

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the transmission control module (TCM).

CAUTION:

- All airbag system wiring harness and connectors are yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage airbag system wiring harness when performing diagnostics and servicing the TCM.

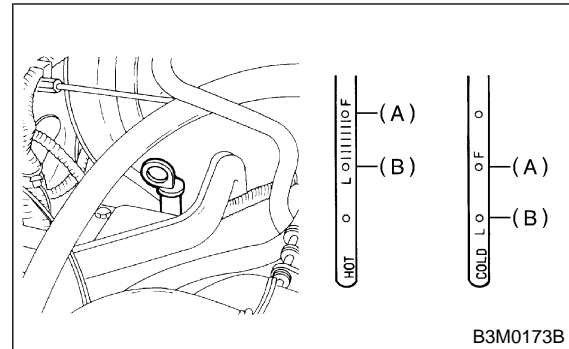
B: MEASUREMENT

When measuring voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 5 mm (0.20 in).

2. Pre-inspection

A: ATF LEVEL

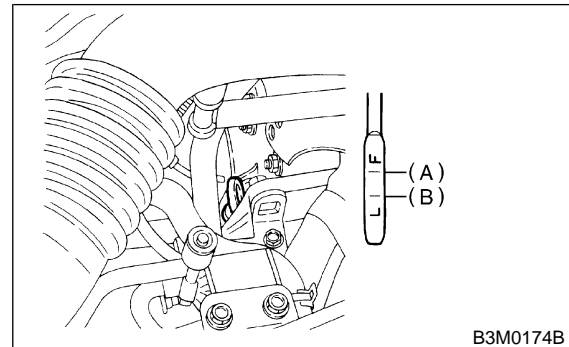
Make sure that ATF level is in the specification.



- (A) Upper level
- (B) Lower level

B: FRONT DIFFERENTIAL OIL LEVEL

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



- (A) Upper level
- (B) Lower level

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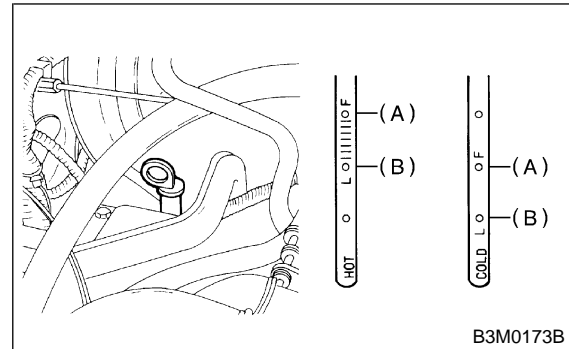
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2. Pre-inspection

A: ATF LEVEL

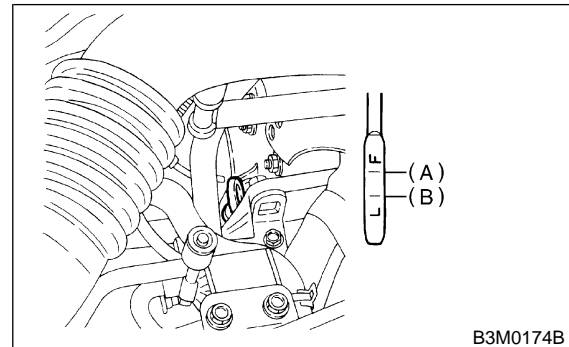
Make sure that ATF level is in the specification.



- (A) Upper level
- (B) Lower level

B: FRONT DIFFERENTIAL OIL LEVEL

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



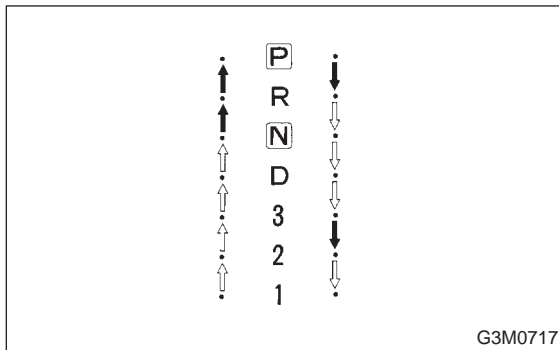
- (A) Upper level
- (B) Lower level

C: OPERATION OF SHIFT SELECT LEVER

WARNING:

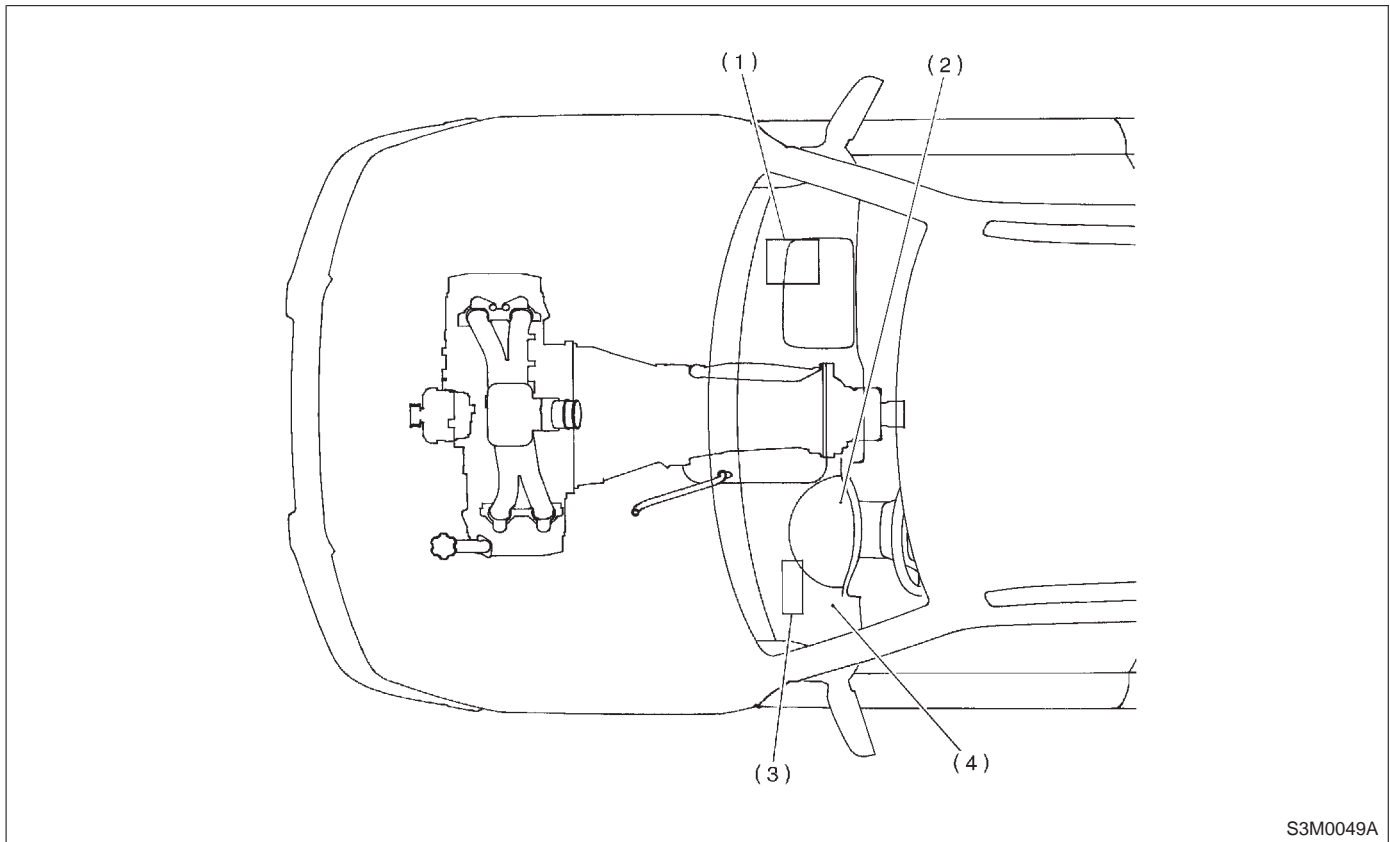
Stop the engine while checking operation of select lever.

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



3. Electrical Components Location

A: MODULE



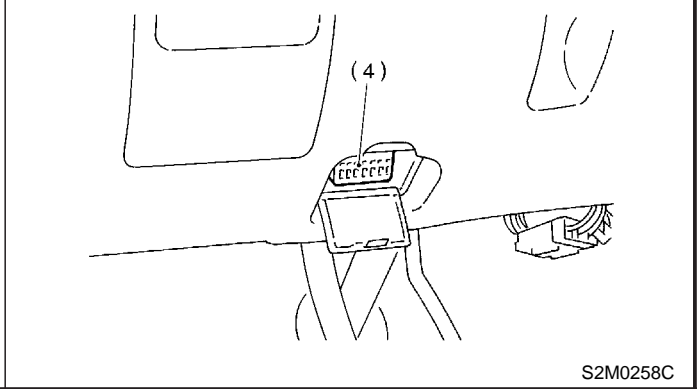
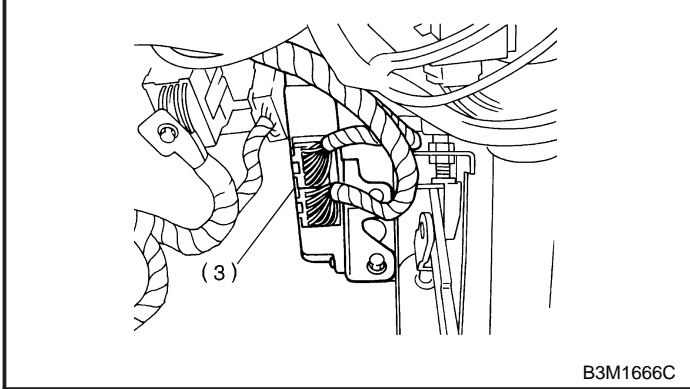
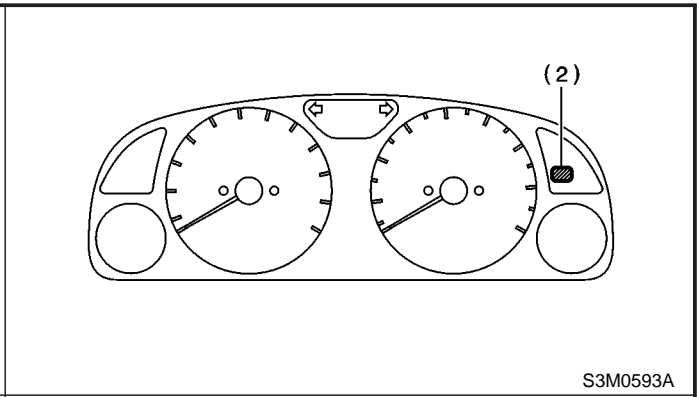
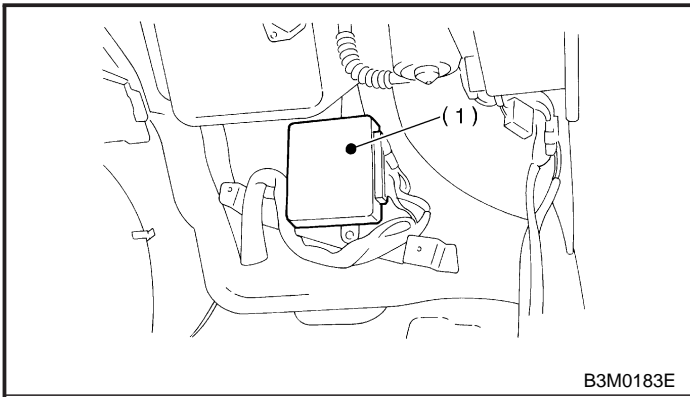
S3M0049A

(1) ECM

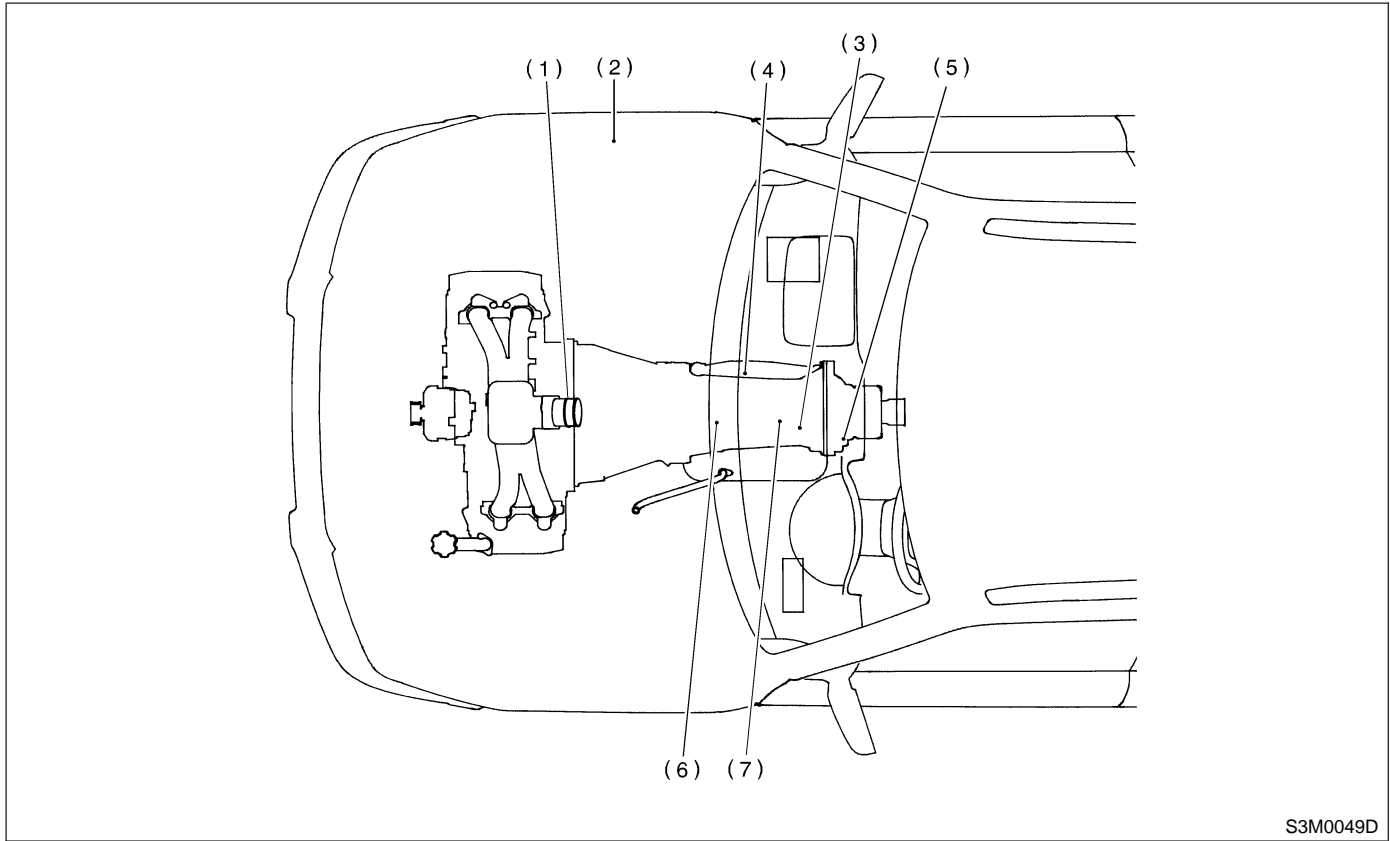
(2) AT OIL TEMP indicator light (AT diagnostic indicator light)

(3) TCM

(4) Data link connector (for Subaru select monitor and OBD-II general scan tool)



B: SENSOR

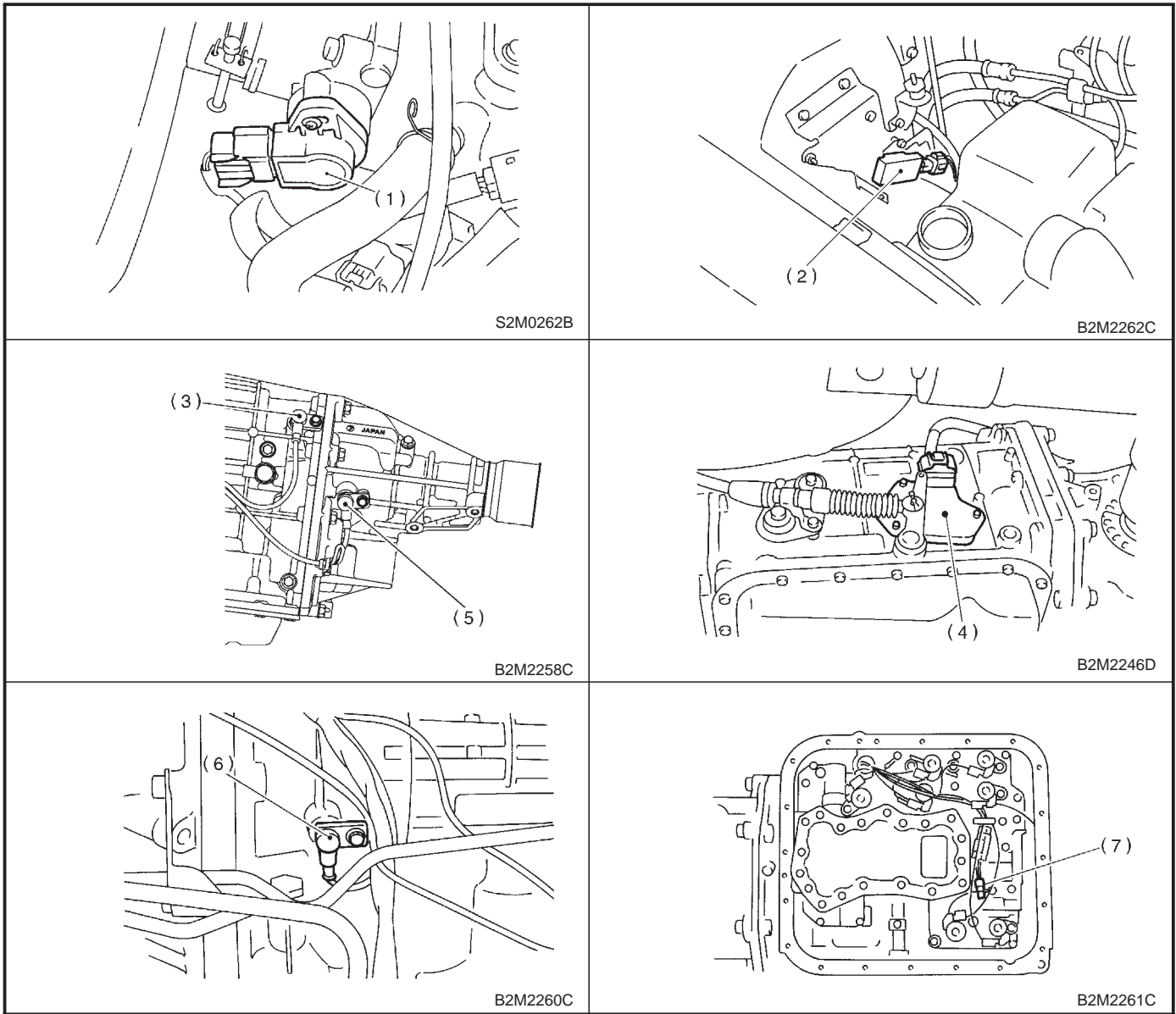


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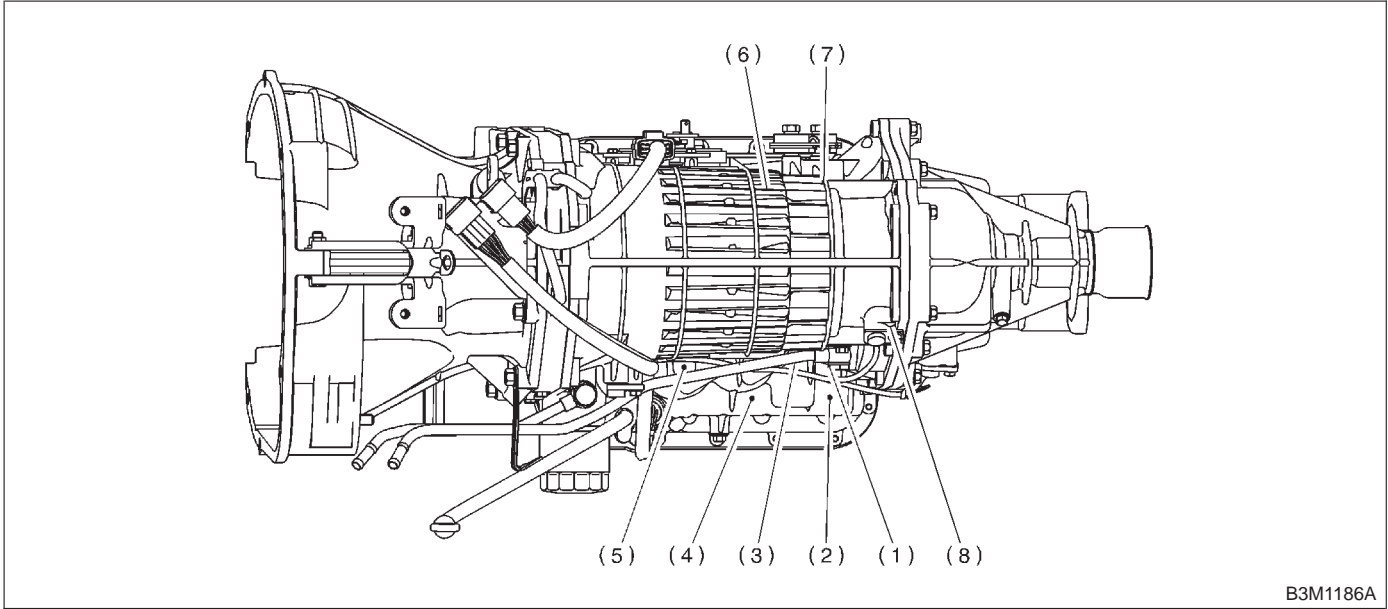
- (1) Throttle position sensor
- (2) Dropping resistor
- (3) Vehicle speed sensor 2 (front)

- (4) Inhibitor switch
- (5) Vehicle speed sensor 1 (rear)

- (6) Torque converter turbine speed sensor
- (7) ATF temperature sensor

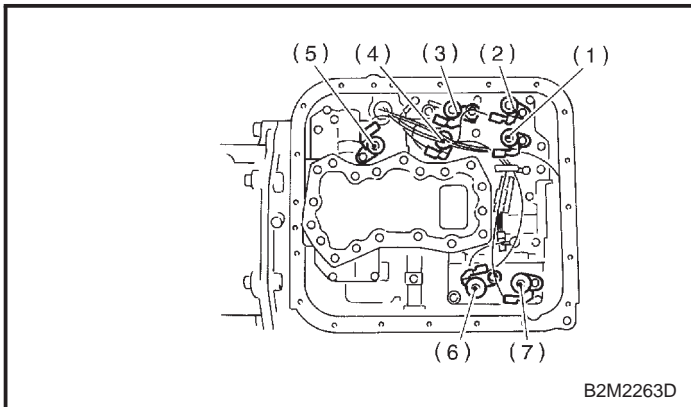


C: SOLENOID

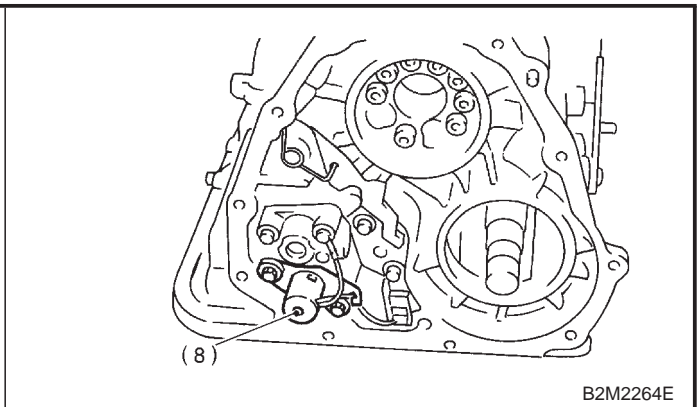


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- | | | |
|---------------------------------|--------------------------------|-------------------------------|
| (1) Shift solenoid 1 | (4) Low clutch timing solenoid | (7) 2-4 brake timing solenoid |
| (2) Shift solenoid 2 | (5) Lock-up duty solenoid | (8) Transfer duty solenoid |
| (3) Line pressure duty solenoid | (6) 2-4 brake duty solenoid | |

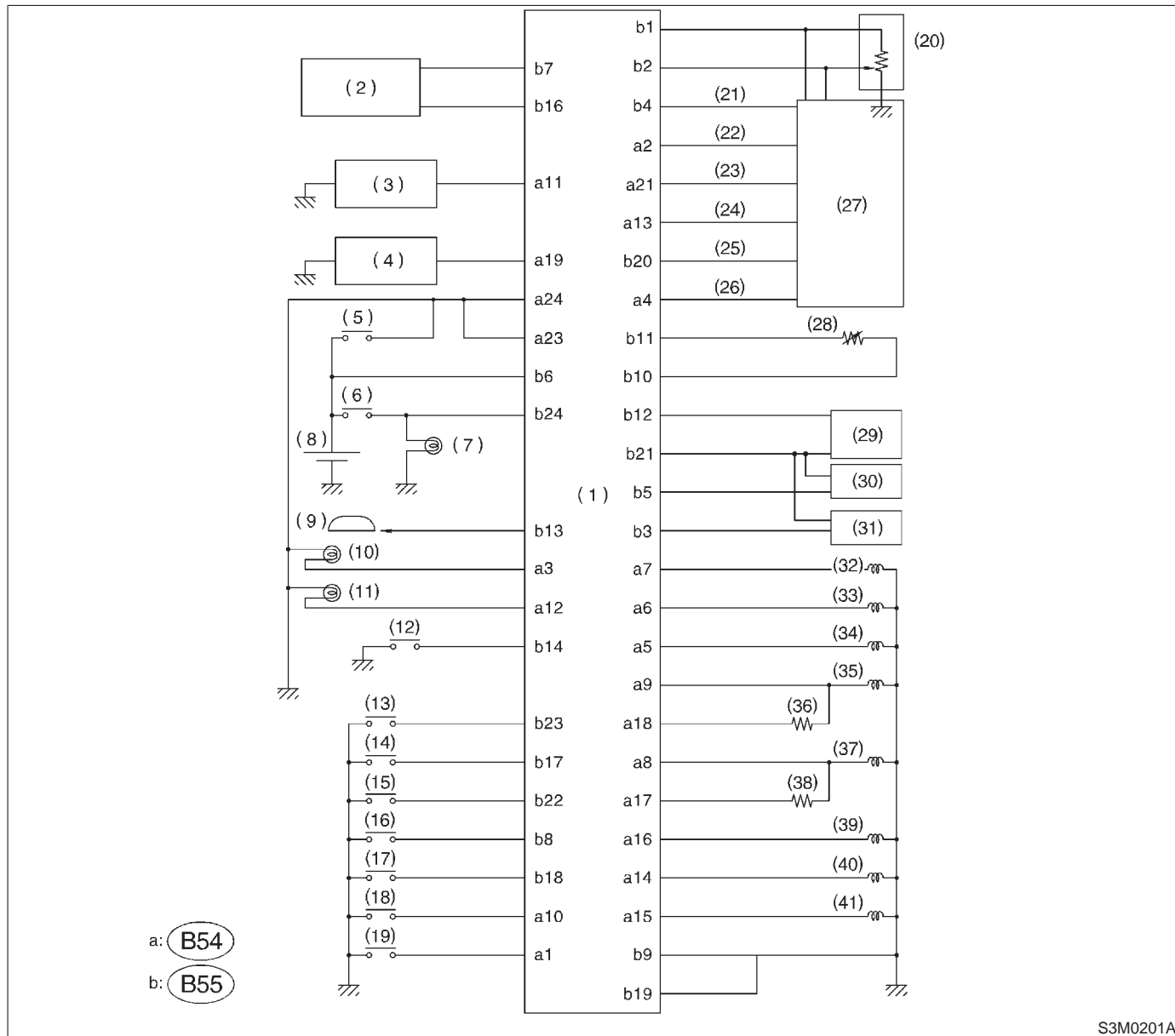


B2M2263D



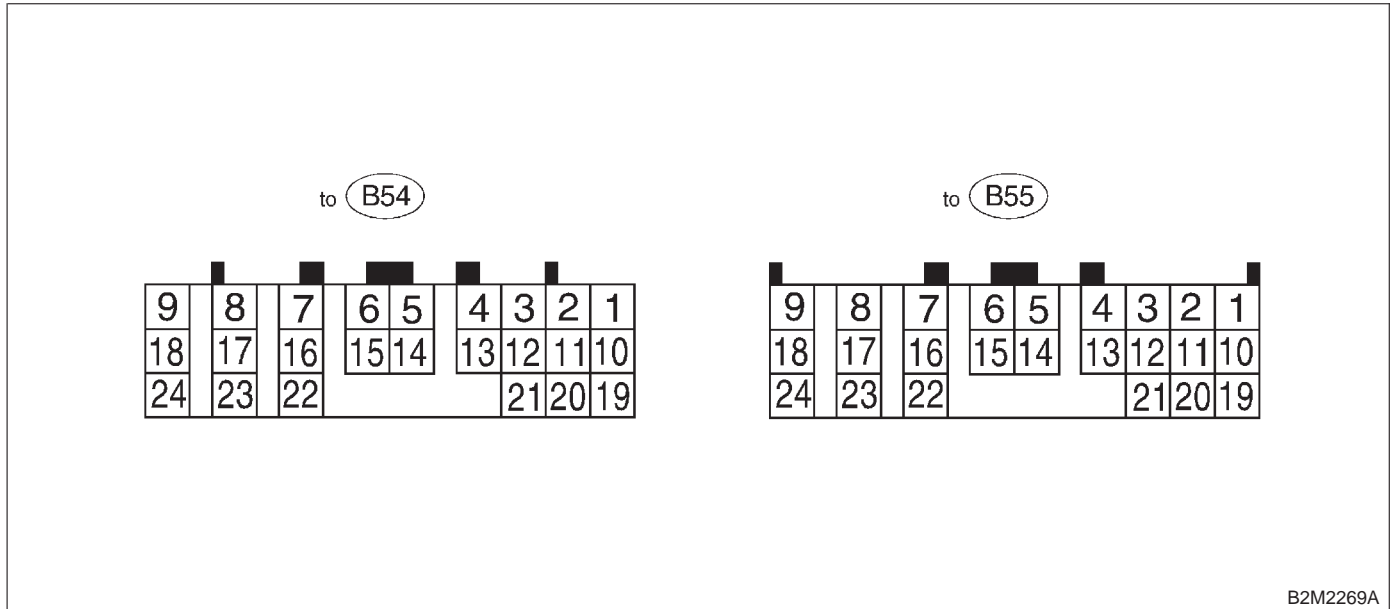
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4. Schematic



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

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



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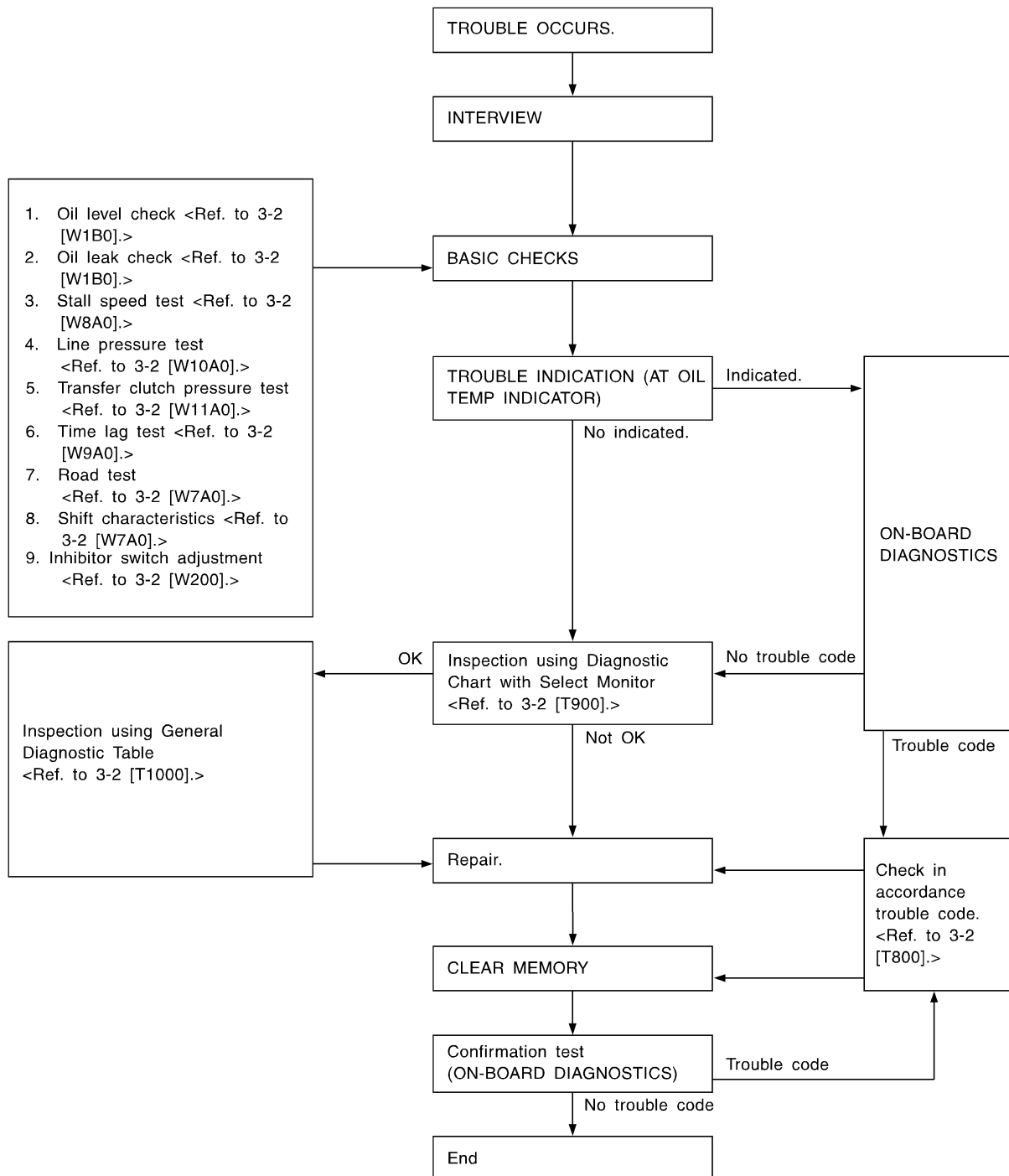
Check with ignition switch ON.						
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)	
Back-up power supply	B55	6	Ignition switch OFF	10 — 16	—	
Ignition power supply	B54	23	Ignition switch ON (with engine OFF)	10 — 16	—	
	B54	24				
Inhibitor switch	"P" range 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 9.5	
	"D" range switch	B55	8	Select lever in "D" range	Less than 1	—
				Select lever in any other than "D" range	More than 9.5	
	"3" range switch	B55	18	Select lever in "3" range	Less than 1	—
				Select lever in any other than "3" range	More than 9.5	
	"2" range switch	B54	10	Select lever in "2" range	Less than 1	—
				Select lever in any other than "2" range	More than 9.5	
	"1" range switch	B54	1	Select lever in "1" range	Less than 1	—
				Select lever in any other than "1" range	More than 9.5	
Brake switch	B55	24	Brake pedal depressed.	More than 10.5	—	
			Brake pedal released.	Less than 1		
ABS signal	B54	19	ABS switch ON	Less than 1	—	
			ABS switch OFF	6.5 — 15		

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
AT OIL TEMP indicator light	B54	3	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B55	2	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.3 — 4.9	
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)	2.9 — 4.9	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.5 — 0.8	275 — 375
Vehicle speed sensor 1 (Rear)	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed sensor 2 (Front)	B55	5	Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range) 4	450 — 650
Torque converter turbine speed sensor	B55	12	Vehicle stopped	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	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 4	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
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 or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	6	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
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	

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 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
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.	6 — 9.1	—
			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	B54	4	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B55	7	—	—	—
		16	—	—	

6. Diagnostic Chart for On-board Diagnostics System

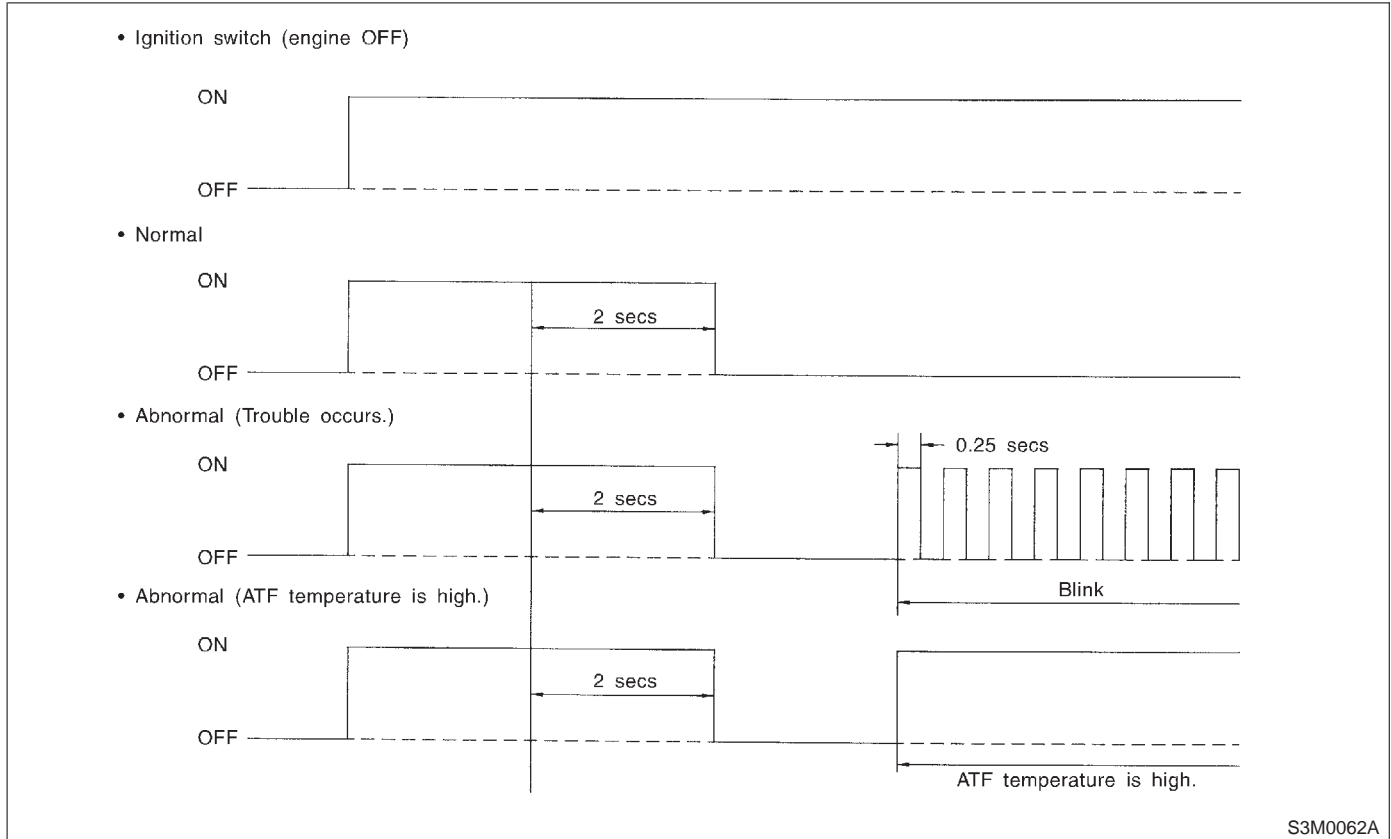
A: BASIC DIAGNOSTICS PROCEDURE



B: ABNORMAL DISPLAY ON AT OIL TEMP INDICATOR

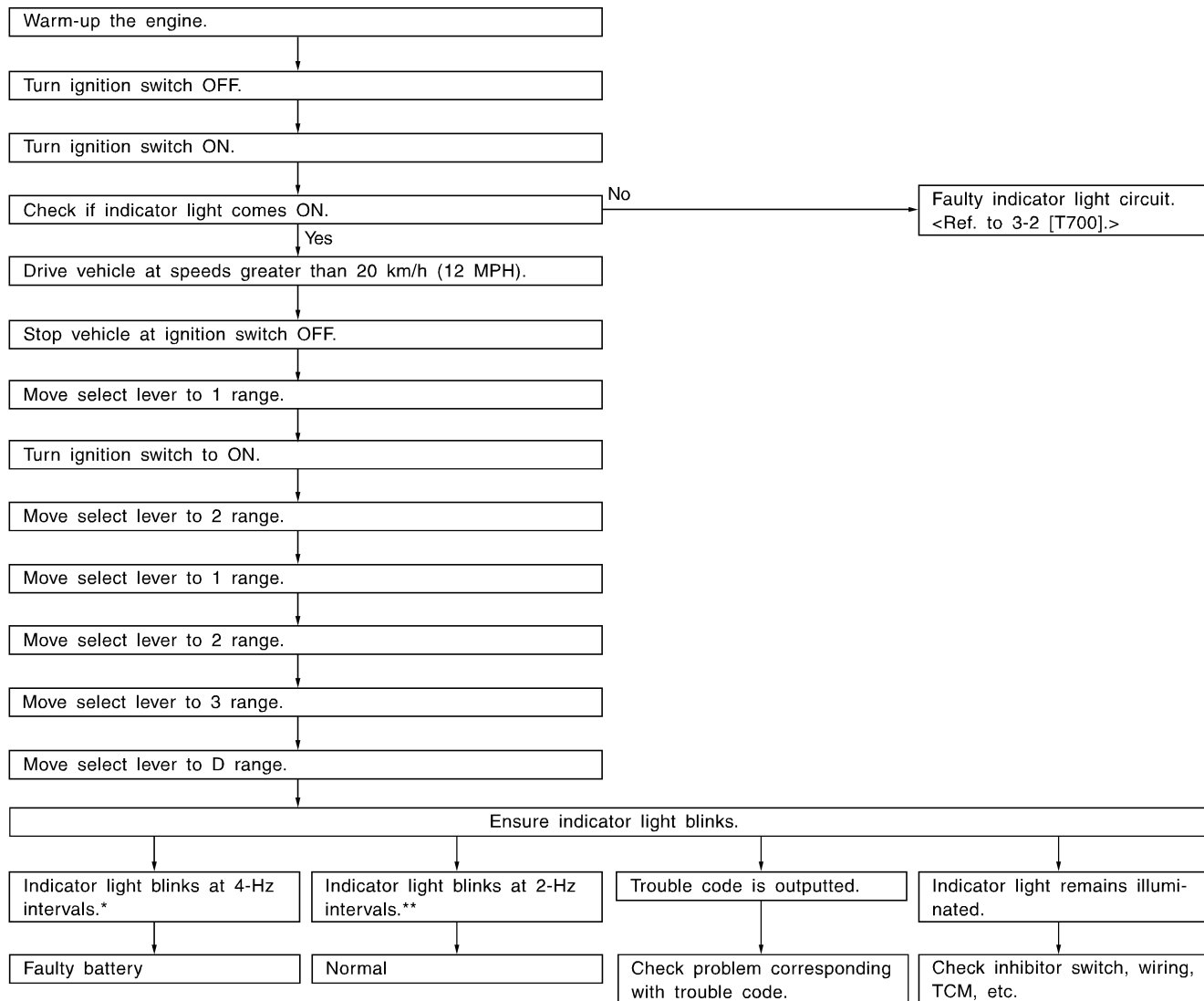
When any on-board diagnostics item is malfunctioning, the display on the AT OIL TEMP indicator light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a trouble code dur-

ing on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the select monitor. Indicator signal is as shown in the figure.



S3M0062A

C: ON-BOARD DIAGNOSTICS



* : Blinks every 0.125 (1/8) seconds (until ignition switch is turned OFF).

** : Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).

7. Diagnostics for On-board Diagnostics Failed

A: AT OIL TEMP INDICATOR LIGHT

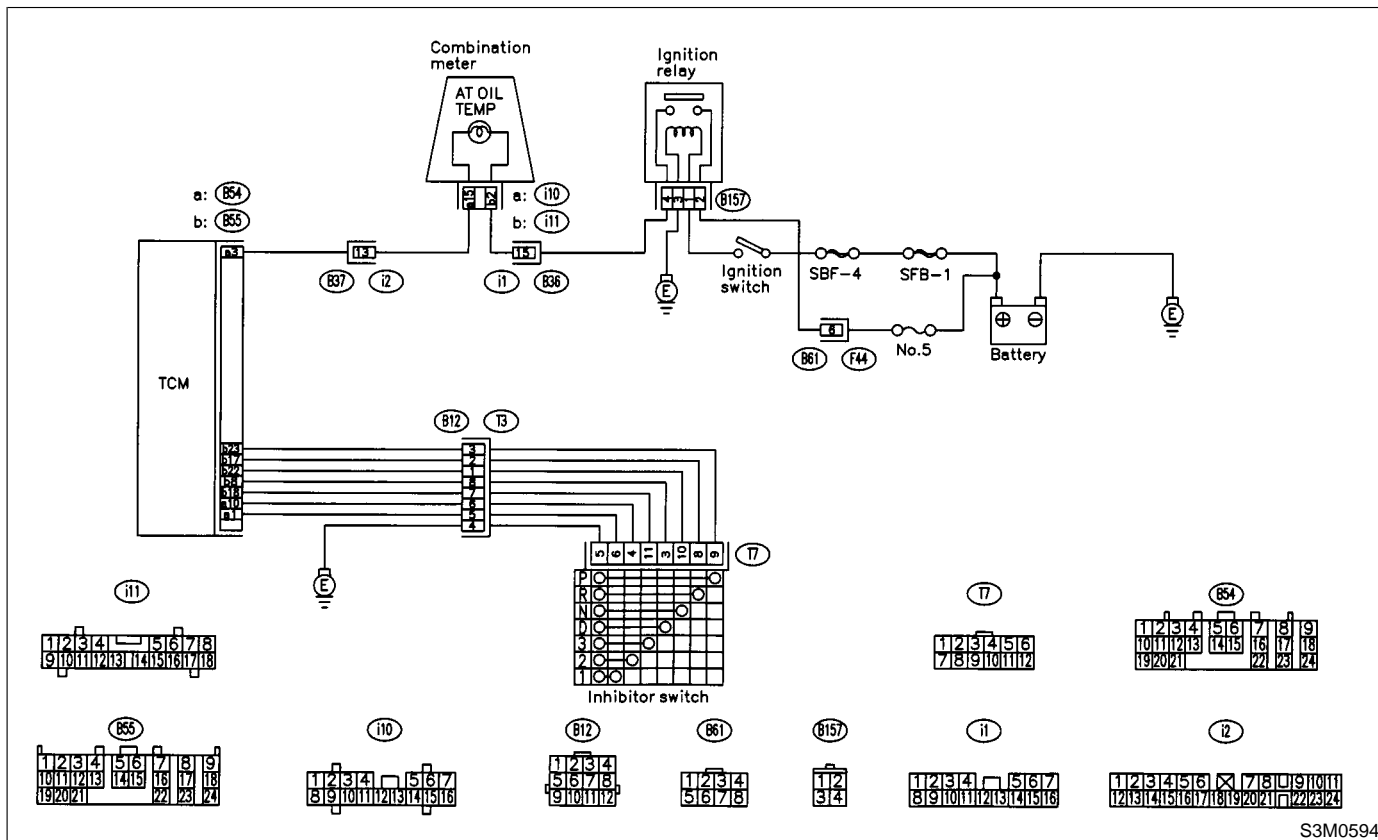
DIAGNOSIS:

The AT OIL TEMP indicator light circuit is open or shorted.

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



S3M0594

7A1 : CHECK AT OIL TEMP INDICATOR LIGHT.

Turn ignition switch to ON (engine OFF).

- CHECK** : Does AT OIL TEMP indicator light illuminate?
- YES** : Go to step 7A4.
- NO** : Go to step 7A2.

7A2 : CHECK FUSE (NO. 5).

Remove fuse (No. 5).

- CHECK** : Is the fuse (No. 5) blown out?
- YES** : Replace fuse (No. 5). If replaced fuse (No. 5) is blown out easily, repair short circuit in harness between fuse (No. 5) and combination meter.
- NO** : Go to step 7A3.

7A3 : CHECK AT OIL TEMP INDICATOR LIGHT.

- 1) Turn ignition switch to OFF.
- 2) Remove combination meter.
- 3) Remove ATF OIL TEMP indicator light bulb from combination meter.

- CHECK** : *Is ATF OIL TEMP indicator light bulb OK?*
- YES** : Go to step 7A5.
- NO** : Replace AT OIL TEMP indicator light bulb.

7A4 : CHECK AT OIL TEMP INDICATOR LIGHT.

Perform on-board diagnostics. <Ref. to 3-2 [T6C0].>

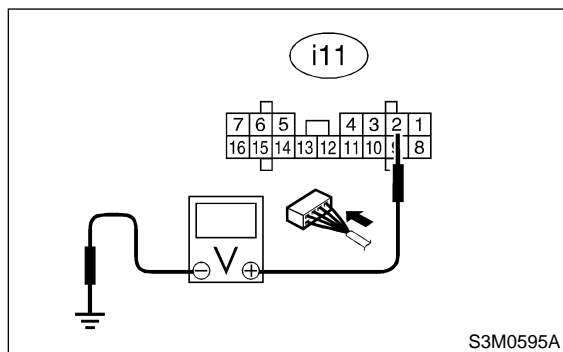
- CHECK** : *Does AT OIL TEMP indicator light blink?*
- YES** : A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM, inhibitor switch and combination meter.
- NO** : Go to step 7A8.

7A5 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure voltage between combination meter connector and chassis ground.

Connector & terminal

(i11) No. 2 (+) — Chassis ground (-):



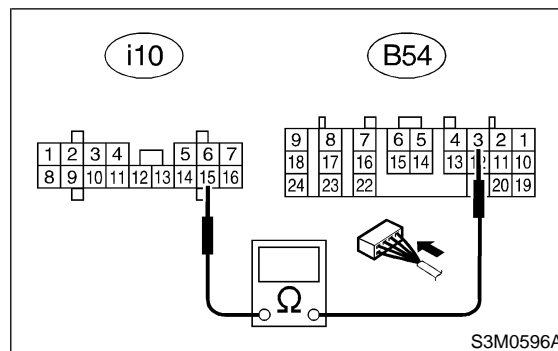
- CHECK** : *Is voltage more than 10 V?*
- YES** : Go to step 7A6.
- NO** : Repair open circuit in harness between combination meter and battery.

7A6 : CHECK OPEN CIRCUIT OF HARNESS.

- 1) Disconnect connector from combination meter connector.
- 2) Measure resistance of harness between TCM and combination meter connector.

Connector & terminal

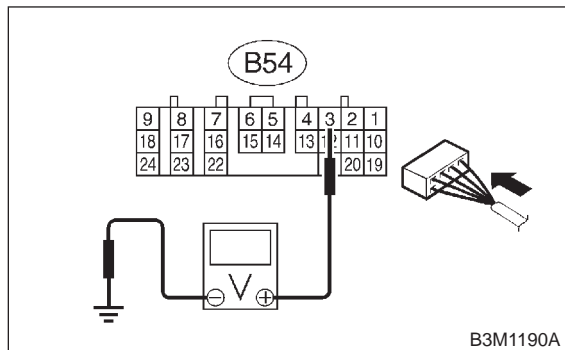
(B54) No. 3 — (i10) No. 15:



- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 7A7.
- NO** : Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.

7A7 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connector to combination meter.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Measure voltage between TCM connector and chassis ground.

Connector & terminal**(B54) No. 3 (+) — Chassis ground (-):**

- CHECK** : **Is the voltage less than 1 V?**
- YES** : Even if AT OIL TEMP indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

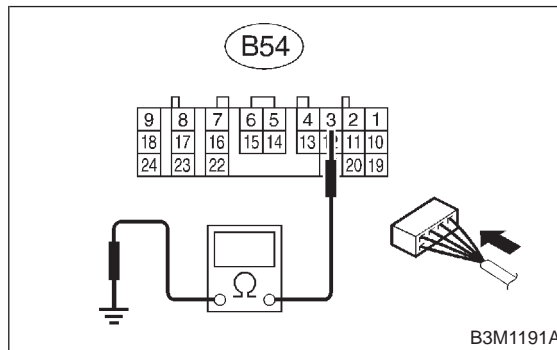
7A8 : CHECK INHIBITOR SWITCH.

- 1) Connect Subaru Select Monitor to data link connector.
 - 2) Turn ignition switch to ON.
 - 3) Subaru Select Monitor to ON.
 - 4) Read data of range switch using Subaru Select Monitor.
- Range switch is indicated in ON ⇔ OFF.

- CHECK** : **When each range is selected, does LED of Subaru Select Monitor light up?**
- YES** : Go to step **7A9**.
- NO** : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

7A9 : CHECK SHORT CIRCUIT OF HARNESS.

- 1) Remove combination meter.
- 2) Disconnect connector from combination meter.
- 3) Measure resistance of harness connector between TCM and combination meter.

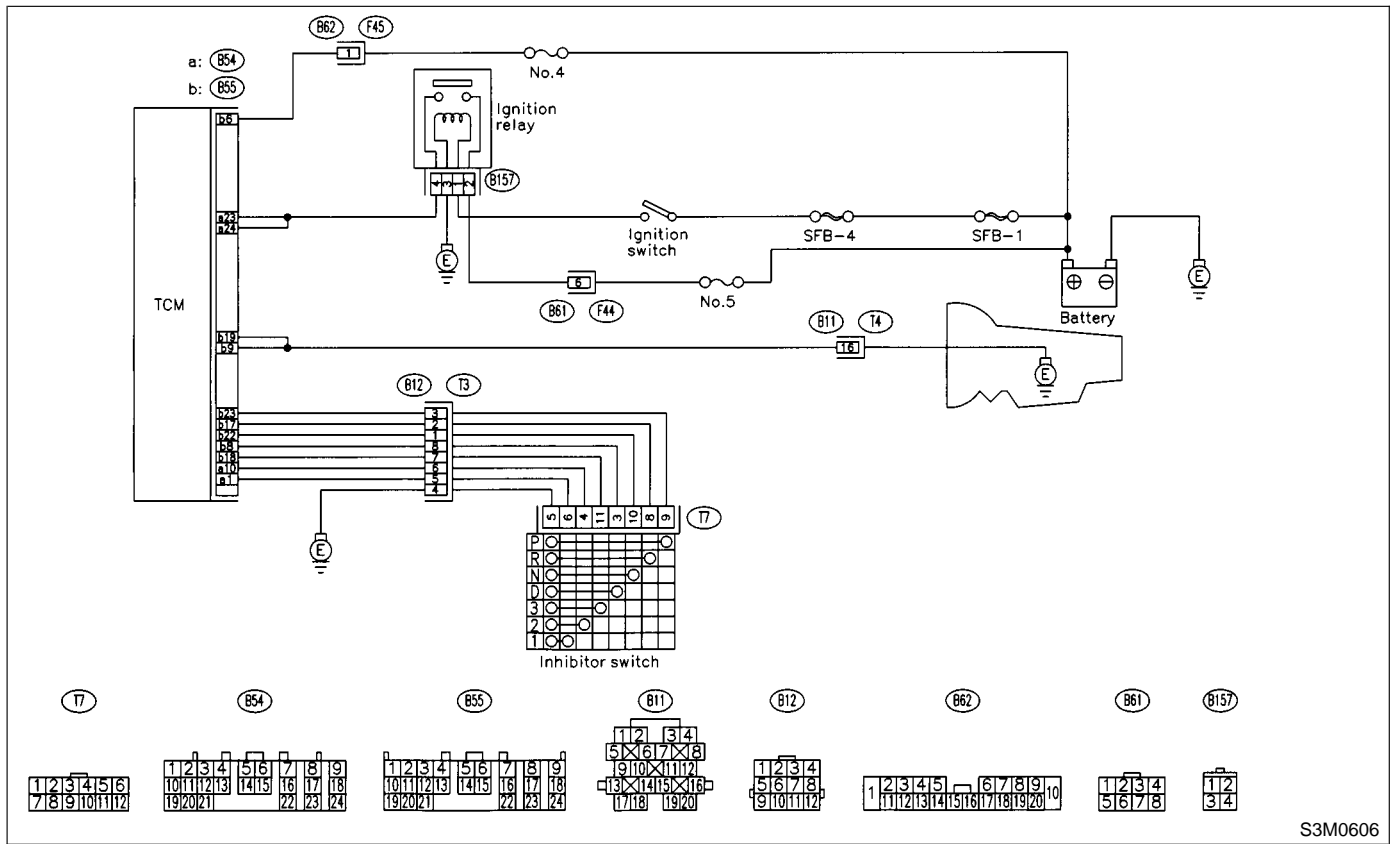
Connector & terminal**(B54) No. 3 — Chassis ground:**

- CHECK** : **Is the resistance less than 1 MΩ?**
- YES** : Replace TCM. <Ref. to 3-2 [W23A0].>
- NO** : Repair short circuit in harness between combination meter connector and TCM connector.

MEMO:

B: CONTROL MODULE POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:



S3M0606

7B1 : CHECK FUSE (NO. 4).

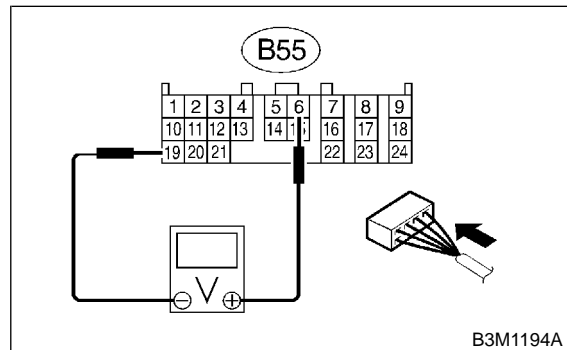
Remove fuse (No. 4).

- CHECK** : *Is the fuse (No. 4) blown out?*
- YES** : Replace fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.
- NO** : Go to step **7B2**.

7B2 : CHECK BACK-UP POWER SUPPLY CIRCUIT.

- 1) Turn ignition switch to ON.
- 2) Measure back-up power supply voltage between TCM connector terminal.

Connector & terminal
(B55) No. 6 (+) — No. 19 (-):



B3M1194A

- CHECK** : *Is the voltage more than 10 V?*
- YES** : Go to step **7B3**.
- NO** : Repair open circuit in harness between fuse (No. 4) and TCM, and poor contact in coupling connector.

7B3 : CHECK FUSE (NO. 5).

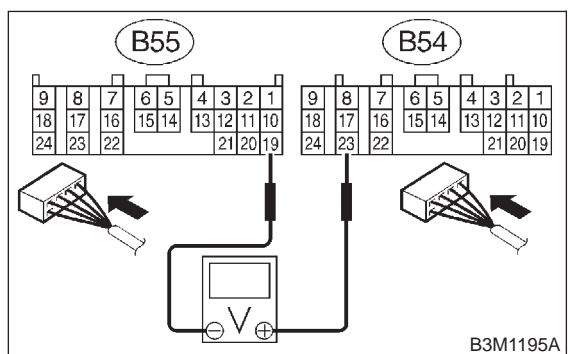
Remove fuse (No. 5).

- CHECK** : *Is the fuse (No. 5) blown out?*
- YES** : Replace fuse (No. 5). If replaced fuse (No. 5) has blown out easily, repair short circuit in harness between fuse (No. 5) and TCM.
- NO** : Go to step 7B4.

7B4 : CHECK IGNITION POWER SUPPLY CIRCUIT.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure ignition power supply voltage between TCM connector terminal.

Connector & terminal
(B54) No. 23 (+) — (B55) No. 19 (-):

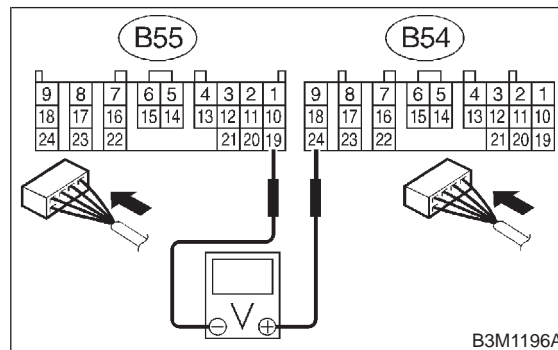


- CHECK** : *Is the voltage more than 10 V?*
- YES** : Go to step 7B5.
- NO** : Go to step 7B6.

7B5 : CHECK IGNITION POWER SUPPLY CIRCUIT.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure ignition power supply voltage between TCM connector terminal.

Connector & terminal
(B54) No. 24 (+) — (B55) No. 19:

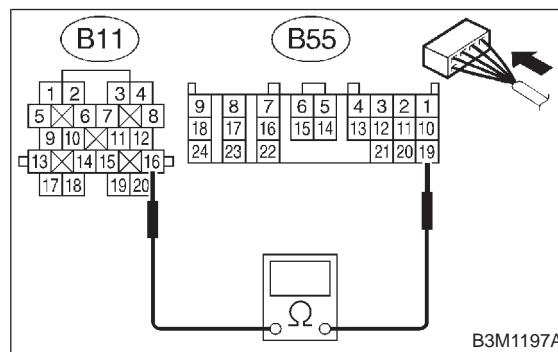


- CHECK** : *Is the voltage more than 10 V?*
- YES** : Go to step 7B6.
- NO** : Repair open circuit in harness between TCM and battery, and poor contact in coupling connector.

7B6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 19 — (B11) No. 16:



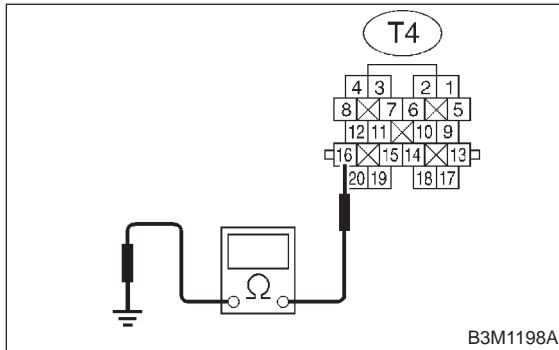
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 7B7.
- NO** : Repair open circuit in harness between TCM and transmission harness connector.

7B7 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.

Measure resistance of harness between transmission and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



CHECK : *Is the resistance less than 1 Ω?*

YES : Go to step **7B8**.

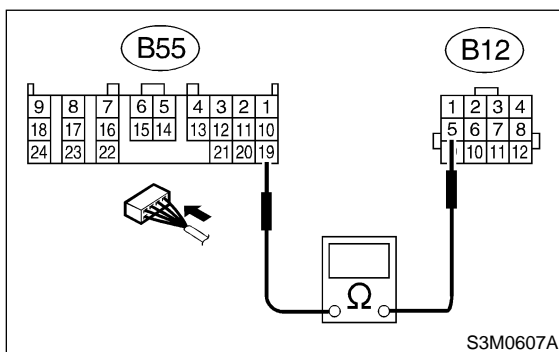
NO : Repair open circuit in harness between transmission and transmission ground.

7B8 : CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND TCM.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between inhibitor switch side connector and TCM.

Connector & terminal

(B12) No. 5 — (B55) No. 19:



CHECK : *Is the resistance less than 1 Ω?*

YES : Go to step **7B9**.

NO : Repair open circuit in harness between TCM and inhibitor side connector, and poor contact in coupling connector.

7B9 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in control module power supply and ground line?*

YES : Repair poor contact and ground terminal.

NO : Replace TCM. <Ref. to 3-2 [W23A0].>

8. Diagnostic Chart with Trouble Code

A: LIST OF TROUBLE CODE

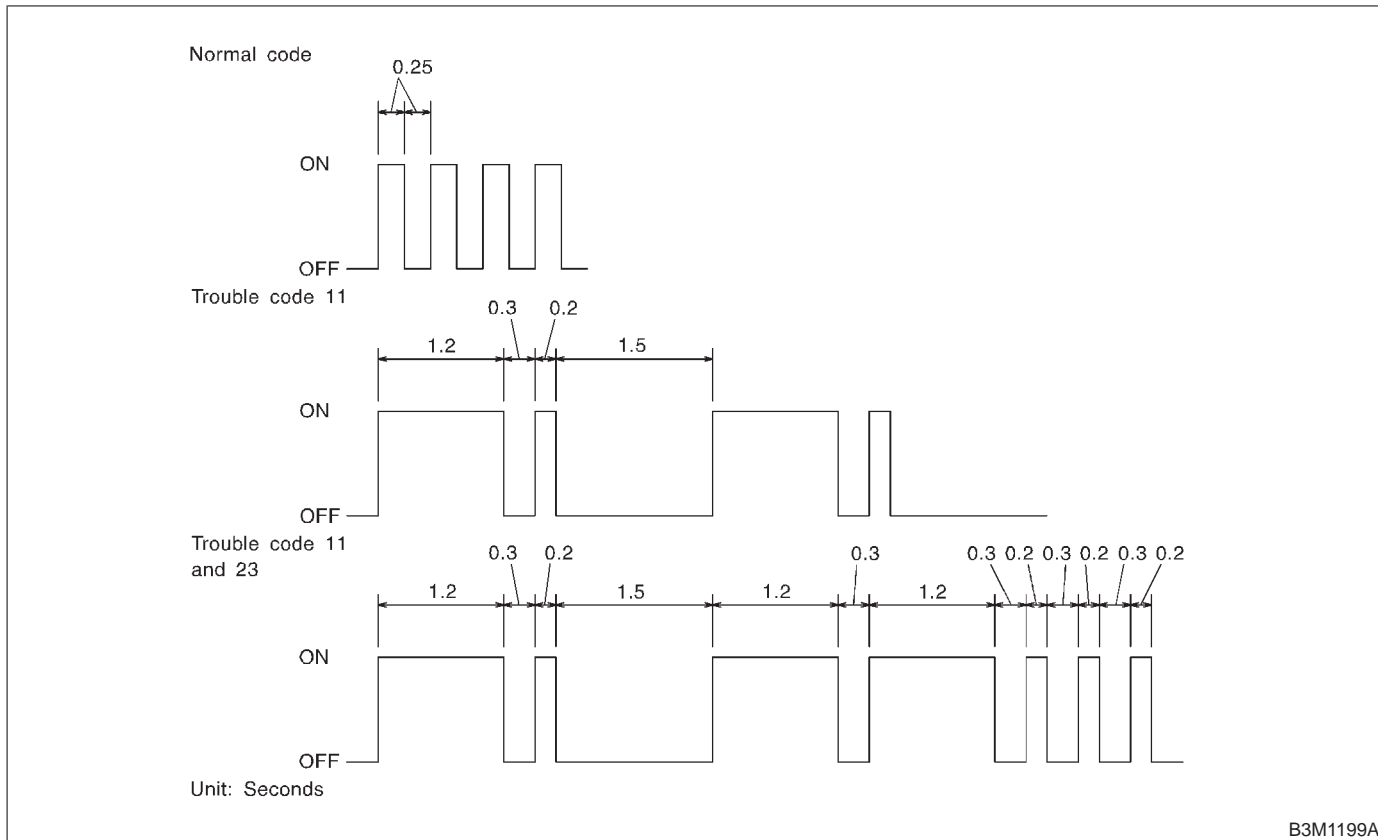
1. TROUBLE CODE

Trouble code	Item	Content of diagnosis	Title index No.
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8C0].>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8D0].>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8E0].>
33	Vehicle speed sensor 2 (Front)	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8F0].>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8G0].>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8H0].>
45	Intake manifold pressure signal	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8I0].>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to 3-2 [T8J0].>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to 3-2 [T8K0].>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to 3-2 [T8L0].>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to 3-2 [T8M0].>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 3-2 [T8N0].>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 3-2 [T8O0].>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 3-2 [T8P0].>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 3-2 [T8Q0].>
93	Vehicle speed sensor 1 (Rear)	Detects open or shorted input signal circuit.	<Ref. to 3-2 [T8R0].>

2. HOW TO READ TROUBLE CODE OF INDICATOR LIGHT

The AT OIL TEMP indicator light flashes the code corresponding to the faulty part.

The long segment (1.2 sec on) indicates a "ten", and the short segment (0.2 sec on) signifies a "one".



B: CLEAR MEMORY

Current trouble codes shown on the display are cleared by turning the ignition switch OFF after conducting on-board diagnostics operation. Previous trouble codes, however, cannot be cleared since they are stored in the TCM memory which is operating on the back-up power supply. These trouble codes can be cleared by removing the specified fuse (located under the light or left lower position of the instrument panel).

CLEAR MEMORY:

Removal of No. 4 fuse (for at least one minute)

- The No. 4 fuse is located in the line to the memory back-up power supply of the TCM. Removal of this fuse clears the previous trouble codes stored in the TCM memory.
- Be sure to remove the No. 4 fuse for at least the specified length of time. Otherwise, trouble codes may not be cleared.

MEMO:

C: TROUBLE CODE 11 — ENGINE SPEED SIGNAL —

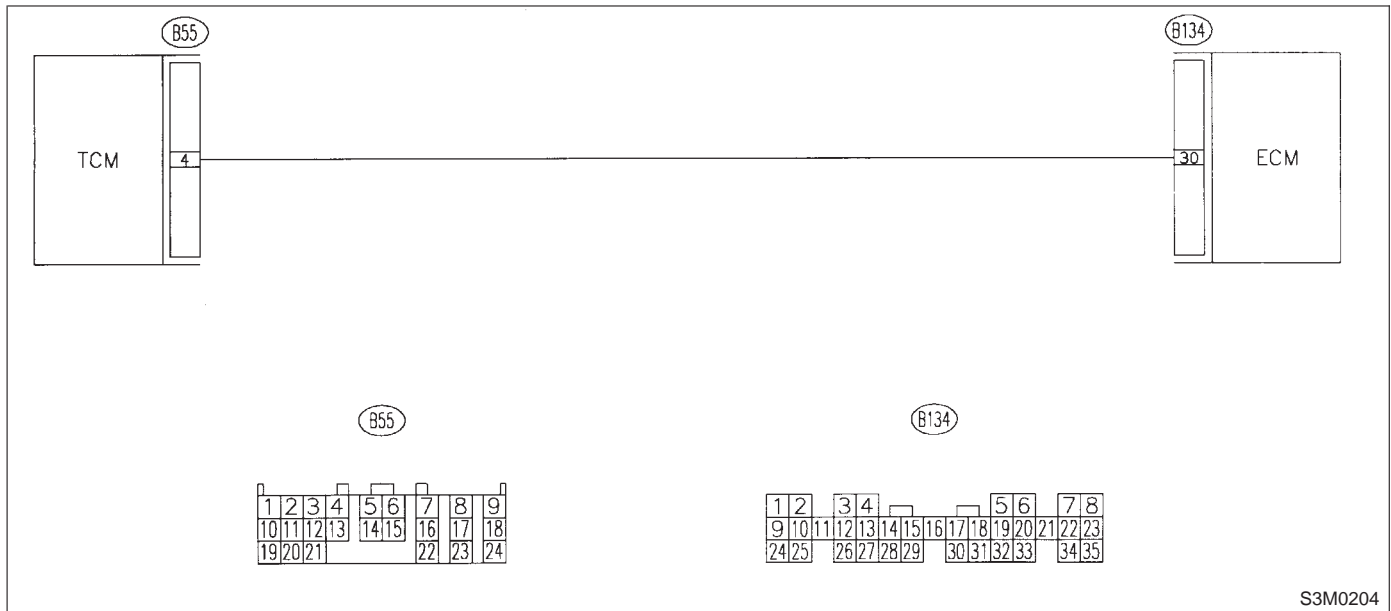
DIAGNOSIS:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- AT OIL TEMP indicator remains on when vehicle speed is "0".

WIRING DIAGRAM:

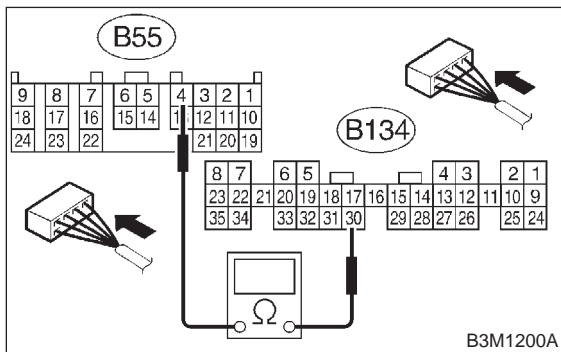


8C1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B55) No. 4 — (B134) No. 30:



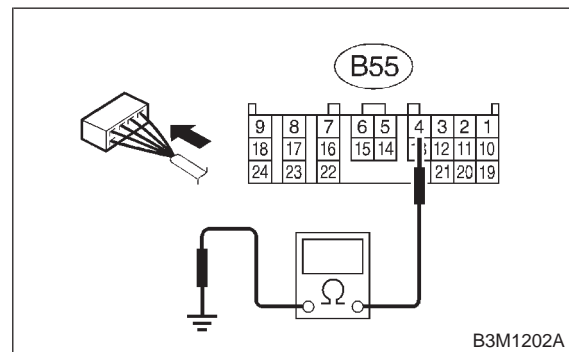
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step **8C2**.
- NO** : Repair open circuit in harness between TCM and ECM connector.

8C2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 4 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step **8C3**.
- NO** : Repair short circuit in harness between TCM and ECM connector.

8C3 : PREPARE SUBARU SELECT MONITOR.

CHECK : *Do you have a Subaru Select Monitor?*

YES : Go to step **8C5**.

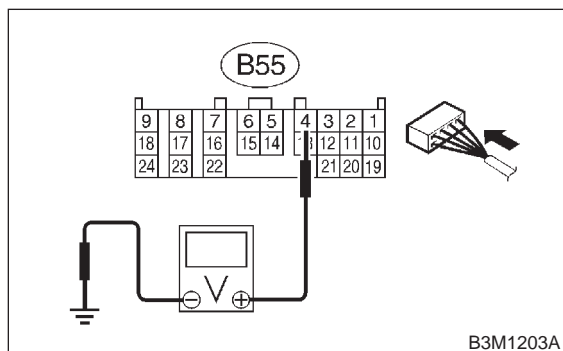
NO : Go to step **8C4**.

8C4 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B55) No. 4 (+) — Chassis ground (-):



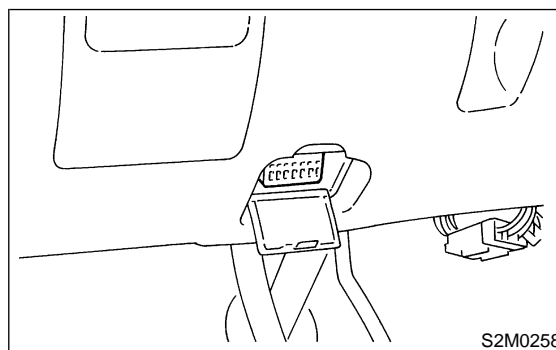
CHECK : *Is the voltage more than 10.5 V?*

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8C6**.

8C5 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect Subaru Select Monitor to data link connector.



- 2) Start the engine, and turn Subaru Select Monitor switch to ON.
- 3) Warm-up the engine until engine coolant temperature is above 80°C (176°F).
- 4) Engine idling.
- 5) Read data of engine speed using Subaru Select Monitor.
 - Display shows engine speed signal value sent from ECM.

CHECK : *Is the revolution value the same as the tachometer reading shown on the combination meter?*

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8C6**.

8C6 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in engine speed signal circuit?*

YES : Repair poor contact.

NO : Go to step **8C7**.

8C7 : CONFIRM TROUBLE CODE 11.

CHECK : *Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?*

YES : Replace TCM. <Ref. to 3-2 [W23A0].>

NO : Replace ECM. <Ref. to 2-7 [W17A0].>

D: TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —

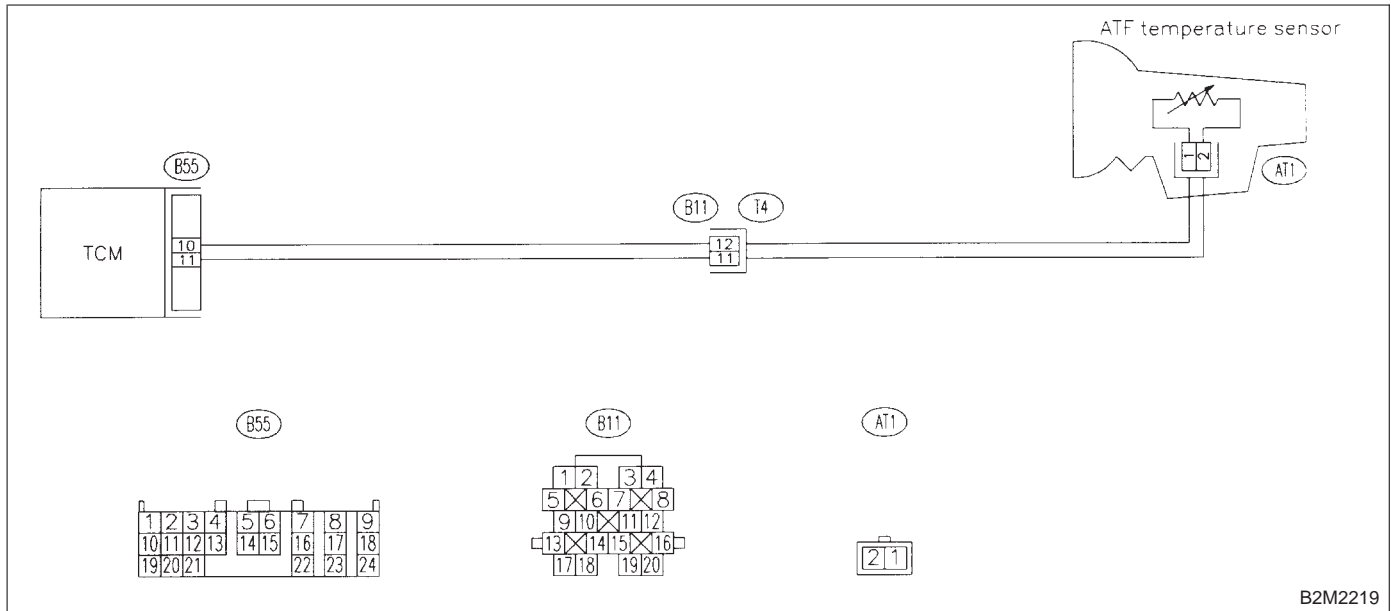
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



8D1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

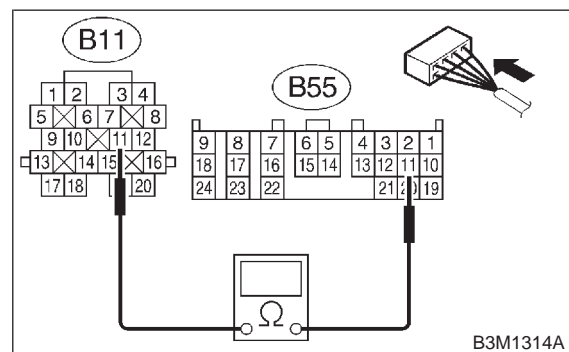
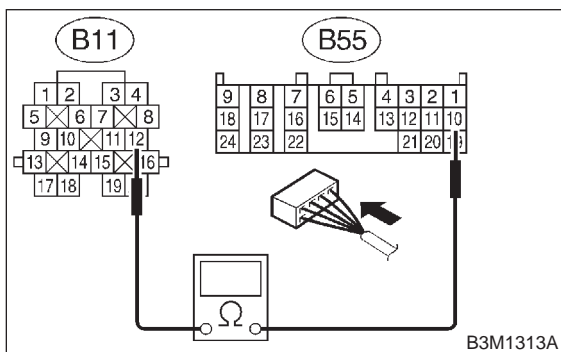
8D2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance of harness between TCM and transmission connector.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 11 — (B11) No. 11:

Connector & terminal
(B55) No. 10 — (B11) No. 12:



- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8D2**.
- NO** : Repair open circuit in harness between TCM and transmission connector.

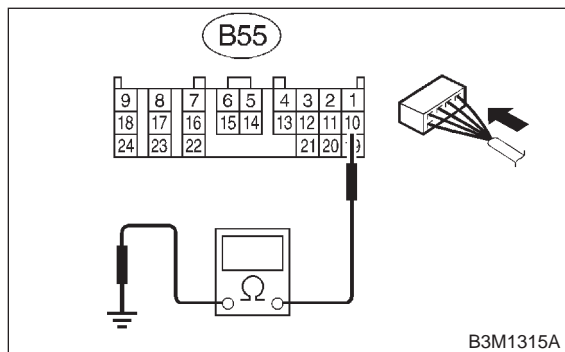
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8D3**.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8D3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 10 — Chassis ground:



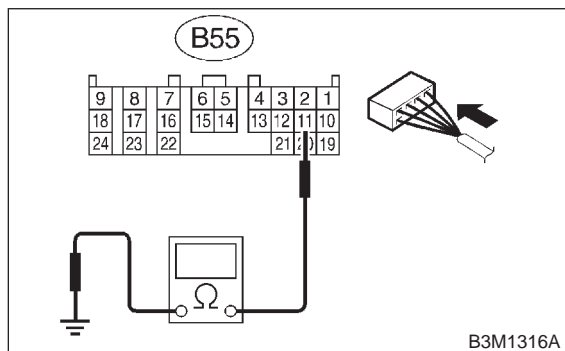
- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **8D4**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8D4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 11 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **8D5**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8D5 : CHECK ATF TEMPERATURE SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Connect connectors to transmission.
- 3) Turn ignition switch to ON and start engine.
- 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F).

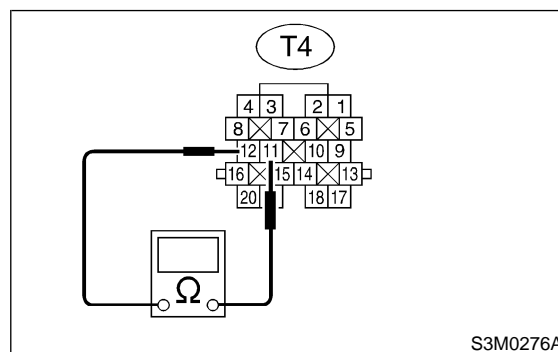
NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 5) Disconnect connector from transmission.
- 6) Measure resistance between transmission connector terminals.

Connector & terminal

(T4) No. 11 — No. 12:



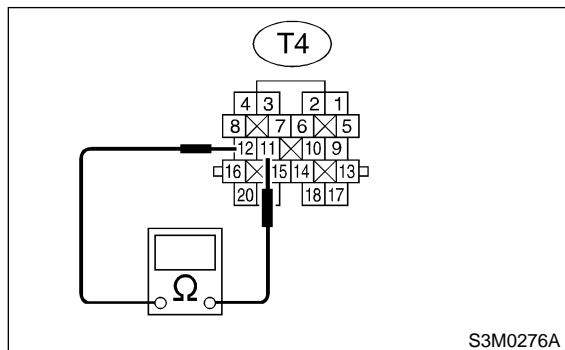
- CHECK** : *Is the resistance between 275 and 375 Ω?*
- YES** : Go to step **8D6**.
- NO** : Go to step **8D13**.

8D6 : CHECK ATF TEMPERATURE SENSOR.

- 1) Turn ignition switch to ON (engine OFF).
- 2) Measure resistance between transmission connector terminals.

Connector & terminal

(T4) No. 11 — No. 12:



CHECK : *Does the resistance value increase while the ATF temperature decreases?*

YES : Go to step 8D7.

NO : Go to step 8D13.

8D7 : PREPARE SUBARU SELECT MONITOR.

CHECK : *Do you have a Subaru Select Monitor?*

YES : Go to step 8D10.

NO : Go to step 8D8.

8D8 : CHECK INPUT SIGNAL FOR TCM.

- 1) Warm-up the transmission until ATF temperature is about 80°C (176°F).

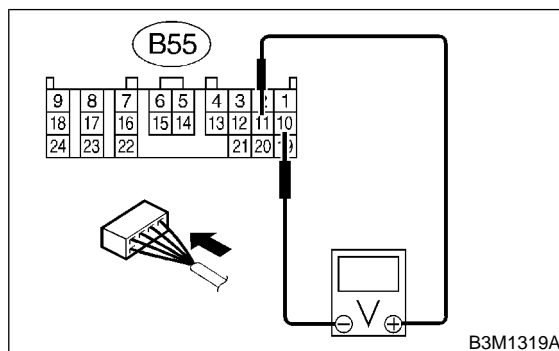
NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 2) Measure voltage between TCM connector terminal.

Connector & terminal

(B55) No. 11 (+) — No. 10 (-):



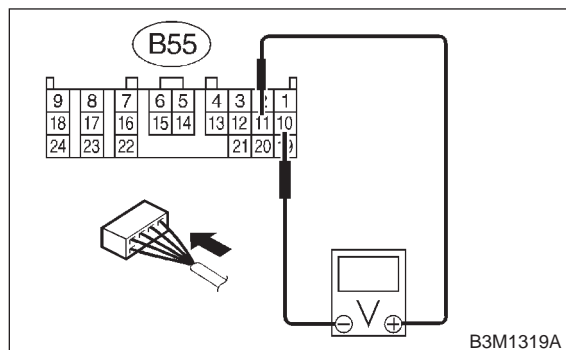
CHECK : *Is the voltage between 0.5 and 0.8 V?*

YES : Go to step 8D9.

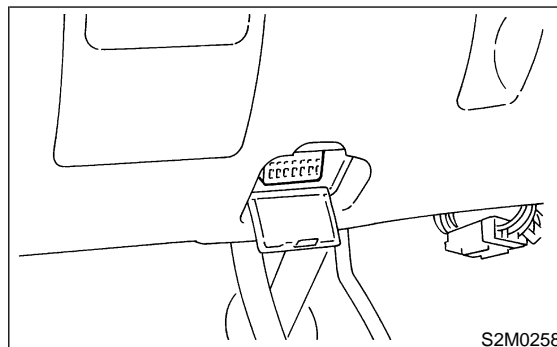
NO : Go to step 8D12.

8D9 : CHECK INPUT SIGNAL FOR TCM.

- 1) Cool-down the transmission until ATF temperature is under 20°C (68°F).
- 2) Measure voltage between TCM connector terminal.

Connector & terminal**(B55) No. 11 (+) — No. 10 (-):****CHECK** : **Is the voltage between 2.9 and 4.9 V?****YES** : Even if "AT OIL TEMP" 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 ATF temperature sensor or transmission connector.**NO** : Go to step **8D12**.**8D10 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.**

- 1) Turn ignition switch to OFF.
- 2) Connect connector to transmission.
- 3) Connect Subaru Select Monitor to data link connector.



- 4) Start the engine, and turn Subaru Select Monitor switch to ON.
- 5) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 6) Read data of ATF temperature using Subaru Select Monitor.

- ATF temperature is indicated in "°F" or "°C".

CHECK : **Is the ATF temperature between 70 and 110°C (158 and 230°F).****YES** : Go to step **8D11**.**NO** : Go to step **8D12**.**8D11 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.**

Turn ignition switch to ON (engine OFF).

CHECK : **Does the ATF temperature gradually decrease?****YES** : Even if "AT OIL TEMP" light 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 contact in the ATF temperature sensor and transmission connector.**NO** : Go to step **8D12**.

8D12 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in ATF temperature sensor circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

8D13 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Remove transmission connector from stay.
- 4) Lift-up or raise the vehicle and support with safety stand.

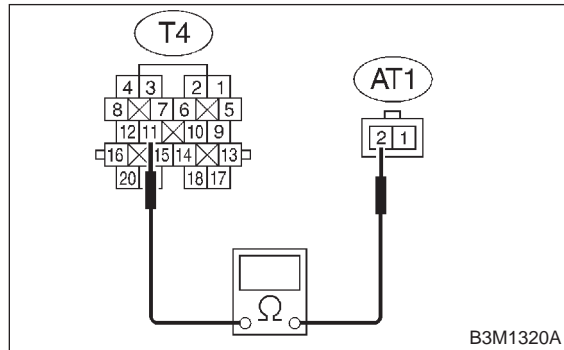
CAUTION:
On AWD models, raise all wheels off ground.

- 5) Drain automatic transmission fluid.

CAUTION:
Do not drain the automatic transmission fluid until it cools down.

- 6) Remove oil pan, and disconnect connector from ATF temperature sensor connector.
- 7) Measure resistance of harness between ATF temperature sensor and transmission connector.

Connector & terminal
(T4) No. 11 — (AT1) No. 2:

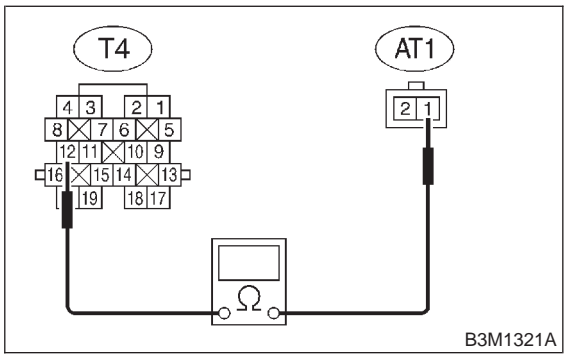


- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 8D14.
- NO** : Repair open circuit in harness between ATF temperature sensor and transmission connector.

8D14 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between ATF temperature sensor and transmission connector.

Connector & terminal
(T4) No. 12 — (AT1) No. 1:

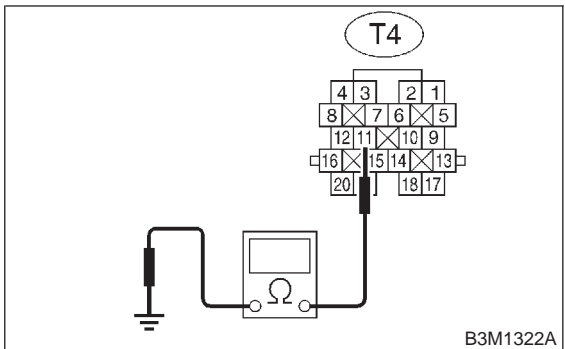


- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 8D15.
- NO** : Repair open circuit in harness between ATF temperature sensor and transmission connector.

8D15 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 11 — Transmission ground:



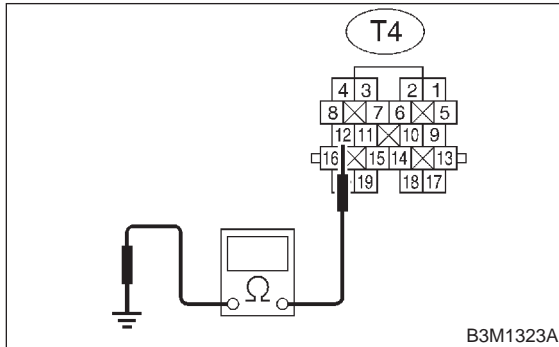
- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8D16.
- NO** : Repair short circuit in harness between ATF temperature sensor and transmission connector.

8D16 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal

(T4) No. 12 — Transmission ground:



- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Replace ATF temperature sensor. <Ref. to 3-2 [W4A0].>
- NO** : Repair short circuit in harness between ATF temperature sensor and transmission connector.

E: TROUBLE CODE 31 — THROTTLE POSITION SENSOR —

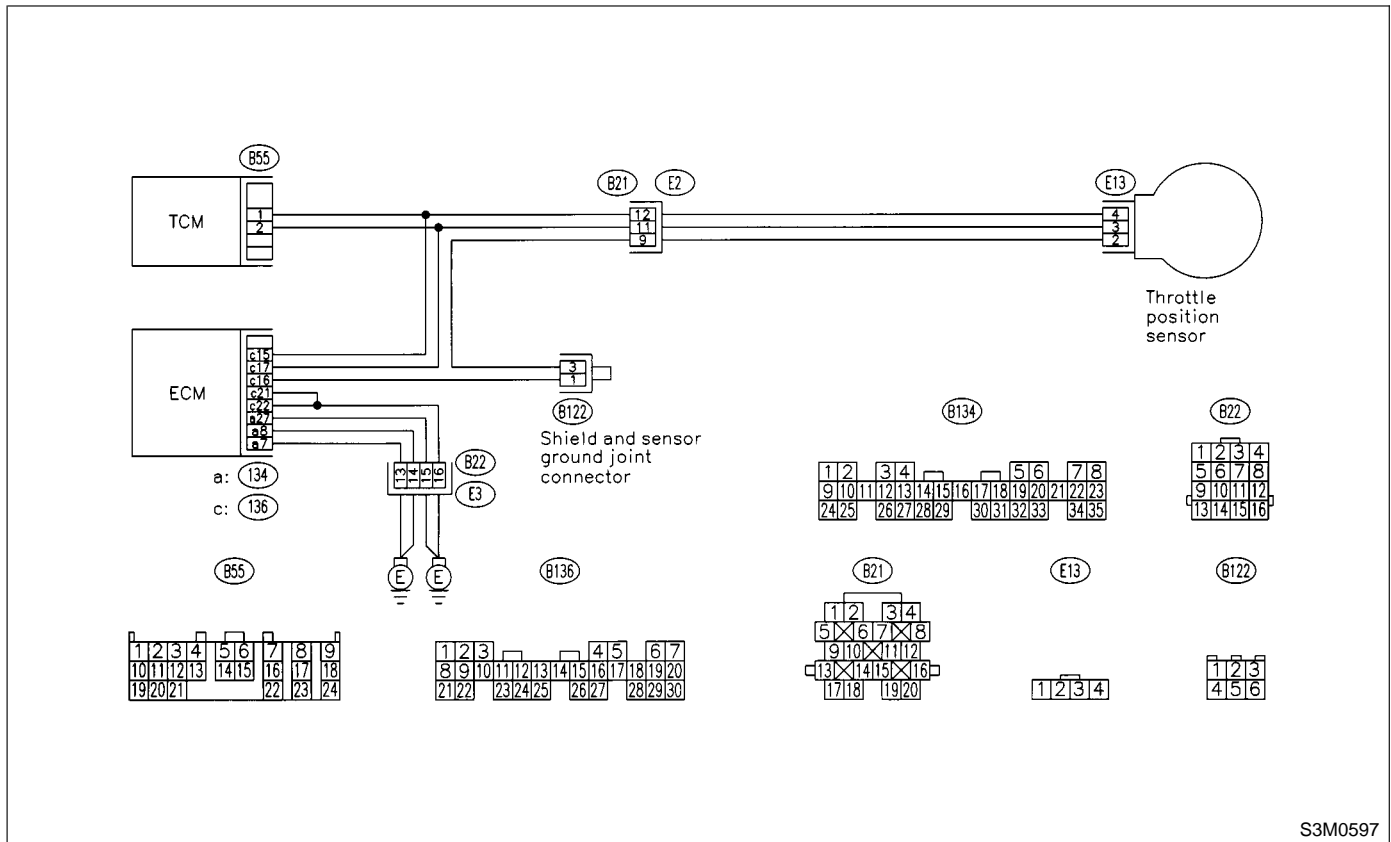
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Shift point too high or too low; engine brake not effected in “3” range: excessive shift shock; excessive tight corner “braking”.

WIRING DIAGRAM:



S3M0597

8E1 : CHECK ENGINE GROUND TERMINALS.

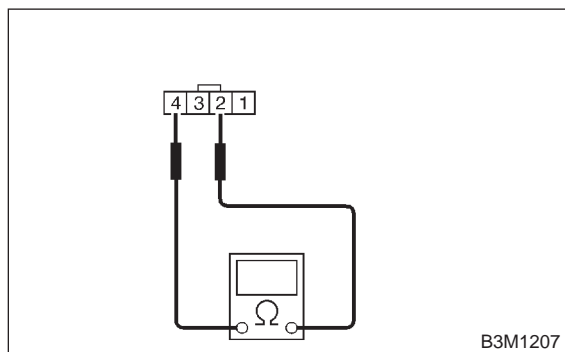
- CHECK** : Have engine ground terminals been tightened?
- YES** : Go to step 8E2.
- NO** : Tighten engine ground terminals.

8E2 : CHECK THROTTLE POSITION SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from throttle position sensor.
- 3) Measure resistance between throttle position sensor connector receptacle's terminals.

Terminals

No. 4 — No. 2:



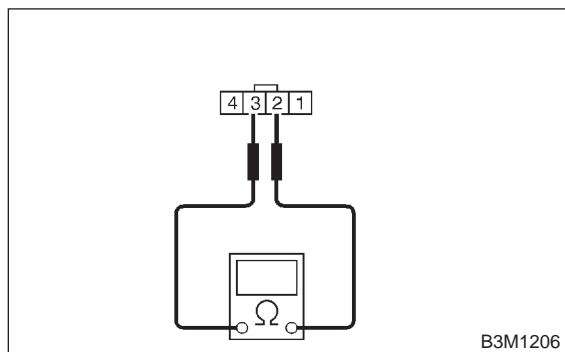
- CHECK** : *Is the resistance between 0.3 and 0.7 kΩ?*
- YES** : Go to step **8E3**.
- NO** : Replace throttle position sensor. <Ref. to 2-7 [W10A0].>

8E3 : CHECK THROTTLE POSITION SENSOR.

Measure resistance between throttle position sensor connector receptacle's terminals.

Terminals

No. 2 — No. 3:



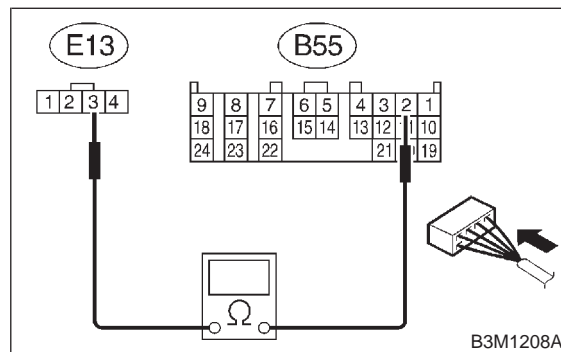
- CHECK** : *Is the resistance between 3.5 and 6.5 kΩ?*
- YES** : Go to step **8E4**.
- NO** : Replace throttle position sensor. <Ref. to 2-7 [W10A0].>

8E4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM and throttle position sensor connector.

Connector & terminal

(B55) No. 2 — (E13) No. 3:



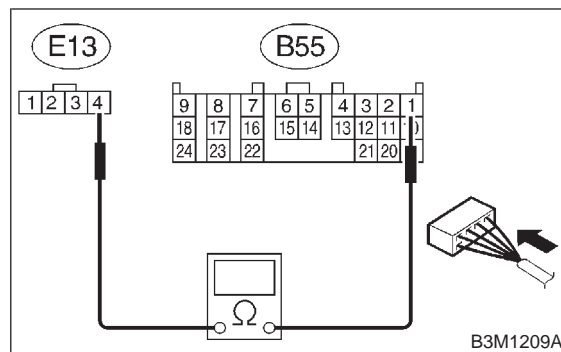
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8E5**.
- NO** : Repair open circuit in harness between TCM and throttle position sensor connector.

8E5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM and throttle position sensor connector.

Connector & terminal

(B55) No. 1 — (E13) No. 4:



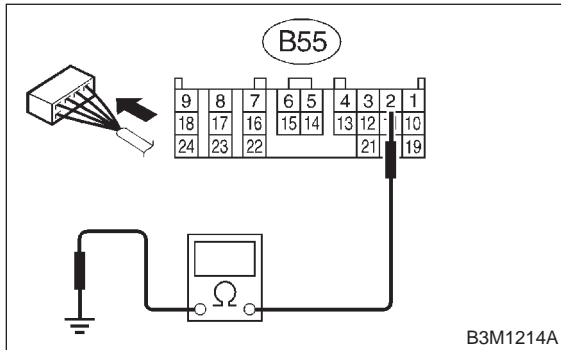
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8E6**.
- NO** : Repair open circuit in harness between TCM and throttle position sensor connector.

8E6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 2 — Chassis ground:



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 8E7.

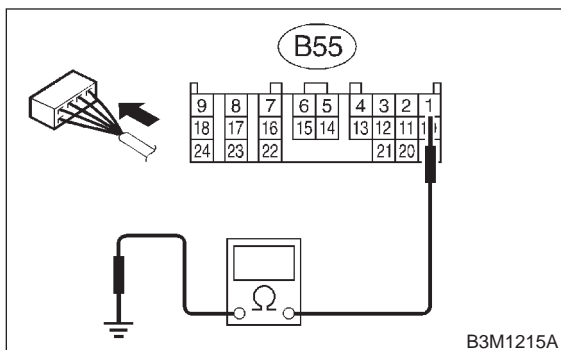
NO : Repair short circuit in harness between TCM and throttle position sensor connector.

8E7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 1 — Chassis ground:



CHECK : *Is the resistance more than 1 MΩ?*

YES : Go to step 8E8.

NO : Repair short circuit in harness between TCM and throttle position sensor connector.

8E8 : PREPARE SUBARU SELECT MONITOR.

CHECK : *Do you have a Subaru Select Monitor?*

YES : Go to step 8E11.

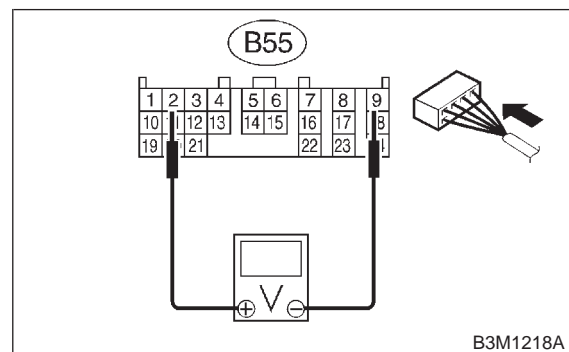
NO : Go to step 8E9.

8E9 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connector to throttle position sensor.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 2 (+) — No. 9 (-):



CHECK : *Is the voltage between 0.3 and 0.7 V in throttle fully closed?*

YES : Go to step 8E10.

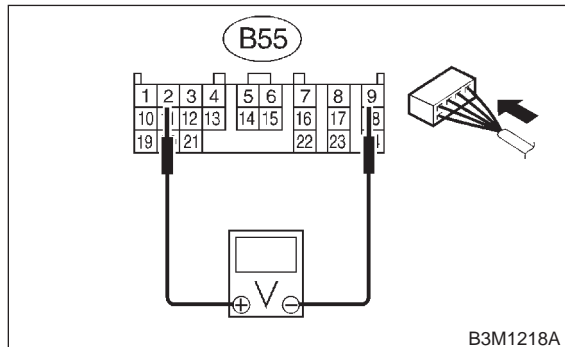
NO : Go to step 8E15.

8E10 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 2 (+) — No. 9 (-):



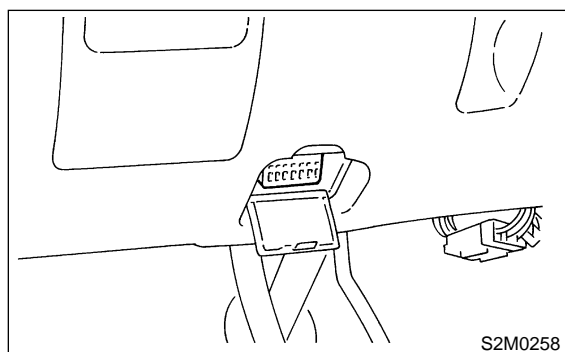
CHECK : *Is the voltage between 4.3 and 4.9 V with throttle fully open?*

YES : Go to step 8E13.

NO : Go to step 8E15.

8E11 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connectors to throttle position sensor.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Turn ignition switch to ON (engine OFF).
 - 4) Turn Subaru Select Monitor switch to ON.
 - 5) Throttle fully closed.
 - 6) Read data of throttle position sensor using Subaru Select Monitor.
- Throttle position sensor input signal is indicated.

CHECK : *Is the value voltage between 0.3 and 0.7 V?*

YES : Go to step 8E12.

NO : Go to step 8E15.

8E12 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

Throttle fully open.

NOTE:

Must be changed correspondingly with accelerator pedal operation (from “released” to “depressed” position).

CHECK : *Is the value voltage between 4.3 and 4.9 V?*

YES : Go to step 8E14.

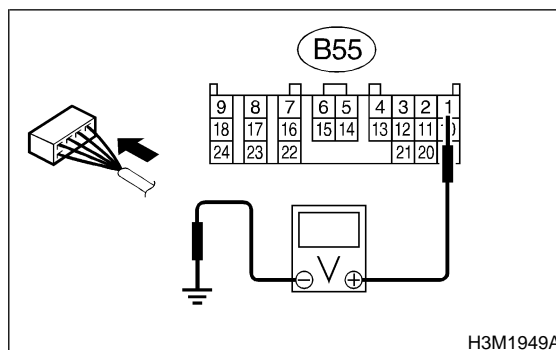
NO : Go to step 8E15.

8E13 : CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY).

Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B55) No. 1 (+) — Chassis ground (-):



CHECK : *Is the voltage between 4.8 and 5.3 V?*

YES : Even if “AT OIL TEMP” 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.

NO : Go to step 8E15.

8E14 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY).

Read data of throttle position sensor power supply using Subaru Select Monitor.

● Throttle position sensor power supply voltage is indicated.

CHECK : *Is the value voltage between 4.8 and 5.3 V?*

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8E15**.

8E15 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in throttle position sensor circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W23A0].>

MEMO:

F: TROUBLE CODE 33 — VEHICLE SPEED SENSOR 2 (FRONT) —

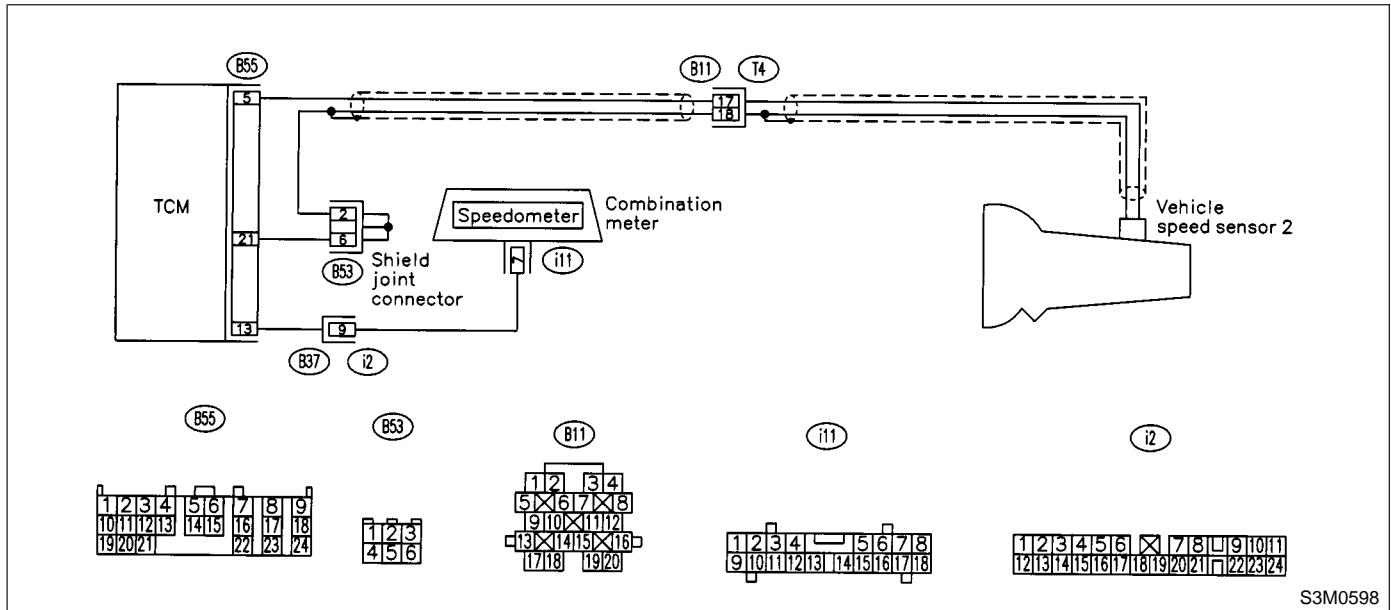
DIAGNOSIS:

- 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.

WIRING DIAGRAM:



S3M0598

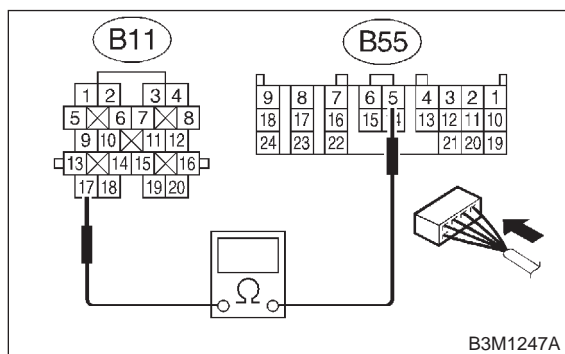
8F1 : CHECK OPERATION OF SPEEDOMETER.

- CHECK** : *Does speedometer operate normally?*
- YES** : Even if "AT OIL TEMP" 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.
- NO** : Go to step **8F2**.

8F2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

- 1) Disconnect connector from transmission.
- 2) Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 5 — (B11) No. 17:

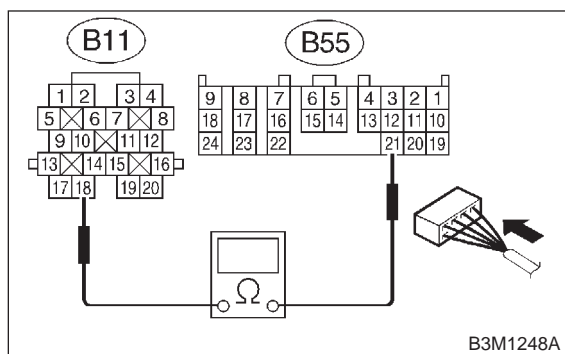


- CHECK** : Is the resistance less than 1 Ω?
YES : Go to step 8F3.
NO : Repair open circuit in harness between TCM and transmission connector.

8F3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 21 — (B11) No. 18:

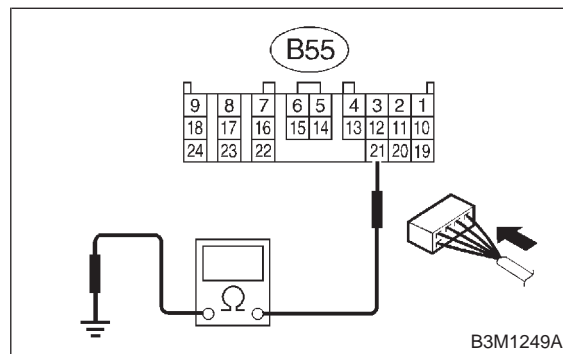


- CHECK** : Is the resistance less than 1 Ω?
YES : Go to step 8F4.
NO : Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.

8F4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 21 — Chassis ground:

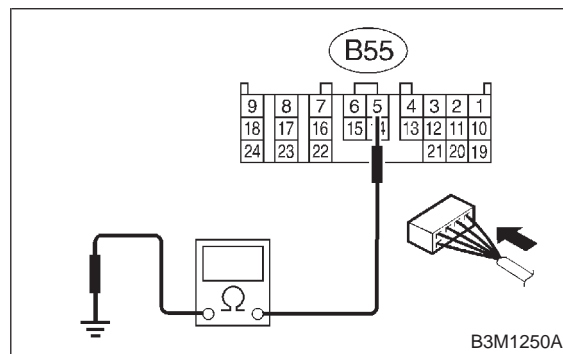


- CHECK** : Is the resistance more than 1 MΩ?
YES : Go to step 8F5.
NO : Repair short circuit in harness between TCM and transmission connector.

8F5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and chassis ground.

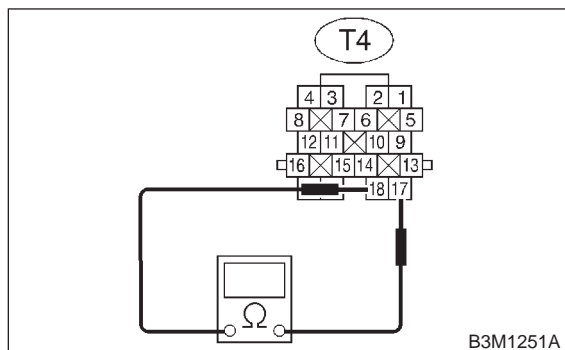
Connector & terminal
(B55) No. 5 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
YES : Go to step 8F6.
NO : Repair short circuit in harness between TCM and transmission connector.

8F6 : CHECK VEHICLE SPEED SENSOR 2.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector receptacle's terminals.

Connector & terminal**(T4) No. 17 — No. 18:**

- CHECK** : *Is the resistance between 450 and 650 Ω?*
- YES** : Go to step 8F7.
- NO** : Replace vehicle speed sensor 2. <Ref. to 3-2 [W12B0].>

8F7 : PREPARE OSCILLOSCOPE.

- CHECK** : *Do you have oscilloscope?*
- YES** : Go to step 8F10.
- NO** : Go to step 8F8.

8F8 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step 8F11.
- NO** : Go to step 8F9.

8F9 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect all connectors.
- 2) Lift-up or raise the vehicle and support with safety stand.

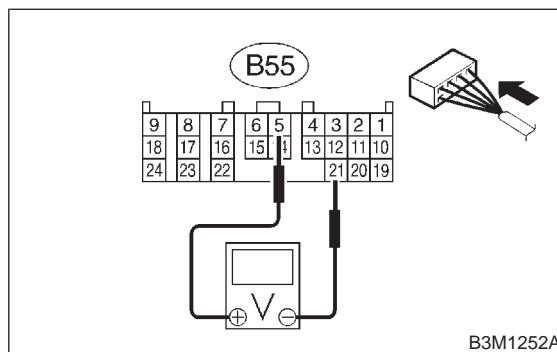
CAUTION:**On AWD models, raise all wheels off ground.**

- 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 4) Measure voltage between TCM connector terminals.

Connector & terminal**(B55) No. 5 (+) — No. 21 (-):**

- CHECK** : *Is the voltage more than AC 1 V?*
- YES** : Go to step 8F12.
- NO** : Go to step 8F19.

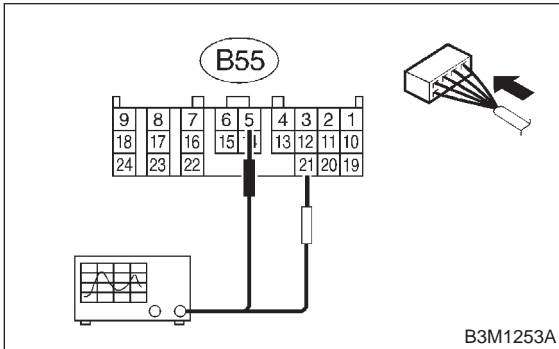
8F10 : CHECK VEHICLE SPEED SENSOR 2 USING OSCILLOSCOPE.

- 1) Connect all connectors.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 5
Earth lead; (B55) No. 21

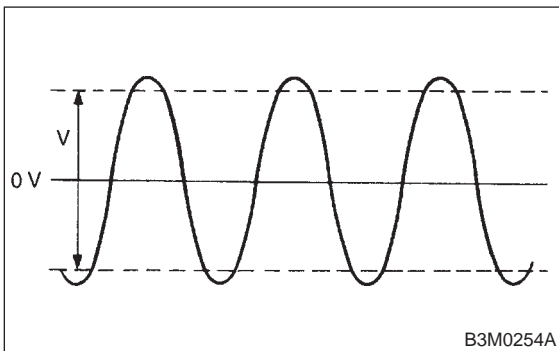


- 4) Start the engine, and drive the wheels slowly.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

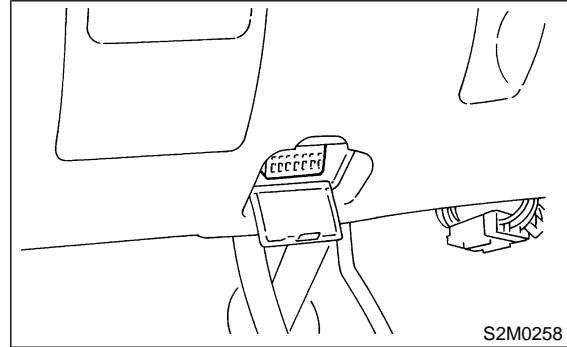
- 5) Measure signal voltage indicated on oscilloscope.



- CHECK** : *Is the voltage more than AC 4 V?*
- YES** : Go to step **8F12**.
- NO** : Go to step **8F19**.

8F11 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect all connectors.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.
- 5) Start the engine.
- 6) Read data of vehicle speed using Subaru Select Monitor.
 - Compare speedometer with Subaru Select Monitor indications.
 - Vehicle speed is indicated in "km/h" or "MPH".
- 7) Slowly increase vehicle speed to 60 km/h or 37 MPH.

NOTE:

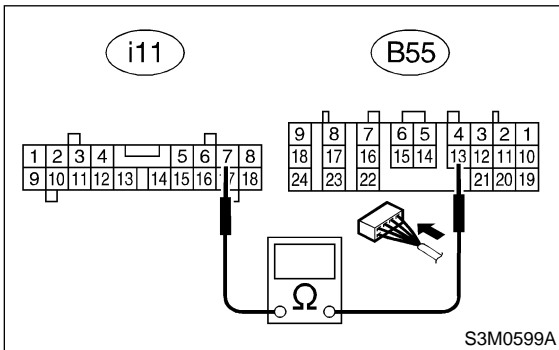
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- CHECK** : *Does the speedometer indication increase as the Subaru Select Monitor data increases?*
- YES** : Go to step **8F12**.
- NO** : Go to step **8F19**.

8F12 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from combination meter.
- 3) Measure resistance of harness between TCM and combination meter connector.

Connector & terminal
(B55) No. 13 — (i11) No. 7:

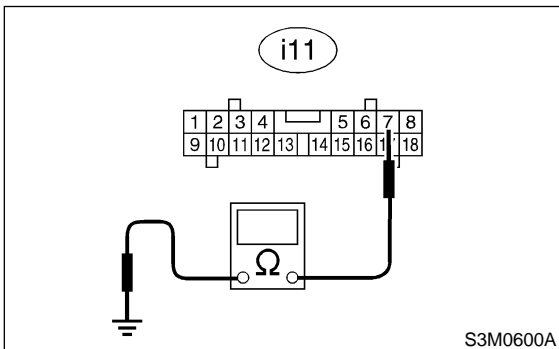


- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8F13**.
- NO** : Repair open circuit in harness between TCM and combination meter connector, and poor contact in coupling connector.

8F13 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

Measure resistance of harness between combination meter and chassis ground.

Connector & terminal
(i11) No. 7 — Chassis ground:



- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step **8F14**.
- NO** : Repair short circuit in harness between TCM and combination meter connector.

8F14 : PREPARE OSCILLOSCOPE.

- CHECK** : **Do you have oscilloscope?**
- YES** : Go to step **8F17**.
- NO** : Go to step **8F15**.

8F15 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : **Do you have a Subaru Select Monitor?**
- YES** : Go to step **8F18**.
- NO** : Go to step **8F16**.

8F16 : CHECK OUTPUT SIGNAL FOR TCM.

- 1) Connect all connectors.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Set vehicle in 10 km/h (6 MPH) condition.

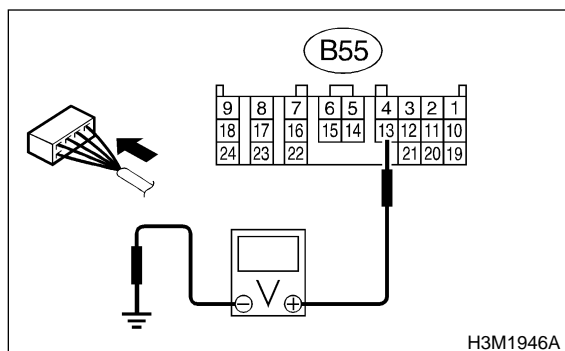
NOTE:

The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure on on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 4) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B55) No. 13 — Chassis ground:



CHECK : **Is the voltage less than 1 V ↔ more than 4 V?**

YES : Even if “AT OIL TEMP” 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.

NO : Go to step **8F19**.

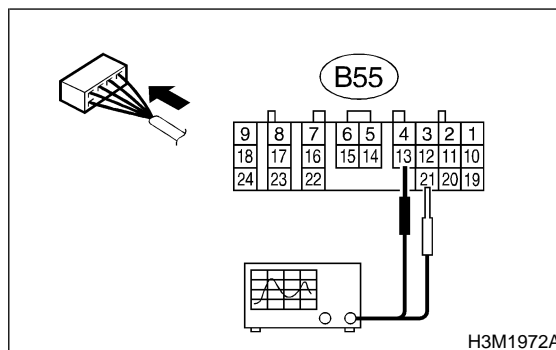
8F17 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

- 1) Connect connectors to combination meter.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

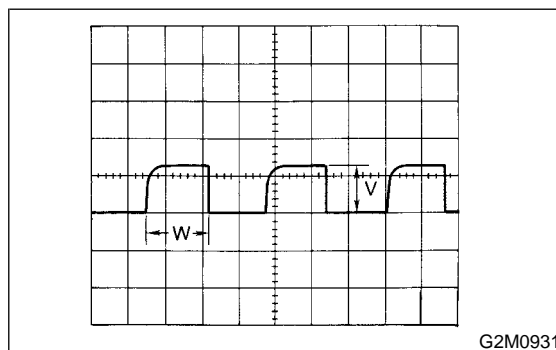
- 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 13
Earth lead; (B55) No. 21



- 4) Start the engine.
- 5) Shift on the gear position, and keep the vehicle speed at constant.
- 6) Measure signal voltage indicated on oscilloscope.

NOTE:

- If vehicle speed increases, the width of amplitude (W) decreases.
- 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 4-4 [T6D2].>



CHECK : **Is the voltage more than AC 2 V?**

YES : Even if “AT OIL TEMP” 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.

NO : Go to step **8F19**.

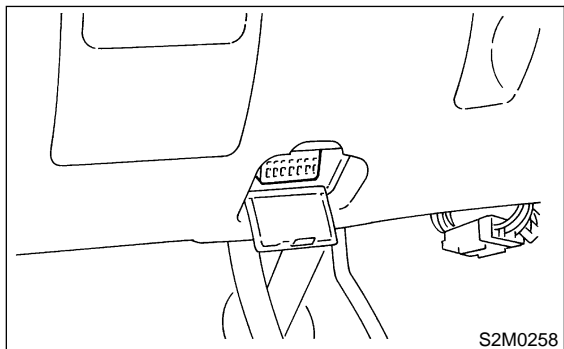
8F18 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect all connectors.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Connect Subaru Select Monitor to data link connector.



- 4) Turn ignition switch to ON and Subaru Select Monitor switch to ON.
- 5) Start the engine, and drive all wheels.
- 6) Read data of vehicle speed using Subaru Select Monitor.
 - Compare speedometer with Subaru Select Monitor indications.
 - Vehicle speed is indicated in "km/h" or "MPH".
- 7) Slowly increase vehicle speed to 60 km/h or 37 MPH.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8F19**.

8F19 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in vehicle speed sensor 2 circuit?***

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W23A0].>

MEMO:

G: TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR

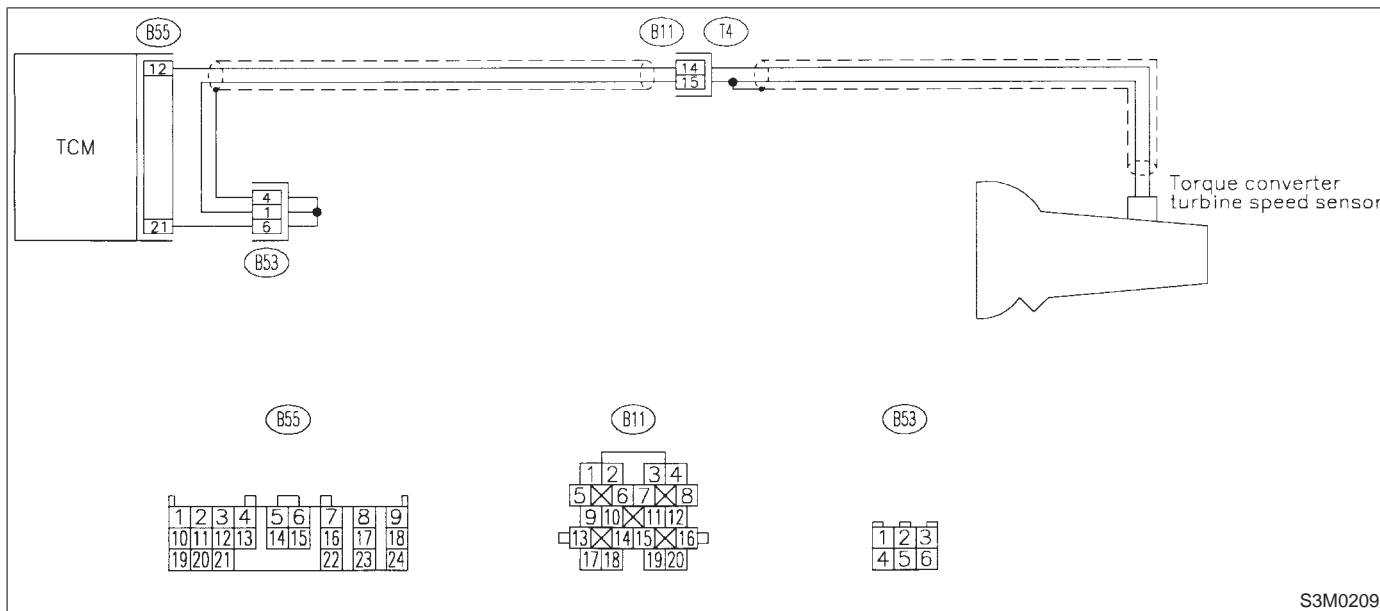
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Excessive shift shock.
- Stuck in 3rd gear when not in low speed (less than 10 km/h or 6 MPH)

WIRING DIAGRAM:

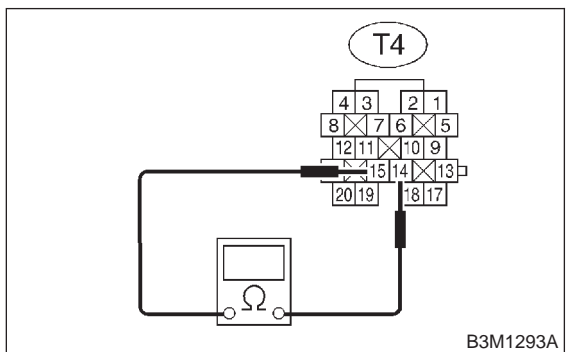


S3M0209

8G1 : CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector receptacle's terminals.

Connector & terminal
(T4) No. 14 — No. 15:



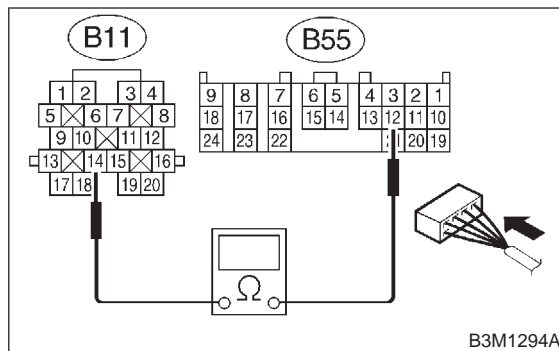
B3M1293A

- CHECK** : **Is the resistance between 450 and 650 Ω?**
- YES** : Go to step **8G2**.
- NO** : Replace torque converter turbine speed sensor. <Ref. to 3-2 [W12A0].>

8G2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 12 — (B11) No. 14:



B3M1294A

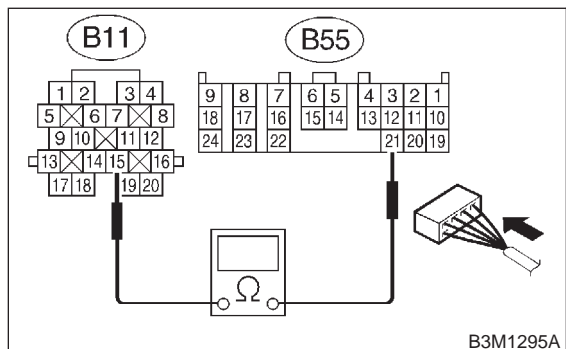
- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8G3**.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8G3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 21 — (B11) No. 15:



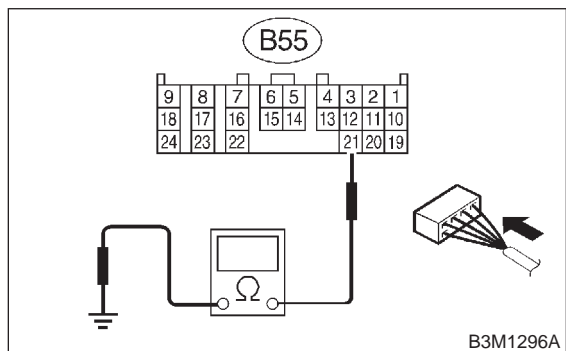
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8G4**.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8G4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 21 — Chassis ground:



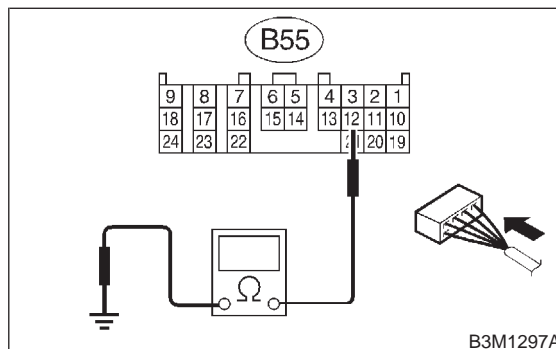
- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **8G5**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8G5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 12 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **8G6**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8G6 : PREPARE OSCILLOSCOPE.

- CHECK** : *Do you have oscilloscope?*
- YES** : Go to step **8G10**.
- NO** : Go to step **8G7**.

8G7 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step **8G9**.
- NO** : Go to step **8G8**.

8G8 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

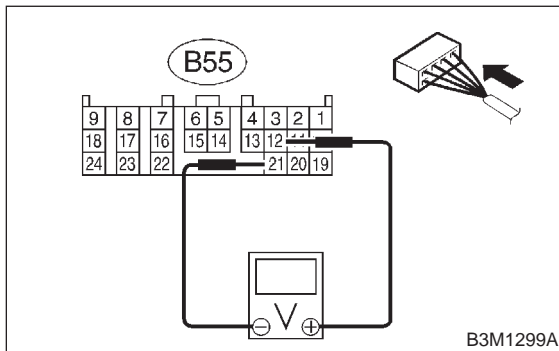
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 4) Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 12 (+) — No. 21 (-):



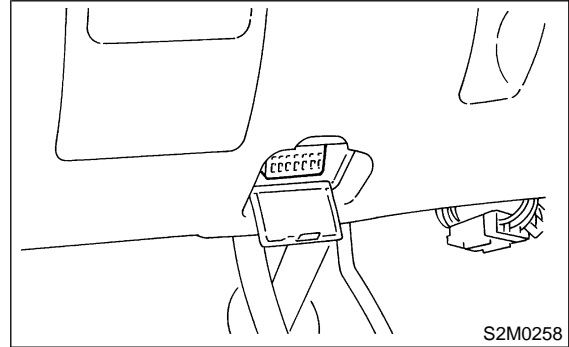
CHECK : **Is the voltage more than AC 1 V?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8G11**.

8G9 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connector to transmission.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.
- 5) Start the engine.
- 6) Read data of vehicle speed using Subaru Select Monitor.
 - Compare speedometer with Subaru Select Monitor indications.
 - Vehicle speed is indicated in "km/h" or "MPH".
- 7) Slowly increase vehicle speed to 20 km/h or 12 MPH.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : **Is the revolution value same as the tachometer reading shown on the combination meter?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8G11**.

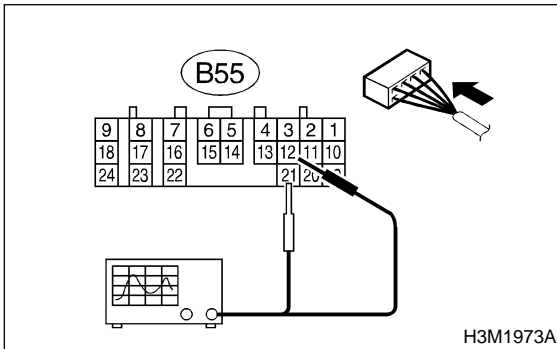
8G10 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Set oscilloscope to TCM connector terminals. Position probe; (B55) No. 12 Earth lead; (B55) No. 21

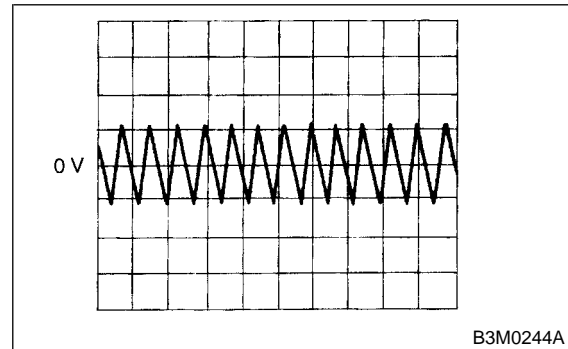


- 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure signal voltage indicated on oscilloscope.



CHECK : *Is the signal voltage more than AC 1 V?*

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8G11**.

8G11 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in torque converter turbine speed sensor circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W23A0].>

H: TROUBLE CODE 38 — TORQUE CONTROL SIGNAL —

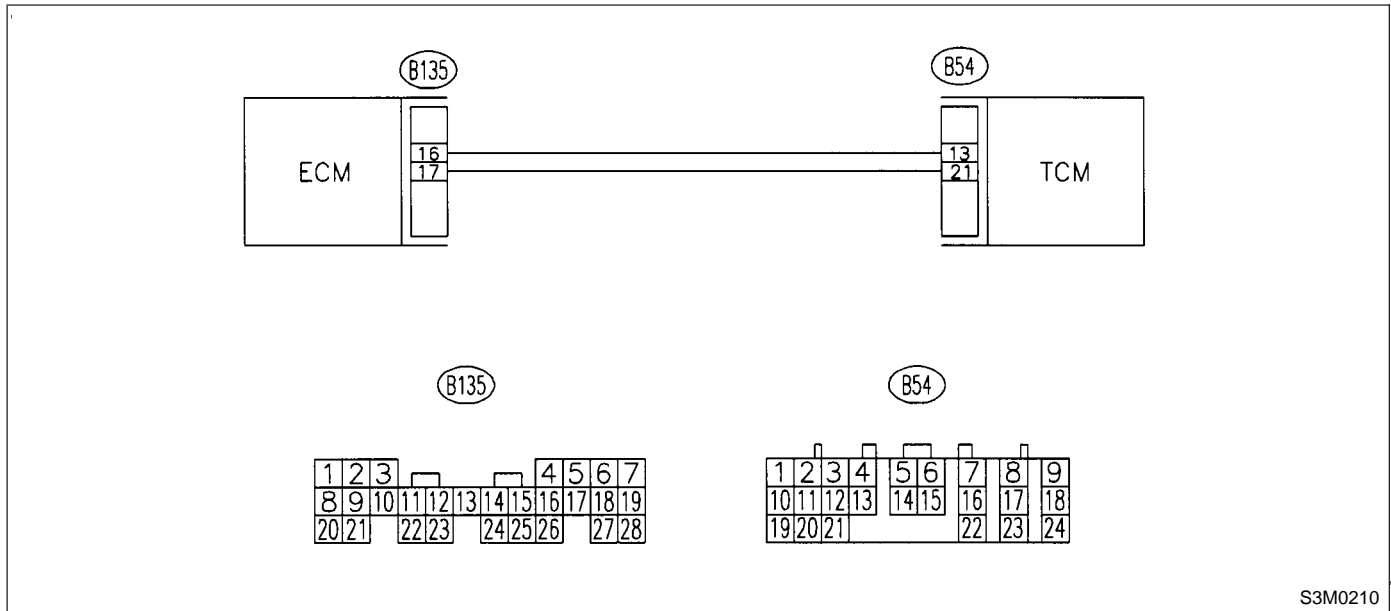
DIAGNOSIS:

- The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

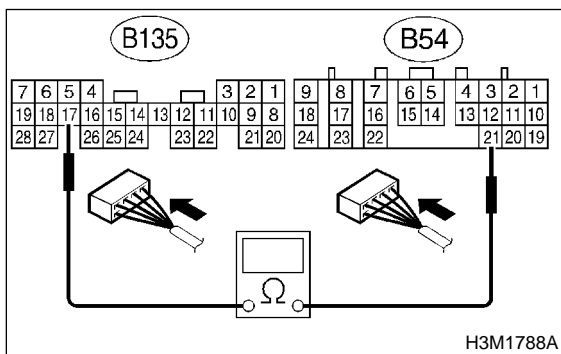


8H1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B54) No. 21 — (B135) No. 17:



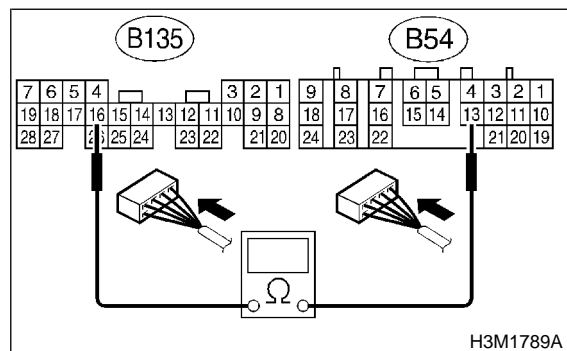
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step **8H2**.
- NO** : Repair open circuit in harness between TCM and ECM connector.

8H2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B54) No. 13 — (B135) No. 16:



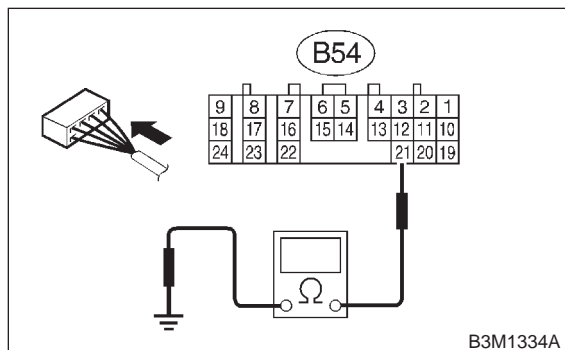
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step **8H3**.
- NO** : Repair open circuit in harness between TCM and ECM connector.

8H3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B54) No. 21 — Chassis ground:



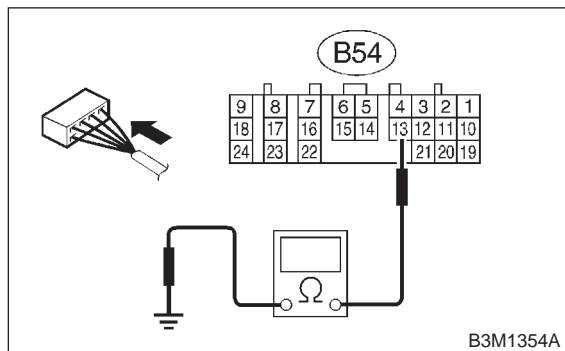
- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8H4.
- NO** : Repair short circuit in harness between TCM and ECM connector.

8H4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B54) No. 13 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8H5.
- NO** : Repair short circuit in harness between TCM and ECM connector.

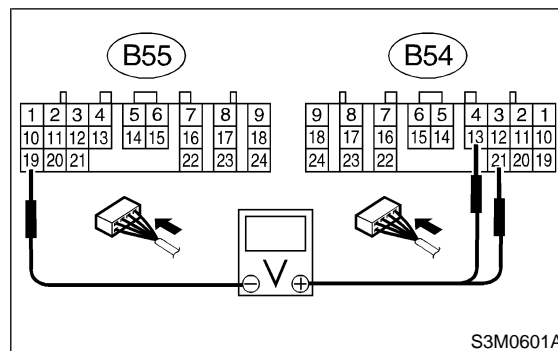
8H5 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Turn ignition switch to ON and start engine.
- 2) Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 13 (+) — (B55) No. 19:

(B54) No. 21 (+) — (B55) No. 19:



- CHECK** : *Is each voltage more than 4.8 V?*
- YES** : Even if "AT OIL TEMP" 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.
- NO** : Go to step 8H6.

8H6 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in torque control signal circuit?*
- YES** : Repair poor contact.
- NO** : Go to step 8H7.

8H7 : CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.

Check installing condition of ground line in transmission and body.

- CHECK** : *Is there any dirt or rust at ground line installing point?*
- YES** : Remove dirt and rust.
- NO** : Go to step 8H8.

8H8 : CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.

Check installing condition of ground line in transmission and body.

Tightening torque:

13±3 N·m (1.3±0.3 kg·m, 9.4±2.2 ft·lb)

CHECK : Is tightening torque value within specification?

YES : Go to step 8H9.

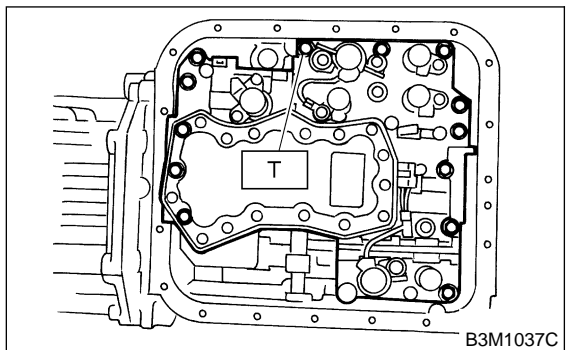
NO : Tighten to specified torque.

8H9 : CHECK GROUND LINE INSIDE TRANSMISSION.

- 1) Drain AT fluid and remove oil pan.
- 2) Check tightening torque value of ground line installing bolt.

Tightening torque:

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



CHECK : Is tightening torque value within specification?

YES : Go to step 8H10.

NO : Tighten to specified torque.

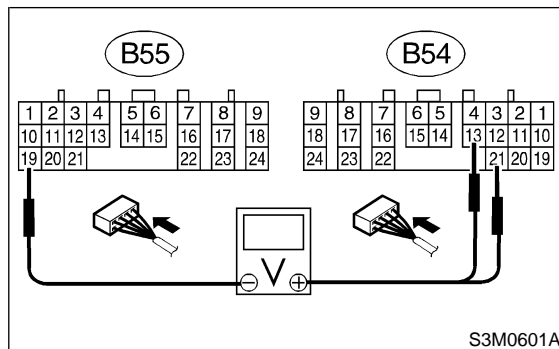
8H10 : RECHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminals.

Connector & terminal

(B54) No. 13 (+) — (B55) No. 19 (-):

(B54) No. 21 (+) — (B55) No. 19 (-):



CHECK : Is each voltage more than 4.8 V?

YES : Replace TCM. <Ref. to 3-2 [W23A0].>

NO : Replace ECM. <Ref. to 2-7 [W17A0].>

MEMO:

I: TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL —

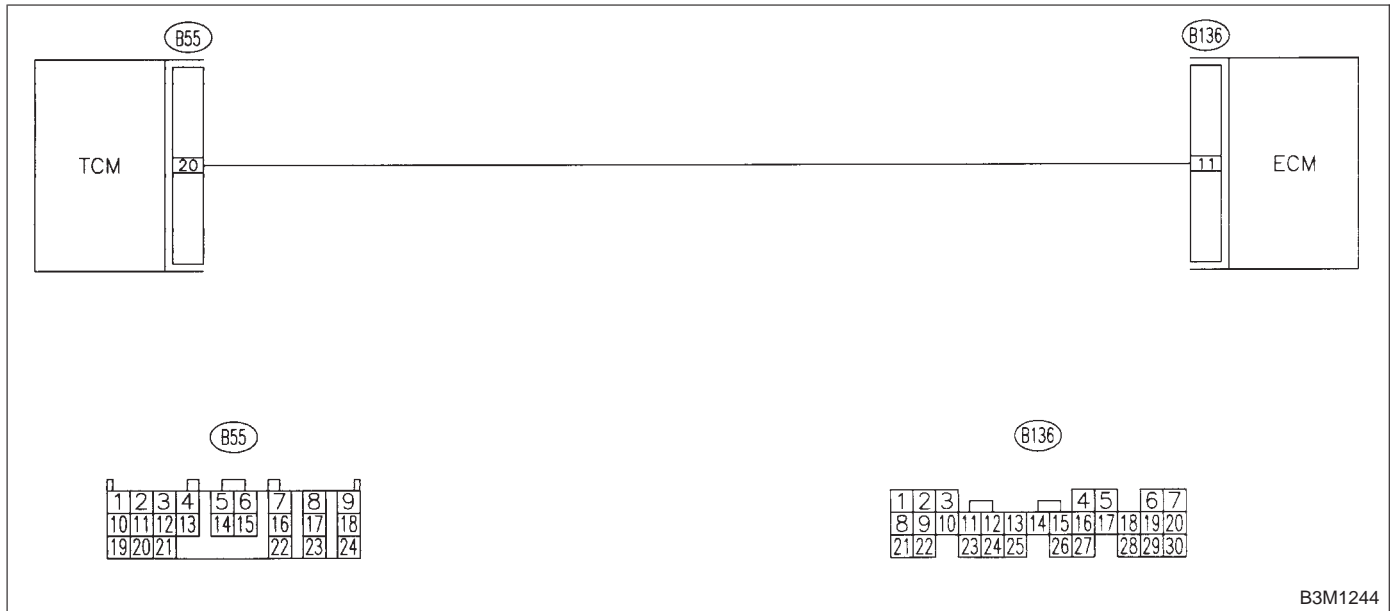
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

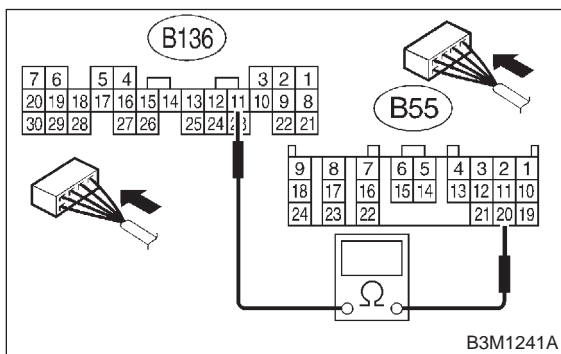


8I1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

- 1) Turn ignition switch to OFF.
- 2) Measure resistance of harness between TCM and ECM connector.

Connector & terminal

(B55) No. 20 — (B136) No. 11:



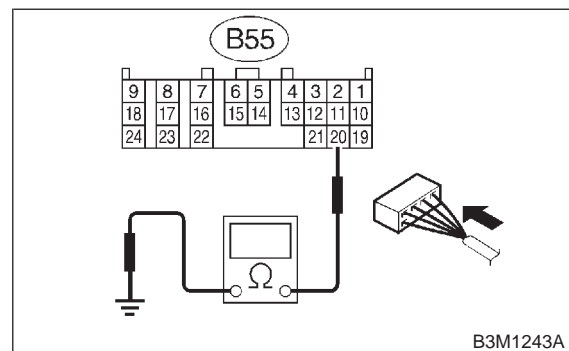
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8I2.
- NO** : Repair open circuit in harness between TCM and ECM connector.

8I2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B55) No. 20 — Chassis ground:



- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 8I3.
- NO** : Repair short circuit in harness between TCM and ECM connector.

813 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step **815**.
- NO** : Go to step **814**.

814 : CHECK INPUT SIGNAL FOR TCM.

1) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F).

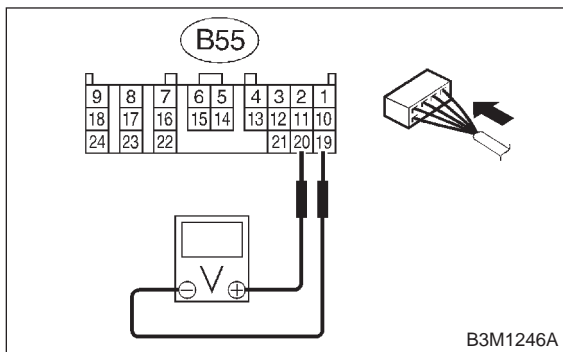
NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 2) Engine idling.
- 3) Measure voltage between TCM connectors.

Connector & terminal

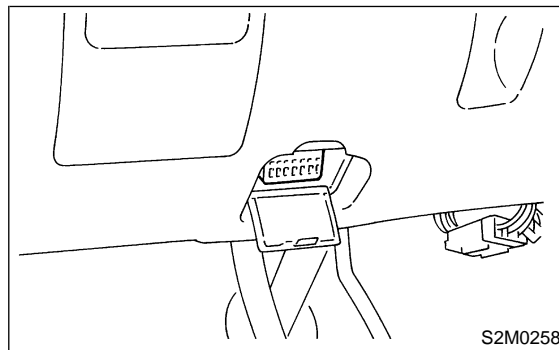
(B55) No. 20 (+) — No. 19 (-):



- CHECK** : *Is the voltage between 1.2 and 1.8 V?*
- YES** : Even if “AT OIL TEMP” 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.
- NO** : Go to step **816**.

815 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Start the engine, and turn Subaru Select monitor switch to ON.
- 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F).
- 5) Engine idling.
- 6) Read data of intake manifold pressure signal using Subaru Select Monitor.
- Display shows intake manifold pressure signal value sent from ECM.

- CHECK** : *Is the value between 1.2 and 1.8 V?*
- YES** : Even if “AT OIL TEMP” 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.
- NO** : Go to step **816**.

816 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in intake manifold pressure signal circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

J: TROUBLE CODE 71 — SHIFT SOLENOID 1 —

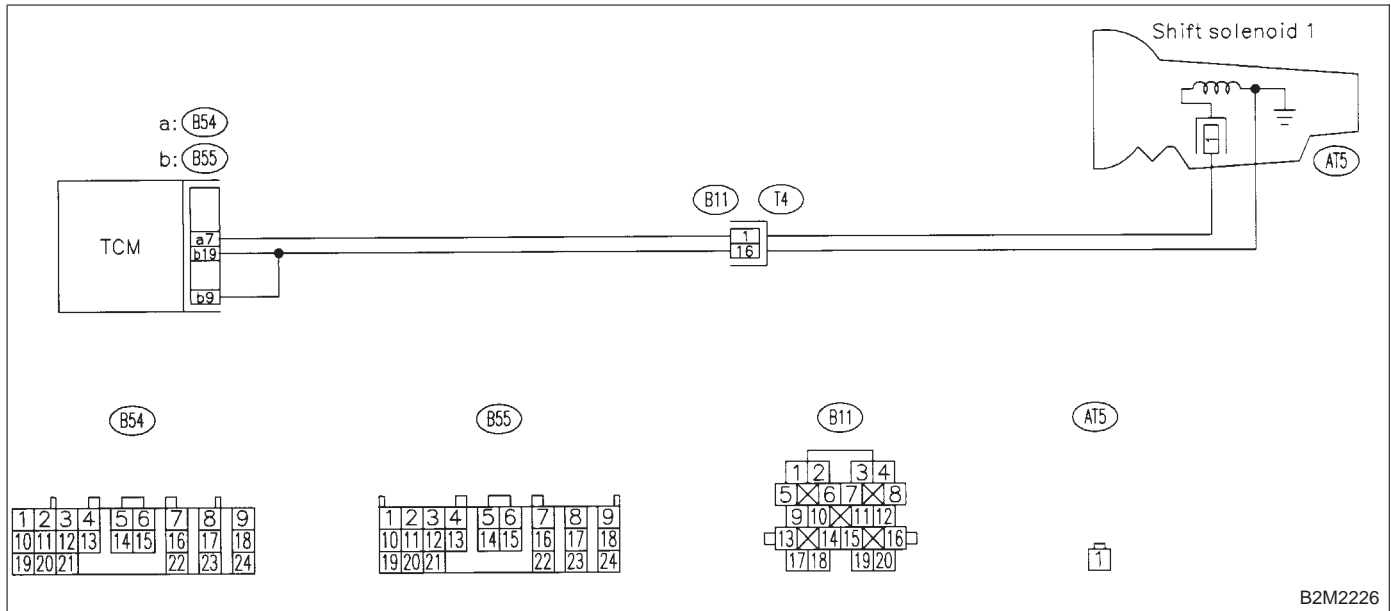
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:

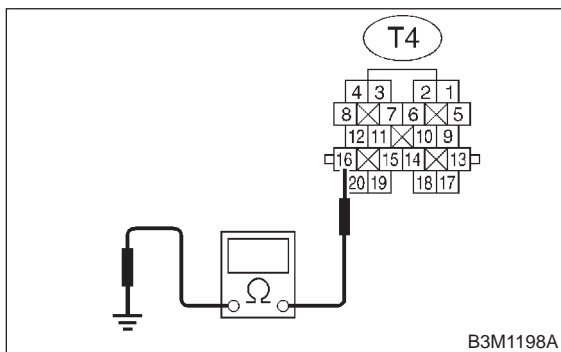


8J1 : CHECK SHIFT SOLENOID 1 GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



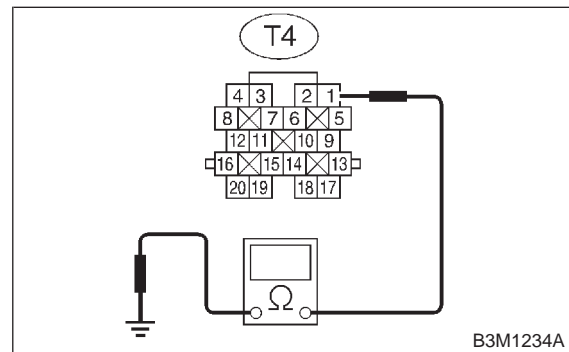
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8J2.
- NO** : Repair open circuit in transmission harness.

8J2 : CHECK SHIFT SOLENOID 1.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 1 — Transmission ground:

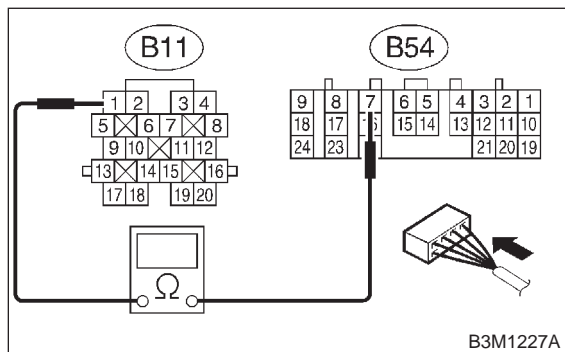


- CHECK** : Is the resistance between 10 and 16 Ω?
- YES** : Go to step 8J3.
- NO** : Go to step 8J6.

8J3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and shift solenoid 1 connector.

Connector & terminal
(B54) No. 7 — (B11) No. 1:

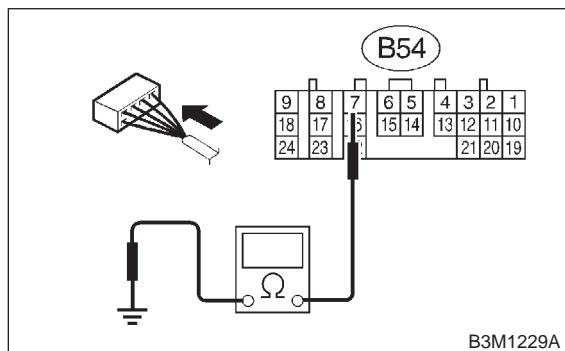


- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 8J4.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8J4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B54) No. 7 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8J5.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8J5 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:
On AWD models, raise all wheels off ground.

- 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

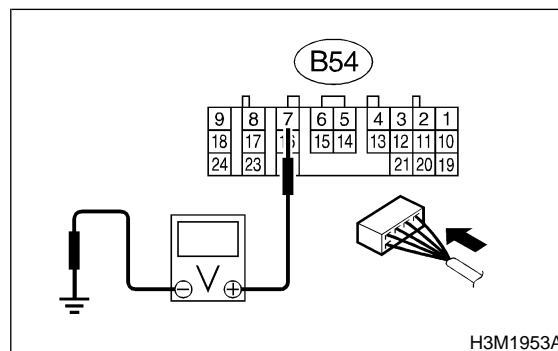
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move select lever to “D”, and slowly increase vehicle speed to 50 km/h (31 MPH).

NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector and chassis ground.

Connector & terminal
(B54) No. 7 (+) — Chassis ground (-):



- CHECK** : *Is the voltage 1 V → 9 V?*
- YES** : Even if “AT OIL TEMP” 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.
- NO** : Go to step 8J8.

8J6 : CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).

- 1) Remove transmission connector from stay.
- 2) Lift-up or raise the vehicle and support with safety stand.

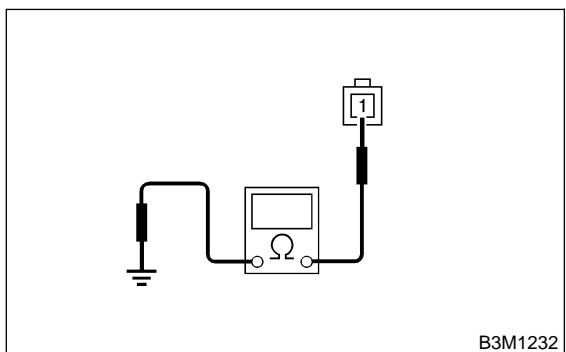
CAUTION:
On AWD models, raise all wheels off ground.

- 3) Drain automatic transmission fluid.

CAUTION:
Do not drain the automatic transmission fluid until it cools down.

- 4) Remove oil pan, and disconnect connector from shift solenoid 1.
- 5) Measure resistance between shift solenoid 1 connector and transmission ground.

Connector & terminal
No. 1 — Transmission ground:

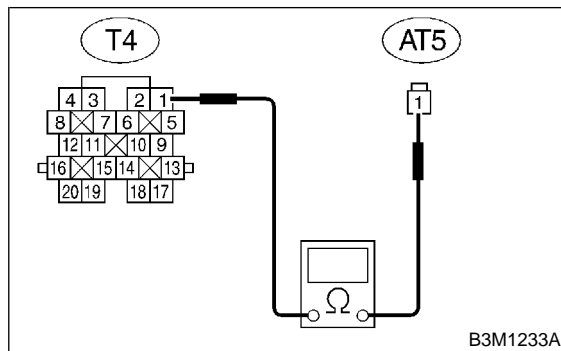


- CHECK** : Is the resistance between 10 and 16 Ω?
- YES** : Go to step 8J7.
- NO** : Replace shift solenoid 1. <Ref. to 3-2 [W4A0].>

8J7 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 1 and transmission connector.

Connector & terminal
(AT5) No. 1 — (T4) No. 1:



- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8J8.
- NO** : Repair open circuit in harness between shift solenoid 1 and transmission connector.

8J8 : CHECK POOR CONTACT.

- CHECK** : Is there poor contact in shift solenoid 1 circuit?
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

MEMO:

K: TROUBLE CODE 72 — SHIFT SOLENOID 2 —

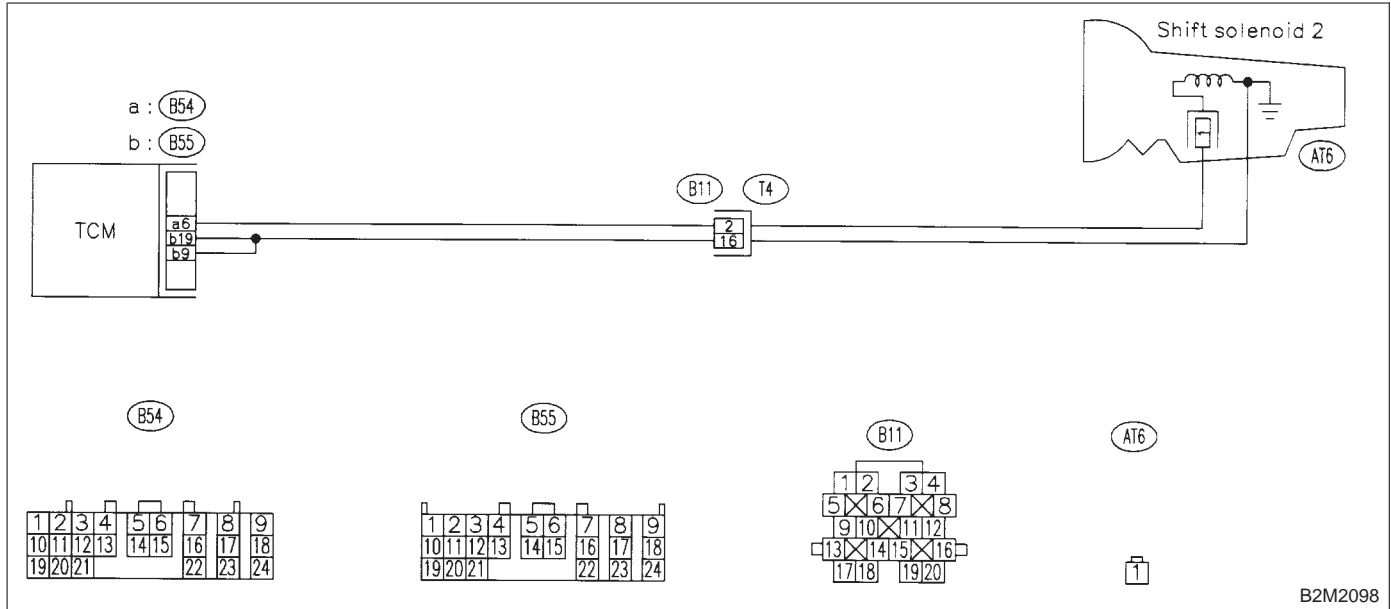
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:



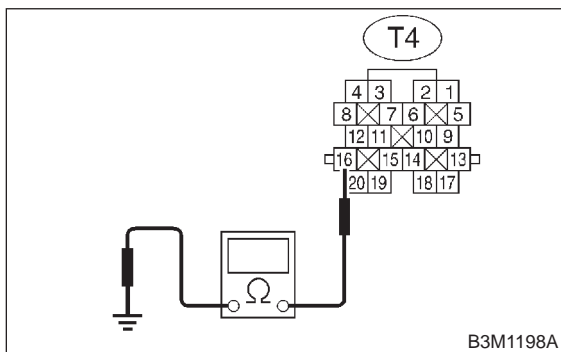
B2M2098

8K1 : CHECK SHIFT SOLENOID 2 GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



B3M1198A

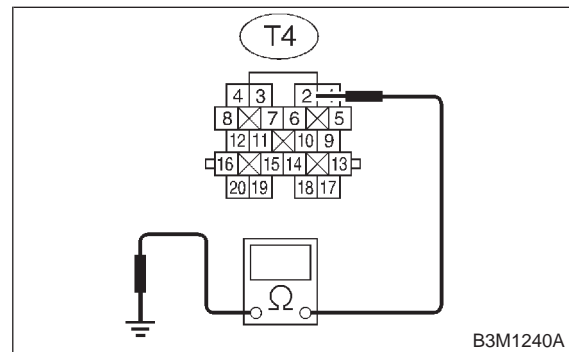
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8K2.
- NO** : Repair open circuit in transmission harness.

8K2 : CHECK SHIFT SOLENOID 2.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 2 — Transmission ground:



B3M1240A

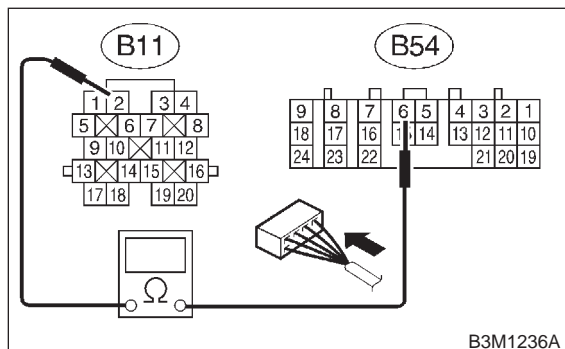
- CHECK** : Is the resistance between 10 and 16 Ω?
- YES** : Go to step 8K3.
- NO** : Go to step 8K6.

8K3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 6 — (B11) No. 2:



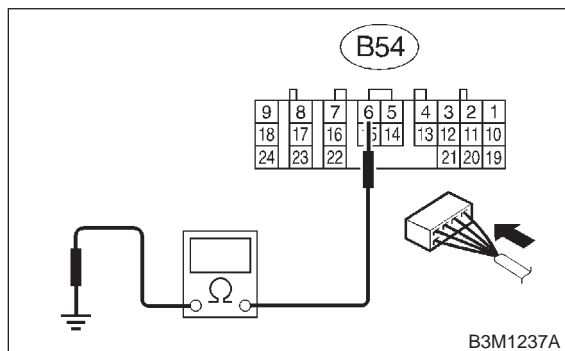
- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8K4**.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8K4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B54) No. 6 — Chassis ground:



- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step **8K5**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8K5 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move select lever to “D”, and slowly increase vehicle speed to 50 km/h (31 MPH).

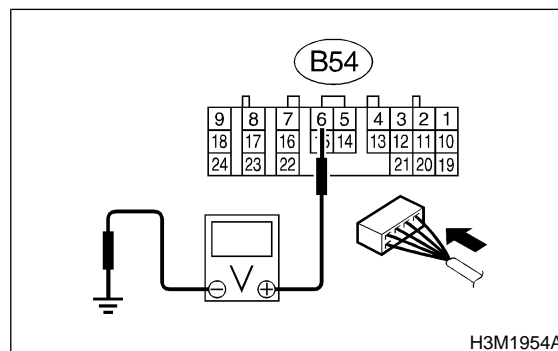
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 6 (+) — Chassis ground (-):



- CHECK** : **Is the voltage 9 V → 1 V?**
- YES** : Even if “AT OIL TEMP” 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.
- NO** : Go to step **8K8**.

8K6 : CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).

- 1) Remove transmission connector from stay.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Drain automatic transmission fluid.

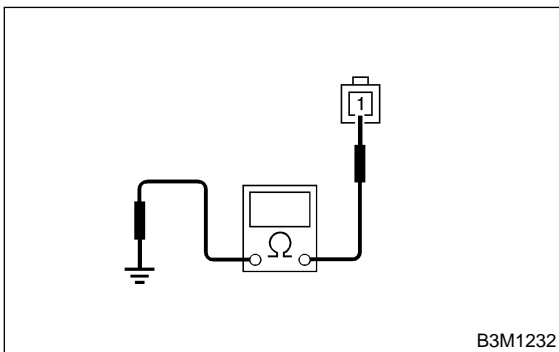
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 4) Remove oil pan, and disconnect connector from shift solenoid 2.
- 5) Measure resistance between shift solenoid 2 connector and transmission ground.

Connector & terminal

No. 1 — Transmission ground:



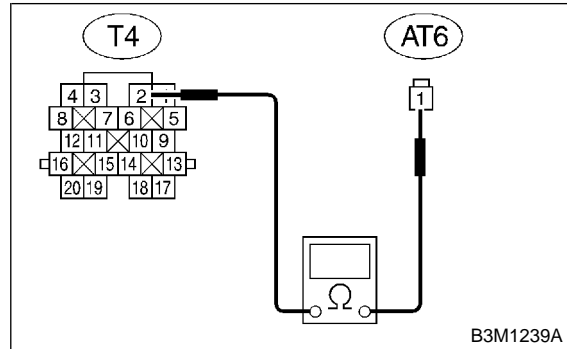
- CHECK** : **Is the resistance between 10 and 16 Ω ?**
- YES** : Go to step **8K7**.
- NO** : Replace shift solenoid assembly. <Ref. to 3-2 [W4A0].>

8K7 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.

Measure resistance of harness between shift solenoid 2 and transmission connector.

Connector & terminal

(AT6) No. 1 — (T4) No. 2:



- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step **8K8**.
- NO** : Repair open circuit in harness between shift solenoid 2 and transmission connector.

8K8 : CHECK POOR CONTACT.

- CHECK** : **Is there poor contact in shift solenoid 2 circuit?**
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

MEMO:

L: TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —

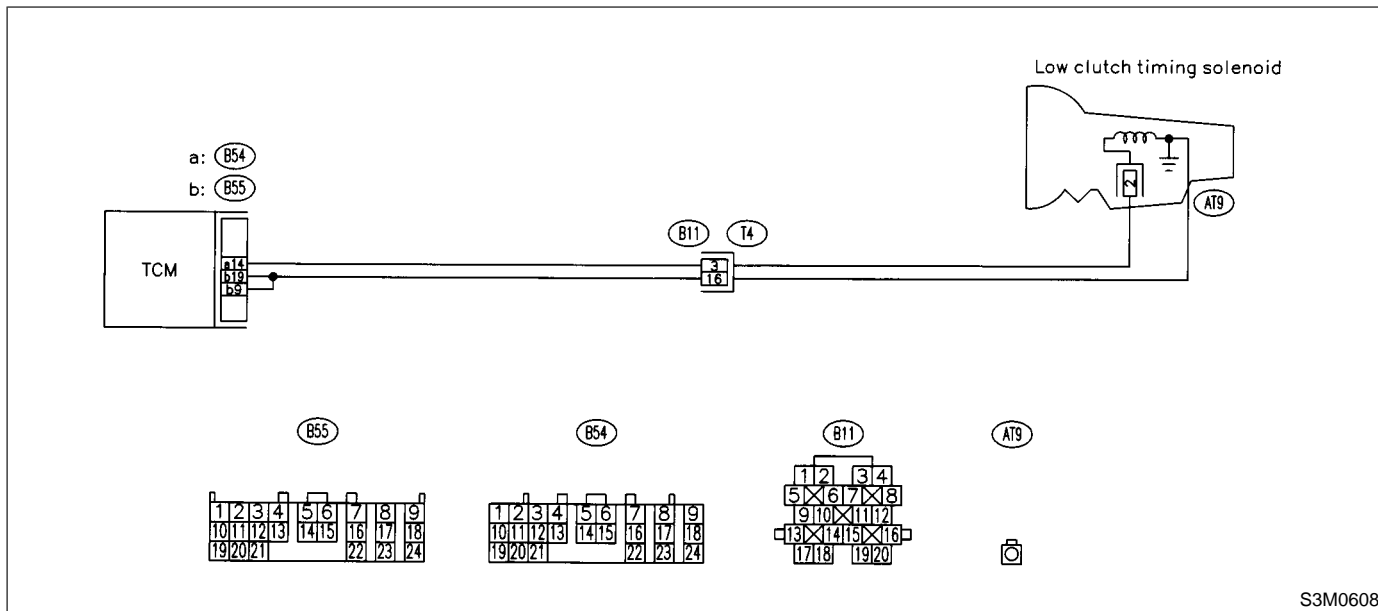
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

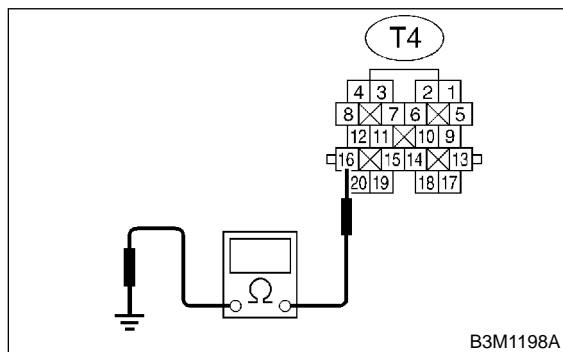


8L1 : CHECK LOW CLUTCH TIMING SOLENOID GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



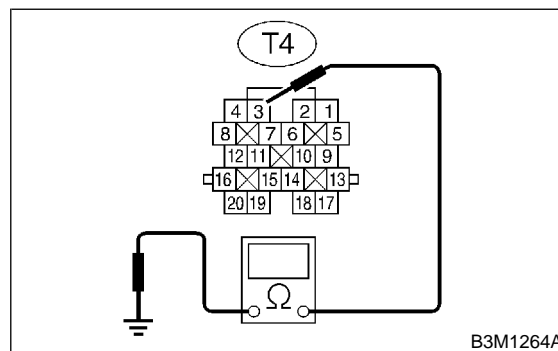
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8L2.
- NO** : Repair open circuit in transmission harness.

8L2 : CHECK LOW CLUTCH TIMING SOLENOID.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 3 — Transmission ground:



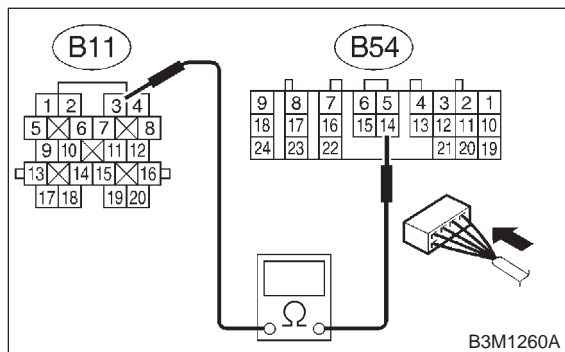
- CHECK** : Is the resistance between 10 and 16 Ω?
- YES** : Go to step 8L3.
- NO** : Go to step 8L7.

8L3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 14 — (B11) No. 3:



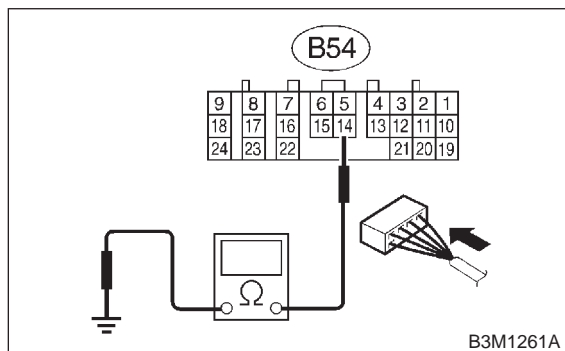
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 8L4.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8L4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B54) No. 14 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8L5.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8L5 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move select lever to “2”, and slowly increase vehicle speed to 35 km/h (22 MPH).

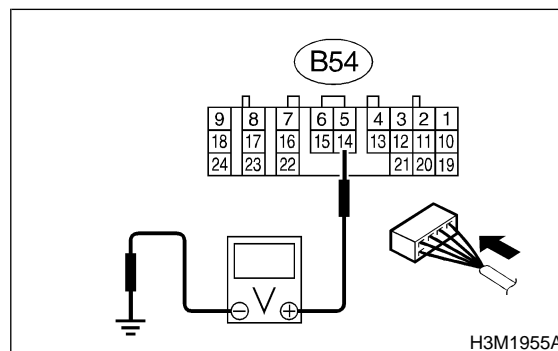
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 14 (+) — Chassis ground (-):



- CHECK** : *Is the voltage less than 1 V?*
- YES** : Go to step 8L6.
- NO** : Go to step 8L9.

8L6 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Move select lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH).

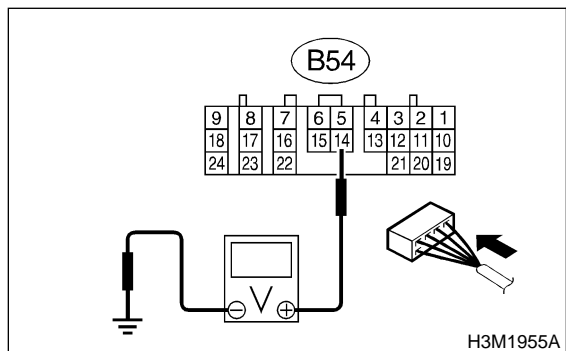
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

2) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 14 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 9 V?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8L9**.

8L7 : CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION).

1) Remove transmission connector from stay.
2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

3) Drain automatic transmission fluid.

CAUTION:

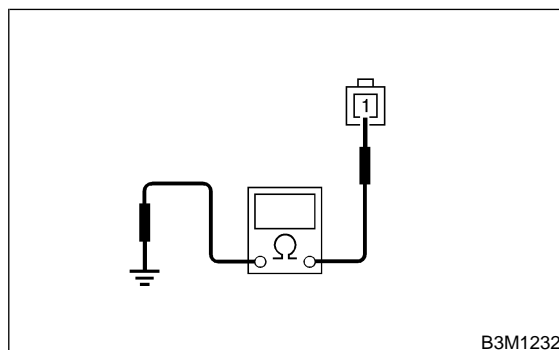
Do not drain the automatic transmission fluid until it cools down.

4) Remove oil pan, and disconnect connector from low clutch timing solenoid.

5) Measure resistance between low clutch timing solenoid connector and transmission ground.

Connector & terminal

No. 1 — Transmission ground:



CHECK : **Is the resistance between 10 and 16 Ω?**

YES : Go to step **8L8**.

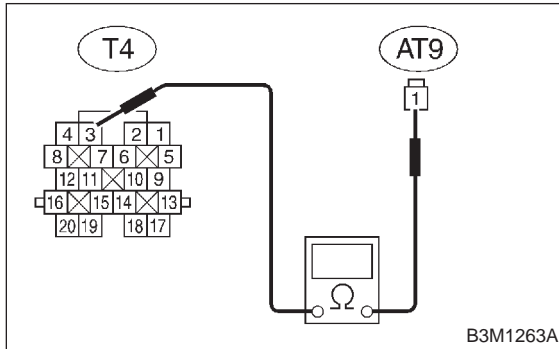
NO : Replace low clutch timing solenoid. <Ref. to 3-2 [W4A0].>

8L8 : CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.

Measure resistance of harness between low clutch timing solenoid and transmission connector.

Connector & terminal

(AT9) No. 1 — (T4) No. 3:



- CHECK** : *Is the resistance less than 1 Ω ?*
- YES** : Go to step **8L9**.
- NO** : Repair open circuit in harness between low clutch timing solenoid and transmission connector.

8L9 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in low clutch timing solenoid circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

M: TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —

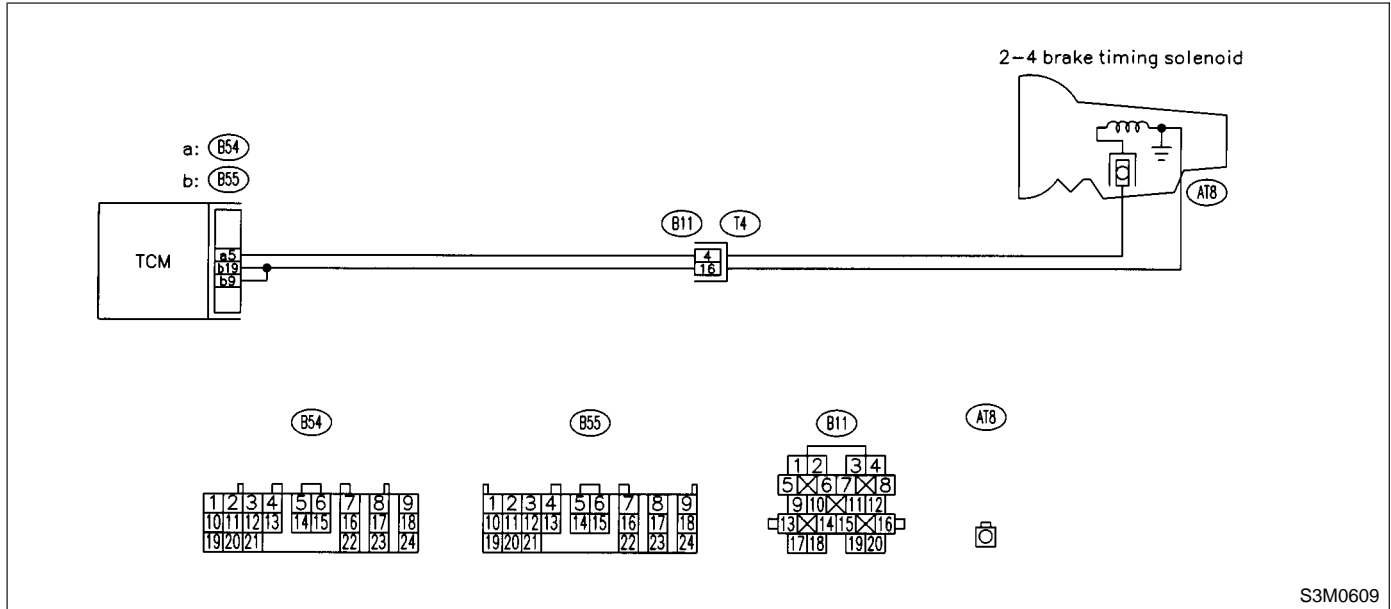
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

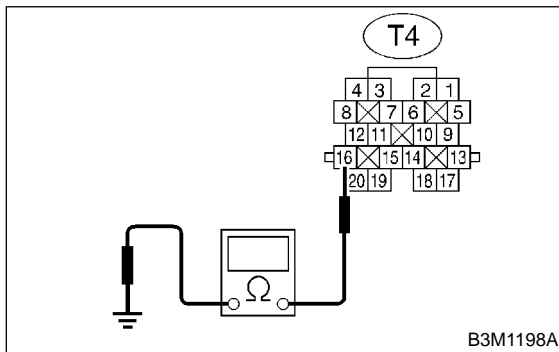


8M1 : CHECK 2-4 BRAKE TIMING SOLENOID GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



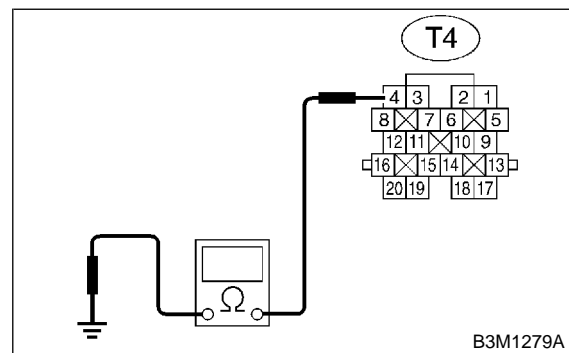
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8M2.
- NO** : Repair open circuit in transmission harness.

8M2 : CHECK 2-4 BRAKE TIMING SOLENOID.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 4 — Transmission ground:



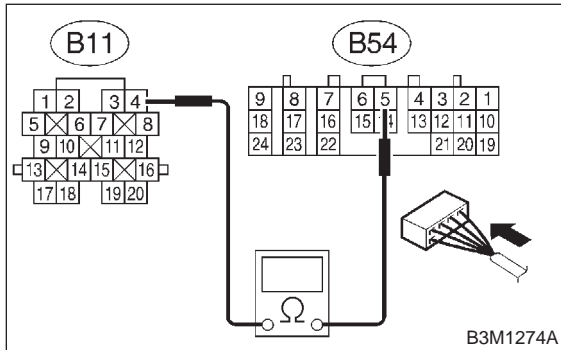
- CHECK** : Is the resistance between 10 and 16 Ω?
- YES** : Go to step 8M3.
- NO** : Go to step 8M7.

8M3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 5 — (B11) No. 4:



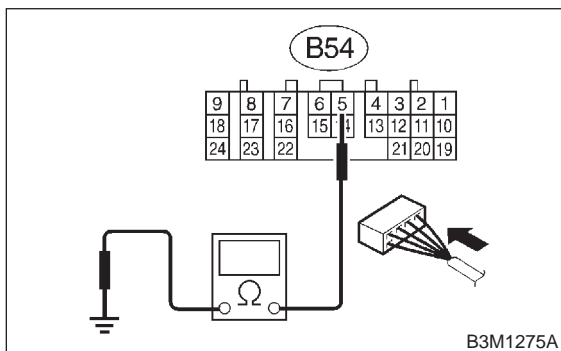
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8M4**.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8M4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal

(B54) No. 5 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **8M5**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8M5 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move select lever to “1”, and slowly increase vehicle speed to 10 km/h (6 MPH).

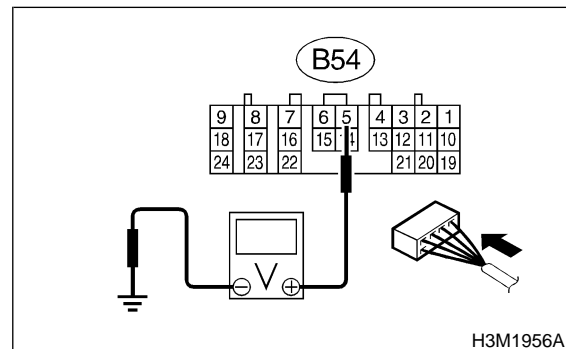
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 5 (+) — Chassis ground (-):



- CHECK** : *Is the voltage less than 1 V?*
- YES** : Go to step **8M6**.
- NO** : Go to step **8M9**.

8M6 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Move select lever to "3", and slowly increase vehicle speed to 10 km/h (6 MPH).

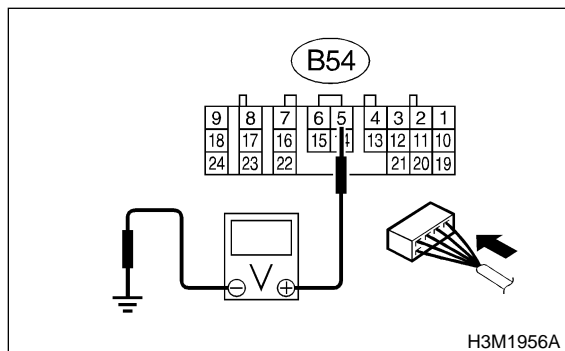
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

2) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 5 (+) — Chassis ground (-):



CHECK : **Is the voltage more than 9 V?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8M9**.

8M7 : CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION).

1) Remove transmission connector from stay.
2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

3) Drain automatic transmission fluid.

CAUTION:

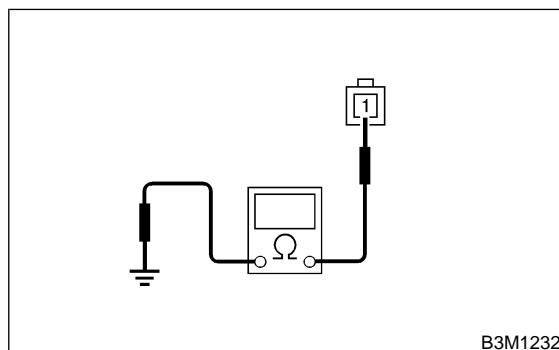
Do not drain the automatic transmission fluid until it cools down.

4) Remove oil pan, and disconnect connector from 2-4 brake timing solenoid.

5) Measure resistance between 2-4 brake timing solenoid connector and transmission ground.

Connector & terminal

No. 1 — Transmission ground:



CHECK : **Is the resistance between 10 and 16 Ω?**

YES : Go to step **8M8**.

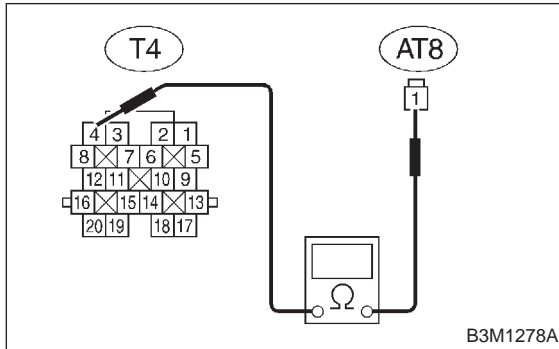
NO : Replace 2-4 brake timing solenoid. <Ref. to 3-2 [W4A0].>

8M8 : CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.

Measure resistance of harness between 2-4 brake timing solenoid and transmission connector.

Connector & terminal

(AT8) No. 1 — (T4) No. 4:



- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step **8M9**.
- NO** : Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.

8M9 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in 2-4 brake timing solenoid circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

N: TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID —

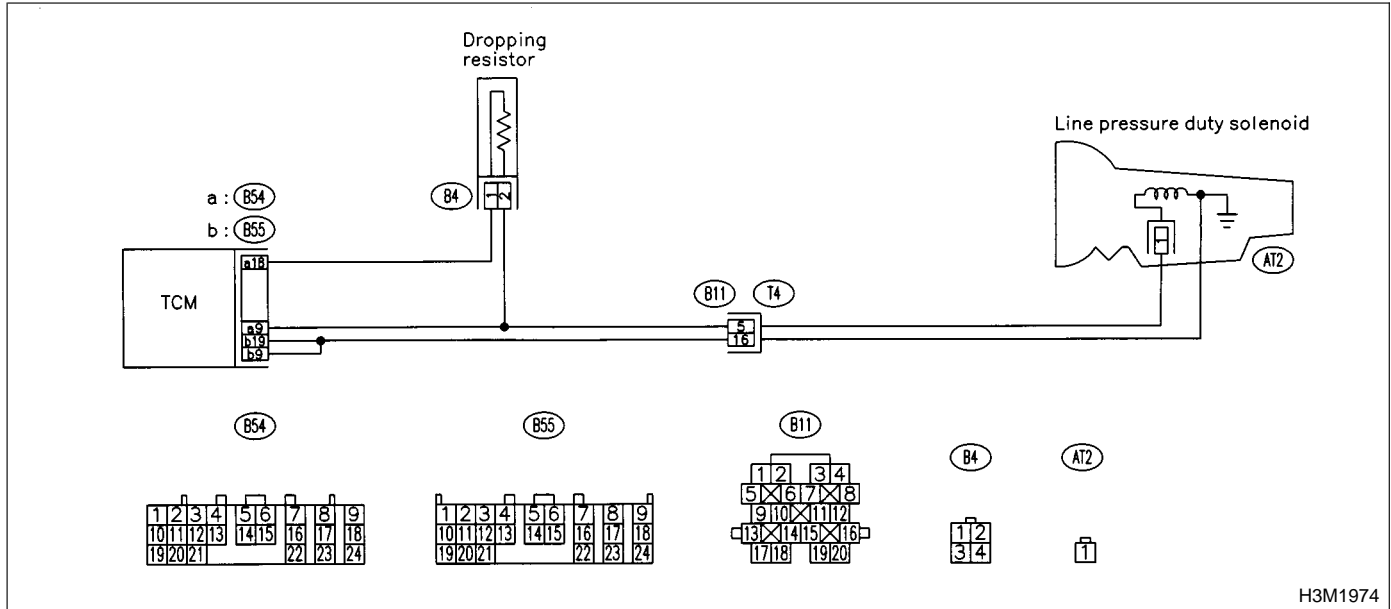
DIAGNOSIS:

Output signal circuit of line pressure duty solenoid or resistor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

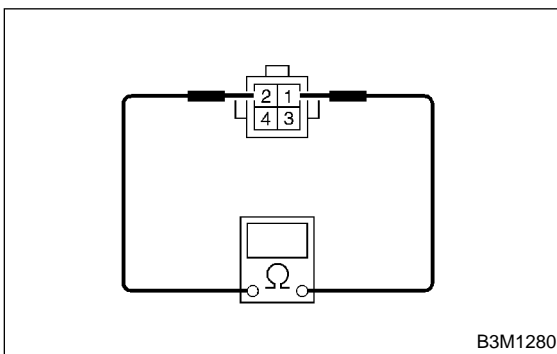


8N1 : CHECK RESISTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from dropping resistor.
- 3) Measure resistance between dropping resistor terminal.

Terminals

No. 1 — No. 2:



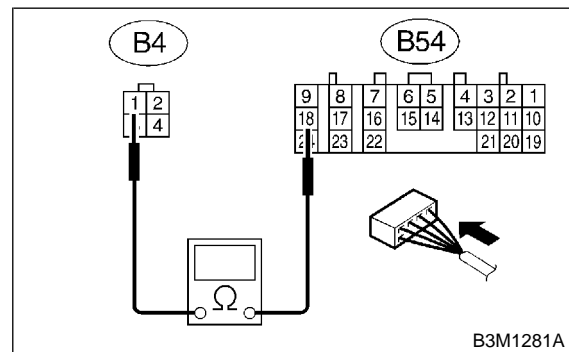
- CHECK** : Is the resistance between 9 and 15 Ω ?
- YES** : Go to step **8N2**.
- NO** : Replace dropping resistor. <Ref. to 3-2 [W24A0].>

8N2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

Measure resistance of harness between TCM connector and dropping resistor connector.

Connector & terminal

(B54) No. 18 — (B4) No. 1:

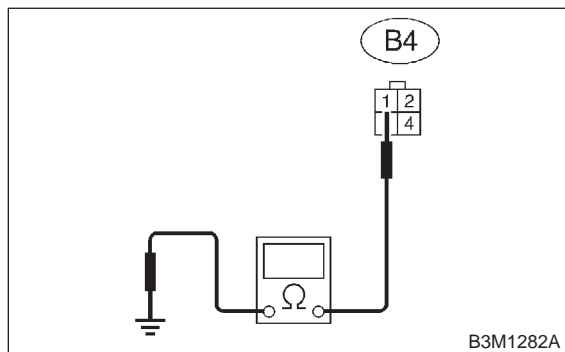


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step **8N3**.
- NO** : Repair open circuit in harness between TCM and dropping resistor connector.

8N3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal
(B4) No. 1 — Chassis ground:

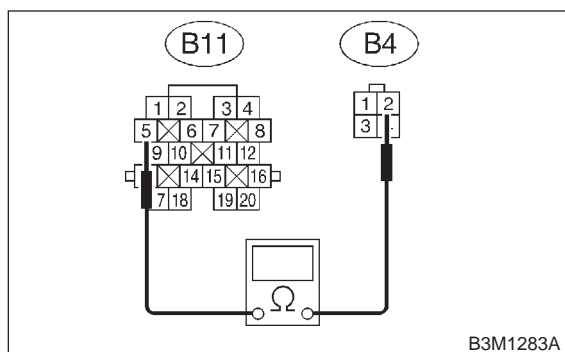


- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step **8N4**.
- NO** : Repair short circuit in harness between TCM and dropping resistor connector.

8N4 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

- 1) Disconnect connector from transmission.
- 2) Measure resistance of harness between transmission and dropping resistor connector.

Connector & terminal
(B4) No. 2 — (B11) No. 5:

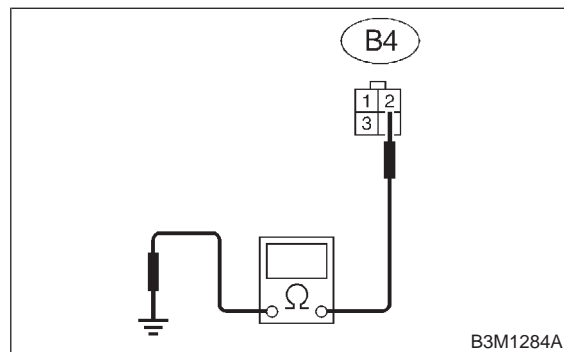


- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8N5**.
- NO** : Repair open circuit in harness between dropping resistor and transmission connector.

8N5 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal
(B4) No. 2 — Chassis ground:

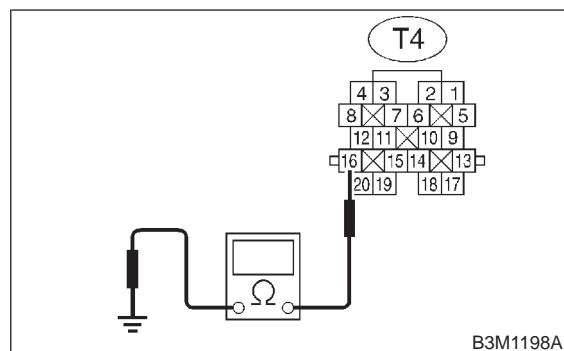


- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step **8N6**.
- NO** : Repair short circuit in harness between dropping resistor and transmission connector.

8N6 : CHECK LINE PRESSURE DUTY SOLENOID GROUND LINE.

Measure resistance between transmission connector and transmission ground.

Connector & terminal
(T4) No. 16 — Transmission ground:



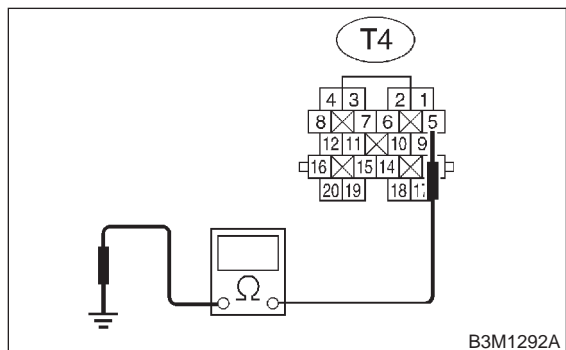
- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8N7**.
- NO** : Repair open circuit in transmission harness.

8N7 : CHECK LINE PRESSURE DUTY SOLENOID.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 5 — Transmission ground:



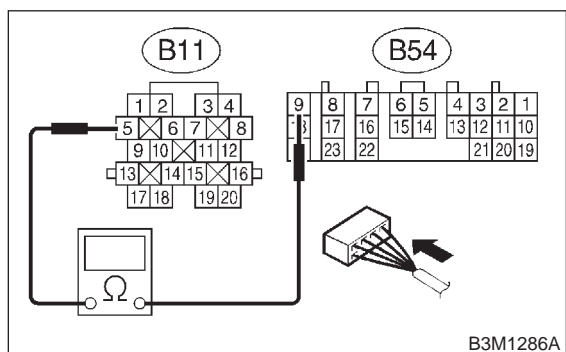
- CHECK** : *Is the resistance between 2.0 and 4.5 Ω ?*
- YES** : Go to step **8N8**.
- NO** : Go to step **8N17**.

8N8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 9 — (B11) No. 5:



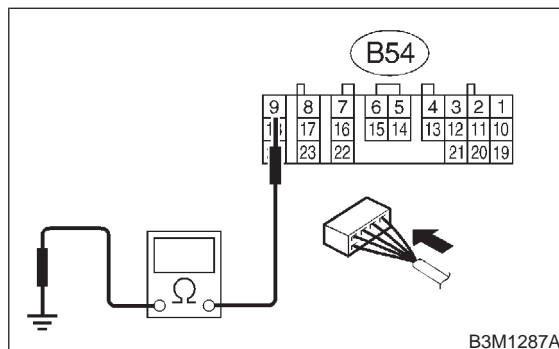
- CHECK** : *Is the resistance less than 1 Ω ?*
- YES** : Go to step **8N9**.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8N9 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 9 — Chassis ground:



- CHECK** : *Is the resistance more than 1 $M\Omega$?*
- YES** : Go to step **8N10**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8N10 : PREPARE SUBARU SELECT MONITOR.

CHECK : *Do you have a Subaru Select Monitor?*

- YES** : Go to step **8N15**.
- NO** : Go to step **8N11**.

8N11 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect all connectors.
- 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

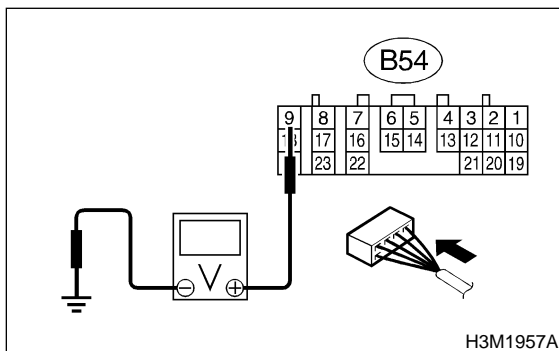
NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Turn ignition switch to ON (engine OFF).
- 4) Move select lever to "N".
- 5) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 9 (+) — Chassis ground (-):



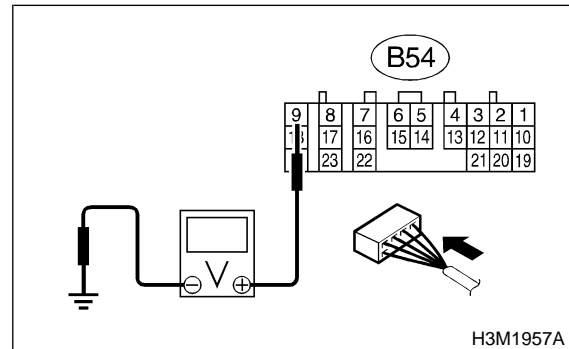
- CHECK** : **Is the voltage between 1.5 and 4.0 V with throttle fully closed?**
- YES** : Go to step **8N12**.
- NO** : Go to step **8N19**.

8N12 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 9 (+) — Chassis ground (-):



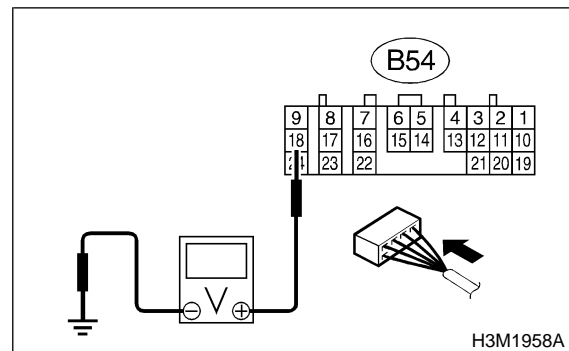
- CHECK** : **Is the voltage less than 1 V with throttle fully open?**
- YES** : Go to step **8N13**.
- NO** : Go to step **8N19**.

8N13 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 18 (+) — Chassis ground (-):



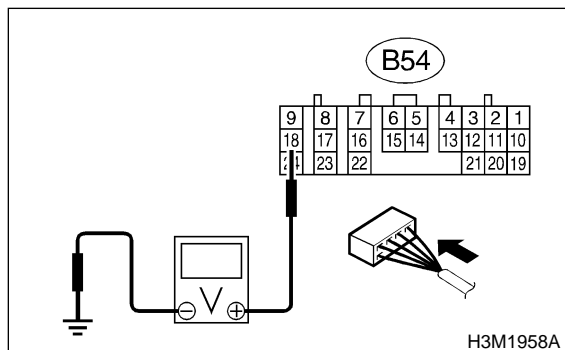
- CHECK** : **Is the voltage more than 8.5 V with throttle fully closed?**
- YES** : Go to step **8N14**.
- NO** : Go to step **8N19**.

8N14 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 18 (+) — Chassis ground (-):



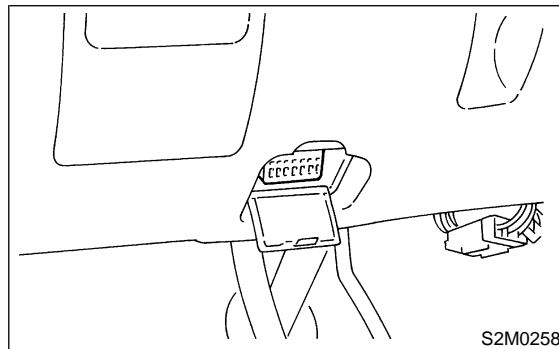
CHECK : **Is the voltage less than 1 V with throttle fully open?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8N19**.

8N15 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Connect connector to transmission.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Start the engine, and turn Subaru Select Monitor switch to ON.
- 4) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 5) Stop the engine and turn ignition switch to ON (engine OFF).
- 6) Move select lever to "N".
- 7) Read data of line pressure duty solenoid using Subaru Select Monitor.
 - Line pressure duty solenoid is indicated in "%".
- 8) Throttle is fully closed.

CHECK : **Is the value 100%?**

YES : Go to step **8N16**.

NO : Go to step **8N19**.

8N16 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Turn ignition switch to ON (Engine OFF).
- 2) Throttle is fully open.

CHECK : **Is the value between 10 and 20%?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8N19**.

8N17 : CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION).

- 1) Remove transmission connector from stay.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Drain automatic transmission fluid.

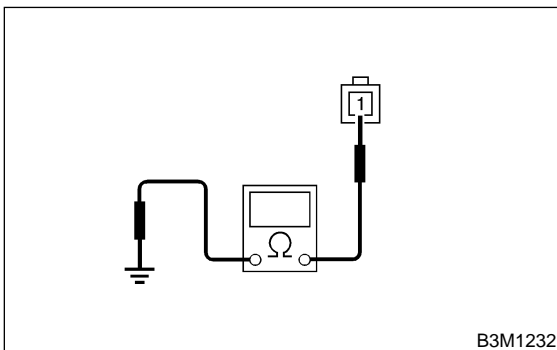
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 4) Remove oil pan, and disconnect connector from line pressure duty solenoid.
- 5) Measure resistance between line pressure duty solenoid connector and transmission ground.

Connector & terminal

No. 1 — Transmission ground:



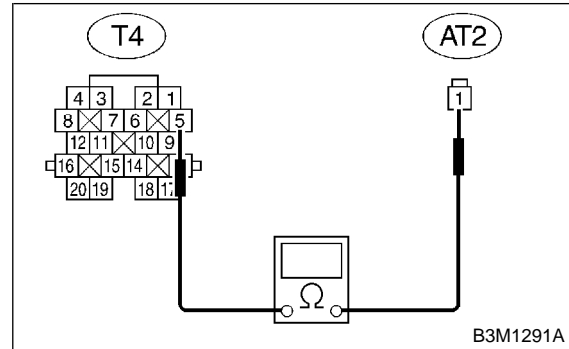
- CHECK** : **Is the resistance between 2.0 and 4.5 Ω?**
- YES** : Go to step **8N18**.
- NO** : Replace line pressure duty solenoid. <Ref. to 3-2 [W4A0].>

8N18 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.

Measure resistance of harness between line pressure duty solenoid and transmission connector.

Connector & terminal

(T4) No. 5 — (AT2) No. 1:



- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8N19**.
- NO** : Repair open circuit in harness between line pressure duty solenoid and transmission connector.

8N19 : CHECK POOR CONTACT.

- CHECK** : **Is there poor contact in line pressure duty solenoid circuit?**
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

O: TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID —

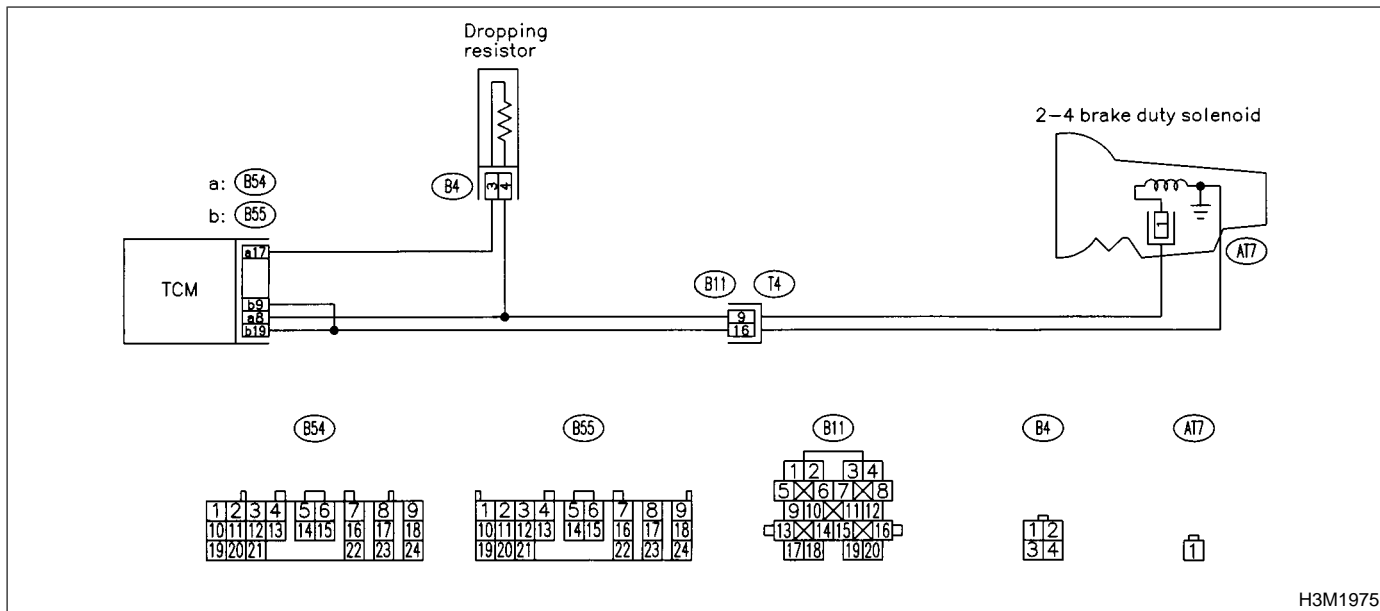
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



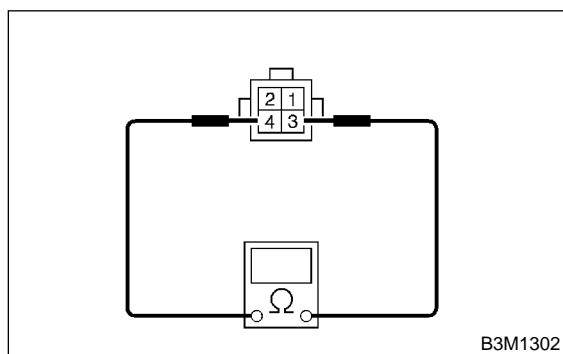
H3M1975

801 : CHECK RESISTOR.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from dropping resistor.
- 3) Measure resistance between dropping resistor terminal.

Terminals

No. 3 — No. 4:



B3M1302

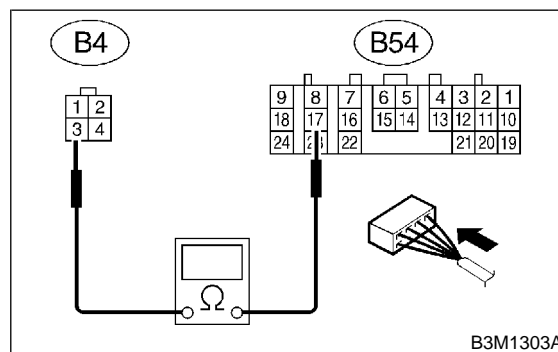
- CHECK** : Is the resistance between 9 and 15 Ω?
- YES** : Go to step 802.
- NO** : Replace dropping resistor. <Ref. to 3-2 [W24A0].>

802 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

Measure resistance of harness between TCM connector and dropping resistor connector.

Connector & terminal

(B54) No. 17 — (B4) No. 3:



B3M1303A

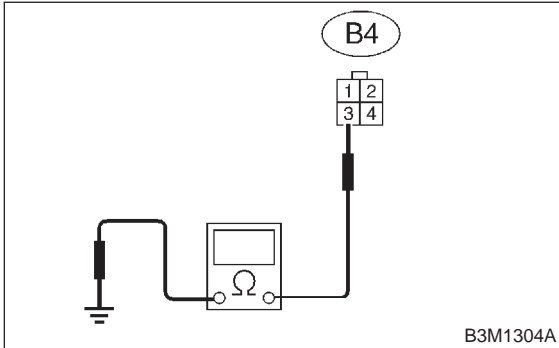
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 803.
- NO** : Repair open circuit in harness between TCM and dropping resistor connector.

803 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal

(B4) No. 3 — Chassis ground:



B3M1304A

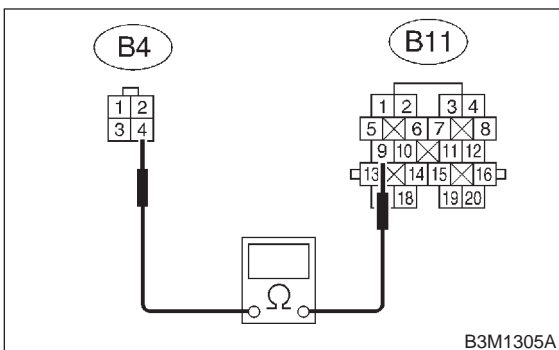
- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step **804**.
- NO** : Repair short circuit in harness between TCM and dropping resistor connector.

804 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

- 1) Disconnect connector from transmission.
- 2) Measure resistance of harness between transmission and dropping resistor connector.

Connector & terminal

(B4) No. 4 — (B11) No. 9:



B3M1305A

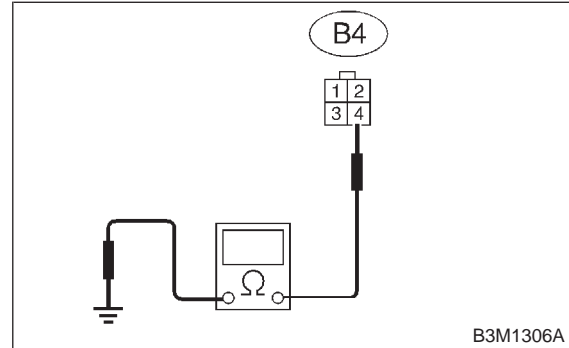
- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **805**.
- NO** : Repair open circuit in harness between dropping resistor and transmission connector.

805 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.

Measure resistance of harness between dropping resistor connector and chassis ground.

Connector & terminal

(B4) No. 4 — Chassis ground:



B3M1306A

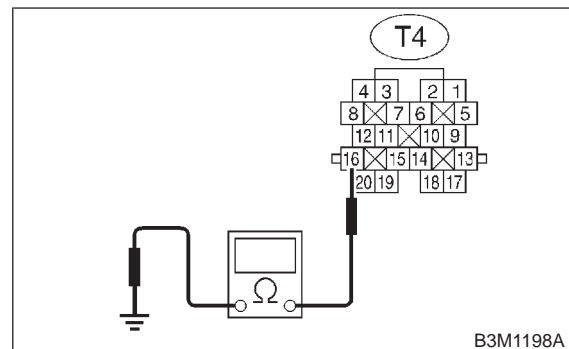
- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step **806**.
- NO** : Repair short circuit in harness between dropping resistor and transmission connector.

806 : CHECK 2-4 BRAKE DUTY SOLENOID GROUND LINE.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



B3M1198A

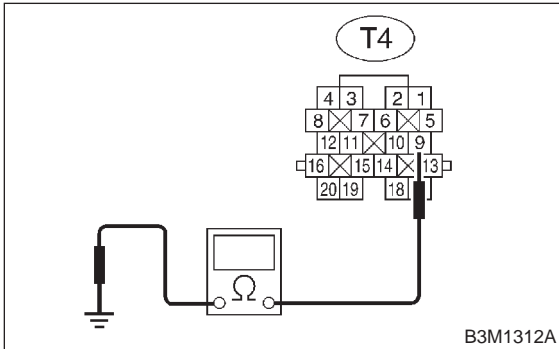
- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **807**.
- NO** : Repair open circuit in transmission harness.

807 : CHECK 2-4 BRAKE DUTY SOLENOID.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 9 — Transmission ground:



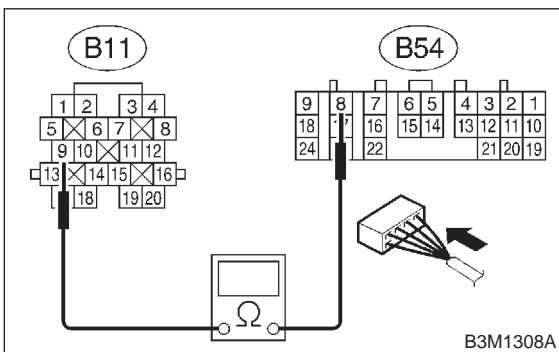
- CHECK** : *Is the resistance between 2.0 and 4.5 Ω ?*
- YES** : Go to step **808**.
- NO** : Go to step **8017**.

808 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 8 — (B11) No. 9:



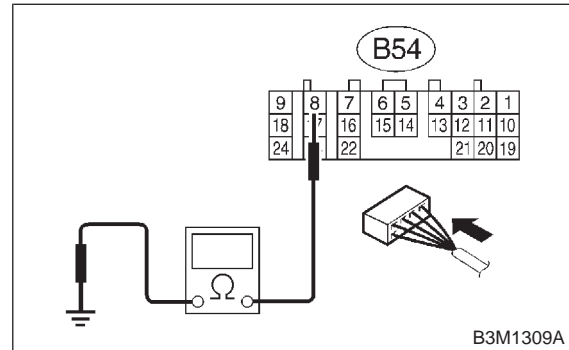
- CHECK** : *Is the resistance less than 1 Ω ?*
- YES** : Go to step **809**.
- NO** : Repair open circuit in harness between TCM and transmission connector.

809 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 8 — Chassis ground:



- CHECK** : *Is the resistance more than 1 $M\Omega$?*
- YES** : Go to step **8010**.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8010 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step **8015**.
- NO** : Go to step **8011**.

8011 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect all connectors.
- 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

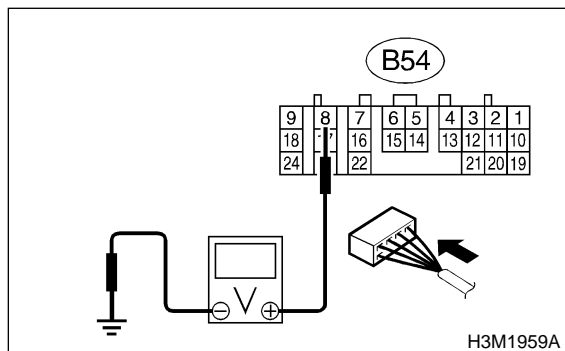
NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Turn ignition switch to ON (engine OFF).
- 4) Move select lever to "N".
- 5) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 8 (+) — Chassis ground (-):



CHECK : *Is the voltage between 1.5 and 4.0 V with throttle fully closed?*

YES : Go to step 8012.

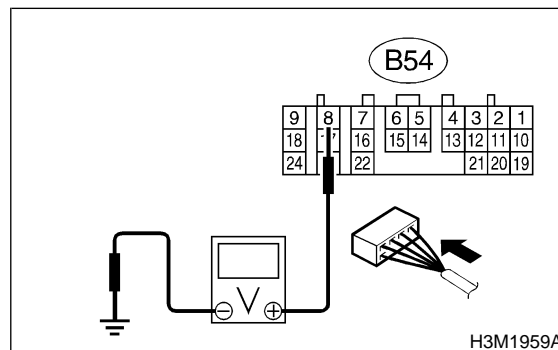
NO : Go to step 8019.

8012 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 8 (+) — Chassis ground (-):



CHECK : *Is the voltage less than 1 V with throttle fully open?*

YES : Go to step 8013.

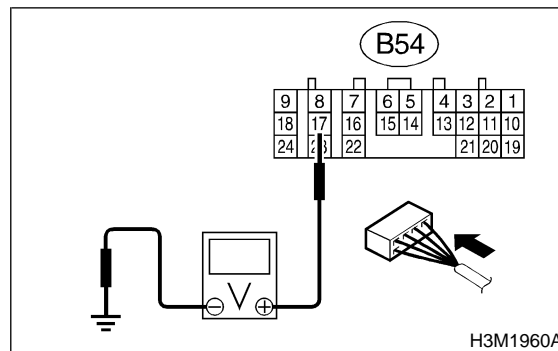
NO : Go to step 8019.

8013 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 17 (+) — Chassis ground (-):



CHECK : *Is the voltage more than 8.5 V with throttle fully closed?*

YES : Go to step 8014.

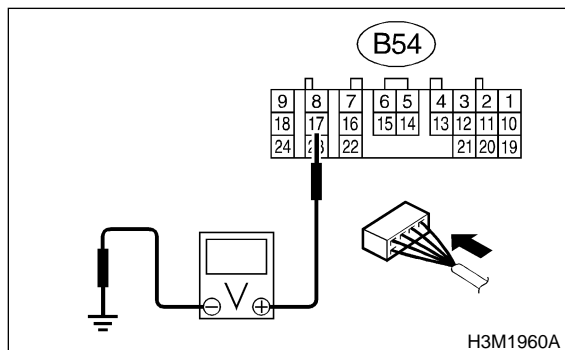
NO : Go to step 8019.

8014 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal and chassis ground.

Connector & terminal

(B54) No. 17 (+) — Chassis ground (-):



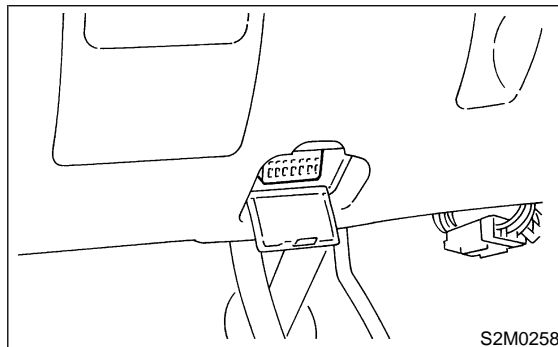
CHECK : **Is the voltage less than 1 V with throttle fully open?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8019**.

8015 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Connect all connectors.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Start the engine, and turn Subaru Select Monitor switch to ON.
- 4) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 5) Stop the engine and turn ignition switch to ON (engine OFF).
- 6) Move select lever to "N".
- 7) Read data of 2-4 brake duty solenoid using Subaru Select Monitor.
 - 2-4 brake duty is indicated in "%".
- 8) Throttle is fully closed.

CHECK : **Is the value 100%?**

YES : Go to step **8016**.

NO : Go to step **8019**.

8016 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Turn ignition switch to ON (Engine OFF).
- 2) Throttle is fully open.

CHECK : **Is the value between 10 and 20%?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8019**.

8017 : CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).

- 1) Remove transmission connector from stay.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Drain automatic transmission fluid.

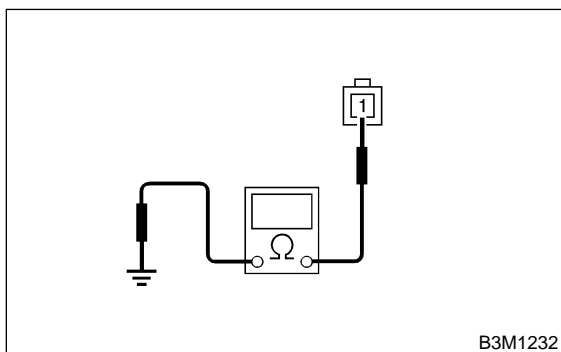
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 4) Remove oil pan, and disconnect connector from 2-4 brake duty solenoid.
- 5) Measure resistance between 2-4 brake duty solenoid connector and transmission ground.

Connector & terminal

No. 1 — Transmission ground:



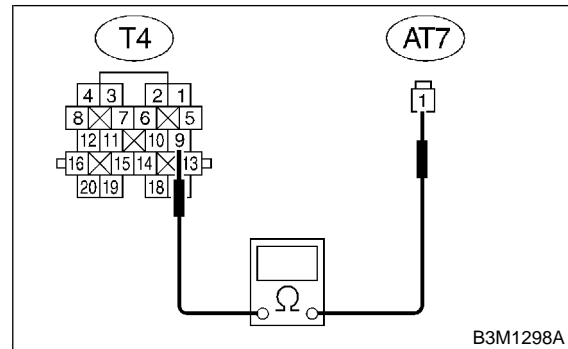
- CHECK** : **Is the resistance between 2.0 and 4.5 Ω?**
- YES** : Go to step **8018**.
- NO** : Replace 2-4 brake duty solenoid. <Ref. to 3-2 [W4A0].>

8018 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.

Measure resistance of harness between 2-4 brake duty solenoid and transmission connector.

Connector & terminal

(T4) No. 9 — (AT7) No. 1:



- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **8019**.
- NO** : Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.

8019 : CHECK POOR CONTACT.

- CHECK** : **Is there poor contact in 2-4 brake duty solenoid circuit?**
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

P: TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —

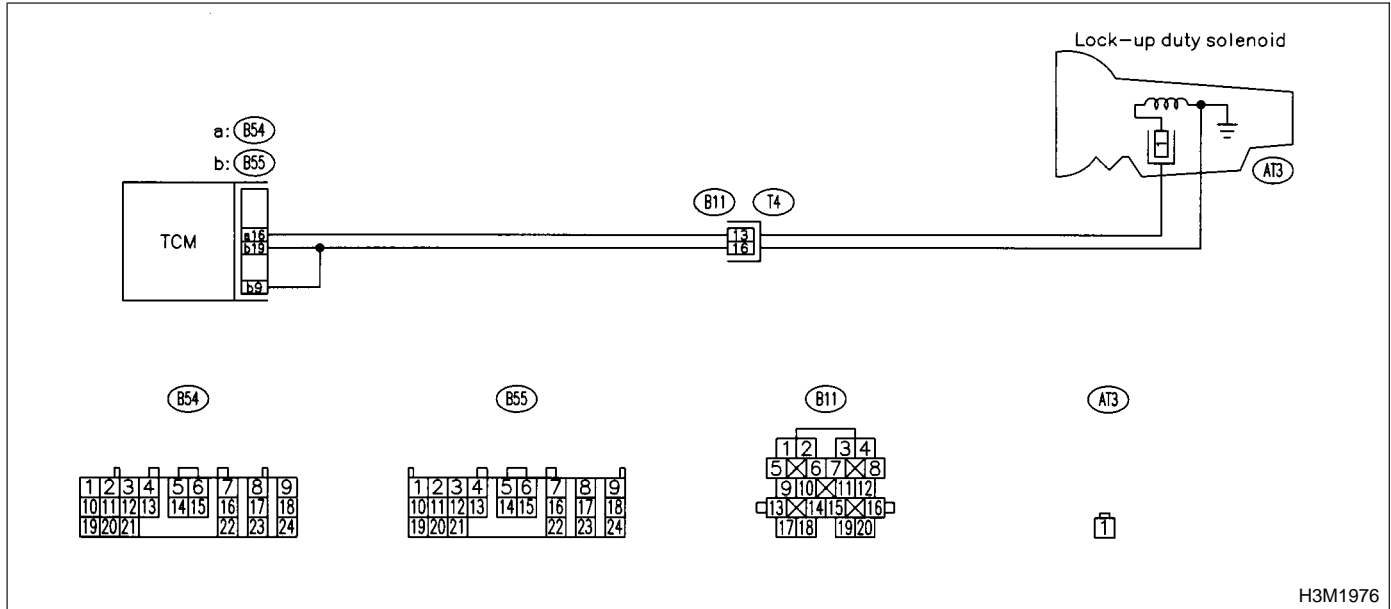
DIAGNOSIS:

Output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No "lock-up" (after engine warm-up).

WIRING DIAGRAM:



H3M1976

8P1 : CHECK TROUBLE CODE.

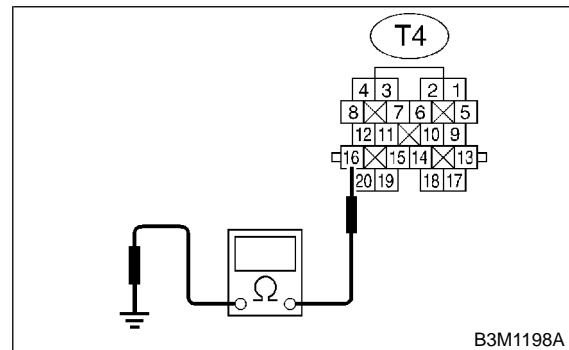
- CHECK** : Do multiple trouble codes appear in the on-board diagnostics test mode?
- YES** : Go to another trouble code.
- NO** : Go to step **8P2**.

8P2 : CHECK LOCK-UP DUTY SOLENOID GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



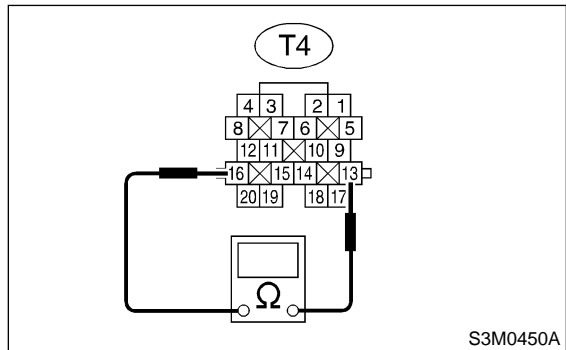
B3M1198A

- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step **8P3**.
- NO** : Repair open circuit in transmission harness.

8P3 : CHECK LOCK-UP DUTY SOLENOID.

Measure resistance between transmission connector receptacle's terminals.

Connector & terminal
(T4) No. 13 — No. 16

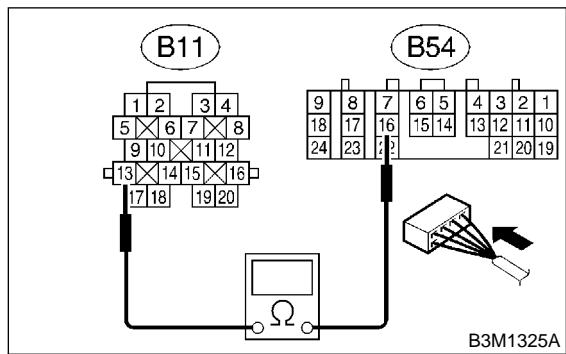


- CHECK** : Is the resistance between 10 and 17 Ω ?
- YES** : Go to step 8P4.
- NO** : Go to step 8P11.

8P4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and transmission.

Connector & terminal
(B54) No. 16 — (B11) No. 13:

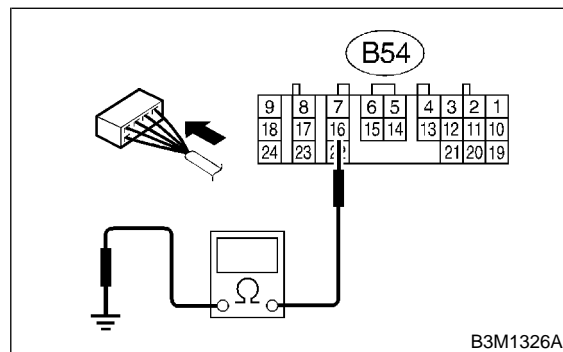


- CHECK** : Is the resistance less than 1 Ω ?
- YES** : Go to step 8P5.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8P5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness connector between TCM and chassis ground.

Connector & terminal
(B54) No. 16 — Chassis ground:



- CHECK** : Is the resistance more than 1 $M\Omega$?
- YES** : Go to step 8P6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8P6 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : Do you have a Subaru Select Monitor?
- YES** : Go to step 8P9.
- NO** : Go to step 8P7.

8P7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 4) Move select lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.

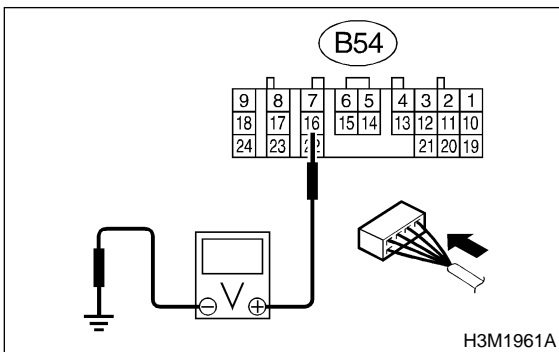
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 16 (+) — Chassis ground (-):



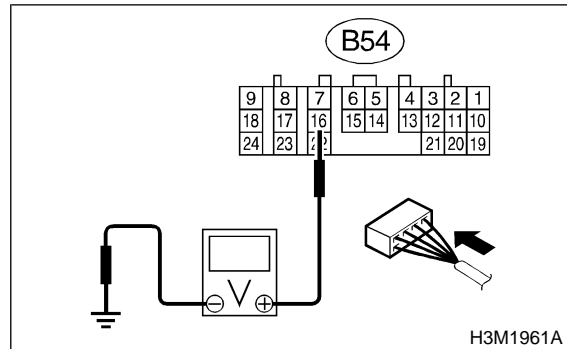
- CHECK** : **Is the voltage more than 8.5 V?**
- YES** : Go to step **8P8**.
- NO** : Go to step **8P13**.

8P8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Return the engine to idling speed and move select lever to "N".
- 2) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 16 (+) — Chassis ground (-):



- CHECK** : **Is the voltage less than 0.5 V?**
- YES** : Even if "AT OIL TEMP" 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.
- NO** : Go to step **8P13**.

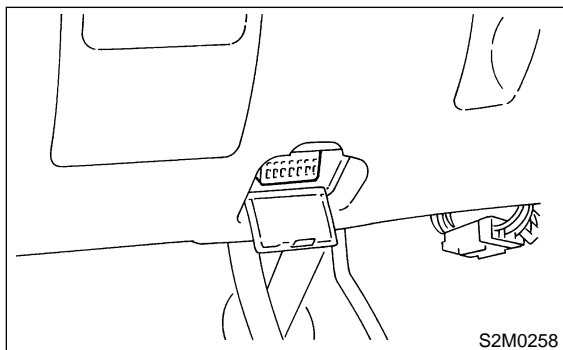
8P9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Connect Subaru Select Monitor to data link connector.



- 4) Start the engine, and turn Subaru Select Monitor switch to ON.
- 5) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 6) Read data of lock-up duty solenoid using Subaru Select Monitor.

● Lock-up duty is indicated in “%”.

- 7) Move select lever to “D” and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : **Is the value 95%?**

YES : Go to step **8P10**.

NO : Go to step **8P13**.

8P10 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

Return the engine to idling speed and move select lever to “N”.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : **Is the value 5%?**

YES : Even if “AT OIL TEMP” 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.

NO : Go to step **8P13**.

8P11 : CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).

- 1) Remove transmission connector from stay.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Drain automatic transmission fluid.

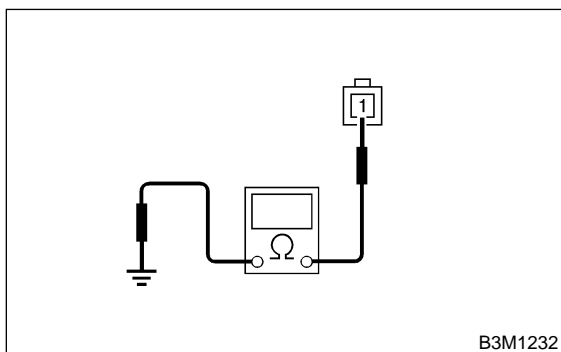
CAUTION:

Do not drain the automatic transmission fluid until it cools down.

- 4) Remove oil pan, and disconnect connector from lock-up duty solenoid.
- 5) Measure resistance between lock-up duty solenoid connector and transmission ground.

Connector & terminal

No. 1 — Transmission ground:



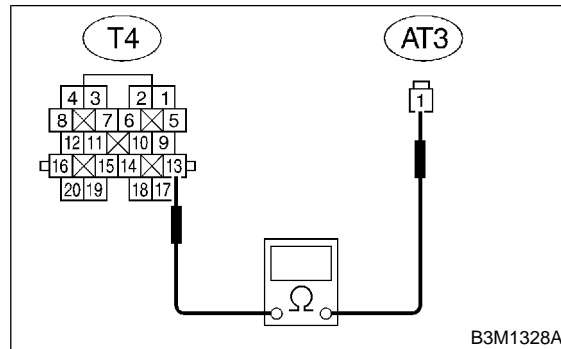
- CHECK** : **Is the resistance between 10 and 17 Ω ?**
- YES** : Go to step **8P12**.
- NO** : Replace lock-up duty solenoid. <Ref. to 3-2 [W4A0].>

8P12 : CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.

Measure resistance of harness between lock-up duty solenoid and transmission connector.

Connector & terminal

(T4) No. 13 — (AT3) No. 1:



- CHECK** : **Is the resistance less than 1 Ω ?**
- YES** : Go to step **8P13**.
- NO** : Repair open circuit in harness between lock-up duty solenoid and transmission connector.

8P13 : CHECK POOR CONTACT.

- CHECK** : **Is there poor contact in lock-up duty solenoid circuit?**
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

MEMO:

Q: TROUBLE CODE 79 — TRANSFER DUTY SOLENOID —

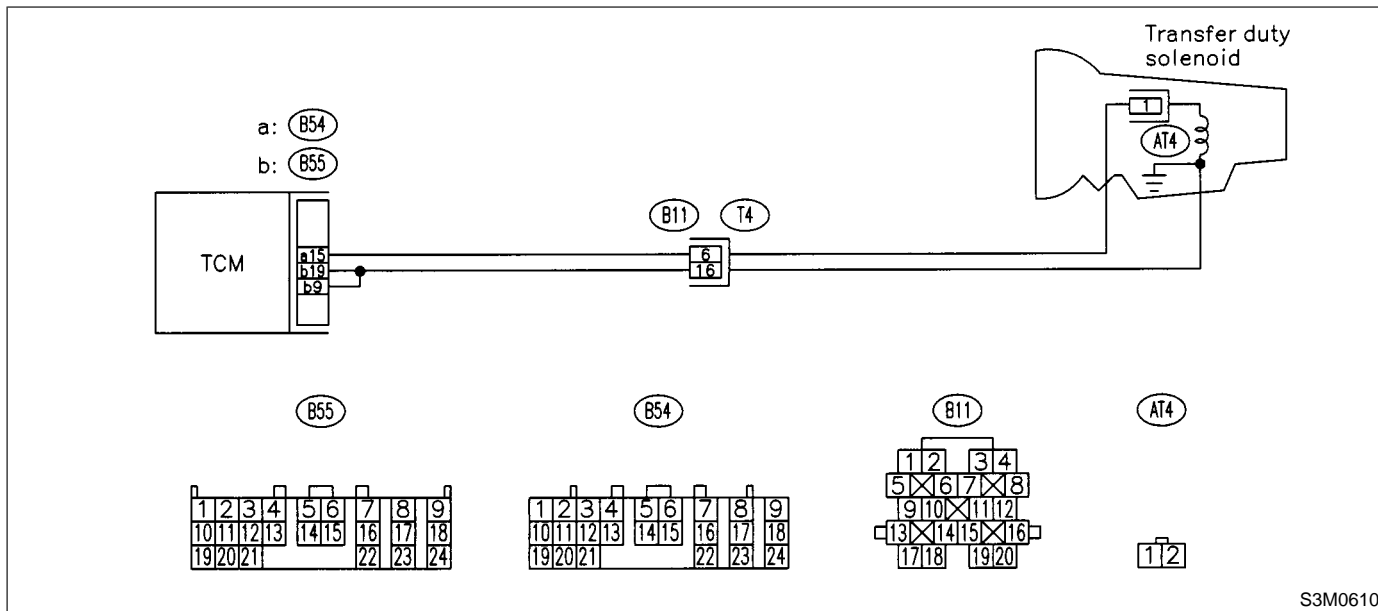
DIAGNOSIS:

Output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive “braking” in tight corners.

WIRING DIAGRAM:

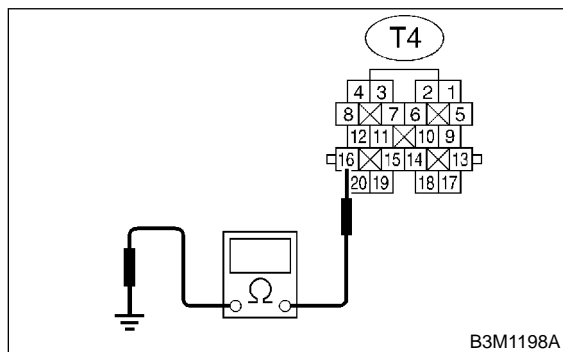


8Q1 : CHECK TRANSFER DUTY SOLENOID GROUND LINE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 16 — Transmission ground:



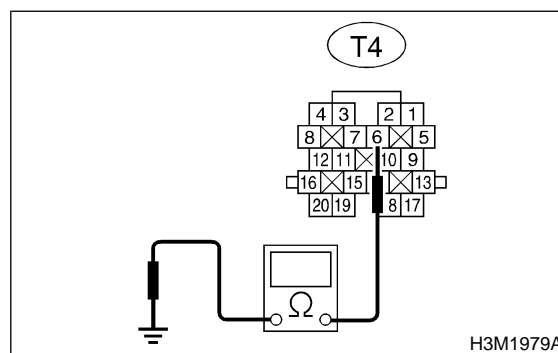
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8Q2.
- NO** : Repair open circuit in transmission harness.

8Q2 : CHECK TRANSFER DUTY SOLENOID.

Measure resistance between transmission connector and transmission ground.

Connector & terminal

(T4) No. 6 — Transmission ground:



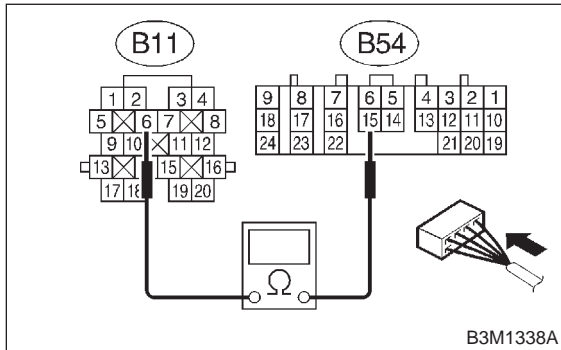
- CHECK** : Is the resistance between 10 and 17 Ω?
- YES** : Go to step 8Q3.
- NO** : Go to step 8Q10.

8Q3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B54) No. 15 — (B11) No. 6:



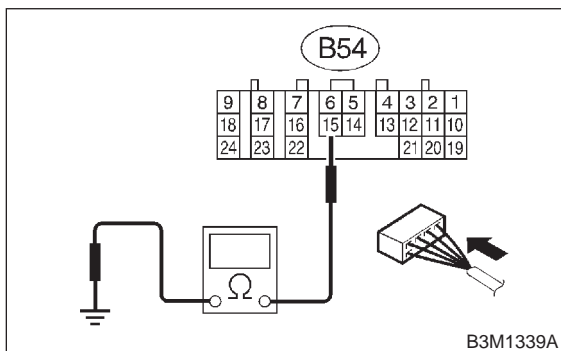
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 8Q4.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8Q4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and chassis ground.

Connector & terminal

(B54) No. 15 — Chassis ground:



- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8Q5.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8Q5 : PREPARE SUBARU SELECT MONITOR.

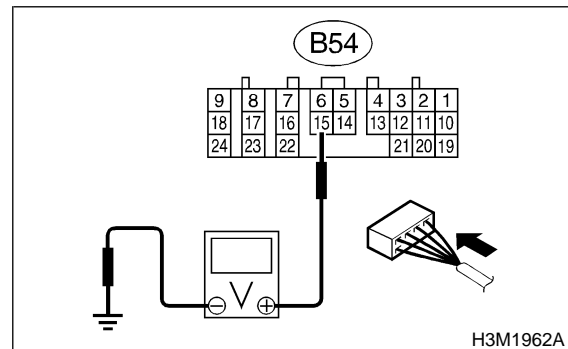
- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step 8Q8.
- NO** : Go to step 8Q6.

8Q6 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Connect connectors to transmission.
- 2) Turn ignition switch to ON (engine OFF).
- 3) Throttle is fully closed.
- 4) Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 15 (+) — Chassis ground (-):



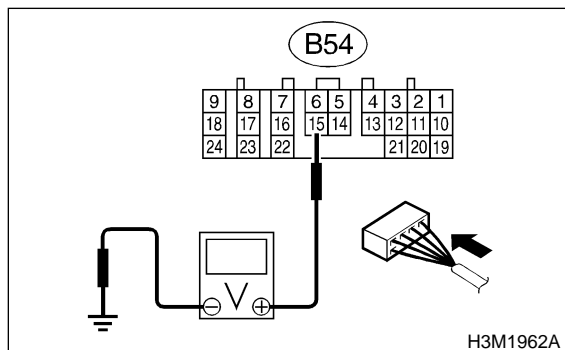
- CHECK** : *Is the voltage less than 1 V in “P” range?*
- YES** : Go to step 8Q7.
- NO** : Go to step 8Q12.

8Q7 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector and chassis ground.

Connector & terminal

(B54) No. 15 (+) — Chassis ground (-):



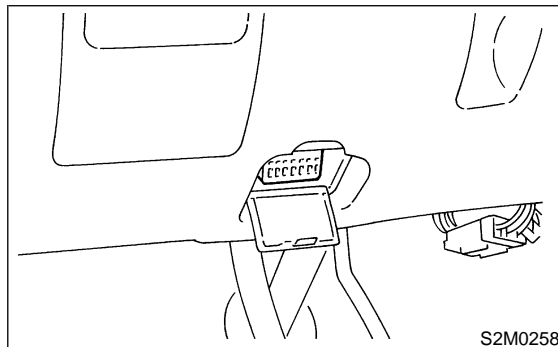
CHECK : **Is the voltage between 5 and 7 V in "D" range?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8Q12**.

8Q8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Connect connector to 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 "%".

CHECK : **Is the value between 5 and 10%?**

YES : Go to step **8Q9**.

NO : Go to step **8Q12**.

8Q9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

- 1) Set FWD mode.
- 2) Throttle fully closed.

CHECK : **Is the value 95%?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step **8Q12**.

8Q10 : CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).

1) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

2) Drain automatic transmission fluid.

CAUTION:

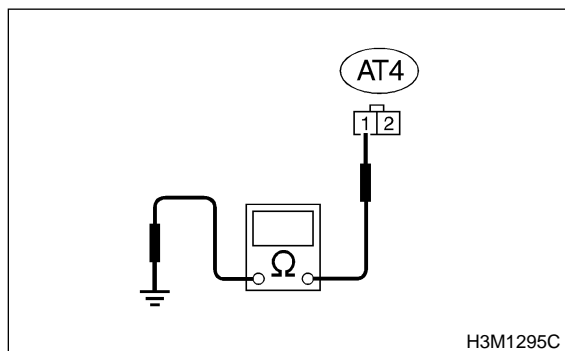
Do not drain the automatic transmission fluid until it cools down.

3) Remove extension case, and disconnect connector from transfer duty solenoid.

4) Measure resistance between transfer duty solenoid connector and transmission ground.

Connector & terminal

(AT4) No. 1 — Transmission ground:



CHECK : Is the resistance between 10 and 17 Ω ?

YES : Go to step 8Q11.

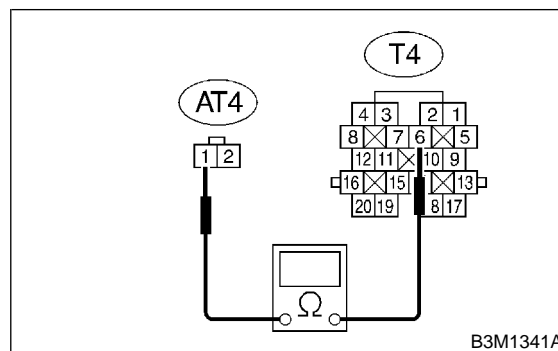
NO : Replace transfer duty solenoid. <Ref. to 3-2 [W5A0].>

8Q11 : CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.

Measure resistance of harness between transfer duty solenoid and transmission connector.

Connector & terminal

(T4) No. 6 — (AT4) No. 1:



CHECK : Is the resistance less than 1 Ω ?

YES : Go to step 8Q12.

NO : Repair open circuit in harness between transfer duty solenoid and transmission connector.

8Q12 : CHECK POOR CONTACT.

CHECK : Is there poor contact in transfer duty solenoid circuit?

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W23A0].>

R: TROUBLE CODE 93 — VEHICLE SPEED SENSOR 1 (REAR) —

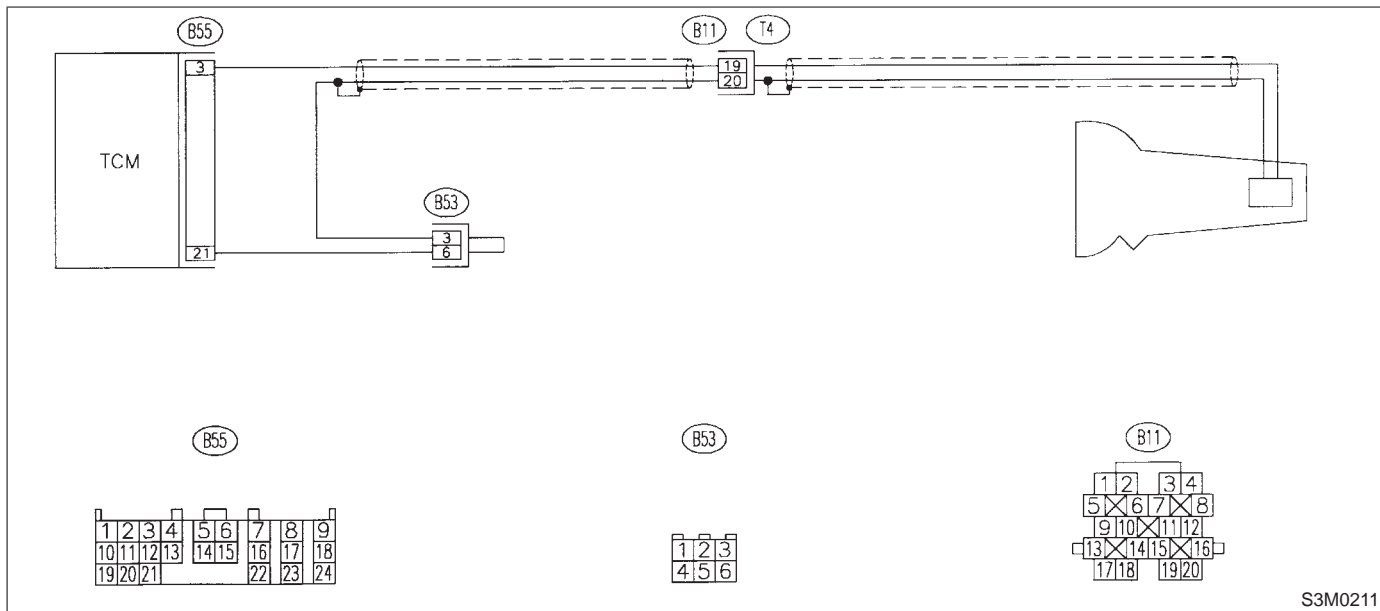
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner “braking”.

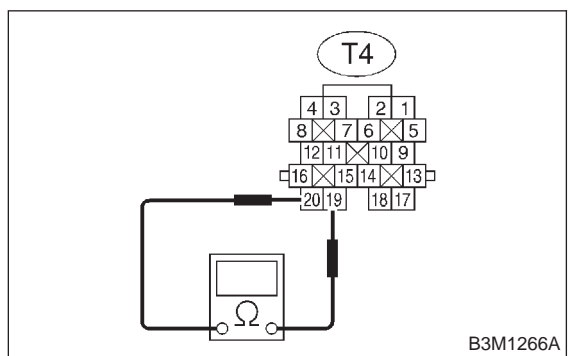
WIRING DIAGRAM:



8R1 : CHECK VEHICLE SPEED SENSOR 1.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from transmission.
- 3) Measure resistance between transmission connector receptacle's terminals.

Connector & terminal
(T4) No. 19 — No. 20:

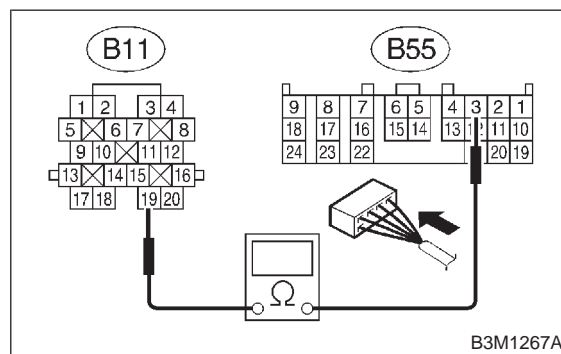


- CHECK** : Is the resistance between 450 and 650 Ω?
- YES** : Go to step 8R2.
- NO** : Replace transmission harness connector. <Ref. to 3-2 [W12A0].>

8R2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance between TCM and transmission connector.

Connector & terminal
(B55) No. 3 — (B11) No. 19:



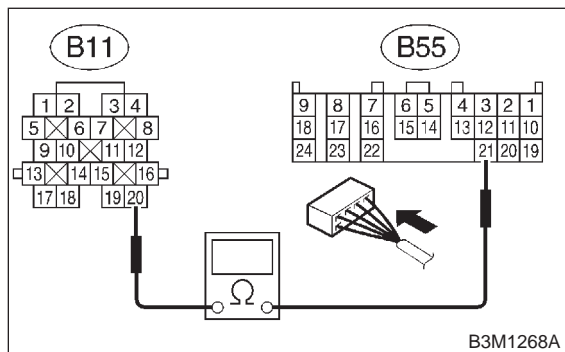
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 8R3.
- NO** : Repair open circuit in harness between TCM and transmission connector.

8R3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal

(B55) No. 21 — (B11) No. 20:



B3M1268A

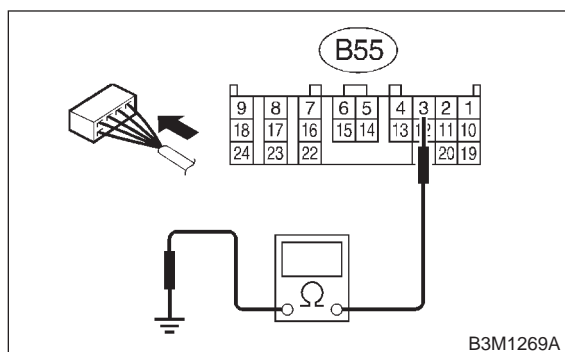
- CHECK** : *Is the resistance less than 1 Ω?*
- YES** : Go to step 8R4.
- NO** : Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.

8R4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 3 — Chassis ground:



B3M1269A

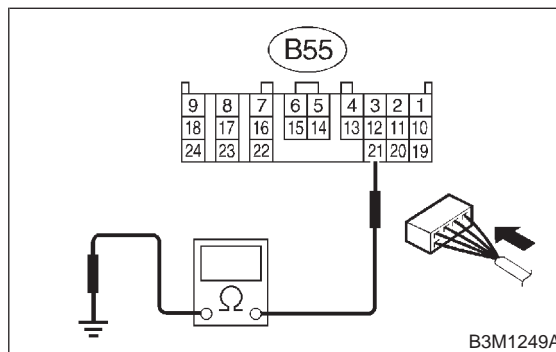
- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8R5.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8R5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B55) No. 21 — Chassis ground:



B3M1249A

- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step 8R6.
- NO** : Repair short circuit in harness between TCM and transmission connector.

8R6 : PREPARE OSCILLOSCOPE.

- CHECK** : *Do you have oscilloscope?*
- YES** : Go to step 8R10.
- NO** : Go to step 8R7.

8R7 : PREPARE SUBARU SELECT MONITOR.

- CHECK** : *Do you have a Subaru Select Monitor?*
- YES** : Go to step 8R9.
- NO** : Go to step 8R8.

8R8 : CHECK INPUT SIGNAL FOR TCM.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

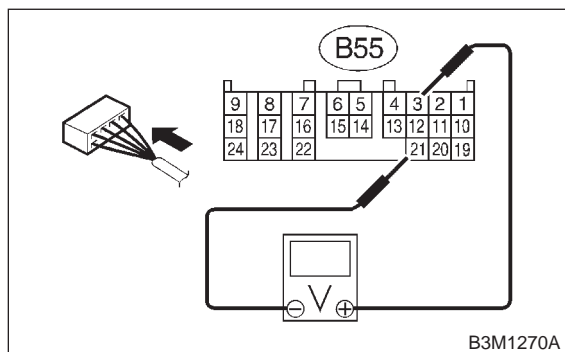
NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 4) Measure voltage between TCM connector terminals.

Connector & terminal

(B55) No. 3 (+) — No. 21 (-):



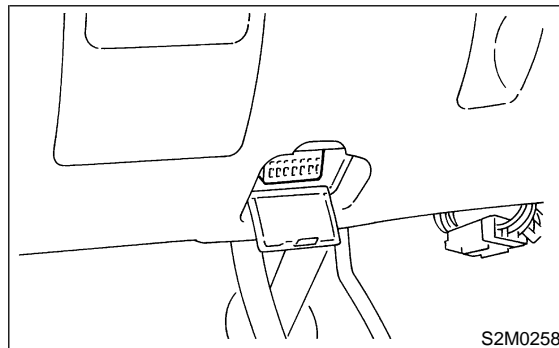
CHECK : **Is the voltage more than AC 1 V?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step 8R11.

8R9 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

- 1) Connect connector to transmission.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.
- 5) Start the engine.
- 6) Read data of vehicle speed using Subaru Select Monitor.
 - Compare speedometer with Subaru Select Monitor indications.
 - Vehicle speed is indicated in "km/h" or "MPH".
- 7) Slowly increase vehicle speed to 60 km/h or 37 MPH.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : **Does the speedometer indication increase as the Subaru Select Monitor data increases?**

YES : Even if "AT OIL TEMP" 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.

NO : Go to step 8R11.

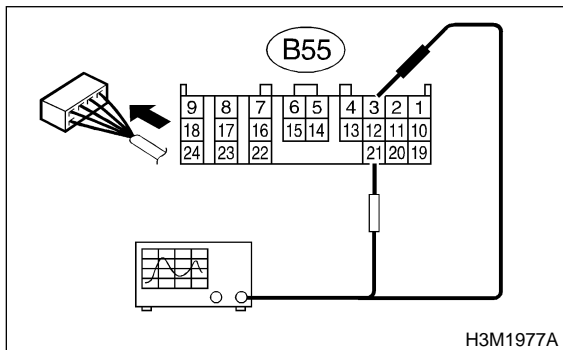
8R10 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

- 1) Connect connector to transmission.
- 2) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 3) Set oscilloscope to TCM connector terminals.
Position probe; (B55) No. 3
Earth lead; (B55) No. 21

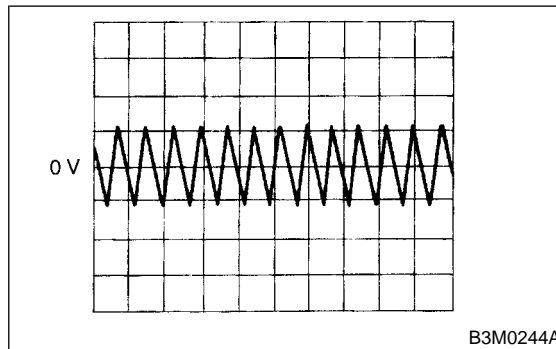


- 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

- 5) Measure signal voltage indicated on oscilloscope.



- CHECK** : *Is the signal voltage more than AC 1 V?*
- YES** : Even if "AT OIL TEMP" 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.
- NO** : Go to step **8R11**.

8R11 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in vehicle speed sensor 1 circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9. Diagnostic Chart with Select Monitor

A: BASIC DIAGNOSTIC CHART

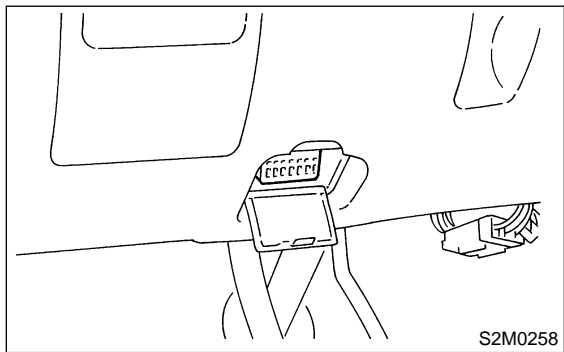
If no trouble codes appear in the on-board diagnostics operation (although problems have occurred or are occurring), measure performance characteristics of sensors, actuators, etc., in the Subaru Select Monitor and compare with the "basic data" to determine the cause of problems.

- 1) Trouble occurs.
- 2) No trouble codes appear in on-board diagnostics operation.
- 3) Measure each item using Subaru Select Monitor.
- 4) Compare measured values with basic data.
- 5) Determine item which is outside basic data specifications.
- 6) Check sensor and actuator affected.

B: BATTERY VOLTAGE

9B1 : CHECK BATTERY VOLTAGE.

- 1) Turn ignition switch to OFF.
- 2) Connect Subaru Select Monitor to data link connector.



- 3) Start the engine, and engine idling after warm-up.
 - 4) Turn Subaru Select Monitor switch to ON.
 - 5) Read data of battery voltage using Subaru Select Monitor.
- Battery voltage applied to TCM.

CHECK : *Is voltage between 10 and 16 V?*

YES : Go to step VEHICLE SPEED SENSOR 1. <Ref. to 3-2 [T9C0].>

NO : Check battery voltage and specification of electrolyte, regulating voltage under no loads and generator (as a single unit).

C: CHECK VEHICLE SPEED SENSOR 1.

9C1 : CHECK VEHICLE SPEED SENSOR 1.

- 1) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 2) Read data of vehicle speed #1 using Subaru Select Monitor.

- Compare speedometer with Subaru Select Monitor indications.
- Vehicle speed is indicated in "MPH" or "km/h".

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the speedometer indication increase as the Subaru Select Monitor data increases?*

YES : Go to step VEHICLE SPEED SENSOR 2. <Ref. to 3-2 [T9D0].>

NO : Check vehicle speed sensor 1 circuit. <Ref. to 3-2 [T8R0].>

D: CHECK VEHICLE SPEED SENSOR 2.

9D1 : CHECK VEHICLE SPEED SENSOR 2.

Read data of vehicle speed #2 using Subaru Select Monitor.

- Compare speedometer with Subaru Select Monitor indications.
- Vehicle speed is indicated in "MPH" or "km/h".

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the speedometer indication increase as the Subaru Select Monitor data increases?*

YES : Go to step ENGINE SPEED SIGNAL. <Ref. to 3-2 [T9E0].>

NO : Check vehicle speed sensor 2 circuit. <Ref. to 3-2 [T8F0].>

E: CHECK ENGINE SPEED SIGNAL.**9E1 : CHECK ENGINE SPEED SIGNAL.**

- 1) Turn A/C switch to OFF (with A/C models).
- 2) Warm-up the engine until engine coolant 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) Read data of engine speed using Subaru Select Monitor.

- Engine speed is indicated in “rpm”.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the tachometer revolution increase as the Subaru Select Monitor revolution data increases?*

YES : Go to step ATF TEMPERATURE SENSOR. <Ref. to 3-2 [T9F0].>

NO : Check engine speed signal circuit. <Ref. to 3-2 [T8C0].>

F: CHECK ATF TEMPERATURE SENSOR.**9F1 : CHECK AT OIL TEMP WARNING LIGHT.**

CHECK : *Does the AT OIL TEMP warning light remain on 2 seconds after the engine has been started?*

YES : Go to step 9F2.

NO : Check ATF temperature sensor and combination meter circuit. <Ref. to 3-2 [T8D0].>

9F2 : CHECK ATF TEMPERATURE SENSOR.

- 1) Read data of ATF temperature using Subaru Select Monitor.

- ATF temperature is indicated in “°F” or “°C”.
- 2) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

- 3) Turn ignition switch to ON (engine OFF).

CHECK : *Does the ATF temperature change from 176°F (80°C)?*

YES : Go to step THROTTLE POSITION SENSOR. <Ref. to 3-2 [T9G0].>

NO : Check ATF temperature sensor circuit. <Ref. to 3-2 [T8D0].>

G: CHECK THROTTLE POSITION SENSOR.**9G1 : CHECK INPUT SIGNAL FOR TCM.**

Read data of throttle position sensor using Subaru Select Monitor.

- Throttle position sensor input signal is indicated.

CHECK : *Is voltage between 0.3 and 0.7 V when the accelerator pedal is completely released?*

YES : Go to step 9G2.

NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8E0].>

9G2 : CHECK INPUT SIGNAL FOR TCM.

CHECK : *Is voltage between 4.3 and 4.9 V when the accelerator pedal is completely depressed?*

YES : Go to step 9G3.

NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8E0].>

9G3 : CHECK INPUT SIGNAL FOR TCM.

CHECK : *Does voltage decrease smoothly when the accelerator pedal is fully depressed and then fully released?*

YES : Go to step GEAR POSITION. <Ref. to 3-2 [T9H0].>

NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8E0].>

H: CHECK GEAR POSITION.**9H1 : CHECK GEAR POSITION.**

1) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

2) Start the engine.

3) Move select lever to "D", and drive vehicle.

4) Read data of gear position using Subaru Select Monitor.

- Gear position is indicated.

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the transmission gear correspond to the gear which is shown on display?*

YES : Go to step LINE PRESSURE DUTY SOLENOID. <Ref. to 3-2 [T9I0].>

NO : Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to 3-2 [T8J0].> and <Ref. to 3-2 [T8K0].>

I: CHECK LINE PRESSURE DUTY SOLENOID.**9I1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

1) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

2) Stop the engine and turn ignition switch to ON (engine OFF).

3) Move select lever to "N".

4) Read data of line pressure duty solenoid using Subaru Select Monitor.

- Line pressure duty solenoid is indicated in "%".

CHECK : *Does the Subaru Select Monitor indicate 100% when the accelerator pedal is completely released?*

YES : Go to step 9I2.

NO : Go to step 9I4.

9I2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : *Does the Subaru Select Monitor indicate between 10 and 20% when the accelerator pedal is completely depressed?*

YES : Go to step 9I3.

NO : Go to step 9I4.

9I3 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : *Does the Subaru Select Monitor change smoothly when the accelerator pedal is fully depressed and then fully released?*

YES : Go to step LOCK-UP DUTY SOLENOID. <Ref. to 3-2 [T9J0].>

NO : Go to step 9I4.

9I4 : CHECK THROTTLE POSITION SENSOR.

NOTE:

For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>.

CHECK : *Is there any trouble in throttle position sensor circuit?*

YES : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8E0].>.

NO : Go to step **9I5**.

9I5 : CHECK ENGINE SPEED SIGNAL.

NOTE:

For the diagnostics procedure on engine speed signal circuit, <Ref. to 3-2 [T9E0].>.

CHECK : *Is there any trouble in engine speed signal circuit?*

YES : Repair or replace engine speed signal circuit, <Ref. to 3-2 [T8C0].>.

NO : Go to step **9I6**.

9I6 : CHECK ATF TEMPERATURE SENSOR.

NOTE:

For the diagnostics procedure on ATF temperature sensor circuit, <Ref. to 3-2 [T9F1].>.

CHECK : *Is there any trouble in ATF temperature sensor circuit?*

YES : Repair or replace ATF temperature sensor circuit, <Ref. to 3-2 [T8D0].>.

NO : Go to step **9I7**.

9I7 : CHECK INHIBITOR SWITCH.

1) Turn ignition switch and Subaru Select Monitor to ON.

2) Read data of range switch using Subaru Select Monitor.

● Range switch is indicated in ON ⇔ OFF.

CHECK : *When each range is selected, does LED of the range switch on Subaru Select Monitor light up?*

YES : Go to step LOCK-UP DUTY SOLENOID. <Ref. to 3-2 [T9J0].>

NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

J: CHECK LOCK-UP DUTY SOLENOID.**9J1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

Read data of lock-up duty solenoid using Subaru Select Monitor.

● Lock-up duty solenoid is indicated in “%”.

CHECK : *Does the Subaru Select Monitor indicate 5%?*

YES : Go to step **9J2**.

NO : Go to step **9J3**.

9J2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Move select lever to “D” and slowly increase vehicle speed to 75 km/h (47 MPH).

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : *Does the Subaru Select Monitor indicate 95%?*

YES : Go to step TRANSFER DUTY SOLENOID. <Ref. to 3-2 [T9K0].>

NO : Go to step **9J3**.

9J3 : CHECK THROTTLE POSITION SENSOR.

NOTE:

For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>.

CHECK : *Is there any trouble in throttle position sensor circuit?*

YES : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8E0].>.

NO : Go to step **9J4**.

9J4 : CHECK VEHICLE SPEED SENSOR 1.

NOTE:

For the diagnostics procedure on vehicle speed sensor 1 circuit, <Ref. to 3-2 [T9C0].>.

- CHECK** : *Is there any trouble in vehicle speed sensor 1 circuit?*
- YES** : Repair or replace vehicle speed sensor 1 circuit, <Ref. to 3-2 [T8R0].>.
- NO** : Go to step **9J5**.

9J5 : CHECK VEHICLE SPEED SENSOR 2.

NOTE:

For the diagnostics procedure on vehicle speed sensor 2 circuit, <Ref. to 3-2 [T9D0].>.

- CHECK** : *Is there any trouble in vehicle speed sensor 2 circuit?*
- YES** : Repair or replace vehicle speed sensor 2 circuit, <Ref. to 3-2 [T8F0].>.
- NO** : Go to step **9J6**.

9J6 : CHECK ENGINE SPEED SIGNAL.

NOTE:

For the diagnostics procedure on engine speed signal circuit, <Ref. to 3-2 [T9E0].>.

- CHECK** : *Is there any trouble in engine speed signal circuit?*
- YES** : Repair or replace engine speed signal circuit, <Ref. to 3-2 [T8C0].>.
- NO** : Go to step **9J7**.

9J7 : CHECK INHIBITOR SWITCH.

Read data of range switch using Subaru Select Monitor.

- Range switch is indicated in ON ⇔ OFF.

- CHECK** : *When each range is selected, does LED of the range switch on Subaru Select Monitor light up?*
- YES** : Go to step TRANSFER DUTY SOLENOID. <Ref. to 3-2 [T9K0].>
- NO** : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

K: CHECK TRANSFER DUTY SOLENOID.**9K1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

- 1) Turn ignition switch to ON (engine OFF).
 - 2) Move select lever to "D".
 - 3) Read data of transfer duty solenoid using Subaru Select Monitor.
- Transfer duty solenoid is indicated in "%".

CHECK : *Does the duty solenoid change in response to the depress-release motion of the accelerator pedal?*

- YES** : Go to step **9K2**.
- NO** : Go to step **9K3**.

9K2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Turn ignition switch to OFF.
- 2) Set FWD mode.
- 3) Turn ignition switch to ON (engine OFF).

CHECK : *Does the Subaru Select Monitor indicate 95%?*

- YES** : Go to step THROTTLE POSITION SENSOR POWER SUPPLY. <Ref. to 3-2 [T9L0].>
- NO** : Go to step **9K3**.

9K3 : CHECK THROTTLE POSITION SENSOR.

NOTE:

For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>.

- CHECK** : *Is there any trouble in throttle position sensor circuit?*
- YES** : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8E0].>.
- NO** : Go to step **9K4**.

9K4 : CHECK VEHICLE SPEED SENSOR 1.

NOTE:

For the diagnostics procedure on vehicle speed sensor 1 circuit, <Ref. to 3-2 [T9C0].>.

- CHECK** : *Is there any trouble in vehicle speed sensor 1 circuit?*
- YES** : Repair or replace vehicle speed sensor 1 circuit, <Ref. to 3-2 [T8R0].>.
- NO** : Go to step **9K5**.

9K5 : CHECK VEHICLE SPEED SENSOR 2.

NOTE:

For the diagnostics procedure on vehicle speed sensor 2 circuit, <Ref. to 3-2 [T9D0].>.

- CHECK** : *Is there any trouble in vehicle speed sensor 2 circuit?*
- YES** : Repair or replace vehicle speed sensor 2 circuit, <Ref. to 3-2 [T8F0].>.
- NO** : Go to step **9K6**.

9K6 : CHECK ATF TEMPERATURE SENSOR.

NOTE:

For the diagnostics procedure on ATF temperature sensor circuit, <Ref. to 3-2 [T9F0].>.

- CHECK** : *Is there any trouble in ATF temperature sensor circuit?*
- YES** : Repair or replace ATF temperature sensor circuit, <Ref. to 3-2 [T8D0].>.
- NO** : Go to step **9K7**.

9K7 : CHECK INHIBITOR SWITCH.

Read data of range switch using Subaru Select Monitor.

- Range switch is indicated in ON ⇔ OFF.

- CHECK** : *When each range is selected, does LED of range switch on Subaru Select Monitor light up?*
- YES** : Go to step **9K8**.
- NO** : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

9K8 : CHECK ABS SIGNAL.

1) Start the engine, and turn Subaru Select Monitor switch to ON.

2) Read data of ABS signal using Subaru Select Monitor.

- ABS switch is indicated in ON ⇔ OFF.

- CHECK** : *Does the LED of ABS switch light up?*
- YES** : Check ABS signal circuit. <Ref. to 4-4 [T10Y0].> and <Ref. to 4-4 [T10Z0].>
- NO** : Go to step THROTTLE POSITION SENSOR POWER SUPPLY. <Ref. to 3-2 [T9L0].>

L: CHECK THROTTLE POSITION SENSOR POWER SUPPLY.**9L1 : CHECK THROTTLE POSITION SENSOR POWER SUPPLY.**

Read data of throttle position sensor power supply using Subaru Select Monitor.

- Throttle position sensor power supply voltage is indicated.

- CHECK** : *Is the value fixed between 4.8 and 5.3 V?*
- YES** : Go to step INTAKE MANIFOLD PRESSURE SIGNAL. <Ref. to 3-2 [T9M0].>
- NO** : Check throttle position sensor power supply circuit. <Ref. to 3-2 [T8E0].>

M: CHECK INTAKE MANIFOLD PRESSURE SIGNAL.**9M1 : CHECK INPUT SIGNAL FOR TCM.**

- 1) Start the engine.
- 2) Warm-up the engine until engine coolant 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 after warm-up.
- 4) Move select lever to "N".
- 5) Read data of intake manifold pressure signal using Subaru Select Monitor.
 - Display shows intake manifold pressure signal value sent from ECM.

CHECK : ***Does voltage change in response to the depress-release motion of the accelerator pedal?***

YES : Go to step **9M2**.

NO : Check intake manifold pressure signal circuit. <Ref. to 3-2 [T8I0].>

9M2 : CHECK ECM.

CHECK : ***Has trouble been eliminated after ECM replacement?***

YES : Replace ECM. <Ref. to 2-7 [W17A0].>

NO : Go to step **9M3**.

9M3 : CHECK TCM.**NOTE:**

Install former ECM.

CHECK : ***Has trouble been eliminated after TCM replacement?***

YES : Replace TCM. <Ref. to 3-2 [W23A0].>

NO : Go to step **TORQUE CONVERTER TURBINE SPEED SENSOR**. <Ref. to 3-2 [T9N0].>

N: CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.**9N1 : CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.**

- 1) Lift-up or raise the vehicle and support with safety stand.

CAUTION:

On AWD models, raise all wheels off ground.

- 2) Read data of torque converter turbine speed sensor using Subaru Select Monitor.

- Compare speedometer with Subaru Select Monitor indications.
- Vehicle speed is indicated in "MPH" or "km/h".

NOTE:

The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***

YES : Go to step 2-4 BRAKE DUTY SOLENOID. <Ref. to 3-2 [T9O0].>

NO : Check torque converter turbine speed sensor circuit. <Ref. to 3-2 [T8G0].>

O: CHECK 2-4 BRAKE DUTY SOLENOID.**901 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

1) Warm-up the transmission until ATF temperature is above 80°C (176°F).

NOTE:

If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

2) Stop the engine and turn ignition switch to ON (engine OFF).

3) Move select lever to "N".

4) Read data of 2-4 brake duty solenoid using Subaru Select Monitor.

- 2-4 brake duty solenoid is indicated in "%".

CHECK : *Does the Subaru Select Monitor indicate 100% when the accelerator pedal is completely released?*

YES : Go to step 902.

NO : Go to step 904.

902 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : *Does the Subaru Select Monitor indicate between 10 and 20% when the accelerator pedal is completely depressed?*

YES : Go to step 903.

NO : Go to step 904.

903 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : *Does the Subaru Select Monitor change smoothly when the accelerator pedal is fully depressed and then fully released?*

YES : Go to step FWD SWITCH. <Ref. to 3-2 [T9P0].>

NO : Go to step 904.

904 : CHECK THROTTLE POSITION SENSOR.**NOTE:**

For the diagnostics procedure on throttle position sensor circuit, <Ref. to 3-2 [T9G0].>

CHECK : *Is there any trouble in throttle position sensor circuit?*

YES : Repair or replace throttle position sensor circuit, <Ref. to 3-2 [T8E0].>

NO : Go to step 905.

905 : CHECK ENGINE SPEED SIGNAL.**NOTE:**

For the diagnostics procedure on engine speed signal circuit, <Ref. to 3-2 [T9E0].>

CHECK : *Is there any trouble in engine speed signal circuit?*

YES : Repair or replace engine speed signal circuit, <Ref. to 3-2 [T8C0].>

NO : Go to step 906.

906 : CHECK ATF TEMPERATURE SENSOR.**NOTE:**

For the diagnostics procedure on ATF temperature sensor circuit, <Ref. to 3-2 [T9F0].>

CHECK : *Is there any trouble in ATF temperature sensor circuit?*

YES : Repair or replace ATF temperature sensor circuit, <Ref. to 3-2 [T8D0].>

NO : Go to step 907.

907 : CHECK INHIBITOR SWITCH.

1) Turn ignition switch and Subaru Select Monitor to ON.

2) Read data of range switch using Subaru Select Monitor.

- Range switch is indicated in ON ⇔ OFF.

CHECK : *When each range is selected, does LED of the range switch on Subaru Select Monitor light up?*

YES : Go to step FWD SWITCH. <Ref. to 3-2 [T9P0].>

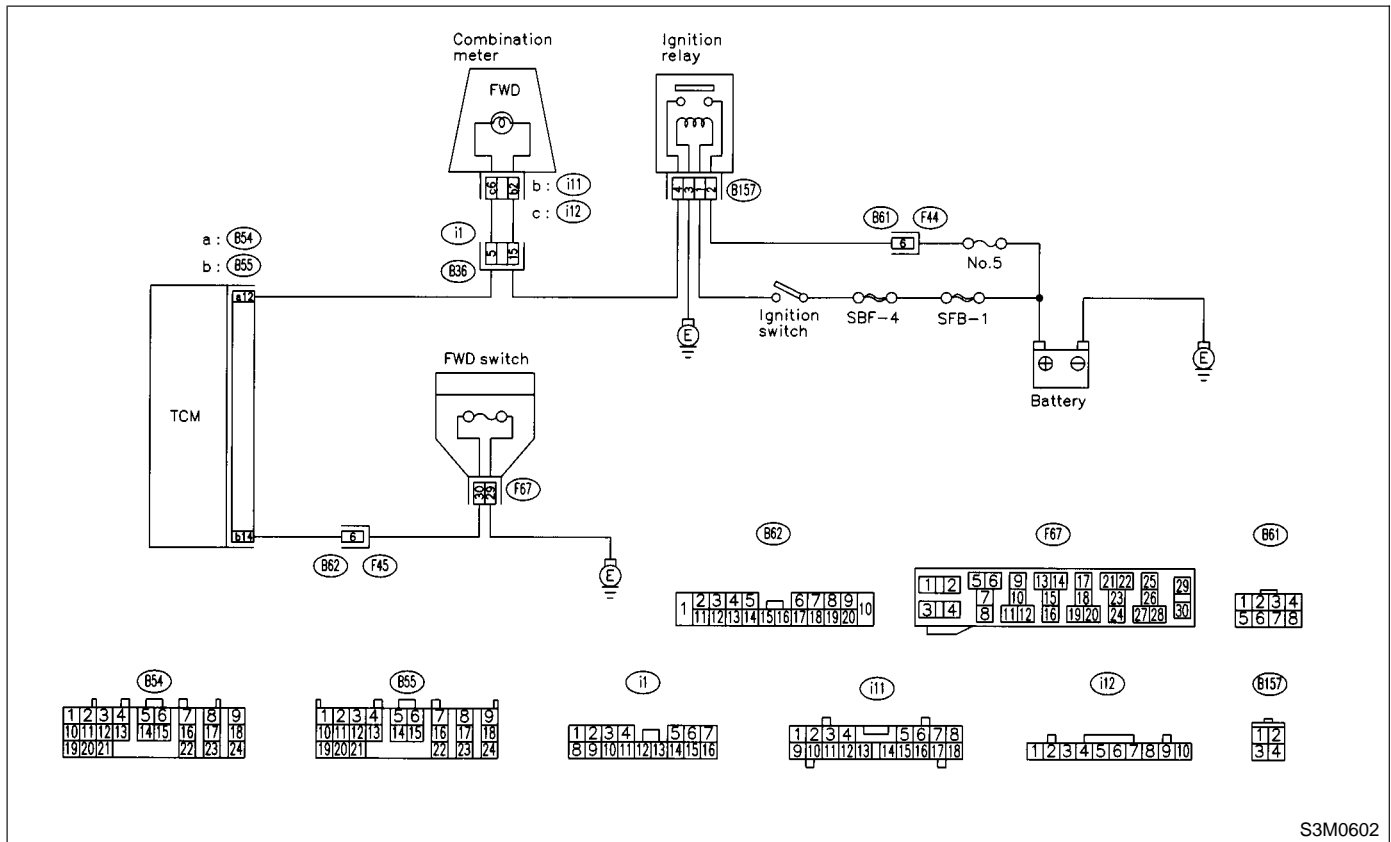
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

P: CHECK FWD SWITCH.

DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

WIRING DIAGRAM:



S3M0602

9P1 : CHECK FWD SWITCH.

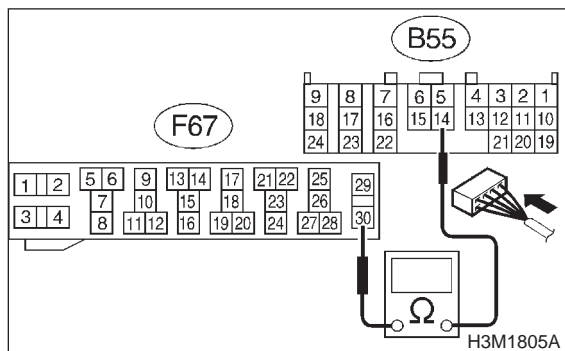
- CHECK** : *When fuse is inserted to FWD switch, does LED light up?*
- YES** : Go to step BRAKE SWITCH. <Ref. to 3-2 [T9Q0].>
- NO** : Go to step 9P2.

9P2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from FWD switch.
- 3) Measure resistance of harness between TCM and FWD switch connector.

Connector & terminal

(B55) No. 14 — (F67) No. 30:



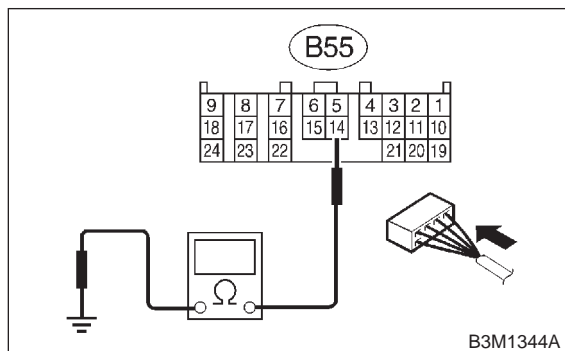
- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9P3.
- NO** : Repair open circuit in harness between TCM and FWD switch connector.

9P3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.

Measure resistance of harness connector between TCM and body to make sure that circuit does not short.

Connector & terminal

(B55) No. 14 — Chassis ground:



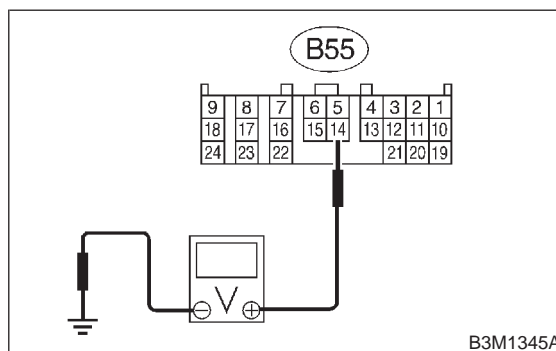
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 9P4.
- NO** : Repair short circuit in harness connector between TCM and chassis ground.

9P4 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to FWD switch.
- 3) Turn ignition switch to ON.
- 4) Measure signal voltage for TCM while installing the fuse to FWD switch connector.

Connector & terminal

(B55) No. 14 (+) — Chassis ground (-):



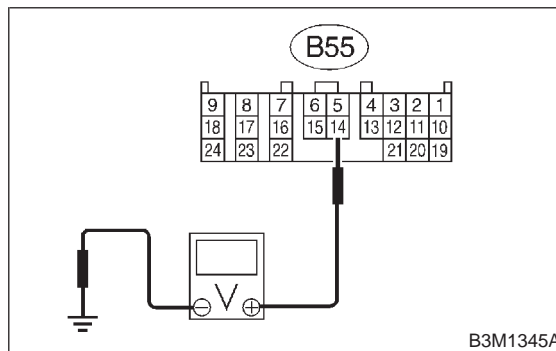
- CHECK** : Is the voltage less than 1 V in FWD switch while installing?
- YES** : Go to step 9P5.
- NO** : Go to step 9P11.

9P5 : CHECK INPUT SIGNAL FOR TCM.

Measure signal voltage for TCM while removing the fuse from FWD switch connector.

Connector & terminal

(B55) No. 14 (+) — Chassis ground (-):



- CHECK** : Is the voltage between 6 and 9.1 V in FWD switch while removing?
- YES** : Go to step 9P6.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9P6 : CHECK FWD INDICATOR LIGHT.

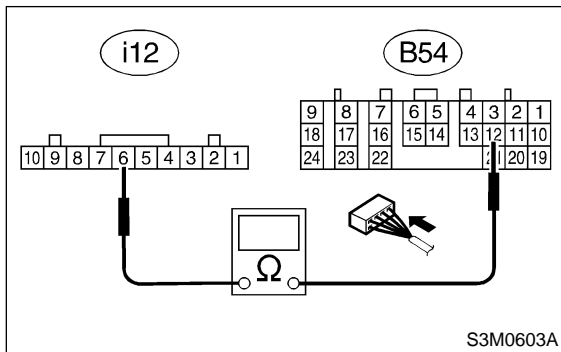
- 1) Turn ignition switch to OFF.
- 2) Remove combination meter.
- 3) Remove FWD indicator light bulb from combination meter.

- CHECK** : *Is FWD indicator light bulb OK?*
YES : Go to step **9P7**.
NO : Replace FWD indicator light bulb.

9P7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from combination meter.
- 3) Measure resistance of harness between TCM and combination meter connector.

Connector & terminal
(B54) No. 12 — (i12) No. 6:

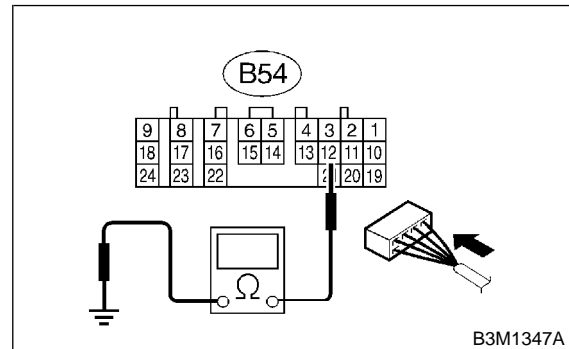


- CHECK** : *Is the resistance less than 1 Ω?*
YES : Go to step **9P8**.
NO : Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.

9P8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short.

Connector & terminal
(B54) No. 12 — Chassis ground:

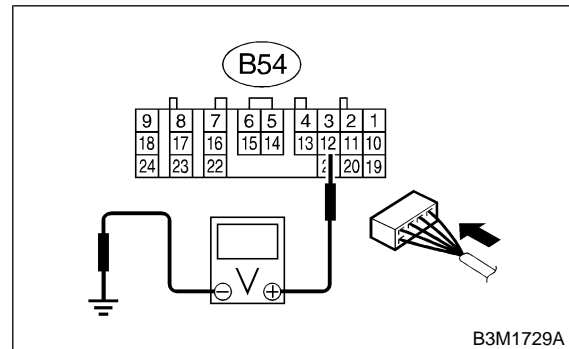


- CHECK** : *Is the resistance more than 1 MΩ?*
YES : Go to step **9P9**.
NO : Repair short circuit in harness between TCM and combination meter connector.

9P9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to combination meter.
- 3) Turn ignition switch to ON.
- 4) Measure signal voltage for TCM while installing and removing the fuse to FWD switch connector.

Connector & terminal
(B54) No. 12 — Chassis ground:



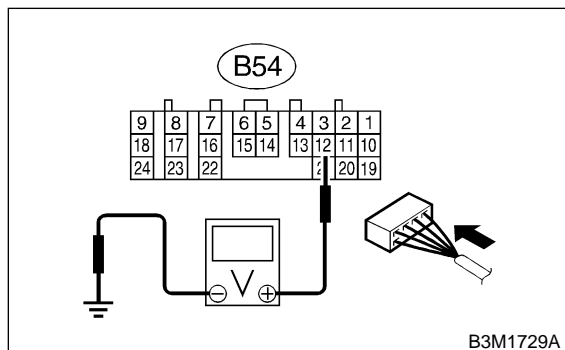
- CHECK** : *Is the voltage less than 1 V in FWD switch while installing?*
YES : Go to step **9P10**.
NO : Go to step **9P11**.

9P10 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure signal voltage for TCM while removing the fuse from FWD switch connector.

Connector & terminal

(B54) No. 12 — Chassis ground:



CHECK : *Is the voltage more than 9 V in FWD switch while removing?*

YES : Go to step **9P11**.

NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9P11 : CHECK POOR CONTACT.

CHECK : *Is there poor contact in FWD switch circuit?*

YES : Repair poor contact.

NO : Replace TCM. <Ref. to 3-2 [W23A0].>

Q: CHECK BRAKE SWITCH.**9Q1 : CHECK BRAKE SWITCH.**

CHECK : *When the brake pedal is depressed, does LED light up?*

YES : Go to step ABS SWITCH. <Ref. to 3-2 [T9R0].>

NO : Check brake switch circuit. <Ref. to 2-7 [T10AW0].>

R: CHECK ABS SWITCH.**9R1 : CHECK ABS SWITCH.**

CHECK : *Does the LED of ABS switch light up?*

YES : Check ABS switch circuit. <Ref. to 4-4 [T10Y0].> and <Ref. to 4-4 [T10Z0].>

NO : Go to step CRUISE CONTROL SWITCH. <Ref. to 3-2 [T9S0].>

S: CHECK CRUISE CONTROL SWITCH.**9S1 : CHECK CRUISE CONTROL SWITCH.**

CHECK : *When cruise control is set, does LED light up?*

YES : Go to step INHIBITOR SWITCH. <Ref. to 3-2 [T9T0].>

NO : Check cruise control. <Ref. to 6-2 [T2A0].>

T: CHECK INHIBITOR SWITCH.

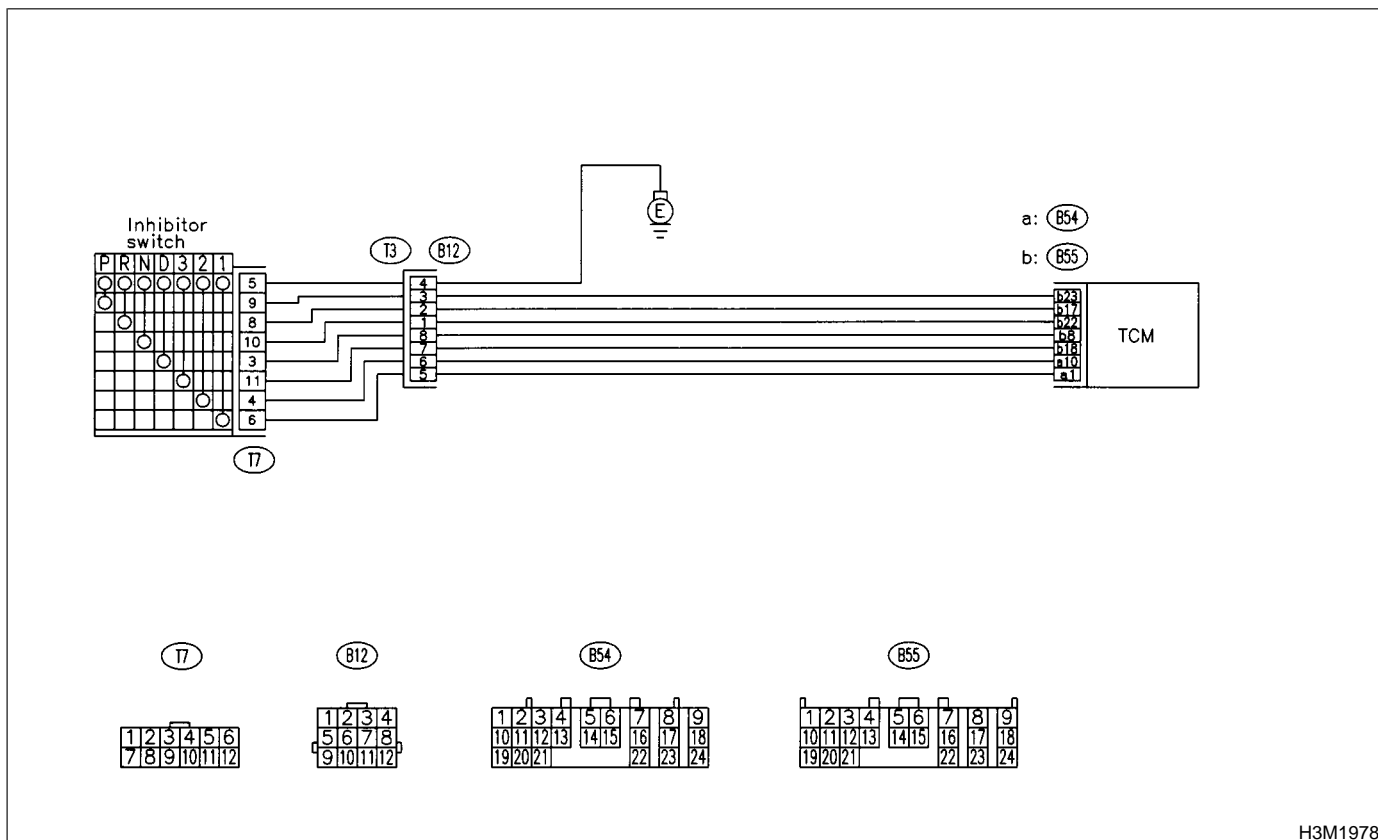
DIAGNOSIS:

Input signal circuit of inhibitor switch is open or shorted.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when select lever is in "3" range.
- Engine brake is not effected when select lever is in "2" range.
- Engine brake is not effected when select lever is in "1" range.

WIRING DIAGRAM:



H3M1978

9T1 : CHECK "P" RANGE SWITCH.

- CHECK** : When "P" range is selected, does LED light up?
- YES** : Go to step 9T2.
- NO** : Go to step 9T15.

9T2 : CHECK "P" RANGE SWITCH.

- CHECK** : When the "R" range is selected, does "P" range LED light up?
- YES** : Go to step 9T20.
- NO** : Go to step 9T3.

9T3 : CHECK "R" RANGE SWITCH.

- CHECK** : When the "R" range is selected, does LED light up?
- YES** : Go to step 9T4.
- NO** : Go to step 9T22.

9T4 : CHECK "R" RANGE SWITCH.

- CHECK** : When the "N" range is selected, does "R" range LED light up?
- YES** : Go to step 9T26.
- NO** : Go to step 9T5.

9T5 : CHECK "N" RANGE SWITCH.

CHECK : *When the "N" range is selected, does LED light up?*

YES : Go to step 9T6.

NO : Go to step 9T28.

9T6 : CHECK "N" RANGE SWITCH.

CHECK : *When the "D" range is selected, does "N" range LED light up?*

YES : Go to step 9T32.

NO : Go to step 9T7.

9T7 : CHECK "D" RANGE SWITCH.

CHECK : *When the "D" range is selected, does LED light up?*

YES : Go to step 9T8.

NO : Go to step 9T34.

9T8 : CHECK "D" RANGE SWITCH.

CHECK : *When the "3" range is selected, does "D" range LED light up?*

YES : Go to step 9T38.

NO : Go to step 9T9.

9T9 : CHECK "3" RANGE SWITCH.

CHECK : *When the "3" range is selected, does LED light up?*

YES : Go to step 9T10.

NO : Go to step 9T40.

9T10 : CHECK "3" RANGE SWITCH.

CHECK : *When the "2" range is selected, does "3" range LED light up?*

YES : Go to step 9T11.

NO : Go to step 9T44.

9T11 : CHECK "2" RANGE SWITCH.

CHECK : *When the "2" range is selected, does LED light up?*

YES : Go to step 9T12.

NO : Go to step 9T46.

9T12 : CHECK "2" RANGE SWITCH.

CHECK : *When the "1" range is selected, does "2" range LED light up?*

YES : Go to step 9T13.

NO : Go to step 9T50.

9T13 : CHECK "1" RANGE SWITCH.

CHECK : *When the "1" range is selected, does LED light up?*

YES : Go to step 9T14.

NO : Go to step 9T52.

9T14 : CHECK "1" RANGE SWITCH.

CHECK : *When the "P" range is selected, does "1" range LED light UP?*

YES : Go to step 9T56.

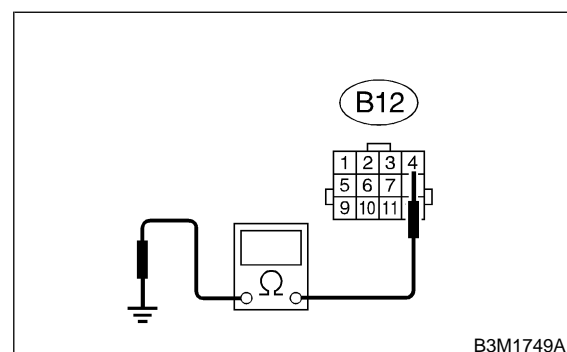
NO : Go to step SHIFT SOLENOID 1. <Ref. to 3-2 [T9U0].>

9T15 : CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between inhibitor switch and chassis ground.

Connector & terminal

(B12) No. 4 — Chassis ground:



CHECK : *Is the resistance less than 1 Ω?*

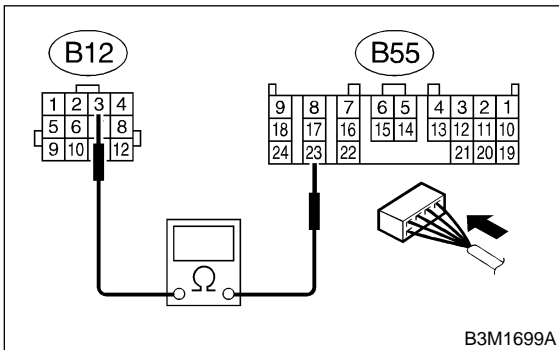
YES : Go to step 9T16.

NO : Repair open circuit in harness between inhibitor switch harness.

9T16 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 23 — (B12) No. 3:

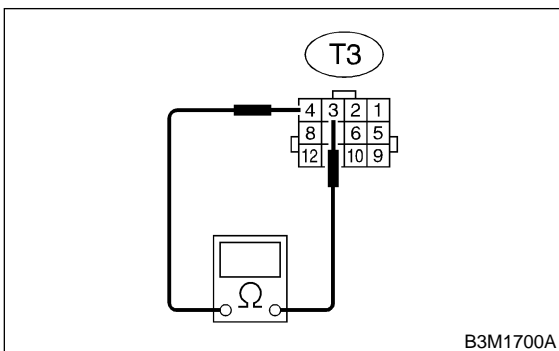


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9T17.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T17 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Connector & terminal
(T3) No. 4 — No. 3:

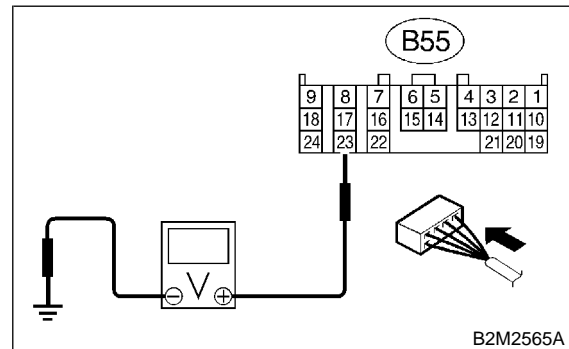


- CHECK** : Is the resistance less than 1 Ω in "P" range?
- YES** : Go to step 9T18.
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>

9T18 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 23 (+) — Chassis ground (-):

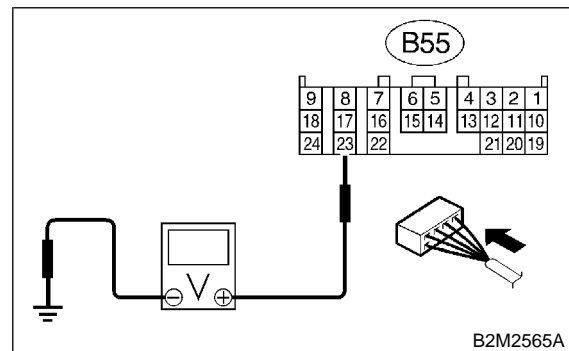


- CHECK** : Is the voltage less than 1 V in "P" range?
- YES** : Go to step 9T19.
- NO** : Go to step 9T58.

9T19 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 23 (+) — Chassis ground (-):

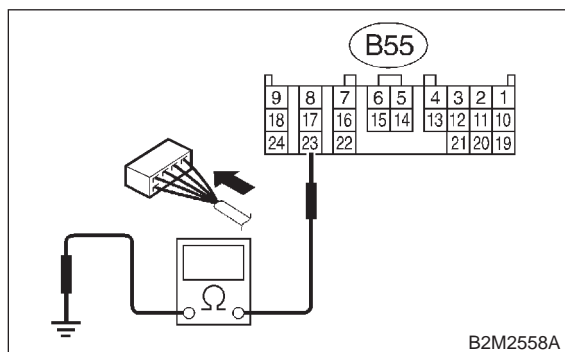


- CHECK** : Is the voltage more than 8 V in other ranges (except "N" range)?
- YES** : Go to step 9T58.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9T20 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from inhibitor switch.
- 3) Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 23 — Chassis ground:

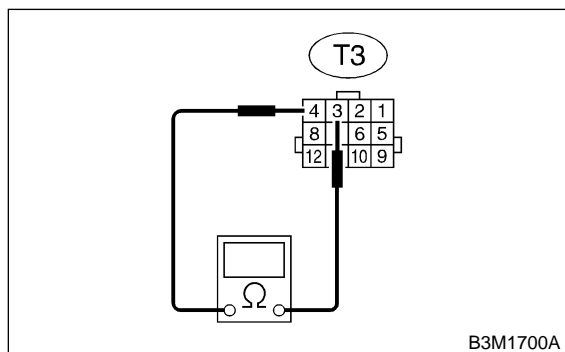


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 9T21.
- NO** : Repair ground short circuit in “P” range circuit.

9T21 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal
(T3) No. 4 — No. 3:

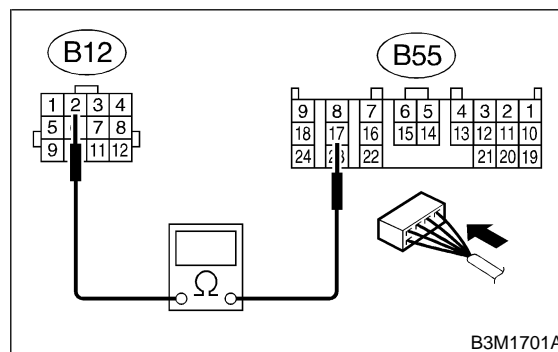


- CHECK** : Is the resistance more than 1 MΩ in other ranges (except “N” range)?
- YES** : Replace TCM. <Ref. to 3-2 [W23A0].>
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T22 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 17 — (B12) No. 2:

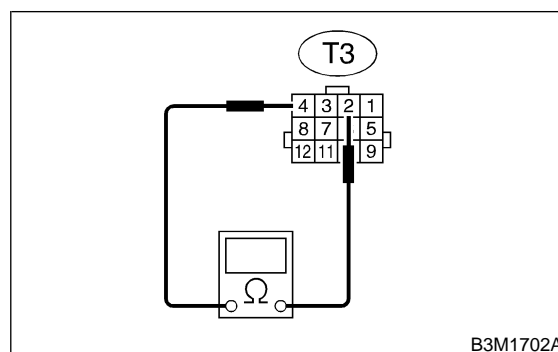


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9T23.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T23 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal
(T3) No. 2 — No. 4:

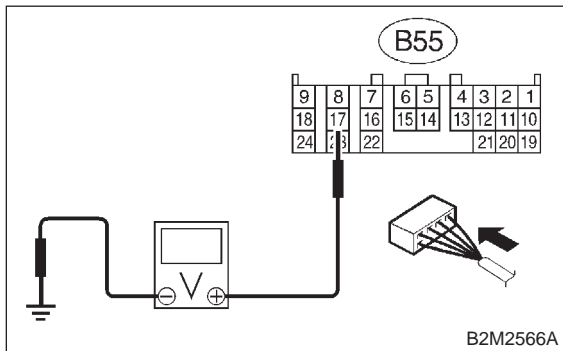


- CHECK** : Is the resistance less than 1 Ω in “R” range?
- YES** : Go to step 9T24.
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T24 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 17 (+) — Chassis ground (-):

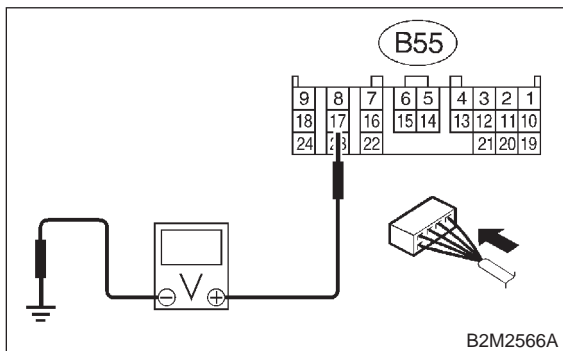


- CHECK** : Is the voltage less than 1 V in “R” range?
- YES** : Go to step 9T25.
- NO** : Go to step 9T58.

9T25 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 17 (+) — Chassis ground (-):

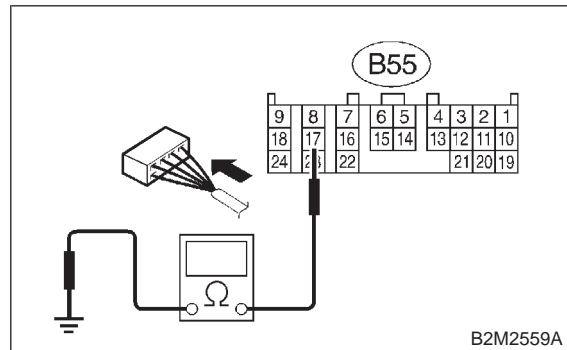


- CHECK** : Is the voltage more than 9.5 V in other ranges?
- YES** : Go to step 9T58.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9T26 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 17 — Chassis ground:

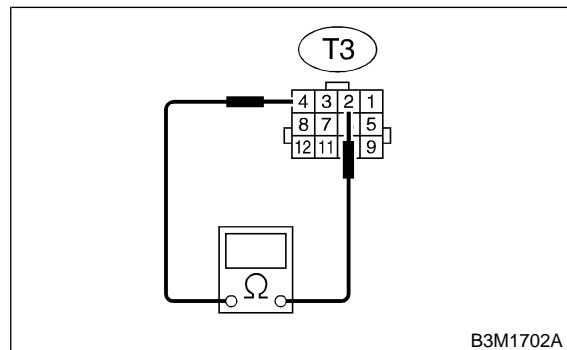


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 9T27.
- NO** : Repair ground short circuit in “R” range circuit.

9T27 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal
(T3) No. 2 — No. 4:

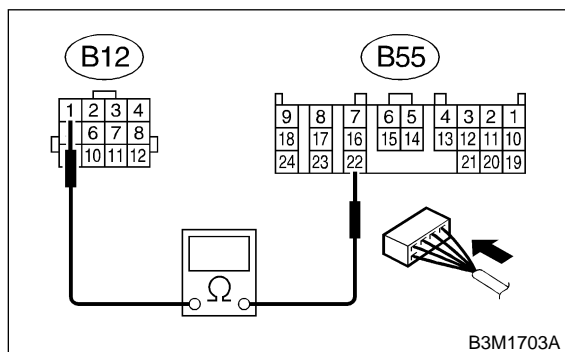


- CHECK** : Is the resistance more than 1 MΩ in other ranges?
- YES** : Replace TCM. <Ref. to 3-2 [W23A0].>
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T28 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 22 (+) — (B12) No. 1:

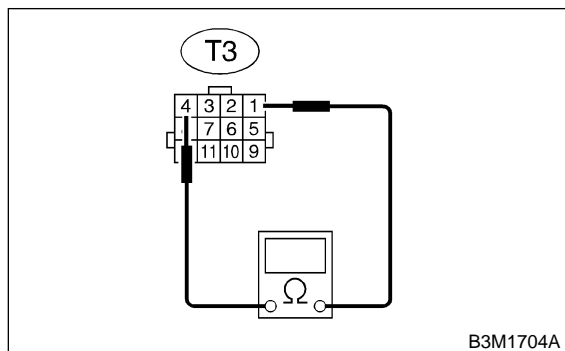


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9T29.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T29 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Connector & terminal
(T3) No. 4 — No. 1:

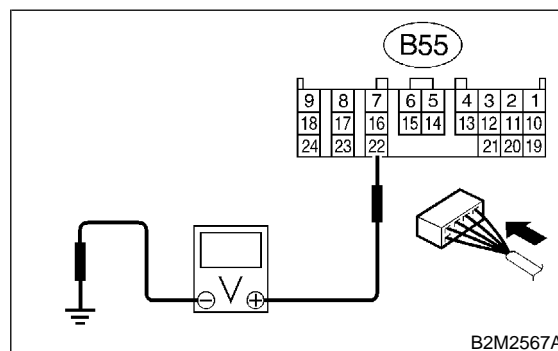


- CHECK** : Is the resistance less than 1 Ω in "N" range?
- YES** : Go to step 9T30.
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T30 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 22 (+) — Chassis ground (-):

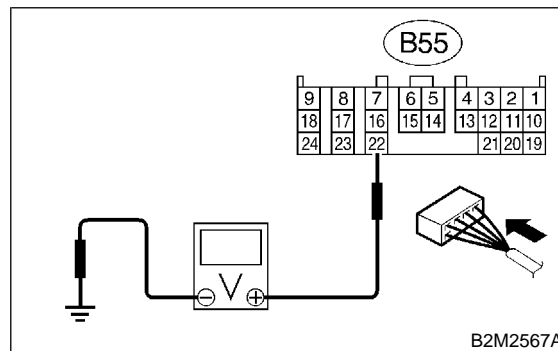


- CHECK** : Is the voltage less than 1 V in "N" range?
- YES** : Go to step 9T31.
- NO** : Go to step 9T58.

9T31 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 22 (+) — Chassis ground (-):

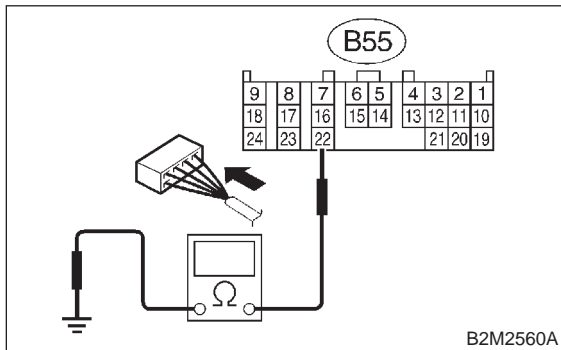


- CHECK** : Is the voltage more than 8 V in other ranges (except "P" range)?
- YES** : Go to step 9T58.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9T32 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from inhibitor switch.
- 3) Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 22 — Chassis ground:

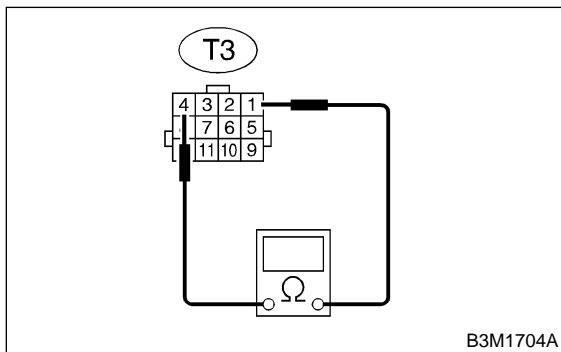


- CHECK** : **Is the resistance more than 1 MΩ?**
- YES** : Go to step **9T33**.
- NO** : Repair ground short circuit in “N” range circuit.

9T33 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal
(T3) No. 1 — No. 4:

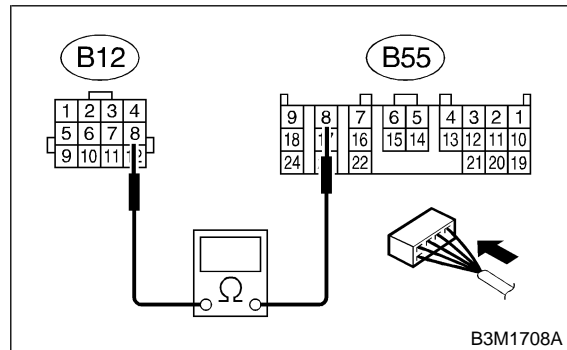


- CHECK** : **Is the resistance more than 1 MΩ in other ranges (except “P” range)?**
- YES** : Replace TCM. <Ref. to 3-2 [W23A0].>
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T34 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 8 — (B12) No. 8:

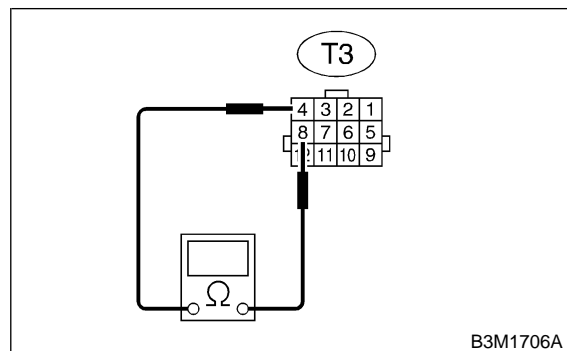


- CHECK** : **Is the resistance less than 1 Ω?**
- YES** : Go to step **9T35**.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T35 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal
(T3) No. 4 — No. 8:

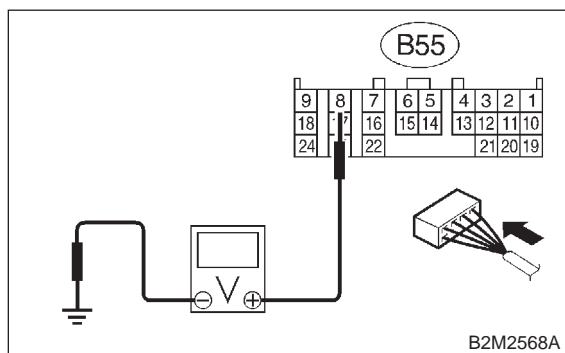


- CHECK** : **Is the resistance less than 1 Ω in “D” range?**
- YES** : Go to step **9T36**.
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T36 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 8 (+) — Chassis ground (-):

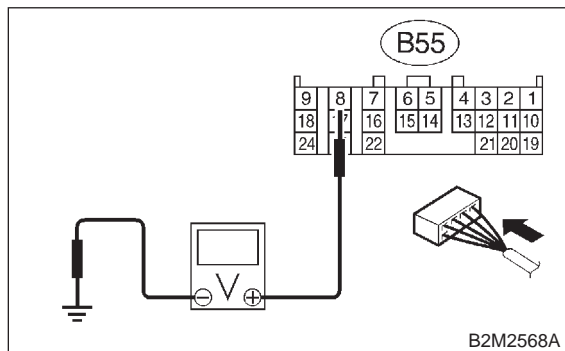


- CHECK** : Is the voltage less than 1 V in “D” range?
- YES** : Go to step 9T37.
- NO** : Go to step 9T58.

9T37 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 8 (+) — Chassis ground (-):

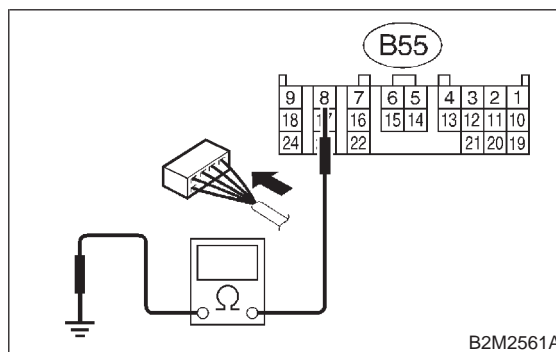


- CHECK** : Is the voltage more than 9.5 V in other ranges?
- YES** : Go to step 9T58.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9T38 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from inhibitor switch.
- 3) Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 8 — Chassis ground:

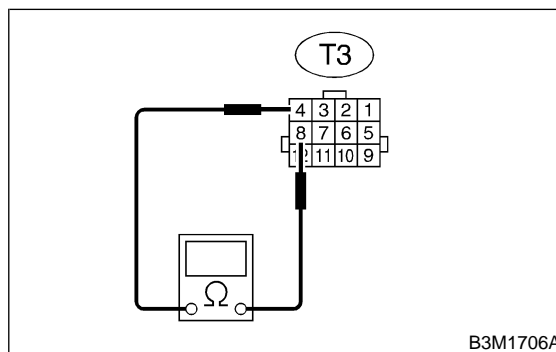


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 9T39.
- NO** : Repair ground short circuit in “D” range circuit.

9T39 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal
(T3) No. 4 — No. 8:

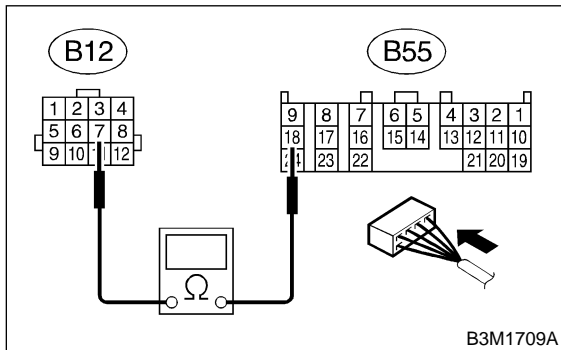


- CHECK** : Is the resistance more than 1 MΩ in other ranges?
- YES** : Replace TCM. <Ref. to 3-2 [W23A0].>
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T40 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B55) No. 18 — (B12) No. 7:

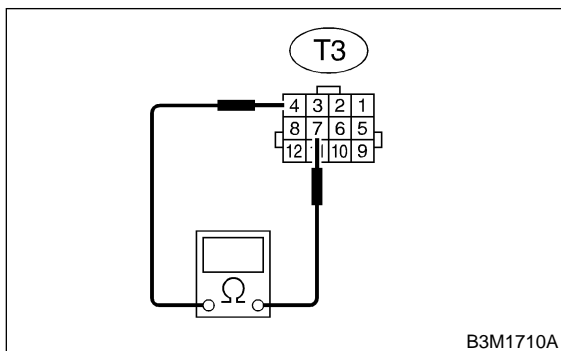


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9T41.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T41 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Connector & terminal
(T3) No. 4 — No. 7:

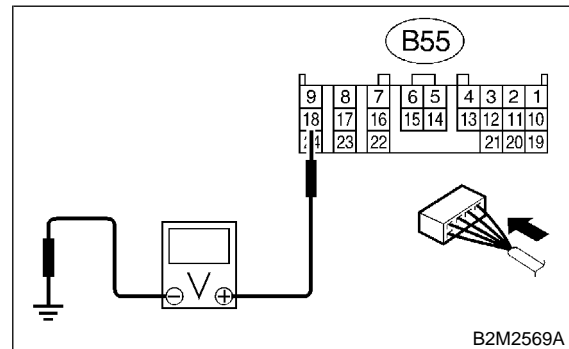


- CHECK** : Is the resistance less than 1 Ω in "3" range?
- YES** : Go to step 9T42.
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-2 [W2A0].>

9T42 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 18 (+) — Chassis ground (-):

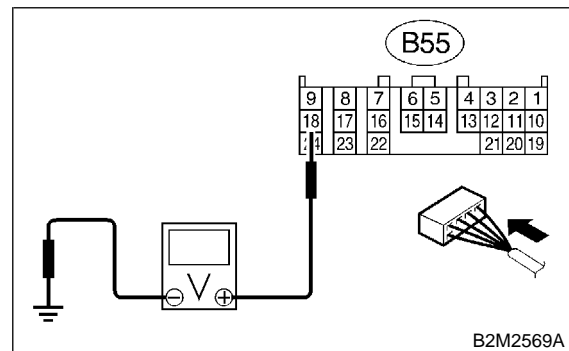


- CHECK** : Is the voltage less than 1 V in "3" range?
- YES** : Go to step 9T43.
- NO** : Go to step 9T58.

9T43 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 18 (+) — Chassis ground (-):

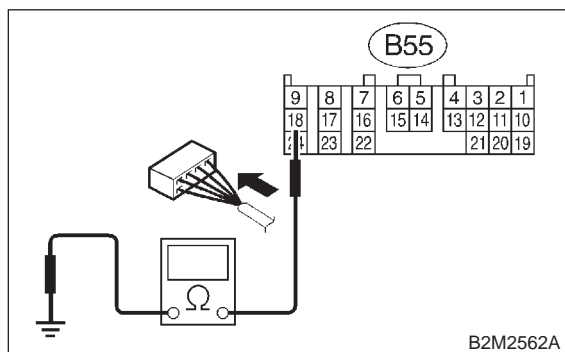


- CHECK** : Is the voltage more than 9.5 V in other ranges?
- YES** : Go to step 9T58.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9T44 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 18 — Chassis ground:

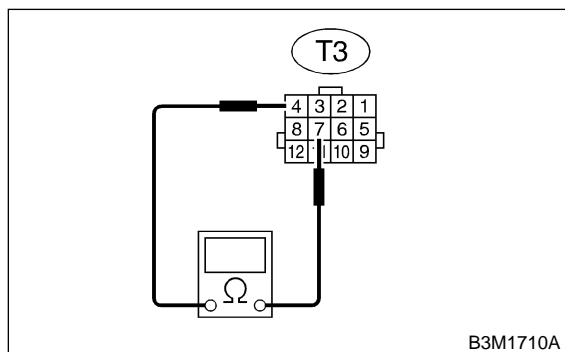


- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 9T45.
- NO** : Repair ground short circuit in “3” range circuit.

9T45 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal
(T3) No. 4 — No. 7:

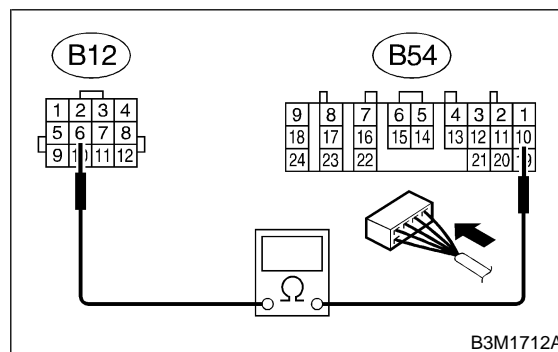


- CHECK** : Is the resistance more than 1 MΩ in other ranges?
- YES** : Replace TCM. <Ref. to 3-2 [W23A0].>
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T46 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B54) No. 10 — (B12) No. 6:

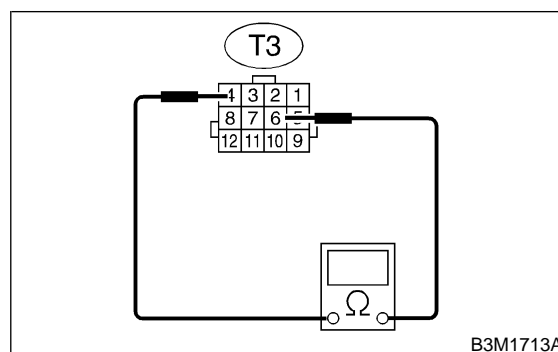


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9T47.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T47 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal
(T3) No. 6 — No. 4:



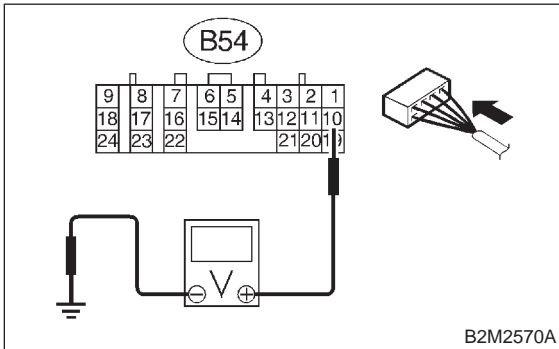
- CHECK** : Is the resistance less than 1 Ω in “2” range?
- YES** : Go to step 9T48.
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T48 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 10 (+) — Chassis ground (-):



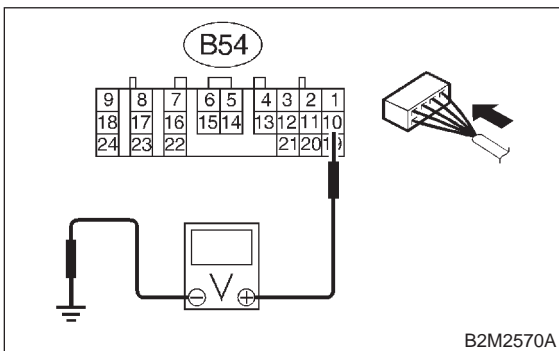
- CHECK** : Is the voltage less than 1 V in “2” range?
- YES** : Go to step 9T49.
- NO** : Go to step 9T58.

9T49 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal

(B54) No. 10 (+) — Chassis ground (-):



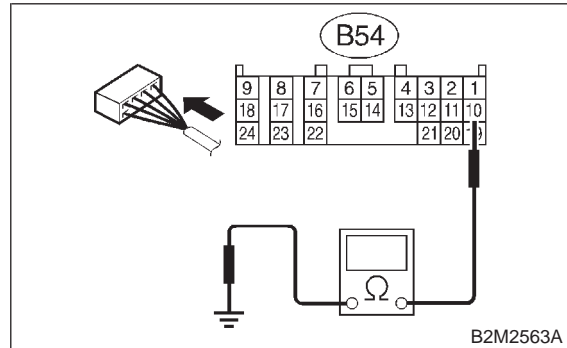
- CHECK** : Is the voltage more than 9.5 V in other ranges?
- YES** : Go to step 9T58.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9T50 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 10 — Chassis ground:



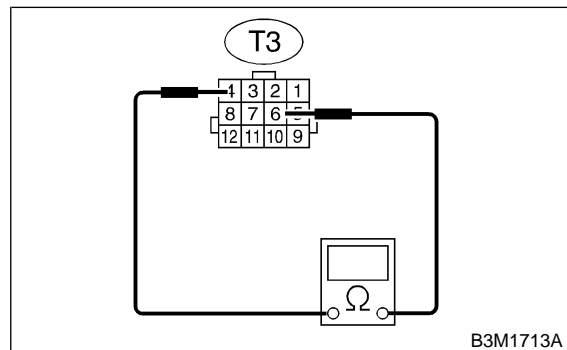
- CHECK** : Is the resistance more than 1 MΩ?
- YES** : Go to step 9T51.
- NO** : Repair ground short circuit in “2” range circuit.

9T51 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal

(T3) No. 6 — No. 4:

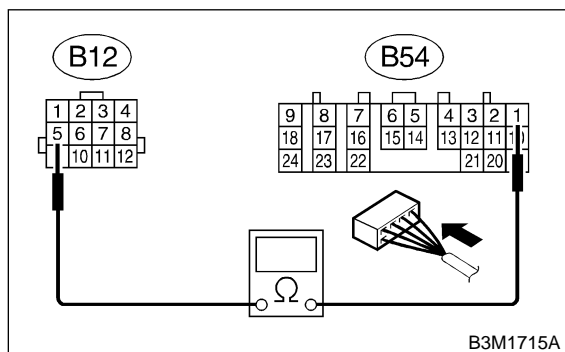


- CHECK** : Is the resistance more than 1 MΩ in other ranges?
- YES** : Replace TCM. <Ref. to 3-2 [W23A0].>
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T52 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and inhibitor switch connector.

Connector & terminal
(B54) No. 1 — (B12) No. 5:

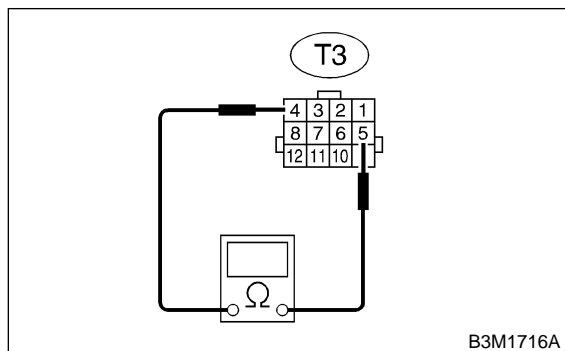


- CHECK** : Is the resistance less than 1 Ω?
- YES** : Go to step 9T53.
- NO** : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T53 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Connector & terminal
(T3) No. 5 — No. 4:

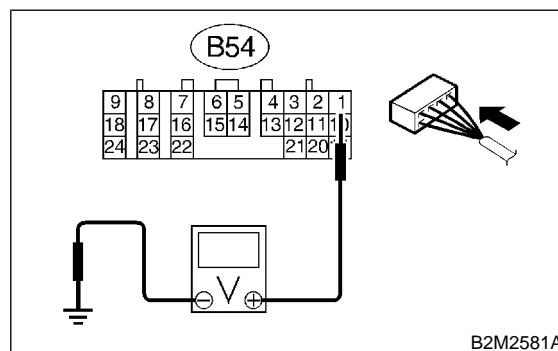


- CHECK** : Is the resistance less than 1 Ω in "1" range?
- YES** : Go to step 9T54.
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T54 : CHECK INPUT SIGNAL FOR TCM.

- 1) Turn ignition switch to OFF.
- 2) Connect connector to inhibitor switch.
- 3) Turn ignition switch to ON.
- 4) Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 1 (+) — Chassis ground (-):

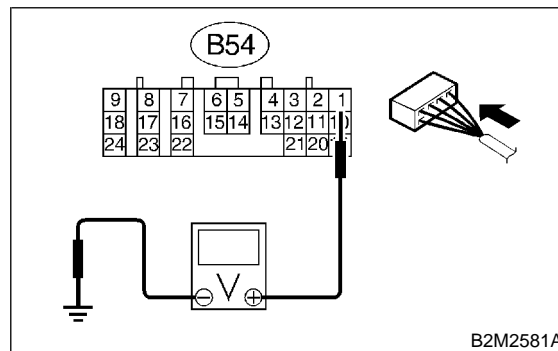


- CHECK** : Is the voltage less than 1 V in "1" range?
- YES** : Go to step 9T55.
- NO** : Go to step 9T58.

9T55 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 1 (+) — Chassis ground (-):



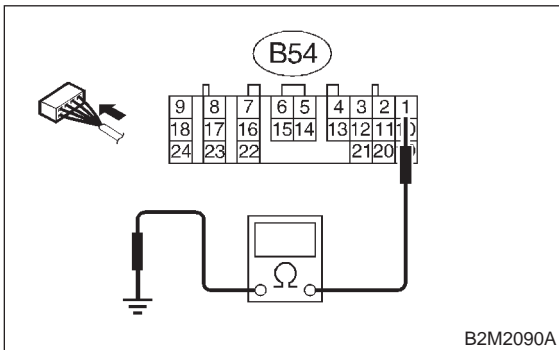
- CHECK** : Is the voltage more than 9.5 V in other ranges?
- YES** : Go to step 9T58.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

9T56 : CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from inhibitor switch.
- 3) Measure resistance of harness between TCM and chassis ground.

Connector & terminal

(B54) No. 1 — Chassis ground:



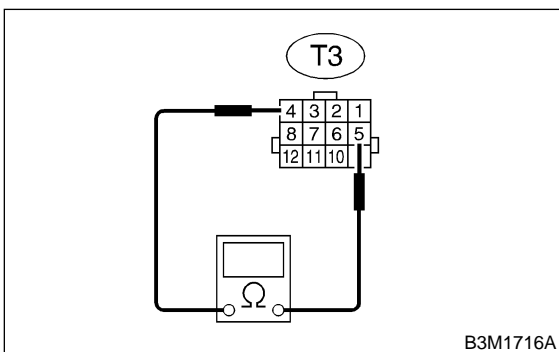
- CHECK** : *Is the resistance more than 1 MΩ?*
- YES** : Go to step **9T57**.
- NO** : Repair ground short circuit in “1” range circuit.

9T57 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Connector & terminal

(T3) No. 5 — No. 4:



- CHECK** : *Is the resistance more than 1 MΩ in other ranges?*
- YES** : Replace TCM. <Ref. to 3-2 [W23A0].>
- NO** : Adjust inhibitor switch and select cable <Ref. to 3-2 [W200].> and <Ref. to 3-3 [W2A0].>.

9T58 : CHECK POOR CONTACT.

- CHECK** : *Is there poor contact in inhibitor switch circuit?*
- YES** : Repair poor contact.
- NO** : Replace TCM. <Ref. to 3-2 [W23A0].>

U: CHECK SHIFT SOLENOID 1.

9U1 : CHECK SHIFT SOLENOID 1.

- CHECK** : *Does the LED of shift solenoid 1 light up?*
- YES** : Go to step SHIFT SOLENOID 2. <Ref. to 3-2 [T9V0].>
- NO** : Check shift solenoid 1 circuit. <Ref. to 3-2 [T8J0].>

V: CHECK SHIFT SOLENOID 2.

9V1 : CHECK SHIFT SOLENOID 2.

- CHECK** : *Does the LED of shift solenoid 2 light up?*
- YES** : Go to step TORQUE CONTROL 1 SIGNAL. <Ref. to 3-2 [T9W0].>
- NO** : Check shift solenoid 2 circuit. <Ref. to 3-2 [T8K0].>

W: CHECK TORQUE CONTROL 1 SIGNAL.

9W1 : CHECK TORQUE CONTROL 1 SIGNAL.

Turn ignition switch to ON (engine ON).

- CHECK** : *Does the LED of torque control 1 signal light up?*
- YES** : Go to step TORQUE CONTROL 2 SIGNAL. <Ref. to 3-2 [T9X0].>
- NO** : Check torque control 1 signal circuit. <Ref. to 3-2 [T8H0].>

X: CHECK TORQUE CONTROL 2 SIGNAL.

9X1 : CHECK TORQUE CONTROL 2 SIGNAL.

Turn ignition switch to ON (engine ON).

- CHECK** : *Does the LED of torque control 2 signal illuminate?*
- YES** : Go to step 2-4 BRAKE TIMING SOLENOID. <Ref. to 3-2 [T9Y0].>
- NO** : Check torque control 2 signal circuit. <Ref. to 3-2 [T8H0].>

Y: CHECK 2-4 BRAKE TIMING SOLENOID.

9Y1 : CHECK 2-4 BRAKE TIMING SOLENOID.

Turn ignition switch to ON, and select 1 range.

- CHECK** : *Does the LED of 2-4 brake timing solenoid illuminate?*
- YES** : Go to step LOW CLUTCH TIMING SOLENOID. <Ref. to 3-2 [T9Z0].>
- NO** : Check 2-4 brake timing solenoid circuit. <Ref. to 3-2 [T8M0].>

Z: CHECK LOW CLUTCH TIMING SOLENOID.

9Z1 : CHECK LOW CLUTCH TIMING SOLENOID.

Turn ignition switch to ON, and select 2 range.

- CHECK** : *Does the LED of low clutch timing solenoid illuminate?*
- YES** : Go to step DIAGNOSIS LIGHT. <Ref. to 3-2 [T9AA0].>
- NO** : Check low clutch timing solenoid circuit. <Ref. to 3-2 [T8L0].>

AA: CHECK DIAGNOSIS LIGHT.

9AA1 : CHECK DIAGNOSIS LIGHT.

Turn ignition switch to ON (engine OFF).

- CHECK** : *Does diagnosis light illuminate?*
- YES** : Go to step FWD LIGHT. <Ref. to 3-2 [T9AB0].>
- NO** : Check diagnosis light circuit.

AB: CHECK FWD LIGHT.

9AB1 : CHECK FWD LIGHT.

- CHECK** : *Does the LED of FWD light illuminate?*
- YES** : Check FWD switch circuit. <Ref. to 3-2 [T9P0].>
- NO** : Go to step General Diagnostic Table. <Ref. to 3-2 [T1000].>

10. General Diagnostic Table

Symptom	Problem parts
Starter does not rotate when select lever is in "P" or "N"; starter rotates when select lever is in "R", "D", "3" or "2".	<ol style="list-style-type: none"> 1) Inhibitor switch 2) Select cable 3) Select lever 4) Starter motor and harness
Abnormal noise when select lever is in "P" or "N".	<ol style="list-style-type: none"> 1) Strainer 2) Transfer duty solenoid 3) Oil pump 4) Drive plate 5) ATF level too high or too low
Hissing noise occurs during standing start.	<ol style="list-style-type: none"> 1) Strainer 2) ATF level too high or too low
Noise occurs while driving in "D1".	<ol style="list-style-type: none"> 1) Final gear 2) Planetary gear
Noise occurs while driving in "D2".	<ol style="list-style-type: none"> 3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in "D3".	<ol style="list-style-type: none"> 1) Final gear 2) Low & reverse brake 3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in "D4".	<ol style="list-style-type: none"> 1) Final gear 2) Low & reverse brake 3) Planetary gear 4) Reduction gear 5) Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	<ol style="list-style-type: none"> 1) Control valve 2) Lock-up damper 3) Engine performance 4) Input shaft
Vehicle moves when select lever is in "N".	<ol style="list-style-type: none"> 1) Control module 2) Low clutch
Shock occurs when select lever is moved from "N" to "D".	<ol style="list-style-type: none"> 1) Control module 2) Harness 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from "N" to "D".	<ol style="list-style-type: none"> 1) Control valve 2) Low clutch 3) Line pressure duty solenoid 4) Seal ring 5) Front gasket transmission case
Shock occurs when select lever is moved from "N" to "R".	<ol style="list-style-type: none"> 1) Control module 2) Harness 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from "N" to "R".	<ol style="list-style-type: none"> 1) Control valve 2) Low & reverse clutch 3) Reverse clutch 4) Line pressure duty solenoid 5) Seal ring 6) Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	<ol style="list-style-type: none"> 1) Parking brake mechanism 2) Planetary gear

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	<ol style="list-style-type: none"> 1) Strainer 2) Line pressure duty solenoid 3) Control valve 4) Drive pinion 5) Hypoid gear 6) Axle shaft 7) Differential gear 8) Oil pump 9) Input shaft 10) Output shaft 11) Planetary gear 12) Drive plate 13) ATF level too low 14) Front gasket transmission case
Vehicle does not start in "R" range only (engine revving up).	<ol style="list-style-type: none"> 1) Select cable 2) Select lever 3) Control valve 4) Low & reverse clutch 5) Reverse clutch
Vehicle does not start in "R" range only (engine stalls).	<ol style="list-style-type: none"> 1) Low clutch 2) 2-4 brake 3) Planetary gear 4) Parking brake mechanism
Vehicle does not start in "D", "3" range only (engine revving up).	<ol style="list-style-type: none"> 1) Low clutch 2) One-way clutch
Vehicle does not start in "D", "3" or "2" range only (engine revving up).	<ol style="list-style-type: none"> 1) Low clutch
Vehicle does not start in "D", "3" or "2" range only (engine stalls).	<ol style="list-style-type: none"> 1) Reverse clutch
Vehicle starts in "R" range only (engine revving up).	<ol style="list-style-type: none"> 1) Control valve
Acceleration during standing starts is poor (high stall rpm).	<ol style="list-style-type: none"> 1) Control valve 2) Low clutch 3) Reverse clutch 4) ATF level too low 5) Front gasket transmission case 6) Differential gear oil level too high or too low
Acceleration during standing starts is poor (low stall rpm).	<ol style="list-style-type: none"> 1) Oil pump 2) Torque converter one-way clutch 3) Engine performance
Acceleration is poor when select lever is in "D", "3" or "2" range (normal stall rpm).	<ol style="list-style-type: none"> 1) Control module 2) Control valve 3) High clutch 4) 2-4 brake 5) Planetary gear
Acceleration is poor when select lever is in "R" (normal stall rpm).	<ol style="list-style-type: none"> 1) Control valve 2) High clutch 3) 2-4 brake 4) Planetary gear
No shift occurs from 1st to 2nd gear.	<ol style="list-style-type: none"> 1) Control module 2) Vehicle speed sensor 1 (Rear) 3) Vehicle speed sensor 2 (Front) 4) Throttle position sensor 5) Shift solenoid 1 6) Control valve 7) 2-4 brake
No shift occurs from 2nd to 3rd gear.	<ol style="list-style-type: none"> 1) Control module 2) Control valve 3) High clutch 4) Shift solenoid 2

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	<ol style="list-style-type: none"> 1) Control module 2) Shift solenoid 1 3) ATF temperature sensor 4) Control valve 5) 2-4 brake
Engine brake is not effected when select lever is in "3" range.	<ol style="list-style-type: none"> 1) Inhibitor switch 2) Control module 3) Throttle position sensor 4) Control valve
Engine brake is not effected when select lever is in "3" or "2" range.	<ol style="list-style-type: none"> 1) Control valve
Engine brake is not effected when select lever is in "1" range.	<ol style="list-style-type: none"> 1) Control valve 2) Low & reverse brake
Shift characteristics are erroneous.	<ol style="list-style-type: none"> 1) Inhibitor switch 2) Control module 3) Vehicle speed sensor 1 (Front) 4) Vehicle speed sensor 2 (Rear) 5) Throttle position sensor 6) Control valve 7) Ground earth
No lock-up occurs.	<ol style="list-style-type: none"> 1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Control valve 5) Lock-up facing 6) Engine speed signal
Parking brake is not effected.	<ol style="list-style-type: none"> 1) Select cable
Shift lever cannot be moved or is hard to move from "P" range.	<ol style="list-style-type: none"> 2) Select lever 3) Parking mechanism
ATF spurts out.	<ol style="list-style-type: none"> 1) ATF level too high
Differential oil spurts out.	<ol style="list-style-type: none"> 1) Differential gear oil too high
Differential oil level changes excessively.	<ol style="list-style-type: none"> 1) Seal pipe 2) Double oil seal
Odor is produced from ATF supply pipe.	<ol style="list-style-type: none"> 1) High clutch 2) 2-4 brake 3) Low & reverse clutch 4) Reverse clutch 5) Lock-up facing 6) ATF deterioration
Shock occurs from 1st to 2nd gear.	<ol style="list-style-type: none"> 1) Control module 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake 8) ATF deterioration 9) Engine performance 10) Dropping resistor 11) 2-4 brake timing solenoid
Slippage occurs from 1st to 2nd gear.	<ol style="list-style-type: none"> 1) Control module 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake 8) 2-4 brake timing solenoid 9) High clutch

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	1) Control module 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) High clutch 8) 2-4 brake 9) ATF deterioration 10) Engine performance 11) 2-4 brake timing solenoid
Slippage occurs from 2nd to 3rd gear.	1) Control module 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) High clutch 8) 2-4 brake 9) 2-4 brake timing solenoid
Shock occurs from 3rd to 4th gear.	1) Control module 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake timing solenoid 8) 2-4 brake 9) ATF deterioration 10) Engine performance 11) Low clutch timing solenoid 12) Low clutch
Slippage occurs from 3rd to 4th gear.	1) Control module 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake 8) 2-4 brake timing solenoid
Shock occurs when select lever is moved from "3" to "2" range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) 2-4 brake duty solenoid 7) 2-4 brake 8) ATF deterioration 9) 2-4 brake timing solenoid
Shock occurs when select lever is moved from "D" to "1" range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) ATF deterioration 7) 2-4 brake duty solenoid 8) 2-4 brake timing solenoid 9) Low clutch timing solenoid

Symptom	Problem parts
Shock occurs when select lever is moved from "2" to "1" range.	<ol style="list-style-type: none"> 1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) Low & reverse clutch 7) ATF deterioration 8) 2-4 brake duty solenoid 9) 2-4 brake timing solenoid 10) Low clutch timing solenoid
Shock occurs when accelerator pedal is released at medium speeds.	<ol style="list-style-type: none"> 1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) Lock-up damper 7) Engine performance 8) 2-4 brake duty solenoid 9) 2-4 brake timing solenoid 10) Low clutch timing solenoid
Vibration occurs during straight-forward operation.	<ol style="list-style-type: none"> 1) Control module 2) Lock-up duty solenoid 3) Lock-up facing 4) Lock-up damper
Vibration occurs during turns (tight corner "braking" phenomenon).	<ol style="list-style-type: none"> 1) Control module 2) Vehicle speed sensor 1 (Front) 3) Vehicle speed sensor 2 (Rear) 4) Throttle position sensor 5) ATF temperature sensor 6) Transfer clutch 7) Transfer valve 8) Transfer duty solenoid 9) ATF deterioration 10) Harness
Front wheel slippage occurs during standing starts.	<ol style="list-style-type: none"> 1) Control module 2) Vehicle speed sensor 2 (Front) 3) FWD switch 4) Throttle position sensor 5) ATF temperature sensor 6) Control valve 7) Transfer clutch 8) Transfer valve 9) Transfer pipe 10) Transfer duty solenoid
Vehicle is not set in FWD mode.	<ol style="list-style-type: none"> 1) Control module 2) FWD switch 3) Transfer clutch 4) Transfer valve 5) Transfer duty solenoid
Select lever is hard to move.	<ol style="list-style-type: none"> 1) Select cable 2) Select lever 3) Detent spring 4) Manual plate
Select lever is too high to move (unreasonable resistance).	<ol style="list-style-type: none"> 1) Detent spring 2) Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	<ol style="list-style-type: none"> 1) Select cable 2) Select lever 3) Detent spring 4) Manual plate

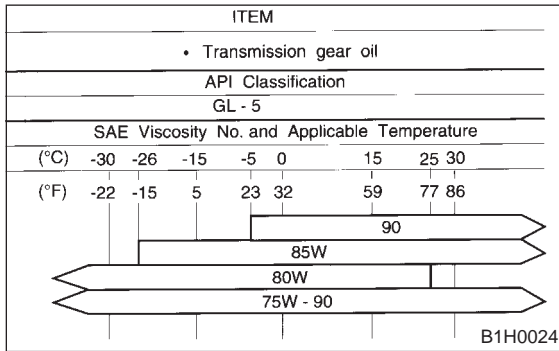
MEMO:

1. Manual Transmission and Differential

Item		Model	
		AWD	
		2500 cc	
Type		5-forward speeds with synchromesh and 1-reverse	
Transmission gear ratio	1st		3.545
	2nd		2.111
	3rd		1.448
	4th		1.088
	5th		0.780
	Reverse		3.333
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	4.111
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)
Transmission gear oil		GL-5	
Transmission oil capacity		3.5 ℓ (3.7 US qt, 3.1 Imp qt)	

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

Drive pinion shim adjustment

Hypoid gear backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

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

Selection of main shaft rear plate

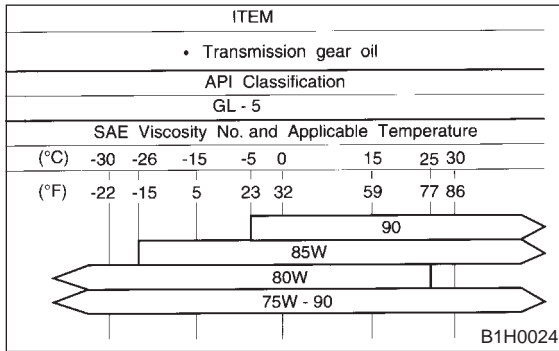
Main shaft rear plate		
Dimension "A" mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

1. Manual Transmission and Differential

Item		Model	
		AWD	
		2500 cc	
Type		5-forward speeds with synchromesh and 1-reverse	
Transmission gear ratio	1st		3.545
	2nd		2.111
	3rd		1.448
	4th		1.088
	5th		0.780
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		Gear ratio	4.111
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)
Transmission gear oil		GL-5	
Transmission oil capacity		3.5 ℓ (3.7 US qt, 3.1 Imp qt)	

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

Drive pinion shim adjustment

Hypoid gear backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

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

Selection of main shaft rear plate

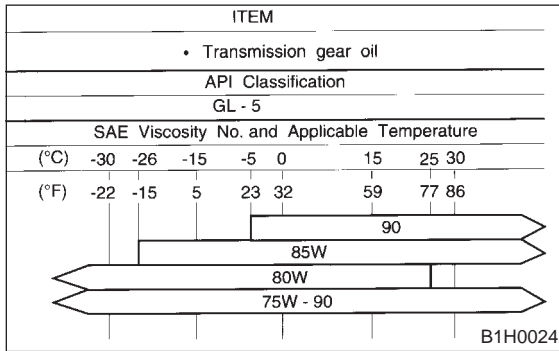
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Dimension "A" mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

1. Manual Transmission and Differential

Item		Model	
		AWD	
		2500 cc	
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Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	4.111
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		Gear ratio	1.000
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Transmission gear oil		GL-5	
Transmission oil capacity		3.5 ℓ (3.7 US qt, 3.1 Imp qt)	

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

Drive pinion shim adjustment

Hypoid gear backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

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

Selection of main shaft rear plate

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

4. Drive Pinion Assembly

Preload adjustment of thrust bearing
 Starting torque
 0.3 — 0.8 N·m (0.03 — 0.08 kg-m, 0.2 — 0.6 ft-lb)

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

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

5. Reverse Idler Gear

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

Reverse shifter lever		
Part No.	Mark	Remarks
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)	—	—

4. Drive Pinion Assembly

Preload adjustment of thrust bearing

Starting torque

0.3 — 0.8 N·m (0.03 — 0.08 kg-m, 0.2 — 0.6 ft-lb)

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Part No.	Thickness mm (in)
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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

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance

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803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

6. Shifter Fork and Rod

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

Rod end clearance

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

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 gear.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

Reverse check plate adjustment

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

6. Shifter Fork and Rod

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

Rod end clearance

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
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32812AA211	No mark	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in)

7. Transfer Case

Neutral position adjustment

Adjustment shim	
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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

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

0.05 — 0.30 mm (0.0020 — 0.0118 in)

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

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

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 — 0.25 mm (0 — 0.0098 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)

8. Extension Assembly

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

0.05 — 0.30 mm (0.0020 — 0.0118 in)

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

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

Bevel gear to pinion backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

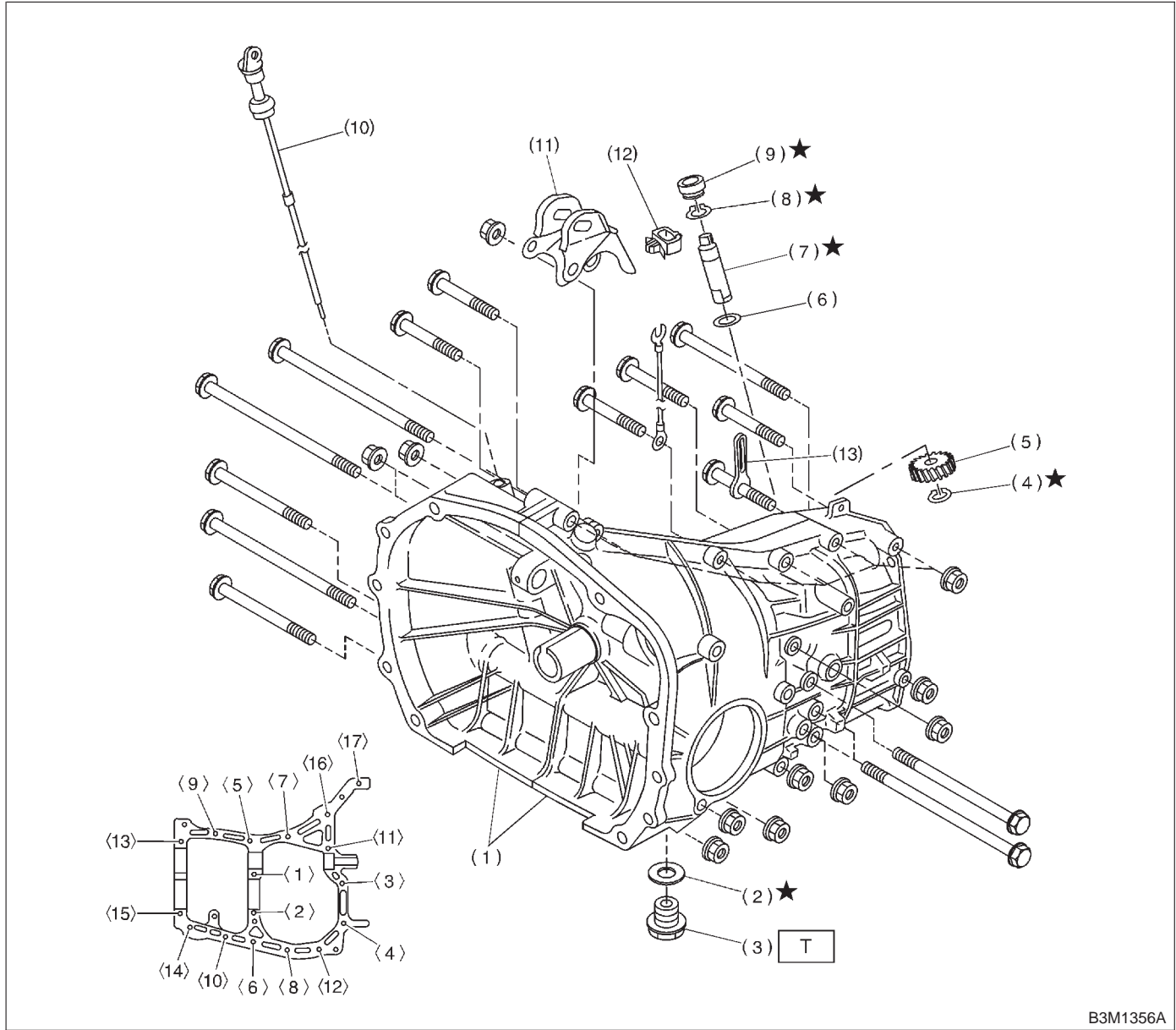
Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

Pinion shaft to axle drive shaft clearance

0 — 0.25 mm (0 — 0.0098 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)

1. Transmission Case



B3M1356A

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

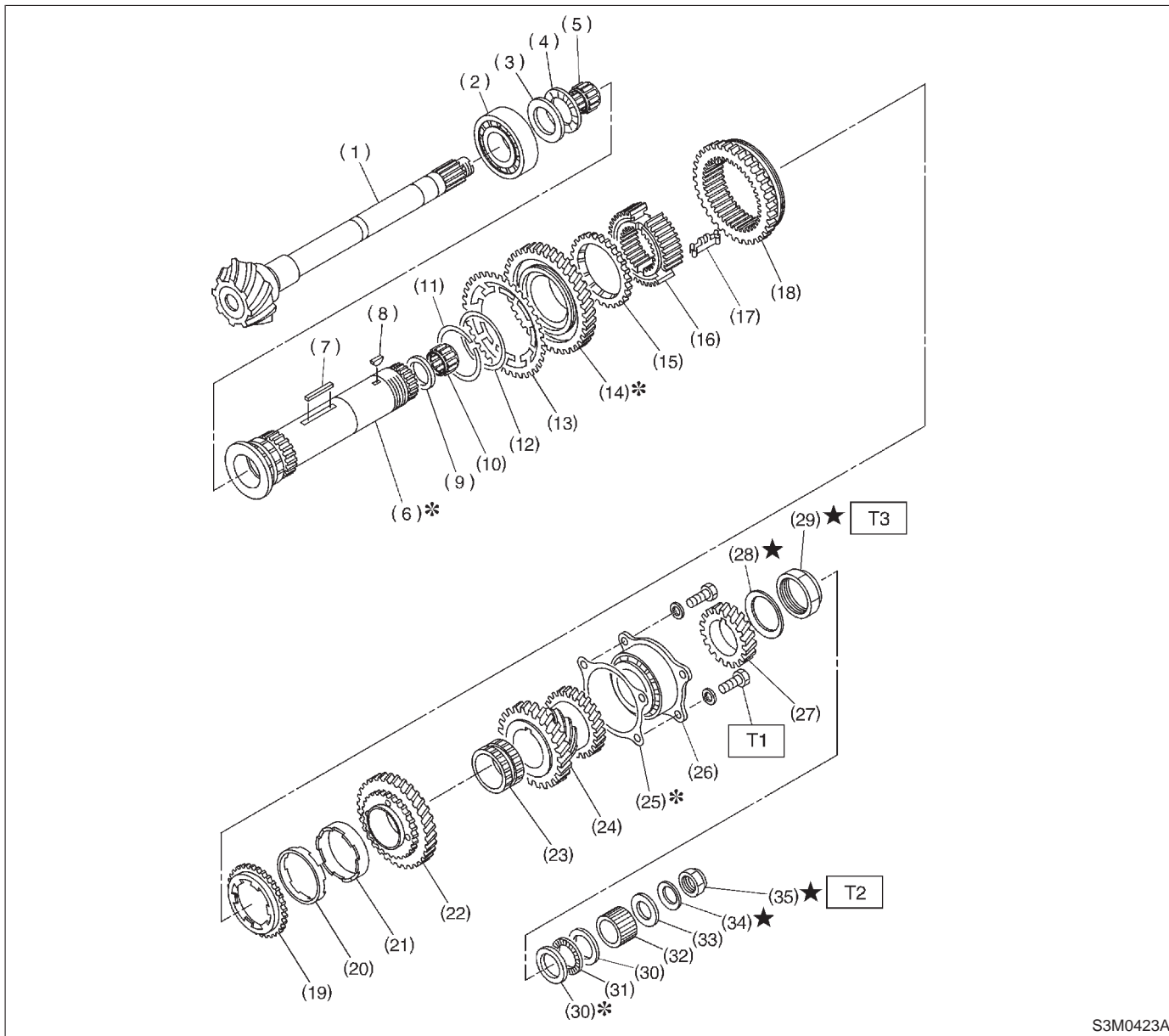
(13) Clip

Tightening torque: N·m (kg·m, ft·lb)

T: 44±3 (4.5±0.3, 32.5±2.2)

Size	All models	Torque
8 mm bolt	<5> — <15>	25±2 N·m (2.5±0.2 kg·m, 18.1±1.4 ft·lb)
10 mm bolt	<1> — <4> <16> — <17>	39±3 N·m (4.0±0.3 kg·m, 28.9±2.2 ft·lb)

2. Drive Pinion Assembly



S3M0423A

- (1) Drive pinion shaft
- (2) Roller bearing
- (3) Washer
- (4) Thrust bearing
- (5) Needle bearing
- (6) Driven shaft
- (7) Key
- (8) Woodruff key
- (9) Drive pinion collar
- (10) Needle bearing
- (11) Snap ring (Outer)
- (12) Washer
- (13) Sub gear
- (14) 1st driven gear

- (15) Baulk ring
- (16) 1st-2nd synchronizer hub
- (17) Insert key
- (18) Reverse driven gear
- (19) Outer baulk ring
- (20) Synchro cone
- (21) Inner baulk ring
- (22) 2nd driven gear
- (23) 2nd driven gear bush
- (24) 3rd-4th driven gear
- (25) Driven pinion shim
- (26) Roller bearing
- (27) 5th driven gear
- (28) Lock washer

- (29) Lock nut
- (30) Washer
- (31) Thrust bearing
- (32) Differential bevel gear sleeve
- (33) Washer
- (34) Lock washer
- (35) Lock nut

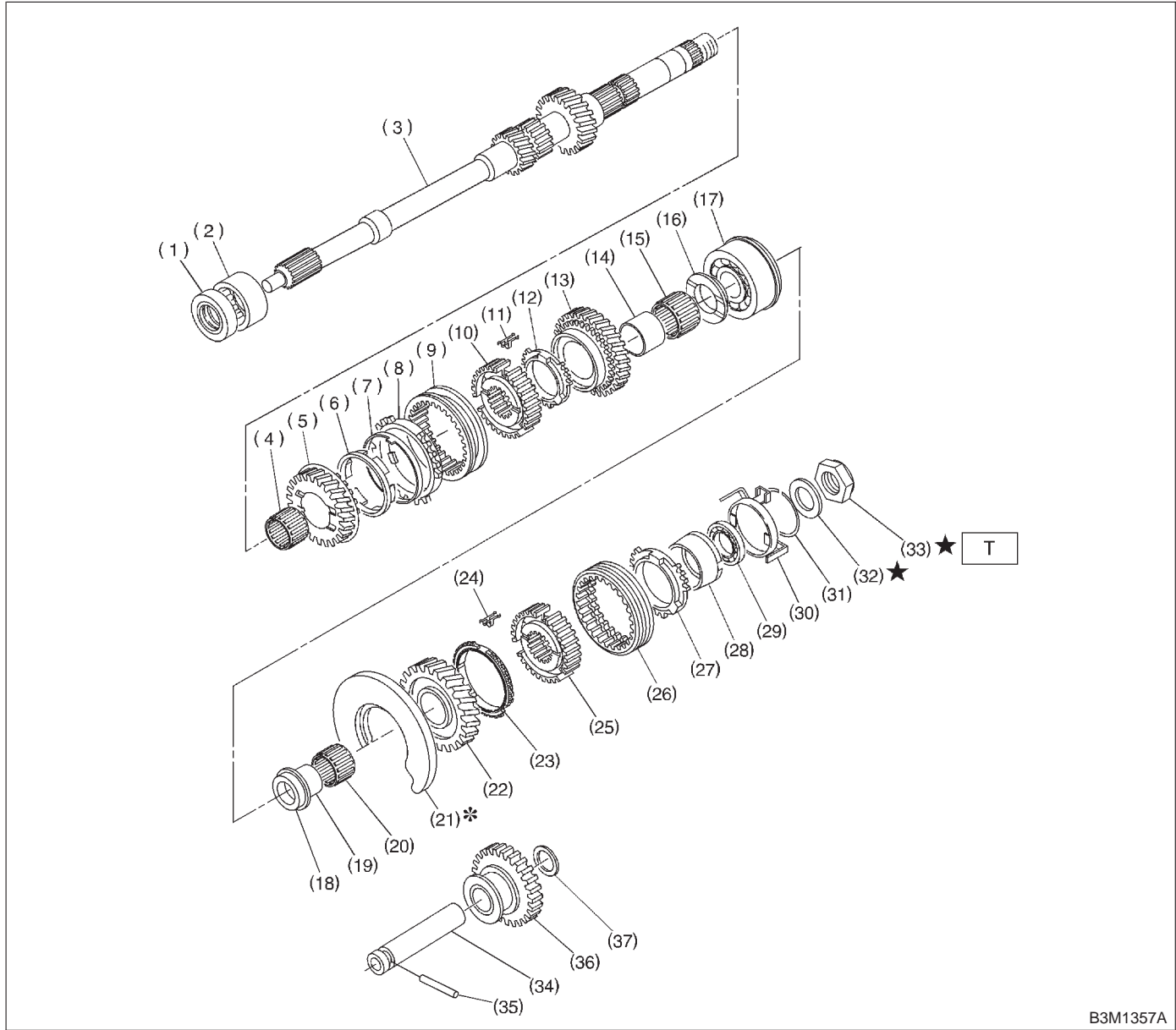
Tightening torque: N·m (kg·m, ft·lb)

T1: 29±3 (3.0±0.3, 21.7±2.2)

T2: 118±8 (12.0±0.8, 86.8±5.8)

T3: 265±10 (27±1, 195±7)

3. Main Shaft Assembly

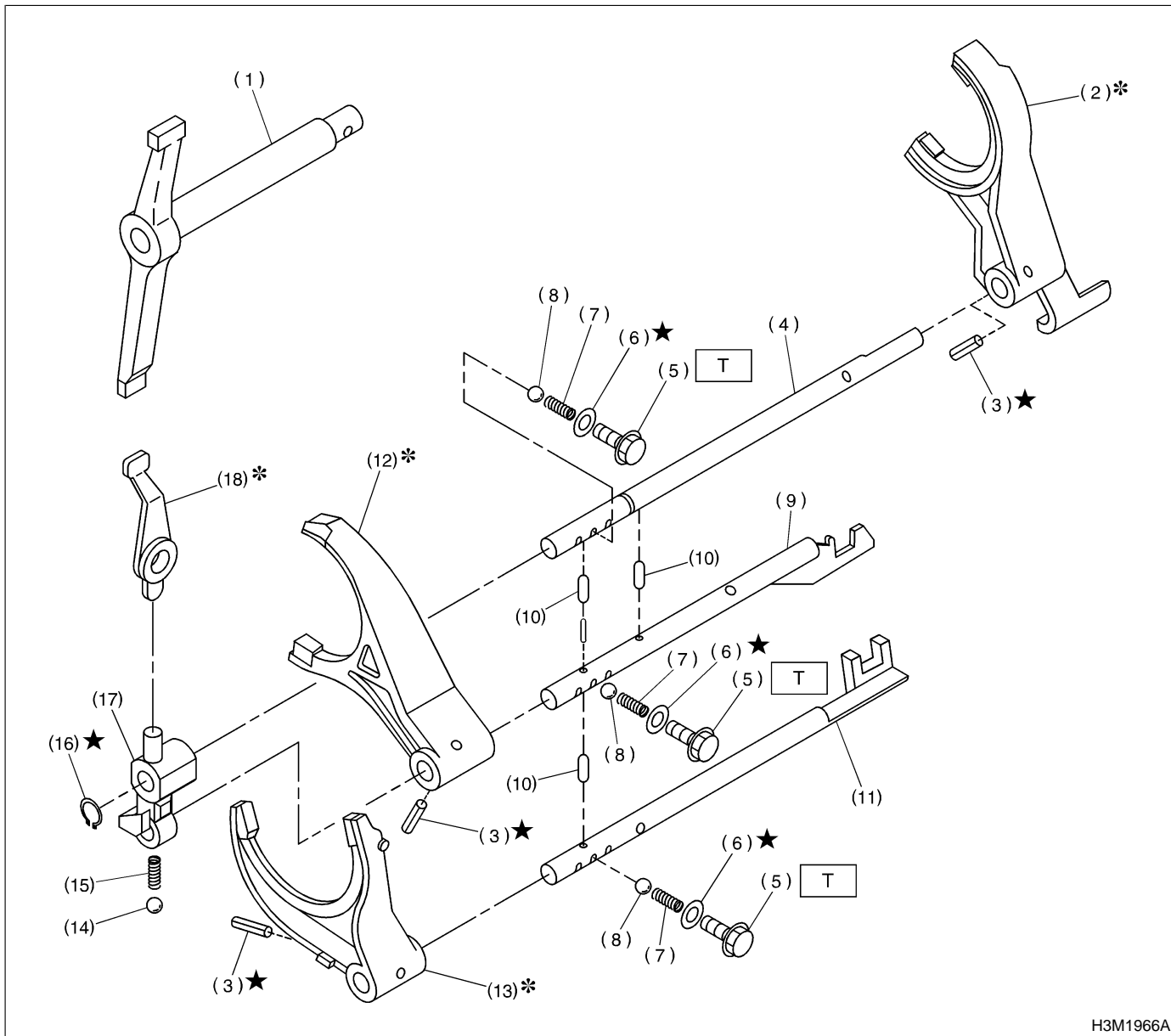


B3M1357A

- | | | |
|------------------------------------|------------------------------------|-------------------------------|
| (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 (kg-m, ft-lb)
T: 118±6 (12.0±0.6, 86.8±4.3)

4. Shifter Fork and Shifter Rod



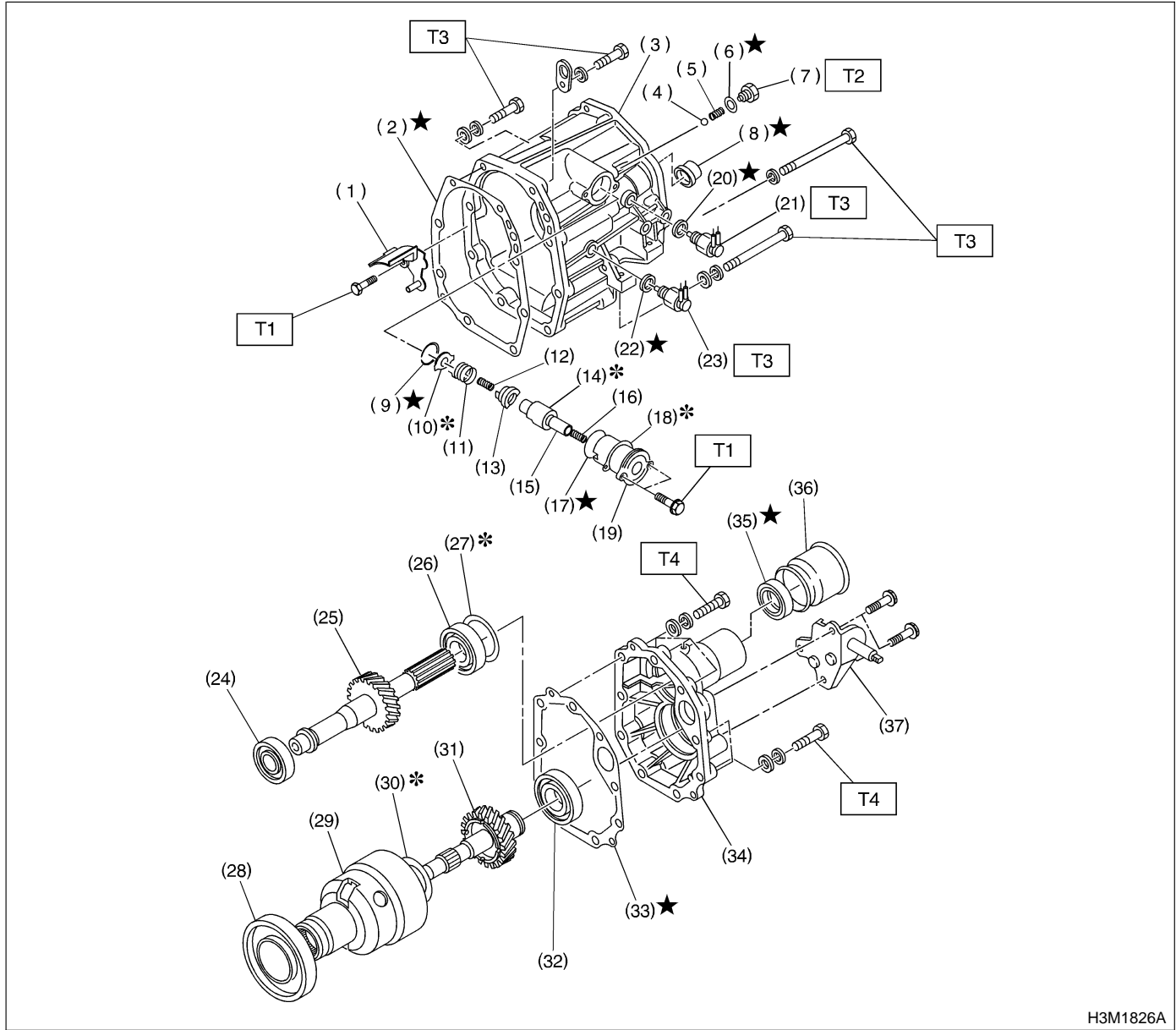
H3M1966A

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

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

Tightening torque: N·m (kg·m, ft·lb)
T: 19.6±1.5 (2.00±0.15, 14.5±1.1)

5. Transfer Case and Extension



H3M1826A

- | | | |
|----------------------------|----------------------------|--------------------------|
| (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) Gasket |
| (4) Ball | (19) Reverse check sleeve | (34) Extension |
| (5) Reverse accent spring | (20) Gasket | (35) Oil seal |
| (6) Gasket | (21) Neutral switch | (36) Dust cover |
| (7) Plug | (22) Gasket | (37) Shift bracket |
| (8) Oil seal | (23) Back-up light switch | |
| (9) Snap ring (Inner) | (24) Ball bearing | |
| (10) Reverse check plate | (25) Transfer driven gear | |
| (11) Reverse check spring | (26) Ball 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 (kg·m, ft·lb)

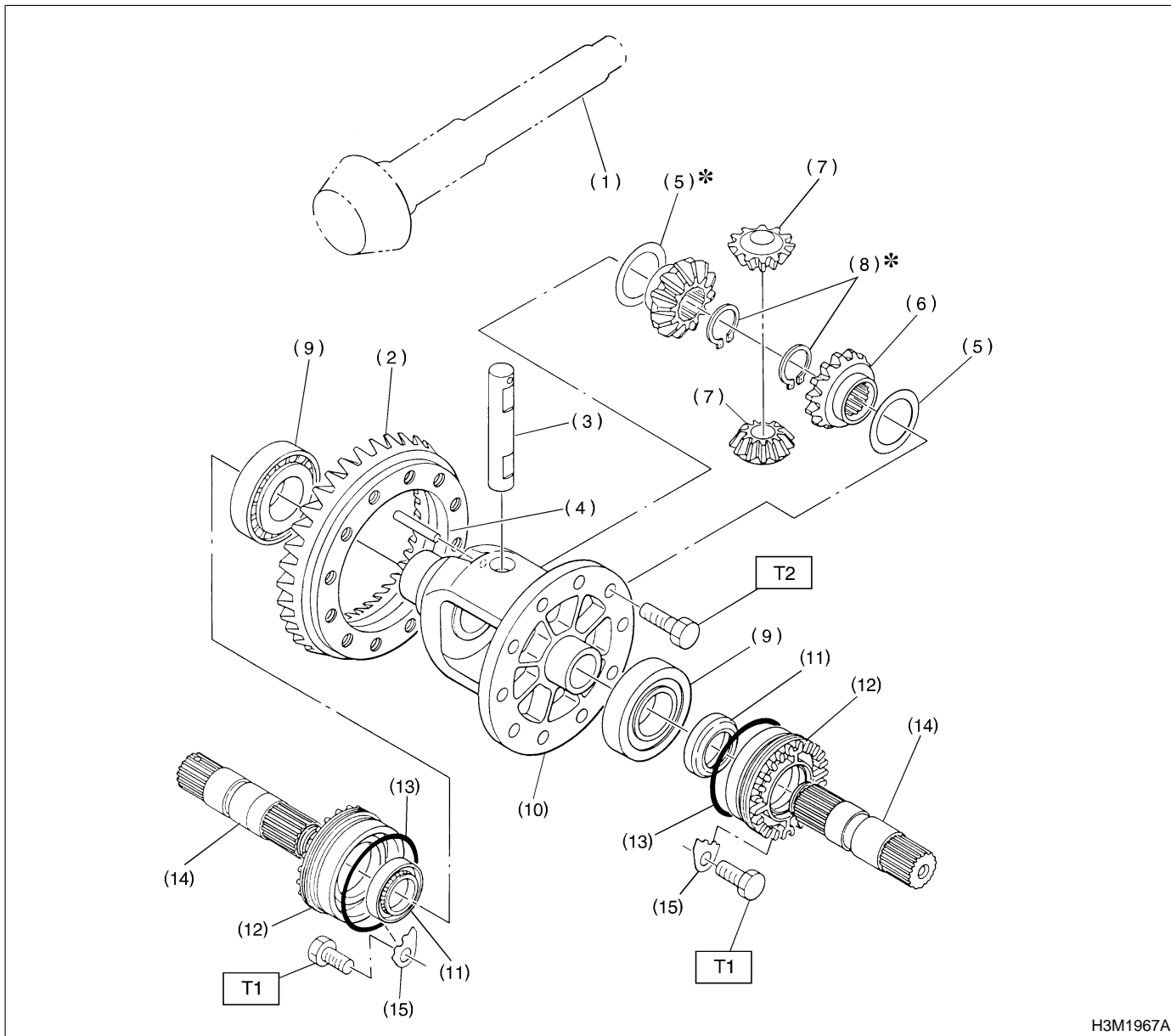
T1: 6.4±0.5 (0.65±0.05, 4.7±0.4)

T2: 10±1 (1.0±0.1, 7.2±0.7)

T3: 25±2 (2.5±0.2, 18.1±1.4)

T4: 37±3 (3.8±0.3, 27.5±2.2)

6. Front Differential



H3M1967A

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

- (15) Retainer lock plate

Tightening torque: N·m (kg·m, ft·lb)

T1: 25±3 (2.5±0.3, 18.1±2.2)

T2: 62±5 (6.3±0.5, 45.6±3.6)

1. General

A: PRECAUTIONS

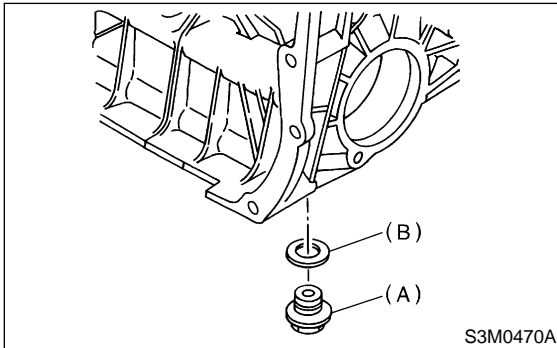
- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove drain plug to drain oil. After draining, retighten it as before.

CAUTION:

Replace gasket with a new one.

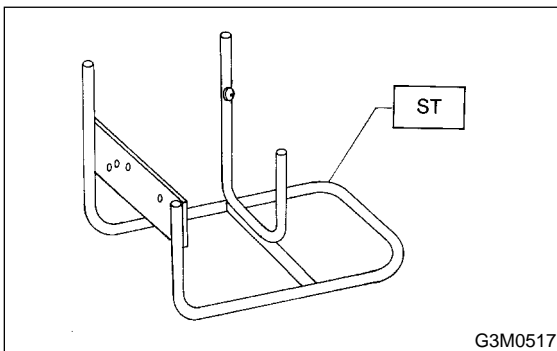
Tightening torque:

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



- (A) Drain plug
(B) Gasket

- 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.

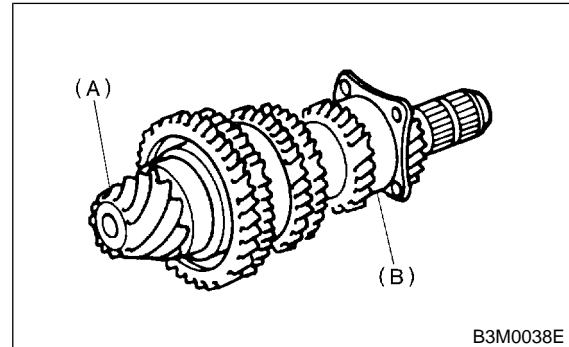
B: INSPECTION

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

- 1) Bearings

Replace bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



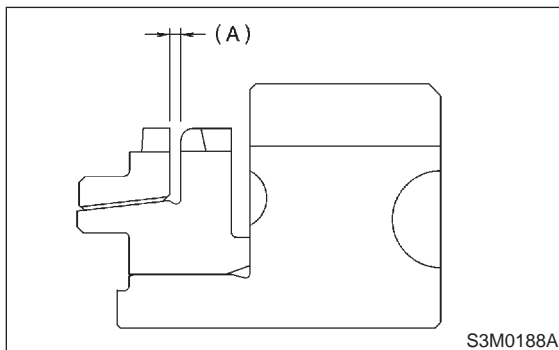
- (A) Drive pinion shaft
(B) Ball bearing

- Bearings having other defects
- 2) Bushing (each gear)
Replace the bushing in the following cases:
 - When the sliding surface is damaged or abnormally worn.
 - When the inner wall is abnormally worn.
 - 3) Gears
 - Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
 - Correct or replace if the cone that contacts the baulk ring is rough or damaged.
 - Correct or replace if the inner surface or end face is damaged.
 - 4) Baulk ring
Replace the ring in the following cases:
 - When the inner surface and end face are damaged.

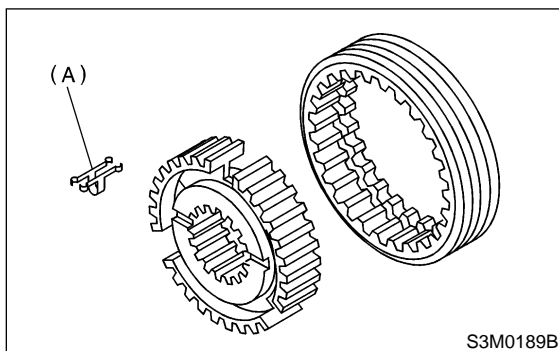
- When the ring inner surface is abnormally or partially worn down.
- If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

Clearance (A):

0.5 — 1.0 mm (0.020 — 0.040 in)



- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
- 5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.



(A) Shifting insert key

6) Oil seal

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

7) O-ring

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

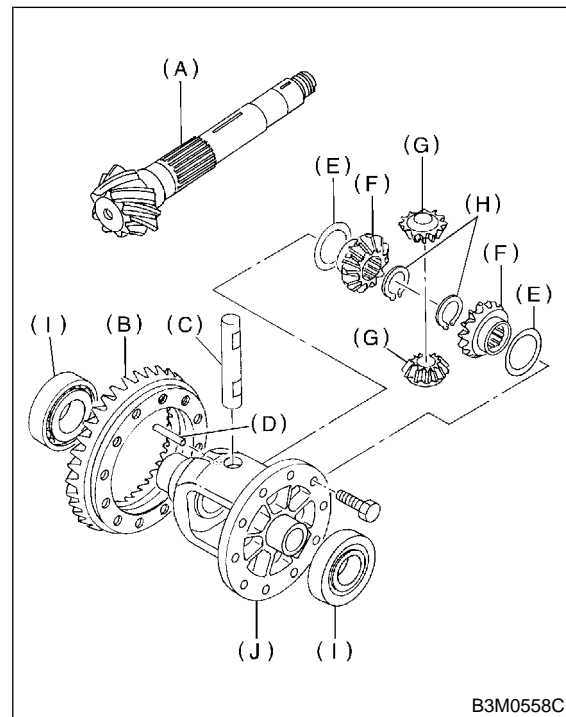
8) Gearshift mechanism

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

9) Differential gear

Repair or replace the differential gear in the following cases:

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

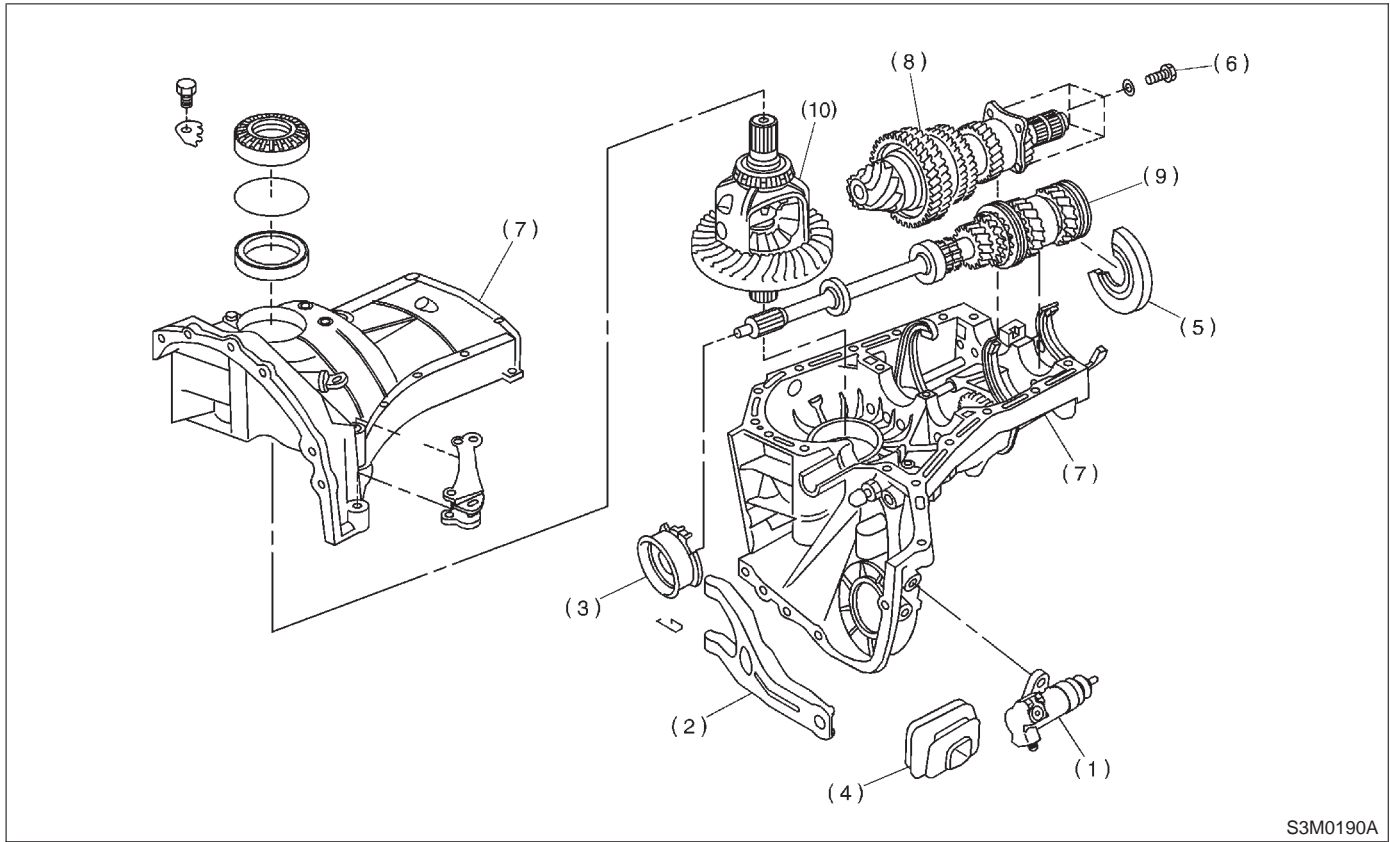


- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Snap ring
- (I) Roller bearing
- (J) Differential case

2. Transmission Case

A: DISASSEMBLY

1. SEPARATION OF TRANSMISSION

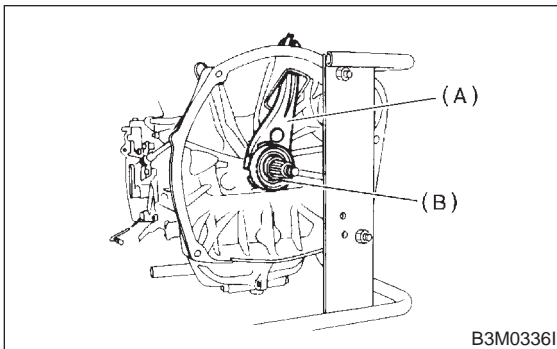


S3M0190A

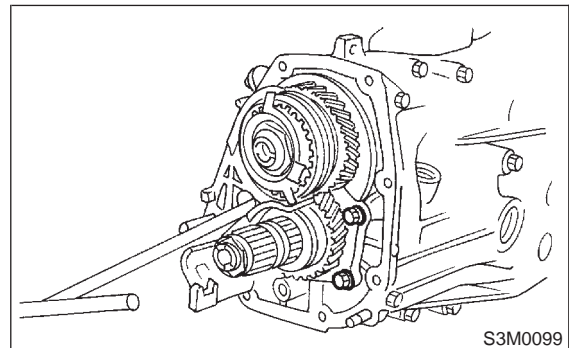
- | | | |
|----------------------------------|---------------------------|-------------------------|
| (1) Operating cylinder | (5) Main shaft rear plate | (9) Main shaft ASSY |
| (2) Clutch release lever | (6) Bolt | (10) Front differential |
| (3) Clutch release bearing | (7) Transmission case | |
| (4) Clutch release lever sealing | (8) Drive pinion ASSY | |

1) Remove clutch release lever. <Ref. to 2-10 [W3A0].>

3) Remove bearing mounting bolts.

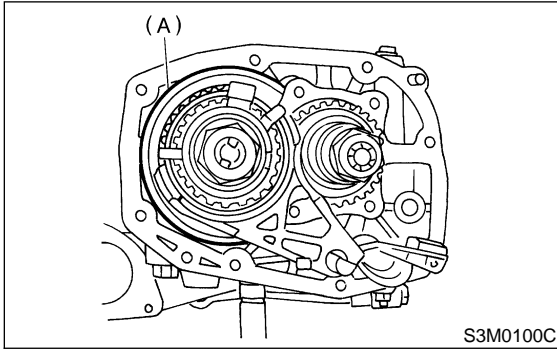


- (A) Clutch release lever
(B) Clutch release bearing



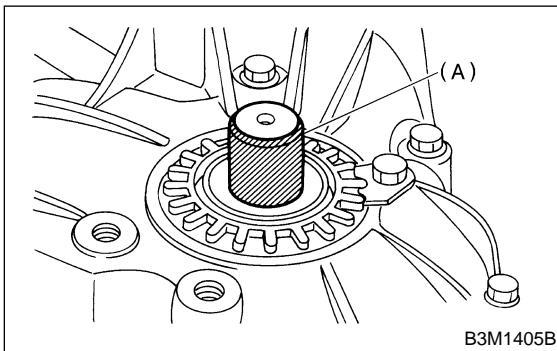
2) Remove transfer case assembly. <Ref. to 3-1 [W5A0].>

4) Remove main shaft rear plate.



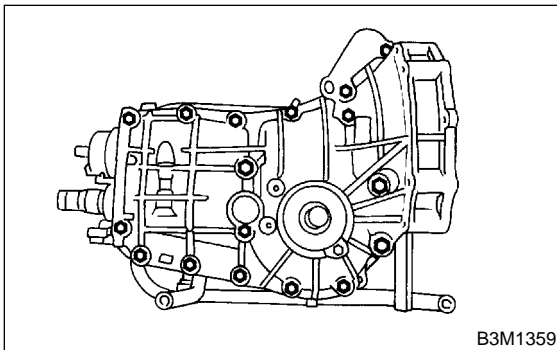
(A) Main shaft rear plate

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



(A) Vinyl tape

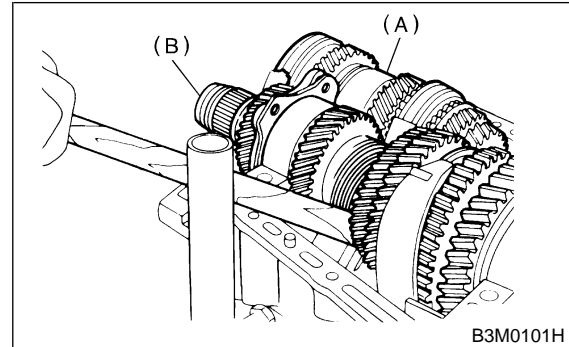
6) Separate transmission case into right and left cases by loosening seventeen coupling bolts and nuts.



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

NOTE:

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



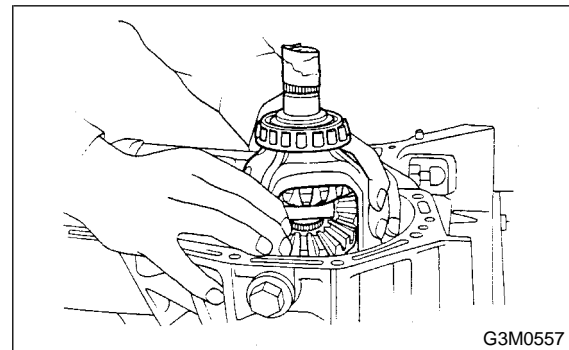
(A) Main shaft ASSY
(B) Drive pinion shaft ASSY

8) Remove main shaft assembly.

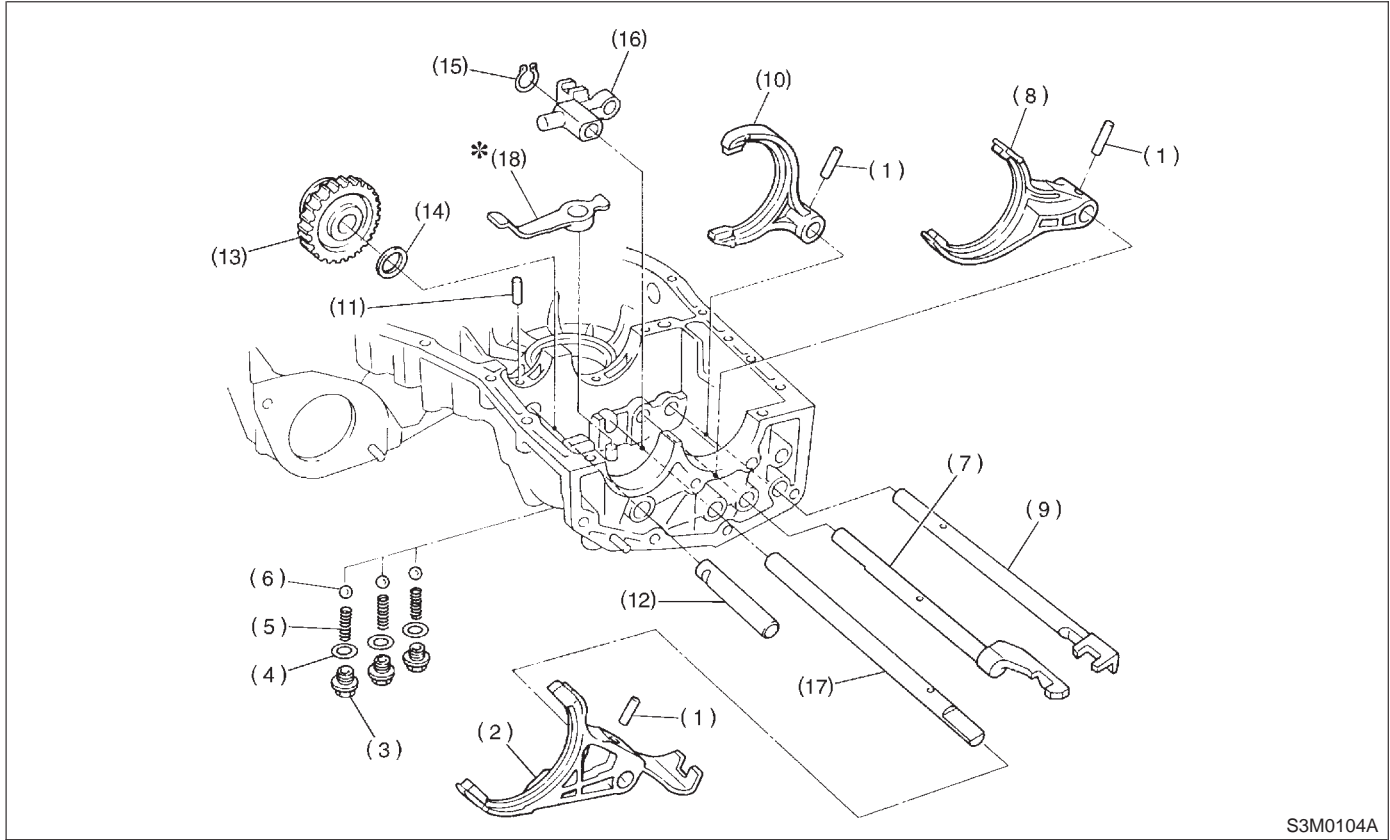
9) Remove differential assembly.

CAUTION:

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



2. TRANSMISSION CASE

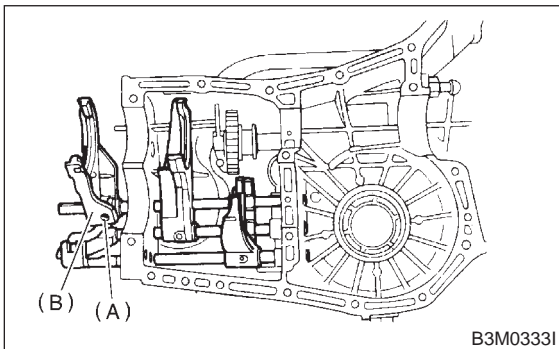


S3M0104A

- | | | |
|--------------------------|-------------------------------|----------------------------|
| (1) Straight pin | (7) 3rd-4th fork rod | (13) Reverse idler gear |
| (2) 5th shifter fork | (8) 3rd-4th shifter fork | (14) Washer |
| (3) Checking ball plug | (9) 1st-2nd fork rod | (15) Snap ring |
| (4) Gasket | (10) 1st-2nd shifter fork | (16) Reverse fork rod arm |
| (5) Checking ball spring | (11) Straight pin | (17) Reverse fork rod |
| (6) Ball | (12) Reverse idler gear shaft | (18) Reverse shifter lever |

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

ST 398791700 STRAIGHT PIN REMOVER



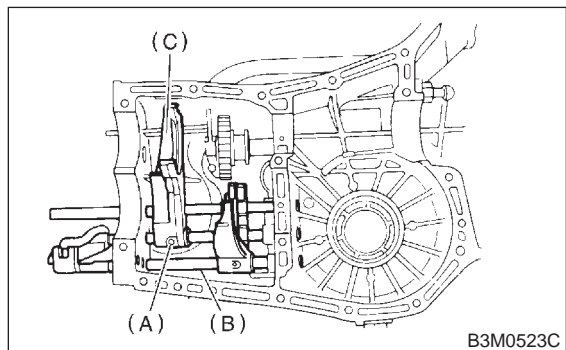
- (A) Straight pin
 (B) 5th shifter fork

2) Remove plugs, springs and checking balls.

3) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:

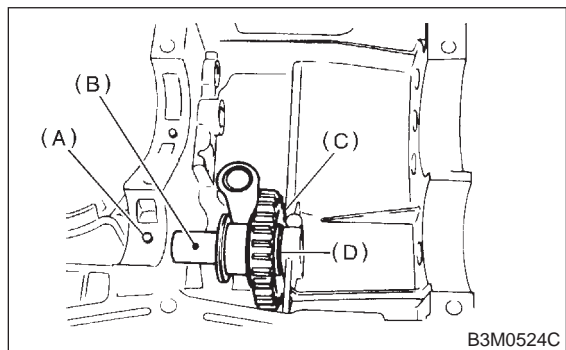
When removing rod, keep other rods in neutral. Also, when pulling out straight pin, remove it toward inside of case so that it may not hit against case.



- (A) Straight pin
- (B) 3-4 fork rod
- (C) Shifter fork

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

5) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.



- (A) Straight pin
- (B) Idler gear shaft
- (C) Idler gear
- (D) Washer

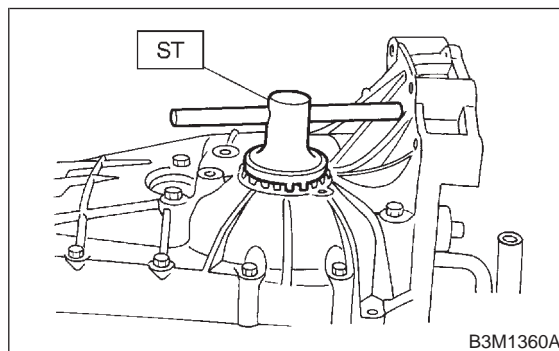
6) Remove outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out ball, spring and interlock plunger from rod. And then remove rod.

NOTE:

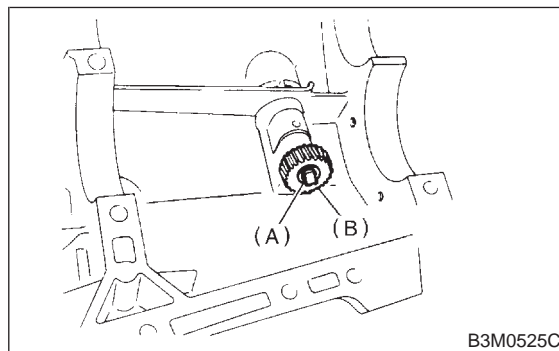
When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

7) Remove reverse shifter lever.

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



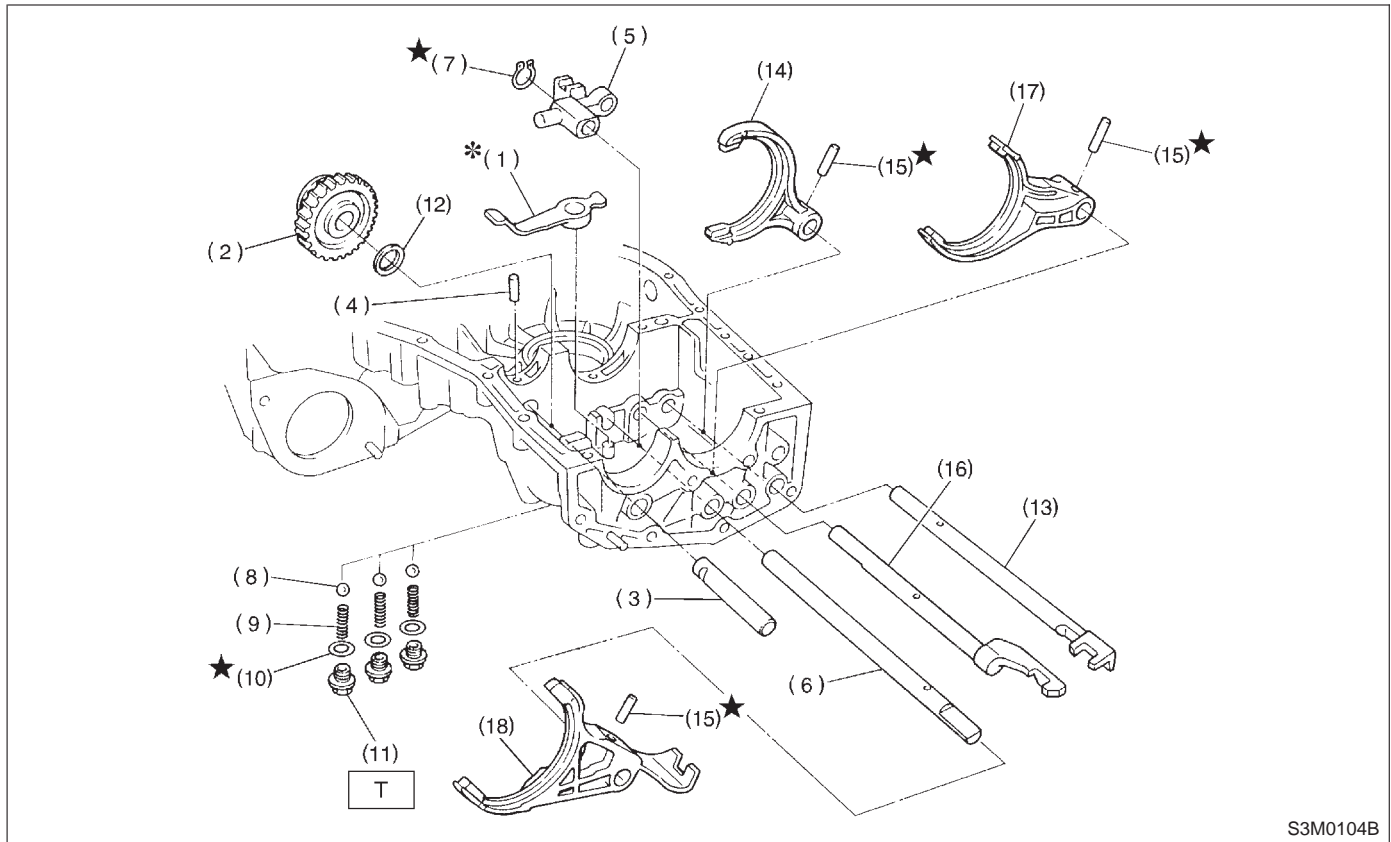
9) Remove outer snap ring and pull out speedometer driven gear. Next, remove vehicle speed sensor 2, oil seal, speedometer shaft and washer.



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

B: ASSEMBLY

1. TRANSMISSION CASE



S3M0104B

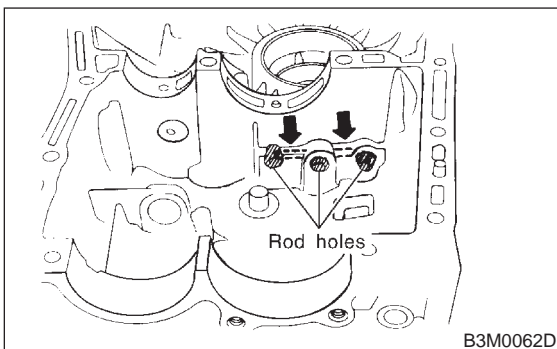
- | | | |
|------------------------------|---------------------------|---------------------------|
| (1) Reverse shifter lever | (9) Checking ball spring | (17) 3rd-4th shifter fork |
| (2) Reverse idler gear | (10) Gasket | (18) 5th shifter fork |
| (3) Reverse idler gear shaft | (11) Checking ball plug | |
| (4) Straight pin | (12) Washer | |
| (5) Reverse fork rod arm | (13) 1st-2nd fork rod | |
| (6) Reverse fork rod | (14) 1st-2nd shifter fork | |
| (7) Snap ring | (15) Straight pin | |
| (8) Ball | (16) 3rd-4th fork rod | |

Tightening torque: N·m (kg·m, ft·lb)

T: 19.6±0.1

(2.00±0.015, 14.5±0.1)

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

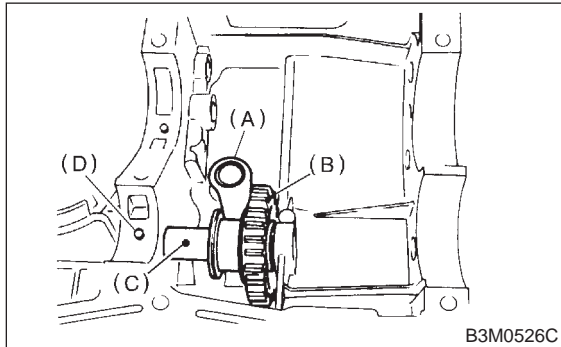


B3M0062D

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

NOTE:

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



- (A) Reverse shifter lever
- (B) Reverse idler gear
- (C) Reverse idler gear shaft
- (D) Straight pin

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

CAUTION:

Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER

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

Tightening torque:

19.6±1.5 N·m (2.00±0.15 kg·m, 14.5±1.1 ft·lb)

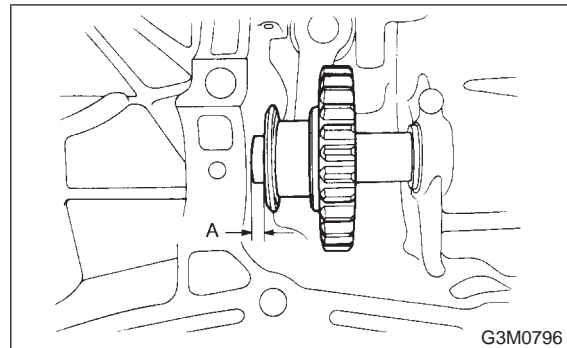
CAUTION:

Replace gasket with a new one.

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

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

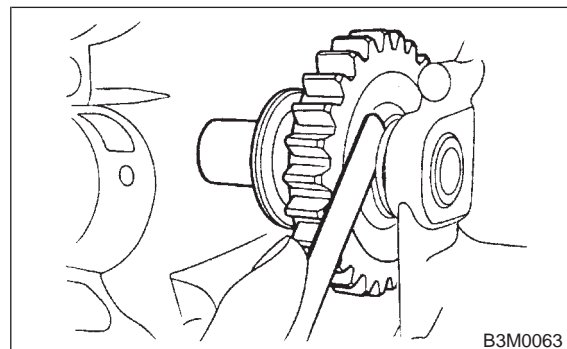


Reverse shifter lever		
Part No.	No.	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

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

Clearance:

0 — 0.5 mm (0 — 0.020 in)



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

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

8) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes using ST. ST 398791700 STRAIGHT PIN REMOVER

CAUTION:

Replace straight pin with a new one.

NOTE:

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

9) Install interlock plunger (3 × 11.9) onto 3-4 fork rod.

CAUTION:

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

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

11) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes. ST 398791700 STRAIGHT PIN REMOVER

CAUTION:

Replace straight pin with a new one.

NOTE:

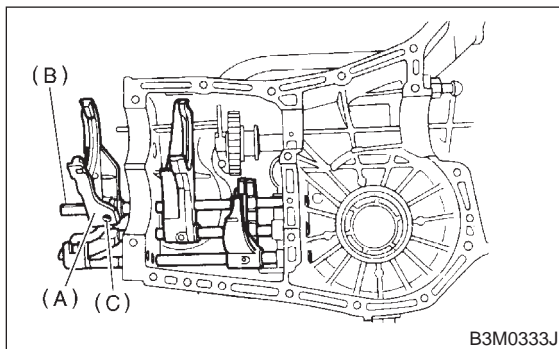
- Set reverse fork rod to neutral.
- Make sure interlock plunger (installed before) is on the reverse fork rod side.

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

CAUTION:

Replace straight pin with a new one.

ST 398791700 STRAIGHT PIN REMOVER

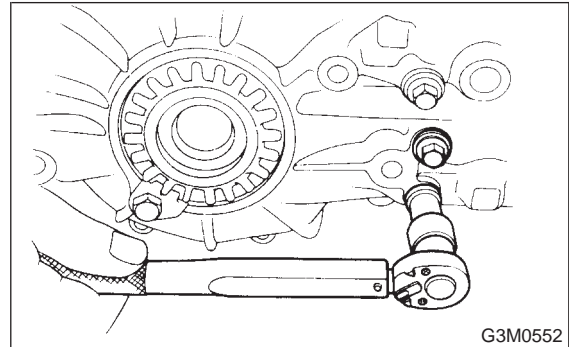


- (A) 5th shifter fork
 (B) Reverse fork rod
 (C) Straight pin

13) Position balls, checking ball springs and gas-kets into 3-4 and 1-2 rod holes, and install plugs.

CAUTION:

Replace gasket with a new one.



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

CAUTION:

Use new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS

15) Install vehicle speed sensor 2.

CAUTION:

Use new vehicle speed sensor 2, if it has been removed.

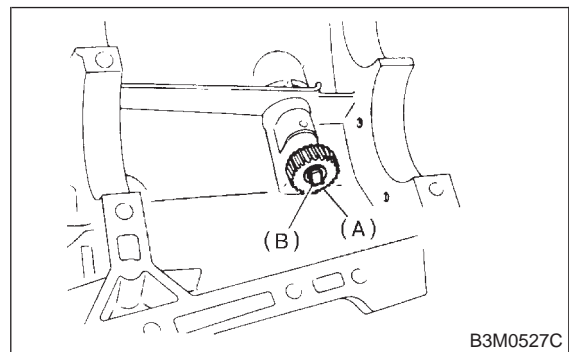
Tightening torque:

$5.9 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.15 \text{ kg}\cdot\text{m}$, $4.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)

16) Install speedometer driven gear and snap ring.

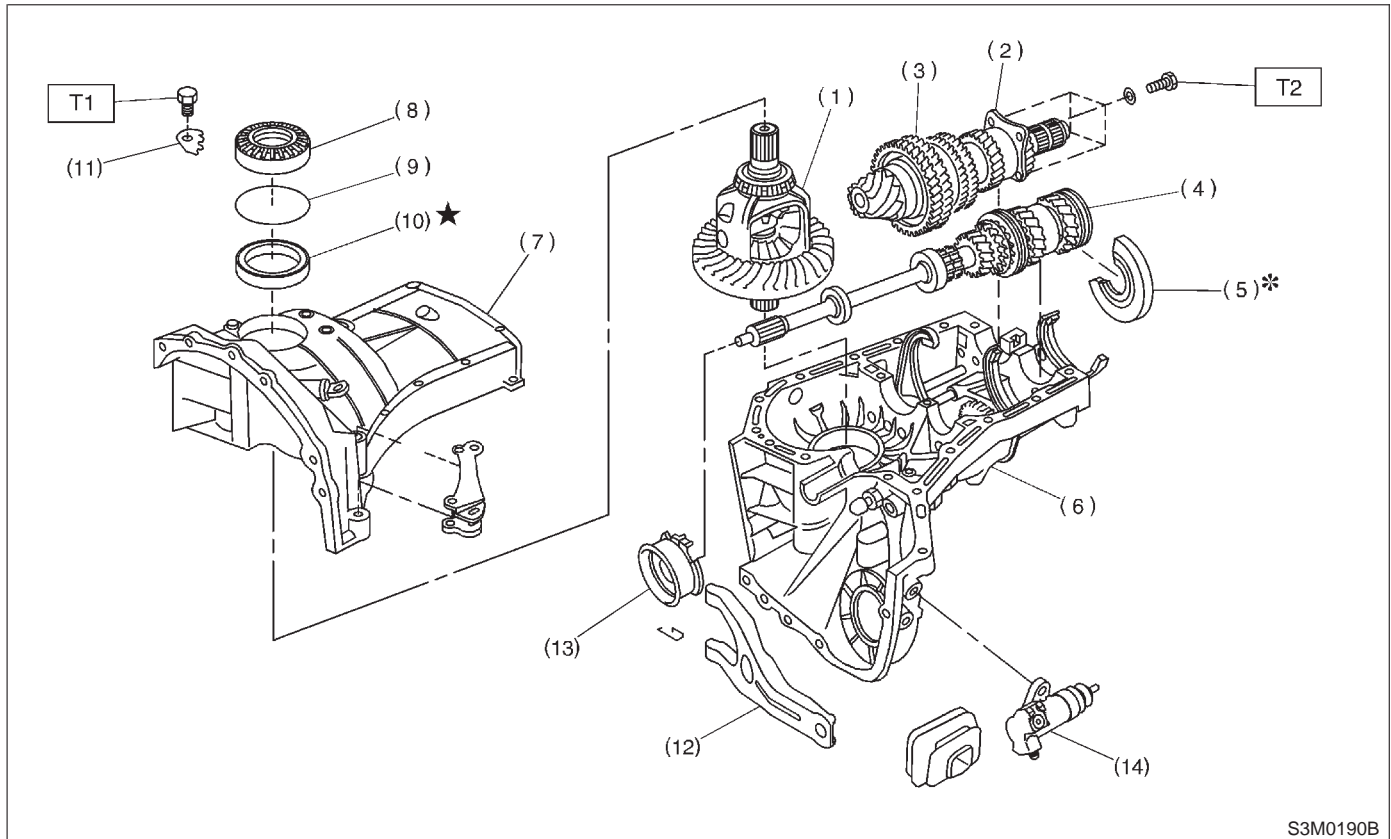
CAUTION:

Use a new snap ring, if it has been removed.



- (A) Speedometer driven gear
 (B) Snap ring

2. COMBINATION OF TRANSMISSION CASE



S3M0190B

- | | |
|----------------------------|--------------------------------|
| (1) Differential ASSY | (8) Differential side retainer |
| (2) Drive pinion shim | (9) O-ring |
| (3) Drive pinion ASSY | (10) Oil seal |
| (4) Main shaft ASSY | (11) Retainer lock plate |
| (5) Main shaft rear plate | (12) Clutch release lever |
| (6) Transmission case (LH) | (13) Clutch release bearing |
| (7) Transmission case (RH) | (14) Operating cylinder |

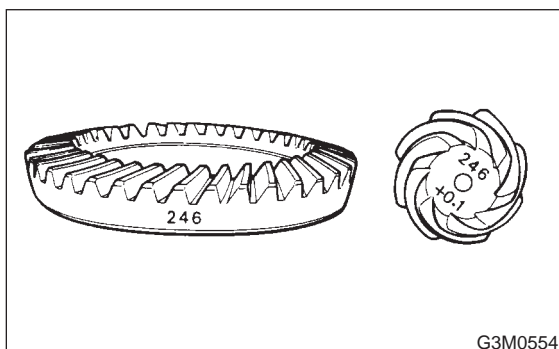
Tightening torque: N·m (kg·m, ft·lb)

T1: 25±3 (2.5±0.3, 18.1±2.2)

T2: 29±3 (3.0±0.3, 21.7±2.2)

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

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



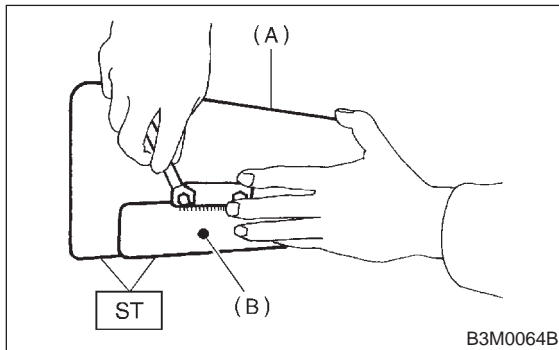
G3M0554

3) 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



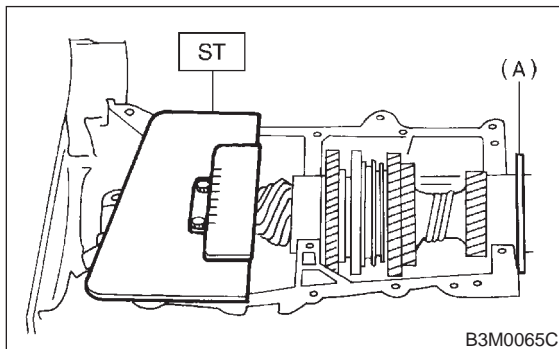
- (A) Plate
(B) Scale

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

ST 499917500 DRIVE PINION GAUGE ASSY

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

ST 499917500 DRIVE PINION GAUGE ASSY



- (A) Adjust clearance to zero without shim.

6) The thickness of shim shall be determined by subtracting 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

7) 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.

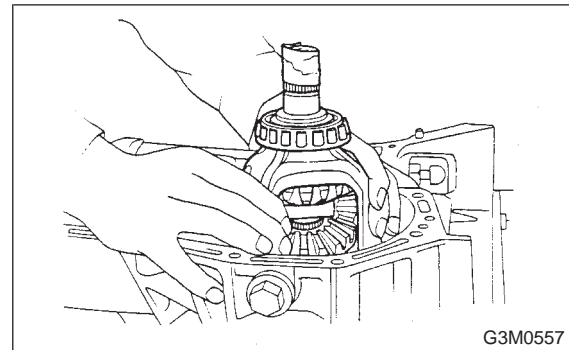
Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

8) Install differential assembly on left hand transmission case.

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

NOTE:

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



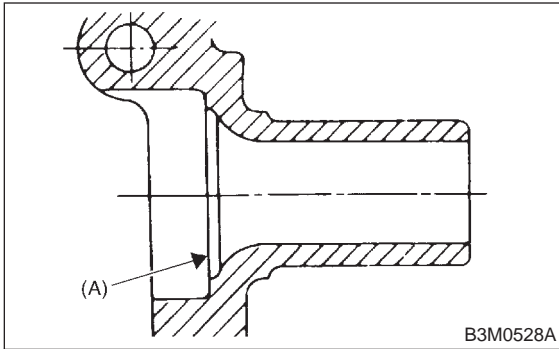
9) Install needle bearing and oil seal onto the front of transmission main shaft assembly, and position in left side transmission case.

CAUTION:

- Wrap clutch splined section with vinyl tape to prevent damage to oil seal.
- Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.
- Use a new oil seal.

NOTE:

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

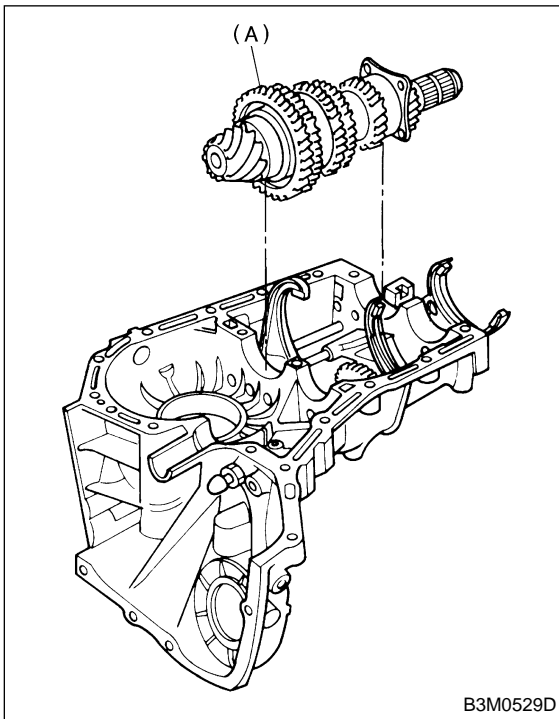


- Be careful not to drop oil seal when installing right side transmission main case.
- Make sure straight pin is positioned in hole in needle bearing's outer race.

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

NOTE:

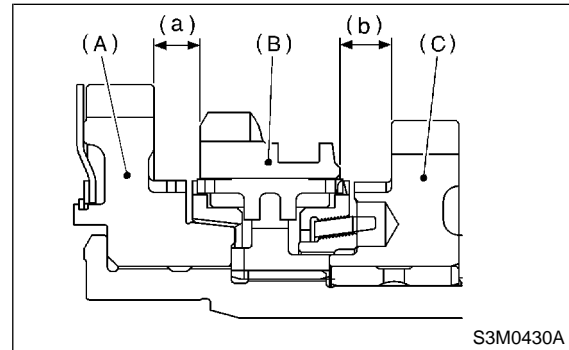
Ensure that the knock pin of the case is fitted into the hole in the bearing outer race.



(A) Drive pinion shaft ASSY

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

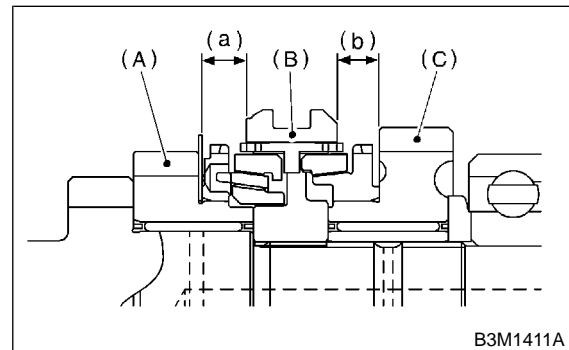
1st driven gear to reverse driven gear
Clearance (a): 9.5 mm (0.374 in)
Reverse driven gear to 2nd driven gear
Clearance (b): 9.5 mm (0.374 in)



- (A) 1st driven gear
- (B) Reverse drive gear
- (C) 2nd driven gear

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

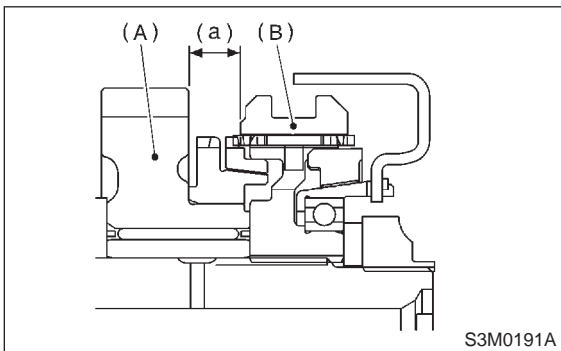
3rd-4th gear to coupling sleeve
Clearance (a): 9.3 mm (0.366 in)
Coupling sleeve to 4th driven gear
Clearance (b): 9.3 mm (0.366 in)



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

3rd-4th shifter fork		
Part No.	No.	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th drive gear to coupling sleeve
 Clearance (a): 9.3 mm (0.366 in)

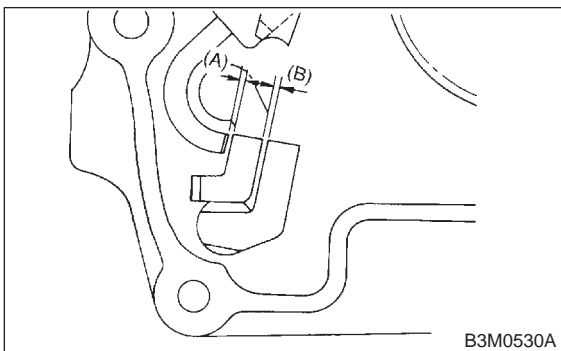


- (A) 5th driven gear
- (B) Coupling sleeve

5th shifter fork		
Part No.	No.	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)

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

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



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

Liquid gasket:
THREE BOND 1215 or equivalent

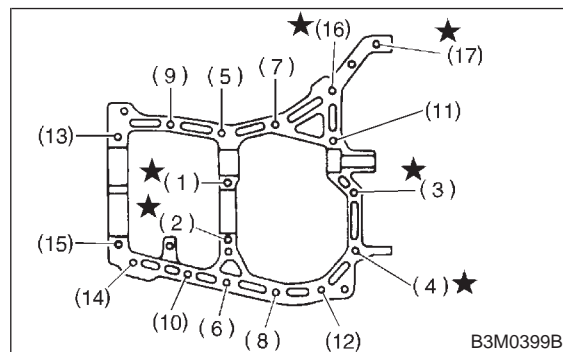
14) Tighten 17 bolts with bracket, clip, etc. as shown in the figure.

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:

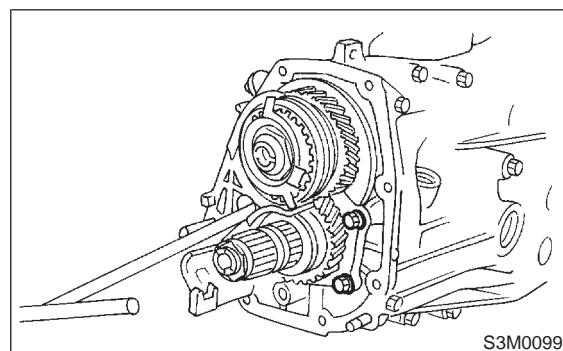
- 8 mm bolt**
 $25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)
- ★ **10 mm bolt**
 $39 \pm 3 \text{ N}\cdot\text{m}$ ($4.0 \pm 0.3 \text{ kg}\cdot\text{m}$, $28.9 \pm 2.2 \text{ ft}\cdot\text{lb}$)



15) Tighten ball bearing attachment bolts.

Tightening torque:

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

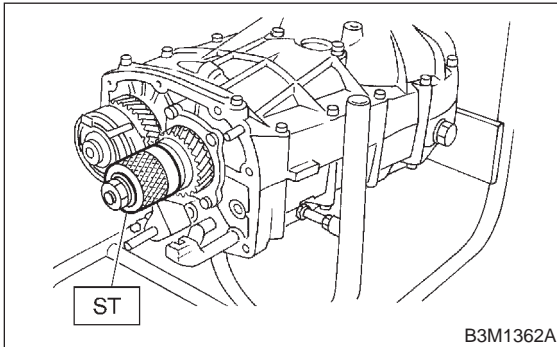


16) Backlash adjustment of hypoid gear and pre-load adjustment of roller bearing

NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



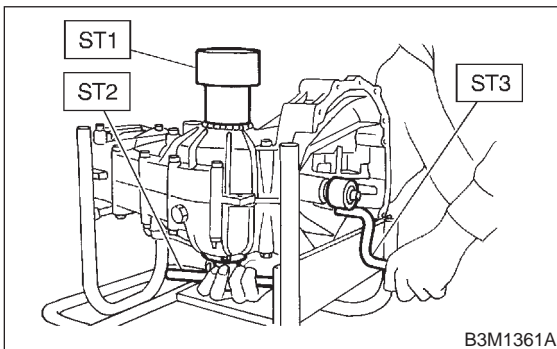
17) Place the transmission with case left side facing downward and put ST1 on bearing cup.

18) 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

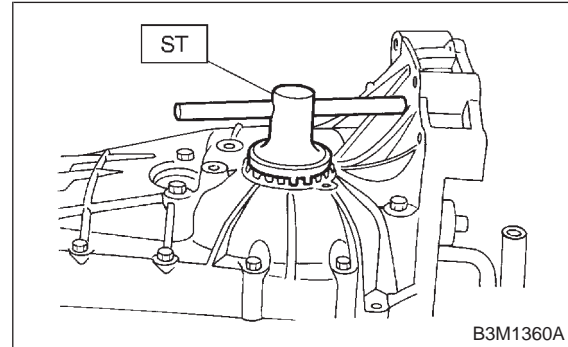


19) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:

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

ST 499787000 WRENCH ASSY



20) 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.

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

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

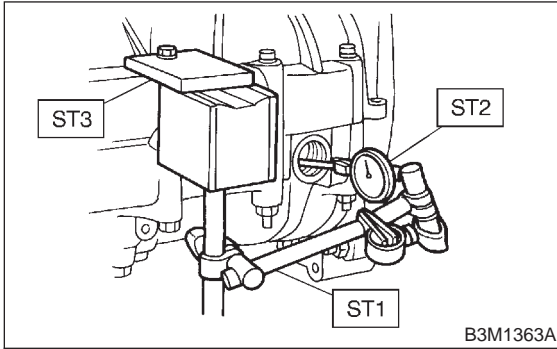
23) Turn transmission main shaft several times while tapping around retainer lightly with plastic hammer.

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

- ST1 498247001 MAGNET BASE
- ST2 498247100 DIAL GAUGE
- ST3 498255400 PLATE

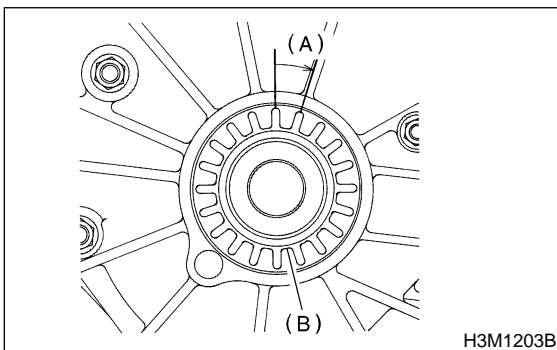
Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



NOTE:

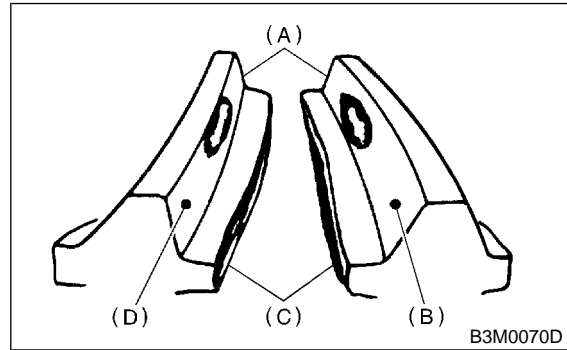
- If backlash is outside specified range, adjust it by turning holder in right side case.
- Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



- (A) 0.05 mm (0.0020 in)
- (B) Differential side retainer

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

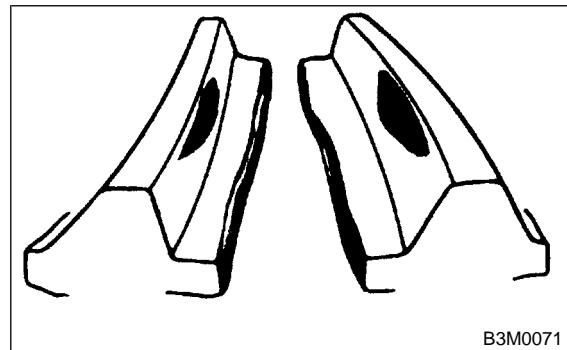
- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

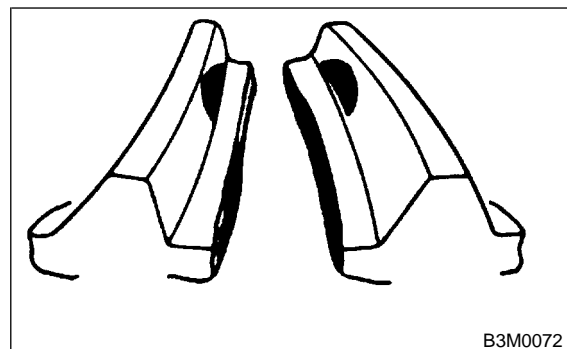
- Backlash is excessive.

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

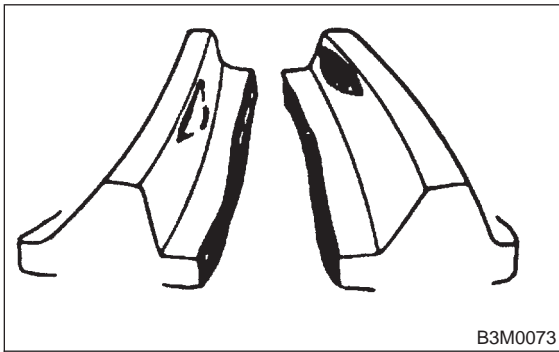


- Backlash is insufficient.

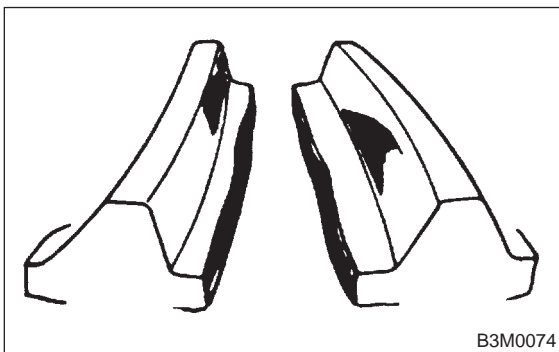
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



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



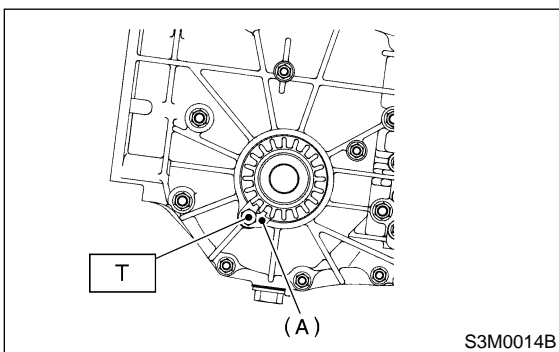
- The drive pinion shim selected before is too thin. Increase its thickness.



26) 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±3 N·m (2.5±0.3 kg·m, 18.1±2.2 ft·lb)



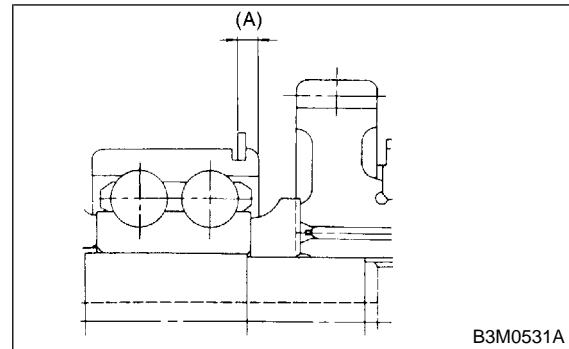
(A) Lock plate

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

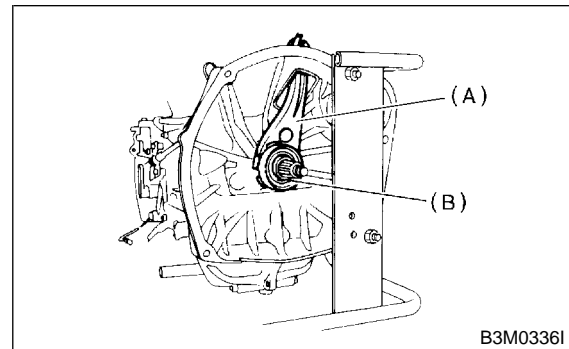
NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.

ST 498147000 DEPTH GAUGE

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



28) Install clutch release lever and bearing. <Ref. to 2-10 [W3C0].>



(A) Clutch release lever
(B) Release bearing

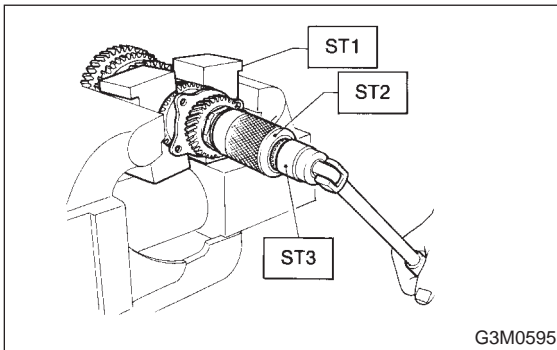
3. Drive Pinion Assembly

A: DISASSEMBLY

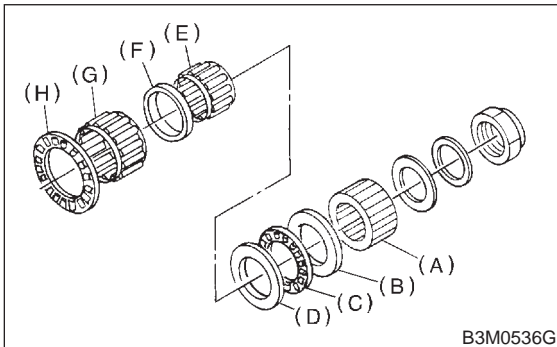
1. DRIVE PINION SHAFT

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

ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH



2) Withdraw drive pinion from driven shaft. Remove differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.



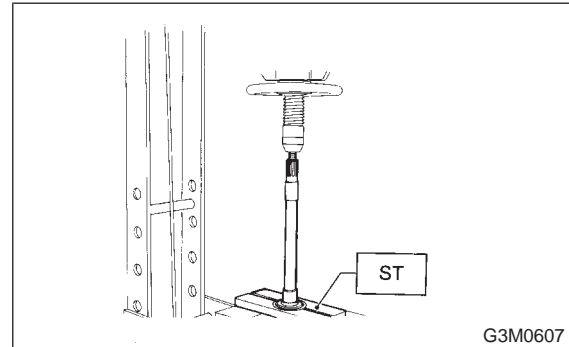
- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Washer No. 2 (25 × 37.5 × 4)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

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

CAUTION:

Do not reuse roller bearing.

ST 498077000 REMOVER



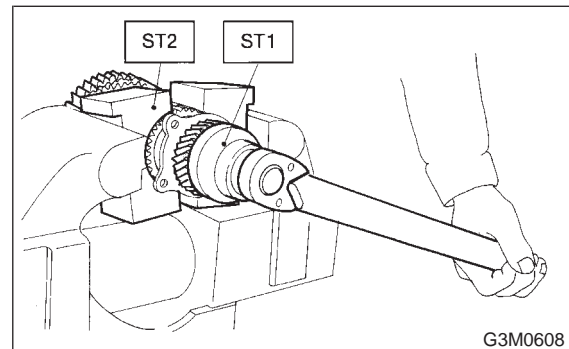
2. DRIVEN GEAR ASSEMBLY

CAUTION:

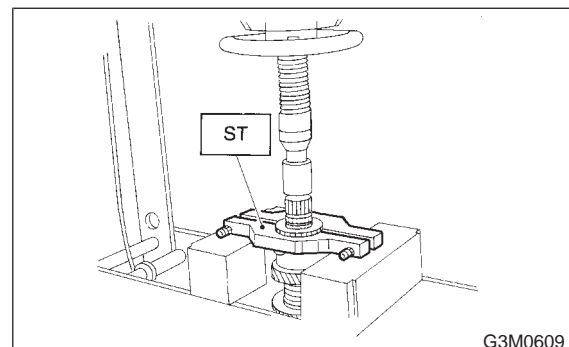
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

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

ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER



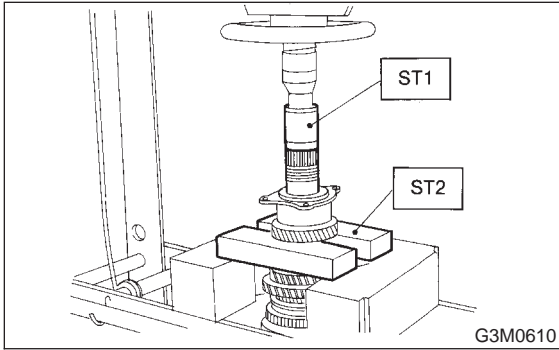
2) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR
REMOVER



3) Remove woodruff key.

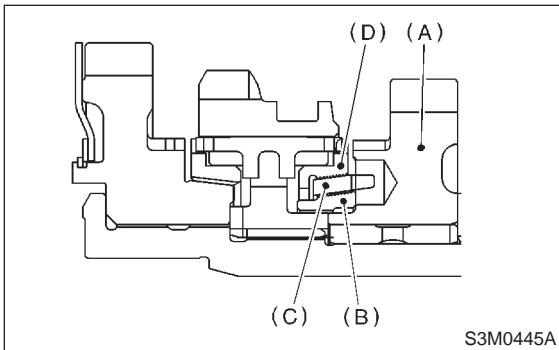
4) Remove roller bearing (42 × 74 × 40), 3rd-4th driven gear using ST1 and ST2.

ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER



5) Remove the key.

6) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



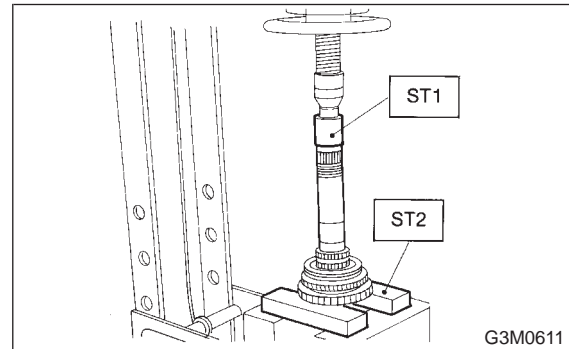
- (A) 2nd driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

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

NOTE:

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

ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER



8) Remove sub gear for 1st driven gear.

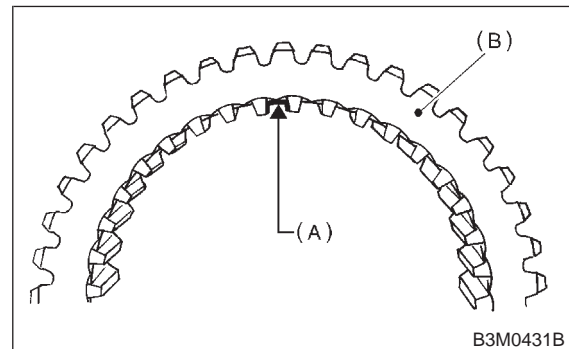
B: ASSEMBLY

1. GEAR AND HUB ASSEMBLY

Assemble gear and hub assembly.

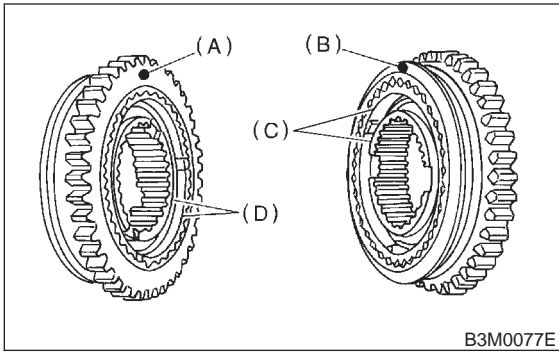
NOTE:

- Use new gear and hub assembly, if gear or hub have been replaced.
- Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.



- (A) Key grooves
- (B) Reverse driven gear

3. Drive Pinion Assembly



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

2. DRIVEN GEAR ASSEMBLY

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

NOTE:

- Take care to install gear and hub assembly in proper direction.
- Align baulk ring and gear & hub assembly with key groove.

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

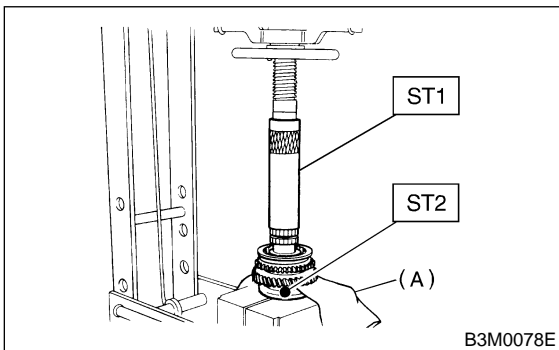
CAUTION:

- Attach a cloth to the end of driven shaft to prevent damage.
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

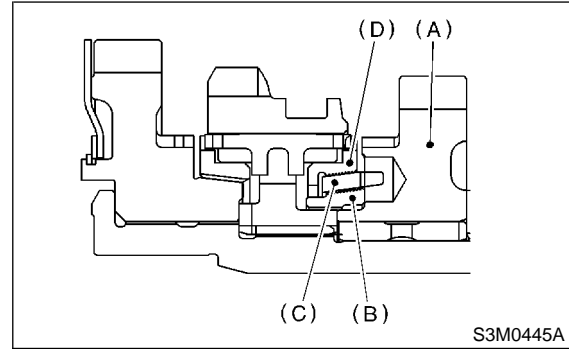
When press fitting, align oil holes of shaft and bush.

- ST1 499277200 INSTALLER
- ST2 499587000 INSTALLER



- (A) Cloth

- 4) Install 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.



- (A) 2nd driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

- 5) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

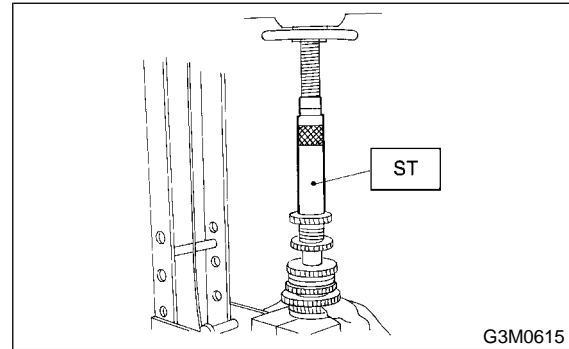
CAUTION:

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

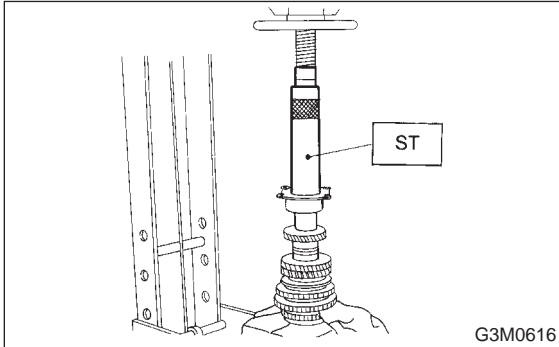


6) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.

CAUTION:

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

ST 499277200 INSTALLER

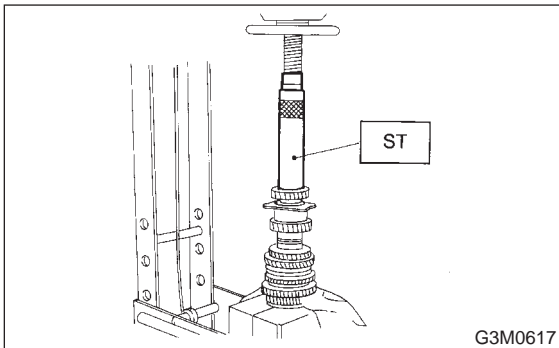


7) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

CAUTION:

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

ST 499277200 INSTALLER

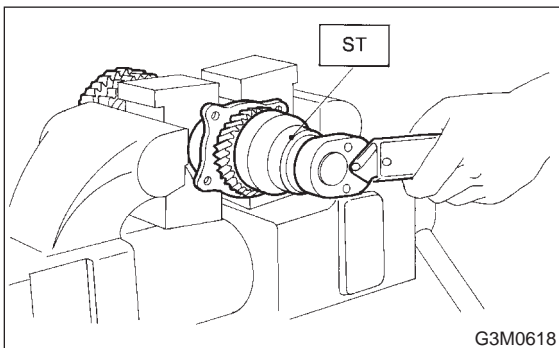


8) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

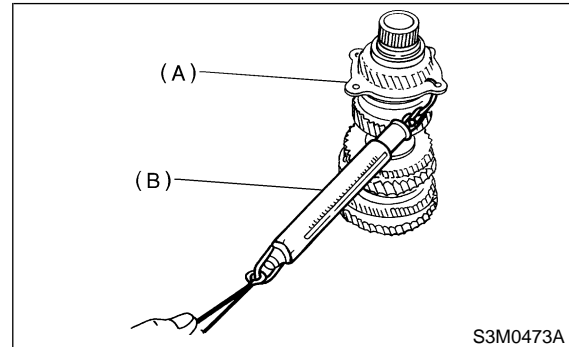
Tightening torque:

265±10 N-m (27±1 kg-m, 195±7 ft-lb)



NOTE:

- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N-m (0.01 to 0.15 kg-m, 0.07 to 1.1 ft-lb).



- (A) Roller bearing
- (B) Spring balancer

3. DRIVE PINION SHAFT

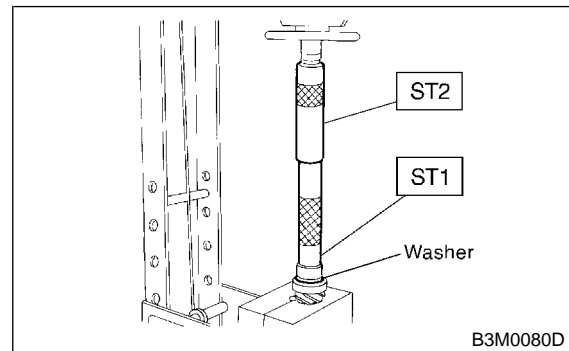
1) Install roller bearing and washer (33 × 50 × 5) onto drive pinion, using ST1, ST2 and press.

CAUTION:

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

ST1 499277100 BUSH 1-2 INSTALLER

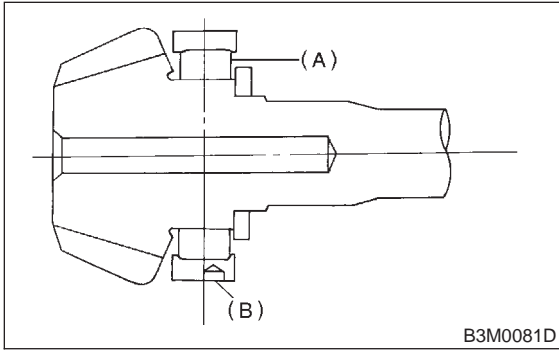
ST2 499277200 INSTALLER



3. Drive Pinion Assembly

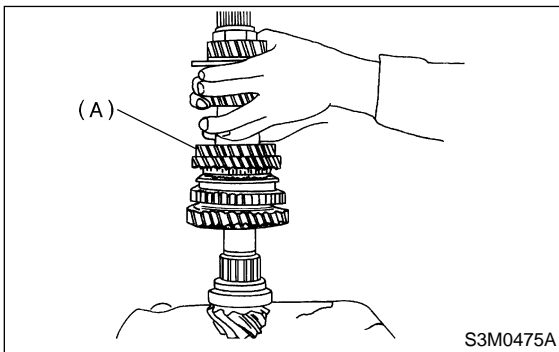
NOTE:

When installing roller bearing, note its directions (front and rear) because knock pin hole in outer race is offset.



- (A) Roller bearing
- (B) Knock pin hole

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

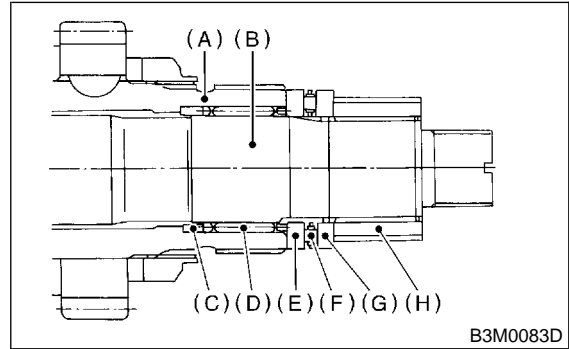


- (A) Driven shaft ASSY

3) Install drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:

Be careful because spacer must be installed in proper direction.

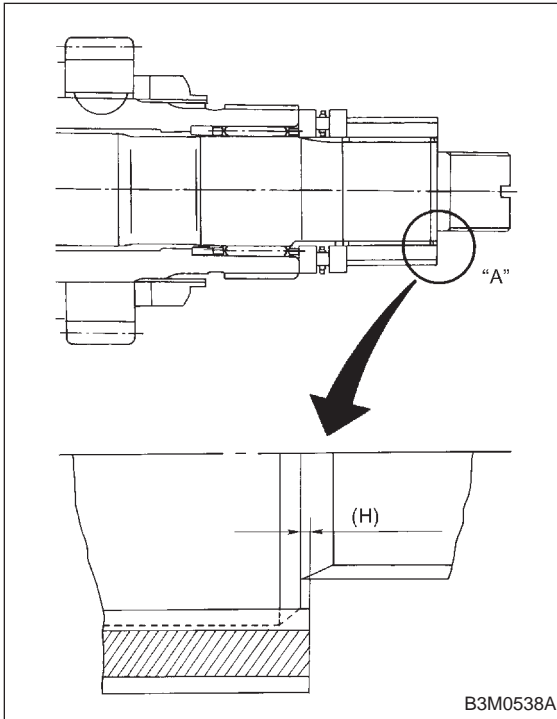


- (A) Driven shaft
- (B) Drive shaft
- (C) Drive pinion collar
- (D) Needle bearing (25 × 30 × 20)
- (E) Washer No. 2 (25 × 36 × 4)
- (F) Thrust bearing (25 × 37.5 × 3)
- (G) Washer No. 1 (25 × 36 × t)
- (H) Differential bevel gear sleeve

C: ADJUSTMENT

1. THRUST BEARING PRELOAD

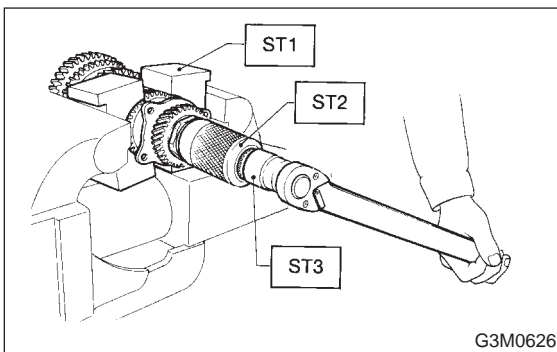
1) After completing the preceding steps 1) through 3), select adjusting washer No. 1 so that dimension (H) is zero through visual check. Position washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



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

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

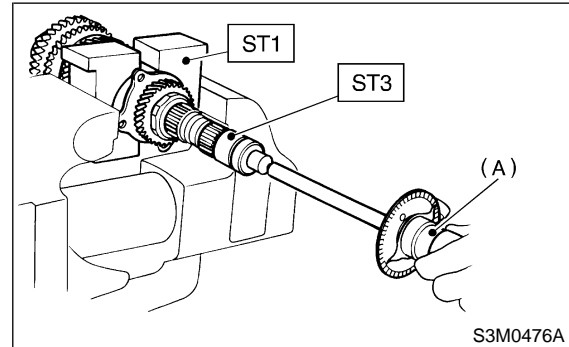
Tightening torque:
118±8 N·m (12±0.8 kg·m, 86.8±5.8 ft·lb)



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

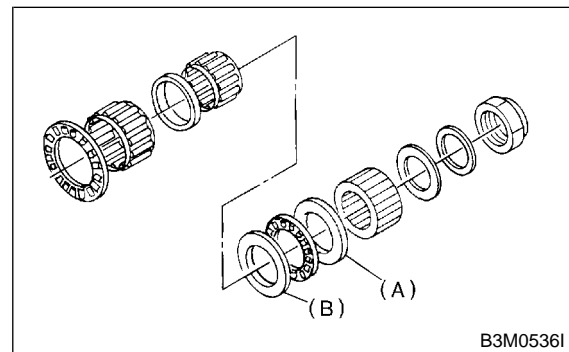
- ST1 899884100 HOLDER
- ST3 899988608 SOCKET WRENCH (27)

Starting torque:
54±25 N·m (5.5±2.5 kg·m, 40±18 ft·lb)



(A) Torque driver

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

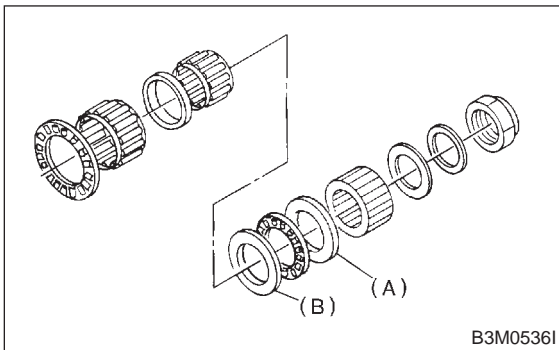


(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

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)

4. Main Shaft Assembly

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)

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

4. Main Shaft Assembly

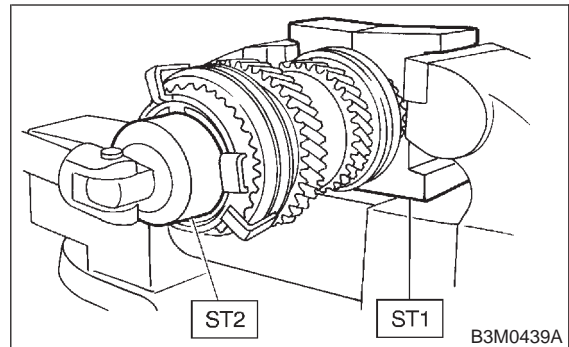
A: DISASSEMBLY

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

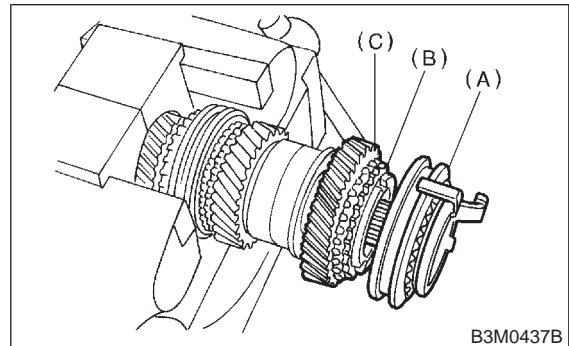
NOTE:

Remove caulking before taking off lock nut.

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



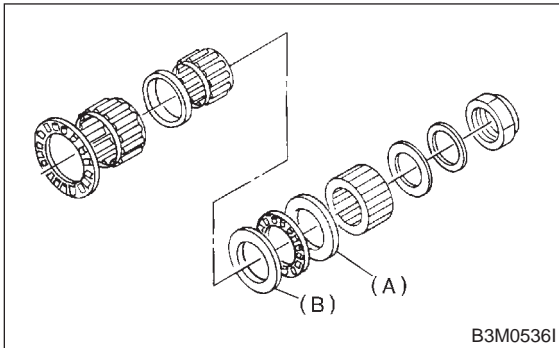
3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing (32 × 36 × 25.7).



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

4. Main Shaft Assembly

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)

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

4. Main Shaft Assembly

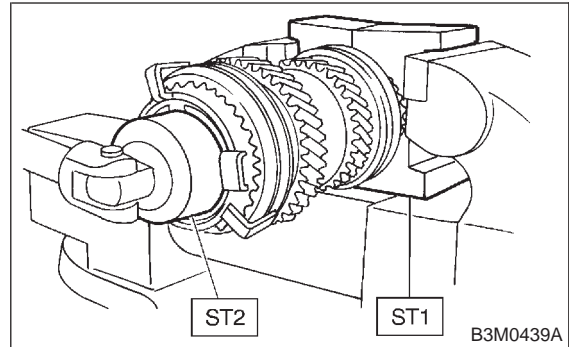
A: DISASSEMBLY

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

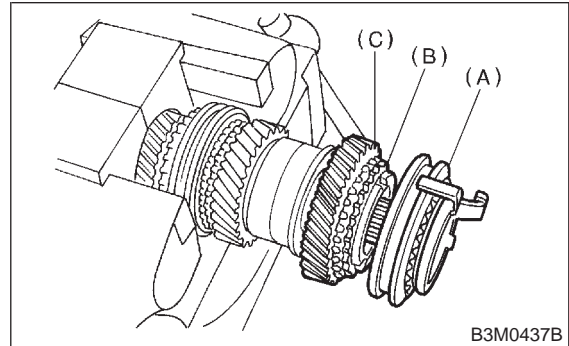
NOTE:

Remove caulking before taking off lock nut.

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

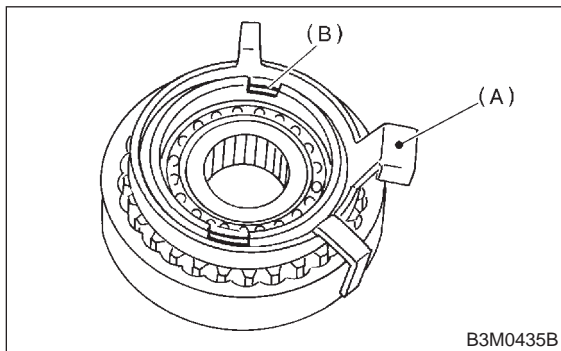


3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing (32 × 36 × 25.7).



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

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



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

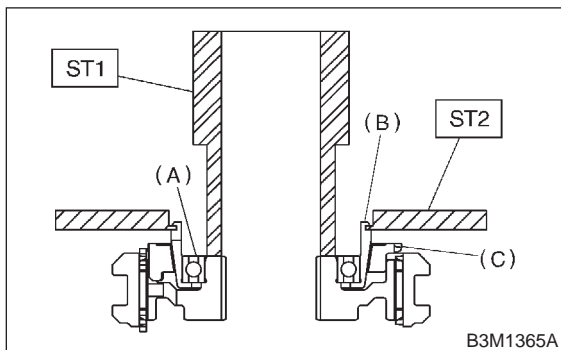
5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

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 SNAP RING PRESS
ST2 498077400 SYNCHRO CONE REMOVER



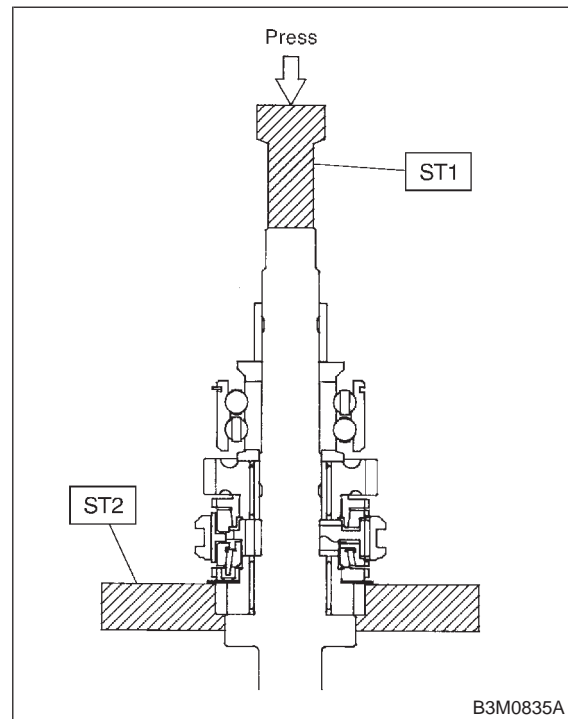
- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

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

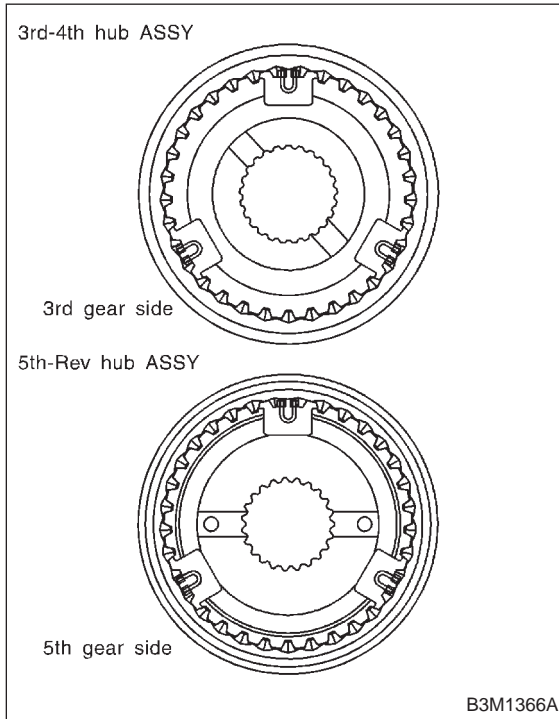


B: ASSEMBLY

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

NOTE:

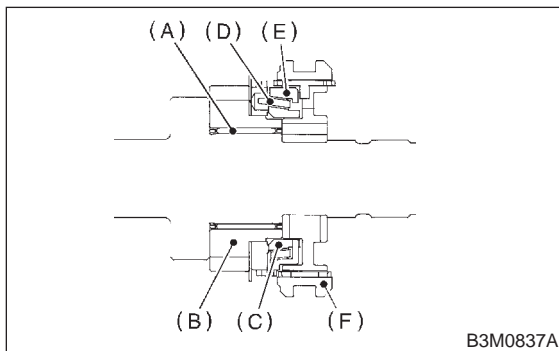
Position open ends of spring 120° apart.



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 (32 × 36 × 25.7)
- (B) 3rd drive gear
- (C) Inner baulk ring
- (D) Synchro cone
- (E) Outer baulk ring
- (F) Sleeve and hub ASSY

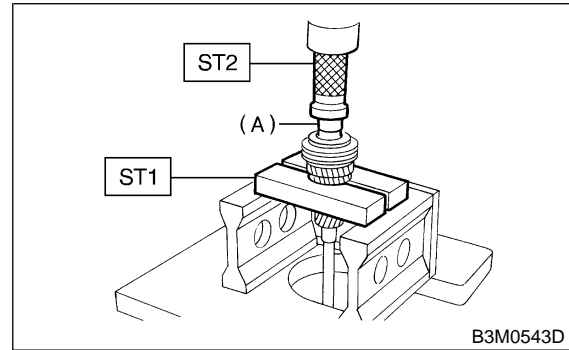
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

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

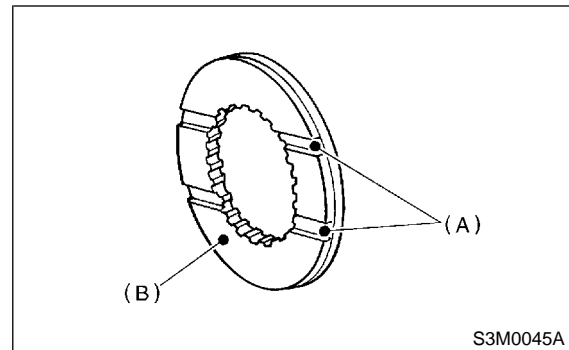


(A) 4th needle bearing race

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

NOTE:

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



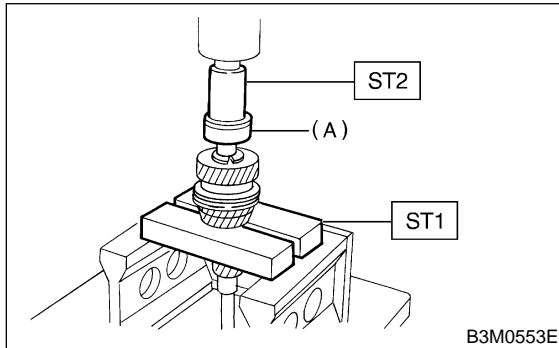
- (A) Groove
- (B) 4th gear side

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



(A) Ball bearing

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

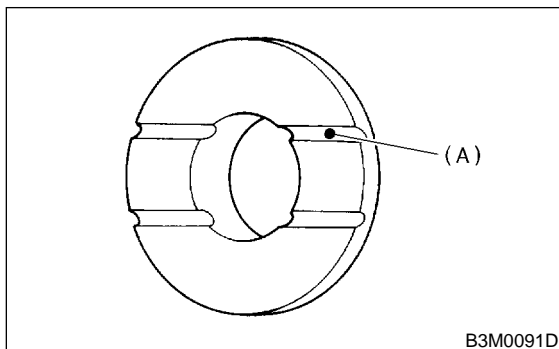
CAUTION:

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.

NOTE:

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

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

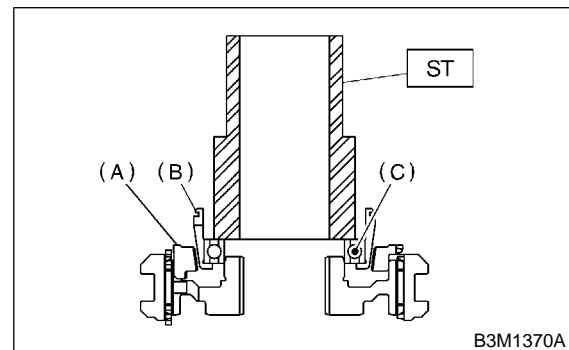
CAUTION:

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

NOTE:

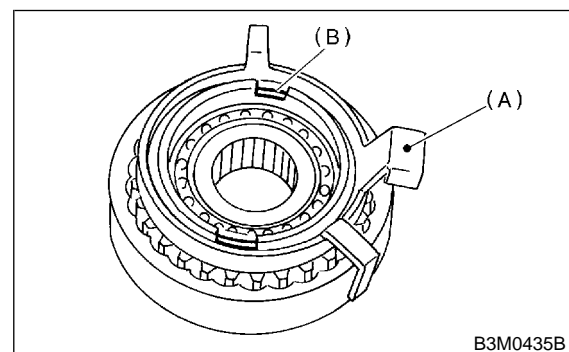
- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

ST 499757002 SNAP RING PRESS



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

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



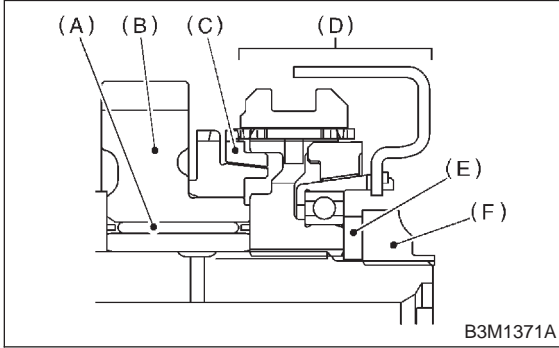
- (A) Synchro cone stopper
- (B) Snap ring

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

NOTE:

Align groove in baulk ring with shifting insert.

- ST1 499987003 SOCKET WRENCH
- ST2 498937000 TRANSMISSION HOLDER



- (A) Needle bearing (32 × 36 × 25.7)
- (B) 5th drive gear
- (C) Baulk ring
- (D) 5th-Rev sleeve and hub ASSY
- (E) Lock washer (22 × 38 × 2)
- (F) Lock nuts (22 × 13)

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

NOTE:

Secure lock nuts in two places after tightening.

- ST1 499987000 SOCKET WRENCH
- ST2 498937000 TRANSMISSION HOLDER

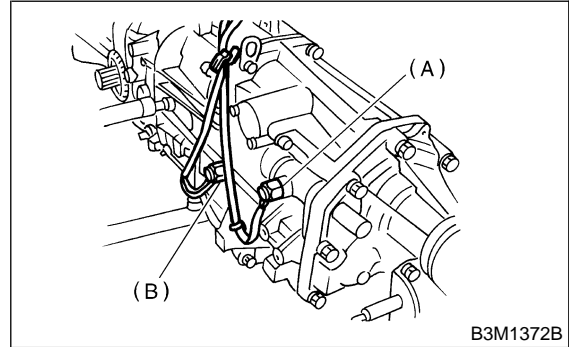
Tightening torque:

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

5. Transfer Case and Extension

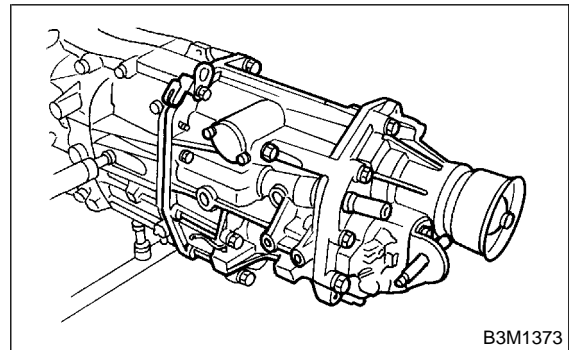
A: REMOVAL

1) Remove back-up light switch and neutral switch.



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

2) Remove transfer case with extension assembly.

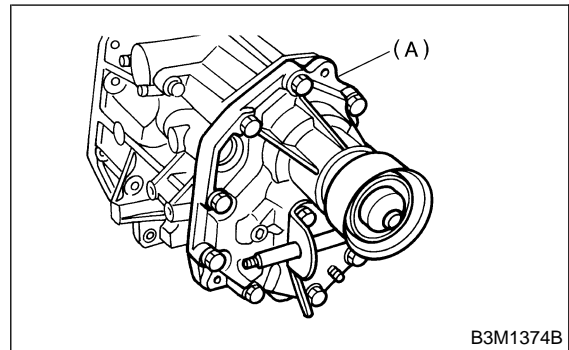


3) Remove shifter arm.

B: DISASSEMBLY

1. SEPARATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

1) Separate transfer case and extension assembly.



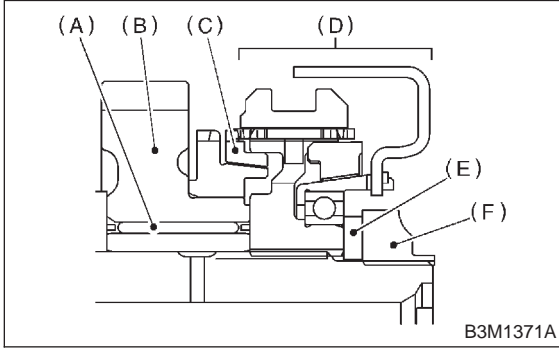
- (A) Extension case ASSY

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

NOTE:

Align groove in baulk ring with shifting insert.

- ST1 499987003 SOCKET WRENCH
- ST2 498937000 TRANSMISSION HOLDER



- (A) Needle bearing (32 × 36 × 25.7)
- (B) 5th drive gear
- (C) Baulk ring
- (D) 5th-Rev sleeve and hub ASSY
- (E) Lock washer (22 × 38 × 2)
- (F) Lock nuts (22 × 13)

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

NOTE:

Secure lock nuts in two places after tightening.

- ST1 499987000 SOCKET WRENCH
- ST2 498937000 TRANSMISSION HOLDER

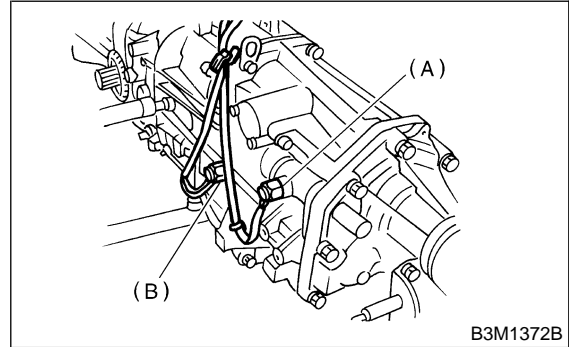
Tightening torque:

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

5. Transfer Case and Extension

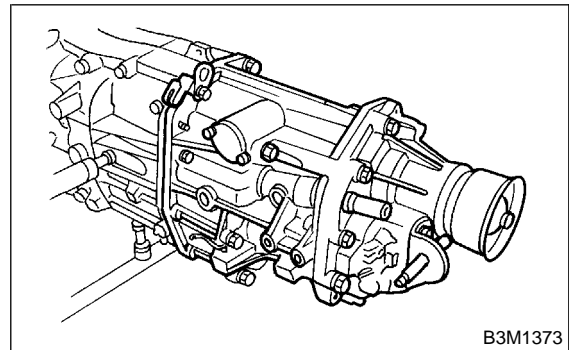
A: REMOVAL

1) Remove back-up light switch and neutral switch.



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

2) Remove transfer case with extension assembly.

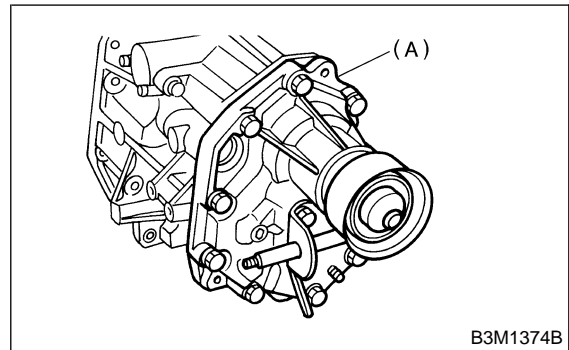


3) Remove shifter arm.

B: DISASSEMBLY

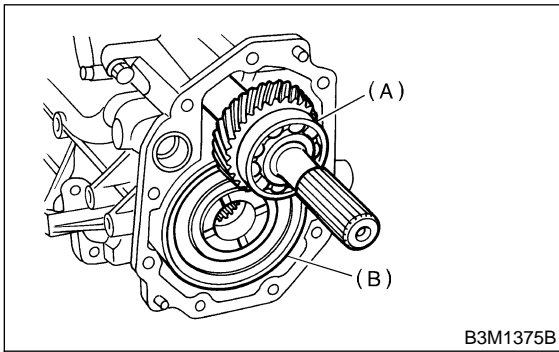
1. SEPARATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

1) Separate transfer case and extension assembly.



- (A) Extension case ASSY

- 2) Remove transfer driven gear and center differential as a set.

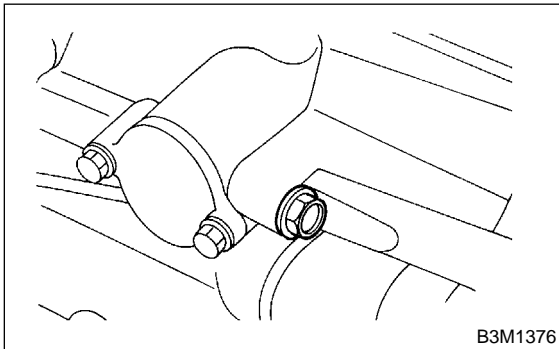


- (A) Transfer driven gear ASSY
(B) Center differential ASSY

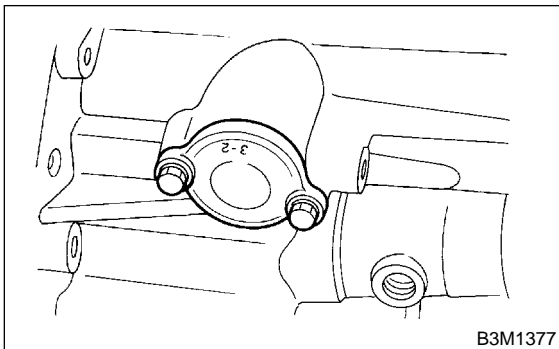
- 3) Remove thrust washer.

2. TRANSFER CASE

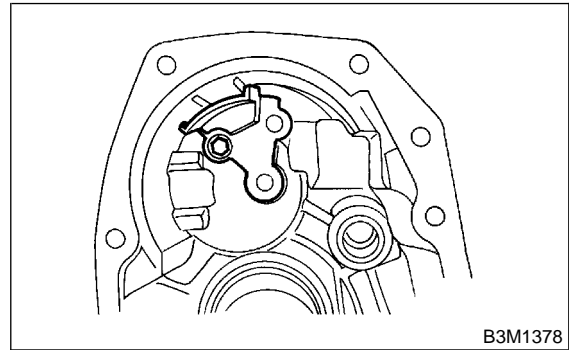
- 1) Remove plug, spring and reverse check ball.



- 2) Remove reverse check assembly.

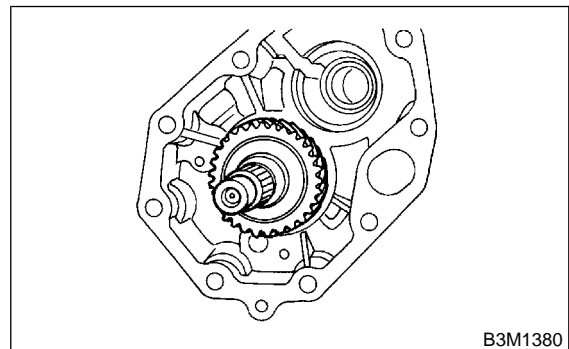


- 3) Remove oil guide.

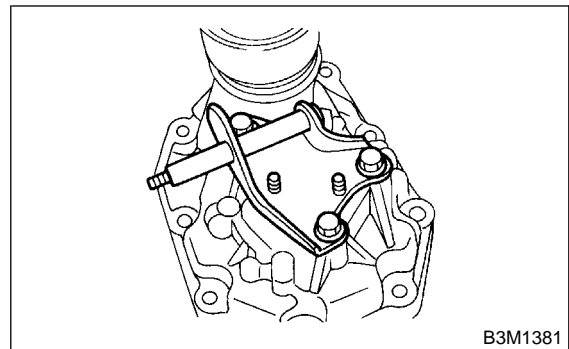


3. EXTENSION

- 1) Remove transfer drive gear assembly.

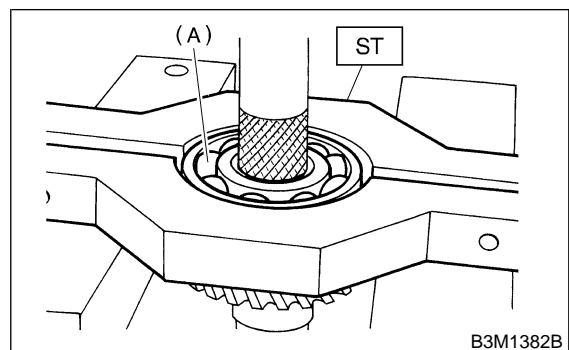


- 2) Remove shift bracket.



- 3) Using ST, remove ball bearing from transfer drive gear.

ST 498077100 REMOVER



- (A) Ball bearing

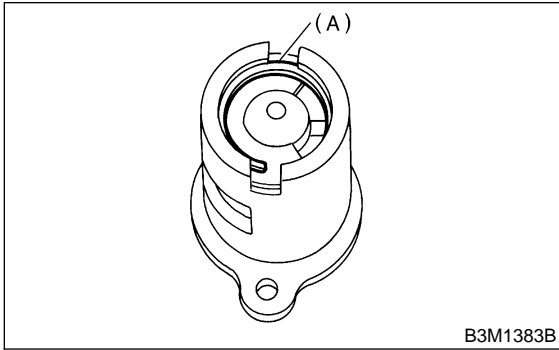
4) Remove oil seal from extension case.

4. REVERSE CHECK SLEEVE

1) Using a standard screwdriver, remove snap ring.

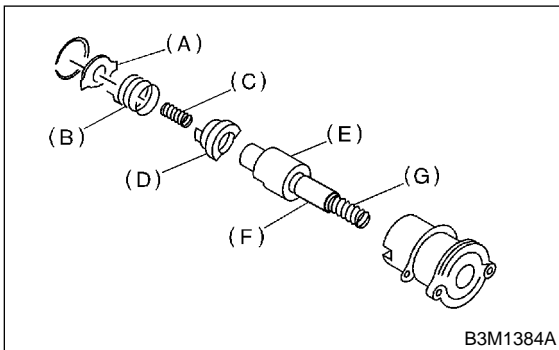
NOTE:

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.

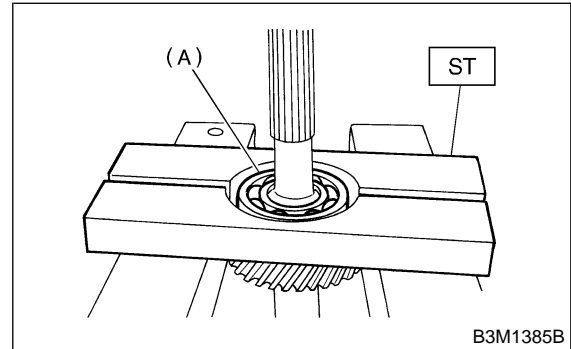
NOTE:

- 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.

5. TRANSFER DRIVEN GEAR

1) Using ST, remove ball bearing from transfer driven gear.

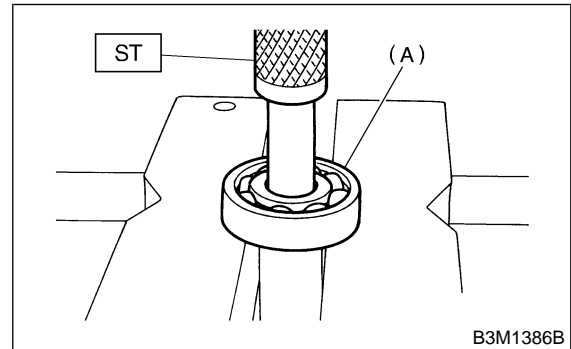
ST 498077000 REMOVER



(A) Ball bearing

2) Using ST, remove ball bearing from transfer driven gear.

ST 899864100 REMOVER



(A) Ball bearing

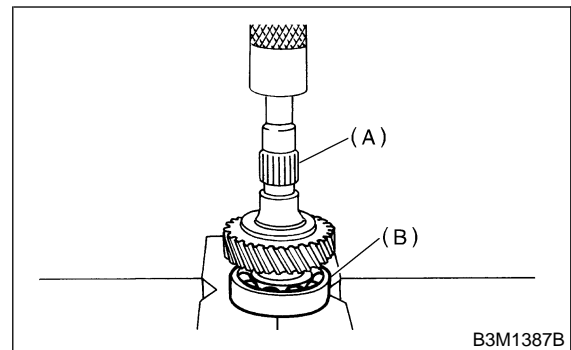
C: ASSEMBLY

1. EXTENSION

1) Install ball bearing to transfer drive gear.

CAUTION:

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



- (A) Transfer drive gear
- (B) Ball bearing

2) Using ST, install oil seal to extension case.

CAUTION:

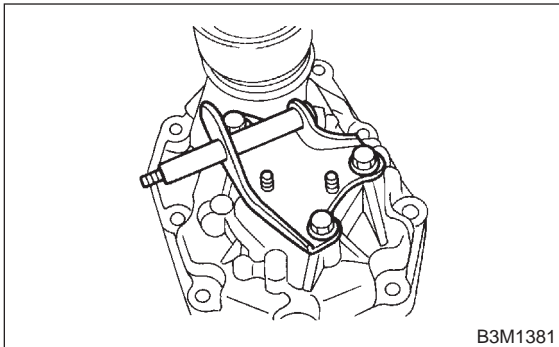
Use new oil seal.

ST 498057300 INSTALLER

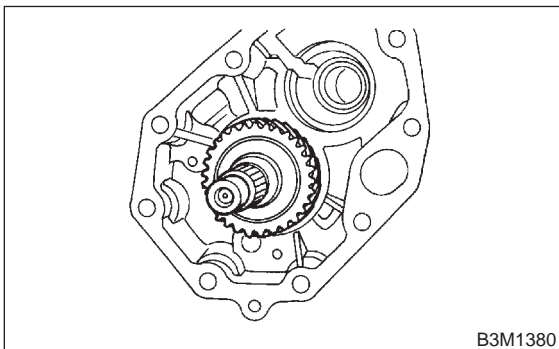
3) Install shift bracket to extension case.

Tightening torque:

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



4) Install transfer drive gear to extension case.

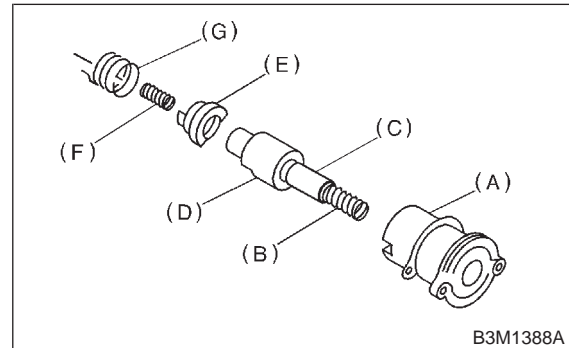


2. REVERSE CHECK SLEEVE

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) Reverse check cam
- (F) Return spring (5th-Rev)
- (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.

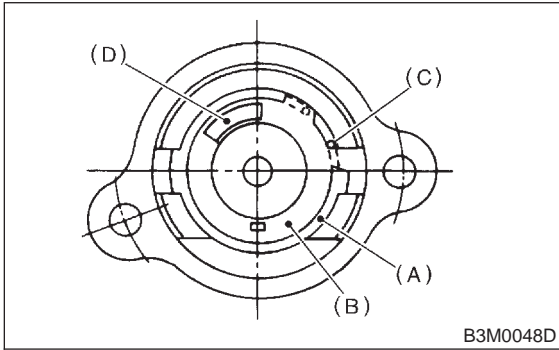
4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring.

5) Position O-ring in groove in sleeve.

CAUTION:

- Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
- Spin cam by hand for smooth rotation.
- 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

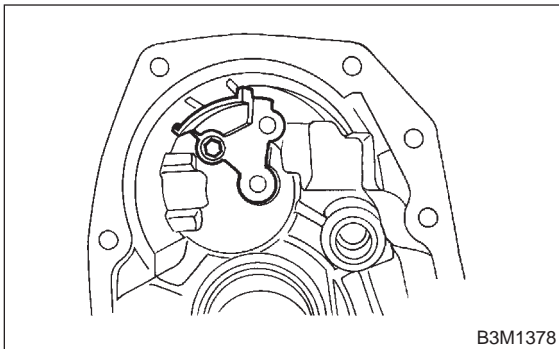
● Select a suitable reverse accent shaft and reverse check plate. <Ref. to 3-1 [W5E0].>

3. TRANSFER CASE

1) Install oil guide to transfer case.

Tightening torque:

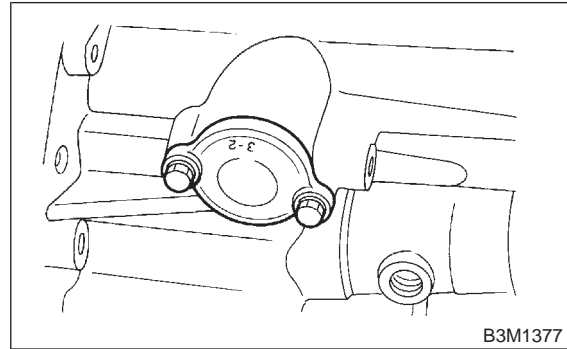
6.4±0.5 N·m (0.65±0.05 kg·m, 4.7±0.4 ft·lb)



2) Install reverse check sleeve assembly to transfer case.

Tightening torque:

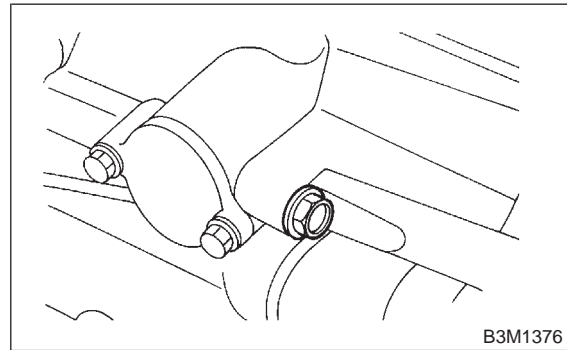
6.4±0.5 N·m (0.65±0.05 kg·m, 4.7±0.4 ft·lb)



3) Install ball, reverse accent spring, washer and plug to transfer case.

Tightening torque:

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

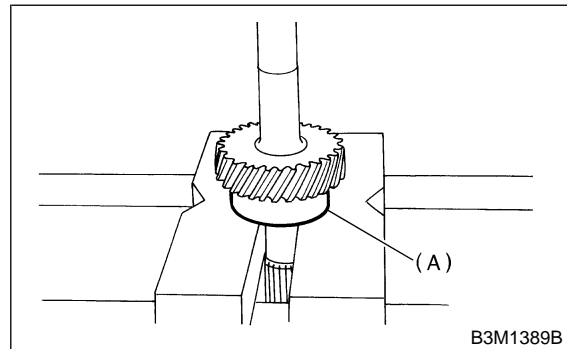


4. TRANSFER DRIVEN GEAR

1) Install ball bearing to transfer driven gear.

CAUTION:

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

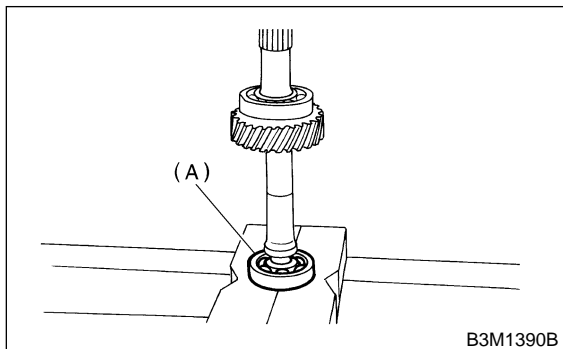


- (A) Ball bearing

2) Install ball bearing to transfer driven gear.

CAUTION:

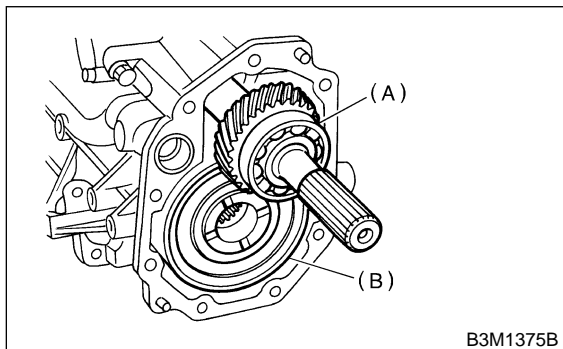
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Ball bearing

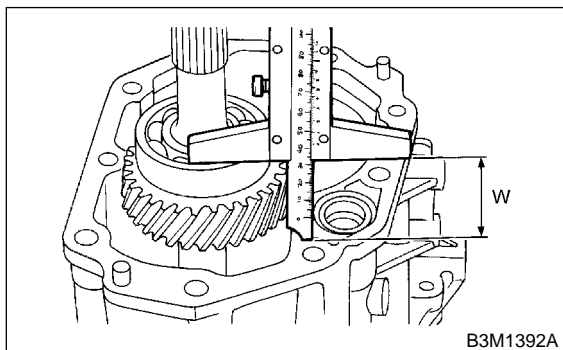
5. COMBINATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

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

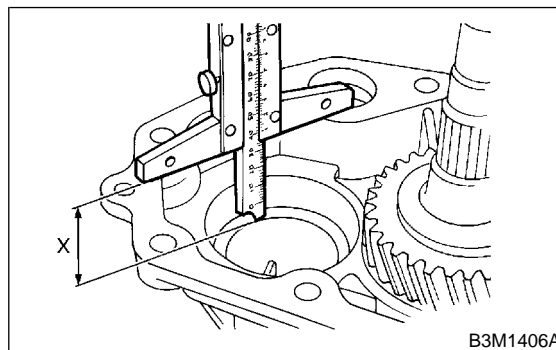


(A) Transfer driven gear ASSY
(B) Center differential ASSY

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



3) Measure depth "X".



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

5) Select suitable washer in the following table:

Standard clearance between thrust washer and ball bearing:

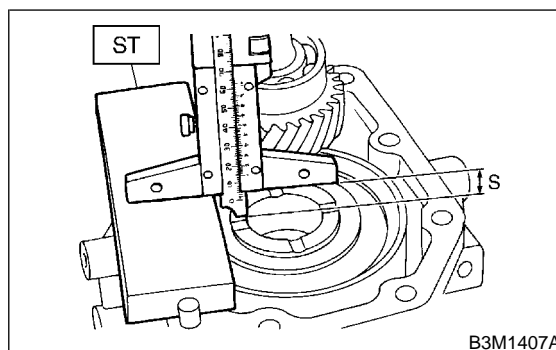
0.05 — 0.30 mm (0.0020 — 0.0118 in)

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

6) Fit thrust washers on transfer drive shaft.

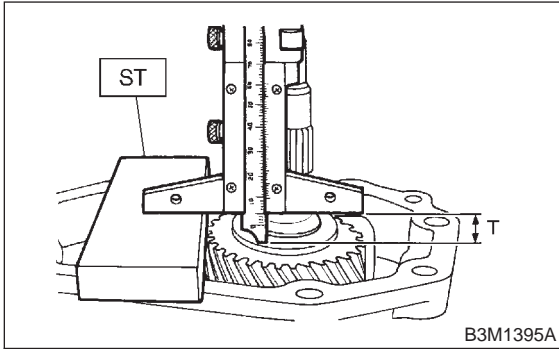
7) Measure depth "S" between transfer case and center differential.

ST 398643600 GAUGE



5. Transfer Case and Extension

- 8) Measure depth "T" between extension case and transfer drive gear.
 ST 398643600 GAUGE



- 9) Calculate space "U" using the following equation: $U = S + T - 0.24 \text{ mm (0.0094 in)}$ [Thickness of gasket] - 30 mm (1.18 in) [Thickness of ST]
 10) Select suitable washer in the following table:

Standard clearance:

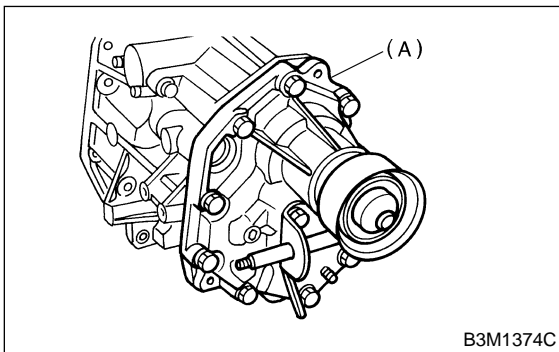
0.15 — 0.35 mm (0.0059 — 0.0138 in)

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)

- 11) Fit thrust washer on center differential.
 12) Install extension assembly into transfer case.

Tightening torque:

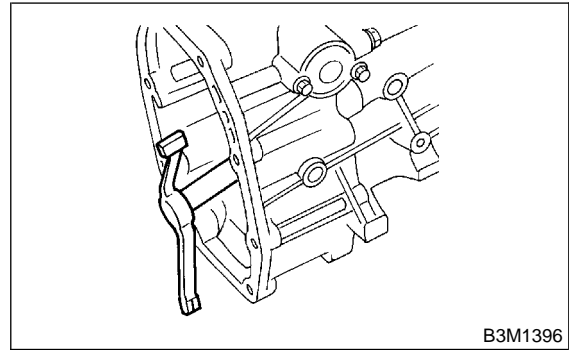
$37 \pm 3 \text{ N}\cdot\text{m}$ ($3.8 \pm 0.3 \text{ kg}\cdot\text{m}$, $27.5 \pm 2.2 \text{ ft}\cdot\text{lb}$)



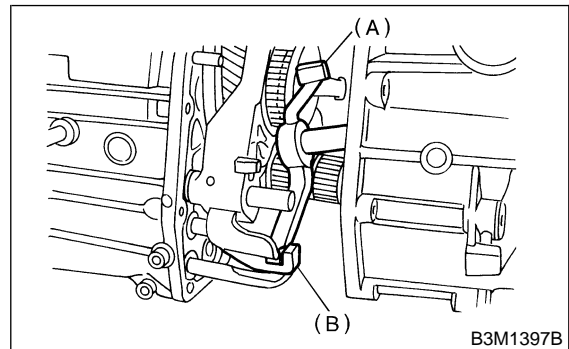
(A) Extension case ASSY

D: INSTALLATION

- 1) Install shifter arm to transfer case.



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

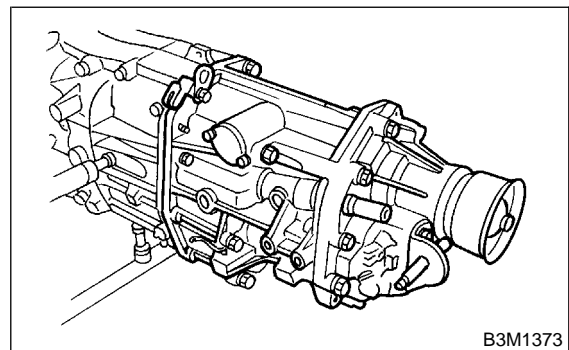


(A) Shift arm
 (B) 3rd-4th fork rod

- 3) Install transfer case with extension assembly to transmission case.

Tightening torque:

$25 \pm 2.0 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



E: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

- 1) Shift gear into 3rd gear position.
- 2) Shifter arm turns lightly toward the 1st and 2nd gear side but heavily toward the reverse gear side because of the function of the return spring, until arm contacts the stopper.
- 3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
- 4) To adjust, remove bolts holding reverse check sleeve assembly to the case, move sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

CAUTION:

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

NOTE:

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

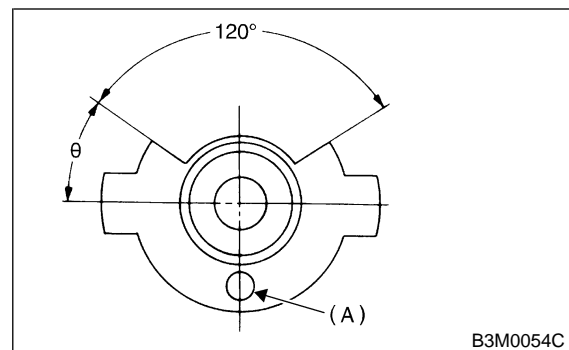
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

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

2. REVERSE CHECK PLATE ADJUSTMENT

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

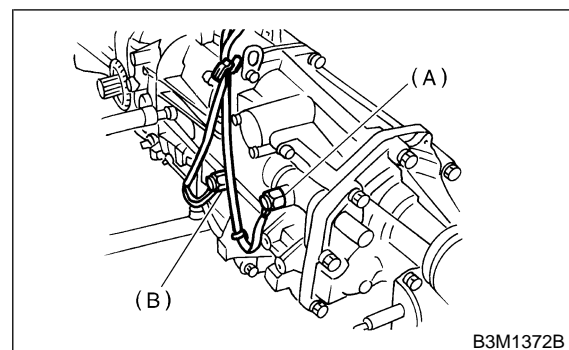
Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



- 3) Install neutral position switch and back-up light switch to transfer case.

Tightening torque:

25±2.0 N·m (2.5±0.2 kg·m, 18.1±1.4 ft-lb)



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

6. Front Differential

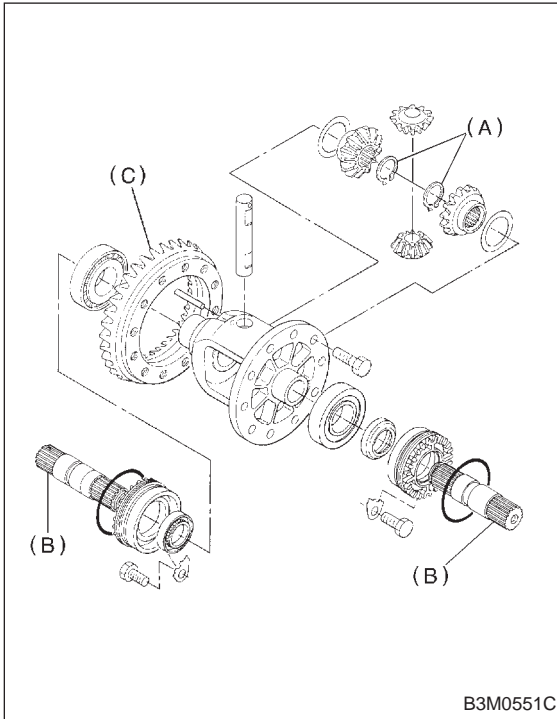
A: DISASSEMBLY

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

NOTE:

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

2) Loosen twelve bolts and remove hypoid driven gear.

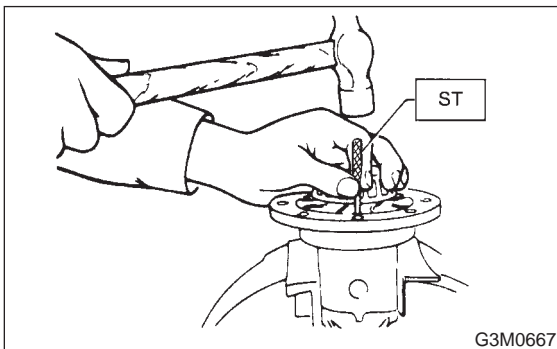


B3M0552C

- (A) Snap ring
- (B) Axle drive shaft
- (C) Hypoid driven gear

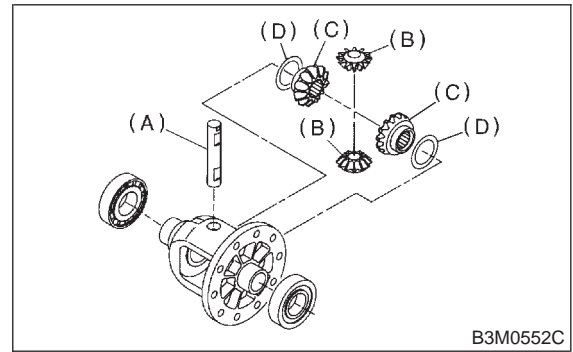
3) Drive out straight pin from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER



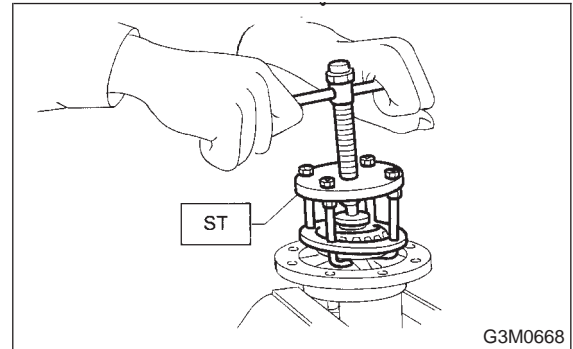
G3M0667

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



- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

5) Remove roller bearing using ST.
ST 399527700 PULLER SET



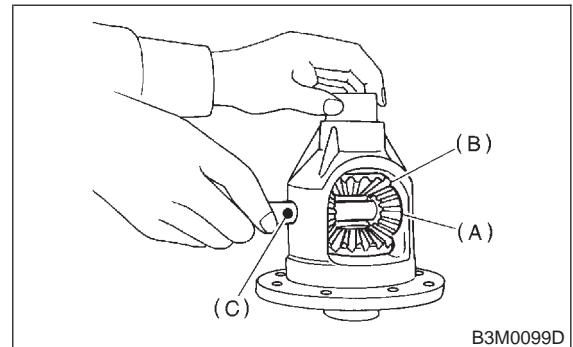
G3M0668

B: ASSEMBLY

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

NOTE:

Face the chamfered side of washer toward gear.



B3M0099D

- (A) Differential bevel pinion
- (B) Differential bevel gear
- (C) Pinion shaft

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

NOTE:

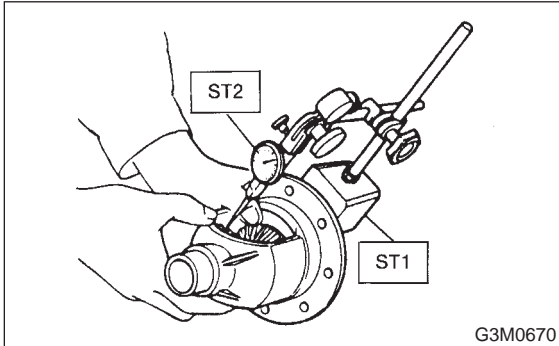
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



G3M0670

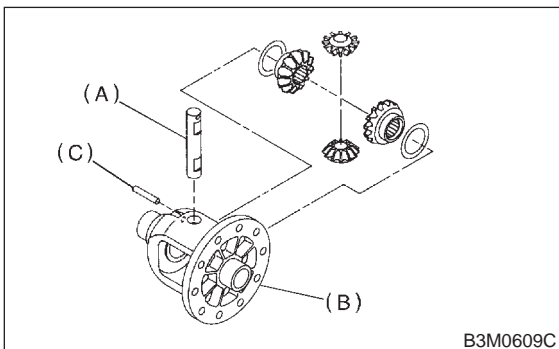
Washer (38.1 × 50 × t)	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

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

NOTE:

Lock straight pin after installing.

ST 899904100 REMOVER



B3M0609C

- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

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

CAUTION:

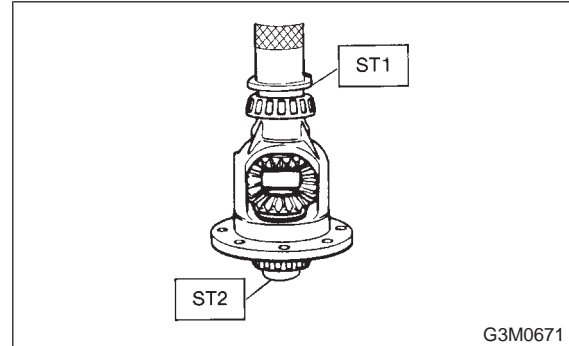
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

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

ST1 499277100 BUSH 1-2 INSTALLER

ST2 398497701 ADAPTER

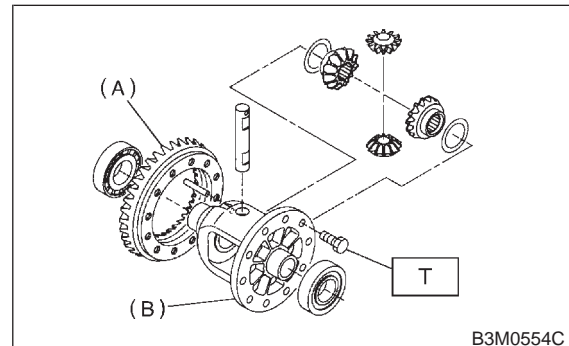


G3M0671

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

Tightening torque:

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



B3M0554C

- (A) Hypoid driven gear
- (B) Differential case

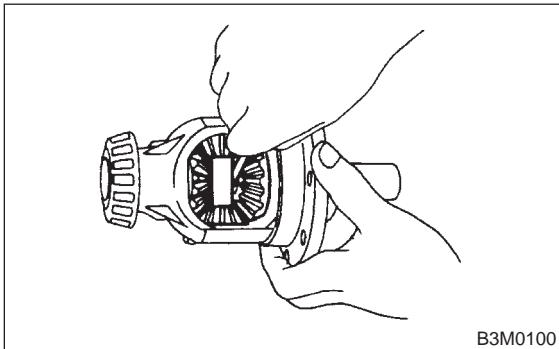
6) Position drive axle shaft in differential case and hold it with outer snap ring (28). Using a thickness gauge, measure clearance between the shaft and case is within specifications.

NOTE:

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

Clearance:

0 — 0.25 mm (0 — 0.0098 in)



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

7. Center Differential

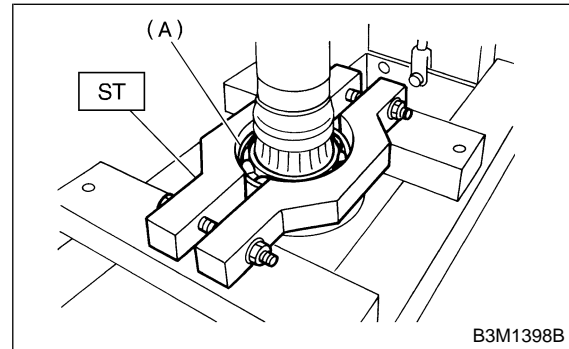
A: DISASSEMBLY AND ASSEMBLY

1) Remove ball bearing using ST.

CAUTION:

Do not reuse ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



(A) Ball bearing

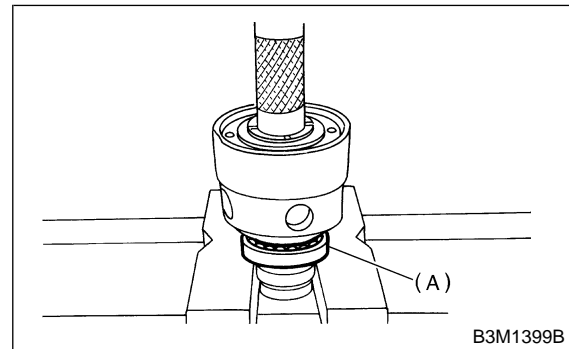
2) Install ball bearing to center differential assembly.

CAUTION:

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

NOTE:

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



(A) Ball bearing

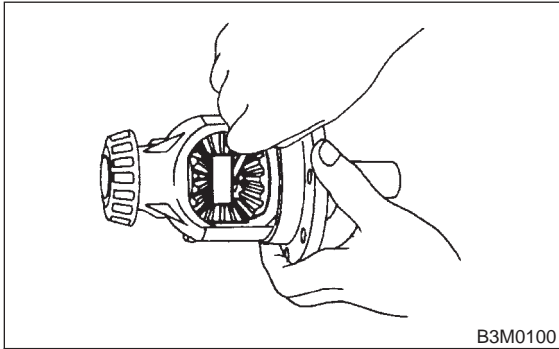
6) Position drive axle shaft in differential case and hold it with outer snap ring (28). Using a thickness gauge, measure clearance between the shaft and case is within specifications.

NOTE:

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

Clearance:

0 — 0.25 mm (0 — 0.0098 in)



Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028011	1.05 (0.0413)
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7. Center Differential

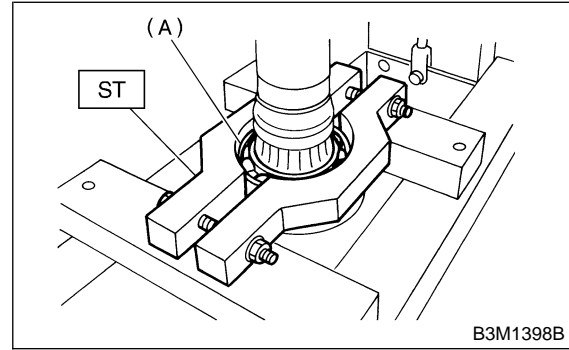
A: DISASSEMBLY AND ASSEMBLY

1) Remove ball bearing using ST.

CAUTION:

Do not reuse ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



(A) Ball bearing

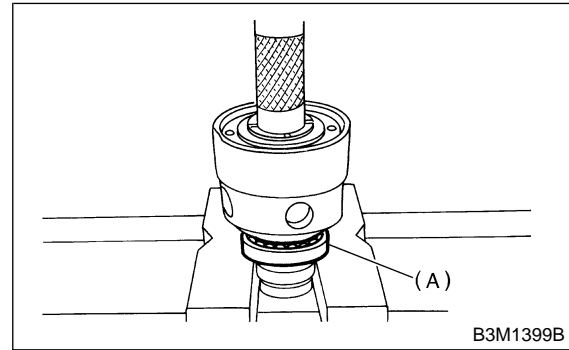
2) Install ball bearing to center differential assembly.

CAUTION:

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

NOTE:

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



(A) Ball bearing

1. Manual Transmission

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

2. Differential

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. <ul style="list-style-type: none"> ● 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.

1. Torque Converter Clutch

1. Torque Converter Clutch

Type	Symmetric, 3 element, single stage, 2 phase torque converter
Stall torque ratio	1.9 — 2.1
Nominal diameter	246 mm (9.69 in)
Stall speed (at sea level)	2,100 — 2,600 rpm
One-way clutch	Sprague type one-way clutch

2. Oil Pump

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

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Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. Transmission Control Element

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

	Gear ratio
1st	3.027
2nd	1.619
3rd	1.000
4th	0.694
Rev	2.272

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	Gear ratio
1st	3.027
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4th	0.694
Rev	2.272

5. Planetary Gear and Plate

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	37
Tooth number of rear pinion	19
Tooth number of rear internal gear	75
Drive & driven plate number of high clutch	4
Drive & driven plate number of low clutch	6
Drive & driven plate number of reverse clutch	2
Drive & driven plate number of 2-4 brake	3
Drive & driven plate number of low & reverse brake	6

6. Selector Position

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	Automatic gear change 1st \leftarrow \rightarrow 2nd \leftarrow \rightarrow 3rd \leftarrow \rightarrow 4th
3 (3rd)	Automatic gear change 1st \leftarrow \rightarrow 2nd \leftarrow \rightarrow 3rd \leftarrow 4th
2 (2nd)	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

5. Planetary Gear and Plate

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	37
Tooth number of rear pinion	19
Tooth number of rear internal gear	75
Drive & driven plate number of high clutch	4
Drive & driven plate number of low clutch	6
Drive & driven plate number of reverse clutch	2
Drive & driven plate number of 2-4 brake	3
Drive & driven plate number of low & reverse brake	6

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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

Type	Electronic/hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid	Dexron IIE or 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

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

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Inhibitor switch	12 poles
Transmission harness	20 poles

9. Transfer

Transfer clutch	Hydraulic multi-plate clutch
Drive & driven plate number of transfer clutch	5
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

Front final gear ratio	4.444 (40/9)																		
Lubrication oil	<p style="text-align: center;">ITEM</p> <p style="text-align: center;">• Front differential gear oil</p> <p style="text-align: center;">API Classification</p> <p style="text-align: center;">GL - 5</p> <p style="text-align: center;">SAE Viscosity No. and Applicable Temperature</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="text-align: center;">(°C)</td> <td style="text-align: center;">-30</td> <td style="text-align: center;">-26</td> <td style="text-align: center;">-15</td> <td style="text-align: center;">-5</td> <td style="text-align: center;">0</td> <td style="text-align: center;">15</td> <td style="text-align: center;">25</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;">(°F)</td> <td style="text-align: center;">-22</td> <td style="text-align: center;">-15</td> <td style="text-align: center;">5</td> <td style="text-align: center;">23</td> <td style="text-align: center;">32</td> <td style="text-align: center;">59</td> <td style="text-align: center;">77</td> <td style="text-align: center;">86</td> </tr> </table> <p style="text-align: right;">H3M1235A</p>	(°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)																		

9. Transfer

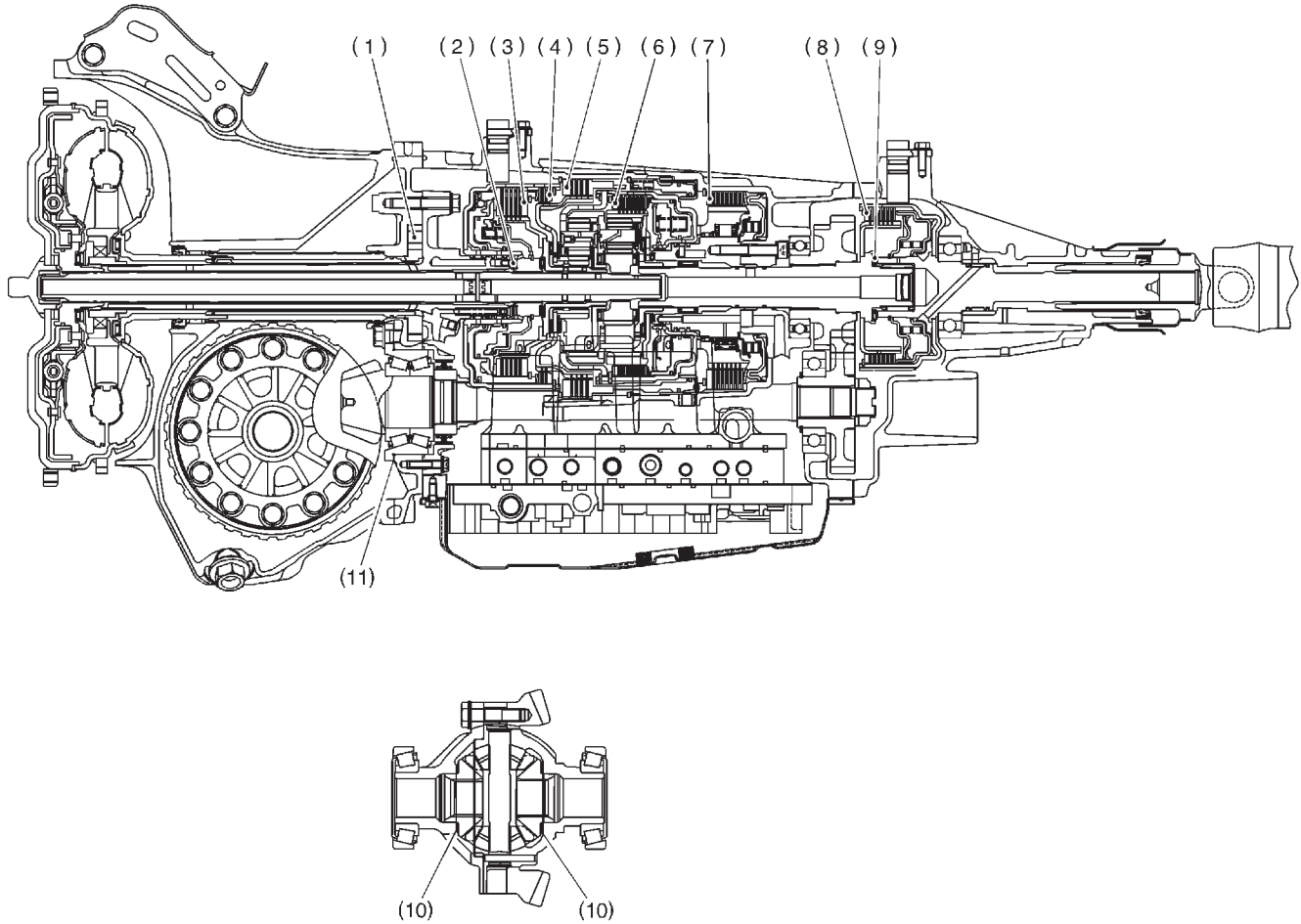
Transfer clutch	Hydraulic multi-plate clutch
Drive & driven plate number of transfer clutch	5
Control method	Electronic, hydraulic type
Lubricant	The same Automatic transmission fluid used in automatic transmission
1st reduction gear ratio	1.000 (53/53)

10. Final Reduction

Front final gear ratio	4.444 (40/9)																		
Lubrication oil	<p style="text-align: center;">ITEM</p> <p style="text-align: center;">• Front differential gear oil</p> <p style="text-align: center;">API Classification</p> <p style="text-align: center;">GL - 5</p> <p style="text-align: center;">SAE Viscosity No. and Applicable Temperature</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="text-align: right;">(°C)</td> <td style="text-align: center;">-30</td> <td style="text-align: center;">-26</td> <td style="text-align: center;">-15</td> <td style="text-align: center;">-5</td> <td style="text-align: center;">0</td> <td style="text-align: center;">15</td> <td style="text-align: center;">25</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: right;">(°F)</td> <td style="text-align: center;">-22</td> <td style="text-align: center;">-15</td> <td style="text-align: center;">5</td> <td style="text-align: center;">23</td> <td style="text-align: center;">32</td> <td style="text-align: center;">59</td> <td style="text-align: center;">77</td> <td style="text-align: center;">86</td> </tr> </table> <p style="text-align: right;">H3M1235A</p>	(°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)																		

MEMO:

11. Adjusting Parts



B3M1015A

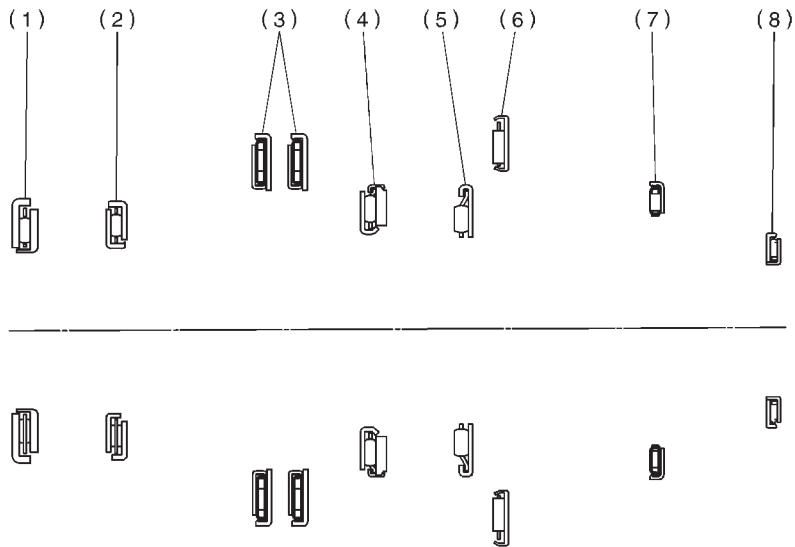
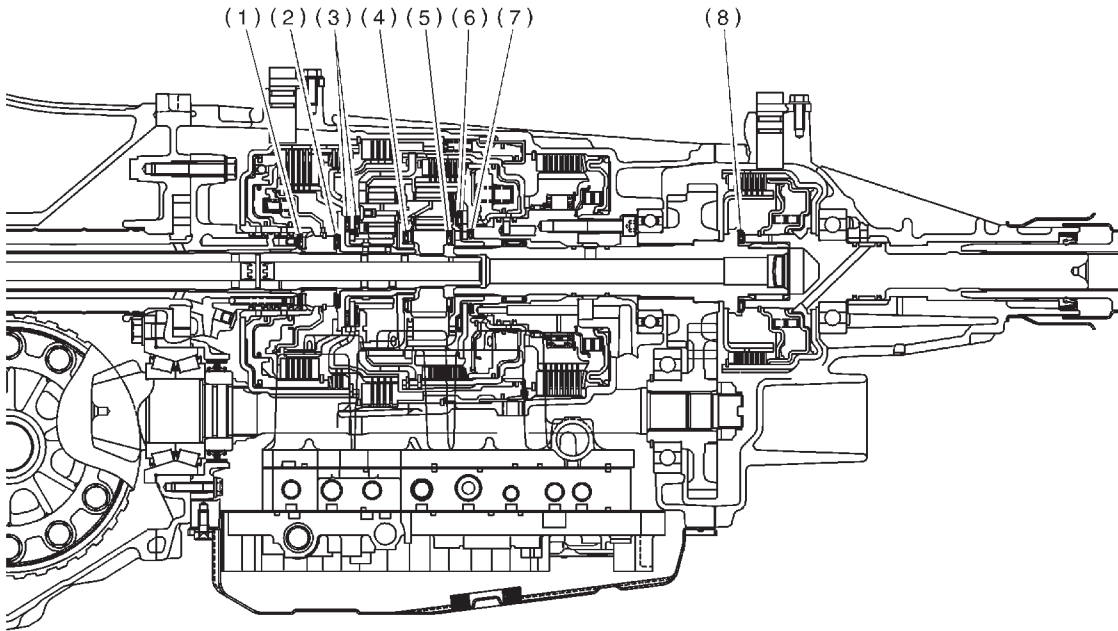
No.	Part Name	Part Number	Dimension mm (in)	Application
1	Rotor (Oil pump)	15008AA060 15008AA070 15008AA080	11.37 — 11.38 (0.4476 — 0.4480) 11.38 — 11.39 (0.4480 — 0.4484) 11.39 — 11.40 (0.4484 — 0.4488)	Adjusting side clearance of oil pump
2	Thrust bearing	806528050 806528060 806528070 806528080 806528090 806528100	4.11 (0.1618) 4.3 (0.169) 4.5 (0.177) 4.7 (0.185) 4.9 (0.193) 5.1 (0.201)	Adjusting total end play
3	Retaining plate (High clutch)	31567AA710 31567AA720 31567AA730 31567AA740 31567AA670 31567AA680 31567AA690 31567AA700	4.7 (0.185) 4.8 (0.189) 4.9 (0.193) 5.0 (0.197) 5.1 (0.201) 5.2 (0.205) 5.3 (0.209) 5.4 (0.213)	Adjusting clearance of high clutch
4	Retaining plate (Reverse clutch)	31567AA760 31567AA770 31567AA780 31567AA790 31567AA800	4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189)	Adjusting clearance of reverse clutch
5	Retaining plate (2-4 brake)	31567AA612 31567AA622 31567AA632 31567AA642 31567AA652 31567AA662	5.6 (0.220) 5.8 (0.228) 6.0 (0.236) 6.2 (0.244) 6.4 (0.252) 6.6 (0.260)	Adjusting clearance of 2-4 brake
6	Retaining plate (Low clutch)	31567AA830 31567AA840 31567AA850 31567AA860 31567AA870	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181)	Adjusting clearance of low clutch
7	Retaining plate (Low and reverse brake)	31667AA320 31667AA330 31667AA340 31667AA350 31667AA360 31667AA370 31667AA380	4.2 (0.165) 4.5 (0.177) 4.8 (0.189) 5.1 (0.201) 5.4 (0.213) 5.7 (0.224) 6.0 (0.236)	Adjusting clearance of low and reverse brake
8	Pressure plate (Transfer clutch)	31593AA151 31593AA161 31593AA171 31593AA181	3.3 (0.130) 3.7 (0.146) 4.1 (0.161) 4.5 (0.177)	Adjusting clearance of transfer clutch
9	Thrust bearing (Transfer clutch)	806536020 806535030 806535040 806535050 806535060 806535070 806535090	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	Adjusting end play of transfer clutch
10	Washer (Front differential)	803038021 803038022 803038023	0.95 (0.0374) 1.00 (0.0394) 1.05 (0.0413)	Adjusting backlash of differential bevel gear

SPECIFICATIONS AND SERVICE DATA

No.	Part Name	Part Number	Dimension mm (in)	Application
11	Drive pinion shim	31451AA050	0.150 (0.0059)	Adjusting drive pinion shim
		31451AA060	0.175 (0.0069)	
		31451AA070	0.200 (0.0079)	
		31451AA080	0.225 (0.0089)	
		31451AA090	0.250 (0.0098)	
		31451AA100	0.275 (0.0108)	

MEMO:

12. Location and Installing Direction of Thrust Needle Bearing



S3M0220A

SPECIFICATIONS AND SERVICE DATA

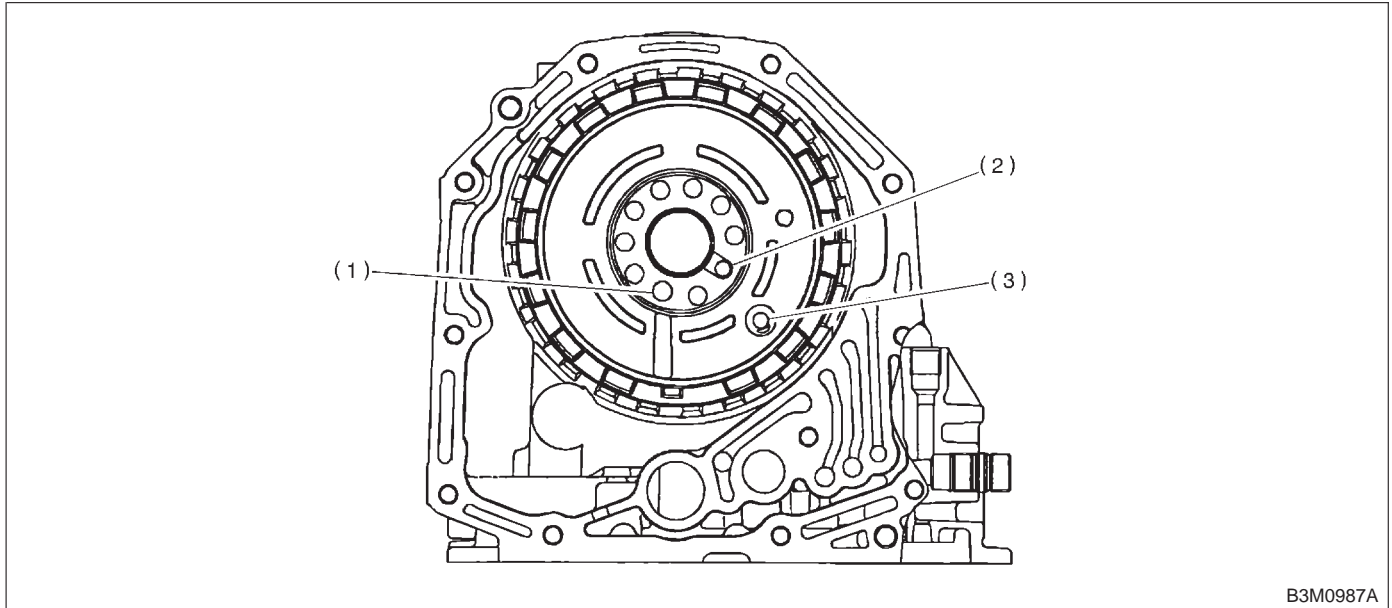
[S1200] 3-2

12. Location and Installing Direction of Thrust Needle Bearing

No.	Part Name	Part Number	Inside diameter mm (in)	Outside diameter mm (in)	Dimension mm (in)	Application
(1)	Thrust needle bearing	806528050 806528060 806528070 806528080 806528090 806528100	28.5 (1.122)	48 (1.89)	4.1 (0.161) 4.3 (0.169) 4.5 (0.177) 4.7 (0.185) 4.9 (0.193) 5.1 (0.201)	Adjusting total end play
(2)	Thrust needle bearing	806530040	30 (1.18)	47 (1.85)	3.8 (0.150)	Place of high clutch
(3)	Thrust needle bearing	806551020	51 (2.01)	71 (2.80)	3.3 (0.130)	Place of front sun gear
(4)	Thrust needle bearing	806535120	35 (1.38)	53 (2.09)	4.8 (0.189)	Place of rear sun gear
(5)	Thrust needle bearing	806534060	35 (1.38)	53 (2.09)	3.3 (0.130)	Place of rear sun gear
(6)	Thrust needle bearing	806558030	58 (2.28)	78 (3.07)	2.8 (0.110)	Place of rear internal gear
(7)	Thrust needle bearing	806541020	39.7 (1.563)	54 (2.13)	3.6 (0.142)	Place of one-way clutch
(8)	Thrust needle bearing	806536020 806535030 806535040 806535050 806535060 806535070 806535090	36 (1.42)	53 (2.09)	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	Adjusting end play of transfer clutch

13. Fluid Passages

A: TRANSMISSION CASE (FRONT SIDE)



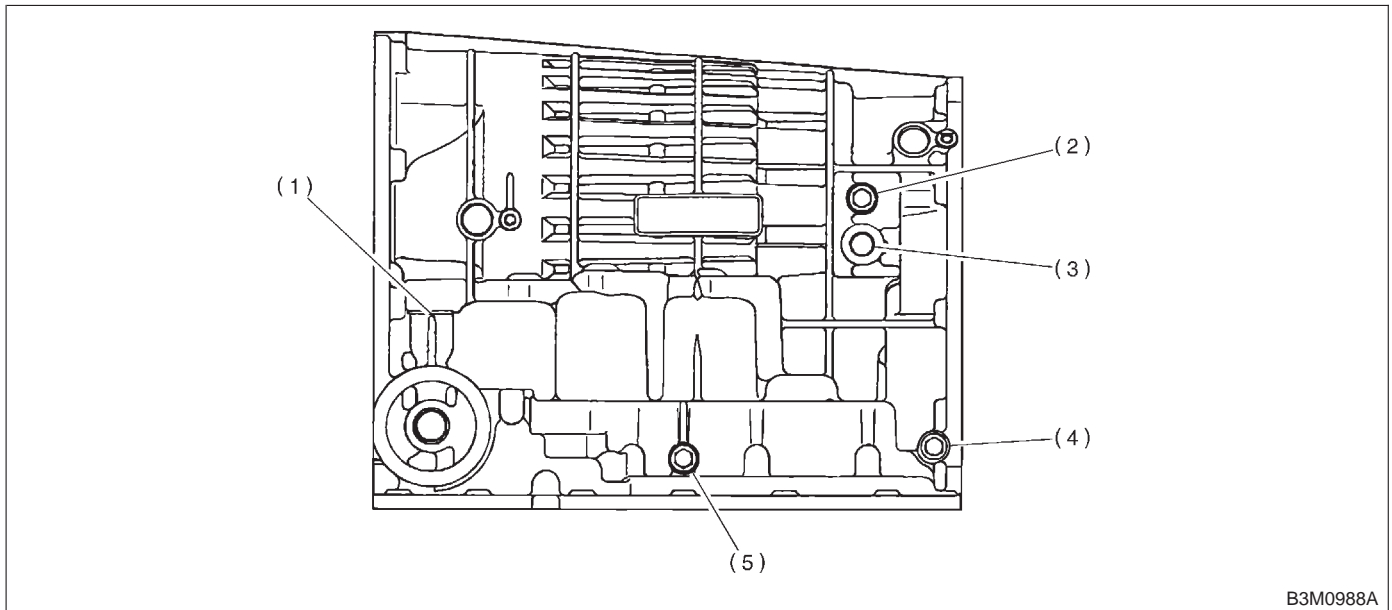
B3M0987A

(1) Low clutch pressure

(2) Oil cooler inlet pressure

(3) Low & reverse brake pressure

B: TRANSMISSION CASE (LH SIDE)



B3M0988A

(1) Oil cooler outlet pressure

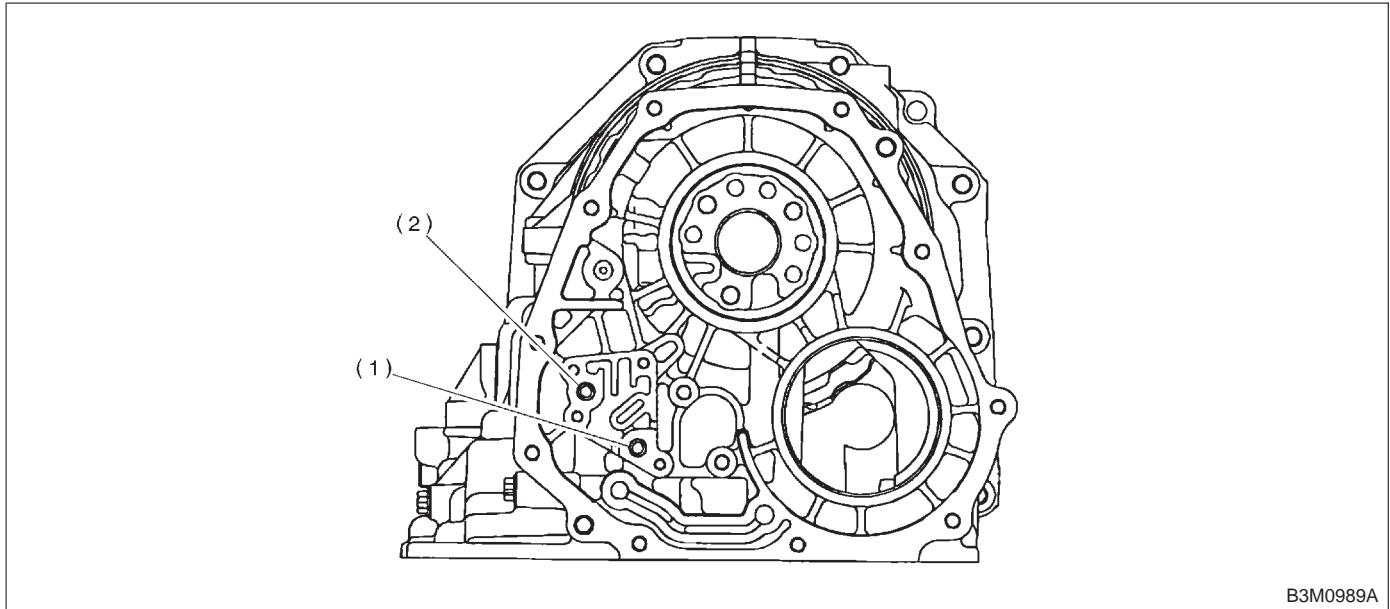
(3) Oil cooler inlet pressure

(5) 2-4 brake pressure

(2) Low & reverse brake pressure

(4) Low clutch pressure

C: TRANSMISSION CASE (REAR SIDE)

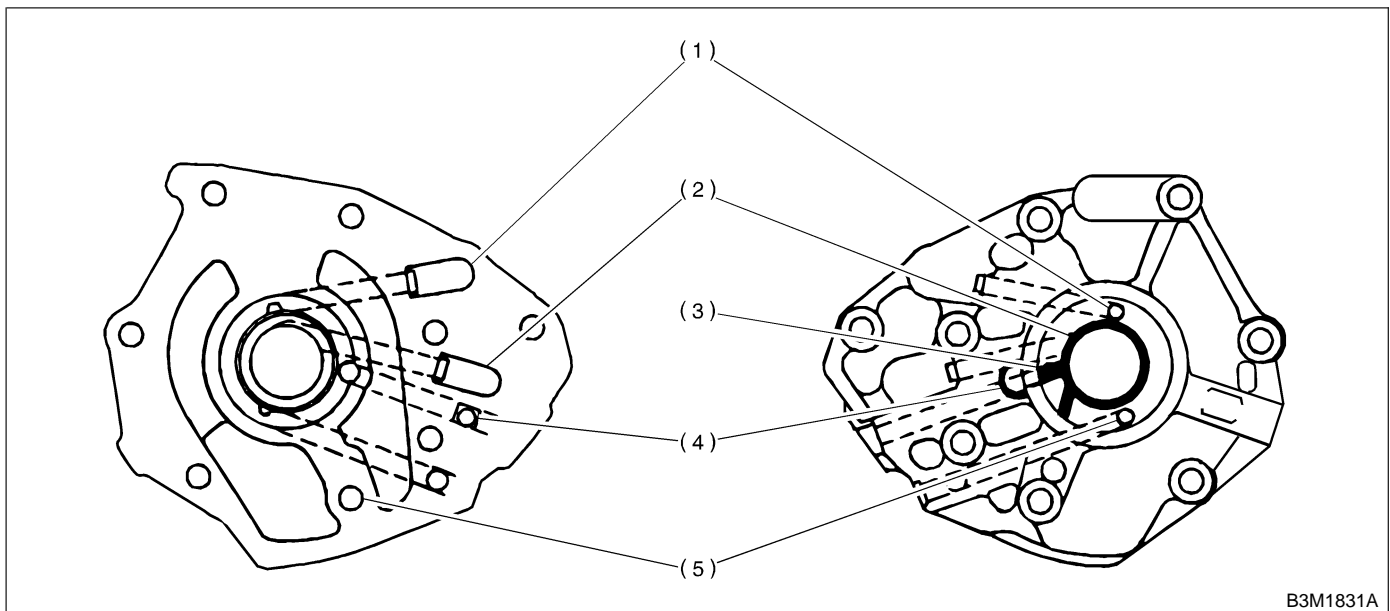


B3M0989A

(1) Pilot pressure

(2) Line pressure

D: OIL PUMP COVER



B3M1831A

(1) High clutch pressure

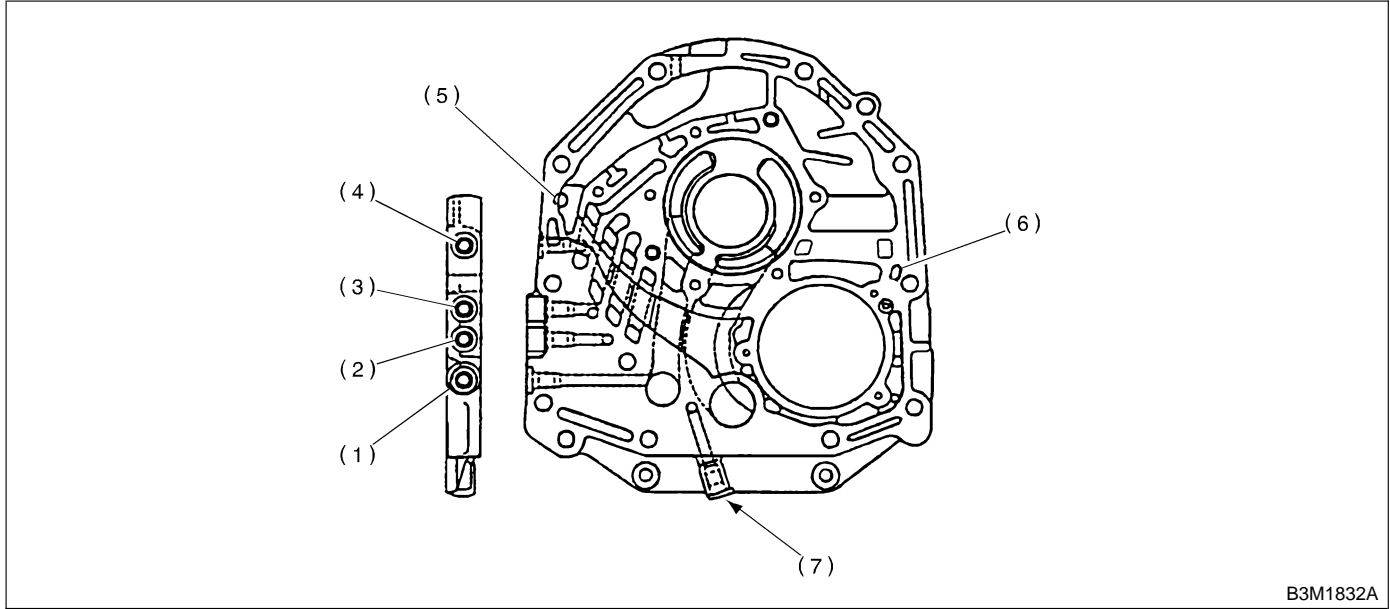
(3) Front lubricating hole

(5) Reverse clutch pressure

(2) Lock-up release pressure

(4) Lock-up apply pressure

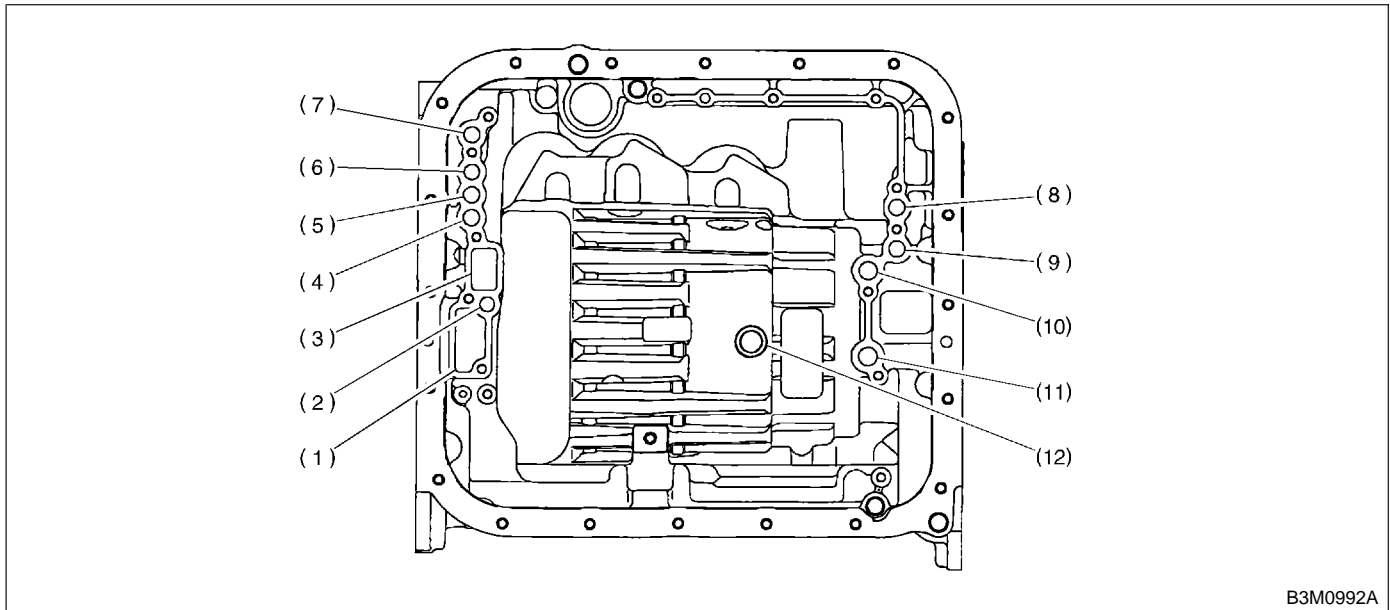
E: OIL PUMP HOUSING



B3M1832A

- | | | |
|------------------------------|--------------------------|-----------------------------|
| (1) Oil pump outlet pressure | (4) High clutch pressure | (7) Reverse clutch pressure |
| (2) Lock-up apply pressure | (5) Drain | |
| (3) Lock-up release pressure | (6) Air breather | |

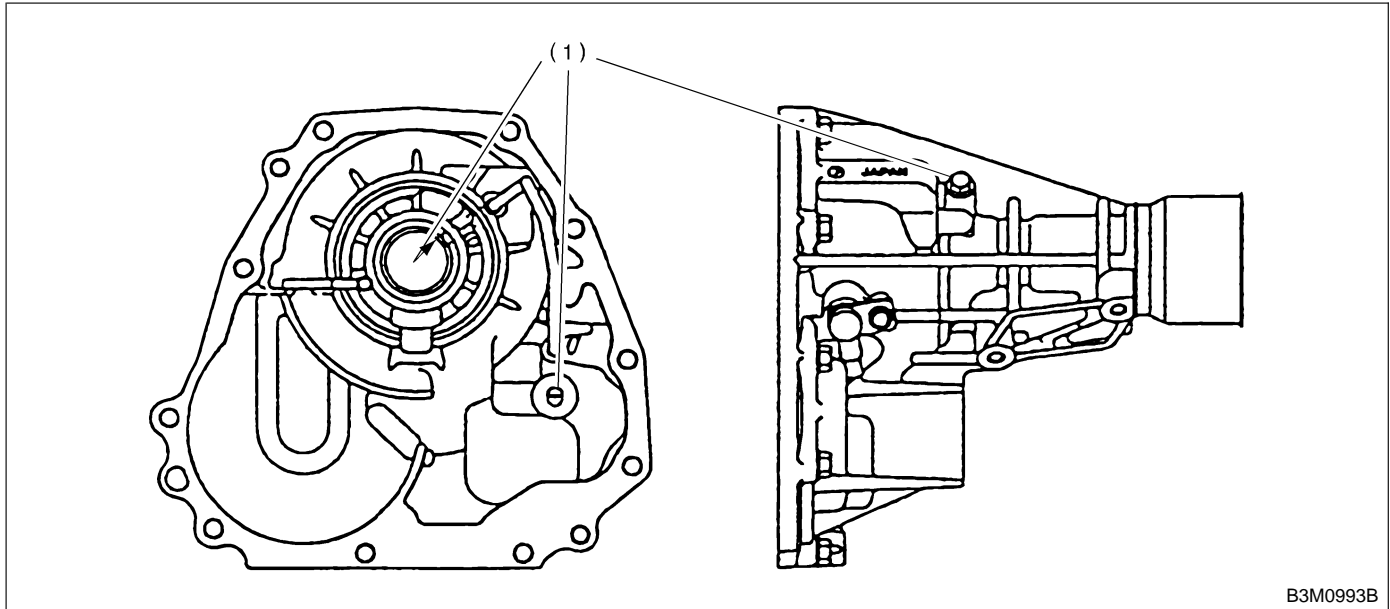
F: TRANSMISSION CASE



B3M0992A

- | | | |
|-----------------------------|--------------------------------|-----------------------------------|
| (1) Oil pump inlet port | (5) Lock-up release pressure | (9) Pilot pressure |
| (2) Reverse clutch pressure | (6) High clutch pressure | (10) Low & reverse brake pressure |
| (3) Oil pump outlet port | (7) Oil cooler outlet pressure | (11) Low clutch pressure |
| (4) Lock-up apply pressure | (8) Line pressure | (12) 2-4 brake pressure |

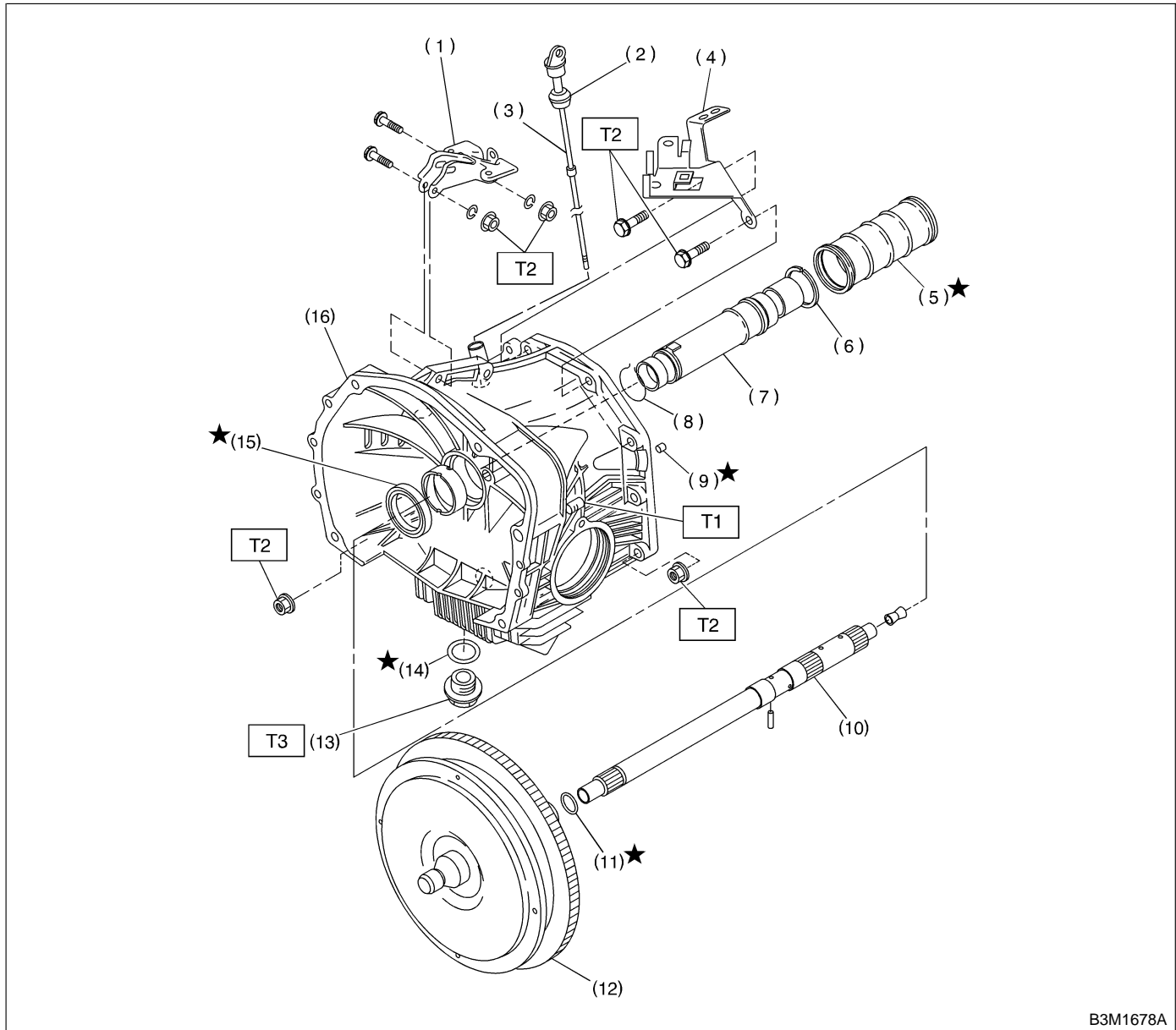
G: EXTENSION CASE



B3M0993B

(1) Transfer clutch pressure

1. Torque Converter Clutch and Case



- | | |
|----------------------------------|-----------------------------------|
| (1) Pitching stopper bracket | (9) Oil drain pipe |
| (2) O-ring | (10) Input shaft |
| (3) Differential oil level gauge | (11) O-ring |
| (4) Stay | (12) Torque converter clutch ASSY |
| (5) Seal pipe | (13) Drain plug |
| (6) Seal ring | (14) Gasket |
| (7) Oil pump shaft | (15) Oil seal |
| (8) Clip | (16) Torque converter clutch case |

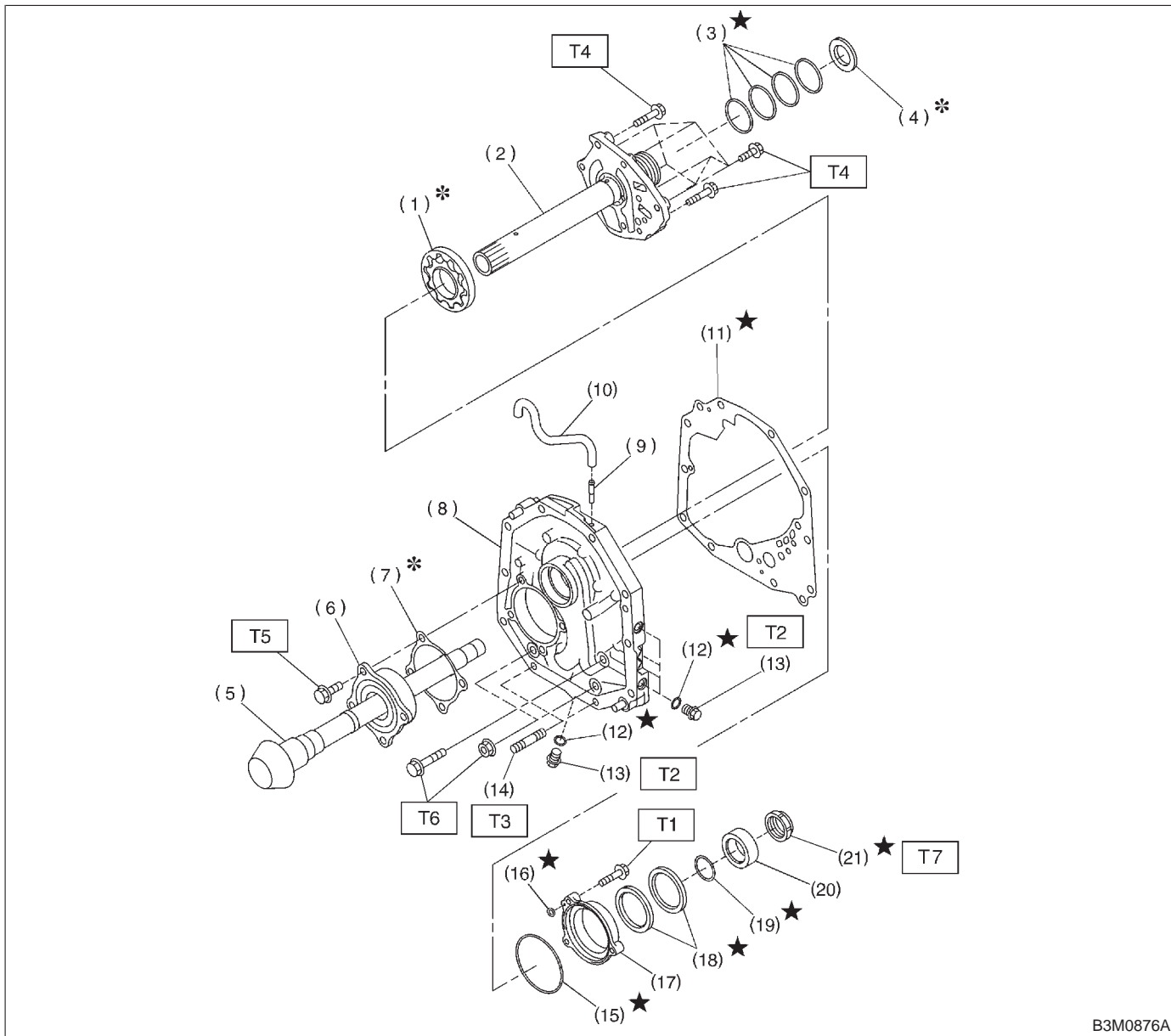
Tightening torque: N·m (kg·m, ft·lb)

T1: 18±5 (1.8±0.5, 13.0±3.6)

T2: 41±3 (4.2±0.3, 30.4±2.2)

T3: 44±3 (4.5±0.3, 32.5±2.2)

2. Oil Pump



B3M0876A

- | | |
|---------------------------|--------------------------|
| (1) Oil pump rotor | (12) O-ring |
| (2) Oil pump cover | (13) Test plug |
| (3) Seal ring | (14) Stud bolt |
| (4) Thrust needle bearing | (15) O-ring |
| (5) Drive pinion shaft | (16) O-ring |
| (6) Roller bearing | (17) Oil seal retainer |
| (7) Shim | (18) Oil seal |
| (8) Oil pump housing | (19) O-ring |
| (9) Nipple | (20) Drive pinion collar |
| (10) Air breather hose | (21) Lock nut |
| (11) Gasket | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 7±1 (0.7±0.1, 5.1±0.7)

T2: 13±1 (1.3±0.1, 9.4±0.7)

T3: 18±5 (1.8±0.5, 13.0±3.6)

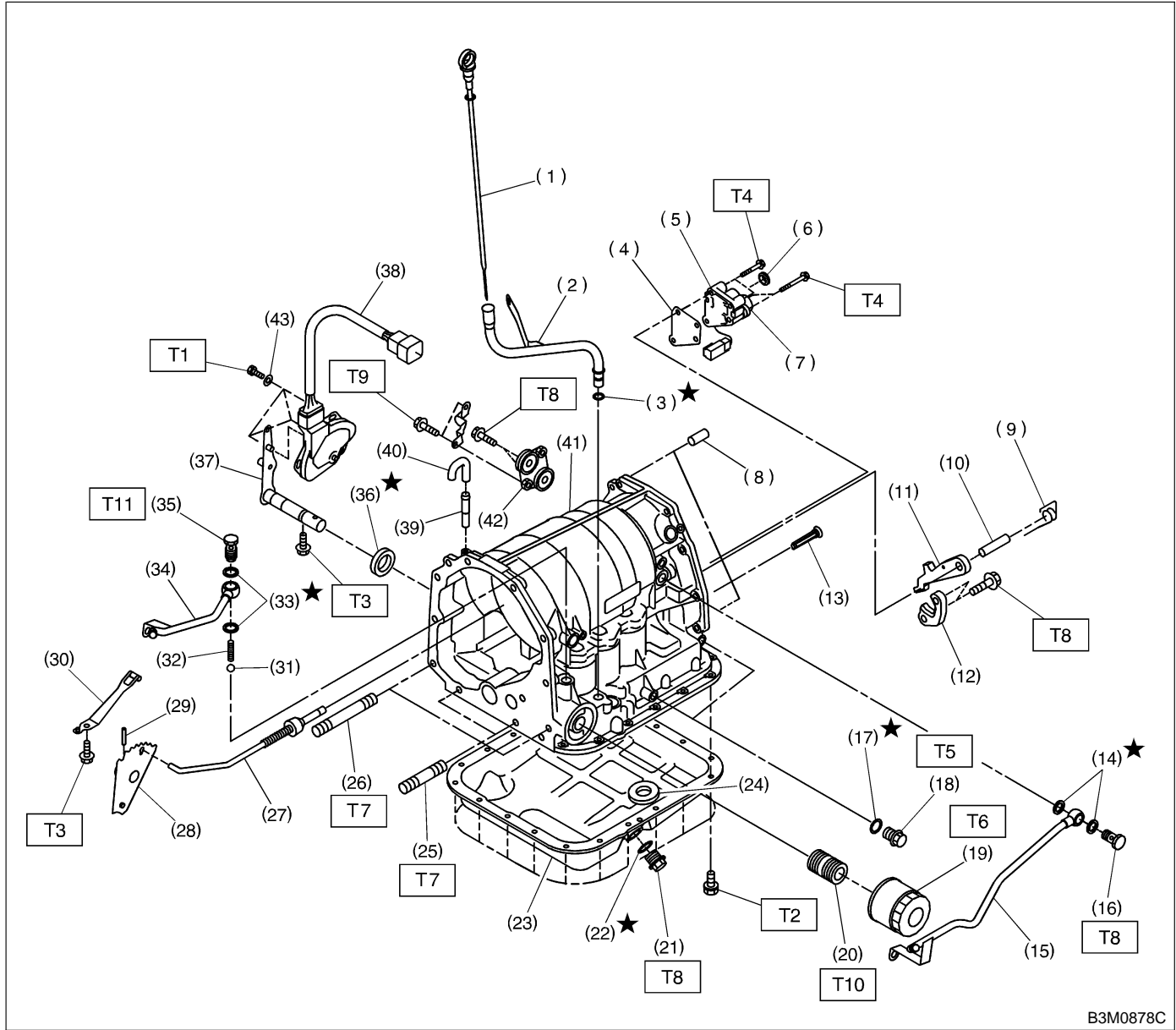
T4: 25±2 (2.5±0.2, 18.1±1.4)

T5: 39±3 (4.0±0.3, 28.9±2.2)

T6: 41±3 (4.2±0.3, 30.4±2.2)

T7: 121±5 (12.3±0.5, 89.0±3.6)

3. Transmission Case and Control Device



- | | |
|----------------------------|----------------------------|
| (1) Oil level gauge | (20) Oil filter stud bolt |
| (2) Oil charger pipe | (21) Drain plug |
| (3) O-ring | (22) Gasket |
| (4) Transfer valve plate | (23) Oil pan |
| (5) Transfer valve ASSY | (24) Magnet |
| (6) Transfer clutch seal | (25) Stud bolt (Short) |
| (7) Transfer duty solenoid | (26) Stud bolt (Long) |
| (8) Straight pin | (27) Parking rod |
| (9) Return spring | (28) Manual plate |
| (10) Shaft | (29) Spring pin |
| (11) Parking pawl | (30) Detention spring |
| (12) Parking support | (31) Ball |
| (13) Inlet filter | (32) Spring |
| (14) Gasket | (33) Gasket |
| (15) Inlet pipe | (34) Outlet pipe |
| (16) Union screw | (35) Union screw |
| (17) O-ring | (36) Oil seal |
| (18) Test plug | (37) Select lever |
| (19) Oil filter | (38) Inhibitor switch ASSY |

- (39) Nipple
- (40) Air breather hose
- (41) Transmission case
- (42) Plate ASSY
- (43) Washer

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

T1: 3.4±0.5 (0.35±0.05, 2.5±0.4)

T2: 4.9±0.5 (0.50±0.05, 3.6±0.4)

T3: 6±1 (0.6±0.1, 4.3±0.7)

T4: 8±1 (0.8±0.1, 5.8±0.7)

T5: 13±1 (1.3±0.1, 9.4±0.7)

T6: 13.7±2.0 (1.4±0.2, 10.1±1.4)

T7: 18±3 (1.8±0.3, 13.0±2.2)

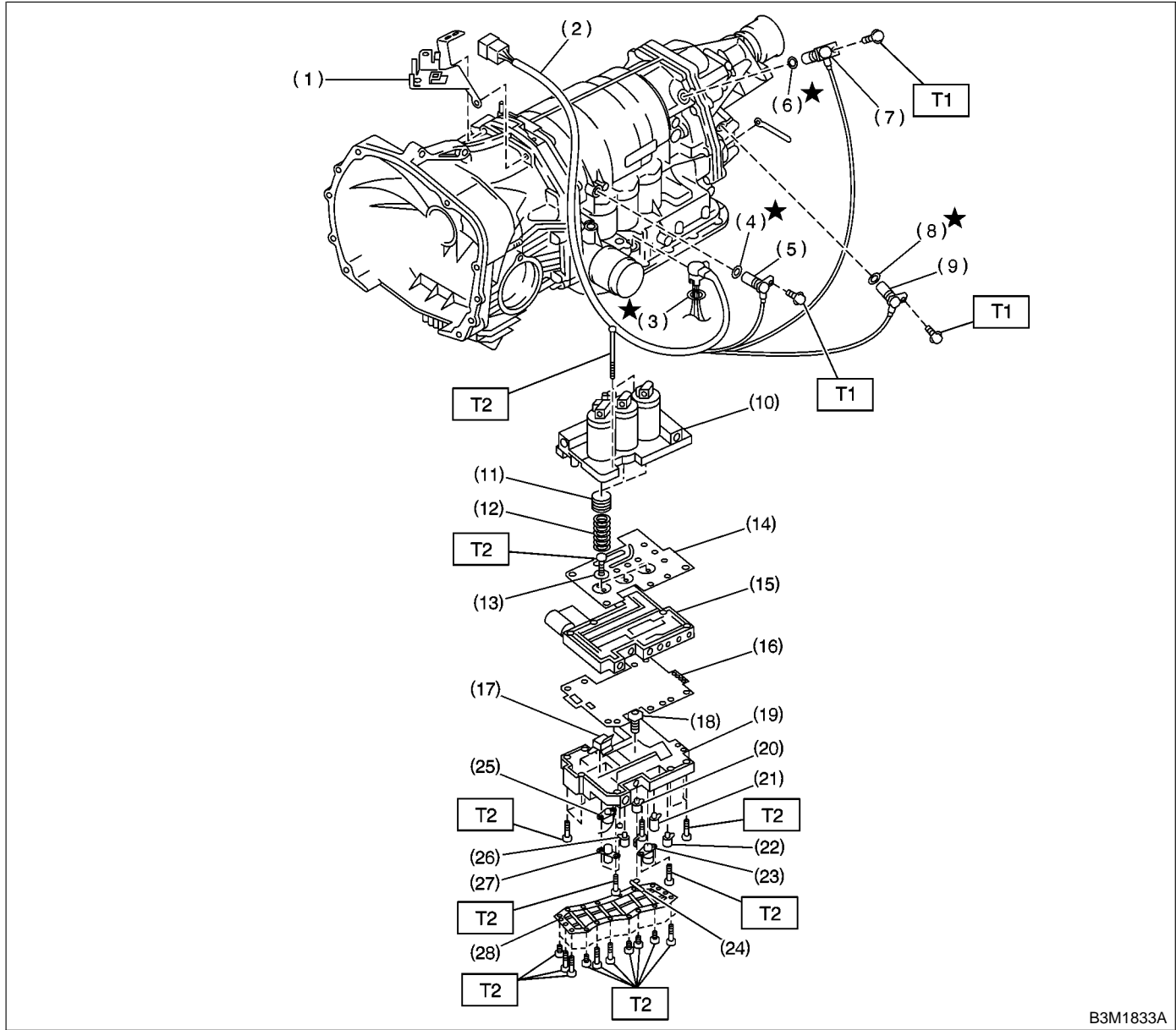
T8: 25±2 (2.5±0.2, 18.1±1.4)

T9: 33±10 (3.3±1.0, 24±7)

T10: 24.5±2.9 (2.5±0.3, 18.1±2.2)

T11: 44±4 (4.5±0.4, 32.5±2.9)

4. Control Valve and Harness Routing



- (1) Stay
- (2) Transmission harness
- (3) O-ring
- (4) O-ring
- (5) Torque converter turbine speed sensor
- (6) O-ring
- (7) Vehicle speed sensor 2 (Front)
- (8) O-ring
- (9) Vehicle speed sensor 1 (Rear)
- (10) Upper valve body
- (11) Accumulator piston

- (12) Accumulator spring
- (13) Side plate
- (14) Separate plate
- (15) Middle valve body
- (16) Separate plate
- (17) Fluid filter
- (18) Fluid filter
- (19) Lower valve body
- (20) Shift solenoid 2
- (21) Shift solenoid 1
- (22) 2-4 brake timing solenoid
- (23) 2-4 brake duty solenoid

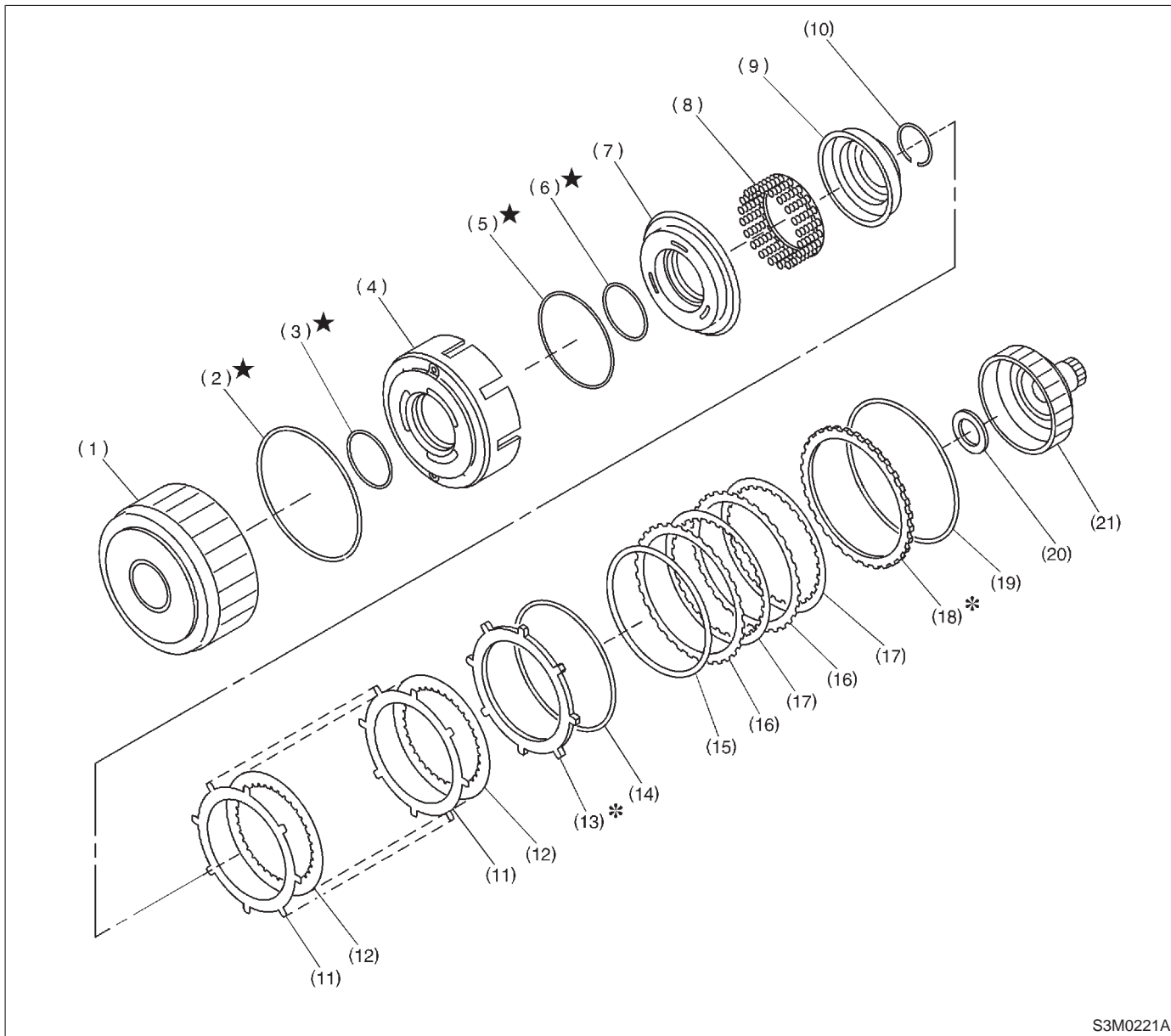
- (24) ATF temperature sensor
- (25) Line pressure duty solenoid
- (26) Low clutch timing solenoid
- (27) Lock-up duty solenoid
- (28) Oil strainer

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

T1: 7±1 (0.7±0.1, 5.1±0.7)

T2: 8±1 (0.8±0.1, 5.8±0.7)

5. High Clutch and Reverse Clutch



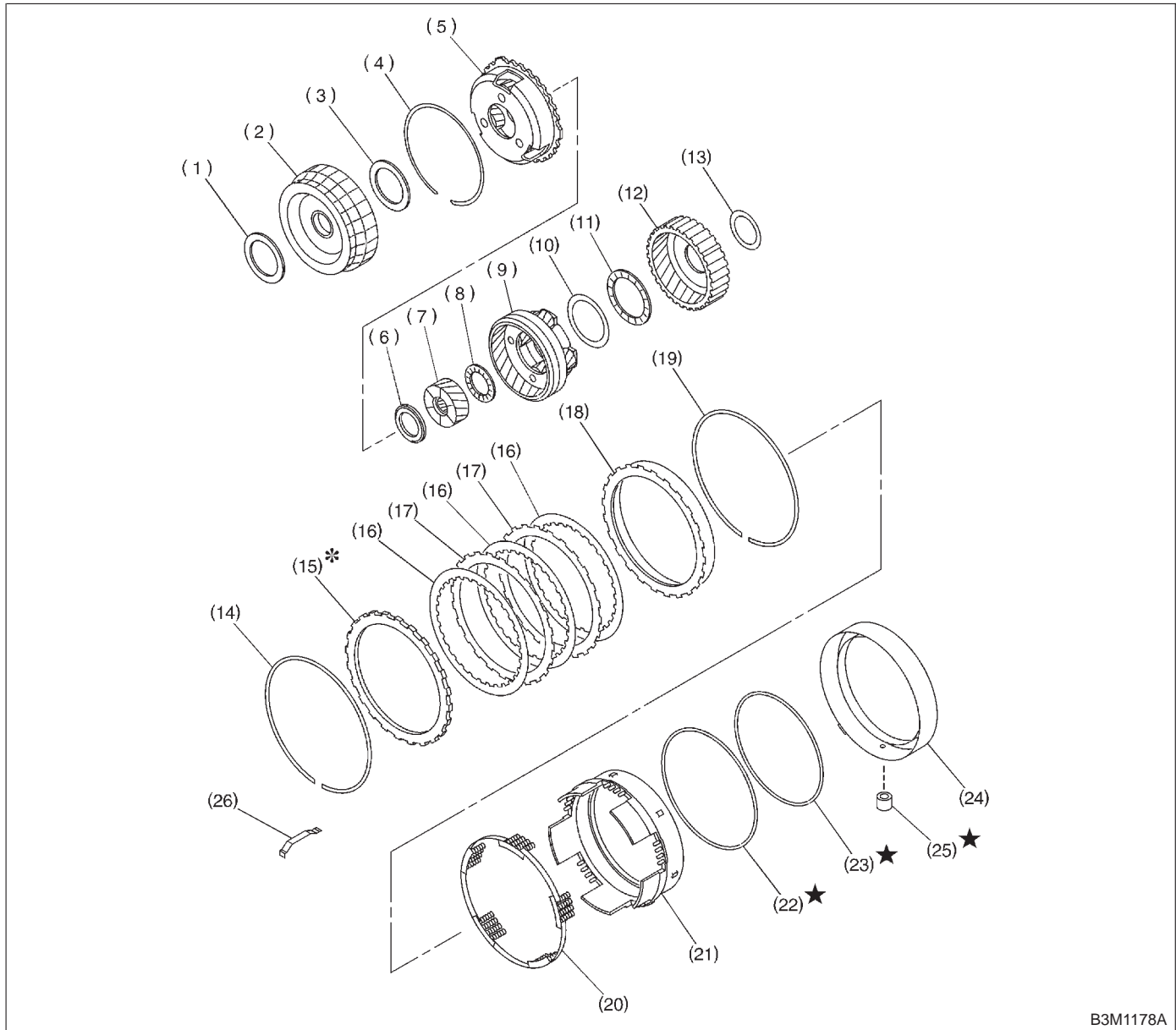
S3M0221A

- (1) High clutch drum
- (2) Lip seal
- (3) Lathe cut seal ring
- (4) Reverse clutch piston
- (5) Lathe cut seal ring
- (6) Lathe cut seal ring
- (7) High clutch piston

- (8) Spring retainer
- (9) Cover
- (10) Snap ring
- (11) Driven plate
- (12) Drive plate
- (13) Retaining plate
- (14) Snap ring

- (15) Dish plate
- (16) Driven plate
- (17) Drive plate
- (18) Retaining plate
- (19) Snap ring
- (20) Thrust needle bearing
- (21) High clutch hub

6. Planetary Gear and 2-4 Brake



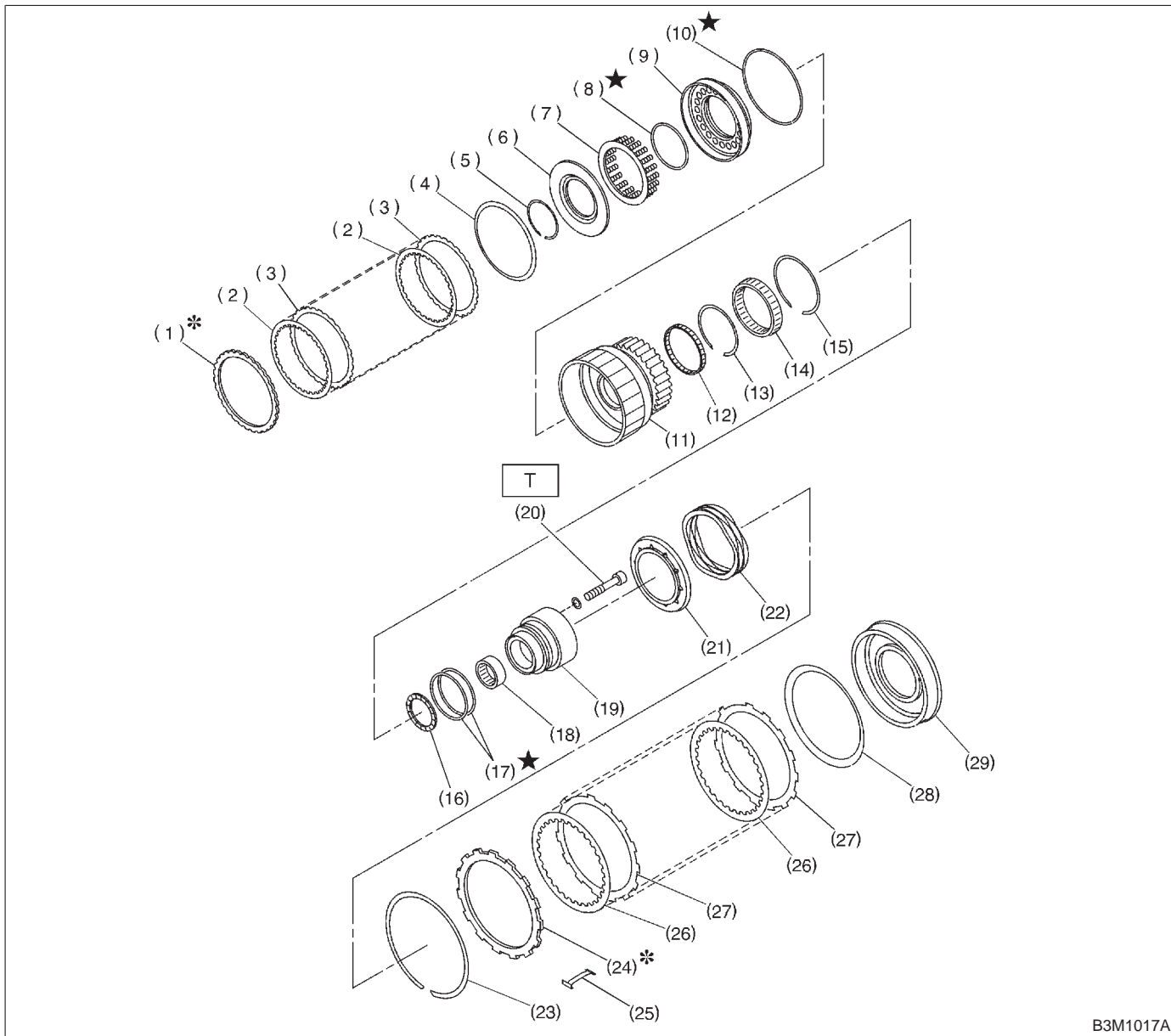
B3M1178A

- (1) Thrust needle bearing
- (2) Front sun gear
- (3) Thrust needle bearing
- (4) Snap ring
- (5) Front planetary carrier
- (6) Thrust needle bearing
- (7) Rear sun gear
- (8) Thrust needle bearing
- (9) Rear planetary carrier

- (10) Washer
- (11) Thrust needle bearing
- (12) Rear internal gear
- (13) Washer
- (14) Snap ring
- (15) Retaining plate
- (16) Drive plate
- (17) Driven plate
- (18) Pressure rear plate

- (19) Snap ring
- (20) Spring retainer
- (21) 2-4 brake piston
- (22) Lathe cut seal ring
- (23) Lathe cut seal ring
- (24) 2-4 brake piston retainer
- (25) 2-4 brake seal
- (26) Leaf spring

7. Low Clutch and Low & Reverse Brake

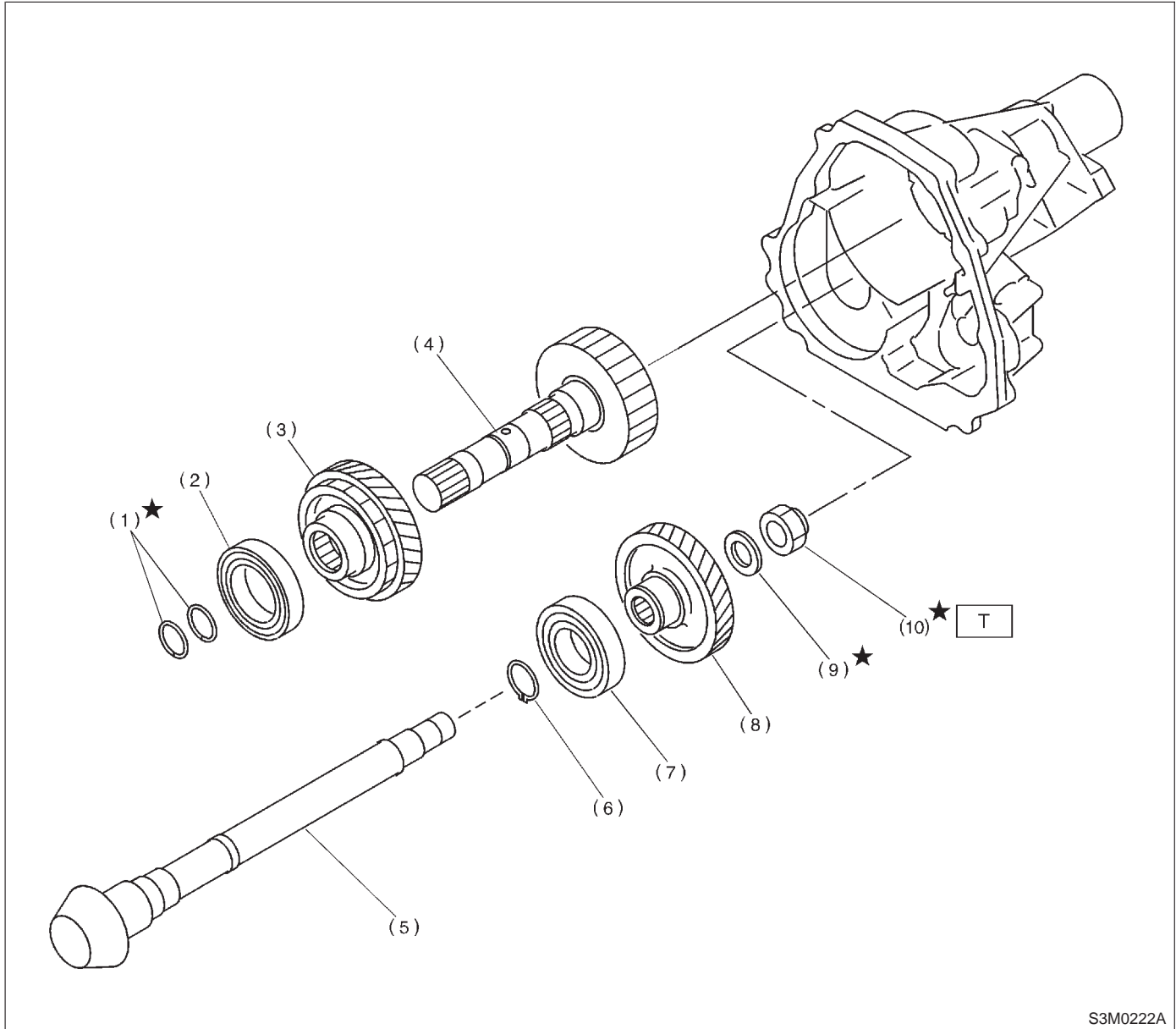


B3M1017A

- | | | |
|--------------------------|--------------------------------|-----------------------------------|
| (1) Retaining plate | (12) Needle bearing | (23) Snap ring |
| (2) Drive plate | (13) Snap ring (Inner) | (24) Retaining plate |
| (3) Driven plate | (14) One-way clutch | (25) Leaf spring |
| (4) Dish plate | (15) Snap ring (Outer) | (26) Drive plate |
| (5) Snap ring | (16) Thrust needle bearing | (27) Driven plate |
| (6) Cover | (17) Seal ring | (28) Dish plate |
| (7) Spring retainer | (18) Needle bearing | (29) Low and reverse brake piston |
| (8) Lathe cut seal ring | (19) One-way clutch inner race | |
| (9) Low clutch piston | (20) Socket bolt | |
| (10) Lathe cut seal ring | (21) Retainer | |
| (11) Low clutch drum | (22) Return spring | |

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

8. Reduction Gear

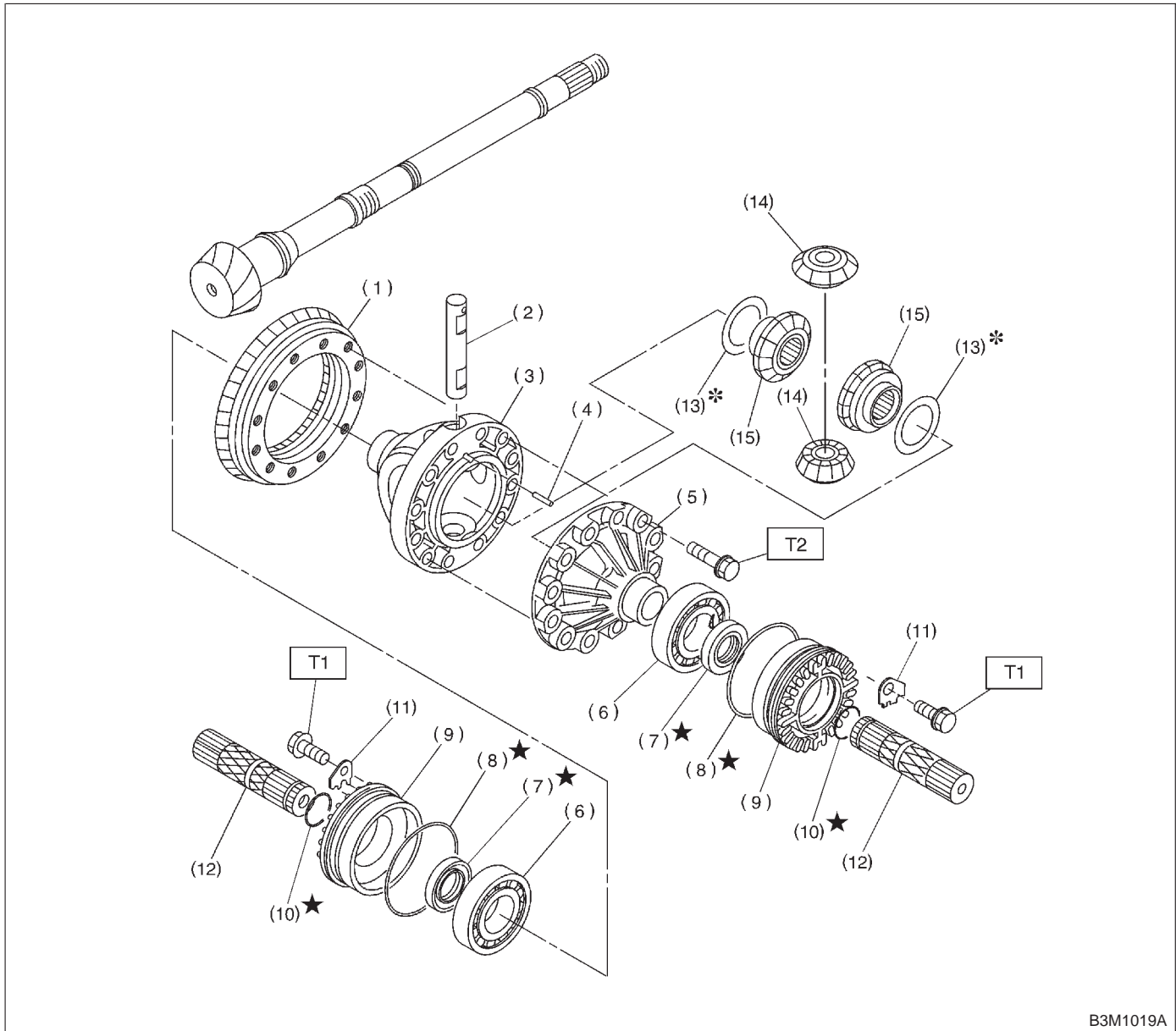


S3M0222A

- | | |
|---------------------------|---------------------------|
| (1) Seal ring | (6) Snap ring |
| (2) Ball bearing | (7) Ball bearing |
| (3) Reduction drive gear | (8) Reduction driven gear |
| (4) Reduction drive shaft | (9) Washer |
| (5) Drive pinion shaft | (10) Lock nut |

Tightening torque: N-m (kg-m, ft-lb)
T: 100±5 (10.2±0.5, 73.8±3.6)

9. Differential Case



B3M1019A

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

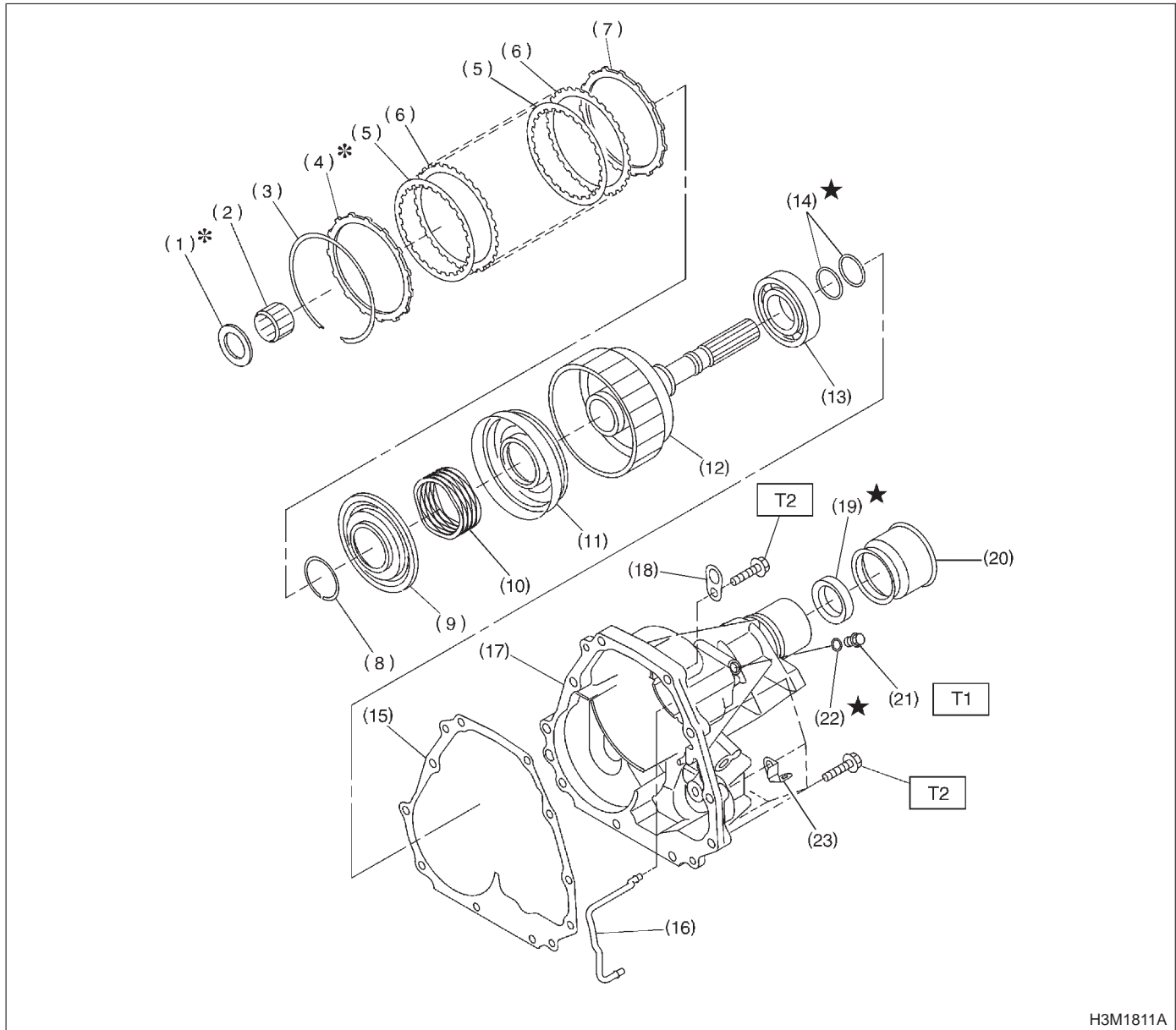
- (13) Washer
- (14) Differential bevel pinion
- (15) Differential bevel gear

Tightening torque: N·m (kg·m, ft·lb)

T1: 25±2 (2.5±0.2, 18.1±1.4)

T2: 62±5 (6.3±0.5, 45.6±3.6)

10. Transfer and Extension



- (1) Thrust needle bearing
- (2) Needle bearing
- (3) Snap ring
- (4) Pressure plate
- (5) Drive plate
- (6) Driven plate
- (7) Pressure plate
- (8) Snap ring
- (9) Transfer piston seal
- (10) Return spring

- (11) Transfer clutch piston
- (12) Rear drive shaft
- (13) Ball bearing
- (14) Seal ring
- (15) Gasket
- (16) Transfer clutch pipe
- (17) Extension case
- (18) Transmission hanger
- (19) Oil seal
- (20) Dust cover

- (21) Test plug
- (22) O-ring
- (23) Clip

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

T1: 13±1 (1.3±0.1, 9.4±0.7)

T2: 25±2 (2.5±0.2, 18.1±1.4)

1. General

A: PRECAUTION

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

1) Workshop

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

2) Work table

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

3) Cleaning of exterior

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

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

4) Disassembly, assembly and cleaning

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

(2) During job, do not use gloves. Do not clean the parts with rags: Use chamois or nylon cloth.
 (3) Pay special attention to the air to be used for cleaning. Get the moisture and the dust rid of the air as much as possible. Be careful not to scratch or dent any part while checking for proper operation with an air gun.

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

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

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

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

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

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

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

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

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

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

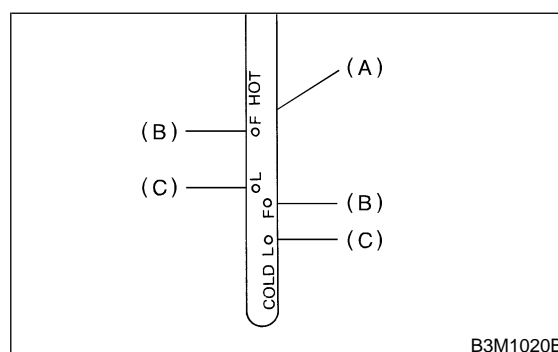
B: INSPECTION

1. ATF LEVEL

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

NOTE:

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



(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.

1. General

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

CAUTION:

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

4) Fluid temperature rising speed

- By idling the engine

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

<Reference>

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

- By running the vehicle

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

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

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

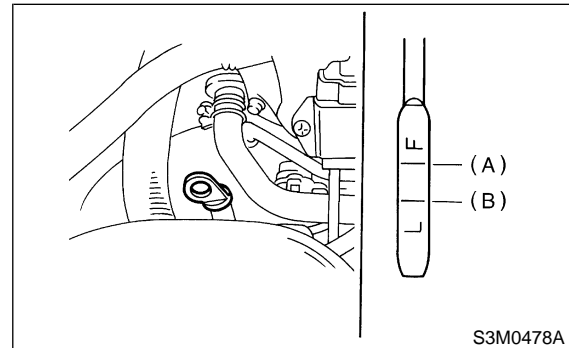
2. DIFFERENTIAL GEAR OIL LEVEL

1) Ensure the vehicle is in safe condition.

NOTE:

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

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



(A) Upper level

(B) Lower level

3. OIL LEAKAGE

It is difficult to accurately determine the precise position of a oil leak, since the surrounding area also becomes wet with oil.

The points listed below should be checked for fluid leakage.

Checking method is as follows:

(1) Place the vehicle in the pit, and check whether the leaking oil is ATF or not. The ATF is wine red in color, and can be discriminated easily from engine oil and gear oil.

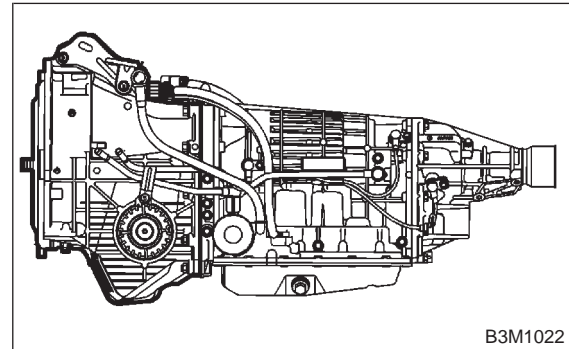
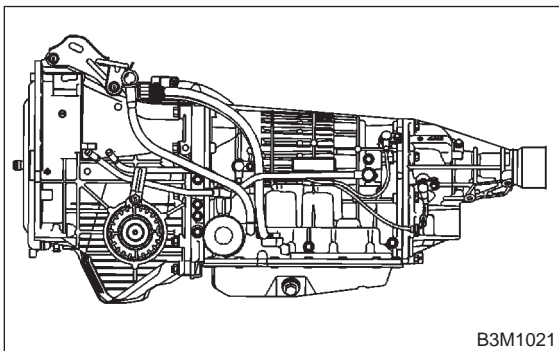
(2) Wipe clean the leaking oil and dust from a suspectable area, using a noninflammable organic solvent such as carbon tetrachloride.

(3) Run the engine to raise the fluid temperature, and set the select lever to "D" in order to increase the fluid pressure and quickly detect a leaking point. Also check for fluid leaks while shifting select lever to "R", "2", and "1".

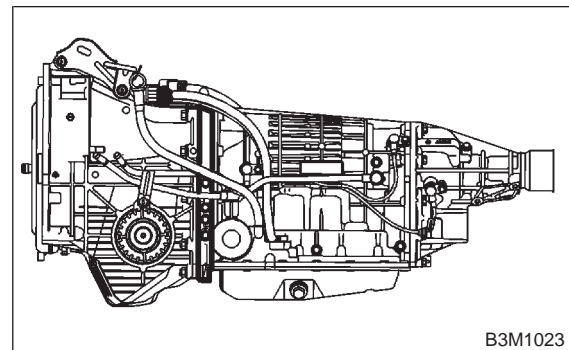
The places where oil seals and gaskets are applied are:

- 1) Jointing portion of the case
 - Transmission case and oil pump housing jointing portion
 - Torque converter clutch case and oil pump housing jointing portion
 - Transmission case and extension case jointing portion

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

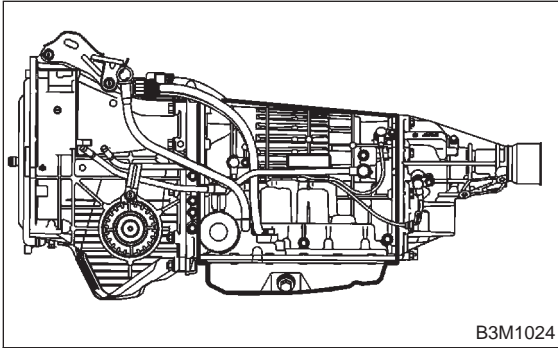


- 3) Oil pump housing
 - Oil pump housing (Defective casting)
 - O-ring on the test plugs
 - Differential gear breather

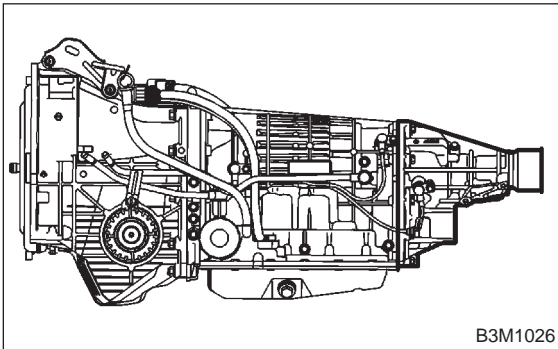


2. Inhibitor Switch

- 4) Automatic transmission case
- Transmission case (Defective casting)
 - Mating surface of oil pan
 - O-ring on the test plugs
 - Oil supply pipe connector
 - ATF cooler pipe connector and gasket
 - Oil pan drain plug
 - O-ring on the transmission harness holder
 - Oil pump plugs
 - ATF breather
 - Select lever oil seal
 - O-ring on the vehicle speed sensor 2 (Front)
 - O-ring on the turbine revolution sensor
 - ATF filter oil seal



- 5) Extension case
- Extension case (Defective casting)
 - O-ring on the vehicle speed sensor 1 (Rear)
 - Rear drive shaft oil seal
 - O-ring on the test plugs



2. Inhibitor Switch

A: INSPECTION

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

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

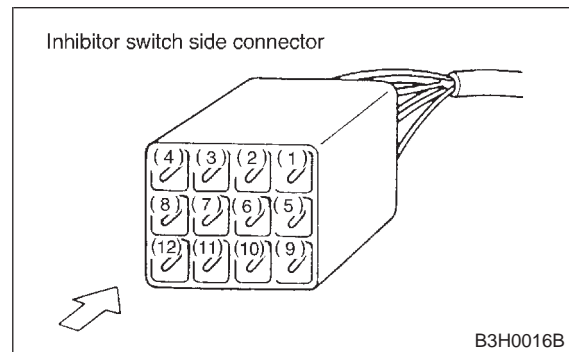
CAUTION:

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

NOTE:

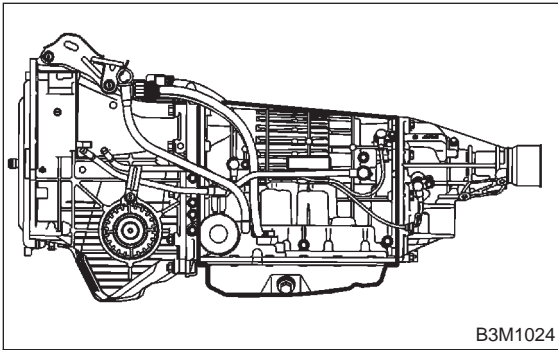
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9

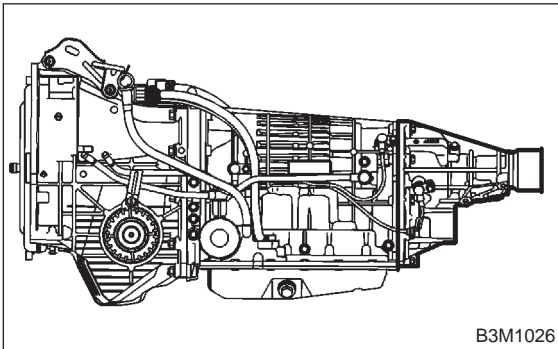


2. Inhibitor Switch

- 4) Automatic transmission case
 - Transmission case (Defective casting)
 - Mating surface of oil pan
 - O-ring on the test plugs
 - Oil supply pipe connector
 - ATF cooler pipe connector and gasket
 - Oil pan drain plug
 - O-ring on the transmission harness holder
 - Oil pump plugs
 - ATF breather
 - Select lever oil seal
 - O-ring on the vehicle speed sensor 2 (Front)
 - O-ring on the turbine revolution sensor
 - ATF filter oil seal



- 5) Extension case
 - Extension case (Defective casting)
 - O-ring on the vehicle speed sensor 1 (Rear)
 - Rear drive shaft oil seal
 - O-ring on the test plugs



2. Inhibitor Switch

A: INSPECTION

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

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

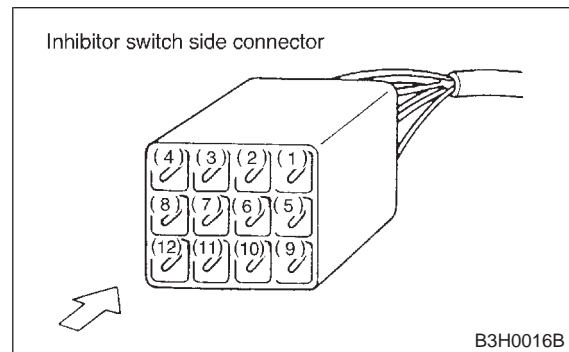
CAUTION:

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

NOTE:

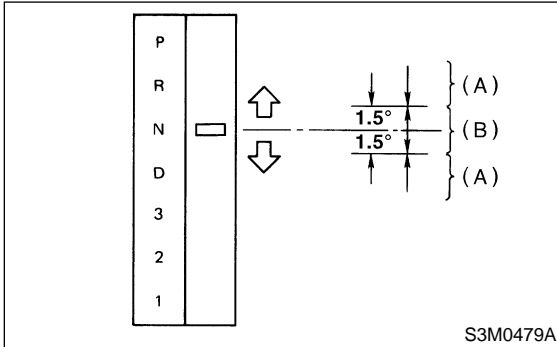
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



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

If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the select cable. <Ref. to 3-3 [W2A0].>

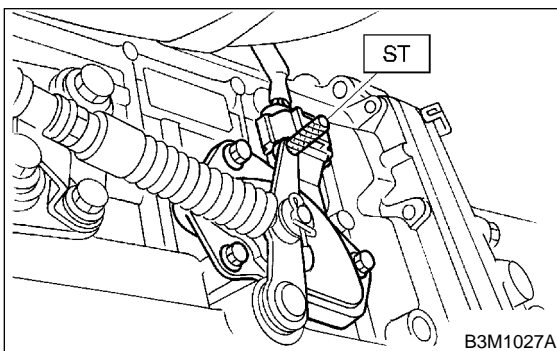


- (A) Continuity does not exist.
- (B) Continuity exists.

4) Repeat the above checks. If there are any abnormalities, adjust inhibitor switch. <Ref. to 3-2 [W2B0].>

B: ADJUSTMENT

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



4) Tighten the three inhibitor switch bolts.

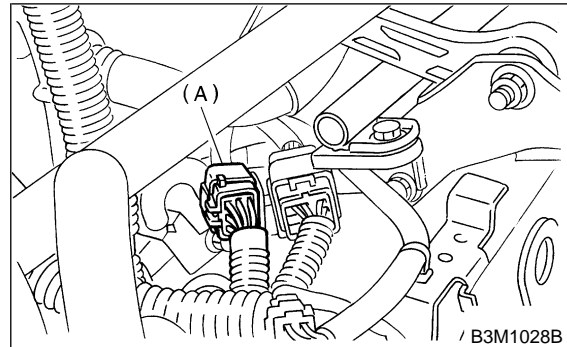
Tightening torque:

3.4±0.5 N·m (0.35±0.05 kg·m, 2.5±0.4 ft·lb)

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

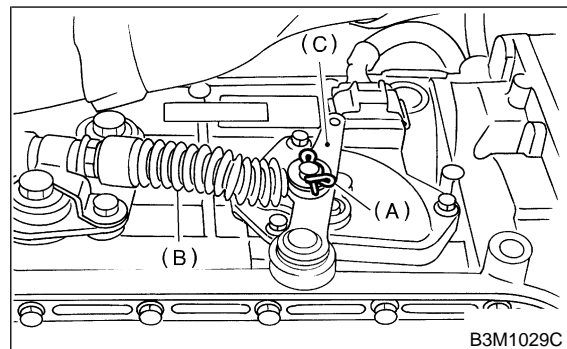
C: REMOVAL

- 1) Move select lever to neutral position.
- 2) Remove air cleaner case and duct. <Ref. to 2-7 [W1A0].>
- 3) Disconnect inhibitor switch connector.



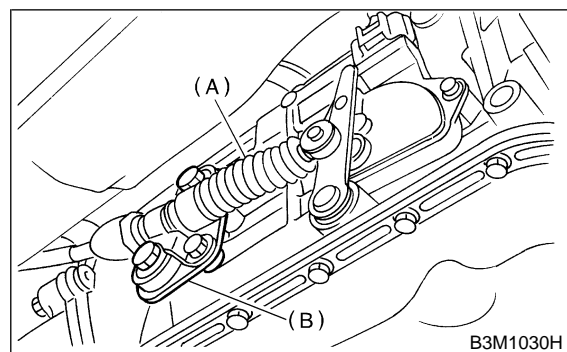
(A) Inhibitor switch

- 4) Remove front exhaust pipe. <Ref. to 2-9 [W1A0].>
- 5) Remove snap pin from range select lever.



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

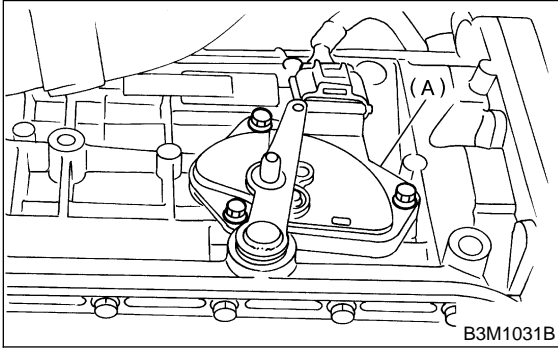
6) Remove plate assembly from transmission case.



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

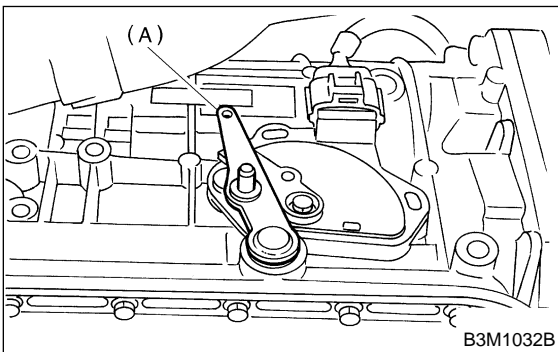
2. Inhibitor Switch

7) Remove bolts.



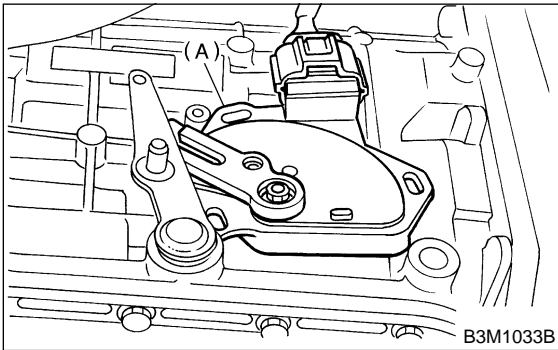
(A) Inhibitor switch

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



(A) Range select lever

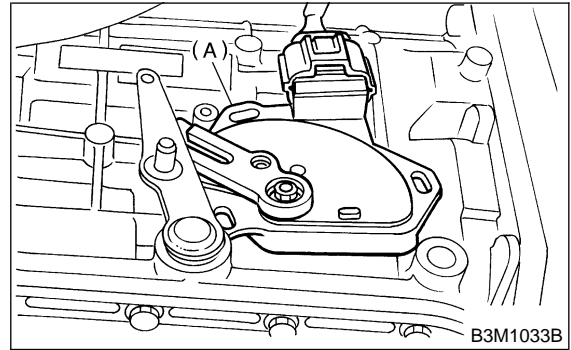
9) Remove inhibitor switch from transmission.



(A) Inhibitor switch

D: INSTALLATION

1) Install inhibitor switch to transmission case.

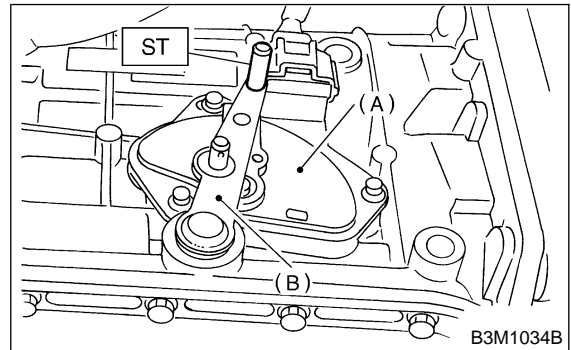


(A) Inhibitor switch

2) Move range select lever to neutral position.

3) Using ST, tighten bolts of inhibitor switch. <Ref. to 3-2 [W2B0].>

ST 499267300 STOPPER PIN



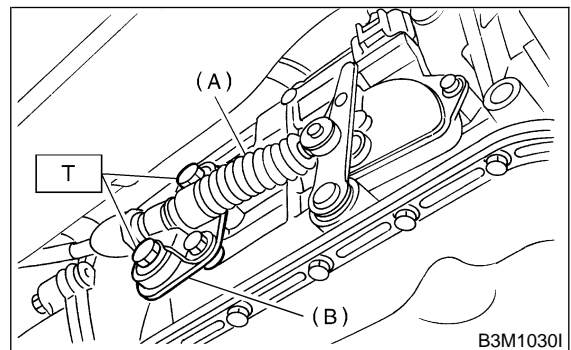
(A) Inhibitor switch
(B) Range select lever

4) Install select cable to range select lever.

5) Install plate assembly to transmission.

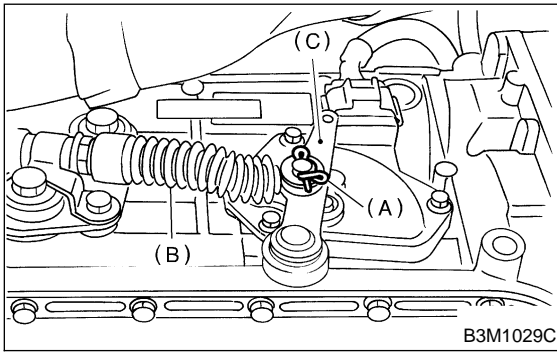
Tightening torque:

T: 24.5±2.0 N·m (2.5±0.2 kg·m, 18.1±1.4 ft·lb)



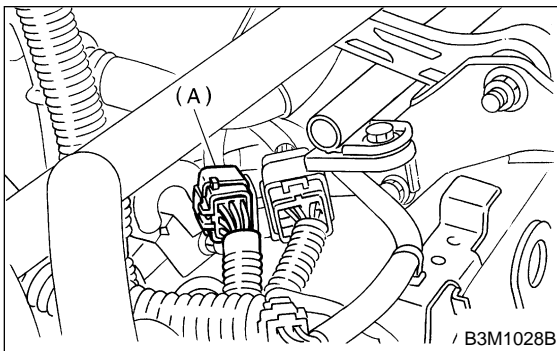
(A) Select cable
(B) Plate ASSY

6) Install snap pin to range select lever.



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

7) Install front exhaust pipe. <Ref. to 2-9 [W1B0].>
8) Connect inhibitor switch connector.



- (A) Inhibitor switch

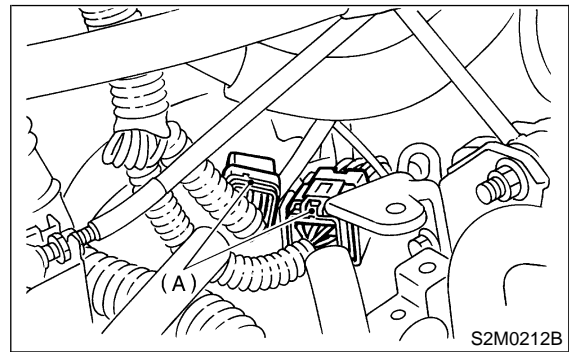
9) Install air cleaner case and duct. <Ref. to 2-7 [W1A0].>

3. Sensor (in transmission)

A: INSPECTION

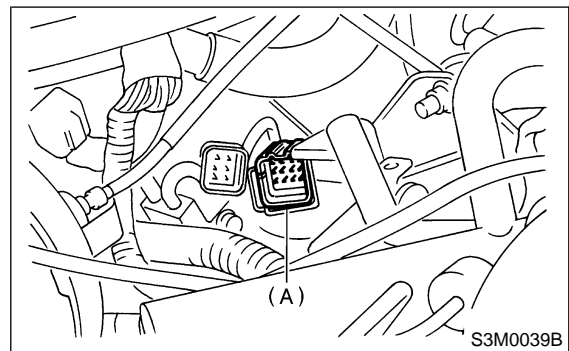
1) Remove air cleaner case and duct. <Ref. to 2-7 [W1A0].>

2) Disconnect transmission connector.



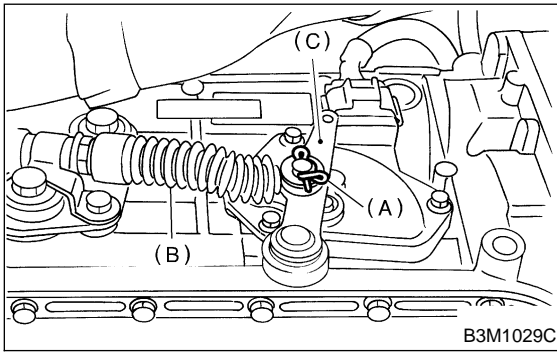
- (A) Transmission harness connector

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



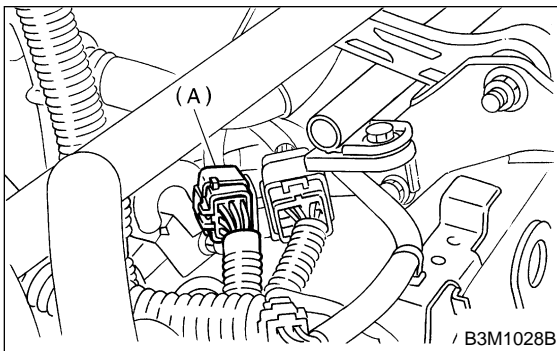
- (A) Transmission connector

6) Install snap pin to range select lever.



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

7) Install front exhaust pipe. <Ref. to 2-9 [W1B0].>
8) Connect inhibitor switch connector.



- (A) Inhibitor switch

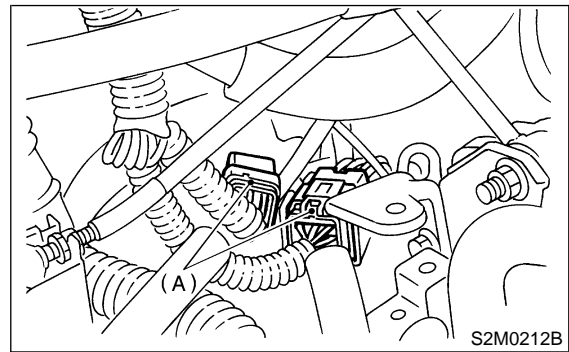
9) Install air cleaner case and duct. <Ref. to 2-7 [W1A0].>

3. Sensor (in transmission)

A: INSPECTION

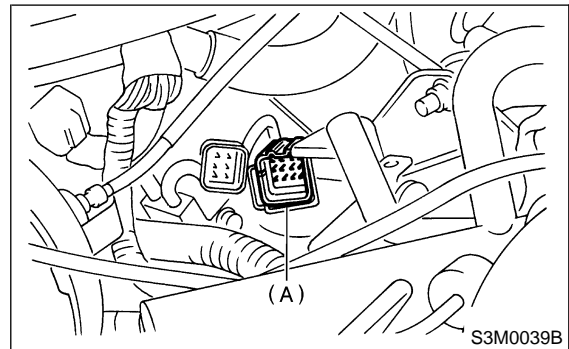
1) Remove air cleaner case and duct. <Ref. to 2-7 [W1A0].>

2) Disconnect transmission connector.



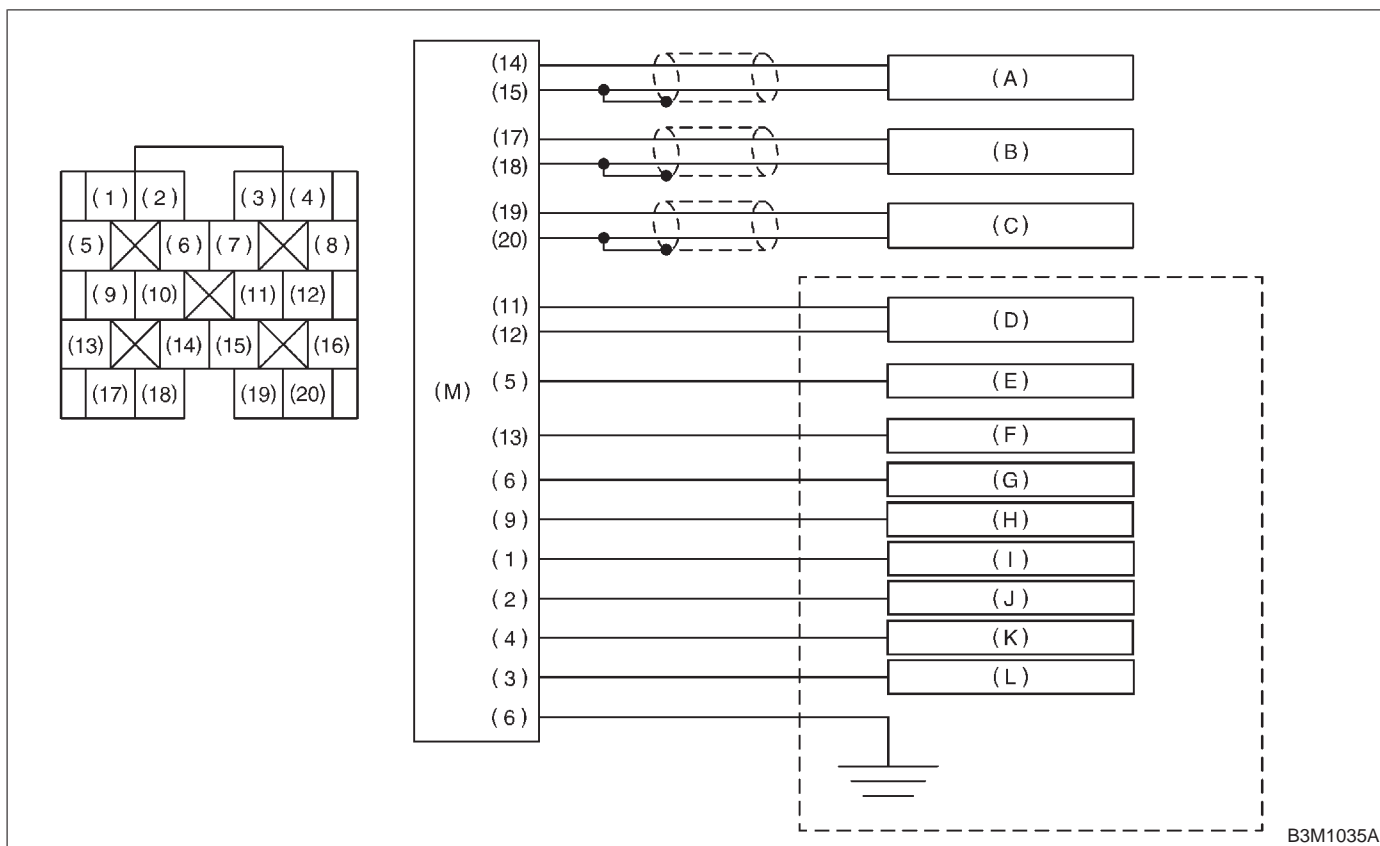
- (A) Transmission harness connector

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



- (A) Transmission connector

3. Sensor (in transmission)



B3M1035A

- (A) Torque converter turbine speed sensor
- (B) Vehicle speed sensor 2 (Front)
- (C) Vehicle speed sensor 1 (Rear)
- (D) ATF temperature sensor

- (E) Line pressure duty solenoid
- (F) Lock-up duty solenoid
- (G) Transfer duty solenoid
- (H) 2-4 brake duty solenoid
- (I) Shift solenoid 1

- (J) Shift solenoid 2
- (K) 2-4 brake timing solenoid
- (L) Low clutch timing solenoid
- (M) Transmission connector

1. EVALUATION

NOTE:

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

Part name	Terminal	Resistance (Ω)
Vehicle speed sensor 1	17 — 18	450 — 650
Vehicle speed sensor 2	19 — 20	450 — 650
ATF temperature sensor	11 — 12	2,100 — 2,900/ 20°C (68°F) 275 — 375/ 80°C (176°F)
Torque converter turbine speed sensor	14 — 15	450 — 650
Shift solenoid 1	1 — 16	10 — 16
Shift solenoid 2	2 — 16	10 — 16
Line pressure duty solenoid	5 — 16	2.0 — 4.5
Lock-up duty solenoid	13 — 16	10 — 17
2-4 brake duty solenoid	9 — 16	2.0 — 4.5
Low clutch timing solenoid	3 — 16	10 — 16
2-4 brake timing solenoid	4 — 16	10 — 16
Transfer duty solenoid	6 — 16	10 — 17

4. Shift Solenoid, Duty Solenoid and Valve

A: REMOVAL

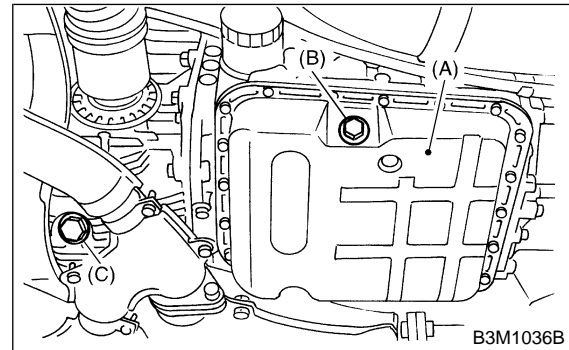
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

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



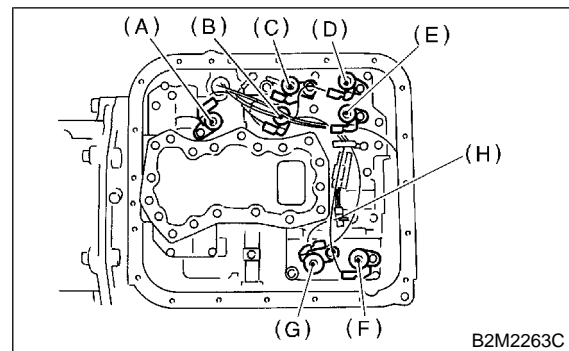
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 3) Remove oil pan.

NOTE:

Drain oil into a container.

- 4) Disconnect solenoid and sensor connectors. Remove connectors from clip and disconnect connectors at eight places.



- (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. EVALUATION

NOTE:

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

Part name	Terminal	Resistance (Ω)
Vehicle speed sensor 1	17 — 18	450 — 650
Vehicle speed sensor 2	19 — 20	450 — 650
ATF temperature sensor	11 — 12	2,100 — 2,900/ 20°C (68°F) 275 — 375/ 80°C (176°F)
Torque converter turbine speed sensor	14 — 15	450 — 650
Shift solenoid 1	1 — 16	10 — 16
Shift solenoid 2	2 — 16	10 — 16
Line pressure duty solenoid	5 — 16	2.0 — 4.5
Lock-up duty solenoid	13 — 16	10 — 17
2-4 brake duty solenoid	9 — 16	2.0 — 4.5
Low clutch timing solenoid	3 — 16	10 — 16
2-4 brake timing solenoid	4 — 16	10 — 16
Transfer duty solenoid	6 — 16	10 — 17

4. Shift Solenoid, Duty Solenoid and Valve

A: REMOVAL

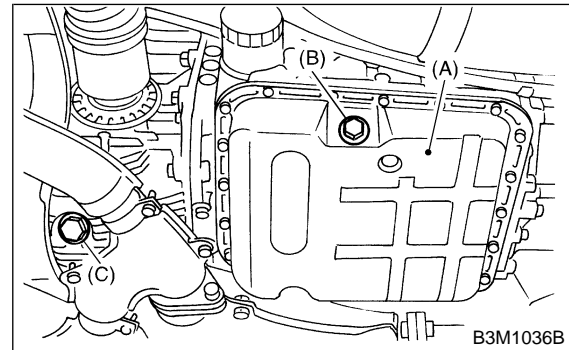
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

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



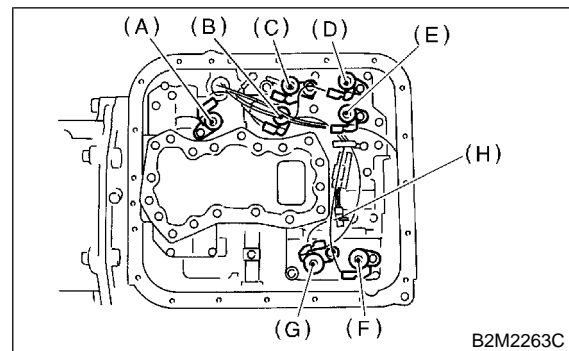
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 3) Remove oil pan.

NOTE:

Drain oil into a container.

- 4) Disconnect solenoid and sensor connectors. Remove connectors from clip and disconnect connectors at eight places.



- (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

4. Shift Solenoid, Duty Solenoid and Valve

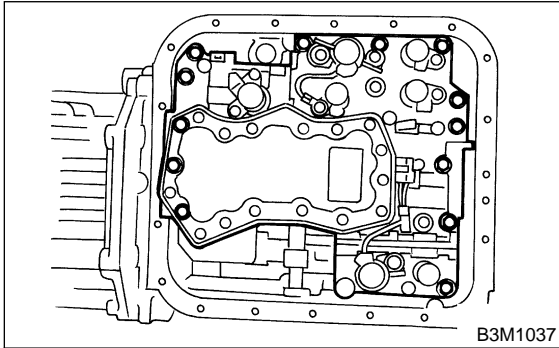
5) Remove control valve body.

CAUTION:

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

NOTE:

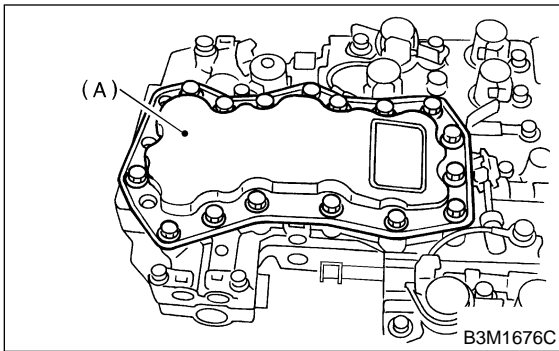
Be careful because oil flows from valve body.



6) Remove oil strainer.

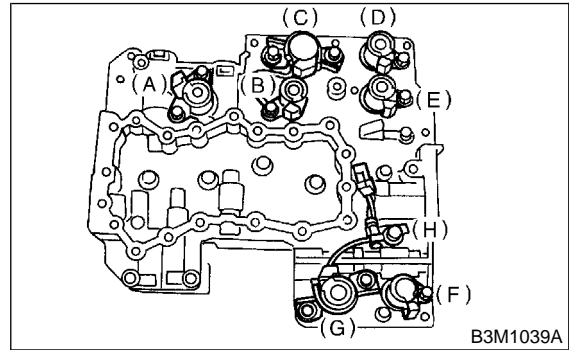
NOTE:

Be careful because oil flows from oil strainer.



(A) Oil strainer

7) Remove solenoids and duty solenoids.



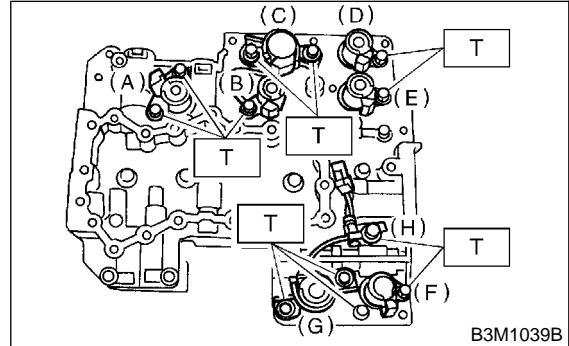
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

B: INSTALLATION

1) Install the seven solenoids and the ATF temperature sensor.

Tightening torque:

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

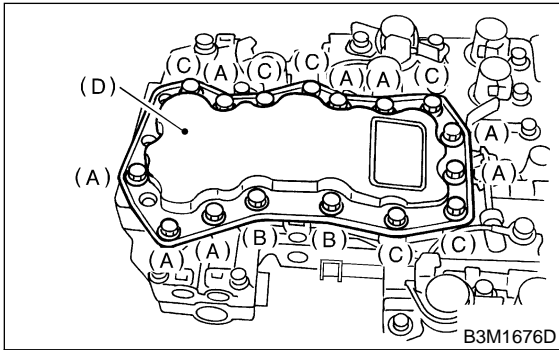


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

2) Install oil strainer.

Tightening torque:

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



- (A) Short bolt
- (B) Middle bolt
- (C) Long bolt
- (D) Oil strainer

3) Install valve body to transmission case.

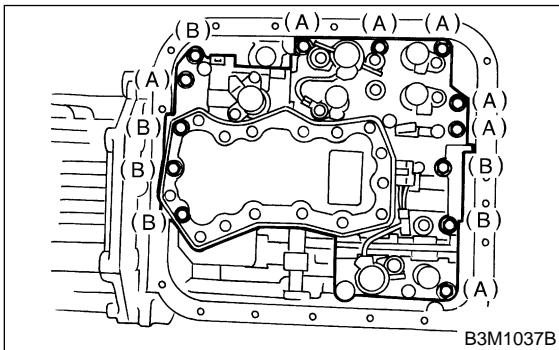
(1) Temporarily tighten the valve body on the transmission case.

CAUTION:

When installing control valve body, be careful not to interfere with transfer duty solenoid wiring (brown).

NOTE:

Align manual valve connections.



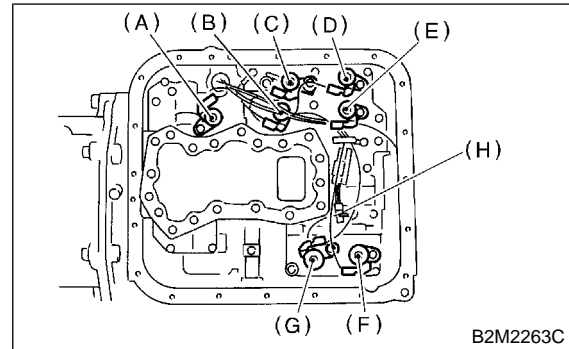
- (A) Short bolts
- (B) Long bolts

(2) Tighten the valve body to the specified torque.

Tightening torque:

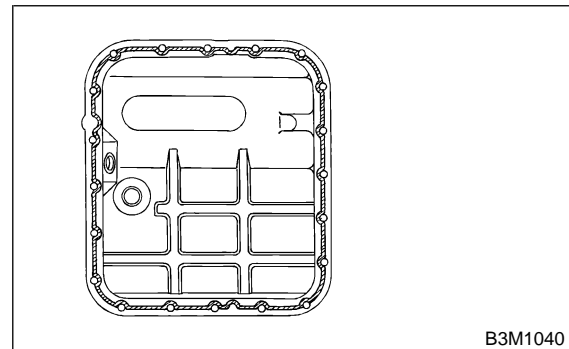
$8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)

4) Connect harness connectors at eight places. 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

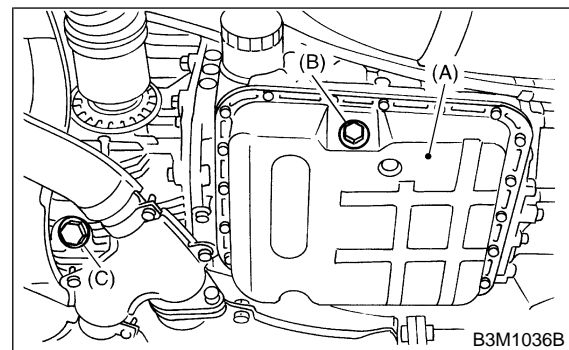
5) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



6) Install oil pan.

Tightening torque:

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



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

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

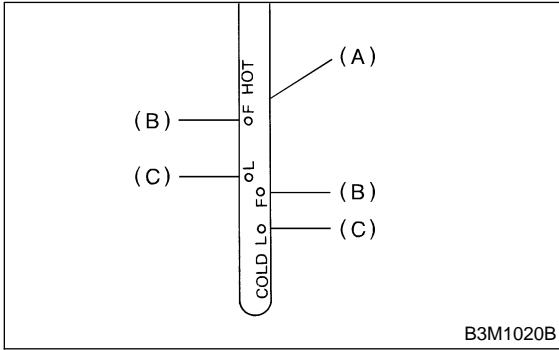
Recommended fluid:

Dexron II E or 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)

8) Run the vehicle until the ATF temperature rises from 60 to 80°C (140 to 176°F) and check the ATF level of the "HOT" side on level gauge.

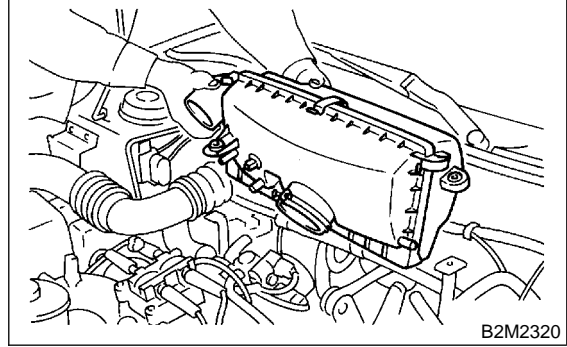


- (A) ATF level gauge
- (B) Upper level
- (C) Lower level

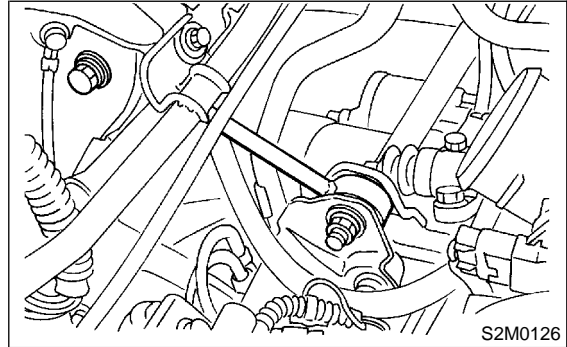
5. Transfer Duty Solenoid and Transfer Valve Body

A: REMOVAL

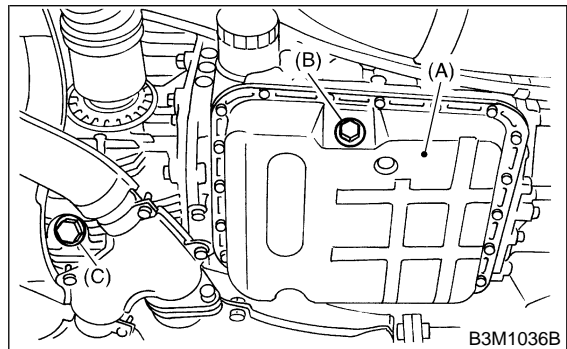
1) Remove air cleaner case and chamber.
<Ref. to 2-7 [W1A0].>



2) Remove pitching stopper.



3) Raise vehicle and drain ATF.



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

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

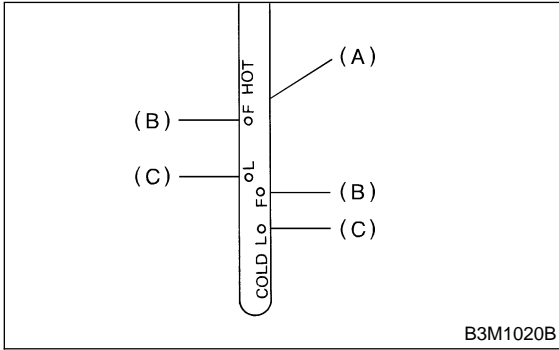
Recommended fluid:

Dexron II E or 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)

8) Run the vehicle until the ATF temperature rises from 60 to 80°C (140 to 176°F) and check the ATF level of the "HOT" side on level gauge.



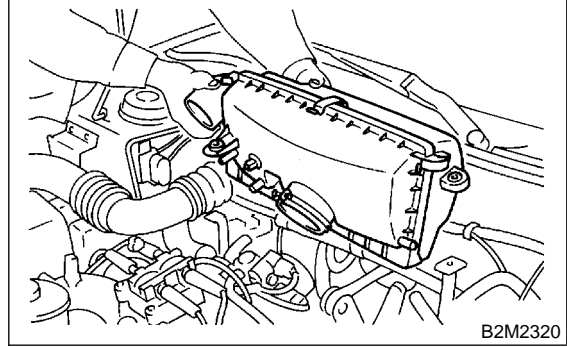
B3M1020B

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

5. Transfer Duty Solenoid and Transfer Valve Body

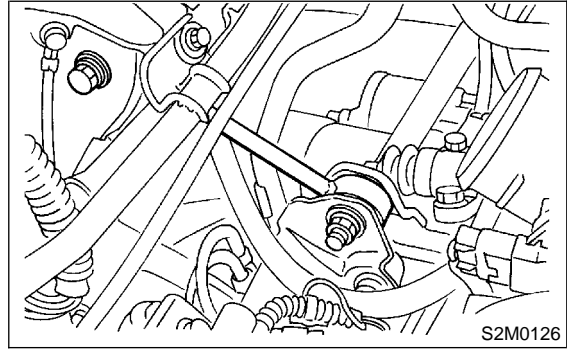
A: REMOVAL

1) Remove air cleaner case and chamber.
<Ref. to 2-7 [W1A0].>



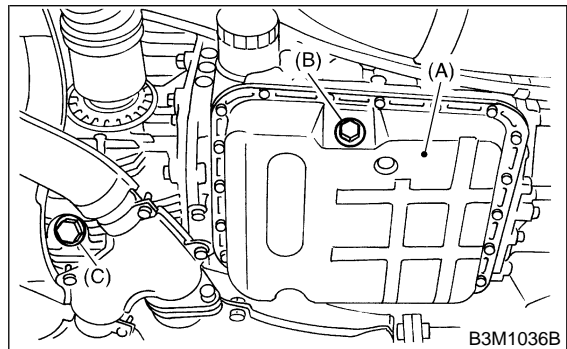
B2M2320

2) Remove pitching stopper.



S2M0126

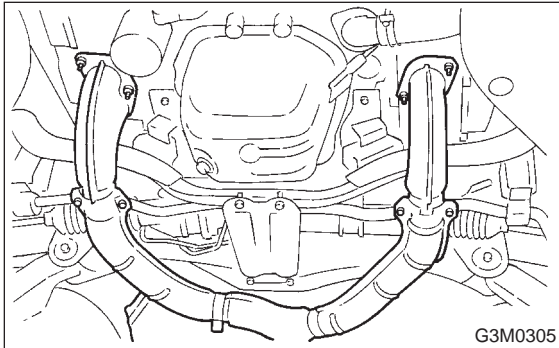
3) Raise vehicle and drain ATF.



B3M1036B

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

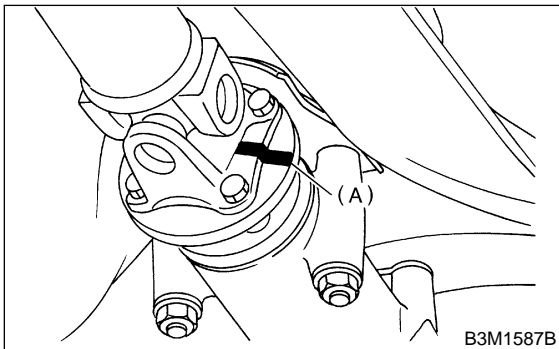
- 4) Remove front exhaust pipe.
Disconnect oxygen sensor connector, and remove front and center exhaust pipe.
<Ref. to 2-9 [W1A0].>



- 5) Remove propeller shaft.
<Ref. to 3-4 [W1B0].>

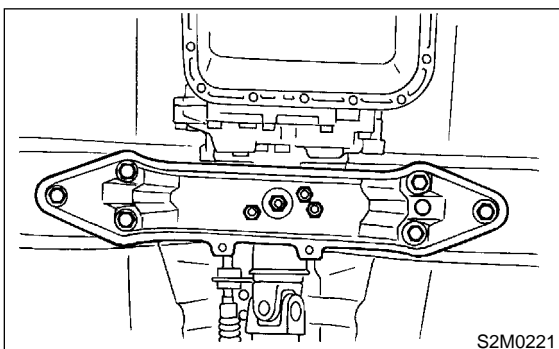
NOTE:

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

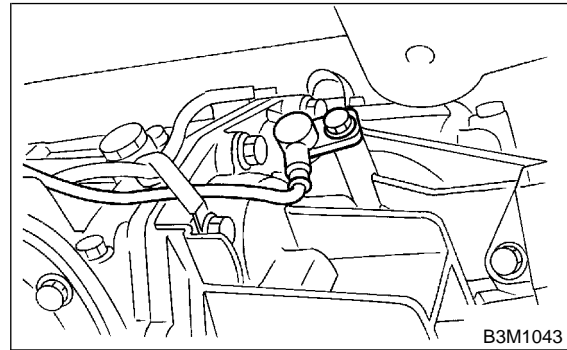


(A) Matching mark

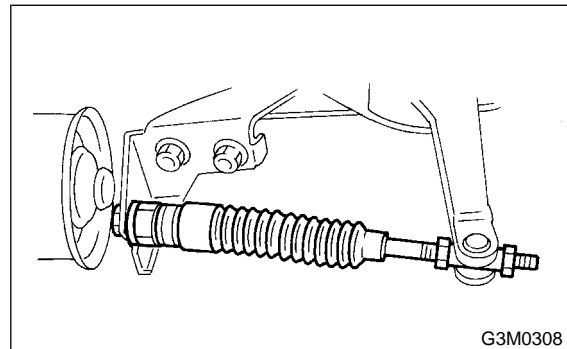
- 6) Remove rear crossmember.
(1) Support transmission using a transmission jack and raise slightly.
(2) Remove bolts and nuts as shown in Figure.



- 7) Remove vehicle speed sensor 1 (rear).



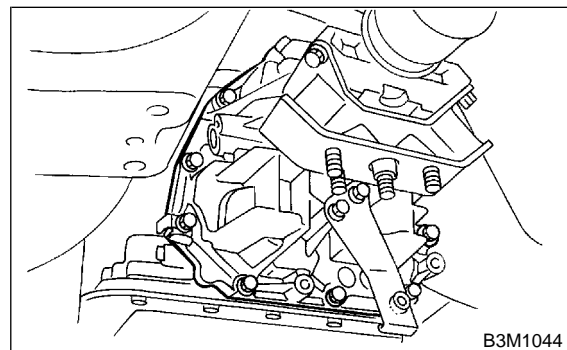
- 8) Remove extension and gasket.
(1) Remove select cable nut.



- (2) Move gear select cable so that extension bolts can be removed.
(3) Remove bolts.
(4) Remove extension case.

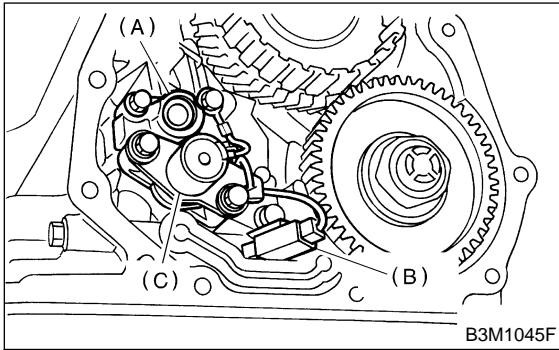
NOTE:

Use a container to catch oil flowing from extension.



5. Transfer Duty Solenoid and Transfer Valve Body

- 9) Disconnect transfer duty solenoid connector.
- 10) Remove transfer duty solenoid and transfer valve body.



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

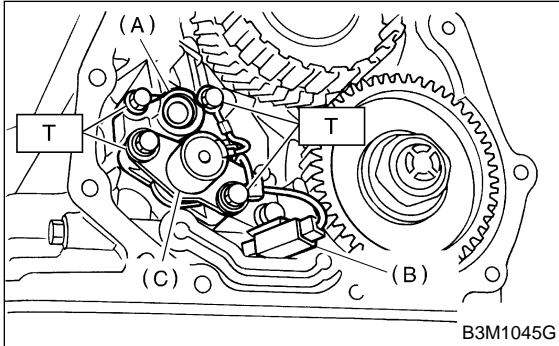
B: INSTALLATION

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

Tightening torque:

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

- (2) Connect transfer duty solenoid connector.



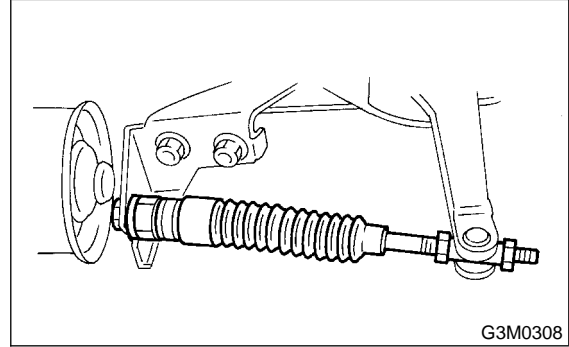
- (A) Transfer valve body
- (B) Transfer duty solenoid connector
- (C) Transfer duty solenoid

- 2) Install extension case to transmission case.
 - (1) Tighten the eleven bolts.

Tightening torque:

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

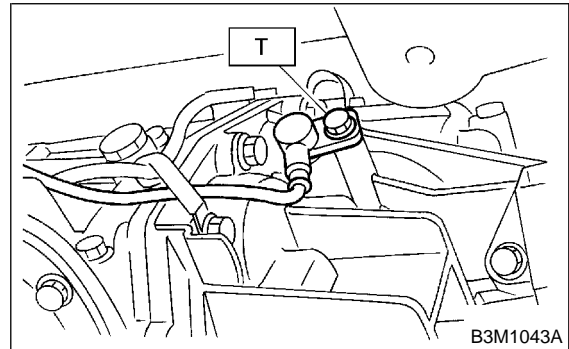
- (2) Adjust the select cable. <Ref. to 3-3 [W2A0].>



- 3) Install vehicle speed sensor 1 (rear).

Tightening torque:

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

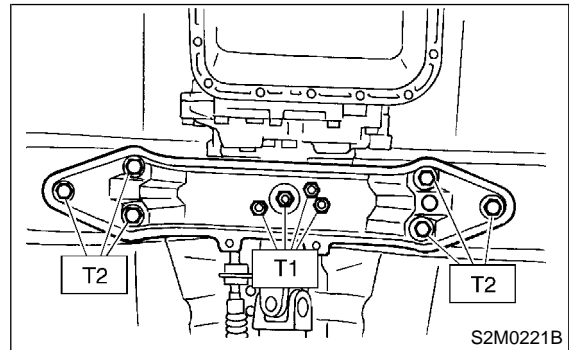


- 4) Install rear crossmember.
 - (1) Tighten bolts.

Tightening torque:

T1: 34±5 N·m (3.5±0.5 kg-m, 25.3±3.6 ft-lb)

T2: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)

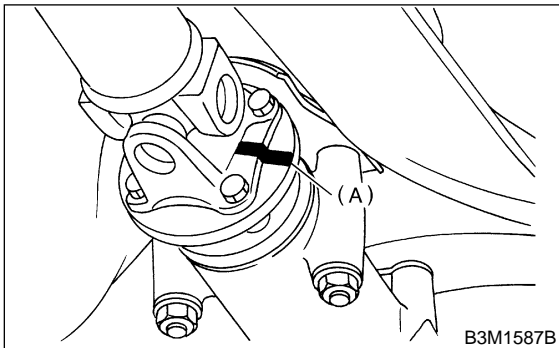


- (2) Lower and remove transmission jack.

5) Install propeller shaft.
<Ref. to 3-4 [W1E0].>

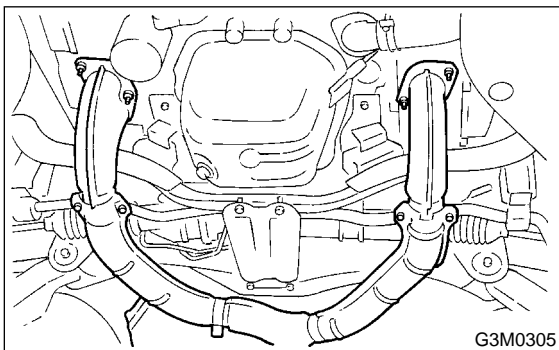
NOTE:

Align matching marks on propeller shaft and rear differential coupling.

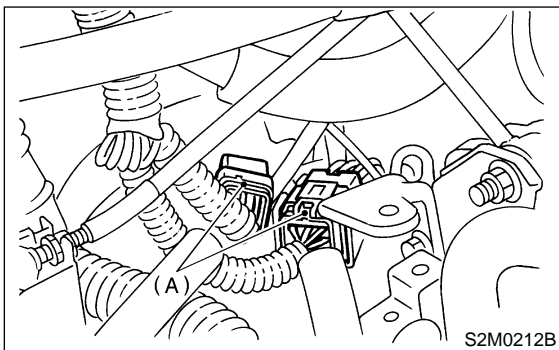


(A) Matching mark

6) Install front exhaust pipe.
<Ref. to 2-9 [W1A0].>



- 7) Lower and remove jack.
- 8) Connect the following parts:
 - (1) Oxygen sensor connector
 - (2) Transmission harness connector



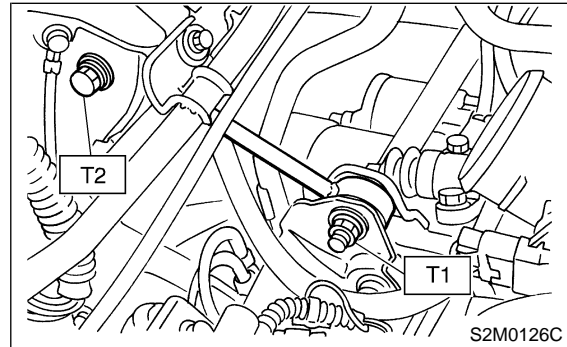
(A) Transmission harness connector

9) Install pitching stopper.

Tightening torque:

T1: 49±5 N·m (5.0±0.5 kg·m, 36.2±3.6 ft·lb)

T2: 57±10 N·m (5.8±1.0 kg·m, 42±7 ft·lb)



- 10) Install air cleaner duct and case.
- 11) Fill ATF up to the middle of the "COLD" side on level gauge by using gauge hole.

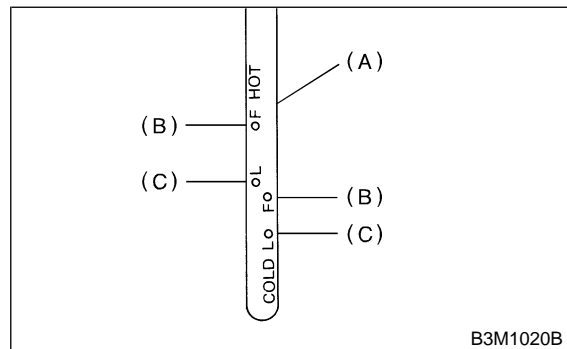
Recommended fluid:

Dexron II E or 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)

12) Run the vehicle until the ATF temperature rises from 60 to 80°C (140 to 176°F) and check the ATF level of the "HOT" side on level gauge.



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

6. ATF Filter

A: REMOVAL AND INSTALLATION

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.

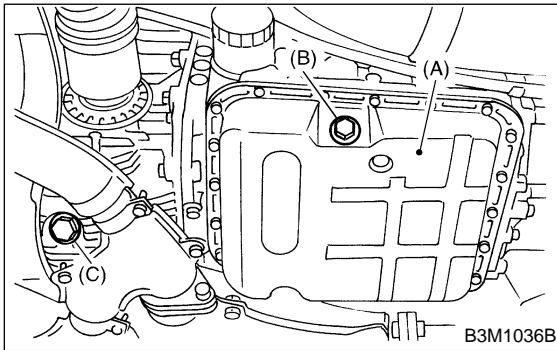
1) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

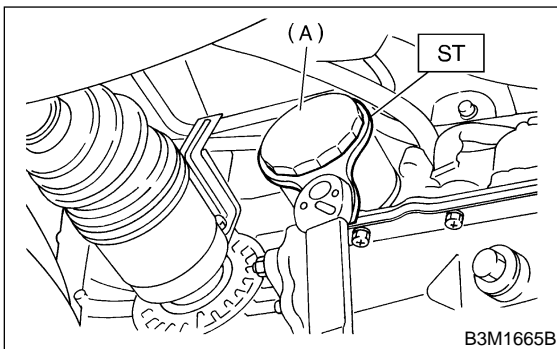
$25 \pm 2 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.2 \text{ kg}\cdot\text{m}$, $18.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)



- (A) Oil pan
- (B) Drain plug
- (B) Differential oil 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.

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

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

Calculate ATF filter torque specifications using the following formula.

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

T1: $14 \pm 2 \text{ N}\cdot\text{m}$ ($1.4 \pm 0.2 \text{ kg}\cdot\text{m}$, $10.1 \pm 1.4 \text{ ft}\cdot\text{lb}$)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

CAUTION:

Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH

6) Add ATF.

7. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

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

CAUTION:

When performing test, do not exceed posted speed limit.

2. SHIFT PATTERNS

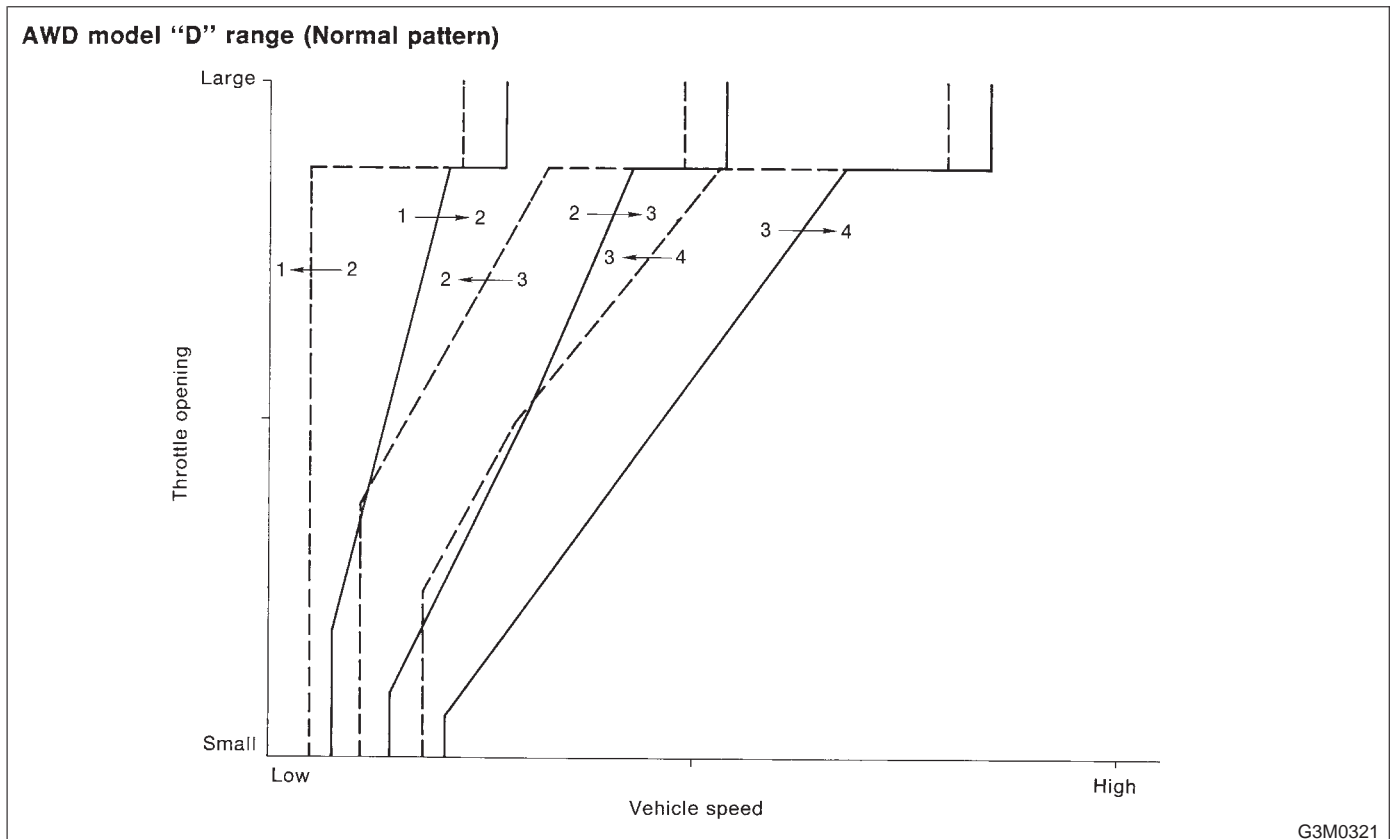
Check "kick-down".

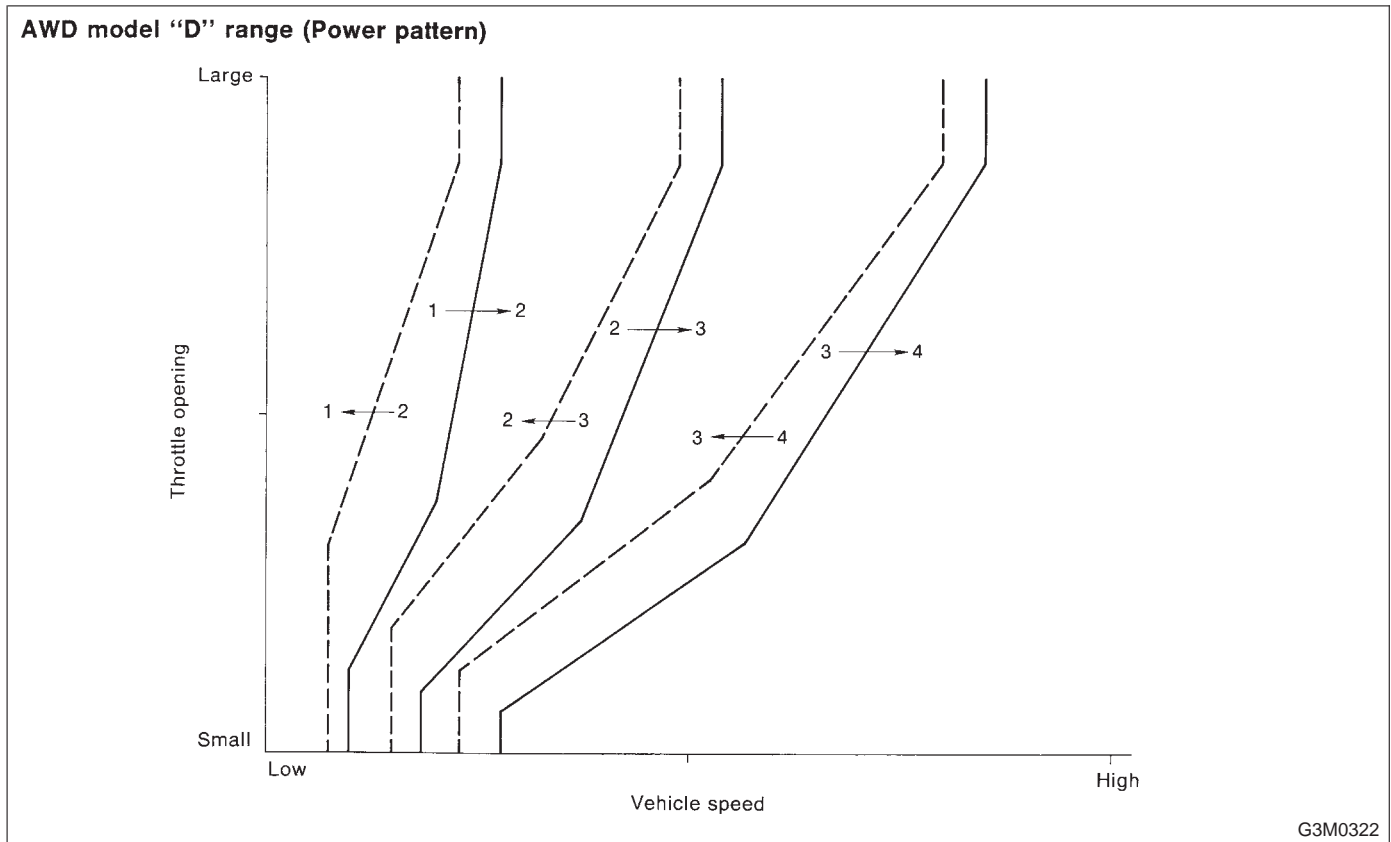
D range: 1st ← → 2nd ← → 3rd ← → 4th

3 range: 1st ← → 2nd ← → 3rd ← 4th

2 range: 2nd ← 3rd ← 4th

1 range: 1st ← 2nd ← 3rd ← 4th





3. ENGINE BRAKE OPERATION

Engine brake operation:

D range → ***4th gear***

3 range → ***3rd gear***

2 range → ***2nd gear***

1 range → ***1st gear***

4. AWD FUNCTION

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

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

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

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

Check the transfer control valve for sticking, and the transfer clutch facing for wear. <Ref. to 3-2 [W21B0].> and <Ref. to 3-2 [W22B0].>

8. Stall Test

A: MEASUREMENT

1. GENERAL INFORMATION

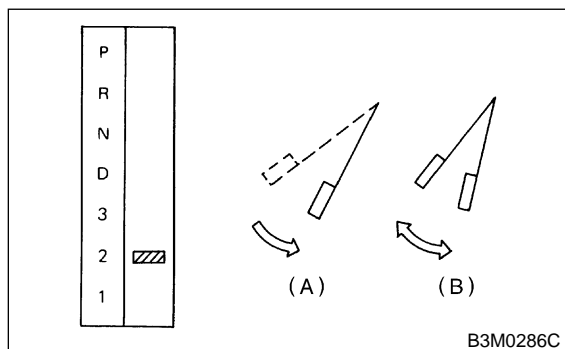
The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.

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

- 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):
2,100 — 2,600 rpm

3. EVALUATION

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

9. Time Lag Test

A: INSPECTION

1. GENERAL INFORMATION

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

CAUTION:

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

2. TEST METHODS

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

3. EVALUATION

- 1) If "N" → "D" time lag is longer than specified:
 - Line pressure too low
 - 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

10. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

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

- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
- Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.
 - 1) Line pressure measurement (under no load)

CAUTION:

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

- 2) Line pressure measurement (under heavy load)

CAUTION:

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

9. Time Lag Test

A: INSPECTION

1. GENERAL INFORMATION

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

CAUTION:

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

2. TEST METHODS

- 1) Fully apply the parking brake.
- 2) Start the engine.
Check engine speed is in idling speed (A/C OFF).
- 3) Shift the shift lever from "N" to "D" range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.

Time lag: Less than 1.2 seconds

- 4) In same manner, measure the time lag for "N" → "R".

Time lag: Less than 1.5 seconds

3. EVALUATION

- 1) If "N" → "D" time lag is longer than specified:
 - Line pressure too low
 - 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

10. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

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

- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
- Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.
 - 1) Line pressure measurement (under no load)

CAUTION:

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

- 2) Line pressure measurement (under heavy load)

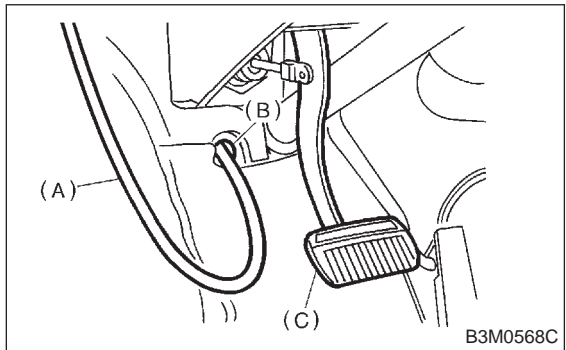
CAUTION:

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

2. TEST METHODS

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.

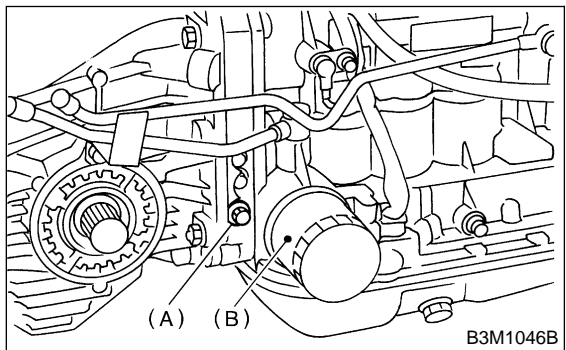
ST 498575400 OIL PRESSURE GAUGE ASSY



- (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
- (B) ATF filter

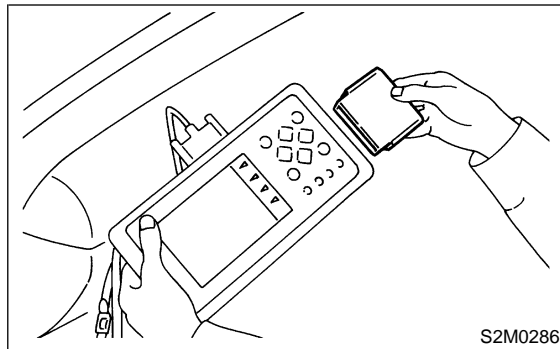
3) Connect ST1 with ST2.

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 1-6 [G1100].>



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

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

3. EVALUATION

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm ² , psi)
2	5	Full open	1,128 — 1,304 (11.5 — 13.3, 164 — 189)
R	5	Full open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	95	Full closed	304 — 412 (3.1 — 4.2, 44 — 60)

11. Transfer Clutch Pressure Test

A: MEASUREMENT

1. TEST METHODS

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

ST 498897700 OIL PRESSURE ADAPTER SET

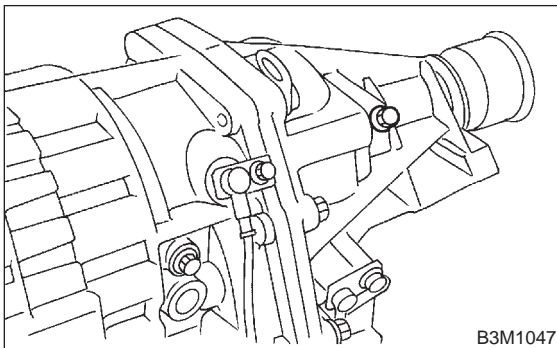
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

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

CAUTION:

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



2. EVALUATION

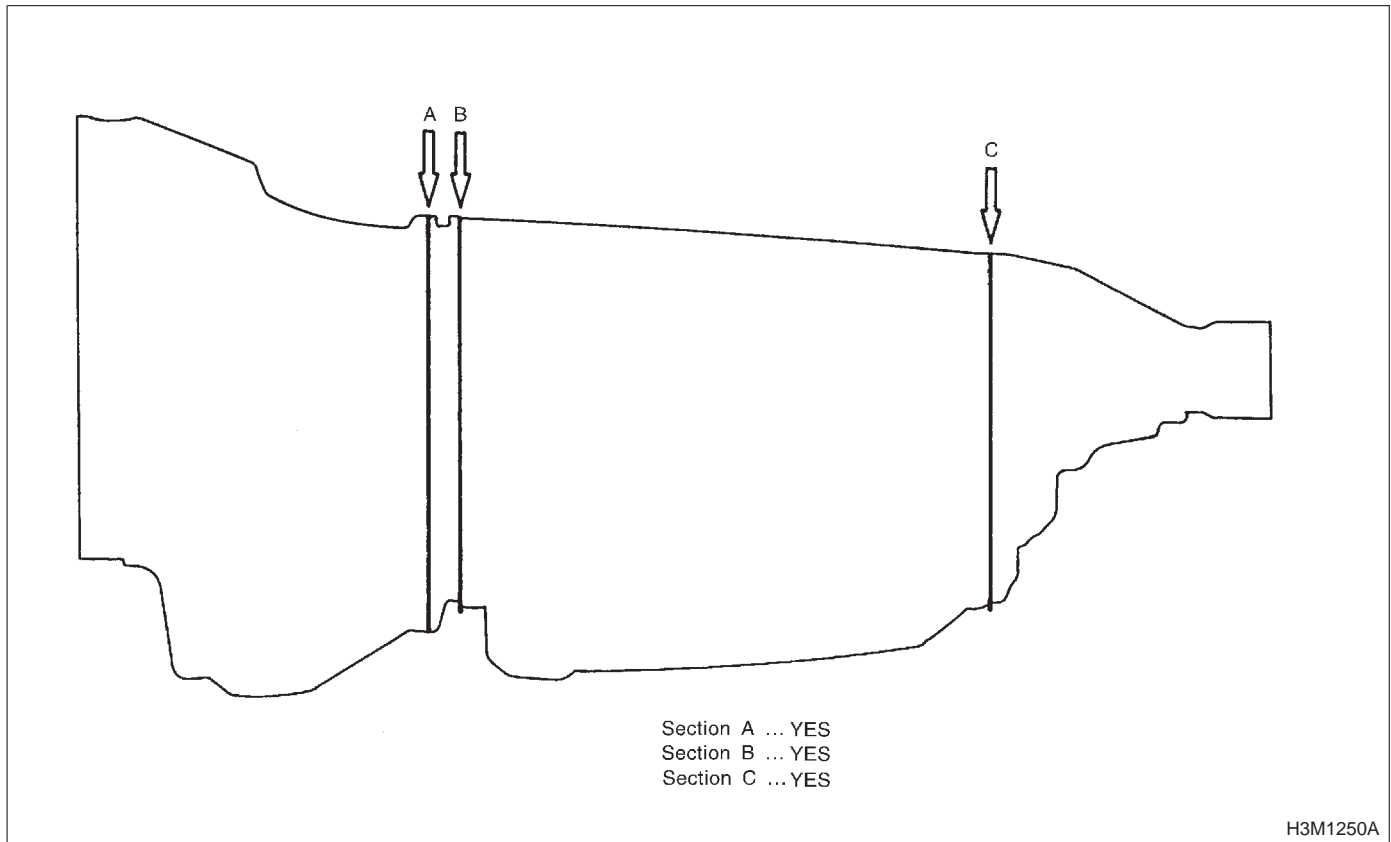
NOTE:

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

Standard transfer clutch pressure kPa (kg/cm ² , psi)			
Duty ratio (%)	Throttle position	AWD mode	FWD mode
5	Full closed	932 — 1,089 (9.5 — 11.1, 135 — 158)	—
60	2/3 throttle	216 — 294 (2.2 — 3.0, 31 — 43)	—
95	Full open	—	0 (0, 0)

12. Overall Transmission

A: SECTIONS THAT CAN BE DETACHED/ASSEMBLED



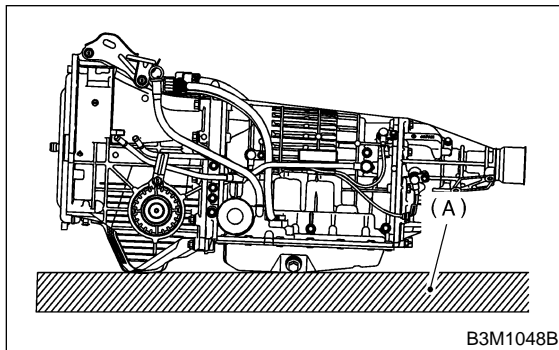
B: DISASSEMBLY

1. EXTERNAL PARTS

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

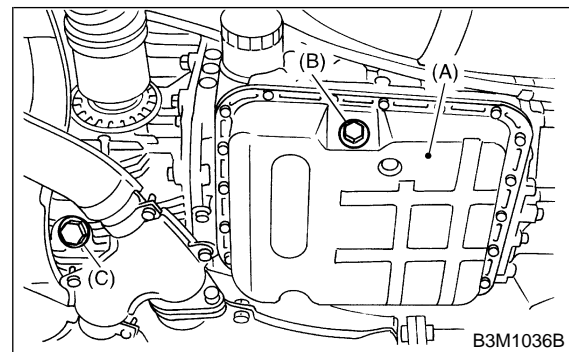
CAUTION:

Be careful not to bend or damage external parts.



(A) Work bench

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

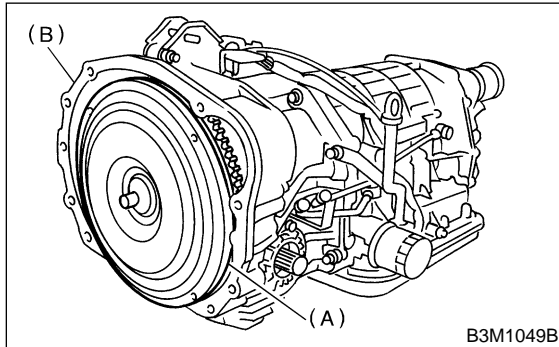


- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

4) Extract the torque converter clutch assembly.

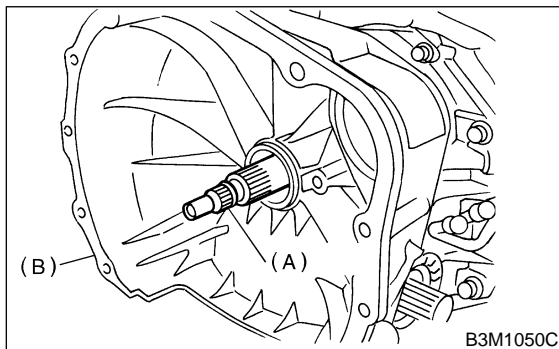
NOTE:

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



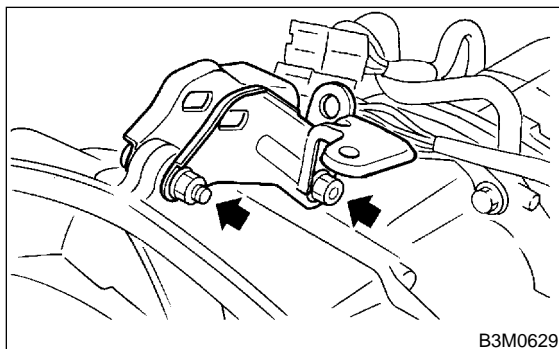
(A) Torque converter clutch ASSY
(B) Torque converter clutch case

5) Remove the input shaft.



(A) Input shaft
(B) Torque converter clutch case

6) Remove the pitching stopper bracket.



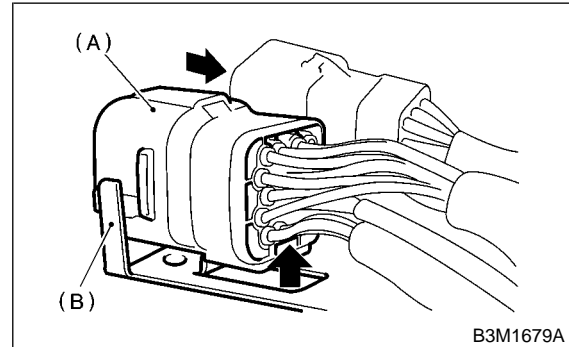
B3M0629

7) Remove harnesses from stay.

- (1) Disconnect transmission harness connector from stay.

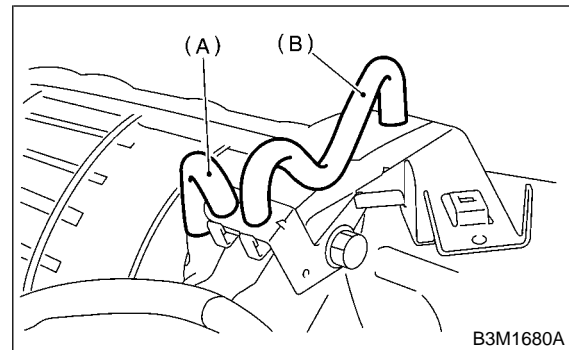
NOTE:

Lift-up lever behind connector and disconnect it from stay.



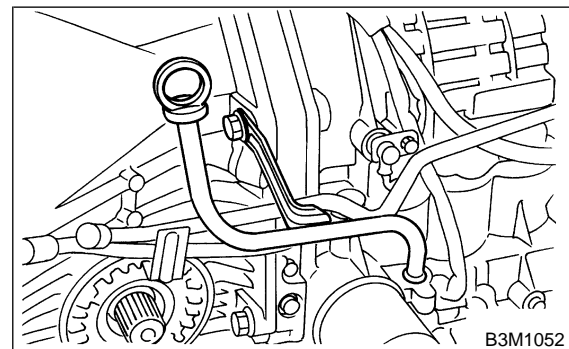
(A) Transmission harness
(B) Stay

- (2) Disconnect inhibitor switch connector stay.
8) Disconnect the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

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

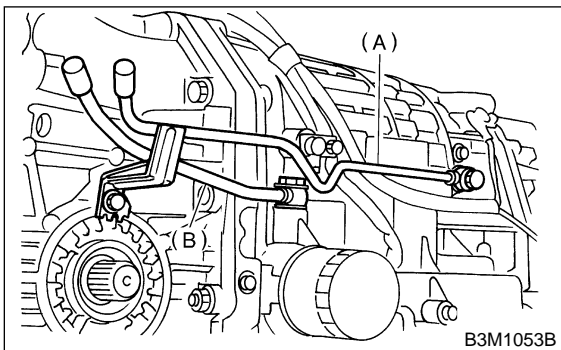


B3M1052

10) Remove the oil cooler inlet and outlet pipes.

CAUTION:

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



- (A) Inlet pipe
- (B) Outlet pipe

2. SEPARATION OF EACH SECTION

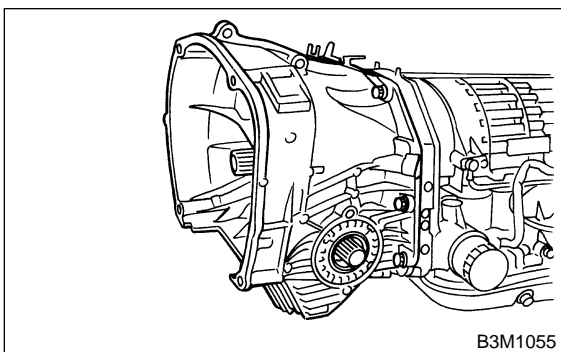
1) Separation of torque converter clutch case and transmission case sections

CAUTION:

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

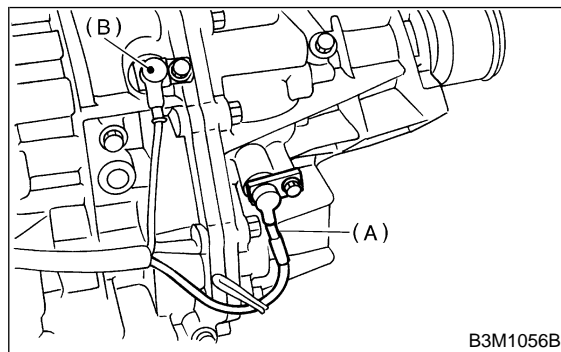
NOTE:

Separate these cases while tapping lightly on the housing.



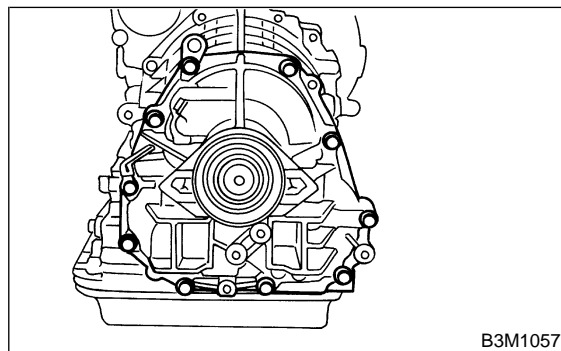
2) Separation of transmission case and extension sections

(1) Remove vehicle speed sensor 1 (rear).



- (A) Vehicle speed sensor 1 (rear)
- (B) Vehicle speed sensor 2 (front)

(2) Separation of transmission case and extension case sections



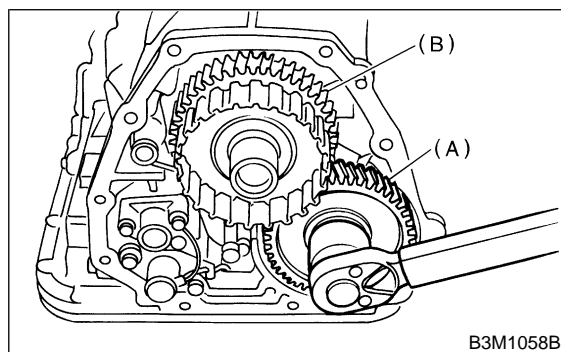
3. TRANSMISSION CASE SECTION

1) Remove the reduction driven gear.

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

NOTE:

Set the range select lever to "P".

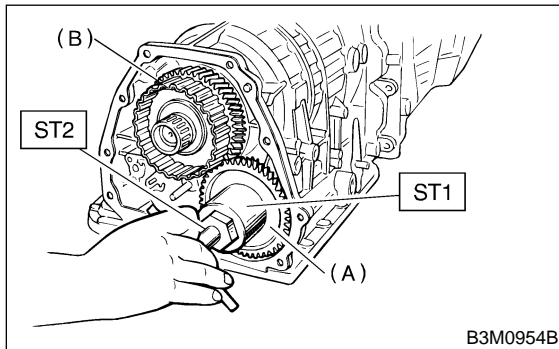


- (A) Reduction driven gear
- (B) Reduction drive gear

(2) Using the ST1 and ST2, extract the reduction driven gear.

NOTE:

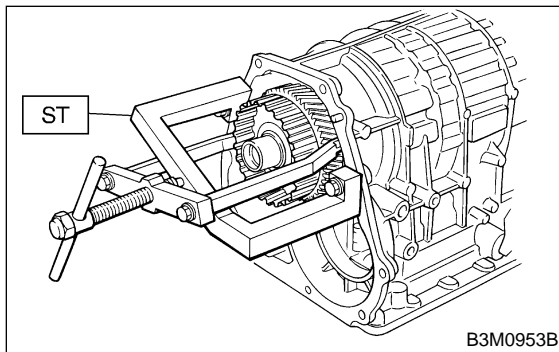
ST1 499737000 PULLER
ST2 899524100 PULLER SET



- (A) Reduction driven gear
- (B) Reduction drive gear

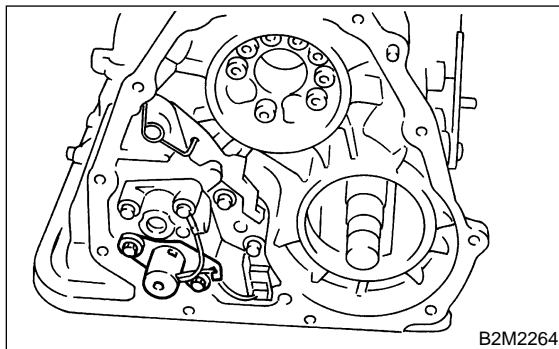
(3) Using the ST, extract the reduction drive gear.

ST 499737100 PULLER SET

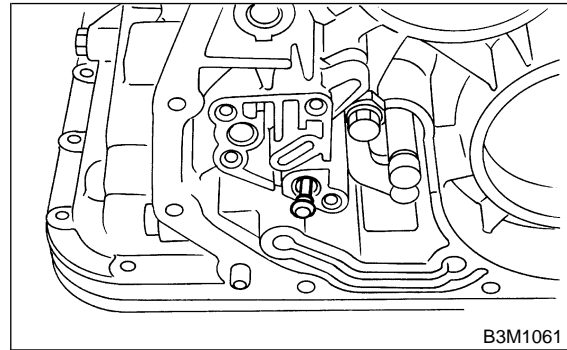


2) Remove transfer valve body and transfer duty solenoid.

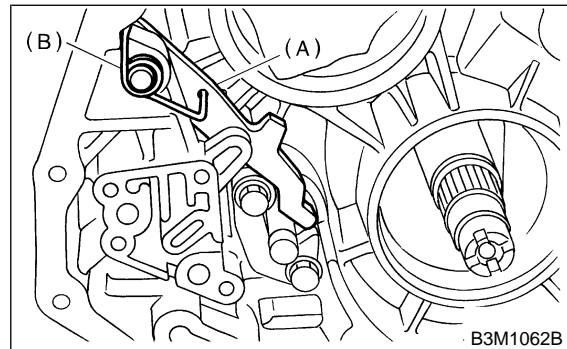
- (1) Disconnect connector from transfer duty solenoid.
- (2) Remove transfer valve body and transfer duty solenoid.



(3) Pull out inlet filter.

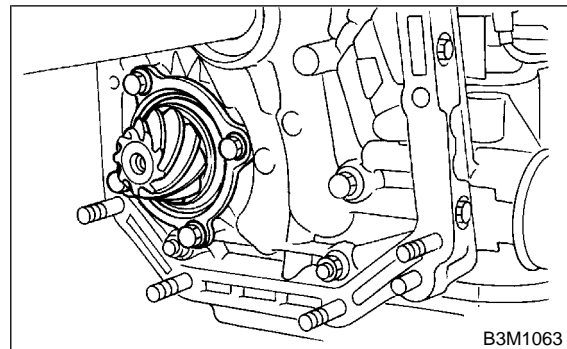


3) Remove the parking pawl, return spring and shaft.



- (A) Parking pawl
- (B) Return spring

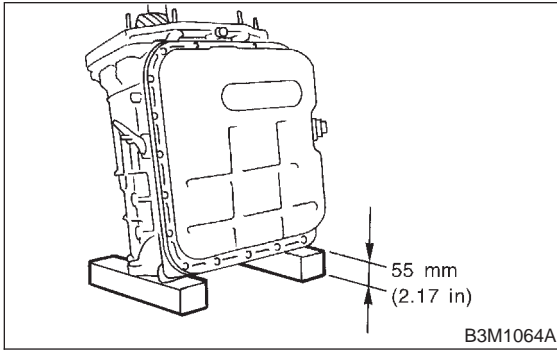
4) Loosen the taper roller bearing mounting bolts.



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

CAUTION:

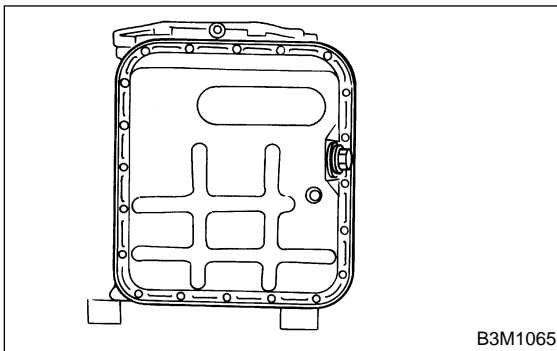
- Be careful not to scratch the rear mating surface of the transmission case.
- Note that the parking rod and drive pinion protrude from the mating surface.



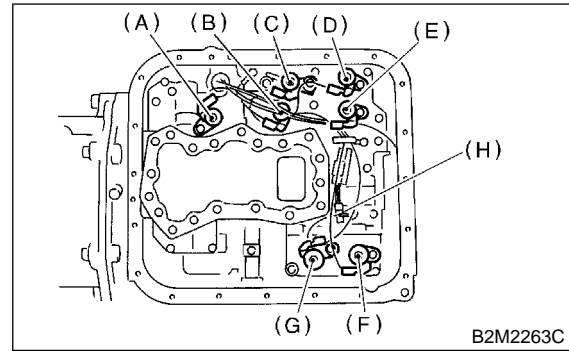
6) Remove the oil pan.

NOTE:

Use a scraper to remove oil pan.



7) Disconnect the harness connectors for the solenoids, duty solenoids, ATF temperature sensor and the ground cord.

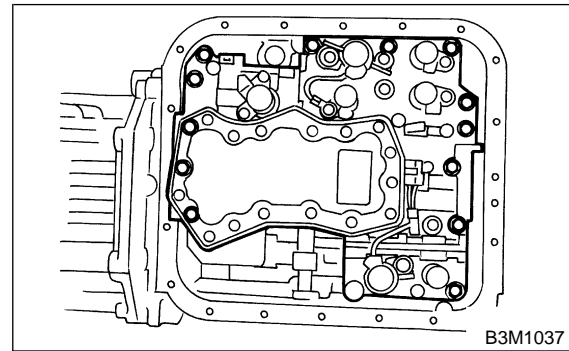


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

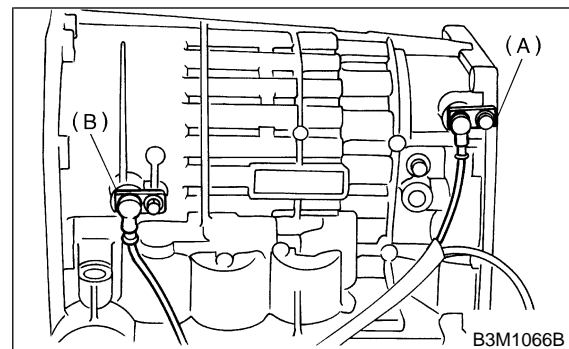
8) Remove the control valve body.

CAUTION:

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

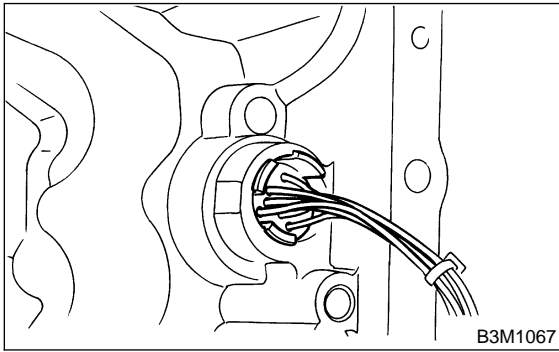


9) Remove vehicle speed sensor 2 (front) and torque converter turbine speed sensor.



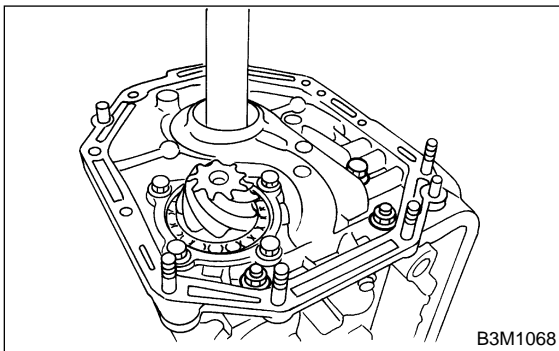
- (A) Vehicle speed sensor 2 (front)
- (B) Torque converter turbine speed sensor

10) Remove transmission harness.

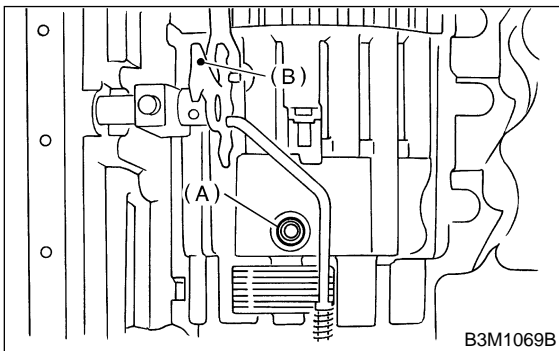


11) Remove the oil pump housing.

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



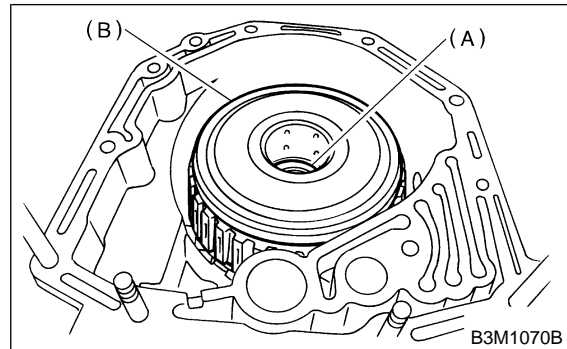
12) Remove 2-4 brake seal.



- (A) 2-4 brake
- (B) Manual lever

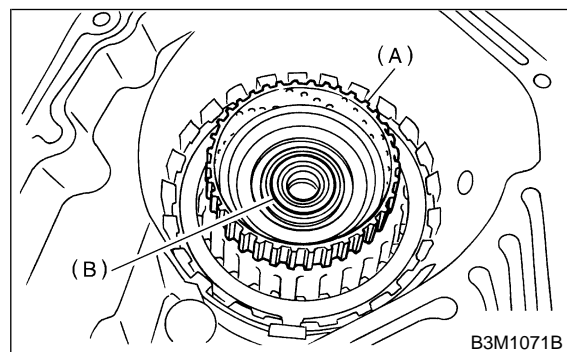
13) Take out the high clutch and reverse clutch assembly.

CAUTION:
Be careful not to lose thrust needle bearing.



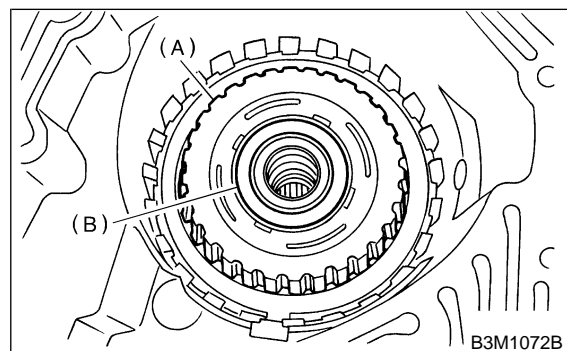
- (A) Thrust needle bearing
- (B) High clutch and reverse clutch ASSY

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



- (A) High clutch hub
- (B) Thrust needle bearing

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



- (A) Front sun gear
- (B) Thrust needle bearing

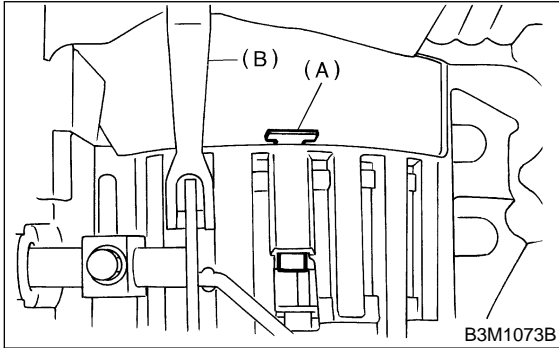
16) Pull out leaf spring.

CAUTION:

Be careful not to bend leaf spring during removal.

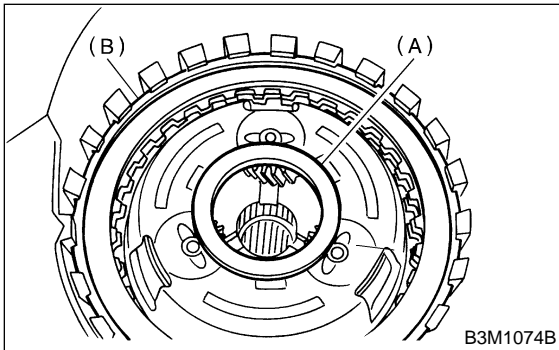
NOTE:

Remove it while pressing down on lower leaf spring.



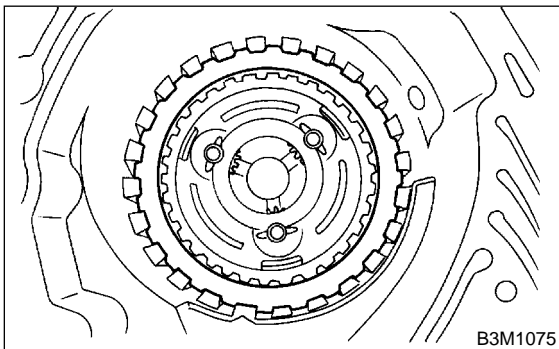
- (A) Leaf spring
- (B) Detention spring

17) Remove snap ring and thrust needle bearing.

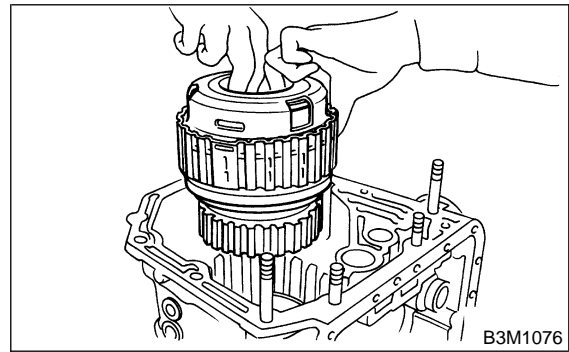


- (A) Thrust needle bearing
- (B) Snap ring

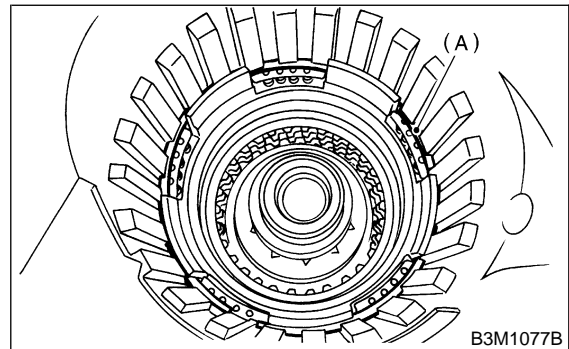
18) Take out retaining plate, drive plate and driven plate of 2-4 brake.



19) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.

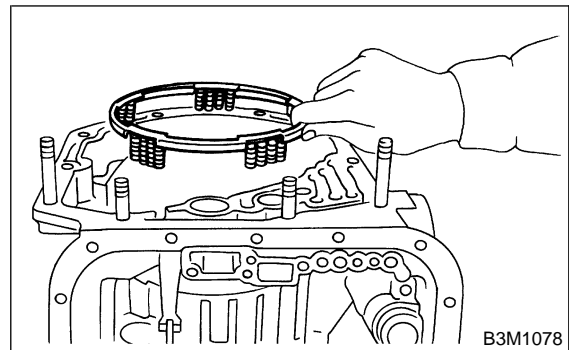


20) Remove snap ring.



- (A) Snap ring

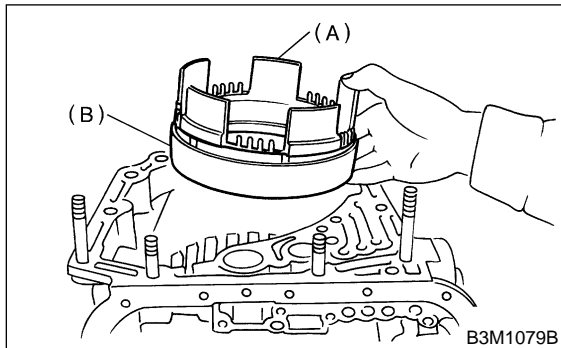
21) Take out 2-4 brake return spring.



22) Take out 2-4 brake piston and piston retainer.

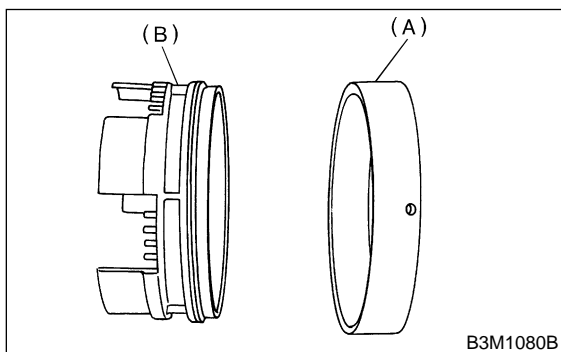
CAUTION:

When removing the brake piston 2-4 and piston retainer, be careful not to rub or bump them against the transmission case.



- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

23) Separate 2-4 brake piston and piston retainer.

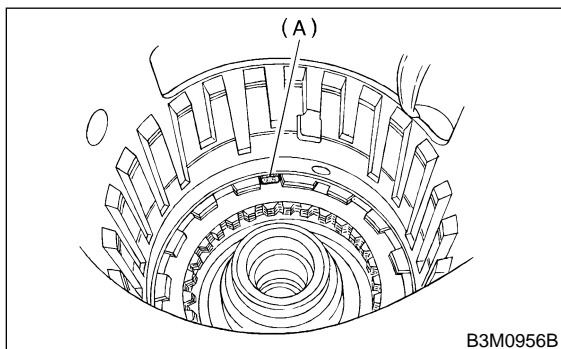


- (A) 2-4 brake piston retainer
- (B) 2-4 brake piston

24) Pull out leaf spring.

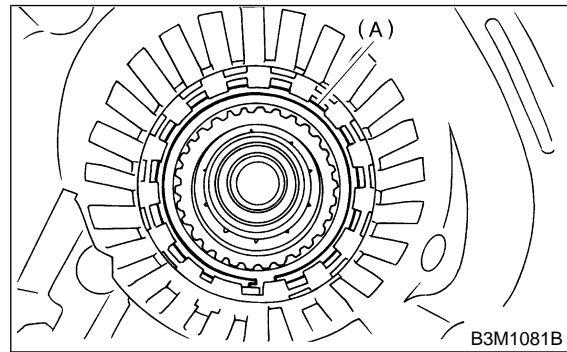
CAUTION:

Be careful not to bend leaf spring during removal.



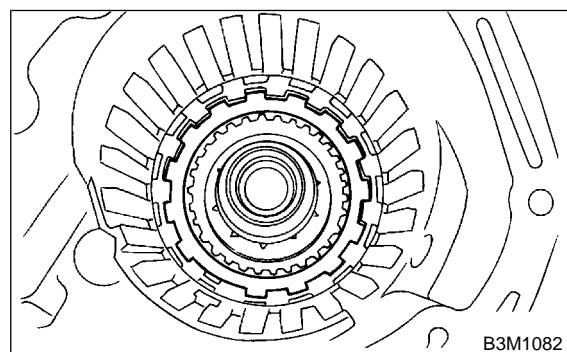
- (A) Leaf spring

25) Remove snap ring.



- (A) Snap ring

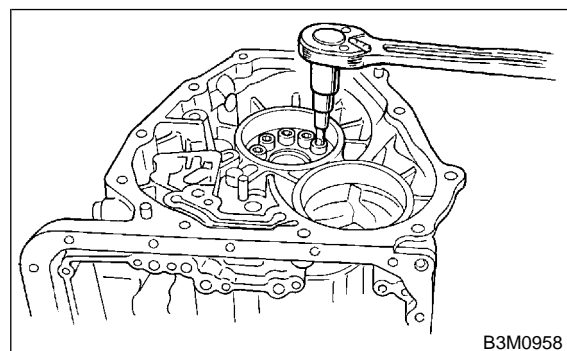
26) Take out retaining plate, drive plate, driven plate and dish plate.



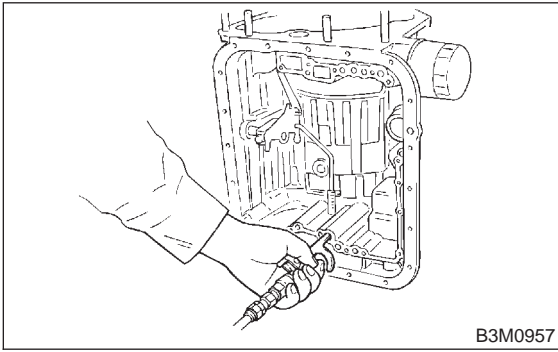
27) Turning the case upside down, take out the one-way clutch inner race, retainer and wave spring.

NOTE:

After loosening all socket bolts, place the side of the transmission case on the floor.



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

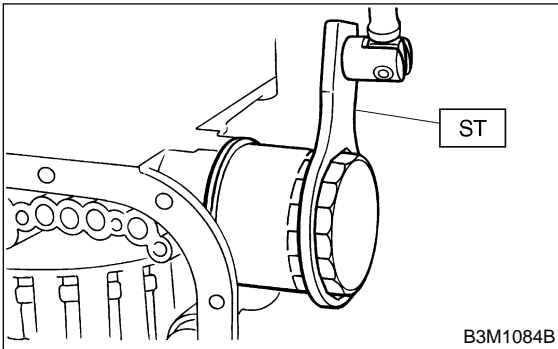


29) Using ST, remove ATF filter.

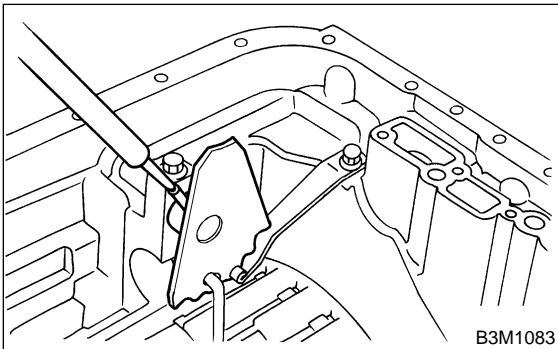
NOTE:

If any of the clutches or brakes are abnormally worn, replace ATF filter and oil seal with new ones.

ST 498545400 OIL FILTER WRENCH



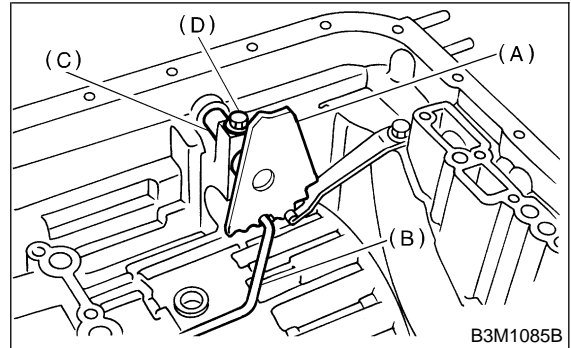
30) Pull off the straight pin of manual lever.



31) Remove bolts securing select lever, then remove select lever, manual lever and parking rod.

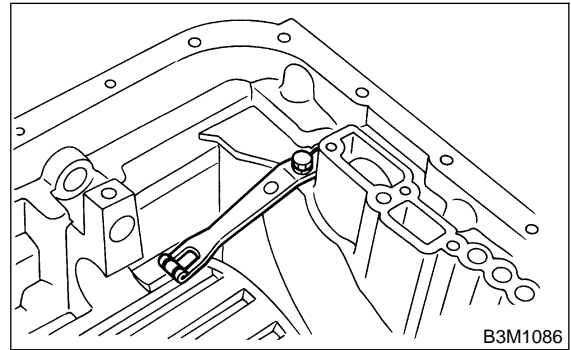
CAUTION:

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

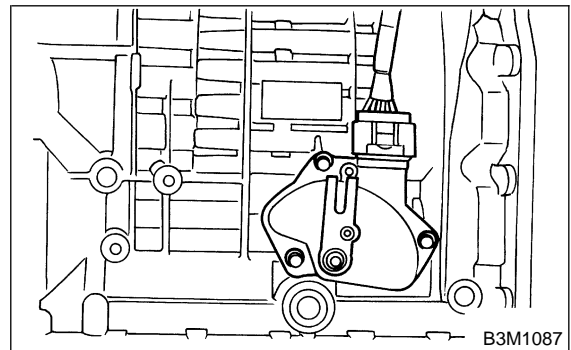


- (A) Manual lever
- (B) Parking rod
- (C) Range select lever
- (D) Bolt

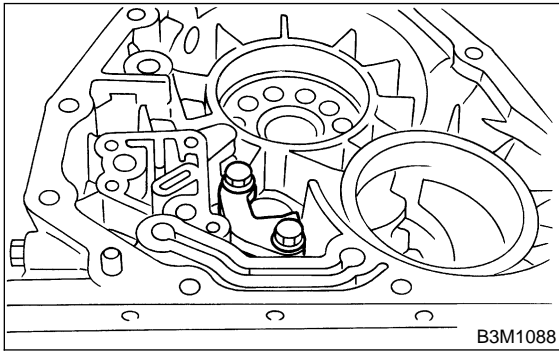
32) Remove the detention spring.



33) Remove the inhibitor switch.

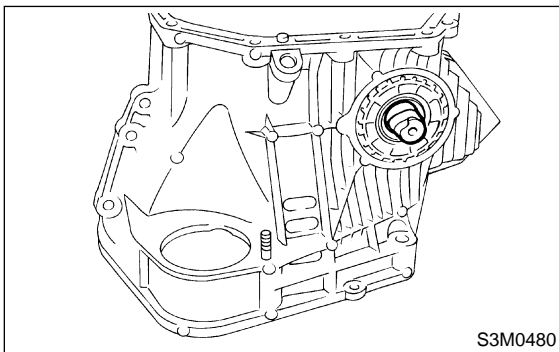


34) Remove parking support.



4. TORQUE CONVERTER CLUTCH CASE SECTION

1) Wrap the axle shaft serration with vinyl tape.



2) Remove the differential side retainer with ST.

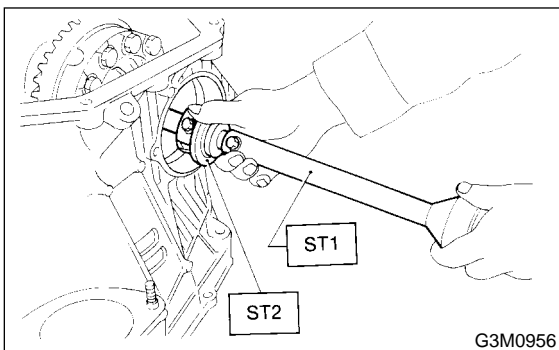
CAUTION:
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case and speedometer gears.

ST 499787000 WRENCH ASSY

3) Extract the axle shaft with ST1 and ST2.

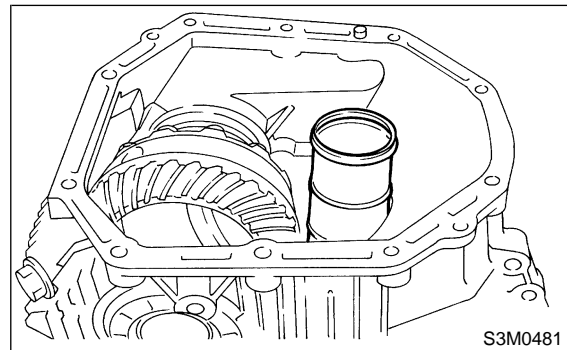
CAUTION:
Do not reuse the circlip.

ST1 499095500 REMOVER
ST2 499247300 INSTALLER



4) Remove the differential case assembly.

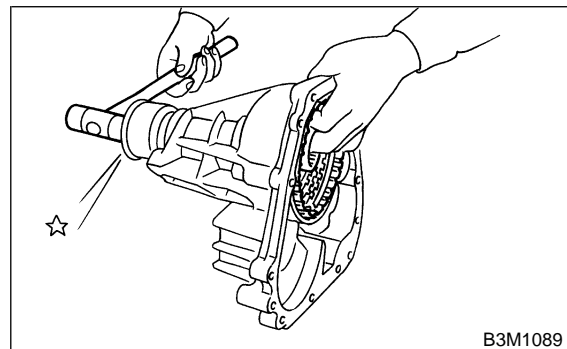
CAUTION:
● Remove the seal pipe if it is attached. (Reusing is not allowed.)
● Be careful not to damage the retainer mounting hole of the torque converter clutch case and the speedometer gears.



5. EXTENSION SECTION

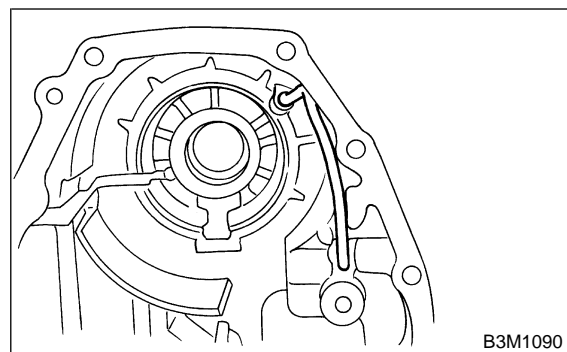
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

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



2) Remove the transfer pipe.

CAUTION:
Be careful not to bend the pipe.



C: ASSEMBLY OF OVERALL TRANSMISSION

1. TORQUE CONVERTER CLUTCH CASE SECTION

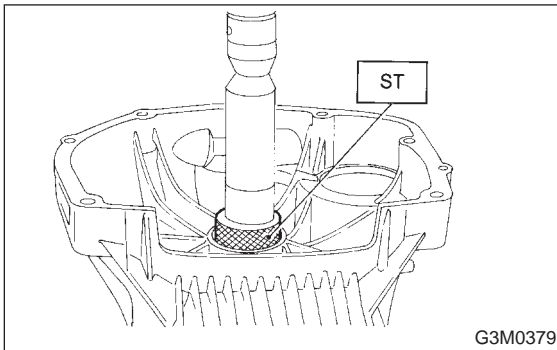
1) Check the appearance of each component and clean.

CAUTION:

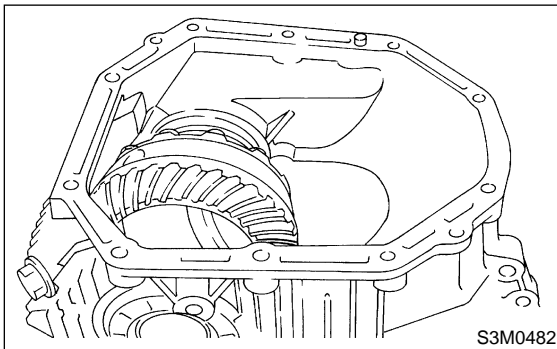
Make sure each part is free of harmful cuts, damage and other faults.

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

ST 398437700 DRIFT



3) Install the differential assembly to the case, paying special attention not to damage the inside of the case (particularly, the differential side retainer contact surface).



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

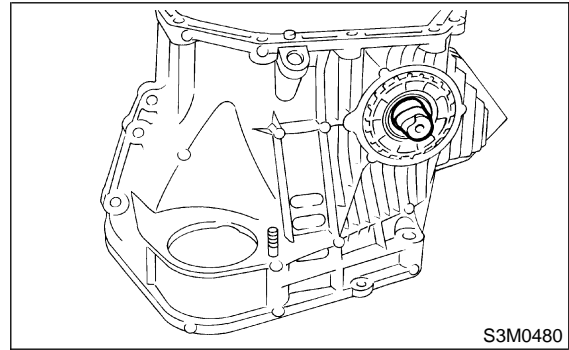
CAUTION:

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

Thrust play:

0.3 — 0.5 mm (0.012 — 0.020 in)

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



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

CAUTION:

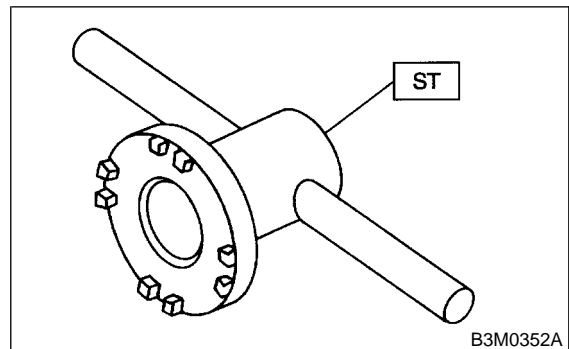
- Pay attention not to damage the oil seal lips.
- Do not confuse the RH and LH oil seals.
- Keep the O-ring removed from the retainer.

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

NOTE:

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

ST 499787000 WRENCH ASSY



8) Hypoid gear backlash adjustment and tooth contact check

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

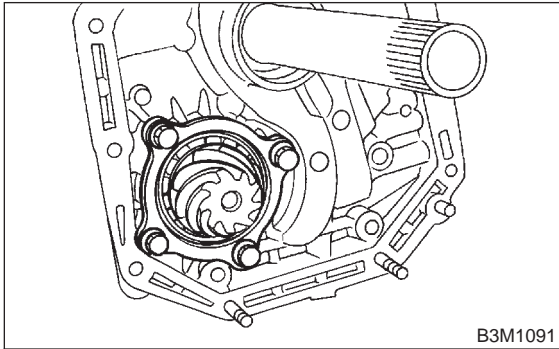
CAUTION:

- Be careful not to bend the shims.
- Be careful not to force the pinion against the housing bore.

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

Tightening torque:

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



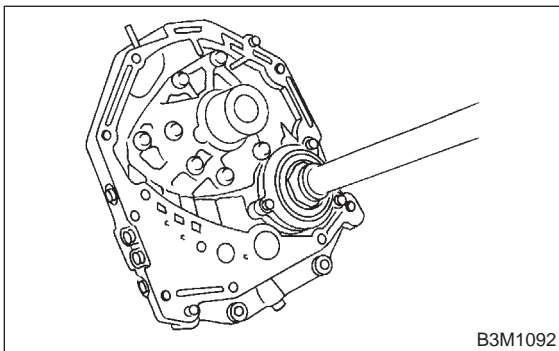
(3) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening the four bolts.

CAUTION:

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

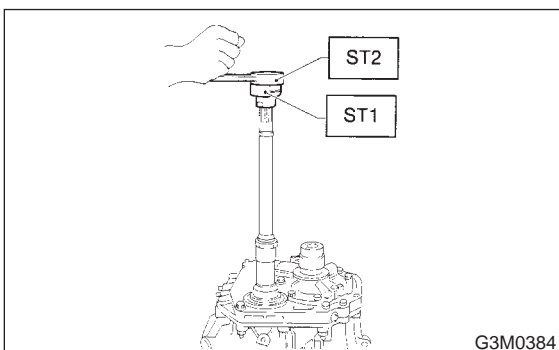
Tightening torque:

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

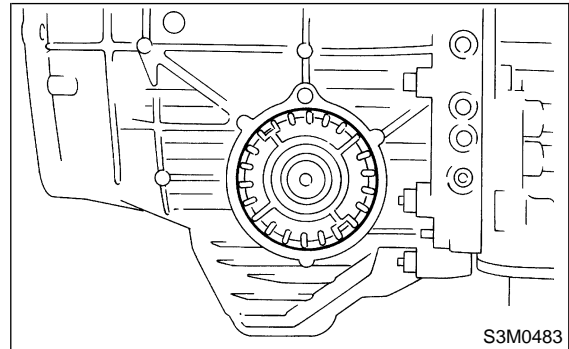


(4) Rotate the drive pinion several times with ST1 and ST2.

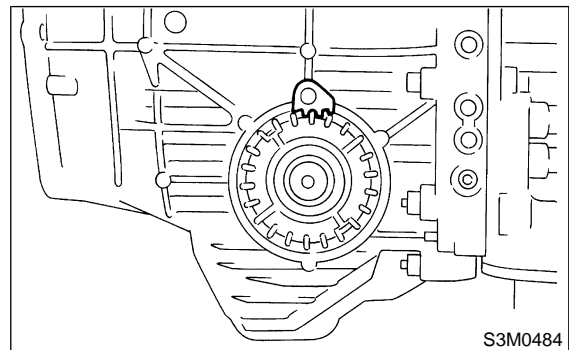
- ST1 498937110 HOLDER
ST2 499787700 WRENCH



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

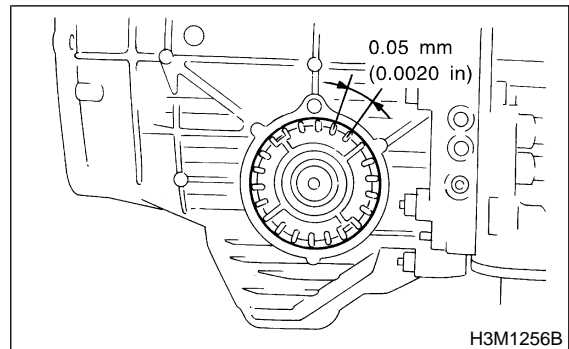


(6) After the "zero" state is established, back off the LH retainer three notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Repeat this procedure several times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the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



NOTE:

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



(7) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

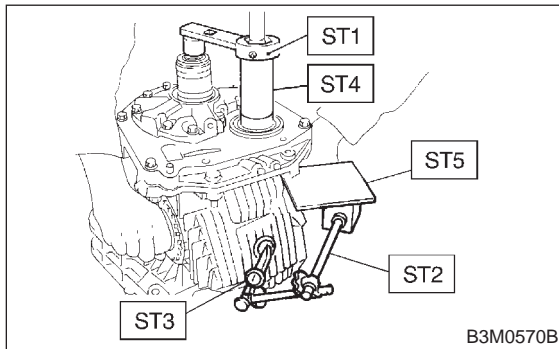
NOTE:

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

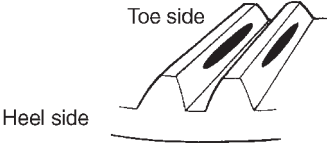
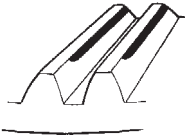
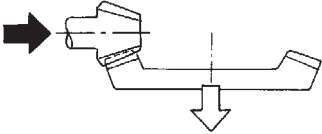

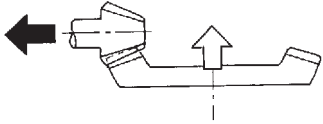

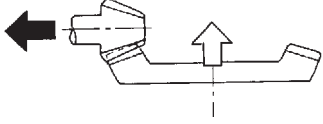

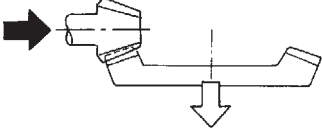
ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER WRENCH
ST5	498255400	PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

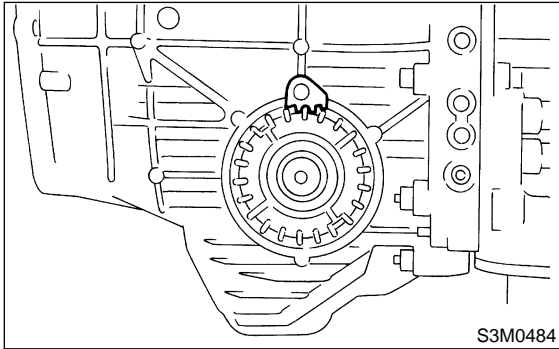
Checking item	Contact pattern	Corrective action
<p>Tooth contact Tooth contact pattern is slightly shifted toward to under no-load rotation. [When loaded, contact pattern moves toward heel.]</p>	 <p style="text-align: center;">B3M0317A</p>	<p style="text-align: center;">—</p>
<p>Face contact Backlash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

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

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

Tightening torque:

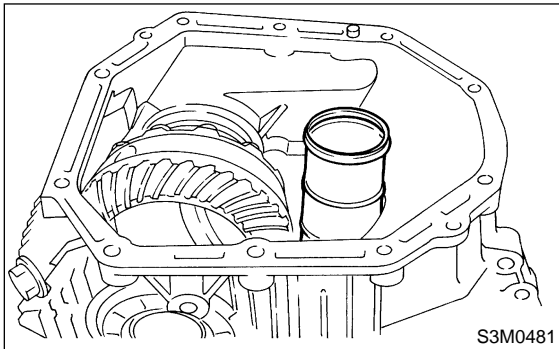
25±2 N·m (2.5±0.2 kg·m, 18.1±1.4 ft·lb)



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

CAUTION:

Be sure to use a new seal pipe.

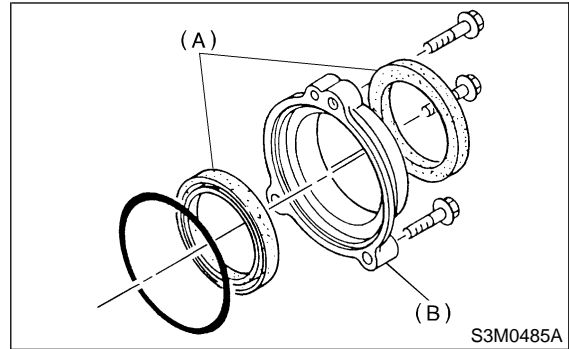


10) Install the two oil seals to the oil seal retainer with ST.

CAUTION:

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

ST 499247300 INSTALLER

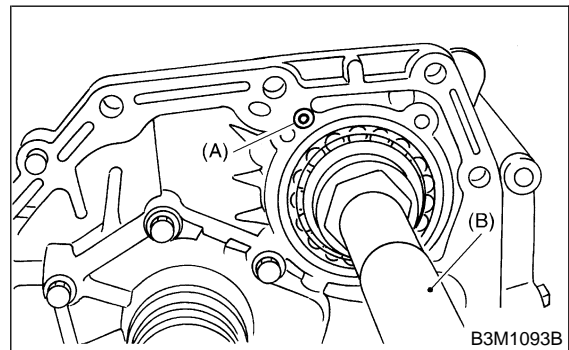


- (A) Oil seal
- (B) Oil seal retainer

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

CAUTION:

Always discard old O-rings and install new ones.



- (A) O-ring
- (B) Drive pinion shaft

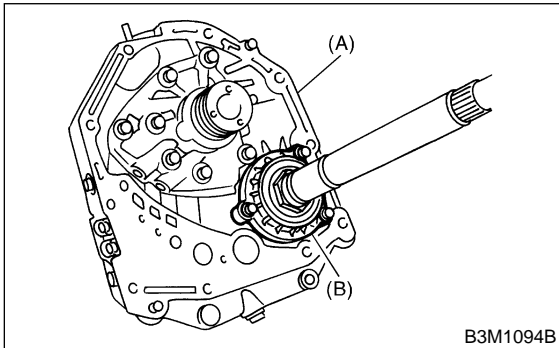
12) Install the oil seal retainer taking care not to damage the oil seal lips. Then secure with the three bolts.

NOTE:

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

Tightening torque:

7 ± 1 N-m (0.7 ± 0.1 kg-m, 5.1 ± 0.7 ft-lb)



- (A) Oil pump housing
- (B) Oil seal retainer

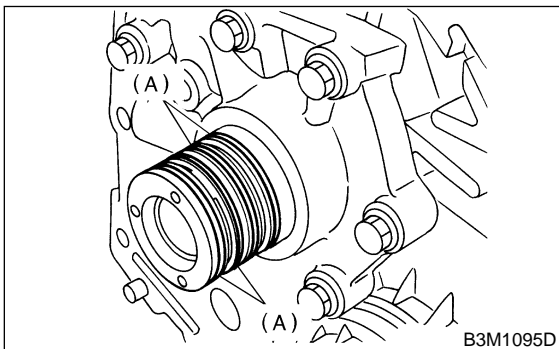
13) Apply vaseline to the groove on the oil pump cover, and install the four seal rings.

CAUTION:

Be careful not to damage the seal ring.

NOTE:

- Fit the seal ring after compressing, and rub vaseline into the seal ring to avoid expansion.

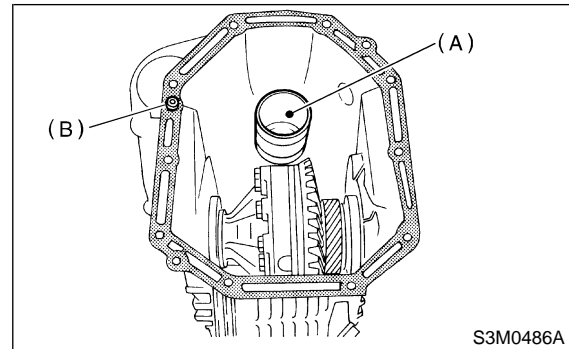


- (A) Seal rings

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

CAUTION:

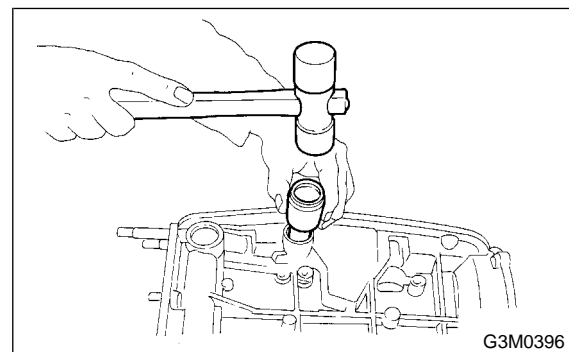
Be careful not to lose the rubber seal.



- (A) Seal pipe
- (B) Rubber seal

2. TRANSMISSION CASE SECTION

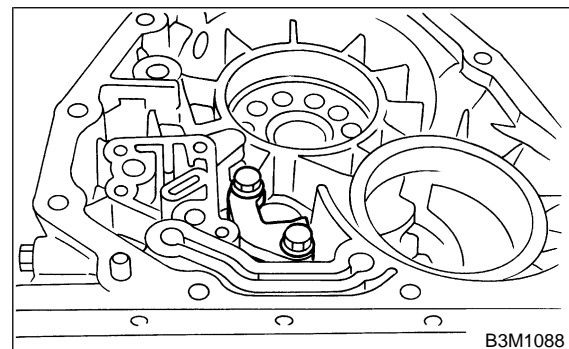
1) Using a plastic hammer, force-fit the oil seal.



2) Install parking support to transmission case.

Tightening torque:

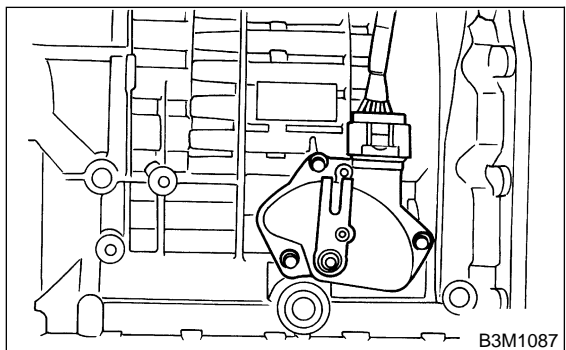
25 ± 2 N-m (2.5 ± 0.2 kg-m, 18.1 ± 1.4 ft-lb)



3) Install inhibitor switch to transmission case.

NOTE:

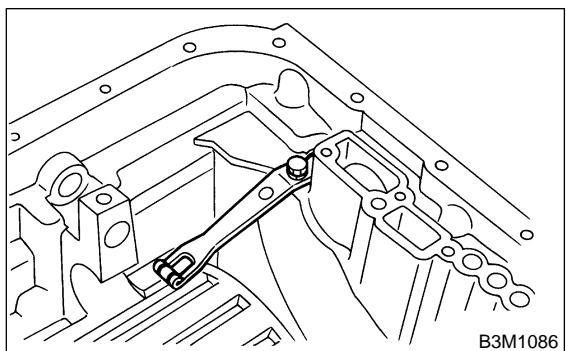
Temporary tighten inhibitor switch.



4) Install detention spring to transmission case.

Tightening torque:

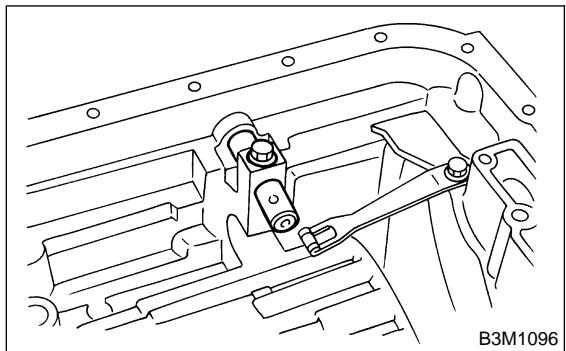
$6 \pm 1 \text{ N}\cdot\text{m}$ ($0.6 \pm 0.1 \text{ kg}\cdot\text{m}$, $4.3 \pm 0.7 \text{ ft}\cdot\text{lb}$)



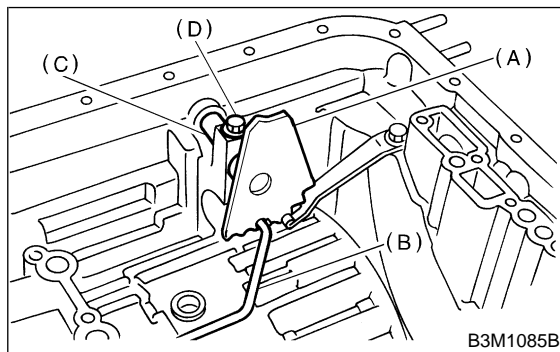
5) Insert range select lever, and tighten bolt.

Tightening torque:

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

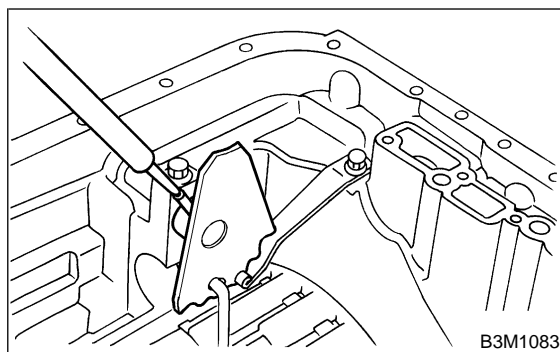


6) Insert manual lever and parking rod.



- (A) Manual lever
- (B) Parking pawl
- (B) Range select lever
- (B) Bolt

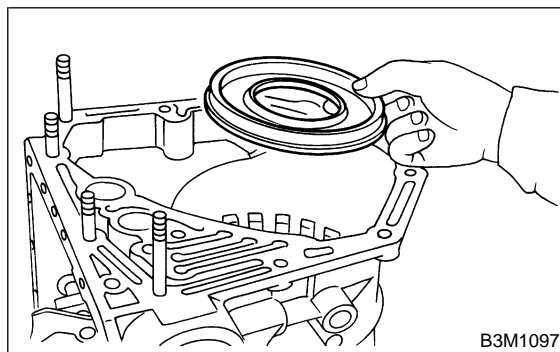
7) Insert spring pin to manual lever.



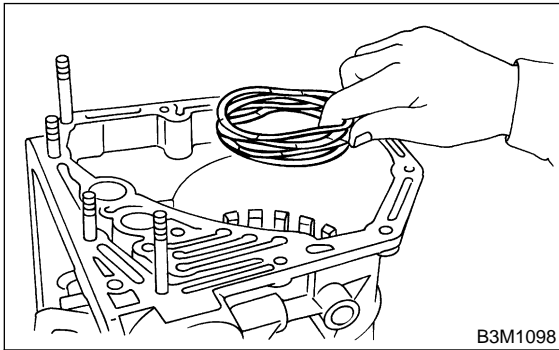
8) Install the low and reverse piston.

CAUTION:

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

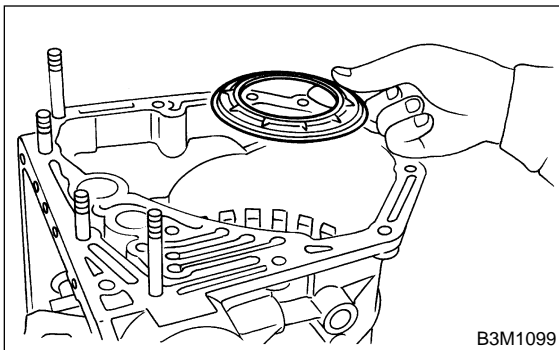


9) Install return spring.



B3M1098

10) Install retainer.



B3M1099

11) Install the one-way clutch inner race.

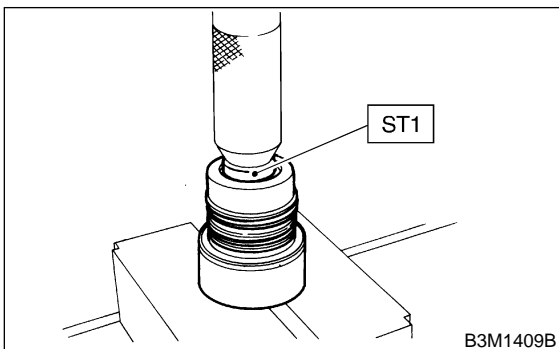
(1) Using a press and ST1, install the needle bearing to the inner race.

ST1 398497701 INSTALLER

NOTE:

Use the following ST when removing.

ST 398527700 PULLER ASSY

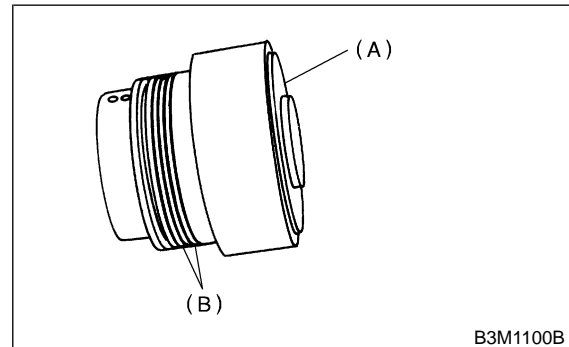


B3M1409B

(2) Install the two seal rings to one-way clutch inner race.

NOTE:

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



B3M1100B

(A) One-way clutch inner race

(B) Seal rings

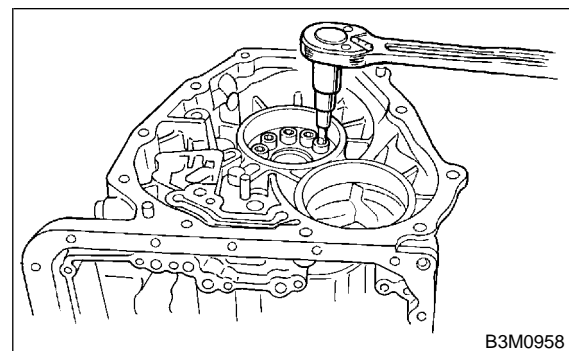
(3) Tighten the eight socket head bolts from the rear side of the transmission case.

Tightening torque:

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

CAUTION:

Be sure to tighten evenly.



B3M0958

(4) Install thrust needle bearing.

NOTE:

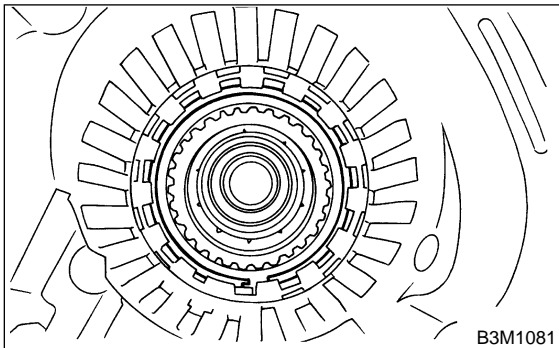
Place transmission case with the front facing up.

12) Installation of the low & reverse brake:

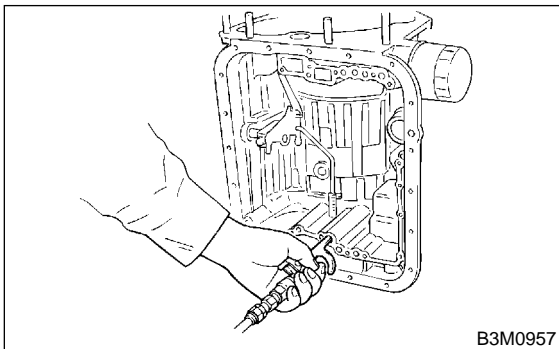
(1) Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

NOTE:

Pay attention to the orientation of the dish plate.



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



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

NOTE:

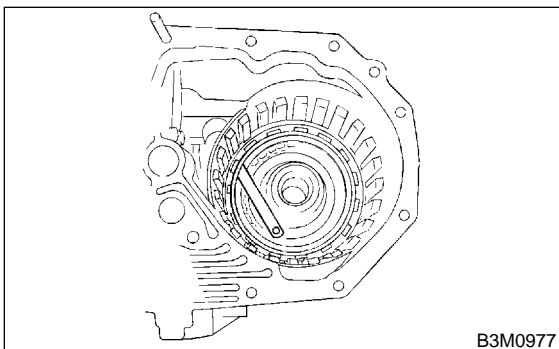
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

Standard value:

0.7 — 1.2 mm (0.028 — 0.047 in)

Allowable limit:

2.2 mm (0.087 in)

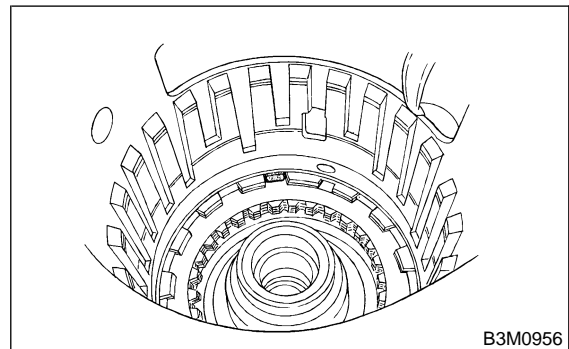


Available retaining plates	
Part No.	Thickness mm (in)
31667AA320	4.2 (0.165)
31667AA330	4.5 (0.177)
31667AA340	4.8 (0.189)
31667AA350	5.1 (0.201)
31667AA360	5.4 (0.213)
31667AA370	5.7 (0.224)
31667AA380	6.0 (0.236)

13) Install leaf spring of low and reverse brake.

CAUTION:

Pay attention to the direction and position of leaf spring during installation.

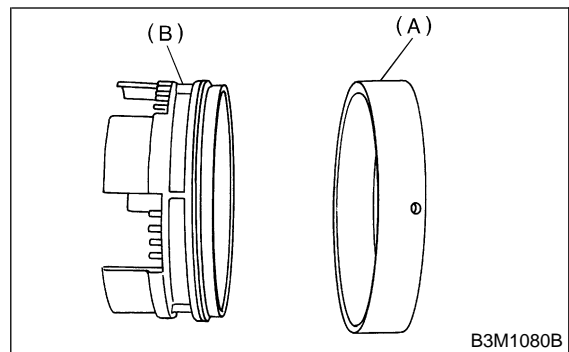


14) Install O-ring to 2-4 brake piston.

CAUTION:

- If O-ring breaks or damage is noted, replace with new O-ring.
- Apply a coat of vaseline to inner side of O-ring before installation.

15) Install 2-4 brake piston to 2-4 brake piston retainer.

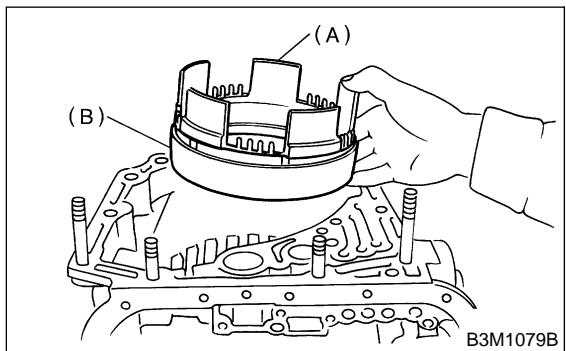


- (A) 2-4 brake piston retainer
- (B) 2-4 brake piston

16) Install 2-4 brake piston and retainer to transmission case.

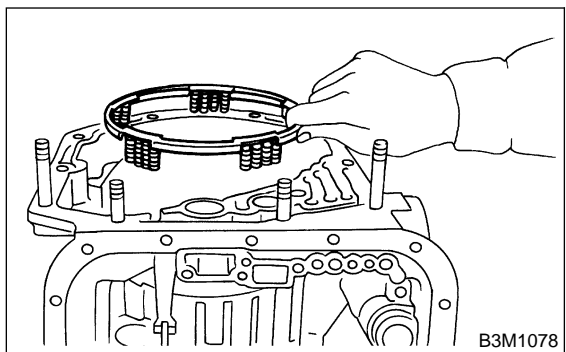
CAUTION:

Align the hole in the 2-4 brake seal of transmission case with the hole in 2-4 brake piston retainer during installation.

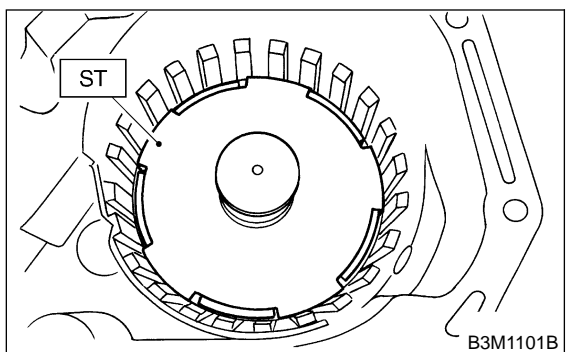


- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

17) Install 2-4 brake piston return spring to transmission case.

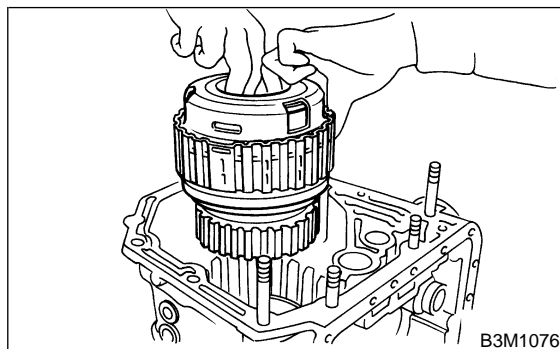


18) Position snap ring in transmission. Using ST, press the snap ring into place.
ST 498677100 COMPRESSOR

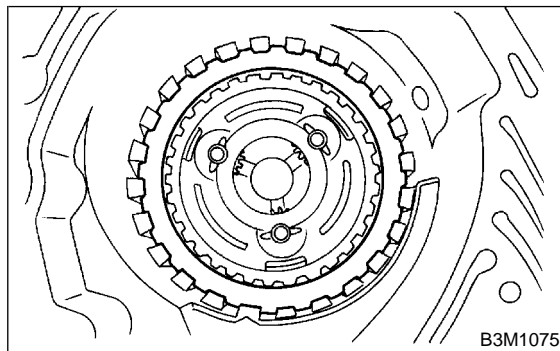


19) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring.

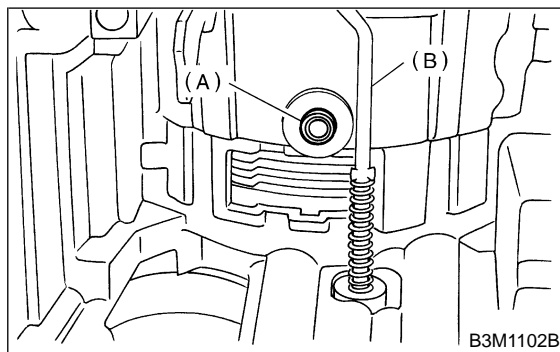


20) Installation of the 2-4 brake:
(1) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



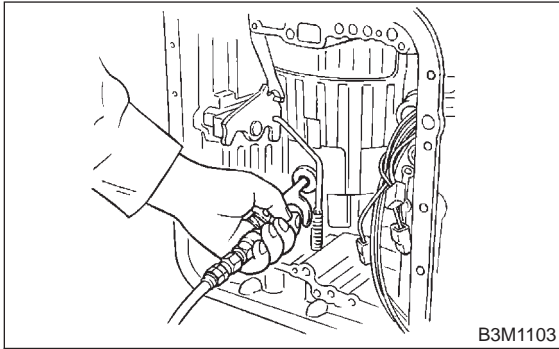
(2) Install 2-4 brake oil seal to transmission case.

NOTE:
Be sure to use a new one.



- (A) 2-4 brake oil seal
- (B) Parking pawl

(3) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.



(4) Measure the clearance between the retaining plate and the snap ring.

NOTE:

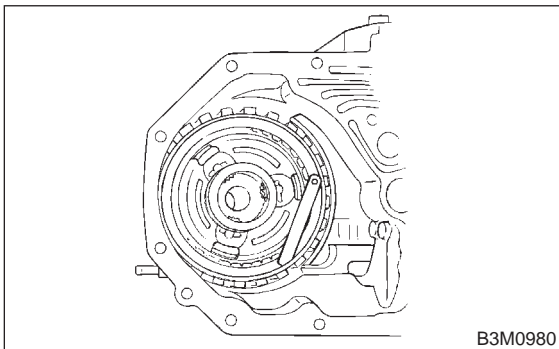
Select a retaining plate with a suitable value from the following table, so that the clearance becomes the standard value.

Standard value:

0.8 — 1.2 mm (0.031 — 0.047 in)

Allowable limit:

1.5 mm (0.059 in)

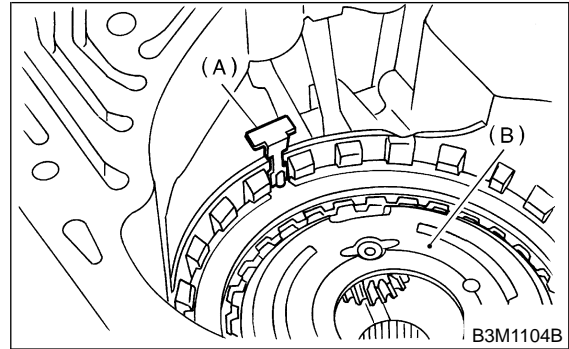


Available retaining plates	
Part No.	Thickness mm (in)
31567AA610	5.6 (0.220)
31567AA620	5.8 (0.228)
31567AA630	6.0 (0.236)
31567AA640	6.2 (0.244)
31567AA650	6.4 (0.252)
31567AA660	6.6 (0.260)

21) Install leaf spring of 2-4 brake.

NOTE:

Be careful not to mistake the location of the leaf spring to be inserted.

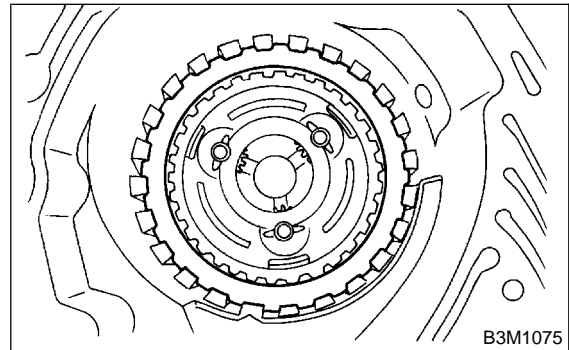


- (A) Leaf spring
- (B) Planetary gear ASSY and low clutch ASSY

22) Install thrust needle bearing.

NOTE:

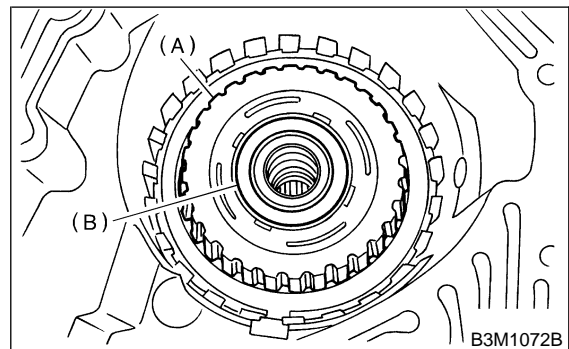
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>



23) Install front sun gear and thrust needle bearing.

NOTE:

Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>



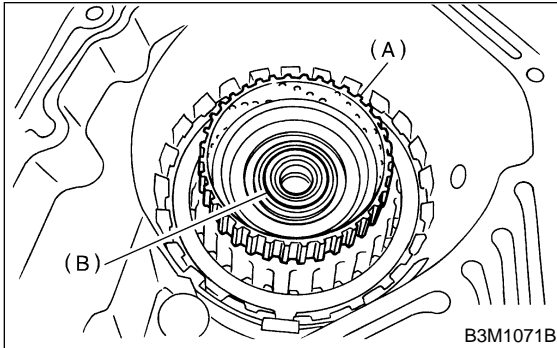
- (A) Front sun gear
- (B) Thrust needle bearing

24) Install the high clutch hub and thrust needle bearing.

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

NOTE:

Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>

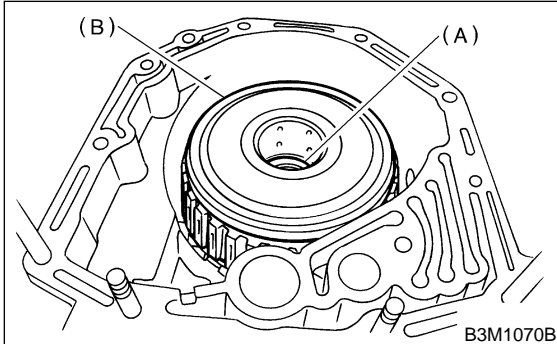


- (A) High clutch hub
- (B) Thrust needle bearing

25) Install the high clutch assembly.

NOTE:

Correctly engage the high clutch hub and clutch splines.

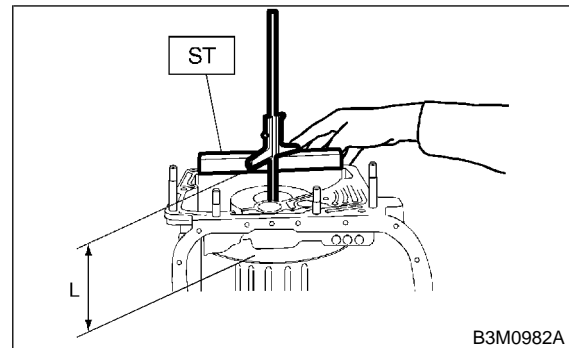


- (A) Thrust needle bearing
- (B) High clutch and reverse clutch ASSY

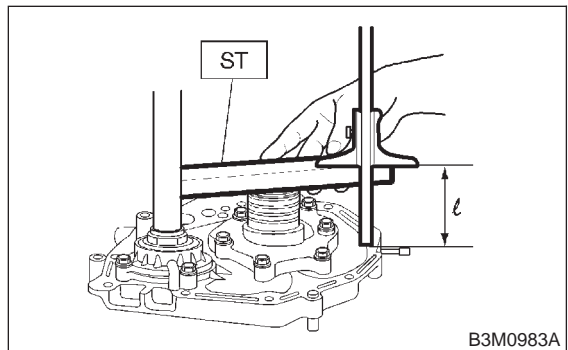
26) Adjustment of total end play:

- (1) Using ST, measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum "L".

ST 398643600 GAUGE

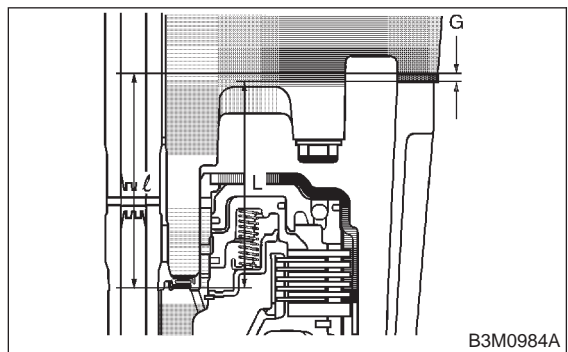


(2) Using ST, measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with thrust needle bearing.
ST 398643600 GAUGE



(3) Calculation of total end play
Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 — 0.55 mm (0.0098 — 0.0217 in) range.
 $C = (L + G) - \ell$

C	Clearance between concave portion of high clutch and end of clutch drum support
L	Length from case mating surface to concave portion of high clutch
G	Gasket thickness (0.28 mm, 0.0110 in)
ℓ	Height from housing mating surface to upper surface of clutch drum support



Thrust needle bearing	
Part No.	Thickness mm (in)
806528050	4.1 (0.161)
806528060	4.3 (0.169)
806528070	4.5 (0.177)
806528080	4.7 (0.185)
806528090	4.9 (0.193)
806528100	5.1 (0.201)

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

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

CAUTION:

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

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

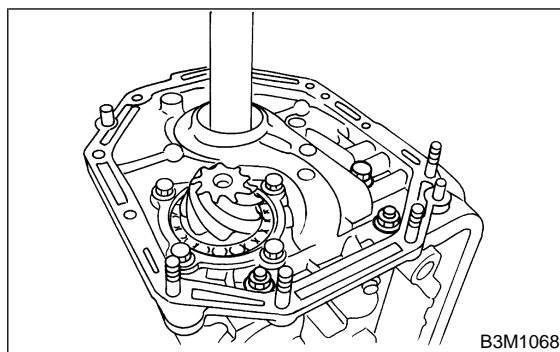
NOTE:

Any clearance suggests a damaged seal ring.

(4) Secure the housing with the two nuts.

Tightening torque:

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

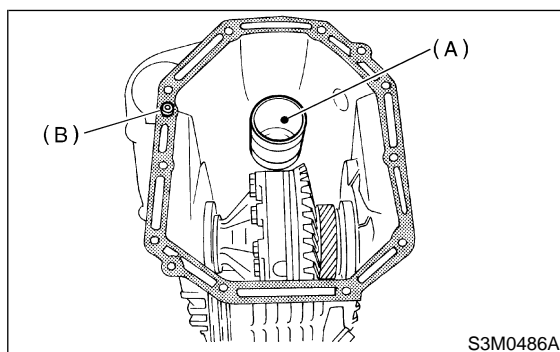


3. TORQUE CONVERTER CLUTCH CASE AND TRANSMISSION CASE

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

NOTE:

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



- (A) Seal pipe
- (B) Rubber seal

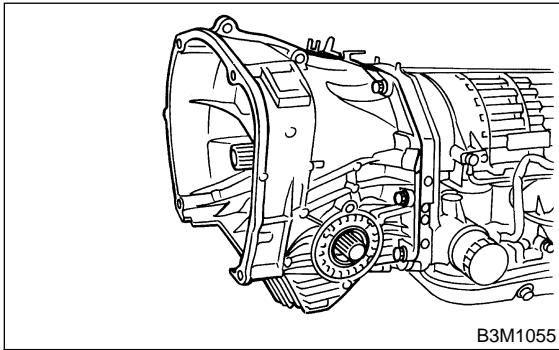
2) Install the torque converter clutch case assembly to the transmission case assembly, and secure with six bolts and four nuts.

CAUTION:

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

Tightening torque:

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

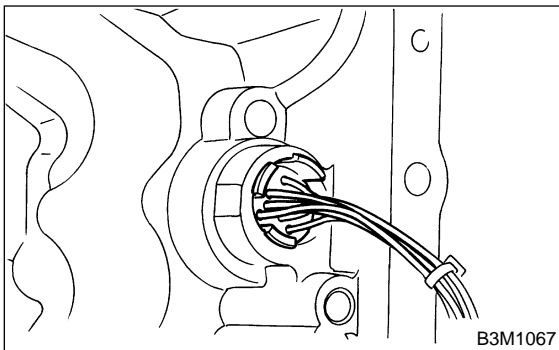


4. CONTROL VALVE AND OIL PAN

1) Install and route the transmission harness.

CAUTION:

Be careful not to damage the harness.



2) Install the control valve assembly.

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

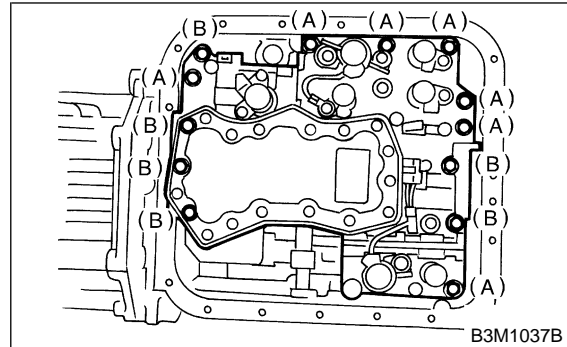
(2) Install the control valve by engaging the manual valve and manual level, then tighten the seventeen bolts.

CAUTION:

Tighten the control valve mounting bolts evenly.

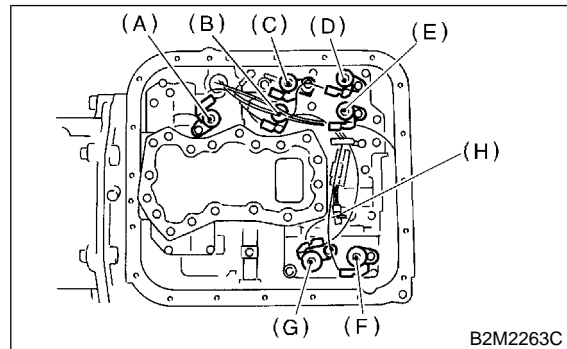
Tightening torque:

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



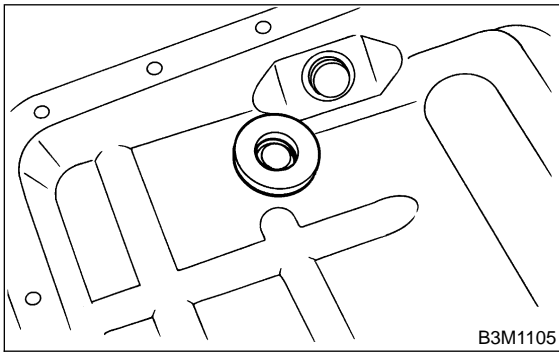
- (A) Short bolts
- (B) Long bolts

3) Connect all connectors.

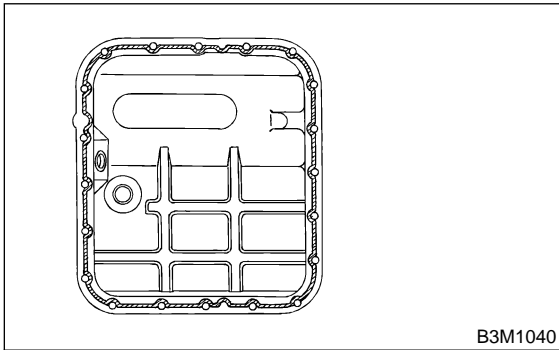


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Transmission ground
- (D) Line pressure duty solenoid (Red)
- (E) Shift solenoid 2 (Yellow)
- (F) Shift solenoid 1 (Green)
- (G) 2-4 brake timing solenoid (Black)
- (H) 2-4 brake duty solenoid (Red)
- (I) ATF temperature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

- 4) Install the oil pan.
 (1) Attach the magnet at the specified position.



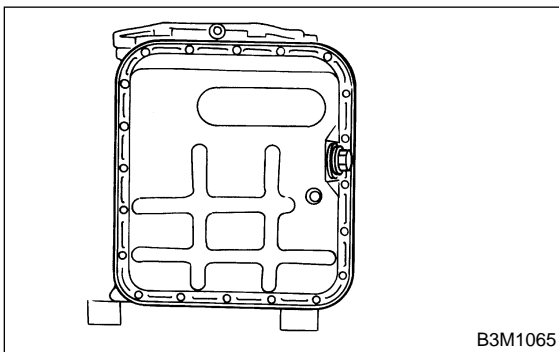
- (2) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



- (3) Install the oil pan to the transmission case assembly, and secure with the twenty bolts.

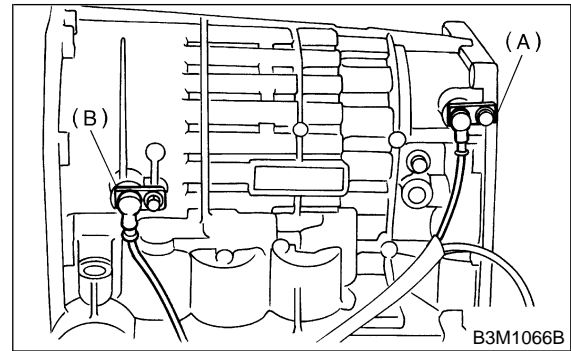
NOTE:
Tighten the bolts evenly.

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



- 5) Install torque converter turbine speed sensor and vehicle speed sensor 2 (front).

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



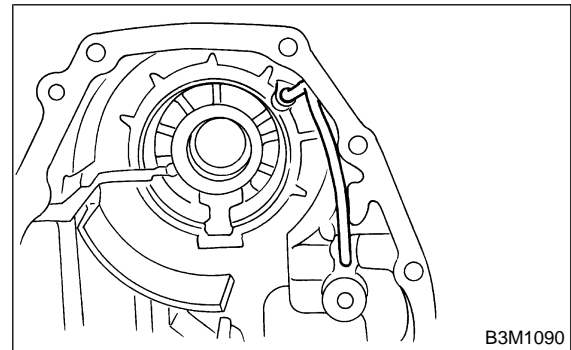
- (A) Vehicle speed sensor 2 (front)
 (B) Torque converter turbine speed sensor

5. EXTENSION SECTION

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

ST 498057300 INSTALLER

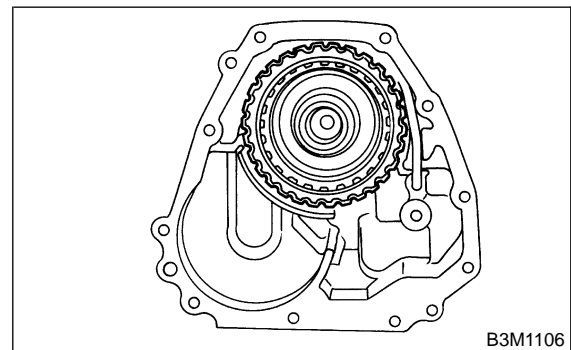
- 1) Install the transfer pipe to extension case.



- 2) Install the transfer clutch assembly to the case.

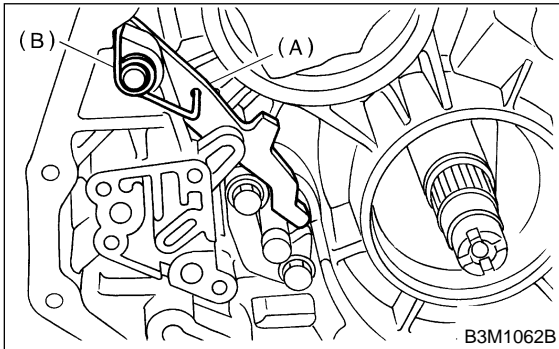
CAUTION:
Be careful not to damage the seal rings.

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



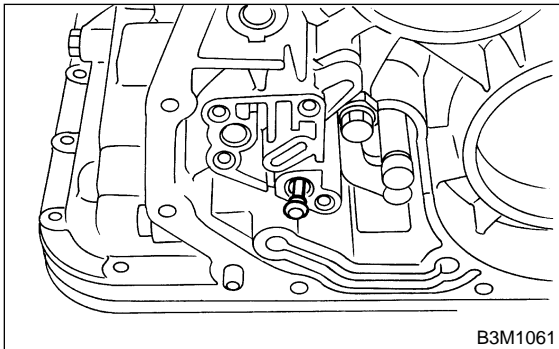
6. CONNECTION OF EACH SECTION

1) Install the parking pawl, shaft and return spring.



(A) Parking pawl
(B) Return spring

2) Install inlet filter to transmission case.



B3M1061

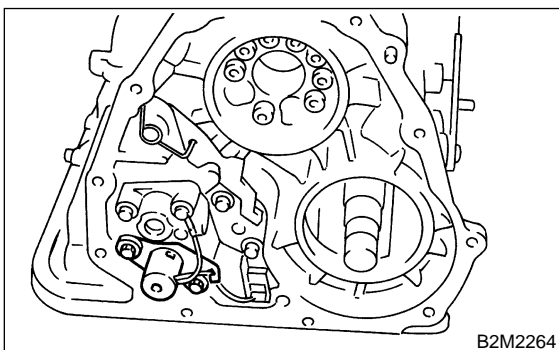
3) Install transfer valve plate, valve body and transfer duty solenoid to transmission case.

CAUTION:

- Be sure to install transfer seal lip to transfer control valve body.
- If transfer seal lip is damaged, replace seal with new one.

Tightening torque:

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



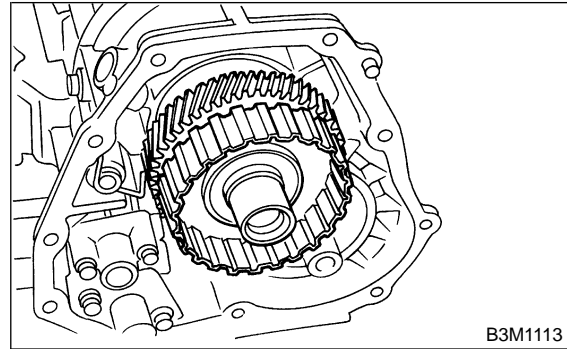
B2M2264

4) Connect connector to transfer duty solenoid.

5) Install the reduction drive gear assembly.

NOTE:

Insert it fully into position until the bearing shoulder bottoms.



B3M1113

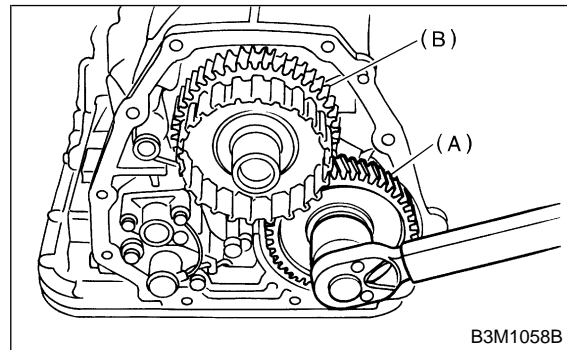
6) Using a plastic hammer, install reduction driven gear assembly, and tighten drive pinion lock nut.

NOTE:

- Be sure to use a new lock nut and a washer.
- Set the select lever in the "P" range.
- After tightening, stake the lock nut securely.

Tightening torque:

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



B3M1058B

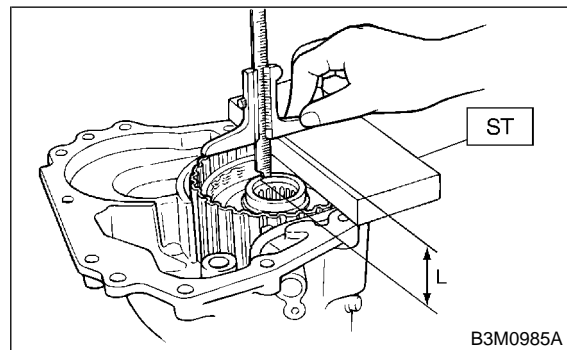
(A) Reduction driven gear
(B) Reduction drive gear

7) Measurement and adjustment of extension end play

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

ST 398643600 GAUGE

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



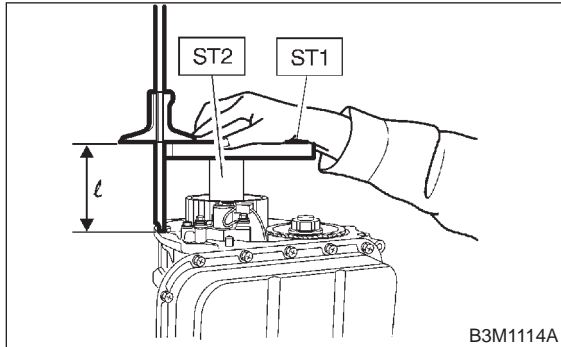
B3M0985A

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

ℓ = Measured value – 50 mm

ST1 398643600 GAUGE

ST2 499577000 GAUGE



(3) Calculation equation:

NOTE:

Add 0.05 mm (0.0020 in) and 0.20 mm (0.0079 in) thick shims to area “T”. Calculate formula 2 to determine “H”. The calculated “H” refers to the shim thickness range. Select shims of suitable thicknesses within the calculated “H” range.

$$T = (L + G) - \ell - H$$

T : Shim clearance

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

G: Gasket thickness (0.45 mm, 0.0177 in)

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

H : Thrust needle bearing thickness

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Thrust needle bearing	
Part No.	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806536090	5.0 (0.197)

8) Installation of extension case and transmission case

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

NOTE:

Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>

(2) Install the extension case to the transmission case.

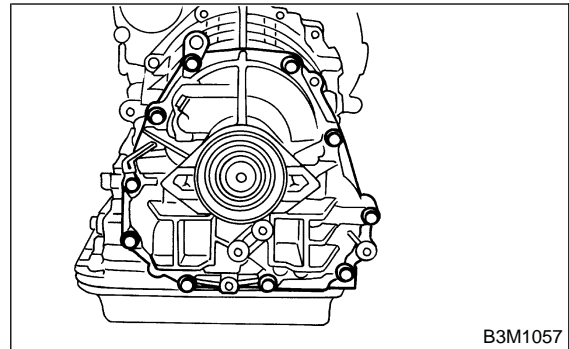
CAUTION:

Be sure to use a new gasket.

(3) Tighten bolts to secure the case.

Tightening torque:

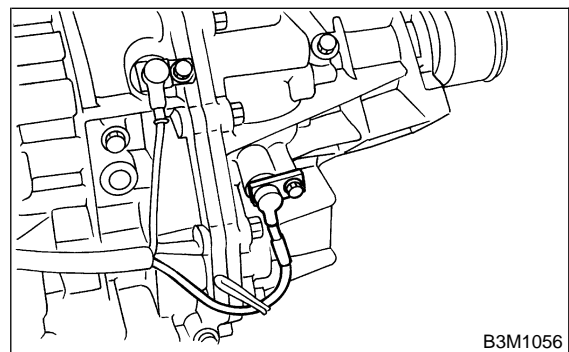
25±2 N·m (2.5±0.2 kg·m, 18.1±1.4 ft·lb)



9) Install the vehicle speed sensor 1 (rear).

Tightening torque:

7±1 N·m (0.7±0.1 kg·m, 5.1±0.7 ft·lb)



7. EXTERNAL PARTS

1) Using ST, install ATF filter to transmission case. Calculate ATF filter torque specifications using the following formula.

$$T_2 = L_2 / (L_1 + L_2) \times T_1$$

T₁: 14±2 N·m (1.4±0.2 kg-m, 10.1±1.4 ft-lb)

[Required torque setting]

T₂: Tightening torque

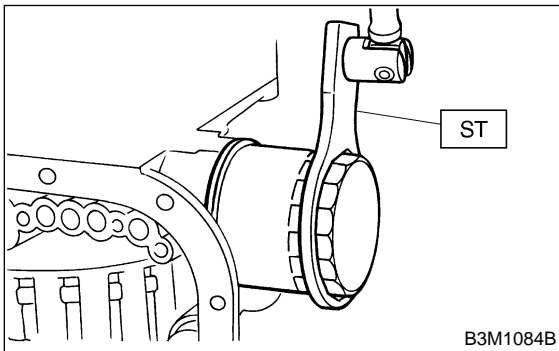
L₁: ST length 0.078 m (3.07 in)

L₂: Torque wrench length

CAUTION:

Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH



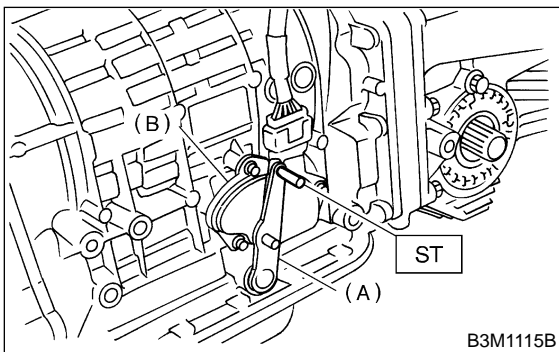
2) Adjustment of inhibitor switch

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

NOTE:

Ensure that gauge moves properly.

ST 499267300 STOPPER PIN



(A) Range select lever

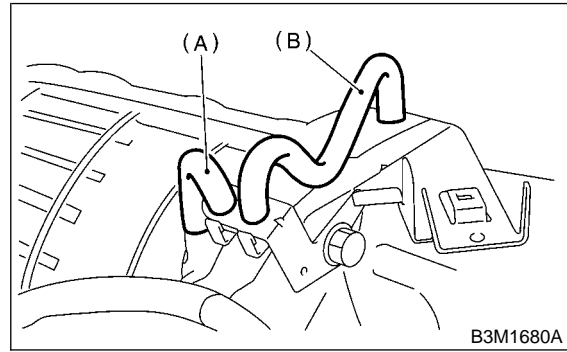
(B) Inhibitor switch

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

Tightening torque:

3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

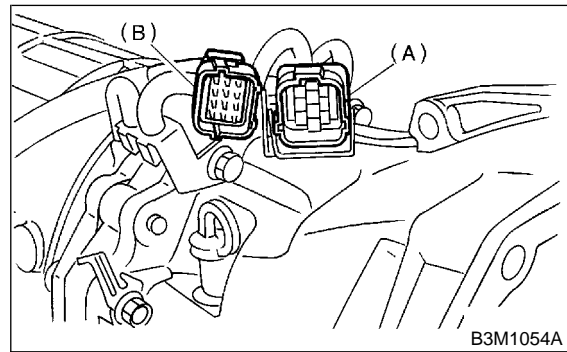
3) Install air breather hose.



(A) Air breather hose (Transmission case)

(B) Air breather hose (Oil pump housing)

4) Insert inhibitor switch harness and transmission harness connector into stay.



(A) Transmission harness

(B) Inhibitor switch harness

5) Install the oil cooler outlet pipe.

CAUTION:

Be sure to use a new aluminum washer.

Tightening torque:

44±4 N·m (4.5±0.4 kg-m, 32.5±2.9 ft-lb)

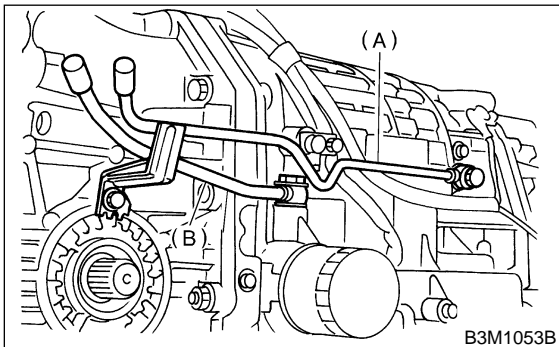
6) Install the oil cooler inlet pipe.

CAUTION:

Be sure to use a new aluminum washer.

Tightening torque:

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



- (A) Inlet pipe
(B) Outlet pipe

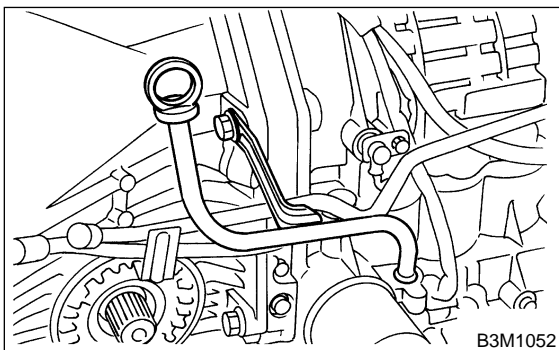
7) Install the oil charge pipe.

CAUTION:

Be careful not to damage the O-ring.

Tightening torque:

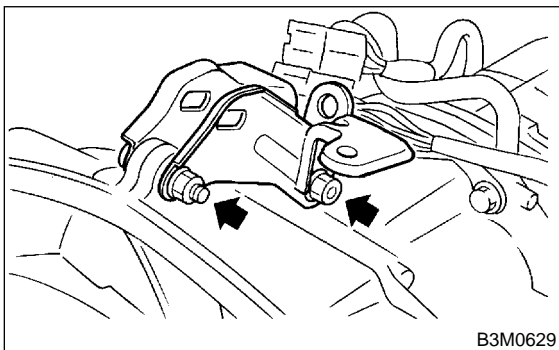
$41 \pm 3 \text{ N}\cdot\text{m}$ ($4.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $30.4 \pm 2.2 \text{ ft}\cdot\text{lb}$)



8) Install the pitching stopper bracket.

Tightening torque:

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



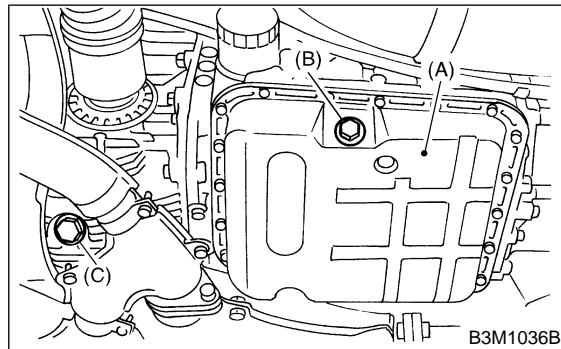
9) Tighten the drain plugs.

Tightening torque:**Diff.**

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

ATF

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



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

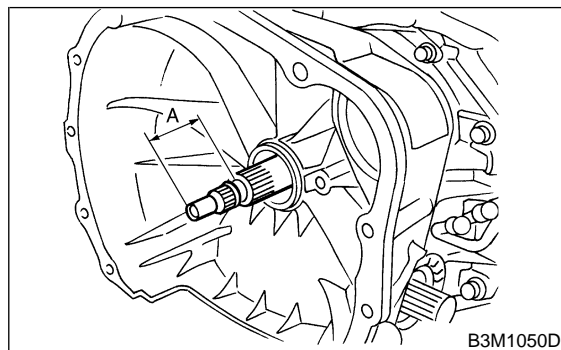
10) Insert the input shaft while turning lightly by hand.

CAUTION:

Be careful not to damage the bushing.

Normal protrusion A:

$50 - 55 \text{ mm}$ ($1.97 - 2.17 \text{ in}$)



11) Install the torque converter clutch assembly.

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

NOTE:

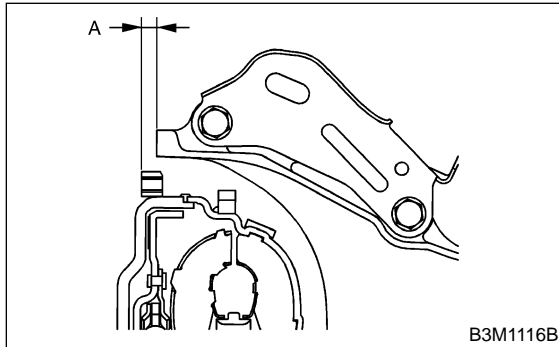
Make sure the clip fits securely in its groove.

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

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

Dimension A:

2.7 — 2.9 mm (0.106 — 0.114 in)



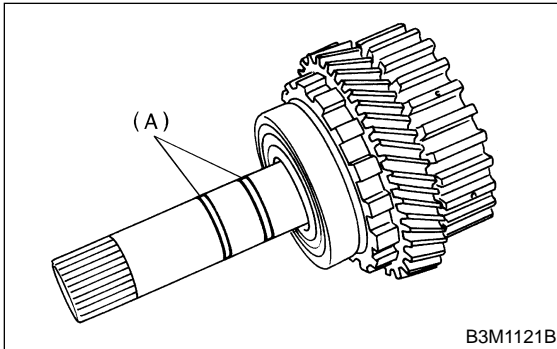
13. Reduction Drive Gear Assembly

A: DISASSEMBLY

- 1) Take out the seal rings.

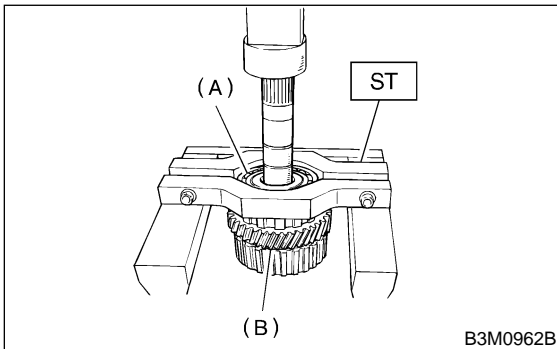
CAUTION:

Be careful not to damage the seal rings.



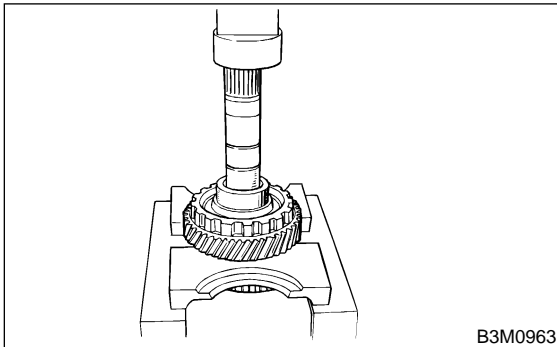
(A) Seal rings

- 2) Using ST, remove the ball bearing.
ST 498077600 REMOVER



(A) Ball bearing
(B) Reduction drive gear

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



B: INSPECTION

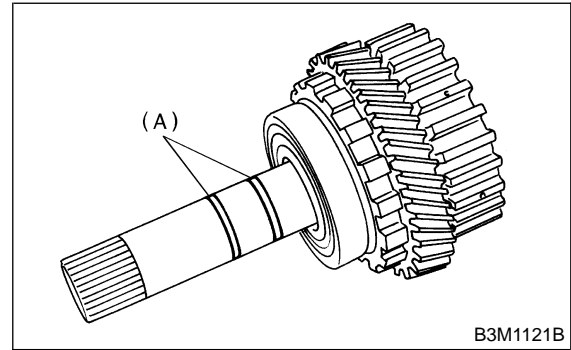
Make sure that each component is free of harmful gouges, cuts, or dust.

C: ASSEMBLY

- 1) Press-fit the reduction drive gear to the shaft.
- 2) Press-fit the ball bearing to the reduction drive gear.
- 3) Attach two seal rings.

NOTE:

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

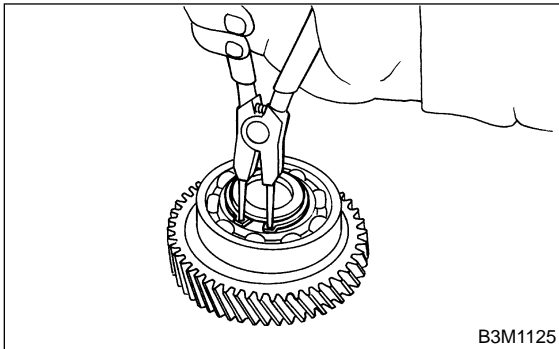


(A) Seal rings

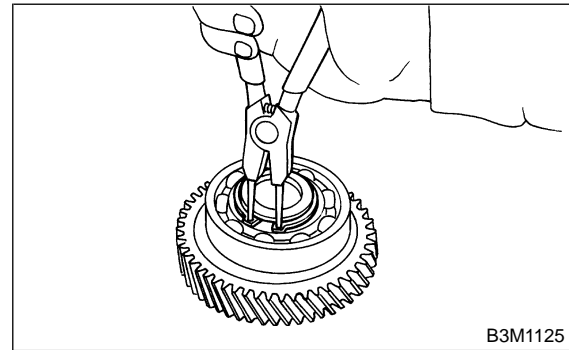
14. Reduction Driven Gear

A: DISASSEMBLY

1) Remove snap ring from reduction driven gear.

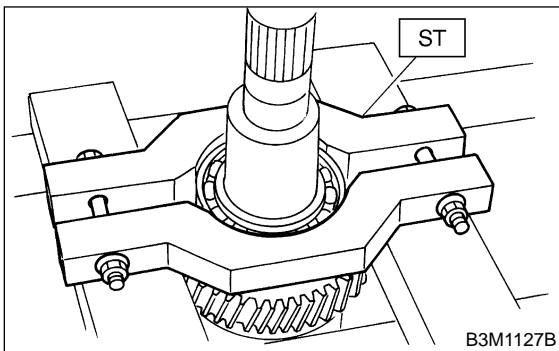


2) Install snap ring to reduction driven gear.



2) Using ST, remove ball bearing from reduction driven gear.

ST 498077600 REMOVER

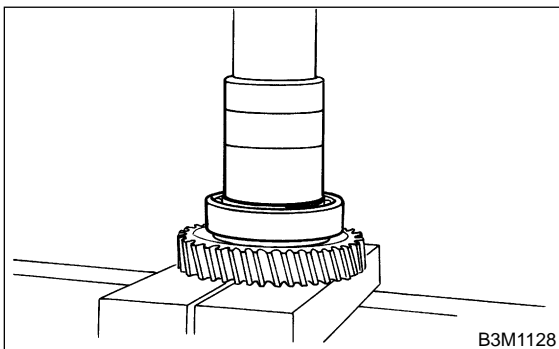


B: INSPECTION

Check ball bearing and gear for dents or damage.

C: ASSEMBLY

1) Using a press, install ball bearing to reduction driven gear.

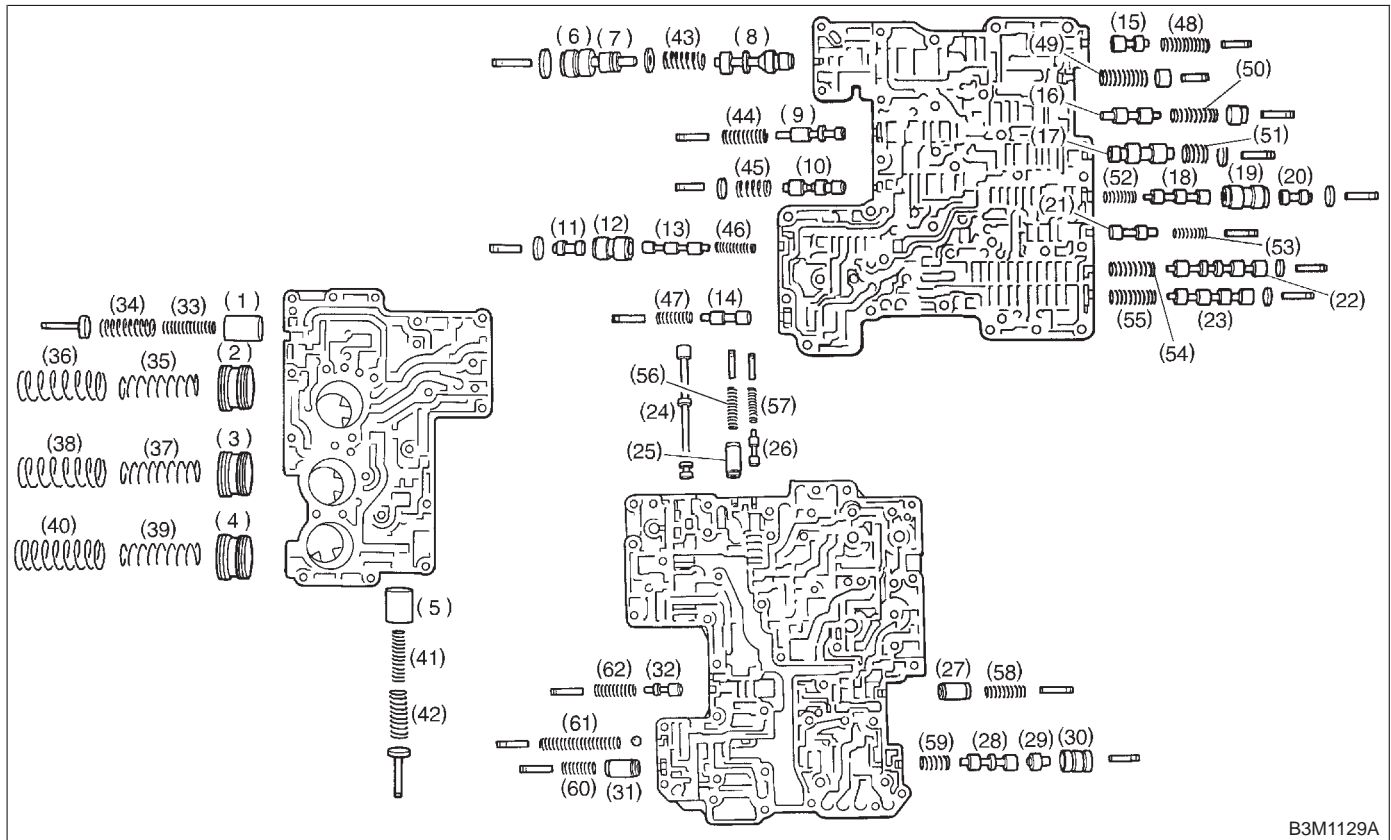


15. Control Valve Body

A: PRECAUTION

The control valve is composed of parts which are accurately machined to a high degree and should be handled carefully during disassembly and assembly. As these parts are similar in shape, they should be arranged in neat order on a table after disassembly so that they can be easily installed to their original positions. Spring loaded parts should

be also handled carefully, as springs may jump out of place when the parts are disassembled or removed. Extreme care should be taken so as not to drop valves on the floor. Before assembling, the parts and valves should be dipped in a container filled with the ATF. Make sure that the valves are clean and free from any foreign material before assembly. Torque specifications should also be observed.



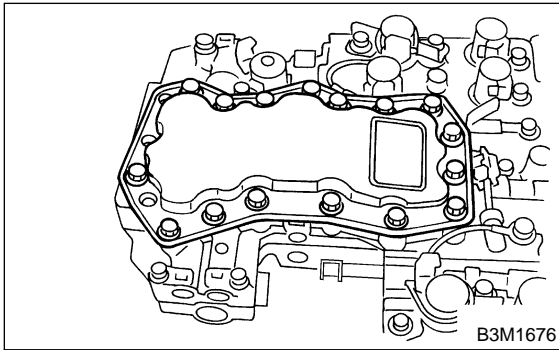
B3M1129A

- | | | |
|---|---------------------------------------|------------------------------------|
| (1) 2-4 brake clutch accumulator piston B | (11) 2-4 brake timing plug | (23) Shift valve A |
| (2) 2-4 brake clutch accumulator piston A | (12) 2-4 brake timing sleeve | (24) Manual valve |
| (3) Low clutch accumulator piston | (13) 2-4 brake timing valve A | (25) Throttle accumulator piston B |
| (4) High clutch accumulator piston A | (14) 2-4 brake timing valve B | (26) 1st reducing valve |
| (5) High clutch accumulator piston B | (15) Torque convertor regulator valve | (27) Throttle accumulator piston A |
| (6) Pressure regulator sleeve | (16) Pressure modifier valve | (28) Lock-up control valve |
| (7) Pressure regulator plug | (17) Accumulator control valve A | (29) Lock-up control plug |
| (8) Pressure regulator valve | (18) Low clutch timing valve A | (30) Lock-up control sleeve |
| (9) Reverse inhibit valve | (19) Low clutch timing sleeve | (31) Modifier accumulator piston |
| (10) Accumulator control valve B | (20) Low clutch timing plug | (32) Pilot valve |
| | (21) Low clutch timing valve B | |
| | (22) Shift valve B | |

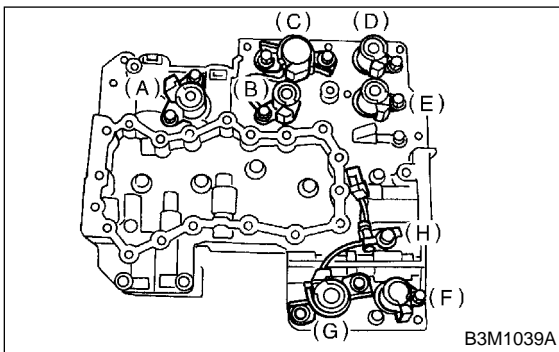
No.	Part name	Wire dia. mm (in)	Average dia. mm (in)	Effective turn	Free length mm (in)
33	2-4 brake accumulator B spring (Inlet)	1.6 (0.063)	9.3 (0.366)	14.6	47.0 (1.850)
34	2-4 brake accumulator B spring (Outlet)	2.3 (0.091)	13.7 (0.539)	8.79	45.0 (1.772)
35	2-4 brake accumulator A spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
36	2-4 brake accumulator A spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
37	Low clutch accumulator spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
38	Low clutch accumulator spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
39	High clutch accumulator A spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
40	High clutch accumulator A spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
41	High clutch accumulator B spring (Inlet)	1.6 (0.063)	9.3 (0.366)	14.6	47.0 (1.850)
42	High clutch accumulator B spring (Outlet)	2.3 (0.091)	13.7 (0.539)	8.79	45.0 (1.772)
43	Pressure regulator valve spring	1.0 (0.039)	13.5 (0.531)	6.5	35.0 (1.378)
44	Reverse inhibit valve spring	0.65 (0.0256)	8.4 (0.331)	7.7	26.5 (1.043)
45	Accumulator control valve B spring	0.5 (0.020)	10.5 (0.413)	4.5	21.5 (0.846)
46	2-4 brake timing valve A spring	0.5 (0.020)	6.5 (0.256)	7.78	19.3 (0.760)
47	2-4 brake timing valve B spring	0.60 (0.0236)	5.8 (0.228)	7.7	20.0 (0.787)
48	Torque converter regulator valve spring	1.40 (0.0551)	7.6 (0.299)	12.1	34.7 (1.366)
49	Plug hold spring	0.8 (0.031)	9.7 (0.382)	11.5	40.0 (1.575)
50	Pressure modifier valve spring	0.7 (0.028)	8.3 (0.327)	8.2	26.9 (1.059)
51	Accumulator control valve A	0.7 (0.028)	10.3 (0.406)	3.6	15.1 (0.594)
52	Low clutch timing valve A spring	0.5 (0.020)	6.5 (0.256)	7.78	19.3 (0.760)
53	Low clutch timing valve B spring	0.60 (0.0236)	5.8 (0.228)	7.7	20.0 (0.787)
54	Shift valve B spring	0.80 (0.0315)	8.2 (0.323)	7.9	25.2 (0.992)
55	Shift valve A spring	0.80 (0.0315)	8.2 (0.323)	7.9	25.2 (0.992)
56	Throttle accumulator B spring	1.6 (0.063)	8.4 (0.331)	9.77	36.0 (1.417)
57	1st reducing valve spring	0.75 (0.0295)	6.0 (0.236)	12.5	25.4 (1.000)
58	Throttle accumulator A spring	1.7 (0.067)	8.0 (0.315)	9.61	36.0 (1.417)
59	Lock-up control valve spring	0.9 (0.035)	11.2 (0.441)	4.0	19.7 (0.776)
60	Modifier accumulator spring	1.7 (0.067)	8.0 (0.315)	9.61	36.0 (1.417)
61	Line pressure relief valve spring	1.6 (0.063)	8.0 (0.315)	22.5	69.3 (2.728)
62	Pilot valve spring	1.1 (0.043)	7.9 (0.311)	10.76	30.6 (1.205)

B: DISASSEMBLY

1) Remove oil strainer from lower control valve body.

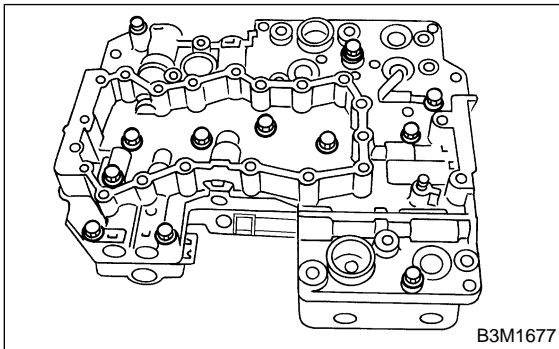


2) Remove the duty solenoids, solenoids and sensor from the lower valve body.



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

3) Remove the upper-lower valve body tightening bolts.



4) Separate the control valve body.

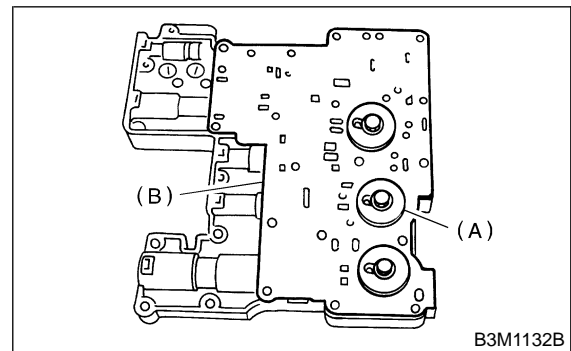
CAUTION:

- Do not lose the ten steel balls contained in the upper valve body and middle valve body.
- Do not lose strainers contained in the lower valve body.

NOTE:

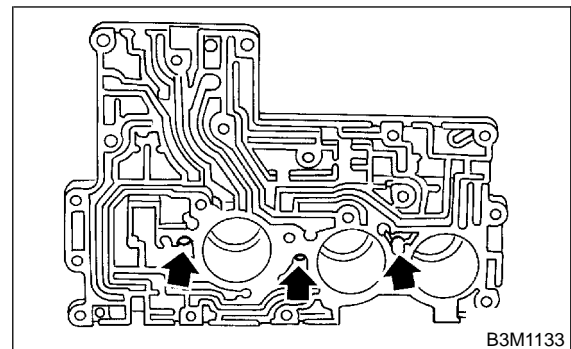
During ordinary servicing, clean the control valve bodies in this condition, without further disassembly. In the event of a seized clutch or other problem, disassemble the control valve bodies further, and clean the component parts.

5) Remove upper separator plate from middle valve body.



- (A) Side plate
- (B) Upper separator plate

6) Remove valve springs from upper valve body.
 7) Using air compressor, remove accumulator piston from upper valve body.



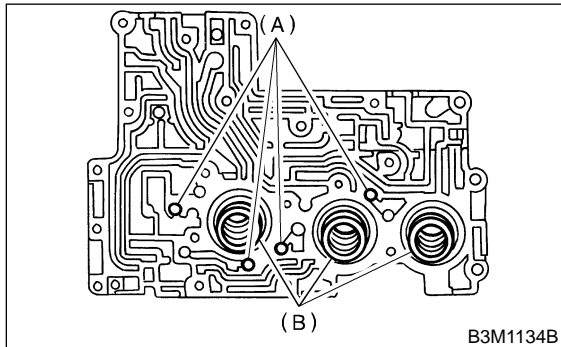
C: INSPECTION

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

D: ASSEMBLY

1) Install accumulator pistons, valve springs and steel balls to upper valve body.

CAUTION:
Insert steel balls in their proper positions.

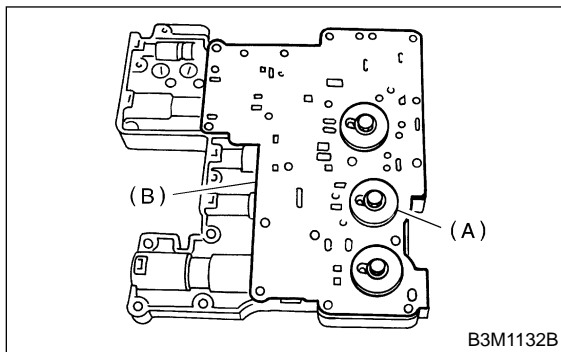


- (A) Steel ball
- (B) Valve spring

2) Install support plate and upper separate plate to middle valve body.

CAUTION:
Align the hole in support plate with the hole in separate plate.

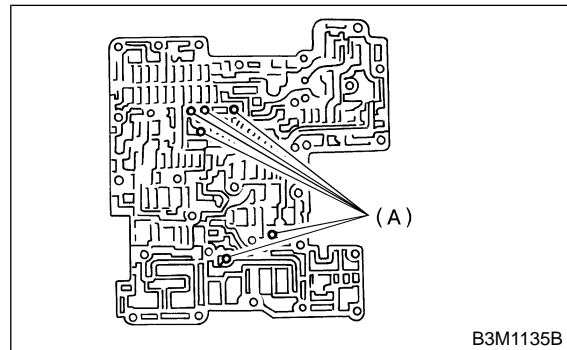
Tightening torque:
 $8 \pm 1 \text{ N}\cdot\text{m}$ ($0.8 \pm 0.1 \text{ kg}\cdot\text{m}$, $5.8 \pm 0.7 \text{ ft}\cdot\text{lb}$)



- (A) Side plate
- (B) Upper separator plate

3) Install the steel balls to middle valve body.

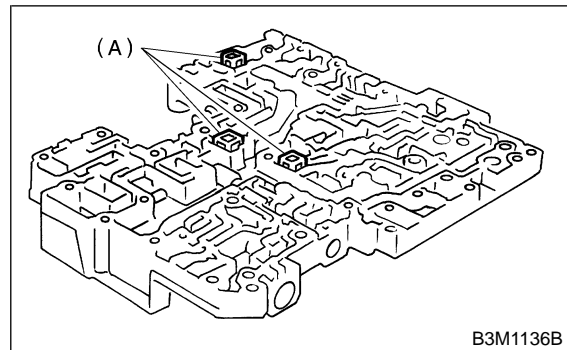
CAUTION:
Insert steel the balls in their proper positions.



- (A) Steel ball

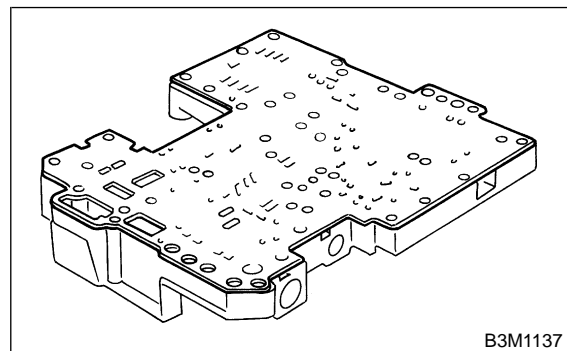
4) Install three filters to lower valve body.

CAUTION:
Pay attention to the location of filters.



- (A) Strainer

5) Install lower separate plate to lower valve body.

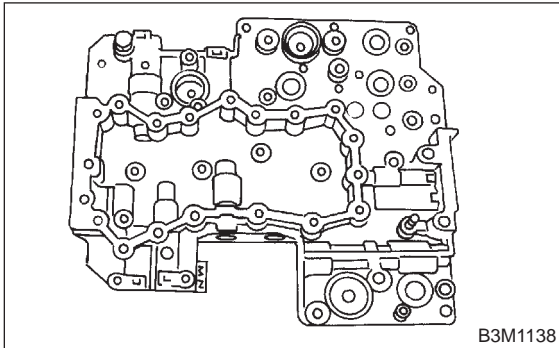


B3M1137

6) Temporarily assemble valve body.

CAUTION:

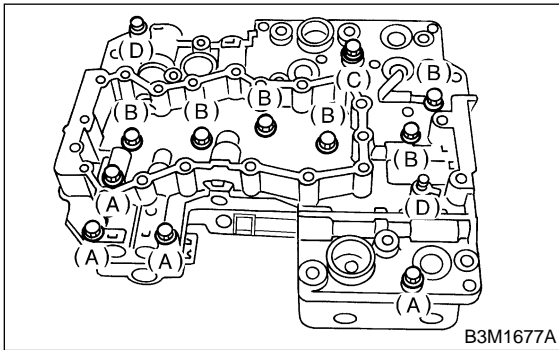
Be careful not to drop the middle valve body and upper body interior steel ball, or the lower body filter.



7) Tighten bolts.

Tightening torque:

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

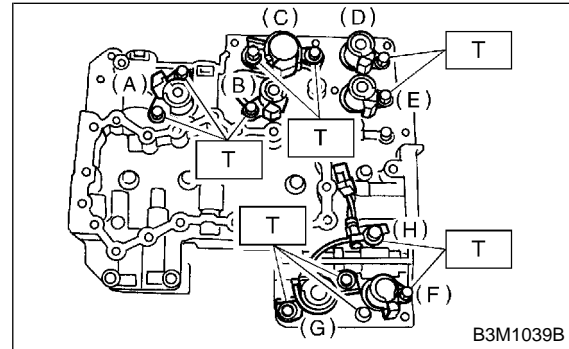


- (A) Short bolts
- (B) Middle bolts
- (C) Long bolt
- (D) Reamer bolts

8) Install the sensor, solenoids and duty solenoids.

Tightening torque:

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



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

9) Install oil strainer to lower valve body.

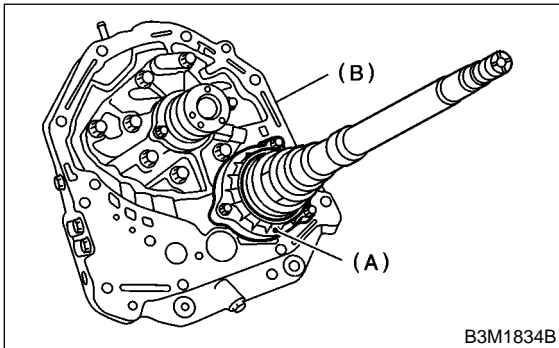
Tightening torque:

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

16. Oil Pump Assembly

A: DISASSEMBLY

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



- (A) Oil seal retainer
- (B) Oil seal housing

- 2) Remove O-rings from oil pump housing.

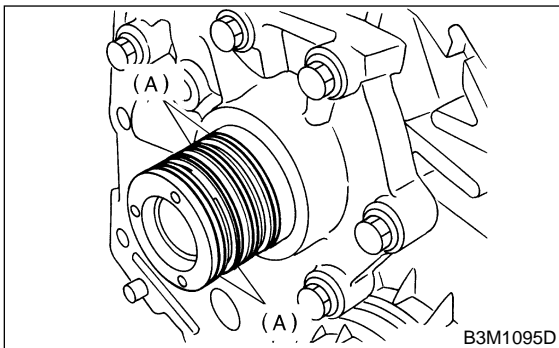
CAUTION:

Be careful not to damage O-ring.

- 3) Remove the four seal rings.

CAUTION:

Be careful not to damage seal ring.

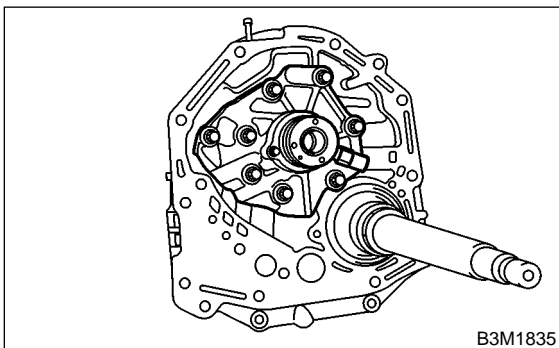


- (A) Seal rings

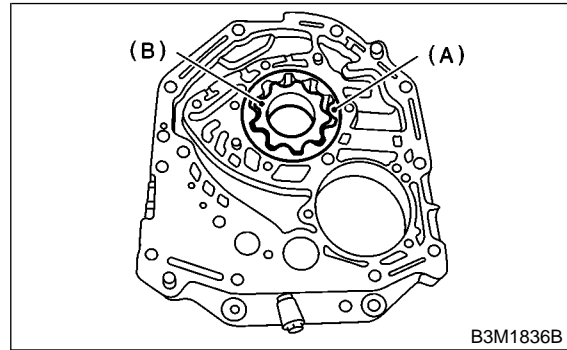
- 4) Remove the oil pump cover.

NOTE:

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



- 5) Remove the inner and outer rotor.



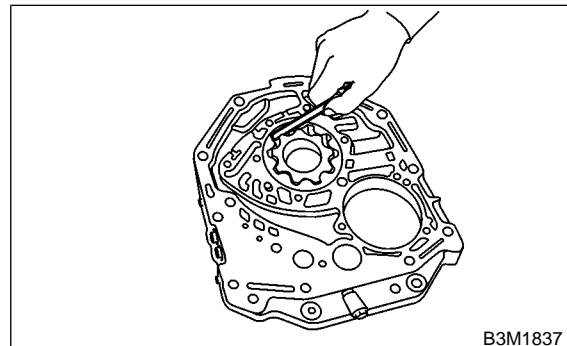
- (A) Outer rotor
- (B) Inner rotor

B: INSPECTION

- 1) Check seal ring and O-ring oil seal for breaks or damage.
- 2) Check other parts for dents or abnormalities.
- 3) Selection of oil pump rotor assembly
 - (1) Tip clearance
Install inner rotor and outer rotor to oil pump.
With rotor gears facing each other, measure crest-to-crest clearance.

Tip clearance:

0.02 — 0.15 mm (0.0008 — 0.0059 in)

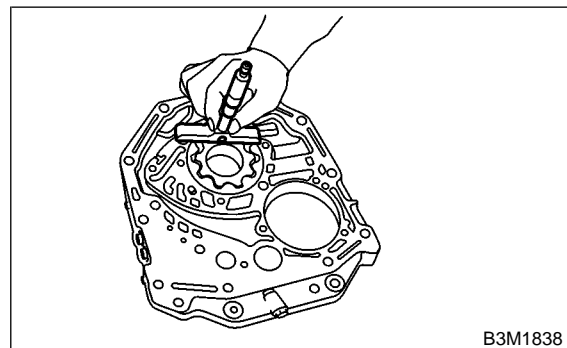


- (2) Side clearance

Set a depth gauge to oil pump housing, then measure oil pump housing-to-rotor clearances.

Side clearance:

0.02 — 0.04 mm (0.0008 — 0.0016 in)

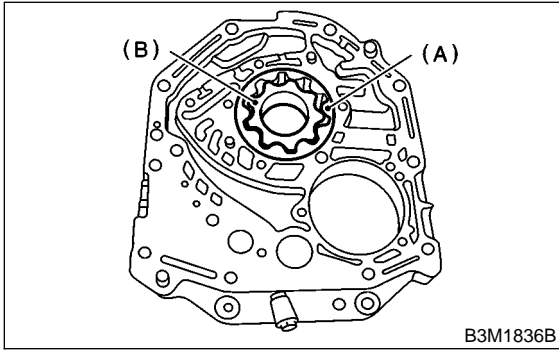


(3) If depth and/or side clearances are outside specifications, replace rotor assembly.

Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.37 — 11.38 (0.4476 — 0.4480)

C: ASSEMBLY

1) Install oil pump rotor assembly to oil pump housing.



- (A) Outer rotor
- (B) Inner rotor

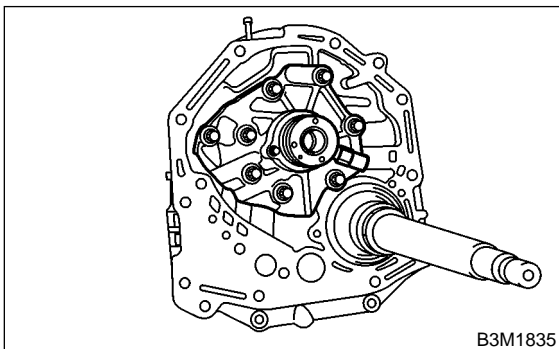
2) Install the oil pump cover.

Tightening torque:

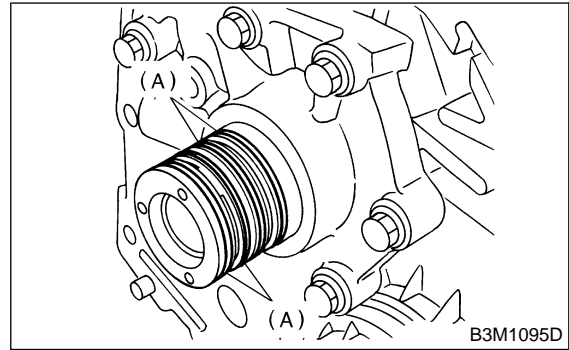
25±2 N·m (2.5±0.2 kg·m, 18.1±1.4 ft·lb)

NOTE:

- Align both pivots with the pivot holes of the cover, and install the cover being careful not to apply undue force to the pivots.
- After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.



- Install the oil seal retainer and seal rings. After adjusting the drive pinion backlash and tooth contact.



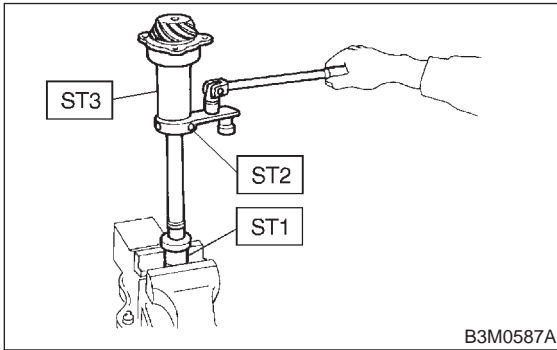
- (A) Seal rings

17. Drive Pinion Shaft

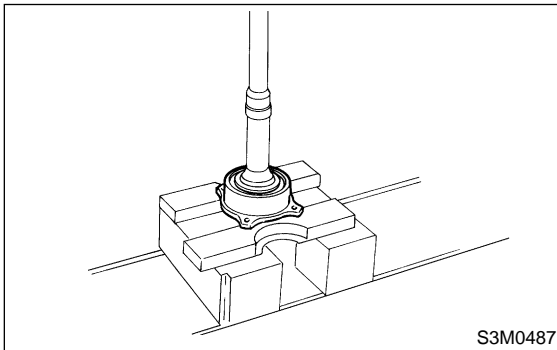
A: DISASSEMBLY

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

ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

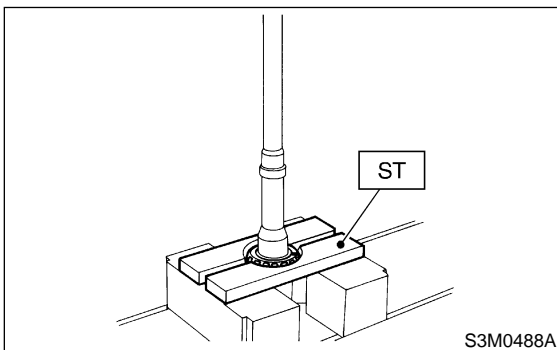


2) Remove the O-ring.
3) Using a press, separate the rear roller bearing and outer race from the shaft.



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

ST 498517000 REPLACER



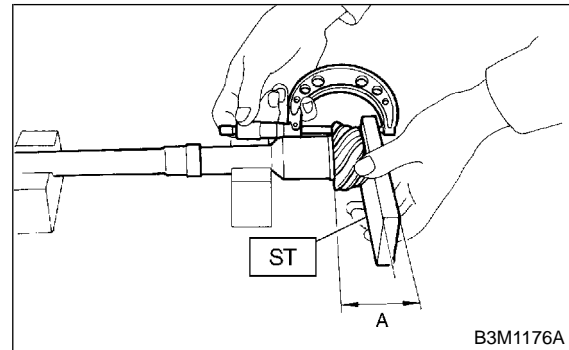
B: INSPECTION

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

C: ASSEMBLY

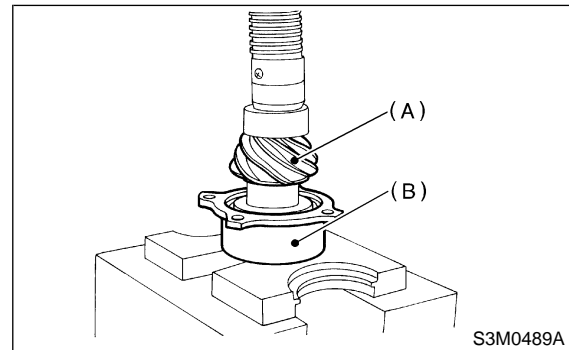
1) Measure dimension "A" of the drive pinion shaft.

ST 398643600 GAUGE



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

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



(A) Drive pinion shaft
(B) Roller bearing

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

CAUTION:
Be careful not to damage the O-ring.

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

- ST1 498937110 HOLDER
- ST2 499787700 WRENCH
- ST3 499787500 ADAPTER

Actual tightening torque:

$116 \pm 5 \text{ N}\cdot\text{m} (11.8 \pm 0.5 \text{ kg}\cdot\text{m}, 85.3 \pm 3.6 \text{ ft}\cdot\text{lb})$

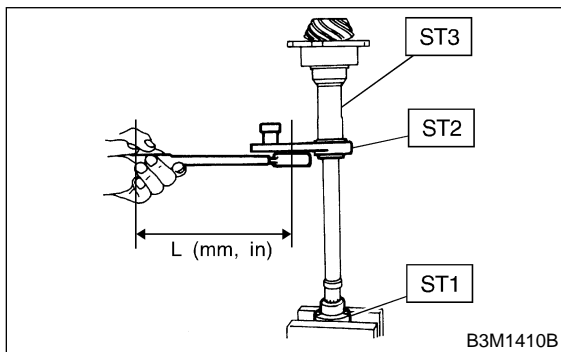
NOTE:

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

$T_1 = L / L + 72.2 \times T$

T: Actual tightening torque

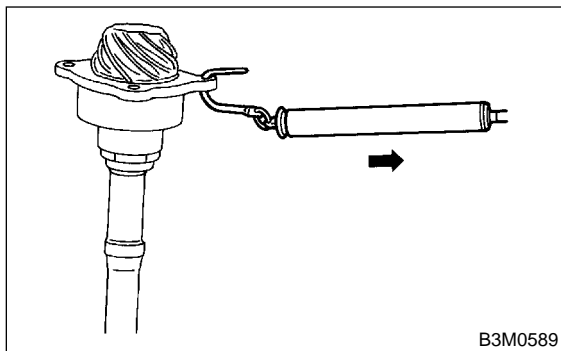
- Install ST2 to torque wrench as straight as possible.



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

Starting torque:

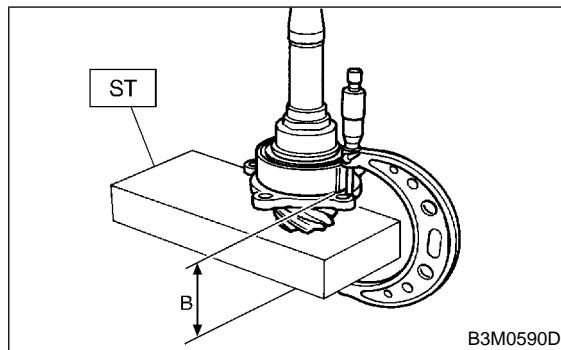
$0.3 - 2.0 \text{ N}\cdot\text{m} (0.03 - 0.2 \text{ kg}\cdot\text{m}, 0.2 - 1.4 \text{ ft}\cdot\text{lb})$



6) Stake the lock nut securely at two places.

7) Measure dimension "B" of the drive pinion shaft.

ST 398643600 GAUGE



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

NOTE:

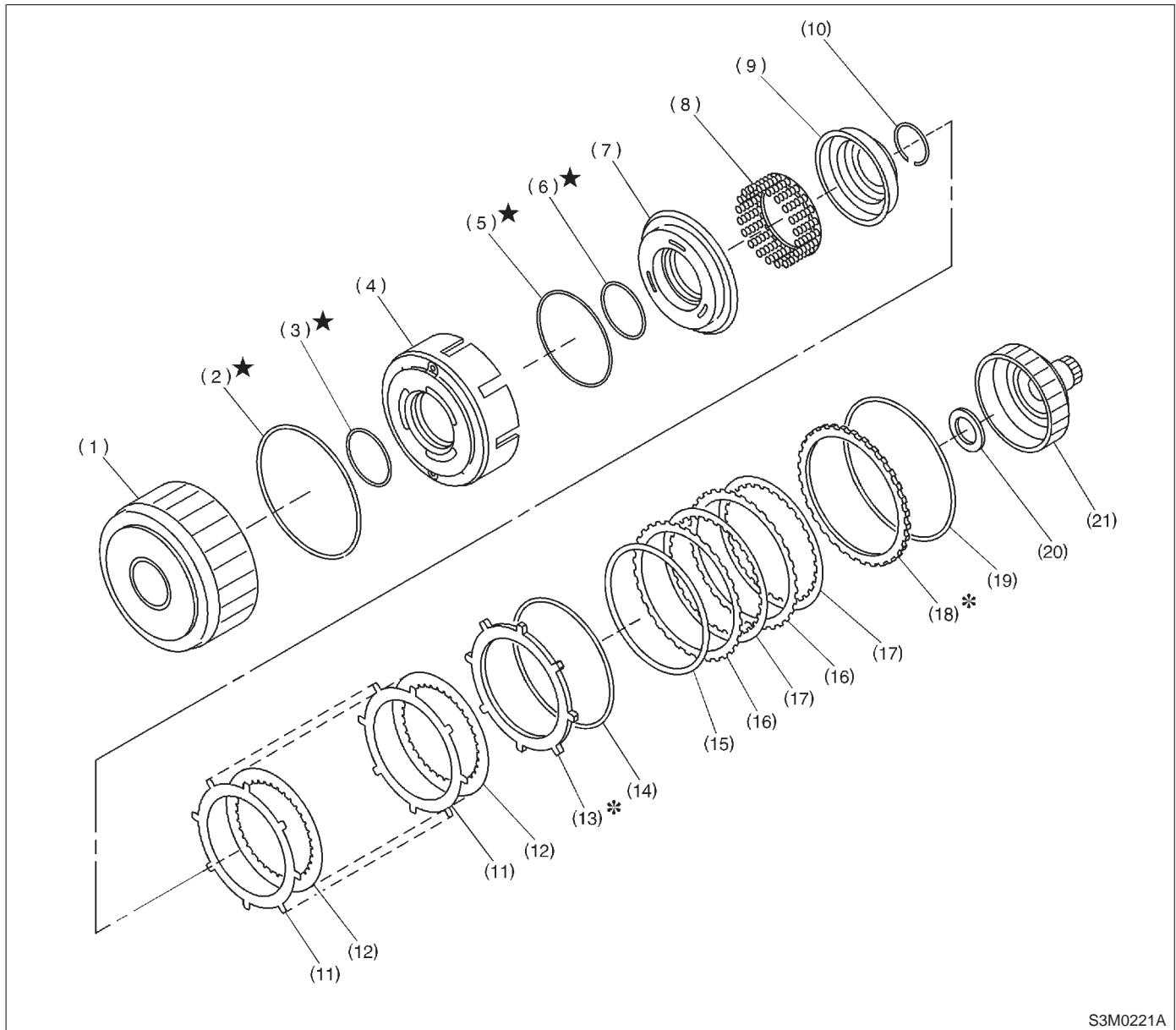
The number of shims must be three or less.

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

Available drive pinion shims	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

18. High Clutch and Reverse Clutch

A: DISASSEMBLY



S3M0221A

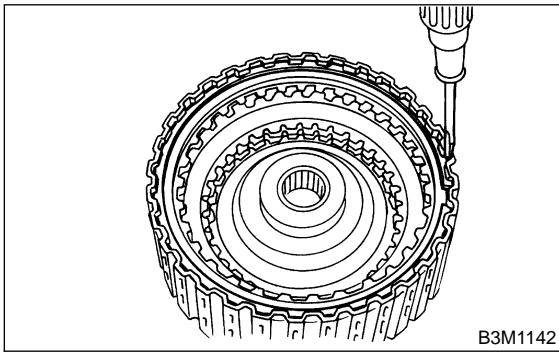
- (1) Reverse clutch drum
- (2) Lip seal
- (3) Lathe cut seal ring
- (4) Reverse clutch piston
- (5) Lathe cut seal ring
- (6) Lathe cut seal ring
- (7) High clutch piston

- (8) Spring retainer
- (9) Cover
- (10) Snap ring
- (11) Driven plate
- (12) Drive plate
- (13) Retaining plate
- (14) Snap ring

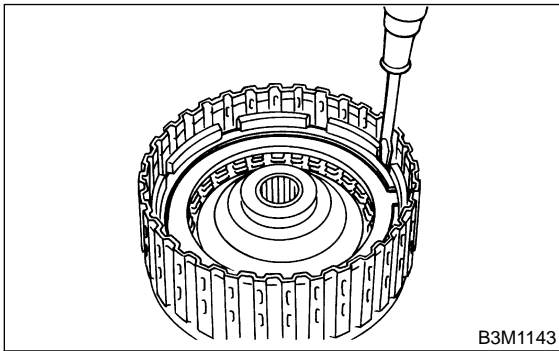
- (15) Dish plate
- (16) Driven plate
- (17) Drive plate
- (18) Retaining plate
- (19) Snap ring
- (20) Thrust needle bearing
- (21) High clutch hub

18. High Clutch and Reverse Clutch

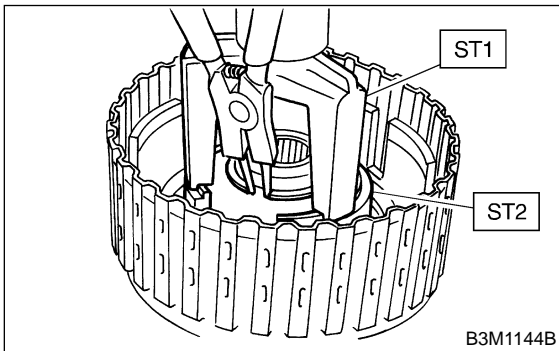
1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates.



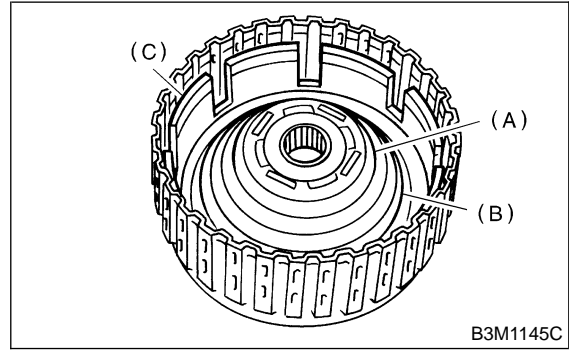
2) Remove snap ring, and take out the retaining plate, drive plates and driven plates.



3) Using ST1 and ST2, remove snap ring.
 ST1 398673600 COMPRESSOR
 ST2 498627100 SEAT

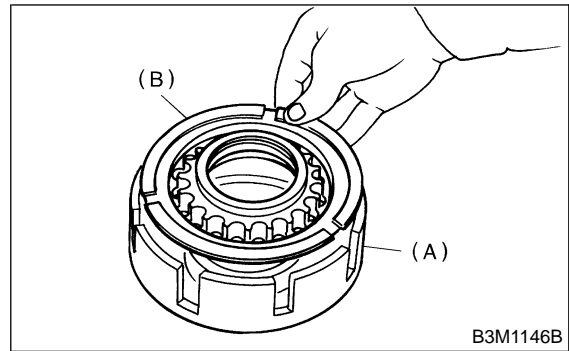


4) Take out clutch cover, spring retainer, high clutch piston and reverse clutch piston.



- (A) Cover
- (B) Return spring
- (C) Reverse clutch piston

5) Remove seal rings and lip seal from high clutch piston and reverse clutch piston.

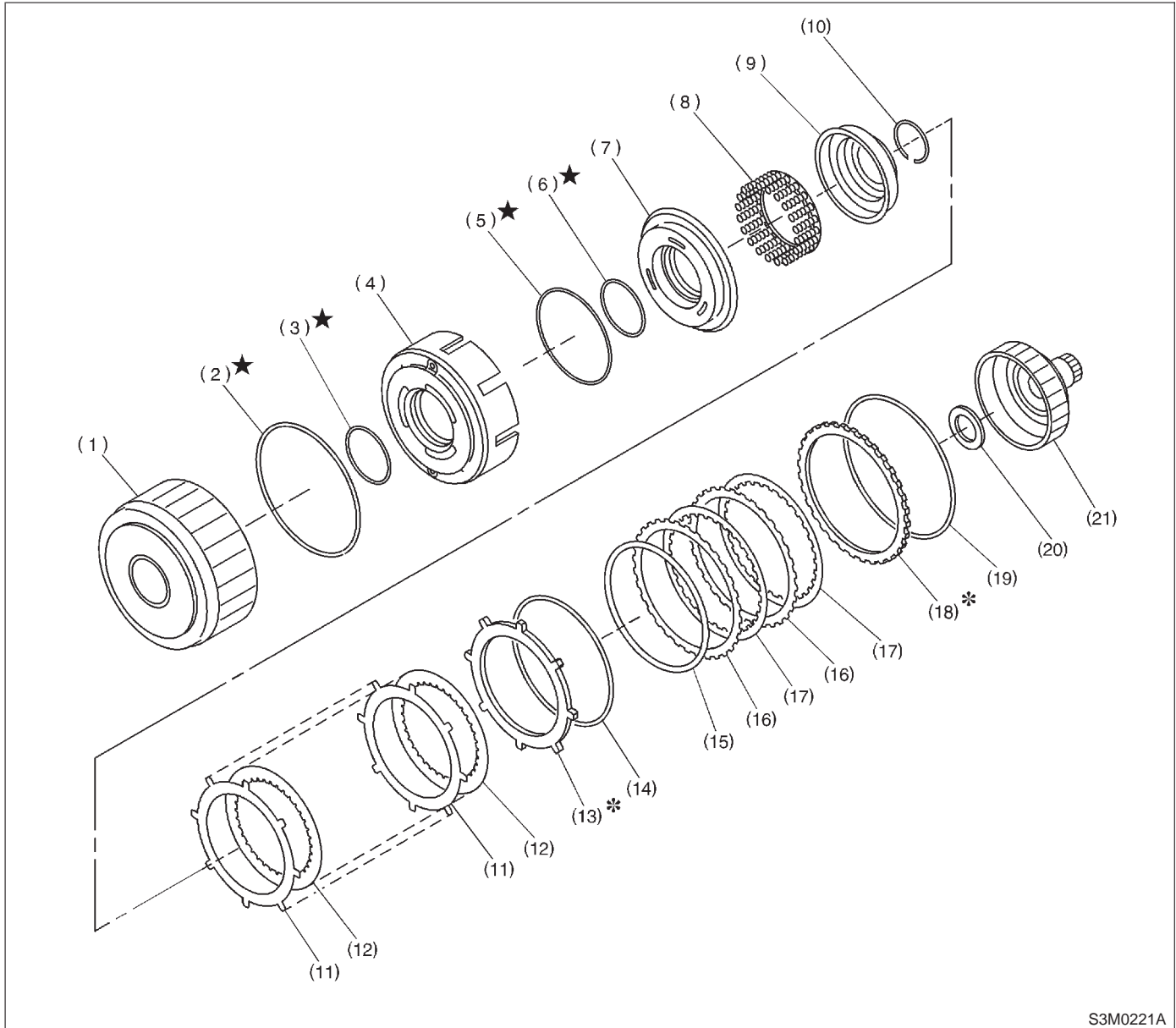


- (A) Reverse clutch piston
- (B) High clutch piston

B: INSPECTION

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

C: ASSEMBLY

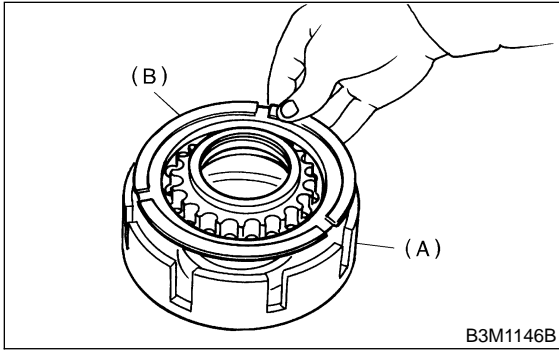


S3M0221A

- | | | |
|---------------------------|----------------------|----------------------------|
| (1) Reverse clutch drum | (8) Spring retainer | (15) Dish plate |
| (2) Lip seal | (9) Cover | (16) Driven plate |
| (3) Lathe cut seal ring | (10) Snap ring | (17) Drive plate |
| (4) Reverse clutch piston | (11) Driven plate | (18) Retaining plate |
| (5) Lathe cut seal ring | (12) Drive plate | (19) Snap ring |
| (6) Lathe cut seal ring | (13) Retaining plate | (20) Thrust needle bearing |
| (7) High clutch piston | (14) Snap ring | (21) High clutch hub |

18. High Clutch and Reverse Clutch

- 1) Install seal rings and lip seal to high clutch piston and reverse clutch piston.
- 2) Install high clutch piston to reverse clutch piston.

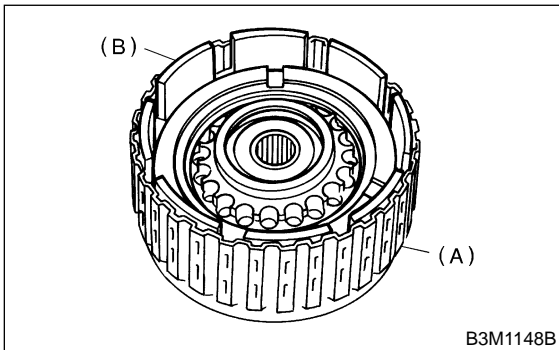


(A) Reverse clutch piston
(B) High clutch piston

- 3) Install reverse clutch to high clutch drum.

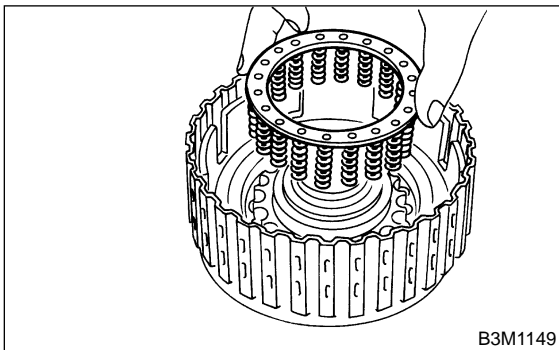
NOTE:

Align the groove on the reverse clutch piston with the groove on the high clutch drum during installation.



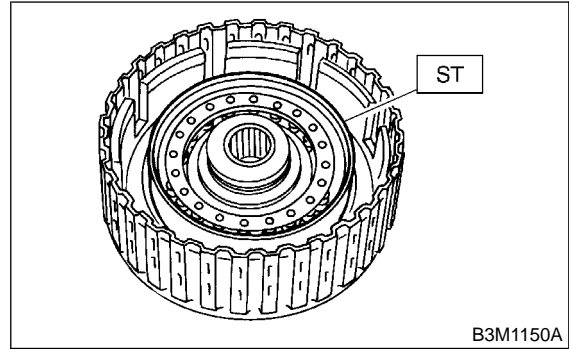
(A) High clutch drum
(B) Reverse clutch piston

- 4) Install spring retainer to high clutch piston.



B3M1149

- 5) Install ST to high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GAUGE



B3M1150A

- 6) Install cover to high clutch piston.

CAUTION:

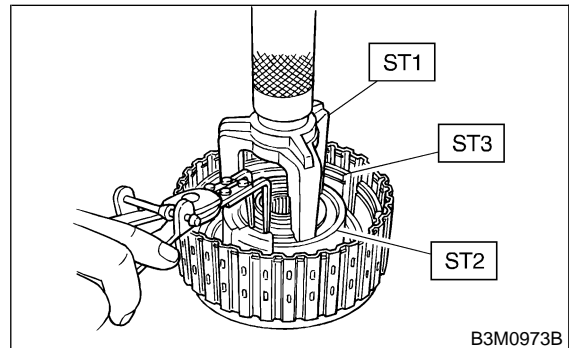
Be careful not to fold over the high clutch piston seal during installation.

- 7) Using ST1 and ST2, install snap ring.

NOTE:

After installing snap ring, remove STs.

- | | | |
|-----|-----------|--------------------------|
| ST1 | 398673600 | COMPRESSOR |
| ST2 | 498627100 | SEAT |
| ST3 | 498437000 | HIGH CLUTCH PISTON GAUGE |

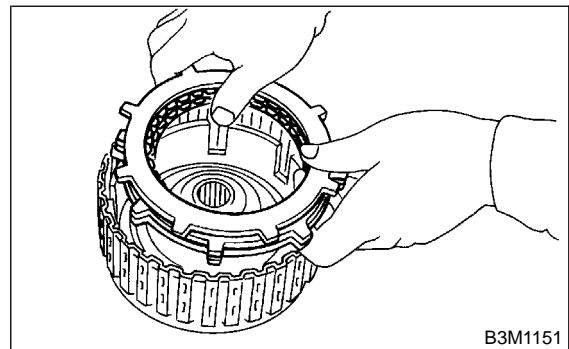


B3M0973B

- 8) Install driven plate, drive plate and retaining plate to high clutch drum.

NOTE:

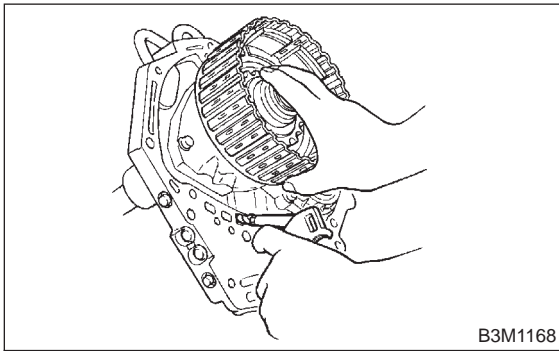
Install a thicker driven plate on the piston side.



B3M1151

- 9) Install snap ring to high clutch drum.

10) Apply compressed air intermittently to check for operation.

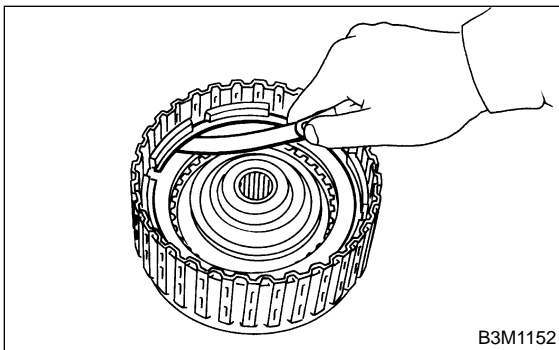


11) Measure the clearance between the retaining plate and snap ring.

CAUTION:
Do not press down retaining plate during clearance measurements.

Standard value:
0.8 — 1.1 mm (0.031 — 0.043 in)

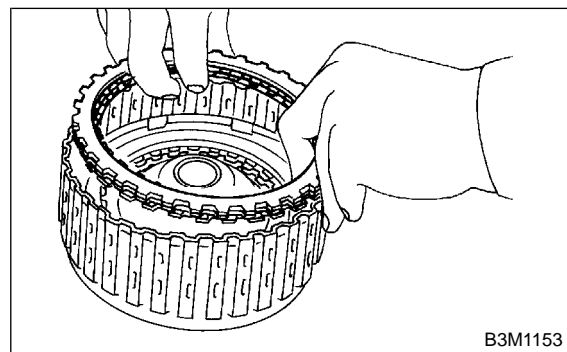
Allowable limit:
1.5 mm (0.059 in)



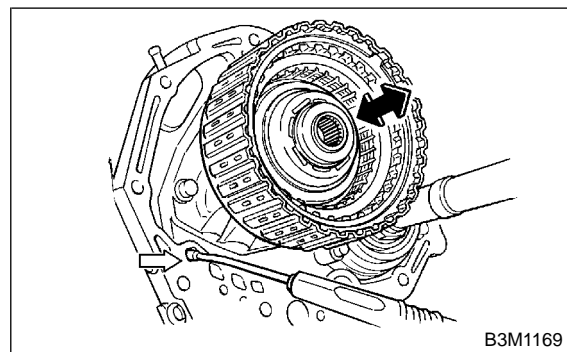
12) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

High clutch retaining plate	
Part No.	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

13) Install driven plate, drive plate, retaining plate and snap ring.



14) Apply compressed air intermittently to check for operation.



18. High Clutch and Reverse Clutch

15) Measure the clearance between the retaining plate and snap ring.

CAUTION:

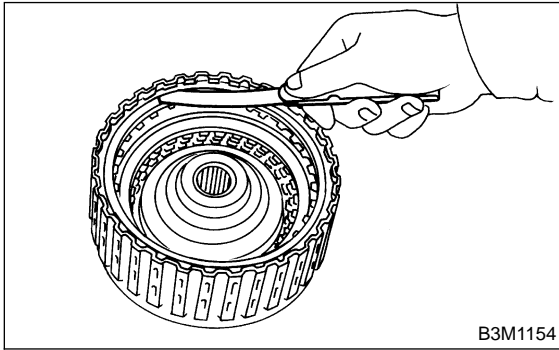
Do not press down retaining plate during clearance measurements.

Standard value:

0.5 — 0.8 mm (0.020 — 0.031 in)

Allowable limit:

1.2 mm (0.047 in)



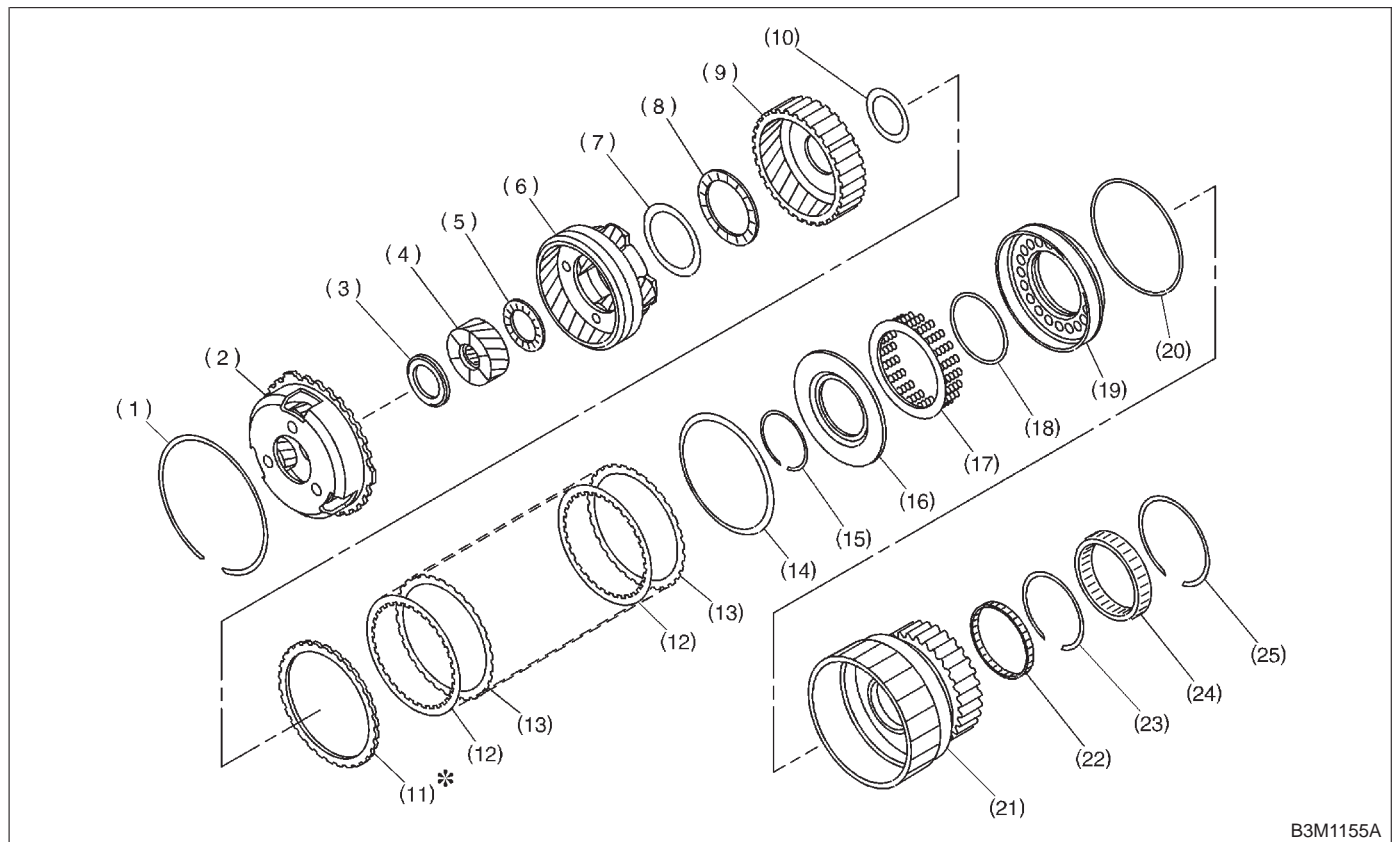
B3M1154

16) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

Reverse clutch retaining plates	
Part No.	Thickness mm (in)
31567AA760	4.0 (0.157)
31567AA770	4.2 (0.165)
31567AA780	4.4 (0.173)
31567AA790	4.6 (0.181)
31567AA800	4.8 (0.189)

19. Low Clutch Drum and Planetary Gear

A: DISASSEMBLY

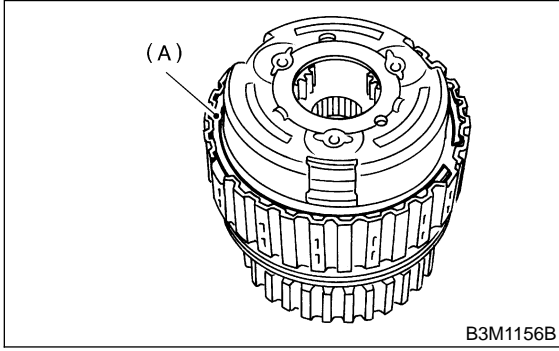


B3M1155A

- | | | |
|-----------------------------|--------------------------|--------------------------|
| (1) Snap ring | (10) Washer | (19) Low clutch piston |
| (2) Front planetary carrier | (11) Retaining plate | (20) Lathe cut seal ring |
| (3) Thrust needle bearing | (12) Drive plate | (21) Low clutch drum |
| (4) Rear sun gear | (13) Driven plate | (22) Needle bearing |
| (5) Thrust needle bearing | (14) Dish plate | (23) Inner snap ring |
| (6) Rear planetary carrier | (15) Snap ring | (24) One-way clutch |
| (7) Washer | (16) Cover | (25) Outer snap ring |
| (8) Thrust needle bearing | (17) Spring retainer | |
| (9) Rear internal gear | (18) Lathe cut seal ring | |

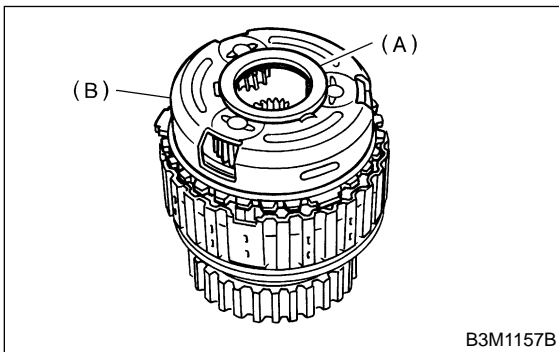
19. Low Clutch Drum and Planetary Gear

1) Remove snap ring from the low clutch drum.



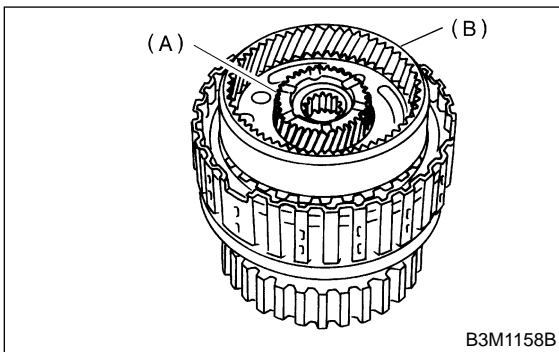
(A) Snap ring

2) Take out front planetary carrier and thrust needle bearing from low clutch drum.



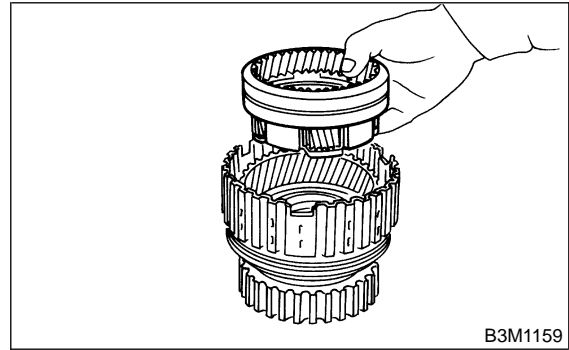
(A) Needle bearing
(B) Front planetary carrier

3) Take out rear sun gear.

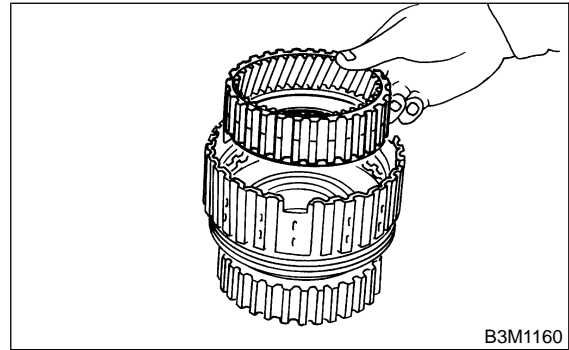


(A) Rear sun gear
(B) Rear planetary carrier

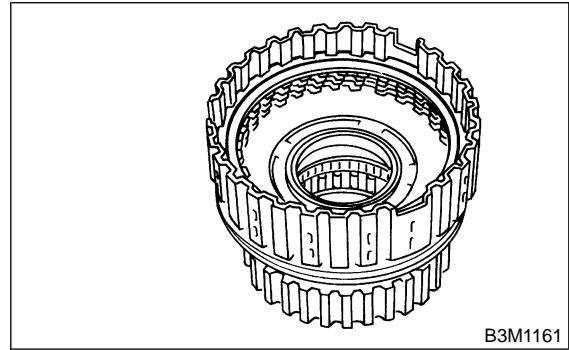
4) Take out rear planetary carrier, washer and thrust needle bearing.



5) Take out rear internal gear.



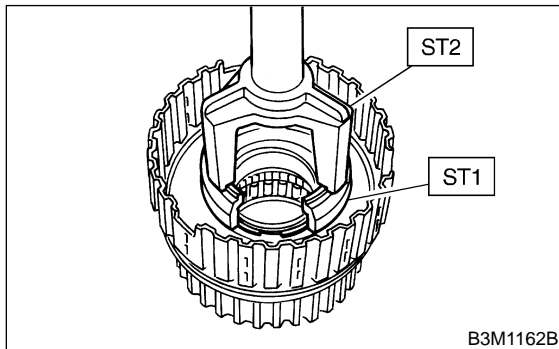
6) Remove the snap ring from the low clutch drum.



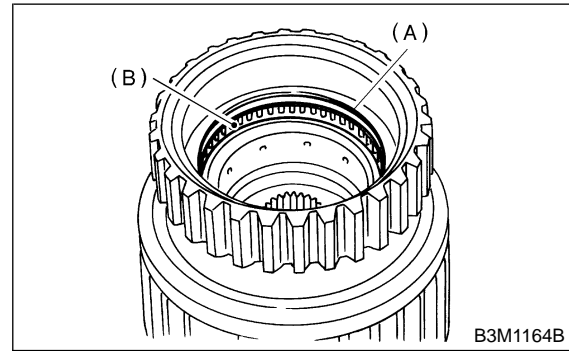
7) Remove the retaining plate, drive plates, driven plates and dish plate.

8) Compress the spring retainer, and remove the snap ring from the low clutch drum, by using ST1 and ST2.

ST1 498627100 SEAT
ST2 398673600 COMPRESSOR

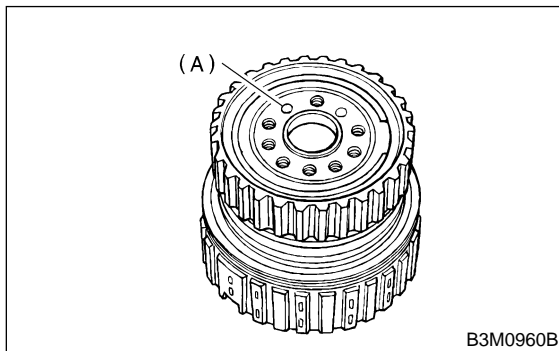


12) Remove the needle bearing after taking out the snap ring.



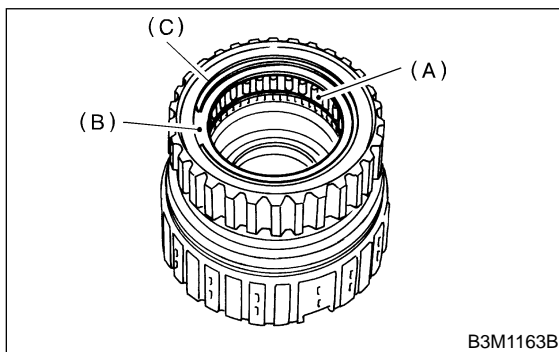
(A) Snap ring
(B) Needle bearing

9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



(A) Blow air into the oil passage.

10) Remove the one-way clutch inner race.
11) Remove the one-way clutch after taking out the snap ring.

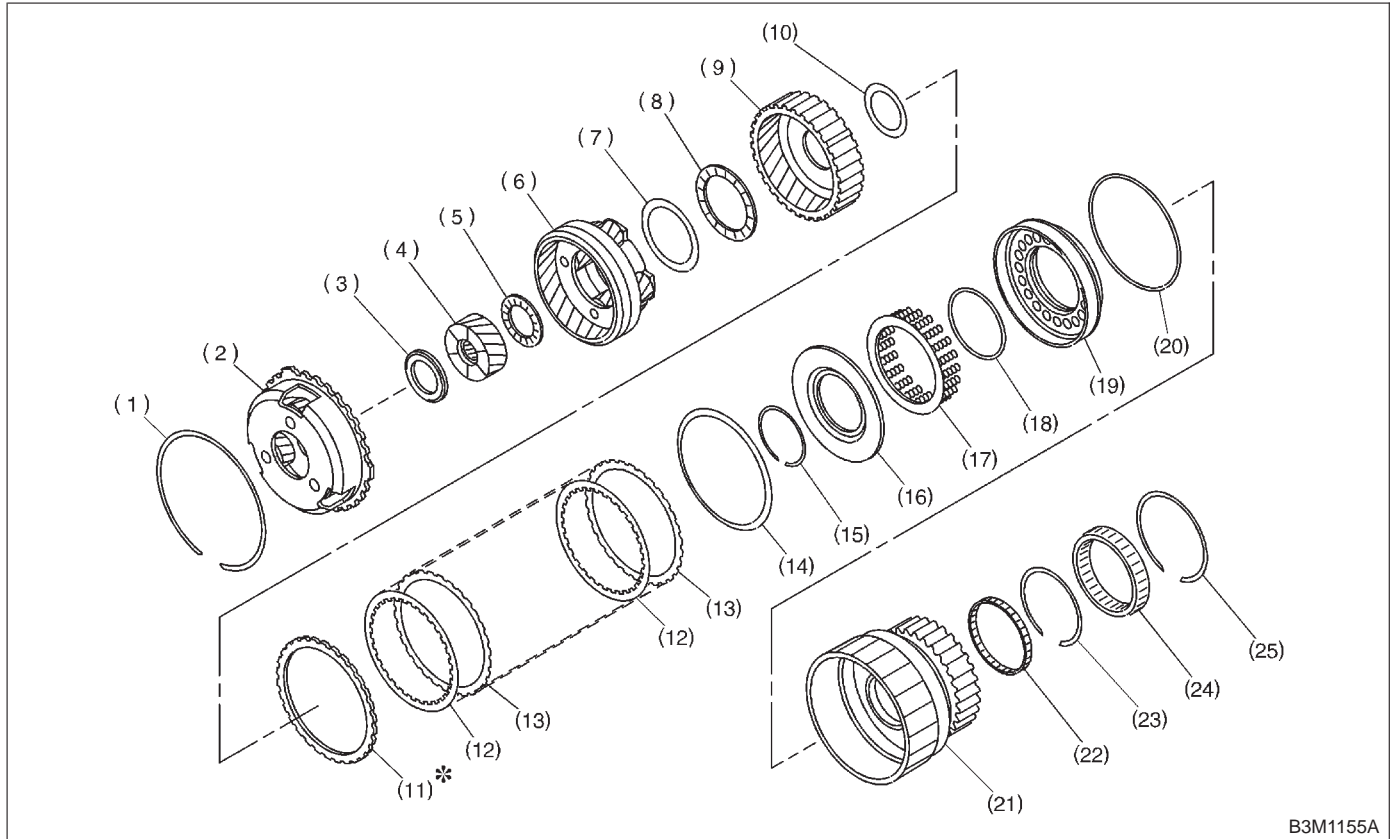


(A) One-way clutch
(B) Plate
(C) Snap ring

B: INSPECTION

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

C: ASSEMBLY

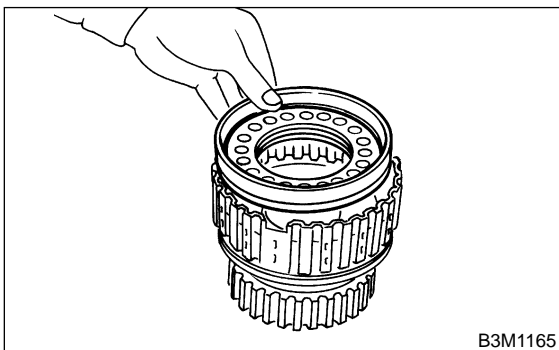


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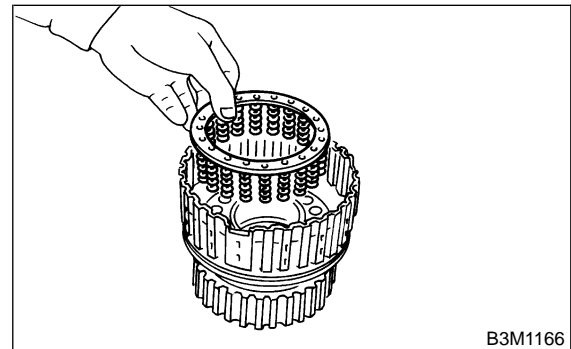
- | | | |
|-----------------------------|--------------------------|--------------------------|
| (1) Snap ring | (10) Washer | (19) Low clutch piston |
| (2) Front planetary carrier | (11) Retaining plate | (20) Lathe cut seal ring |
| (3) Thrust needle bearing | (12) Drive plate | (21) Low clutch drum |
| (4) Rear sun gear | (13) Driven plate | (22) Needle bearing |
| (5) Thrust needle bearing | (14) Dish plate | (23) Inner snap ring |
| (6) Rear planetary carrier | (15) Snap ring | (24) One-way clutch |
| (7) Washer | (16) Cover | (25) Outer snap ring |
| (8) Thrust needle bearing | (17) Spring retainer | |
| (9) Rear internal gear | (18) Lathe cut seal ring | |

- 1) Install lathe cut seal ring to low clutch piston.
- 2) Fit the low clutch piston to the low clutch drum.

- 3) Install spring retainer to low clutch piston.

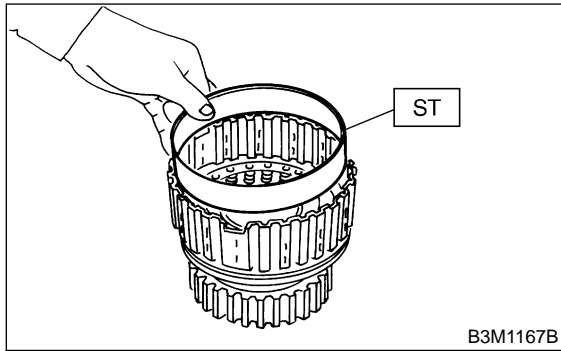


B3M1165



B3M1166

- 4) Install ST to low clutch drum.
 ST 498437100 LOW CLUTCH PISTON GUIDE

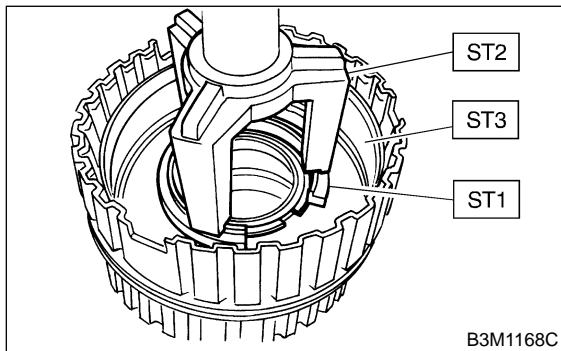


- 5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring.

CAUTION:
 Be careful not to fold cover seal during installation.

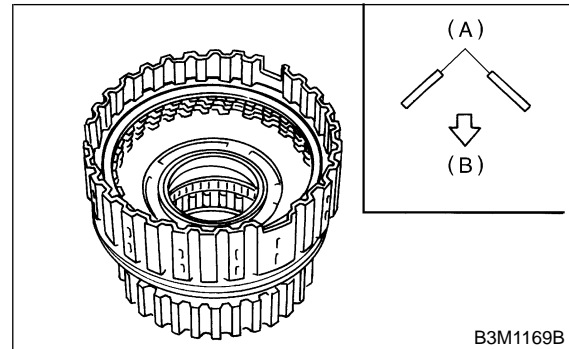
NOTE:
 After installing snap ring, remove ST1, ST2 and ST3.

- ST1 498627100 SEAT
 ST2 398673600 COMPRESSOR
 ST3 498437100 LOW CLUTCH PISTON GUIDE



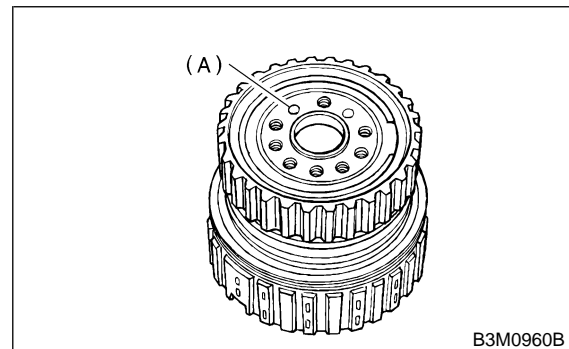
- 6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.

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



- (A) Dish plate
 (B) Low clutch piston side

- 7) Check the low clutch for operation.
 Set the one-way clutch inner race, and apply compressed air for checking.



- (A) Blow air into the oil passage.

8) Checking low clutch clearance
Measure the gap between the retaining plate and the operation of the low clutch.

NOTE:

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

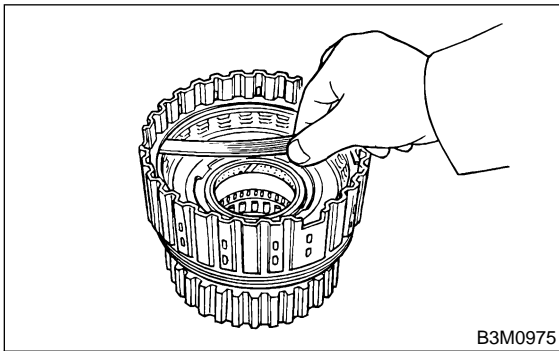
If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Standard value:

0.7 — 1.1 mm (0.028 — 0.043 in)

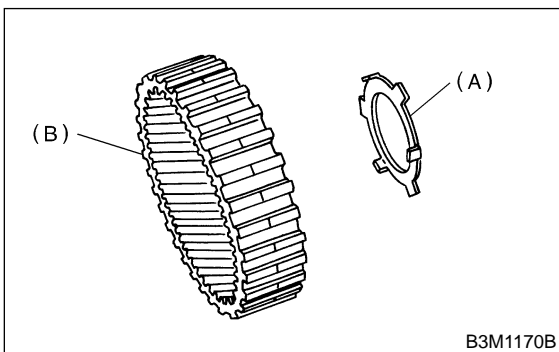
Allowable limit:

1.6 mm (0.063 in)



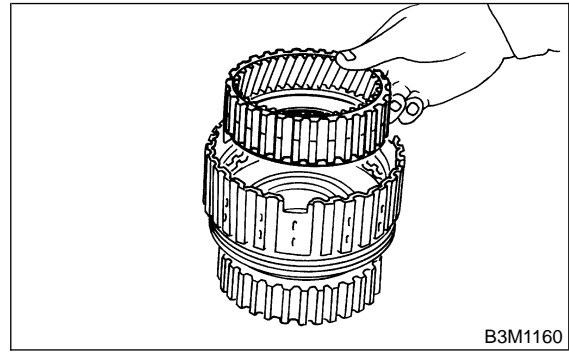
Available retaining plates	
Part No.	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

9) Install washer to rear internal gear.



- (A) Washer
- (B) Rear internal gear

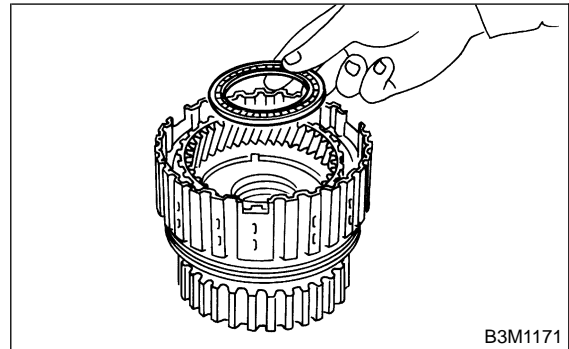
10) Install rear internal gear.



11) Install thrust needle bearing.

NOTE:

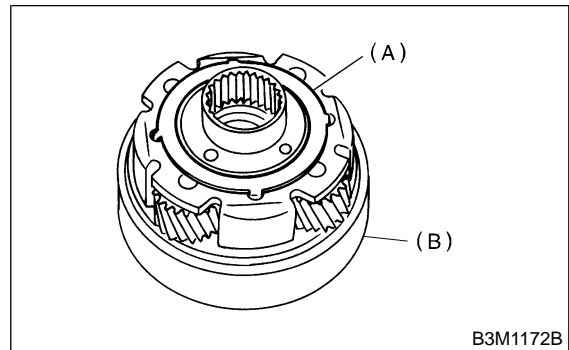
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>



12) Install washer to rear planetary carrier.

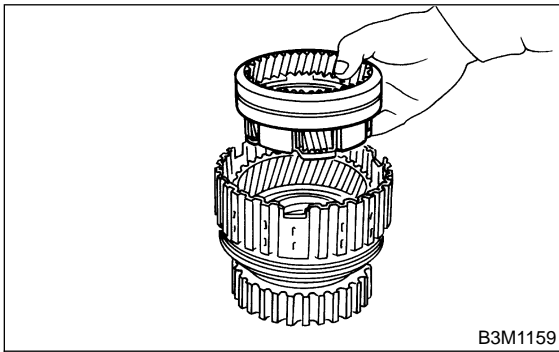
NOTE:

Make sure washer tooth is inserted into hole on planetary carrier.



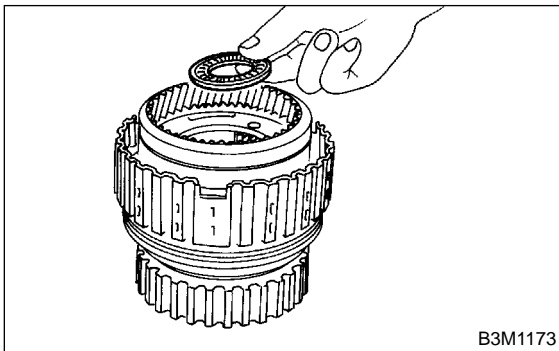
- (A) Washer
- (B) Rear planetary carrier

13) Install rear planetary carrier to low clutch drum.



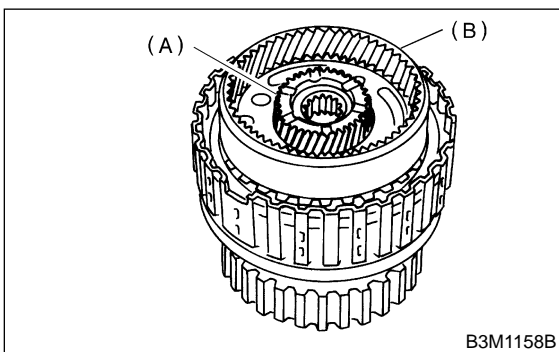
14) Install thrust needle bearing to rear planetary carrier.

NOTE:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>



15) Install rear sun gear.

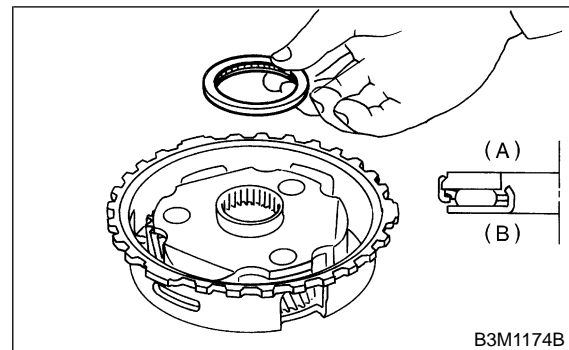
NOTE:
Pay attention to the orientation of the rear sun gear.



- (A) Rear sun gear
- (B) Front planetary carrier

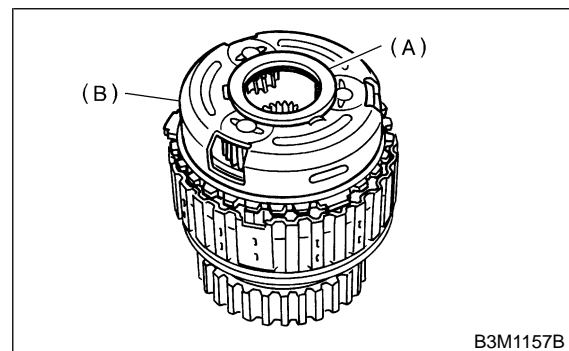
16) Install thrust needle bearing to front planetary carrier.

NOTE:
Pay attention to the orientation of the thrust needle bearing.



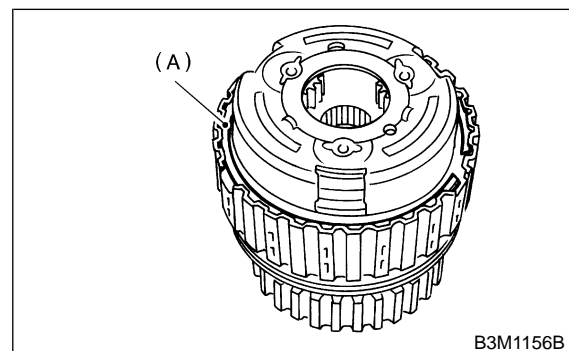
- (A) Rear side
- (B) Front side

17) Install front planetary carrier to low clutch drum.



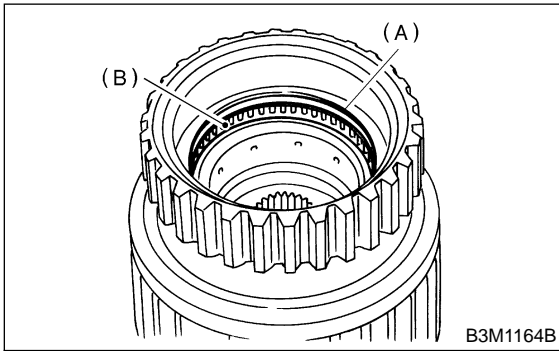
- (A) Needle bearing
- (B) Front planetary carrier

18) Install snap ring to low clutch drum.



- (A) Snap ring

19) Install the needle bearing, and secure with the snap ring.

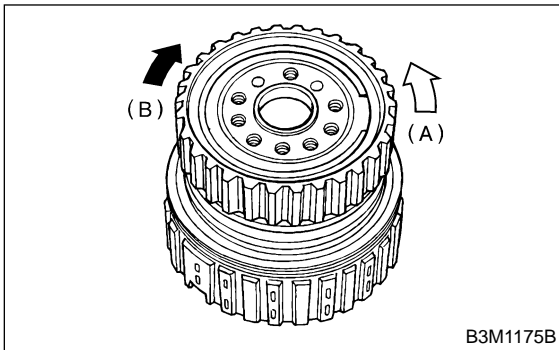


- (A) Snap ring
- (B) Needle bearing

20) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

NOTE:

Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



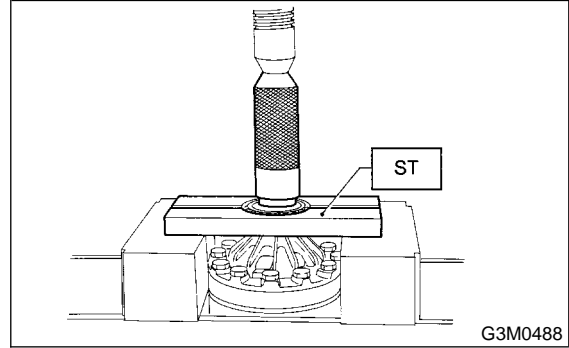
- (A) Free
- (B) Locked

20. Differential Case Assembly

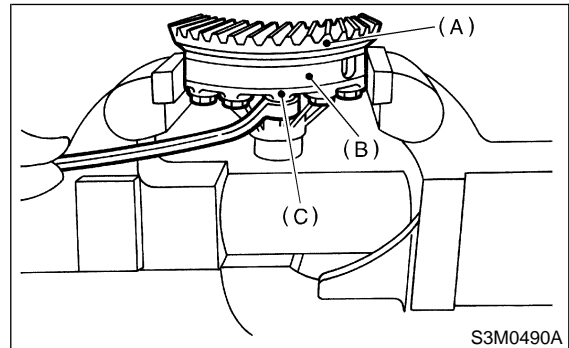
A: DISASSEMBLY

1) Using a press and ST, remove the taper roller bearing.

ST 498077000 REMOVER

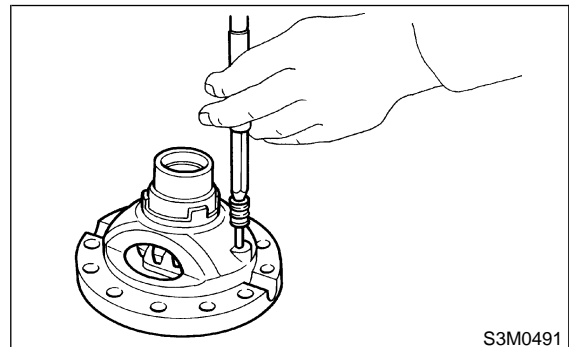


2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



- (A) Crown gear
- (B) Differential case (RH)
- (C) Differential case (LH)

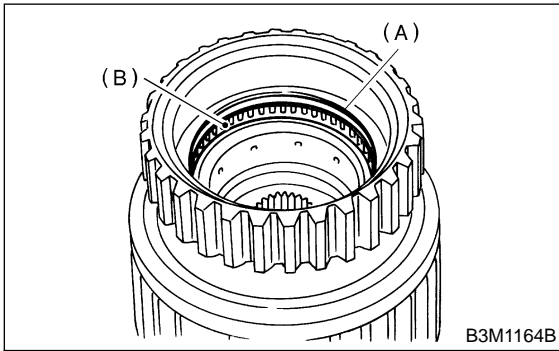
3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.



B: INSPECTION

Check each component for harmful cuts, damage and other faults.

19) Install the needle bearing, and secure with the snap ring.

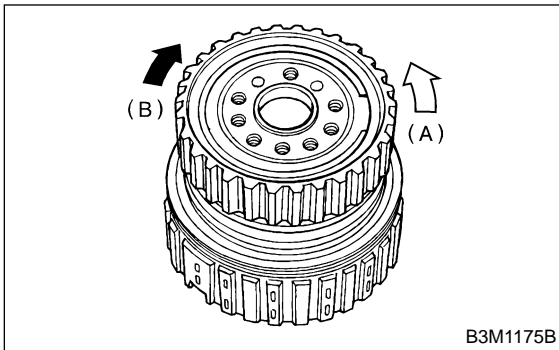


- (A) Snap ring
- (B) Needle bearing

20) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

NOTE:

Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



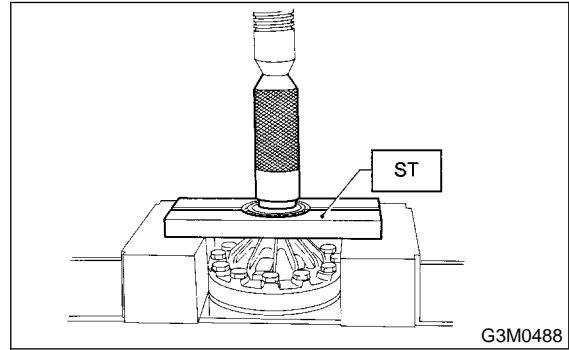
- (A) Free
- (B) Locked

20. Differential Case Assembly

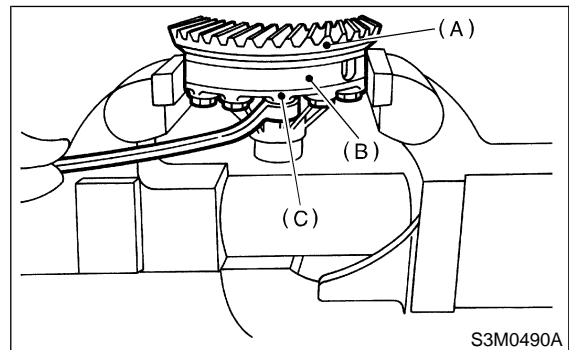
A: DISASSEMBLY

1) Using a press and ST, remove the taper roller bearing.

ST 498077000 REMOVER

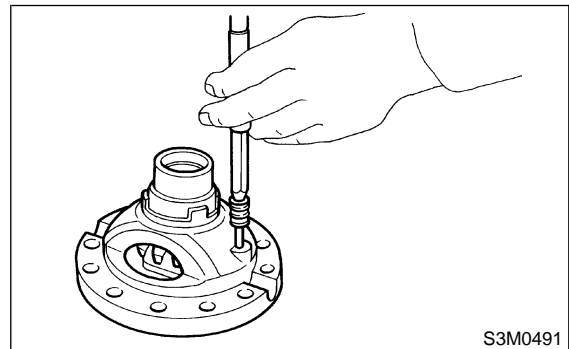


2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



- (A) Crown gear
- (B) Differential case (RH)
- (C) Differential case (LH)

3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.



B: INSPECTION

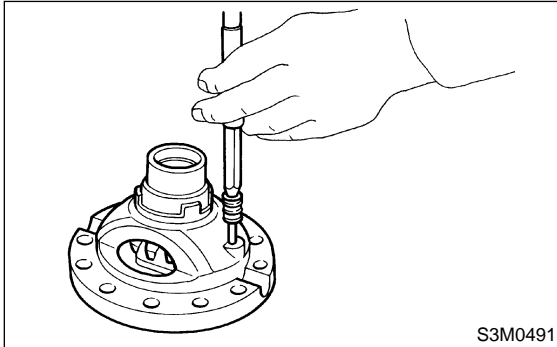
Check each component for harmful cuts, damage and other faults.

C: ASSEMBLY

1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft, and fit the straight pin.

NOTE:

Install straight pin from reverse direction.

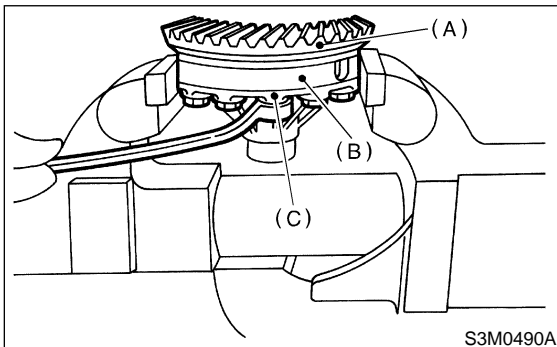


S3M0491

2) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.
3) Install the crown gear and secure by tightening the bolt.

Standard tightening torque:

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



S3M0490A

- (A) Crown gear
- (B) Differential case (RH)
- (C) Differential case (LH)

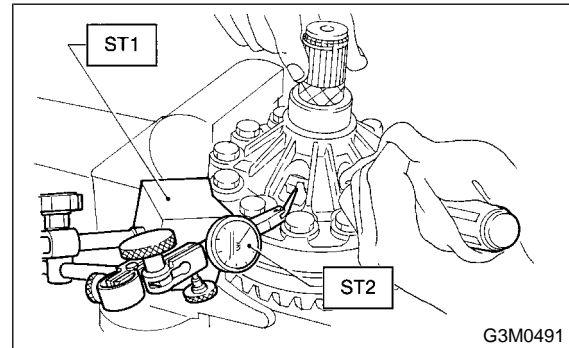
4) Measurement of backlash (Selection of washer)
Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:

Measure the backlash by applying a pinion tooth between two bevel gear teeth.

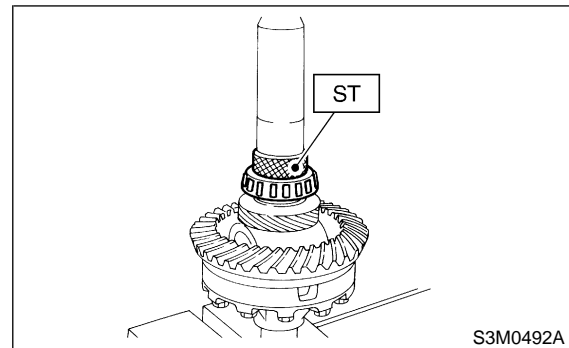
Standard value:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



G3M0491

5) Using ST, install taper roller bearing.
ST 398487700 DRIFT



S3M0492A

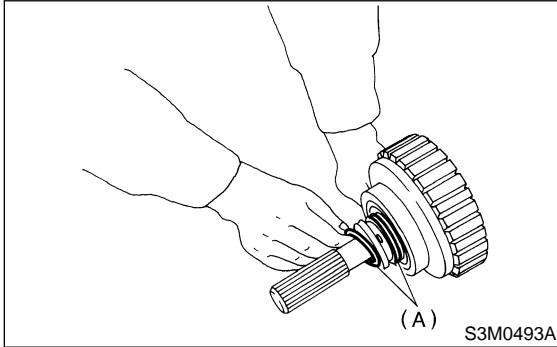
21. Transfer Clutch

A: DISASSEMBLY

1) Remove the seal ring.

CAUTION:

Be careful not to damage the seal ring.



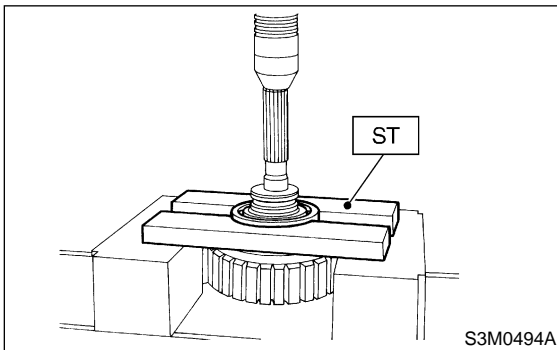
(A) Seal ring

2) Using a press and ST, remove the ball bearing.

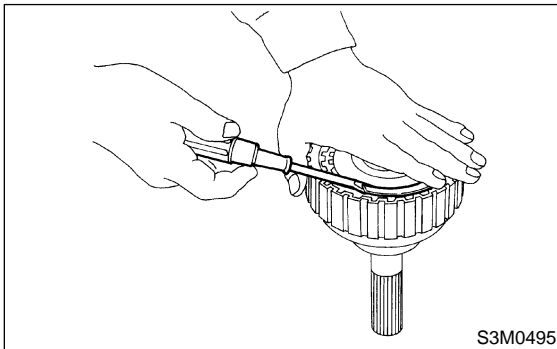
CAUTION:

Do not reuse the bearing.

ST 498077600 REMOVER



3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.

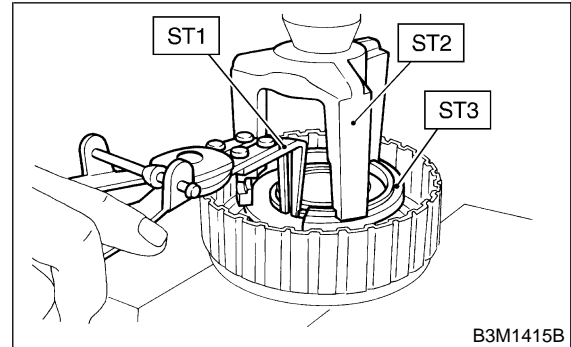


4) Remove the snap ring with ST1, ST2 and ST3, and take out the return ring spring and transfer clutch piston seal.

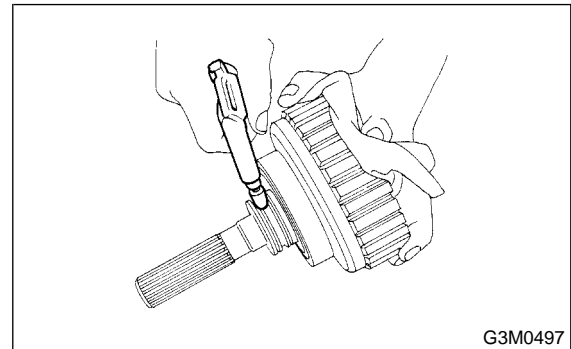
ST1 399893600 PLIERS

ST2 398673600 COMPRESSOR

ST3 398623600 SEAT



5) Apply compressed air to the rear drive shaft to remove the piston.

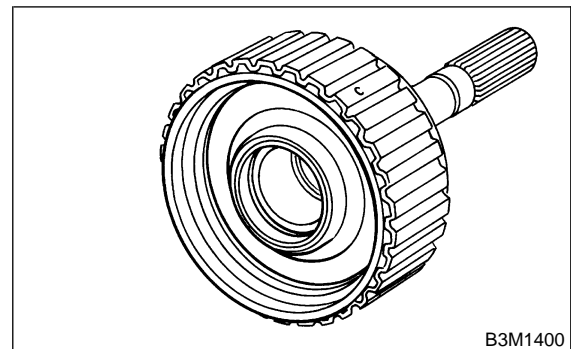


B: INSPECTION

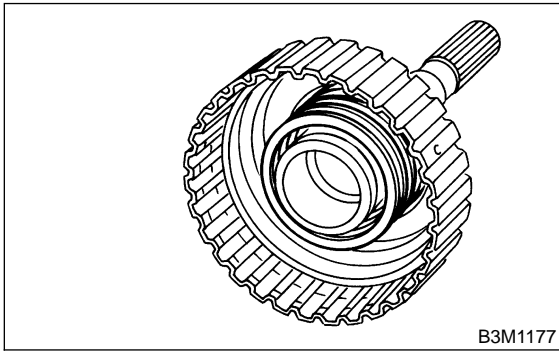
- 1) Check the drive plate facing for wear and damage.
- 2) Check the snap ring for wear, return spring for permanent set and breakage, and return spring for deformation.
- 3) Check the lathe cut ring for damage.

C: ASSEMBLY

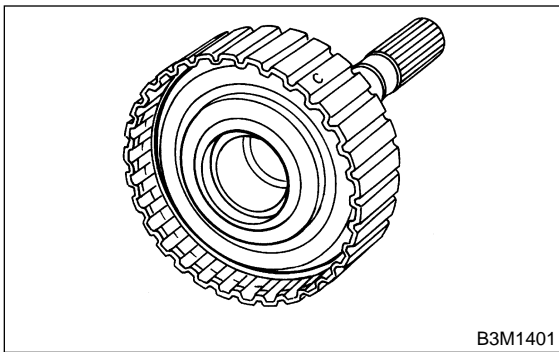
1) Install the transfer clutch piston.



2) Install return spring to transfer piston.

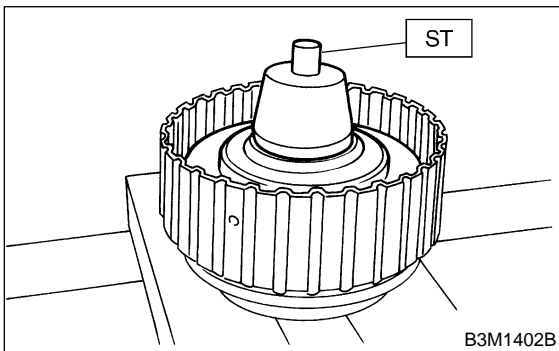


3) Install transfer clutch piston seal.



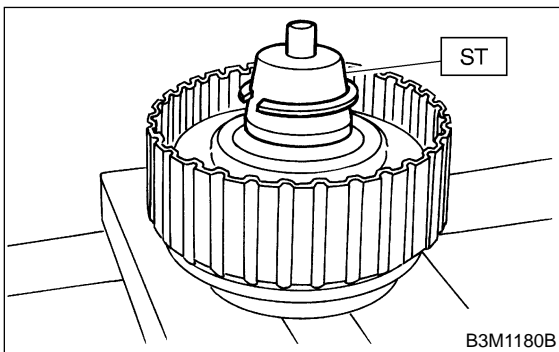
4) Install ST to rear drive shaft.

ST 499257300 SNAP RING OUTER GUIDE



5) Install snap ring to ST.

ST 499257300 SNAP RING OUTER GUIDE



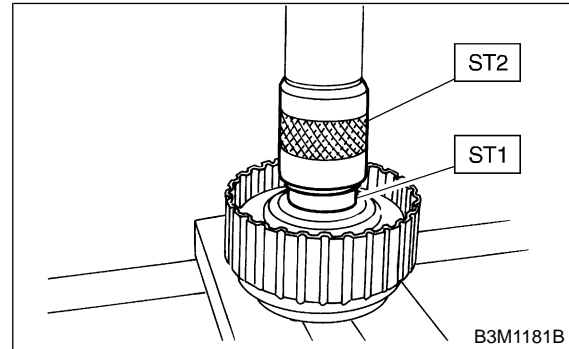
6) Using ST1 and ST2, install snap ring to rear drive shaft.

NOTE:

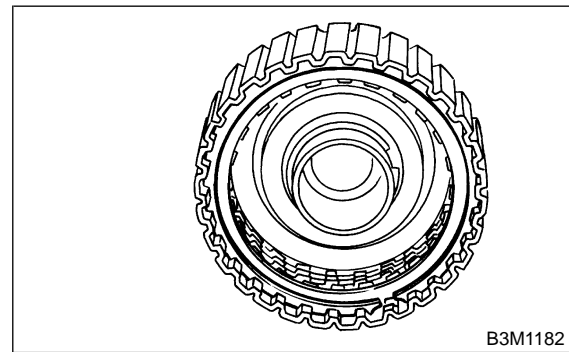
After installing snap ring, remove ST1 and ST2.

ST1 499257300 SNAP RING OUTER GUIDE

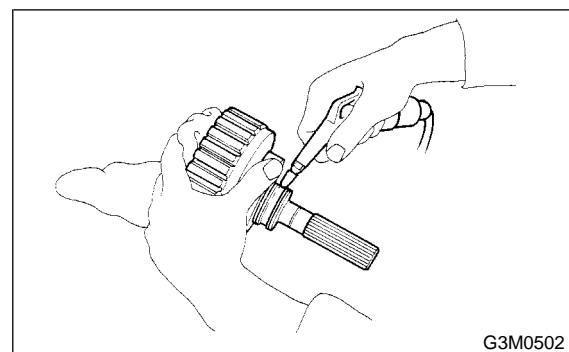
ST2 499247400 INSTALLER



7) Install the driven plates, drive plates, pressure plate and snap ring.



8) Apply compressed air to see if the assembled parts move smoothly.



9) Check the clearance.

NOTE:

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

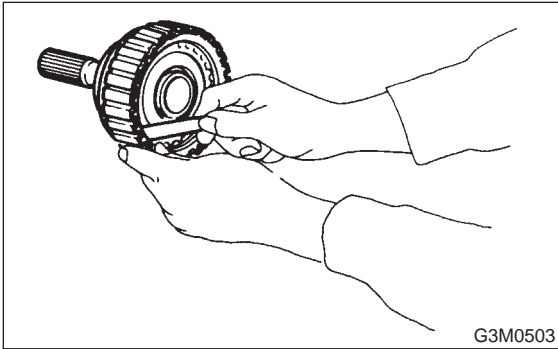
If the clearance is not within the specified range, select a proper pressure plate.

Standard value:

0.2 — 0.6 mm (0.008 — 0.024 in)

Allowable limit:

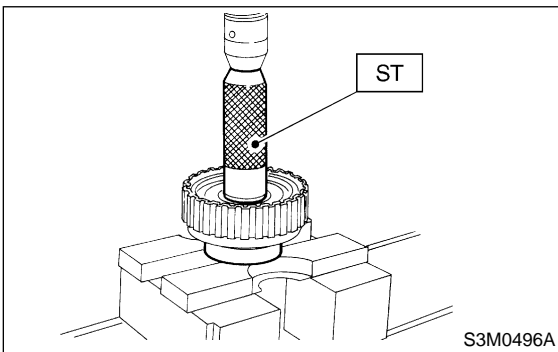
1.6 mm (0.063 in)



Available pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

10) Press-fit the ball bearing with ST.

ST 899580100 INSTALLER

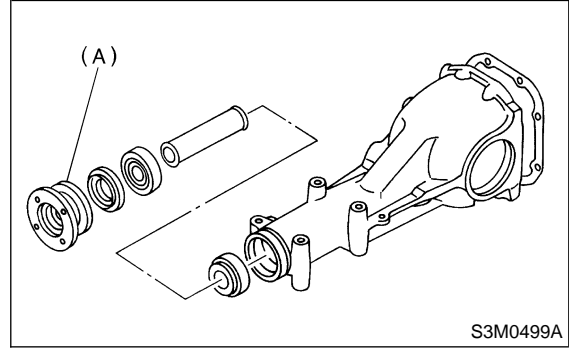


11) Coat the seal ring with vaseline, and install it in the seal ring groove of the shaft.

CAUTION:

Do not expand the seal ring excessively when installing.

ST 899580100 INSTALLER



(A) Seal ring

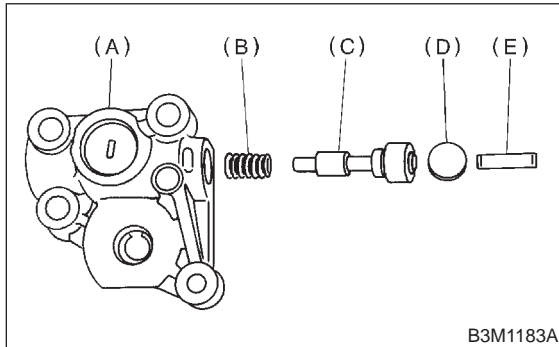
22. Transfer Valve Body

A: DISASSEMBLY

- 1) Separate transfer duty solenoid and transfer valve body.
- 2) Remove the stopper plate and pry out the plug with a screwdriver. Then extract the spring and transfer control valve together.

CAUTION:

Be careful not to damage the valve and valve body.



- (A) Transfer valve body
- (B) Return spring
- (C) Transfer control valve
- (D) Plug
- (E) Stopper plate

B: INSPECTION

Check each component for harmful cuts, damage, or other faults.

C: ASSEMBLY

Assemble in the reverse order of removal.

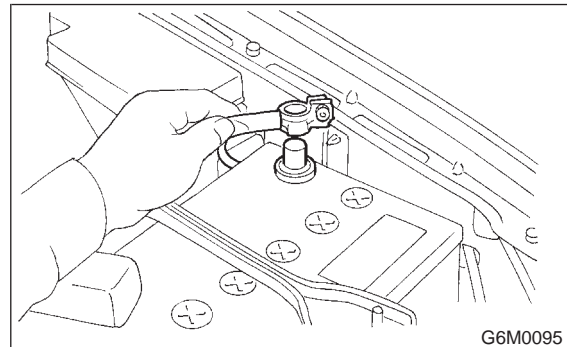
NOTE:

Make sure the valve slides smoothly after assembling.

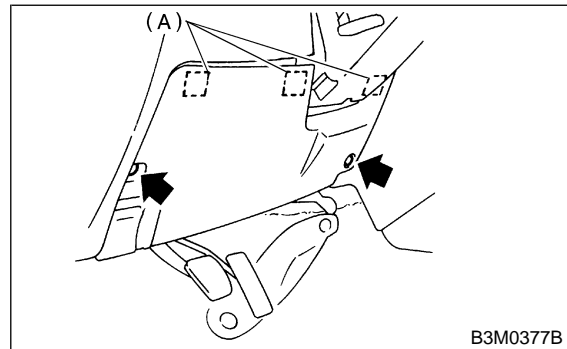
23. Transmission Control Module (TCM)

A: REMOVAL

- 1) Disconnect battery ground terminal.

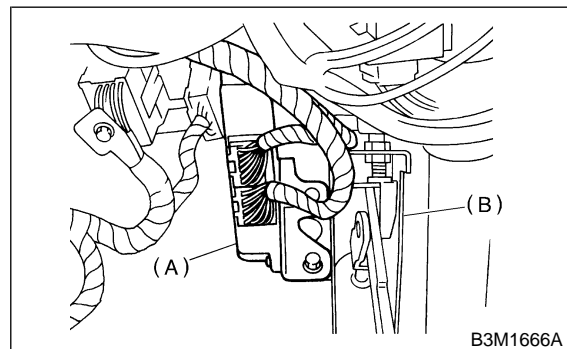


- 2) Remove lower cover and then disconnect connector.



- (A) Clip

- 3) Disconnect connectors from TCM.
- 4) Remove transmission control module.



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

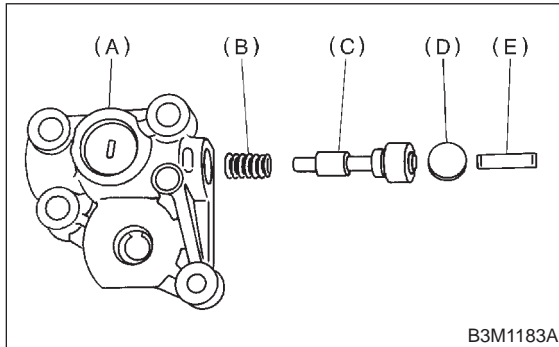
22. Transfer Valve Body

A: DISASSEMBLY

- 1) Separate transfer duty solenoid and transfer valve body.
- 2) Remove the stopper plate and pry out the plug with a screwdriver. Then extract the spring and transfer control valve together.

CAUTION:

Be careful not to damage the valve and valve body.



- (A) Transfer valve body
- (B) Return spring
- (C) Transfer control valve
- (D) Plug
- (E) Stopper plate

B: INSPECTION

Check each component for harmful cuts, damage, or other faults.

C: ASSEMBLY

Assemble in the reverse order of removal.

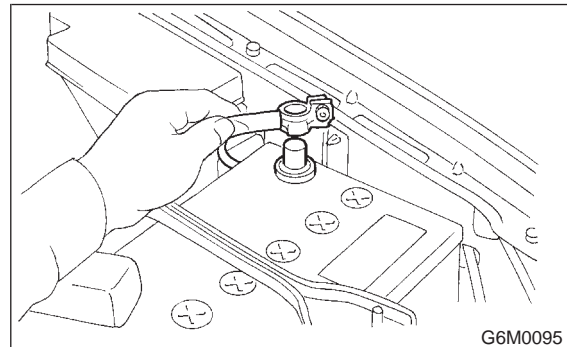
NOTE:

Make sure the valve slides smoothly after assembling.

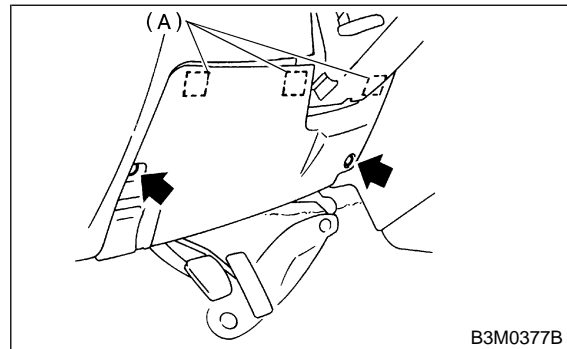
23. Transmission Control Module (TCM)

A: REMOVAL

- 1) Disconnect battery ground terminal.

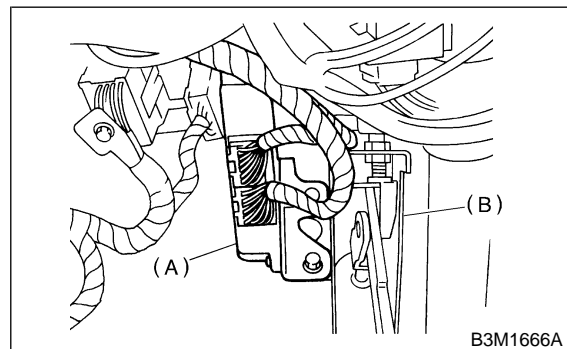


- 2) Remove lower cover and then disconnect connector.



- (A) Clip

- 3) Disconnect connectors from TCM.
- 4) Remove transmission control module.



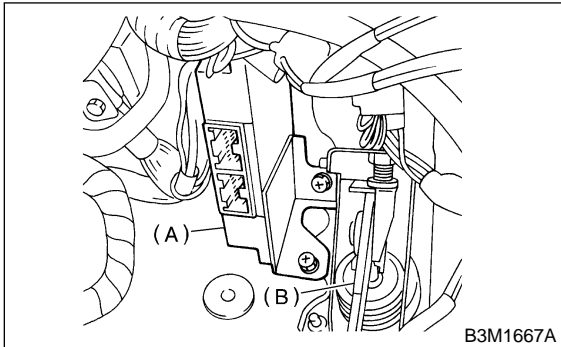
- (A) Transmission control module
- (B) Brake pedal bracket

B: INSTALLATION

- 1) Install TCM to brake pedal bracket.

Tightening torque:

$7.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)

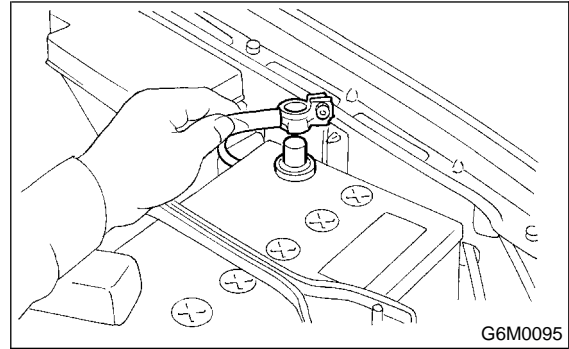


- (A) Transmission control module
(B) Brake pedal bracket

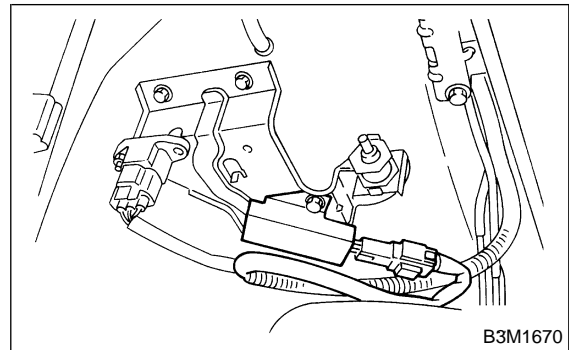
- 2) Connect connectors to TCM.
- 3) Install lower cover and then connect connector.
- 4) Connect battery terminal.

24. Dropping Resistor**A: REMOVAL AND INSTALLATION**

- 1) Disconnect battery ground terminal.



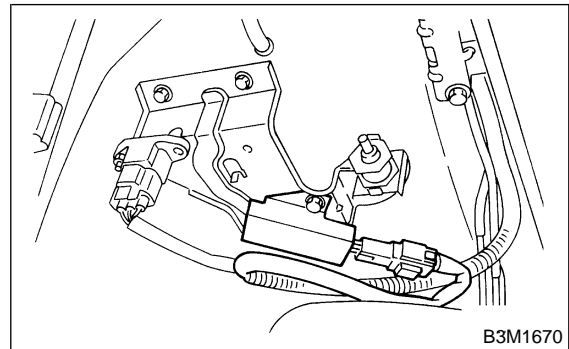
- 2) Remove air intake duct. <Ref. to 2-7 [W1A0].>
- 3) Disconnect connector from dropping resistor.
- 4) Remove dropping resistor from bracket.



- 5) Install dropping resistor.

Tightening torque:

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



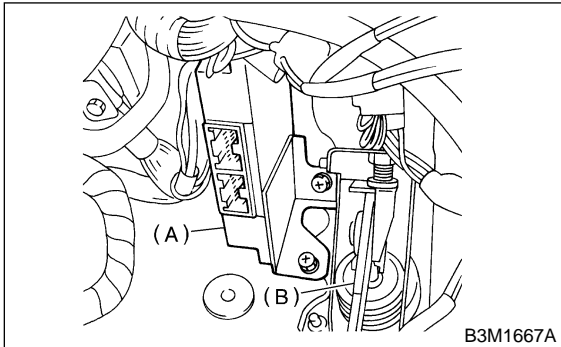
- 6) Install in the reverse order of removal.

B: INSTALLATION

- 1) Install TCM to brake pedal bracket.

Tightening torque:

$7.4 \pm 2.0 \text{ N}\cdot\text{m}$ ($0.75 \pm 0.2 \text{ kg}\cdot\text{m}$, $5.4 \pm 1.4 \text{ ft}\cdot\text{lb}$)

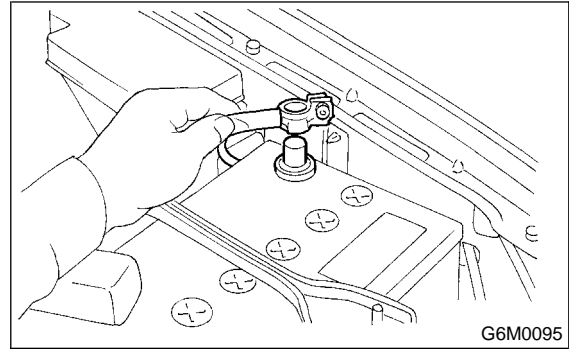


- (A) Transmission control module
(B) Brake pedal bracket

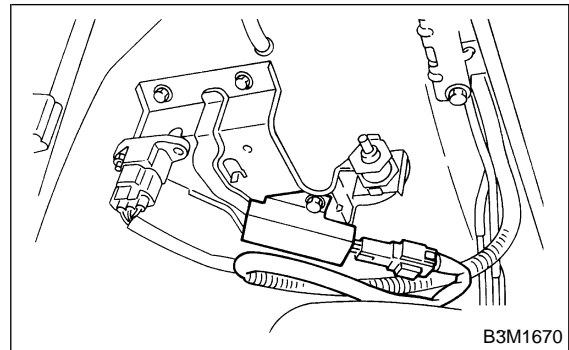
- 2) Connect connectors to TCM.
- 3) Install lower cover and then connect connector.
- 4) Connect battery terminal.

24. Dropping Resistor**A: REMOVAL AND INSTALLATION**

- 1) Disconnect battery ground terminal.



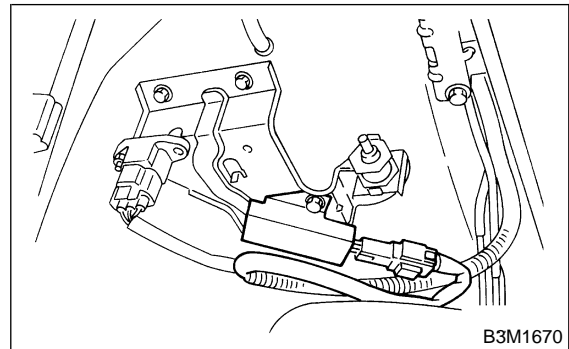
- 2) Remove air intake duct. <Ref. to 2-7 [W1A0].>
- 3) Disconnect connector from dropping resistor.
- 4) Remove dropping resistor from bracket.



- 5) Install dropping resistor.

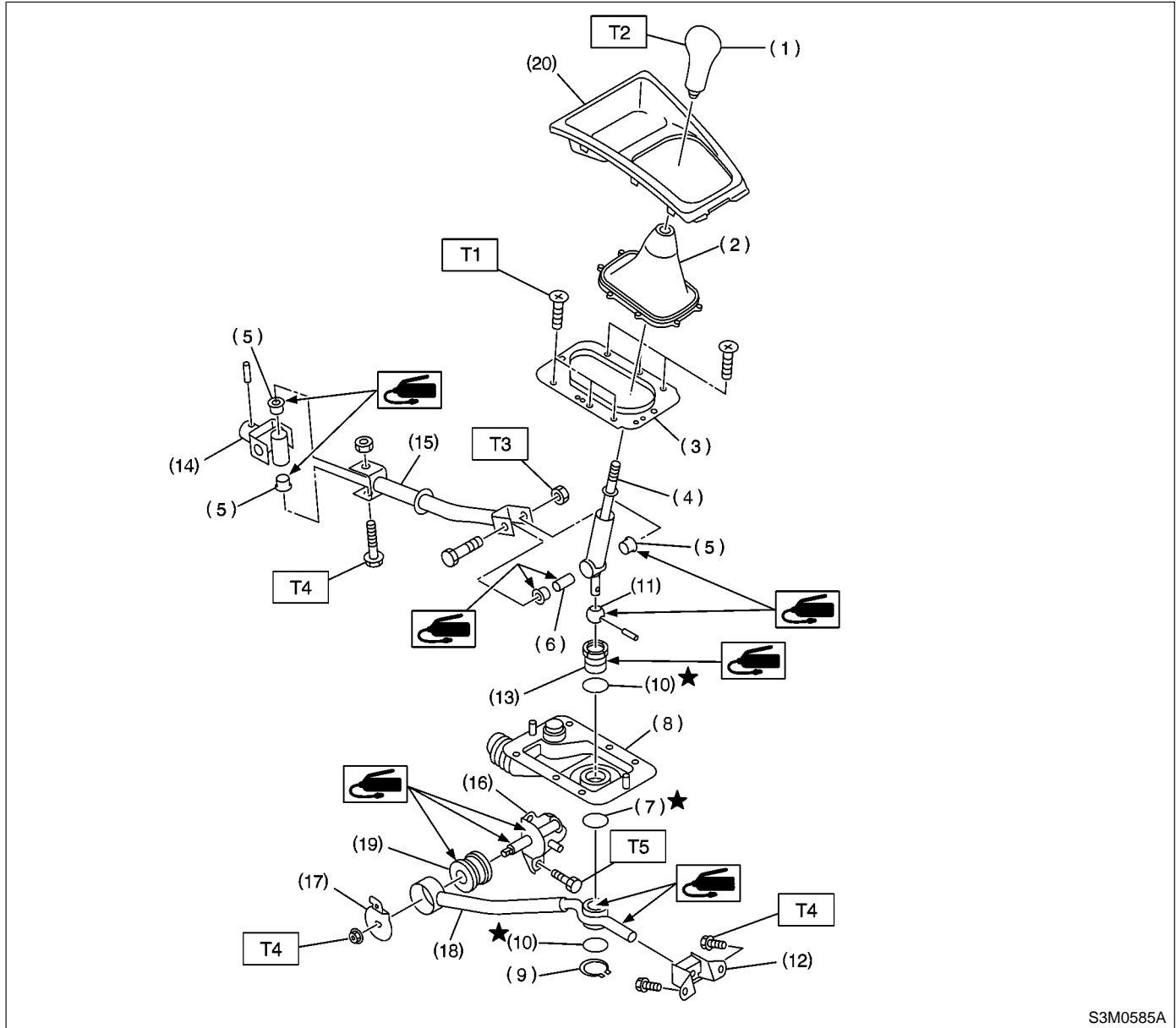
Tightening torque:

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



- 6) Install in the reverse order of removal.

1. Gear Shift Lever



S3M0585A

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

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

T1: 4.5±1.5 (0.46±0.15, 3.3±1.1)

T2: 5 (0.51, 3.7)

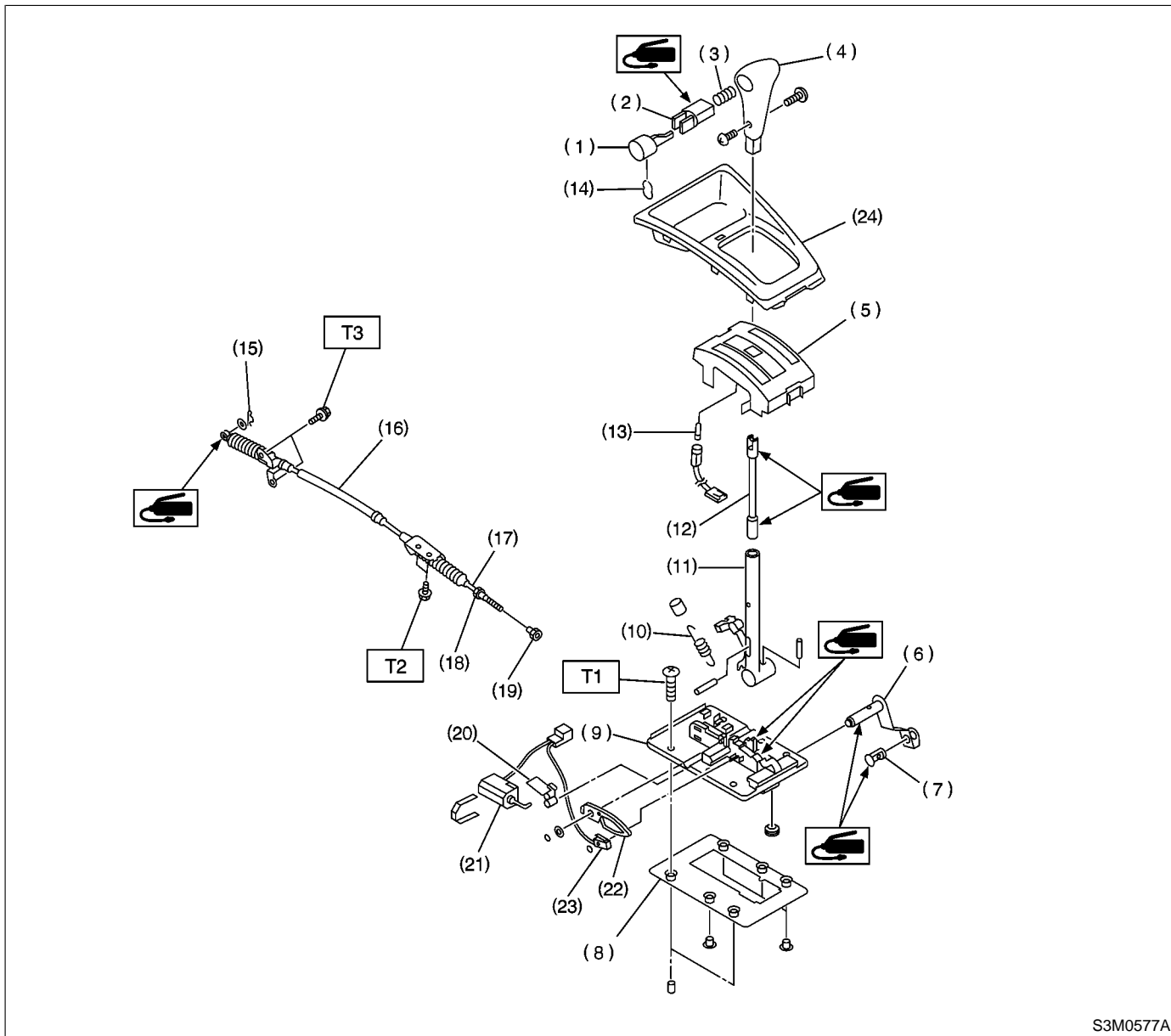
T3: 12±3 (1.2±0.3, 8.7±2.2)

T4: 18±5 (1.8±0.5, 13.0±3.6)

T5: 24.5±2

(2.50±0.20, 18.07±1.48)

2. Select Lever



S3M0577A

- | | | |
|------------------------|---------------------------|--------------------------|
| (1) Button A | (11) Select lever upper | (21) Shift-lock solenoid |
| (2) Button B | (12) Rod | (22) Lock arm |
| (3) Spring (button) | (13) Indicator light bulb | (23) "P" position switch |
| (4) Grip | (14) Clip | (24) Front cover |
| (5) Indicator cover | (15) Snap pin | |
| (6) Select lever lower | (16) Outer cable | |
| (7) Pin | (17) Inner cable | |
| (8) Packing | (18) Nut (front) | |
| (9) Plate | (19) Nut (rear) | |
| (10) Detent spring | (20) Lock plate | |

Tightening torque: N·m (kg·m, ft·lb)

T1: 4.5±1.5 (0.46±0.15, 3.3±1.1)

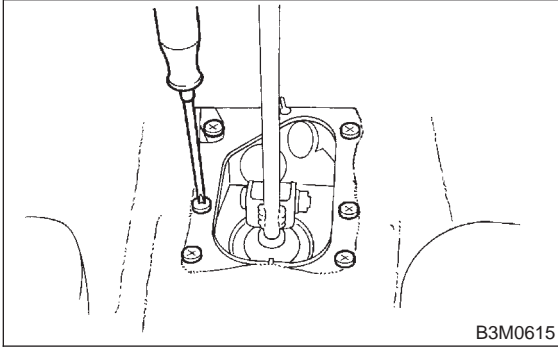
T2: 18±5 (1.8±0.5, 13.0±3.6)

T3: 32±10 (3.3±1.0, 24±7)

1. Gear Shift Lever

A: REMOVAL

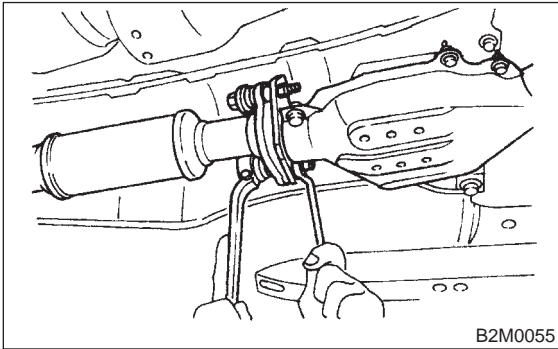
- 1) Remove gear shift knob.
- 2) Remove front cover. <Ref. to 5-4 [W1A0].>
- 3) Remove console boot.
- 4) Remove boot plate from body.



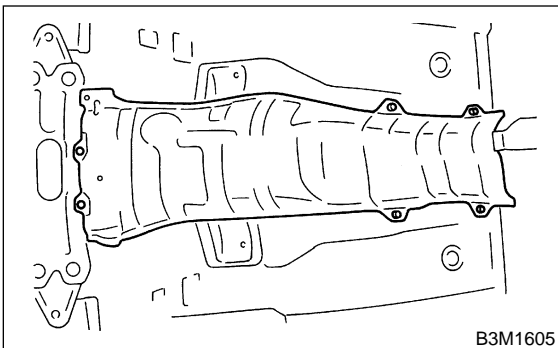
- 5) Remove rear exhaust pipe and muffler. <Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>

CAUTION:

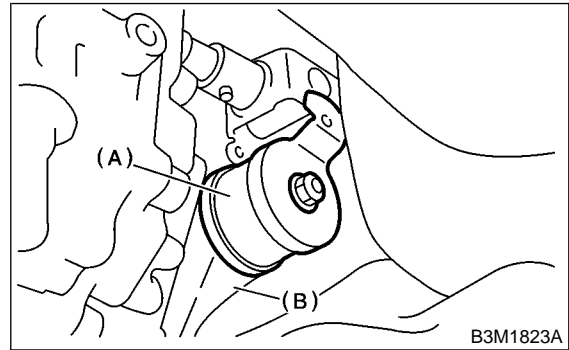
When removing exhaust pipes, make sure no exhaust pipes drop out.



- 6) Remove heat shield cover.

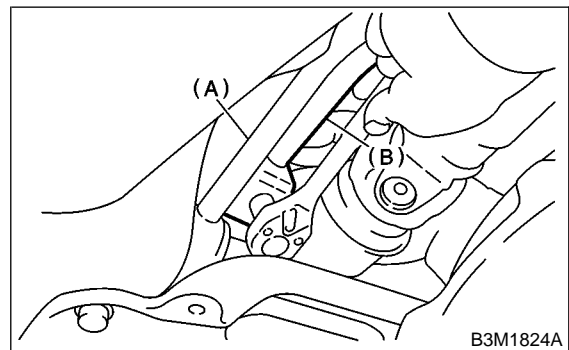


- 7) Remove stay from transmission bracket.



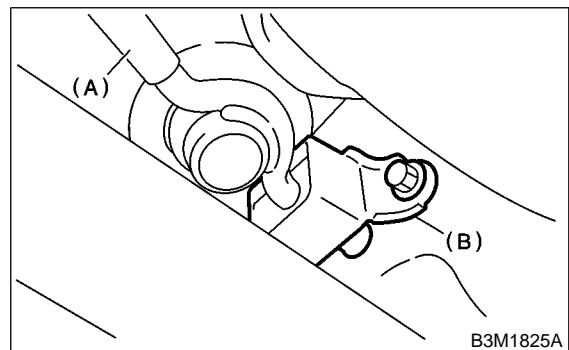
- (A) Stay
(B) Transmission bracket

- 8) Remove rod from joint.



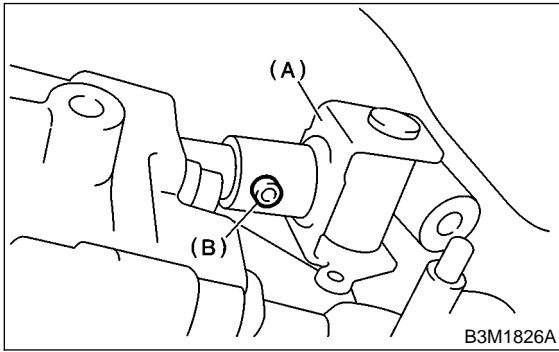
- (A) Stay
(B) Rod

- 9) Remove cushion rubber from body.



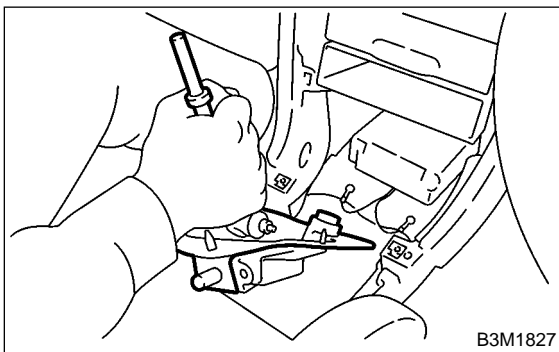
- (A) Rod
(B) Cushion rubber

10) Remove joint and then extract straight pin.



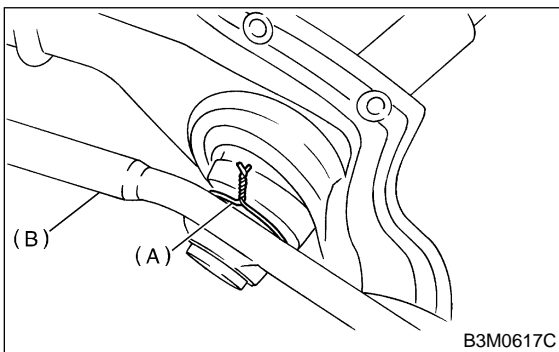
- (A) Joint
- (B) Straight pin

11) Remove gear shift lever.



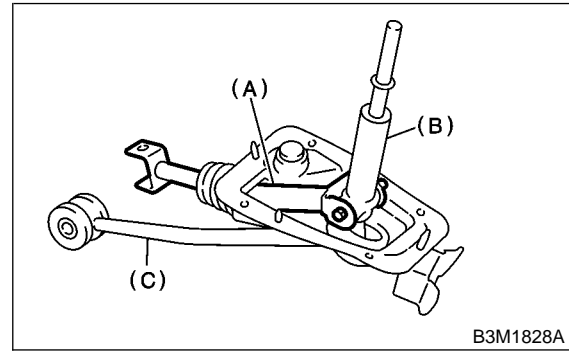
B: DISASSEMBLY

1) Disassemble locking wire.



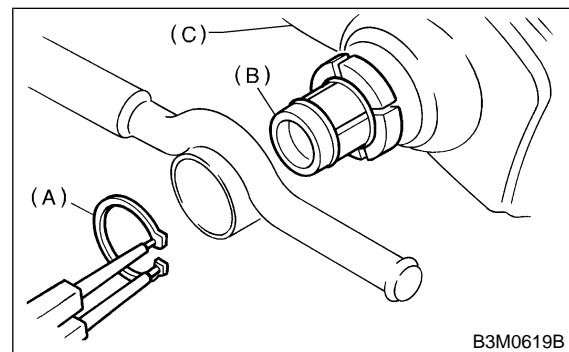
- (A) Locking wire
- (B) Stay

2) Remove rod from gear shift lever.



- (A) Rod
- (B) Gear shift lever
- (C) Stay

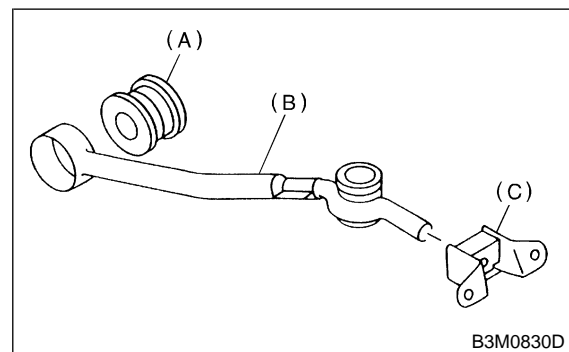
3) Remove snap ring from bush D, then disconnect stay.



- (A) Snap ring
- (B) Bush D
- (C) Boot

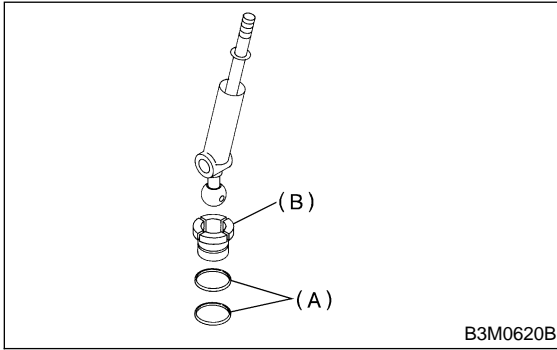
4) Remove boot from gear shift lever.

5) Remove bush and cushion rubber from stay.



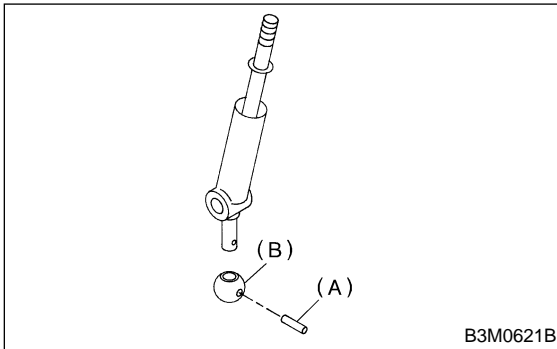
- (A) Bush B
- (B) Stay
- (C) Cushion rubber

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



- (A) O-ring
- (B) Bush D

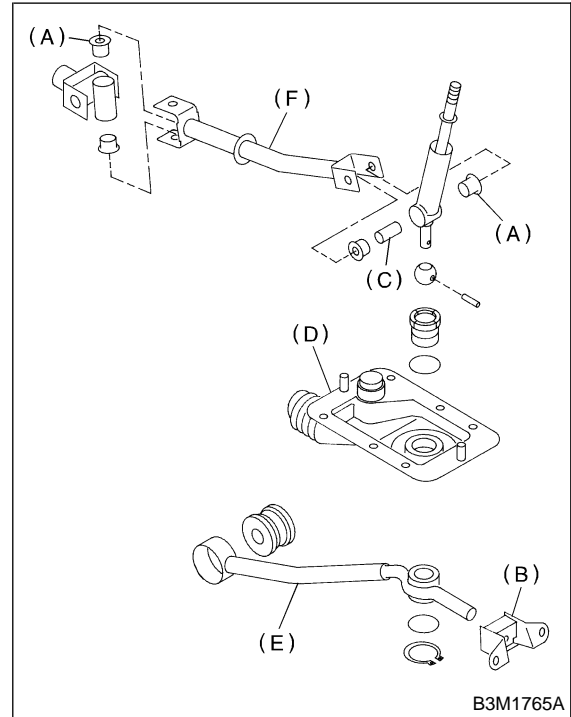
7) Draw out straight pin, then remove bush C from gear shift lever.



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

C: INSPECTION

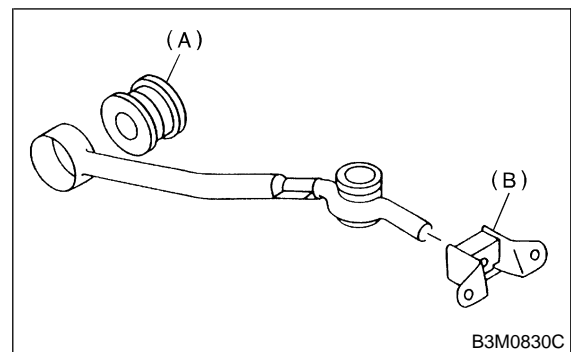
Check each part (bush A, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.



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

D: ASSEMBLY

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

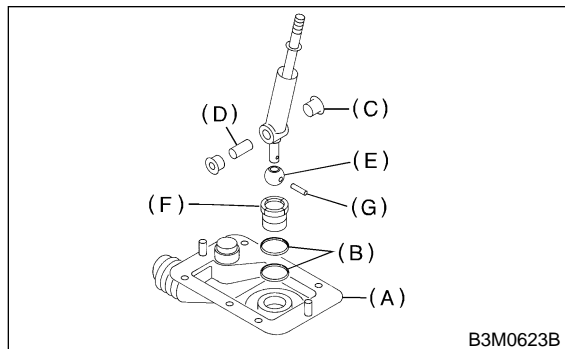


- (A) Bush B
- (B) Cushion rubber

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

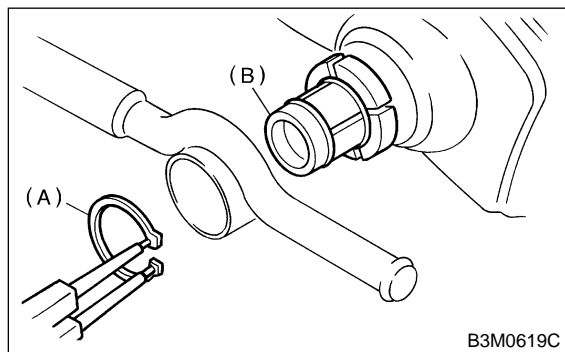
CAUTION:

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



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

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

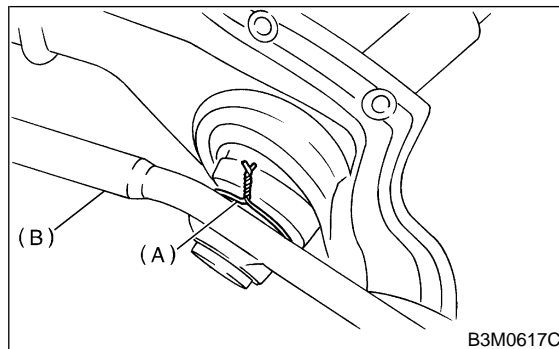


- (A) Snap ring
- (B) Bush D

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

CAUTION:

Always use new locking wire.

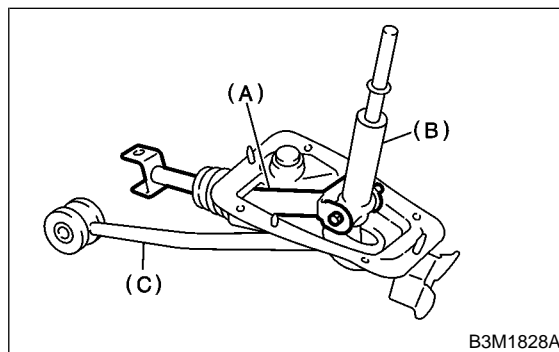


- (A) Locking wire
- (B) Stay

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

Tightening torque:

$12 \pm 3 \text{ N}\cdot\text{m}$ ($1.2 \pm 0.3 \text{ kg}\cdot\text{m}$, $8.7 \pm 2.2 \text{ ft}\cdot\text{lb}$)

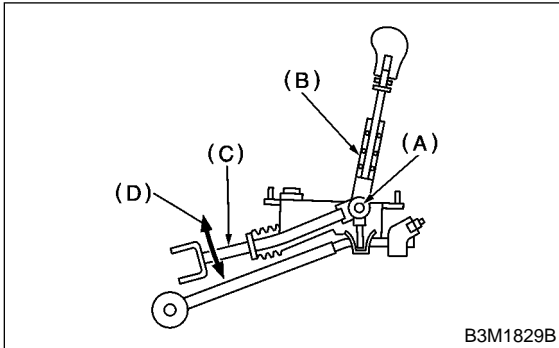


- (A) Rod
- (B) Shift lever
- (C) Stay

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

Rocking torque:

**$0.74 \pm 0.25 \text{ N}\cdot\text{m}$ ($0.075 \pm 0.025 \text{ kg}\cdot\text{m}$,
 $0.54 \pm 0.18 \text{ ft}\cdot\text{lb}$) or less**



- (A) Center of rotation
- (B) Lever
- (C) Rod
- (D) Swing torque

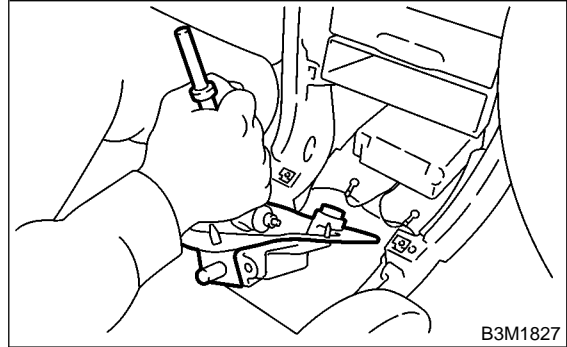
10) Check that there is no excessive play and that parts move smoothly.

E: INSTALLATION

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

NOTE:

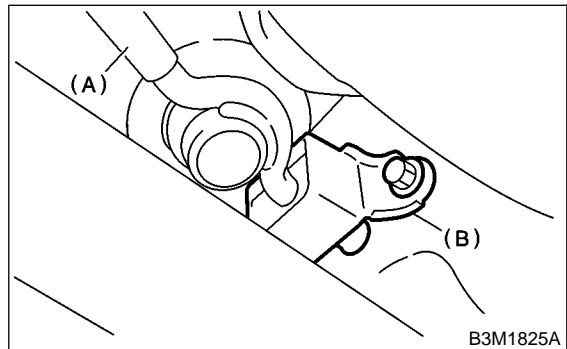
After inserting rod and stay, temporarily put them onto transmission mount.



- 3) Mount cushion rubber on the body.

Tightening torque:

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

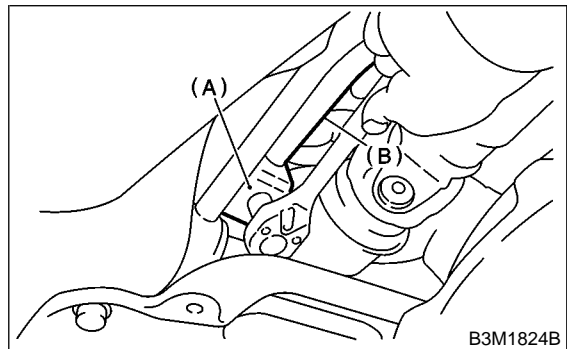


- (A) Cushion rubber
- (B) Stay

- 4) Connect rod to the joint.

Tightening torque:

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

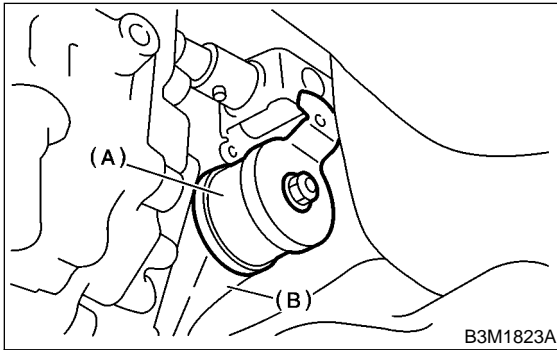


- (A) Joint
- (B) Rod

5) Connect stay to transmission bracket.

Tightening torque:

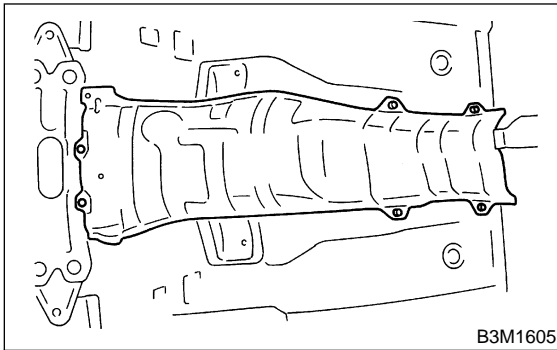
$18 \pm 5 \text{ N}\cdot\text{m}$ ($1.8 \pm 0.5 \text{ kg}\cdot\text{m}$, $13.0 \pm 3.6 \text{ ft}\cdot\text{lb}$)



B3M1823A

- (A) Stay
- (B) Transmission bracket

6) Install heat shield cover.

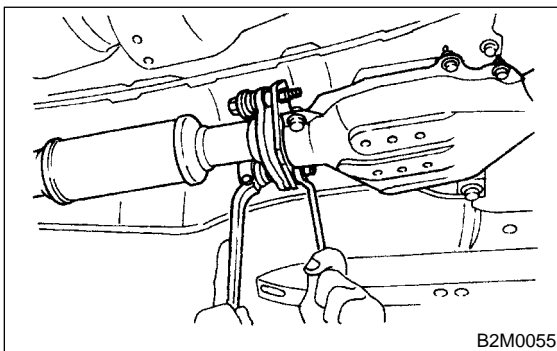


B3M1605

7) Install rear exhaust pipe to muffler.

Tightening torque:

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

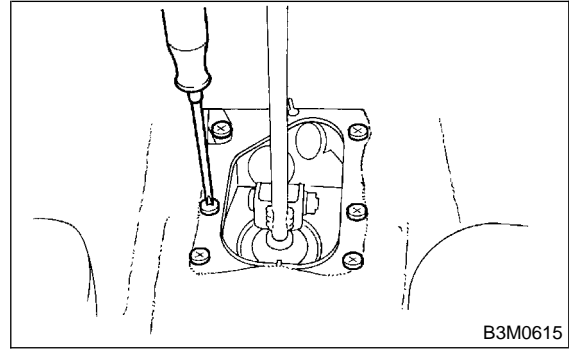


B2M0055

8) Mount boot plate on body.

Tightening torque:

$4.5 \pm 1.5 \text{ N}\cdot\text{m}$ ($0.46 \pm 0.15 \text{ kg}\cdot\text{m}$, $3.3 \pm 1.1 \text{ ft}\cdot\text{lb}$)



B3M0615

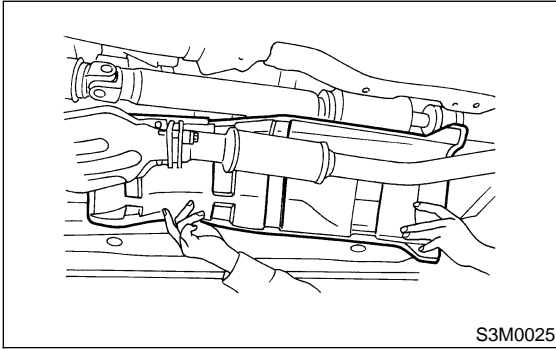
9) Install front cover, console boot and gear shift knob. <Ref. to 5-4 [W1B0].>

2. Select Cable

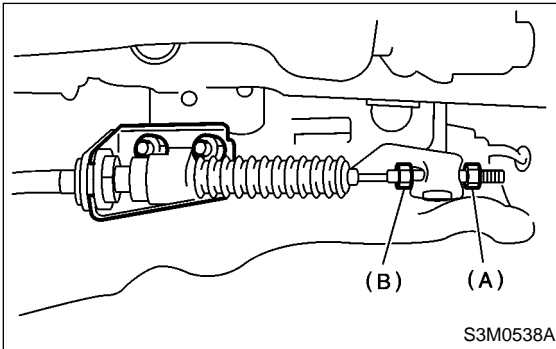
A: ADJUSTMENT

Move select lever from "P" position to "1" position. You should be able to feel the detentes in each position. If the detentes cannot be felt or the position pointer is improperly aligned, adjust the cable.

- 1) Prior to removal, set lever to "N" position.
- 2) Remove heat shield cover.

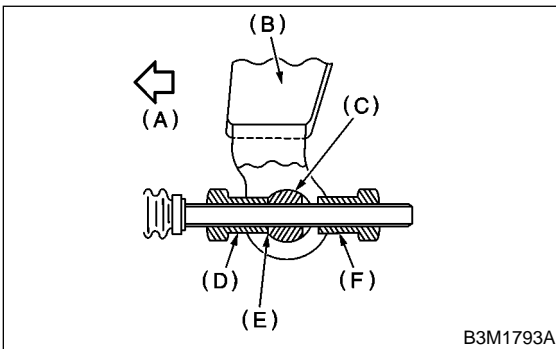


- 3) Loosen the adjusting nut on each side.



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

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

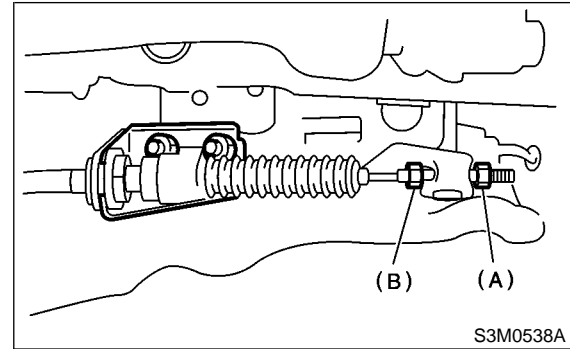


- (A) Front side
- (B) Select lever
- (C) Connector
- (D) Adjusting nut B
- (E) Contact point
- (F) Adjusting nut A

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

Tightening torque:

7.5±2.0 N·m (0.76±0.2 kg·m, 5.5±1.4 ft-lb)

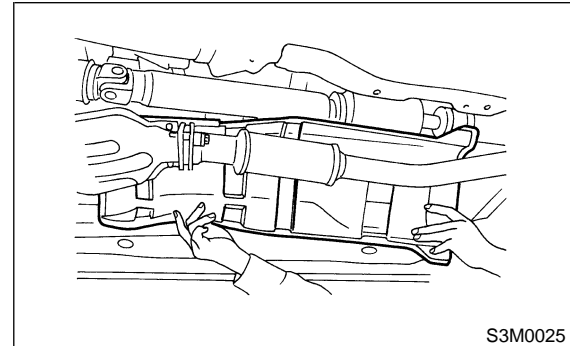


- (A) Adjusting nut A
- (B) Adjusting nut B

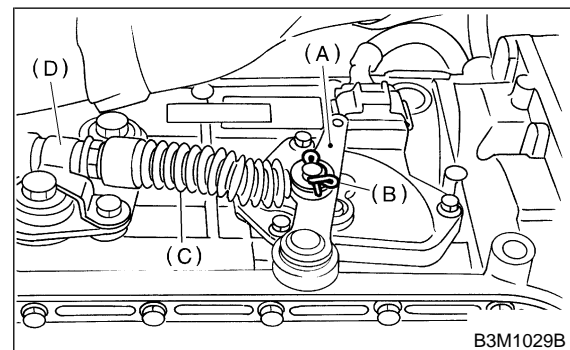
- 6) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.

B: REMOVAL

- 1) Prior to removal, set lever to "N" position.
- 2) Remove under cover.
- 3) Remove heat shield cover.

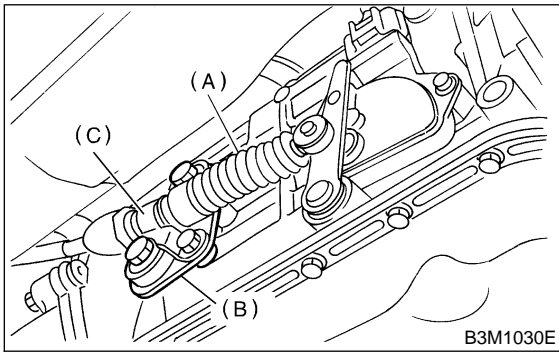


- 4) Remove snap pin from range select lever.



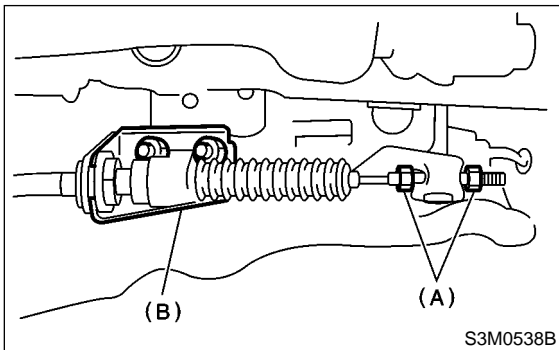
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp

5) Remove plate assembly from transmission case.



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

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



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

7) Remove select cable from plate assembly.

C: INSTALLATION

1) Install select cable to plate assembly.

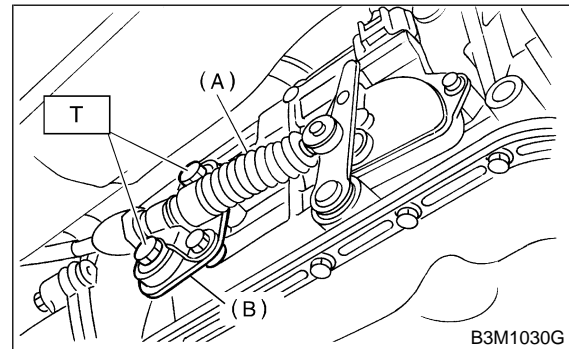
Tightening torque:
32±10 N·m (3.3±1.0 kg·m, 24±7 ft·lb)

2) Install select cable to range select lever.
3) Install select cable bracket to body.

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

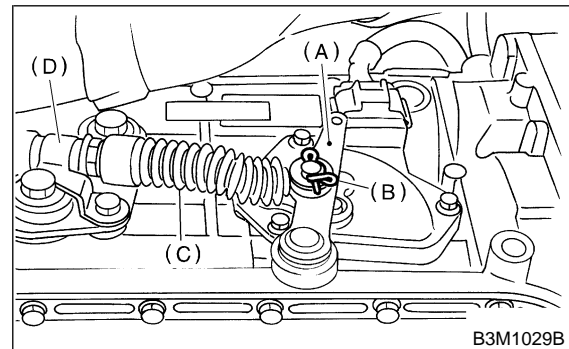
4) Install plate assembly to transmission.

Tightening torque:
T: 24.5±2.0 N·m (2.5±0.2 kg·m, 18.1±1.4 ft·lb)



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

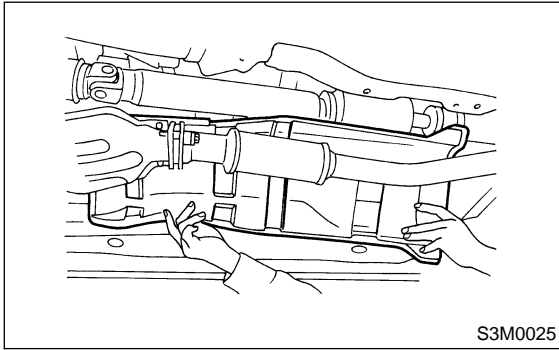
5) Install snap pin to range select lever.



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

6) Move the select lever to the "N" position, then adjust the select cable position. <Ref. to 3-3 [W2A0].>

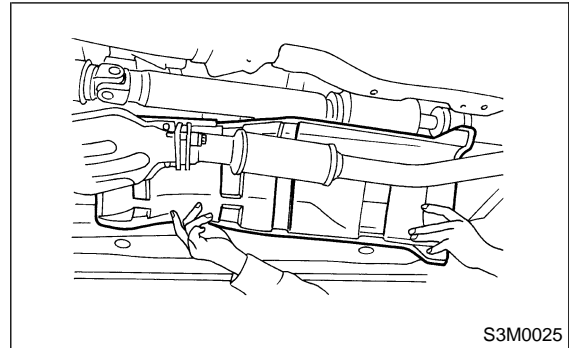
7) Install heat shield cover.



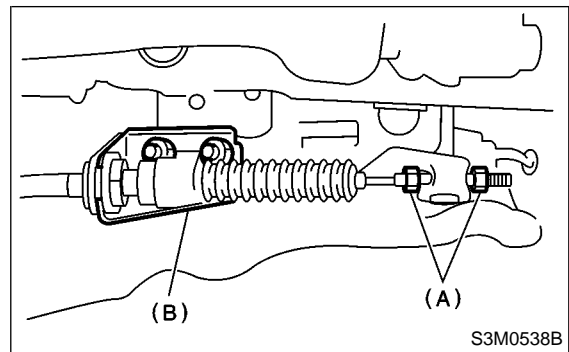
3. Select Lever

A: REMOVAL

- 1) Move the select lever to the "N" position.
- 2) Remove heat shield cover.

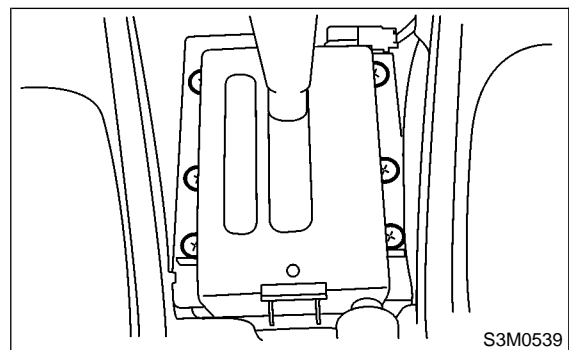


- 3) Disconnect cable from select lever and then remove cable bracket.

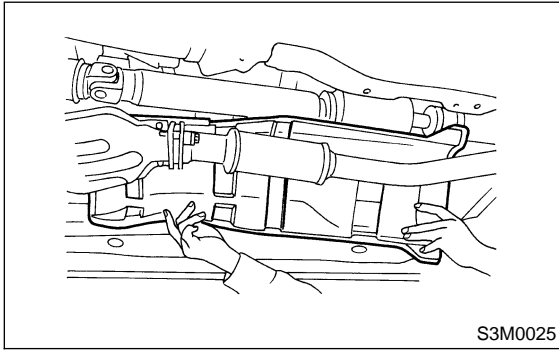


- (A) Adjusting nuts
- (B) Cable bracket

- 4) Remove front cover. <Ref. to 5-4 [W1A0].>
- 5) Disconnect connectors, and remove the stay.
- 6) Remove the six bolts to take out the select lever assembly from body.



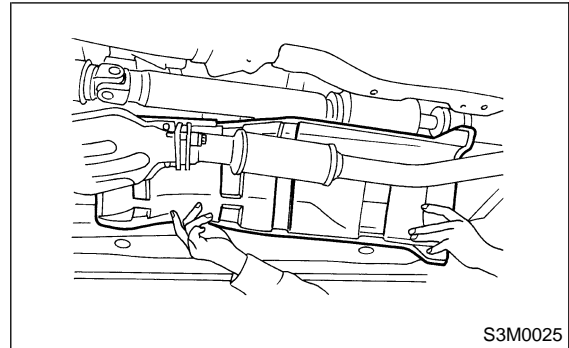
7) Install heat shield cover.



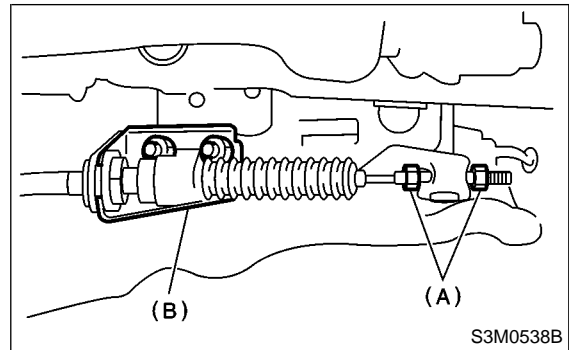
3. Select Lever

A: REMOVAL

- 1) Move the select lever to the "N" position.
- 2) Remove heat shield cover.

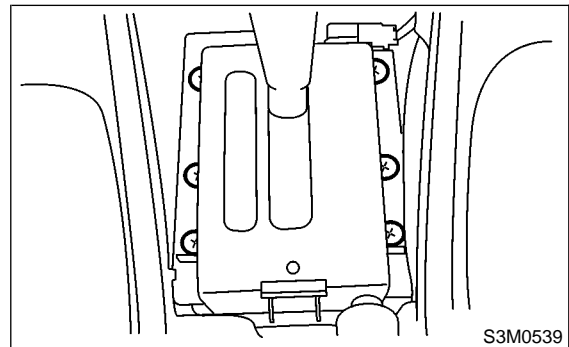


- 3) Disconnect cable from select lever and then remove cable bracket.



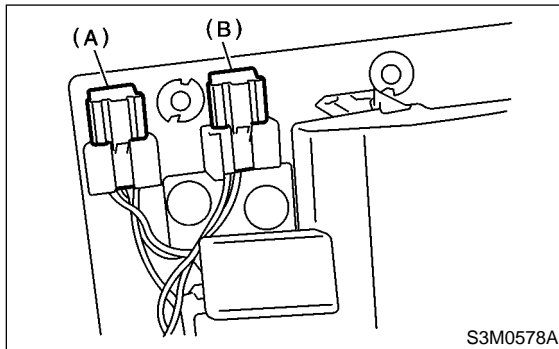
- (A) Adjusting nuts
- (B) Cable bracket

- 4) Remove front cover. <Ref. to 5-4 [W1A0].>
- 5) Disconnect connectors, and remove the stay.
- 6) Remove the six bolts to take out the select lever assembly from body.



B: DISASSEMBLY

1) Remove connectors from plate

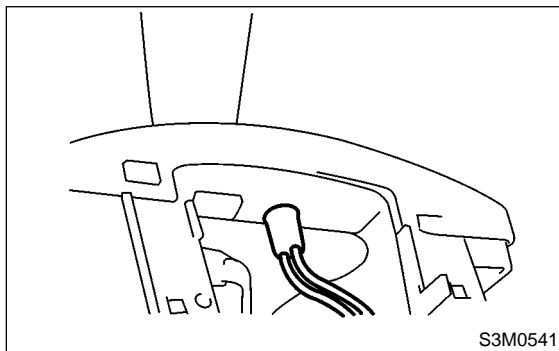


- (A) Shift-lock solenoid and "P" position switch connector
- (B) Indicator light connector

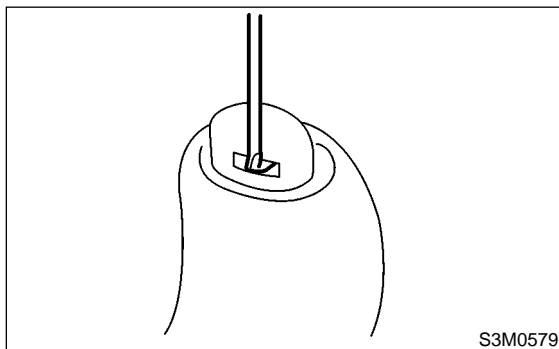
2) Remove indicator light.

NOTE:

Be careful not to break the indicator light during removal.



3) Remove the clip.



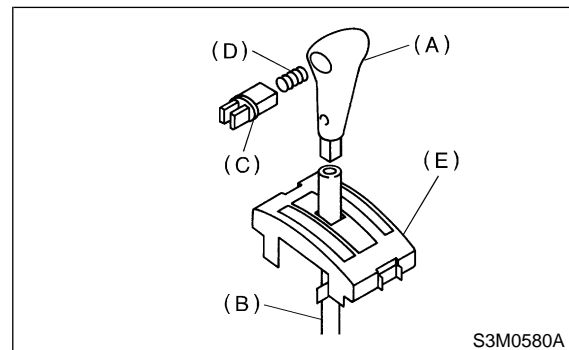
4) Remove the button A.

5) Remove the two screws from the select lever grip.

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

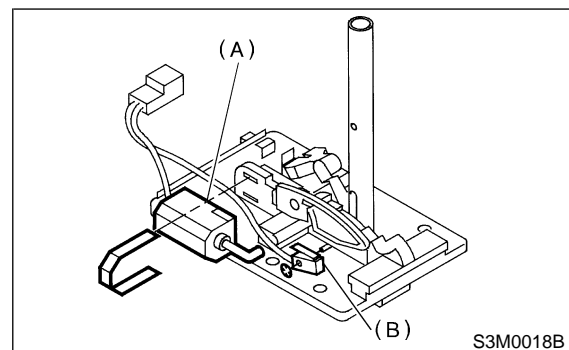
CAUTION:

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



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

7) Remove shift-lock solenoid and "P" position switch.

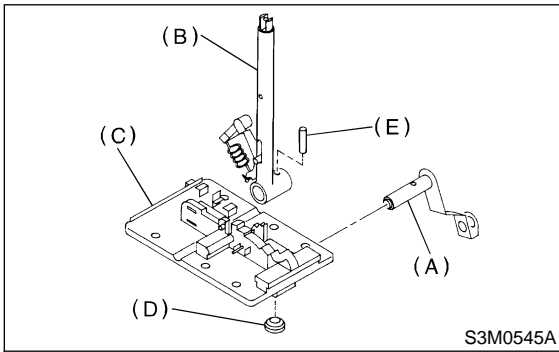


- (A) Shift-lock solenoid
- (B) "P" position switch

8) Remove lock plate.

9) Remove the cap, then the straight pin.

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



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

C: INSPECTION

1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.

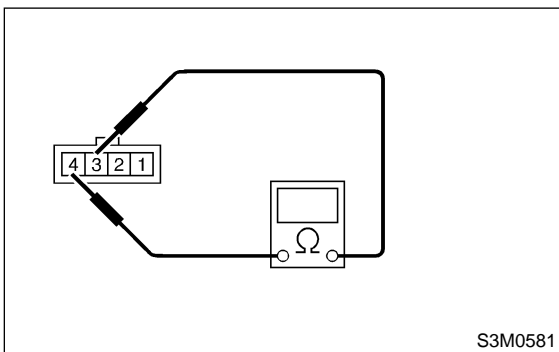
2) Confirm the following parts for operating condition before assembly.

(1) Sliding condition of the button in the grip: it should move smoothly.

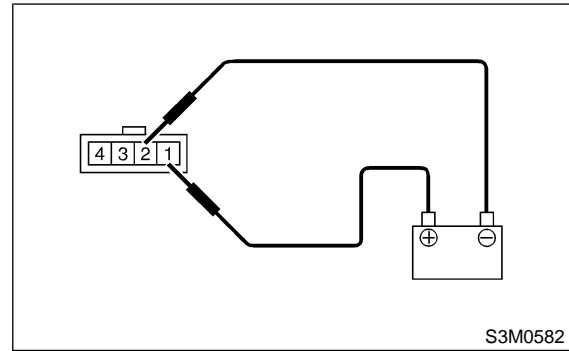
(2) Insertion of the grip on the select lever: when pushing the grip on the select lever by hand, screw holes should be aligned.

(3) Operation of select lever and rod: they should move smoothly.

3) Check connection and disconnection while turning the "P" position switch to ON-OFF.



4) Connect lead harness to connector terminal of shift-lock solenoid, and apply battery power to check whether the solenoid operates.

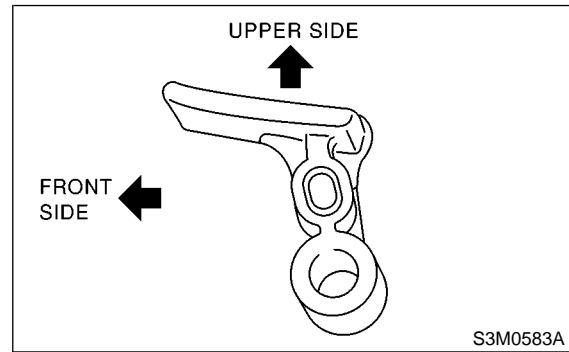


D: ASSEMBLY

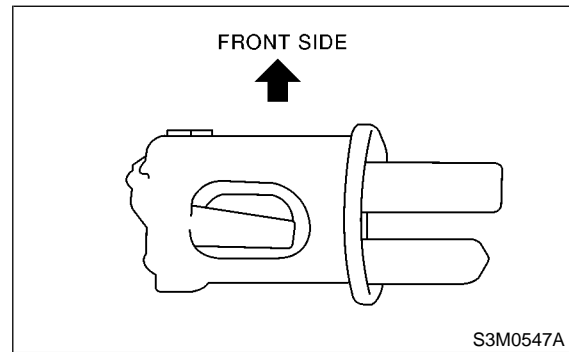
- 1) Clean all parts before assembly.
- 2) Apply grease [NIGHTIGHT LYW No. 2 or equivalent] to each part. <Ref. 3-3 [C200].>
- 3) Assemble in the reverse order of disassembly.

NOTE:

- When installing the lock plate, be careful to position it in the correct direction.



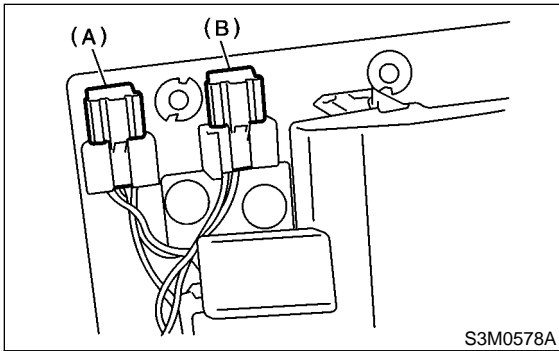
- Be careful to install the spring and button into the select lever grip in the correct direction.



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

E: INSTALLATION

1) Install the select indicator light, shift-lock solenoid and "P" position switch connectors.



- (A) Shift-lock solenoid and "P" position switch connector
- (B) Indicator light connector

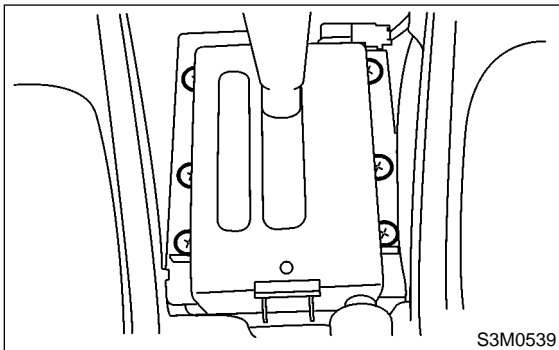
2) Install the select lever to vehicle.

NOTE:

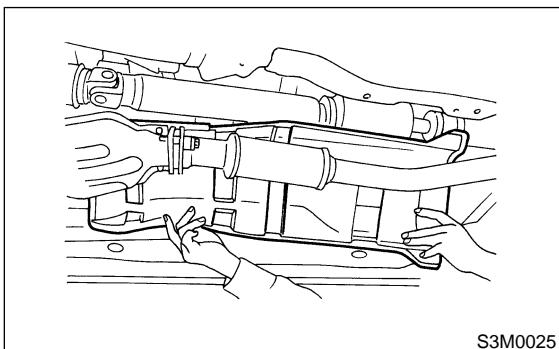
Do not allow the select lever to catch on the wiring harnesses, etc. during installation.

Tightening torque:

13±3 N·m (1.3±0.3 kg·m, 9.4±2.2 ft·lb)



- 3) Install front cover. <Ref. to 5-4 [W1B0].>
- 4) Move the select lever to the "N" position, then adjust the select cable position. <Ref. to 3-3 [W2A0].>
- 5) Install heat shield cover.

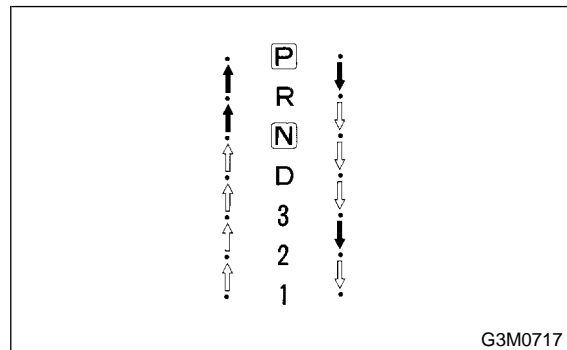


- 6) Check the following items.
 - (1) The engine starts operating when select lever is in position "P" or "N", but not in other positions.
 - (2) The back-up light is lit when the select lever is in position "R", but not in other positions.
 - (3) Check select lever operation.

WARNING:

Stop the engine while checking operation of select lever.

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



- 7) Check shift-lock system.
 - (1) Ensure ignition switch rotates from "ACC" to "LOCK" when the select lever is set at "P". Also check that ignition key can be removed only from the "LOCK" position.
 - (2) Ensure select lever moves from "P" to any other position when the brake pedal is depressed with ignition key set at "ON" or "START".

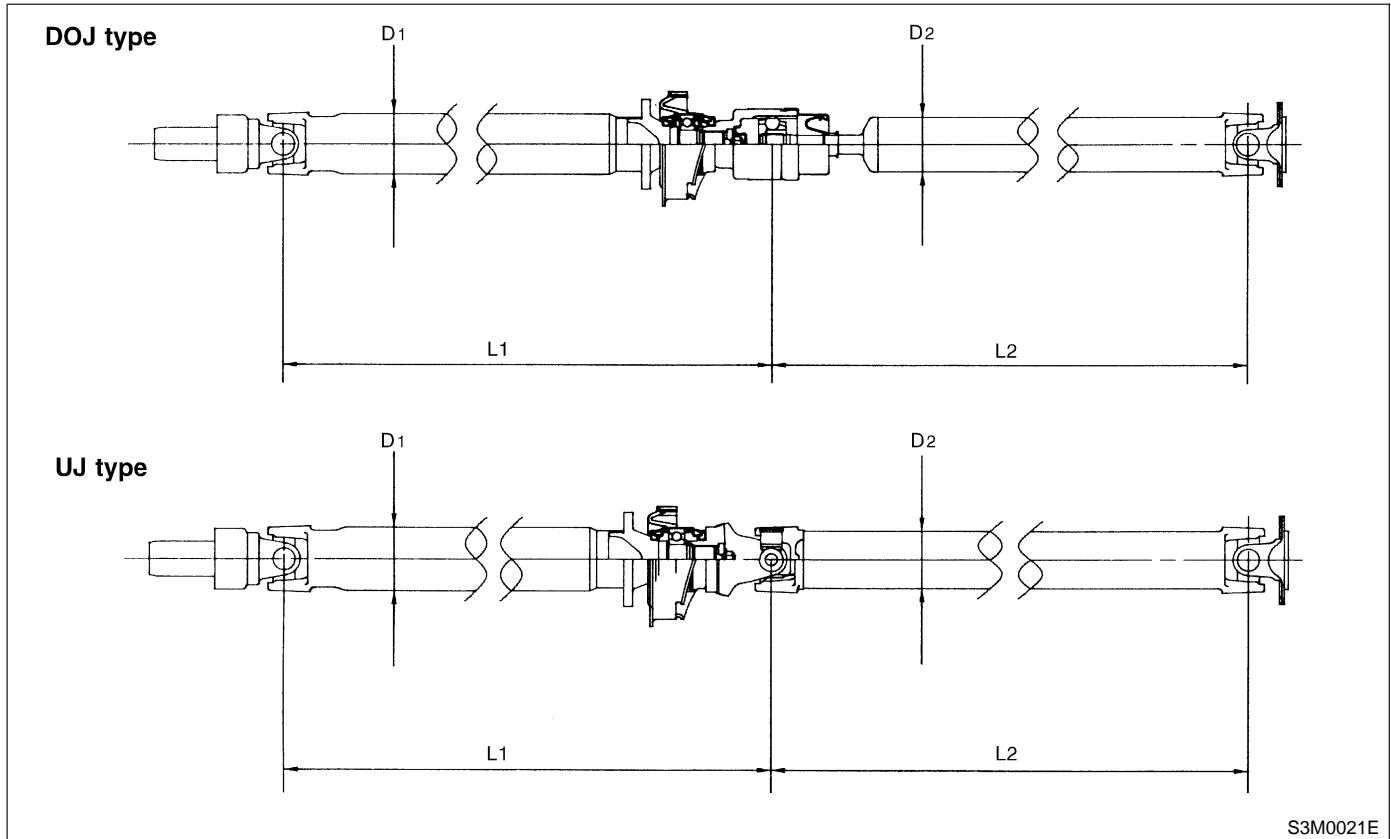
1. Select Lever

Symptom	Possible cause	Remedy
1. Select lever	(1) Starter does not run.	Adjust select cable and inhibitor switch, or inspect circuit.
	(2) Back-up light does not light up.	Adjust select cable and inhibitor switch, or inspect circuit.
	(3) Select lever does not move from "P" to "R" position.	Adjust select cable and inhibitor switch, or inspect AT shift-lock circuit.

1. Propeller Shaft

A: SPECIFICATIONS

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



2. Rear Differential

A: SPECIFICATIONS

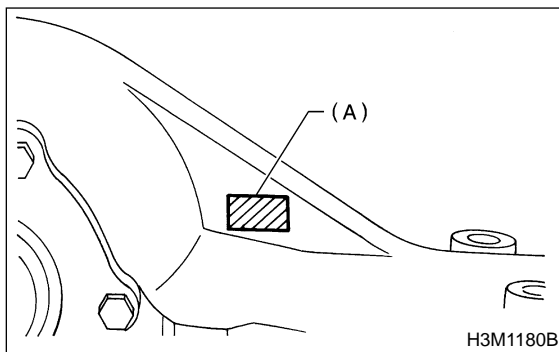
Model	MT	AT	MT	AT
Rear differential type	T type T2	T type TP	T type BK	T type CF
	Without LSD		With LSD	
Type of gear	Hipoide gear			
Gear ratio (Number of gear teeth)	4.111 (37/9)	4.444 (40/9)	4.111 (37/9)	4.444 (40/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)			
Rear differential gear oil	GL-5			

B: IDENTIFICATION

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

CAUTION:

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



(A) Stamp location

C: ADJUSTING PARTS

Front and rear bearing preload at companion flange bolt hole	New bearing	19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb)
	Used bearing	8.34 — 16.67 N (0.85 — 1.70 kg, 1.87 — 3.75 lb)
Preload adjusting spacer	Part No.	Length
	383695201	56.2 mm (2.213 in)
	383695202	56.4 mm (2.220 in)
	383695203	56.6 mm (2.228 in)
	383695204	56.8 mm (2.236 in)
	383695205	57.0 mm (2.244 in)
	383695206	57.2 mm (2.252 in)
Preload adjusting washer	Part No.	Thickness
	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
	383835200	2.33 mm (0.0917 in)
383845200	2.31 mm (0.0909 in)	
Pinion height adjusting shim	Part No.	Thickness
	383495200	3.09 mm (0.1217 in)
	383505200	3.12 mm (0.1228 in)
	383515200	3.15 mm (0.1240 in)
	383525200	3.18 mm (0.1252 in)
	383535200	3.21 mm (0.1264 in)
	383545200	3.24 mm (0.1276 in)
	383555200	3.27 mm (0.1287 in)
	383565200	3.30 mm (0.1299 in)
	383575200	3.33 mm (0.1311 in)
	383585200	3.36 mm (0.1323 in)
	383595200	3.39 mm (0.1335 in)
	383605200	3.42 mm (0.1346 in)
	383615200	3.45 mm (0.1358 in)
	383625200	3.48 mm (0.1370 in)
	383635200	3.51 mm (0.1382 in)
	383645200	3.54 mm (0.1394 in)
383655200	3.57 mm (0.1406 in)	
383665200	3.60 mm (0.1417 in)	
383675200	3.63 mm (0.1429 in)	
383685200	3.66 mm (0.1441 in)	
Side gear backlash	—	0.10 — 0.20 mm (0.0039 — 0.0079 in)

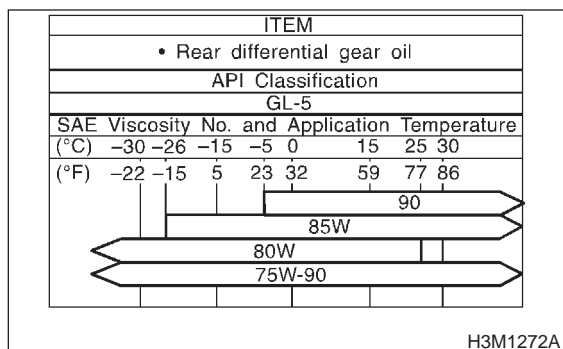
	Part No.	Thickness
Side gear thrust washer	383445201	0.75 — 0.80 mm (0.0295 — 0.0315 in)
	383445202	0.80 — 0.85 mm (0.0315 — 0.0335 in)
	383445203	0.85 — 0.90 mm (0.0335 — 0.0354 in)
Side bearing standard width	—	20.00 mm (0.7874 in)
	Part No.	Thickness
Side bearing retainer shim	383475201	0.20 mm (0.0079 in)
	383475202	0.25 mm (0.0098 in)
	383475203	0.30 mm (0.0118 in)
	383475204	0.40 mm (0.0157 in)
	383475205	0.50 mm (0.0197 in)
Crown gear to drive pinion backlash	Limit	0.10 — 0.20 mm (0.0039 — 0.0079 in)
Crown gear runout on its back surface		0.05 mm (0.0020 in)

D: REAR DIFFERENTIAL GEAR OIL

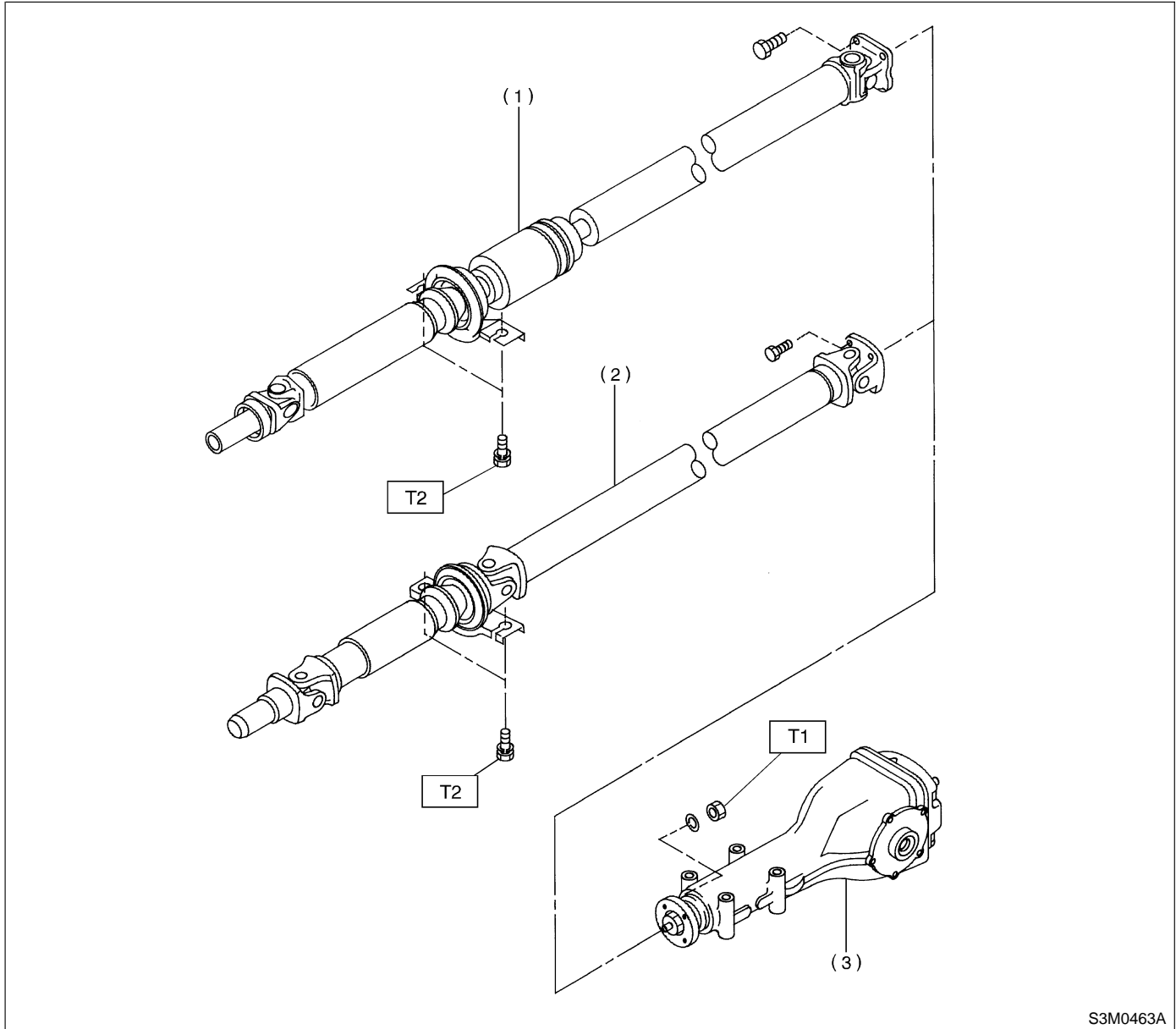
- Recommended oil

CAUTION:

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



1. Propeller Shaft



S3M0463A

- (1) Propeller shaft (DOJ type)
- (2) Propeller shaft (UJ type)
- (3) Rear differential

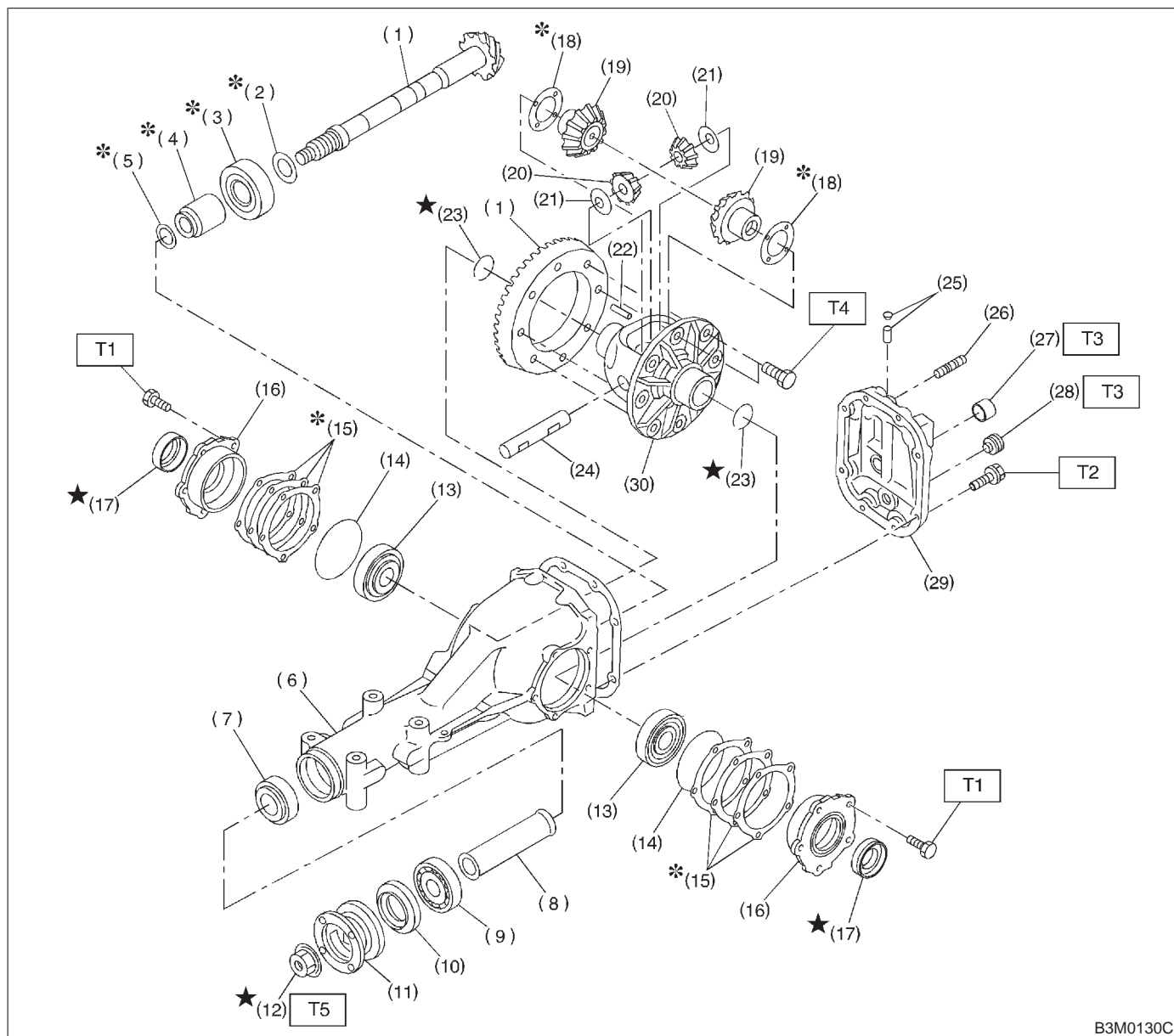
Tightening torque: N·m (kg·m, ft·lb)

T1: 31±8 (3.2±0.8, 23.1±5.8)

T2: 52±5 (5.3±0.5, 38.3±3.6)

2. Rear Differential Assembly

A: WITHOUT LSD



B3M0130C

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

Tightening torque: N·m (kg·m, ft·lb)

T1: 10.3±1.5 (1.05±0.15, 7.6±1.1)

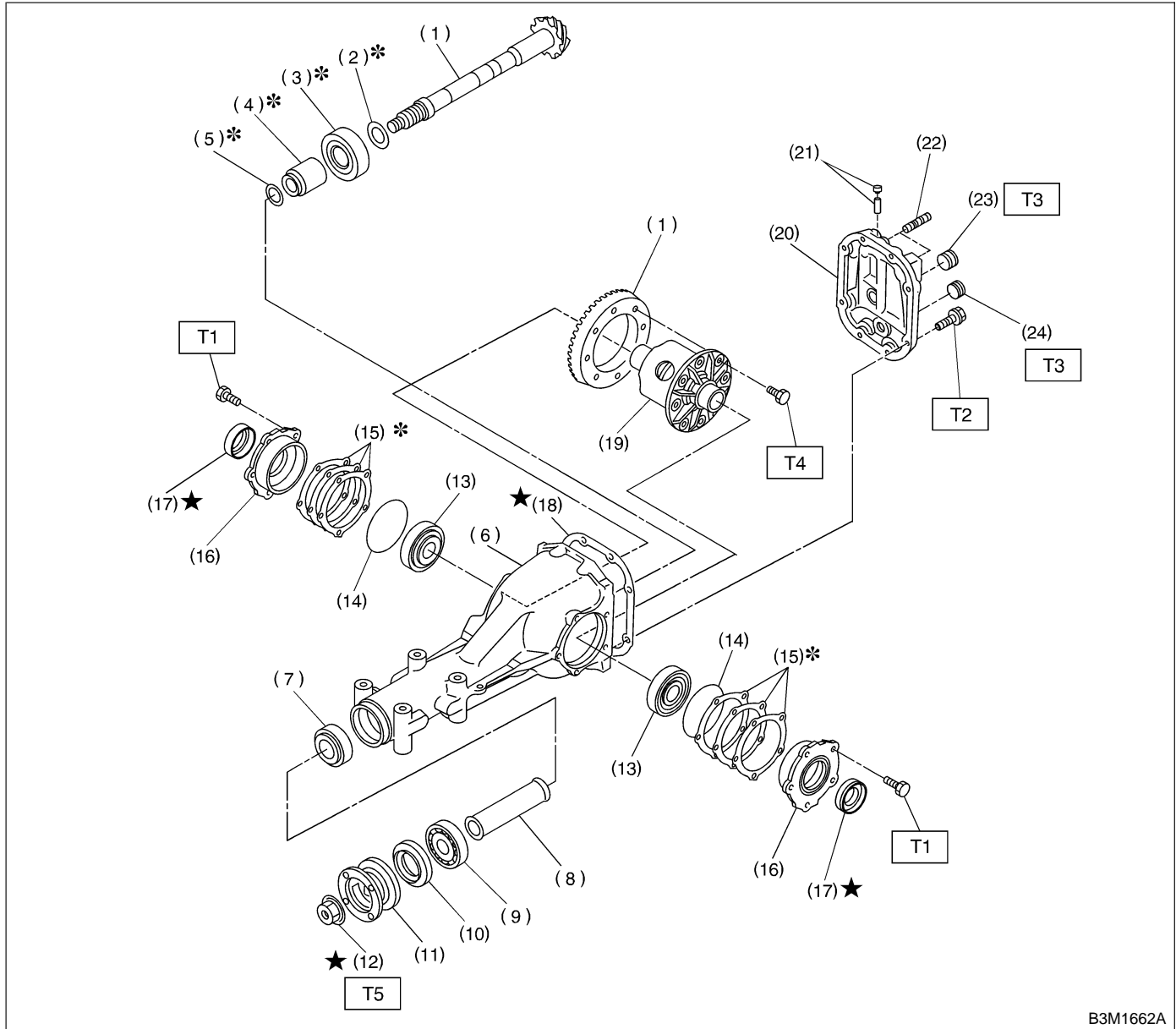
T2: 29±4.9 (3.0±0.5, 21.7±3.6)

T3: 49.0±9.8 (5.0±1.0, 36.2±7.2)

T4: 103±10 (10.5±1.0, 76±7)

T5: 181±14 (18.5±1.5, 134±11)

B: WITH LSD



B3M1662A

- | | |
|--------------------------------------|---------------------------------|
| (1) Pinion crown gear set | (12) Self-locking nut |
| (2) Pinion height adjusting shim | (13) Side bearing |
| (3) Rear bearing | (14) O-ring |
| (4) Bearing preload adjusting spacer | (15) Side bearing retainer shim |
| (5) Bearing preload adjusting washer | (16) Side bearing retainer |
| (6) Differential carrier | (17) Side oil seal |
| (7) Front bearing | (18) Gasket |
| (8) Collar | (19) Differential case |
| (9) Pilot bearing | (20) Rear cover |
| (10) Front oil seal | (21) Air breather cap |
| (11) Companion flange | (22) Stud bolt |

- (24) Oil drain plug

Tightening torque: N·m (kg·m, ft·lb)

T1: 10.3±1.5 (1.05±0.15, 7.6±1.1)

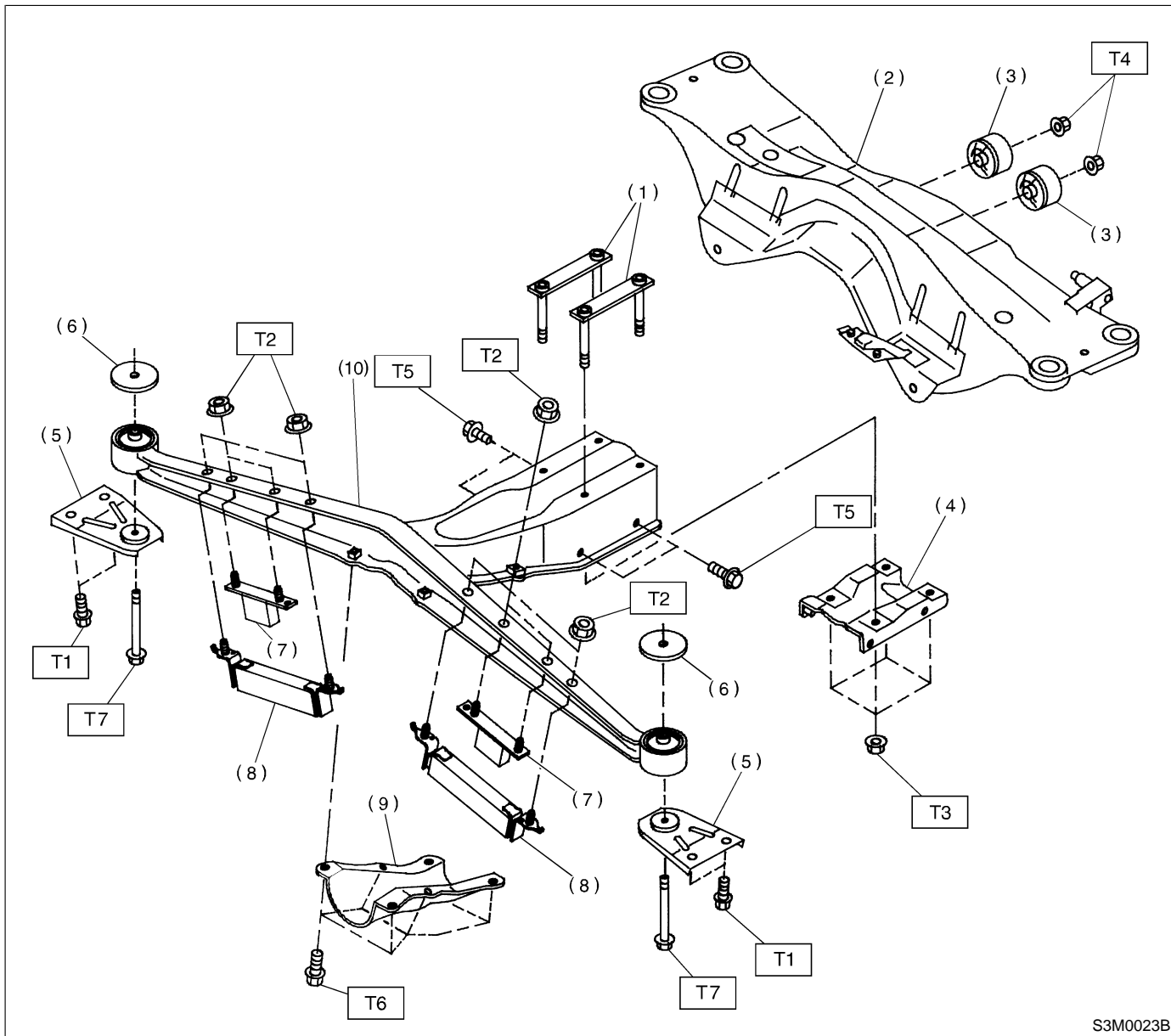
T2: 29±5 (3.0±0.5, 21.7±3.6)

**T3: 49.0±9.8
(5.0±1.0, 36.2±7.2)**

**T4: 103.0±9.8
(10.50±1.00, 75.9±7.2)**

**T5: 181±15
(18.5±1.5, 134±11)**

3. Rear Differential Mounting System



S3M0023B

- | | |
|--------------------------------------|------------------------------------|
| (1) Plate | (8) Dynamic damper (MT vehicles) |
| (2) Crossmember | (9) Differential mount front cover |
| (3) Rear bushing | (10) Differential front member |
| (4) Differential mount lower bracket | |
| (5) Differential mount bracket | |
| (6) Stopper | |
| (7) Mass damper (AT vehicles) | |

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

- T1: 32±8 (3.3±0.8, 23.9±5.8)**
T2: 40±10 (4.1±1.0, 29.7±7.2)
T3: 64±8 (6.5±0.8, 47.0±5.8)
T4: 69±8 (7.0±0.8, 50.6±5.8)
T5: 69±10 (7.0±1.0, 51.0±7.2)
T6: 88±10 (9.0±1.0, 65.0±7.2)
T7: 98±10 (10.0±1.0, 72.0±7.2)

1. Propeller Shaft

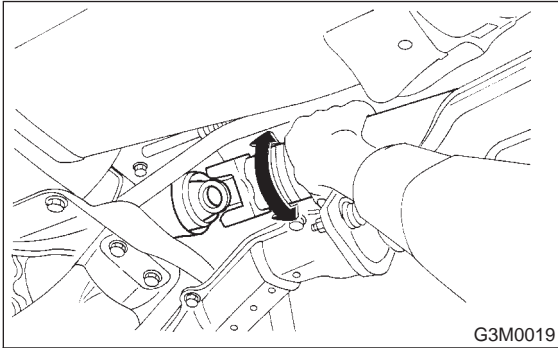
A: ON-CAR SERVICE

1) Joints and connections

Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.

2) Splines and bearing locations

Turn propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.



3) Runout of propeller shaft

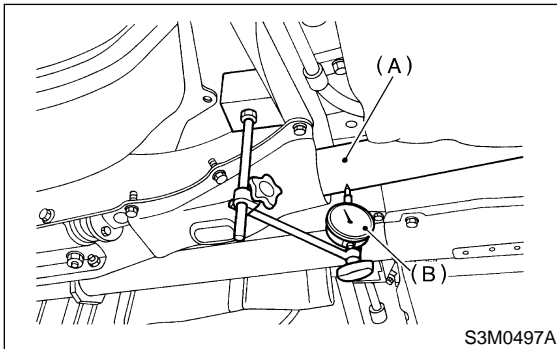
Turn rear wheels by hand to check for "runout" of propeller shaft.

NOTE:

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

Runout:

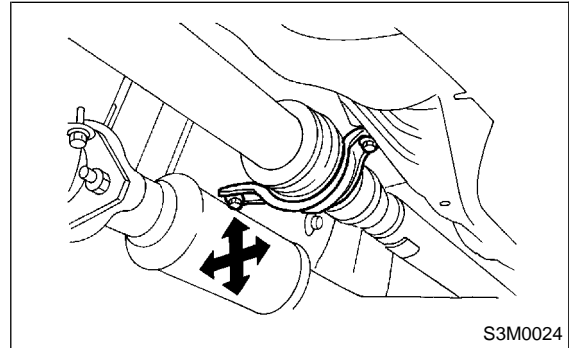
Limit 0.6 mm (0.024 in)



- (A) Propeller shaft
(B) Dial gauge

4) Center bearing free play

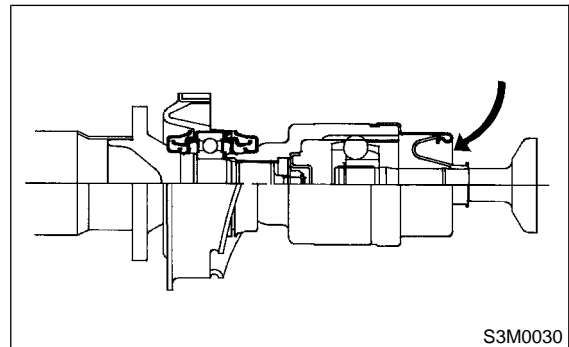
While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.



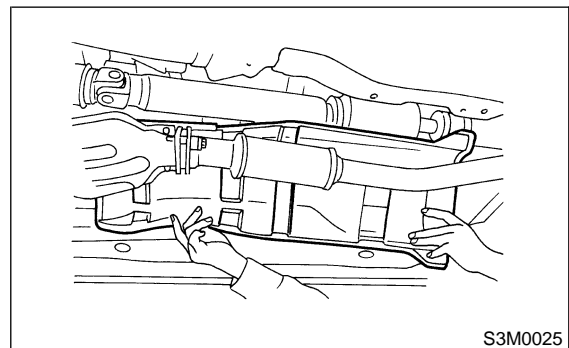
B: REMOVAL

NOTE:

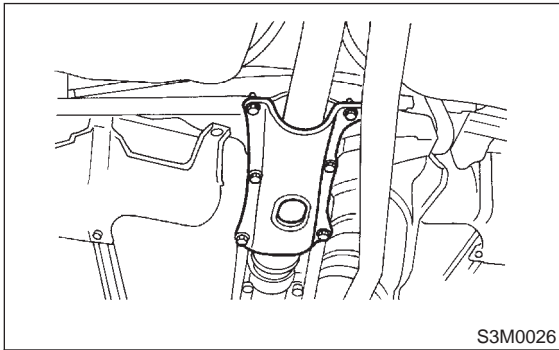
- Before removing propeller shaft, wrap metal parts with a cloth or rubber material.
- In case of DOJ type, before removing propeller shaft, wrap metal parts (installed at the rubber boot of center DOJ) with a cloth or rubber material, as shown in the figure. Rubber boot may be damaged due to interference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



- 1) Disconnect ground terminal from battery.
- 2) Move select lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Jack-up vehicle and support it with sturdy racks.
- 5) Remove front exhaust cover.



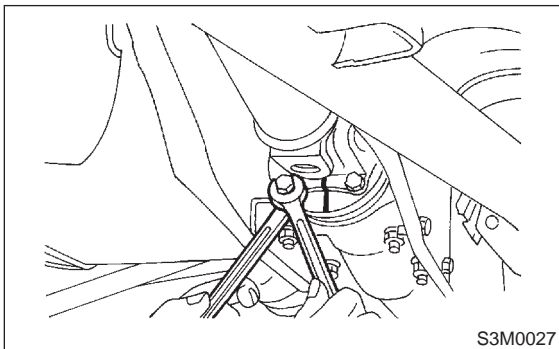
6) Remove differential mount front cover.



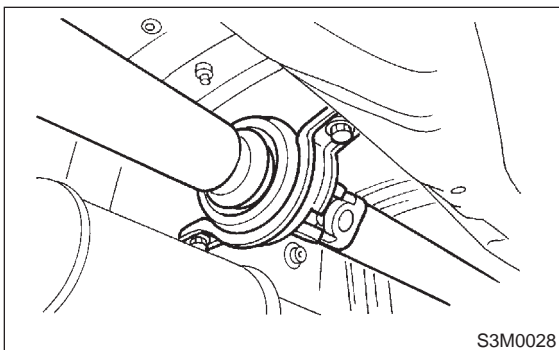
7) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:

- Put matching mark on affected parts before removal.
- Remove all but one bolt.



8) Remove the two bolts which hold center bearing to vehicle body.



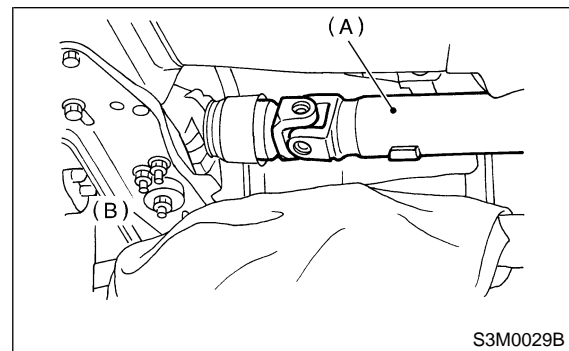
9) Remove propeller shaft from transmission.

CAUTION:

- Be sure not to damage oil seals and the frictional surface of sleeve yoke.
- Cover the center exhaust pipe with a cloth because ATF or oil may be spilled from transmission, when removing propeller shaft.

NOTE:

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

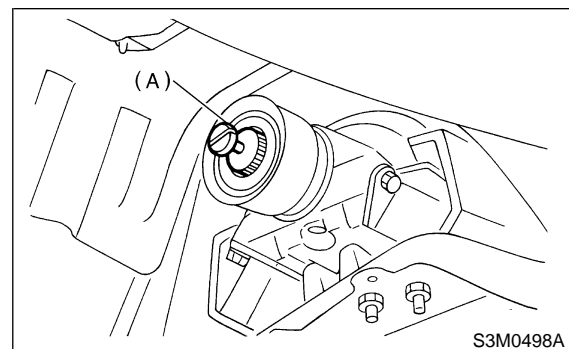


- (A) Propeller shaft
- (B) Cloth

10) Install the extension cap to transmission.

NOTE:

If extension cap is not available, cover the opening with a vinyl bag in order to prevent gear oil or ATF leakage.



- (A) Extension cap

C: DISASSEMBLY AND ASSEMBLY

NOTE:

Do not disassemble propeller shaft. It is a single unit.

D: INSPECTION

NOTE:

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

- 1) Tube surfaces for dents or cracks

1. Propeller Shaft

- 2) Splines for deformation or abnormal wear
- 3) Joints for non-smooth operation or abnormal noise
- 4) Center bearing for free play, noise or non-smooth operation
- 5) Oil seals for abnormal wear or damage
- 6) Center bearing for breakage or damage to rubber boot

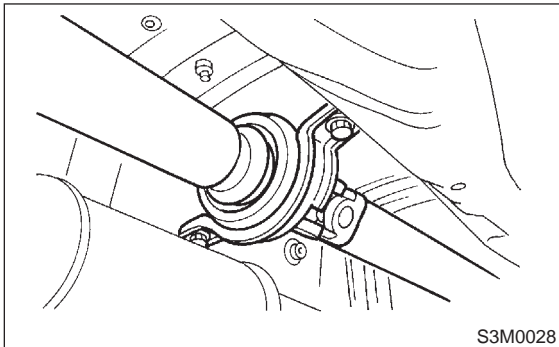
E: INSTALLATION**NOTE:**

Be careful not to damage rubber boot (installed at DOJ) while installing propeller shaft.

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

Tightening torque:

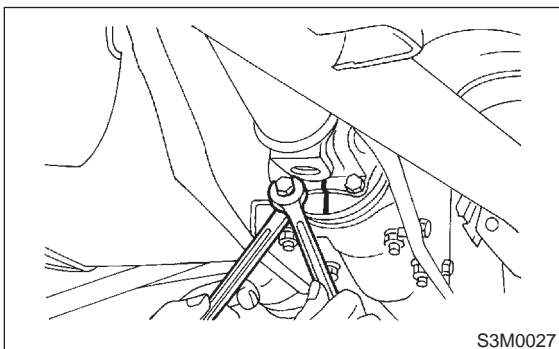
$52 \pm 5 \text{ N}\cdot\text{m}$ ($5.3 \pm 0.5 \text{ kg}\cdot\text{m}$, $38.3 \pm 3.6 \text{ ft}\cdot\text{lb}$)



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

Tightening torque:

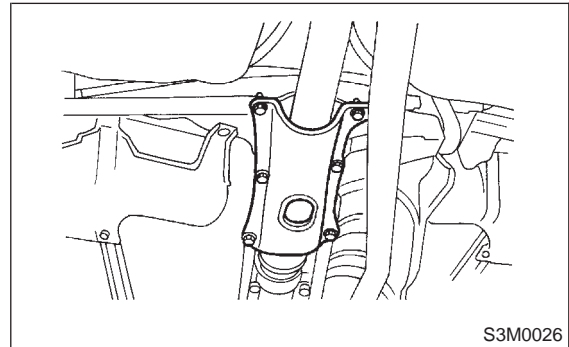
$31 \pm 8 \text{ N}\cdot\text{m}$ ($3.2 \pm 0.8 \text{ kg}\cdot\text{m}$, $23.1 \pm 5.8 \text{ ft}\cdot\text{lb}$)



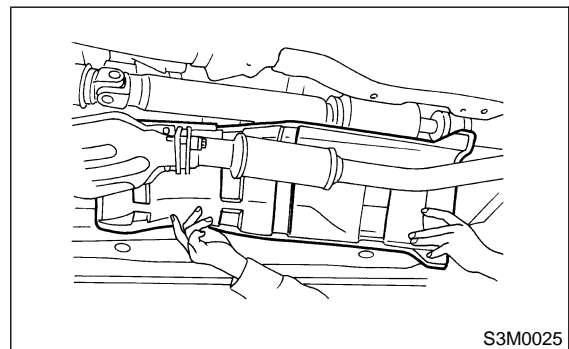
- 3) Install differential mount front cover.

Tightening torque:

$88 \pm 10 \text{ N}\cdot\text{m}$ ($9.0 \pm 1.0 \text{ kg}\cdot\text{m}$, $65 \pm 7 \text{ ft}\cdot\text{lb}$)



- 4) Install front exhaust cover.



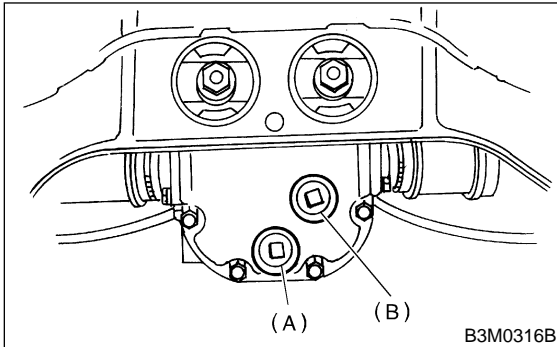
- 5) Install rear exhaust pipe and muffler.

2. Rear Differential

A: ON-CAR SERVICE

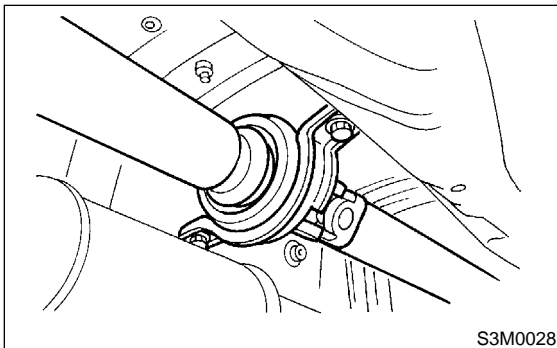
1. FRONT OIL SEAL

- 1) Disconnect ground terminal from battery.
- 2) Move select lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Remove oil drain plug, and drain gear oil.

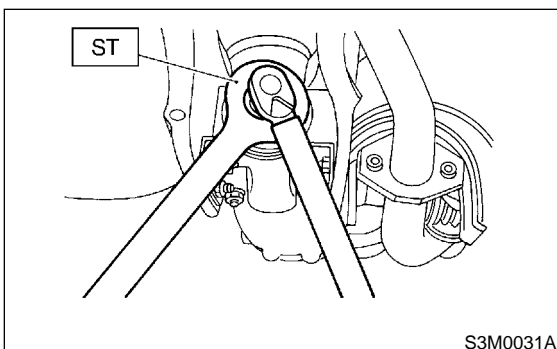


- (A) Drain plug
- (B) Filler plug

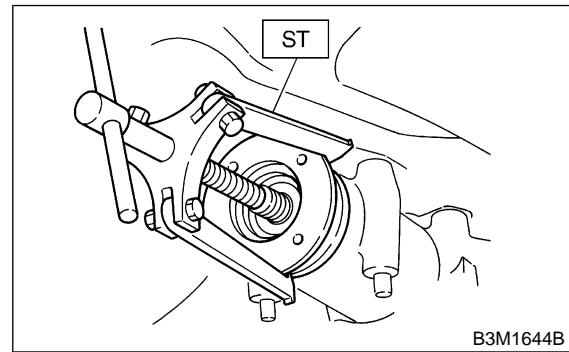
- 5) Jack-up rear wheels and support the vehicle body with sturdy racks.
- 6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>



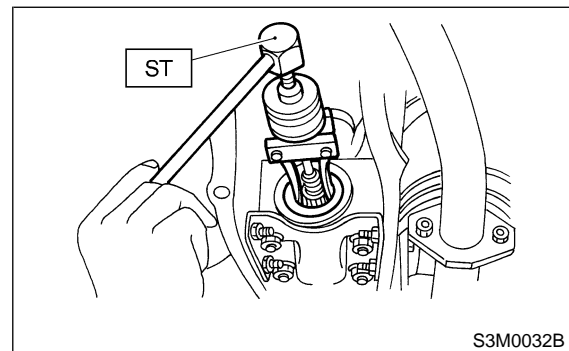
- 7) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



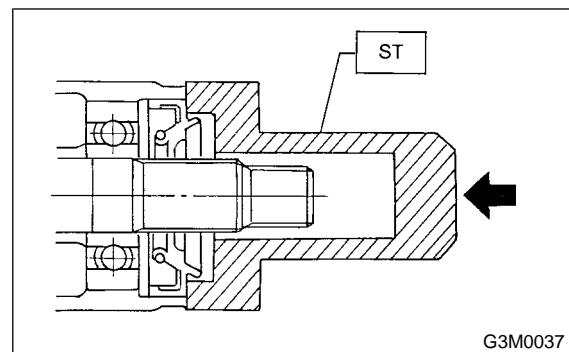
- 8) Extract companion flange with a puller.



- 9) Remove oil seal using ST.
ST 398527700 PULLER ASSY



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



- 11) Install companion flange.

2. Rear Differential

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

CAUTION:

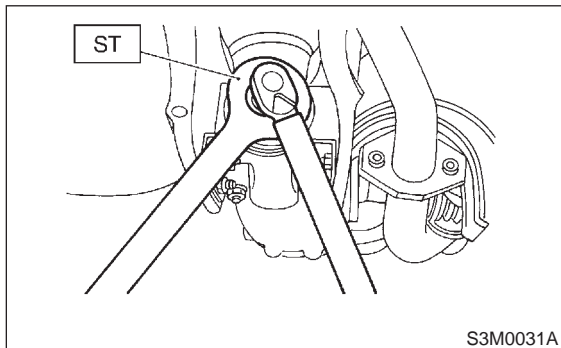
Use a new self-locking nut.

ST 498427200 FLANGE WRENCH

Tightening torque:

181.4±14.7 N·m (18.50±1.50 kg·m,

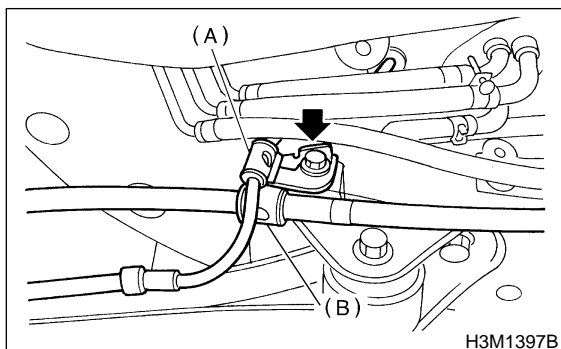
133.8±10.8 ft·lb)



13) Reassembling procedure hereafter is the reverse of the disassembling.

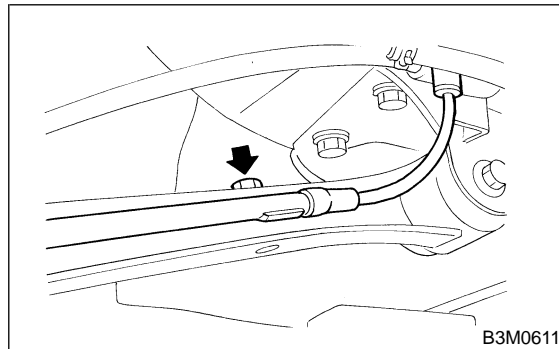
2. SIDE OIL SEAL

- 1) Disconnect ground terminal from battery.
- 2) Move select lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen both wheel nuts.
- 5) Jack-up the vehicle and support it with rigid racks.
- 6) Remove wheels.
- 7) Remove muffler. <Ref. to 2-9 [W3A0].>
- 8) Remove the ABS sensor cable clamp and parking brake cable clamp from bracket.

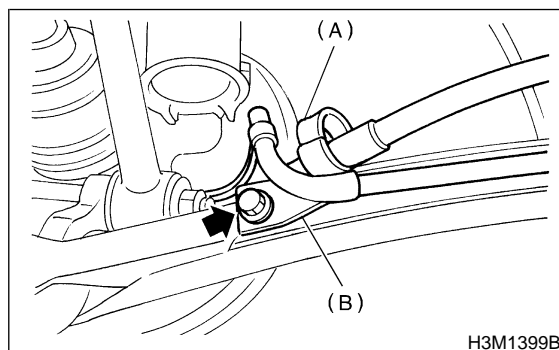


- (A) ABS sensor cable clamp
- (B) Parking brake cable clamp

9) Remove the ABS sensor cable clamp from the trailing link.

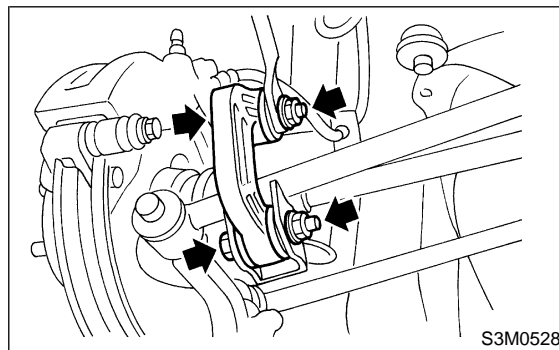


10) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.

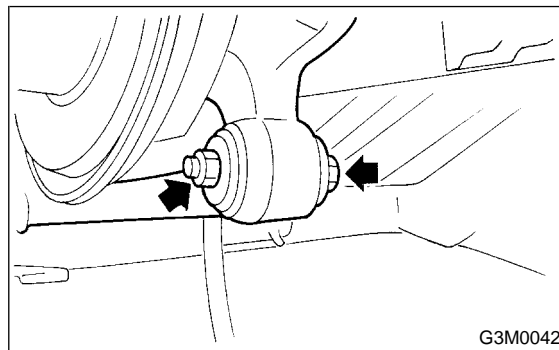


- (A) ABS sensor cable clamp
- (B) Parking brake cable clamp

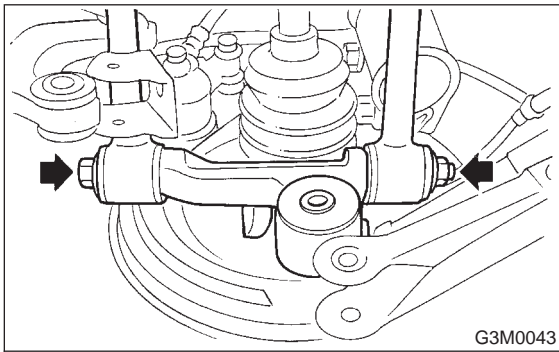
11) Remove the rear stabilizer link.



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



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

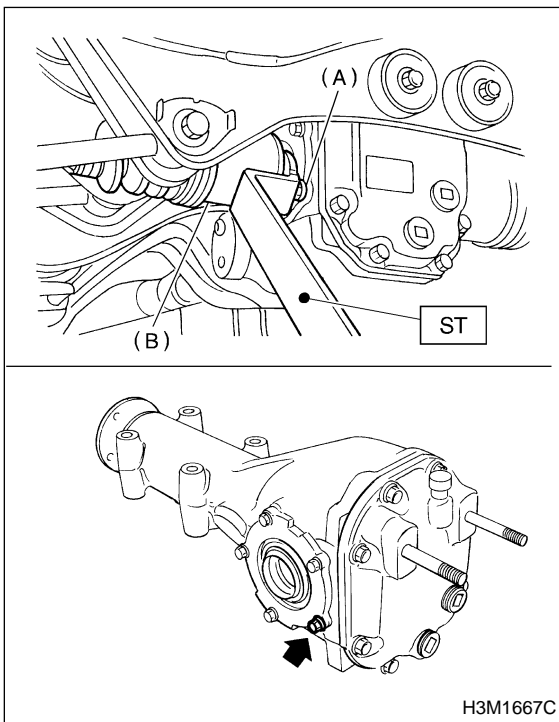


14) Remove the DOJ from the rear differential by using ST.

CAUTION:

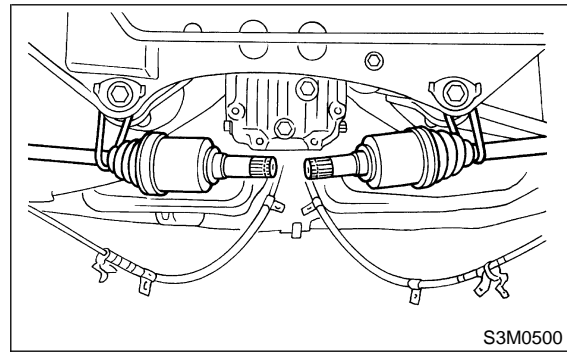
When removing the DOJ from the rear differential, fit ST to the bolt as shown in figure so as not to damage the side bearing retainer.

ST 208099PA100 DRIVE SHAFT REMOVER

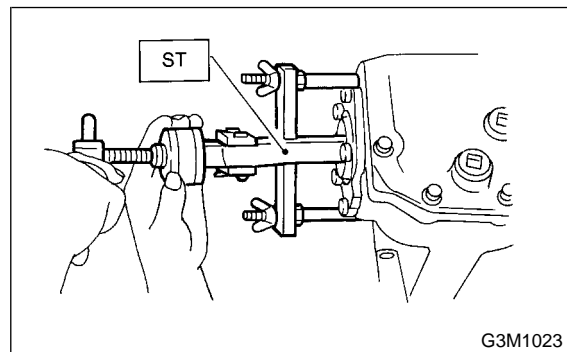


- (A) Bolt
- (B) DOJ

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



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

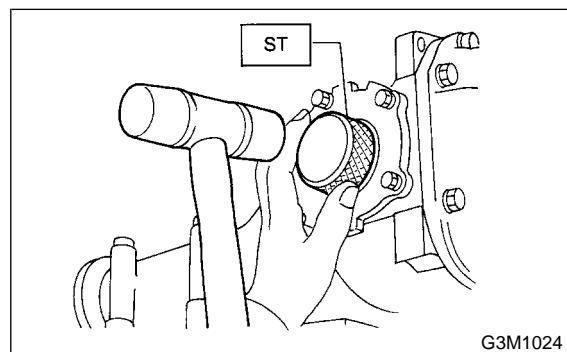


17) Drive in a new side oil seal with ST.

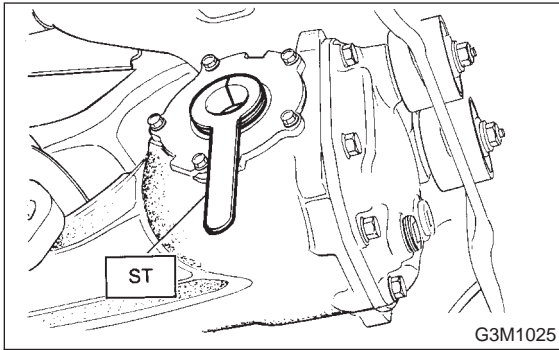
CAUTION:

Apply chassis grease between the oil seal lips.

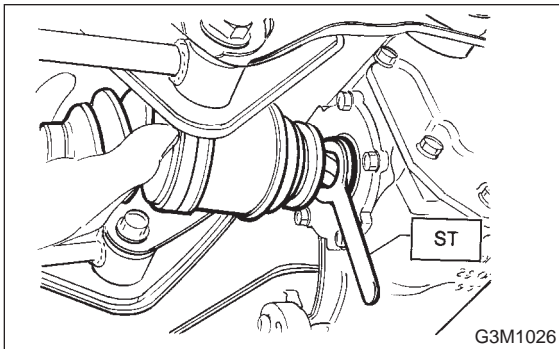
ST 398437700 DRIFT



- 18) Install ST to rear differential.
 ST 28099PA090 SIDE OIL SEAL PROTECTOR



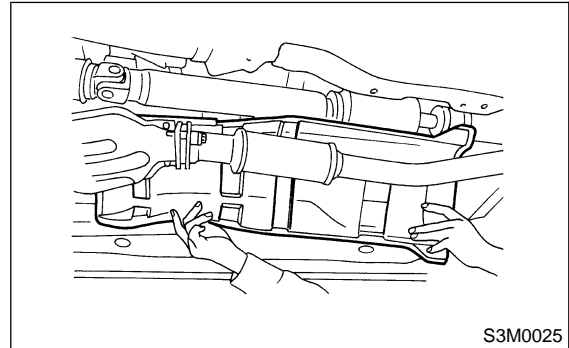
- 19) Insert the spline shaft until the spline portion is inside the side oil seal.
 ST 28099PA090 SIDE OIL SEAL PROTECTOR



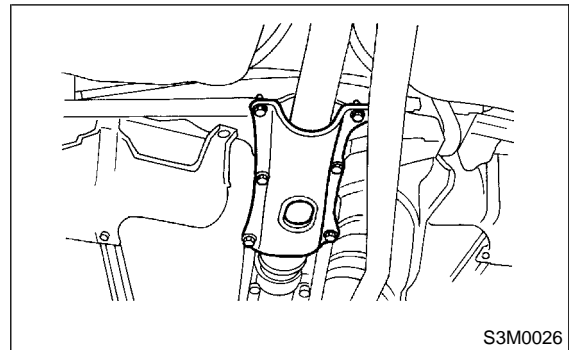
- 20) Remove ST.
 ST 28099PA090 SIDE OIL SEAL PROTECTOR
- 21) Reassemble in the reverse order of disassembly.

B: REMOVAL

- 1) Disconnect ground terminal from battery.
- 2) Move select lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
 <Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>
- 8) Remove front exhaust cover.



- 9) Remove front cover of rear differential mount.



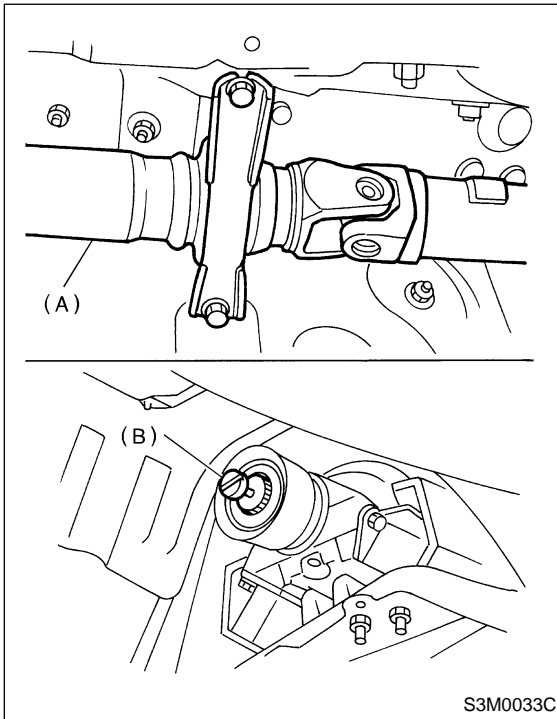
10) Remove propeller shaft.

CAUTION:

When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

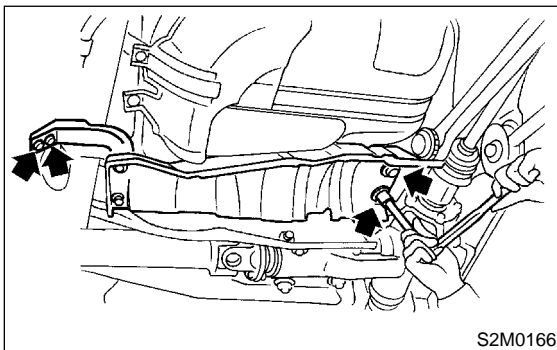
NOTE:

- Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
- Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.

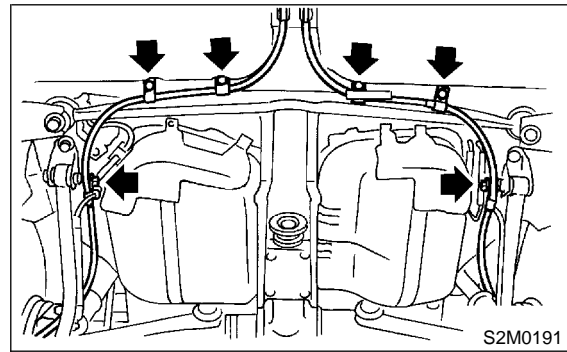


- (A) Propeller shaft
- (B) Extension cap

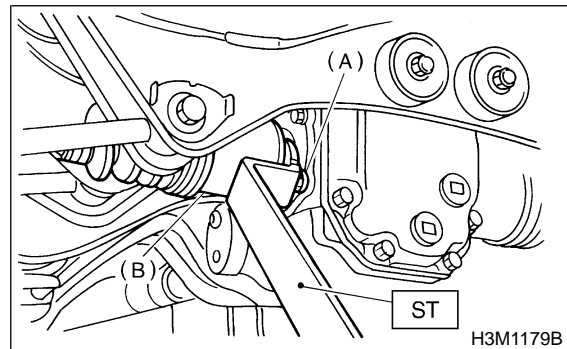
11) Remove heat sealed cover.



12) Remove clamps and bracket of parking brake cable.

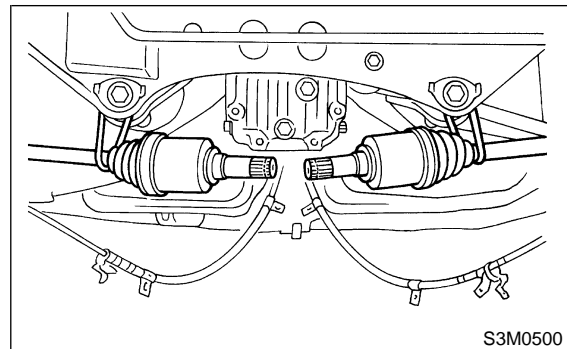


13) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to 3-4 [W2A2].>
ST 28099PA100 DRIVE SHAFT REMOVER



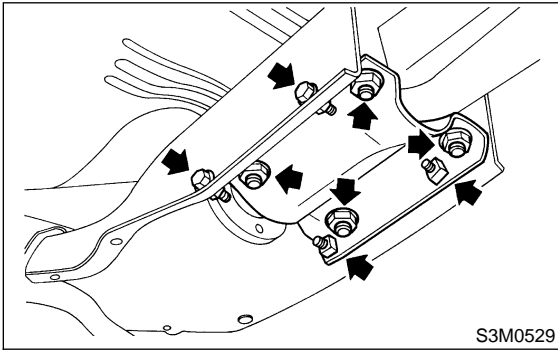
- (A) Bolt
- (B) DOJ

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

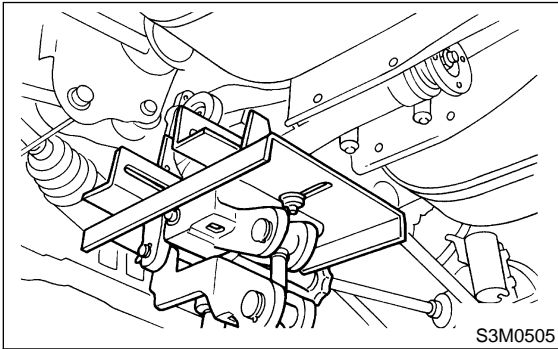


2. Rear Differential

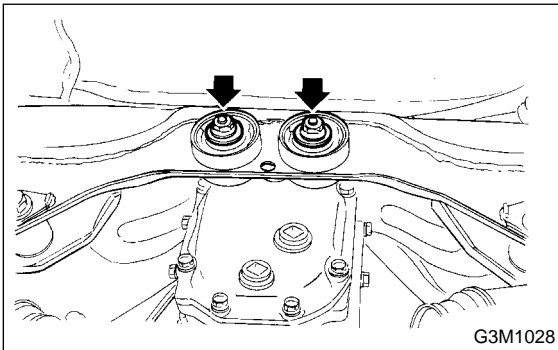
15) Remove lower differential bracket. (If rear differential protector is not equipped.)



16) Support rear differential with transmission jack.



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



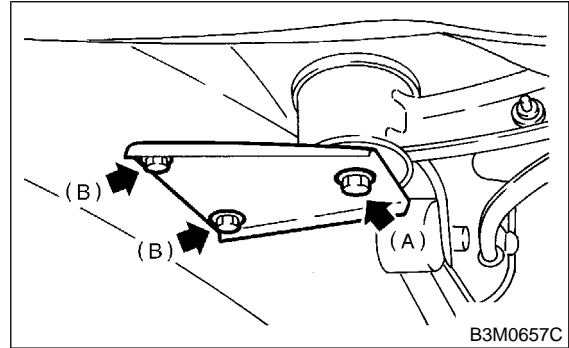
18) Remove bolts which secure rear differential front member to body.

(1) Loosen bolt A first, then remove bolts B.

NOTE:

Support front member with the use of a helper to prevent it from dropping.

(2) Remove bolt A.



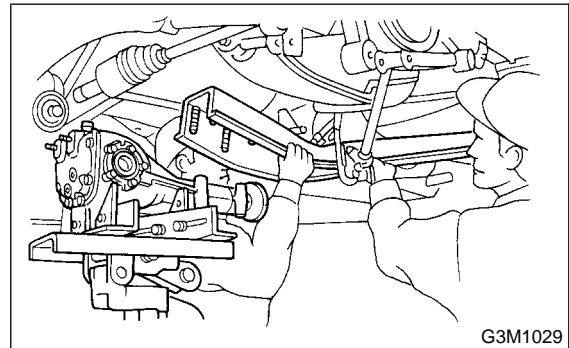
(A) Bolt A

(B) Bolt B

19) While slowly lowering transmission jack, move rear differential forward and remove front member and rear differential from body.

NOTE:

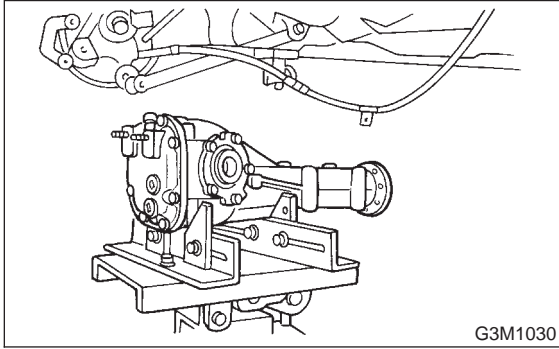
If rear differential protector is equipped, remove front member, rear differential and rear differential protector as a unit from body.



20) Remove rear differential protector. (If rear differential protector is equipped.)

21) Remove lower differential bracket. (If rear differential protector is equipped.)

22) Remove rear differential from front member.



G3M1030

C: DISASSEMBLY

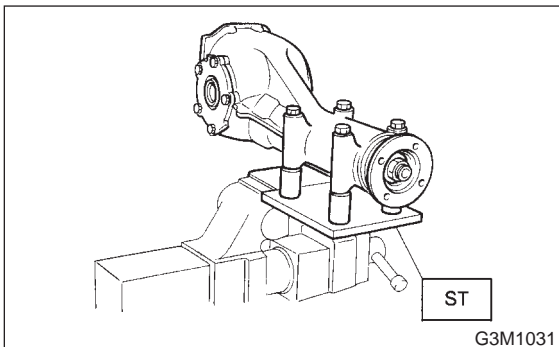
NOTE:

To detect real cause of trouble, inspect the following items before disassembling. <Ref. to 3-4 [W2E0].>

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

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

ST 398217700 ATTACHMENT



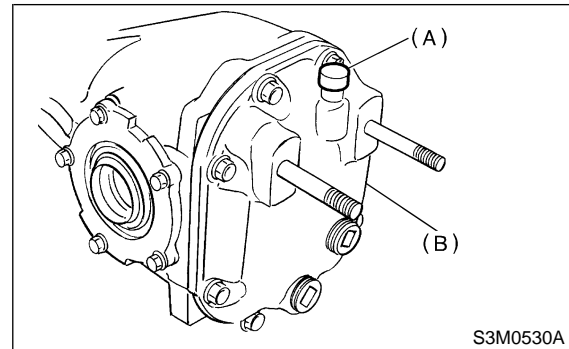
G3M1031

2) Drain gear oil by removing plug.

3) Remove the air breather cap.

NOTE:

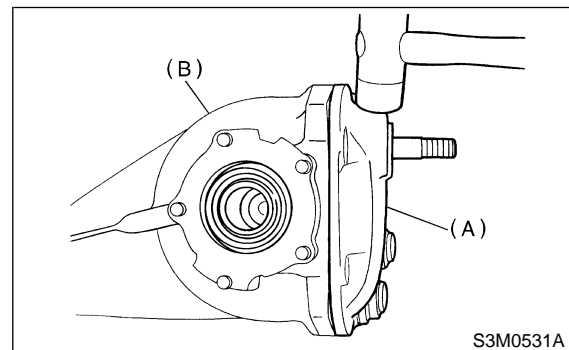
Do not attempt to replace the air breather cap unless necessary.



S3M0530A

- (A) Air breather cap
- (B) Rear cover

4) Remove rear cover by loosening retaining bolts.



S3M0531A

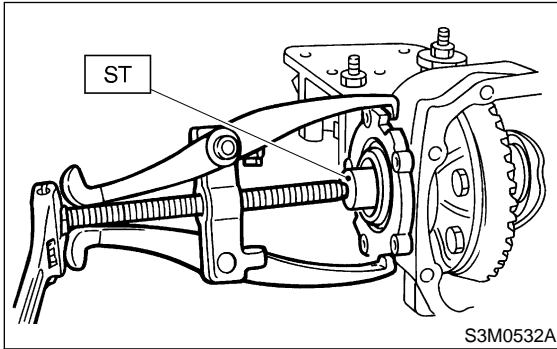
- (A) Rear cover
- (B) Differential carrier

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

CAUTION:

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

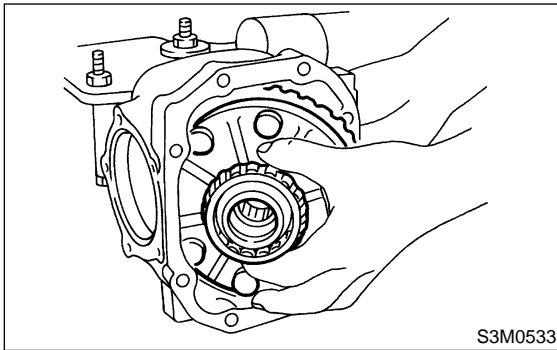
ST 398457700 ATTACHMENT



6) Pull out differential assembly from differential carrier.

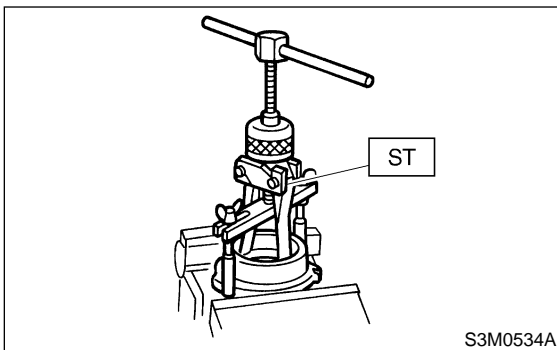
CAUTION:

Be careful not to hit the teeth against the case.



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

ST 398527700 PULLER ASSY



8) Extract bearing cone with ST.

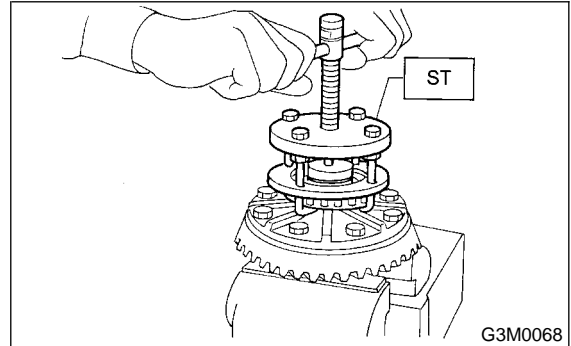
CAUTION:

Do not attempt to disassemble the parts unless necessary.

NOTE:

- Set puller so that its claw catch the edge of the bearing cone.
- Never mix up the right and left hand bearing cups and cones.

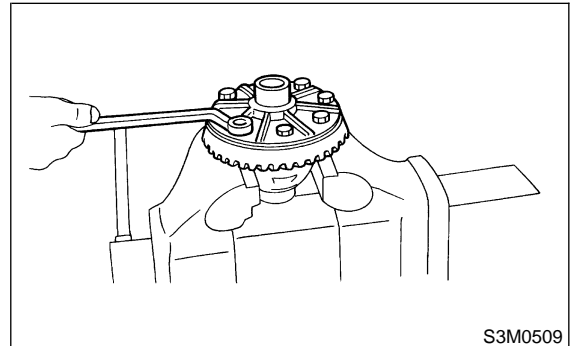
ST 399527700 PULLER SET



9) Remove crown gear by loosening crown gear bolts.

CAUTION:

Further disassembling is not allowed.

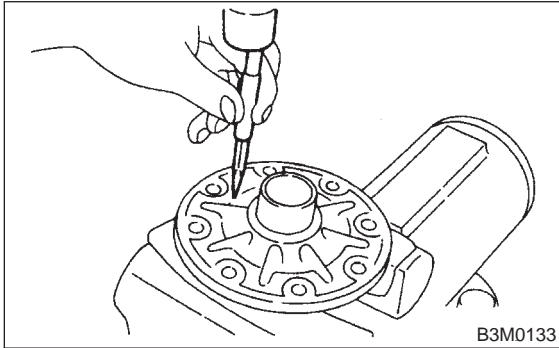


10) Drive out pinion shaft lock pin from crown gear side. (Without LSD)

NOTE:

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

ST 899904100 STRAIGHT PIN REMOVER

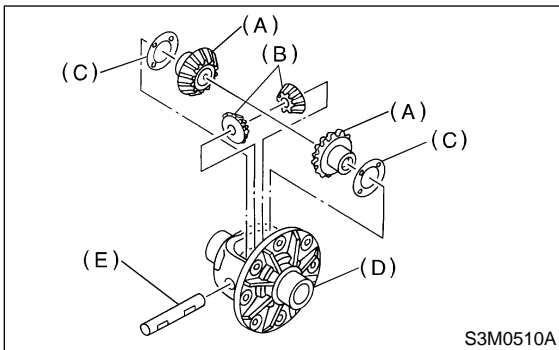


B3M0133

11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers. (Without LSD)

NOTE:

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

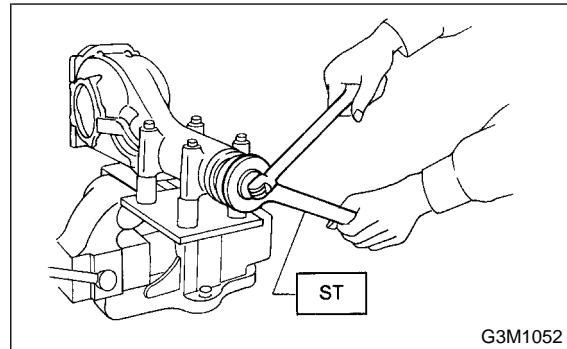


S3M0510A

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

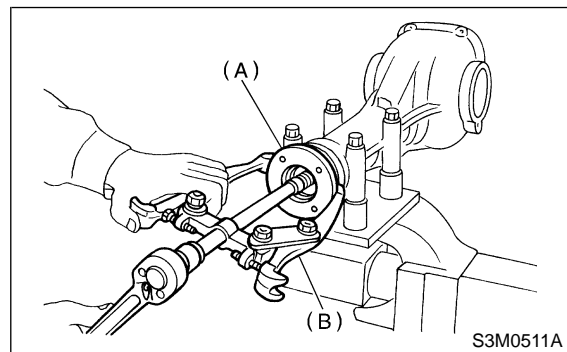
12) Hold companion flange with ST and remove drive pinion nut.

ST 498427200 FLANGE WRENCH



G3M1052

13) Extract the companion flange with a puller.



S3M0511A

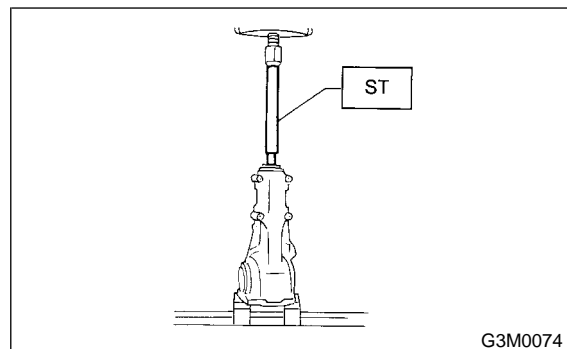
- (A) Companion flange
- (B) Puller

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

NOTE:

Hold the drive pinion so as not to drop it.

ST 398467700 DRIFT



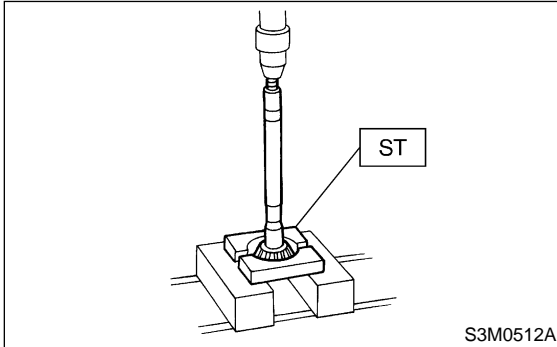
G3M0074

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

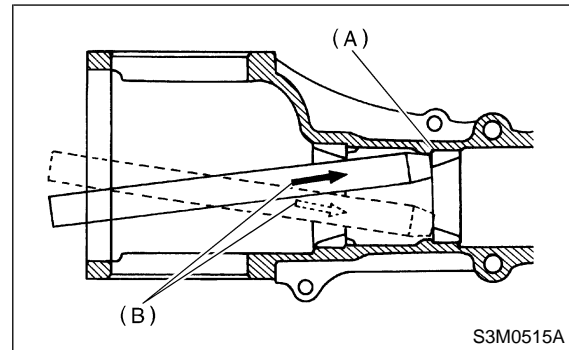
NOTE:

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

ST 498515500 REPLACER



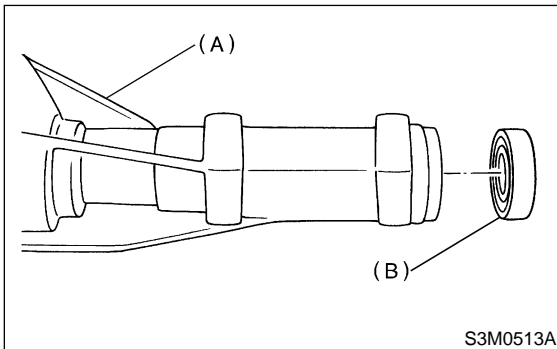
18) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



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

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

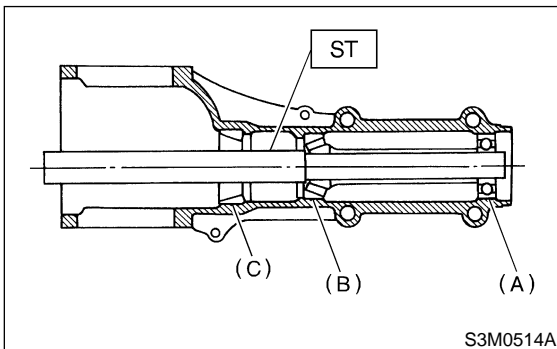
ST 398527700 PULLER ASSY



- (A) Differential carrier
- (B) Front oil seal

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

ST 398467700 DRIFT



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

D: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.

1) Crown gear and drive pinion

- If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.

- If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.

2) Side gear and pinion mate gear

- Replace if crack, score, or other defects are evident on tooth surface.

- Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.

3) Bearing

Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.

4) Thrust washers of side gear and pinion mate gear

Replace if seizure, flaw, abnormal wear or other defect is evident.

5) Oil seal

Replace if deformed or damaged, and at every disassembling.

6) Differential carrier

Replace if the bearing bores are worn or damaged.

7) Differential case

Replace if its sliding surfaces are worn or cracked.

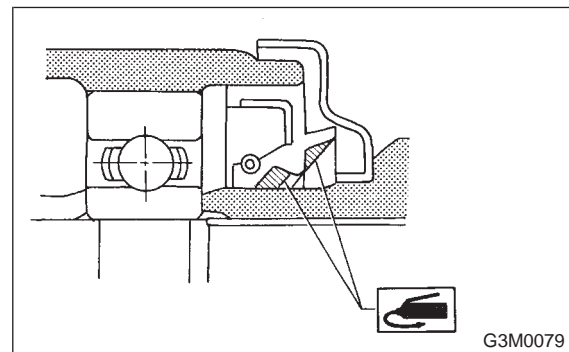
8) Companion flange

Replace if the oil seal lip contacting surfaces have flaws.

E: ASSEMBLY

1) Precautions for assembling

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

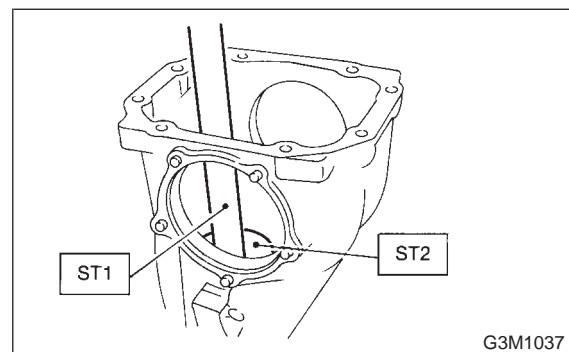


2) Adjusting preload for front and rear bearings
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washers are not affected by this adjustment. The adjustment must be carried out without the oil seal inserted.

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

ST1 398477701 HANDLE

ST2 398477703 DRIFT 2



2. Rear Differential

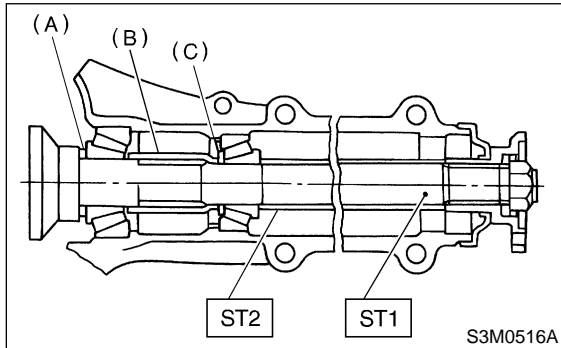
(2) Insert ST1 into case with pinion height adjusting washer and rear bearing cone fitted onto it.

CAUTION:

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

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

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



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

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

ST1 398507704 BLOCK
ST2 398507702 DUMMY SHAFT

CAUTION:

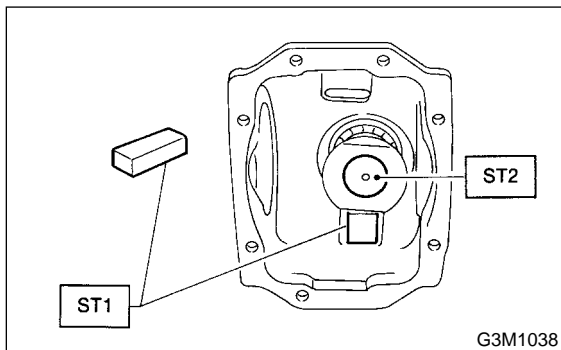
Use a new lock nut.

NOTE:

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

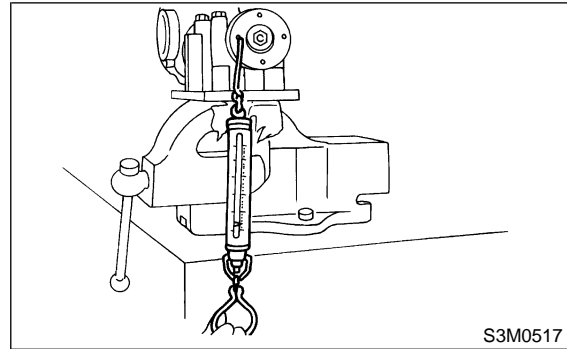
Tightening torque:

181±15 N·m (18.5±1.5 kg·m, 134±11 ft·lb)



Front and rear bearing preload

For new bearing:
17.7 — 25.5 N (1.8 — 2.6 kg, 4.0 — 5.7 lb)
at companion flange bolt hole



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

3) Adjusting drive pinion height

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

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

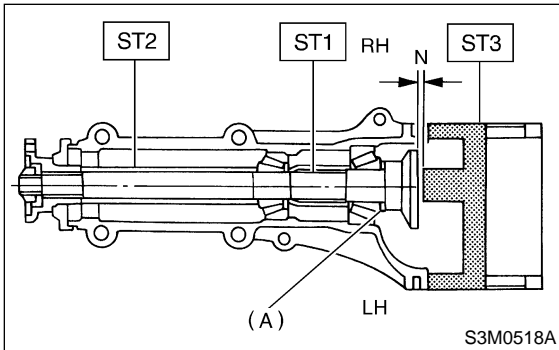
Front and rear bearing preload

For new bearing:
17.7 — 25.5 N (1.8 — 2.6 kg, 4.0 — 5.7 lb)
at companion flange bolt hole

Adjust preload for front and rear bearings.

NOTE:

At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before.



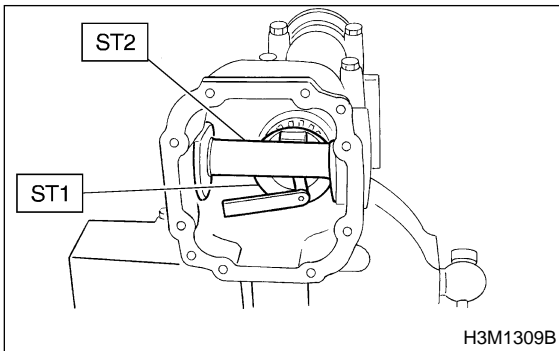
(A) Pinion height adjusting shim

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

NOTE:

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

- ST1 398507702 DUMMY SHAFT
- ST2 398507703 DUMMY COLLAR
- ST3 398507701 DIFFERENTIAL CARRIER GAUGE



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

$$T = T_o + N - (H \times 0.01) - 0.20 \text{ (mm)}$$

Where:

T = Thickness of pinion height adjusting shim (mm)

T_o = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)

H = Figure marked on drive pinion head

(Example of calculation)

$$T_o = 2.20 + 1.20 = 3.40 \text{ mm}$$

$$N = 0.23 \text{ mm } H = + 1,$$

$$T = 3.40 + 0.23 - 0.01 - 0.20 = 3.42$$

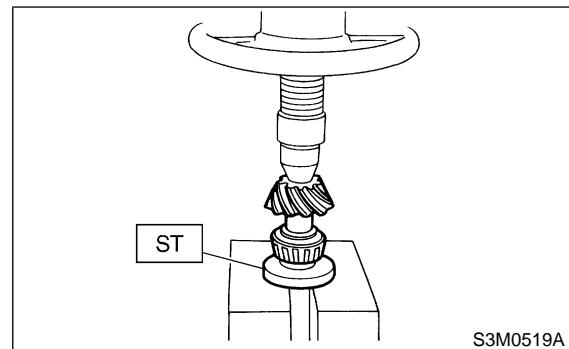
Result: Thickness = 3.42 mm

Therefore use the shim 383605200.

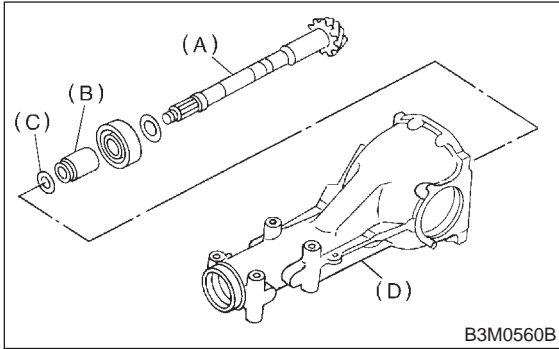
Pinion height adjusting shim	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200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

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

ST 398177700 INSTALLER



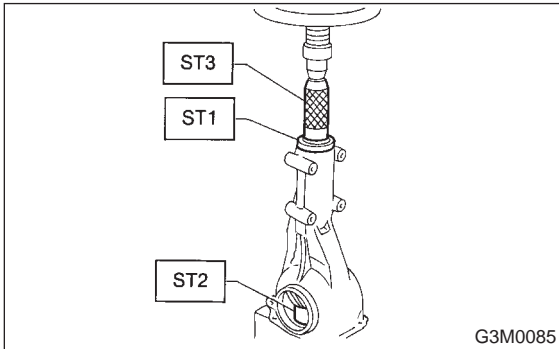
5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



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

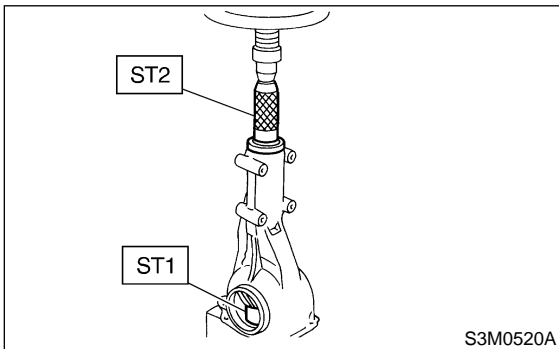
6) Press-fit front bearing cone into case with ST1, ST2 and ST3.

- ST1 398507703 DUMMY COLLAR
- ST2 399780104 WEIGHT
- ST3 899580100 INSTALLER



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

- ST1 399780104 WEIGHT
- ST2 899580100 INSTALLER

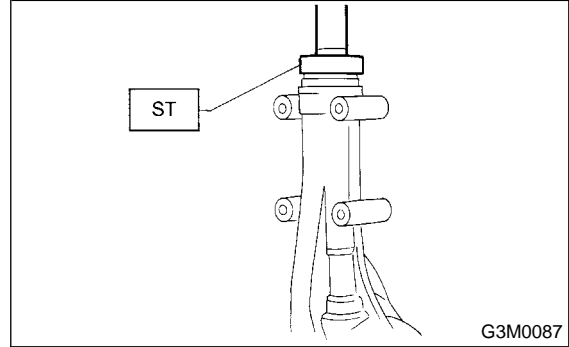


8) Fit a new oil seal with ST.

NOTE:

- Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
- Apply grease between the oil seal lips. <Ref. to 3-4 [W2E0].>

ST 498447120 OIL SEAL INSTALLER

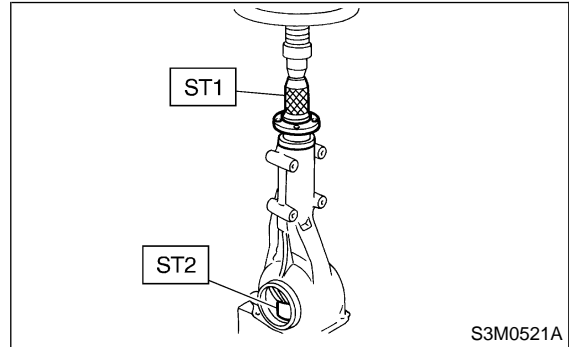


9) Press-fit companion flange with ST1 and ST2.

CAUTION:

Be careful not to damage bearing.

- ST1 899874100 INSTALLER
- ST2 399780104 WEIGHT

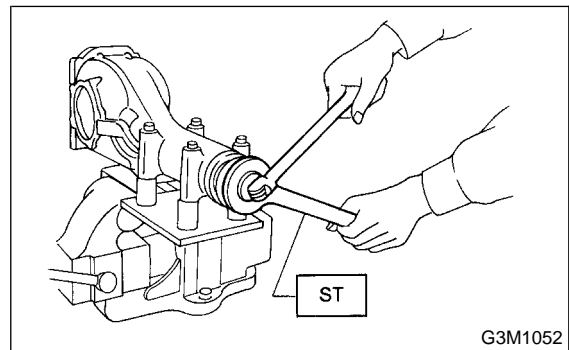


10) Install self-locking nut. Then tighten it with ST.

ST 498427200 FLANGE WRENCH

Tightening torque:

181±15 N·m (18.5±1.5 kg·m, 134±11 ft·lb)



11) Assembly of differential case

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

CAUTION:

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

- (1) Measure the clearance between differential case and the back of side gear.
- (2) Adjust the clearance as specified by selecting side gear thrust washer.

Side gear backlash:

0.1 — 0.2 mm (0.004 — 0.008 in)

Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)
383445204	0.90 — 0.95 (0.0354 — 0.0374)
383445205	0.95 — 1.0 (0.0374 — 0.0394)

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

CAUTION:

Before installing bolts, apply Lock Tite to bolt threads.

Lock Tite:

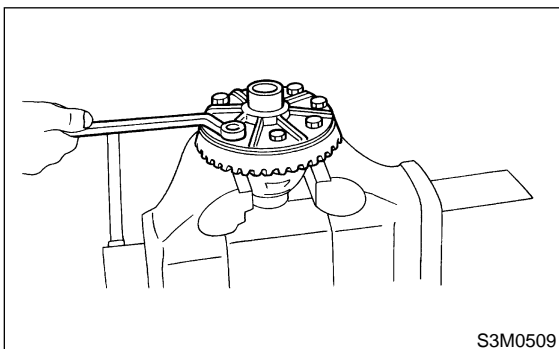
THREE BOND 1324 or equivalent

NOTE:

Tighten diagonally while tapping the bolt heads.

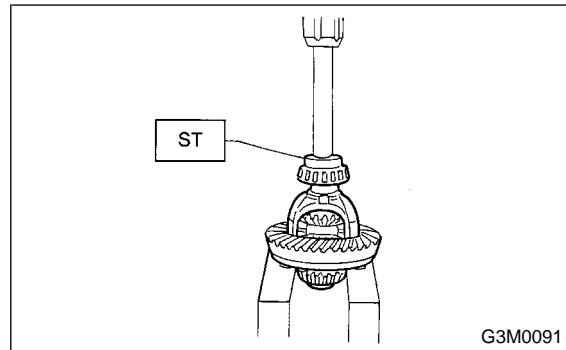
Tightening torque:

103±10 N·m (10.5±1.0 kg·m, 76±7 ft·lb)



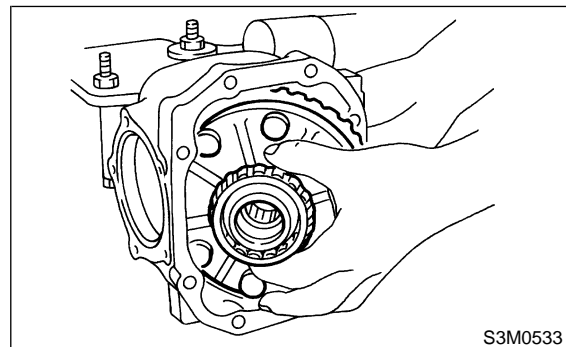
- 13) Press side bearing cone onto differential case with ST.

ST 398487700 DRIFT



- 14) Adjusting side bearing retainer shims

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



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

NOTE:

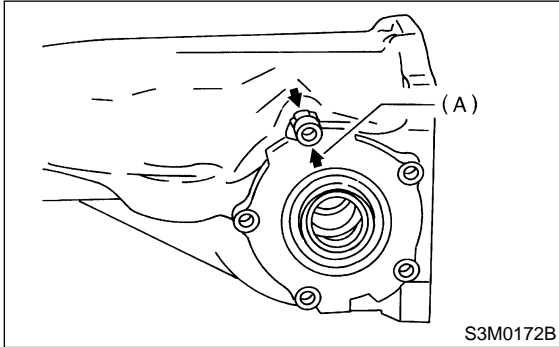
- Replace broken or cracked O-ring with new one.
- Replace broken or corroded side retainer shim with new one of same thickness.

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

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

CAUTION:

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



(A) Arrow mark

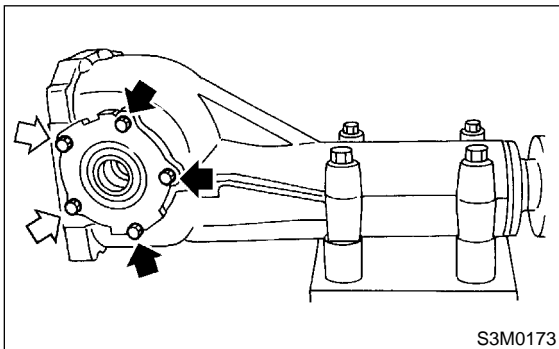
(5) Tighten side bearing retainer bolts.

CAUTION:

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

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

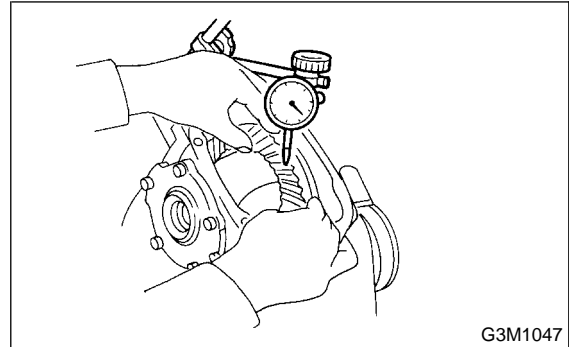
Tightening torque:
10.3±1.5 N·m (1.05±0.15 kg·m, 7.6±1.1 ft·lb)



(6) Measure the crown gear-to-drive pinion backlash.

Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

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



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

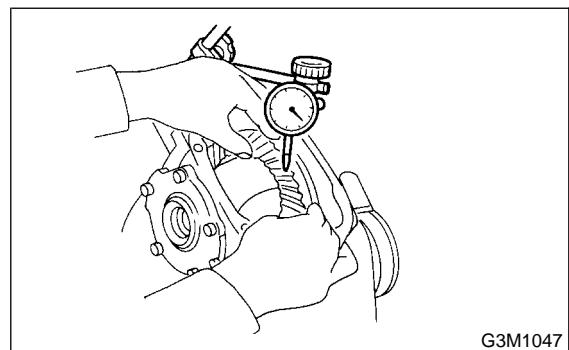
NOTE:

If measured backlash is not within specified range, repeat procedure for adjustment of side bearing retainer shims.

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

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

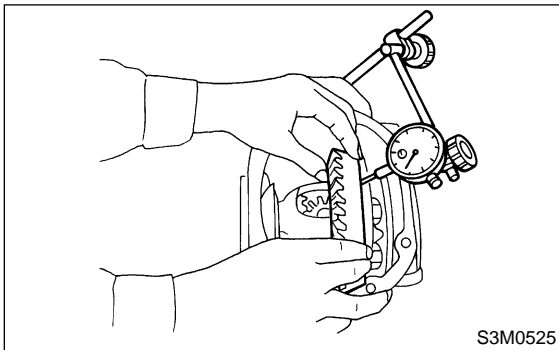
Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



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

Limit of runout:

Less than 0.05 mm (0.0020 in)



17) Checking and adjusting tooth contact of crown gear

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

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

NOTE:

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

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

(1) Drive pinion height
ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE

$$T = To + N - (H \times 0.01) - 0.20 \text{ (mm)}$$

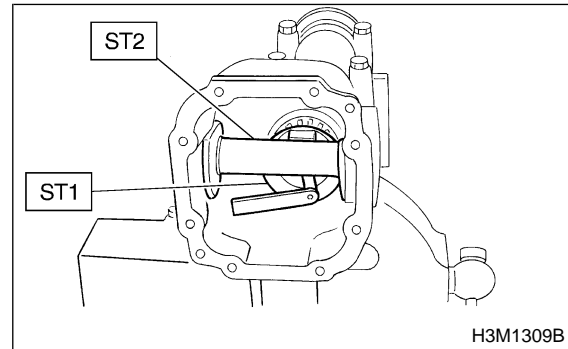
Where:

T = Thickness of pinion height adjusting shim (mm)

To = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)

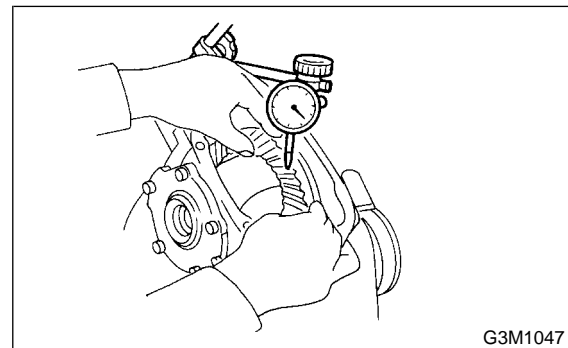
H = Figure marked on drive pinion head



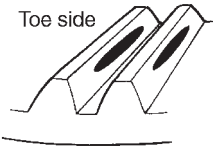

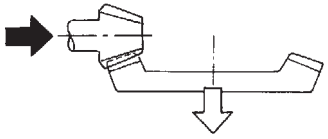
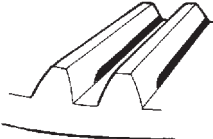
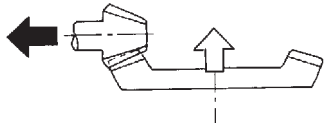

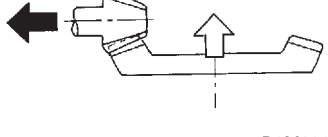

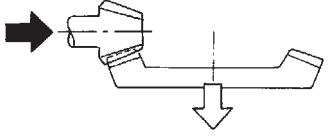
(2) Hypoid gear backlash

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)



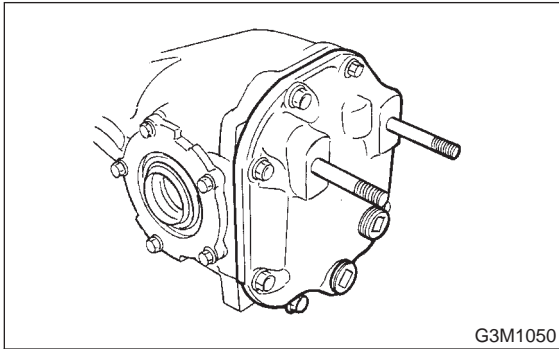
- ➡ : Adjusting direction of drive pinion
- ⇨ : Adjusting direction of crown gear

TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
<p>Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)</p>	<p>Toe side</p>  <p>Heel side</p> <p>B3M0317A</p>	<p>—</p>
<p>Face contact Backlash is too large.</p>	<p>This may cause noise and chipping at tooth ends.</p>  <p>B3M0319</p>	<p>Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.</p>  <p>B3M0323</p>
<p>Flank contact Backlash is too small.</p>	<p>This may cause noise and stepped wear on surfaces.</p>  <p>B3M0320</p>	<p>Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.</p>  <p>B3M0324</p>
<p>Toe contact Contact area is small.</p>	<p>This may cause chipping at toe ends.</p>  <p>B3M0321</p>	<p>Adjust as for flank contact.</p>  <p>B3M0324</p>
<p>Heel contact Contact area is small.</p>	<p>This may cause chipping at heel ends.</p>  <p>B3M0322</p>	<p>Adjust as for face contact.</p>  <p>B3M0323</p>

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

Tightening torque:

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



F: INSTALLATION

To install, reverse the removal sequence.

1) Install the air breather cap tapping with a plastic hammer.

CAUTION:

Be sure to install new air breather cap.

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

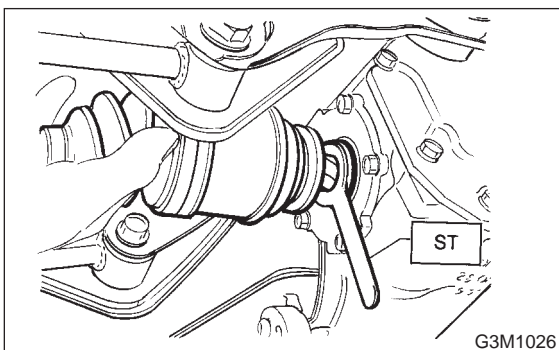
NOTE:

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

3) Install DOJ of rear drive shaft into rear differential.

<Ref. to 3-4 [W2A2].>

ST 28099PA090 SIDE OIL SEAL PROTECTOR



4) Install in the reverse order of removal.

5) After installation, fill differential carrier with gear oil to the upper plug level.

CAUTION:

Apply fluid packing to plug.

Fluid packing:

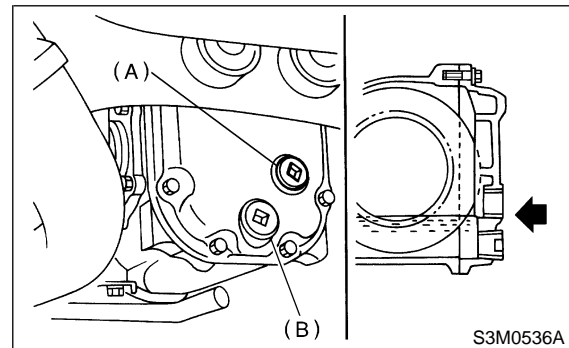
THREE BOND 1205 or equivalent

Oil capacity:

0.8 l (0.8 US qt, 0.7 Imp qt)

Tightening torque:

49.0±9.8 N·m (5.0±1.0 kg·m, 36.2±3.6 ft-lb)



- (A) Filler plug
- (B) Drain plug

3. Rear Differential Front Member

A: REMOVAL

- 1) Disconnect ground terminal from battery.
- 2) Move select lever or gear shift lever to "N".
- 3) Release the parking brake.
- 4) Loosen wheel nuts.
- 5) Jack-up vehicle and support it with sturdy racks.
- 6) Remove wheels.
- 7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>
- 8) Remove rear differential front member.

NOTE:

When removing rear differential front member, work the removal procedure as rear differential.
<Ref. to 3-4 [W2B0].>

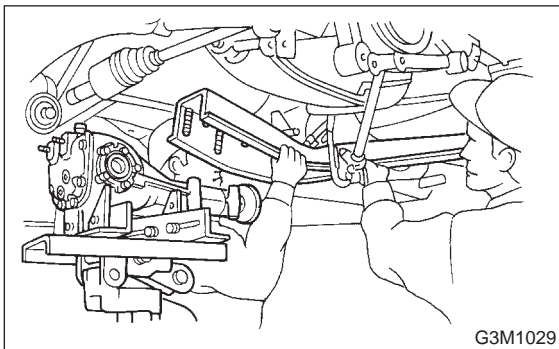
B: INSTALLATION

To install, reverse the removal sequence.

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

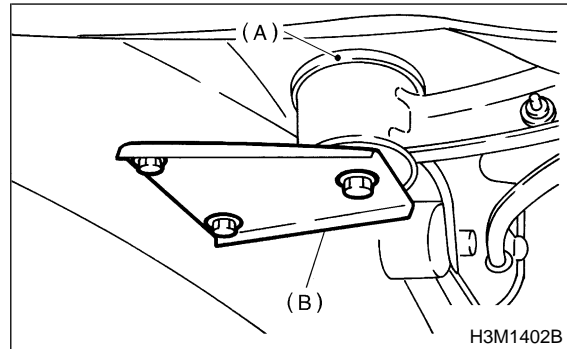
NOTE:

- If rear differential protector has been or will be equipped, install front member, rear differential and rear differential protector as a unit.



G3M1029

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



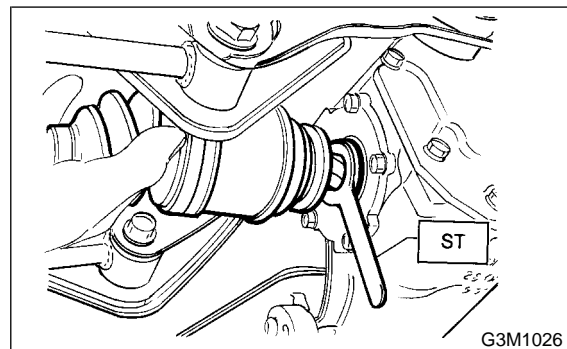
- (A) Stopper
(B) Differential mount bracket

- 2) Insert DOJ of rear drive shaft into rear differential.

CAUTION:

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

ST 28099PA090 SIDE OIL SEAL PROTECTOR



- 3) Install in the reverse order of removal.

1. Propeller Shaft

NOTE:

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

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

2. Rear Differential

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

MEMO: