

## GENERAL DESCRIPTION

Control Systems

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### 1. General Description SS01001

#### A: SPECIFICATIONS SS01001E49

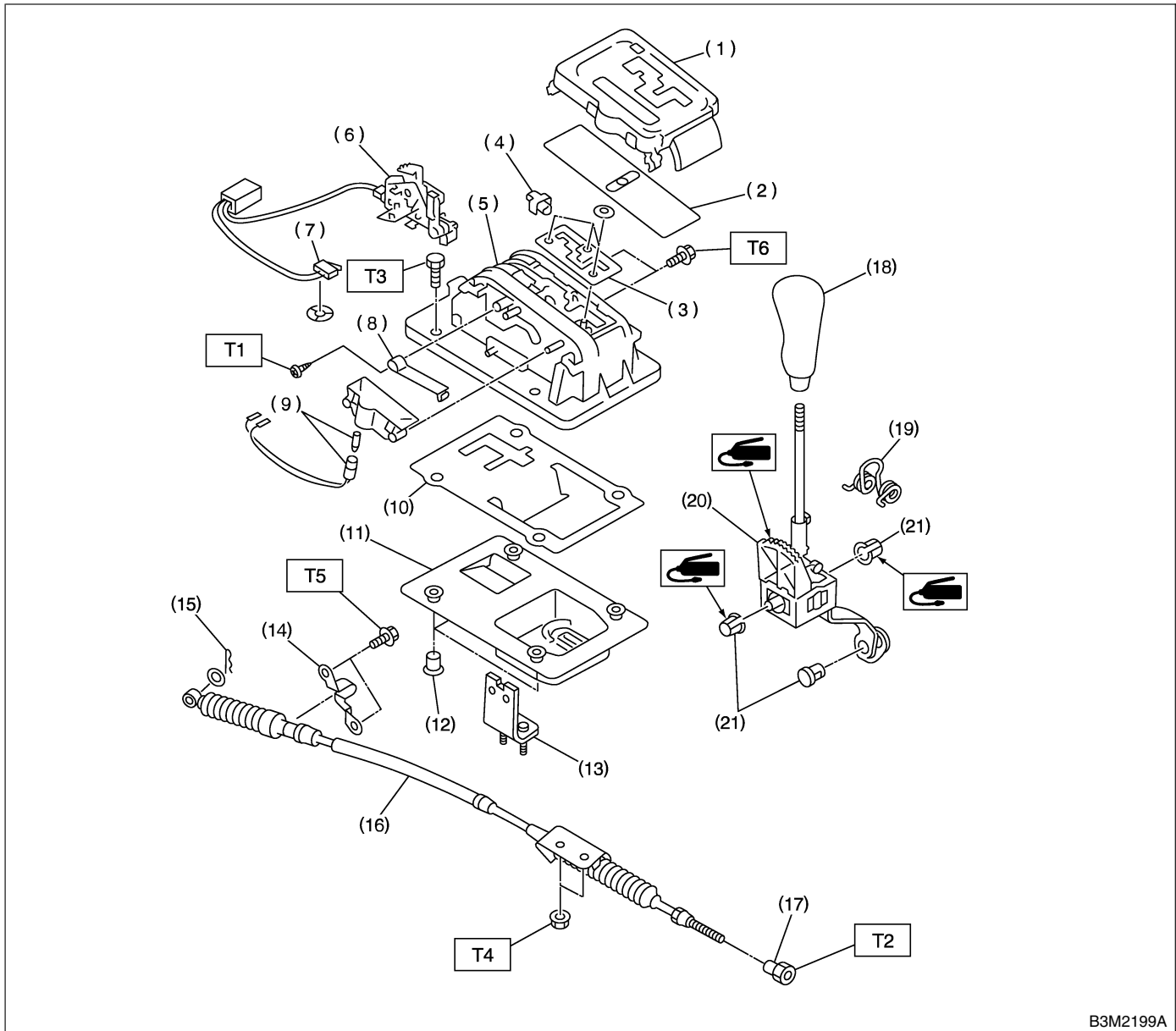
Item		Specification
Vibration torque of rod against lever	N·m (kgf-m, ft-lb)	0.7 (0.07, 0.5) or less

## B: COMPONENT

S501001A05

### 1. AT SELECT LEVER

S501001A0501



- (1) Indicator cover
- (2) Slider
- (3) Pattern plate
- (4) Stopper
- (5) Frame
- (6) Solenoid ASSY
- (7) "P" position switch
- (8) Detent spring
- (9) Illumination bulb
- (10) Plate

- (11) Rubber boot
- (12) Washer
- (13) Cable bracket
- (14) Cable clamp
- (15) Snap pin
- (16) Outer cable
- (17) Nut
- (18) Grip
- (19) Spring
- (20) Select lever ASSY

- (21) Bushing

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

**T1: 4.9 (0.50, 3.6)**

**T2: 7.5 (0.76, 5.5)**

**T3: 13 (1.3, 9.4)**

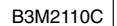
**T4: 18 (1.8, 13.0)**

**T5: 33 (3.4, 25)**

**T6: 51 (5.2, 38)**

## 2. MT GEAR SHIFT LEVER

S501001A0502



- (19) Stay  
(20) Spring pin  
(21) Bushing

**T3: 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.

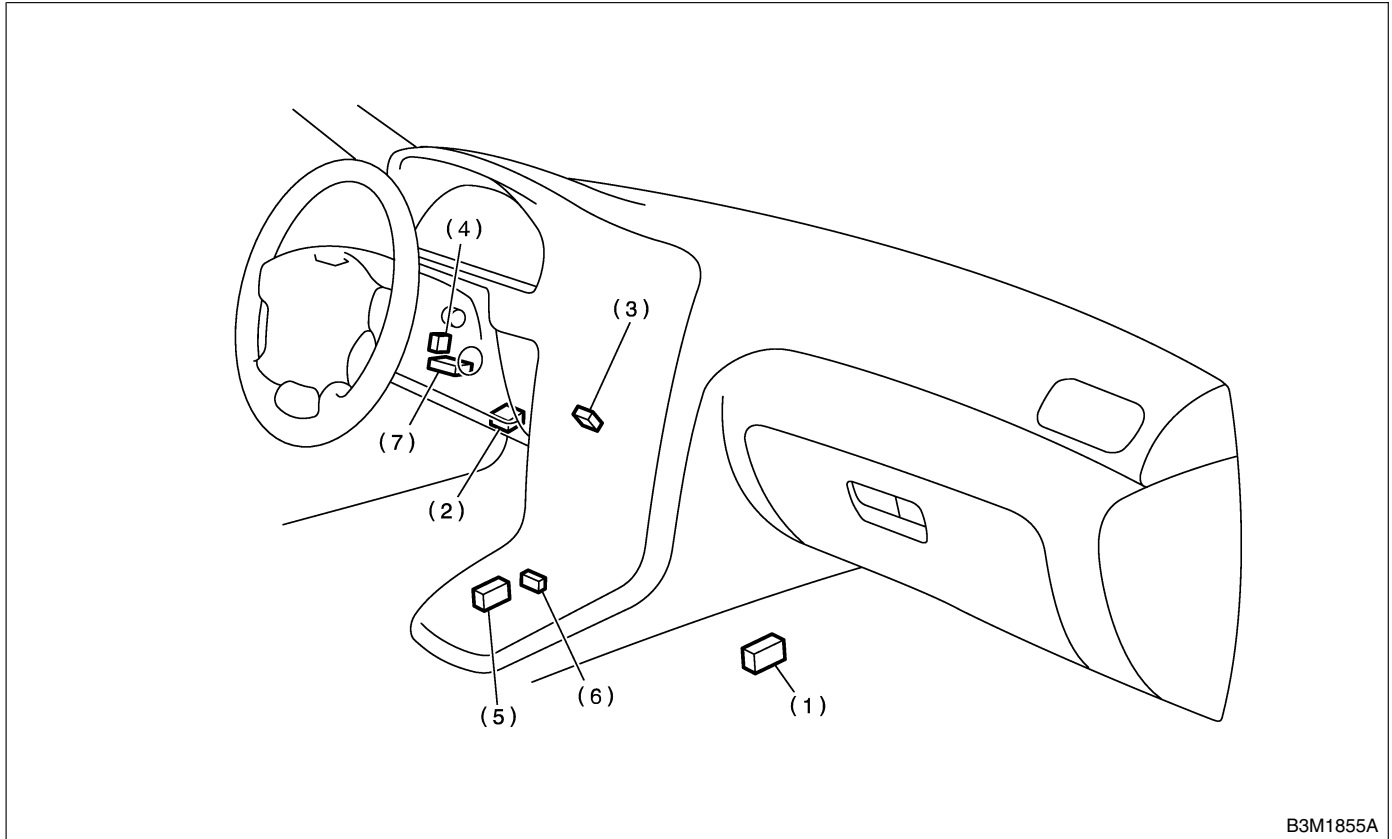
- Be sure to tighten fasteners including nuts and bolts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolving surfaces before installation.
- Before installing O-rings or snap rings, apply a sufficient amount of grease to avoid damage and deformation.
- Before securing a part in a vise, place cushioning material such as wood blocks, aluminum plates, or shop cloths between the part and the vise.
- Before disconnecting electrical connectors, be sure to disconnect ground cable from battery.

**D: PREPARATION TOOL** SS01001A17**1. GENERAL PURPOSE TOOLS** SS01001A1701

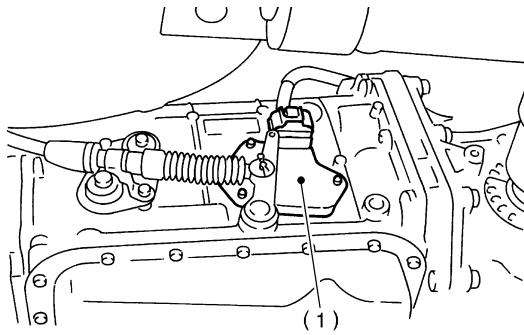
TOOL NAME	REMARKs
Circuit tester	Used for measuring resistance, voltage and ampere.

## 2. Electrical Component S501547

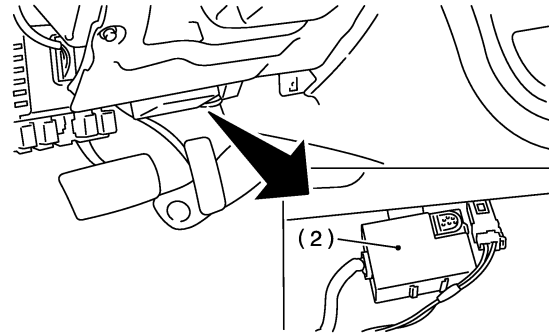
### A: LOCATION S501547A13



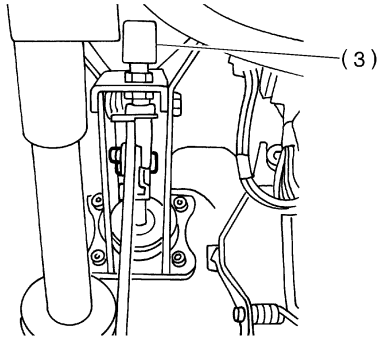
- |                             |                         |                       |
|-----------------------------|-------------------------|-----------------------|
| (1) Inhibitor switch        | (4) Key warning switch  | (7) Key lock solenoid |
| (2) AT shift control module | (5) Shift lock solenoid |                       |
| (3) Stop light switch       | (6) "P" position switch |                       |



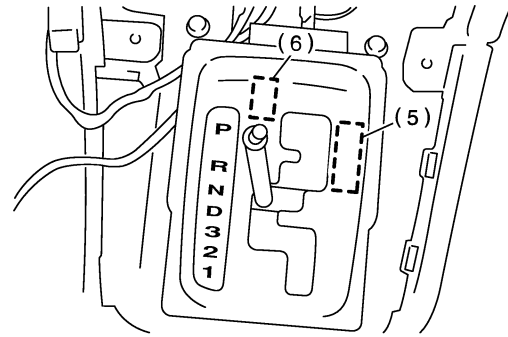
B2M2246E



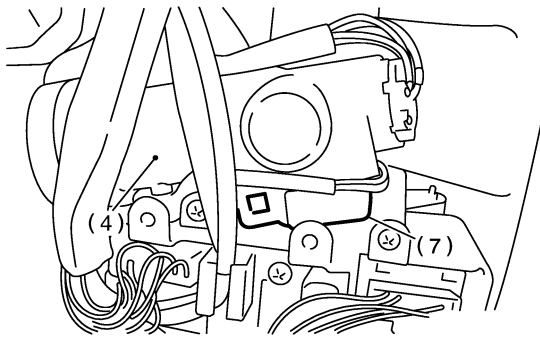
B3M1857A



B4M1747B



B3M2200A



B3M1860A

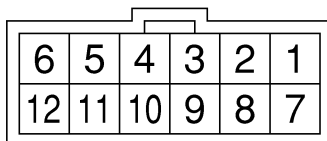
SUBARU.

## 3. AT Shift Lock System

S501240

### A: ELECTRICAL SPECIFICATION

S501240A08

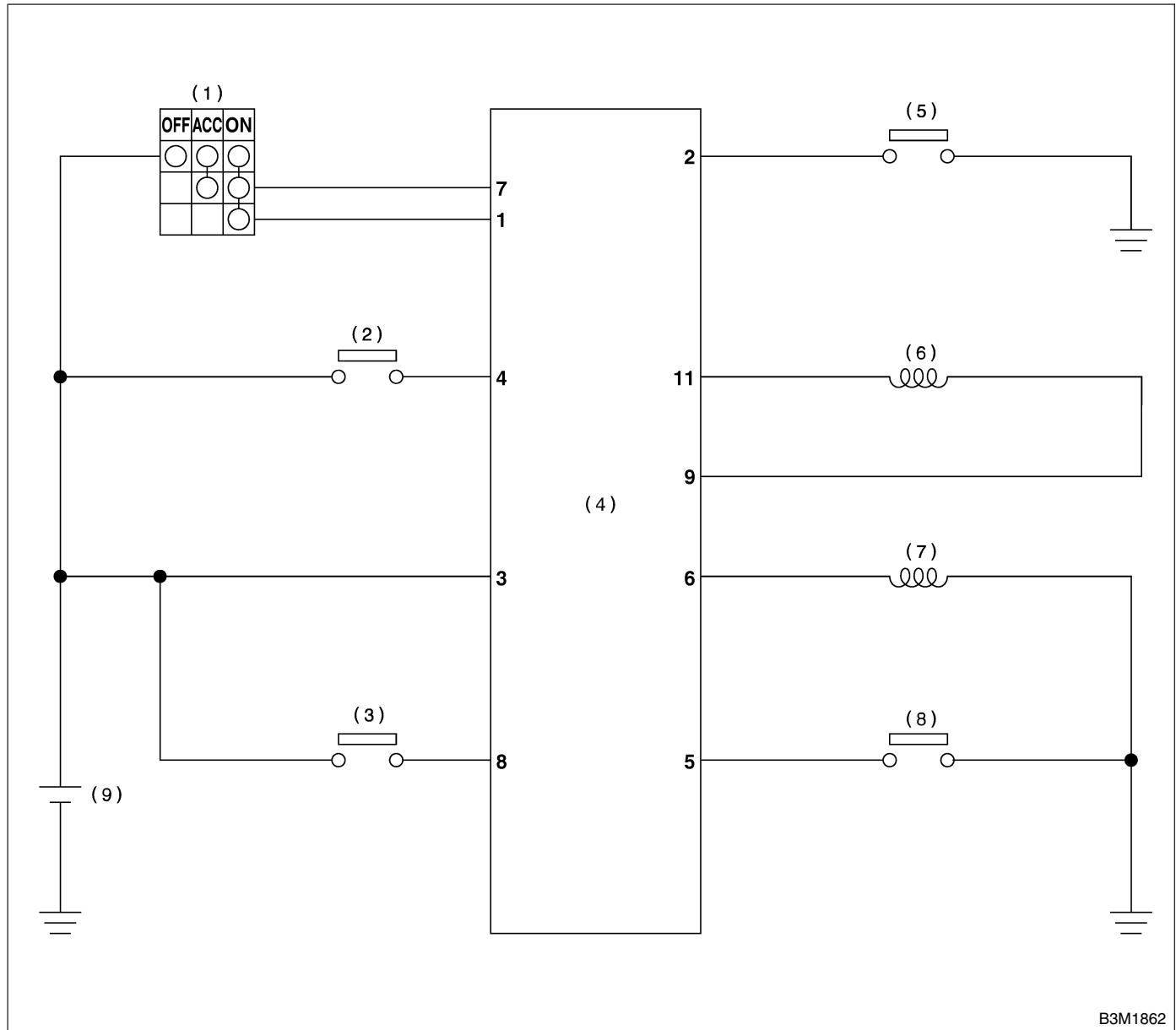


B3M1861

Contents	Terminal No. (+) — (—)	Input/Output signal
		Measured value and measuring conditions
Back-up power supply	3 — 10	10 — 15 V
Ignition power supply	1 — 10	10 — 15 V when ignition switch is ON or START.
Ignition power supply	7 — 10	10 — 15 V when ignition switch is ACC.
Inhibitor Switch ("P" position)	2 — 10	0 V when select lever is in "P" position. 5 - 7 V when select lever is in other positions than "P" position.
Stop light switch	4 — 10	10 - 15 V when stop light switch is ON. 0 V when stop light switch is OFF.
"P" position switch	5 — 10	0 V when select lever is in "P" position. 5 - 7 V when select lever is in other positions than "P" position.
Shift lock solenoid signal	6 — 10	10 - 15 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	8 — 10	10 - 15 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	9 — 10	8.5 — 15 V when turning ignition switch ON, select lever is in "P" position and brake switch is ON. 0 V at other conditions than above.
Key lock solenoid signal ground	11 — 10	0 V
Ground	10	—

## B: SCHEMATIC

S501240A21



- (1) Ignition switch
- (2) Stop light switch
- (3) Key warning switch

- (4) AT shift lock control module
- (5) Inhibitor switch
- (6) Key lock solenoid

- (7) Shift lock solenoid
- (8) "P" position switch
- (9) Battery



# AT SHIFT LOCK SYSTEM

Control Systems

## C: INSPECTION

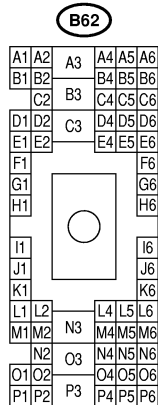
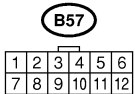
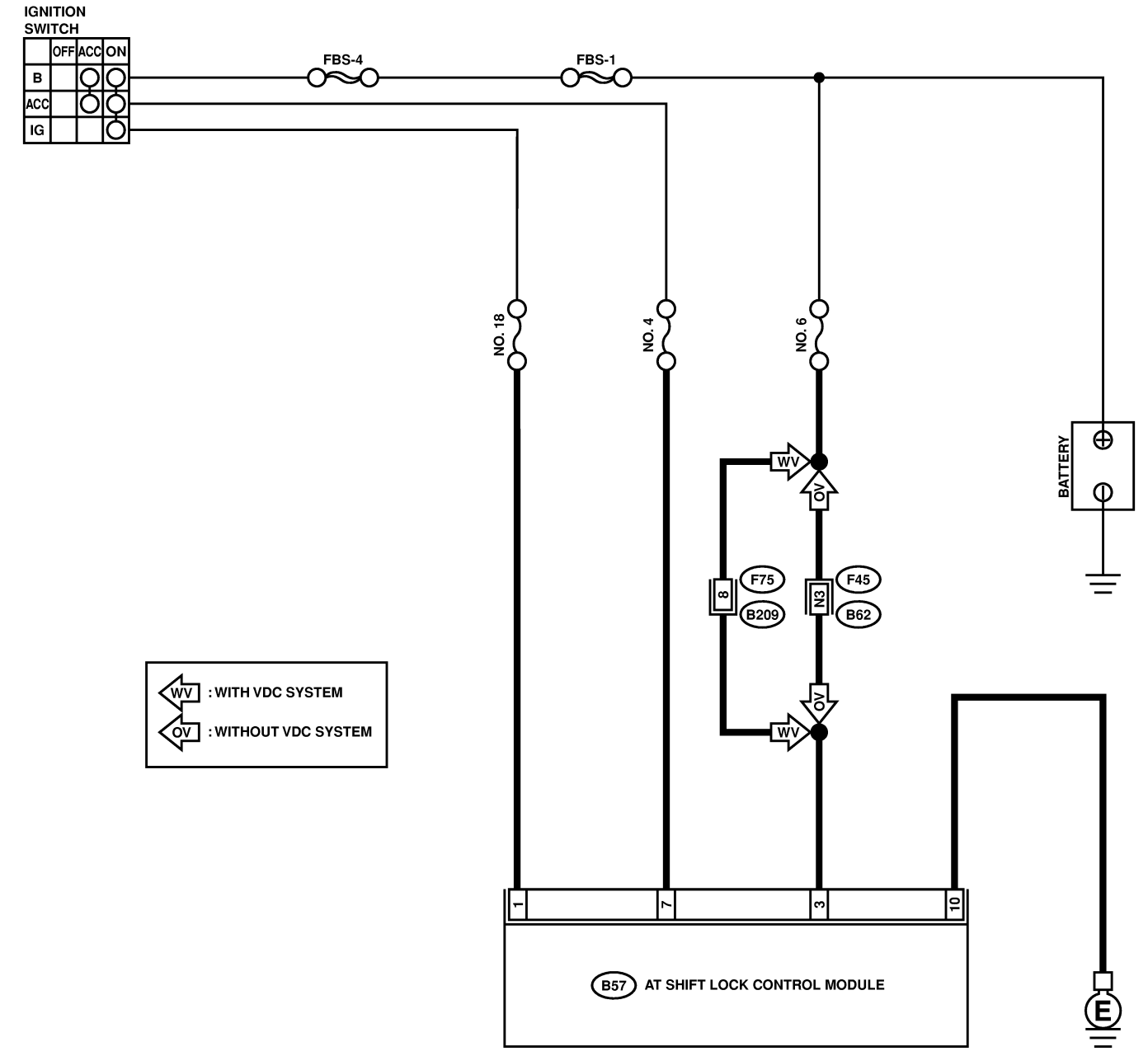
S501240A10

No.	Step	Check	Yes	No
1	<b>CHECK SHIFT LOCK.</b> 1) Turn ignition switch ON. 2) Move select lever to "P" position.	While brake pedal is depressed, can select lever move from "P" position to other positions?	Go to step 2.	Inspect "SELECT LEVER CANNOT BE SHIFT LOCKED". <Ref. to CS-13, SELECT LEVER CANNOT BE SHIFT LOCKED, INSPECTION, AT Shift Lock System.>
2	<b>CHECK SHIFT LOCK.</b>	While brake pedal is not depressed, can select lever move from "P" position to other positions?	Inspect "SELECT LEVER SHIFT LOCK CANNOT BE RELEASED". <Ref. to CS-16, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock System.>	Go to step 3.
3	<b>CHECK KEY INTER LOCK.</b>	When select lever is in other than "P" position, does ignition switch turn to "LOCK" position? Or when select lever is in "P" position, does ignition switch not turn to "LOCK" position?	Inspect "KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED". <Ref. to CS-19, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock System.>	AT shift lock system is normal.

## 1. AT SHIFT LOCK CONTROL MODULE POWER SUPPLY AND GROUND LINE

SS01240A1001

### WIRING DIAGRAM:



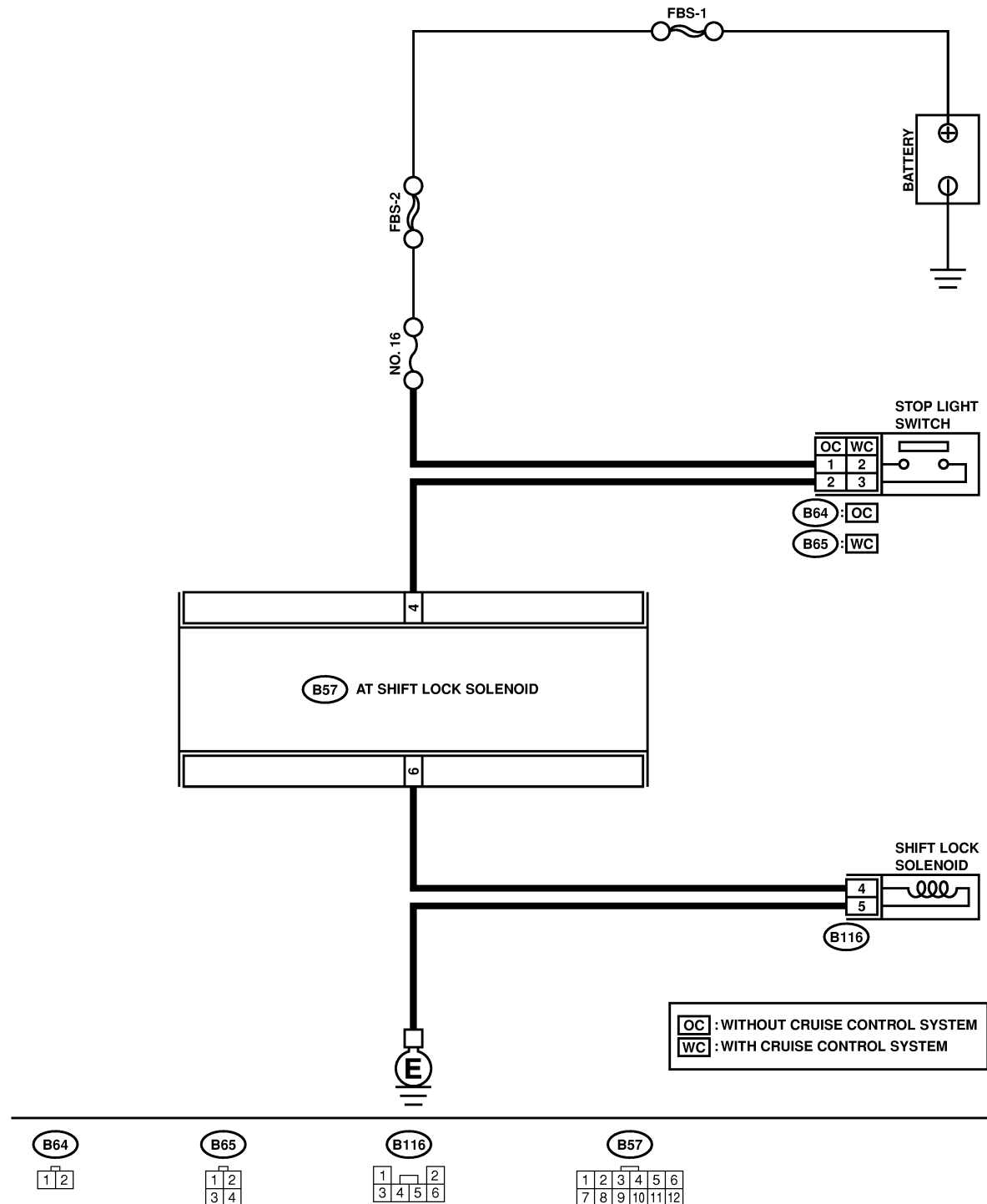
# AT SHIFT LOCK SYSTEM

## Control Systems

No.	Step	Check	Yes	No
1	<b>CHECK FUSE.</b> 1) Remove the fuse (No. 6, 18 and 4).	Is the fuse (No. 6, 18 or 4) blown out?	Replace the fuse (No. 6, 18 or 4). If replace fuse (No. 6, 18 or 4) has blown out easily, repair short circuit in harness between fuse and AT shift lock control module.	Go to step 2.
2	<b>CHECK HARNESS CONNECTOR BETWEEN AT SHIFT LOCK CONTROL MODULE AND CHASSIS GROUND.</b> 1) Turn ignition switch to OFF. 2) Measure the resistance of harness between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 10 — Chassis ground:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between AT shift lock control module and body ground.
3	<b>CHECK BATTERY POWER SUPPLY.</b> 1) Measure the voltages between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 3 (+) — Chassis ground (-):</b>	Is the voltage more than 10 V?	Go to step 4.	Repair open or short circuit in harness between battery and AT shift lock control module, and poor contact in coupling connector.
4	<b>CHECK IGNITION POWER SUPPLY CIRCUIT.</b> 1) Turn ignition switch to ACC. 2) Measure the voltage between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 7 (+) — Chassis ground (-):</b>	Is the voltage more than 10 V?	Go to step 5.	Repair open or short circuit in harness between battery and AT shift lock control module, and poor contact in coupling connector.
5	<b>CHECK IGNITION POWER SUPPLY CIRCUIT.</b> 1) Turn ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 1 (+) — Chassis ground (-):</b>	Is the voltage more than 10 V?	Go to step 6.	Repair open or short circuit in harness between battery and AT shift lock control module, and poor contact in coupling connector.
6	<b>CHECK POOR CONTACT.</b>	Is there poor contact in power supply and ground line circuit?	Repair poor contact.	Replace AT shift lock control module.

## 2. SELECT LEVER CANNOT BE SHIFT LOCKED SS01240A1002

### WIRING DIAGRAM:



# AT SHIFT LOCK SYSTEM

## Control Systems

No.	Step	Check	Yes	No
1	<b>CHECK STOP LIGHT SWITCH.</b> Depress brake pedal.	Does stop light turn ON?	Go to step 2.	Inspect stop light system.
2	<b>CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition switch to OFF. 2) Disconnect stop light switch and AT shift lock control module. 3) Measure the resistance of harness between stop light switch and AT shift lock control module. <b>Connector &amp; terminal</b> <b>Without cruise control model</b> <b>(B64) No. 2 — (B57) No. 4:</b> <b>With cruise control model</b> <b>(B65) No. 3 — (B57) No. 4:</b>	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and stop light switch.	Go to step 3.
3	<b>CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b> 1) Measure the resistance of harness between stop light switch and chassis ground. <b>Connector &amp; terminal</b> <b>Without cruise control model</b> <b>(B64) No. 2 — Chassis ground:</b> <b>With cruise control model</b> <b>(B65) No. 3 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between AT shift lock control module and stop light switch.
4	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.</b> 1) Disconnect shift lock solenoid connector. 2) Measure the resistance of harness between AT shift lock control module and shift lock solenoid. <b>Connector &amp; terminal</b> <b>(B116) No. 4 — (B57) No. 6:</b>	Is the resistance less than 1 Ω?	Go to step 5.	Repair open circuit in harness between AT shift lock control module and shift lock solenoid.
5	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.</b> Measure the resistance of harness between shift lock solenoid and chassis ground. <b>Connector &amp; terminal</b> <b>(B116) No. 4 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 6.	Repair short circuit in harness between AT shift lock control module and shift lock solenoid.
6	<b>CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND.</b> Measure the resistance of harness between shift lock solenoid and chassis ground. <b>Connector &amp; terminal</b> <b>(B116) No. 5 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Repair open circuit in harness between shift lock solenoid and body ground.	Go to step 7.
7	<b>CHECK SHIFT LOCK SOLENOID.</b> Measure the resistance of shift lock solenoid connector terminals. <b>Terminal</b> <b>No. 4 — No. 5:</b>	Is the resistance between 10 and 20 Ω?	Go to step 8.	Replace shift lock solenoid.
8	<b>CHECK SHIFT LOCK SOLENOID.</b> Connect battery with shift lock solenoid connector terminal and operate solenoid. <b>Terminal</b> <b>No. 4 (+) — No. 5 (-):</b>	Does shift lock solenoid operate properly?	Go to step 9.	Replace shift lock solenoid.

# AT SHIFT LOCK SYSTEM

Control Systems

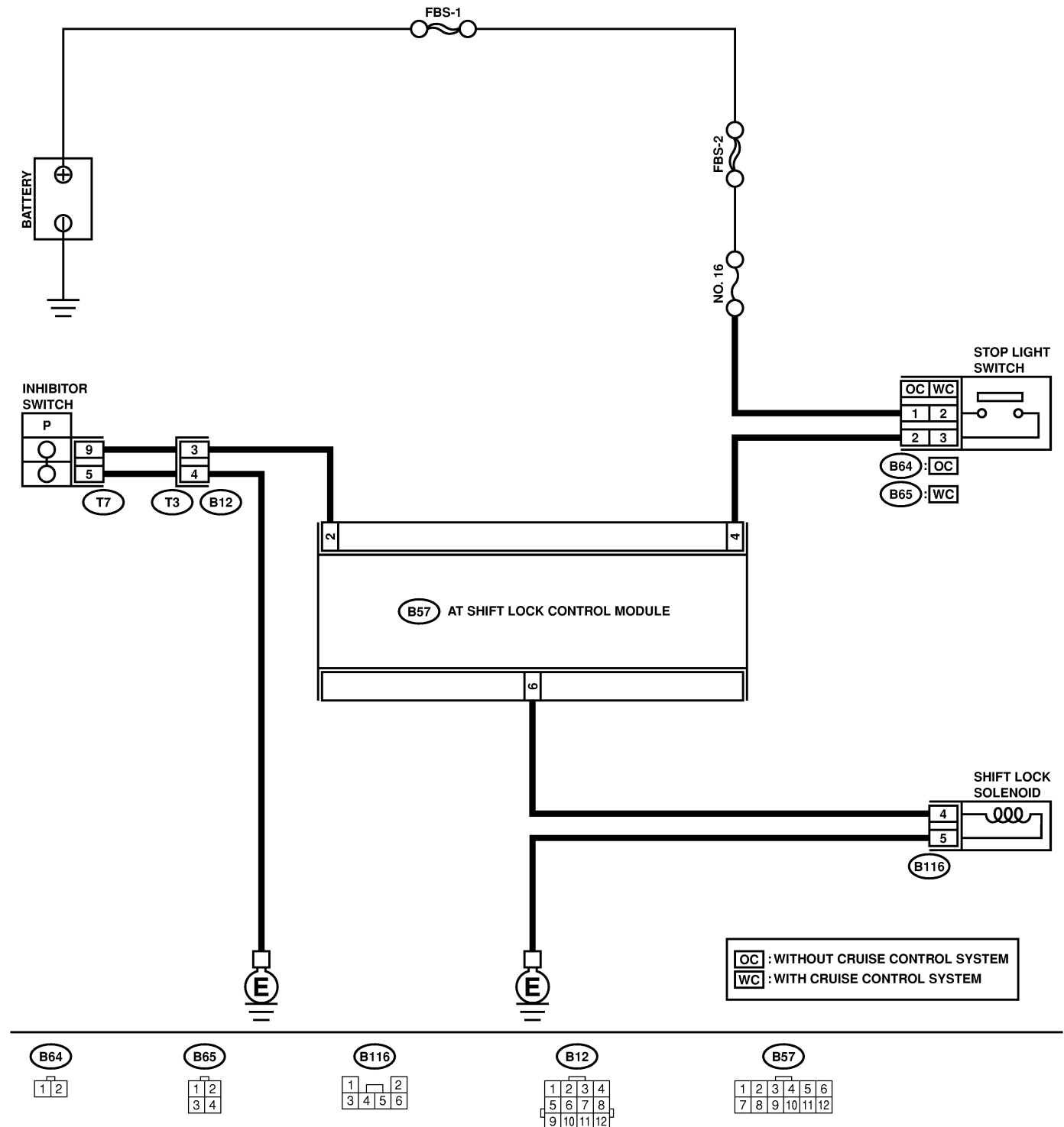
No.	Step	Check	Yes	No
9	CHECK POOR CONTACT.	Is there poor contact in key lock circuit?	Repair poor contact.	Replace AT shift lock control module.

# AT SHIFT LOCK SYSTEM

Control Systems

## 3. SELECT LEVER SHIFT LOCK CANNOT BE RELEASED S501240A1003

### WIRING DIAGRAM:



# AT SHIFT LOCK SYSTEM

Control Systems

No.	Step	Check	Yes	No
1	<b>CHECK INHIBITOR SWITCH.</b> 1) Turn ignition switch to ON (engine OFF). 2) Move select lever from "P" to "1" position.	Combination meter indicator lamp and select lever "P", "R", "N", "3", "2" and "1" are correctly matched?	Go to step 2.	Adjust inhibitor switch and select cable.
2	<b>CHECK HARNESS BETWEEN INHIBITOR SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector transmission harness and AT shift lock control module. 3) Measure the resistance of harness between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 2 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between AT shift lock control module and transmission connector.
3	<b>CHECK HARNESS BETWEEN INHIBITOR SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b> Measure the resistance of harness between AT shift lock control module and inhibitor switch. <b>Connector &amp; terminal</b> <b>(B12) No. 3 — (B57) No. 2:</b>	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and transmission connector.	Go to step 4.
4	<b>CHECK HARNESS BETWEEN INHIBITOR SWITCH AND BODY GROUND.</b> 1) Measure the resistance of harness between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B12) No. 4 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Repair open circuit in harness between transmission connector and chassis ground.	Go to step 5.
5	<b>CHECK INHIBITOR SWITCH.</b> 1) Move select lever to "P" position. 2) Measure the resistance of transmission harness connector terminals. <b>Connector &amp; terminal</b> <b>(T3) No. 3 — No. 4:</b>	Is the resistance more than 1 MΩ?	Repair or replace inhibitor switch.	Go to step 6.
6	<b>CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.</b> 1) Connect all connectors. 2) Turn ignition switch to ON. 3) Measure the voltage between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 2 (+) — Chassis ground (-):</b>	Is the voltage between 5 and 7 V?	Go to step 7.	Go to step 15.
7	<b>CHECK STOP LIGHT SWITCH.</b> 1) Turn ignition switch to ON (engine OFF). 2) Depress brake pedal.	Does stop light turn on?	Go to step 8.	Inspect stop light system.
8	<b>CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b> 1) Press brake pedal. 2) Measure the voltage between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 4 — Chassis ground:</b>	Is the voltage more than 10 V?	Go to step 9.	Repair open or short circuit in harness between AT shift lock control module and stop light switch.



# AT SHIFT LOCK SYSTEM

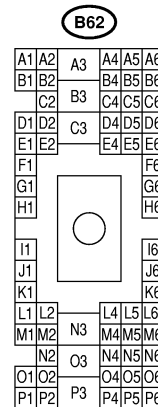
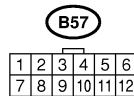
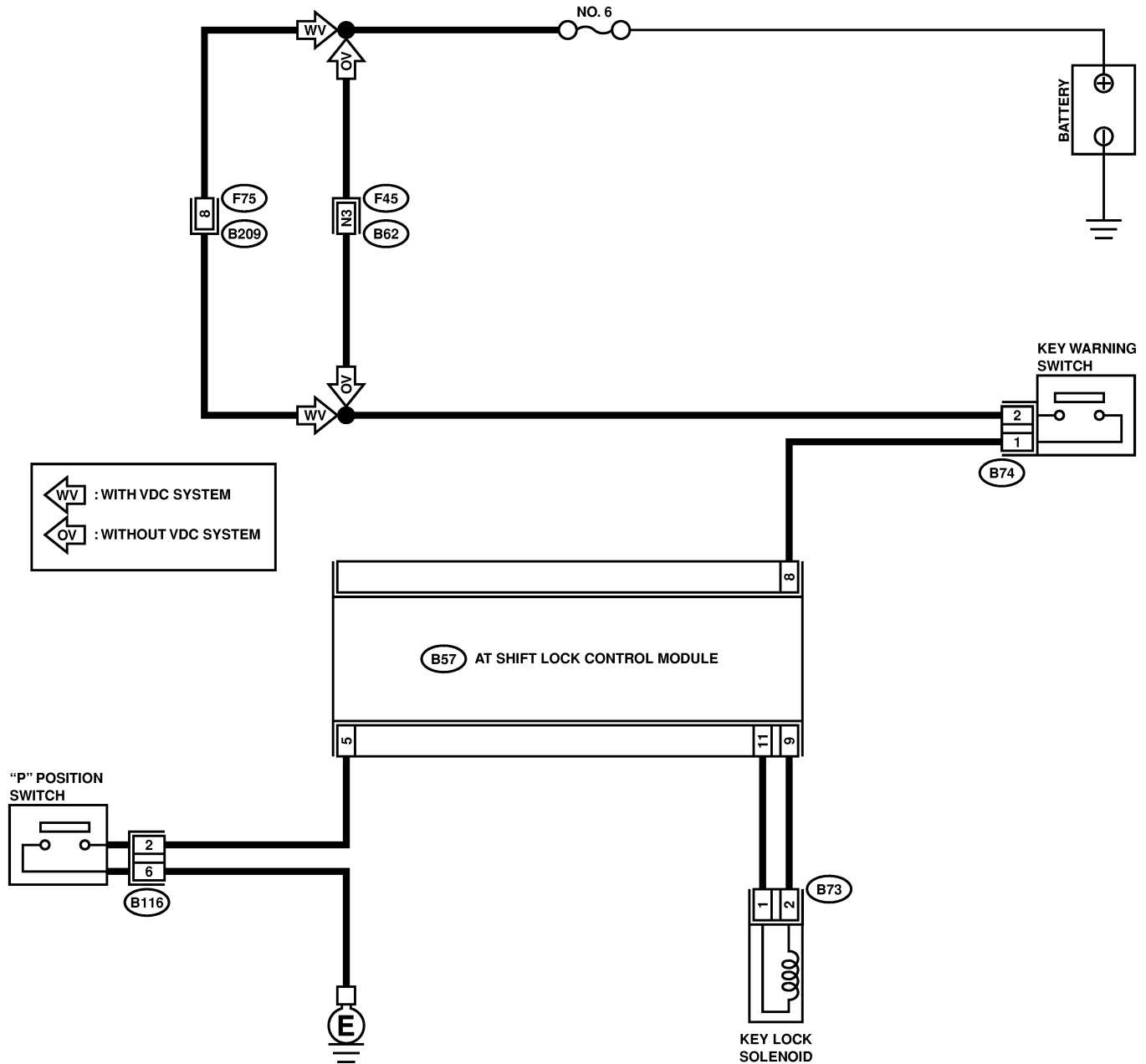
## Control Systems

No.	Step	Check	Yes	No
9	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from shift lock solenoid. 3) Measure the resistance of harness between shift lock solenoid and AT shift lock control module. <b>Connector &amp; terminal</b> <b>(B57) No. 6 — (B116) No. 4:</b>	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and shift lock solenoid.	Go to step 10.
10	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.</b> Measure the resistance of harness between shift lock solenoid and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 6 — Chassis ground:</b>	Is the resistance less than 10 Ω?	Go to step 11.	Repair short circuit in harness between AT shift lock control module and shift lock solenoid.
11	<b>CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND.</b> Measure the resistance of harness between shift lock solenoid and chassis ground. <b>Connector &amp; terminal</b> <b>(B116) No. 5 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Repair open circuit in harness between shift lock solenoid and chassis ground.	Go to step 12.
12	<b>CHECK SHIFT LOCK SOLENOID.</b> Measure the resistance of shift lock solenoid connector terminals. <b>Terminal</b> <b>No. 4 — No. 5:</b>	Is the resistance between 10 and 20 Ω?	Go to step 13.	Replace shift lock solenoid.
13	<b>CHECK SHIFT LOCK SOLENOID.</b> Connect battery with shift lock solenoid connector terminal and operate solenoid. <b>Terminal</b> <b>No. 4 (+) — No. 5 (-):</b>	Is shift lock solenoid operating properly?	Go to step 14.	Replace shift lock solenoid.
14	<b>CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 6 (+) — Chassis ground (-):</b>	Is the voltage more than 10 V?	Go to step 15.	Replace AT shift lock control module.
15	<b>CHECK POOR CONTACT.</b>	Is there poor contact in key lock circuit?	Repair poor contact.	Replace AT shift lock control module.

## 4. KEY INTERLOCK DOES NOT LOCK OR RELEASE

SS01240A1004

### WIRING DIAGRAM:



# AT SHIFT LOCK SYSTEM

## Control Systems

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH.</b> 1) Disconnect connector key warning switch. 2) Measure the voltage of harness between key warning switch and chassis ground. <b>Connector &amp; terminal</b> <b>(B74) No. 2 — Chassis ground:</b>	Is the voltage more than 10 V?	Go to step 2.	Repair open or short circuit in harness between battery and key warning switch.
2	<b>CHECK KEY WARNING SWITCH.</b> Measure the resistance of stop key warning connector terminals. <b>Terminal</b> <b>No. 1 — No. 2:</b>	Is the resistance more than 1 MΩ?	Replace key warning switch.	Go to step 3.
3	<b>CHECK KEY WARNING SWITCH.</b> 1) Remove key. 2) Measure the resistance of stop key warning connector terminals. <b>Terminal</b> <b>No. 1 — No. 2:</b>	Is the resistance more than 1 MΩ?	Go to step 4.	Replace key warning switch.
4	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH.</b> 1) Disconnect AT shift lock control module. 2) Connect key warning switch. 3) Install key. 4) Measure the voltage of harness between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 8 — Chassis ground:</b>	Is the resistance more than 10 V?	Go to step 5.	Repair open or short circuit in harness between AT shift lock control module and key warning switch.
5	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.</b> 1) Disconnect connector from key lock solenoid. 2) Measure the resistance of harness between AT shift lock control module and key lock solenoid. <b>Connector &amp; terminal</b> <b>(B73) No. 2 — (B57) No. 9:</b>	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and key lock solenoid.	Go to step 6.
6	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.</b> Measure the resistance of harness between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 9 — Chassis ground:</b>	Is the resistance less than 1 Ω?	Repair short circuit in harness between AT shift lock control module and key lock solenoid.	Go to step 7.
7	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.</b> Measure the resistance of harness between AT shift lock control module and key lock solenoid. <b>Connector &amp; terminal</b> <b>(B73) No. 1 — (B57) No. 11:</b> <b>(B73) No. 2 — (B57) No. 9:</b>	Is the resistance more than 1 MΩ?	Repair open circuit in harness between AT shift lock control module and key lock solenoid.	Go to step 8.

# AT SHIFT LOCK SYSTEM

Control Systems

No.	Step	Check	Yes	No
8	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.</b> Measure the resistance of harness between key lock solenoid and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 11 — Chassis ground:</b>	Is the resistance less than 10 $\Omega$ ?	Go to step 9.	Repair short circuit in harness between AT shift lock control module and key lock solenoid.
9	<b>CHECK KEY LOCK SOLENOID.</b> Measure the resistance of key lock solenoid connector terminals. <b>Connector &amp; terminal</b> <b>(B73) No. 1 — No. 2:</b>	Is the resistance between 4 and 8 $\Omega$ ?	Go to step 10.	Replace key lock solenoid.
10	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND “P” POSITION SWITCH.</b> 1) Disconnect connector from “P” position switch. 2) Measure the resistance of harness between AT shift lock control module and “P” position switch. <b>Connector &amp; terminal</b> <b>(B116) No. 2 — (B57) No. 5:</b>	Is the resistance more than 1 M $\Omega$ ?	Repair open circuit in harness between AT shift lock control module and “P” position switch.	Go to step 11.
11	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND “P” POSITION SWITCH.</b> Measure the resistance of harness between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B116) No. 2 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 12.	Repair open circuit harness between AT shift lock control module and “P” position switch.
12	<b>CHECK HARNESS BETWEEN “P” POSITION SWITCH AND CHASSIS GROUND.</b> Measure the resistance of harness between shift lock solenoid and “P” position switch. <b>Connector &amp; terminal</b> <b>(B116) No. 6 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Repair open circuit in harness between “P” position switch and body ground.	Go to step 13.
13	1) Move the select lever to “P” position. 2) Measure resistance between “P” position switch connector terminals. <b>Terminal</b> <b>No. 2 — No. 6:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 14.	Replace the “P” position switch.
14	1) Move the select lever to other than “P” position. 2) Measure resistance between “P” position switch connector terminals. <b>Terminal</b> <b>No. 2 — No. 6:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 15.	Replace the “P” position switch.
15	<b>CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 5 (+) — Chassis ground (-):</b>	Is the voltage between 5 and 7 V?	Go to step 16.	Replace AT shift lock control module.

# AT SHIFT LOCK SYSTEM

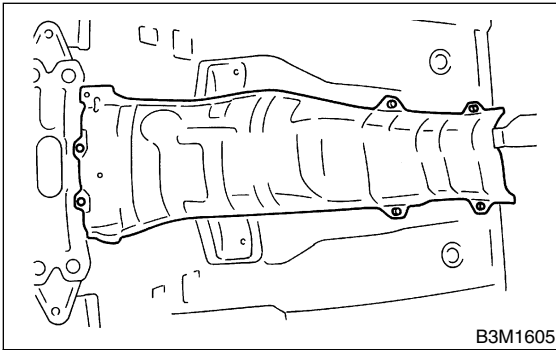
## Control Systems

No.	Step	Check	Yes	No
16	<b>CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition to ON (engine OFF). 2) Move select lever to "P" position. 3) Press brake pedal. 4) Measure the voltage of AT shift lock control module and chassis ground. <b>Connector &amp; terminal</b> <b>(B57) No. 9 (+) — Chassis ground (-):</b>	Is the voltage 8.5 and 15 V?	Go to step 17.	Replace AT shift lock control module.
17	<b>CHECK POOR CONTACT.</b>	Is there poor contact in AT shift lock circuit?	Repair poor contact.	Replace AT shift lock control module.

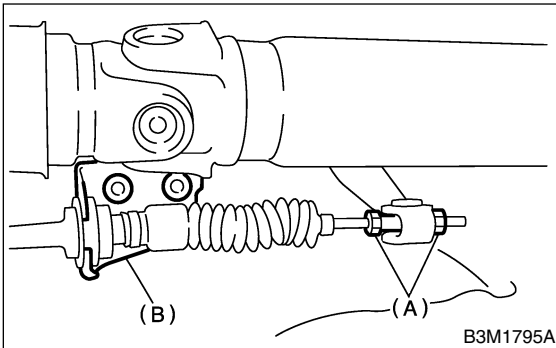
## 4. Select Lever SS01548

### A: REMOVAL SS01548A18

- 1) Move the select lever to the "N" position.
- 2) Remove rear exhaust pipe and muffler.  
2.5 L model  
<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.>  
and <Ref. to EX-10, REMOVAL, Muffler.>  
3.0 L model  
<Ref. to EX(H6)-8, REMOVAL, Rear Exhaust  
Pipe.> and <Ref. to EX(H6)-9, REMOVAL, Muf-  
fler.>
- 3) Remove heat shield cover.



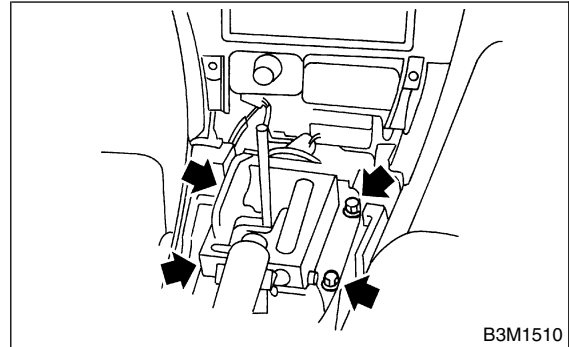
- 4) Disconnect cable from select lever and then remove cable bracket.



- (A) Adjusting nuts  
(B) Cable bracket

- 5) Remove console box. <Ref. to EI-36, REMOVAL, Console Box.>

- 6) Disconnect the connectors, then remove the four bolts to take out the selector lever assembly from the body.

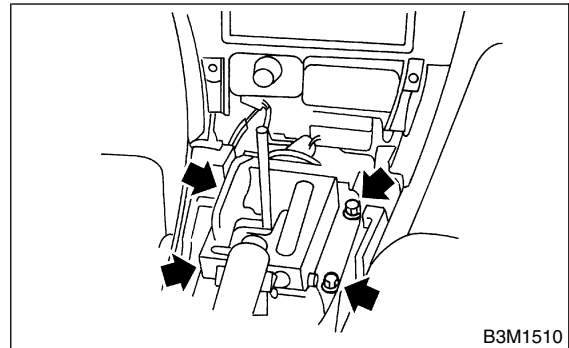


### B: INSTALLATION SS01548A11

- 1) Mount the select lever onto the vehicle body.
- 2) Tighten the four bolts to install the selector lever to the vehicle body, then connect connector.

#### Tightening torque:

**13 N·m (1.3 kgf-m, 9.4 ft-lb)**



- 3) Install console box. <Ref. to EI-36, INSTALLATION, Console Box.>
- 4) Set location of select lever at "N" position.
- 5) Set location of select arm installed on the transmission body at "N" position.
- 6) Insert the thread portion of the other inner cable and into the connector hole of the selector lever, and fix the other outer cable end to the bracket.

#### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

- 7) Adjust the select cable. <Ref. to CS-27, ADJUSTMENT, Select Cable.>
- 8) After completion of fitting, make sure that the selector lever operates smoothly across the entire operating range.
- 9) Connect the harnesses and check the following items.

- (1) The engine starts operating when selector lever is in position "P", but not in other positions.
- (2) The back-up light is lit when the selector lever is in position "R", but not in other positions.

# SELECT LEVER

## Control Systems

### 10) Check shift-lock system.

(1) Ensure ignition switch rotates from “ACC” to “LOCK” when the selector lever is set at “P”. Also check that ignition key can be removed only from the “LOCK” position.

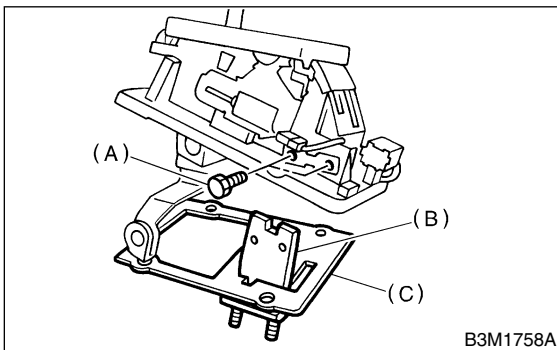
(2) Ensure selector lever moves from “P” to any other position when the brake pedal is depressed with ignition key set at “ON” or “START”.

## C: DISASSEMBLY

S501548A06

1) Remove four washers and then detach rubber boot.

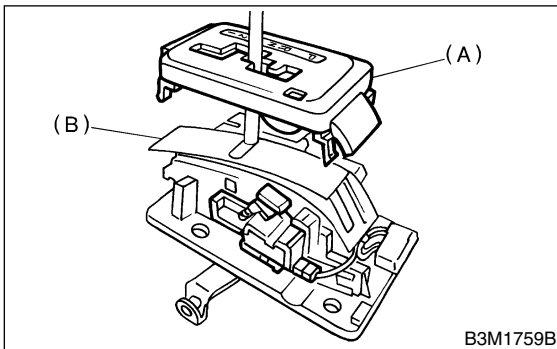
2) Remove bolts and then remove cable bracket and plate.



- (A) Bolt
- (B) Cable bracket
- (C) Plate

3) Twist the select lever grip and then remove select lever grip.

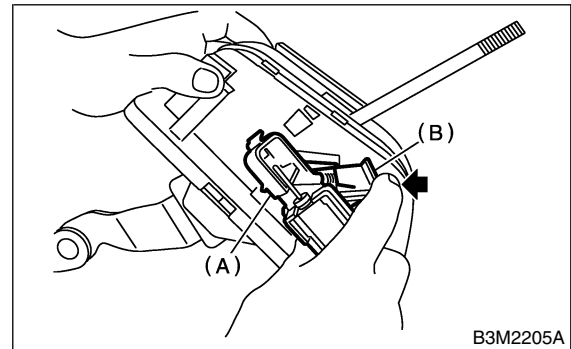
4) Detach indicator cover and pattern plate.



- (A) Indicator cover
- (B) Pattern plate

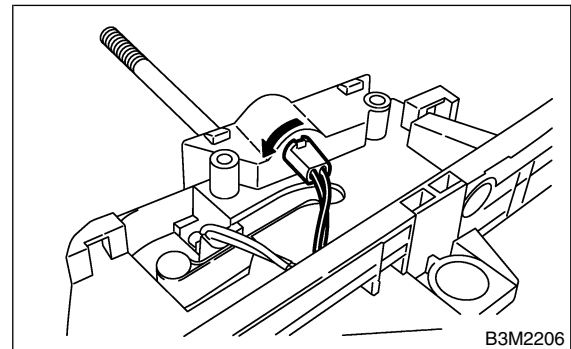
5) Disconnect solenoid assembly connector.

6) While pressing shift lock cancel button, remove shift lock solenoid assembly.



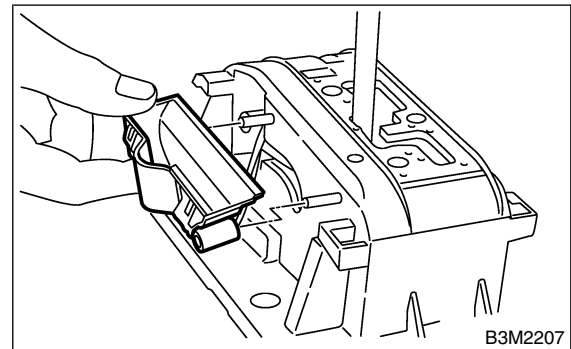
- (A) Shift lock solenoid ASSY
- (B) Button

7) Remove illumination light.

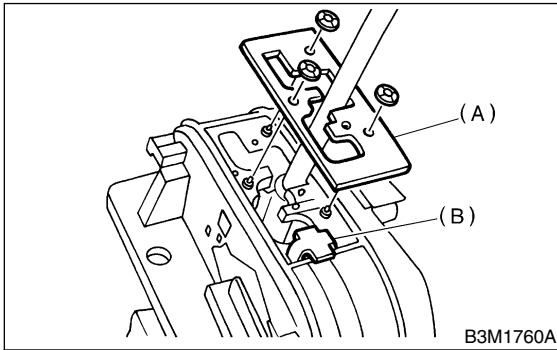


8) Remove illumination bulb.

9) Remove illumination light cover.

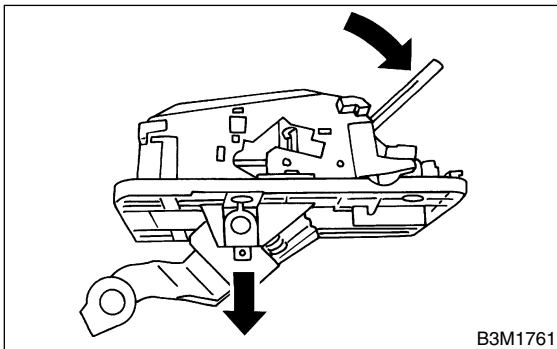


10) Remove stopper.

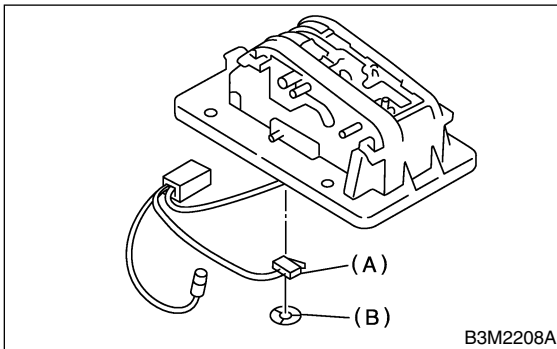


- (A) Pattern plate
- (B) Stopper

11) Tilt lever forward and pull down to separate it from frame.

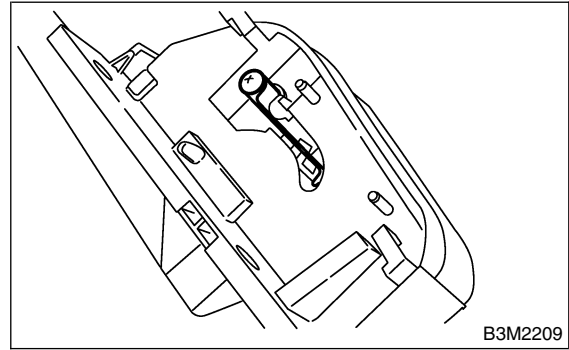


12) Remove clip, and "P" position switch with harness.



- (A) "P" position switch
- (B) Clip

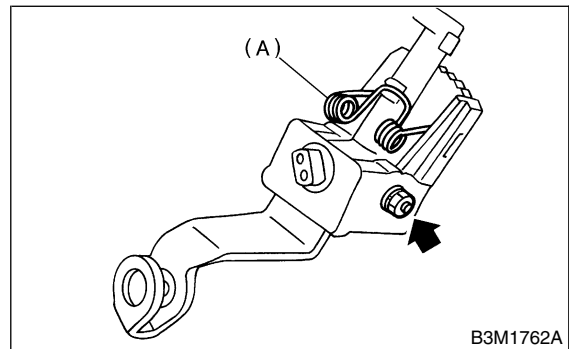
13) Remove detent spring



14) Remove spring.

**CAUTION:**  
Wear goggles. Do not allow spring to fly out during removal.

15) Remove bolt and then disconnect lever upper and lever lower.



- (A) Spring

## D: ASSEMBLY SS01548A02

- 1) Clean all parts before assembly.
- 2) Apply grease [MULTEMP AC-D or equivalent] to each parts. <Ref. to CS-3, AT SELECT LEVER, COMPONENT, General Description.>
- 3) Assembly is in the reverse order of disassembly.
- 4) After completion of fitting, transfer select lever to position "P" — "1", then check whether the indicator and select lever agree, whether operating force is.

## E: INSPECTION SS01548A10

- 1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
- 2) Confirm the following parts for operating condition before assembly. Moving condition of the selector lever upper... it should move smoothly.
- 3) Check shift lock operation. <Ref. to CS-10, INSPECTION, AT Shift Lock System.>



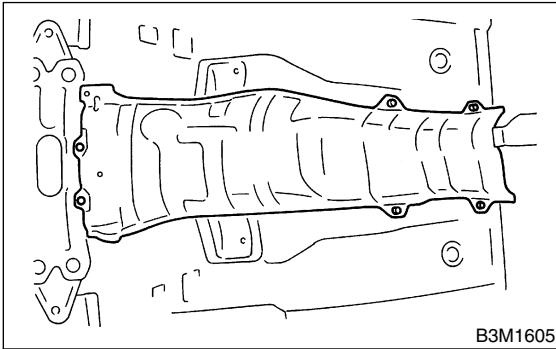
# SELECT CABLE

Control Systems

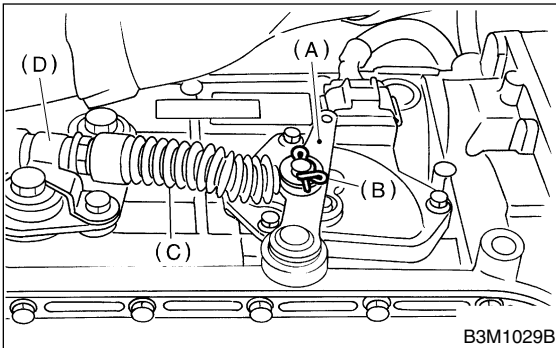
## 5. Select Cable SS01549

### A: REMOVAL SS01549A18

- 1) Prior to removal, set select lever to "N" position.
- 2) Remove under cover.
- 3) Remove rear exhaust pipe and muffler.  
2.5 L model  
<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.>  
and <Ref. to EX-10, REMOVAL, Muffler.>  
3.0 L model  
<Ref. to EX(H6)-8, REMOVAL, Rear Exhaust  
Pipe.> and <Ref. to EX(H6)-9, REMOVAL, Muf-  
fler.>
- 4) Remove heat shield cover.

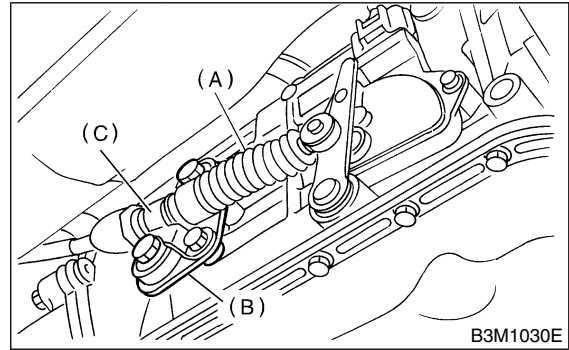


- 5) Remove snap pin from range select lever.



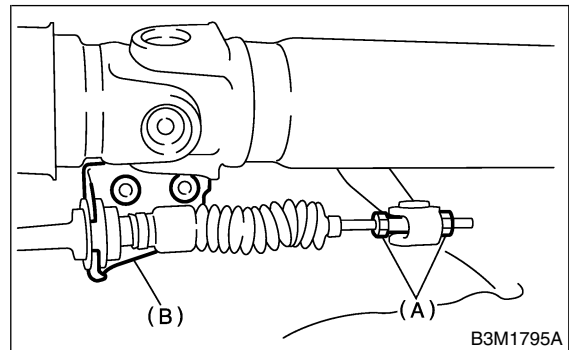
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp

- 6) Remove plate assembly from transmission case.



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

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



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

- 8) Remove select cable from plate assembly.

## B: INSTALLATION

S501549A11

- 1) Install select cable to plate assembly.

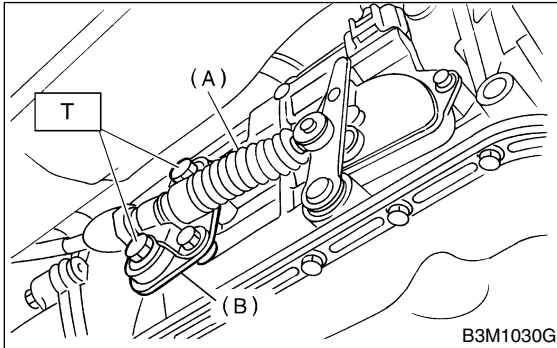
### Tightening torque:

**32 N·m (3.3 kgf-m, 24 ft-lb)**

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

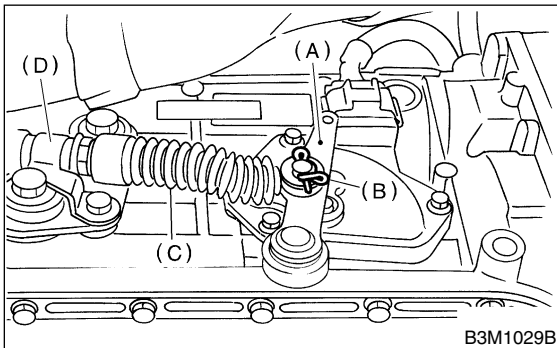
### Tightening torque:

**T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)**



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

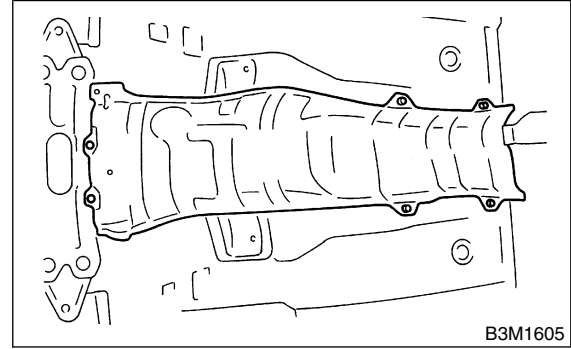
- 4) Install snap pin to range select lever.



- (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-27, ADJUSTMENT, Select Cable.>

- 6) Install heat shield cover.



- 7) Install rear exhaust pipe to muffler.

2.5 L model

<Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, INSTALLATION, Muffler.>

- 8) Install under cover.

## C: INSPECTION

S501549A10

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

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

## D: ADJUSTMENT

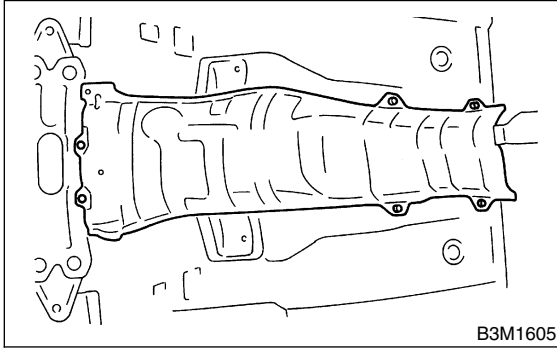
S501549A01

- 1) Prior to removal, set select lever to "N" position.
- 2) Remove rear exhaust pipe and muffler.  
2.5 L model  
<Ref. to EX-9, REMOVAL, Rear Exhaust pipe.> and <Ref. to EX-10, REMOVAL, Muffler.>  
3.0 L model  
<Ref. to EX(H6)-8, REMOVAL, Rear Exhaust pipe.> and <Ref. to EX(H6)-9, REMOVAL, Muffler.>

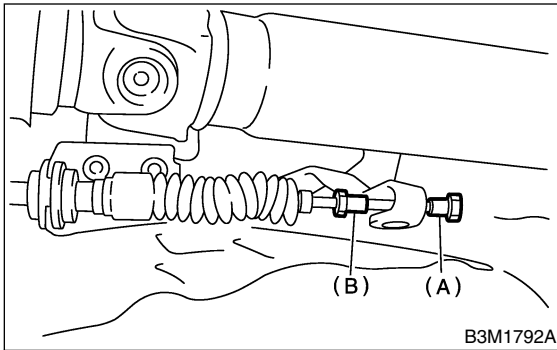
## SELECT CABLE

### Control Systems

- 3) Remove heat shield cover.

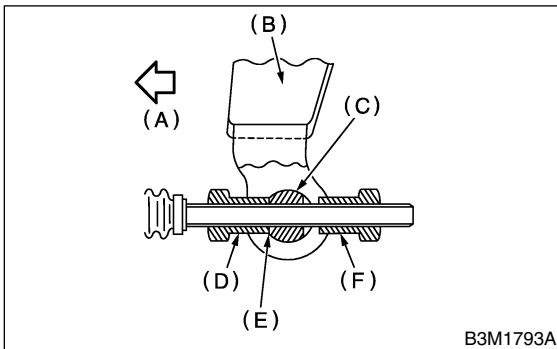


- 4) Loosen the adjusting nut on each side.



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

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

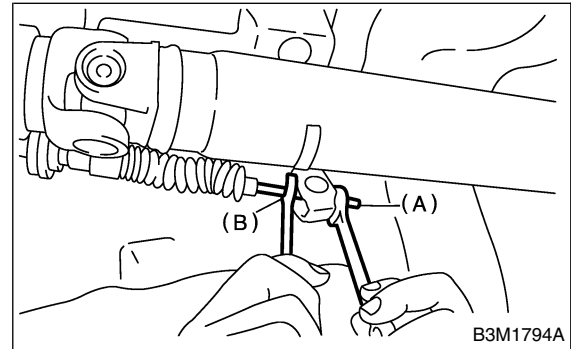


- (A) Front side  
(B) Select lever  
(C) Connector  
(D) Adjusting nut B  
(E) Contact point  
(F) Adjusting nut A

- 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 the select lever operates smoothly across the entire operating range.  
8) Install in the reverse order of removal.

## 6. AT Shift Lock Solenoid and “P” Position Switch

S501234

### A: REMOVAL

S501234A18

- 1) Remove the select lever. <Ref. to CS-23, REMOVAL, Select Lever.>
- 2) Remove AT shift lock solenoid and “P” position switch. <Ref. to CS-24, DISASSEMBLY, Select Lever.>

### C: INSPECTION

S501234A10

### B: INSTALLATION

S501234A11

- 1) Install AT shift lock solenoid and “P” position switch. <Ref. to CS-25, ASSEMBLY, Select Lever.>
- 2) Install the select lever. <Ref. to CS-23, INSTALLATION, Select Lever.>

No.	Step	Check	Yes	No
1	<b>CHECK SHIFT LOCK SOLENOID.</b> Measure resistance of shift lock solenoid connector terminals. <i>Terminal</i> <b>No. 4 — No. 5</b>	Is the resistance between 10 and 20 $\Omega$ ?	Go to step 2.	Replace shift lock solenoid.
2	<b>CHECK SHIFT LOCK SOLENOID.</b> Connect battery with shift lock solenoid connector terminal, operate solenoid. <i>Terminal</i> <b>No. 4 (+) — No. 5 (-)</b>	Is shift lock solenoid operating properly?	Go to step 3.	Replace shift lock solenoid.
3	<b>CHECK “P” POSITION SWITCH.</b> When “P” position switch is turned ON to OFF, measure resistance between connectors. <i>Terminal</i> <b>No. 2 — No. 6</b>	When “P” position switch is ON, is resistance less than 1 $\Omega$ ?	Go to step 4.	Replace “P” position switch.
4	<b>CHECK “P” POSITION SWITCH.</b> When “P” position switch is turned OFF, measure resistance between connectors. <i>Terminal</i> <b>No. 2 — No. 6</b>	When “P” position switch is OFF, is resistance more than 1 M $\Omega$ ?	Normal	Replace shift lock solenoid and “P” position switch assembly.

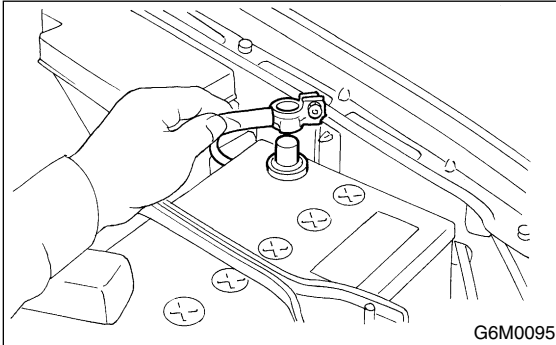
## 7. AT Shift Lock Control Module

S501237

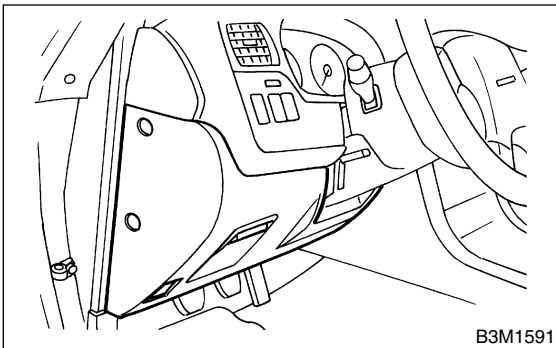
### A: REMOVAL

S501237A18

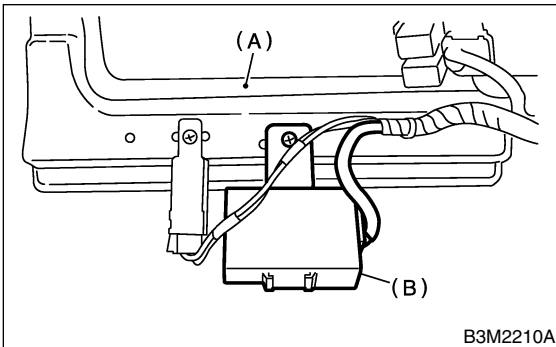
- 1) Disconnect battery ground cable.



- 2) Remove the lower cover.



- 3) Remove knee bolster.
- 4) Disconnect connector from AT shift lock control module.



- (A) Knee bolster  
(B) AT shift lock control module

- 5) Remove the AT shift lock control module from knee bolster.

### B: INSTALLATION

S501237A11

Install in the reverse order of removal.

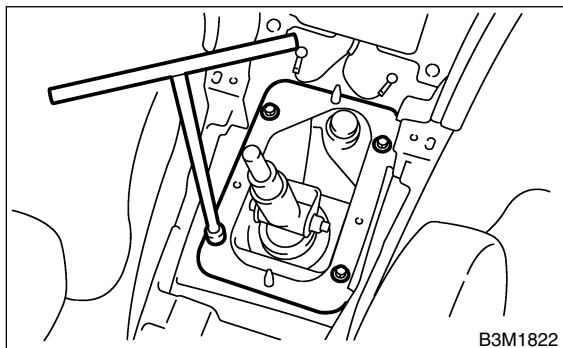
## 8. MT Gear Shift Lever

S501236

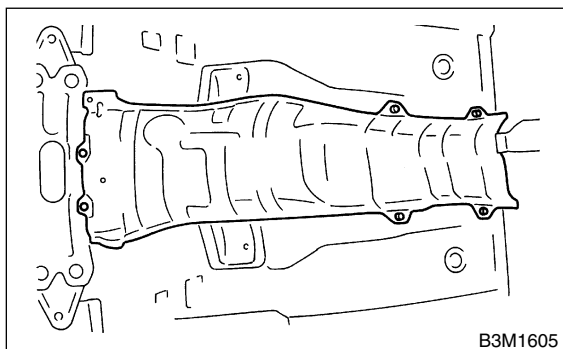
### A: REMOVAL

S501236A18

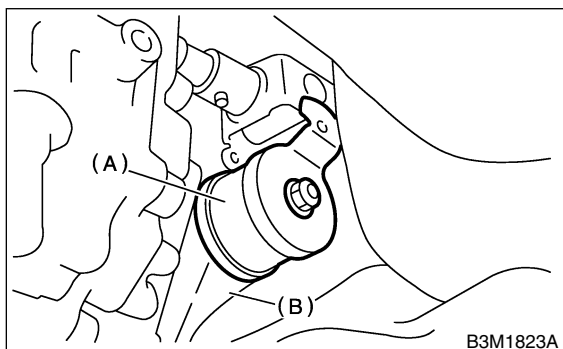
- 1) Remove gear shift knob.
- 2) Remove console box. <Ref. to EI-36, REMOVAL, Console Box.>
- 3) Remove boot plate from body.



- 4) Lift the vehicle.
- 5) Remove rear exhaust pipe and muffler. <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-10, REMOVAL, Muffler.>
- 6) Remove heat shield cover.

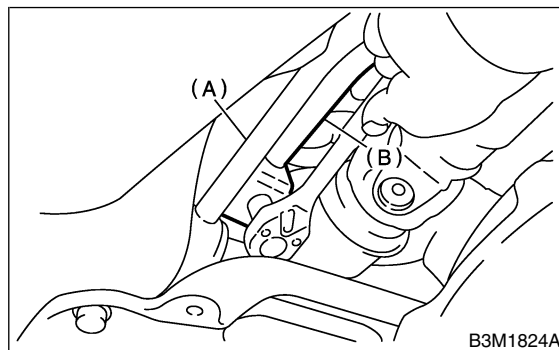


- 7) Remove stay from transmission bracket.



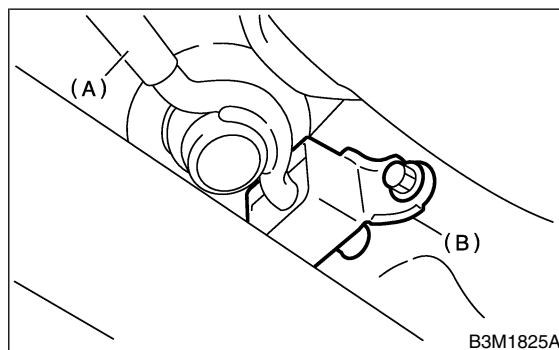
- (A) Stay
- (B) Transmission bracket

- 8) Remove rod from joint.



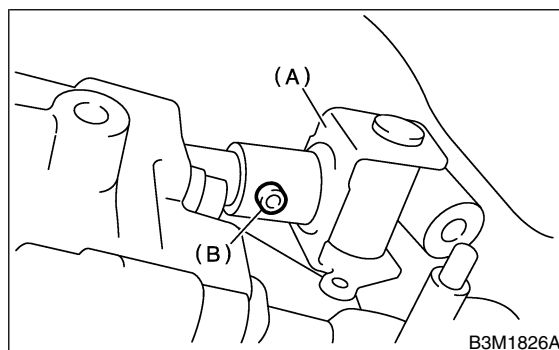
- (A) Stay
- (B) Rod

- 9) Remove cushion rubber from body.



- (A) Stay
- (B) Cushion rubber

- 10) Remove joint and then extract spring pin.



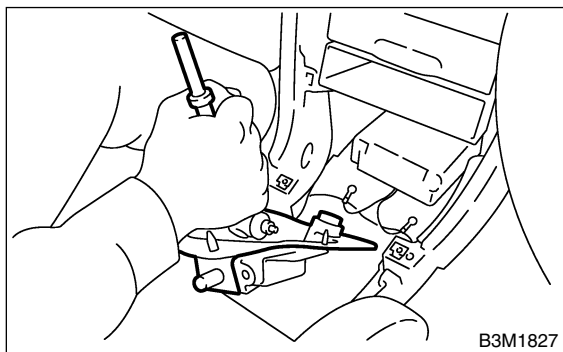
- (A) Joint
- (B) Spring pin

- 11) Lower the vehicle.

# MT GEAR SHIFT LEVER

## Control Systems

12) Remove gear shift lever.



## B: INSTALLATION

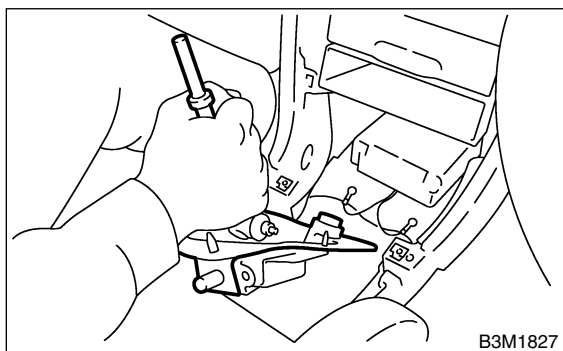
S501236A11

1) Install joint to transmission and secure with spring pin.

2) Insert gear shift lever from room side.

### NOTE:

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

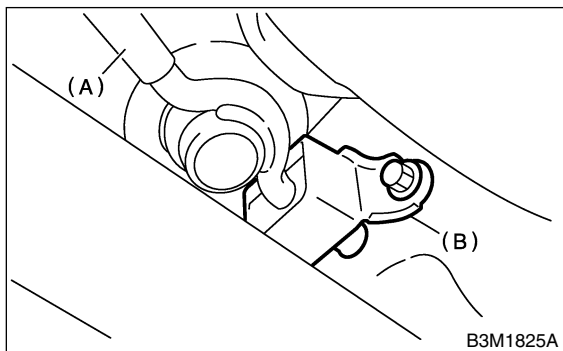


3) Lift the vehicle.

4) Mount cushion rubber on the body.

### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

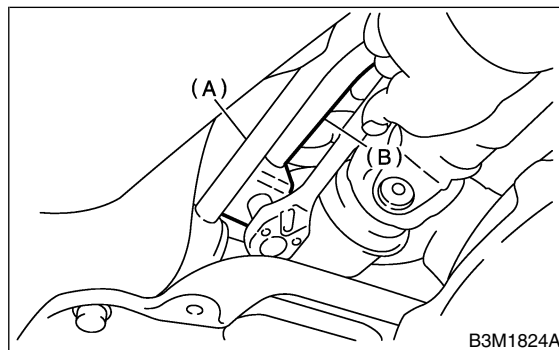


- (A) Cushion rubber
- (B) Stay

5) Connect rod to the joint.

### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

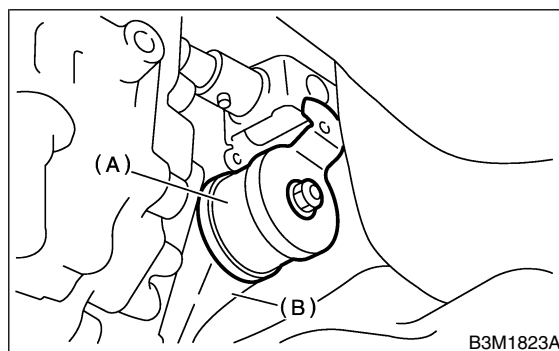


- (A) Stay
- (B) Rod

6) Connect stay to transmission bracket.

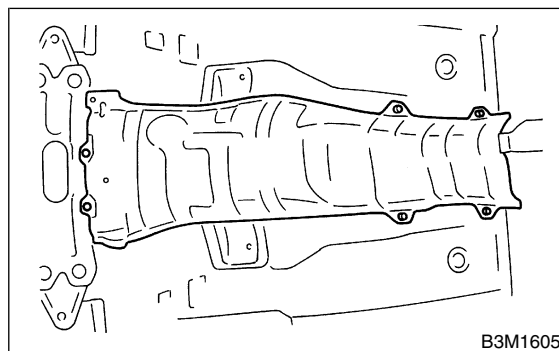
### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**



- (A) Stay
- (B) Transmission bracket

7) Install heat shield cover.



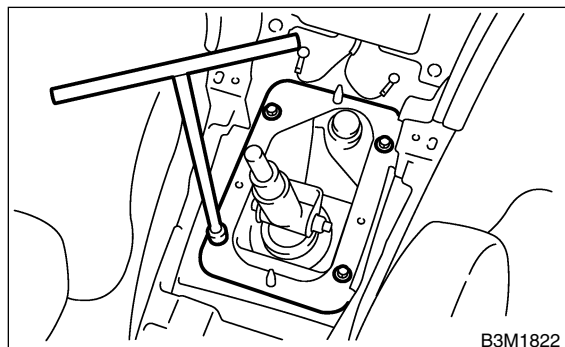
8) Install rear exhaust pipe and muffler.

<Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-10, INSTALLATION, Muffler.>

9) Mount boot plate on body.

**Tightening torque:**

**7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**

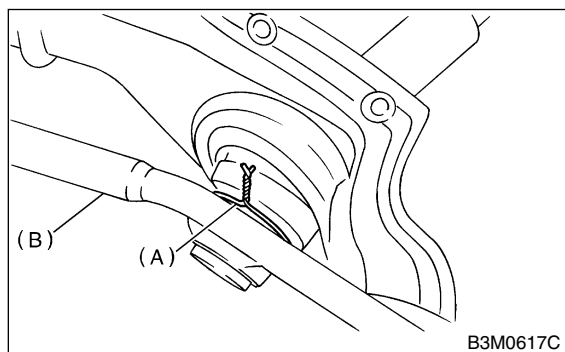


10) Install console box. <Ref. to EI-36, INSTALLATION, Console Box.>

## C: DISASSEMBLY

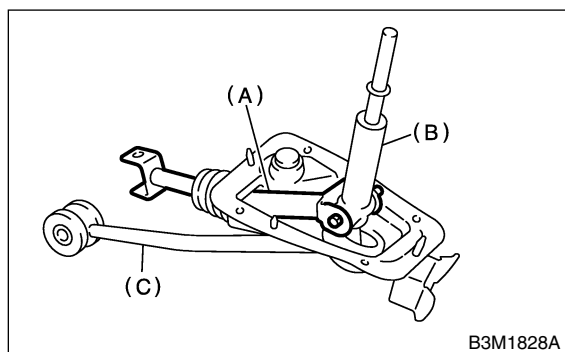
S501236A06

1) Remove lock wire.



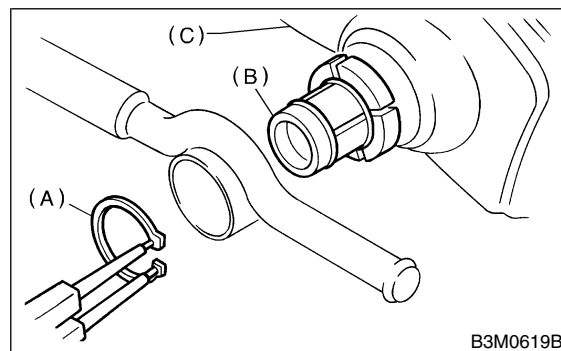
(A) Lock wire  
(B) Stay

2) Remove rod from lever.



(A) Rod  
(B) Lever  
(C) Stay

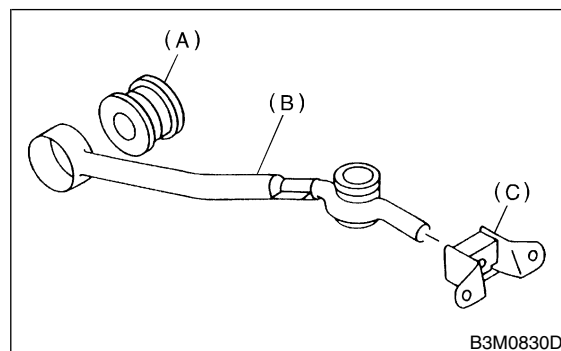
3) Remove snap ring from bushing B, then disconnect stay.



(A) Snap ring  
(B) Bushing B  
(C) Boot

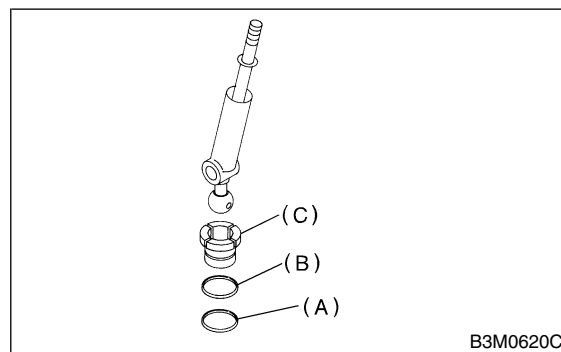
4) Remove boot from gear shift lever.

5) Remove bushing and cushion rubber from stay.



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

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



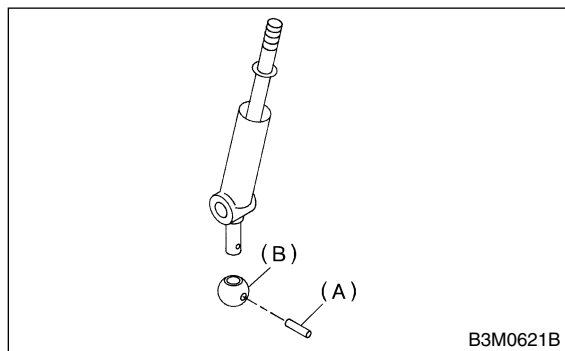
(A) O-ring  
(B) O-ring  
(C) Bushing B



# MT GEAR SHIFT LEVER

## Control Systems

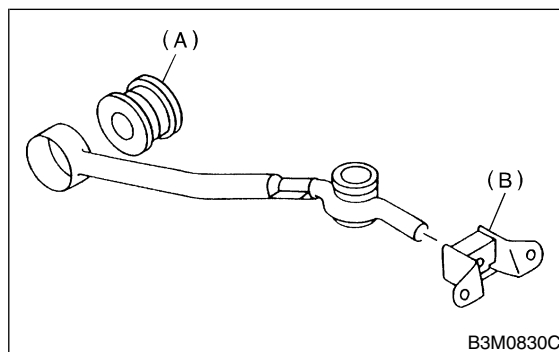
7) Draw out spring pin, then remove bushing A from gear shift lever.



- (A) Spring pin
- (B) Bushing A

## D: ASSEMBLY S501236A02

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

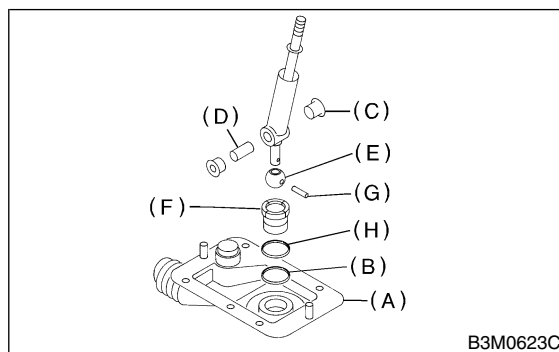


- (A) Bushing
- (B) Cushion rubber

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

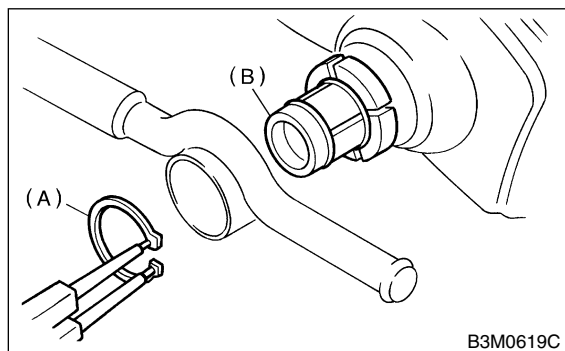
### NOTE:

- Always use new O-rings.
- Apply grease [NIGTIGHT LYW No. 2 or equivalent] to the inner and side surfaces of the bushing when installing the spacer. <Ref. to CS-4, MT GEAR SHIFT LEVER, COMPONENT, General Description.>



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

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

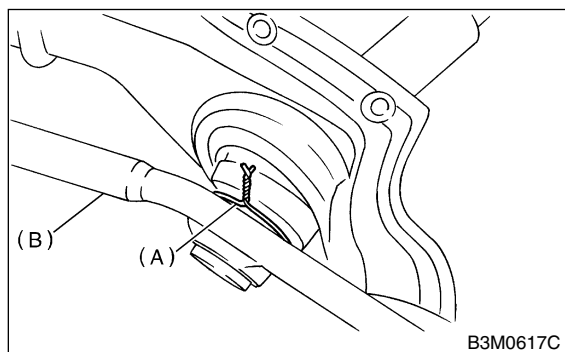


- (A) Snap ring
- (B) Bushing B

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

**NOTE:**

Always use new lock wire.

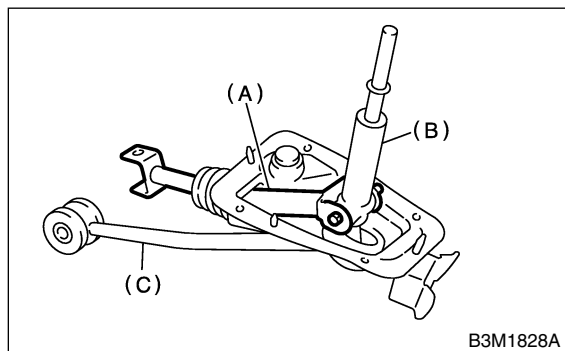


- (A) Lock wire
- (B) Stay

- 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)**



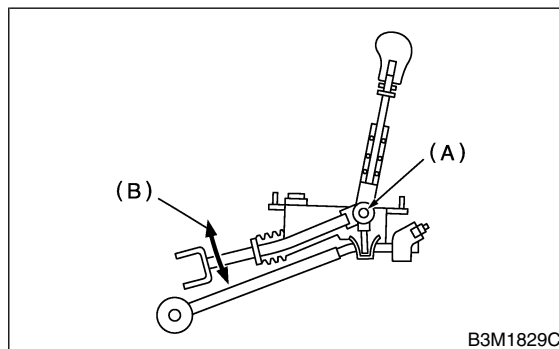
- (A) Rod
- (B) Shift lever
- (C) Stay

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

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

**Locking torque:**

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



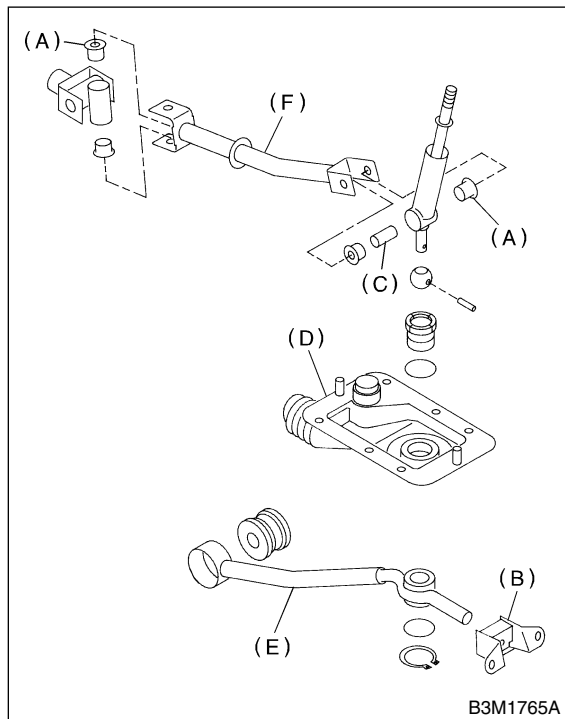
- (A) Center of rotation
- (B) Swing torque

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

## E: INSPECTION

S501236A10

1) Check each part (bushing, 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.



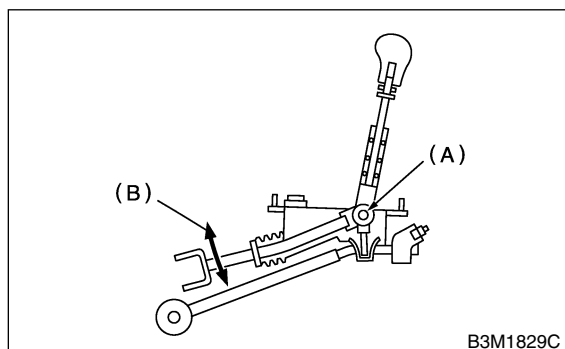
- (A) Bushing
- (B) Cushion rubber
- (C) Spacer
- (D) Boot
- (E) Stay
- (F) Rod

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

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

### Locking torque:

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



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

## 9. General Diagnostic Table S501257

### A: INSPECTION S501257A10

Select Lever Does Not Move From "P" Position

Symptom	Problem parts
Shift lock does not function.	<ul style="list-style-type: none"> <li>● Stop light switch</li> <li>● Shift lock solenoid</li> <li>● AT shift lock control module</li> </ul>
Shift lock cannot be released.	<ul style="list-style-type: none"> <li>● Stop light switch</li> <li>● Shift lock solenoid</li> <li>● AT shift lock control module</li> <li>● Inhibitor switch</li> <li>● Ignition switch</li> </ul>
Key interlock does not function.	<ul style="list-style-type: none"> <li>● Key warning switch</li> <li>● "P" position switch</li> <li>● Key lock solenoid</li> <li>● AT shift lock control module</li> <li>● Ignition switch</li> </ul>
Key interlock cannot be released.	<ul style="list-style-type: none"> <li>● Key warning switch</li> <li>● "P" position switch</li> <li>● Key lock solenoid</li> <li>● AT shift lock control module</li> </ul>
Starter does not run.	<ul style="list-style-type: none"> <li>● Select cable</li> <li>● Inhibitor switch</li> <li>● Starter circuit</li> </ul>
Back-up light does not light up.	<ul style="list-style-type: none"> <li>● Select cable</li> <li>● Inhibitor switch</li> <li>● Back-up circuit</li> </ul>

# GENERAL DIAGNOSTIC TABLE

Control Systems

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**MEMO:**

# GENERAL DESCRIPTION

Automatic Transmission

## 1. General Description S502001

### A: SPECIFICATIONS S502001E49

#### 1. TORQUE CONVERTER CLUTCH S502001E4901

Model	2.5 L model		3.0 L model
	Except OUTBACK	OUTBACK	
Type	Symmetric, 3 element, single stage, 2 phase torque converter		
Stall torque ratio	1.9 — 2.1	2.1 — 2.3	1.8 — 2.0
Nominal diameter	246 mm (9.69 in)		
Stall speed (at sea level)	2,100 — 2,600 rpm	2,200 — 2,700 rpm	2,000 — 2,500 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

Model	BRIGHTON, L, OUTBACK (3.0 L model)	GT, OUTBACK (2.5 L model)
1st	2.785	3.027
2nd	1.545	1.619
3rd	1.000	
4th	0.694	
Rev	2.272	

## 5. PLANETARY GEAR AND PLATE S502001E4905

	BRIGHTON, L	GT, OUTBACK (2.5 L model)	3.0 L 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	37	42
Tooth number of rear pinion	17	19	17
Tooth number of rear internal gear	75		
Drive & driven plate number of high clutch	4		5
Drive & driven plate number of low clutch	6		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	6		7

## 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 $\leftarrow$ 2nd $\leftrightarrow$ 3rd $\leftrightarrow$ 4th
3 (3rd)	Automatic gear change 1st $\leftarrow$ 2nd $\leftrightarrow$ 3rd $\leftarrow$ 4th
2 (2nd)	2nd gear locked (Deceleration possible 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	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
Inhibitor switch	12 poles
Transmission harness	20 poles

## 9. TRANSFER

S502001E4909

	MPT model		VTD model
	2.5 L model	3.0 L model	
Transfer type	Multi-plate transfer		Variable torque distribution
Drive & driven plate number of transfer clutch	5	6	3
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	BRIGHTON, L		Except BRIGHTON, L																			
Front final gear ratio	4.111 (37/9)		4.444 (40/9)																			
Lubrication oil	<div><div>ITEM</div><div><ul style="list-style-type: none"><li>Front differential gear oil</li></ul></div><div>API Classification</div><div>GL - 5</div><div>SAE Viscosity No. and Applicable Temperature</div><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><div><div><div>90</div></div><div><div>85W</div></div><div><div>80W</div></div><div><div>80W-90</div></div></div></div>				(°C)	-30	-26	-15	-5	0	15	25	30	(°F)	-22	-15	5	23	32	59	77	86
(°C)	-30	-26	-15	-5	0	15	25	30														
(°F)	-22	-15	5	23	32	59	77	86														
Front differential oil capacity	1.2 ℓ (1.3 US qt, 1.1 Imp qt)																					

H3M1235A

# GENERAL DESCRIPTION

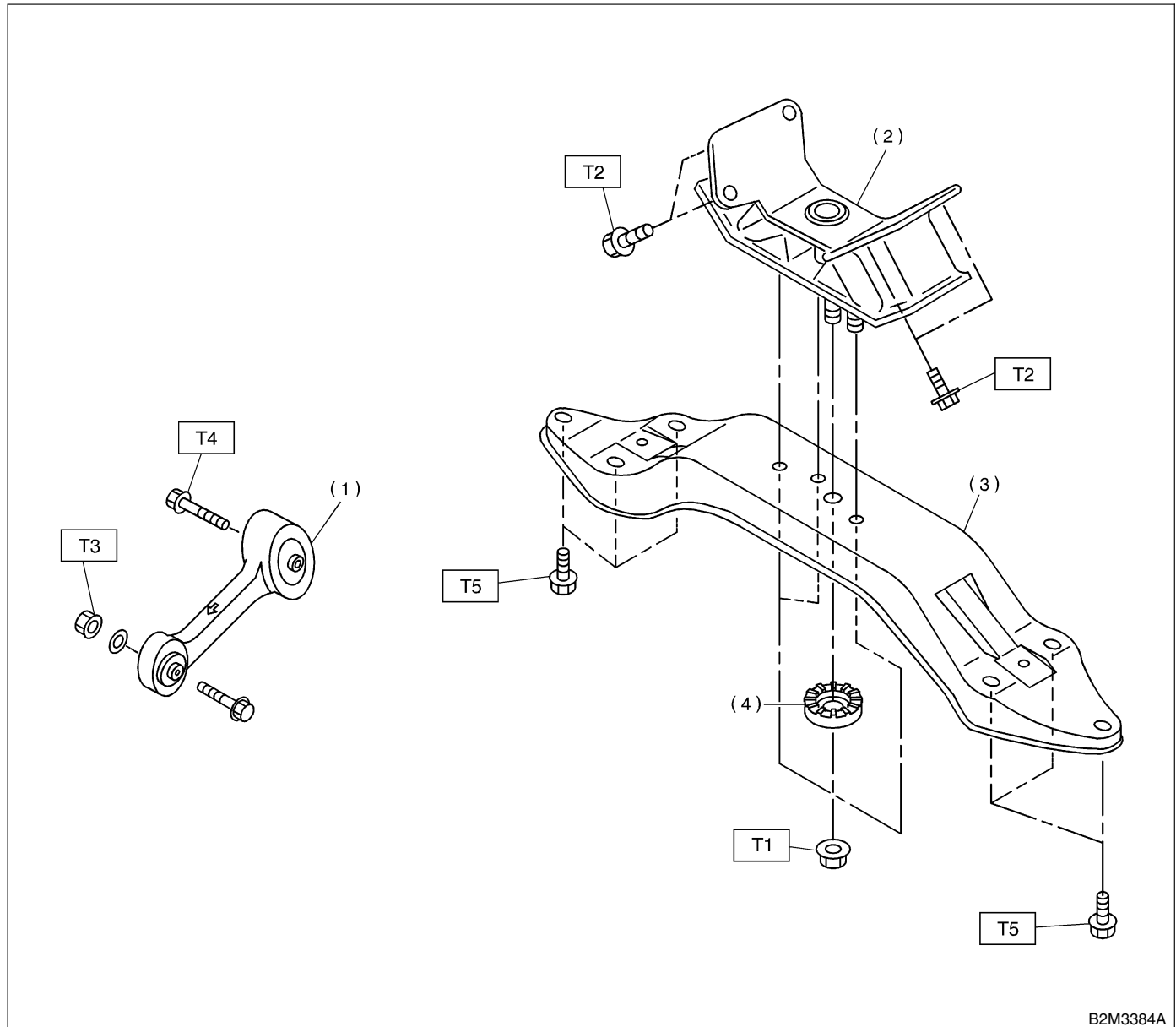
Automatic Transmission

## B: COMPONENT SS02001A05

### NOTE:

For information about other transmission mounting components, refer to “AUTOMATIC TRANSMISSION” <Pub. No. G0864ZE> a separate publication.

## 1. TRANSMISSION MOUNTING SS02001A0501



- (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: 75 (7.6, 55)**



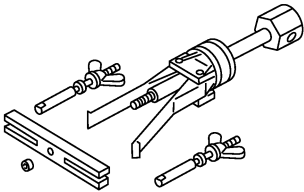
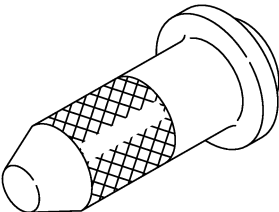
**C: CAUTION** S502001A03

- 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.

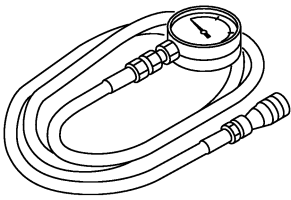
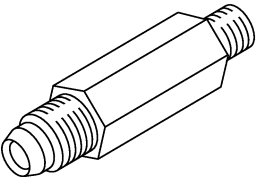
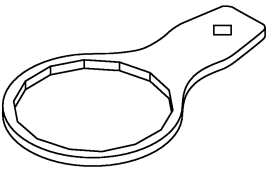
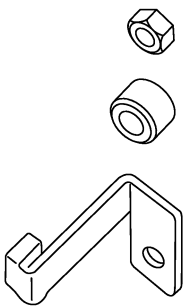
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing 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
 <p>B3M1977</p>	398527700	PULLER ASSY	Used for removing extension case oil seal.
 <p>B3M1972</p>	498057300	INSTALLER	Used for installing extension oil seal.

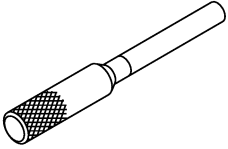
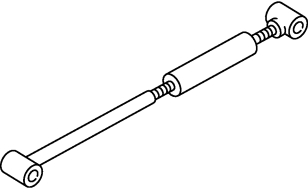
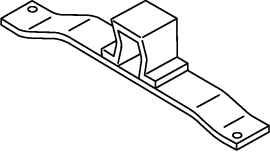
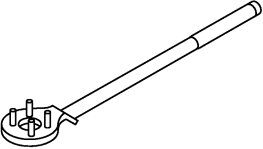
# GENERAL DESCRIPTION

Automatic Transmission

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

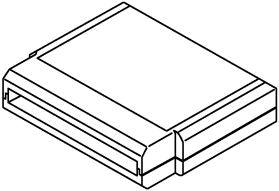

# GENERAL DESCRIPTION

Automatic Transmission

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M2008	499267300	STOPPER PIN	Used for installing and adjusting inhibitor switch.
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 B2M3870	499977100	CRANK PULLEY WRENCH	Used for stopping rotating of crankshaft pulley when loosening and tightening crankshaft pulley bolts.

# GENERAL DESCRIPTION

Automatic Transmission

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B2M3876</p>	24082AA190 <Newly adopted tool>	CARTRIDGE	Troubleshooting for electrical systems.
 <p>B2M3877</p>	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"> <li>English: 22771AA030 (Without printer)</li> <li>German: 22771AA070 (Without printer)</li> <li>French: 22771AA080 (Without printer)</li> <li>Spanish: 22771AA090 (Without printer)</li> </ul>

## 2. GENERAL PURPOSE TOOLS S502001A1702

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

## 2. Automatic Transmission Fluid

S502248

### A: INSPECTION

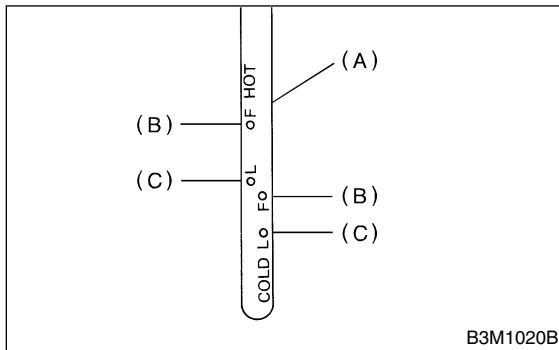
S502248A10

1) Check the level of the ATF.

(1) Raise the ATF temperature to 60 to 80°C (140 to 176°F) 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.

#### NOTE:

- 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 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-up the vehicle.
- 2) Drain the ATF completely.

#### CAUTION:

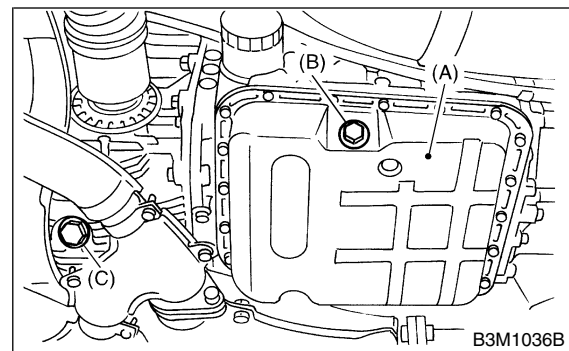
**Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.**

#### NOTE:

Tighten the ATF drain plug after draining the 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

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**Capacity:**

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

**Capacity when transmission is overhauled:**

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

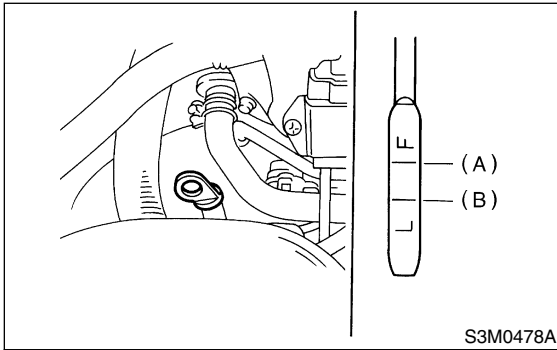
5) Check the level and leaks of the ATF.

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

## 3. Differential Gear Oil S502150

### A: INSPECTION S502150A10

- 1) Park the vehicle on a level surface.
- 2) Remove the 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.



- (A) Upper level  
(B) Lower level

### B: REPLACEMENT S502150A20

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

#### CAUTION:

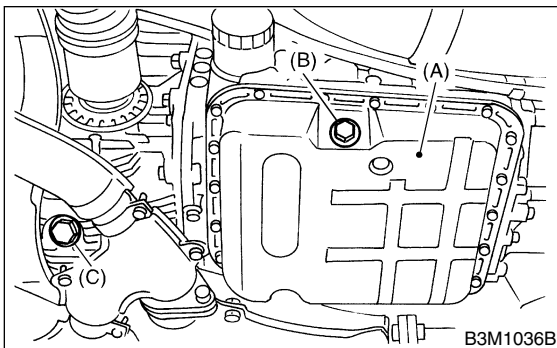
**Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.**

#### 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)**



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

- 3) 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)**

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

**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.

**NOTE:**

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.



## 5. Stall Test SS02246

### A: INSPECTION SS02246A10

#### 1. GENERAL INFORMATION SS02246A1001

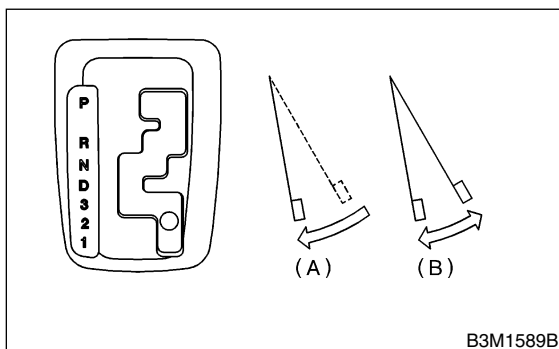
The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.

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 SS02246A1002

- 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):**

**Except OUTBACK (2.5 L model); 2,100 — 2,600 rpm**

**OUTBACK (2.5 L model); 2,200 — 2,700 rpm**

**3.0 L model; 2,000 — 3,500 rpm**

# STALL TEST

Automatic Transmission

## 3. EVALUATION S502246A1003

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

## 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.

**NOTE:**

- 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

## 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)

NOTE:

- 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)

NOTE:

- 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.

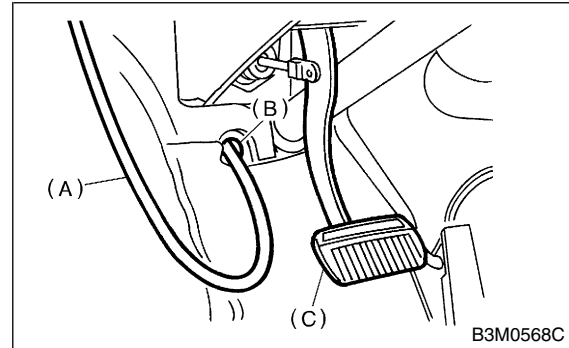
- Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)

- 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



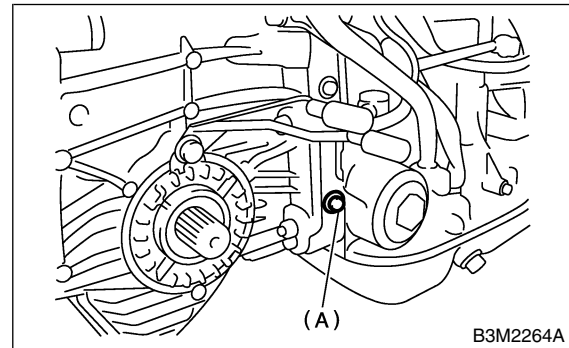
(A) Pressure gauge hose

(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

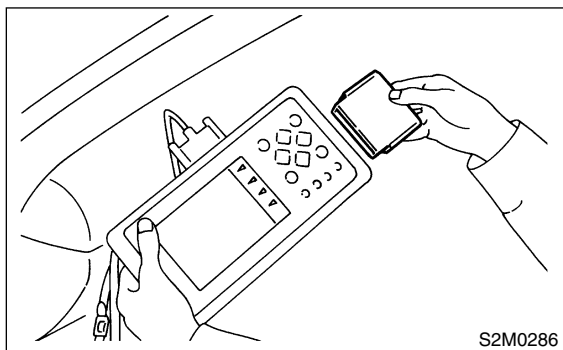
3) Connect ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

ST2 498575400 OIL PRESSURE GAUGE ASSY

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 S502244A1403

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm <sup>2</sup> , 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

##### ● MPT model

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

ST 498897700 OIL PRESSURE ADAPTER SET

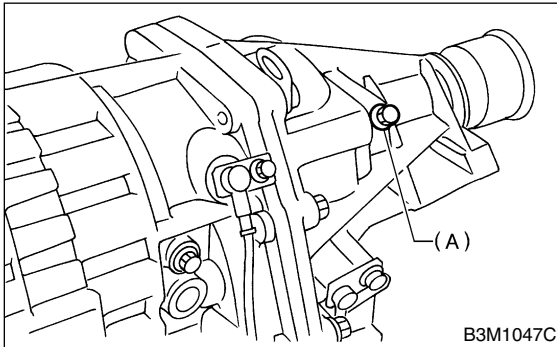
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

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

NOTE:

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



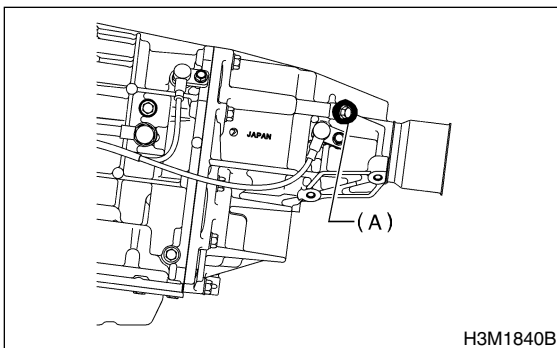
(A) Test plug

##### ● VTD model

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

ST 498897700 OIL PRESSURE ADAPTER SET

ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Test plug

## 2. EVALUATION

S502159A1002

##### ● MPT model

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 <sup>2</sup> , 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)

##### ● VTD model

Duty ratio (%)	Throttle position	Standard transfer clutch pressure kPa (kg/cm <sup>2</sup> , psi)
5	Full closed	932 — 1,089 (9.5 — 11.1, 135 — 158)
60	2/3 throttle	216 — 294 (2.2 — 3.0, 31 — 43)

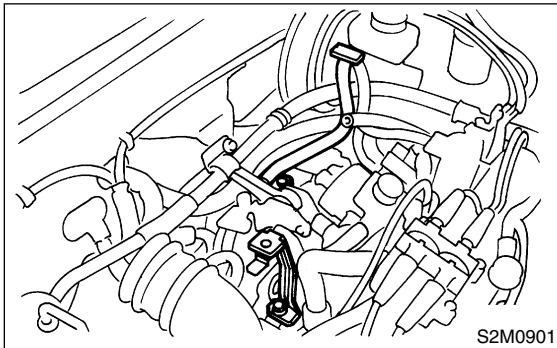
## 9. Automatic Transmission Assembly

S502207

### A: REMOVAL

S502207A18

- 1) Set the vehicle on the lift.
- 2) Open front hood fully, and support with stay.
- 3) Disconnect battery ground cable.
- 4) Remove air intake duct. <Ref. to IN-7, REMOVAL, Air Intake Duct.> or <Ref. to IN(H6)-7, REMOVAL, Air Intake Duct.>
- 5) Remove air cleaner case or air intake chamber. <Ref. to IN-6, Air Cleaner Case.> or <Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
- 6) Remove air cleaner case stay.



- 7) Remove front, center, rear exhaust pipe and muffler.

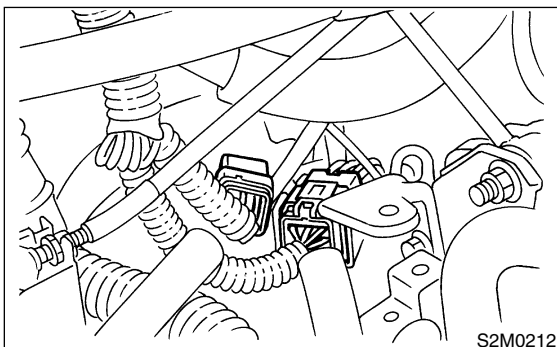
2.5 L model

<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-10, REMOVAL, Muffler.>

3.0 L model

<Ref. to EX(H6)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H6)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, REMOVAL, Muffler.>

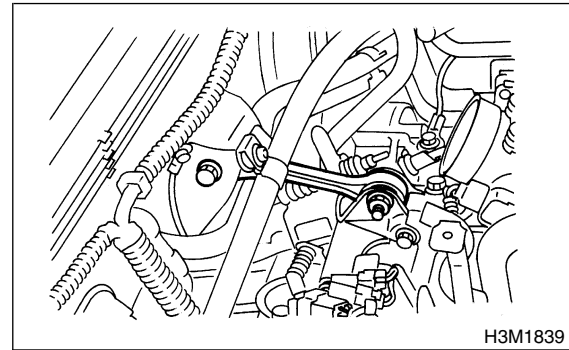
- 8) Disconnect the following connectors.
  - (1) Transmission harness connector



- (2) Transmission ground terminal

- 9) Remove starter. <Ref. to SC-7, REMOVAL, Starter.>

- 10) Remove pitching stopper.



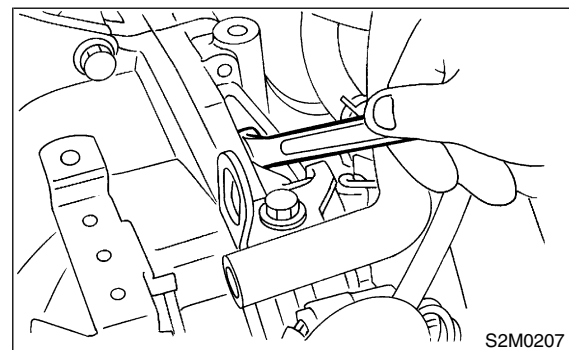
- 11) Separate torque converter clutch from drive plate.

- (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.

#### NOTE:

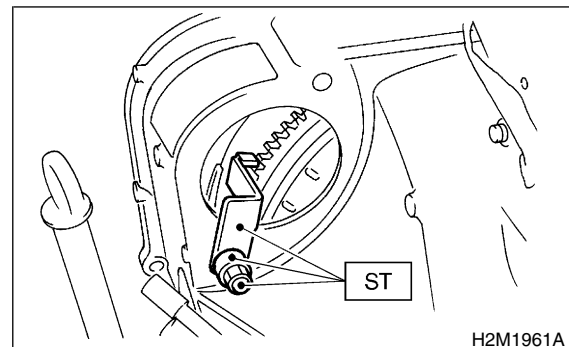
Be careful not to drop bolts into torque converter clutch housing.

ST 499977100 CRANK PULLEY WRENCH



- 12) Install ST to torque converter clutch case.
 

ST 498277200 STOPPER SET



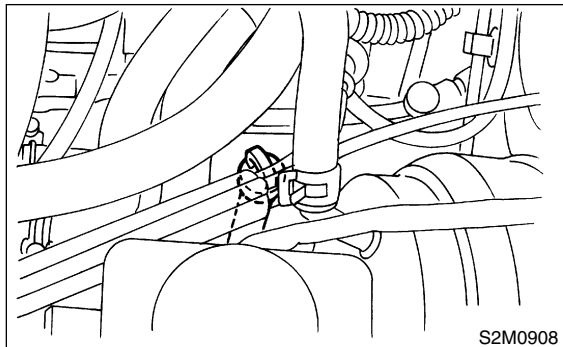
# AUTOMATIC TRANSMISSION ASSEMBLY

## Automatic Transmission

13) Remove ATF level gauge.

### NOTE:

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

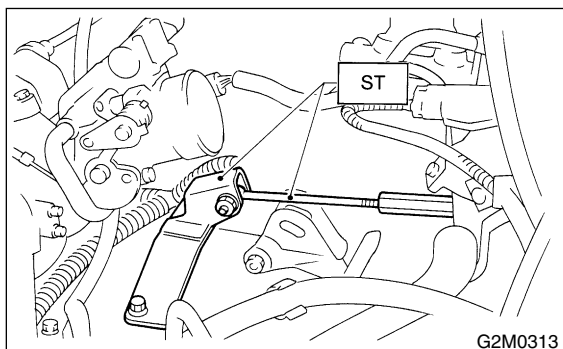


14) Set ST.

### NOTE:

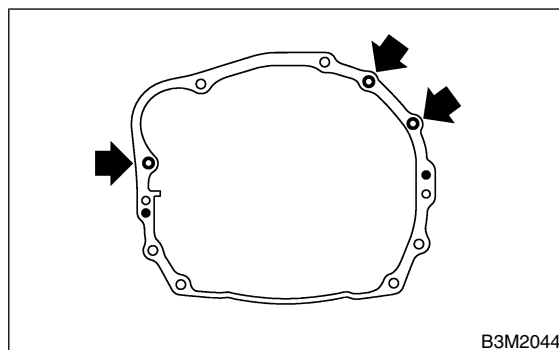
Part No. 41099AA010 is also available.

ST 41099AA020 ENGINE SUPPORT ASSY

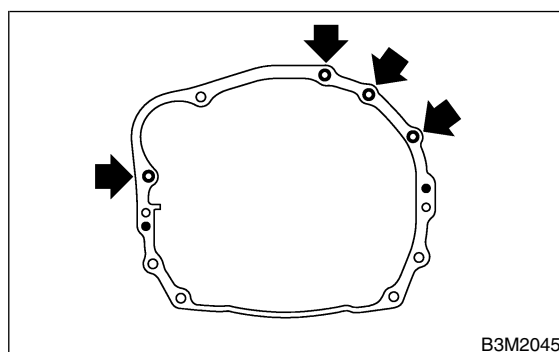


15) Remove bolt which holds right upper side of transmission to engine.

### 2.5 L model



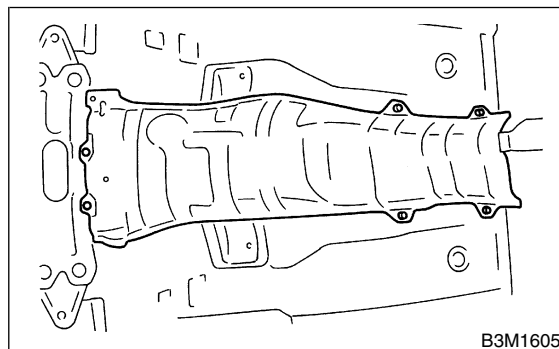
### 3.0 L model



16) Lift-up the vehicle.

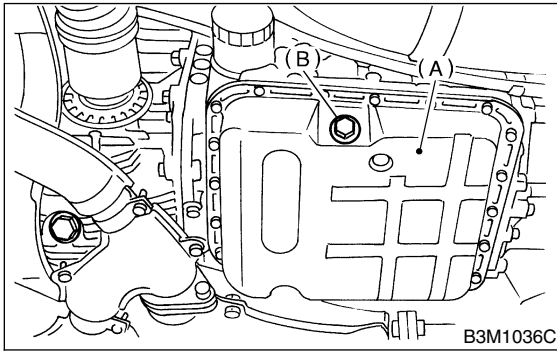
17) Remove under cover.

18) Remove heat shield cover.



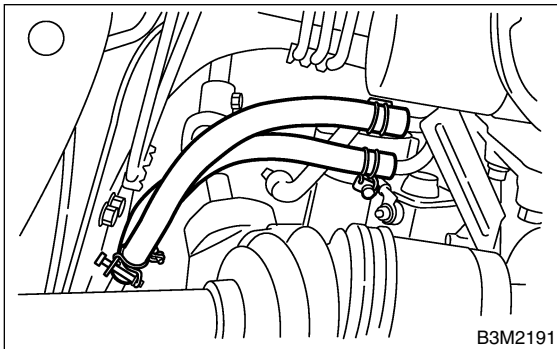


19) Drain ATF to remove ATF drain plug.



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

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



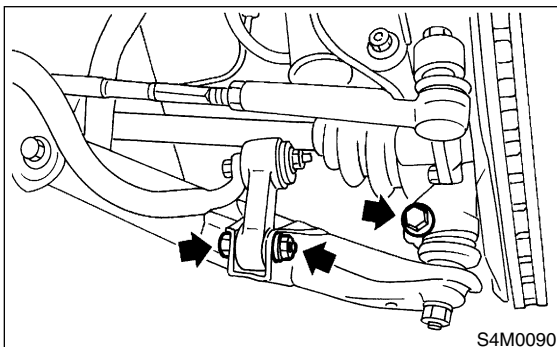
21) Remove propeller shaft.

<Ref. to DS-13, REMOVAL, Propeller Shaft.>

22) Remove shift select cable. <Ref. to CS-26, REMOVAL, Select Cable.>

23) Disconnect stabilizer link from transverse link.

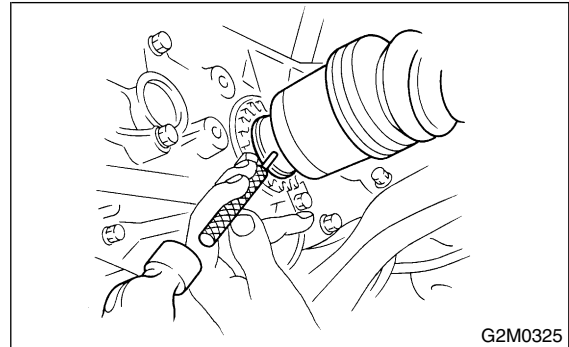
24) Remove bolt securing ball joint of transverse link to housing.



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

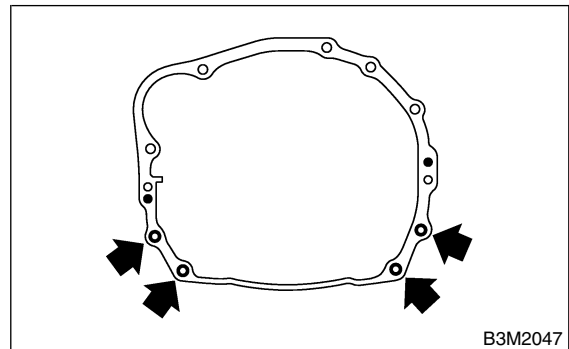
NOTE:

Do not reuse spring pin. Prepare a new spring pin.

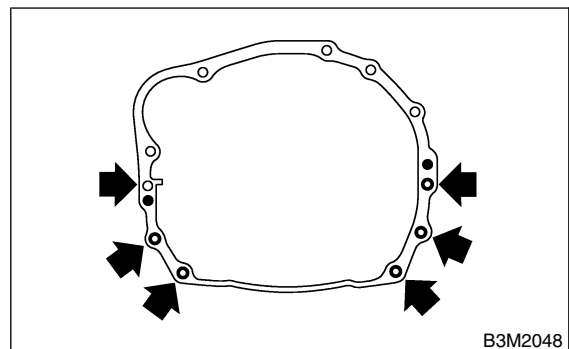


26) Remove nuts which hold lower side of transmission to engine.

**2.5 L model**



**3.0 L model**



27) Place transmission jack under transmission.

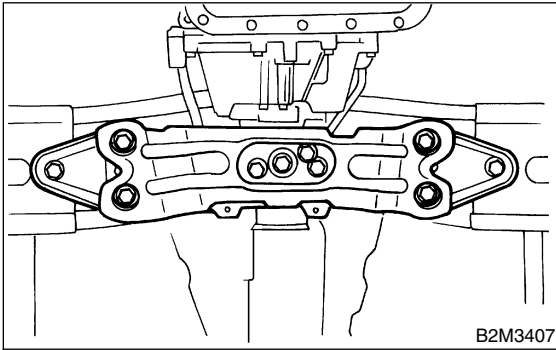
NOTE:

● Make sure that the support plates of transmission jack don't touch the oil pan.

# AUTOMATIC TRANSMISSION ASSEMBLY

## Automatic Transmission

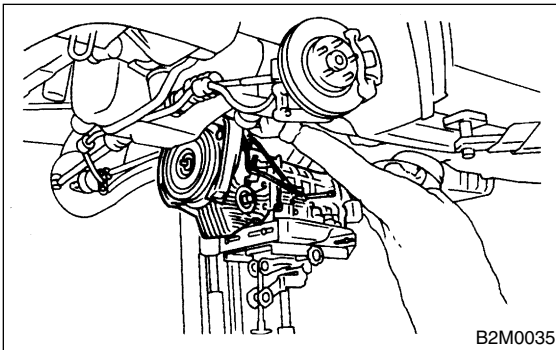
28) Remove transmission rear crossmember from vehicle.



29) Remove transmission.

### CAUTION:

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



30) Separate transmission assembly and rear cushion rubber.

## B: INSTALLATION

S502207A11

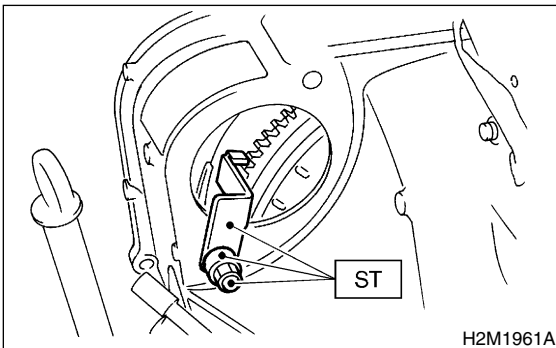
1) Install rear cushion rubber to transmission assembly.

### Tightening torque:

**39 N·m (4.0 kgf-m, 29 ft-lb)**

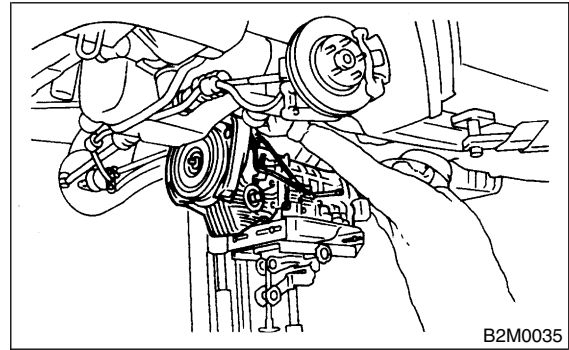
2) Install ST to torque converter clutch case.

ST 498277200 STOPPER SET



3) Install transmission onto engine.

(1) Gradually raise transmission with transmission jack.



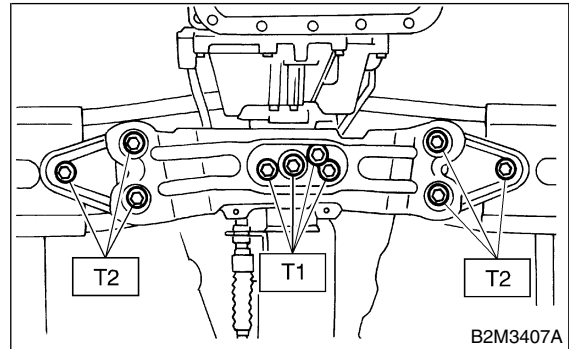
(2) Engage them at splines.

4) Install transmission rear crossmember.

### Tightening torque:

**T1: 35 N·m (3.6 kgf-m, 26 ft-lb)**

**T2: 75 N·m (7.6 kgf-m, 55 ft-lb)**



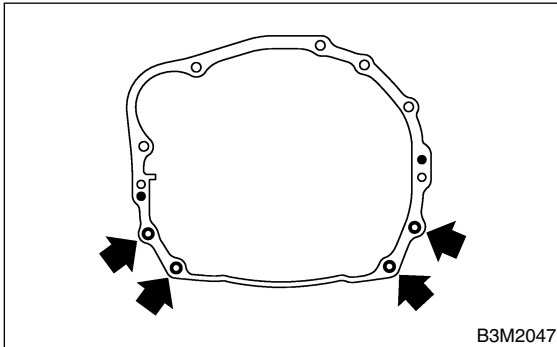
5) Take off transmission jack.

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

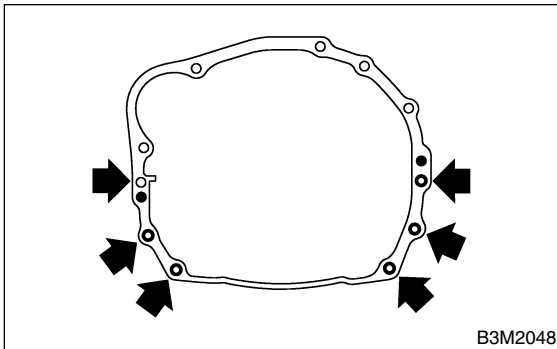
**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

**2.5 L model**



**3.0 L model**



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.

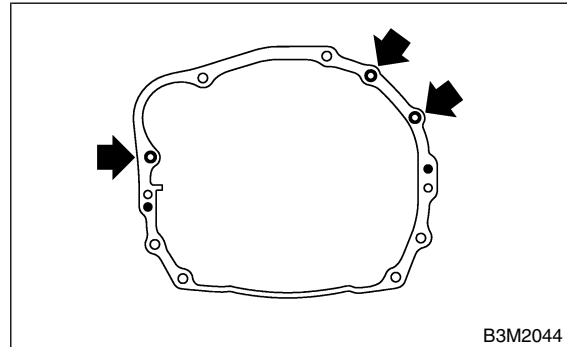
<Ref. to SC-7, INSTALLATION, Starter.>

(3) Tighten bolt which holds right upper side of transmission to engine.

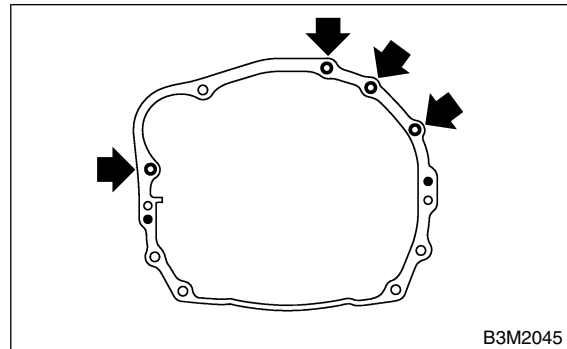
**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

**2.5 L model**



**3.0 L model**



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.

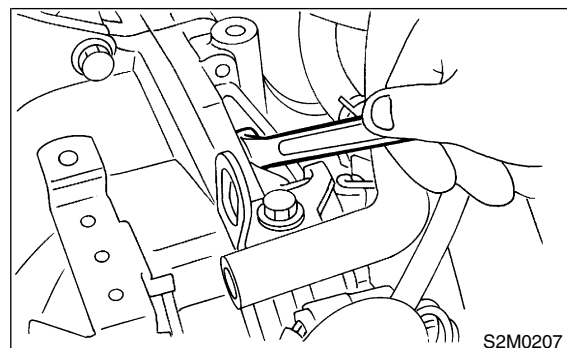
**NOTE:**

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)**

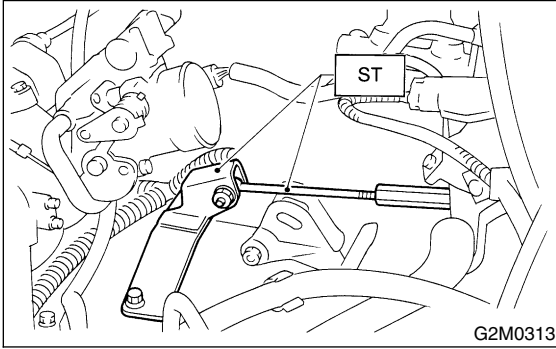


(3) Clog plug onto service hole.

# AUTOMATIC TRANSMISSION ASSEMBLY

## Automatic Transmission

### 10) Remove ST.

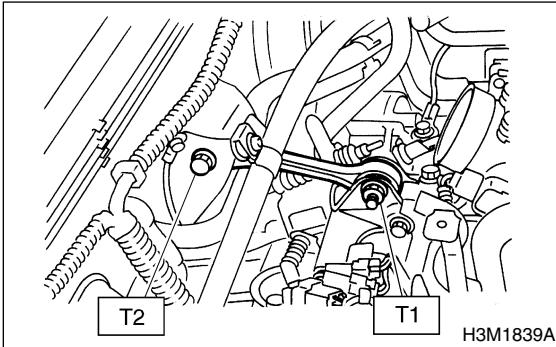


### 11) Install pitching stopper.

#### Tightening torque:

**T1: 50 N·m (5.1 kgf-m, 37 ft-lb)**

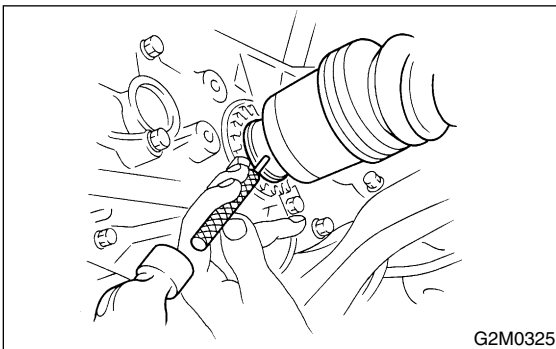
**T2: 58 N·m (5.9 kgf-m, 43 ft-lb)**



### 12) Lift-up the vehicle.

#### Install front drive shafts into transmission.

- (1) Lift-up the vehicle.
- (2) Install front drive shaft into transmission.
- (3) New drive spring pin into chamfered hole of drive shaft.



### 13) Install ball joint into housing.

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

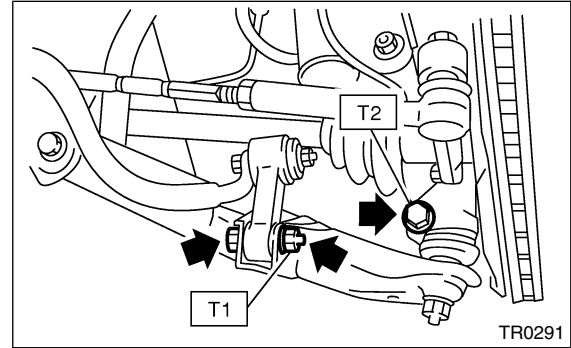
#### NOTE:

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

#### Tightening torque:

**T1: 30 N·m (3.1 kgf-m, 22.4 ft-lb)**

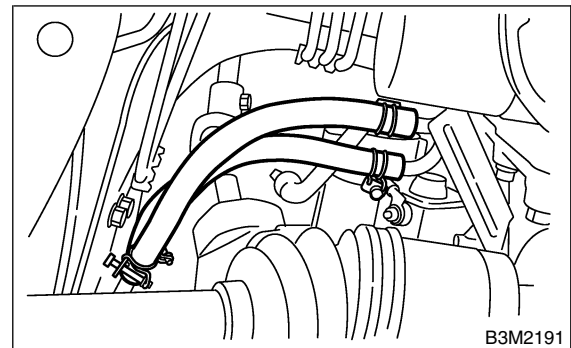
**T2: 50 N·m (5.1 kgf-m, 37 ft-lb)**



### 15) Install shift select cable onto select lever.

<Ref. to CS-27, INSTALLATION, Select Cable.>

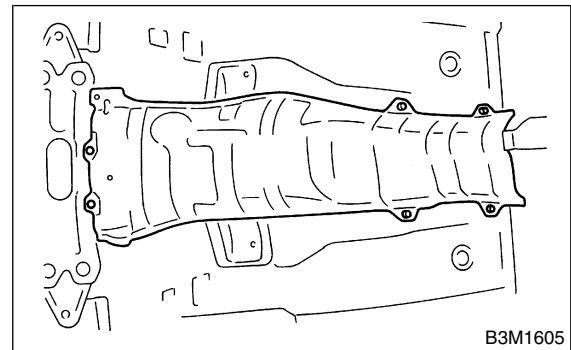
### 16) Install ATF level gauge guide, and connect ATF cooler hoses to pipe.



### 17) Install propeller shaft.

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

### 18) Install heat shield cover.



19) Install front, center, rear exhaust pipes and muffler.

2.5 L model

<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-10, INSTALLATION, Muffler.>

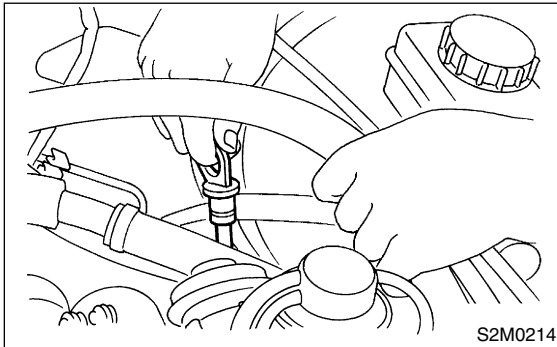
3.0 L model

<Ref. to EX(H6)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H6)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, INSTALLATION, Muffler.>

20) Install under cover.

21) Lower the vehicle.

22) Install ATF level gauge.



23) Connect the following connectors.

(1) Transmission harness connectors

(2) Transmission ground terminal

24) Install air cleaner case stay.

## ***Tightening torque:***

**16 N·m (1.6 kgf-m, 11.6 ft-lb)**

25) Install air cleaner case or air intake chamber.

2.5 L model

<Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

3.0 L model

<Ref. to IN(H6)-6, INSTALLATION, Air Intake Chamber.>

26) Install air intake duct.

2.5 L model

<Ref. to IN-7, INSTALLATION, Air Intake Duct.>

3.0 L model

<Ref. to IN(H6)-7, INSTALLATION, Air Intake Duct.>

27) Connect battery ground cable.

28) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole. <Ref. to AT-9, Automatic Transmission Fluid.>

29) Take off vehicle from lift arms.

30) Check select lever operation.

<Ref. to AT-29, INSPECTION, Inhibitor Switch.>

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

32) Check the vehicle on the road tester.

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

## 10. Transmission Mounting System

S502233

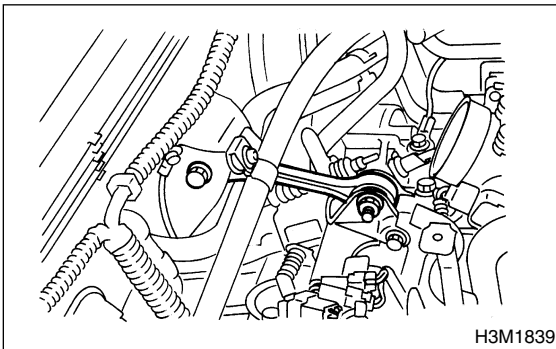
### A: REMOVAL

S502233A18

#### 1. PITCHING STOPPER

S502233A1801

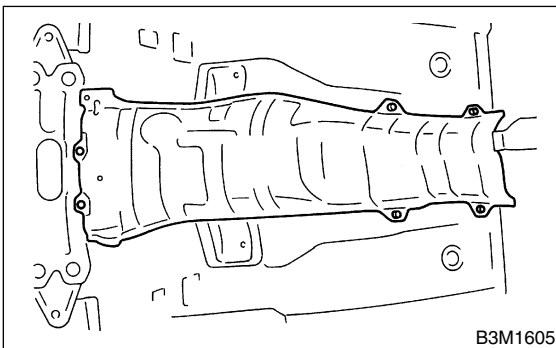
- 1) Disconnect battery ground cable.
- 2) Remove the air cleaner case or air intake chamber.  
2.5 L model  
<Ref. to IN-6, REMOVAL, Air Cleaner Case.>  
3.0 L model  
<Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
- 3) Remove the pitching stopper.



#### 2. CROSSMEMBER AND CUSHION RUBBER

S502233A1802

- 1) Disconnect battery ground cable.
- 2) Jack-up vehicle and support it with sturdy racks.
- 3) Remove the front center, rear exhaust pipes and muffler.  
2.5 L model  
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-10, REMOVAL, Muffler.>  
3.0 L model  
<Ref. to EX(H6)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H6)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, REMOVAL, Muffler.>
- 4) Remove the heat shield cover.

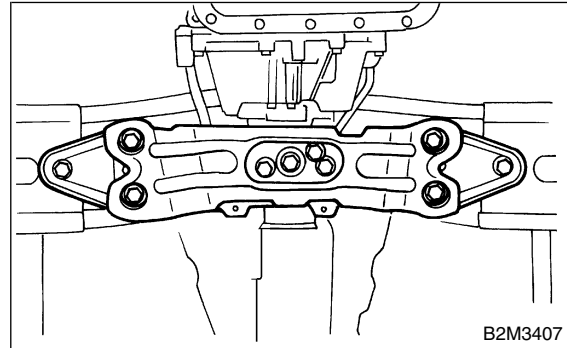


- 5) Set the transmission jack under the transmission.

#### CAUTION:

Make sure that the support plates of transmission jack don't touch the oil pan.

- 6) Remove the crossmember.



- 7) Remove the rear cushion rubber.

### B: INSTALLATION

S502233A11

#### 1. PITCHING STOPPER

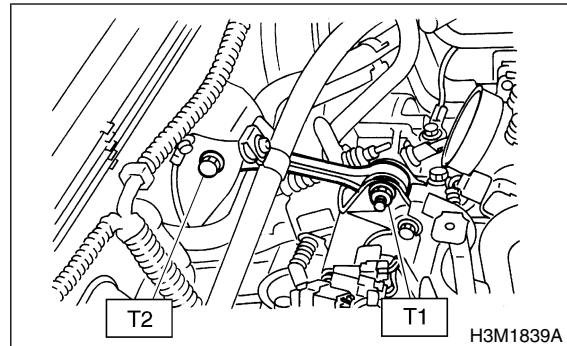
S502233A1101

- 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 cleaner case or air intake chamber.  
2.5 L model  
<Ref. to IN-6, INSTALLATION, Air Cleaner Case.>  
3.0 L model  
<Ref. to IN(H6)-6, INSTALLATION, Air Intake Chamber.>

## 2. CROSSMEMBER AND CUSHION RUBBER

S502233A1102

1) Install the rear cushion rubber.

**Tightening torque:**

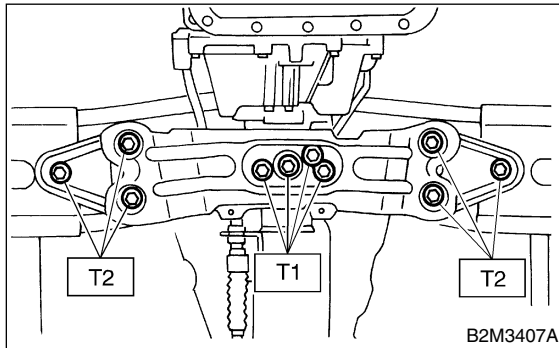
**39 N·m (4.0 kgf-m, 29 ft-lb)**

2) Install the crossmember or air intake chamber.

**Tightening torque:**

**T1: 35 N·m (3.6 kgf-m, 26 ft-lb)**

**T2: 75 N·m (7.6 kgf-m, 55 ft-lb)**



3) Remove the transmission jack.

4) Install the heat shield cover.

5) Install the front center, rear exhaust pipes and the muffler.

2.5 L model

<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H6)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, INSTALLATION, Muffler.>

## 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 transmission and propeller shaft joint. If so, replace oil seal.  
<Ref to AT-28, REPLACEMENT, Extension Case Oil Seal.>

### B: REPLACEMENT S502718A20

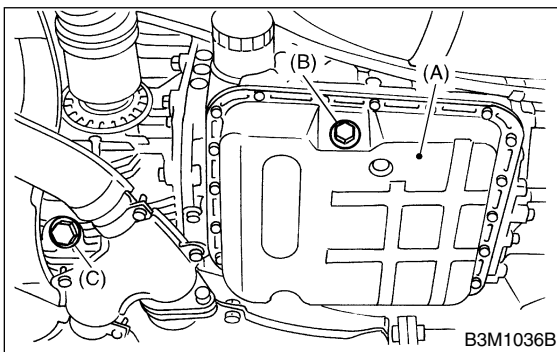
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

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

- 3) Remove the rear exhaust pipe and muffler.

2.5 L model

<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.>  
and <Ref. to EX-10, REMOVAL, Muffler.>

3.0 L model

<Ref. to EX(H6)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, REMOVAL, Muffler.>

- 4) Remove the heat shield cover.

- 5) Remove the propeller shaft. <Ref. to DS-13, REMOVAL, Propeller Shaft.>

- 6) Using ST, remove the oil seal.

ST 398527700 PULLER ASSY

- 7) Using ST, install the oil seal.

ST 498057300 INSTALLER

- 8) Install the propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>

- 9) Install the heat shield cover.

- 10) Install the rear exhaust pipe and muffler.

2.5 L model

<Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, INSTALLATION, Muffler.>

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



## 12. Inhibitor Switch S502243

### A: INSPECTION S502243A10

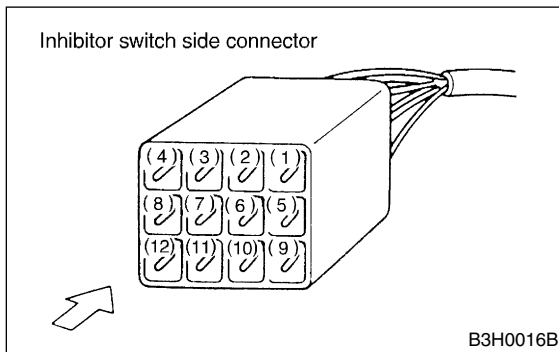
When driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

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

#### NOTE:

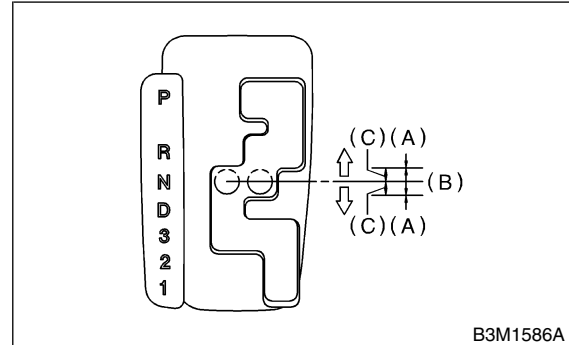
- Also check that continuity in ignition circuit does not exist when select lever is in R, D, 3, 2 and 1 ranges.
- If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	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-29, ADJUSTMENT, Inhibitor Switch.>

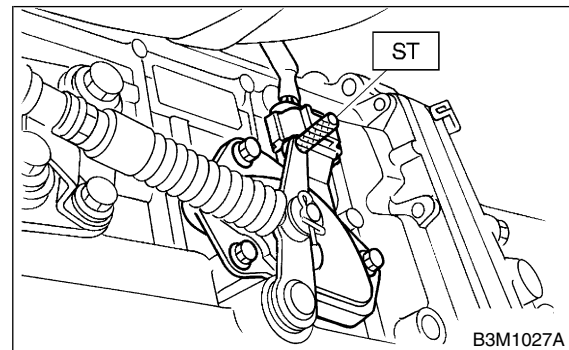


- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°

- 4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-27, ADJUSTMENT, Select Cable.>

### B: ADJUSTMENT S502243A01

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



- 4) Tighten the three inhibitor switch bolts.

#### Tightening torque:

**3.5 N·m (0.36 kgf-m, 2.6 ft-lb)**

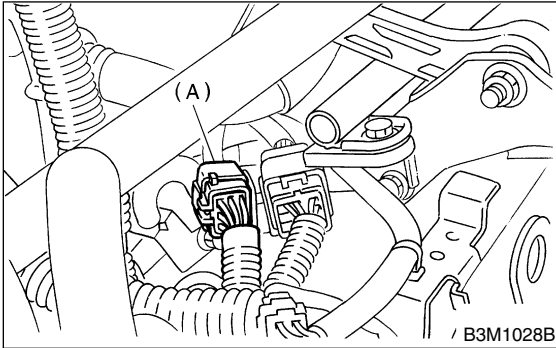
- 5) Repeat the above checks. If the inhibitor switch is determined to be "faulty", replace it.

# INHIBITOR SWITCH

Automatic Transmission

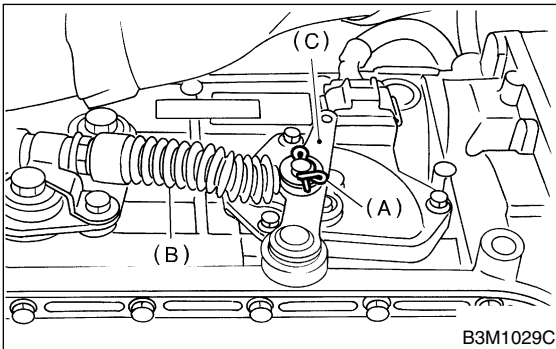
## C: REMOVAL S502243A18

- 1) Move select lever to neutral position.
- 2) Remove air cleaner case or air intake chamber.  
2.5 L model  
<Ref. to IN-6, REMOVAL, Air Cleaner Case.>  
3.0 L model  
<Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
- 3) Disconnect inhibitor switch connector.



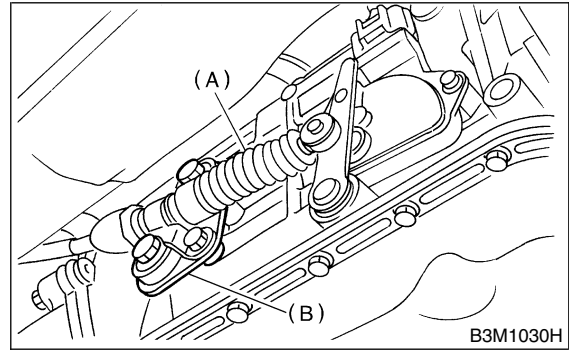
(A) Inhibitor switch

- 4) Remove front exhaust pipe with center exhaust pipe.  
2.5 L model  
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>  
3.0 L model  
<Ref. to EX(H6)-5, REMOVAL, Front Exhaust Pipe.>
- 5) Remove snap pin from range select lever.



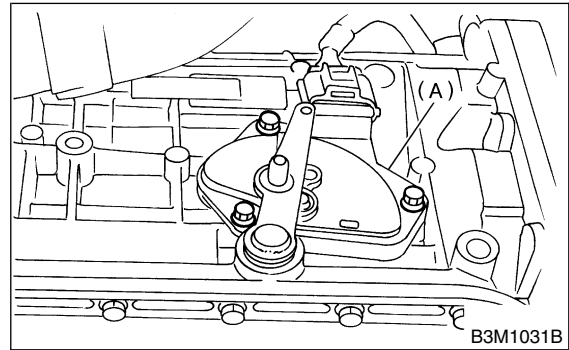
- (A) Snap pin  
(B) Select cable  
(C) Range select lever

- 6) Remove plate assembly from transmission case.



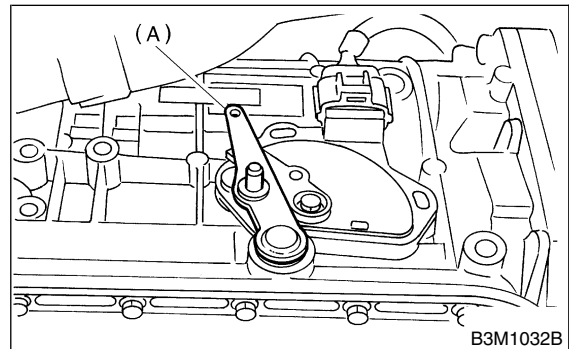
- (A) Select cable  
(B) Plate ASSY

- 7) Remove bolts.



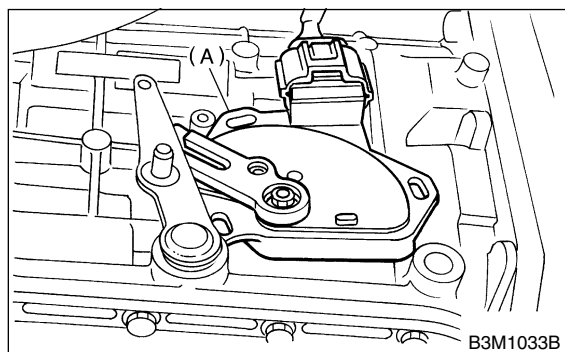
(A) Inhibitor switch

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



(A) Range select lever

- 9) Remove inhibitor switch from transmission.



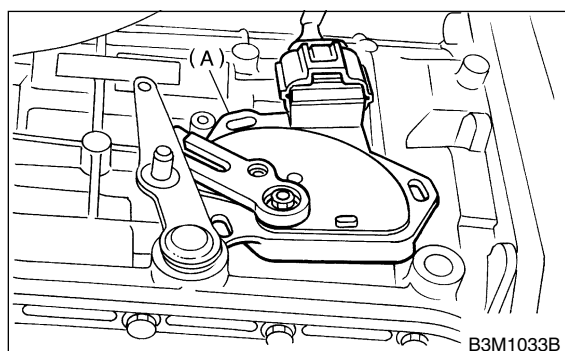
(A) Inhibitor switch

- 10) Disconnect inhibitor switch harness connector from inhibitor switch.

## D: INSTALLATION

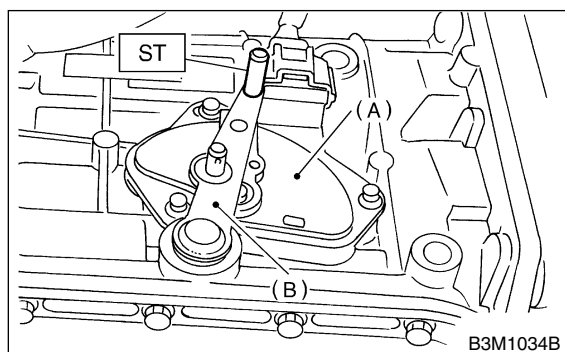
S502243A11

- 1) Connect inhibitor switch harness connector to inhibitor switch.
- 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

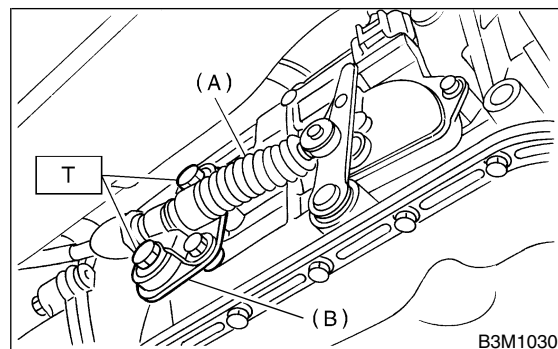


(A) Inhibitor switch  
(B) Range select lever

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

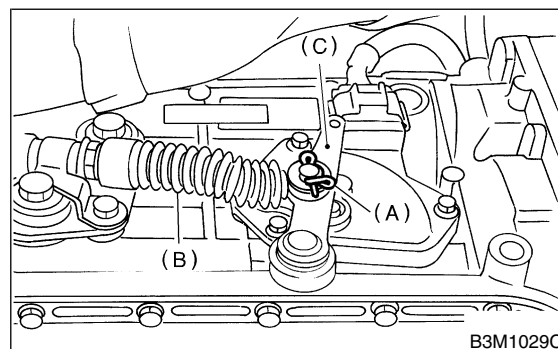
### Tightening torque:

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

## INHIBITOR SWITCH

### Automatic Transmission

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8) Install front exhaust pipe and center exhaust pipe.

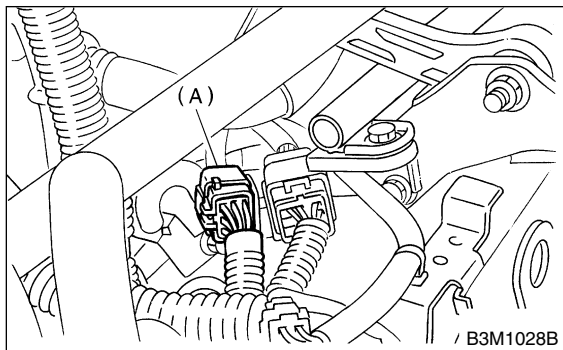
2.5 L model

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

3.0 L model

<Ref. to EX(H6)-6, INSTALLATION, Front Exhaust Pipe.>

9) Connect inhibitor switch connector.



(A) Inhibitor switch

10) Install air cleaner case or air intake chamber.

2.5 L model

<Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

3.0 L model

<Ref. to IN(H6)-6, INSTALLATION, Air Intake Chamber.>

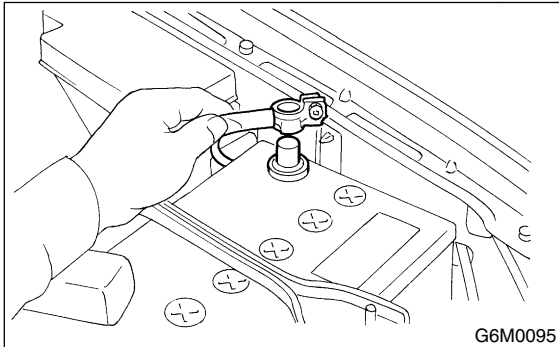
11) Inspect inhibitor switch. <Ref. to AT-29, INSPECTION, Inhibitor Switch.>

## 13. Front Vehicle Speed Sensor

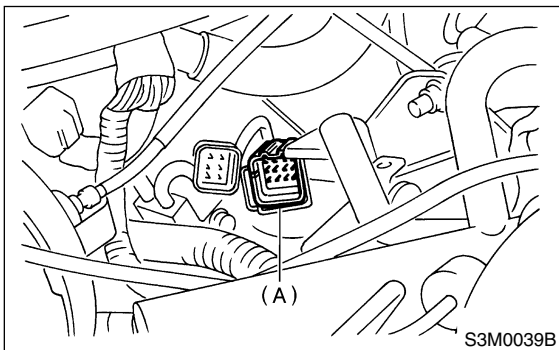
S502709

### A: REMOVAL S502709A18

- 1) Set up the vehicle on the lift.
- 2) Disconnect battery ground cable.



- 3) Remove air cleaner case or intake chamber.  
2.5 L model  
<Ref. to IN-6, REMOVAL, Air Cleaner Case.>  
3.0 L model  
<Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
- 4) Disconnect transmission connector.



(A) Transmission connector

- 5) Remove pitching stopper.  
<Ref. to AT-26, REMOVAL, Transmission Mounting System.>
- 6) Remove the transmission connector from stay.
- 7) Lift-up the vehicle.
- 8) Clean transmission exterior.

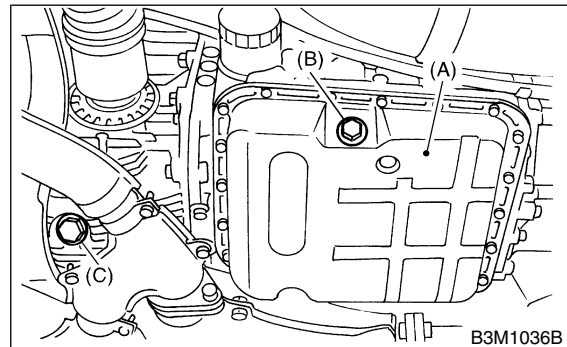
- 9) Drain ATF completely.

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

- 10) Remove front, center, rear exhaust pipes and muffler.

2.5 L model

<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>  
<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.>  
and <Ref. to EX-10, REMOVAL, Muffler.>

3.0 L model

<Ref. to EX(H6)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H6)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, REMOVAL, Muffler.>

- 11) Remove the shield cover.

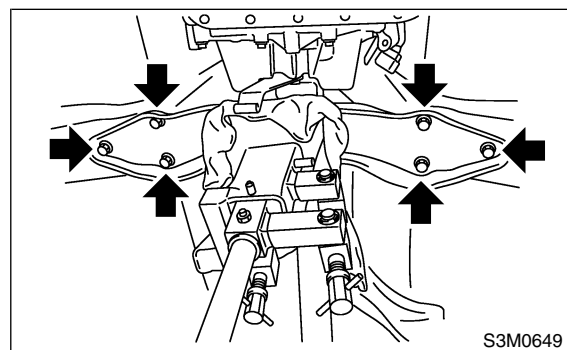
- 12) Remove the propeller shaft. <Ref. to DS-13, REMOVAL, Propeller Shaft.>

- 13) Place transmission jack under crossmember.

NOTE:

Make sure that the support plates of transmission jack don't touch the crossmember.

- 14) Remove the transmission rear crossmember bolts.



- 15) Lower the AT jack.

NOTE:

Do not separate the AT jack and transmission.

# FRONT VEHICLE SPEED SENSOR

Automatic Transmission

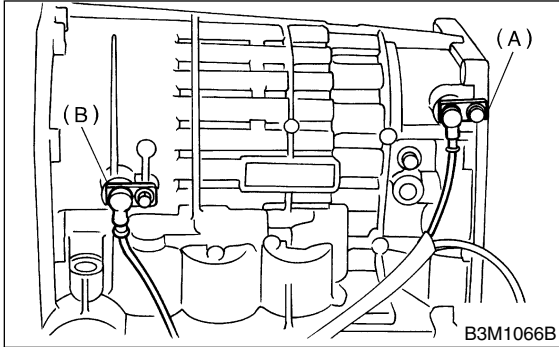
16) Remove the oil cooler outlet pipe.

## NOTE:

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

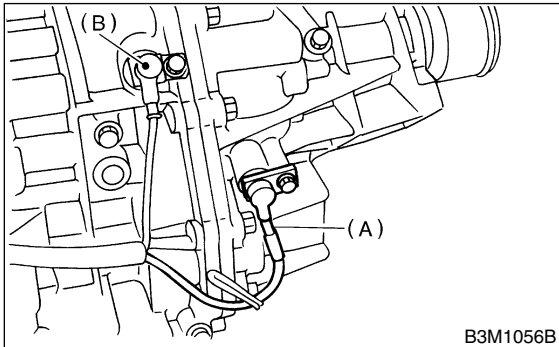
17) Remove front and rear vehicle speed sensor and torque converter turbine speed sensor.

## ● Front vehicle speed sensor and torque converter turbine speed sensor



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

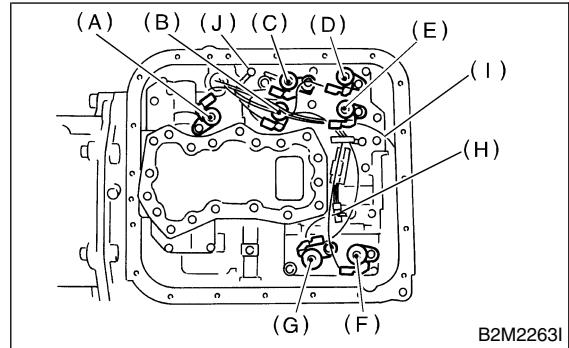
## ● Rear vehicle speed sensor



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

18) Remove oil pan.

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



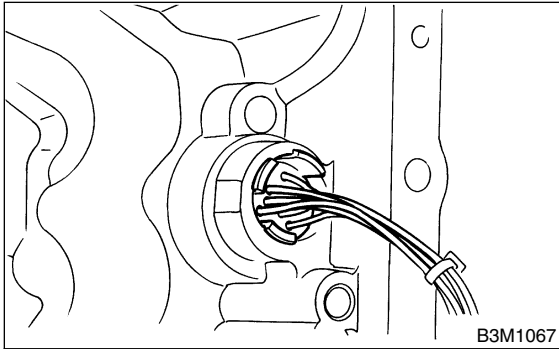
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

20) Remove harness assembly.

## B: INSTALLATION

S502709A11

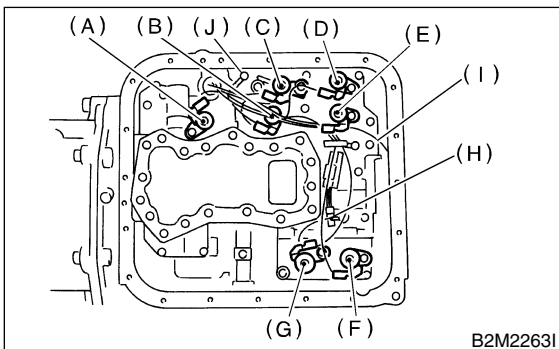
- 1) Pass the harness assembly through the hole in the transmission case.



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

**Tightening torque (Transmission ground terminal):**

**8 N·m (0.8 kgf-m, 5.8 ft-lb)**

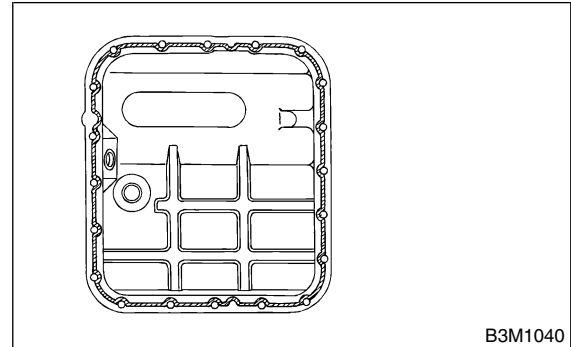


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

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

**Fluid packing:**

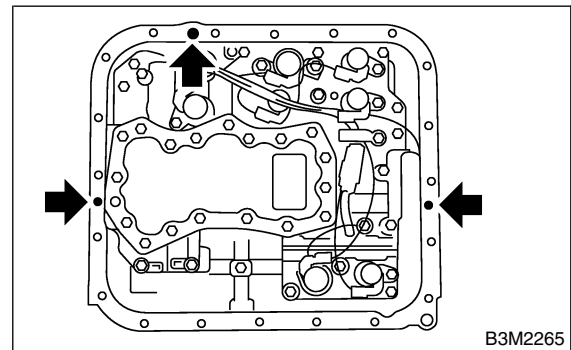
**THREE BOND 1217B**



- 4) Apply liquid gasket fully to 3 holes other than screw holes on the transmission case.

**Fluid packing:**

**THREE BOND 1217B**



- 5) Install the oil pan.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

- 6) 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)**

- 7) Install oil cooler outlet pipe.

**NOTE:**

Be sure to use a new aluminum washer.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

- 8) Install transmission rear crossmember bolts.

**Tightening torque:**

**75 N·m (7.6 kgf-m, 55 ft-lb)**

- 9) Install propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>
- 10) Install shield cover.

## FRONT VEHICLE SPEED SENSOR

Automatic Transmission

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11) Install front, center, rear exhaust pipes and muffler.

2.5 L model

<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H6)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, INSTALLATION, Muffler.>

12) Lower the vehicle.

13) Install the transmission connector to the stay.

14) Install pitching stopper.

<Ref. to AT-26, PITCHING STOPPER, INSPECTION, Transmission Mounting System.>

15) Install air cleaner case or air intake chamber.

2.5 L model

<Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

3.0 L model

<Ref. to IN(H6)-6, INSTALLATION, Air Intake Chamber.>



## 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-33, REMOVAL, Front Vehicle Speed Sensor.>

### B: INSTALLATION S502710A11

When installing the rear vehicle speed sensor, refer to "Front Vehicle Speed Sensor". <Ref. to AT-35, 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-33, 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-35, INSTALLATION, Front Vehicle Speed Sensor.>

## 16. Control Valve Body S502564

### A: REMOVAL S502564A18

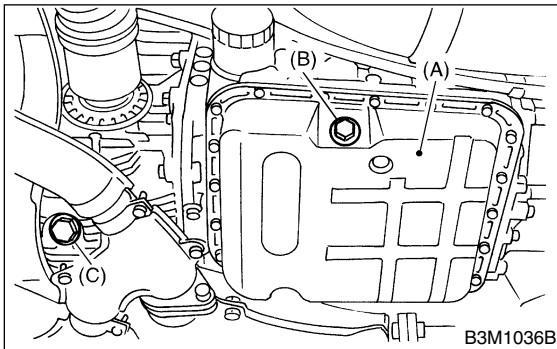
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



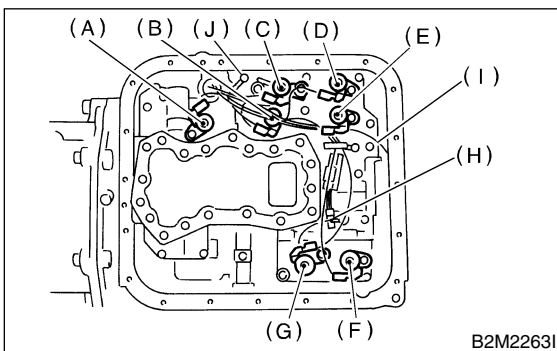
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 3) Remove the oil pan.

**NOTE:**

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

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

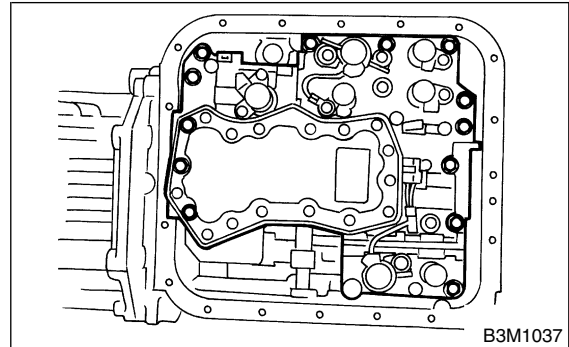


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

- 5) Remove the control valve.

**NOTE:**

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

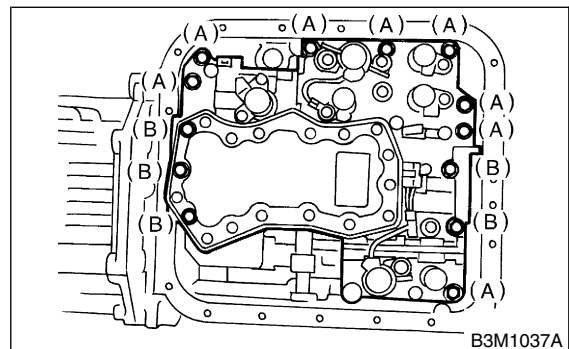


### B: INSTALLATION S502564A11

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

**Tightening torque:**

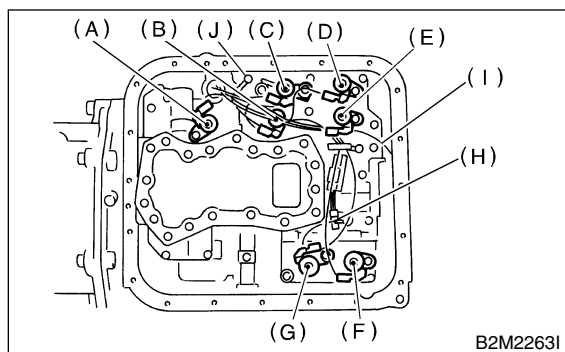
**8 N·m (0.8 kgf-m, 5.8 ft-lb)**



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

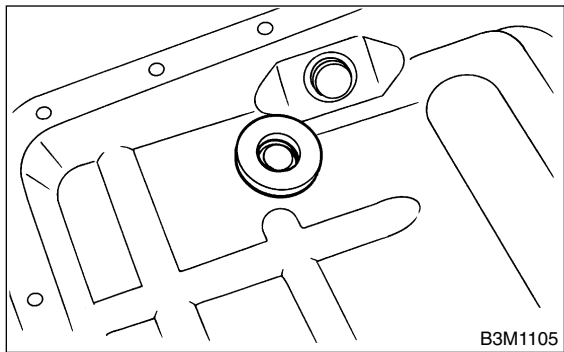
- 3) Connect all connector.

# CONTROL VALVE BODY



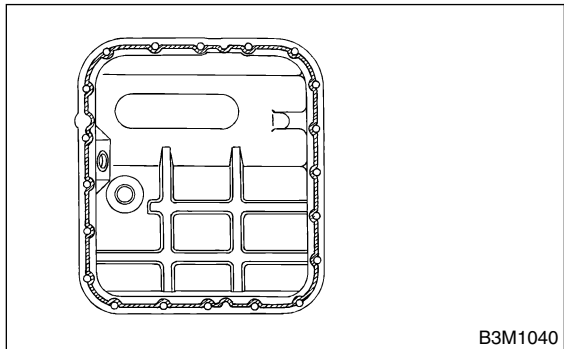
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

4) Attach the magnet at the specified position.



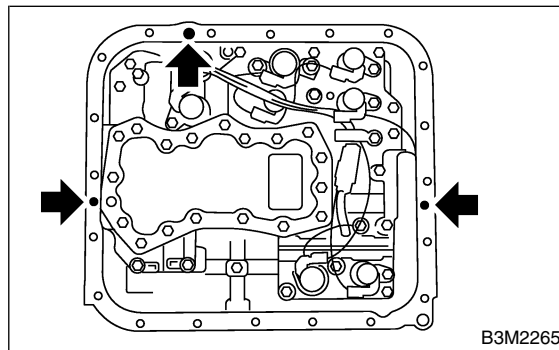
5) Apply proper amount of liquid gasket to the entire oil pan mating surface.

**Fluid packing:**  
**THREE BOND 1217B**



6) Apply liquid gasket fully to 3 holes other than screw holes on the transmission case.

**Fluid packing:**  
**THREE BOND 1217B**



7) Install the oil pan.

**NOTE:**

Uniformly tighten the bolts in several passes.

**Tightening torque:**  
**5 N·m (0.5 kgf-m, 3.6 ft-lb)**

8) Pour ATF into the oil charge pipe.

**Recommended fluid:**  
**Dexron III type automatic transmission fluid**

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

9) Check the level of the ATF.

## C: DISASSEMBLY S502564A06

Refer to "AUTOMATIC TRANSMISSION" <Pub. No. G0864ZE> a separate publication.

## D: ASSEMBLY S502564A02

Refer to "AUTOMATIC TRANSMISSION" <Pub. No. G0864ZE> a separate publication.

## E: INSPECTION S502564A10

Refer to "AUTOMATIC TRANSMISSION" <Pub. No. G0864ZE> a separate publication.

## 17. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

S502227

### A: REMOVAL

S502227A18

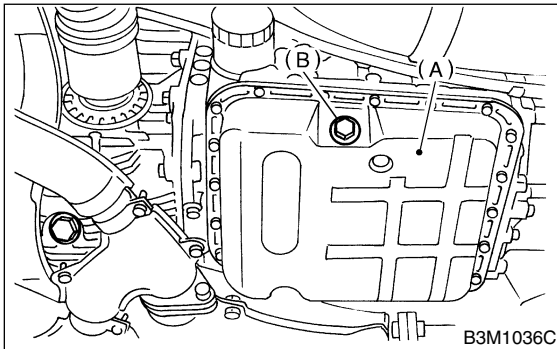
- 1) Lift-up the vehicle.
- 2) Clean transmission exterior.
- 3) Drain ATF completely.

#### NOTE:

Tighten ATF drain plug after draining ATF.

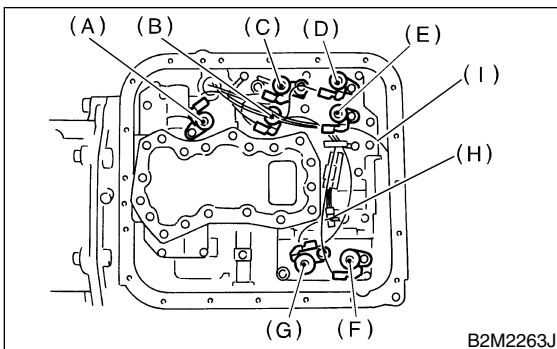
#### Tightening torque:

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



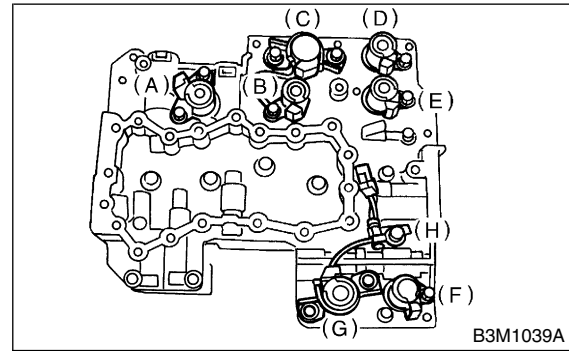
- (A) Oil pan
- (B) Drain plug

- 4) Remove oil pan.
- 5) 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)

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

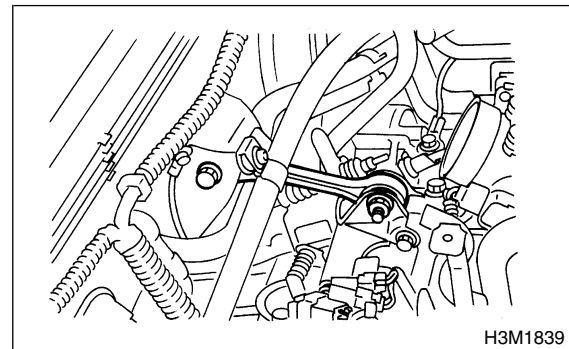


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

### 1. TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY

S502227A1801

- 1) Set up the vehicle on the lift.
- 2) Disconnect battery ground terminal.
- 3) Remove air cleaner case or air intake chamber.  
2.5 L model  
<Ref. to IN-6, REMOVAL, Air Cleaner Case.>  
3.0 L model  
<Ref. to IN(H6)-6, REMOVAL, Air Intake Chamber.>
- 4) Remove pitching stopper.



- 5) Remove front exhaust pipe with center exhaust pipe.  
2.5 L model  
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>  
3.0 L model  
<Ref. to EX(H6)-5, REMOVAL, Front Exhaust Pipe.>

# SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

## Automatic Transmission

6) Remove rear exhaust pipe and muffler.

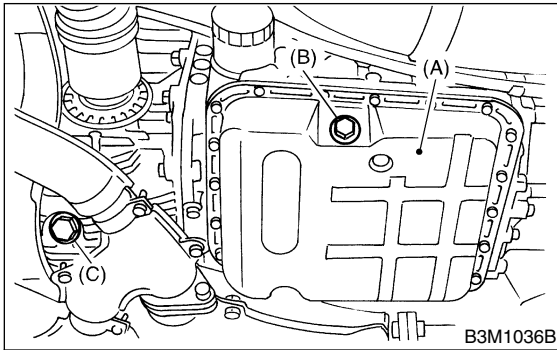
2.5 L model

<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.>  
& <Ref. to EX-10, REMOVAL, Muffler.>

3.0 L model

<Ref. to EX(H6)-8, REMOVAL, Rear Exhaust Pipe.> & <Ref. to EX(H6)-9, REMOVAL, Muffler.>

7) Raise vehicle and drain ATF.



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

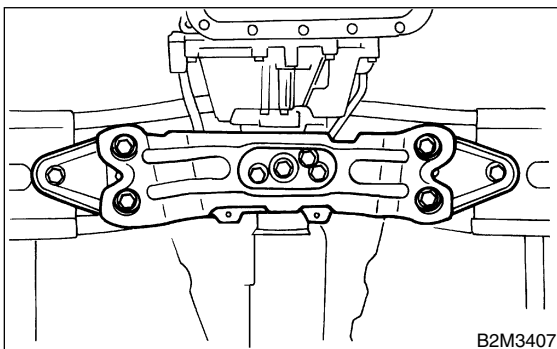
8) Remove heat shield cover.

9) Remove propeller shaft. <Ref. to DS-13, REMOVAL, Propeller Shaft.>

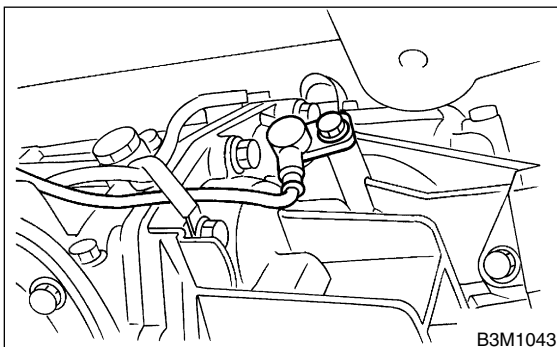
10) Remove rear crossmember.

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

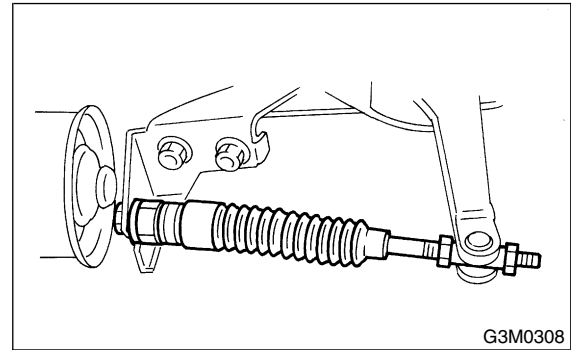
(2) Remove bolts and nuts as shown in Figure.



11) Remove rear vehicle speed sensor.



12) Remove select cable nut.



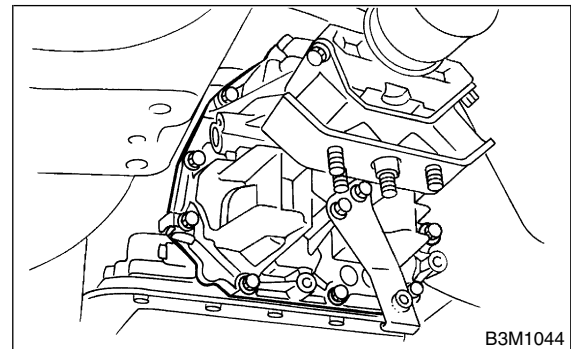
13) Move gear select cable so that extension bolts can be removed.

14) Remove bolts.

15) Remove extension case.

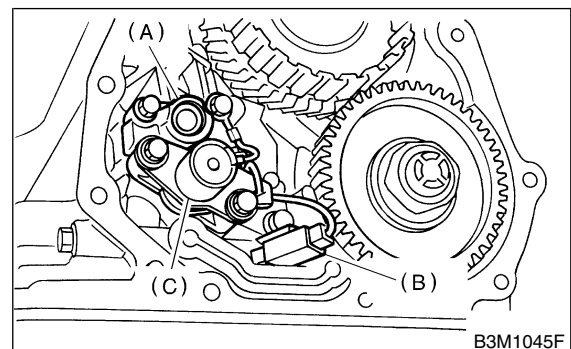
NOTE:

Use a container to catch oil flowing from extension.



16) Disconnect transfer duty solenoid connector.

17) Remove transfer duty solenoid and transfer valve body.



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

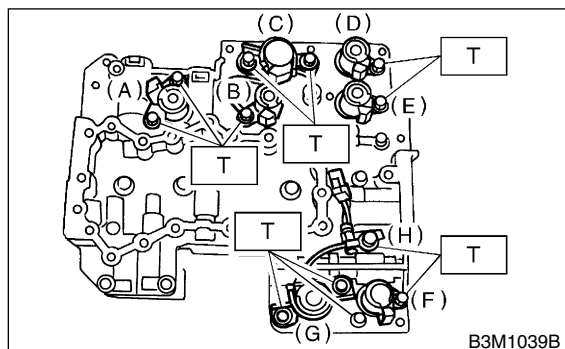
## B: INSTALLATION

S50227A11

1) Install solenoids and ATF temperature sensor.

**Tightening torque:**

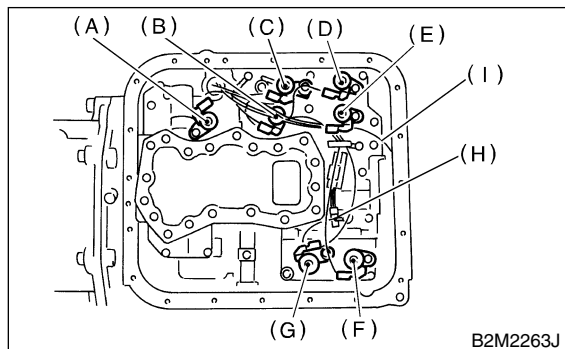
**T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)**



- (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.

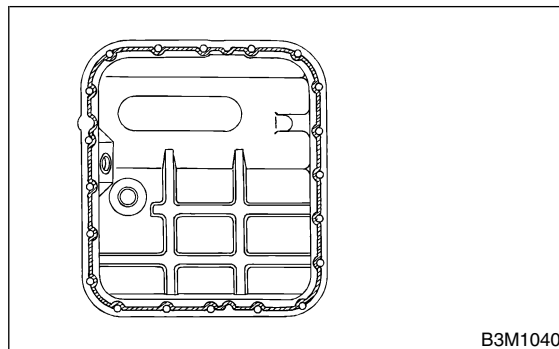


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

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

**Fluid packing:**

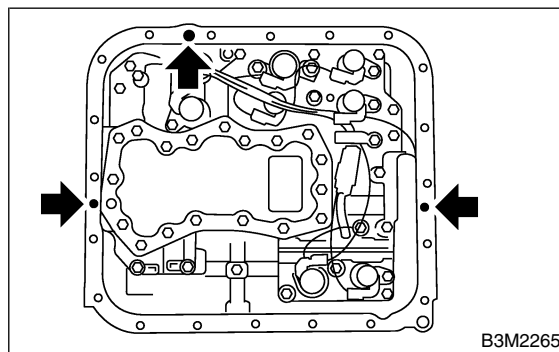
**THREE BOND 1217B**



4) Apply liquid gasket fully to 3 holes other than screw holes on the transmission case.

**Fluid packing:**

**THREE BOND 1217B**



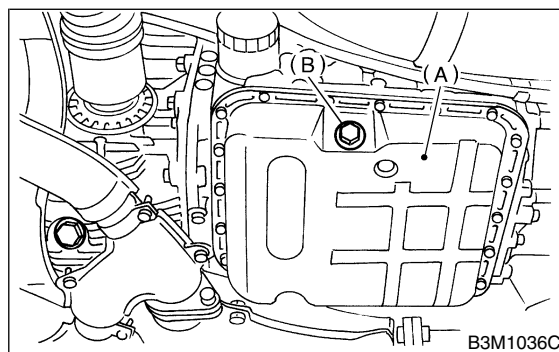
5) Install oil pan.

**NOTE:**

Uniformly tighten the bolts in several passes.

**Tightening torque:**

**5 N·m (0.5 kgf-m, 3.6 ft-lb)**



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

6) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole. <Ref. to AT-9, Automatic Transmission Fluid.>

# SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

## Automatic Transmission

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

### 1. TRANSFER DUTY SOLENOID AND TRANSFER VALVE BODY

S502227A1101

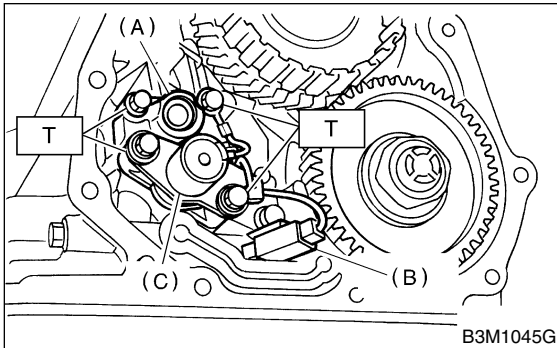
1) Install transfer duty solenoid and transfer valve body.

(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:

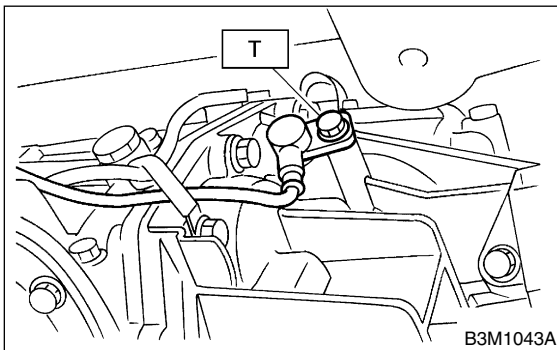
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

(2) Adjust the select cable. <Ref. to CS-27, ADJUSTMENT, Select Cable.>

3) Install rear vehicle speed sensor.

#### Tightening torque:

**T: 7 N·m (0.7 kgf-m, 5.1 ft-lb)**



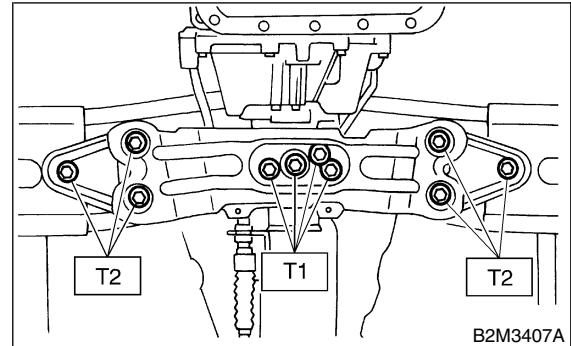
4) Install rear crossmember.

(1) Tighten bolts.

#### Tightening torque:

**T1: 35 N·m (3.6 kgf-m, 26 ft-lb)**

**T2: 75 N·m (7.6 kgf-m, 55 ft-lb)**



(2) Lower and remove transmission jack.

5) Install propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>

6) Install front center, rear exhaust pipe and muffler.

2.5 L model

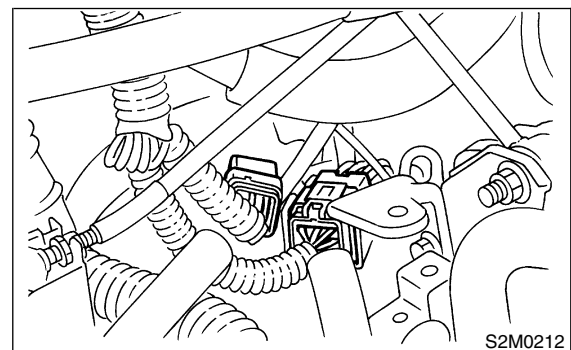
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H6)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6)-9, INSTALLATION, Muffler.>

7) Lower and remove jack.

8) Connect transmission harness connector.



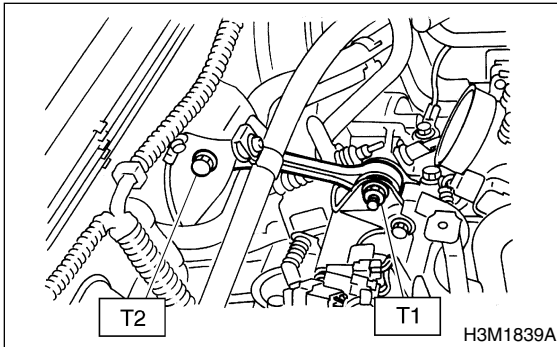


9) Install pitching stopper.

**Tightening torque:**

**T1: 50 N·m (5.1 kgf-m, 37 ft-lb)**

**T2: 58 N·m (5.9 kgf-m, 43 ft-lb)**



10) Install air cleaner case or air intake chamber.

2.5 L model

<Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

3.0 L model

<Ref. to IN(H6)-6, INSTALLATION, Air Intake Chamber.>

11) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to AT-9, Automatic Transmission Fluid.>

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

## 18. ATF Filter S502226

### A: REMOVAL S502226A18

#### 1. 2.5 L MODEL S502226A1804

**NOTE:**

The ATF filter is maintenance free. Replace only when there are obvious dents or damage to the filter or if there is oil leakage from the joining area to the transmission.

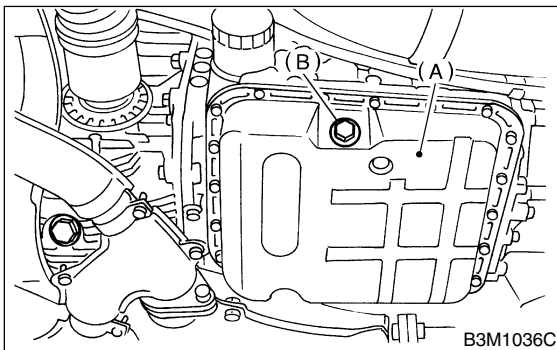
- 1) Drain ATF completely.

**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

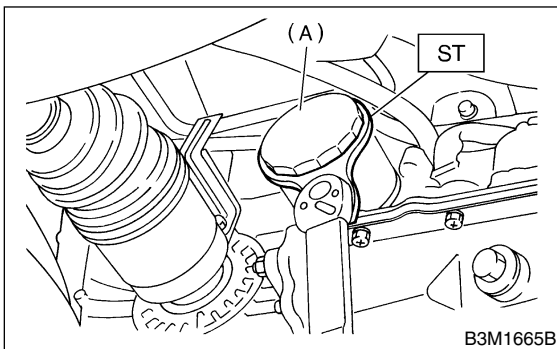
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



- (A) Oil pan  
(B) Drain plug

- 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.

#### 2. 3.0 L MODEL S502226A1805

### ● ATF Filter

**NOTE:**

The ATF filter is maintenance free. Replace only when there are obvious dents or damage to the filter or if there is oil leakage from the joining area to the transmission.

- 1) Drain ATF completely. <Ref. to AT-9, REPLACEMENT, Automatic Transmission.>

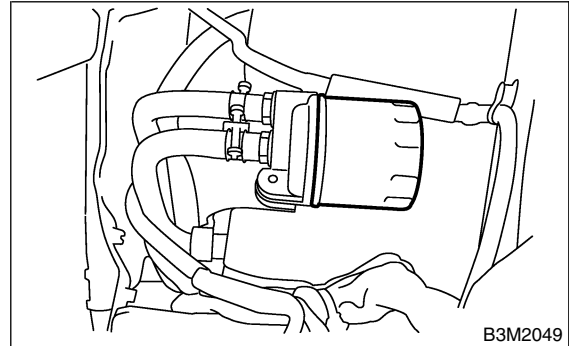
**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

- 2) Remove front left mud guard. <Ref. to EI-23, REMOVAL, Mud Guard.>
- 3) Using ST, remove ATF filter.  
ST 498548500 OIL FILTER WRENCH



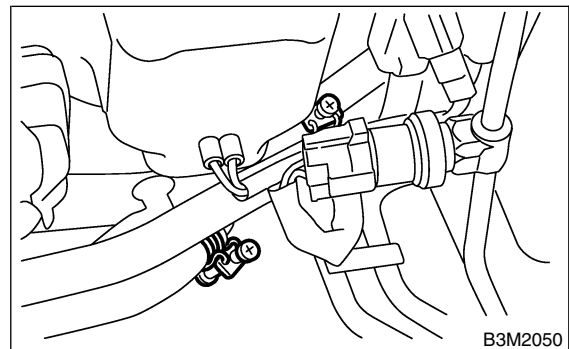
- 4) Get new ATF filter and apply a thin coat of ATF to the oil seal

### ● ATF Filter Assembly

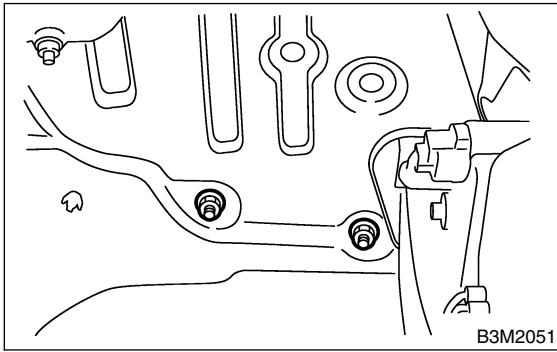
- 1) Remove battery.
- 2) Remove front left mud guard. <Ref. to EI-23, REMOVAL, Mud Guard.>
- 3) Release clamp of IN, OUT of oil filter hose, and remove hose from pipe.

**NOTE:**

- Plug the pipe.
- Put a mark etc., to distinguish IN, OUT on pipe and hose.



- 4) Remove oil filter bracket installation nut.



- 5) Remove ATF filter assembly.  
 6) Using ST, remove ATF filter.  
 ST 498548500 OIL FILTER WRENCH  
 7) Get new ATF filter and apply a thin coat of ATF to the oil seal.

## B: INSTALLATION S502226A11

### 1. 2.5 L MODEL S502226A1104

- 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.  
 $T2 = L2 / (L1 + L2) \times T1$   
 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)	7.9 (0.81, 5.9)
150 (5.91)	9.2 (0.94, 6.8)
200 (7.87)	10.0 (1.0, 7.2)

NOTE:  
 Align ST with torque wrench while tightening ATF filter.

- ST 498545400 OIL FILTER WRENCH  
 3) Add ATF.

### 2. 3.0 L MODEL S502226A1105

#### ● ATF Filter

- 1) Install AT oil filter. Turn it by hand, being careful not to damage oil seal.  
 2) Using ST, tighten AT oil filter to transmission case.  
 Calculate AT filter torque specifications using the following formula.  
 $T2 = L2 / (L1 + L2) \times T1$

- 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)	7.9 (0.81, 5.9)
150 (5.91)	9.2 (0.94, 6.8)
200 (7.87)	10.0 (1.0, 7.2)

NOTE:  
 Align ST with torque wrench while tightening AT oil filter.

- ST 498545400 OIL FILTER WRENCH  
 3) Install front left mud guard. <Ref. to EI-23, INSTALLATION, Mud Guard.>  
 4) Add ATF.  
 5) Inspect level of ATF. <Ref. to AT-9, Automatic Transmission Fluid.>

#### ● ATF Filter Assembly

- 1) Install ATF filter to bracket.  
**Tightening torque:**  
**14 N·m (1.4 kgf-m, 10 ft-lb)**  
 2) Install ATF filter assembly to vehicle.  
**Tightening torque:**  
**16 N·m (1.6 kgf-m, 12 ft-lb)**

- 3) Install AT oil filter. Turn it by hand, being careful not to damage oil seal.  
 4) Using ST, tighten AT oil filter to transmission case.  
 Calculate AT filter torque specifications using the following formula.

- $T2 = L2 / (L1 + L2) \times T1$   
 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)	7.9 (0.81, 5.9)
150 (5.91)	9.2 (0.94, 6.8)
200 (7.87)	10.0 (1.0, 7.2)

NOTE:  
 Align ST with torque wrench while tightening AT oil filter.

- ST 498545400 OIL FILTER WRENCH  
 5) Install hoses to pipe.

### NOTE:

Align the mark on the hose with the one on the pipe.

6) Install front left mud guard.

<Ref. to EI-23, INSTALLATION, Mud Guard.>

7) Add ATF.

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

### C: INSPECTION S502226A10

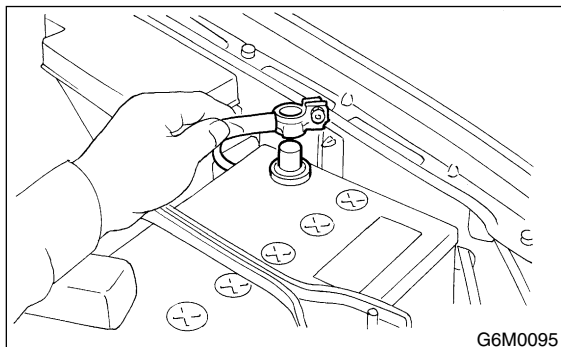
Replace the part if any defect is found from the inspection.

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

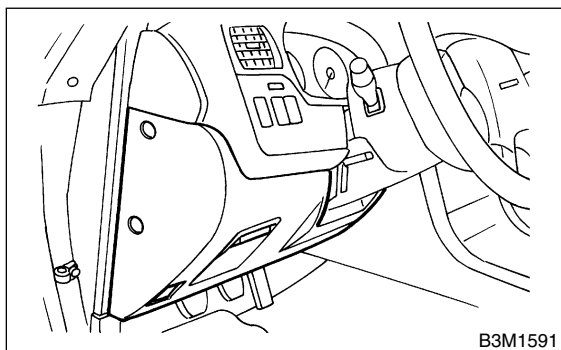
## 19. Transmission Control Module (TCM) S502225

### A: REMOVAL S502225A18

- 1) Disconnect battery ground cable.

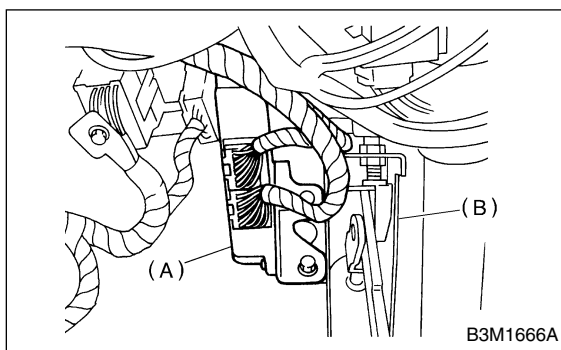


- 2) Remove lower cover and then disconnect connector.



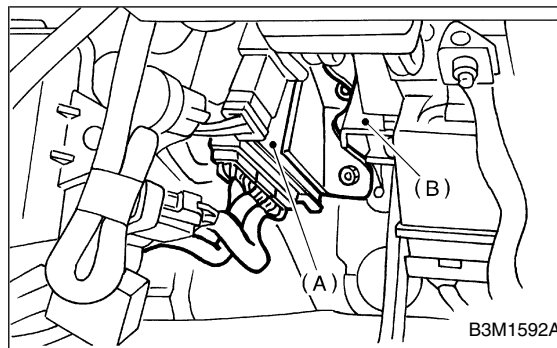
- 3) Disconnect connectors from transmission control module.

#### MPT model



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

#### VTD model



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

- 4) Remove transmission control module.

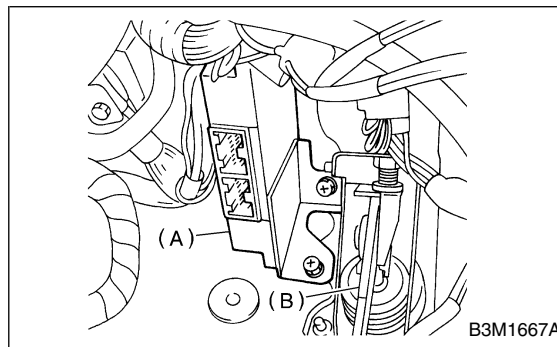
### B: INSTALLATION S502225A11

- 1) Install transmission control module.

#### Tightening torque:

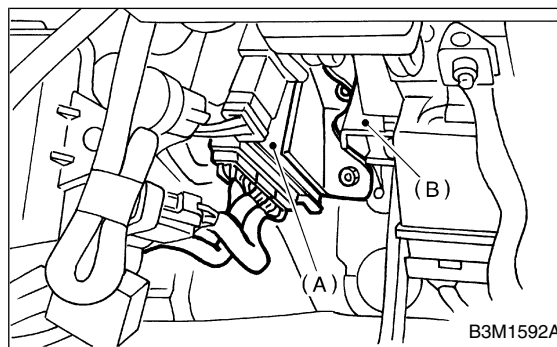
**7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**

#### MPT model



- (A) Transmission control module  
(B) Pedal bracket

#### VTD model



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

- 2) Connect connectors to transmission control module.
- 3) Install in the reverse order of removal.

# DROPPING RESISTOR

Automatic Transmission

## 20. Dropping Resistor

S502218

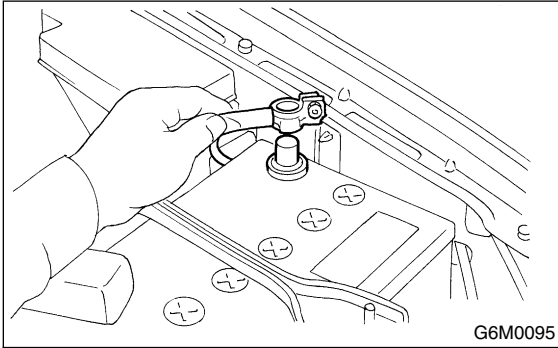
### A: REMOVAL

S502218A18

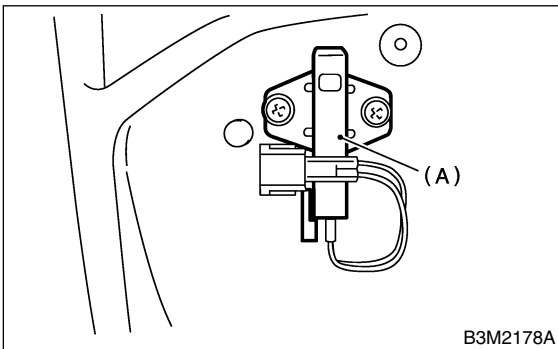
NOTE:

Model without VDC system only

- 1) Disconnect battery ground cable.



- 2) Remove air intake duct.
- 3) Disconnect connector from dropping resistor.
- 4) Remove dropping resistor.



(A) Dropping resistor

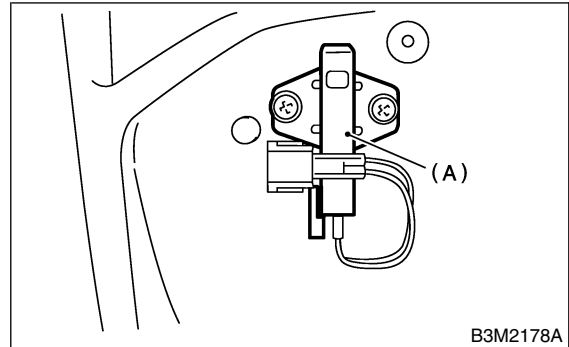
### B: INSTALLATION

S502218A11

- 1) Install in the reverse order of removal.

**Tightening torque:**

**7.5 N·m (0.76 kgf-m, 5.5 ft-lb)**



(A) Dropping resistor

### C: INSPECTION

S502218A10

No.	Step	Check	Yes	No
1	<b>CHECK RESISTOR.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminal. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance between 9 and 15 $\Omega$ ?	Go to step 2.	Replace dropping resistor. <Ref. to 50, Dropping Resistor.>
2	<b>CHECK RESISTOR.</b> Measure resistance between dropping resistor terminal. <b>Terminals</b> <b>No. 3 — No. 4:</b>	Is the resistance between 9 and 15 $\Omega$ ?	Dropping resistor is normal.	Replace dropping resistor. <Ref. to 50, Dropping Resistor.>

## 21. ATF Cooler Pipe and Hose

S502565

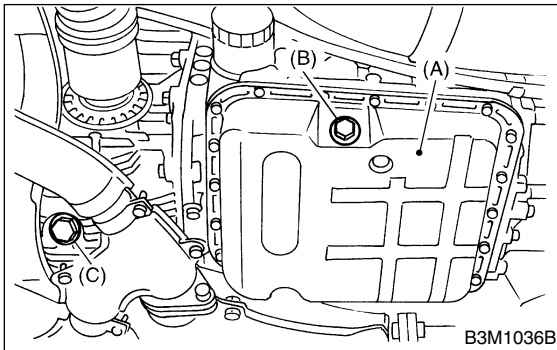
### A: REMOVAL S502565A18

#### 1. 2.5 L MODEL S502565A1806

- 1) Remove battery and washer tank.
- 2) Lift-up the vehicle.
- 3) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

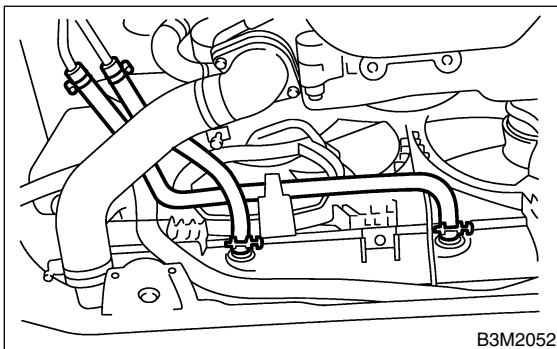
**Tightening torque:****25 N·m (2.5 kgf-m, 18.1 ft-lb)**

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

- 4) Remove the under cover.
- 5) Disconnect ATF cooler hose from radiator.

NOTE:

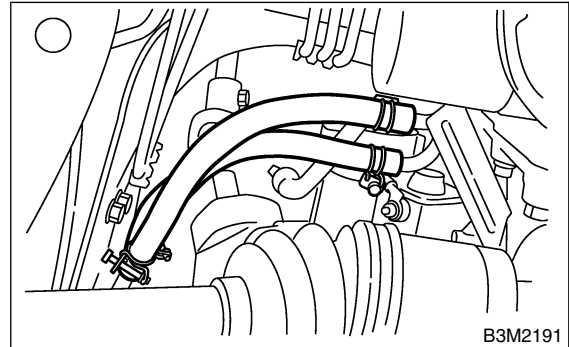
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



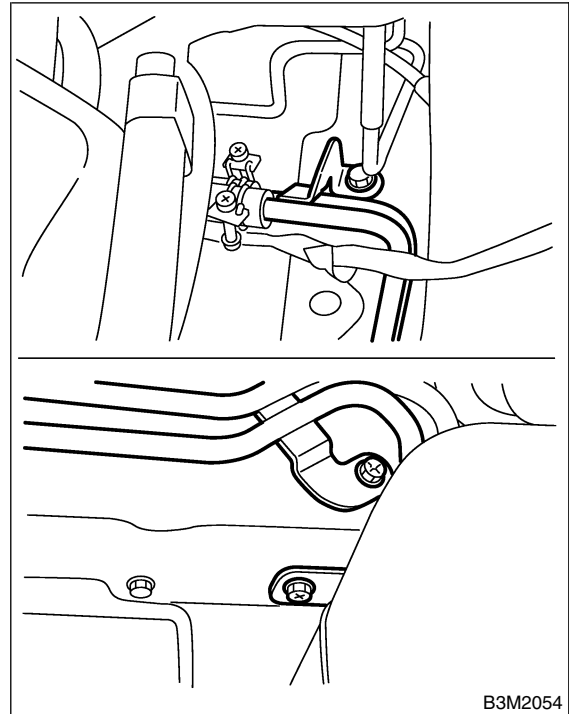
- 6) Disconnect ATF cooler hoses from pipes.

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 frame.



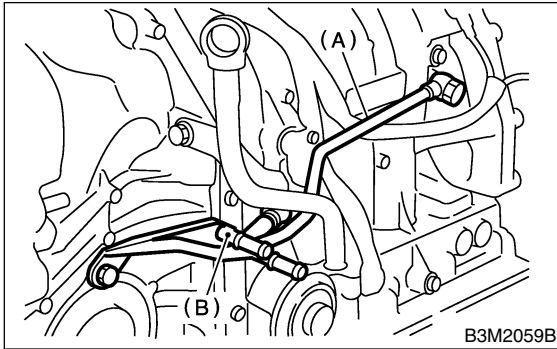
# ATF COOLER PIPE AND HOSE

## Automatic Transmission

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

**NOTE:**

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



- (A) Inlet pipe  
(B) Outlet pipe

## 2. 3.0 L MODEL S502565A1807

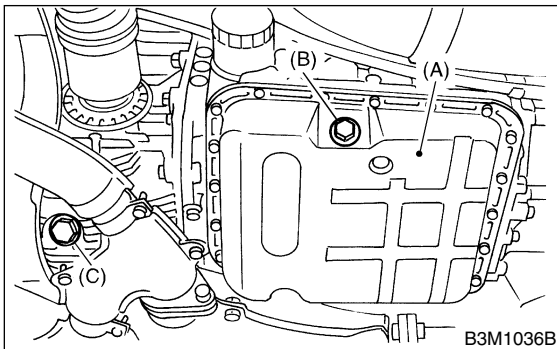
- 1) Remove battery and washer tank.
- 2) Lift-up the vehicle.
- 3) Drain ATF completely.

**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



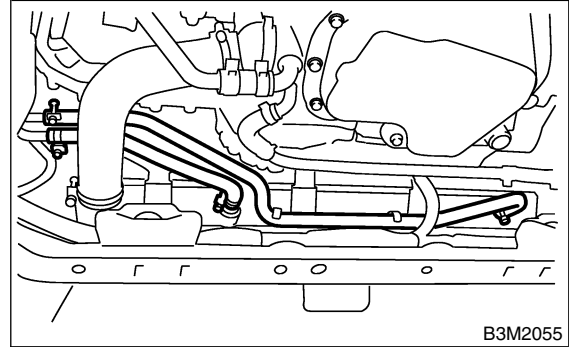
- (A) Oil pan  
(B) Drain plug  
(C) Differential oil drain plug

- 4) Remove the under cover.

- 5) Disconnect ATF cooler hose from radiator.

**NOTE:**

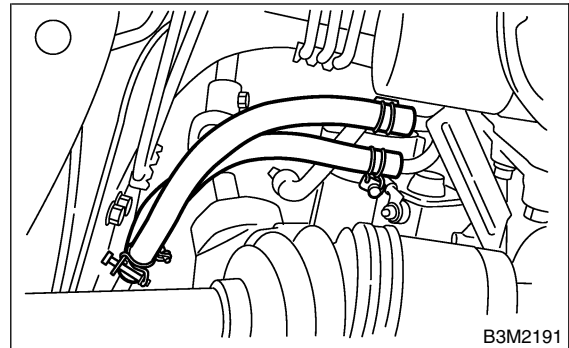
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



- 6) Disconnect ATF cooler hoses from transmission.

**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.



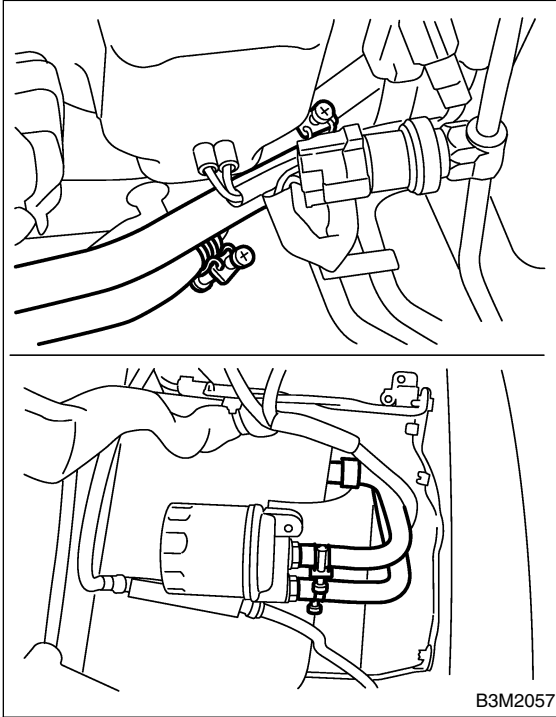
- 7) Remove front left mud guard.  
<Ref. to EI-23, REMOVAL, Mud Guard.>



8) Disconnect ATF cooler hoses from ATF filter.

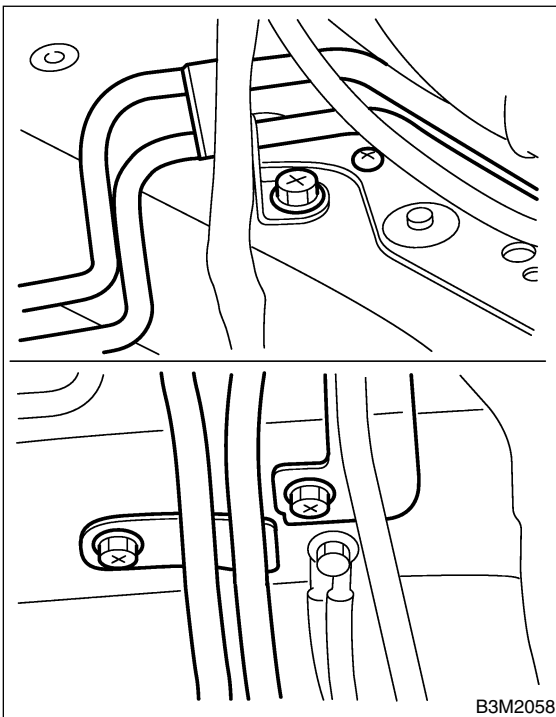
**NOTE:**

- 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.



B3M2057

9) Remove AT cooler pipe from frame.

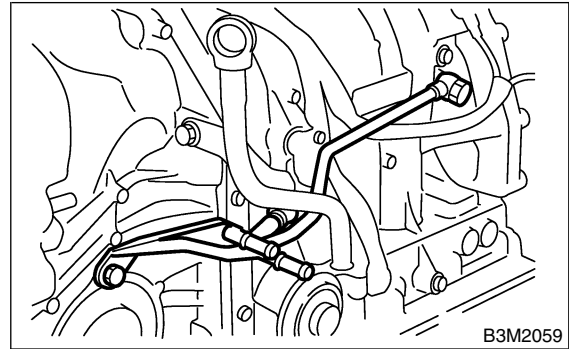


B3M2058

10) Remove the oil cooler inlet and outlet pipes.

**NOTE:**

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



B3M2059

## B: INSTALLATION

S502565A11

### 1. 2.5 L MODEL

S502565A1106

1) Install the oil cooler outlet and inlet pipes.

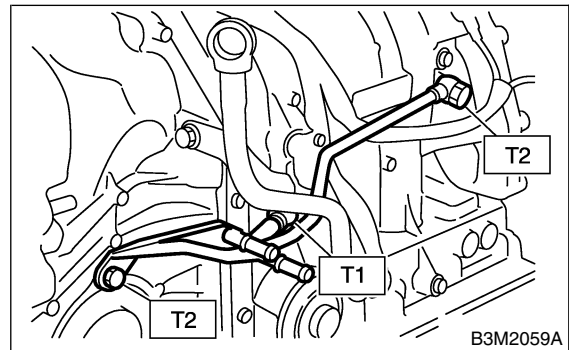
**NOTE:**

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)**

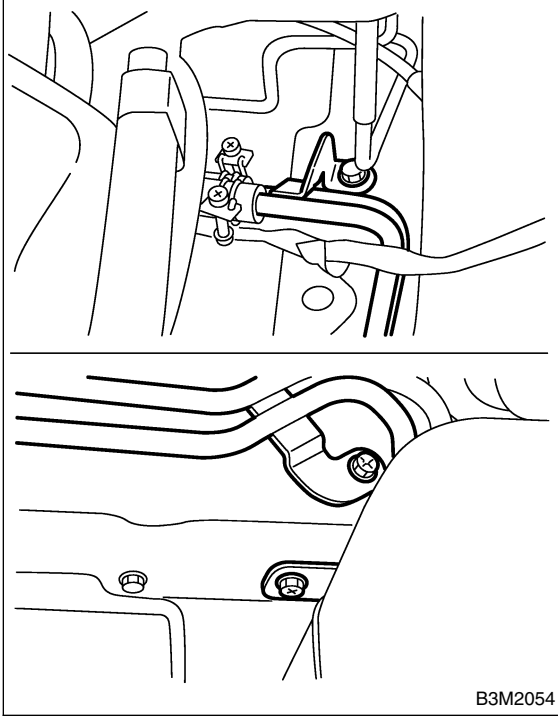


B3M2059A

## ATF COOLER PIPE AND HOSE

### Automatic Transmission

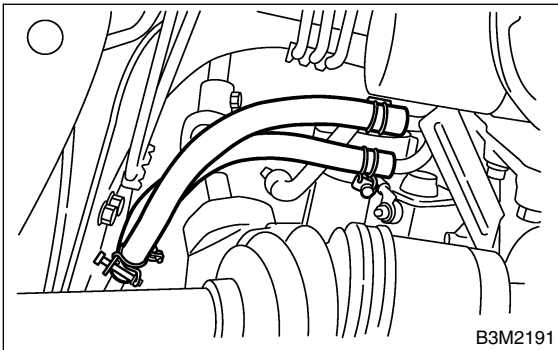
- 2) Install ATF cooler pipe to frame.



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

**NOTE:**

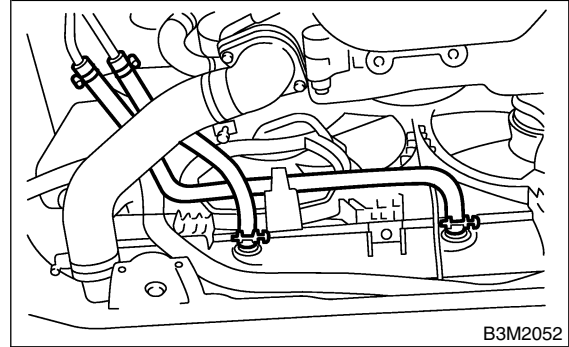
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



- 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. 3.0 L MODEL S502565A1107

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

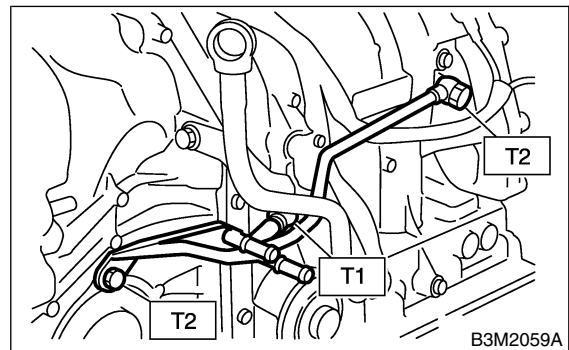
**NOTE:**

Be sure to use a new aluminum washer.

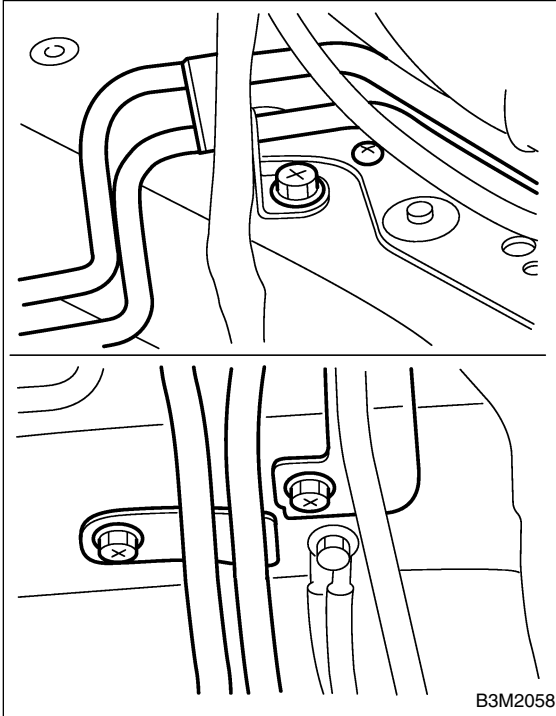
**Tightening torque:**

**T1: 44 N·m (4.5 kgf-m, 32.5 ft-lb)**

**T2: 25 N·m (2.5 kgf-m, 18.1 ft-lb)**



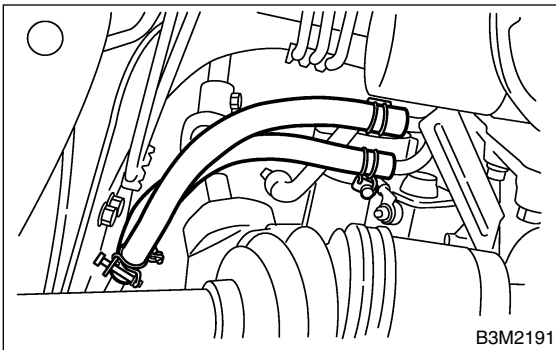
2) Install ATF cooler pipe to frame.



3) Connect ATF cooler hose to transmission.

NOTE:

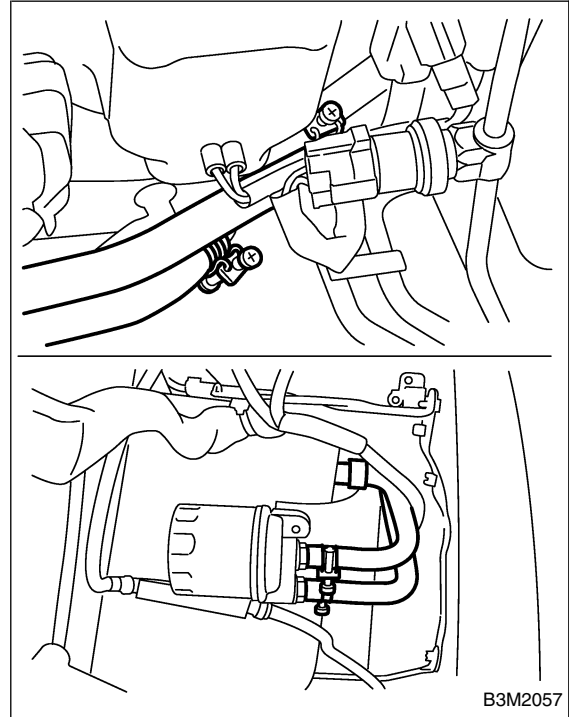
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



4) Connect ATF cooler hoses from ATF filter.

NOTE:

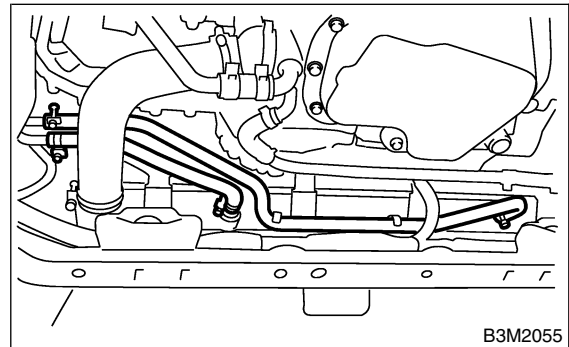
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



5) Connect ATF cooler hoses from radiator.

NOTE:

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



6) Install front left mud guard. <Ref. to EI-23, INSTALLATION, Mud Guard.>

7) Install the under cover.

8) Install battery and washer tank.

9) Fill ATF. <Ref. to AT-9, Automatic Transmission Fluid.>

## **C: INSPECTION** S502565A10

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.

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 1. General Description S503001

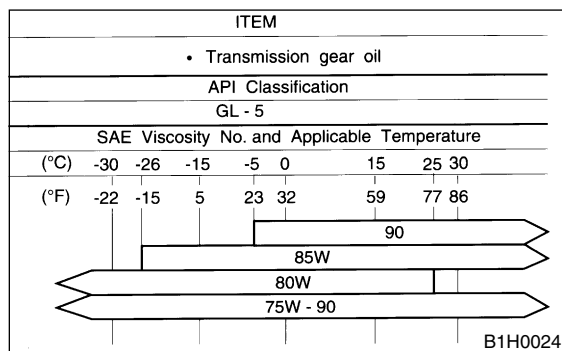
### A: SPECIFICATIONS S503001E49

#### 1. MANUAL TRANSMISSION AND DIFFERENTIAL S503001E4901

Item		Model			
		BRIGHTON	L	GT	OUTBACK
Type		5-forward speeds with synchromesh and 1-reverse			
Transmission gear ratio	1st	3.454			
	2nd	2.062			
	3rd	1.448			
	4th	1.088			
	5th	0.780			0.871
	Reverse	3.333			
Front reduction gear	Final	Type of gear	Hypoid		
		Gear ratio	3.900	4.111	
Rear reduction gear	Transfer	Type of gear	Helical		
		Gear ratio	1.000		
	Final	Type of gear	Hypoid		
		Gear ratio	3.900	4.111	
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)		
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)		
Transmission gear oil		GL-5			
Transmission oil capacity		3.5 ℓ (3.7 US qt, 3.1 Imp qt)			

#### 2. TRANSMISSION GEAR OIL S503001E4902

##### Recommended oil



#### 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)

Selection of main shaft rear plate

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

## 4. DRIVE PINION ASSEMBLY 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. 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)	—	—

## 6. 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)

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	No mark	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in)

## 7. 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.

# GENERAL DESCRIPTION

## Manual Transmission and Differential

### Reverse check plate adjustment

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

## 8. EXTENSION 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)

## 9. 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)

## 10. TRANSFER DRIVE GEAR SS03001E4913

Snap ring (Outer-30) to ball bearing clearance

0.01 — 0.15 mm (0.004 — 0.0050 in)

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

# GENERAL DESCRIPTION

Manual Transmission and Differential

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**MEMO:**



# GENERAL DESCRIPTION

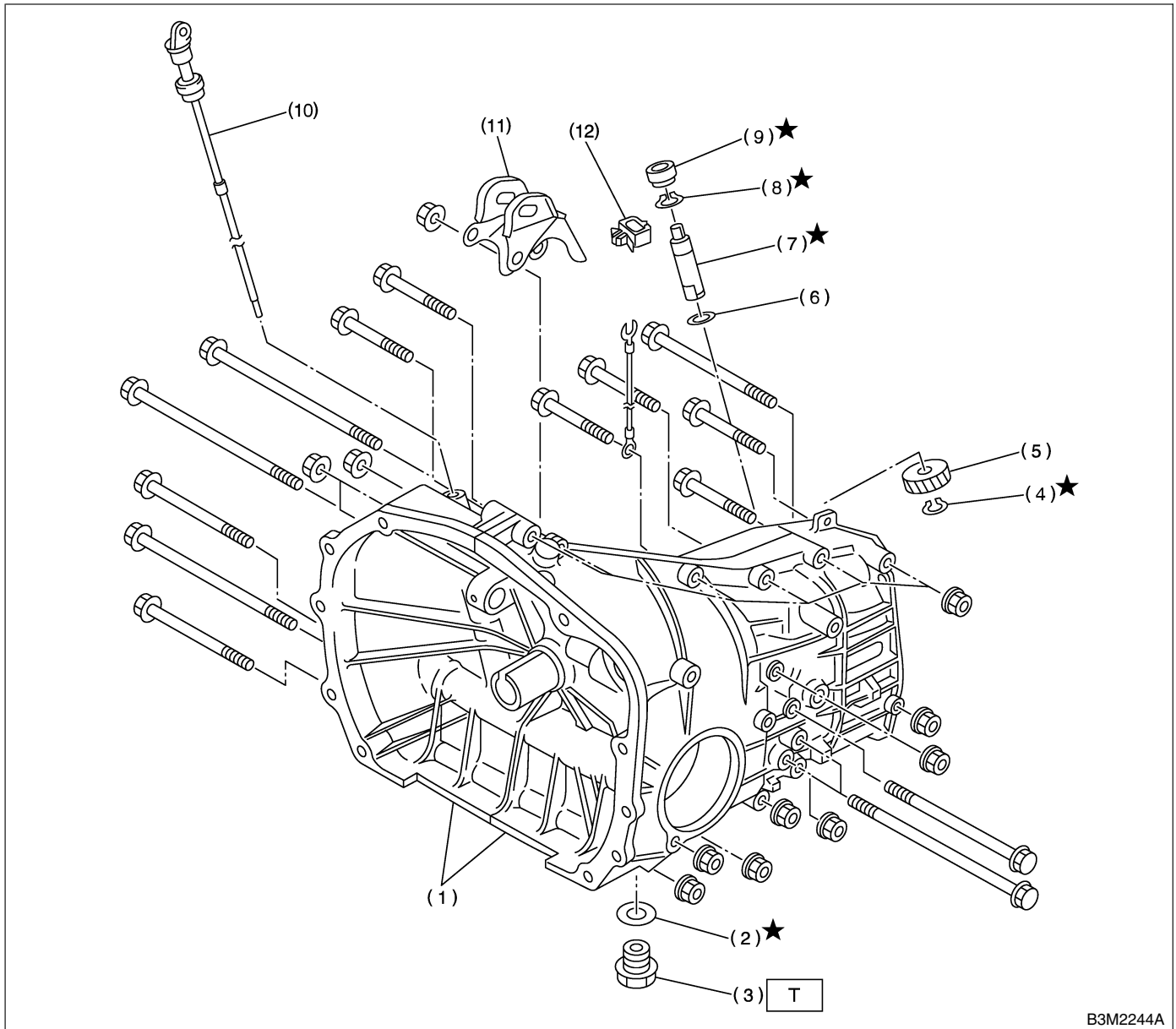
Manual Transmission and Differential

## B: COMPONENT

S503001A05

### 1. TRANSMISSION CASE

S503001A0501



B3M2244A

# GENERAL DESCRIPTION

Manual Transmission and Differential

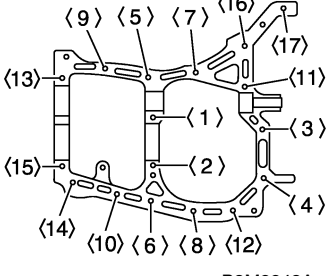
- (1) Transmission case ASSY
- (2) Gasket
- (3) Drain plug
- (4) Snap ring (Outer)
- (5) Speedometer driven gear

- (6) Washer
- (7) Speedometer shaft
- (8) Snap ring (Outer)
- (9) Oil seal
- (10) Oil level gauge

- (11) Pitching stopper bracket
- (12) Clamp

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

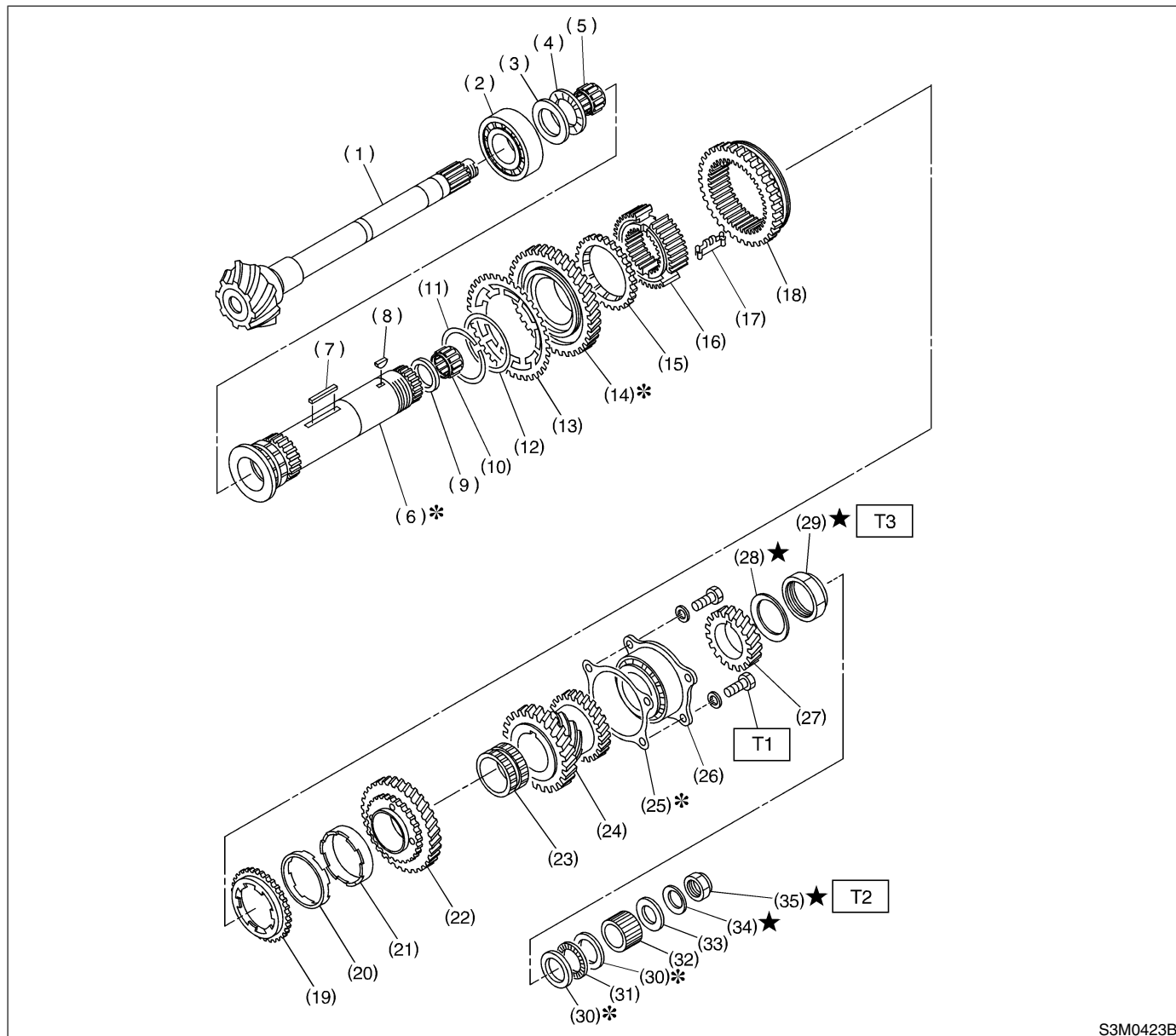
● **Transmission case tightening torque:**

 <p>B3M2243A</p>	Bolt No.	Bolt size	Tightening torque: N·m (kgf-m, ft-lb)
	<5> to <15>	8 mm	25 (2.5, 18.1)
	<1> to <4> <16>, <17>	10 mm	39 (4.0, 28.9)

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 2. DRIVE PINION ASSEMBLY S503001A0502



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 bushing	
(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)**

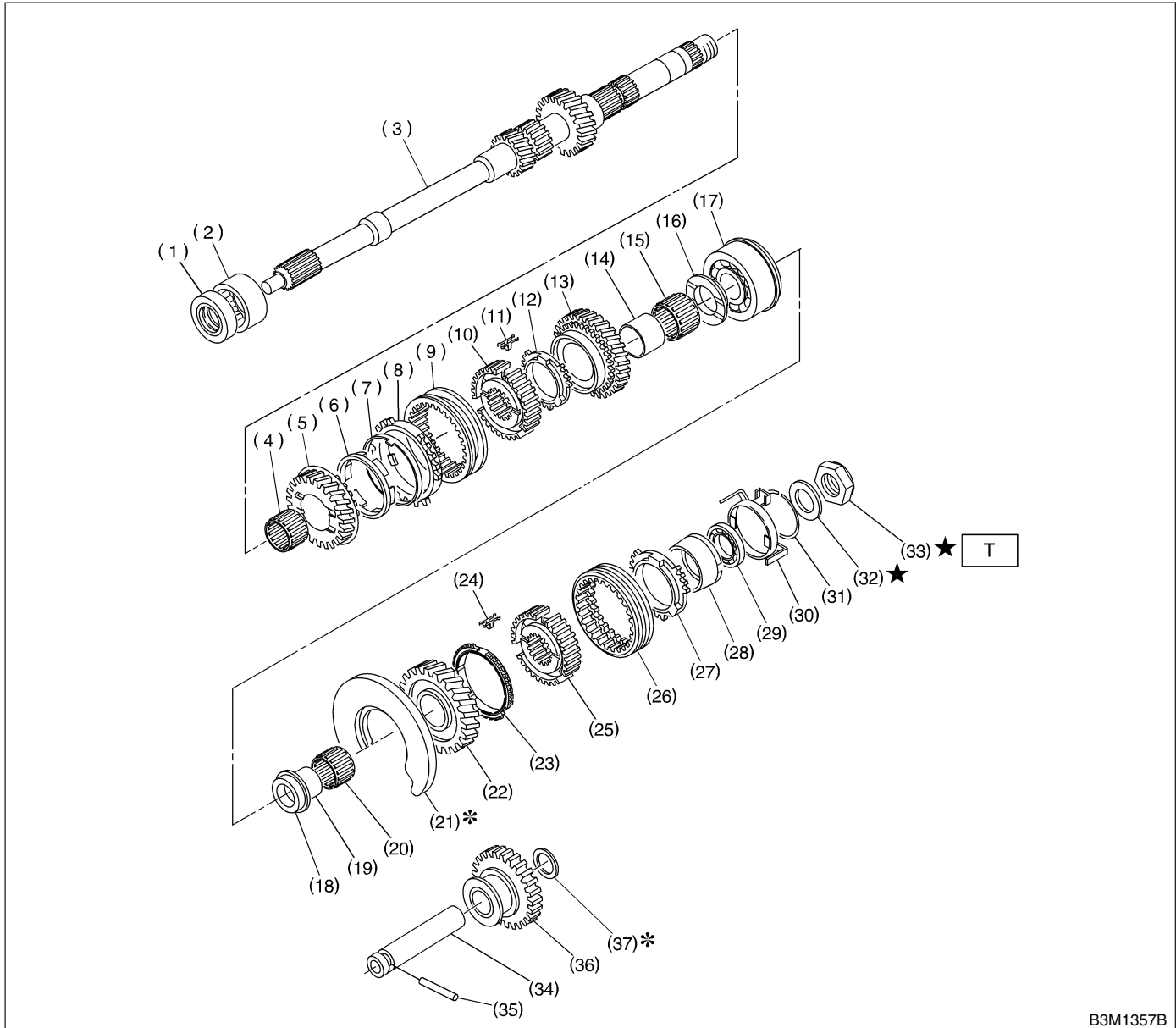
**T1: 29 (3.0, 21.7)**

**T2: 118 (12.0, 86.8)**

**T3: 265 (27, 195)**

## 3. MAIN SHAFT ASSEMBLY

S502001A0503



B3M1357B

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

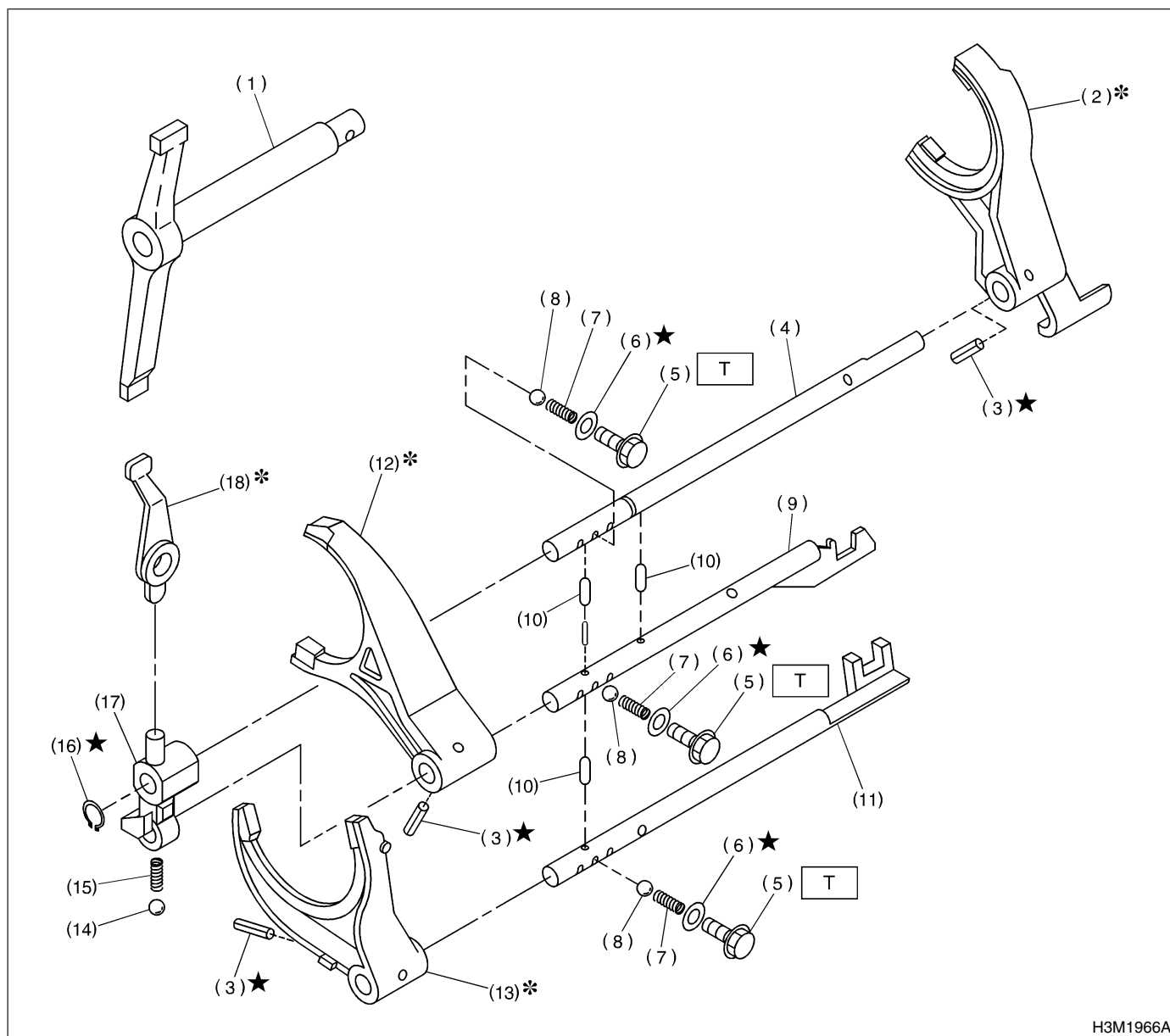
**Tightening torque: N·m (kgf-m, ft-lb)**  
**T: 118 (12.0, 86.8)**

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 4. SHIFTER FORK AND SHIFTER ROD

S503001A0504



H3M1966A

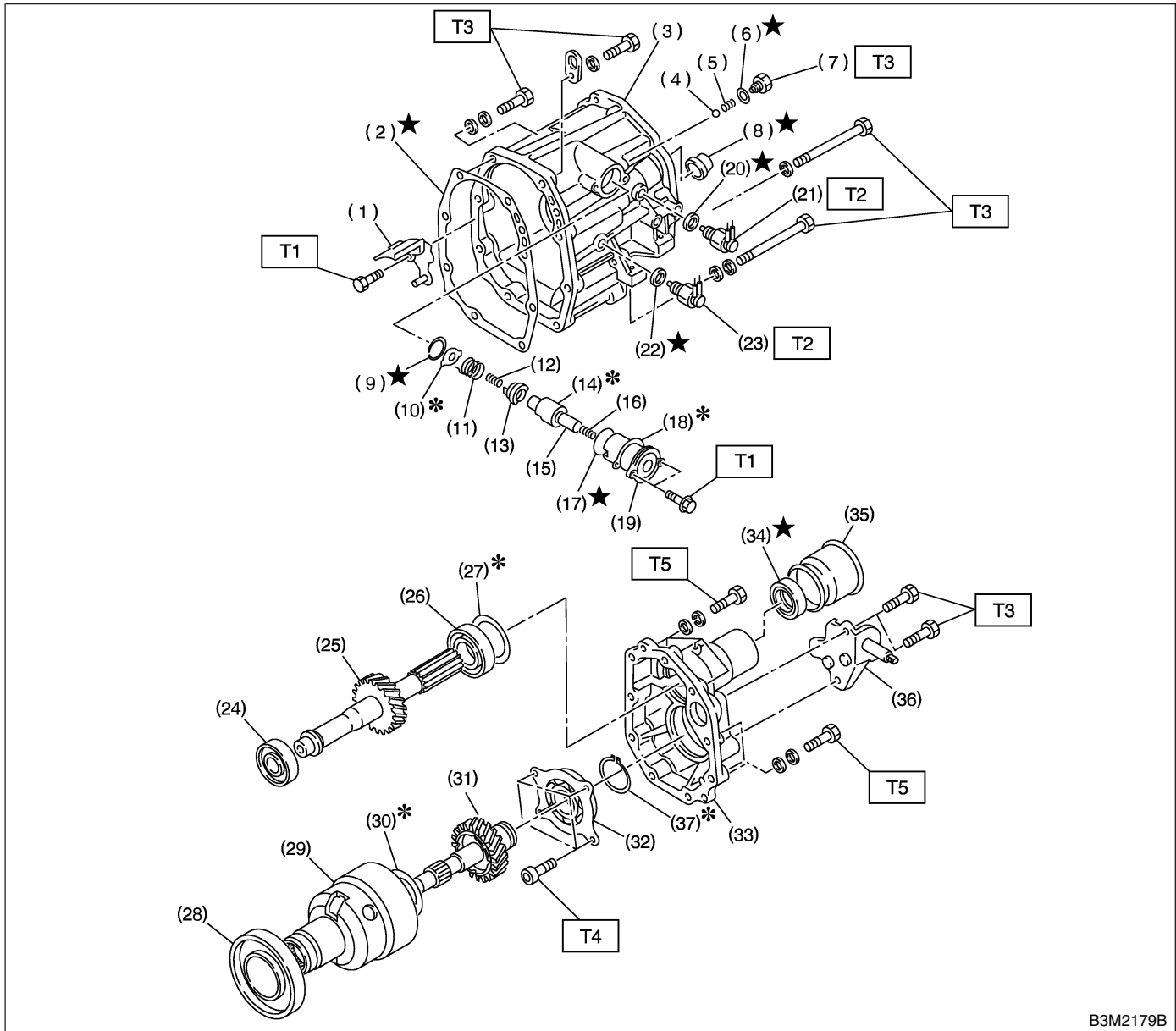
- |                          |                           |
|--------------------------|---------------------------|
| (1) Shifter arm          | (9) 3rd-4th fork rod      |
| (2) 5th shifter fork     | (10) Interlock plunger    |
| (3) Straight pin         | (11) 1st-2nd fork rod     |
| (4) Reverse 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)**

## 5. TRANSFER CASE AND EXTENSION

S503001A0505



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           |
| (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: 8.8 (0.9, 6.5)**

**T3: 10 (1.0, 7.2)**

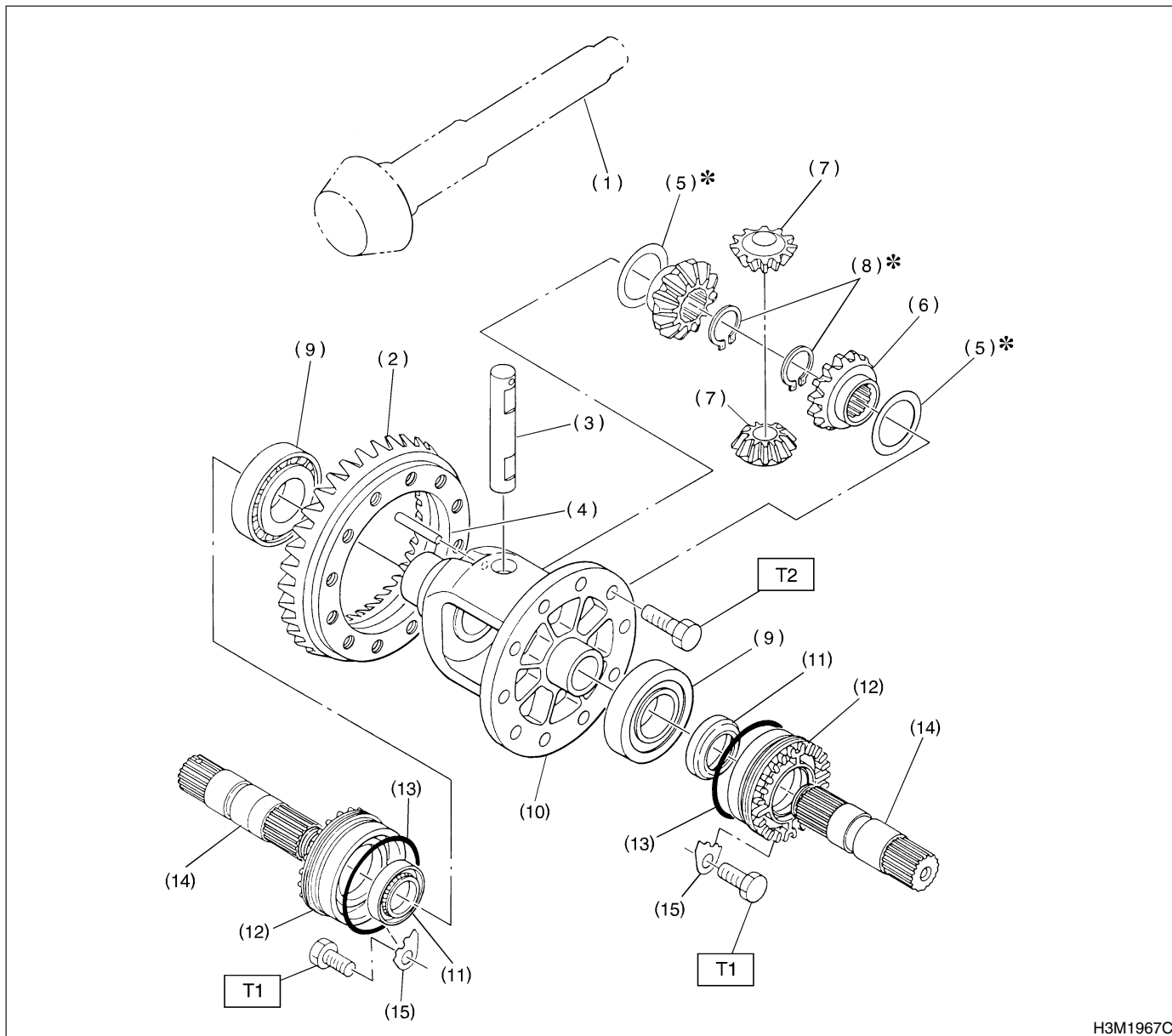
**T4: 25 (2.5, 18.1)**

**T5: 40 (4.1, 29.7)**

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 6. FRONT DIFFERENTIAL S503001A0506



- (1) Drive pinion shaft
- (2) Hypoid driven gear
- (3) Pinion shaft
- (4) Straight pin
- (5) Washer
- (6) Differential bevel gear
- (7) Differential bevel pinion

- (8) Snap ring (Outer)
- (9) Roller bearing
- (10) Differential case
- (11) Oil seal
- (12) Differential side retainer
- (13) O-ring
- (14) Axle drive shaft

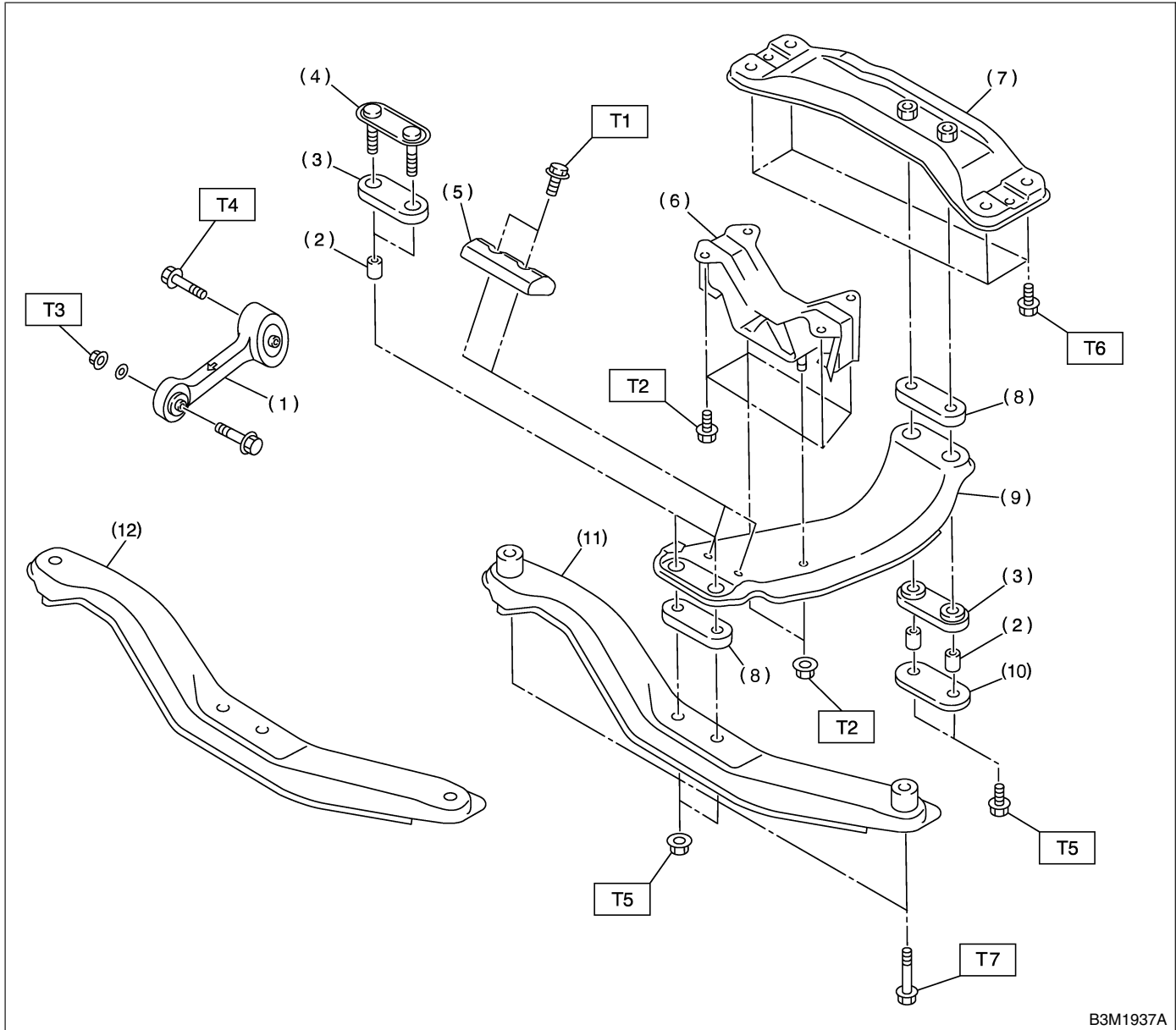
- (15) Retainer lock plate

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

**T1: 25 (2.5, 18.1)**

**T2: 62 (6.3, 45.6)**

## 7. TRANSMISSION MOUNTING SS03001A0507



B3M1937A

- |                                 |   |
|---------------------------------|---|
| (1) Pitching stopper            | (9) Center crossmember                        |
| (2) Spacer                      | (10) Rear plate                               |
| (3) Cushion C                   | (11) Front crossmember (OUTBACK model)        |
| (4) Front plate                 | (12) Front crossmember (Except OUTBACK model) |
| (5) Damper (Outback model only) |   |
| (6) Rear cushion rubber         |   |
| (7) Rear crossmember            |   |
| (8) Cushion D                   |   |

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

**T1: 7.5 (0.76, 5.5)**

**T2: 35 (3.6, 26)**

**T3: 50 (5.1, 37)**

**T4: 58 (5.9, 43)**

**T5: 70 (7.1, 51)**

**T6: 75 (7.6, 55)**

**T7: 140 (14.3, 103)**



## GENERAL DESCRIPTION

Manual Transmission and Differential

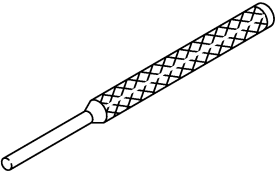
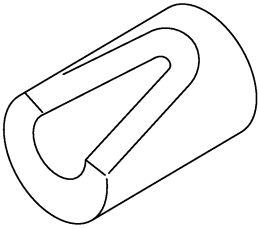
### C: CAUTION S503001A03

- 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.

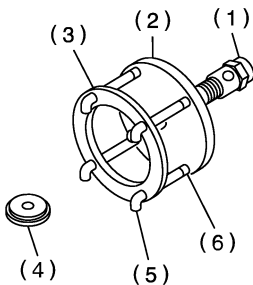
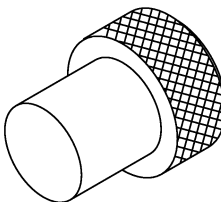
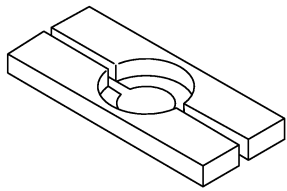
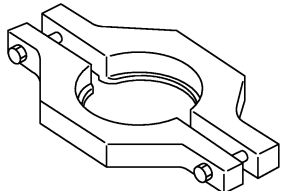
### D: PREPARATION TOOL S503001A17

#### 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.

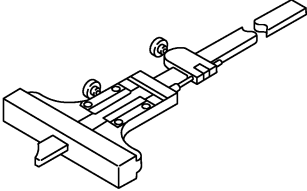
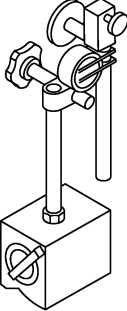
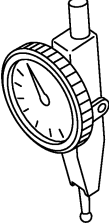
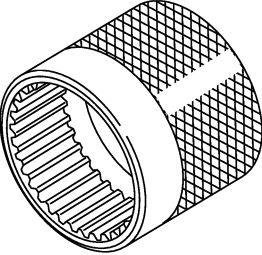
# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B3M1940A</p>	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)
 <p>B3M1941</p>	399780104	WEIGHT	Used for measuring preload on roller bearing.
 <p>B3M1942</p>	498077000	5TH DRIVEN GEAR REMOVER	Used for removing roller bearing of drive pinion shaft.
 <p>B3M1943</p>	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.

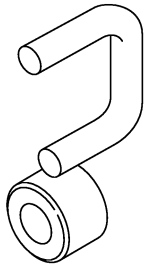
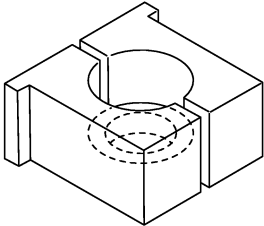
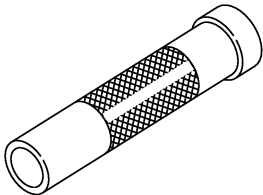
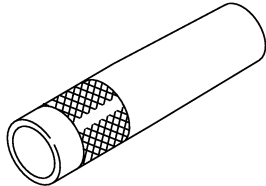
# GENERAL DESCRIPTION

## Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B3M1944</p>	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 <p>B3M1945</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> <li>Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>Used with DIAL GAUGE (498247100).</li> </ul>
 <p>B3M1946</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> <li>Used for measuring backlash between side gear and pinion, and hypoid gear.</li> <li>Used with MAGNET BASE (498247001).</li> </ul>
 <p>B3M1947</p>	498427100	STOPPER	Used for securing the drive pinion shaft assembly and driven gear assembly when removing the drive pinion shaft assembly lock nut.

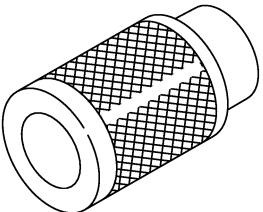
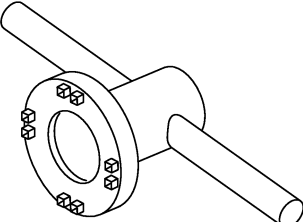
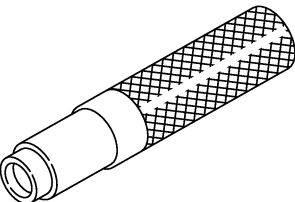
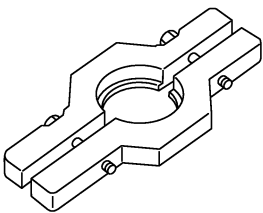
# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B3M1948</p>	498787100	MAIN SHAFT STOP- PER	Used for removing and installing transmission main shaft lock nut.
 <p>B3M1949</p>	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.
 <p>B3M1950</p>	499277100	BUSHING 1-2 INSTALLER	<ul style="list-style-type: none"> <li>• Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bushing.</li> <li>• Used for installing roller bearing outer races to differential case.</li> </ul>
 <p>B3M1951</p>	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings, and 5th driven gear onto the driven shaft.

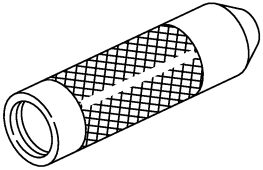
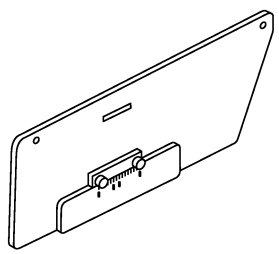
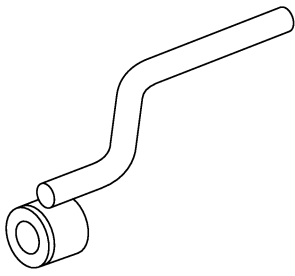
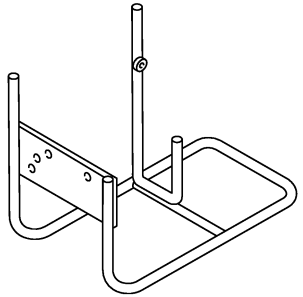
# GENERAL DESCRIPTION

## Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1952	499757002	SNAP RING PRESS	Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17).
 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.

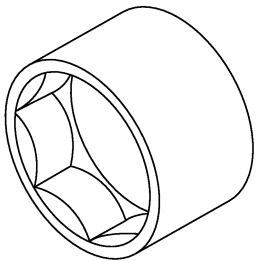
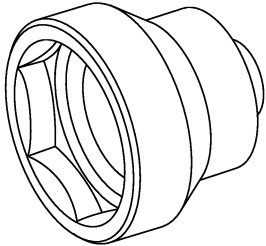
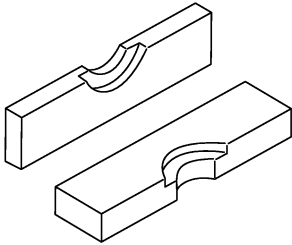
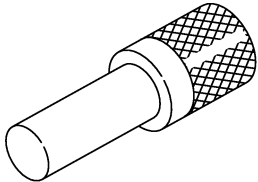
# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B3M1956</p>	499877000	RACE 4-5 INSTALLER	<ul style="list-style-type: none"> <li>Used for installing 4th needle bearing race and ball bearing onto transmission main shaft.</li> <li>Used with REMOVER (899714110).</li> </ul>
 <p>B3M1957</p>	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 <p>B3M1958</p>	499927100	HANDLE	Used for fitting transmission main shaft.
 <p>B3M1959</p>	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.

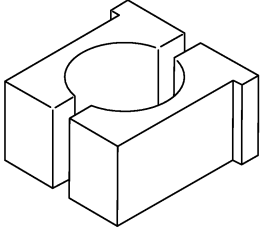
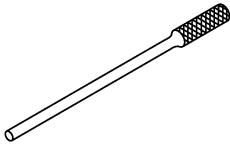
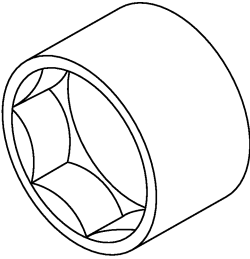
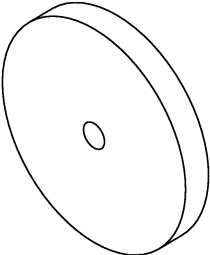
# GENERAL DESCRIPTION

## Manual Transmission and Differential

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

# GENERAL DESCRIPTION

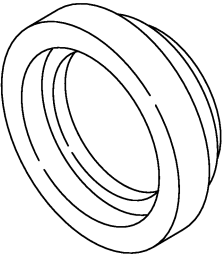
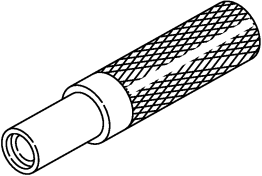
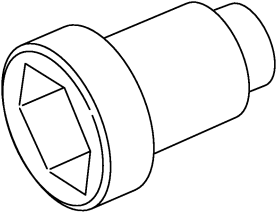
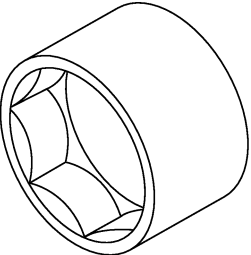
Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B3M1964</p>	899884100	HOLDER	Used for tightening lock nut on sleeve.
 <p>B3M1965</p>	899904100	REMOVER	Used for removing and installing straight pin.
 <p>B3M1966</p>	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.
 <p>B3M1967</p>	398497701	ADAPTER	<ul style="list-style-type: none"> <li>Used for installing roller bearing onto differential case.</li> <li>Used with INSTALLER (499277100).</li> </ul>



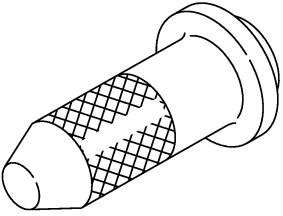
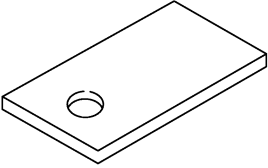
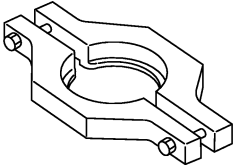
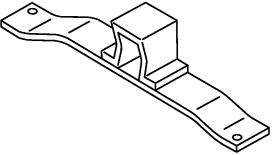
# GENERAL DESCRIPTION

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.

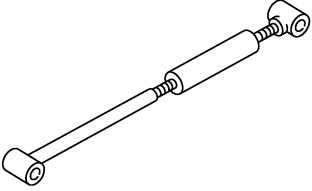
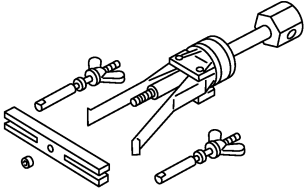
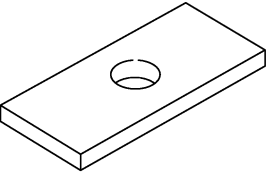
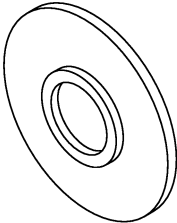
# GENERAL DESCRIPTION

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	<ul style="list-style-type: none"> <li>• Used for removing synchronizer cone of main shaft.</li> <li>• Used for removing 5th driven gear of drive pinion shaft.</li> </ul>
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.

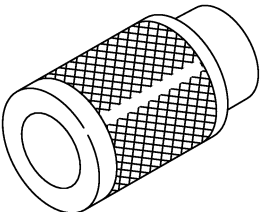
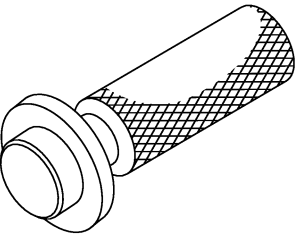
# GENERAL DESCRIPTION

## Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B3M1976</p>	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 <p>B3M1977</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> <li>Used for removing and installing extension case roller bearing.</li> <li>Used for removing front differential side retainer bearing cup.</li> </ul>
 <p>B3M1978</p>	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 <p>B3M1905</p>	38177700	INSTALLER	Used for installing bearing cone of transfer driven gear (transfer case side).

# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B3M1952</p>	499757002	INSTALLER	Used for installing bearing cone of transfer driven gear (extension case side).
 <p>B3M2197</p>	499797000	INSTALLER	Used for installing differential side retainer oil seal.

## 2. GENERAL PURPOSE TOOLS

S503001A1702

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

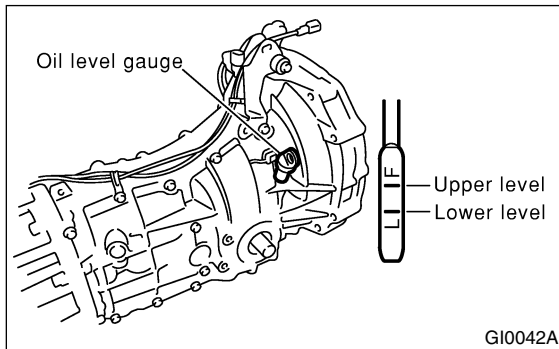
# TRANSMISSION GEAR OIL

Manual Transmission and Differential

## 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.



### B: REPLACEMENT S503219A20

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

#### CAUTION:

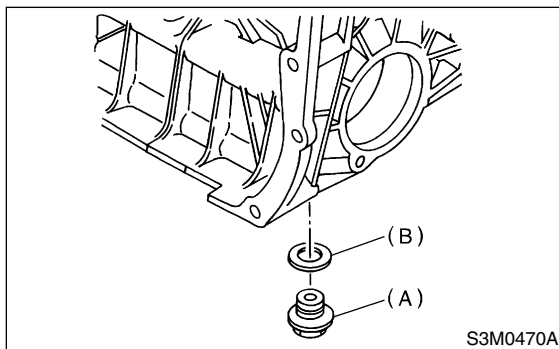
Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.

#### 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.

- 5) Pour gear oil into the gauge hole.

**Recommended gear oil:**

**Use GL-5 or equivalent.**

**Gear oil capacity:**

**3.5 ℓ (3.7 US qt, 3.1 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.

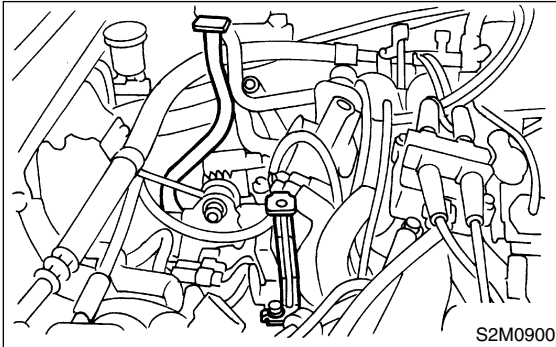
## 3. Manual Transmission Assembly

S503224

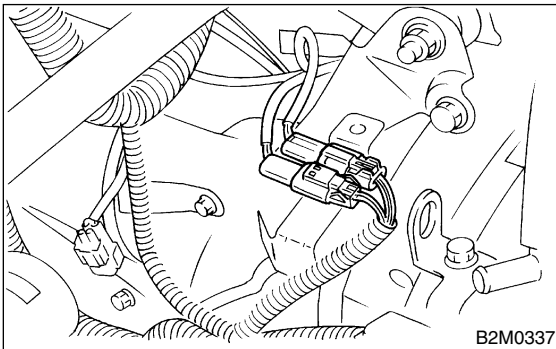
### A: REMOVAL

S503224A18

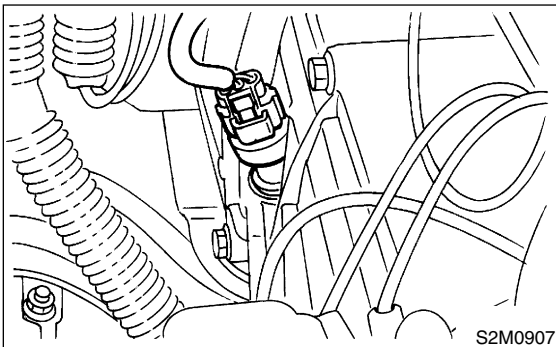
- 1) Set vehicle on a lift.
- 2) Open front hood fully, and support with stay.
- 3) Disconnect battery ground cable.
- 4) Move gear shift lever to "N", and release the parking brake.
- 5) Remove air intake duct and cleaner case. <Ref. to IN-7, REMOVAL, Air Intake Duct.> and <Ref. to IN-6, REMOVAL, Air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



- 7) Disconnect the following connectors.
  - (1) Neutral position switch connector
  - (2) Back-up light switch connector

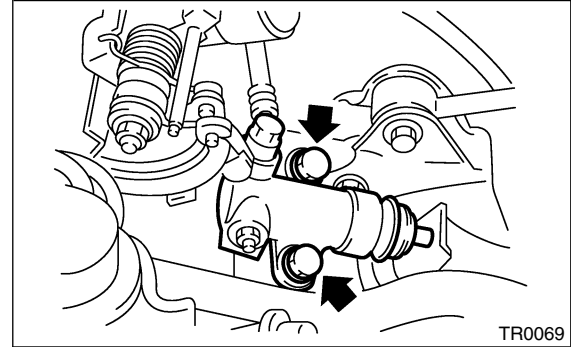


- (3) Vehicle speed sensor

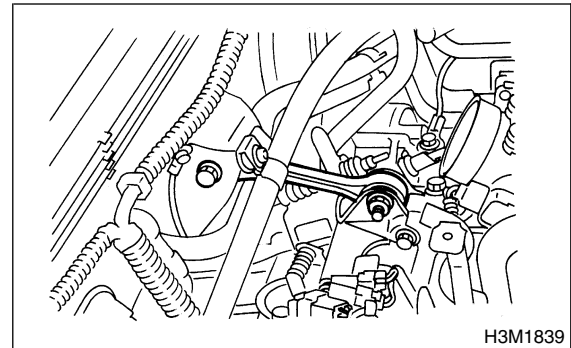


- (4) Transmission ground cable.
- 8) Remove starter. <Ref. to SC-7, REMOVAL, Starter.>

- 9) Remove operating cylinder from transmission.



- 10) Remove pitching stopper.

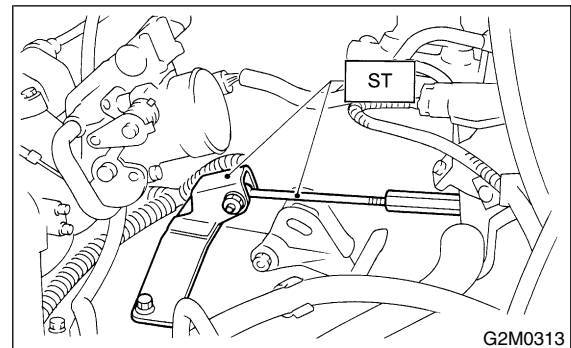


- 11) Set ST.

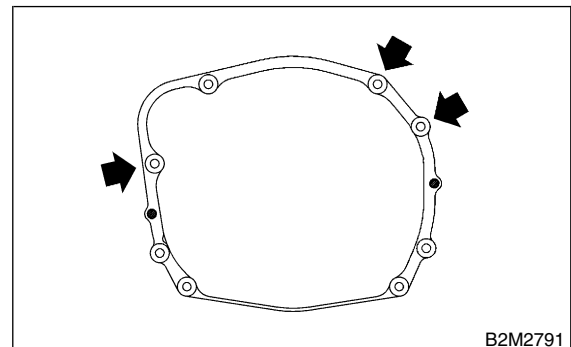
NOTE:

Part No. 41099AA010 is also available.

ST 41099AA020 ENGINE SUPPORT ASSY



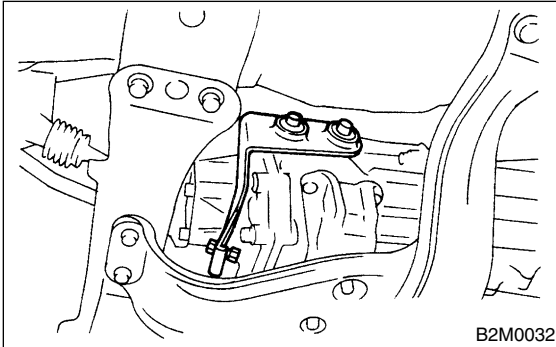
- 12) Remove bolt which holds right upper side of transmission to engine.



# MANUAL TRANSMISSION ASSEMBLY

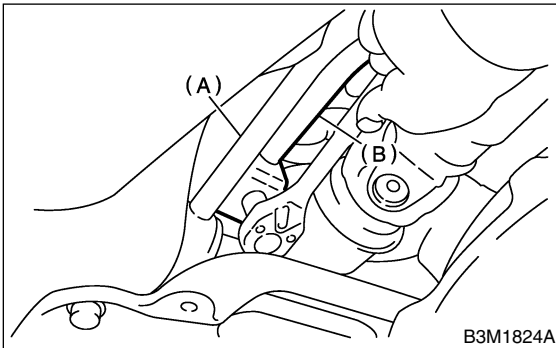
## Manual Transmission and Differential

- 13) Remove front and center exhaust pipes. <Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>
- 14) Remove rear exhaust pipe and muffler. <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-10, REMOVAL, Muffler.>
- 15) Remove heat shield cover.
- 16) Remove hanger bracket from right side of transmission.



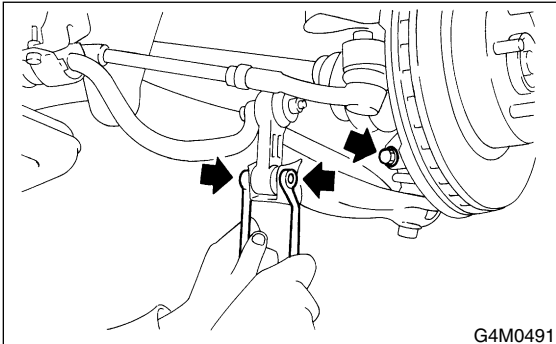
- 17) Remove propeller shaft. <Ref. to DS-13, REMOVAL, Propeller Shaft.>
- 18) Remove gear shift rod and stay from transmission.

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



- (A) Stay  
(B) Rod

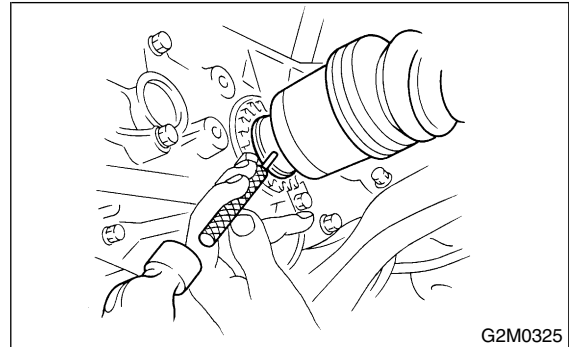
- 19) Disconnect stabilizer link from transverse link.
- 20) Remove bolt securing ball joint of transverse link to housing.



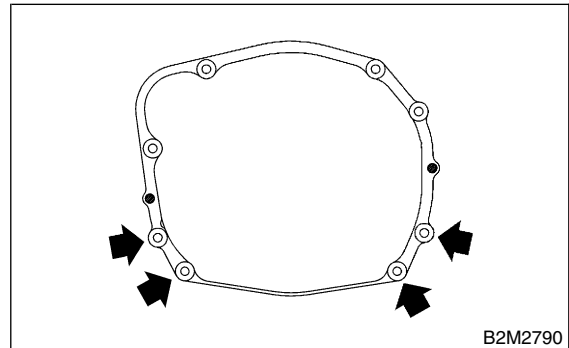
- 21) Remove spring pins and separate front drive shafts from each side of the transmission.

### NOTE:

Do not reuse spring pin. Prepare a new spring pin.



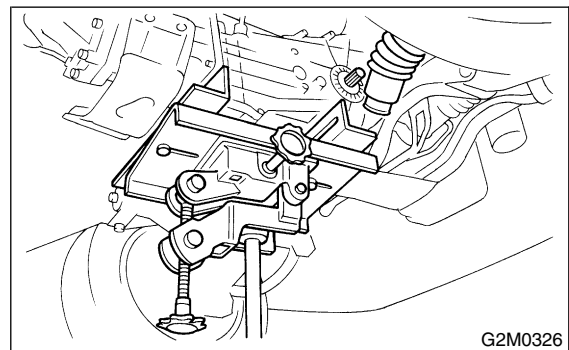
- 22) Remove nuts which hold lower side of transmission to engine.



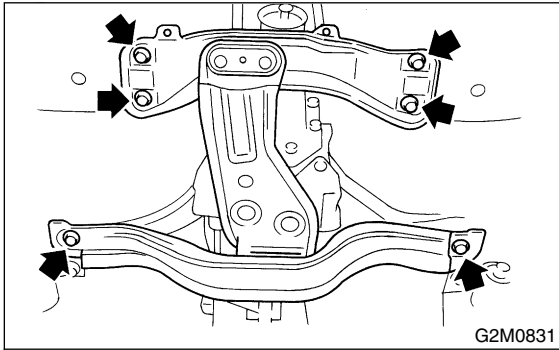
- 23) Place transmission jack under transmission.

### CAUTION:

- Always support transmission case with a transmission jack.
- Fix transmission with a band etc.



- 24) Remove transmission rear crossmember from vehicle.



- 25) Move transmission jack toward rear until main shaft is withdrawn from clutch cover and transmission.

- 26) Separate transmission assembly and rear cushion rubber.

## B: INSTALLATION

S503224A11

- 1) Install rear cushion rubber to transmission assembly.

### Tightening torque:

**35 N·m (3.6 kgf-m, 26 ft-lb)**

- 2) Install transmission onto engine.  
 (1) Gradually raise transmission with transmission jack.  
 (2) Engage them at splines.

### NOTE:

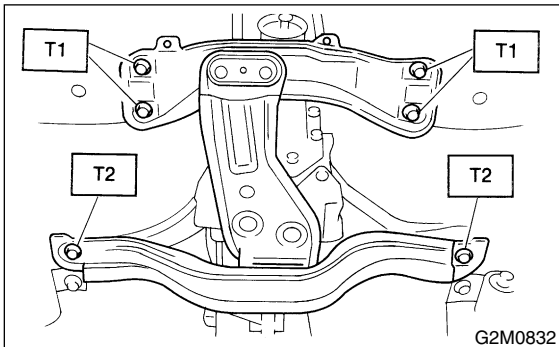
Be careful not to strike main shaft against clutch cover.

- 3) Install transmission rear crossmember.

### Tightening torque:

**T1: 75 N·m (7.6 kgf-m, 55 ft-lb)**

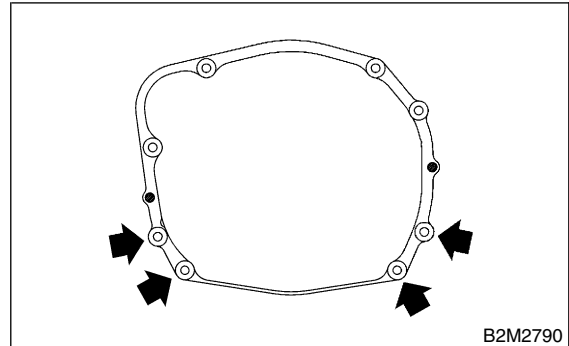
**T2: 140 N·m (14.3 kgf-m, 103 ft-lb)**



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

### Tightening torque:

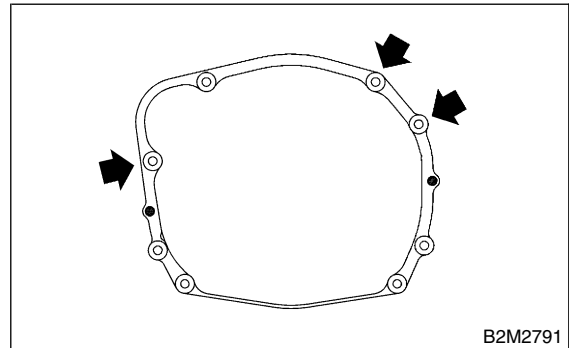
**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



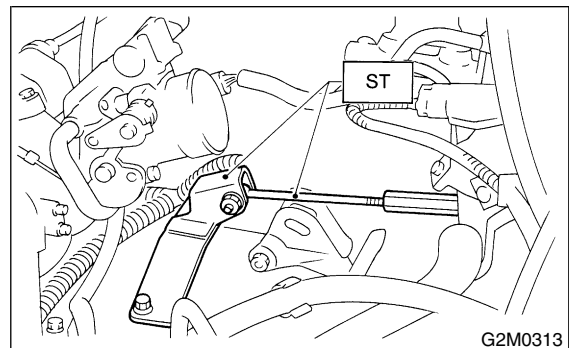
- 6) Connect engine and transmission.  
 (1) Install starter.  
 <Ref. to SC-7, INSTALLATION, Starter.>  
 (2) Tighten bolt which holds right upper side of transmission to engine.

### Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



- 7) Remove ST.





# MANUAL TRANSMISSION ASSEMBLY

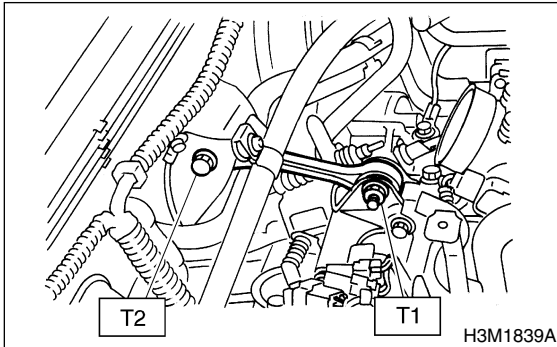
## Manual Transmission and Differential

8) Install pitching stopper.

### Tightening torque:

**T1: 50 N·m (5.1 kgf-m, 37 ft-lb)**

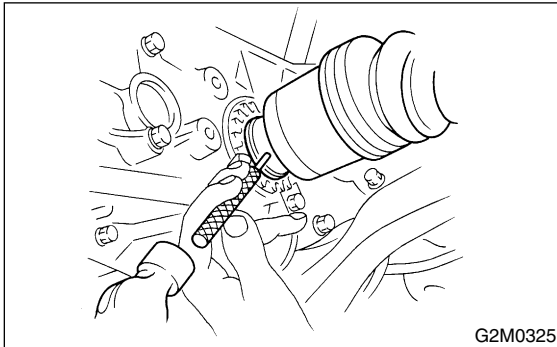
**T2: 58 N·m (5.9 kgf-m, 43 ft-lb)**



9) Lift-up the vehicle.

10) Install front drive shaft into transmission.

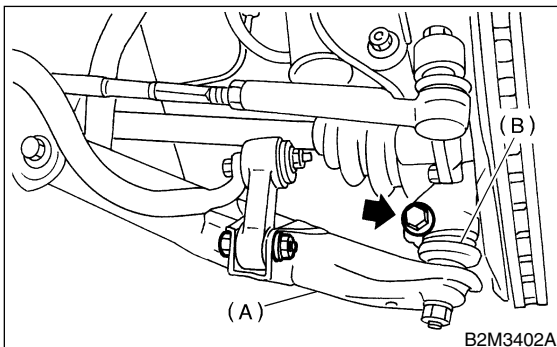
11) Drive new spring pin into chamfered hole of drive shaft.



12) 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)**

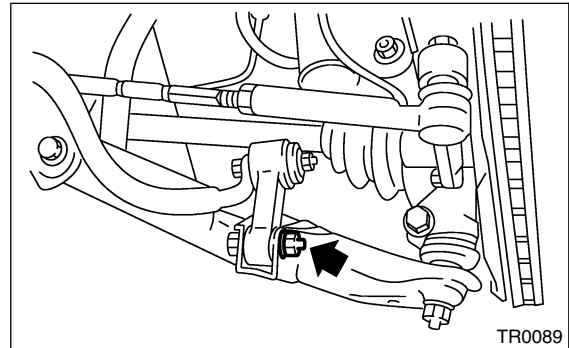


- (A) Transverse link
- (B) Ball joint

13) Install stabilizer link from transverse link.

### Tightening torque:

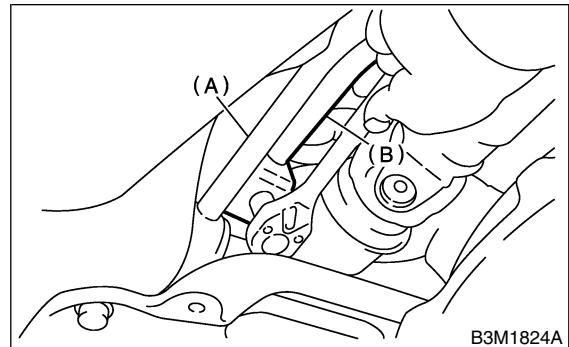
**30 N·m (3.1 kgf-m, 22.1 ft-lb)**



14) Connect rod to the joint.

### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

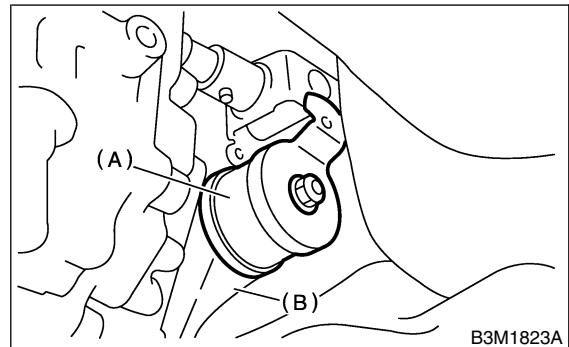


- (A) Joint
- (B) Rod

15) Connect stay to transmission bracket.

### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

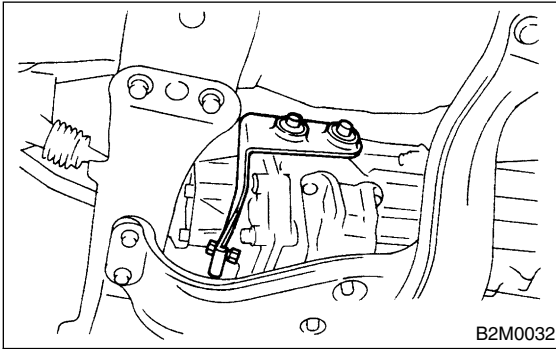


- (A) Stay
- (B) Transmission bracket

16) Install propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>

17) Install heat shield cover.

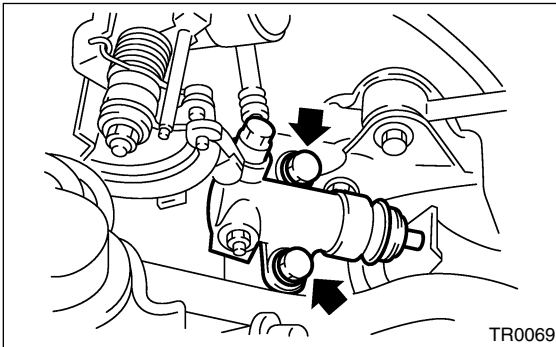
- 18) Install hanger bracket on right side of transmission.



- 19) Install rear exhaust pipe and muffler.  
<Ref. to EX-10, INSTALLATION, Muffler.> and  
<Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.>  
20) Install front exhaust pipe and center exhaust pipe.  
<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>  
21) Install under cover.  
22) Install operating cylinder.

**Tightening torque:**

**37 N·m (3.8 kgf-m, 27.5 ft-lb)**



- 23) 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  
24) Install air cleaner case stay.

**Tightening torque:**

**16 N·m (1.6 kgf-m, 11.6 ft-lb)**

- 25) Install air cleaner case and intake duct. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.> and <Ref. to IN-7, INSTALLATION, Air Intake Duct.>  
26) Connect battery ground cable.  
27) Pour gear oil and check the oil level. <Ref. to MT-26, Transmission Gear Oil.>  
28) Take off vehicle from lift arms.

# TRANSMISSION MOUNTING SYSTEM

Manual Transmission and Differential

## 4. Transmission Mounting System

S503233

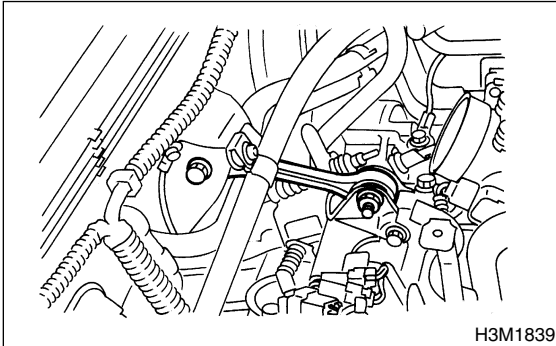
### A: REMOVAL

S503233A18

#### 1. PITCHING STOPPER

S503233A1801

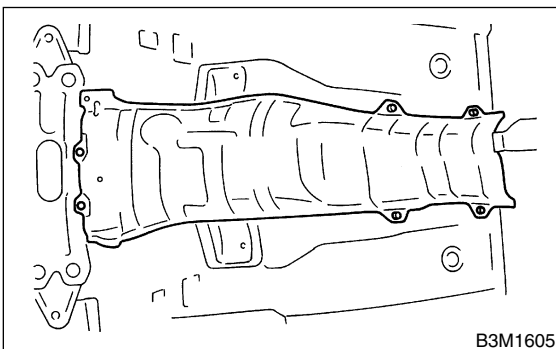
- 1) Disconnect battery ground cable.
- 2) Remove the cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
- 3) Remove the pitching stopper.



#### 2. CROSSMEMBER AND CUSHION RUBBER

S503233A1802

- 1) Disconnect battery ground cable.
- 2) Jack-up vehicle and support it with sturdy racks.
- 3) Remove the front, center, rear exhaust pipes and muffler.  
<Ref. to EX-5, REMOVAL, Front Exhaust Pipe.>,  
<Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.>  
and <Ref. to EX-10, REMOVAL, Muffler.>
- 4) Remove the heat shield cover.

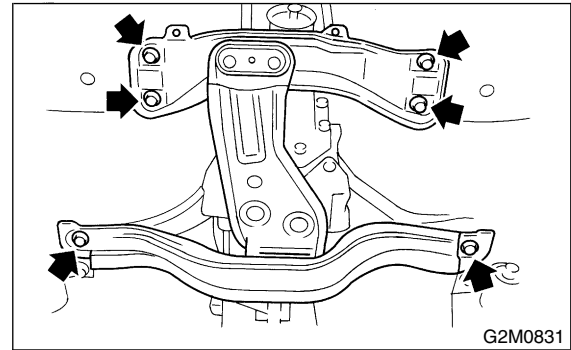


- 5) Set the transmission jack under the transmission body.

### CAUTION:

Always support transmission case with a transmission jack.

- 6) Remove the rear crossmember.



- 7) Remove the rear cushion rubber.

### B: INSTALLATION

S503233A11

#### 1. PITCHING STOPPER

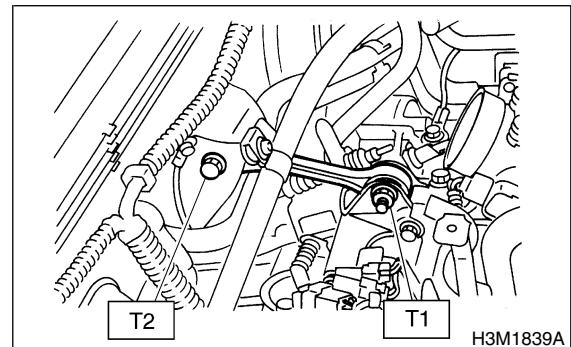
S503233A1101

- 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. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>
- 3) Connect battery ground cable.

## 2. CROSSMEMBER AND CUSHION RUBBER

S503233A1102

1) Install the rear cushion rubber.

**Tightening torque:**

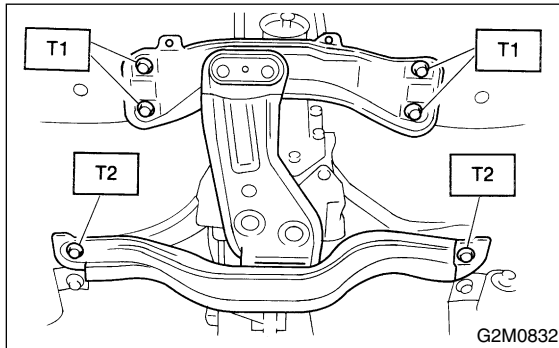
**35 N·m (3.6 kgf-m, 26 ft-lb)**

2) Install the crossmember.

**Tightening torque:**

**T1: 75 N·m (7.6 kgf-m, 55 ft-lb)**

**T2: 140 N·m (14.3 kgf-m, 103 ft-lb)**



3) Remove the transmission jack.

4) Install the heat shield cover.

5) Install the front, center, rear exhaust pipes and the muffler.

<Ref. to EX-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX-10, 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.

## 5. Oil Seal S503143

### A: INSPECTION S503143A10

Check oil seal portion for leakage. If leakage is found, replace the oil seal with new one.

### B: REPLACEMENT S503143A20

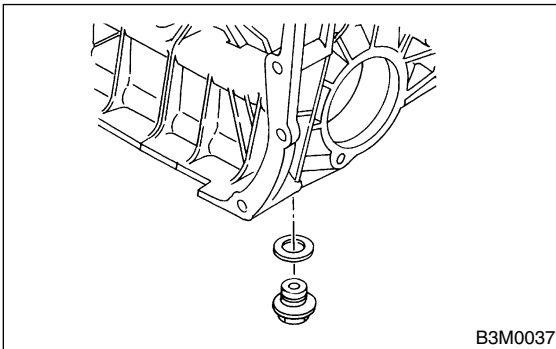
- 1) Clean transmission exterior.
- 2) Drain gear oil completely.

NOTE:

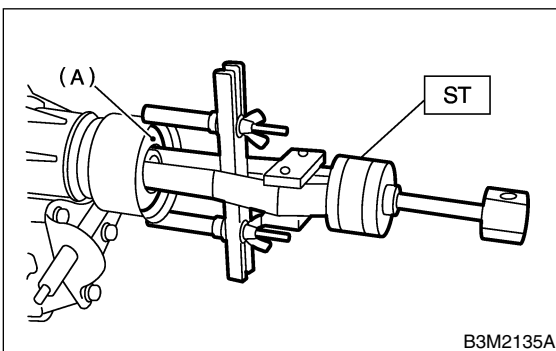
Tighten drain plug after draining gear oil.

**Tightening torque:**

**44 N·m (4.5 kgf-m, 32.5 ft-lb)**

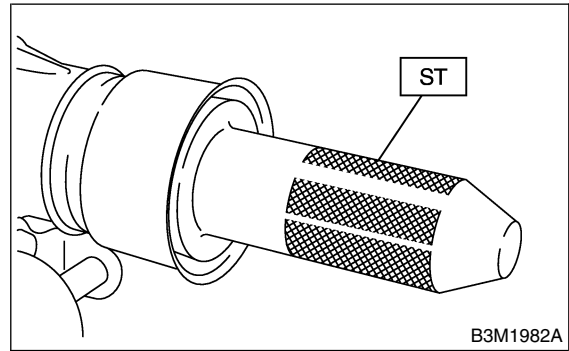


- 3) Remove rear exhaust pipe and muffler. <Ref. to EX-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX-10, REMOVAL, Muffler.>
- 4) Remove heat shield cover.
- 5) Remove propeller shaft. <Ref. to DS-13, REMOVAL, Propeller Shaft.>
- 6) Using ST, remove the oil seal.  
ST 398527700 PULLER ASSY



(A) Oil seal

- 7) Using ST, install the oil seal.  
ST 498057300 INSTALLER



- 8) Install the propeller shaft. <Ref. to DS-14, INSTALLATION, Propeller Shaft.>
- 9) Install the heat shield cover.
- 10) Install the rear exhaust pipe and muffler. <Ref. to EX-9, INSTALLATION, Muffler.> and <Ref. to EX-10, INSTALLATION, Rear Exhaust Pipe.>
- 11) Pour gear oil and check the oil level. <Ref. to MT-26, REPLACEMENT, Transmission Gear Oil.>

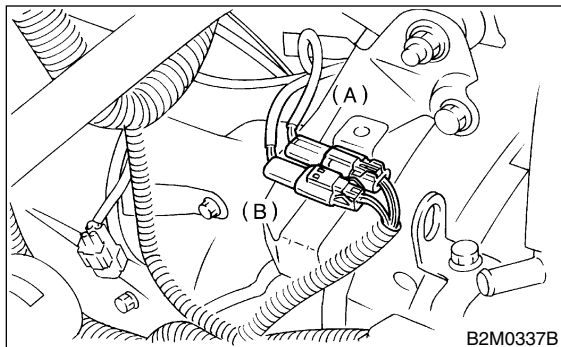
## 6. Switches and Harness

S503232

### A: REMOVAL

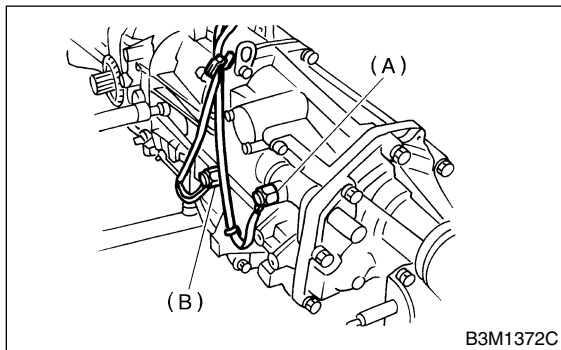
S503232A18

- 1) Disconnect battery ground cable.
- 2) Remove air intake duct and cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
- 3) Disconnect connector back-up light switch and neutral position switch.



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

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



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

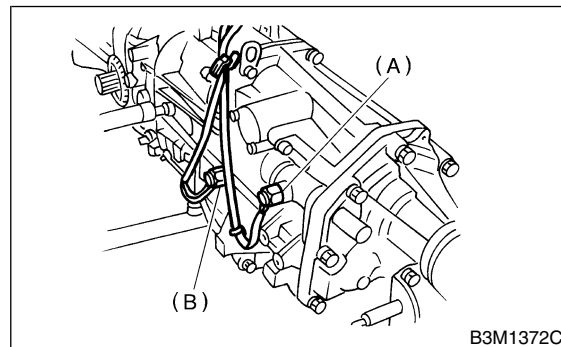
### B: INSTALLATION

S503232A11

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

- 2) Connect connector of back-up light switch and neutral position switch.
- 3) Install air cleaner case. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>
- 4) Connect battery ground cable.

## C: INSPECTION S503232A10

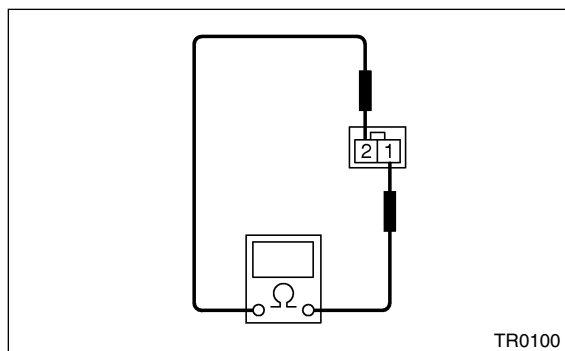
### 1. BACK-UP LIGHT SWITCH S503232A1001

Inspect the back-up light switch. <Ref. to LI-6, INSPECTION, Back-up Light System.>

### 2. NEUTRAL POSITION SWITCH S503232A1002

- 1) Turn ignition switch to OFF.
- 2) Disconnect neutral position switch connector.
- 3) Measure resistance between neutral position switch terminals.

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 $\Omega$
Other positions		More than 1 M $\Omega$

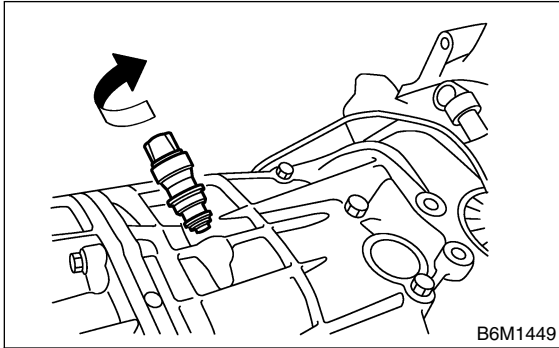


- 4) Replace defective parts.

## 7. Vehicle Speed Sensor S503231

### A: REMOVAL S503231A18

- 1) Disconnect battery ground cable.
- 2) Lift-up the vehicle.
- 3) Remove front and center exhaust pipes.
- 4) Disconnect connector from vehicle speed sensor.
- 5) 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.
- 5) Lower the vehicle.
- 6) Connect battery ground cable.

### C: INSPECTION S503231A10

Inspect the vehicle speed sensor. <Ref. to EN-252, DTC P0500 — VEHICLE SPEED SENSOR MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>



## 8. Preparation for Overhaul S503091

### A: PROCEDURE S503091E45

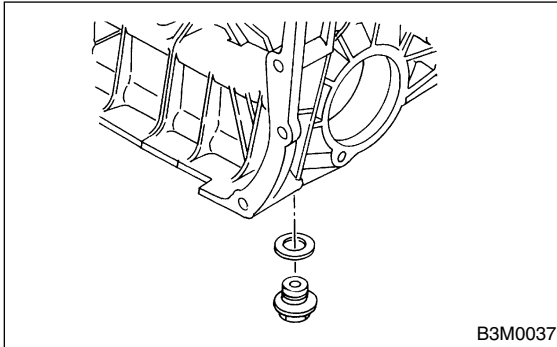
- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove drain plug to drain oil. After draining, retighten it as before.

NOTE:

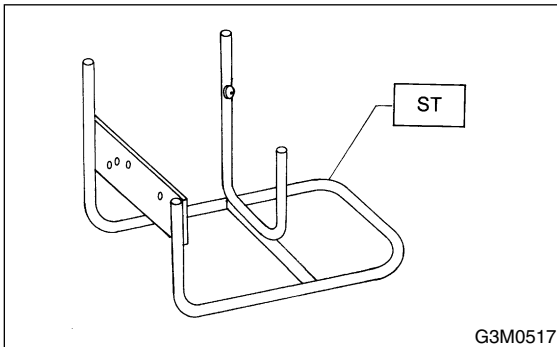
Do not reuse gasket. Prepare a new gasket.

**Tightening torque:**

**44 N·m (4.5 kgf-m, 32.5 ft-lb)**



- 3) Attach transmission to ST.  
ST 499937100 TRANSMISSION STAND SET



- 4) Rotating parts should be coated with oil prior to assembly.
- 5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
- 6) Gaskets, lock washers and lock nut must be replaced with new ones.
- 7) Liquid gasket should be used where specified to prevent leakage.

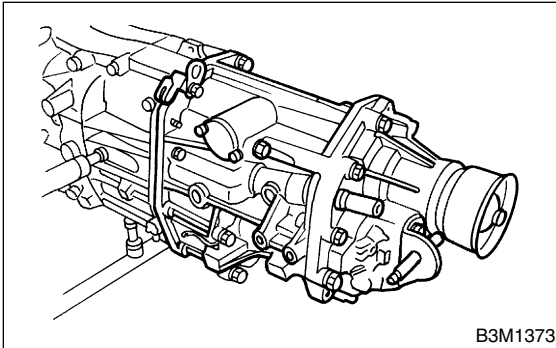
## 9. Transfer Case and Extension Case Assembly

S503561

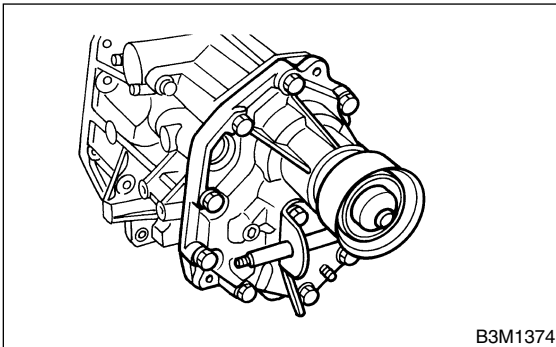
### A: REMOVAL

S503561A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-35, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly.



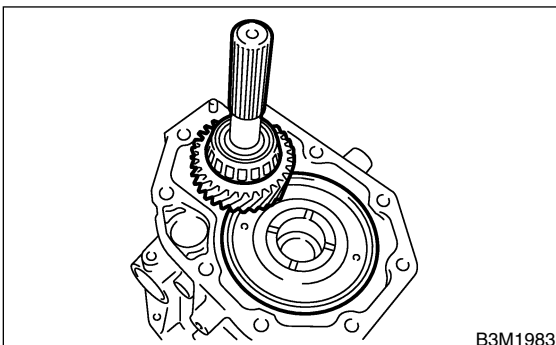
- 4) Remove shifter arm.
- 5) Remove extension case assembly.



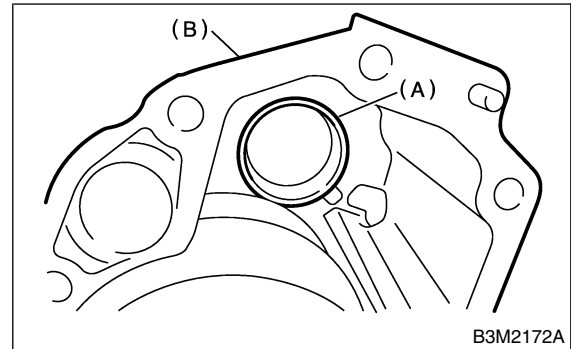
### B: INSTALLATION

S503561A11

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

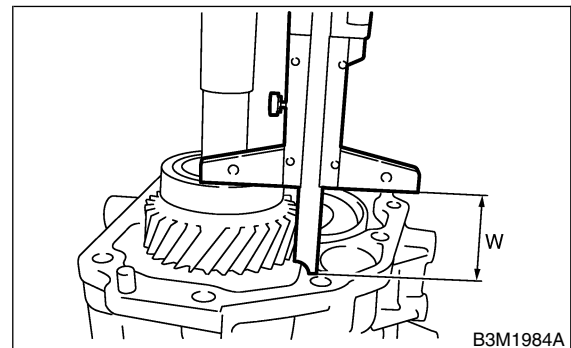


- 2) Remove bearing cone from the extension case assembly, and install to taper roller bearing of the transfer driven gear.



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

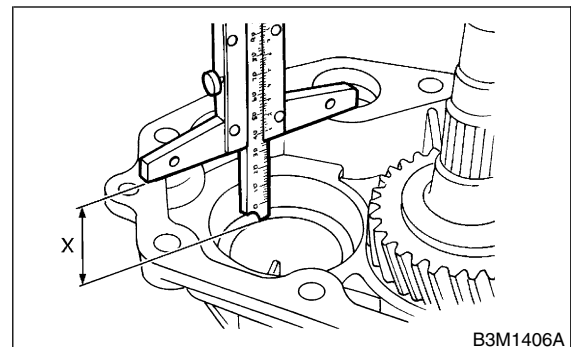
- 3) While pressing the bearing cone horizontally, turn the driven shaft ten rotations.
- 4) Measure height "W" between transfer case and taper roller bearing on the transfer driven gear.



- 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

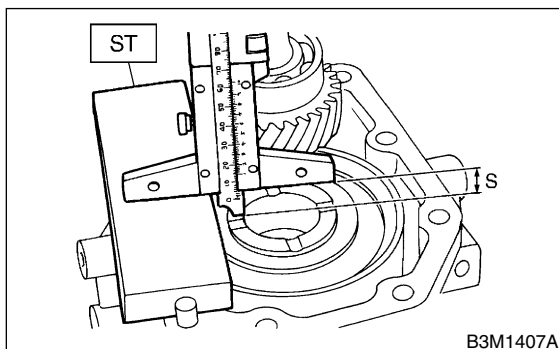
Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	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 into extension case.

9) Install bearing cone into extension case.

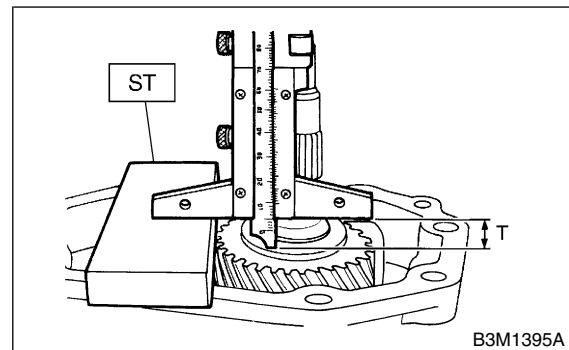
10) Measure depth "S" between transfer case and center differential.

ST 398643600 GAUGE



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

ST 398643600 GAUGE



12) Calculate space "U" using the following equation:  $U = S + T - 30 \text{ mm (1.8 in)}$  [Thickness of ST]

13) Select suitable washer in the following table:

**Standard clearance:**

**0.15 — 0.35 mm (0.0059 — 0.0138 in)**

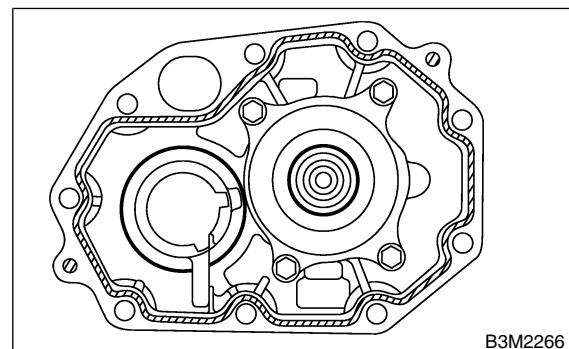
Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

14) Fit thrust washer on center differential.

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

**Liquid gasket:**

**THREE BOND 1215**



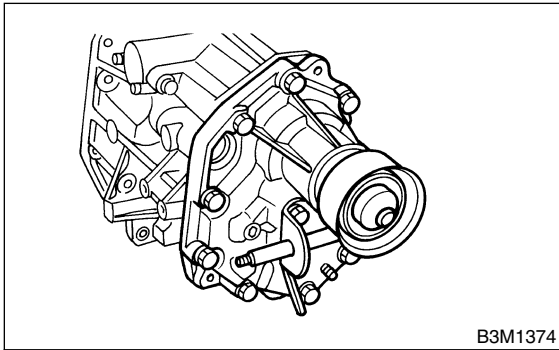
# TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

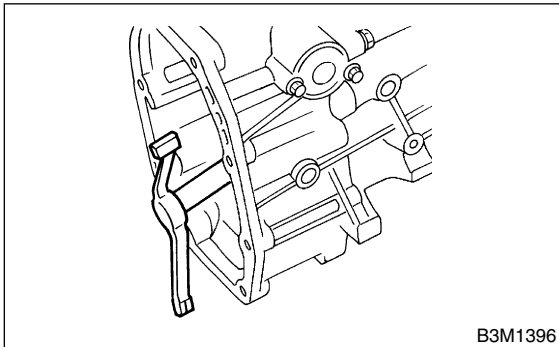
16) Install extension assembly into transfer case.

**Tightening torque:**

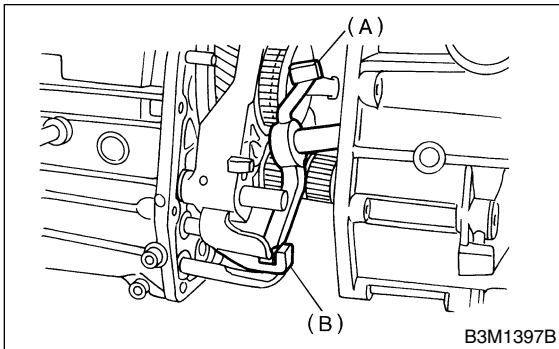
**40 N·m (4.1 kgf-m, 29.7 ft-lb)**



17) Install shifter arm to transfer case.



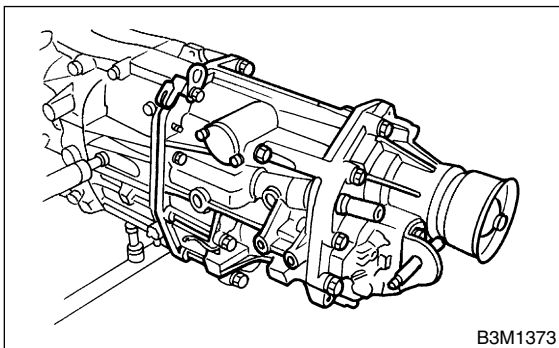
18) Hang the shifter arm on the 3rd-4th fork rod.



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

**Tighting torque:**

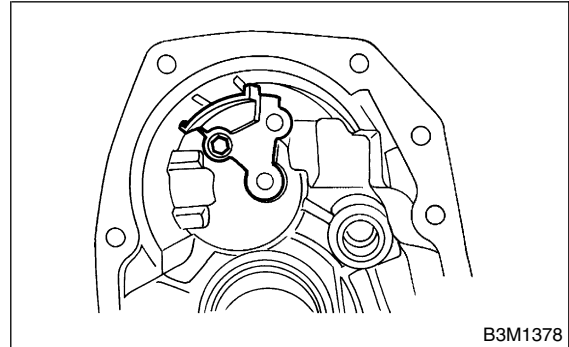
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



## C: DISASSEMBLY S503561A06

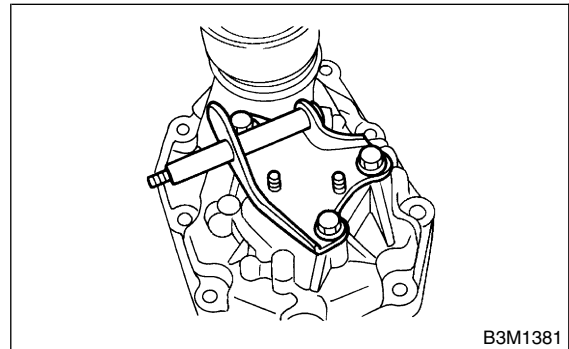
### 1. TRANSFER CASE S503561A0601

- 1) Remove reverse check assembly. <Ref. to MT-48, REMOVAL, Reverse Check Sleeve.>
- 2) Remove oil guide.



### 2. EXTENSION CASE S503561A0602

- 1) Remove transfer drive gear assembly. <Ref. to MT-43, REMOVAL, Transfer Drive Gear.>
- 2) Remove shift bracket.



- 3) Remove oil seal from extension case. <Ref. to MT-34, 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-34, Oil Seal.>

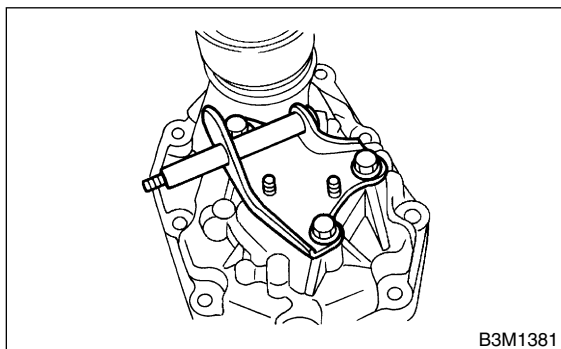
#### CAUTION:

Use new oil seal.

- 2) Install shift bracket to extension case.

#### Tightening torque:

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



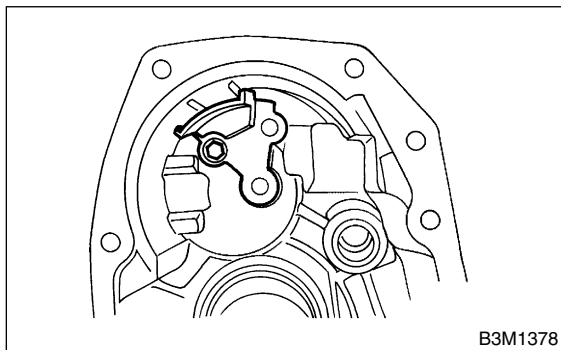
- 3) Install transfer drive gear to extension case.  
<Ref. to MT-43, INSTALLATION, Transfer Drive Gear.>

### 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-48, INSTALLATION, Reverse Check Sleeve.>

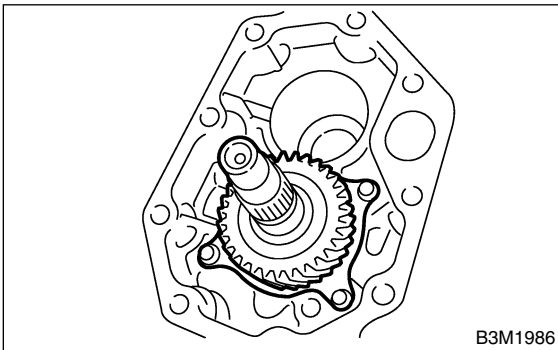
## 10. Transfer Drive Gear

S503229

### A: REMOVAL

S503229A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-35, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly.
- 5) Remove transfer driven gear.
- 6) Remove transfer drive gear.



B3M1986

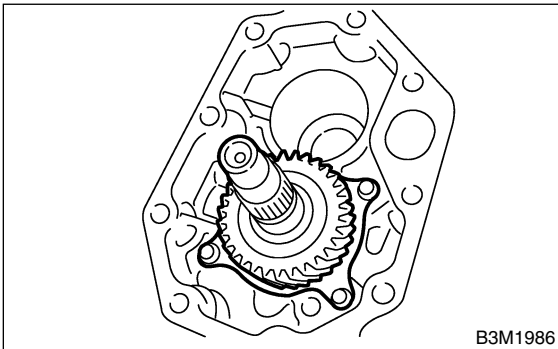
### B: INSTALLATION

S503229A11

- 1) Install transfer drive gear.

#### Tightening torque:

**26 N·m (2.7 kgf-m, 20 ft-lb)**



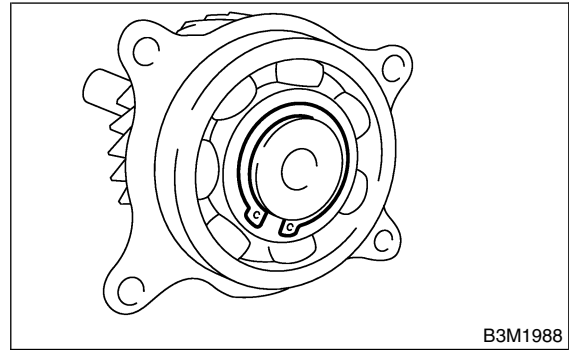
B3M1986

- 2) Install the extension case assembly.
- 3) Install transfer driven gear.
- 4) Install transfer case and extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install back-up light switch and neutral position switch. <Ref. to MT-35, INSTALLATION, Switches and Harness.>
- 6) Install the manual transmission assembly from vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY

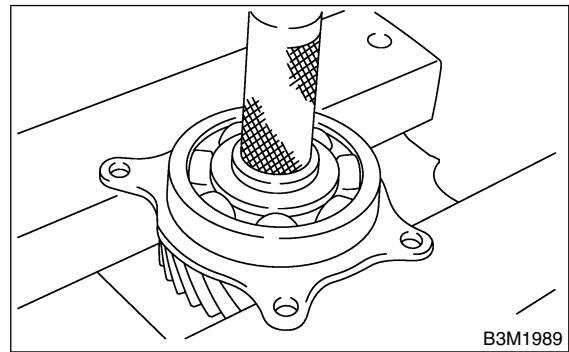
S503229A06

- 1) Remove snap ring.



B3M1988

- 2) Remove ball bearing.



B3M1989

### D: ASSEMBLY

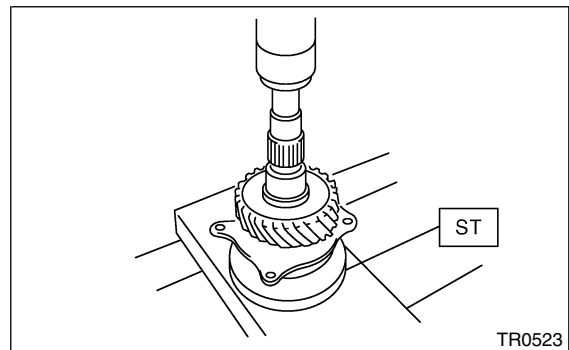
S503229A02

- 1) Set the ST to inner race of bearing and install to drive shaft.

ST 39817700 INSTALLER

#### CAUTION:

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



TR0523

- 2) Install snap ring on transfer drive shaft.
- 3) Inspect clearance between snap ring and inner race of ball bearing. <Ref to MT-44, INSPECTION, Transfer Drive Gear.>

## E: INSPECTION

S503229A10

### 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

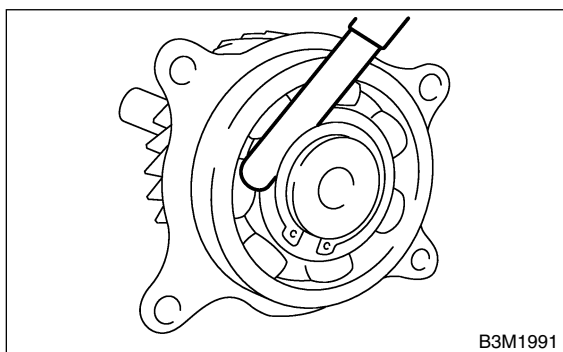
Replace drive gear in the following cases:

- 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)**



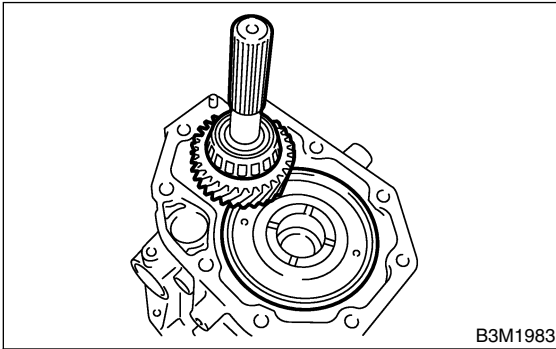
If the measurement is not within the specification, select suitable snap ring.

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

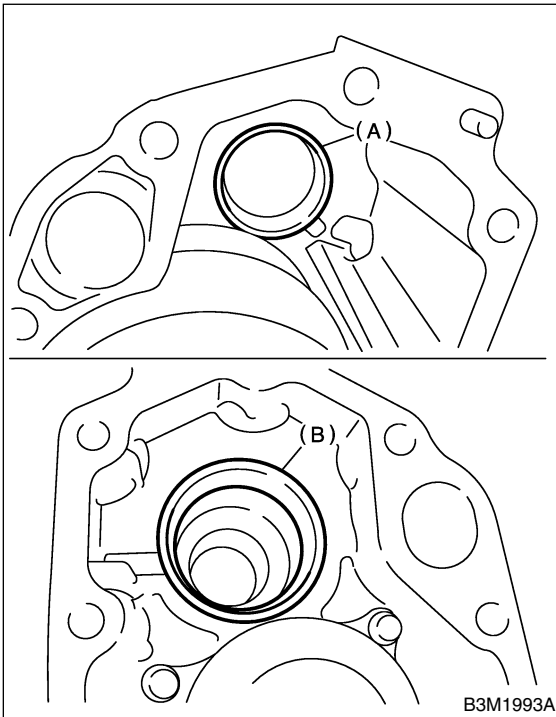
## 11. Transfer Driven Gear S503223

### A: REMOVAL S503223A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-35, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly.
- 5) Remove transfer driven gear.



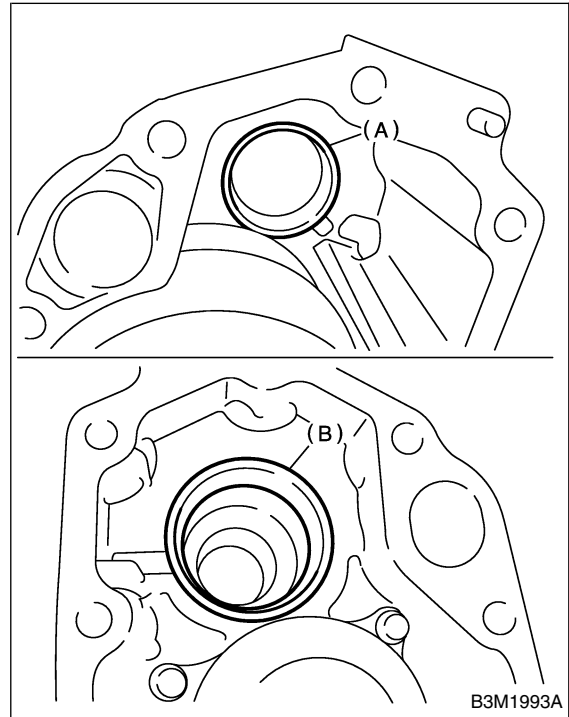
- 6) Remove bearing cup from extension case and transfer case.



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

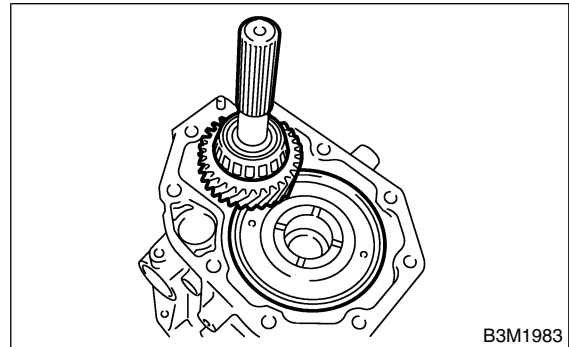
### B: INSTALLATION S503223A11

- 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-39, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install back-up light switch and neutral position switch. <Ref. to MT-35, INSTALLATION, Switches and Harness.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>



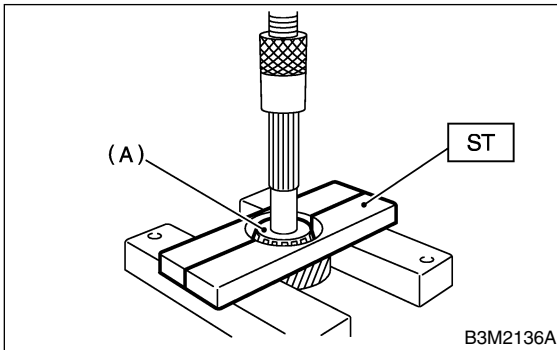
# TRANSFER DRIVEN GEAR

Manual Transmission and Differential

## C: DISASSEMBLY S503223A06

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

ST 498077000 REMOVER

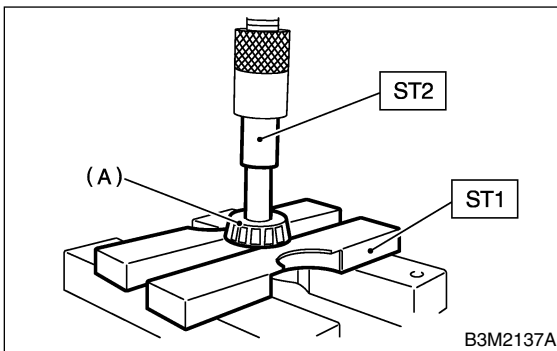


(A) Roller bearing

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

ST1 498077000 REMOVER

ST2 899864100 REMOVER



(A) Roller bearing

## D: ASSEMBLY S503223A02

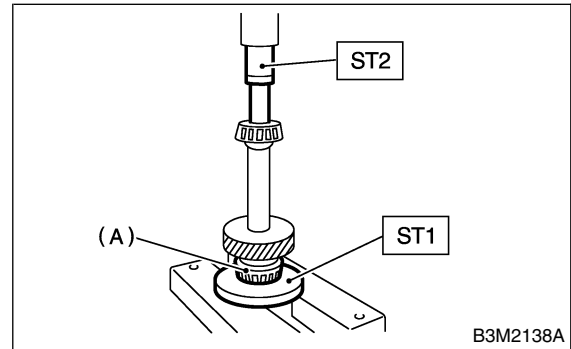
1) Using ST, install roller bearing (extension case side).

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)



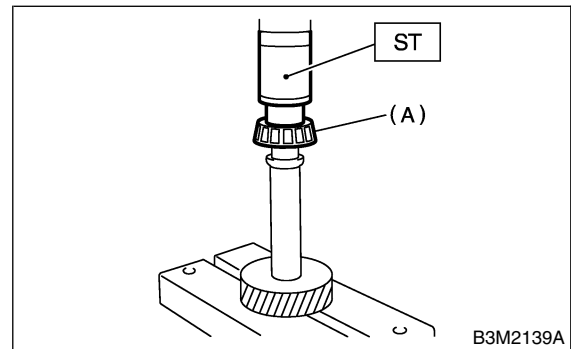
(A) Roller bearing

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.

## 12. Center Differential

S503158

### A: REMOVAL

S503158A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transfer driven gear. <Ref. to MT-45, 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-45, INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to MT-35, REMOVAL, Switches and Harness.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY

S503158A06

#### NOTE:

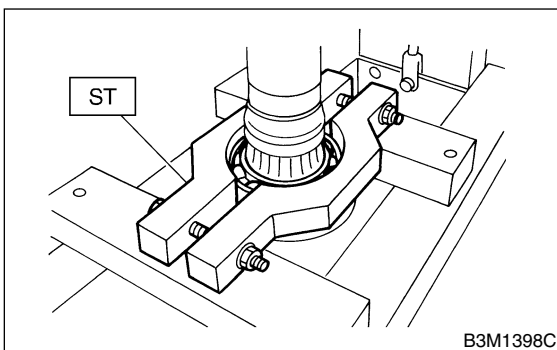
Do not disassemble center differential because it is a non-disassemble part.

Remove ball bearing using ST.

#### NOTE:

Do not reuse ball bearing. Prepare a new ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



B3M1398C

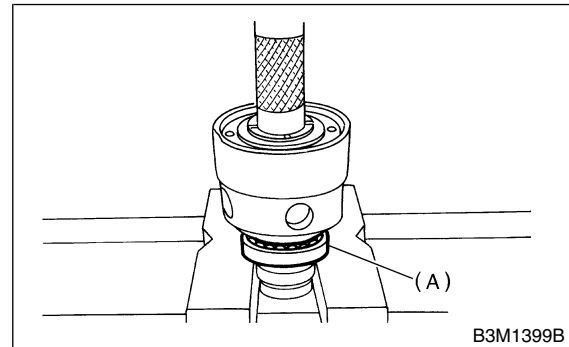
### D: ASSEMBLY

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).



B3M1399B

(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

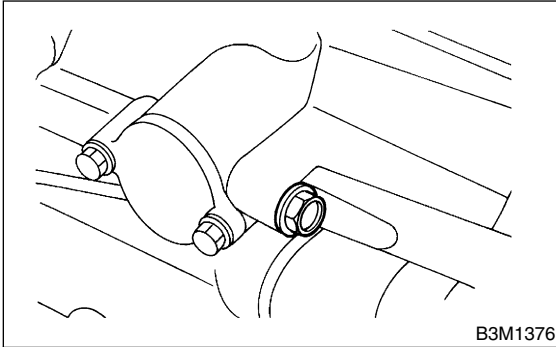
# REVERSE CHECK SLEEVE

Manual Transmission and Differential

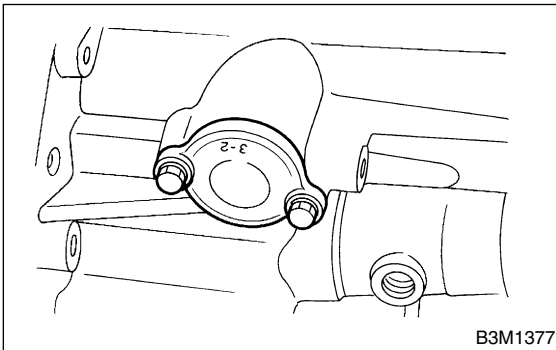
## 13. Reverse Check Sleeve S503267

### A: REMOVAL S503267A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove shifter arm.
- 4) Remove plug, spring washer and reverse check ball.



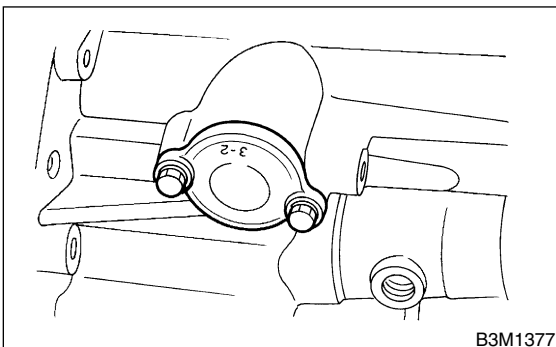
- 5) Remove the reverse check sleeve.



### B: INSTALLATION S503267A11

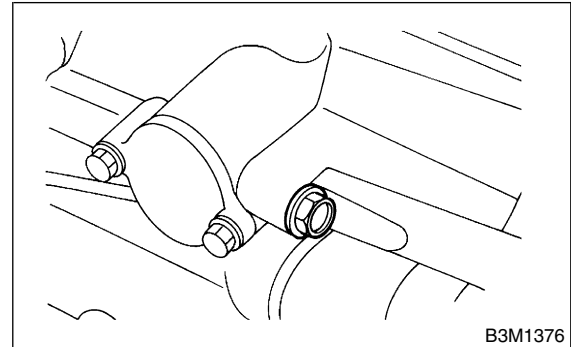
- 1) Install the reverse check sleeve.

**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)**



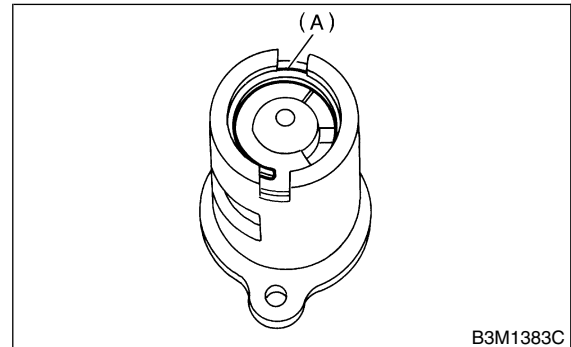
- 3) Install the shifter arm to transfer case assembly.
- 4) Install the transfer case with extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY S503267A06

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

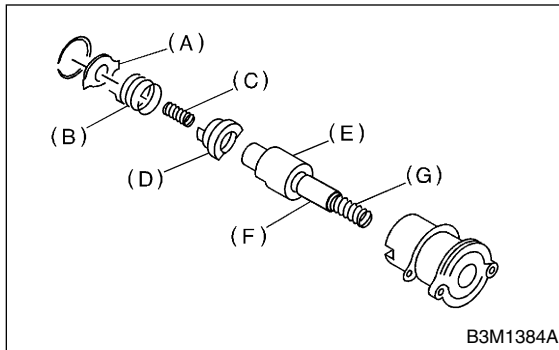
**NOTE:**

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



(A) Snap ring

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.

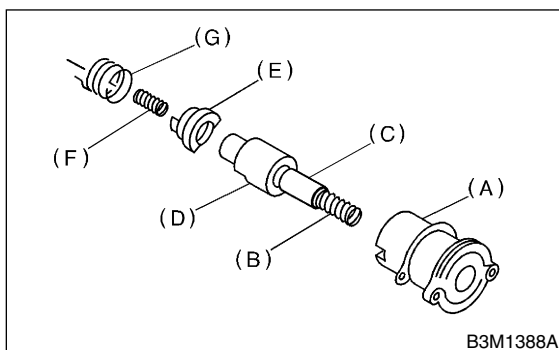
## D: ASSEMBLY

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

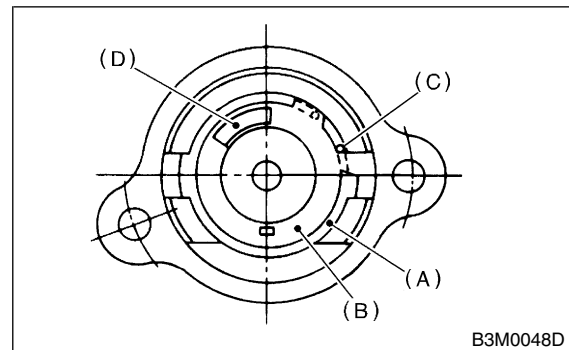
- 2) Hook the bent section of reverse check spring over reverse check plate.
- 3) Rotate cam so that the protrusion of reverse check cam is at the opening in plate.
- 4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring.
- 5) Position O-ring in groove in 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-50, ADJUSTMENT, Reverse Check Sleeve.>

# REVERSE CHECK SLEEVE

Manual Transmission and Differential

## F: ADJUSTMENT

S503267A01

### 1. NEUTRAL POSITION ADJUSTMENT

S503267A0101

- 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.

#### NOTE:

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

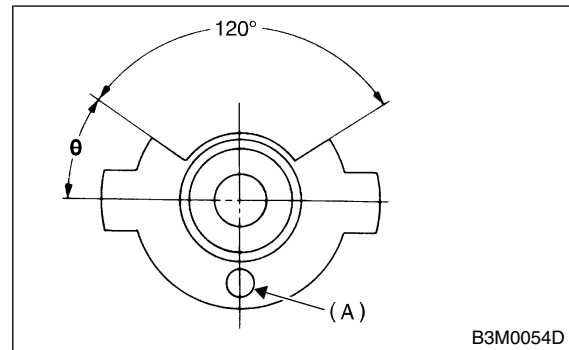
Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st gear.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

### 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.

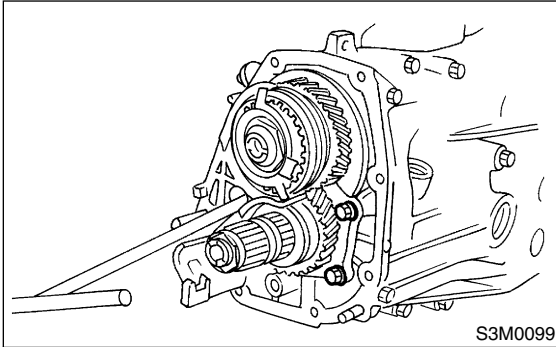
Reverse check plate			
Part No.	(A): No.	Angle $\theta$	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



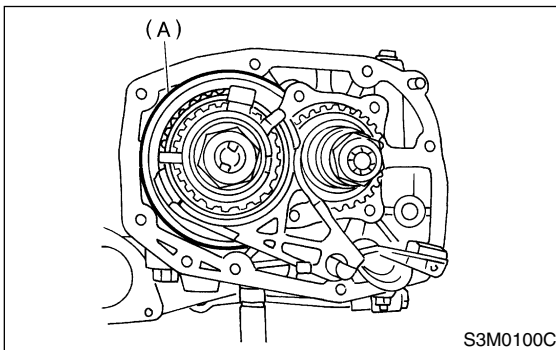
## 14. Transmission Case S503266

### A: REMOVAL S503266A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove clutch release lever. <Ref. to CL-13, REMOVAL, Release Bearing and Lever.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove bearing mounting bolts.

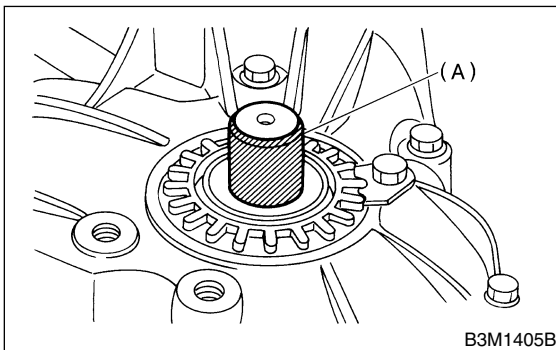


- 5) Remove main shaft rear plate.



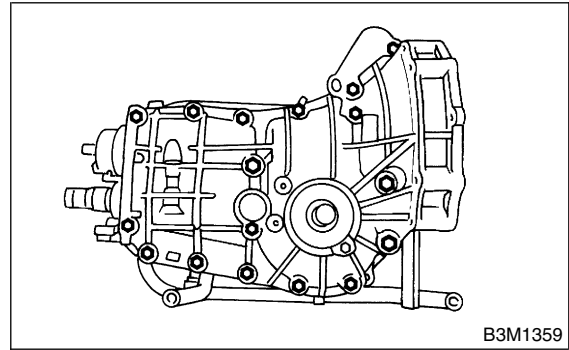
(A) Main shaft rear plate

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



(A) Vinyl tape

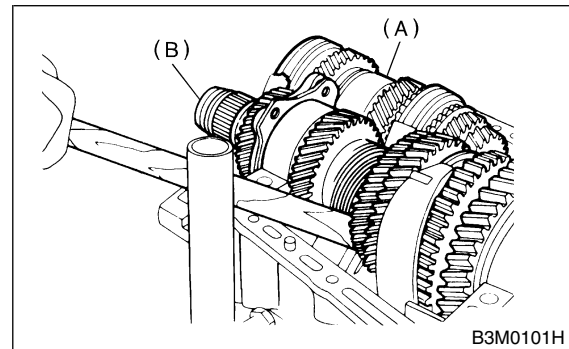
- 7) Separate transmission case into right and left cases by removing coupling bolts and nuts.



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

#### NOTE:

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



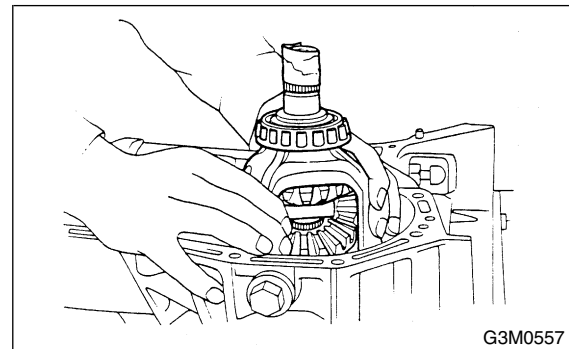
(A) Main shaft assembly

(B) Drive pinion shaft assembly

- 9) Remove main shaft assembly.
- 10) Remove differential assembly.

#### NOTE:

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



### B: INSTALLATION S503266A11

- 1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
- 2) Install the front differential assembly.

# TRANSMISSION CASE

## Manual Transmission and Differential

- 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**

- 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.

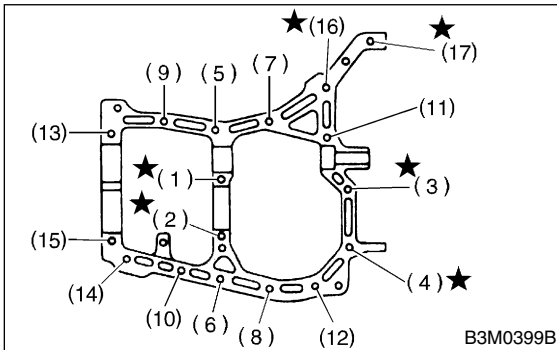
### Tightening torque:

**8 mm bolt**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

★ **10 mm bolt**

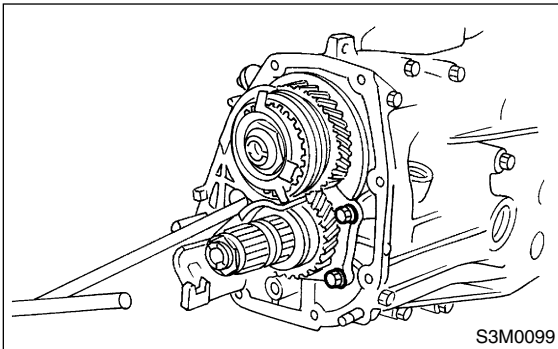
**39 N·m (4.0 kgf-m, 28.9 ft-lb)**



- 7) Tighten ball bearing attachment bolts.

### Tightening torque:

**29 N·m (3.0 kgf-m, 21.7 ft-lb)**

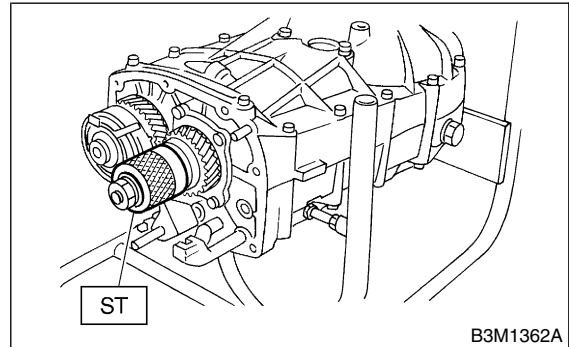


- 8) Backlash adjustment of hypoid gear and pre-load adjustment of roller bearing

### NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



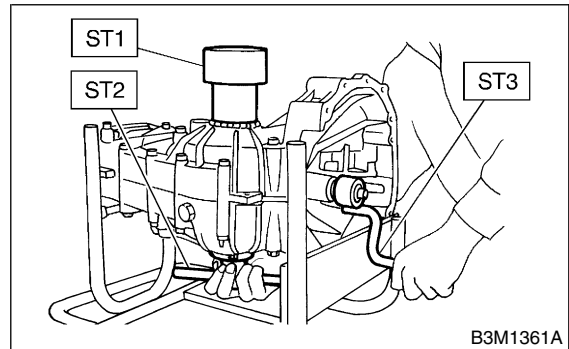
- 9) Place the transmission with case left side facing downward and put ST1 on bearing cup.

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

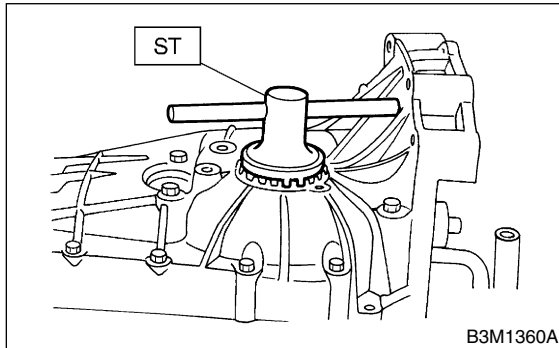


11) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

**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-73, INSPECTION, Front Differential Assembly.>

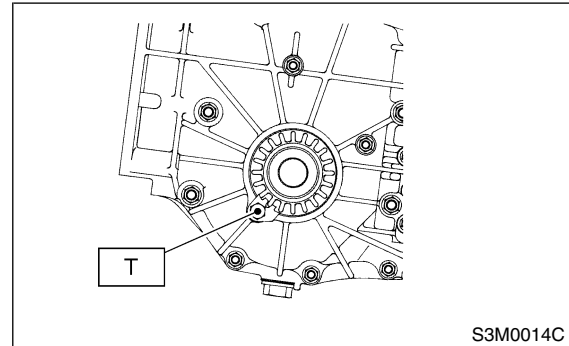
17) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen retainer until the O-ring groove appears. Fit O-ring into the groove and tighten retainer into the position where retainer has been tightened in. Tighten lock plate.

**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-59, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

19) Install clutch release lever and bearing. <Ref. to CL-13, INSTALLATION, Release Bearing and Lever.>

20) Install transfer case with extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly into the vehicle. <Ref. to MT-29, 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

## 15. Main Shaft Assembly for Single-Range

S503713

### A: REMOVAL

S503713A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-51, REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly. <Ref. to MT-60, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly.

### B: INSTALLATION

S503713A11

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

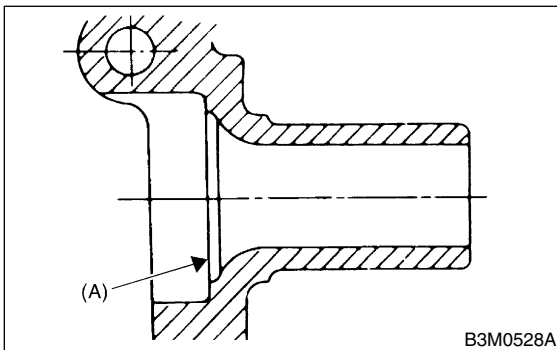
#### NOTE:

- 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.

- 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-60, INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>
- 5) Install transfer case with extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY

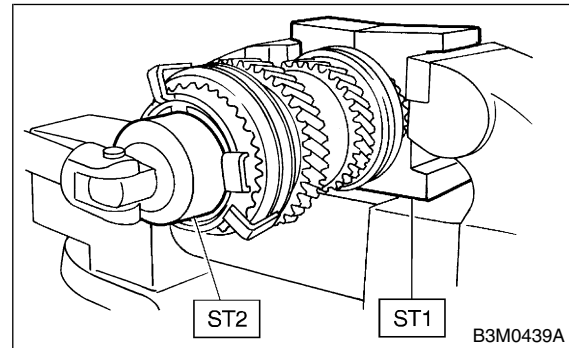
S503713A06

- 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.

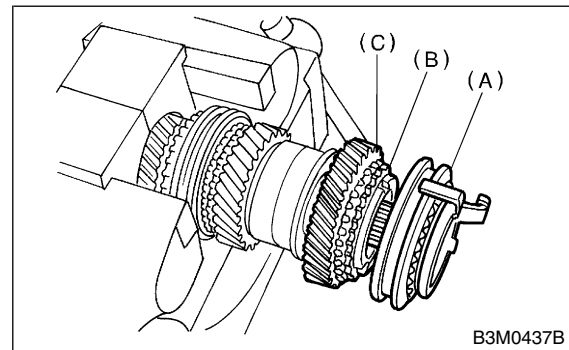
#### NOTE:

Remove caulking before taking off lock nut.

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



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

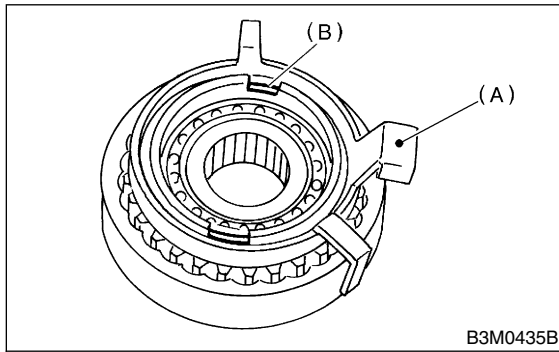


- (A) 5th-Rev sleeve and hub ASSY  
(B) Baulk ring  
(C) 5th drive gear

# 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

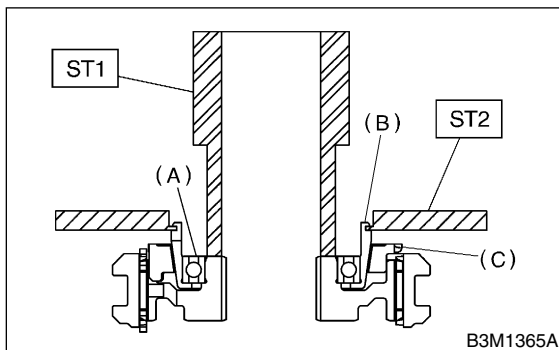
5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

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



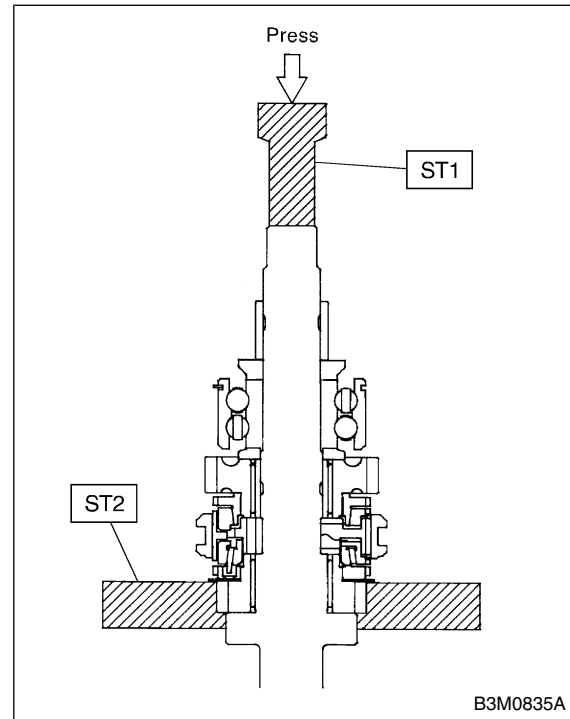
- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

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

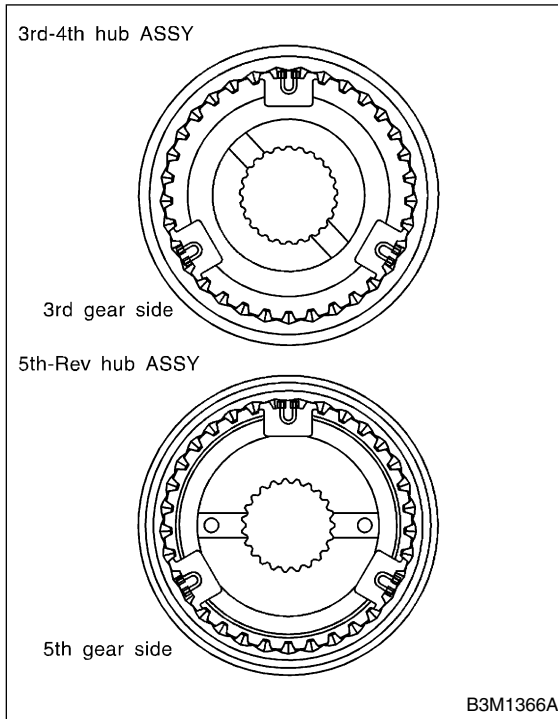
Manual Transmission and Differential

## D: ASSEMBLY S503713A02

1) Assemble each sleeve and hub assembly.

NOTE:

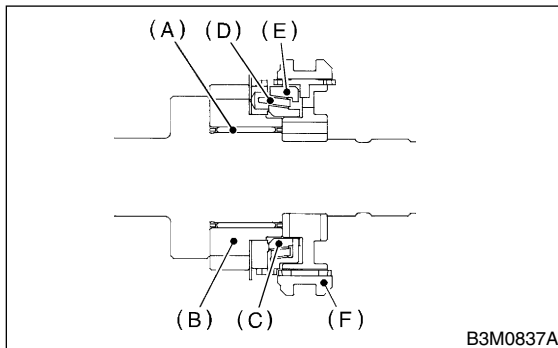
Position open ends of spring 120° apart.



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

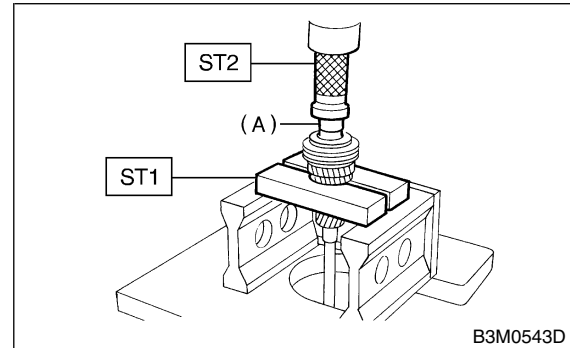
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

**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

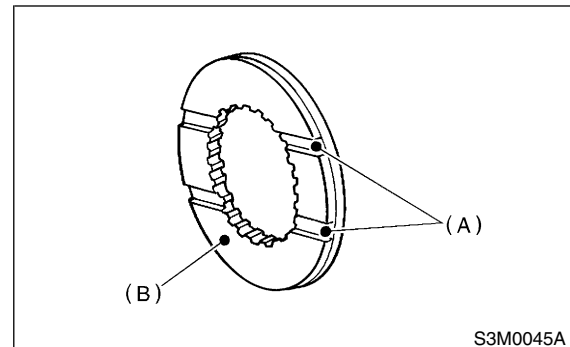


(A) 4th needle bearing race

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

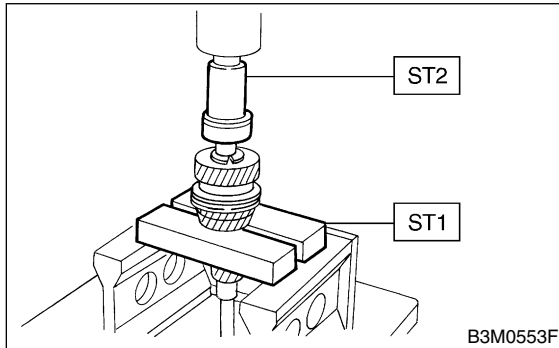
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

## 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:

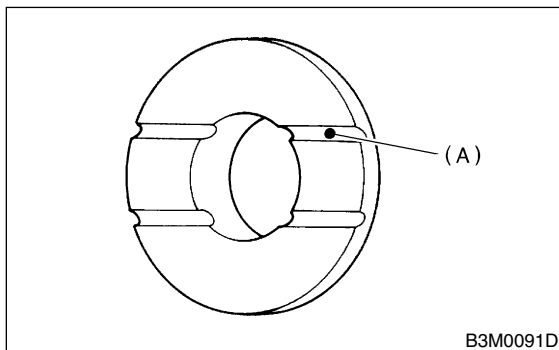
**Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

## NOTE:

Face thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

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.

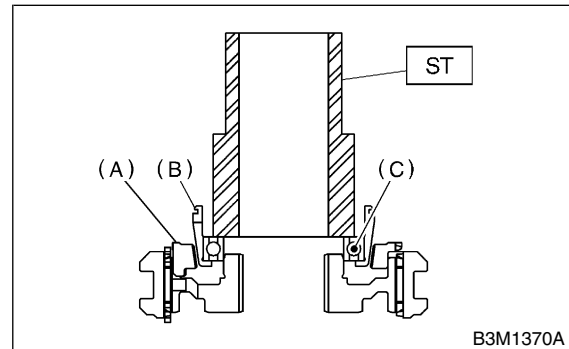
## CAUTION:

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

## NOTE:

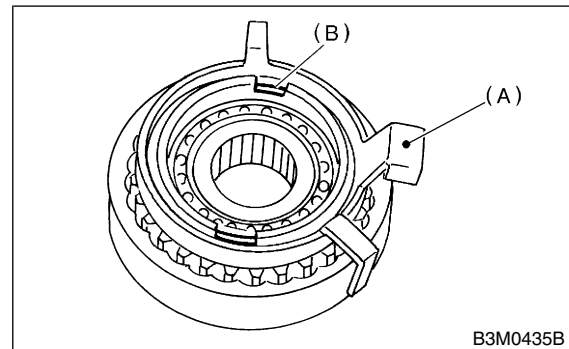
- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

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

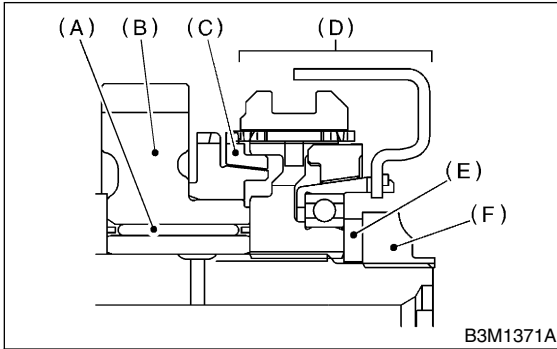
# MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

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

S503713A10

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.

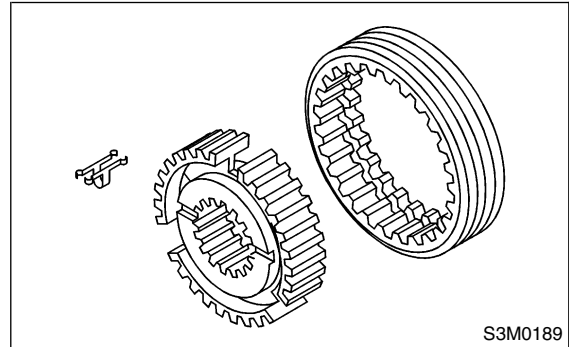
**4) Baulk ring**

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

S503713A01

Selection of main shaft rear plate

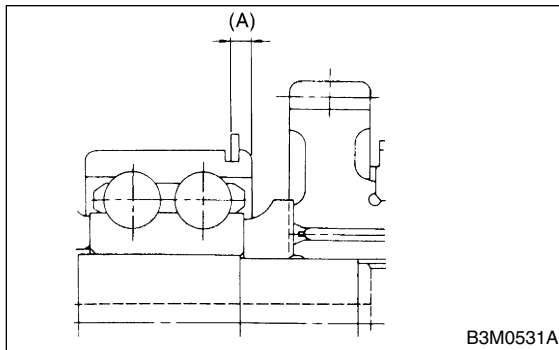
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

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



# DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

## 16. Drive Pinion Shaft Assembly

S503269

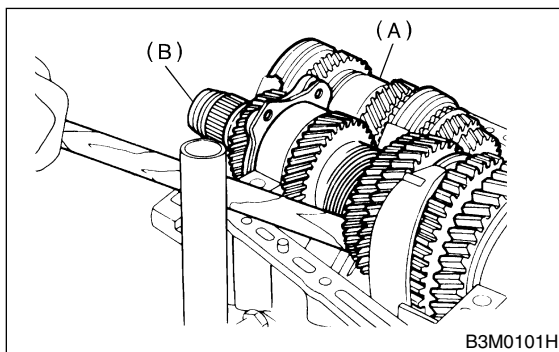
### A: REMOVAL

S503269A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-51, REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly.

NOTE:

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

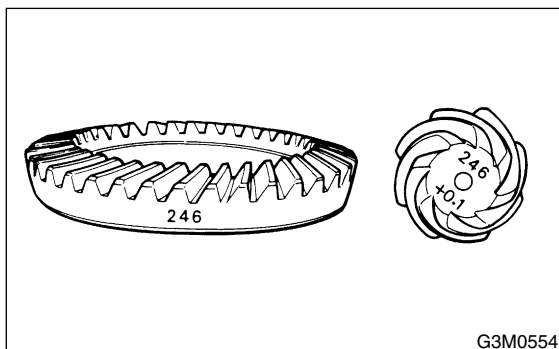


- (A) Main shaft assembly  
(B) Drive pinion shaft assembly

### 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.



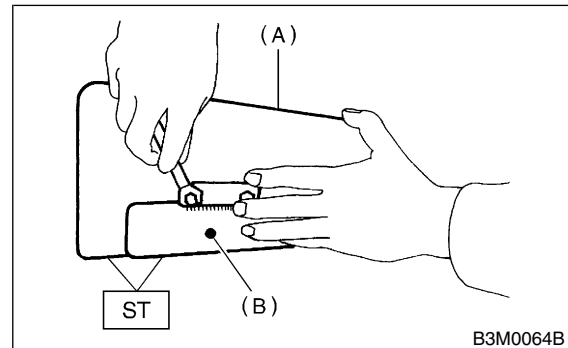
- 3) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.

- 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



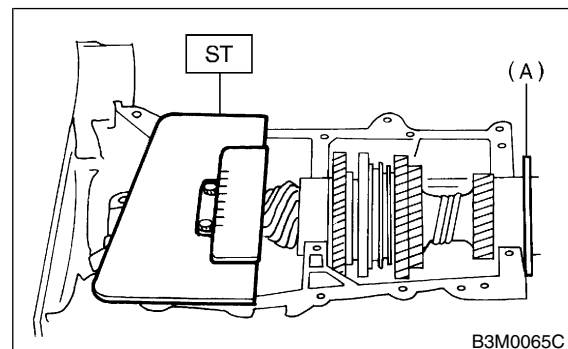
- (A) Plate  
(B) Scale

- 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 fingertip 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-69, 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-65, INSPECTION, Drive Pinion Shaft Assembly.>

11) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>

12) Install transfer case with extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

## C: DISASSEMBLY

S503269A06

### CAUTION:

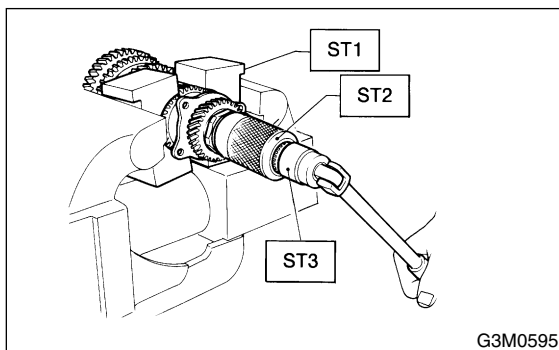
**Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.**

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

ST1 899884100 HOLDER

ST2 498427100 STOPPER

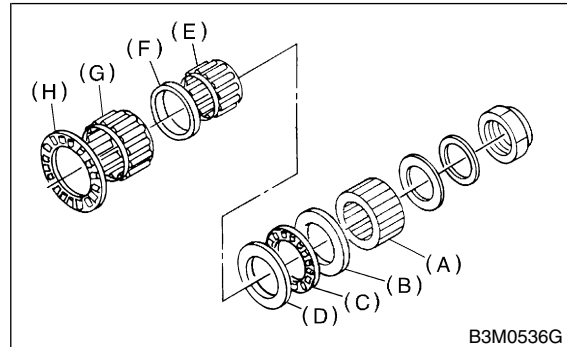
ST3 899988608 SOCKET WRENCH



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)

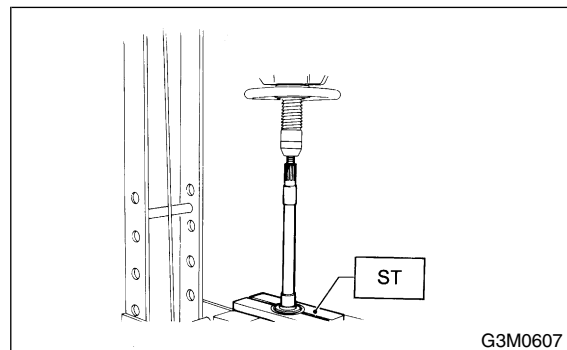
(H) Thrust bearing (33 × 50 × 3)

3) Remove roller bearing and washer using ST and press.

### NOTE:

Do not reuse roller bearing.

ST 498077000 REMOVER



G3M0607



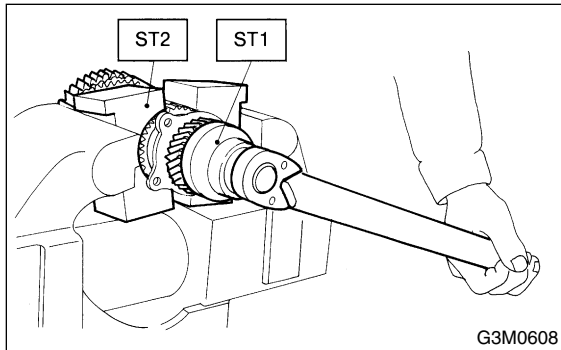
# DRIVE PINION SHAFT ASSEMBLY

## Manual Transmission and Differential

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

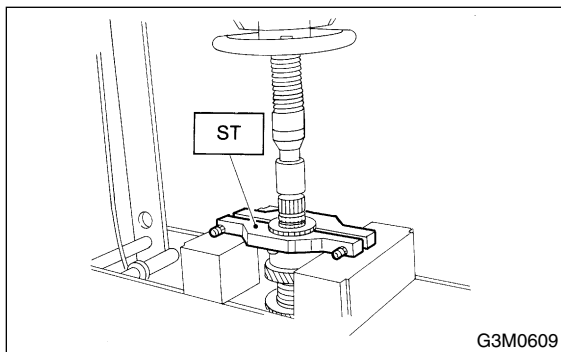
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



5) Remove 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR REMOVER

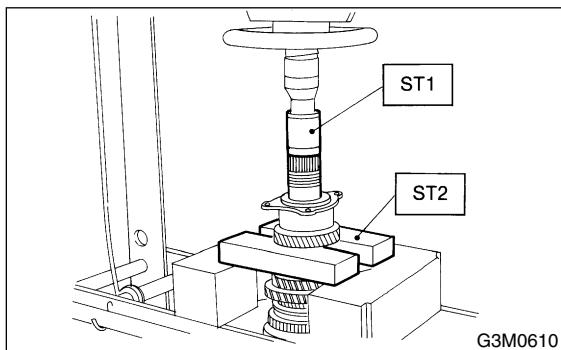


6) Remove woodruff key.

7) Remove roller bearing, 3rd-4th driven gear using ST1 and ST2.

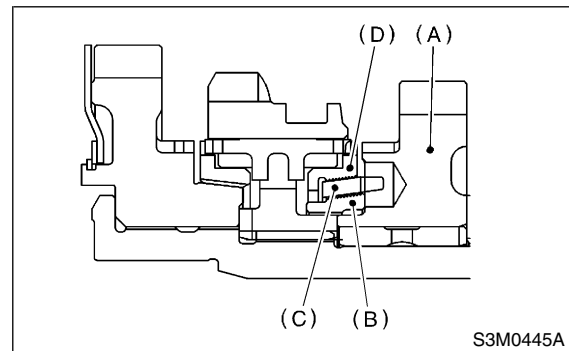
ST1 499757002 INSTALLER

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

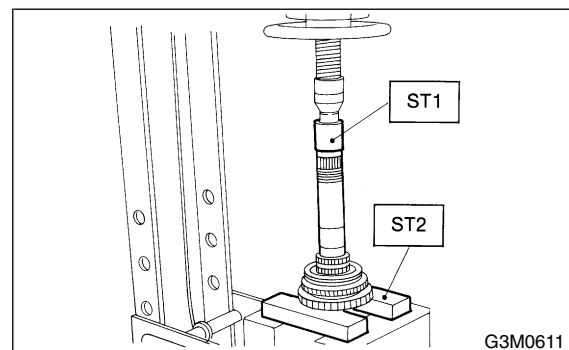
10) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

### 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

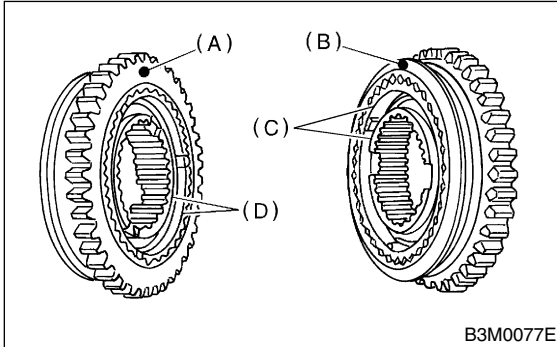
Manual Transmission and Differential

## 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:**

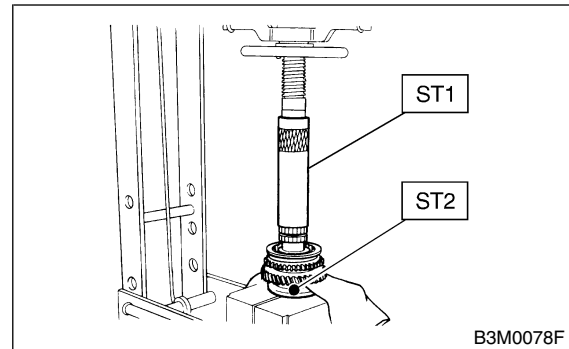
**Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

NOTE:

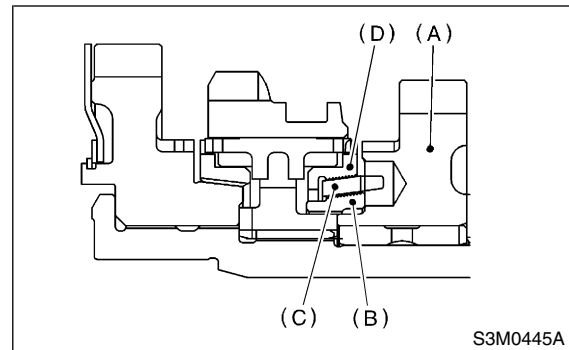
- Attach a cloth to the end of driven shaft to prevent damage.
- When press fitting, align oil holes of shaft and bushing.

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.

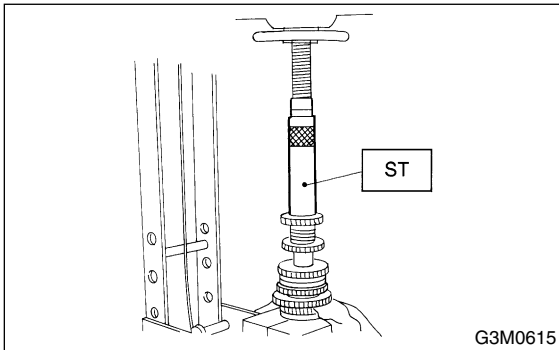
**CAUTION:**

**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

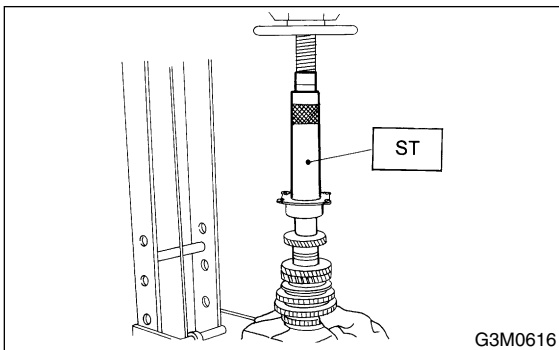


7) Install a set of roller bearings onto the driven shaft using ST and press.

**CAUTION:**

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

ST 499277200 INSTALLER

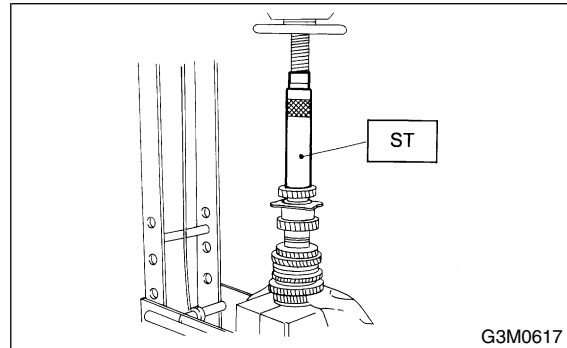


8) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

**CAUTION:**

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

ST 499277200 INSTALLER

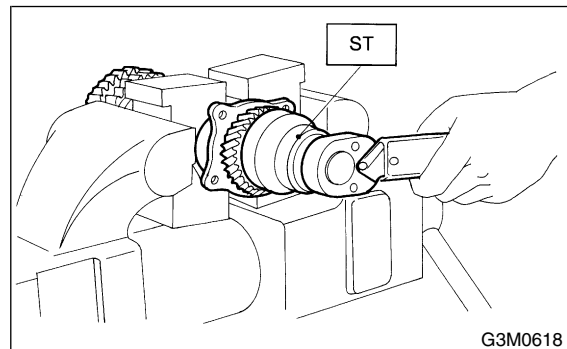


9) Install lock washer. Install lock nut and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

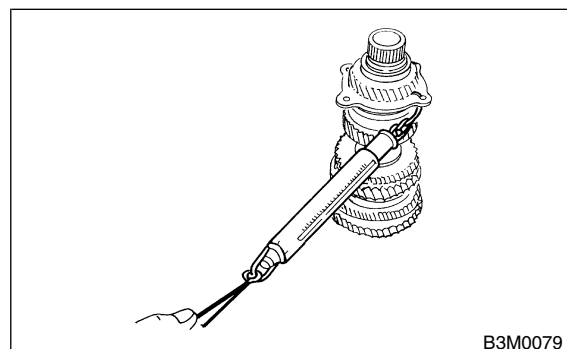
**Tightening torque:**

**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 0.33 lb).



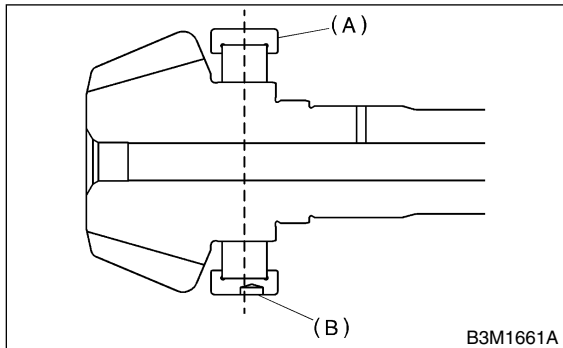
# DRIVE PINION SHAFT ASSEMBLY

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

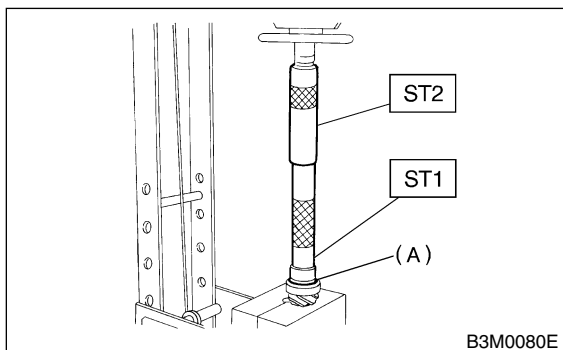
11) Install washer using ST1, ST2 and press.

## CAUTION:

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

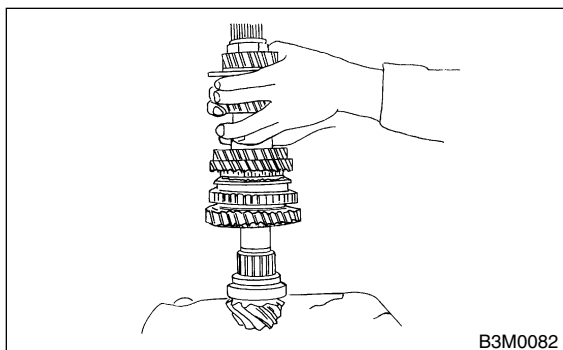
ST1 499277100 BUSHING 1-2 INSTALLER

ST2 499277200 INSTALLER



- (A) Washer

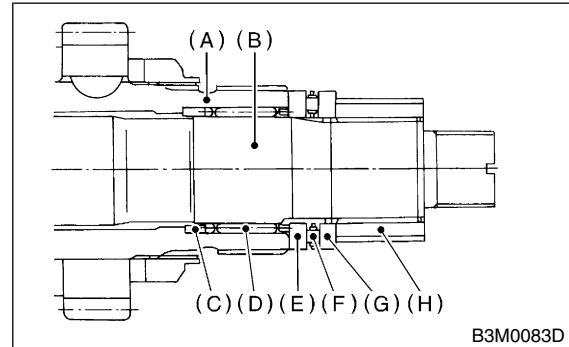
12) Install thrust bearing and needle bearing.  
Install driven shaft assembly.



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 to install spacer 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

SS03269A10

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

### 1) Bearings

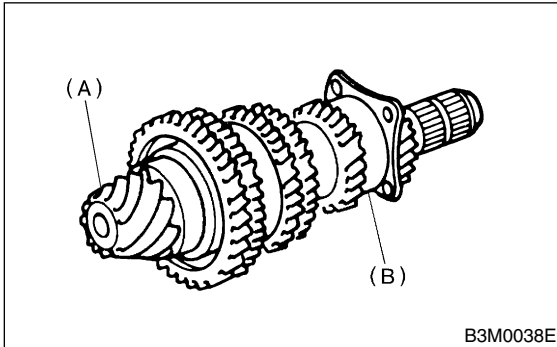
Replace bearings in the following cases:

- 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.

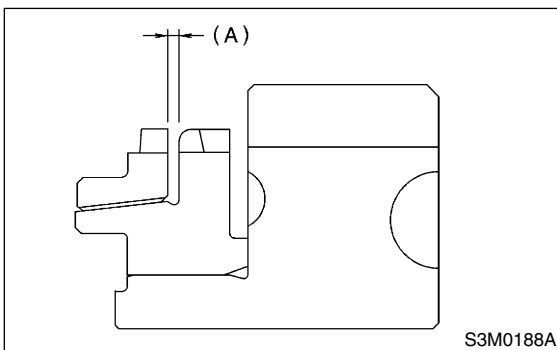


- (A) Drive pinion shaft  
(B) Ball bearing

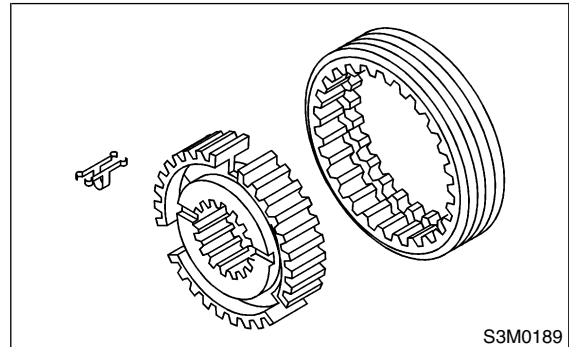
- Bearings having other defects
- 2) Bushing (each gear)
- Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
  - When the inner wall is abnormally worn.
- 3) Gears
- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively 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 — 0.039 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.

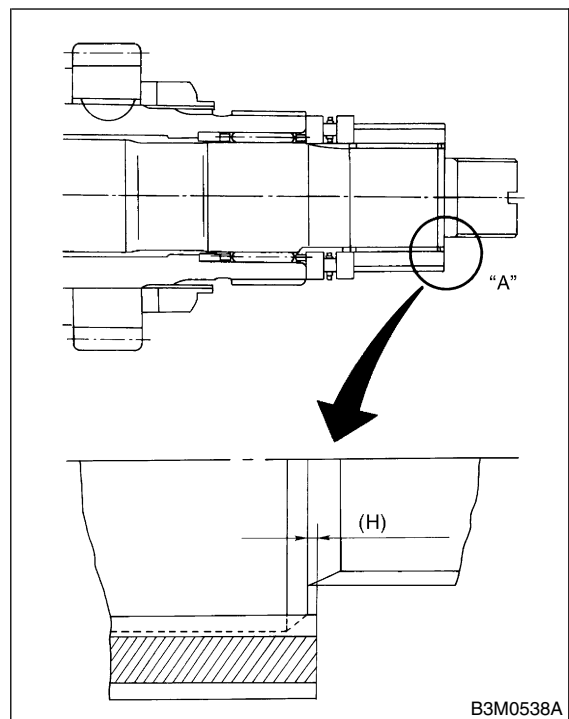
## F: ADJUSTMENT

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

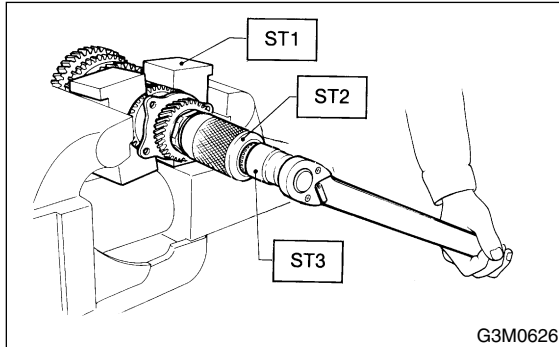
Manual Transmission and Differential

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)**

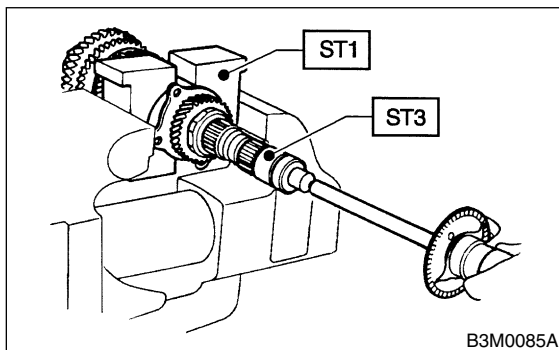


3) After removing ST2, measure starting torque using torque driver.

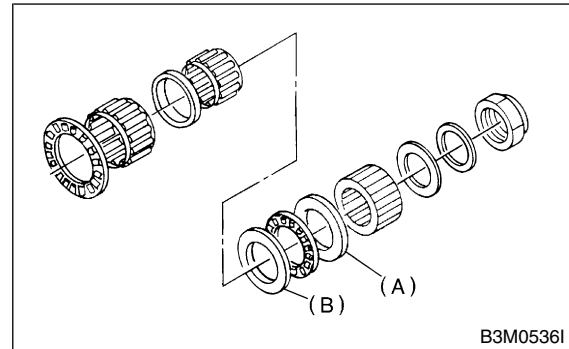
ST1 899884100 HOLDER  
ST3 899988608 SOCKET WRENCH (27)

**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.

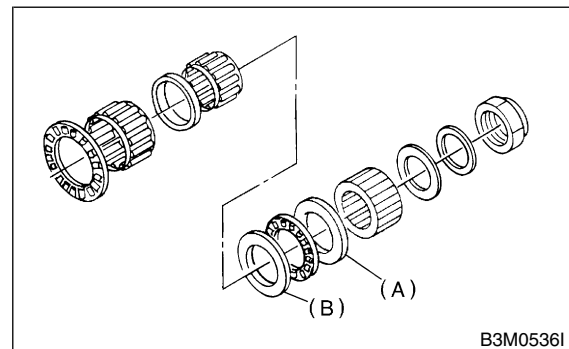


(A) Adjusting washer No. 1

(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

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

## 17. Front Differential Assembly

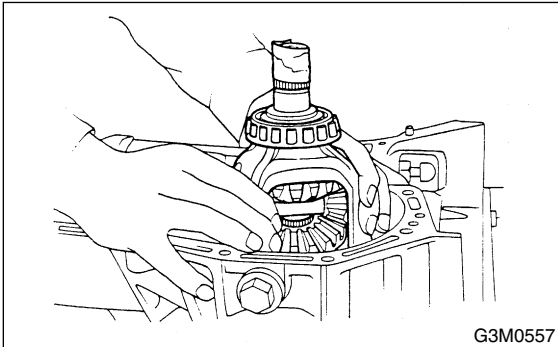
S503152

### A: REMOVAL S503152A18

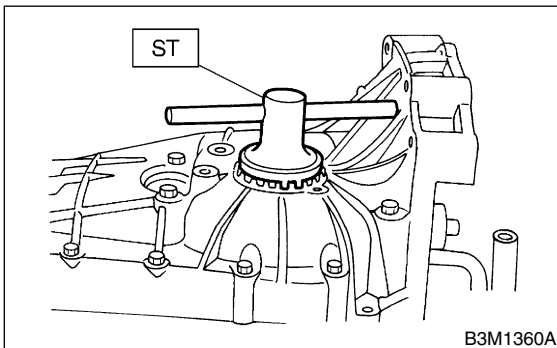
- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-51, REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly. Remove transfer case with extension case assembly. <Ref. to MT-60, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly. <Ref. to MT-54, REMOVAL, Main Shaft Assembly for Single-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

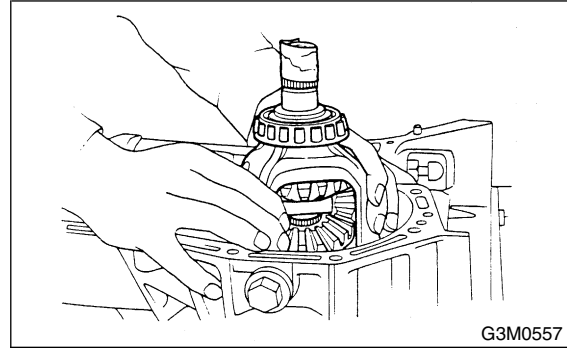


### B: INSTALLATION S503152A11

- 1) Install differential side retainers using ST. ST 499787000 WRENCH ASSY
- 2) Install differential assembly.

#### NOTE:

- Be careful not to fold the sealing lip of oil seal.
- Wrap the left and right splines sections of axle shaft with vinyl tape to prevent scratches.



- 3) Install main shaft assembly. <Ref. to MT-54, INSTALLATION, Main Shaft Assembly for Single-Range.>
- 4) Install drive pinion assembly. <Ref. to MT-60, INSTALLATION, Drive Pinion Shaft Assembly.>
- 5) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>
- 6) Install transfer case with extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY S503152A06

#### 1. DIFFERENTIAL CASE ASSEMBLY

S503152A0601

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

#### NOTE:

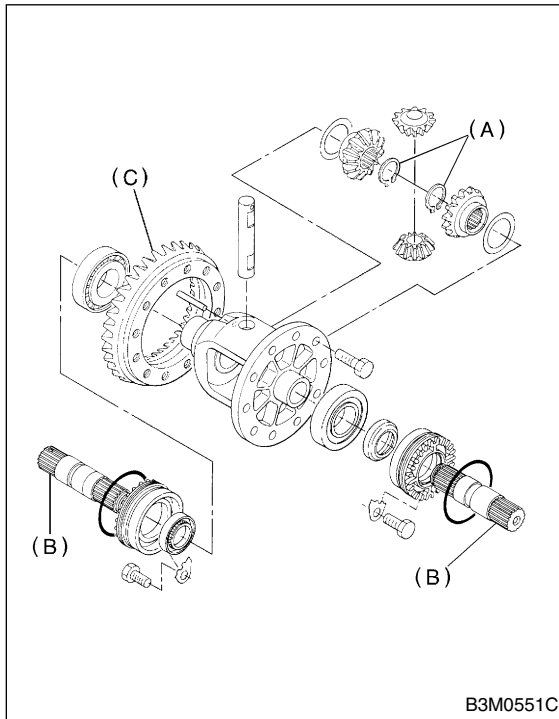
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.



# FRONT DIFFERENTIAL ASSEMBLY

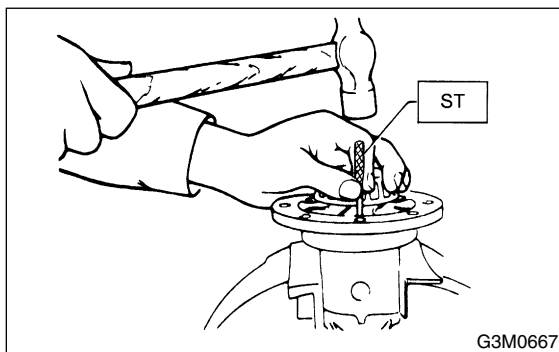
## Manual Transmission and Differential

2) Loosen twelve bolts and remove hypoid driven gear.

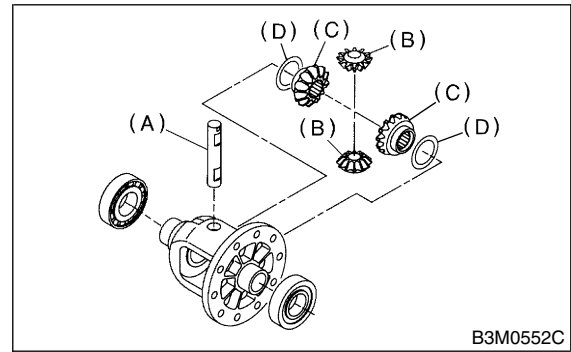


3) Drive out straight pin from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER



4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.

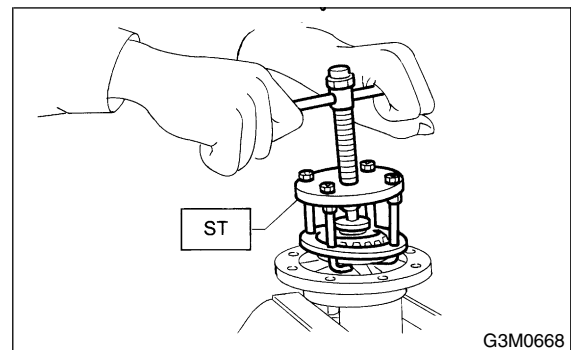


5) Remove roller bearing using ST.

NOTE:

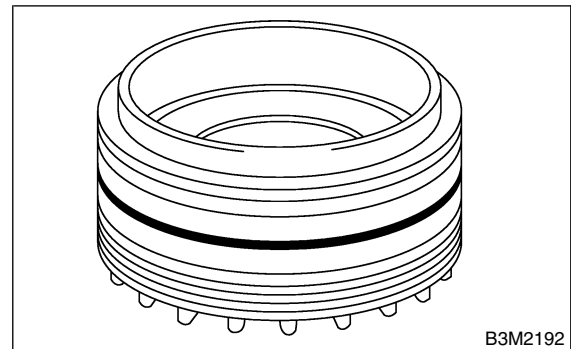
When replacing bearing inner race, replace it with outer race as a set.

ST 399527700 PULLER SET



## 2. SIDE RETAINER S503152A0602

1) Remove O-ring.



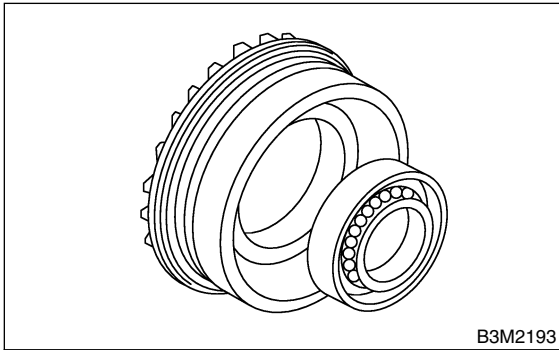
# FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

2) Remove oil seal.

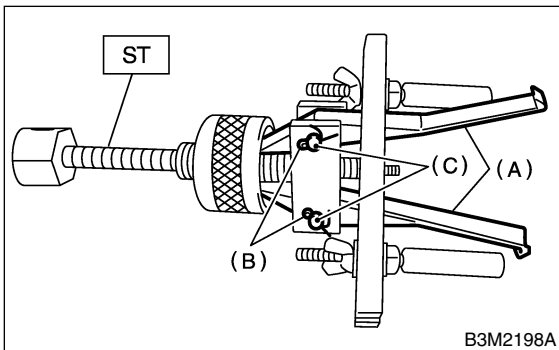
NOTE:

Do not reuse oil seal. Prepare a new oil seal.



3) Remove either of side split pin and pin, and remove claw.

ST 398527700 PULLER ASSY



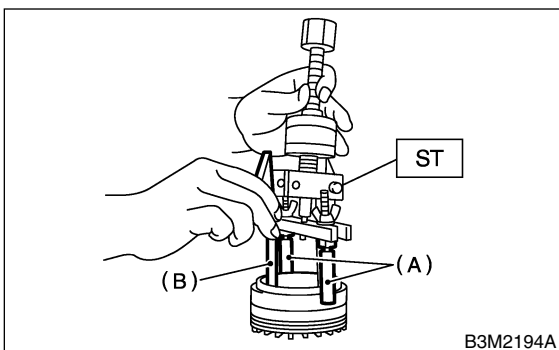
- (A) Claw
- (B) Split pin
- (C) Pin

4) Attach two claws to outer race securely, and set ST to side retainer.

ST 398527700 PULLER ASSY

NOTE:

- Attach notch portions of the two shafts securely to side retainer.
- Restore the removed claws to original position, and install pin and split pin.

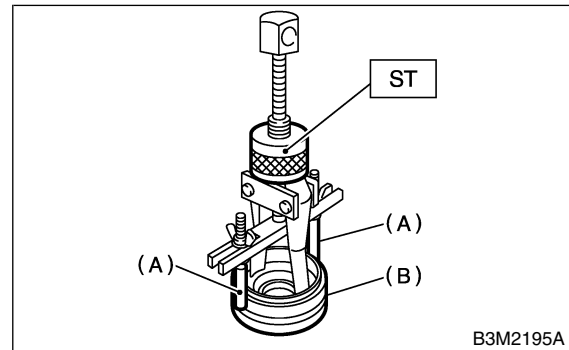


- (A) Shaft
- (B) Claw

5) Remove bearing outer race from side retainer.  
ST 398527700 PULLER ASSY

NOTE:

- Fix shaft of ST secure enough it will not loosen and fall from side retainer.
- When replacing bearing outer race, replace it with inner race as a set.



- (A) Shaft
- (B) Side retainer

## D: ASSEMBLY S503152A02

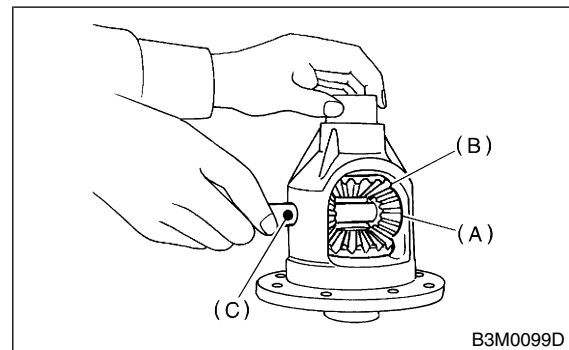
### 1. DIFFERENTIAL CASE ASSEMBLY

S503152A0201

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-74, ADJUSTMENT, Front Differential Assembly.>

### NOTE:

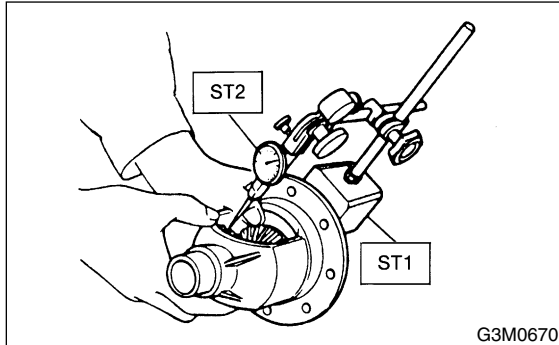
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

### Standard backlash:

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**

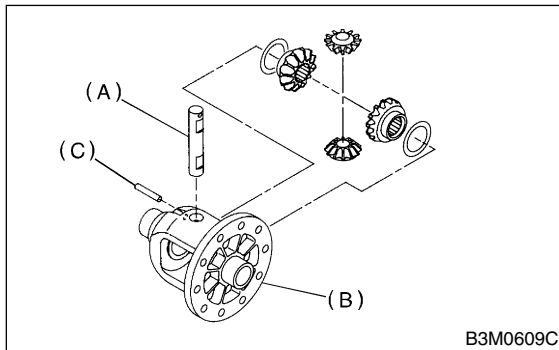


3) Align pinion shaft and differential case at their holes, and drive straight pin into holes from the hypoid driven gear side, using ST.

### 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:

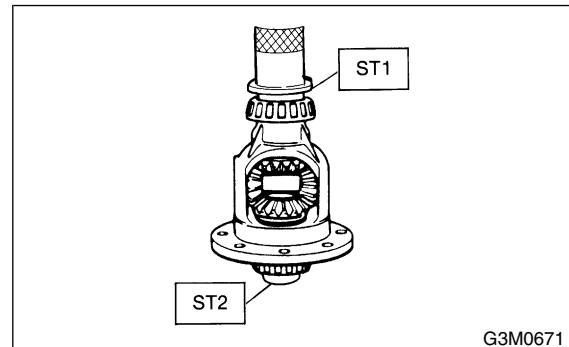
**Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

### NOTE:

Be careful to use roller bearing outer races as a set.

ST1 499277100 BUSHING 1-2 INSTALLER

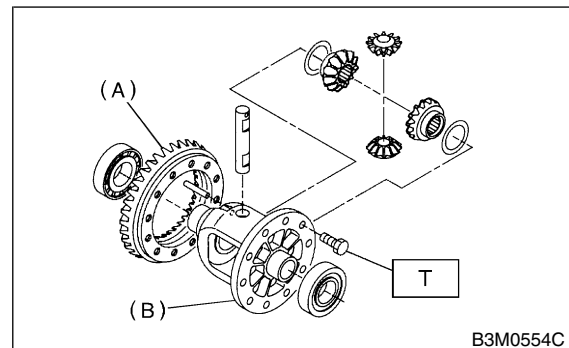
ST2 398497701 ADAPTER



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

## 2. SIDE RETAINER S503152A0202

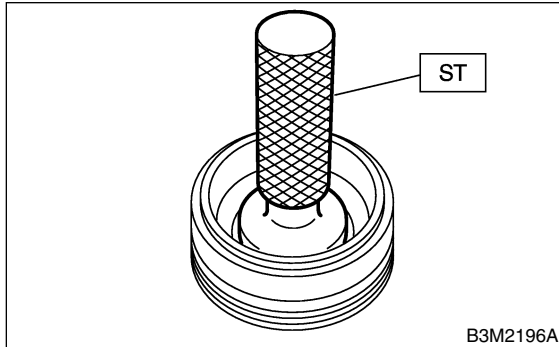
1) Install bearing outer race to side retainer.

### NOTE:

Press-in while being careful not to scratch side retainer and bearing outer race.

2) Install new oil seal.

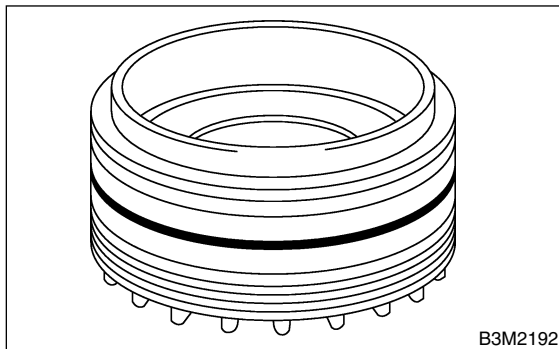
ST 49979700 INSTALLER



3) Install new O-ring.

### NOTE:

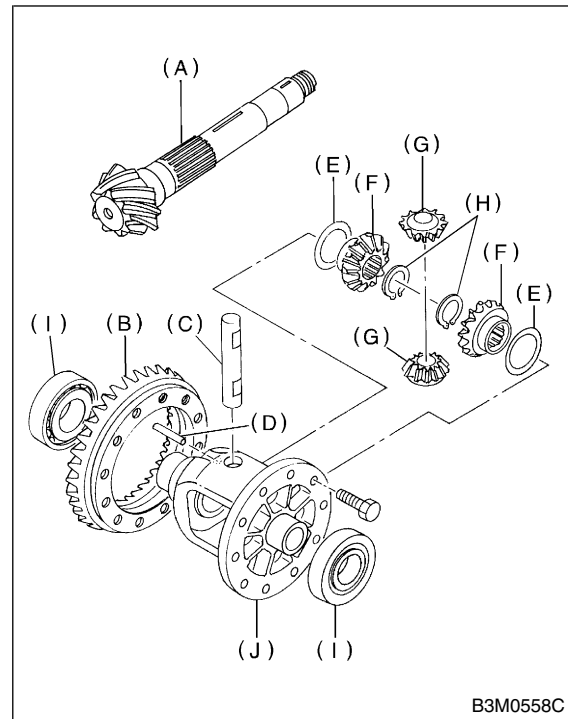
Do not stretch or damage O-ring.



## 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.



- (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.

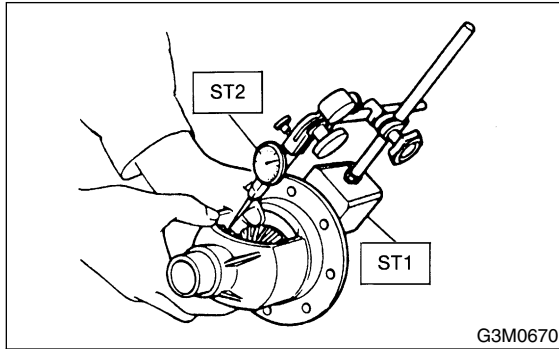
# FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

ST1 498247001 MAGNET BASE  
ST2 498247100 DIAL GAUGE

## Standard backlash:

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**



## 2. HYPOID GEAR BACKLASH

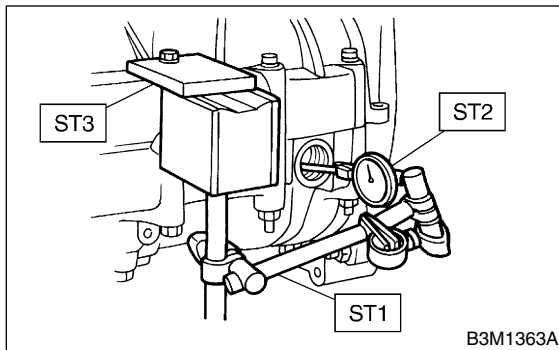
S503152A1002

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)**



## NOTE:

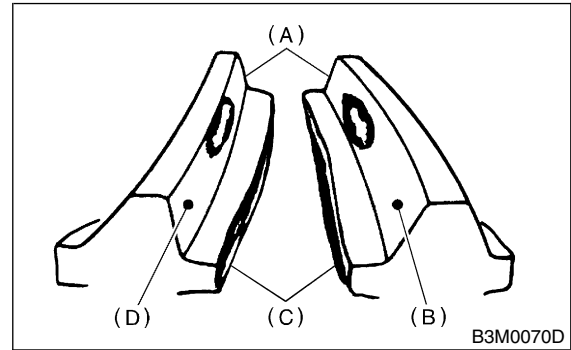
If backlash is outside specified range, adjust it by turning holder in right side case.

## 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-74, ADJUSTMENT, Front Differential Assembly.>

- 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-69, 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:

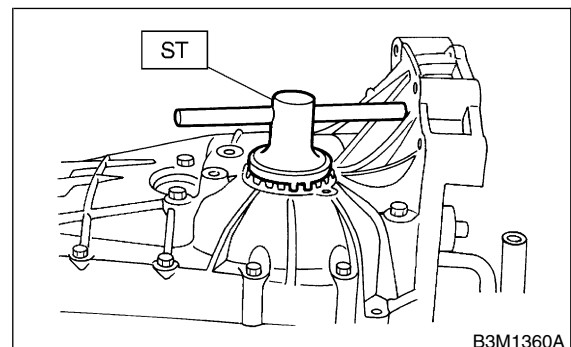
**0.13 — 0.18 mm (0.0051 — 0.0071 in)**

## 2. HYPOID GEAR BACKLASH

S503152A0102

Adjust backlash by turning holder in the right side case.

ST 499787000 WRENCH ASSY

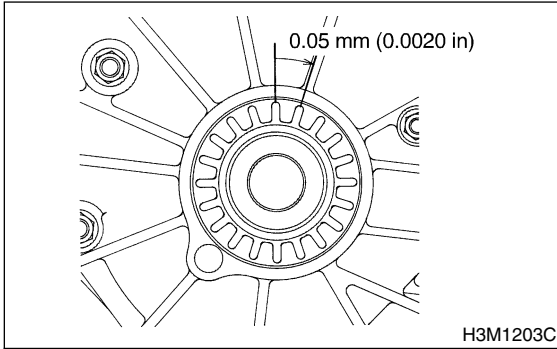


# FRONT DIFFERENTIAL ASSEMBLY

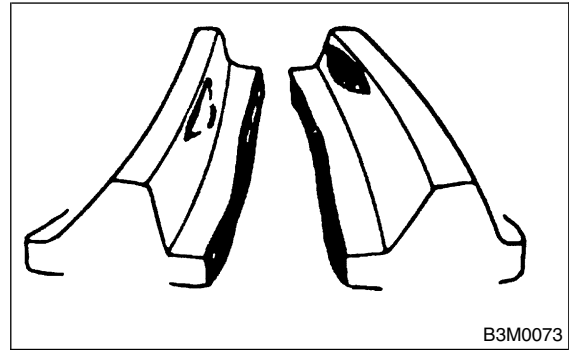
Manual Transmission and Differential

## NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



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



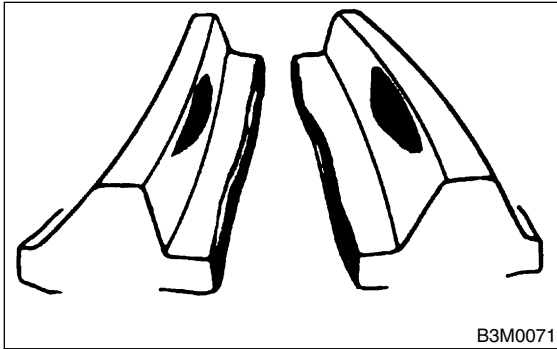
## 3. TOOTH CONTACT OF HYPOID GEAR

S503152A0103

Adjust until the teeth contact is correct.

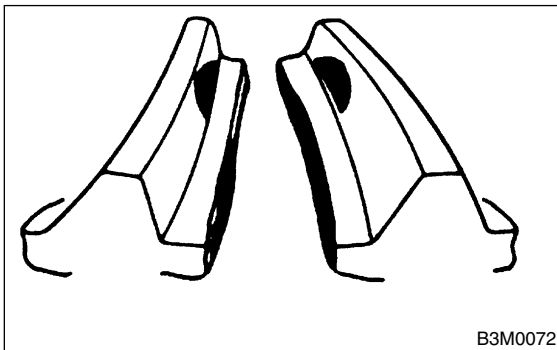
- Backlash is excessive.

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.

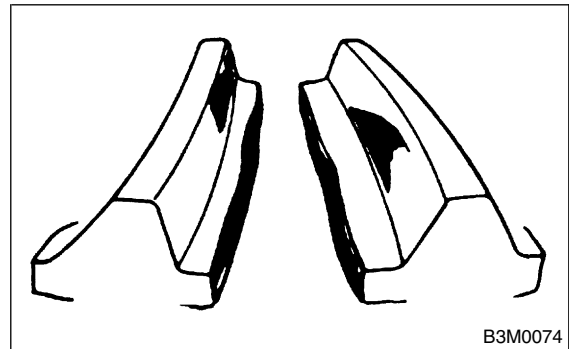


- Backlash is insufficient.

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.



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



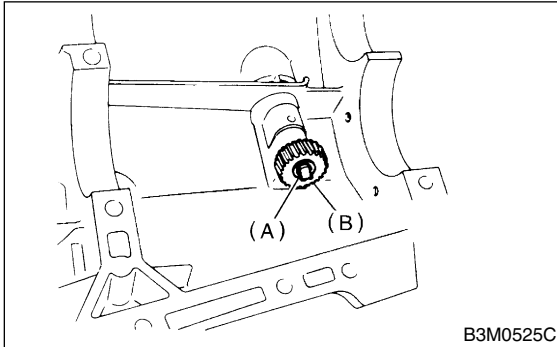
# SPEEDOMETER GEAR

Manual Transmission and Differential

## 18. Speedometer Gear S503268

### A: REMOVAL S503268A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-35, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-51, REMOVAL, Transmission Case.>
- 5) Remove vehicle speed sensor. <Ref. to MT-37, 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.

#### NOTE:

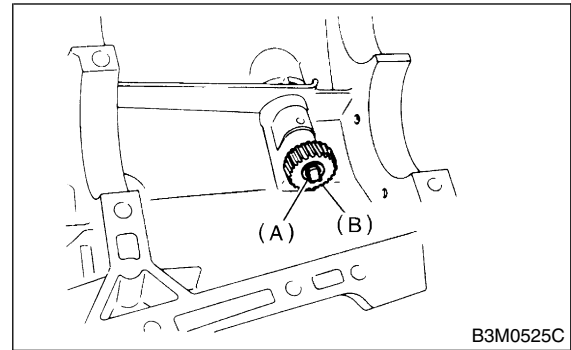
Use new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS

- 2) Install vehicle speed sensor. <Ref. to MT-37, INSTALLATION, Vehicle Speed Sensor.>
- 3) Install speedometer driven gear and snap ring.

#### NOTE:

Use new snap ring, if it has been removed.



- (A) Outer snap ring  
(B) Speedometer driven gear

- 4) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>
- 5) Install transfer case with extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install back-up light switch and neutral position switch. <Ref. to MT-35, INSTALLATION, Switches and Harness.>
- 7) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

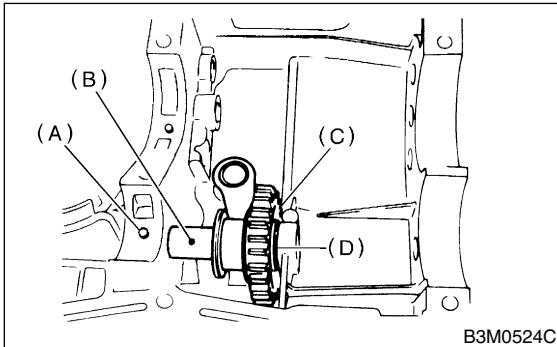
### C: INSPECTION S503268A10

Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.

## 19. Reverse Idler Gear S503263

### A: REMOVAL S503263A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-35, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-51, REMOVAL, Transmission Case.>
- 5) Remove drive pinion shaft assembly. <Ref. to MT-60, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove main shaft assembly. <Ref. to MT-54, REMOVAL, Main Shaft Assembly for Single-Range.>
- 7) Remove differential assembly. <Ref. to MT-69, REMOVAL, Front Differential Assembly.>
- 8) Remove shifter forks and rods. <Ref. to MT-79, 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

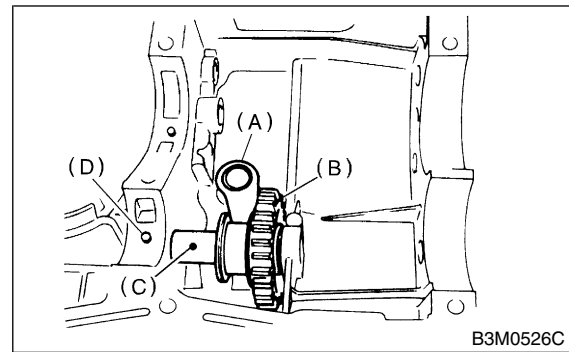
- 10) Remove reverse shifter lever.

### 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-78, INSPECTION, Reverse Idler Gear.> and <Ref. to MT-78, ADJUSTMENT, Reverse Idler Gear.>
- 3) Install shifter forks and rods. <Ref. to MT-79, INSTALLATION, Shifter Fork and Rod.>
- 4) Install differential assembly. <Ref. to MT-69, INSTALLATION, Front Differential Assembly.>
- 5) Install main shaft assembly. <Ref. to MT-54, INSTALLATION, Main Shaft Assembly for Single-Range.>
- 6) Install drive pinion shaft assembly. <Ref. to MT-60, INSTALLATION, Drive Pinion Shaft Assembly.>
- 7) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>
- 8) Install transfer case with extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 9) Install back-up light switch and neutral position switch. <Ref. to MT-35, INSTALLATION, Switches and Harness.>
- 10) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>



# REVERSE IDLER GEAR

Manual Transmission and Differential

## C: INSPECTION

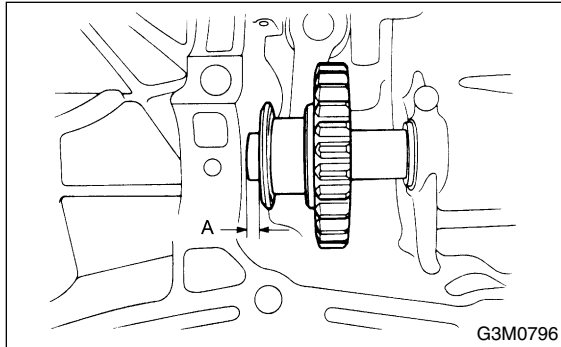
S503263A10

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)**

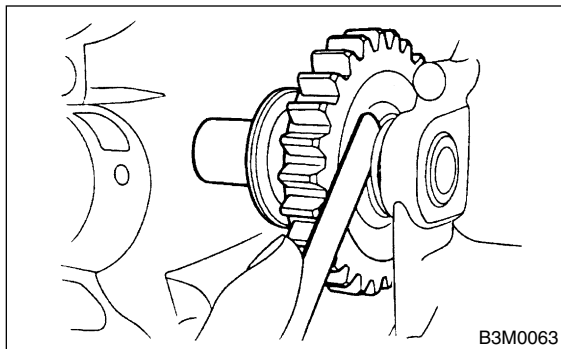


2) After installing a suitable reverse shifter lever, shift into neutral. Inspect clearance between reverse idler gear and transmission case wall.

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.

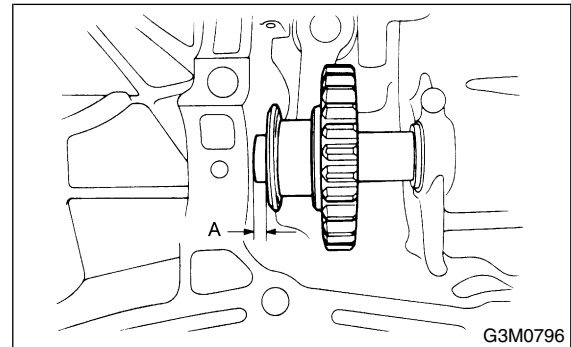
## D: ADJUSTMENT

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)**

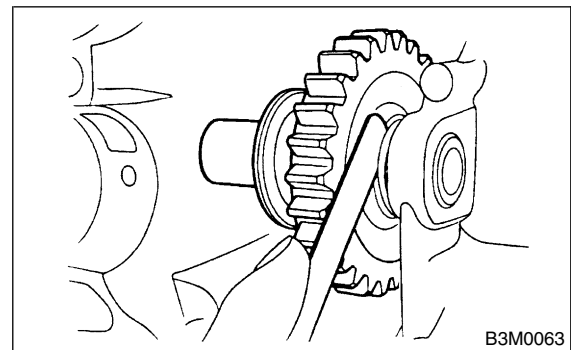


Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

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)**



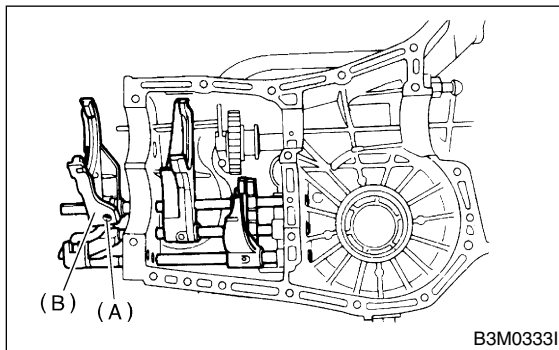
Washer	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

## 20. Shifter Fork and Rod S503255

### A: REMOVAL S503255A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-35, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-51, REMOVAL, Transmission Case.>
- 5) Remove drive pinion shaft assembly. <Ref. to MT-60, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove main shaft assembly. <Ref. to MT-54, REMOVAL, Main Shaft Assembly for Single-Range.>
- 7) Remove differential assembly. <Ref. to MT-69, REMOVAL, Front Differential Assembly.>
- 8) Drive out straight pin with ST, and 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER

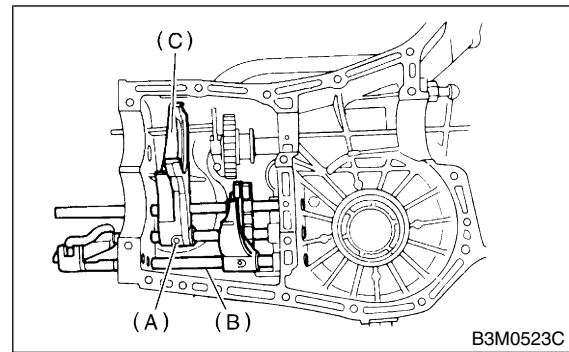


- (A) Straight pin
- (B) 5th shifter fork

- 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.

#### NOTE:

Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER

- 2) Position ball, spring and new gasket in reverse shifter rod hole, on left side transmission case, and tighten checking ball plug.
- 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 new drive straight pin into these holes using ST.

#### 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.

#### NOTE:

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 new drive straight pin into these holes.

# SHIFTER FORK AND ROD

Manual Transmission and Differential

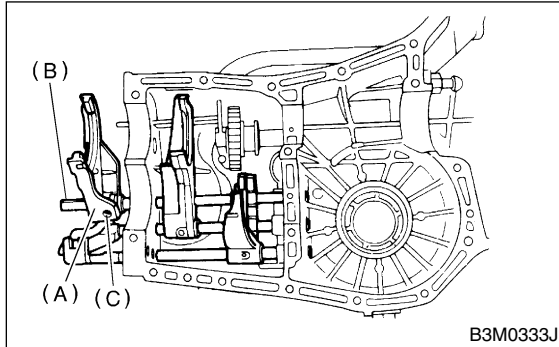
## NOTE:

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

ST 398791700 STRAIGHT PIN REMOVER

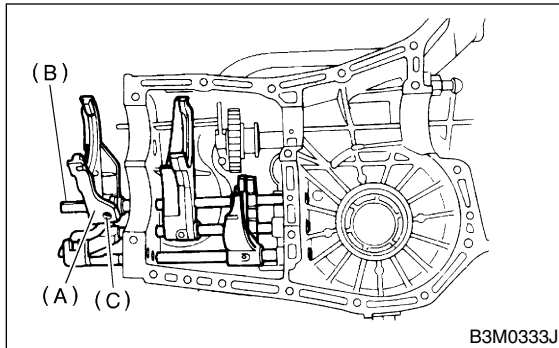
8) Install 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and new drive straight pin into place.

ST 398791700 STRAIGHT PIN REMOVER



- (A) 5th shifter fork  
(B) Reverse fork rod  
(C) Straight pin

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



10) Install differential assembly. <Ref. to MT-69, INSTALLATION, Front Differential Assembly.>

11) Install main shaft assembly.

12) Install drive pinion shaft assembly. <Ref. to MT-60, INSTALLATION, Drive Pinon Shaft Assembly.>

13) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>

14) Install transfer case with extension case assembly. <Ref. to MT-39, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install back-up light switch and neutral position switch. <Ref. to MT-35, INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to vehicle. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION

SS03255A10

1) Check the shift shaft and shift rod for damage. Replace if damaged.

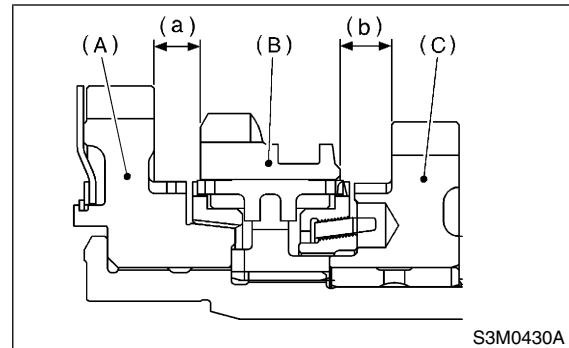
2) Gearshift mechanism

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

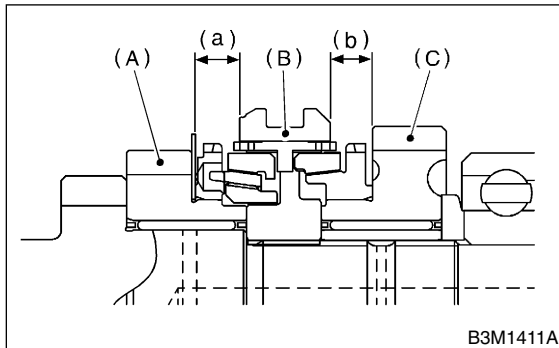
1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

# 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)**

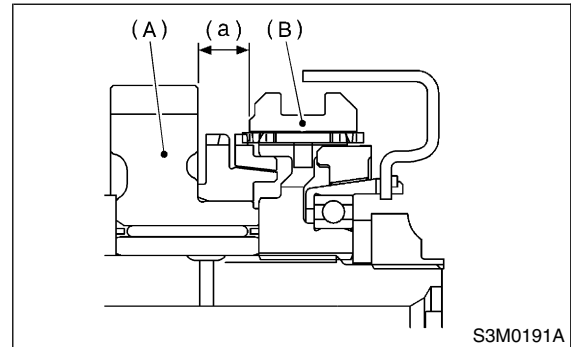


- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

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)**



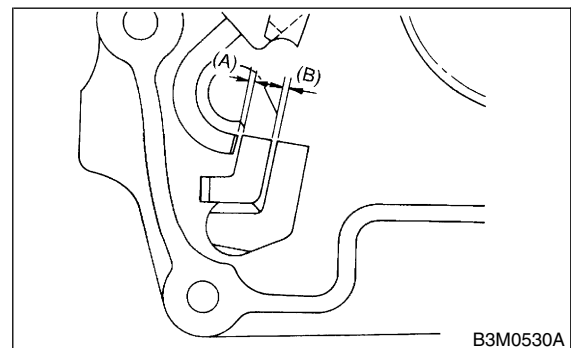
- (A) 5th drive gear
- (B) Coupling sleeve

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	—	Standard
32812AA221	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)**



# GENERAL DIAGNOSTIC TABLE

Manual Transmission and Differential

## 21. General Diagnostic Table

S503257

### A: INSPECTION

S503257A10

#### 1. MANUAL TRANSMISSION

S503257A1001

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. <b>NOTE:</b> 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.
3. Unusual noise comes from transmission. <b>NOTE:</b> 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.	(k) Worn reverse idler gear and bushing	Replace.
	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings <b>NOTE:</b> 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 TABLE

Manual Transmission and Differential

## 2. DIFFERENTIAL S503257A1002

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 TABLE

Manual Transmission and Differential

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**MEMO:**

# GENERAL DESCRIPTION

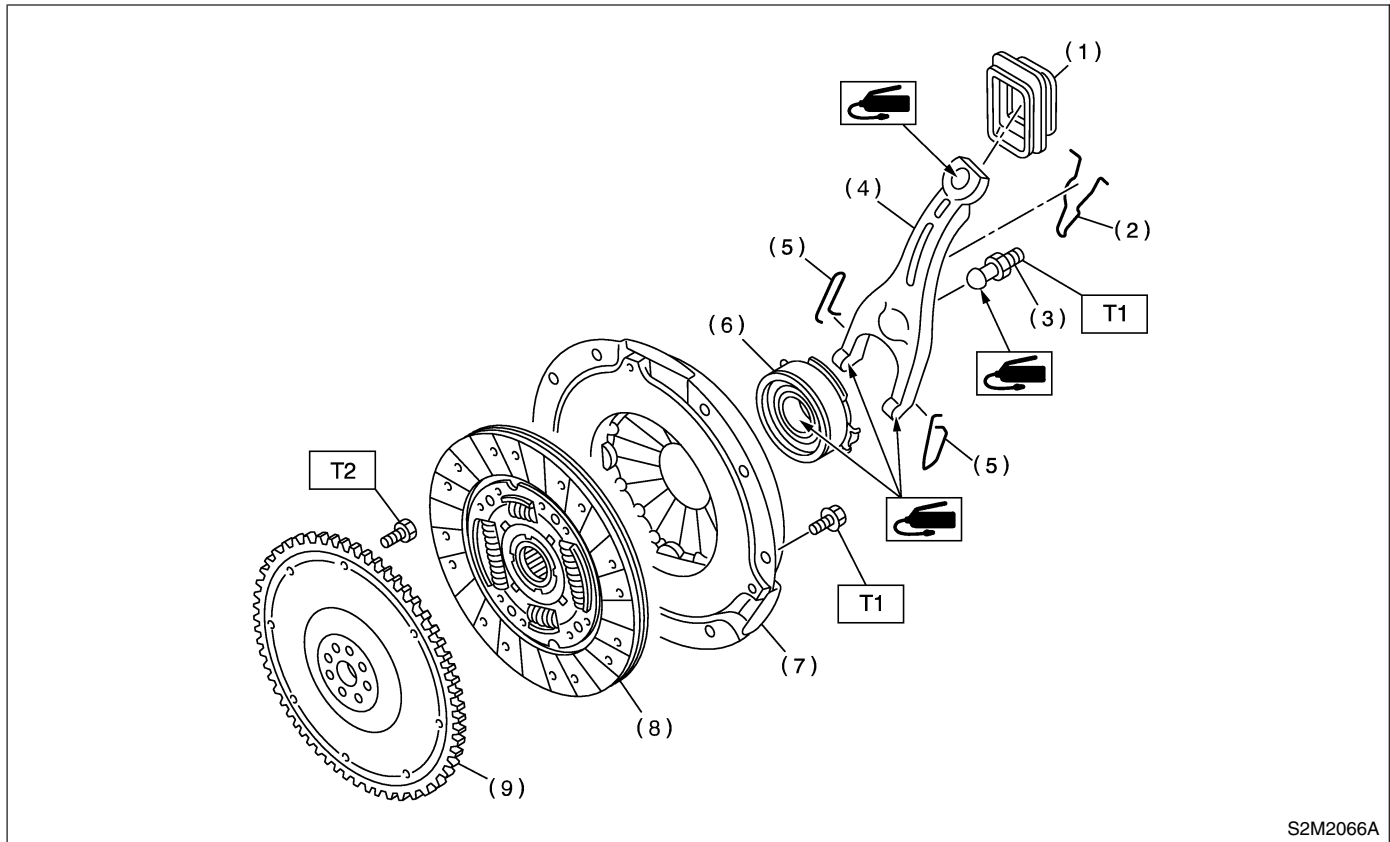
Clutch System

## 1. General Description SS04001

### A: SPECIFICATIONS SS04001E49

Clutch cover	Diaphragm set load kg (lb)	580 (1,279)
Clutch disc	Facing material	Woven
	O.D. × I.D. × thickness mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)
	Spline O.D. (No. of teeth) mm (in)	25.2 (0.992) (24)
	Depth of rivet head mm (in)	Limit of sinking 0.3 (0.012)
	Limit for runout mm (in)	1.0 (0.039) at R = 107 (4.21)
Clutch release lever ratio		1.6
Release bearing		Grease-packed self-aligning
Release lever	Stroke mm (in)	12 — 13.6 (0.472 — 0.535)
Clutch pedal	Full stroke mm (in)	130 — 135 (5.12 — 5.31)
	Free play mm (in)	4 — 13 (0.16 — 0.51)



**B: COMPONENT** S504001A05**1. CLUTCH ASSEMBLY** S504001A0510

S2M2066A

- |                                  |                            |
|----------------------------------|----------------------------|
| (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                         |                            |

---

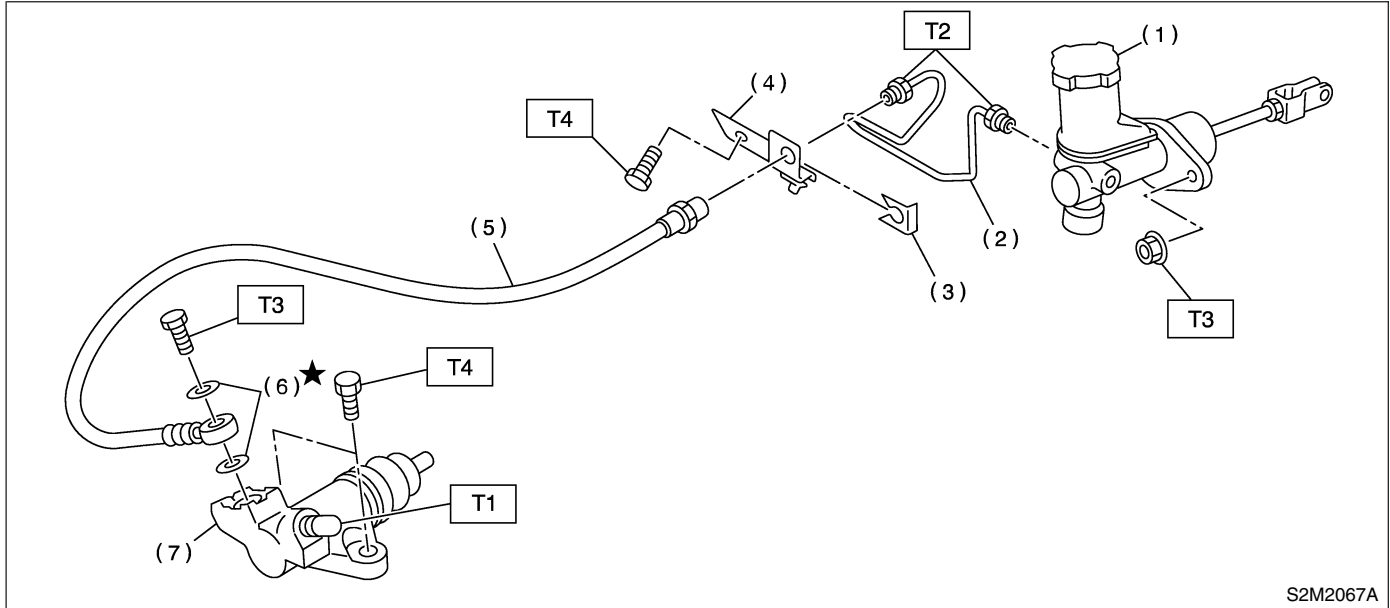
**Tightening torque: N·m (kgf-m, ft-lb)**
**T1: 15.7 (1.6, 11.6)****T2: 72 (7.3, 52.8)**

# GENERAL DESCRIPTION

Clutch System

## 2. CLUTCH PIPE AND HOSE

S504001A0511



- |                          |                        |
|--------------------------|------------------------|
| (1) Master cylinder ASSY | (6) Washer             |
| (2) Clutch pipe          | (7) Operating cylinder |
| (3) Clip                 |                        |
| (4) Bracket              |                        |
| (5) Clutch hose          |                        |

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

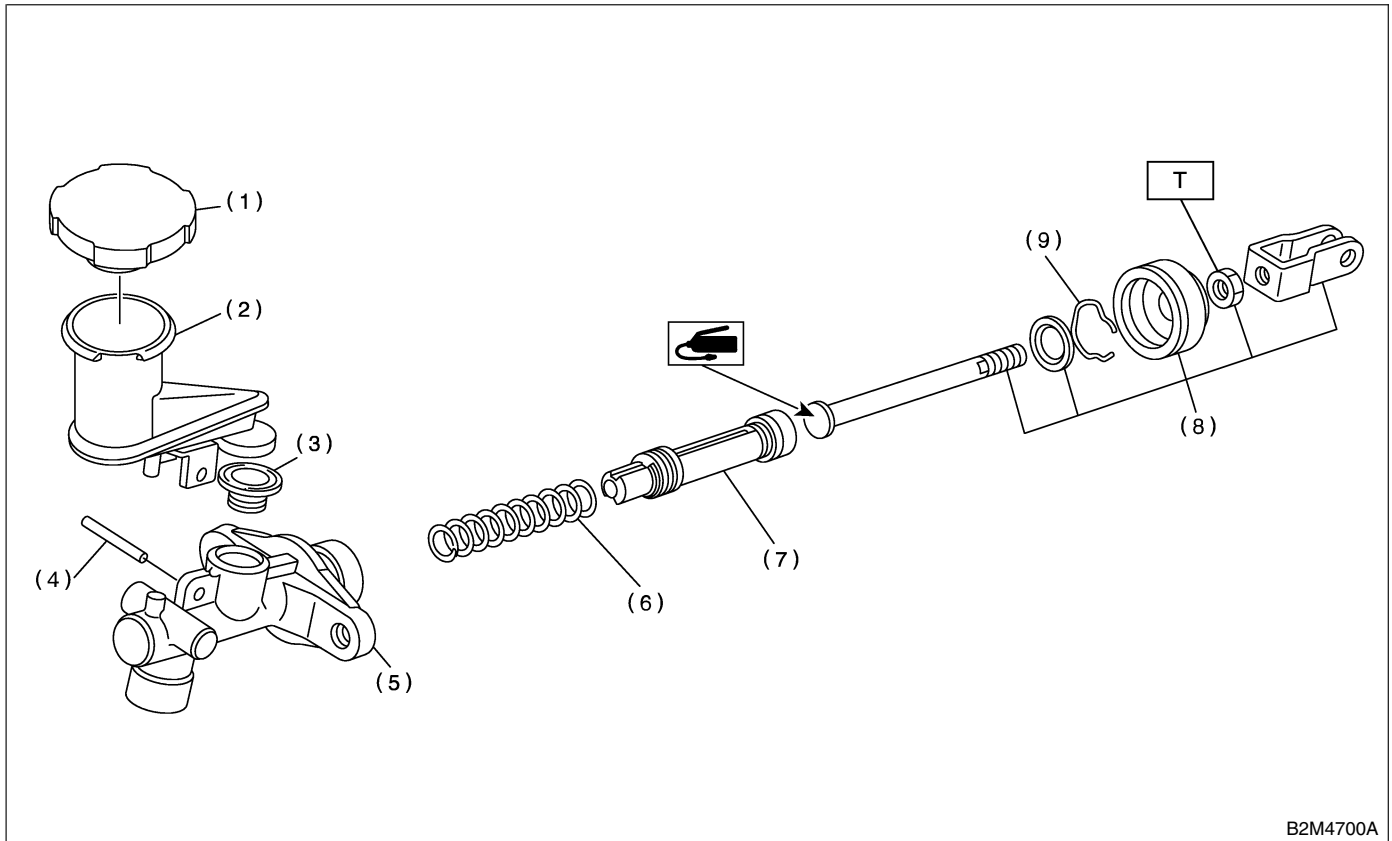
**T1: 8 (0.8, 5.8)**

**T2: 15 (1.5, 10.8)**

**T3: 18 (1.8, 13.0)**

**T4: 37 (3.8, 27.5)**

## 3. MASTER CYLINDER SS04001A0502



- (1) Reservoir cap
- (2) Reservoir tank
- (3) Oil seal
- (4) Straight pin

- (5) Master cylinder
- (6) Return spring
- (7) Piston
- (8) Push rod

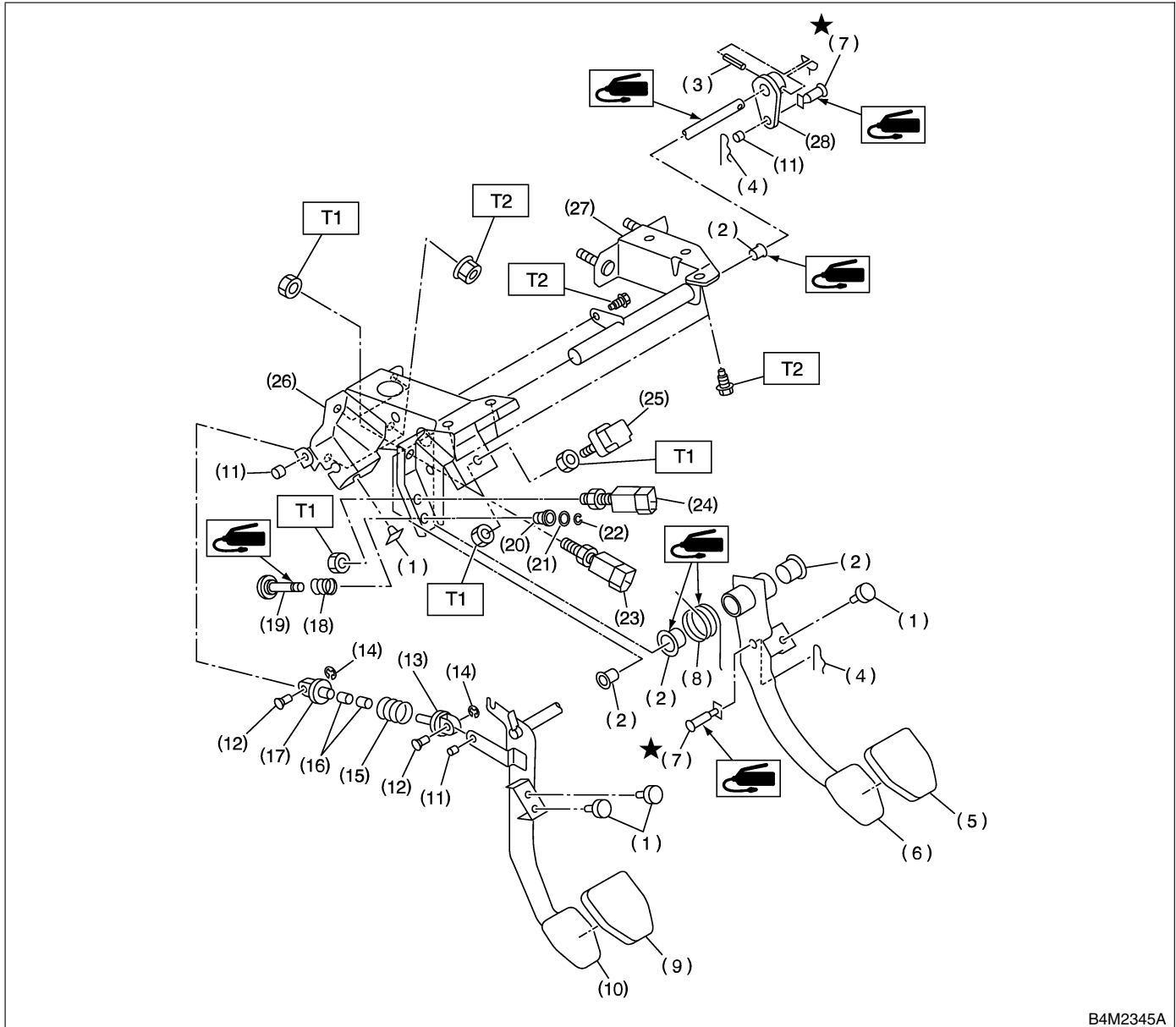
- (9) Piston stop ring

**Tightening torque: N·m (kgf-m, ft-lb)**  
**T: 10 (1.0, 7)**

# GENERAL DESCRIPTION

Clutch System

## 4. CLUTCH PEDAL SS04001A0503



B4M2345A

- |                        |  |  |
|------------------------|--|--|
| (1) Stopper            | (13) Assist rod A                      | (24) Clutch switch (With cruise control) |
| (2) Bushing            | (14) Clip                              | (25) Stop light switch                   |
| (3) Spring pin         | (15) Assist spring                     | (26) Pedal bracket                       |
| (4) Snap pin           | (16) Assist bushing                    | (27) Clutch master cylinder bracket      |
| (5) Brake pedal pad    | (17) Assist rod B                      | (28) Lever                               |
| (6) Brake pedal        | (18) Spring S                          |  |
| (7) Clevis pin         | (19) Rod S                             |  |
| (8) Brake pedal spring | (20) Bushing S                         |  |
| (9) Clutch pedal pad   | (21) O-ring                            |  |
| (10) Clutch pedal      | (22) Clip                              |  |
| (11) Bushing C         | (23) Clutch switch (Starter interlock) |  |
| (12) Clutch clevis pin |  |  |

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

**T1: 8 (0.8, 5.8)**

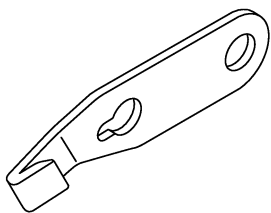
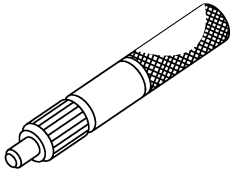
**T2: 18 (1.8, 13.0)**

**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.
- Refer to CAUTION in the "MT" section for removal of transmission.

**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

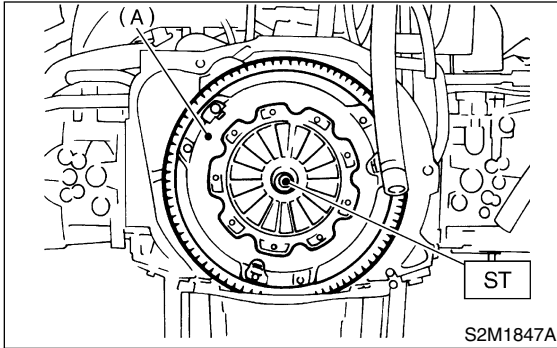
## 2. Clutch Disc and Cover S504252

### A: REMOVAL S504252A18

1) Remove transmission assembly from vehicle body. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>

2) Install ST on flywheel.

ST 498497100 CRANKSHAFT STOPPER



(A) Clutch cover

3) Remove clutch cover and clutch disc.

#### NOTE:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either clutch cover or clutch disc.

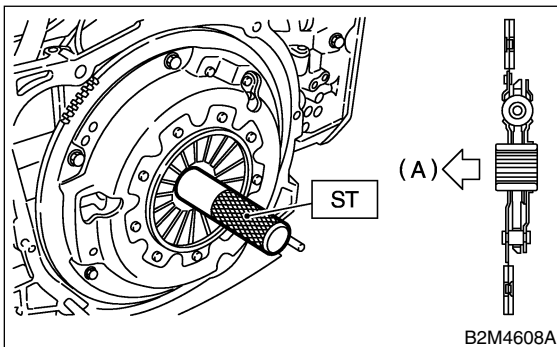
### B: INSTALLATION S504252A11

1) Insert ST into the clutch disc and install them on the flywheel by inserting the ST end into the pilot bearing.

#### NOTE:

When installing clutch disc, be careful of its direction.

ST 499747100 CLUTCH DISC GUIDE



(A) Flywheel side

2) 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

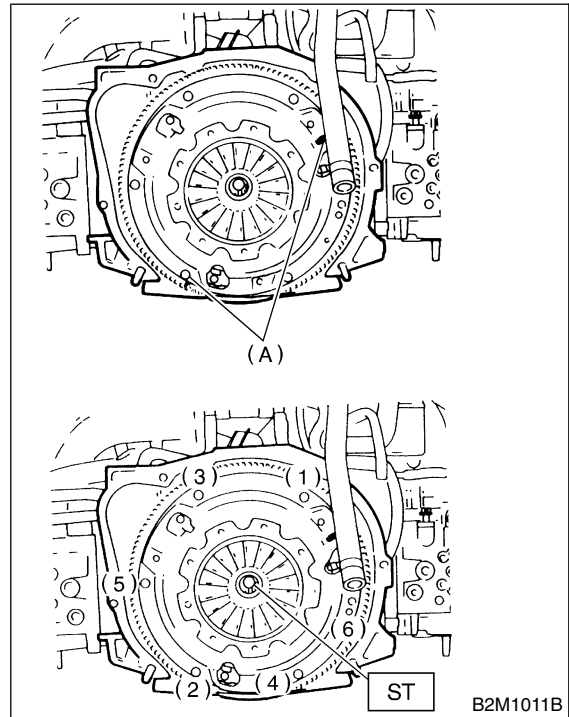
120° or more between “0” marks on the flywheel and clutch cover. (“0” marks indicate the directions of residual unbalance.)

- 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

3) Remove ST.

ST 499747100 CLUTCH DISC GUIDE

4) Install transmission assembly. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

## 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.

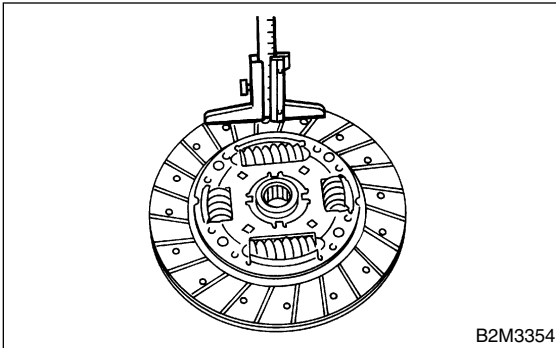
#### Depth of rivet head:

##### Limit of sinking

0.3 mm (0.012 in)

#### NOTE:

Do not wash clutch disc with any cleaning fluid.



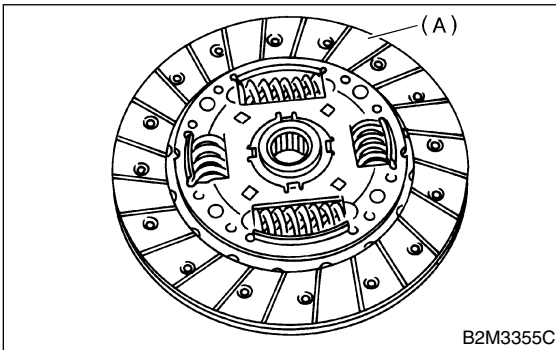
B2M3354

#### 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.



B2M3355C

(A) Facing

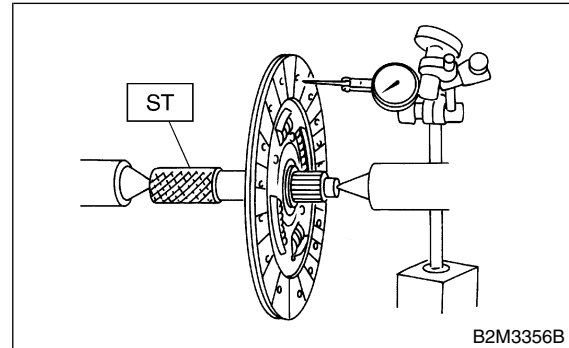
#### 4) Deflection on facing

If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

## ST 499747100 CLUTCH DISC GUIDE

### Limit for deflection:

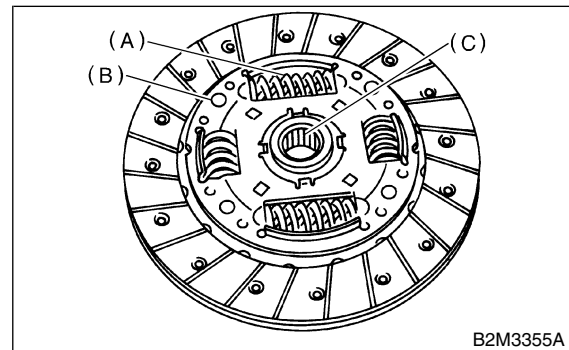
1.0 mm (0.039 in) at R = 107 mm (4.21 in)



B2M3356B

#### 5) Worn spline, loose rivets and torsion spring failure

Replace defective parts.



B2M3355A

(A) Torsion spring

(B) Rivet

(C) Spline

## 2. CLUTCH COVER

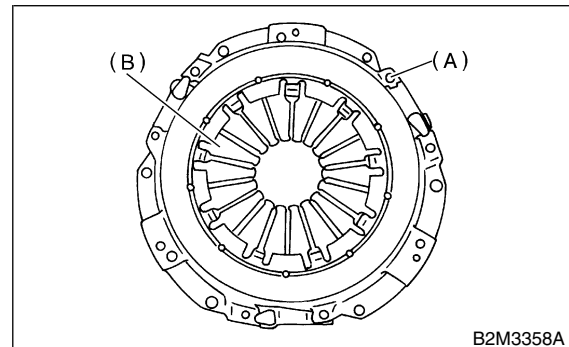
S504252A1002

### 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.



B2M3358A

(A) Thrust rivet

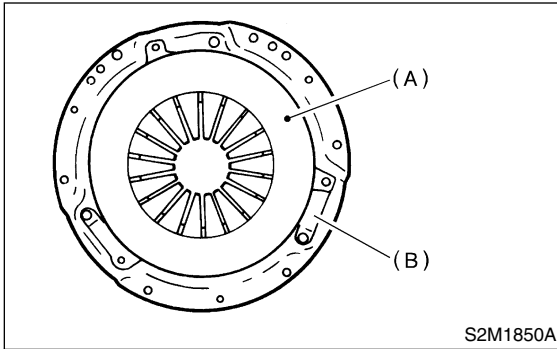
(B) Diaphragm spring

## CLUTCH DISC AND COVER

### Clutch System

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- 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



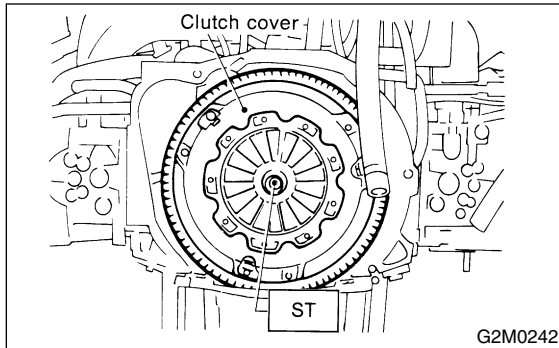
## 3. Flywheel S504250

### A: REMOVAL S504250A18

1) Remove transmission assembly. <Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>

2) Install ST on flywheel.

ST 498497100 CRANKSHAFT STOPPER



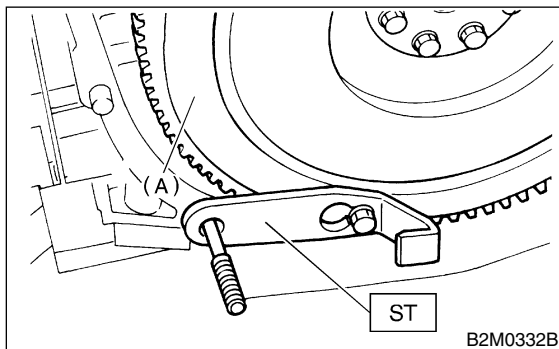
3) Remove clutch cover and clutch disc. <Ref. to CL-8, REMOVAL, Clutch Disc and Cover.>

NOTE:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either clutch cover and clutch disc.

4) Using ST, remove flywheel.

ST 498497100 CRANKSHAFT STOPPER

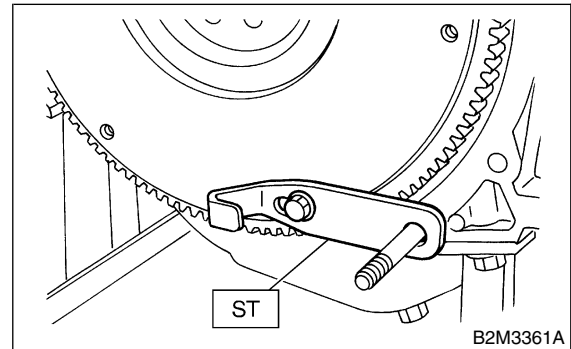


(A) Flywheel

### B: INSTALLATION S504250A11

1) Install flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



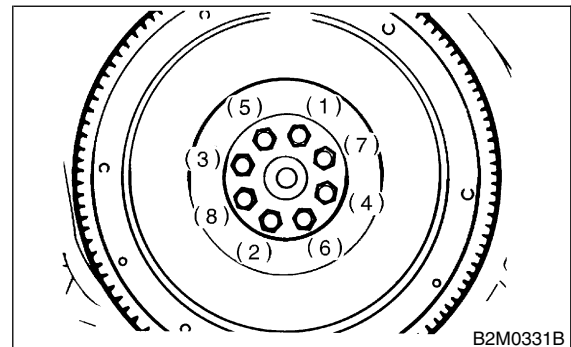
2) Tighten the flywheel attaching bolts to the specified torque.

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-8, INSTALLATION, Clutch Disc and Cover.>

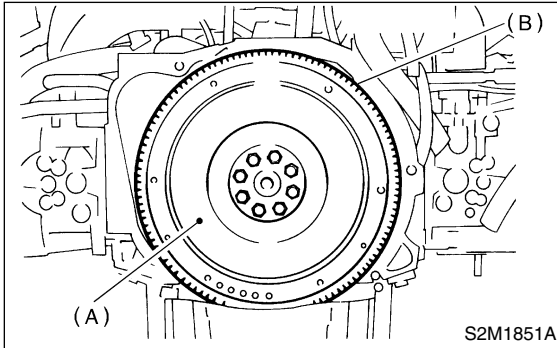
4) Install transmission assembly. <Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION S504250A10

### NOTE:

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 fly-wheel.

## 4. Release Bearing and Lever

S504251

### A: REMOVAL S504251A18

1) Remove transmission assembly from vehicle body.

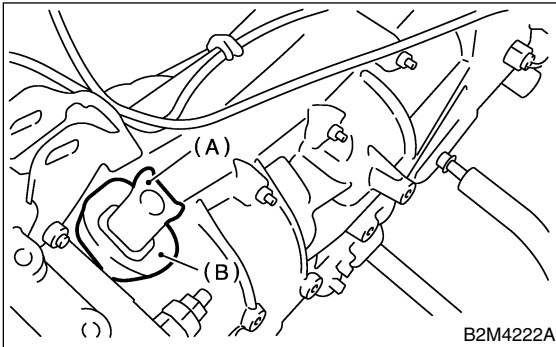
<Ref. to MT-27, REMOVAL, Manual Transmission Assembly.>

2) Remove the two clips from clutch release lever and remove release bearing.

NOTE:

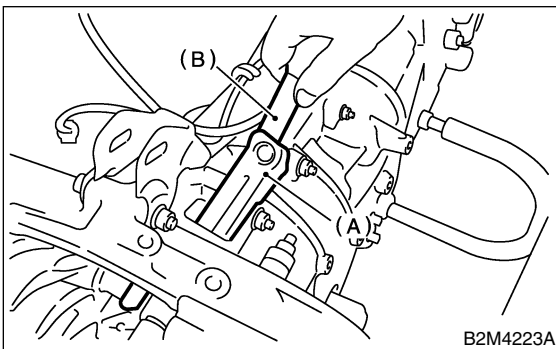
Be careful not to deform clips.

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

5) Remove pivot.

### B: INSTALLATION S504251A11

NOTE:

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 disulphide.)
- Contact surface of lever and operating cylinder

1) Install pivot.

**Tightening torque:**

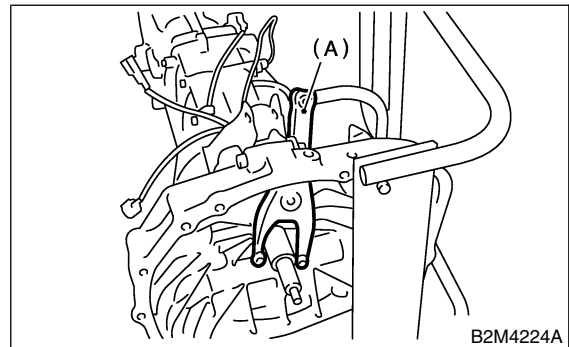
***T: 15.7 N·m (1.6 kgf-m, 11.6 ft-lb)***

2) 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.>

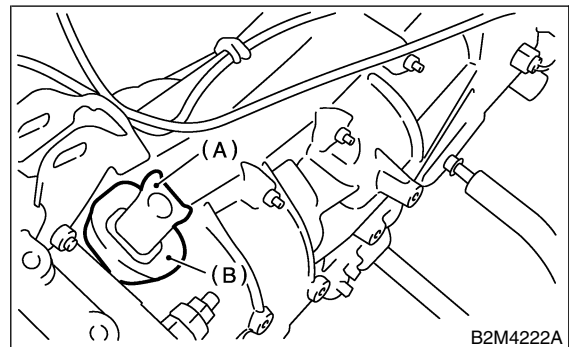
● Confirm that retainer spring is securely fitted by observing it through the main case hole.



- (A) Release lever

3) Install release bearing and fasten it with two clips.

4) Install release lever seal.



- (A) Clutch release lever  
(B) Screwdriver

# RELEASE BEARING AND LEVER

## Clutch System

5) Install transmission assembly.  
<Ref. to MT-29, INSTALLATION, Manual Transmission Assembly.>

### C: INSPECTION S504251A10

#### 1. RELEASE BEARING S504251A1001

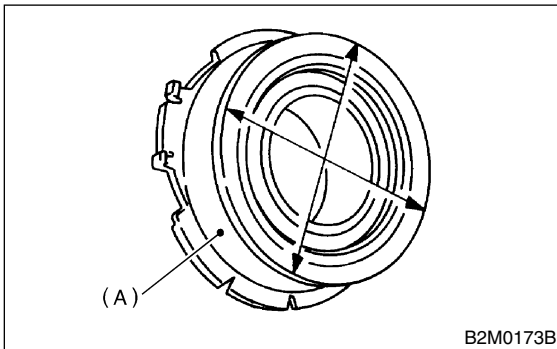
##### NOTE:

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.

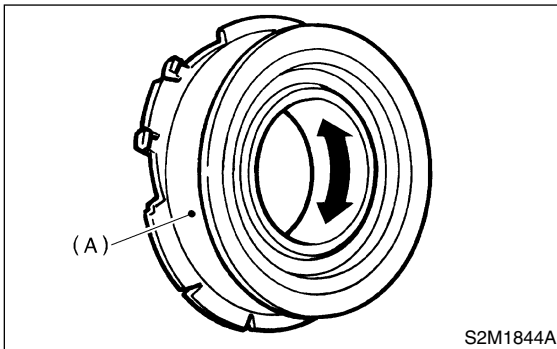
##### **Radial direction stroke:**

**1.4 mm (0.055 in)**



(A) Bearing case

2) Check the bearing for smooth rotation by applying pressure in the thrust direction.

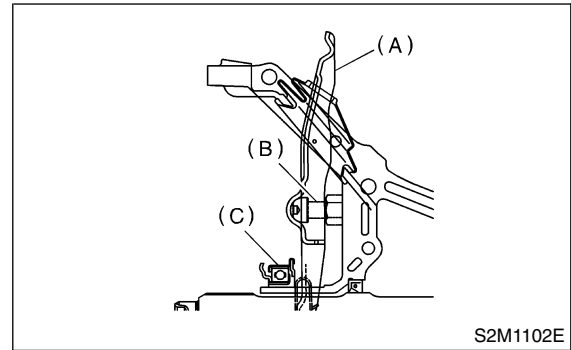


(A) Bearing case

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

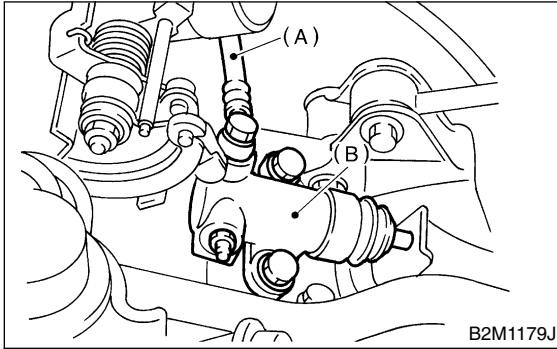
## 5. Operating Cylinder S504253

### A: REMOVAL S504253A18

- 1) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
- 2) Remove clutch hose from operating cylinder.

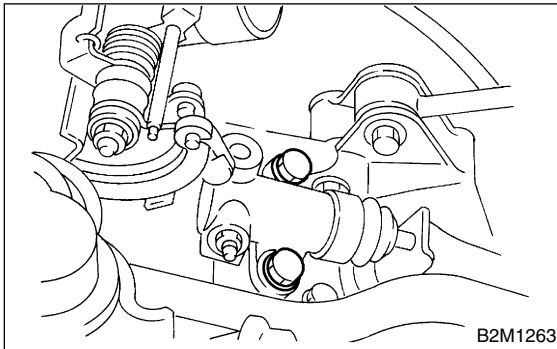
#### CAUTION:

Cover hose joint to prevent clutch fluid from flowing out.



- (A) Clutch hose  
(B) Operating cylinder

- 3) Remove operating cylinder from transmission.



### B: INSTALLATION S504253A11

- 1) Install in the reverse order of removal.

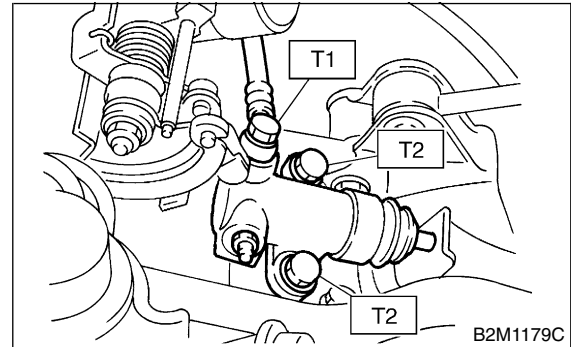
#### NOTE:

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-20, Clutch Fluid Air Bleeding.>

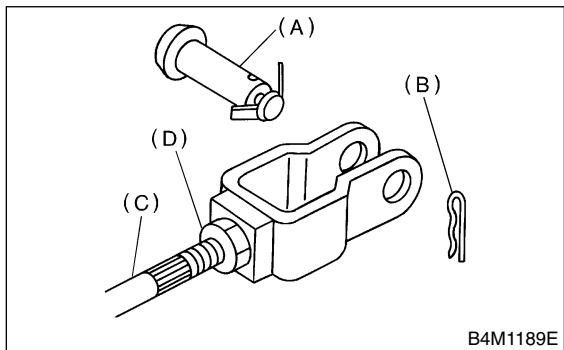
### C: INSPECTION S504253A10

- 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.

## 6. Master Cylinder S504168

### A: REMOVAL S504168A18

- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.

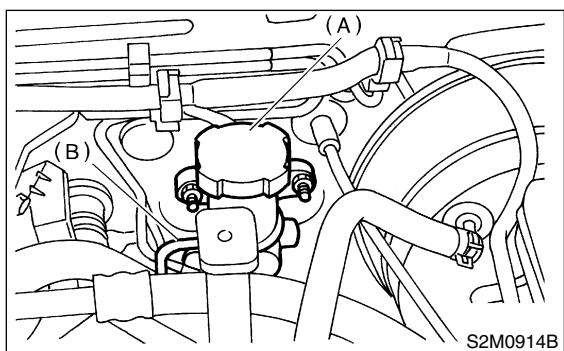


- (A) Clevis pin  
(B) Snap pin  
(C) Push rod  
(D) Lock nut

- 3) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
- 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.**



- (A) Master cylinder  
(B) Clutch pipe

### B: INSTALLATION S504168A11

- 1) Install master cylinder to body, and install clutch pipe to master cylinder.

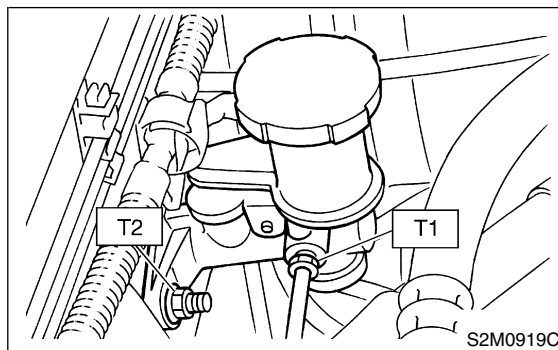
#### NOTE:

Check that pipe is routed properly.

#### Tightening torque:

**T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)**

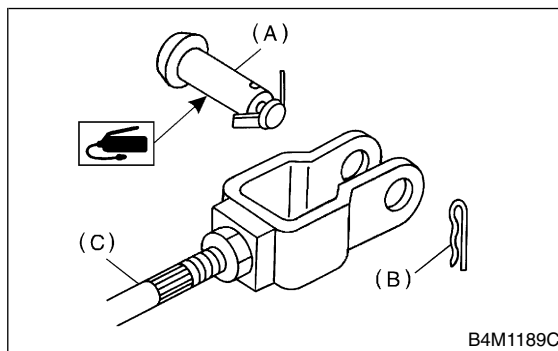
**T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)**



- 2) Connect push rod of master cylinder to clutch pedal, and install new clevis pin and snap pin.

#### NOTE:

Apply grease to clevis pin.



- (A) Clevis pin  
(B) Snap pin  
(C) Push rod

- 3) After bleeding air from system, ensure that clutch operates properly.

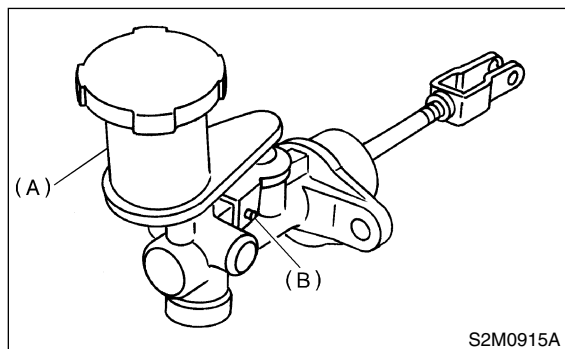
<Ref. to CL-20, Clutch Fluid Air Bleeding.>

- 4) Install air cleaner case. <Ref. to IN-6, INSTALLATION, Air Cleaner Case.>

## C: DISASSEMBLY

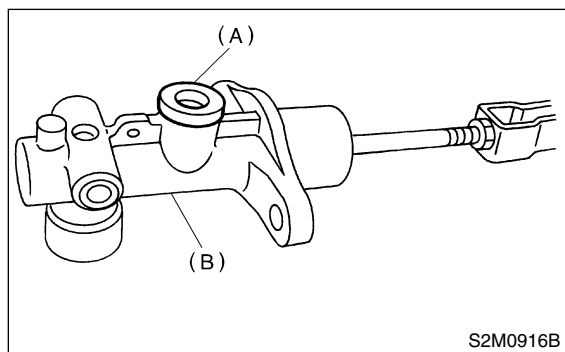
S504168A06

- 1) Remove straight pin and reservoir tank.



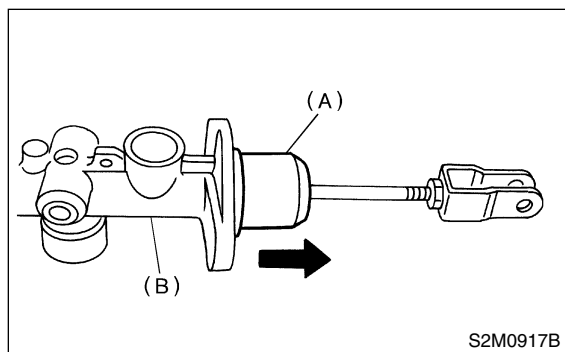
- (A) Reservoir tank
- (B) Straight pin

- 2) Remove oil seal.



- (A) Oil seal
- (B) Master cylinder

- 3) 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.

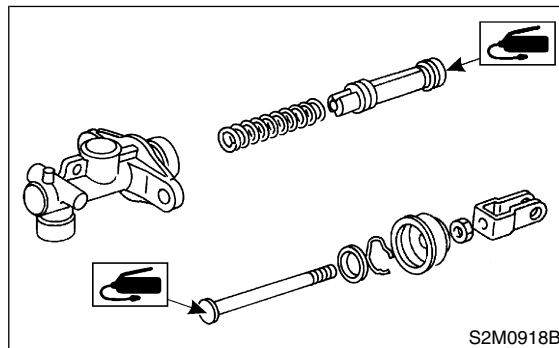
## D: ASSEMBLY

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)**

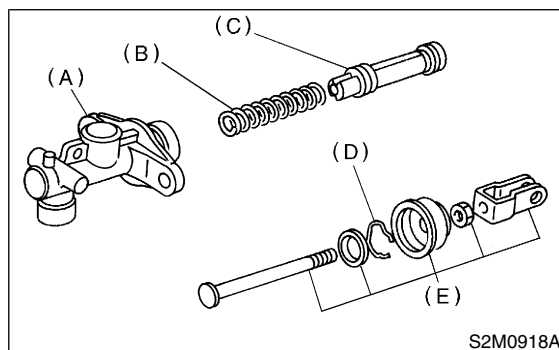


- 2) To assemble the master cylinder reverse the sequence of disassembly procedure.

## E: INSPECTION

S504168A10

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring and gasket, replace the faulty part.



- (A) Master cylinder body
- (B) Return spring
- (C) Piston
- (D) Snap ring
- (E) Rod ASSY

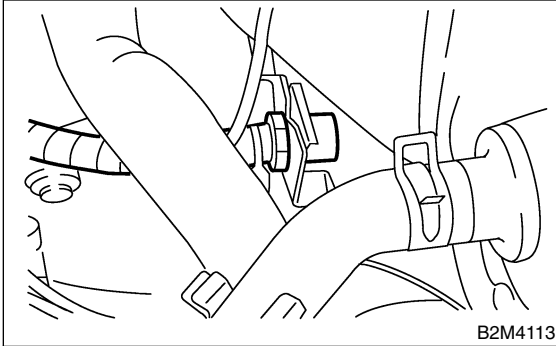
## 7. Clutch Pipe and Hose

S504262

### A: REMOVAL

S504262A18

- 1) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
- 2) Drain clutch fluid. <Ref. to CL-19, Clutch Fluid.>
- 3) Remove clutch pipe.
- 4) Unclip and remove hose from bracket.



- 5) Remove hose from operating cylinder.

### B: INSTALLATION

S504262A11

Install in the reverse order of removal.

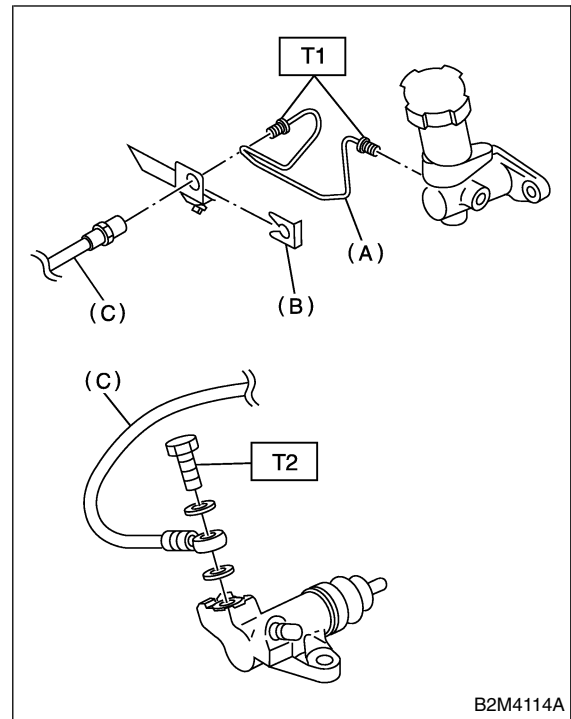
#### NOTE:

Bleed clutch fluid. <Ref. to CL-20, 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)**



- (A) Clutch pipe
- (B) Clip
- (C) Clutch hose

### 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.



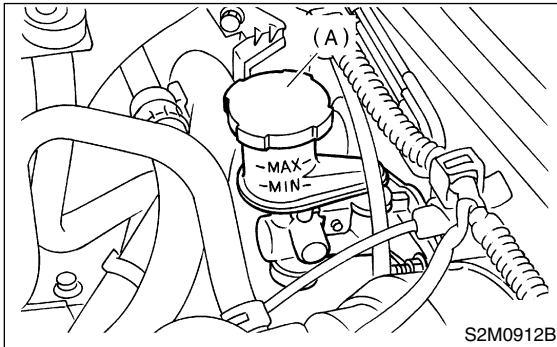
## 8. Clutch Fluid

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

#### NOTE:

- 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.
- 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. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
- 2) Draw out the brake fluid from reservoir tank with syringe.
- 3) Refill reservoir tank with recommended brake fluid.

#### **Recommended brake fluid:**

**FMVSS No. 116, fresh DOT3 or 4 brake fluid**

- 4) Bleed air from oil line with the help of a co-worker.  
<Ref. to CL-20, Clutch Fluid Air Bleeding.>

# CLUTCH FLUID AIR BLEEDING

Clutch System

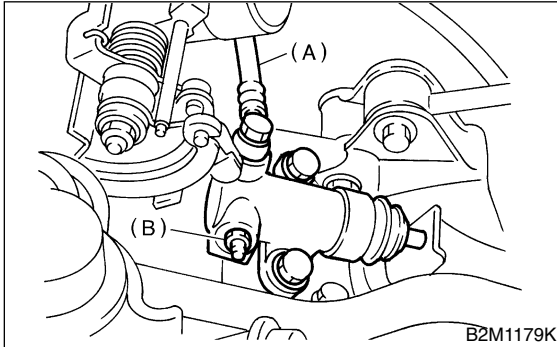
## 9. Clutch Fluid Air Bleeding S504260

### A: PROCEDURE S504260E45

#### NOTE:

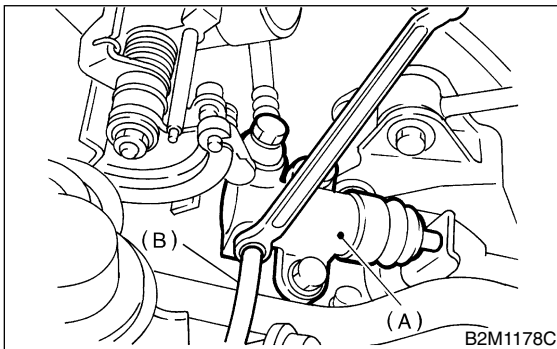
Bleed air from oil line with the help of a co-worker.

- 1) Remove air cleaner case. <Ref. to IN-6, REMOVAL, Air Cleaner Case.>
- 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

- 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.**

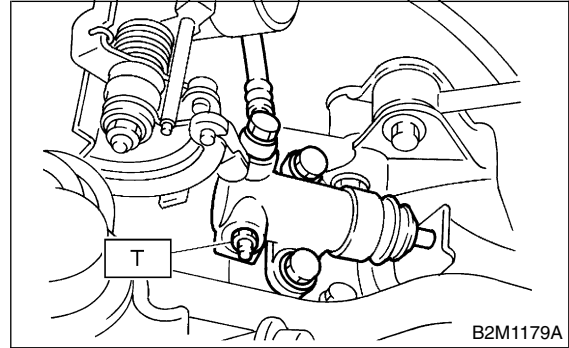
#### NOTE:

During bleeding operation, keep the clutch reservoir tank filled with brake fluid to eliminate entry of air.

- 5) Tighten air bleeder.

#### Tightening torque:

**T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)**



- 6) Check the clutch fluid level. <Ref. to CL-19, INSPECTION, Clutch Fluid.>
- 7) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
- 8) After bleeding air from system, ensure that clutch operates properly.

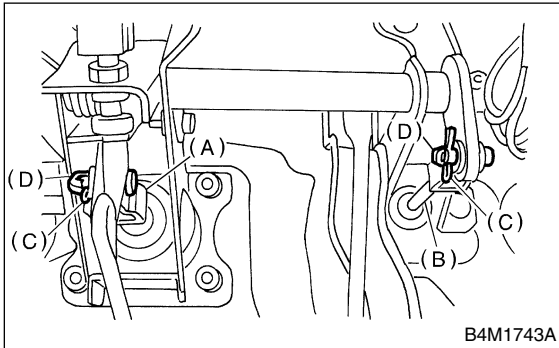
## 10. Clutch Pedal

S504256

### A: REMOVAL

S504256A18

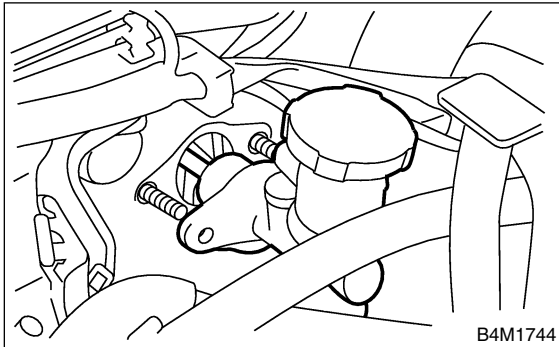
- 1) Remove steering column. <Ref. to PS-20, REMOVAL, Tilt Steering Column.>
- 2) Disconnect stop light and clutch switch connectors.
- 3) Remove snap pins which secure lever to push rod and operating rod.
- 4) Remove clevis pins which secure lever to push rod and operating rod.



B4M1743A

- (A) Operating rod
- (B) Push rod
- (C) Snap pin
- (D) Clevis pin

- 5) Remove nut which secures clutch master cylinder.



B4M1744

- 6) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

### B: INSTALLATION

S504256A11

- 1) Install in the reverse order of removal.

#### NOTE:

- Be careful not to kink accelerator cable.
- Always use new clevis pins.

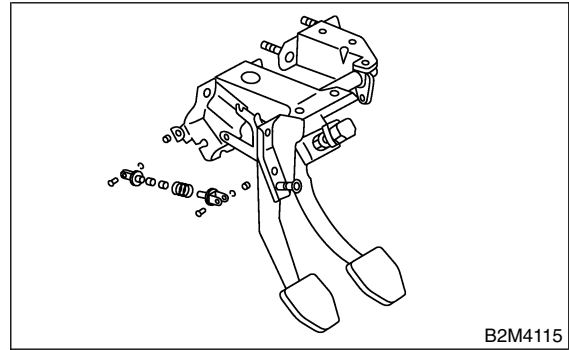
- 2) Adjustment of clutch pedal and adjustment after pedal installation. <Ref. to CL-22, ADJUSTMENT, Clutch Pedal.>

### C: DISASSEMBLY

S504256A06

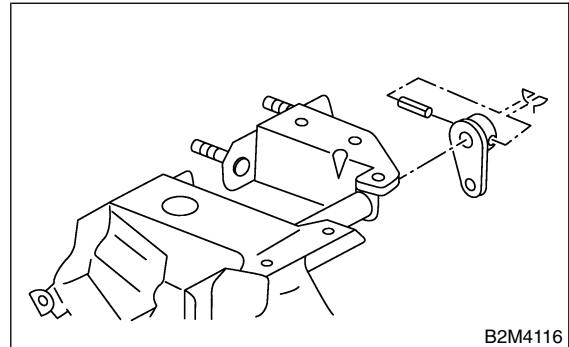
- 1) Remove clutch switches.

- 2) Remove clips, assist spring assembly and bushing.



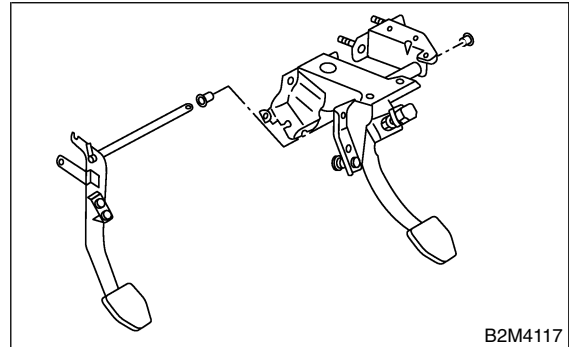
B2M4115

- 3) Remove spring pin and lever.



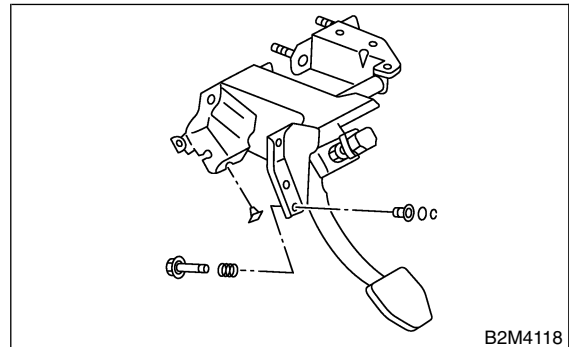
B2M4116

- 4) Remove clutch pedal and bushing.



B2M4117

- 5) Remove stopper, clip, O-ring, rod S, and then remove spring and bushing S.



B2M4118

- 6) Remove stoppers from clutch pedal.
- 7) Remove clutch pedal pad.

# CLUTCH PEDAL

## Clutch System

### D: ASSEMBLY S504256A02

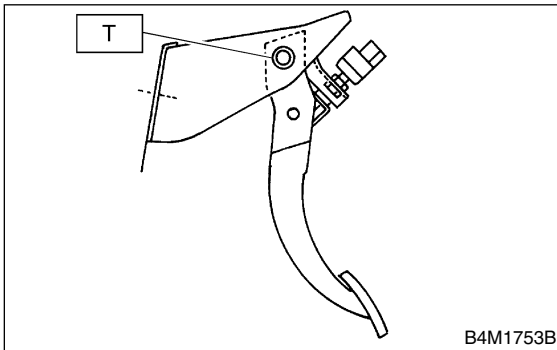
- 1) Attach stop light switch, etc. to pedal bracket temporarily.
- 2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
- 3) Align bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring and clutch pedal effort reducing spring (vehicle with hill holder), and then install pedal bolt.

#### NOTE:

Clean up inside of bushings and apply grease before installing spacer.

#### Tightening torque:

**T: 29 N·m (3.0 kgf-m, 21.7 ft-lb)**



### E: INSPECTION S504256A10

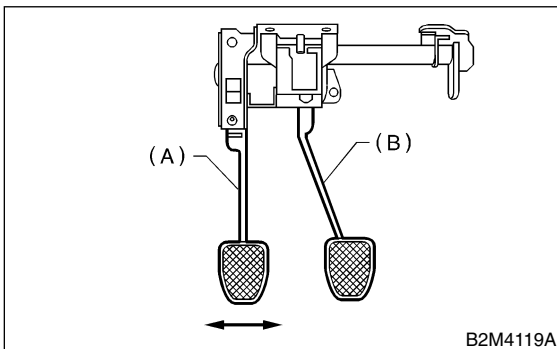
#### 1. CLUTCH PEDAL S504256A1001

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. If excessive deflection is noted, replace bushings with new ones.

#### Deflection of clutch pedal:

##### Service limit

**5.0 mm (0.197 in) or less**



- (A) Clutch pedal  
(B) Brake pedal

### F: ADJUSTMENT S504256A01

#### 1. CLUTCH PEDAL S504256A0101

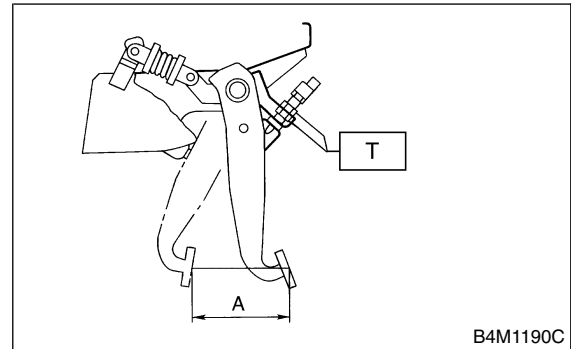
- 1) Turn clutch switch lock nuts until clutch pedal full stroke length is within specifications.

#### NOTE:

- Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.
- If lock nuts cannot adjust clutch pedal full stroke length to specifications, turn master cylinder push rod to adjust it.

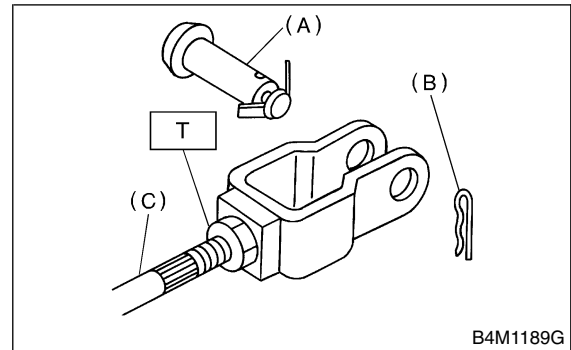
**Specified clutch pedal full stroke: A**  
**130 — 135 mm (5.12 — 5.31 in)**

**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: 8 N·m (0.8 kgf-m, 5.8 ft-lb)**



- (A) Clevis pin  
(B) Snap pin  
(C) Push rod  
(D) Lock nut

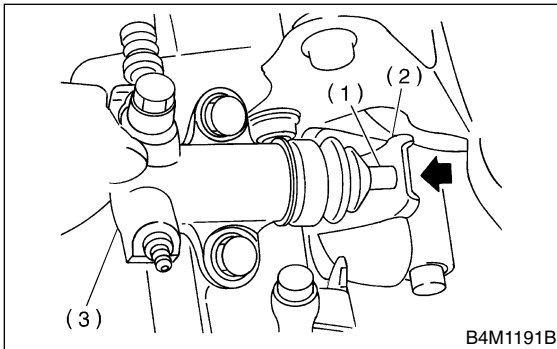
- 3) Depress and release clutch pedal 2 to 3 times to ensure that clutch pedal and release fork operate smoothly. If clutch pedal and release fork do not operate smoothly, bleed air from clutch hydraulic system. <Ref. to CL-20, Clutch Fluid Air Bleeding.>

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)***

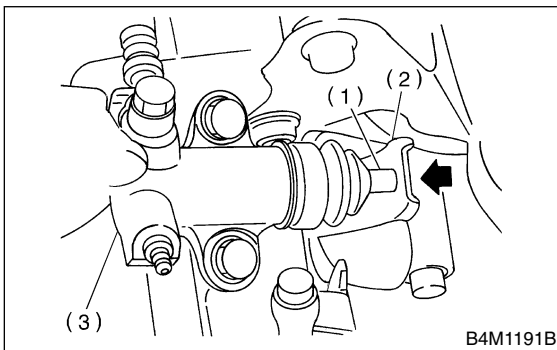
5) Move clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

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 a new one. <Ref. to CL-16, Master Cylinder.>



- (1) Push rod
- (2) Release lever
- (3) Operating cylinder

7) Push release fork 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.

10) Check the fluid level. <Ref. to CL-19, INSPECTION, Clutch Fluid.>

## 11. Clutch Switch S504258

### A: REMOVAL S504258A18

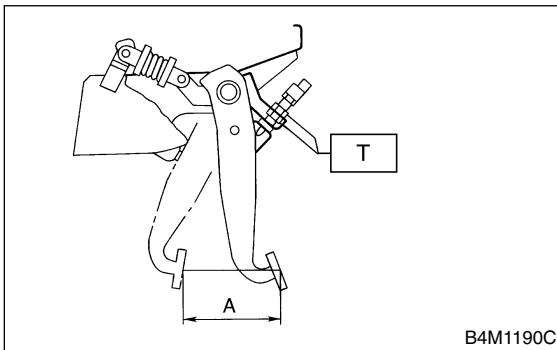
- 1) Remove battery ground cable.
- 2) Disconnect connector from clutch switch.
- 3) Remove clutch switch.

### B: INSTALLATION S504258A11

- 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)**

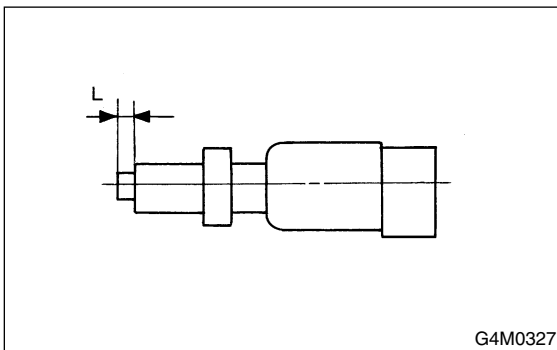


- 2) If clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-22, ADJUSTMENT, Clutch Pedal.>
- 3) Connect clutch switch connector.

### C: INSPECTION S504258A10

- 1) If clutch switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

**Specified position: L**  
 **$2^{+1.5}/_0$  mm ( $0.079^{+0.059}/_0$  in)**



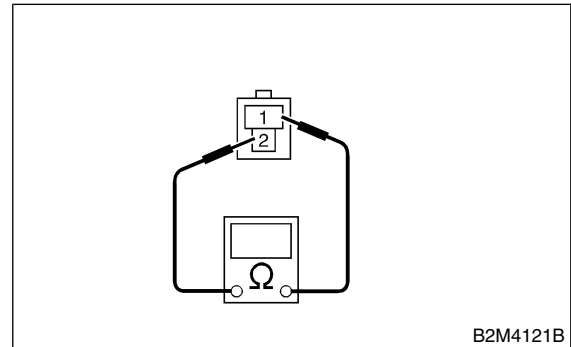
- 2) Check clutch switch continuity. If continuity is not as specified, replace the switch.

- (1) Disconnect the clutch switch connector.
- (2) Measure the resistance between 1 and 2 of switch terminal.

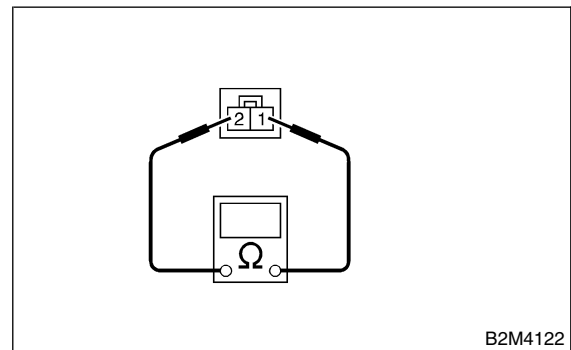
**Terminals/Specified resistance**  
**When clutch pedal depressed:**  
**1 — 2/Less than 1Ω**

**Terminals/Specified resistance**  
**When clutch pedal not depressed:**  
**1 — 2/More than 1MΩ**

- Clutch switch (Starter interlock)



- Clutch switch (With cruise control)



## 12. General Diagnostic Table

S504257

### A: INSPECTION

S504257A10

#### 1. CLUTCH

S504257A1002

Symptom	Possible cause	Corrective action
<b>1. Clutch slippage.</b> It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms <ul style="list-style-type: none"> <li>● Engine speed up when shifting.</li> <li>● High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed.</li> <li>● Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing.</li> <li>● 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.</li> </ul>	(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.
<b>2. Clutch drags.</b> 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. <ul style="list-style-type: none"> <li>● Method of testing: &lt;Ref. to CL-26, DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.&gt;</li> </ul> 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.
<b>3. Clutch chatters.</b> 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 action
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 SS04257A1003

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 a new one.

## 3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG SS04257A1001

No.	Step	Check	Yes	No
1	<b>CHECK GEAR NOISE.</b> 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	<b>CHECK GEAR NOISE.</b> 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	<b>CHECK GEAR NOISE.</b> 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.



# BASIC DIAGNOSTIC PROCEDURE

Automatic Transmission (Diagnostics)

## 1. Basic Diagnostic Procedure

S004501

### A: PROCEDURE

S004501E45

No.	Step	Check	Yes	No
1	<b>CHECK PRE-INSPECTION.</b> 1) Ask the customer when and how the trouble occurred using the 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-29, Inhibitor Switch.>	Is the unit that might influence the AT problem normal?	Go to step 2.	Repair or replace each item.
2	<b>CHECK “AT OIL TEMP” WARNING LIGHT.</b> Turn the ignition switch to ON.	Does not the “AT OIL TEMP” warning light light up?	Go to step 3.	Go to step 4.
3	<b>CHECK “AT OIL TEMP” WARNING LIGHT.</b> 1) Turn the ignition switch to OFF. 2) Repair the “AT OIL TEMP” warning light circuit or power supply and ground line circuit. <Ref. to AT-32, Diagnostic Procedure for “AT Oil Temp” Warning Light.> 3) Turn the ignition switch to ON.	Is the “AT OIL TEMP” warning light flashing?	Go to step 4.	Go to step 5.
4	<b>CHECK INDICATION OF DTC.</b> Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-25, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-26, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> <b>NOTE:</b> If the communication function of the select monitor cannot be executed normally, check the communication circuit. <Ref. to AT-40, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is the diagnostic trouble code (DTC) displayed?	Go to step 6. <b>NOTE:</b> Record all diagnostic trouble code (DTC).	Go to step 5.

# BASIC DIAGNOSTIC PROCEDURE

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
5	<b>PERFORM THE GENERAL DIAGNOSTICS.</b> 1) Inspect using the "Diagnostic Procedure for No-Diagnostic trouble Code". <Ref. to AT-116, Diagnostic Procedure for No-diagnostic Trouble Code (DTC).> 2) Inspect using the "Symptom Related Diagnostic". <Ref. to AT-134, Symptom Related Diagnostic.> 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-28, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-28, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-27, Inspection Mode.> Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-25, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-26, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the diagnostic trouble code (DTC) displayed?	Go to step 6.	Complete the diagnosis.
6	<b>PERFORM THE DIAGNOSIS.</b> 1) Inspect using the "Diagnostics Chart with Diagnostic Trouble Code". <Ref. to AT-44, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For trouble code table, refer to the "List of Diagnostic Trouble Code". <Ref. to AT-30, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-28, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-28, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-27, Inspection Mode.> 5) Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-25, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-26, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the diagnostic trouble code (DTC) displayed?	Inspect using the "Diagnostics Chart with Diagnostic Connector". <Ref. to AT-44, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	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	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent (      times a day)	
Weather	<input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Snowy <input type="checkbox"/> Various/Others (                      )	
Place	<input type="checkbox"/> High <input type="checkbox"/> Suburbs <input type="checkbox"/> Inner city <input type="checkbox"/> Uphill <input type="checkbox"/> Rough road <input type="checkbox"/> Others (                      )	
Outdoor temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold	
Vehicle speed	km/h (MPH)	
Malfunction indicator lamp (MIL)	<input type="checkbox"/> Continuously lit	<input type="checkbox"/> Not lit
Select lever position	<input type="checkbox"/> P <input type="checkbox"/> R <input type="checkbox"/> N <input type="checkbox"/> D <input type="checkbox"/> 3 <input type="checkbox"/> 2 <input type="checkbox"/> 1	
Driving condition	<input type="checkbox"/> Not affected <input type="checkbox"/> At racing <input type="checkbox"/> While decelerating	<input type="checkbox"/> At starting <input type="checkbox"/> While accelerating <input type="checkbox"/> While turning ( <input type="checkbox"/> RH/ <input type="checkbox"/> LH)
Symptoms	<input type="checkbox"/> While idling	
	<input type="checkbox"/> While cruising	
	<input type="checkbox"/> No up-shift	
	<input type="checkbox"/> No down-shift	
	<input type="checkbox"/> No kick down	
	<input type="checkbox"/> Vehicle does not move ( <input type="checkbox"/> Any position <input type="checkbox"/> Particular position)	
	<input type="checkbox"/> Lock-up malfunction	
	<input type="checkbox"/> Noise or vibration	
<input type="checkbox"/> Shift shock or slip		
<input type="checkbox"/> Select lever does not move		
<input type="checkbox"/> Others (                      )		

### 3. General Description S004001

#### A: CAUTION S004001A03

##### ● Supplemental Restraint System “Airbag”

The 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 the airbag system wiring harness when performing diagnostics and servicing the TCM.

##### ● Measurement

When measuring the 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 the battery voltage and specific gravity of electrolyte.

**Standard voltage: 12 V or more**

**Specific gravity: Above 1.260**

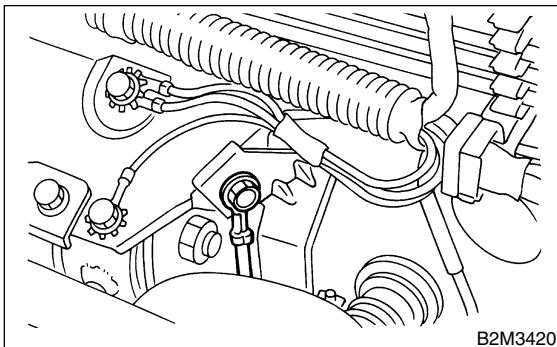
##### 2. TRANSMISSION GROUND S004001A1002

Make sure that the ground terminal bolt is tightened securely.

##### ● Chassis side

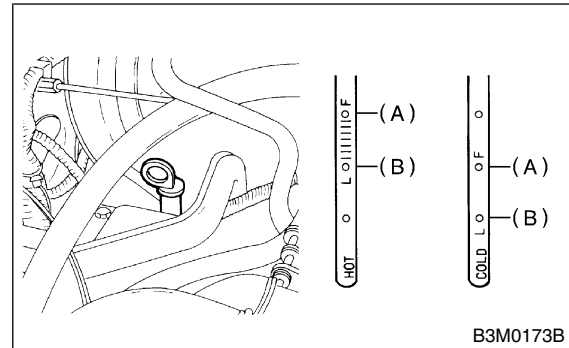
**Tightening torque:**

**13 N·m (1.3 kgf-m, 9.4 ft-lb)**



### 3. ATF LEVEL S004001A1003

Make sure the ATF level is in the specification.  
<Ref. to AT-9, Automatic Transmission Fluid.>

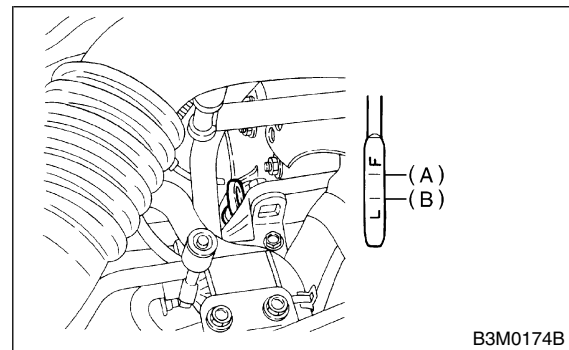


(A) Upper level

(B) Lower level

### 4. FRONT DIFFERENTIAL OIL LEVEL S004001A1004

Make sure the front differential oil level is in the specification.



(A) Upper level

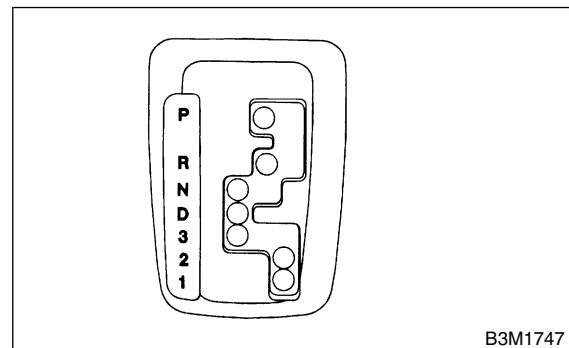
(B) Lower level

### 5. OPERATION OF SHIFT SELECT LEVER S004001A1005

Make sure there is no abnormal noise, dragging or contact pattern in each select lever range.

##### WARNING:

**Stop the engine while checking operation of the selector lever.**

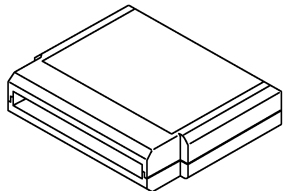



## GENERAL DESCRIPTION

Automatic Transmission (Diagnostics)

### C: PREPARATION TOOL S004001A17

#### 1. SPECIAL TOOLS S004001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA190 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"> <li>English: 22771AA030 (Without printer)</li> <li>German: 22771AA070 (Without printer)</li> <li>French: 22771AA080 (Without printer)</li> <li>Spanish: 22771AA090 (Without printer)</li> </ul>

#### 2. GENERAL PURPOSE TOOLS S004001A1702

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

## 4. Electrical Components Location

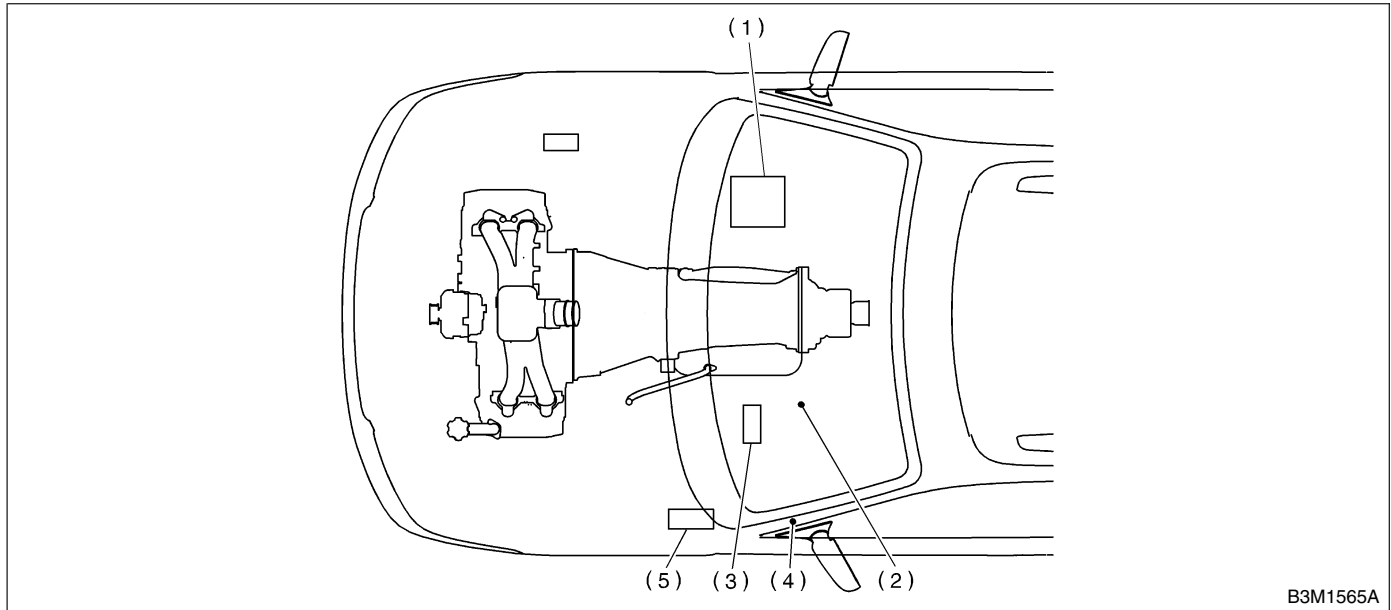
S004507

### A: LOCATION

S004507A13

#### 1. CONTROL MODULE

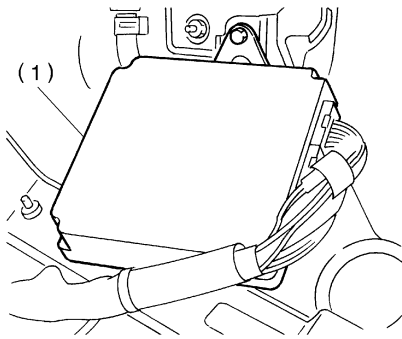
S004507A1301



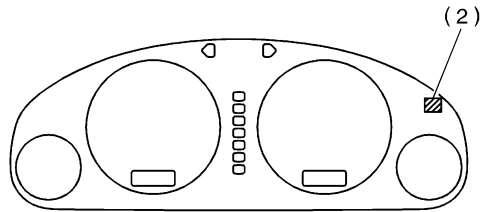
- |   |                                       |  |
|---|---------------------------------------|--|
| (1) Engine control module (ECM)                                 | (3) Transmission control module (TCM) | (5) Vehicle dynamic control module (with VDC system) |
| (2) "AT OIL TEMP" warning light (AT diagnostic indicator light) | (4) Data link connector               |  |

# ELECTRICAL COMPONENTS LOCATION

## Automatic Transmission (Diagnostics)

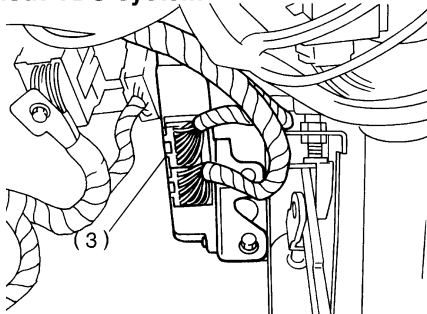


B3M1575A



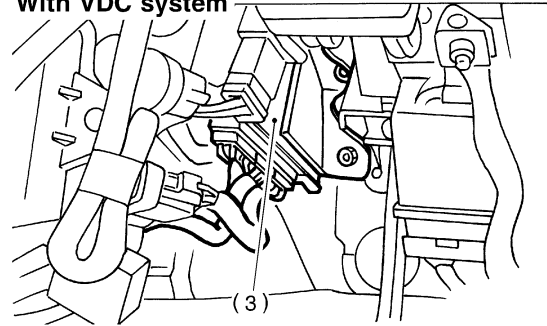
B3M1718A

**Without VDC system**

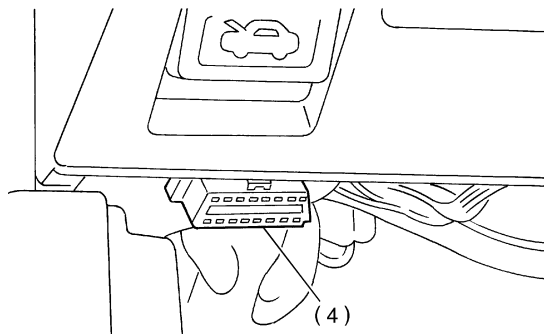


B3M1666F

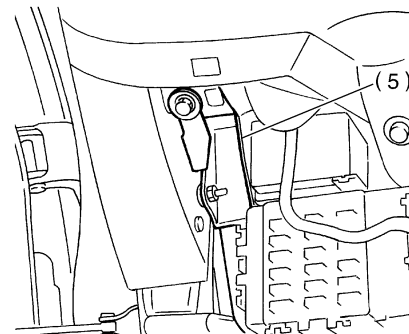
**With VDC system**



B3M1592C



B3M1574A

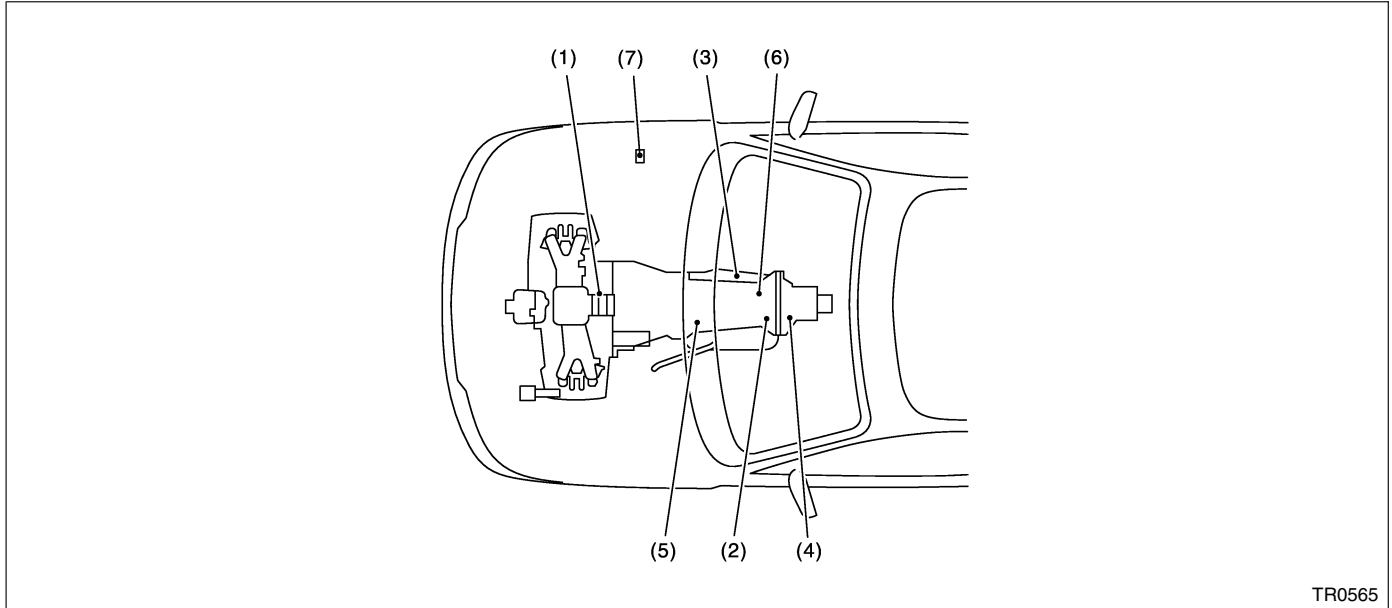


B3M1576A

# ELECTRICAL COMPONENTS LOCATION

Automatic Transmission (Diagnostics)

## 2. SENSOR S004507A1302



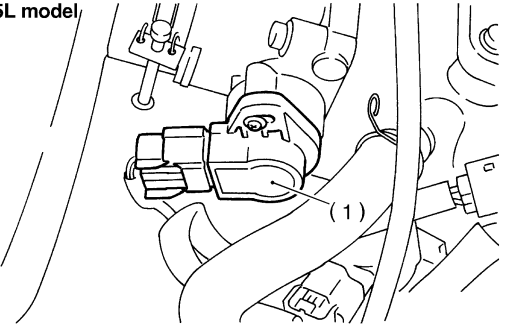
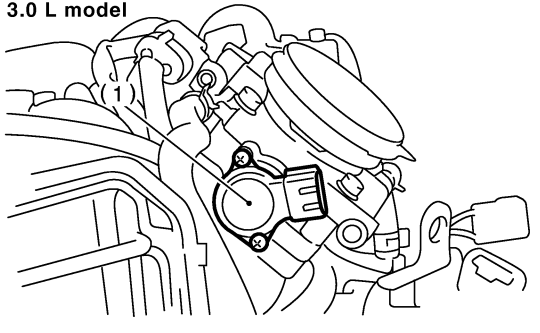
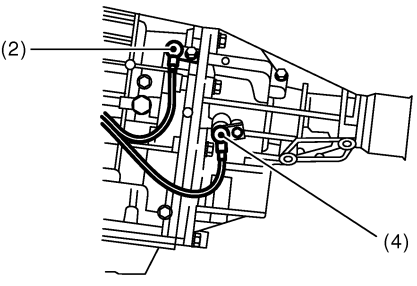
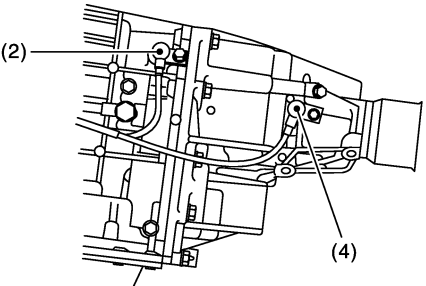
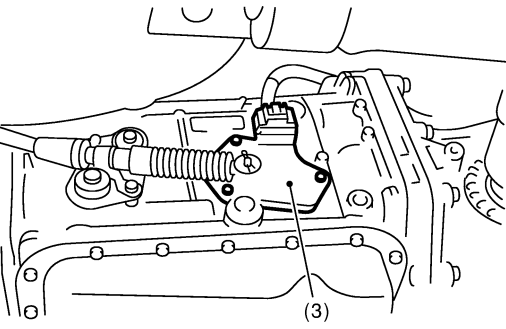
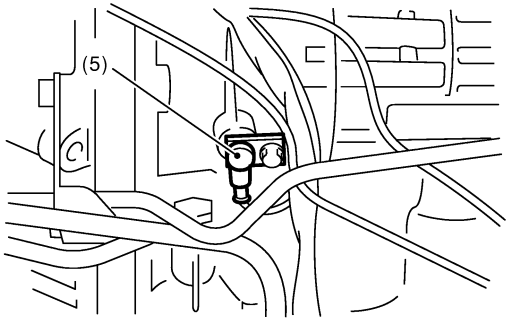
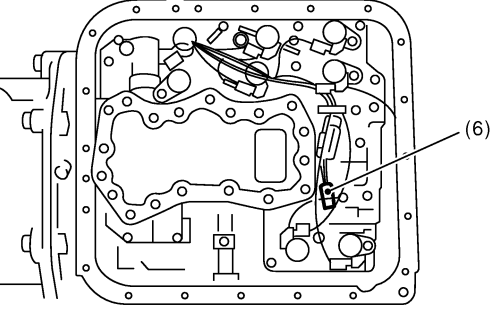
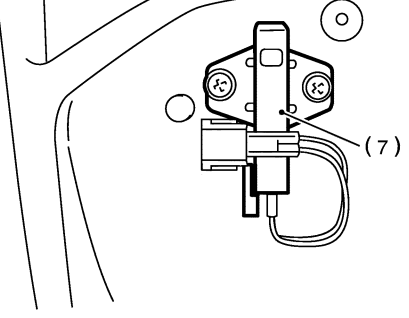
TR0565

- |                                |   |  |
|--------------------------------|---|--|
| (1) Throttle position sensor   | (4) Rear vehicle speed sensor             | (6) ATF temperature sensor                 |
| (2) Front vehicle speed sensor | (5) Torque converter turbine speed sensor | (7) Dropping resistor (Without VDC system) |
| (3) Inhibitor switch           |   |  |



# ELECTRICAL COMPONENTS LOCATION

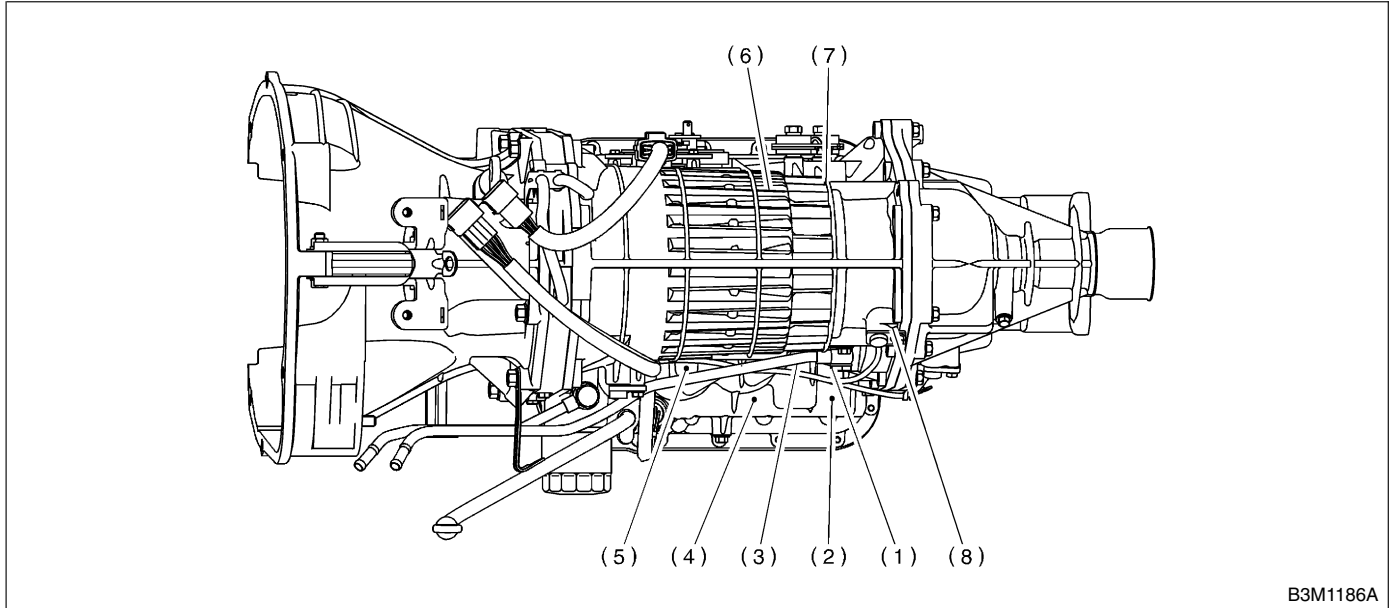
## Automatic Transmission (Diagnostics)

<p><b>2.5L model</b></p>  <p>(1)</p> <p>S2M0262C</p>	<p><b>3.0 L model</b></p>  <p>B2M4383B</p>
<p><b>Without VDC system</b></p>  <p>(2)</p> <p>(4)</p> <p>B3M2240A</p>	<p><b>With VDC system</b></p>  <p>(2)</p> <p>(4)</p> <p>B3M2241A</p>
 <p>(3)</p> <p>TR0388</p>	 <p>(5)</p> <p>TR0390</p>
 <p>(6)</p> <p>TR0389</p>	 <p>(7)</p> <p>TR0593</p>

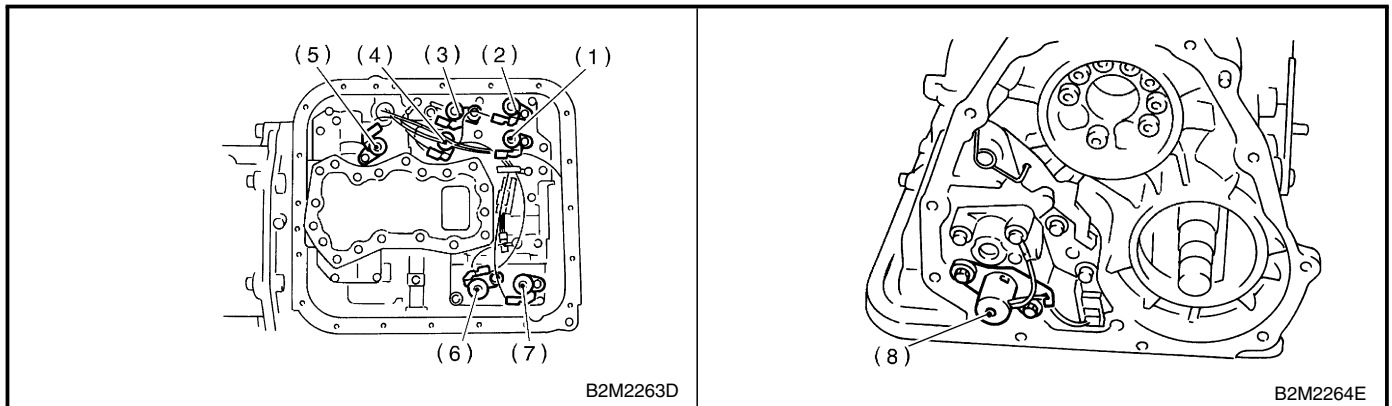
# ELECTRICAL COMPONENTS LOCATION

Automatic Transmission (Diagnostics)

## 3. 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    |                               |



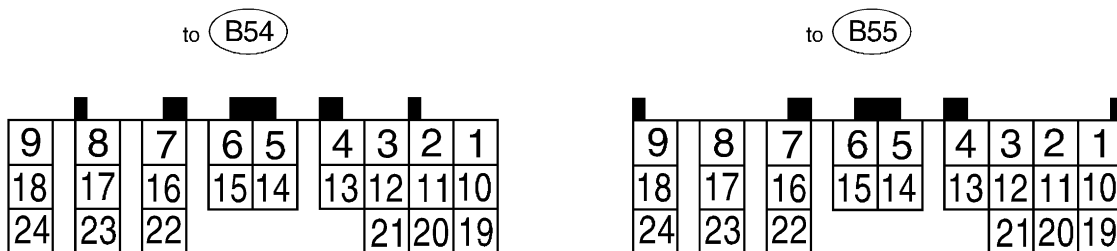
# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

## 5. Transmission Control Module (TCM) I/O Signal S004506

### A: ELECTRICAL SPECIFICATION S004506A08

#### 1. WITHOUT VDC SYSTEM S004506A0801



B2M2269A

Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B55	6	Ignition switch OFF	10 — 13	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 13	—
		B54	24			
Inhibitor switch	“P” range switch	B55	23	Select lever in “P” range	Less than 1	—
				Select lever in any other than “P” range (except “N” range)	More than 8	
	“N” range switch	B55	22	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range (except “P” range)	More than 8	
	“R” range switch	B55	17	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 8	
	“D” range switch	B55	8	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 8	
	“3” range switch	B55	18	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 8	
	“2” range switch	B54	10	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 8	
	“1” range switch	B54	1	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 8	
Brake switch		B55	24	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	

# 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)
ABS signal	B54	19	ABS switch ON	Less than 1	—
			ABS switch OFF	More than 6.5	
“AT OIL TEMP” warning light	B54	3	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B55	2	Throttle fully closed.	Approx. 0.5	—
			Throttle fully open.	Approx. 4.3	
Throttle position sensor power supply	B55	1	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B55	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	5	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	12	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	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 5	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF)	0	—
			Ignition switch ON (with engine ON)	0 — 13 or more	
Cruise set signal	B54	11	When cruise control is set (SET light ON)	Less than 1	—
			When cruise control is not set (SET light OFF)	More than 6.5	
Torque control signal 1	B54	13	Ignition switch ON (with engine ON)	More than 4.8	—
Torque control signal 2	B54	21	Ignition switch ON (with engine ON)	More than 4.8	—
Torque control cut signal	B54	2	Ignition switch ON	8	—
Intake manifold pressure signal	B55	20	Engine idling after warm-up.	1.2 — 1.8	—
Shift solenoid 1	B54	7	1st gear	More than 9	10 — 16
			3rd gear	Less than 1	
Shift solenoid 2	B54	6	2nd gear	More than 9	10 — 16
			4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 5.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
Line pressure dropping resistor	B54	18	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

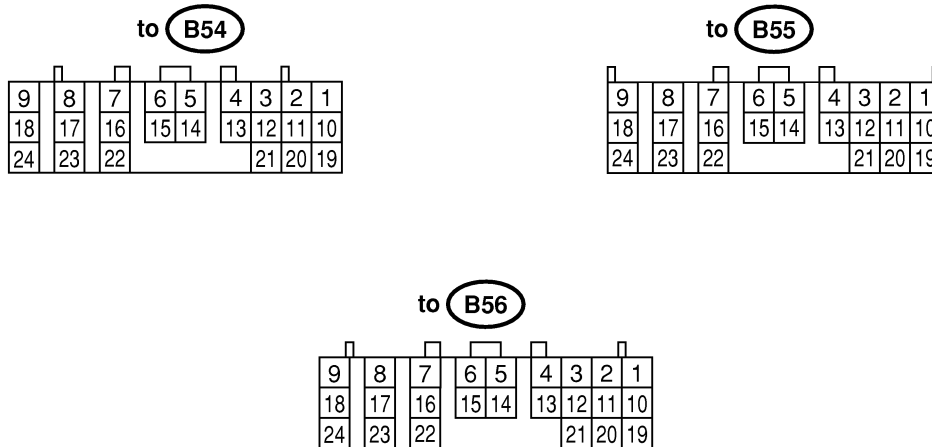
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Transfer duty solenoid	B54	15	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	8	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 5.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
2-4 brake dropping resistor	B54	17	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	5	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	14	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B55	10	—	0	Less than 1
Sensor ground line 2	B55	21	—	0	Less than 1
System ground line	B55	9	—	0	Less than 1
		19			
FWD switch	B55	14	Fuse removed.	More than 9	—
			Fuse installed.	Less than 1	
FWD indicator light	B54	12	Fuse on FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
AT diagnosis signal (Waveform)	B54	4	Ignition switch ON	Less than 1← →More than 4	—
Data link signal (Subaru Select Monitor)	B55	7	—	—	—

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

## 2. WITH VDC SYSTEM

S004506A0802



TR0532

Check with ignition switch ON.						
Content		Con- nector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B56	1	Ignition switch OFF	10 — 13	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 13	—
		B54	24			
Inhibitor switch	“P” range switch	B55	1	Select lever in “P” range	Less than 1	—
				Select lever in any other than “P” range (except “N” range)	More than 8	
	“N” range switch	B55	14	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range (except “P” range)	More than 8	
	“R” range switch	B55	3	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 8	
	“D” range switch	B55	4	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 8	
	“3” range switch	B55	5	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 8	
	“2” range switch	B55	6	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 8	
	“1” range switch	B55	7	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 8	
Brake switch		B55	12	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
“AT OIL TEMP” warning light		B56	11	Light ON	Less than 1	—
				Light OFF	More than 9	

# 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)
Throttle position sensor	B54	3	Throttle fully closed.	Approx. 0.5	—
			Throttle fully open.	Approx. 4.3	
Throttle position sensor power supply	B54	2	Ignition switch ON (With engine OFF)	Approx. 5.0	—
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	B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 5	—
Engine speed signal	B55	17	Ignition switch ON (with engine OFF)	0	—
			Ignition switch ON (with engine ON)	0 — 13 or more	
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	B54	1	Engine idling after warm- up.	1.2 — 1.8	—
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	
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 5.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 1	
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	

# 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)
Transfer duty solenoid	B54	6	—	More than 8.5	10 — 17
			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 — 5.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm- up.	Less than 1	
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	
VDC communication signal +	B56	9	Ignition ON	(+) — (–) Plus signal	—
VDC communication signal –	B56	18		(+) — (–) Plus signal	—
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 (Wave- form)	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B56	15	—	—	—



# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

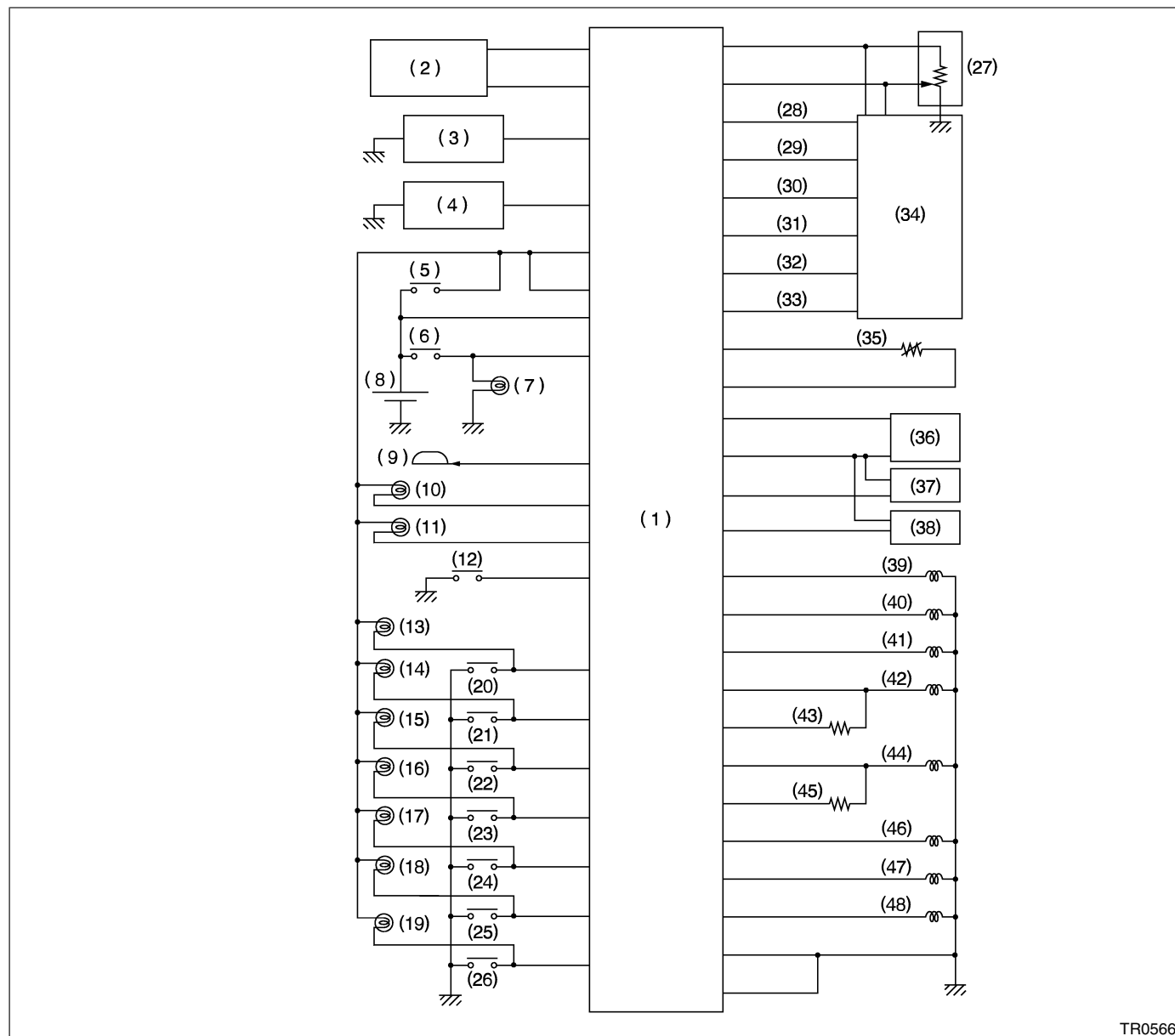
Automatic Transmission (Diagnostics)

## B: SCHEMATIC

S004506A21

### 1. WITHOUT VDC SYSTEM

S004506A2101



TR0566

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

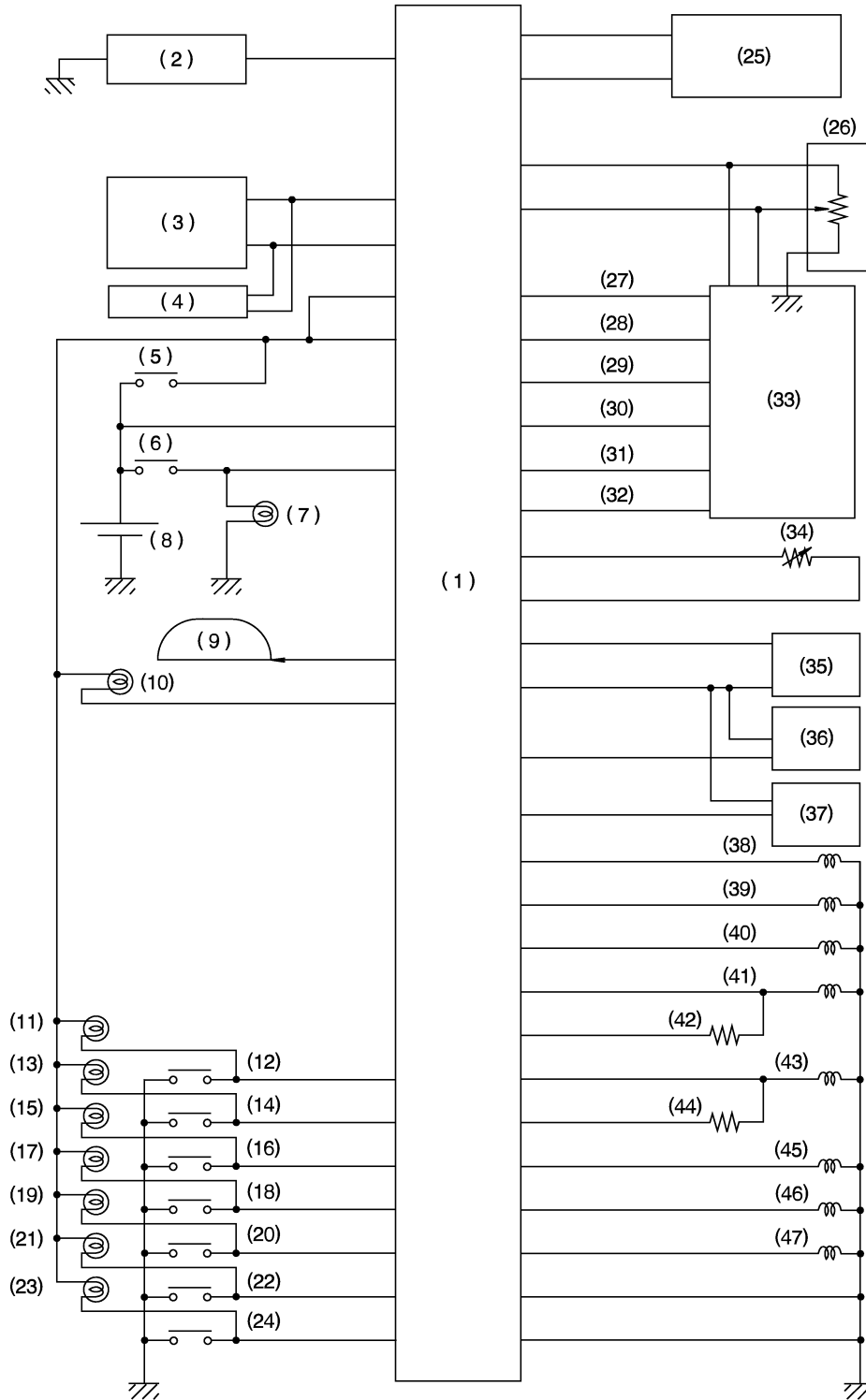
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(1) Transmission control module	(18) "2" range indicator light	(35) ATF temperature sensor
(2) Data link connector	(19) "1" range indicator light	(36) Torque converter turbine speed sensor
(3) Cruise set switch	(20) "P" range switch	(37) Front vehicle speed sensor
(4) ABS control module	(21) "R" range switch	(38) Rear vehicle speed sensor
(5) Ignition switch	(22) "N" range switch	(39) Shift solenoid 1
(6) Brake switch	(23) "D" range switch	(40) Shift solenoid 2
(7) Brake light	(24) "3" range switch	(41) 2-4 brake timing solenoid
(8) Battery	(25) "2" range switch	(42) Line pressure duty solenoid
(9) Combination meter	(26) "1" range switch	(43) Line pressure dropping resistor
(10) "AT OIL TEMP" warning light	(27) Throttle position sensor	(44) 2-4 brake duty solenoid
(11) FWD indicator light	(28) Engine speed signal	(45) 2-4 brake dropping resistor
(12) FWD switch	(29) Torque control cut signal	(46) 2-4 brake dropping resistor
(13) "P" range indicator light	(30) Torque control signal 2	(47) Low clutch timing solenoid
(14) "R" range indicator light	(31) Torque control signal 1	(48) Transfer duty solenoid
(15) "N" range indicator light	(32) AT load signal	
(16) "D" range indicator light	(33) AT diagnostics signal	
(17) "3" range indicator light	(34) Engine control module	

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

## 2. WITH VDC SYSTEM



B3M1867B

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

- 
- |   |                                      |  |
|---|--------------------------------------|--|
| (1) Transmission control module             | (17) "D" range indicator light       | (34) ATF temperature sensor                |
| (2) Cruise control module                   | (18) "D" range switch                | (35) Torque converter turbine speed sensor |
| (3) Vehicle dynamic control module          | (19) "3" range indicator light       | (36) Rear vehicle speed sensor             |
| (4) Steering angle sensor                   | (20) "3" range switch                | (37) Front vehicle speed sensor            |
| (5) Ignition switch                         | (21) "2" range indicator light       | (38) Shift solenoid 1                      |
| (6) Brake switch                            | (22) "2" range switch                | (39) Shift solenoid 2                      |
| (7) Brake light                             | (23) "1" range indicator light       | (40) 2-4 brake timing solenoid             |
| (8) Battery                                 | (24) "1" range switch                | (41) Line pressure duty solenoid           |
| (9) Combination meter (Speedometer circuit) | (25) Data link connector             | (42) Line pressure dropping resistor       |
| (10) AT OIL TEMP warning light              | (26) Throttle position sensor        | (43) 2-4 brake duty solenoid               |
| (11) "P" range indicator light              | (27) Engine speed signal             | (44) 2-4 brake dropping resistor           |
| (12) "P" range switch                       | (28) Torque control cut signal       | (45) Lock-up duty solenoid                 |
| (13) "R" range indicator light              | (29) Torque control signal 2         | (46) Low clutch timing solenoid            |
| (14) "R" range switch                       | (30) Torque control signal 1         | (47) Transfer duty solenoid                |
| (15) "N" range indicator light              | (31) Intake manifold pressure signal |  |
| (16) "N" range switch                       | (32) AT diagnostics signal           |  |
|   | (33) Engine control module           |  |

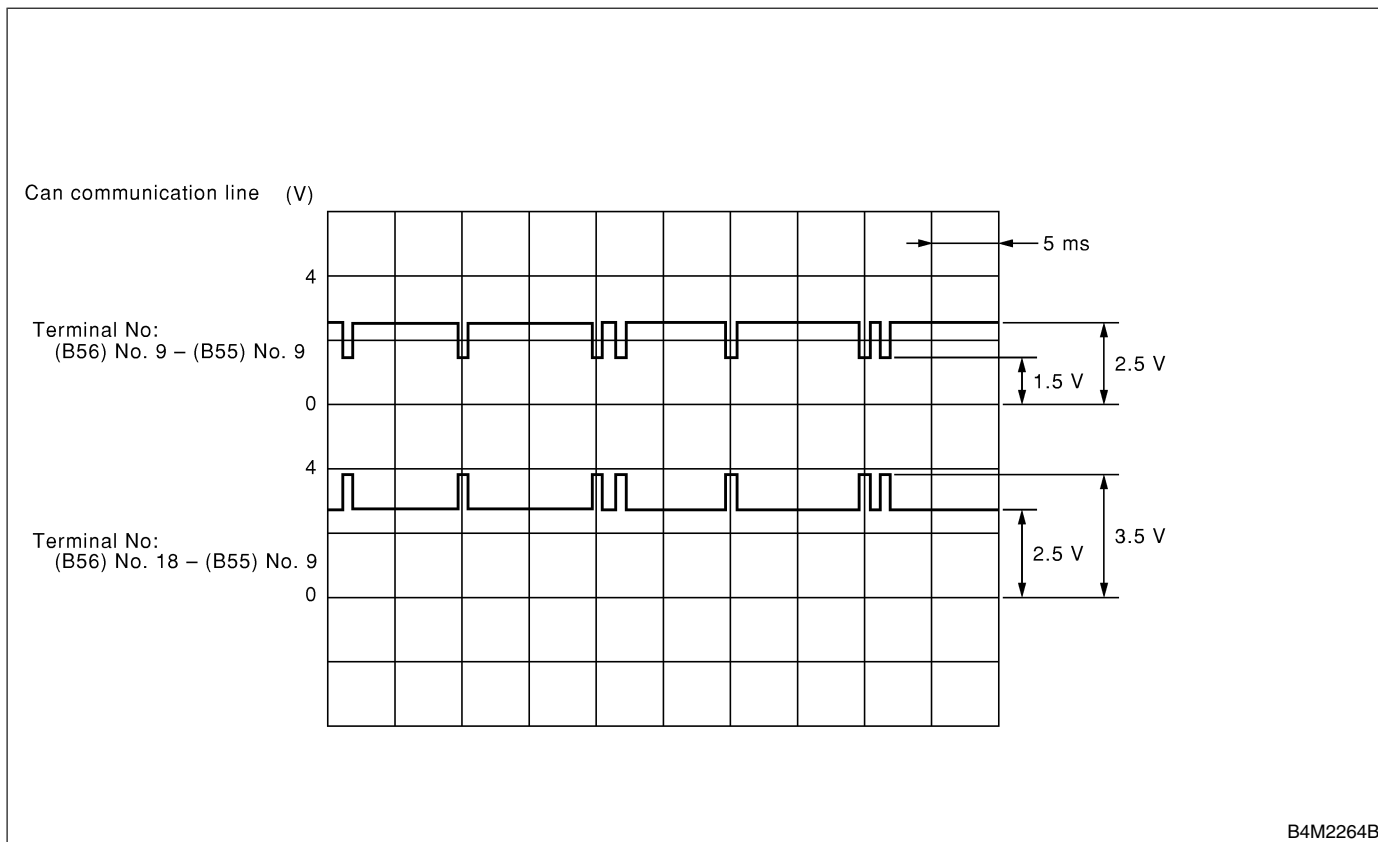
# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (Diagnostics)

## C: MEASUREMENT S004506A14

Only for models with VDC system, measure input/output signal voltage.

### 1. WAVEFORM S004506A1401

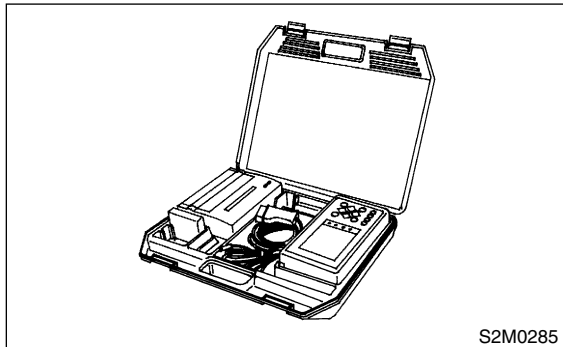


## 6. Subaru Select Monitor S004503

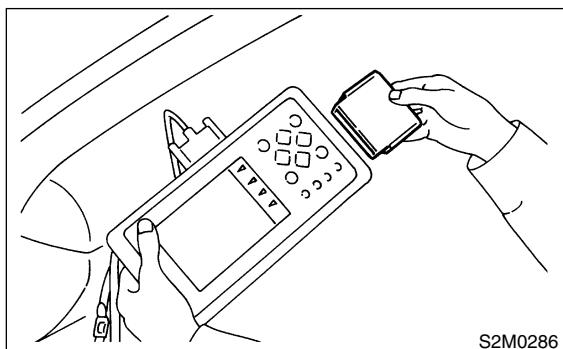
### A: OPERATION S004503A16

#### 1. READ DIAGNOSTIC TROUBLE CODE (DTC) S004503A1604

- 1) Prepare the Subaru Select Monitor kit.

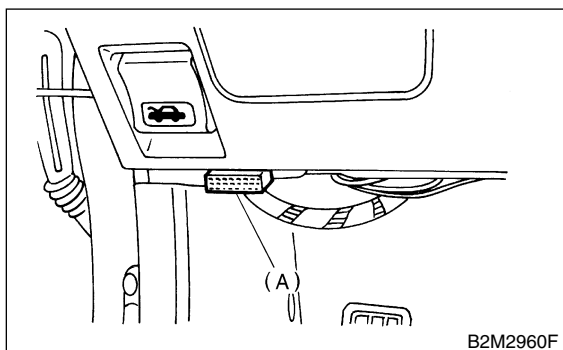


- 2) Connect the diagnosis cable to Subaru Select Monitor.
- 3) Insert the cartridge into Subaru Select Monitor.  
<Ref. to AT-6, PREPARATION TOOL, General Description.>



- 4) Connect the 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).



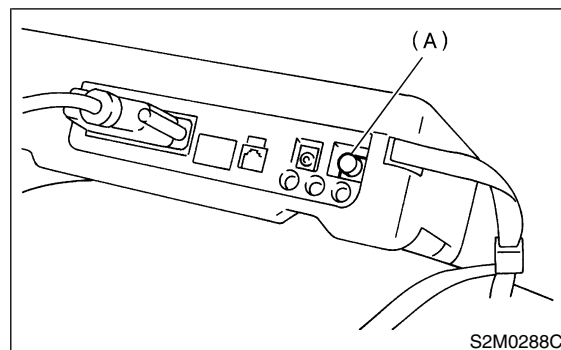
(A) Data link connector

- (2) Connect the diagnosis cable to data link connector.

#### NOTE:

Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

- 5) Turn the 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 (DTC). <Ref. to AT-30, List of Diagnostic Trouble Code (DTC).>

#### 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 (Without VDC system)	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
Parking range signal	"P" Range Signal	ON or OFF
Neutral range signal	"N" 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

### 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 (DTC)

Automatic Transmission (Diagnostics)

## 7. Read Diagnostic Trouble Code (DTC) S004792

### A: OPERATION S004792A16

#### 1. WITHOUT SUBARU SELECT MONITOR S004792A1601

No.	Step	Check	Yes	No
1	<b>PERFORM READ DIAGNOSTIC TROUBLE CODE.</b> 1) Warm-up the engine. 2) Turn the ignition switch to OFF. 3) Turn the ignition switch to ON. 4) Start the engine. 5) Drive the vehicle at speeds greater than 20 km/h (12 MPH). 6) Stop the vehicle. 7) Brake pedal depressed and move the select lever to 1 range. 8) Turn the ignition switch to OFF. 9) Turn the ignition switch to ON. 10) Move the select lever 2 range. 11) Move the select lever 1 range. 12) Move the select lever 2 range. 13) Move the select lever 3 range. 14) Move the select lever D range.	Does the indicator light blink 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-36, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for "AT OIL TEMP" Warning Light.>	Go to step 2.
2	<b>CHECK INDICATOR LIGHT.</b>	Does the indicator light blink 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	<b>CHECK INDICATOR LIGHT.</b>	Is a trouble code outputted?	Inspect the problem corresponding with diagnostic trouble code (DTC). NOTE: Record all diagnostic trouble code (DTC).	Go to step 4.
4	<b>CHECK INDICATOR LIGHT.</b>	Does the indicator light remain illuminated?	Repair the AT OIL TEMP warning light circuit <Ref. to AT-32, Diagnostic Procedure for "AT OIL TEMP" Warning Light.>, or Inspect inhibitor switch, wiring, TCM, etc.	Calling up the diagnostic trouble code (DTC) again.

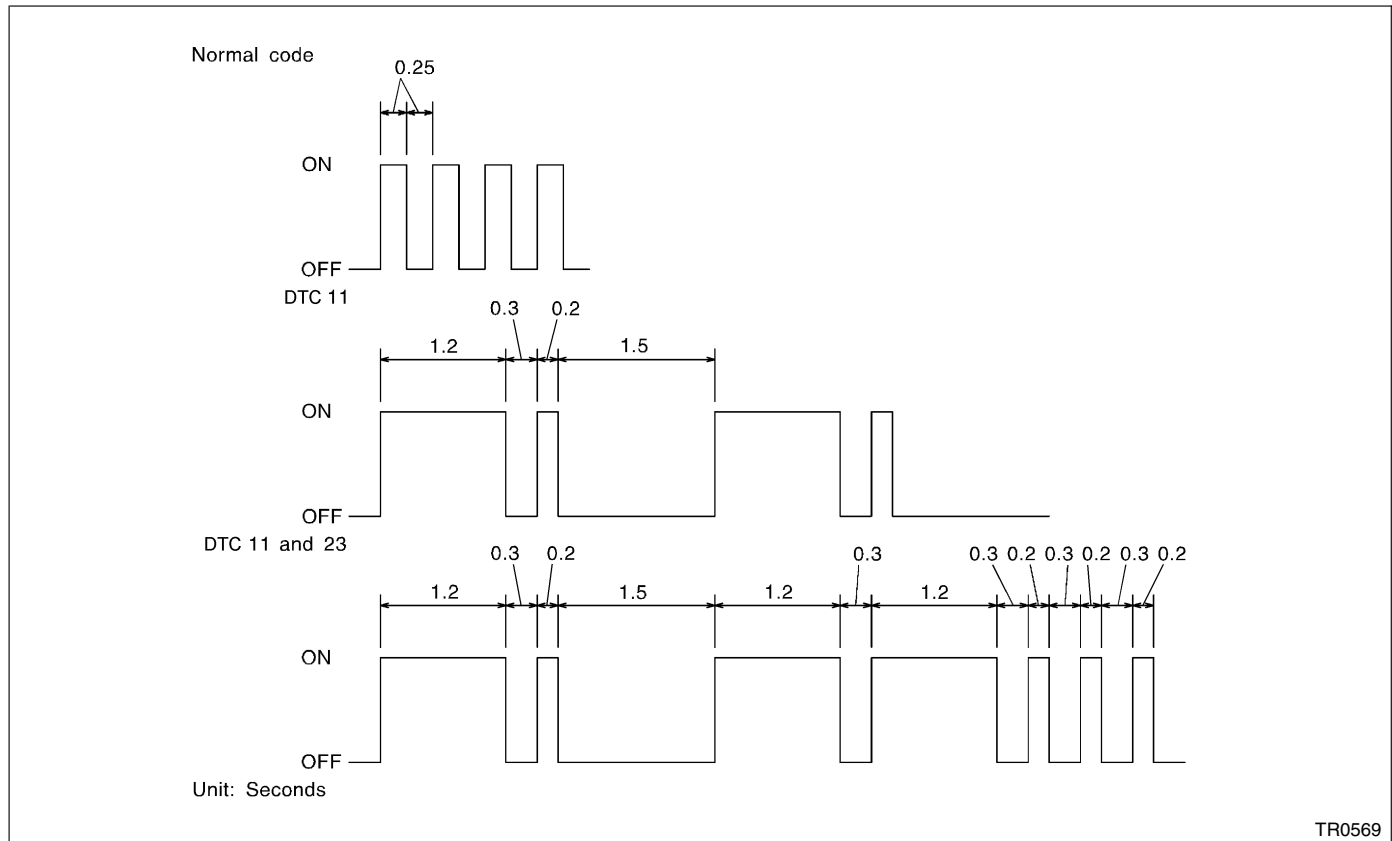


# READ DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

The “AT OIL TEMP” warning 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”.



TR0569

## 2. WITH SUBARU SELECT MONITOR

S004792A1602

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to AT-23, OPERATION, Subaru Select Monitor.>

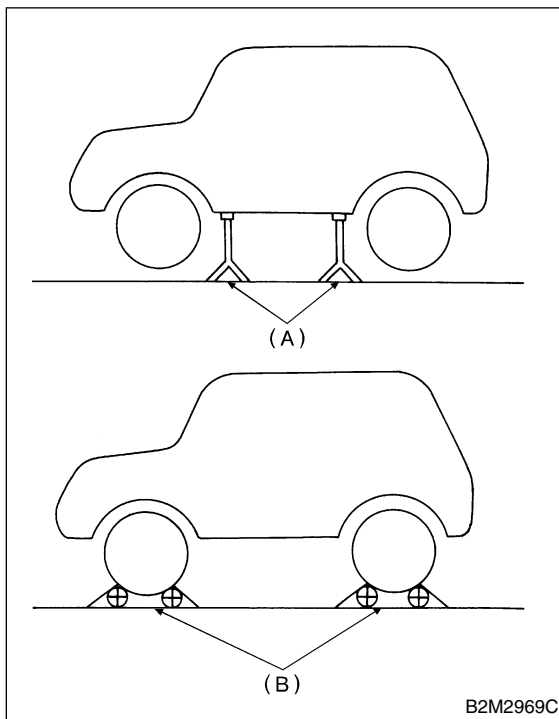
## 8. Inspection Mode S004510

### 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 the 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 the 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.

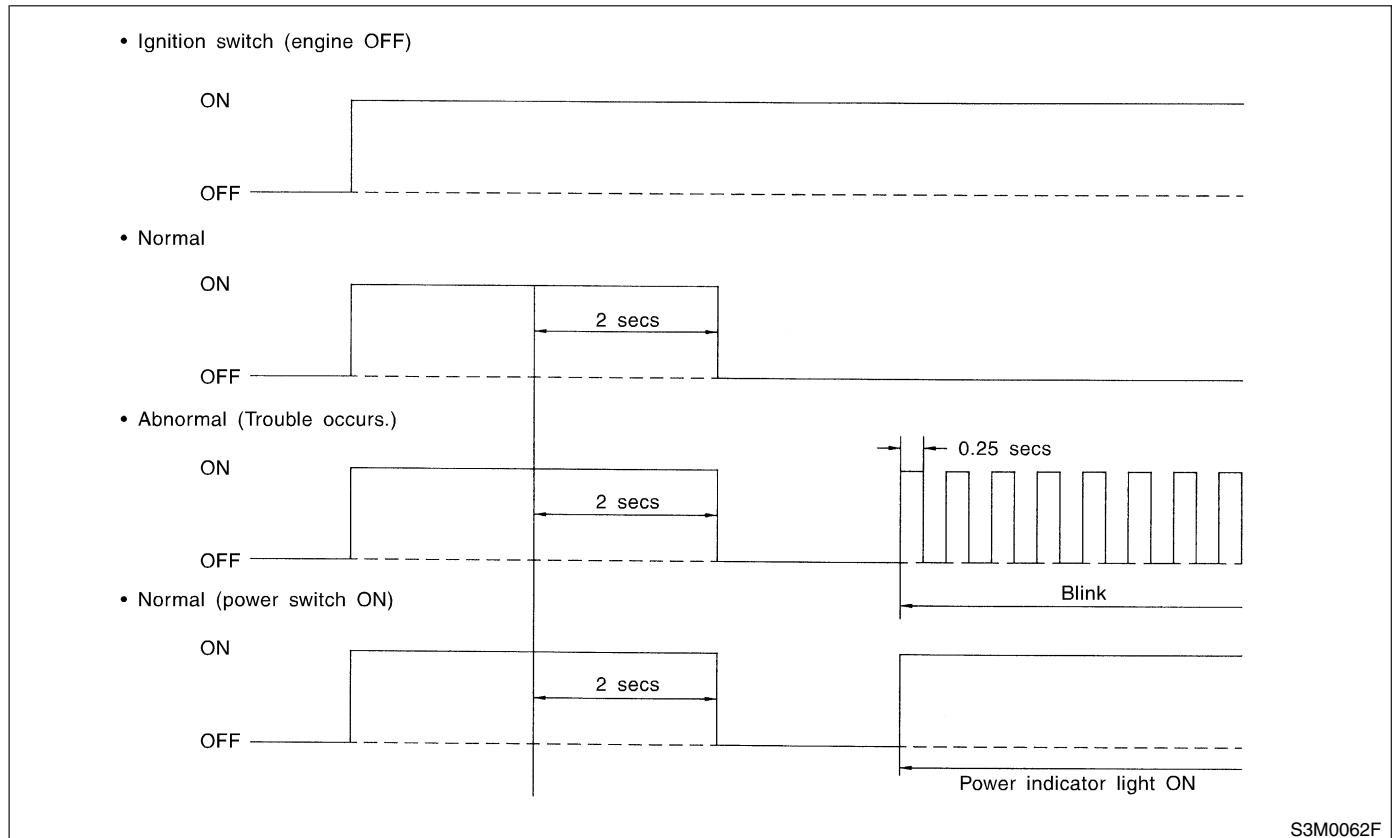
<Ref. to AT-24, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

## 10. “AT OIL TEMP” Warning Light Display S004793

### A: INSPECTION S004793A10

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 the on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the “AT OIL TEMP” warning 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.



S3M0062F

# LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

## 11. List of Diagnostic Trouble Code (DTC) S004525

### A: LIST S004525A12

DTC No.	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to AT-44, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to AT-48, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to AT-52, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Front vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-60, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-66, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to AT-70, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
45	Intake manifold pressure signal	Detects open or shorted input signal circuit.	<Ref. to AT-72, DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to AT-74, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to AT-78, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-82, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-86, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-90, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-94, DTC 76 2-4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-100, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-104, DTC 79 TRANSFER DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
86	VDC communication signal	Detects open or shorted input signal circuit.	<Ref. to AT-108, DTC 86 VDC COMMUNICATION SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-112, DTC 93 REAR VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

# LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:

# DIAGNOSTIC PROCEDURE FOR “AT OIL TEMP” WARNING LIGHT

Automatic Transmission (Diagnostics)

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## 12. Diagnostic Procedure for “AT OIL TEMP” Warning Light

S004617

### A: “AT OIL TEMP” WARNING LIGHT DOES NOT COME ON OR GO OFF

S004617F14

#### DIAGNOSIS:

The “AT OIL TEMP” warning light circuit is open or shorted.

#### TROUBLE SYMPTOM:

- When the ignition switch is turned to ON (engine OFF), “AT OIL TEMP” warning light does not illuminate.
- When the on-board diagnostics is performed, “AT OIL TEMP” warning light remains illuminated.





# DIAGNOSTIC PROCEDURE FOR “AT OIL TEMP” WARNING LIGHT

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK “AT OIL TEMP” WARNING LIGHT.</b> Turn the ignition switch to ON (engine OFF).	Does the “AT OIL TEMP” warning light illuminate?	Go to step 3.	Go to step 2.
2	<b>CHECK “AT OIL TEMP” WARNING LIGHT.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the ATF temp warning light bulb from combination meter.	Is the “AT OIL TEMP” warning light bulb OK?	Go to step 4.	Replace the “AT OIL TEMP” warning light bulb.
3	<b>CHECK “AT OIL TEMP” WARNING LIGHT.</b> Perform “Read Diagnostic Trouble Code”. <Ref. to AT-25, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Does the “AT OIL TEMP” warning light blink?	A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM, inhibitor switch and combination meter.	Go to step 10.
4	<b>CHECK FUSE (No. 5).</b> Remove the fuse (No. 5).	Is the fuse (No. 5) blown out?	Replace the fuse (No. 5). If the 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	<b>CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.</b> 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i12) No. 3 (+) — Chassis ground (-):</b>	Is the voltage more than 9 V?	Go to step 6.	Repair open or short circuit in harness between combination meter and battery.
6	<b>CHECK COMBINATION METER.</b> Measure the voltage between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i12) No. 14 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Repair the combination meter. <Ref. to IDI-11, Combination Meter Assembly.>	Go to step 7.
7	<b>CHECK OPEN CIRCUIT OF HARNESS.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter connector. 3) Measure the resistance of harness between combination meter. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 3 — (i12) No. 14:</b> <b>With VDC system</b> <b>(B56) No. 11 — (i12) No. 14:</b>	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.

# DIAGNOSTIC PROCEDURE FOR “AT OIL TEMP” WARNING LIGHT

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect the connector to TCM and combination meter. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 3 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B56) No. 11 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning 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 the harness or connector in TCM.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
9	<b>CHECK SUBARU SELECT MONITOR.</b>	Do you have a SUBARU SELECT MONITOR?	Go to step 10.	Go to step 11.
10	<b>CHECK INHIBITOR SWITCH.</b> 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Subaru Select Monitor to ON. 4) Read the data of range switch using Subaru Select Monitor. ● Range switch is indicated in ON ⇔ OFF.	When each range is selected, does the LED of Subaru Select Monitor light up?	Go to step 11.	Check the inhibitor switch circuit. <Ref. to AT-122, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>
11	<b>CHECK SHORT CIRCUIT OF HARNESS.</b> 1) Disconnect the connector from TCM. 2) Remove the combination meter. 3) Disconnect the connector from combination meter. 4) Measure the resistance of harness connector between TCM and chassis ground. <b>Connector &amp; terminal/specified resistance</b> <b>Without VDC system</b> <b>(B54) No. 3 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B56) No. 11 (+) — Chassis ground (-):</b>	Is the resistance less than 1 MΩ?	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>	Repair short circuit in harness between combination meter connector and TCM connector.

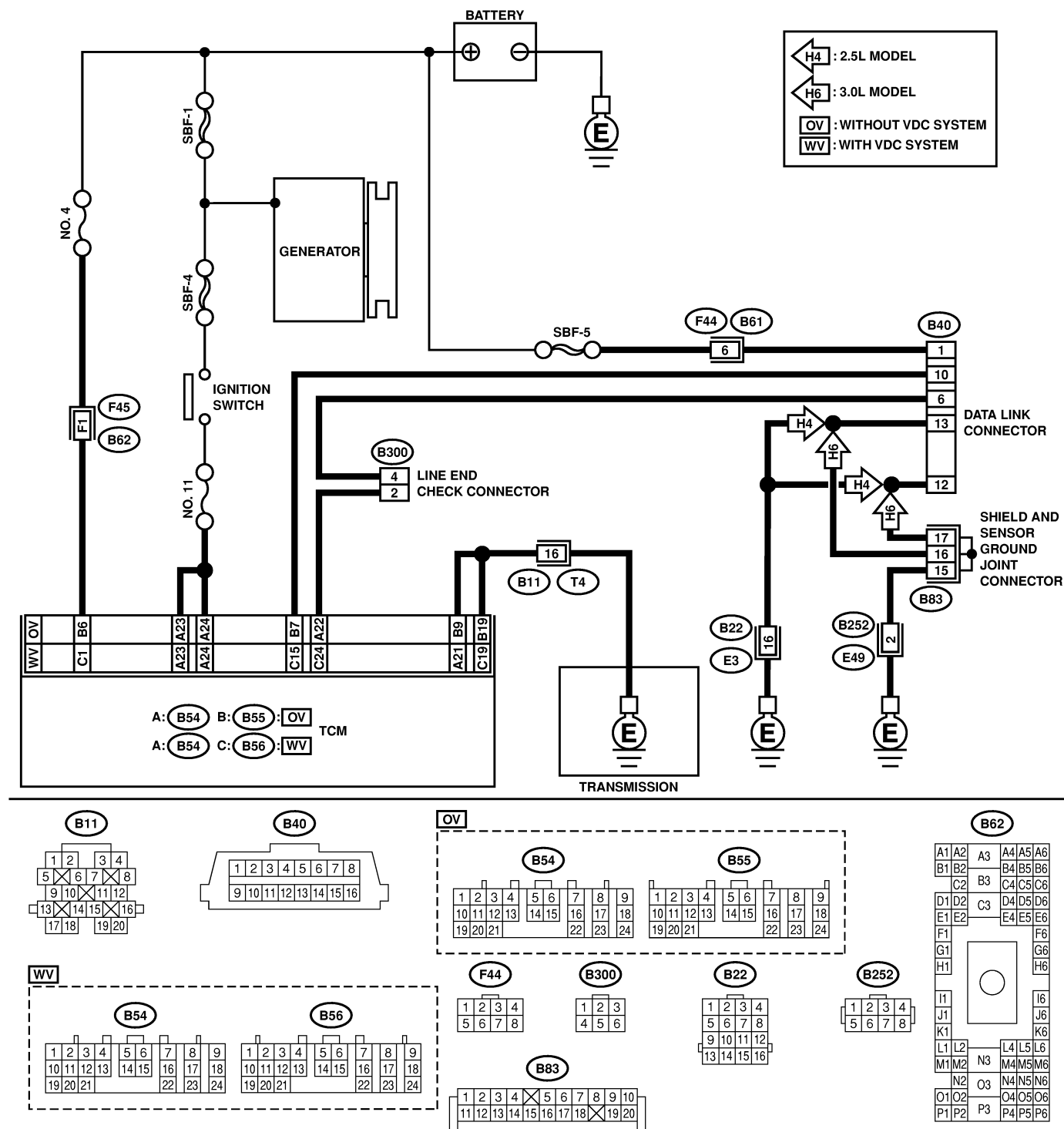
# DIAGNOSTIC PROCEDURE FOR "AT OIL TEMP" WARNING LIGHT

Automatic Transmission (Diagnostics)

## B: CHECK POWER SUPPLY AND GROUND LINE

S004617G86

### WIRING DIAGRAM:



B3M2218

# DIAGNOSTIC PROCEDURE FOR “AT OIL TEMP” WARNING LIGHT

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK IGNITION SWITCH.</b>	Is the ignition switch ON?	Go to step 2.	Turn the ignition switch ON.
2	<b>CHECK GENERATOR.</b> 1) Start the engine. 2) Idle the engine. 3) Measure the voltage between generator and chassis ground. <b>Terminal</b> <b>Generator B terminal (+) — Chassis ground (-):</b>	Is the voltage between 10 and 15 V?	Go to step 3.	Repair the generator. <Ref. to SC-15, Generator.>
3	<b>CHECK BATTERY TERMINAL.</b> Turn the ignition switch to OFF.	Is there poor contact at battery terminal?	Repair the battery terminal.	Go to step 4.
4	<b>CHECK POWER SUPPLY OF TCM.</b> 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 6 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B56) No. 1 (+) — Chassis ground (-):</b>	Is the voltage between 10 and 15 V?	Go to step 6.	Go to step 5.
5	<b>CHECK FUSE (NO. 4).</b> Remove fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace the fuse (No. 4). If the 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	<b>CHECK IGNITION POWER SUPPLY CIRCUIT.</b> 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B54) No. 23 (+) — Chassis ground (-):</b> <b>(B54) No. 24 (+) — Chassis ground (-):</b>	Is the voltage more than 10 V?	Go to step 8.	Go to step 7.
7	<b>CHECK FUSE (NO. 11).</b> Remove the fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace the fuse (No. 11). If the 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. 4) and TCM, or fuse (No. 4) and battery, and poor contact in coupling connector.

# DIAGNOSTIC PROCEDURE FOR “AT OIL TEMP” WARNING LIGHT

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> (B55) No. 9 — (B11) No. 16 (B55) No. 19 — (B11) No. 16 <b>With VDC system</b> (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, transmission harness connector, and poor contact in coupling connector.
9	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.</b> Measure the resistance of harness between transmission and transmission ground. <b>Connector &amp; terminal</b> (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	<b>CHECK POOR CONTACT IN CONNECTORS.</b>	Is there poor contact in control module power supply, ground line and data link connector?	Repair the connector.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR “AT OIL TEMP” WARNING LIGHT

Automatic Transmission (Diagnostics)

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MEMO:

## **13. Diagnostic Procedure for Select Monitor Communication** S004782

### **A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE** S004782E34

**DIAGNOSIS:**

- Faulty harness connector

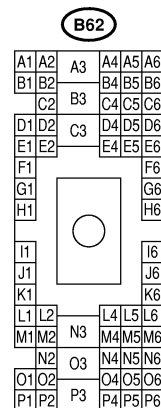
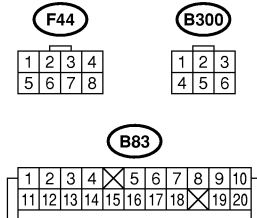
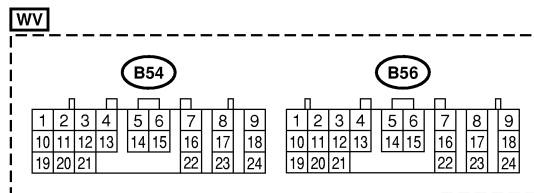
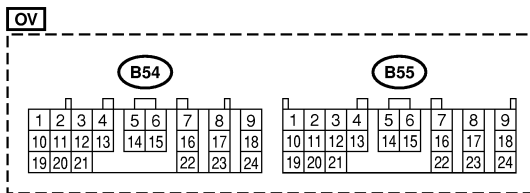
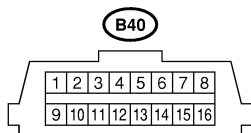
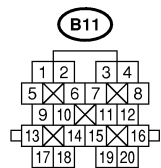
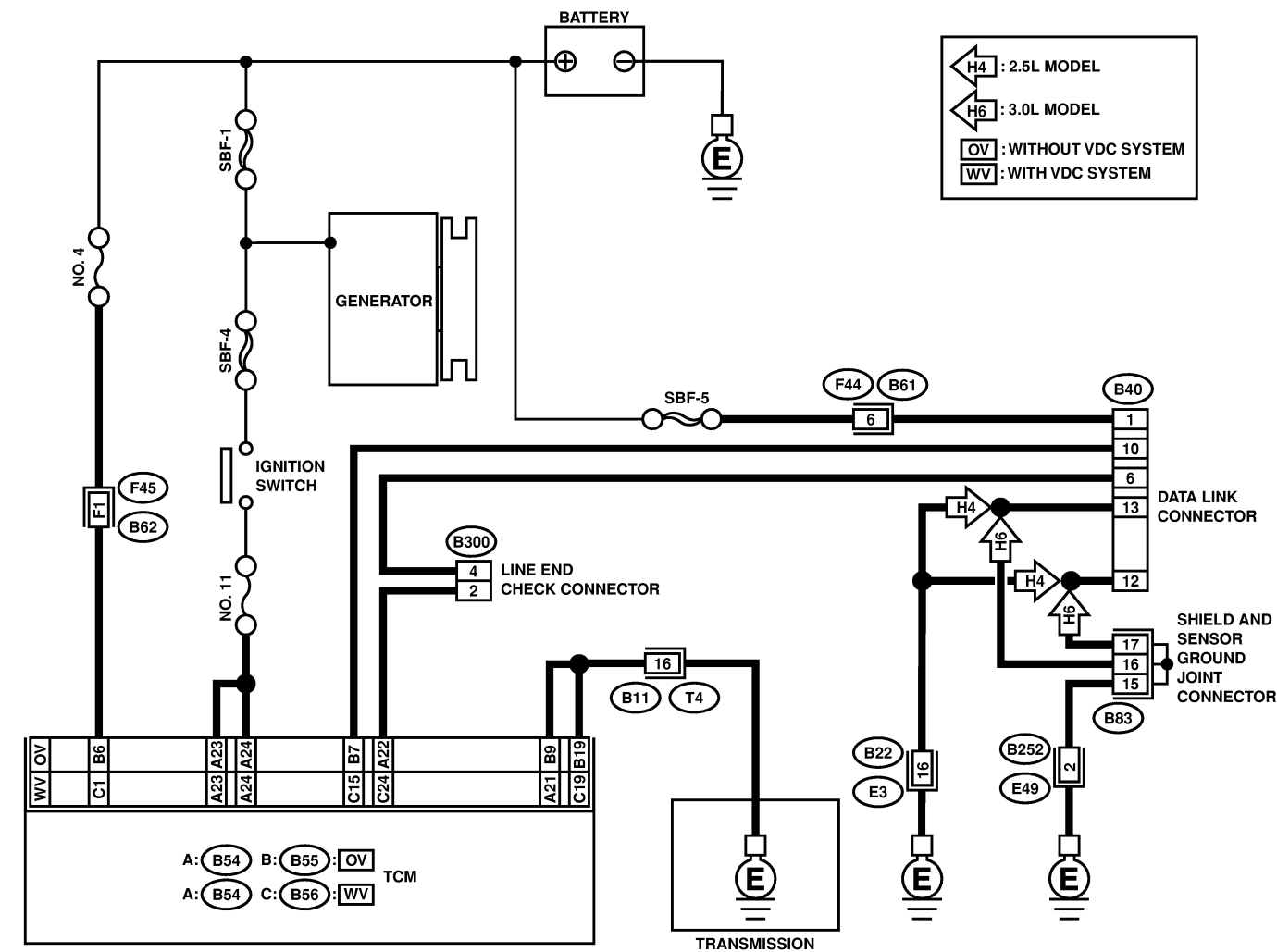
**TROUBLE SYMPTOM:**

- Select the monitor communication failure

# DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

Automatic Transmission (Diagnostics)

## WIRING DIAGRAM:





# DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.</b> Measure the voltage between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B40) No. 1 — Chassis ground:</b>	Is the voltage more than 10V?	Go to step 2.	Repair harness and connector between battery and data link connector, and poor contact in coupling connector.
2	<b>CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.</b> Measure the resistance of harness between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B40) No. 12 — Chassis ground:</b> <b>(B40) No. 13 — Chassis ground:</b>	Is the resistance less than 1Ω?	Go to step 3.	Repair open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
3	<b>CHECK COMMUNICATION OF SELECT MONITOR.</b> 1) Turn the ignition switch to ON. 2) Using the select monitor, check whether communication to other systems (such as engine) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step 6.	Go to step 4.
4	<b>CHECK COMMUNICATION OF SELECT MONITOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Check whether communication to engine systems can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step 8.	Go to step 5.
5	<b>CHECK COMMUNICATION OF SELECT MONITOR.</b> 1) Connect the TCM connector. 2) Disconnect the ECM connector. 3) Check whether communication to transmission systems can be executed normally.	Are the name and year of the system displayed on the select monitor?	Inspect the ECM.	Go to step 6.
6	<b>CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the TCM, ECM connectors. 3) Measure the resistance between data link connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B40) No. 10 — Chassis ground:</b> <b>(B40) No. 6 — Chassis ground:</b>	Is the resistance more than 1M Ω?	Go to step 7.	Repair harness and connector between each control module and data link connector.
7	<b>CHECK OUTPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to ON. 2) Measure the voltage between data link and chassis ground. <b>Connector &amp; terminal</b> <b>(B40) No. 10 — Chassis ground:</b> <b>(B40) No. 6 — Chassis ground:</b>	Is the voltage more than 1 V?	Repair harness and connector between each control module and data link connector.	A temporary poor contact or harness may be the case. Repair harness or connector in the select monitor communication circuit.

# DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	<b>CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.</b> Measure the resistance between TCM connector and data link connector. <i>Connector &amp; terminal</i> <i>Without VDC system</i> (B55) No. 7 — (B40) No. 10: <i>With VDC system</i> (B56) No. 15 — (B40) No. 10:	Is the resistance less than 0.5 $\Omega$ ?	Go to step 9.	Repair harness and connector between TCM and data link connector.
9	<b>CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.</b> Measure the resistance between TCM connector and data link connector. <i>Connector &amp; terminal</i> <i>Without VDC system</i> (B54) No. 22 — (B40) No. 6: <i>With VDC system</i> (B56) No. 24 — (B40) No. 6:	Is the resistance more than 1 M $\Omega$ ?	Go to step 10.	Repair harness and connector between TCM and data link connector.
10	<b>CHECK INSTALLATION OF TCM CONNECTOR.</b> Turn the ignition switch to OFF.	Is TCM connector inserted into TCM?	Go to step 11.	Insert the TCM connector into TCM.
11	<b>CHECK POOR CONTACT IN CONNECTORS.</b>	Is there poor contact in control module and data link connector?	Repair the poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

14. Diagnostic Procedure with Diagnostic Trouble Code (DTC) S004521

A: DTC 11 ENGINE SPEED SIGNAL S004521110

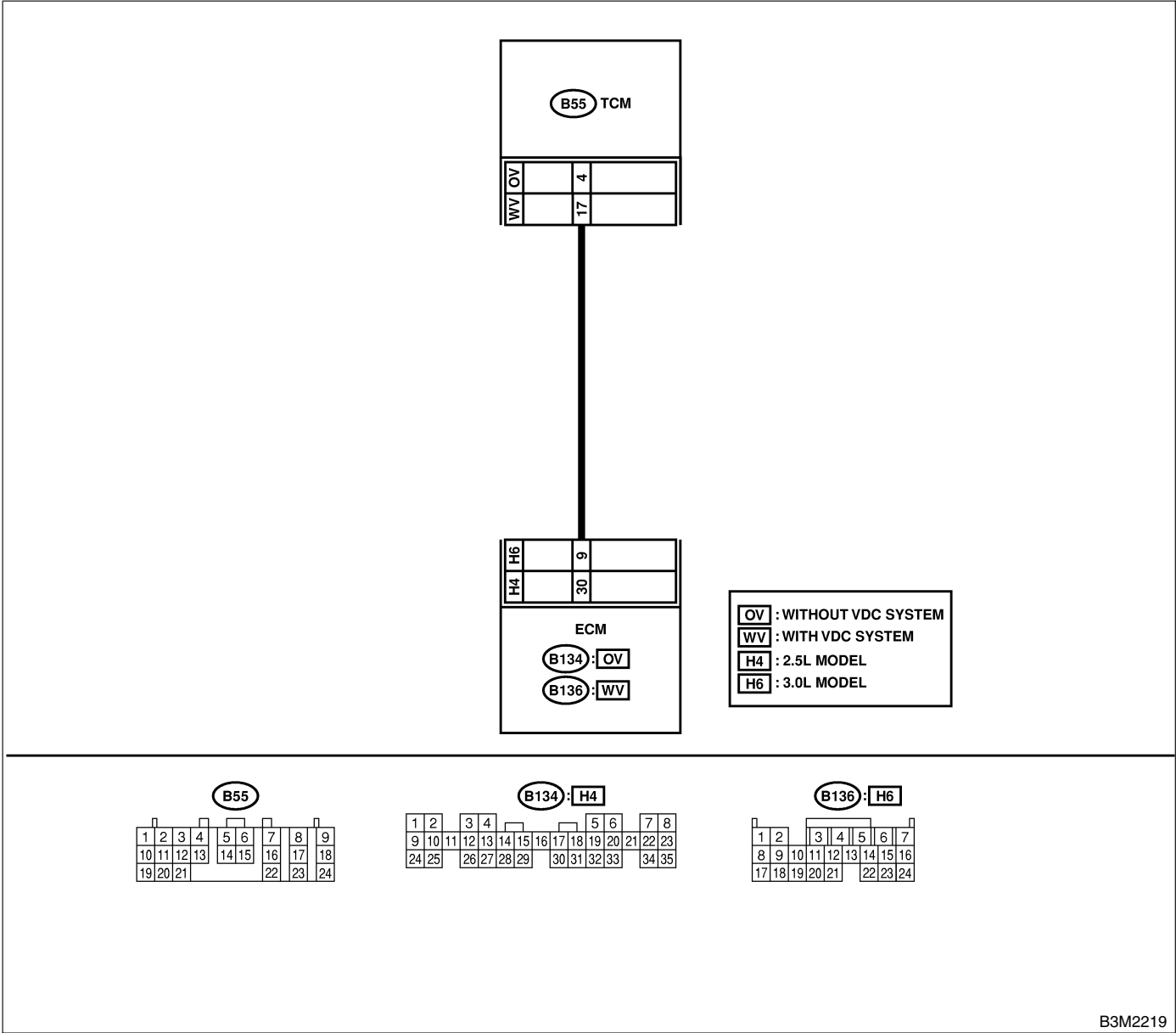
DIAGNOSIS:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- “AT OIL TEMP” warning light remains on when the vehicle speed is “0”.

WIRING DIAGRAM:



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 L model without VDC system</b> <b>(B55) No. 4 — (B134) No. 30:</b> <b>3.0 L model with VDC system</b> <b>(B55) No. 17 — (B136) No. 9:</b> <b>3.0 L model without VDC system</b> <b>(B55) No. 4 — (B136) No. 9:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 4 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 17 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
3	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 5.	Go to step 4.
4	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect the connectors to TCM and ECM. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 4 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 17 (+) — Chassis ground (-):</b>	Is the voltage 0 V?	Even if the AT OIL TEMP warning 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	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the 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 the data of engine speed using the 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 the AT OIL TEMP warning 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	<b>CHECK POOR CONTACT.</b>	Is there poor contact in engine speed signal circuit?	Repair poor contact.	Go to step 7.

## DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
7	CONFIRM DTC 11.	Replace the ECM with a new one. Does the trouble code appear again, after the memory has been cleared?	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>	Replace the ECM.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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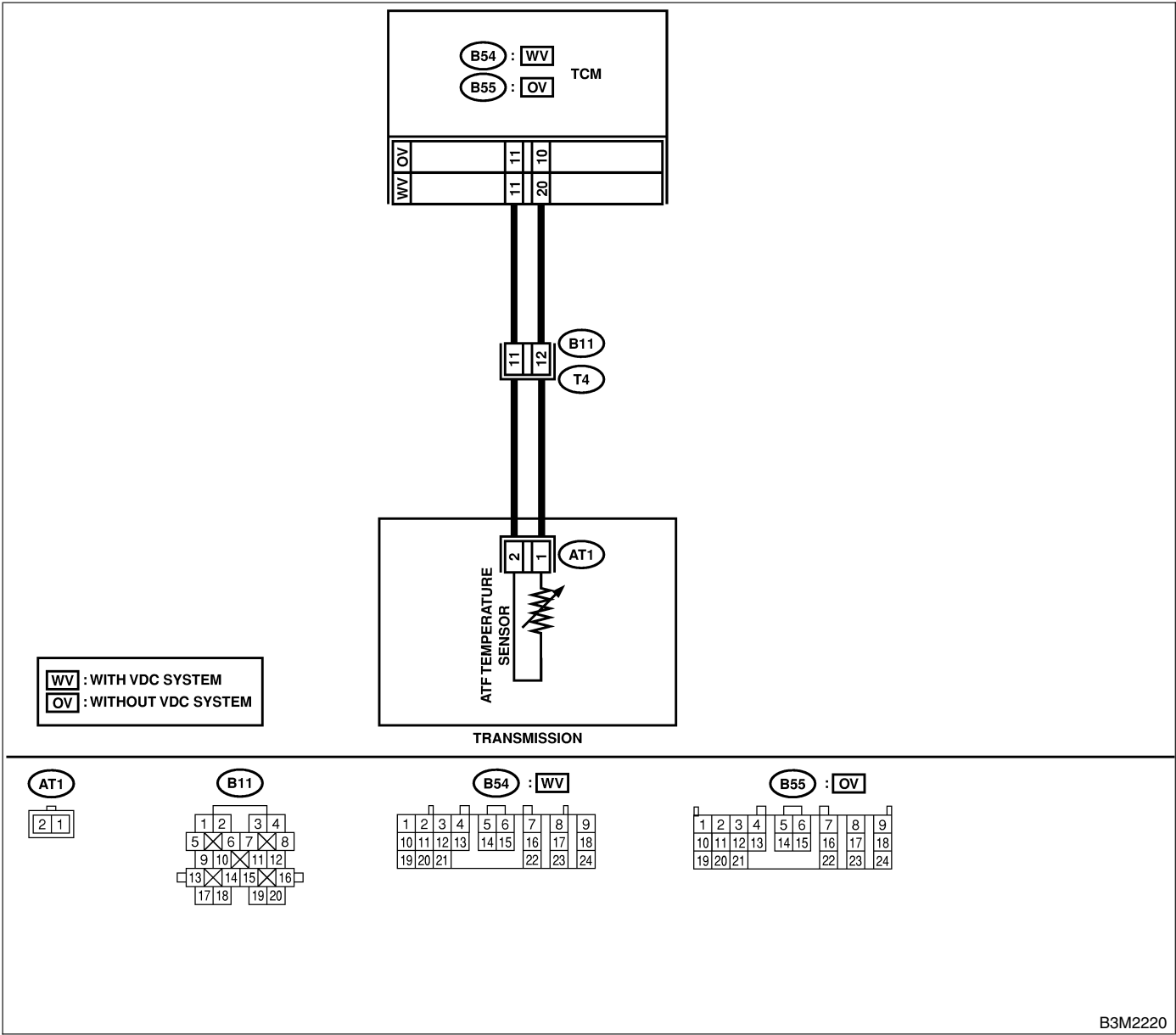
MEMO:

B: DTC 27 ATF TEMPERATURE SENSOR S004521111

**DIAGNOSIS:**  
Input signal circuit of TCM to ATF temperature sensor is open or shorted.

**TROUBLE SYMPTOM:**  
Excessive shift shock.

**WIRING DIAGRAM:**



B3M2220

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 10 — (B11) No. 12:</b> <b>With VDC system</b> <b>(B54) No. 20 — (B11) No. 12:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.</b> Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 11 — (B11) No. 11:</b> <b>With VDC system</b> <b>(B54) No. 11 — (B11) No. 11:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 10 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 20 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 11 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 11 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
5	<b>CHECK ATF TEMPERATURE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). <b>NOTE:</b> If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 11 — No. 12:</b>	Is the resistance between 275 and 375 Ω?	Go to step 6.	Go to step 11.
6	<b>CHECK ATF TEMPERATURE SENSOR.</b> 1) Turn the ignition switch to ON (engine OFF). 2) Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 11 — No. 12:</b>	Does the resistance value increase while the ATF temperature decreases?	Go to step 7.	Go to step 11.
7	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.
8	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect the connector to transmission. 2) Warm-up the transmission until the ATF temperature is about 80°C (176°F). <b>NOTE:</b> If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure the voltage between TCM connector terminal. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 11 (+) — No. 10 (-):</b> <b>With VDC system</b> <b>(B54) No. 11 (+) — No. 20 (-):</b>	Is the voltage between 0.4 and 0.9 V?	Even if the AT OIL TEMP warning 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	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connector to transmission. 2) Turn the ignition switch to ON (engine OFF).	Does the ATF temperature gradually decrease?	Even if the AT OIL TEMP warning 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.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	<b>CHECK POOR CONTACT.</b>	Is there poor contact in ATF temperature sensor circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
11	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place safety stand. <b>NOTE:</b> On AWD models, raise all wheels off ground. 5) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 6) Remove the oil pan, and disconnect the connector from ATF temperature sensor connector. 7) Measure the resistance of harness between ATF temperature sensor and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 11 — (AT1) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 12.	Repair open circuit in harness between ATF temperature sensor and transmission connector.
12	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.</b> Measure the resistance of harness between ATF temperature sensor and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 12 — (AT1) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 13.	Repair open circuit in harness between ATF temperature sensor and transmission connector.
13	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.</b> Measure the resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 11 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 14.	Repair short circuit in harness between ATF temperature sensor and transmission connector.
14	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.</b> Measure the resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 12 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Replace the 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 DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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### C: DTC 31 THROTTLE POSITION SENSOR S004521G62

#### DIAGNOSIS:

Input signal circuit of throttle position sensor is open or shorted.

#### TROUBLE SYMPTOM:

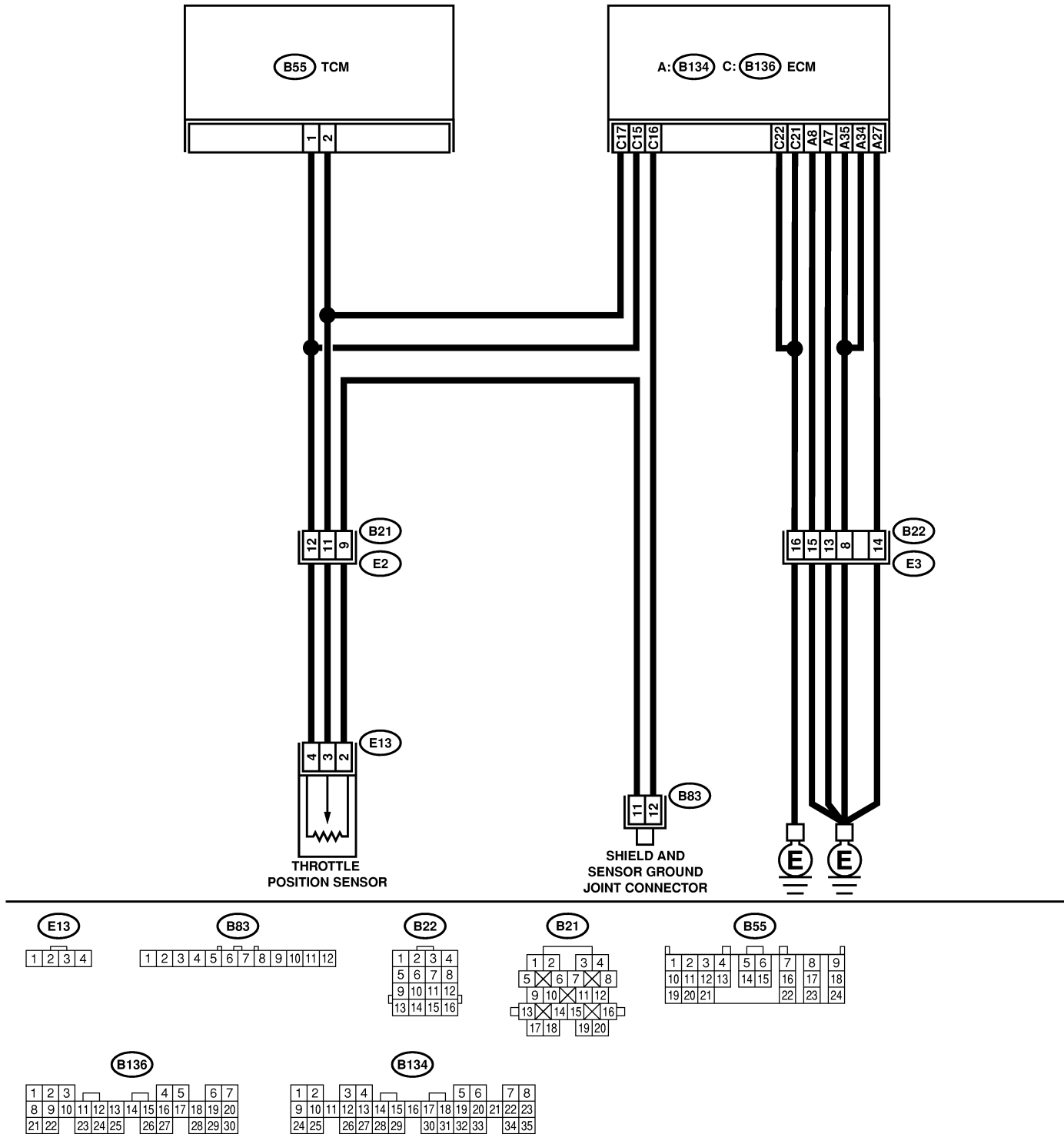
Shift point too high or too low; excessive shift shock; excessive tight corner “braking”.

#### WIRING DIAGRAM:

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

## • 2.5 L ENGINE MODEL

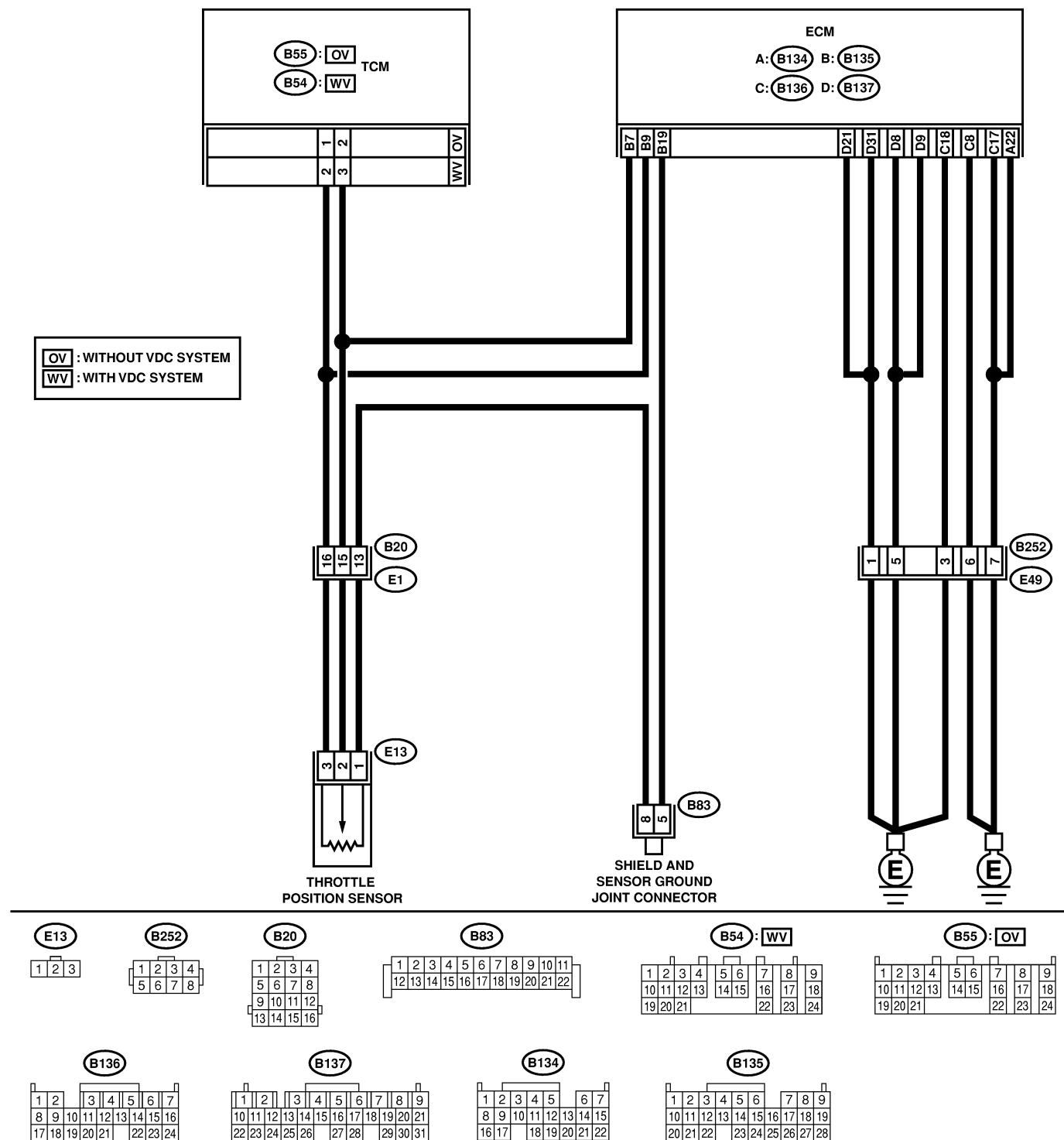


B3M2221

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

### • 3.0 L ENGINE MODEL



B3M2222

No.	Step	Check	Yes	No
1	CHECK ENGINE GROUND TERMINALS.	Have engine ground terminals been tightened?	Go to step 2.	Tighten the engine ground terminals.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	<b>CHECK GROUND CIRCUIT OF ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and engine ground. <b>Connector &amp; terminal</b> <b>2.5 L engine model</b> (B134) No. 27 — Engine ground: (B134) No. 8 — Engine ground: (B134) No. 7 — Engine ground: (B136) No. 21 — Engine ground: (B136) No. 22 — Engine ground: (B134) No. 35 — Engine ground: (B134) No. 34 — Engine ground: <b>3.0 L engine model</b> (B134) No. 22 — Engine ground: (B136) No. 8 — Engine ground: (B136) No. 17 — Engine ground: (B136) No. 18 — Engine ground: (B137) No. 8 — Engine ground: (B137) No. 9 — Engine ground: (B137) No. 21 — Engine ground: (B137) No. 31 — Engine ground:	Is the resistance less than 5 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between ECM connector and engine grounding terminal.
3	<b>CHECK THROTTLE POSITION SENSOR.</b> 1) Disconnect the connector from throttle position sensor. 2) Measure the resistance between throttle position sensor connector receptacle's terminals. <b>Terminals</b> <b>2.5 L engine model</b> No. 4 — No. 2: <b>3.0 L engine model</b> No. 1 — No. 3:	Is the resistance between 3.0 and 4.2 k $\Omega$ ?	Go to step 4.	Replace the throttle position sensor.
4	<b>CHECK THROTTLE POSITION SENSOR.</b> Measure the resistance between throttle position sensor connector receptacle's terminals. <b>Terminals</b> <b>2.5 L engine model</b> No. 2 — No. 3: <b>3.0 L engine model</b> No. 2 — No. 1:	Is the resistance between 0.35 and 0.5 k $\Omega$ ?	Go to step 5.	Replace the throttle position sensor.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.</b> 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and throttle position sensor connector. <b>Connector &amp; terminal</b> <b>2.5 L engine model</b> (B55) No. 2 — (E13) No. 3: <b>3.0 L engine model with VDC system</b> (B54) No. 3 — (E13) No. 2: <b>3.0 L engine model without VDC system</b> (B55) No. 2 — (E13) No. 2:	Is the resistance less than 1 $\Omega$ ?	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 DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
6	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.</b> Measure the resistance of harness between TCM and throttle position sensor connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 1 — (E13) No. 4:</b> <b>With VDC system</b> <b>(B54) No. 2 — (E13) No. 4:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 7.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
7	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 2 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 3 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 8.	Repair short circuit in harness between TCM and throttle position sensor connector.
8	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 1 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 2 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 9.	Repair short circuit in harness between TCM and throttle position sensor connector.
9	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> Measure the resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 L engine model</b> <b>(B55) No. 2 — (B136) No. 17:</b> <b>3.0 L engine model with VDC system</b> <b>(B54) No. 3 — (B135) No. 7:</b> <b>3.0 L engine model without VDC system</b> <b>(B55) No. 2 — (B135) No. 7:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 10.	Repair open circuit in harness between TCM and ECM connector.
10	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> Measure the resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 L engine model</b> <b>(B55) No. 1 — (B136) No. 15:</b> <b>3.0 L engine model with VDC system</b> <b>(B54) No. 2 — (B135) No. 9:</b> <b>3.0 L engine model without VDC system</b> <b>(B55) No. 1 — (B135) No. 9:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 11.	Repair open circuit in harness between TCM and ECM connector.
11	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 14.	Go to step 12.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
12	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect the connectors to TCM, throttle position sensor and ECM. 2) Turn the ignition switch to ON (engine OFF). 3) Close the throttle completely. 4) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 2 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 3 (+) — Chassis ground (-):</b>	Is the voltage between approx. 0.5 V in throttle fully closed?	Go to step 13.	Go to step 18.
13	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Open the throttle completely. 2) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 2 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 3 (+) — Chassis ground (-):</b>	Is the voltage between approx. 4.3 V with throttle fully open?	Go to step 16.	Go to step 18.
14	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connectors to TCM, throttle position sensor and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF). 4) Turn the Subaru Select Monitor switch to ON. 5) Throttle fully closed. 6) Read the data of throttle position sensor using Subaru Select Monitor. ● Throttle position sensor input signal is indicated.	Is the value voltage between approx. 0.5 V?	Go to step 15.	Go to step 18.
15	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> Throttle fully open. NOTE: Must be changed correspondingly with accelerator pedal operation (from "released" to "depressed" position).	Is the value voltage between approx. 4.3 V?	Go to step 18.	Go to step 17.
16	<b>CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY).</b> Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 1 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 2 (+) — Chassis ground (-):</b>	Is the voltage between 4.8 and 5.3 V?	Even if the AT OIL TEMP warning 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.



## DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
17	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY).</b> Read the data of throttle position sensor power supply using Subaru Select Monitor. <ul style="list-style-type: none"><li>● Throttle position sensor power supply voltage is indicated.</li></ul>	Is the value voltage between 4.8 and 5.3 V?	Even if the AT OIL TEMP warning 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	<b>CHECK POOR CONTACT.</b>	Is there poor contact in throttle position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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## D: DTC 33 FRONT VEHICLE SPEED SENSOR S004521113

### DIAGNOSIS:

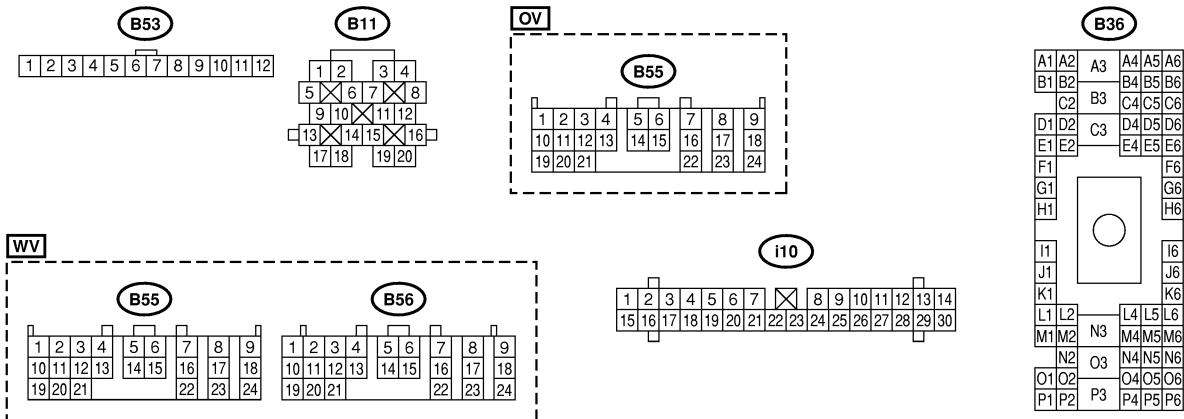
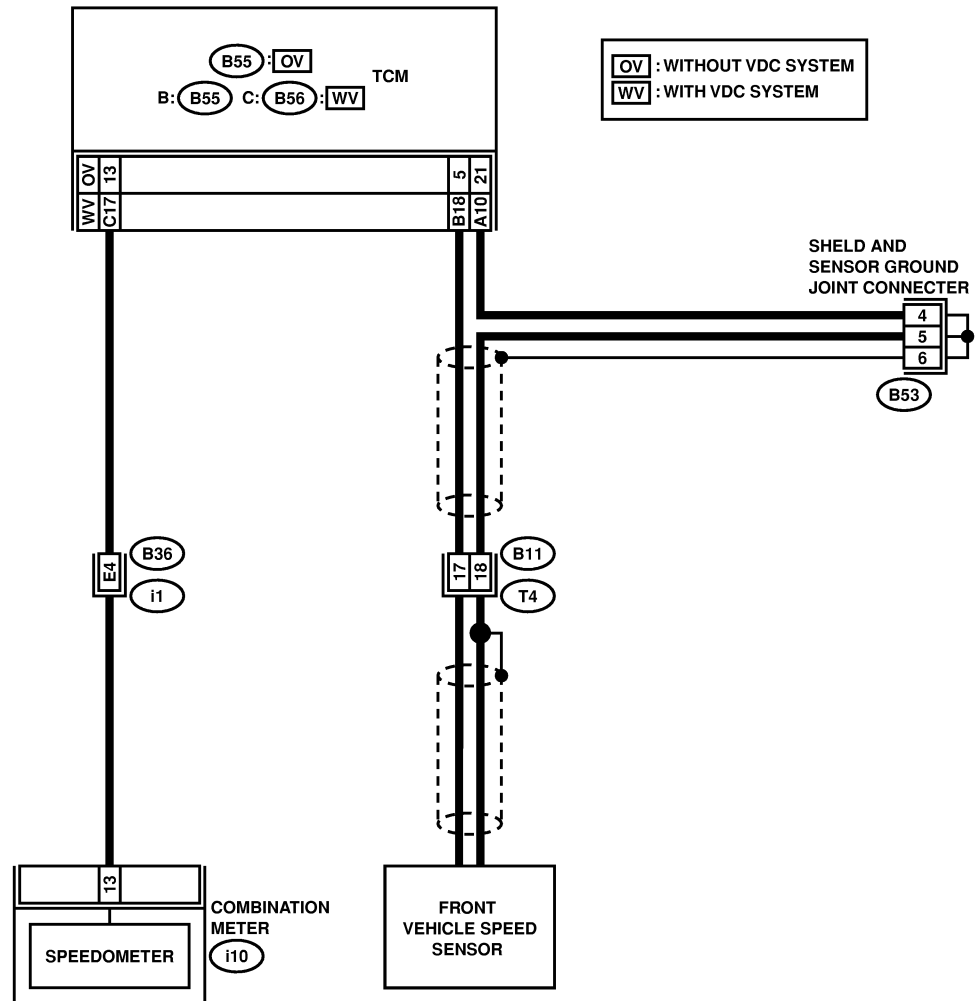
- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

### TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Poor driving performance.

## Automatic Transmission (Diagnostics)

### WIRING DIAGRAM:



B3M2223

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 5 — (B11) No. 17:</b> <b>With VDC system</b> <b>(B55) No. 18 — (B11) No. 17:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 21 — (B11) No. 18:</b> <b>With VDC system</b> <b>(B54) No. 10 — (B11) No. 18:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 21 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 10 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 5 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 18 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5	<b>CHECK FRONT VEHICLE SPEED SENSOR.</b> Measure the resistance between transmission connector receptacle's terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 17 — No. 18:</b>	Is the resistance between 450 and 650 $\Omega$ ?	Go to step 6.	Replace the front vehicle speed sensor. <Ref. to AT-33, Front Vehicle Speed Sensor.>
6	<b>PREPARE OSCILLOSCOPE.</b>	Do you have an oscilloscope?	Go to step 9.	Go to step 7.
7	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 10.	Go to step 8.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect all connectors. 2) Lift-up or raise the vehicle and place safety stands. NOTE: On AWD models, raise all wheels off floor. 3) Start the engine and set the 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 the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.> 4) Measure the voltage between TCM connector terminals. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 5 (+) — (B54) No. 21 (-):</b> <b>With VDC system</b> <b>(B55) No. 18 (+) — (B54) No. 10 (-):</b>	Is the voltage more than AC 1 V?	Even if the AT OIL TEMP warning 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 case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
9	<b>CHECK FRONT VEHICLE SPEED SENSOR USING OSCILLOSCOPE.</b> 1) Connect all connectors. 2) Lift-up the vehicle and place safety stands. NOTE: On AWD models, raise all wheels off ground. 3) Set the oscilloscope to TCM connector terminals. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>Positive probe; (B55) No. 5</b> <b>Earth lead; (B55) No. 21</b> <b>With VDC system</b> <b>Positive probe; (B55) No. 18</b> <b>Earth lead; (B54) No. 10</b> 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 the AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to ABS-21, Clear Memory Mode.> 5) Measure the signal voltage indicated on oscilloscope.	Is the voltage more than AC 4 V?	Even if the AT OIL TEMP warning 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 case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. NOTE: On AWD models, raise all wheels off floor. 4) Turn the ignition switch to ON and turn the Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read the data of vehicle speed using Subaru Select Monitor. ● Compare the speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in "km/h" or "MPH". 7) Slowly increase the 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 the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if the AT OIL TEMP warning 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	<b>CHECK POOR CONTACT.</b>	Is there poor contact in front vehicle speed sensor circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:



**E: DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR** S004521/14

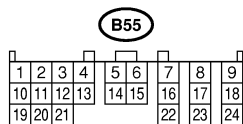
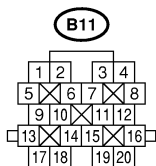
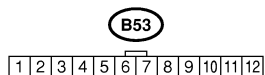
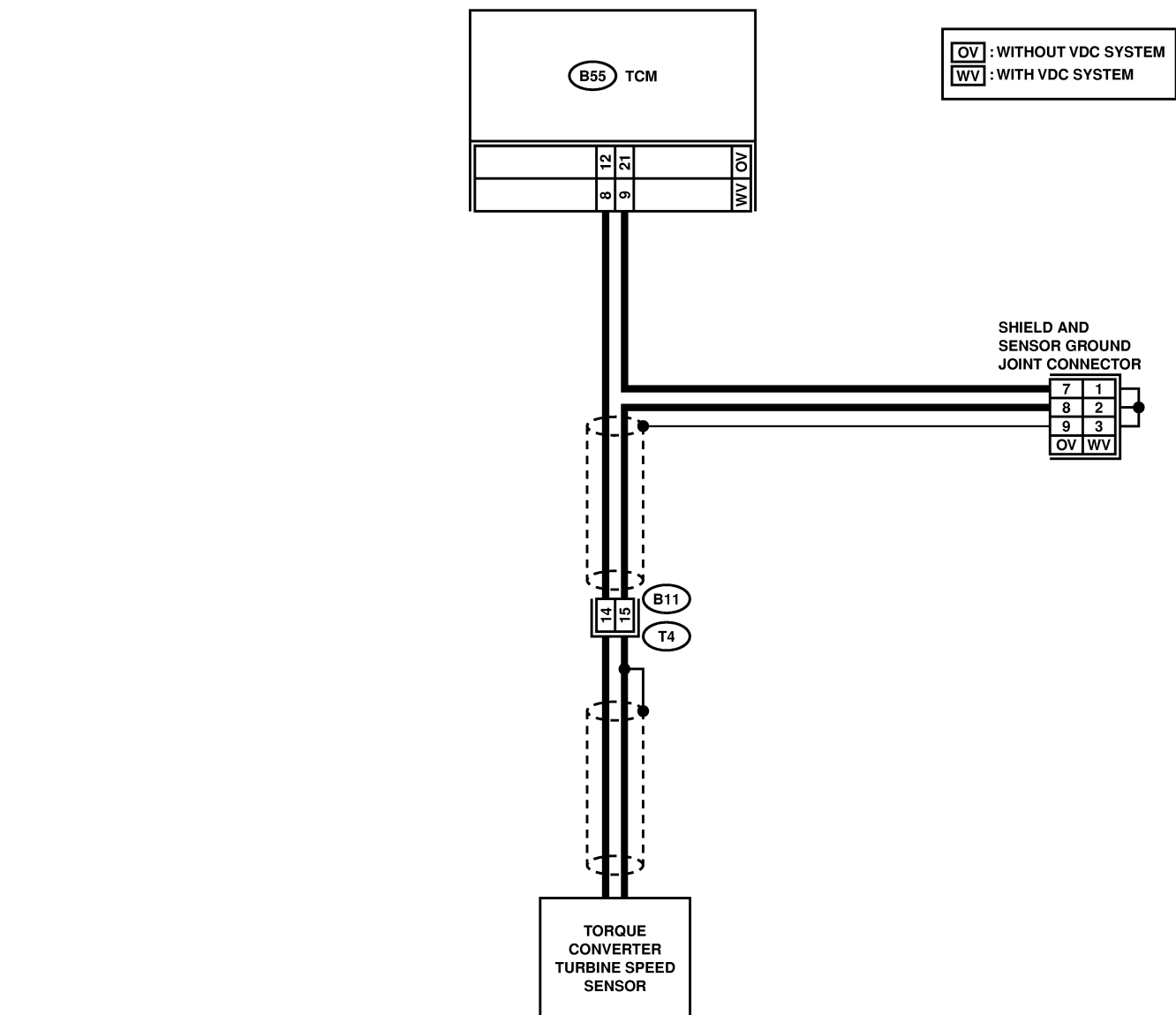
**DIAGNOSIS:**

Input signal circuit of TCM is open or shorted.

**TROUBLE SYMPTOM:**

Excessive shift shock.

**WIRING DIAGRAM:**



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Measure the resistance between transmission connector receptacle's terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 14 — No. 15:</b>	Is the resistance between 450 and 650 $\Omega$ ?	Go to step 2.	Replace the turbine speed sensor. <Ref. to AT-38, Torque Converter Turbine Speed Sensor.>
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 12 — (B11) No. 14:</b> <b>With VDC system</b> <b>(B55) No. 8 — (B11) No. 14:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 21 — (B11) No. 15:</b> <b>With VDC system</b> <b>(B55) No. 9 — (B11) No. 15:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 21 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 9 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 12 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 8 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 6.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6	<b>PREPARE OSCILLOSCOPE.</b>	Do you have an oscilloscope?	Go to step 10.	Go to step 7.
7	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect the connectors to TCM and transmission. 2) Start the engine and move select lever to "P" or "N" range. 3) Measure the voltage between TCM connector terminals. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 12 (+) — No. 21 (-):</b> <b>With VDC system</b> <b>(B55) No. 8 (+) — No. 9 (-):</b>	Is the voltage more than AC 1 V?	Even if the AT OIL TEMP warning 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.
9	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and turn the Subaru Select Monitor switch to ON. 4) Start the engine. 5) Move the select lever to "P" or "N" range. 6) Read the data of turbine speed using Subaru Select Monitor. • Compare the tachometer with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the AT OIL TEMP warning 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	<b>CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.</b> 1) Connect the connectors to TCM and transmission. 2) Set the oscilloscope to TCM connector terminals. <b>Connector &amp; terminal</b> <b>With VDC system</b> <b>Positive probe; (B55) No. 8</b> <b>Earth lead; (B55) No. 9</b> <b>Without VDC system</b> <b>Positive probe; (B55) No. 12</b> <b>Earth lead; (B55) No. 21</b> 3) Start the engine and move the select lever to "P" or "N" range.	Is the signal voltage more than AC 1 V?	Even if the AT OIL TEMP warning 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	<b>CHECK POOR CONTACT.</b>	Is there poor contact in torque converter turbine speed sensor circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:

## F: DTC 38 TORQUE CONTROL SIGNAL S004521G66

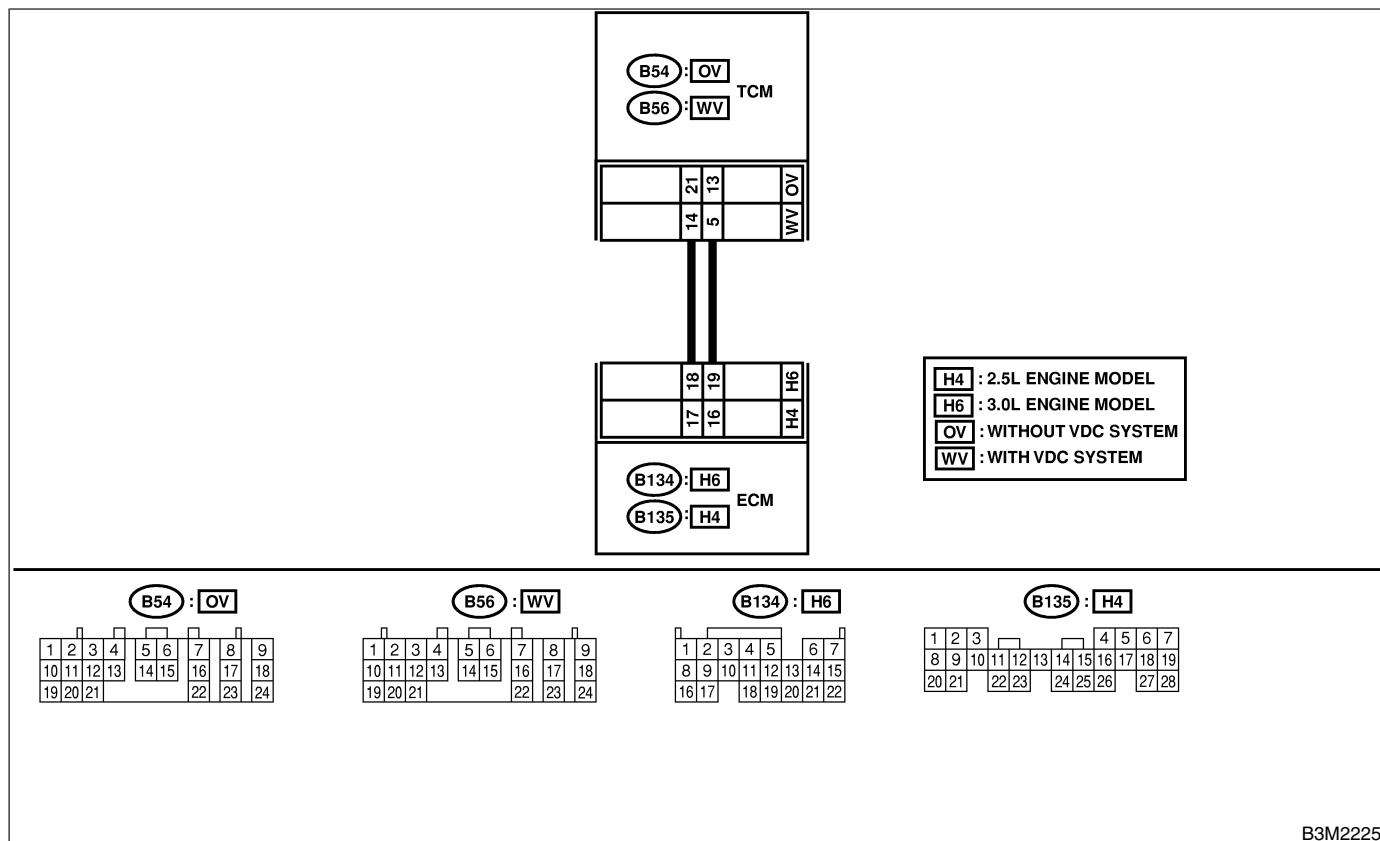
### DIAGNOSIS:

- The signal circuit is open or shorted.

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 L engine model</b> (B54) No. 21 — (B134) No. 17: (B54) No. 13 — (B134) No. 16: <b>3.0 L engine model with VDC model</b> (B56) No. 14 — (B135) No. 18: (B56) No. 5 — (B135) No. 19: <b>3.0 L engine model without VDC model</b> (B54) No. 21 — (B135) No. 18: (B54) No. 13 — (B135) No. 19:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> (B56) No. 21 — Chassis ground: (B54) No. 13 — Chassis ground: <b>With VDC system</b> (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.
3	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect the connectors to TCM and ECM. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the voltage between TCM connector terminals. <b>Connector &amp; terminal</b> <b>Without VDC system</b> (B54) No. 21 (+) — Chassis ground (-): (B54) No. 13 (+) — Chassis ground (-): <b>With VDC system</b> (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-):	Is the voltage more than 4.8 V?	Even if the AT OIL TEMP warning 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	<b>CHECK POOR CONTACT.</b>	Is there poor contact in torque control signal circuit?	Repair poor contact.	Go to step 5.
5	<b>CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.</b> Check the 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	<b>CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.</b> Check the installing condition of ground line in transmission and body. <b>Tightening torque:</b> <b>13±3 N·m (1.3±0.3 kgf-m, 9.4±2.2 ft-lb)</b>	Is the tightening torque value within specification?	Go to step 7.	Tighten to specified torque.
7	<b>CHECK GROUND LINE INSIDE TRANSMISSION.</b> 1) Drain the AT fluid and remove the oil pan. 2) Check the tightening torque value of ground line installing bolt. <b>Tightening torque:</b> <b>T: 8±1 N·m (0.8±0.1 kgf-m, 5.8±0.7 ft-lb)</b>	Is the tightening torque value within specification?	Go to step 9.	Tighten to specified torque.
8	<b>CHECK GROUND CIRCUIT OF ECM.</b> <Ref. to AT-52, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step 9.
9	<b>RECHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> (B54) No. 21 (+) — Chassis ground (-): (B54) No. 13 (+) — Chassis ground (-): <b>With VDC system</b> (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-):	Is each voltage more than 4.8 V?	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>	Replace the ECM.

## G: DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL S004521116

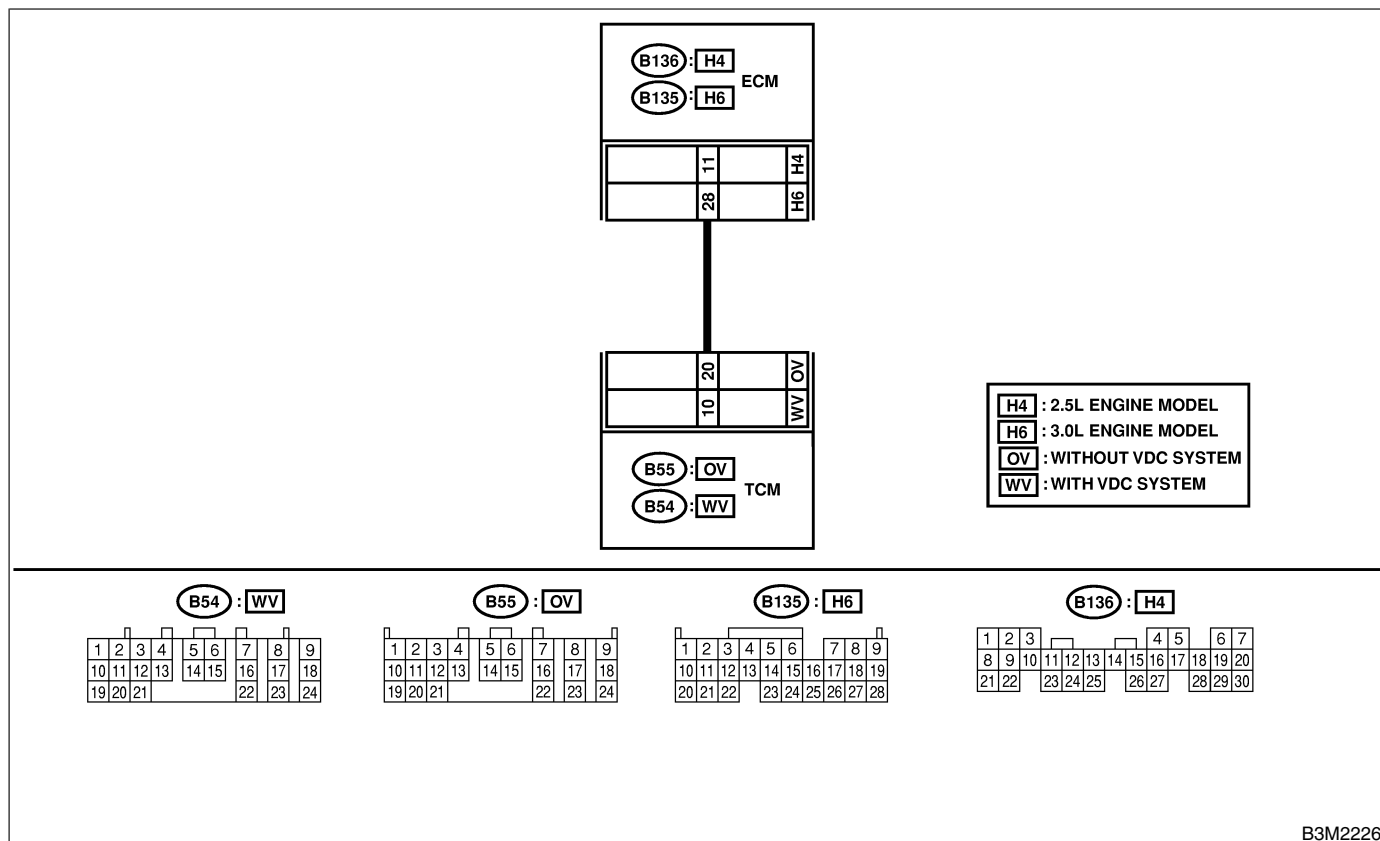
### DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	<b>CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM</b> <Ref. to AT-52, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step 2.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 L engine model</b> (B55) No. 20 — (B136) No. 11: <b>3.0 L engine model without VDC system</b> (B55) No. 20 — (B135) No. 28: <b>3.0 L engine model with VDC system</b> (B54) No. 10 — (B135) No. 28:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and ECM connector.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> Measure the resistance of harness between TCM connector and chassis ground. <i>Connector &amp; terminal</i> <i>Without VDC system</i> <i>(B55) No. 20 — Chassis ground:</i> <i>With VDC system</i> <i>(B54) No. 10 — Chassis ground:</i>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and ECM connector.
4	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 6.	Go to step 5.
5	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect the connectors to TCM and ECM. 2) Start the engine, and warm-up the transmission until the 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 the voltage between TCM connector and chassis ground. <i>Connector &amp; terminal</i> <i>Without VDC system</i> <i>(B55) No. 20 (+) — Chassis ground (-):</i> <i>With VDC system</i> <i>(B54) No. 10 (+) — Chassis ground (-):</i>	Is the voltage between 1.2 and 1.8 V?	Even if the AT OIL TEMP warning 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	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select monitor switch to ON. 4) Warm-up the engine until the engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read the data of intake manifold pressure signal using Subaru Select Monitor. ● Display shows the intake manifold pressure signal value sent from ECM.	Is the value between 1.2 and 1.8 V?	Even if the AT OIL TEMP warning 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	<b>CHECK POOR CONTACT.</b>	Is there poor contact in intake manifold pressure signal circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>



**H: DTC 71 SHIFT SOLENOID 1** S004521117

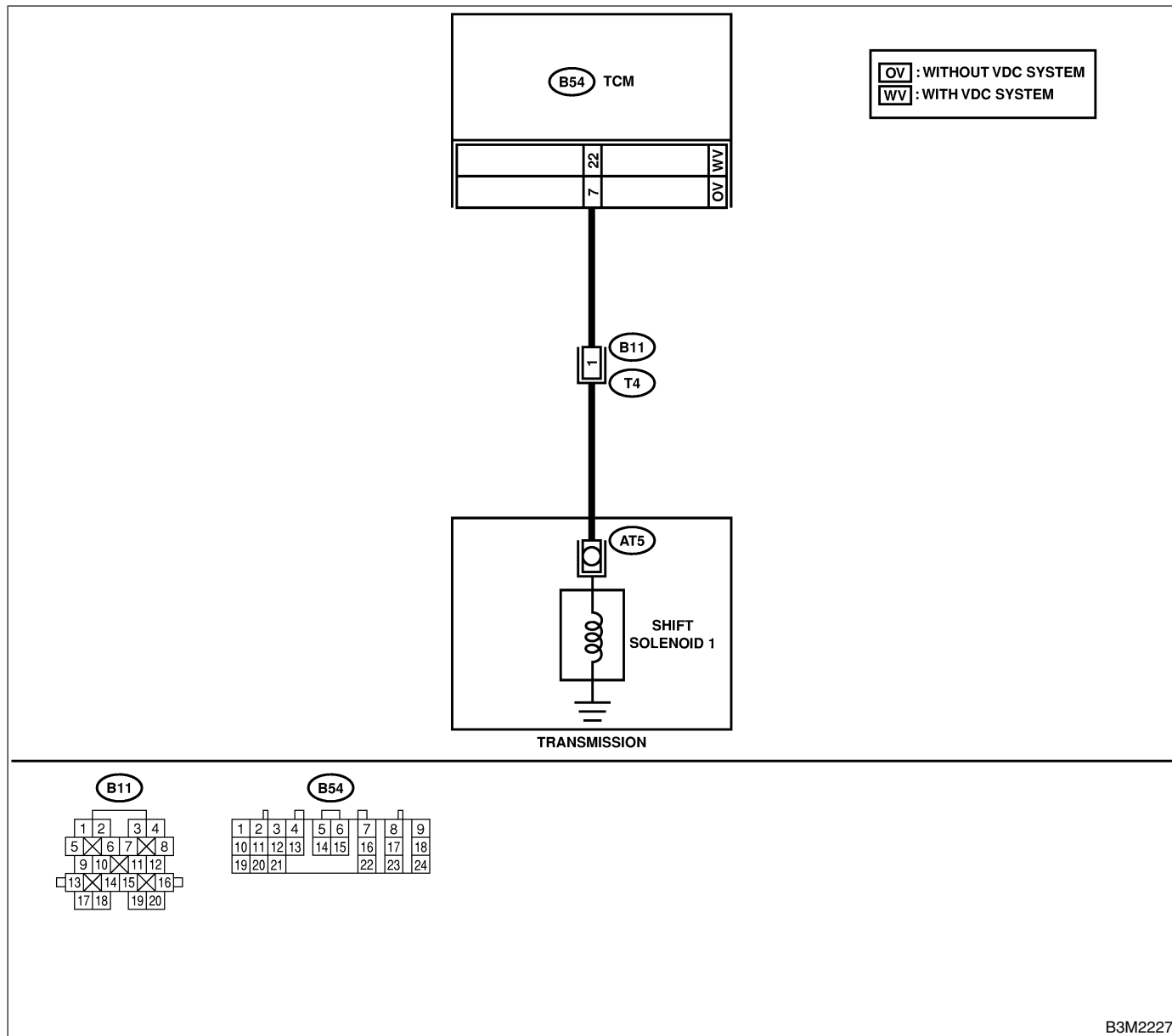
**DIAGNOSIS:**

Output signal circuit of shift solenoid 1 is open or shorted.

**TROUBLE SYMPTOM:**

Does not shift.

**WIRING DIAGRAM:**



B3M2227

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and shift solenoid 1 connector. <i>Connector &amp; terminal</i> <i>Without VDC system</i> (B54) No. 7 — (B11) No. 1: <i>With VDC system</i> (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.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM connector and chassis ground. <i>Connector &amp; terminal</i> <i>Without VDC system</i> (B54) No. 7 — Chassis ground: <i>With VDC system</i> (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	<b>CHECK SHIFT SOLENOID 1.</b> Measure the resistance between transmission connector terminals. <i>Connector &amp; terminal</i> (T4) No. 1 — No. 16:	Is the resistance between 10 and 16 Ω?	Go to step 4.	Go to step 7.
4	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to “D” range. 4) Measure the voltage between TCM connector and chassis ground. <i>Connector &amp; terminal</i> <i>Without VDC system</i> (B54) No. 7 (+) — Chassis ground (–): <i>With VDC system</i> (B54) No. 22 (+) — Chassis ground (–):	Is the voltage more than 9V?	Go to step 5.	Go to step 6.
5	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Move the select lever to “2” range. 2) Measure the voltage between TCM connector and chassis ground. <i>Connector &amp; terminal</i> <i>Without VDC system</i> (B54) No. 7 (+) — Chassis ground (–): <i>With VDC system</i> (B54) No. 22 (+) — Chassis ground (–):	Is the voltage less than 1V?	Even if the AT OIL TEMP warning 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	<b>CHECK POOR CONTACT.</b>	Is there poor contact in shift solenoid 1 circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
7	<b>CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).</b> 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. <b>NOTE:</b> On AWD models, raise all wheels off ground. 3) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 4) Remove the oil pan, and disconnect the connector from shift solenoid 1. 5) Measure the resistance between shift solenoid 1 connector and transmission ground. <b>Terminal</b> <b>No. 1 — Transmission ground:</b>	Is the resistance between 10 and 16 $\Omega$ ?	Go to step 8.	Replace the shift solenoid 1. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	<b>CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.</b> Measure the resistance of harness between shift solenoid 1 and transmission connector. <b>Connector &amp; terminal</b> <b>(AT5) No. 1 — (T4) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair open circuit in harness between shift solenoid 1 and transmission connector.
9	<b>CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.</b> Measure the resistance of harness between shift solenoid 1 connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 1 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if the AT OIL TEMP warning 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 DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:

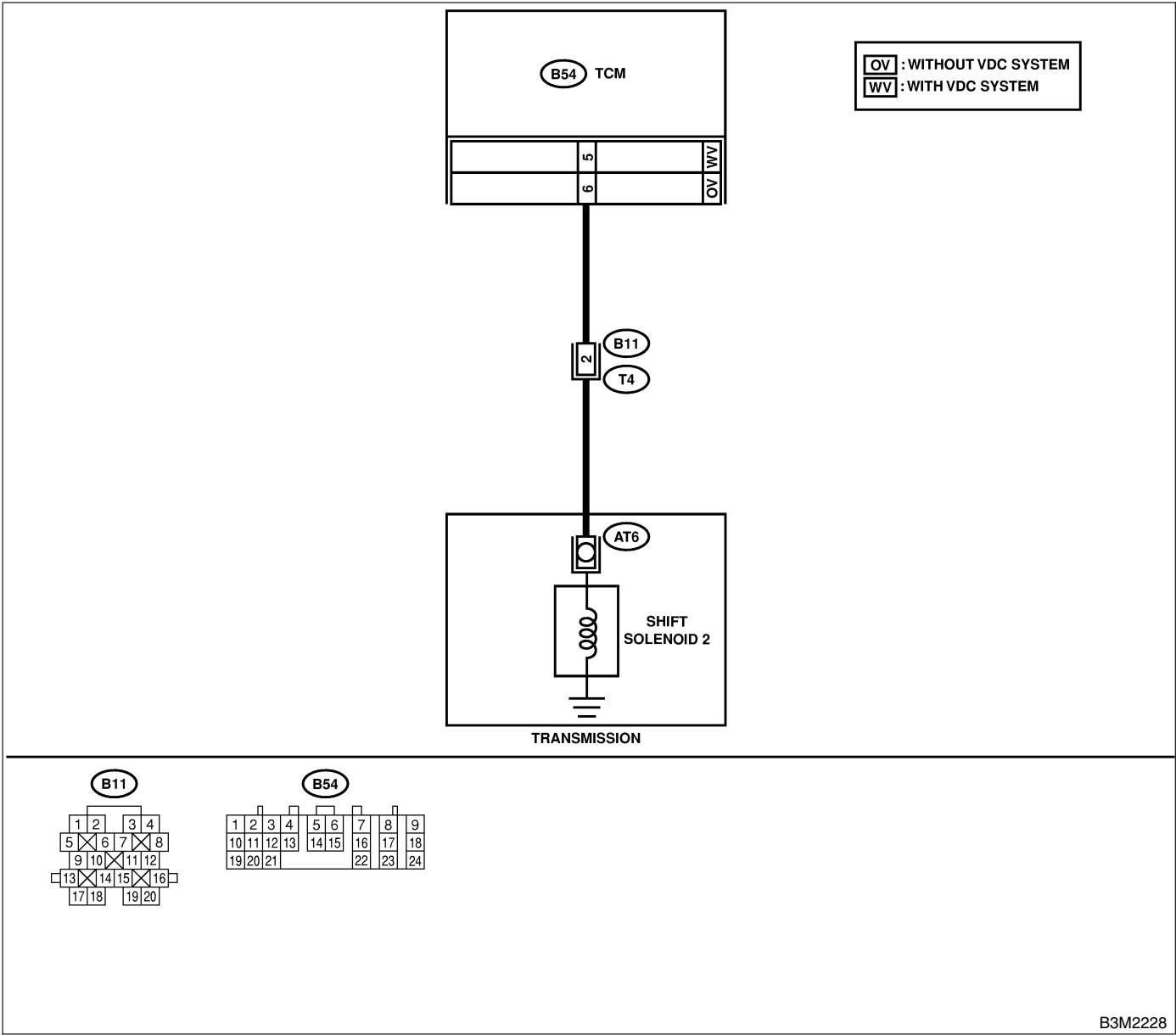
I: DTC 72 SHIFT SOLENOID 2

S004521118

**DIAGNOSIS:**  
Output signal circuit of shift solenoid 2 is open or shorted.

**TROUBLE SYMPTOM:**  
Does not shift.

**WIRING DIAGRAM:**



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and shift solenoid 2 connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 6 — (B11) No. 2:</b> <b>With VDC system</b> <b>(B54) No. 5 — (B11) No. 2:</b>	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 6 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 5 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	<b>CHECK SHIFT SOLENOID 2.</b> Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 2 — No. 16:</b>	Is the resistance between 10 and 16 Ω?	Go to step 4.	Go to step 6.
4	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect the connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. NOTE: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move the selector lever to "D", and slowly increase the 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 the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.> 5) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 6 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 5 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Even if the AT OIL TEMP warning 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.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
5	<b>CHECK POOR CONTACT.</b>	Is there poor contact in shift solenoid 2 circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
6	<b>CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).</b> 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 3) Remove the oil pan, and disconnect the connector from shift solenoid 2. 4) Measure the resistance between shift solenoid 2 connector and transmission ground. <b>Connector &amp; terminal</b> <b>No. 1 — Transmission ground:</b>	Is the resistance between 10 and 16 $\Omega$ ?	Go to step 7.	Replace the shift solenoid 2 assembly. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
7	<b>CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.</b> Measure the resistance of harness between shift solenoid 2 and transmission connector. <b>Connector &amp; terminal</b> <b>(AT6) No. 1 — (T4) No. 2:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 8.	Repair open circuit in harness between shift solenoid 2 and transmission connector.
8	<b>CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.</b> Measure the resistance of harness between shift solenoid 2 connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 2 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if the AT OIL TEMP warning 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 DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:



## J: DTC 73 LOW CLUTCH TIMING SOLENOID S004521119

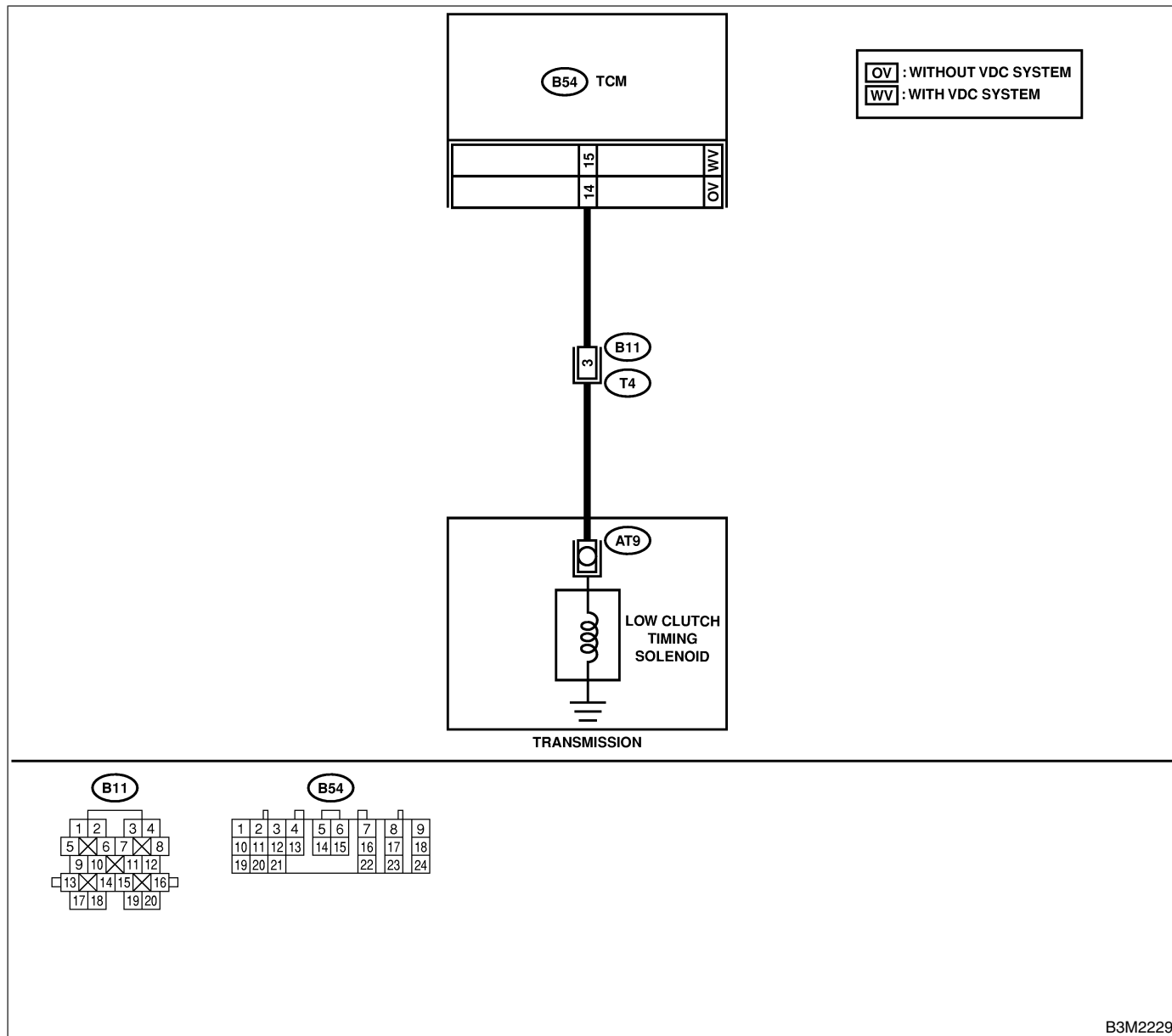
### DIAGNOSIS:

Output signal circuit of low clutch timing solenoid is open or shorted.

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 14 — (B11) No. 3:</b> <b>With VDC system</b> <b>(B54) No. 15 — (B11) No. 3:</b>	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM connector and transmission ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 14 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 15 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	<b>CHECK LOW CLUTCH TIMING SOLENOID.</b> Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 3 — No. 16:</b>	Is the resistance between 10 and 16 Ω?	Go to step 4.	Go to step 7.
4	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to "D" range. 4) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 14 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 15 (+) — Chassis ground (-):</b>	Is the voltage more than 9V?	Go to step 5.	Go to step 6.
5	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Move the select lever to "2" range. 2) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 14 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 15 (+) — Chassis ground (-):</b>	Is the voltage less than 1V?	Even if the AT OIL TEMP warning 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	<b>CHECK POOR CONTACT.</b>	Is there poor contact in low clutch timing solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
7	<b>CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION).</b> 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stands. <b>NOTE:</b> On AWD models, raise all wheels off ground. 3) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 4) Remove the oil pan, and disconnect the connector from low clutch timing solenoid. 5) Measure the resistance between low clutch timing solenoid connector and transmission ground. <b>Terminal</b> <b>No. 1 — Transmission ground:</b>	Is the resistance between 10 and 16 $\Omega$ ?	Go to step 8.	Replace the low clutch timing solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	<b>CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.</b> Measure the resistance of harness between low clutch timing solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(AT9) No. 1 — (T4) No. 3:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair open circuit in harness between low clutch timing solenoid and transmission connector.
9	<b>CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.</b> Measure the resistance of harness between low clutch timing solenoid connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 3 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if the AT OIL TEMP warning 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 DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:

## K: DTC 74 2-4 BRAKE TIMING SOLENOID S004521/20

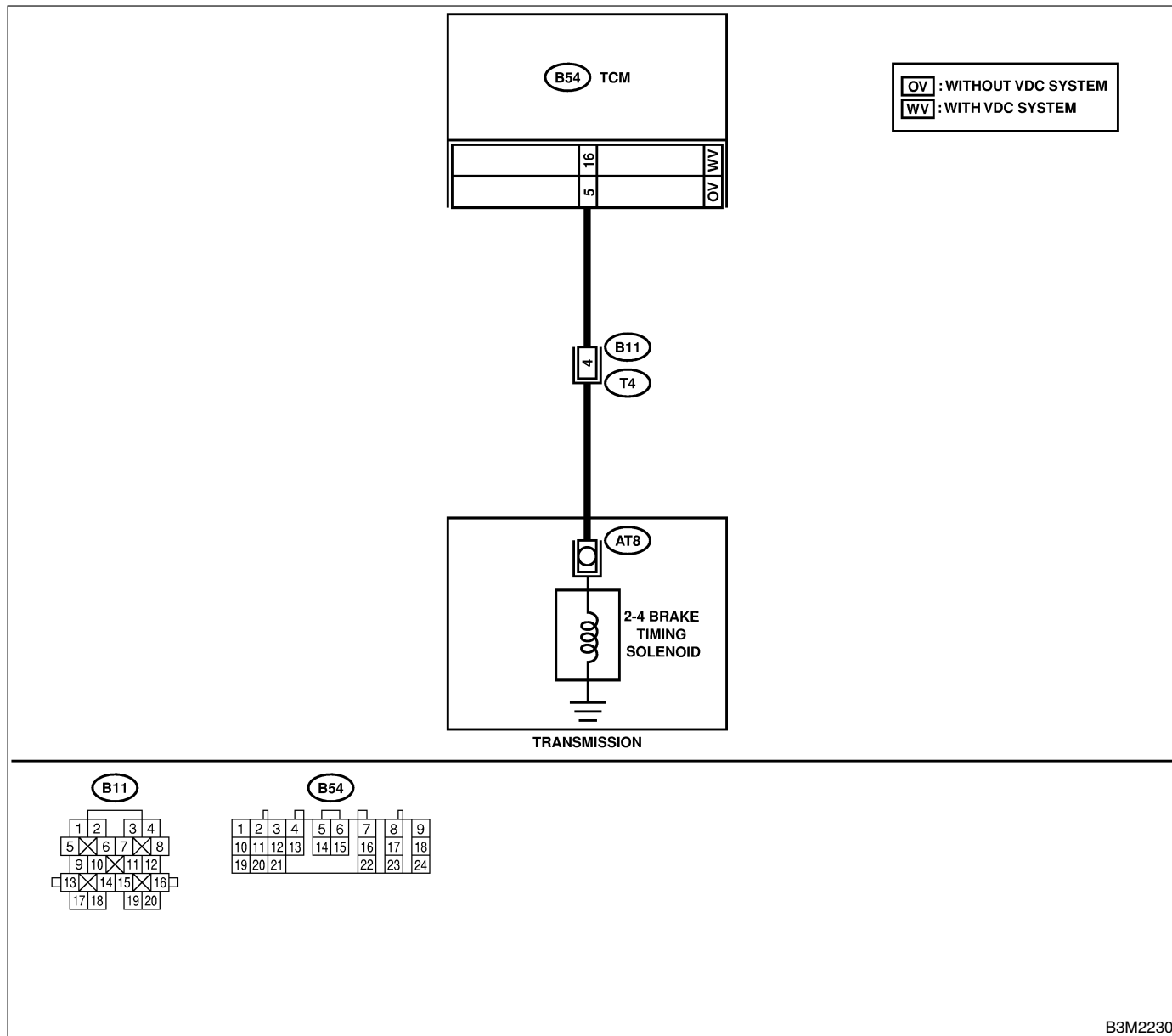
### DIAGNOSIS:

Output signal circuit of 2-4 brake timing solenoid is open or shorted.

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



B3M2230

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 5 — (B11) No. 4:</b> <b>With VDC system</b> <b>(B54) No. 16 — (B11) No. 4:</b>	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM connector and transmission ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 5 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 16 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	<b>CHECK 2-4 BRAKE TIMING SOLENOID.</b> Measure the resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 4 — No. 16:</b>	Is the resistance between 10 and 16 Ω?	Go to step 4.	Go to step 7.
4	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect the connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stands. NOTE: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move the select 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 the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.> 5) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 5 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 16 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V?	Go to step 5.	Go to step 6.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
5	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Move the select lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH). <b>NOTE:</b> The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.> 2) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 5 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 16 (+) — Chassis ground (-):</b>	Is the voltage more than 9 V?	Even if the AT OIL TEMP warning 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.
6	<b>CHECK POOR CONTACT.</b>	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
7	<b>CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION).</b> 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stands. <b>NOTE:</b> On AWD models, raise all wheels off ground. 3) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 4) Remove the oil pan, and disconnect the connector from 2-4 brake timing solenoid. 5) Measure the resistance between 2-4 brake timing solenoid connector and transmission ground. <b>Terminal</b> <b>No. 1 — Transmission ground:</b>	Is the resistance between 10 and 16 $\Omega$ ?	Go to step 8.	Replace the 2-4 brake timing solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	<b>CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.</b> Measure the resistance of harness between 2-4 brake timing solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(AT8) No. 1 — (T4) No. 4:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
9	<b>CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.</b> Measure the resistance of harness between 2-4 brake timing solenoid connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 4 — Transmission ground:</b>	Is the resistance more than 1 MΩ?	Even if the AT OIL TEMP warning 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.



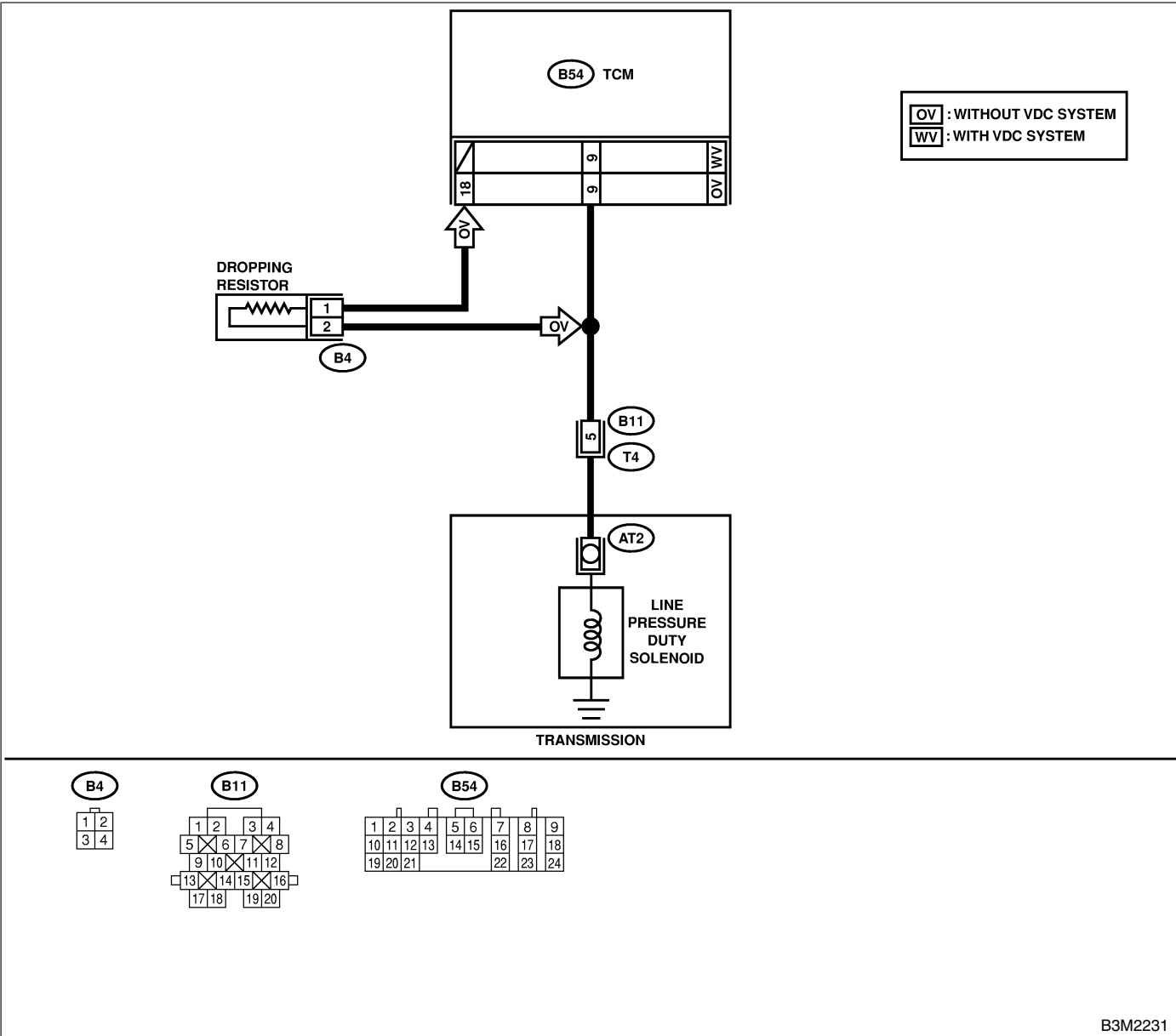
L: DTC 75 LINE PRESSURE DUTY SOLENOID

S004521/21

**DIAGNOSIS:**  
Output signal circuit of line pressure duty solenoid is open or shorted.

**TROUBLE SYMPTOM:**  
Excessive shift shock.

**WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	CHECK VEHICLE.	Is the target model without VDC system?	Go to step 2.	Go to step 7.
2	CHECK RESISTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from dropping resistor. 3) Measure the resistance between dropping resistor terminal. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance between 9 and 15 Ω?	Go to step 3.	Replace the dropping resistor. <Ref. to AT-50, Dropping Resistor.>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.</b> 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and dropping resistor connector. <b>Connector &amp; terminal</b> <b>(B54) No. 18 — (B4) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair open circuit in harness between TCM and dropping resistor connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.</b> Measure the resistance of harness between dropping resistor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B4) No. 1 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and dropping resistor connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.</b> 1) Disconnect the connector from transmission. 2) Measure the resistance of harness between transmission and dropping resistor connector. <b>Connector &amp; terminal</b> <b>(B4) No. 2 — (B11) No. 5:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair open circuit in harness between dropping resistor and transmission connector.
6	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.</b> Measure the resistance of harness between dropping resistor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B4) No. 2 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 7.	Repair short circuit in harness between dropping resistor and transmission connector.
7	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>(B54) No. 9 — (B11) No. 5:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.
8	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>(B54) No. 9 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 9.	Repair short circuit in harness between TCM and transmission connector.
9	<b>CHECK LINE PRESSURE DUTY SOLENOID.</b> Measure the resistance between transmission connector receptacle's terminals. <b>Terminal</b> <b>(T4) No. 5 — No. 16:</b>	Is the resistance between 2.0 and 4.5 $\Omega$ ?	Go to step 10.	Go to step 16.
10	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 13.	Go to step 11.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
11	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect all connectors. 2) Start the engine and warm-up the transmission until the ATF temperature is above 80°C (176°F). <b>NOTE:</b> If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn the ignition switch to ON (engine OFF). 4) Move the select lever to "N". 5) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B54) No. 9 (+) — Chassis ground (–):</b>	Is the voltage between 1.5 and 5.0 V with throttle fully closed?	Go to step 12.	Go to step 15.
12	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B54) No. 9 (+) — Chassis ground (–):</b>	Is the voltage less than 1 V with throttle fully open?	Even if the AT OIL TEMP warning 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 15.
13	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Warm-up the transmission until the ATF temperature is above 80°C (176°F). <b>NOTE:</b> If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (engine OFF). 6) Move the select lever to "N". 7) Read the 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 14.	Go to step 15.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

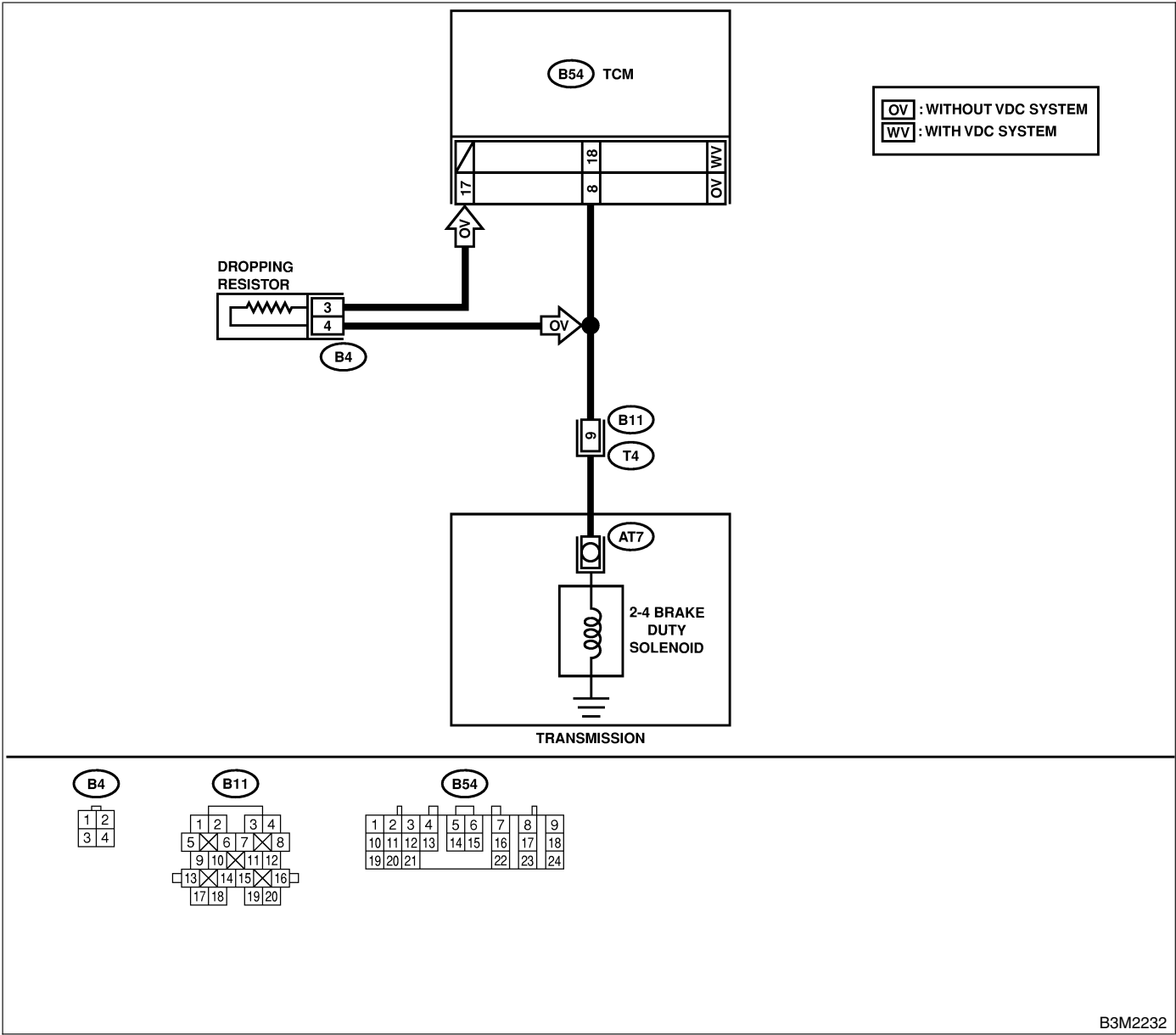
No.	Step	Check	Yes	No
14	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to ON (Engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if the AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step 15.
15	<b>CHECK POOR CONTACT.</b>	Is there poor contact in line pressure duty solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
16	<b>CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION).</b> 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 3) Remove the oil pan, and disconnect the connector from line pressure duty solenoid. 4) Measure the resistance between line pressure duty solenoid connector and transmission ground. <b>Terminal</b> <b>No. 1 — Transmission ground:</b>	Is the resistance between 2.0 and 4.5 $\Omega$ ?	Go to step 17.	Replace the line pressure duty solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
17	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.</b> Measure the resistance of harness between line pressure duty solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 5 — (AT2) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 18.	Repair open circuit in harness between line pressure duty solenoid and transmission connector.
18	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.</b> Measure the resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 5 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if the AT OIL TEMP warning 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.

M: DTC 76 2-4 BRAKE DUTY SOLENOID S004521/22

**DIAGNOSIS:**  
Output signal circuit of 2-4 brake duty solenoid is open or shorted.

**TROUBLE SYMPTOM:**  
Excessive shift shock.

**WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	<b>CHECK VEHICLE.</b>	Is the target model without VDC system?	Go to step 2.	Go to step 7.
2	<b>CHECK RESISTOR.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from dropping resistor. 3) Measure the resistance between dropping resistor terminal. <b>Terminals</b> <b>No. 3 — No. 4:</b>	Is the resistance between 9 and 15 Ω?	Go to step 3.	Replace the dropping resistor. <Ref. to AT-50, Dropping Resistor.>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.</b> 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and dropping resistor connector. <b>Connector &amp; terminal</b> <b>(B54) No. 17 — (B4) No. 3:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair open circuit in harness between TCM and dropping resistor connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.</b> Measure the resistance of harness between dropping resistor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B4) No. 3 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and dropping resistor connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.</b> 1) Disconnect the connector from transmission. 2) Measure the resistance of harness between transmission and dropping resistor connector. <b>Connector &amp; terminal</b> <b>(B4) No. 4 — (B11) No. 9:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair open circuit in harness between dropping resistor and transmission connector.
6	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.</b> Measure the resistance of harness between dropping resistor connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B4) No. 4 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 7.	Repair short circuit in harness between dropping resistor and transmission connector.
7	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 8 — (B11) No. 9:</b> <b>With VDC system</b> <b>(B54) No. 18 — (B11) No. 9:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.
8	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 8 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 18 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 9.	Repair short circuit in harness between TCM and transmission connector.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
9	<b>CHECK 2-4 BRAKE DUTY SOLENOID.</b> Measure the resistance between transmission connector receptacle's terminals. <b>Terminal</b> <b>(T4) No. 16 — No. 9:</b>	Is the resistance between 2.0 and 4.5 $\Omega$ ?	Go to step 10.	Go to step 16.
10	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 13.	Go to step 11.
11	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect all connectors. 2) Start the engine and warm-up the transmission until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn the ignition switch to ON (engine OFF). 4) Move the select lever to "N". 5) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 8 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 18 (+) — Chassis ground (-):</b>	Is the voltage between 1.5 and 5.0 V with throttle fully closed?	Go to step 12.	Go to step 15.
12	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 8 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 18 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V with throttle fully open?	Even if the AT OIL TEMP warning 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 15.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
13	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Warm-up the transmission until the ATF temperature is above 80°C (176°F). <b>NOTE:</b> If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (engine OFF). 6) Move the select lever to "N". 7) Read the 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 14.	Go to step 15.
14	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 1) Turn the ignition switch to ON (Engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if the AT OIL TEMP warning 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 15.
15	<b>CHECK POOR CONTACT.</b>	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
16	<b>CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).</b> 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 3) Remove the oil pan, and disconnect the connector from 2-4 brake duty solenoid. 4) Measure the resistance between 2-4 brake duty solenoid connector and transmission ground. <b>Terminal</b> <b>No. 1 — Transmission ground:</b>	Is the resistance between 2.0 and 4.5 Ω?	Go to step 17.	Replace the 2-4 brake duty solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
17	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.</b> Measure the resistance of harness between 2-4 brake duty solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 9 — (AT7) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 18.	Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.
18	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.</b> Measure the resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 9 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if the AT OIL TEMP warning 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 DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:

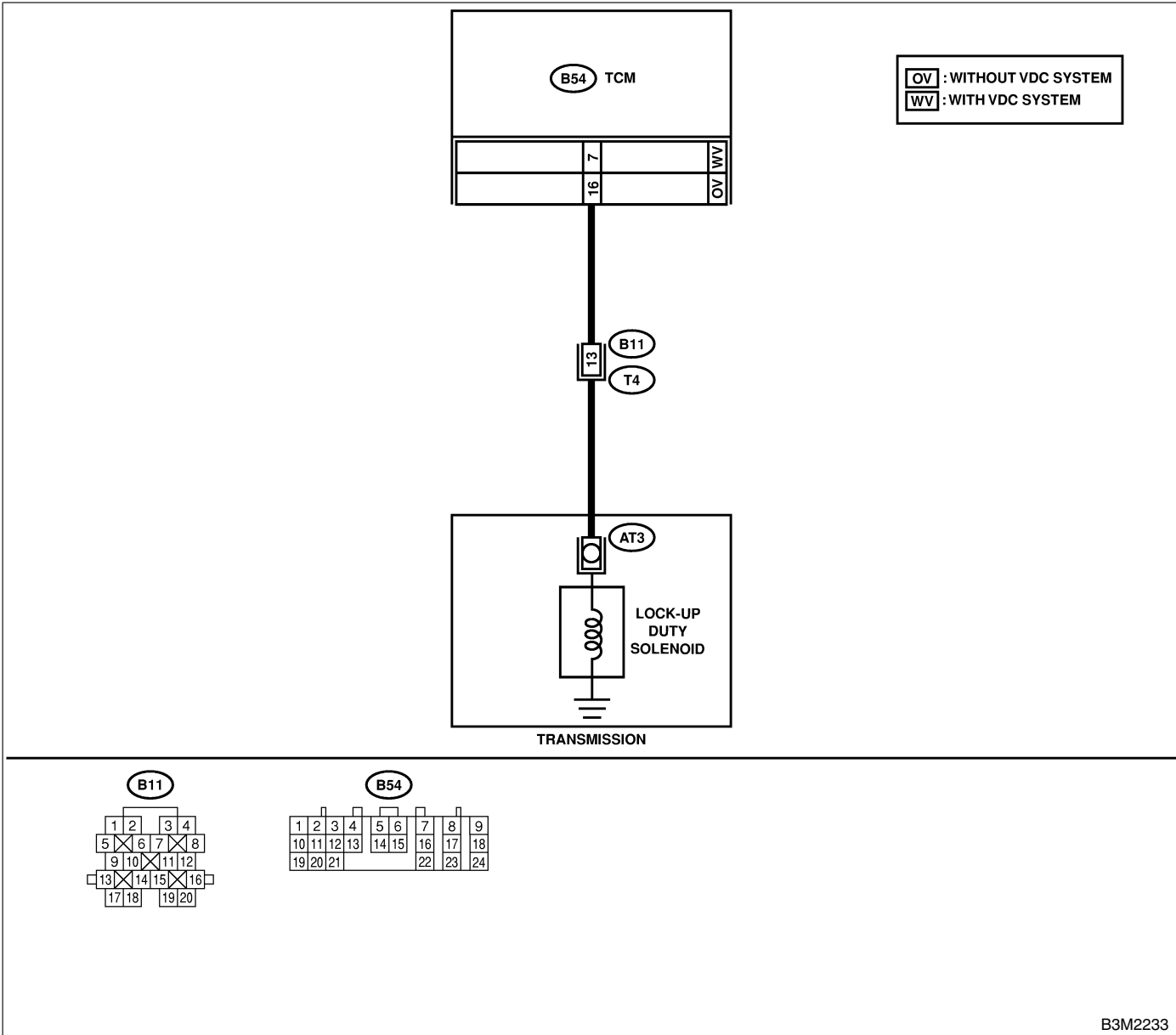
N: DTC 77 LOCK-UP DUTY SOLENOID

S004521123

**DIAGNOSIS:**  
Output signal circuit of lock-up duty solenoid is open or shorted.

**TROUBLE SYMPTOM:**  
No “lock-up” (after engine warm-up).

**WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	CHECK DTC.	Do multiple trouble codes appear in the on-board diagnostics test mode?	Go to another trouble code.	Go to step 2.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 16 — (B11) No. 13:</b> <b>With VDC system</b> <b>(B54) No. 7 — (B11) No. 13:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness connector between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 16 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 7 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<b>CHECK LOCK-UP DUTY SOLENOID.</b> Measure the resistance between transmission connector receptacle's terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 13 — No. 16:</b>	Is the resistance between 10 and 17 $\Omega$ ?	Go to step 5.	Go to step 11.
5	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 8.	Go to step 6.
6	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. <b>NOTE:</b> On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until the ATF temperature is above 80°C (176°F). <b>NOTE:</b> If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move the select lever to "D" and slowly increase the vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. <b>NOTE:</b> The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.> 5) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 16 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 7 (+) — Chassis ground (-):</b>	Is the voltage more than 8.5 V?	Go to step 7.	Go to step 10.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
7	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Return the engine to idling speed and move the select lever to "N". 2) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 16 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 7 (+) — Chassis ground (-):</b>	Is the voltage less than 0.5 V?	Even if the AT OIL TEMP warning 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	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. <b>NOTE:</b> On AWD models, raise all wheels off ground. 3) Connect the Subaru Select Monitor to data link connector. 4) Start the engine, and turn the Subaru Select Monitor switch to ON. 5) Start the engine and warm-up the transmission until the ATF temperature is above 80°C (176°F). <b>NOTE:</b> If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read the data of lock-up duty solenoid using Subaru Select Monitor. ● Lock-up duty solenoid is indicated in "%". 7) Move the select lever to "D" and slowly increase the vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. <b>NOTE:</b> The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.>	Is the value 95%?	Go to step 9.	Go to step 10.
9	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> Return the engine to idling speed and move the select lever to "N". <b>NOTE:</b> 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-21, Clear Memory Mode.>	Is the value 5%?	Even if the AT OIL TEMP warning 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 DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	<b>CHECK POOR CONTACT.</b>	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
11	<b>CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).</b> 1) Remove the transmission connector from bracket. 2) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 3) Remove the oil pan, and disconnect the connector from lock-up duty solenoid. 4) Measure the resistance between lock-up duty solenoid connector and transmission ground. <b>Terminal</b> <b>No. 1 — Transmission ground:</b>	Is the resistance between 10 and 17 $\Omega$ ?	Go to step 12.	Replace the lock-up duty solenoid. <Ref. to AT-41, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
12	<b>CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.</b> Measure the resistance of harness between lock-up duty solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 13 — (AT3) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 13.	Repair open circuit in harness between TCM and transmission connector.
13	<b>CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.</b> Measure the resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 13 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if the AT OIL TEMP warning 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.

**O: DTC 79 TRANSFER DUTY SOLENOID** S004521/24

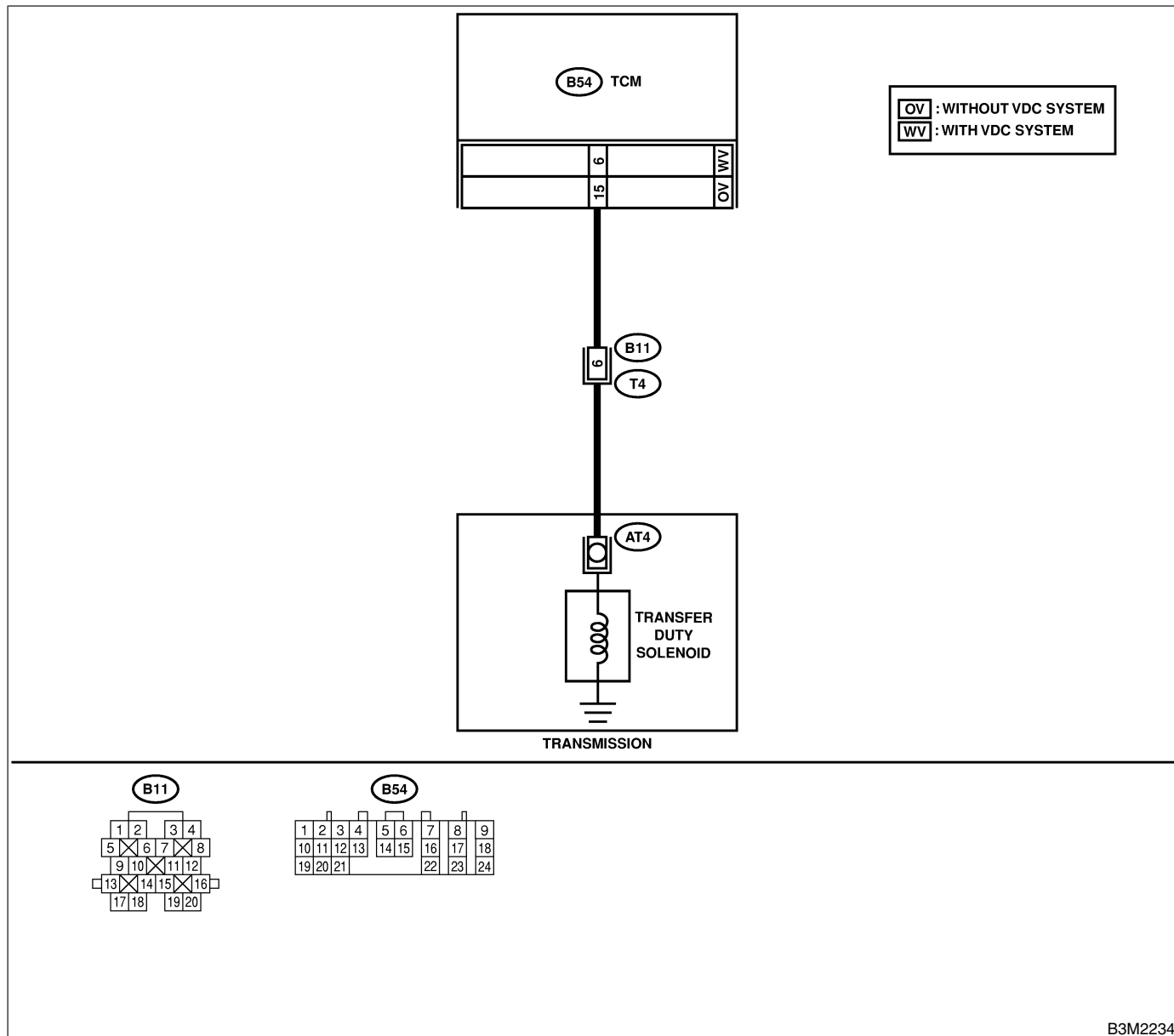
**DIAGNOSIS:**

Output signal circuit of transfer duty solenoid is open or shorted.

**TROUBLE SYMPTOM:**

Excessive “braking” in tight corners.

**WIRING DIAGRAM:**



B3M2234

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 15 — (B11) No. 6:</b> <b>With VDC system</b> <b>(B54) No. 6 — (B11) No. 6:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance harness connector between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 15 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 6 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3	<b>CHECK TRANSFER DUTY SOLENOID.</b> Measure the resistance between transmission connector and transmission terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 6 — No. 16:</b>	Is the resistance between 10 and 17 $\Omega$ ?	Go to step 4.	Go to step 13.
4	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 7.	Go to step 5.
5	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Throttle is fully closed. 4) Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 15 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 6 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in "P" range?	Go to step 6.	Go to step 12.
6	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> Measure the voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 15 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B54) No. 6 (+) — Chassis ground (-):</b>	Is the voltage between 5 and 7 V in "D" range?	Even if the AT OIL TEMP warning 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 12.
7	<b>CHECK VEHICLE</b>	Is the target model without VDC system?	Go to step 8.	Go to step 10.



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON. 4) Move the select lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5) Read the 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 9.	Go to step 12.
9	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 1) Move the select lever to "D" with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2) Read the 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 the AT OIL TEMP warning 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 12.
10	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 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 80 and 95%?	Go to step 11.	Go to step 12.
11	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b> 1) Move select lever to "N" with throttle fully close (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 approx. 40%?	Even if the AT OIL TEMP warning 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 transfer duty solenoid and TCM connector.	Go to step 12.

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
12	<b>CHECK POOR CONTACT.</b>	Is there poor contact in transfer duty solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
13	<b>CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).</b> 1) Lift-up the vehicle and place safety stand. <b>NOTE:</b> On AWD models, raise all wheels off ground. 2) Drain the automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 3) Remove the extension case, and disconnect the connector from transfer duty solenoid. 4) Measure the resistance between transfer duty solenoid connector and transmission ground. <b>Connector &amp; terminal</b> <b>(AT4) No. 1 — Transmission ground:</b>	Is the resistance between 10 and 17 $\Omega$ ?	Go to step 14.	Replace the transfer duty solenoid.
14	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.</b> Measure the resistance of harness between transfer duty solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 6 — (AT4) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 15.	Repair open circuit in harness between transfer duty solenoid and transmission connector.
15	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.</b> Measure the resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 6 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if the AT OIL TEMP warning 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.

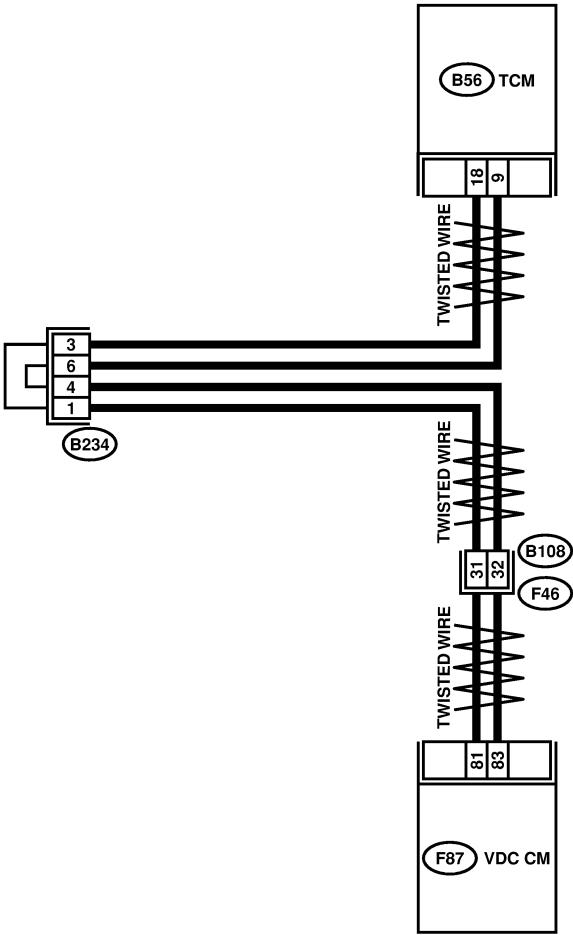
P: DTC 86 VDC COMMUNICATION SIGNAL

S004521J91

DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

WIRING DIAGRAM:



**B234**

1	2	3	4	5	6
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**B56**

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

**F46**

1	2	3	4		5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21								
22	23	24	25	26	27	28	29	30	31
									32

**F87**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	
56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK DTC.</b>	Do multiple trouble codes appear in the on-board diagnostics test mode?	Go to another trouble code.	Go to step 2.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM.</b> 1) Turn ignition switch to OFF. 2) Disconnect TCM and VDCCM connector. 3) Measure resistance of harness between TCM and VDCCM connector. <b>Connector &amp; terminal</b> <b>(B56) No. 18 — (F87) No. 81:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and VDCCM, and poor contact in coupling connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM.</b> Measure resistance of harness between TCM and VDCCM connector. <b>Connector &amp; terminal</b> <b>(B56) No. 9 — (F87) No. 83:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair open circuit in harness between TCM and VDCCM, and poor contact in coupling connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM.</b> Measure resistance of harness between TCM and VDCCM connector. <b>Connector &amp; terminal</b> <b>(B56) No. 18 — Chassis ground:</b>	Is the resistance less than 1 $M\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and VDCCM connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM.</b> Measure resistance of harness between TCM and VDCCM connector. <b>Connector &amp; terminal</b> <b>(B56) No. 9 — Chassis ground:</b>	Is the resistance less than 1 $M\Omega$ ?	Go to step 6.	Repair short circuit in harness between TCM and VDCCM connector.
6	<b>PREPARE OSCILLOSCOPE.</b>	Do you have oscilloscope?	Go to step 8.	Go to step 7.
7	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect TCM and VDCCM connector. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B56) No. 9 (+) — Chassis ground (-):</b> <b>(B56) No. 18 (+) — Chassis ground (-):</b>	Does input voltage value change?	Go to step 10.	Repair poor contact in VDCCM.
8	<b>CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.</b> 1) Connect TCM and VDCCM connector. 2) Set oscilloscope to TCM connector terminals. <b>Connector &amp; terminal</b> <b>Positive probe; (B56) No. 9</b> <b>Earth lead; (B55) No. 9</b> 3) Turn ignition switch to ON (engine OFF).	Check signal waveform pattern on oscilloscope. <Ref. AT-22, WAVEFORM, MEASUREMENT, Transmission Control Module (TCM) I/O Signal.> Is waveform pattern same as that shown in the figure?	Go to step 9.	Repair poor contact in VDCCM.
9	<b>CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.</b> 1) Set oscilloscope to TCM connector terminals. <b>Connector &amp; terminal</b> <b>Positive probe; (B56) No. 18</b> <b>Earth lead; (B55) No. 9</b> 2) Turn ignition switch to ON (engine OFF).	Check signal waveform pattern on oscilloscope. <Ref. AT-22, WAVEFORM, MEASUREMENT, Transmission Control Module (TCM) I/O Signal.> Is waveform pattern same as that shown in the figure?	Go to step 10.	Repair poor contact in VDCCM.

## DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	CHECK POOR CONTACT.	Is there poor contact in TCM?	Repair poor contact.	Replace TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:

## Q: DTC 93 REAR VEHICLE SPEED SENSOR

S004521/25

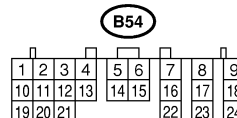
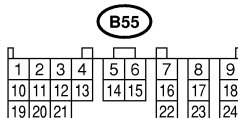
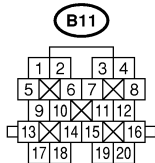
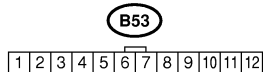
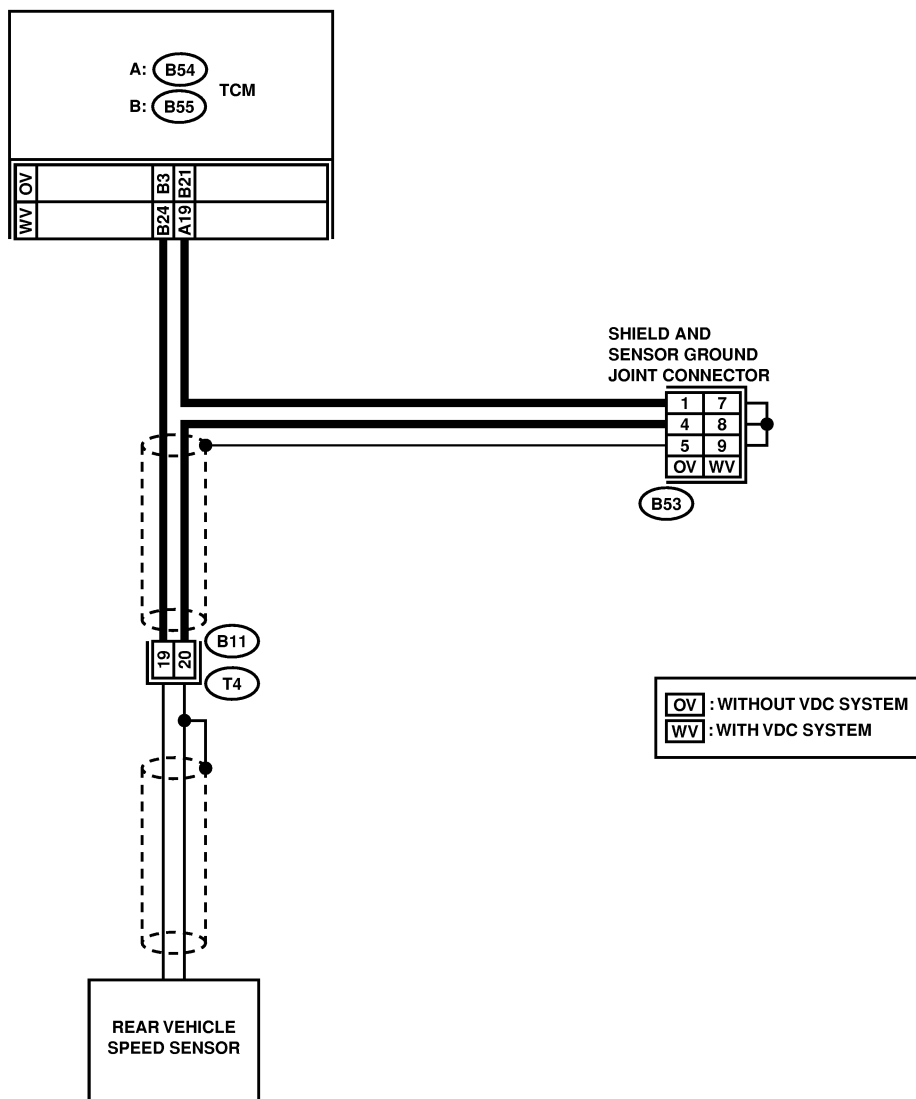
### DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

### TROUBLE SYMPTOM:

No lock-up or excessive tight corner "braking".

### WIRING DIAGRAM:



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 3 — (B11) No. 19:</b> <b>With VDC system</b> <b>(B55) No. 24 — (B11) No. 19:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 21 — (B11) No. 20:</b> <b>With VDC system</b> <b>(B54) No. 19 — (B11) No. 20:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 3 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 24 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 21 — Chassis ground:</b> <b>With VDC system</b> <b>(B54) No. 19 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	<b>CHECK REAR VEHICLE SPEED SENSOR.</b> Measure the resistance between transmission connector receptacle's terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 19 — No. 20:</b>	Is the resistance between 450 and 650 $\Omega$ ?	Go to step 6.	Replace the rear vehicle speed sensor. <Ref. to AT-37, Rear Vehicle Speed Sensor.>
6	<b>PREPARE OSCILLOSCOPE.</b>	Do you have an oscilloscope?	Go to step 10.	Go to step 7.
7	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.



# DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

## Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect the connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. NOTE: 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 the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.> 4) Measure the voltage between TCM connector terminals. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 3 (+) — (B55) No. 21 (-):</b> <b>With VDC system</b> <b>(B55) No. 24 (+) — (B54) No. 19 (-):</b>	Is the voltage more than AC 1 V?	Even if the AT OIL TEMP warning 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.
9	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. NOTE: Raise all wheels off floor. 4) Turn the ignition switch to ON and turn the Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read the data of vehicle speed using Subaru Select Monitor. ● Compare the speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in “km/h” or “MPH”. 7) Slowly increase the 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 the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if the AT OIL TEMP warning 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 DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
10	<p><b>CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.</b></p> <p>1) Connect the connectors to TCM and transmission.</p> <p>2) Lift-up or raise the vehicle and place safety stands.</p> <p>NOTE:</p> <p>Raise all wheels off floor.</p> <p>3) Set the oscilloscope to TCM connector terminals.</p> <p><b>Connector &amp; terminal</b></p> <p><b>With VDC system</b></p> <p><b>Positive probe; (B55) No. 24</b></p> <p><b>Earth lead; (B54) No. 19</b></p> <p><b>Without VDC system</b></p> <p><b>Positive probe; (B55) No. 3</b></p> <p><b>Earth lead; (B55) No. 21</b></p> <p>4) Start the engine and set the vehicle in 20 km/h (12 MPH) condition.</p> <p>NOTE:</p> <p>The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. &lt;Ref. to ABS-21, Clear Memory Mode.&gt;</p> <p>5) Measure the signal voltage indicated on oscilloscope.</p>	Is the signal voltage more than AC 1 V?	Even if the AT OIL TEMP warning 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	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in rear vehicle speed sensor circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

## 15. Diagnostic Procedure for No-diagnostic Trouble Code (DTC) S004794

### A: CHECK GEAR POSITION. S004794F15

No.	Step	Check	Yes	No
1	<b>CHECK GEAR POSITION.</b> 1) Lift-up the vehicle and place safety stand. NOTE: On AWD models, raise all wheels off ground. 2) Start the engine. 3) Move the select lever to "D", and drive the vehicle. 4) Read the 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 the AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-21, Clear Memory Mode.>	Does the transmission gear correspond to the gear which is shown on display?	Go to step 2.	Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to AT-74, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> and <Ref. to AT-78, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2	<b>CHECK VEHICLE.</b>	Is the target model without VDC sysem?	Go to step CHECK FWD SWITCH. <Ref. to AT-118, CEHCK FWD SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Go to step CHECK BRAKE SWITCH. <Ref. to AT- 120, CEHCK BRAKE SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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MEMO:

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

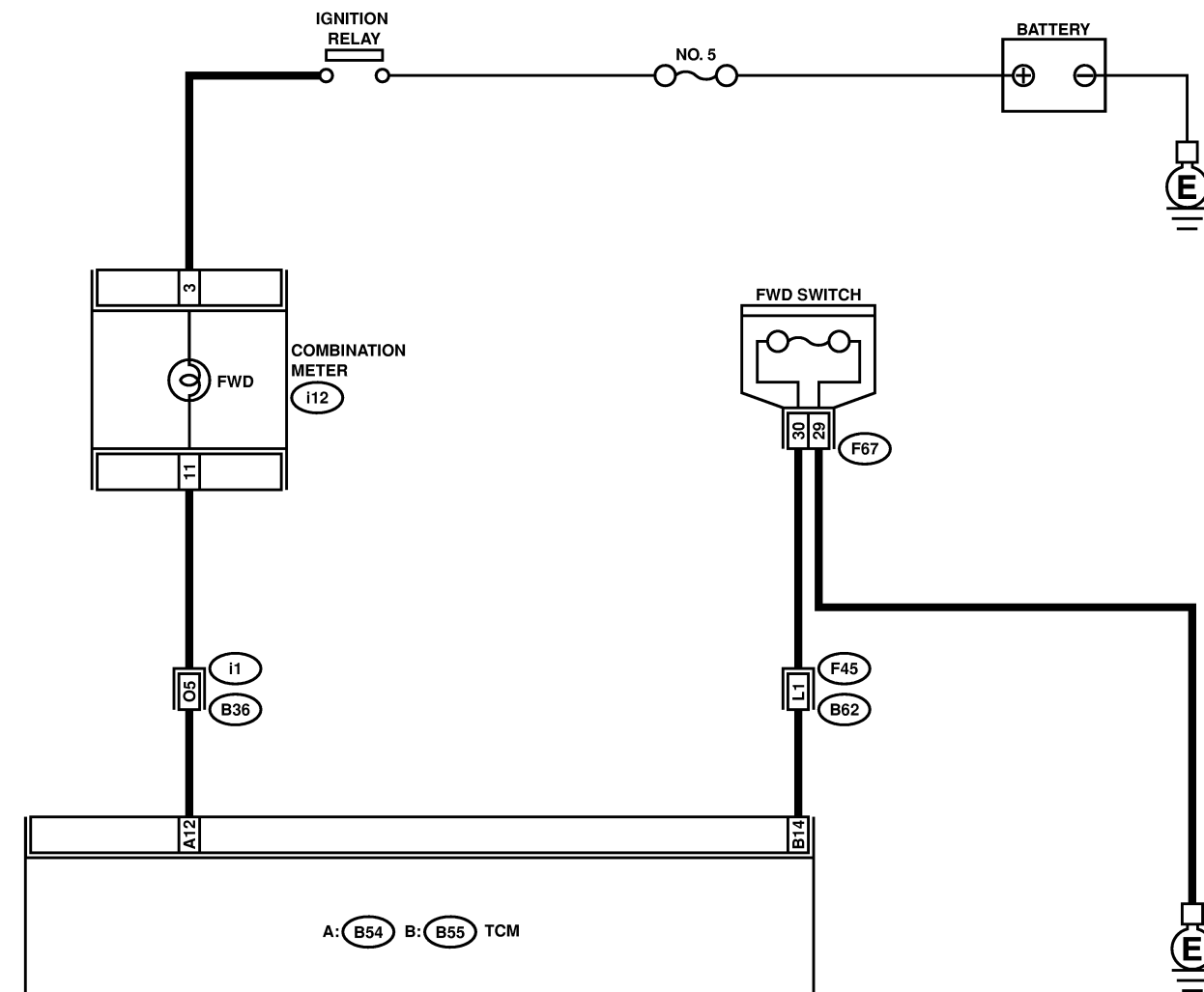
Automatic Transmission (Diagnostics)

## B: CHECK FWD SWITCH. S004794F16

### DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or shorted.

### WIRING DIAGRAM:



**i12**

1	2	3	4	5	6
7	8	9	10	11	12
13	14				

**B54**

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

**B55**

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

**F67**

1	2	5	6	9	13	14	17	21	22	25	29
3	4	7	10	15	18	23	26				
		8	11	12	16	19	20	24	27	28	30

**B36** **B62**

A1	A2	A3	A4	A5	A6
B1	B2		B4	B5	B6
	C2	B3	C4	C5	C6
D1	D2	C3	D4	D5	D6
E1	E2		E4	E5	E6
F1					F6
G1					G6
H1					H6
I1					
J1					J6
K1					K6
L1	L2		L4	L5	L6
M1	M2	N3	M4	M5	M6
N2	O3		N4	N5	N6
O1	O2		O4	O5	O6
P1	P2	P3	P4	P5	P6

B3M2237

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	<b>CHECK FWD SWITCH.</b>	When the fuse is inserted to FWD switch, does the LED light up?	Go to step CHECK BRAKE SWITCH. <Ref. to AT-120, CHECK BRAKE SWITCH., Diagnostic Proce- dure for No-diag- nostic Trouble Code (DTC).>	Go to step 2.
2	<b>CHECK FWD INDICATOR LIGHT.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the FWD indicator light bulb from combination meter.	Is the FWD indicator light bulb OK?	Go to step 3.	Replace the FWD indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and FWD switch. 3) Measure the resistance of harness between TCM and FWD switch connector. <b>Connector &amp; terminal</b> <b>(B55) No. 14 — (F67) No. 30:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair open circuit in harness between TCM and FWD switch connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.</b> Measure the resistance of harness connector between TCM and body to make sure that circuit does not short. <b>Connector &amp; terminal</b> <b>(B55) No. 14 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and FWD switch connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND.</b> Measure the resistance of harness between FWD switch and chassis ground. <b>Connector &amp; terminal</b> <b>(F67) No. 29 — Chassis ground:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 6.	Repair open circuit in harness between FWD switch connector and chassis ground.
6	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and FWD switch. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing the fuse to FWD switch connector. <b>Connector &amp; terminal</b> <b>(B55) No. 14 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in FWD switch while installing?	Go to step 7.	Go to step 12.
7	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure the signal voltage for TCM while removing the fuse from FWD switch connector. <b>Connector &amp; terminal</b> <b>(B55) No. 14 (+) — Chassis ground (-):</b>	Is the voltage more than 9 V in FWD switch while removing?	Go to step 8.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
8	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and combination meter. 3) Measure the resistance of harness between TCM and diagnosis connector. <b>Connector &amp; terminal</b> <b>(B54) No. 12 — (i12) No. 11:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.
9	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> Measure the resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. <b>Connector &amp; terminal</b> <b>(B54) No. 12 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 10.	Repair short circuit in harness between TCM and combination meter connector.
10	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and combination meter. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing and removing the fuse to FWD switch connector. <b>Connector &amp; terminal</b> <b>(B54) No. 12 — Chassis ground:</b>	Is the voltage less than 1 V in FWD switch while installing?	Go to step 11.	Go to step 12.
11	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> Measure the signal voltage for TCM while removing the fuse from FWD switch connector. <b>Connector &amp; terminal</b> <b>(B54) No. 12 — Chassis ground:</b>	Is the voltage more than 9 V in FWD switch while removing?	Go to step 12.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
12	<b>CHECK POOR CONTACT.</b>	Is there poor contact in FWD switch circuit?	Repair poor contact.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

## C: CHECK BRAKE SWITCH. S004794F17

No.	Step	Check	Yes	No
1	<b>CHECK BRAKE SWITCH.</b>	When the brake pedal is depressed, does the LED light up?	Go to step CHECK ABS SWITCH. <Ref. to AT-121, CHECK ABS SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>	Check the brake switch circuit.

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

## D: CHECK ABS SWITCH. S004794F18

No.	Step	Check	Yes	No
1	CHECK ABS SWITCH.	Does the LED of ABS switch light up?	Check the ABS switch circuit. <Ref. to ABS-118, DTC 44 ABS-AT CONTROL (NON CONTROLLED), Diagnostics Chart with Subaru Select Monitor.> and <Ref. to ABS-120, DTC 44 ABS-AT CONTROL (CONTROLLED), Diagnostics Chart with Subaru Select Monitor.>	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to AT-121, CHECK CRUISE CONTROL SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>

## E: CHECK CRUISE CONTROL SWITCH. S004794F19

No.	Step	Check	Yes	No
1	CHECK CRUISE CONTROL SWITCH.	When cruise control is set, does the LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to AT-122, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-Diagnostic Trouble Code (DTC).>	Check the cruise control. <Ref. to CC-28, Diagnostics Chart with Trouble Code.>



## DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

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### F: CHECK INHIBITOR SWITCH. S004794F20

#### DIAGNOSIS:

Input signal circuit of inhibitor switch is open or shorted.

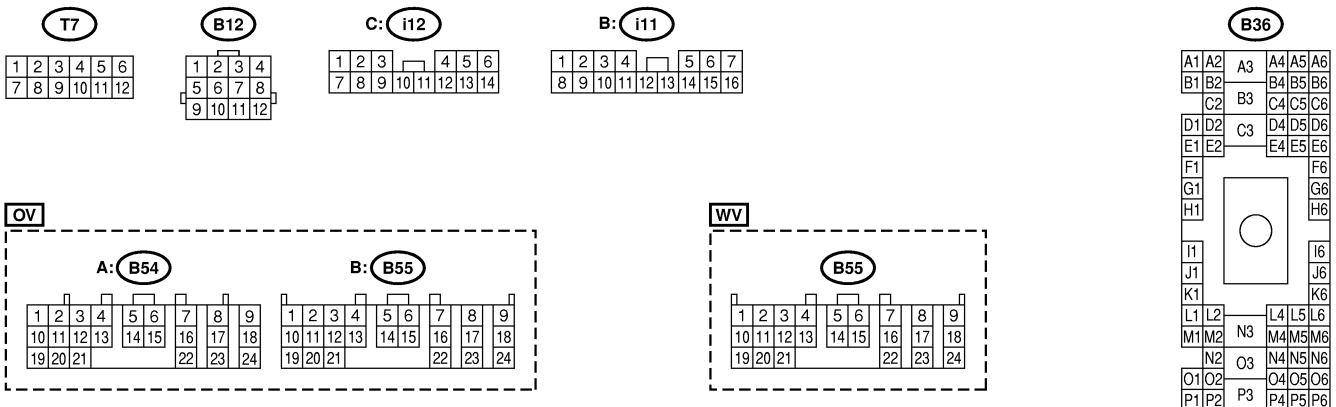
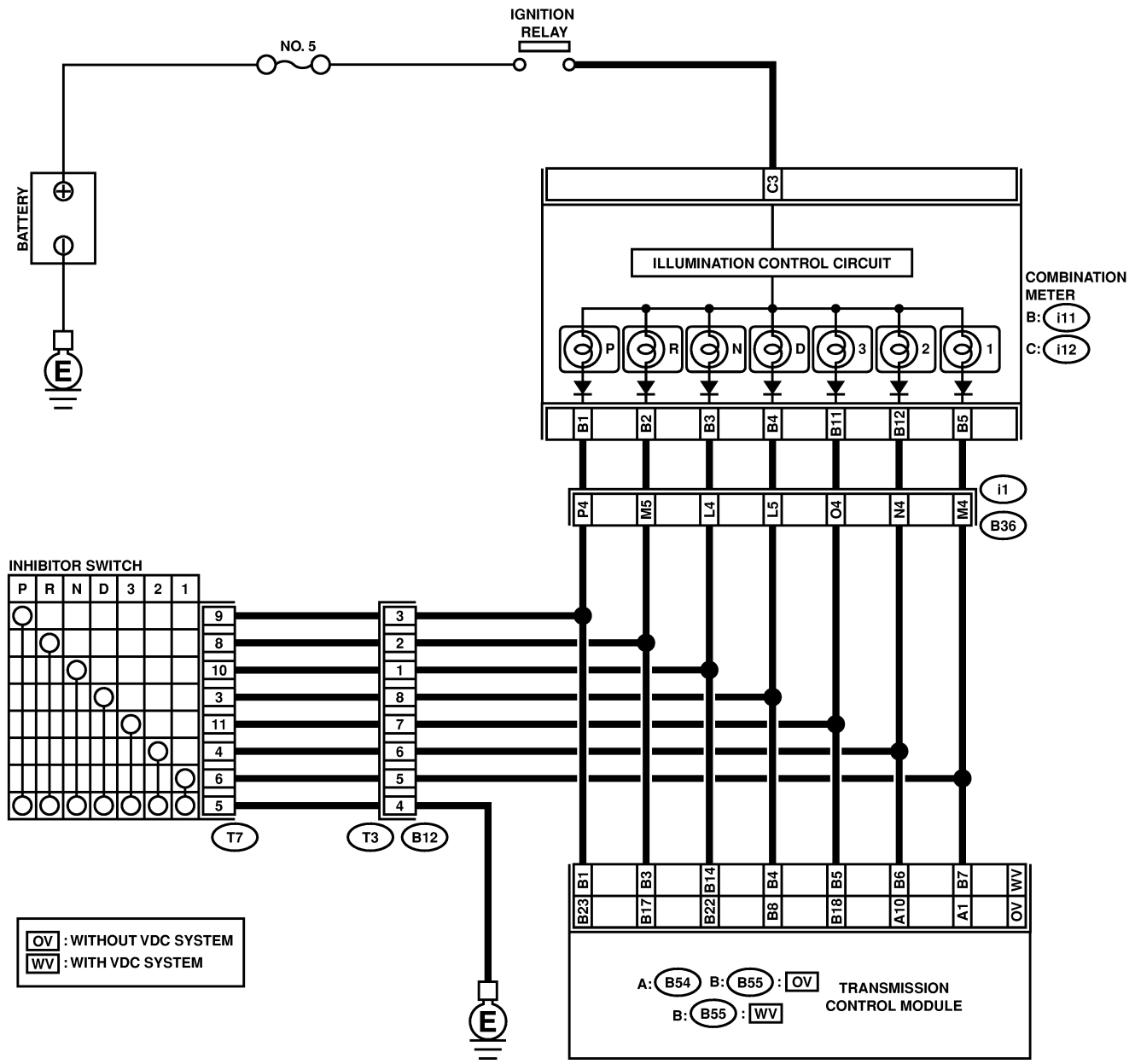
#### TROUBLE SYMPTOM:

- 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-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

## WIRING DIAGRAM:



# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
1	CHECK "P" RANGE SWITCH.	When "P" range is selected, does the LED light up?	Go to step 2.	Go to step 22.
2	CHECK INDICATOR LIGHT.	Does the combination meter "P" range indicator illuminate?	Go to step 3.	Go to step 26.
3	CHECK "P" RANGE SWITCH.	When the "R" range is selected, does the "P" range LED light up?	Go to step 28.	Go to step 4.
4	CHECK "R" RANGE SWITCH.	When the "R" range is selected, does the LED light up?	Go to step 5.	Go to step 29.
5	CHECK INDICATOR LIGHT.	Does the combination meter "R" range indicator illuminate?	Go to step 6.	Go to step 32.
6	CHECK "R" RANGE SWITCH.	When the "N" range is selected, does the "R" range LED light up?	Go to step 34.	Go to step 7.
7	CHECK "N" RANGE SWITCH.	When the "N" range is selected, does the LED light up?	Go to step 8.	Go to step 35.
8	CHECK INDICATOR LIGHT.	Does the combination meter "N" range indicator illuminate?	Go to step 9.	Go to step 38.
9	CHECK "N" RANGE SWITCH.	When the "D" range is selected, does the "N" range LED light up?	Go to step 40.	Go to step 10.
10	CHECK "D" RANGE SWITCH.	When the "D" range is selected, does the LED light up?	Go to step 11.	Go to step 41.
11	CHECK INDICATOR LIGHT.	Does the combination meter "D" range indicator illuminate?	Go to step 12.	Go to step 44.
12	CHECK "D" RANGE SWITCH.	When the "3" range is selected, does the "D" range LED light up?	Go to step 46.	Go to step 13.
13	CHECK "3" RANGE SWITCH.	When the "3" range is selected, does the LED light up?	Go to step 14.	Go to step 47.
14	CHECK INDICATOR LIGHT.	Does the combination meter "3" range indicator illuminate?	Go to step 15.	Go to step 50.
15	CHECK "3" RANGE SWITCH.	When the "2" range is selected, does the "3" range LED light up?	Go to step 52.	Go to step 16.
16	CHECK "2" RANGE SWITCH.	When the "2" range is selected, does the LED light up?	Go to step 17.	Go to step 53.
17	CHECK INDICATOR LIGHT.	Does the combination meter "2" range indicator illuminate?	Go to step 18.	Go to step 56.
18	CHECK "2" RANGE SWITCH.	When the "1" range is selected, does the "2" range LED light up?	Go to step 58.	Go to step 19.
19	CHECK "1" RANGE SWITCH.	When the "1" range is selected, does the LED light up?	Go to step 20.	Go to step 59.

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
20	<b>CHECK INDICATOR LIGHT.</b>	Does the combination meter "1" range indicator illuminate?	Go to step 21.	Go to step 62.
21	<b>CHECK "1" RANGE SWITCH.</b>	When the "P" range is selected, does the "1" range LED light up?	Go to step 64.	Go to step Symptom Related Diagnostic. <Ref. to AT-134, Symptom Related Diagnostic.>
22	<b>CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between inhibitor switch and chassis ground. <b>Connector &amp; terminal</b> <b>(T7) No. 5 — Chassis ground:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 23.	Repair open circuit in harness between inhibitor switch connector and chassis ground, and poor contact in coupling connector.
23	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 23 — (T7) No. 9</b> <b>With VDC system</b> <b>(B55) No. 1 — (T7) No. 9</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 24.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
24	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 23 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 1 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in "P" range?	Go to step 25.	Go to step 65.
25	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 23 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 1 (+) — Chassis ground (-):</b>	Is the voltage more than 8 V in other ranges?	Go to step 65.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
26	<b>CHECK "P" RANGE INDICATOR LIGHT BULB.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "P" range indicator light bulb from combination meter.	Is the "P" range indicator light bulb OK?	Go to step 27.	Replace the "P" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
27	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 23 — (i11) No. 1:</b> <b>With VDC system</b> <b>(B55) No. 1 — (i11) No. 1:</b>	Is the resistance more than 1 $\Omega$ ?	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and poor contact in coupling connector.
28	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 23 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 1 — Chassis ground:</b>	Is the resistance less than 1 M $\Omega$ ?	Go to step 29.	Repair ground short circuit in "P" range circuit.
29	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 17 — (T7) No. 8:</b> <b>With VDC system</b> <b>(B55) No. 3 — (T7) No. 8:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 30.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
30	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 17 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 3 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in "R" range?	Go to step 31.	Go to step 65.
31	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 17 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 3 (+) — Chassis ground (-):</b>	Is the voltage more than 8 V in other ranges?	Go to step 65.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
32	<b>CHECK "R" RANGE INDICATOR LIGHT BULB.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "R" range indicator light bulb from combination meter.	Is the "R" range indicator light bulb OK?	Go to step 33.	Replace the "R" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
33	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 17 — (i11) No. 2:</b> <b>With VDC system</b> <b>(B55) No. 3 — (i11) No. 2:</b>	Is the resistance less than 1 Ω?	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
34	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 17 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 3 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 35.	Repair ground short circuit in "R" range circuit.
35	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 22 — (T7) No. 10:</b> <b>With VDC system</b> <b>(B55) No. 14 — (T7) No. 10:</b>	Is the resistance less than 1 Ω?	Go to step 36.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
36	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 22 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 14 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in "N" range?	Go to step 37.	Go to step 65.

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
37	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> (B55) No. 22 (+) — Chassis ground (–): <b>With VDC system</b> (B55) No. 14 (+) — Chassis ground (–):	Is the voltage more than 8 V in other ranges?	Go to step 65.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
38	<b>CHECK “N” RANGE INDICATOR LIGHT BULB.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the “N” range indicator light bulb from combination meter.	Is the “N” range indicator light bulb OK?	Go to step 39.	Replace the “N” range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
39	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>Without VDC system</b> (B55) No. 22 — (i11) No. 3: <b>With VDC system</b> (B55) No. 14 — (i11) No. 3:	Is the resistance less than 1 Ω?	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
40	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> (B55) No. 22 — Chassis ground: <b>With VDC system</b> (B55) No. 14 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 41.	Repair ground short circuit in “N” range circuit.
41	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> (B55) No. 8 — (T7) No. 3: <b>With VDC system</b> (B55) No. 4 — (T7) No. 3:	Is the resistance less than 1 Ω?	Go to step 42.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
42	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 8 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 4 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in "D" range?	Go to step 43.	Go to step 65.
43	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 8 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 4 (+) — Chassis ground (-):</b>	Is the voltage more than 8 V in other ranges?	Go to step 65.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
44	<b>CHECK "D" RANGE INDICATOR LIGHT BULB.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "D" range indicator light bulb from combination meter.	Is the "D" range indicator light bulb OK?	Go to step 45.	Replace the "D" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
45	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 8 — (i11) No. 4:</b> <b>With VDC system</b> <b>(B55) No. 4 — (i11) No. 4:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and TCM connector.
46	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 8 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 4 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 47.	Repair ground short circuit in "D" range circuit.



# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
47	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 18 — (T7) No. 11:</b> <b>With VDC system</b> <b>(B55) No. 5 — (T7) No. 11:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 48.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
48	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 18 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 5 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in "3" range?	Go to step 49.	Go to step 65.
49	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 18 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 5 (+) — Chassis ground (-):</b>	Is the voltage more than 8 V in other ranges?	Go to step 65.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
50	<b>CHECK "3" RANGE INDICATOR LIGHT BULB.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "3" range indicator light bulb from combination meter.	Is the "3" range indicator light bulb OK?	Go to step 51.	Replace the "3" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
51	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B55) No. 18 — (i11) No. 11:</b> <b>With VDC system</b> <b>(B55) No. 5 — (i11) No. 11:</b>	Is the resistance more than 1 $\Omega$ ?	Go to step 65.	Repair open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
52	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. <i>Connector &amp; terminal</i> <i>Without VDC system</i> <i>(B55) No. 18 — Chassis ground:</i> <i>With VDC system</i> <i>(B55) No. 5 — Chassis ground:</i>	Is the resistance more than 1 MΩ?	Go to step 53.	Repair ground short circuit in "3" range circuit.
53	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. <i>Connector &amp; terminal</i> <i>Without VDC system</i> <i>(B54) No. 10 — (T7) No. 4:</i> <i>With VDC system</i> <i>(B55) No. 6 — (T7) No. 4:</i>	Is the resistance less than 1 Ω?	Go to step 54.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
54	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between TCM and chassis ground. <i>Connector &amp; terminal</i> <i>Without VDC system</i> <i>(B54) No. 10 (+) — Chassis ground (-):</i> <i>With VDC system</i> <i>(B55) No. 6 (+) — Chassis ground (-):</i>	Is the voltage less than 1 V in "2" range?	Go to step 55.	Go to step 65.
55	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure the voltage between TCM and chassis ground. <i>Connector &amp; terminal</i> <i>Without VDC system</i> <i>(B54) No. 10 (+) — Chassis ground (-):</i> <i>With VDC system</i> <i>(B55) No. 6 (+) — Chassis ground (-):</i>	Is the voltage more than 8 V in other ranges?	Go to step 65.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>
56	<b>CHECK "2" RANGE INDICATOR LIGHT BULB.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "2" range indicator light bulb from combination meter.	Is the "2" range indicator light bulb OK?	Go to step 57.	Replace the "2" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
57	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 10 — (i11) No. 12:</b> <b>With VDC system</b> <b>(B55) No. 6 — (i11) No. 12:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 65.	Repair open circuit in harness between TCM and combination meter, and poor contact in TCM connector.
58	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 10 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 6 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 59.	Repair ground short circuit in "2" range circuit.
59	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 1 — (T7) No. 6:</b> <b>With VDC system</b> <b>(B55) No. 7 — (T7) No. 6:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 60.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
60	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 1 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 7 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in "1" range?	Go to step 61.	Go to step 65.
61	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure the voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 1 (+) — Chassis ground (-):</b> <b>With VDC system</b> <b>(B55) No. 7 (+) — Chassis ground (-):</b>	Is the voltage more than 8 V in other ranges?	Go to step 65.	Replace the TCM. <Ref. to AT-49, Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

Automatic Transmission (Diagnostics)

No.	Step	Check	Yes	No
62	<b>CHECK “1” RANGE INDICATOR LIGHT BULB.</b> 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the “1” range indicator light bulb from combination meter.	Is the “1” range indicator light bulb OK?	Go to step 63.	Replace the “1” range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
63	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 1 — (i11) No. 5:</b> <b>With VDC system</b> <b>(B55) No. 7 — (i11) No. 5:</b>	Is the resistance less than 1Ω?	Go to step 65.	Repair open circuit in harness between TCM and combination meter, poor contact in TCM connector.
64	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>Without VDC system</b> <b>(B54) No. 1 — Chassis ground:</b> <b>With VDC system</b> <b>(B55) No. 7 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 65.	Repair ground short circuit in “1” range circuit.
65	<b>CHECK POOR CONTACT.</b>	Is there poor contact in inhibitor switch circuit?	Repair poor contact.	Adjust the inhibitor switch and select cable. <Ref. to AT-29, ADJUSTMENT, Inhibitor Switch.> and <Ref. to CS-26, Select Cable.>

# SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission (Diagnostics)

## 16. Symptom Related Diagnostic

S004519

### A: INSPECTION

S004519A10

Symptom	Problem parts
Starter does not rotate when the select lever is in "P" or "N"; starter rotates when the select lever is in "R", "D", "3" or "2".	<ul style="list-style-type: none"> <li>● Inhibitor switch</li> <li>● Select cable</li> <li>● Select lever</li> <li>● Starter motor and harness</li> </ul>
Abnormal noise when the select lever is in "P" or "N".	<ul style="list-style-type: none"> <li>● Strainer</li> <li>● Transfer duty solenoid</li> <li>● Oil pump</li> <li>● Drive plate</li> <li>● ATF level too high or too low</li> </ul>
Hissing noise occurs during standing start.	<ul style="list-style-type: none"> <li>● Strainer</li> <li>● ATF level too high or too low</li> </ul>
Noise occurs while driving in "D1".	<ul style="list-style-type: none"> <li>● Final gear</li> <li>● Planetary gear</li> <li>● Reduction gear</li> <li>● Differential gear oil level too high or too low</li> </ul>
Noise occurs while driving in "D2".	
Noise occurs while driving in "D3".	<ul style="list-style-type: none"> <li>● Final gear</li> <li>● Low &amp; reverse brake</li> <li>● Reduction gear</li> <li>● Differential gear oil level too high or too low</li> </ul>
Noise occurs while driving in "D4".	<ul style="list-style-type: none"> <li>● Final gear</li> <li>● Low &amp; reverse brake</li> <li>● Planetary gear</li> <li>● Reduction gear</li> <li>● Differential gear oil level too high or too low</li> </ul>
Engine stalls while shifting from one range to another.	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Lock-up damper</li> <li>● Engine performance</li> <li>● Input shaft</li> </ul>
Vehicle moves when the select lever is in "N".	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Low clutch</li> </ul>
Shock occurs when the select lever is moved from "N" to "D".	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Harness</li> <li>● Control valve</li> <li>● ATF deterioration</li> </ul>
Excessive time lag occurs when the select lever is moved from "N" to "D".	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Low clutch</li> <li>● Line pressure duty solenoid</li> <li>● Seal ring</li> <li>● Front gasket transmission case</li> </ul>
Shock occurs when the select lever is moved from "N" to "R".	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Harness</li> <li>● Control valve</li> <li>● ATF deterioration</li> </ul>
Excessive time lag occurs when the select lever is moved from "N" to "R".	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Low &amp; reverse clutch</li> <li>● Reverse clutch</li> <li>● Line pressure duty solenoid</li> <li>● Seal ring</li> <li>● Front gasket transmission case</li> </ul>
Vehicle does not start in any shift range (engine stalls).	<ul style="list-style-type: none"> <li>● Parking brake mechanism</li> <li>● Planetary gear</li> </ul>

# SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission (Diagnostics)

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	<ul style="list-style-type: none"> <li>● Strainer</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● Drive pinion</li> <li>● Hypoid gear</li> <li>● Axle shaft</li> <li>● Differential gear</li> <li>● Oil pump</li> <li>● Input shaft</li> <li>● Output shaft</li> <li>● Planetary gear</li> <li>● Drive plate</li> <li>● ATF level too low</li> <li>● Front gasket transmission case</li> </ul>
Vehicle does not start in "R" range only (engine revving up).	<ul style="list-style-type: none"> <li>● Select cable</li> <li>● Select lever</li> <li>● Control valve</li> <li>● Low &amp; reverse clutch</li> <li>● Reverse clutch</li> </ul>
Vehicle does not start in "R" range only (engine stalls).	<ul style="list-style-type: none"> <li>● Low clutch</li> <li>● 2-4 brake</li> <li>● Planetary gear</li> <li>● Parking brake mechanism</li> </ul>
Vehicle does not start in "D", "3" range only (engine revving up).	<ul style="list-style-type: none"> <li>● Low clutch</li> <li>● One-way clutch</li> </ul>
Vehicle does not start in "D", "3" or "2" range only (engine revving up).	<ul style="list-style-type: none"> <li>● Low clutch</li> </ul>
Vehicle does not start in "D", "3" or "2" range only (engine stalls).	<ul style="list-style-type: none"> <li>● Reverse clutch</li> </ul>
Vehicle starts in "R" range only (engine revving up).	<ul style="list-style-type: none"> <li>● Control valve</li> </ul>
Acceleration during standing starts is poor (high stall rpm).	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Low clutch</li> <li>● Reverse clutch</li> <li>● ATF level too low</li> <li>● Front gasket transmission case</li> <li>● Differential gear oil level too high or too low</li> </ul>
Acceleration during standing starts is poor (low stall rpm).	<ul style="list-style-type: none"> <li>● Oil pump</li> <li>● Torque converter one-way clutch</li> <li>● Engine performance</li> </ul>
Acceleration is poor when the select lever is in "D", "3" or "2" range (normal stall rpm).	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Control valve</li> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● Planetary gear</li> </ul>
Acceleration is poor when the select lever is in "R" (normal stall rpm).	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● Planetary gear</li> </ul>
No shift occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Rear vehicle speed sensor</li> <li>● Front vehicle speed sensor</li> <li>● Throttle position sensor</li> <li>● Shift solenoid 1</li> <li>● Control valve</li> <li>● 2-4 brake</li> </ul>
No shift occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Control valve</li> <li>● High clutch</li> <li>● Shift solenoid 2</li> </ul>

# SYMPTOM RELATED DIAGNOSTIC

## Automatic Transmission (Diagnostics)

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> <li>• TCM</li> <li>• Shift solenoid 1</li> <li>• ATF temperature sensor</li> <li>• Control valve</li> <li>• 2-4 brake</li> </ul>
Engine brake is not effected when the select lever is in "3" range.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• TCM</li> <li>• Throttle position sensor</li> <li>• Control valve</li> </ul>
Engine brake is not effected when the select lever is in "3" or "2" range.	<ul style="list-style-type: none"> <li>• Control valve</li> </ul>
Engine brake is not effected when the select lever is in "1" range.	<ul style="list-style-type: none"> <li>• Control valve</li> <li>• Low &amp; reverse brake</li> </ul>
Shift characteristics are erroneous.	<ul style="list-style-type: none"> <li>• Inhibitor switch</li> <li>• TCM</li> <li>• Front vehicle speed sensor</li> <li>• Rear vehicle speed sensor</li> <li>• Throttle position sensor</li> <li>• Control valve</li> <li>• Ground earth</li> </ul>
No lock-up occurs.	<ul style="list-style-type: none"> <li>• TCM</li> <li>• Throttle position sensor</li> <li>• ATF temperature sensor</li> <li>• Control valve</li> <li>• Lock-up facing</li> <li>• Engine speed signal</li> </ul>
Parking brake is not effected.	<ul style="list-style-type: none"> <li>• Select cable</li> <li>• Select lever</li> <li>• Parking mechanism</li> </ul>
Shift lever cannot be moved or is hard to move from "P" range.	
ATF spurts out.	<ul style="list-style-type: none"> <li>• ATF level too high</li> </ul>
Differential oil spurts out.	<ul style="list-style-type: none"> <li>• Differential gear oil too high</li> </ul>
Differential oil level changes excessively.	<ul style="list-style-type: none"> <li>• Seal pipe</li> <li>• Double oil seal</li> </ul>
Odor is produced from ATF supply pipe.	<ul style="list-style-type: none"> <li>• High clutch</li> <li>• 2-4 brake</li> <li>• Low &amp; reverse clutch</li> <li>• Reverse clutch</li> <li>• Lock-up facing</li> <li>• ATF deterioration</li> </ul>
Shock occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> <li>• TCM</li> <li>• Throttle position sensor</li> <li>• 2-4 brake duty solenoid</li> <li>• ATF temperature sensor</li> <li>• Line pressure duty solenoid</li> <li>• Control valve</li> <li>• 2-4 brake</li> <li>• ATF deterioration</li> <li>• Engine performance</li> <li>• 2-4 brake timing solenoid</li> </ul>
Slippage occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> <li>• TCM</li> <li>• Throttle position sensor</li> <li>• 2-4 brake duty solenoid</li> <li>• ATF temperature sensor</li> <li>• Line pressure duty solenoid</li> <li>• Control valve</li> <li>• 2-4 brake</li> <li>• 2-4 brake timing solenoid</li> <li>• High clutch</li> </ul>

# SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission (Diagnostics)

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● ATF deterioration</li> <li>● Engine performance</li> <li>● 2-4 brake timing solenoid</li> </ul>
Slippage occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● 2-4 brake timing solenoid</li> </ul>
Shock occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● 2-4 brake timing solenoid</li> <li>● 2-4 brake</li> <li>● ATF deterioration</li> <li>● Engine performance</li> <li>● Low clutch timing solenoid</li> <li>● Low clutch</li> </ul>
Slippage occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● 2-4 brake</li> <li>● 2-4 brake timing solenoid</li> </ul>
Shock occurs when the select lever is moved from "3" to "2" range.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● 2-4 brake duty solenoid</li> <li>● 2-4 brake</li> <li>● ATF deterioration</li> <li>● 2-4 brake timing solenoid</li> </ul>
Shock occurs when the select lever is moved from "D" to "1" range.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● ATF deterioration</li> <li>● 2-4 brake duty solenoid</li> <li>● 2-4 brake timing solenoid</li> <li>● Low clutch timing solenoid</li> </ul>



# SYMPTOM RELATED DIAGNOSTIC

## Automatic Transmission (Diagnostics)

Symptom	Problem parts
Shock occurs when the select lever is moved from "2" to "1" range.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● Low &amp; reverse clutch</li> <li>● ATF deterioration</li> <li>● 2-4 brake duty solenoid</li> <li>● 2-4 brake timing solenoid</li> <li>● Low clutch timing solenoid</li> </ul>
Shock occurs when the accelerator pedal is released at medium speeds.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● Lock-up damper</li> <li>● Engine performance</li> <li>● 2-4 brake duty solenoid</li> <li>● 2-4 brake timing solenoid</li> <li>● Low clutch timing solenoid</li> </ul>
Vibration occurs during straight-forward operation.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Lock-up duty solenoid</li> <li>● Lock-up facing</li> <li>● Lock-up damper</li> </ul>
Vibration occurs during turns (tight corner "braking" phenomenon).	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Front vehicle speed sensor</li> <li>● Rear vehicle speed sensor</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Transfer clutch</li> <li>● Transfer valve</li> <li>● Transfer duty solenoid</li> <li>● ATF deterioration</li> <li>● Harness</li> </ul>
Front wheel slippage occurs during standing starts.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Front vehicle speed sensor</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Control valve</li> <li>● Transfer clutch</li> <li>● Transfer valve</li> <li>● Transfer pipe</li> <li>● Transfer duty solenoid</li> </ul>
Vehicle is not set in FWD mode.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Transfer clutch</li> <li>● Transfer valve</li> <li>● Transfer duty solenoid</li> </ul>
Select lever is hard to move.	<ul style="list-style-type: none"> <li>● Select cable</li> <li>● Select lever</li> <li>● Detent spring</li> <li>● Manual plate</li> </ul>
Select lever is too high to move (unreasonable resistance).	<ul style="list-style-type: none"> <li>● Detent spring</li> <li>● Manual plate</li> </ul>
Select lever slips out of operation during acceleration or while driving on rough terrain.	<ul style="list-style-type: none"> <li>● Select cable</li> <li>● Select lever</li> <li>● Detent spring</li> <li>● Manual plate</li> </ul>