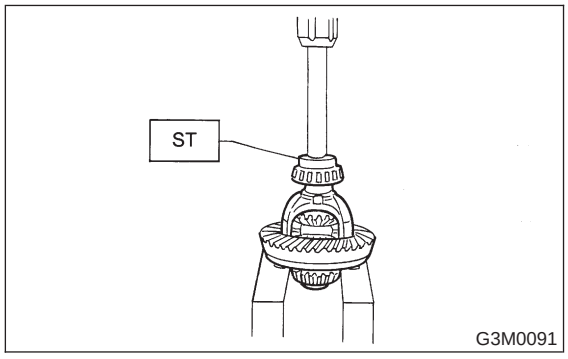
NOTE:
Set the dial gauge needle to zero, using a standard bearing or block of specified height in advance.

ST1 398227700 WEIGHT
ST2 398237700 GAUGE

Standard bearing width:
20.00 mm (0.7874 in)



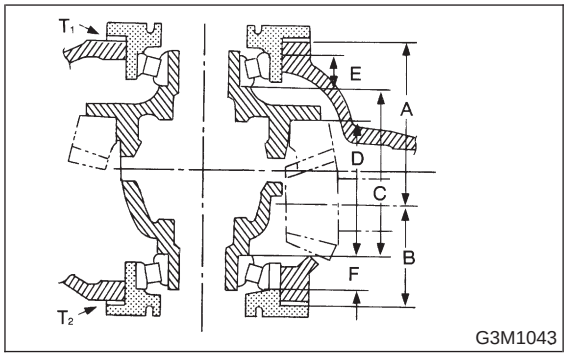
14) Press side bearing cone onto differential case with ST1.
ST1 398487700 DRIFT



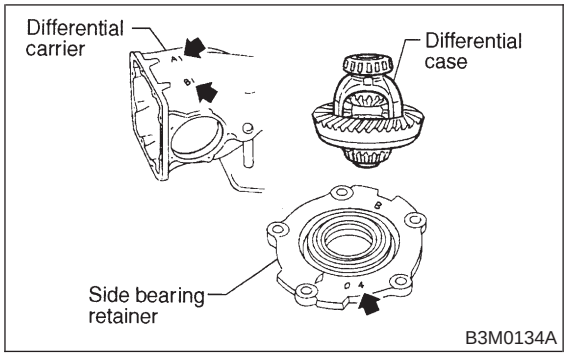
15) Adjusting side bearing retainer shims

(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 (Left) = (A + C + G_1 − D) x 0.01 + 0.76 − E (mm)
T_2 (Right) = (B + D + G_2) x 0.01 + 0.76 − F (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.

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

Example of calculation

Ex. 1

A = 5, B = 5, C = 3, D = 3, G_1 = 4, G_2 = 1, E = 0.10 mm, F = 0.15 mm

Left side

T_1 = (A + C + G_1 − D) × 0.01 + 0.76 − E
= (5 + 3 + 4 − 3) × 0.01 + 0.76 − 0.10
= 0.09 + 0.76 − 0.10 = 0.75 mm

The correct shims are as follows:

Thickness	Q'ty		
0.25	×	1	= 0.25
0.50	×	1	= 0.50
	Total shim thickness		= 0.75 mm

Right side

T_2 = (B + D + G_2) × 0.01 + 0.76 − F
= (5 + 3 + 1) × 0.01 + 0.76 − 0.15
= 0.09 + 0.76 − 0.15
= 0.70 mm

The correct shims are as follows:

Thickness	Q'ty		
0.20	×	1	= 0.20
0.50	×	1	= 0.50
	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 mm, F = 0.10 mm

Left side

T_1 = (A + C + G_1 − D) × 0.01 + 0.76 − E
= (2 + 0 + 2 − 3) × 0.01 + 0.76 − 0.22
= 0.01 + 0.76 − 0.22
= 0.55 mm

The correct shims are as follows:

Thickness	Q'ty		
0.25	×	1	= 0.25
0.30	×	1	= 0.30
	Total shim thickness		= 0.55 mm

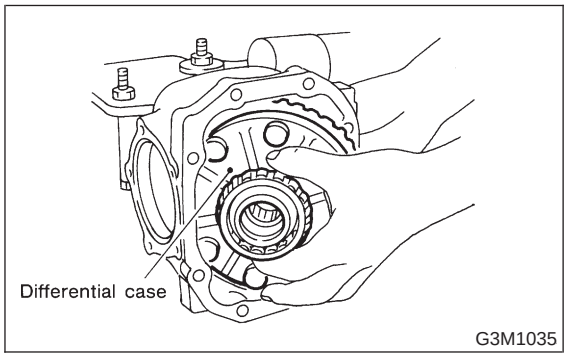
Right side

T_2 = (B + D + G_2) × 0.01 + 0.76 − F
= (3 + 3 + 3) × 0.01 + 0.76 − 0.10
= 0.09 + 0.76 − 0.10
= 0.75 mm

The correct shims are as follows:

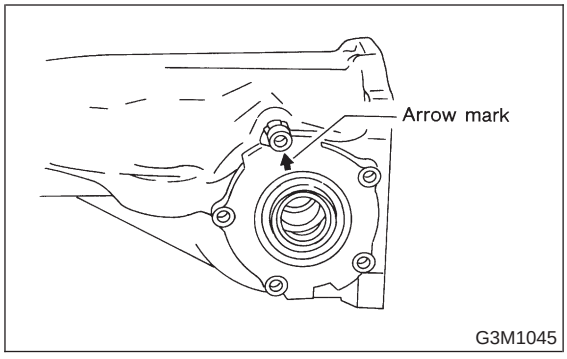
Thickness	Q'ty		
0.25	×	1	= 0.25
0.50	×	1	= 0.50
	Total shim thickness		= 0.75 mm

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



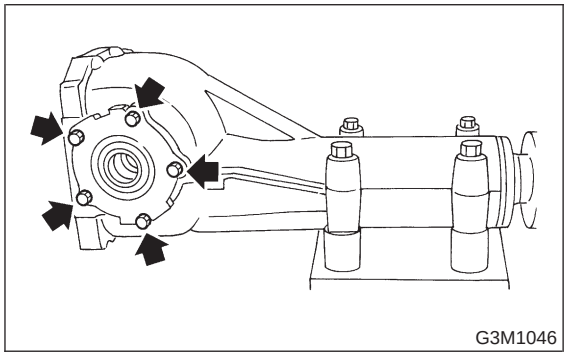
(4) Fit the selected shims and O-ring on side bearing retainer and install them on differential carrier with the arrow mark on the retainer directed as shown in figure.

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



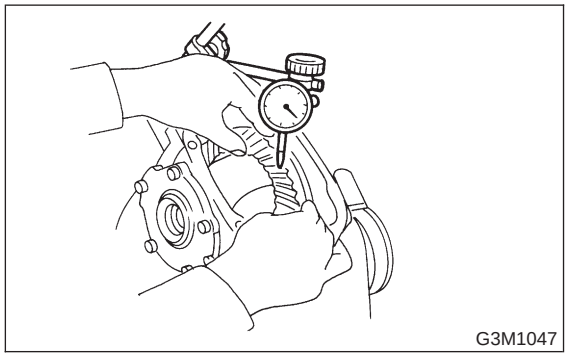
(5) Tighten side bearing retainer bolts.

Tightening torque:
10.3±1.5 N·m (1.05±0.15 kg-m, 7.6±1.1 ft-lb)



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

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


G3M1047

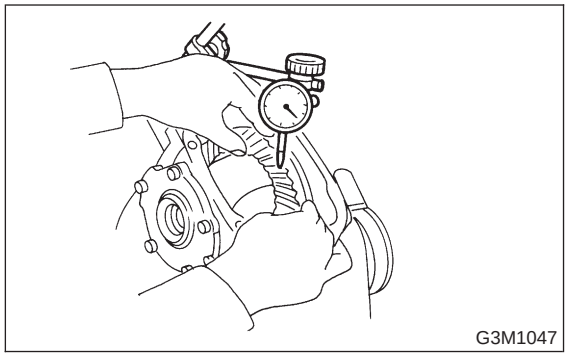
(7) At the same time, measure the turning resistance of drive pinion. Compared with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, readjust side bearing retainer shims.

NOTE:
If measured backlash is not within specified range, repeat procedure for side bearing retainer shims adjustment.

Turning resistance increase:
0.1 — 0.6 N·m (0.01 — 0.06 kg-m, 0.07 — 0.43 ft-lb)

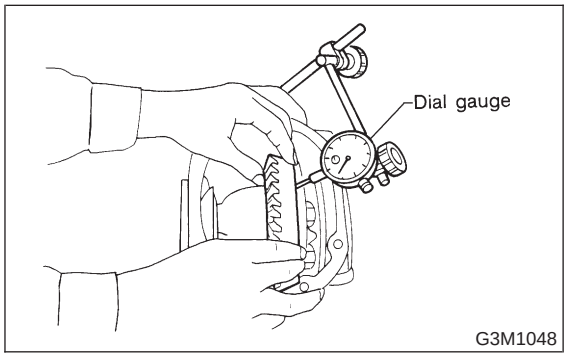
16) Re-check crown gear-to-pinion backlash.

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


G3M1047

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)



G3M1048

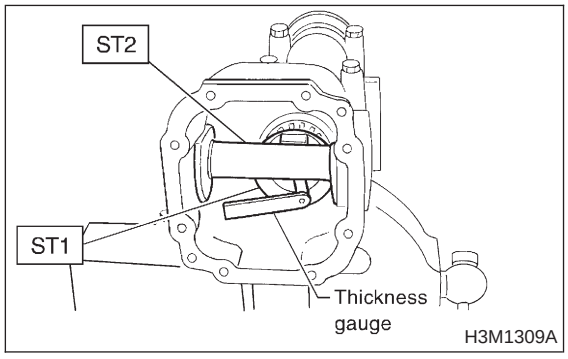
18) Checking and adjusting tooth contact of crown gear
(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.
(2) When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



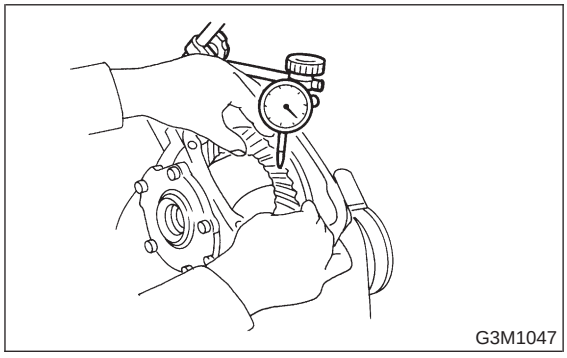
T = To + N − (H x 0.01) − 0.20 (mm)

Where:

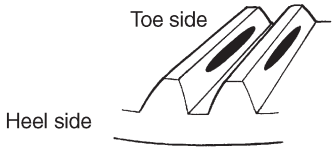
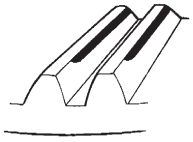
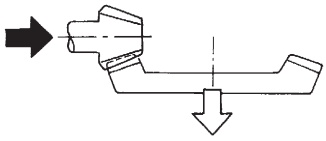
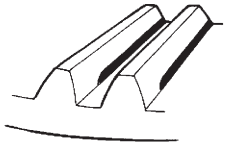
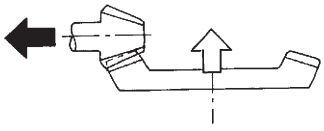
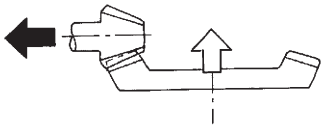
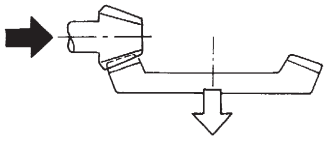
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim temporarily inserted (mm)
N = Reading of thickness gauge (mm)
H = Figure marked on drive pinion head

(2) Hypoid gear backlash

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

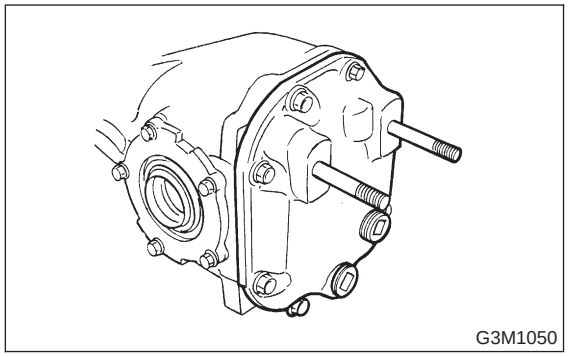


➡ Adjusting direction of drive pinion
⇨ Adjusting direction of crown gear

TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 B3M0317A	
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  B3M0319	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.  B3M0323
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  B3M0320	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  B3M0324
Toe contact Contact area is small.	This may cause chipping at toe ends.  B3M0321	Adjust as for flank contact.  B3M0324
Heel contact Contact area is small.	This may cause chipping at heel ends.  B3M0322	Adjust as for face contact.  B3M0323

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

Tightening torque:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)


G3M1050

F: INSTALLATION

To install, reverse the removal sequence.

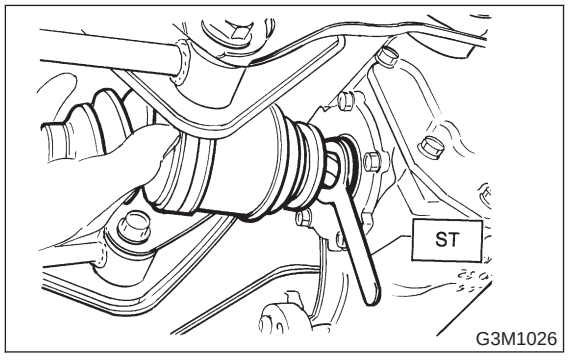
1) Install the air breather cap tapping with a plastic hammer.

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



G3M1026

4) Installing procedure hereafter is in the reverse order of removal.

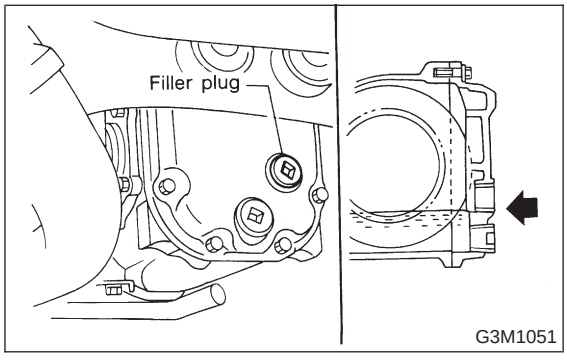
5) After installation, fill differential carrier with gear oil to the upper plug level.

CAUTION:
Apply fluid packing to plug.

Fluid packing:
THREE BOND 1105 or equivalent

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

Tightening torque:
44±4 N·m (4.5±0.4 kg-m, 32.5±2.9 ft-lb)



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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 [W3A0].> and <Ref. to 2-9 [W4A0].>
8) Remove rear differential front member.

NOTE:
When removing rear differential front member, work the removal procedure as rear differential.
<Ref. to 3-4 [W2B0].>

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 [W3A0].> and <Ref. to 2-9 [W4A0].>
8) Remove rear differential front member.

NOTE:
When removing rear differential front member, work the removal procedure as rear differential.
<Ref. to 3-4 [W3B0].>

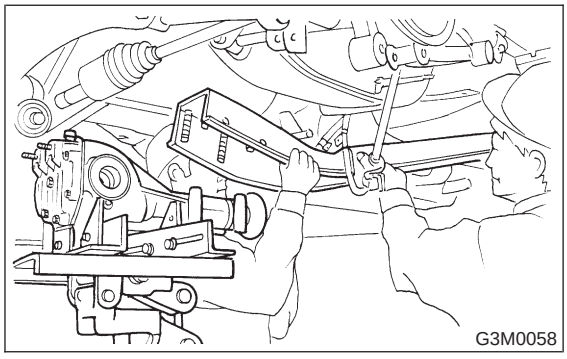
B: INSTALLATION

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.

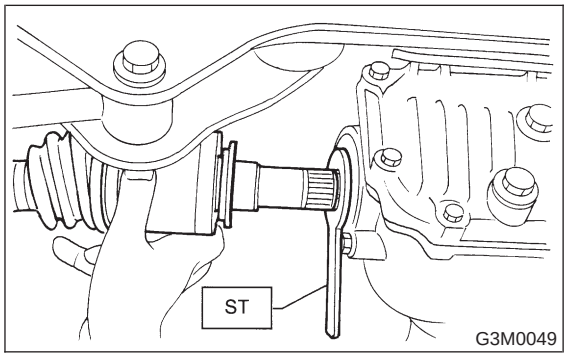
NOTE:
When installing rear differential front member, do not confuse the installation sequence of the stopper.



2) Insert DOJ of rear drive shaft into rear differential.
<Ref. to 3-4 [W2A2].>

CAUTION:
Before inserting, replace the differential side oil seal with a new one.

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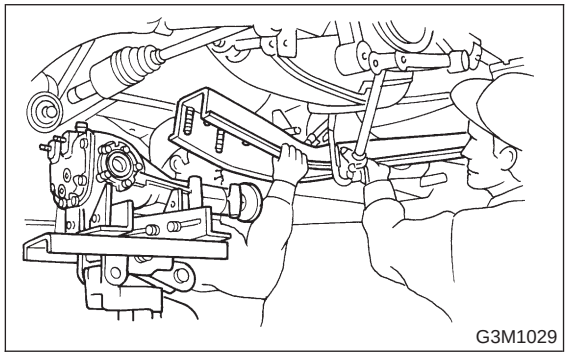
3) Installing procedure hereafter is in the reverse order of removal.

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.

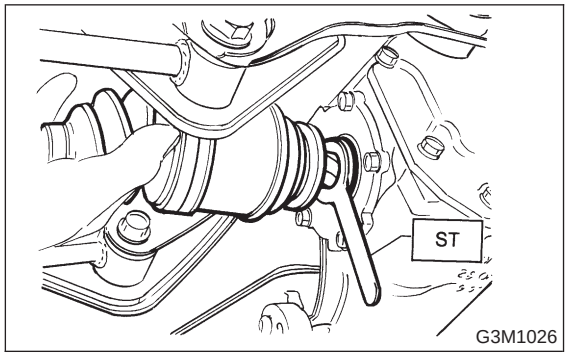
NOTE:
When installing rear differential front member, do not confuse the installation sequence of the stopper.


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2) Insert DOJ of rear drive shaft into rear differential.
<Ref. to 3-4 [W3A2].>

CAUTION:
Before inserting, replace the differential side oil seal with a new one.

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3) Installing procedure hereafter is in the reverse order of removal.

1. Propeller Shaft

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

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.

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.
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.

Symptom and possible cause	Remedy
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.

MEMO: