

TRANSMISSION SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

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

FUJI HEAVY INDUSTRIES LTD.

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	AT
MANUAL TRANSMISSION AND DIFFERENTIAL	MT
CLUTCH SYSTEM	CL
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	AT

CONTROL SYSTEMS



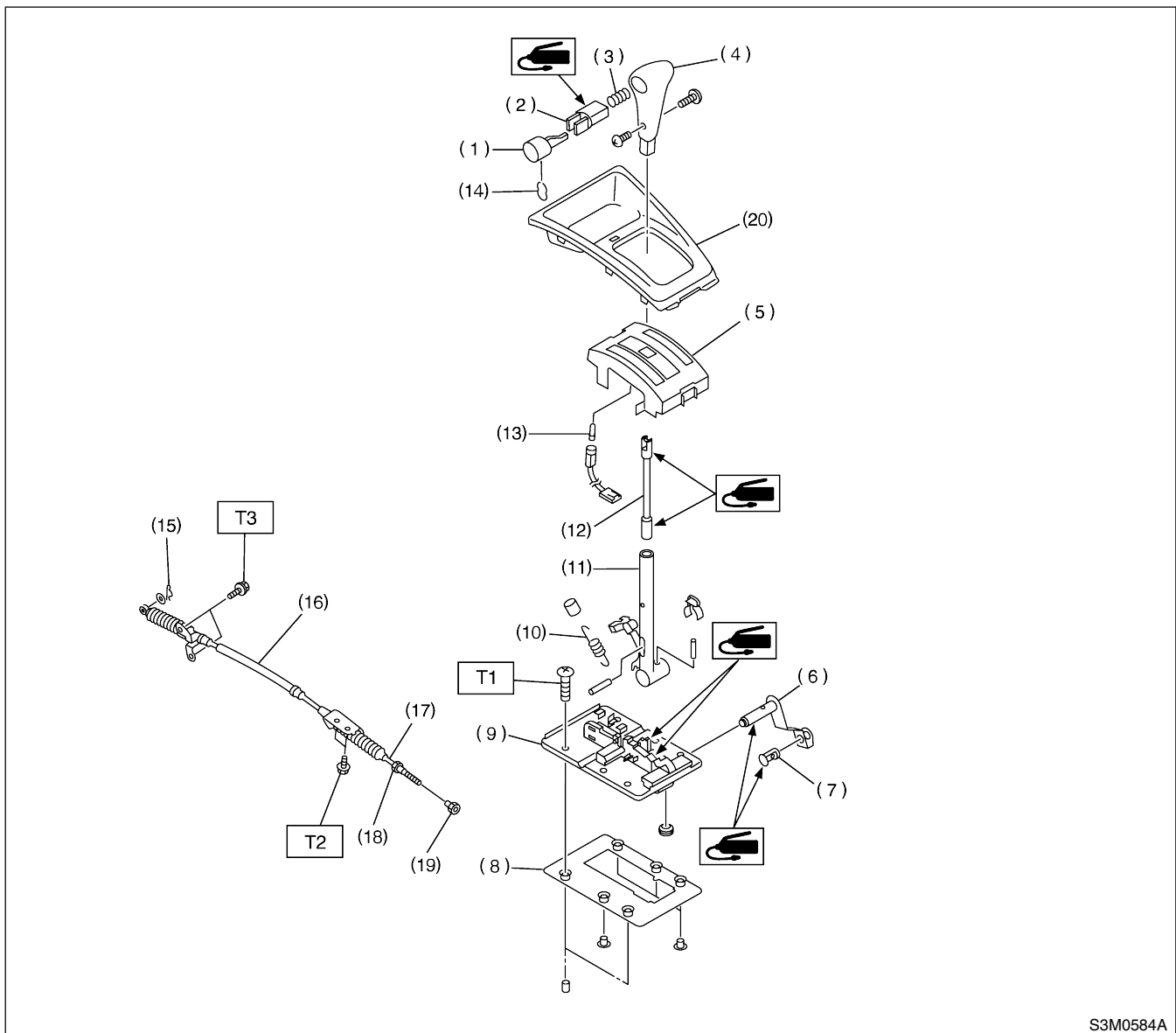
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4. MT Gear Shift Lever.....	13
5. MT Drive Select Lever	19
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GENERAL DESCRIPTION**1. General Description** S501001**A: SPECIFICATIONS** S501001E49

Item		Specification
Vibration torque of rod against lever	N·m (kgf-m, ft-lb)	0.7 (0.07, 0.5) or less

B: COMPONENT SS01001A05

1. AT SELECT LEVER SS01001A0501



S3M0584A

- | | | |
|--------------------------|---------------------------|------------------|
| (1) Button A | (10) Detent spring | (19) Nut (rear) |
| (2) Button B | (11) Selector lever upper | (20) Front cover |
| (3) Spring (button) | (12) Rod | |
| (4) Grip | (13) Indicator light bulb | |
| (5) Indicator cover | (14) Clip | |
| (6) Selector lever lower | (15) Snap pin | |
| (7) Pin | (16) Outer cable | |
| (8) Packing | (17) Inner cable | |
| (9) Plate | (18) Nut (front) | |

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

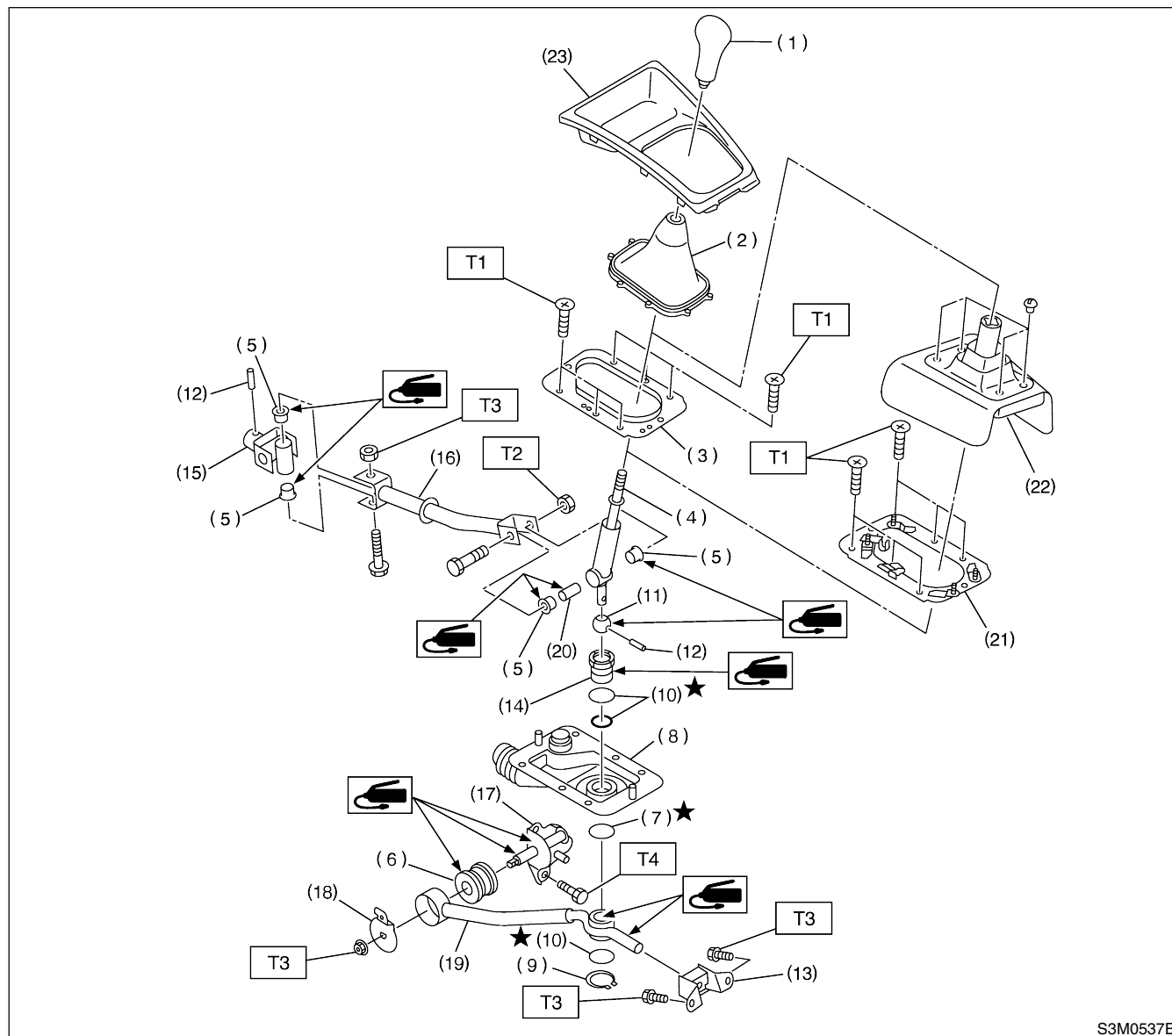
T1: 5.9 (0.6, 4.3)

T2: 25 (2.5, 18.1)

T3: 32 (3.3, 24)

GENERAL DESCRIPTION

2. MT GEAR SHIFT LEVER S501001A0502



S3M0537B

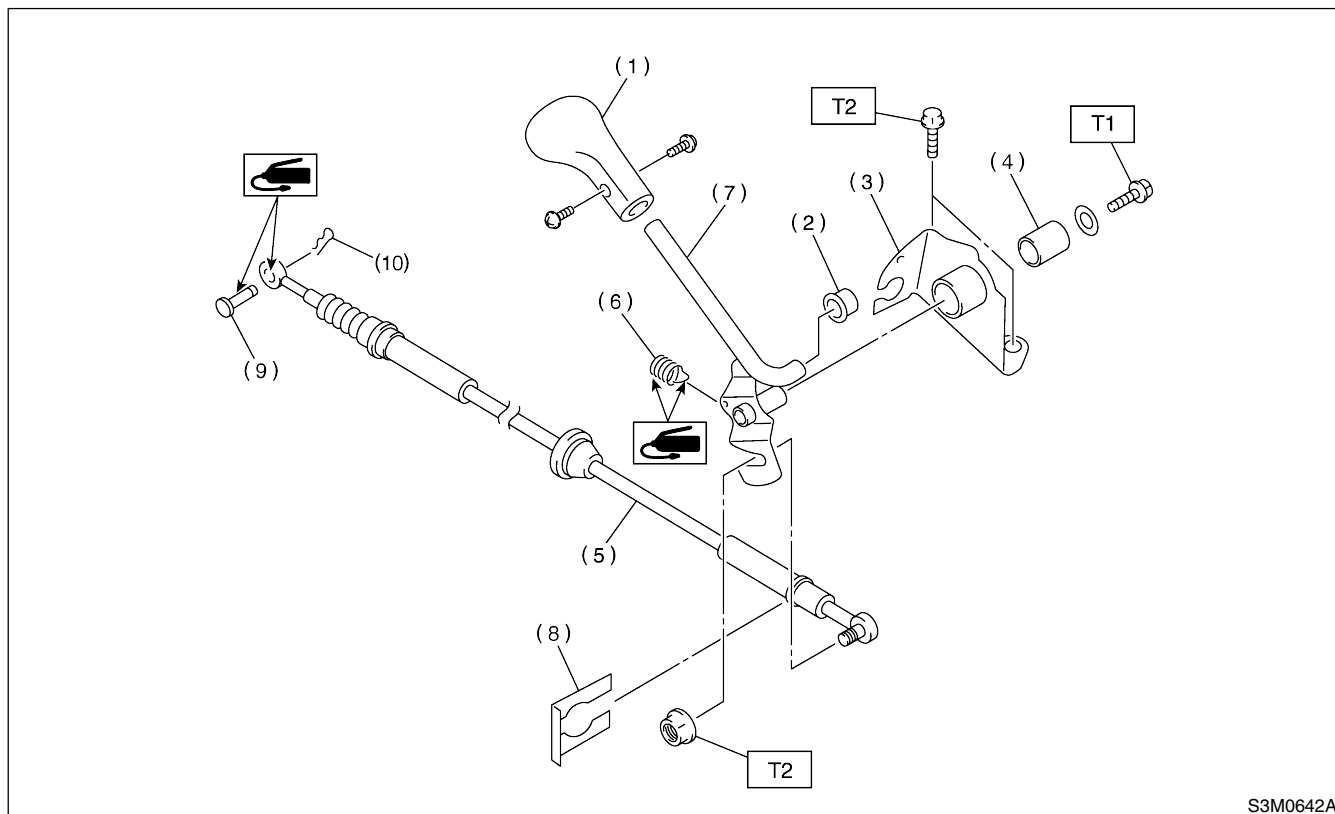
- | | | |
|----------------------------------|---------------------|-------------------------------|
| (1) Gear shift knob | (11) Bush C | (21) Boot plate (Turbo model) |
| (2) Console boot | (12) Straight pin | (22) Boot and insulator |
| (3) Boot plate (Non-Turbo model) | (13) Cushion rubber | (23) Front cover |
| (4) Lever | (14) Bush D | |
| (5) Bush A | (15) Joint | |
| (6) Bush B | (16) Rod | |
| (7) Locking wire | (17) Bracket | |
| (8) Boot | (18) Washer | |
| (9) Snap ring | (19) Stay | |
| (10) O-ring | (20) Spacer | |

Tightening torque: N-m (kgf-m, ft-lb)
T1: 4.5 (0.46, 3.3)
T2: 11.8 (1.20, 8.7)
T3: 18 (1.8, 13.0)
T4: 24.5 (2.5, 18.1)

GENERAL DESCRIPTION

Control Systems

3. DRIVE SELECT LEVER SS01001A0503



- | | |
|-------------|----------------|
| (1) Knob | (6) Spring |
| (2) Cap | (7) Lever |
| (3) Plate | (8) Clamp |
| (4) Bushing | (9) Clevis pin |
| (5) Cable | (10) Snap ring |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 1.6 (0.16, 1.2)

T2: 18 (1.8, 13.0)

C: CAUTION SS01001A03

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

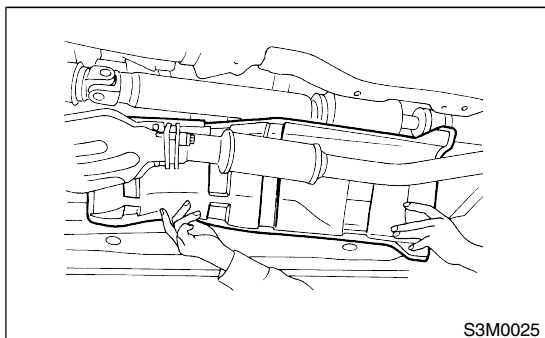
2. Select Lever

S501548

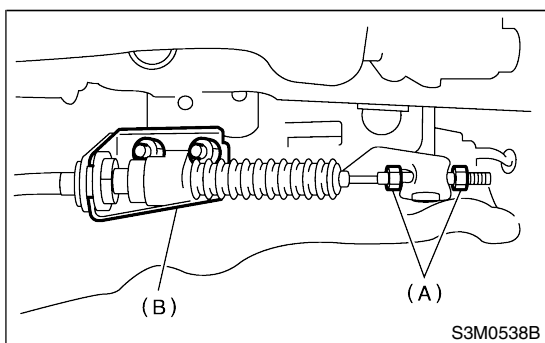
A: REMOVAL

S501548A18

- 1) Set vehicle on a lift.
- 2) Disconnect battery ground terminal from battery.
- 3) Move the select lever to the "N" position.
- 4) Lift-up the vehicle.
- 5) Remove heat shield cover. (Non-Turbo model)

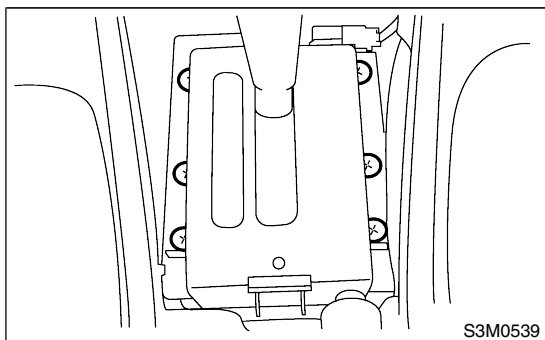


- 6) Disconnect cable from select lever and then remove cable bracket.



- (A) Adjusting nuts
(B) Cable bracket

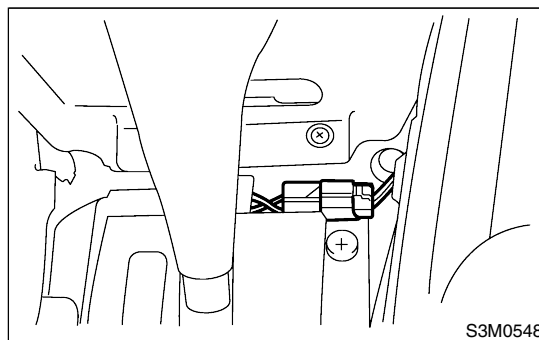
- 7) Remove front cover. <Ref. to EI-30, REMOVAL, Consol Box.>
- 8) Disconnect connectors, and remove the stay.
- 9) Remove the six bolts to take out the select lever assembly from body.



B: INSTALLATION

S501548A11

- 1) Install the select indicator light connector.



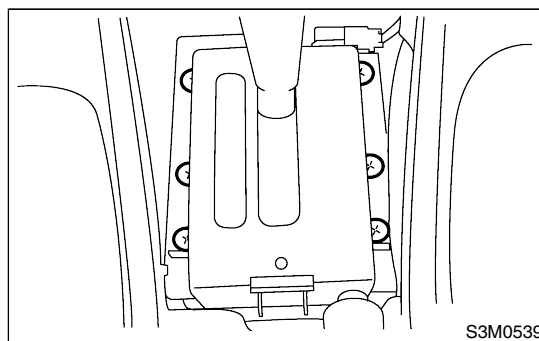
- 2) Install the select lever to vehicle.

NOTE:

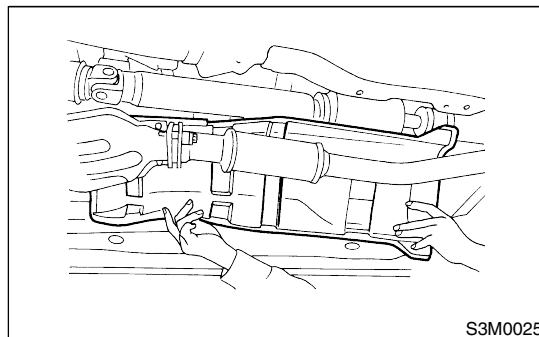
Do not allow the select lever to catch on the wiring harnesses, etc. during installation.

Tightening torque:

5.9 N·m (0.6 kgf-m, 4.3 ft-lb)



- 3) Install the front cover. <Ref. to EI-30, INSTALLATION, Console Box.>
- 4) Lift-up the vehicle.
- 5) Move the select lever to the "N" position, then adjust the select cable position. <Ref. to CS-11, ADJUSTMENT, Select Cable.>
- 6) Install heat shield cover. (Non-Turbo model)



SELECT LEVER

Control Systems

7) Inspect the following items. If the following inspection reveals problems, adjust the select cable and inhibitor switch. <Ref. to CS-11, ADJUSTMENT, Select Cable.> and <Ref. to AT-28, ADJUSTMENT, Inhibitor Switch.>

(1) The engine starts operating when select lever is in position "P" or "N", but not in other positions.

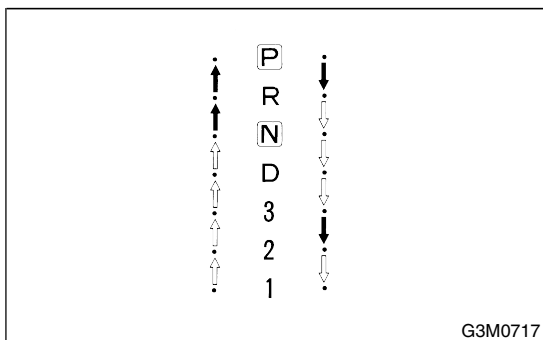
(2) The back-up light is lit when the select lever is in position "R", but not in other positions.

(3) Check select lever operation.

WARNING:

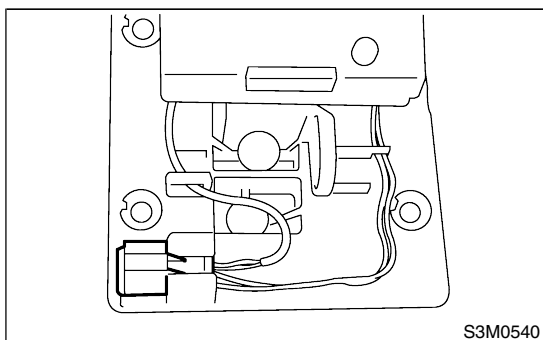
Stop the engine while checking operation of select lever.

- Check that select lever does not move from "N" to "R" without pushing the button.
- Check that select lever does not move from "R" to "P" without pushing the button.
- Check that select lever does not move from "P" to "R" without pushing the button.
- Check that select lever does not move from "3" to "2" without pushing the button.



C: DISASSEMBLY S501548A06

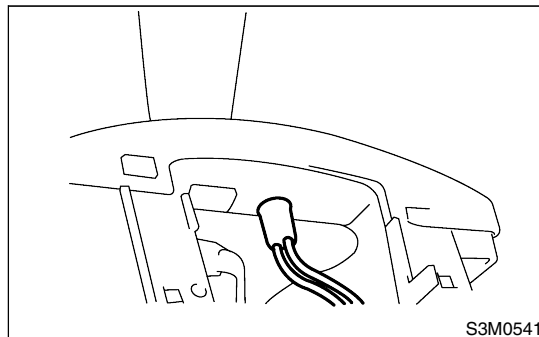
1) Remove connector from plate.



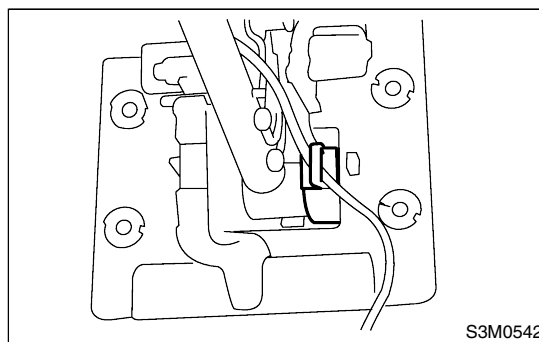
2) Remove indicator light.

NOTE:

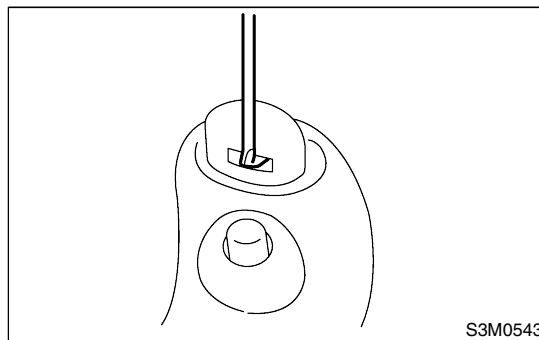
Be careful not to break the indicator light during removal.



3) Detach indicator cover from plate, and remove clip.



4) Remove clip.



5) Remove the two screws.

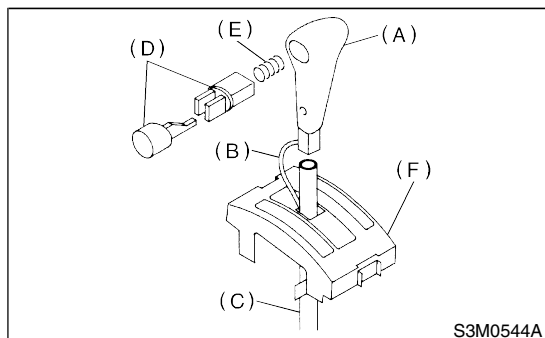
SELECT LEVER

Control Systems

6) While pressing select lever button, remove select lever grip and indicator cover from upper select lever, and then remove the select lever button and spring.

CAUTION:

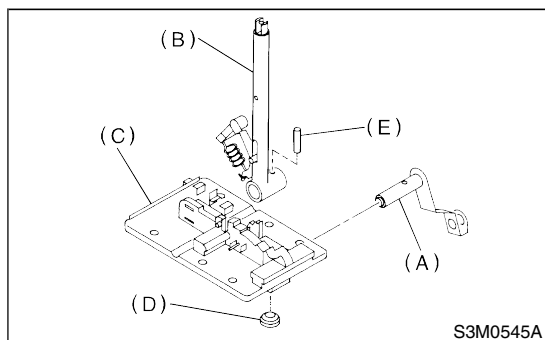
Position the select lever grip carefully so that the select lever button does not jump out.



- (A) Select lever grip
- (B) Harness
- (C) Upper select lever
- (D) Button
- (E) Spring
- (F) Indicator cover

7) Remove cap and then the straight pin.

8) Remove lower select lever, and then lift upper select lever from plate.



- (A) Lower select lever
- (B) Upper select lever
- (C) Plate
- (D) Cap
- (E) Straight pin

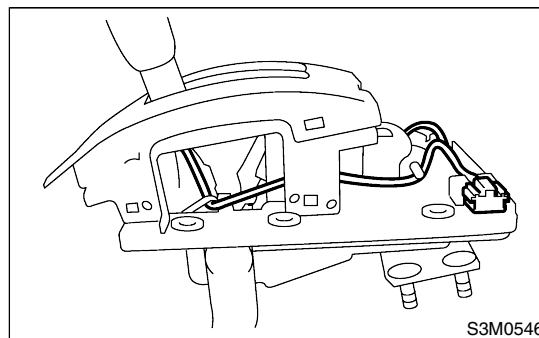
D: ASSEMBLY

S501548A02

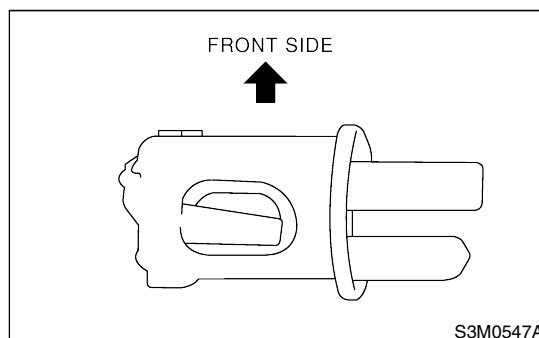
- 1) Clean all parts before assembly.
- 2) Apply grease [NIGHTIGHT LYW No. 2 or equivalent] to each parts. <Ref. to CS-3 AT SELECT LEVER, COMPONENT, General Description.>
- 3) Assembly is in the reverse order of disassembly.

NOTE:

- Install indicator cover so that harness does not interfere with select lever operation.



- Be careful to install the spring and button into the select lever grip in the correct direction.



- 4) After completion of fitting, transfer select lever to range "P" — "1", then check whether the indicator and select lever agree, whether the pointer and position mark agree and what the operating force is.

E: INSPECTION

S501548A10

- 1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
- 2) Make sure the following parts operate properly before assembly.
 - (1) Button in the grip: It should slide smoothly.
 - (2) Grip on the select lever: When pushing the grip on the select lever by hand, screw holes should be aligned.
 - (3) Select lever and rod: They should move smoothly.

SELECT CABLE

Control Systems

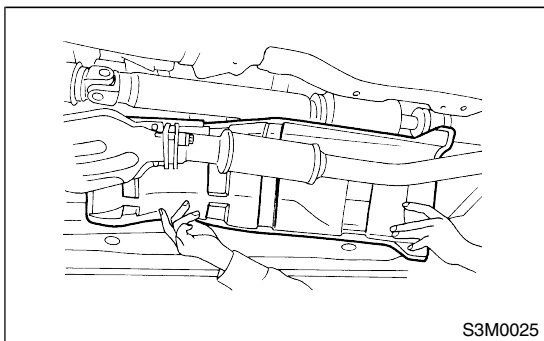
3. Select Cable

S501549

A: REMOVAL

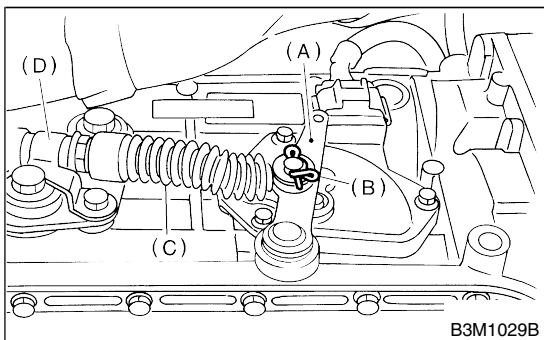
S501549A18

- 1) Set vehicle on a lift.
- 2) Disconnect battery ground terminal from battery.
- 3) Prior to removal, set lever to "N" position.
- 4) Lift-up the vehicle.
- 5) Remove heat shield cover. (Non-turbo model)



S3M0025

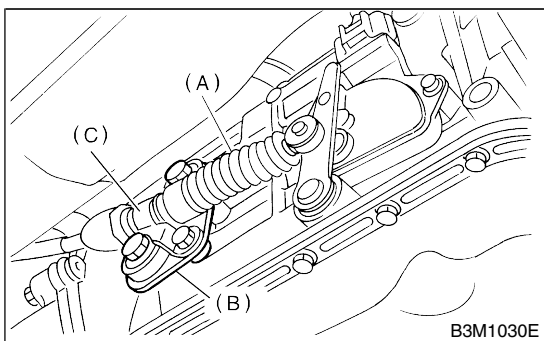
- 6) Remove snap pin from range select lever.



B3M1029B

- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp

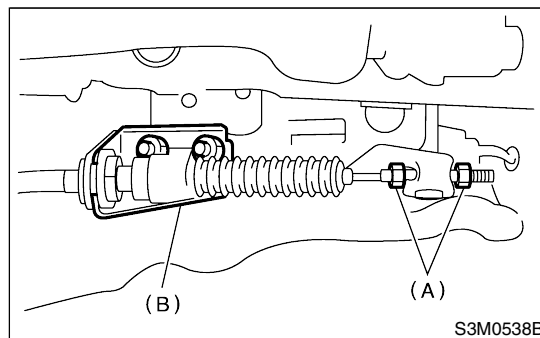
- 7) Remove plate assembly from transmission case.



B3M1030E

- (A) Select cable
- (B) Plate ASSY
- (C) Clamp

- 8) Disconnect cable from select lever and then remove cable bracket.



S3M0538B

- (A) Adjusting nuts
- (B) Cable bracket

- 9) Remove select cable from plate assembly.

SELECT CABLE

Control Systems

B: INSTALLATION

S501549A11

- 1) Install select cable to plate assembly.

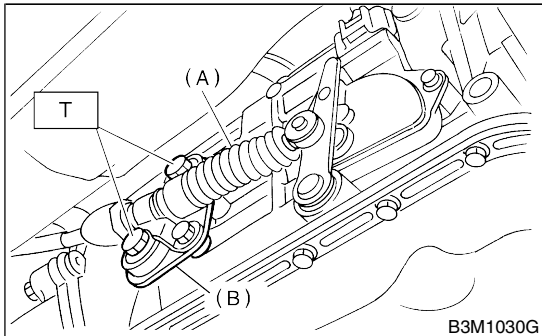
Tightening torque:

32 N·m (3.3 kgf-m, 24 ft-lb)

- 2) Install select cable to range select lever.
- 3) Install plate assembly to transmission.

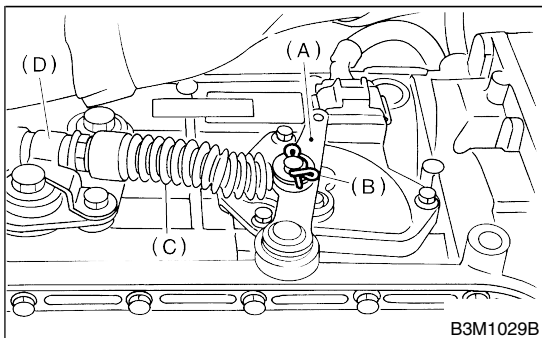
Tightening torque:

T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Select cable
- (B) Plate ASSY

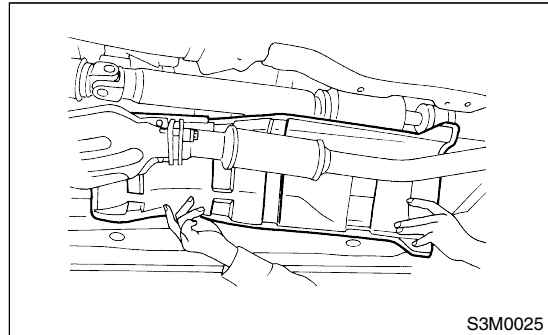
- 4) Install snap pin to range select lever.



- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp

- 5) Move the select lever to the "N" position, then adjust the select cable position. <Ref. to CS-11 ADJUSTMENT, Select Cable.>

- 6) Install heat shield cover. (Non-turbo model)



C: INSPECTION

S501549A10

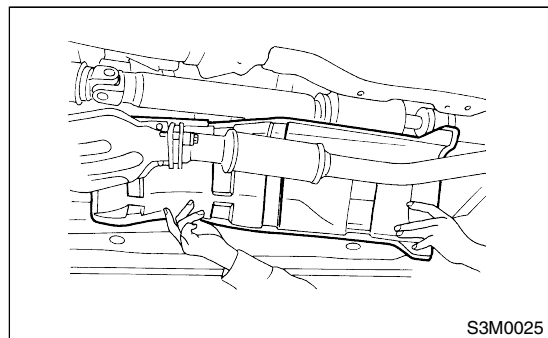
Check the removed cable and replace if damaged, rusty, or malfunctioning.

- 1) Check for smooth operation of the cable.
- 2) Check the inner cable for damage and rust.
- 3) Check the outer cable for damage, bends, and cracks.
- 4) Check the boot for damage, cracks, and deterioration.
- 5) Move select lever from "P" position to "1" position. You should be able to feel the detentes in each position. If the detentes cannot be felt or the position pointer is improperly aligned, adjust the cable.

D: ADJUSTMENT

S501549A01

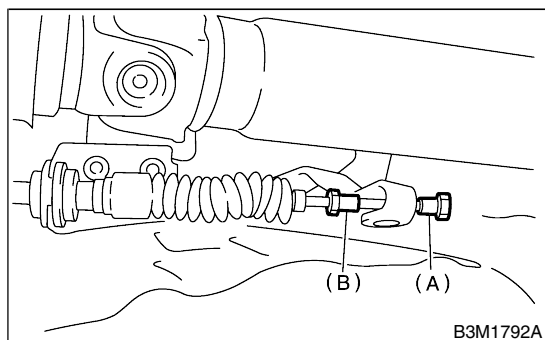
- 1) Set lever to "N" position.
- 2) Lift-up the vehicle.
- 3) Remove heat shield cover.



SELECT CABLE

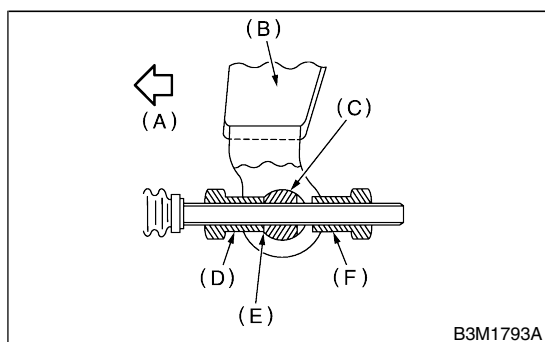
Control Systems

- 4) Loosen the adjusting nut on each side.



- (A) Adjusting nut A
(B) Adjusting nut B

- 5) Turn adjusting nut B until it lightly touches the connector.

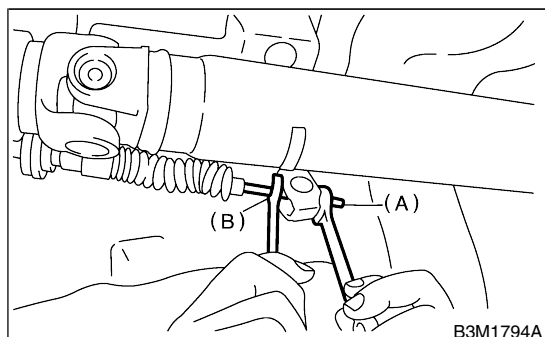


- (A) Front side
(B) Select lever
(C) Connector
(D) Adjusting nut B
(E) Contact point
(F) Adjusting nut A

- 6) While preventing adjusting nut B from moving with a wrench, tighten adjusting nut A.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



- (A) Adjusting nut A
(B) Adjusting nut B

- 7) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.

- 8) Install in the reverse order of removal.

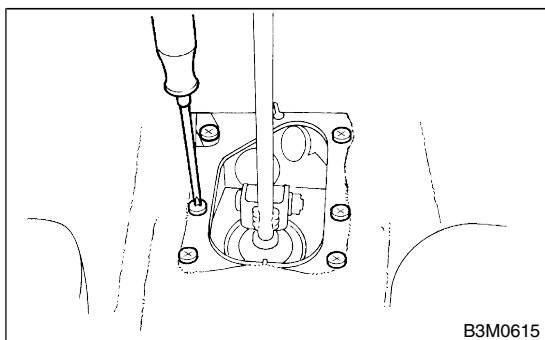
4. MT Gear Shift Lever

S501236

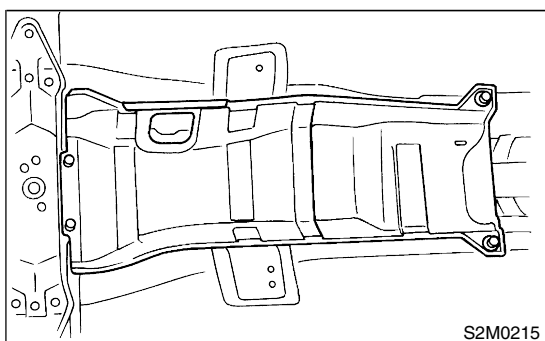
A: REMOVAL

S501236A18

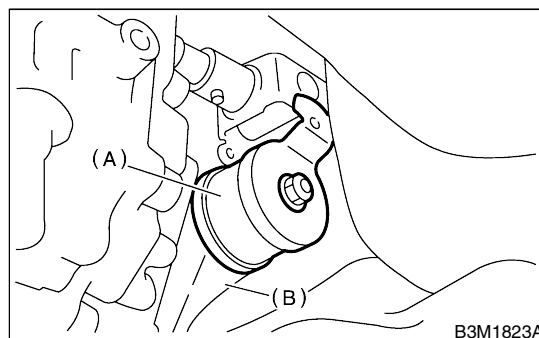
- 1) Set the vehicle on the lift.
- 2) Remove gear shift knob.
- 3) Remove front cover. <Ref. to EI-30, REMOVAL, Console Box.>
- 4) Remove the four screws to take out the boot and insulator assembly from boot plate. (Turbo model)
- 5) Remove boot plate from body.



- 6) Lift-up the vehicle.
- 7) Remove rear exhaust pipe and muffler.
Non-turbo model with OBD:
<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust.>
and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>
Non-turbo model without OBD:
<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>
Turbo model:
<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>
- 8) Remove heat shield cover. (Non-turbo model)

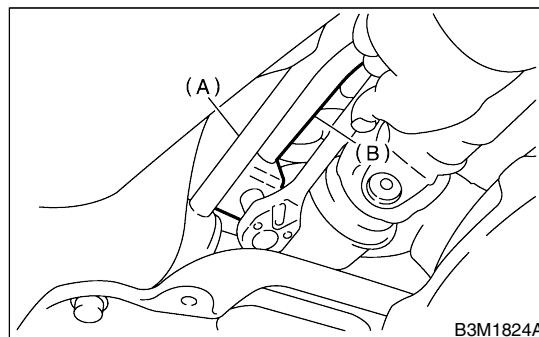


- 9) Remove stay from transmission bracket.



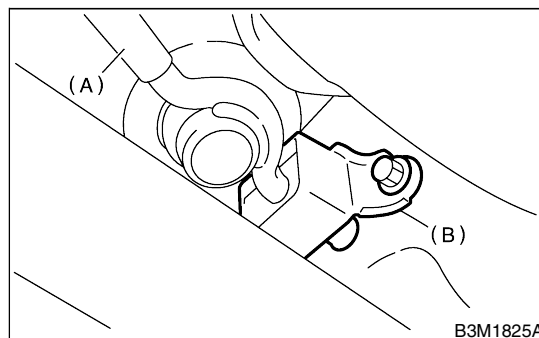
- (A) Stay
(B) Transmission bracket

- 10) Remove rod from joint.



- (A) Stay
(B) Rod

- 11) Remove cushion rubber from body.

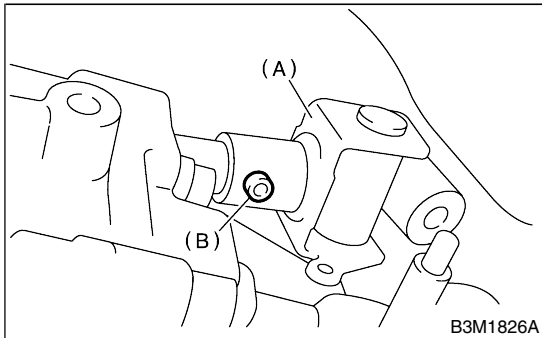


- (A) Stay
(B) Cushion rubber

MT GEAR SHIFT LEVER

Control Systems

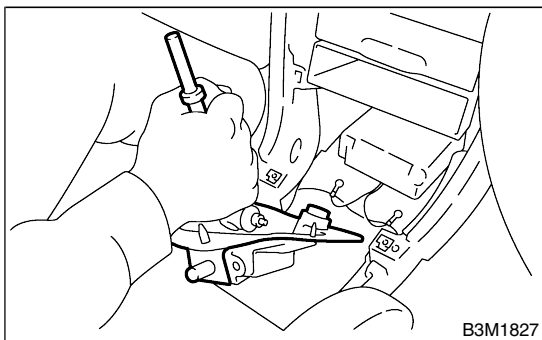
- 12) Remove joint and then extract straight pin.



- (A) Joint
(B) Straight pin

- 13) Lower the vehicle.

- 14) Remove gear shift lever.



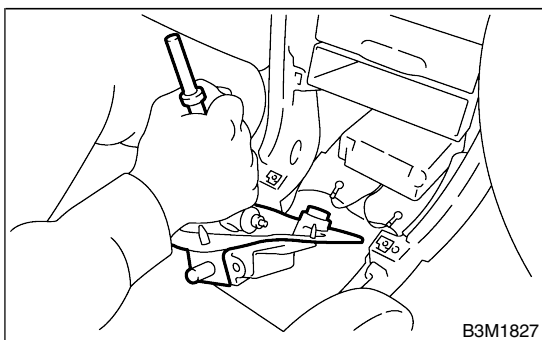
B: INSTALLATION

S501236A11

- 1) Install the joint to the transmission and secure with the straight pin.
2) Insert gear shift lever from room side.

NOTE:

After inserting rod and stay, temporarily put them onto transmission mount.

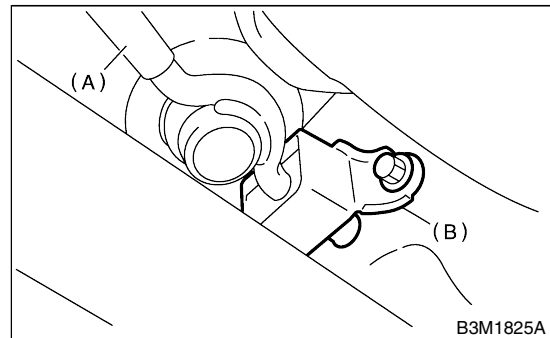


- 3) Lift-up the vehicle.

- 4) Mount cushion rubber on the body.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

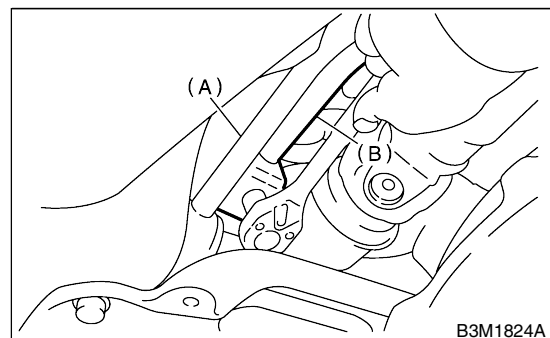


- (A) Cushion rubber
(B) Stay

- 5) Connect rod to the joint.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

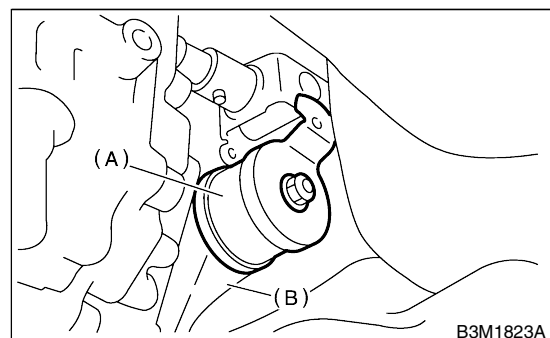


- (A) Joint
(B) Rod

- 6) Connect stay to transmission bracket.

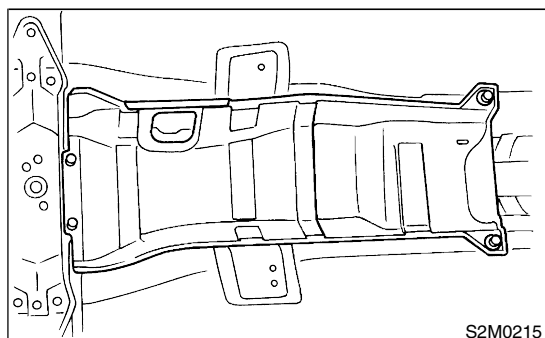
Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



- (A) Stay
(B) Transmission bracket

7) Install heat shield cover. (Non-turbo model)



8) Install rear exhaust pipe and muffler.

Non-turbo model with OBD:

<Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust.> and <Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>

Non-turbo model without OBD:

<Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust.> and <Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.>

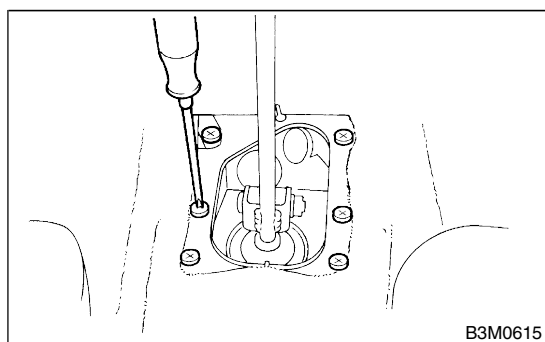
Turbo model:

<Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>

9) Mount boot plate on body.

Tightening torque:

4.5 N·m (0.46 kgf-m, 3.3 ft-lb)

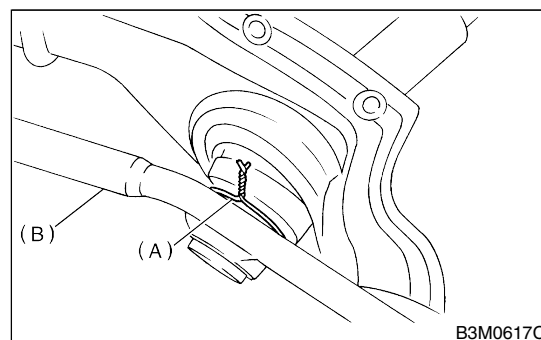


10) Install boot and insulator assembly on boot plate. (Turbo model)

11) Install front cover, gear shift knob. <Ref. to EI-30, INSTALLATION, Console Box.>

C: DISASSEMBLY SS01236A06

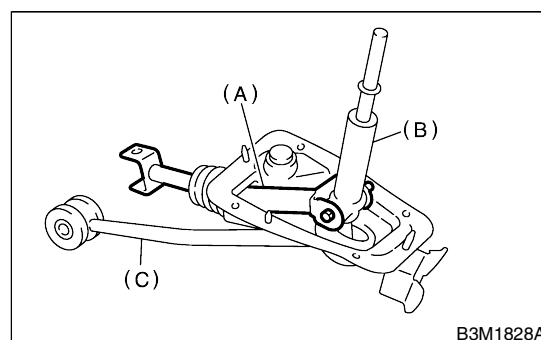
1) Disassemble locking wire.



(A) Locking wire

(B) Stay

2) Remove rod from gear shift lever.

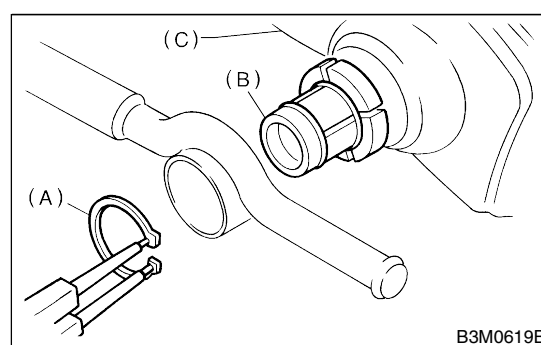


(A) Rod

(B) Gear shift lever

(C) Stay

3) Remove snap ring from bushing D, then disconnect stay.



(A) Snap ring

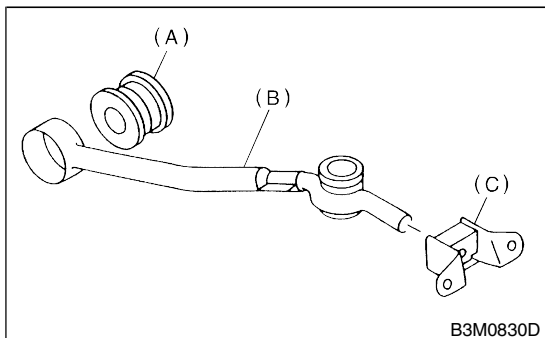
(B) Bushing D

(C) Boot

4) Remove boot from gear shift lever.

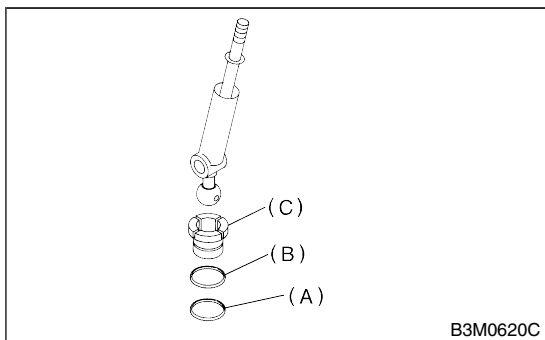
MT GEAR SHIFT LEVER

5) Remove bushing and cushion rubber from stay.



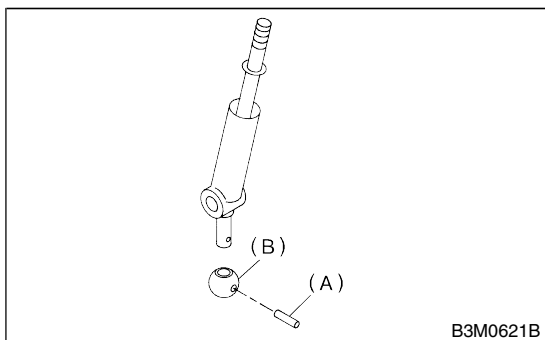
- (A) Bushing
- (B) Stay
- (C) Cushion rubber

6) Remove O-ring, then disconnect bushing D.



- (A) O-ring A
- (B) O-ring B
- (C) Bushing D

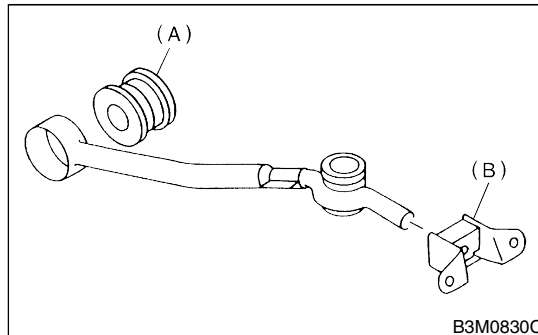
7) Draw out straight pin, then remove bushing C from gear shift lever.



- (A) Straight pin
- (B) Bushing C

D: ASSEMBLY S501236A02

- 1) Clean all parts before assembly.
- 2) Mount the bushing B and cushion rubber on the stay.

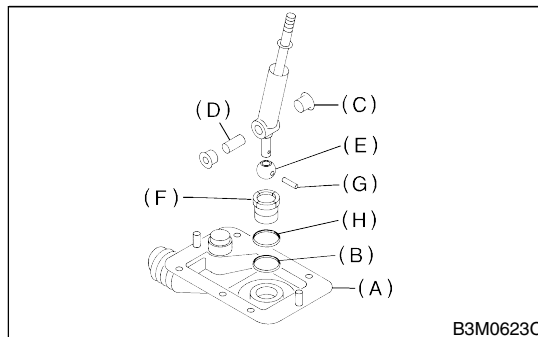


- (A) Bushing
- (B) Cushion rubber

- 3) Mount each part; boot, O-ring, bushing A, spacer, bushing B, bushing D and straight pin on the gear shift lever.

CAUTION:

- Always use new O-rings.
- Apply grease [DNIGHTIGHT LYW No. 2 or equivalent] to the inner and side surfaces of the bushing when installing the spacer.

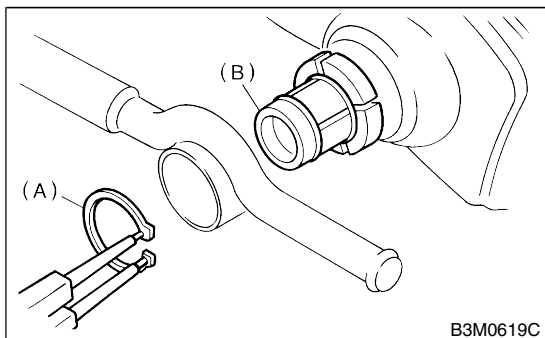


- (A) Boot
- (B) O-ring B
- (C) Bushing A
- (D) Spacer
- (E) Bushing C
- (F) Bushing D
- (G) Straight pin
- (H) O-ring A

MT GEAR SHIFT LEVER

Control Systems

- 4) Insert the gear shift lever into the boot hole.
- 5) Install snap ring and stay to the bushing D.

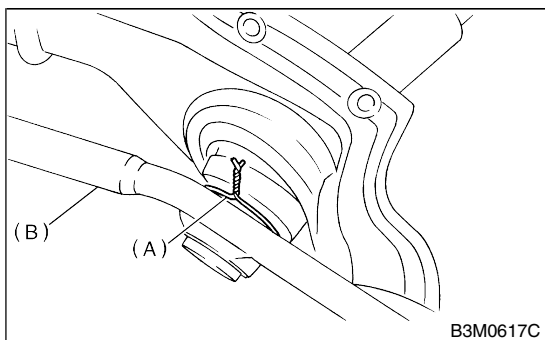


- (A) Snap ring
- (B) Bushing D

- 6) Tighten with locking wire to the extent that the boot will not come off.

CAUTION:

Always use new locking wire.

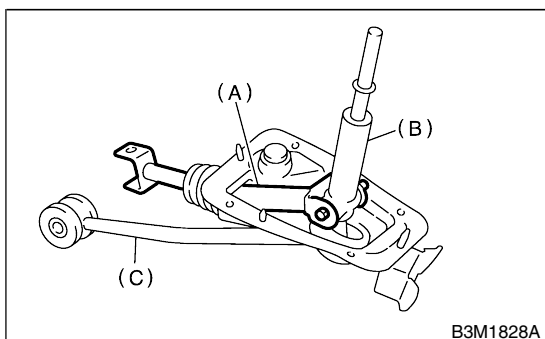


- (A) Locking wire
- (B) Stay

- 7) Insert the rod into the boot hole.
- 8) Connect rod to gear shift lever.

Tightening torque:

11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



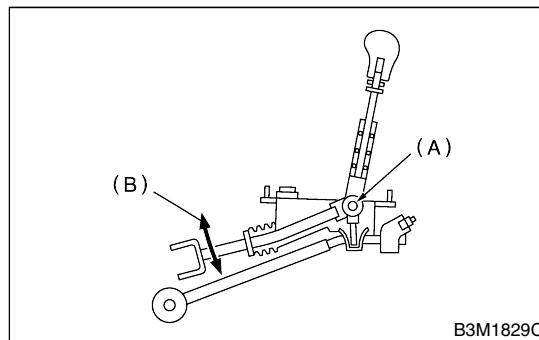
- (A) Rod
- (B) Shift lever
- (C) Stay

- 9) Check the swing torque of the rod in relation to the gear shift lever.

If the torque exceeds the specification, replace bushing or retighten nuts.

Rocking torque:

0.7 N·m (0.07 kgf-m, 0.5 ft-lb) or less



- (A) Center of rotation
- (B) Swing torque

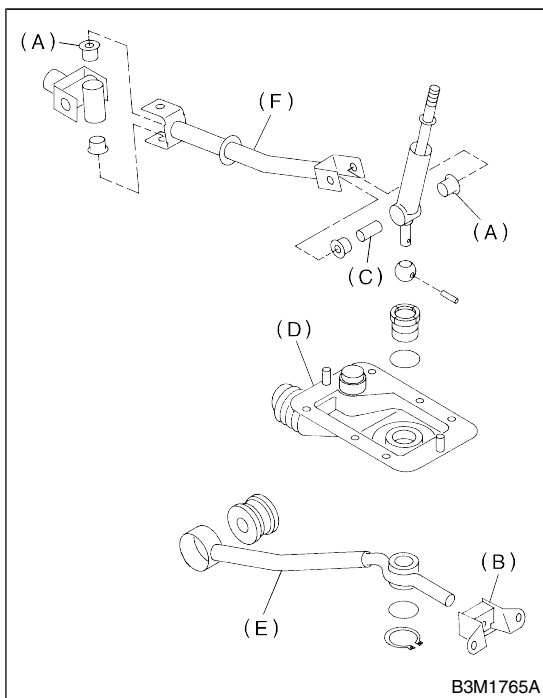
- 10) Check that there is no excessive play and that parts move smoothly.

MT GEAR SHIFT LEVER

E: INSPECTION

SS01236A10

1) Check each part (bushing A, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.



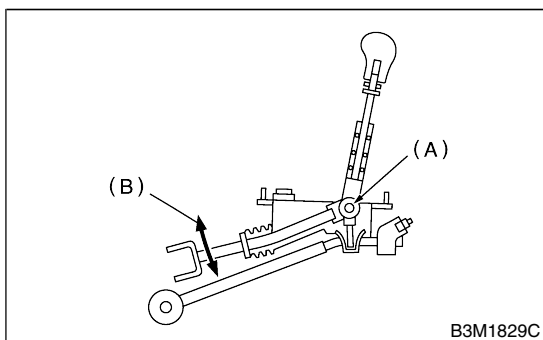
- (A) Bushing A
- (B) Cushion rubber
- (C) Spacer
- (D) Boot
- (E) Stay
- (F) Rod

2) Check the swing torque of the rod in relation of the gear shift lever.

If the torque exceeds the specification, replace bushing or retighten nuts.

Rocking torque:

0.7 N·m (0.07 kgf-m, 0.5 ft-lb) or less

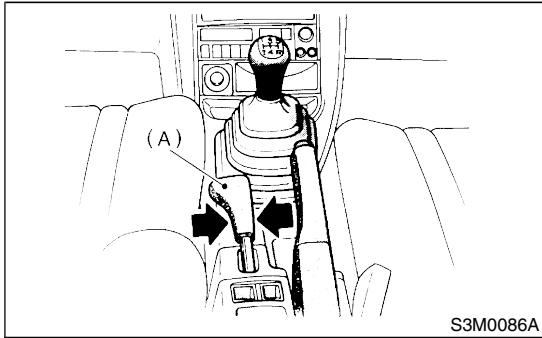


- (A) Center of rotation
- (B) Swing torque

5. MT Drive Select Lever S501235

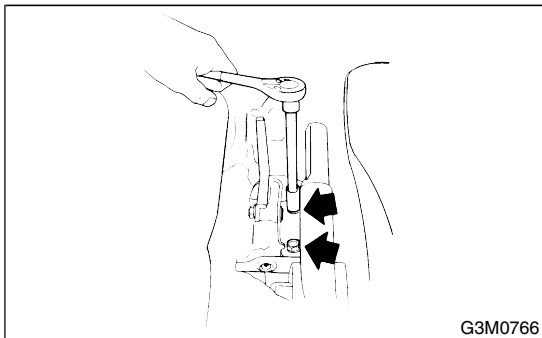
A: REMOVAL S501235A18

- 1) To immobilize vehicle, put the select lever in "1st" and block the tires.
- 2) Disconnect battery ground terminal from battery.
- 3) Set drive select lever to HI position.
- 4) Remove the drive select lever knob.

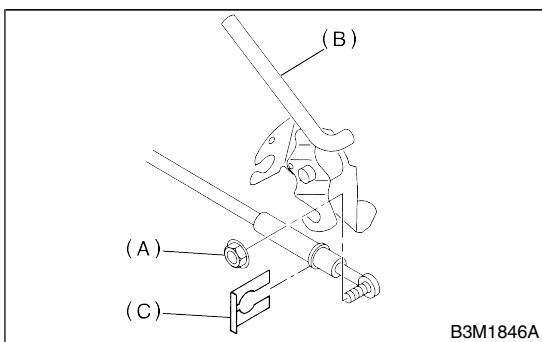


(A) Drive select lever knob

- 5) Remove console box. <Ref. to EI-30 Console Box.>
- 6) Remove the bolt installing drive select lever assembly on body.



- 7) Remove nut, clamp and then disconnect the cable from drive select lever assembly.



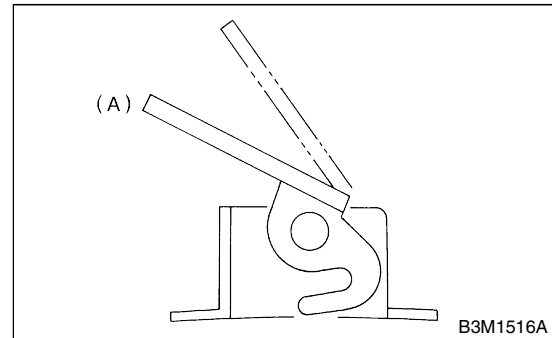
- (A) Nut
(B) Drive select lever
(C) Clamp

B: INSTALLATION S501235A11

- 1) Install drive select lever.

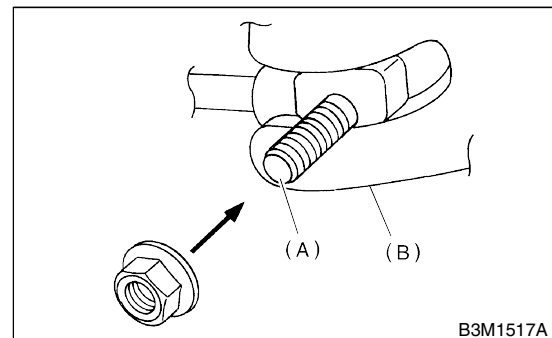
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 2) Set drive select lever to HI position.



(A) HI position

- 3) Be sure to insert cable end bolt into lever arm slit.



- (A) Cable end bolt
(B) Lever arm

- 4) Tighten nut where cable end bolt comes to a stop.

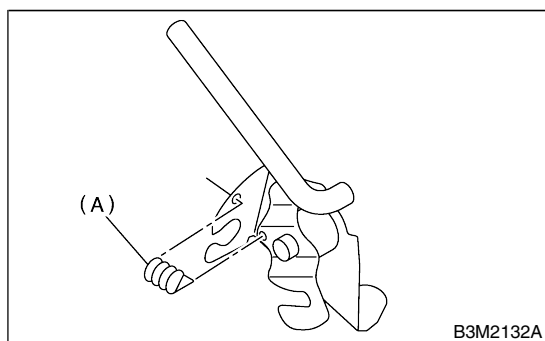
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 5) Install in the reverse order of removal.

C: DISASSEMBLY

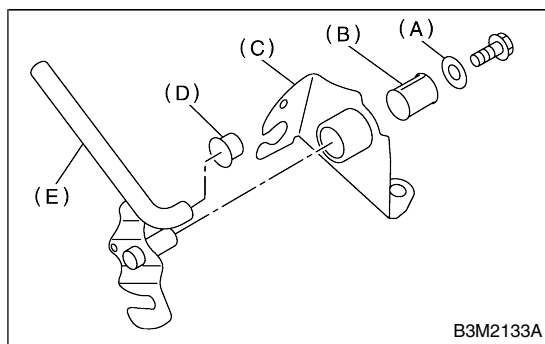
S501235A06

- 1) Remove spring.



- (A) Spring

- 2) Remove lever, cap and bushing.



- (A) Washer
(B) Bushing
(C) Plate
(D) Cap
(E) Lever

D: ASSEMBLY

S501235A02

- 1) Assemble in the reverse order of disassembly.

Tightening torque:**1.6 N·m (0.16 kgf-m, 1.2 ft-lb)**

- 2) Make sure the select lever moves smoothly.

E: INSPECTION

S501235A10

- 1) Make sure the select lever moves smoothly. If it does not move smoothly, repair or replace it.
2) Make sure the drive select lever is not damaged. If it is damaged, repair or replace it.

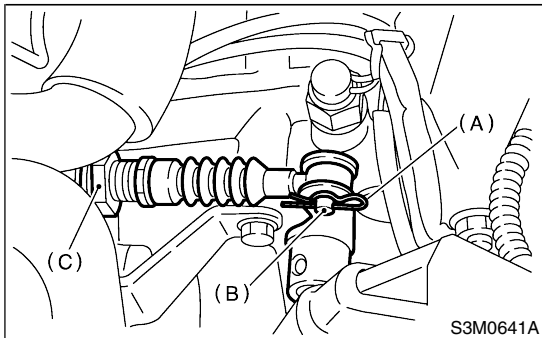
6. Drive Select Cable

S501717

A: REMOVAL

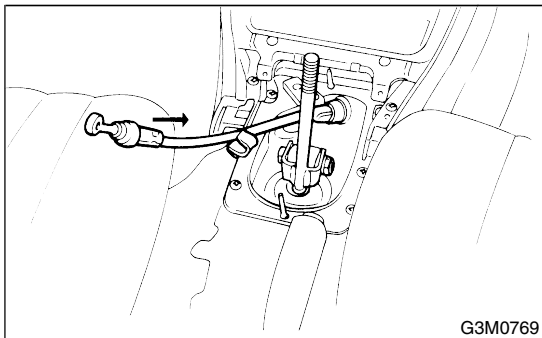
S501717A18

- 1) Remove the drive select lever. <Ref. to CS-19 REMOVAL, MT Drive Select Lever.>
- 2) Remove intake duct. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
- 3) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 4) Remove snap pin and clevis pin.
- 5) Loosen the nut and disconnect the cable from cable bracket.



- (A) Snap pin
- (B) Clevis pin
- (C) Nut

- 6) Remove cable from the under side of vehicle.



B: INSTALLATION

S501717A11

- 1) Install in the reverse order of removal.
- 2) Make sure the drive select lever operates properly.

C: INSPECTION

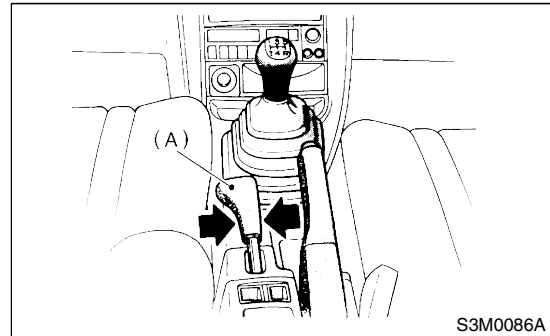
S501717A10

- 1) Make sure to move transmission to HI or LO position by moving the drive select lever. If it doesn't, adjust the cable.<Ref. to CS-21 ADJUSTMENT, Drive Select Cable.>
- 2) Make sure cable operates smoothly. If it catches or fails to work properly, repair or replace it.
- 3) Check cable for damage.

D: ADJUSTMENT

S501717A01

- 1) Set the drive select lever to HI position.
- 2) Remove the drive select lever knob.



- 3) Remove console box. <Ref. to EI-30, Console Box.>
- 4) Loosen the nut.
- 5) Make sure transmission is in HI position. If isn't, pull on cable to put transmission in HI position.
- 6) Tighten the nut in the location where the cable end bolt stops naturally.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 7) Make sure to move transmission to HI or LO position by moving the drive select lever. If it doesn't, readjust cable.

GENERAL DIAGNOSTIC TABLE**7. General Diagnostic Table** S501257**A: INSPECTION** S501257A10

Symptom	Possible cause	Remedy
1. AT select lever	(1) Starter does not run.	Adjust select cable and inhibitor switch, or inspect circuit.
	(2) Back-up light does not light up.	Adjust select cable and inhibitor switch, or inspect circuit.

AUTOMATIC TRANSMISSION

AT

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GENERAL DESCRIPTION

Automatic Transmission

1. General Description

S502001

A: SPECIFICATIONS

S502001E49

1. TORQUE CONVERTER CLUTCH

S502001E4901

Model	Non-turbo model	Turbo model
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	2.0 — 2.2	1.9 — 2.1
Nominal diameter	236 mm (9.29 in)	246 mm (9.69 in)
Stall speed (at sea level)	2,100 — 2,600 rpm	2,150 — 2,950 rpm
One-way clutch	Sprague type one-way clutch	

2. OIL PUMP

S502001E4902

Type	Pracoid constant-displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. TRANSMISSION CONTROL ELEMENT

S502001E4903

Type	4-forward, 1-reverse, double-row planetary gears
Multi-plate clutch	3 sets
Multi-plate brake	2 sets
One-way clutch (sprague type)	1 sets

4. TRANSMISSION GEAR RATIO

S502001E4904

	Gear ratio
1st	2.785
2nd	1.545
3rd	1.000
4th	0.694
Rev	2.272

5. PLANETARY GEAR AND PLATE

S502001E4905

	Non-turbo model	Turbo model
Tooth number of front sun gear	33	
Tooth number of front pinion	21	
Tooth number of front internal gear	75	
Tooth number of rear sun gear	42	
Tooth number of rear pinion	17	
Tooth number of rear internal gear	75	
Drive & driven plate number of high clutch	4	5
Drive & driven plate number of low clutch	4	7
Drive & driven plate number of reverse clutch	2	
Drive & driven plate number of 2-4 brake	3	4
Drive & driven plate number of low & reverse brake	4	7

GENERAL DESCRIPTION

Automatic Transmission

6. SELECTOR POSITION S502001E4906

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 $\leftarrow$ $\rightarrow$ 2nd $\leftarrow$ $\rightarrow$ 3rd $\leftarrow$ $\rightarrow$ 4th
3 (3rd)	Automatic gear change 1st $\leftarrow$ $\rightarrow$ 2nd $\leftarrow$ $\rightarrow$ 3rd $\leftarrow$ 4th
2 (2nd)	Automatic gear change 1st $\leftarrow$ $\rightarrow$ 2nd $\leftarrow$ 3rd $\leftarrow$ 4th
1 (1st)	1st gear locked (Deceleration possible 1st $\leftarrow$ 2nd $\leftarrow$ 3rd $\leftarrow$ 4th)
Control method	Hydraulic remote control

7. HYDRAULIC CONTROL AND LUBRICATION S502001E4907

Type	Electronic/hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]	
Fluid	Dexron III type Automatic transmission fluid	
Fluid capacity	Non-turbo model	8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
	Turbo model	9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)
Lubrication system	Forced feed lubrication with oil pump	
Oil	Automatic transmission fluid (above mentioned)	

8. COOLING AND HARNESS S502001E4908

Cooling system	Liquid-cooled cooler incorporated in radiator
ATF cooling system (Radiation capacity)	4.630 kW (3,981 kcal/h, 15,797 BTU/h)
Inhibitor switch	12 poles
Transmission harness	20 poles

9. TRANSFER S502001E4909

Model	Non-turbo model	Turbo model
Transfer clutch	Hydraulic multi-plate clutch	
Drive & driven plate number of transfer clutch	4	6
Control method	Electronic, hydraulic type	
Lubricant	The same Automatic transmission fluid used in automatic transmission	
1st reduction gear ratio	1.000 (53/53)	

10. FINAL REDUCTION S502001E4910

Model	Turbo model	Non-turbo model																		
Front final gear ratio	4.111 (37/9)	4.444 (40/9)																		
Lubrication oil	ITEM • Front differential gear oil API Classification GL - 5 SAE Viscosity No. and Applicable Temperature <table><tr><td>(°C)</td><td>-30</td><td>-26</td><td>-15</td><td>-5</td><td>0</td><td>15</td><td>25</td><td>30</td></tr><tr><td>(°F)</td><td>-22</td><td>-15</td><td>5</td><td>23</td><td>32</td><td>59</td><td>77</td><td>86</td></tr></table> 90 85W 80W 80W-90 H3M1235A		(°C)	-30	-26	-15	-5	0	15	25	30	(°F)	-22	-15	5	23	32	59	77	86
(°C)	-30	-26	-15	-5	0	15	25	30												
(°F)	-22	-15	5	23	32	59	77	86												
Front differential oil capacity	1.2 ℓ (1.3 US qt, 1.1 Imp qt)																			

GENERAL DESCRIPTION

Automatic Transmission

B: COMPONENT

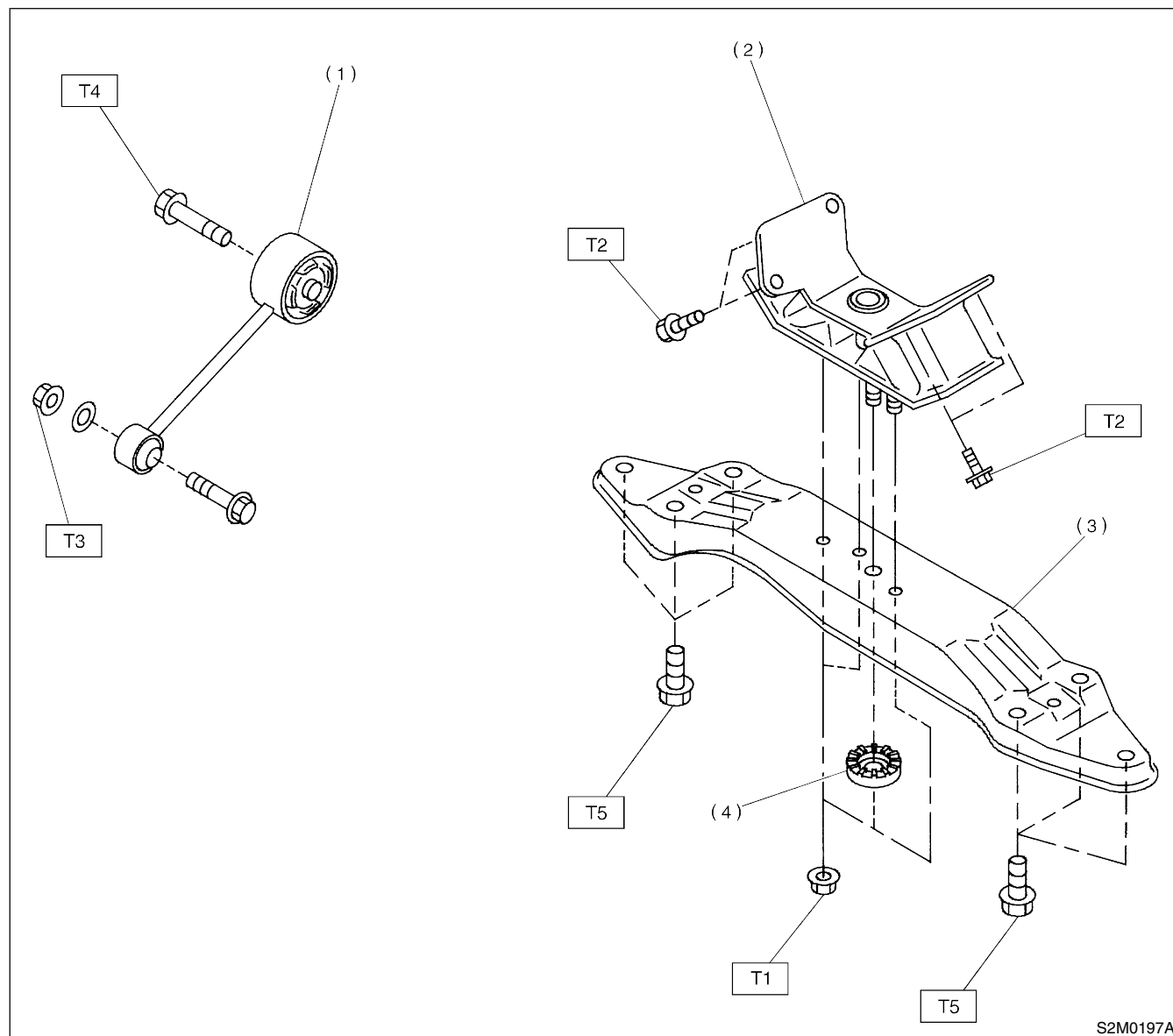
S502001A05

NOTE:

For information about other transmission mounting components, refer to "AUTOMATIC TRANSMISSION" <Pub. No. G0853ZE> a separate publication.

1. TRANSMISSION MOUNTING

S502001A0501



- (1) Pitching stopper
- (2) Rear cushion rubber
- (3) Crossmember
- (4) Stopper

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 26)

T2: 39 (4.0, 29)

T3: 50 (5.1, 37)

T4: 58 (5.9, 43)

T5: 70 (7.1, 51)

GENERAL DESCRIPTION

Automatic Transmission

C: CAUTION S502001A03

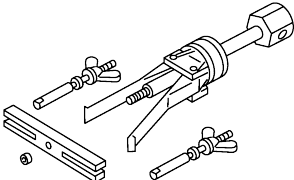
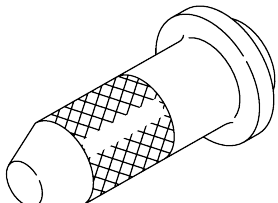
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Until the oil pan is removed, do not place with the oil pan side facing up to prevent foreign matter from entering the valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with

that of another grade or from other manufacturers.

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing O-rings or oil seals, apply sufficient amount of ATF fluid to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

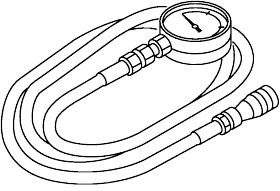
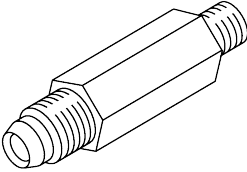
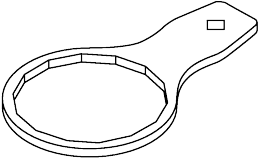
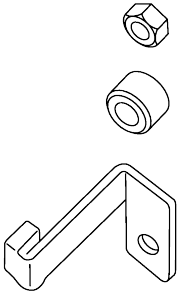
D: PREPARATION TOOL S502001A17

1. SPECIAL TOOLS S502001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1977	398527700	PULLER ASSY	Used for removing extension case oil seal.
 B3M1972	498057300	INSTALLER	Used for installing extension oil seal.

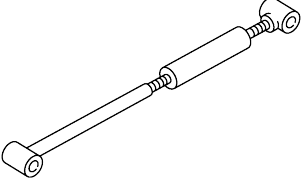
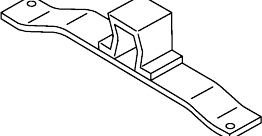
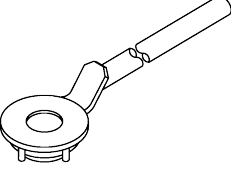
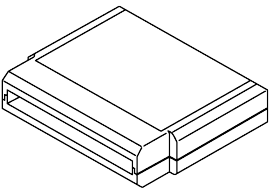
GENERAL DESCRIPTION

Automatic Transmission

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M2040	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 B3M2041	498897200	ADAPTER	Used oil pump housing when measuring reverse clutch pressure and line pressure.
 B3M2042	498545400	FILTER WRENCH	Used for removing and installing ATF filter.
 B3M2043	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.

GENERAL DESCRIPTION

Automatic Transmission

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 B2M4157	499977300	CRANK PULLEY WRENCH	Used for removing and installing bolts which secure torque converter to the drive plate.
 B2M3876	24082AA150 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.

GENERAL DESCRIPTION

Automatic Transmission

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

2. GENERAL PURPOSE TOOLS S502001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

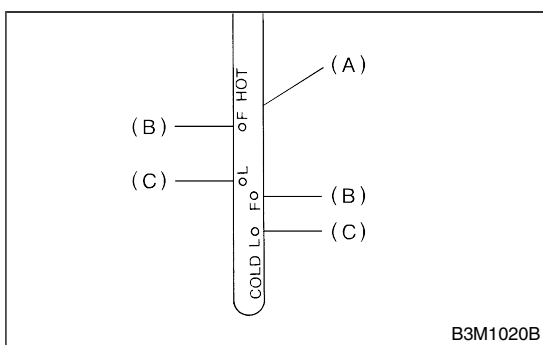
2. Automatic Transmission Fluid S502248

A: INSPECTION S502248A10

- 1) Check the level of the ATF.
 - (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.



- (A) ATF level gauge
- (B) Upper level
- (C) Lower level

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

NOTE:

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

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

CAUTION:

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

- (4) Fluid temperature rising speed
 - By idling the engine

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

<Reference>

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

- By running the vehicle

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

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

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

- 2) Check the fluid for leaks.

Check for leaks in the transmission. If there are leaks, it is necessary to repair or replace gasket, oil seals, plugs or other parts.

B: REPLACEMENT S502248A20

- 1) Lift vehicle.
- 2) Drain ATF completely.

CAUTION:

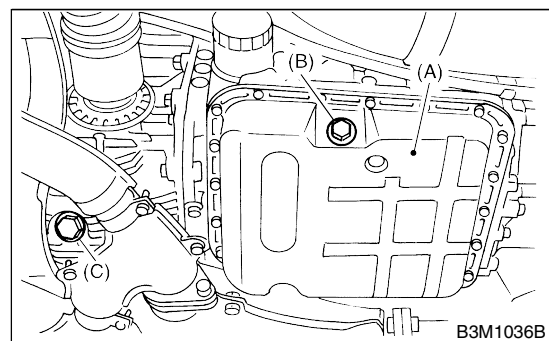
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 3) Lower the vehicle.
- 4) Pour ATF into the oil charge pipe.

Recommended fluid:

Dexron III type automatic transmission fluid

AUTOMATIC TRANSMISSION FLUID

Automatic Transmission

Capacity:

*Fill the same amount of fluid drained
from drain plug hole.*

Capacity when transmission is overhauled:

Non-turbo model:

*8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.71
Imp qt)*

Turbo model:

*9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4
Imp qt)*

5) Check the level and leaks of the ATF.

<Ref. to AT-9 INSPECTION, Automatic Transmis-
sion Fluid.>

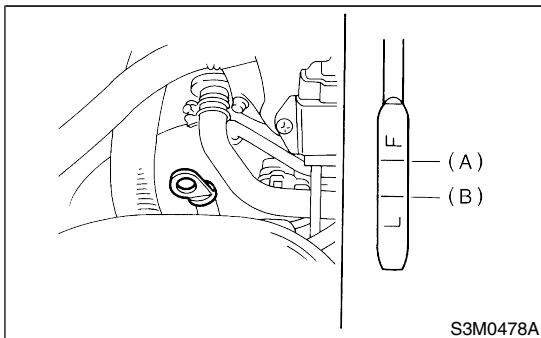
3. Differential Gear Oil

S502150

A: INSPECTION

S502150A10

- 1) Park vehicle on a level surface.
- 2) Remove oil level gauge and wipe it clean.
- 3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
- 4) Remove it again and note the reading. If the differential gear oil level is below the "L" line, add oil to bring the level up to the "F" line.
- 5) To prevent overfilling the differential gear oil, do not add oil above the "F" line.



S3M0478A

- (A) Upper level
(B) Lower level

B: REPLACEMENT

S502150A20

- 1) Lift vehicle.
- 2) Drain differential gear oil completely.

CAUTION:

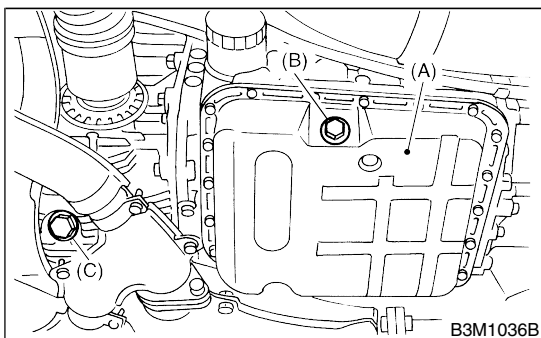
Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.

NOTE:

Tighten differential gear oil drain plug after draining differential gear oil.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)



B3M1036B

- (A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

- 3) Lower the vehicle.
- 4) Pour gear oil into the gauge hole.

Recommended fluid:

Use GL-5 or equivalent.

Gear oil capacity:

1.2 l (1.3 US qt, 1.1 Imp qt)

- 5) Check the level of the differential gear oil.
<Ref. to AT-11 INSPECTION, Differential Gear Oil.>

ROAD TEST

Automatic Transmission

4. Road Test S502247

A: INSPECTION S502247A10

1. GENERAL PRECAUTION S502247A1001

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. D RANGE SHIFT FUNCTION S502247A1002

Check shifting between 1st ⇔ 2nd ⇔ 3rd ⇔ 4th while driving on normal city streets.

3. D RANGE SHIFT SHOCK S502247A1003

Check the shock level when shifting up during normal driving.

4. KICK-DOWN FUNCTION S502247A1004

Check kick-down for each gear. Also check the kick-down shock level.

5. ENGINE BRAKE OPERATION S502247A1005

- Check the 3rd gear engine brake when shifting between D ⇔ 3rd range while driving in 4th gear of D range [50 to 60 km/h (31 to 37 MPH)].
- Check the 2nd gear engine brake when shifting between 3 ⇔ 2 range while driving in the 3 range 3rd gear [40 to 50 km/h (25 to 31 MPH)].
- Check the 1st gear engine brake when shifting between 2 ⇔ 1 range while driving in the 2 range 2nd gear [20 to 30 km/h (12 to 19 MPH)].

6. LOCK-UP FUNCTION S502247A1006

Check that rpm does not change sharply when the axle pedal is lightly depressed when driving on flat roads at normal speed in the lock-up range.

7. P RANGE OPERATION S502247A1007

Stop the vehicle on an uphill grade of 5% or more and shift to P range. Check that the vehicle does not move when the parking brake is released.

8. UNUSUAL SOUNDS AND VIBRATION S502247A1008

Check for unusual sounds and vibration while driving and during shifting.

9. CLIMBING CONTROL FUNCTION S502247A1009

- Check that gear remains in 3rd when going up a grade.
- Check that gear remains in 3rd when applying the brakes while going down a grade.

10. OIL LEAKS S502247A1010

After the driving test, inspect for oil leaks.

STALL TEST

Automatic Transmission

5. Stall Test S502246

A: INSPECTION S502246A10

1. GENERAL INFORMATION S502246A1001

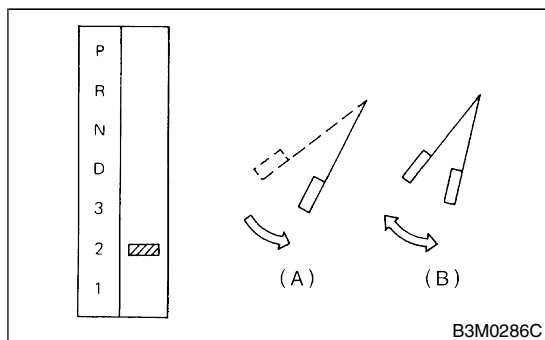
The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.

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 S502246A1002

- 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 50 to 80°C (122 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.



- (A) Brake pedal
(B) Accelerator pedal

- 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, low clutch slipping and 2-4 brake 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.

NOTE:

- 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 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.

Stall speed (at sea level):

Non-turbo model: 2,100 — 2,600 rpm

Turbo model: 2,150 — 2,950 rpm

STALL TEST

Automatic Transmission

3. EVALUATION SS02246A1003

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	● Line pressure too low ● Low clutch slipping ● One-way clutch malfunctioning
	R	● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	● Line pressure too low ● Low clutch slipping ● 2-4 brake slipping

6. Time Lag Test S502245

A: INSPECTION S502245A10

1. GENERAL INFORMATION S502245A1001

If the select 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 low clutch, reverse clutch, low & reverse brake and 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 S502245A1002

1) Fully apply the parking brake.

2) Start the engine.

Check idling speed (A/C OFF).

3) Shift the select 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 S502245A1003

1) If "N" → "D" time lag is longer than specified:

- Line pressure too low
- Low clutch worn
- 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

LINE PRESSURE TEST

Automatic Transmission

7. Line Pressure Test S502244

A: MEASUREMENT S502244A14

1. GENERAL INFORMATION S502244A1401

If the clutch or the brake 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 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.

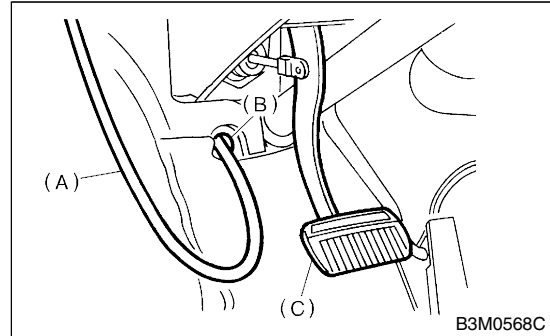
- Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)

- 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 S502244A1402

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.

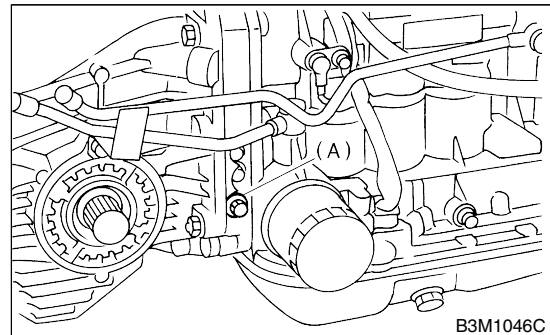
ST 498575400 OIL PRESSURE GAUGE ASSY



- (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



- (A) Test plug

3) Connect ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

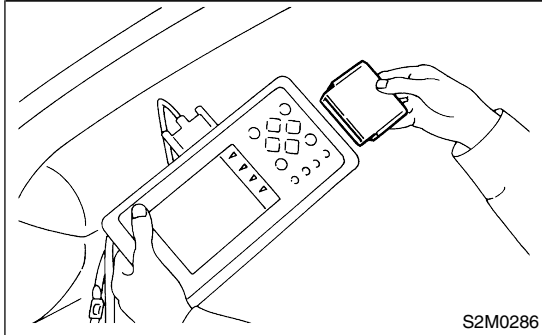
ST2 498575400 OIL PRESSURE GAUGE ASSY

LINE PRESSURE TEST

Automatic Transmission

4) Check for duty ratio changes by opening and closing throttle valve using Subaru Select Monitor.

(1) Insert the cartridge to Subaru Select Monitor. <Ref. to AT-5 PREPARATION TOOL, General Description.>



(2) Connect Subaru Select Monitor to data link connector.

5) Check line pressure in accordance with the following chart.

3. EVALUATION SS02244A1403

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm ² , psi)
2	5	Full open	1,128 — 1,304 (11.5 — 13.3, 164 — 189)
R	5	Full open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	100	Full closed	304 — 412 (3.1 — 4.2, 44 — 60)

TRANSFER CLUTCH PRESSURE TEST

Automatic Transmission

8. Transfer Clutch Pressure Test

S502159

A: INSPECTION

S502159A10

1. TEST METHODS

S502159A1001

Check transfer clutch pressure in accordance with the following chart in the same manner as with line pressure test. <Ref. to AT-16, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET

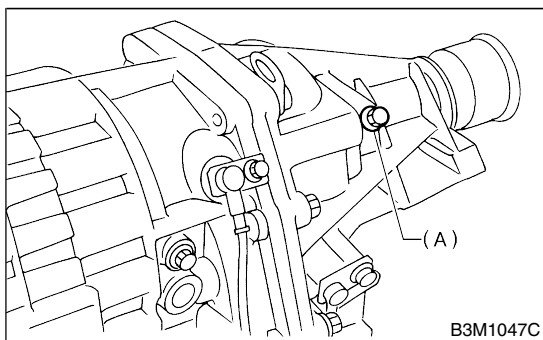
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

FWD mode: "P" range, engine speed 2,000 rpm

CAUTION:

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



(A) Test plug

2. EVALUATION

S502159A1002

NOTE:

If oil pressure is not produced or if it does not change in the AWD mode, the transfer duty solenoid 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 kPa (kg/cm ² , psi)			
Duty ratio (%)	Throttle position	AWD mode	FWD mode
5	Full closed	932 — 1,089 (9.5 — 11.1, 135 — 158)	—
60	2/3 throttle	216 — 294 (2.2 — 3.0, 31 — 43)	—
95	Full open	—	0 (0, 0)

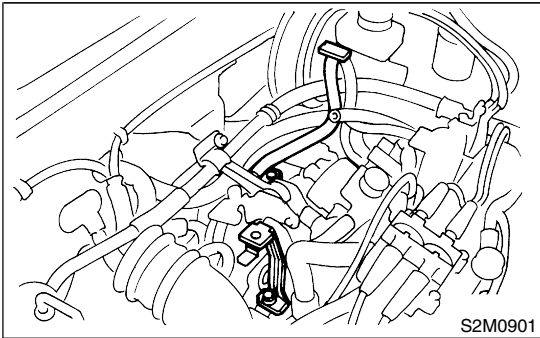
9. Automatic Transmission Assembly

S502207

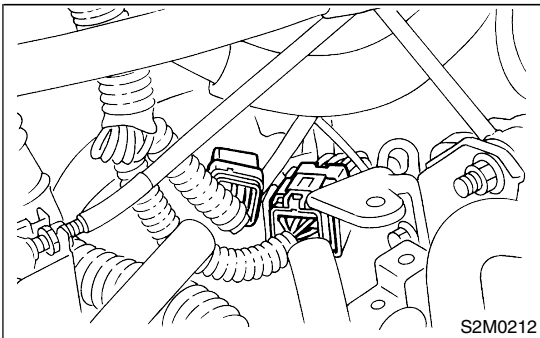
A: REMOVAL

S502207A18

- 1) Set vehicle on a lift.
- 2) Open front hood fully, and support with stay.
- 3) Disconnect battery ground terminal.
- 4) Remove air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 5) Remove air cleaner case stay. (Non-turbo model)

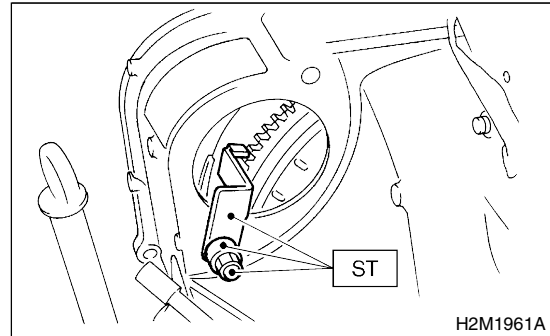


- 6) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
- 7) Disconnect the following connectors.
 - (1) Transmission harness connector

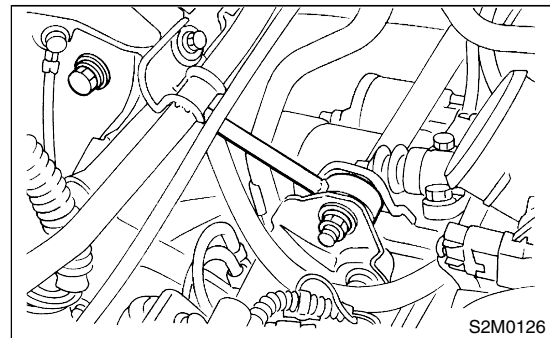


- (2) Transmission ground terminal
- 8) Remove starter. <Ref. to SC-5, REMOVAL, Starter.>

- 9) Install ST to torque converter clutch case.
ST 498277200 STOPPER SET



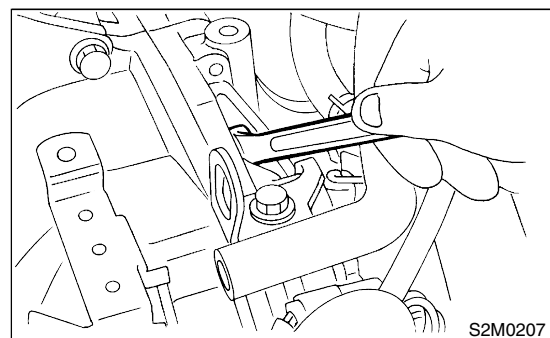
- 10) Remove pitching stopper.



- 11) Separate torque converter clutch from drive plate.
 - (1) Remove service hole plug.
 - (2) Remove bolts which hold torque converter clutch to drive plate.
 - (3) While rotating the engine, remove other bolts using ST.

CAUTION:
Be careful not to drop bolts into torque converter clutch housing.

- ST 499977300 CRANK PULLEY WRENCH



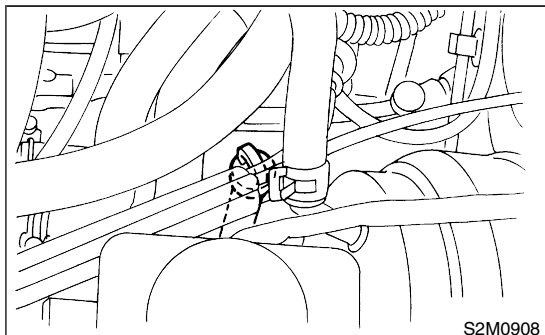
AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

12) Remove ATF level gauge.

CAUTION:

Plug opening to prevent entry of foreign particles into transmission fluid.

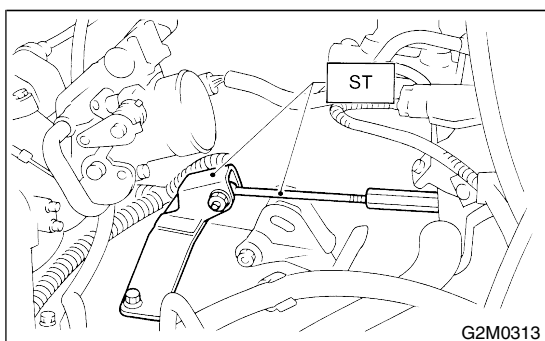


13) Set ST.

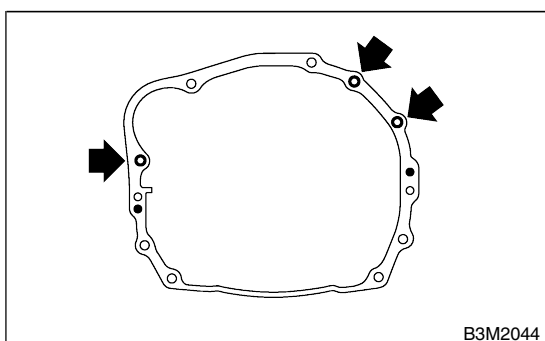
NOTE:

Also is available Part No. 41099AA010.

ST 41099AA020 ENGINE SUPPORT ASSY



14) Remove bolt which holds right upper side of transmission to engine.



15) Remove front and center exhaust pipe. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>

16) Remove rear exhaust pipe and muffler. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>

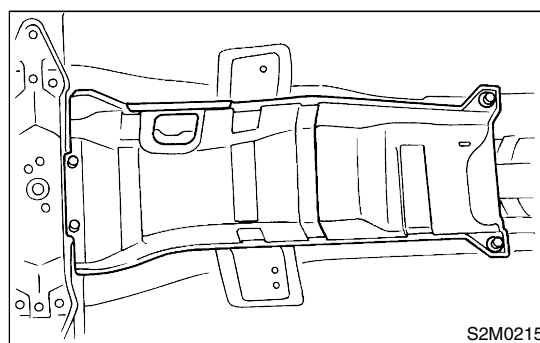
Without OBD:

<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>

17) Remove center, rear exhaust pipe and muffler. (Turbo model)

<Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>

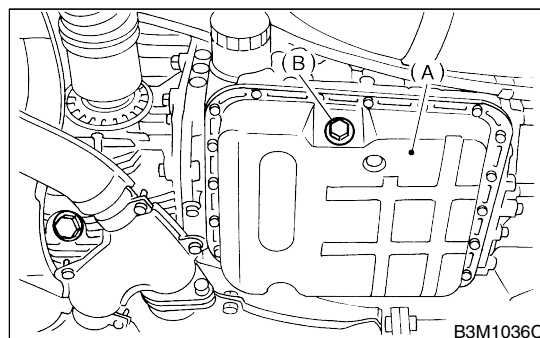
18) Remove heat shield cover. (If equipped)



19) Remove hanger bracket from right side of transmission.

20) Remove under cover.

21) Drain ATF to remove ATF drain plug.



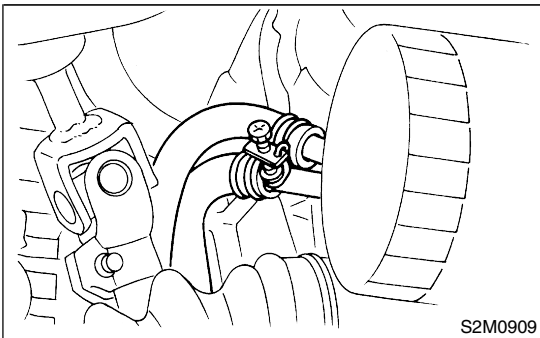
(A) Oil pan

(B) Drain plug

AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

22) Disconnect ATF cooler hoses from pipes of transmission side, and remove ATF level gauge guide.



23) Remove propeller shaft.

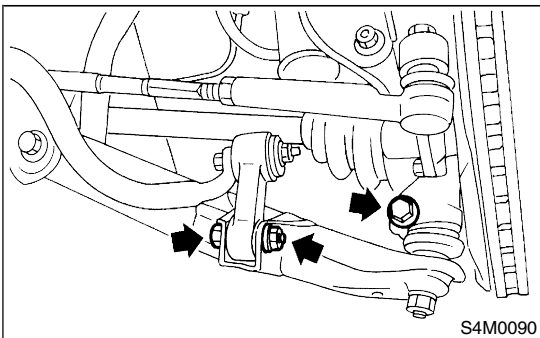
<Ref. to DS-14 REMOVAL, Propeller Shaft.>

24) Remove shift select cable. <Ref. to CS-10 REMOVAL, Select Cable.>

25) Remove front drive shafts from transmission.

(1) Disconnect stabilizer link from transverse link.

(2) Remove bolt securing ball joint of transverse link to housing.

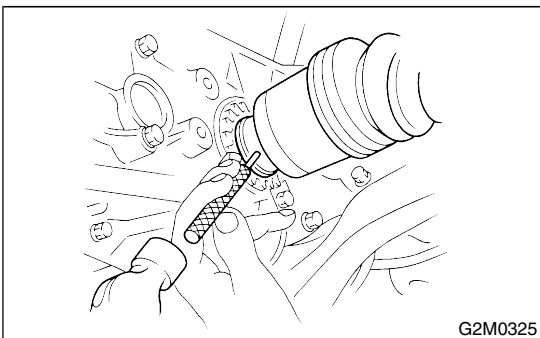


(3) Lower transverse link.

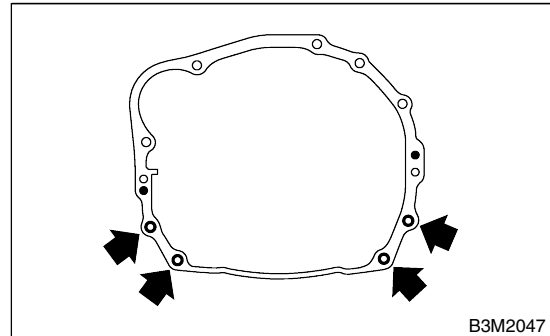
(4) Remove spring pins and separate front drive shafts from each side of the transmission.

CAUTION:

Discard removing spring pin. Replace with a new one.



26) Remove nuts which hold lower side of transmission to engine.



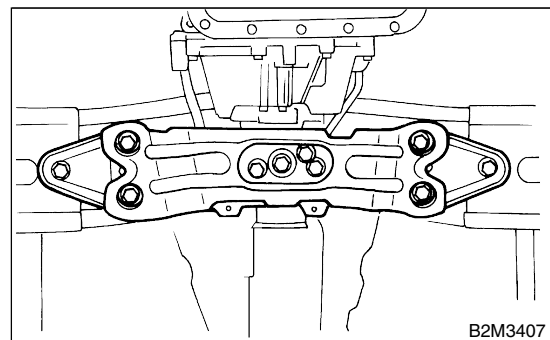
27) Place transmission jack under transmission.

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.

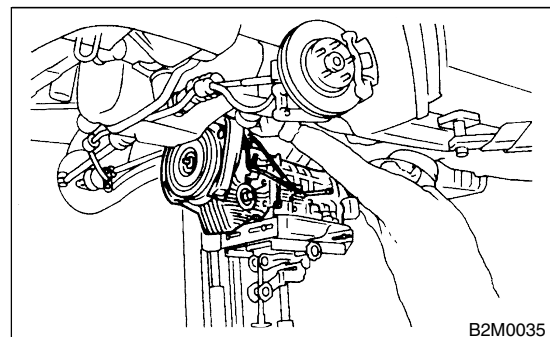
28) Remove transmission rear crossmember from vehicle.



29) Remove transmission.

CAUTION:

Move transmission and torque converter as a unit away from engine.



30) Separate transmission assembly and rear cushion rubber.

AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

B: INSTALLATION

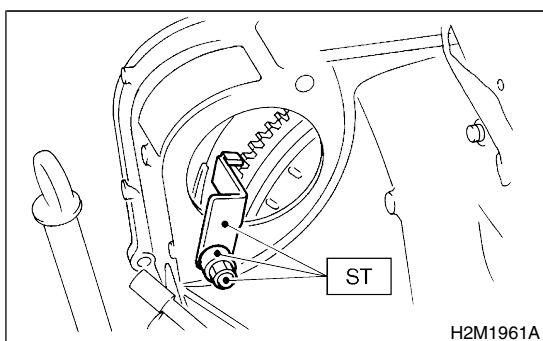
S502207A11

- 1) Install rear cushion rubber to transmission assembly.

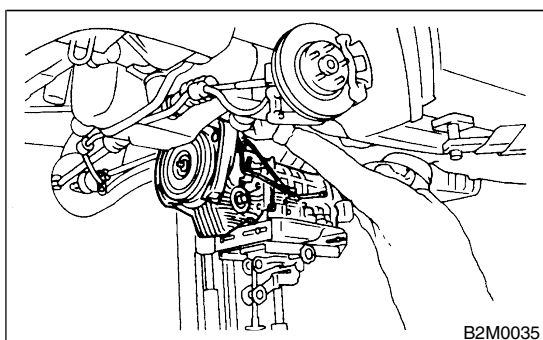
Tightening torque:

38 N·m (3.9 kgf-m, 28 ft-lb)

- 2) Install ST to torque converter clutch case.
ST 498277200 STOPPER SET



- 3) Install transmission onto engine.
(1) Gradually raise transmission with transmission jack.

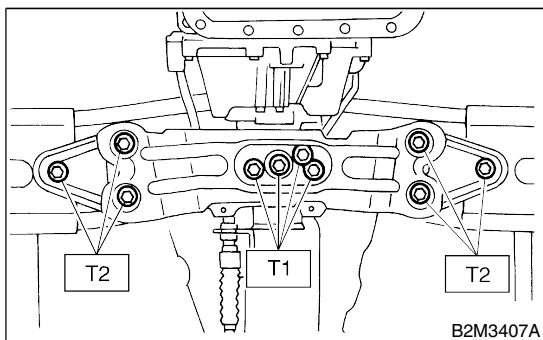


- (2) Engage them at splines.
- 4) Install transmission rear crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51 ft-lb)

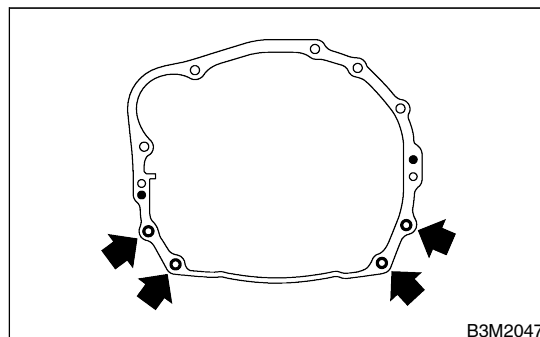


- 5) Take off transmission jack.

- 6) Tighten nuts and bolts which hold lower side of transmission to engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 7) Lower the vehicle.
- 8) Connect engine and transmission.
(1) Remove ST from torque converter clutch case.

NOTE:

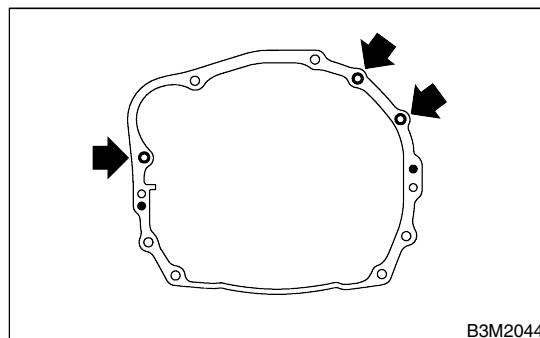
Be careful not to drop the ST into the torque converter clutch case when removing ST.

ST 498277200 STOPPER SET

- (2) Install starter.
<Ref. to SC-6 INSTALLATION, Starter.>
- (3) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

- 9) Install torque converter clutch to drive plate.
(1) Tighten bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine by using ST.

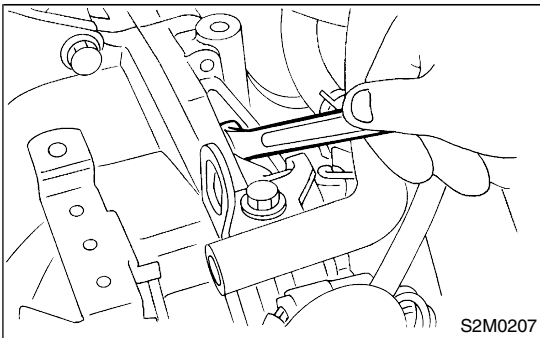
CAUTION:

Be careful not to drop bolts into torque converter clutch housing.

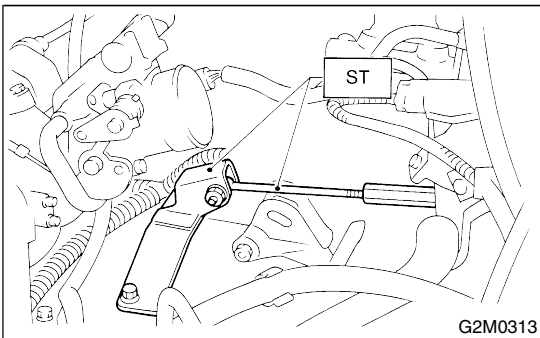
ST 499977300 CRANK PULLEY WRENCH

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (3) Clog plug onto service hole.
10) Remove ST.

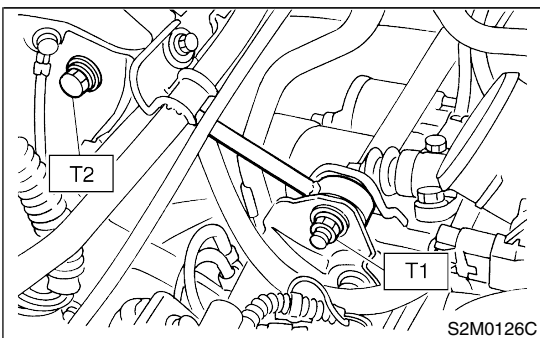


- 11) Install pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)

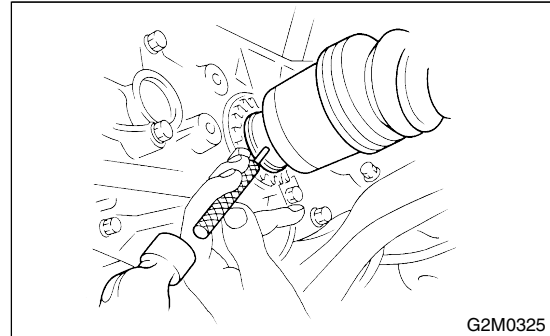


- 12) Lift vehicle.
Install front drive shafts into transmission.
(1) Lift vehicle.

- (2) Install front drive shaft into transmission.
(3) Drive spring pin into chamfered hole of drive shaft.

CAUTION:

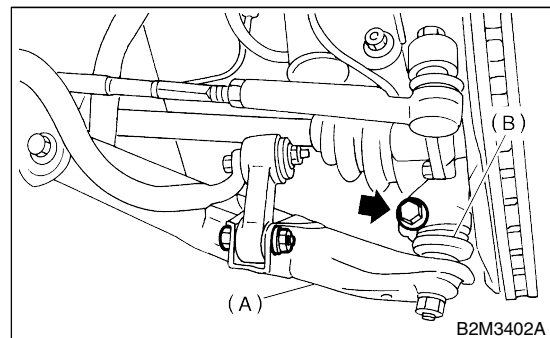
Always use a new spring pin.



- (4) Install ball joints of lower arm into knuckle arm of housing, and tighten installing bolts.

Tightening torque:

49 N·m (5.0 kgf-m, 36 ft-lb)

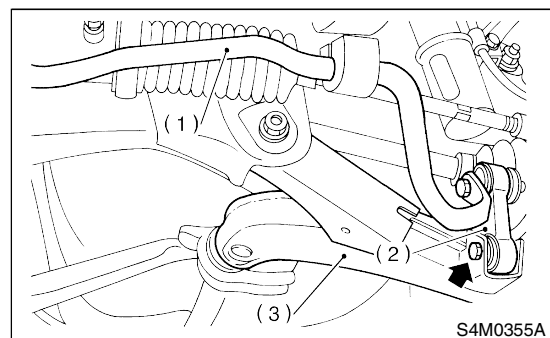


- (A) Transverse link
(B) Ball joint

- 13) Install stabilizer link to front transverse link.

Tightening torque:

30 N·m (3.1 kgf-m, 22 ft-lb)



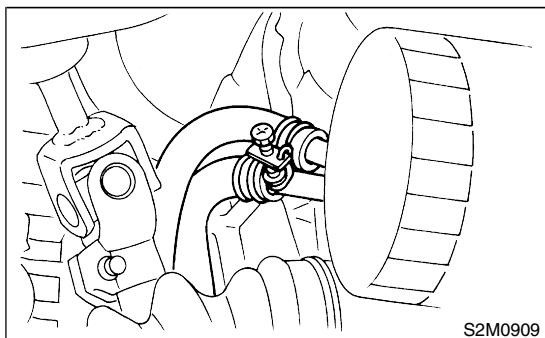
- (A) Stabilizer
(B) Stabilizer link
(C) Transverse link

- 14) Install shift select cable onto select lever.
<Ref. to CS-11 INSTALLATION, Select Cable.>

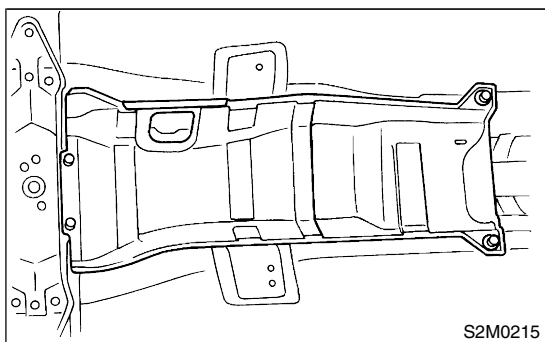
AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

- 15) Install ATF level gauge guide, and connect ATF cooler hoses to pipe.



- 16) Install propeller shaft.
<Ref. to DS-15 INSTALLATION, Propeller Shaft.>
17) Install heat shield cover. (If equipped)



- 18) Install rear exhaust pipe and muffler assembly. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>
and <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>

- 19) Install front and center exhaust pipe. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>

Without OBD:

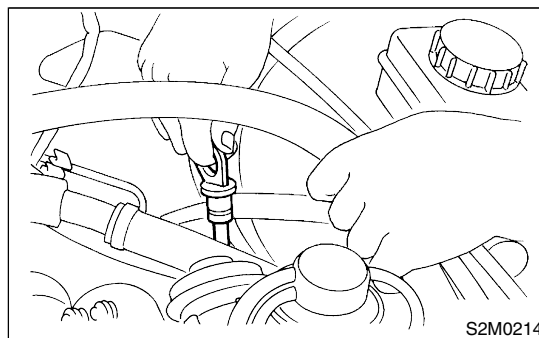
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>

- 20) Install center, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>

- 21) Install under cover.

- 22) Lower the vehicle.

- 23) Install ATF level gauge.



- 24) Connect the following connectors.
(1) Transmission harness connectors
(2) Transmission ground terminal
25) Install air cleaner case stay.

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)

- 26) Install air cleaner case and intake duct. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>

- 27) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

- 28) Connect battery ground terminal.

- 29) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole.

Recommended fluid:

Dexron III type automatic transmission fluid

Fluid capacity:

Non-turbo model

8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 8.4 Imp qt)

Turbo model

9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

- 30) Take off vehicle from lift arms.

- 31) Check select lever operation.

<Ref. to AT-28, INSPECTION, Inhibitor Switch.>

- 32) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>

- 33) Check the vehicle on the road tester.

<Ref. to AT-12, Road Test.>

10. Transmission Mounting System

S502233

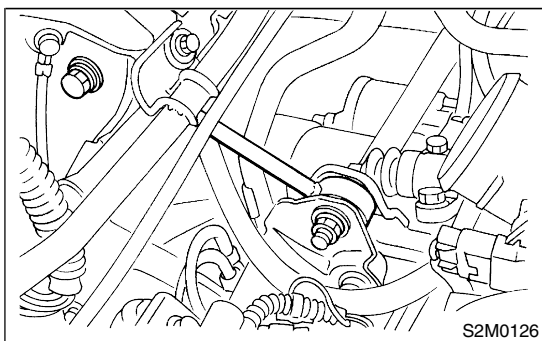
A: REMOVAL

S502233A18

1. PITCHING STOPPER

S502233A1801

- 1) Disconnect battery ground terminal.
- 2) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 3) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
- 4) Remove the pitching stopper.



2. CROSSMEMBER AND CUSHION RUBBER

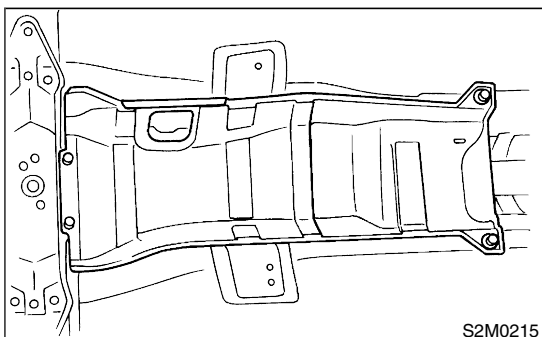
S502233A1802

- 1) Set vehicle on a lift.
- 2) Disconnect battery ground terminal.
- 3) Lift vehicle and support it with sturdy racks.
- 4) Remove the front, center, rear exhaust pipes and muffler.

CAUTION:

When removing exhaust pipes, be careful each exhaust pipe does not drop out.

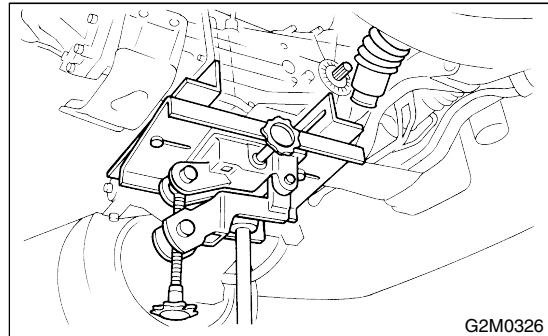
- 5) Remove the heat shield cover. (If equipped)



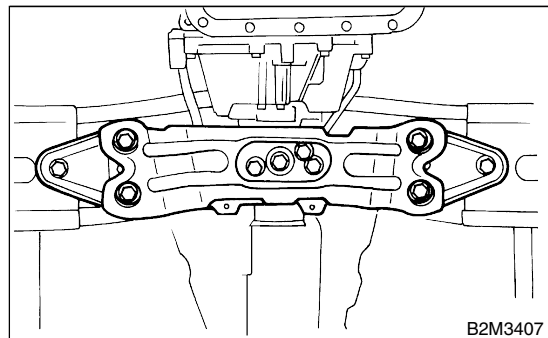
- 6) Set the transmission jack under the transmission.

CAUTION:

- Always support transmission case with a transmission jack.
- On AT vehicle, make sure that the support plates of transmission jack don't touch the oil pan.



- 7) Remove the crossmember.



- 8) Remove the rear cushion rubber.

B: INSTALLATION

S502233A11

1. PITCHING STOPPER

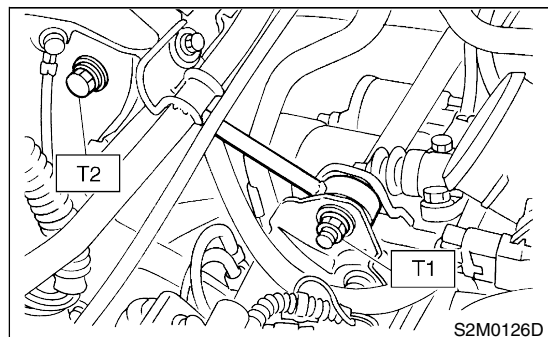
S502233A1101

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



- 2) Install the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>

TRANSMISSION MOUNTING SYSTEM

Automatic Transmission

3) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

2. CROSSMEMBER AND CUSHION RUBBER

S502233A1102

1) Install the rear cushion rubber.

Tightening torque:

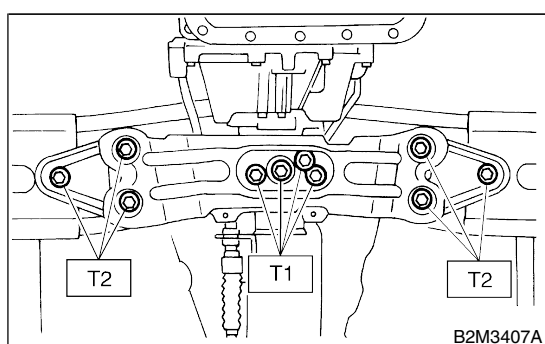
38 N·m (3.9 kgf-m, 28 ft-lb)

2) Install the crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the front, center, rear exhaust pipes and the muffler. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>

6) Install center, rear exhaust pipes and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>

7) Install under cover.

C: INSPECTION

S502233A10

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER

S502233A1001

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

S502233A1002

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

11. Extension Case Oil Seal S502718

A: INSPECTION S502718A10

Make sure ATF does not leak from the joint of the transmission and propeller shaft. If so, replace oil seal. <Ref. to AT-27 REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT S502718A20

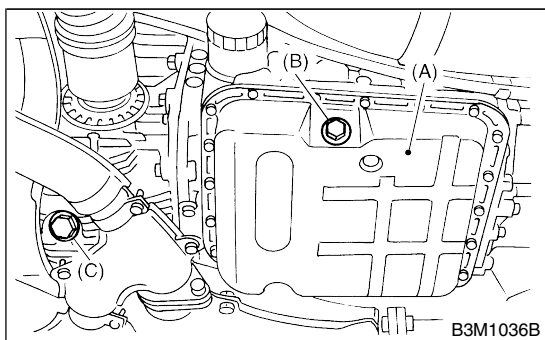
- 1) Set vehicle on a lift.
- 2) Lift vehicle.
- 3) Clean transmission exterior.
- 4) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (G) Oil pan
- (H) Drain plug
- (I) Differential oil drain plug

- 5) Remove the rear exhaust pipe and muffler.

Non-turbo model:

With OBD

<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>

Without OBD

<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>

Turbo model:

<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>

- 6) Remove the heat shield cover. (If equipped)
- 7) Remove the propeller shaft. <Ref. to DS-14 REMOVAL, Propeller Shaft.>
- 8) Using ST, remove the oil seal.
ST 398527700 PULLER ASSY
- 9) Using ST, install the oil seal.

ST 498057300 INSTALLER

10) Install the propeller shaft. <Ref. to DS-15 INSTALLATION, Propeller Shaft.>

11) Install the heat shield cover. (If equipped)

12) Install the rear exhaust pipe and muffler.

Non-turbo model:

With OBD

<Ref. to EX(SOHC)-11, INSTALLATION, Muffler.> and <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.>

Without OBD

<Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>

Turbo model:

<Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>

13) Pour ATF and check the ATF level. <Ref. to AT-9 Automatic Transmission Fluid.>

INHIBITOR SWITCH

12. Inhibitor Switch SS02243

A: INSPECTION SS02243A10

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 inhibitor switch connector.
- 2) Check continuity in inhibitor switch circuits with select lever moved to each position.

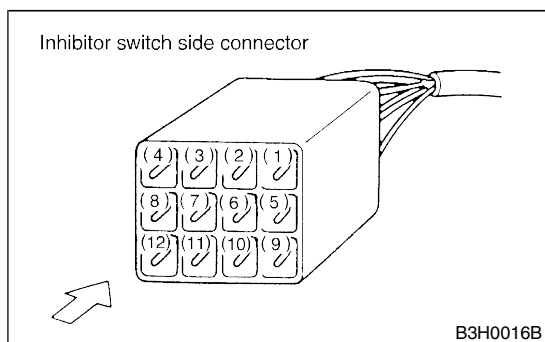
CAUTION:

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

NOTE:

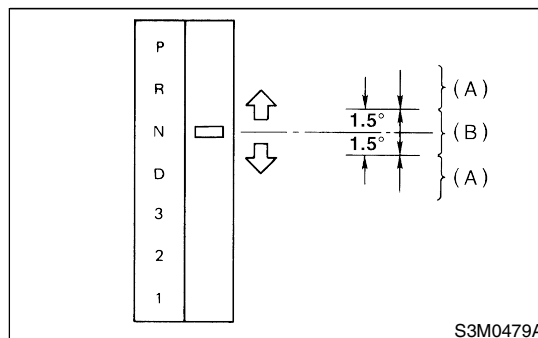
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	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



- 3) 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. <Ref. to AT-28 ADJUSTMENT, Inhibitor Switch.>

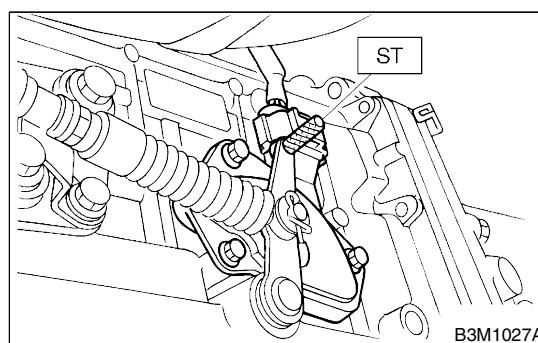


- (A) Continuity does not exist.
(B) Continuity exists.

- 4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-11 ADJUSTMENT, Select Cable.>

B: ADJUSTMENT SS02243A01

- 1) Shift the select lever to the N range.
- 2) Loosen the three inhibitor switch securing bolts.
- 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 N·m (0.35 kgf-m, 2.5 ft-lb)

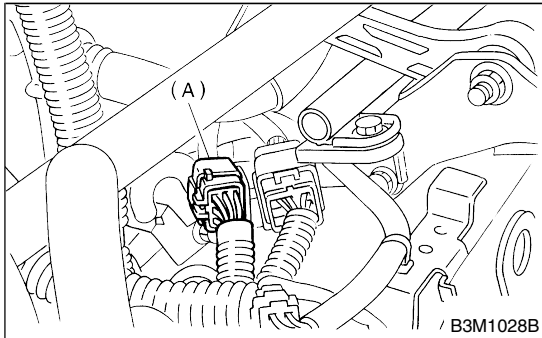
- 5) Repeat the above checks. If the inhibitor switch is determined to be "faulty", replace it.

INHIBITOR SWITCH

Automatic Transmission

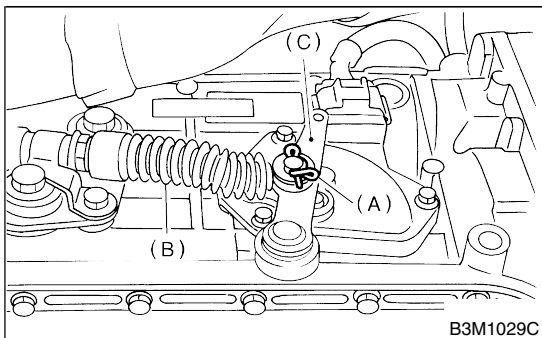
C: REMOVAL S502243A18

- 1) Set vehicle on a lift.
- 2) Move select lever to neutral position.
- 3) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 4) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
- 5) Disconnect inhibitor switch connector.



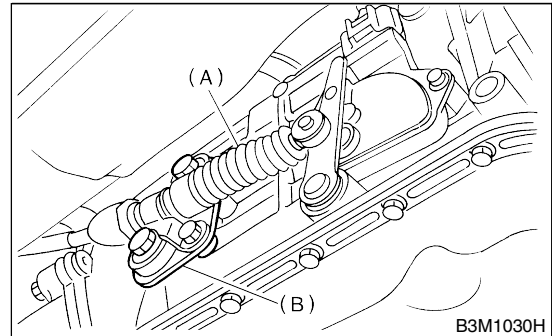
(A) Inhibitor switch

- 6) Remove inhibitor switch connector from stay.
- 7) Lift vehicle.
- 8) Remove under cover.
- 9) Remove snap pin from range select lever.



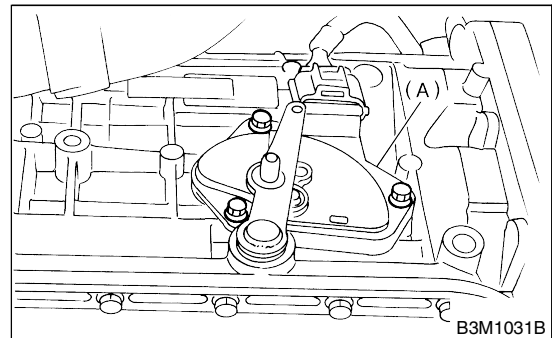
- (A) Snap pin
(B) Select cable
(C) Range select lever

- 10) Remove plate assembly from transmission case.



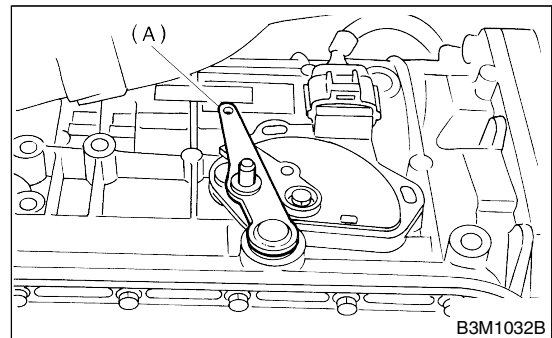
- (A) Select cable
(B) Plate ASSY

- 11) Remove bolts.



(A) Inhibitor switch

- 12) Move range select lever to parking position (left side).

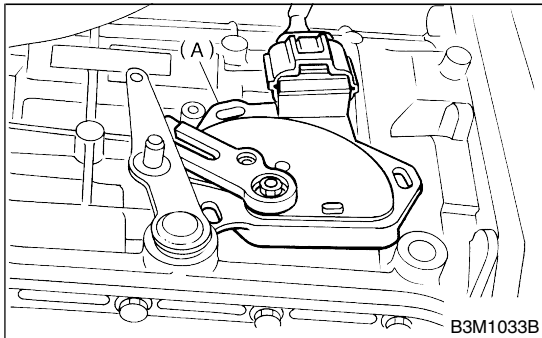


(A) Range select lever

INHIBITOR SWITCH

Automatic Transmission

- 13) Remove inhibitor switch from transmission.



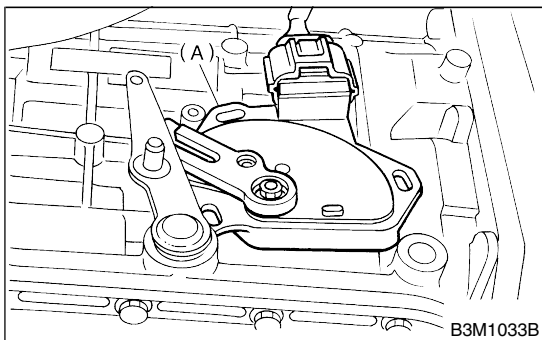
(A) Inhibitor switch

- 14) Remove inhibitor switch connector from inhibitor switch.

D: INSTALLATION

S502243A11

- 1) Connect inhibitor switch connector.
2) Install inhibitor switch to transmission case.

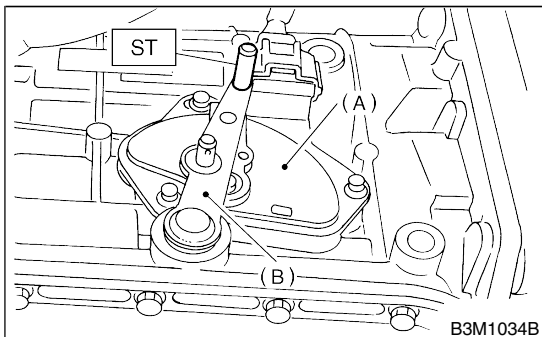


(A) Inhibitor switch

- 3) Move range select lever to neutral position.
4) Using ST, tighten bolts of inhibitor switch.
ST 499267300 STOPPER PIN

Tightening torque:

3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

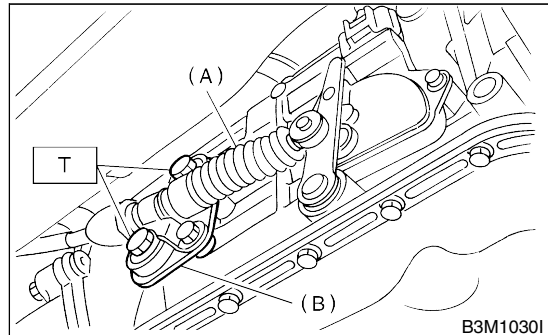


(A) Inhibitor switch
(B) Range select lever

- 5) Install select cable to range select lever.
6) Install plate assembly to transmission.

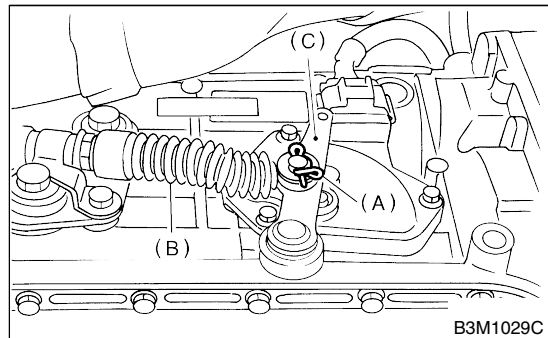
Tightening torque:

T: 24.5 N·m (2.50 kgf-m, 18.1 ft-lb)



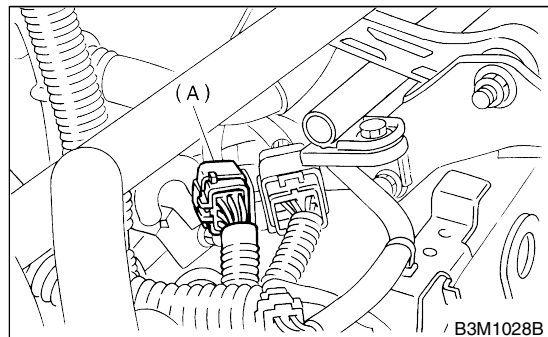
(A) Select cable
(B) Plate ASSY

- 7) Install snap pin to range select lever.



(A) Snap ring
(B) Select cable
(C) Range select lever

- 8) Install under cover.
9) Lower the vehicle.
10) Install inhibitor switch connector from stay.
11) Connect inhibitor switch connector.



(A) Inhibitor switch

- 12) Install air cleaner case. (Non-turbo model)
<Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>

INHIBITOR SWITCH

Automatic Transmission

13) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

14) Inspect inhibitor switch. <Ref. to AT-28 INSPECTION, Inhibitor Switch.>

FRONT VEHICLE SPEED SENSOR

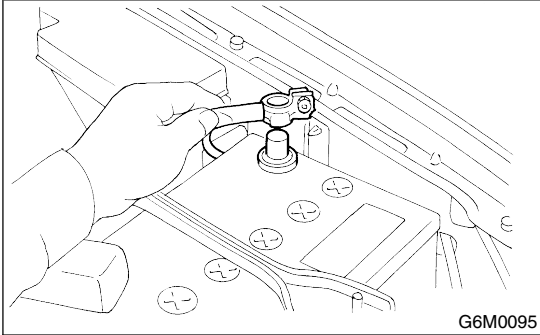
Automatic Transmission

13. Front Vehicle Speed Sensor

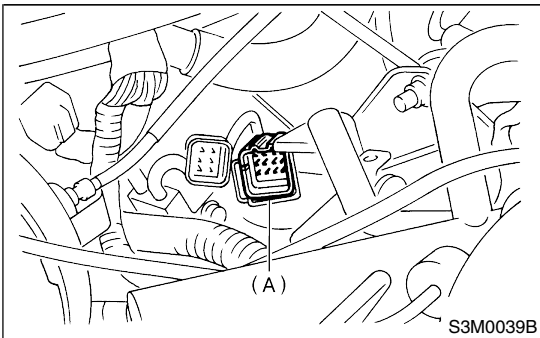
S502709

A: REMOVAL S502709A18

- 1) Set vehicle on a lift.
- 2) Disconnect battery ground terminal.



- 3) Remove air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 4) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
- 5) Disconnect transmission connector.



(A) Transmission connector

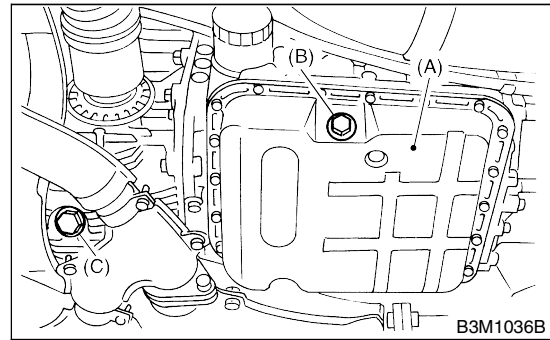
- 6) Remove the transmission connector from stay.
- 7) Lift vehicle.
- 8) Remove under cover.
- 9) Clean transmission exterior.
- 10) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 11) Remove front, center, rear exhaust pipes and muffler. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>

- 12) Remove center, rear exhaust pipe and muffler. (Turbo model)

<Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>

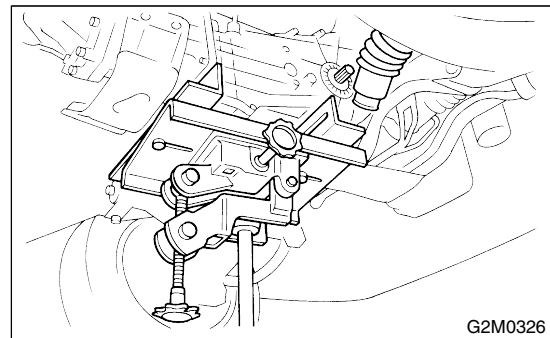
- 13) Remove the shield cover. (If equipped)

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

- 15) Place transmission jack under transmission.

CAUTION:

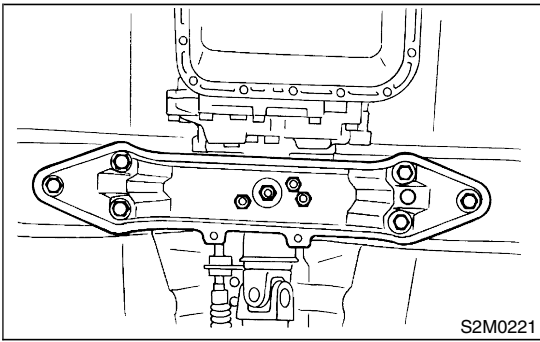
- Always support transmission case with a transmission jack.
- On AT vehicle, make sure that the support plates of transmission jack don't touch the oil pan.



- 16) Remove the transmission rear crossmember bolts.

FRONT VEHICLE SPEED SENSOR

Automatic Transmission



17) Lower the AT jack.

NOTE:

Do not separate the AT jack and transmission.

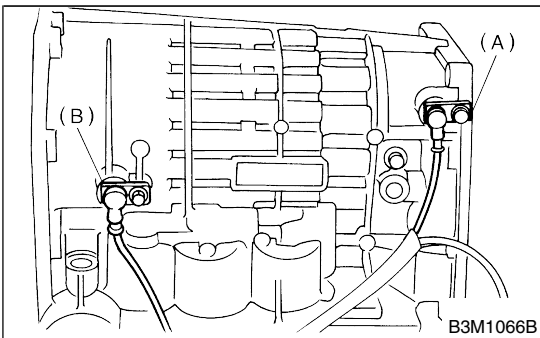
18) Remove the oil cooler outlet pipe.

CAUTION:

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

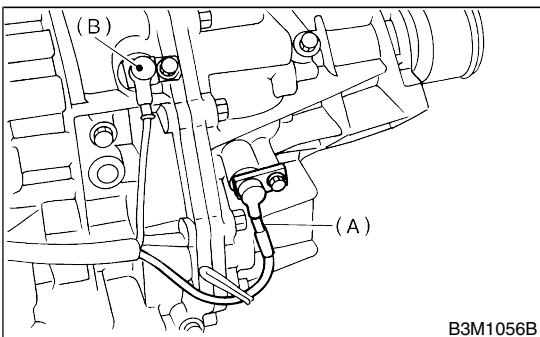
19) Remove front and rear vehicle speed sensor and torque converter turbine speed sensor.

● Front vehicle speed sensor and torque converter turbine speed sensor



- (A) Front vehicle speed sensor
- (B) Torque converter turbine speed sensor

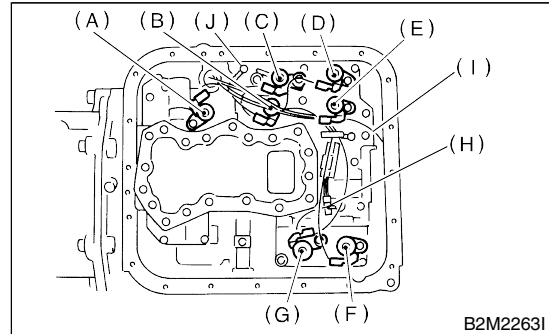
● Rear vehicle speed sensor



- (A) Rear vehicle speed sensor
- (B) Front vehicle speed sensor

20) Attach transmission rear crossmember bolt and tighten temporarily.

- 21) Remove the transmission jack.
- 22) Remove oil pan.
- 23) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)
- (J) Transmission ground

24) Remove harness assembly.

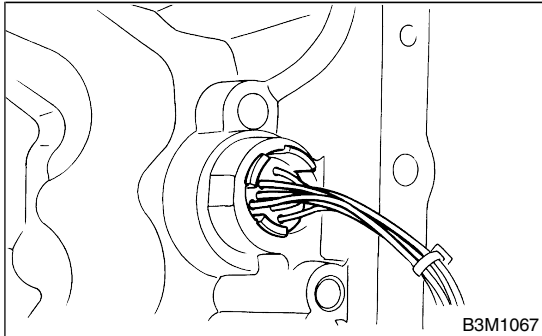
FRONT VEHICLE SPEED SENSOR

Automatic Transmission

B: INSTALLATION

S502709A11

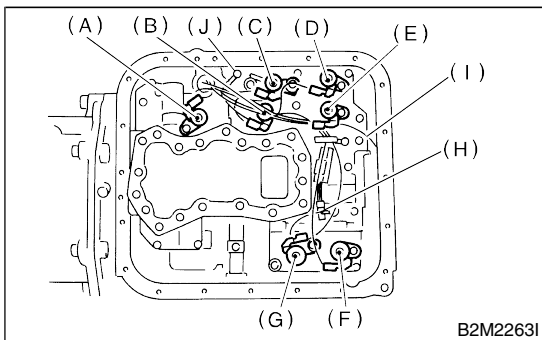
- 1) Pass the harness assembly through the hole in the transmission case.



- 2) Connect harness connectors. Connect connectors of same color, and secure connectors to valve body using clips.

Tightening torque (transmission ground terminal):

8 N·m (0.8 kgf-m, 5.8 ft-lb)

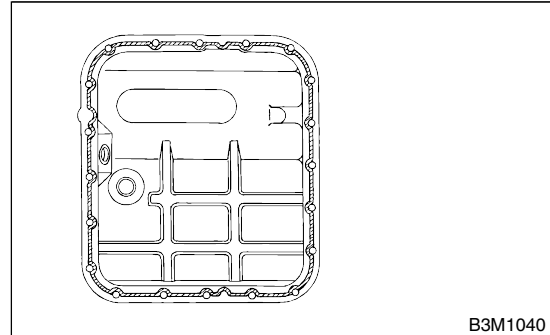


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)
- (J) Transmission ground

- 3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Fluid packing:

Three Bond 1217B



- 4) Install the oil pan.

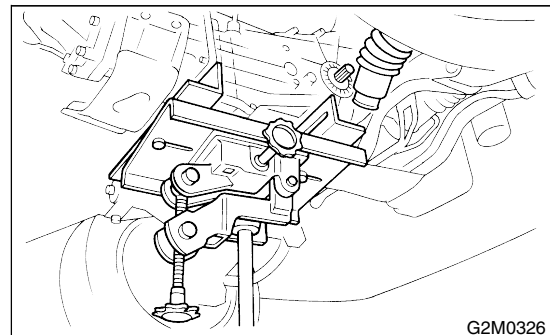
Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

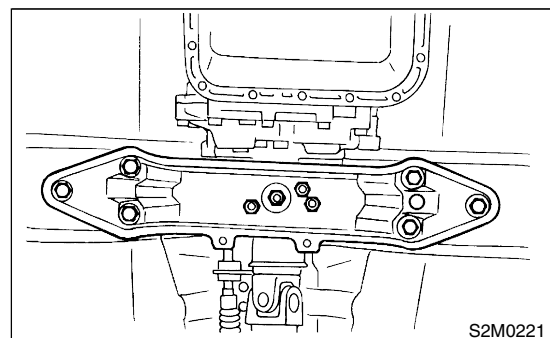
- 5) Place transmission jack under transmission.

CAUTION:

- Always support transmission case with a transmission jack.
- On AT vehicle, make sure that the support plates of transmission jack don't touch the oil pan.



- 6) Remove the transmission rear crossmember bolts.



- 7) Lower the AT jack.

NOTE:

Do not separate the AT jack and transmission.

8) Remove the oil cooler outlet pipe.

CAUTION:

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

9) Install the front and rear vehicle speed sensor, and also the torque converter turbine speed sensor, and then fasten the harness.

Tightening torque:

7 N·m (0.7 kgf-m, 5.1 ft-lb)

10) Install oil cooler outlet pipe.

CAUTION:

Be sure to use a new aluminum washer.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

11) Install transmission rear crossmember bolts.

Tightening torque:

75 N·m (7.6 kgf-m, 55 ft-lb)

12) Install propeller shaft. <Ref. to DS-15 INSTALLATION, Propeller Shaft.>

13) Install shield cover. (If equipped)

14) Install front, center, rear exhaust pipes and muffler. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.>

15) Install center, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>

16) Install under cover. (Turbo model)

17) Lower the vehicle.

18) Install the transmission connector to the stay.

19) Install air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>

20) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Inter-cooler.>

REAR VEHICLE SPEED SENSOR

Automatic Transmission

14. Rear Vehicle Speed Sensor

S502710

A: REMOVAL S502710A18

When removing the rear vehicle speed sensor, refer to "Front Vehicle Speed Sensor." <Ref. to AT-32 REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION S502710A11

When installing the rear vehicle speed sensor, refer to "Front Vehicle Speed Sensor." <Ref. to AT-34 INSTALLATION, Front Vehicle Speed Sensor.>

15. Torque Converter Turbine Speed Sensor S502711

A: REMOVAL S502711A18

When removing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor."
<Ref. to AT-32 REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION S502711A11

When installing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor."
<Ref. to AT-34 INSTALLATION, Front Vehicle Speed Sensor.>

CONTROL VALVE BODY

16. Control Valve Body

S502564

A: REMOVAL

S502564A18

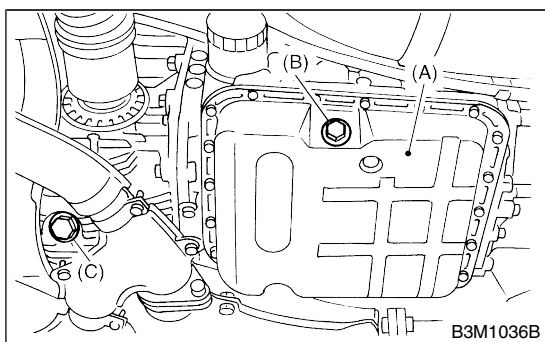
- 1) Set vehicle on a lift.
- 2) Disconnect battery ground terminal from battery.
- 3) Lift vehicle.
- 4) Clean transmission exterior.
- 5) Remove under cover.
- 6) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



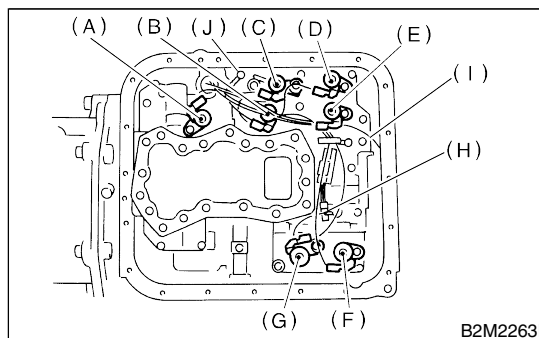
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 7) Remove the oil pan.

NOTE:

- Remove and clean the magnet.
- Remove the old gasket on the oil pan and transmission case completely.

- 8) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors.

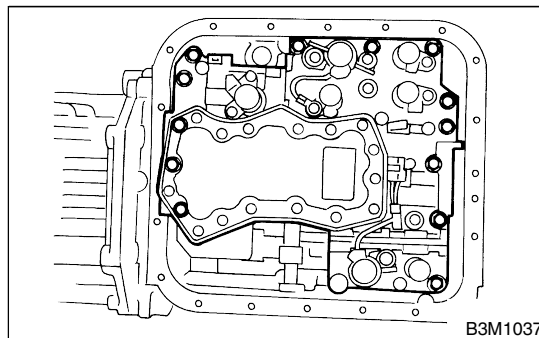


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)
- (J) Transmission ground

- 9) Remove the control valve.

CAUTION:

When removing control valve body, be careful not to interfere with transfer duty solenoid wiring.



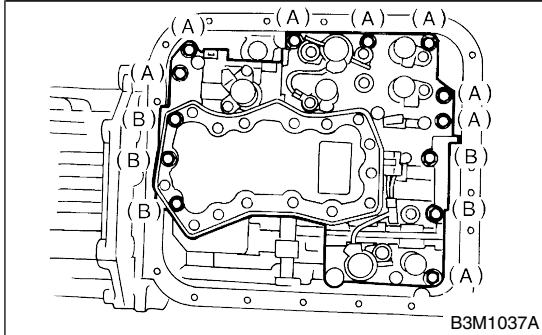
B: INSTALLATION

S502564A11

- 1) Set the range select lever in "N" position.
- 2) Install the control valve and ground earth terminal.

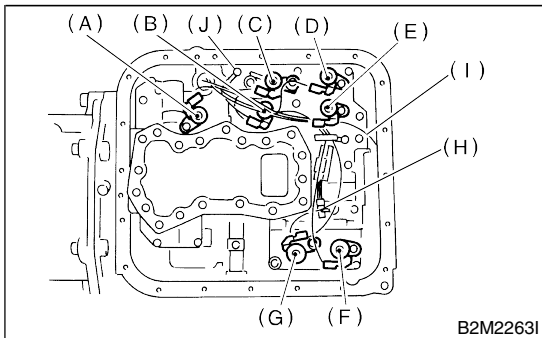
Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



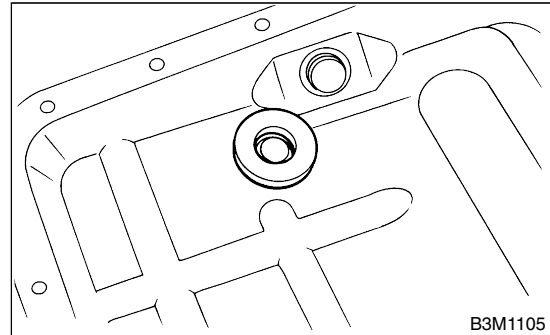
- (A) Short bolts
- (B) Long bolts

- 3) Connect all connector.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)
- (J) Transmission ground

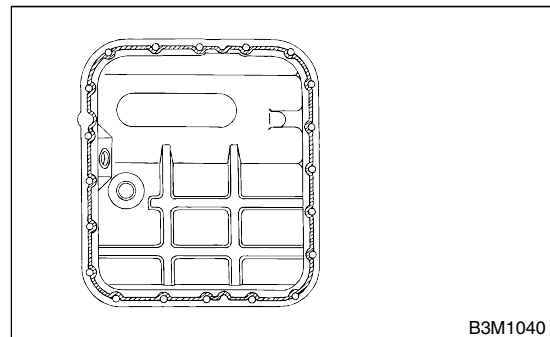
- 4) Attach the magnet at the specified position.



- 5) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Fluid packing:

Three Bond 1217B



- 6) Install the oil pan.

Tightening torque:

4.9 N·m (0.5 kgf-m, 3.6 ft-lb)

- 7) Install under cover. (Turbo model)
- 8) Pour ATF into the oil charge pipe.

Recommended fluid:

Dexron III type automatic transmission fluid

Fluid capacity:

Non-turbo model

8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)

Turbo model

9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

- 9) Check the level of the ATF.

<Ref. to AT-9 Automatic Transmission Fluid.>

CONTROL VALVE BODY

Automatic Transmission

C: DISASSEMBLY SS02564A06

Refer to "AUTOMATIC TRANSMISSION" <Pub.
No. G0853ZE> a separate publication.

D: ASSEMBLY SS02564A02

Refer to "AUTOMATIC TRANSMISSION" <Pub.
No. G0853ZE> a separate publication.

E: INSPECTION SS02564A10

Refer to "AUTOMATIC TRANSMISSION" <Pub.
No. G0853ZE> a separate publication.

17. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

S502227

A: REMOVAL

S502227A18

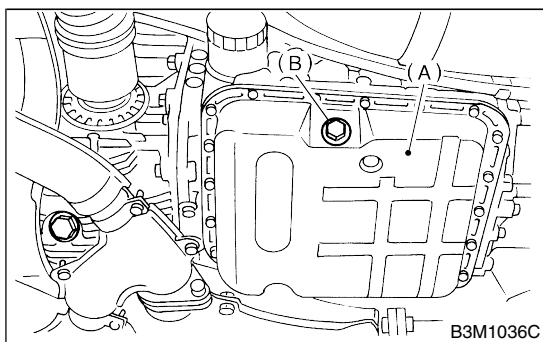
- 1) Set vehicle on a lift.
- 2) Disconnect battery ground terminal from battery.
- 3) Lift vehicle.
- 4) Remove under cover.
- 5) Clean transmission exterior.
- 6) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

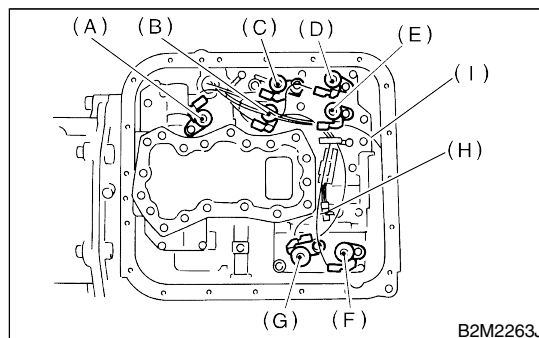
25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Oil pan
- (B) Drain plug

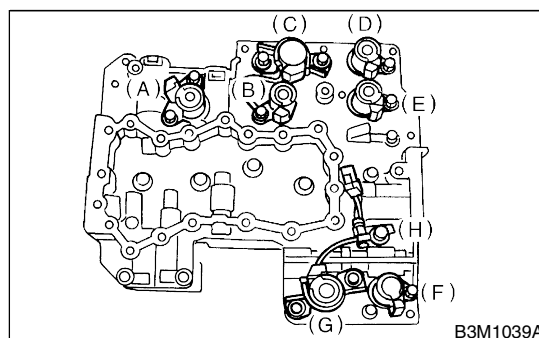
- 7) Remove oil pan.

- 8) Disconnect solenoid and sensor connectors. Remove connectors from clip and disconnect connectors.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)

- 9) Remove solenoids, duty solenoids and ATF temperature sensor.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

1. TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY

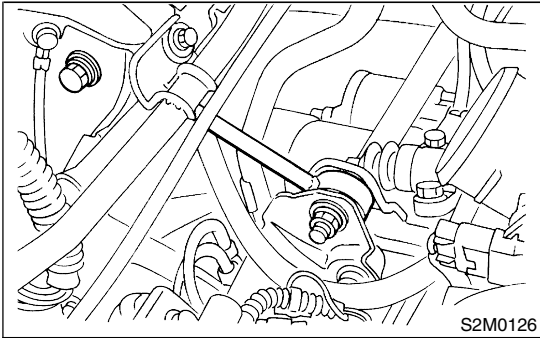
S502227A1801

- 1) Set vehicle on a lift.
- 2) Disconnect battery ground terminal.
- 3) Remove air intake duct. <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
- 4) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 5) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10.>

SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

Automatic Transmission

- 6) Remove pitching stopper.



- 7) Remove front exhaust pipe with center exhaust pipe. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.> and <Ref. to XX.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>

- 8) Remove center exhaust pipe. (Turbo Model)
<Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>

- 9) Remove rear exhaust pipe and muffler. (Non-turbo model)

Non-turbo model with OBD:

<Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>

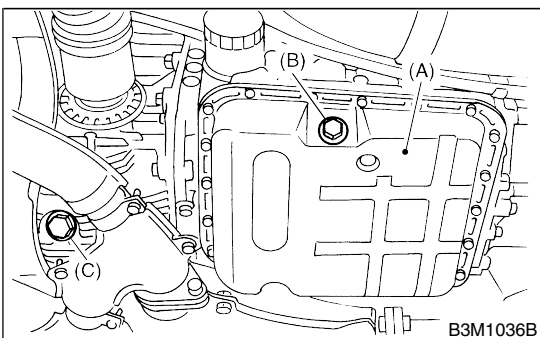
Non-turbo model without OBD:

<Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>

Turbo model:

<Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>

- 10) Raise vehicle and drain ATF.



- (A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

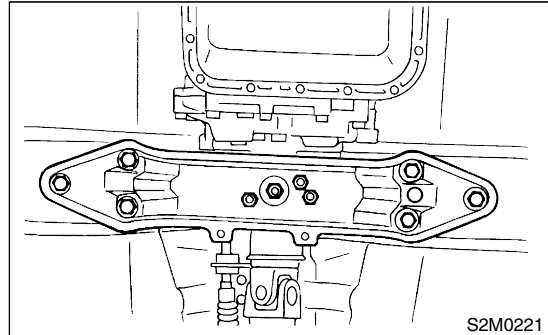
- 11) Remove heat shield cover. (If equipped)

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

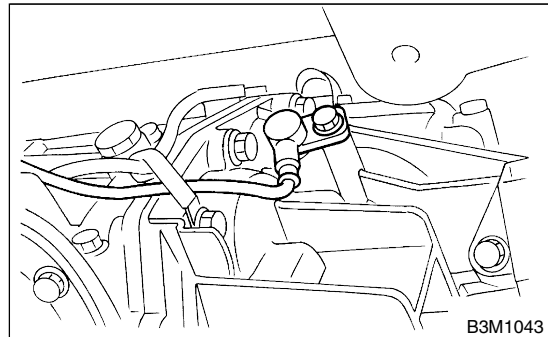
- 13) Remove rear crossmember.

- (1) Support transmission using a transmission jack and raise slightly.

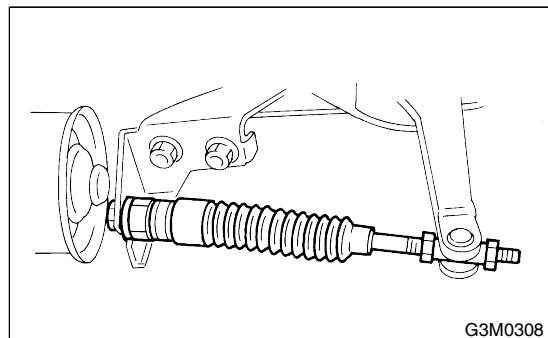
- (2) Remove bolts and nuts as shown in Figure.



- 14) Remove rear vehicle speed sensor.



- 15) Remove select cable nut.



- 16) Move gear select cable so that extension bolts can be removed.

- 17) Remove bolts.

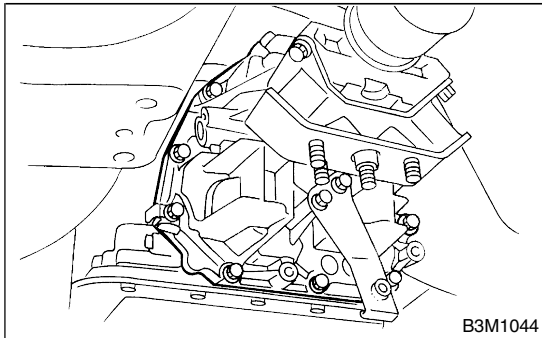
SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

Automatic Transmission

18) Remove extension case.

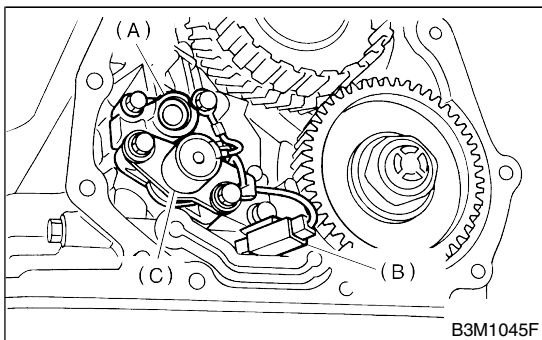
NOTE:

Use a container to catch oil flowing from extension.



19) Disconnect transfer duty solenoid connector.

20) Remove transfer duty solenoid and transfer valve body.



- (A) Transfer valve body
- (B) Transfer duty solenoid connector
- (C) Transfer duty solenoid

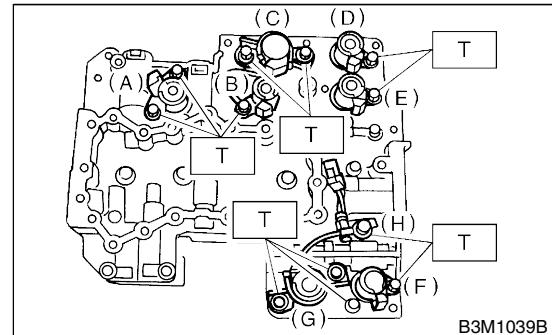
B: INSTALLATION

S502227A11

1) Install solenoids and ATF temperature sensor.

Tightening torque:

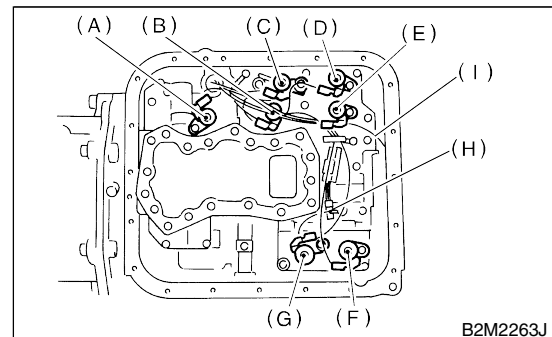
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

2) Connect harness connectors.

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



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)

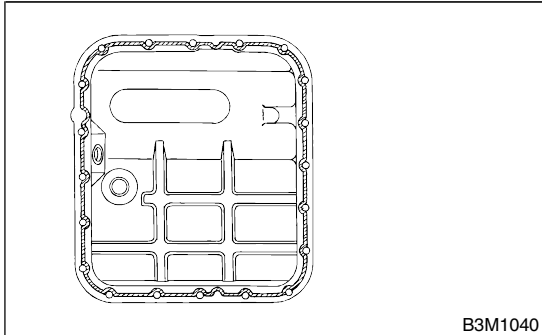
SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

Automatic Transmission

3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Fluid packing:

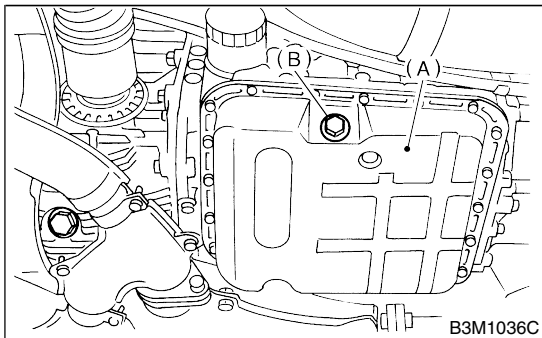
Three Bond 1217B



4) Install oil pan.

Tightening torque:

4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



- (A) Oil pan
(B) Drain plug

5) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole.

Recommended fluid:

Dexron III type automatic transmission fluid

Fluid capacity:

Turbo model:

9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

Non-turbo model:

8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)

6) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>

1. TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY

S502227A1101

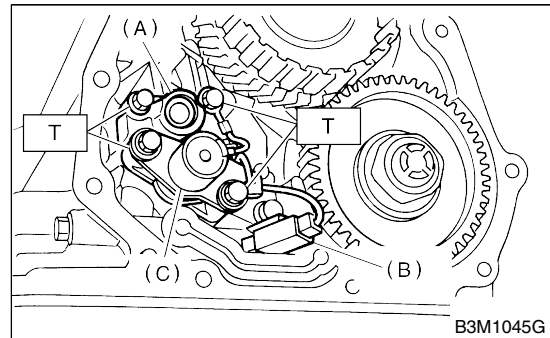
1) Install transfer duty solenoid and transfer valve body.

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

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

(2) Connect transfer duty solenoid connector.



- (A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

2) Install extension case to transmission case.

(1) Tighten 11 bolts.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

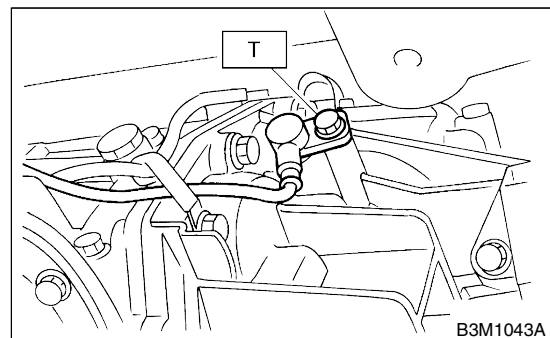
(2) Install select cable.

(3) Adjust the select cable. <Ref. to CS-11, ADJUSTMENT, Select Cable.>

3) Install rear vehicle speed sensor.

Tightening torque:

T: 7 N·m (0.7 kgf-m, 5.1 ft-lb)



SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

Automatic Transmission

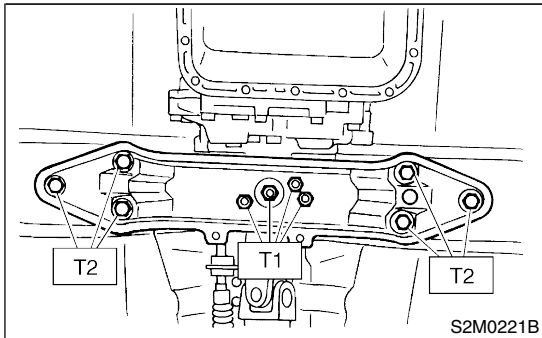
4) Install rear crossmember.

(1) Tighten bolts.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51.4 ft-lb)



(2) Lower and remove transmission jack.

5) Install propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>

6) Install front exhaust pipe and center exhaust pipe. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>

7) Install rear exhaust pipe and muffler. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>

and <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.> and <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>

8) Install center, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.> and <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.>

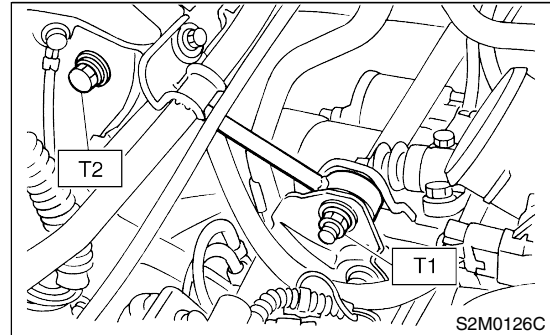
9) Install under cover.

10) Install pitching stopper.

Tightening torque:

T1: 49 N·m (5.0 kgf-m, 36.2 ft-lb)

T2: 57 N·m (5.8 kgf-m, 42 ft-lb)



11) Install air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>

12) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

13) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole.

Recommended fluid:

Dexron III type automatic transmission fluid

Fluid capacity:

Non-turbo model; 8.4 - 8.7 L (8.9 - 9.2 US qt, 7.4 - 7.3 Imp qt)

Turbo model; 9.3 - 9.6 L (9.8 - 10.1 US qt, 8.2 - 8.4 Imp qt)

14) Check the ATF level. <Ref. to AT-9, Automatic Transmission Fluid.>

ATF FILTER

Automatic Transmission

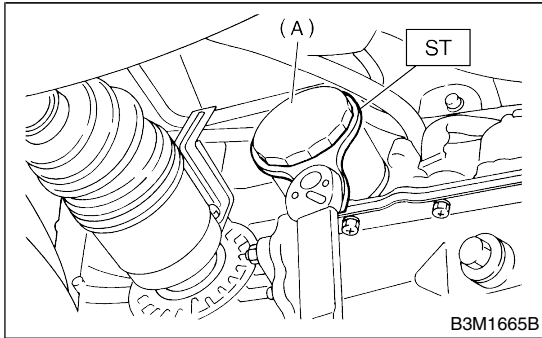
18. ATF Filter S502226

A: REMOVAL S502226A18

NOTE:

The ATF filter is maintenance free.

- 1) Lift vehicle.
 - 2) Using ST, remove ATF filter.
- ST 498545400 OIL FILTER WRENCH



(A) ATF filter

- 3) Get new ATF filter and apply a thin coat of ATF to the oil seal.

B: INSTALLATION SS02226A11

1) Install ATF filter. Turn it by hand, being careful not to damage oil seal.

2) Using ST, tighten ATF filter to transmission case.

Calculate ATF filter torque specifications using the following formula.

$$T2 = L1 / (L1 + L2) \times T1$$

T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	6 (0.6, 4.3)
150 (5.91)	5 (0.5, 3.6)
200 (7.87)	4 (0.4, 2.9)
250 (9.84)	3 (0.3, 2.2)

CAUTION:

Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH

3) Add ATF.

4) Inspect level of ATF. <Ref. to AT-9 Automatic Transmission Fluid.>

C: INSPECTION SS02226A10

Replace the part if any defect is found from the inspection.

Check for rust, hole, ATF leaks, and other damage.

TRANSMISSION CONTROL MODULE (TCM)

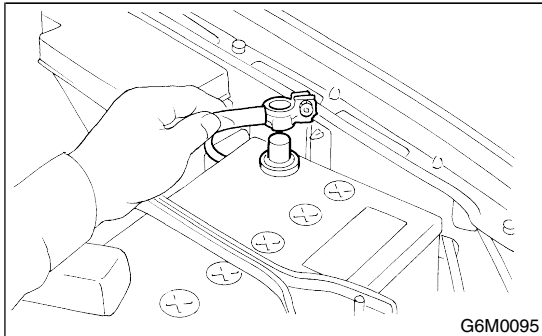
19. Transmission Control Module (TCM)

S502225

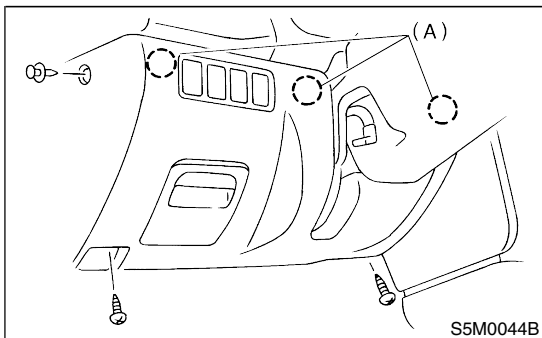
A: REMOVAL

S502225A18

- 1) Disconnect battery ground cable.



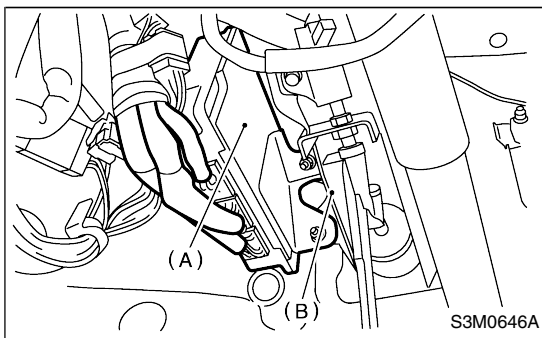
- 2) Remove lower cover and then disconnect connector.



(A) Clip

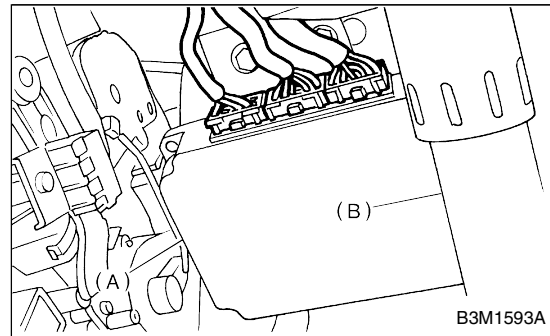
- 3) Disconnect connectors from transmission control module.

LHD model



(A) Transmission control module
(B) Brake pedal bracket

RHD model



(A) Transmission control module
(B) Column shaft

- 4) Remove transmission control module.

B: INSTALLATION

S502225A11

- 1) Install transmission control module.

Tightening torque:

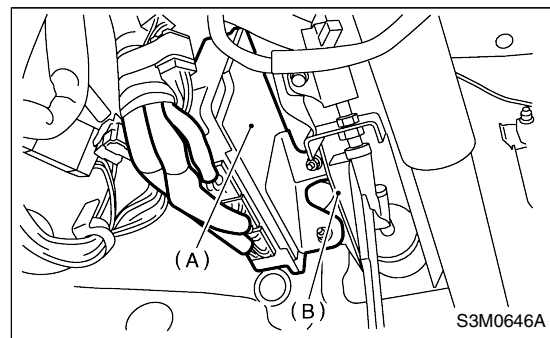
LHD model

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

RHD model

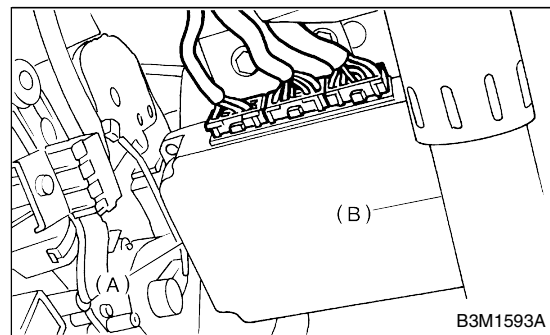
25 N·m (2.5 kgf-m, 18.1 ft-lb)

LHD model



(A) Transmission control module
(B) Brake pedal bracket

RHD model



(A) Transmission control module
(B) Column shaft

- 2) Install in the reverse order of removal.

20. ATF Cooler Pipe and Hose

S502565

A: REMOVAL

S502565A18

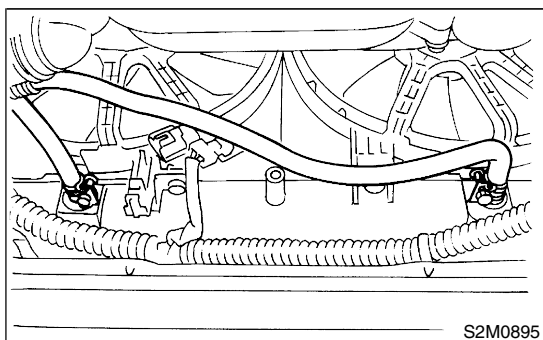
1. NON-TURBO MODEL

S502565A1804

- 1) Set vehicle on a lift.
- 2) Remove battery and washer tank.
- 3) Lift vehicle.
- 4) Remove the under cover.
- 5) Disconnect ATF cooler hose from radiator.

NOTE:

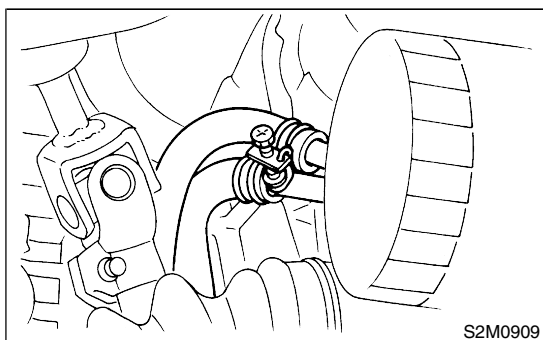
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



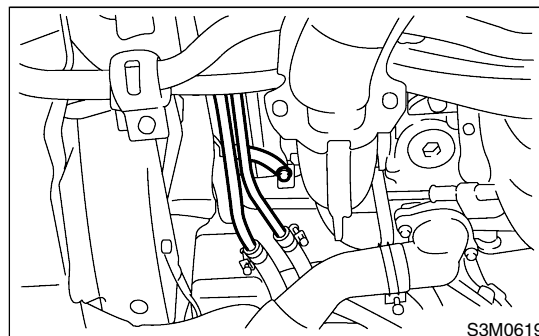
- 6) Disconnect ATF cooler hoses from pipes.

NOTE:

- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



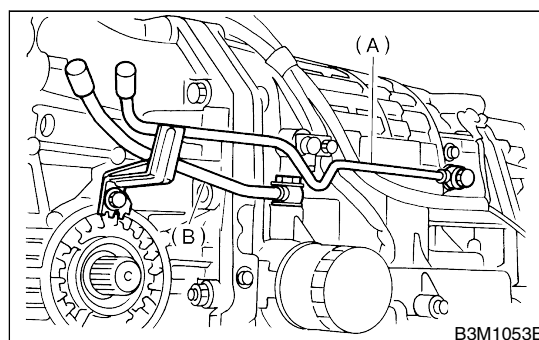
- 7) Remove ATF cooler pipe from cylinder head.



- 8) Remove the oil cooler inlet and outlet pipes.

CAUTION:

When removing outlet pipe, be careful not to lose ball and spring used with retaining screw.



- (A) Inlet pipe
(B) Outlet pipe

2. TURBO MODEL

S502565A1805

- 1) Set vehicle on a lift.
- 2) Remove battery and washer tank.
- 3) Lift vehicle.
- 4) Remove the under cover.
- 5) Disconnect ATF cooler hose from radiator.
 - (1) Remove radiator. <Ref. to CO-25, REMOVAL, Radiator.>
 - (2) Remove radiator under cover.
 - (3) Remove ATF cooler hose from radiator.

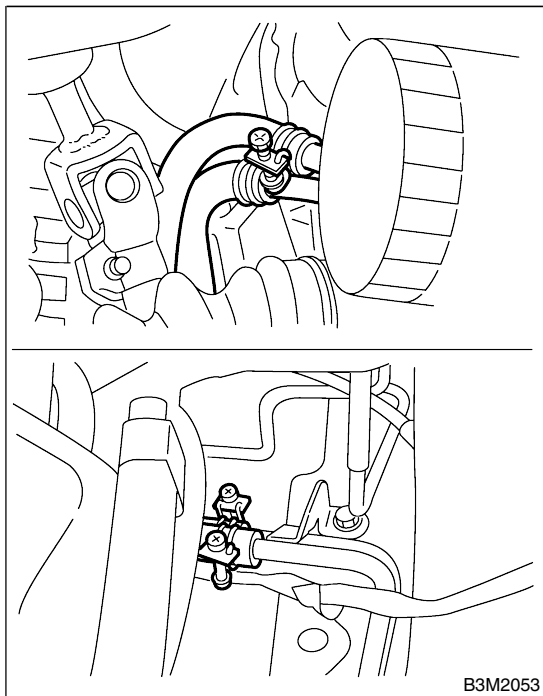
ATF COOLER PIPE AND HOSE

Automatic Transmission

6) Disconnect ATF cooler hoses from pipes.

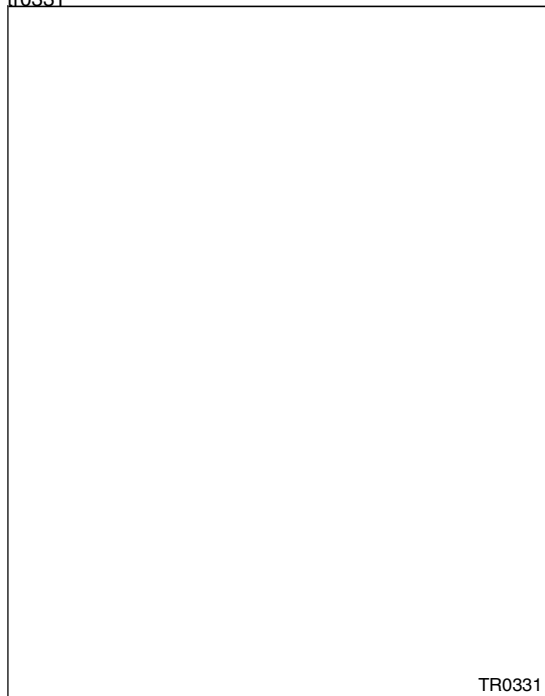
NOTE:

- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



7) Remove ATF cooler pipe from frame.

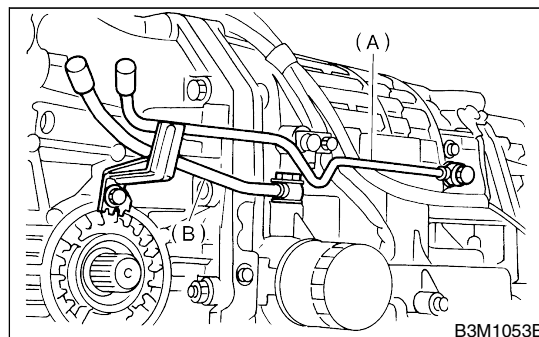
tr0331



8) Remove the oil cooler inlet and outlet pipes.

CAUTION:

When removing outlet pipe, be careful not to lose ball and spring used with retaining screw.



- (A) Inlet pipe
(B) Outlet pipe

B: INSTALLATION

S502565A11

1. NON-TURBO MODEL

S502565A1104

1) Install the oil cooler outlet and inlet pipes.

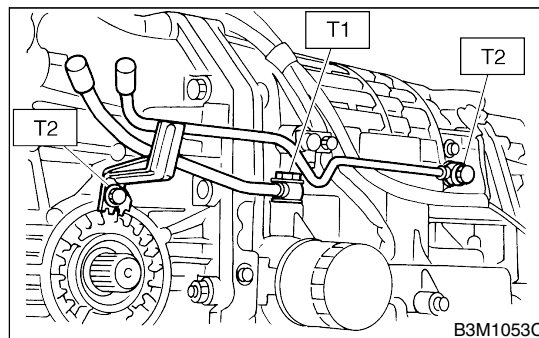
CAUTION:

Be sure to use a new aluminum washer.

Tightening torque:

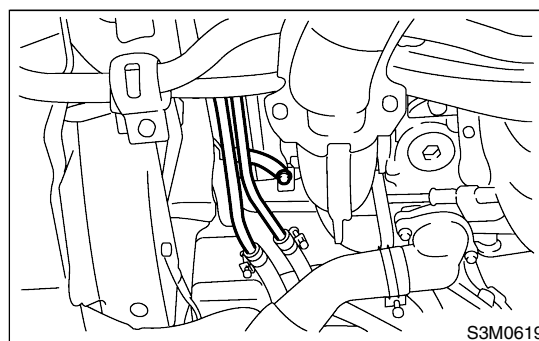
T1: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

T2: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Inlet pipe
(B) Outlet pipe

2) Install ATF cooler pipe to cylinder head.



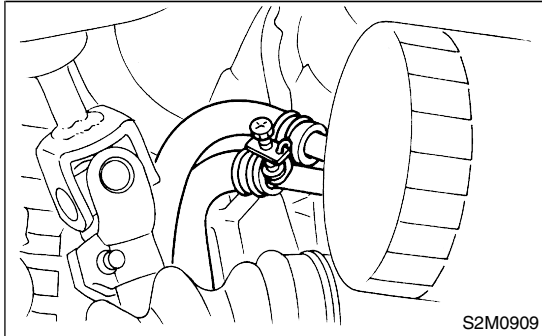
ATF COOLER PIPE AND HOSE

Automatic Transmission

- 3) Connect ATF cooler hose to pipe transmission side.

NOTE:

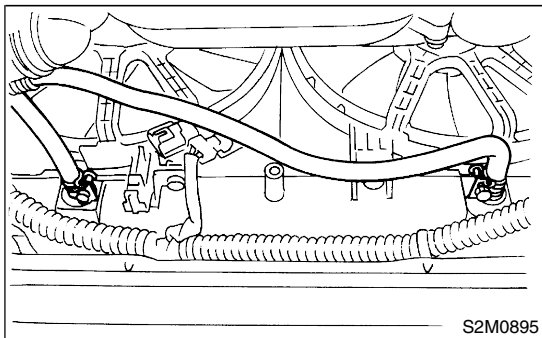
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



- 4) Connect ATF cooler hose to pipe of radiator side.

NOTE:

- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



- 5) Install the under cover.
6) Install battery and washer tank.
7) Fill ATF. <Ref. to AT-9 Automatic Transmission Fluid.>

NOTE:

Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

2. TURBO MODEL S502565A1105

- 1) Install the oil cooler outlet and inlet pipes.

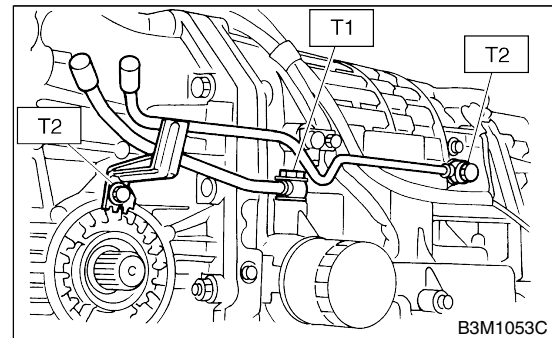
CAUTION:

Be sure to use a new aluminum washer.

Tightening torque:

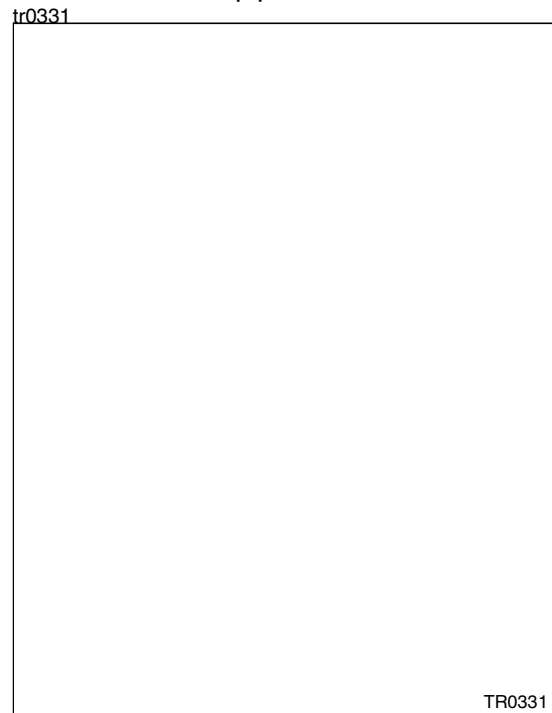
T1: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

T2: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Inlet pipe
(B) Outlet pipe

- 2) Install ATF cooler pipe to frame.



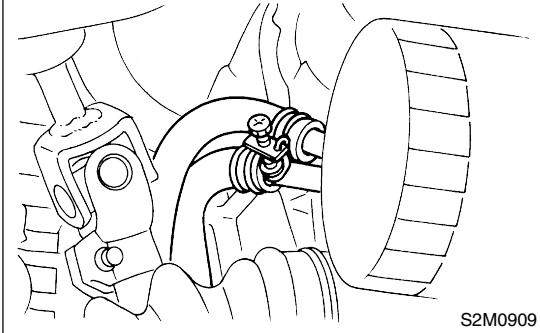
- 3) Connect ATF cooler hose to pipe transmission side.

ATF COOLER PIPE AND HOSE

Automatic Transmission

NOTE:

- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



4) Connect ATF cooler hose to pipe of radiator side.

- (1) Install ATF cooler hoses to radiator.
 - (2) Install radiator under cover.
 - (3) Install radiator. <Ref. to CO-27, INSTALLATION, Radiator.>
- 5) Install the under cover.
- 6) Install battery and washer tank.
- 7) Fill ATF. <Ref. to AT-9 Automatic Transmission Fluid.>

NOTE:

Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

C: INSPECTION SS02565A10

Repair or replace any defective hoses, pipes, clamps, and washers found from the inspection below.

- 1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
- 2) Check for deformed clamps.
- 3) Lightly bend the hose and check for cracks in the surface and other damage.
- 4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was by pressing with your fingernail.
- 5) Check for peeling, cracks, and deformation at the tip of the hose.

ATF COOLER PIPE AND HOSE

MEMO:

MANUAL TRANSMISSION AND DIFFERENTIAL

MT

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GENERAL DESCRIPTION

Manual Transmission and Differential

1. General Description

S503001

A: SPECIFICATIONS

S503001E49

1. MANUAL TRANSMISSION AND DIFFERENTIAL

S503001E4901

Model		Non-Turbo	Turbo		
			Without oil pump	With oil pump	
				Dual-range	Single-range
Type		5 × 2-forward speeds and 1 × 2-reverse	5-forward speeds and 1-reverse		
Transmission gear ratio		1st	3.454	3.454	
		2nd	2.062	1.947	
		3rd	1.448	1.366	
		4th	1.088	0.972	
		5th	0.871	0.738	
		Reverse	3.333		
Auxiliary transmission gear ratio		High	1.000	—	
		Low	1.447	—	
Front reduction gear	Final	Type of gear	Hypoid		
		Gear ratio	4.111	4.444	
Rear reduction gear	Transfer	Type of gear	Helical		
		Gear ratio	1.000		1.081
	Final	Type of gear	Hypoid		
		Gear ratio	4.111	4.444	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)		
Center differen- tial	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)		
Transmission gear oil		GL-5			
Transmission gear oil capacity		4.0 ℓ (4.2 US qt, 3.5 Imp qt)	3.5 ℓ (3.7 US qt, 3.11 Imp qt)	4.4 ℓ (4.7 US qt, 3.9 Imp qt)	

2. TRANSMISSION GEAR OIL

S503001E4902

Recommended oil

ITEM									
• Transmission gear oil									
API Classification									
GL - 5									
SAE Viscosity No. and Applicable Temperature									
(°C)	-30	-26	-15	-5	0	15	25	30	
(°F)	-22	-15	5	23	32	59	77	86	
B1H0024									

3. TRANSMISSION CASE ASSEMBLY

S503001E4903

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)

GENERAL DESCRIPTION

Manual Transmission and Differential

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

Snap ring to counter washer clearance
0.05 — 0.35 mm (0.0020 — 0.0138 in)

Snap ring (Outer-19)	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

Input shaft holder adjustment

Dimension "D" mm (in)	Number of shim
52.50 — 53.11 (2.0669 — 2.0909)	—
52.00 — 52.49 (2.0472 — 2.0665)	1
51.26 — 51.99 (2.0181 — 2.0468)	2

4. DRIVE PINION ASSEMBLY S503001E4904

Preload adjustment of thrust bearing

Starting torque
0.3 — 0.8 N·m (0.03 — 0.08 kgf-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)

5. INPUT SHAFT ASSEMBLY S503001E4910

Snap ring (Outer-28) to ball bearing clearance
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

Snap ring (Inner-68) to bearing clearance
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Inner-68)	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

6. MAIN SHAFT S503001E4911

Snap ring (Outer-25) to synchronizer hub clearance
0.060 — 0.100 mm (0.0024 — 0.0039 in)

Snap ring (Outer-25)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805025051	2.42 (0.0953)	805025055	2.62 (0.1031)
805025052	2.47 (0.0972)	805025056	2.67 (0.1051)
805025053	2.52 (0.0992)	805025057	2.72 (0.1071)
805025054	2.57 (0.1012)	805025058	2.37 (0.0933)

7. REVERSE IDLER GEAR S503001E4905

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
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	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)	—	—

GENERAL DESCRIPTION

Manual Transmission and Differential

8. SHIFTER FORK AND ROD S503001E4906

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

A: 1st-2nd — 3rd-4th

0.4 — 1.4 mm (0.016 — 0.055 in)

B: 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)

Non-Turbo model

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in)

Turbo model

5th shifter fork		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA241	No mark	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in)

9. TRANSFER CASE S503001E4907

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
32188AA090	3	Neutral position is closer to 1st.
32188AA100	0	Standard
32188AA110	1	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.

GENERAL DESCRIPTION

Manual Transmission and Differential

10. EXTENSION ASSEMBLY SS03001E4908

Thrust washer (50 × 61 × t) to taper roller bearing table outer race side clearance

0.2 — 0.3 mm T (0.0008 — 0.012 in T)

NOTE:

T: Tight

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

Thrust washer to center differential side clearance
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

11. FRONT DIFFERENTIAL SS03001E4909

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)

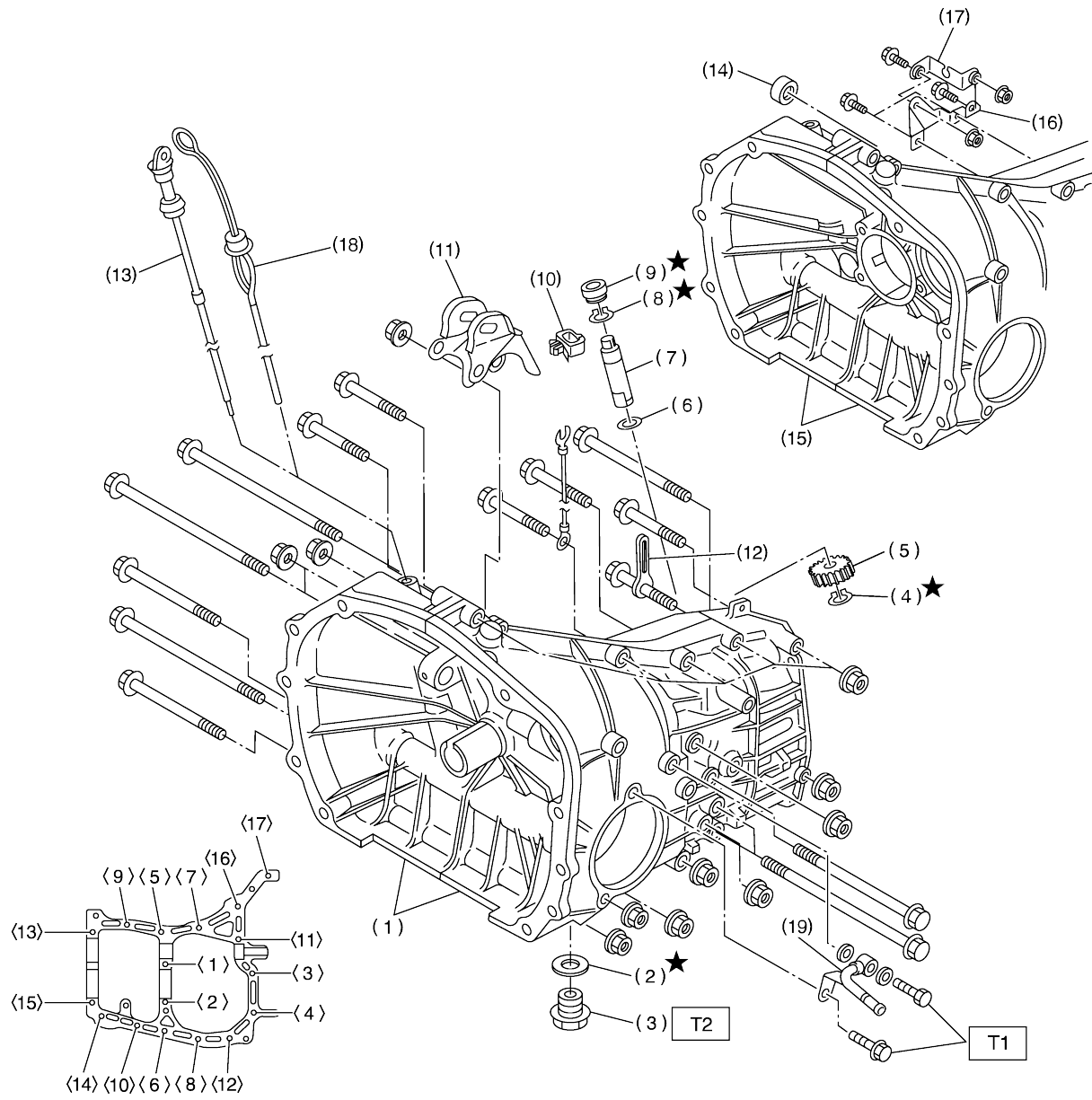
Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

GENERAL DESCRIPTION

Manual Transmission and Differential

B: COMPONENT S503001A05

1. TRANSMISSION CASE S503001A0501



S3M0616A

GENERAL DESCRIPTION

Manual Transmission and Differential

(1) Transmission case ASSY (Turbo model)	(9) Oil seal	(16) High-low cable bracket A (Non-turbo model)
(2) Gasket	(10) Clamp	(17) High-low cable bracket B (Non-turbo model)
(3) Drain plug	(11) Pitching stopper bracket	(18) Oil level gauge (Turbo model)
(4) Snap ring (Outer)	(12) Clip	(19) Inlet pipe (with oil pump)
(5) Speedometer driven gear	(13) Oil level gauge (Non-turbo model)	
(6) Washer	(14) Oil seal (Non-turbo model)	
(7) Speedometer shaft	(15) Transmission case ASSY (Non-turbo model)	
(8) Snap ring (Outer)		

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

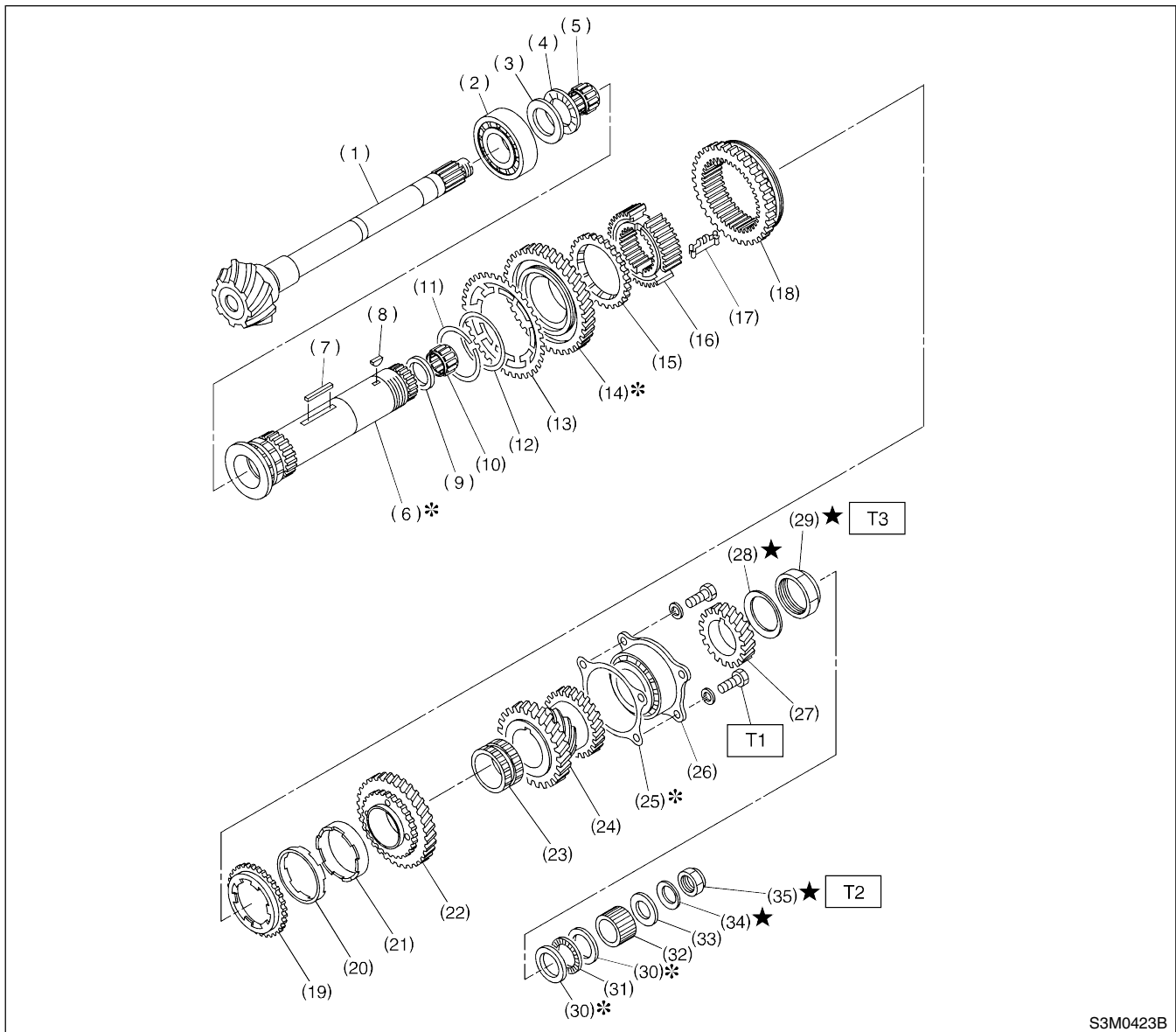
Size	All models	Tightening torque: N·m (kgf-m, ft-lb)
8 mm bolt	<5> — <15>	25 (2.5, 18.1)
10 mm bolt	<1> — <4> <16> — <17>	39 (4.0, 28.9)

GENERAL DESCRIPTION

Manual Transmission and Differential

2. DRIVE PINION ASSEMBLY

SS03001A0502



S3M0423B

- | | | |
|-------------------------|-------------------------------|-------------------------------------|
| (1) Drive pinion shaft | (15) Baulk ring | (29) Lock nut |
| (2) Roller bearing | (16) 1st-2nd synchronizer hub | (30) Washer |
| (3) Washer | (17) Insert key | (31) Thrust bearing |
| (4) Thrust bearing | (18) Reverse driven gear | (32) Differential bevel gear sleeve |
| (5) Needle bearing | (19) Outer baulk ring | (33) Washer |
| (6) Driven shaft | (20) Synchro cone | (34) Lock washer |
| (7) Key | (21) Inner baulk ring | (35) Lock nut |
| (8) Woodruff key | (22) 2nd driven gear | |
| (9) Drive pinion collar | (23) 2nd driven gear bush | |
| (10) Needle bearing | (24) 3rd-4th driven gear | |
| (11) Snap ring (Outer) | (25) Driven pinion shim | |
| (12) Washer | (26) Roller bearing | |
| (13) Sub gear | (27) 5th driven gear | |
| (14) 1st driven gear | (28) Lock washer | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 29 (3.0, 21.7)

T2: 118 (12.0, 86.8)

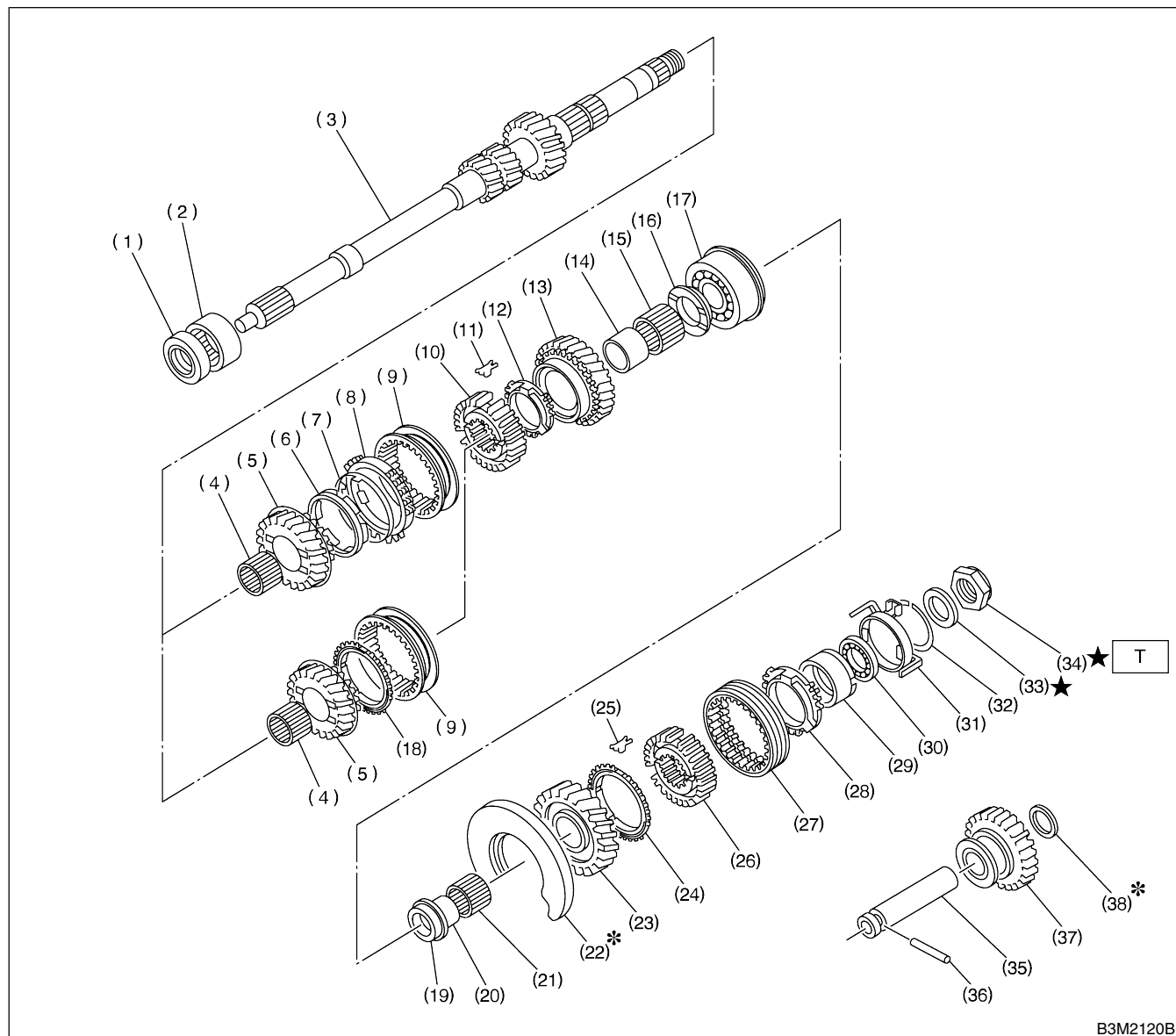
T3: 265 (27, 195)

GENERAL DESCRIPTION

Manual Transmission and Differential

3. MAIN SHAFT ASSEMBLY

S503001A0503



B3M2120B

- | | | |
|------------------------------------|-----------------------------------|-------------------------------|
| (1) Oil seal | (15) Needle bearing | (29) Rev synchro cone |
| (2) Needle bearing | (16) 4th gear thrust washer | (30) Ball bearing |
| (3) Transmission main shaft | (17) Ball bearing | (31) Synchro cone stopper |
| (4) Needle bearing | (18) Baulk ring (Non-turbo model) | (32) Snap ring |
| (5) 3rd drive gear | (19) 5th gear thrust washer | (33) Lock washer |
| (6) Inner baulk ring (Turbo model) | (20) 5th needle bearing race | (34) Lock nut |
| (7) 3rd synchro cone (Turbo model) | (21) Needle bearing | (35) Reverse idler gear shaft |
| (8) Outer baulk ring (Turbo model) | (22) Main shaft rear plate | (36) Straight pin |
| (9) 3rd-4th coupling sleeve | (23) 5th drive gear | (37) Reverse idler gear |
| (10) 3rd-4th synchronizer hub | (24) 5th baulk ring | (38) Washer |
| (11) 3rd-4th shifting insert key | (25) 5th-Rev shifting insert key | |
| (12) 4th baulk ring | (26) 5th-Rev synchronizer hub | |
| (13) 4th drive gear | (27) 5th-Rev coupling sleeve | |
| (14) 4th needle bearing race | (28) Rev baulk ring | |

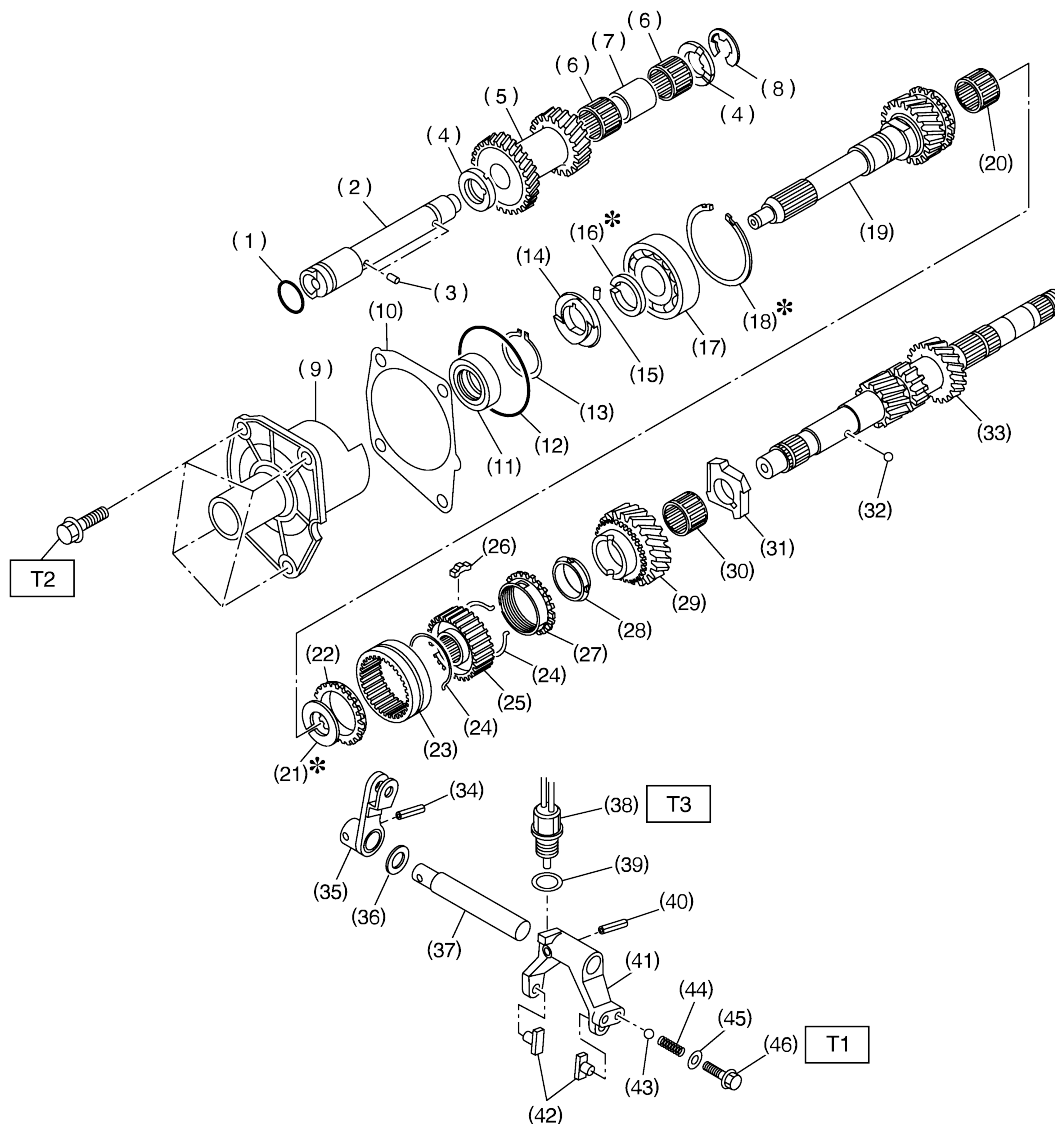
Tightening torque: N-m (kgf-m, ft-lb)
T: 118 (12.0, 86.8)

GENERAL DESCRIPTION

Manual Transmission and Differential

4. AUXILIARY TRANSMISSION GEARS

S503001A0508



B3M2173B

MT-10

GENERAL DESCRIPTION

Manual Transmission and Differential

(1) O-ring	(19) Input shaft	(37) High-low shifter shaft
(2) High-low counter shaft	(20) Needle bearing	(38) Low switch
(3) Straight pin	(21) Snap ring (Outer-25)	(39) Gasket
(4) High-low counter washer	(22) High-low baulk ring	(40) Straight pin
(5) Counter gear	(23) High-low coupling sleeve	(41) High-low shifter fork
(6) Needle bearing	(24) High-low synchronizer spring	(42) High-low shifter piece
(7) Counter gear collar	(25) High-low synchronizer hub	(43) Ball
(8) Snap ring (Outer-19)	(26) Shifting insert	(44) Spring
(9) Input shaft holder	(27) High-low baulk ring	(45) Gasket
(10) Input shaft shim	(28) Friction damper	(46) Plug
(11) Oil seal	(29) Input low gear	
(12) O-ring	(30) Needle bearing	
(13) Snap ring (Outer-28)	(31) Input low gear spacer	
(14) Oil squeeze	(32) Ball	
(15) Straight pin	(33) Main shaft	
(16) Snap ring (Outer-28)	(34) Straight pin	
(17) Ball bearing	(35) High-low shifter lever	
(18) Snap ring (Inner-68)	(36) Washer	

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

T1: 15.7 (1.6, 11.6)

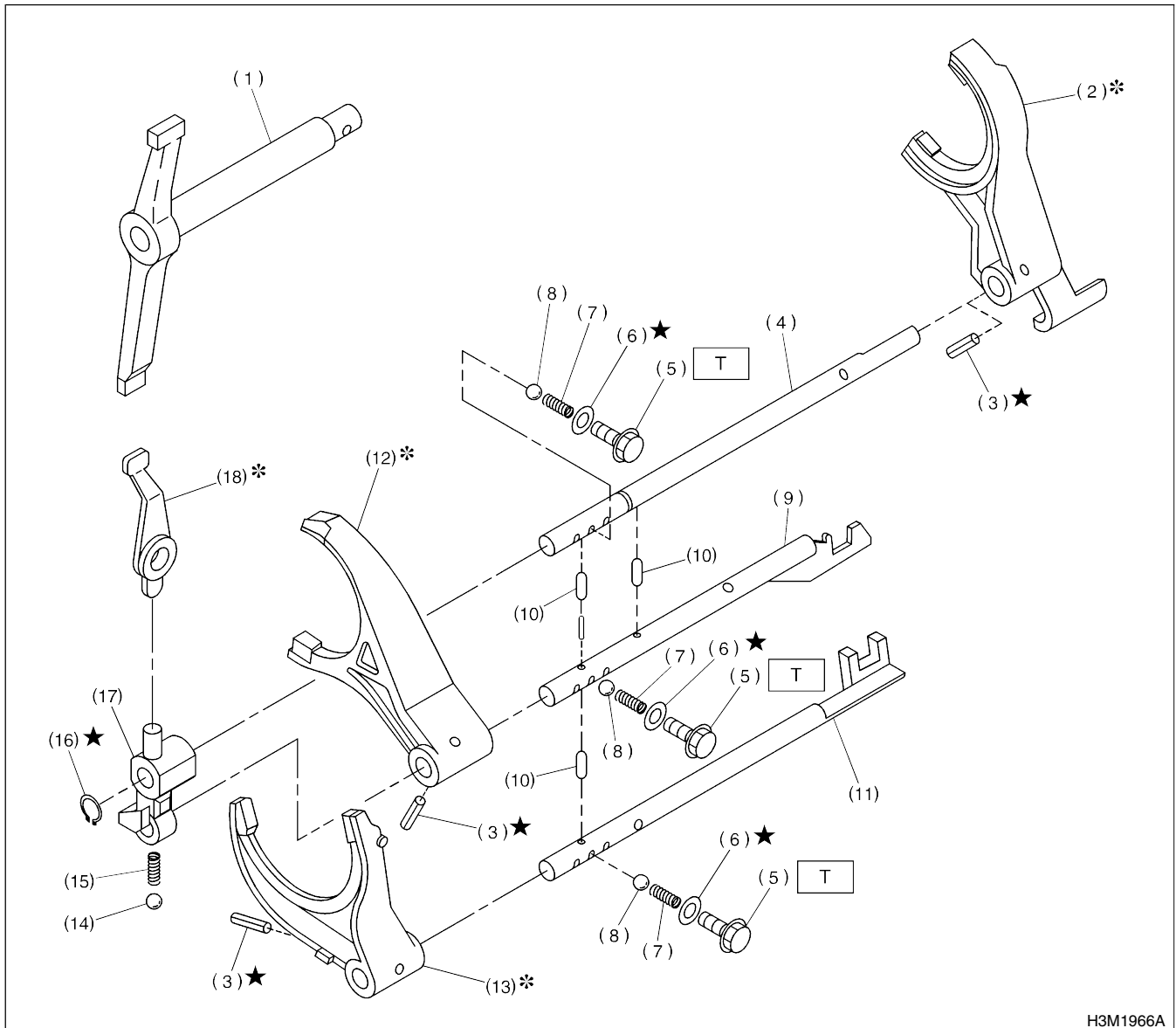
T2: 20 (2, 14.5)

T3: 25 (2.5, 18.1)

GENERAL DESCRIPTION

Manual Transmission and Differential

5. SHIFTER FORK AND SHIFTER ROD SS03001A0504



H3M1966A

- | | |
|--------------------------|---------------------------|
| (1) Shifter arm | (9) 3rd-4th fork rod |
| (2) 5th shifter fork | (10) Interlock plunger |
| (3) Straight pin | (11) 1st-2nd fork rod |
| (4) Reverse fork rod | (12) 3rd-4th shifter fork |
| (5) Checking ball plug | (13) 1st-2nd shifter fork |
| (6) Gasket | (14) Ball |
| (7) Checking ball spring | (15) Spring |
| (8) Ball | (16) Snap ring (Outer) |

- (17) Reverse fork rod arm
(18) Reverse shifter lever

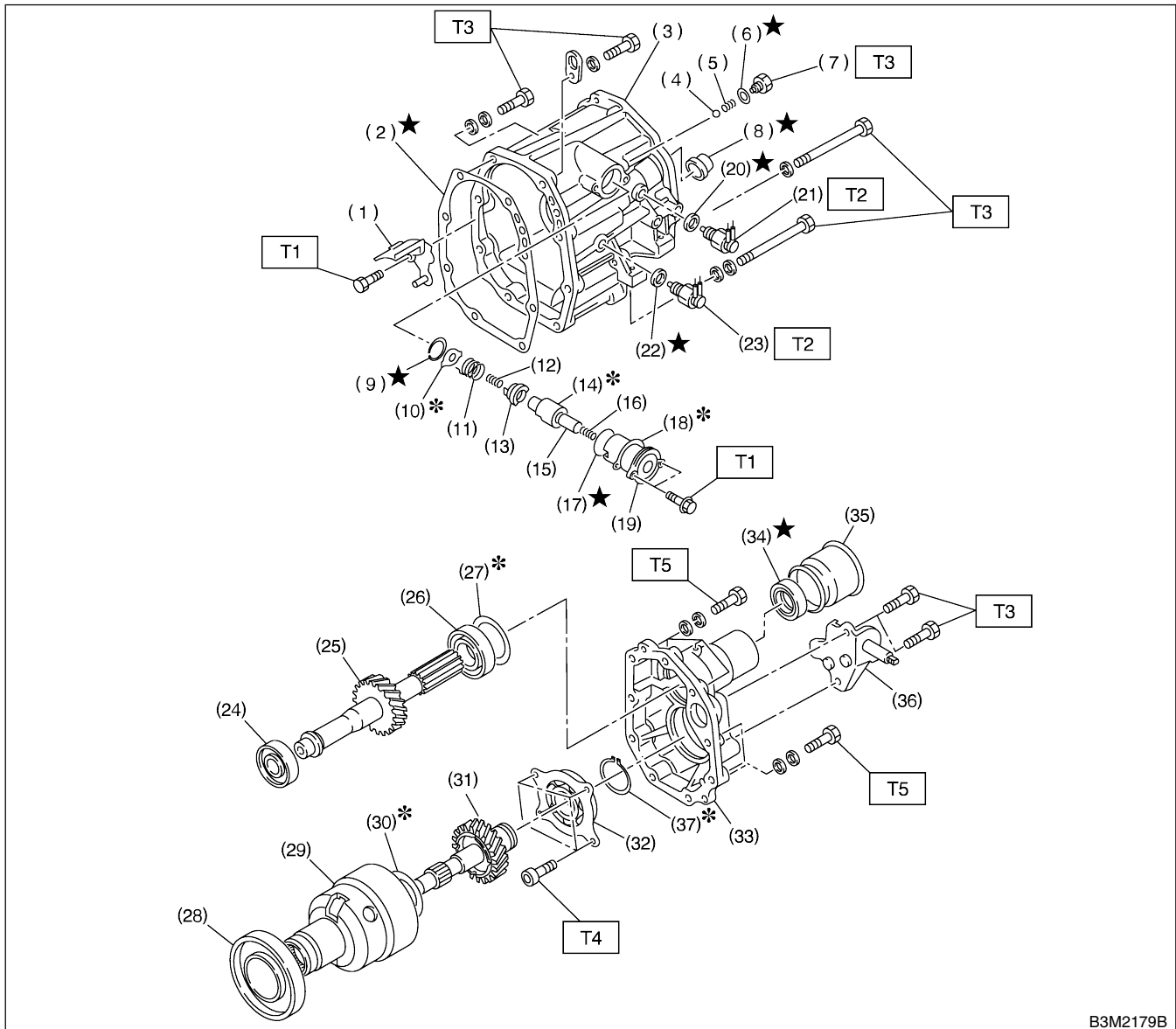
Tightening torque: N·m (kgf-m, ft-lb)
T: 19.6 (2.0, 14.5)

GENERAL DESCRIPTION

Manual Transmission and Differential

6. TRANSFER CASE AND EXTENSION CASE FOR MODEL WITHOUT OIL PUMP

SS03001A0509



B3M2179B

- | | | |
|----------------------------|----------------------------|--------------------------|
| (1) Oil guide | (16) Return spring | (31) Transfer drive gear |
| (2) Gasket | (17) O-ring | (32) Ball bearing |
| (3) Transfer case | (18) Adjusting select shim | (33) Extension case |
| (4) Ball | (19) Reverse check sleeve | (34) Oil seal |
| (5) Reverse accent spring | (20) Gasket | (35) Dust cover |
| (6) Gasket | (21) Neutral switch | (36) Shift bracket |
| (7) Plug | (22) Gasket | (37) Snap ring |
| (8) Oil seal | (23) Back-up light switch | |
| (9) Snap ring (Inner) | (24) Roller bearing | |
| (10) Reverse check plate | (25) Transfer driven gear | |
| (11) Reverse check spring | (26) Roller bearing | |
| (12) Reverse return spring | (27) Adjusting washer | |
| (13) Reverse check cam | (28) Ball bearing | |
| (14) Reverse accent shaft | (29) Center differential | |
| (15) Return spring cap | (30) Adjusting washer | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 6.4 (0.65, 4.7)

T2: 10 (1.0, 7.2)

T3: 25 (2.5, 18.1)

T4: 26 (2.7, 20)

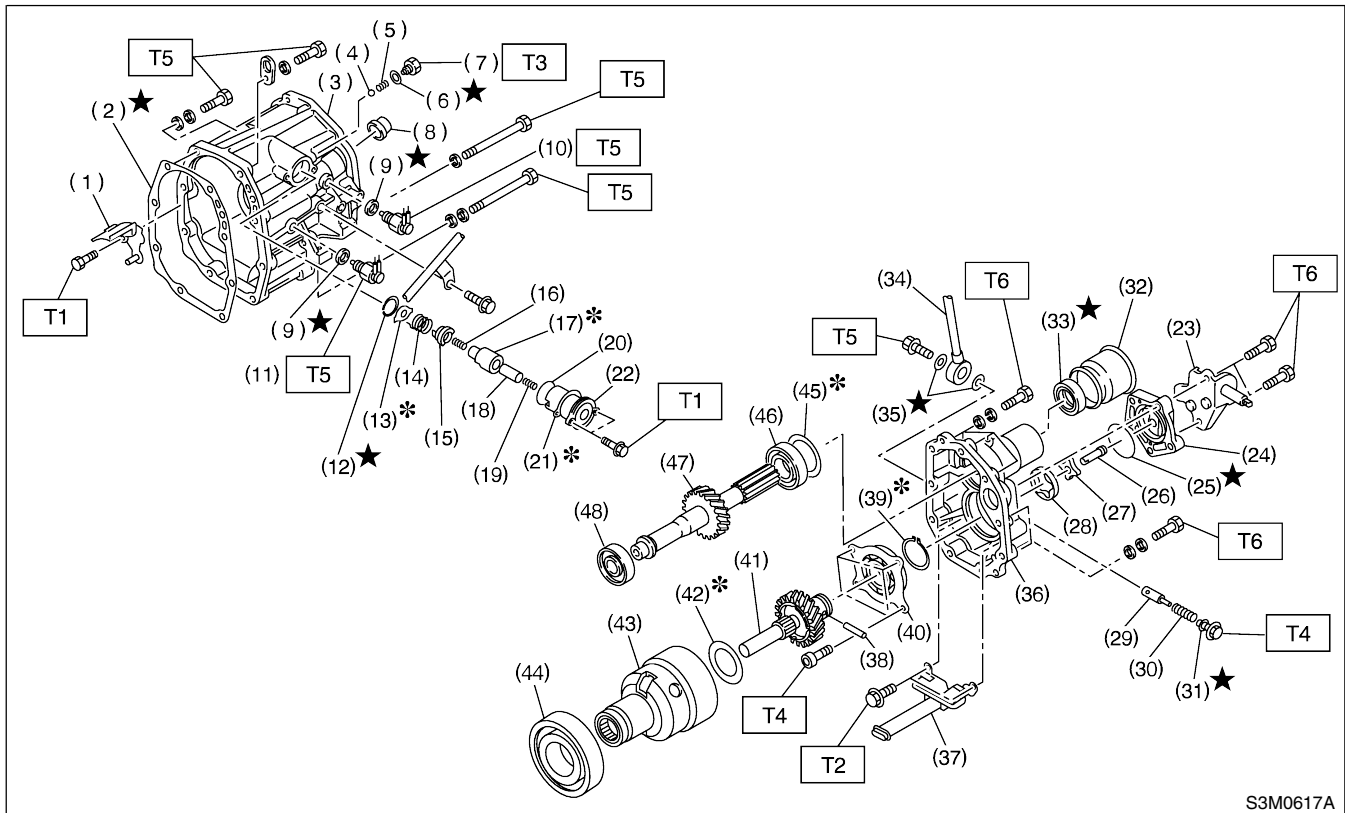
T5: 40 (4.1, 29.7)

GENERAL DESCRIPTION

Manual Transmission and Differential

7. TRANSFER CASE AND EXTENSION CASE FOR MODEL WITH OIL PUMP

S503001A0510



S3M0617A

- | | | |
|---------------------------|----------------------------|---------------------------|
| (1) Oil guide | (20) O-ring | (39) Snap ring |
| (2) Gasket | (21) Adjusting select shim | (40) Ball bearing |
| (3) Transfer case | (22) Reverse check sleeve | (41) Transfer drive gear |
| (4) Ball | (23) Shift bracket | (42) Washer |
| (5) Reverse accent spring | (24) Oil pump cover | (43) Center differential |
| (6) Gasket | (25) O-ring | (44) Ball bearing |
| (7) Plug | (26) Oil pump shaft | (45) Adjusting washer |
| (8) Oil seal | (27) Inner rotor | (46) Roller bearing |
| (9) Gasket | (28) Outer rotor | (47) Transfer driven gear |
| (10) Neutral switch | (29) Relief valve | (48) Roller bearing |
| (11) Back-up light switch | (30) Return spring | |
| (12) Snap ring (Inner) | (31) O-ring | |
| (13) Reverse check plate | (32) Dust cover | |
| (14) Reverse check spring | (33) Oil seal | |
| (15) Reverse check cam | (34) Outlet pipe | |
| (16) Return spring | (35) Washer | |
| (17) Reverse accent shaft | (36) Extension case | |
| (18) Return spring cap | (37) Oil strainer | |
| (19) Return spring | (38) Straight pin | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 10 (1.0, 7.2)

T3: 13 (1.3, 9.4)

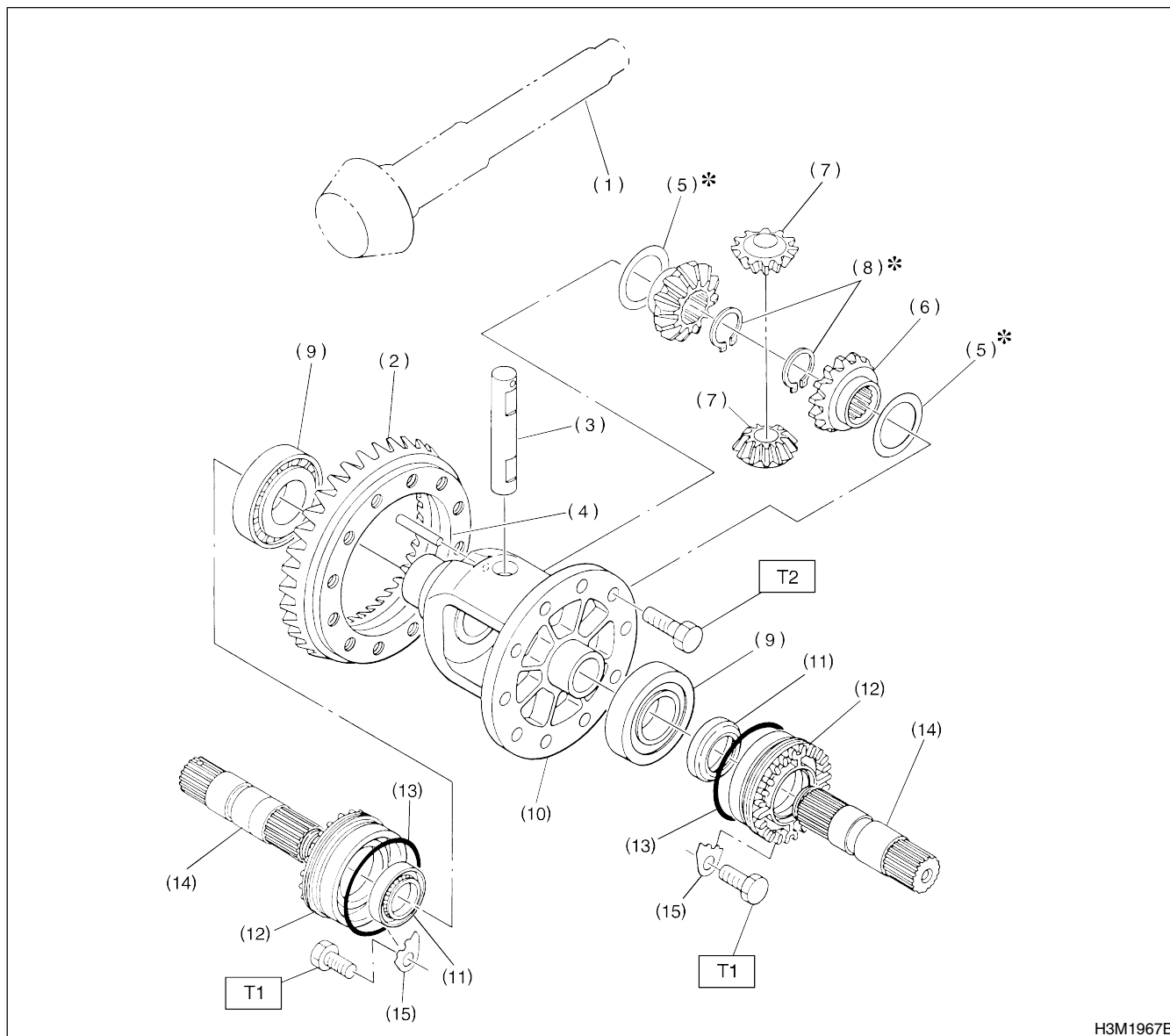
T4: 26 (2.7, 20)

T5: 40 (4.1, 30)

GENERAL DESCRIPTION

Manual Transmission and Differential

8. FRONT DIFFERENTIAL S503001A0506



H3M1967B

- | | |
|-------------------------------|---------------------------------|
| (1) Drive pinion shaft | (8) Snap ring (Outer) |
| (2) Hypoid driven gear | (9) Roller bearing |
| (3) Pinion shaft | (10) Differential case |
| (4) Straight pin | (11) Oil seal |
| (5) Washer | (12) Differential side retainer |
| (6) Differential bevel gear | (13) O-ring |
| (7) Differential bevel pinion | (14) Axle drive shaft |

- (15) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.1)

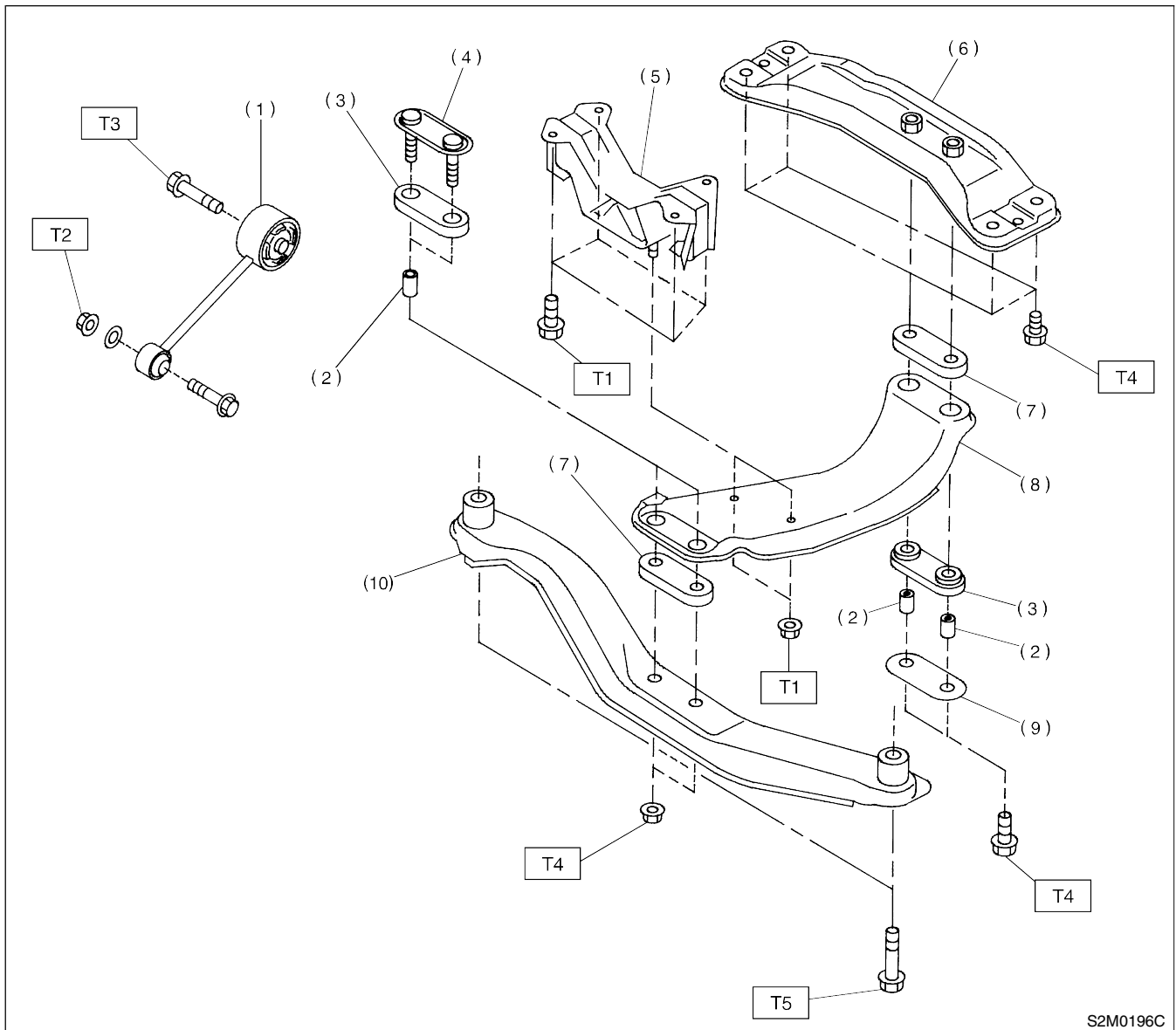
T2: 62 (6.3, 45.6)

GENERAL DESCRIPTION

Manual Transmission and Differential

9. TRANSMISSION MOUNTING

S503001A0507



- | | |
|-------------------------|------------------------|
| (1) Pitching stopper | (7) Cushion D |
| (2) Spacer | (8) Center crossmember |
| (3) Cushion C | (9) Rear plate |
| (4) Front plate | (10) Front crossmember |
| (5) Rear cushion rubber | |
| (6) Rear crossmember | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 26)

T2: 50 (5.1, 37)

T3: 58 (5.9, 43)

T4: 70 (7.1, 51)

T5: 140 (14.3, 103)

GENERAL DESCRIPTION

Manual Transmission and Differential

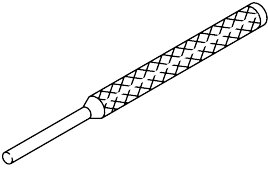
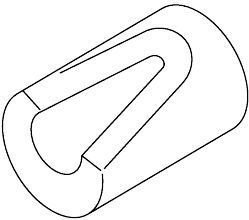
C: CAUTION S503001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

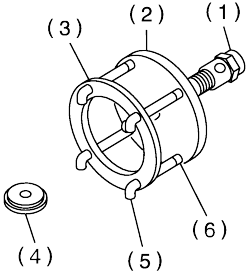
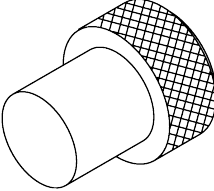
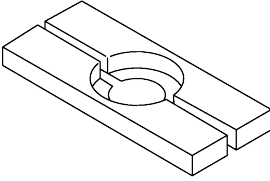
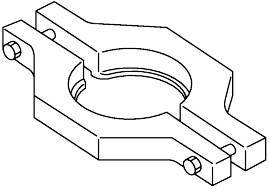
D: PREPARATION TOOL S503001A17

1. SPECIAL TOOLS S503001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1938	398791700	REMOVER II	Used for removing and installing spring pin (6 mm).
 B3M1939	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.

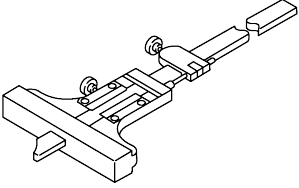
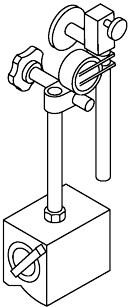
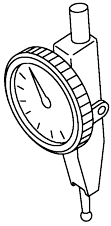
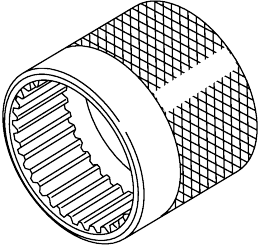
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1940A	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)
 B3M1941	399780104	WEIGHT	Used for measuring preload on roller bearing.
 B3M1942	498077000	5TH DRIVEN GEAR REMOVER	Used for removing roller bearing of drive pinion shaft.
 B3M1943	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.

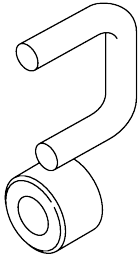
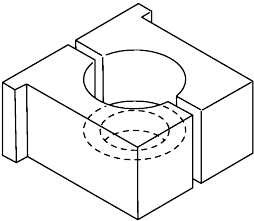
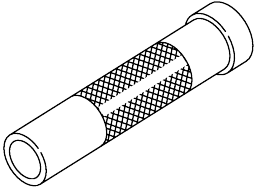
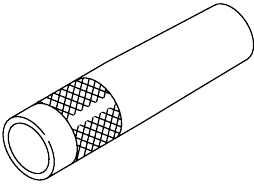
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1944	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 B3M1945	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 B3M1946	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).
 B3M1947	498427100	STOPPER	Used for securing the drive pinion shaft assembly and driven gear assembly when removing the drive pinion shaft assembly lock nut.

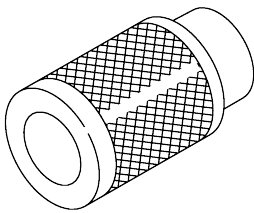
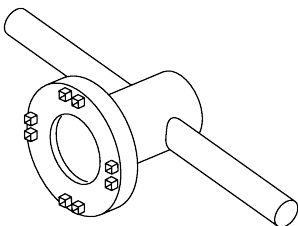
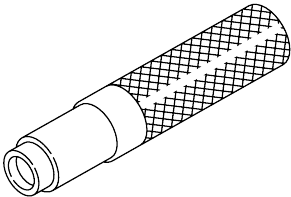
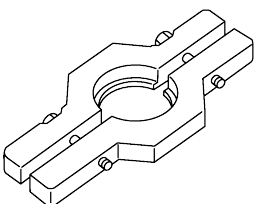
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1948	498787100	MAIN SHAFT STOPPER	Used for removing and installing transmission main shaft lock nut.
 B3M1949	498937000	HOLDER	Used for removing and installing transmission main shaft lock nut.
 B3M1950	499277100	BUSH 1-2 INSTALLER	• Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bush. • Used for installing roller bearing outer races to differential case.
 B3M1951	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings, and 5th driven gear onto the driven shaft.

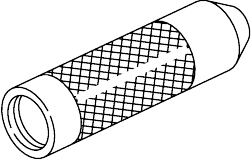
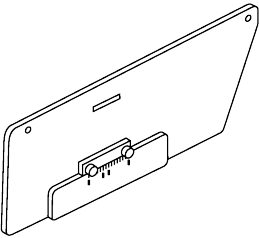
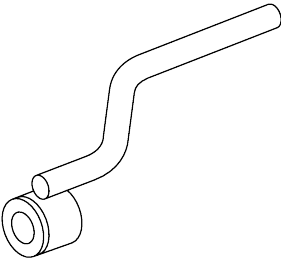
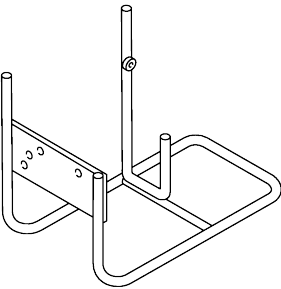
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1952	499757002	INSTALLER	- Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17). - Used for installing bearing cone of transfer driven gear (extension core side).
 B3M1953	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 B3M1954	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 B3M1955	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.

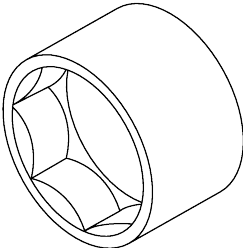
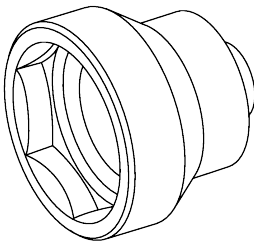
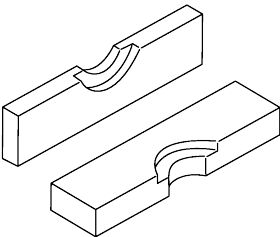
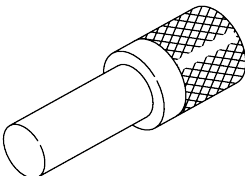
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1956	499877000	RACE 4-5 INSTALLER	- Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. - Used with REMOVER (899714110).
 B3M1957	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 B3M1958	499927100	HANDLE	Used for fitting transmission main shaft.
 B3M1959	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.

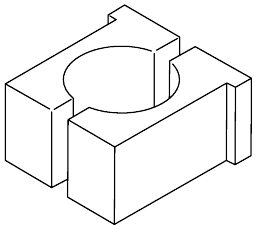
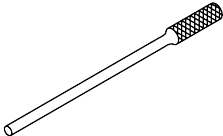
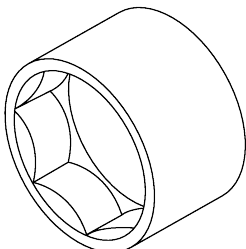
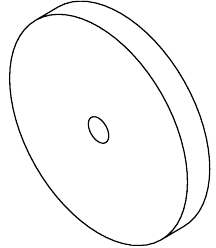
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1960	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 B3M1961	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.
 B3M1962	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion, rear drive shaft.
 B3M1963	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.

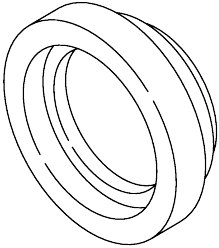
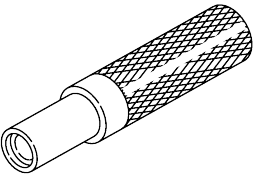
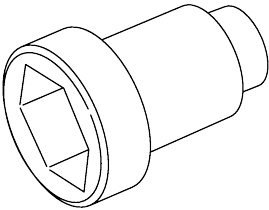
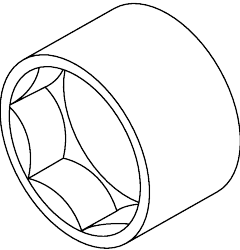
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1964	899884100	HOLDER	Used for tightening lock nut on sleeve.
 B3M1965	899904100	REMOVER	Used for removing and installing straight pin.
 B3M1966	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.
 B3M1967	398497701	ADAPTER	• Used for installing roller bearing onto differential case. • Used with INSTALLER (499277100).

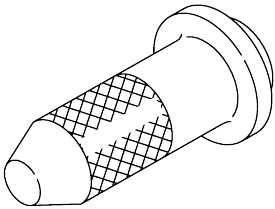
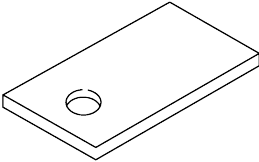
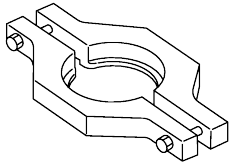
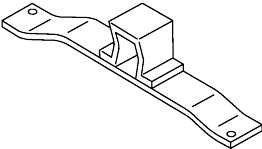
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1968	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 B3M1969	899824100	PRESS	Used for installing speedometer shaft oil seal.
 B3M1970	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 B3M1971	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.

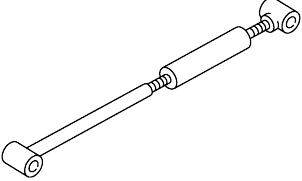
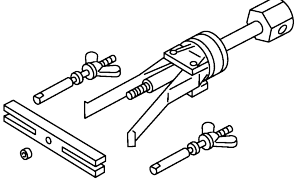
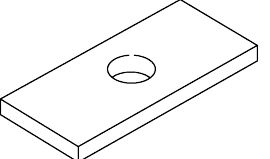
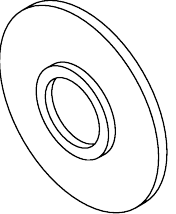
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1972	498057300	INSTALLER	Used for installing extension oil seal.
 B3M1973	498255400	PLATE	Used for measuring backlash.
 B3M1974	498077400	REMOVER	● Used for removing synchronizer cone of main shaft. ● Used for removing 5th driven gear of drive pinion shaft.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.

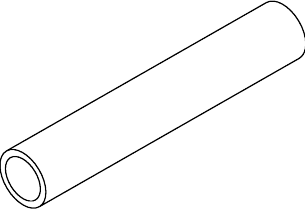
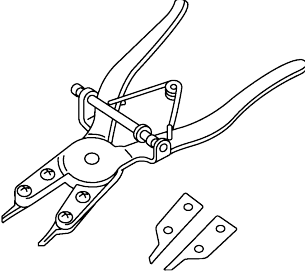
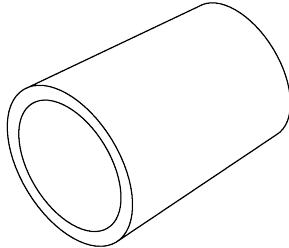
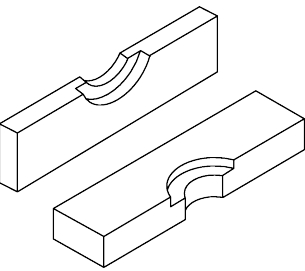
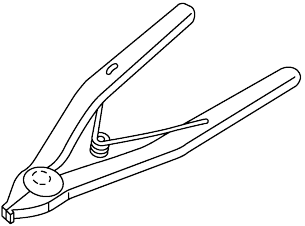
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1977	398527700	PULLER ASSY	Used for removing and installing extension case roller bearing.
 B3M1978	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 B3M1905	38177700	INSTALLER	● Used for installing bearing cone of transfer driven gear (transfer case side). ● Used for installing ball bearing of transfer drive gear.

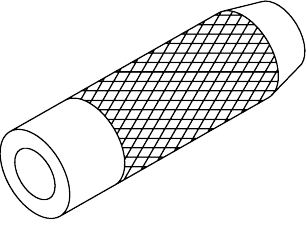
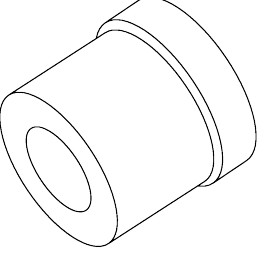
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M2122	398507703	DUMMY COLLAR	- Used for installing input shaft holder oil seal. - For dual-range model.
 B3M2123	398663600	PLIERS	- Used for removing and installing input shaft snap ring. - For dual-range model.
 B3M2124	499757001	SNAP RING GUIDE	- Used for installing snap ring (OUT 25). - For dual-range model.
 B3M2125	899858600	RETAINER	- Used for removing ball bearing. - For dual-range model.
 B3M2126	899474100	EXPANDER	- Used for removing and installing snap ring. - For dual-range model.

GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M2127	899580100	INSTALLER	- Used when pressing ball bearings into input shaft. - For dual-range model.
 B3M2129	399513600	INSTALLER	- Used when pressing ball bearings into input shaft. - For dual-range model.

2. GENERAL PURPOSE TOOLS S503001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

GENERAL DESCRIPTION

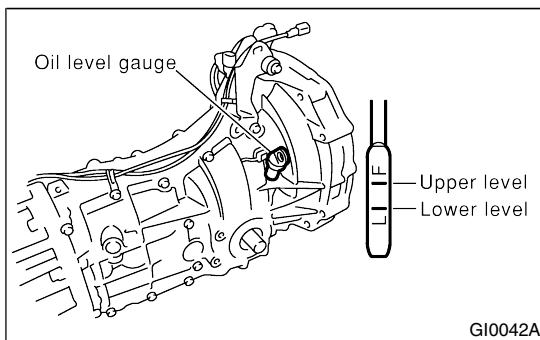
Manual Transmission and Differential

MEMO:

2. Transmission Gear Oil S503219

A: INSPECTION S503219A10

- 1) Park vehicle on a level surface.
- 2) Turn ignition switch to OFF, and wait until the engine cools.
- 3) Remove oil level gauge and wipe it clean.
- 4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper direction.
- 5) Pull out the oil level gauge again and check the oil level on it. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



- 5) Pour gear oil into the gauge hole.

Recommended gear oil:
Use GL-5 or equivalent.

Gear oil capacity:

Turbo model without oil pump;

3.5 ℓ (3.7 US qt, 3.1 Imp qt)

Turbo model with oil pump;

4.4 ℓ (4.7 US qt, 3.9 Imp qt)

Non-turbo model;

4.0 ℓ (4.2 US qt, 3.5 Imp qt)

- 6) Check the level of the transmission gear oil.

CAUTION:

When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

NOTE:

The level should be within the specified range marked on the gauge.

B: REPLACEMENT S503219A20

- 1) Pull out oil level gauge.
- 2) Lift-up the vehicle.
- 3) Drain transmission gear oil completely.

CAUTION:

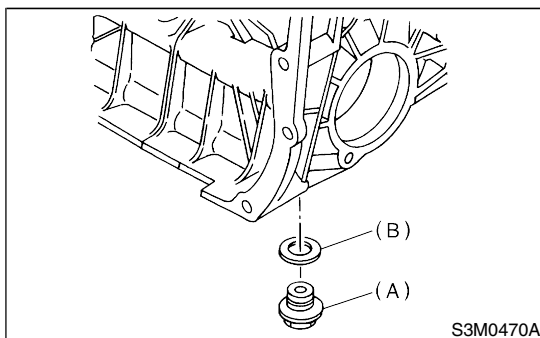
Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.

NOTE:

Tighten transmission gear oil drain plug after draining transmission gear oil.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)



(A) Drain plug

(B) Gasket

- 4) Lower the vehicle.

MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

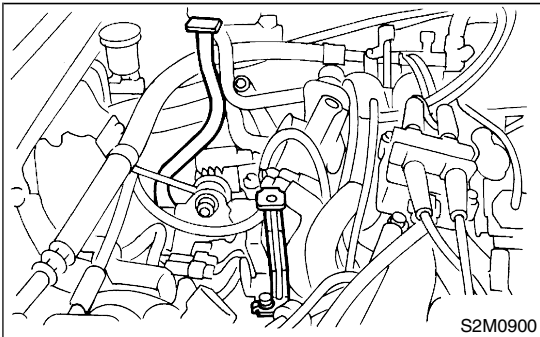
3. Manual Transmission Assembly

S503224

A: REMOVAL

S503224A18

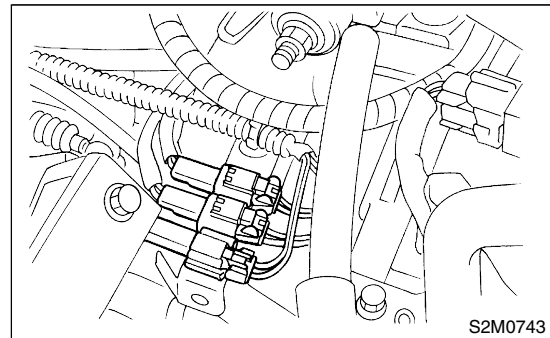
- 1) Set vehicle on a lift.
- 2) Open front hood fully, and support with stay.
- 3) Disconnect battery ground terminal.
- 4) Move gear shift lever to "N", and release the parking brake.
- 5) Remove air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.> and <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 6) Remove air cleaner case stay. (Non-turbo model)



- 7) Remove intercooler (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
- 8) Disconnect the following connectors.
 - (1) Neutral position switch connector
 - (2) Back-up light switch connector

- (3) High-low switch connector (Non-turbo model)

Non-turbo model

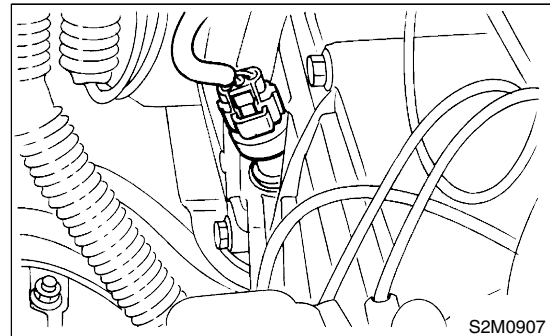


Turbo model

tr0428



- (4) Vehicle speed sensor

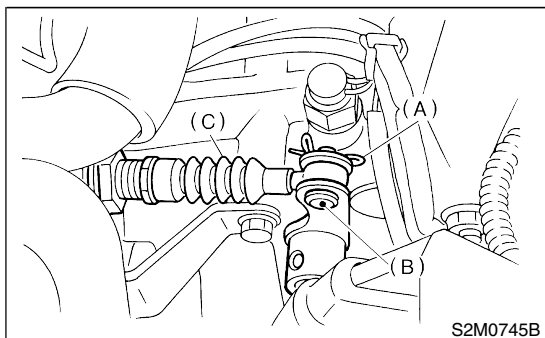


- (5) Transmission ground terminal.
- 9) Remove snap pin and pin from the drive select cable.

MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

10) Remove the drive select cable on the transmission. (Non-turbo model)



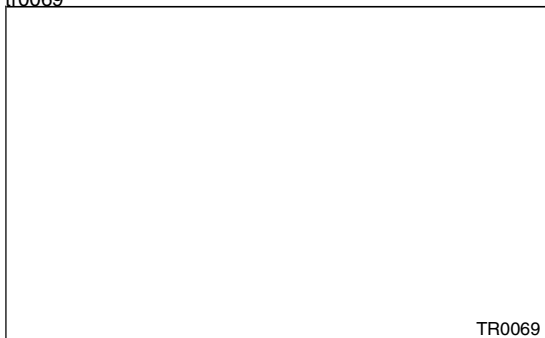
- (A) Snap pin
- (B) Pin
- (C) Drive select cable

11) Remove starter. <Ref. to SC-5, REMOVAL, Starter.>

12) Remove operating cylinder from transmission.

Non-turbo model

tr0069

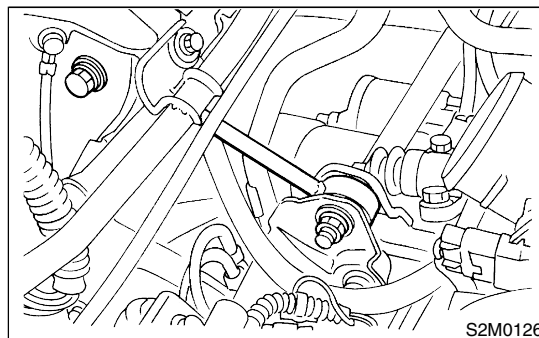


Turbo model

tr0070



13) Remove pitching stopper.

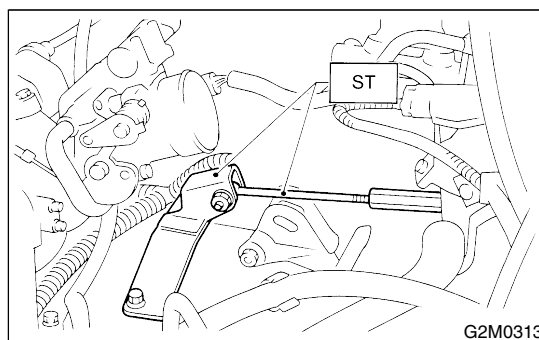


14) Set ST.

NOTE:

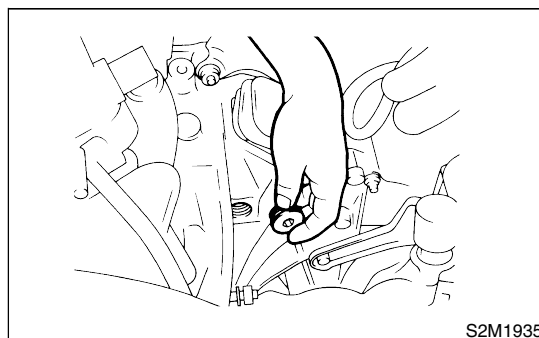
Also is available Part No. 41099AA010.

ST 41099AA020 ENGINE SUPPORT ASSY



15) Separate clutch release fork from release bearing. (Turbo model)

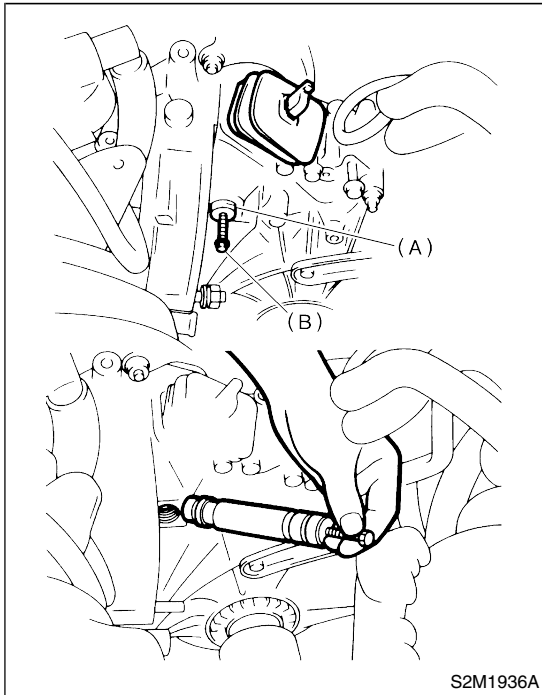
(1) Remove plug using 10 mm hexagon wrench.



MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

- (2) Screw 6 mm dia. bolt into release fork shaft, and remove it.



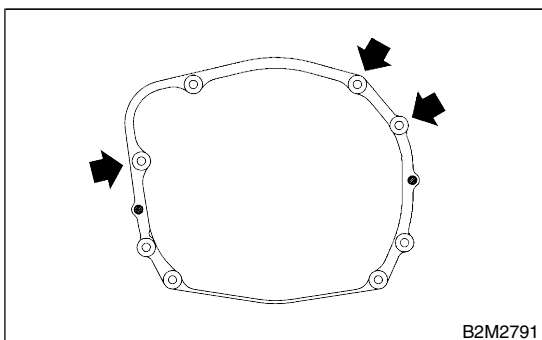
- (A) Shaft
(B) Bolt

- (3) Raise release fork and unfasten release bearing tabs to free release fork.

CAUTION:

Step (4) is required to prevent interference with engine when removing engine from transmission.

- 16) Remove bolt which holds right upper side of transmission to engine.



- 17) Remove front and center exhaust pipes. (Non-turbo model) with OBD <Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.> without OBD <Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>

- 18) Remove center exhaust pipe. (Turbo model). <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>

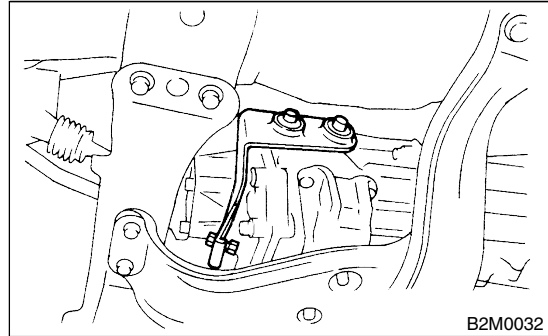
- 19) Remove rear exhaust pipe and muffler.

CAUTION:

When removing exhaust pipes, be careful each exhaust pipe does not drop out.

- 20) Remove heat shield cover. (If equipped)

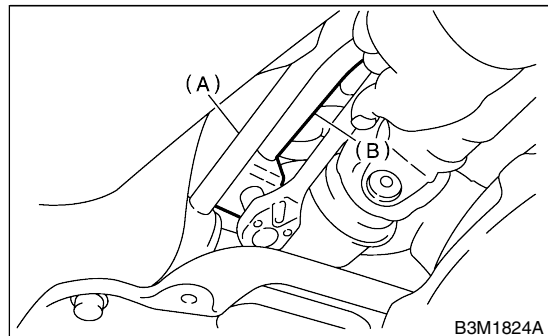
- 21) Remove hanger bracket from right side of transmission.



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

- 23) Remove gear shift rod and stay from transmission.

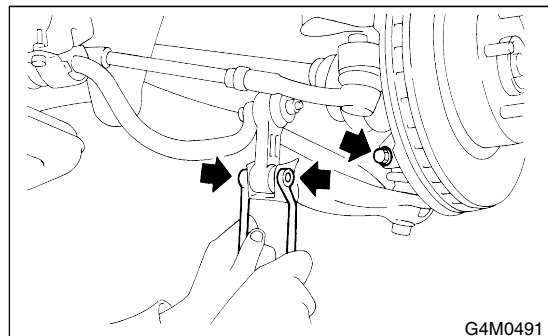
- (1) Disconnect stay from transmission.
(2) Disconnect rod from transmission.



- (A) Stay
(B) Rod

- 24) Disconnect stabilizer link from transverse link.

- 25) Remove bolt securing ball joint of transverse link to housing.



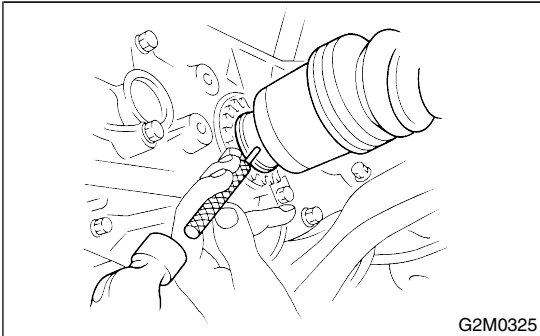
MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

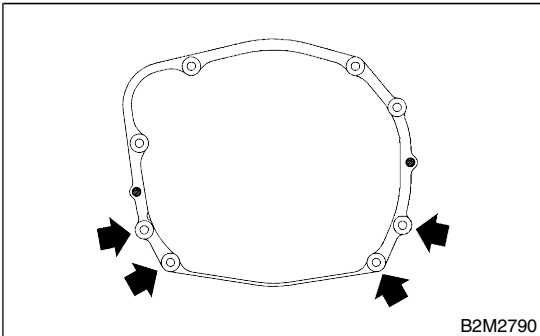
26) Remove spring pins and separate front drive shafts from each side of the transmission.

CAUTION:

Discard removing spring pin. Replace with a new one.



27) Remove nuts which hold lower side of transmission to engine.

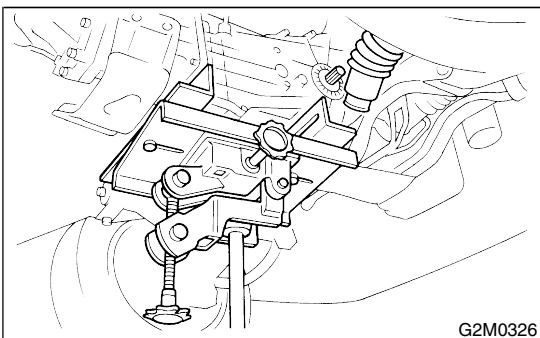


28) Disconnect oil cooler hoses to pipe. (Turbo model with oil pump)

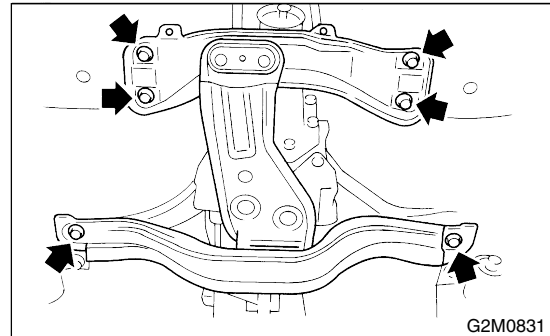
29) Place transmission jack under transmission.

CAUTION:

Always support transmission case with a transmission jack.



30) Remove transmission rear crossmember from vehicle.



31) Remove transmission.

CAUTION:

Move transmission jack toward rear until main shaft is withdrawn from clutch cover.

32) Separate transmission assembly and rear cushion rubber.

B: INSTALLATION

S503224A11

1) Install rear cushion rubber to transmission assembly.

Tightening torque:

34 N·m (3.5 kgf-m, 25.3 ft-lb)

2) Install clutch release lever and bearing onto transmission. (Turbo model) <Ref. to CL-21, INSTALLATION, Release Bearing and Lever.>

3) Install transmission onto engine.

(1) Gradually raise transmission with transmission jack.

(2) Engage them at splines.

CAUTION:

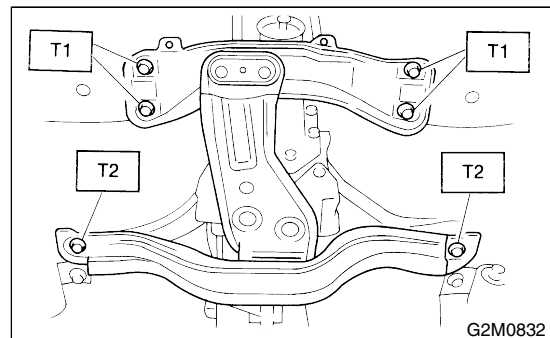
Be careful not to strike main shaft against clutch cover.

4) Install transmission rear crossmember.

Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



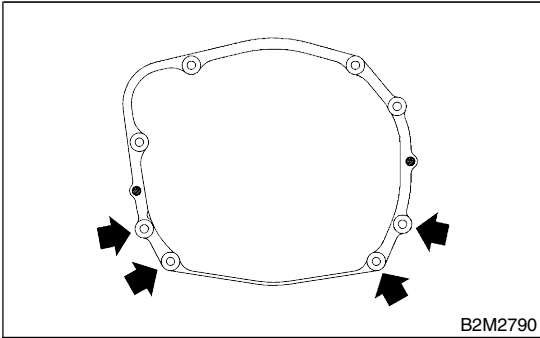
MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

- 5) Take off transmission jack.
- 6) Tighten nuts which hold lower side of transmission to engine.

Tightening torque:

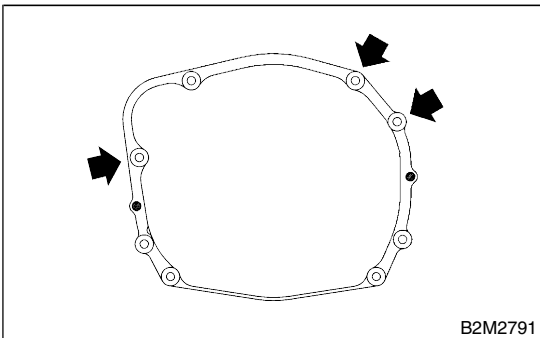
50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 7) Connect engine and transmission.
 - (1) Install starter.
<Ref. to SC-6, INSTALLATION, Starter.>
 - (2) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:

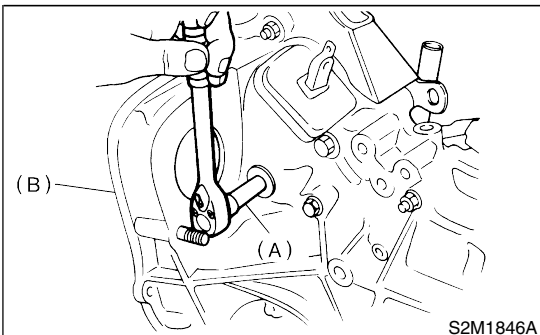
50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 8) Install plug.

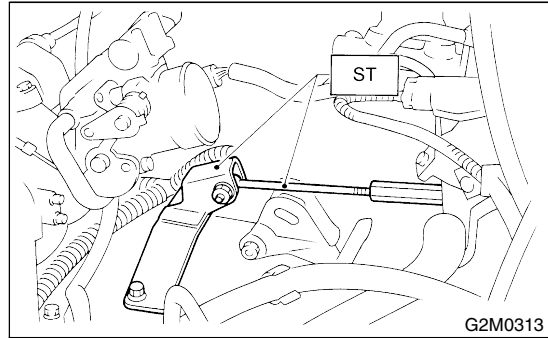
Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)

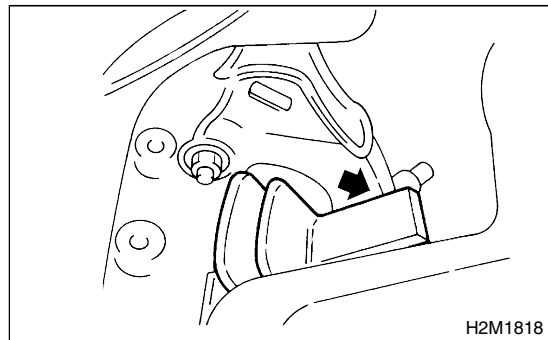


- (A) Plug
(B) Transmission ASSY

- 9) Remove ST.



- 10) Push clutch release lever to fit bearing into clutch cover.

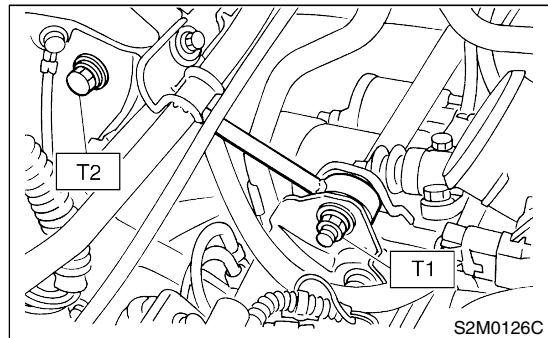


- 11) Install pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



- 12) Lift-up the vehicle.
- 13) Connect oil cooler hoses to pipe. (Turbo model with oil pump)
- 14) Install front drive shaft into transmission.

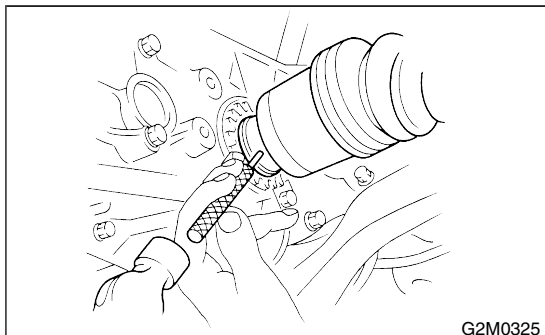
MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

15) Drive spring pin into chamfered hole of drive shaft.

CAUTION:

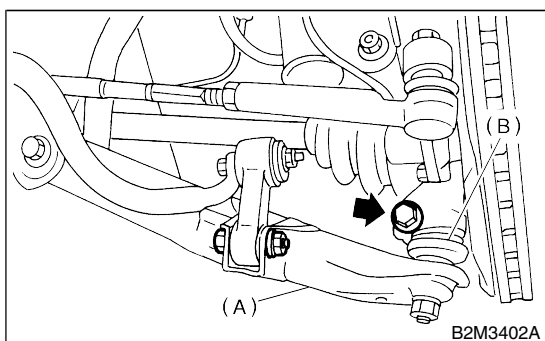
Always use a new spring pin.



16) Install ball joints of lower arm into knuckle arm of housing, and tighten installing bolts.

Tightening torque:

49 N·m (5.0 kgf-m, 36 ft-lb)

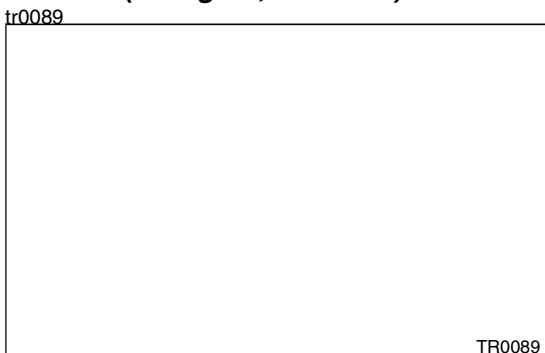


- (A) Transverse link
- (B) Ball joint

17) Install stabilizer link from transverse link.

Tightening torque:

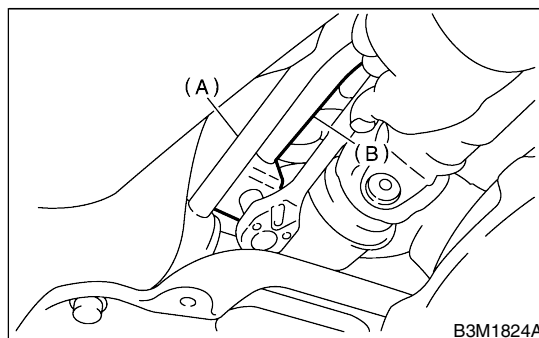
30 N·m (3.1 kgf-m, 22.1 ft-lb)



18) Connect rod to the joint.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

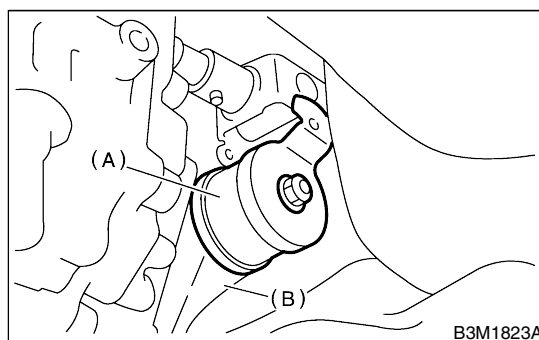


- (A) Joint
- (B) Rod

19) Connect stay to transmission bracket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

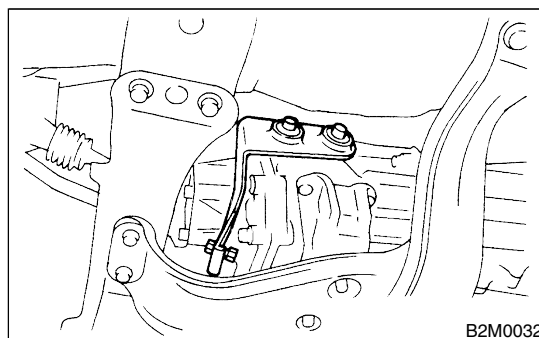


- (A) Stay
- (B) Transmission bracket

20) Install propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>

21) Install heat shield cover. (if equipped)

22) Install hanger bracket on right side of transmission.



MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

23) Install rear exhaust pipe and muffler.

Non-turbo model with OBD:

<Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>
& <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.>

Non-turbo model without OBD:

<Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.> & <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.>

Turbo model:

<Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.> & <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.>

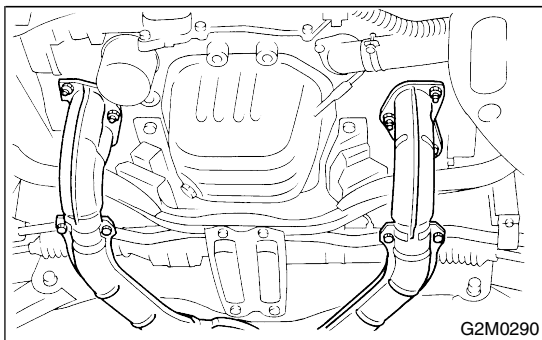
24) Install front exhaust pipe and center exhaust pipe. (Non-turbo model)

Without OBD:

<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>

With OBD:

<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>



25) Install center exhaust pipe. (Turbo model)
<Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>

26) Install under cover.

27) Install operating cylinder.

Tightening torque:

37 N·m (3.8 kgf-m, 27.5 ft-lb)

Non-turbo model



Turbo model

tr0070



28) Connect the following connectors.

(1) Transmission ground terminal

Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Vehicle speed sensor connector

(3) Neutral position switch connector

(4) Back-up light switch connector

(5) High-low switch connector (Non-turbo model)

29) Install air cleaner case stay.

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)

30) Install air cleaner case and intake duct. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>, <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>

31) Install intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

32) Connect battery ground terminal.

33) Pour gear oil and check the oil level. <Ref. to MT-31, Transmission Gear Oil.>

34) Take off vehicle from lift arms.

TRANSMISSION MOUNTING SYSTEM

Manual Transmission and Differential

4. Transmission Mounting System

S503233

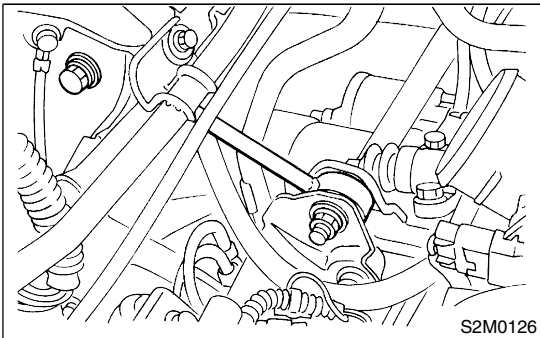
A: REMOVAL

S503233A18

1. PITCHING STOPPER

S503233A1801

- 1) Disconnect battery ground terminal.
- 2) Remove the cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 3) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
- 4) Remove the pitching stopper.



2. CROSSMEMBER AND CUSHION RUBBER

S503233A1802

- 1) Disconnect battery ground terminal.
- 2) Jack-up vehicle and support it with sturdy racks.
- 3) Remove the front, center, rear exhaust pipes and muffler. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, REMOVAL, Muffler.>

Without OBD:

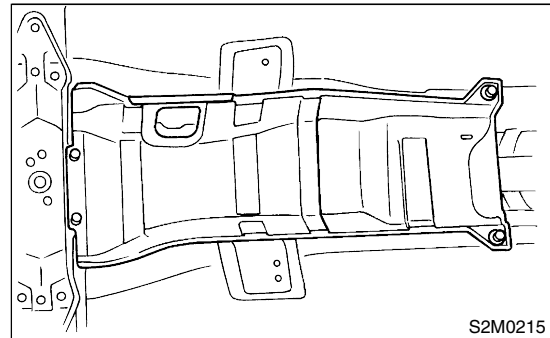
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, REMOVAL, Muffler.>

CAUTION:

When removing exhaust pipes, be careful each exhaust pipe does not drop out.

- 4) Remove center, rear exhaust pipes and muffler. <Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, REMOVAL, Muffler.>

- 5) Remove the heat shield cover. (If equipped)

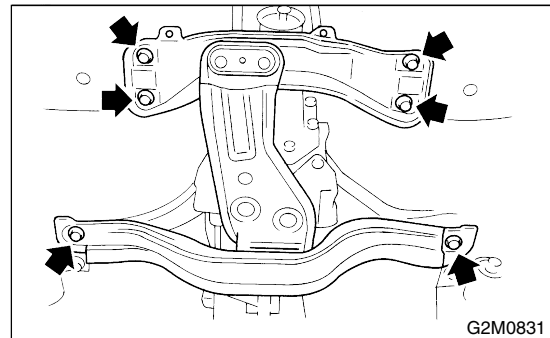


- 6) Set the transmission jack under the transmission body.

CAUTION:

Always support transmission case with a transmission jack.

- 7) Remove the rear crossmember.



- 8) Remove the rear cushion rubber.

B: INSTALLATION

S503233A11

1. PITCHING STOPPER

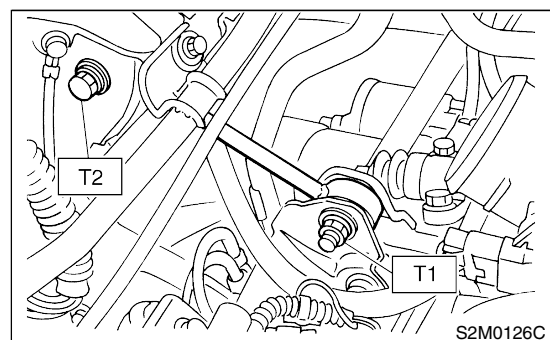
S503233A1101

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



- 2) Install the cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.>

TRANSMISSION MOUNTING SYSTEM

Manual Transmission and Differential

- 3) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
- 4) Connect battery ground terminal.

2. CROSSMEMBER AND CUSHION RUBBER

S503233A1102

- 1) Install the rear cushion rubber.

Tightening torque:

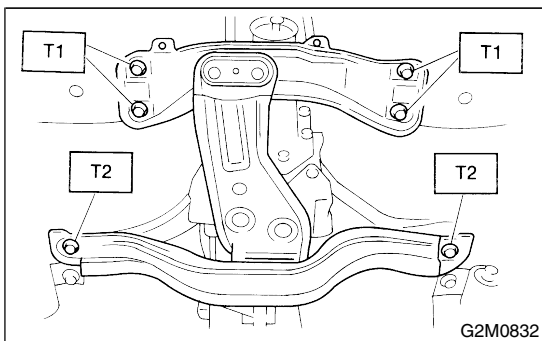
35 N·m (3.6 kgf-m, 26 ft-lb)

- 2) Install the crossmember.

Tightening torque:

T1: 70 N·m (7.1 kgf-m, 51 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



- 3) Remove the transmission jack.
- 4) Install the heat shield cover. (If equipped)
- 5) Install the front, center, rear exhaust pipes and the muffler. (Non-turbo model)

With OBD:

<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-11, INSTALLATION, Muffler.>

Without OBD:

<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHCw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHCw/oOBD)-12, INSTALLATION, Muffler.>

- 6) Install center, rear exhaust pipes and muffler. (Turbo model) <Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(DOHC TURBO)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(DOHC TURBO)-15, INSTALLATION, Muffler.>

C: INSPECTION

S503233A10

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER

S503233A1001

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

S503233A1002

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

OIL SEAL

Manual Transmission and Differential

5. Oil Seal

S503143

A: REPLACEMENT

S503143A20

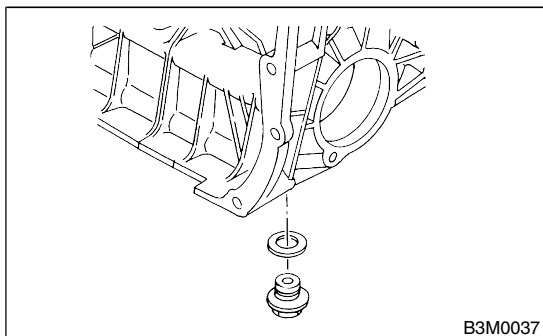
- 1) Clean transmission exterior.
- 2) Drain gear oil completely.

NOTE:

Tighten drain plug after draining gear oil.

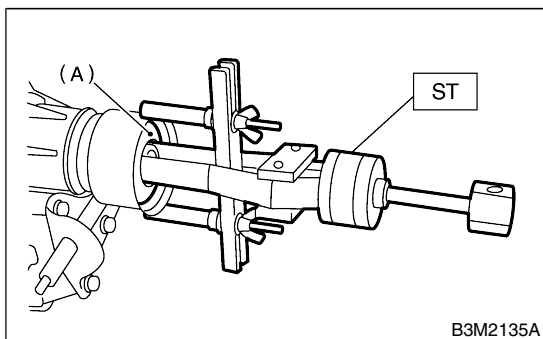
Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)



- 3) Remove rear exhaust pipe and muffler.
- 4) Remove heat shield cover. (If equipped)
- 5) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
- 6) Using ST, remove the oil seal.

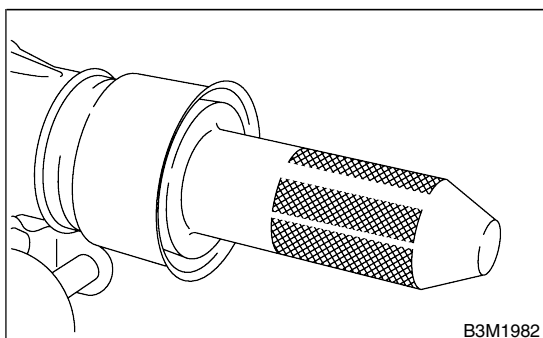
ST 398527700 PULLER ASSY



(A) Oil seal

- 7) Using ST, install the oil seal.

ST 498057300 INSTALLER



- 8) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>

9) Install the heat shield cover.

10) Install the rear exhaust pipe and muffler.

11) Pour gear oil and check the oil level. <Ref. to MT-31, Transmission Gear Oil.>

SWITCHES AND HARNESS

Manual Transmission and Differential

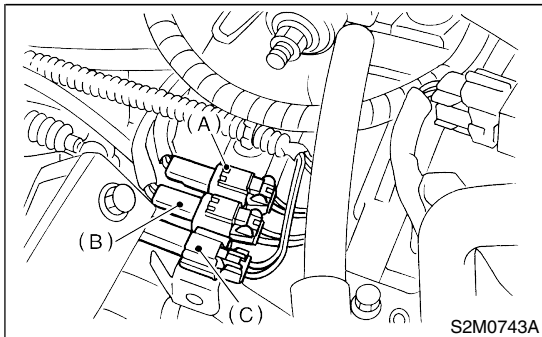
6. Switches and Harness S503232

A: REMOVAL S503232A18

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH S503232A1801

- 1) Disconnect connector battery ground terminal.
- 2) Remove air intake duct and cleaner case. (Non-Turbo model) <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, REMOVAL, Air Intake Duct.>
- 3) Remove intercooler. (Turbo model) <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
- 4) Disconnect connector back-up light switch and neutral position switch.

Non-turbo model



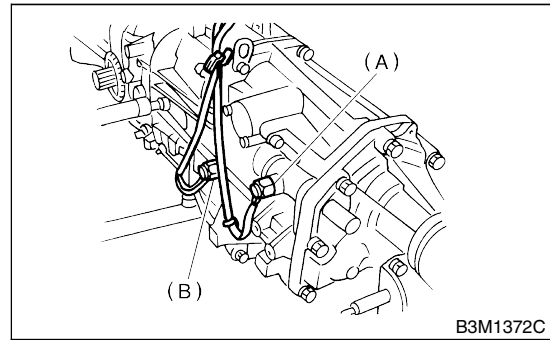
- (A) Neutral switch (Brown)
- (B) Back-up light switch (Gray)
- (C) High-low switch (Black)

Turbo model

tr0428



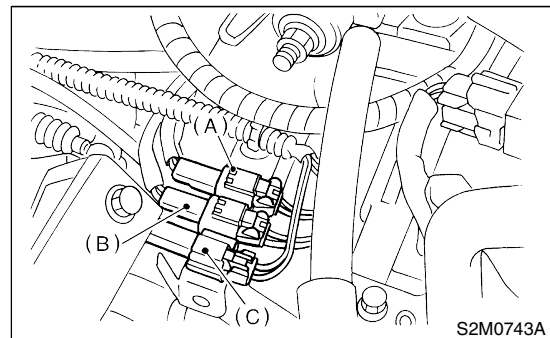
- 5) Lift-up the vehicle.
- 6) Remove back-up light switch and neutral position switch with harness.



- (A) Neutral switch (Brown connector)
- (B) Back-up light switch (Gray connector)

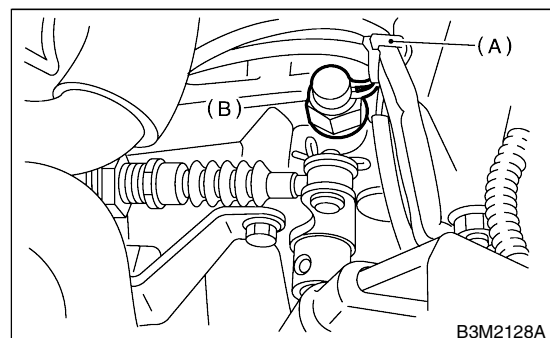
2. HIGH-LOW SWITCH S503232A1802

- 1) Disconnect connector battery ground terminal.
- 2) Remove air intake duct and cleaner case. <Ref. to IN (SOHC)-7, REMOVAL, Air Cleaner Case.> and <Ref. to IN (SOHC)-8, REMOVAL, Air Intake Duct.>
- 3) Disconnect connector high-low switch.



- (A) Neutral switch (Brown)
- (B) Back-up light switch (Gray)
- (C) High-low switch (Black)

- 4) Remove HI-LO switch cable from clamp.
- 5) Remove HI-LO switch.



- (A) Clamp
- (B) High-low switch

SWITCHES AND HARNESS

Manual Transmission and Differential

B: INSTALLATION

S503232A11

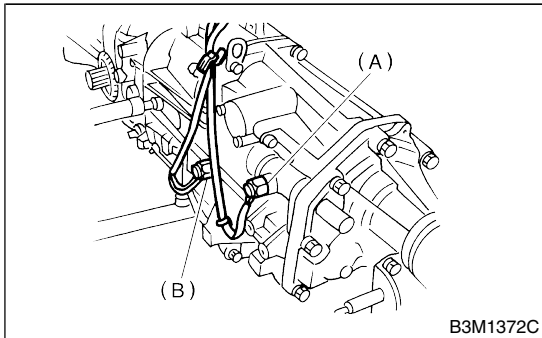
1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

S503232A1101

- 1) Install back-up light switch and neutral position switch with harness.

Tightening torque:

24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Neutral switch
(B) Back-up light switch

- 2) Connect connector of back-up light switch and neutral position switch.
- 3) Install air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>
- 4) Install intercooler (Turbo model) <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>
- 5) Connect battery ground terminal.

2. HIGH-LOW SWITCH

S503232A1102

- 1) Install high-low switch.

Tightening torque:

24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

- 2) Install HI-LO switch cable to the clamp.
- 3) Connect connector high-low switch.
- 4) Install air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-7, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(SOHC)-8, INSTALLATION, Air Intake Duct.>
- 5) Connect battery ground terminal.

C: INSPECTION

S503232A10

1. BACK-UP LIGHT SWITCH

S503232A1001

Inspect the back-up light switch. <Ref. to LI-29 INSPECTION, Back-up Light System.>

2. NEUTRAL POSITION SWITCH

S503232A1002

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector neutral position switch.
- 3) Using the circuit tester, verify the current in neutral position. Also verify that there is no current in positions other than neutral.

Non-turbo model

tr0100



Turbo model

tr0101

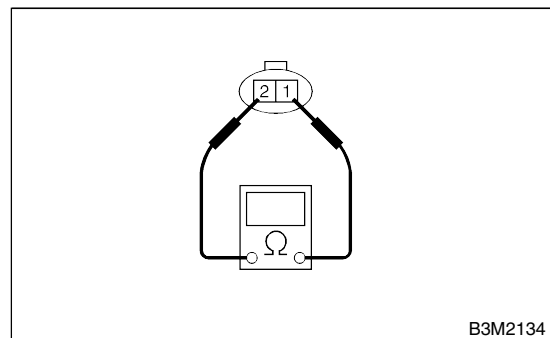


- 4) Replace defective parts.

3. HIGH-LOW SWITCH

S503232A1003

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector high-low switch.
- 3) Set drive select lever in LO position, and make sure continuity exists using circuit tester.



- 4) Replace defective parts.

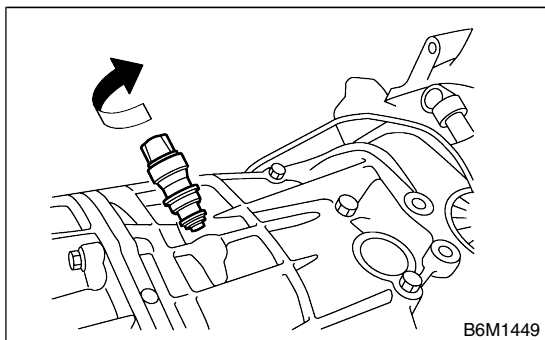
VEHICLE SPEED SENSOR

Manual Transmission and Differential

7. Vehicle Speed Sensor S503231

A: REMOVAL S503231A18

- 1) Disconnect ground terminal from battery.
- 2) Lift-up the vehicle.
- 3) Remove front and center exhaust pipes. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-5, REMOVAL, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
- 4) Remove center exhaust pipe. (Turbo model)
<Ref. to EX(DOHC TURBO)-9, REMOVAL, Center Exhaust Pipe.>
- 5) Disconnect connector from vehicle speed sensor.
- 6) Turn and remove vehicle speed sensor.



B: INSTALLATION S503231A11

NOTE:

- Discard vehicle speed sensor and after removal, replace with a new one.
- Ensure sensor mounting hole is clean and free of foreign matter.
- Align tip end of key with key groove on end of speedometer shaft during installation.

- 1) Hand tighten vehicle speed sensor.
- 2) Tighten vehicle speed sensor using suitable tool.

Tightening torque:

5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

- 3) Connect connector to vehicle speed sensor.
- 4) Install front and center exhaust pipes. (Non-turbo model)
With OBD:
<Ref. to EX(SOHC)-6, INSTALLATION, Front Exhaust Pipe.>
Without OBD:
<Ref. to EX(SOHCw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>

- 5) Install center exhaust pipe. (Turbo model)
<Ref. to EX(DOHC TURBO)-10, INSTALLATION, Center Exhaust Pipe.>
- 6) Lower the vehicle.
- 7) Connect battery ground terminal.

C: INSPECTION S503231A10

Inspect the vehicle speed sensor.

Non-turbo model with OBD:

<Ref. to EN(SOHC)-208, DTC P0500-VEHICLE SPEED SENSOR MALFUNCTION-, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Non-turbo model without OBD:

<Ref. to EN(SOHCw/oOBD)-94, DTC 33 VEHICLE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Turbo model:

<Ref. to EN(DOHC TURBO)-230, DTC P0500-VEHICLE SPEED SENSOR MALFUNCTION-, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

PREPARATION FOR OVERHAUL

Manual Transmission and Differential

8. Preparation for Overhaul SS03091

A: PROCEDURE SS03091E45

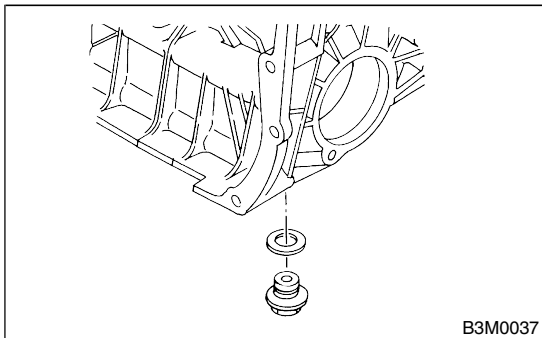
- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove drain plug to drain oil. After draining, retighten it as before.

NOTE:

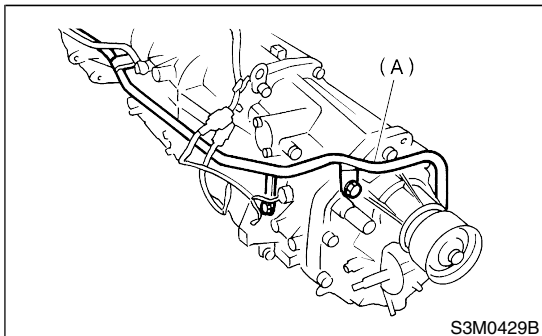
Replace gasket with a new one.

Tightening torque:

44 N·m (4.5 kgf-m, 32.5 ft-lb)



- 3) Remove outlet pipe. (With oil pump)



(A) Outlet pipe

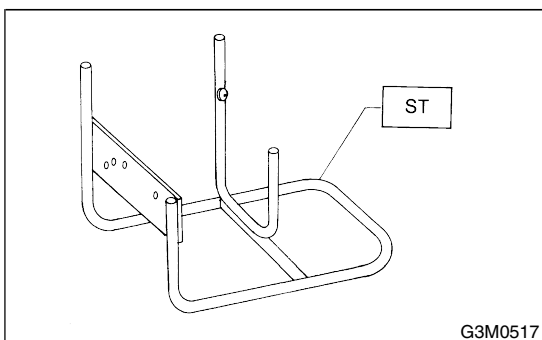
- 4) Tighten union screw. (With oil pump)

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

- 5) Attach transmission to ST.

ST 499937100 TRANSMISSION STAND SET



- 6) Rotating parts should be coated with oil prior to assembly.

- 7) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.

- 8) Gaskets, lock washers and lock nut must be replaced with new ones.

- 9) Liquid gasket should be used where specified to prevent leakage.

TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

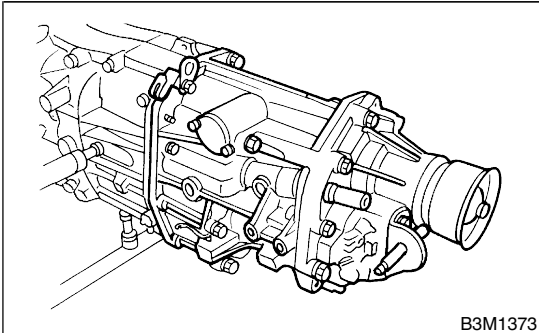
9. Transfer Case and Extension Case Assembly

S503561

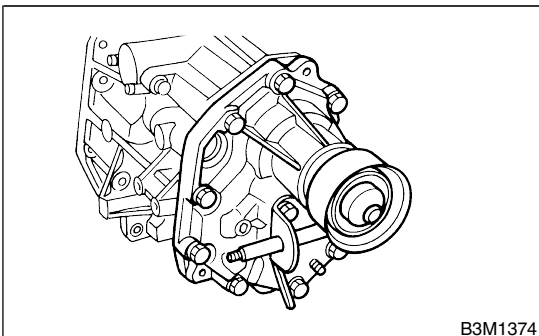
A: REMOVAL

S503561A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly.



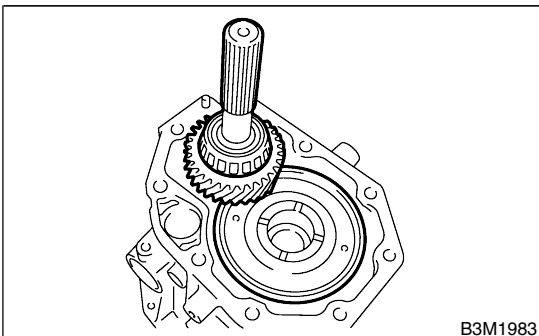
- 4) Remove shifter arm.
- 5) Remove extension case assembly.



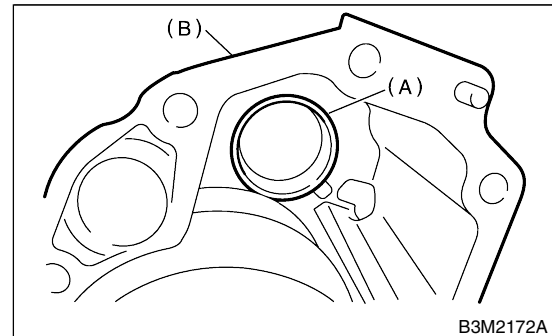
B: INSTALLATION

S503561A11

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

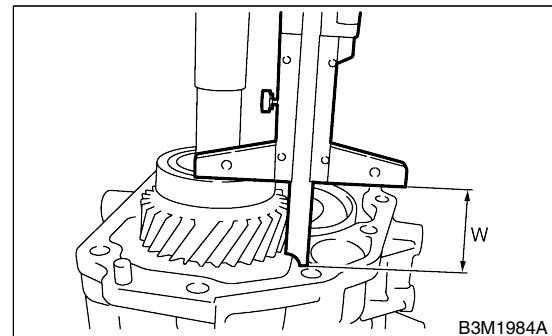


- 2) Remove bearing cone from the extension case assembly, and install to taper roller bearing of the transfer driven gear.



- (A) Bearing cone (Extension case)
(B) Extension case

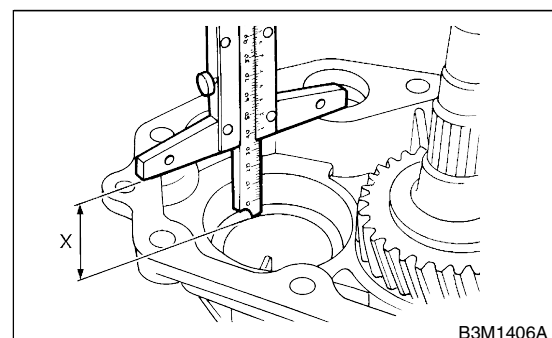
- 3) While pressing the bearing cone horizontally, turn the driven shaft ten rotations.
- 4) Measure height "W" between transfer case and taper roller bearing on the transfer driven gear.



- 5) Measure depth "X".

NOTE:

Measure with bearing cone and thrust washer removed.



- 6) Calculate space "t" using the following equation: $t = X - W + 0.2$ to 0.3 mm (0.008 to 0.012 in)
- 7) Select nearest washer in the following table:

Standard clearance between thrust washer and taper roller bearing:

0.2 — 0.3 mm T (0.008 — 0.012 in T)

TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

NOTE:

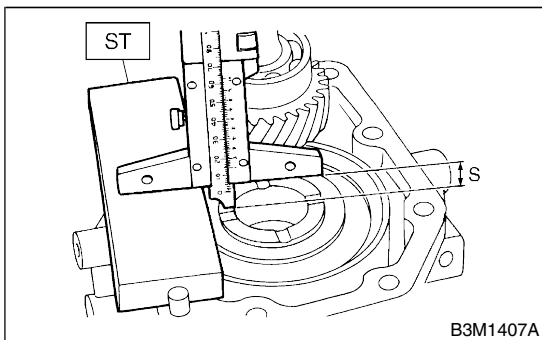
T: Tight

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

8) Fit thrust washers on transfer drive shaft.

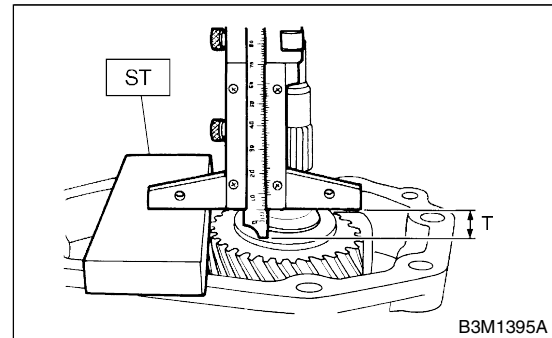
9) Measure depth "S" between transfer case and center differential.

ST 398643600 GAUGE



10) Measure depth "T" between extension case and transfer drive gear.

ST 398643600 GAUGE



11) Calculate space "U" using the following equation: $U = S - T$

12) Select suitable washer in the following table:

Standard clearance:

0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

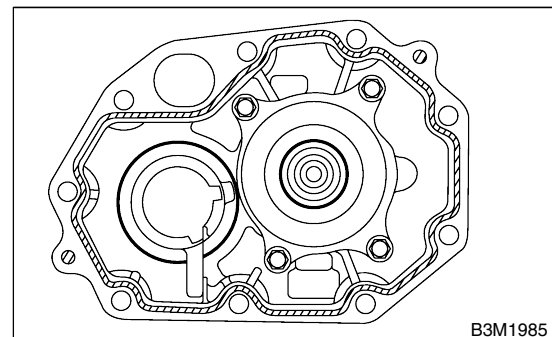
13) Fit thrust washer on center differential.

14) Install bearing cone into extension case.

15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:

THREE BOND 1215B



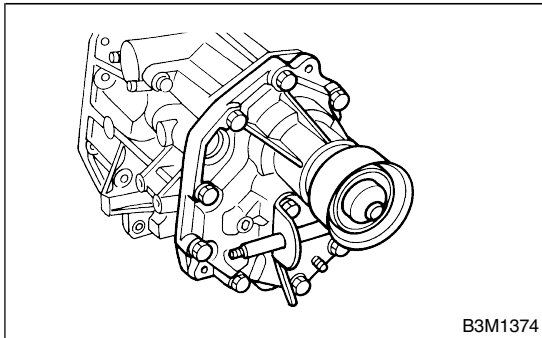
TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

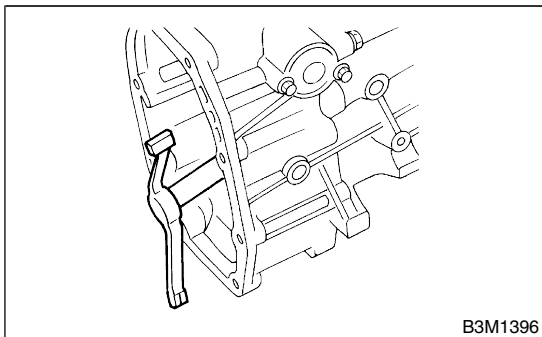
16) Install extension assembly into transfer case.

Tightening torque:

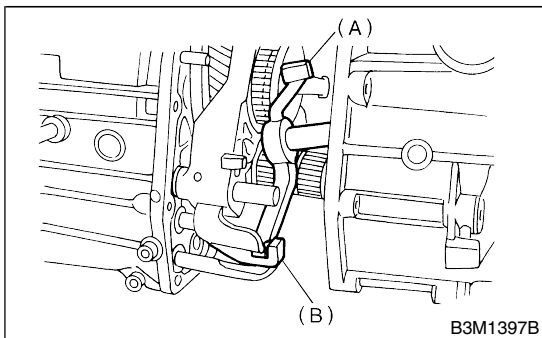
40N·m (4.1 kgf-m, 29.7 ft-lb)



17) Install shifter arm to transfer case.



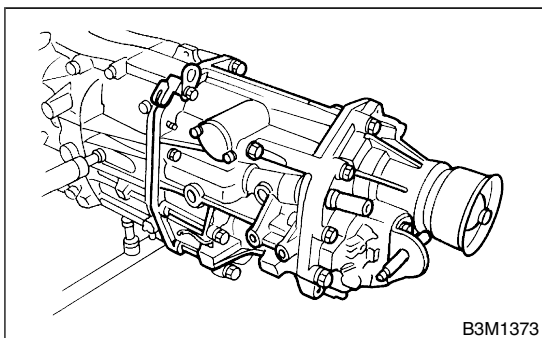
18) Hang the shifter arm on the 3rd-4th fork rod.



19) Install transfer case with extension case assembly to transmission case.

Tightening torque:

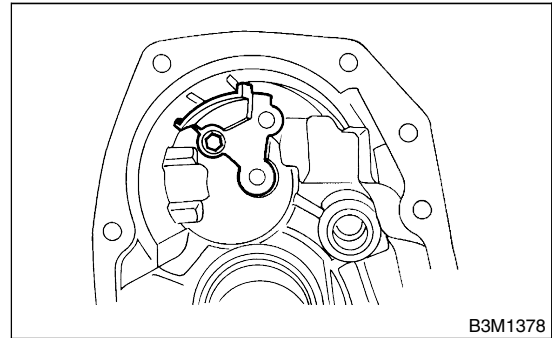
25N·m (2.5 kgf-m, 18.1 ft-lb)



C: DISASSEMBLY S503561A06

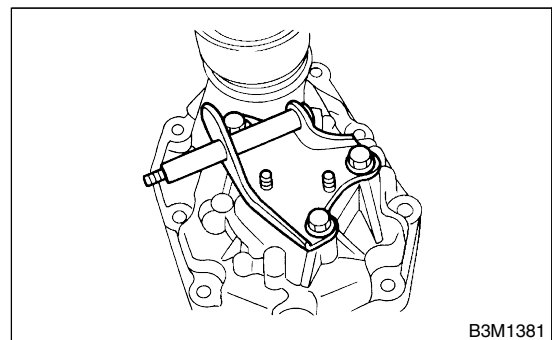
1. TRANSFER CASE S503561A0601

- 1) Remove reverse check assembly. <Ref. to MT-57 REMOVAL, Reverse Check Removal.>
- 2) Remove oil guide.



2. EXTENSION CASE S503561A0602

- 1) Remove transfer drive gear assembly. <Ref. to MT-52 REMOVAL, Transfer Drive Gear.>
- 2) Remove shift bracket.



- 3) Remove oil seal from extension case. <Ref. to MT-41 Oil Seal.>

TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

D: ASSEMBLY

S503561A02

1. EXTENSION CASE

S503561A0201

- 1) Using ST, install oil seal to extension case.
<Ref. to MT-41, Oil Seal.>

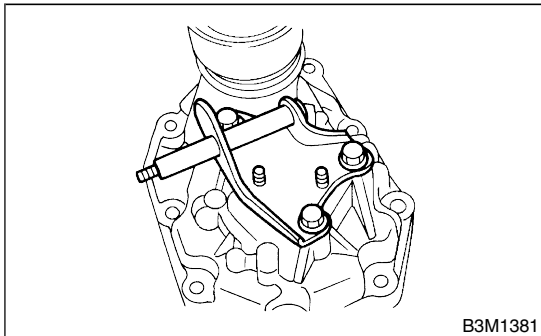
CAUTION:

Use new oil seal.

- 2) Install shift bracket to extension case.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- 3) Install transfer drive gear to extension case.
<Ref. to MT52 INSTALLATION, Transfer Drive Gear.>

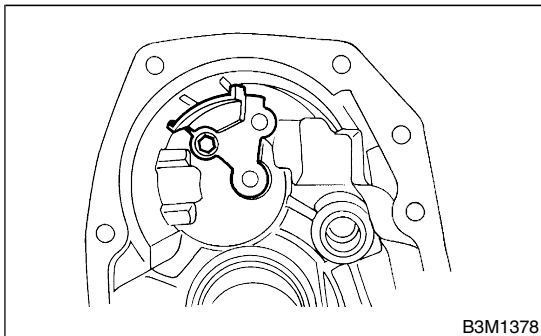
2. TRANSFER CASE

S503561A0202

- 1) Install oil guide to transfer case.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 2) Install reverse check sleeve assembly to transfer case. <Ref. to MT-57 INSTALLATION, Reverse Check Sleeve.>

OIL PUMP

Manual Transmission and Differential

10. Oil Pump S503070

A: REMOVAL S503070A18

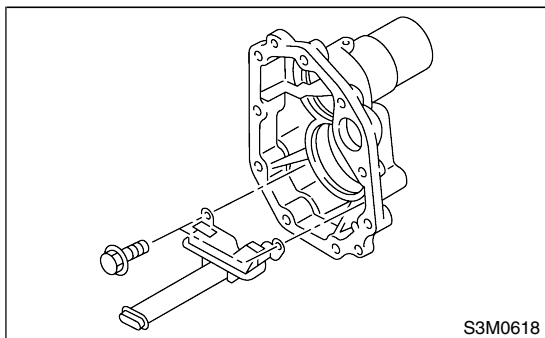
For extension case removal procedure, refer to "Transfer Case and Extension Case Assembly".
<Ref. to MT-46, REMOVAL, Transfer Case and Extension Case Assembly.>

B: INSTALLATION S503070A11

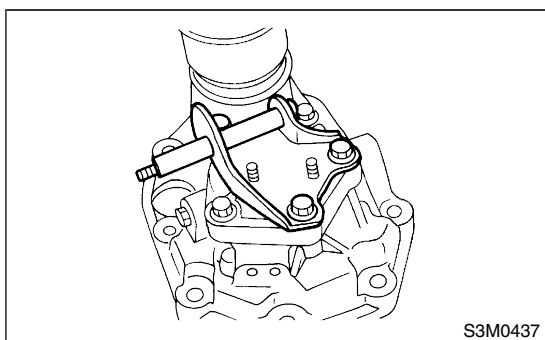
For extension case installation procedure, refer to "Transfer Case Pump and Extension Case Assembly". <Ref. to MT-46, INSTALLATION, Transfer Case and Extension Case Assembly.>

C: DISASSEMBLY S503070A06

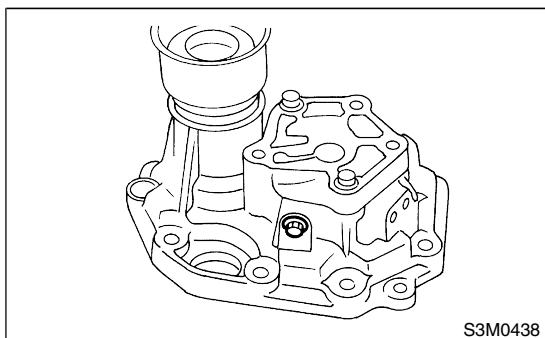
- 1) Remove transfer drive gear assembly. <Ref. to MT-52, REMOVAL, Transfer Drive Gear.>
- 2) Remove oil strainer from extension case.



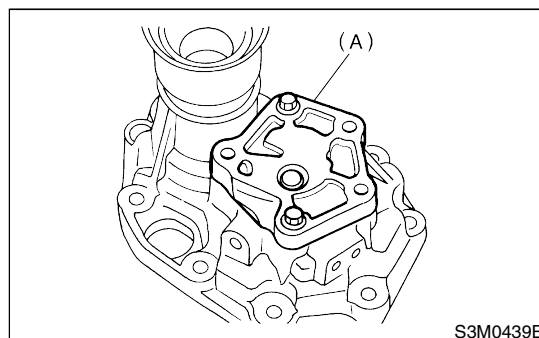
- 3) Remove shift bracket.



- 4) Remove relief valve from extension case.

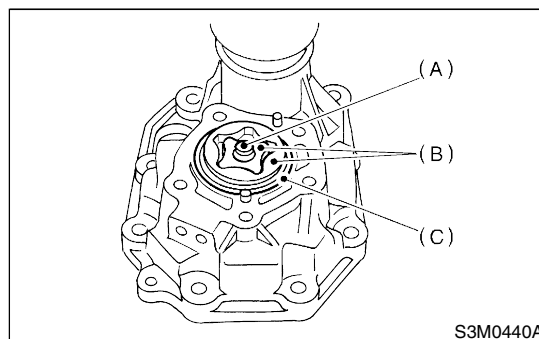


- 5) Remove oil pump cover from extension.



(A) Oil pump cover

- 6) Remove rotor assembly, oil pump shaft and O-ring.



(A) Oil pump shaft
(B) Rotor ASSY
(C) O-ring

D: ASSEMBLY S503070A02

- 1) Install rotor assembly and oil pump shaft to extension case.
- 2) Install O-ring to oil pump cover.

CAUTION:
Replace O-ring with a new one.

NOTE:
Apply a coat of gear oil to the O-ring.

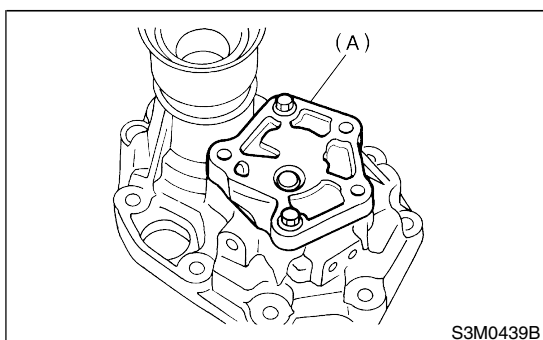
OIL PUMP

Manual Transmission and Differential

3) Install oil pump cover to extension case.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Oil pump cover

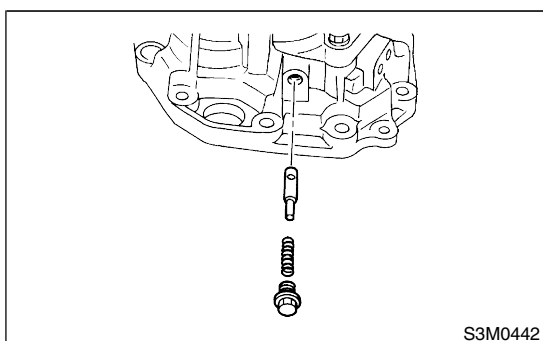
4) Install relief valve and return spring to extension case.

CAUTION:

Replace O-ring with a new one.

Tightening torque:

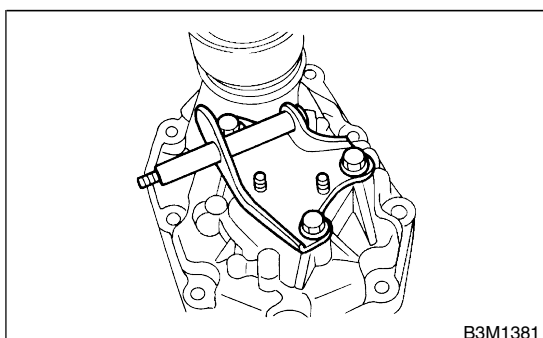
13 N·m (1.3 kgf-m, 9.4 ft-lb)



5) Install shift bracket to extension case.

Tightening torque:

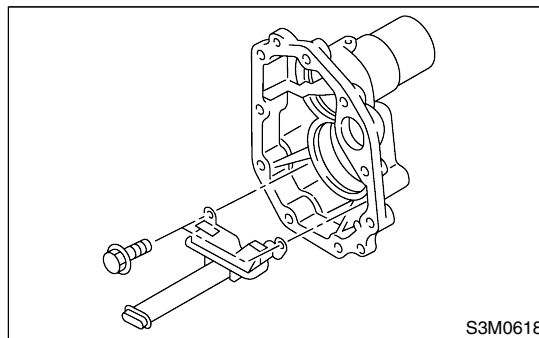
25 N·m (2.5 kgf-m, 18.1 ft-lb)



6) Install oil strainer to extension case.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



7) Install transfer drive gear. <Ref. to MT-52, INSTALLATION, Transfer Drive Gear.>

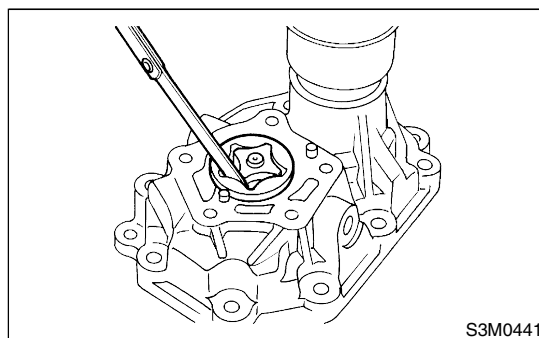
E: INSPECTION

S503070A10

Use a thickness gauge to measure the chip clearance of the rotor assembly. If the value exceeds standard, replace the rotor as an assembly.

Chip clearance:

Less than 0.15 mm (0.0059 in)



TRANSFER DRIVE GEAR

Manual Transmission and Differential

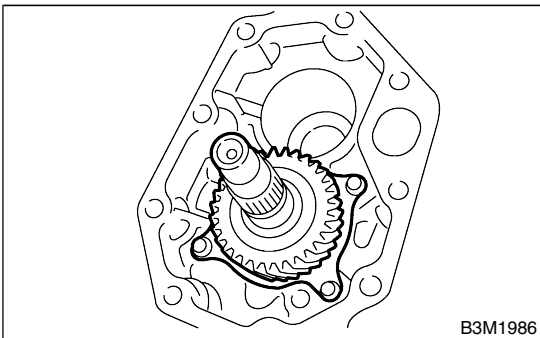
11. Transfer Drive Gear

S503229

A: REMOVAL

S503229A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly.
- 5) Remove transfer driven gear.
- 6) Remove transfer drive gear.



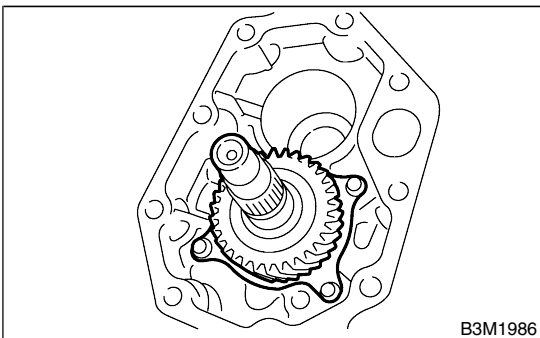
B: INSTALLATION

S503229A11

- 1) Install transfer drive gear. (Without oil pump)

Tightening torque:

26 N·m (2.7 kgf-m, 20 ft-lb)



- 2) Install transfer drive gear to extension case. (With oil pump)

Tightening torque:

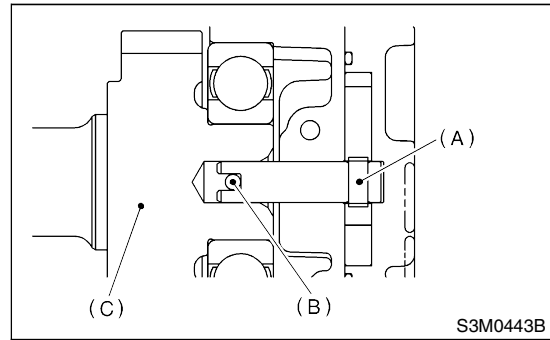
26 N·m (2.7 kgf-m, 20 ft-lb)

CAUTION:

Do not use a press machine. Always install the parts by hand.

NOTE:

Engage the transfer drive gear pin with the extension case pin.



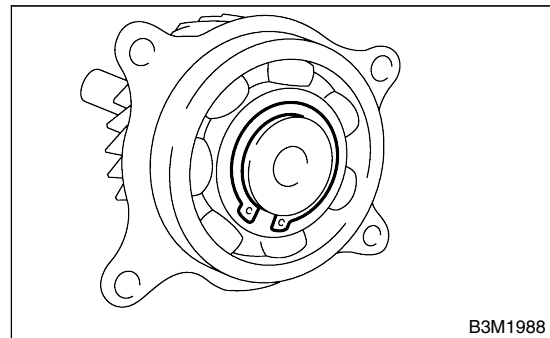
- (A) Oil pump shaft
(B) Straight pin
(C) Transfer drive gear

- 3) Install transfer driven gear.
- 4) Install the extension case assembly.
- 5) Install transfer case and extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>
- 7) Install the manual transmission assembly from vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

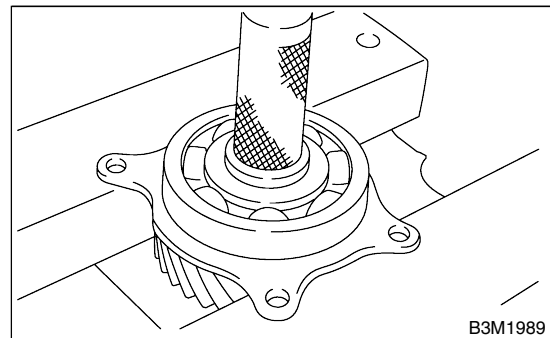
C: DISASSEMBLY

S503229A06

- 1) Remove snap ring.



- 2) Remove ball bearing.



- 3) Remove straight pin from transfer drive gear. (With oil pump)

TRANSFER DRIVE GEAR

Manual Transmission and Differential

D: ASSEMBLY SS03229A02

- 1) Install straight pin to transfer drive gear. (With pump)
- 2) Set the ST applying to inner race of bearing and instal to drive shaft.
ST 398177700 INSTALLER

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



- 3) Install snap ring on transfer drive shaft.
- 4) Inspect clearance between snap ring and inner race of ball bearing. <Ref. MT-53, INSPECTION, Transfer Drive Gear.>

E: INSPECTION SS03229A10

1) Bearings

Replace bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Drive gear

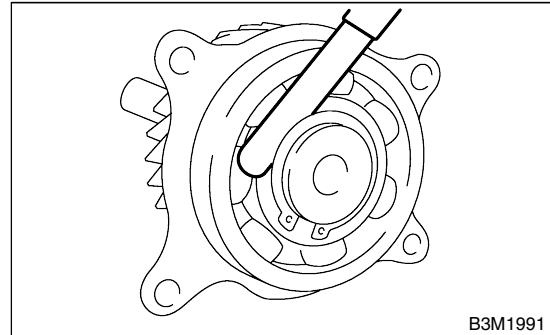
Replace drive gear in the following cases:

- If their tooth surfaces and shaft are excessively broken or damaged.

- 3) Measure clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:

0.01 — 0.15 mm (0.0004 — 0.0059 in)



If the measurement is not within the specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.697)

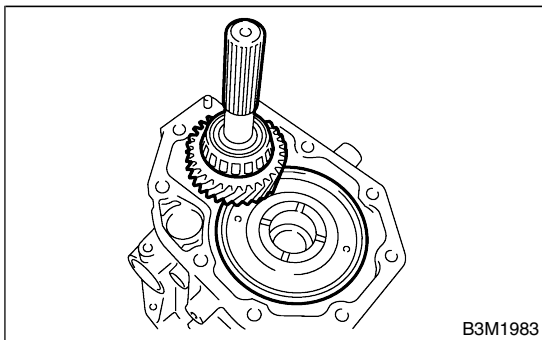
TRANSFER DRIVEN GEAR

Manual Transmission and Differential

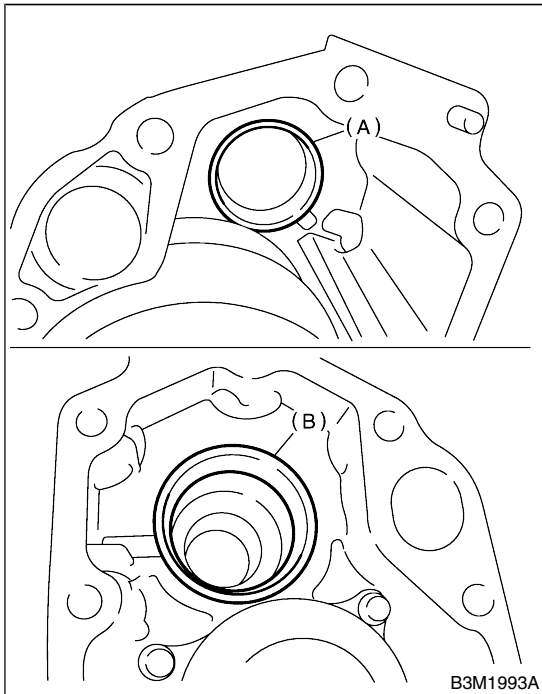
12. Transfer Driven Gear S503223

A: REMOVAL S503223A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-42, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-46, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly.
- 5) Remove transfer driven gear.



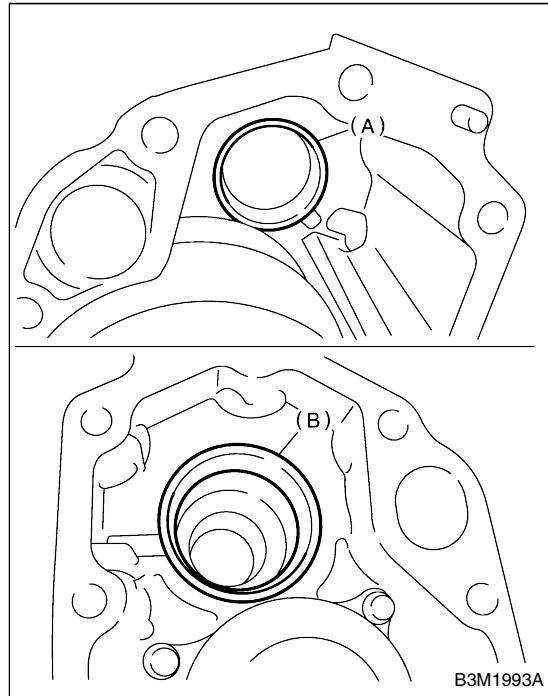
- 6) Remove bearing cup from extension case and transfer case.



- (A) Bearing cup (transfer case)
(B) Bearing cup (extension case)

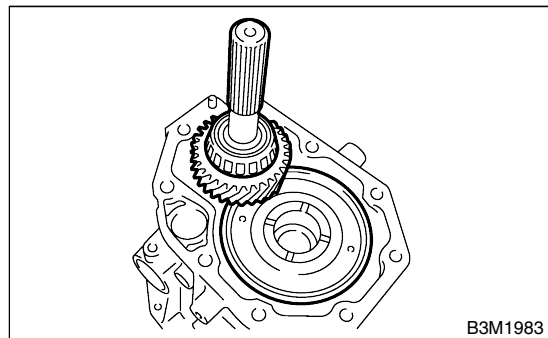
B: INSTALLATION S503223A11

- 1) Install bearing cup to extension case and transfer case.



- (A) Bearing cup (transfer case)
(B) Bearing cup (extension case)

- 2) Install transfer driven gear.



- 3) Install transfer case and extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

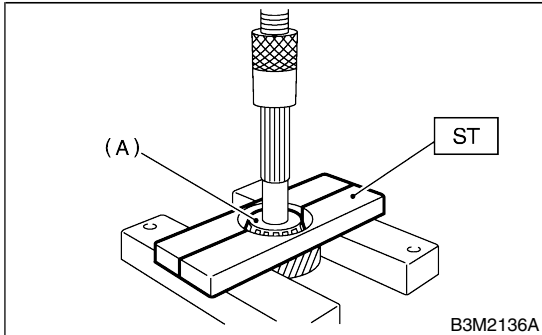
TRANSFER DRIVEN GEAR

Manual Transmission and Differential

C: DISASSEMBLY S503223A06

1) Using ST, remove roller bearing (extension case side).

ST 498077000 REMOVER

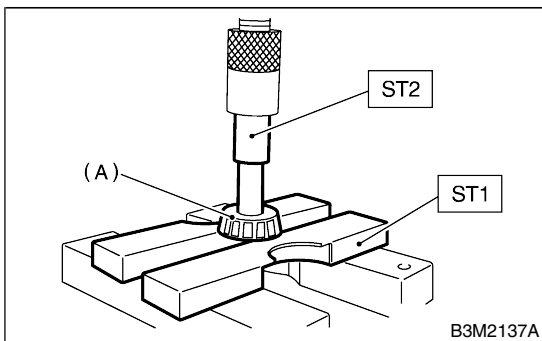


(A) Roller bearing

2) Using ST1 and ST2, remove roller bearing (transfer case side).

ST1 498077000 REMOVER

ST2 899864100 REMOVER



(A) Roller bearing

D: ASSEMBLY S503223A02

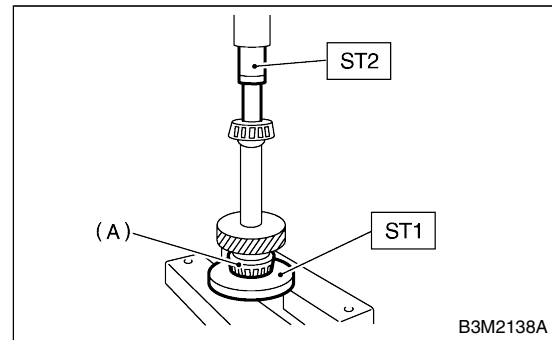
1) Using ST, install roller bearing (extension case side).

ST1 398177700 INSTALLER

ST2 899864100 REMOVER

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



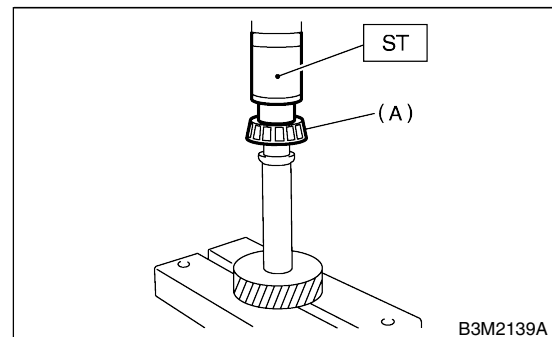
(A) Roller bearing

2) Using ST, install roller bearing (transfer case side).

ST 499757002 INSTALLER

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



(A) Roller bearing

E: INSPECTION S503223A10

1) Bearings

Replace bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Driven gear

Replace drive gear in the following cases:

- If their tooth surfaces and shaft are excessively broken or damaged.

CENTER DIFFERENTIAL

Manual Transmission and Differential

13. Center Differential S503158

A: REMOVAL S503158A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transfer driven gear. <Ref. to MT-54 REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential.

B: INSTALLATION S503158A11

- 1) Install the center differential into transfer case.
- 2) Install the transfer driven gear. <Ref. to MT-54 INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to MT-46 INSTALLATION, Extension Case Assembly.>
- 4) Install the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503158A06

NOTE:

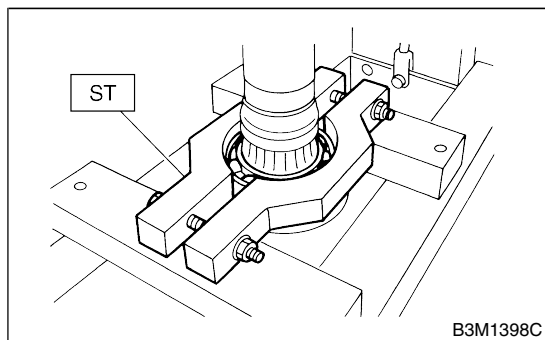
Do not disassemble center differential because it is a non-disassemble part.

Remove ball bearing using ST.

CAUTION:

Do not reuse ball bearing.

ST 498077300 CENTER DIFFERENTIAL
BEARING REMOVER

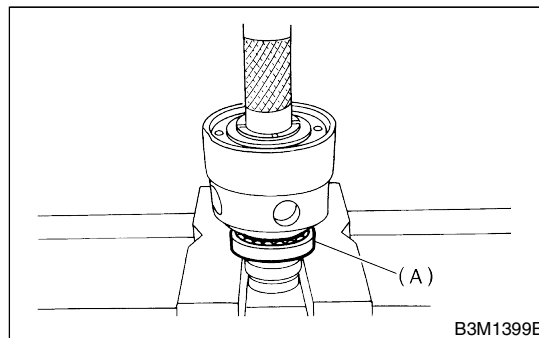


D: ASSEMBLY S503158A02

Install ball bearing to center differential assembly.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Ball bearing

E: INSPECTION S503158A10

1) Bearings

Replace bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Center differential

Replace center differential assembly in the following case:

- Worn or damaged

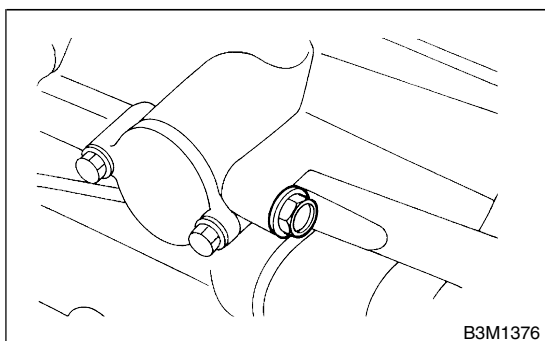
REVERSE CHECK SLEEVE

Manual Transmission and Differential

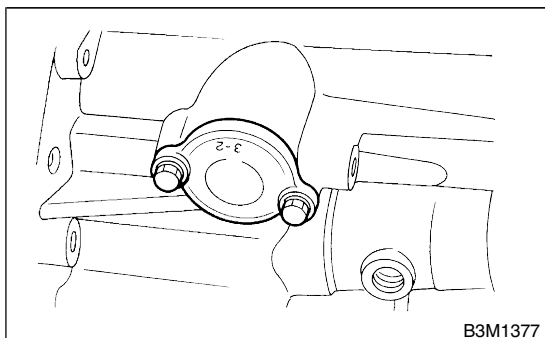
14. Reverse Check Sleeve S503267

A: REMOVAL S503267A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove shifter arm.
- 4) Remove plug, spring washer and reverse check ball.



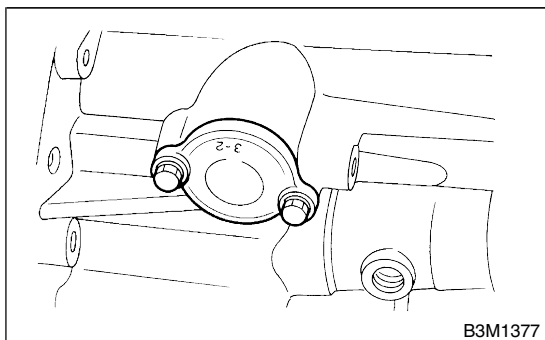
- 5) Remove the reverse check sleeve.



B: INSTALLATION S503267A11

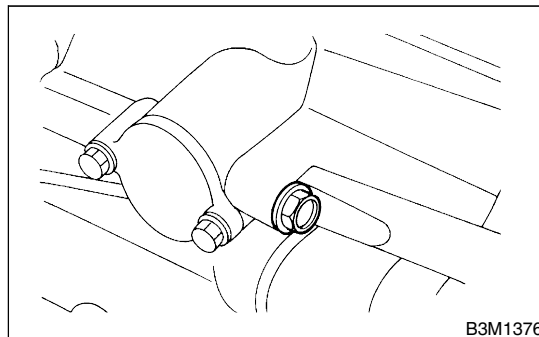
- 1) Install the reverse check sleeve.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 2) Install ball, spring, washer and plug to transfer case.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



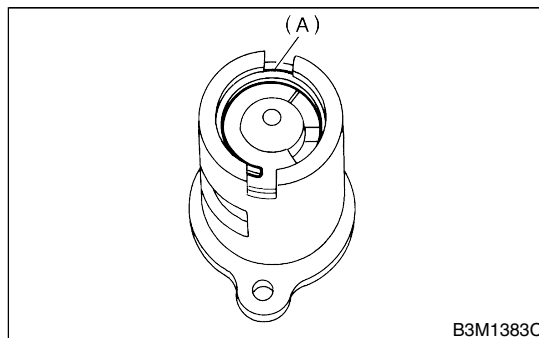
- 3) Install the shifter arm to transfer case assembly.
- 4) Install the transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503267A06

- 1) Cover the reverse check sleeve with a rag, and remove snap ring using a screwdriver.

NOTE:

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

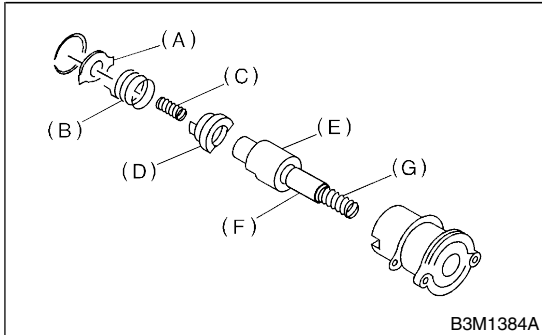


(A) Snap ring

REVERSE CHECK SLEEVE

Manual Transmission and Differential

2) Remove reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



- (A) Reverse check plate
- (B) Reverse check spring
- (C) Return spring (5th-Rev)
- (D) Reverse check cam
- (E) Reverse accent shaft
- (F) Return spring cap
- (G) Return spring (1st-2nd)

3) 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.

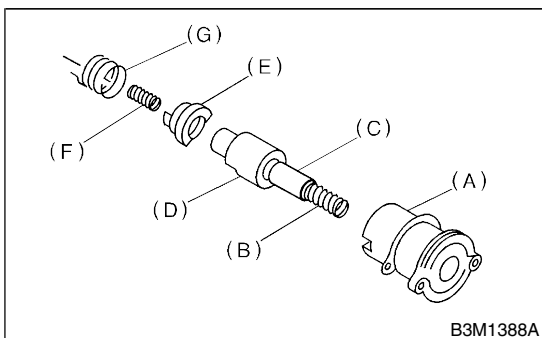
D: ASSEMBLY

S503267A02

1) Install return spring (1st-2nd), return spring cap, 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.



- (A) Reverse check sleeve
- (B) Return spring (1st-2nd)
- (C) Return spring cap
- (D) Reverse accent shaft
- (E) Return spring (5th-Rev)
- (F) Reverse check cam
- (G) Reverse check spring

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.

5) Position O-ring in groove in sleeve.

E: INSPECTION

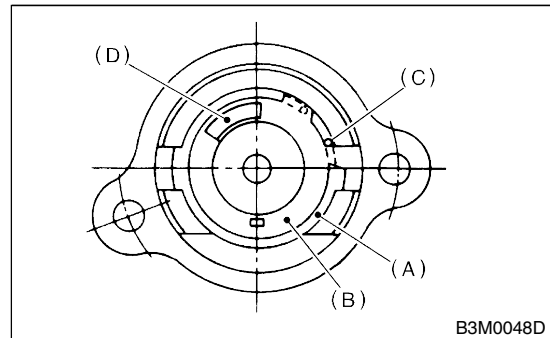
S503267A10

- 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.

- 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) Check spring
- (D) Check cam

- Select a suitable reverse accent shaft and reverse check plate. <Ref. to MT-59 ADJUSTMENT, Reverse Check Sleeve.>

REVERSE CHECK SLEEVE

Manual Transmission and Differential

F: ADJUSTMENT

S503267A01

1. NEUTRAL POSITION ADJUSTMENT

BB30109201

- 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).

NOTE:

- 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.

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

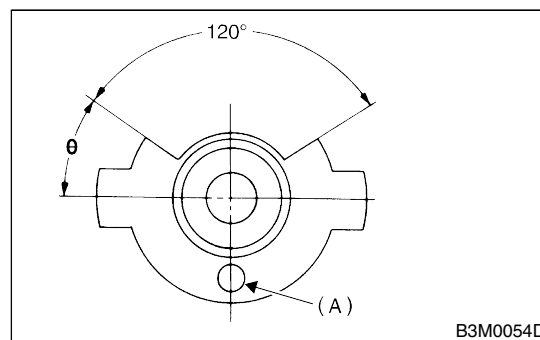
Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st gear.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT

S503267A0102

- 1) Shift shifter arm to "5th" and then to reverse to see if reverse check mechanism operates properly.
- 2) 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.



TRANSMISSION CASE

Manual Transmission and Differential

15. Transmission Case

S503266

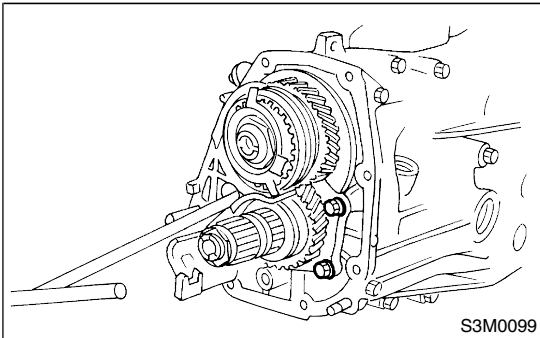
A: REMOVAL

S503266A18

1. SINGLE-RANGE

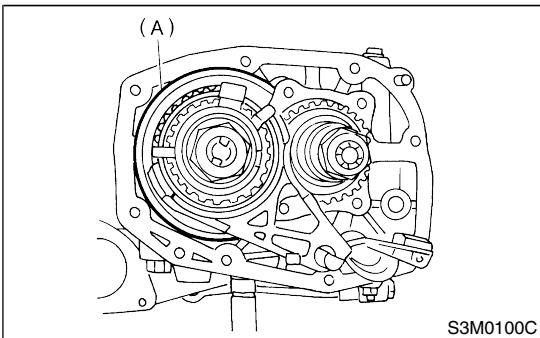
S503266A1801

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>
- 2) Remove clutch release lever. <Ref. to CL-20, REMOVAL, Release Bearing and Lever.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-46, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove bearing mounting bolts.



S3M0099

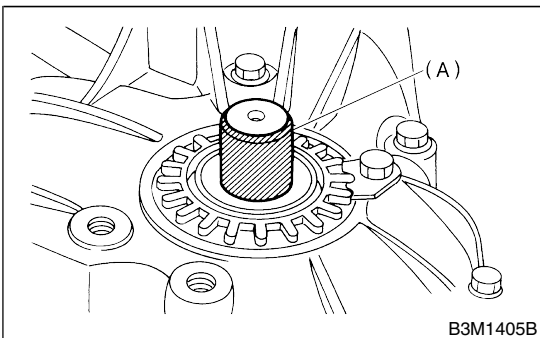
- 5) Remove main shaft rear plate.



S3M0100C

(A) Main shaft rear plate

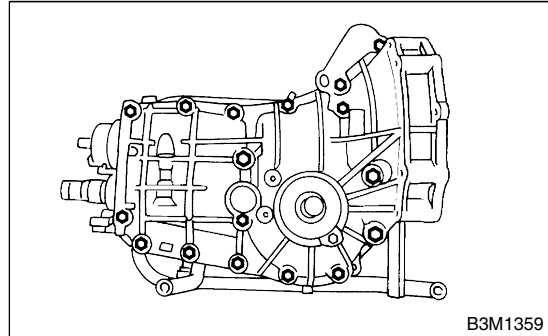
- 6) Put vinyl tape around splines of right and left axle drive shafts to prevent damage to oil seal.



B3M1405B

(A) Vinyl tape

- 7) Separate transmission case into right and left cases by loosening coupling bolts and nuts.

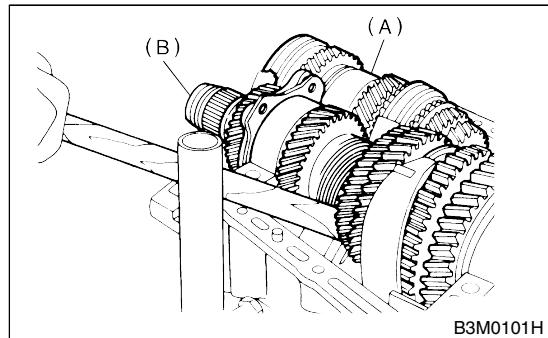


B3M1359

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

NOTE:

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



B3M0101H

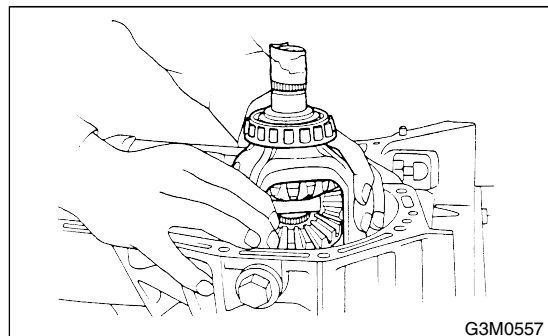
(A) Main shaft assembly

(B) Drive pinion shaft assembly

- 9) Remove main shaft assembly.
- 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. DUAL-RANGE

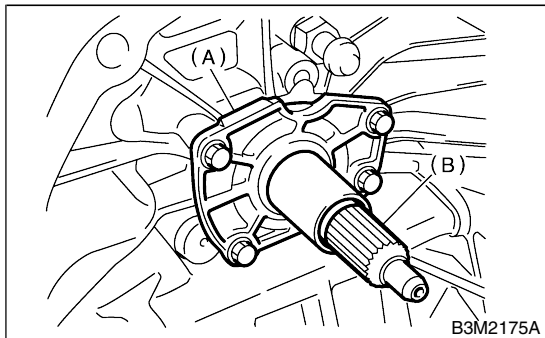
S503266A1802

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>

TRANSMISSION CASE

Manual Transmission and Differential

- 2) Remove clutch release lever. <Ref. to CL-20, REMOVAL, Release Bearing and Lever.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-46, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the input shaft holder.

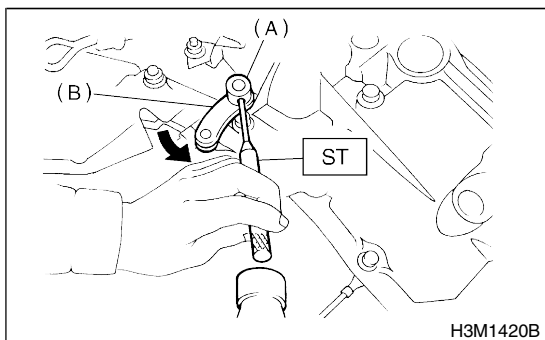


- (A) Input shaft holder
(B) Input shaft

- 5) Remove the high-low switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
 - 6) Using ST, drive out straight pin, and remove high-low shifter lever.
- ST 398791700 REMOVER II

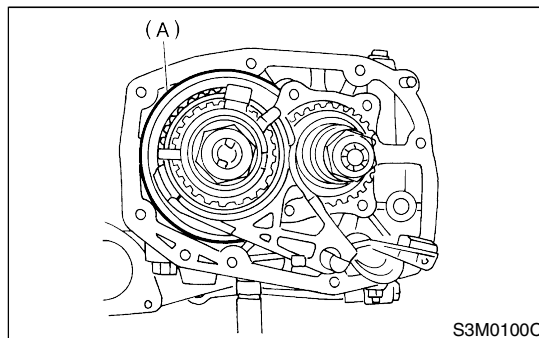
NOTE:

When driving out straight pin, remove it in the direction that it does not butt against transmission case.



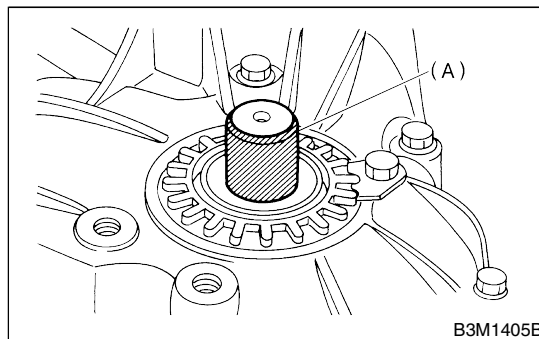
- (A) Straight pin
(B) High-low shifter lever

- 7) Remove main shaft rear plate.



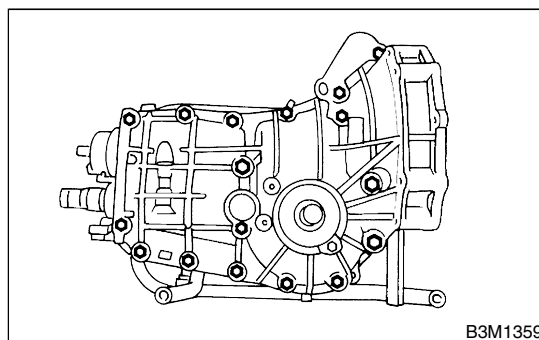
- (A) Main shaft rear plate

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



- (A) Vinyl tape

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



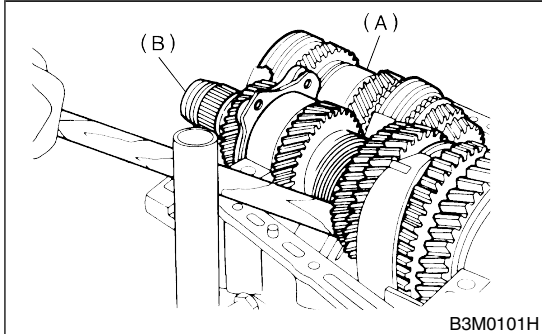
TRANSMISSION CASE

Manual Transmission and Differential

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

NOTE:

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

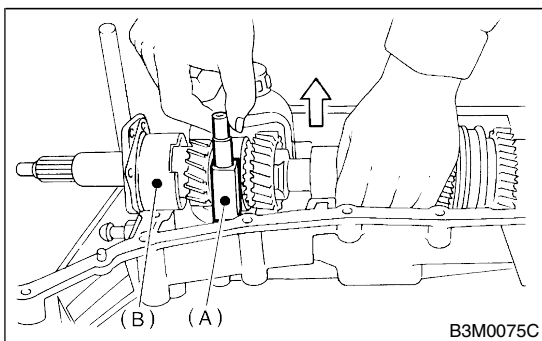


- (A) Main shaft assembly
(B) Drive pinion shaft assembly

11) Removing high-low shifter fork
Raise main shaft assembly slightly, and remove high-low shifter fork together with high-low shifter shaft and washer.

CAUTION:

Be careful not to drop the two high-low shifter pieces.

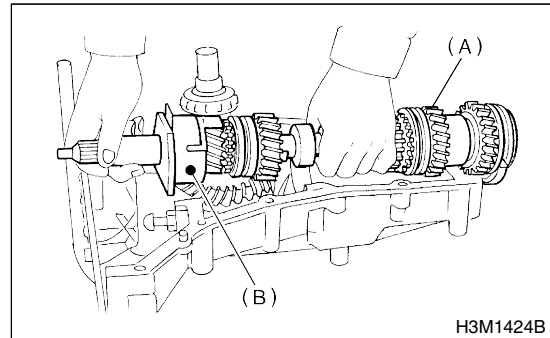


- (A) High-low shifter fork
(B) Input shaft ASSY

12) Remove main shaft assembly and input shaft assembly.

CAUTION:

Be careful not to drop input shaft and main shaft as they are separable.

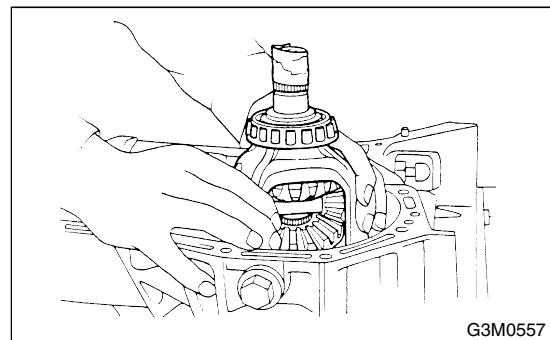


- (A) Main shaft ASSY
(B) Input shaft ASSY

13) Remove differential assembly.

CAUTION:

- Be careful not to confuse right and left roller bearing outer races.
- Be careful not to damage retainer oil seal.



B: INSTALLATION S503266A11

1. SINGLE-RANGE S503266A1101

- 1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
- 2) Install the front differential assembly.
- 3) Install the main shaft assembly.
Install needle bearing knock pin hole into transmission case knock pin.
- 4) Install the drive pinion shaft assembly.
Install roller bearing knock pin hole into transmission case knock pin.
- 5) Apply liquid gasket, and then put case right side and left side together.

Liquid gasket:

THREE BOND 1215 or equivalent

TRANSMISSION CASE

Manual Transmission and Differential

6) 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 and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

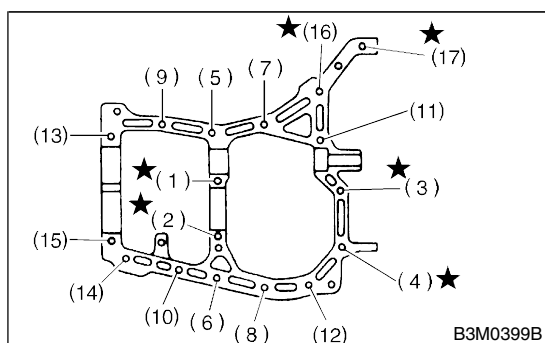
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.1 ft-lb)

★ 10 mm bolt

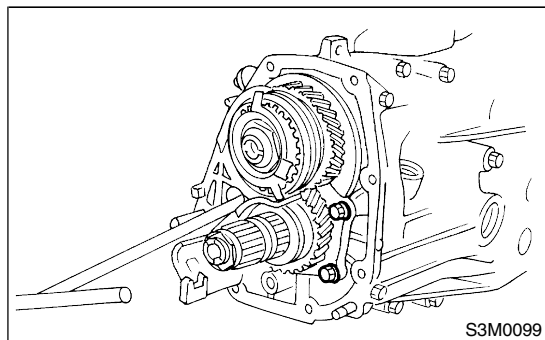
39 N·m (4.0 kgf-m, 28.9 ft-lb)



7) Tighten ball bearing attachment bolts.

Tightening torque:

29 N·m (3.0 kgf-m, 21.7 ft-lb)

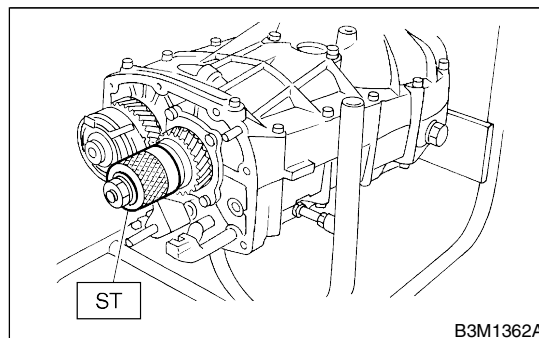


8) Backlash adjustment of hypoid gear and pre-load adjustment of roller bearing

NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



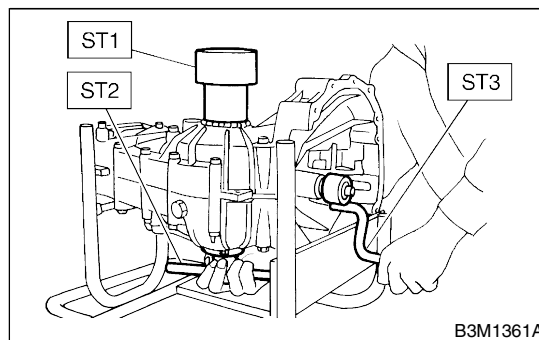
9) Place the transmission with case left side facing downward and put ST1 on bearing cup.

10) 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



TRANSMISSION CASE

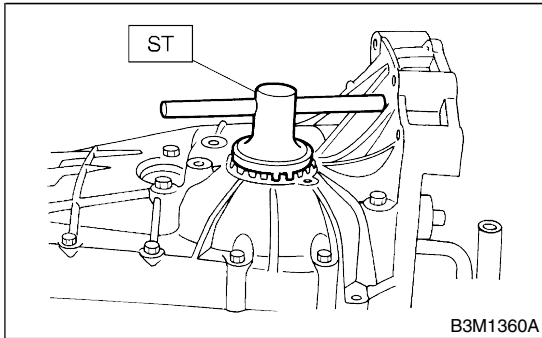
Manual Transmission and Differential

11) 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



12) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches 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 notch if the plate is turned upside down.

13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

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

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

16) Inspect and adjust backlash and tooth contact of hypoid gear. <Ref. to MT-94 INSPECTION, Front Differential Assembly.>

17) 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.

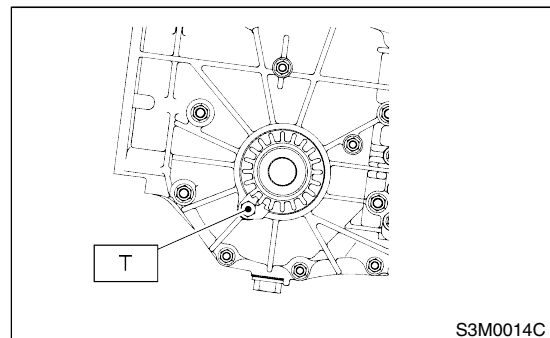
Tighten lock plate.

NOTE:

Carry out this job on both upper and lower retainers.

Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



18) Selecting of main shaft rear plate <Ref. to MT-72 ADJUSTMENT, Main Shaft Assembly for Single-Range.>

19) Install clutch release lever and bearing. <Ref. to CL21 INSTALLATION, Release Bearing and Lever.>

20) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly into the vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

2. DUAL-RANGE S503266A1102

1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.

2) Install the front differential assembly.

3) Install the main shaft assembly and input shaft assembly.

Connect main shaft assembly and input shaft assembly, and install needle bearing knock pin hole into transmission case knock pin.

4) Install the drive pinion shaft assembly.

Install roller bearing knock pin hole into transmission case knock pin.

5) Apply liquid gasket, and then put case right side and left side together.

Liquid gasket:

THREE BOND 1215 or equivalent

TRANSMISSION CASE

Manual Transmission and Differential

6) 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 and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

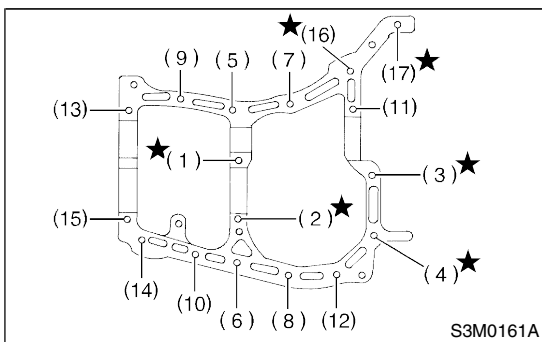
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.1 ft-lb)

★ 10 mm bolt

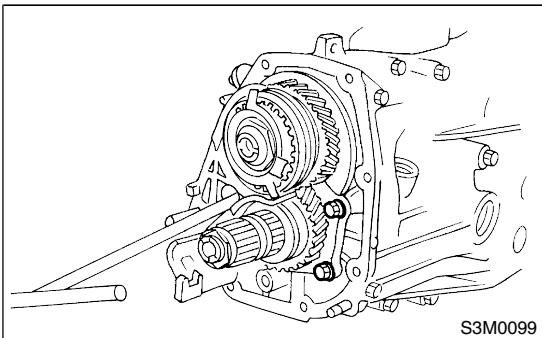
39 N·m (4.0 kgf-m, 28.9 ft-lb)



7) Tighten ball bearing attachment bolts.

Tightening torque:

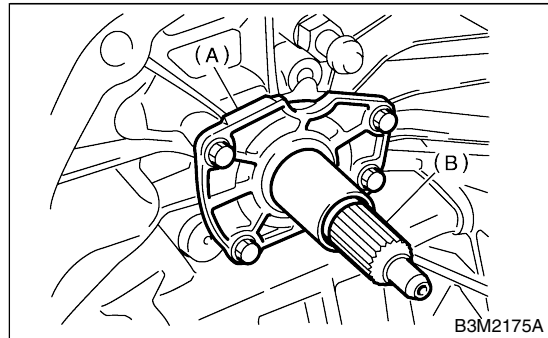
29 N·m (3.0 kgf-m, 21.7 ft-lb)



8) Tighten input shaft holder attaching bolts.

Tightening torque:

20 N·m (2.0 kgf-m, 14.5 ft-lb)



(A) Input shaft holder

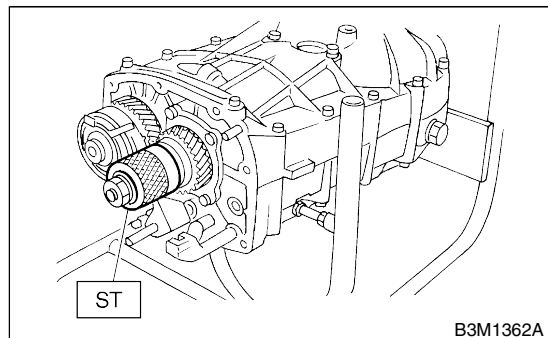
(B) Input shaft

9) Backlash adjustment of hypoid gear and pre-load adjustment of roller bearing

NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



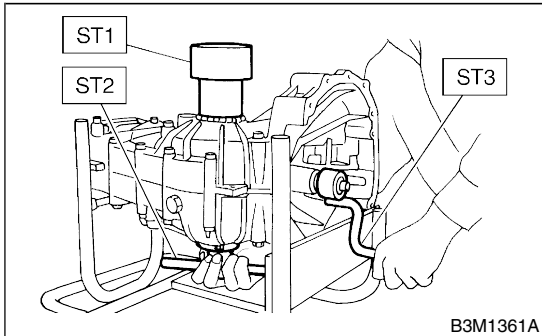
10) Place the transmission with case left side facing downward and put ST1 on bearing cup.

TRANSMISSION CASE

Manual Transmission and Differential

11) 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

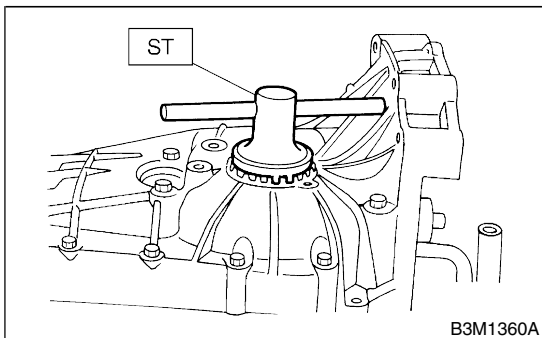


12) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:

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

ST 499787000 WRENCH ASSY



13) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches 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 notch if the plate is turned upside down.

14) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

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

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

17) Inspect and adjust backlash and tooth contact of hypoid gear. <Ref. to MT-94 INSPECTION, Front Differential Assembly.>

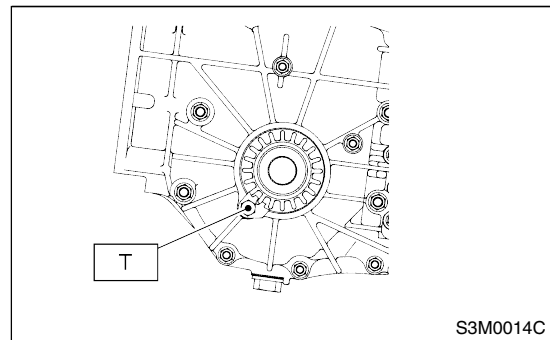
18) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen retainer until the O-ring groove appears. Fit O-ring into the groove and tighten retainer into the position where retainer has been tightened in. Tighten lock plate.

NOTE:

Carry out this job on both upper and lower retainers.

Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



19) Selection of main shaft rear plate <Ref. to MT-72 ADJUSTMENT, Main Shaft Assembly for Signal-Range.>

20) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install clutch release lever and bearing. <Ref. to CL21 INSTALLATION, Release Bearing and Lever.>

22) Install the manual transmission assembly into the vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

S503266A10

Check the transmission case for cracks, damage, and oil leaks.

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

Manual Transmission and Differential

16. Main Shaft Assembly for Single-Range

S503713

A: REMOVAL

S503713A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-46 REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly.

B: INSTALLATION

S503713A11

- 1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

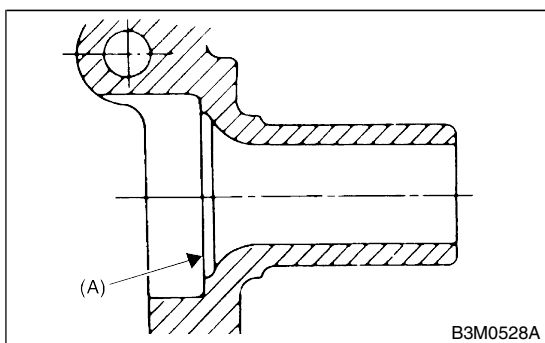
CAUTION:

- 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.
- Use a new one.

- 2) Install needle bearing outer race knock pin hole into transmission case knock pin.

NOTE:

Align the end face of seal with surface (A) when installing oil seal.



- 3) Install the drive pinion assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
- 5) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

S503713A06

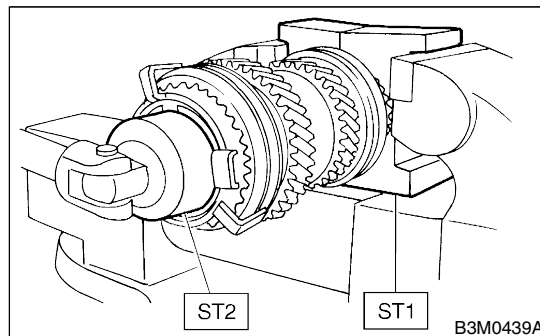
- 1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
- 2) Remove lock nut from transmission main shaft assembly.

NOTE:

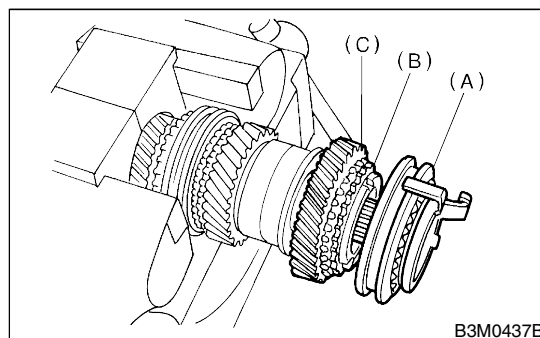
Remove caulking before taking off lock nut.

ST1 498937000 HOLDER

ST2 499987003 SOCKET WRENCH (35)



- 3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.

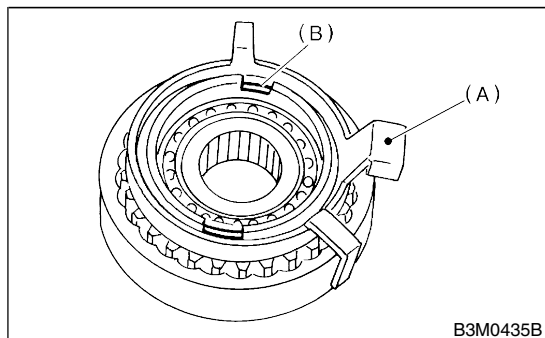


- (A) 5th-Rev sleeve and hub ASSY
(B) Baulk ring
(C) 5th drive gear

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

Manual Transmission and Differential

4) Remove snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.



- (A) Synchro cone stopper
- (B) Snap ring

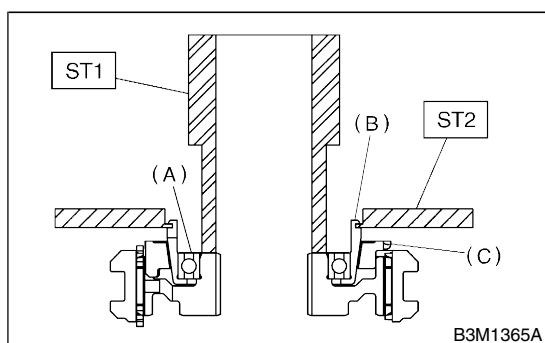
5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

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.

- Do not reuse ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE
REMOVER



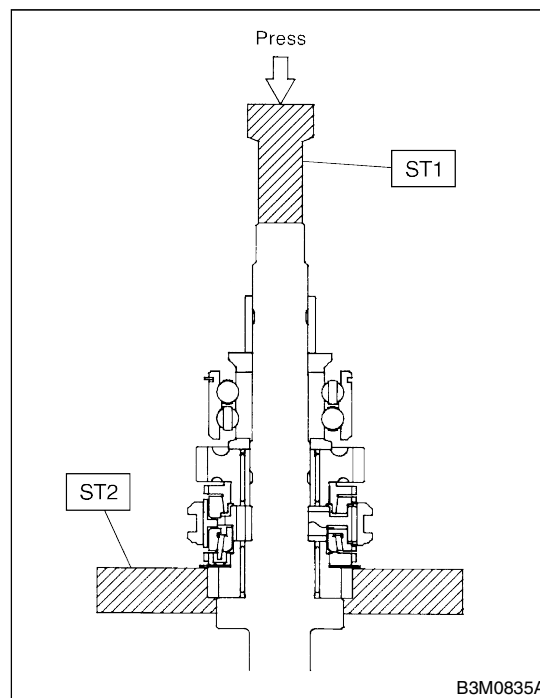
- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

6) 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



MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

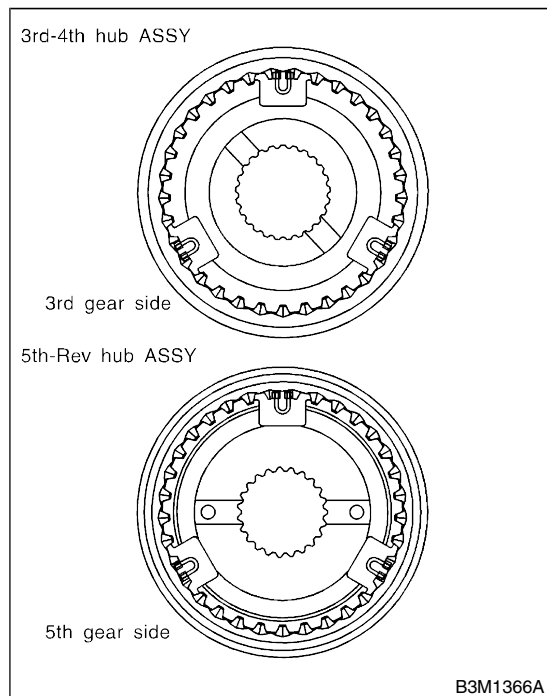
Manual Transmission and Differential

D: ASSEMBLY S503713A02

1) Assemble each sleeve and hub assembly.

NOTE:

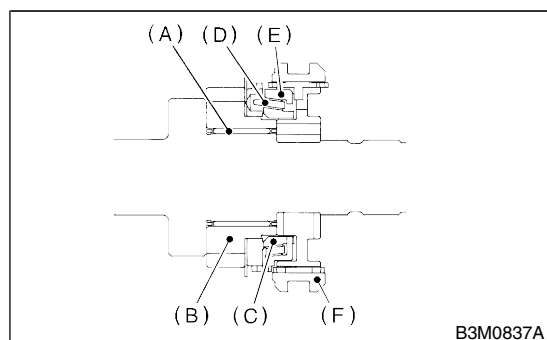
Position open ends of spring 120° apart.



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 shifting insert.



- (A) 3rd needle bearing
- (B) 3rd drive gear
- (C) Inner baulk ring
- (D) Synchro cone
- (E) Outer baulk ring
- (F) Sleeve and hub ASSY

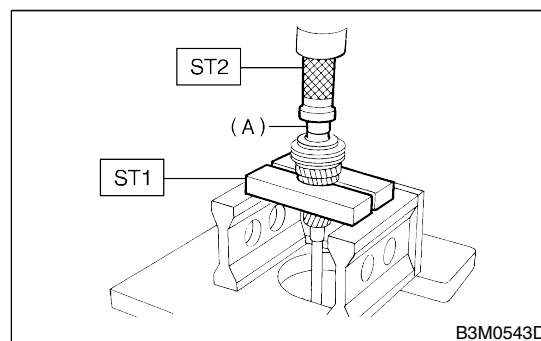
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

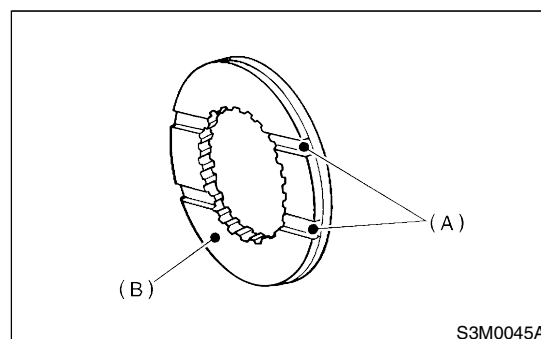


(A) 4th needle bearing race

4) Install baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:

Align baulk ring and gear & hub assembly with key groove.



- (A) Groove
- (B) 4th gear side

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

Manual Transmission and Differential

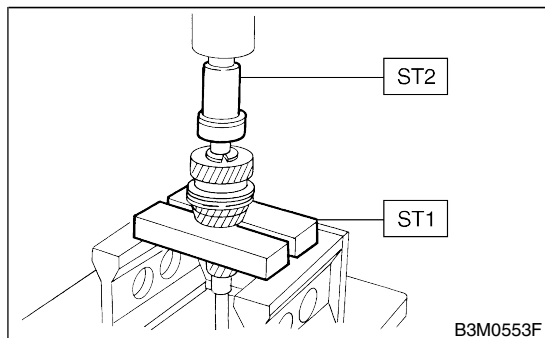
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

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.

CAUTION:

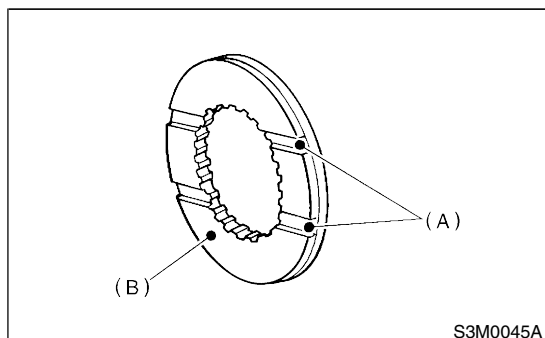
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Face thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Groove

(B) 4th gear thrust washer

7) Install bearing onto synchro cone.

8) Install baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

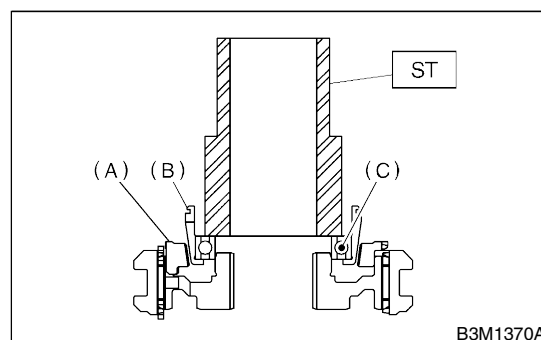
CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

ST 499757002 INSTALLER

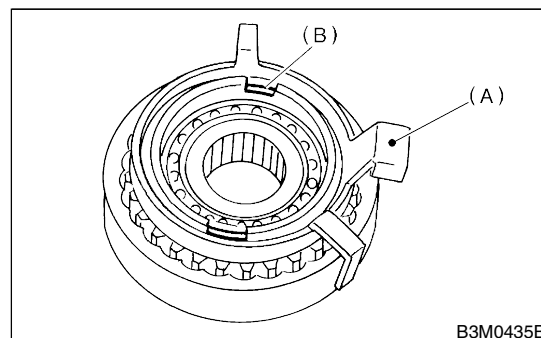


(A) Baulk ring

(B) Synchro cone

(C) Ball bearing

9) Install synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper

(B) Snap ring

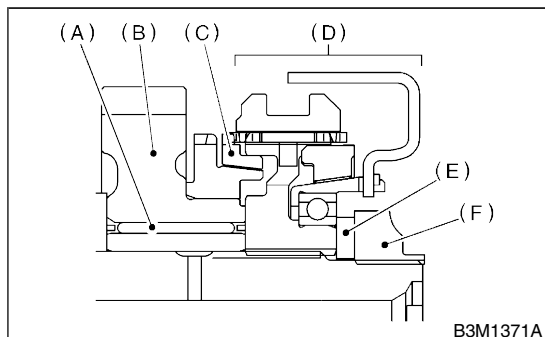
MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

Manual Transmission and Differential

10) Install the rest parts to the rear section of transmission main shaft.

NOTE:

Align groove in baulk ring with shifting insert.



- (A) Needle bearing
- (B) 5th drive gear
- (C) Baulk ring
- (D) 5th-Rev sleeve and hub ASSY
- (E) Lock washer
- (F) Lock nuts

11) Tighten lock nuts to the specified torque using ST1 and ST2.

NOTE:

Secure lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:

118 N·m (12.0 kgf-m, 86.8 ft-lb)

E: INSPECTION

SS03713A10

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.

- 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.

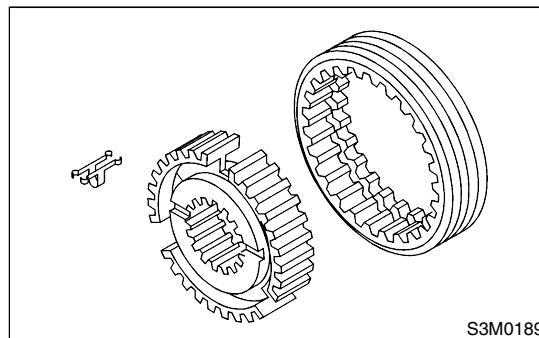
4) Baulk ring

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

5) Shifting insert key

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



6) Oil seal

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

7) O-ring

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

8) Gearshift mechanism

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

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

Manual Transmission and Differential

F: ADJUSTMENT S503713A01

Selection of main shaft rear plate

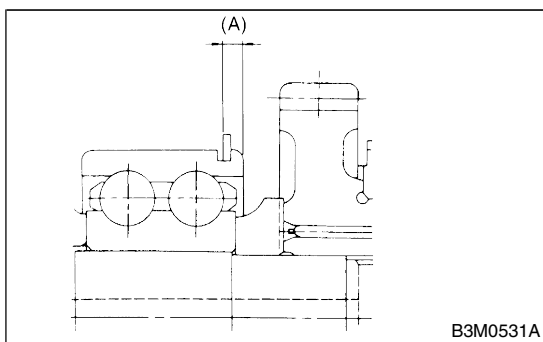
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

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



MAIN SHAFT ASSEMBLY FOR DUAL-RANGE

Manual Transmission and Differential

17. Main Shaft Assembly for Dual-Range

S503714

A: REMOVAL

S503714A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-46 REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly and input shaft assembly.

B: INSTALLATION

S503714A11

- 1) Install the needle bearing onto the front of transmission main shaft assembly.
- 2) Connect main shaft assembly and input shaft assembly.
- 3) Install needle bearing outer race knock pin hole into transmission case knock pin.
- 4) Install the drive pinion assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft Assembly.>
- 5) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
- 6) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

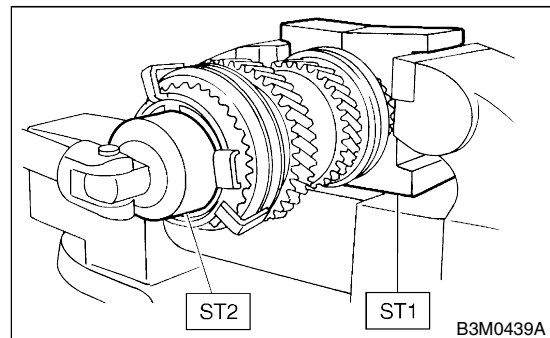
S503714A06

- 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.

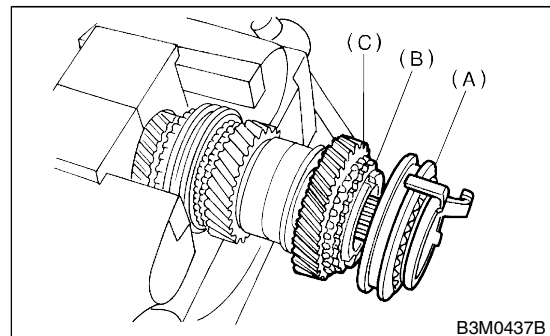
NOTE:

Remove caulking before taking off lock nut.

- ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)

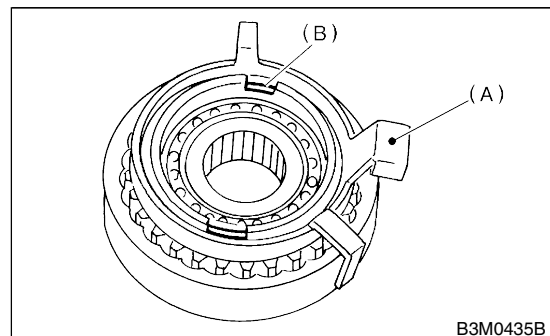


- 3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



- (A) 5th-Rev sleeve and hub ASSY
(B) Baulk ring
(C) 5th drive gear

- 4) Remove snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.



- (A) Synchro cone stopper
(B) Snap ring

MAIN SHAFT ASSEMBLY FOR DUAL-RANGE

Manual Transmission and Differential

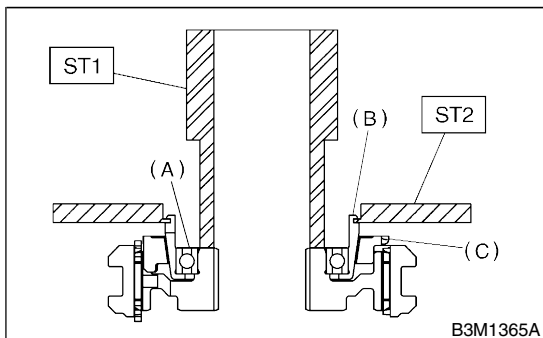
5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

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.

- Do not reuse ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE
REMOVER



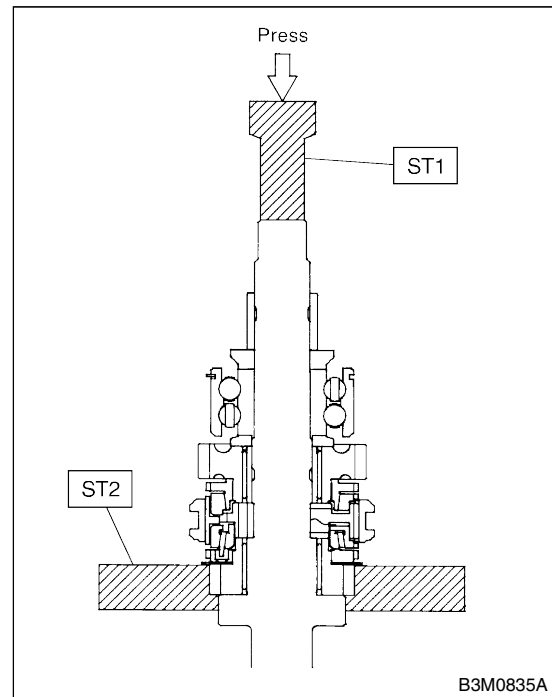
- (A) Ball bearing
(B) Synchro cone
(C) Baulk ring

6) Using ST1 and ST2, remove the rest of parts.

NOTE:

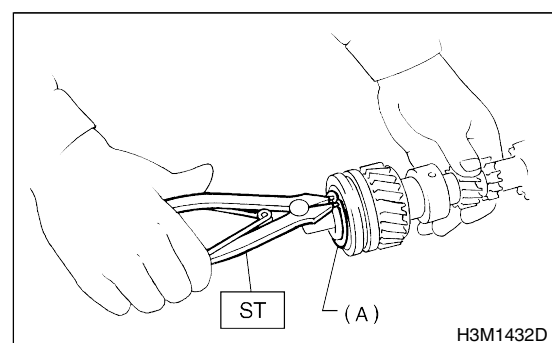
Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER



7) Remove snap ring from main shaft.

ST 899474100 EXPANDER

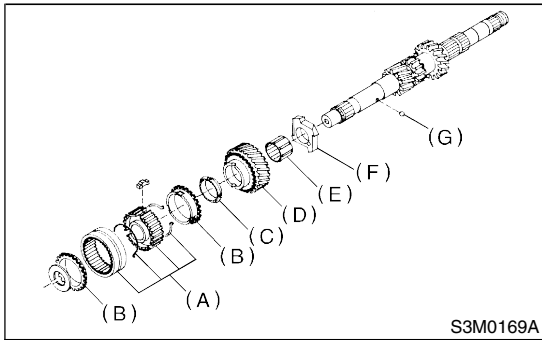


- (A) Snap ring

MAIN SHAFT ASSEMBLY FOR DUAL-RANGE

Manual Transmission and Differential

8) Remove the rest of parts.



- (A) Sleeve and hub ASSY
- (B) High-low baulk ring
- (C) Friction damper
- (D) Low input gear
- (E) Needle bearing
- (F) Input low gear spacer
- (G) Ball

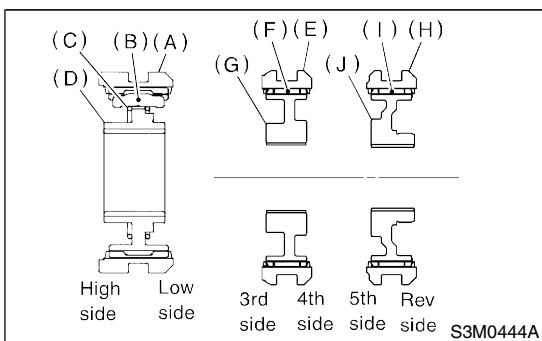
D: ASSEMBLY

S503714A02

1) Assemble when each sleeve and hub assembly are disassembled.

NOTE:

Position open ends of spring 120° apart.



- (A) High-low coupling sleeve
- (B) Shifting insert
- (C) High-low synchronizer spring
- (D) High-low synchronizer hub
- (E) Sleeve
- (F) Insert key
- (G) 3rd-4th synchronizer hub
- (H) Sleeve
- (I) Insert key
- (J) 5th-Rev synchronizer hub

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

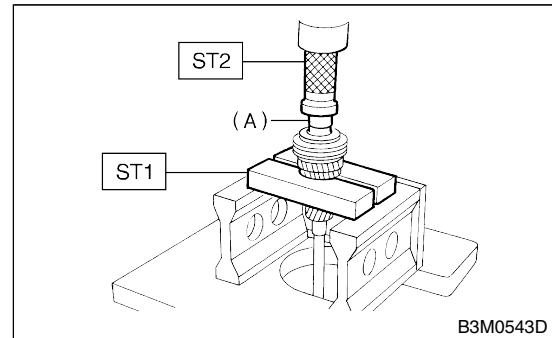
NOTE:

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

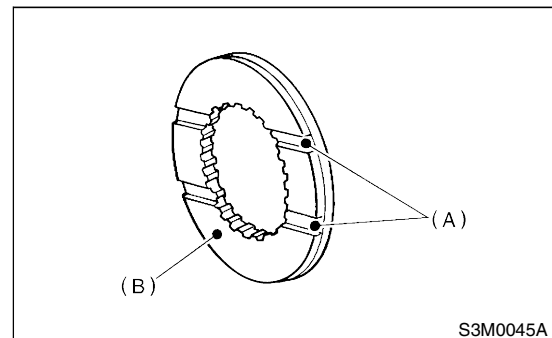


(A) 4th needle bearing race

4) Install baulk ring, needle bearing, 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

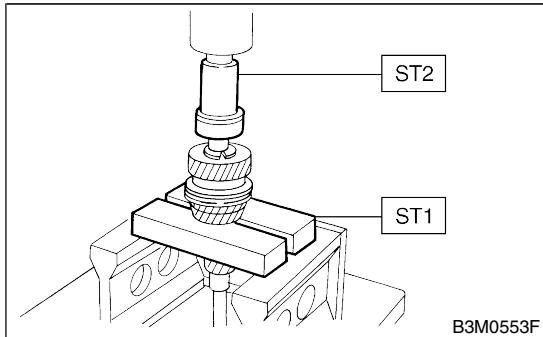
MAIN SHAFT ASSEMBLY FOR DUAL-RANGE

Manual Transmission and Differential

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



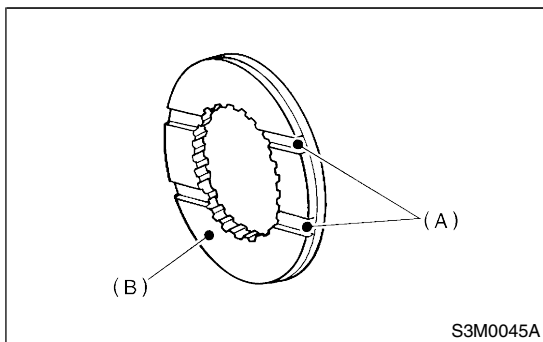
6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:

Face thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Groove

(B) 4th gear thrust washer

7) Install bearing onto synchro cone.

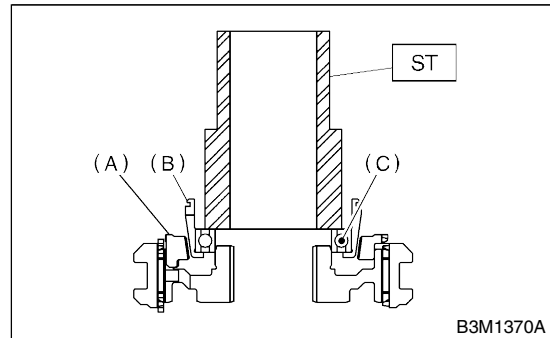
8) Install baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

NOTE:

- Use new ball bearing.

- After press fitting, make sure synchro cone rotates freely.

ST 499757002 INSTALLER

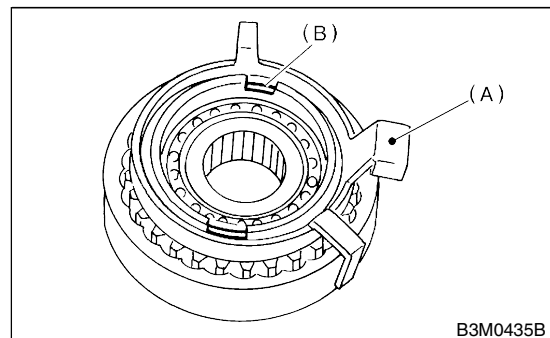


(A) Baulk ring

(B) Synchro cone

(C) Ball bearing

9) Install synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper

(B) Snap ring

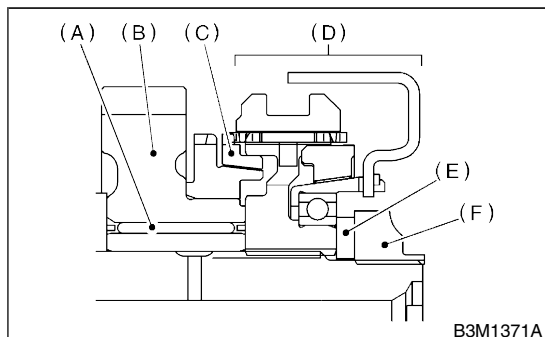
MAIN SHAFT ASSEMBLY FOR DUAL-RANGE

Manual Transmission and Differential

10) Install the rest parts to the rear section of transmission main shaft.

NOTE:

Align groove in baulk ring with shifting insert.



- (A) Needle bearing
- (B) 5th drive gear
- (C) Baulk ring
- (D) 5th-Rev sleeve and hub ASSY
- (E) Lock washer
- (F) Lock nuts

11) Tighten lock nuts 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 N·m (12.0 kgf-m, 86.8 ft-lb)

12) Install needle bearing on main shaft.

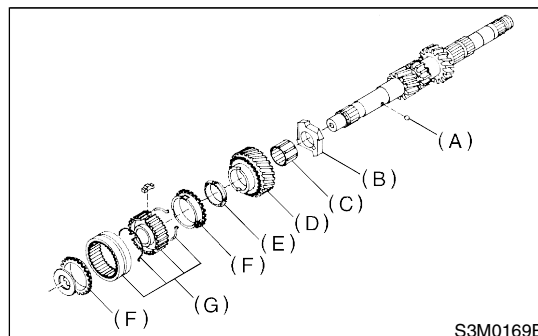
13) Install the parts to the front section of transmission main shaft.

CAUTION:

Be careful not to damage the graded section of transmission main shaft when installing needle bearing.

NOTE:

- Face the grooved side toward input gear.
- Align high-low baulk ring's groove with shifting insert.



- (A) Ball
- (B) Input low gear spacer
- (C) Needle bearing
- (D) Low input gear
- (E) Friction damper
- (F) High-low baulk ring
- (G) Sleeve and hub ASSY

14) Install snap ring to the rod section of transmission main shaft using ST1 and ST2.

CAUTION:

Use only new snap ring.

NOTE:

Select a suitable outer snap ring so that axial clearance between snap ring and hub is held within 0.060 to 0.100 mm (0.0024 to 0.0039 in).

ST1 499757002 INSTALLER
ST2 499757001 SNAP RING GUIDE

Snap ring	
Part No.	Thickness mm (in)
805025051	2.42 (0.0953)
805025052	2.47 (0.0972)
805025053	2.52 (0.0992)
805025054	2.57 (0.1012)
805025055	2.62 (0.1031)
805025056	2.67 (0.1051)
805025057	2.72 (0.1071)
805025058	2.37 (0.0933)

MAIN SHAFT ASSEMBLY FOR DUAL-RANGE

Manual Transmission and Differential

E: INSPECTION

S503714A10

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

5) Shifting insert key

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

6) Oil seal

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

7) O-ring

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

8) Gearshift mechanism

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

F: ADJUSTMENT

S503714A01

Choose main shaft rear plate. <Ref. to MT-72 ADJUSTMENT, Main Shaft Assembly for Single-Range.>

INPUT SHAFT ASSEMBLY

Manual Transmission and Differential

18. Input Shaft Assembly S503715

A: REMOVAL S503715A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly and input shaft assembly.

B: INSTALLATION S503715A11

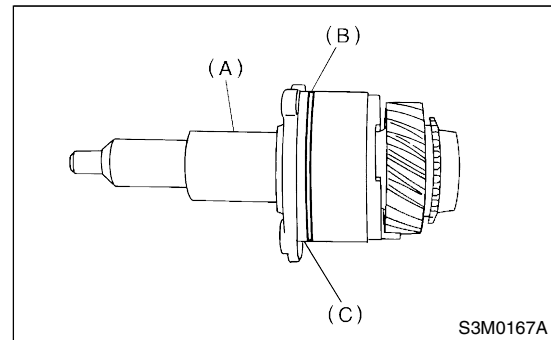
- 1) Install the needle bearing onto the front of the transmission main shaft assembly.
- 2) Connect main shaft assembly and input shaft assembly.
- 3) Install needle bearing outer race knock pin hole into transmission case knock pin.
- 4) Install the drive pinion assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft.>
- 5) Install the transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
- 6) Install the transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install manual transmission assembly on vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503715A06

- 1) Remove O-ring from input shaft holder. Also, remove input shaft holder shim.

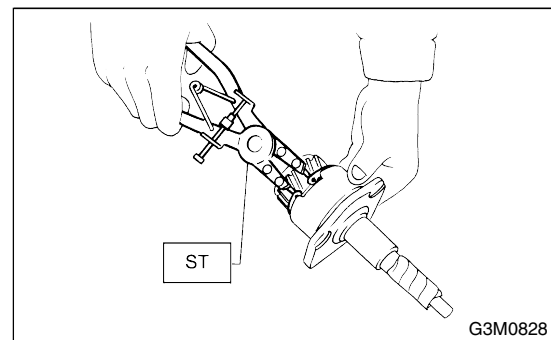
CAUTION:
Use new O-ring.

NOTE:
Number of shims used varies from none to two.

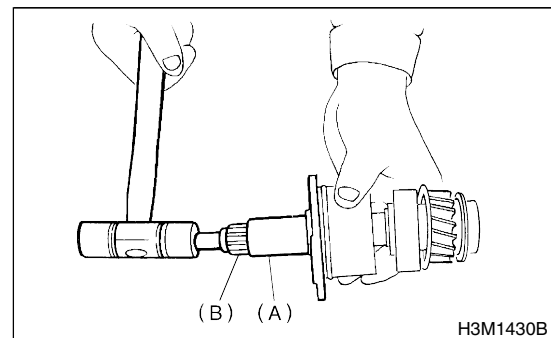


- (A) Input shaft holder
(B) O-ring
(C) Input shaft holder shim

- 2) Put vinyl tape around input shaft splines to protect oil seal from damage.
- 3) Remove inner snap ring.
ST 398663600 PLIERS



- 4) Hold input shaft holder stationary and remove input shaft by tapping its end with a plastic hammer.

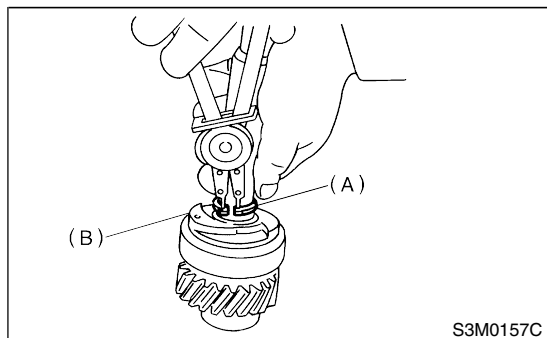


- (A) Input shaft holder
(B) Input shaft

INPUT SHAFT ASSEMBLY

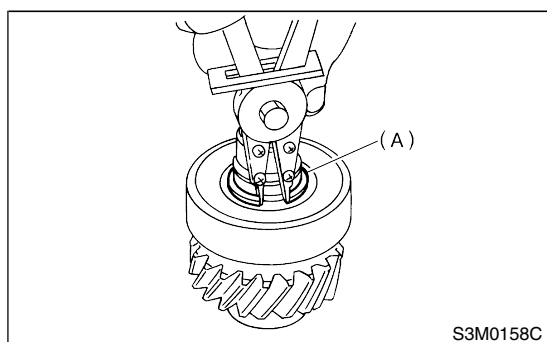
Manual Transmission and Differential

5) Remove outer snap ring. Then remove oil squeeze plate and straight pin.



- (A) Snap ring
(B) Oil squeeze plate

6) Remove snap ring.



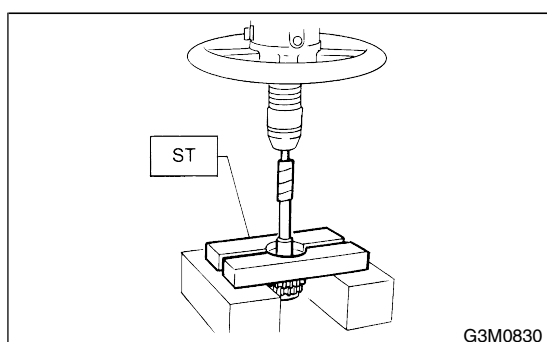
- (A) Snap ring

7) Using a press and ST, remove ball bearing.

NOTE:

Remove inner snap ring before pressing.

ST 498077000 RETAINER



8) Remove oil seal from input shaft holder.

D: ASSEMBLY S503715A02

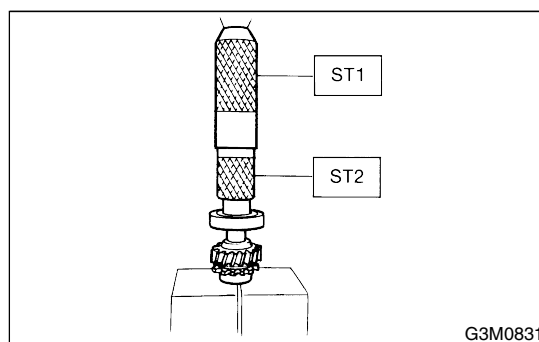
1) Install ball bearing onto input shaft.

NOTE:

Place snap ring between input shaft gear and ball bearing beforehand. Use the table at 5) as a guide in selecting a suitable snap ring.

ST1 899580100 INSTALLER

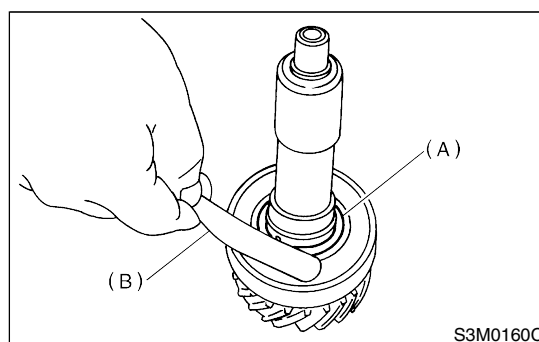
ST2 399513600 INSTALLER



2) Install snap ring on input shaft.

NOTE:

Select a suitable snap ring so that the axial play of ball bearing is held within 0 to 0.12 mm (0 to 0.0047 in).



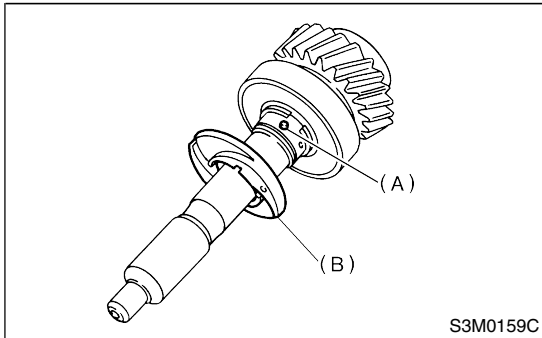
- (A) Snap ring
(B) Thickness gauge

Snap ring	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

INPUT SHAFT ASSEMBLY

Manual Transmission and Differential

- 3) Install straight pin and oil squeeze plate to input shaft.



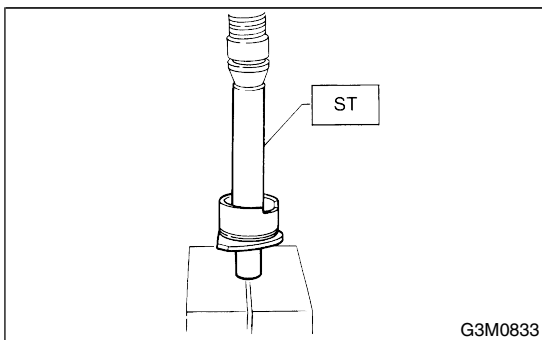
- (A) Straight pin
(B) Oil squeeze plate

- 4) Install snap ring.
5) Drive oil seal into input shaft holder.

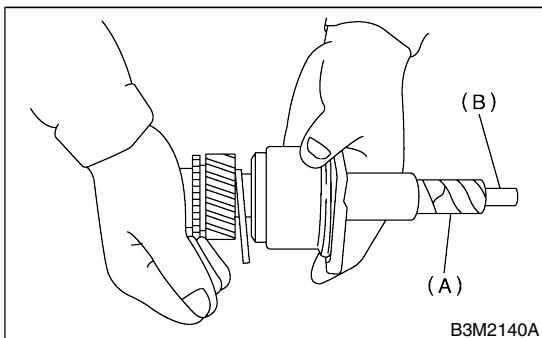
NOTE:

Apply a coat of grease to sealing lips before installing oil seal.

ST 398507703 DUMMY COLLAR



- 6) Wind vinyl tape around shaft splines and insert input shaft into holder by lightly tapping it by hand.



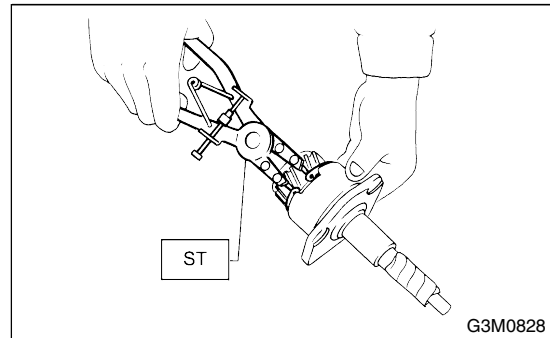
- (A) Vinyl tape
(B) Input shaft

- 7) Install snap ring to input shaft holder.

NOTE:

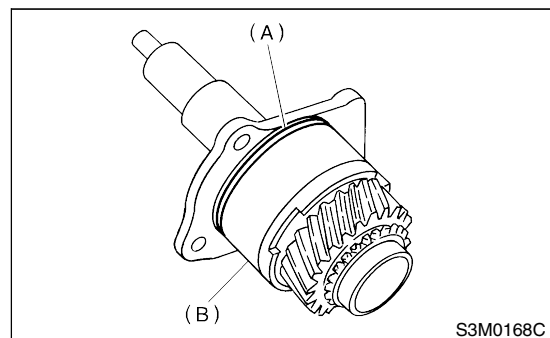
Select a suitable snap ring so that clearance between snap ring and bearing is held within 0 to 0.12 mm (0 to 0.0047 in).

ST 398663600 PLIERS



Snap ring	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

- 8) Install O-ring on input shaft holder.



- (A) O-ring
(B) Input shaft holder

E: INSPECTION S503715A10

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.
- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.

INPUT SHAFT ASSEMBLY

Manual Transmission and Differential

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

5) Shifting insert key

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

6) Oil seal

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

7) O-ring

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

8) Gearshift mechanism

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

DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

19. Drive Pinion Shaft Assembly

S503269

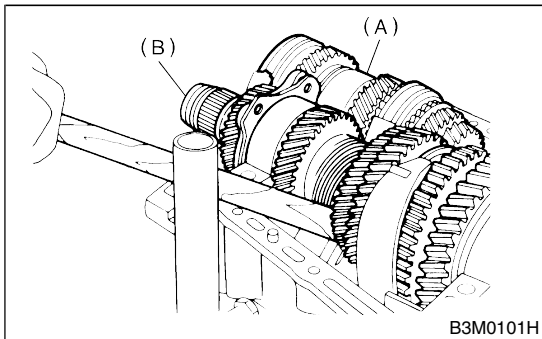
A: REMOVAL

S503269A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly.

NOTE:

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

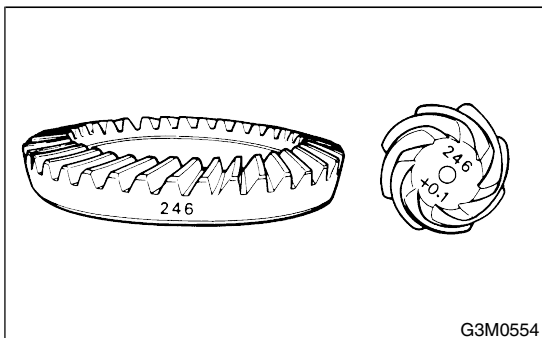


- (A) Main shaft assembly
(B) Drive pinion shaft assembly

B: INSTALLATION

S503269A11

- 1) Remove differential assembly.
- 2) 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.



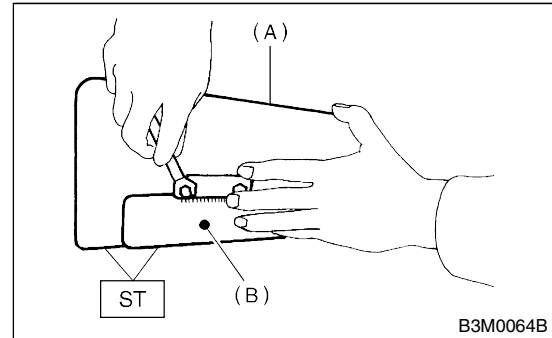
- 3) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.

- 4) 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



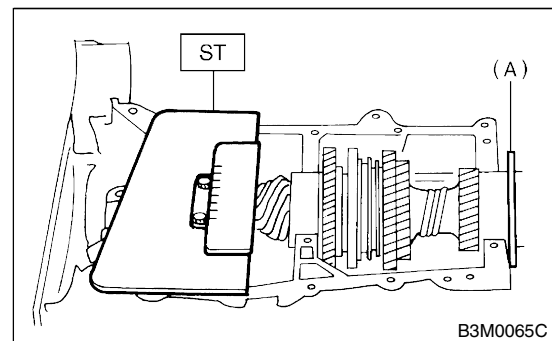
- (A) Plate
(B) Scale

- 5) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

- 6) 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



- (A) Adjust clearance to zero without shim.

- 7) 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

DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

8) 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)

9) Install differential assembly. <Ref. to MT-92 INSTALLATION, Front Differential Assembly.>

10) Set transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect suitable 1st — 2nd, 3rd — 4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their cynchronizing mechanisms. <Ref. to MT-88 INSPECTION, Drive Shaft Assembly.>

11) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>

12) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to vehicle. <Ref. to MT-32 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

S503269A06

CAUTION:

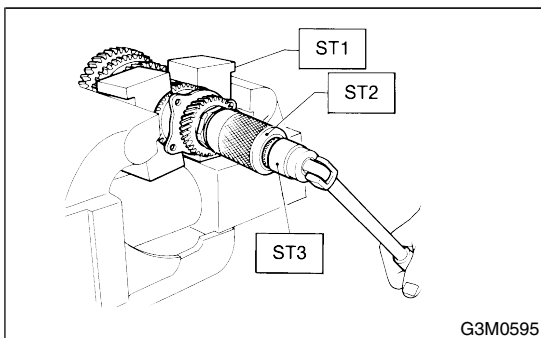
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

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

ST1 899884100 HOLDER

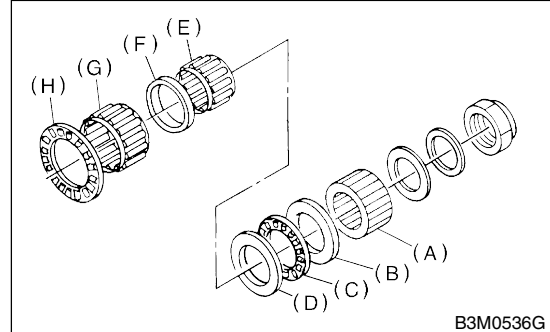
ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)



G3M0595

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.



B3M0536G

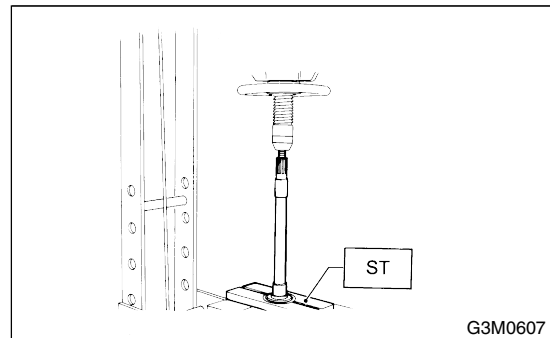
- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Washer No. 2 (25 × 37.5 × 4)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

3) Remove roller bearing and washer using ST and press.

CAUTION:

Do not reuse roller bearing.

ST 498077000 REMOVER



G3M0607

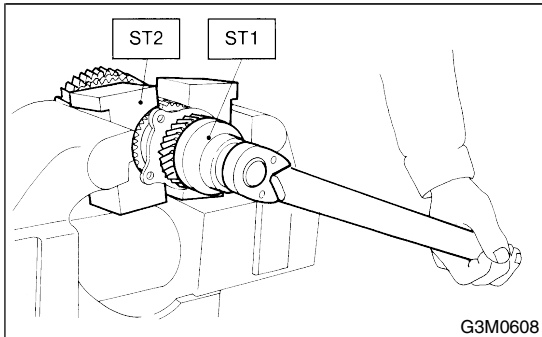
DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

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

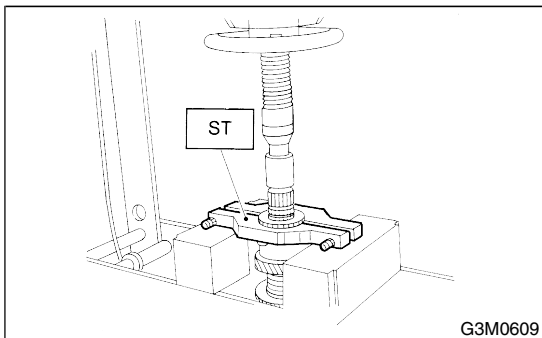
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



5) Remove 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR
REMOVER

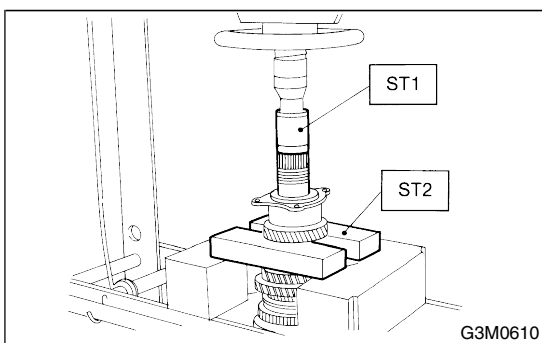


6) Remove woodruff key.

7) Remove roller bearing, 3rd-4th driven gear using ST1 and ST2.

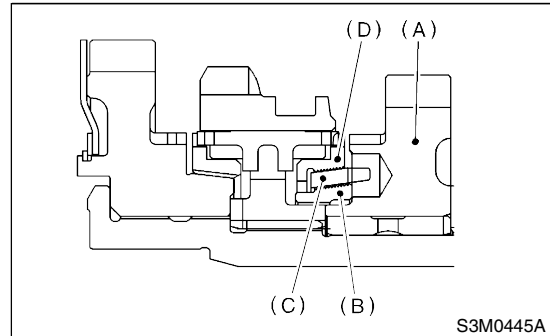
ST1 499757002 INSTALLER

ST2 899714110 REMOVER



8) Remove the key.

9) 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

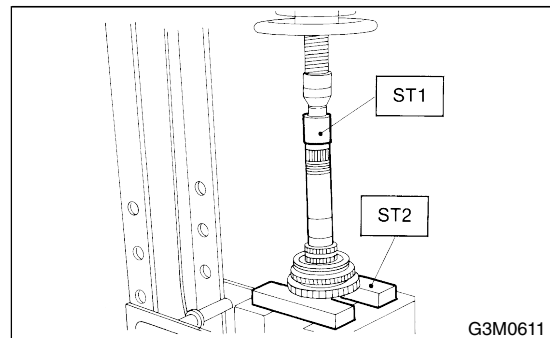
10) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

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 INSTALLER

ST2 899714110 REMOVER



11) Remove sub gear for 1st driven gear.

DRIVE PINION SHAFT ASSEMBLY

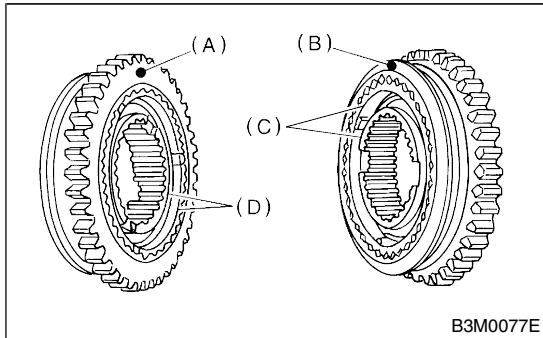
Manual Transmission and Differential

D: ASSEMBLY S503269A02

1) Install sleeve and assembly by matching alignment marks.

NOTE:

- Use new gear and hub assembly, if gear or hub have been replaced.



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

2) Install washer, snap ring and sub gear to 1st driven gear.

3) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:

- Take care to install gear and hub assembly in proper direction.
- Align baulk ring and gear & hub assembly with key groove.

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

CAUTION:

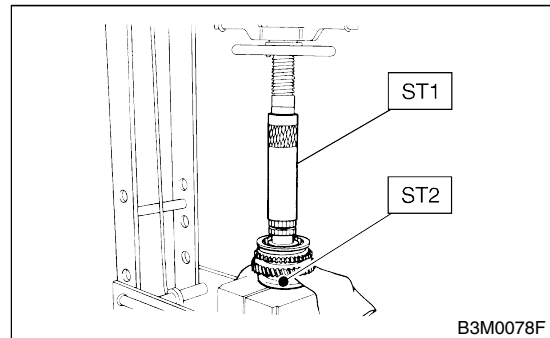
- Attach a cloth to the end of driven shaft to prevent damage.
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

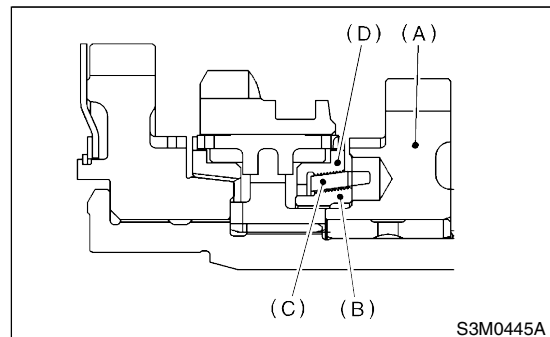
When press fitting, align oil holes of shaft and bushing.

ST1 499277200 INSTALLER

ST2 499587000 INSTALLER



5) 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

DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

6) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

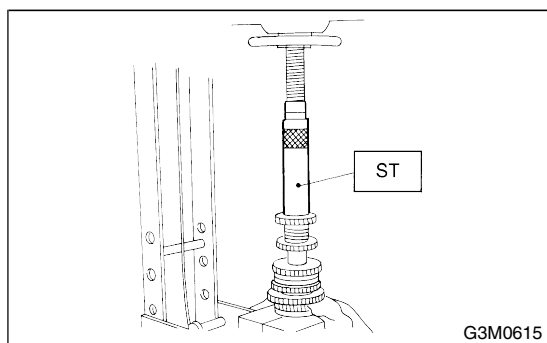
CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Align groove in baulk ring with insert.

ST 499277200 INSTALLER

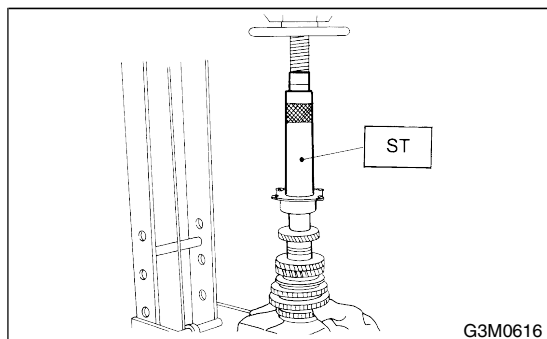


7) Install a set of roller bearings onto the driven shaft using ST and press.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

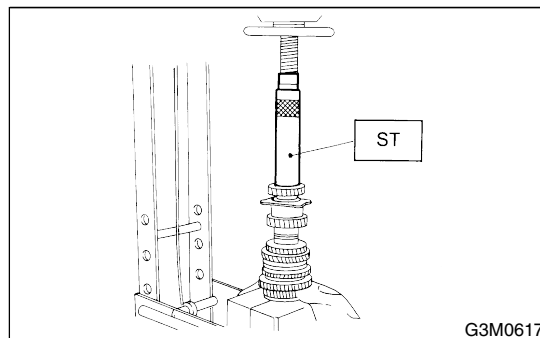


8) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

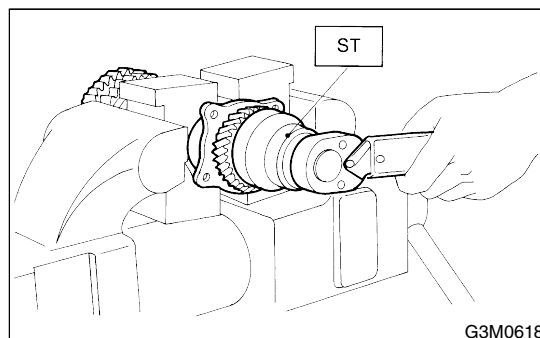


9) Install lock washer. Install lock nut and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

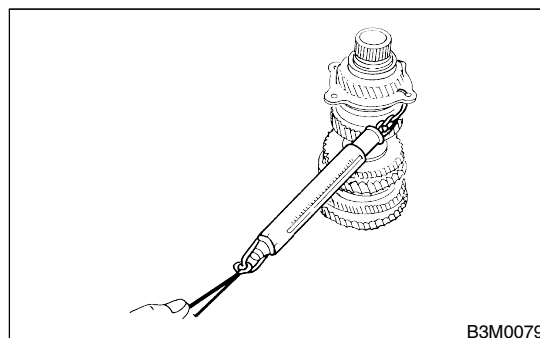
Tightening torque:

265 N·m (27 kgf·m, 195 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 (0.01 to 0.15 kgf, 0.02 to 0.33ft).



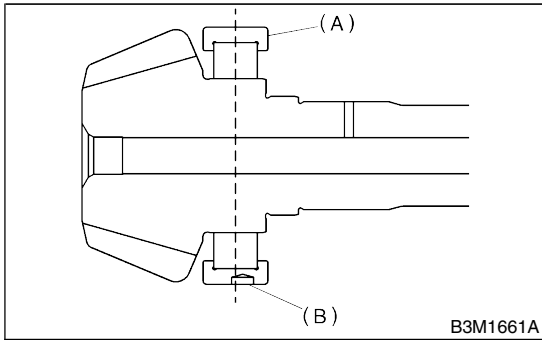
DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

10) Install roller bearing onto drive pinion.

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

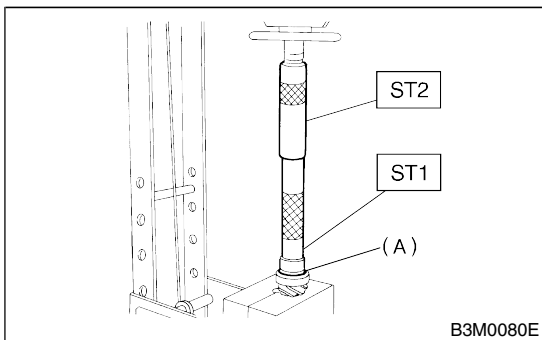
11) Install washer using ST1, ST2 and press.

CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

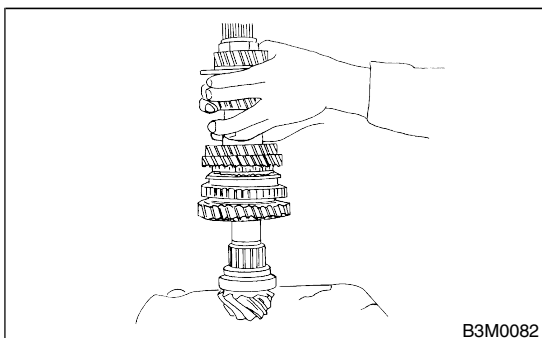
ST1 499277100 BUSH 1-2 INSTALLER

ST2 499277200 INSTALLER



- (A) Washer

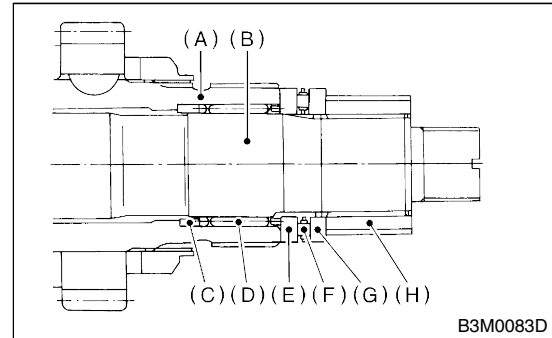
12) Install thrust bearing and needle bearing.
Install driven shaft assembly.



13) 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 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

E: INSPECTION S503269A10

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

1) Bearings

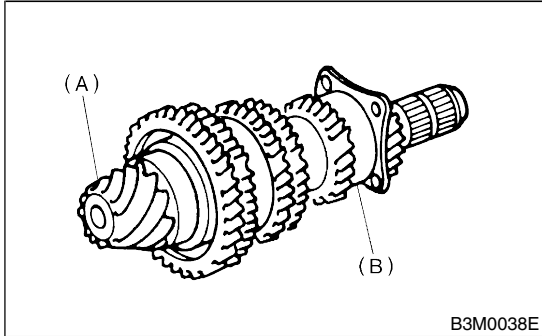
Replace bearings in the following cases:

- 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.

DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

- 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.

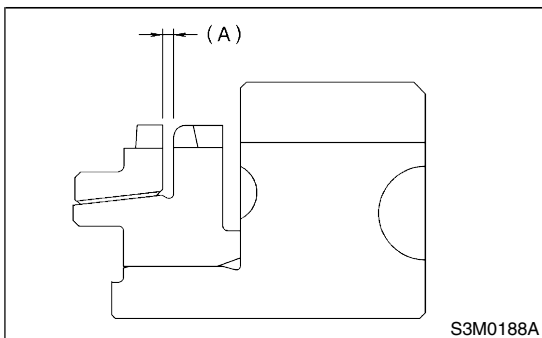


(A) Drive pinion shaft
(B) Ball bearing

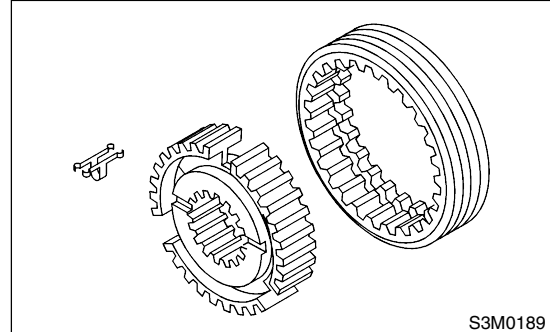
- Bearings having other defects
- 2) Bushing (each gear)
Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
 - When the inner wall is abnormally worn.
- 3) Gears
- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively 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 key
Replace the insert if deformed, excessively worn, or defective in any way.



- 6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
- 7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

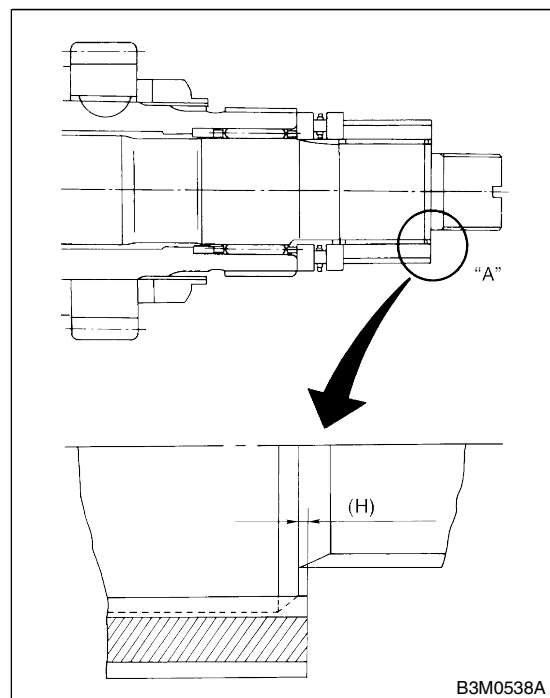
F: ADJUSTMENT

S503269A01

1. THRUST BEARING PRELOAD

S503269A0101

- 1) After completing the preceding steps 1) through 3), select adjusting washer No. 1 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).



DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

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

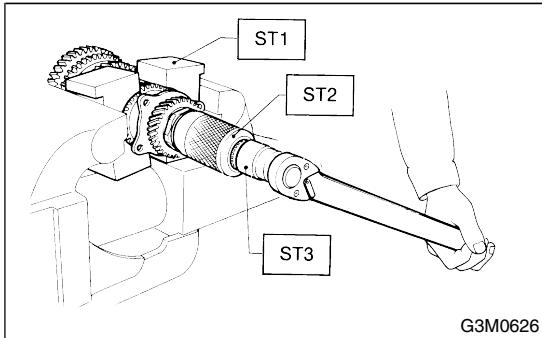
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

118 N·m (12 kgf-m, 86.8 ft-lb)



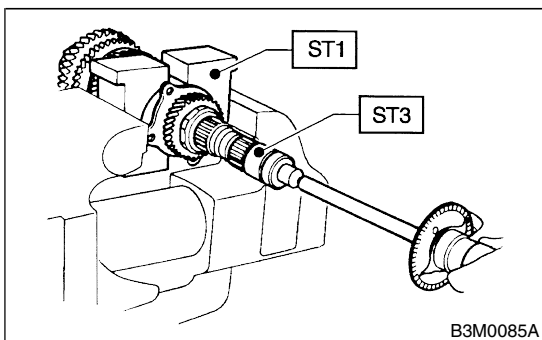
3) After removing ST2, measure starting torque using torque driver.

ST1 899884100 HOLDER

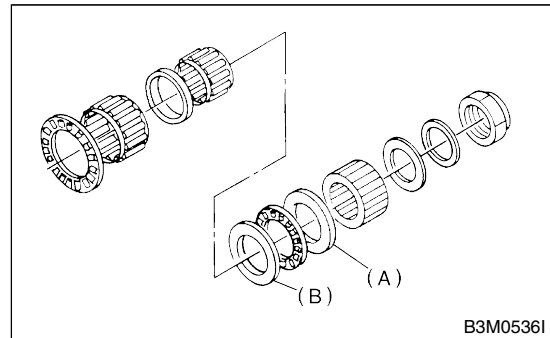
ST3 899988608 SOCKET WRENCH (27)

Starting torque:

0.3–0.8 N·m (0.03–0.08 kgf-m, 0.2–0.6 ft-lb)



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

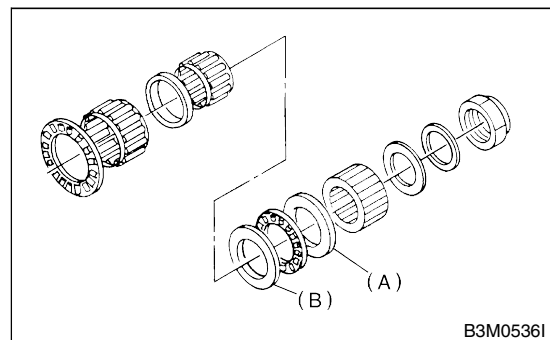


(A) Adjusting washer No.1

(B) Adjusting washer No.2

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.



(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

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)

DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

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

FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

20. Front Differential Assembly

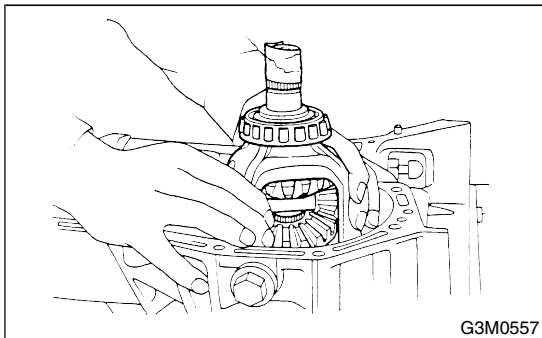
S503152

A: REMOVAL S503152A18

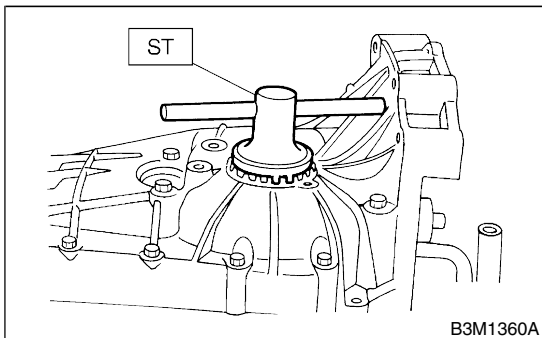
- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly. Remove transfer case with extension case assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly.
Single-range model:
<Ref. to MT-67 REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model:
<Ref. to MT-73 REMOVAL, Main Shaft Assembly for Dual-Range.>
- 6) Remove differential assembly.

CAUTION:

- Be careful not to confuse right and left roller bearing outer races.
- Be careful not to damage retainer oil seal.



- 7) Remove differential side retainers using ST. ST 499787000 WRENCH ASSY



B: INSTALLATION S503152A11

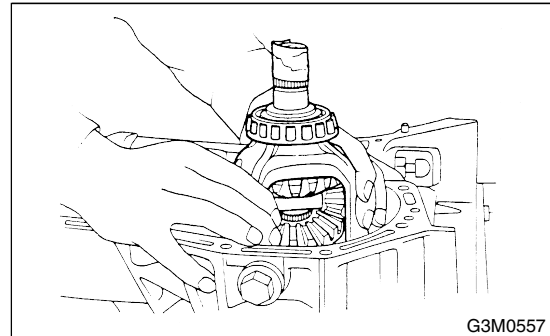
- 1) Install differential side retainers using ST. ST 499787000 WRENCH ASSY
- 2) Install differential assembly.

CAUTION:

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

NOTE:

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



- 3) Install main shaft assembly.
Single-range model:
<Ref. to MT-67 INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range:
<Ref. to MT-73 INSTALLATION, Main Shaft Assembly for Dual-Range.>
- 4) Install drive pinion assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft Assembly.>
- 5) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
- 6) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503152A06

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

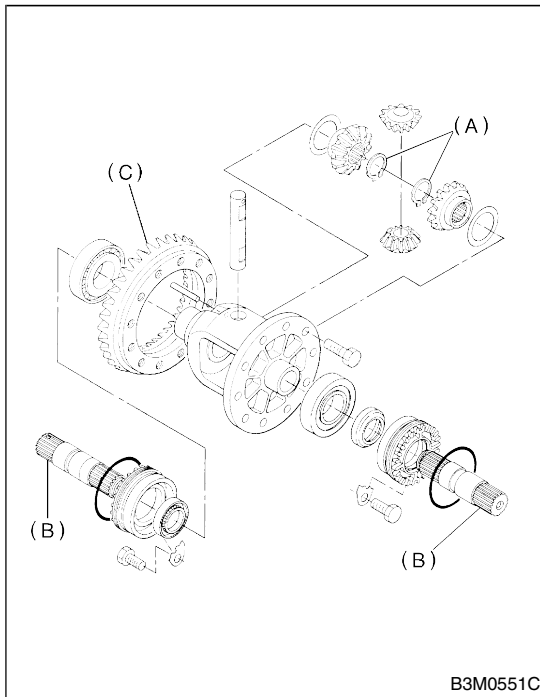
NOTE:

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

FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

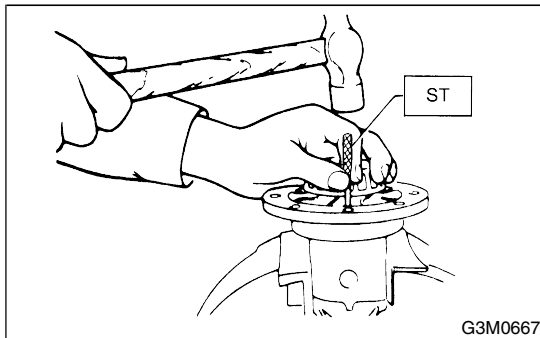
2) Loosen twelve bolts and remove hypoid driven gear.



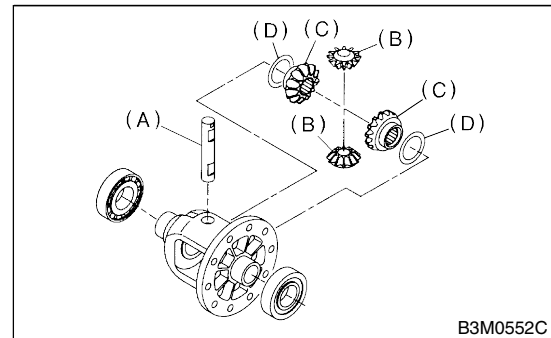
- (A) Snap ring
- (B) Axle drive shaft
- (C) Hypoid driven gear

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

ST 899904100 REMOVER

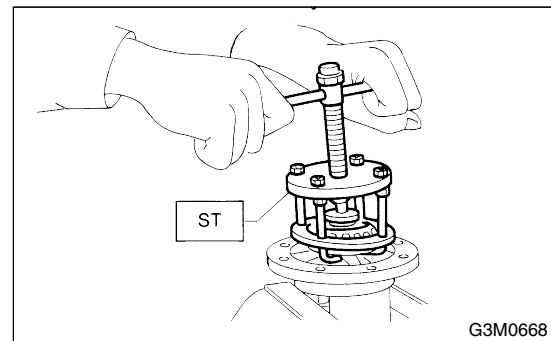


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

5) Remove roller bearing using ST. 399527700 PULLER SET



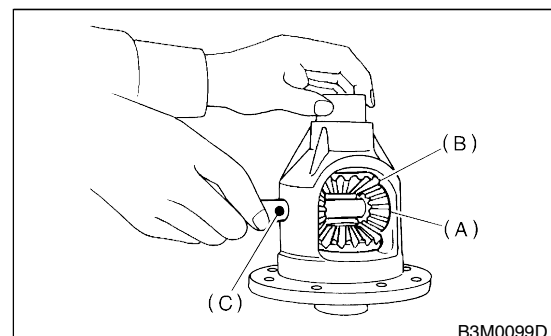
D: ASSEMBLY

S503152A02

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

NOTE:

Face the chamfered side of washer toward gear.



- (A) Bevel pinion
- (B) Bevel gear
- (C) Pinion shaft

FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to MT-96 ADJUSTMENT, Front Differential Assembly.>

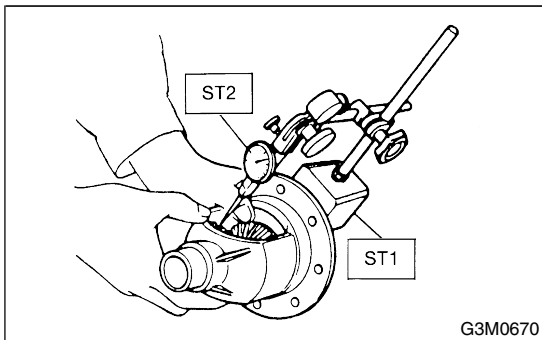
NOTE:

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)

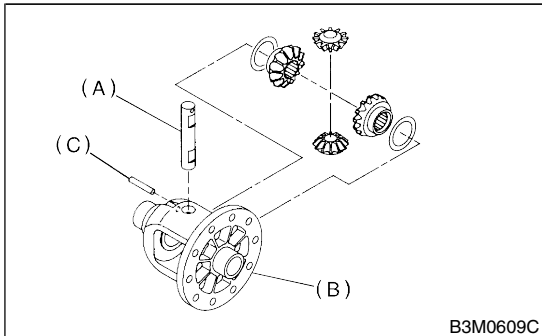


3) Align pinion shaft and differential case at their holes, and drive straight pin into holes from the hypoid driven gear side, using ST.

NOTE:

Lock straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

4) Install roller bearing to differential case.

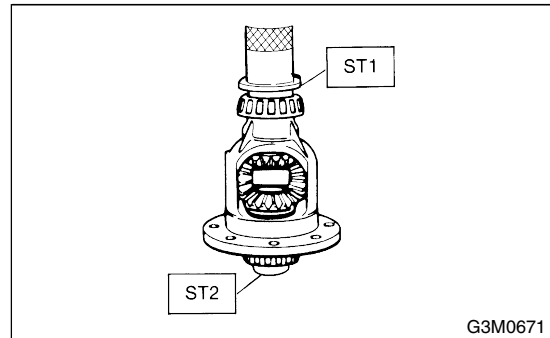
CAUTION:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

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

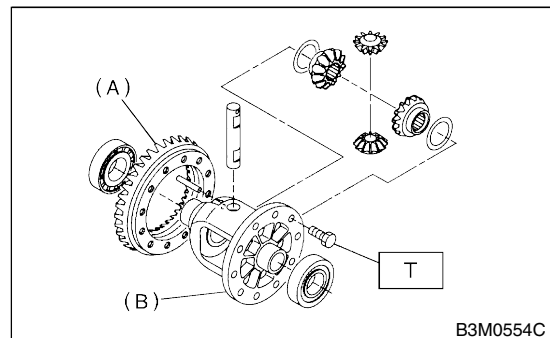
ST1 499277100 BUSH 1-2 INSTALLER
ST2 398497701 ADAPTER



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

Tightening torque:

T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)



- (A) Hypoid driven gear
- (B) Differential case

E: INSPECTION

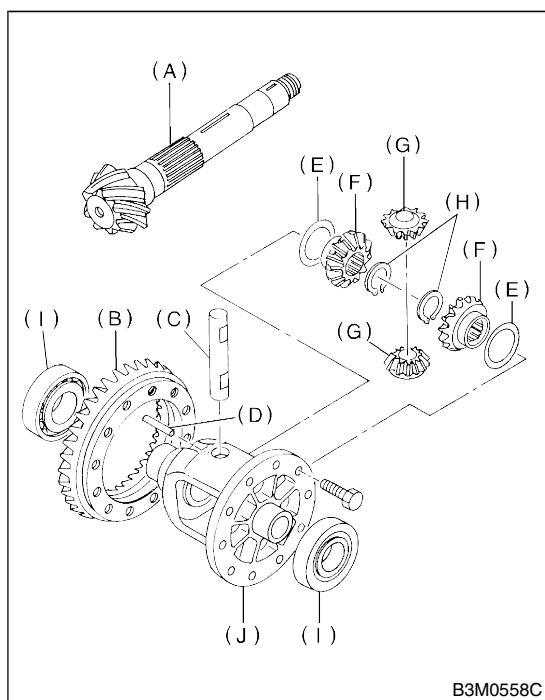
S503152A10

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.

FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential



B3M0558C

- (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

1. BEVEL PINION GEAR BACKLASH

S503152A1001

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

NOTE:

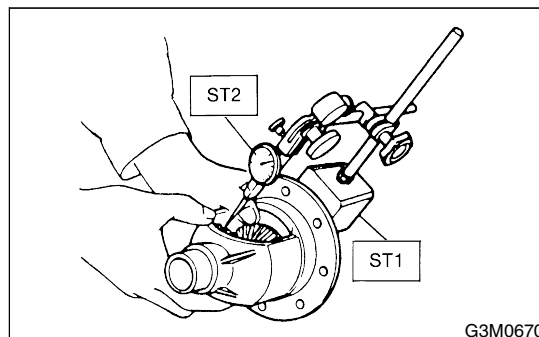
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



G3M0670

2. HYPOID GEAR BACKLASH

S503152A1002

Set ST1, ST2 and ST3. 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.

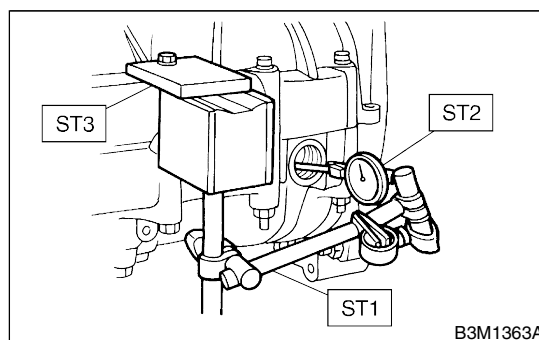
ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

ST3 498255400 PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



B3M1363A

NOTE:

If backlash is outside specified range, adjust it by turning holder in right side case.

3. TOOTH CONTACT OF HYPOID GEAR

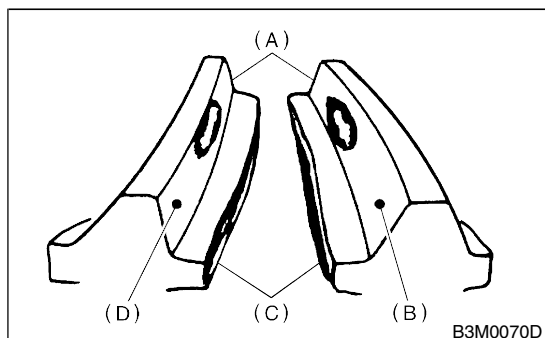
S503152A1003

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 inaccurate, make adjustment. <Ref. to MT-96 ADJUSTMENT, Front Differential Assembly.>

FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

F: ADJUSTMENT

S503152A01

1. BEVEL PINION GEAR BACKLASH

S503152A0101

- 1) Disassemble the front differential. <Ref. to MT-92 REMOVAL, Front Differential Assembly.>
- 2) Select a different washer from the table and install.

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

- 3) Adjust until the specified value is obtained.

Standard backlash:

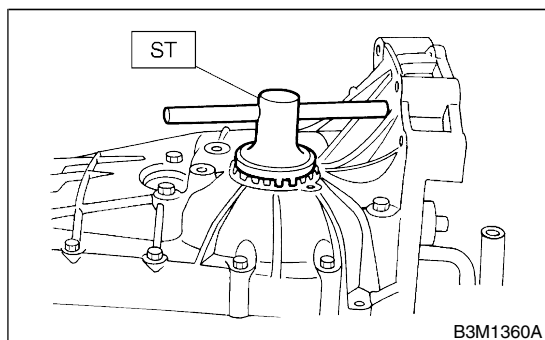
0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

S503152A0102

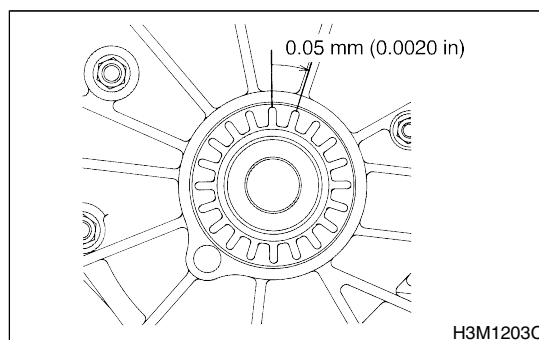
Adjust backlash by turning holder in right side case.

ST 499787000 WRENCH ASSY



NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.020 in).



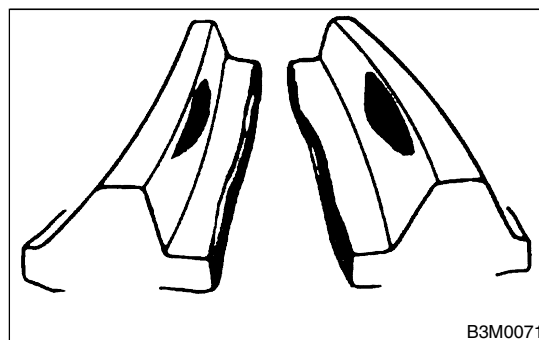
3. TOOTH CONTACT OF HYPOID GEAR

S503152A0103

Adjust until the teeth contact is correct.

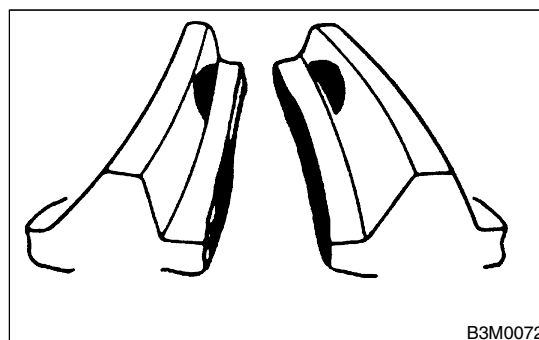
- Backlash is excessive.

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.

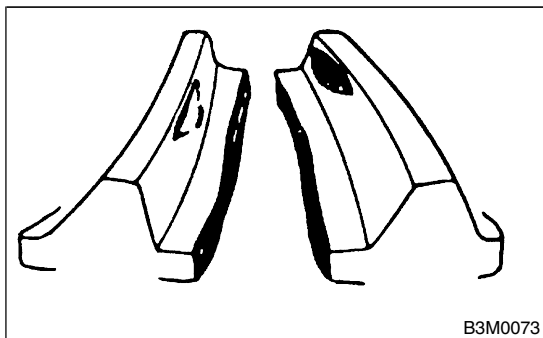
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



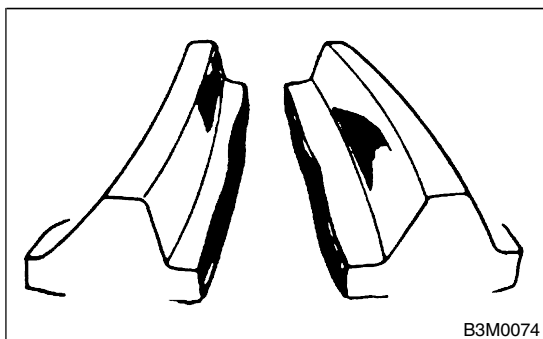
FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

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



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



SPEEDOMETER GEAR

Manual Transmission and Differential

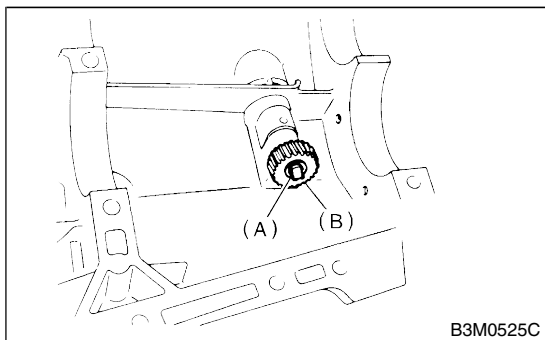
21. Speedometer Gear

S503268

A: REMOVAL

S503268A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
- 5) Remove vehicle speed sensor. <Ref. to MT-44 REMOVAL, Vehicle Speed Sensor.>
- 6) Remove outer snap ring and pull out speedometer driven gear. Next, remove oil seal, speedometer shaft and washer.



- (A) Outer snap ring
(B) Speedometer driven gear

B: INSTALLATION

S503268A11

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

CAUTION:

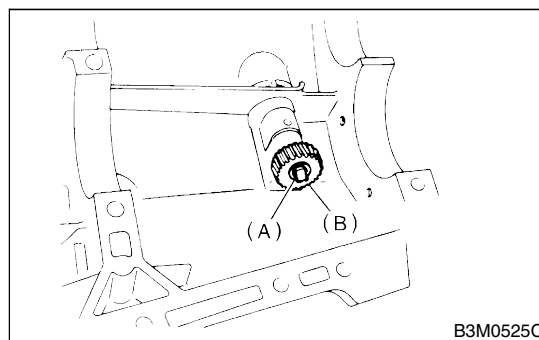
Use new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS

- 2) Install vehicle speed sensor. <Ref. to MT-44 INSTALLATION, Vehicle Speed Sensor.>
- 3) Install speedometer driven gear and snap ring.

CAUTION:

Use new snap ring, if it has been removed.



- (A) Outer snap ring
(B) Speedometer driven gear

- 4) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
- 5) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

S503268A10

Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.

REVERSE IDLER GEAR

Manual Transmission and Differential

22. Reverse Idler Gear

S503263

A: REMOVAL

S503263A18

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>

2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>

3) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>

4) Remove transmission case. <Ref. to MT-83 REMOVAL, Transmission Case.>

5) Remove drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>

6) Remove main shaft assembly.

Single-range model:

<Ref. to MT-67 REMOVAL, Main Shaft Assembly for Single-Range.>

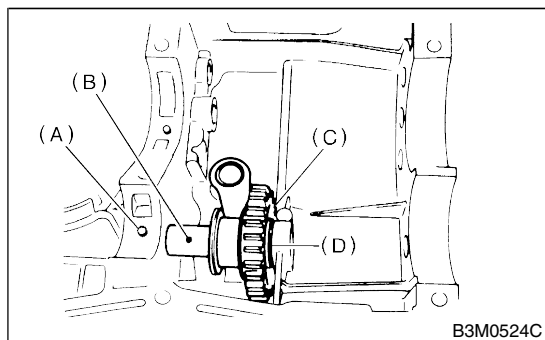
Dual-range model:

<Ref. to MT-73 REMOVAL, Main Shaft Assembly for Dual-Range.>

7) Remove differential assembly. <Ref. to MT-92 REMOVAL, Front Differential Assembly.>

8) Remove shifter forks and rods. <Ref. to MT-101 REMOVAL, Shifter Fork and Rod.>

9) 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

10) Remove reverse shifter lever.

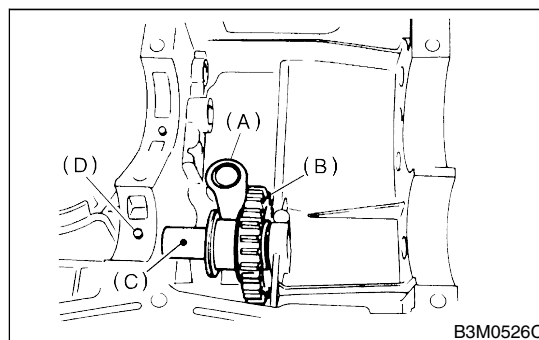
B: INSTALLATION

S503263A11

1) 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

2) Inspect and adjust clearance between reverse idler gear and transmission case wall. <Ref. to MT-99 INSTALLATION, Reverse Idler Gear.> and <Ref. to MT-100 ADJUSTMENT, Reverse Idler Gear.>

3) Install shifter forks and rods. <Ref. to MT-101 INSTALLATION, Shifter Fork and Rod.>

4) Install differential assembly. <Ref. to MT-92 INSTALLATION, Front Differential Assembly.>

5) Install main shaft assembly.

Single-range model:

<Ref. to MT-67 INSTALLATION, Main Shaft Assembly for Single-Range.>

Dual-range:

<Ref. to MT-73 INSTALLATION, Main Shaft Assembly for Dual-Range.>

6) Install drive pinion shaft assembly. <Ref. to MT-83 INSTALLATION, Drive Pinion Shaft Assembly.>

7) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>

8) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>

9) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>

10) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

REVERSE IDLER GEAR

Manual Transmission and Differential

C: INSPECTION

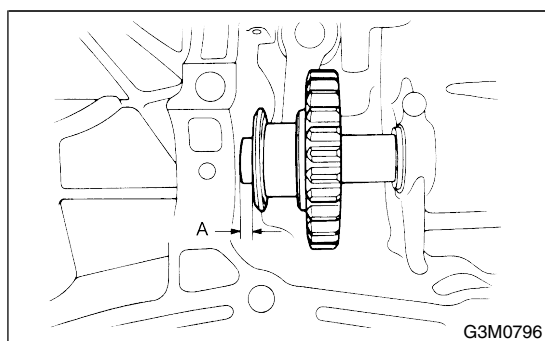
S503263A10

1) Move the reverse shifter rod toward the reverse side. Inspect clearance between reverse idler gear and transmission case wall.

If out of specification, select the appropriate reverse shifter lever and adjust.

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

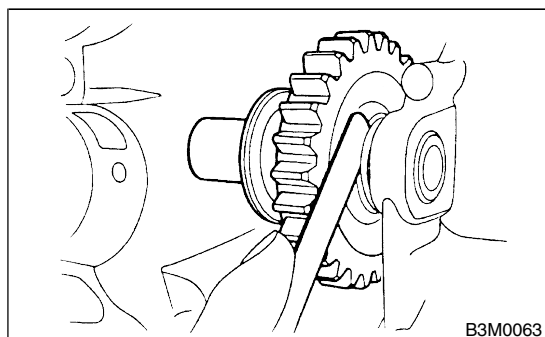


2) After installing a suitable reverse shifter lever, shift into neutral. Inspect clearance between reverse idler gear and transmission case wall.

If out of specification, select the appropriate washer and adjust.

Clearance:

0 — 0.5 mm (0 — 0.020 in)



3) Check the reverse idler gear and shaft for damage. Replace if damaged.

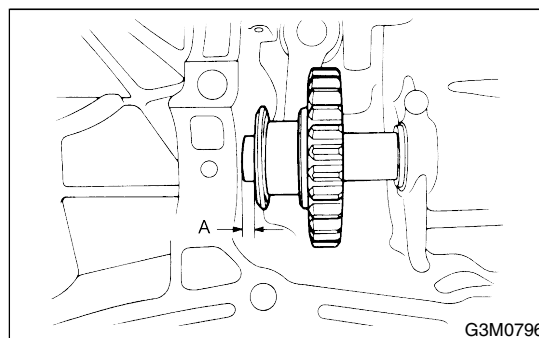
D: ADJUSTMENT

S503263A01

1) Select the appropriate reverse shifter lever from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

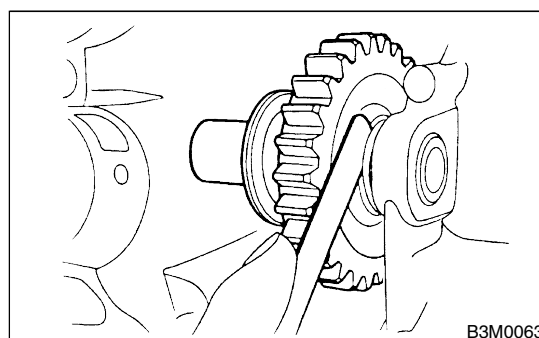


Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select the appropriate washer from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance:

0 — 0.5 mm (0 — 0.020 in)



Washer	
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)

SHIFTER FORK AND ROD

Manual Transmission and Differential

23. Shifter Fork and Rod

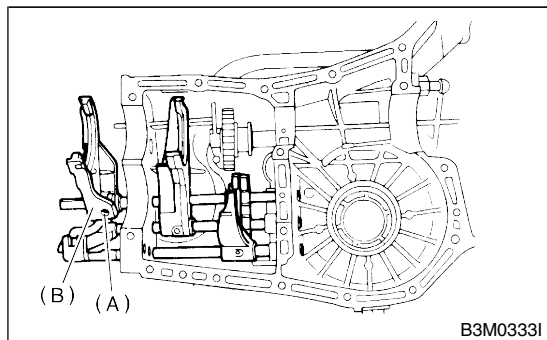
S503255

A: REMOVAL

S503255A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
 - 2) Remove back-up light switch and neutral position switch. <Ref. to MT-42 REMOVAL, Switches and Harness.>
 - 3) Remove transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
 - 4) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
 - 5) Remove drive pinion shaft assembly. <Ref. to MT-83 REMOVAL, Drive Pinion Shaft Assembly.>
 - 6) Remove main shaft assembly.
- Single-range model:
<Ref. to MT-67 REMOVAL, Main Shaft Assembly for Single-Range.>
- Dual-range model:
<Ref. to MT-73 REMOVAL, Main Shaft Assembly for Dual-Range.>
- 7) Remove differential assembly. <Ref. to MT-92 REMOVAL, Front Differential Assembly.>
 - 8) Drive out straight pin with ST, and 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER

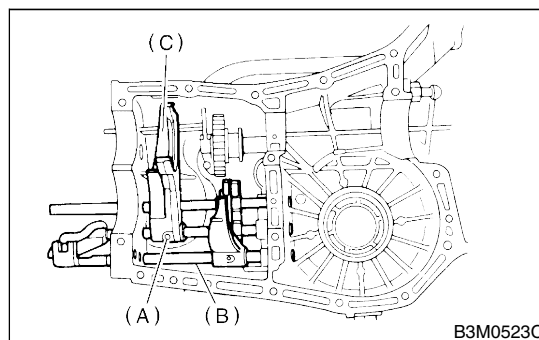


- (A) Straight pin
(B) 5th shifter fork

- 9) Remove plugs, springs and checking balls.
- 10) 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 the inside of the case so that it does not hit against the case.



- (A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

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

- 12) 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.

- 13) Remove reverse shifter lever.

B: INSTALLATION

S503255A11

- 1) Install reverse arm fork spring, ball and interlock plunger 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

- 2) Position ball, 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.

- 3) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of the transmission case.
- 4) Align the holes in rod and fork, and drive straight pin into these holes using ST.

CAUTION:

Replace straight pin with a new one.

NOTE:

- Set other rods to neutral.
- Make sure interlock plunger is on the 3-4 fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

- 5) Install interlock plunger onto 3-4 fork rod.

SHIFTER FORK AND ROD

Manual Transmission and Differential

CAUTION:

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

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

7) Align the holes in rod and fork, and drive straight pin into these holes.

CAUTION:

Replace straight pin with a new one.

NOTE:

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

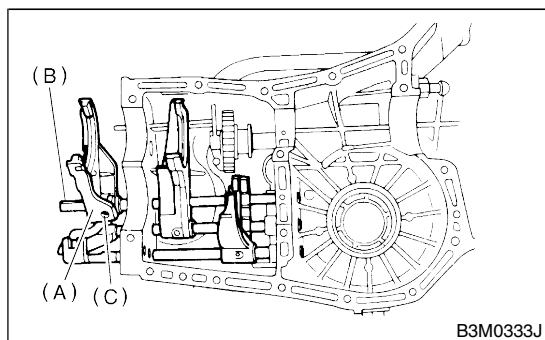
ST 398791700 STRAIGHT PIN REMOVER

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

CAUTION:

Replace straight pin with a new one.

ST 398791700 STRAIGHT PIN REMOVER

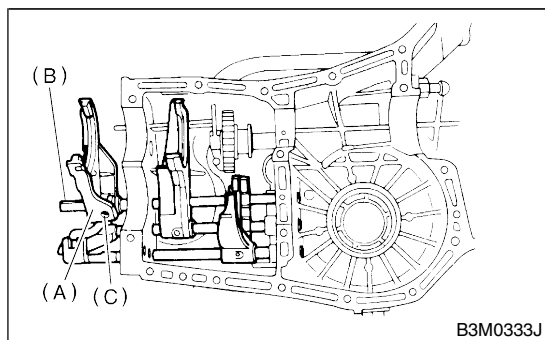


- (A) 5th shifter fork
- (B) Reverse fork rod
- (C) Straight pin

9) Position balls, checking ball springs and gas-kets into 3-4 and 1-2 rod holes, and install plugs.

CAUTION:

Replace gasket with a new one.



10) Install differential assembly. <Ref. to MT-92 INSTALLATION, Front Differential Assembly.>

11) Install main shaft assembly.

12) Install drive pinion shaft assembly. <Ref. to MT-83 INSTALLATION, Drive Pinon Shaft Assembly.>

13) Install transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>

14) Install transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install back-up light switch and neutral position switch. <Ref. to MT-43 INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

S503255A10

1) Check the shift shaft and shift rod for damage. Replace if damaged.

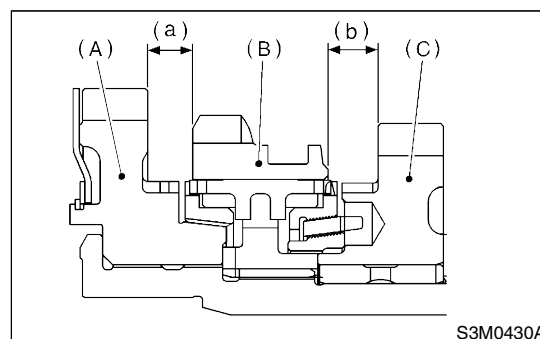
2) Gearshift mechanism

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

3) Inspect clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a) and (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.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

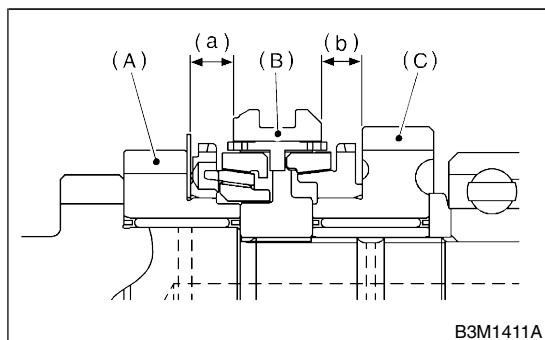
SHIFTER FORK AND ROD

Manual Transmission and Differential

4) Inspect clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a) and (b):

9.3 mm (0.366 in)



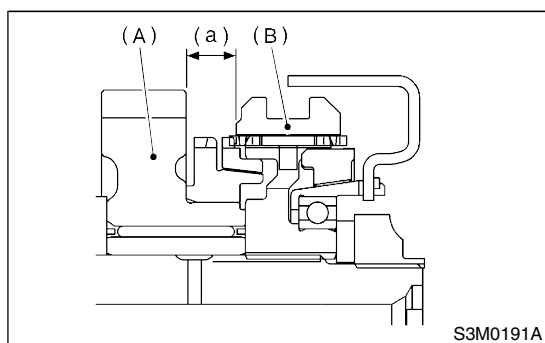
- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	—	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

5) Inspect clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a):

9.3 mm (0.366 in)



- (A) 5th drive gear
- (B) Coupling sleeve

Non-turbo model

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in).

Turbo model

5th shifter fork		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA241	—	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in).

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

Clearance (A):

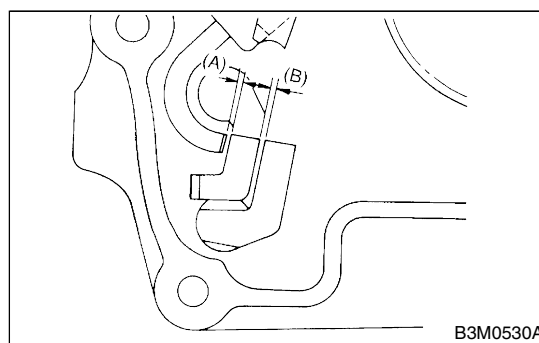
1st — 2nd to 3rd — 4th:

0.4 — 1.4 mm(0.016 — 0.055 in)

Clearance (B):

3rd — 4th to 5th:

0.5 — 1.3 mm(0.020 — 0.051 in)



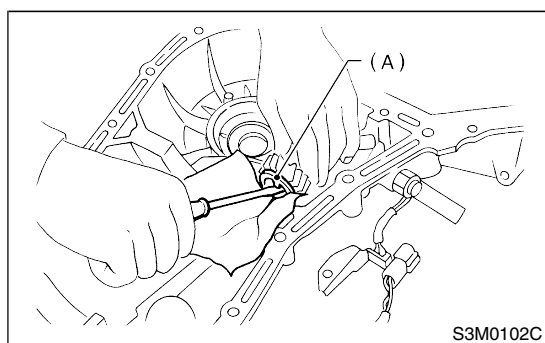
COUNTER GEAR

Manual Transmission and Differential

24. Counter Gear S503716

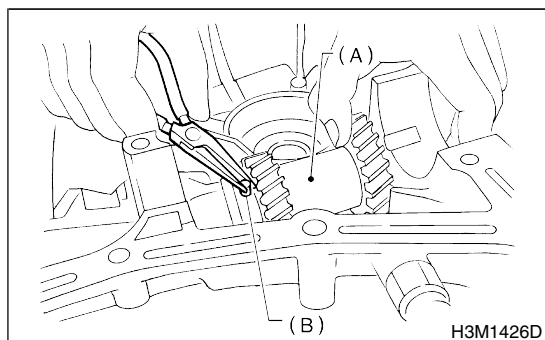
A: REMOVAL S503716A18

- 1) Remove the manual transmission assembly from the vehicle. <Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-46 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-60 REMOVAL, Transmission Case.>
- 4) Move counter gear shaft until it touches transmission case, and remove snap ring with a suitable tool.



(A) Snap ring

- 5) Slide washer at rear of high-low counter shaft, and remove straight pin from counter shaft.

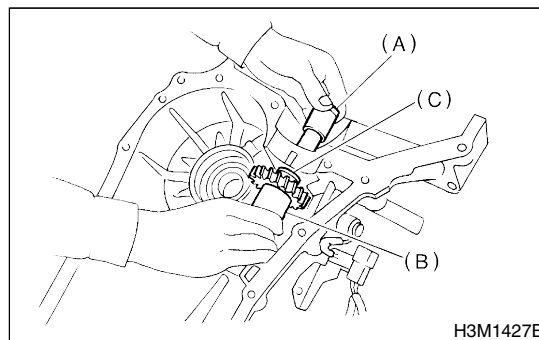


(A) Counter gear
(B) Straight pin

- 6) Remove counter shaft from transmission case, taking care not to drop counter gear and the two washers.

CAUTION:

- Be careful not to damage O-ring.
- Be careful not to drop straight pin on front side.
- Be careful not to drop two needle bearings and collar contained in counter gear.



(A) Counter shaft
(B) Counter gear
(C) Washers

B: INSTALLATION S503716A11

- 1) Install O-ring and straight pin onto counter gear shaft.
- 2) Install the following parts in main case (Right-side), and push the shaft perfectly into case.
 - Counter gear shaft
 - Two counter gear washers
 - Two needle bearings
 - Counter gear collar
 - Counter gear
 - Straight pin
 - Snap ring
- 3) Install the transmission case. <Ref. to MT-62 INSTALLATION, Transmission Case.>
- 4) Install the transfer case with extension case assembly. <Ref. to MT-46 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly on vehicle. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

NOTE:

- Make sure that cut-out end surface of counter gear shaft does not protrude above the end surface of the case.
- Position the cut-out portion of counter gear shaft as shown in the figure.

C: INSPECTION S503716A10

1) After installing snap ring, measure clearance between snap ring and counter washer.

Clearance:

0.05 — 0.35 mm (0.0020 — 0.0138 in)

2) If the clearance is out of measured value, select a snap ring and install to put clearance within measured value. <Ref. to MT-104 ADJUSTMENT, Counter Gear.>

D: ADJUSTMENT S503716A01

Selection of snap ring

If the measurement is not within the specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

GENERAL DIAGNOSTIC

Manual Transmission and Differential

25. General Diagnostic S503278

A: INSPECTION S503278A10

1. MANUAL TRANSMISSION S503278A1001

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: 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. • Gear slips out when coasting on rough road. • 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. NOTE: 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 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.	Replace.

GENERAL DIAGNOSTIC

Manual Transmission and Differential

2. DIFFERENTIAL S503278A1002

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: 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 vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. 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. ● 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. ● Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment ● Bearing noise when driving or when coasting: Cracked, broken or damaged bearings ● 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.

GENERAL DIAGNOSTIC

Manual Transmission and Differential

MEMO:

CLUTCH SYSTEM

CL

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GENERAL DESCRIPTION

Clutch System

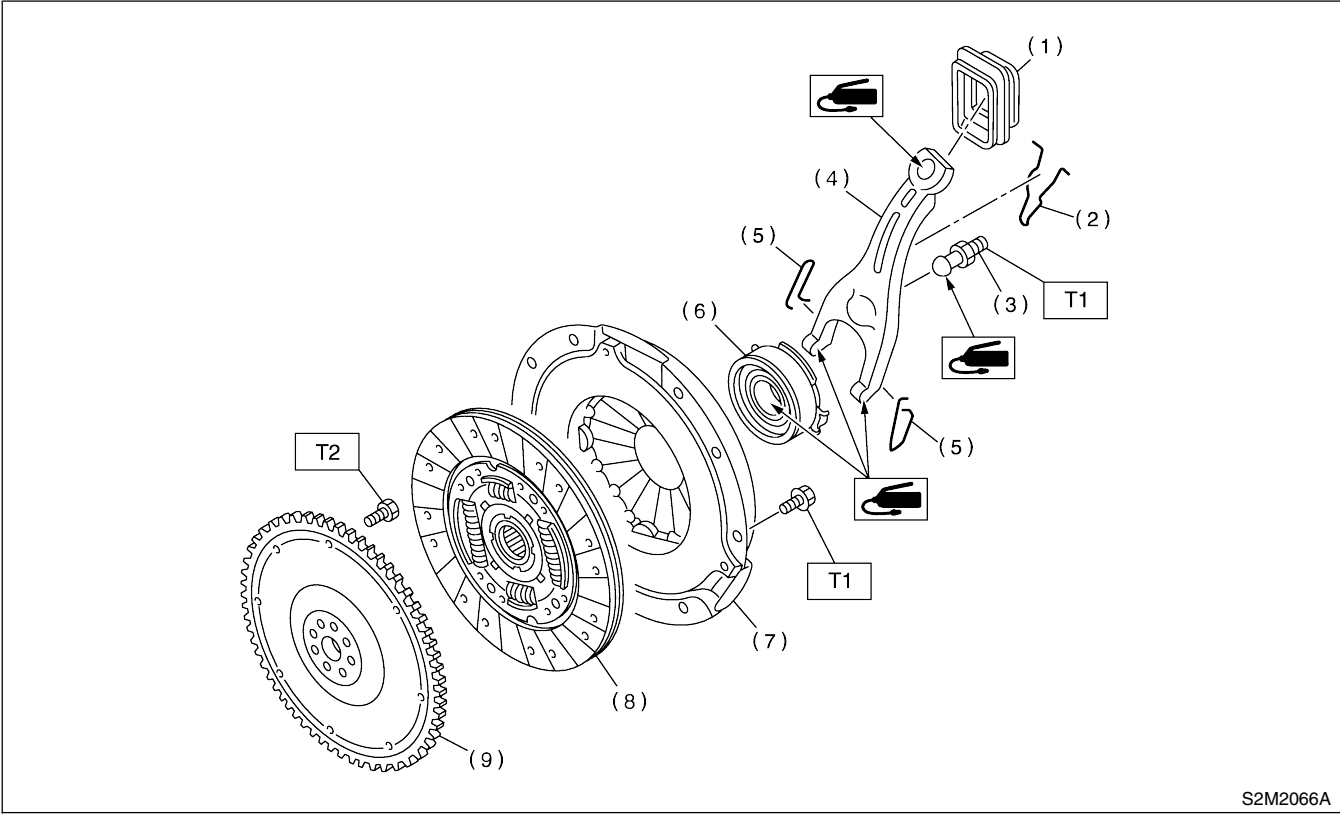
1. General Description SS04001

A: SPECIFICATIONS SS04001E49

Model				Non-turbo		Turbo	
Clutch cover	Type			Push type		Pull type	
	Diaphragm set load kg (lb)			580 (1,279)		700 (1,544)	
Clutch disc	Facing material			Woven (Non asbestos)			
	O.D. × I.D. × thickness mm (in)			225 × 150 × 3.5 (8.86 × 5.91 × 0.138)		230 × 150 × 3.5 (9.06 × 5.91 × 0.138)	
	Spline O.D. mm (in)			25.2 (0.992), (No. of teeth: 24)			
	Depth of rivet head	Standard mm (in)		1.65 — 2.25 (0.0650 — 0.0886)			
		Limit of sinking mm (in)		0.3 (0.012)			
	Limit for deflection mm (in)			1.0 (0.039) at R = 107 (4.21)			
Clutch release lever ratio				1.6		1.7	
Clutch release bearing				Grease-packed self-aligning			
Clutch pedal	Full stroke mm (in)			130 — 135 (5.12 — 5.31)			
Clutch release lever	Stroke mm (in)			12 — 13.6 (0.472 — 0.535)		13.3 — 14.7 (0.524 — 0.579)	

B: COMPONENT SS04001A05

1. CLUTCH ASSEMBLY FOR NON-TURBO MODEL SS04001A0504



- | | |
|----------------------------------|----------------------------|
| (1) Clutch release lever sealing | (6) Clutch release bearing |
| (2) Retainer spring | (7) Clutch cover |
| (3) Pivot | (8) Clutch disc |
| (4) Clutch release lever | (9) Flywheel |
| (5) Clip | |

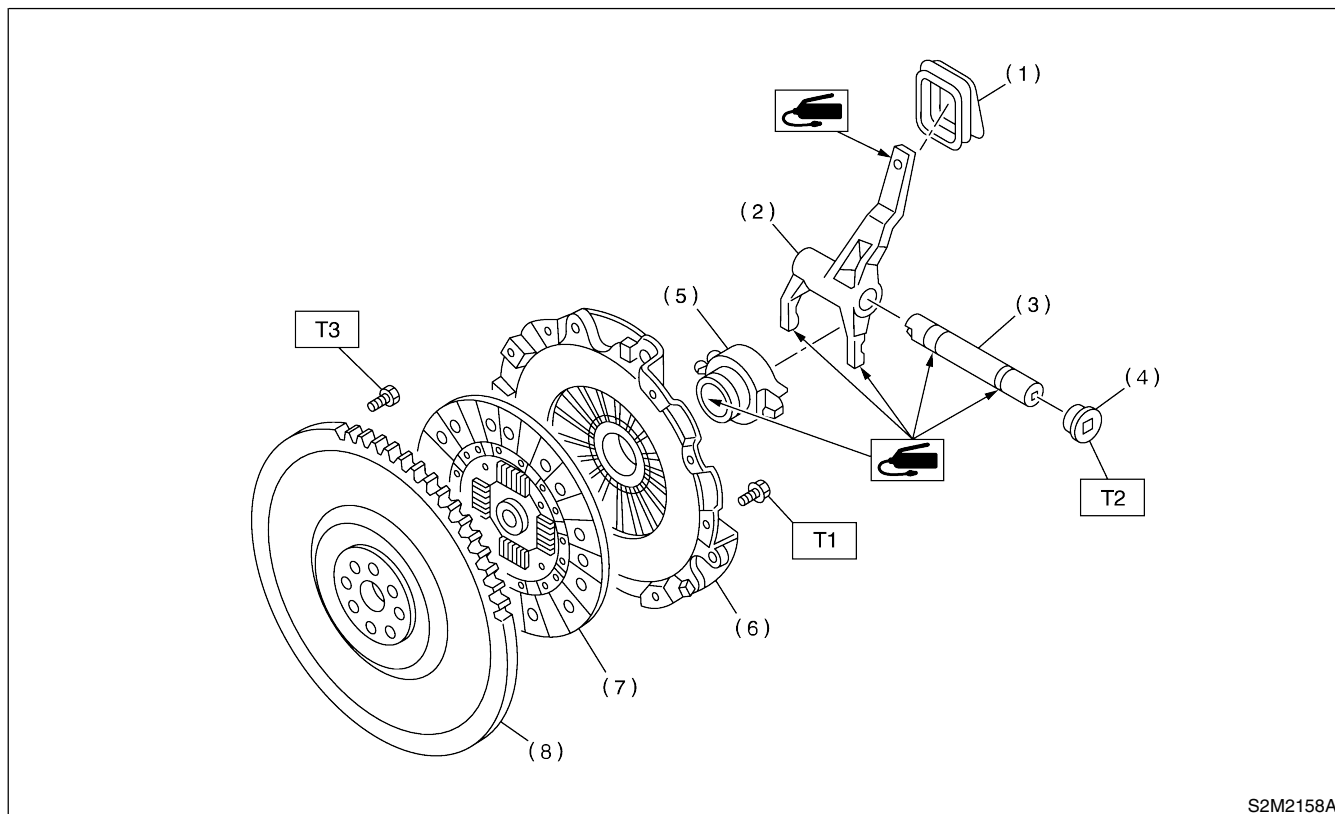
Tightening torque: N·m (kgf·m, ft·lb)

T1: 15.7 (1.6, 11.6)

T2: 72 (7.3, 52.8)

GENERAL DESCRIPTION

2. CLUTCH ASSEMBLY FOR TURBO MODEL S504001A0505



- | | |
|----------------------------------|------------------|
| (1) Clutch release lever sealing | (6) Clutch cover |
| (2) Clutch release lever | (7) Clutch disc |
| (3) Clutch release lever shaft | (8) Flywheel |
| (4) Plug | |
| (5) Clutch release bearing | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 15.7 (1.6, 11.6)

T2: 44 (4.5, 32.5)

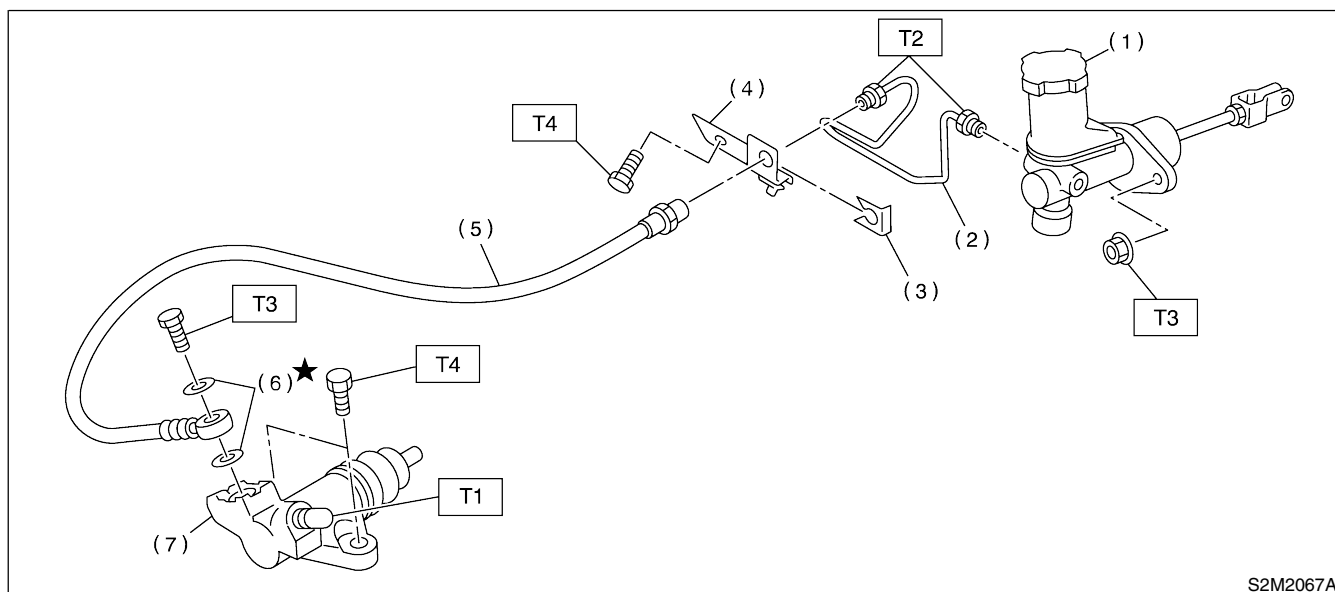
T3: 72 (7.3, 52.8)

GENERAL DESCRIPTION

Clutch System

3. CLUTCH PIPE AND HOSE FOR NON-TURBO MODEL SS04001A0506

● LHD Model SS04001A050601



S2M2067A

- | | |
|------------------------|--------------------------|
| (1) Operating cylinder | (7) Master cylinder ASSY |
| (2) Washer | (8) Clevis pin |
| (3) Clutch hose | (9) Snap pin |
| (4) Bracket | (10) Spacer |
| (5) Clip | |
| (6) Clutch pipe | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.8)

T2: 15 (1.5, 10.8)

T3: 18 (1.8, 13.0)

T4: 37 (3.8, 27.5)

Clutch System

[illegible]

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

$T1: 8 (0.8, 5.8)$

T2: 15 (1.5, 10.8)

T3: 18 (1.8, 13.0)

T4: 25 (2.5, 18.1)

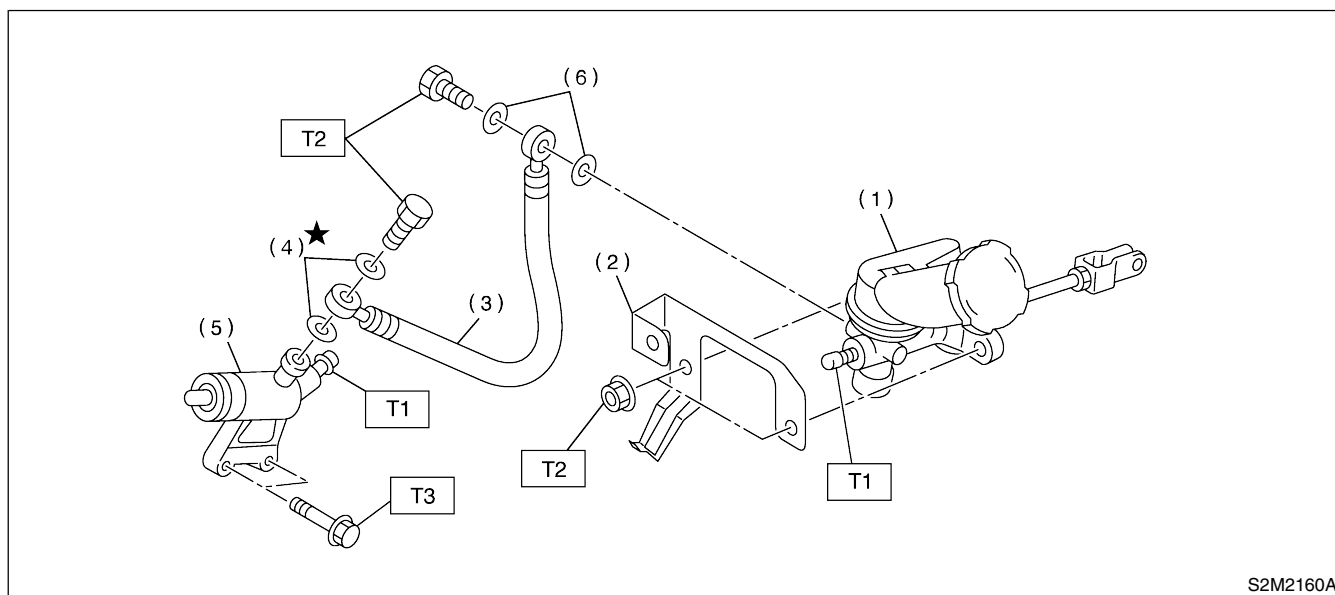
T5: 37 (3.8, 27.5)

GENERAL DESCRIPTION

Clutch System

4. CLUTCH PIPE AND HOSE FOR TURBO MODEL S504001A0507

● LHD Model S504001A050701



- | | |
|--------------------------|------------------------|
| (1) Master cylinder ASSY | (5) Operating cylinder |
| (2) Bracket | |
| (3) Clutch hose | |
| (4) Washer | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.8)

T2: 18 (1.8, 13.0)

T3: 37 (3.8, 27.5)

Clutch System

Exploded view diagram of the front suspension assembly. The diagram shows the following components and their assembly points:

- Component (1):** Main suspension knuckle/steering knuckle.
- Component (2):** Upper control arm.
- Component (3):** Lower control arm.
- Component (4):** Steering knuckle/steering knuckle.
- Component (5):** Lower control arm.
- Component (6):** Lower control arm.
- Component (7):** Upper control arm.
- Component (8):** Lower control arm.
- Component (9):** Lower control arm.
- Component (10):** Lower control arm.
- Component (11):** Lower control arm.

Assembly points and torque specifications:

- T1:** Torque specification for the upper control arm (7) and lower control arm (6).
- T2:** Torque specification for the lower control arm (5).
- T3:** Torque specification for the upper control arm (7).
- T4:** Torque specification for the lower control arm (8) and lower control arm (11).
- T5:** Torque specification for the lower control arm (5).
- T6:** Torque specification for the lower control arm (6).

A star symbol is placed next to component (11).

- (1) Master cylinder ASSY
- (2) Bracket
- (3) Sealed cover
- (4) Clutch pipe and connector ASSY
- (5) Clutch hose
- (6) Operating cylinder
- (7) Connector bracket
- (8) Clip A
- (9) Clip B
- (10) Bracket
- (11) Washer

Tightening torque: N·m (kgf-m, ft-lb)

$T1: 8 (0.8, 5.8)$

T2: 15 (1.5, 10.8)

T3: 15.7 (1.6, 11.6)

T4: 18 (1.8, 13.0)

T5: 25 (2.5, 18.1)

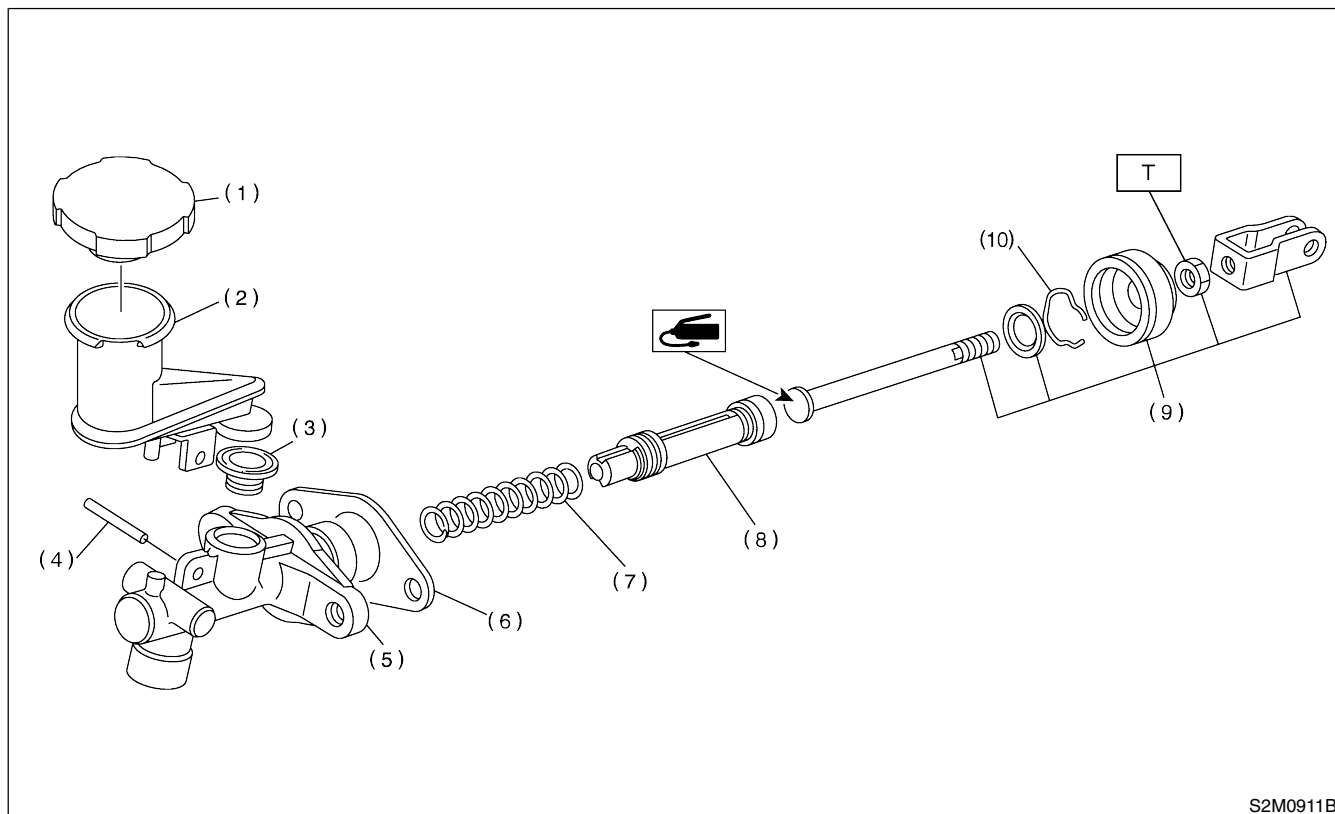
T6: 37 (3.8, 27.5)

GENERAL DESCRIPTION

Clutch System

5. MASTER CYLINDER FOR NON-TURBO MODEL

SS04001A0508



- | | |
|---------------------|-----------------------|
| (1) Reservoir cap | (6) Seat |
| (2) Reservoir tank | (7) Return spring |
| (3) Oil seal | (8) Piston |
| (4) Straight pin | (9) Push rod |
| (5) Master cylinder | (10) Piston stop ring |

Tightening torque: N·m (kgf-m, ft-lb)

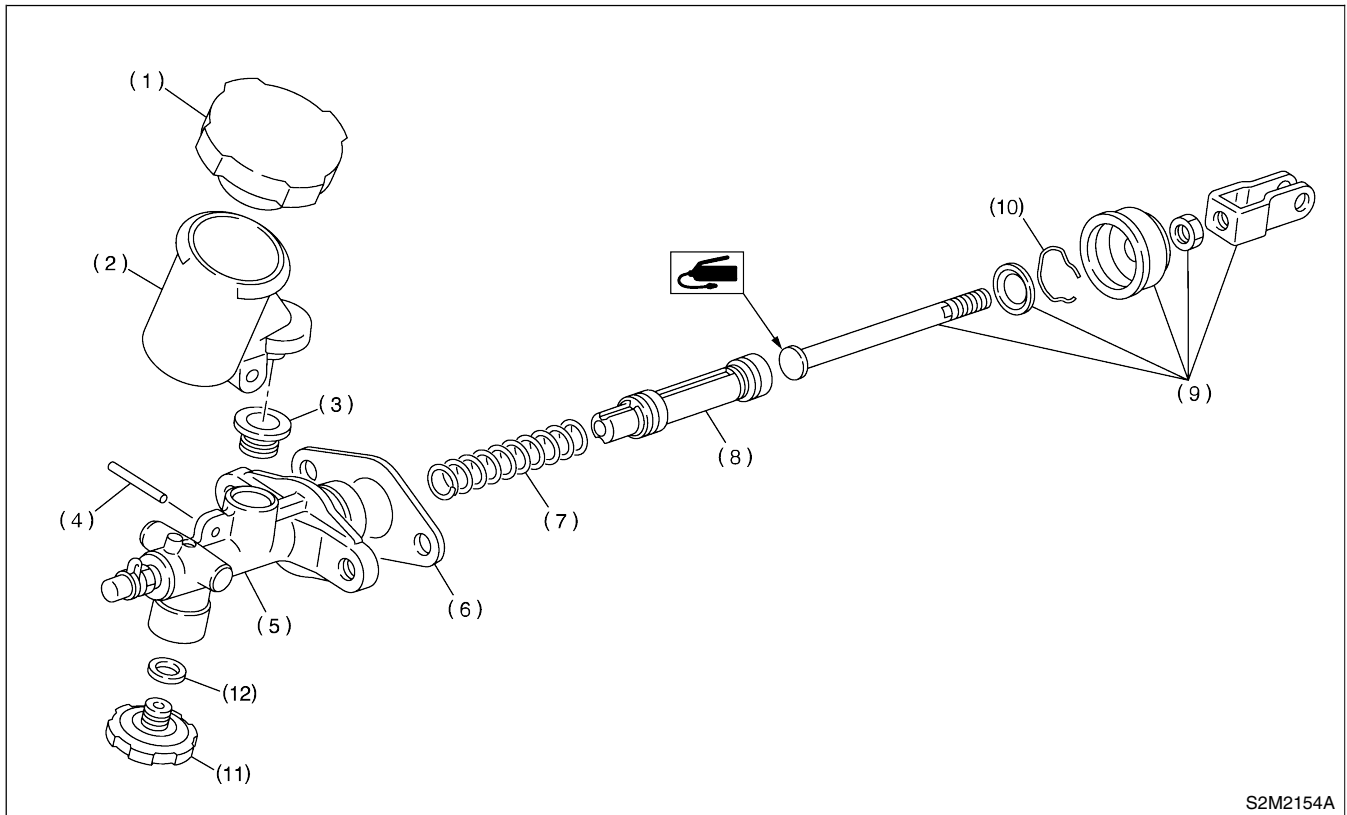
T: 10 (1.0, 7)

GENERAL DESCRIPTION

Clutch System

6. MASTER CYLINDER FOR TURBO MODEL SS04001A0509

● LHD Model SS04001A050901



- | | |
|---------------------|-----------------------|
| (1) Reservoir cap | (7) Return spring |
| (2) Reservoir tank | (8) Piston |
| (3) Oil seal | (9) Push rod |
| (4) Straight pin | (10) Piston stop ring |
| (5) Master cylinder | (11) Diaphragm spring |
| (6) Seat | (12) Gasket |

Tightening torque: N·m (kgf-m, ft-lb)

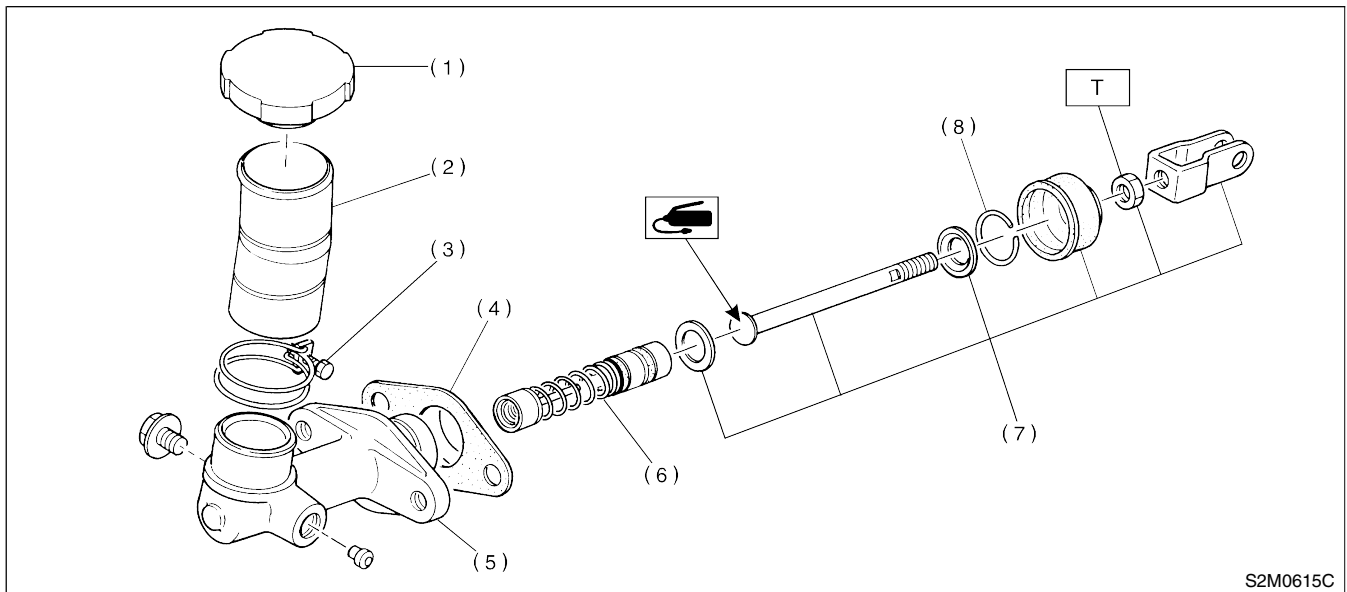
T1: 10 (1.0, 7)

T2: 46.6 (4.75, 34.4)

GENERAL DESCRIPTION

Clutch System

● RHD Model S504001A050902



- | | |
|--------------------|----------------------|
| (1) Reservoir cap | (5) Master cylinder |
| (2) Reservoir tank | (6) Piston |
| (3) Reservoir band | (7) Push rod |
| (4) Seat | (8) Piston stop ring |

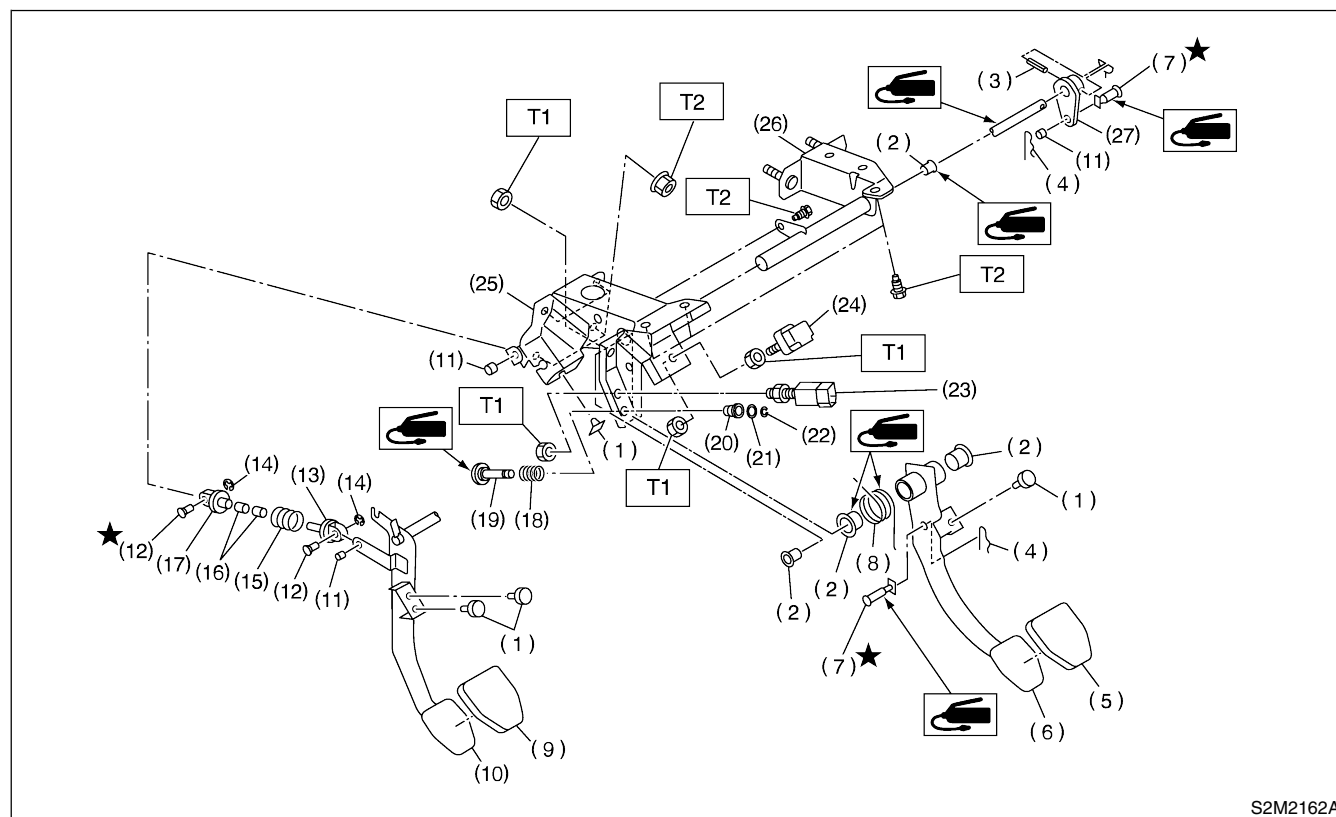
Tightening torque: N·m (kgf-m, ft-lb)
T: 10 (1.0, 7)

GENERAL DESCRIPTION

Clutch System

7. CLUTCH PEDAL S504001A0503

● LHD Model S504001A050301



S2M2162A

- | | | |
|------------------------|------------------------|--|
| (1) Stopper | (12) Clutch clevis pin | (23) Clutch switch (With cruise control) |
| (2) Bushing | (13) Assist rod A | (24) Stop light switch |
| (3) Spring pin | (14) Clip | (25) Pedal bracket |
| (4) Snap pin | (15) Assist spring | (26) Clutch master cylinder bracket |
| (5) Brake pedal pad | (16) Assist bushing | (27) Lever |
| (6) Brake pedal | (17) Assist rod B | |
| (7) Clevis pin | (18) Spring S | |
| (8) Brake pedal spring | (19) Rod S | |
| (9) Clutch pedal pad | (20) Bushing S | |
| (10) Clutch pedal | (21) O-ring | |
| (11) Bushing C | (22) Clip | |

Tightening torque: N·m (kgf-m, ft-lb)

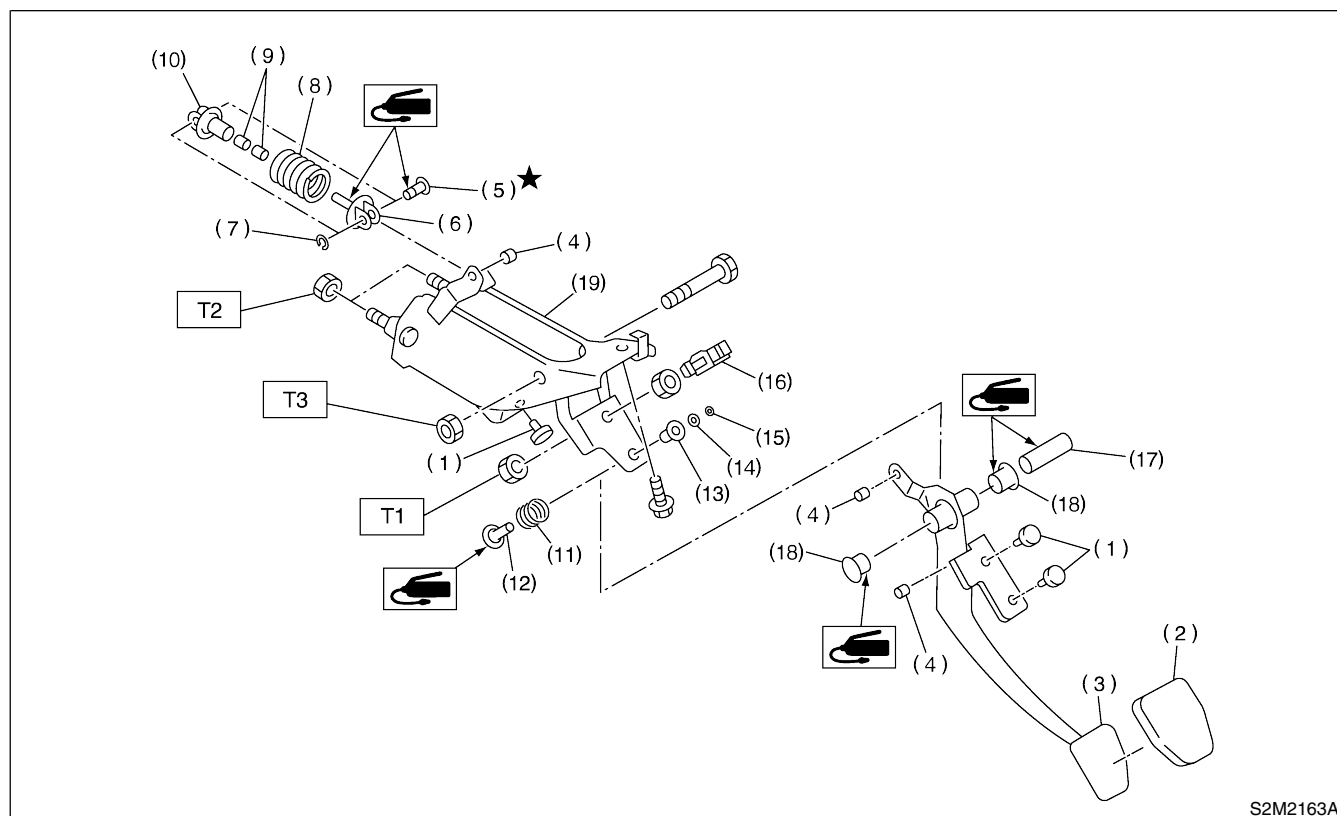
T1: 8 (0.8, 5.8)

T2: 18 (1.8, 13.0)

GENERAL DESCRIPTION

Clutch System

● RHD Model S504001A050302



- (1) Stopper
- (2) Clutch pedal pad
- (3) Clutch pedal
- (4) Bushing C
- (5) Clutch clevis pin
- (6) Assist rod A
- (7) Clip
- (8) Assist spring
- (9) Assist bushing

- (10) Assist rod B
- (11) Spring S
- (12) Rod S
- (13) Bushing S
- (14) O-ring
- (15) Clip
- (16) Clutch switch (With cruise control)
- (17) Spacer

- (18) Bushing
- (19) Clutch pedal bracket

Tightening torque: N·m (kgf·m, ft·lb)

T1: 8 (0.8, 5.8)

T2: 18 (1.8, 13.0)

T3: 30 (3.1, 22.4)

GENERAL DESCRIPTION

C: CAUTION S504001A03

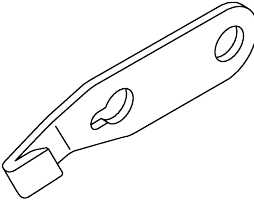
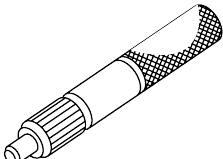
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine fluid, grease etc. or the equivalent. Do not mix fluid, grease etc. with that

of another grade or from other manufacturers.

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

D: PREPARATION TOOL S504001A17

1. SPECIAL TOOLS S504001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3853	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening tightening bolt, etc.
 B2M4112	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.

2. GENERAL PURPOSE TOOLS S504001A1702

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Dial Gauge	Used for measuring clutch disk run-out.

CLUTCH DISC AND COVER

Clutch System

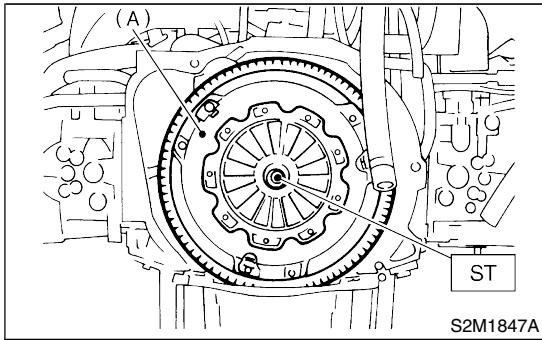
2. Clutch Disc and Cover S504252

A: REMOVAL S504252A18

1) Remove transmission assembly from vehicle body. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>

2) Install ST on flywheel.

ST 498497100 CRANKSHAFT STOPPER



(A) Clutch cover

3) Remove clutch cover and clutch disc.

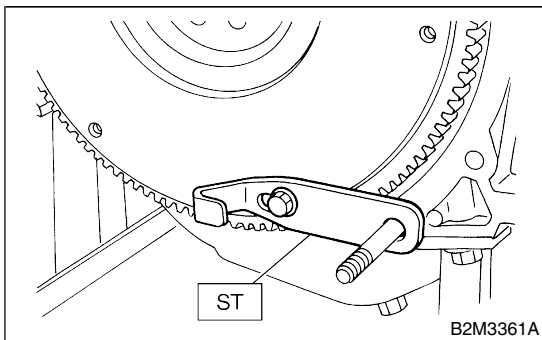
CAUTION:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either clutch cover or clutch disc.

B: INSTALLATION S504252A11

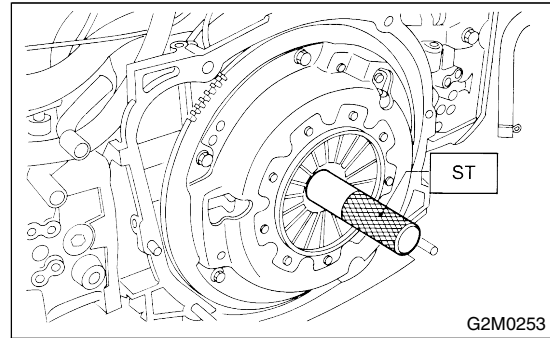
1) Install flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



2) 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



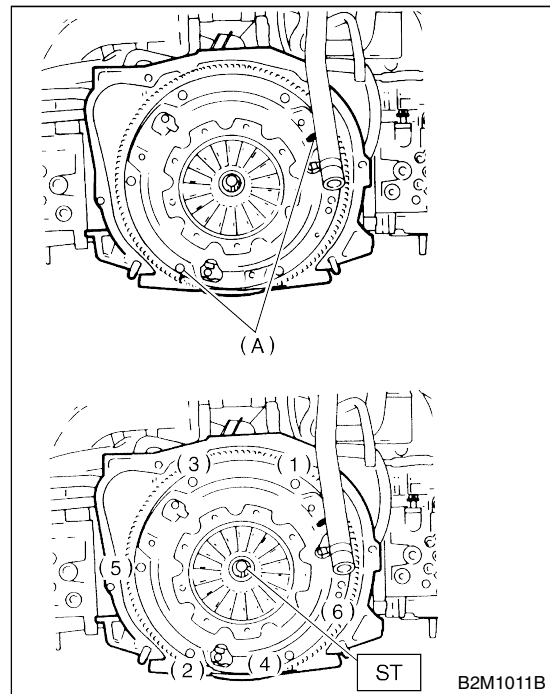
3) Install clutch cover on flywheel and tighten bolts to the specified torque.

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.
- Temporarily tighten bolts by hand. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:

15.7 N·m (1.6 kgf-m, 11.6 ft-lb)



(A) "0" marks

4) Remove ST.

ST 499747100 CLUTCH DISC GUIDE

5) Install transmission assembly. <Ref. to MT-35, INSTALLATION, Manual Transmission.>

CLUTCH DISC AND COVER

Clutch System

C: INSPECTION

S504252A10

1. CLUTCH DISC

S504252A1001

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.

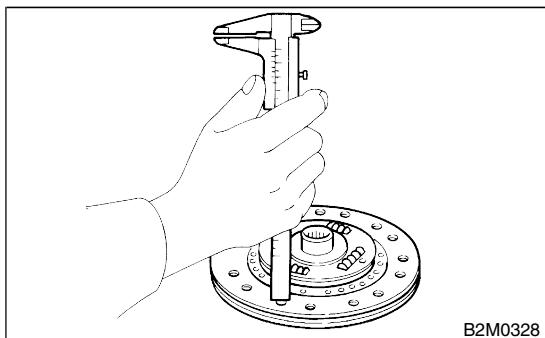
Depth of rivet head:

Limit of sinking

0.3 mm (0.012 in)

CAUTION:

Do not wash clutch disc with any cleaning fluid.

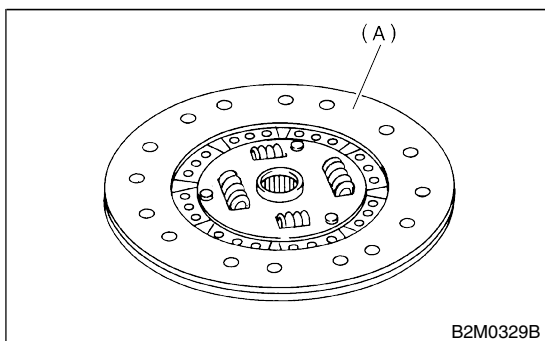


2) Hardened facing

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.



(A) Facing

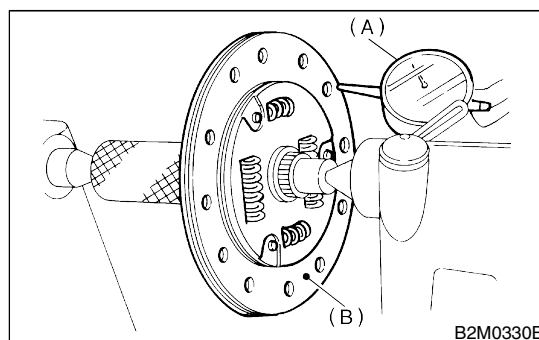
4) Deflection on facing

If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

ST 499747100 CLUTCH DISC GUIDE

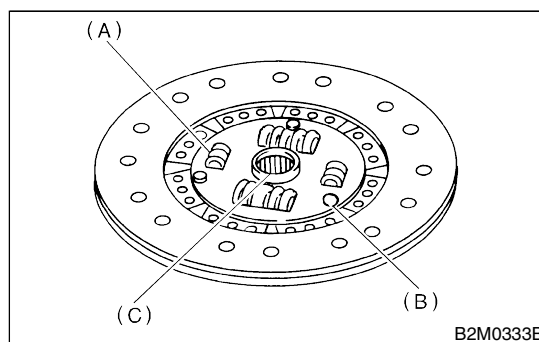
Limit for deflection:

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.



(A) Spline

(B) Rivet

(C) Torsion spring

2. CLUTCH COVER

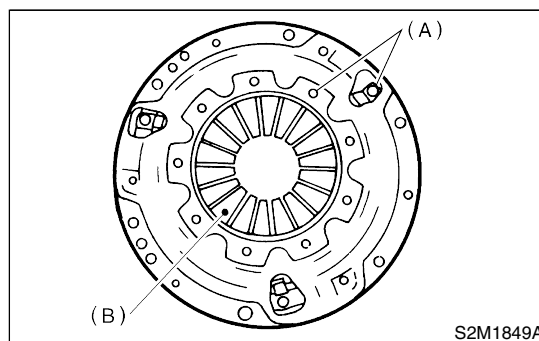
S504252A1002

NOTE:

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.



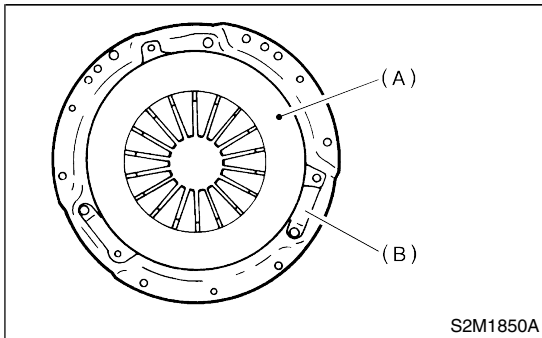
(A) Thrust rivet

(B) Diaphragm spring

CLUTCH DISC AND COVER

Clutch System

- 3) Damaged or worn disc contact surface of pressure plate.
- 4) Loose strap plate setting bolt.
- 5) Worn diaphragm sliding surface.



- (A) Pressure plate
- (B) Strap plate

FLYWHEEL

Clutch System

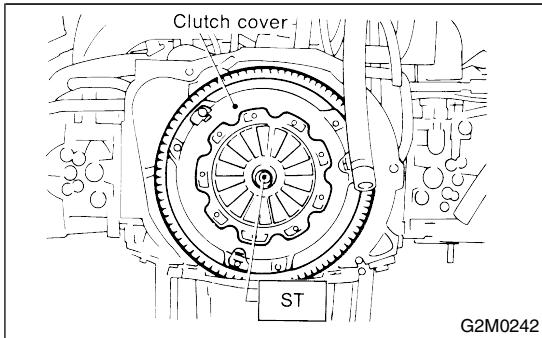
3. Flywheel

S504250

A: REMOVAL

S504250A18

- 1) Remove transmission assembly. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>
- 2) Install ST on flywheel.
ST 498497100 CRANKSHAFT STOPPER

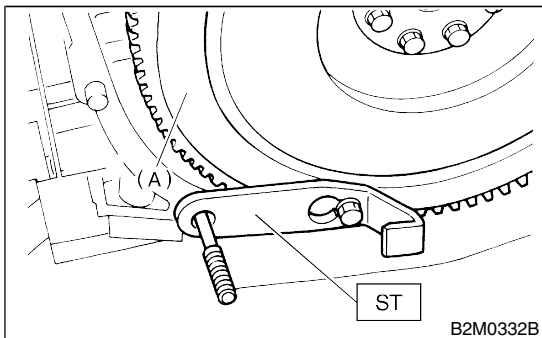


- 3) Remove clutch cover and clutch disc. <Ref. to CL-15, REMOVAL, Clutch Disc and Cover.>

CAUTION:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either clutch cover or clutch disc.

- 4) Using ST, remove flywheel.
ST 498497100 CRANKSHAFT STOPPER

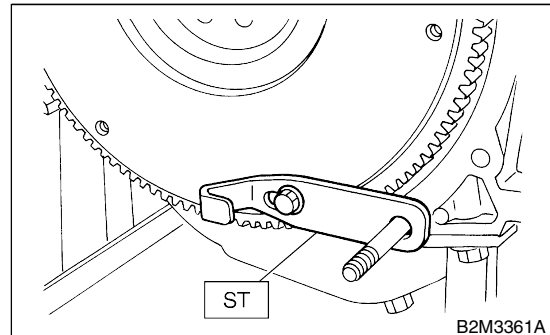


(A) Flywheel

B: INSTALLATION

S504250A11

- 1) Install flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



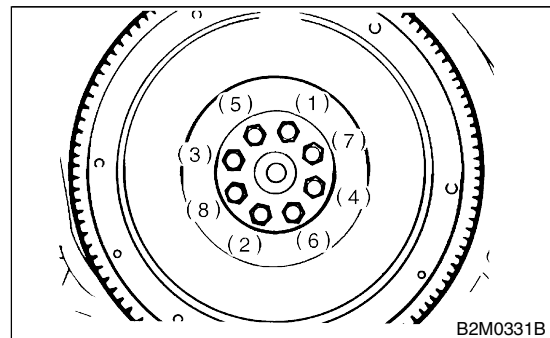
- 2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:

Tighten flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:

72 N·m (7.3 kgf-m, 52.8 ft-lb)



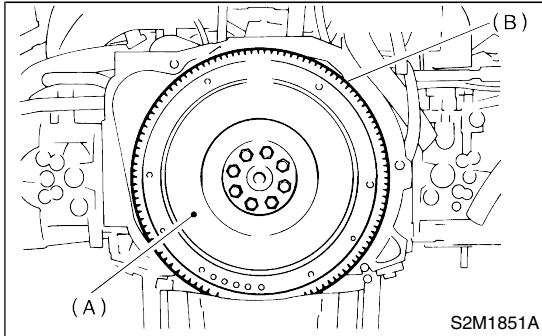
- 3) Install clutch disc and cover. <Ref. to CL-15, INSTALLATION, Clutch Disc and Cover.>
- 4) Install transmission assembly. <Ref. to MT-35 INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION SS04250A10

CAUTION:

Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent.

- 1) Damage of facing and ring gear
If defective, replace flywheel.



- (A) Flywheel
- (B) Ring gear

- 2) Smoothness of rotation
Rotate ball bearing applying pressure in thrust direction.
- 3) If noise or excessive play is noted, replace flywheel.

RELEASE BEARING AND LEVER

4. Release Bearing and Lever

S504251

A: REMOVAL

S504251A18

1. NON-TURBO MODEL

S504251A1803

1) Remove transmission assembly from vehicle body.

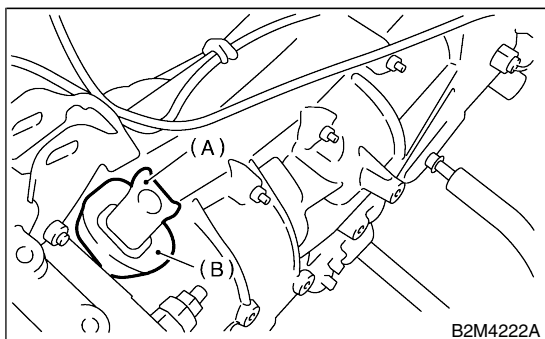
<Ref. to MT-32 REMOVAL, Manual Transmission Assembly.>

2) Remove the two clips from clutch release lever and remove release bearing.

CAUTION:

Be careful not to deform clips.

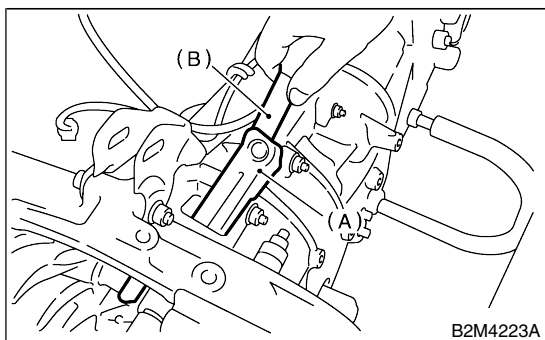
3) Remove release lever seal.



(A) Clutch release lever

(B) 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.



(A) Clutch release lever

(B) Screwdriver

2. TURBO MODEL

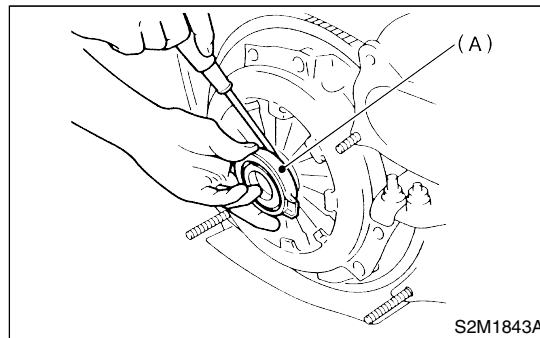
S504251A1804

1) Remove transmission assembly from vehicle body. <Ref. to MT-32, REMOVAL, Manual Transmission Assembly.>

2) Remove clutch release lever from transmission.

3) Put clutch release bearing in engine side.

4) Remove clutch release bearing from clutch cover using flat-type screwdriver.



(A) Clutch release bearing

B: INSTALLATION

S504251A11

CAUTION:

Before or during assembling, lubricate the following points with a light coat of grease.

- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulfide.)
- Contact surface of lever and operating cylinder

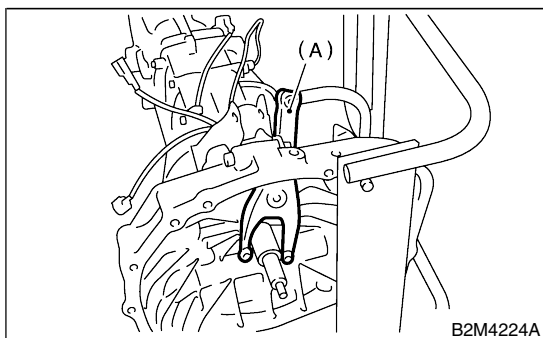
1. NON-TURBO MODEL

S504251A1103

1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

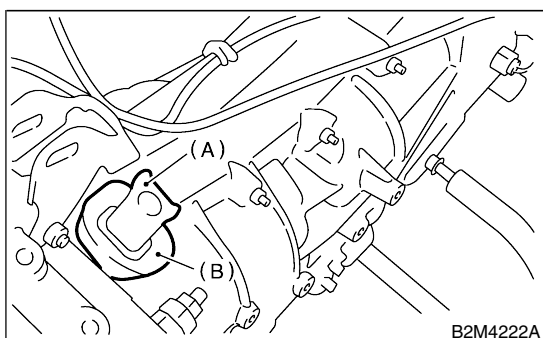
NOTE:

- Apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder. <Ref. to CL-3, COMPONENT, General Description.>
- Confirm that retainer spring is securely fitted by observing it through the main case hole.



(A) Release lever

- 2) Install release bearing and fasten it with two clips.
- 3) Install release lever seal.



(A) Release lever
(B) Release lever seal

4) Install transmission assembly. <Ref. to MT-35, INSTALLATION, Manual Transmission Assembly.>

2. TURBO MODEL

S504251A1104

1) Apply grease to each parts. <Ref. CL-3, COMPONENT, General Description.>

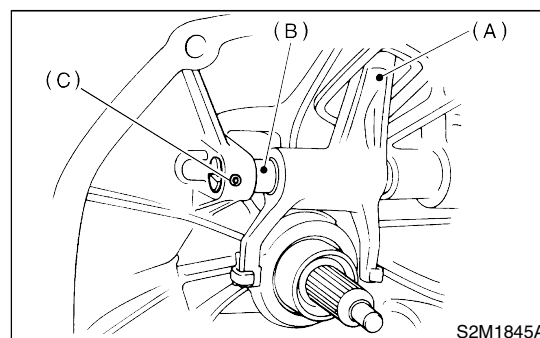
Grease:

SUNLIGHT2 (P/N 003602010)

- 2) Position both clutch release lever and bearing on transmission.
- 3) Install clutch release lever shaft.

CAUTION:

Be sure to fit groove on clutch release lever shaft into pin located at through-hole.



(A) Release fork
(B) Release shaft
(C) Spring pin

4) With clutch release lever held in that position, connect engine and transmission. <Ref. to MT-35, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

S504251A10

1. RELEASE BEARING

S504251A1001

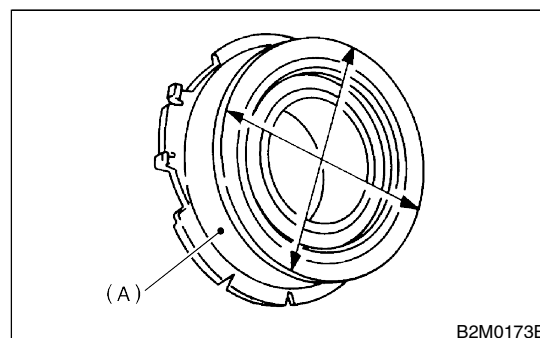
CAUTION:

Since this bearing is grease sealed and is of a non-lubrication 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:

1.4 mm (0.055 in)

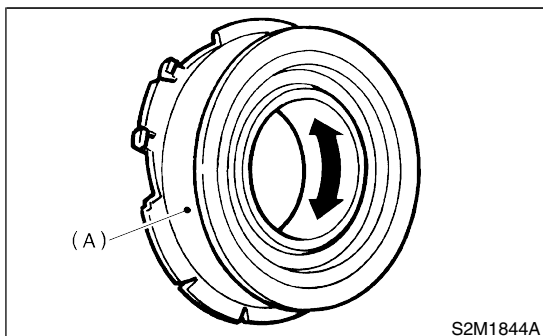


(A) Bearing case

RELEASE BEARING AND LEVER

Clutch System

- 2) Check the bearing for smooth rotation by applying pressure in the thrust direction.

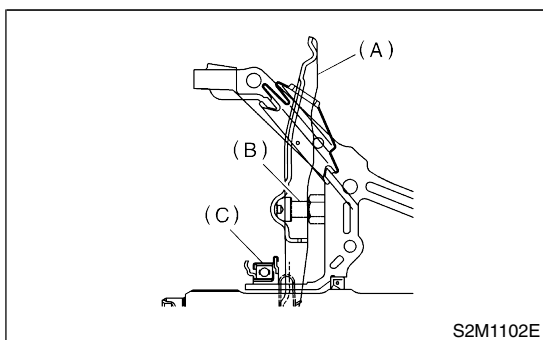


(A) Bearing case

- 3) Check wear and damage of bearing case surface contacting with lever.

2. RELEASE LEVER S504251A1002

- 1) Check lever pivot portion and the point of contact with release bearing case for wear.



- (A) Clutch release lever
(B) Pivot
(C) Clutch release bearing

5. Operating Cylinder

S504253

A: REMOVAL

S504253A18

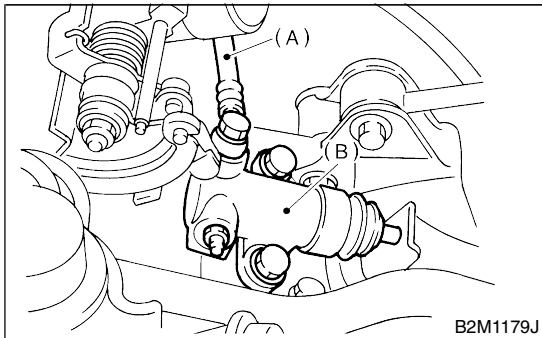
1. NON-TURBO MODEL

S504253A1801

- 1) Remove air cleaner case. <Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>
- 2) Remove clutch hose from operating cylinder.

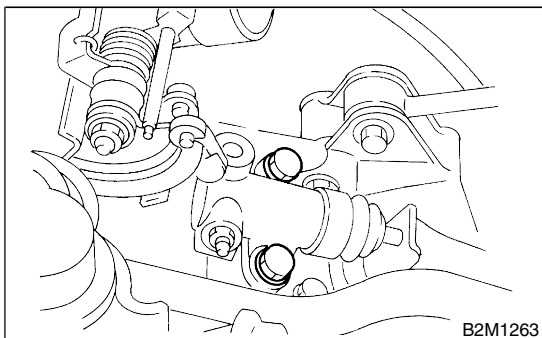
CAUTION:

Cover hose joint to prevent clutch fluid from flowing out.



- (A) Clutch hose
(B) Operating cylinder

- 3) Remove operating cylinder from transmission.



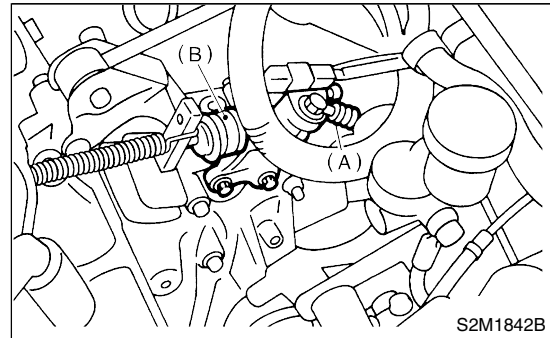
2. TURBO MODEL

S504253A1802

- 1) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
- 2) Remove clutch hose from operating cylinder.

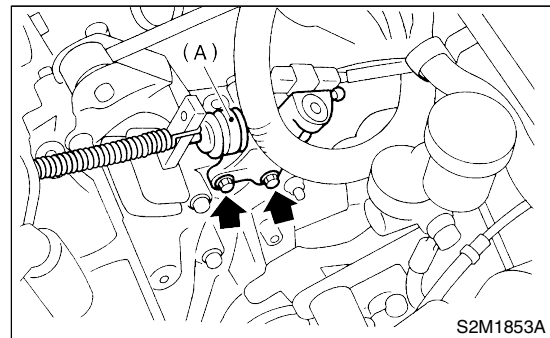
CAUTION:

Cover hose joint to prevent clutch fluid from flowing out.



- (A) Clutch hose
(B) Operating cylinder

- 3) Remove operating cylinder from transmission.



- (A) Operating cylinder

OPERATING CYLINDER

Clutch System

B: INSTALLATION

S504253A11

1. NON-TURBO MODEL

S504253A1101

1) Install in the reverse order of removal.

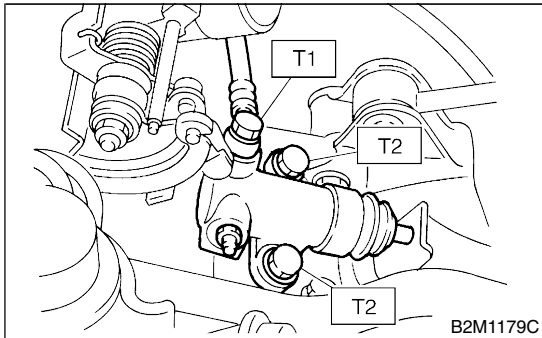
NOTE:

Before installing operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.

Tightening torque:

T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



2) After bleeding air from operating cylinder, ensure that clutch operates properly.
<Ref. to CL-34 Clutch Fluid Air Bleeding.>

2. TURBO MODEL

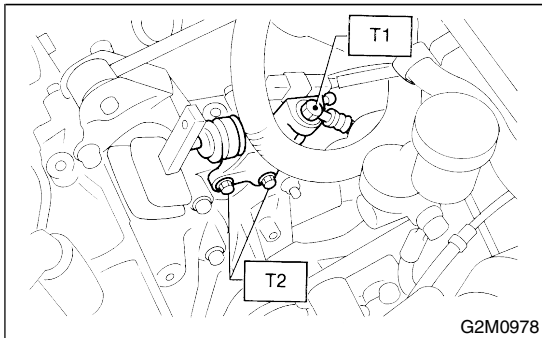
S504253A1102

1) Install in the reverse order of removal.

Tightening torque:

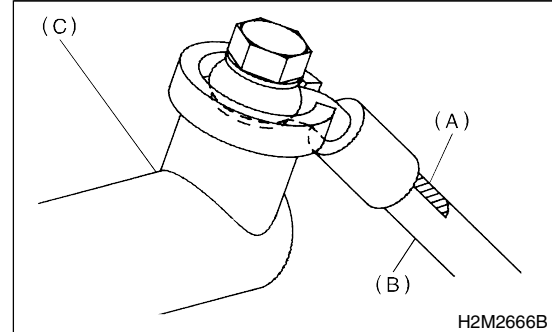
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



NOTE:

- Be sure to install the clutch hose with the mark side facing upward.
- Be careful not to twist the clutch hose during installation.



- (A) Marking
- (B) Clutch hose
- (C) Operating cylinder

2) After bleeding air from operating cylinder, ensure that clutch operates properly.
<Ref. to CL-34, Clutch Fluid Air Bleeding.>

C: INSPECTION

S504253A10

- 1) Check operating cylinder for damage. If operating cylinder is damaged, replace it.
- 2) Check operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace operating cylinder.

MASTER CYLINDER

Clutch System

6. Master Cylinder

S504168

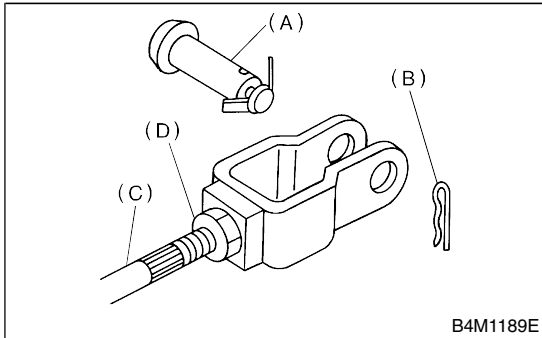
A: REMOVAL

S504168A18

1. NON-TURBO MODEL

S504168A1801

- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



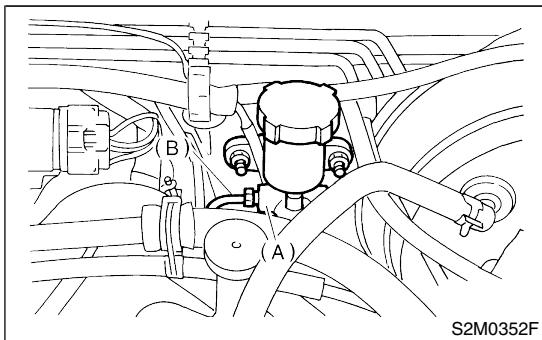
B4M1189E

- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

- 3) Remove air cleaner case and air intake duct.
- 4) Remove clutch pipe from master cylinder.
- 5) 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.



S2M0352F

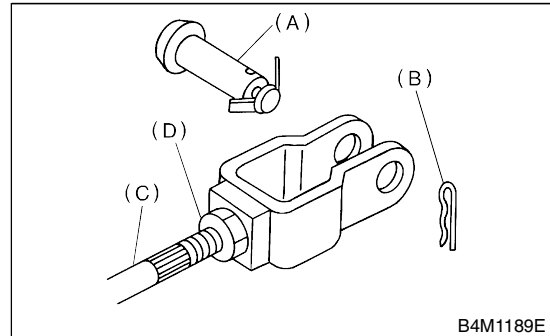
- (A) Master cylinder
- (B) Clutch pipe

2. TURBO LHD MODEL

S504168A1802

- 1) Thoroughly drain brake fluid from reservoir tank.

- 2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



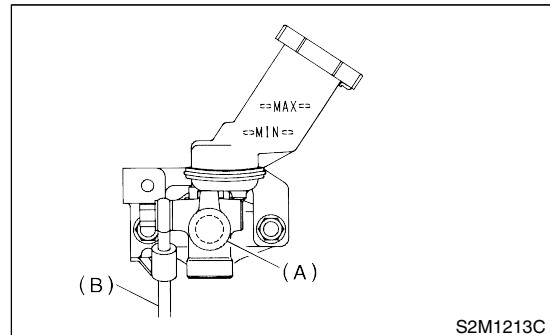
B4M1189E

- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

- 3) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>
- 4) Remove clutch hose from master cylinder.

CAUTION:

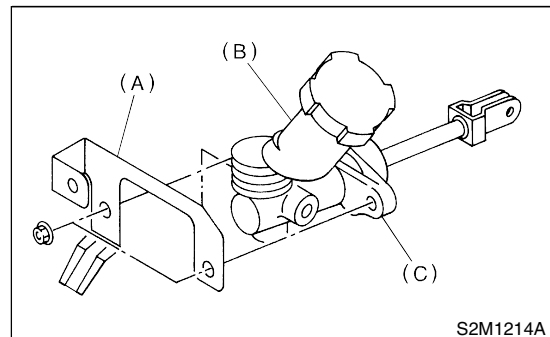
Plug up hose connection to prevent clutch fluid from spilling out.



S2M1213C

- (A) Master cylinder
- (B) Clutch hose

- 5) Remove master cylinder with reservoir tank.



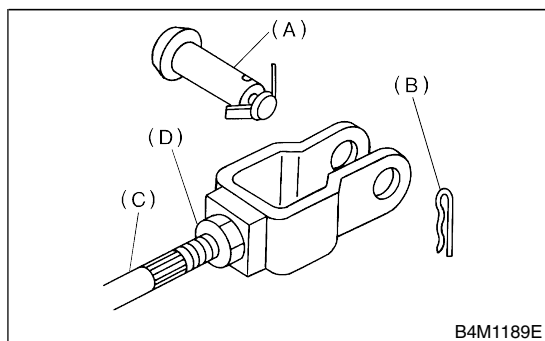
S2M1214A

- (A) Bracket
- (B) Reservoir tank
- (C) Master cylinder

MASTER CYLINDER

3. TURBO RHD MODEL S504168A1803

- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



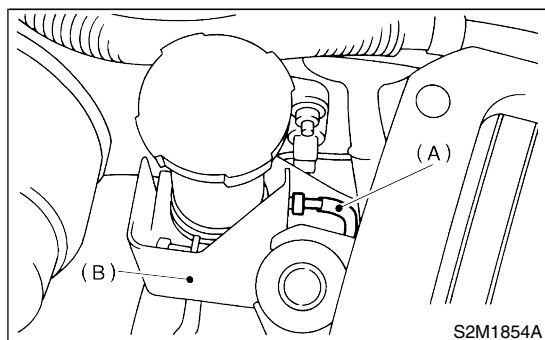
- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

- 3) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>

- 4) Remove clutch pipe and sealed cover from master cylinder.

CAUTION:

Plug up pipe connection to prevent clutch fluid from spilling out.



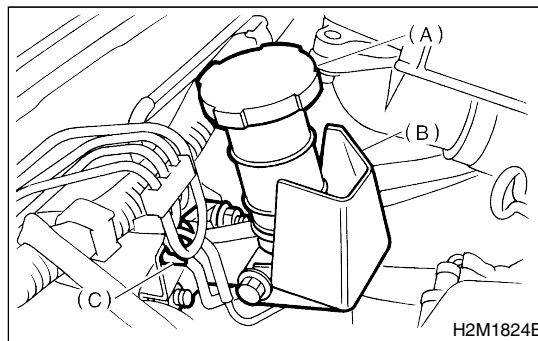
- (A) Clutch pipe
- (B) Sealed cover

- 5) Remove clutch pipe from master cylinder bracket clamp.

- 6) Slightly lift clutch pipe on master cylinder, then remove master cylinder and reservoir tank as a single unit.

CAUTION:

Be careful not to bend or twist clutch pipe.



- (A) Reservoir tank
- (B) Sealed cover
- (C) Clamp

B: INSTALLATION S504168A11

1. NON-TURBO MODEL S504168A1101

- 1) Install master cylinder to body, and install clutch pipe to master cylinder.

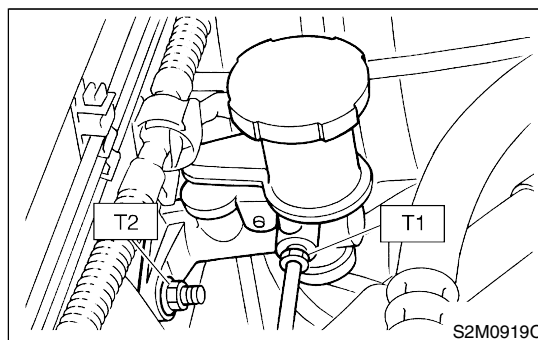
CAUTION:

Check that pipe is routed properly.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



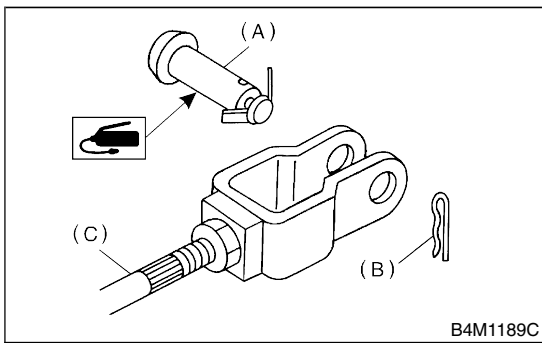
- 2) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.

NOTE:

Apply grease to clevis pin.

MASTER CYLINDER

Clutch System



- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

3) After bleeding air from system, ensure that clutch operates properly.
<Ref. to CL-34 Clutch Fluid Air Bleeding.>

4) Install air cleaner case and air intake duct.

2. TURBO LHD MODEL S504168A1102

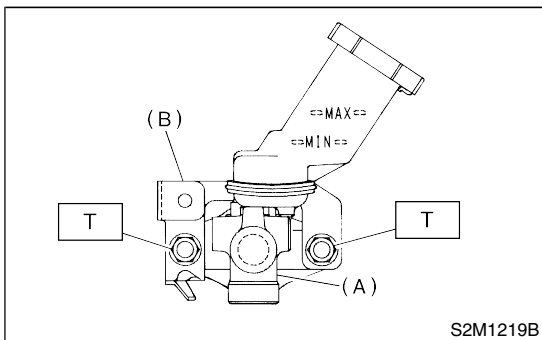
1) Install master cylinder to body.

CAUTION:

Always use a new gasket.

Tightening torque:

T: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



- (A) Master cylinder
- (B) Bracket

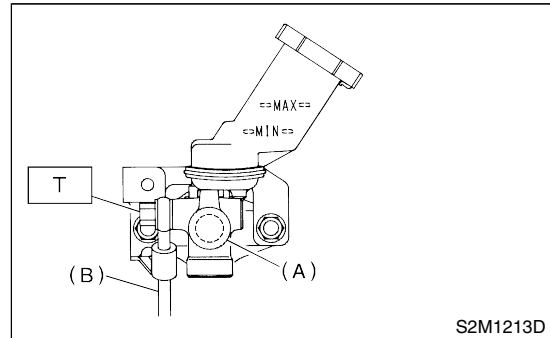
2) Install clutch hose to master cylinder.

CAUTION:

Check that hose is routed properly.

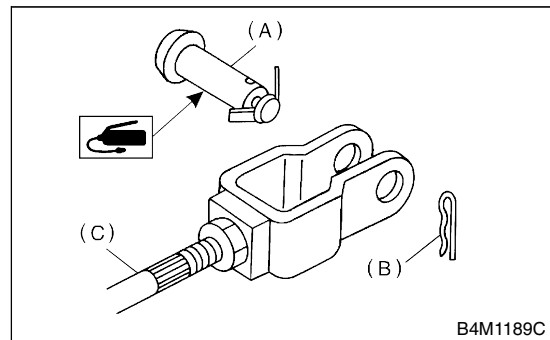
Tightening torque:

T: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



- (A) Master cylinder
- (B) Clutch hose

3) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.



- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

4) After installing master cylinder assembly, bleed-
ing air from clutch system. <Ref. to CL-34, Clutch
Fluid Air Bleeding.>

5) After bleeding air from system, ensure that
clutch operates properly.

6) Install inter coder. <Ref. to IN(DOHC TURBO)-
10, INSTALLATION, Intercooler.>

MASTER CYLINDER

Clutch System

3. TURBO RHD MODEL S504168A1103

- 1) Slightly lift clutch pipe on master cylinder, then install master cylinder to body.

CAUTION:

Always use a new gasket.

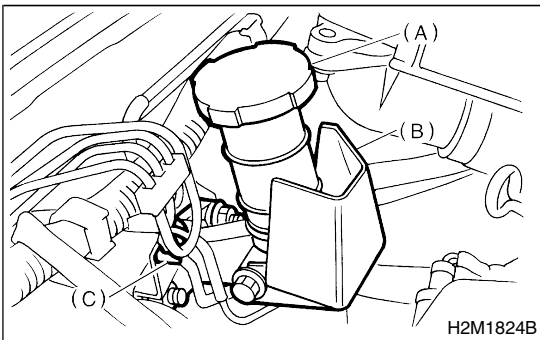
NOTE:

Be careful not to bend clutch pipe when installing master cylinder.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 2) Insert clutch pipe into pipe bracket clamp.

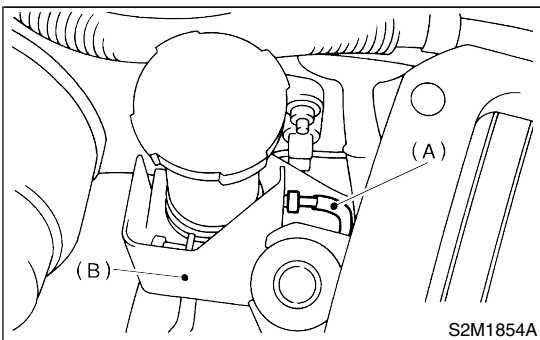


- (A) Reservoir tank
- (B) Sealed cover
- (C) Clamp

- 3) Install clutch pipe to master cylinder.

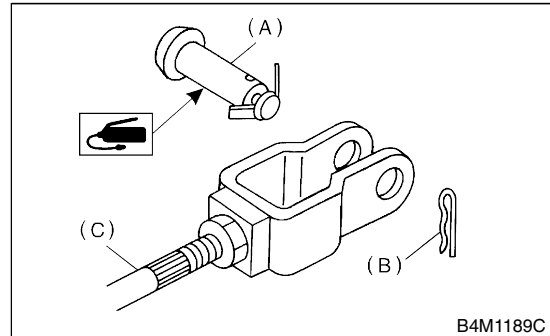
Tightening torque:

T1: 15N·m (1.5 kgf-m, 10.8 ft-lb)



- (A) Clutch pipe
- (B) Sealed cover

- 4) Connect push rod of master cylinder to clutch pedal, and install clevis pin and snap pin.



- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

- 5) After installing master cylinder assembly, bleeding air from clutch system. <Ref. to CL-34, Clutch Fluid Air Bleeding.>

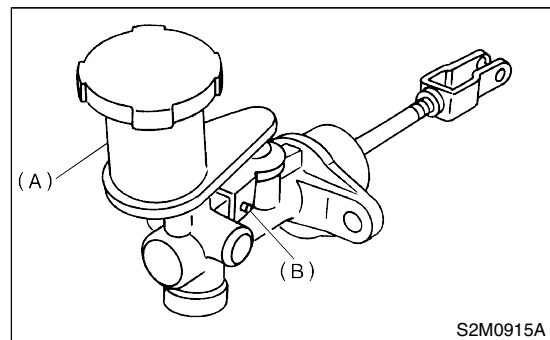
- 6) After bleeding air from system, ensure that clutch operates properly.

- 7) Install intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

C: DISASSEMBLY S504168A06

1. NON-TURBO MODEL S504168A0601

- 1) Remove straight pin and reservoir tank.

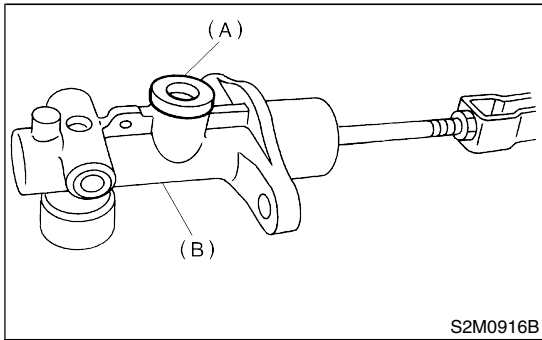


- (A) Reservoir tank
- (B) Straight pin

MASTER CYLINDER

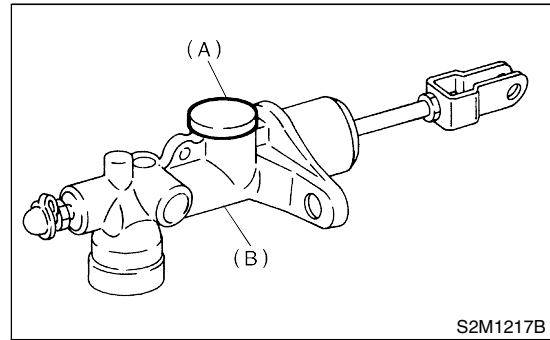
Clutch System

2) Remove oil seal.



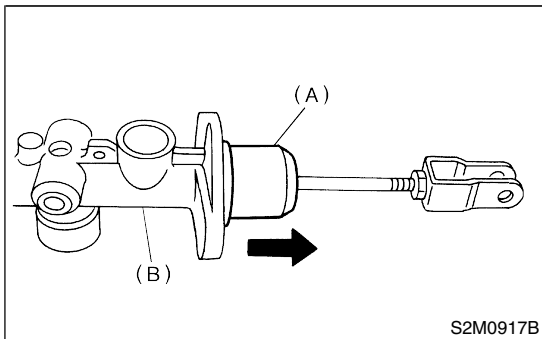
- (A) Oil seal
- (B) Master cylinder

3) Remove oil seal.



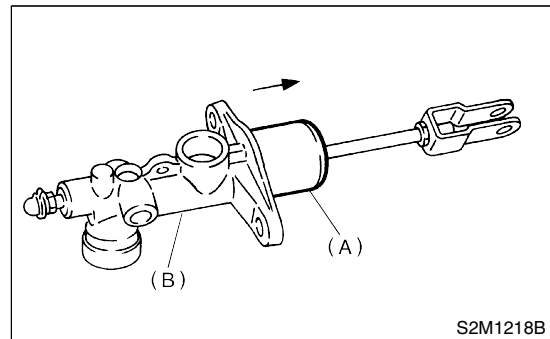
- (A) Oil seal
- (B) Master cylinder

3) Move the cylinder boot backward.



- (A) Cylinder boot
- (B) Master cylinder

4) Move the cylinder boot backward.



- (A) Cylinder boot
- (B) Master cylinder

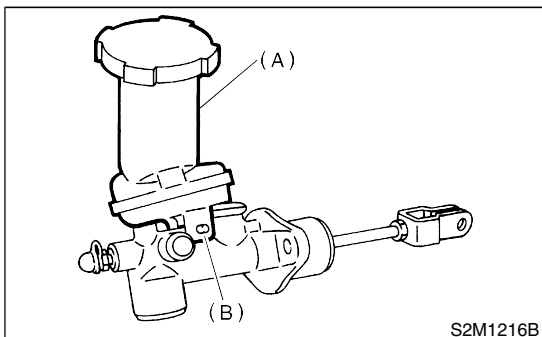
4) Remove snap ring.

CAUTION:

Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

2. TURBO LHD MODEL S504168A0602

- 1) Remove diaphragm spring and gasket.
- 2) Remove straight pin and reservoir tank.



- (A) Reservoir tank
- (B) Straight pin

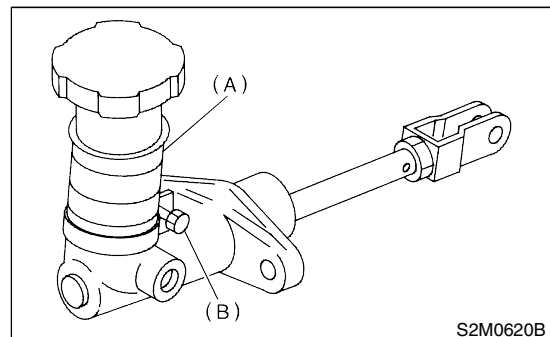
5) Remove snap ring.

CAUTION:

Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

3. TURBO RHD MODEL S504168A0603

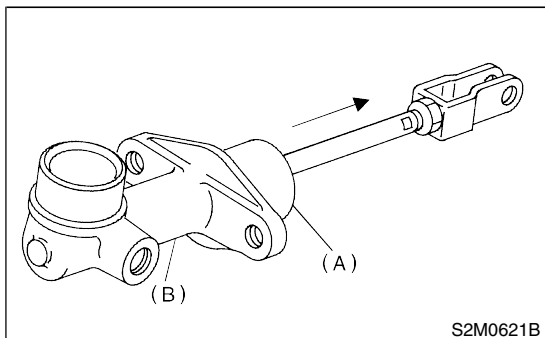
- 1) Loose reservoir band, and remove reservoir tank and band.



- (A) Reservoir tank
- (B) Reservoir band

MASTER CYLINDER

- 2) Move the cylinder boot backward.



- (A) Master cylinder boot
(B) Master cylinder

- 3) Remove snap ring.

CAUTION:

Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

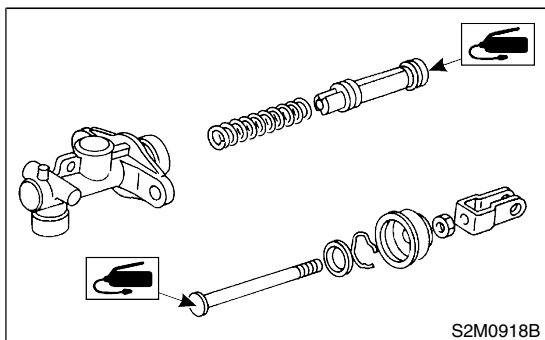
D: ASSEMBLY

S504168A02

- 1) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

Grease:

SILICONE GREASE G40M (Part No. 004404003)



- 2) Assemble in the reverse order of disassembly.

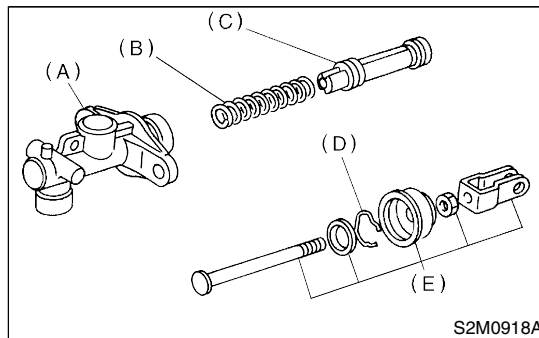
E: INSPECTION

S504168A10

1. LHD AND NON-TURBO RHD MODEL

S504168A1001

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring and seat, replace the faulty part.

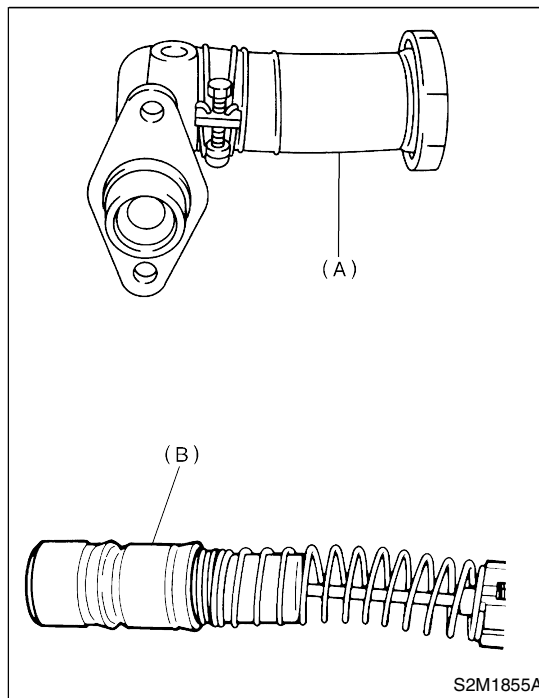


- (A) Master cylinder body
(B) Return spring
(C) Piston
(D) Snap ring
(E) Rod ASSY

2. TURBO RHD MODEL

S504168A1002

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring and seat, replace the faulty part.



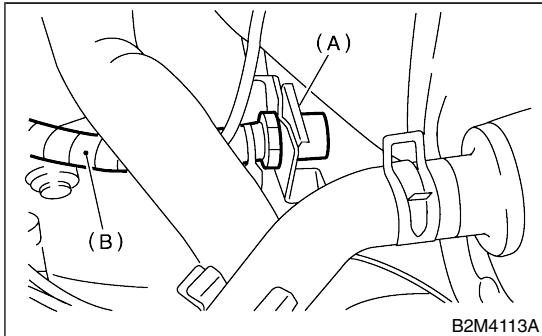
- (A) Reservoir tank
(B) Piston

7. Clutch Pipe and Hose S504262

A: REMOVAL S504262A18

1. EXCEPT RHD TURBO MODEL S504262A1801

- 1) Remove air cleaner case or intercooler.
- 2) Drain clutch fluid. <Ref. to CL-33 Clutch Fluid.>
- 3) Remove clutch pipe from the clutch hose and master cylinder.
- 4) Pull out clamp, then remove clutch hose from bracket.

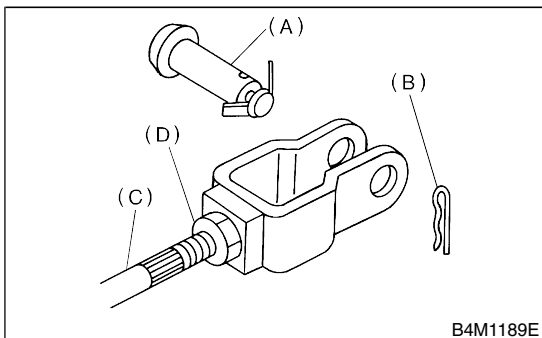


- (A) Clamp
(B) Clutch hose

- 5) Remove hose from operating cylinder.

2. RHD TURBO MODEL S504262A1802

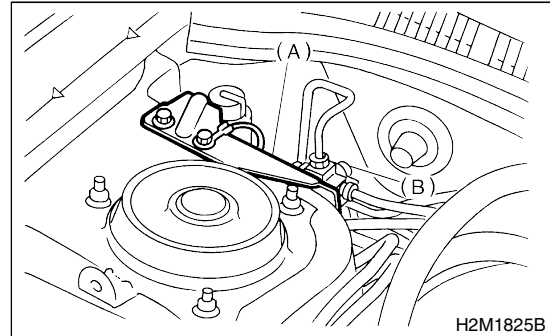
- 1) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



- (A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

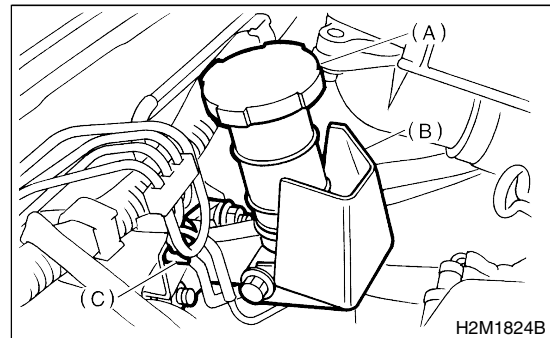
- 2) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, INSTALLATION, Intercooler.>

- 3) Remove connector bracket.



- (A) Connector bracket
(B) Connector ASSY

- 4) Remove master cylinder. <Ref. to CL-28, TURBO RHD MODEL, INSTALLATION, Master Cylinder.>



- (A) Reservoir tank
(B) Sealed cover
(C) Clamp

- 5) Remove clutch pipe bracket from body.
- 6) Remove clutch pipe from clutch pipe bracket.
- 7) Separate master cylinder and clutch pipe and connector assembly.

B: INSTALLATION S504262A11

1. EXCEPT RHD TURBO MODEL S504262A1101

Install in the reverse order of removal.

NOTE:

Bleed clutch fluid. <Ref. to CL-34 Clutch Fluid Air Bleeding.>

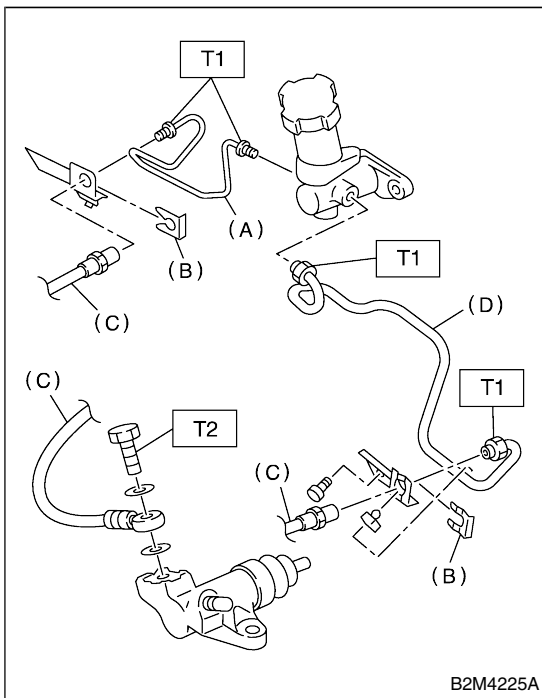
Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

CLUTCH PIPE AND HOSE

Clutch System



- (A) Clutch pipe (LHD model)
- (B) Clip
- (C) Clutch hose
- (D) Clutch pipe (RHD model)

2. RHD TURBO MODEL S504262A1102

- 1) Install clutch pipe to clutch pipe bracket.

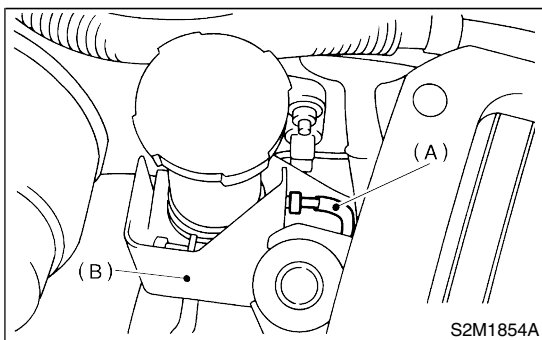
Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 2) Install clutch pipe to master cylinder.

Tightening torque:

15 N·m (1.5 kgf-m, 10.8 ft-lb)



- (A) Clutch pipe
- (B) Sealed cover

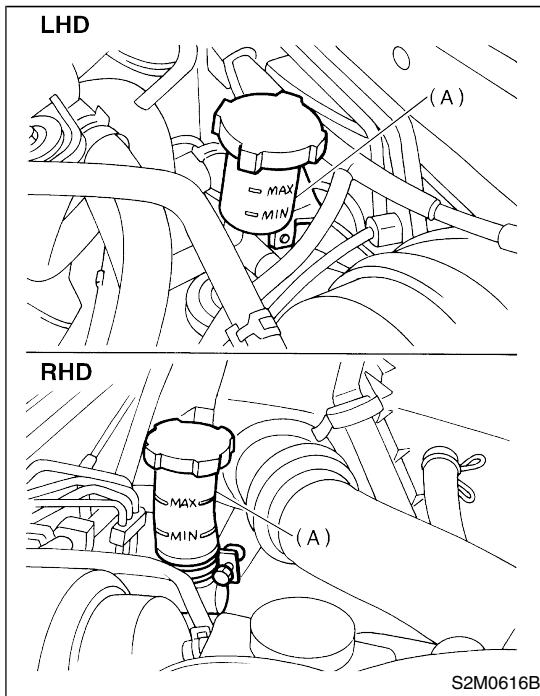
C: INSPECTION S504262A10

Check pipes and hoses for cracks, breakage, or damage. Check joints for fluid leakage. If any cracks, breakage, damage, or leakage is found, repair or replace the applicable pipe or hose.

8. Clutch Fluid S504261

A: INSPECTION S504261A10

- 1) Park vehicle on a level surface.
- 2) Check the clutch fluid for significant deterioration. If it is deteriorated, replace it.
- 3) Inspect the fluid level using the scale on the outside of the clutch master cylinder tank. If the level is below "MIN", add clutch fluid to bring it up to "MAX".



(A) Reservoir tank

B: REPLACEMENT S504261A20

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 reservoir 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) Remove air cleaner case and air duct.
- 2) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
- 3) Draw out the brake fluid from reservoir tank with syringe.
- 4) Refill reservoir tank with recommended brake fluid.

Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

- 5) Drain fluid in the same method as the air bleeding.
- 6) Refill brake fluid before reservoir tank becomes empty, and drain contaminated fluid again.
- 7) Repeat the above procedure until the contaminated fluid is completely drained.

CLUTCH FLUID AIR BLEEDING

Clutch System

9. Clutch Fluid Air Bleeding S504260

A: PROCEDURE S504260E45

1. LHD AND NON-TURBO RHD MODEL S504260E4501

NOTE:

Bleed air from oil line with the help of a co-worker.

1) Remove air cleaner case or intercooler.

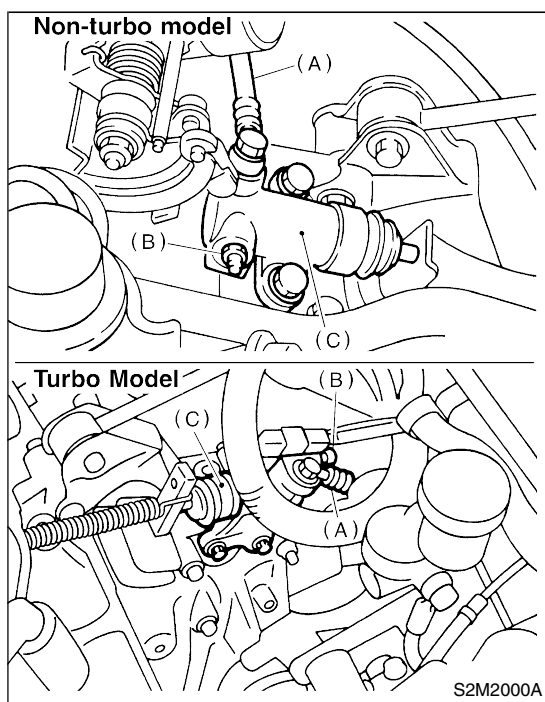
Non-turbo model:

<Ref. to IN(SOHC)-7, REMOVAL, Air Cleaner Case.>

Turbo model:

<Ref. to IN(DOHC TURBO)-10, REMOVAL, Inter-cooler.>

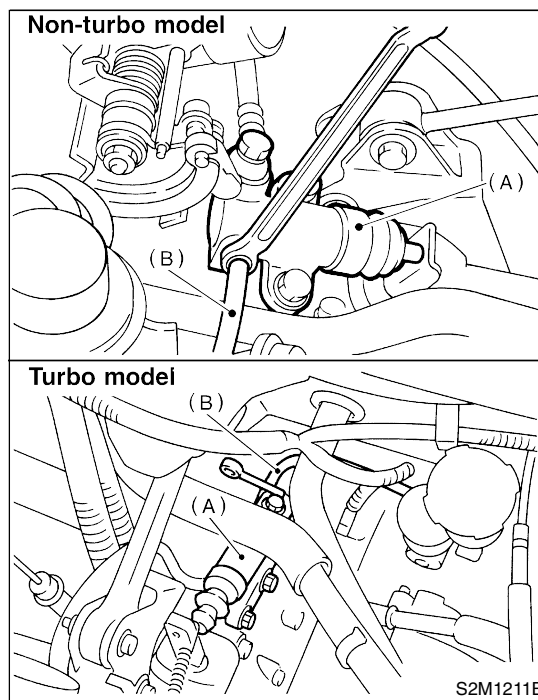
2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



- (A) Clutch hose
- (B) Air bleeder
- (C) Operating cylinder

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.



- (A) Operating cylinder
- (B) Vinyl tube

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.

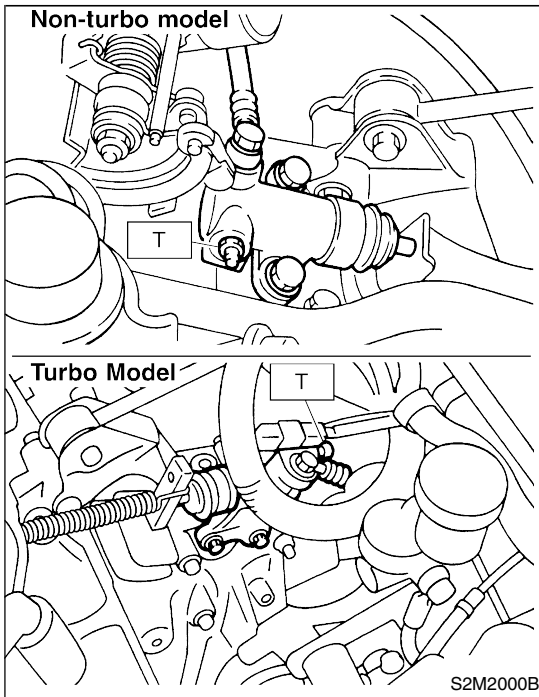
CLUTCH FLUID AIR BLEEDING

Clutch System

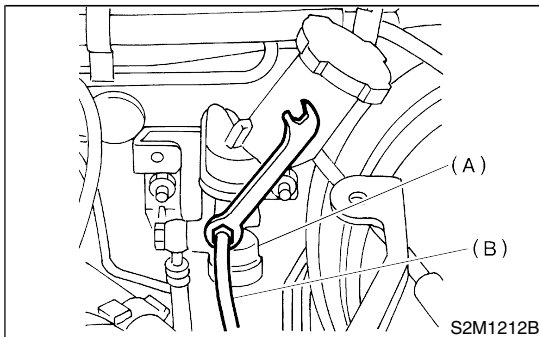
5) Tighten air bleeder.

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



6) Repeat steps 2) through 4) using air bleeder on master cylinder. (Turbo LHD model)



(A) Master cylinder
(B) Vinyl tube

7) Tighten air bleeder. (Turbo LHD model)

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

8) After depressing the clutch pedal, make sure that there are no evident leaks in the entire system.

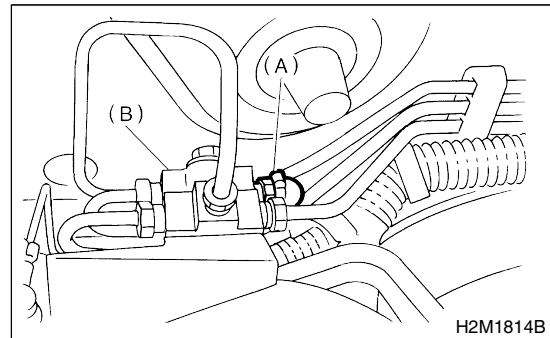
2. TURBO RHD MODEL SS04260E4502

NOTE:

Bleed air from oil line with the help of a co-worker.

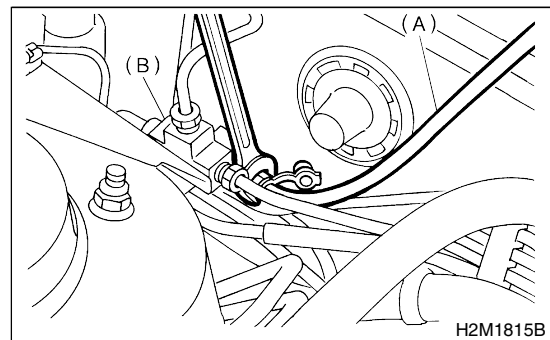
1) Remove intercooler. <Ref. to IN(DOHC TURBO)-10, REMOVAL, Intercooler.>

2) Fit one end of a vinyl tube into the air bleeder of clutch pipe and connector assembly and put the other end into a clutch fluid container.



(A) Air bleeder
(B) Connector ASSY

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.



(A) Vinyl tube
(B) Connector ASSY

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.

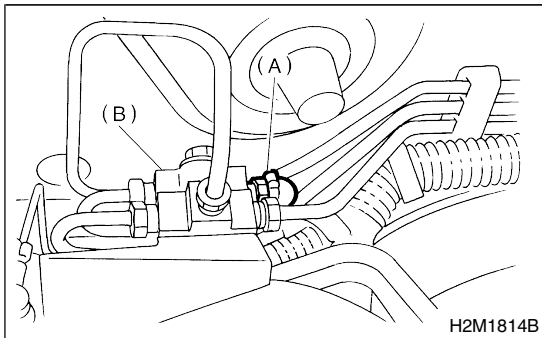
CLUTCH FLUID AIR BLEEDING

Clutch System

5) Tighten air bleeder.

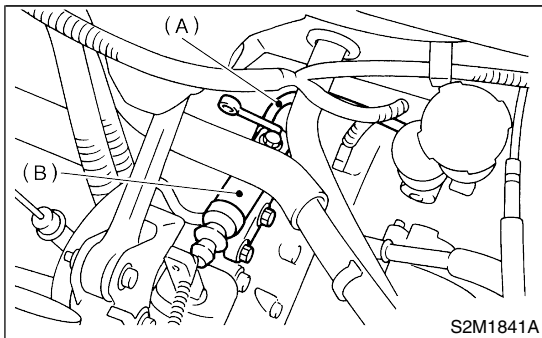
Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



- (A) Air bleeder
- (B) Connector ASSY

6) Repeat steps 2) through 4) using air bleeder on operating cylinder.

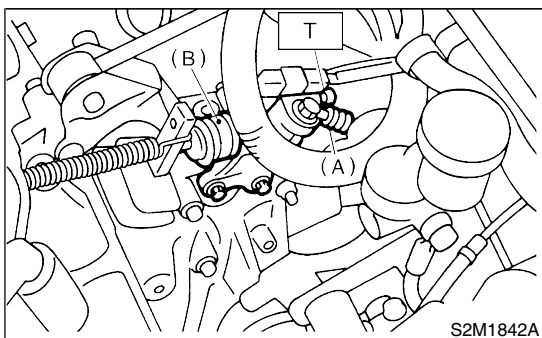


- (A) Vinyl tube
- (B) Operating cylinder

7) Tighten air bleeder.

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



- (A) Clutch hose
- (B) Operating cylinder

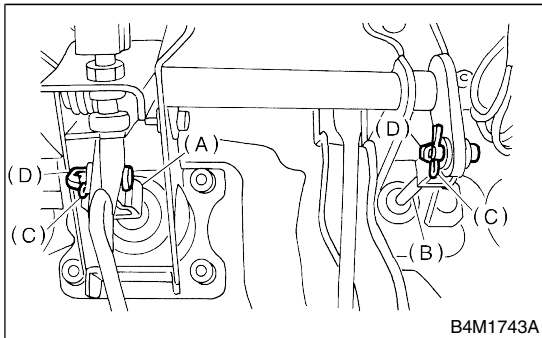
8) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.

10. Clutch Pedal S504256

A: REMOVAL S504256A18

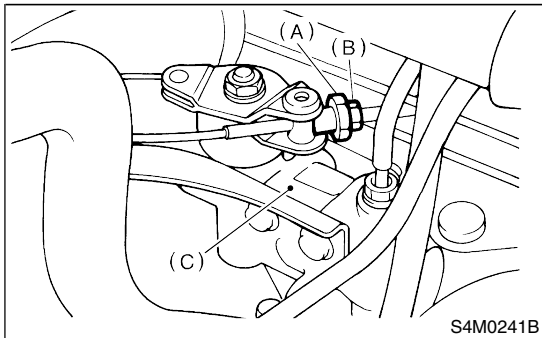
1. LHD MODEL S504256A1803

- 1) Remove steering column. <Ref. to PS-30 REMOVAL, Tilt Steering Column.>
- 2) Disconnect connectors from stop light and clutch switches.
- 3) Remove snap pins which secure lever to push rod and operating rod.
- 4) Remove clevis pins which secure lever to push rod and operating rod.



- (A) Operating rod
- (B) Push rod
- (C) Snap pin
- (D) Clevis pin

- 5) Remove PHV adjusting nut and lock nut.

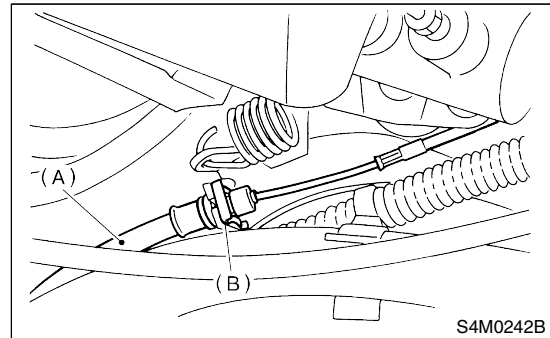


- (A) Adjusting nut
- (B) Lock nut
- (C) PHV

- 6) Remove cable clamp, and disconnect PHV cable from PHV.

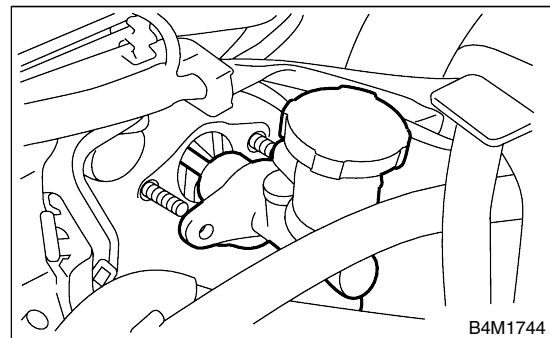
CAUTION:

Carefully protect boot and inner cable from damage when disconnecting PHV cable.



- (A) PHV cable
- (B) Clamp

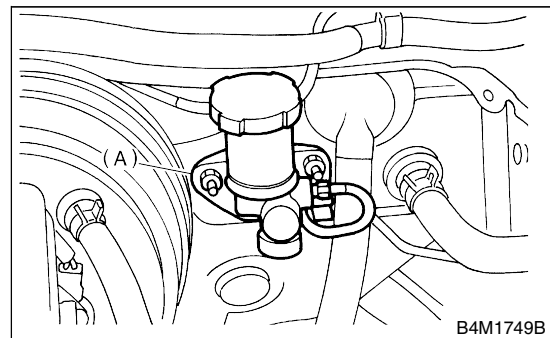
- 7) Remove nut which secures clutch master cylinder.



- 8) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

2. RHD MODEL S504256A1804

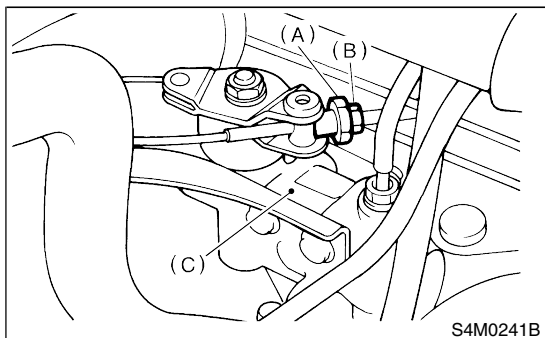
- 1) Disconnect ground cable from battery.
- 2) Disconnect connector from clutch. (With cruise control)
- 3) Remove snap pin and clevis pin that join push rod and clutch pedal.
- 4) Remove master cylinder mounting nuts.



- (A) Master cylinder

CLUTCH PEDAL

- 5) Remove PHV adjusting nut and lock nut.

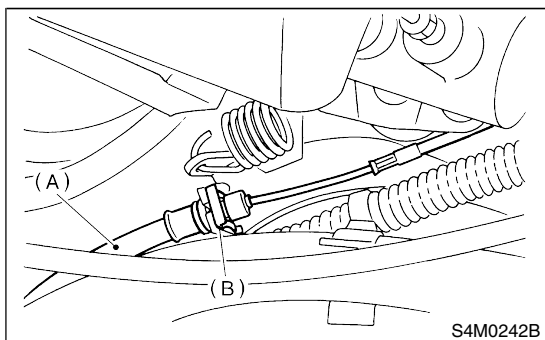


- (A) Adjusting nut
(B) Lock nut
(C) PHV

- 6) Remove cable clamp and disconnect PHV cable from PHV.

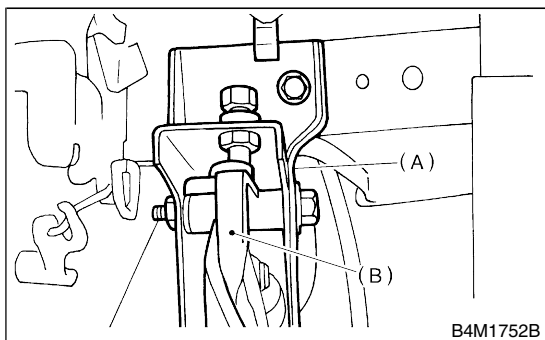
CAUTION:

Carefully protect boot and inner cable from damage when disconnecting PHV cable.



- (A) PHV cable
(B) Clamp

- 7) Remove clutch pedal and bracket as a unit.



- (A) Clutch pedal bracket
(B) Clutch pedal

B: INSTALLATION S504256A11

- 1) Install in the reverse order of removal.

CAUTION:

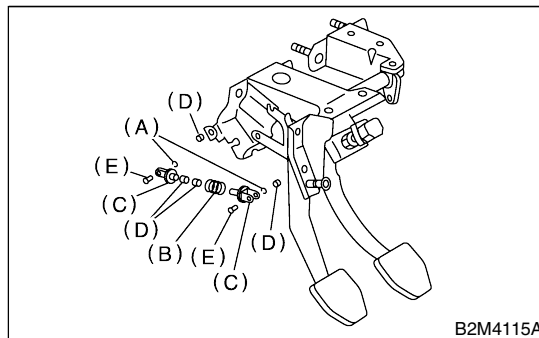
- If cable clamp is damaged, replace it with a new one.
- Never fail to cover outer cable end with boot.
- Be careful not to kink accelerator cable.
- Always use new clevis pins.

- 2) Adjustment of clutch pedal and adjustment after pedal installation. <Ref. to CL-41 ADJUSTMENT, Clutch Pedal.>

C: DISASSEMBLY S504256A06

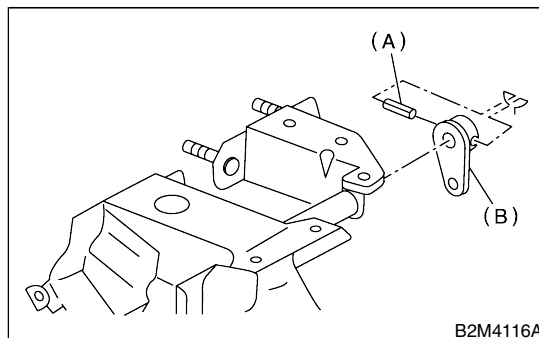
1. LHD MODEL S504256A0601

- 1) Remove clutch switches.
2) Remove clips, assist spring, rod and bushing.



- (A) Clip
(B) Assist spring
(C) Assist rod
(D) Bushing
(E) Clevis pin

- 3) Remove spring pin and lever.

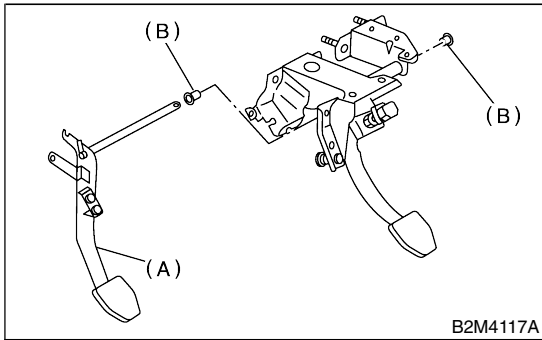


- (A) Pin
(B) Lever

CLUTCH PEDAL

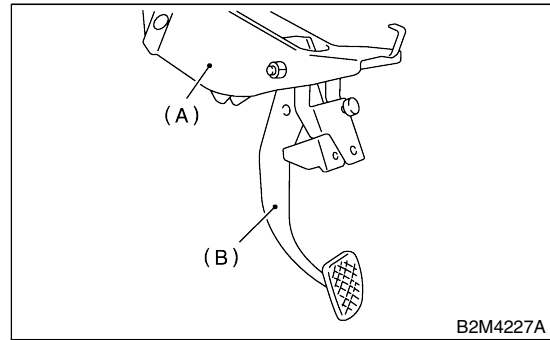
Clutch System

4) Remove clutch pedal and bushings.



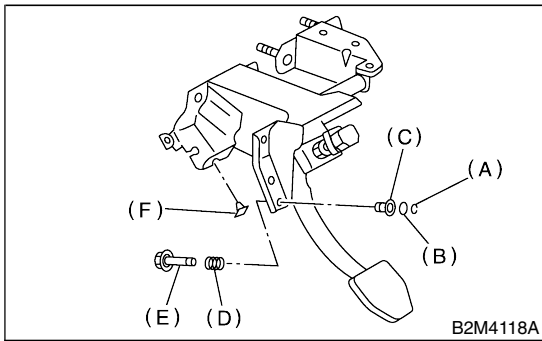
- (A) Clutch pedal
- (B) Bushing

4) Remove clutch pedal from clutch pedal bracket.



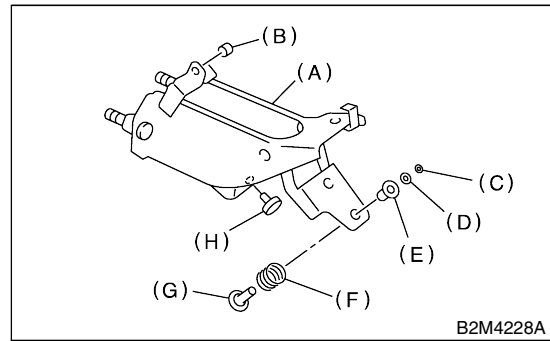
- (A) Clutch pedal bracket
- (B) Clutch pedal

5) Remove stopper, clip, O-ring, rod S, and then remove spring and bushing S.



- (A) Clip
- (B) O-ring
- (C) Bushing S
- (D) Spring S
- (E) Rod S
- (F) Stopper

5) Remove following parts (B to H) from clutch pedal bracket (A) as shown in figure.



- (A) Clutch pedal bracket
- (B) Bushing C
- (C) Clip
- (D) O-ring
- (E) Bushing S
- (F) Spring S
- (G) Rod S
- (H) Bushing

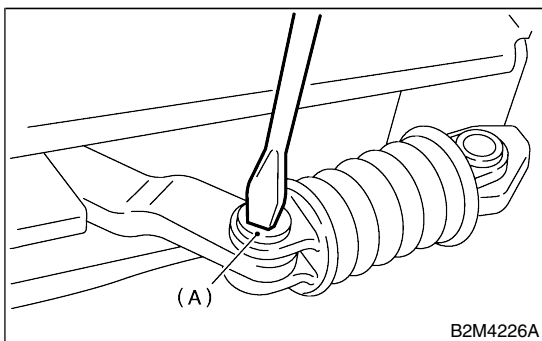
6) Remove stoppers from clutch pedal.

7) Remove clutch pedal pad.

2. RHD MODEL SS04256A0602

1) Remove clutch switch.

2) Remove clip, pull out clevis pin.



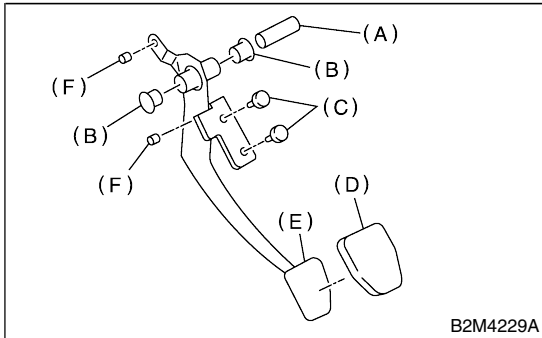
- (A) Clevis pin

3) Remove assist rod, spring and bushing.

CLUTCH PEDAL

Clutch System

6) Remove spacer, bushing and pedal pad from clutch pedal.



- (A) Spacer
- (B) Bushing
- (C) Bushing
- (D) Pedal pad
- (E) Clutch pedal
- (F) Bushing C

D: ASSEMBLY

S504256A02

1. LHD MODEL

S504256A0201

- 1) Attach clutch 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, assist rods, and spring, and bushing.

NOTE:

Clean up inside of bushings and apply grease before installing spacer.

- 4) Install hill holder cable to the clutch pedal. (Vehicle with hill holder)

2. RHD MODEL

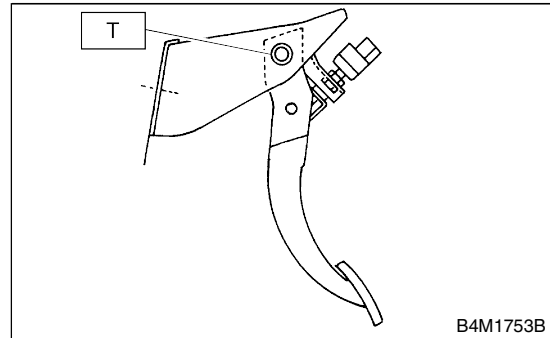
S504256A0202

- 1) Clean and apply grease to hole of sliding portion between clutch pedal and bushing.
- 2) Install pad, stopper, bushing C, spacer and bushing to clutch pedal.
- 3) Install rod S, spring S, bushing S, O-ring, clip, bushing, clutch switch and bushing C to clutch pedal bracket.

- 4) Install clutch pedal to pedal bracket.

Tightening torque:

T: 29 N·m (3.0 kgf-m, 21.7 ft-lb)



B4M1753B

- 5) Install assist rod, bushing and assist spring to clutch pedal and pedal bracket.

- 6) Install PHV cable to clutch pedal. (Vehicle with hill holder).

E: INSPECTION

S504256A10

1. CLUTCH PEDAL

S504256A1001

Move clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure pedal deflection is in specified range.

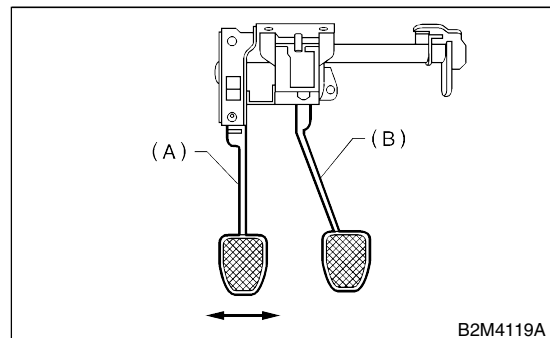
CAUTION:

If excessive deflection is noted, replace bushings with new ones.

Deflection of clutch pedal:

Service limit

5.0 mm (0.197 in) or less



B2M4119A

- (A) Clutch pedal
- (B) Brake pedal

F: ADJUSTMENT S504256A01

1. CLUTCH PEDAL S504256A0101

1) Turn clutch switch lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:

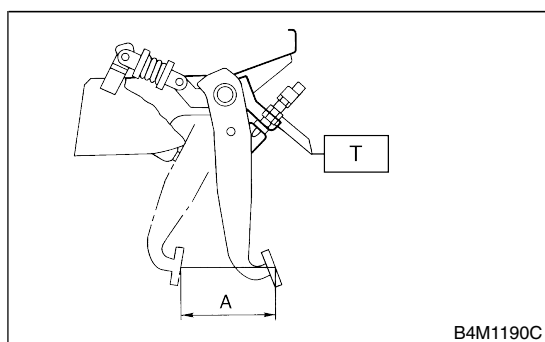
Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.

NOTE:

If lock nuts cannot adjust clutch pedal full stroke length to specifications, turn master cylinder push rod to adjust it.

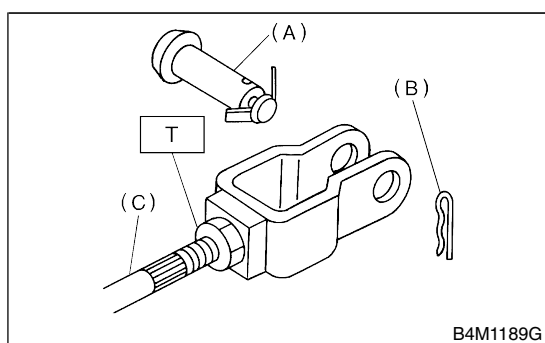
Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):
T: 8 N·m (0.8 kgf·m, 5.8 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):
T: 10 N·m (1.0 kgf·m, 7 ft-lb)



- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

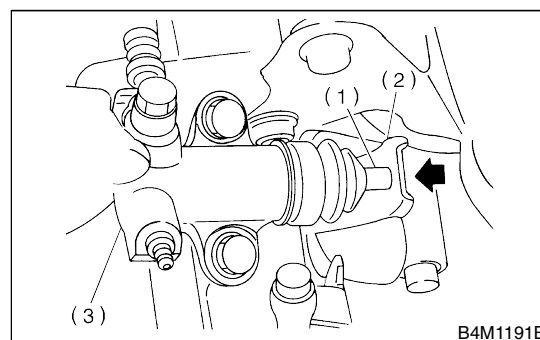
3) Depress and release clutch pedal 2 to 3 times to ensure that clutch pedal and release fork operate smoothly. If clutch pedal and release fork do not operate smoothly, bleed air from clutch hydraulic system. <Ref. to CL-34 Clutch Fluid Air Bleeding.>

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)

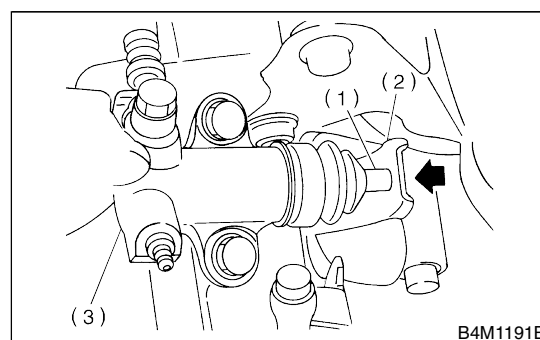
5) Move clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

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 CL-25 Master Cylinder.>



- (1) Push rod
- (2) Release lever
- (3) Operating cylinder

7) Push release lever until operating cylinder push rod retracts. Check that clutch fluid level in reservoir tank increases.



- (1) Push rod
- (2) Release lever
- (3) Operating cylinder

8) If clutch fluid level increases, hydraulic clutch play is correct.

9) If clutch fluid level does not increase or push rod does not retract, clutch pedal must be readjusted.

CLUTCH PEDAL

Clutch System

10) Inspect the fluid level. <Ref. to CL-33, Clutch Fluid.>

11. Clutch Switch SS04258

A: REMOVAL SS04258A18

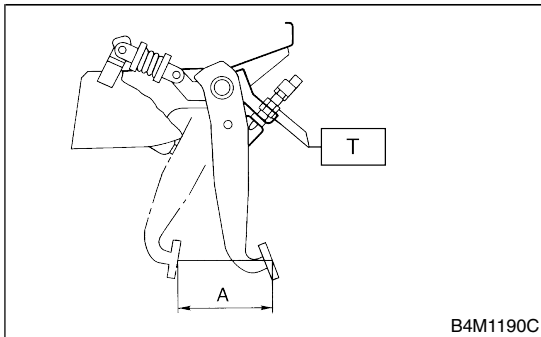
- 1) Remove battery ground terminal.
- 2) Disconnect connector from clutch switch.
- 3) Remove clutch switch.

B: INSTALLATION SS04258A11

- 1) Move clevis pin of the push rod right and left and hold where it moves smoothly, then measure stroke of clutch pedal.

Specified clutch pedal full stroke:A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

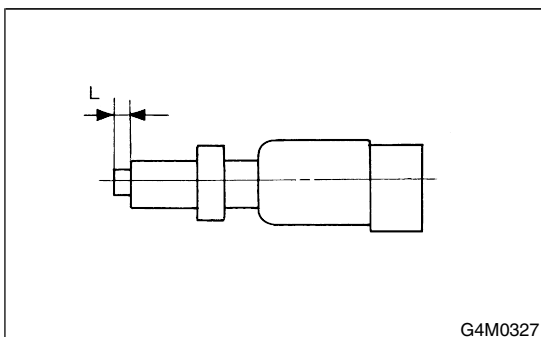


- 2) If clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-41, ADJUSTMENT, Clutch Pedal.>
- 3) Connect clutch switch connector.

C: INSPECTION SS04258A10

- 1) If clutch switch does not operate properly (or if it does not stop at the specified position), replace with new one.

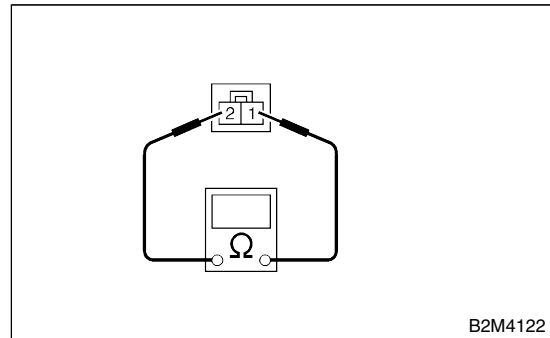
Specified position: L
 $2^{+1.5}_{-0}$ mm ($0.079^{+0.059}_{-0}$ in)



- 2) Check clutch switch continuity. If continuity is not as specified, replace the switch.

Switch position	Tester connection	Specified condition
Switch pin free	1 — 2	Continuity
Switch pin pushed in		No continuity

Clutch switch (With cruise control)



GENERAL DIAGNOSTIC TABLE

Clutch System

12. General Diagnostic Table

S504257

A: INSPECTION

S504257A10

1. CLUTCH

S504257A1002

Symptom	Possible cause	Corrective
1. Clutch slippage. It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms ● Engine speed 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) Clutch facing smeared by oil	Replace.
	(b) Worn clutch facing	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Distorted pressure plate or flywheel	Correct or replace.
	(e) Defective release bearing holder	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 CL-45 DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(b) Excessive deflection of clutch disc facing	Correct or replace.
	(c) Seized crankshaft pilot needle bearing	Replace.
	(d) Cracked clutch disc facing	Replace.
	(e) 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) Adhesion of oil on the facing	Replace clutch disc.
	(b) Weak or broken torsion spring	Replace clutch disc.
	(c) Defective facing contact or excessive disc	Replace clutch disc defection.
	(d) Warped pressure plate or flywheel	Correct or replace.
	(e) Loose disc rivets	Replace clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
	(g) Improper adjustment of pitching stopper	Adjustment.

GENERAL DIAGNOSTIC TABLE

Clutch System

Symptom	Possible cause	Corrective
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.
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 shaft	Take off rust, apply grease or replace clutch disc or main shaft.
	(d) Deteriorated or broken torsion spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

2. CLUTCH PEDAL S504257A1003

Trouble	Corrective action
Insufficient pedal play	Adjust pedal play.
Clutch pedal free play insufficient	Adjust pedal free play.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG S504257A1001

No.	Step	Check	Yes	No
1	CHECK GEAR NOISE. 1) Start the engine. 2) Disengage the clutch and shift quickly from neutral to reverse in idling condition.	Is an abnormal noise heard from the transmission gears?	Go to step 2.	Clutch is normal.
2	CHECK GEAR NOISE. With the engine idling, disengage the clutch and shift quickly (between 0.5 to 1.0 s) from neutral to reverse.	Is an abnormal noise heard from the transmission gears?	Go to step 3.	Defective transmission or excessive clutch drag torque. Inspect pilot bearing, clutch disc, transmission and clutch disc hub spline.
3	CHECK GEAR NOISE. With the engine idling, disengage the clutch and shift quickly (between 0.5 to 1.0 s) from neutral to reverse shift repeatedly between neutral and reverse with clutch disengaged.	Is an abnormal noise heard from the transmission gears?	Clutch is not disengaged properly. Inspect clutch disc, clutch cover, clutch release system, and clutch pedal free play.	Clutch disc and flywheel are locked together. Inspect clutch disc and clutch disc hub spline.

GENERAL DIAGNOSTIC TABLE

MEMO:

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

AT

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BASIC DIAGNOSTIC PROCEDURE

Automatic Transmission (Diagnostics)

1. Basic Diagnostic Procedure S004501

A: PROCEDURE S004501E45

No.	Step	Check	Yes	No
1	CHECK PRE-INSPECTION. 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to AT-4, Check List for Interview.> 2) Before performing diagnosis, inspect the following items which might influence the AT problems. ● General inspection <Ref. to AT-5, INSPECTION, General Description.> ● Oil leak ● Stall speed test <Ref. to AT-13, Stall Test.> ● Line pressure test <Ref. to AT-16, Line Pressure Test.> ● Transfer clutch pressure test <Ref. to AT-18, Transfer Clutch Pressure Test.> ● Time lag test <Ref. to AT-15, Time Lag Test.> ● Road test <Ref. to AT-12, Road Test.> ● Inhibitor switch <Ref. to AT-28, Inhibitor Switch.>	Is unit that might influence the AT problem normal?	Go to step 2.	Repair or replace each item.
2	CHECK POWER INDICATOR LIGHT. Turn ignition switch to ON.	Does not the POWER indicator light light up?	Go to step 3.	Go to step 4.
3	CHECK POWER INDICATOR LIGHT. 1) Turn ignition switch to OFF. 2) Repair POWER indicator light circuit or power supply and ground line circuit. <Ref. to AT-28, Diagnostic Procedure for Power Indicator Light.> 3) Turn ignition switch to ON.	Is the POWER indicator light flashing?	Go to step 4.	Go to step 5.
4	CHECK INDICATION OF TROUBLE CODE. Calling up trouble code. Without SUBARU SELECT MONITOR <Ref. to AT-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> With SUBARU SELECT MONITOR <Ref. to AT-23, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> NOTE: If the communication function of the select monitor cannot be executed normally, check the communication circuit. <Ref. to AT-36, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is the trouble code displayed?	Go to step 6. NOTE: Record all trouble codes.	Go to step 5.

BASIC DIAGNOSTIC PROCEDURE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
5	PERFORM THE GENERAL DIAGNOSTICS. 1) Inspect using "Diagnostic Procedure for No-trouble Code". <Ref. to AT-107, Diagnostic Procedure for No-trouble Code.> 2) Inspect using "Symptom Related Diagnostic". <Ref. to AT-134, Symptom Related Diagnostic.> 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-25, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-25, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-24, Inspection Mode.> Calling up the trouble code. Without SUBARU SELECT MONITOR <Ref. to AT-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> With SUBARU SELECT MONITOR <Ref. to AT-23, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code displayed?	Go to step 6.	Complete the diagnosis.
6	PERFORM THE DIAGNOSIS. 1) Inspect using "Diagnostics Chart with Trouble Code". <Ref. to AT-42, Diagnostic Procedure with Trouble Code.> NOTE: For trouble code table, refer to "List of Diagnostic Trouble Code". <Ref. to AT-27, List of Diagnostic Trouble Code.> 2) Repair trouble cause. 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-25, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-25, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-24, Inspection Mode.> 5) Calling up the trouble code. Without SUBARU SELECT MONITOR <Ref. to AT-22, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> With SUBARU SELECT MONITOR <Ref. to AT-23, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code displayed?	Inspect using "Diagnostics Chart with Diagnostic Connector". <Ref. to AT-42, Diagnostic Procedure with Trouble Code.>	Complete the diagnosis.

CHECK LIST FOR INTERVIEW

Automatic Transmission (Diagnostics)

2. Check List for Interview S004502

A: CHECK S004502A04

Check the following items when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name			
Data vehicle brought in			
Data of repair			
Trans. model	TRANSMISSION	VIN	
Odometer reading	km/h or mile		
Frequency	☐ Continuous ☐ Intermittent (times a day)		
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others ()		
Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Rough road ☐ Others ()		
Outdoor temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold		
Vehicle speed	km/h (MPH)		
Malfunction indicator lamp (MIL)	☐ Continuously lit		☐ Not lit
Select lever position	☐ P ☐ R ☐ N ☐ D ☐ 3 ☐ 2 ☐ 1		
Driving condition	☐ Not affected ☐ At racing ☐ While decelerating	☐ At starting ☐ While accelerating ☐ While turning (☐ RH/ ☐ LH)	☐ While idling ☐ While cruising
POWER switch	☐ ON ☐ OFF		
HOLD switch	☐ ON ☐ OFF		
Symptoms	☐ No up-shift		
	☐ No down-shift		
	☐ No kick down		
	☐ Vehicle does not move (☐ Any position ☐ Particular position)		
	☐ Lock-up malfunction		
	☐ Noise or vibration		
	☐ Shift shock or slip		
	☐ Select lever does not move		
☐ Others ()			

GENERAL DESCRIPTION

Automatic Transmission (Diagnostics)

3. General Description

S004001

A: CAUTION

S004001A03

- **Supplemental Restraint System “Airbag”**

Airbag system wiring harness is routed near the transmission control module (TCM).

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 performing diagnostics and servicing the TCM.

- **Measurement**

When measuring voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 6.5 mm (0.256 in).

B: INSPECTION

S004001A10

1. BATTERY

S004001A1001

Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12V or more

Specific gravity: Above 1.260

2. TRANSMISSION GROUND

S004001A1002

Make sure that the ground terminal bolt is tightened securely.

- **Chassis side**

Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)

tr0373

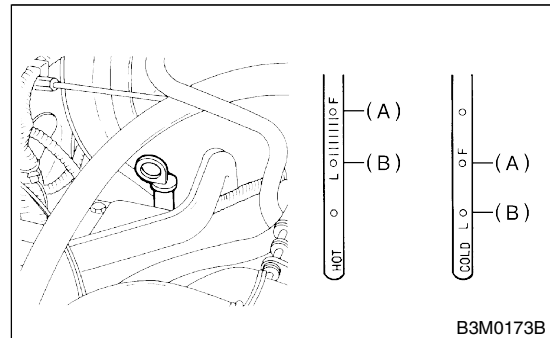


TR0373

3. ATF LEVEL

S004001A1003

Make sure that ATF level is in the specification.

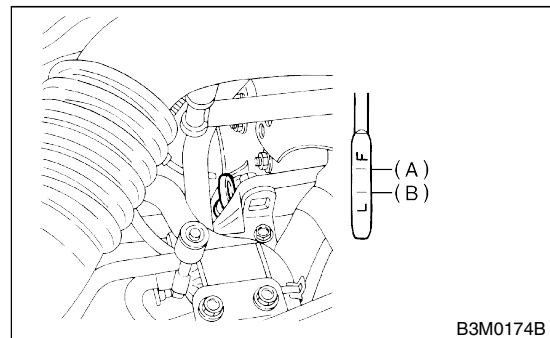


- (A) Upper level
- (B) Lower level

4. FRONT DIFFERENTIAL OIL LEVEL

S004001A1004

Make sure that front differential oil level is in the specification.



- (A) Upper level
- (B) Lower level

GENERAL DESCRIPTION

Automatic Transmission (Diagnostics)

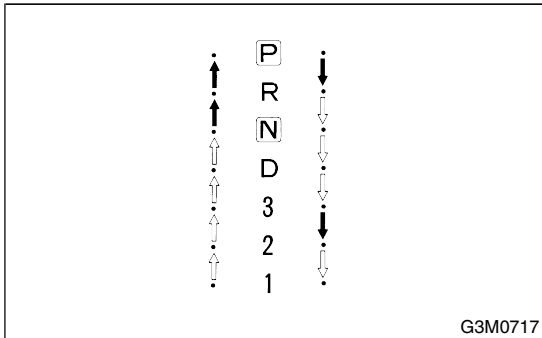
5. OPERATION OF SHIFT SELECT LEVER

S004001A1005

WARNING:

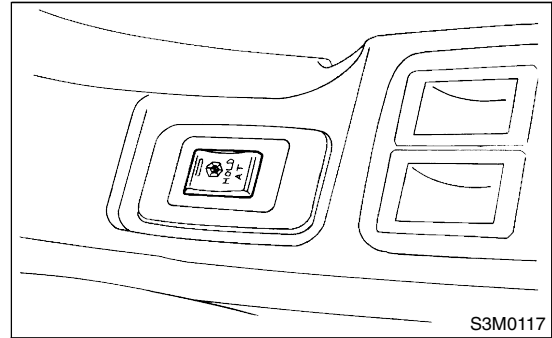
Stop the engine while checking operation of select lever.

- 1) Check that select lever does not move from "N" to "R" without pushing the button.
- 2) Check that select lever does not move from "R" to "P" without pushing the button.
- 3) Check that select lever does not move from "P" to "R" without pushing the button.
- 4) Check that select lever does not move from "3" to "2" without pushing the button.



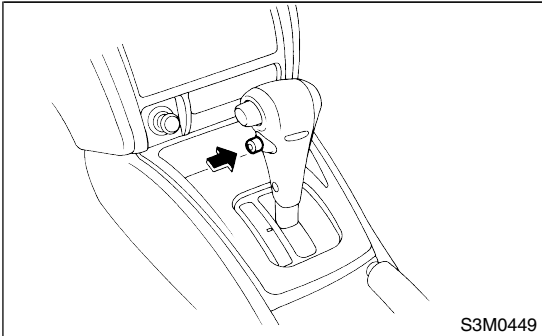
7. HOLD SWITCH S004001A1007

Make sure that HOLD indicator light in combination meter comes ON, when turning hold switch to ON.



6. POWER SWITCH S004001A1006

Make sure that POWER indicator light in combination meter comes ON, when turning power switch to ON.

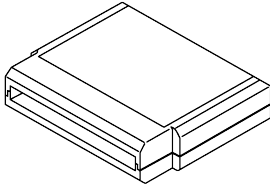


GENERAL DESCRIPTION

Automatic Transmission (Diagnostics)

C: PREPARATION TOOL S004001A17

1. SPECIAL TOOLS S004001A1701

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

2. GENERAL PURPOSE TOOLS S004001A1702

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

ELECTRICAL COMPONENTS LOCATION

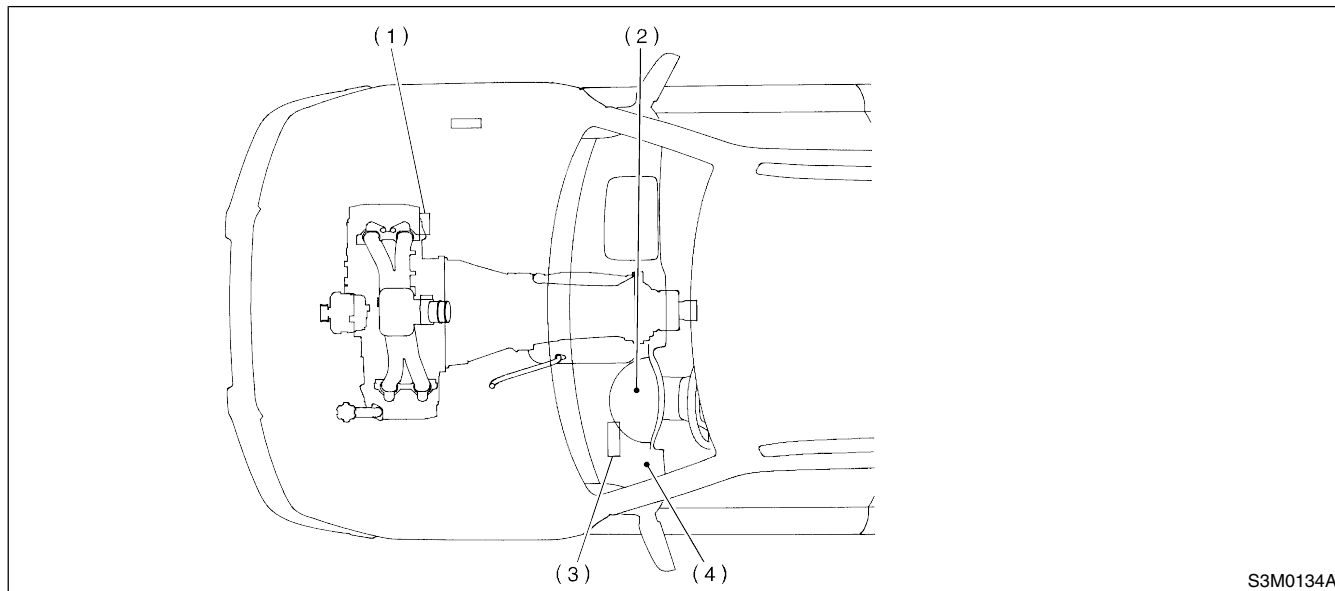
Automatic Transmission (Diagnostics)

4. Electrical Components Location S004507

A: LOCATION S004507A13

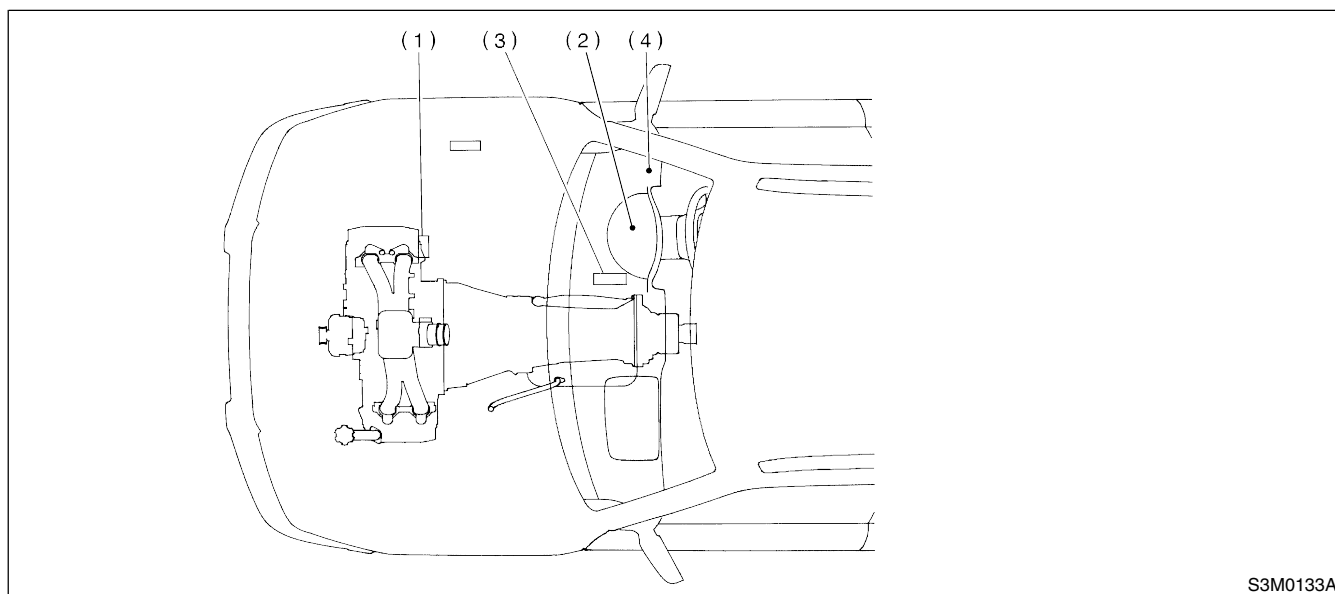
1. CONTROL MODULE FOR MODEL WITHOUT OBD S004507A1304

● LHD MODEL



S3M0134A

● RHD MODEL

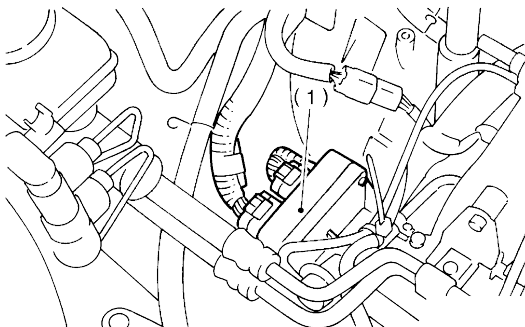
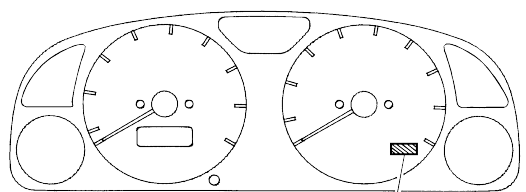
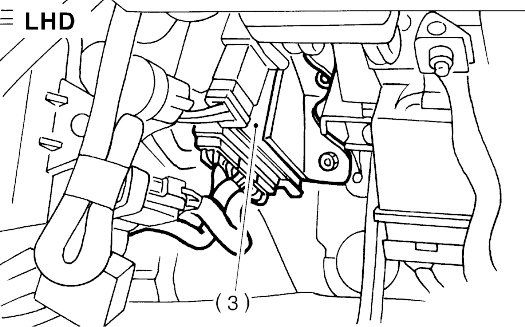
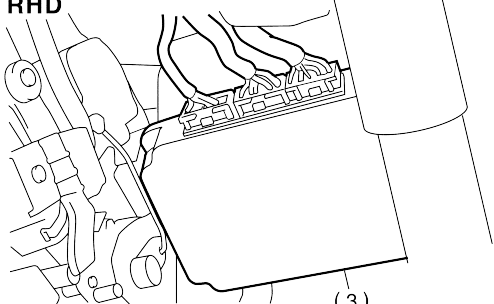
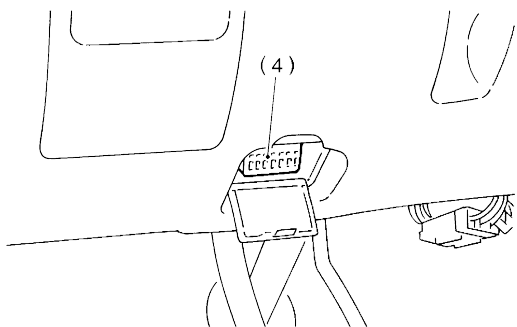


S3M0133A

- | | |
|---|---------------------------------------|
| (1) Engine control module (ECM) | (3) Transmission control module (TCM) |
| (2) Power indicator light (AT diagnostic indicator light) | (4) Data link connector |

ELECTRICAL COMPONENTS LOCATION

Automatic Transmission (Diagnostics)

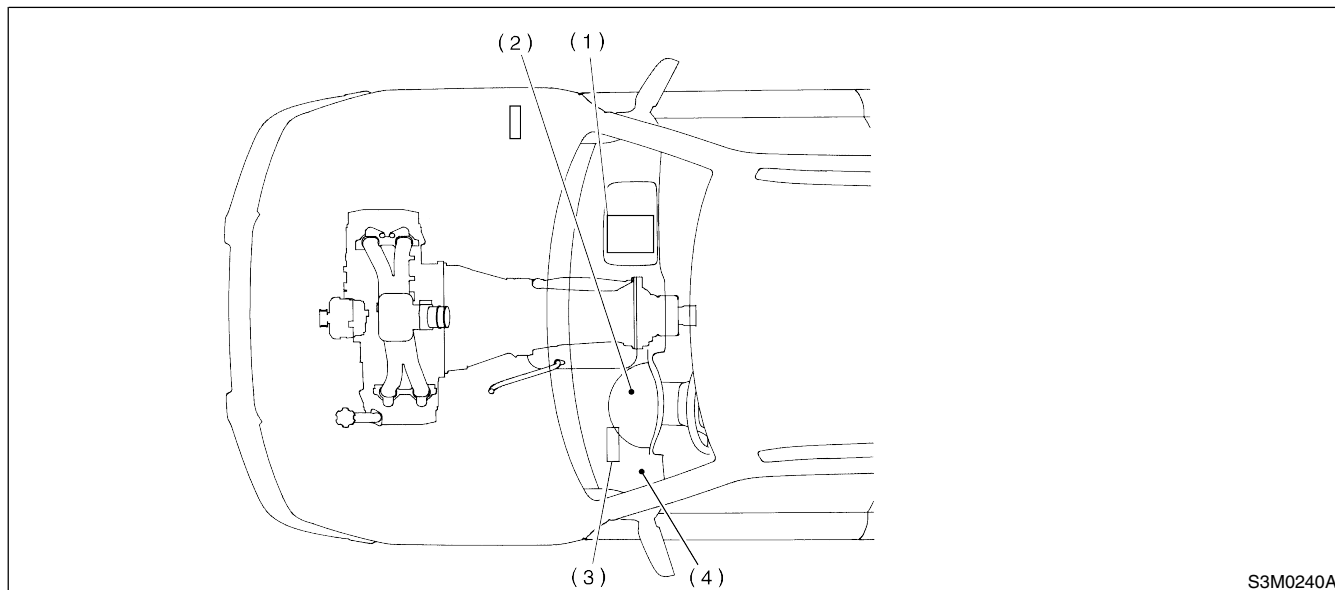
 S2M0533C	 S3M0590A
LHD  B3M1592B	RHD  B3M1652A
 S2M0258C	SUBARU.

ELECTRICAL COMPONENTS LOCATION

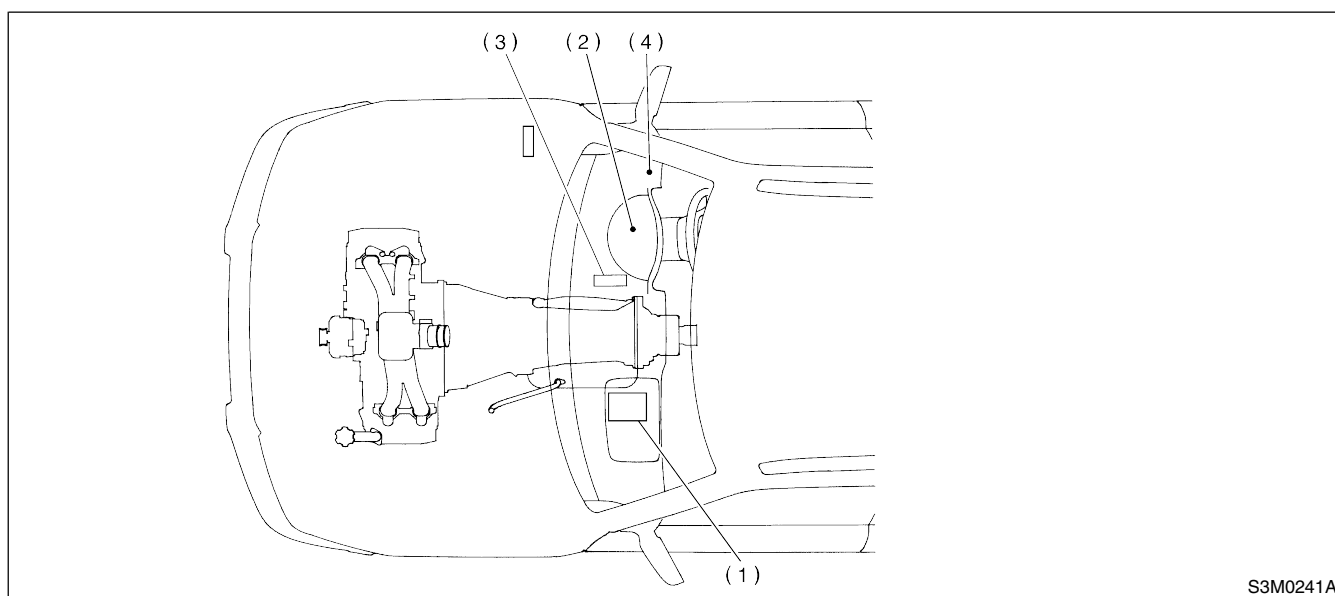
Automatic Transmission (Diagnostics)

2. CONTROL MODULE FOR MODEL WITH OBD S004507A1305

● LHD MODEL



● RHD MODEL

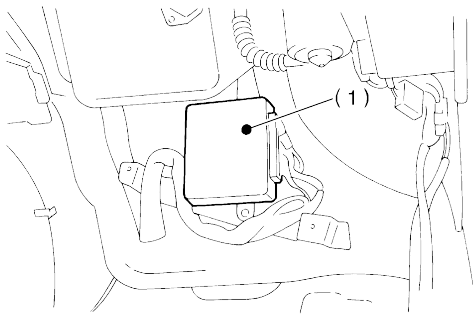
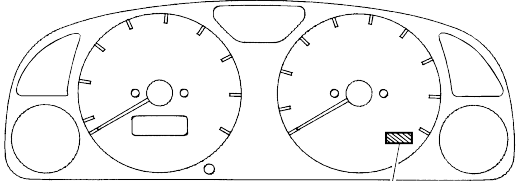
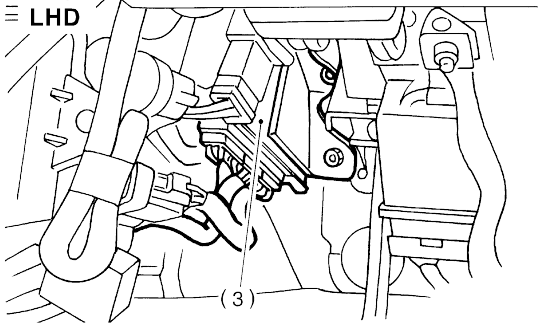
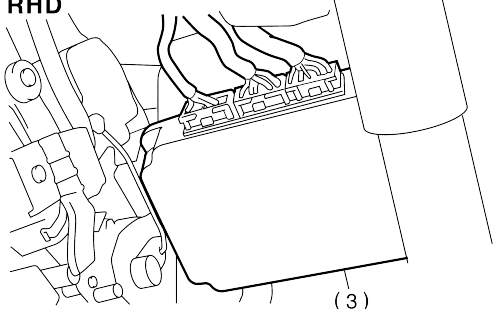
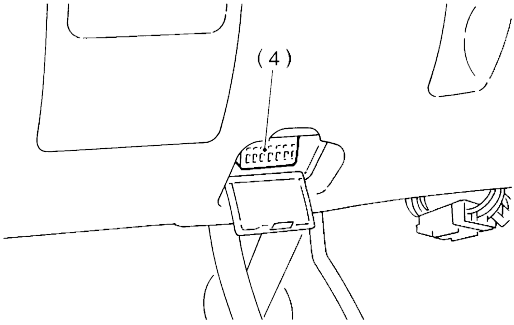


(1) Engine control module (ECM)
(2) Power indicator light (AT diagnostic indicator light)

(3) Transmission control module (TCM)
(4) Data link connector

ELECTRICAL COMPONENTS LOCATION

Automatic Transmission (Diagnostics)

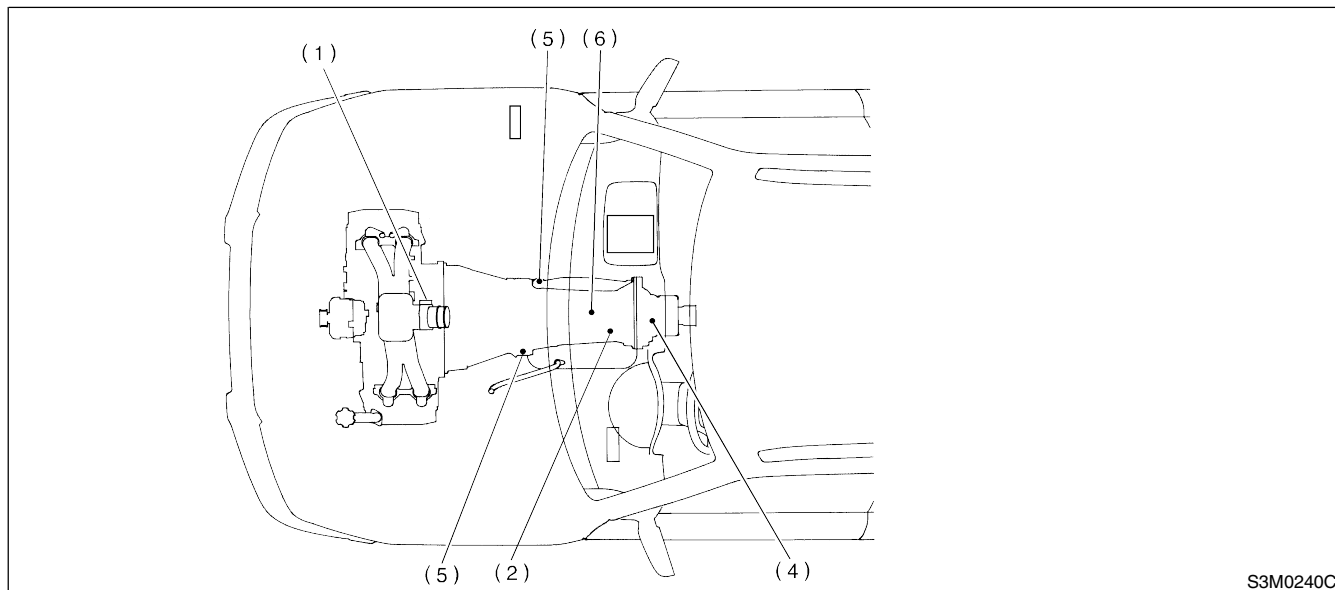
 (1)	 (2)
B3M0183E	S3M0590A
 LHD (3)	 RHD (3)
B3M1592B	B3M1652A
 (4)	
S2M0258C	

ELECTRICAL COMPONENTS LOCATION

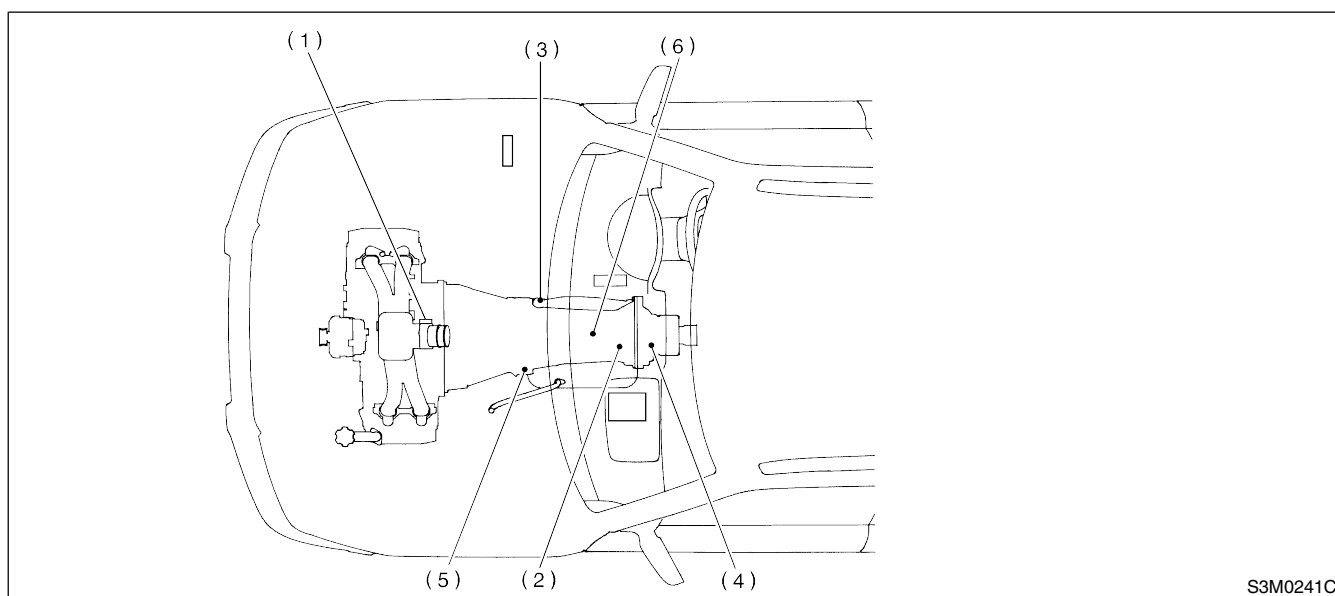
Automatic Transmission (Diagnostics)

3. SENSOR S004507A1302

● LHD MODEL



● RHD MODEL



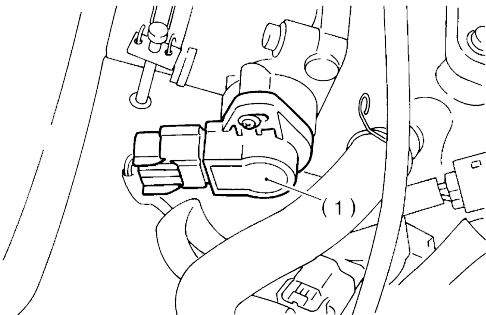
- (1) Throttle position sensor
- (2) Front vehicle speed sensor
- (3) Inhibitor switch

- (4) Rear vehicle speed sensor
- (5) Torque converter turbine speed sensor

- (6) ATF temperature sensor

ELECTRICAL COMPONENTS LOCATION

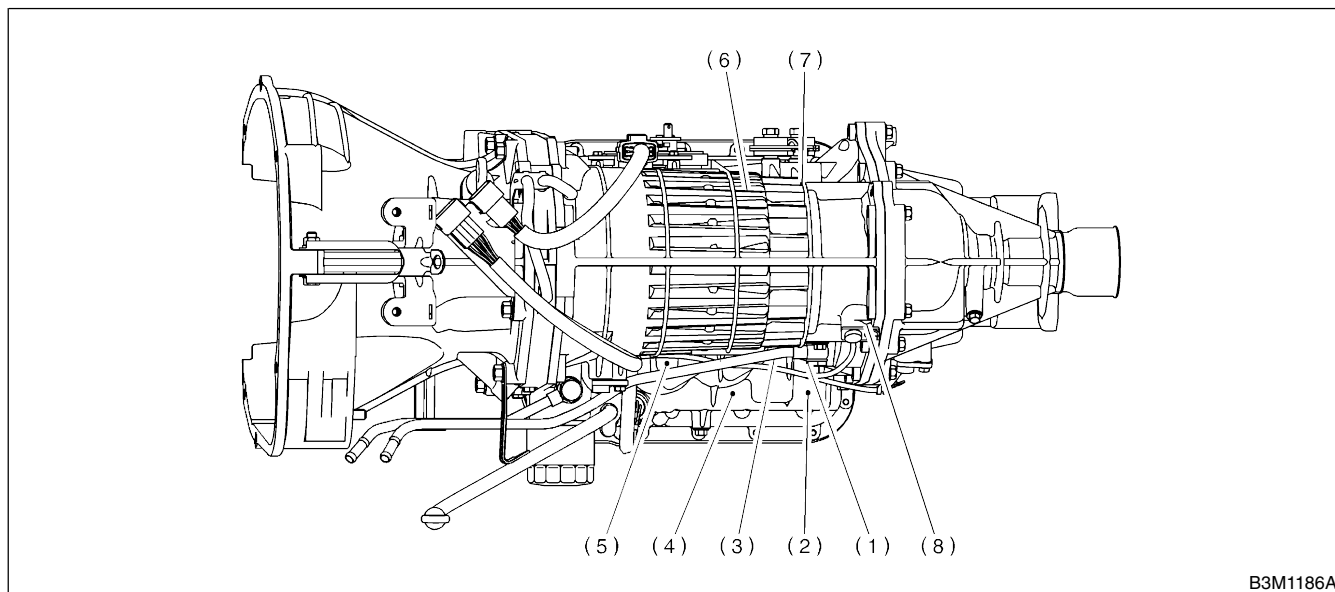
Automatic Transmission (Diagnostics)

		tr0387	
tr0388	S2M0262B		TR0387
		tr0390	
tr0389	TR0388		TR0390
	TR0389		

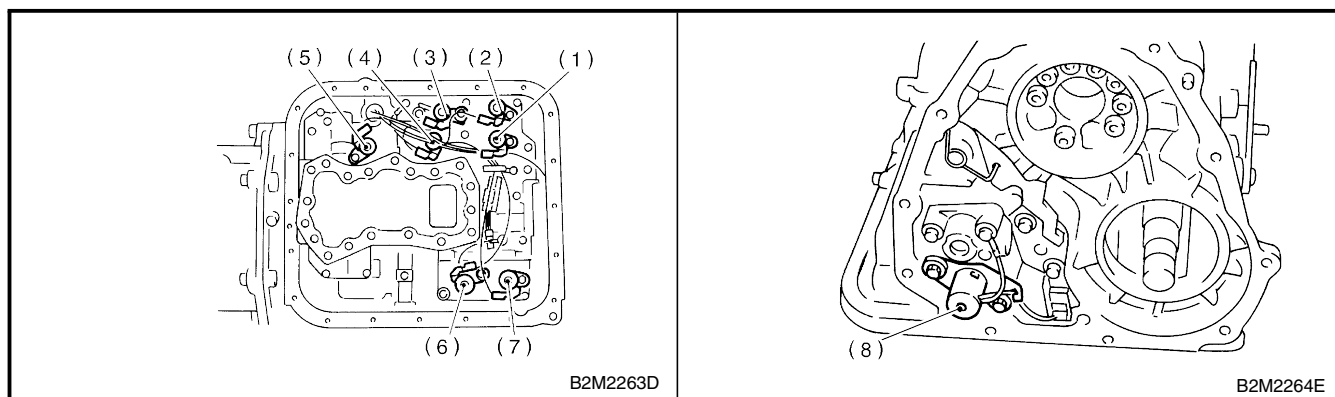
ELECTRICAL COMPONENTS LOCATION

Automatic Transmission (Diagnostics)

4. SOLENOID S004507A1303



- | | | |
|---------------------------------|--------------------------------|-------------------------------|
| (1) Solenoid 1 | (4) Low clutch timing solenoid | (7) 2-4 brake timing solenoid |
| (2) Solenoid 2 | (5) Lock-up duty solenoid | (8) Transfer duty solenoid |
| (3) Line pressure duty solenoid | (6) 2-4 brake duty solenoid | |



Automatic Transmission (Diagnostics)

S004506

S004506A08

TR0532

AT-15

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Kick-down switch	B55	11	Throttle fully open.	Less than 1	—
			Throttle fully closed.	More than 6.5	
AT OIL TEMP warning light	B56	10	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B54	3	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.0 — 4.6	
Throttle position sensor power supply (with OBD model)	B54	2	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 k — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	24	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	18	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor	B55	8	Engine idling after warm-up. (D range)	0	450 — 650
			Engine idling after warm-up. (N range)	More than 1 (AC range)	
Vehicle speed output signal (Waveform)	B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 4	—
Engine speed signal	B55	17	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B55	22	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B56	5	Ignition switch ON (with engine ON)	More than 4	—
Torque control signal 2	B56	14	Ignition switch ON (with engine ON)	More than 4	—
Torque control cut signal	B55	10	Ignition switch ON	8	—
Intake manifold pressure signal (Non-turbo model)	B54	1	Engine idling after warm-up.	1.2 — 1.8	—
Mass air flow signal (Turbo model)	B54	1	Engine idling after warm-up.	0.5 — 1.2	—
Shift solenoid 1	B54	22	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

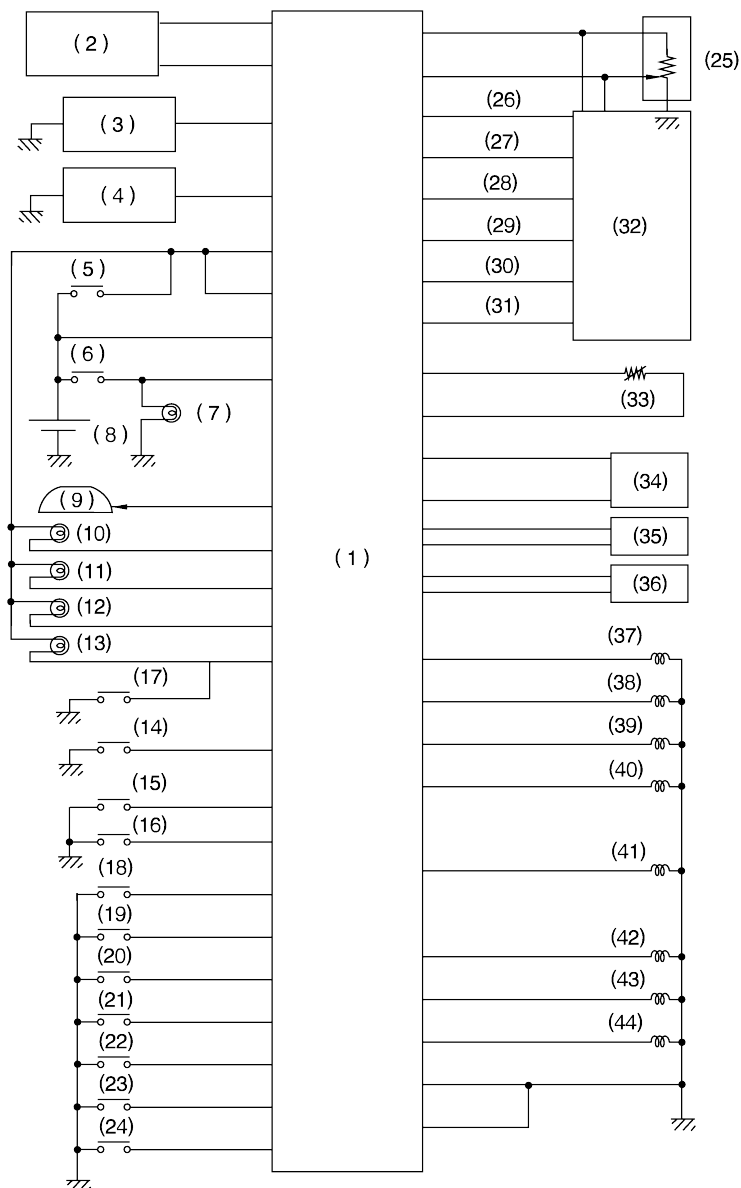
Check with ignition switch ON.					
Content	Con- nector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 4.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	6	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	18	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Hold switch	B55	16	Hold switch ON	Less than 1	—
			Hold switch OFF	More than 8	—
Power switch	B55	23	Power switch ON	Less than 1	—
			Power switch OFF	More than 10	—
Power indicator light	B56	11	Light ON	Less than 1	—
			Light OFF	More than 9	—
FWD switch	B55	20	Fuse removed	6 — 9.1	—
			Fuse installed	Less than 1	—
FWD indicator light	B56	2	Fused ON FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	—
ABS signal	B55	21	ABS switch ON	Less than 1	—
			ABS switch OFF	6.5 — 15	—
Sensor ground line 1	B54	20	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	21			
Sensor ground line 3	B54	10	—	0	Less than 1
Sensor ground line 4	B54	19	—	0	Less than 1
AT diagnosis signal (Waveform)	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B56	15	—	—	—
		6	—	—	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

B: SCHEMATIC

S004506A21



S3M0620

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

(1) Transmission control module	(15) Kick-down switch	(31) AT diagnostic signal (with OBD)
(2) Data link connector	(16) Power switch	(32) Engine control module
(3) Cruise control module (Non-turbo model)	(17) Hold switch	(33) ATF temperature sensor
(4) ABS control module	(18) "P" range switch	(34) Torque converter turbine speed sensor
(5) Ignition switch	(19) "R" range switch	(35) Vehicle speed sensor 2 (Front)
(6) Brake switch	(20) "N" range switch	(36) Vehicle speed sensor 1 (Rear)
(7) Brake light	(21) "D" range switch	(37) Shift solenoid 1
(8) Battery	(22) "3" range switch	(38) Shift solenoid 2
(9) Combination meter (Speedometer circuit)	(23) "2" range switch	(39) 2-4 brake timing solenoid
(10) ATF temperature warning light	(24) "1" range switch	(40) Line pressure duty solenoid
(11) FWD indicator light	(25) Throttle position sensor	(41) 2-4 brake duty solenoid
(12) POWER indicator light	(26) Engine speed signal	(42) Lock-up duty solenoid
(13) HOLD indicator light	(27) Torque control cut signal	(43) Low clutch timing solenoid
(14) FWD switch	(28) Torque control signal 2	(44) Transfer duty solenoid
	(29) Torque control signal 1	
	(30) AT load signal	

SUBARU SELECT MONITOR

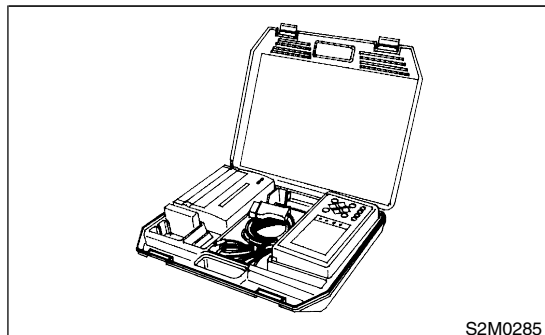
Automatic Transmission (Diagnostics)

6. Subaru Select Monitor S004503

A: OPERATION S004503A16

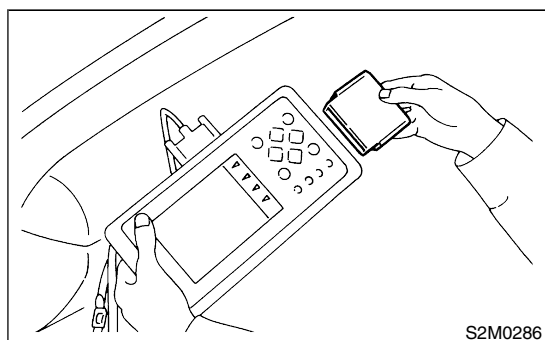
1. READ DIAGNOSTIC TROUBLE CODE S004503A1601

1) Prepare Subaru Select Monitor kit.



2) Connect diagnosis cable to Subaru Select Monitor.

3) Insert cartridge into Subaru Select Monitor.
<Ref. to AT-7, PREPARATION TOOL, General Description.>



4) Connect Subaru Select Monitor to data link connector.

(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).

br0033



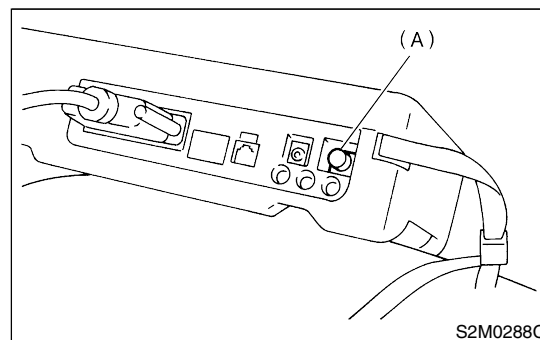
(A) Data link connector

(2) Connect diagnosis cable to data link connector.

CAUTION:

Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

5) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.

7) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.

8) Press the [YES] key after displayed the information of transmission type.

9) On the «Transmission Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

10) On the «Diagnostic Code(s) Display» display screen, select the {Latest Diagnostic Code(s)} or {Memorized Diagnostic Code(s)} and press the [YES] key.

NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

- For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE LIST. <Ref. to AT-27, List of Diagnostic Trouble Code.>

2. READ CURRENT DATA S004503A1602

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.

2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.

3) Press the [YES] key after displayed the information of transmission type.

4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.

5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.

6) Using the scroll key, move the display screen up or down until the desired data is shown.

SUBARU SELECT MONITOR

Automatic Transmission (Diagnostics)

- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Intake manifold pressure sensor voltage	Mani. Pressure Voltage	V
2 wheel drive switch signal	FWD Switch	ON or OFF
Stop lamp switch signal	Stop Light Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Neutral/Parking range signal	N/P Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal 1	ON or OFF
Torque control output signal #2	Torque Control Signal 2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
Automatic transmission diagnosis indicator lamp	Diagnosis Lamp	ON or OFF
Power mode switch signal	Power Mode Switch	ON or OFF
Hold mode switch signal	Hold Mode Switch	ON or OFF
Kick down switch signal	Kick Down Switch	ON or OFF
Automatic transmission fluid temperature lamp	ATF Temperature Lamp	ON or OFF

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

3. CLEAR MEMORY MODE S004503A1603

- 1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
- 2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of transmission type.

- 4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
- 5) When the 'Done' and 'Turn Ignition Switch OFF' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

READ DIAGNOSTIC TROUBLE CODE

Automatic Transmission (Diagnostics)

7. Read Diagnostic Trouble Code S004508

A: OPERATION S004508A16

1. WITHOUT SUBARU SELECT MONITOR S004508A1601

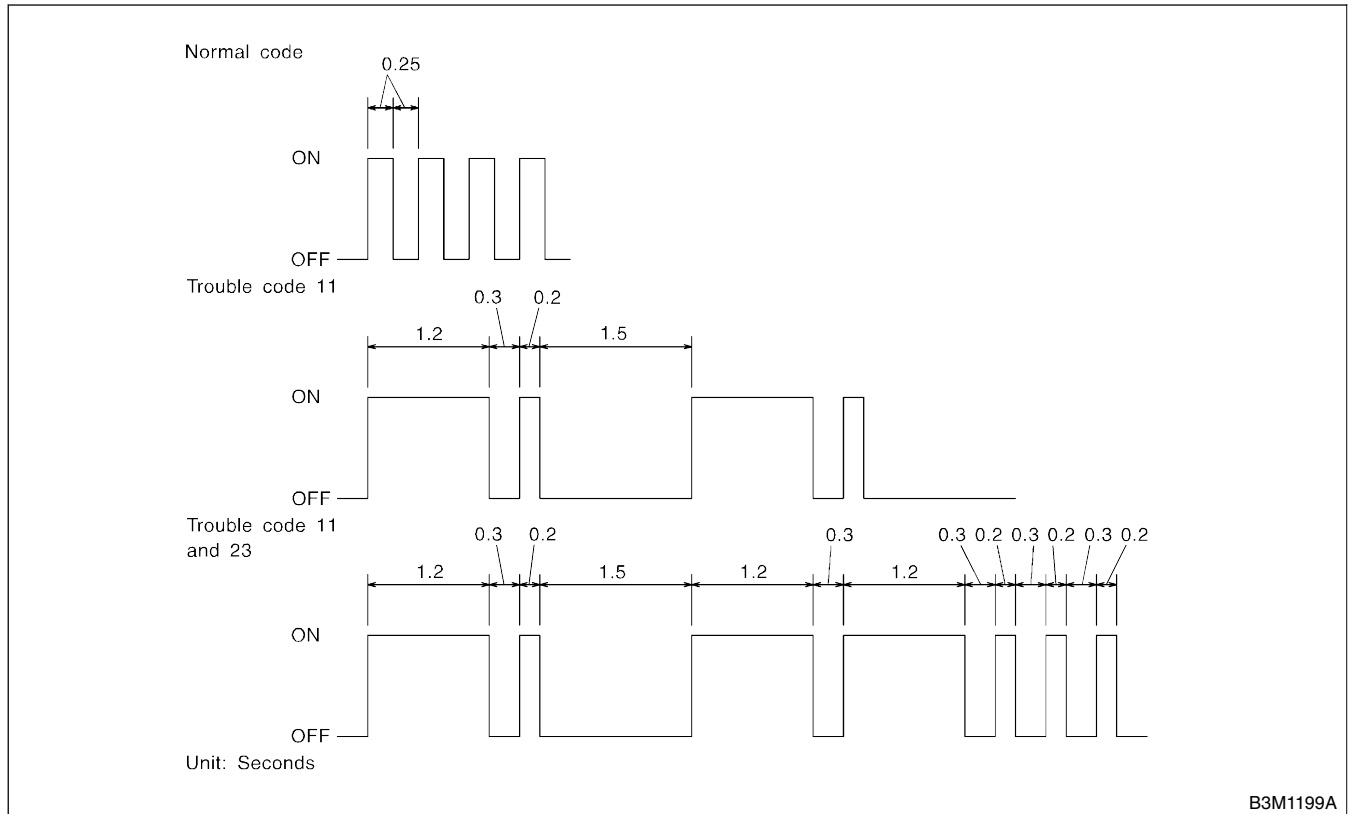
No.	Step	Check	Yes	No
1	PERFORM READ DIAGNOSTIC TROUBLE CODE. 1) Warm-up the engine. 2) Turn ignition switch to OFF. 3) Turn ignition switch to ON. 4) Start the engine. 5) Drive vehicle at speeds greater than 20 km/h (12 MPH). 6) Stop vehicle. 7) Brake pedal depressed and move select lever to 1 range. 8) Turn ignition switch to OFF. 9) Turn ignition switch to ON. 10) Move select lever 2 range. 11) Move select lever 1 range. 12) Move select lever 2 range. 13) Move select lever 3 range. 14) Move select lever D range.	Does indicator light blinks at 4-Hz intervals? NOTE: Blinks every 0.125 (1/8) seconds (until ignition switch is turned OFF).	Repair power supply and ground circuit. <Ref. to AT-32, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for Power Indicator Light.>	Go to step 2.
2	CHECK INDICATOR LIGHT.	Does indicator light blinks at 2-Hz intervals? NOTE: Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).	AT system is normal.	Go to step 3.
3	CHECK INDICATOR LIGHT.	Is trouble code outputted?	Inspect problem corresponding with trouble code. NOTE: Record all trouble codes.	Go to step 4.
4	CHECK INDICATOR LIGHT.	Does indicator light remains illuminated?	Repair power indicator light circuit <Ref. to AT-28, Diagnostic Procedure for Power Indicator Light.>, or Inspect inhibitor switch, wiring, TCM, etc.	Calling up trouble code again.

READ DIAGNOSTIC TROUBLE CODE

Automatic Transmission (Diagnostics)

The power indicator light flashes the code corresponding to the faulty part.

The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



2. WITH SUBARU SELECT MONITOR

S004508A1602

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to AT-20, OPERATION, Subaru Select Monitor.>

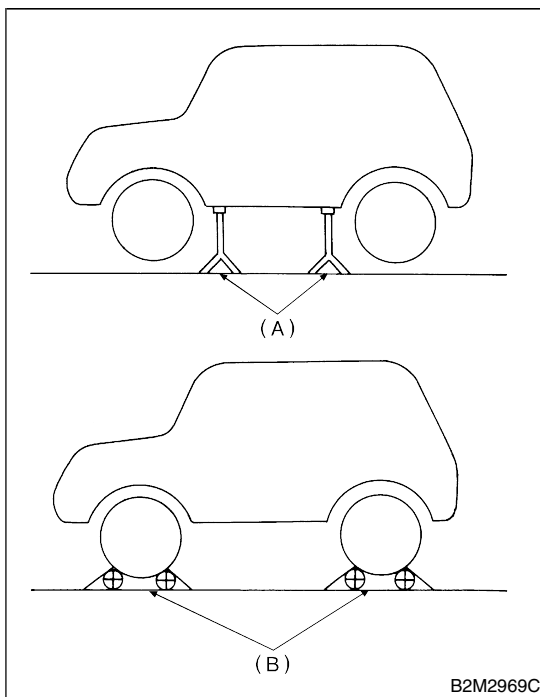
8. Inspection Mode S004510

A: OPERATION S004510A16

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

WARNING:

- Before raising the vehicle, ensure parking brakes are applied.
- Do not use a pantograph jack in place of a safety stand.
- Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runoff of front wheels.
- Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
- In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
- Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



- (A) Safety stand
(B) Free rollers

9. Clear Memory Mode S004513

A: OPERATION S004513A16

1. WITHOUT SUBARU SELECT MONITOR

S004513A1602

Current trouble codes shown on the display are cleared by turning the ignition switch OFF after conducting on-board diagnostics operation. Previous trouble codes, however, cannot be cleared since they are stored in the TCM memory which is operating on the back-up power supply. These trouble codes can be cleared by removing the specified fuse (located under the light or left lower position of the instrument panel).

CLEAR MEMORY:

Removal of No. 4 fuse (for at least one minute)

- The No. 4 fuse is located in the line to the memory back-up power supply of the TCM. Removal of this fuse clears the previous trouble codes stored in the TCM memory.
- Be sure to remove the No. 4 fuse for at least the specified length of time. Otherwise, trouble codes may not be cleared.

2. WITH SUBARU SELECT MONITOR

S004513A1601

Refer to SUBARU SELECT MONITOR for information about how to clear trouble codes.

<Ref. to AT-21, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

POWER INDICATOR LIGHT DISPLAY

Automatic Transmission (Diagnostics)

10. Power Indicator Light Display

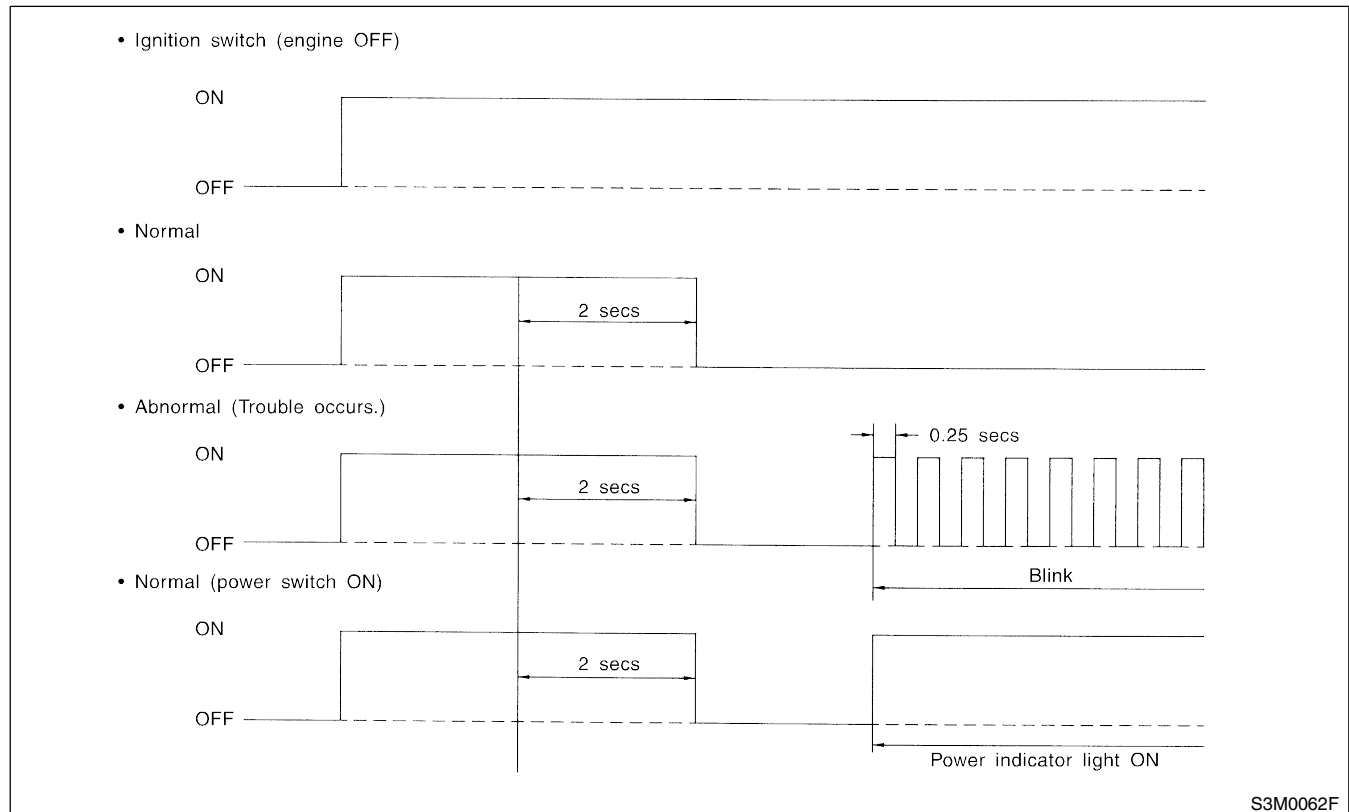
S004729

A: INSPECTION

S004729A10

When any on-board diagnostics item is malfunctioning, the display on the power indicator light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or

unit can be determined by a trouble code during on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the power indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the select monitor. Indicator signal is as shown in the figure.



LIST OF DIAGNOSTIC TROUBLE CODE

Automatic Transmission (Diagnostics)

11. List of Diagnostic Trouble Code S004511

A: LIST S004511A12

Trouble code	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to AT-42, TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>
23	Mass air flow signal (Turbo model)	Detects open or shorted input signal circuit.	<Ref. to AT-44, TROUBLE CODE 23 — MASS AIR FLOW SIGNAL —, Diagnostic Procedure with Trouble Code.>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to AT-46, TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>
33	Front vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-58, TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-64, TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to AT-68, TROUBLE CODE 38 — TORQUE CONTROL SIGNAL —, Diagnostic Procedure with Trouble Code.>
45	Intake manifold pressure signal (Non-turbo model)	Detects open or shorted input signal circuit.	<Ref. to AT-70, TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL —, Diagnostic Procedure with Trouble Code.>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to AT-72, TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to AT-76, TROUBLE CODE 72 — SHIFT SOLENOID 2 —, Diagnostic Procedure with Trouble Code.>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-80, TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-84, TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-88, TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-92, TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-96, TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-100, TROUBLE CODE 79 — TRANSFER DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-104, TROUBLE CODE 93 — REAR VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>

DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

Automatic Transmission (Diagnostics)

12. Diagnostic Procedure for Power Indicator Light S004730

A: POWER INDICATOR LIGHT DOES NOT COME ON OR GO OFF S004730G75

DIAGNOSIS:

The POWER Indicator light circuit is open or shorted.

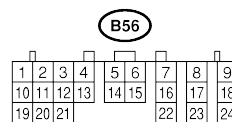
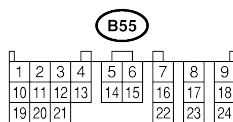
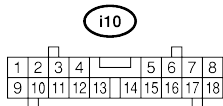
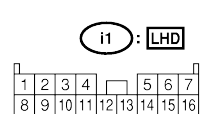
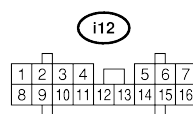
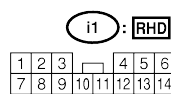
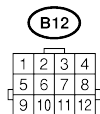
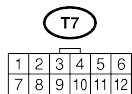
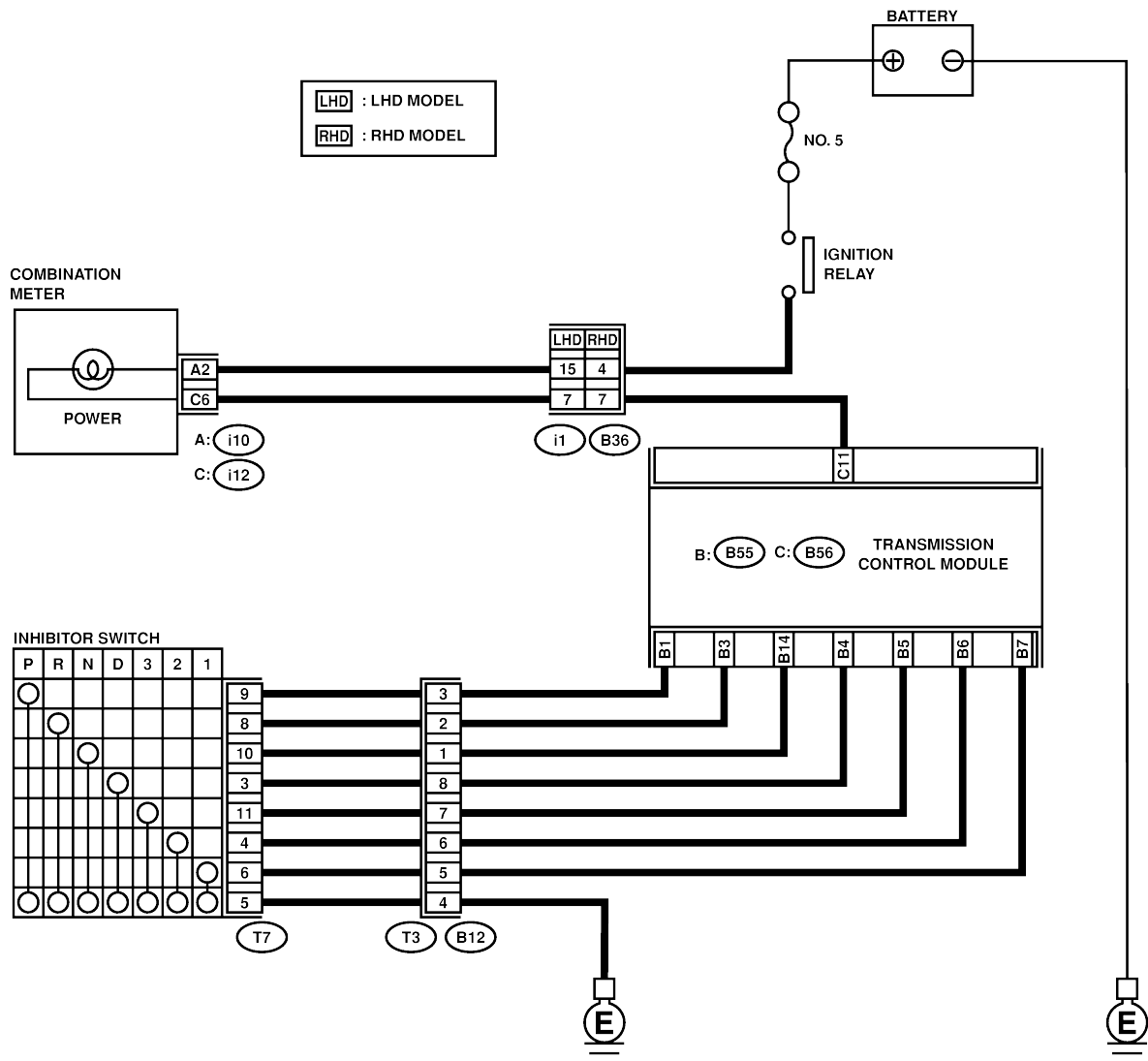
TROUBLE SYMPTOM:

- When ignition switch is turned to ON (engine OFF), POWER indicator light does not illuminate.
- When on-board diagnostics is performed, POWER indicator light remains illuminated.

DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

Automatic Transmission (Diagnostics)

WIRING DIAGRAM:



S3M0621

No.	Step	Check	Yes	No
1	CHECK POWER INDICATOR LIGHT. Turn ignition switch to ON (engine OFF).	Does POWER indicator light illuminate?	Go to step 3.	Go to step 2.

DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	CHECK POWER INDICATOR LIGHT. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove POWER indicator light bulb from combination meter.	Is POWER indicator light bulb OK?	Go to step 4.	Replace POWER indicator light bulb.
3	CHECK POWER INDICATOR LIGHT. Perform "Read Diagnostic Trouble Code". <Ref. to AT-22, WITHOUT SUBARU SELECT MONITOR OPERATION, Read Diagnostic Trouble Code.>	Does POWER indicator light blink?	A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM, inhibitor switch and combination meter.	Go to step 9.
4	CHECK FUSE (No. 5). Remove fuse (No. 5).	Is the fuse (No. 5) blown out?	Replace fuse (No. 5). If replaced fuse (No. 5) is blown out easily, repair short circuit in harness between fuse (No. 5) and combination meter.	Go to step 5.
5	CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION RELAY. 1) Turn ignition switch to ON (engine OFF). 2) Measure voltage between combination meter connector and chassis ground. Connector & terminal (i10) No. 2 (+) — Chassis ground (-):	Is voltage more than 9 V?	Go to step 6.	Repair open or short circuit in harness between combination meter and battery.
6	CHECK COMBINATION METER. Measure voltage between combination meter connector and chassis ground. Connector & terminal (i12) No. 6 (+) — Chassis ground (-):	Is voltage less than 1 V?	Go to step 7.	Repair combination meter. <Ref. to IDI-15, Combination Meter Assembly.>
7	CHECK OPEN CIRCUIT OF HARNESS. 1) Turn ignition switch to OFF. 2) Disconnect TCM and combination meter connector. 3) Measure resistance of harness between combination meter. Connector & terminal (B56) No. 11 — (i12) No. 6:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
8	CHECK INPUT SIGNAL FOR TCM. 1) Connect connector to TCM and combination meter. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. Connector & terminal (B56) No. 11 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
9	CHECK SUBARU SELECT MONITOR.	Do you have SUBARU SELECT MONITOR?	Go to step 10.	Go to step 11.

DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	CHECK INHIBITOR SWITCH. 1) Connect Subaru Select Monitor to data link connector. 2) Turn ignition switch to ON. 3) Subaru Select Monitor to ON. 4) Read data of range switch using Subaru Select Monitor. • Range switch is indicated in ON ⇔ OFF.	When each range is selected, does LED of Subaru Select Monitor light up?	Go to step 11.	Check inhibitor switch circuit. <Ref. to AT-122, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-trouble Code.>
11	CHECK SHORT CIRCUIT OF HARNESS. 1) Disconnect connector from TCM. 2) Remove combination meter. 3) Disconnect connector from combination meter. 4) Measure resistance of harness connector between TCM and chassis ground. Connector & terminal/specified resistance (B56) No. 11 (+) — Chassis ground (-):	Is the resistance less than 1 MΩ?	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>	Repair short circuit in harness between combination meter connector and TCM connector.

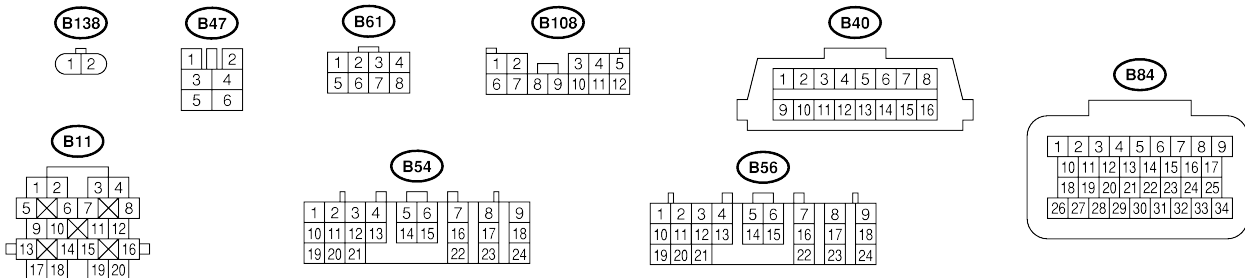
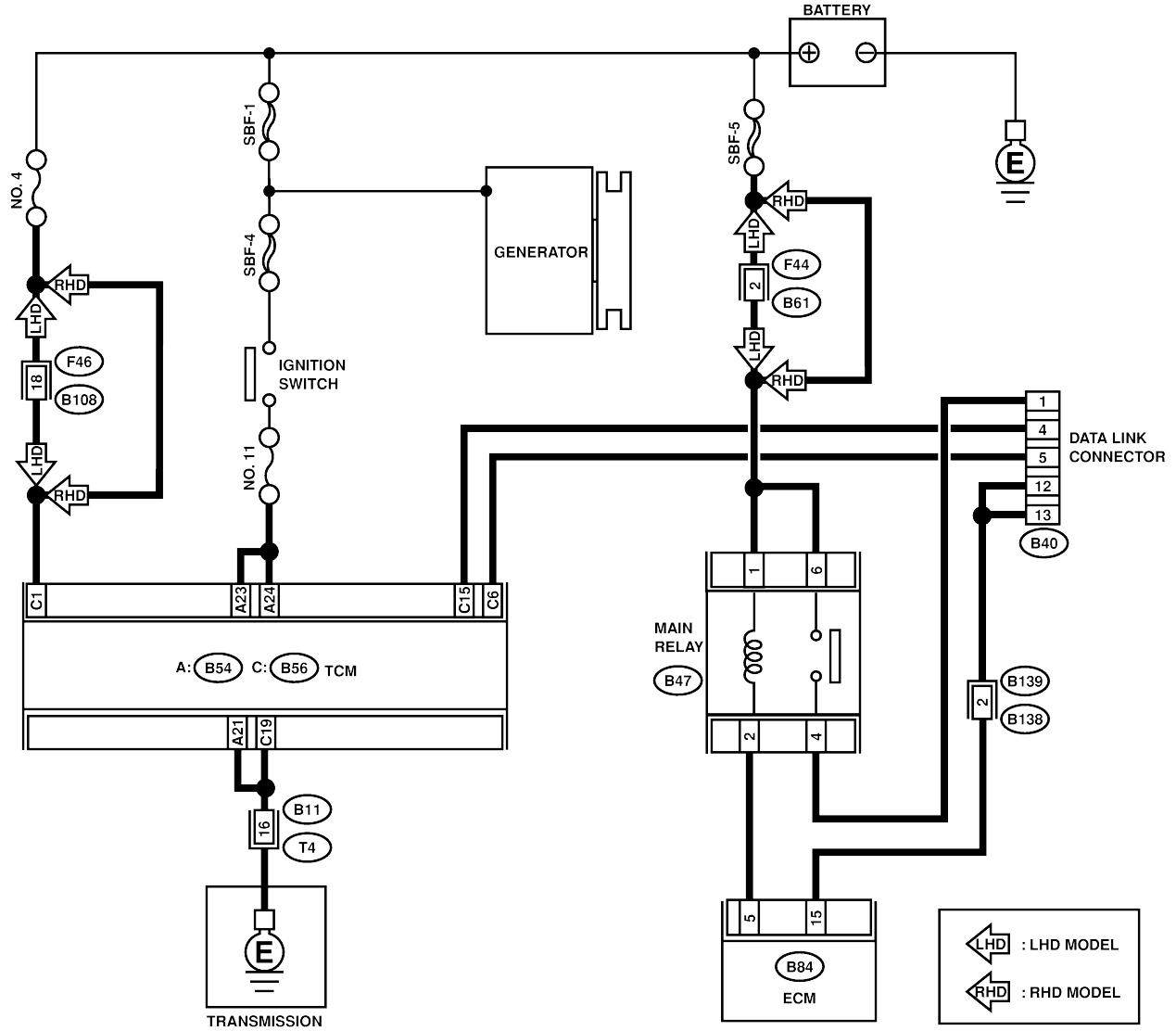
DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

Automatic Transmission (Diagnostics)

B: CHECK POWER SUPPLY AND GROUND LINE

S004730G86

WIRING DIAGRAM:
WITHOUT OBD MODEL

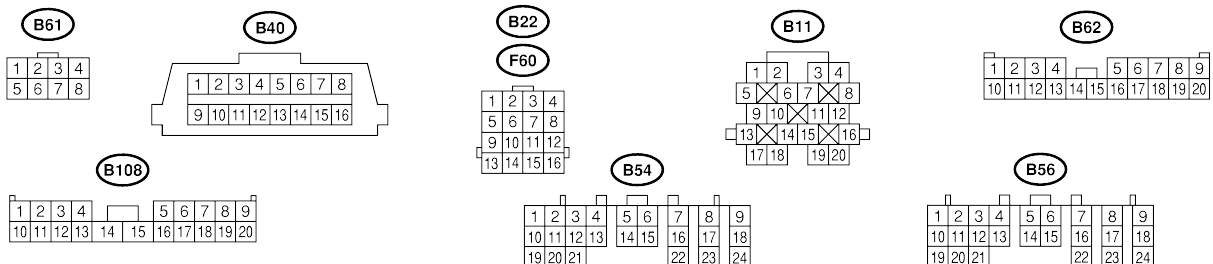
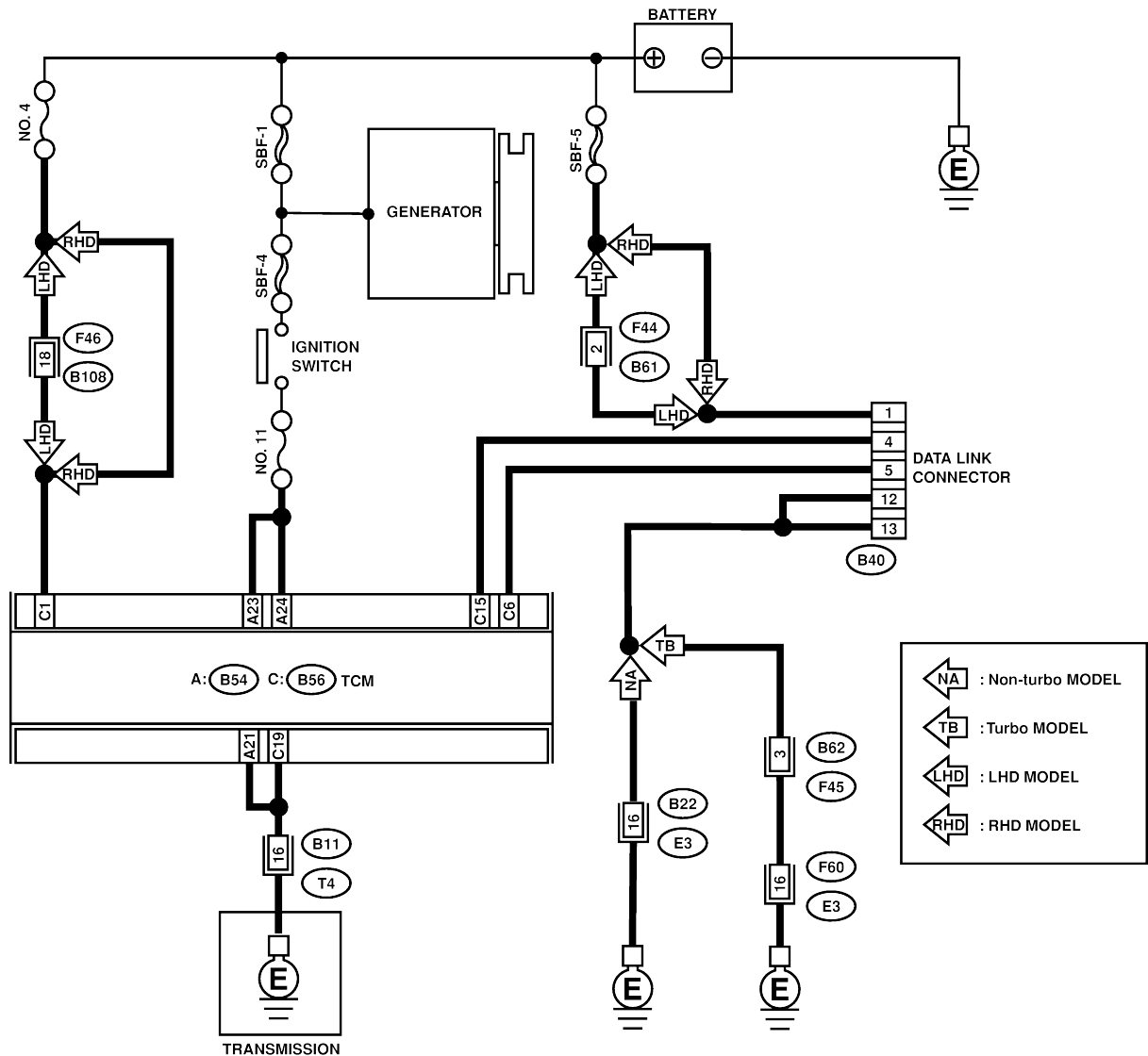


S3M0623

DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

Automatic Transmission (Diagnostics)

WITH OBD MODEL



S3M0622

DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK IGNITION SWITCH.	Is ignition switch ON?	Go to step 2.	Turn ignition switch ON.
2	CHECK GENERATOR. 1) Start the engine. 2) Idle the engine. 3) Measure voltage between generator and chassis ground. Terminal Generator B terminal (+) — Chassis ground (-):	Is the voltage between 10 and 15 V?	Go to step 3.	Repair generator. <Ref. to SC-12, Generator.>
3	CHECK BATTERY TERMINAL. Turn ignition switch to OFF.	Is there poor contact at battery terminal?	Repair battery terminal.	Go to step 4.
4	CHECK POWER SUPPLY OF TCM. 1) Disconnect connector from TCM. 2) Turn ignition switch to ON. 3) Measure voltage between TCM connector and chassis ground. Connector & terminal (B56) No. 1 (+) — Chassis ground (-):	Is the voltage between 10 and 15 V?	Go to step 6.	Go to step 5.
5	CHECK FUSE (NO. 4). Remove fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Repair open circuit in harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact in coupling connector.
6	CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn ignition switch to ON (engine OFF). 2) Measure ignition power supply voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 23 (+) — Chassis ground (-): (B54) No. 24 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 8.	Go to step 7.
7	CHECK FUSE (NO. 11). Remove fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair open circuit in harness between fuse (No. 11) and TCM, or fuse (No. 11) and battery, and poor contact in coupling connector.
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B56) No. 19 — (B11) No. 16 (B54) No. 21 — (B11) No. 16	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between TCM and transmission harness connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
9	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND. Measure resistance of harness between transmission and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair open circuit in harness between transmission and transmission ground.
10	CHECK POOR CONTACT IN CONNECTORS.	Is there poor contact in control module power supply and ground line?	Repair connector.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

13. Diagnostic Procedure for Select Monitor Communication S004782

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE S004782E34

DIAGNOSIS:

- Faulty harness connector

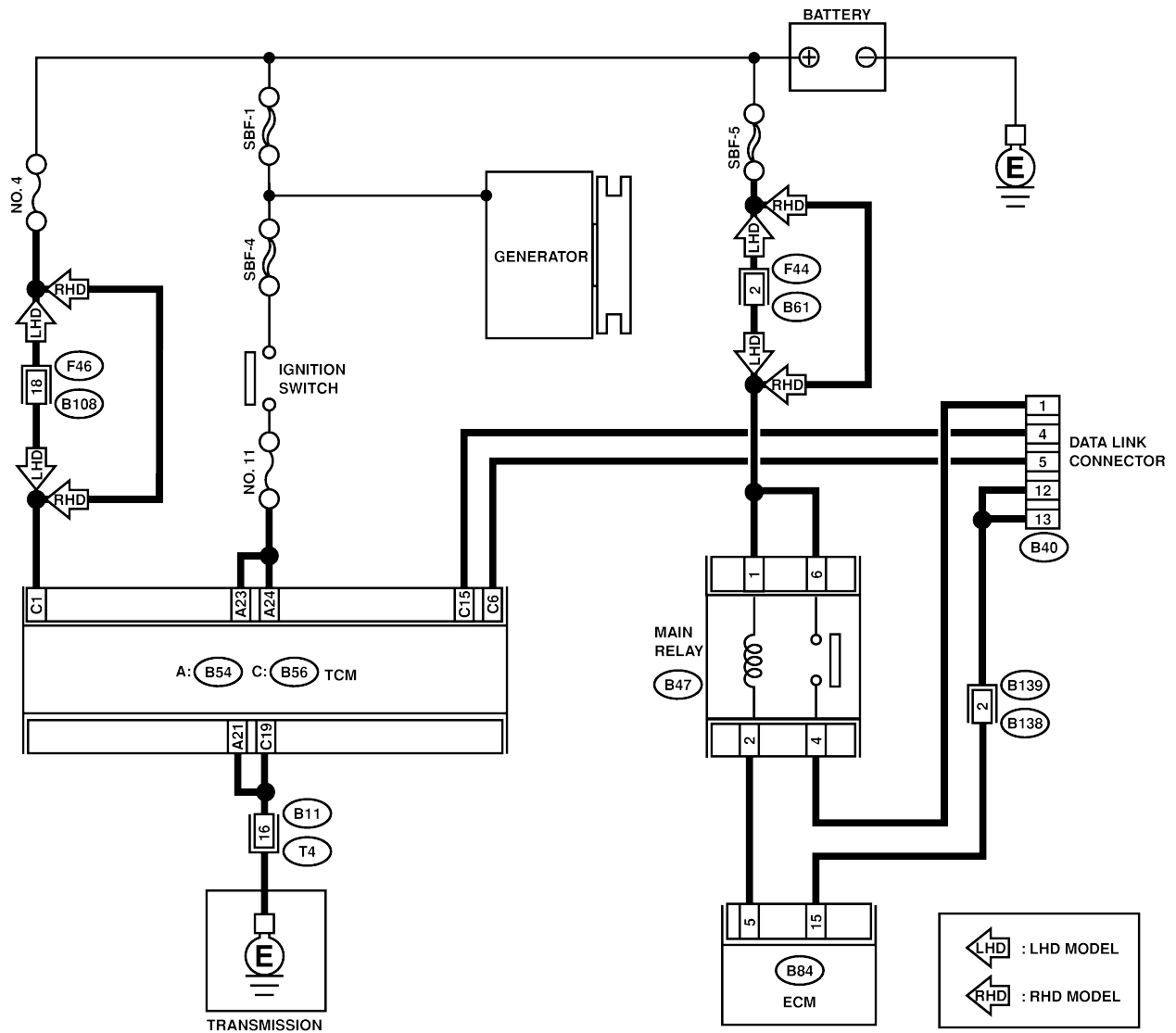
TROUBLE SYMPTOM:

- Select monitor communication failure

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

Automatic Transmission (Diagnostics)

WIRING DIAGRAM: WITHOUT OBD

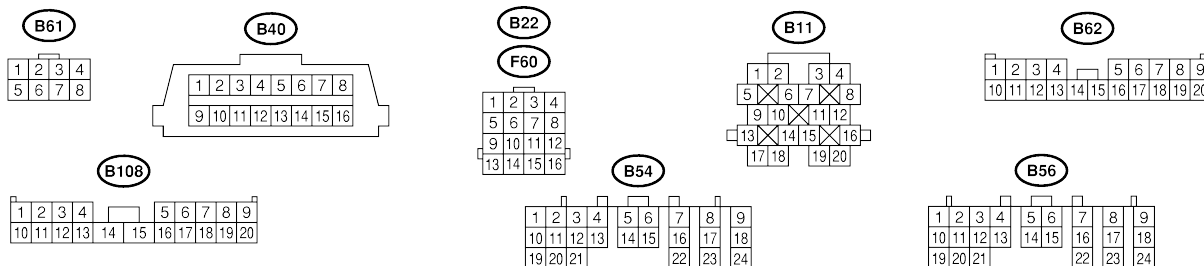
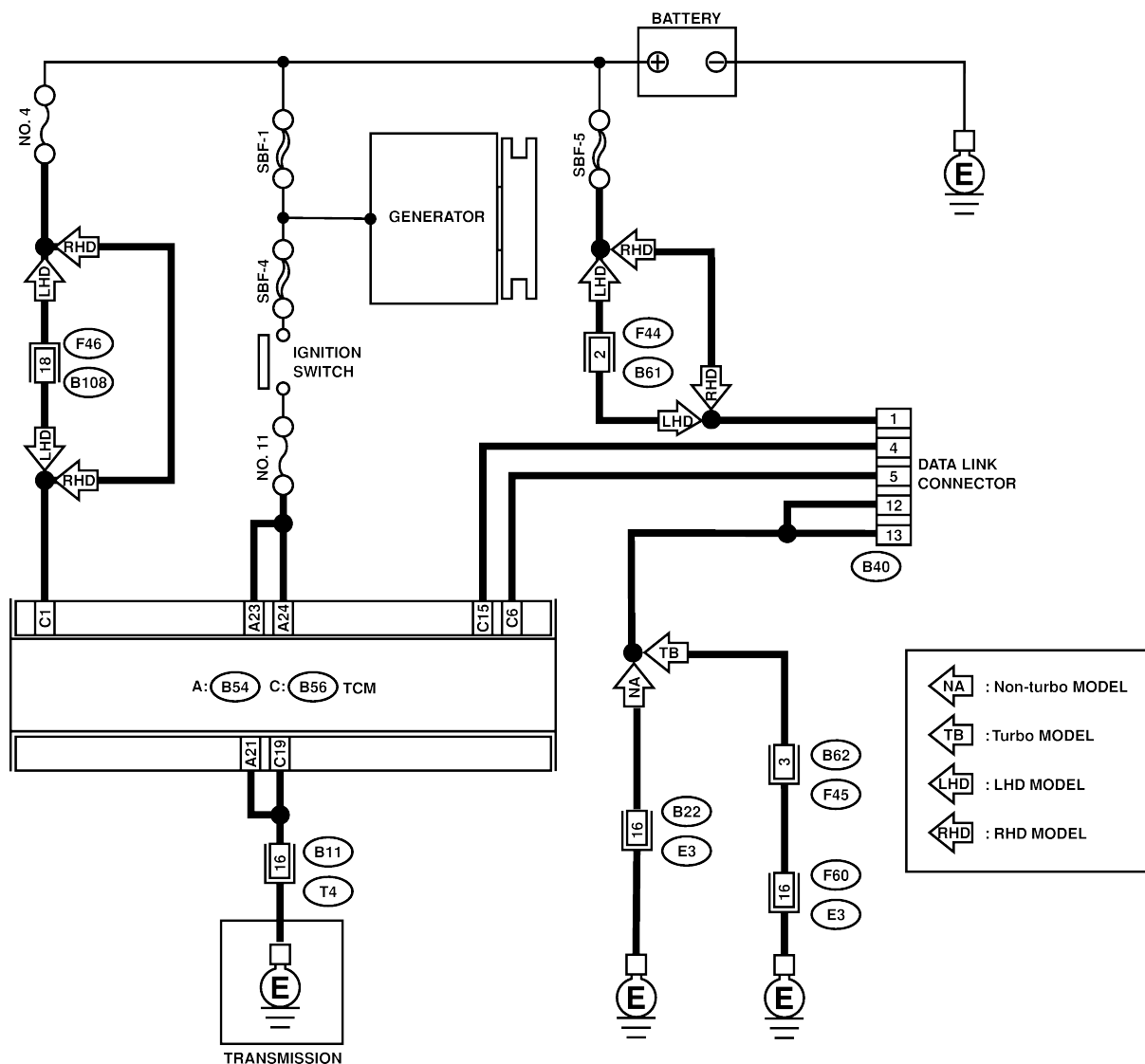


S3M0623

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

Automatic Transmission (Diagnostics)

WITH OBD



S3M0622

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK THE VEHICLE.	Is the target vehicle without OBD?	Go to step 2.	Go to step 10.
2	CHECK MAIN RELAY. 1) Turn ignition switch to OFF. 2) Remove main relay. 3) Connect battery to main relay terminals No. 2 (+) and No. 1 (-). 4) Measure resistance between main relay terminal. Terminal No. 4 — No. 6	Is the resistance less than 10 Ω?	Go to step 3.	Replace main relay.
3	CHECK GROUND CIRCUIT OF ECM. <Ref. to AT-50, TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step 4.
4	CHECK HARNESS BETWEEN ECM AND MAIN RELAY. 1) Remove main relay connector. 2) Measure voltage between main relay and chassis ground. Connector & terminal (B47) No. 1 — Chassis ground:	Is the voltage more than 10 V?	Go to step 5.	Repair short circuit in harness between battery and main relay connector.
5	CHECK INPUT VOLTAGE TO ECM. 1) Install main relay. 2) Disconnect ECM connector. 3) Measure voltage between ECM connector and chassis ground. Connector & terminal (B84) No. 5 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 6.	Repair open or short circuit in harness between ECM and main relay connector, then replace ECM.
6	CHECK INPUT VOLTAGE TO SUBARU SELECT MONITOR. 1) Connect main relay connector. 2) Turn ignition switch to ON. 3) Measure voltage between data link connector and chassis ground. Connector & terminal (B40) No. 1 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 7.	Repair harness and connector between data link connector and battery.
7	CHECK SUBARU SELECT MONITOR GROUND CIRCUIT. 1) Turn ignition switch to OFF. 2) Disconnect ECM connector. 3) Measure resistance between data link connector and chassis ground. Connector & terminal (B40) No. 12 — Chassis ground: (B40) No. 13 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 8.	Repair harness and connector between data link connector and ECM connector.
8	CHECK HARNESS BETWEEN BATTERY AND MAIN RELAY. 1) Connect ECM connector. 2) Measure resistance of harness between data link connector and chassis ground. Connector & terminal (B40) No. 12 — Chassis ground: (B40) No. 13 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 9.	Replace ECM.

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
9	CHECK SUBARU SELECT MONITOR GROUND CIRCUIT. Measure resistance between data link connector and ECM connector. <i>Connector & terminal</i> (B40) No. 12 — (B84) No. 15: (B40) No. 13 — (B84) No. 15:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair harness and connector between data link connector and ECM connector, or replace ECM.
10	CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT. Measure voltage between data link connector and chassis ground. <i>Connector & terminal</i> (B40) No. 1 — Chassis ground:	Is the voltage more than 10 V?	Go to step 11.	Repair harness and connector between battery and data link connector, and poor contact in coupling connector.
11	CHECK SUBARU SELECT MONITOR GROUND CIRCUIT. Measure resistance of harness between data link connector and chassis ground. <i>Connector & terminal</i> (B40) No. 12 — Chassis ground: (B40) No. 13 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
12	CHECK COMMUNICATION OF SELECT MONITOR. 1) Connect ECM connector (Vehicle without OBD) 2) Turn ignition switch to ON. 3) Using the select monitor, check whether communication to other systems (such as engine, ABS etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step 17.	Go to step 13.
13	CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn ignition switch to OFF. 2) Disconnect TCM connector. 3) Check whether communication to other systems (such as ABS etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step 19.	Go to step 14.
14	CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn ignition switch to OFF. 2) Connect TCM connector. 3) Disconnect ECM connector. 4) Check whether communication to other systems (such as ABS etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect ECM.	Go to step 15.
15	CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn ignition switch to OFF. 2) Connect ECM connector. 3) Disconnect ABSCM&H/U connector. 4) Check whether communication to other systems (such as engine etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect ABSCM&H/U.	Go to step 16.

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
16	CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn ignition switch to OFF. 2) Connect ABSCM&H/U module connector. 3) Disconnect cruise control module connector. 4) Check whether communication to other systems (such as engine etc.) can be executed normally. NOTE: If the vehicle is not equipped with cruise control, Go to step 17.	Are the name and year of the system displayed on the select monitor?	Inspect cruise control module.	Go to step 17.
17	CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect TCM, ECM, ABSCM&H/U and cruise control module connectors. 3) Measure resistance between data link connector and chassis ground. Connector & terminal (B40) No. 5 — Chassis ground: (B40) No. 4 — Chassis ground:	Is the resistance more than 1M Ω ?	Go to step 18.	Repair harness and connector between each control module and data link connector.
18	CHECK OUTPUT SIGNAL FOR TCM. 1) Turn ignition switch to ON. 2) Measure voltage between data link connector and chassis ground. Connector & terminal (B40) No. 5 — Chassis ground: (B40) No. 4 — Chassis ground:	Is the voltage more than 1 V?	Repair harness and connector between each control module and data link connector.	A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the circuit.
19	CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR. Measure resistance between TCM connector and data link connector. Connector & terminal (B56) No. 6 — (B40) No. 5: (B56) No. 15 — (B40) No. 4:	Is the resistance less than 0.5 Ω ?	Go to step 20.	Repair harness and connector between TCM and data link connector.
20	CHECK INSTALLATION OF TCM CONNECTOR. Turn ignition switch to OFF.	Is TCM connector inserted into TCM?	Go to step 21.	Insert TCM connector into TCM.
21	CHECK POOR CONTACT IN CONNECTORS.	Is there poor contact in control module and data link connector?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

14. Diagnostic Procedure with Trouble Code S004509

A: TROUBLE CODE 11 — ENGINE SPEED SIGNAL — S004509C39

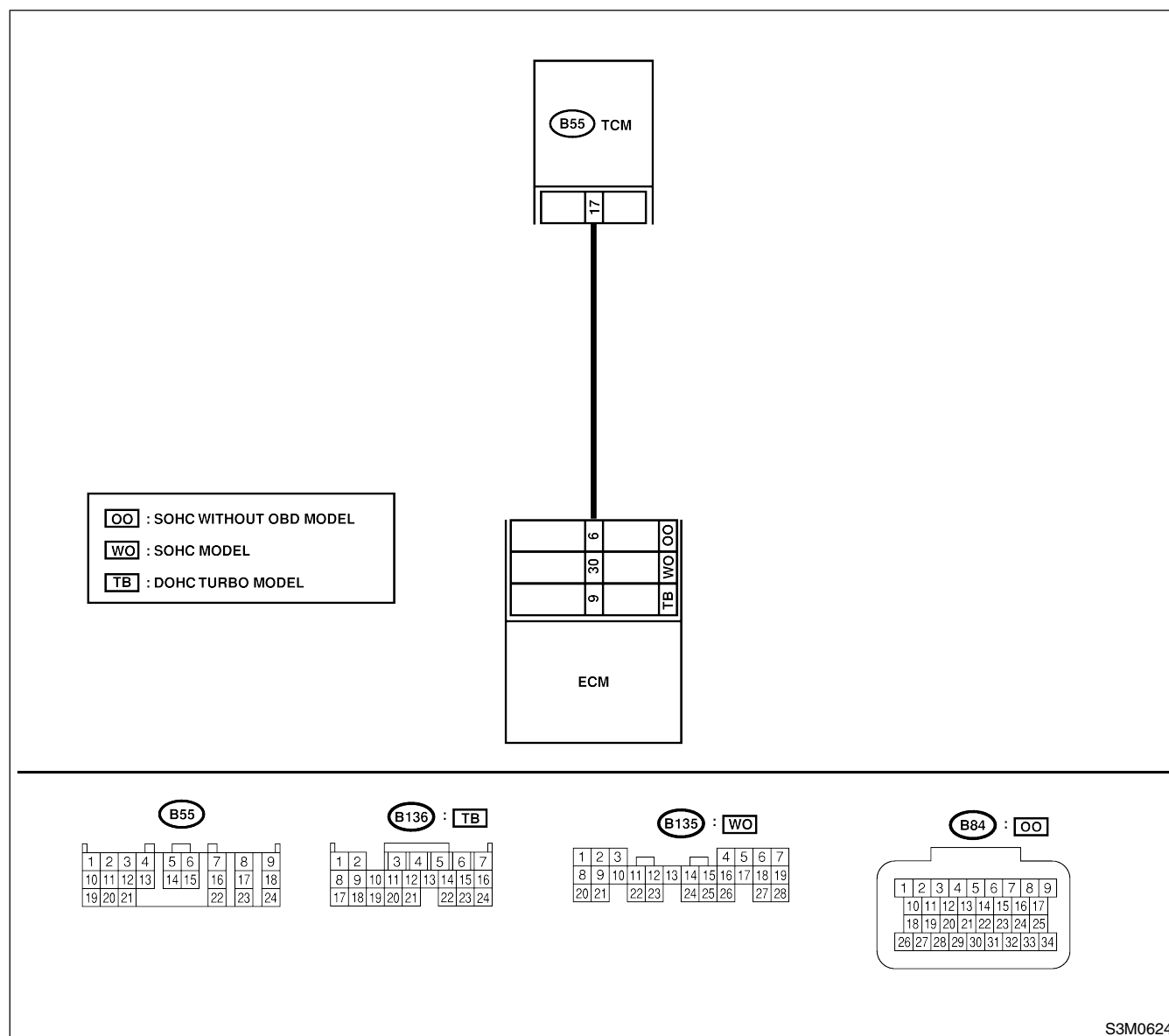
DIAGNOSIS:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- POWER indicator light remains on when vehicle speed is "0".

WIRING DIAGRAM:



S3M0624

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. Connector & terminal SOHC model: (B55) No. 17 — (B135) No. 30: SOHC without OBD: (B55) No. 17 — (B84) No. 6: DOHC TURBO: (B55) No. 17 — (B136) No. 9:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 17 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
3	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 5.	Go to step 4.
4	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. Connector & terminal (B55) No. 17 (+) — Chassis ground (-):	Is the voltage more than 10.5 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 6.
5	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of engine speed using Subaru Select Monitor. ● Display shows engine speed signal value sent from ECM.	Is the revolution value the same as the tachometer reading shown on the combination meter?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 6.
6	CHECK POOR CONTACT.	Is there poor contact in engine speed signal circuit?	Repair poor contact.	Go to step 7.
7	CONFIRM TROUBLE CODE 11.	Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>	Replace ECM.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

B: TROUBLE CODE 23 — MASS AIR FLOW SIGNAL — S004509101

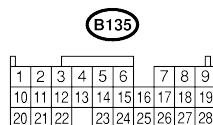
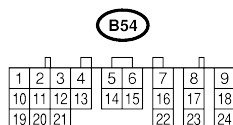
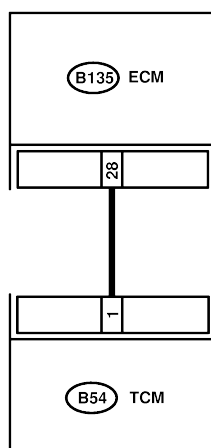
DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



S3M0625

No.	Step	Check	Yes	No
1	CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM <Ref. to AT-50, TROUBLE CODE 31 - THROTTLE POSITION SENSOR -, Diagnostic Procedure with Trouble Code.>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step 2.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. Connector & terminal (B54) No. 1 — (B135) No. 28:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and ECM connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 1 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and ECM connector.
4	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 6.	Go to step 5.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
5	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and ECM. 2) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Engine idling. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 1 (+) — Chassis ground (-):	Is the voltage between 0.4 and 1.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
6	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of intake manifold pressure signal using Subaru Select Monitor. ● Display shows intake manifold pressure signal value sent from ECM.	Is the value between 0.4 and 1.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
7	CHECK POOR CONTACT.	Is there poor contact in intake manifold pressure signal circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

C: TROUBLE CODE 27 — ATF TEMPERATURE SENSOR — S004509C76

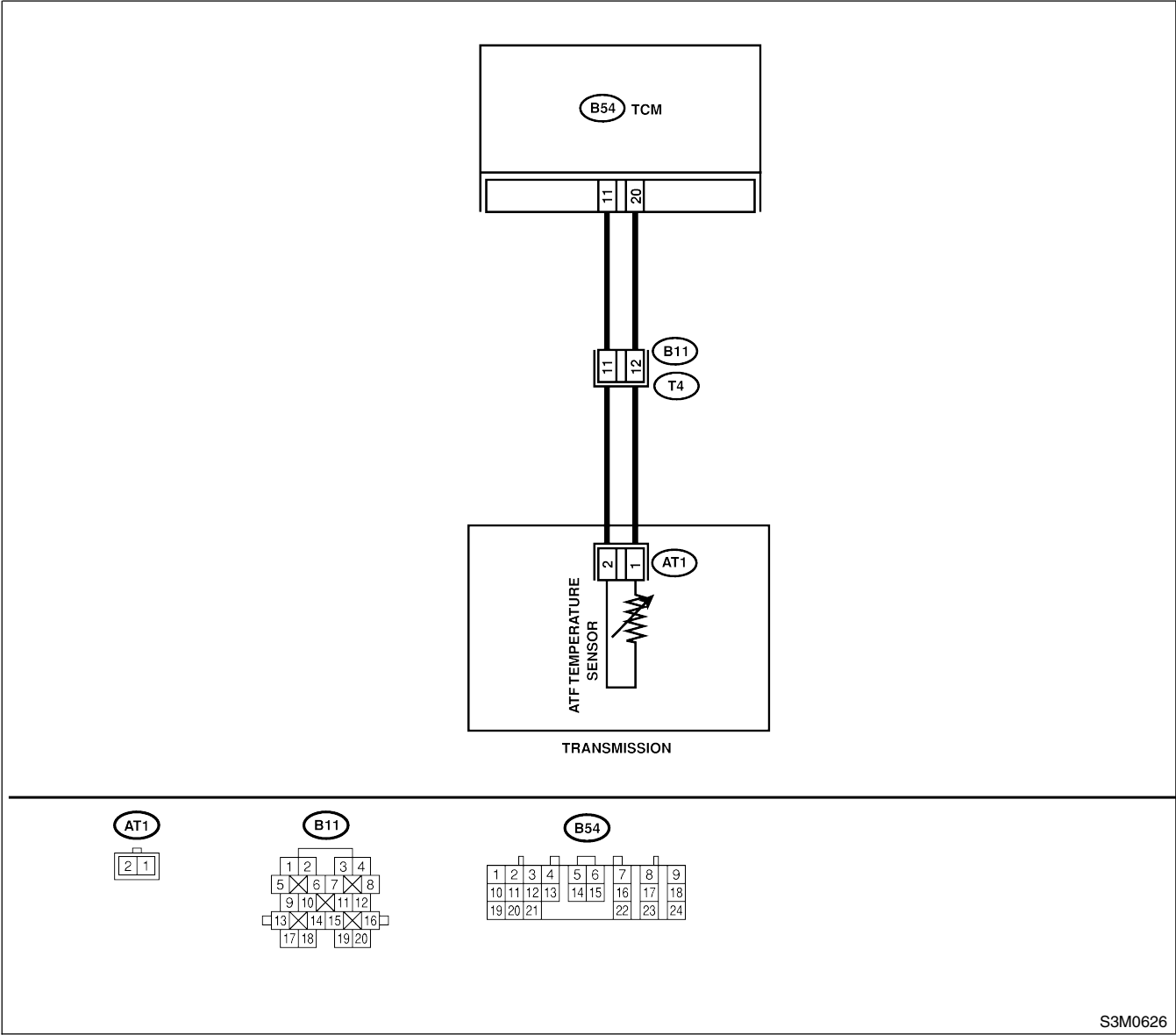
DIAGNOSIS:

Input signal circuit of TCM to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



S3M0626

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 20 — (B11) No. 12:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 11 — (B11) No. 11:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 20 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 11 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	CHECK ATF TEMPERATURE SENSOR. 1) Turn ignition switch to OFF. 2) Connect connectors to transmission and TCM. 3) Turn ignition switch to ON and start engine. 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect connector from transmission. 6) Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 12:	Is the resistance between 275 and 375 Ω ?	Go to step 6.	Go to step 11.
6	CHECK ATF TEMPERATURE SENSOR. 1) Turn ignition switch to ON (engine OFF). 2) Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 12:	Does the resistance value increase while the ATF temperature decreases?	Go to step 7.	Go to step 11.
7	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	CHECK INPUT SIGNAL FOR TCM. 1) Connect connector to transmission. 2) Warm-up the transmission until ATF temperature is about 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure voltage between TCM connector terminal. Connector & terminal (B54) No. 11 (+) — No. 20 (-):	Is the voltage between 0.4 and 0.9 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step 10.
9	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connector to transmission. 2) Turn ignition switch to ON (engine OFF).	Does the ATF temperature gradually decrease?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step 10.
10	CHECK POOR CONTACT.	Is there poor contact in ATF temperature sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
11	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Remove transmission connector from bracket. 4) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 5) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 6) Remove oil pan, and disconnect connector from ATF temperature sensor connector. 7) Measure resistance of harness between ATF temperature sensor and transmission connector. Connector & terminal (T4) No. 11 — (AT1) No. 2:	Is the resistance less than 1 Ω?	Go to step 12.	Repair open circuit in harness between ATF temperature sensor and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
12	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure resistance of harness between ATF temperature sensor and transmission connector. <i>Connector & terminal (T4) No. 12 — (AT1) No. 1:</i>	Is the resistance less than 1 Ω ?	Go to step 13.	Repair open circuit in harness between ATF temperature sensor and transmission connector.
13	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure resistance of harness between transmission connector and transmission ground. <i>Connector & terminal (T4) No. 11 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 14.	Repair short circuit in harness between ATF temperature sensor and transmission connector.
14	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure resistance of harness between transmission connector and transmission ground. <i>Connector & terminal (T4) No. 12 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Replace ATF temperature sensor. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>	Repair short circuit in harness between ATF temperature sensor and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

D: TROUBLE CODE 31 — THROTTLE POSITION SENSOR — S004509C94

DIAGNOSIS:

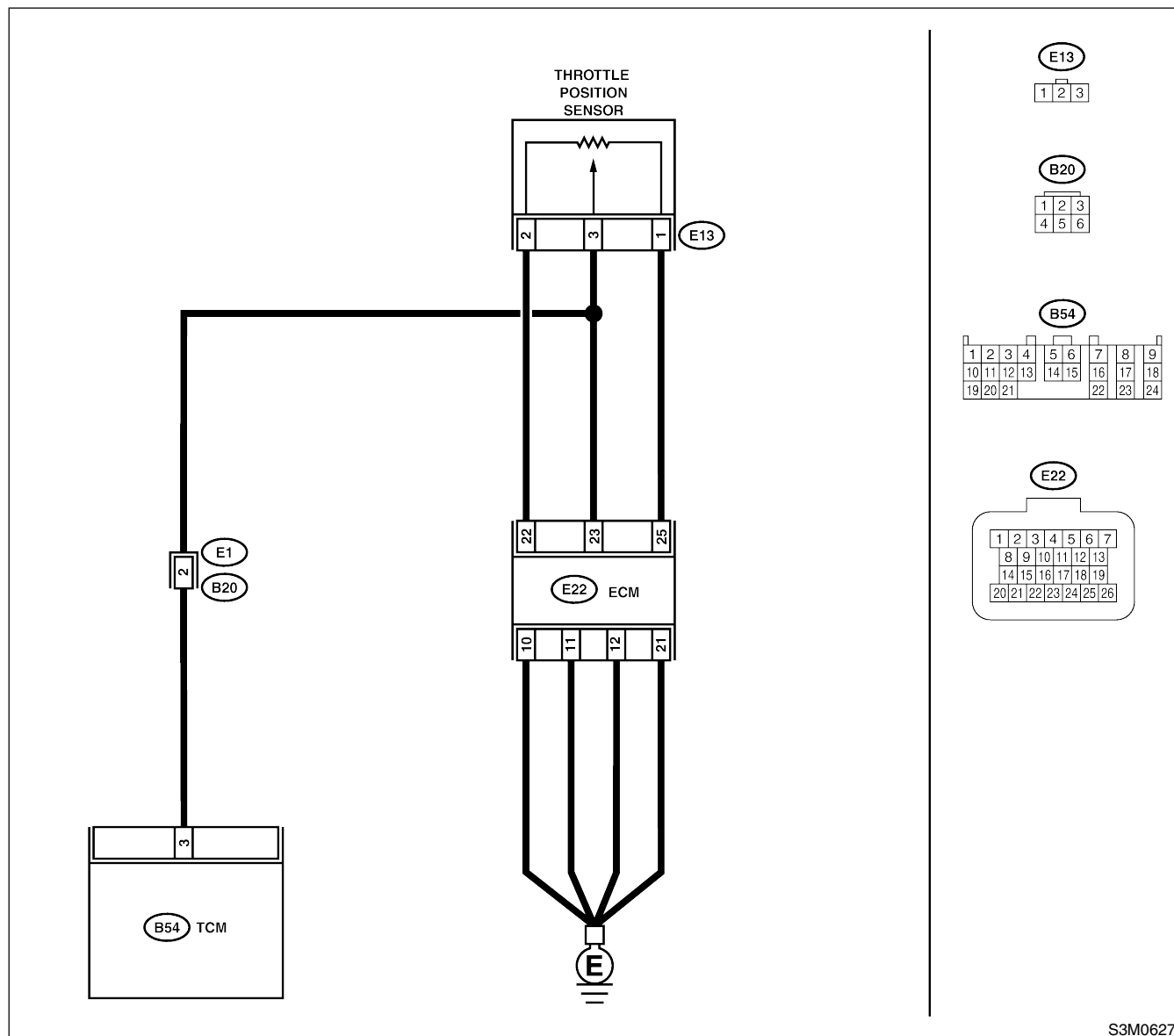
Input signal circuit of throttle position sensor is open or shorted.

TROUBLE SYMPTOM:

Shift point too high or too low; excessive shift shock; excessive tight corner “braking”.

WIRING DIAGRAM:

SOHC w/o OBD

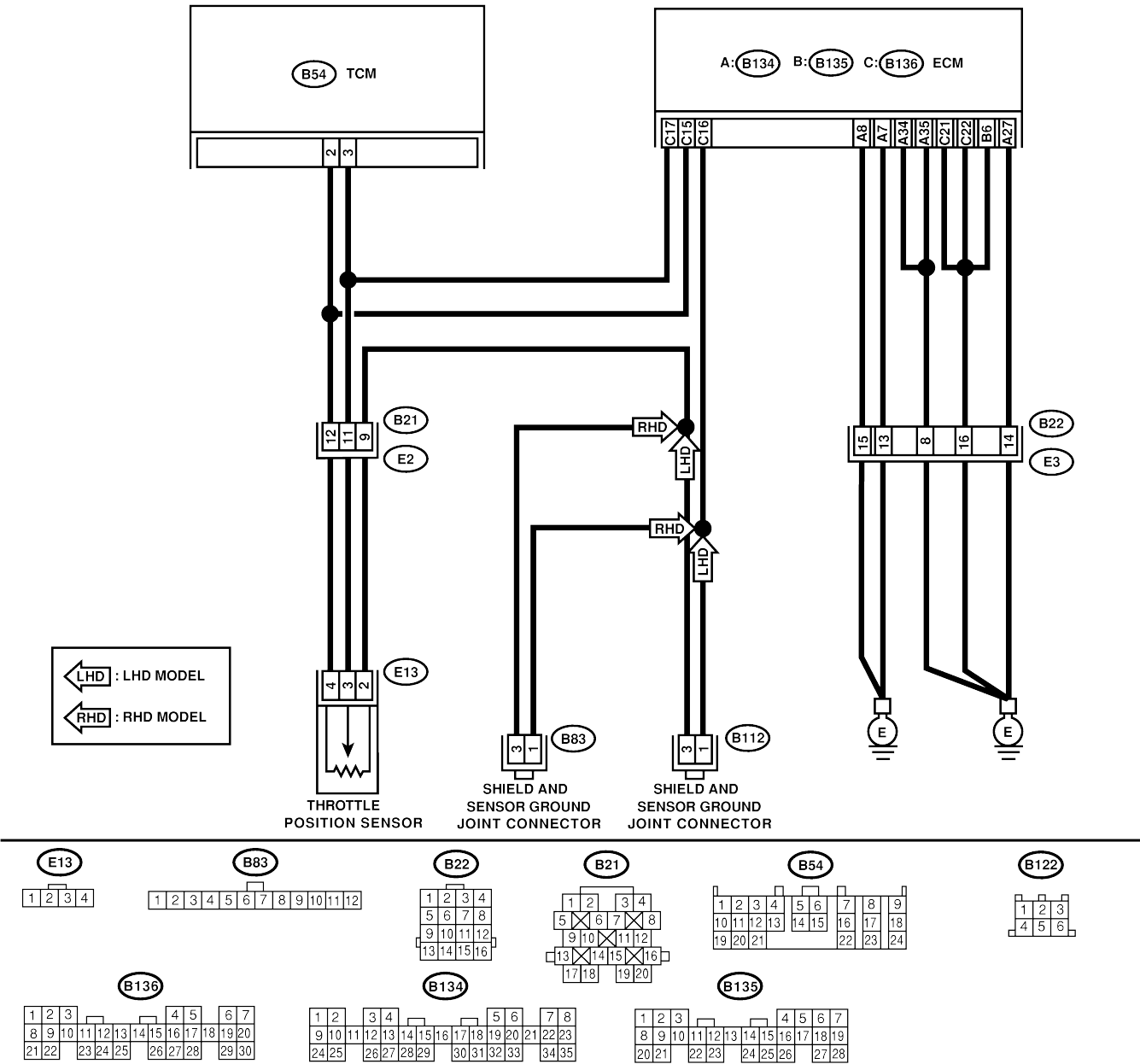


S3M0627

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

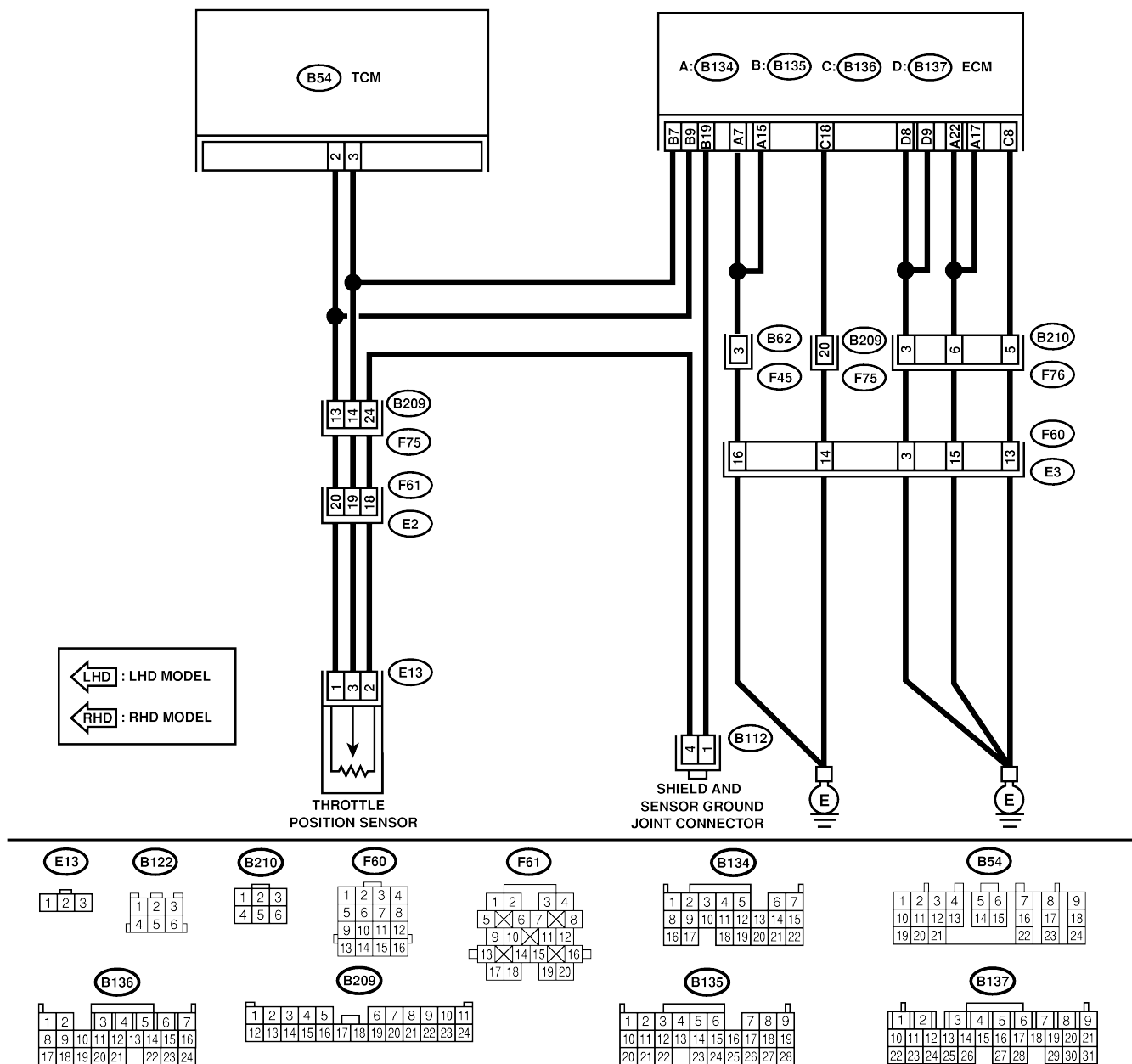
SOHC



DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

DOHC TURBO FOR LHD

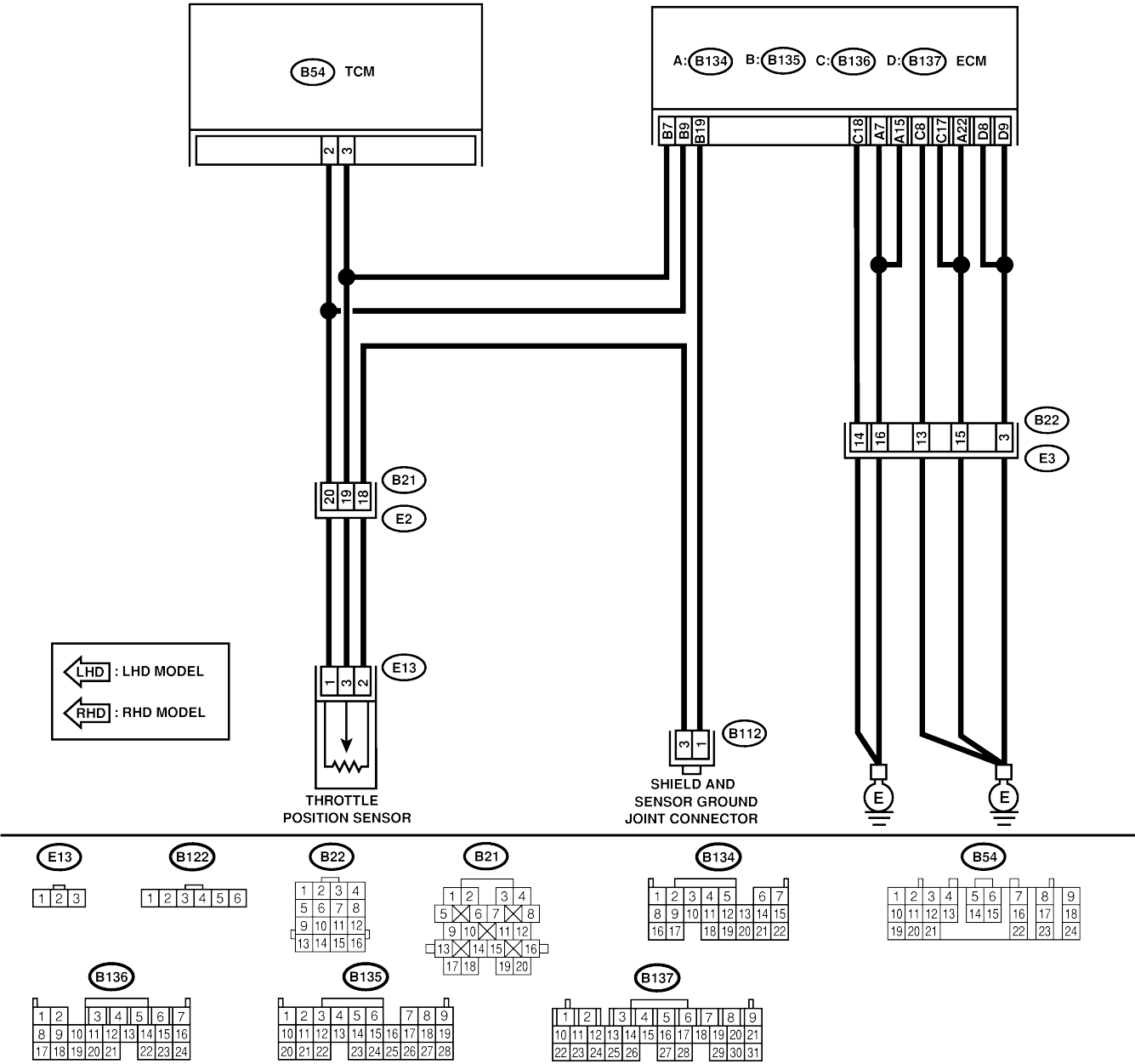


S3M0647

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

DOHC TURBO FOR RHD



S3M0648

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK ENGINE GROUND TERMINALS.	Have engine ground terminals been tightened?	Go to step 2.	Tighten engine ground terminals.
2	CHECK GROUND CIRCUIT OF ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and engine ground. Connector & terminal SOHC MODEL: <i>(B134) No. 27 — Engine ground:</i> <i>(B134) No. 8 — Engine ground:</i> <i>(B134) No. 7 — Engine ground:</i> <i>(B136) No. 21 — Engine ground:</i> <i>(B136) No. 22 — Engine ground:</i> <i>(B134) No. 35 — Engine ground:</i> <i>(B134) No. 34 — Engine ground:</i> <i>(B135) No. 6 — Engine ground:</i> SOHC w/o OBD MODEL <i>(E22) No. 10 — Engine ground:</i> <i>(E22) No. 11 — Engine ground:</i> <i>(E22) No. 12 — Engine ground:</i> <i>(E22) No. 21 — Engine ground:</i> DOHC TURBO MODEL: <i>(B134) No. 7 — Engine ground:</i> <i>(B134) No. 15 — Engine ground:</i> <i>(B134) No. 22 — Engine ground:</i> <i>(B136) No. 8 — Engine ground:</i> <i>(B136) No. 17 — Engine ground:</i> <i>(B136) No. 18 — Engine ground:</i> <i>(B137) No. 8 — Engine ground:</i> <i>(B137) No. 9 — Engine ground:</i>	Is the resistance less than 5 Ω ?	Go to step 3.	Repair open circuit in harness between ECM connector and engine grounding terminal.
3	CHECK THROTTLE POSITION SENSOR. 1) Disconnect connector from throttle position sensor. 2) Measure resistance between throttle position sensor connector receptacle's terminals. Terminals SOHC MODEL: <i>No. 4 — No. 2:</i> EXCEPT SOHC MODEL: <i>No. 1 — No. 2:</i>	Is the resistance between 3.0 and 4.2 k Ω ?	Go to step 4.	Replace throttle position sensor.
4	CHECK THROTTLE POSITION SENSOR. Measure resistance between throttle position sensor connector receptacle's terminals. Terminals <i>No. 2 — No. 3:</i>	Is the resistance between 0.35 and 0.5 k Ω ?	Go to step 5.	Replace throttle position sensor.
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and throttle position sensor connector. Connector & terminal <i>(B55) No. 3 — (E13) No. 3:</i>	Is the resistance less than 1 Ω ?	Go to step 6.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
6	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM and throttle position sensor connector. Connector & terminal (B54) No. 2 — (E13) No. 4: NOTE: If SOHC w/o OBD model, Go to step 7.	Is the resistance less than 1 Ω ?	Go to step 7.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
7	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 3 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 8.	Repair short circuit in harness between TCM and throttle position sensor connector.
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 2 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 9.	Repair short circuit in harness between TCM and throttle position sensor connector.
9	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM and ECM connector. Connector & terminal SOHC w/o OBD MODEL: (B54) No. 3 — (E22) No. 23: SOHC MODEL: (B54) No. 3 — (B136) No. 17: DOHC TURBO: (B54) No. 3 — (B135) No. 7:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair open circuit in harness between TCM and ECM connector.
10	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM and ECM connector. Connector & terminal (B54) No. 2 — (B136) No. 15: NOTE: If SOHC w/o OBD model, Go to step 11.	Is the resistance less than 1 Ω ?	Go to step 11.	Repair open circuit in harness between TCM and ECM connector.
11	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 14.	Go to step 12.
12	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Close the throttle completely. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 3 (+) — Chassis ground (-):	Is the voltage between 0.3 and 0.7 V in throttle fully closed?	Go to step 13.	Go to step 18.
13	CHECK INPUT SIGNAL FOR TCM. 1) Open the throttle completely. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 3 (+) — Chassis ground (-):	Is the voltage between 4.0 and 4.6 V with throttle fully open?	Go to step 16.	Go to step 18.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
14	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF). 4) Turn Subaru Select Monitor switch to ON. 5) Throttle fully closed. 6) Read data of throttle position sensor using Subaru Select Monitor. ● Throttle position sensor input signal is indicated.	Is the value voltage between 0.3 and 0.7 V?	Go to step 15.	Go to step 18.
15	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. Throttle fully open. NOTE: Must be changed correspondingly with accelerator pedal operation (from "released" to "depressed" position).	Is the value voltage between 4.0 and 4.6 V?	Go to step 17.	Go to step 18.
16	CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY). Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 2 (+) — Chassis ground (-):	Is the voltage between 4.8 and 5.3 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.	Go to step 18.
17	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY). Read data of throttle position sensor power supply using Subaru Select Monitor. ● Throttle position sensor power supply voltage is indicated.	Is the value voltage between 4.8 and 5.3 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.	Go to step 18.
18	CHECK POOR CONTACT.	Is there poor contact in throttle position sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

E: TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR — S004509F60

DIAGNOSIS:

- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

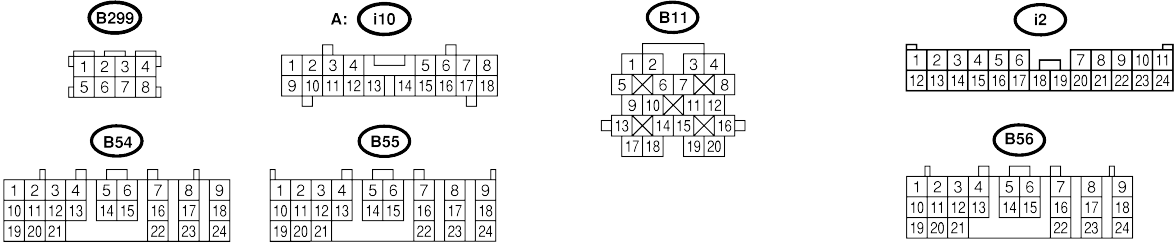
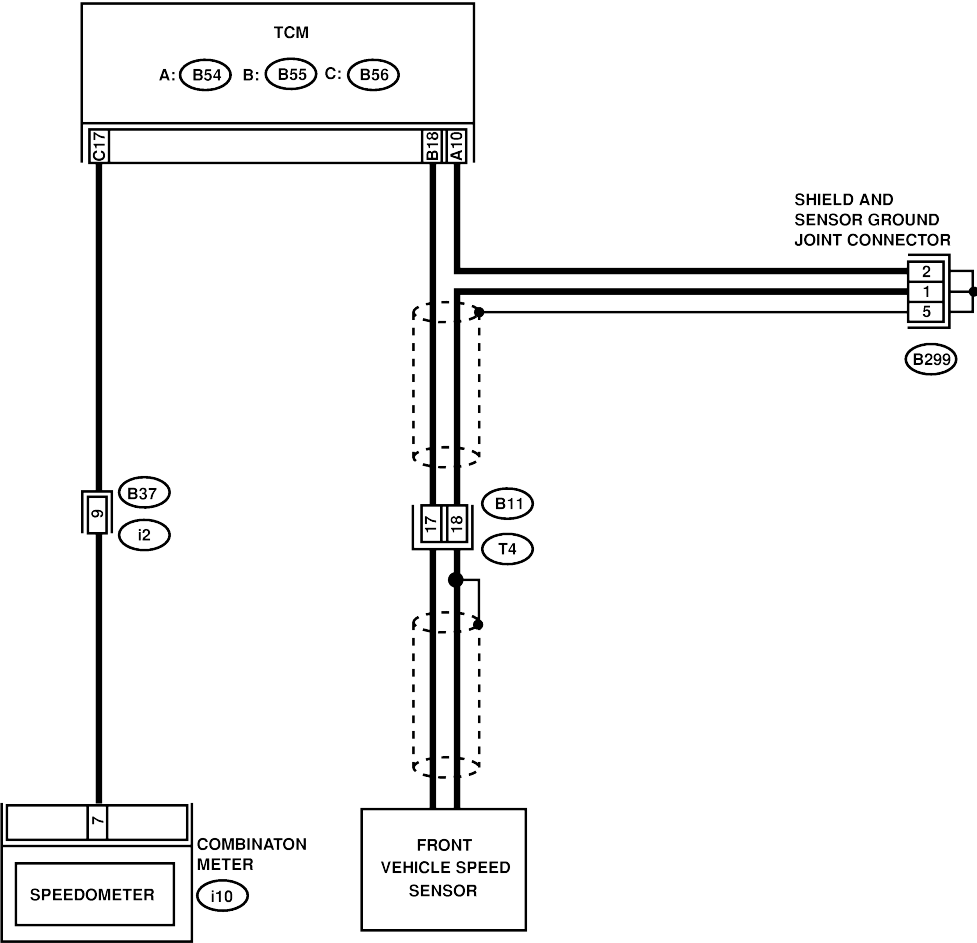
TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Poor driving performance.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

WIRING DIAGRAM:



S3M0629

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 18 — (B11) No. 17:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 10 — (B11) No. 18:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 10 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 18 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5	CHECK FRONT VEHICLE SPEED SENSOR. Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 17 — No. 18:	Is the resistance between 450 and 650 Ω ?	Go to step 6.	Replace front vehicle speed sensor. <Ref. to AT-32, Front Vehicle Speed Sensor.>
6	PREPARE OSCILLOSCOPE.	Do you have oscilloscope?	Go to step 9.	Go to step 7.
7	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 10.	Go to step 8.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	CHECK INPUT SIGNAL FOR TCM. 1) Connect all connectors. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 4) Measure voltage between TCM connector terminals. Connector & terminal (B55) No. 18 (+) — (B54) No. 10 (-):	Is the voltage more than AC 1 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
9	CHECK FRONT VEHICLE SPEED SENSOR USING OSCILLOSCOPE. 1) Connect all connectors. 2) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 18 Earth lead; (B54) No. 10 4) Start the engine, and drive the wheels slowly. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure signal voltage indicated on oscilloscope.	Is the voltage more than AC 4 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read data of vehicle speed using Subaru Select Monitor. ● Compare speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in "km/h" or "MPH". 7) Slowly increase vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
11	CHECK POOR CONTACT.	Is there poor contact in front vehicle speed sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

F: TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR

S004509D17

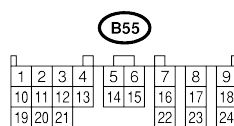
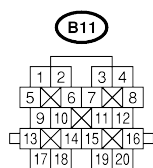
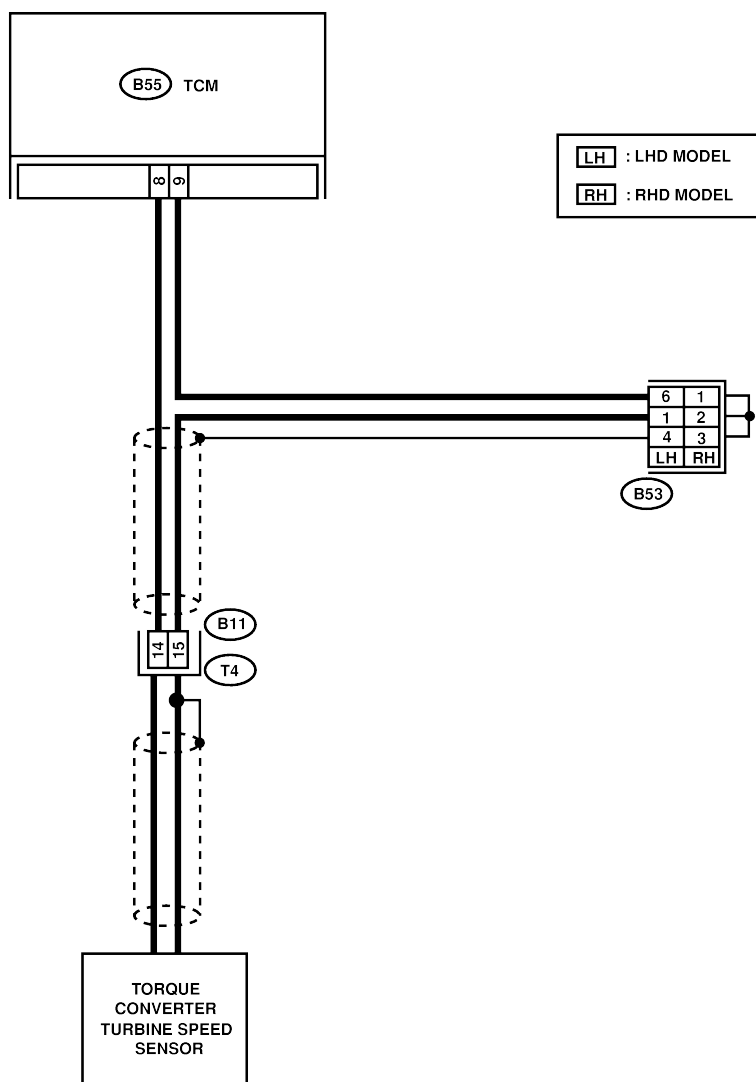
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



S3M0630

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK TORQUE CONVERTER TURBINE SPEED SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector receptacle's terminals. <i>Connector & terminal</i> <i>(T4) No. 14 — No. 15:</i>	Is the resistance between 450 and 650 Ω ?	Go to step 2.	Replace turbine speed sensor. <Ref. to AT-37, Torque Converter Turbine Speed Sensor.>
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>(B55) No. 8 — (B11) No. 14:</i>	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>(B55) No. 9 — (B11) No. 15:</i>	Is the resistance less than 1 Ω ?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. <i>Connector & terminal</i> <i>(B55) No. 9 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. <i>Connector & terminal</i> <i>(B55) No. 8 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6	PREPARE OSCILLOSCOPE.	Do you have oscilloscope?	Go to step 10.	Go to step 7.
7	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.
8	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and transmission. 2) Start the engine and move select lever to "P" or "N" range. 3) Measure voltage between TCM connector terminals. <i>Connector & terminal</i> <i>(B55) No. 8 (+) — No. 9 (-):</i>	Is the voltage more than AC 1 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
9	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 4) Start the engine. 5) Move select lever to "P" or "N" range. 6) Read data of turbine speed using Subaru Select Monitor. • Compare tachometer with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
10	CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Connect connectors to TCM and transmission. 2) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 8 Earth lead; (B55) No. 9 3) Start the engine and move select lever to "P" or "N" range.	Is the signal voltage more than AC 1 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
11	CHECK POOR CONTACT.	Is there poor contact in torque converter turbine speed sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

G: TROUBLE CODE 38 — TORQUE CONTROL SIGNAL — S004509D26

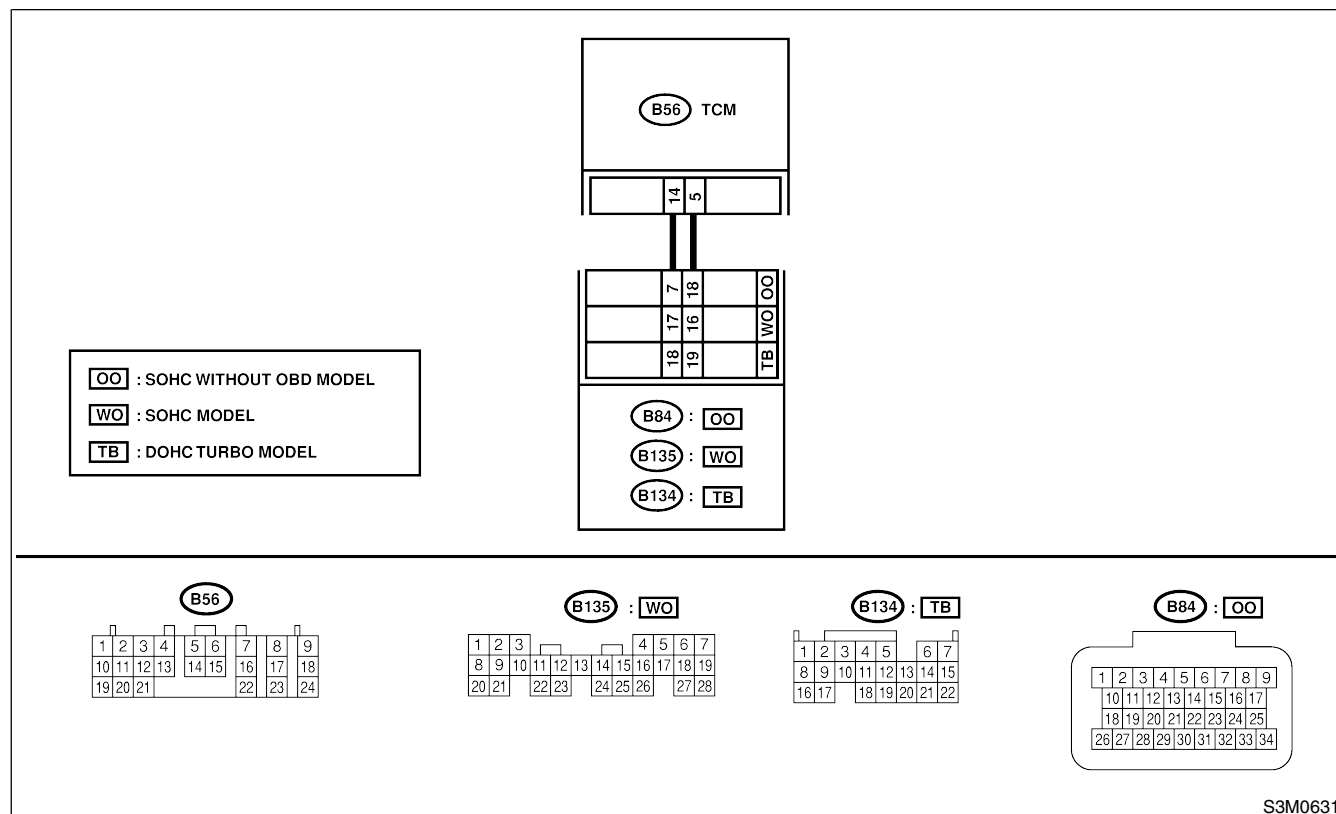
DIAGNOSIS:

- The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



S3M0631

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. Connector & terminal SOHC without OBD: (B56) No. 14 — (B84) No. 7: (B56) No. 5 — (B84) No. 18: SOHC: (B56) No. 14 — (B135) No. 17: (B56) No. 5 — (B135) No. 16: DOHC TURBO: (B56) No. 14 — (B134) No. 18: (B56) No. 5 — (B134) No. 19:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B56) No. 14 — Chassis ground: (B56) No. 5 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
3	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector terminals. Connector & terminal (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-):	Is the voltage more than 4.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 4.
4	CHECK POOR CONTACT.	Is there poor contact in torque control signal circuit?	Repair poor contact.	Go to step 5.
5	CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY. Check installing condition of ground line in transmission and body.	Is there any dirt or rust at ground line installing point?	Remove dirt and rust.	Go to step 6.
6	CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY. Check installing condition of ground line in transmission and body. Tightening torque: 13±3 N·m (1.3±0.3 kgf-m, 9.4±2.2 ft-lb)	Is tightening torque value within specification?	Go to step 7.	Tighten to specified torque.
7	CHECK GROUND LINE INSIDE TRANSMISSION. 1) Drain AT fluid and remove oil pan. 2) Check tightening torque value of ground line installing bolt. Tightening torque: T: 8±1 N·m (0.8±0.1 kgf-m, 5.8±0.7 ft-lb)	Is tightening torque value within specification?	Go to step 9.	Tighten to specified torque.
8	CHECK GROUND CIRCUIT OF ECM. <Ref. to AT-50, TROUBLE CODE 31 - THROTTLE POSITION SENSOR -, Diagnostic Procedure with Trouble Code.>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step 9.
9	RECHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector and chassis ground. Connector & terminal (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-):	Is each voltage more than 4.8 V?	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>	Replace ECM.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

H: TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL — S004509D48

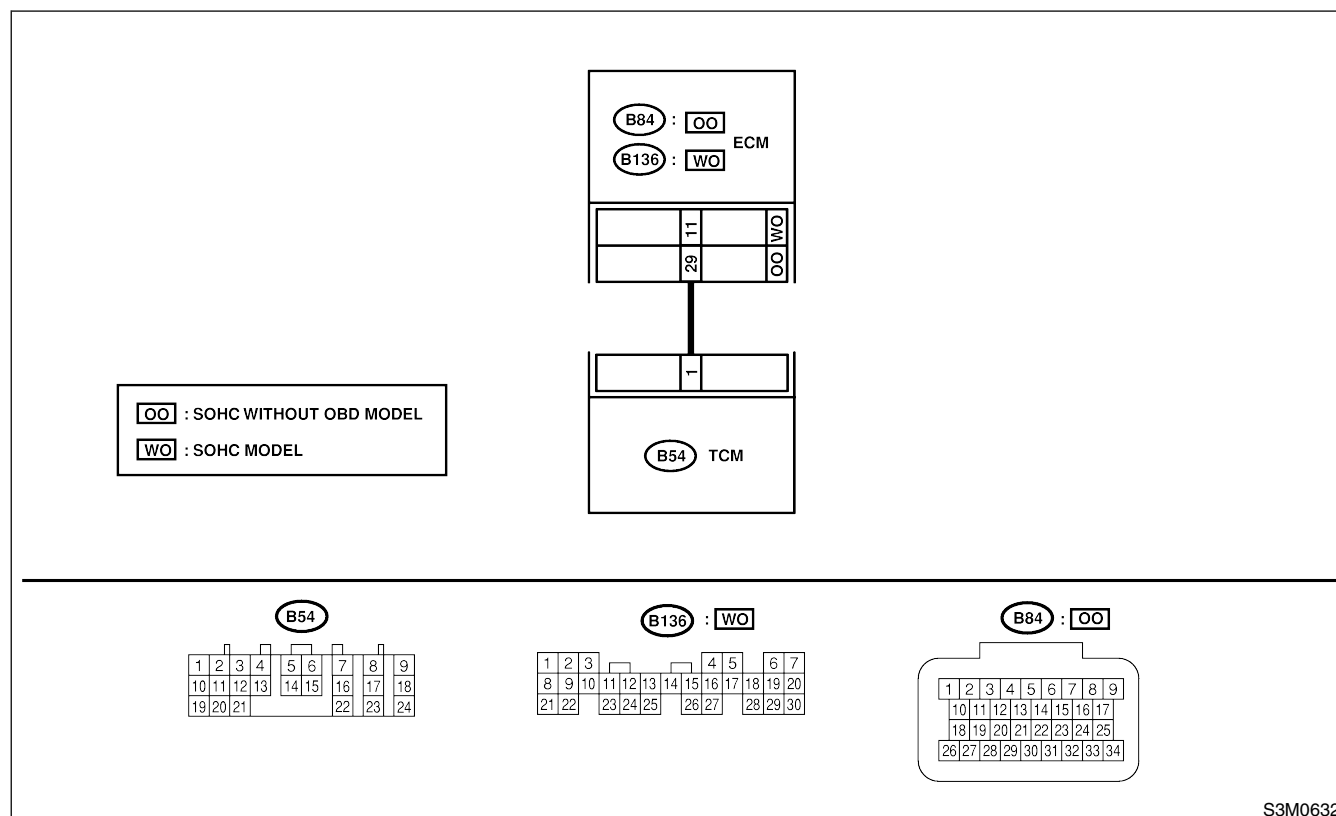
DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



S3M0632

No.	Step	Check	Yes	No
1	CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM <Ref. to AT-50, TROUBLE CODE 31 - THROTTLE POSITION SENSOR -, Diagnostic Procedure with Trouble Code.>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step 2.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. Connector & terminal SOHC without OBD: (B54) No. 1 — (B84) No. 29: SOHC: (B54) No. 1 — (B136) No. 11:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and ECM connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 1 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and ECM connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
4	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 6.	Go to step 5.
5	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and ECM. 2) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Engine idling. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 1 (+) — Chassis ground (-):	Is the voltage between 0.4 and 1.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
6	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of intake manifold pressure signal using Subaru Select Monitor. ● Display shows intake manifold pressure signal value sent from ECM.	Is the value between 0.4 and 1.8 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
7	CHECK POOR CONTACT.	Is there poor contact in intake manifold pressure signal circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

I: TROUBLE CODE 71 — SHIFT SOLENOID 1 — S004509D91

DIAGNOSIS:

Output signal circuit of shift solenoid 1 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:

tr0410



TR0410

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and shift solenoid 1 connector. Connector & terminal (B54) No. 22 — (B11) No. 1:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 22 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	CHECK SHIFT SOLENOID 1. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 1 — No. 16:	Is the resistance between 10 and 16 Ω?	Go to step 4.	Go to step 7.
4	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Move select lever to "D" range. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 22 (+) — Chassis ground (-):	Is the voltage more than 9V?	Go to step 5.	Go to step 6.
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Hold switch to ON. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 22 (+) — Chassis ground (-):	Is the voltage less than 1V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.	Go to step 6.
6	CHECK POOR CONTACT.	Is there poor contact in shift solenoid 1 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
7	CHECK SHIFT SOLENOID 1 (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from shift solenoid 1. 5) Measure resistance between shift solenoid 1 connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω?	Go to step 8.	Replace shift solenoid 1. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION. Measure resistance of harness between shift solenoid 1 and transmission connector. <i>Connector & terminal (AT5) No. 1 — (T4) No. 1:</i>	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between shift solenoid 1 and transmission connector.
9	CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION. Measure resistance of harness between shift solenoid 1 connector and transmission ground. <i>Connector & terminal (T4) No. 1 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 1 and transmission.	Repair short circuit harness between shift solenoid 1 and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

J: TROUBLE CODE 72 — SHIFT SOLENOID 2 — S004509D98

DIAGNOSIS:

Output signal circuit of shift solenoid 2 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:

tr0411



TR0411

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and shift solenoid 2 connector. Connector & terminal (B54) No. 5 — (B11) No. 2:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and transmission ground. Connector & terminal (B54) No. 5 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	CHECK SHIFT SOLENOID 2. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 2 — No. 16:	Is the resistance between 10 and 16 Ω?	Go to step 4.	Go to step 6.
4	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 22 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 5.
5	CHECK POOR CONTACT.	Is there poor contact in shift solenoid 2 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
6	CHECK SHIFT SOLENOID 2 (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from shift solenoid 2. 4) Measure resistance between shift solenoid 2 connector and transmission ground. Connector & terminal No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω?	Go to step 7.	Replace shift solenoid 2 assembly. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
7	CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION. Measure resistance of harness between shift solenoid 2 and transmission connector. <i>Connector & terminal (AT6) No. 1 — (T4) No. 2:</i>	Is the resistance less than 1 Ω ?	Go to step 8.	Repair open circuit in harness between shift solenoid 2 and transmission connector.
8	CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION. Measure resistance of harness between shift solenoid 2 connector and transmission ground. <i>Connector & terminal (T4) No. 2 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 2 and transmission.	Repair short circuit harness between shift solenoid 2 and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

K: TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID — S004509E05

DIAGNOSIS:

Output signal circuit of low clutch timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

tr0412

TR0412

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 15 — (B11) No. 3:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and transmission ground. Connector & terminal (B54) No. 15 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	CHECK LOW CLUTCH TIMING SOLENOID. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 3 — No. 16:	Is the resistance between 10 and 16 Ω?	Go to step 4.	Go to step 7.
4	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Move select lever to "D" range. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 15 (+) — Chassis ground (-):	Is the voltage more than 9V?	Go to step 5.	Go to step 6.
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Hold switch to ON. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 15 (+) — Chassis ground (-):	Is the voltage less than 1V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM and transmission.	Go to step 6.
6	CHECK POOR CONTACT.	Is there poor contact in low clutch timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
7	CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from low clutch timing solenoid. 5) Measure resistance between low clutch timing solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω?	Go to step 8.	Replace low clutch timing solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between low clutch timing solenoid and transmission connector. <i>Connector & terminal (AT9) No. 1 — (T4) No. 3:</i>	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between low clutch timing solenoid and transmission connector.
9	CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between low clutch timing solenoid connector and transmission ground. <i>Connector & terminal (T4) No. 3 — Transmission ground:</i>	Is the resistance more than 1 M Ω ?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in low clutch timing solenoid and transmission.	Repair short circuit harness between low clutch timing solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

L: TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID — S004509E07

DIAGNOSIS:

Output signal circuit of 2-4 brake timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

tr0413

TR0413

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 16 — (B11) No. 4:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and transmission ground. Connector & terminal (B54) No. 16 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	CHECK 2-4 BRAKE TIMING SOLENOID. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 4 — No. 16:	Is the resistance between 10 and 16 Ω?	Go to step 4.	Go to step 7.
4	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to "1", and slowly increase vehicle speed to 10 km/h (6 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 16 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 5.	Go to step 6.
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move selector lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 16 (+) — Chassis ground (-):	Is the voltage more than 9 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transmission.	Go to step 6.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
6	CHECK POOR CONTACT.	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
7	CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from 2-4 brake timing solenoid. 5) Measure resistance between 2-4 brake timing solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω ?	Go to step 8.	Replace 2-4 brake timing solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between 2-4 brake timing solenoid and transmission connector. Connector & terminal (AT8) No. 1 — (T4) No. 4:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.
9	CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between 2-4 brake timing solenoid connector and transmission ground. Connector & terminal (T4) No. 4 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 2-4 brake timing solenoid and transmission.	Repair short circuit harness between 2-4 brake timing solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

M: TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID — S004509E14

DIAGNOSIS:

Output signal circuit of line pressure duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

tr0414

TR0414

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 9 — (B11) No. 5:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 9 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	CHECK LINE PRESSURE DUTY SOLENOID. Measure resistance between transmission connector receptacle's terminals. Terminal (T4) No. 5 — No. 16:	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 4.	Go to step 10.
4	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 7.	Go to step 5.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn ignition switch to ON (engine OFF). 4) Move select lever to "N". 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 9 (+) — Chassis ground (-):	Is the voltage between 1.5 and 5.0 V with throttle fully closed?	Go to step 6.	Go to step 9.
6	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 9 (+) — Chassis ground (-):	Is the voltage less than 1 V with throttle fully open?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step 9.
7	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move select lever to "N". 7) Read data of line pressure duty solenoid using Subaru Select Monitor. ● Line pressure duty solenoid is indicated in "%". 8) Throttle is fully closed.	Is the value 100%?	Go to step 8.	Go to step 9.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn ignition switch to ON (Engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step 9.
9	CHECK POOR CONTACT.	Is there poor contact in line pressure duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
10	CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from line pressure duty solenoid. 4) Measure resistance between line pressure duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 11.	Replace line pressure duty solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
11	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID. Measure resistance of harness between line pressure duty solenoid and transmission connector. Connector & terminal (T4) No. 5 — (AT2) No. 1:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair open circuit in harness between line pressure duty solenoid and transmission connector.
12	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 5 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between line pressure duty solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

N: TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID — S004509E15

DIAGNOSIS:

Output signal circuit of 2-4 brake duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

tr0415

TR0415

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 18 — (B11) No. 9:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 18 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	CHECK 2-4 BRAKE DUTY SOLENOID. Measure resistance between transmission connector receptacle's terminals. Terminal (T4) No. 16 — No. 9:	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 4.	Go to step 10.
4	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 7.	Go to step 5.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn ignition switch to ON (engine OFF). 4) Move select lever to "N". 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 18 (+) — Chassis ground (-):	Is the voltage between 1.5 and 5.0 V with throttle fully closed?	Go to step 6.	Go to step 9.
6	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 18 (+) — Chassis ground (-):	Is the voltage less than 1 V with throttle fully open?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 9.
7	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move select lever to "N". 7) Read data of 2-4 brake duty solenoid using Subaru Select Monitor. ● 2-4 brake duty solenoid is indicated in "%". 8) Throttle is fully closed.	Is the value 100%?	Go to step 8.	Go to step 9.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn ignition switch to ON (Engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 9.
9	CHECK POOR CONTACT.	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
10	CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from 2-4 brake duty solenoid. 4) Measure resistance between 2-4 brake duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 11.	Replace 2-4 brake duty solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
11	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID. Measure resistance of harness between 2-4 brake duty solenoid and transmission connector. Connector & terminal (T4) No. 9 — (AT7) No. 1:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.
12	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 9 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between 2-4 brake duty solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

O: TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID — S004509E16

DIAGNOSIS:

Output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No "lock-up" (after engine warm-up).

WIRING DIAGRAM:

tr0416

TR0416

No.	Step	Check	Yes	No
1	CHECK TROUBLE CODE.	Do multiple trouble codes appear in the on-board diagnostics test mode?	Go to another trouble code.	Go to step 2.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 7 — (B11) No. 13:	Is the resistance than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness connector between TCM and chassis ground. Connector & terminal (B54) No. 7 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	CHECK LOCK-UP DUTY SOLENOID. Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 13 — No. 16:	Is the resistance between 10 and 17 Ω ?	Go to step 5.	Go to step 11.
5	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 8.	Go to step 6.
6	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 7 (+) — Chassis ground (-):	Is the voltage more than 8.5 V?	Go to step 7.	Go to step 10.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
7	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Return the engine to idling speed and move select lever to "N". 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 7 (+) — Chassis ground (-):	Is the voltage less than 0.5 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 10.
8	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Connect Subaru Select Monitor to data link connector. 4) Start the engine, and turn Subaru Select Monitor switch to ON. 5) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read data of lock-up duty solenoid using Subaru Select Monitor. ● Lock-up duty solenoid is indicated in "%". 7) Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Is the value 95%?	Go to step 9.	Go to step 10.
9	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. Return the engine to idling speed and move selector lever to "N". NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Is the value 5%?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 10.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	CHECK POOR CONTACT.	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
11	CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from lock-up duty solenoid. 4) Measure resistance between lock-up duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 10 and 17 Ω ?	Go to step 12.	Replace lock-up duty solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
12	CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between lock-up duty solenoid and transmission connector. Connector & terminal (T4) No. 13 — (AT3) No. 1:	Is the resistance less than 1 Ω ?	Go to step 13.	Repair open circuit in harness between TCM and transmission connector.
13	CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 13 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in lock-up duty solenoid and transmission.	Repair short circuit in harness between lock-up duty solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

P: TROUBLE CODE 79 — TRANSFER DUTY SOLENOID — S004509E17

DIAGNOSIS:

Output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive “braking” in tight corners.

WIRING DIAGRAM:

tr0417

TR0417

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 6 — (B11) No. 6:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance harness connector between TCM and chassis ground. <i>Connector & terminal</i> <i>(B54) No. 6 — Chassis ground:</i>	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	CHECK TRANSFER DUTY SOLENOID. Measure resistance between transmission connector and transmission terminals. <i>Connector & terminal</i> <i>(T4) No. 6 — No. 16:</i>	Is the resistance between 10 and 17 Ω?	Go to step 4.	Go to step 10.
4	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 7.	Go to step 5.
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Throttle is fully closed. 4) Measure voltage between TCM connector and chassis ground. <i>Connector & terminal</i> <i>(B54) No. 6 (+) — Chassis ground (-):</i>	Is the voltage less than 1 V in "P" range?	Go to step 6.	Go to step 9.
6	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector and chassis ground. <i>Connector & terminal</i> <i>(B54) No. 6 (+) — Chassis ground (-):</i>	Is the voltage between 5 and 7 V in "D" range?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 9.
7	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON. 4) Move select lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5) Read data of transfer duty solenoid using Subaru Select Monitor. ● Transfer duty solenoid is indicated in "%".	Is the value between 5 and 10%?	Go to step 8.	Go to step 9.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Move select lever to "N" with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2) Rear data of transfer duty solenoid using Subaru Select Monitor. ● Transfer duty solenoid is indicated in "%".	Is the value between approx. 60% and approx. 70%?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 9.
9	CHECK POOR CONTACT.	Is there poor contact in transfer duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
10	CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION). 1) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove extension case, and disconnect connector from transfer duty solenoid. 4) Measure resistance between transfer duty solenoid connector and transmission ground. Connector & terminal (AT4) No. 1 — Transmission ground:	Is the resistance between 10 and 17 Ω ?	Go to step 11.	Replace transfer duty solenoid.
11	CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between transfer duty solenoid and transmission connector. Connector & terminal (T4) No. 6 — (AT4) No. 1:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair open circuit in harness between transfer duty solenoid and transmission connector.
12	CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 6 — Transmission ground:	Is the resistance more than 1 M Ω ?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transfer duty solenoid and transmission.	Repair short circuit in harness between transfer duty solenoid and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

Q: TROUBLE CODE 93 — REAR VEHICLE SPEED SENSOR — S004509F61

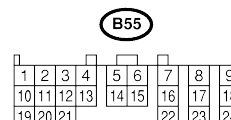
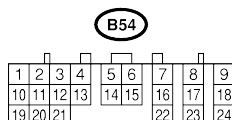
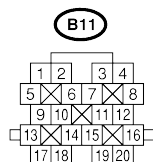
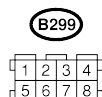
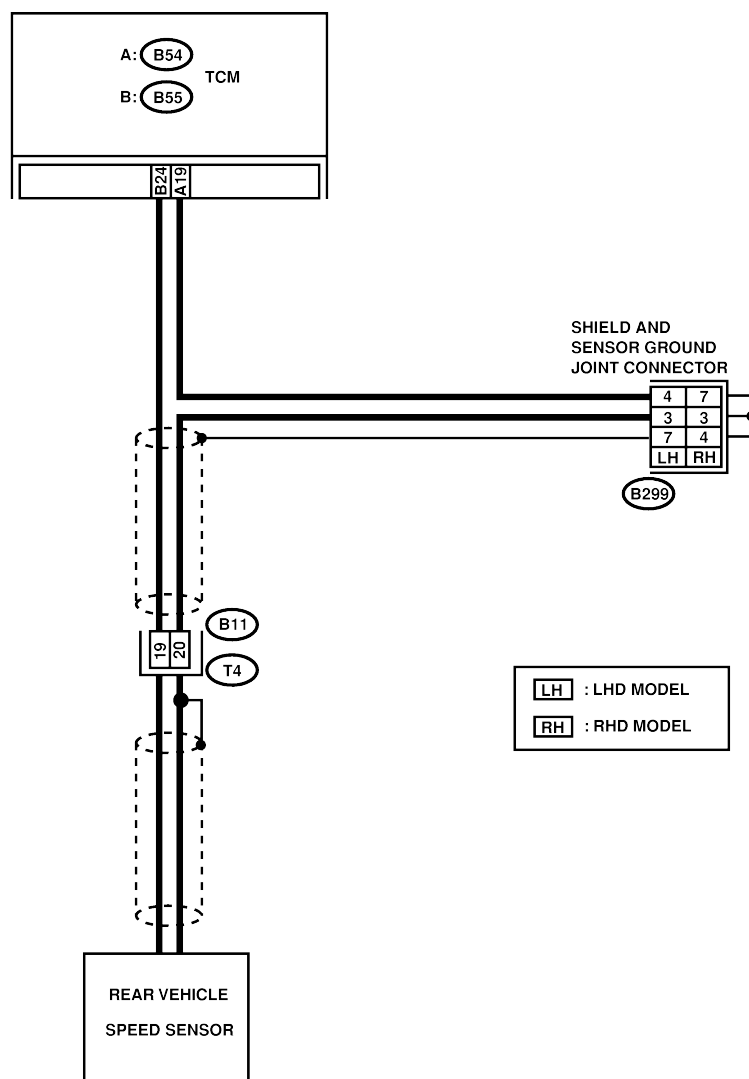
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner “braking”.

WIRING DIAGRAM:



S3M0633

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 24 — (B11) No. 19:	Is the resistance less than 1 Ω ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 19 — (B11) No. 20:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 24 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 19 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	CHECK REAR VEHICLE SPEED SENSOR. Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 19 — No. 20:	Is the resistance between 450 and 650 Ω ?	Go to step 6.	Replace rear vehicle speed sensor. <Ref. to AT-36, Rear Vehicle Speed Sensor.>
6	PREPARE OSCILLOSCOPE.	Do you have oscilloscope?	Go to step 10.	Go to step 7.
7	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.
8	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 4) Measure voltage between TCM connector terminals. Connector & terminal (B55) No. 24 (+) — (B54) No. 19 (-):	Is the voltage more than AC 1 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
9	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read data of vehicle speed using Subaru Select Monitor. ● Compare speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in "km/h" or "MPH". 7) Slowly increase vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
10	CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 24 Earth lead; (B54) No. 19 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure signal voltage indicated on oscilloscope.	Is the signal voltage more than AC 1 V?	Even if "POWER" indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
11	CHECK POOR CONTACT.	Is there poor contact in rear vehicle speed sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

15. Diagnostic Procedure for No-trouble Code S004618

A: CHECK GEAR POSITION. S004618F15

No.	Step	Check	Yes	No
1	CHECK GEAR POSITION. 1) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 2) Start the engine. 3) Move select lever to "D", and drive vehicle. 4) Read data of gear position using Subaru Select Monitor. ● Gear position is indicated. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Does the transmission gear correspond to the gear which is shown on display?	Go to step CHECK FWD SWITCH. <Ref. to AT-108, CHECK FWD SWITCH., Diagnostic Procedure for No-trouble Code.>	Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to AT-72, TROUBLE CODE 71 - SHIFT SOLENOID 1 -, Diagnostic Procedure with Trouble Code.> and <Ref. to AT-76, TROUBLE CODE 72 - SHIFT SOLENOID 2 -, Diagnostic Procedure with Trouble Code.>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

B: CHECK FWD SWITCH. S004618F16

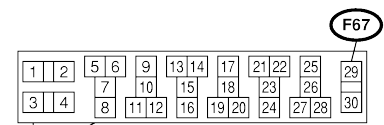
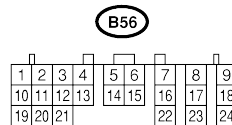
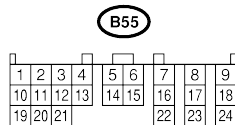
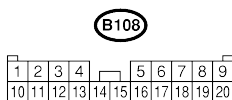
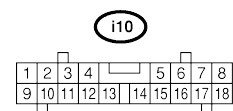
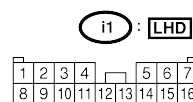
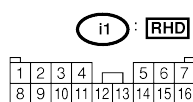
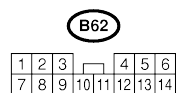
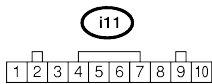
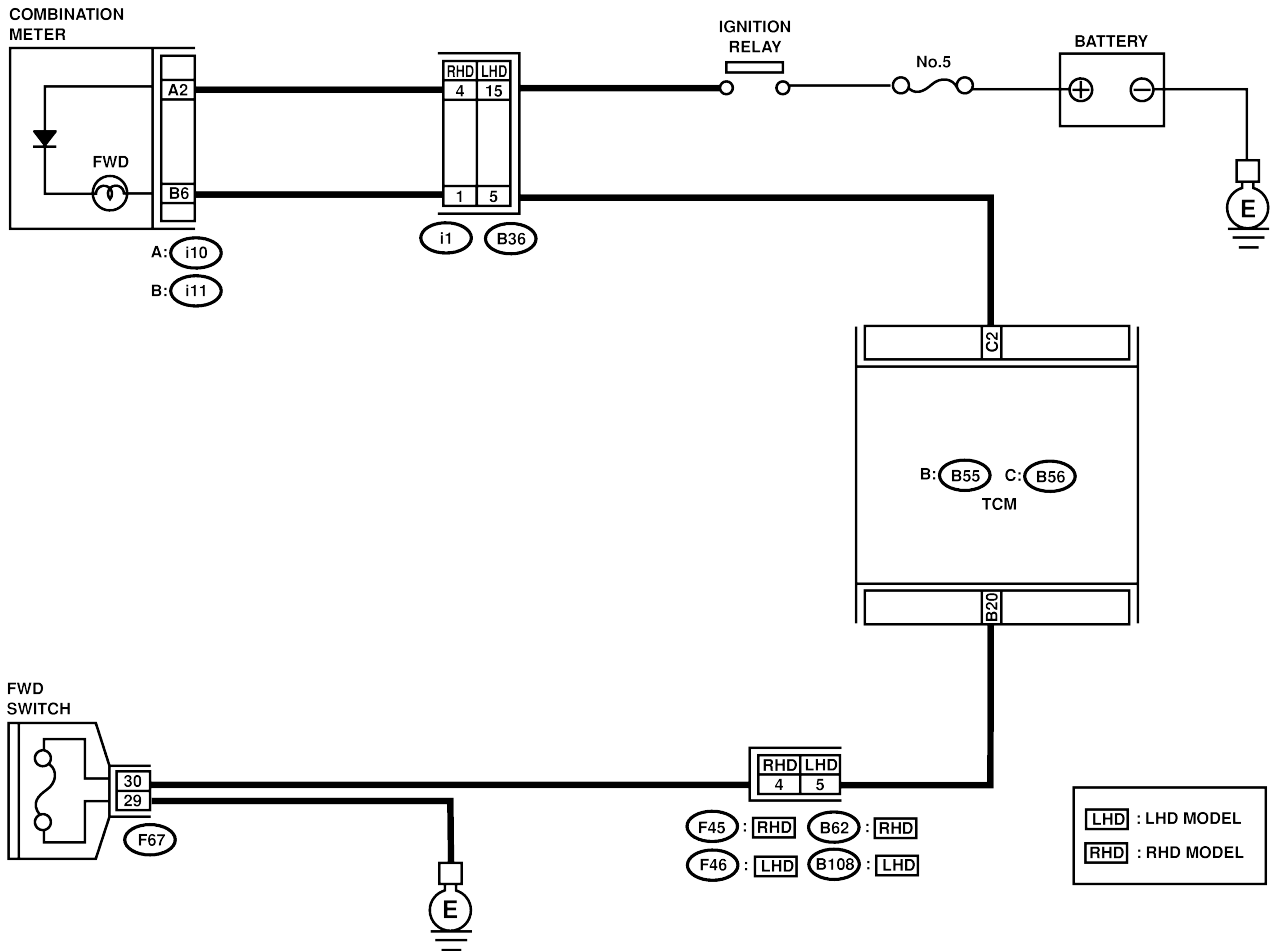
DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

WIRING DIAGRAM:



S3M0634

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK FWD SWITCH.	When fuse is inserted to FWD switch, does LED light up?	Go to step CHECK BRAKE SWITCH.<Ref. to AT-111, CHECK BRAKE SWITCH., Diagnostic Proce- dure for No-trouble Code.>	Go to step 2.
2	CHECK FWD INDICATOR LIGHT. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove FWD indicator light bulb from combination meter.	Is FWD indicator light bulb OK?	Go to step 3.	Replace FWD indicator light bulb. <Ref. to IDI-15, Combination Meter Assembly.>
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and FWD switch. 3) Measure resistance of harness between TCM and FWD switch connector. Connector & terminal (B55) No. 20 — (F67) No. 30:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair open circuit in harness between TCM and FWD switch connector.
4	CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND. Measure resistance of harness between FWD switch and chassis ground. Connector & terminal (F67) No. 29 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair open circuit in harness between FWD switch connector and chassis ground.
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. Measure resistance of harness connector between TCM and body to make sure that circuit does not short. Connector & terminal (B55) No. 20 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair short circuit in harness between TCM and FWD switch connector.
6	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and FWD switch. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing the fuse to FWD switch connector. Connector & terminal (B55) No. 20 (+) — Chassis ground (-):	Is the voltage less than 1 V in FWD switch while installing?	Go to step 7.	Go to step 11.
7	CHECK INPUT SIGNAL FOR TCM. Measure signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B55) No. 20 (+) — Chassis ground (-):	Is the voltage more than 6 V in FWD switch while removing?	Go to step 8.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and combination meter. 3) Measure resistance of harness between TCM and diagnosis connector. Connector & terminal (B56) No. 2 — (i11) No. 6:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
9	CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. <i>Connector & terminal (B56) No. 2 — Chassis ground:</i>	Is the resistance more than 1 MΩ?	Go to step 10.	Repair short circuit in harness between TCM and combination meter connector.
10	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and combination meter. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing and removing the fuse to FWD switch connector. <i>Connector & terminal (B56) No. 2 — Chassis ground:</i>	Is the voltage less than 1 V in FWD switch while installing?	Go to step 11.	Go to step 12.
11	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure signal voltage for TCM while removing the fuse from FWD switch connector. <i>Connector & terminal (B56) No. 2 — Chassis ground:</i>	Is the voltage more than 9 V in FWD switch while removing?	Go to step 12.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
12	CHECK POOR CONTACT.	Is there poor contact in FWD switch circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

C: CHECK BRAKE SWITCH. S004618F17

No.	Step	Check	Yes	No
1	CHECK BRAKE SWITCH.	When the brake pedal is depressed, does LED light up?	Go to step CHECK ABS SWITCH. <Ref. to AT-112, CHECK ABS SWITCH, Diagnostic Procedure for No-trouble Code.>	Check brake switch circuit. <Ref. WI-58, A/T Control System.>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

D: CHECK ABS SWITCH. S004618F18

No.	Step	Check	Yes	No
1	CHECK ABS SWITCH.	Does the LED of ABS switch light up?	Check ABS switch circuit. <Ref. to ABS-134, TROUBLE CODE 44 - ABS-AT CONTROL (NON CONTROLLED) -, Diagnostics Chart with Subaru Select Monitor.> and <Ref. to ABS-136, TROUBLE CODE 44 - ABS-AT CONTROL (CONTROLLED) -, Diagnostics Chart with Subaru Select Monitor.>	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to AT-112, CHECK CRUISE CONTROL SWITCH., Diagnostic Procedure for No-trouble Code.>

E: CHECK CRUISE CONTROL SWITCH. S004618F19

No.	Step	Check	Yes	No
1	CHECK CRUISE CONTROL SWITCH.	When cruise control is set, does LED light up?	Go to step CHECK KICK-DOWN SWITCH. <Ref. to AT-114, CHECK KICK-DOWN SWITCH., Diagnostic Procedure for No-trouble Code.>	Check cruise control. <Ref. to CC-37, Diagnostics Chart with Trouble Code (Turbo Model).>, <Ref. to CC-57, Diagnostics Chart with Trouble Code (Non-Turbo Model).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

F: CHECK KICK-DOWN SWITCH. S004618G76

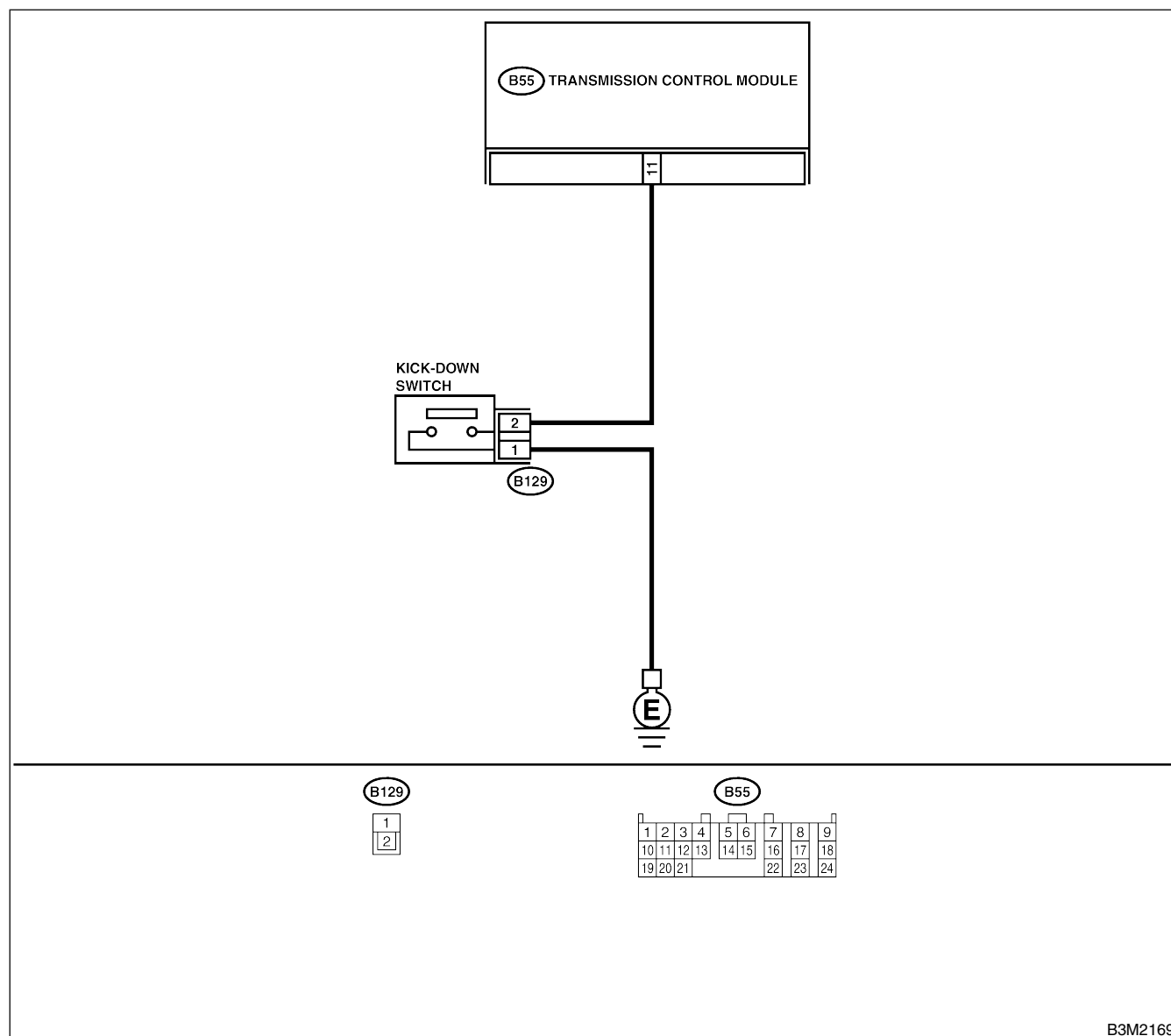
DIAGNOSIS:

- The kick-down switch is not ON when the throttle is fully open but is OFF when the throttle is partially open or fully closed.
- Kick-down switch circuit is open or short.

TROUBLE SYMPTOM:

No kick-down occurs (when the throttle is fully open).

WIRING DIAGRAM:



DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK KICK-DOWN SWITCH OPERATION.	When the accelerator pedal is depressed, does "ON" displayed?	Go to step CHECK POWER MODE SWITCH. <Ref. to AT-118, CHECK POWER MODE SWITCH , Diagnostic Procedure for No-trouble Code.>	Go to step 2.
2	CHECK KICK-DOWN SWITCH GROUND LINE. 1) Disconnect connector from kick-down switch. 2) Measure resistance of harness connector between kick-down switch and chassis ground. Connector & terminal (B129) No. 1 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between kick-down switch and chassis ground.
3	CHECK KICK-DOWN SWITCH. Measure resistance for kick-down switch when depressing the accelerator pedal. Terminals No. 1 — No. 2:	Is the resistance less than 1 Ω?	Go to step 4.	Replace kick-down switch. <Ref. to SP-5, Accelerator Pedal.>
4	CHECK KICK-DOWN SWITCH. Measure resistance for kick-down switch when pressing the accelerator pedal. Terminals No. 1 — No. 2:	Is the resistance more than 1 MΩ?	Go to step 5.	Replace kick-down switch.
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND KICK-DOWN SWITCH. 1) Turn ignition switch OFF. 2) Disconnect connectors from kick-down switch. 3) Measure resistance of harness connector between TCM and kick-down switch. Connector & terminal (B55) No. 11 — (B129) No. 2:	Is the resistance less than 1 Ω?	Go to step 6.	Repair open circuit in harness between TCM and kick-down switch.
6	CHECK HARNESS CONNECTOR BETWEEN TCM AND KICK-DOWN SWITCH. Measure resistance of harness connector between TCM and chassis ground. Connector & terminal (B55) No. 11 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 7.	Repair short circuit in harness between TCM and chassis ground.
7	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to kick-down switch. 3) Turn ignition switch ON (with engine OFF). 4) Measure signal voltage for TCM when depressing the accelerator pedal. Connector & terminal (B55) No. 11 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 8.	Go to step 9.
8	CHECK INPUT SIGNAL FOR TCM. Measure signal voltage for TCM when pressing the accelerator pedal. Connector & terminal (B55) No. 11 (+) — Chassis ground (-):	Is the voltage more than 6.5 V?	A temporary poor contact of the connector and harness may be the cause. Repair harness and connector in the TCM.	Go to step 9.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
9	CHECK POOR CONTACT.	Is there poor contact?	Repair poor contact.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

G: CHECK POWER MODE SWITCH. S004618G77

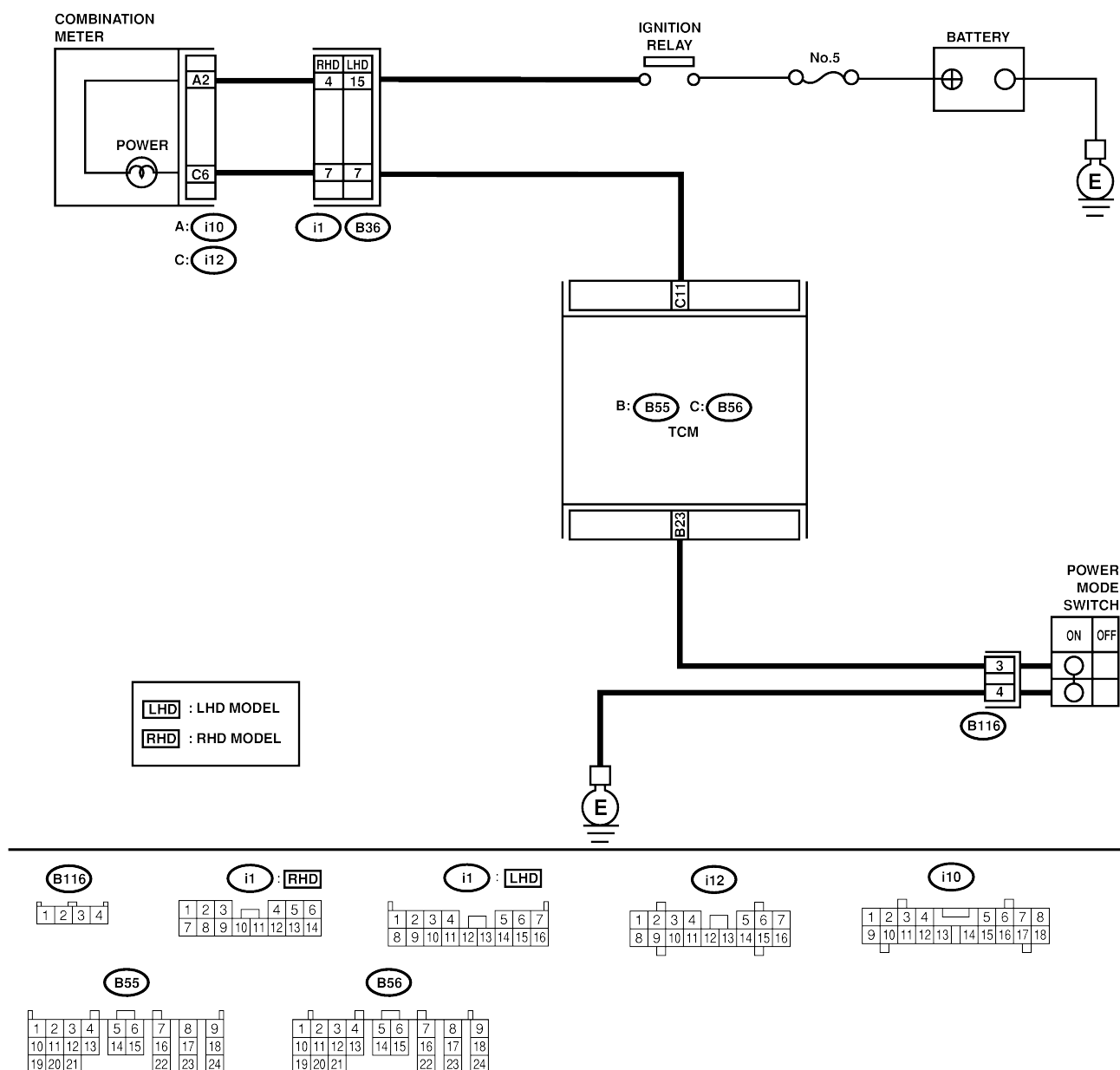
DIAGNOSIS:

- LED does not come on when power switch is ON.
- Power switch circuit is open or shorted.

TROUBLE SYMPTOM:

No power mode occurs.

WIRING DIAGRAM:



S3M0635

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK POWER SWITCH OPERATION.	When power switch is turned OFF, does LED light up?	Go to step 5.	Go to step 2.
2	CHECK POWER SWITCH OPERATION.	When power switch is turned ON, does LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to AT-122, CHECK INHIBITOR SWITCH. , Diagnostic Procedure for No-trouble Code.>	Go to step 3.
3	CHECK POWER INDICATOR LIGHT. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove POWER indicator light bulb from combination meter.	Is POWER indicator light bulb OK?	Go to step 4.	Replace POWER indicator light bulb. <Ref. to IDI-15, Combination Meter Assembly.>
4	CHECK POWER SWITCH GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from power switch. 3) Measure resistance of harness connector between power switch and chassis ground. Connector & terminal (B116) No. 4 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 5.	Repair open circuit in harness between power switch and chassis ground.
5	CHECK POWER SWITCH. 1) Power switch turned ON. 2) Measure resistance between terminals of power switch. Terminals No. 3 — No. 4:	Is the resistance less than 1 Ω?	Go to step 6.	Repair power switch.
6	CHECK POWER SWITCH. 1) Power switch turned OFF. 2) Measure resistance between terminals of power switch. Terminals No. 3 — No. 4:	Is the resistance more than 1 MΩ?	Go to step 7.	Repair power switch.
7	CHECK HARNESS CONNECTOR BETWEEN TCM AND POWER SWITCH. Measure resistance of harness connector between TCM and power switch. Connector & terminal (B55) No. 23 — (B116) No. 3:	Is the resistance less than 1 Ω?	Go to step 8.	Repair open circuit in harness between TCM and power switch connector.
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND POWER SWITCH. Measure resistance of harness connector between TCM and chassis ground. Connector & terminal (B55) No. 23 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 9.	Repair short circuit in harness between TCM and power switch connector.
9	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and power switch. 2) Turn ignition switch ON (with engine OFF). 3) Measure signal voltage for TCM while turning power switch OFF. Connector & terminal (B55) No. 23 (+) — Chassis ground (-):	Is the voltage more than 10 V?	Go to step 10.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	CHECK INPUT SIGNAL FOR TCM. Measure signal voltage for TCM while turning power switch ON. Connector & terminal (B55) No. 23 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 11.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
11	CHECK POOR CONTACT.	Is there poor contact?	Repair poor contact.	A temporary poor contact of the connector or harness in power switch circuit.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

H: CHECK INHIBITOR SWITCH. S004618F20

DIAGNOSIS:

Input signal circuit of inhibitor switch is open or shorted.

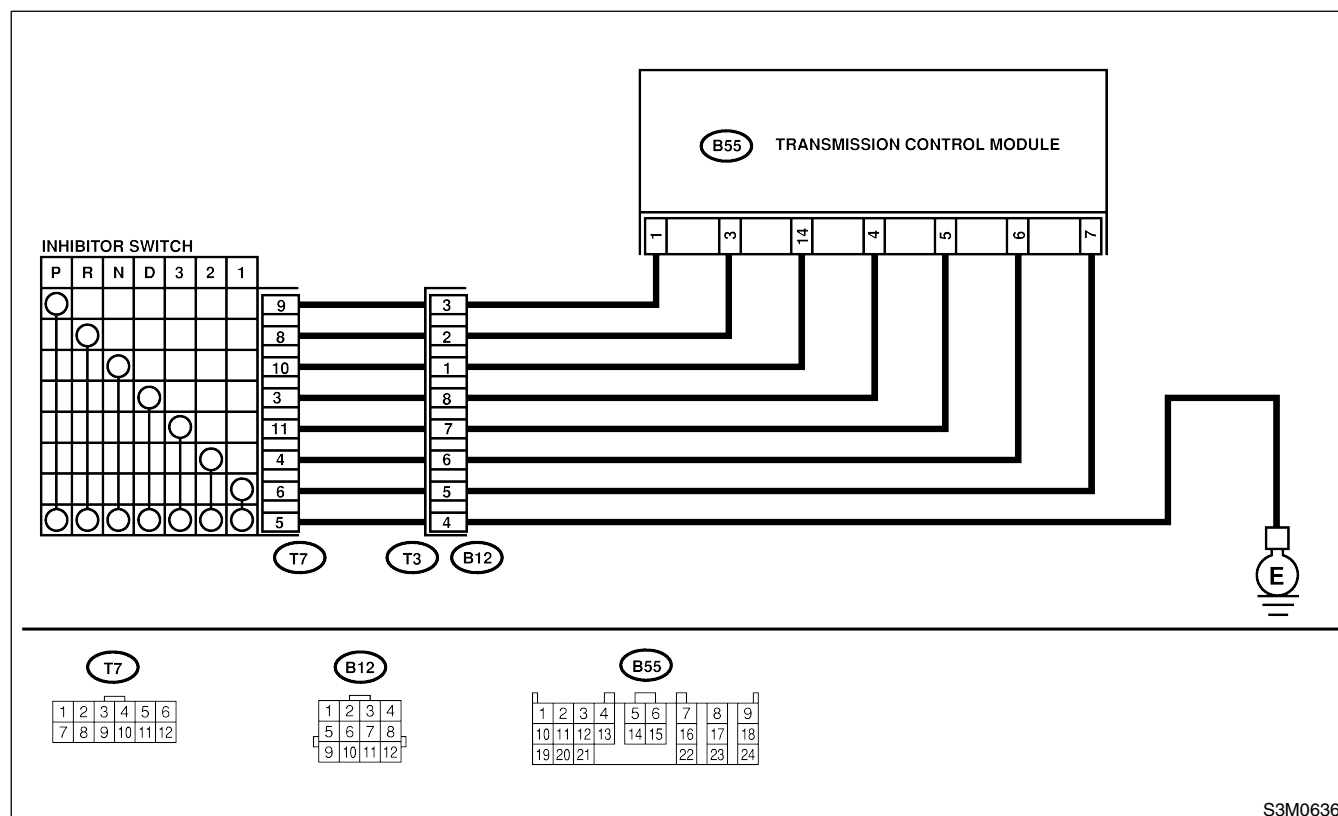
TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in “3” range.
- Engine brake is not effected when selector lever is in “2” range.
- Engine brake is not effected when selector lever is in “1” range.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

WIRING DIAGRAM:



S3M0636

No.	Step	Check	Yes	No
1	CHECK "P" RANGE SWITCH.	When "P" range is selected, does LED light up?	Go to step 2.	Go to step 15.
2	CHECK "P" RANGE SWITCH.	When the "R" range is selected, does "P" range LED light up?	Go to step 19.	Go to step 3.
3	CHECK "R" RANGE SWITCH.	When the "R" range is selected, does LED light up?	Go to step 4.	Go to step 20.
4	CHECK "R" RANGE SWITCH.	When the "N" range is selected, does "R" range LED light up?	Go to step 23.	Go to step 5.
5	CHECK "N" RANGE SWITCH.	When the "N" range is selected, does LED light up?	Go to step 6.	Go to step 24.
6	CHECK "N" RANGE SWITCH.	When the "D" range is selected, does "N" range LED light up?	Go to step 27.	Go to step 7.
7	CHECK "D" RANGE SWITCH.	When the "D" range is selected, does LED light up?	Go to step 8.	Go to step 28.
8	CHECK "D" RANGE SWITCH.	When the "3" range is selected, does "D" range LED light up?	Go to step 31.	Go to step 9.
9	CHECK "3" RANGE SWITCH.	When the "3" range is selected, does LED light up?	Go to step 10.	Go to step 32.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	CHECK "3" RANGE SWITCH.	When the "2" range is selected, does "3" range LED light up?	Go to step 35.	Go to step 11.
11	CHECK "2" RANGE SWITCH.	When the "2" range is selected, does LED light up?	Go to step 12.	Go to step 36.
12	CHECK "2" RANGE SWITCH.	When the "1" range is selected, does "2" range LED light up?	Go to step 39.	Go to step 13.
13	CHECK "1" RANGE SWITCH.	When the "1" range is selected, does LED light up?	Go to step 14.	Go to step 40.
14	CHECK "1" RANGE SWITCH.	When the "P" range is selected, does "1" range LED light UP?	Go to step 43.	Go to step CHECK HOLD SWITCH. <Ref. to AT-130, CHECK HOLD SWITCH., Diagnostic Proce- dure for No-trouble Code.>
15	CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHAS- SIS GROUND. 1) Turn ignition switch to OFF. 2) Disconnect connector from inhibitor switch. 3) Measure resistance of harness between inhibitor switch and chassis ground. Connector & terminal (T7) No. 5 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 16.	Repair open cir- cuit in harness between inhibitor switch connector and chassis ground, and poor contact in cou- pling connector.
16	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 1 — (T7) No. 9	Is the resistance less than 1 Ω?	Go to step 17.	Repair open cir- cuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connec- tor.
17	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chas- sis ground. Connector & terminal (B55) No. 1 (+) — Chassis ground (-):	Is the voltage less than 1 V in "P" range?	Go to step 18.	Go to step 44.
18	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 1 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 44.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
19	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 1 — Chassis ground:	Is the resistance less than 1 MΩ?	Go to step 20.	Repair ground short circuit in "P" range circuit.
20	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 3 — (T7) No. 8:	Is the resistance less than 1 Ω?	Go to step 21.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
21	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 3 (+) — Chassis ground (-):	Is the voltage less than 1 V in "R" range?	Go to step 22.	Go to step 44.
22	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 3 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 44.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
23	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 3 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 24.	Repair ground short circuit in "R" range circuit.
24	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 14 — (T7) No. 10:	Is the resistance less than 1 Ω?	Go to step 25.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
25	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage less than 1 V in "N" range?	Go to step 26.	Go to step 44.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
26	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 44.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
27	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 14 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 28.	Repair ground short circuit in "N" range circuit.
28	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 4 — (T7) No. 3:	Is the resistance less than 1 Ω?	Go to step 29.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
29	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 4 (+) — Chassis ground (-):	Is the voltage less than 1 V in "D" range?	Go to step 30.	Go to step 44.
30	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 4 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 44.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
31	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 4 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 32.	Repair ground short circuit in "D" range circuit.
32	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 5 — (T7) No. 11:	Is the resistance less than 1 Ω?	Go to step 33.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
33	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 5 (+) — Chassis ground (-):	Is the voltage less than 1 V in "3" range?	Go to step 34.	Go to step 44.
34	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 5 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 44.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
35	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 5 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 36.	Repair ground short circuit in "3" range circuit.
36	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 6 — (T7) No. 4:	Is the resistance less than 1 Ω?	Go to step 37.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
37	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 6 (+) — Chassis ground (-):	Is the voltage less than 1 V in "2" range?	Go to step 38.	Go to step 44.
38	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 6 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 44.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
39	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 6 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 40.	Repair ground short circuit in "2" range circuit.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
40	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 7 — (T7) No. 6:	Is the resistance less than 1 Ω ?	Go to step 41.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
41	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 7 (+) — Chassis ground (-):	Is the voltage less than 1 V in "1" range?	Go to step 42.	Go to step 44.
42	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 7 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 44.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
43	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 7 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 44.	Repair ground short circuit in "1" range circuit.
44	CHECK POOR CONTACT.	Is there poor contact in inhibitor switch circuit?	Repair poor contact.	Adjust inhibitor switch and select cable or replace TCM. <Ref. to AT-28, ADJUSTMENT, Inhibitor Switch.> and <Ref. to CS-10, Select Cable.> <Ref. to AT-48, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

MEMO:

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

I: CHECK HOLD SWITCH. S004618G78

DIAGNOSIS:

- LED does not come on when hold switch is ON.
- Hold switch circuit is open or shorted.

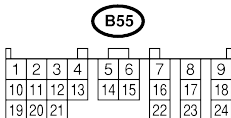
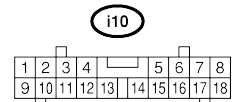
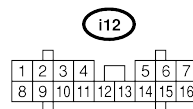
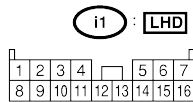
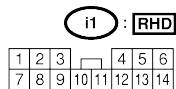
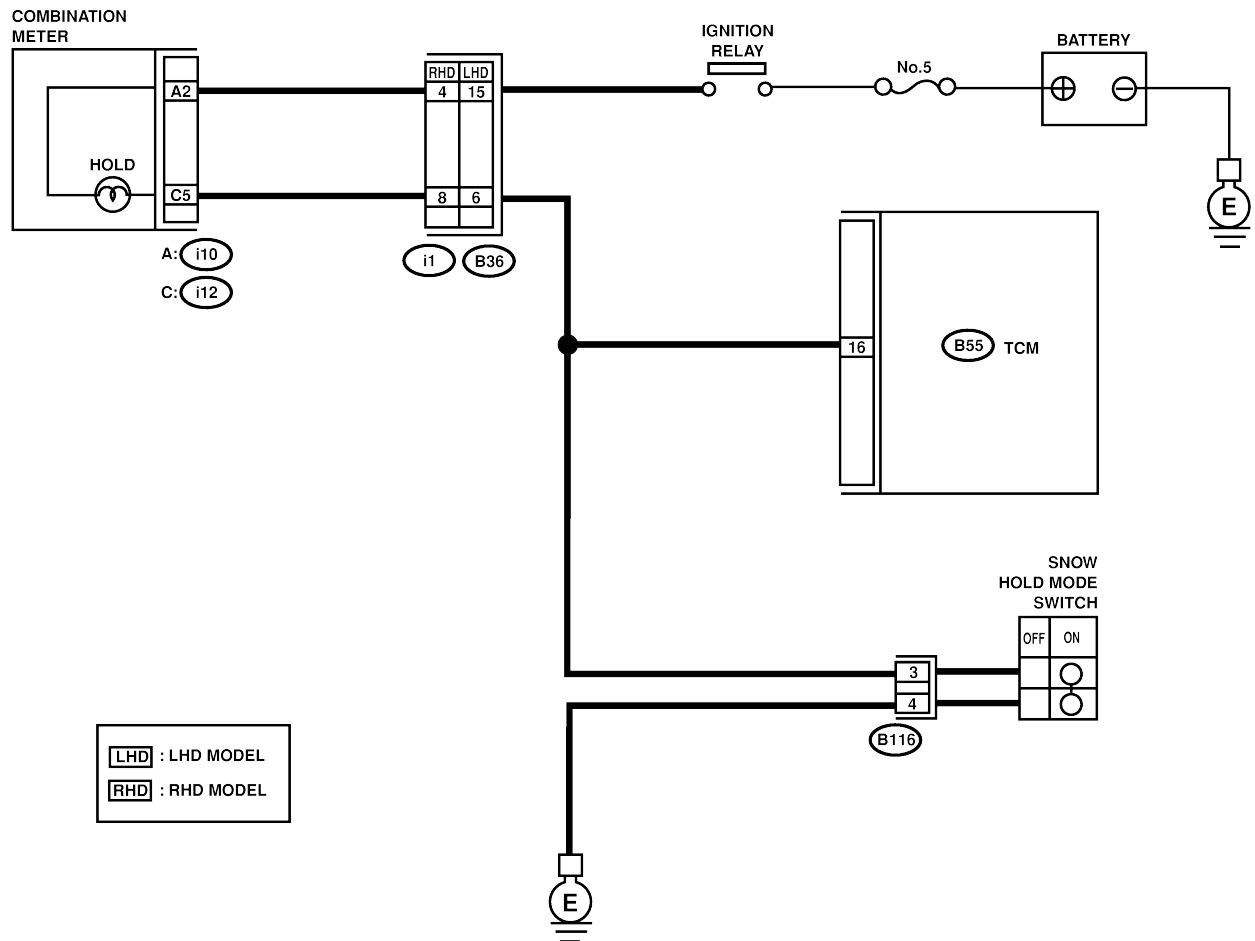
TROUBLE SYMPTOM:

- 2nd gear is not held.
- Failure of vehicle to start in 2nd gear except 1st range.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

WIRING DIAGRAM:



S3M0637

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK HOLD SWITCH OPERATION.	When hold switch is turned OFF, does LED light up?	Go to step 5.	Go to step 2.
2	CHECK HOLD SWITCH OPERATION.	When hold switch is turned ON, does LED light up?	Go to step Symptom Related Diagnostic. <Ref. 134, Symptom Related Diagnostic.>	Go to step 3.
3	CHECK HOLD INDICATOR LIGHT. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove HOLD indicator light bulb from combination meter.	Is HOLD indicator light bulb OK?	Go to step 4.	Replace HOLD indicator light bulb. <Ref. to IDI-15, Combination Meter Assembly.>
4	CHECK HOLD SWITCH GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from hold switch. 3) Measure resistance of harness connector between hold switch and chassis ground. Connector & terminal (B116) No. 4 — Chassis ground:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair open circuit in harness between hold switch and chassis ground.
5	CHECK HOLD SWITCH. 1) Hold switch turned ON. 2) Measure resistance between terminals of hold switch. Terminals No. 4 — No. 3:	Is the resistance less than 1 Ω ?	Go to step 6.	Repair hold switch.
6	CHECK HOLD SWITCH. 1) Hold switch turned OFF. 2) Measure resistance between terminals of hold switch. Terminals No. 4 — No. 3:	Is the resistance more than 1 M Ω ?	Go to step 7.	Repair hold switch.
7	CHECK HARNESS CONNECTOR BETWEEN TCM AND HOLD SWITCH. 1) Disconnect connector TCM and combination meter. 2) Measure resistance of harness connector between TCM and hold switch. Connector & terminal (B55) No. 16 — (B116) No. 3:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair open circuit in harness between TCM and hold switch connector and poor contact in coupling connector.
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. Measure resistance of harness connector TCM and combination meter. Connector & terminal (B55) No. 16 — (i12) No. 5:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
9	CHECK HARNESS CONNECTOR BETWEEN TCM AND HOLD SWITCH. Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. Connector & terminal (B55) No. 16 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 10.	Repair short circuit in harness between TCM, hold switch and combination meter connector.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and hold switch. 2) Turn ignition switch ON (with engine OFF). 3) Measure signal voltage for TCM while turning hold switch OFF. Connector & terminal (B55) No. 16 (+) — Chassis ground (-):	Is the voltage more than 8 V?	Go to step 11.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
11	CHECK INPUT SIGNAL FOR TCM. Measure signal voltage for TCM while turning hold switch ON. Connector & terminal (B55) No. 16 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 12.	Replace TCM. <Ref. to AT-48, Transmission Control Module (TCM).>
12	CHECK POOR CONTACT.	Is there poor contact?	Repair poor contact.	A temporary poor contact of the connector or harness or connector in hold switch circuit.

SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission (Diagnostics)

16. Symptom Related Diagnostic

S004519

A: INSPECTION

S004519A10

Symptom	Problem parts
Starter does not rotate when select lever is in "P" or "N"; starter rotates when select lever is in "R", "D", "3" or "2".	● Inhibitor switch ● Select cable ● Select lever ● Starter motor and harness
Abnormal noise when select lever is in "P" or "N".	● Strainer ● Transfer duty solenoid ● Oil pump ● Drive plate ● ATF level too high or too low
Hissing noise occurs during standing start.	● Strainer ● ATF level too high or too low
Noise occurs while driving in "D1".	● Final gear ● Planetary gear
Noise occurs while driving in "D2".	● Reduction gear ● Differential gear oil level too high or too low
Noise occurs while driving in "D3".	● Final gear ● Low & reverse brake ● Reduction gear ● Differential gear oil level too high or too low
Noise occurs while driving in "D4".	● Final gear ● Low & reverse brake ● Planetary gear ● Reduction gear ● Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	● Control valve ● Lock-up damper ● Engine performance ● Input shaft
Vehicle moves when select lever is in "N".	● TCM ● Low clutch
Shock occurs when select lever is moved from "N" to "D".	● TCM ● Harness ● Control valve ● ATF deterioration
Excessive time lag occurs when select lever is moved from "N" to "D".	● Control valve ● Low clutch ● Line pressure duty solenoid ● Seal ring ● Front gasket transmission case
Shock occurs when select lever is moved from "N" to "R".	● TCM ● Harness ● Control valve ● ATF deterioration
Excessive time lag occurs when select lever is moved from "N" to "R".	● Control valve ● Low & reverse clutch ● Reverse clutch ● Line pressure duty solenoid ● Seal ring ● Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	● Parking brake mechanism ● Planetary gear