

# GENERAL DESCRIPTION

Automatic Transmission

## 1. General Description S502001

### A: SPECIFICATIONS S502001E49

#### 1. TORQUE CONVERTER CLUTCH S502001E4901

Model	EXCEPT OUTBACK	OUTBACK	
		2.5 ℓ model	3.0 ℓ model
Type	Symmetric, 3 element, single stage, 2 phase torque converter		
Stall torque ratio	1.9 — 2.1	2.1 — 2.3	1.8 — 2.0
Nominal diameter	246 mm (9.69 in)		
Stall speed (at sea level)	2,100 — 2,600 rpm	2,200 — 2,700 rpm	2,000 — 2,500
One-way clutch	Sprague type one-way clutch		

#### 2. OIL PUMP S502001E4902

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

#### 3. TRANSMISSION CONTROL ELEMENT S502001E4903

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

#### 4. TRANSMISSION GEAR RATIO S502001E4904

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

## 5. PLANETARY GEAR AND PLATE S502001E4905

	BRIGHTON, L	GT, OUTBACK (2.5ℓ model)	OUTBACK (3.0ℓ model)
Tooth number of front sun gear	33		
Tooth number of front pinion	21		
Tooth number of front internal gear	75		
Tooth number of rear sun gear	42	37	42
Tooth number of rear pinion	17	19	17
Tooth number of rear internal gear	75		
Drive & driven plate number of high clutch	4		5
Drive & driven plate number of low clutch	6		7
Drive & driven plate number of reverse clutch	2		
Drive & driven plate number of 2-4 brake	3		4
Drive & driven plate number of low & reverse brake	6		7

## 6. SELECTOR POSITION S502001E4906

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	Automatic gear change 1st ← → 2nd ← → 3rd ← → 4th
3 (3rd)	Automatic gear change 1st ← → 2nd ← → 3rd ← 4th
2 (2nd)	2nd gear locked (Deceleration possible 2nd ← 3rd ← 4th)
1 (1st)	1st gear locked (Deceleration possible 1st ← 2nd ← 3rd ← 4th)
Control method	Hydraulic remote control

## 7. HYDRAULIC CONTROL AND LUBRICATION S502001E4907

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

## 8. COOLING AND HARNESS S502001E4908

	2.5ℓ model	3.0ℓ model
Cooling system	Liquid-cooled cooler incorporated in radiator	
ATF cooling system (Radiation capacity)	4.630 kW (3,981 kcal/h, 15,797 BTU/h)	2.09 kW (1,797 kcal/h, 7,130 BTU/h)
Inhibitor switch	12 poles	
Transmission harness	20 poles	

## 9. TRANSFER S502001E4909

	Except VTD model		VTD model
	2.5ℓ model	3.0ℓ model	
Transfer clutch	Hydraulic multi-plate clutch		
Drive & driven plate number of transfer clutch	5	6	3
Control method	Electronic, hydraulic type		
Lubricant	The same Automatic transmission fluid used in automatic transmission		
1st reduction gear ratio	1.000 (53/53)		

## 10. FINAL REDUCTION S502001E4910

Model	BRIGHTON, L	GT, OUTBACK																		
Front final gear ratio	4.111 (37/9)	4.444 (40/9)																		
Lubrication oil	<p style="text-align: center;">ITEM</p> <ul style="list-style-type: none"> <li>• Front differential gear oil</li> </ul> <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: auto; border-collapse: collapse;"> <tr> <td>(°C)</td> <td>-30</td> <td>-26</td> <td>-15</td> <td>-5</td> <td>0</td> <td>15</td> <td>25</td> <td>30</td> </tr> <tr> <td>(°F)</td> <td>-22</td> <td>-15</td> <td>5</td> <td>23</td> <td>32</td> <td>59</td> <td>77</td> <td>86</td> </tr> </table> <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)																			

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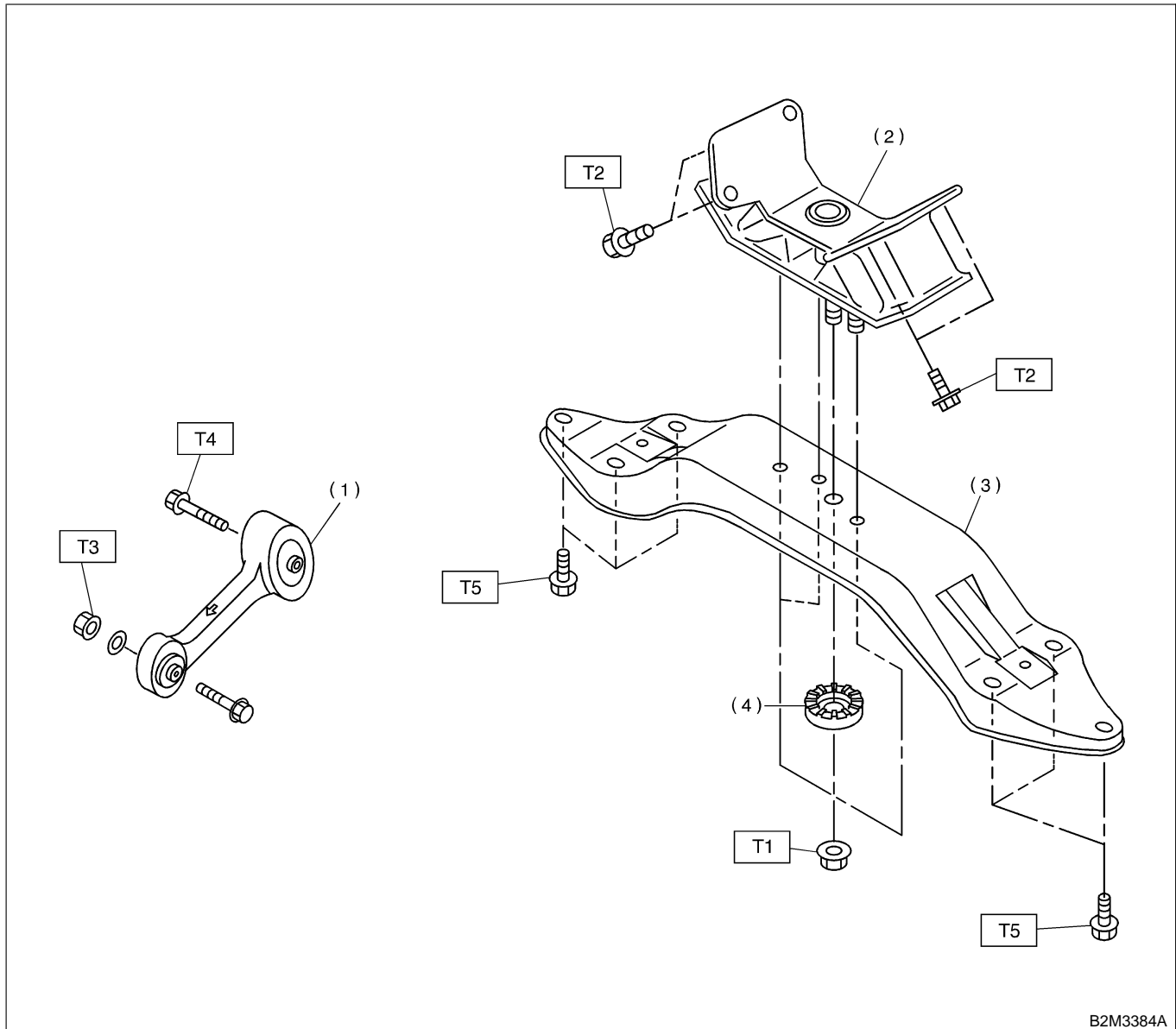
Automatic Transmission

## B: COMPONENT S502001A05

### NOTE:

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

### 1. TRANSMISSION MOUNTING S502001A0501



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

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

**T1: 35 (3.6, 26)**

**T2: 39 (4.0, 29)**

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

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

**T5: 75 (7.6, 55)**

**AT-4**

## C: CAUTION S502001A03

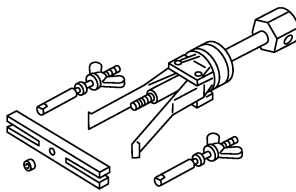
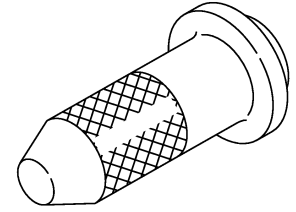
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Until the oil pan is removed,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

that of another grade or from other manufacturers.

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

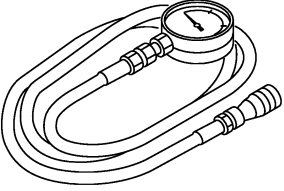
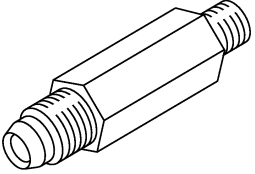
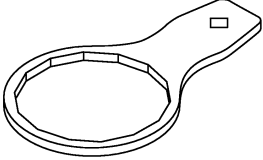
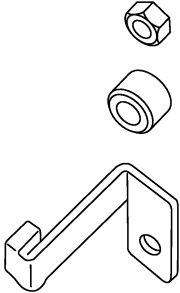
## D: PREPARATION TOOL S502001A17

### 1. SPECIAL TOOLS S502001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1977</p>	398527700	PULLER ASSY	Used for removing and installing extension case roller bearing.
 <p style="text-align: center;">B3M1972</p>	498057300	INSTALLER	Used for installing extension oil seal.

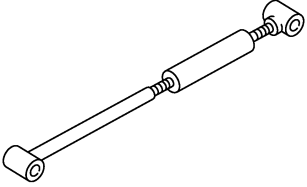
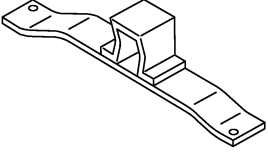
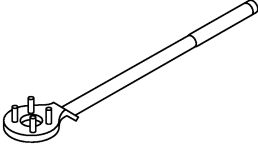
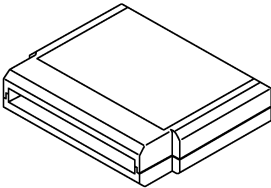
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M2040</p>	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 <p style="text-align: center;">B3M2041</p>	498897200	ADAPTER	Used oil pump housing when measuring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


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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>B3M1976</p>	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 <p>B3M1975</p>	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 <p>B2M3870</p>	499977100	CRANK PULLEY WRENCH	Used for stopping rotating of crankshaft pulley when loosening and tightening crankshaft pulley bolts.
 <p>B2M3876</p>	24082AA150	CARTRIDGE	Troubleshooting for electrical systems.

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: right; margin-right: 10px;">B2M3877</p>	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"> <li>● English: 22771AA030 (Without printer)</li> <li>● German: 22771AA070 (Without printer)</li> <li>● French: 22771AA080 (Without printer)</li> <li>● Spanish: 22771AA090 (Without printer)</li> </ul>

## 2. GENERAL PURPOSE TOOLS S502001A1702

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

## 2. Automatic Transmission Fluid

S502248

### A: REPLACEMENT

S502248A20

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

#### CAUTION:

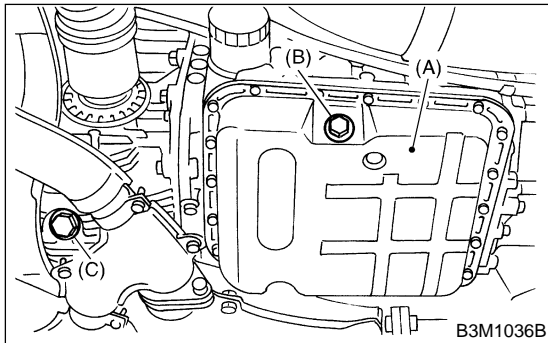
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

#### NOTE:

Tighten ATF drain plug after draining ATF.

#### Tightening torque:

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



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

- 3) Pour ATF into the oil charge pipe.

#### Recommended fluid:

**Dexron III type automatic transmission fluid**

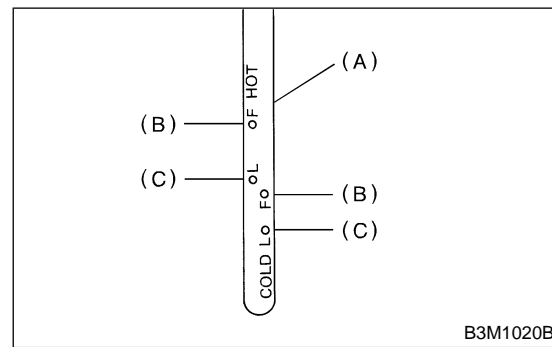
#### Fluid capacity:

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

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

#### NOTE:

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



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

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

#### NOTE:

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

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

#### CAUTION:

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

- (4) Fluid temperature rising speed

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

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

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

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

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



## 3. Differential Gear Oil S502150

### A: REPLACEMENT S502150A20

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

**CAUTION:**

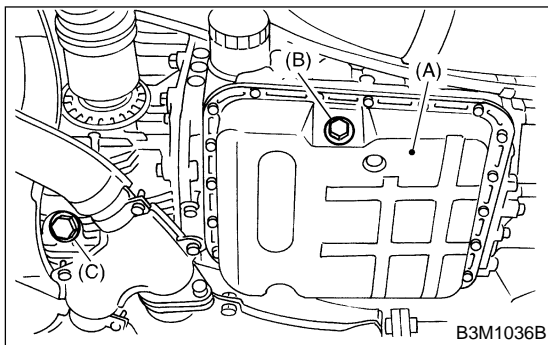
Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.

**NOTE:**

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

**Tightening torque:**

**44 N·m (4.5 kgf·m, 32.5 ft·lb)**



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

- 3) Pour gear oil into the gauge hole.

**Recommended fluid:**

**Use GL-5 or equivalent.**

**Gear oil capacity:**

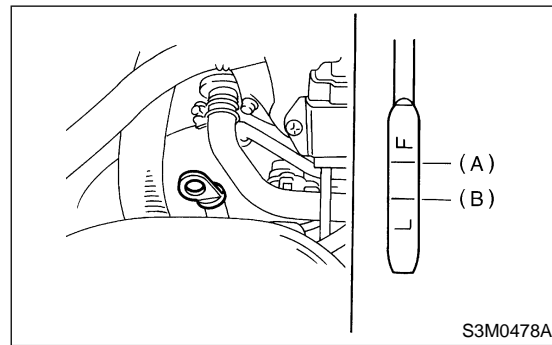
**1.2 l (1.3 US qt, 1.1 Imp qt)**

- 4) Check the level of the differential gear oil.
  - (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

**4. Road Test** S502247**A: INSPECTION** S502247A10**1. GENERAL PRECAUTION** S502247A1001

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

**CAUTION:**

**When performing test, do not exceed posted speed limit.**

**2. D RANGE SHIFT FUNCTION** S502247A1002

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

**3. D RANGE SHIFT SHOCK** S502247A1003

Check the shock level when shifting up during normal driving.

**4. KICK-DOWN FUNCTION** S502247A1004

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

**5. ENGINE BRAKE OPERATION** S502247A1005

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

**6. LOCK-UP FUNCTION** S502247A1006

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

**7. P RANGE OPERATION** S502247A1007

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

**8. UNUSUAL SOUNDS AND VIBRATION**S502247A1008

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

**9. CLIMBING CONTROL FUNCTION** S502247A1009

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

**10. OIL LEAKS** S502247A1010

After the driving test, inspect for oil leaks.

# STALL TEST

Automatic Transmission

## 5. Stall Test S502246

### A: INSPECTION S502246A10

#### 1. GENERAL INFORMATION S502246A1001

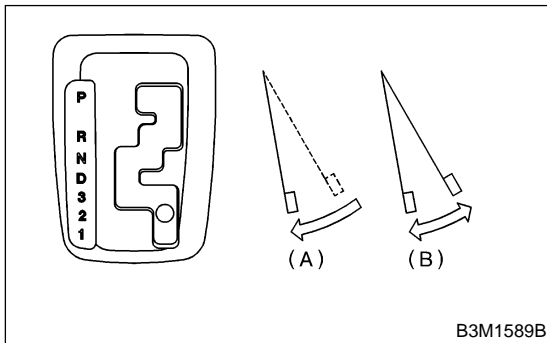
The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.

Purposes of the stall test:

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

#### 2. TEST METHODS S502246A1002

- 1) Preparations before test:
  - (1) Check that throttle valve opens fully.
  - (2) Check that engine oil level is correct.
  - (3) Check that coolant level is correct.
  - (4) Check that ATF level is correct.
  - (5) Check that differential gear oil level is correct.
  - (6) Increase ATF temperature to 50 to 80°C (122 to 176°F) by idling the engine for approximately 30 minutes (with select lever set to "N" or "P").
- 2) Install an engine tachometer at a location visible from the driver's compartment and mark the stall speed range on the tachometer scale.
- 3) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
- 4) Move the manual linkage to ensure it operates properly, and shift the select lever to the 2 range.
- 5) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



- (A) Brake pedal  
(B) Accelerator pedal

- 6) When the engine speed is stabilized, read that speed quickly and release the accelerator pedal.
- 7) Shift the select lever to Neutral, and cool down the engine by idling it for more than one minute.
- 8) Record the stall speed.

9) If stall speed in 2 range is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify it, conduct the same test as above in D range.

10) Perform the stall tests with the select lever in the R range.

NOTE:

- Do not continue the stall test for MORE THAN FIVE SECONDS at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.

Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the P or N range and with the idle speed lower than 1,200 rpm.

- If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

**Stall speed (at sea level):**

**Except OUTBACK; 2,100 — 2,600 rpm**

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

**OUTBACK (3.0ℓ model); 2,000 — 3,500 rpm**

# STALL TEST

Automatic Transmission

## 3. EVALUATION SS02246A1003

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

## 6. Time Lag Test S502245

### A: INSPECTION S502245A10

#### 1. GENERAL INFORMATION S502245A1001

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

#### CAUTION:

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

#### 2. TEST METHODS S502245A1002

- 1) Fully apply the parking brake.
- 2) Start the engine.

Check idling speed (A/C OFF).

- 3) Shift the select lever from "N" to "D" range.

Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.

Time lag: Less than 1.2 seconds

- 4) In same manner, measure the time lag for "N" → "R".

Time lag: Less than 1.5 seconds

#### 3. EVALUATION S502245A1003

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

## 7. Line Pressure Test S502244

### A: MEASUREMENT S502244A14

#### 1. GENERAL INFORMATION S502244A1401

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

- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.

- Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.

1) Line pressure measurement (under no load)

#### CAUTION:

- Before measuring line pressure, jack-up all wheels.

- Maintain temperature of ATF at approximately 50°C (122°F) during measurement.

(ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in “N” or “P”.)

2) Line pressure measurement (under heavy load)

#### CAUTION:

- Before measuring line pressure, apply both foot and parking brakes with all wheels chocked (Same as for “stall” test conditions).

- Measure line pressure when select lever is in “R”, “2” with engine under stall conditions.

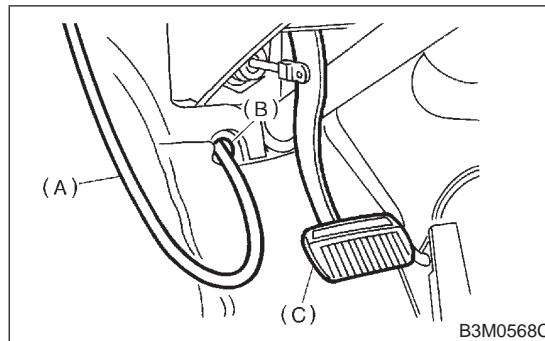
- Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)

- Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in “N” or “P”.)

## 2. TEST METHODS S502244A1402

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

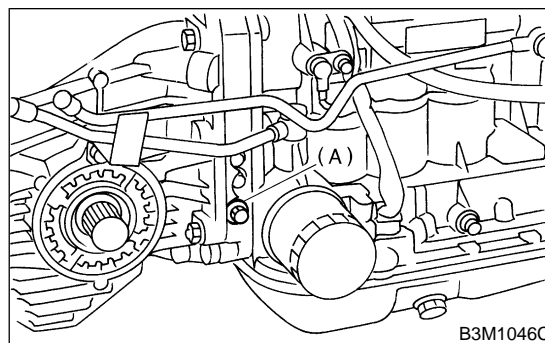
ST 498575400 OIL PRESSURE GAUGE ASSY



- (A) Pressure gauge hose
- (B) Hole in toe board (blank cap hole)
- (C) Brake pedal

2) Remove the test plug and install ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER



- (A) Test plug

3) Connect ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

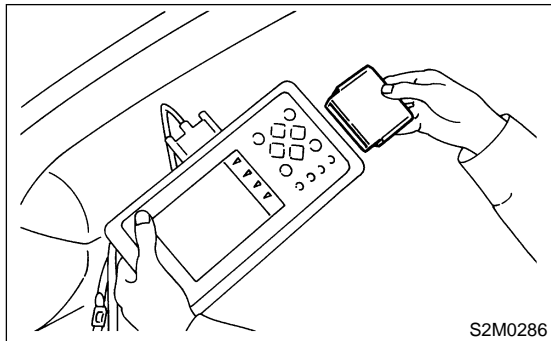
ST2 498575400 OIL PRESSURE GAUGE ASSY

# LINE PRESSURE TEST

Automatic Transmission

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

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



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

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

### 3. EVALUATION S502244A1403

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

## 8. Transfer Clutch Pressure Test S502159

### A: INSPECTION S502159A10

#### 1. TEST METHODS S502159A1001

- Except VTD model

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

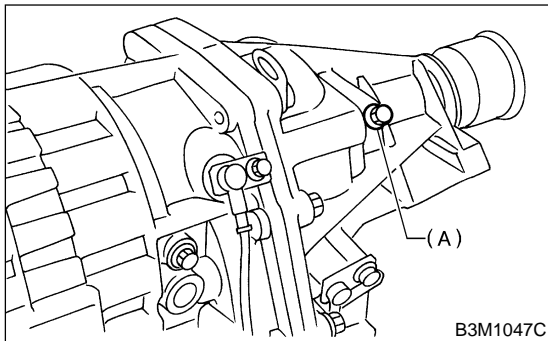
- ST 498897700 OIL PRESSURE ADAPTER SET
- ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

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

**CAUTION:**

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

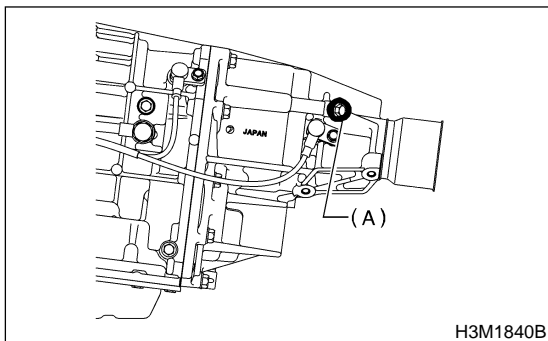


(A) Test plug

- VTD model

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

- ST 498897700 OIL PRESSURE ADAPTER SET
- ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Test plug

## 2. EVALUATION S502159A1002

- Except VTD model

**NOTE:**

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

Standard transfer clutch pressure kPa (kg/cm <sup>2</sup> , psi)			
Duty ratio (%)	Throttle position	AWD mode	FWD mode
5	Full closed	932 — 1,089 (9.5 — 11.1, 135 — 158)	—
60	2/3 throttle	216 — 294 (2.2 — 3.0, 31 — 43)	—
95	Full open	—	0 (0, 0)

- VTD model

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



# AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

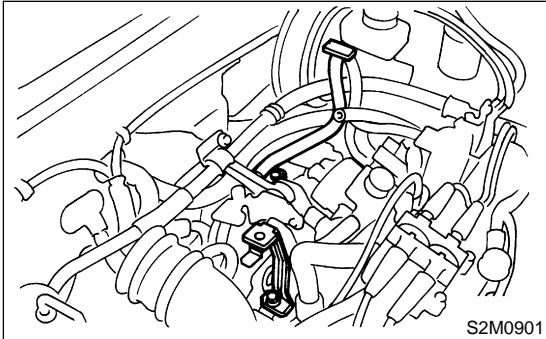
## 9. Automatic Transmission Assembly

S502207

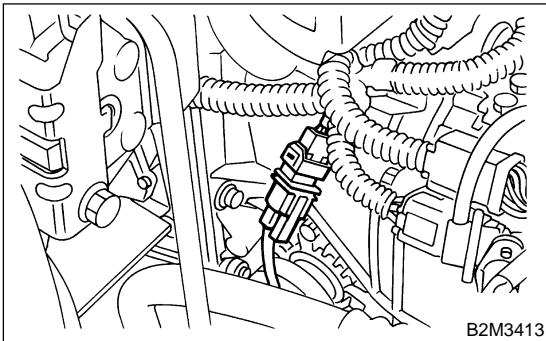
### A: REMOVAL

S502207A18

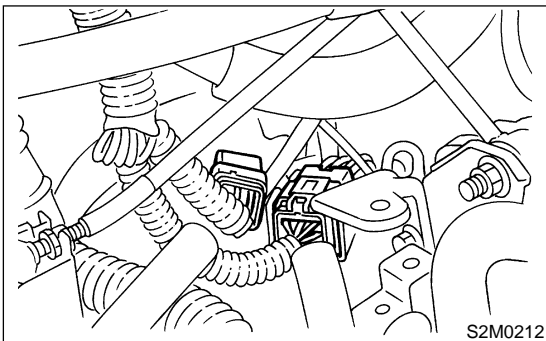
- 1) Open front hood fully, and support with stay.
- 2) Disconnect battery ground terminal.
- 3) Remove air intake duct and cleaner case.
- 4) Remove air cleaner case stay.



- 5) Disconnect the following connectors.
  - (1) Oxygen sensor connector



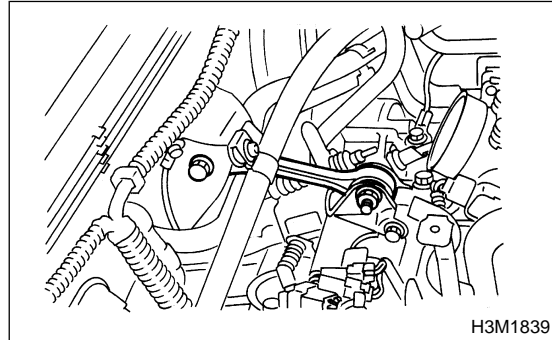
- (2) Transmission harness connector



- (3) Transmission ground terminal

- 6) Remove starter. <Ref. to SC(H4)-7 REMOVAL, Starter.>

- 7) Remove pitching stopper.



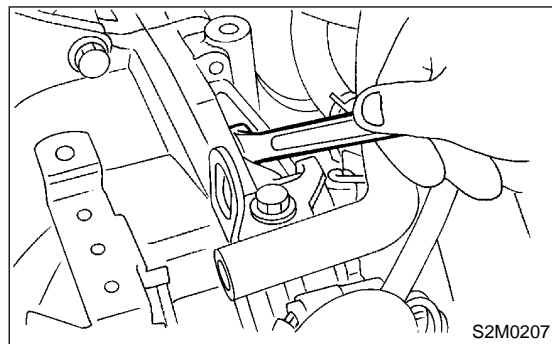
- 8) Separate torque converter clutch from drive plate.

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

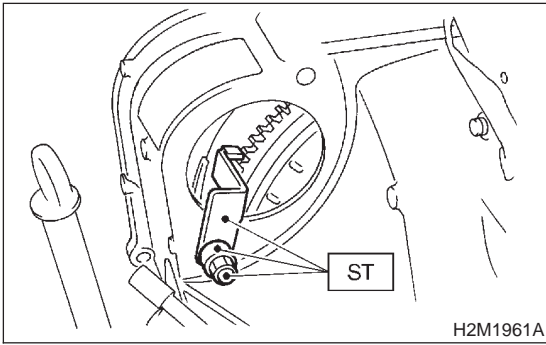
### CAUTION:

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

ST 499977100 CRANK PULLEY WRENCH



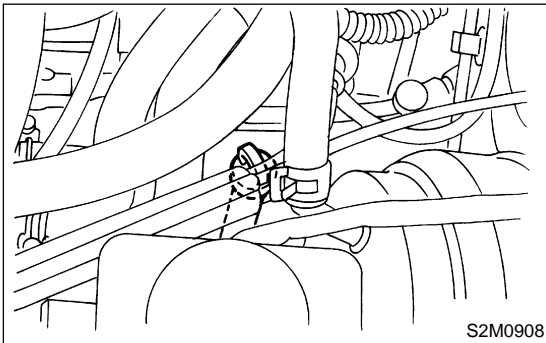
- 9) Install ST to torque converter clutch case.  
ST 498277200 STOPPER SET



- 10) Remove ATF level gauge.

**CAUTION:**

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

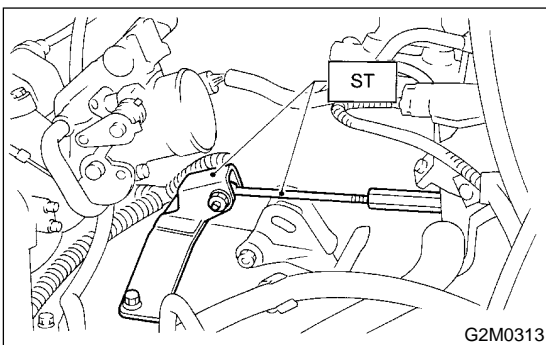


- 11) Set ST.

**NOTE:**

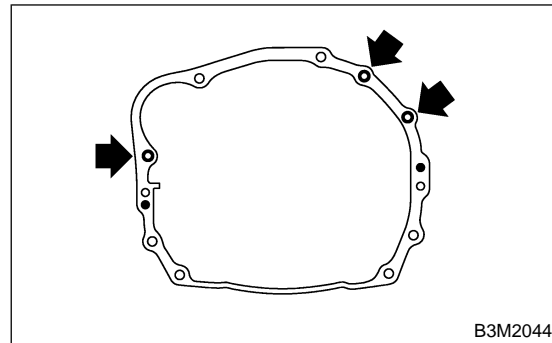
Also is available Part No. 927670000.

- ST 41099AA020 ENGINE SUPPORT ASSY

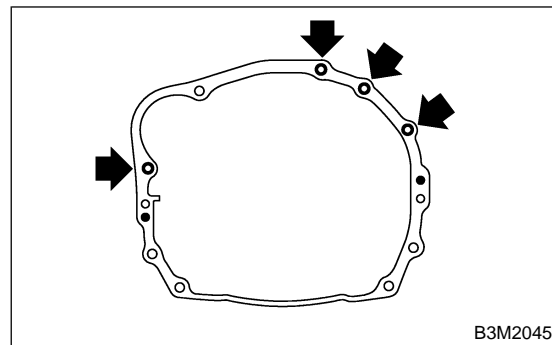


- 12) Remove bolt which holds right upper side of transmission to engine.

**2.5ℓ model**

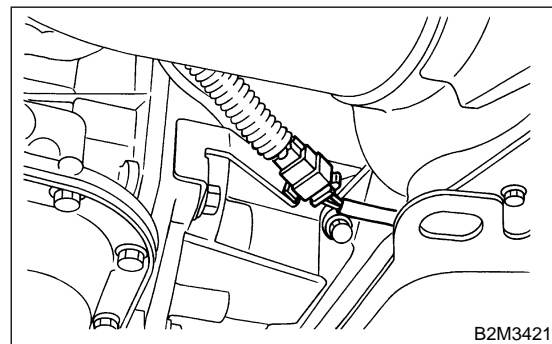


**3.0ℓ model**



- 13) Remove under cover.

- 14) Disconnect connector from rear oxygen sensor.



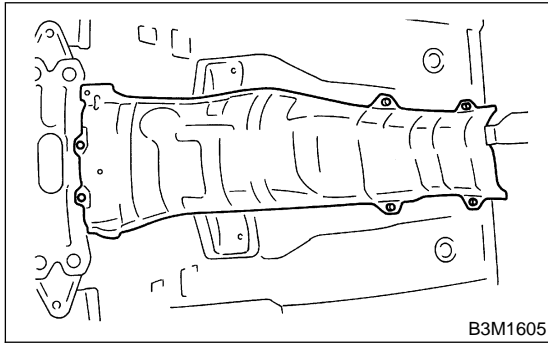
- 15) Remove front and center exhaust pipes.

- 16) Remove rear exhaust pipe and muffler assembly.

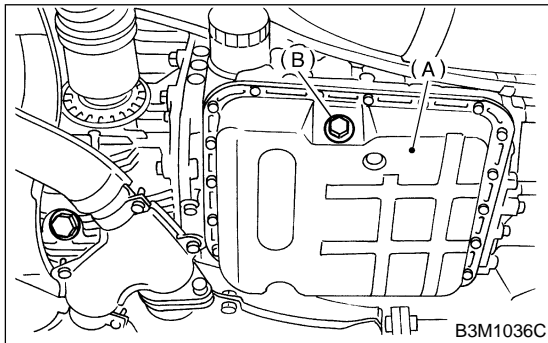
# AUTOMATIC TRANSMISSION ASSEMBLY

## Automatic Transmission

17) Remove heat shield cover.

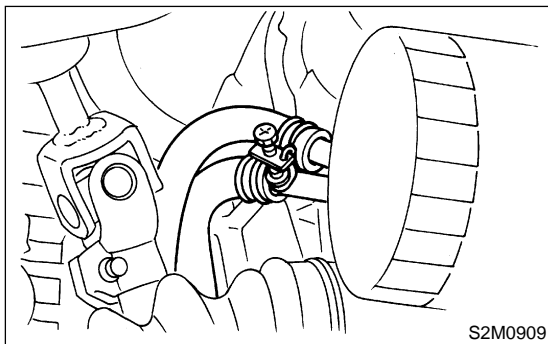


18) Drain ATF to remove ATF drain plug.



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

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

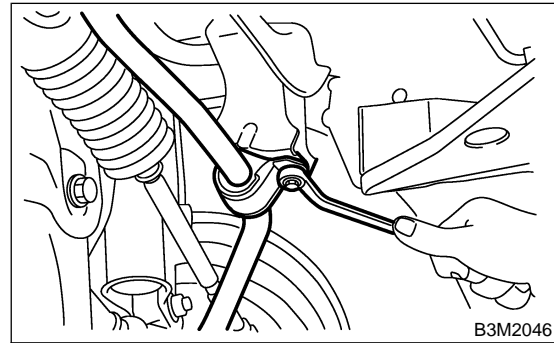


20) Remove propeller shaft.

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

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

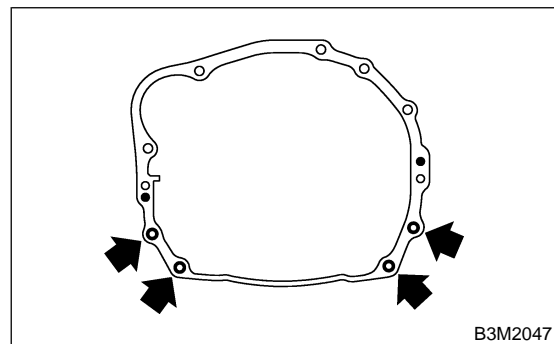
22) Remove bolts which install stabilizer clamps onto crossmember.



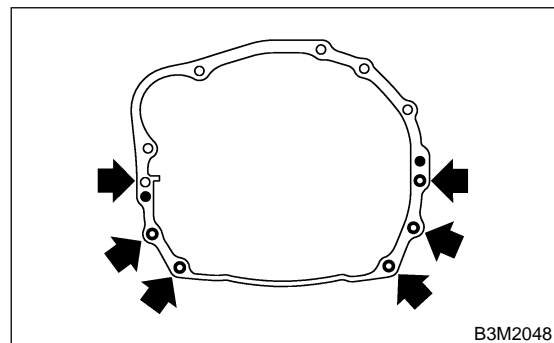
23) Remove front drive shafts from transmission.  
<Ref. to DS-28 REMOVAL, Front Drive Shaft.>

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

**2.5ℓ model**



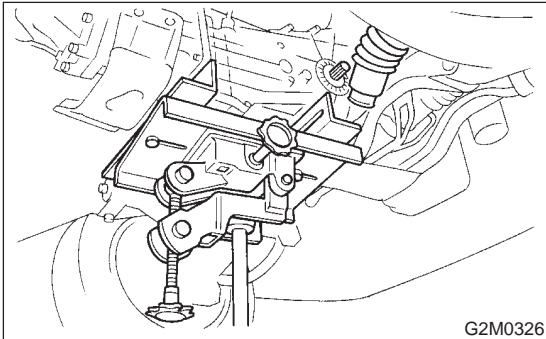
**3.0ℓ model**



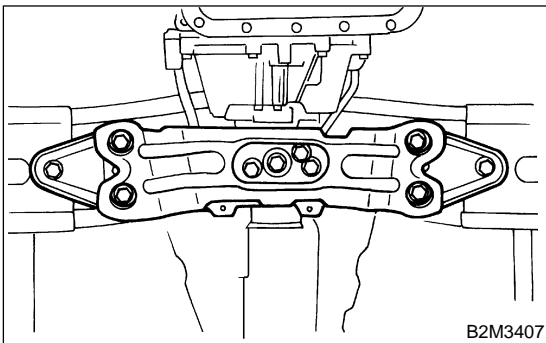
25) Place transmission jack under transmission.

**CAUTION:**

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



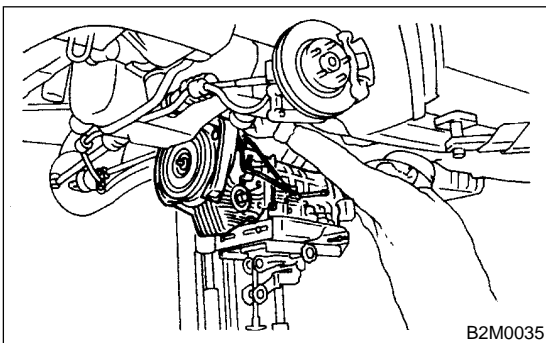
26) Remove transmission rear crossmember from vehicle.



27) Remove transmission.

**CAUTION:**

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



28) Separate transmission assembly and rear cushion rubber.

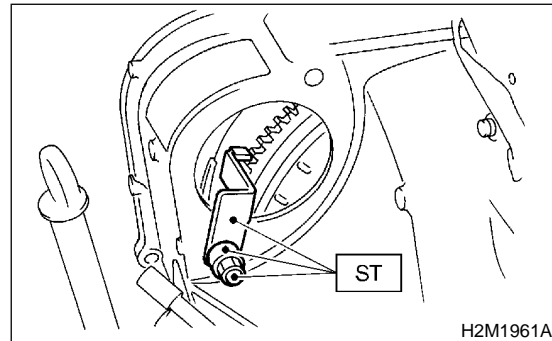
## B: INSTALLATION S502207A11

1) Install rear cushion rubber to transmission assembly.

**Tightening torque:**

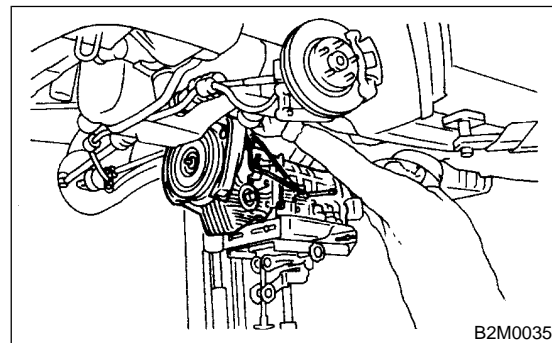
**38 N·m (3.9 kgf·m, 28 ft·lb)**

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



3) Install transmission onto engine.

(1) Gradually raise transmission with transmission jack.



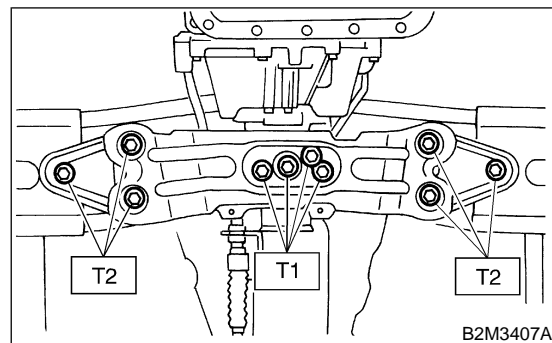
(2) Engage them at splines.

4) Install transmission rear crossmember.

**Tightening torque:**

**T1: 35 N·m (3.6 kgf·m, 26 ft·lb)**

**T2: 75 N·m (7.6 kgf·m, 55 ft·lb)**



5) Take off transmission jack.

# AUTOMATIC TRANSMISSION ASSEMBLY

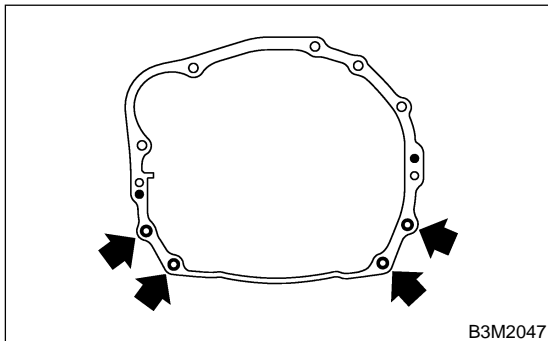
Automatic Transmission

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

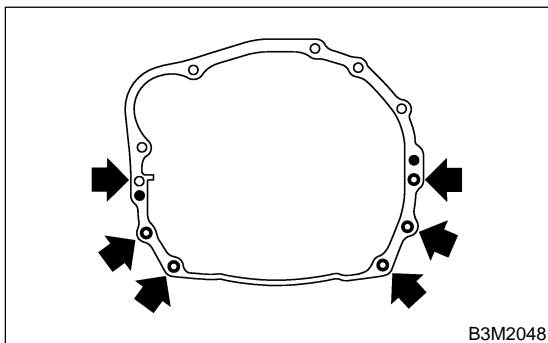
**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

**2.5l model**



**3.0l model**



7) Connect engine and transmission.

(1) Remove ST from torque converter clutch case.

**NOTE:**

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

ST 498277200 STOPPER SET

(2) Install starter.

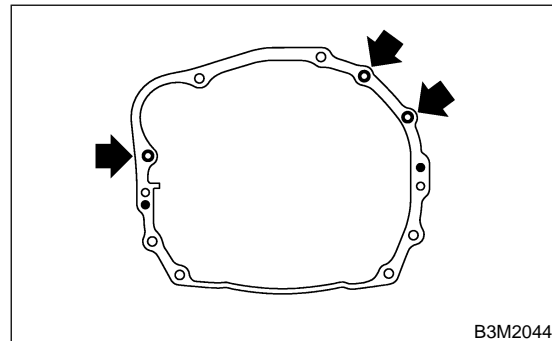
<Ref. to SC(H4)-8 INSTALLATION, Starter.>

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

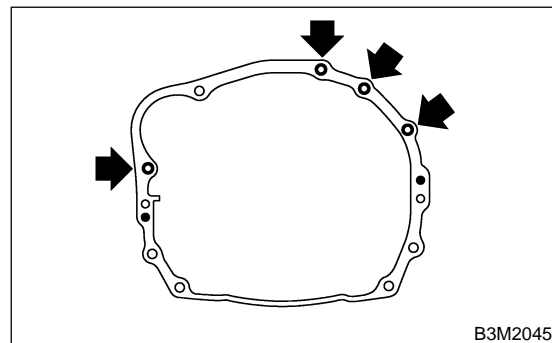
**Tightening torque:**

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**

**2.5l model**



**3.0l model**



8) Install torque converter clutch to drive plate.

(1) Tighten bolts which hold torque converter clutch to drive plate.

(2) Tighten other bolts while rotating the engine by using ST.

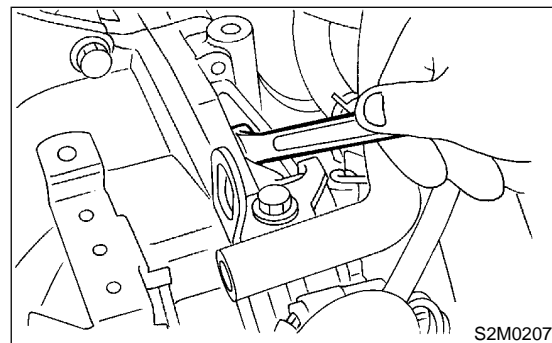
**CAUTION:**

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

ST 499977100 CRANK PULLEY WRENCH

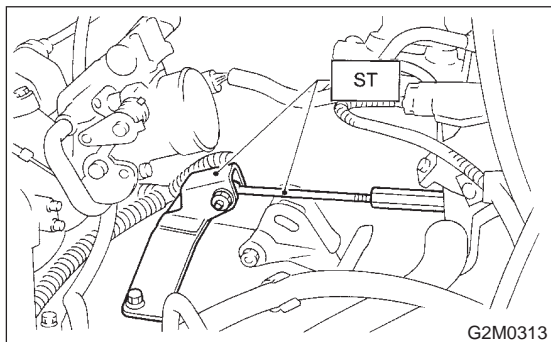
**Tightening torque:**

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



(3) Clog plug onto service hole.

9) Remove ST.

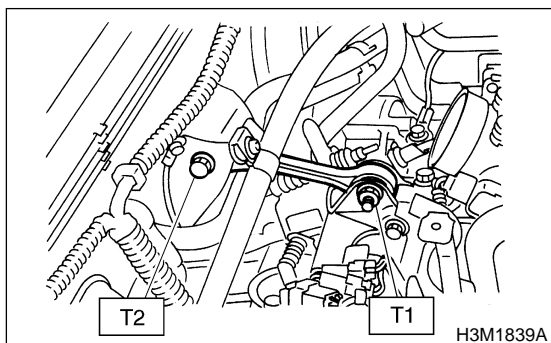


10) Install pitching stopper.

**Tightening torque:**

**T1: 50 N·m (5.1 kgf-m, 37 ft-lb)**

**T2: 58 N·m (5.9 kgf-m, 43 ft-lb)**

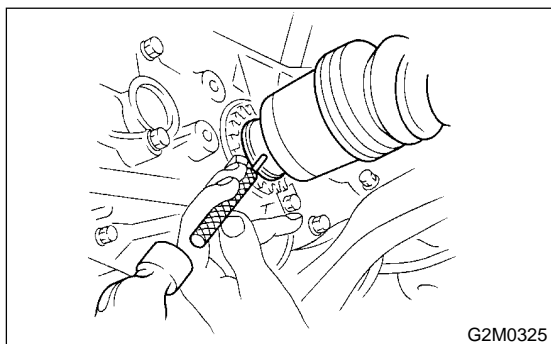


11) Install front drive shafts into transmission.

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

**CAUTION:**

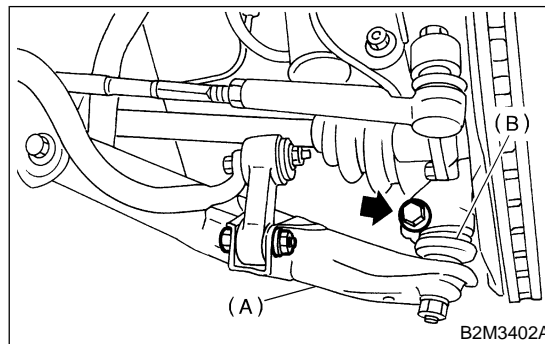
**Always use a new spring pin.**



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

**Tightening torque:**

**49 N·m (5.0 kgf-m, 36 ft-lb)**



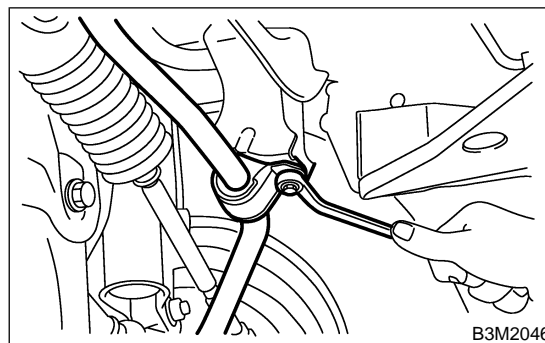
(A) Transverse link

(B) Ball joint

12) Install stabilizer clamps onto front crossmember.

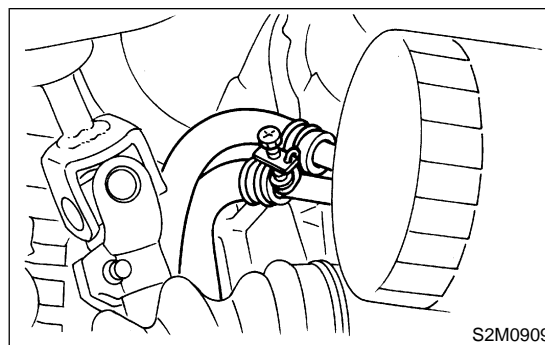
**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



13) Install shift select cable onto select lever.  
<Ref. to CS-25 INSTALLATION, Select Cable.>

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



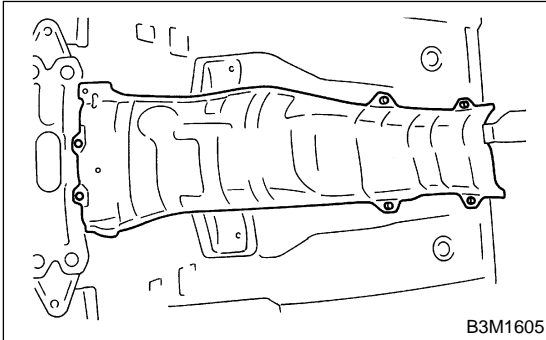
15) Install propeller shaft.

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

# AUTOMATIC TRANSMISSION ASSEMBLY

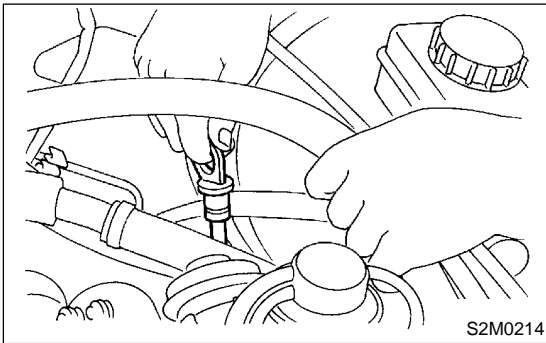
Automatic Transmission

16) Install heat shield cover.



30) Check the vehicle on the road tester.  
<Ref. to AT-11 Road Test.>

- 17) Install rear exhaust pipe to muffler.
- 18) Install front exhaust pipe and center exhaust pipe.
- 19) Install under cover.
- 20) Install ATF level gauge.



- 21) Connect the following connectors.
  - (1) Transmission harness connectors
  - (2) Transmission ground terminal
  - (3) Oxygen sensor connector
- 22) Connect the following cables.
  - (1) Cruise control cable (With cruise control vehicles)
- 23) Install air cleaner case stay.

### **Tightening torque:**

**16 N·m (1.6 kgf·m, 11.6 ft·lb)**

- 24) Install air cleaner case.
- 25) Connect battery ground cable.
- 26) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole.

### **Recommended fluid:**

**Dexron III type automatic transmission fluid**

### **Fluid capacity:**

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

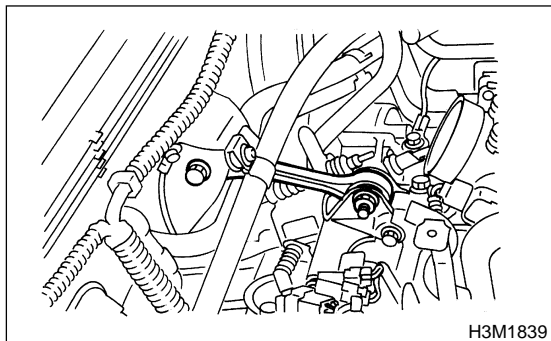
- 27) Take off vehicle from lift arms.
- 28) Check select lever operation.  
<Ref. to AT-28 INSPECTION, Inhibitor Switch.>
- 29) Run the vehicle until the ATF temperature rises from 60 to 80°C (140 to 176°F) and check the ATF level of the "HOT" side on level gauge.

## 10. Transmission Mounting System S502233

### A: REMOVAL S502233A18

#### 1. PITCHING STOPPER S502233A1801

- 1) Disconnect battery ground terminal.
- 2) Remove the air intake duct and cleaner case.
- 3) Remove the pitching stopper.



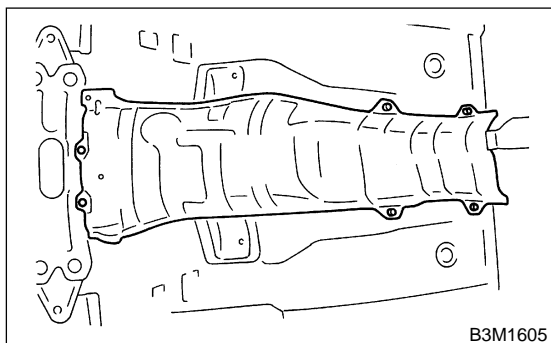
#### 2. CROSSMEMBER AND CUSHION RUBBER S502233A1802

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

#### CAUTION:

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

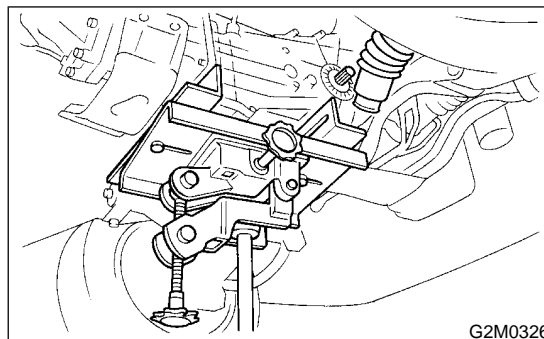
- 4) Remove the heat shield cover.



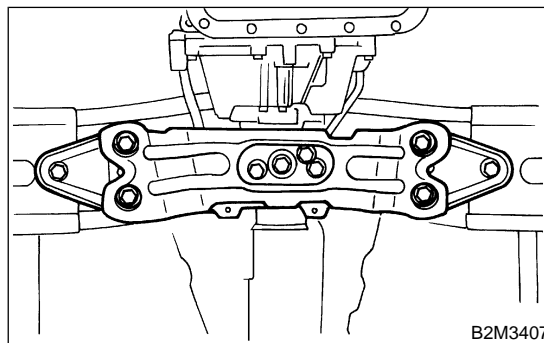
- 5) Set the transmission jack under the transmission.

#### CAUTION:

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



- 6) Remove the crossmember.



- 7) Remove the rear cushion rubber.

### B: INSTALLATION S502233A11

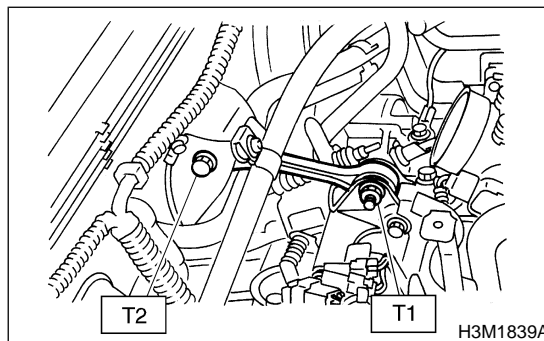
#### 1. PITCHING STOPPER S502233A1101

- 1) Install the pitching stopper.

#### Tightening torque:

T1: 50 N·m (5.1 kgf·m, 37 ft·lb)

T2: 58 N·m (5.9 kgf·m, 43 ft·lb)



- 2) Install the air intake duct and cleaner case.



# TRANSMISSION MOUNTING SYSTEM

Automatic Transmission

## 2. CROSSMEMBER AND CUSHION RUBBER

S502233A1102

- 1) Install the rear cushion rubber.

### **Tightening torque:**

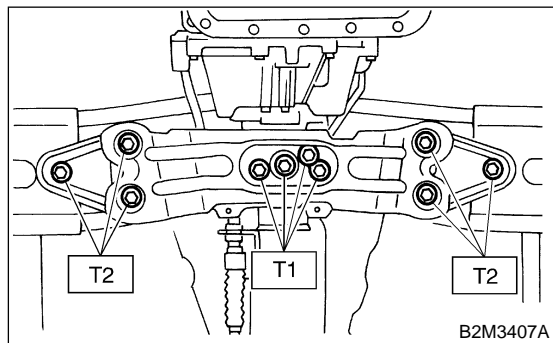
**38 N·m (3.9 kgf-m, 28 ft-lb)**

- 2) Install the crossmember.

### **Tightening torque:**

**T1: 35 N·m (3.6 kgf-m, 26 ft-lb)**

**T2: 75 N·m (7.6 kgf-m, 55 ft-lb)**



- 3) Remove the transmission jack.
- 4) Install the heat shield cover.
- 5) Install the front center, rear exhaust pipes and the muffler.

## C: INSPECTION

S502233A10

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

### 1. PITCHING STOPPER

S502233A1001

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

### 2. CROSSMEMBER AND CUSHION RUBBER

S502233A1002

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

## 11. Oil Seal S502143

### A: REPLACEMENT S502143A20

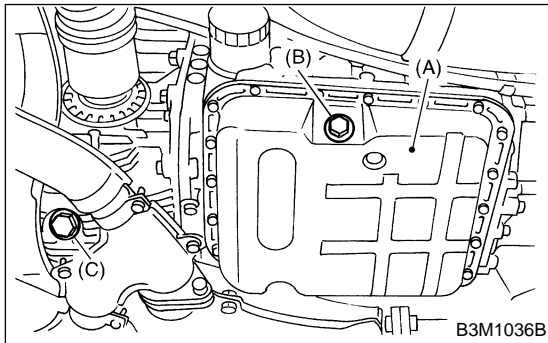
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



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

- 3) Remove the rear exhaust pipe and muffler.
- 4) Remove the heat shield cover.
- 5) Remove the propeller shaft. <Ref. to DS-13 REMOVAL, Propeller Shaft.>
- 6) Using ST, remove the oil seal.  
ST 398527700 PULLER ASSY
- 7) Using ST, install the oil seal.  
ST 498057300 INSTALLER
- 8) Install the propeller shaft. <Ref. to DS-14 INSTALLATION, Propeller Shaft.>
- 9) Install the heat shield cover.
- 10) Install the rear exhaust pipe and muffler.
- 11) Pour ATF and check the ATF level. <Ref. to AT-9 Automatic Transmission Fluid.>

# INHIBITOR SWITCH

Automatic Transmission

## 12. Inhibitor Switch S502243

### A: INSPECTION S502243A10

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

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

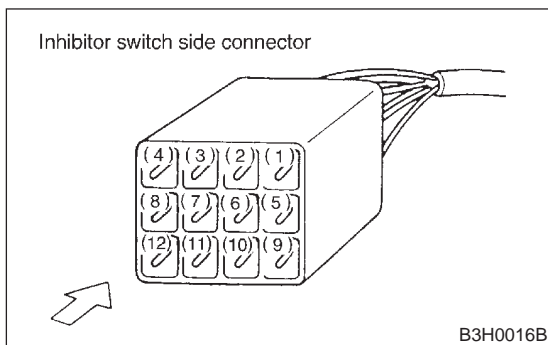
#### CAUTION:

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

#### NOTE:

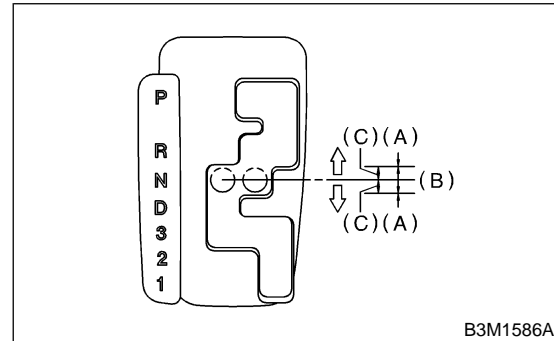
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



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

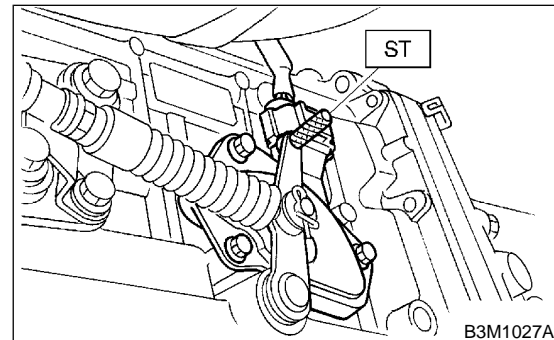
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.



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

### B: ADJUSTMENT S502243A01

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



- 4) Tighten the three inhibitor switch bolts.

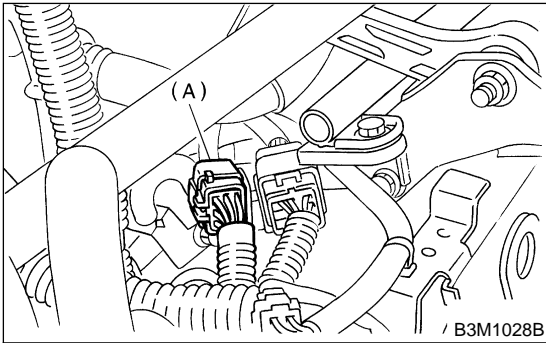
#### Tightening torque:

**3.4 N·m (0.35 kgf-m, 2.5 ft-lb)**

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

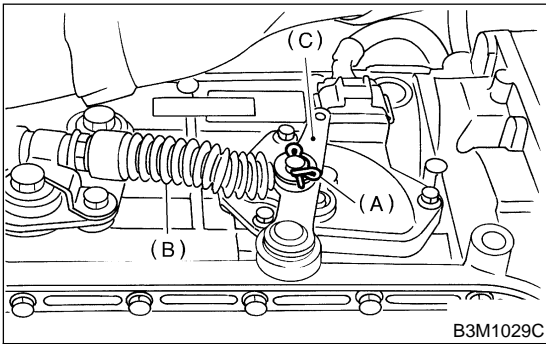
## C: REMOVAL S502243A1B

- 1) Move select lever to neutral position.
- 2) Remove air intake chamber and duct.
- 3) Disconnect inhibitor switch connector.



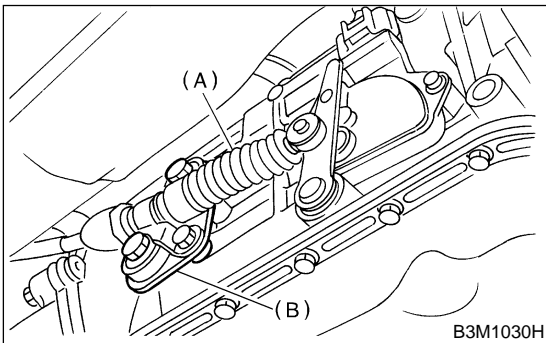
(A) Inhibitor switch

- 4) Remove center exhaust pipe.
- 5) Remove snap pin from range select lever.



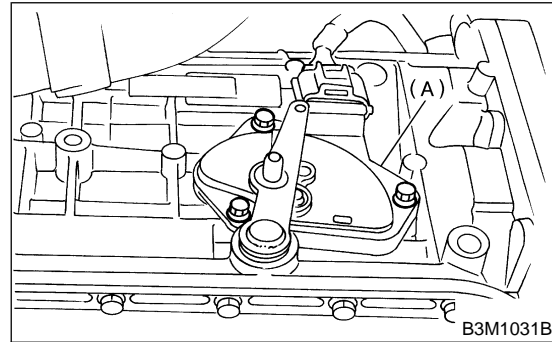
(A) Snap pin  
(B) Select cable  
(C) Range select lever

- 6) Remove plate assembly from transmission case.



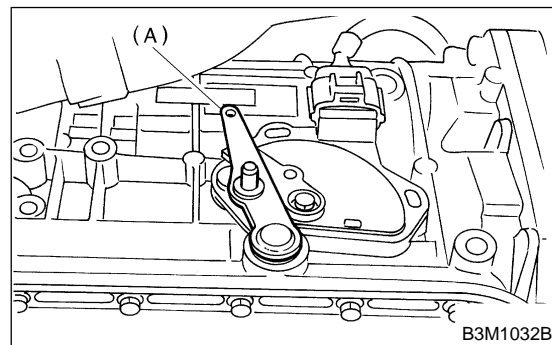
(A) Select cable  
(B) Plate ASSY

- 7) Remove bolts.



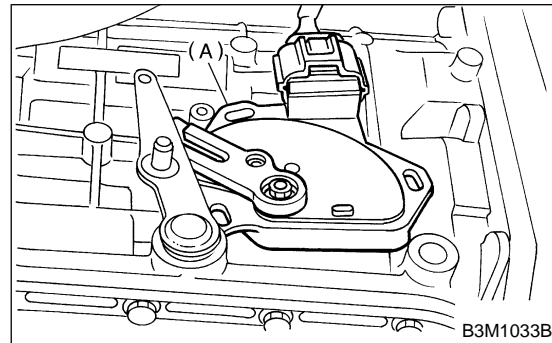
(A) Inhibitor switch

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



(A) Range select lever

- 9) Remove inhibitor switch from transmission.



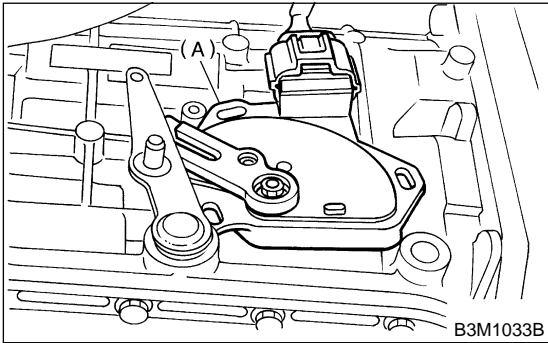
(A) Inhibitor switch

# INHIBITOR SWITCH

Automatic Transmission

## D: INSTALLATION S502243A11

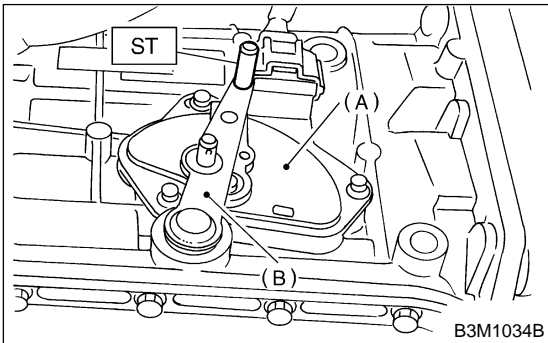
1) Install inhibitor switch to transmission case.



(A) Inhibitor switch

2) Move range select lever to neutral position.

3) Using ST, tighten bolts of inhibitor switch.  
ST 499267300 STOPPER PIN



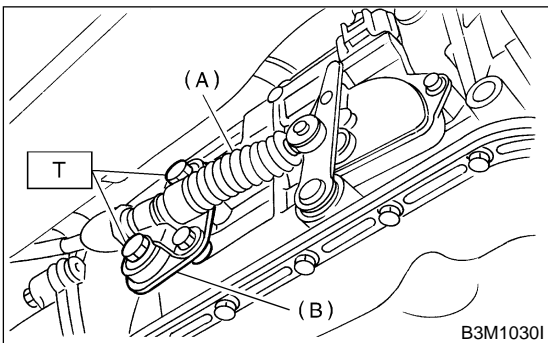
(A) Inhibitor switch  
(B) Range select lever

4) Install select cable to range select lever.

5) Install plate assembly to transmission.

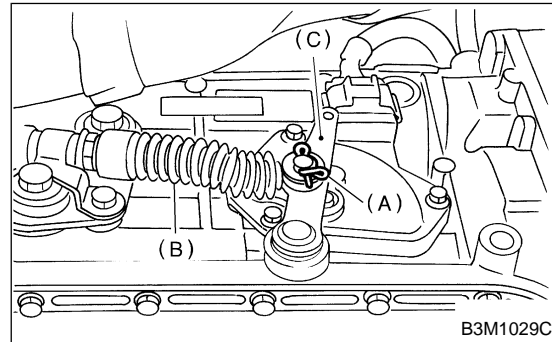
**Tightening torque:**

**T: 24.5 N·m (2.50 kgf-m, 18.1 ft-lb)**



(A) Select cable  
(B) Plate ASSY

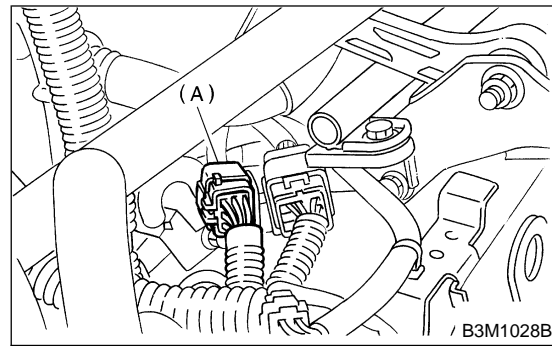
6) Install snap pin to range select lever.



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

7) Install center exhaust pipe.

8) Connect inhibitor switch connector.



(A) Inhibitor switch

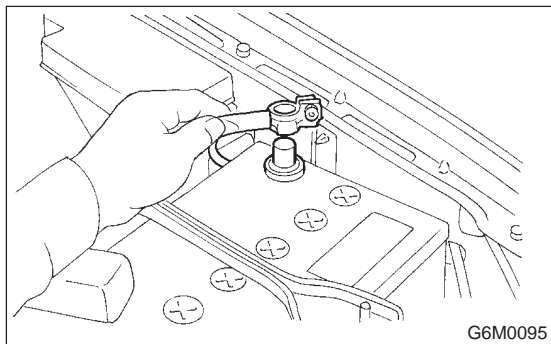
9) Install air intake chamber and duct.

### 13. Front and Rear Vehicle Speed Sensor, Torque Converter Turbine Speed Sensor and Harness Assembly

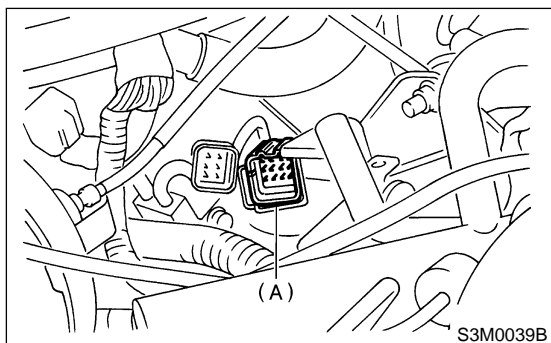
S502680

#### A: REMOVAL S502680A18

- 1) Disconnect battery ground cable.



- 2) Disconnect transmission connector.



(A) Transmission connector

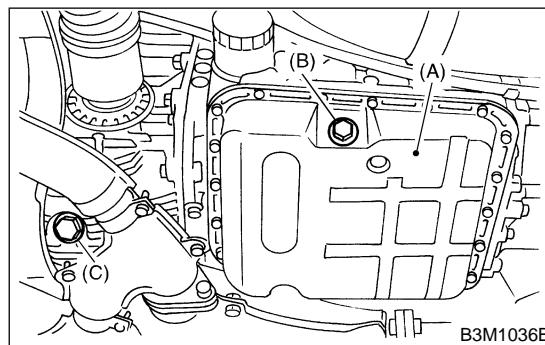
- 3) Remove the transmission connector from stay.
- 4) Lift-up the vehicle.
- 5) Clean transmission exterior.
- 6) Drain ATF completely.

**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**

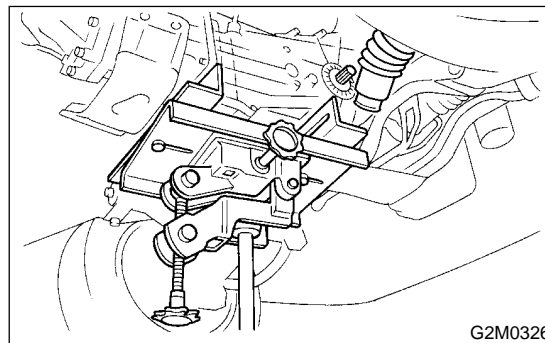


- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

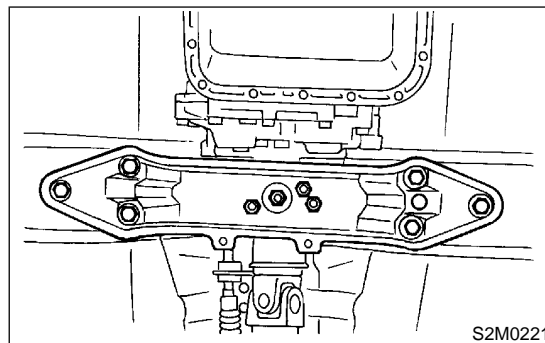
- 7) Remove front, center, exhaust pipes and muffler.
- 8) Remove the shield cover.
- 9) Remove the propeller shaft. <Ref. to DS-13 REMOVAL, Proppeller Shaft.>
- 10) Place transmission jack under transmission.

**CAUTION:**

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



- 11) Remove the transmission rear crossmember bolts.



- 12) Lower the AT jack.

**NOTE:**

Do not separate the AT jack and transmission.

# FRONT AND REAR VEHICLE SPEED SENSOR, TORQUE CONVERTER TURBINE SPEED SENSOR AND HARNESS ASSEMBLY

Automatic Transmission

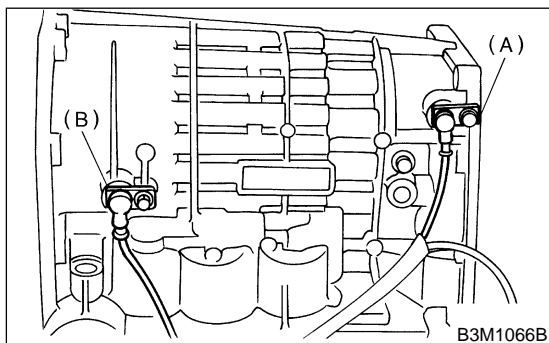
13) Remove the oil cooler outlet pipe.

## CAUTION:

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

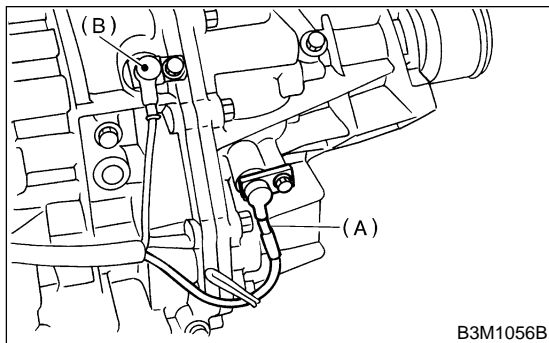
14) Remove front and rear vehicle speed sensor, and torque converter turbine speed sensor with harness assembly.

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



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

### ● Rear vehicle speed sensor



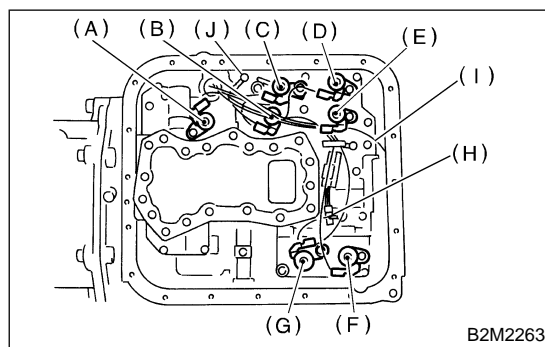
- (A) Rear vehicle speed sensor
- (B) Front vehicle speed sensor

15) Remove oil pan.

## NOTE:

Drain oil into a container.

16) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors at 9 places.



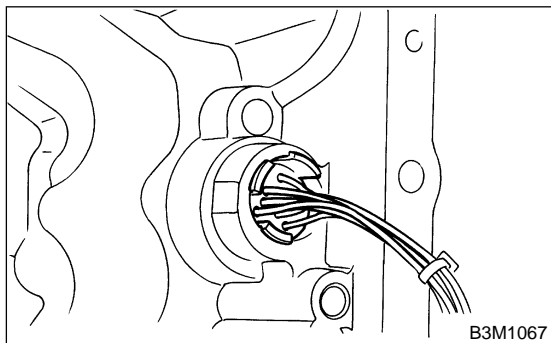
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

# FRONT AND REAR VEHICLE SPEED SENSOR, TORQUE CONVERTER TURBINE SPEED SENSOR AND HARNESS ASSEMBLY

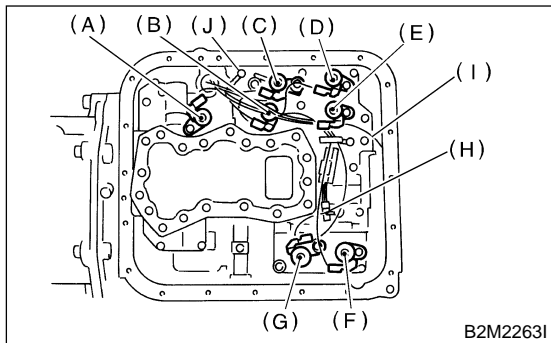
Automatic Transmission

## B: INSTALLATION S502680A11

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



2) Connect harness connectors at 9 places. Connect connectors of same color, and secure connectors to valve body using clips.

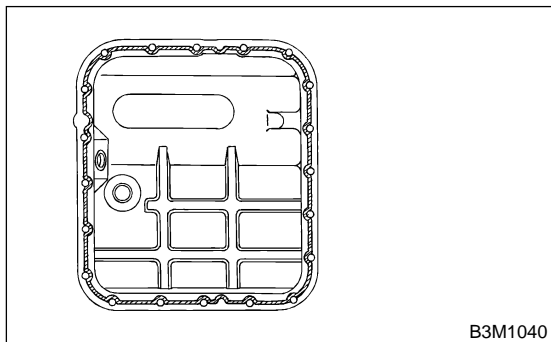


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

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

**Fluid packing:**

**Three Bond 1217B**



4) Install the oil pan.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

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

**Tightening torque:**

**7 N·m (0.7 kgf-m, 5.1 ft-lb)**

6) Install oil cooler outlet pipe.

**CAUTION:**

**Be sure to use a new aluminum washer.**

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

7) Install transmission rear crossmember bolts.

**Tightening torque:**

**75 N·m (7.6 kgf-m, 55 ft-lb)**

8) Install propeller shaft.

9) Install shield cover.

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

11) Install the transmission connector to the stay.



# CONTROL VALVE BODY

Automatic Transmission

## 14. Control Valve Body S502564

### A: REMOVAL S502564A18

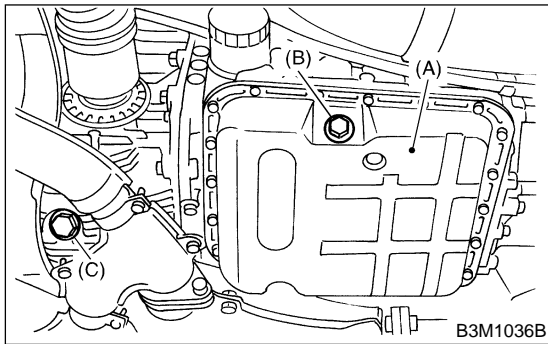
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

#### NOTE:

Tighten ATF drain plug after draining ATF.

#### Tightening torque:

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



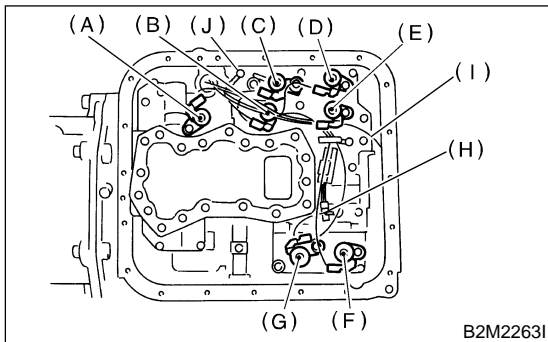
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 3) Remove the oil pan.

#### NOTE:

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

- 4) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors at 9 places.

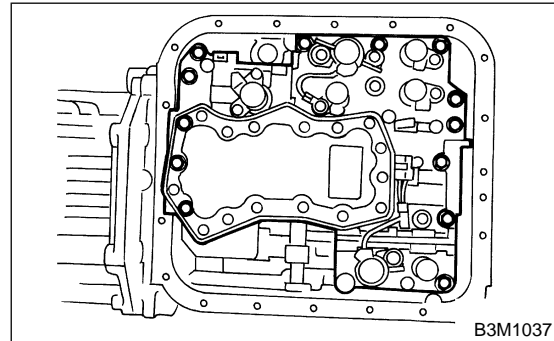


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

- 5) Remove the control valve.

#### CAUTION:

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

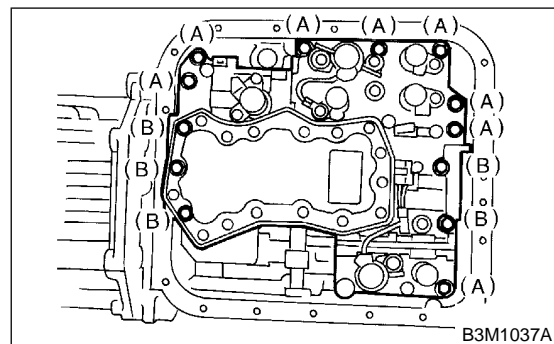


### B: INSTALLATION S502564A11

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

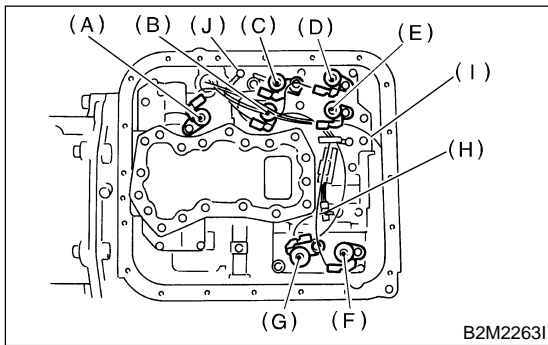
#### Tightening torque:

**8 N·m (0.8 kgf·m, 5.8 ft·lb)**



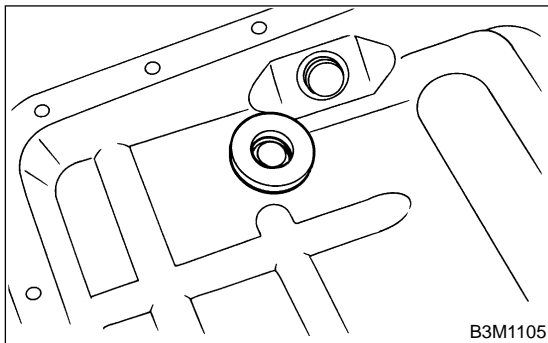
- (A) Short bolts
- (B) Long bolts

- 3) Connect all connector.



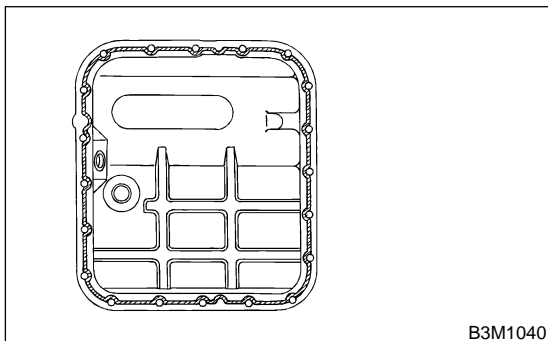
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

4) Attach the magnet at the specified position.



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

**Fluid packing:**  
**Tree Bond 1217B**



6) Install the oil pan.

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

7) Pour ATF into the oil charge pipe.

**Recommended 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)**

8) Check the level of the ATF.

## C: DISASSEMBLY S502564A06

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

## D: ASSEMBLY S502564A02

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

## E: INSPECTION S502564A10

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

# SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

Automatic Transmission

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

S502227

### A: REMOVAL

S502227A18

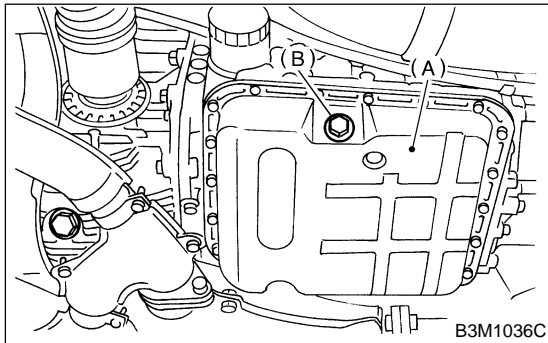
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



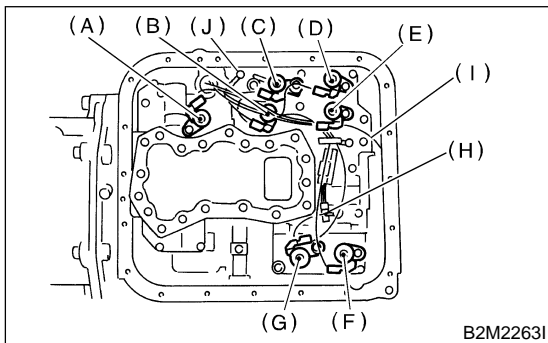
- (A) Oil pan
- (B) Drain plug

- 3) Remove oil pan.

NOTE:

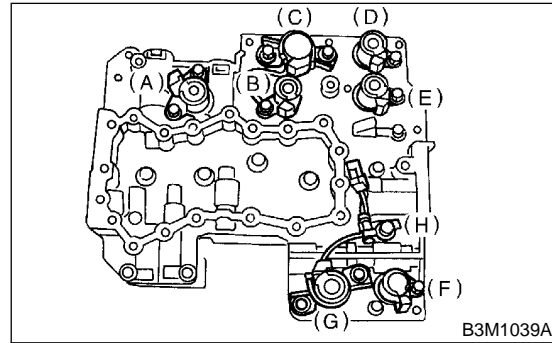
Drain oil into a container.

- 4) Disconnect solenoid and sensor connectors. Remove connectors from clip and disconnect connectors at 8 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
- (I) Transfer duty solenoid (Brown)
- (J) Transmission ground

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



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

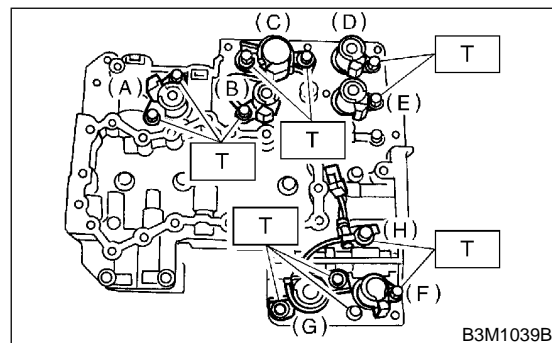
### B: INSTALLATION

S502227A11

- 1) Install solenoids and ATF temperature sensor.

**Tightening torque:**

**T: 8 N·m (0.8 kgf·m, 5.8 ft·lb)**

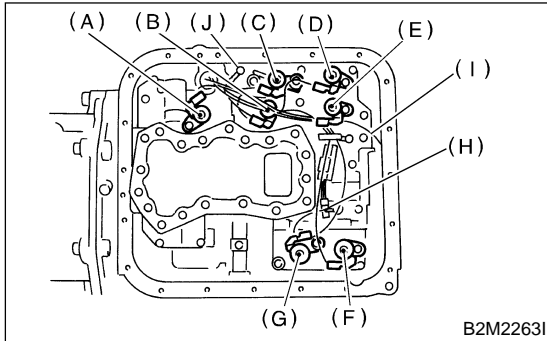


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

# SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

Automatic Transmission

2) Connect harness connectors at 8 places. Connect connectors of same color, and secure connectors to valve body using clips.

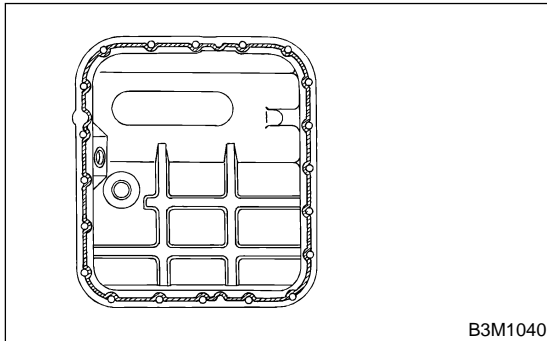


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

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

### Fluid packing:

**Tree Bond 1217B**

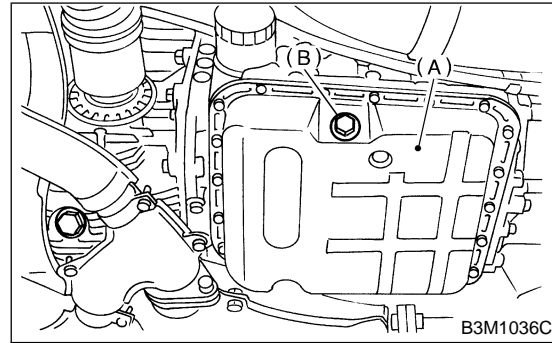


B3M1040

4) Install oil pan.

### Tightening torque:

**4.9 N·m (0.50 kgf-m, 3.6 ft-lb)**



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

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

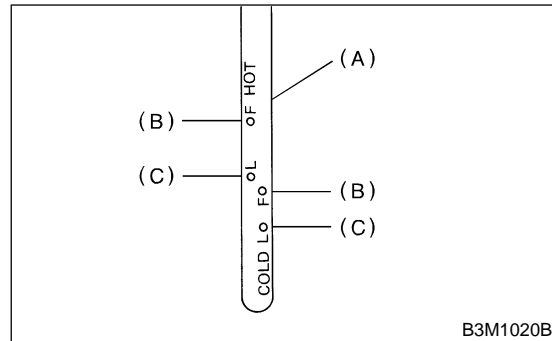
### Recommended fluid:

**Dexron III type automatic transmission fluid**

### Fluid capacity:

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

6) 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

## 16. ATF Filter S502226

### A: REMOVAL S502226A18

#### 1. 2.5ℓ MODEL S502226A1801

**NOTE:**

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

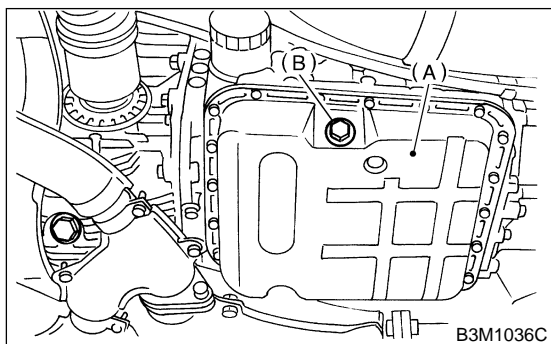
- 1) Drain ATF completely.

**NOTE:**

Tighten ATF drain plug after draining ATF.

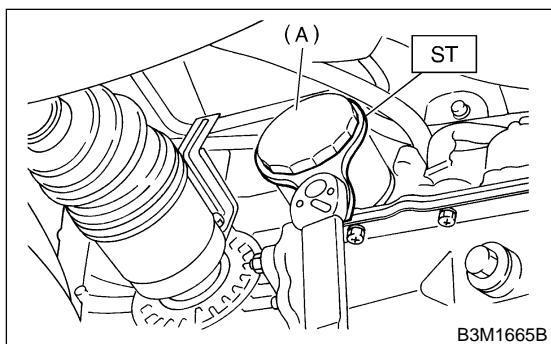
**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



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

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



- (A) ATF filter

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

#### 2. 3.0ℓ MODEL S502226A1802

##### ● ATF Filter

**NOTE:**

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

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

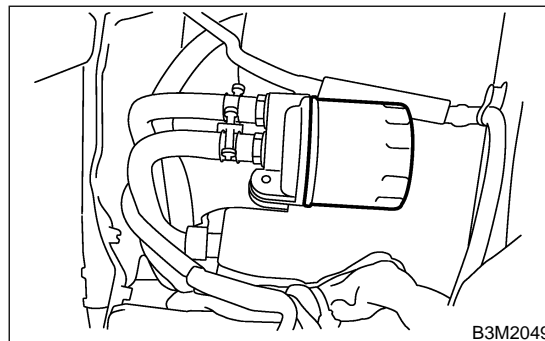
**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

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



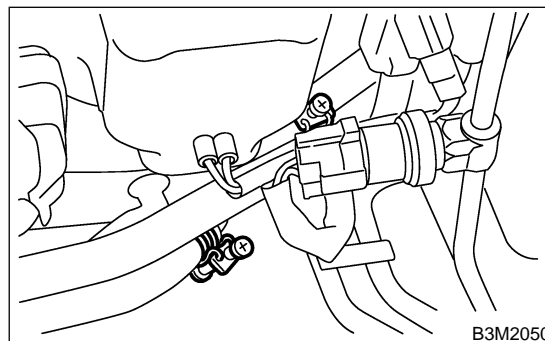
- 4) Get new ATF filter and apply a thin coat of ATF to the oil seal

##### ● ATF Filter Assembly

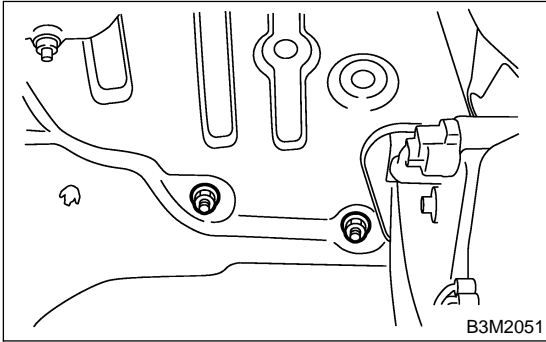
- 1) Remove battery.
- 2) Drain ATF completely. <Ref. to AT-9 REPLACEMENT, Automatic Transmission.>
- 3) Remove front left mud guard.  
<Ref. to EI-23 REMOVAL, Mud Guard.>
- 4) Release clamp of IN, OUT of oil filter hose, and remove hose from pipe.

**NOTE:**

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



- 5) Remove oil filter bracket installation nut.



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

# ATF FILTER

Automatic Transmission

## B: INSTALLATION S502226A11

### 1. 2.5ℓ MODEL S502226A1101

- 1) Install ATF filter. Turn it by hand, being careful not to damage oil seal.
- 2) Using ST, tighten ATF filter to transmission case.

Calculate ATF filter torque specifications using the following formula.

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

T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

Example:

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

#### CAUTION:

**Align ST with torque wrench while tightening ATF filter.**

ST 498545400 OIL FILTER WRENCH

- 3) Add ATF.

### 2. 3.0ℓ MODEL S502226A1102

#### ● ATF Filter

- 1) Install AT oil filter. Turn it by hand, being careful not to damage oil seal.
- 2) Using ST, tighten AT oil filter to transmission case.

Calculate AT filter torque specifications using the following formula.

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

T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

Example:

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

#### CAUTION:

**Align ST with torque wrench while tightening AT oil filter.**

ST 498545400 OIL FILTER WRENCH

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

- 4) Add ATF.

#### ● ATF Filter Assembly

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

- 2) Using ST, tighten AT oil filter to transmission case.

Calculate AT filter torque specifications using the following formula.

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

T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

Example:

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

#### CAUTION:

**Align ST with torque wrench while tightening AT oil filter.**

ST 498545400 OIL FILTER WRENCH

- 3) Install ATF filter to bracket.

#### **Tightening torque:**

**16 N·m (1.6 kgf-m, 12 ft-lb)**

- 4) Install ATF filter assembly to vehicle.

#### **Tightening torque:**

**16 N·m (1.6 kgf-m, 12 ft-lb)**

- 5) Install front left mud guard.

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

- 6) Add ATF.

## C: INSPECTION S502226A10

Replace the part if any defect is found from the inspection.  
Check for rust, hole, ATF leaks, and other damage.



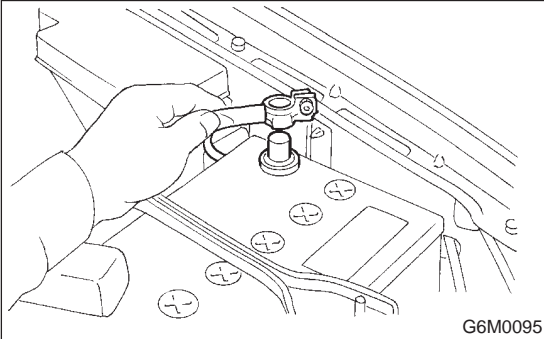
# TRANSMISSION CONTROL MODULE (TCM)

Automatic Transmission

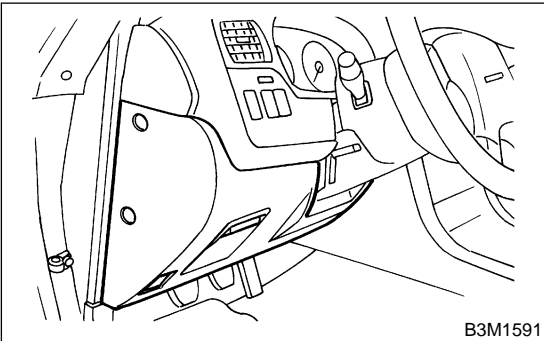
## 17. Transmission Control Module (TCM) S502225

### A: REMOVAL S502225A18

- 1) Disconnect battery ground cable.

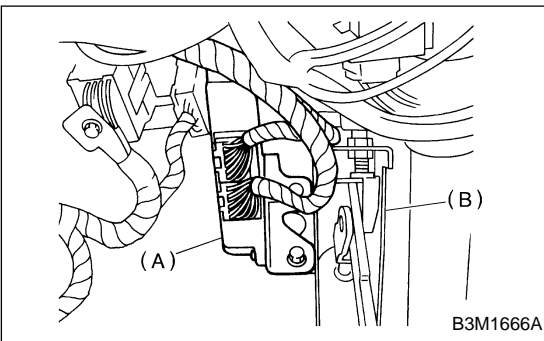


- 2) Remove lower cover and then disconnect connector.



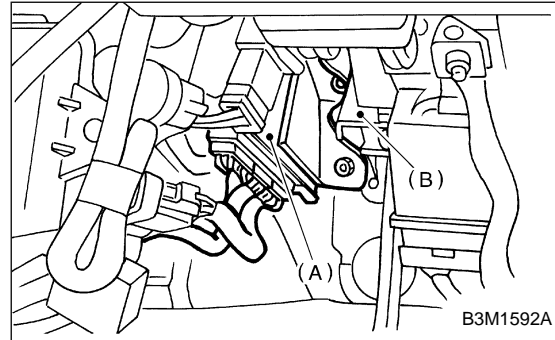
- 3) Disconnect connectors from transmission control module.

**Except VTD model**



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

**VTD model**



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

4) Remove transmission control module.

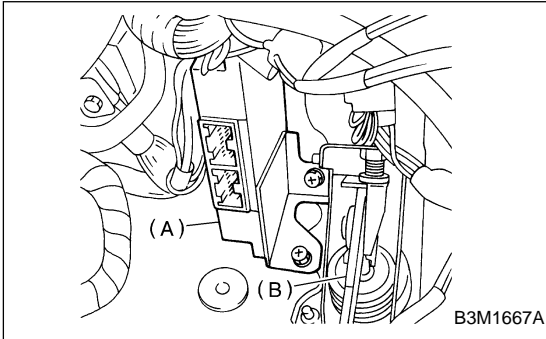
## B: INSTALLATION S502225A11

1) Install transmission control module.

**Tightening torque:**

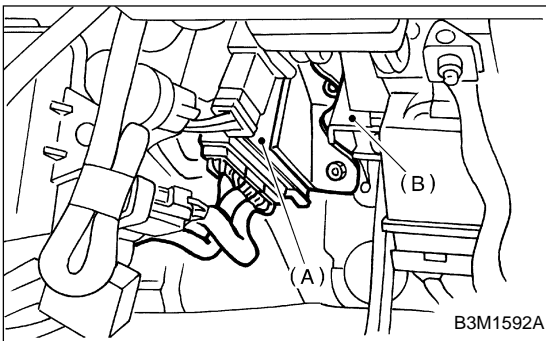
**7.4 N·m (0.75 kgf·m, 5.4 ft·lb)**

Except VTD model



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

VTD model



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

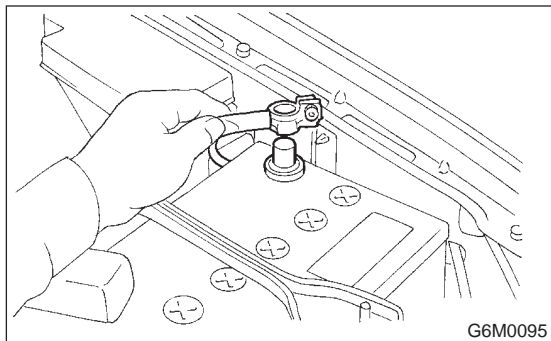
2) Connect connectors to transmission control module.

3) Install in the reverse order of removal.

## 18. Dropping Resistor S502218

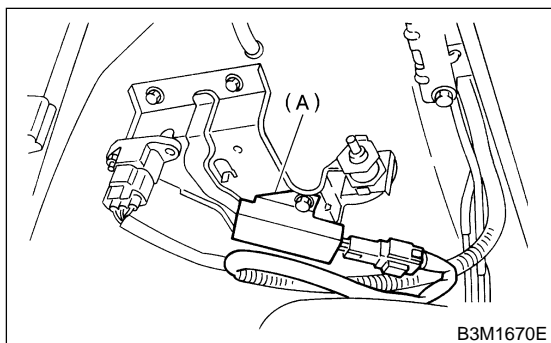
### A: REMOVAL S502218A18

- 1) Disconnect battery ground cable.



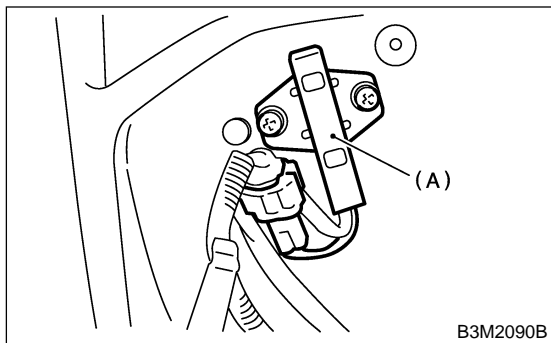
- 2) Remove air intake duct.
- 3) Disconnect connector from dropping resistor.
- 4) Remove dropping resistor.

#### 2.5ℓ model



(A) Dropping resistor

#### 3.0ℓ model



(A) Dropping resistor

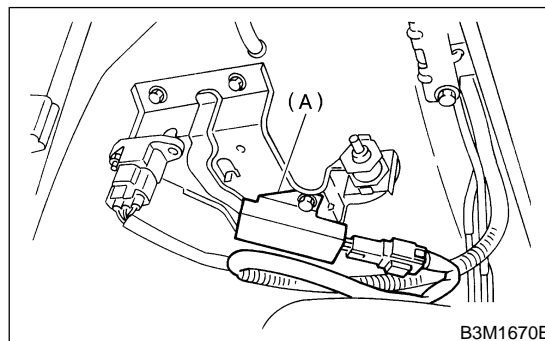
### B: INSTALLATION S502218A11

- 1) Install in the reverse order of removal.

#### Tightening torque:

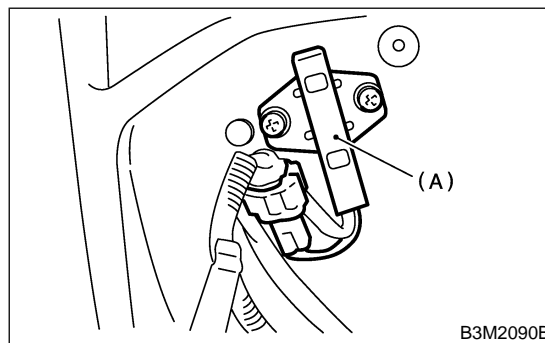
**6.4 N·m (0.65 kgf-m, 4.7 ft-lb)**

#### 2.5ℓ model



(A) Dropping resistor

#### 3.0ℓ model



(A) Dropping resistor

# DROPPING RESISTOR

Automatic Transmission

## C: INSPECTION S502218A10

No.	Step	Check	Yes	No
1	<b>CHECK RESISTOR.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminal. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance between 9 and 15 $\Omega$ ?	Go to step 2.	Replace dropping resistor. <Ref. to 44 Dropping Resistor.>
2	<b>CHECK RESISTOR.</b> Measure resistance between dropping resistor terminal. <b>Terminals</b> <b>No. 3 — No. 4:</b>	Is the resistance between 9 and 15 $\Omega$ ?	Dropping resistor is normal.	Replace dropping resistor. <Ref. to 44 Dropping Resistor.>

## 19. ATF Cooler Pipe and Hose

S502565

### A: REMOVAL S502565A18

#### 1. 2.5l MODEL S502565A1801

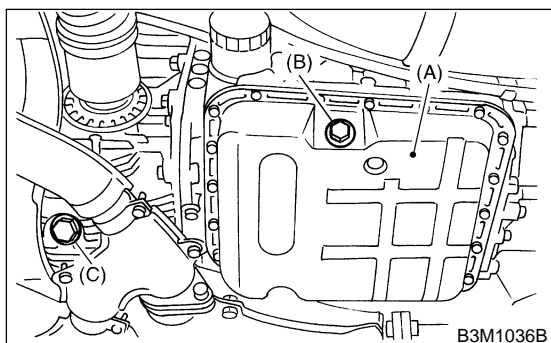
- 1) Remove battery and washer tank.
- 2) Lift-up the vehicle.
- 3) Drain ATF completely.

**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**

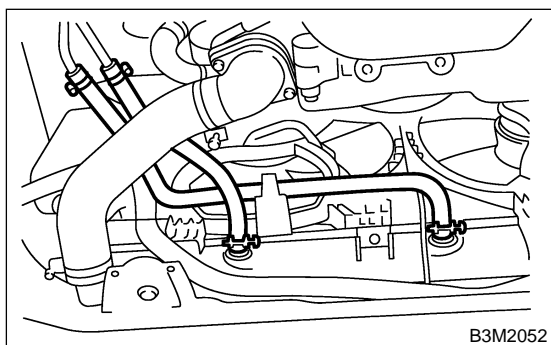


- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

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

**NOTE:**

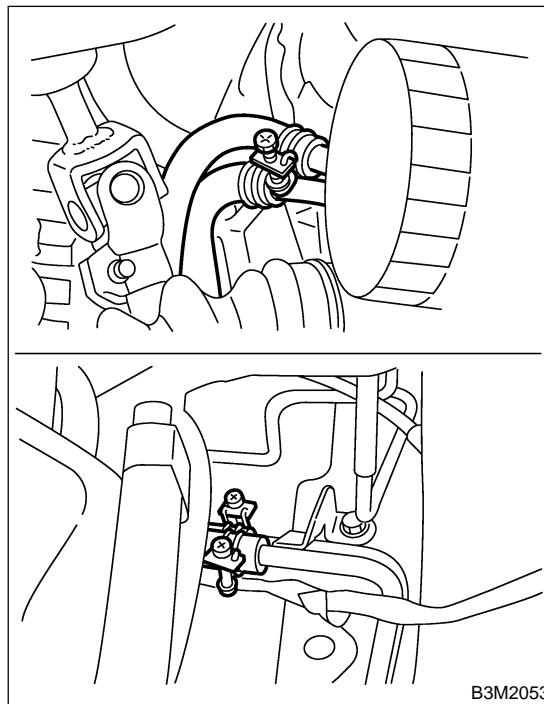
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



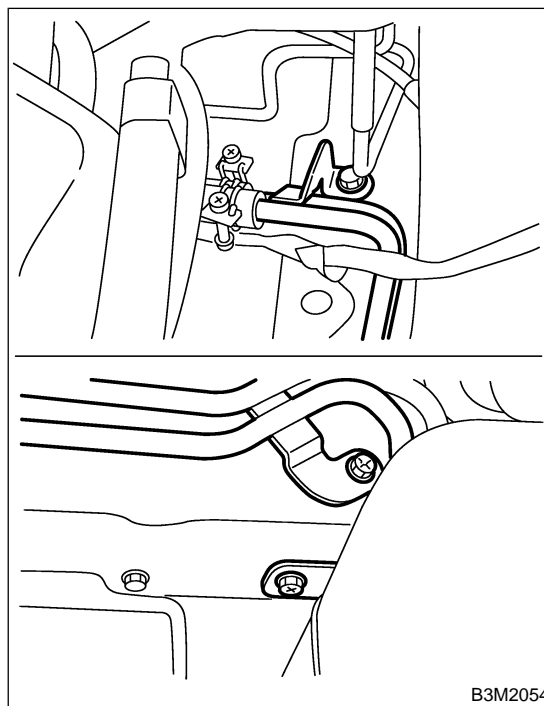
- 6) Disconnect ATF cooler hoses from pipes.

**NOTE:**

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



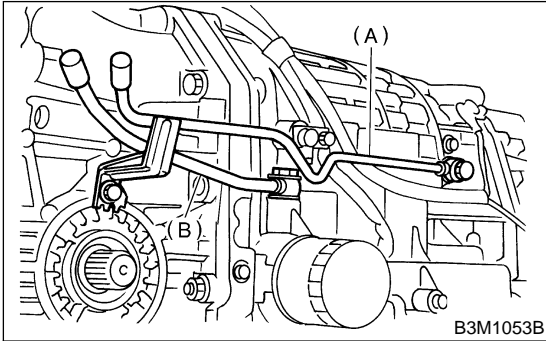
- 7) Remove ATF cooler pipe from frame.



8) Remove the oil cooler inlet and outlet pipes.

**CAUTION:**

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



- (A) Inlet pipe
- (B) Outlet pipe

**2. 3.0ℓ MODEL** S502565A1802

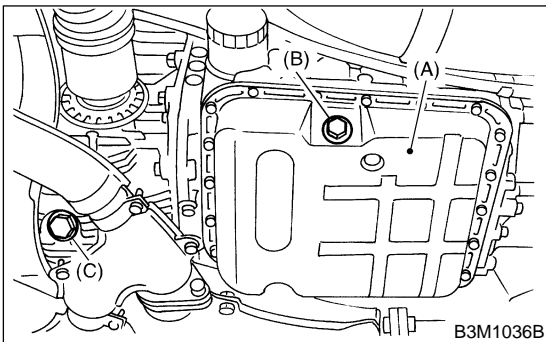
- 1) Remove battery and washer tank.
- 2) Lift-up the vehicle.
- 3) Drain ATF completely.

**NOTE:**

Tighten ATF drain plug after draining ATF.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



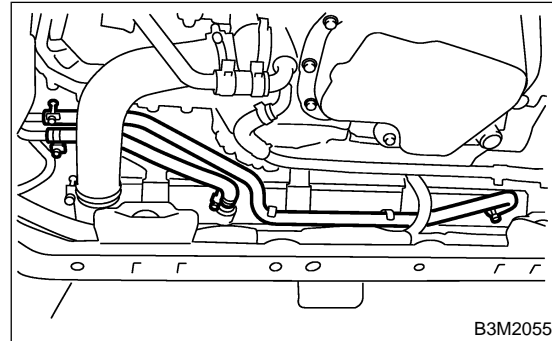
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

4) Remove the under cover.

5) Disconnect ATF cooler hose from radiator.

**NOTE:**

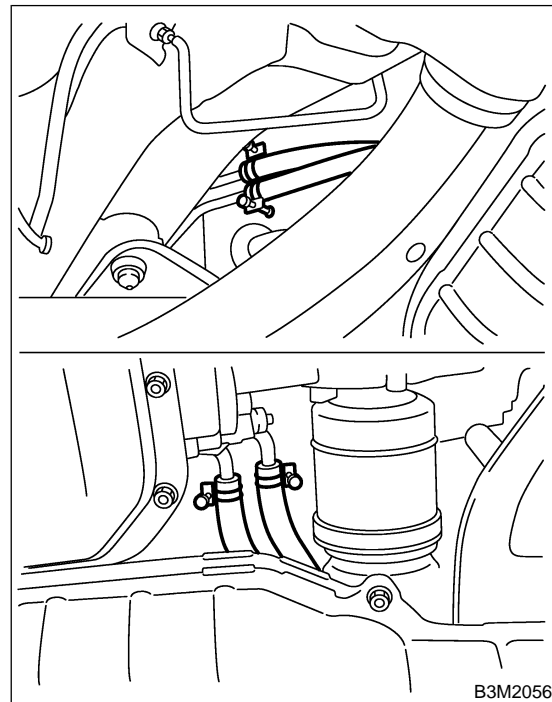
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



6) Disconnect ATF cooler hoses from transmission.

**NOTE:**

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



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

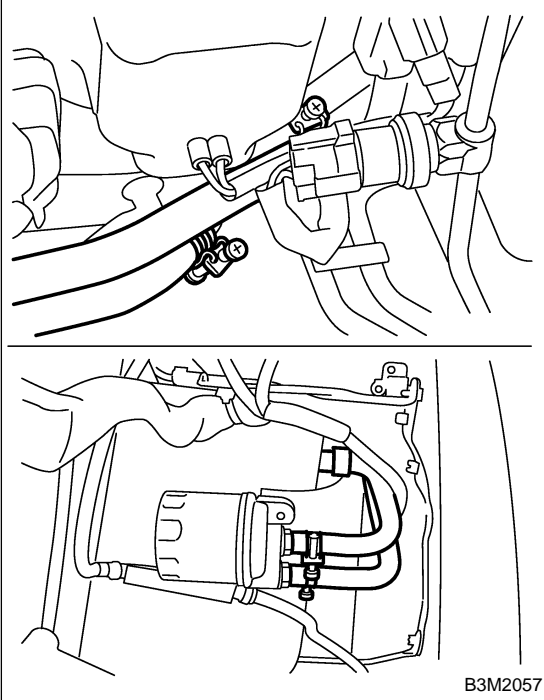
# ATF COOLER PIPE AND HOSE

Automatic Transmission

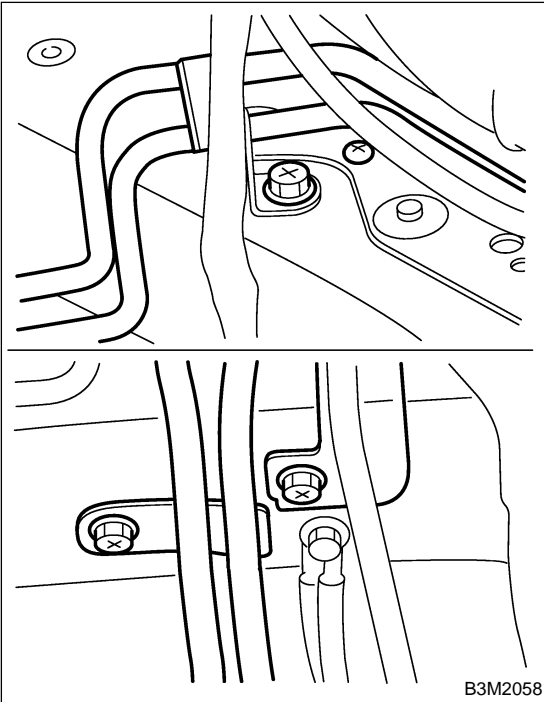
8) Disconnect ATF cooler hoses from ATF filter.

**NOTE:**

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



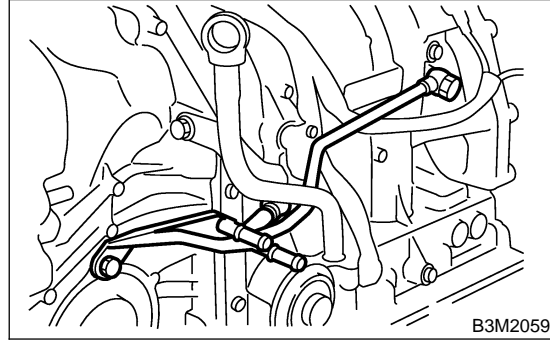
9) Remove AT cooler pipe from frame.



10) Remove the oil cooler inlet and outlet pipes.

**CAUTION:**

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



## B: INSTALLATION

S502565A11

### 1. 2.5ℓ MODEL

S502565A1101

1) Install the oil cooler outlet and inlet pipes.

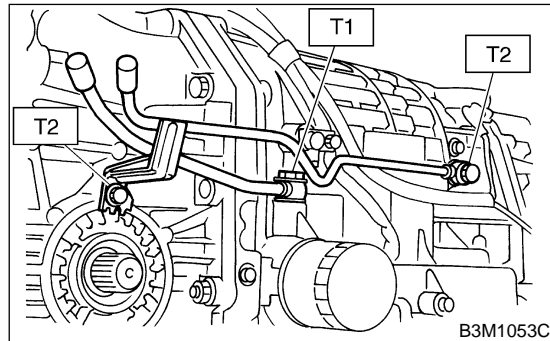
**CAUTION:**

Be sure to use a new aluminum washer.

**Tightening torque:**

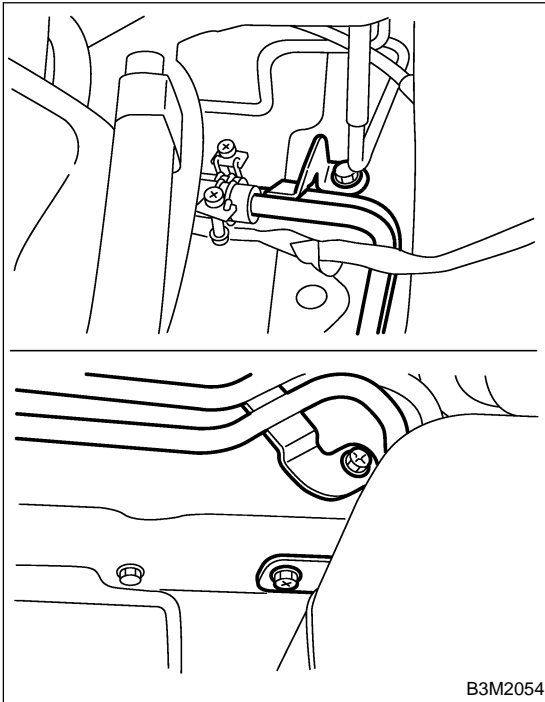
**T1: 44 N·m (4.5 kgf·m, 32.5 ft·lb)**

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



- (A) Inlet pipe
- (B) Outlet pipe

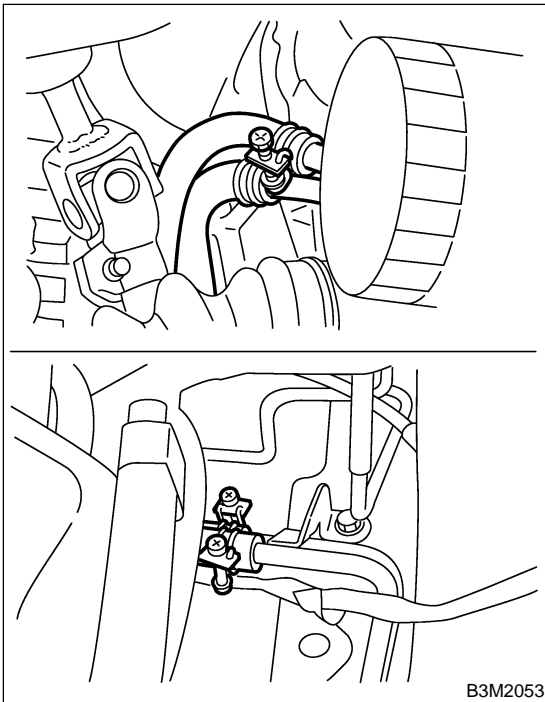
2) Install ATF cooler pipe to frame.



3) Connect ATF cooler hose to pipe transmission side.

**NOTE:**

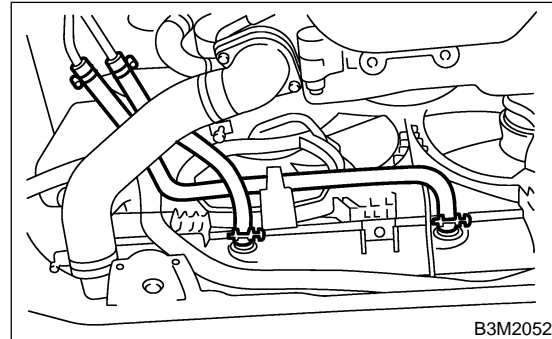
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



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

**NOTE:**

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



5) Install the under cover.

6) Install battery and washer tank.

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

**NOTE:**

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

**2. 3.0ℓ MODEL** S502565A1102

1) Install the oil cooler outlet and inlet pipes.

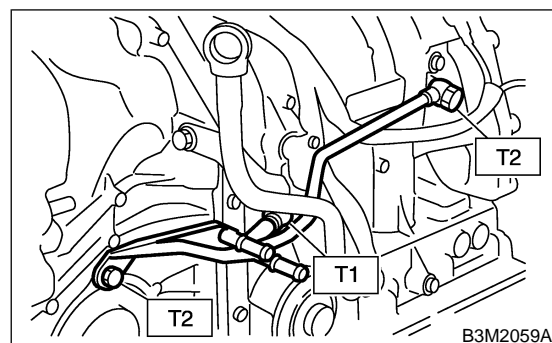
**CAUTION:**

**Be sure to use a new aluminum washer.**

**Tightening torque:**

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

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



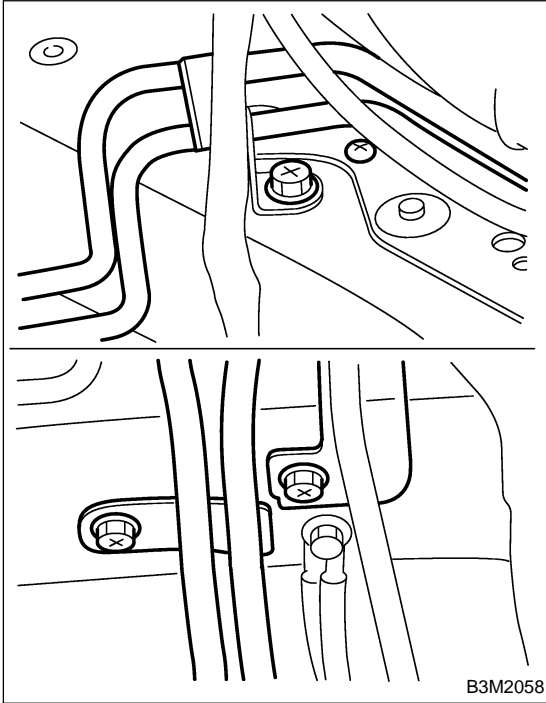
- (A) Inlet pipe
- (B) Outlet pipe



# ATF COOLER PIPE AND HOSE

Automatic Transmission

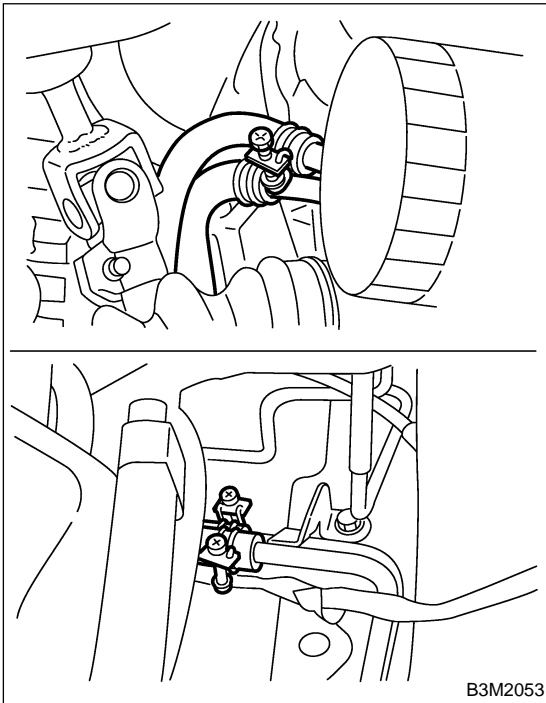
2) Install ATF cooler pipe to frame.



3) Connect ATF cooler hose to transmission.

NOTE:

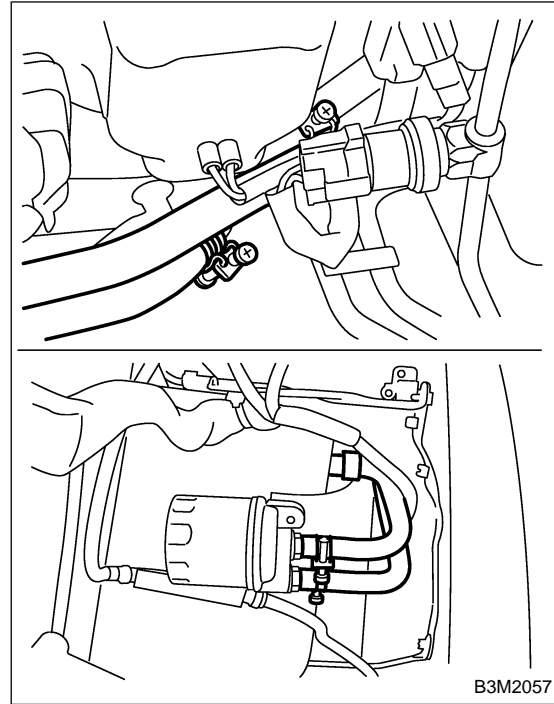
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



4) Connect ATF cooler hoses from ATF filter.

NOTE:

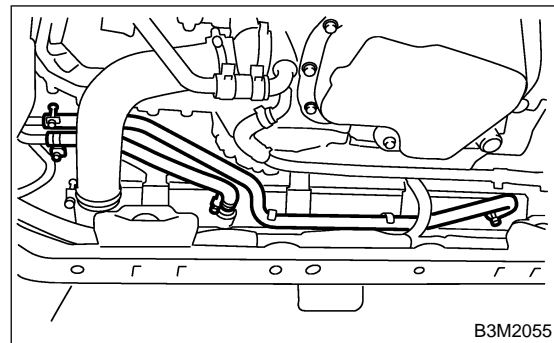
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



5) Connect ATF cooler hoses from radiator.

NOTE:

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



6) Install front left mud guard. <Ref. to EI-0 INSTALLATION, Mud Guard.>

7) Install the under cover.

8) Install battery and washer tank.

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

## C: INSPECTION S502565A10

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

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

# ATF COOLER PIPE AND HOSE

---

**MEMO:**

AT-52

# GENERAL DESCRIPTION

Clutch System

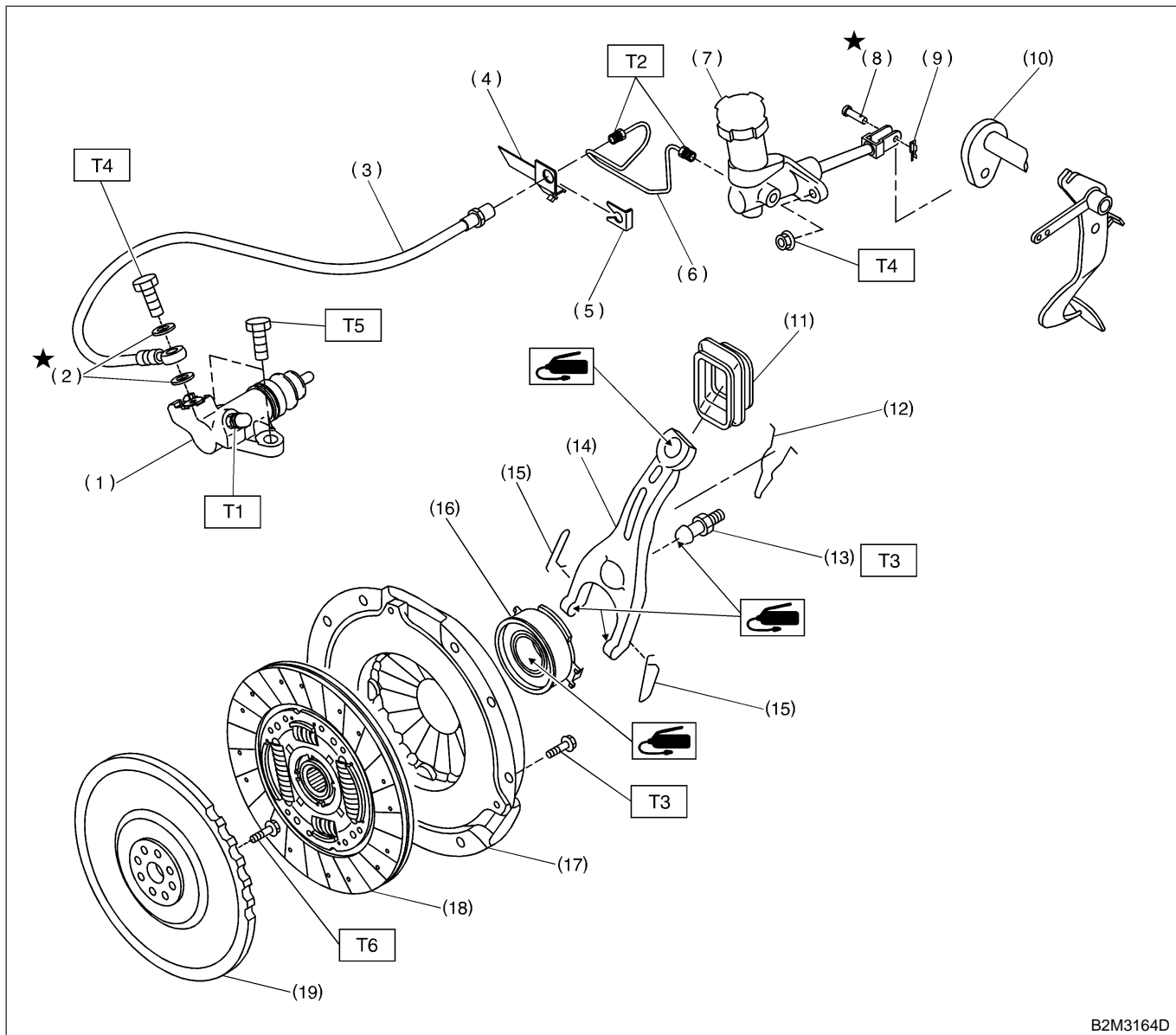
## 1. General Description SS04001

### A: SPECIFICATIONS SS04001E49

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

## B: COMPONENT S504001A05

### 1. CLUTCH SYSTEM S504001A0501



B2M3164D

- |                          |                                   |
|--------------------------|-----------------------------------|
| (1) Operating cylinder   | (11) Clutch release lever sealing |
| (2) Washer               | (12) Retainer spring              |
| (3) Clutch hose          | (13) Pivot                        |
| (4) Bracket              | (14) Release lever                |
| (5) Clip                 | (15) Clip                         |
| (6) Pipe                 | (16) Release bearing              |
| (7) Master cylinder ASSY | (17) Clutch cover                 |
| (8) Clevis pin           | (18) Clutch disc                  |
| (9) Snap pin             | (19) Flywheel                     |
| (10) Lever               |                                   |

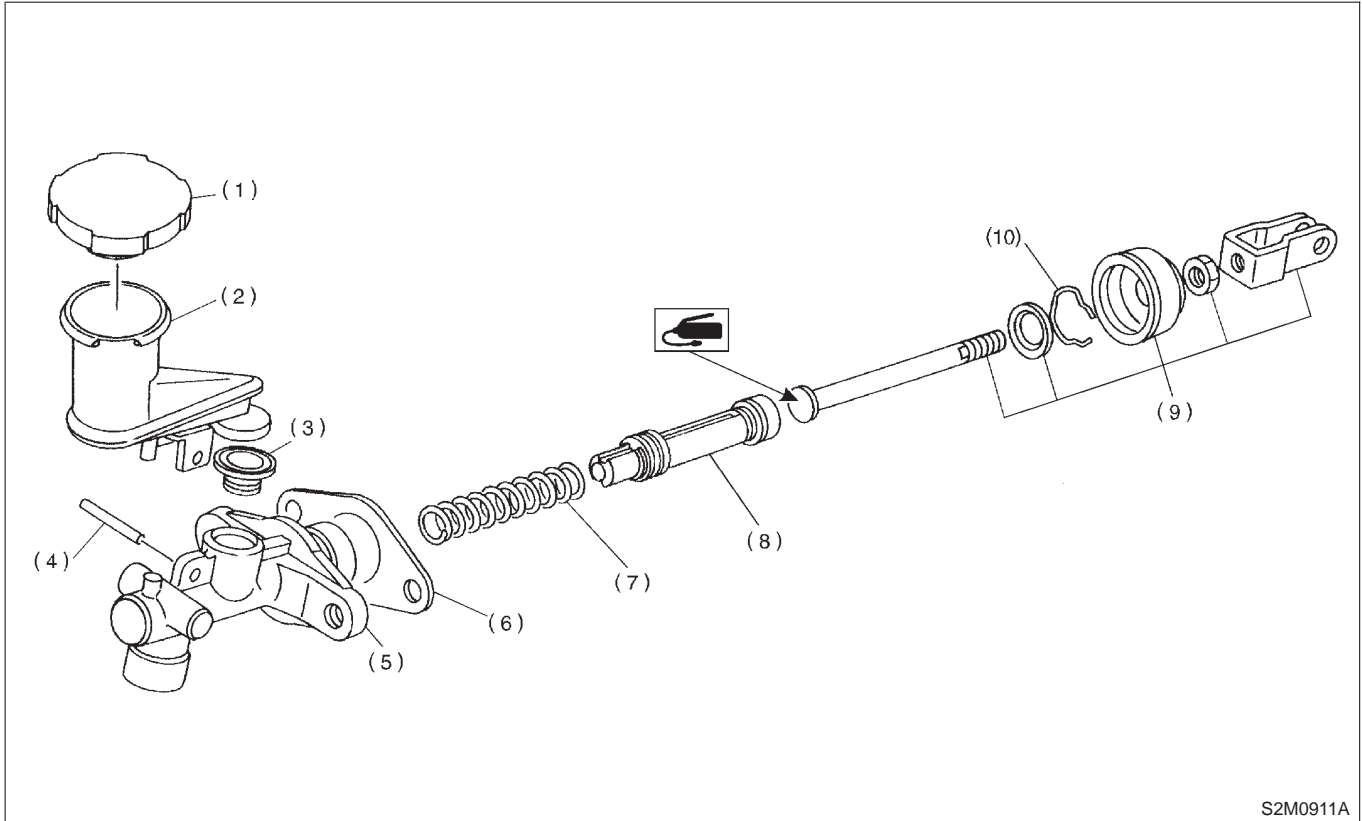
**Tightening torque: N-m (kgf-m, ft-lb)**

- T1: 8 (0.8, 5.8)**  
**T2: 15 (1.5, 11)**  
**T3: 15.7 (1.6, 11.6)**  
**T4: 18 (1.8, 13.0)**  
**T5: 37 (3.8, 27.5)**  
**T6: 72 (7.3, 52.8)**

# GENERAL DESCRIPTION

Clutch System

## 2. MASTER CYLINDER SS04001A0502

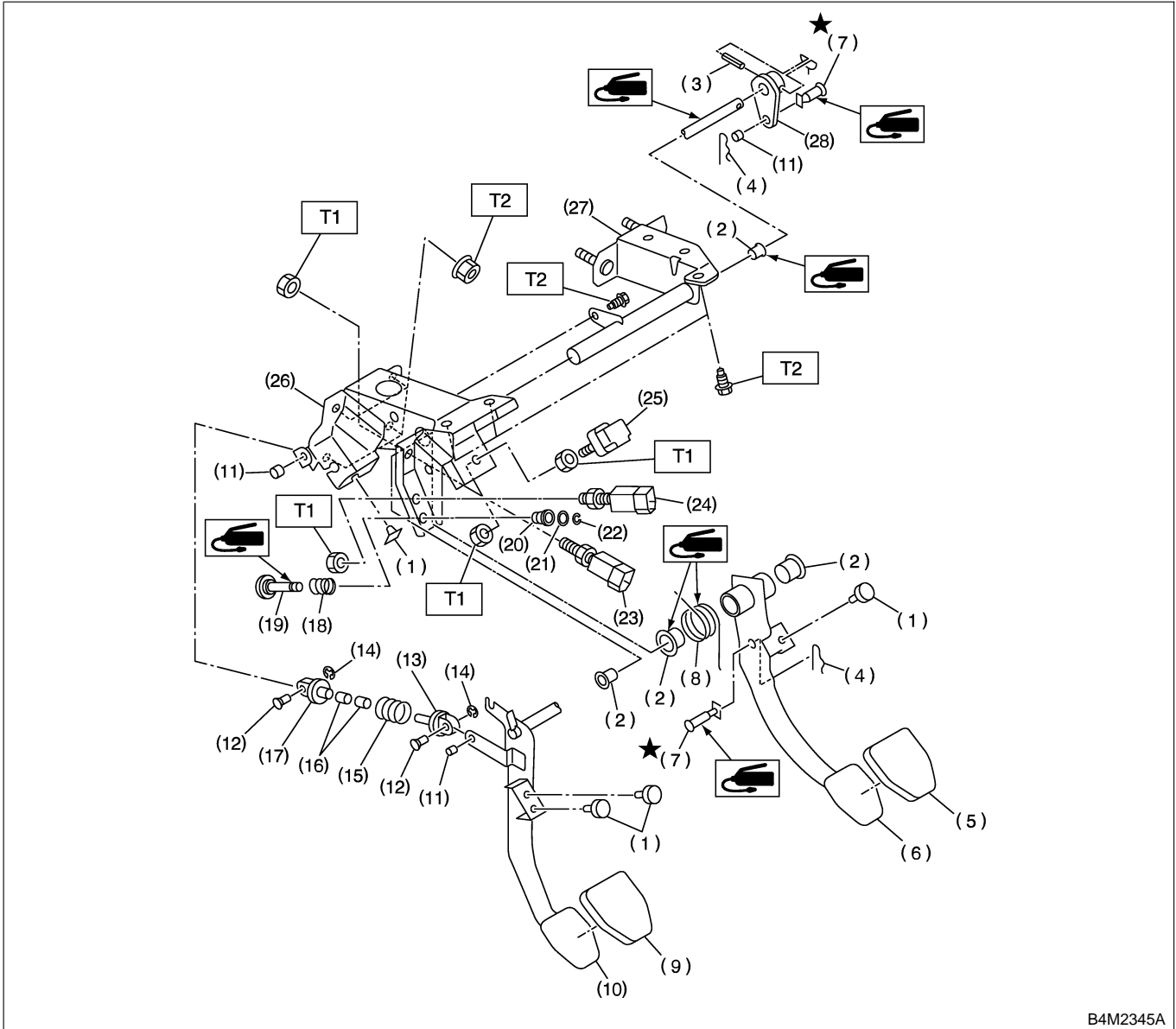


S2M0911A

- |                    |                     |                       |
|--------------------|---------------------|-----------------------|
| (1) Reservoir cap  | (5) Master cylinder | (9) Push rod          |
| (2) Reservoir tank | (6) Seat            | (10) Piston stop ring |
| (3) Oil seal       | (7) Return spring   |                       |
| (4) Straight pin   | (8) Piston          |                       |

CL-4

## 3. CLUTCH PEDAL S504001A0503



B4M2345A

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

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

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

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

# GENERAL DESCRIPTION

## Clutch System

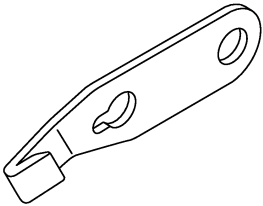
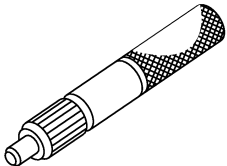
### C: CAUTION S504001A03

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

- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
- Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vice.
- Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.
- Refer to CAUTION in the "AT" section for removal of transmission.

### D: PREPARATION TOOL S504001A17

#### 1. SPECIAL TOOLS S504001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <small>B2M3853</small>	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening tightening bolt, etc.
 <small>B2M4112</small>	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.

#### 2. GENERAL PURPOSE TOOLS S504001A1702

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Dial gauge	Used for measuring clutch disk run-out.



## 2. Clutch Disc and Cover S504252

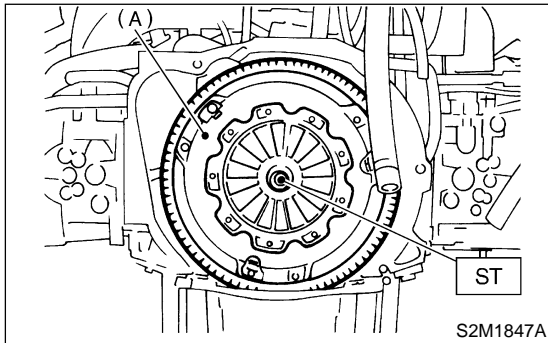
ST 499747100 CLUTCH DISC GUIDE

### A: REMOVAL S504252A18

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

2) Install ST on flywheel.

ST 498497100 CRANKSHAFT STOPPER



(A) Clutch cover

3) Remove clutch cover and clutch disc.

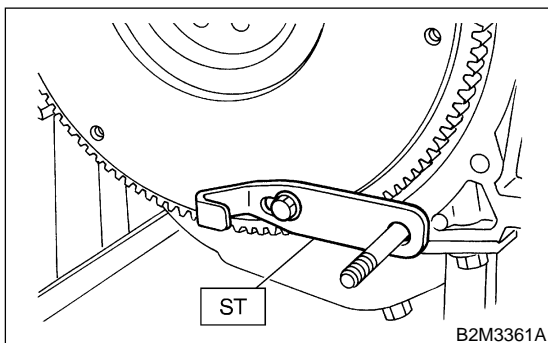
#### CAUTION:

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

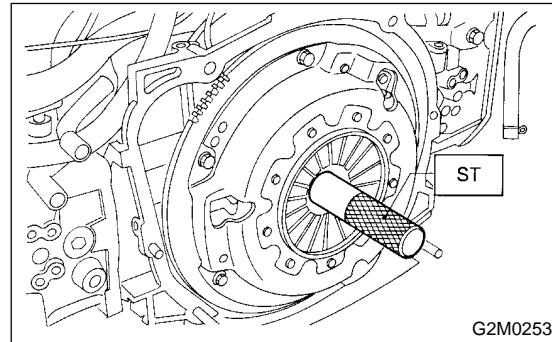
### B: INSTALLATION S504252A11

1) Install flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



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



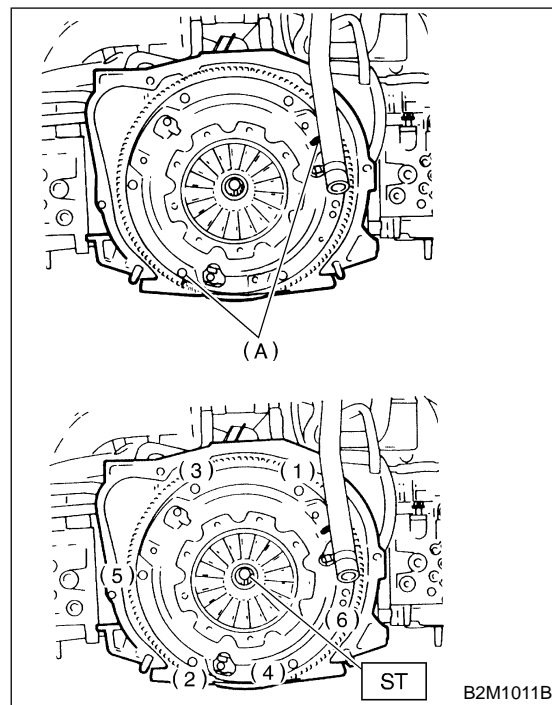
3) Install clutch cover on flywheel and tighten bolts to the specified torque.

#### NOTE:

- When installing the clutch cover on the flywheel, position the clutch cover so that there is a gap of 120° or more between “0” marks on the flywheel and clutch cover. (“0” marks indicate the directions of residual unbalance.)
- Note the front and rear of the clutch disc when installing.
- Temporarily tighten bolts by hand. Each bolt should be tightened to the specified torque in a crisscross fashion.

#### Tightening torque:

**15.7 N·m (1.6 kgf-m, 11.6 ft-lb)**



(A) “0” marks

4) Remove ST.

ST 499747100 CLUTCH DISC GUIDE

5) Install transmission assembly. <Ref. to MT-30 INSTALLATION, Manual Transmission.>

# CLUTCH DISC AND COVER

Clutch System

## C: INSPECTION S504252A10

### 1. CLUTCH DISC S504252A1001

#### 1) Facing wear

Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

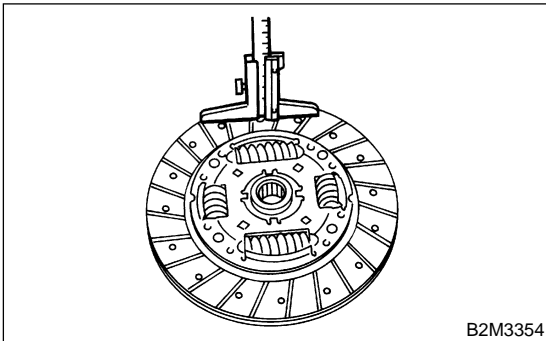
**Depth of rivet head:**

**Limit of sinking**

**0.3 mm (0.012 in)**

#### CAUTION:

Do not wash clutch disc with any cleaning fluid.

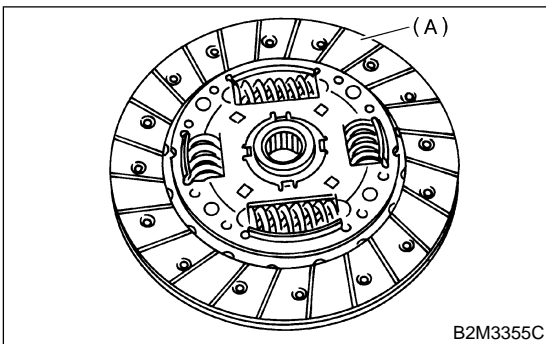


#### 2) Hardened facing

Correct by using emery paper or replace.

#### 3) Oil soakage on facing

Replace clutch disc and inspect transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.



(A) Facing

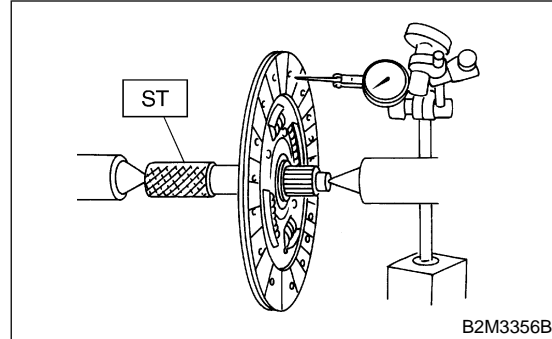
#### 4) Deflection on facing

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

## ST 499747100 CLUTCH DISC GUIDE

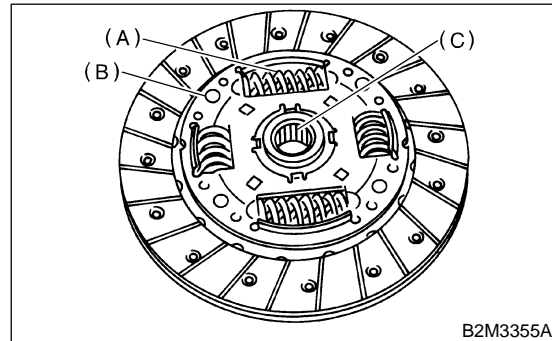
**Limit for deflection:**

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



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

Replace defective parts.



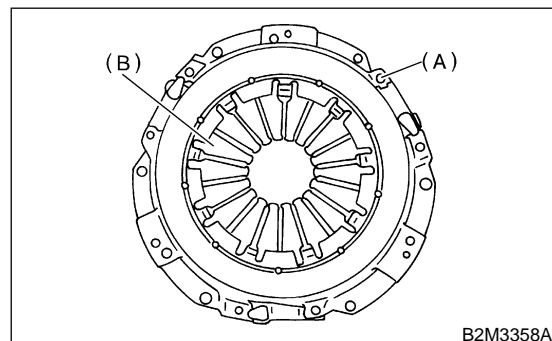
- (A) Torsion spring
- (B) Rivet
- (C) Spline

## 2. CLUTCH COVER S504252A1002

#### NOTE:

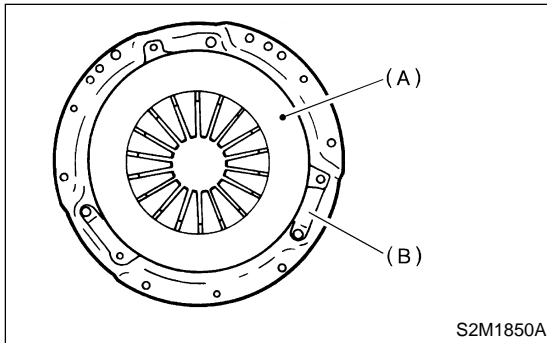
Visually check for the following items without disassembling, and replace or repair if defective.

- 1) Loose thrust rivet.
- 2) Damaged or worn bearing contact area at center of diaphragm spring.



- (A) Thrust rivet
- (B) Diaphragm spring

- 3) Damaged or worn disc contact surface of pressure plate.
- 4) Loose strap plate setting bolt.
- 5) Worn diaphragm sliding surface.



- (A) Pressure plate  
(B) Strap plate

# FLYWHEEL

Clutch System

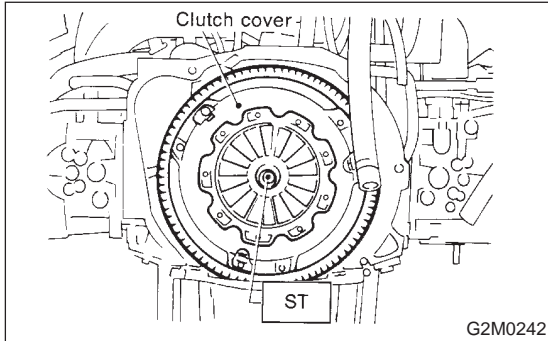
## 3. Flywheel S504250

### A: REMOVAL S504250A18

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

2) Install ST on flywheel.

ST 498497100 CRANKSHAFT STOPPER



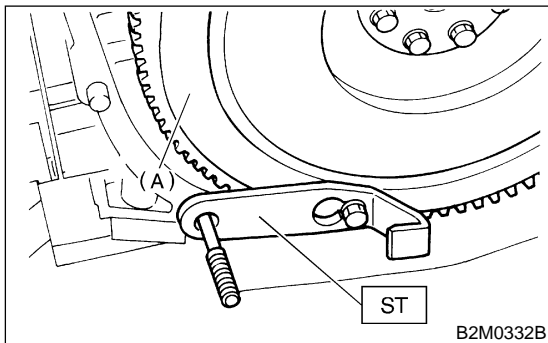
3) Remove clutch cover and clutch disc. <Ref. to CL-7 REMOVAL, Clutch Disc and Cover.>

#### CAUTION:

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

4) Using ST, remove flywheel.

ST 498497100 CRANKSHAFT STOPPER

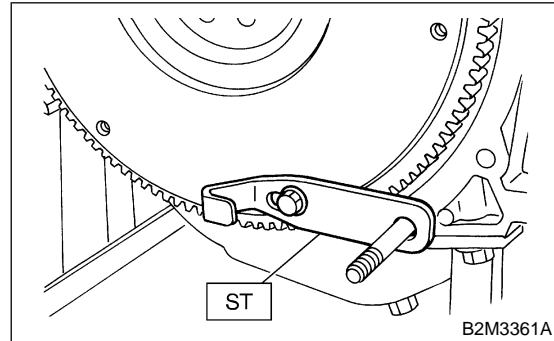


(A) Flywheel

### B: INSTALLATION S504250A11

1) Install flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



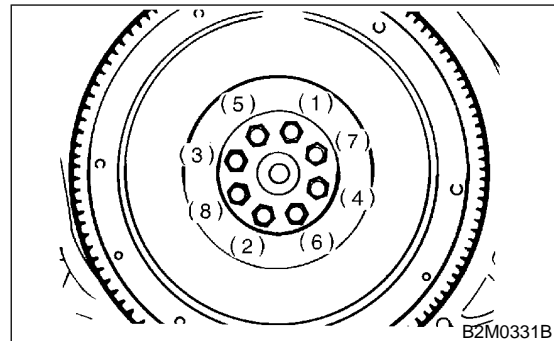
2) Tighten the flywheel attaching bolts to the specified torque.

#### NOTE:

Tighten flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

#### Tightening torque:

**72 N·m (7.3 kgf-m, 52.8 ft-lb)**



3) Install clutch disc and cover. <Ref. to CL-7 INSTALLATION, Clutch Disc and Cover.>

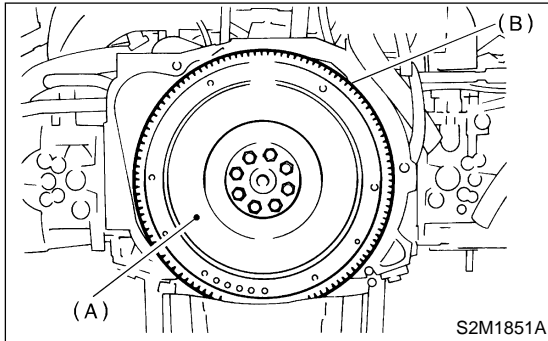
4) Install transmission assembly. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION S504250A10

### CAUTION:

Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent.

- 1) Damage of facing and ring gear  
If defective, replace flywheel.



- (A) Flywheel
- (B) Ring gear

- 2) Smoothness of rotation  
Rotate ball bearing applying pressure in thrust direction.
- 3) If noise or excessive play is noted, replace flywheel.

# RELEASE BEARING AND LEVER

Clutch System

## 4. Release Bearing and Lever

S504251

### A: REMOVAL S504251A18

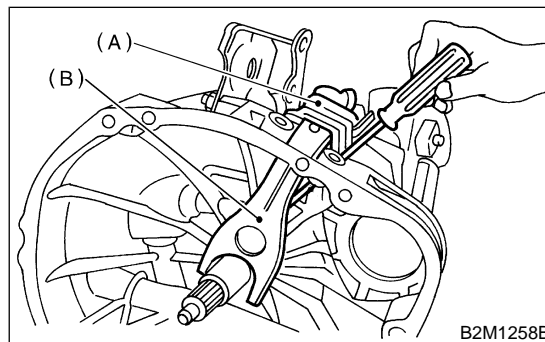
- 1) Remove transmission assembly from vehicle body.  
<Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove the two clips from clutch release lever and remove release bearing.

#### CAUTION:

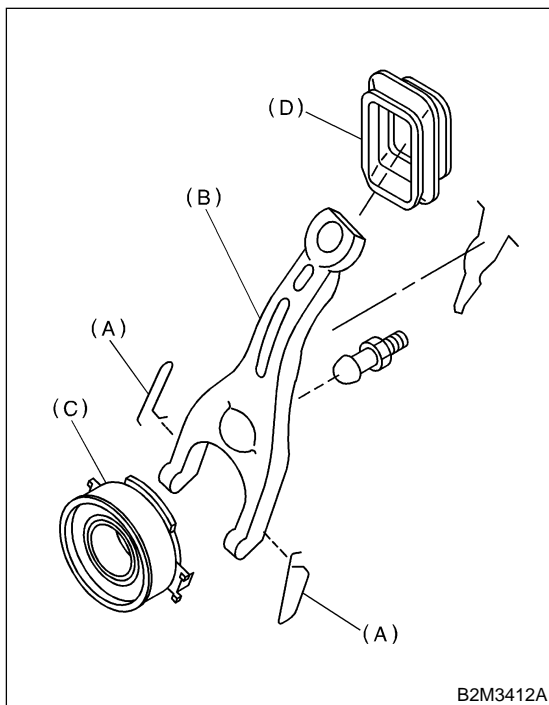
**Be careful not to deform clips.**

- 3) Remove release lever seal.

- 4) Remove release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove release lever.



- (A) Clutch release lever sealing
- (B) Clutch release lever



- (A) Clip
- (B) Clutch release lever
- (C) Release bearing
- (D) Release lever seal

## B: INSTALLATION S504251A11

### CAUTION:

Before or during assembling, lubricate the following points with a light coat of grease.

- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)
- Contact surface of lever and operating cylinder

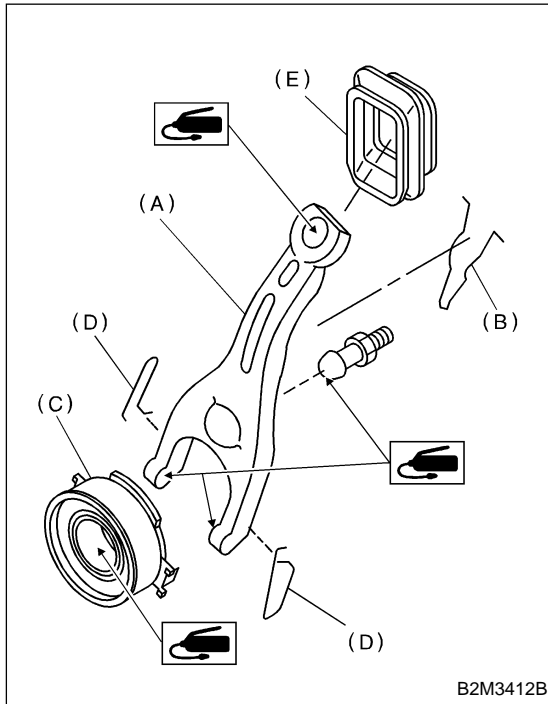
1) While pushing release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

### NOTE:

- Apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.
  - Confirm that retainer spring is securely fitted by observing it through the main case hole.
- 2) Install release bearing and fasten it with two clips.
- 3) Install release lever seal.

### Tightening torque:

**T: 37 N·m (3.8 kgf-m, 27.5 ft-lb)**



- (A) Release lever
- (B) Retainer spring
- (C) Release bearing
- (D) Clip
- (E) Release lever seal

4) After remounting engine and transmission on body.

<Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION S504251A10

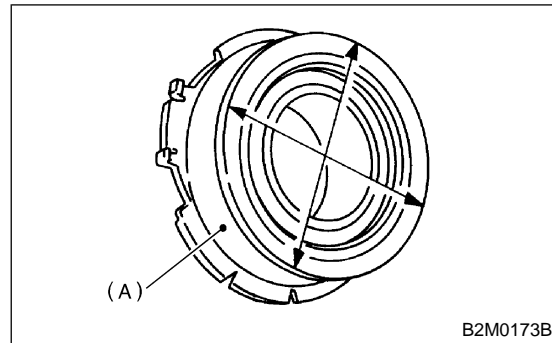
### 1. RELEASE BEARING S504251A1001

#### CAUTION:

Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent when servicing the clutch.

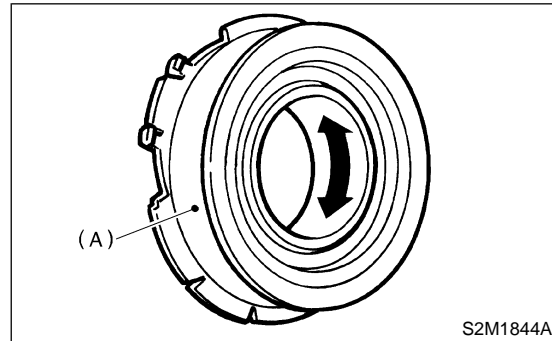
1) Check the bearing for smooth movement by applying force in the radial direction.

**Radial direction stroke:**  
**1.4 mm (0.055 in)**



(A) Bearing case

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



(A) Bearing case

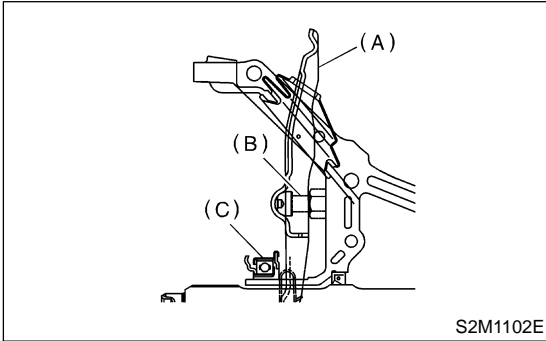
3) Check wear and damage of bearing case surface contacting with lever.

# RELEASE BEARING AND LEVER

Clutch System

## 2. RELEASE LEVER S504251A1002

1) Check lever pivot portion and the point of contact with release bearing case for wear.



- (A) Clutch release lever
- (B) Pivot
- (C) Clutch release bearing



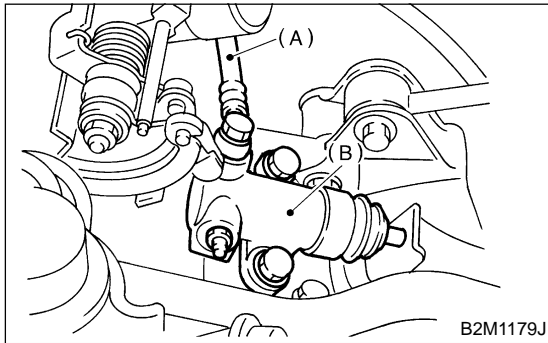
## 5. Operating Cylinder S504253

### A: REMOVAL S504253A18

- 1) Remove air cleaner case and air intake duct.
- 2) Remove clutch hose from operating cylinder.

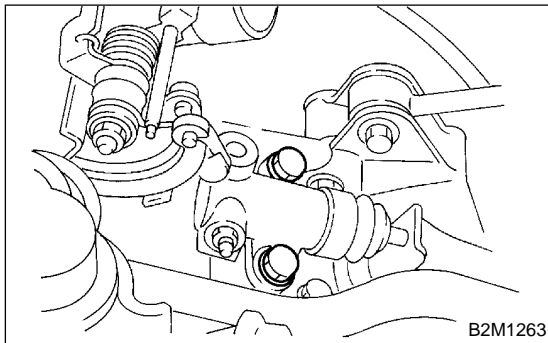
**CAUTION:**

Cover hose joint to prevent clutch fluid from flowing out.



- (A) Clutch hose
- (B) Operating cylinder

- 3) Remove operating cylinder from transmission.



### B: INSTALLATION S504253A11

- 1) Install in the reverse order of removal.

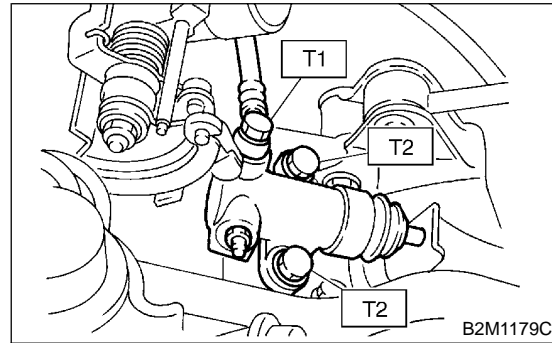
**NOTE:**

Before installing operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of release lever and operating cylinder.

**Tightening torque:**

**T1: 18 N·m (1.8 kgf·m, 13.0 ft·lb)**

**T2: 37 N·m (3.8 kgf·m, 27.5 ft·lb)**



- 2) After bleeding air from operating cylinder, ensure that clutch operates properly. <Ref. to CL-20 Clutch Fluid Air Bleeding.>

### C: INSPECTION S504253A10

- 1) Check operating cylinder for damage. If operating cylinder is damaged, replace it.
- 2) Check operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace operating cylinder.

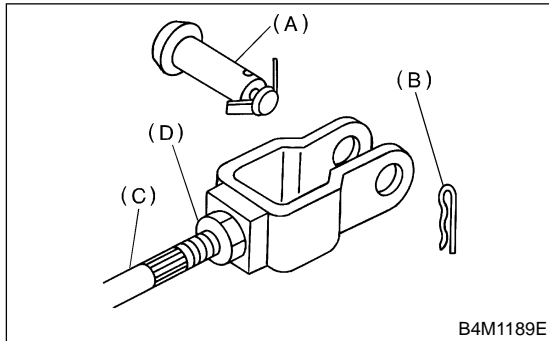
# MASTER CYLINDER

Clutch System

## 6. Master Cylinder S504168

### A: REMOVAL S504168A18

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

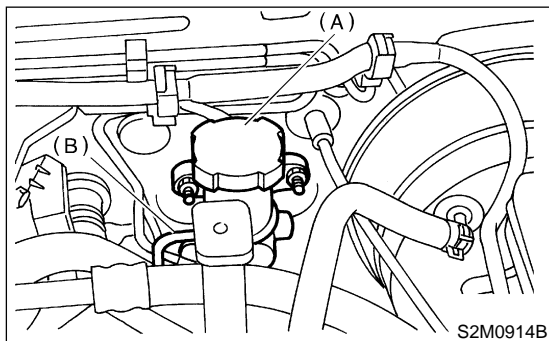


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

- 3) Remove air cleaner case and air intake duct.
- 4) Remove clutch pipe from master cylinder.
- 5) Remove master cylinder with reservoir tank.

#### CAUTION:

**Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.**



- (A) Master cylinder
- (B) Clutch pipe

### B: INSTALLATION S504168A11

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

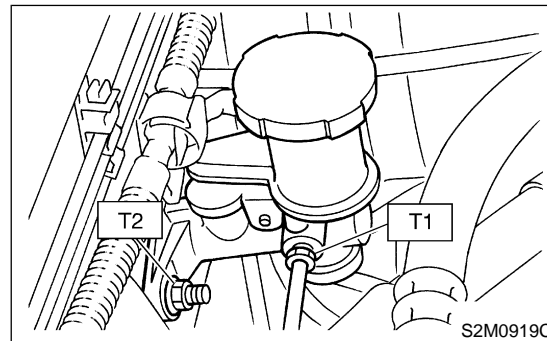
#### CAUTION:

**Check that pipe is routed properly.**

#### Tightening torque:

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

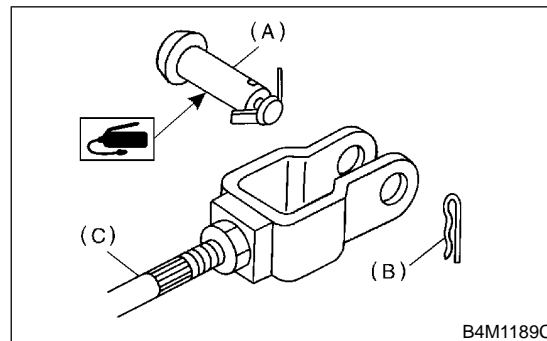
**T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)**



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

#### NOTE:

Apply grease to clevis pin.



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

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

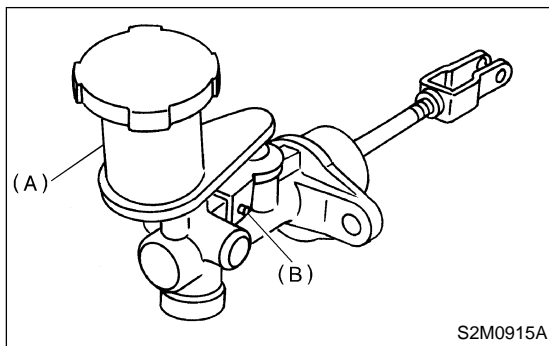
<Ref. to CL-20 Clutch Fluid Air Bleeding.>

- 4) Install air cleaner case and air intake duct.

## C: DISASSEMBLY

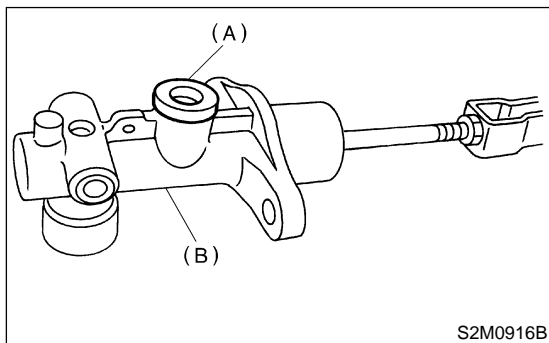
S504168A06

- 1) Remove straight pin and reservoir tank.



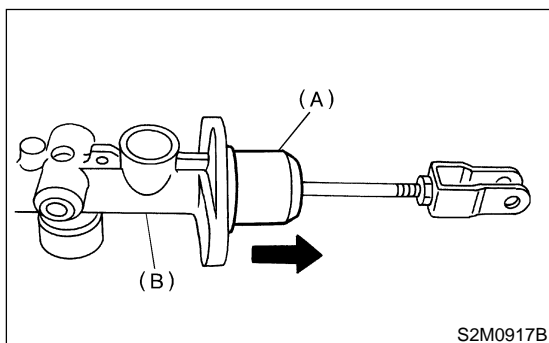
- (A) Reservoir tank
- (B) Straight pin

- 2) Remove oil seal.



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

- 3) Move the cylinder boot backward.



- (A) Cylinder boot
- (B) Master cylinder

- 4) Remove snap ring.

### CAUTION:

Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

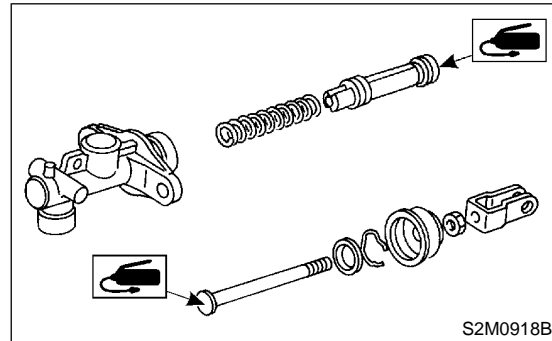
## D: ASSEMBLY

S504168A02

- 1) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

### Grease:

**SILICONE GREASE G40M (Part No. 004404003)**

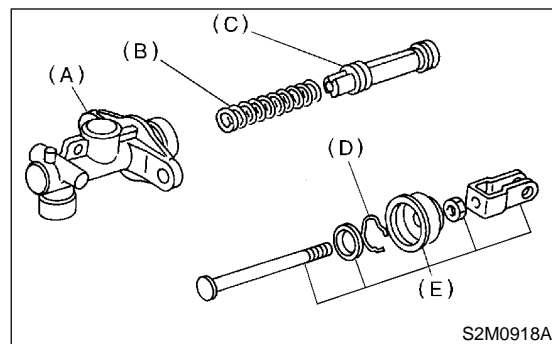


- 2) To assemble the master cylinder reverse the sequence of disassembly procedure.

## E: INSPECTION

S504168A10

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



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

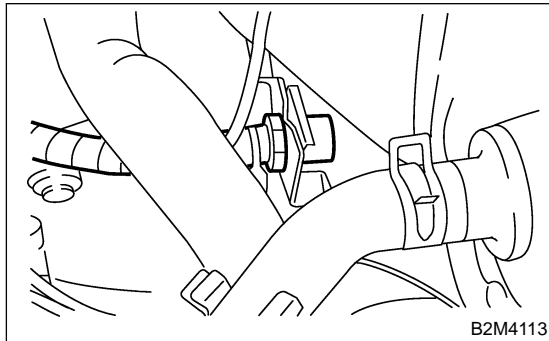
# CLUTCH PIPE AND HOSE

Clutch System

## 7. Clutch Pipe and Hose S504262

### A: REMOVAL S504262A18

- 1) Remove air chamber.
- 2) Drain clutch fluid. <Ref. to CL-19 Clutch Fluid.>
- 3) Remove clutch pipe.
- 4) Unclip and remove hose from bracket.



- 5) Remove hose from operating cylinder.

### B: INSTALLATION S504262A11

Install in the reverse order of removal.

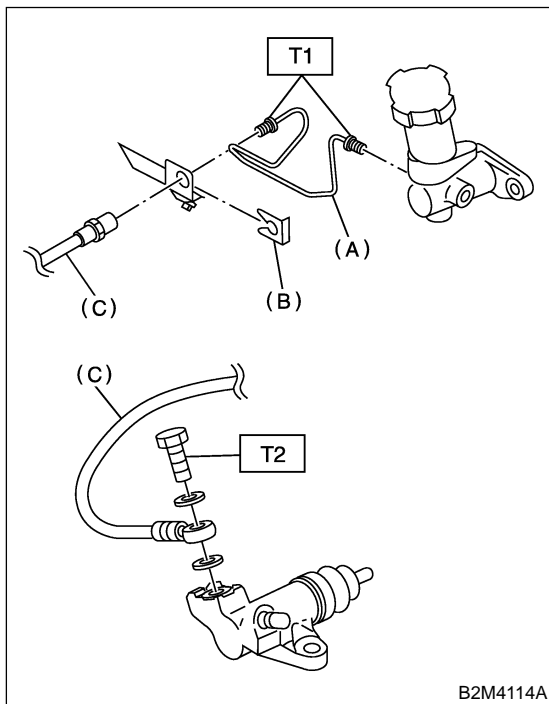
NOTE:

Bleed clutch fluid. <Ref. to CL-20 Clutch Fluid Air Bleeding.>

**Tightening torque:**

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

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



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

### C: INSPECTION S504262A10

Check pipes and hoses for cracks, breakage, or damage. Check joints for fluid leakage. If any cracks, breakage, damage, or leakage is found, repair or replace the applicable pipe or hose.

## 8. Clutch Fluid S504261

### A: REPLACEMENT S504261A20

#### CAUTION:

- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

#### NOTE:

- During bleeding operation, keep the clutch reservoir tank filled with brake fluid to eliminate entry of air.
  - Clutch pedal operating must be very slow.
  - For convenience and safety, it is advisable to have two men working.
  - The amount of brake fluid required is approximately 70 ml (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.
- 1) Either jack-up vehicle and place a safety stand under it, or lift-up vehicle.
  - 2) Remove both front and rear wheels.
  - 3) Draw out the brake fluid from reservoir tank with syringe.
  - 4) Refill reservoir tank with recommended brake fluid.

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

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

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

# CLUTCH FLUID AIR BLEEDING

Clutch System

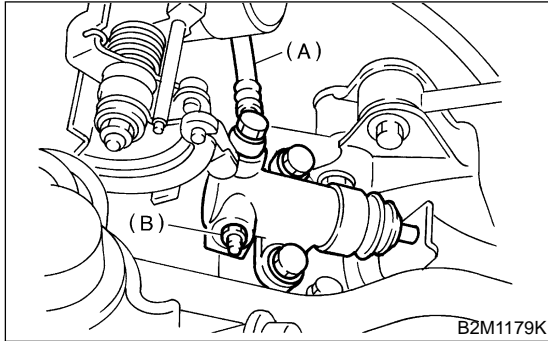
## 9. Clutch Fluid Air Bleeding S504260

### A: PROCEDURE S504260E45

#### NOTE:

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

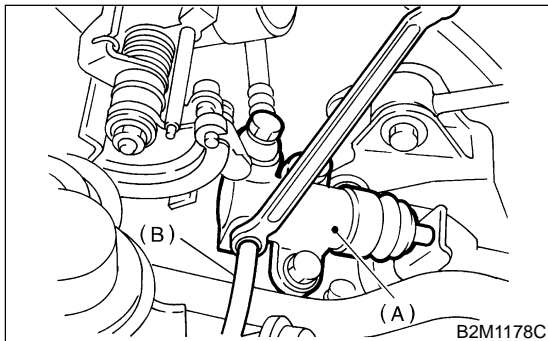
- 1) Remove air chamber.
- 2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



- (A) Clutch hose
- (B) Air bleeder

- 3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.

Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.



- (A) Operating cylinder
- (B) Vinyl tube

- 4) Repeat these steps until there are no more air bubbles in the vinyl tube.

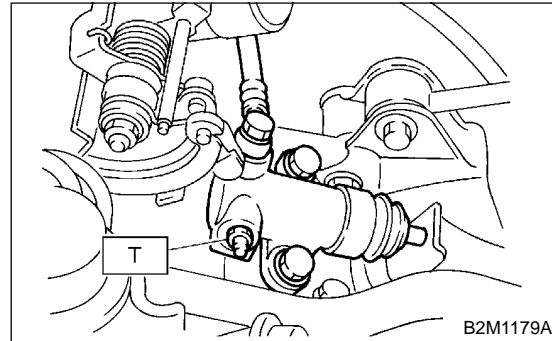
#### CAUTION:

**Cover bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.**

- 5) Tighten air bleeder.

#### Tightening torque:

**T: 8 N·m (0.8 kgf·m, 5.8 ft·lb)**

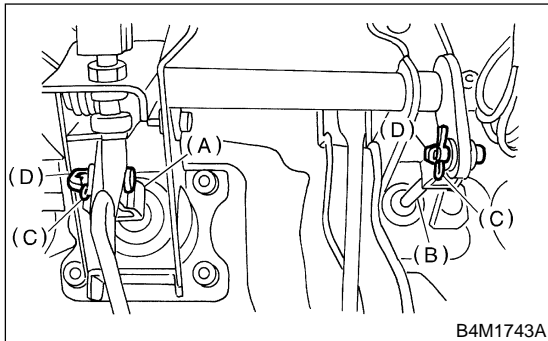


- 6) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
- 7) After bleeding air from system, ensure that clutch operates properly.

## 10. Clutch Pedal S504256

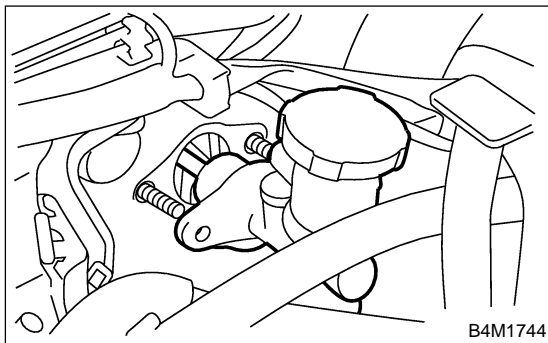
### A: REMOVAL S504256A18

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



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

- 5) Remove nut which secures clutch master cylinder.



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

### B: INSTALLATION S504256A11

- 1) Install in the reverse order of removal.

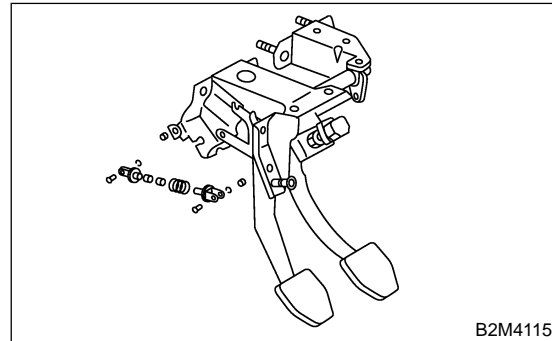
#### CAUTION:

- If cable clamp is damaged, replace it with a new one.
- Never fail to cover outer cable end with boot.
- Be careful not to kink accelerator cable.
- Always use new clevis pins.

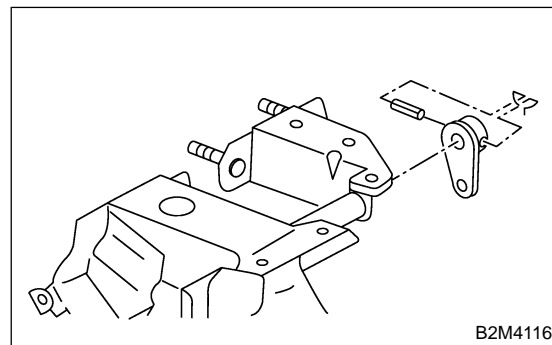
- 2) Adjustment of clutch pedal and adjustment after pedal installation. <Ref. to CL-22 ADJUSTMENT, Clutch Pedal.>

### C: DISASSEMBLY S504256A06

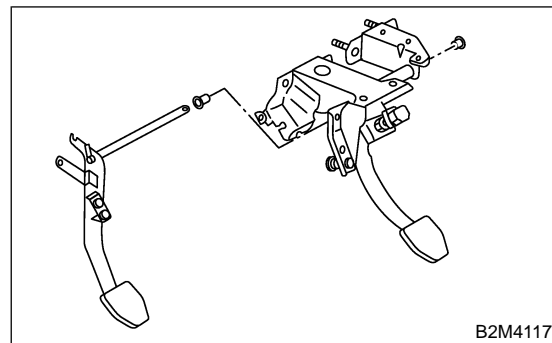
- 1) Remove clutch switches.
- 2) Remove clips, assist spring assembly and bush.



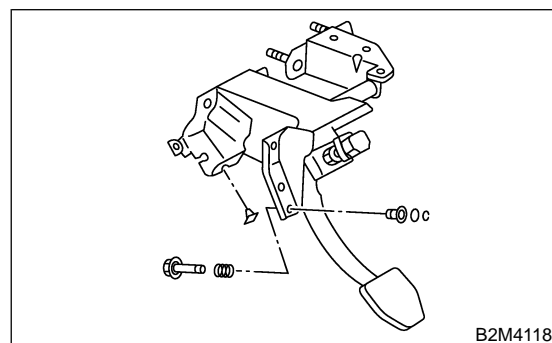
- 3) Remove spring pin and lever.



- 4) Remove clutch pedal and bushes.



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



- 6) Remove stoppers from clutch pedal.

# CLUTCH PEDAL

## Clutch System

7) Remove clutch pedal pad.

### D: ASSEMBLY S504256A02

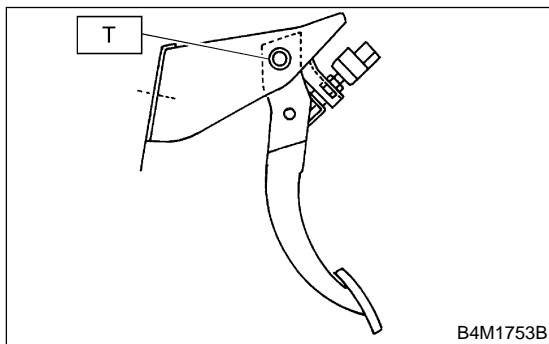
- 1) Attach stop light switch, etc. to pedal bracket temporarily.
- 2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
- 3) Align bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring and clutch pedal effort reducing spring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

#### NOTE:

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

#### Tightening torque:

**T: 29 N·m (3.0 kgf·m, 21.7 ft·lb)**



### E: INSPECTION S504256A10

#### 1. CLUTCH PEDAL S504256A1001

Move clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kg, 2 lb) to ensure pedal deflection is in specified range.

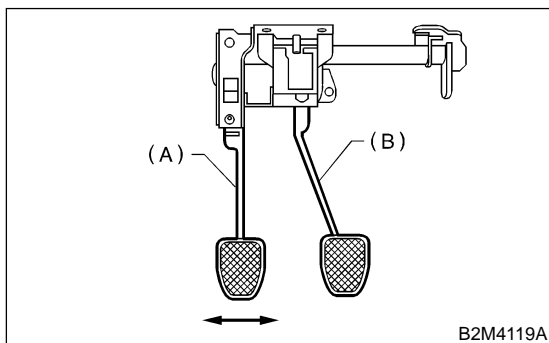
#### CAUTION:

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

#### Deflection of clutch pedal:

##### Service limit

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



- (A) Clutch pedal
- (B) Brake pedal

### F: ADJUSTMENT S504256A01

#### 1. CLUTCH PEDAL S504256A0101

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

#### CAUTION:

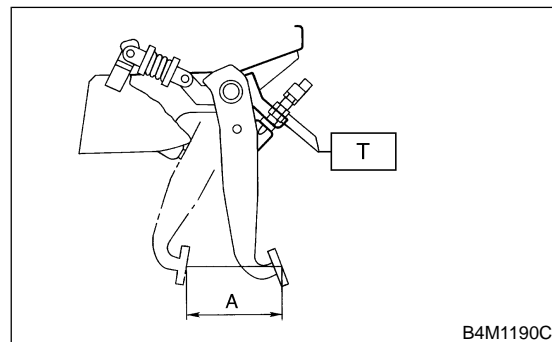
Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.

#### NOTE:

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

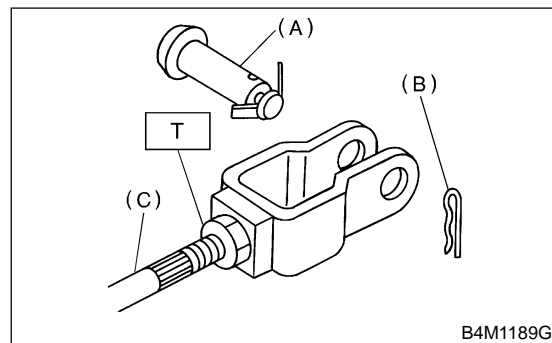
**Specified clutch pedal full stroke: A**  
**130 — 135 mm (5.12 — 5.31 in)**

**Tightening torque (Clutch switch lock nut):**  
**T: 8 N·m (0.8 kgf·m, 5.8 ft·lb)**



- 2) Turn master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

**Tightening torque (Push rod lock nut):**  
**T: 8 N·m (0.8 kgf·m, 5.8 ft·lb)**



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

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

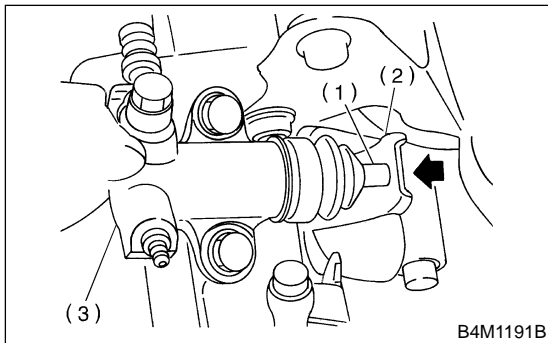


4) Measure clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

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

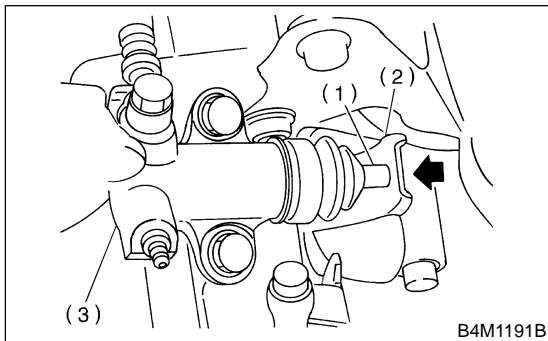
5) Move clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

6) Push release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace master cylinder with new one. <Ref. to CL-16 Master Cylinder.>



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

7) Push release fork until operating cylinder push rod retracts. Check that clutch fluid level in reservoir tank increases.



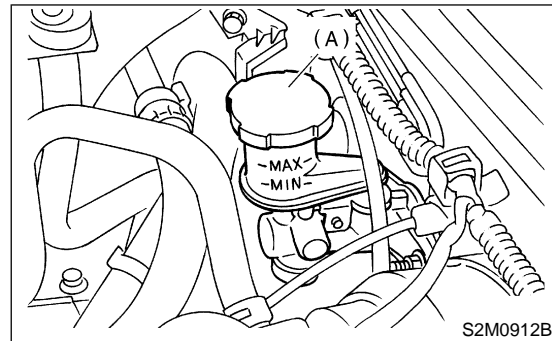
- (1) Push rod
- (2) Release lever
- (3) Operating cylinder

8) If clutch fluid level increases, hydraulic clutch play is correct.

9) If clutch fluid level does not increase or push rod does not retract, clutch pedal must be readjusted.

10) Check the fluid level on the outside of the clutch master cylinder tank. If the level is below "MIN", add clutch fluid to bring it up to "MAX".

**Recommended clutch fluid:**  
**FMVSS No. 116, fresh DOT 3 or DOT 4 brake fluid**



(A) Reservoir tank

# CLUTCH SWITCH

Clutch System

## 11. Clutch Switch S504258

### A: REMOVAL S504258A18

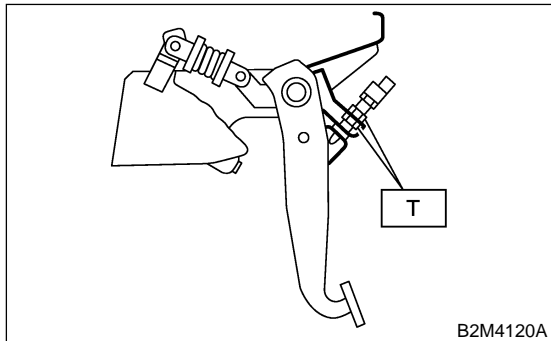
- 1) Remove battery ground terminal.
- 2) Disconnect connector from clutch switch.
- 3) Remove clutch switch.

### B: INSTALLATION S504258A11

Install in the reverse order of removal.

**Tightening torque:**

**T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)**

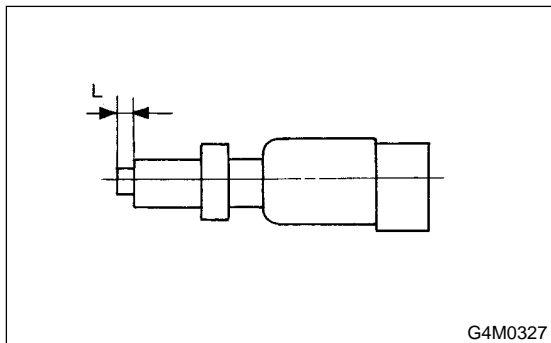


### C: INSPECTION S504258A10

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

**Specified position: L**

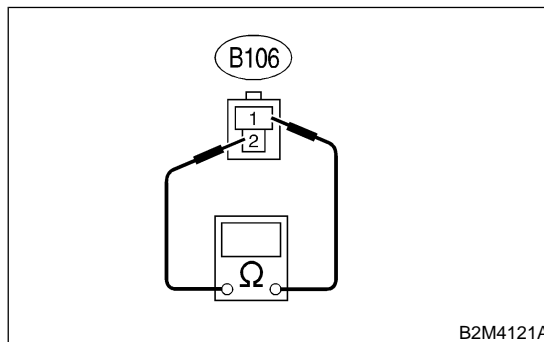
**$2^{+1.5}/_0$  mm ( $0.079^{+0.059}/_0$  in)**



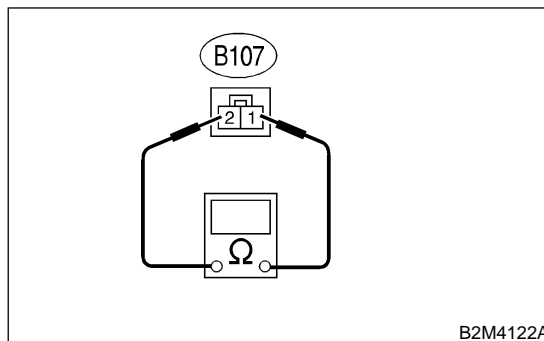
- 2) Check clutch switch continuity. If continuity is not as specified, replace the switch.

Switch position	Tester connection	Specified condition
Switch pin free	1 — 2	Continuity
Switch pin pushed in		No continuity

- Clutch switch (Starter interlock)



- Clutch switch (With cruise control)



## 12. General Diagnostic Table

S504257

### A: INSPECTION S504257A10

#### 1. CLUTCH S504257A1002

Symptom	Possible cause	Corrective
<p>1. Clutch slippage. It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms</p> <ul style="list-style-type: none"> <li>● Engine speed up when shifting.</li> <li>● High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed.</li> <li>● Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing.</li> <li>● Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.</li> </ul>	(a) Clutch facing smeared by oil	Replace.
	(b) Worn clutch facing	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Distorted pressure plate or flywheel	Correct or replace.
	(e) Defective release bearing holder	Correct or replace.
<p>2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after.</p> <ul style="list-style-type: none"> <li>● Method of testing: &lt;Ref. to CL-27 DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.&gt;</li> </ul> <p>It may be judged as insufficient disengagement of clutch if any noise occurs during this test.</p>	(a) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(b) Excessive deflection of clutch disc facing	Correct or replace.
	(c) Seized crankshaft pilot needle bearing	Replace.
	(d) Cracked clutch disc facing	Replace.
	(e) Sticked clutch disc (smeared by oil or water)	Replace.
<p>3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.</p>	(a) Adhesion of oil on the facing	Replace clutch disc.
	(b) Weak or broken torsion spring	Replace clutch disc.
	(c) Defective facing contact or excessive disc	Replace clutch disc deflection.
	(d) Warped pressure plate or flywheel	Correct or replace.
	(e) Loose disc rivets	Replace clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
	(g) Improper adjustment of pitching stopper	Adjustment.

# GENERAL DIAGNOSTIC TABLE

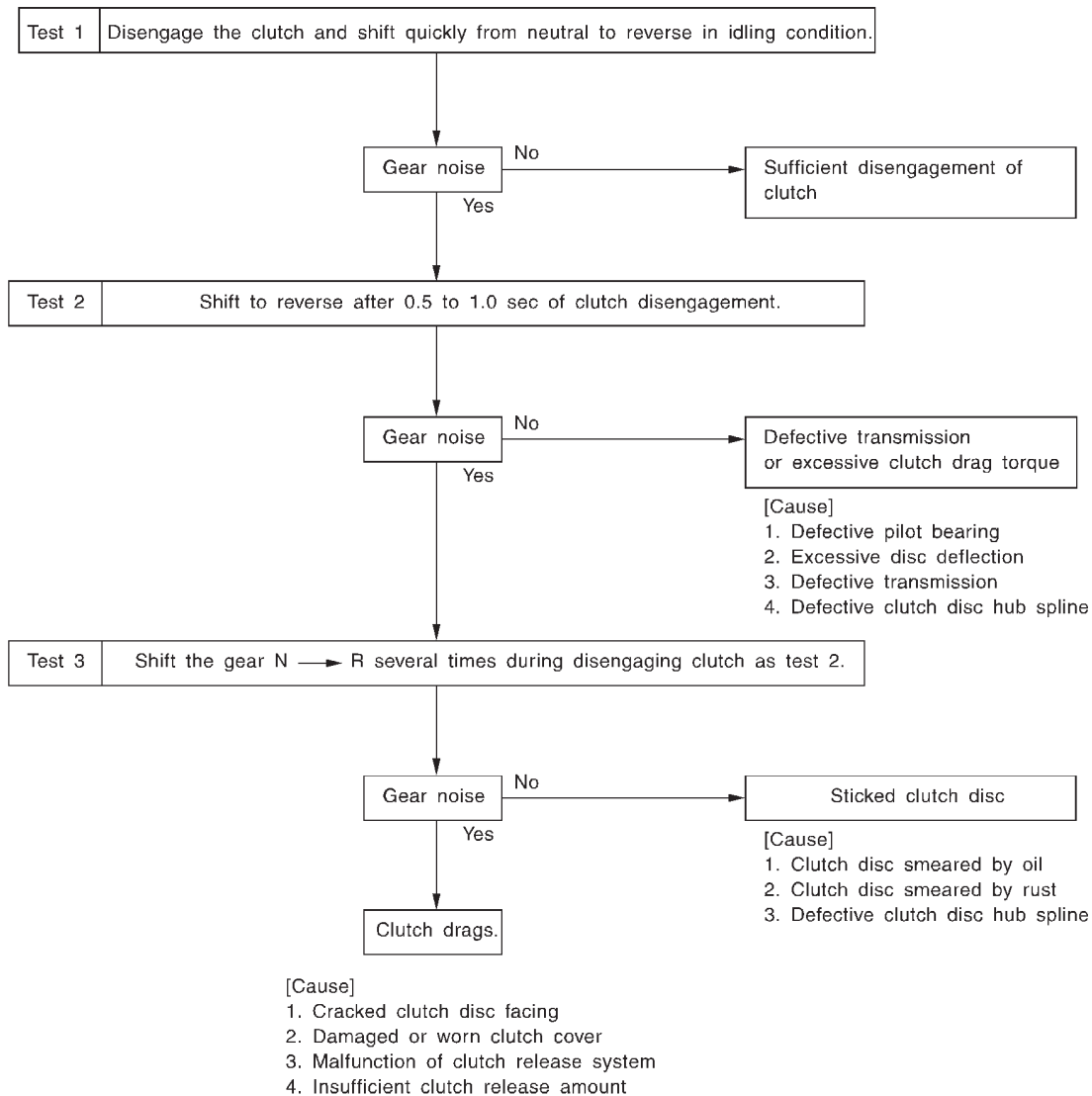
## Clutch System

Symptom	Possible cause	Corrective
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace clutch disc.
	(d) Loose torsion spring retainer	Replace clutch disc.
	(e) Deteriorated or broken torsion spring	Replace clutch disc.
5. Clutch grabs. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace clutch disc.
	(b) Deteriorated cushioning spring	Replace clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace clutch disc or main shaft.
	(d) Deteriorated or broken torsion spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

## 2. CLUTCH PEDAL S504257A1003

Trouble	Corrective action
Insufficient pedal play	Adjust pedal play.
Clutch pedal free play insufficient	Adjust pedal free play.
Excessively worn and damaged pedal shaft and/or bushing	Replace bushing and/or shaft with new one.

## 3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG SS04257A1001



B2M1012B

# GENERAL DIAGNOSTIC TABLE

Clutch System

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**MEMO:**

# GENERAL DESCRIPTION

Control Systems

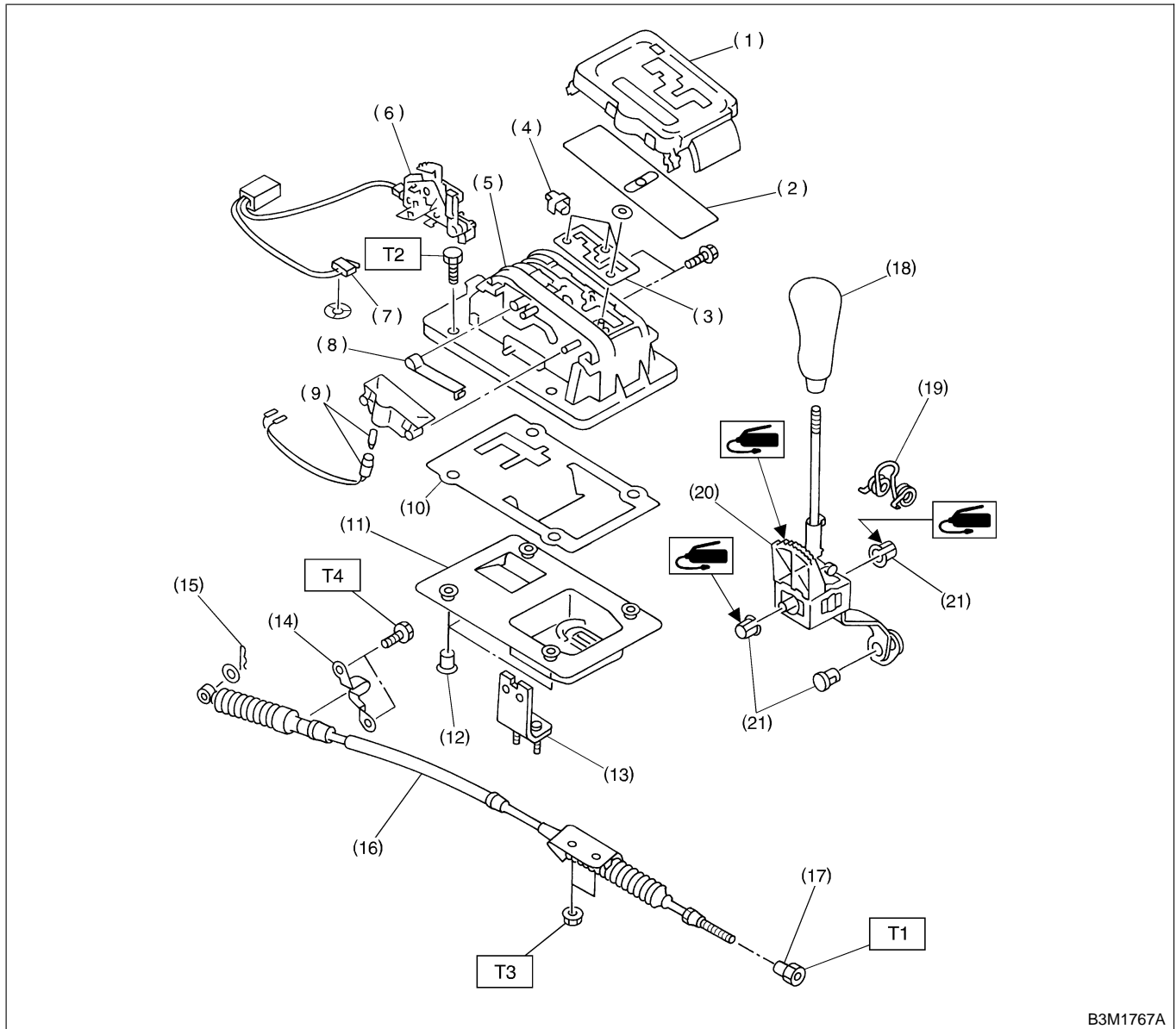
## 1. General Description SS01001

### A: SPECIFICATIONS SS01001E49

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

## B: COMPONENT SS01001A05

### 1. AT SELECT LEVER SS01001A0501



B3M1767A

- |                         |                        |
|-------------------------|------------------------|
| (1) Indicator cover     | (11) Rubber boot       |
| (2) Slider              | (12) Washer            |
| (3) Pattern plate       | (13) Cable bracket     |
| (4) Stopper             | (14) Cable clamp       |
| (5) Frame               | (15) Snap pin          |
| (6) Solenoid ASSY       | (16) Outer cable       |
| (7) "P" position switch | (17) Nut               |
| (8) Detent spring       | (18) Grip              |
| (9) Illumination bulb   | (19) Spring            |
| (10) Plate              | (20) Select lever ASSY |

- (21) Bush

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

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

**T2: 13 (1.3, 9.4)**

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

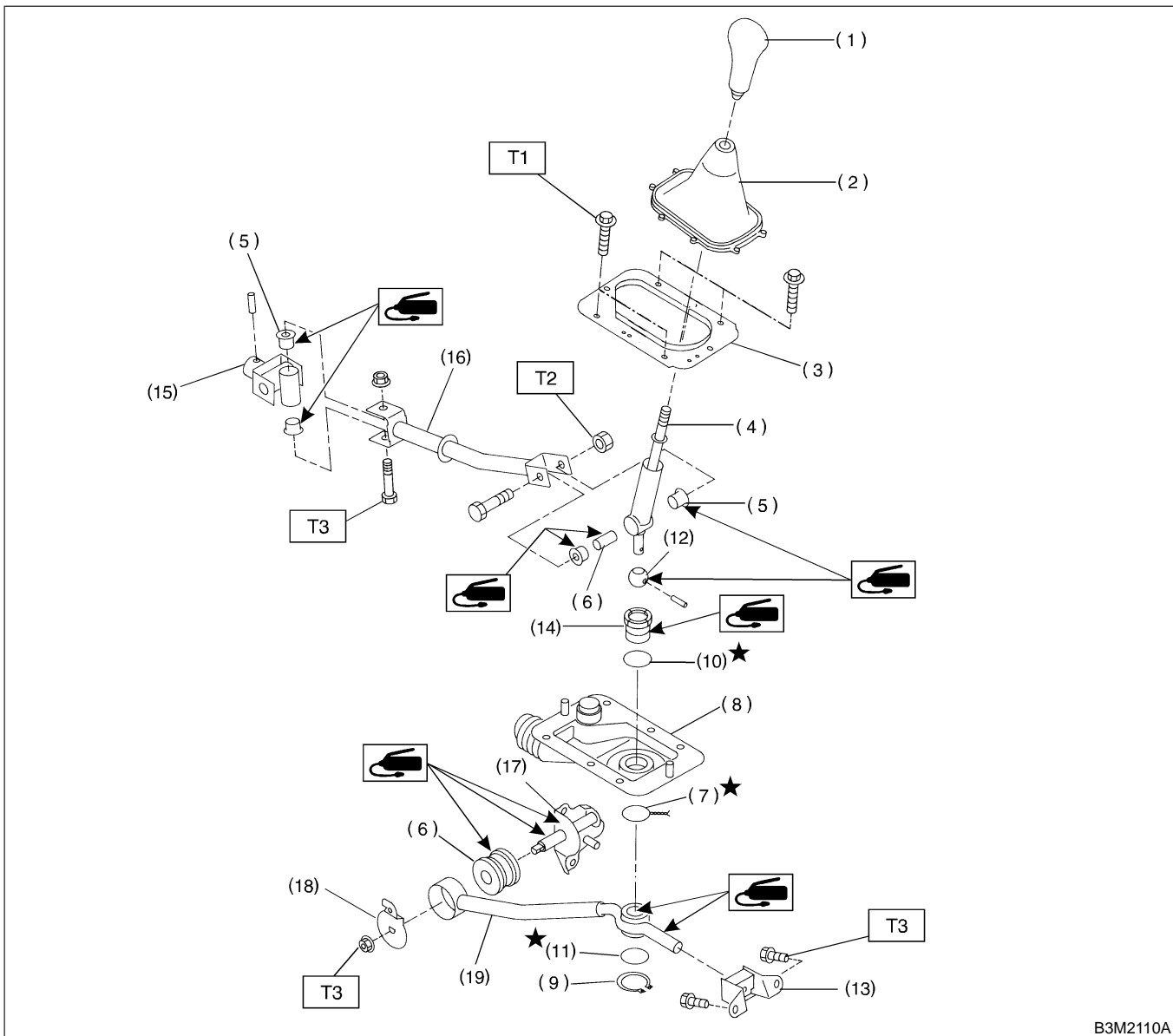
**T4: 33 (3.4, 25)**



# GENERAL DESCRIPTION

Control Systems

## 2. MT GEAR SHIFT LEVER S501001A0502



B3M2110A

- (1) Gear shift knob
- (2) Console boot
- (3) Boot plate
- (4) Lever
- (5) Bush
- (6) Bush (Stay front)
- (7) Locking wire
- (8) Boot
- (9) Snap ring

- (10) O-ring A
- (11) O-ring B
- (12) Bush (Shift lever)
- (13) Cushion rubber
- (14) Bush (Stay rear)
- (15) Joint
- (16) Rod
- (17) Bracket
- (18) Washer

- (19) Stay

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

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

**T2: 12 (1.2, 8.7)**

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

## C: CAUTION S501001A03

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.

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

## D: PREPARATION TOOL S501001A17

### 1. GENERAL PURPOSE TOOLS S501001A1701

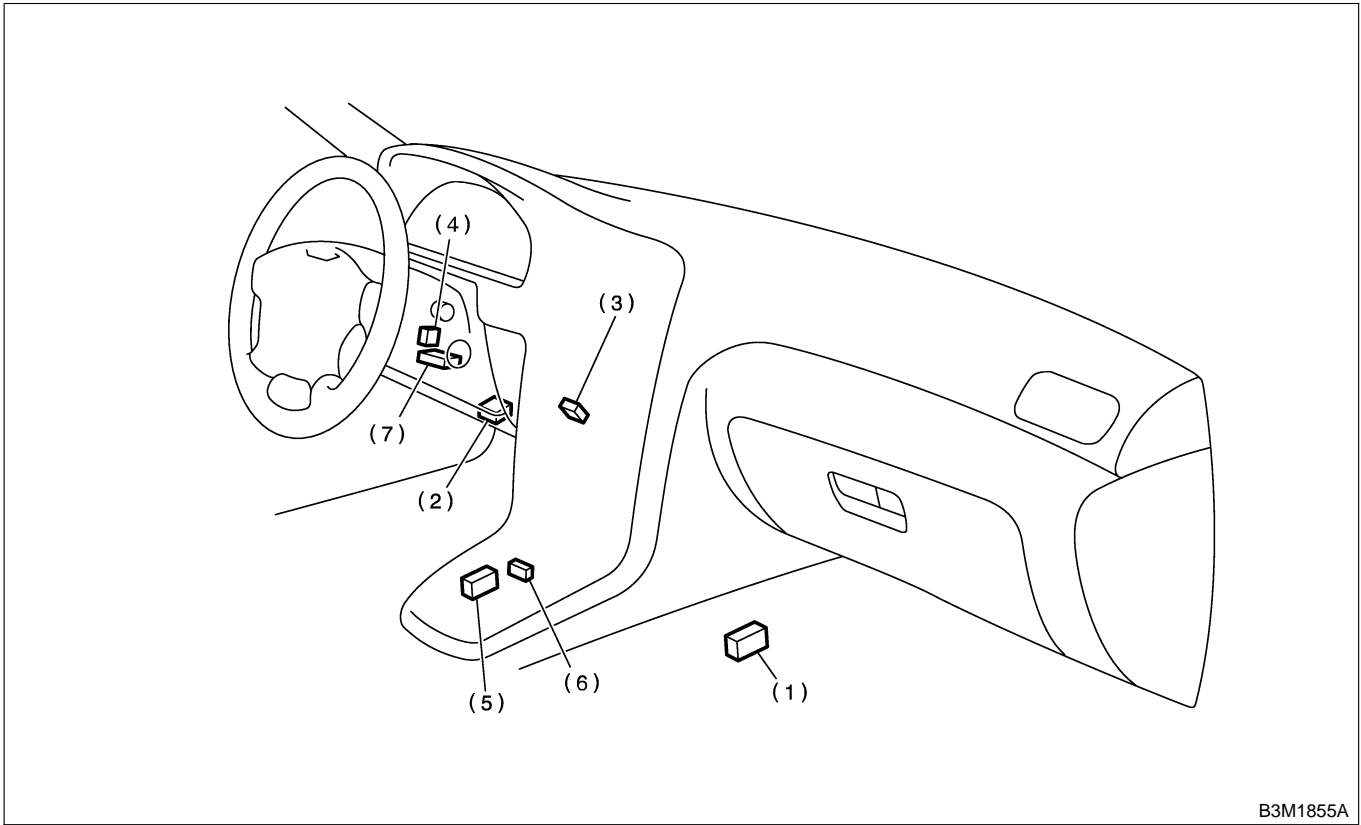
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.

# ELECTRICAL COMPONENT

Control Systems

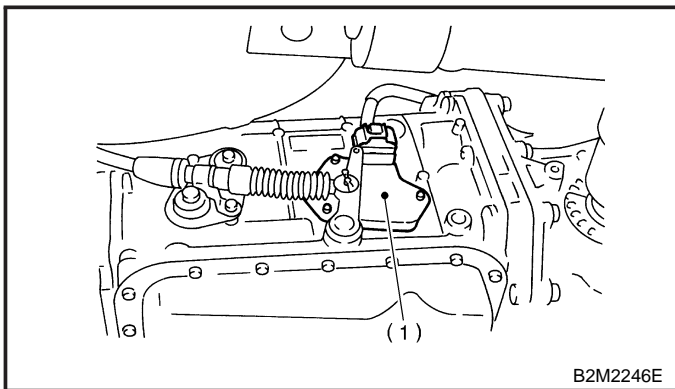
## 2. Electrical Component SS01547

### A: LOCATION SS01547A13

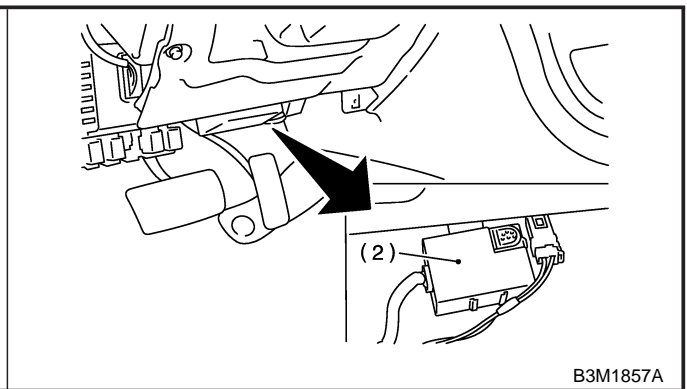


B3M1855A

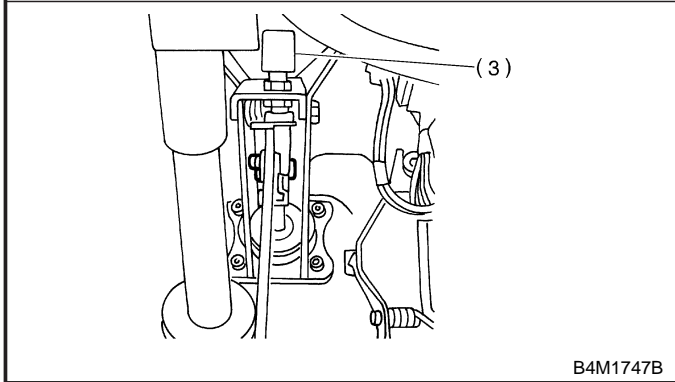
- |                             |                         |                       |
|-----------------------------|-------------------------|-----------------------|
| (1) Inhibitor switch        | (4) Key warning switch  | (7) Key lock solenoid |
| (2) AT shift control module | (5) Shift lock solenoid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



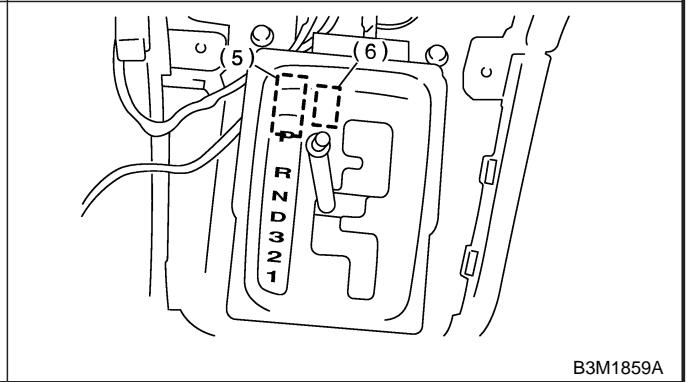
B2M2246E



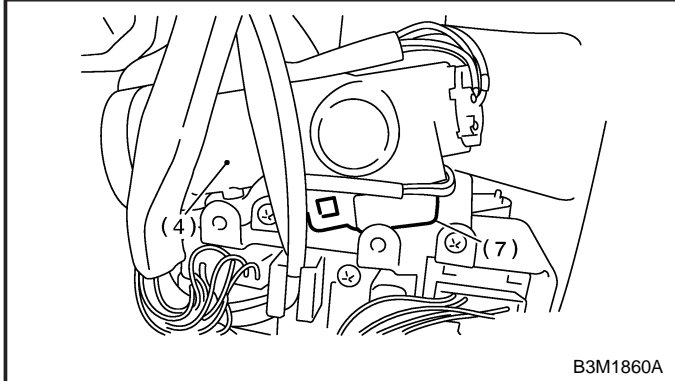
B3M1857A



B4M1747B



B3M1859A



B3M1860A

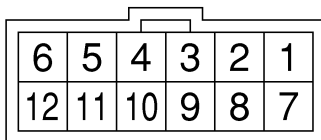


# AT SHIFT LOCK SYSTEM

Control Systems

## 3. AT Shift Lock System SS01240

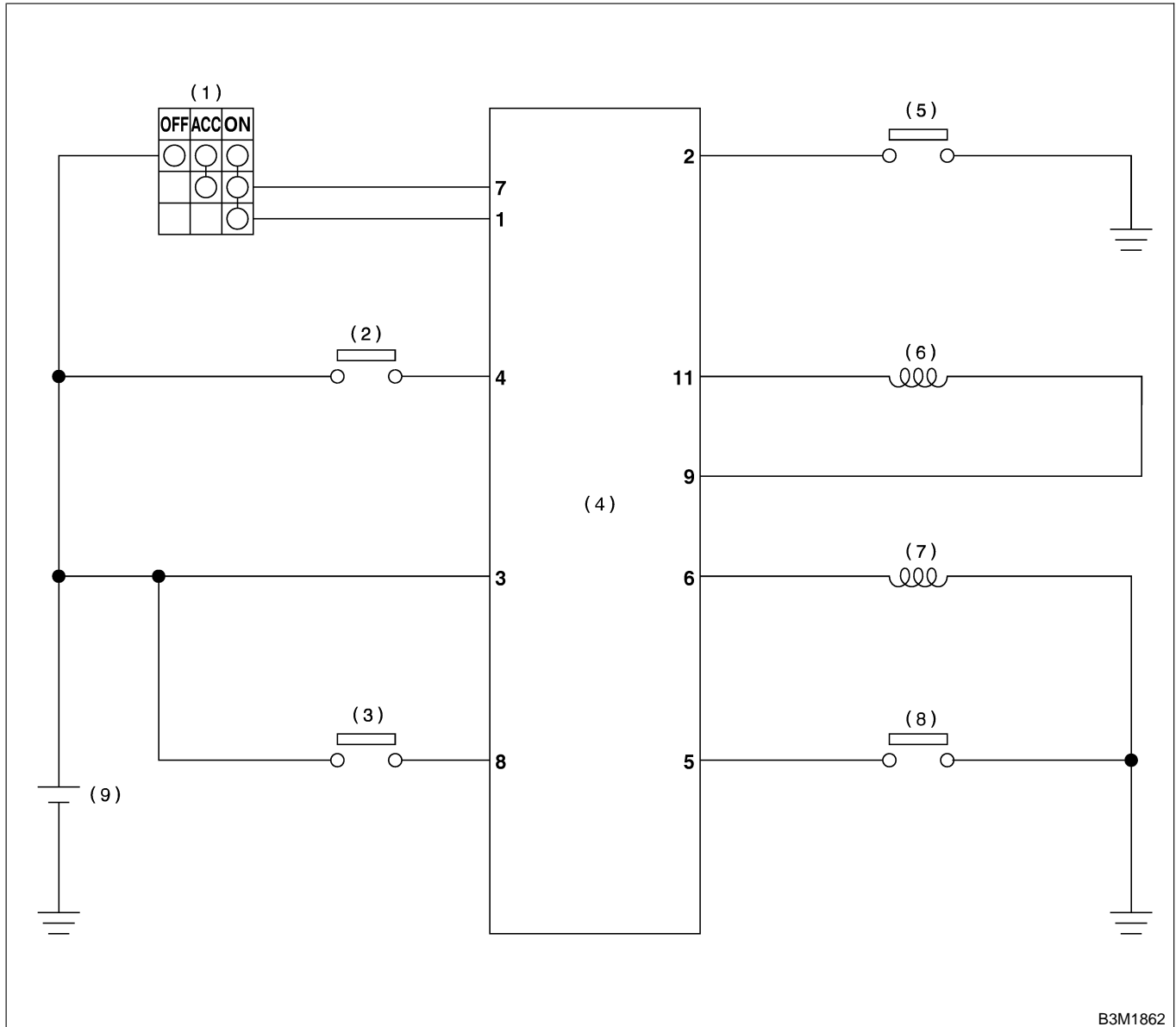
### A: ELECTRICAL SPECIFICATION SS01240A08



B3M1861

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

## B: SCHEMATIC SS01240A21



B3M1862

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

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

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

# AT SHIFT LOCK SYSTEM

Control Systems

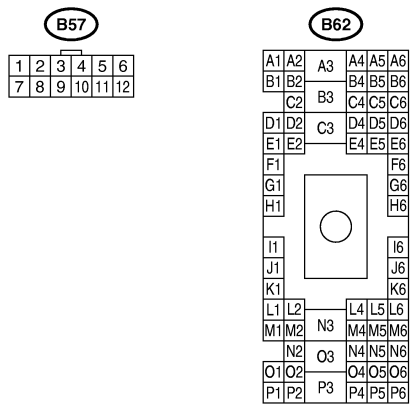
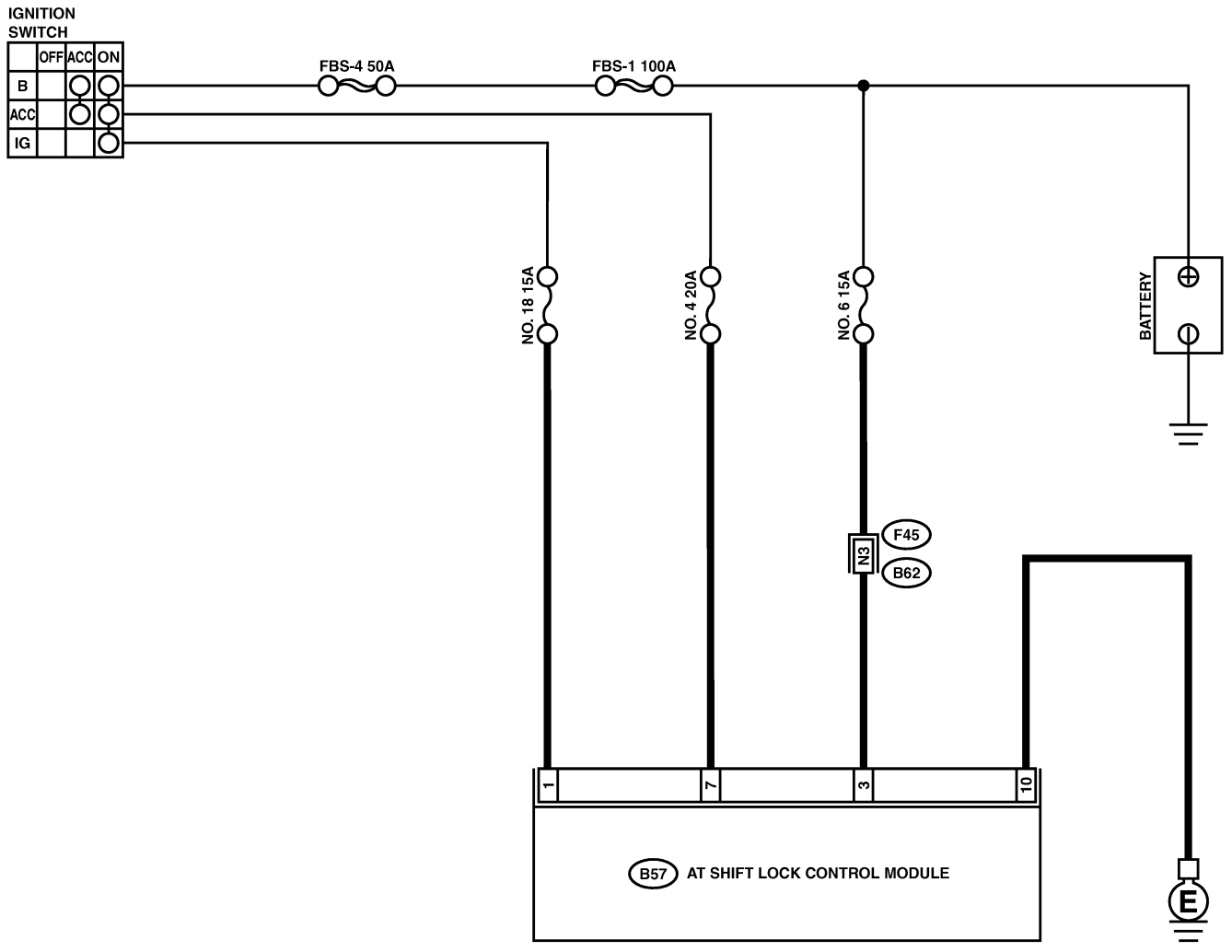
## C: INSPECTION S501240A10

No.	Step	Check	Yes	No
1	<b>CHECK SHIFT LOCK.</b> 1) Turn ignition switch ON. 2) Move select lever to "P" position.	While brake pedal is depressed, can select lever move from "P" range to other positions?	Go to step 2.	Inspect "SELECT LEVER CANNOT BE SHIFT LOCKED". <Ref. to CS-13 SELECT LEVER CANNOT BE SHIFT LOCKED, INSPECTION, AT Shift Lock System.>
2	<b>CHECK SHIFT LOCK.</b>	While brake pedal is not depressed, can select lever move from "P" range to other positions?	Inspect "SELECT LEVER SHIFT LOCK CANNOT BE RELEASED". <Ref. to CS-15 SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock System.>	Go to step 3.
3	<b>CHECK KEY INTER LOCK.</b>	When select lever is in other than "P" position, does ignition switch turn to "LOCK" position? Or when select lever is in "P" position, does ignition switch turn to "LOCK" position?	Inspect "KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED". <Ref. to CS-18 KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock System.>	AT shift lock system is normal.

# AT SHIFT LOCK SYSTEM

## 1. AT SHIFT LOCK CONTROL MODULE POWER SUPPLY AND GROUND LINE S501240A1001

### WIRING DIAGRAM:



B3M1863



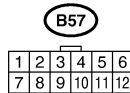
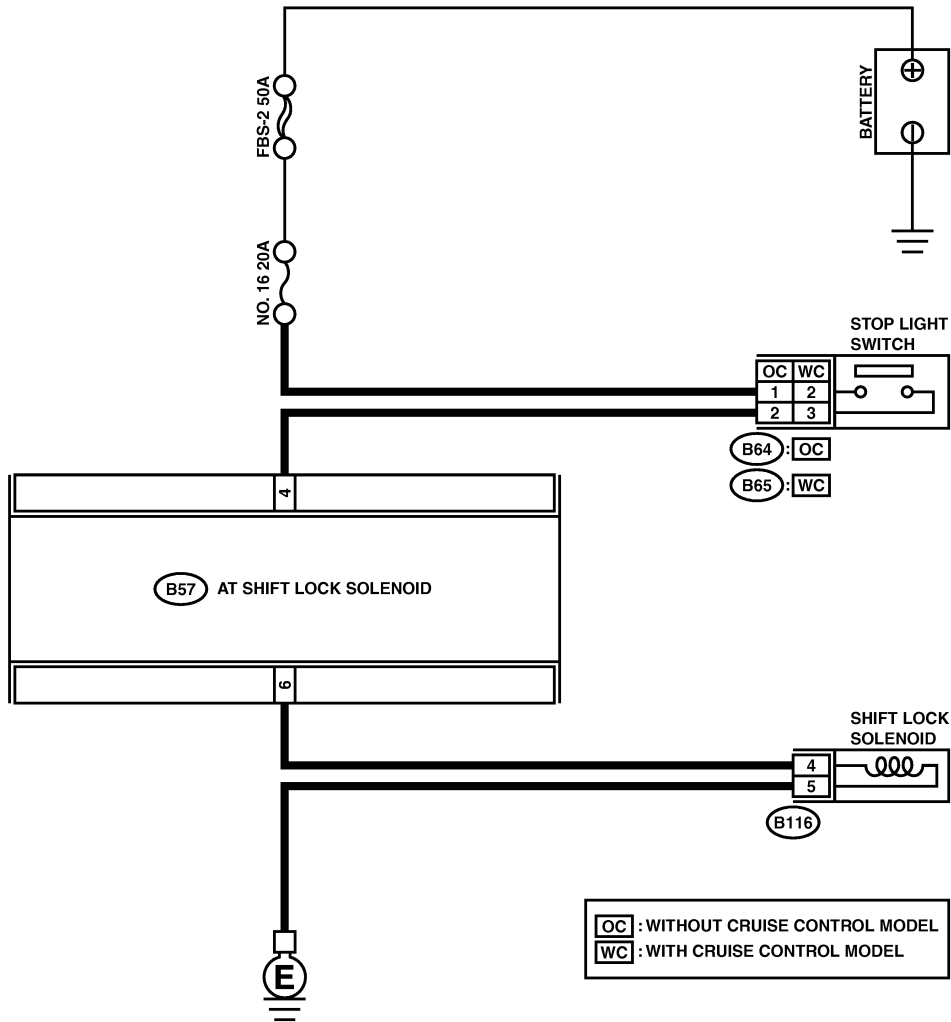
# AT SHIFT LOCK SYSTEM

Control Systems

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

## 2. SELECT LEVER CANNOT BE SHIFT LOCKED S501240A1002

**WIRING DIAGRAM:**



B3M1864

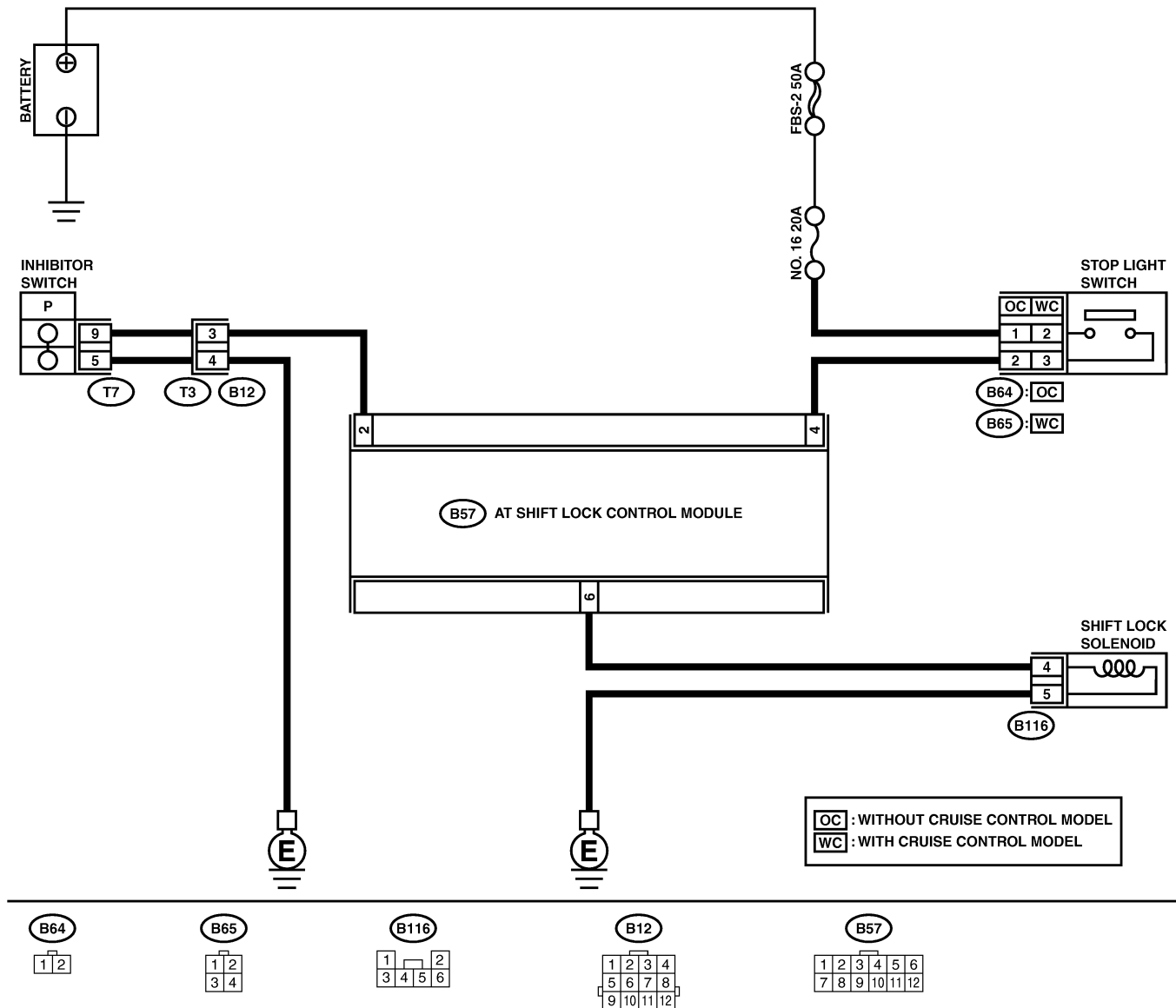
No.	Step	Check	Yes	No
1	<b>CHECK STOP LIGHT SWITCH.</b> Depress brake pedal.	Does stop light turn ON?	Go to step 2.	Inspect stop light system.

# AT SHIFT LOCK SYSTEM

No.	Step	Check	Yes	No
2	<p><b>CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b></p> <p>1) Turn ignition switch to OFF. 2) Measure the resistance of harness between stop light switch and AT shift lock control module.</p> <p><b>Connector &amp; terminal</b> <i>Without cruise control model</i> <b>(B64) No. 2 — (B57) NO. 4</b> <i>Without cruise control model</i> <b>(B65) No. 3 — (B57) No. 4</b></p>	Is the resistance more than 1 MΩ?	Go to step 3.	Repair open circuit in harness between AT shift lock control module and stop light switch.
3	<p><b>CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b></p> <p>1) Turn ignition switch to OFF. 2) Measure the resistance of harness between stop light switch and body ground.</p> <p><b>Connector &amp; terminal</b> <i>Without cruise control model</i> <b>(B64) No. 2 — (B57) NO. 4</b> <i>Without cruise control model</i> <b>(B65) No. 3 — (B57) No. 4</b></p>	Is the resistance less than 10 Ω?	Go to step 4.	Repair open circuit in harness between AT shift lock control module and stop light switch.
4	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.</b></p> <p>1) Ignition switch to OFF. 2) Disconnect connector and shift lock solenoid. 3) Measure the resistance of harness between AT shift lock control module and shift lock solenoid.</p> <p><b>Connector &amp; terminal</b> <b>(B116) No. 4 — (B57) No. 6</b></p>	Is the resistance more than 1 MΩ?	Go to step 5.	Repair open circuit in harness between AT shift lock control module and shift lock solenoid.
5	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.</b></p> <p>Measure the resistance of harness between shift lock solenoid and body ground.</p> <p><b>Connector &amp; terminal</b> <b>(B116) No. 4 — Body ground</b></p>	Is the resistance less than 10 Ω?	Go to step 6.	Repair open circuit in harness between AT shift lock control module and shift lock solenoid.
6	<p><b>CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND BODY GROUND.</b></p> <p>Measure the resistance of harness between shift lock solenoid and body ground.</p> <p><b>Connector &amp; terminal</b> <b>(B116) No. 5 — Body ground</b></p>	Is the resistance more than 1 MΩ?	Go to step 7.	Repair open circuit in harness between shift lock solenoid and body ground.
7	<p><b>CHECK SHIFT LOCK SOLENOID.</b></p> <p>Measure the resistance of shift lock solenoid connector terminals.</p> <p><b>Terminal</b> <b>No. 4 — No. 5</b></p>	Is the resistance between 10 and 20 Ω?	Go to step 8.	Replace shift lock solenoid.
8	<p><b>CHECK SHIFT LOCK SOLENOID.</b></p> <p>Connect battery with shift lock solenoid connector terminal and operate solenoid.</p> <p><b>Terminal</b> <b>No. 4 (+) — No. 5 (-)</b></p>	Does shift lock solenoid operate properly?	Go to step 9.	Replace shift lock solenoid.
9	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in key lock circuit?	Repair poor contact.	Replace AT shift lock control module.

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

### WIRING DIAGRAM:



B3M1865

# AT SHIFT LOCK SYSTEM

No.	Step	Check	Yes	No
1	<b>CHECK INHIBITOR SWITCH.</b> 1) Turn ignition switch to ON (engine OFF). 2) Move select lever from "P" to "1" range.	Combination meter indicator lamp and select lever "P", "R", "N", "3", "2" and "1" are correctly matched?	Go to step 2.	Adjust inhibitor switch and select cable.
2	<b>CHECK HARNESS BETWEEN INHIBITOR SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b> 1) Disconnect connector transmission harness. 2) Turn ignition switch to OFF. 3) Measure the resistance of harness between AT shift lock control module and inhibitor switch. <i>Connector &amp; terminal</i> <i>(B12) No. 3 (+) — (B57) No. 2</i>	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between AT shift lock control module and body ground.
3	<b>CHECK HARNESS BETWEEN INHIBITOR SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b> Measure the resistance of harness between AT shift lock control module and inhibitor switch. <i>Connector &amp; terminal</i> <i>(B12) No. 3 (+) — (B57) No. 2</i>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair open circuit in harness between AT shift lock control module and body ground.
4	<b>CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition switch to ON. 2) Measure the voltage between AT shift lock control module and body ground. <i>Connector &amp; terminal</i> <i>(B57) No. 2 (+) — Body ground (-)</i>	Is the voltage between 5 and 7 V?	Go to step 5.	Go to step 16.
5	<b>CHECK HARNESS BETWEEN INHIBITOR SWITCH AND BODY GROUND.</b> 1) Turn ignition switch to OFF. 2) Measure the resistance of harness between AT shift lock control module and body ground. <i>Connector &amp; terminal</i> <i>(B12) No. 4 — Body ground</i>	Is the resistance less than 1 Ω?	Go to step 6.	Repair open circuit in harness between AT shift lock control module and body ground.
6	<b>CHECK INHIBITOR SWITCH.</b> 1) Move select lever to "P" position. 2) Measure the resistance of transmission harness connector terminals. <i>Connector &amp; terminal</i> <i>(T3) No. 3 — No. 4</i>	Is the resistance more than 1 MΩ?	Go to step 7.	Repair or replace inhibitor switch.
7	<b>CHECK STOP LIGHT SWITCH.</b> 1) Turn ignition switch to ON (engine OFF). 2) Depress brake pedal.	Does stop light turn on?	Go to step 8.	Inspect stop light system.
8	<b>CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition switch to OFF. 2) Measure the resistance of harness between stop light switch and AT shift lock control module. <i>Connector &amp; terminal</i> <i>Without cruise control model</i> <i>(B64) No. 2 — (B57) No. 4</i> <i>Without cruise control model</i> <i>(B65) No. 3 — (B57) No. 4</i>	Is the resistance more than 1 MΩ?	Go to step 9.	Repair open circuit in harness between AT shift lock control module and stop light switch.

# AT SHIFT LOCK SYSTEM

Control Systems

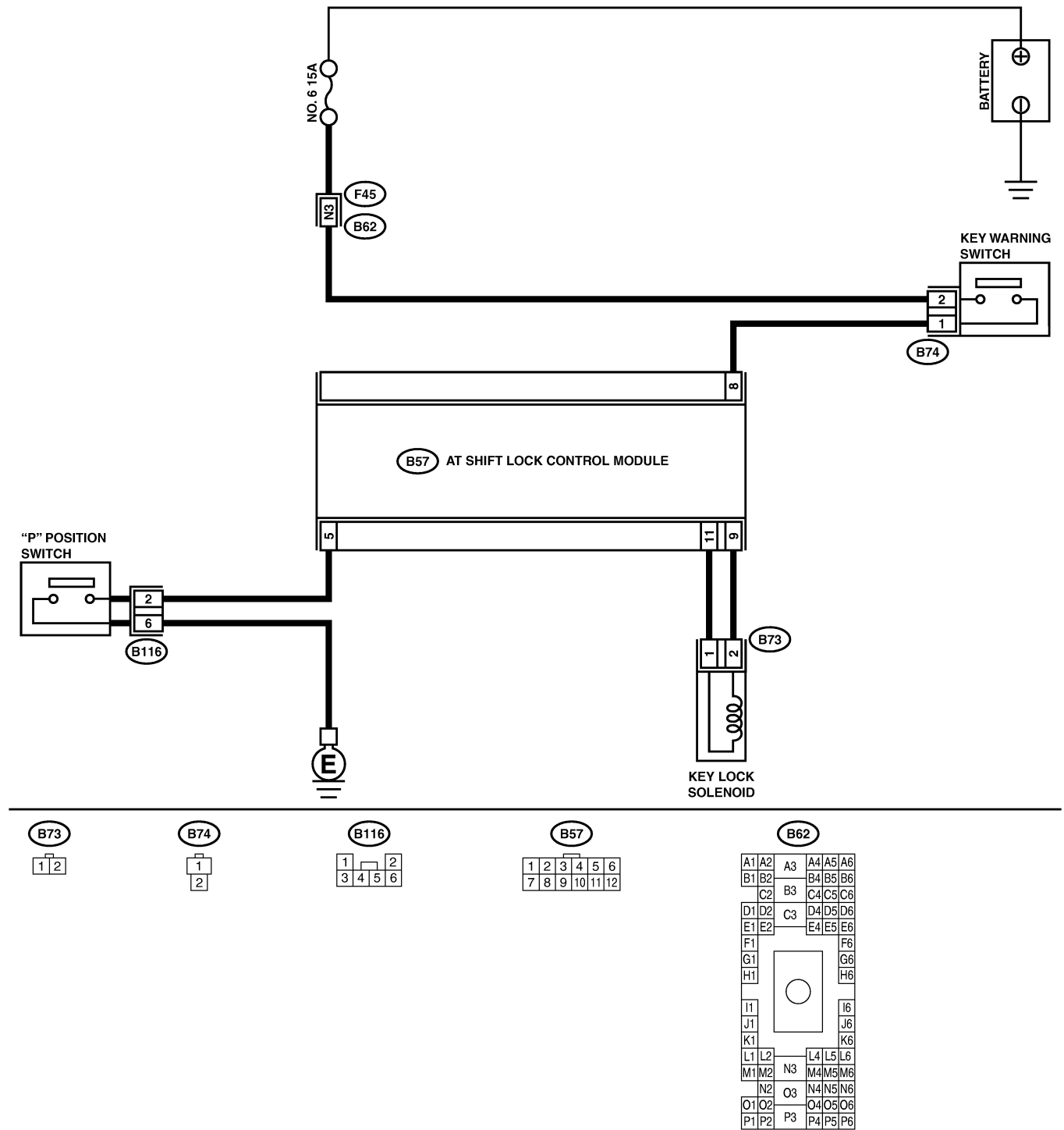
No.	Step	Check	Yes	No
9	<p><b>CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.</b></p> <p>1) Disconnect connector from shift lock solenoid.</p> <p>2) Measure the resistance of harness between stop light switch and body ground.</p> <p><b>Connector &amp; terminal</b>  <b>Without cruise control model</b>  <b>(B64) No. 2 — Body ground</b>  <b>Without cruise control model</b>  <b>(B65) No. 3 — Body ground</b></p>	Is the resistance less than 10 Ω?	Go to step 10.	Repair open circuit in harness between AT shift lock control module and stop light switch.
10	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.</b></p> <p>1) Disconnect connector from shift lock solenoid.</p> <p>2) Turn ignition switch to ON (engine OFF).</p> <p>3) Measure the resistance of harness between shift lock solenoid and body ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B57) No. 6 — (B116) No. 4</b></p>	Is the resistance more than 1 MΩ?	Go to step 11.	Repair open circuit in harness between AT shift lock control module and shift lock solenoid.
11	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.</b></p> <p>1) Disconnect connector from shift lock solenoid.</p> <p>2) Turn ignition switch to ON (engine OFF).</p> <p>3) Measure the resistance of harness between shift lock solenoid and body ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B57) No. 6 — Body ground</b></p>	Is the resistance less than 10 Ω?	Go to step 12.	Repair open circuit in harness between AT shift lock control module and shift lock solenoid.
12	<p><b>CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND BODY GROUND.</b></p> <p>Measure the resistance of harness between shift lock solenoid and body ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B116) No. 5 — Body ground</b></p>	Is the resistance more than 1 MΩ?	Go to step 13.	Repair open circuit in harness between shift lock solenoid and body ground.
13	<p><b>CHECK SHIFT LOCK SOLENOID.</b></p> <p>Measure the resistance of shift lock solenoid connector terminals.</p> <p><b>Terminal</b>  <b>No. 4 — No. 5</b></p>	Is the resistance between 10 and 20 Ω?	Go to step 14.	Replace shift lock solenoid.
14	<p><b>CHECK SHIFT LOCK SOLENOID.</b></p> <p>Connect battery with shift lock solenoid connector terminal and operate solenoid.</p> <p><b>Terminal</b>  <b>No. 4 (+) — No. 5 (-)</b></p>	Is shift lock solenoid operating properly?	Go to step 15.	Replace shift lock solenoid.
15	<p><b>CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.</b></p> <p>1) Turn ignition switch to ON (engine OFF).</p> <p>2) Measure the voltage between AT shift lock control module and body ground.</p> <p><b>Connector &amp; terminal</b>  <b>(B57) No. 6 (+) — Body ground (-)</b></p>	Is the voltage more than 10 V?	Go to step 16.	Go to step 16.
16	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in key lock circuit?	Repair poor contact.	Replace AT shift lock control module.

# AT SHIFT LOCK SYSTEM

Control Systems

## 4. KEY INTERLOCK DOES NOT LOCK OR RELEASE S501240A1004

WIRING DIAGRAM:



B3M1866

# AT SHIFT LOCK SYSTEM

No.	Step	Check	Yes	No
1	<p><b>CHECK HARNESS BETWEEN FUSE (No. 6) AND KEY WARNING SWITCH.</b>                      1) Disconnect connector key warning switch.                      2) Measure the voltage of harness between key warning switch and body ground.  <i>Connector &amp; terminal</i>  <i>(B74) No. 2 — Body ground</i></p>	Is the voltage between 10 and 15 V?	Go to step 2.	Repair open circuit in harness between fuse (No. 6) and key warning switch.
2	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH.</b>                      Measure the voltage of harness between key warning switch and AT shift lock control module.  <i>Connector &amp; terminal</i>  <i>(B57) No. 8 — Body ground</i></p>	Is the resistance more than 10 V?	Go to step 3.	Repair open circuit in harness between AT shift lock control module and key warning switch.
3	<p><b>CHECK KEY WARNING SWITCH.</b>                      Measure the resistance of stop light switch connector terminals.  <i>Terminal</i>  <i>No. 1 — No. 2</i></p>	Is the resistance more than 1 MΩ?	Go to step 4.	Replace key warning switch.
4	<p><b>CHECK KEY WARNING SWITCH.</b>                      1) Remove key.                      2) Measure the resistance of stop light switch connector terminals.  <i>Terminal</i>  <i>No. 1 — No. 2</i></p>	Is the resistance ∞ MΩ?	Go to step 5.	Replace key warning switch.
5	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.</b>                      1) Disconnect connector from key lock solenoid.                      2) Turn ignition switch to OFF.                      3) Measure the resistance of harness between AT shift lock control module and key lock solenoid.  <i>Connector &amp; terminal</i>  <i>(B73) No. 2 — (B57) No. 9</i></p>	Is the resistance more than 1 MΩ?	Go to step 6.	Repair open circuit in harness between AT shift lock control module and key lock solenoid.
6	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.</b>                      Measure the resistance of harness between AT shift lock control module and body ground.  <i>Connector &amp; terminal</i>  <i>(B57) No. 9 — Body ground</i></p>	Is the resistance less than 10 Ω?	Go to step 7.	Repair open circuit in harness between AT shift lock control module and key lock solenoid.
7	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.</b>                      Measure the resistance of harness between AT shift lock control module and key lock solenoid.  <i>Connector &amp; terminal</i>  <i>(B73) No. 1 — (B57) No. 11</i></p>	Is the resistance more than 1 MΩ?	Go to step 8.	Repair open circuit in harness between AT shift lock control module and key lock solenoid.
8	<p><b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.</b>                      Measure the resistance of harness between key lock solenoid and body ground.  <i>Connector &amp; terminal</i>  <i>(B57) No. 11 — Body ground</i></p>	Is the resistance less than 10 Ω?	Go to step 9.	Repair open circuit in harness between AT shift lock control module and key lock solenoid.



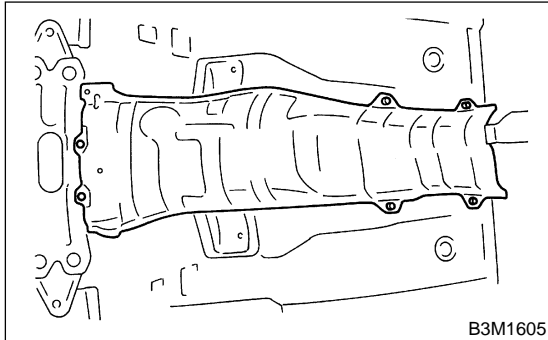
# AT SHIFT LOCK SYSTEM

No.	Step	Check	Yes	No
9	<b>CHECK KEY LOCK SOLENOID.</b> Measure the resistance of key lock solenoid connector terminals. <i>Connector &amp; terminal (B73) No. 1 — No. 2</i>	Is the resistance between 4 and 8 Ω?	Go to step 10.	Replace key lock solenoid.
10	<b>CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition to ON (engine OFF). 2) Move select lever to "P" position. 3) Press brake pedal. 4) Measure the voltage of AT shift lock control module connector terminals. <i>Connector &amp; terminal (B57) No. 9 (+) — No. 10 (-)</i>	Is the voltage 8.5 and 15 V?	Go to step 11.	Go to step 16.
11	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND "P" POSITION SWITCH.</b> 1) Disconnect connector from "P" position switch. 2) Measure the resistance of harness between AT shift lock control module and "P" position switch. <i>Connector &amp; terminal (B116) No. 2 — (B57) No. 5</i>	Is the resistance more than 1 MΩ?	Go to step 12.	Repair open circuit in harness between AT shift lock control module and "P" position switch.
12	<b>CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND "P" POSITION SWITCH.</b> 1) Disconnect connector from "P" position switch. 2) Measure the resistance of harness between AT shift lock control module and body ground. <i>Connector &amp; terminal (B116) No. 2 — Body ground</i>	Is the resistance less than 10Ω?	Go to step 13.	Go to step 16.
13	<b>CHECK HARNESS BETWEEN "P" POSITION SWITCH AND BODY GROUND.</b> Measure the resistance of harness between shift lock solenoid and "P" position switch. <i>Connector &amp; terminal (B116) No. 6 — Body ground</i>	Is the resistance more than 1 MΩ?	Go to step 14.	Repair open circuit in harness between "P" position switch and body ground.
14	<b>CHECK "P" POSITION SWITCH.</b> When select lever is on "P" position (switch ON), measure resistance between connectors. Or when select lever is on other than "P" position (switch OFF), measure the resistance. <i>Terminal No. 2 — No. 6</i>	When select lever is on "P" position, is resistance 1 MΩ or less? Or when select lever is on other than "P" position, is resistance ∞ MΩ?	Go to step 15.	Replace "P" position switch.
15	<b>CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.</b> 1) Turn ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module connectors. <i>Connector &amp; terminal (B57) No. 5 — No. 10</i>	Is the voltage between 5 and 7 V?	Go to step 16.	Replace AT shift lock control module.
16	<b>CHECK POOR CONTACT.</b>	Is there poor contact in AT shift lock circuit?	Repair poor contact.	Replace AT shift lock control module.

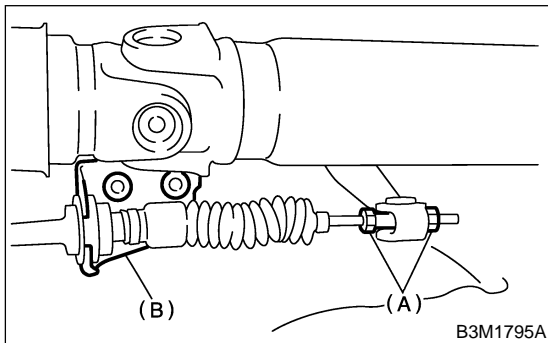
## 4. Select Lever S501548

### A: REMOVAL S501548A18

- 1) Move the select lever to the "N" position.
- 2) Remove rear exhaust pipe and muffler.
- 3) Remove heat shield cover.



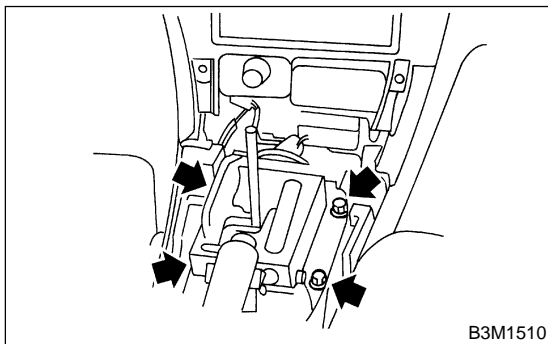
- 4) Disconnect cable from select lever and then remove cable bracket.



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

- 5) Remove console box. <Ref. to EI-34 REMOVAL, Console Box.>

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

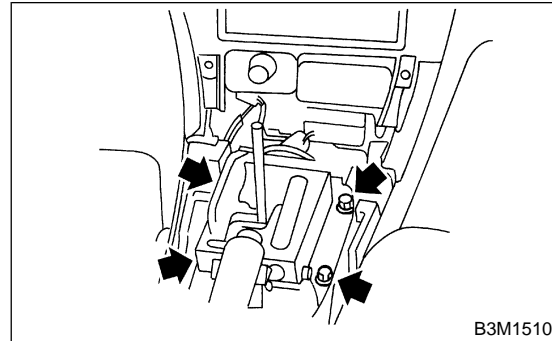


### B: INSTALLATION S501548A11

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

#### Tightening torque:

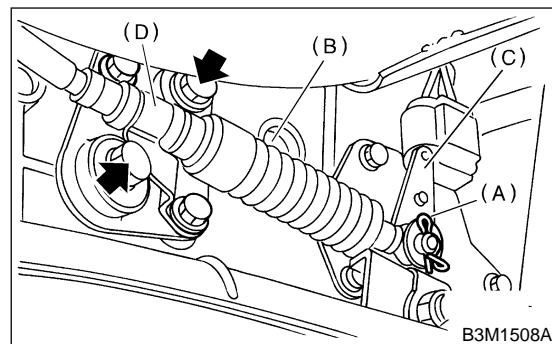
**13 N·m (1.3 kgf-m, 9.4 ft-lb)**



- 3) Install console box.
- 4) Set location of selector lever at "N" position.
- 5) Set location of selector arm installed on the transmission body at "N" position.
- 6) Pass cable through selector arm pin and then connect it using a washer and snap pin.
- 7) Attach cable clamp to transmission case with the bolts.

#### Tightening torque:

**24.5 N·m (2.5 kgf-m, 18.1 ft-lb)**



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

- 8) Insert the thread portion of the other inner cable and into the connector hole of the selector lever, and fix the other outer cable end to the bracket.

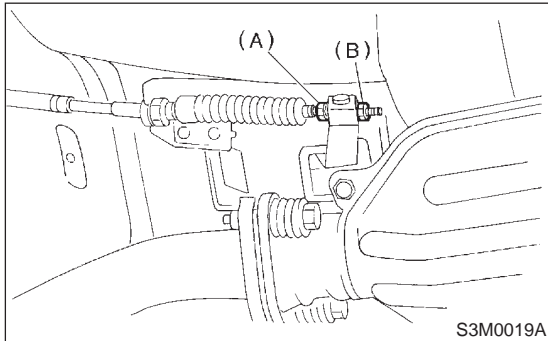
# SELECT LEVER

## Control Systems

- 9) Adjust the inner cable length.
  - (1) Put connector into contact with nut.
  - (2) Tighten nut (B).

### Tightening torque:

**7.5 N·m (0.76 kgf·m, 5.5 ft·lb)**



- (A) Nut
- (B) Lock nut

10) After completion of fitting, make sure that the selector lever operates smoothly all across the operating range.

11) Connect the harnesses and check the following items.

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

12) Check shift-lock system.

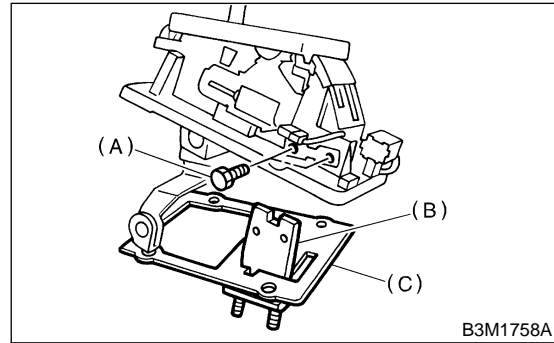
- (1) Ensure ignition switch rotates from "ACC" to "LOCK" when the selector lever is set at "P". Also check that ignition key can be removed only from the "LOCK" position.
- (2) Ensure selector lever moves from "P" to any other position when the brake pedal is depressed with ignition key set at "ON" or "START".

## C: DISASSEMBLY

S501548A06

1) Remove four washers and then detach rubber boot.

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

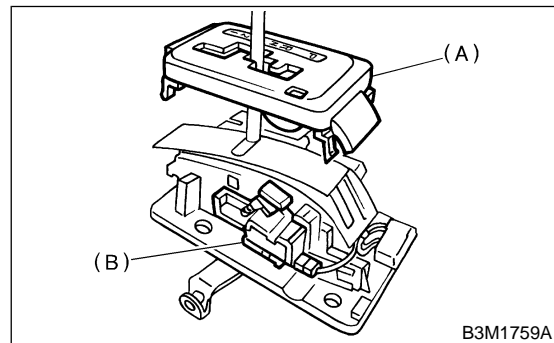


- (A) Bolt
- (B) Cable bracket
- (C) Plate

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

4) Detach indicator cover.

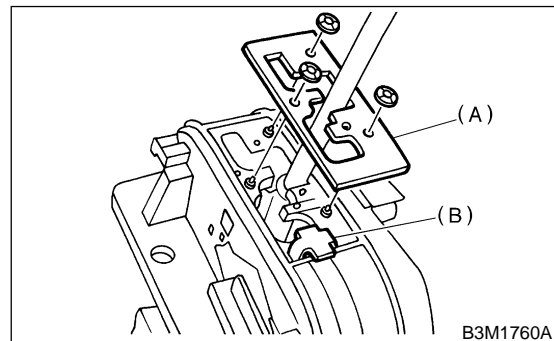
5) Disconnect connector and then remove solenoid assembly.



- (A) Indicator cover
- (B) Solenoid ASSY

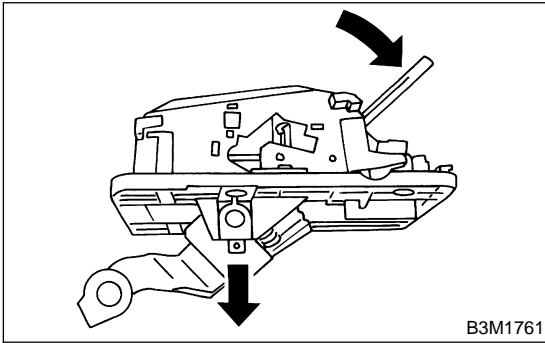
6) Remove pattern plate.

7) Remove stopper.



- (A) Pattern plate
- (B) Stopper

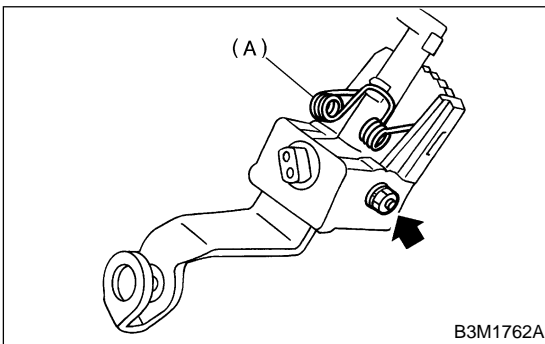
8) Tilt lever forward and pull down to separate it from frame.



9) Remove spring.

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

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



(A) Spring

## D: ASSEMBLY SS01548A02

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

## E: INSPECTION SS01548A10

- 1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
- 2) Confirm the following parts for operating condition before assembly. Moving condition of the selector lever upper... it should move smoothly.

# SELECT CABLE

## 5. Select Cable S501549

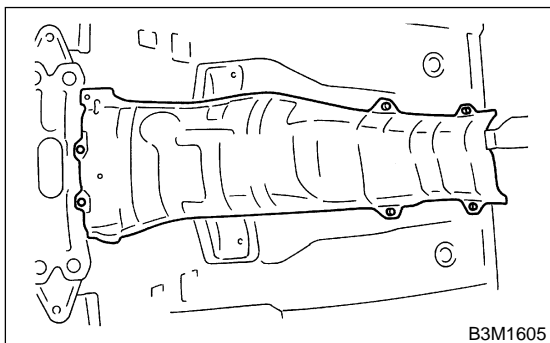
### A: REMOVAL S501549A18

- 1) Prior to removal, set lever to "N" position.
- 2) Remove under cover.
- 3) Remove rear exhaust pipe and muffler.

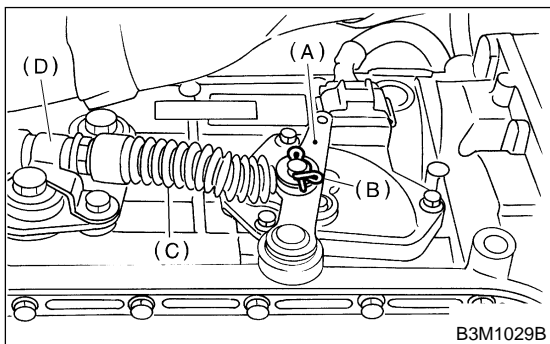
#### CAUTION:

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

- 4) Remove heat shield cover.

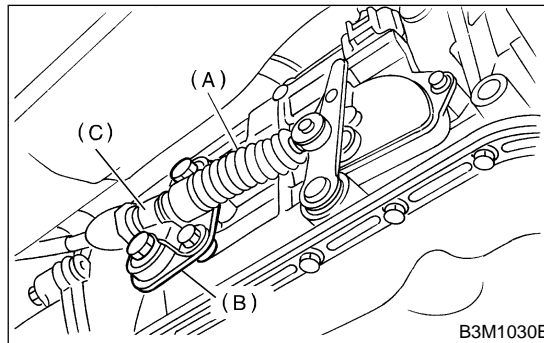


- 5) Remove snap pin from range select lever.



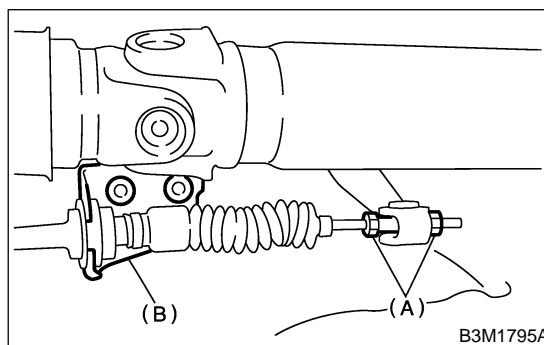
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp

- 6) Remove plate assembly from transmission case.



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

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



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

- 8) Remove select cable from plate assembly.

## B: INSTALLATION S501549A11

1) Install select cable to plate assembly.

**Tightening torque:**

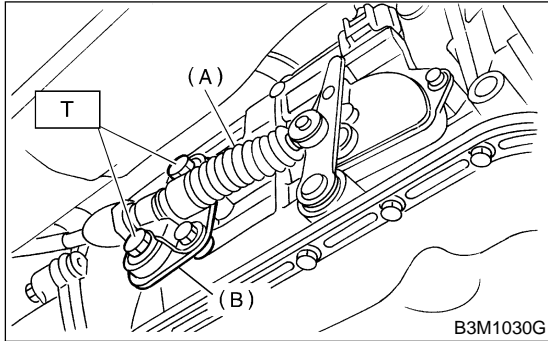
**32 N·m (3.3 kgf-m, 24 ft-lb)**

2) Install select cable to range select lever.

3) Install plate assembly to transmission.

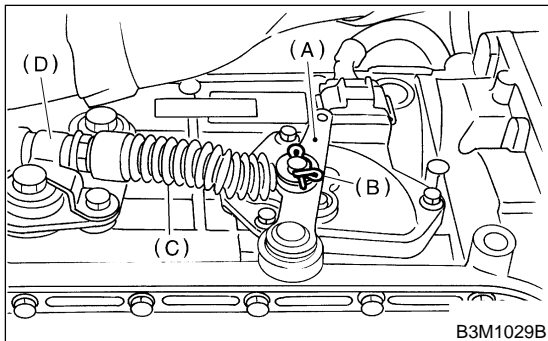
**Tightening torque:**

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



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

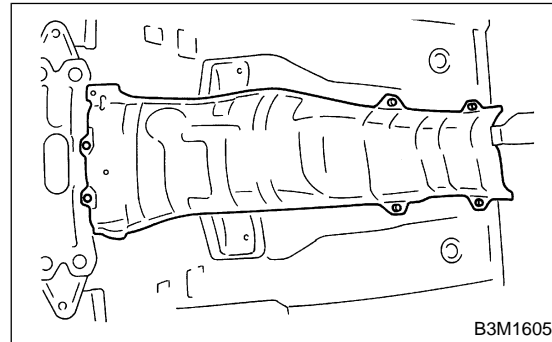
4) Install snap pin to range select lever.



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

5) Move the select lever to the "N" position, then adjust the select cable position. <Ref. to CS-25 ADJUSTMENT, Select Cable.>

6) Install heat shield cover.



7) Install rear exhaust pipe to muffler.

8) Install under cover.

## C: INSPECTION S501549A10

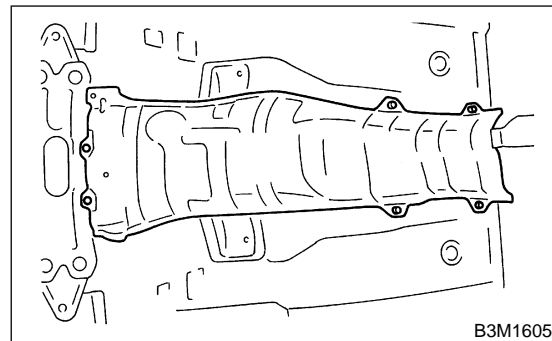
Check the removed cable and replace if damaged, rusty, or malfunctioning.

- 1) Check for smooth operation of the cable.
- 2) Check the inner cable for damage and rust.
- 3) Check the outer cable for damage, bends, and cracks.
- 4) Check the boot for damage, cracks, and deterioration.

## D: ADJUSTMENT S501549A01

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.

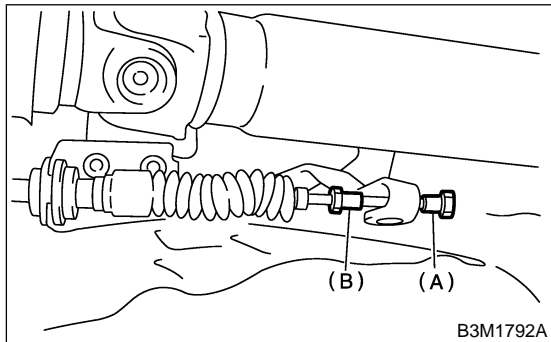
- 1) Prior to removal, set lever to "N" position.
- 2) Remove rear exhaust pipe and muffler.
- 3) Remove heat shield cover.



# SELECT CABLE

## Control Systems

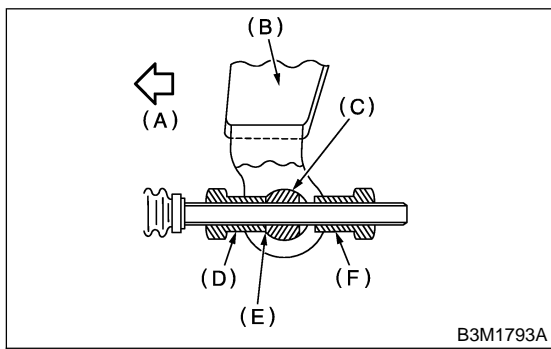
4) Loosen the adjusting nut on each side.



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

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

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

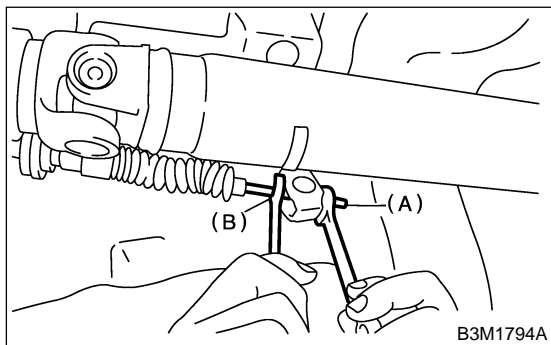


- (A) Front side
- (B) Select lever
- (C) Connector
- (D) Adjusting nut B
- (E) Contact point
- (F) Adjusting nut A

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

### Tightening torque:

**7.5 N·m (0.76 kgf·m, 5.5 ft·lb)**



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

## 6. AT Shift Lock Solenoid and “P” Position Switch S501234

### A: REMOVAL S501234A18

- 1) Remove the select lever. <Ref. to CS-21 REMOVAL, Select Lever.>
- 2) Remove AT shift lock solenoid “P” position switch.

### B: INSTALLATION S501234A11

- 1) Install AT shift lock solenoid and “P” position switch.
- 2) Install the select lever. <Ref. to CS-21 INSTALLATION, Select Lever.>

### C: INSPECTION S501234A10

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



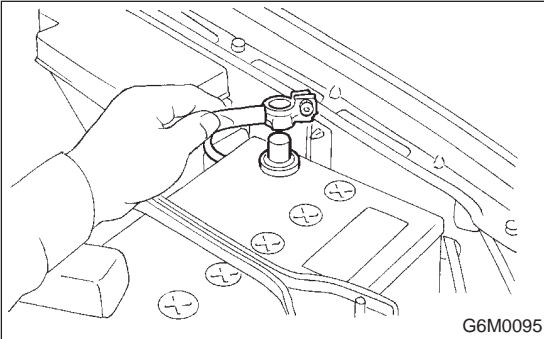
## 7. AT Shift Lock Control Module

S501237

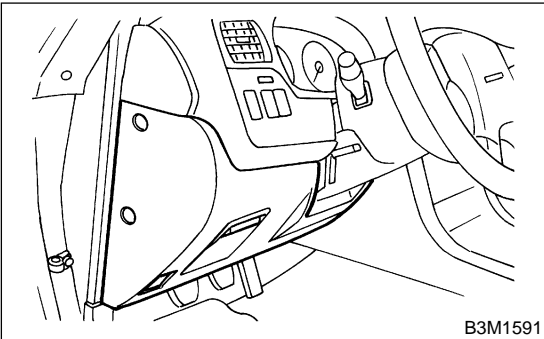
### A: REMOVAL

S510237A18

- 1) Disconnect battery ground terminal.



- 2) Remove the lower cover and then disconnect connector.



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

### B: INSTALLATION

S510237A11

Install in the reverse order of removal.

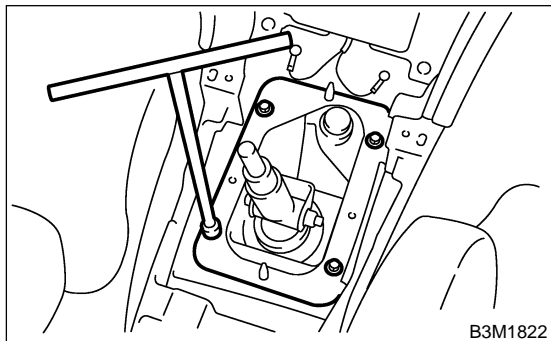
## 8. MT Gear Shift Lever

S501236

### A: REMOVAL

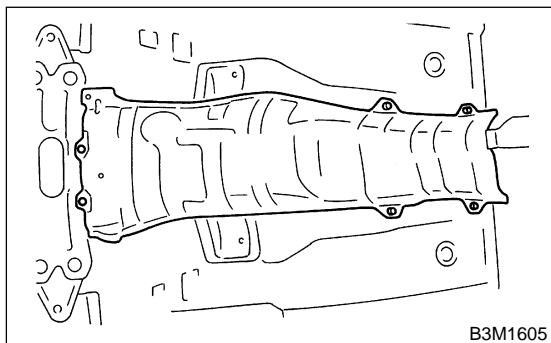
S501236A18

- 1) Remove gear shift knob.
- 2) Remove console box. <Ref. to EI-34 REMOVAL, Console Box.>
- 3) Remove boot plate from body.



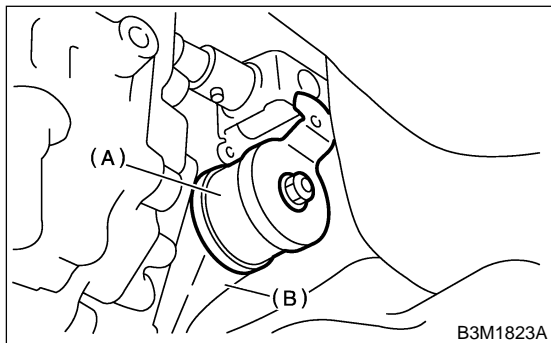
B3M1822

- 4) Remove rear exhaust pipe and muffler.
- 5) Remove heat shield cover.



B3M1605

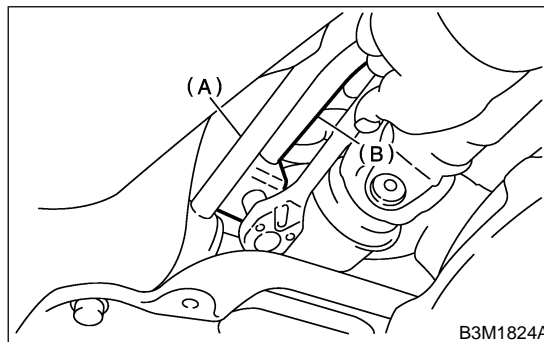
- 6) Remove stay from transmission bracket.



B3M1823A

- (A) Stay
- (B) Transmission bracket

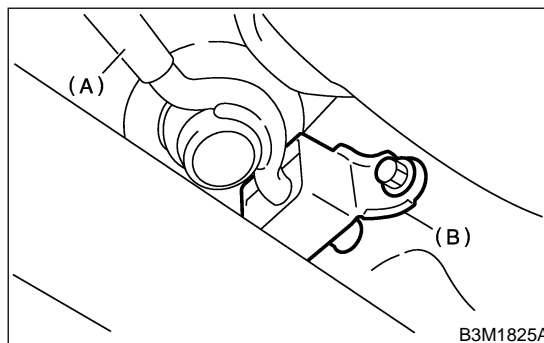
- 7) Remove rod from joint.



B3M1824A

- (A) Stay
- (B) Rod

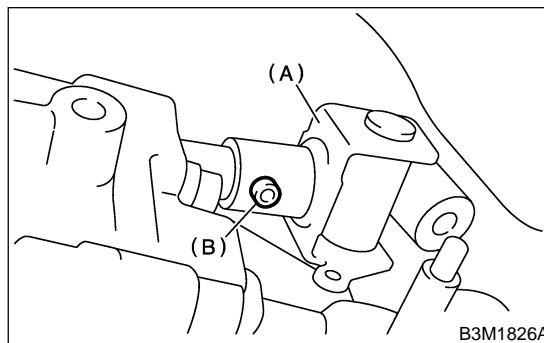
- 8) Remove cushion rubber from body.



B3M1825A

- (A) Rod
- (B) Cushion rubber

- 9) Remove joint and then extract straight pin.



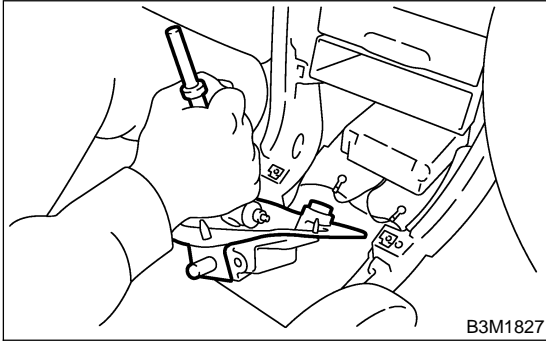
B3M1826A

- (A) Joint
- (B) Straight pin

# MT GEAR SHIFT LEVER

Control Systems

10) Remove gear shift lever.



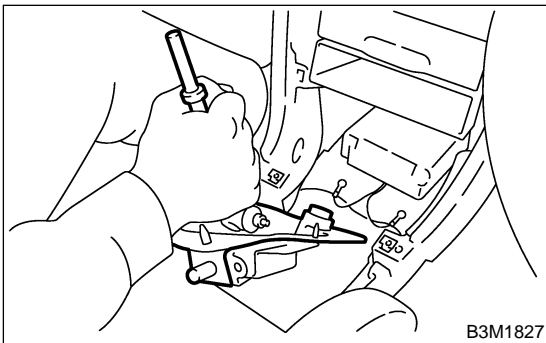
## B: INSTALLATION

S501236A11

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

### NOTE:

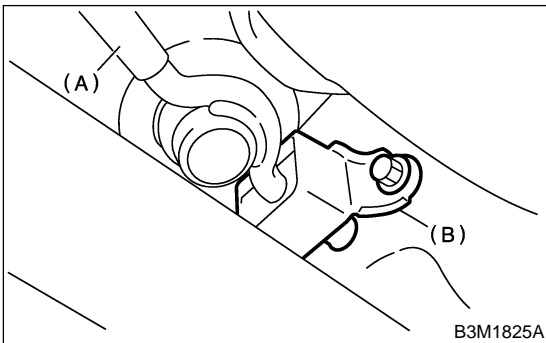
After inserting rod and stay, temporarily put them onto transmission mount.



3) Mount cushion rubber on the body.

### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

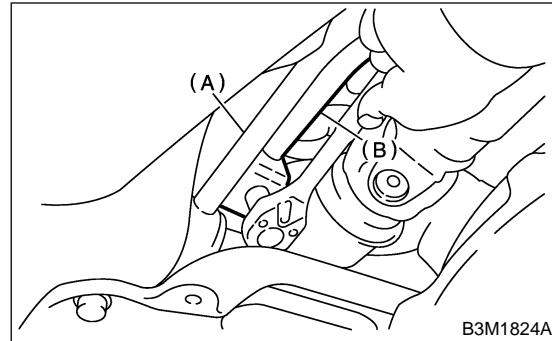


- (A) Cushion rubber
- (B) Stay

4) Connect rod to the joint.

### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**

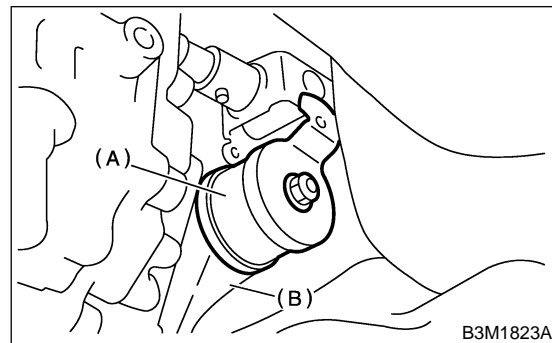


- (A) Joint
- (B) Rod

5) Connect stay to transmission bracket.

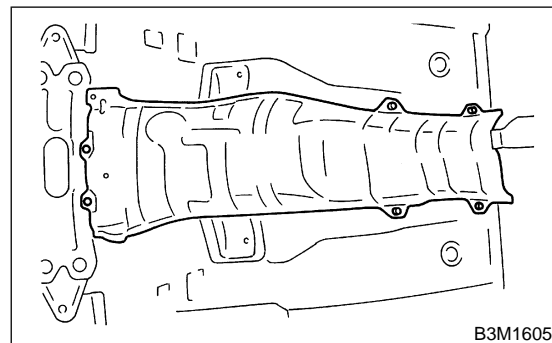
### Tightening torque:

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**



- (A) Stay
- (B) Transmission bracket

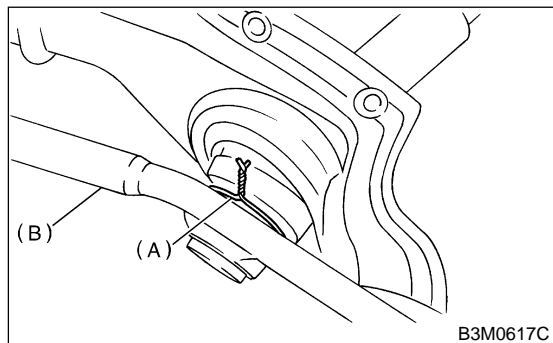
6) Install heat shield cover.



## C: DISASSEMBLY

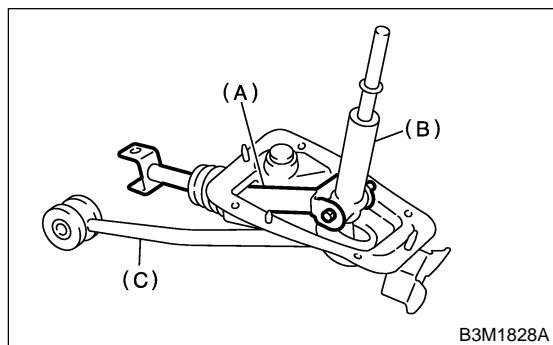
S501236A06

1) Disassemble locking wire.



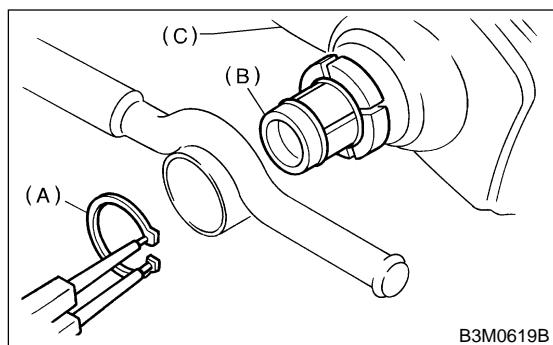
- (A) Locking wire
- (B) Stay

2) Remove rod from gear shift lever.



- (A) Rod
- (B) Gear shift lever
- (C) Stay

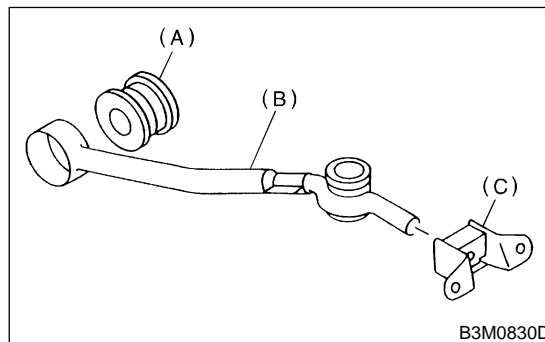
3) Remove snap ring from bush D, then disconnect stay.



- (A) Snap ring
- (B) Bush D
- (C) Boot

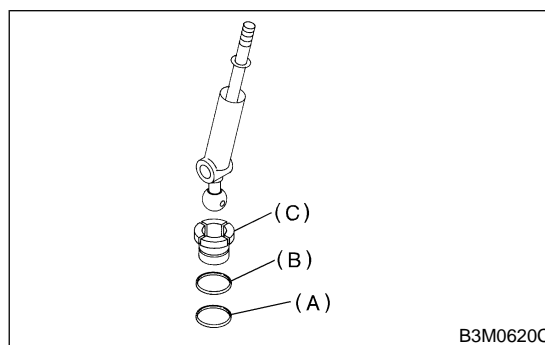
4) Remove boot from gear shift lever.

5) Remove bush and cushion rubber from stay.



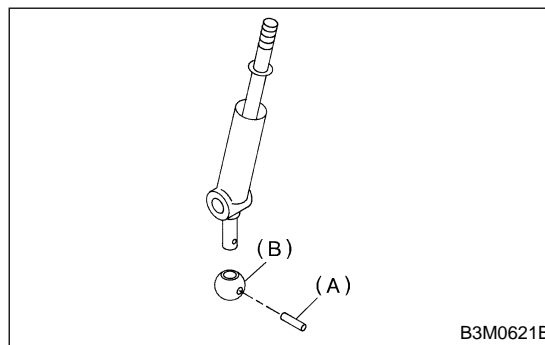
- (A) Bush B
- (B) Stay
- (C) Cushion rubber

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



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

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



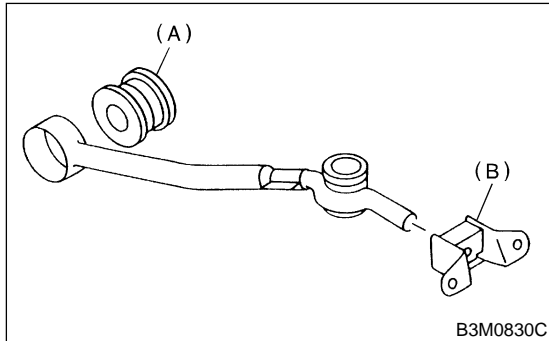
- (A) Straight pin
- (B) Bush C

# MT GEAR SHIFT LEVER

Control Systems

## D: ASSEMBLY S501236A02

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

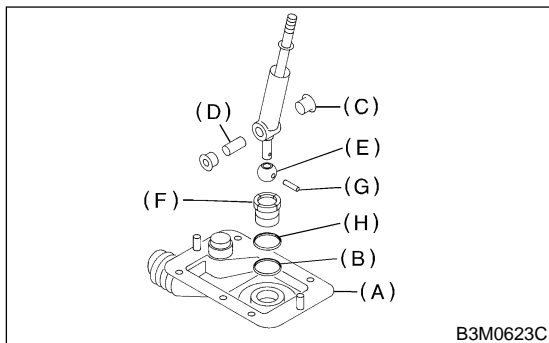


- (A) Bush B
- (B) Cushion rubber

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

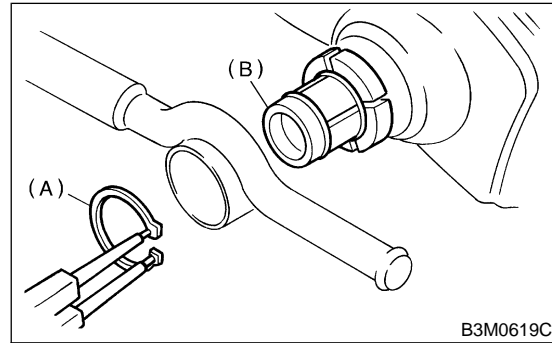
### CAUTION:

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



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

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

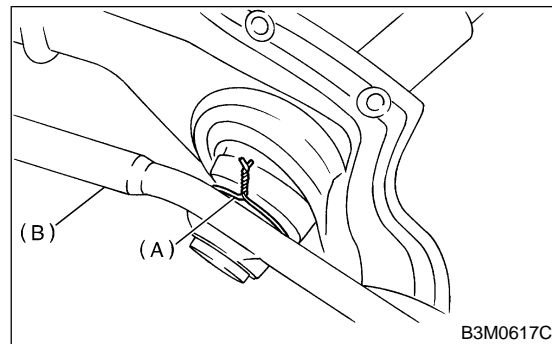


- (A) Snap ring
- (B) Bush D

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

### CAUTION:

Always use new locking wire.

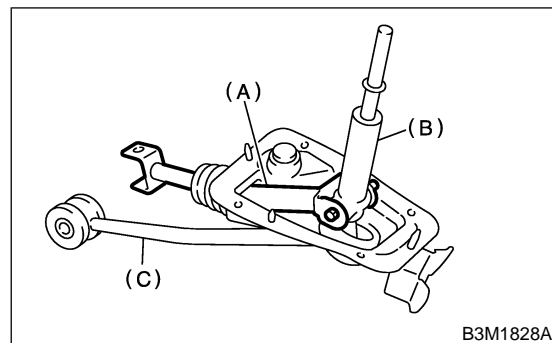


- (A) Locking wire
- (B) Stay

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

### Tightening torque:

11.8 N·m (1.2 kgf·m, 8.7 ft·lb)



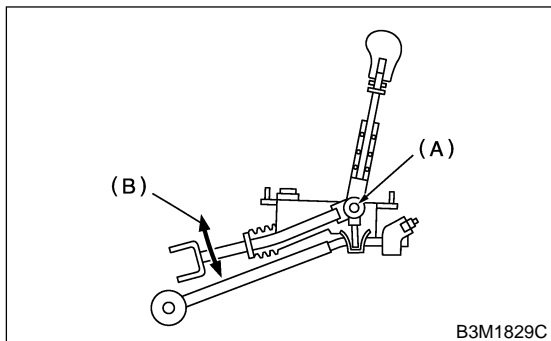
- (A) Rod
- (B) Shift lever
- (C) Stay

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

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

**Rocking torque:**

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



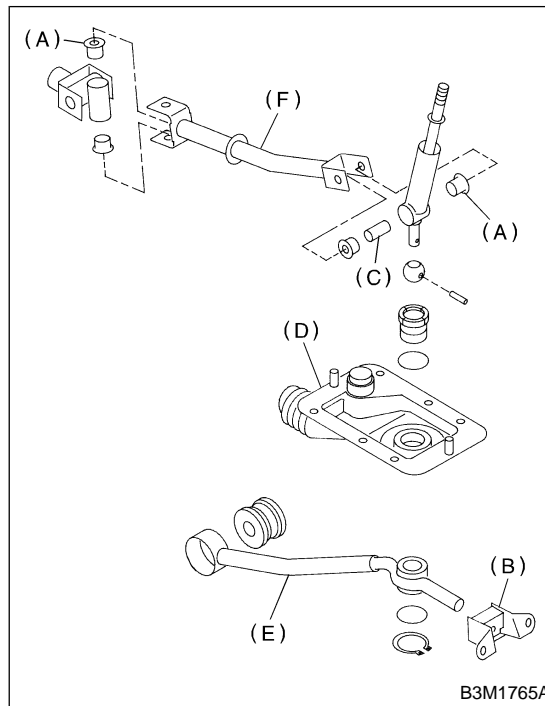
- (A) Center of rotation
- (B) Swing torque

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

## E: INSPECTION

S501236A10

1) 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.



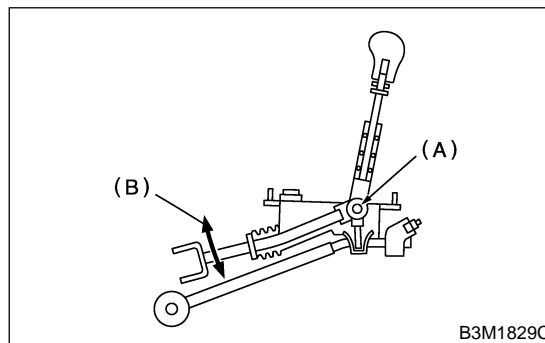
- (A) Bush A
- (B) Cushion rubber
- (C) Spacer
- (D) Boot
- (E) Stay
- (F) Rod

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

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

**Rocking torque:**

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



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

## 9. General Diagnostic S501278

### A: INSPECTION S501278A10

#### 1. SELECT LEVER DOES NOT MOVE FROM "P" POSITION S501278A1001

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

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 1. General Description S503001

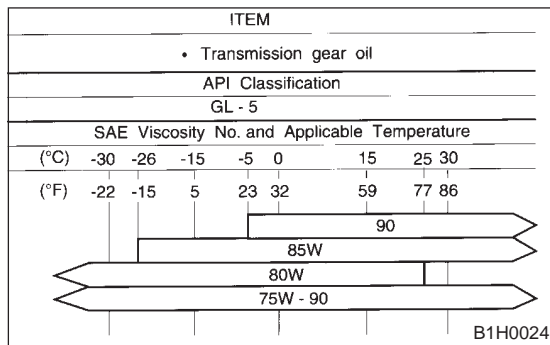
### A: SPECIFICATIONS S503001E49

#### 1. MANUAL TRANSMISSION AND DIFFERENTIAL S503001E4901

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

#### 2. TRANSMISSION GEAR OIL S503001E4902

##### Recommended oil



#### 3. TRANSMISSION CASE ASSEMBLY S503001E4903

Drive pinion shim adjustment  
Hypoid gear backlash  
0.13 — 0.18 mm (0.0051 — 0.0071 in)

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

##### Selection of main shaft rear plate

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



# GENERAL DESCRIPTION

Manual Transmission and Differential

## 4. DRIVE PINION ASSEMBLY S503001E4904

Preload adjustment of thrust bearing

Starting torque

0.3 — 0.8 N·m (0.03 — 0.08 kgf·m, 0.2 — 0.6 ft·lb)

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

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

## 5. REVERSE IDLER GEAR S503001E4905

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance

6.0 — 7.5 mm (0.236 — 0.295 in)

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

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

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

## 6. SHIFTER FORK AND ROD S503001E4906

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

Rod end clearance

A: 1st-2nd — 3rd-4th

0.4 — 1.4 mm (0.016 — 0.055 in)

B: 3rd-4th — 5th

0.5 — 1.3 mm (0.020 — 0.051 in)

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

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

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

## 7. TRANSFER CASE S503001E4907

Neutral position adjustment

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

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

# GENERAL DESCRIPTION

Manual Transmission and Differential

## Reverse check plate adjustment

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

## 8. EXTENSION ASSEMBLY S503001E4908

Thrust washer (50 × 61 × t) to taper roller bearing table rdlr race side clearance  
0.2 — 0.3 mm T (0.0008 — 0.012 in T)

NOTE:  
T: Tight

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

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

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

## 9. FRONT DIFFERENTIAL S503001E4909

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

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

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

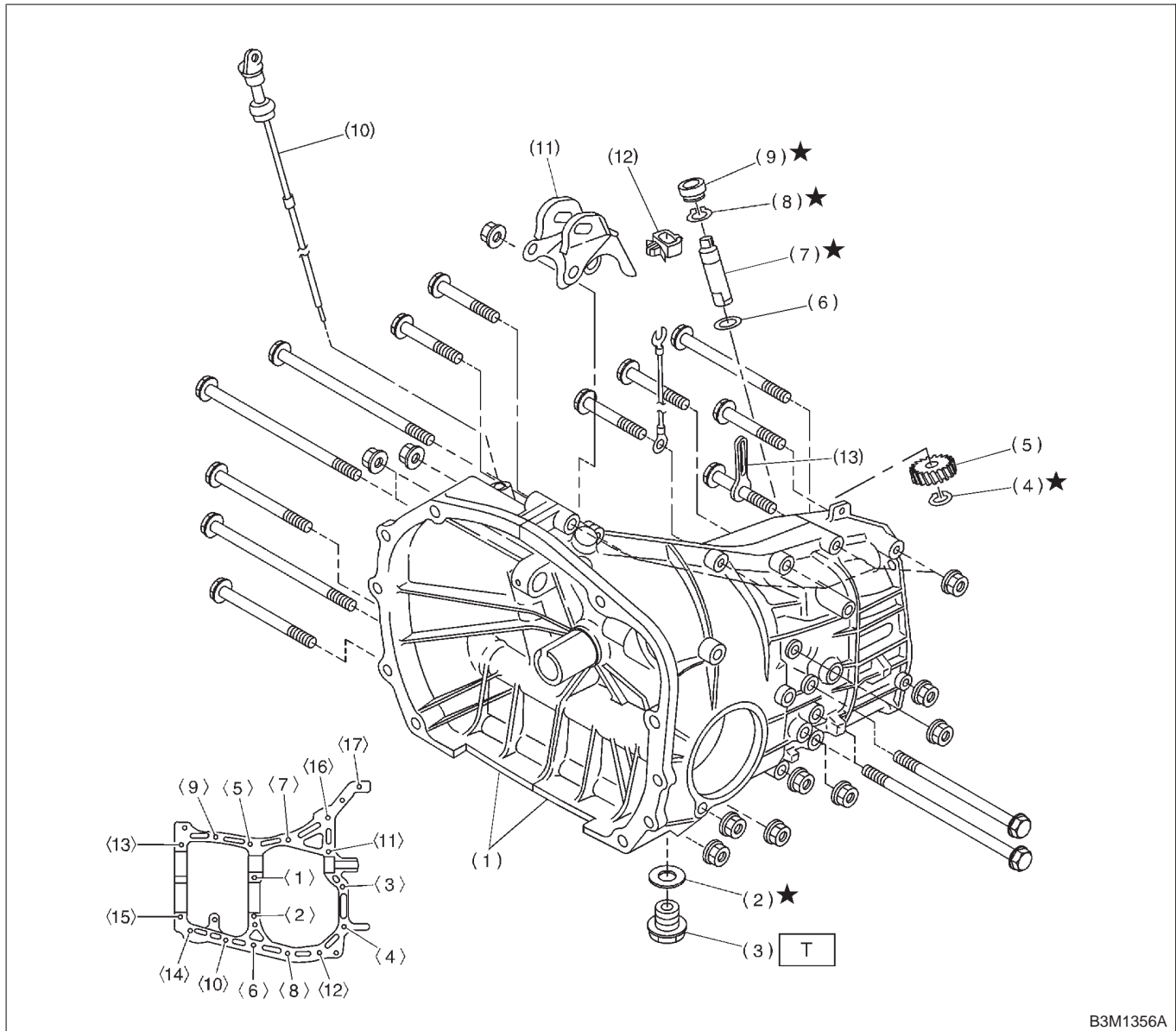
Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

# GENERAL DESCRIPTION

Manual Transmission and Differential

## B: COMPONENT S503001A05

### 1. TRANSMISSION CASE S503001A0501



B3M1356A

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

(13) Clip

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

**T: 44 (4.5, 32.5)**

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

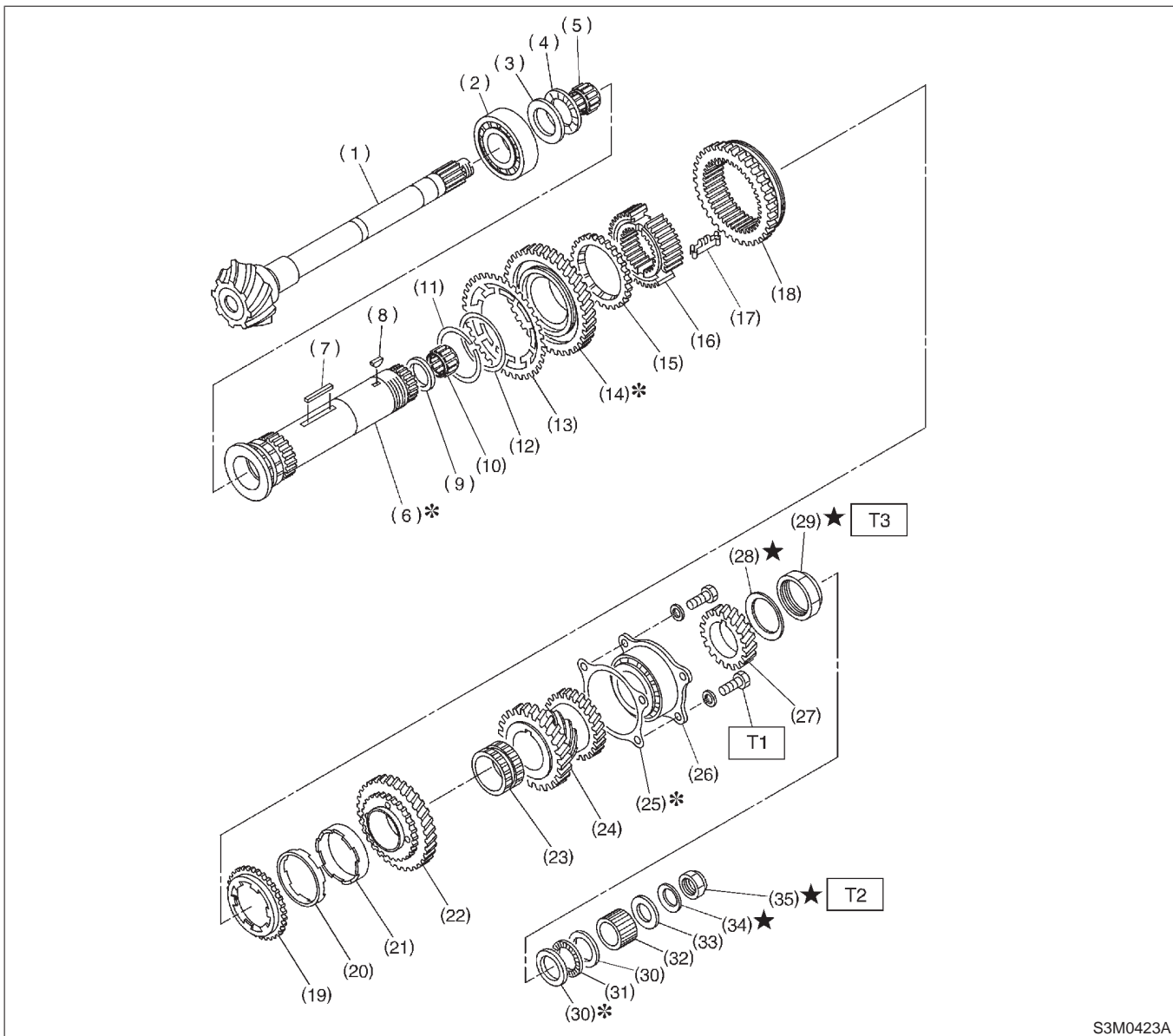
MT-5

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 2. DRIVE PINION ASSEMBLY

S503001A0502



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 (kgf-m, ft-lb)**

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

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

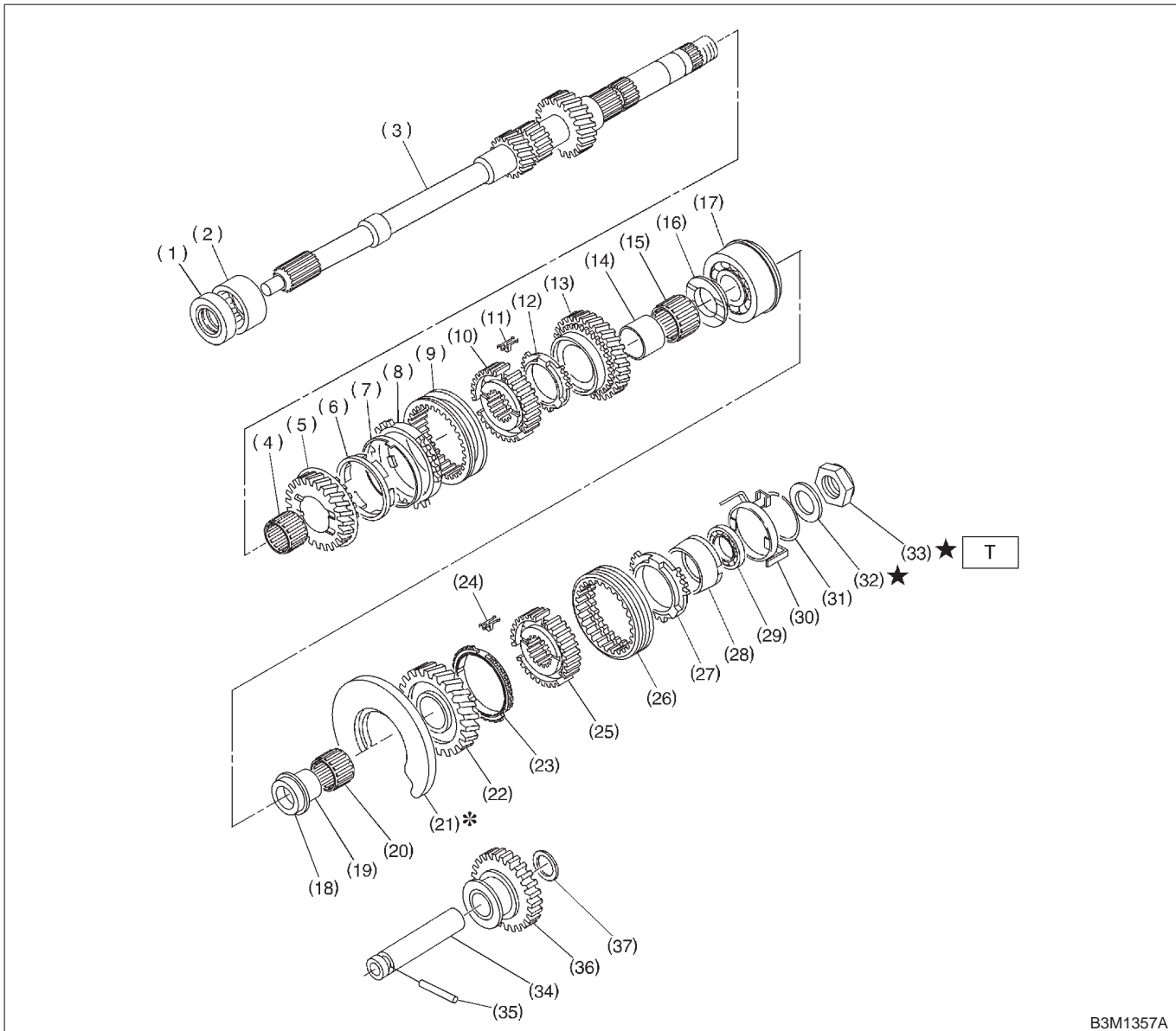
**T3: 265 (27, 195)**

MT-6

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 3. MAIN SHAFT ASSEMBLY S502001A0503



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 (kgf-m, ft-lb)**  
**T: 118 (12.0, 86.8)**

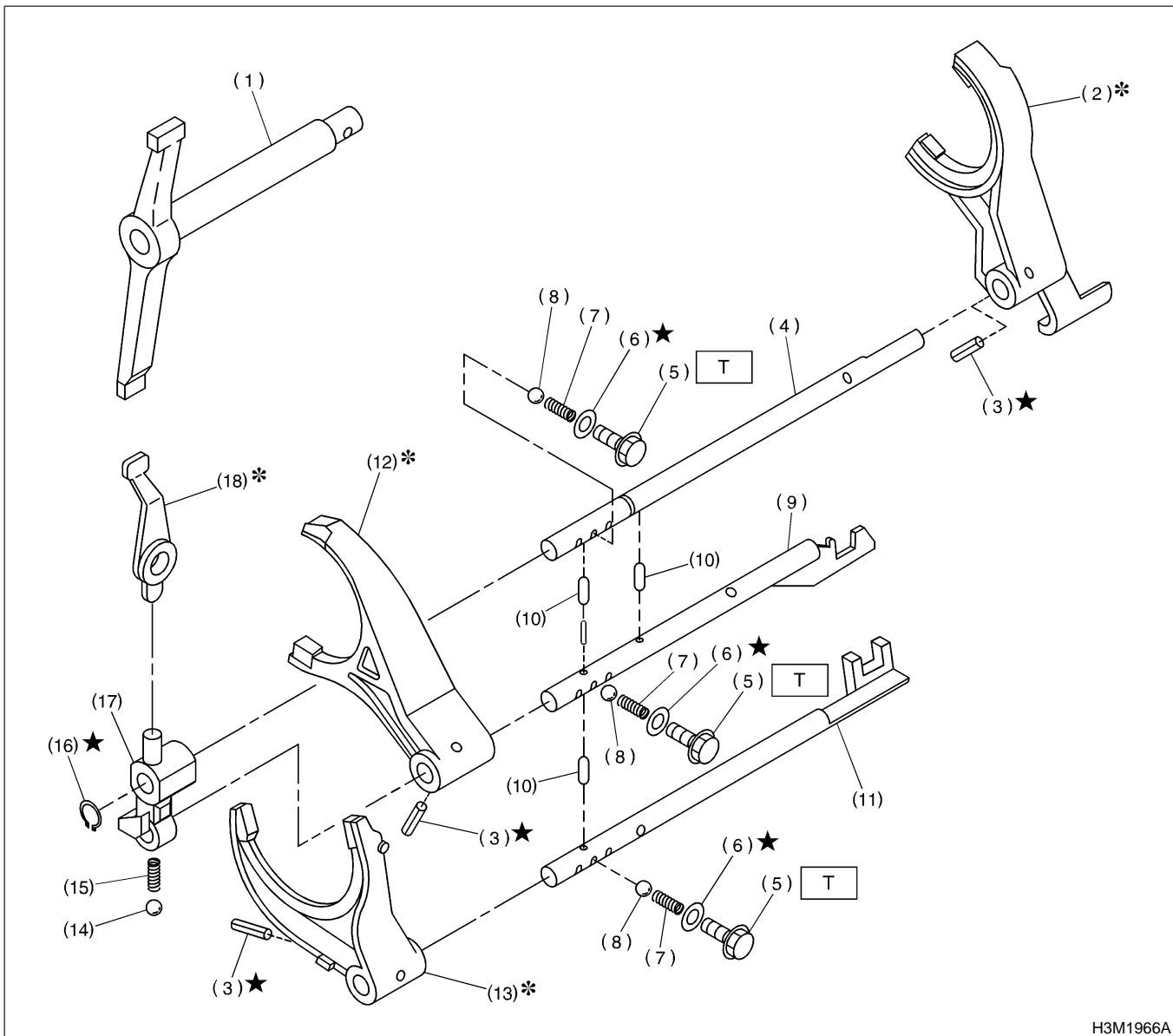
MT-7

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 4. SHIFTER FORK AND SHIFTER ROD

S503001A0504



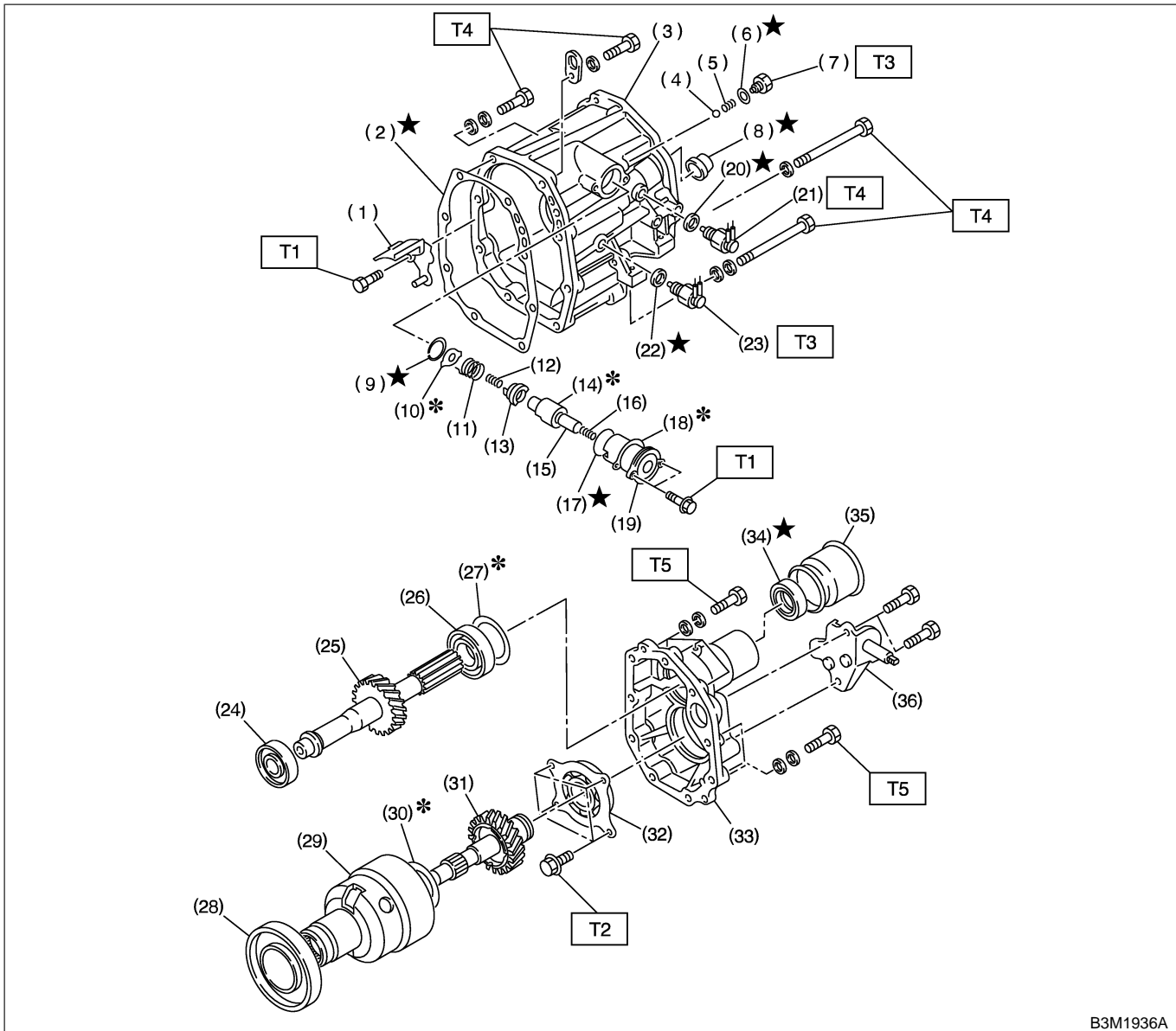
H3M1966A

- |                          |                           |                            |
|--------------------------|---------------------------|----------------------------|
| (1) Shifter arm          | (9) 3rd-4th fork rod      | (17) Reverse fork rod arm  |
| (2) 5th shifter fork     | (10) Interlock plunger    | (18) Reverse shifter lever |
| (3) Straight pin         | (11) 1st-2nd fork rod     |                            |
| (4) Reverse fork rod     | (12) 3rd-4th shifter fork |                            |
| (5) Checking ball plug   | (13) 1st-2nd shifter fork |                            |
| (6) Gasket               | (14) Ball                 |                            |
| (7) Checking ball spring | (15) Spring               |                            |
| (8) Ball                 | (16) Snap ring (Outer)    |                            |

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

## 5. TRANSFER CASE AND EXTENSION

S503001A0505



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

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

**T1: 6.4 (0.65, 4.7)**

**T2: 8.8 (0.9, 6.5)**

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

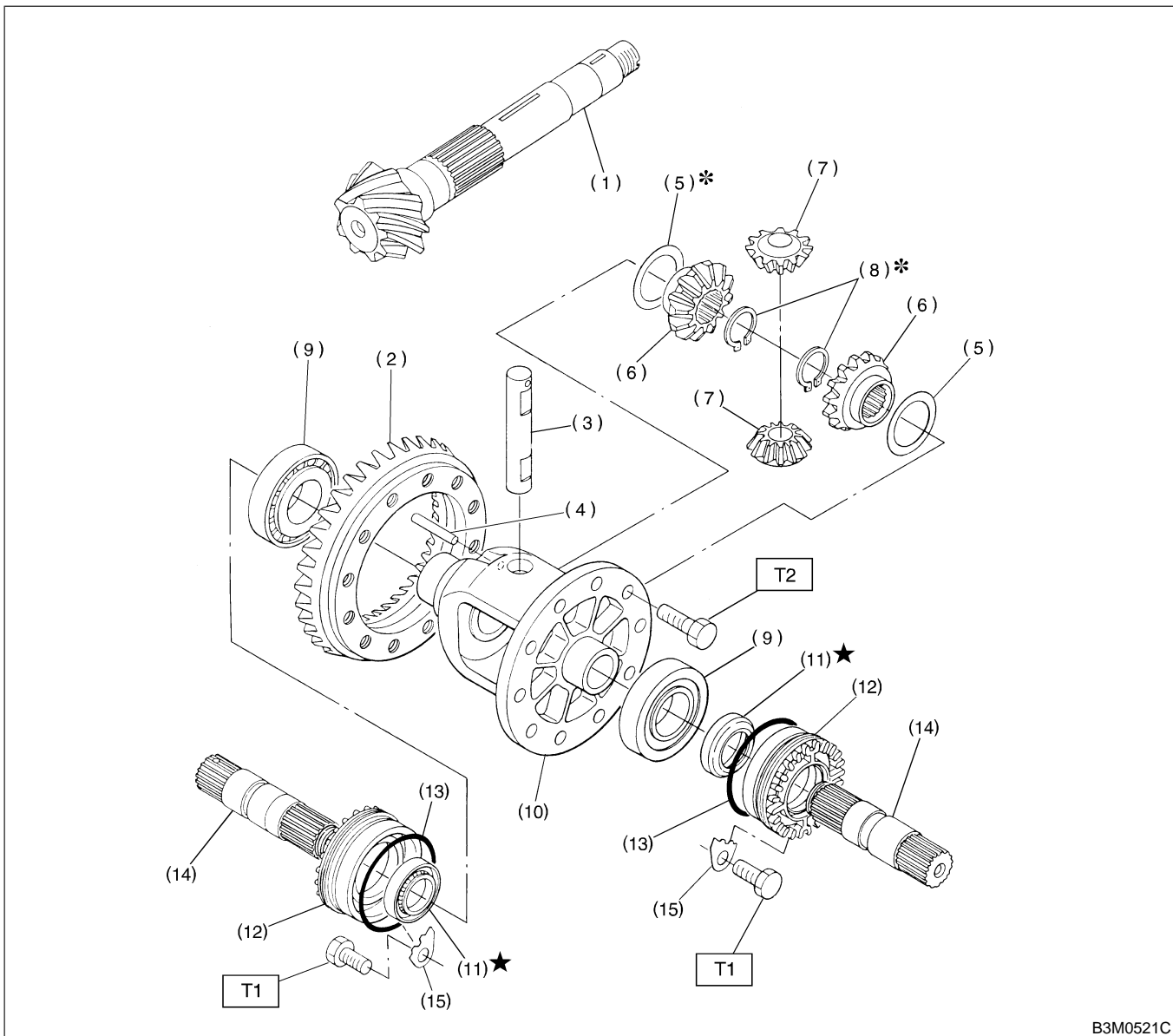
**T4: 25 (2.5, 18.1)**

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

# GENERAL DESCRIPTION

Manual Transmission and Differential

## 6. FRONT DIFFERENTIAL S503001A0506



B3M0521C

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

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

- (15) Retainer lock plate

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

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

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

**MT-10**

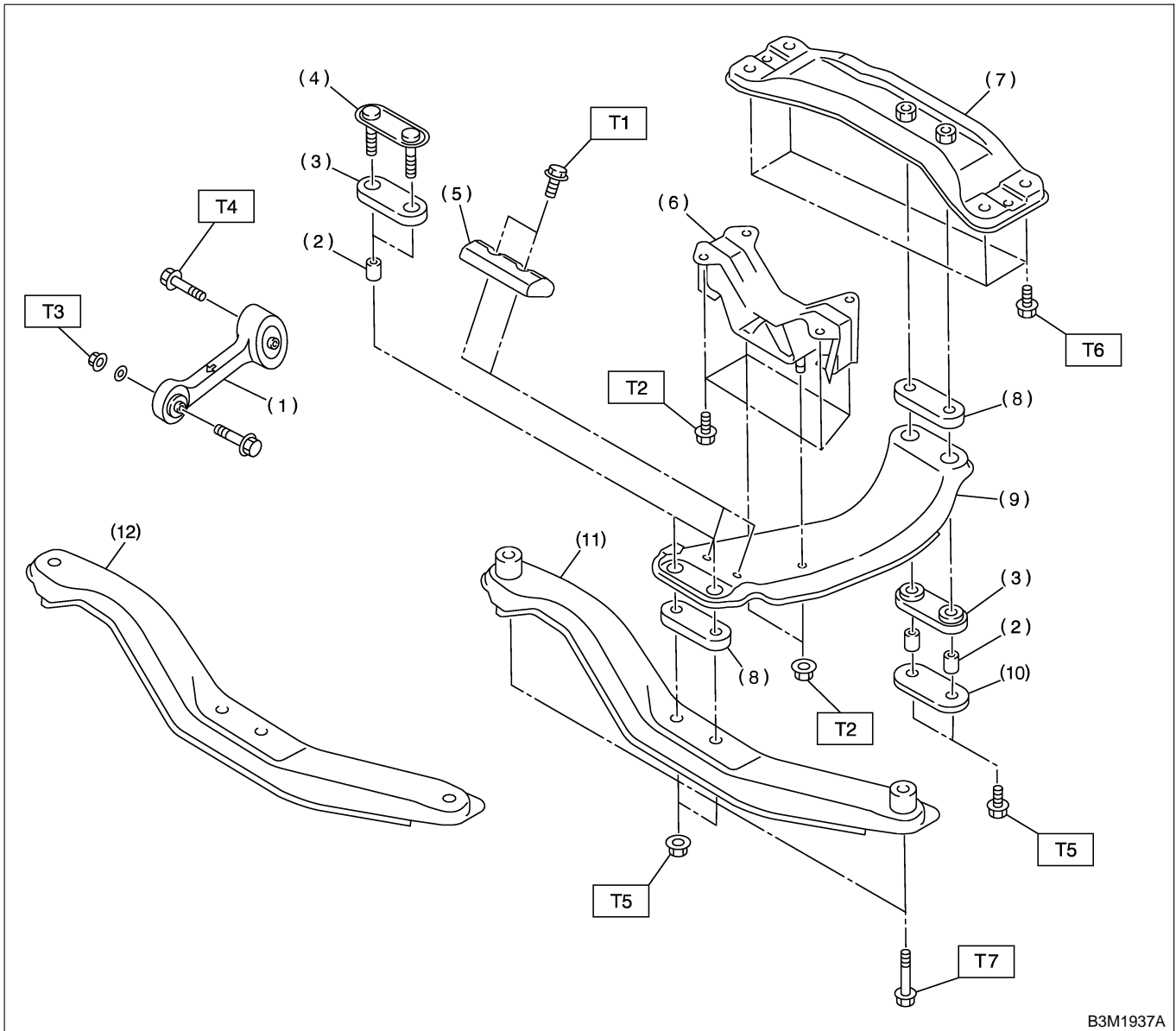


# GENERAL DESCRIPTION

Manual Transmission and Differential

## 7. TRANSMISSION MOUNTING

S503001A0507



B3M1937A

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

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

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

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

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

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

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

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

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

MT-11

# GENERAL DESCRIPTION

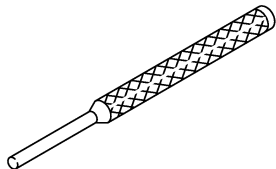
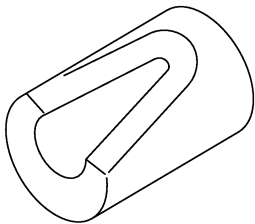
## C: CAUTION S503001A03

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

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

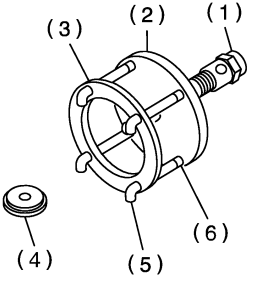
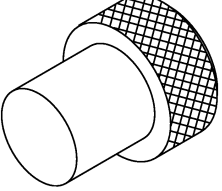
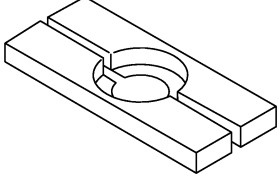
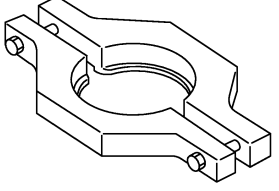
## D: PREPARATION TOOL S503001A17

### 1. SPECIAL TOOLS S503001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1938</p>	398791700	REMOVER II	Used for removing and installing spring pin (6 mm).
 <p style="text-align: center;">B3M1939</p>	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.

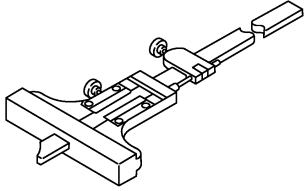
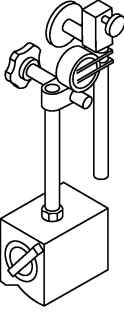
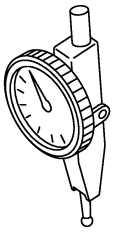
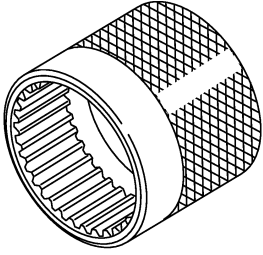
# GENERAL DESCRIPTION

Manual Transmission and Differential

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

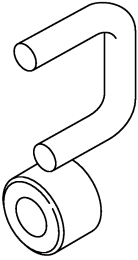
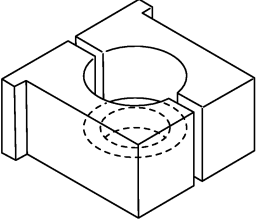
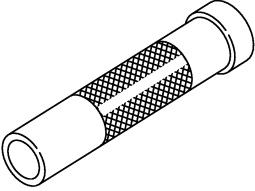
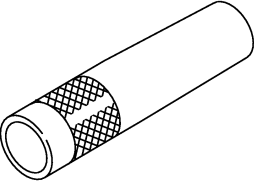
# GENERAL DESCRIPTION

Manual Transmission and Differential

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

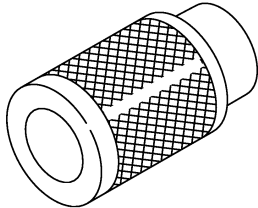
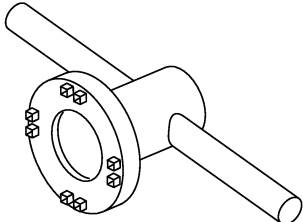
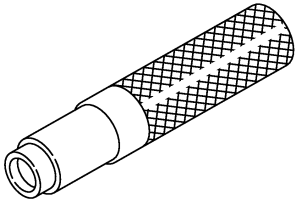
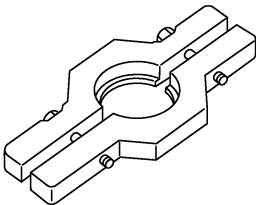
# GENERAL DESCRIPTION

Manual Transmission and Differential

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

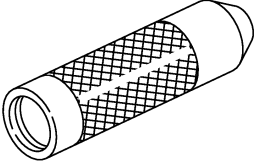
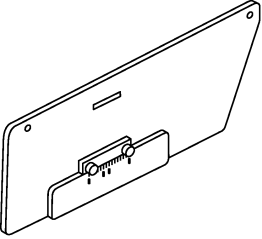
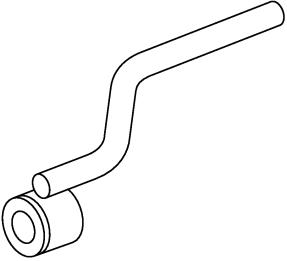
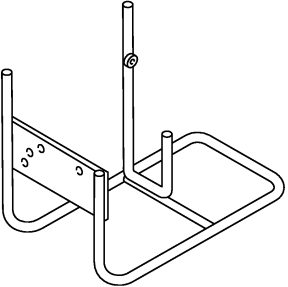
# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1952</p>	499757002	SNAP RING PRESS	Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17).
 <p style="text-align: center;">B3M1953</p>	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 <p style="text-align: center;">B3M1954</p>	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 <p style="text-align: center;">B3M1955</p>	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.

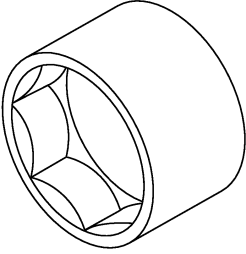
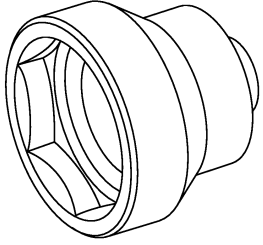
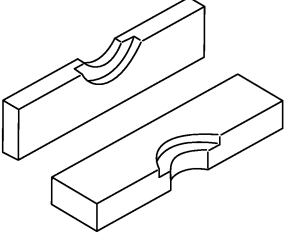
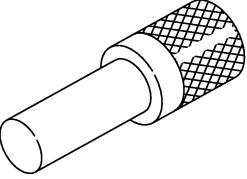
# GENERAL DESCRIPTION

Manual Transmission and Differential

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

# GENERAL DESCRIPTION

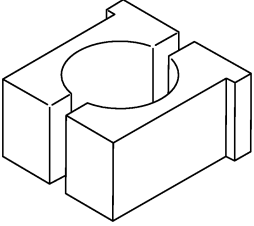
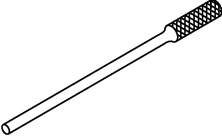
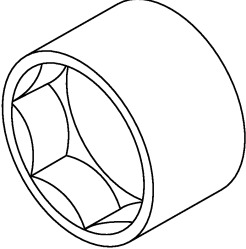
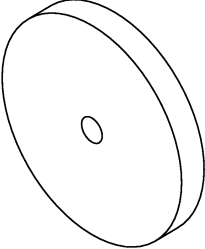
Manual Transmission and Differential

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



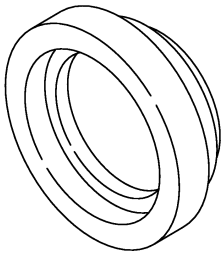
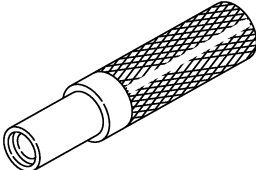
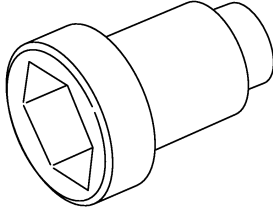
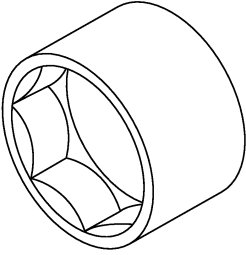
# GENERAL DESCRIPTION

Manual Transmission and Differential

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

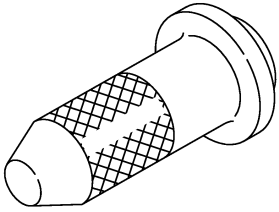
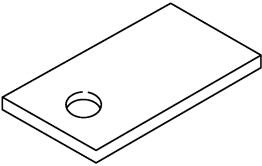
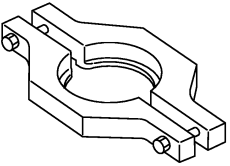
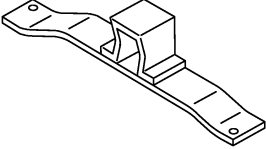
# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1968</p>	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 <p style="text-align: center;">B3M1969</p>	899824100	PRESS	Used for installing speedometer shaft oil seal.
 <p style="text-align: center;">B3M1970</p>	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 <p style="text-align: center;">B3M1971</p>	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.

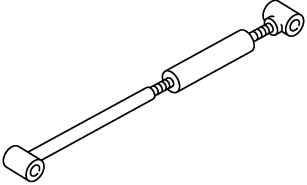
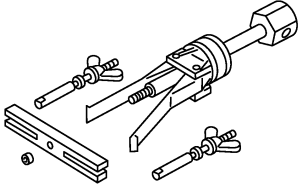
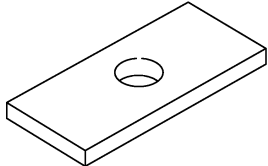
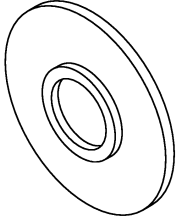
# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1972</p>	498057300	INSTALLER	Used for installing extension oil seal.
 <p style="text-align: center;">B3M1973</p>	498255400	PLATE	Used for measuring backlash.
 <p style="text-align: center;">B3M1974</p>	498077400	SYNCHRONIZER CONE REMOVER	Used for removing synchronizer cone of main shaft.
 <p style="text-align: center;">B3M1975</p>	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.

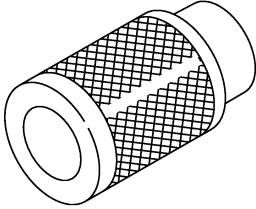
# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">B3M1976</p>	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 <p style="text-align: center;">B3M1977</p>	398527700	PULLER ASSY	Used for removing and installing extension case roller bearing.
 <p style="text-align: center;">B3M1978</p>	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 <p style="text-align: center;">B3M1905</p>	38177700	INSTALLER	Used for installing bearing cone of transfer driven gear (transfer case side).

# GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
  B3M1952	499757002	INSTALLER	Used for installing bearing cone of transfer driven gear (extension case side).

## 2. GENERAL PURPOSE TOOLS S503001A1702

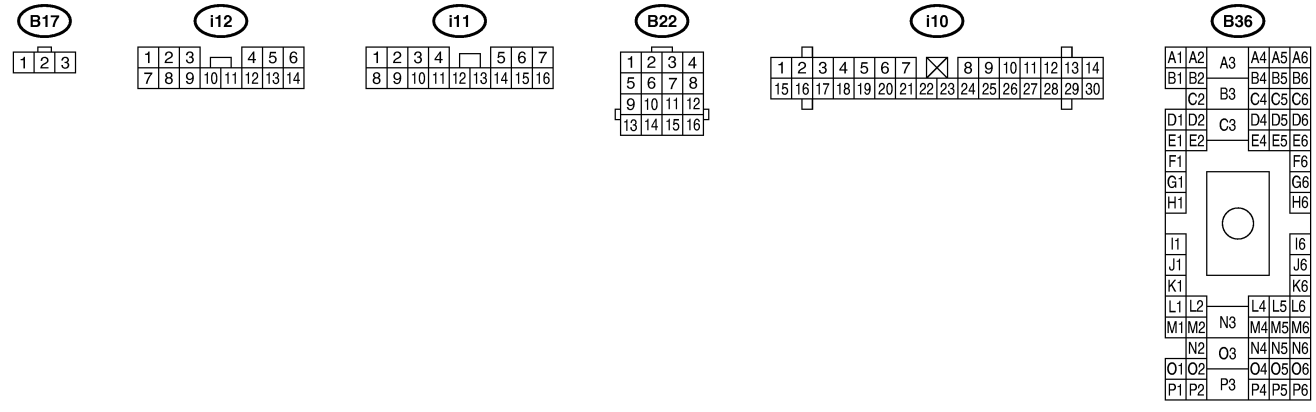
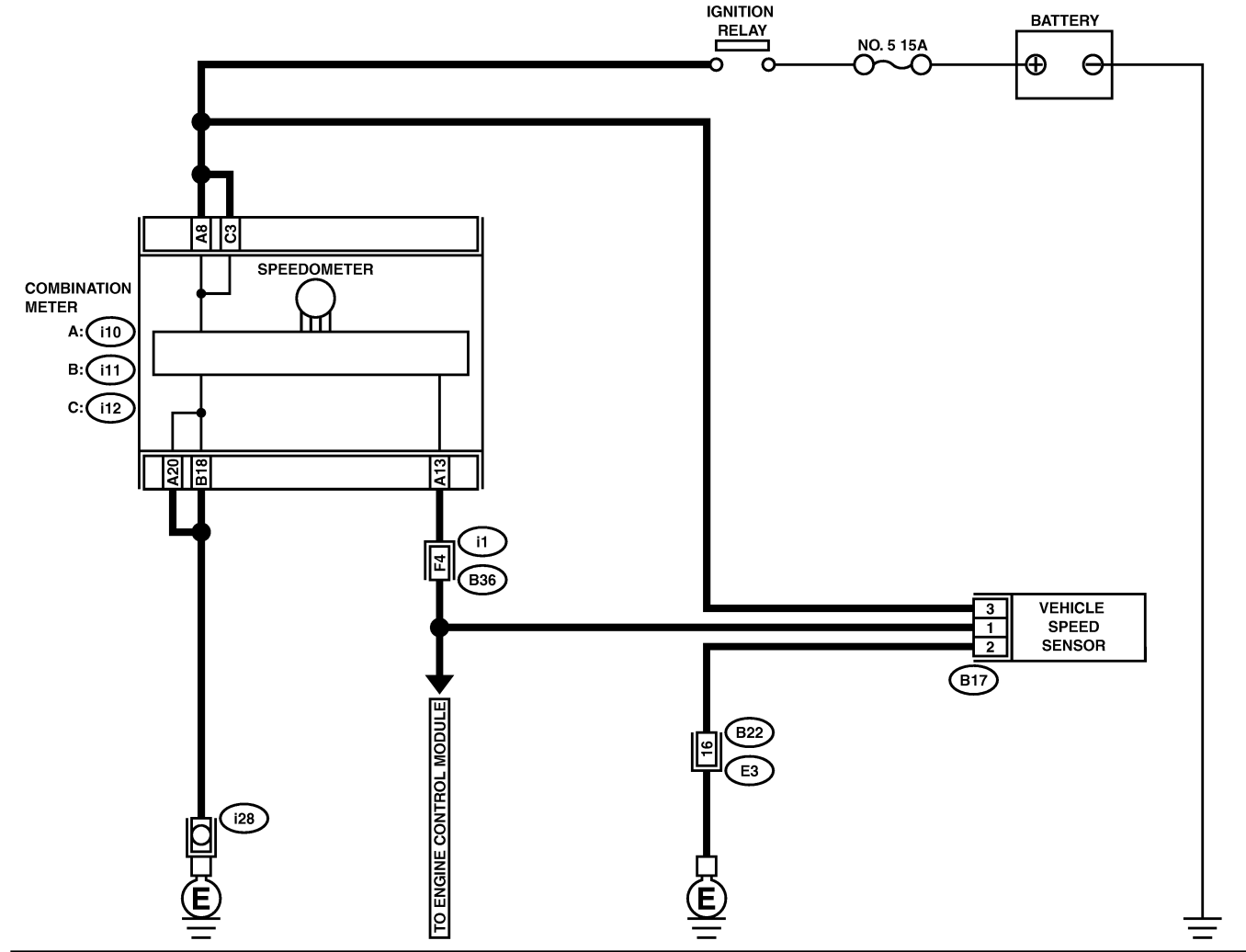
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.

# SPEEDOMETER SYSTEM

Manual Transmission and Differential

## 2. Speedometer System S503220

### A: SCHEMATIC S503220A21



B3M1979

# SPEEDOMETER SYSTEM

Manual Transmission and Differential

## B: INSPECTION S503220A10

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN BATTERY AND VEHICLE SPEED SENSOR.</b> 1) Disconnect connector from vehicle speed sensor. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between vehicle speed sensor and chassis ground. <b>Connector &amp; terminal</b> <b>(B17) No. 3 (+) — Chassis ground (-):</b>	Is the voltage more than 10 V?	Go to step 2.	Repair harness connector between battery and vehicle speed sensor.
2	<b>CHECK HARNESS CONNECTOR BETWEEN VEHICLE SPEED SENSOR AND ENGINE GROUND.</b> 1) Turn ignition switch to OFF. 2) Measure resistance between vehicle speed sensor and engine ground. <b>Connector &amp; terminal</b> <b>(B17) No. 2 — Engine ground:</b>	Is the resistance less than 10 Ω?	Go to step 3.	Repair harness connector between vehicle speed sensor and engine ground.
3	<b>CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND VEHICLE SPEED SENSOR.</b> 1) Disconnect connector combination meter. 2) Measure resistance between combination meter and vehicle speed sensor. <b>Connector &amp; terminal</b> <b>(B17) No. 1 — (i10) No. 13:</b>	Is the resistance less than 10 Ω?	Go to step 4.	Repair harness connector between combination meter and vehicle speed sensor.
4	<b>CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND VEHICLE SPEED SENSOR.</b> Measure resistance between vehicle speed sensor and chassis ground. <b>Connector &amp; terminal</b> <b>(B17) No. 1 — Chassis ground:</b>	Is the resistance less than 1 MΩ ?	Go to step 5.	Repair harness connector between combination meter and vehicle speed sensor.
5	<b>CHECK VEHICLE SPEED SENSOR.</b> 1) Connect connector to vehicle speed sensor and combination meter. 2) Set the vehicle on flee roller, or lift-up the vehicle and support with safety stands. <b>WARNING:</b> <b>Be careful not to be caught up by the running wheels.</b> 3) Set oscilloscope to vehicle speed sensor terminal. Positive probe; (B17) No. 1 Earth lead; (B17) No. 2 4) Drive the vehicle at speed greater than 20 km /h (12 MPH). 5) Measure signal voltage indicated on oscilloscope.	Is the voltage more than 5 V?	Go to step 6.	Replace the vehicle speed sensor.
6	<b>CHECK COMBINATION METER.</b> Inspect combination meter. <Ref. to IDI-10 INSPECTION, Combination Meter System.>	Is the combination meter normal?	Go to step 7.	Repair or replace the combination meter.
7	<b>CHECK POOR CONTACT.</b>	Is there poor contact in speedometer system circuit?	Repair poor contact.	Repair harness and connector.

## 3. Transmission Gear Oil S503219

### A: REPLACEMENT S503219A20

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

#### CAUTION:

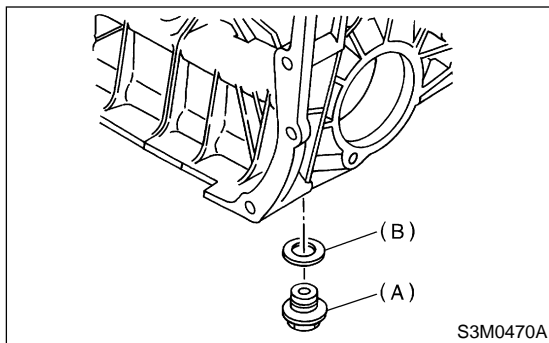
Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.

#### NOTE:

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

#### Tightening torque:

**44 N·m (4.5 kgf-m, 32.5 ft-lb)**



- (A) Drain plug  
(B) Gasket

- 3) Pour gear oil into the gauge hole.

#### Recommended gear oil:

**Use GL-5 or equivalent.**

#### Gear oil capacity:

**3.5 ℓ (3.7 US qt, 3.1 Imp qt)**

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

#### CAUTION:

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

#### NOTE:

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



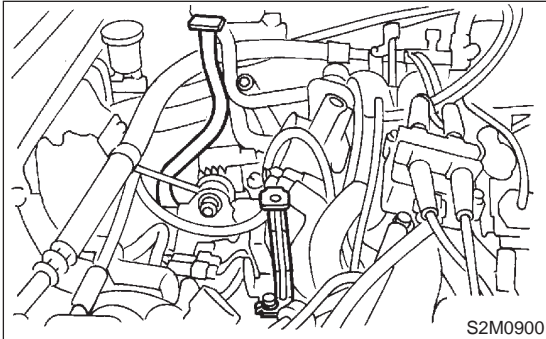
## 4. Manual Transmission Assembly

S503224

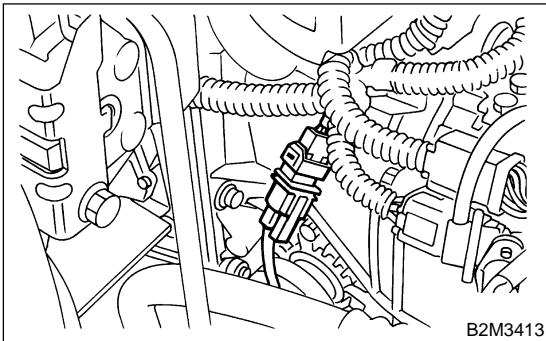
### A: REMOVAL

S503224A18

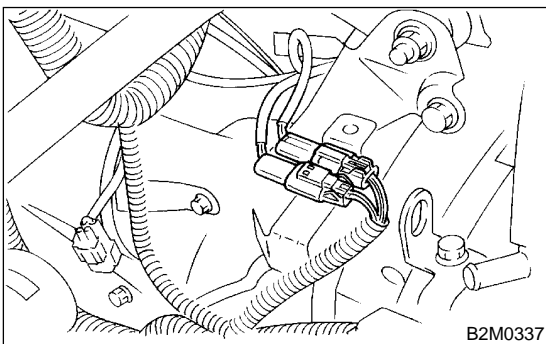
- 1) Open front hood fully, and support with stay.
- 2) Disconnect battery ground terminal.
- 3) Remove air intake duct and cleaner case.
- 4) Remove air cleaner case stay.



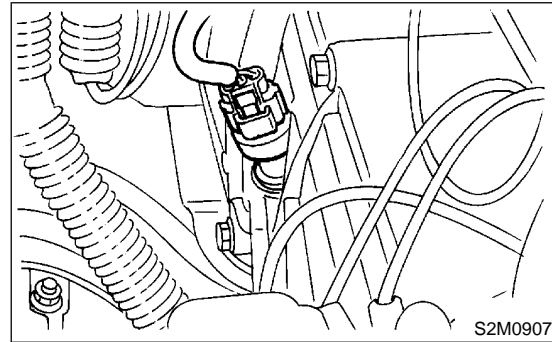
- 5) Disconnect the following connectors.
  - (1) Front oxygen sensor connector



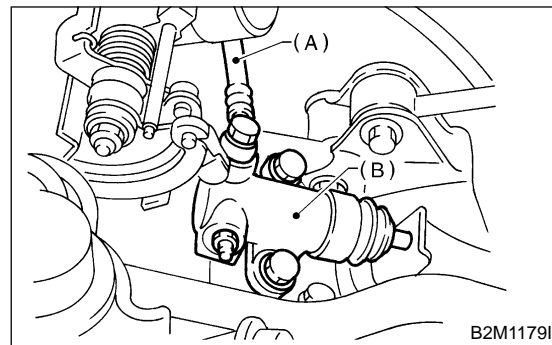
- (2) Neutral position switch connector
- (3) Back-up light switch connector



- (4) Vehicle speed sensor

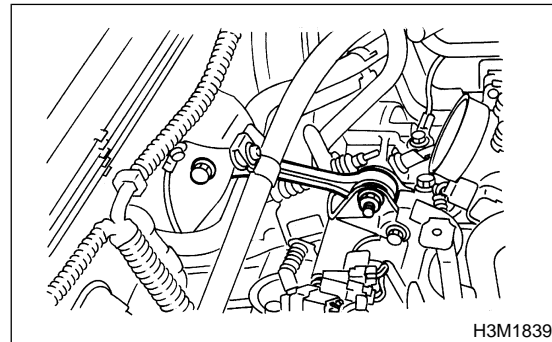


- 6) Remove starter. <Ref. to SC(H4)-7 REMOVAL, Starter.>
- 7) Remove operating cylinder from transmission.



- (A) Clutch hose
- (B) Operating cylinder

- 8) Remove pitching stopper.



# MANUAL TRANSMISSION ASSEMBLY

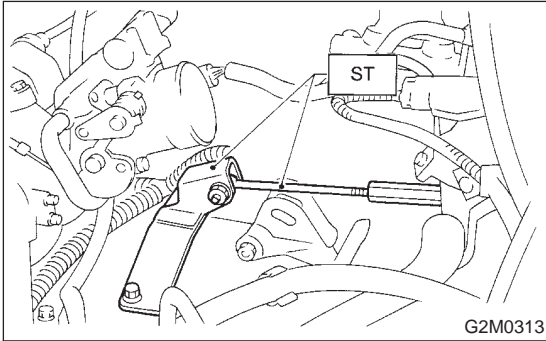
Manual Transmission and Differential

9) Set ST.

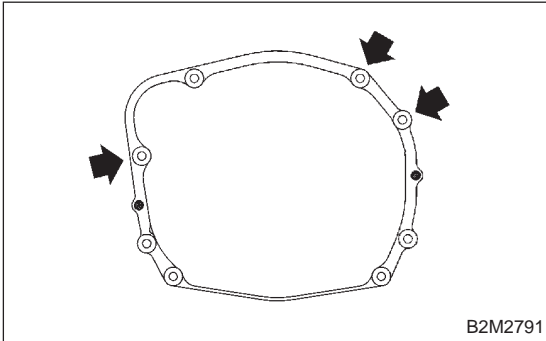
NOTE:

Also is available Part No. 927670000.

ST 41099AA020 ENGINE SUPPORT ASSY

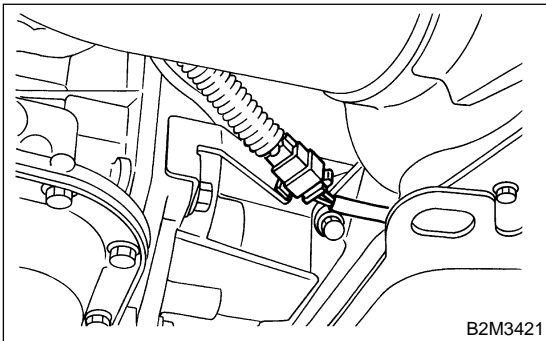


10) Remove bolt which holds right upper side of transmission to engine.



11) Remove under cover.

12) Remove rear oxygen sensor connector from bracket.



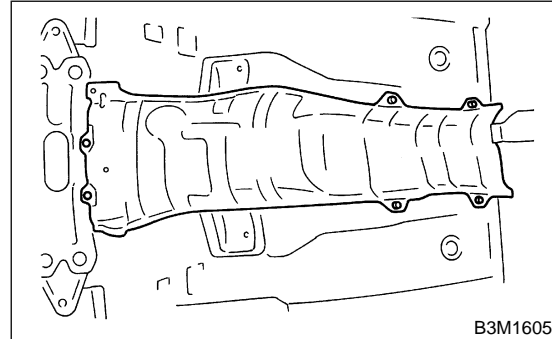
13) Remove front and center exhaust pipes.

14) Remove rear exhaust pipe and muffler.

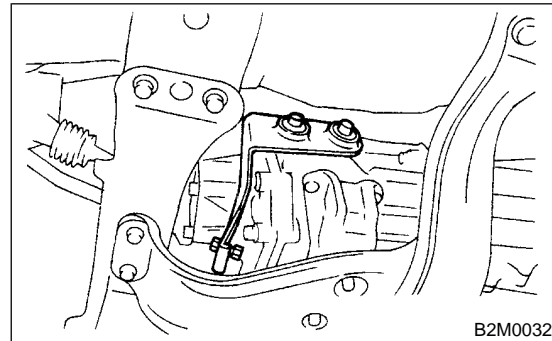
**CAUTION:**

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

15) Remove heat shield cover.



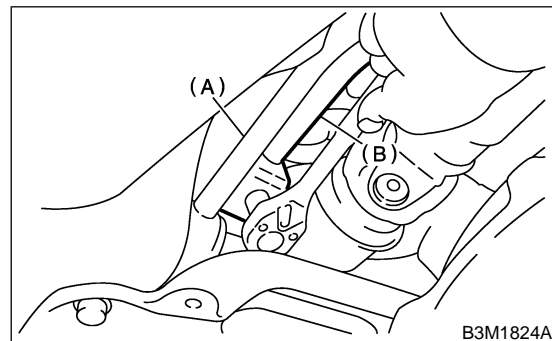
16) Remove hanger bracket from right side of transmission.



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

18) Remove gear shift rod and stay from transmission.

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

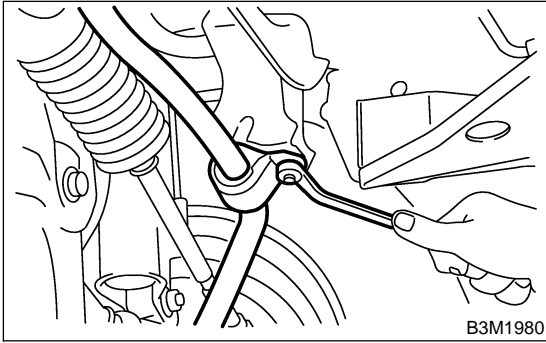


- (A) Stay  
(B) Rod

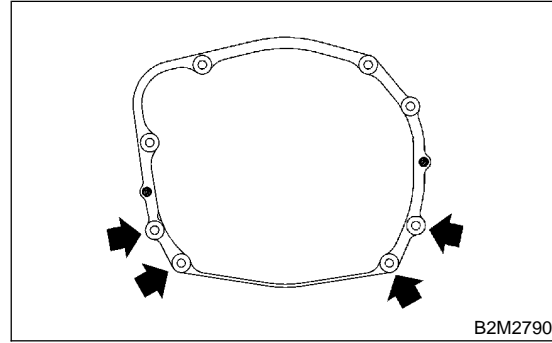
# MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

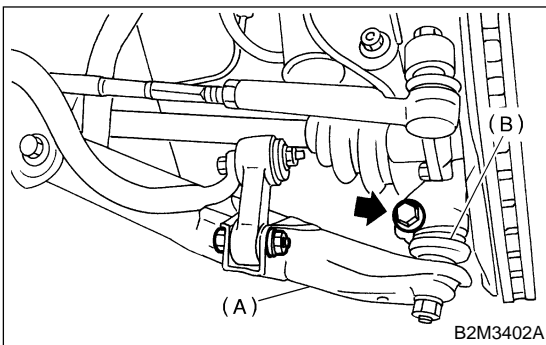
19) Remove bolts which install stabilizer clamps onto crossmember.



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



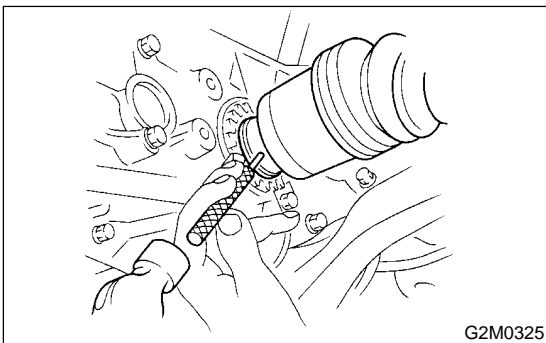
20) Remove front drive shafts from transmission.  
(1) Remove transverse link from housing.



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

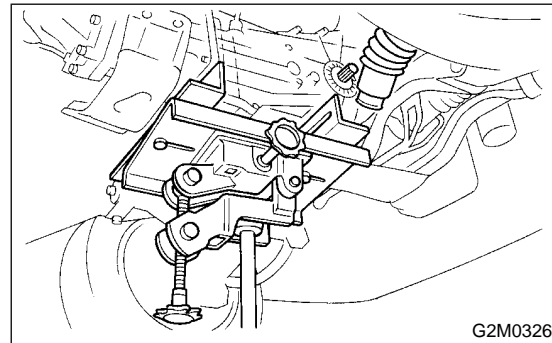
(2) Lower transverse link.  
(3) Remove spring pins and separate front drive shafts from each side of the transmission.

**CAUTION:**  
Discard removing spring pin. Replace with a new one.

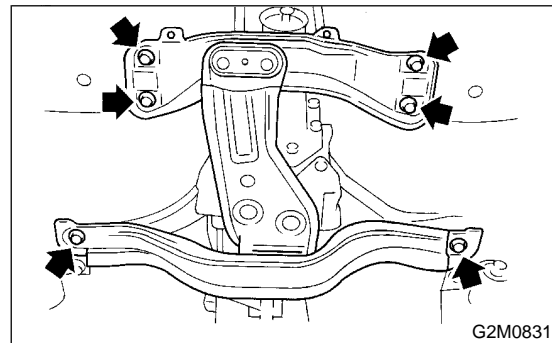


22) Place transmission jack under transmission.

**CAUTION:**  
Always support transmission case with a transmission jack.



23) Remove transmission rear crossmember from vehicle.



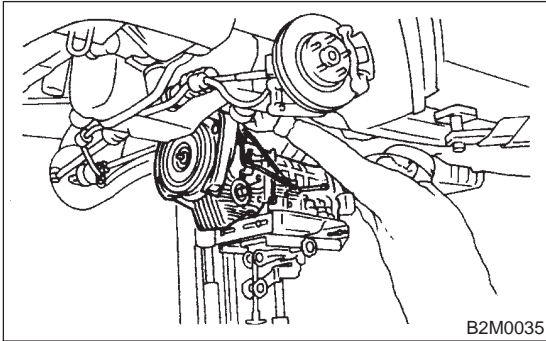
# MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

24) Remove transmission.

## CAUTION:

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



25) Separate transmission assembly and rear cushion rubber.

## B: INSTALLATION

S503224A11

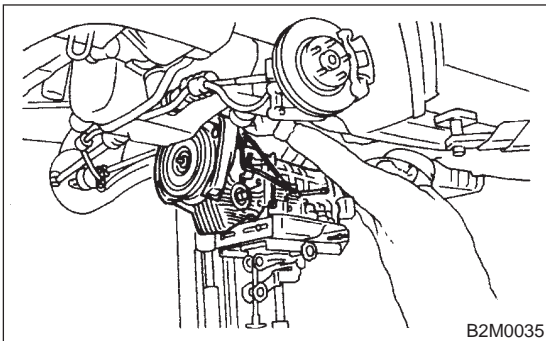
1) Install rear cushion rubber to transmission assembly.

### Tightening torque:

**34 N·m (3.5 kgf-m, 25.3 ft-lb)**

2) Install transmission onto engine.

(1) Gradually raise transmission with transmission jack.



(2) Engage them at splines.

## CAUTION:

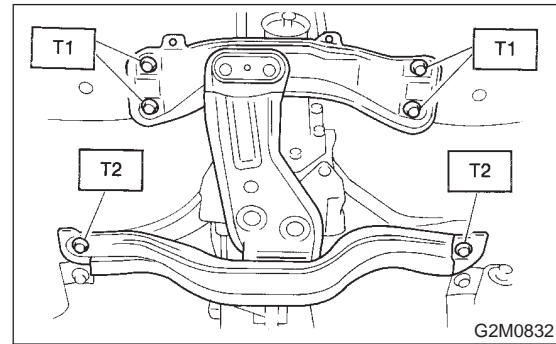
Be careful not to strike main shaft against clutch cover.

3) Install transmission rear crossmember.

### Tightening torque:

**T1: 70 N·m (7.1 kgf-m, 51 ft-lb)**

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

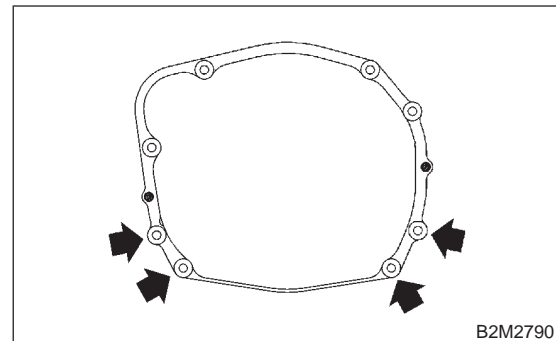


4) Take off transmission jack.

5) Tighten nuts which hold lower side of transmission to engine.

### Tightening torque:

**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



6) Connect engine and transmission.

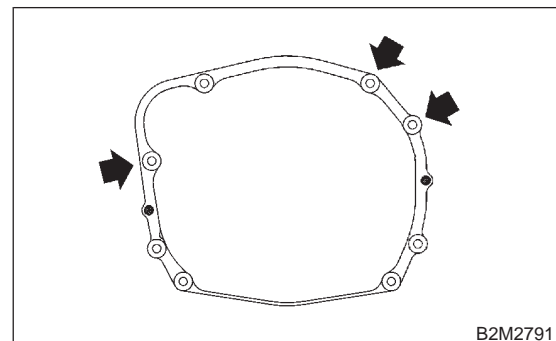
(1) Install starter.

<Ref. to SC(H4)-8 INSTALLATION, Starter.>

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

### Tightening torque:

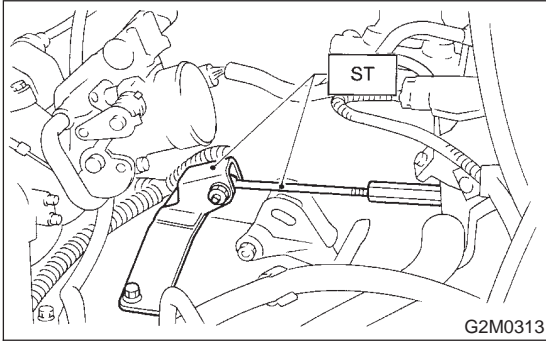
**50 N·m (5.1 kgf-m, 36.9 ft-lb)**



# MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

7) Remove ST.

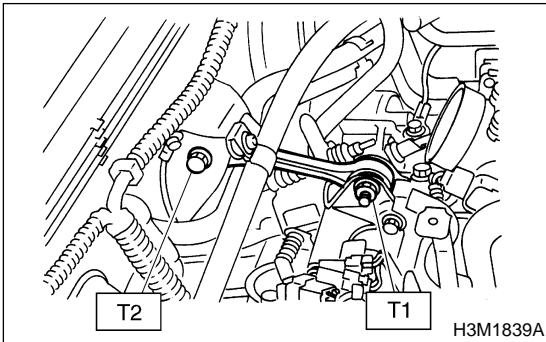


8) Install pitching stopper.

**Tightening torque:**

**T1: 50 N·m (5.1 kgf-m, 37 ft-lb)**

**T2: 58 N·m (5.9 kgf-m, 43 ft-lb)**

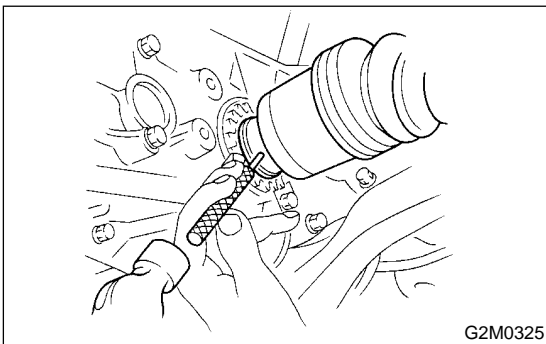


9) Install front drive shafts into transmission.

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

**CAUTION:**

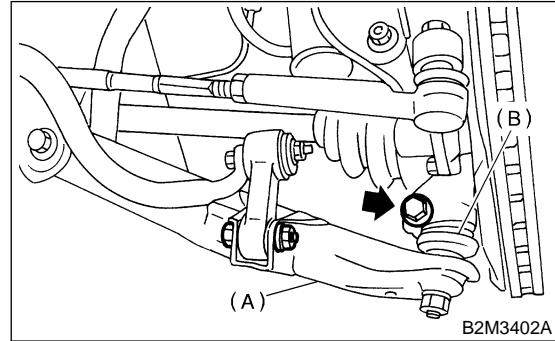
**Always use a new spring pin.**



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

**Tightening torque:**

**49 N·m (5.0 kgf-m, 36 ft-lb)**

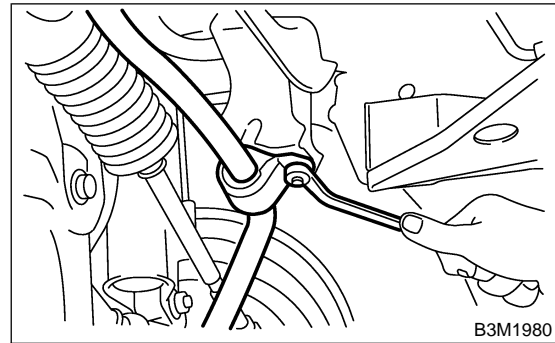


- (A) Transverse link  
(B) Ball joint

10) Install stabilizer clamps onto front crossmember.

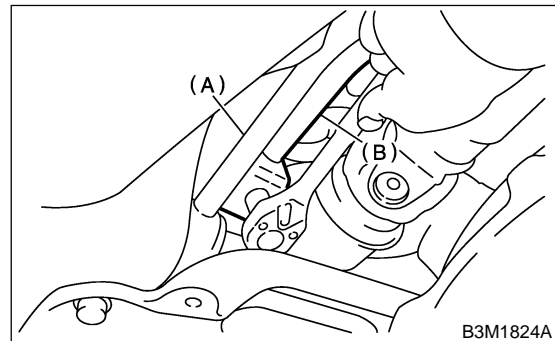
**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



11) Install gear shift rod and stay.

- (1) Install gear shift rod onto transmission.



- (A) Stay  
(B) Rod

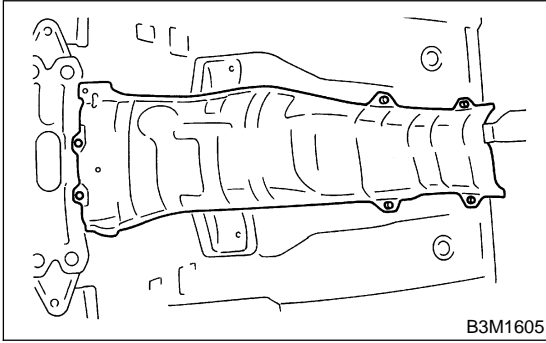
- (2) Install stay onto transmission.
- (3) Install spring.

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

# MANUAL TRANSMISSION ASSEMBLY

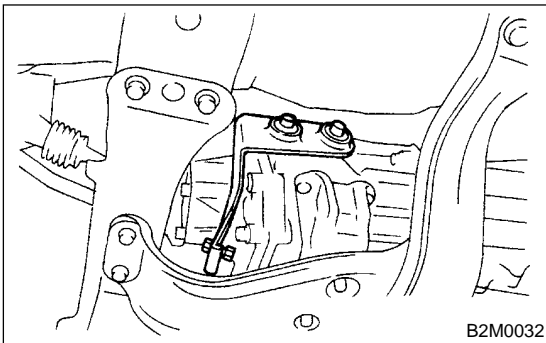
Manual Transmission and Differential

13) Install heat shield cover.

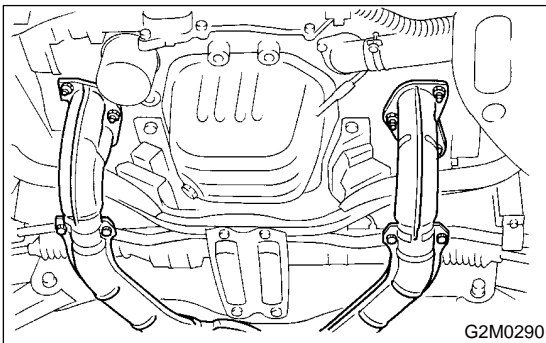


14) Install rear exhaust pipe and muffler.

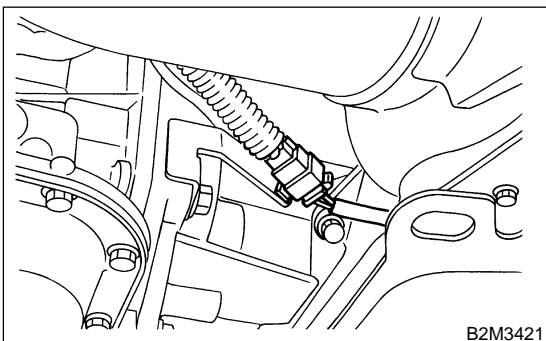
15) Install hanger bracket on right side of transmission.



16) Install front exhaust pipe and center exhaust pipe.



17) Connect rear oxygen sensor connector, and install rear oxygen sensor connector to bracket.

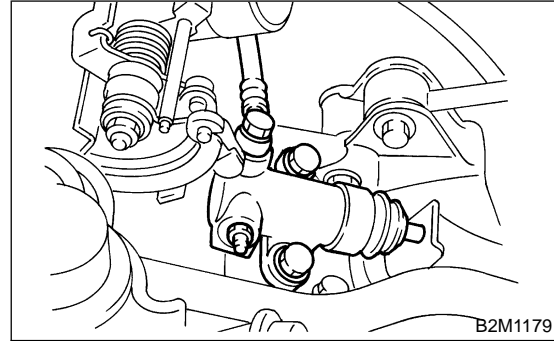


18) Install under cover.

19) Install operating cylinder.

**Tightening torque:**

**37 N·m (3.8 kgf-m, 27.5 ft-lb)**



20) Connect the following connectors.

(1) Transmission ground terminal

**Tightening torque:**

**13 N·m (1.3 kgf-m, 9.4 ft-lb)**

(2) Oxygen sensor connector

(3) Vehicle speed sensor connector

(4) Neutral position switch connector

(5) Back-up light switch connector

21) Install air cleaner case stay.

**Tightening torque:**

**16 N·m (1.6 kgf-m, 11.6 ft-lb)**

22) Install air cleaner case.

23) Connect battery ground cable.

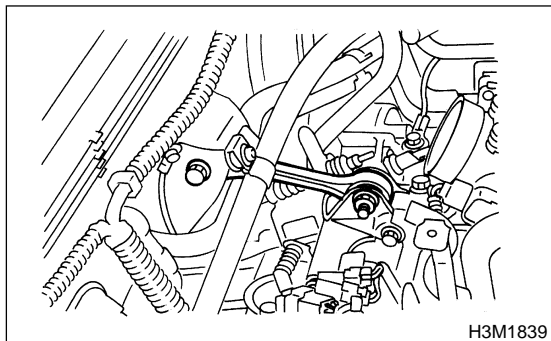
24) Take off vehicle from lift arms.

## 5. Transmission Mounting System S503233

### A: REMOVAL S503233A18

#### 1. PITCHING STOPPER S503233A1801

- 1) Disconnect battery ground terminal.
- 2) Remove the air intake duct and cleaner case.
- 3) Remove the pitching stopper.



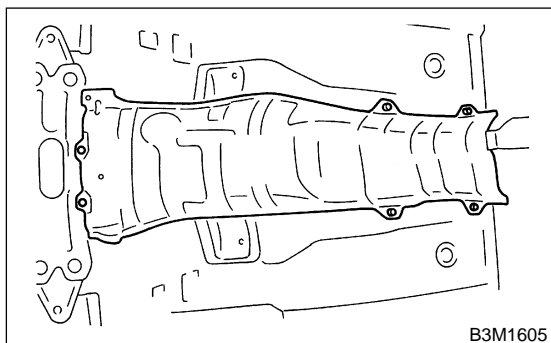
#### 2. CROSSMEMBER AND CUSHION RUBBER S503233A1802

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

**CAUTION:**

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

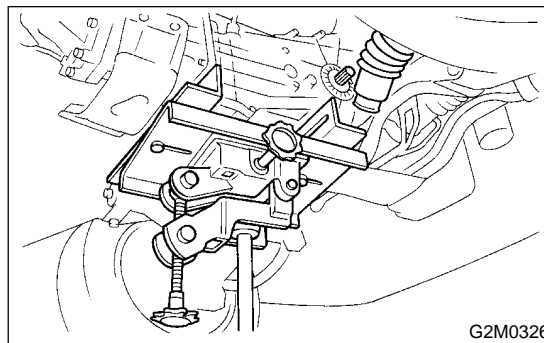
- 4) Remove the heat shield cover.



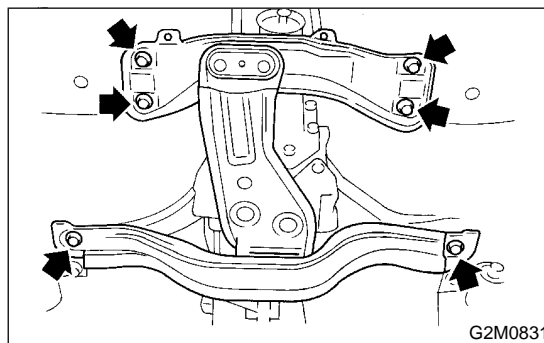
- 5) Set the transmission jack under the transmission.

**CAUTION:**

Always support transmission case with a transmission jack.



- 6) Remove the rear crossmember.



- 7) Remove the rear cushion rubber.

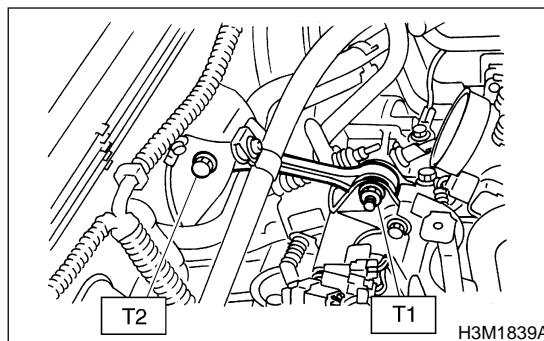
### B: INSTALLATION S503233A11

#### 1. PITCHING STOPPER S503233A1101

- 1) Install the pitching stopper.

**Tightening torque:**

- T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
- T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



- 2) Install the air intake duct and cleaner case.

# TRANSMISSION MOUNTING SYSTEM

Manual Transmission and Differential

## 2. CROSSMEMBER AND CUSHION RUBBER

S503233A1102

- 1) Install the rear cushion rubber.

**Tightening torque:**

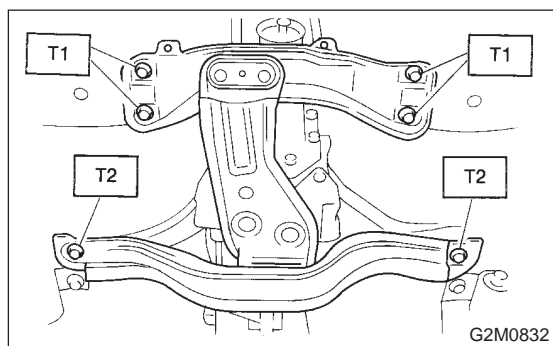
**34 N·m (3.5 kgf-m, 25.3 ft-lb)**

- 2) Install the crossmember.

**Tightening torque:**

**T1: 70 N·m (7.1 kgf-m, 51 ft-lb)**

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



- 3) Remove the transmission jack.
- 4) Install the heat shield cover.
- 5) Install the center, rear exhaust pipes and the muffler.

## C: INSPECTION

S503233A10

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

### 1. PITCHING STOPPER

S503233A1001

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

### 2. CROSSMEMBER AND CUSHION RUBBER

S503233A1002

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



## 6. Oil Seal S503143

### A: REPLACEMENT S503143A20

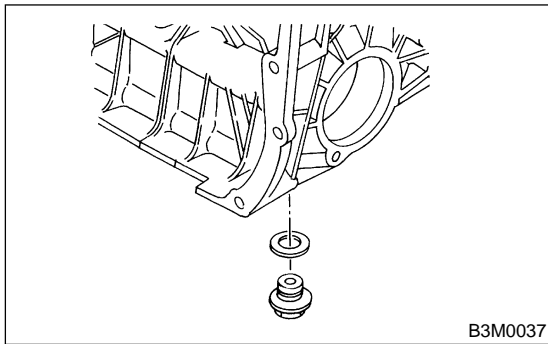
- 1) Clean transmission exterior.
- 2) Drain gear oil completely.

**NOTE:**

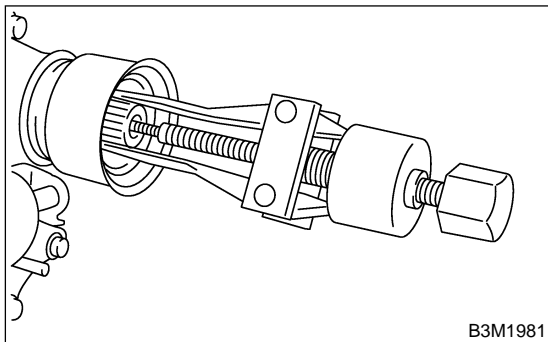
Tighten drain plug after draining gear oil.

**Tightening torque:**

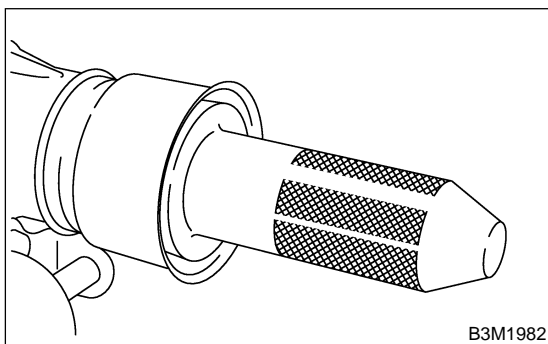
**44 N·m (4.5 kgf-m, 32.5 ft-lb)**



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



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



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

- 10) Install the rear exhaust pipe and muffler.
- 11) Pour gear oil and check the oil level. <Ref. to MT-26 REPLACEMENT, Transmission Gear Oil.>

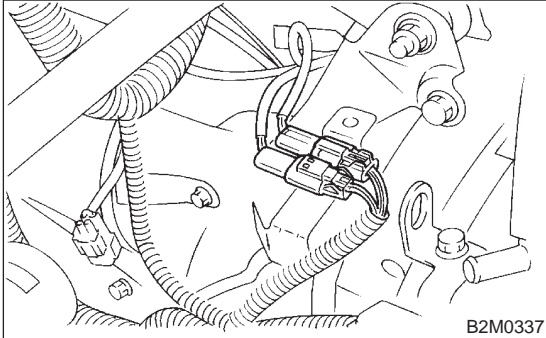
# SWITCHES AND HARNESS

Manual Transmission and Differential

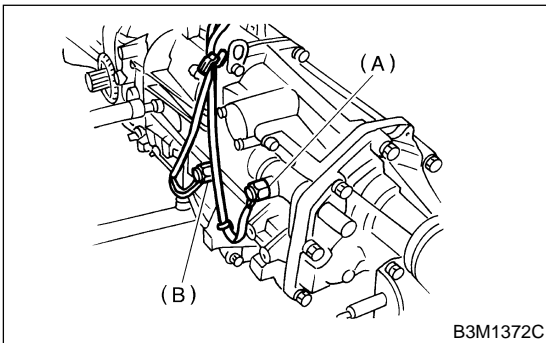
## 7. Switches and Harness S503232

### A: REMOVAL S503232A18

- 1) Disconnect connector battery ground terminal.
- 2) Disconnect connector back-up light switch and neutral position switch.



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



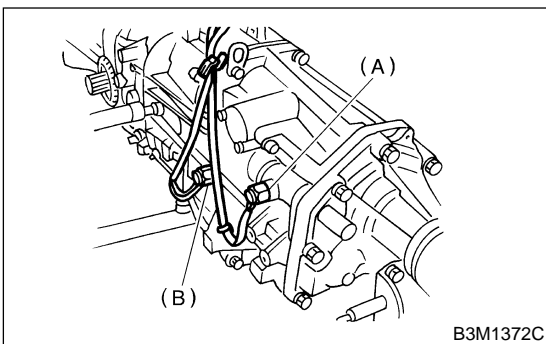
- (A) Neutral switch  
(B) Back-up light switch

### B: INSTALLATION S503232A11

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

#### **Tightening torque:**

**24.5 N·m (2.5 kgf·m, 18.1 ft·lb)**



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

- 2) Disconnect connector of back-up light switch and neutral position switch.
- 3) Connect battery ground terminal.

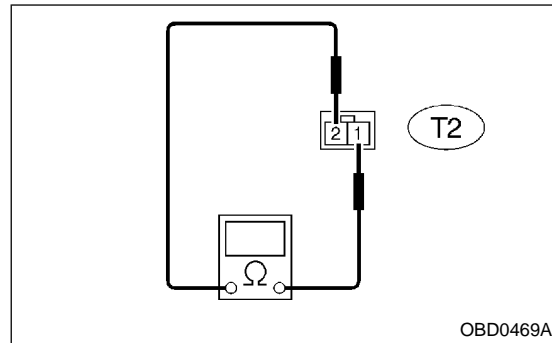
### C: INSPECTION S503232A10

#### 1. BACK-UP LIGHT SWITCH S503232A1001

Inspect the back-up light switch. <Ref. to LI-16 INSPECTION, Back-up Light System.>

#### 2. NEUTRAL POSITION SWITCH S503232A1002

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

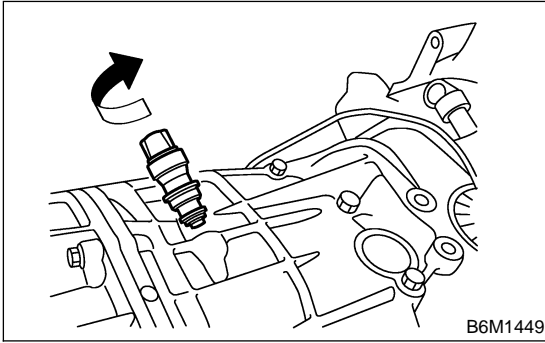


- 4) Replace defective parts.

## 8. Vehicle Speed Sensor S503231

### A: REMOVAL S503231A18

- 1) Disconnect ground terminal from battery.
- 2) Lift-up the vehicle.
- 3) Remove center rear exhaust pipes and muffler.
- 4) Disconnect connector from vehicle speed sensor.
- 5) Turn and remove vehicle speed sensor.



### B: INSTALLATION S503231A11

**NOTE:**

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

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

**Tightening torque:**

**5.9 N·m (0.6 kgf-m, 4.3 ft-lb)**

- 3) Connect connector to vehicle speed sensor.
- 4) Install front and center exhaust pipes.

### C: INSPECTION S503231A10

Inspect the vehicle speed sensor. <Ref. to MT-25 INSPECTION, Speedometer System.>

# PREPARATION FOR OVERHAUL

Manual Transmission and Differential

## 9. Preparation for Overhaul S503091

### A: PROCEDURE S503091E45

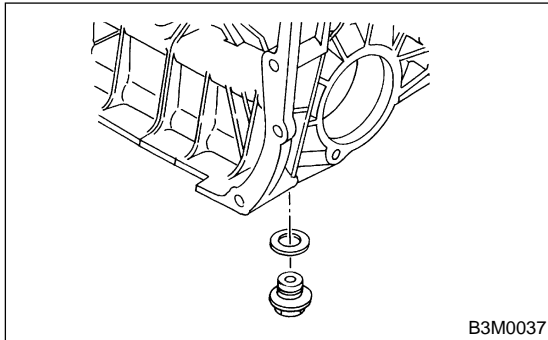
- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove drain plug to drain oil. After draining, retighten it as before.

#### CAUTION:

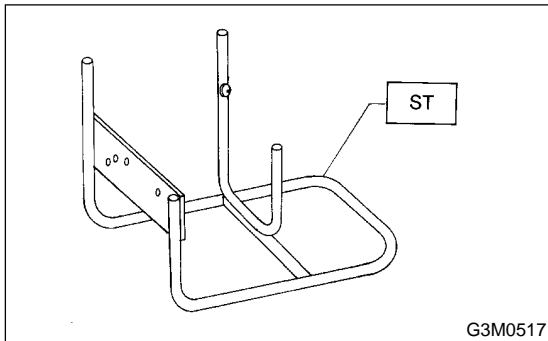
Replace gasket with a new one.

#### Tightening torque:

**44 N·m (4.5 kgf-m, 32.5 ft-lb)**



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

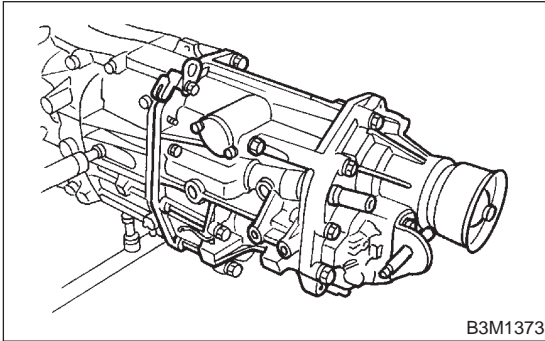


- 4) Rotating parts should be coated with oil prior to assembly.
- 5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
- 6) Gaskets, lock washers and lock nut must be replaced with new ones.
- 7) Liquid gasket should be used where specified to prevent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

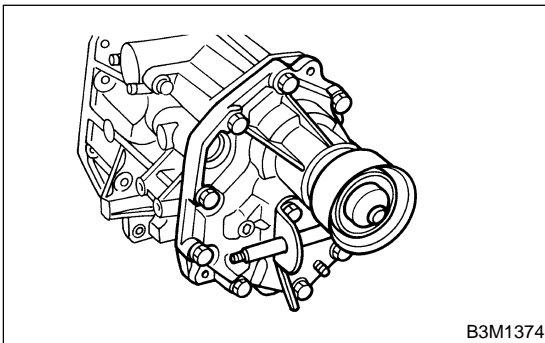
## 10. Transfer Case and Extension Case Assembly S503561

### A: REMOVAL S503561A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-36 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly.

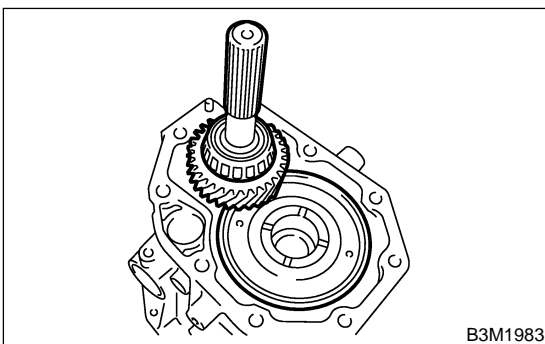


- 4) Remove shifter arm.
- 5) Remove extension case assembly.



### B: INSTALLATION S503561A11

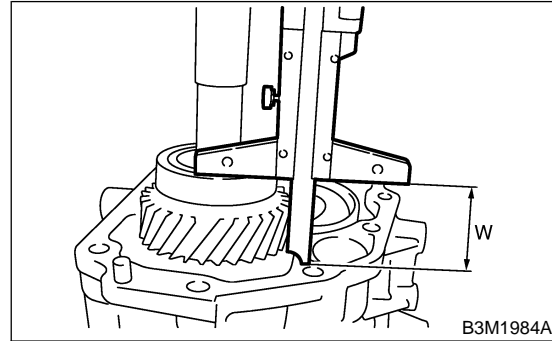
- 1) Install center differential and transfer driven gear into transfer case.



- 2) Measure height "W" between transfer case and ball bearing on the transfer driven gear.

NOTE:

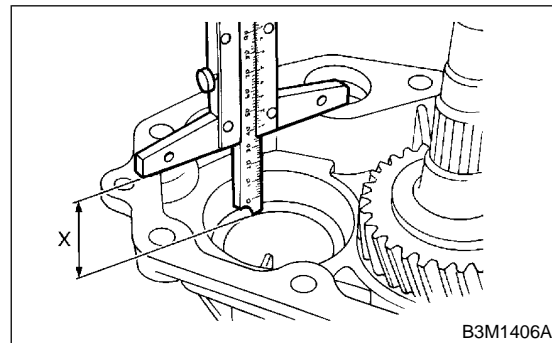
Measure with bearing cone equipped.



- 3) Measure depth "X".

NOTE:

Measure with bearing cone equipped.



- 4) Calculate space "t" using the following equation:  $t = X - W + 0.2$  to  $0.3$  mm (0.008 to 0.012 in)

- 5) Select nearest washer in the following table:

**Standard clearance between thrust washer and taper roller bearing:**

**0.2 — 0.3 mm T (0.008 — 0.012 in T)**

NOTE:

T: Tight

# TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

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

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

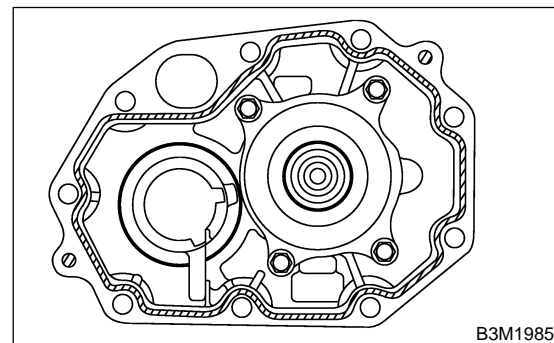
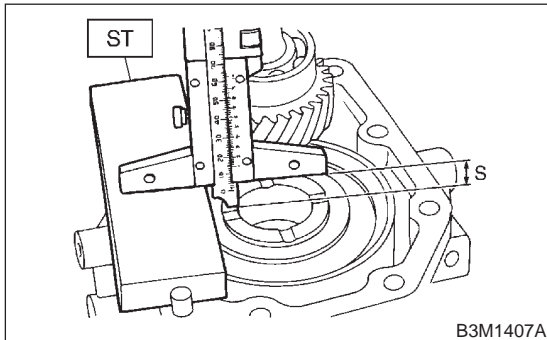
**Liquid gasket:**

**THREE BOND 1215B**

6) Fit thrust washers on transfer drive shaft.

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

ST 398643600 GAUGE



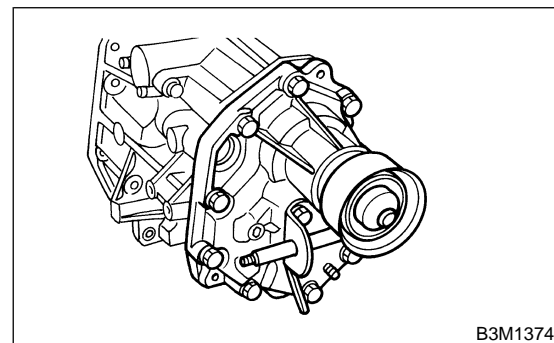
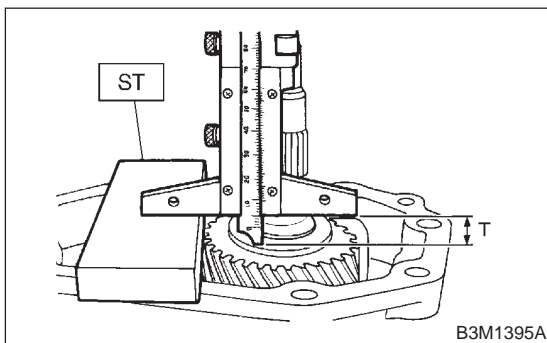
13) Install extension assembly into transfer case.

**Tightening torque:**

**37 N·m (3.8 kgf-m, 27.5 ft-lb)**

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

ST 398643600 GAUGE

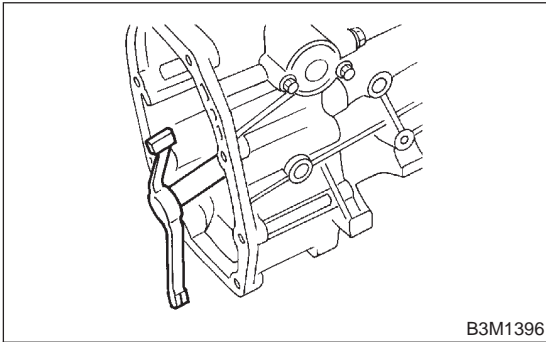


9) Calculate space "U" using the following equation:  $U = S - T$

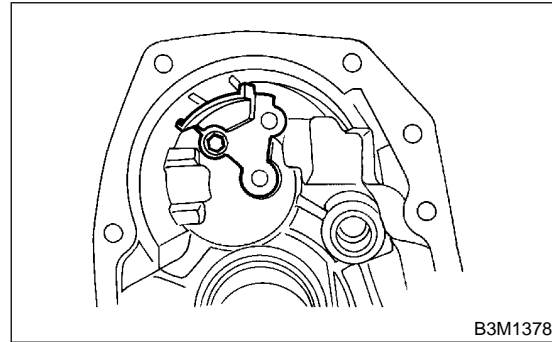
# TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

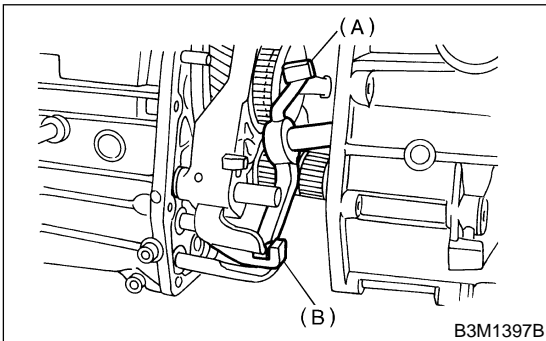
14) Install shifter arm to transfer case.



2) Remove oil guide.



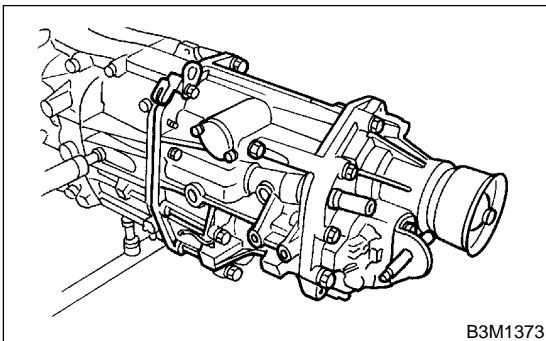
15) Hang the shifter arm on the 3rd-4th fork rod.



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

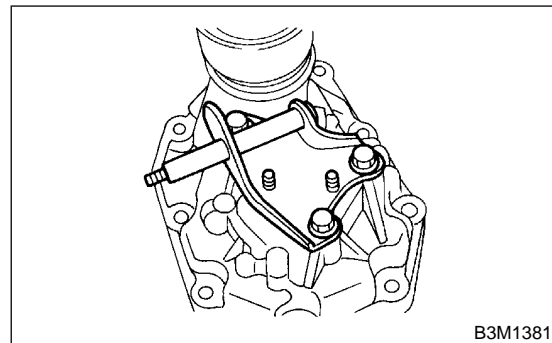
**Tightening torque:**

**24.5 N·m (2.50 kgf·m, 18.1 ft·lb)**



## 2. EXTENSION CASE S503561A0602

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



- 3) Remove oil seal from extension case. <Ref. to MT-35 Oil Seal.>

## D: ASSEMBLY S503561A02

### 1. EXTENSION CASE S503561A0201

- 1) Using ST, install oil seal to extension case. <Ref. to MT-35, Oil Seal.>

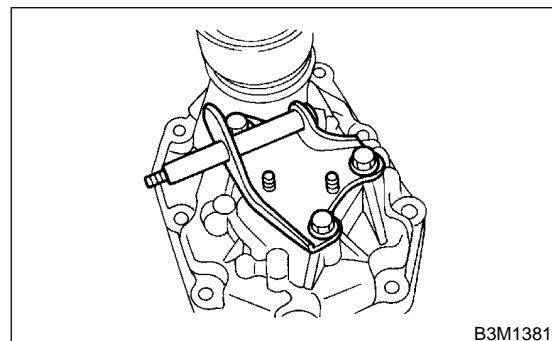
**CAUTION:**

**Use new oil seal.**

- 2) Install shift bracket to extension case.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



## C: DISASSEMBLY S503561A06

### 1. TRANSFER CASE S503561A0601

- 1) Remove reverse check assembly. <Ref. to MT-48 REMOVAL, Reverse Check Removal.>

# TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

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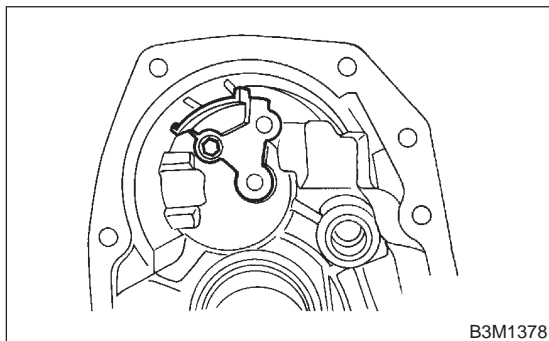
3) Install transfer drive gear to extension case.  
<Ref. to MT43 INSTALLATION, Transfer Drive Gear.>

## 2. TRANSFER CASE S503561A0202

1) Install oil guide to transfer case.

**Tightening torque:**

**6.4 N·m (0.65 kgf·m, 4.7 ft·lb)**



2) Install reverse check sleeve assembly to transfer case. <Ref. to MT-48 INSTALLATION, Reverse Check Sleeve.>



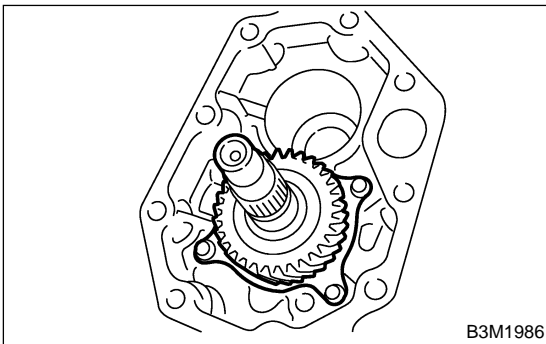
## 11. Transfer Drive Gear

S503229

### A: REMOVAL

S503229A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-36 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly.
- 5) Remove transfer driven gear.
- 6) Remove transfer drive gear.



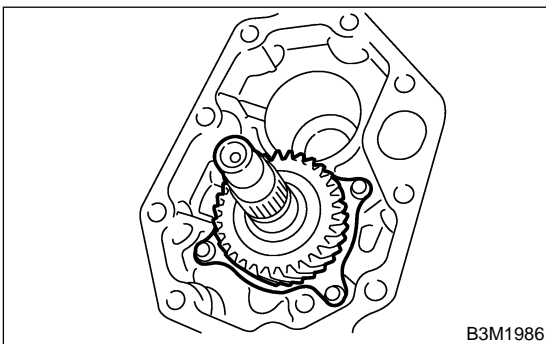
### B: INSTALLATION

S503229A11

- 1) Install transfer drive gear.

#### Tightening torque:

**8.8 N·m (0.9 kgf-m, 6.5 ft-lb)**

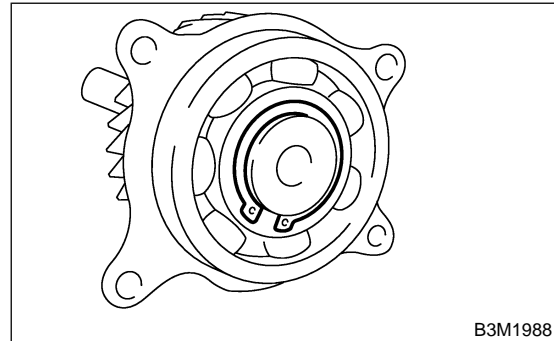


- 2) Install transfer driven gear.
- 3) Install transfer case and extension case assembly. <Ref. to MT-39 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install back-up light switch and neutral position switch. <Ref. to MT-36 INSTALLATION, Switches and Harness.>
- 5) Install the manual transmission assembly from vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

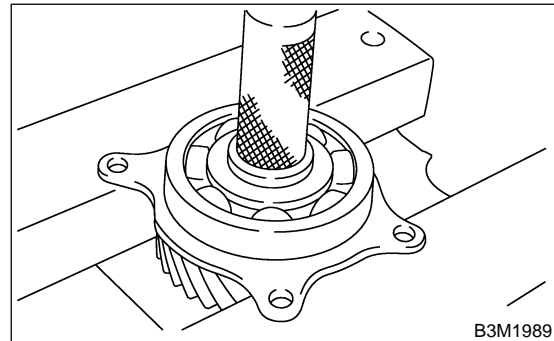
### C: DISASSEMBLY

S503229A06

- 1) Remove snap ring.



- 2) Remove ball bearing.



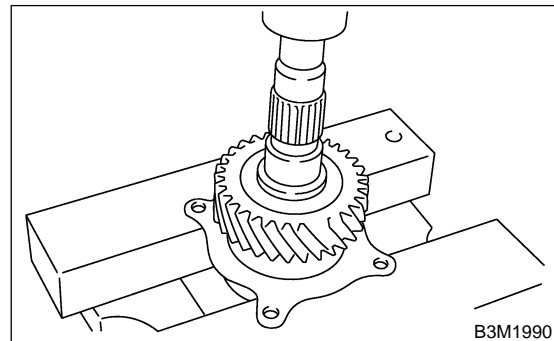
### D: ASSEMBLY

S503229A02

- 1) Install ball bearing.

#### CAUTION:

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



- 2) Install snap ring on transfer drive shaft.

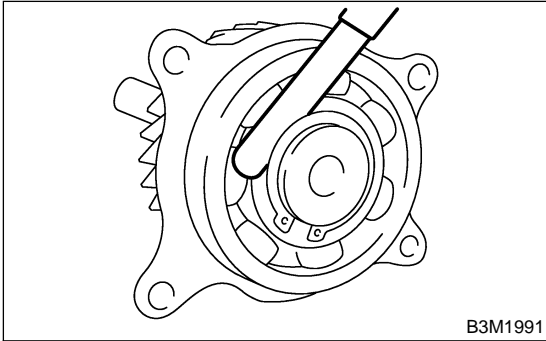
# TRANSFER DRIVE GEAR

Manual Transmission and Differential

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

**Clearance:**

**0.01 — 0.15 mm (0.0004 — 0.0059 in)**



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

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.697)

## E: INSPECTION S503229A10

### 1) Bearings

Replace bearings in the following cases:

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

### 2) Drive gear

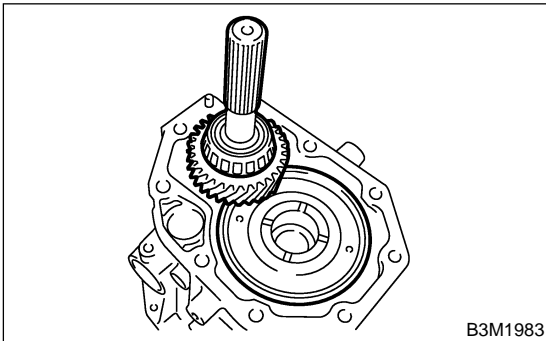
Replace drive gear in the following cases:

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

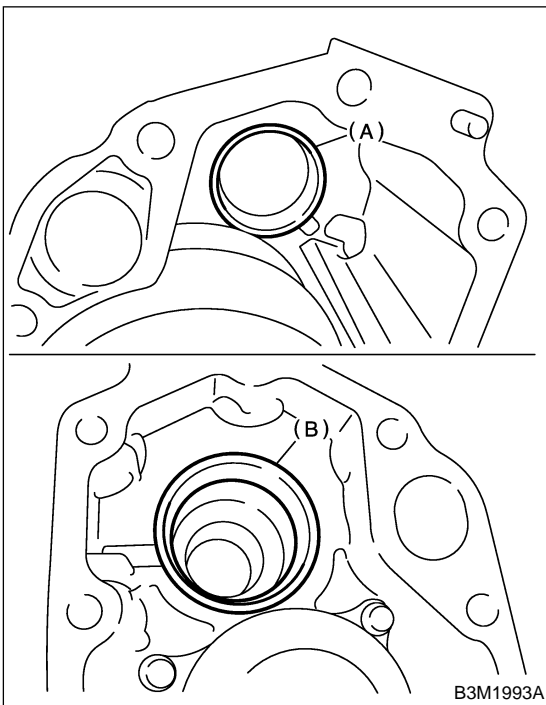
## 12. Transfer Driven Gear S503223

### A: REMOVAL S503223A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-36 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly.
- 5) Remove transfer driven gear.



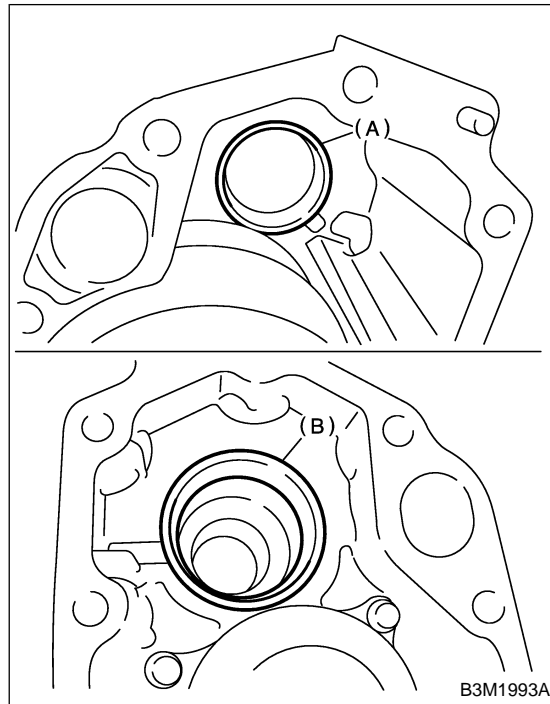
- 6) Remove bearing cup.



- (A) Transfer case side  
(B) Extension case side

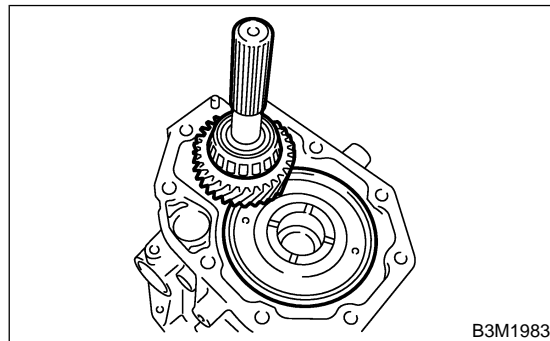
### B: INSTALLATION S503223A11

- 1) Install bearing cup.



- (A) Transfer case side  
(B) Extension case side

- 2) Install transfer driven gear.



- 3) Install transfer case and extension case assembly. <Ref. to MT-39 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install back-up light switch and neutral position switch. <Ref. to MT-36 INSTALLATION, Switches and Harness.>
- 5) Install the manual transmission assembly from vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

# TRANSFER DRIVEN GEAR

Manual Transmission and Differential

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## C: DISASSEMBLY S503223A06

- 1) Remove bearing cone (extension case side).  
ST
- 2) Remove bearing cone (transfer case side).

## D: ASSEMBLY S503223A02

- 1) Using ST, install bearing cone (transfer case side).  
ST 398177700 INSTALLER

### CAUTION:

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

- 2) Using ST, install bearing cone (extension case side).  
ST 499757002 INSTALLER

### CAUTION:

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

## E: INSPECTION S503223A10

- 1) Bearings

Replace bearings in the following cases:

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

- 2) Driven gear

Replace drive gear in the following cases:

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

## 13. Center Differential S503158

### A: REMOVAL S503158A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transfer driven gear. <Ref. to MT-45 REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential.

### B: INSTALLATION S503158A11

- 1) Install the center differential into transmission case.
- 2) Install the transfer driven gear. <Ref. to MT-45 INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to MT-39 INSTALLATION, Extension Case Assembly.>
- 4) Install the manual transmission assembly to vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY S503158A06

**NOTE:**

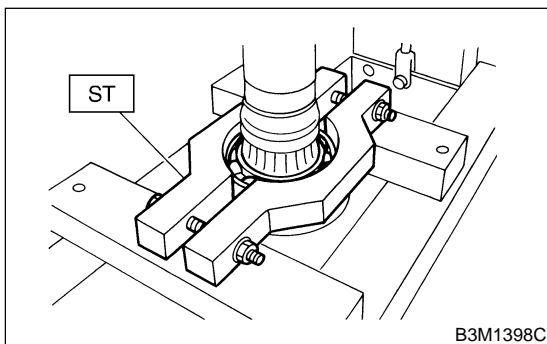
Do not disassemble center differential because it is a non-disassemble part.

Remove ball bearing using ST.

**CAUTION:**

**Do not reuse ball bearing.**

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER

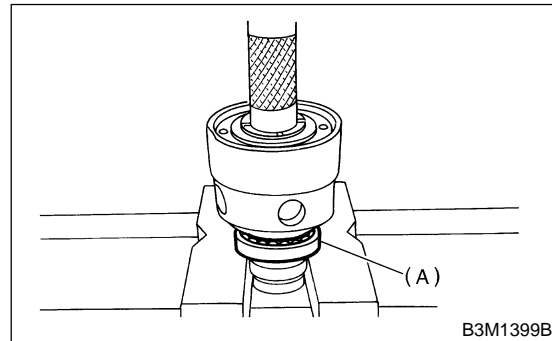


### D: ASSEMBLY S503158A02

Install ball bearing to center differential assembly.

**CAUTION:**

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



(A) Ball bearing

### E: INSPECTION S503158A10

1) Bearings

Replace bearings in the following cases:

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

2) Center differential

Replace center differential assembly in the following case:

- Worn or damaged

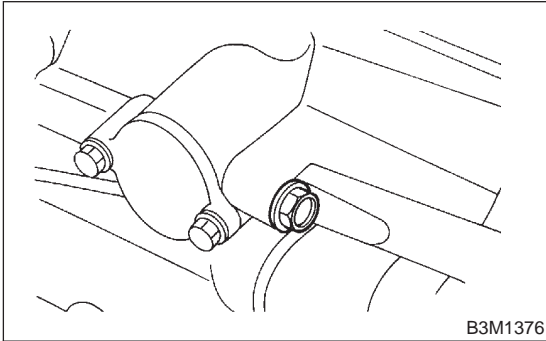
# REVERSE CHECK SLEEVE

Manual Transmission and Differential

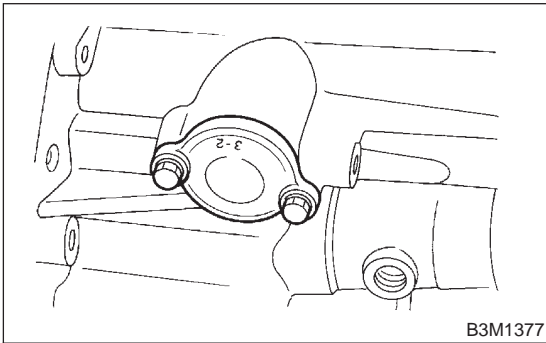
## 14. Reverse Check Sleeve S503267

### A: REMOVAL S503267A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove plug, spring and reverse check ball.



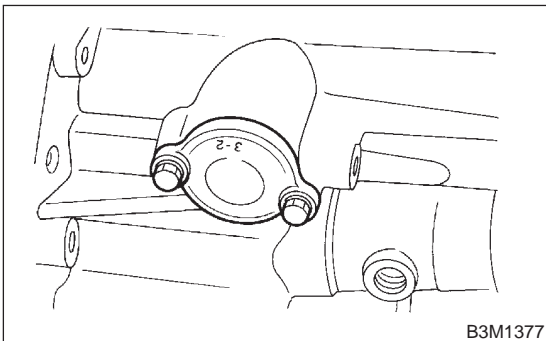
- 3) Remove the reverse check sleeve.



### B: INSTALLATION S503267A11

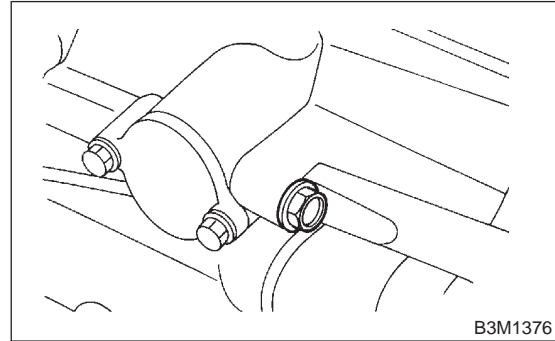
- 1) Install the reverse check sleeve.

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



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

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

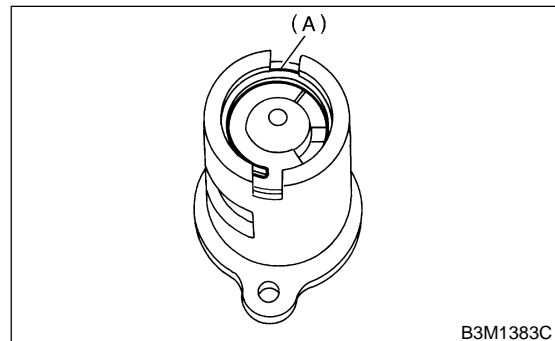


- 3) Install the manual transmission assembly to vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY S503267A06

- 1) Using a standard screwdriver, remove snap ring.

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

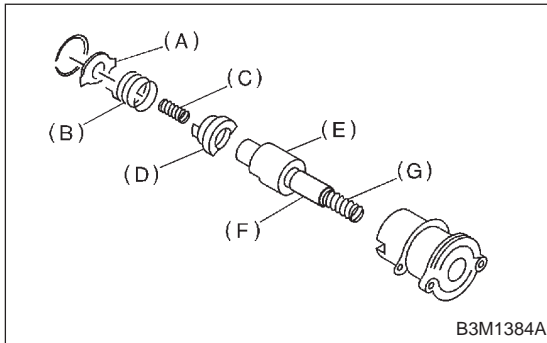


(A) Snap ring

# REVERSE CHECK SLEEVE

Manual Transmission and Differential

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



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

3) Remove O-ring.

### NOTE:

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

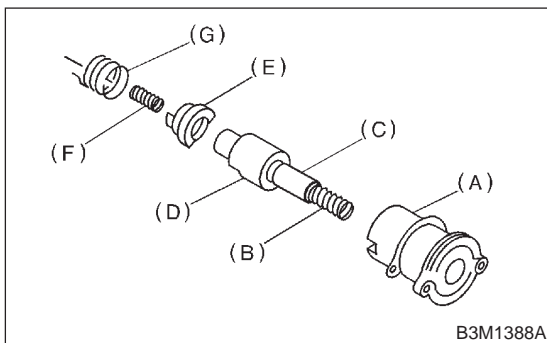
### D: ASSEMBLY

S503267A02

1) Install return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring and check spring onto reverse check sleeve.

### NOTE:

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



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

2) Hook the bent section of reverse check spring over reverse check plate.

3) Rotate cam so that the protrusion of reverse check cam is at the opening in plate.

4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring.

5) Position O-ring in groove in sleeve.

### E: INSPECTION

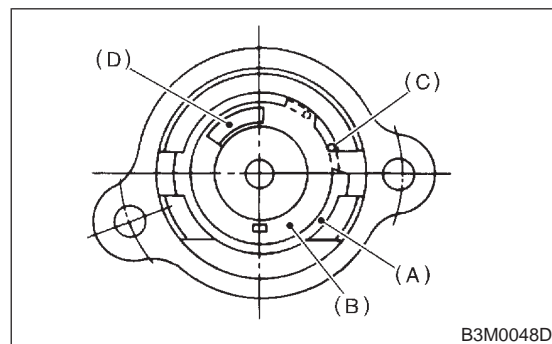
S503267A10

- Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.

- Spin cam by hand for smooth rotation.

- Move cam and shaft all the way toward plate and release.

If cam does not return properly, replace reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace spring.



- (A) Snap ring
- (B) Reverse check plate
- (C) Check spring
- (D) Check cam

- Select a suitable reverse accent shaft and reverse check plate. <Ref. to MT-50 ADJUSTMENT, Reverse Check Sleeve.>

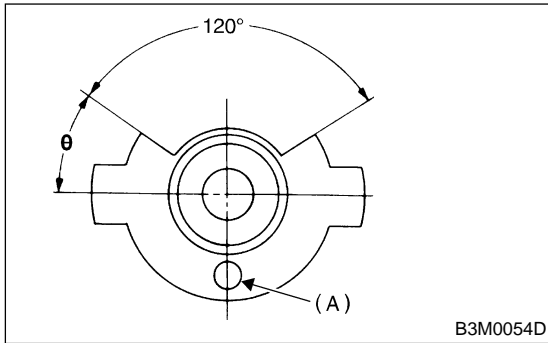
# REVERSE CHECK SLEEVE

Manual Transmission and Differential

## F: ADJUSTMENT S503267A01

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

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

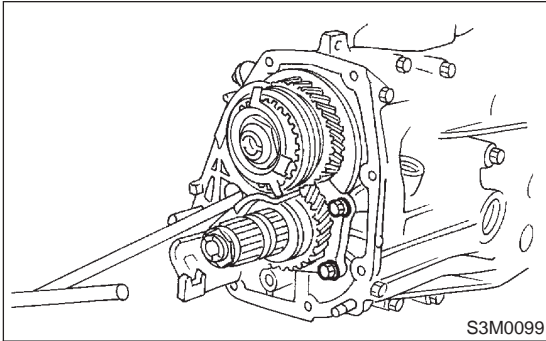




## 15. Transmission Case S503266

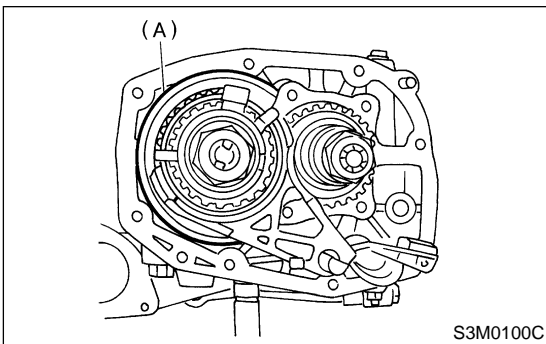
### A: REMOVAL S503266A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove clutch release lever. <Ref. to CL-12 REMOVAL, Release Bearing and Lever.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove bearing mounting bolts.



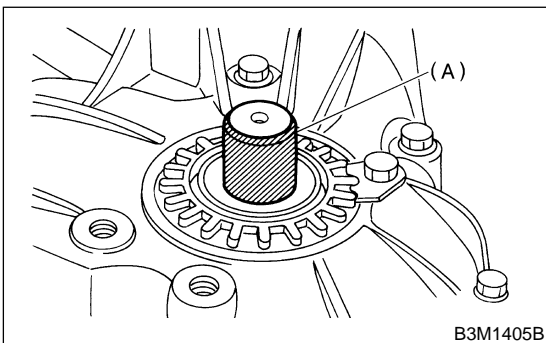
S3M0099

- 5) Remove main shaft rear plate.



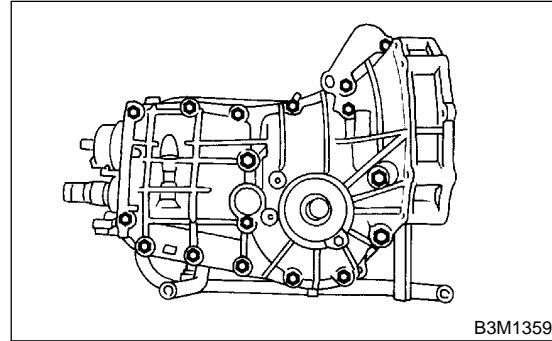
S3M0100C

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



B3M1405B

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



B3M1359

### B: INSTALLATION S503266A11

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

#### Liquid gasket:

**THREE BOND 1215 or equivalent**

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

#### NOTE:

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

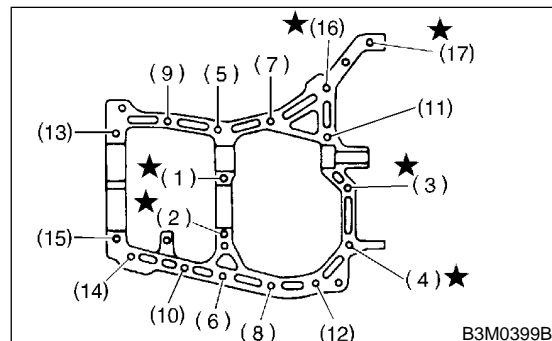
#### Tightening torque:

**8 mm bolt**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

**★ 10 mm bolt**

**39 N·m (4.0 kgf-m, 28.9 ft-lb)**



B3M0399B

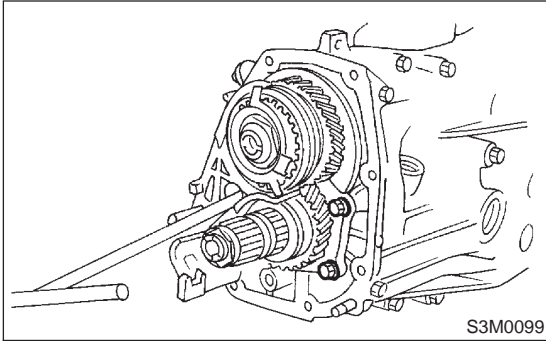
# TRANSMISSION CASE

Manual Transmission and Differential

3) Tighten ball bearing attachment bolts.

### Tightening torque:

**29 N·m (3.0 kgf-m, 21.7 ft-lb)**

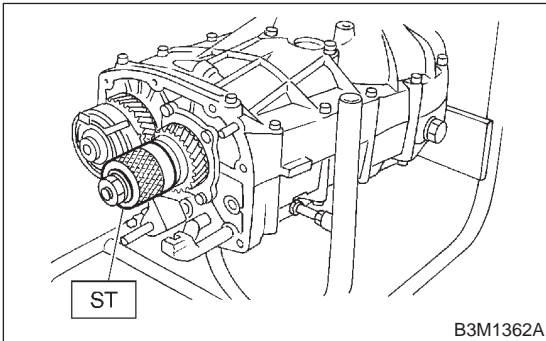


4) Backlash adjustment of hypoid gear and pre-load adjustment of roller bearing

### NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



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

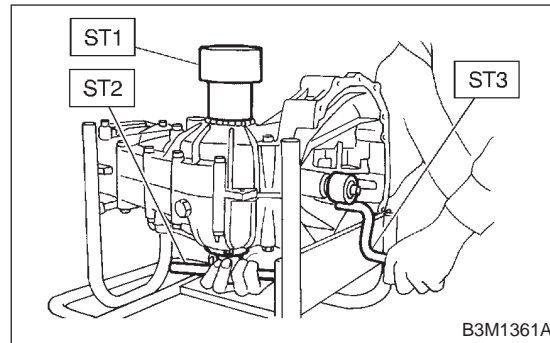
6) Screw retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2.

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

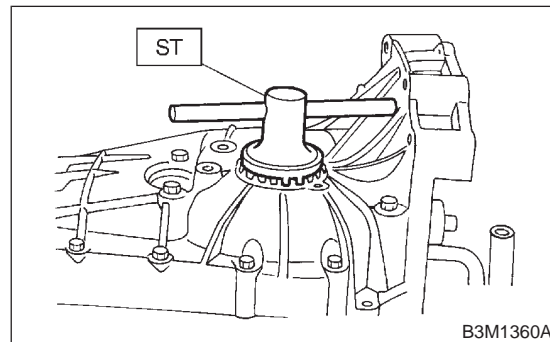


7) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

### NOTE:

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

ST 499787000 WRENCH ASSY



8) 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.

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

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

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

12) Inspect and adjust backlash and tooth contact of hypoid gear. <Ref. to MT-71 INSPECTION, Front Differential Assembly.>

# TRANSMISSION CASE

Manual Transmission and Differential

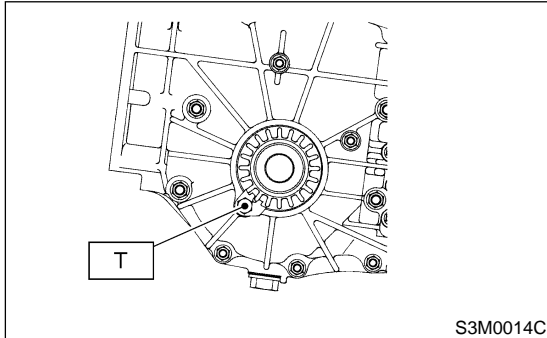
13) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen retainer until the O-ring groove appears. Fit O-ring into the groove and tighten retainer into the position where retainer has been tightened in. Tighten lock plate.

**NOTE:**

Carry out this job on both upper and lower retainers.

**Tightening torque:**

**T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)**



S3M0014C

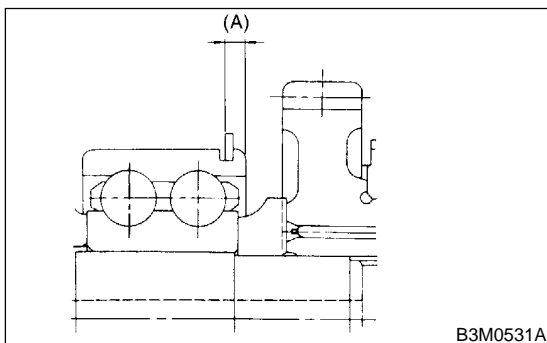
14) Selecting of main shaft rear plate  
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

**NOTE:**

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

ST 498147000 DEPTH GAUGE

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



B3M0531A

15) Install clutch release lever and bearing. <Ref. to CL13 INSTALLATION, Release Bearing and Lever.>

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

17) Install the manual transmission assembly into the vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION S503266A10

- 1) Check the transmission case for cracks, damage, and oil leaks.
- 2) At neutral position, make sure that the gear shift is not leaning towards first, second, or back gear. If it is leaning, replace the shim and/or reverse accent shaft. <Ref. to MT-53 ADJUSTMENT, Transmission Case.>

## D: ADJUSTMENT S503266A01

- 1) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
- 2) 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.

# MAIN SHAFT ASSEMBLY

Manual Transmission and Differential

## 16. Main Shaft Assembly S503562

### A: REMOVAL S503562A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-39 REMOVAL, Transmission Case.>
- 4) Removes drive pinion shaft assembly. <Ref. to MT-59 REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly.

### B: INSTALLATION S503562A11

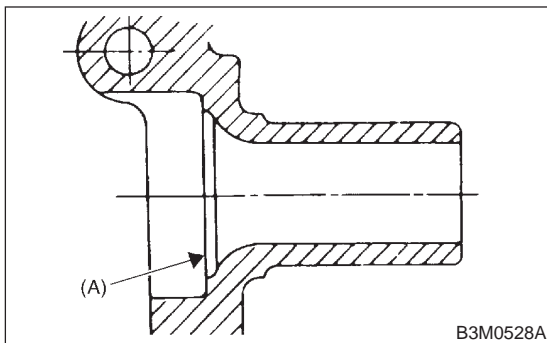
- 1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

#### CAUTION:

- Wrap clutch splined section with vinyl tape to prevent damage to oil seal.
- Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.
- Use a new one.

#### NOTE:

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



- Be careful not to drop oil seal when installing transmission main case.
- Make sure straight pin is positioned in hole in needle bearing's outer race.

- 2) Install the drive pinion assembly. <Ref. to MT-59 INSTALLATION, Drive Pinion Shaft Assembly.>
- 3) Install transmission case. <Ref. to MT-51 INSTALLATION, Transmission Case.>
- 4) Install transfer case with extension case assembly. <Ref. to MT-39 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly from vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

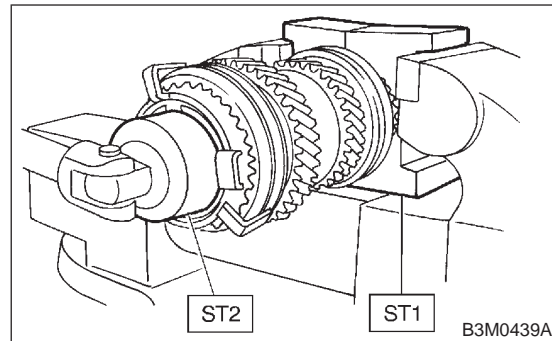
## C: DISASSEMBLY S503562A06

- 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.

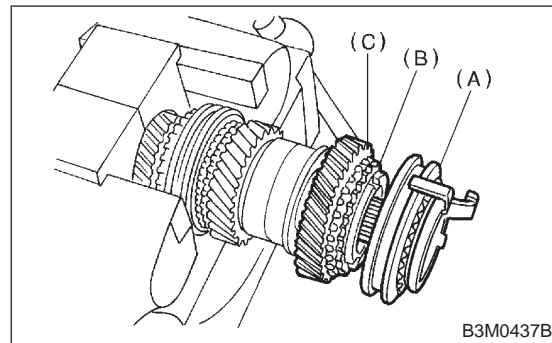
#### NOTE:

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).

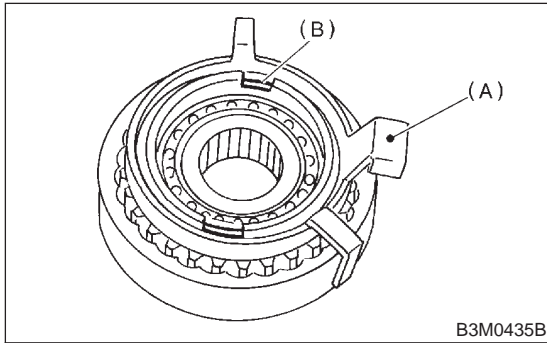


- (A) 5th-Rev sleeve and hub ASSY  
(B) Baulk ring  
(C) 5th drive gear

# MAIN SHAFT ASSEMBLY

Manual Transmission and Differential

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



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

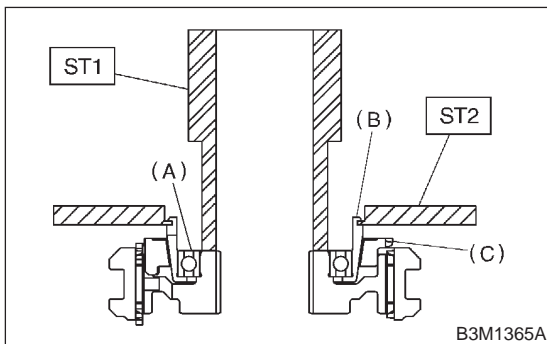
5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

NOTE:

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

- Do not reuse ball bearing.

ST1 499757002 SNAP RING PRESS  
ST2 498077400 SYNCHRO CONE  
REMOVER



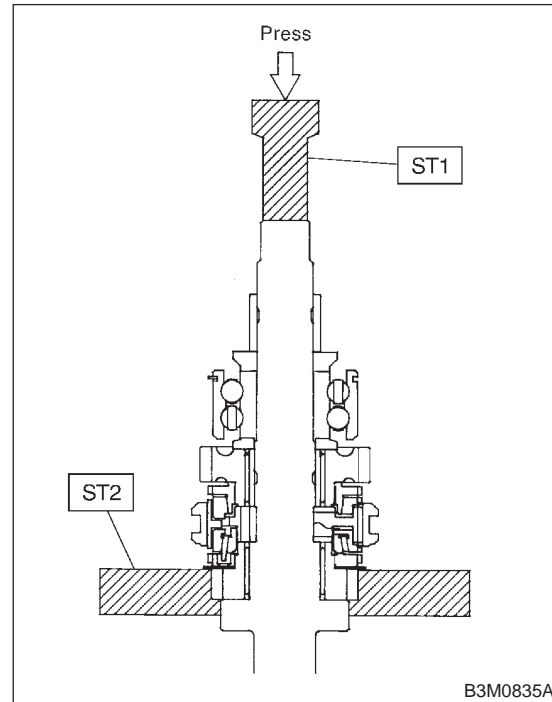
- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

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



# MAIN SHAFT ASSEMBLY

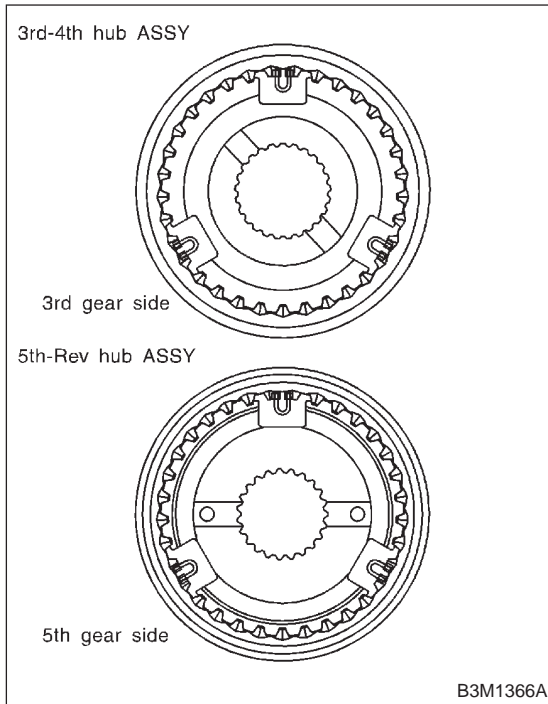
Manual Transmission and Differential

## D: ASSEMBLY S503562A02

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

NOTE:

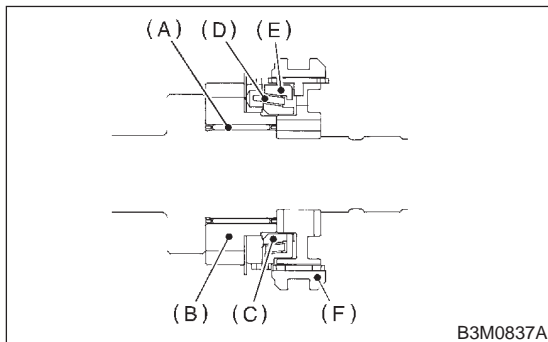
Position open ends of spring 120° apart.



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

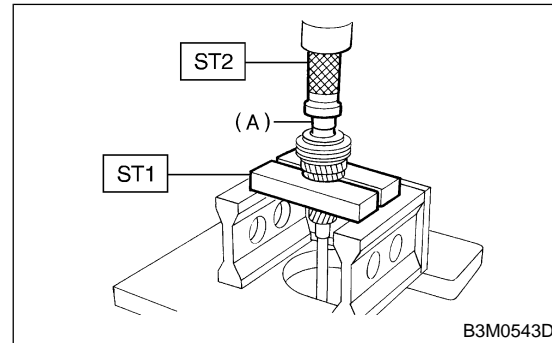
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

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

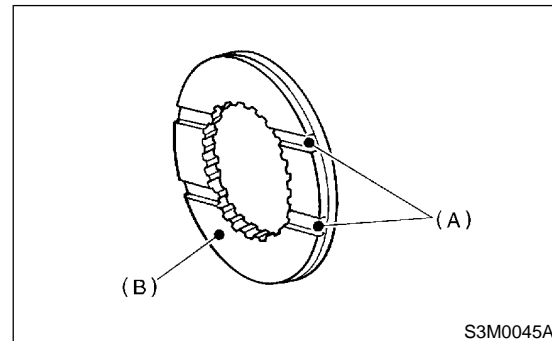


(A) 4th needle bearing race

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

# MAIN SHAFT ASSEMBLY

Manual Transmission and Differential

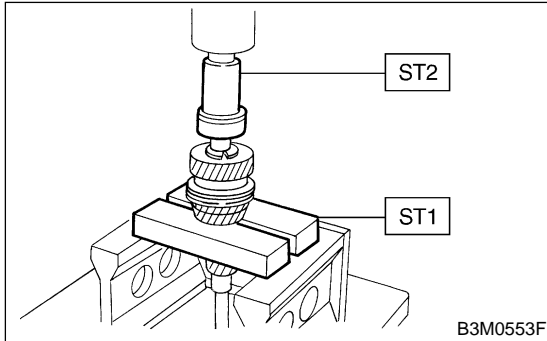
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

**CAUTION:**

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

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



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

**CAUTION:**

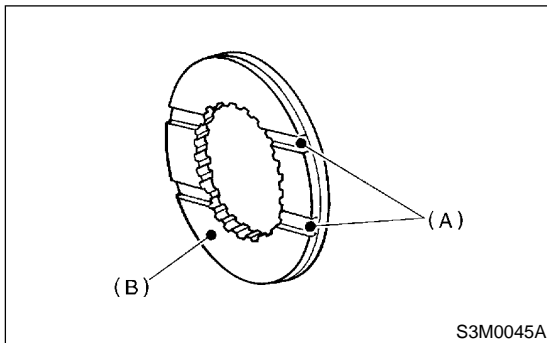
**Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**NOTE:**

Face thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Groove

(B) 4th gear thrust washer

7) Install bearing onto synchro cone.

**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.

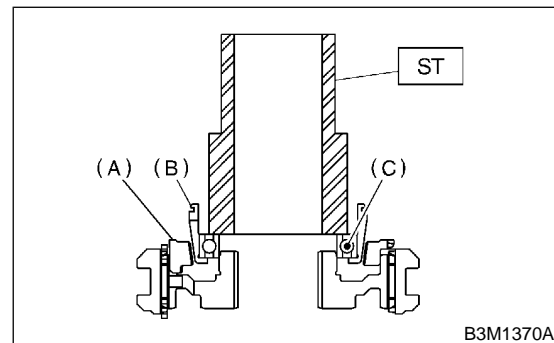
**CAUTION:**

**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

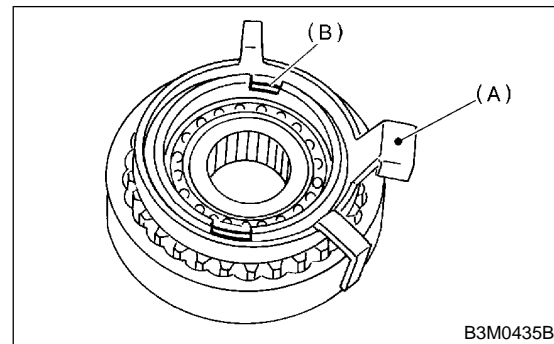


(A) Baulk ring

(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

# MAIN SHAFT ASSEMBLY

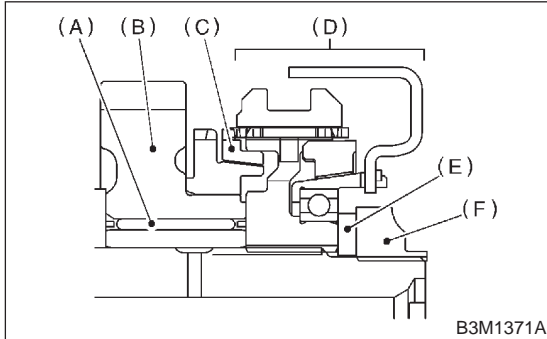
Manual Transmission and Differential

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

## NOTE:

Align groove in baulk ring with shifting insert.

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 N·m (12.0 kgf·m, 86.8 ft·lb)**

## E: INSPECTION S503562A10

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

### 1) Bearings

Replace bearings in the following cases:

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

### 2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

### 3) Gears

- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.

- Correct or replace if the inner surface or end face is damaged.

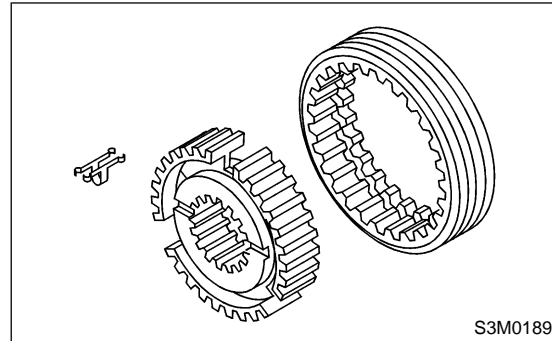
### 4) Baulk ring

Replace the ring in the following cases:

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

### 5) Shifting insert key

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



### 6) Oil seal

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

### 7) O-ring

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

### 8) Gearshift mechanism

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



## 17. Drive Pinion Shaft Assembly

S503269

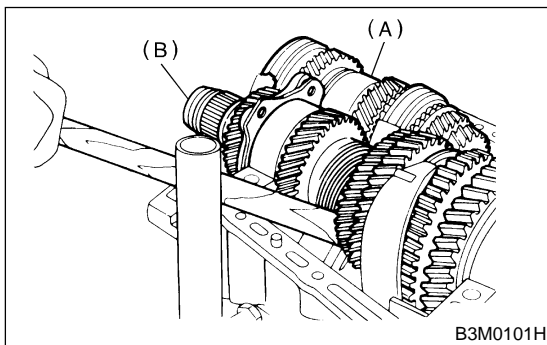
### A: REMOVAL

S503269A18

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

#### NOTE:

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

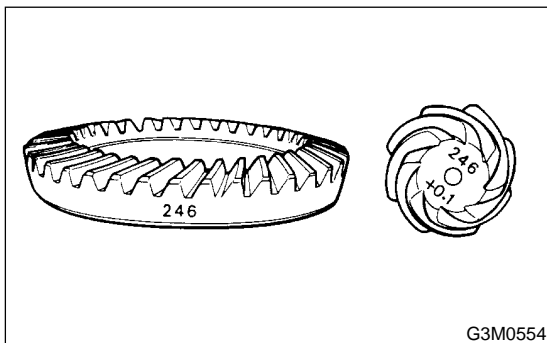


B3M0101H

### B: INSTALLATION

S503269A11

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



G3M0554

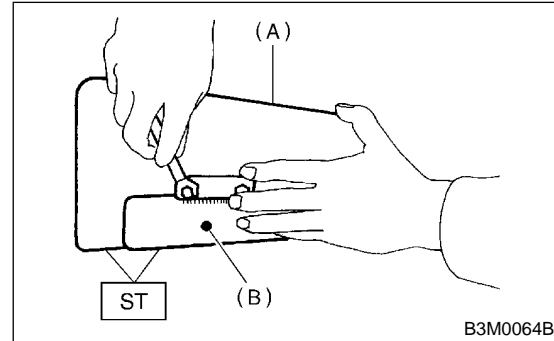
- 3) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.

- 4) Inspection and adjustment of ST

#### NOTE:

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

ST 499917500 DRIVE PINION GAUGE ASSY



B3M0064B

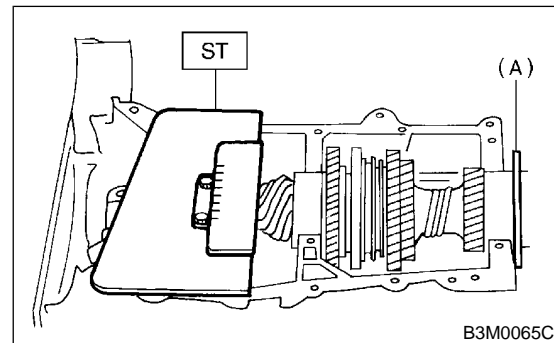
- (A) Plate  
(B) Scale

- 5) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

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

ST 499917500 DRIVE PINION GAUGE ASSY



B3M0065C

- (A) Adjust clearance to zero without shim.

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

ST 499917500 DRIVE PINION GAUGE ASSY

# DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

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

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

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

10) Set transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect suitable 1st — 2nd, 3rd — 4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to MT-64 INSPECTION, Drive Shaft Assembly.>

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

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

13) Install the manual transmission assembly from vehicle. <Ref. to MT-27 INSTALLATION, Manual Transmission Assembly.>

## C: DISASSEMBLY S503269A06

### CAUTION:

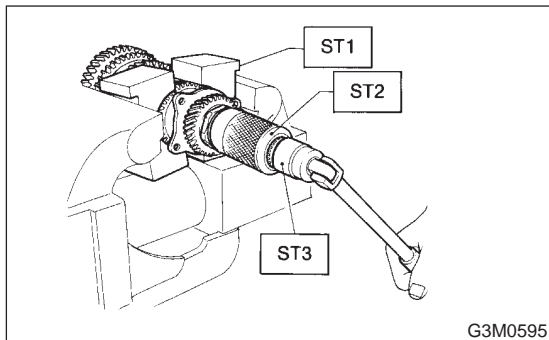
**Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.**

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

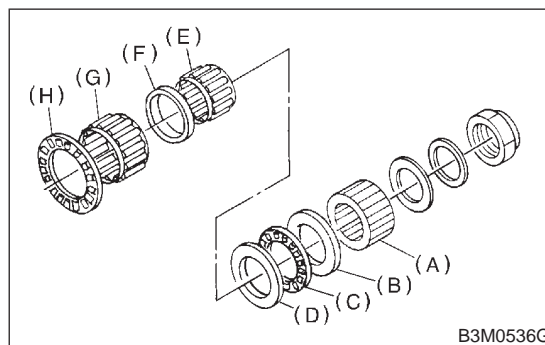
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH



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.



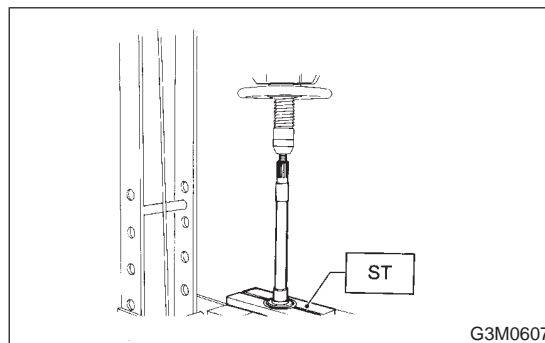
- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 x 37.5 x t)
- (C) Thrust bearing (25 x 37.5 x 3)
- (D) Washer No. 2 (25 x 37.5 x 4)
- (E) Needle bearing (25 x 30 x 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 x 37 x 23)
- (H) Thrust bearing (33 x 50 x 3)

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

### CAUTION:

**Do not reuse roller bearing.**

ST 498077000 REMOVER

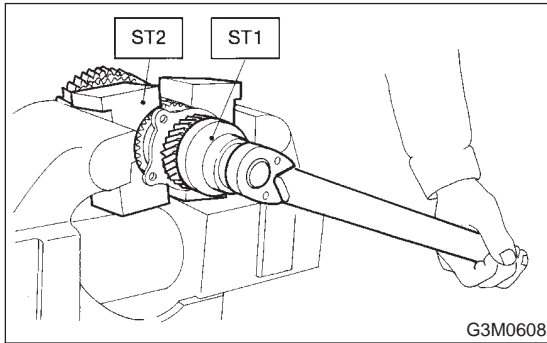


# DRIVE PINION SHAFT ASSEMBLY

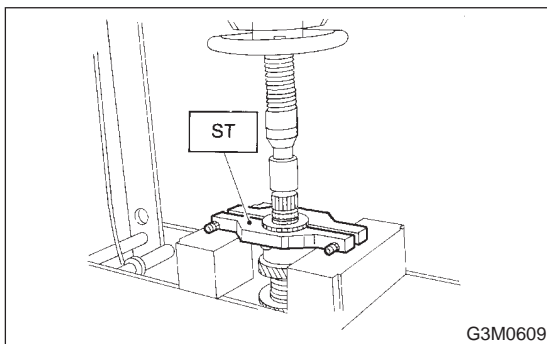
Manual Transmission and Differential

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

ST1 499987300 SOCKET WRENCH (50)  
ST2 899884100 HOLDER



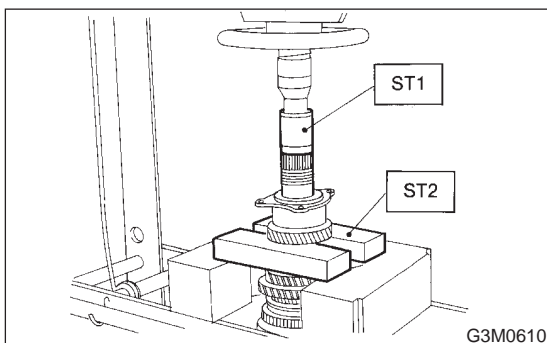
5) Remove 5th driven gear using ST.  
ST 499857000 5TH DRIVEN GEAR  
REMOVER



6) Remove woodruff key.

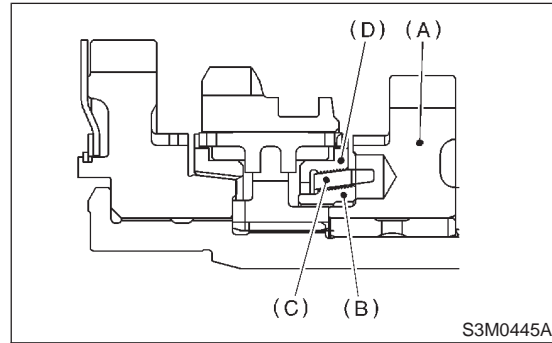
7) Remove roller bearing (42 × 74 × 40), 3rd-4th driven gear using ST1 and ST2.

ST1 499757002 SNAP RING PRESS  
ST2 899714110 REMOVER



8) Remove the key.

9) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



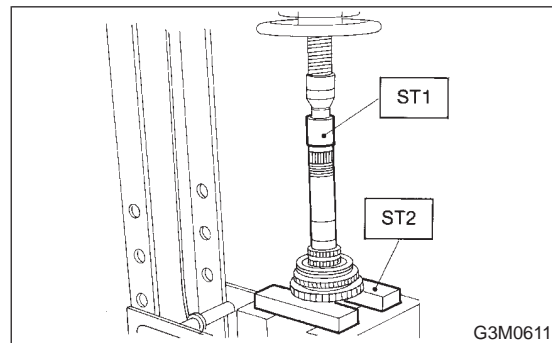
(A) 2nd driven gear  
(B) Inner baulk ring  
(C) Synchro cone  
(D) Outer baulk ring

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

NOTE:

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

ST1 499757002 SNAP RING PRESS  
ST2 899714110 REMOVER



11) Remove sub gear for 1st driven gear.

# DRIVE PINION SHAFT ASSEMBLY

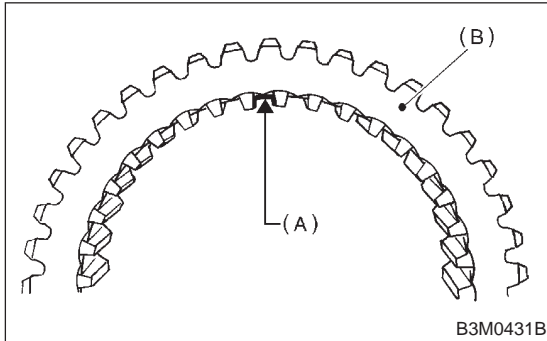
Manual Transmission and Differential

## D: ASSEMBLY S503269A02

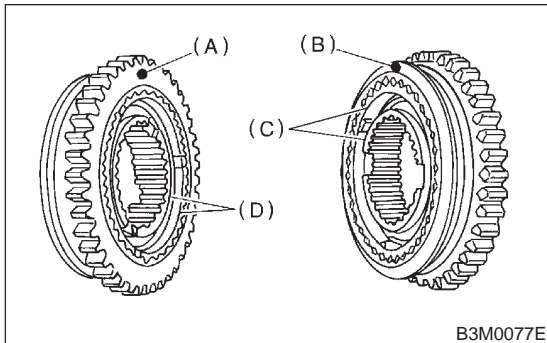
1) Assemble gear and hub assembly.

### NOTE:

- Use new gear and hub assembly, if gear or hub have been replaced.
- Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.



- (A) Key grooves  
(B) Reverse driven gear



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

2) Install sub gear to 1st driven gear.

3) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

### NOTE:

- Take care to install gear and hub assembly in proper direction.
- Align baulk ring and gear & hub assembly with key groove.

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

### CAUTION:

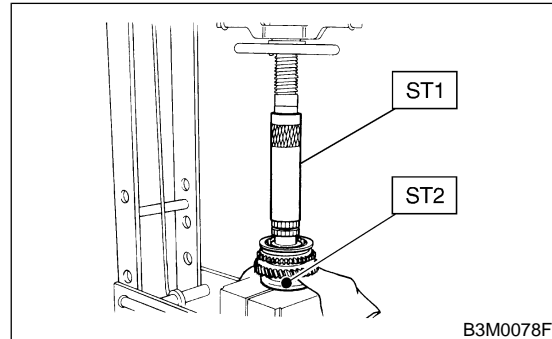
- Attach a cloth to the end of driven shaft to prevent damage.
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

### NOTE:

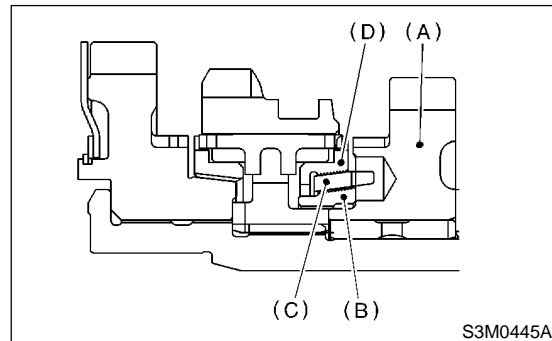
When press fitting, align oil holes of shaft and bush.

ST1 499277200 INSTALLER

ST2 499587000 INSTALLER



5) Install 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.



- (A) 2nd driven gear  
(B) Inner baulk ring  
(C) Synchro cone  
(D) Outer baulk ring

# DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

6) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

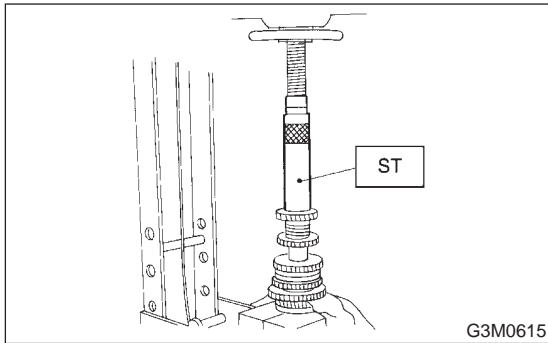
**CAUTION:**

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

**NOTE:**

Align groove in baulk ring with insert.

ST 499277200 INSTALLER

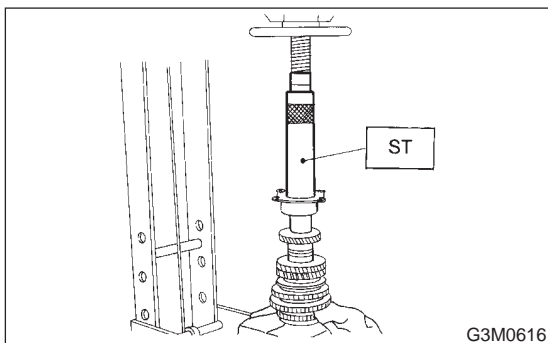


7) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.

**CAUTION:**

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

ST 499277200 INSTALLER

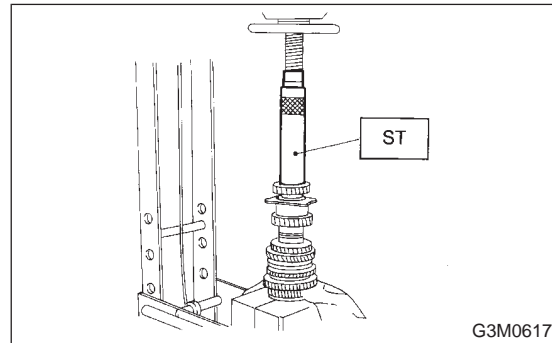


8) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

**CAUTION:**

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

ST 499277200 INSTALLER

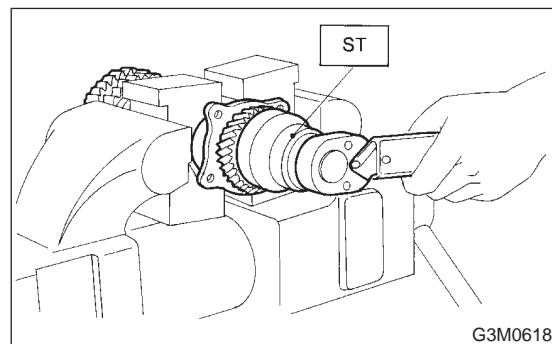


9) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

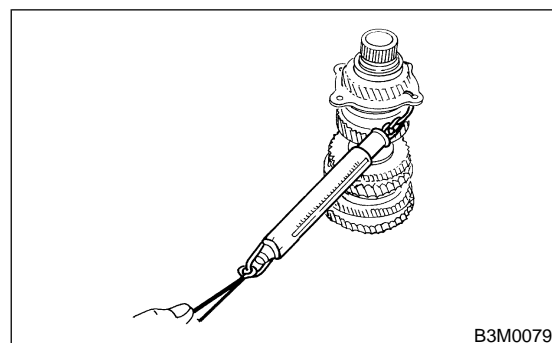
**Tightening torque:**

**265±10 N·m (27±1 kgf·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 kgf·m, 0.07 to 1.08ft·lb).



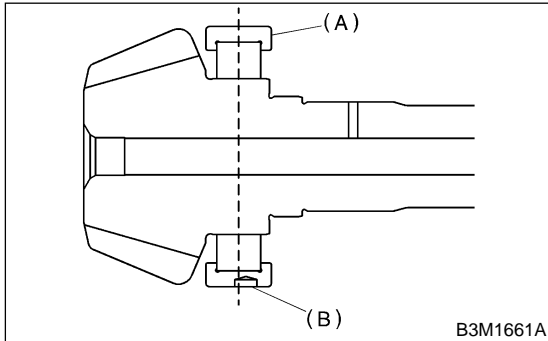
# DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

10) Install roller bearing onto drive pinion.

**NOTE:**

When installing roller bearing, note its directions (front and rear) because knock pin hole in outer race is offset.



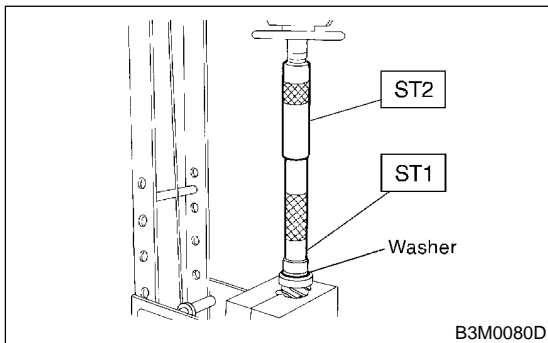
- (A) Roller bearing
- (B) Knock pin hole

11) Install washer (33 × 50 × 5) using ST1, ST2 and press.

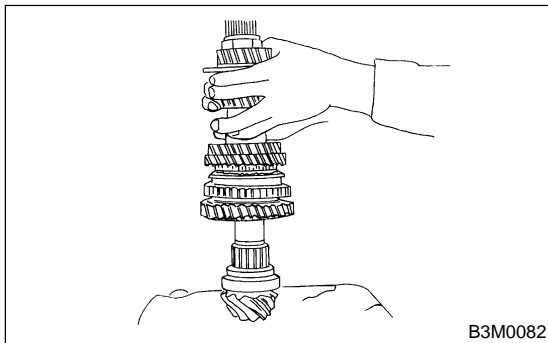
**CAUTION:**

**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



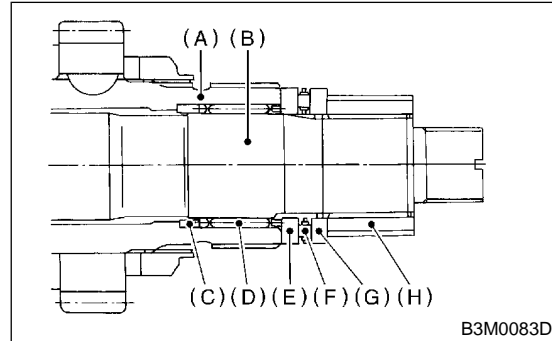
12) Install thrust bearing (33 × 50 × 3) and needle bearing (30 × 37 × 23). Install driven shaft assembly.



13) Install drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

**NOTE:**

Be careful because spacer must be installed in proper direction.



- (A) Driven shaft
- (B) Drive shaft
- (C) Drive pinion collar
- (D) Needle bearing (25 × 30 × 20)
- (E) Washer No. 2 (25 × 36 × 4)
- (F) Thrust bearing (25 × 37.5 × 3)
- (G) Washer No. 1 (25 × 36 × t)
- (H) Differential bevel gear sleeve

**E: INSPECTION**

S503269A10

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

1) Bearings

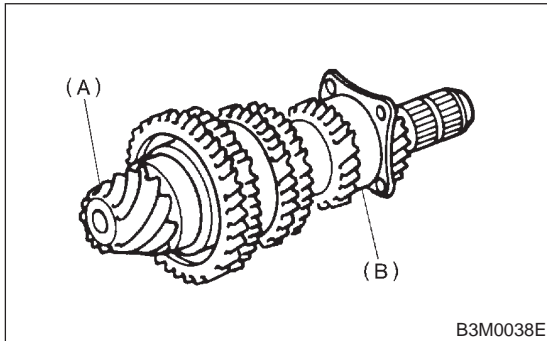
Replace bearings in the following cases:

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

# DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

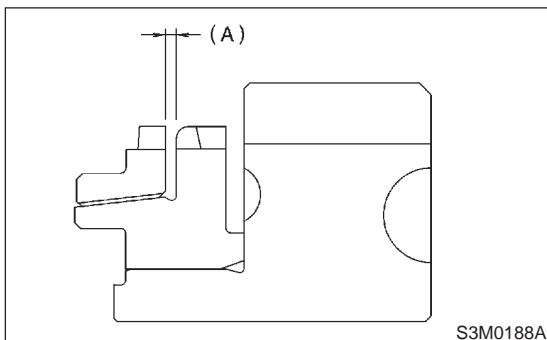
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



(A) Drive pinion shaft  
(B) Ball bearing

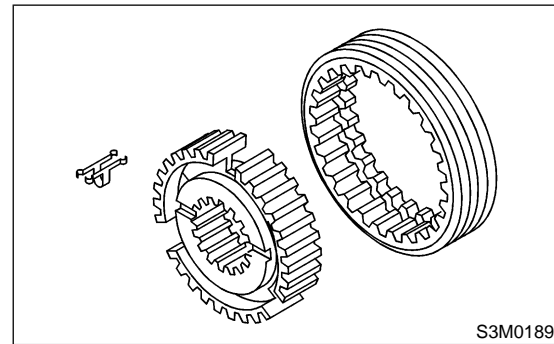
- Bearings having other defects
- 2) Bushing (each gear)  
Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
  - When the inner wall is abnormally worn.
- 3) Gears
- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
  - Correct or replace if the cone that contacts the baulk ring is rough or damaged.
  - Correct or replace if the inner surface or end face is damaged.
- 4) Baulk ring  
Replace the ring in the following cases:
- When the inner surface and end face are damaged.
  - When the ring inner surface is abnormally or partially worn down.
  - If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

**Clearance (A):**  
**0.5 — 1.0 mm (0.020 — 0.040 in)**



S3M0188A

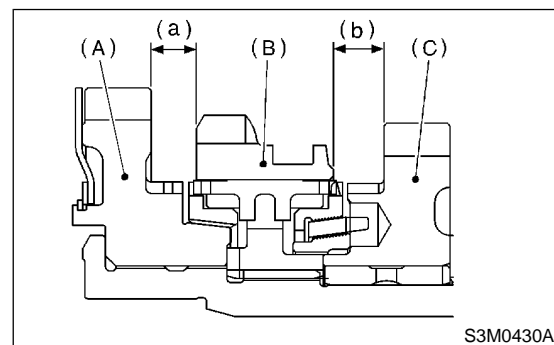
- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
- 5) Shifting insert key  
Replace the insert if deformed, excessively worn, or defective in any way.



S3M0189

- 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) Inspect clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace shifter fork as required.

**Clearance (a) and (b):**  
**9.5 mm (0.374 in)**



S3M0430A

(A) 1st driven gear  
(B) Reverse driven gear  
(C) 2nd driven gear

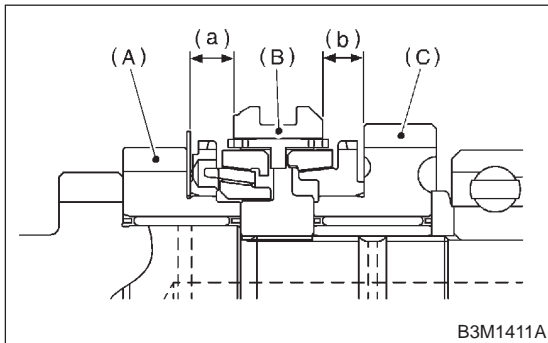
1st – 2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

# DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

10) Inspect clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

**Clearance (a) and (b):**  
**9.3 mm (0.366 in)**

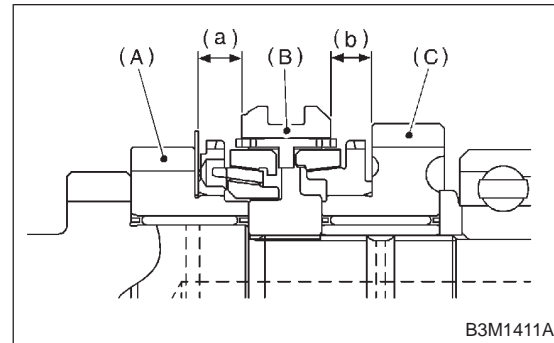


- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd – 4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	—	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

11) Inspect clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

**Clearance (a):**  
**9.3 mm (0.366 in)**



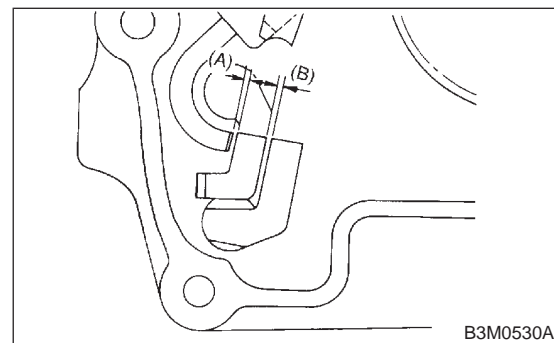
- (A) 5th drive gear
- (B) Coupling sleeve

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

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

**Clearance (A):**  
**1st — 2nd to 3rd — 4th:**  
**0.4 — 1.4 mm(0.016 — 0.055 in)**

**Clearance (B):**  
**3rd — 4th to 5th:**  
**0.5 — 1.3 mm(0.020 — 0.051 in)**





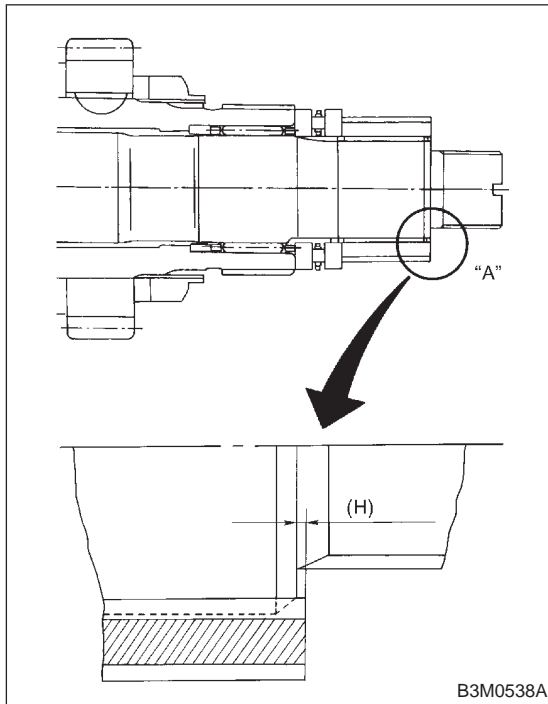
# DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

## F: ADJUSTMENT S503269A01

### 1. THRUST BEARING PRELOAD S503269A0101

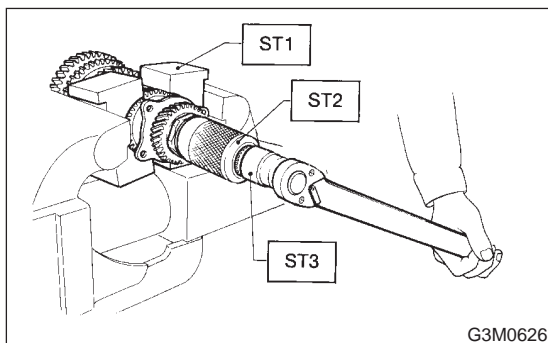
1) After completing the preceding steps 1) through 3), select adjusting washer No. 1 so that dimension (H) is zero through visual check. Position washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



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

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

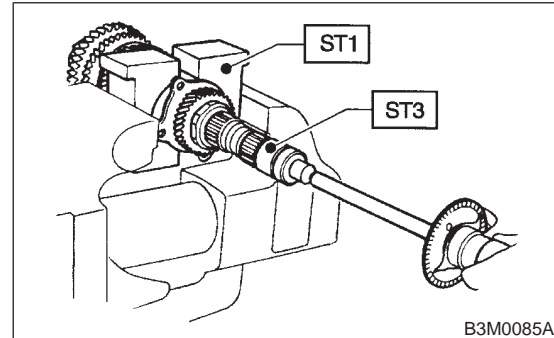
**Tightening torque:**  
**118 N·m (12 kgf·m, 86.8 ft-lb)**



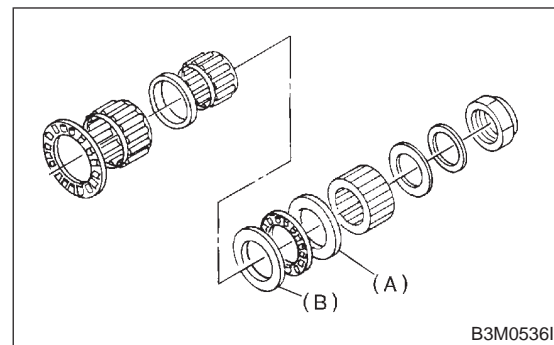
3) After removing ST2, measure starting torque using torque driver.

ST1 899884100 HOLDER  
 ST3 899988608 SOCKET WRENCH (27)

**Starting torque:**  
**54±25 N·m (5.5±2.5 kgf·m, 40±18 ft-lb)**



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



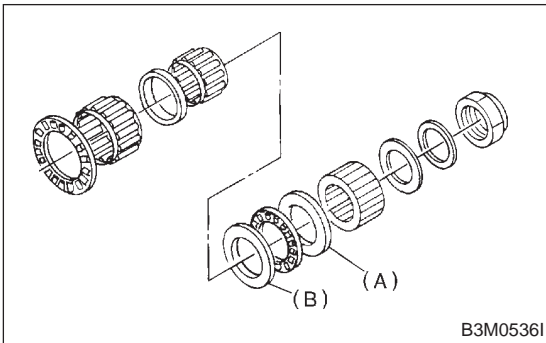
(A) Adjusting washer No.1  
 (B) Adjusting washer No.2

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

# DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

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.

## 18. Front Differential Assembly

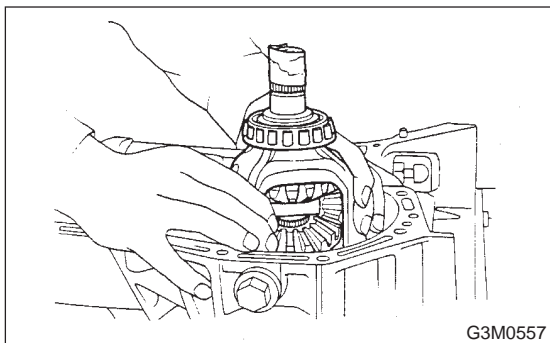
S503152

### A: REMOVAL S503152A18

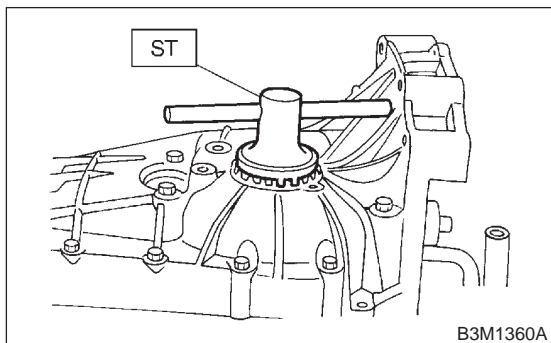
- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. Remove transfer case with extension case assembly. <Ref. to MT-51 REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly. Remove transfer case with extension case assembly. <Ref. to MT-59 REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly. Remove transfer case with extension case assembly. <Ref. to MT-54 REMOVAL, Main Shaft Assembly.>
- 6) Remove differential assembly.

#### CAUTION:

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



- 7) Remove differential side retainers using ST. ST 499787000 WRENCH ASSY



### B: INSTALLATION S503152A11

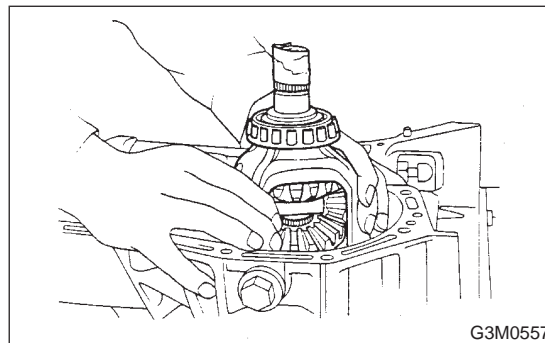
- 1) Install differential assembly.

#### CAUTION:

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

#### NOTE:

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



- 2) Install main shaft assembly. <Ref. to MT-54 INSTALLATION, Main Shaft Assembly.>
- 3) Install drive pinion assembly. <Ref. to MT-59 INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install transmission case. <Ref. to MT-51 INSTALLATION, Transmission Case.>
- 5) Install transfer case with extension case assembly. <Ref. to MT-39 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly from vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

### C: DISASSEMBLY S503152A06

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

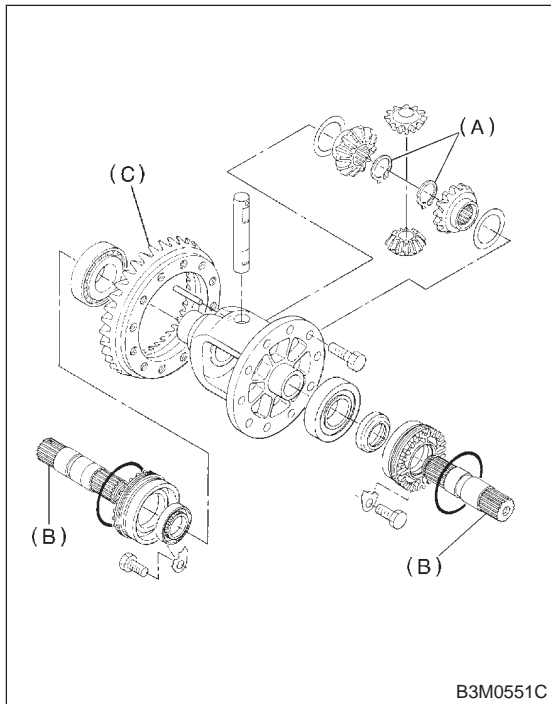
#### NOTE:

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

# FRONT DIFFERENTIAL ASSEMBLY

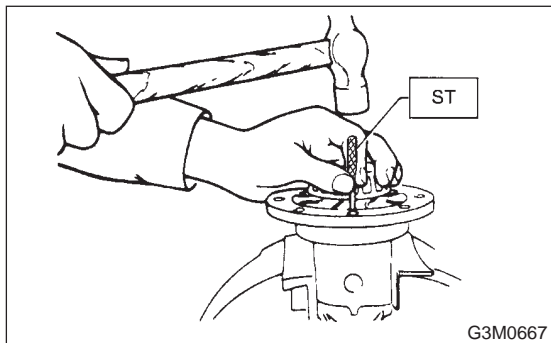
Manual Transmission and Differential

2) Loosen twelve bolts and remove hypoid driven gear.

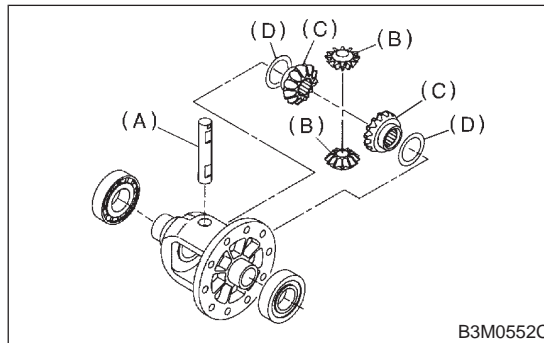


- (A) Snap ring
- (B) Axle drive shaft
- (C) Hypoid driven gear

3) Drive out straight pin from differential assembly toward hypoid driven gear.  
ST 899904100 REMOVER

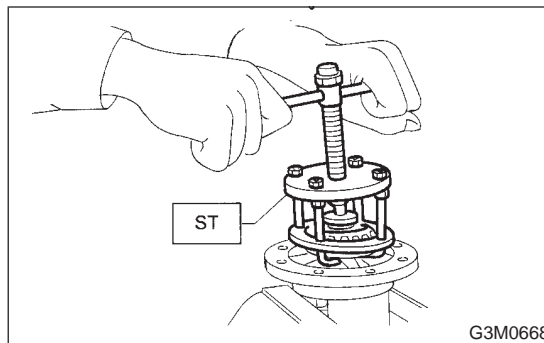


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

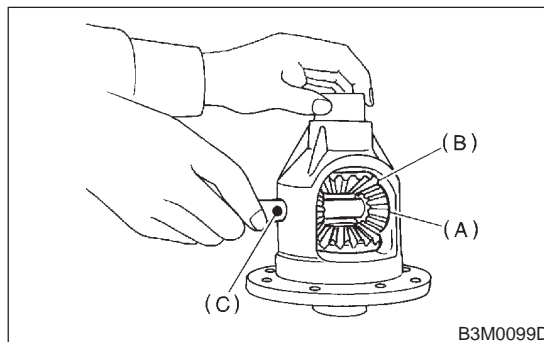
5) Remove roller bearing using ST.  
ST 399527700 PULLER SET



## D: ASSEMBLY S503152A02

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

NOTE:  
Face the chamfered side of washer toward gear.



- (A) Bevel pinion
- (B) Bevel gear
- (C) Pinion shaft

# FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to MT-73 ADJUSTMENT, Front Differential Assembly.>

**NOTE:**

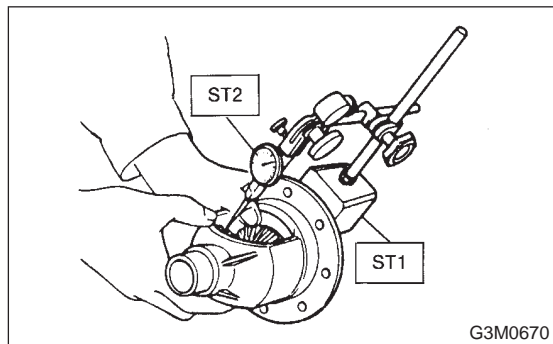
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

**Standard backlash:**

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

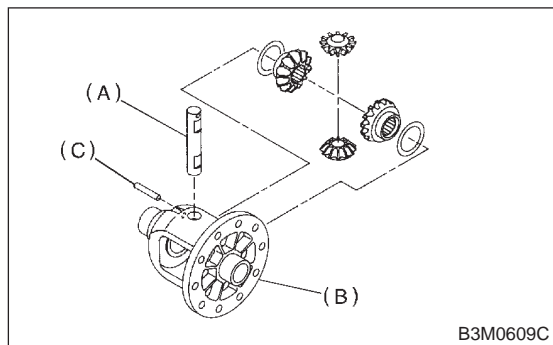


3) Align pinion shaft and differential case at their holes, and drive straight pin into holes from the hypoid driven gear side, using ST.

**NOTE:**

Lock straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

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

**CAUTION:**

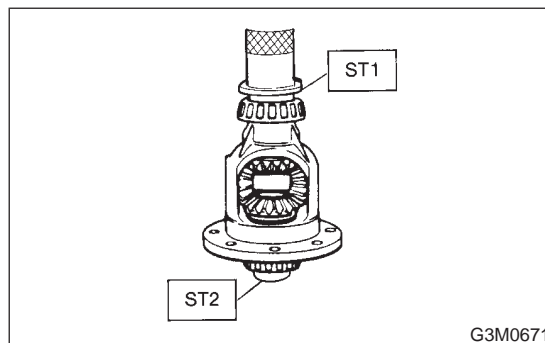
**Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).**

**NOTE:**

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

ST1 499277100 BUSH 1-2 INSTALLER

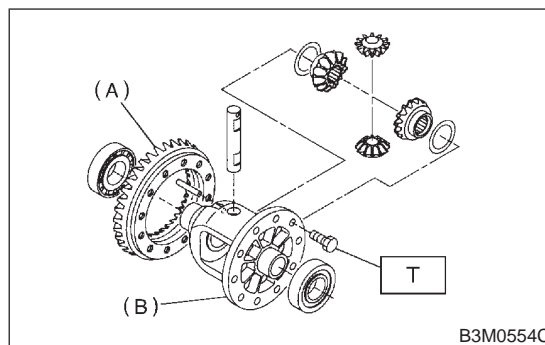
ST2 398497701 ADAPTER



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

**Tightening torque:**

**T: 62 N·m (6.3 kgf·m, 45.6 ft·lb)**



- (A) Hypoid driven gear
- (B) Differential case

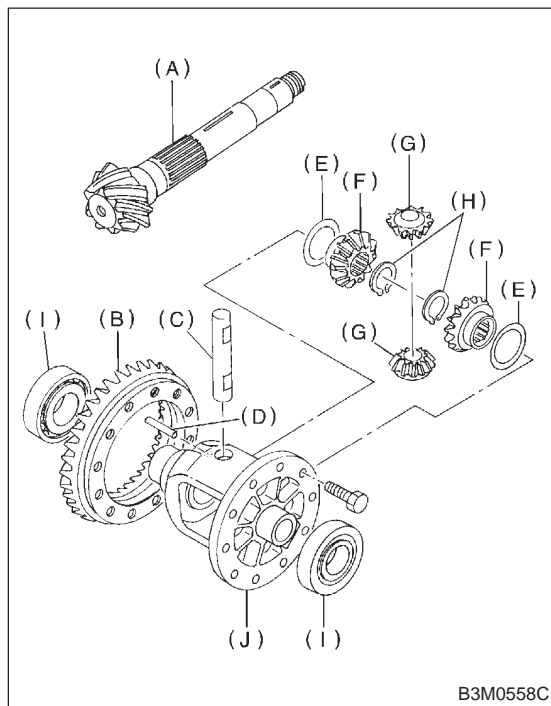
## E: INSPECTION S503152A10

Repair or replace the differential gear in the following cases:

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

# FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential



B3M0558C

- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Snap ring
- (I) Roller bearing
- (J) Differential case

## 1. BEVEL PINION GEAR BACKLASH

S503152A1001

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

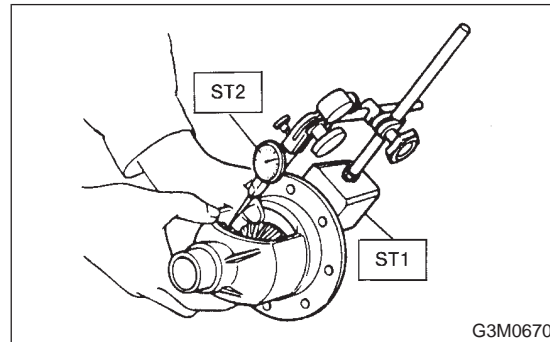
### NOTE:

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

ST1 498247001 MAGNET BASE  
ST2 498247100 DIAL GAUGE

### Standard backlash:

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



G3M0670

## 2. HYPOID GEAR BACKLASH

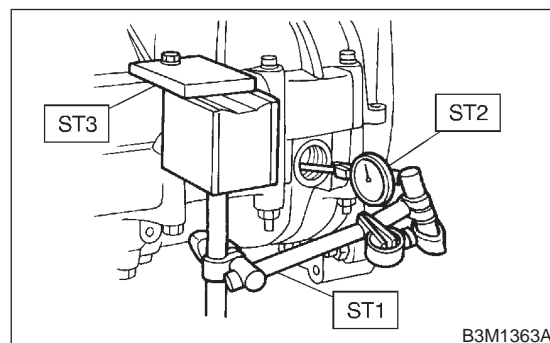
S503152A1002

Set ST1 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)**



B3M1363A

### NOTE:

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

## 3. TOOTH CONTACT OF HYPOID GEAR

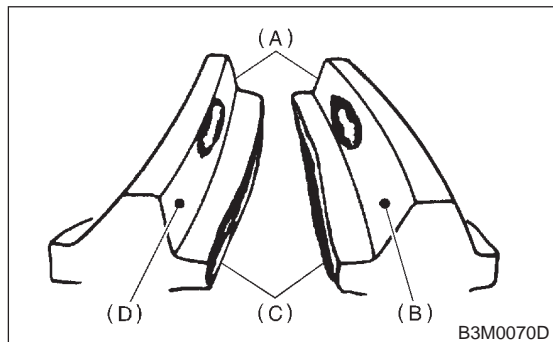
S503152A1003

Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is inaccurate, make adjustment. <Ref. to MT-73 ADJUSTMENT, Front Differential Assembly.>

# FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

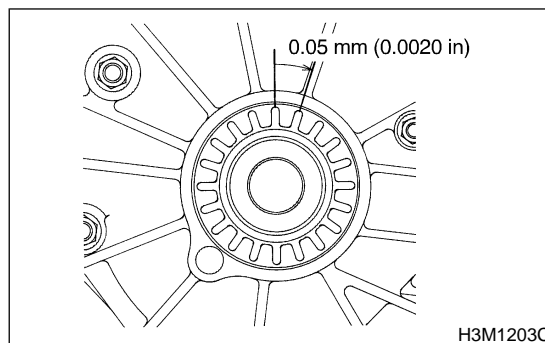
- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

## NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.020 in).



## F: ADJUSTMENT

S503152A01

### 1. BEVEL PINION GEAR BACKLASH

S503152A0101

- 1) Disassemble the front differential. <Ref. to MT-69 REMOVAL, Front Differential Assembly.>
- 2) Select a different washer from the table and install.

Washer (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) Adjust until the specified value is obtained.

#### Standard backlash:

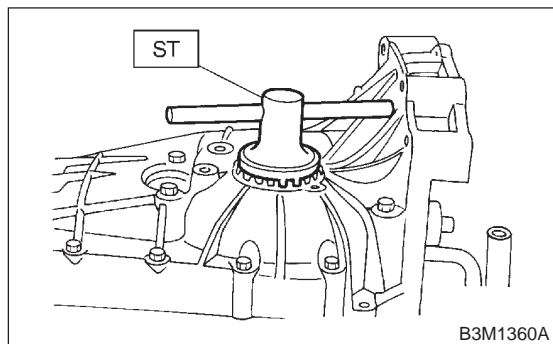
**0.13 — 0.18 mm (0.0051 — 0.0071 in)**

### 2. HYPOID GEAR BACKLASH

S503152A0102

Adjust backlash by turning holder in right side case.

ST 499787000 WRENCH ASSY

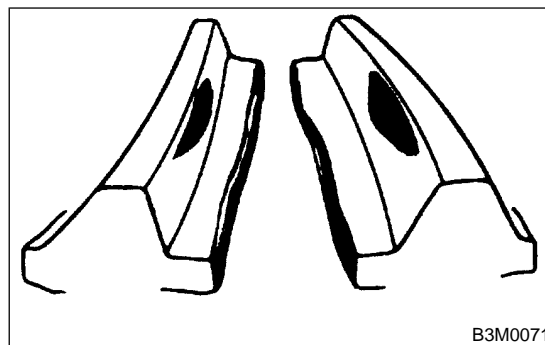


### 3. TOOTH CONTACT OF HYPOID GEAR

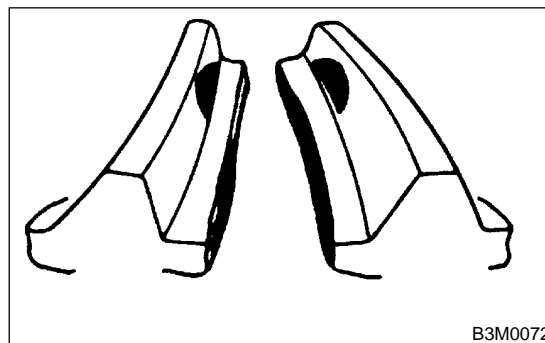
S503152A0103

Adjust until the teeth contact is correct.

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



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



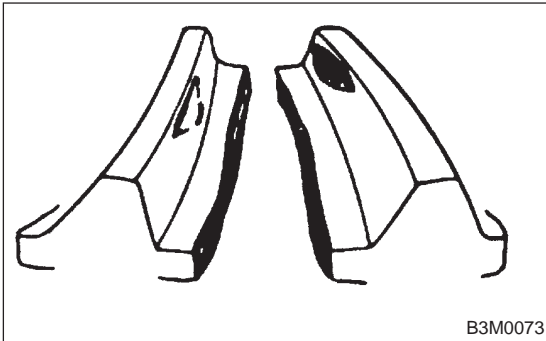
# FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

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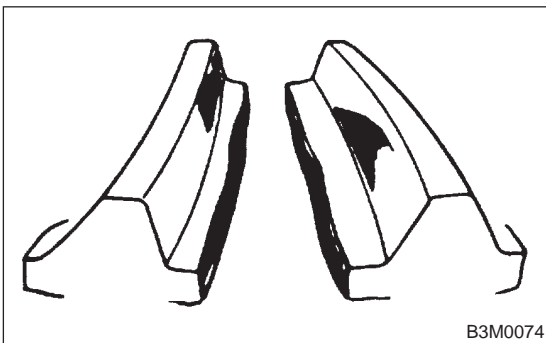
- The drive pinion shim selected before is too thick.

Reduce its thickness.



- The drive pinion shim selected before is too thin.

Increase its thickness.

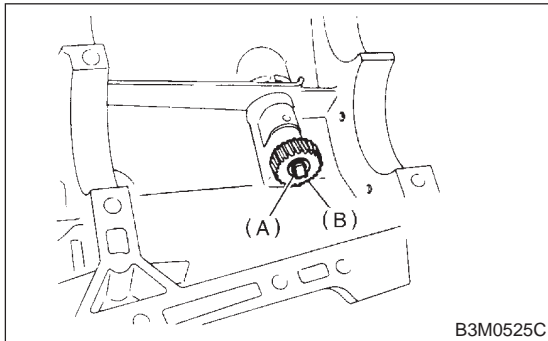




## 19. Speedometer Gear S503268

### A: REMOVAL S503268A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-36 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-51 REMOVAL, Transmission Case.>
- 5) Remove vehicle speed sensor. <Ref. to MT-37 REMOVAL, Vehicle Speed Sensor.>
- 6) Remove outer snap ring and pull out speedometer driven gear. Next, remove vehicle speed sensor, oil seal, speedometer shaft and washer.



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

### B: INSTALLATION S503268A11

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

#### CAUTION:

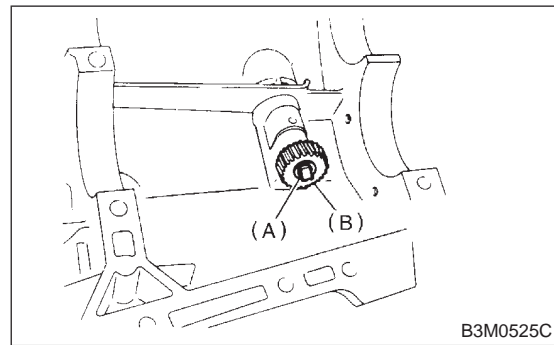
**Use new oil seal, if it has been removed.**

ST 899824100 or 499827000 PRESS

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

#### CAUTION:

**Use new snap ring, if it has been removed.**



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

- 4) Install transmission case. <Ref. to MT-51 INSTALLATION, Transmission Case.>
- 5) Install transfer case with extension case assembly. <Ref. to MT-39 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install back-up light switch and neutral position switch. <Ref. to MT-36 INSTALLATION, Switches and Harness.>
- 7) Install the manual transmission assembly from vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

### C: INSPECTION S503268A10

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

# REVERSE IDLER GEAR

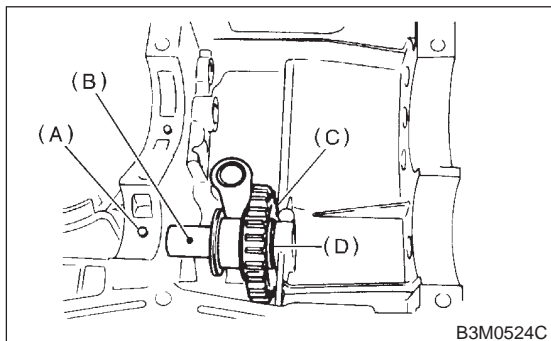
## 20. Reverse Idler Gear

S503263

### A: REMOVAL

S503263A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-36 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-59 REMOVAL, Transmission Case.>
- 5) Remove drive pinion shaft assembly. <Ref. to MT-59 REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove main shaft assembly. <Ref. to MT-54 REMOVAL, Main Shaft Assembly.>
- 7) Remove differential assembly. <Ref. to MT-69 REMOVAL, Front Differential Assembly.>
- 8) Remove shifter forks and rods. <Ref. to MT-78 REMOVAL, Shifter Fork and Rod.>
- 9) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.



- (A) Straight pin
- (B) Idler gear shaft
- (C) Idler gear
- (D) Washer

- 10) Remove reverse shifter lever.

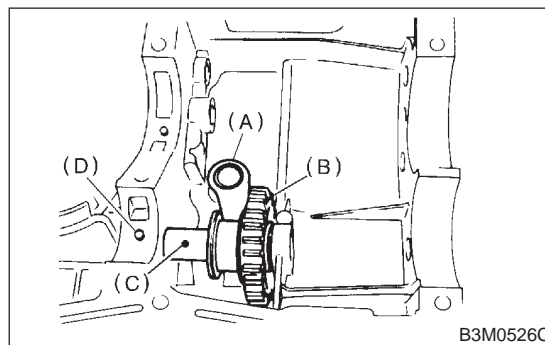
### B: INSTALLATION

S503263A11

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

#### NOTE:

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



- (A) Reverse shifter lever
- (B) Reverse idler gear
- (C) Reverse idler gear shaft
- (D) Straight pin

- 2) Install reverse arm fork spring, ball and interlock plunger (5.56×9.6) 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

- 3) Position ball (7.1438), spring and gasket in the reverse shifter rod hole on the left side transmission case, and tighten checking ball plug.

#### CAUTION:

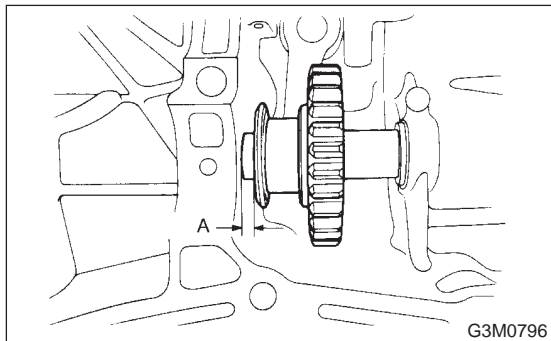
**Replace gasket with a new one.**

- 4) Inspect and adjust clearance between reverse idler gear and transmission case wall. <Ref. to MT-76 INSTALLATION, Reverse Idler Gear.> and <Ref. to MT-77 ADJUSTMENT, Reverse Idler Gear.>
- 5) Install shifter forks and rods. <Ref. to MT-78 INSTALLATION, Shifter Fork and Rod.>
- 6) Install differential assembly. <Ref. to MT-69 INSTALLATION, Front Differential Assembly.>
- 7) Install main shaft assembly. <Ref. to MT-54 INSTALLATION, Main Shaft Assembly.>
- 8) Install drive pinion shaft assembly. <Ref. to MT-59 INSTALLATION, Drive Pinon Shaft Assembly.>
- 9) Install transmission case. <Ref. to MT-51 INSTALLATION, Transmission Case.>
- 10) Install transfer case with extension case assembly. <Ref. to MT-39 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 11) Install back-up light switch and neutral position switch. <Ref. to MT-36 INSTALLATION, Switches and Harness.>
- 12) Install the manual transmission assembly from vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION S503263A10

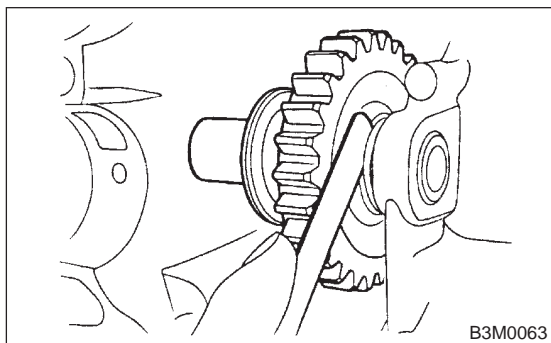
1) Move the reverse shifter rod toward the reverse side. Inspect clearance between reverse idler gear and transmission case wall. If out of specification, select the appropriate reverse shifter lever and adjust.

**Clearance A:**  
**6.0 — 7.5 mm (0.236 — 0.295 in)**



2) After installing a suitable reverse shifter lever, shift into neutral. Inspect clearance between reverse idler gear and transmission case wall. If out of specification, select the appropriate washer and adjust.

**Clearance:**  
**0 — 0.5 mm (0 — 0.020 in)**

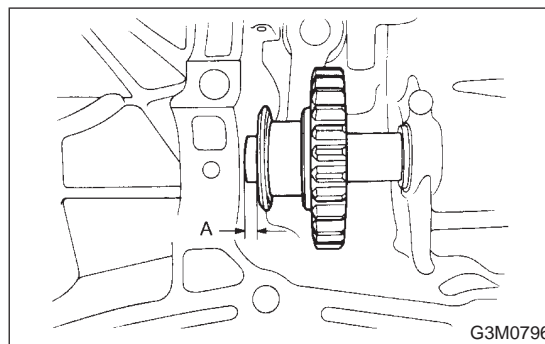


3) Check the reverse idler gear and shaft for damage. Replace if damaged.

## D: ADJUSTMENT S503263A01

1) Select the appropriate reverse shifter lever from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

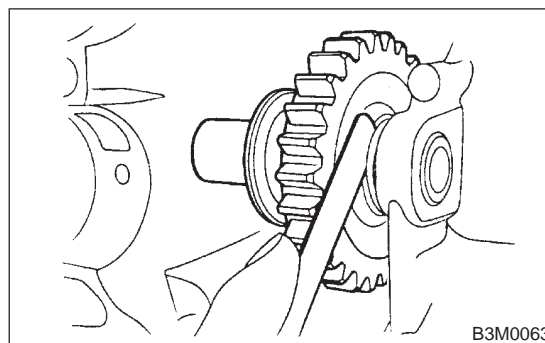
**Clearance A:**  
**6.0 — 7.5 mm (0.236 — 0.295 in)**



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

2) Select the appropriate washer from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

**Clearance:**  
**0 — 0.5 mm (0 — 0.020 in)**



Washer (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)

# SHIFTER FORK AND ROD

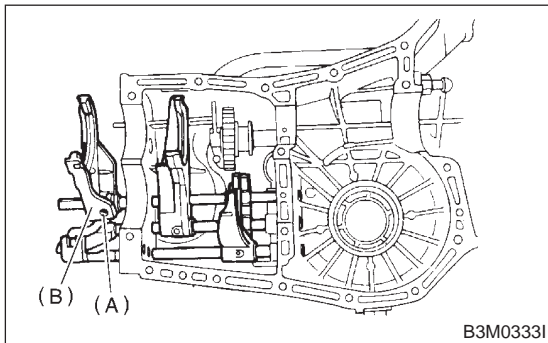
Manual Transmission and Differential

## 21. Shifter Fork and Rod S503255

### A: REMOVAL S503255A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-36 REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-39 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-51 REMOVAL, Transmission Case.>
- 5) Remove drive pinion shaft assembly. <Ref. to MT-59 REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove main shaft assembly. <Ref. to MT-54 REMOVAL, Main Shaft Assembly.>
- 7) Remove differential assembly. <Ref. to MT-69 REMOVAL, Front Differential Assembly.>
- 8) Drive out straight pin with ST, and 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER

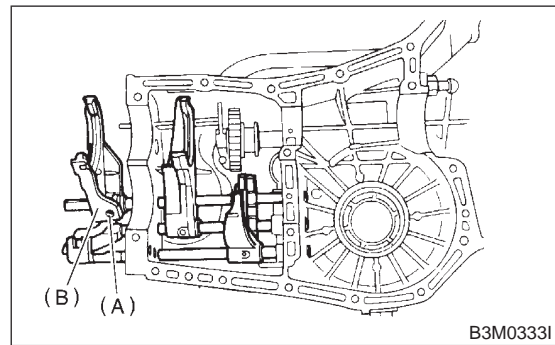


- (A) Straight pin
- (B) 5th shifter fork

- 9) Remove plugs, springs and checking balls.
- 10) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

#### NOTE:

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

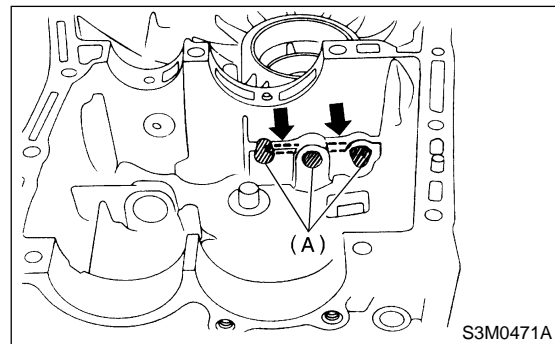


- (A) Straight pin
- (B) 3-4 fork rod
- (C) Shifter fork

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

### B: INSTALLATION S503255A11

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



- (A) Rod holes

- 2) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of the transmission case.
- 3) Align the holes in rod and fork, and drive straight pin (6×22) into these holes using ST.

#### 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.

ST 398791700 STRAIGHT PIN REMOVER

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

#### CAUTION:

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

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

MT-78

# SHIFTER FORK AND ROD

Manual Transmission and Differential

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

**CAUTION:**

**Replace straight pin with a new one.**

**NOTE:**

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

ST 398791700 STRAIGHT PIN REMOVER

7) 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

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

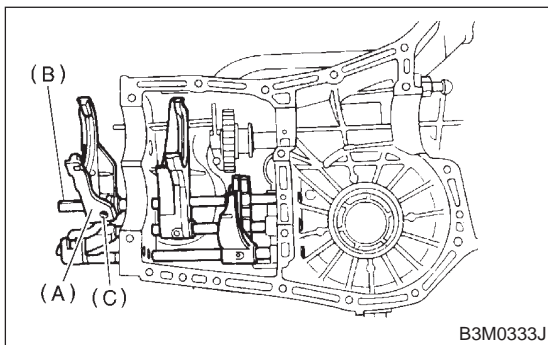
13) Install transfer case with extension case assembly. <Ref. to MT-39 INSTALLATION, Transfer Case and Extension Case Assembly.>

14) Install back-up light switch and neutral position switch. <Ref. to MT-36 INSTALLATION, Switches and Harness.>

15) Install the manual transmission assembly from vehicle. <Ref. to MT-30 INSTALLATION, Manual Transmission Assembly.>

## C: INSPECTION S503255A10

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

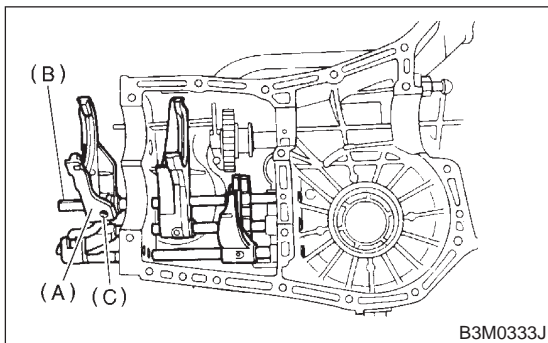


- (A) 5th shifter fork
- (B) Reverse fork rod
- (C) Straight pin

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

**CAUTION:**

**Replace gasket with a new one.**



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

10) Install main shaft assembly. <Ref. to MT-54 INSTALLATION, Main Shaft Assembly.>

11) Install drive pinion shaft assembly. <Ref. to MT-59 INSTALLATION, Drive Pinon Shaft Assembly.>

# GENERAL DIAGNOSTIC

Manual Transmission and Differential

## 22. General Diagnostic S503278

### A: INSPECTION S503278A10

#### 1. MANUAL TRANSMISSION S503278A1001

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

## 2. DIFFERENTIAL S503278A1002

Symptom	Possible cause	Remedy
<p>1. Broken differential (case, gear, bearing, etc.)</p> <p>NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.</p>	(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.
<p>2. Differential and hypoid gear noises</p> <p>Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises.</p> <ul style="list-style-type: none"> <li>● 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.</li> <li>● Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment</li> <li>● Bearing noise when driving or when coasting: Cracked, broken or damaged bearings</li> <li>● Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.</li> </ul>	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

# GENERAL DIAGNOSTIC

Manual Transmission and Differential

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**MEMO:**



# BASIC DIAGNOSTIC PROCEDURE

Automatic Transmission (DIAGNOSTICS)

## 1. Basic Diagnostic Procedure

S004501

### A: PROCEDURE S004501E45

No.	Step	Check	Yes	No
1	<b>CHECK PRE-INSPECTION.</b> 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to AT-4 Check List for Interview.> 2) Before performing diagnosis, inspect the following items which might influence the AT problems. <ul style="list-style-type: none"><li>● General inspection &lt;Ref. to AT-5 INSPECTION, General Description.&gt;</li><li>● Oil leak</li><li>● Stall speed test &lt;Ref. to AT-12 Stall Test.&gt;</li><li>● Line pressure test &lt;Ref. to AT-15 Line Pressure Test.&gt;</li><li>● Transfer clutch pressure test &lt;Ref. to AT-17 Transfer Clutch Pressure Test.&gt;</li><li>● Time lag test &lt;Ref. to AT-14 Time Lag Test.&gt;</li><li>● Road test &lt;Ref. to AT-11 Road Test.&gt;</li><li>● Inhibitor switch &lt;Ref. to AT-28 Inhibitor Switch.&gt;</li></ul>	Is unit that might influence the AT problem normal?	Go to step 2.	Repair or replace each item.
2	<b>CHECK AT OIL TEMP WARNING LIGHT.</b>	Is the AT OIL TEMP warning light flashing?	Go to step 3.	Go to step 4.
3	<b>CHECK INDICATION OF TROUBLE CODE.</b> Calling up trouble code. Without SUBARU SELECT MONITOR <Ref. to AT-26 WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.> With SUBARU SELECT MONITOR <Ref. to AT-27 WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.>	Is the trouble code displayed?	Go to step 5. NOTE: Record all trouble codes.	Go to step 4.

# BASIC DIAGNOSTIC PROCEDURE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
4	<p><b>PERFORM THE GENERAL DIAGNOSTICS.</b></p> <p>1) Inspect using "Diagnostic Procedure for No-trouble Code". &lt;Ref. to AT-118 Diagnostoc Procedure for No-trouble Code.&gt;</p> <p>2) Inspect using "Symptom Related Diagnostic". &lt;Ref. to AT-138 Symptom Related Diagnostic.&gt;</p> <p>3) Perform the clear memory mode. Without SUBARU SELECT MONITOR &lt;Ref. to AT-29 WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.&gt; With SUBARU SELECT MONITOR &lt;Ref. to AT-29 WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.&gt;</p> <p>4) Perform the inspection mode. &lt;Ref. to AT-28 Inspection Mode.&gt; Calling up the trouble code. Without SUBARU SELECT MONITOR &lt;Ref. to AT-26 WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.&gt; With SUBARU SELECT MONITOR &lt;Ref. to AT-27 WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.&gt;</p>	Is the trouble code displayed?	Complete the diagnosis.	Go to step 5.
5	<p><b>PERFORM THE DIAGNOSIS.</b></p> <p>1) Inspect using "Diagnostics Chart with Trouble Code". &lt;Ref. to AT-36 Diagnostoc Procedure with Trouble Code.&gt; NOTE]: For trouble code table, refer to "List of Diagnostic Trouble Code". &lt;Ref. to AT-31 List of Diagnostic Trouble Code.&gt;</p> <p>2) Repair trouble cause.</p> <p>3) Perform the clear memory mode. Without SUBARU SELECT MONITOR &lt;Ref. to AT-29 WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.&gt; With SUBARU SELECT MONITOR &lt;Ref. to AT-29 WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.&gt;</p> <p>4) Perform the inspection mode. &lt;Ref. to AT-28 Inspection Mode.&gt;</p> <p>5) Calling up the trouble code. Without SUBARU SELECT MONITOR &lt;Ref. to AT-26 WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.&gt; With SUBARU SELECT MONITOR &lt;Ref. to AT-27 WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code.&gt;</p>	Is the trouble code displayed?	Complete the diagnosis.	Inspect using "Diagnostics Chart with Diagnostic Connector". <Ref. to AT-36 Diagnostoc Procedure with Trouble Code.>



### 3. General Description S004001

#### A: CAUTION S004001A03

- **Supplemental Restraint System “Airbag”**  
Airbag system wiring harness is routed near the transmission control module (TCM).

#### CAUTION:

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

- **Measurement**

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

#### B: INSPECTION S004001A10

##### 1. BATTERY S004001A1001

Measure battery voltage and specific gravity of electrolyte.

**Standard voltage: 12V or more**

**Specific gravity: Above 1.260**

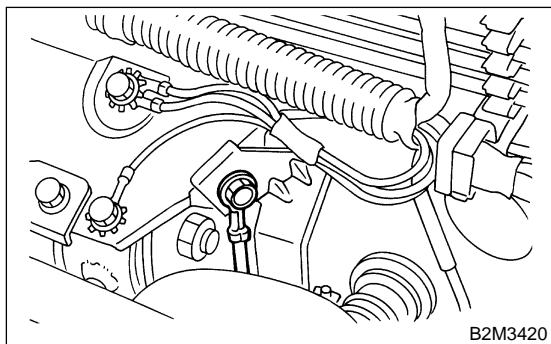
##### 2. TRANSMISSION GROUND S004001A1002

Make sure that the ground terminal bolt is tightened securely.

- **Chassis side**

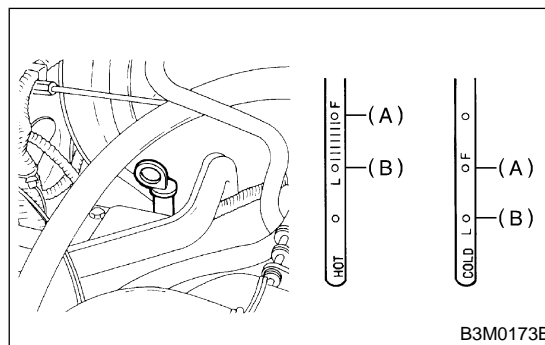
#### Tightening torque:

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



### 3. ATF LEVEL S004001A1003

Make sure that ATF level is in the specification.

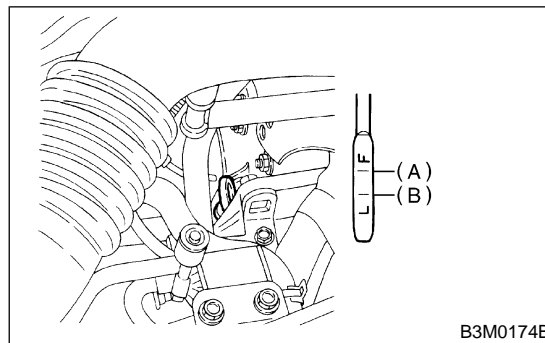


- (A) Upper level
- (B) Lower level

### 4. FRONT DIFFERENTIAL OIL LEVEL

S004001A1004

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



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

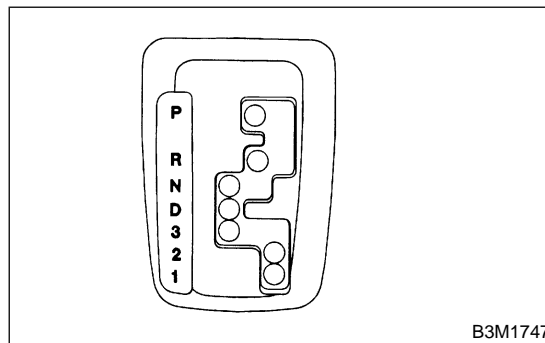
### 5. OPERATION OF SHIFT SELECT LEVER

S004001A1005

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

#### WARNING:

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

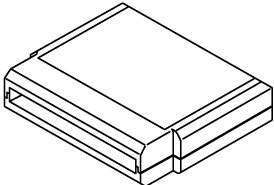



# GENERAL DESCRIPTION

Automatic Transmission (DIAGNOSTICS)

## C: PREPARATION TOOL S004001A17

### 1. SPECIAL TOOLS S004001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
  <small>B2M3876</small>	24082AA150	CARTRIDGE	Troubleshooting for electrical systems.
  <small>B2M3877</small>	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"> <li>● English: 22771AA030 (Without printer)</li> <li>● German: 22771AA070 (Without printer)</li> <li>● French: 22771AA080 (Without printer)</li> <li>● Spanish: 22771AA090 (Without printer)</li> </ul>

### 2. GENERAL PURPOSE TOOLS S004001A1702

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

## 4. Electrical Components Location

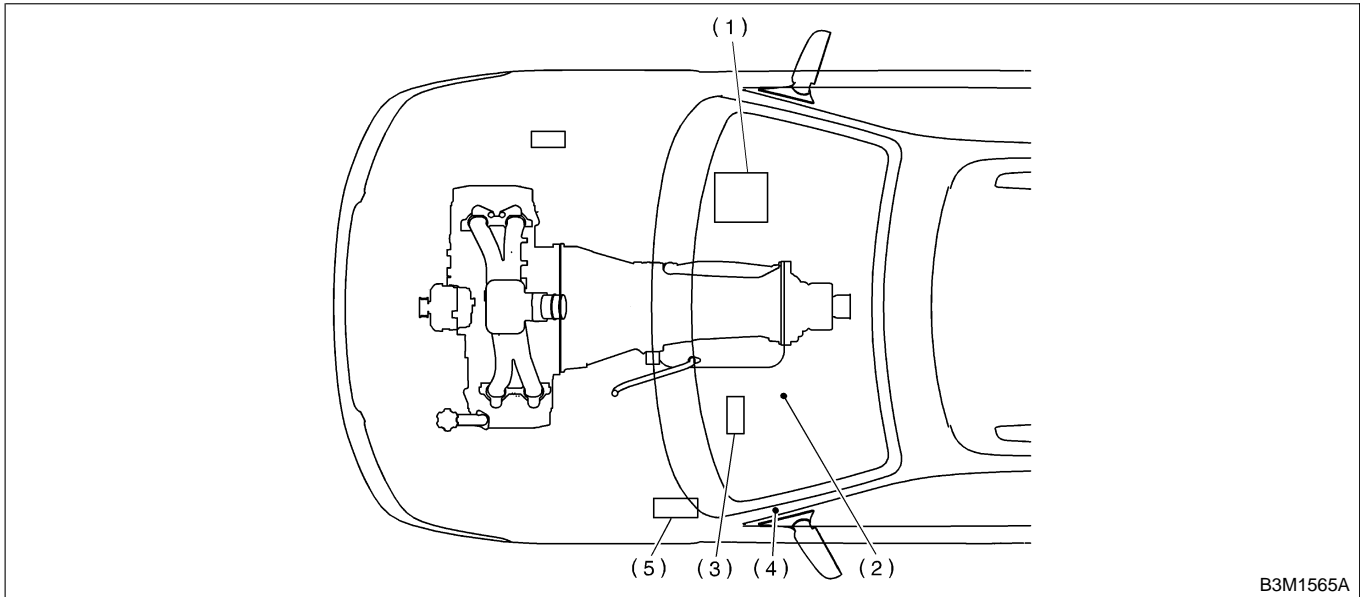
S004507

### A: LOCATION

S004507A13

#### 1. CONTROL MODULE

S004507A1301



B3M1565A

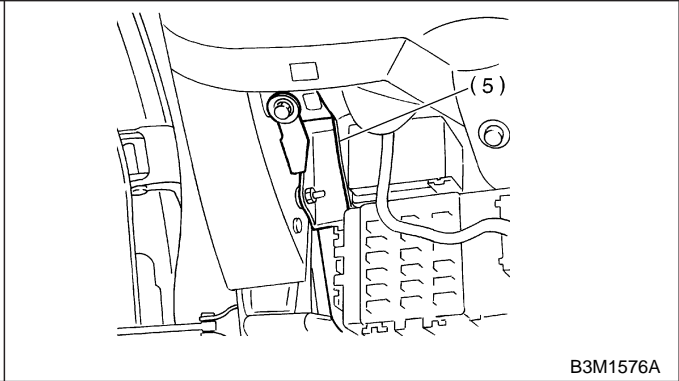
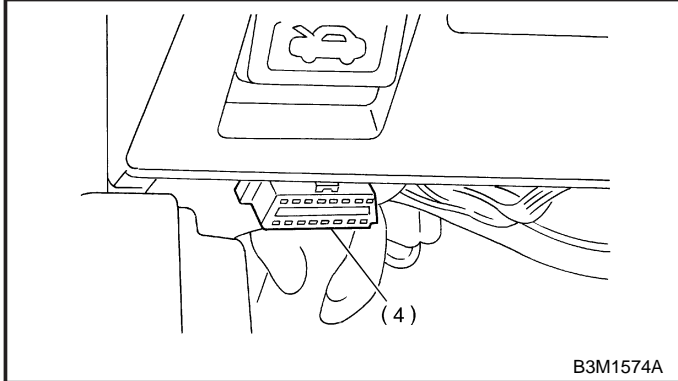
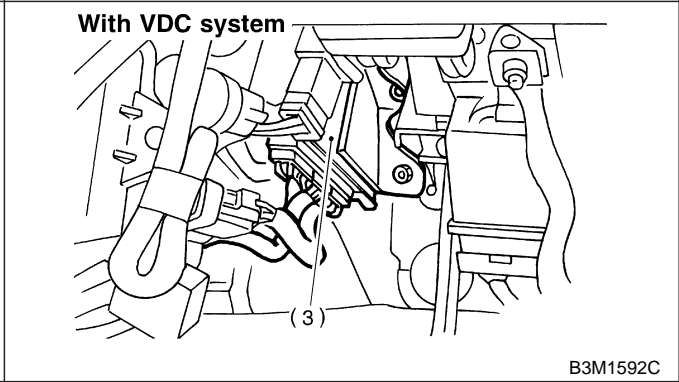
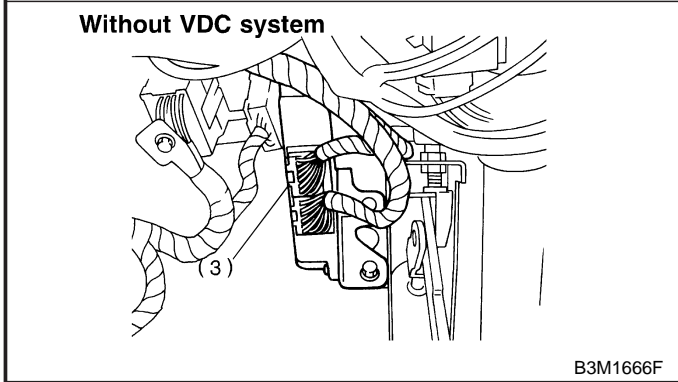
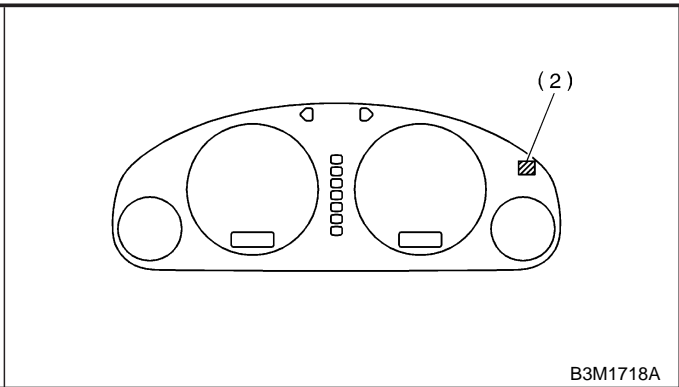
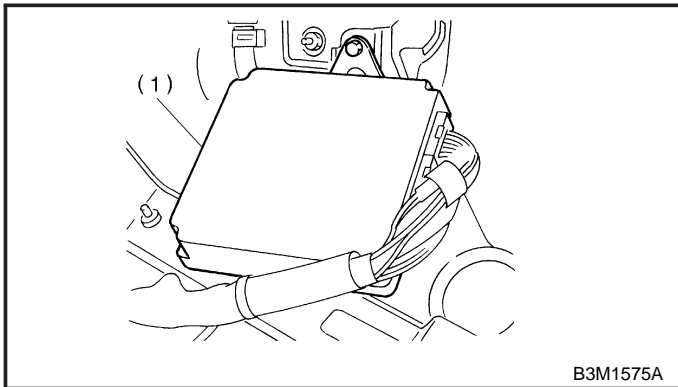
(1) Engine control module (ECM)  
(2) AT OIL TEMP warning light (AT diagnostic indicator light)

(3) Transmission control module (TCM)  
(4) Data link connector

(5) Vehicle dynamic control module (with VDC system)

# ELECTRICAL COMPONENTS LOCATION

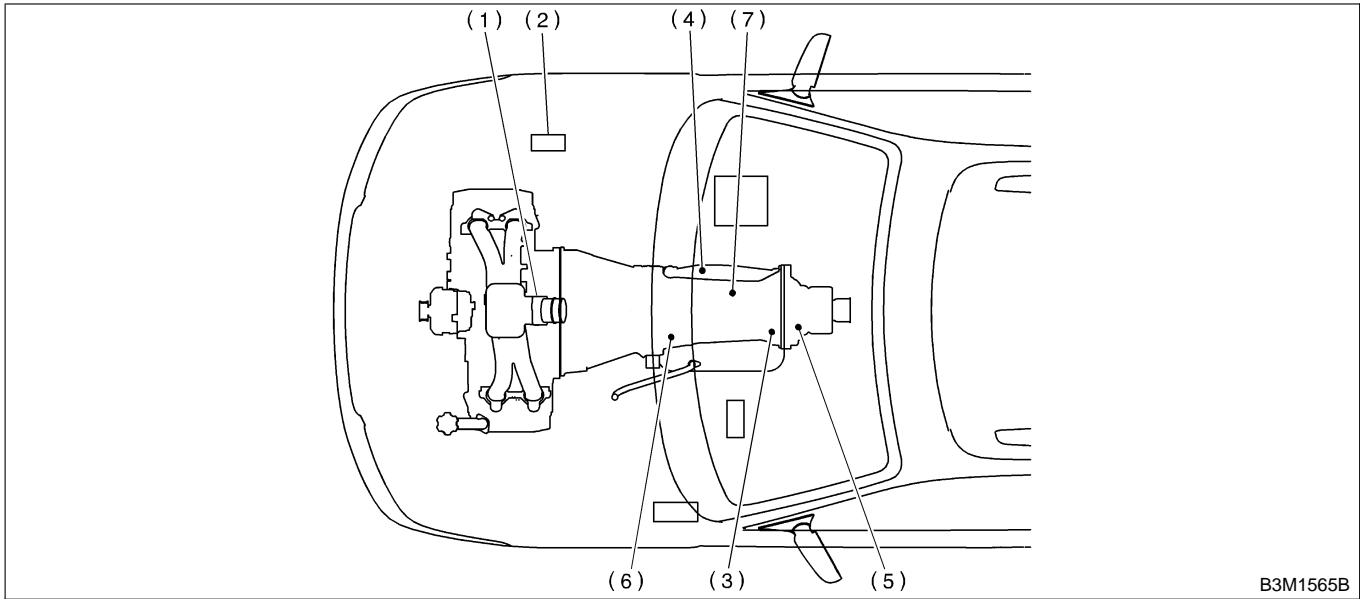
Automatic Transmission (DIAGNOSTICS)



# ELECTRICAL COMPONENTS LOCATION

Automatic Transmission (DIAGNOSTICS)

## 2. SENSOR S004507A1302



- (1) Throttle position sensor
- (2) Dropping resistor
- (3) Front vehicle speed sensor

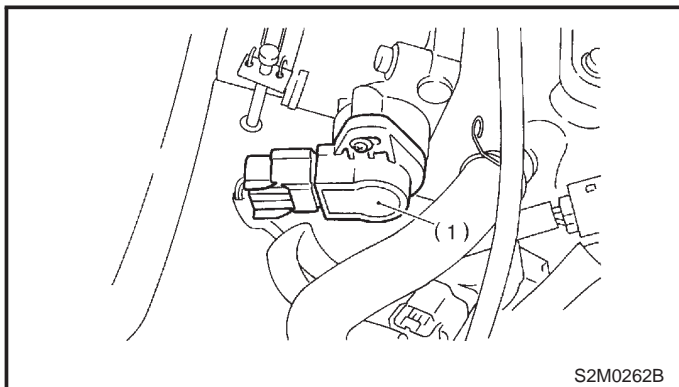
- (4) Inhibitor switch
- (5) Rear vehicle speed sensor

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



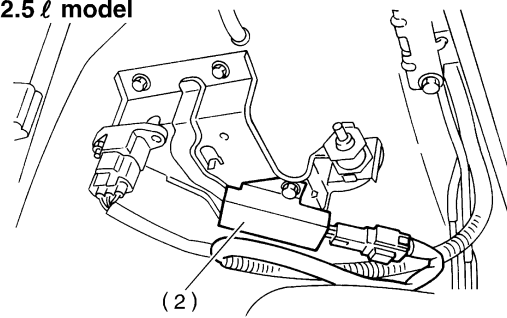
# ELECTRICAL COMPONENTS LOCATION

Automatic Transmission (DIAGNOSTICS)



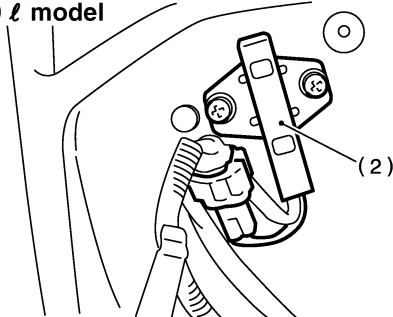
S2M0262B

2.5 l model



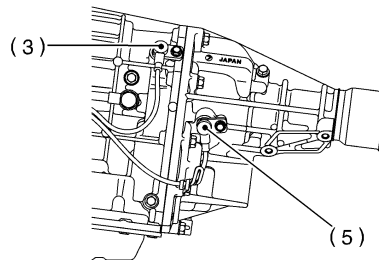
B3M1670F

3.0 l model



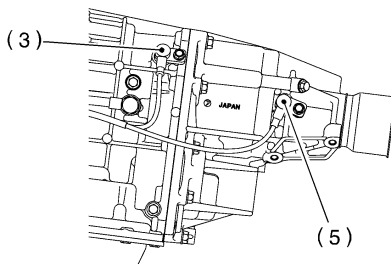
B3M2090A

Without VDC system

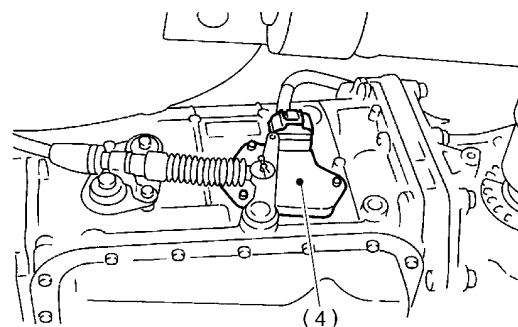


B2M2258F

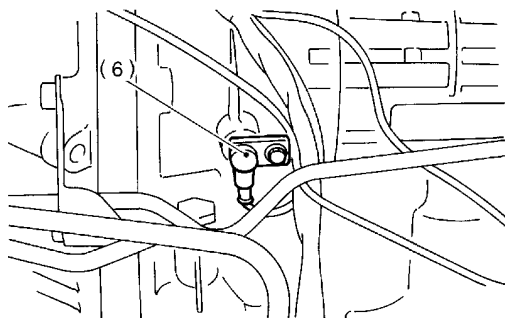
With VDC system



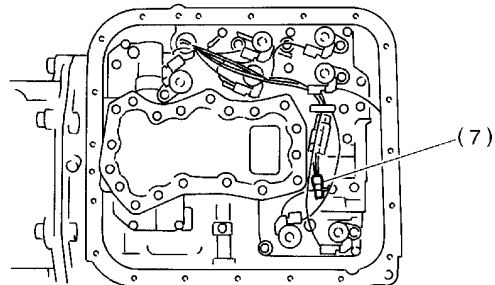
H3M1842D



B2M2246D



B2M2260C

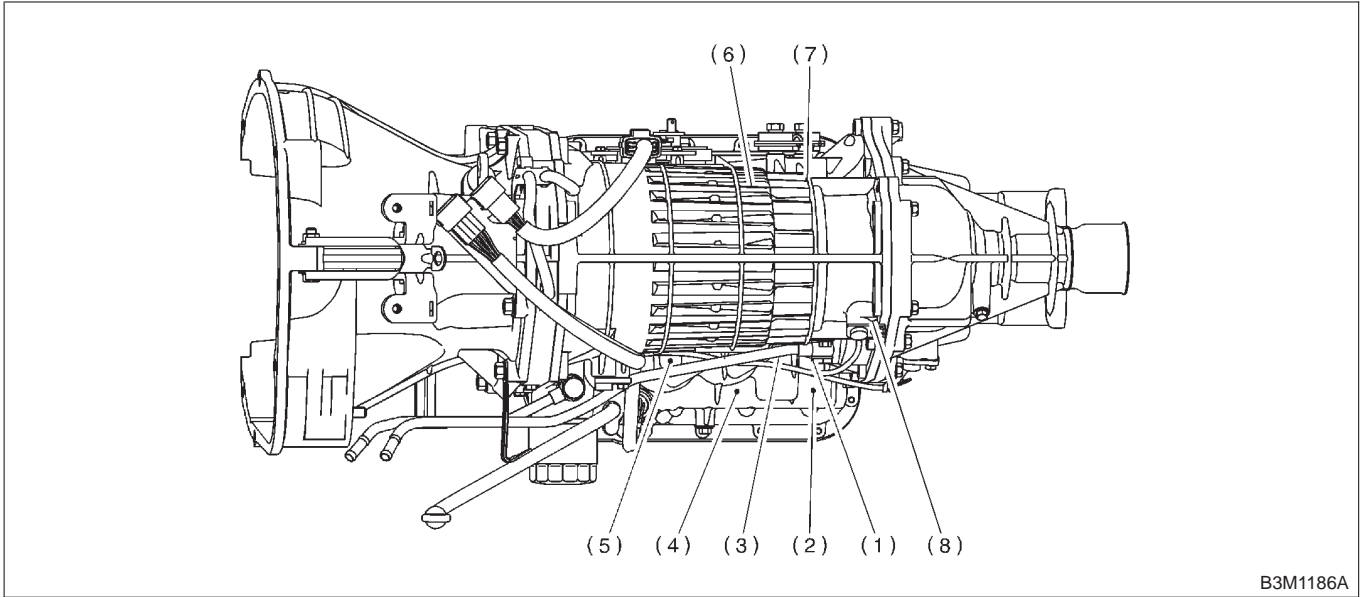


B2M2261C

# ELECTRICAL COMPONENTS LOCATION

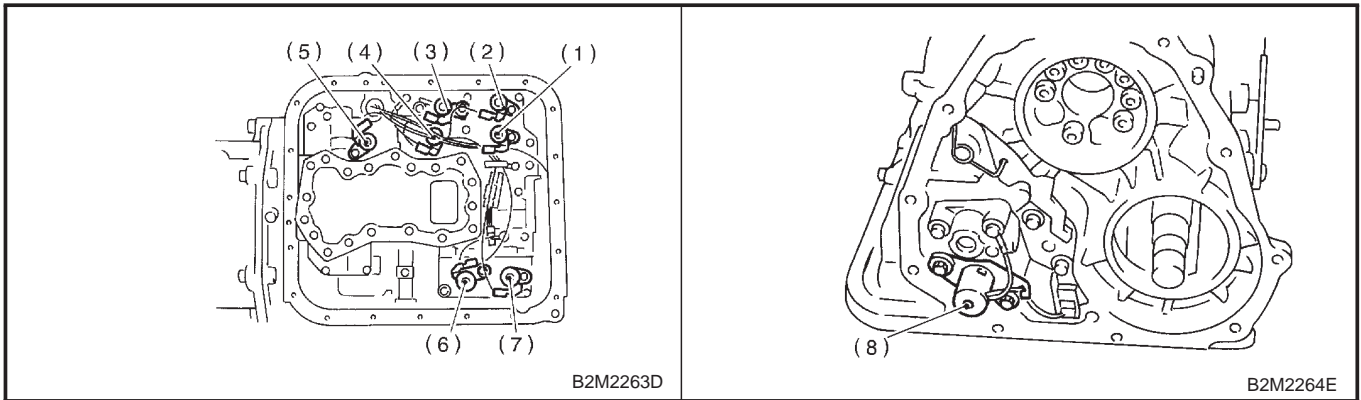
Automatic Transmission (DIAGNOSTICS)

## 3. SOLENOID S004507A1303



B3M1186A

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



B2M2263D

B2M2264E

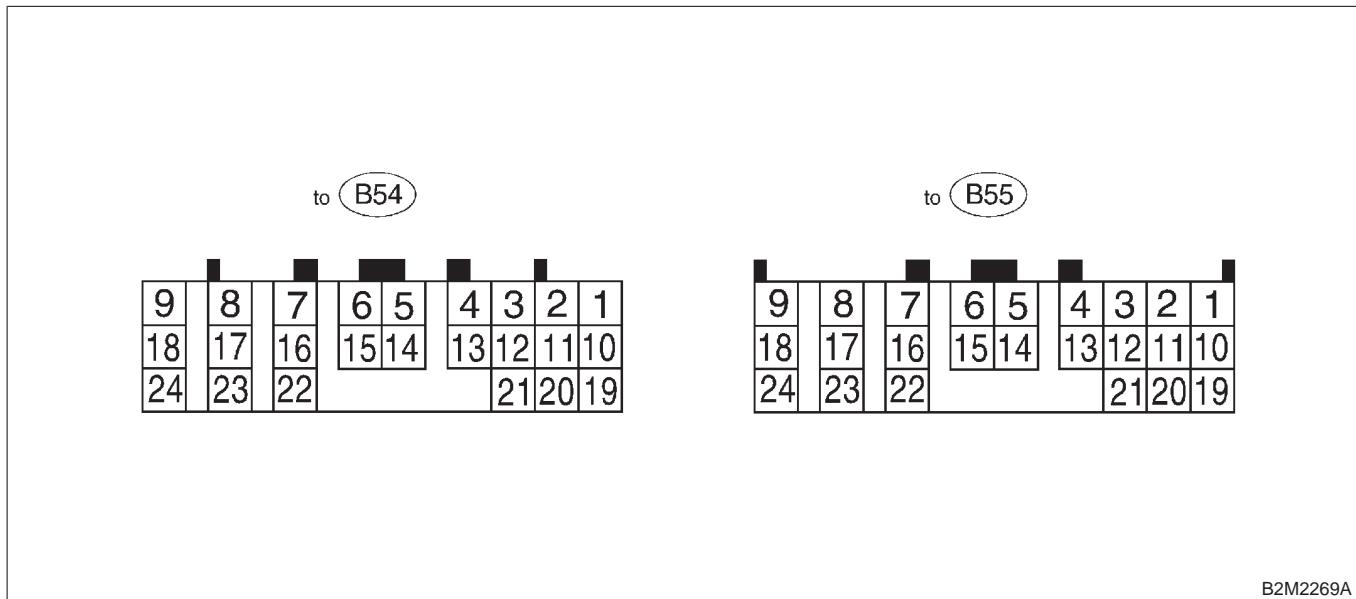
# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

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

### A: ELECTRICAL SPECIFICATION S004506A08

#### 1. WITHOUT VDC SYSTEM S004506A0801



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 8	
	"D" range switch	B55	8	Select lever in "D" range	Less than 1	—
				Select lever in any other than "D" range	More than 8	
	"3" range switch	B55	18	Select lever in "3" range	Less than 1	—
				Select lever in any other than "3" range	More than 8	
	"2" range switch	B54	10	Select lever in "2" range	Less than 1	—
				Select lever in any other than "2" range	More than 8	
	"1" range switch	B54	1	Select lever in "1" range	Less than 1	—
				Select lever in any other than "1" range	More than 8	

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
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	
AT OIL TEMP 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 — 4.0	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.5 — 0.8	275 — 375
Rear vehicle speed sensor	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	5	Vehicle stopped	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range) 4	
Torque converter turbine speed sensor	B55	12	Engine idling after warm-up (D range)	0	450 — 650
			Engine idling after warm-up (N range)	More than 1 (AC range)	
Vehicle speed output signal	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 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	

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

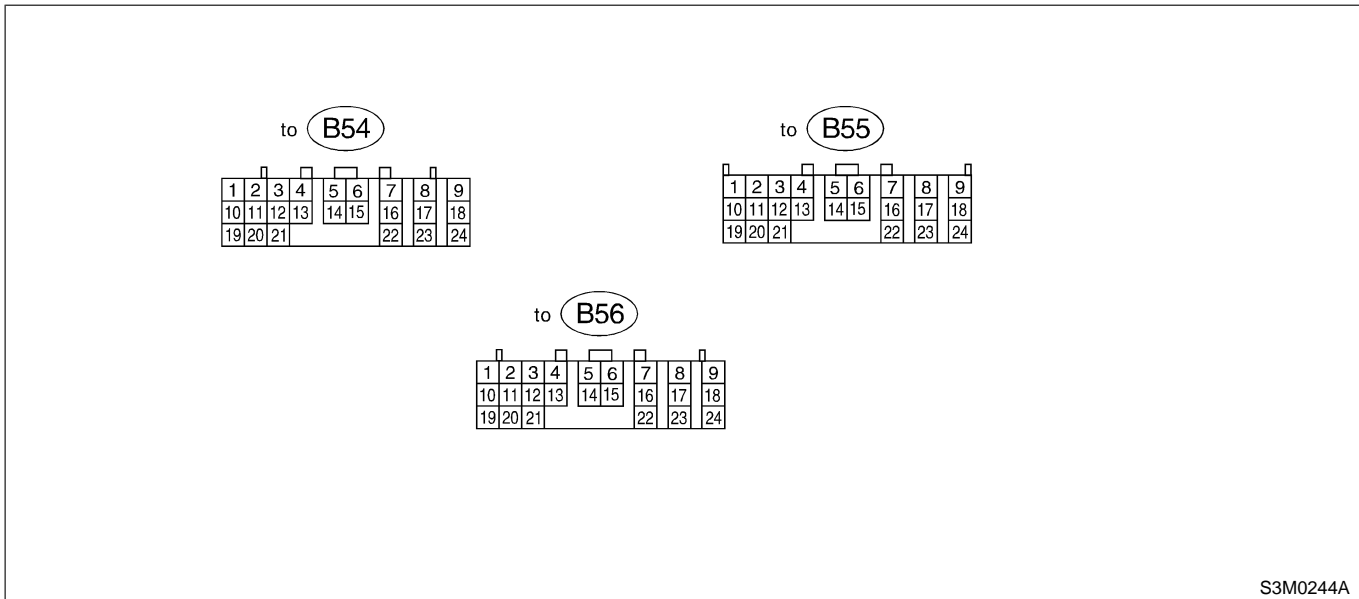
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Lock-up duty solenoid	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	15	Fuse on FWD switch	More than 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	—	—	

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

## 2. WITH VDC SYSTEM

S004506A0802



S3M0244A

Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B56	1	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	1	Select lever in "P" range	Less than 1	—
				Select lever in any other than "P" range (except "N" range)	More than 8	
	"N" range switch	B55	14	Select lever in "N" range	Less than 1	—
				Select lever in any other than "N" range (except "P" range)	More than 8	
	"R" range switch	B55	3	Select lever in "R" range	Less than 1	—
				Select lever in any other than "R" range	More than 8	
	"D" range switch	B55	4	Select lever in "D" range	Less than 1	—
				Select lever in any other than "D" range	More than 8	
	"3" range switch	B55	5	Select lever in "3" range	Less than 1	—
				Select lever in any other than "3" range	More than 8	
	"2" range switch	B55	6	Select lever in "2" range	Less than 1	—
				Select lever in any other than "2" range	More than 8	
	"1" range switch	B55	7	Select lever in "1" range	Less than 1	—
				Select lever in any other than "1" range	More than 8	
Brake switch		B55	12	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
VDC communication signal +		B56	9	Ignition ON	(+) — (-) Plus signal	—
VDC communication signal -		B56	18		(+) — (-) Plus signal	—

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Kick-down switch	B55	11	Throttle fully opened.	Less than 1	—
			Throttle fully closed.	More than 6.5	
AT OIL TEMP warning light	B56	10	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B54	3	Throttle fully closed.	0.3 — 0.7	—
			Throttle fully open.	4.3 — 4.9	
Throttle position sensor power supply	B54	2	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	11	ATF temperature 20°C (68°F)	2.9 — 4.0	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.5 — 0.8	275 — 375
Rear vehicle speed sensor	B55	24	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	18	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range) 4	
Torque converter turbine speed sensor	B55	8	Engine idling after warm-up. (D range)	0	450 — 650
			Engine idling after warm-up. (N range)	More than 1 (AC range)	
Vehicle speed output signal	B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 4	—
Engine speed signal	B55	17	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B55	22	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B56	5	Ignition switch ON (with engine ON)	More than 4.8	—
Torque control signal 2	B56	14	Ignition switch ON (with engine ON)	More than 4.8	—
Torque control cut signal	B55	10	Ignition switch ON	8	—
Intake manifold pressure signal	B54	10	Engine idling after warm-up.	1.2 — 1.8	—
Shift solenoid 1	B54	22	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	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	8	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	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Transfer duty solenoid	B54	6	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	18	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake 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	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B54	19	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	20			
AT diagnosis signal	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B56	15	—	—	—
		6	—	—	



# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

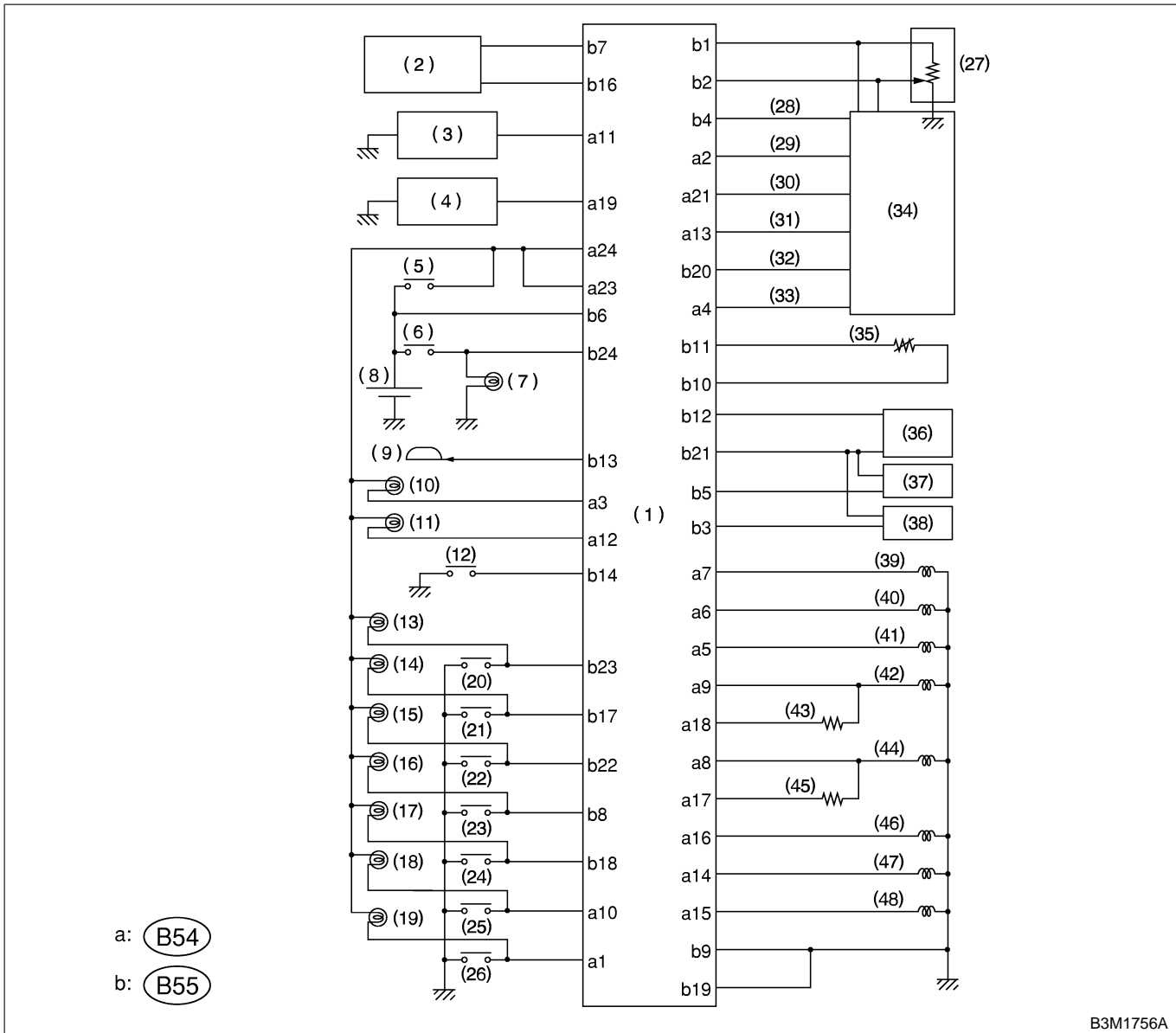
Automatic Transmission (DIAGNOSTICS)

## B: SCHEMATIC

S004506A21

### 1. WITHOUT VDC SYSTEM

S004506A2101



# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

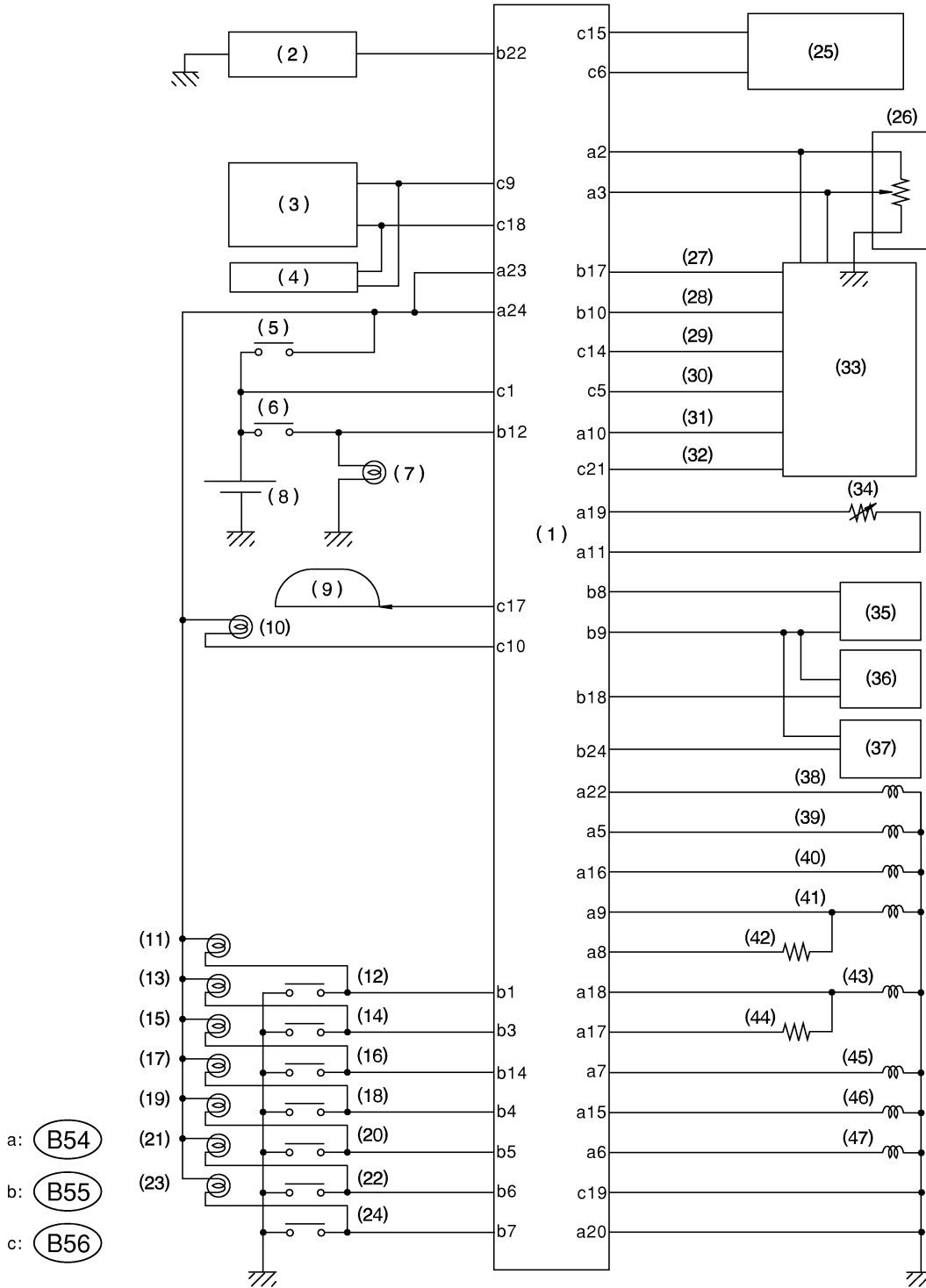
Automatic Transmission (DIAGNOSTICS)

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

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

## 2. WITH VDC SYSTEM S004506A2102



B3M1867A

AT-20

# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

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

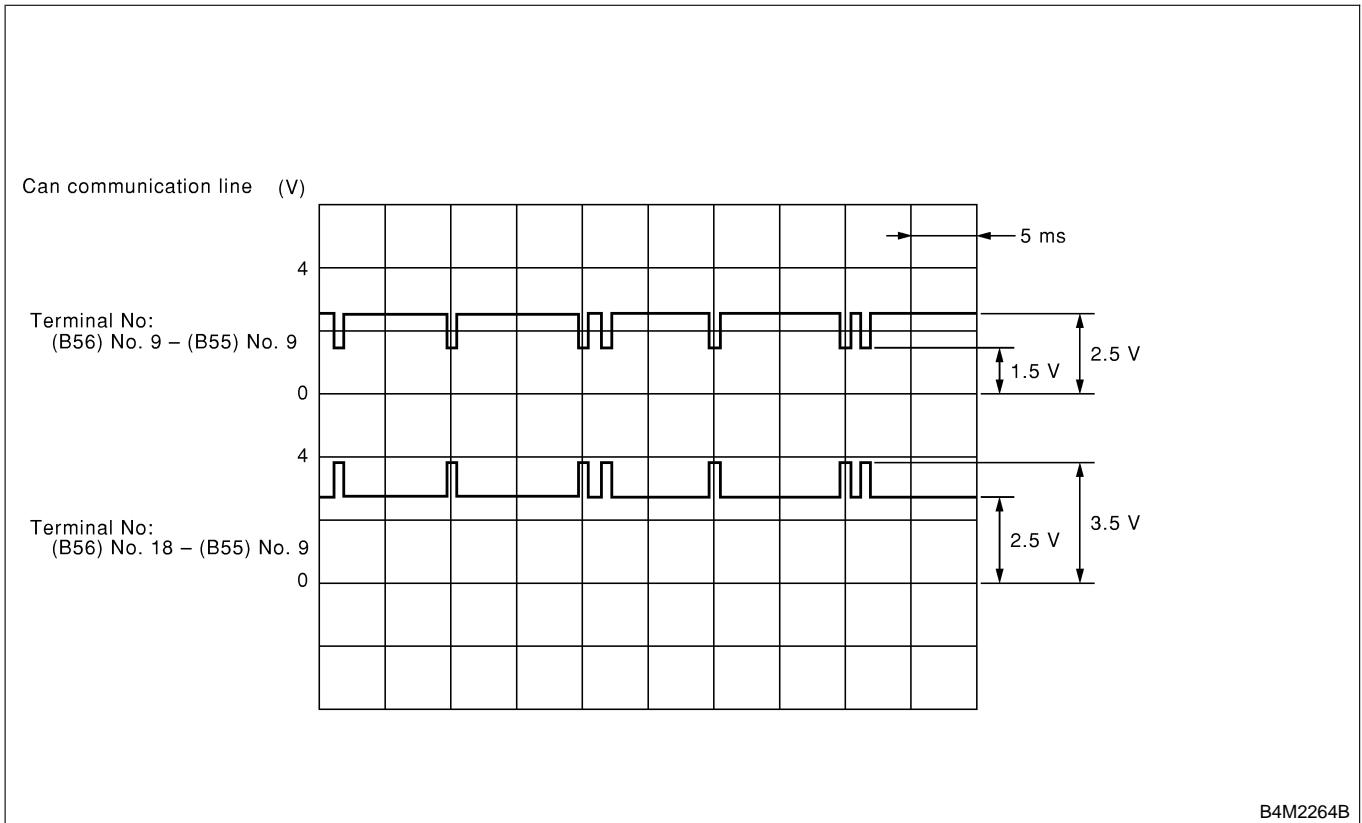
# TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission (DIAGNOSTICS)

## C: MEASUREMENT S004506A14

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

### 1. WAVEFORM S004506A1401



## 6. Data Link Connector S004505

### A: NOTE S004505A15

Refer to “EN(H6)” or “EN(H4)” section for information about the data link connector.

# SUBARU SELECT MONITOR

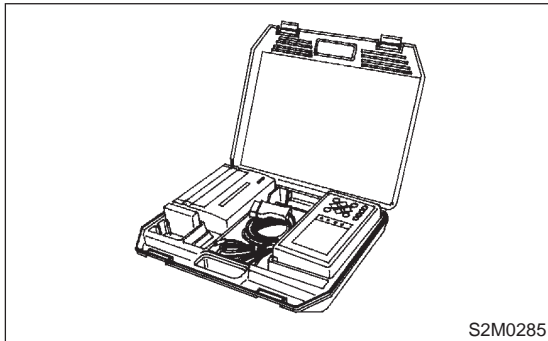
Automatic Transmission (DIAGNOSTICS)

## 7. Subaru Select Monitor S004503

### A: OPERATION S004503A16

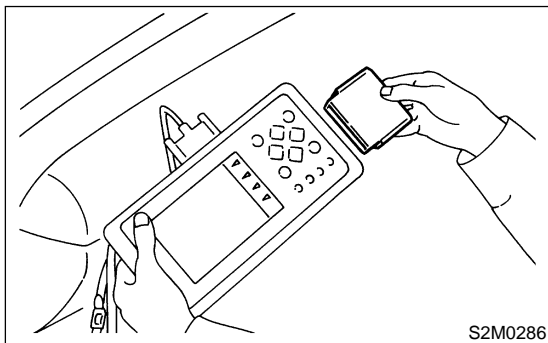
#### 1. READ DIAGNOSTIC TROUBLE CODE S004503A1601

1) Prepare Subaru Select Monitor kit.



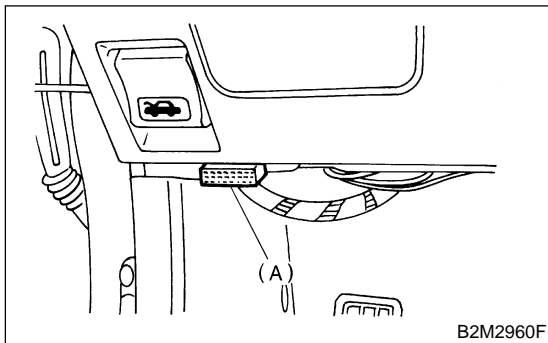
2) Connect diagnosis cable to Subaru Select Monitor.

3) Insert cartridge into Subaru Select Monitor.  
<Ref. to AT-.>



4) Connect Subaru Select Monitor to data link connector.

(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).



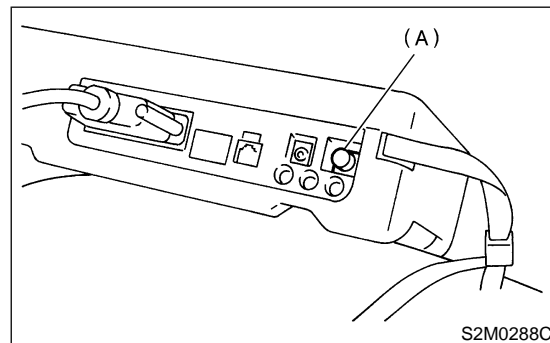
(A) Data link connector

(2) Connect diagnosis cable to data link connector.

### CAUTION:

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

5) Turn ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.  
7) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.

8) Press the [YES] key after displayed the information of engine type.

9) On the «Transmission Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

10) On the «Diagnostic Code(s) Display» display screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)} and press the [YES] key.

### NOTE:

- For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

- For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE LIST. <Ref. to AT-31 List of Diagnostic Trouble Code.>

#### 2. READ CURRENT DATA S004503A1602

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.

2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.

3) Press the [YES] key after displayed the information of transmission type.

4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.

5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.

6) Using the scroll key, move the display screen up or down until the desired data is shown.

# SUBARU SELECT MONITOR

Automatic Transmission (DIAGNOSTICS)

- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Vehicle Speed #1	km/h or MPH
Vehicle speed sensor 2 signal	Vehicle Speed #2	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Torque converter turbine speed signal	AT Turbine Speed	rpm
2-4 brake timing pressure control duty ratio	2-4B Duty Ratio	%
Intake manifold pressure sensor voltage	Mani. Pressure Voltage	V
2 wheel drive switch signal	2WD Switch	ON or OFF
Stop lamp switch signal	Stop Lamp Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Neutral/Parking range signal	N/P Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal #1	ON or OFF
Torque control output signal #2	Torque Control Signal #2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
Automatic transmission diagnosis indicator lamp	AT Diagnosis Lamp	ON or OFF

## NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

### 3. CLEAR MEMORY MODE S004503A1603

- 1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
- 2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of engine type.
- 4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
- 5) When the 'Done' and 'Turn Ignition Switch OFF' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

## NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.



# READ DIAGNOSTIC TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## 8. Read Diagnostic Trouble Code

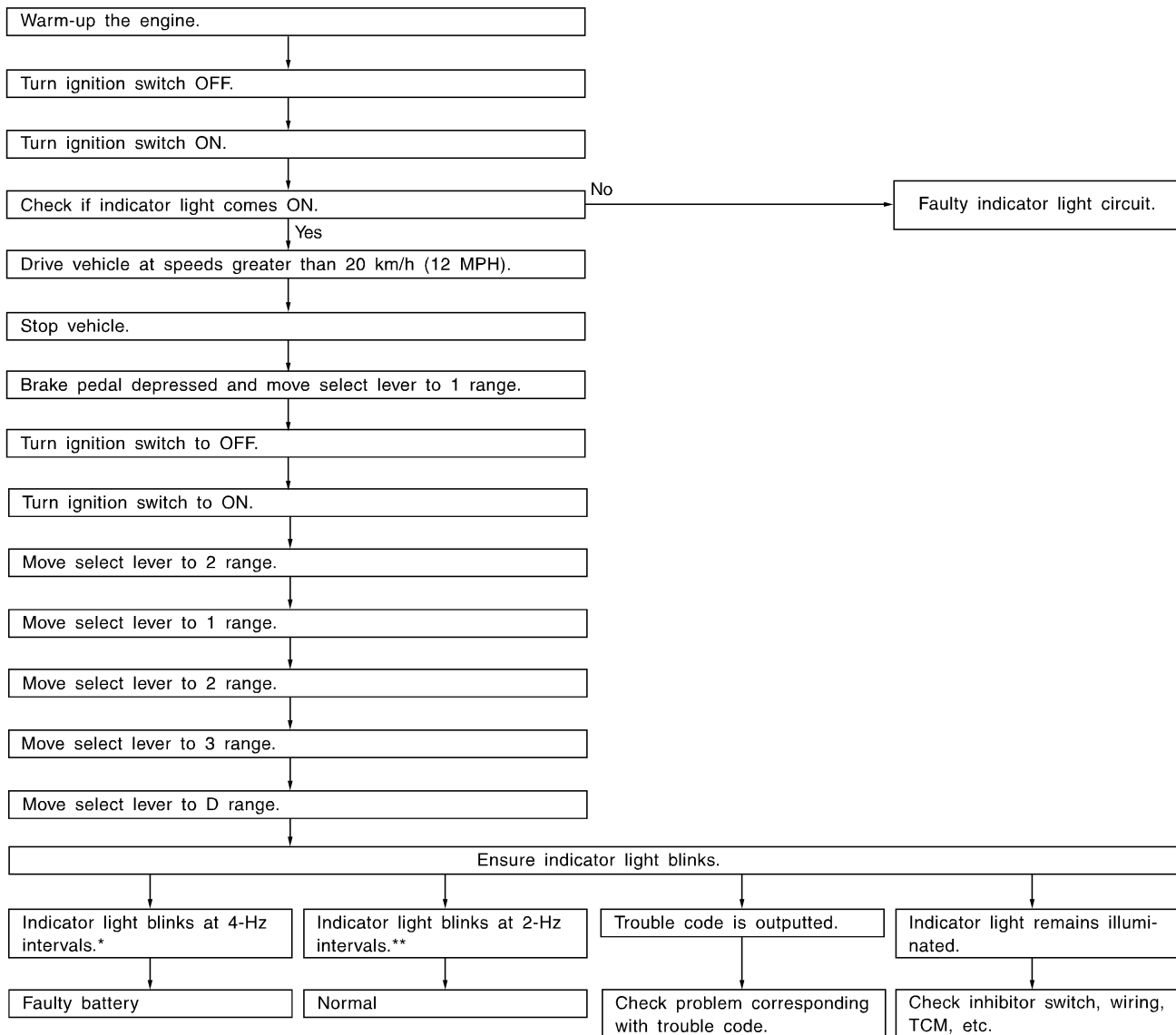
S004508

### A: OPERATION

S004508A16

#### 1. WITHOUT SUBARU SELECT MONITOR

S004508A1601



\* : 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).

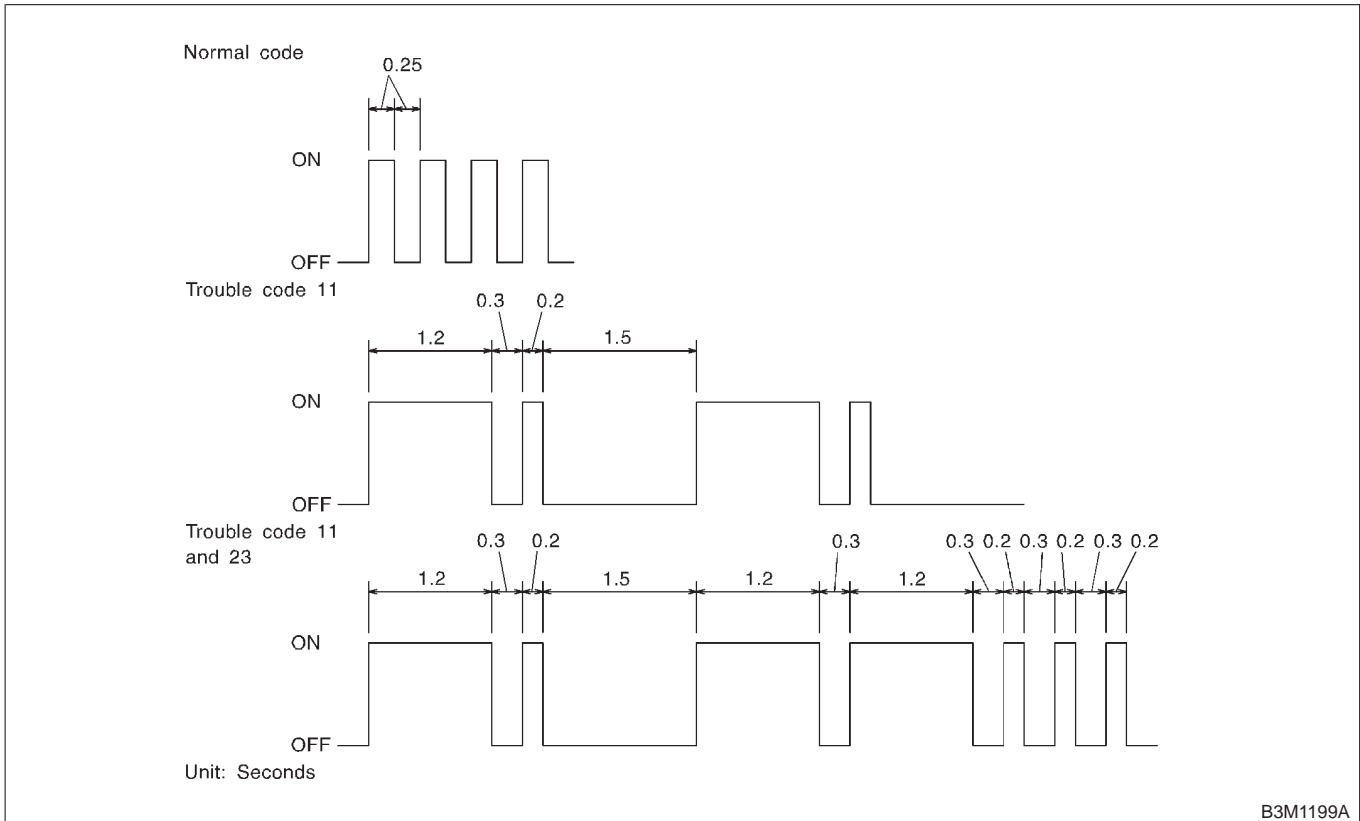
B3M2111A

# READ DIAGNOSTIC TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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

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



## 2. WITH SUBARU SELECT MONITOR

S004508A1602

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to AT-24 OPERATION, Subaru Select Monitor.>

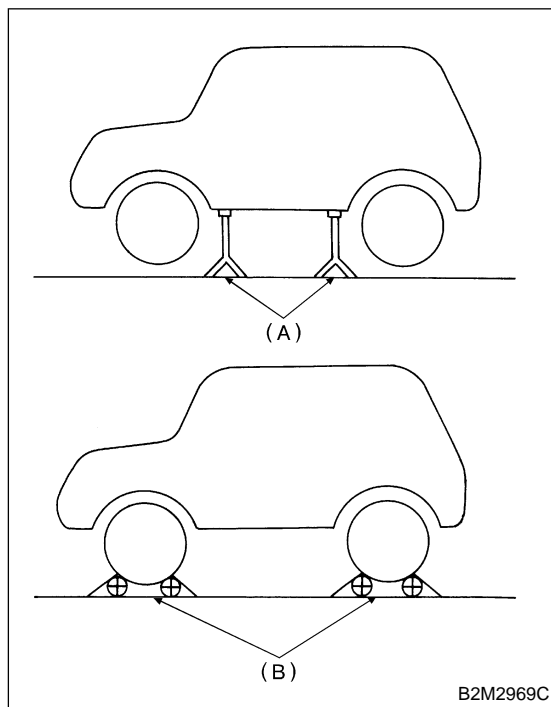
## 9. Inspection Mode S004510

### A: OPERATION S004510A16

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

#### WARNING:

- Before raising the vehicle, ensure parking brakes are applied.
- Do not use a pantograph jack in place of a safety stand.
- Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
- Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
- In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
- Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



- (A) Safety stand
- (B) Free rollers

## 10. Clear Memory Mode S004513

### A: OPERATION S004513A16

#### 1. WITHOUT SUBARU SELECT MONITOR

S004513A1602

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

#### **CLEAR MEMORY:**

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

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

#### 2. WITH SUBARU SELECT MONITOR

S004513A1601

Refer to SUBARU SELECT MONITOR for information about how to clear trouble codes.  
<Ref. to AT-25 CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

# ATF TEMPERATURE WARNING LIGHT DISPLAY

Automatic Transmission (DIAGNOSTICS)

## 11. ATF Temperature Warning Light Display

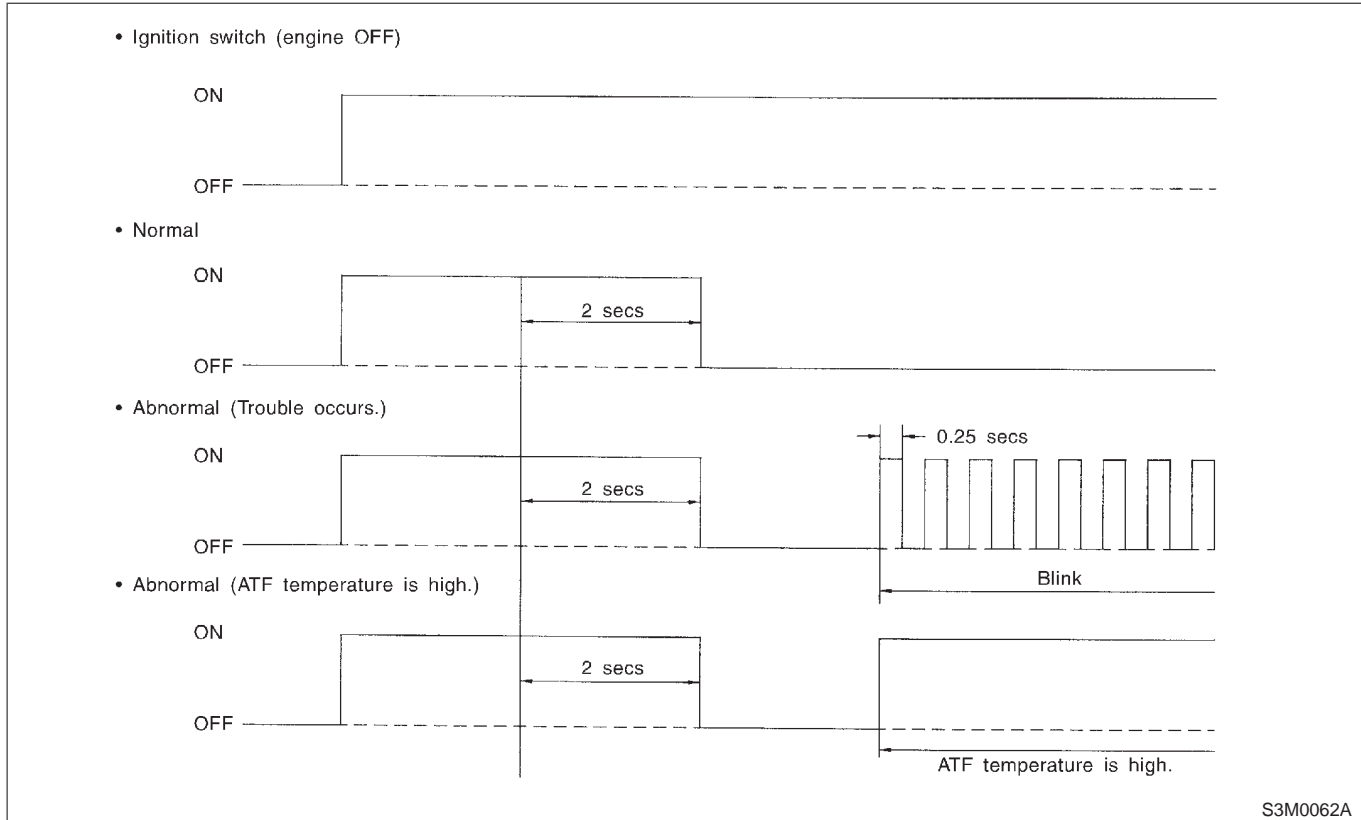
S004616

### A: INSPECTION

S004616A10

When any on-board diagnostics item is malfunctioning, the display on the AT OIL TEMP warning light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part

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



# LIST OF DIAGNOSTIC TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## 12. List of Diagnostic Trouble Code

S004511

### A: LIST

S004511A12

Trouble code	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to AT-40 TROUBLE CODE 11 — ENGINE SPEED SIGNAL —, Diagnostic Procedure with Trouble Code.>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to AT-44 TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —, Diagnostic Procedure with Trouble Code.>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to AT-48 TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>
33	Front vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-56 TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR 2 —, Diagnostic Procedure with Trouble Code.>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-62 TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to AT-66 TROUBLE CODE 38 — TORQUE CONTROL SIGNAL —, Diagnostic Procedure with Trouble Code.>
45	Intake manifold pressure signal	Detects open or shorted input signal circuit.	<Ref. to AT-70 TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL —, Diagnostic Procedure with Trouble Code.>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to AT-74 TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to AT-78 TROUBLE CODE 72 — SHIFT SOLENOID 2 —, Diagnostic Procedure with Trouble Code.>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-82 TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-86 TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-90 TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-96 TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-102 TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-106 TROUBLE CODE 79 — TRANSFER DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
86	VDC communication signal	Detects open or shorted input signal circuit.	<Ref. to AT-110 TROUBLE CODE 86 — VDC COMMUNICATION SIGNAL —, Diagnostic Procedure with Trouble Code.>
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-114 TROUBLE CODE 93 — REAR VEHICLE SPEED SENSOR —, Diagnostic Procedure with Trouble Code.>

# DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

Automatic Transmission (DIAGNOSTICS)

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## 13. Diagnostic Procedure for AT Oil Temp Warning Light S004617

### A: AT OIL TEMP WARNING LIGHT DOES NOT COME ON OR GO OFF S004617F14

#### DIAGNOSIS:

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

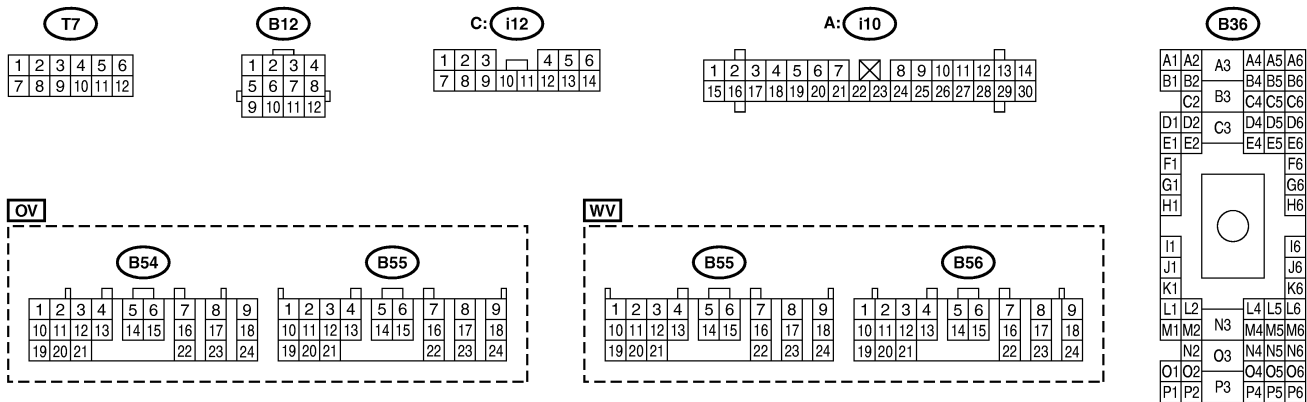
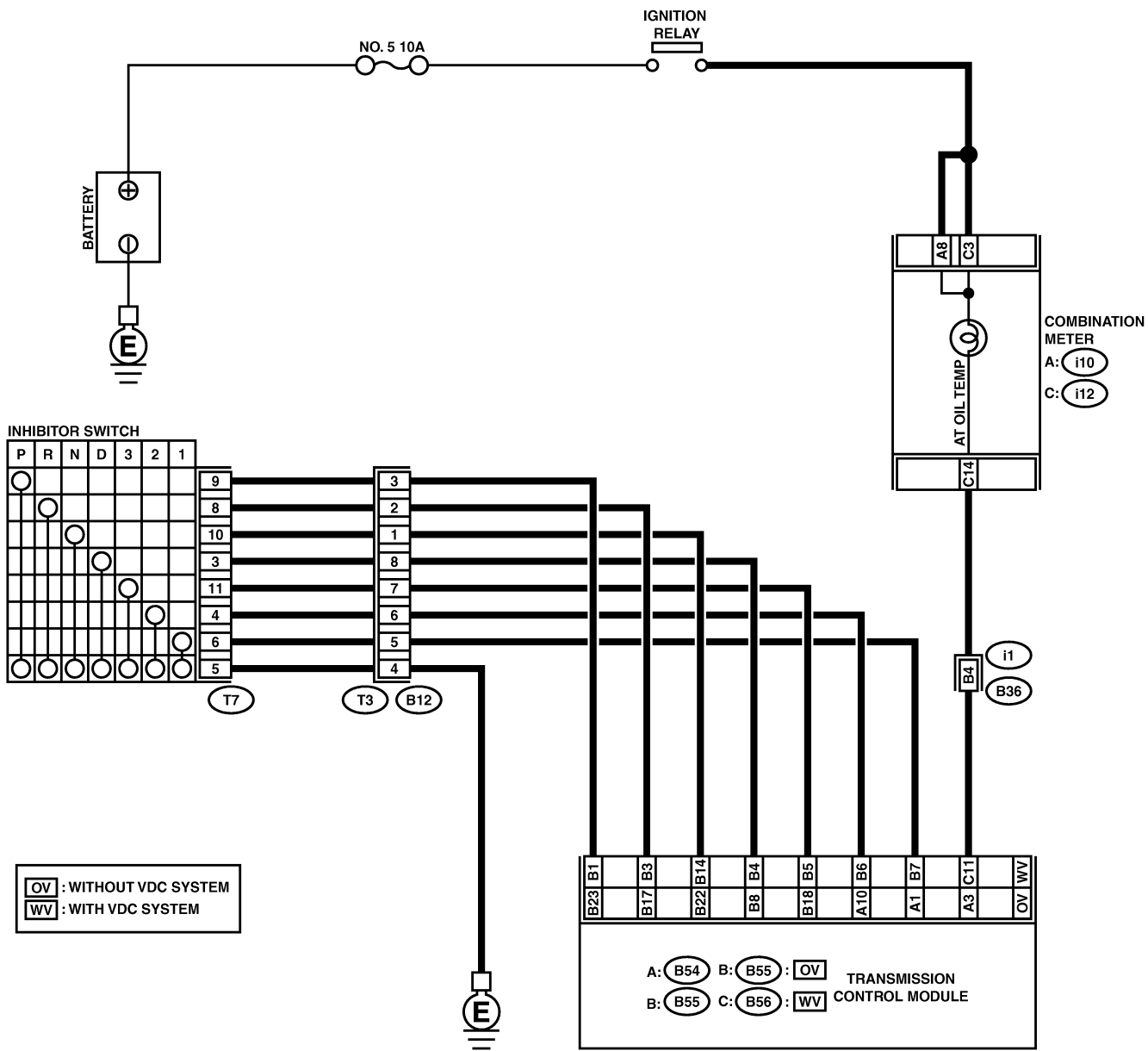
#### TROUBLE SYMPTOM:

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

# DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

Automatic Transmission (DIAGNOSTICS)

## WIRING DIAGRAM:



B3M1890

AT-33



# DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	<b>CHECK AT OIL TEMP WARNING LIGHT.</b> Turn ignition switch to ON (engine OFF).	Does AT OIL TEMP warning light illuminate?	Go to step 2.	Go to step 4.
2	<b>CHECK AT OIL TEMP WARNING LIGHT.</b> 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove AT OIL TEMP warning light bulb from combination meter.	Is AT OIL TEMP warning light bulb OK?	Go to step 3.	Replace AT OIL TEMP warning light bulb.
3	<b>CHECK AT OIL TEMP WARNING LIGHT.</b> Perform "Read Diagnostic Trouble Code". <Ref. to AT-26 Read Diagnostic Trouble Code.>	Does AT OIL TEMP warning light blink?	A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM, inhibitor switch and combination meter.	Go to step 10.
4	<b>CHECK FUSE (No. 5).</b> Remove fuse (No. 5).	Is the fuse (No. 5) blown out?	Replace fuse (No. 5). If replaced fuse (No. 5) is blown out easily, repair short circuit in harness between fuse (No. 5) and combination meter.	Go to step 5.
5	<b>CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.</b> 1) Turn ignition switch to ON (engine OFF). 2) Measure voltage between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i10) No. 8 (+) — Chassis ground (-):</b>	Is voltage more than 9 V?	Go to step 6.	Repair open circuit in harness between combination meter and battery.
6	<b>CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.</b> Measure voltage between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i12) No. 3 (+) — Chassis ground (-):</b>	Is voltage more than 9 V?	Go to step 7.	Repair open circuit in harness between combination meter and battery.
7	<b>CHECK COMBINATION METER.</b> Measure voltage between combination meter connector and chassis ground. <b>Connector &amp; terminal</b> <b>(i12) No. 14 (+) — Chassis ground (-):</b>	Is voltage less than 1 V?	Go to step 8.	Repair combination meter. <Ref. to IDI-17 Combination Meter Assembly.>
8	<b>CHECK OPEN CIRCUIT OF HARNESS.</b> 1) Disconnect connector from combination meter connector. 2) Measure resistance of harness between combination meter. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B54) No. 3 — (i12) No. 14:</b> <b>WITH VDC SYSTEM</b> <b>(B56) No. 11 — (i12) No. 14:</b>	Is the resistance less than 1 Ω?	Go to step 9.	Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.

# DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
9	<p><b>CHECK INPUT SIGNAL FOR TCM.</b></p> <p>1) Connect connector to TCM and combination meter.</p> <p>2) Turn ignition switch to ON (engine OFF).</p> <p>3) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>  <b>(B54) No. 3 (+) — Chassis ground (-):</b>  <b>WITH VDC SYSTEM</b>  <b>(B56) No. 11 (+) — Chassis ground (-):</b></p>	Is the voltage less than 1 V?	Even if AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
10	<p><b>CHECK INHIBITOR SWITCH.</b></p> <p>1) Connect Subaru Select Monitor to data link connector.</p> <p>2) Turn ignition switch to ON.</p> <p>3) Subaru Select Monitor to ON.</p> <p>4) Read data of range switch using Subaru Select Monitor.</p> <p>● Range switch is indicated in ON ⇔ OFF.</p>	When each range is selected, does LED of Subaru Select Monitor light up?	Go to step 11.	Check inhibitor switch circuit. <Ref. to AT-124 CHECK INHIBITOR SWITCH, Diagnostic Procedure for No-trouble Code.>
11	<p><b>CHECK SHORT CIRCUIT OF HARNESS.</b></p> <p>1) Disconnect connector from TCM.</p> <p>2) Remove combination meter.</p> <p>3) Disconnect connector from combination meter.</p> <p>4) Measure resistance of harness connector between TCM and combination meter.</p> <p><b>Connector &amp; terminal/specified resistance</b>  <b>WITHOUT VDC SYSTEM</b>  <b>(B54) No. 3 — Chassis ground:</b>  <b>WITH VDC SYSTEM</b>  <b>(B56) No. 11 (+) — Chassis ground (-):</b></p>	Is the resistance less than 1 MΩ?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Repair short circuit in harness between combination meter connector and TCM connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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## 14. Diagnostic Procedure with Trouble Code S004509

### A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE S004509E34

#### 1. CONTROL MODULE POWER SUPPLY AND GROUND LINE S004509E3401

**DIAGNOSIS:**

- Faulty harness connector

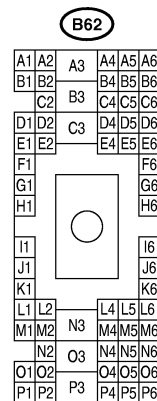
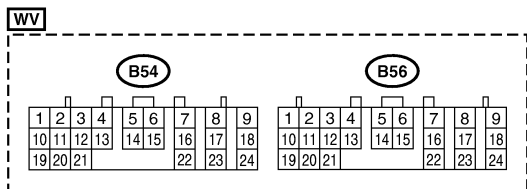
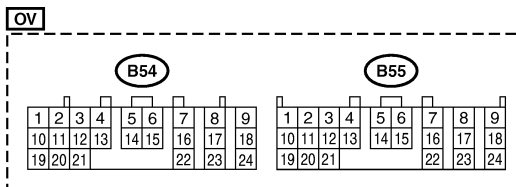
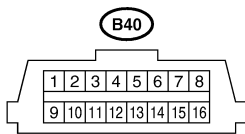
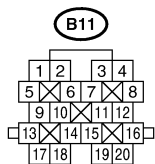
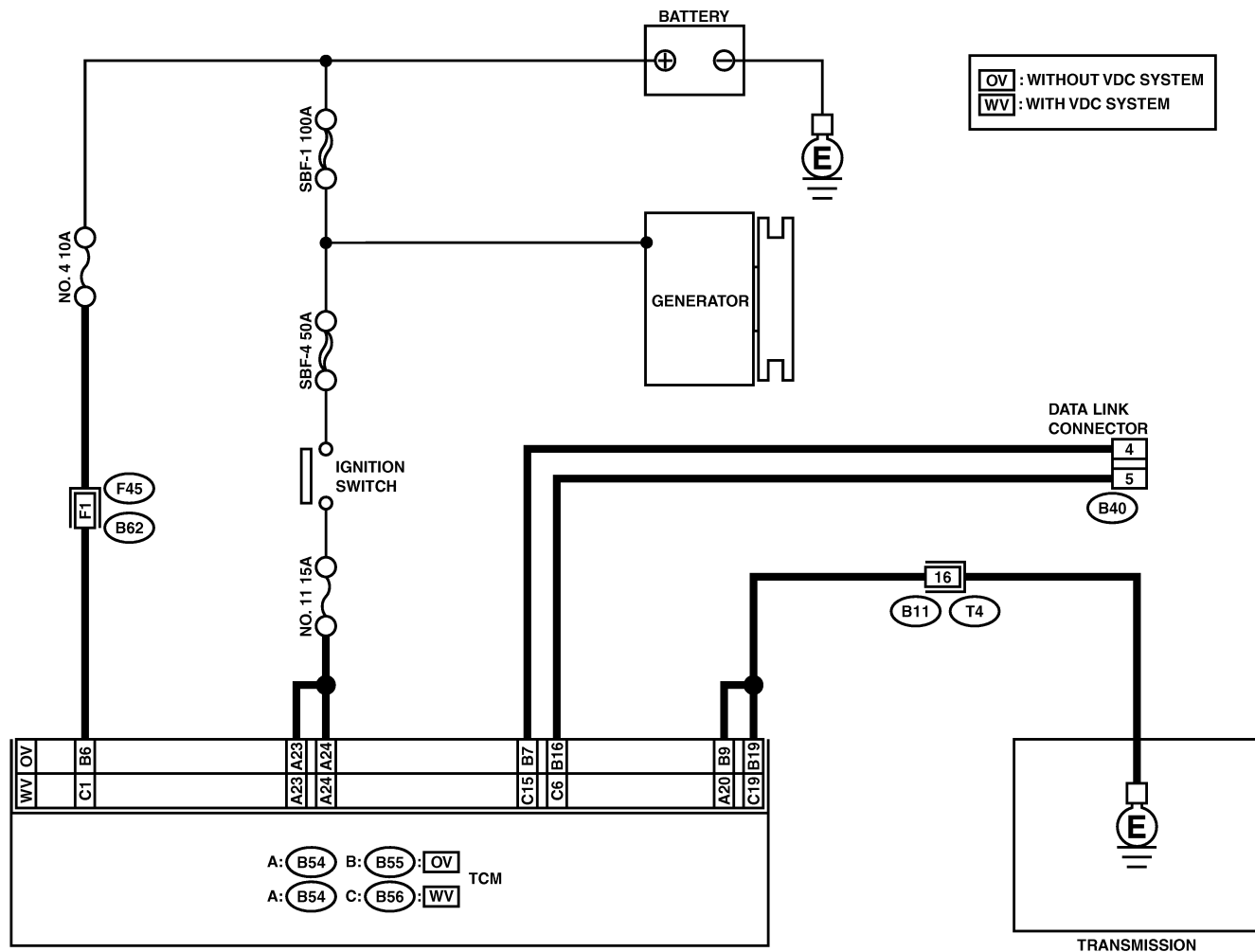
**TROUBLE SYMPTOM:**

- AT OIL TEMP warning light remains on.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## WIRING DIAGRAM:



B3M1868

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	<b>CHECK IGNITION SWITCH.</b>	Is ignition switch ON?	Go to step 2.	Turn ignition switch ON, and select TCM mode using the select monitor.
2	<b>CHECK GENERATOR.</b> 1) Start the engine. 2) Idle the engine. 3) Measure voltage between generator and chassis ground. <b>Terminal</b> <b>Generator B terminal (+) — Chassis ground (-):</b>	Is the voltage between 10 and 15 V?	Go to step 3.	Repair generator. <Ref. to SC-15 Generator.>
3	<b>CHECK BATTERY TERMINAL.</b> Turn ignition switch to OFF.	Is there poor contact at battery terminal?	Repair battery terminal.	Go to step 4.
4	<b>CHECK COMMUNICATION OF SELECT MONITOR.</b> Using the select monitor, check whether communication to other systems (such as engine, ABS, etc.) can be executed normally.	Are the name and year of the system displayed on the select monitor?	Go to step 5.	Repair select monitor communication cable and connector.
5	<b>CHECK INSTALLATION OF TCM CONNECTOR.</b> Turn ignition switch to OFF.	Is TCM connector inserted into TCM until the tab locks onto it?	Go to step 6.	Insert TCM connector into TCM until the tab locks onto it.
6	<b>CHECK POWER SUPPLY OF TCM.</b> 1) Disconnect connector from TCM. 2) Start engine. 3) Idle the engine. 4) Measure voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 6 (+) — Chassis ground (-):</b> <b>WITHOUT VDC SYSTEM</b> <b>(B56) No. 1 (+) — Chassis ground (-):</b>	Is the voltage between 10 and 15 V?	Go to step 8.	Go to step 7.
7	<b>CHECK FUSE (NO. 4).</b> Remove fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Repair open circuit in harness between fuse (No. 4) and TCM, and poor contact in coupling connector.
8	<b>CHECK IGNITION POWER SUPPLY CIRCUIT.</b> 1) Turn ignition switch to ON (engine OFF). 2) Measure ignition power supply voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B53) No. 23 (+) — Chassis ground (-):</b> <b>(B54) No. 24 (+) — Chassis ground (-):</b>	Is the voltage more than 10 V?	Go to step 10.	Go to step 9.
9	<b>CHECK FUSE (NO. 11).</b> Remove fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair open circuit in harness between fuse (No. 11) and TCM, and poor contact in coupling connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
10	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b></p> <p>1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 19 — (B11) No. 16:</b> <b>WITH VDC SYSTEM</b> <b>(B56) No. 19 — (B11) No. 16:</b></p>	Is the resistance less than 1 Ω?	Go to step 11.	Repair open circuit in harness between TCM and transmission harness connector.
11	<p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TCM.</b></p> <p>1) Turn ignition switch to OFF. 2) Disconnect connector from inhibitor switch. 3) Measure resistance of harness between inhibitor switch side connector and TCM.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B11) No. 16 — (B55) No. 9:</b> <b>WITH VDC SYSTEM</b> <b>(B11) No. 16 — (B11) No. 20:</b></p>	Is the resistance less than 1 Ω?	Go to step 12.	Repair open circuit in harness between TCM and inhibitor side connector, and poor contact in coupling connector.
12	<p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.</b></p> <p>Measure resistance of harness between transmission and transmission ground.</p> <p><b>Connector &amp; terminal</b> <b>(T4) No. 16 — Transmission ground:</b></p>	Is the resistance less than 1 Ω?	Go to step 13.	Repair open circuit in harness between transmission and transmission ground.
13	<p><b>CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.</b></p> <p>1) Turn ignition switch OFF. 2) Measure resistance between TCM connector and data link connector.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 16 — (B40) No. 5:</b> <b>(B55) No. 7 — (B40) No. 4:</b> <b>WITH VDC SYSTEM</b> <b>(B56) No. 6 — (B40) No. 5:</b> <b>(B56) No. 15 — (B40) No. 4:</b></p>	Is the resistance less than 0.5 Ω?	Repair harness and connector between TCM and data link connector.	Go to step 14.
14	<p><b>CHECK POOR CONTACT IN CONNECTORS.</b></p>	Is there poor contact in control module power supply, ground line and data link connector?	Repair connector.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## B: TROUBLE CODE 11 — ENGINE SPEED SIGNAL — S004509C39

### DIAGNOSIS:

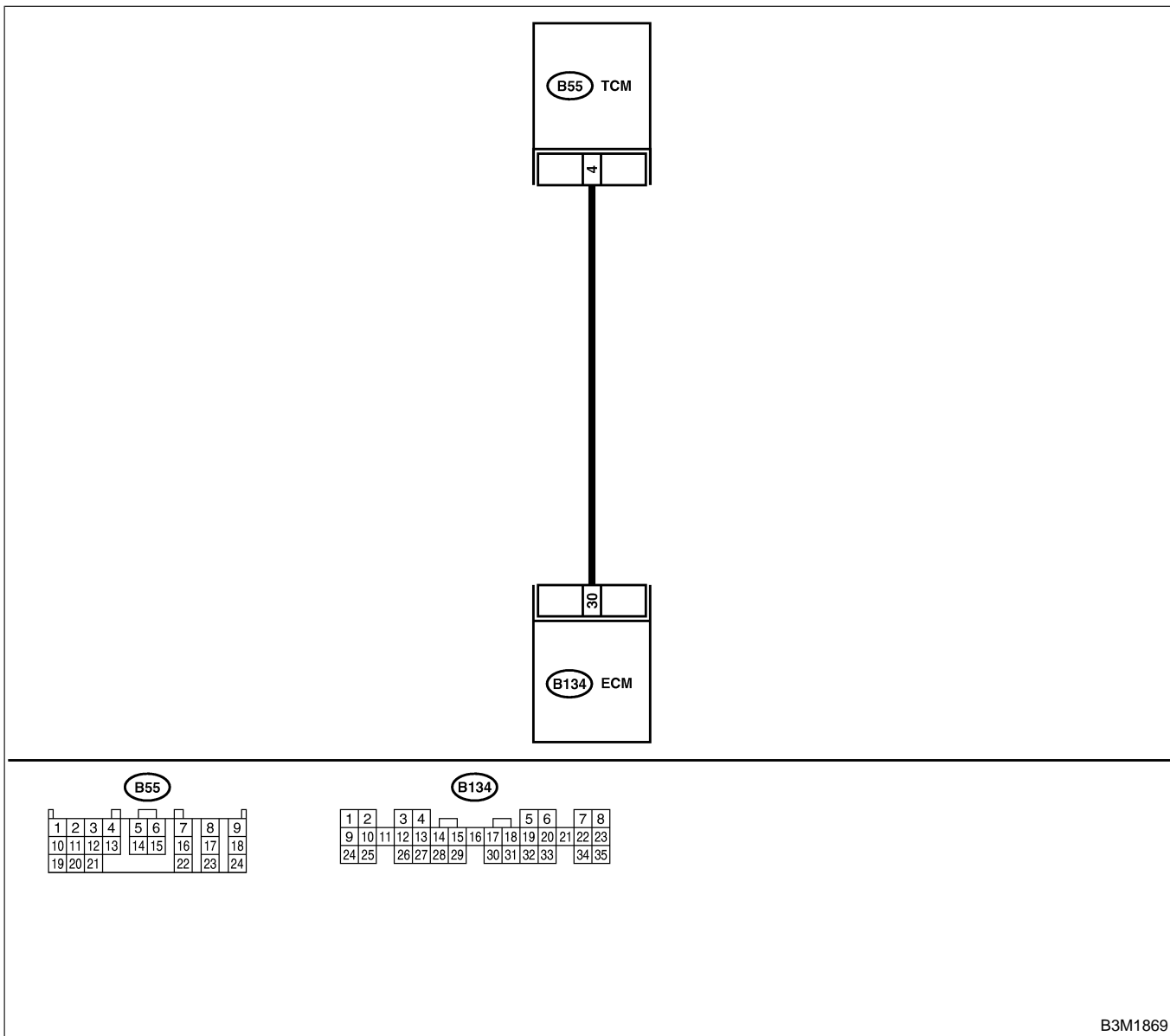
Engine speed input signal circuit is open or shorted.

### TROUBLE SYMPTOM:

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

### WIRING DIAGRAM:

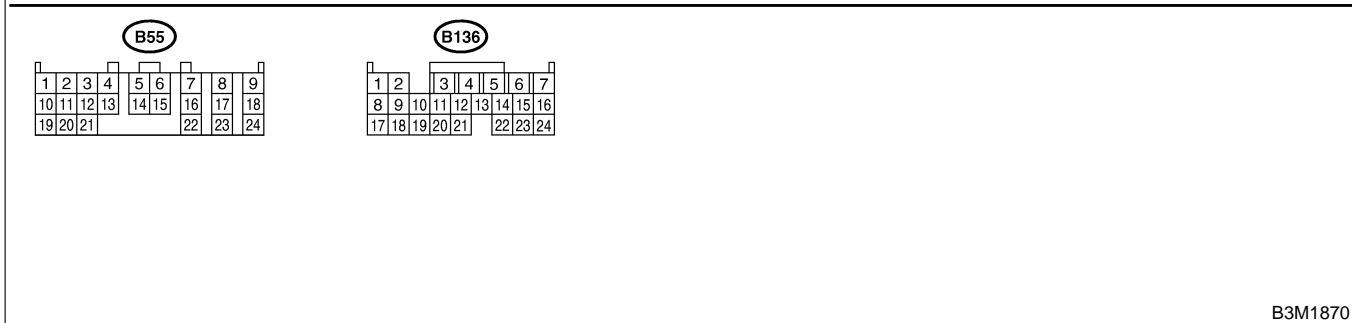
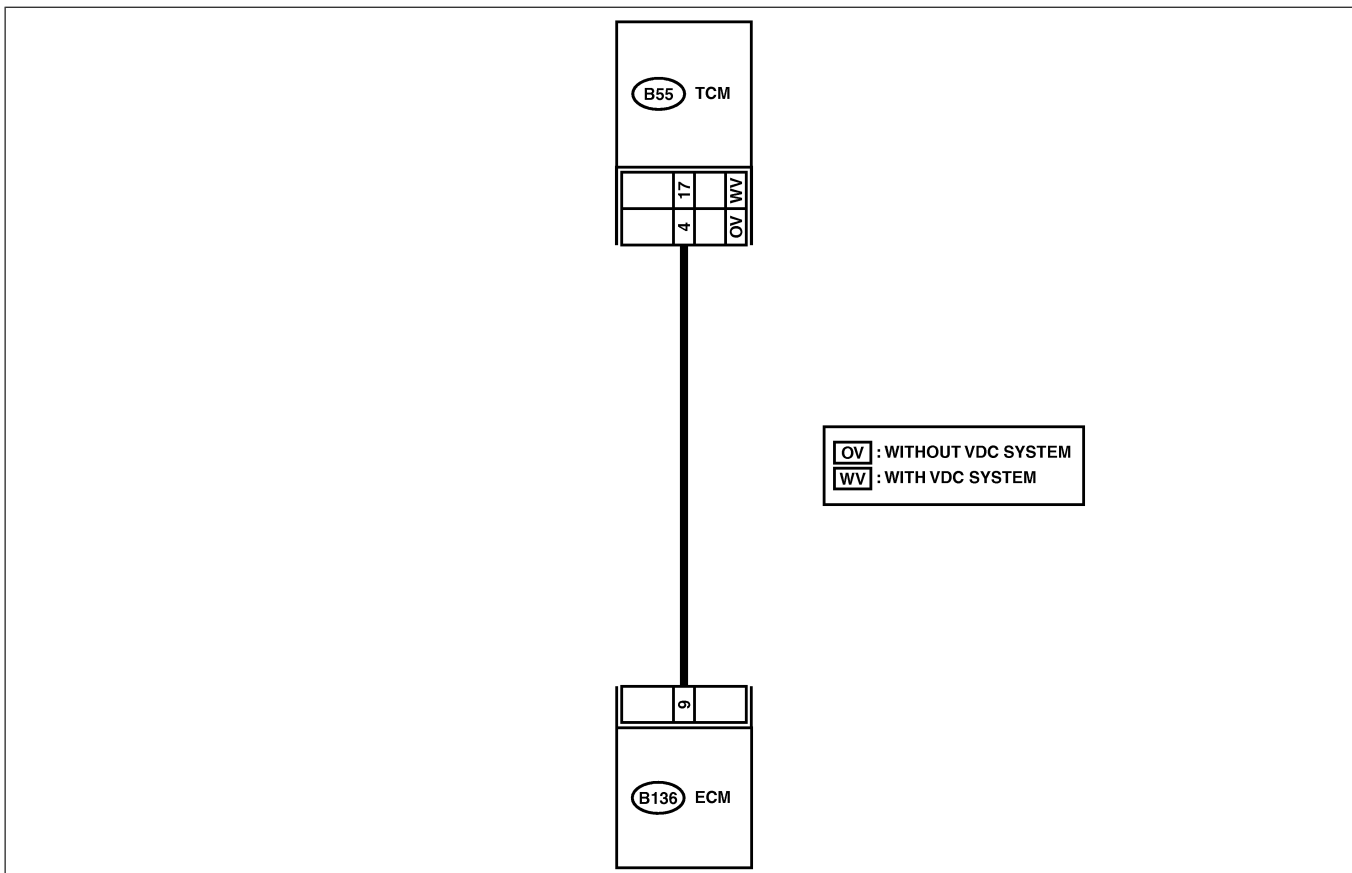
- 2.5 ℓ ENGINE MODEL



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## ● 3.0 ℓ ENGINE MODEL



B3M1870

No.	Step	Check	Yes	No
1	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 ℓ ENGINE MODEL</b> (B55) No. 4 — (B134) No. 30: <b>3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM</b> (B55) No. 4 — (B136) No. 9: <b>3.0 ℓ ENGINE MODEL WITH VDC SYSTEM</b> (B55) No. 17 — (B136) No. 9:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> Measure resistance of harness between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 4 — Chassis ground: <b>WITH VDC SYSTEM</b> (B55) No. 17 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
3	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 5.	Go to step 4.
4	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 4 (+) — Chassis ground (-): <b>WITH VDC SYSTEM</b> (B55) No. 17 (+) — Chassis ground (-):	Is the voltage more than 10.5 V?	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.	Go to step 6.
5	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of engine speed using Subaru Select Monitor. ● Display shows engine speed signal value sent from ECM.	Is the revolution value the same as the tachometer reading shown on the combination meter?	Even if "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.	Go to step 6.
6	<b>CHECK POOR CONTACT.</b>	Is there poor contact in engine speed signal circuit?	Repair poor contact.	Go to step 7.
7	<b>CONFIRM TROUBLE CODE 11.</b>	Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Replace ECM.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-43

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## C: TROUBLE CODE 27 — ATF TEMPERATURE SENSOR — S004509C76

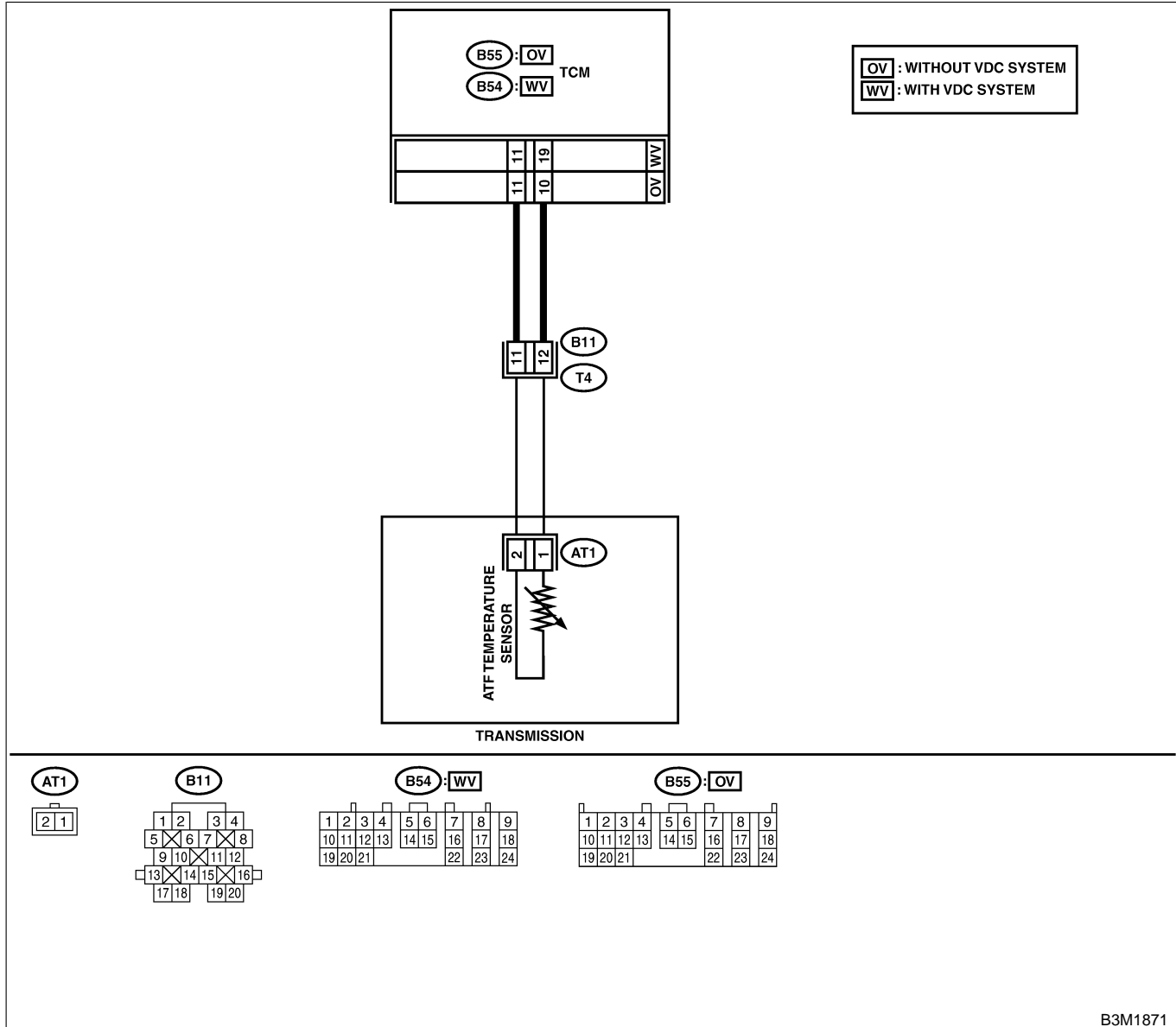
### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



B3M1871

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.</b></p> <p>1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 10 — (B11) No. 12: <b>WITH VDC SYSTEM</b> (B54) No. 19 — (B11) No. 12:</p>	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.</b></p> <p>Measure resistance of harness between TCM and transmission connector.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 11 — (B11) No. 11: <b>WITH VDC SYSTEM</b> (B54) No. 11 — (B11) No. 11:</p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.</b></p> <p>Measure resistance of harness between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 10 — Chassis ground: <b>WITH VDC SYSTEM</b> (B54) No. 19 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.</b></p> <p>Measure resistance of harness between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 11 — Chassis ground: <b>WITH VDC SYSTEM</b> (B54) No. 11 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	<p><b>CHECK ATF TEMPERATURE SENSOR.</b></p> <p>1) Turn ignition switch to OFF. 2) Connect connectors to transmission and TCM. 3) Turn ignition switch to ON and start engine. 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Measure resistance between transmission connector terminals. 6) Disconnect connector from transmission.</p> <p><b>Connector &amp; terminal</b> (T4) No. 11 — No. 12:</p>	Is the resistance between 275 and 375 Ω?	Go to step 6.	Go to step 11.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	<b>CHECK ATF TEMPERATURE SENSOR.</b> 1) Turn ignition switch to ON (engine OFF). 2) Measure resistance between transmission connector terminals.  <b>Connector &amp; terminal</b> <b>(T4) No. 11 — No. 12:</b>	Does the resistance value increase while the ATF temperature decreases?	Go to step 7.	Go to step 11.
7	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.
8	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) 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.  <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 11 (+) — No. 10 (-):</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 11 (+) — No. 19 (-):</b>	Is the voltage between 0.5 and 0.8 V?	Even if "AT OIL TEMP" light up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step 10.
9	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> Turn ignition switch to ON (engine OFF).	Does the ATF temperature gradually decrease?	Even if "AT OIL TEMP" light up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step 10.
10	<b>CHECK POOR CONTACT.</b>	Is there poor contact in ATF temperature sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
11	<p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.</b></p> <p>1) Turn ignition switch to OFF.                      2) Disconnect connector from transmission.                      3) Remove transmission connector from bracket.                      4) Lift-up the vehicle and place safety stand.  <b>CAUTION:</b>  <b>On AWD models, raise all wheels off ground.</b>                      5) Drain automatic transmission fluid.  <b>CAUTION:</b>  <b>Do not drain the automatic transmission fluid until it cools down.</b>                      6) Remove oil pan, and disconnect connector from ATF temperature sensor connector.                      7) Measure resistance of harness between ATF temperature sensor and transmission connector.</p> <p><b>Connector &amp; terminal</b>  <b>(T4) No. 11 — (AT1) No. 2:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 12.	Repair open circuit in harness between ATF temperature sensor and transmission connector.
12	<p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.</b></p> <p>Measure resistance of harness between ATF temperature sensor and transmission connector.</p> <p><b>Connector &amp; terminal</b>  <b>(T4) No. 12 — (AT1) No. 1:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 13.	Repair open circuit in harness between ATF temperature sensor and transmission connector.
13	<p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.</b></p> <p>Measure resistance of harness between transmission connector and transmission ground.</p> <p><b>Connector &amp; terminal</b>  <b>(T4) No. 11 — Transmission ground:</b></p>	Is the resistance more than 1 M $\Omega$ ?	Go to step 14.	Repair short circuit in harness between ATF temperature sensor and transmission connector.
14	<p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.</b></p> <p>Measure resistance of harness between transmission connector and transmission ground.</p> <p><b>Connector &amp; terminal</b>  <b>(T4) No. 12 — Transmission ground:</b></p>	Is the resistance more than 1 M $\Omega$ ?	Replace ATF temperature sensor. <Ref. to AT-36 Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>	Repair short circuit in harness between ATF temperature sensor and transmission connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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## D: TROUBLE CODE 31 — THROTTLE POSITION SENSOR — S004509C94

### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

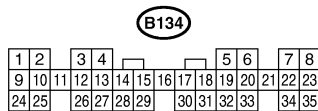
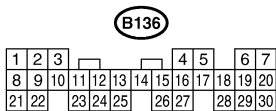
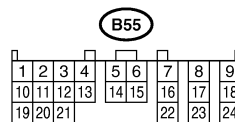
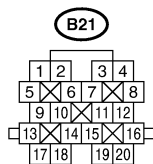
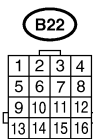
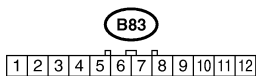
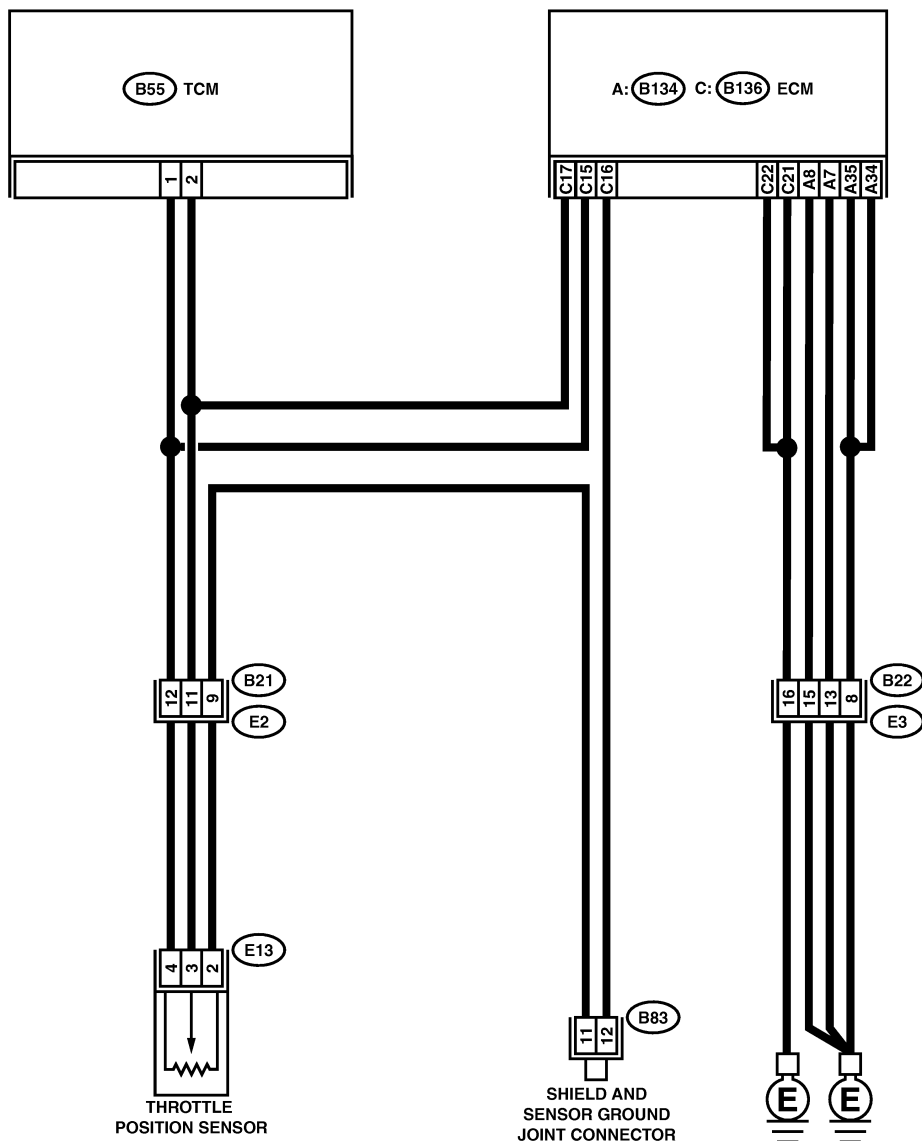
Shift point too high or too low; excessive shift shock; excessive tight corner "braking".

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## WIRING DIAGRAM:

- 2.5 l ENGINE MODEL



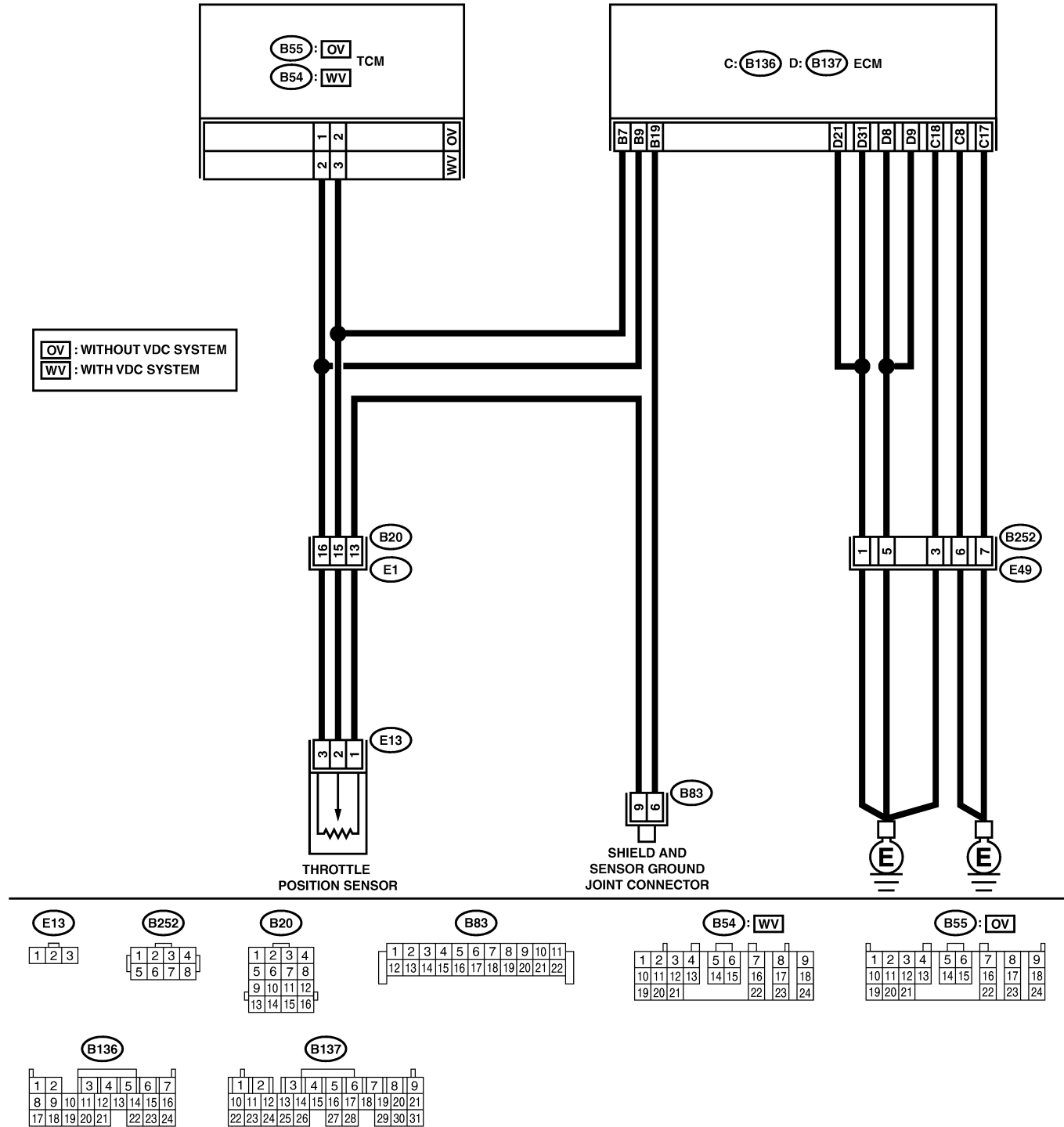
B3M1872



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

## Automatic Transmission (DIAGNOSTICS)

### ● 3.0 ℓ ENGINE MODEL



B3M1873

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	<b>CHECK ENGINE GROUND TERMINALS.</b>	Have engine ground terminals been tightened?	Go to step 2.	Tighten engine ground terminals.
2	<b>CHECK GROUND CIRCUIT OF ECM.</b> 1) Disconnect connector from ECM. 2) Measure resistance of harness between ECM and engine ground. <b>Connector &amp; terminal</b> <b>2.5 ℓ ENGINE MODEL</b> <b>(B136) No. 22 — Engine ground:</b> <b>(B136) No. 21 — Engine ground:</b> <b>3.0 ℓ ENGINE MODEL</b> <b>(B136) No. 17 — Engine ground:</b> <b>(B136) No. 18 — Engine ground:</b> <b>(B136) No. 8 — Engine ground:</b>	Is the resistance less than 5 Ω?	Go to step 3.	Repair open circuit in harness between ECM connector and engine grounding terminal.
3	<b>CHECK GROUND CIRCUIT OF ECM.</b> Measure resistance of harness between ECM and engine ground. <b>Connector &amp; terminal</b> <b>2.5 ℓ ENGINE MODEL</b> <b>(B134) No. 8 — Engine ground:</b> <b>(B134) No. 7 — Engine ground:</b> <b>(B134) No. 35 — Engine ground:</b> <b>(B134) No. 34 — Engine ground:</b> <b>3.0 ℓ ENGINE MODEL</b> <b>(B137) No. 8 — Engine ground:</b> <b>(B137) No. 9 — Engine ground:</b> <b>(B137) No. 21 — Engine ground:</b> <b>(B137) No. 31 — Engine ground:</b>	Is the resistance less than 5 Ω?	Go to step 4.	Repair open circuit in harness between ECM connector and engine grounding terminal.
4	<b>CHECK THROTTLE POSITION SENSOR.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from throttle position sensor. 3) Measure resistance between throttle position sensor connector receptacle's terminals. <b>Terminals</b> <b>2.5 ℓ ENGINE MODEL</b> <b>No. 4 — No. 2:</b> <b>3.0 ℓ ENGINE MODEL</b> <b>No. 1 — No. 3:</b>	Is the resistance between 3.5 and 6.5 kΩ?	Go to step 5.	Replace throttle position sensor.
5	<b>CHECK THROTTLE POSITION SENSOR.</b> Measure resistance between throttle position sensor connector receptacle's terminals. <b>Terminals</b> <b>2.5 ℓ ENGINE MODEL</b> <b>No. 2 — No. 3:</b> <b>3.0 ℓ ENGINE MODEL</b> <b>No. 1 — No. 2:</b>	Is the resistance between 0.3 and 0.7 kΩ?	Go to step 6.	Replace throttle position sensor.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.</b></p> <p>1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and throttle position sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>2.5 ℓ ENGINE MODEL</b>  <b>(B55) No. 2 — (E13) No. 3:</b>  <b>3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM</b>  <b>(B55) No. 2 — (E13) No. 2:</b>  <b>3.0 ℓ ENGINE MODEL WITH VDC SYSTEM</b>  <b>(B54) No. 3 — (E13) No. 2:</b></p>	Is the resistance less than 1 Ω?	Go to step 7.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
7	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.</b></p> <p>Measure resistance of harness between TCM and throttle position sensor connector.</p> <p><b>Connector &amp; terminal</b>  <b>2.5 ℓ ENGINE MODEL</b>  <b>(B55) No. 1 — (E13) No. 4:</b>  <b>3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM</b>  <b>(B55) No. 1 — (E13) No. 3:</b>  <b>3.0 ℓ ENGINE MODEL WITH VDC SYSTEM</b>  <b>(B54) No. 2 — (E13) No. 3:</b></p>	Is the resistance less than 1 Ω?	Go to step 8.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
8	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.</b></p> <p>Measure resistance of harness between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>  <b>(B55) No. 2 — Chassis ground:</b>  <b>WITH VDC SYSTEM</b>  <b>(B54) No. 3 — Chassis ground:</b></p>	Is the resistance more than 1 MΩ?	Go to step 9.	Repair short circuit in harness between TCM and throttle position sensor connector.
9	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.</b></p> <p>Measure resistance of harness between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>  <b>(B55) No. 1 — Chassis ground:</b>  <b>WITH VDC SYSTEM</b>  <b>(B54) No. 2 — Chassis ground:</b></p>	Is the resistance more than 1 MΩ?	Go to step 10.	Repair short circuit in harness between TCM and throttle position sensor connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
10	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> 1) Disconnect connector from ECM. 2) Measure resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 ℓ ENGINE MODEL</b> <b>(B55) No. 2 — (B136) No. 17:</b> <b>3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM</b> <b>(B55) No. 2 — (B135) No. 7:</b> <b>3.0 ℓ ENGINE MODEL WITH VDC SYSTEM</b> <b>(B54) No. 3 — (B135) No. 7:</b>	Is the resistance less than 1 Ω?	Go to step 11.	Repair open circuit in harness between TCM and ECM connector.
11	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> Measure resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 ℓ ENGINE MODEL</b> <b>(B55) No. 1 — (B136) No. 15:</b> <b>3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM</b> <b>(B55) No. 1 — (B135) No. 9:</b> <b>3.0 ℓ ENGINE MODEL WITH VDC SYSTEM</b> <b>(B54) No. 2 — (B135) No. 9:</b>	Is the resistance less than 1 Ω?	Go to step 12.	Repair open circuit in harness between TCM and ECM connector.
12	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 15.	Go to step 13.
13	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Close the throttle completely. 4) Measure voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 2 (+) — Chassis ground (-):</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 3 (+) — Chassis ground (-):</b>	Is the voltage between 0.3 and 0.7 V in throttle fully closed?	Go to step 14.	Go to step 19.
14	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Open the throttle completely. 2) Measure voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 2 (+) — Chassis ground (-):</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 3 (+) — Chassis ground (-):</b>	Is the voltage between 4.3 and 4.9 V with throttle fully open?	Go to step 17.	Go to step 19.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

## Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
15	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF). 4) Turn Subaru Select Monitor switch to ON. 5) Throttle fully closed. 6) Read data of throttle position sensor using Subaru Select Monitor. ● Throttle position sensor input signal is indicated.	Is the value voltage between 0.3 and 0.7 V?	Go to step 16.	Go to step 19.
16	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> Throttle fully open. NOTE: Must be changed correspondingly with accelerator pedal operation (from "released" to "depressed" position).	Is the value voltage between 4.3 and 4.9 V?	Go to step 19.	Go to step 18.
17	<b>CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY).</b> Measure voltage between TCM connector and chassis ground. <i>Connector &amp; terminal</i> 2.5 ℓ ENGINE MODEL (B55) No. 1 (+) — Chassis ground (-): 3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM (B55) No. 1 (+) — Chassis ground (-): 3.0 ℓ ENGINE MODEL WITH VDC SYSTEM (B54) No. 2 (+) — Chassis ground (-):	Is the voltage between 4.8 and 5.3 V?	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.	Go to step 19.
18	<b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY).</b> Read data of throttle position sensor power supply using Subaru Select Monitor. ● Throttle position sensor power supply voltage is indicated.	Is the value voltage between 4.8 and 5.3 V?	Even if "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.	Go to step 19.
19	<b>CHECK POOR CONTACT.</b>	Is there poor contact in throttle position sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-55

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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## E: TROUBLE CODE 33 — FRONT VEHICLE SPEED SENSOR — S004509F60

### DIAGNOSIS:

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

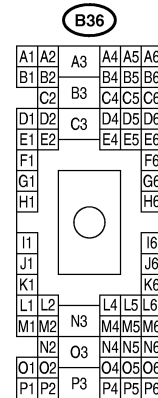
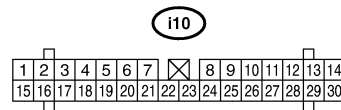
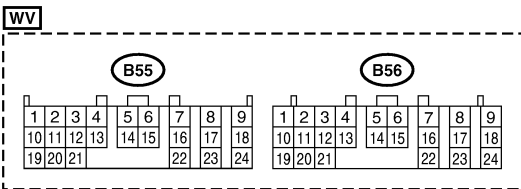
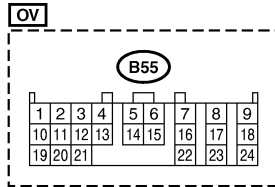
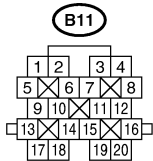
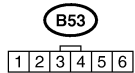
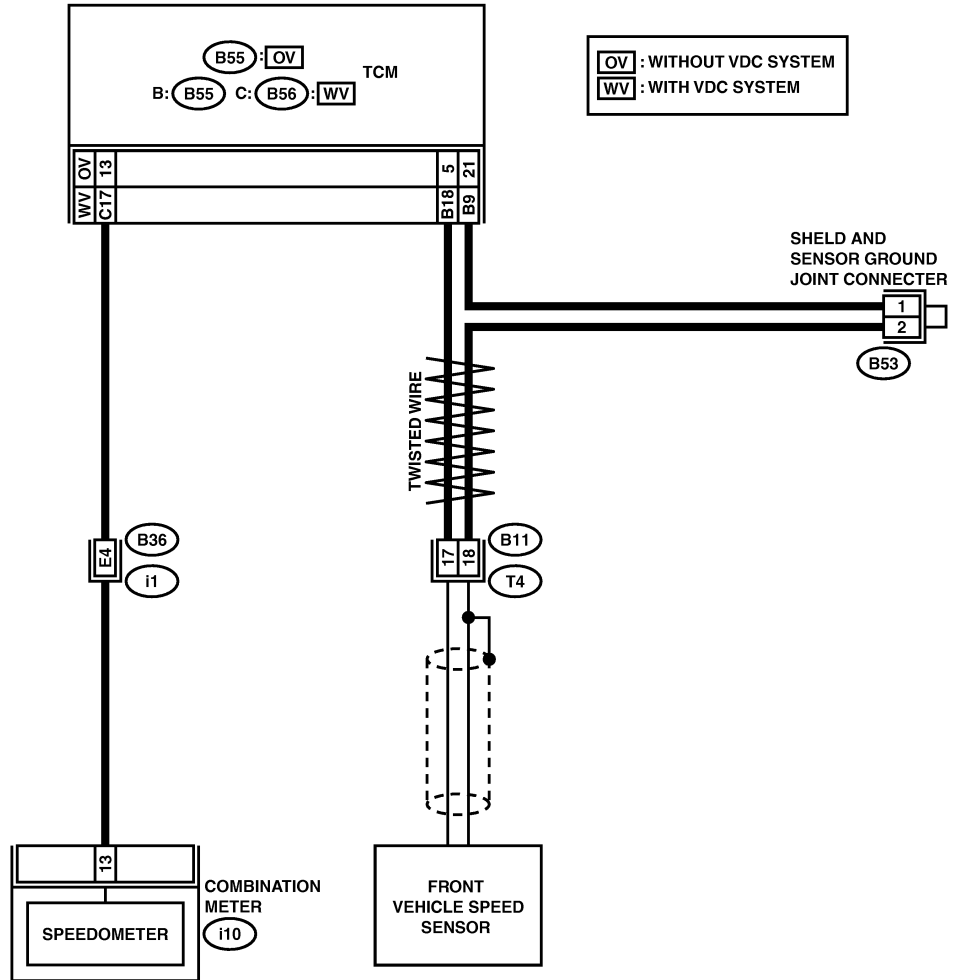
### TROUBLE SYMPTOM:

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

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## WIRING DIAGRAM:



B3M1874



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	<p><b>CHECK INPUT SIGNAL FOR TCM.</b></p> <p>1) Connect all connectors. 2) Lift-up or raise the vehicle and place safety stands.</p> <p><b>CAUTION:</b> <b>On AWD models, raise all wheels off floor.</b></p> <p>3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.</p> <p><b>NOTE:</b> The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p> <p>4) Measure voltage between TCM connector terminals.</p> <p><b>Connector &amp; terminal</b> <b>Without VDC SYSTEM</b> <b>(B55) No. 5 (+) — No. 21 (-):</b> <b>With VDC SYSTEM</b> <b>(B55) No. 18 (+) — No. 9 (-):</b></p>	Is the voltage more than AC 1 V?	Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contactor or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
9	<p><b>CHECK FRONT VEHICLE SPEED SENSOR USING OSCILLOSCOPE.</b></p> <p>1) Connect all connectors. 2) Lift-up the vehicle and place safety stand.</p> <p><b>CAUTION:</b> <b>On AWD models, raise all wheels off ground.</b></p> <p>3) Set oscilloscope to TCM connector terminals.</p> <p><b>WITHOUT VDC SYSTEM</b> Positive probe; (B55) No. 5 Earth lead; (B55) No. 21</p> <p><b>WITH VDC SYSTEM</b> Positive probe; (B55) No. 18 Earth lead; (B55) No. 9</p> <p>4) Start the engine, and drive the wheels slowly.</p> <p><b>NOTE:</b> The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p> <p>5) Measure signal voltage indicated on oscilloscope.</p>	Is the voltage more than AC 4 V?	Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contactor or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
10	<p><b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Connect all connectors.                      2) Connect Subaru Select Monitor to data link connector.                      3) Lift-up or raise the vehicle and place safety stands.</p> <p><b>CAUTION:</b>  <b>On AWD models, raise all wheels off floor.</b></p> <p>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.</p> <ul style="list-style-type: none"> <li>● Compare speedometer with Subaru Select Monitor indications.</li> <li>● Vehicle speed is indicated in "km/h" or "MPH".</li> </ul> <p>7) Slowly increase vehicle speed to 60 km/h or 37 MPH.</p> <p><b>NOTE:</b>                      The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contactor or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
11	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in vehicle speed sensor 2 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-61

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## F: TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR

S004509D17

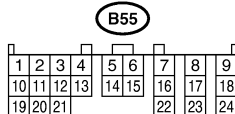
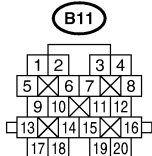
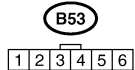
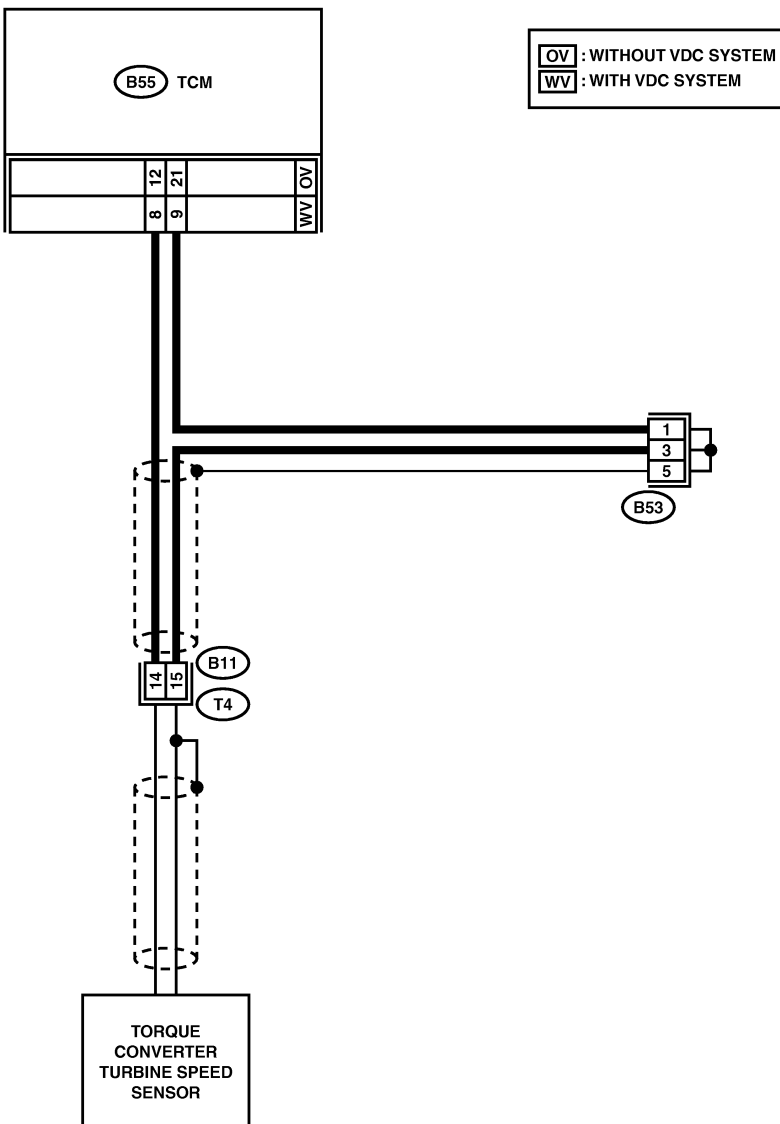
### DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



B3M1875

AT-62

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	<b>CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector receptacle's terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 14 — No. 15:</b>	Is the resistance between 450 and 650 $\Omega$ ?	Go to step 2.	Replace turbine speed sensor. <Ref. to AT-31 Front and Rear Vehicle Speed Sensors, Torque Converter Turbine Speed Sensor and Harness Assembly.>
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 12 — (B11) No. 14:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 8 — (B11) No. 14:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 21 — (B11) No. 15:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 9 — (B11) No. 15:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 21 — Chassis ground:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 9 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 12 — Chassis ground:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 8 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 6.	Repair short circuit in harness between TCM and transmission connector.
6	<b>PREPARE OSCILLOSCOPE.</b>	Do you have oscilloscope?	Go to step 10.	Go to step 7.
7	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	<p><b>CHECK INPUT SIGNAL FOR TCM.</b></p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Start the engine and move select lever to "P" or "N" range.</p> <p>3) Measure voltage between TCM connector terminals.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>  <b>(B55) No. 12 (+) — No. 21 (-):</b>  <b>WITH VDC SYSTEM</b>  <b>(B55) No. 8 (+) — No. 9 (-):</b></p>	Is the voltage more than AC 1 V?	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.	Go to step 11.
9	<p><b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Connect Subaru Select Monitor to data link connector.</p> <p>3) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.</p> <p>4) Start the engine.</p> <p>5) Move select lever to "P" or "N" range.</p> <p>6) Read data of turbine speed using Subaru Select Monitor.</p> <ul style="list-style-type: none"> <li>● Compare tachometer with Subaru Select Monitor indications.</li> </ul>	Is the revolution value same as the tachometer reading shown on the combination meter?	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.	Go to step 11.
10	<p><b>CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.</b></p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Set oscilloscope to TCM connector terminals.</p> <p>WITHOUT VDC SYSTEM Position prove; (B55) No. 12 Earth lead; (B55) No. 21</p> <p>WITH VDC SYSTEM Position prove; (B55) No. 8 Earth lead; (B55) No. 9</p> <p>3) Start the engine and move select lever to "P" or "N" range.</p>	Is the signal voltage more than AC 1 V?	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.	Go to step 11.
11	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in torque converter turbine speed sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-65



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## G: TROUBLE CODE 38 — TORQUE CONTROL SIGNAL — S004509D26

### DIAGNOSIS:

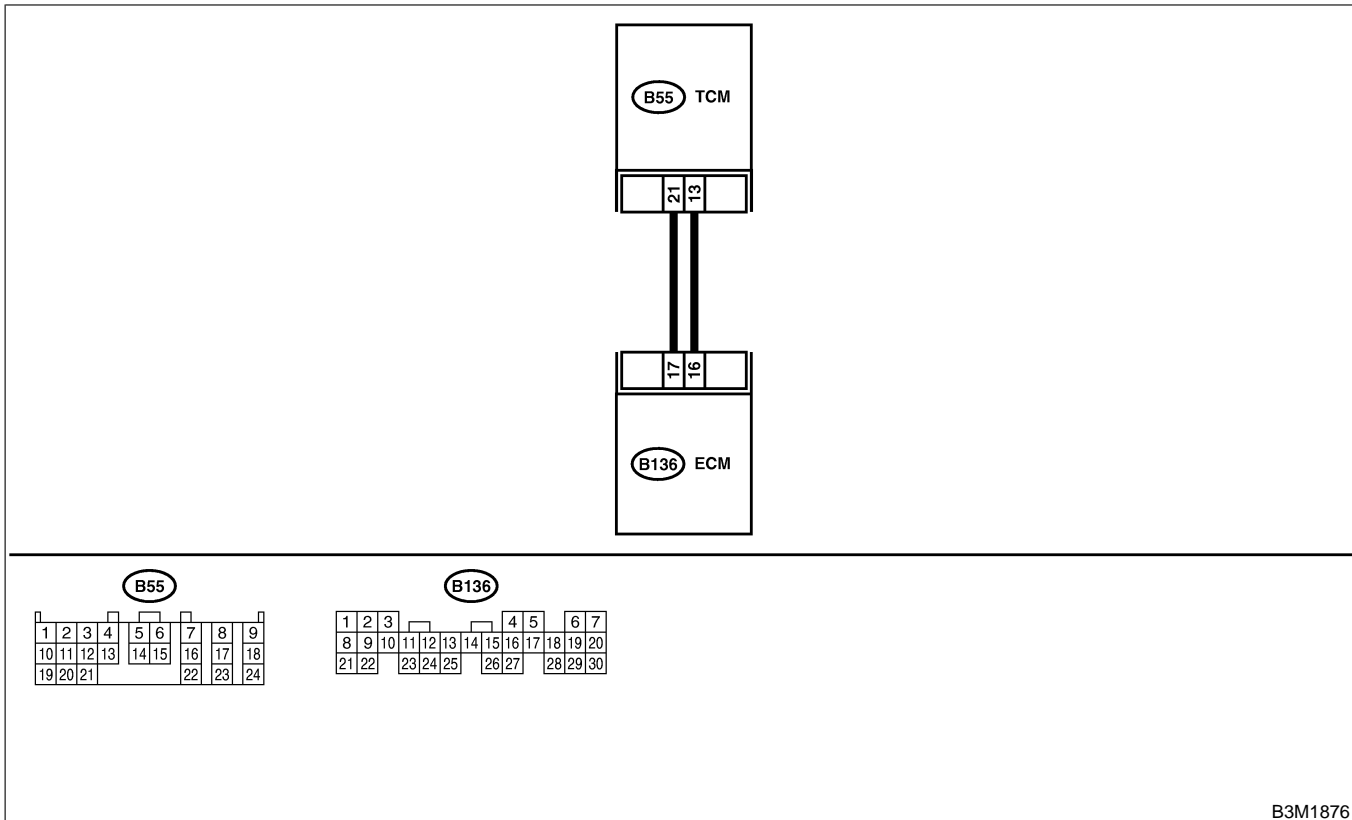
- The signal circuit is open or shorted.

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:

- 2.5 ℓ ENGINE MODEL

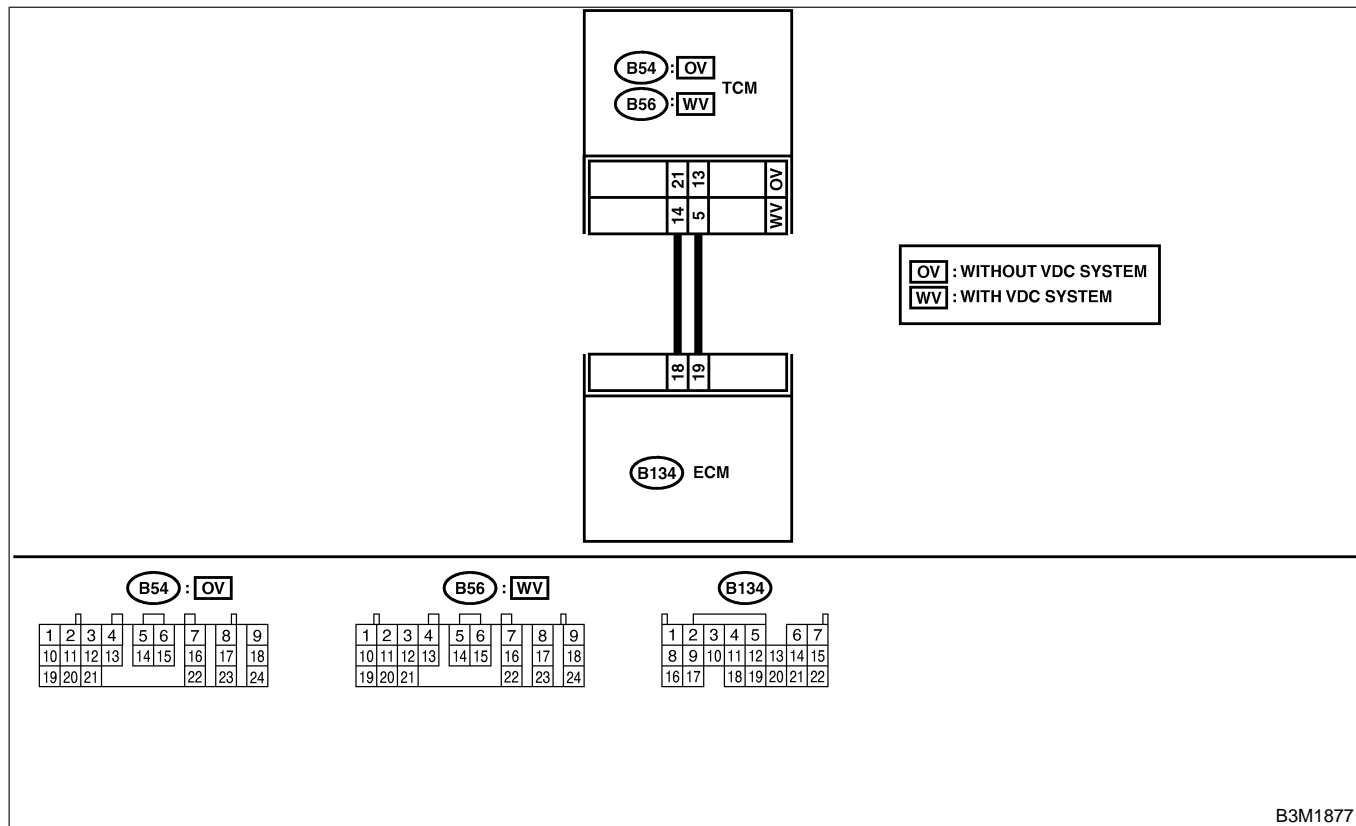


B3M1876

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## ● 3.0 ℓ ENGINE MODEL



No.	Step	Check	Yes	No
1	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b></p> <p>1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector.</p> <p><b>Connector &amp; terminal</b></p> <p><b>2.5 ℓ ENGINE MODEL</b></p> <p>(B54) No. 21 — (B135) No. 17: (B54) No. 13 — (B135) No. 16:</p> <p><b>3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM</b></p> <p>(B54) No. 21 — (B134) No. 18: (B54) No. 13 — (B134) No. 19:</p> <p><b>3.0 ℓ ENGINE MODEL WITH VDC SYSTEM</b></p> <p>(B56) No. 14 — (B134) No. 18: (B56) No. 5 — (B134) No. 19:</p>	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b></p> <p>Measure resistance of harness between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b></p> <p><b>WITHOUT VDC SYSTEM</b></p> <p>(B54) No. 21 — Chassis ground: (B54) No. 13 — Chassis ground:</p> <p><b>WITH VDC SYSTEM</b></p> <p>(B56) No. 14 — Chassis ground: (B56) No. 5 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
3	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Connect connectors to TCM and ECM.                      2) Turn ignition switch to ON (engine OFF).                      3) Measure voltage between TCM connector terminals.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 21 (+) — Chassis ground (-):                      (B54) No. 13 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B56) No. 14 (+) — Chassis ground (-):                      (B56) No. 5 (+) — Chassis ground (-):</p>	Is the voltage more than 4.8 V?	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.	Go to step 4.
4	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in torque control signal circuit?	Repair poor contact.	Go to step 5.
5	<p><b>CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.</b>                      Check installing condition of ground line in transmission and body.</p>	Is there any dirt or rust at ground line installing point?	Remove dirt and rust.	Go to step 6.
6	<p><b>CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.</b>                      Check installing condition of ground line in transmission and body.</p> <p><b>Tightening torque:</b>                      13±3 N·m (1.3±0.3 kgf-m, 9.4±2.2 ft-lb)</p>	Is tightening torque value within specification?	Go to step 7.	Tighten to specified torque.
7	<p><b>CHECK GROUND LINE INSIDE TRANSMISSION.</b>                      1) Drain AT fluid and remove oil pan.                      2) Check tightening torque value of ground line installing bolt.</p> <p><b>Tightening torque:</b>                      T: 8±1 N·m (0.8±0.1 kgf-m, 5.8±0.7 ft-lb)</p>	Is tightening torque value within specification?	Go to step 8.	Tighten to specified torque.
8	<p><b>RECHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 21 (+) — Chassis ground (-):                      (B54) No. 13 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B56) No. 14 (+) — Chassis ground (-):                      (B56) No. 5 (+) — Chassis ground (-):</p>	Is each voltage more than 4.8 V?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Replace ECM.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-69

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## H: TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL — S004509D48

### DIAGNOSIS:

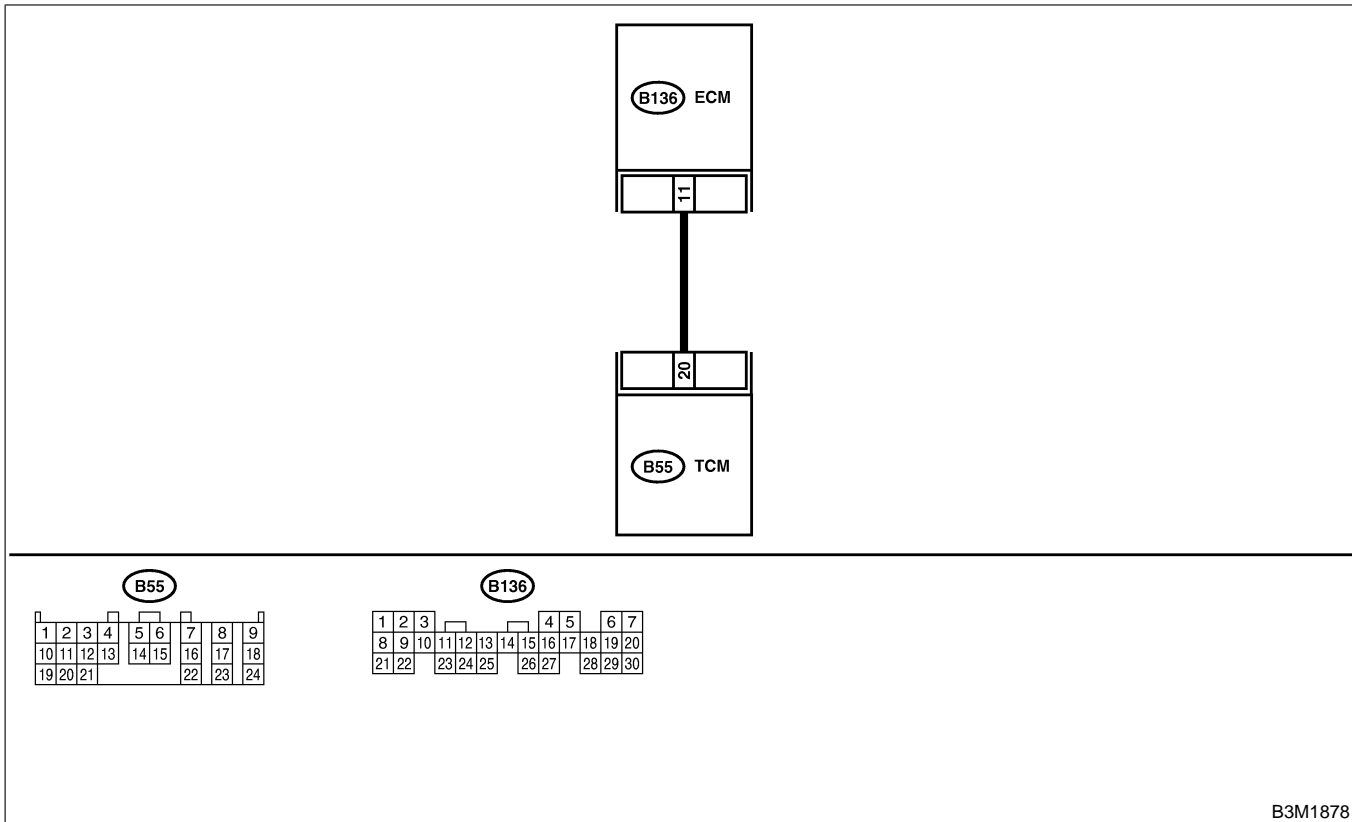
Input signal circuit of TCM from ECM is open or shorted.

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:

- 2.5 ℓ ENGINE MODEL

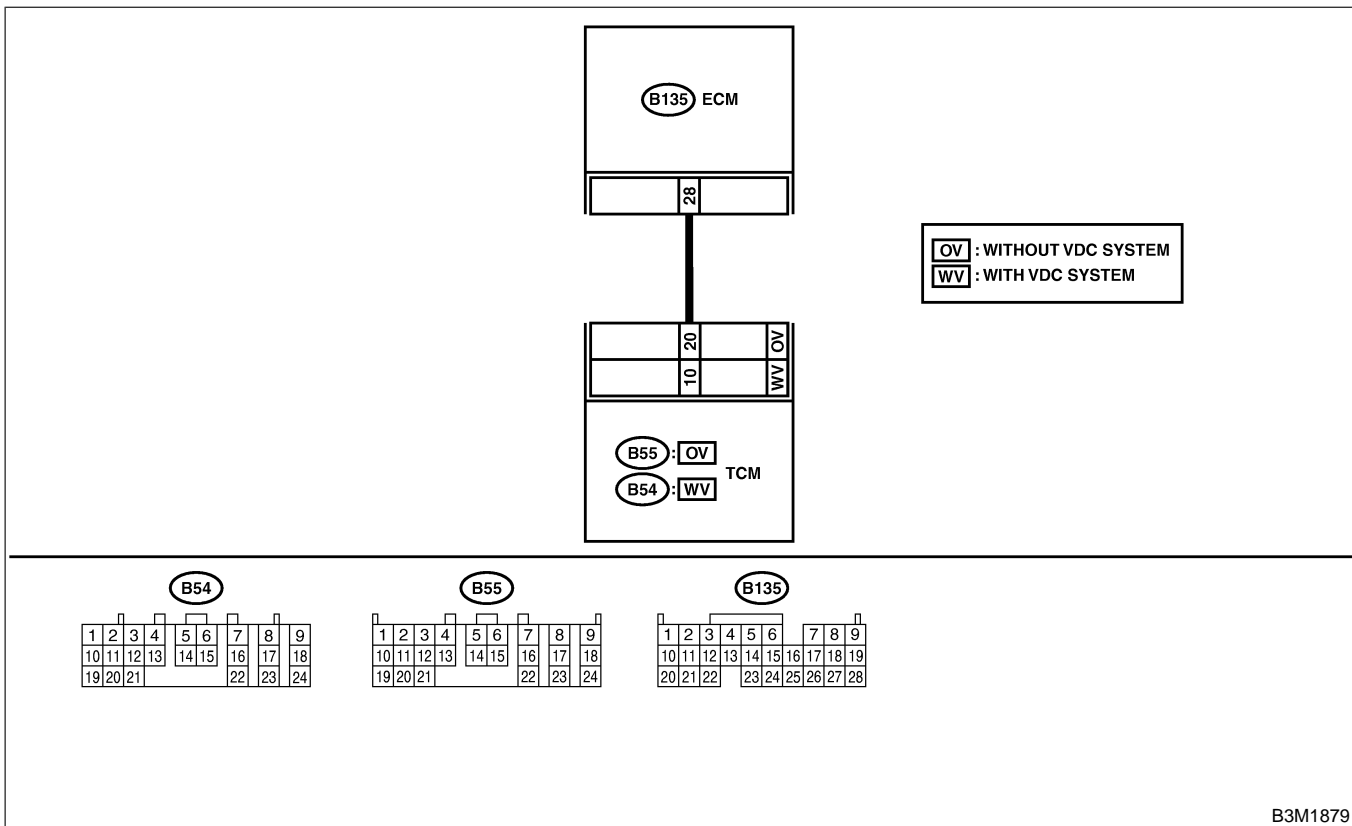


B3M1878

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## ● 3.0 ℓ ENGINE MODEL



No.	Step	Check	Yes	No
1	<b>CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM</b> <Ref. to AT-48 TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>	Is there any trouble?	Repair ground terminal and/or ground circuit of ECM.	Go to step 2.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. <b>Connector &amp; terminal</b> <b>2.5 ℓ ENGINE MODEL</b> (B55) No. 20 — (B136) No. 11: <b>3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM</b> (B55) No. 20 — (B135) No. 28: <b>3.0 ℓ ENGINE MODEL WITH VDC SYSTEM</b> (B54) No. 10 — (B135) No. 28:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and ECM connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
3	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</b> Measure resistance of harness between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 20 — Chassis ground:</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 10 — Chassis ground:</b></p>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and ECM connector.
4	<p><b>PREPARE SUBARU SELECT MONITOR.</b></p>	Do you have a Subaru Select Monitor?	Go to step 6.	Go to step 5.
5	<p><b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Connect connectors to TCM and ECM. 2) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Engine idling. 4) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>2.5 ℓ ENGINE MODEL</b> <b>(B55) No. 20 (+) — Chassis ground (-):</b> <b>3.0 ℓ ENGINE MODEL WITHOUT VDC SYSTEM</b> <b>(B55) No. 20 (+) — Chassis ground (-):</b> <b>3.0 ℓ ENGINE MODEL WITH VDC SYSTEM</b> <b>(B54) No. 10 (+) — Chassis ground (-):</b></p>	Is the voltage between 1.2 and 1.8 V?	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.	Go to step 7.
6	<p><b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b> 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to OFF. 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 engine until engine coolant temperature is above 80°C (176°F). 6) Engine idling. 7) Read data of intake manifold pressure signal using Subaru Select Monitor. ● Display shows intake manifold pressure signal value sent from ECM.</p>	Is the value between 1.2 and 1.8 V?	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.	Go to step 7.
7	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in intake manifold pressure signal circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-73



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## I: TROUBLE CODE 71 — SHIFT SOLENOID 1 — S004509D91

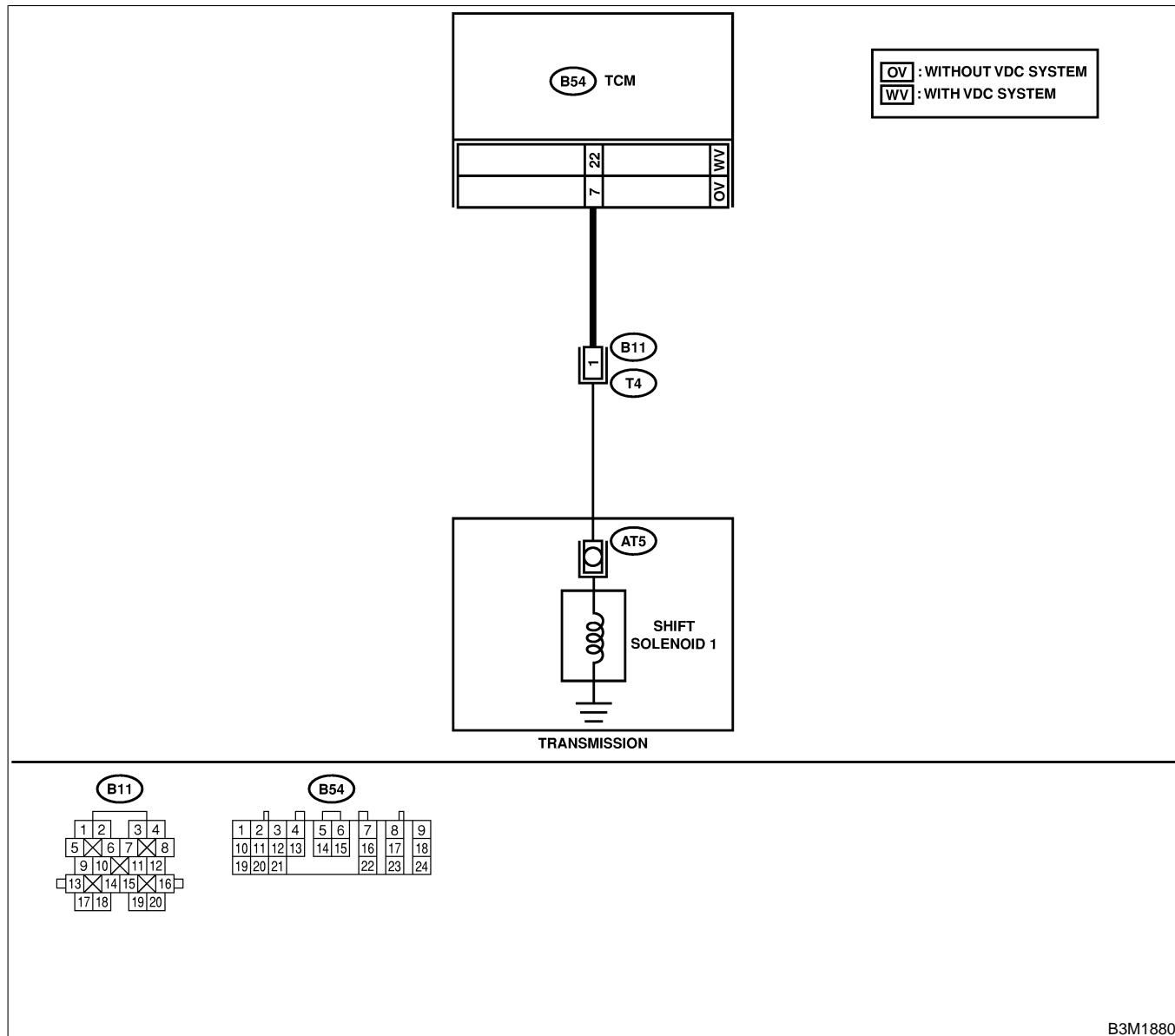
### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

Does not shift.

### WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	<b>CHECK SHIFT SOLENOID 1.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector terminals. <b>Connector &amp; terminal</b> <b>(T4) No. 1 — No. 16:</b>	Is the resistance between 10 and 16 Ω?	Go to step 2.	Go to step 6.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      1) Disconnect connector from TCM.                      2) Measure resistance of harness between TCM and shift solenoid 1 connector.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 7 — (B11) No. 1:  <b>WITH VDC SYSTEM</b>                      (B54) No. 22 — (B11) No. 1:</p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      Measure resistance of harness between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 7 — Chassis ground:  <b>WITH VDC SYSTEM</b>                      (B54) No. 22 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Connect connectors to TCM and transmission.                      2) Lift-up or raise the vehicle and support with safety stand.  <b>CAUTION:</b>  <b>On AWD models, raise all wheels off ground.</b>                      3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).                      NOTE:                      If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.                      4) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 MPH).                      NOTE:                      The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;                      5) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 7 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 22 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V?	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.	Go to step 5.
5	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in shift solenoid 1 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
6	<p><b>CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).</b></p> <p>1) Remove transmission connector from bracket.</p> <p>2) Lift-up or raise the vehicle and support with safety stand.</p> <p><b>CAUTION:</b> <b>On AWD models, raise all wheels off ground.</b></p> <p>3) Drain automatic transmission fluid.</p> <p><b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b></p> <p>4) Remove oil pan, and disconnect connector from shift solenoid 1.</p> <p>5) Measure resistance between shift solenoid 1 connector and transmission ground.</p> <p><b>Terminal</b> <b>No. 1 — Transmission ground:</b></p>	Is the resistance between 10 and 16 Ω?	Go to step 7.	Replace shift solenoid 1. <Ref. to AT-42 Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
7	<p><b>CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.</b></p> <p>Measure resistance of harness between shift solenoid 1 and transmission connector.</p> <p><b>Connector &amp; terminal</b> <b>(AT5) No. 1 — (T4) No. 1:</b></p>	Is the resistance less than 1 Ω?	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.
8	<p><b>CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.</b></p> <p>Measure resistance of harness between shift solenoid 1 connector and transmission ground.</p> <p><b>Connector &amp; terminal</b> <b>(T4) No. 1 — Transmission ground:</b></p>	Is the resistance more than 1 MΩ?	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 shift solenoid 1 and transmission.	Repair short circuit harness between TCM and transmission connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-77

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## J: TROUBLE CODE 72 — SHIFT SOLENOID 2 — S004509D98

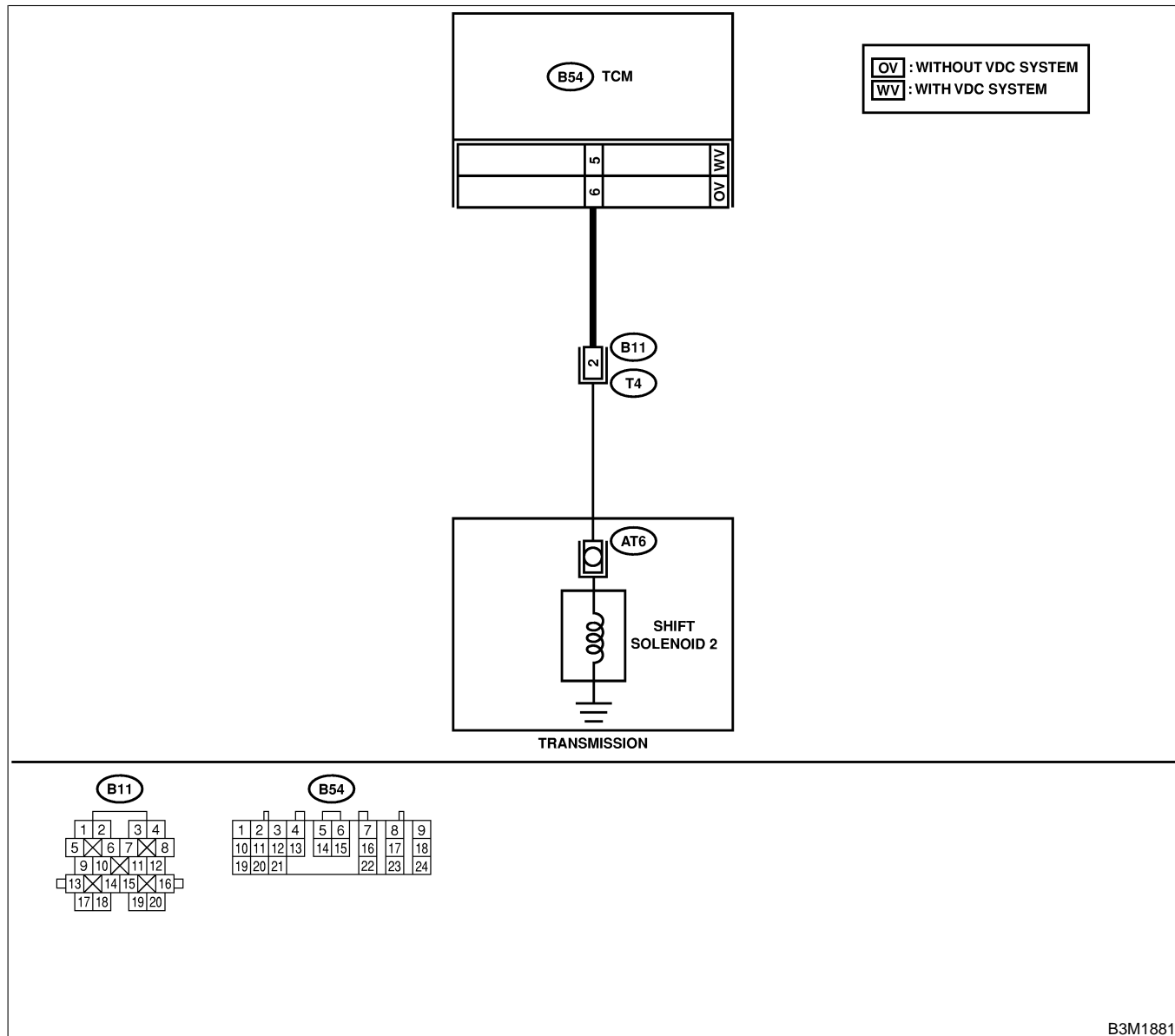
### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

Does not shift.

### WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	<b>CHECK SHIFT SOLENOID 2.</b> Measure resistance between transmission connector terminals. <b>Connector &amp; terminal</b> (T4) No. 2 — No. 16:	Is the resistance between 10 and 16 Ω?	Go to step 2.	Go to step 7.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      1) Disconnect connector from TCM.                      2) Measure resistance of harness between TCM and shift solenoid 2 connector.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 6 — (B11) No. 2:  <b>WITH VDC SYSTEM</b>                      (B54) No. 5 — (B11) No. 2:</p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      Measure resistance of harness between TCM connector and transmission ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 6 — Chassis ground:  <b>WITH VDC SYSTEM</b>                      (B54) No. 5 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Connect connectors to TCM and transmission.                      2) Turn ignition switch to ON (engine OFF).                      3) Move select lever to "D" range.                      4) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 6 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 5 (+) — Chassis ground (-):</p>	Is the voltage less than 1V → more than 9V?	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.	Go to step 5.
5	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Move select lever to "2" range.                      2) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 6 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 5 (+) — Chassis ground (-):</p>	Is the voltage less than 1V → more than 9V?	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.	Go to step 6.
6	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in shift solenoid 2 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	<p><b>CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).</b></p> <p>1) Remove transmission connector from bracket.</p> <p>2) Drain automatic transmission fluid.</p> <p><b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b></p> <p>3) Remove oil pan, and disconnect connector from shift solenoid 2.</p> <p>4) Measure resistance between shift solenoid 2 connector and transmission ground.</p> <p><b>Connector &amp; terminal</b> <b>No. 1 — Transmission ground:</b></p>	Is the resistance between 10 and 16 $\Omega$ ?	Go to step 8.	Replace shift solenoid 2 assembly. <Ref. to AT-42 Transmission Control Module (TCM).>
8	<p><b>CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.</b></p> <p>Measure resistance of harness between shift solenoid 2 and transmission connector.</p> <p><b>Connector &amp; terminal</b> <b>(AT6) No. 1 — (T4) No. 2:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair open circuit in harness between shift solenoid 2 and transmission connector.
9	<p><b>CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.</b></p> <p>Measure resistance of harness between shift solenoid 2 connector and transmission ground.</p> <p><b>Connector &amp; terminal</b> <b>(T4) No. 2 — Transmission ground:</b></p>	Is the resistance more than 1 M $\Omega$ ?	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.	Repair short circuit harness between TCM and transmission connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-81



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## K: TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID — S004509E05

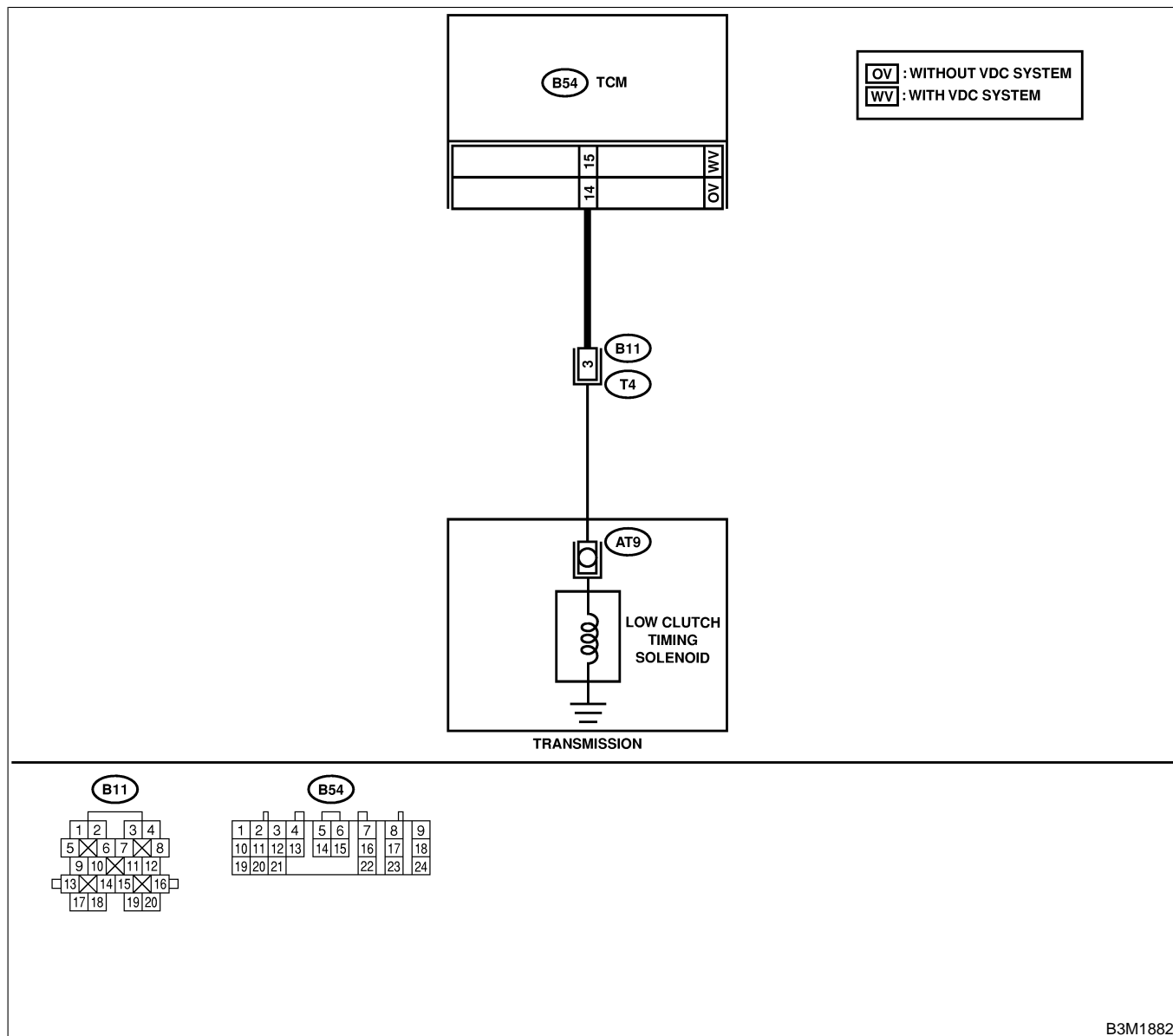
### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	<b>CHECK LOW CLUTCH TIMING SOLENOID.</b> Measure resistance between transmission connector terminals. <b>Connector &amp; terminal</b> (T4) No. 3 — No. 16:	Is the resistance between 10 and 16 Ω?	Go to step 2.	Go to step 7.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      1) Disconnect connector from TCM.                      2) Measure resistance of harness between TCM and transmission connector.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 14 — (B11) No. 3:  <b>WITH VDC SYSTEM</b>                      (B54) No. 15 — (B11) No. 3:</p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      Measure resistance of harness between TCM connector and transmission ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 14 — Chassis ground:  <b>WITH VDC SYSTEM</b>                      (B54) No. 15 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Connect connectors to TCM and transmission.                      2) Turn ignition switch to ON (engine OFF).                      3) Move select lever to "D" range.                      4) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 14 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 15 (+) — Chassis ground (-):</p>	Is the voltage more than 9V → less than 1 V?	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.	Go to step 5.
5	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Move select lever to "2" range.                      2) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 14 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 15 (+) — Chassis ground (-):</p>	Is the voltage more than 9V → less than 1V?	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.	Go to step 6.
6	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in low clutch timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

## Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	<p><b>CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION).</b></p> <p>1) Remove transmission connector from bracket.</p> <p>2) Lift-up or raise the vehicle and support with safety stand.</p> <p><b>CAUTION:</b> On AWD models, raise all wheels off ground.</p> <p>3) Drain automatic transmission fluid.</p> <p><b>CAUTION:</b> Do not drain the automatic transmission fluid until it cools down.</p> <p>4) Remove oil pan, and disconnect connector from low clutch timing solenoid.</p> <p>5) Measure resistance between low clutch timing solenoid connector and transmission ground.</p> <p><i>Terminal</i> <i>No. 1 — Transmission ground:</i></p>	Is the resistance between 10 and 16 Ω?	Go to step 8.	Replace low clutch timing solenoid. <Ref. to AT-36 Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	<p><b>CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.</b></p> <p>Measure resistance of harness between low clutch timing solenoid and transmission connector.</p> <p><i>Connector &amp; terminal</i> <i>(AT9) No. 1 — (T4) No. 3:</i></p>	Is the resistance less than 1 Ω?	Go to step 9.	Repair open circuit in harness between low clutch timing solenoid and transmission connector.
9	<p><b>CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.</b></p> <p>Measure resistance of harness between low clutch timing solenoid connector and transmission ground.</p> <p><i>Connector &amp; terminal</i> <i>(T4) No. 3 — Transmission ground:</i></p>	Is the resistance more than 1 MΩ?	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 low clutch timing solenoid and transmission.	Repair short circuit harness between TCM and transmission connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-85

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## L: TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID — S004509E07

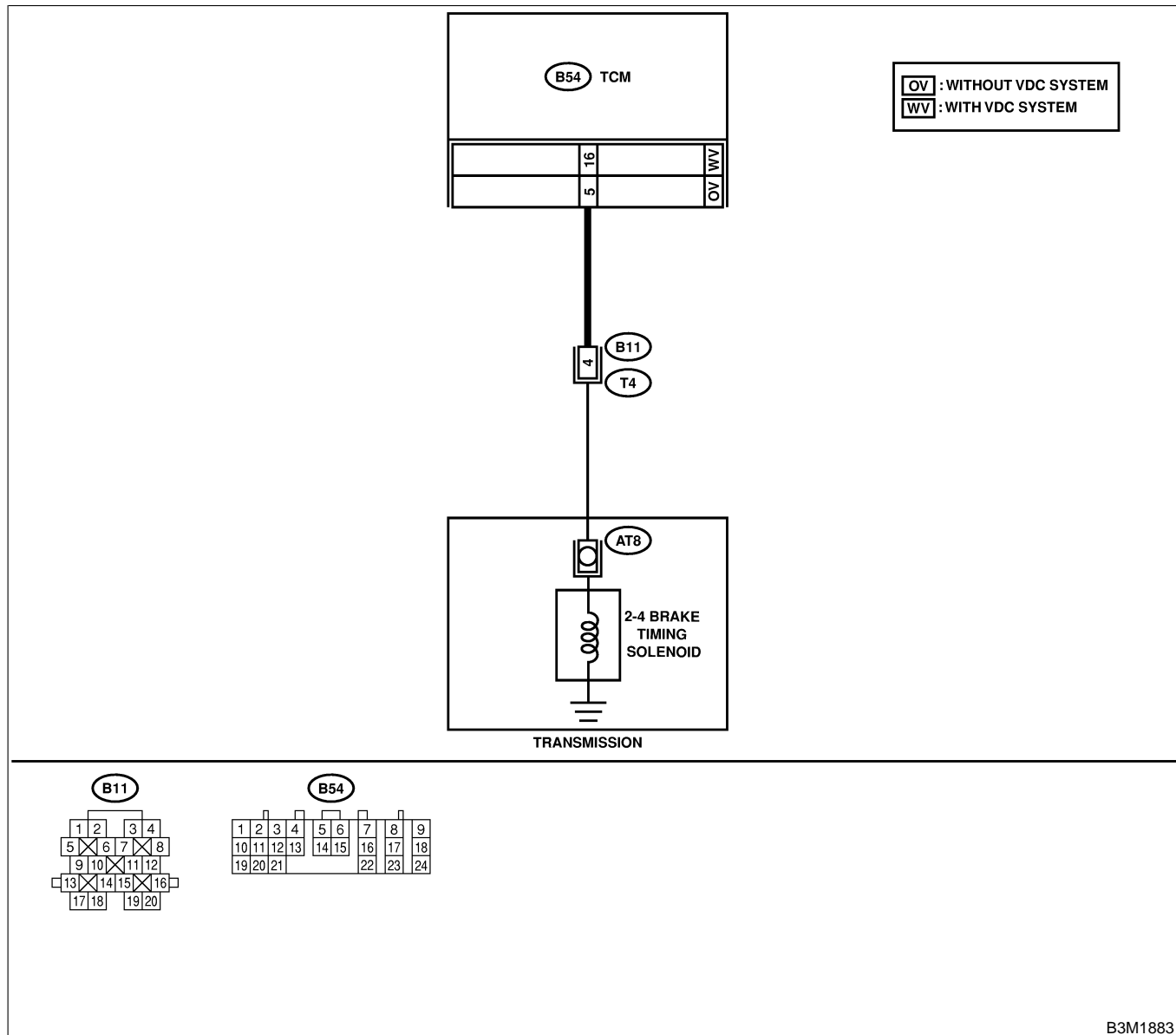
### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	<b>CHECK 2-4 BRAKE TIMING SOLENOID.</b> Measure resistance between transmission connector terminals. <b>Connector &amp; terminal</b> (T4) No. 4 — No. 16:	Is the resistance between 10 and 16 Ω?	Go to step 2.	Go to step 7.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      1) Disconnect connector from TCM.                      2) Measure resistance of harness between TCM and transmission connector.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 5 — (B11) No. 4:  <b>WITH VDC SYSTEM</b>                      (B54) No. 16 — (B11) No. 4:</p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      Measure resistance of harness between TCM connector and transmission ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 5 — Chassis ground:  <b>WITH VDC SYSTEM</b>                      (B54) No. 16 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Connect connectors to TCM and transmission.                      2) Lift-up or raise the vehicle and support with safety stand.  <b>CAUTION:</b>  <b>On AWD models, raise all wheels off ground.</b>                      3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).                      NOTE:                      If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.                      4) Move selector lever to "1", and slowly increase vehicle speed to 10 km/h (6 MPH).                      NOTE:                      The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;                      5) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 5 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 16 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V?	Go to step 5.	Go to step 6.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
5	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Move selector lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH).                      NOTE:                      The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;                      2) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal                      WITHOUT VDC SYSTEM                      (B54) No. 5 (+) — Chassis ground (-):                      WITH VDC SYSTEM                      (B54) No. 16 (+) — Chassis ground (-):</b></p>	Is the voltage more than 9 V?	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.	Go to step 6.
6	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
7	<p><b>CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION).</b>                      1) Remove transmission connector from bracket.                      2) Lift-up or raise the vehicle and support with safety stand.  <b>CAUTION:</b>  <b>On AWD models, raise all wheels off ground.</b>                      3) Drain automatic transmission fluid.  <b>CAUTION:</b>  <b>Do not drain the automatic transmission fluid until it cools down.</b>                      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.</p> <p><b>Terminal                      No. 1 — Transmission ground:</b></p>	Is the resistance between 10 and 16 $\Omega$ ?	Go to step 8.	Replace 2-4 brake timing solenoid. <Ref. to AT-36 Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	<p><b>CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.</b>                      Measure resistance of harness between 2-4 brake timing solenoid and transmission connector.</p> <p><b>Connector &amp; terminal                      (AT8) No. 1 — (T4) No. 4:</b></p>	Is the resistance less than 1 $\Omega$ ?	Go to step 9.	Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
9	<p><b>CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.</b></p> <p>Measure resistance of harness between 2-4 brake timing solenoid connector and transmission ground.</p> <p><b>Connector &amp; terminal</b> <b>(T4) No. 4 — Transmission ground:</b></p>	Is the resistance more than 1 MΩ?	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 2-4 brake timing solenoid and transmission.	Repair short circuit harness between TCM and transmission connector.



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## M: TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID — S004509E14

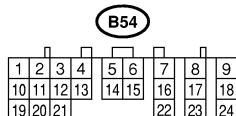
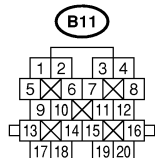
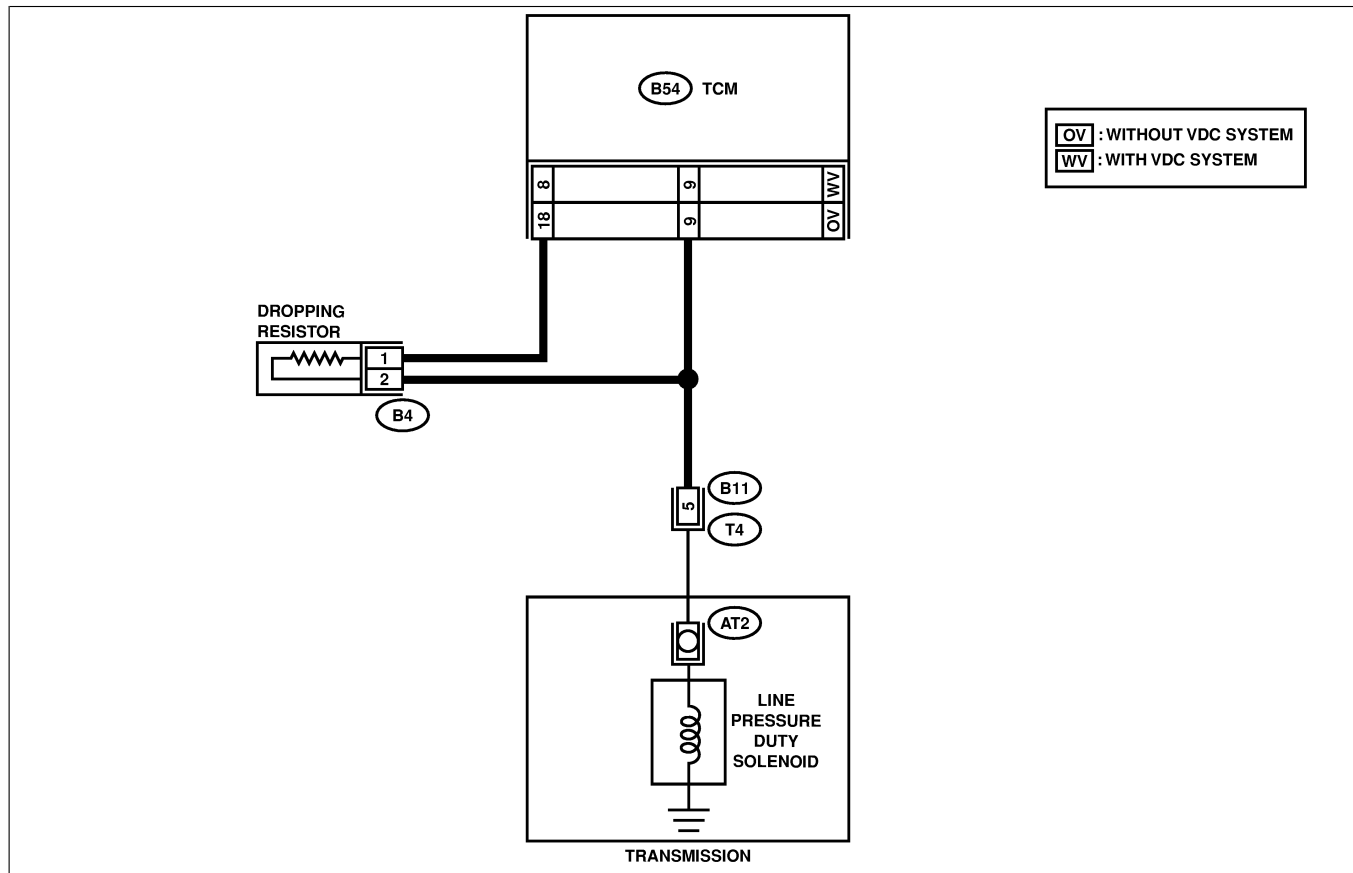
### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



B3M1884

No.	Step	Check	Yes	No
1	<b>CHECK RESISTOR.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminal. <b>Terminals</b> <b>No. 1 — No. 2:</b>	Is the resistance between 9 and 15 $\Omega$ ?	Go to step 2.	Replace dropping resistor. <Ref. to AT-44 Dropping Resistor.>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.</b></p> <p>1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and dropping resistor connector.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B54) No. 18 — (B4) No. 1:</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 8 — (B4) No. 1:</b></p>	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and dropping resistor connector.
3	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.</b></p> <p>Measure resistance of harness between dropping resistor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B4) No. 1 — Chassis ground:</b></p>	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and dropping resistor connector.
4	<p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.</b></p> <p>1) Disconnect connector from transmission. 2) Measure resistance of harness between transmission and dropping resistor connector.</p> <p><b>Connector &amp; terminal</b> <b>(B4) No. 2 — (B11) No. 5:</b></p>	Is the resistance less than 1 Ω?	Go to step 5.	Repair open circuit in harness between dropping resistor and transmission connector.
5	<p><b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.</b></p> <p>Measure resistance of harness between dropping resistor connector and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>(B4) No. 2 — Chassis ground:</b></p>	Is the resistance more than 1 MΩ?	Go to step 6.	Repair short circuit in harness between dropping resistor and transmission connector.
6	<p><b>CHECK LINE PRESSURE DUTY SOLENOID.</b></p> <p>Measure resistance between transmission connector receptacle's terminals.</p> <p><b>Terminal</b> <b>(T4) No. 5 — No. 16:</b></p>	Is the resistance between 2.0 and 4.5 Ω?	Go to step 7.	Go to step 17.
7	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b></p> <p>Measure resistance of harness between TCM and transmission connector.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B54) No. 9 — (B11) No. 5:</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 9 — (B11) No. 5:</b></p>	Is the resistance less than 1 Ω?	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.
8	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b></p> <p>Measure resistance of harness between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B54) No. 9 — Chassis ground:</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 9 — Chassis ground:</b></p>	Is the resistance more than 1 MΩ?	Go to step 9.	Repair short circuit in harness between TCM and transmission connector.
9	<p><b>PREPARE SUBARU SELECT MONITOR.</b></p>	Do you have a Subaru Select Monitor?	Go to step 14.	Go to step 10.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
10	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      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.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 9 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 9 (+) — Chassis ground (-):</p>	Is the voltage between 1.5 and 4.0 V with throttle fully closed?	Go to step 11.	Go to step 16.
11	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 9 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 9 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V with throttle fully open?	Go to step 12.	Go to step 16.
12	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 18 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 8 (+) — Chassis ground (-):</p>	Is the voltage more than 8.5 V with throttle fully closed?	Go to step 13.	Go to step 16.
13	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 18 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 8 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V with throttle fully open?	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.	Go to step 16.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
14	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Connect Subaru Select Monitor to data link connector.</p> <p>3) Start the engine, and turn Subaru Select Monitor switch to ON.</p> <p>4) Warm-up the transmission until ATF temperature is above 80°C (176°F).</p> <p>NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.</p> <p>5) Stop the engine and turn ignition switch to ON (engine OFF).</p> <p>6) Move select lever to "N".</p> <p>7) Read data of line pressure duty solenoid using Subaru Select Monitor.</p> <ul style="list-style-type: none"> <li>● Line pressure duty solenoid is indicated in "%".</li> </ul> <p>8) Throttle is fully closed.</p>	Is the value 100%?	Go to step 15.	Go to step 16.
15	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Turn ignition switch to ON (Engine OFF).</p> <p>2) Throttle is fully open.</p>	Is the value between 10 and 20%?	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.	Go to step 16.
16	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in line pressure duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
17	<p><b>CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION).</b></p> <p>1) Remove transmission connector from bracket.</p> <p>2) Drain automatic transmission fluid.</p> <p><b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b></p> <p>3) Remove oil pan, and disconnect connector from line pressure duty solenoid.</p> <p>4) Measure resistance between line pressure duty solenoid connector and transmission ground.</p> <p><b>Terminal</b> <b>No. 1 — Transmission ground:</b></p>	Is the resistance between 2.0 and 4.5 Ω?	Go to step 18.	Replace line pressure duty solenoid. <Ref. to AT-36 Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
18	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.</b> Measure resistance of harness between line pressure duty solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 5 — (AT2) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 19.	Repair open circuit in harness between line pressure duty solenoid and transmission connector.
19	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.</b> Measure resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 5 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if "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 line pressure duty solenoid and transmission connector.	Repair short circuit in harness between line pressure duty solenoid and transmission connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-95

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## N: TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID — S004509E15

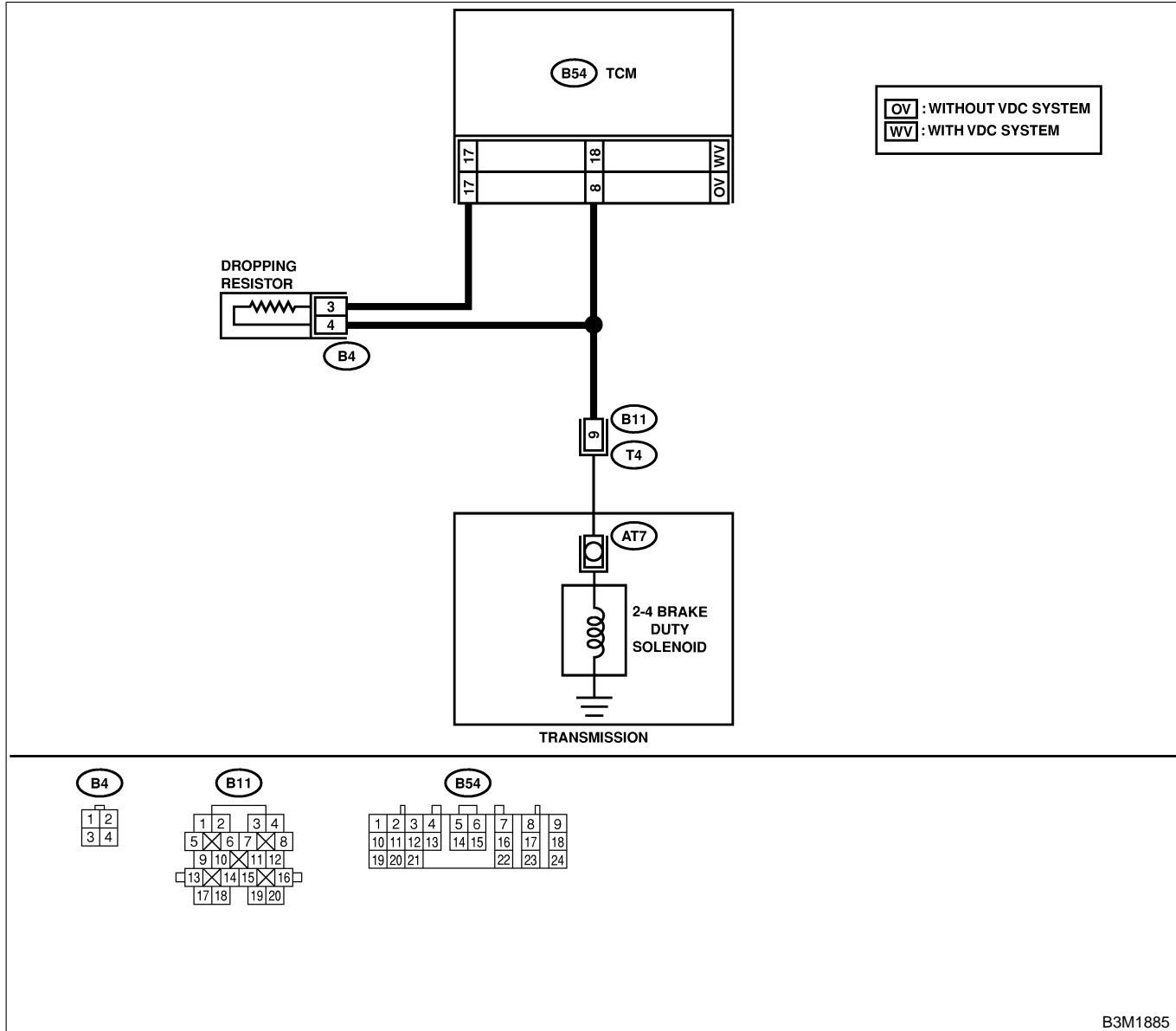
### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

Excessive shift shock.

### WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	<b>CHECK RESISTOR.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminal. <b>Terminals</b> <b>No. 3 — No. 4:</b>	Is the resistance between 9 and 15 Ω?	Go to step 2.	Replace dropping resistor. <Ref. to AT-44 Dropping Resistor.>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.</b> 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and dropping resistor connector. <i>Connector &amp; terminal</i> <b>WITHOUT VDC SYSTEM</b> (B54) No. 17 — (B4) No. 3: <b>WITH VDC SYSTEM</b> (B54) No. 17 — (B4) No. 3:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and dropping resistor connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.</b> Measure resistance of harness between dropping resistor connector and chassis ground. <i>Connector &amp; terminal</i> (B4) No. 3 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and dropping resistor connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.</b> 1) Disconnect connector from transmission. 2) Measure resistance of harness between transmission and dropping resistor connector. <i>Connector &amp; terminal</i> (B4) No. 4 — (B11) No. 9:	Is the resistance less than 1 Ω?	Go to step 5.	Repair open circuit in harness between dropping resistor and transmission connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR.</b> Measure resistance of harness between dropping resistor connector and chassis ground. <i>Connector &amp; terminal</i> (B4) No. 4 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 6.	Repair short circuit in harness between dropping resistor and transmission connector.
6	<b>CHECK 2-4 BRAKE DUTY SOLENOID.</b> Measure resistance between transmission connector receptacle's terminals. <i>Terminal</i> (T4) No. 16 — No. 9:	Is the resistance between 2.0 and 4.5 Ω?	Go to step 7.	Go to step 17.
7	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure resistance of harness between TCM and transmission connector. <i>Connector &amp; terminal</i> <b>WITHOUT VDC SYSTEM</b> (B54) No. 8 — (B11) No. 9: <b>WITH VDC SYSTEM</b> (B54) No. 18 — (B11) No. 9:	Is the resistance less than 1 Ω?	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.
8	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.</b> Measure resistance of harness between TCM and chassis ground. <i>Connector &amp; terminal</i> <b>WITHOUT VDC SYSTEM</b> (B54) No. 8 — Chassis ground: <b>WITH VDC SYSTEM</b> (B54) No. 18 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 9.	Repair short circuit in harness between TCM and transmission connector.
9	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 14.	Go to step 10.



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
10	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      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.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 8 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 18 (+) — Chassis ground (-):</p>	Is the voltage between 1.5 and 4.0 V with throttle fully closed?	Go to step 11.	Go to step 16.
11	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 8 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 18 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V with throttle fully open?	Go to step 12.	Go to step 16.
12	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 17 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 17 (+) — Chassis ground (-):</p>	Is the voltage more than 8.5 V with throttle fully closed?	Go to step 13.	Go to step 16.
13	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 17 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 17 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V with throttle fully open?	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.	Go to step 16.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
14	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>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).  <b>NOTE:</b>                      If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.                      5) Stop the engine and turn ignition switch to ON (engine OFF).                      6) Move select lever to "N".                      7) Read data of 2-4 brake duty solenoid using Subaru Select Monitor.                      ● 2-4 brake duty solenoid is indicated in "%".                      8) Throttle is fully closed.</p>	Is the value 100%?	Go to step 15.	Go to step 16.
15	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Turn ignition switch to ON (Engine OFF).                      2) Throttle is fully open.</p>	Is the value between 10 and 20%?	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.	Go to step 16.
16	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
17	<p><b>CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).</b></p> <p>1) Remove transmission connector from bracket.                      2) Drain automatic transmission fluid.  <b>CAUTION:</b>  <b>Do not drain the automatic transmission fluid until it cools down.</b>                      3) Remove oil pan, and disconnect connector from 2-4 brake duty solenoid.                      4) Measure resistance between 2-4 brake duty solenoid connector and transmission ground.  <b>Terminal</b>  <b>No. 1 — Transmission ground:</b></p>	Is the resistance between 2.0 and 4.5 Ω?	Go to step 18.	Replace 2-4 brake duty solenoid. <Ref. to AT-36 Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
18	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.</b> Measure resistance of harness between 2-4 brake duty solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 9 — (AT7) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 19.	Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.
19	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.</b> Measure resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 9 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if "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 line pressure duty solenoid and transmission connector.	Repair short circuit in harness between 2-4 brake duty solenoid and transmission connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-101

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## O: TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID — S004509E16

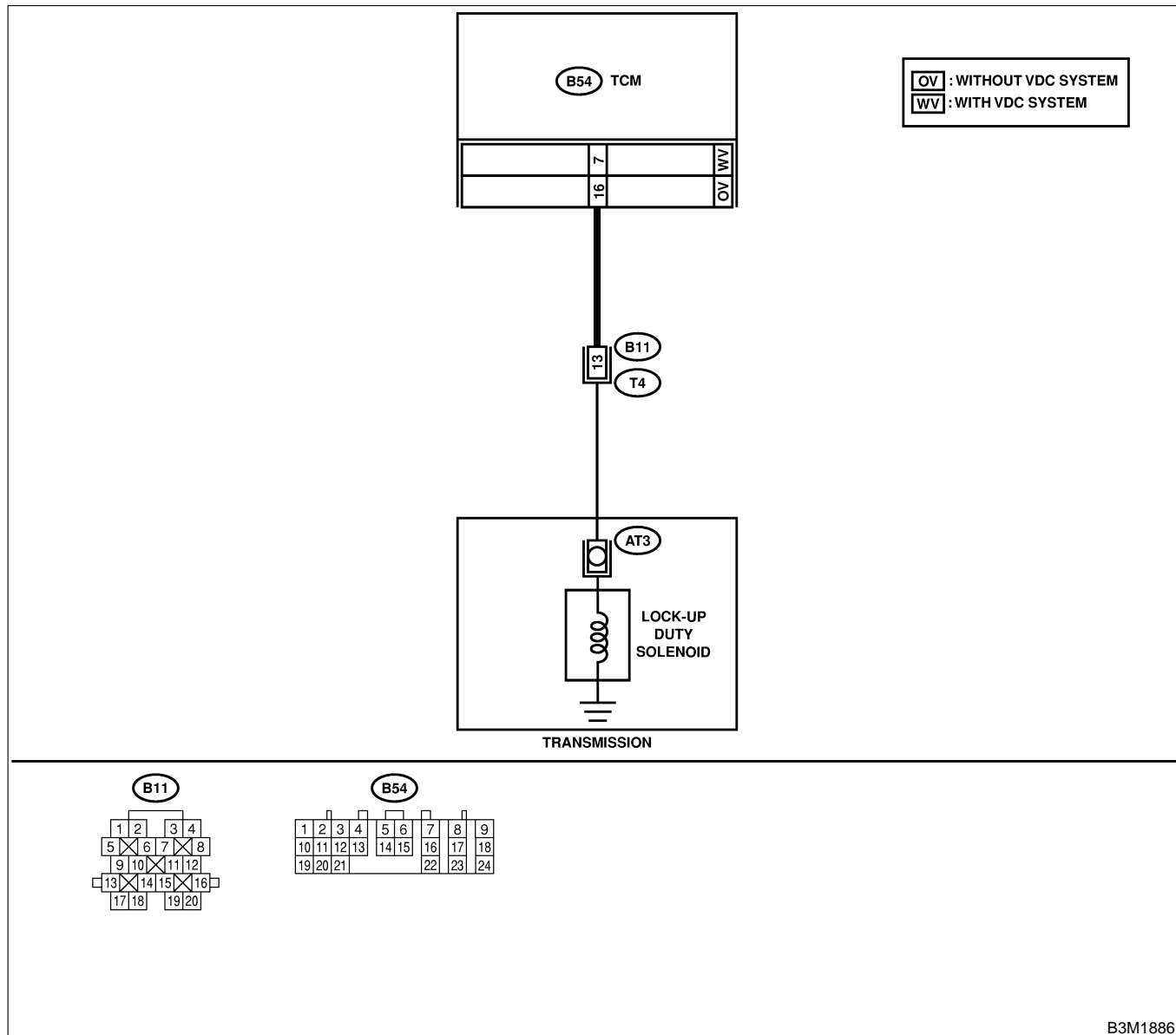
### DIAGNOSIS:

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

### TROUBLE SYMPTOM:

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

### WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	<b>CHECK TROUBLE CODE.</b>	Do multiple trouble codes appear in the on-board diagnostics test mode?	Go to another trouble code.	Go to step 2.
2	<b>CHECK LOCK-UP DUTY SOLENOID.</b> Measure resistance between transmission connector receptacle's terminals. <i>Connector &amp; terminal</i> <i>(T4) No. 13 — No. 16:</i>	Is the resistance between 9 and 15 Ω?	Go to step 3.	Go to step 11.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
3	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      1) Disconnect connector from TCM.                      2) Measure resistance of harness between TCM and transmission connector.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 16 — (B11) No. 13:  <b>WITH VDC SYSTEM</b>                      (B54) No. 7 — (B11) No. 13:</p>	Is the resistance than 1 Ω?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector.
4	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b>                      Measure resistance of harness connector between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 16 — Chassis ground:  <b>WITH VDC SYSTEM</b>                      (B54) No. 7 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	<p><b>PREPARE SUBARU SELECT MONITOR.</b></p>	Do you have a Subaru Select Monitor?	Go to step 8.	Go to step 6.
6	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b>                      1) Connect connectors to TCM and transmission.                      2) Lift-up the vehicle and place safety stand.  <b>CAUTION:</b>  <b>On AWD models, raise all wheels off ground.</b>                      3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).                      NOTE:                      If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.                      4) Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.                      NOTE:                      The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;                      5) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 16 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B54) No. 7 (+) — Chassis ground (-):</p>	Is the voltage more than 8.5 V?	Go to step 7.	Go to step 10.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
7	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b></p> <p>1) Return the engine to idling speed and move select lever to "N".</p> <p>2) Measure voltage between TCM connector and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>  <b>(B54) No. 16 (+) — Chassis ground (-):</b>  <b>WITH VDC SYSTEM</b>  <b>(B54) No. 7 (+) — Chassis ground (-):</b></p>	Is the voltage less than 0.5 V?	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.	Go to step 10.
8	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Lift-up the vehicle and place safety stand.</p> <p><b>CAUTION:</b>  <b>On AWD models, raise all wheels off ground.</b></p> <p>3) Connect Subaru Select Monitor to data link connector.</p> <p>4) Start the engine, and turn Subaru Select Monitor switch to ON.</p> <p>5) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).</p> <p>NOTE:          If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.</p> <p>6) Read data of lock-up duty solenoid using Subaru Select Monitor.</p> <ul style="list-style-type: none"> <li>● Lock-up duty solenoid is indicated in "%".</li> </ul> <p>7) Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.</p> <p>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. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p>	Is the value 95%?	Go to step 9.	Go to step 10.
9	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>Return the engine to idling speed and move selector lever to "N".</p> <p>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. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p>	Is the value 5%?	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.	Go to step 10.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
10	<b>CHECK POOR CONTACT.</b>	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
11	<b>CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).</b> 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 3) Remove oil pan, and disconnect connector from lock-up duty solenoid. 4) Measure resistance between lock-up duty solenoid connector and transmission ground. <b>Terminal</b> <b>No. 1 — Transmission ground:</b>	Is the resistance between 10 and 17 $\Omega$ ?	Go to step 12.	Replace lock-up duty solenoid. <Ref. to AT-36 Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
12	<b>CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.</b> Measure resistance of harness between lock-up duty solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 13 — (AT3) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 13.	Repair open circuit in harness between TCM and transmission connector.
13	<b>CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.</b> Measure resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 13 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if "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 lock-up duty solenoid and transmission.	Repair short circuit in harness between TCM and transmission connector.



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## P: TROUBLE CODE 79 — TRANSFER DUTY SOLENOID — S004509E17

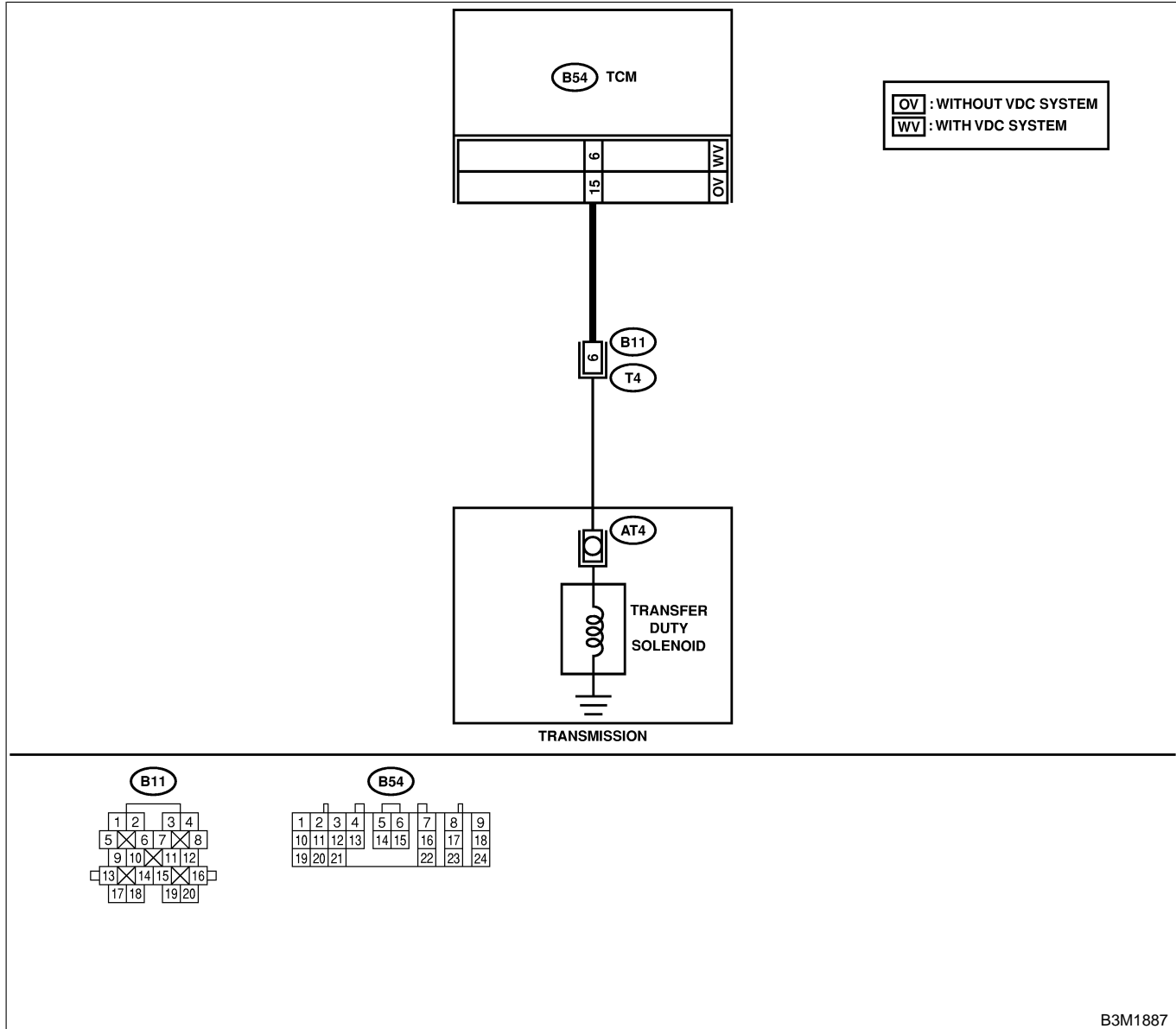
**DIAGNOSIS:**

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

**TROUBLE SYMPTOM:**

Excessive “braking” in tight corners.

**WIRING DIAGRAM:**



No.	Step	Check	Yes	No
1	<b>CHECK TRANSFER DUTY SOLENOID.</b> Measure resistance between transmission connector and transmission terminals. <i>Connector &amp; terminal</i> (T4) No. 6 — No. 16:	Is the resistance between 10 and 17 Ω?	Go to step 2.	Go to step 13.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B54) No. 15 — (B11) No. 6:</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 6 — (B11) No. 6:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure resistance harness connector between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B54) No. 15 — Chassis ground:</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 6 — Chassis ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 7.	Go to step 5.
5	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Throttle is fully closed. 4) Measure voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B54) No. 15 (+) — Chassis ground (-):</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 6 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in "P" range?	Go to step 6.	Go to step 12.
6	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> Measure voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B54) No. 15 (+) — Chassis ground (-):</b> <b>WITH VDC SYSTEM</b> <b>(B54) No. 6 (+) — Chassis ground (-):</b>	Is the voltage between 5 and 7 V in "D" range?	Even if "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.	Go to step 12.
7	<b>CHECK VDC SYSTEM.</b>	Is the vehicle equipped with the VDC system?	Go to step 10.	Go to step 8.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Connect connectors to TCM and transmission.                      2) Connect Subaru Select Monitor to data link connector.                      3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.                      4) Move select lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 MPH).                      5) Read data of transfer duty solenoid using Subaru Select Monitor.</p> <ul style="list-style-type: none"> <li>● Transfer duty solenoid is indicated in "%".</li> </ul>	Is the value between 5 and 10%?	Go to step 9.	Go to step 12.
9	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Move select lever to "N" with throttle fully closed (vehicle speed 0 km/h or 0 MPH).                      2) Rear data of transfer duty solenoid using Subaru Select Monitor.</p> <ul style="list-style-type: none"> <li>● Transfer duty solenoid is indicated in "%".</li> </ul>	Is the value 95%?	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.	Go to step 12.
10	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Connect connectors to TCM and transmission.                      2) Connect Subaru Select Monitor to data link connector.                      3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.                      4) Move select lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 MPH).                      5) Read data of transfer duty solenoid using Subaru Select Monitor.</p> <ul style="list-style-type: none"> <li>● Transfer duty solenoid is indicated in "%".</li> </ul>	Is the value between 90 and 95%?	Go to step 11.	Go to step 12.
11	<p><b>CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Move select lever to "N" with throttle fully close (vehicle speed 0 km/h or 0 MPH).                      2) Rear data of transfer duty solenoid using Subaru Select Monitor.</p> <ul style="list-style-type: none"> <li>● Transfer duty solenoid is indicated in "%".</li> </ul>	Is the value 5%?	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.	Go to step 12.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
12	<b>CHECK POOR CONTACT.</b>	Is there poor contact in transfer duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
13	<b>CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).</b> 1) Lift-up the vehicle and place safety stand. <b>CAUTION:</b> <b>On AWD models, raise all wheels off ground.</b> 2) Drain automatic transmission fluid. <b>CAUTION:</b> <b>Do not drain the automatic transmission fluid until it cools down.</b> 3) Remove extension case, and disconnect connector from transfer duty solenoid. 4) Measure resistance between transfer duty solenoid connector and transmission ground. <b>Connector &amp; terminal</b> <b>(AT4) No. 1 — Transmission ground:</b>	Is the resistance between 10 and 17 $\Omega$ ?	Go to step 14.	Replace transfer duty solenoid. <Ref. to AT-36 Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
14	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.</b> Measure resistance of harness between transfer duty solenoid and transmission connector. <b>Connector &amp; terminal</b> <b>(T4) No. 6 — (AT4) No. 1:</b>	Is the resistance less than 1 $\Omega$ ?	Go to step 15.	Repair open circuit in harness between transfer duty solenoid and transmission connector.
15	<b>CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.</b> Measure resistance of harness between transmission connector and transmission ground. <b>Connector &amp; terminal</b> <b>(T4) No. 6 — Transmission ground:</b>	Is the resistance more than 1 M $\Omega$ ?	Even if "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 transfer duty solenoid and transmission connector.	Repair short circuit in harness between transfer duty solenoid and transmission connector.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

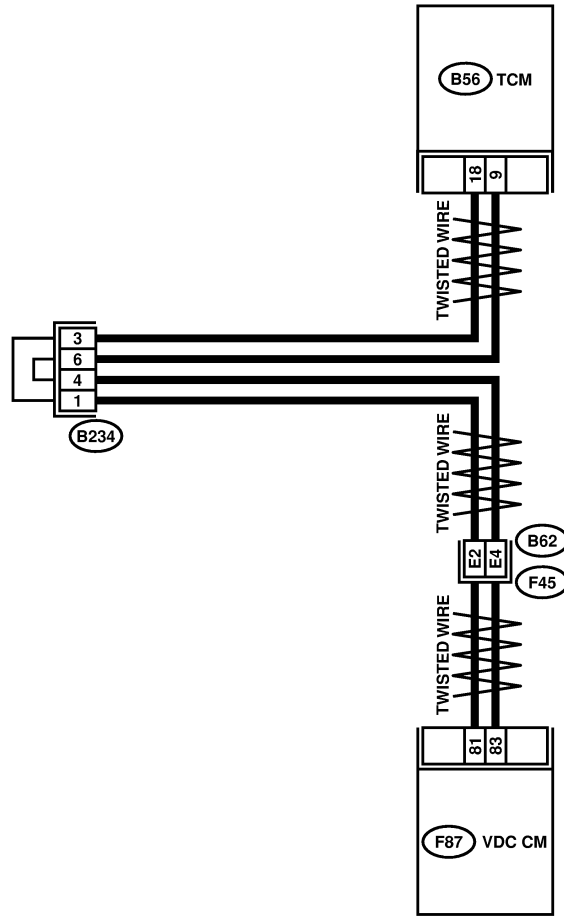
Automatic Transmission (DIAGNOSTICS)

## Q: TROUBLE CODE 86 — VDC COMMUNICATION SIGNAL — S004509E19

### DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

### WIRING DIAGRAM:



**B234**

1	2	3	4	5	6
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**B56**

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

**B62**

A1	A2	A3	A4	A5	A6
B1	B2	B3	B4	B5	B6
C1	C2	C3	C4	C5	C6
D1	D2	D3	D4	D5	D6
E1	E2	E3	E4	E5	E6
F1					F6
G1					G6
H1					H6
I1					I6
J1					J6
K1					K6
L1	L2		L4	L5	L6
M1	M2	N3	M4	M5	M6
N1	N2	O3	N4	N5	N6
O1	O2	P3	O4	O5	O6
P1	P2		P4	P5	P6

**F87**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84

B3M1888

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	<b>CHECK TROUBLE CODE.</b>	Do multiple trouble codes appear in the on-board diagnostics test mode?	Go to another trouble code.	Go to step 2.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM.</b> 1) Turn ignition switch to off. 2) Measure resistance of harness between TCM and VDCCM connector. <b>Connector &amp; terminal</b> <b>(B56) No. 18 — (F87) No. 81:</b>	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and VDCCM, and poor contact in coupling connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM.</b> Measure resistance of harness between TCM and VDCCM connector. <b>Connector &amp; terminal</b> <b>(B56) No. 9 — (F87) No. 83:</b>	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit in harness between TCM and VDCCM, and poor contact in coupling connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM.</b> Measure resistance of harness between TCM and VDCCM connector. <b>Connector &amp; terminal</b> <b>(B56) No. 18 — Chassis ground:</b>	Is the resistance less than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and VDCCM connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM.</b> Measure resistance of harness between TCM and VDCCM connector. <b>Connector &amp; terminal</b> <b>(B56) No. 9 — Chassis ground:</b>	Is the resistance less than 1 MΩ?	Go to step 6.	Repair short circuit in harness between TCM and VDCCM connector.
6	<b>PREPARE OSCILLOSCOPE.</b>	Do you have oscilloscope?	Go to step 8.	Go to step 7.
7	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn ignition switch to ON (engine OFF). 2) Measure voltage between TCM connector and chassis ground. <b>Connector &amp; terminal</b> <b>(B56) No. 9 (+) — Chassis ground (-):</b> <b>(B56) No. 18 (+) — Chassis ground (-):</b>	Does input voltage value change?	Go to step 10.	Repair poor contact in VDCCM.
8	<b>CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.</b> 1) Set oscilloscope to TCM connector terminals. Positive probe; (B56) No. 9 Earth lead; (B55) No. 9 2) Turn ignition switch to ON (engine OFF). 3) Check signal waveform pattern on oscilloscope. <Ref. AT-22 WAVEFORM, MEASUREMENT, Transmission Control Module (TCM) I/O Signal.>	Is waveform pattern same as that shown in the figure?	Go to step 9.	Repair poor contact in VDCCM.
9	<b>CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.</b> 1) Set oscilloscope to TCM connector terminals. Positive probe; (B56) No. 18 Earth lead; (B55) No. 9 2) Turn ignition switch to ON (engine OFF). 3) Check signal waveform pattern on oscilloscope. <Ref. AT-22 WAVEFORM, MEASUREMENT, Transmission Control Module (TCM) I/O Signal.>	Is waveform pattern same as that shown in the figure?	Go to step 10.	Repair poor contact in VDCCM.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
10	CHECK POOR CONTACT.	Is there poor contact in TCM?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-113



# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## R: TROUBLE CODE 93 — REAR VEHICLE SPEED SENSOR — S004509F61

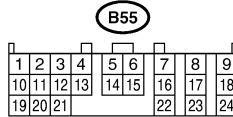
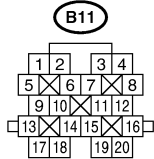
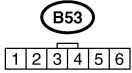
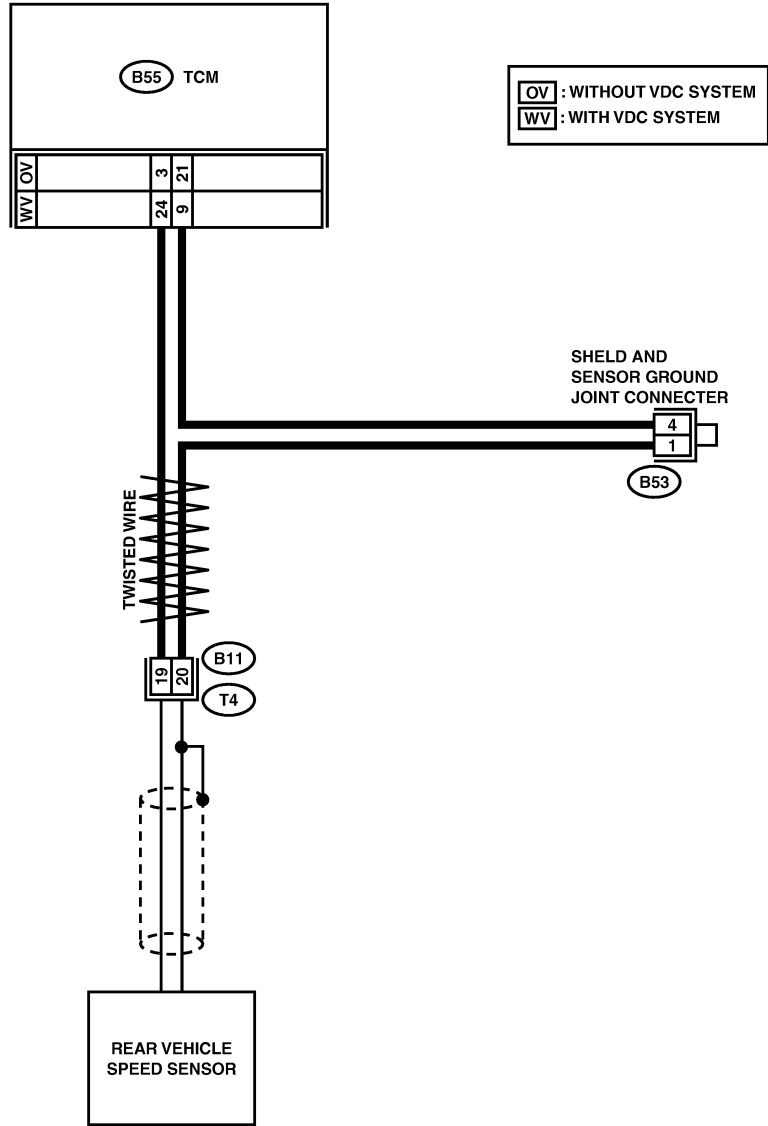
### DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

### TROUBLE SYMPTOM:

No lock-up or excessive tight corner "braking".

### WIRING DIAGRAM:



B3M1889

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	<b>CHECK REAR VEHICLE SPEED SENSOR.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector receptacle's terminals. <i>Connector &amp; terminal</i> <i>(T4) No. 19 — No. 20:</i>	Is the resistance between 450 and 650 $\Omega$ ?	Go to step 1.	Replace transmission harness connector.
2	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. <i>Connector &amp; terminal</i> <i>WITHOUT VDC SYSTEM</i> <i>(B55) No. 3 — (B11) No. 19:</i> <i>WITH VDC SYSTEM</i> <i>(B55) No. 24 — (B11) No. 19:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure resistance of harness between TCM and transmission connector. <i>Connector &amp; terminal</i> <i>WITHOUT VDC SYSTEM</i> <i>(B55) No. 21 — (B11) No. 20:</i> <i>WITH VDC SYSTEM</i> <i>(B55) No. 9 — (B11) No. 20:</i>	Is the resistance less than 1 $\Omega$ ?	Go to step 4.	Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure resistance of harness between TCM and chassis ground. <i>Connector &amp; terminal</i> <i>WITHOUT VDC SYSTEM</i> <i>(B55) No. 3 — Chassis ground:</i> <i>WITH VDC SYSTEM</i> <i>(B55) No. 24 — Chassis ground:</i>	Is the resistance more than 1 M $\Omega$ ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.</b> Measure resistance of harness between TCM and chassis ground. <i>Connector &amp; terminal</i> <i>WITHOUT VDC SYSTEM</i> <i>(B55) No. 21 — Chassis ground:</i> <i>WITH VDC SYSTEM</i> <i>(B55) No. 9 — Chassis ground:</i>	Is the resistance more than 1 M $\Omega$ ?	Go to step 6.	Repair short circuit in harness between TCM and transmission connector.
6	<b>PREPARE OSCILLOSCOPE.</b>	Do you have oscilloscope?	Go to step 10.	Go to step 7.
7	<b>PREPARE SUBARU SELECT MONITOR.</b>	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	<p><b>CHECK INPUT SIGNAL FOR TCM.</b></p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Lift-up or raise the vehicle and place safety stands.</p> <p><b>CAUTION:</b>  <b>On AWD models, raise all wheels off floor.</b></p> <p>3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.</p> <p>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. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p> <p>4) Measure voltage between TCM connector terminals.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 3 (+) — No. 21 (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 24 (+) — No. 9 (-):</p>	Is the voltage more than AC 1 V?	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.	Go to step 11.
9	<p><b>CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</b></p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Connect Subaru Select Monitor to data link connector.</p> <p>3) Lift-up or raise the vehicle and place safety stands.</p> <p><b>CAUTION:</b>  <b>On AWD models, raise all wheels off floor.</b></p> <p>4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.</p> <p>5) Start the engine.</p> <p>6) Read data of vehicle speed using Subaru Select Monitor.</p> <ul style="list-style-type: none"> <li>● Compare speedometer with Subaru Select Monitor indications.</li> <li>● Vehicle speed is indicated in "km/h" or "MPH".</li> </ul> <p>7) Slowly increase vehicle speed to 60 km/h or 37 MPH.</p> <p>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. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	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.	Go to step 11.

# DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
10	<p><b>CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.</b></p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Lift-up or raise the vehicle and place safety stands.</p> <p><b>CAUTION:</b>  <b>On AWD models, raise all wheels off floor.</b></p> <p>3) Set oscilloscope to TCM connector terminals.</p> <p>Position probe; (B55) No. 3                      Earth lead; (B55) No. 21</p> <p>4) Start the engine and set vehicle in 20 km/h (12 MPH) condition.</p> <p>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. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p> <p>5) Measure signal voltage indicated on oscilloscope.</p>	Is the signal voltage more than AC 1 V?	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.	Go to step 11.
11	<p><b>CHECK POOR CONTACT.</b></p>	Is there poor contact in rear vehicle speed sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## 15. Diagnostic Procedure for No-trouble Code S004618

### A: CHECK GEAR POSITION. S004618F15

No.	Step	Check	Yes	No
1	<p><b>CHECK GEAR POSITION.</b></p> <p>1) Lift-up the vehicle and place safety stand.</p> <p><b>CAUTION:</b> <b>On AWD models, raise all wheels off ground.</b></p> <p>2) Start the engine.</p> <p>3) Move select lever to "D", and drive vehicle.</p> <p>4) Read data of gear position using Subaru Select Monitor.</p> <ul style="list-style-type: none"><li>● Gear position is indicated.</li></ul> <p>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. &lt;Ref. to ABS-20 Clear Memory Mode.&gt;</p>	Does the transmission gear correspond to the gear which is shown on display?	Go to step CHECK FWD SWITCH. <Ref. to AT-120 CHECK FWD SWITCH, Diagnostic Procedure for No-trouble Code.>	Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to AT-74 TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.> and <Ref. to AT-78 TROUBLE CODE 72 — SHIFT SOLENOID 2 —, Diagnostic Procedure with Trouble Code.>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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MEMO:

AT-119

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

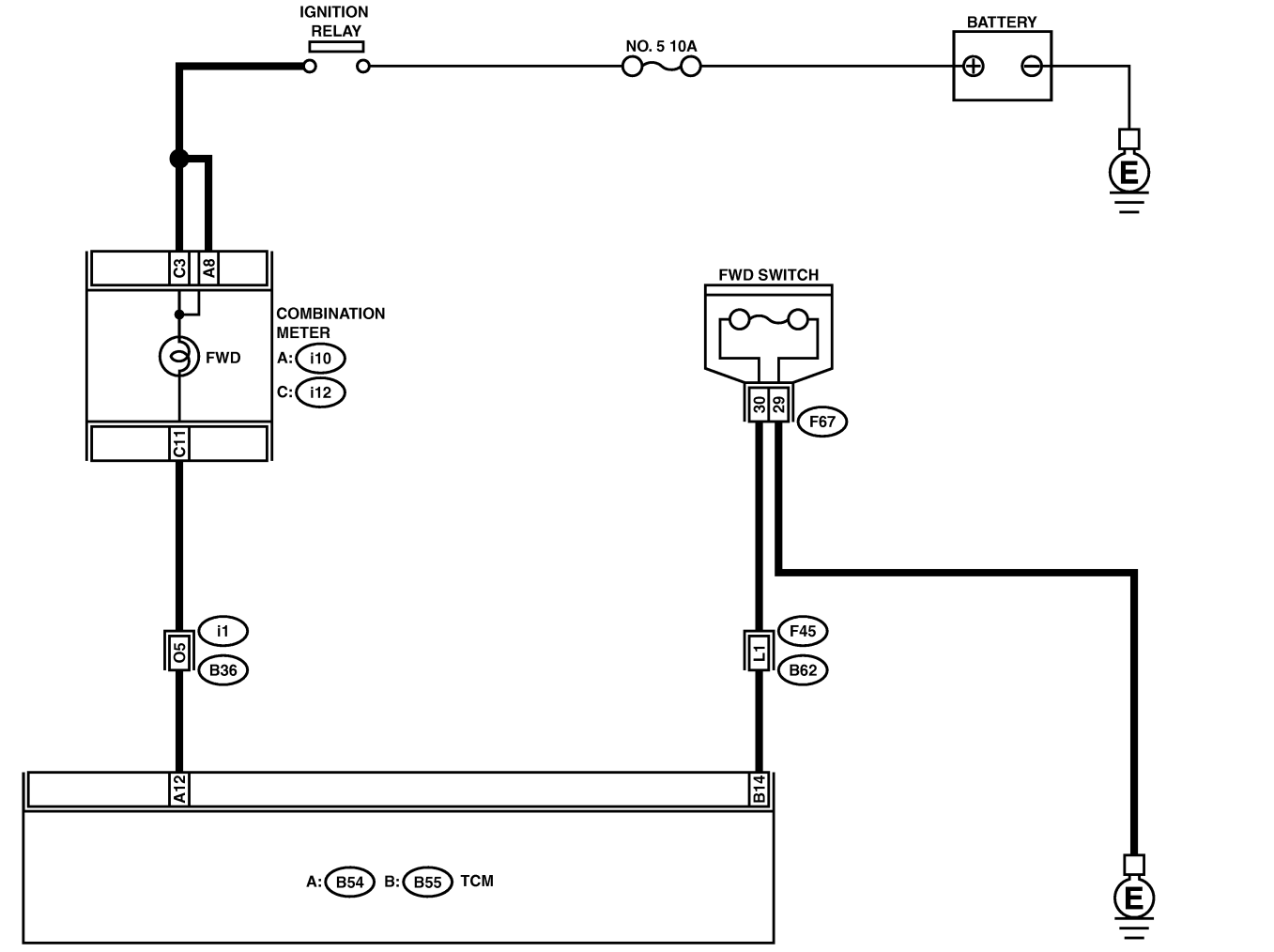
Automatic Transmission (DIAGNOSTICS)

## B: CHECK FWD SWITCH. S004618F16

### DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

### WIRING DIAGRAM:



i12

1	2	3	4	5	6
7	8	9	10	11	12
13	14				

B54

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

B55

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21				22	23	24

B36

B62

A1	A2	A3	A4	A5	A6
B1	B2	B3	B4	B5	B6
C1	C2	C3	C4	C5	C6
D1	D2	D3	D4	D5	D6
E1	E2	E3	E4	E5	E6
F1	F2	F3	F4	F5	F6
G1	G2	G3	G4	G5	G6
H1	H2	H3	H4	H5	H6
I1	I2	I3	I4	I5	I6
J1	J2	J3	J4	J5	J6
K1	K2	K3	K4	K5	K6
L1	L2	L3	L4	L5	L6
M1	M2	M3	M4	M5	M6
N1	N2	N3	N4	N5	N6
O1	O2	O3	O4	O5	O6
P1	P2	P3	P4	P5	P6

i10

1	2	3	4	5	6	7	8	9	10	11	12	13	14		
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

B3M1891

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	<b>CHECK FWD SWITCH.</b>	When fuse is inserted to FWD switch, does LED light up?	Go to step BRAKE SWITCH. <Ref. to AT-122 CHECK BRAKE SWITCH, Diagnostic Procedure for No-trouble Code.>	Go to step 2.
2	<b>CHECK FWD INDICATOR LIGHT.</b> 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove FWD indicator light bulb from combination meter.	Is FWD indicator light bulb OK?	Go to step 3.	Replace FWD indicator light bulb.
3	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and FWD switch. 3) Measure resistance of harness between TCM and FWD switch connector. <b>Connector &amp; terminal</b> <b>(B55) No. 14 — (F67) No. 30:</b>	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit in harness between TCM and FWD switch connector.
4	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.</b> Measure resistance of harness connector between TCM and body to make sure that circuit does not short. <b>Connector &amp; terminal</b> <b>(B55) No. 14 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness connector between TCM and chassis ground.
5	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn ignition switch to OFF. 2) Connect connector to TCM and FWD switch. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing the fuse to FWD switch connector. <b>Connector &amp; terminal</b> <b>(B55) No. 14 (+) — Chassis ground (-):</b>	Is the voltage less than 1 V in FWD switch while installing?	Go to step 6.	Go to step 11.
6	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure signal voltage for TCM while removing the fuse from FWD switch connector. <b>Connector &amp; terminal</b> <b>(B55) No. 14 (+) — Chassis ground (-):</b>	Is the voltage more than 10 V in FWD switch while removing?	Go to step 7.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
7	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and combination meter. 3) Measure resistance of harness between TCM and diagnosis connector. <b>Connector &amp; terminal</b> <b>(B54) No. 12 — (i12) No. 11:</b>	Is the resistance less than 1 Ω?	Go to step 8.	Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.



# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
8	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. <i>Connector &amp; terminal (B54) No. 12 — Chassis ground:</i>	Is the resistance more than 1 MΩ?	Go to step 9.	Repair short circuit in harness between TCM and combination meter connector.
9	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> 1) Turn ignition switch to OFF. 2) Connect connector to TCM and combination meter. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing and removing the fuse to FWD switch connector. <i>Connector &amp; terminal (B54) No. 12 — Chassis ground:</i>	Is the voltage less than 1 V in FWD switch while installing?	Go to step 10.	Go to step 11.
10	<b>CHECK OUTPUT SIGNAL EMITTED FROM TCM.</b> Measure signal voltage for TCM while removing the fuse from FWD switch connector. <i>Connector &amp; terminal (B54) No. 12 — Chassis ground:</i>	Is the voltage more than 10 V in FWD switch while removing?	Go to step 11.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
11	<b>CHECK POOR CONTACT.</b>	Is there poor contact in FWD switch circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

## C: CHECK BRAKE SWITCH. S004618F17

No.	Step	Check	Yes	No
1	<b>CHECK BRAKE SWITCH.</b>	When the brake pedal is depressed, does LED light up?	Go to step ABS SWITCH. <Ref. to AT-123 CHECK ABS SWITCH, Diagnostic Procedure for No-trouble Code.>	Check brake switch circuit. <Ref. to EN-476 DTC P0703 — BRAKE SWITCH INPUT MALFUNCTION —, Diagnostic Procedure with Diagnostic Trouble Code (DTC) for AT Vehicles.>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## D: CHECK ABS SWITCH. S004618F18

No.	Step	Check	Yes	No
1	CHECK ABS SWITCH.	Does the LED of ABS switch light up?	Check ABS switch circuit. <Ref. to ABS-126 TROUBLE CODE 44 — ABS — AT CONTROL (NON CONTROLLED), Diagnostic Chart with Subaru Select Monitor.> and <Ref. to ABS-128 TROUBLE CODE 44 — ABS — AT CONTROL (CONTROLLED), Diagnostic Chart with Subaru Select Monitor.>	Go to step CRUISE CONTROL SWITCH. <Ref. to AT-Go to step . CHECK CRUISE CONTROL SWITCH, Diagnostic Procedure for No-trouble Code.>

## E: CHECK CRUISE CONTROL SWITCH. S004618F19

No.	Step	Check	Yes	No
1	CHECK CRUISE CONTROL SWITCH.	When cruise control is set, does LED light up?	Go to step INHIBITOR SWITCH. <Ref. to AT-124 CHECK INHIBITOR SWITCH, Diagnostic Procedure for No-trouble Code.>	Check cruise control. <Ref. to CC-30 Diagnostic Chart with Trouble Code.>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

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## F: CHECK INHIBITOR SWITCH. S004618F20

### DIAGNOSIS:

Input signal circuit of inhibitor switch is open or shorted.

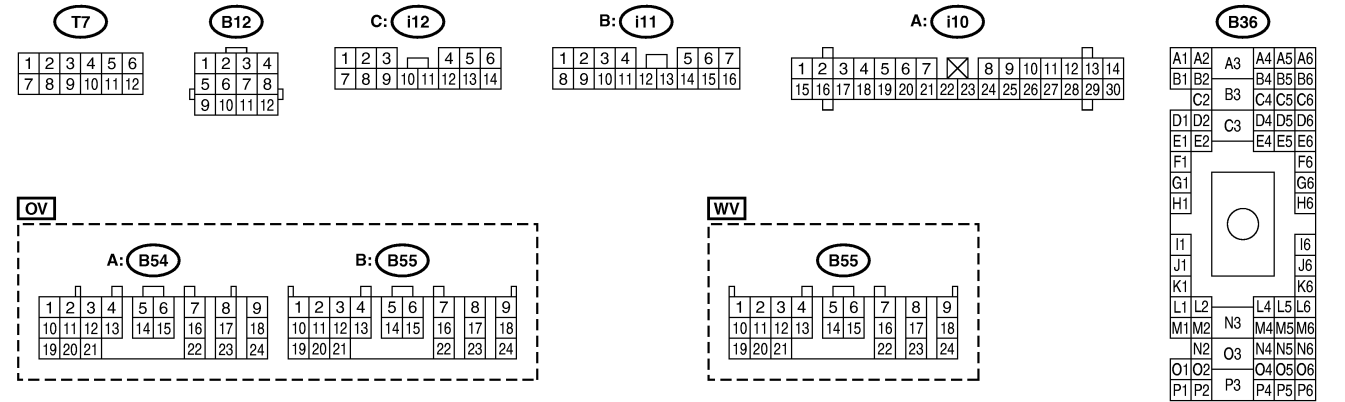
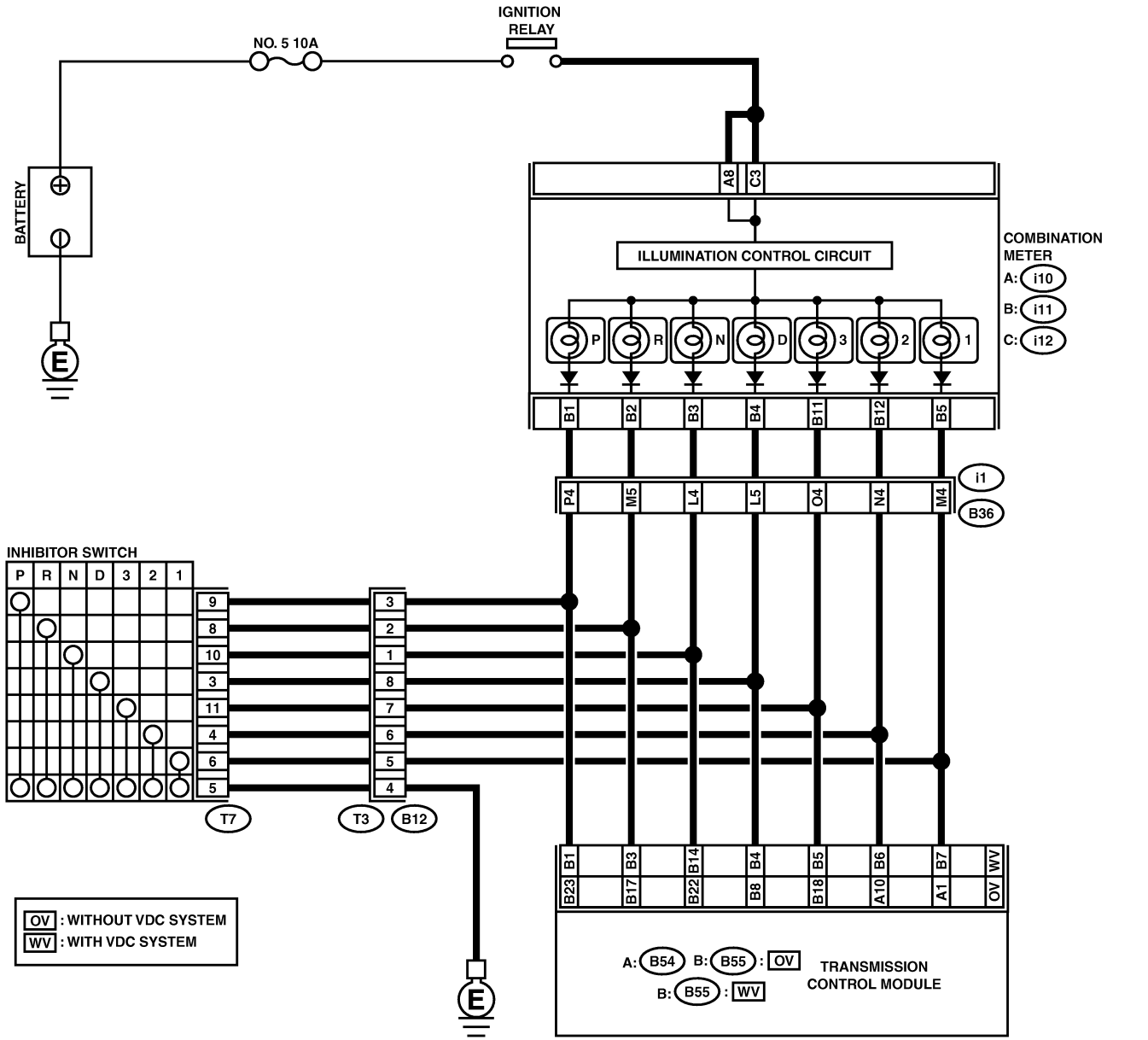
### TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in "3" range.
- Engine brake is not effected when selector lever is in "2" range.
- Engine brake is not effected when selector lever is in "1" range.

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## WIRING DIAGRAM:



B3M1892

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
1	CHECK "P" RANGE SWITCH.	When "P" range is selected, does LED light up?	Go to step 2.	Go to step 22.
2	CHECK INDICATOR LIGHT.	Does combination meter "P" range indicator illuminate?	Go to step 3.	Go to step 27.
3	CHECK "P" RANGE SWITCH.	When the "R" range is selected, does "P" range LED light up?	Go to step 29.	Go to step 4.
4	CHECK "R" RANGE SWITCH.	When the "R" range is selected, does LED light up?	Go to step 5.	Go to step 31.
5	CHECK INDICATOR LIGHT.	Does combination meter "R" range indicator illuminate?	Go to step 6.	Go to step 35.
6	CHECK "R" RANGE SWITCH.	When the "N" range is selected, does "R" range LED light up?	Go to step 37.	Go to step 7.
7	CHECK "N" RANGE SWITCH.	When the "N" range is selected, does LED light up?	Go to step 8.	Go to step 39.
8	CHECK INDICATOR LIGHT.	Does combination meter "N" range indicator illuminate?	Go to step 9.	Go to step 43.
9	CHECK "N" RANGE SWITCH.	When the "D" range is selected, does "N" range LED light up?	Go to step 45.	Go to step 10.
10	CHECK "D" RANGE SWITCH.	When the "D" range is selected, does LED light up?	Go to step 11.	Go to step 47.
11	CHECK INDICATOR LIGHT.	Does combination meter "D" range indicator illuminate?	Go to step 12.	Go to step 51.
12	CHECK "D" RANGE SWITCH.	When the "3" range is selected, does "D" range LED light up?	Go to step 53.	Go to step 13.
13	CHECK "3" RANGE SWITCH.	When the "3" range is selected, does LED light up?	Go to step 14.	Go to step 55.
14	CHECK INDICATOR LIGHT.	Does combination meter "3" range indicator illuminate?	Go to step 15.	Go to step 59.
15	CHECK "3" RANGE SWITCH.	When the "2" range is selected, does "3" range LED light up?	Go to step 61.	Go to step 16.
16	CHECK "2" RANGE SWITCH.	When the "2" range is selected, does LED light up?	Go to step 17.	Go to step 63.
17	CHECK INDICATOR LIGHT.	Does combination meter "2" range indicator illuminate?	Go to step 18.	Go to step 67.
18	CHECK "2" RANGE SWITCH.	When the "1" range is selected, does "2" range LED light up?	Go to step 69.	Go to step 19.
19	CHECK "1" RANGE SWITCH.	When the "1" range is selected, does LED light up?	Go to step 20.	Go to step 71.

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
20	<b>CHECK INDICATOR LIGHT.</b>	Does combination meter "1" range indicator illuminate?	Go to step 21.	Go to step 75.
21	<b>CHECK "1" RANGE SWITCH.</b>	When the "P" range is selected, does "1" range LED light UP?	Go to step 77.	Go to step CHECK FWD SWITCH. <Ref. to AT-137 CHECK FWD LIGHT, Diagnostic Procedure for No-trouble Code.>
22	<b>CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from inhibitor switch. 3) Measure resistance of harness between inhibitor switch and chassis ground. <b>Connector &amp; terminal</b> <b>(B12) No. 4 — Chassis ground:</b>	Is the resistance less than 1 Ω?	Go to step 23.	Repair open circuit in harness between inhibitor switch connector and combination meter.
23	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 23 — (B12) No. 3:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 1 — (B12) No. 3:</b>	Is the resistance less than 1 Ω?	Go to step 24.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
24	<b>CHECK INHIBITOR SWITCH.</b> Measure resistance between inhibitor switch connector receptacle's terminals. <b>Terminals</b> <b>(T3) No. 4 — No. 3:</b>	Is the resistance less than 1 Ω in "P" range?	Go to step 25.	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
25	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 23 (+) — Chassis ground (-):</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 1 (+) — (B12) No. 3 (-):</b>	Is the voltage less than 1 V in "P" range?	Go to step 26.	Go to step 79.
26	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 23 (+) — Chassis ground (-):</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 1 (+) — (B12) No. 3 (-):</b>	Is the voltage more than 8 V in other ranges?	Go to step 79.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
27	<b>CHECK "P" RANGE INDICATOR LIGHT BULB.</b> 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "P" range indicator light bulb from combination meter.	Is "P" range indicator light bulb OK?	Go to step 28.	Replace "P" range indicator light bulb. <Ref. to ID1-17 Combination Meter Assembly.>
28	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 23 — (i11) No. 1:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 1 — (i11) No. 1:</b>	Is the resistance more than 1 Ω?	Go to step 79.	Repair open circuit in harness between inhibitor switch connector and combination meter.
29	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 23 — Chassis ground:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 1 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 30.	Repair ground short circuit in "P" range circuit.
30	<b>CHECK INHIBITOR SWITCH.</b> Measure resistance between inhibitor switch connector receptacle's terminals. <b>Terminals</b> <b>(T3) No. 4 — No. 3:</b>	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
31	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 17 — (B12) No. 2:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 3 — (B12) No. 2:</b>	Is the resistance less than 1 Ω?	Go to step 32.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
32	<b>CHECK INHIBITOR SWITCH.</b> Measure resistance between inhibitor switch connector receptacle's terminals. <b>Terminals</b> <b>(T3) No. 2 — No. 4:</b>	Is the resistance less than 1 Ω in "R" range?	Go to step 33.	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
33	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      1) Turn ignition switch to OFF.                      2) Connect connector to TCM and inhibitor switch.                      3) Turn ignition switch to ON.                      4) Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 17 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 3 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V in "R" range?	Go to step 34.	Go to step 79.
34	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 17 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 3 (+) — Chassis ground (-):</p>	Is the voltage more than 9.5 V in other ranges?	Go to step 79.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
35	<p><b>CHECK "R" RANGE INDICATOR LIGHT BULB.</b>                      1) Turn ignition switch to OFF.                      2) Remove combination meter.                      3) Remove "R" range indicator light bulb from combination meter.</p>	Is "R" range indicator light bulb OK?	Go to step 36.	Replace "R" range indicator light bulb. <Ref. to IDI-17 Combination Meter Assembly.>
36	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b>                      1) Disconnect connectors from TCM and combination meter.                      2) Measure resistance of harness between TCM and combination meter.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 17 — (i11) No. 2  <b>WITH VDC SYSTEM</b>                      (B55) No. 3 (+) — Chassis ground (-):</p>	Is the resistance more than 1 Ω?	Go to step 79.	Repair open circuit in harness between inhibitor switch connector and combination meter.
37	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b>                      1) Turn ignition switch to OFF.                      2) Disconnect connectors from TCM, inhibitor switch and combination meter.                      3) Measure resistance of harness between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 17 — Chassis ground:  <b>WITH VDC SYSTEM</b>                      (B55) No. 3 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 38.	Repair ground short circuit in "R" range circuit.
38	<p><b>CHECK INHIBITOR SWITCH.</b>                      Measure resistance between inhibitor switch connector receptacle's terminals.</p> <p><b>Terminals</b>                      (T3) No. 2 — No. 4:</p>	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>



# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
39	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b>                      1) Turn ignition switch to OFF.                      2) Disconnect connectors from TCM and inhibitor switch.                      3) Measure resistance of harness between TCM and inhibitor switch connector.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 22 — (B12) No. 1:  <b>WITH VDC SYSTEM</b>                      (B55) No. 14 — (B12) No. 1:</p>	Is the resistance less than 1 Ω?	Go to step 40.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
40	<p><b>CHECK INHIBITOR SWITCH.</b>                      Measure resistance between inhibitor switch connector receptacle's terminals.</p> <p><b>Terminals</b>                      (T3) No. 4 — No. 1:</p>	Is the resistance less than 1 Ω in "N" range?	Go to step 41.	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
41	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      1) Turn ignition switch to OFF.                      2) Connect connector to TCM and inhibitor switch.                      3) Turn ignition switch to ON.                      4) Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 22 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 14 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V in "N" range?	Go to step 42.	Go to step 79.
42	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 22 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 14 (+) — Chassis ground (-):</p>	Is the voltage more than 8 V in other ranges?	Go to step 79.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
43	<p><b>CHECK "N" RANGE INDICATOR LIGHT BULB.</b>                      1) Turn ignition switch to OFF.                      2) Remove combination meter.                      3) Remove "N" range indicator light bulb from combination meter.</p>	Is "N" range indicator light bulb OK?	Go to step 44.	Replace "N" range indicator light bulb. <Ref. to IDI-17 Combination Meter Assembly.>
44	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b>                      1) Disconnect connectors from TCM and combination meter.                      2) Measure resistance of harness between TCM and combination meter.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 22 — (i11) No. 3:  <b>WITH VDC SYSTEM</b>                      (B55) No. 14 — (i11) No. 3:</p>	Is the resistance more than 1 Ω?	Go to step 79.	Repair open circuit in harness between inhibitor switch connector and combination meter.

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
45	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 22 — Chassis ground: <b>WITH VDC SYSTEM</b> (B55) No. 14 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 47.	Repair ground short circuit in "N" range circuit.
46	<b>CHECK INHIBITOR SWITCH.</b> Measure resistance between inhibitor switch connector receptacle's terminals. <b>Terminals</b> (T3) No. 1 — No. 4:	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
47	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 8 — (B12) No. 8: <b>WITH VDC SYSTEM</b> (B55) No. 4 — (B12) No. 8:	Is the resistance less than 1 Ω?	Go to step 48.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
48	<b>CHECK INHIBITOR SWITCH.</b> Measure resistance between inhibitor switch connector receptacle's terminals. <b>Terminals</b> (T3) No. 4 — No. 8:	Is the resistance less than 1 Ω in "D" range?	Go to step 49.	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
49	<b>CHECK INPUT SIGNAL FOR TCM.</b> 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 8 (+) — Chassis ground (-): <b>WITH VDC SYSTEM</b> (B55) No. 4 (+) — Chassis ground (-):	Is the voltage less than 1 V in "D" range?	Go to step 50.	Go to step 79.
50	<b>CHECK INPUT SIGNAL FOR TCM.</b> Measure voltage between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> (B55) No. 8 (+) — Chassis ground (-): <b>WITH VDC SYSTEM</b> (B55) No. 4 (+) — Chassis ground (-):	Is the voltage more than 9.5 V in other ranges?	Go to step 79.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
51	<b>CHECK "D" RANGE INDICATOR LIGHT BULB.</b> 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "D" range indicator light bulb from combination meter.	Is "D" range indicator light bulb OK?	Go to step 52.	Replace "D" range indicator light bulb. <Ref. to ID1-17 Combination Meter Assembly.>
52	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 8 — (i11) No. 4:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 4 — (i11) No. 4:</b>	Is the resistance more than 1 Ω?	Go to step 79.	Repair open circuit in harness between inhibitor switch connector and combination meter.
53	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 8 — Chassis ground:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 4 — Chassis ground:</b>	Is the resistance more than 1 MΩ?	Go to step 54.	Repair ground short circuit in "D" range circuit.
54	<b>CHECK INHIBITOR SWITCH.</b> Measure resistance between inhibitor switch connector receptacle's terminals. <b>Terminals</b> <b>(T3) No. 4 — No. 8:</b>	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
55	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. <b>Connector &amp; terminal</b> <b>WITHOUT VDC SYSTEM</b> <b>(B55) No. 18 — (B12) No. 7:</b> <b>WITH VDC SYSTEM</b> <b>(B55) No. 5 — (B12) No. 7:</b>	Is the resistance less than 1 Ω?	Go to step 56.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
56	<b>CHECK INHIBITOR SWITCH.</b> Measure resistance between inhibitor switch connector receptacle's terminals. <b>Terminals</b> <b>(T3) No. 4 — No. 7:</b>	Is the resistance less than 1 Ω in "3" range?	Go to step 57.	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
57	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      1) Turn ignition switch to OFF.                      2) Connect connector to TCM and inhibitor switch.                      3) Turn ignition switch to ON.                      4) Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 18 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 5 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V in "3" range?	Go to step 58.	Go to step 79.
58	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 18 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 5 (+) — Chassis ground (-):</p>	Is the voltage more than 9.5 V in other ranges?	Go to step 79.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>
59	<p><b>CHECK "3" RANGE INDICATOR LIGHT BULB.</b>                      1) Turn ignition switch to OFF.                      2) Remove combination meter.                      3) Remove "3" range indicator light bulb from combination meter.</p>	Is "3" range indicator light bulb OK?	Go to step 60.	Replace "3" range indicator light bulb. <Ref. to IDI-17 Combination Meter Assembly.>
60	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b>                      1) Disconnect connectors from TCM and combination meter.                      2) Measure resistance of harness between TCM and combination meter.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 18 — (i11) No. 11:  <b>WITH VDC SYSTEM</b>                      (B55) No. 5 — (i11) No. 11:</p>	Is the resistance more than 1 Ω?	Go to step 79.	Repair open circuit in harness between inhibitor switch connector and combination meter.
61	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b>                      1) Turn ignition switch to OFF.                      2) Disconnect connectors from TCM, inhibitor switch and combination meter.                      3) Measure resistance of harness between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B55) No. 18 — Chassis ground:  <b>WITH VDC SYSTEM</b>                      (B55) No. 5 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 62.	Repair ground short circuit in "3" range circuit.
62	<p><b>CHECK INHIBITOR SWITCH.</b>                      Measure resistance between inhibitor switch connector receptacle's terminals.</p> <p><b>Terminals</b>                      (T3) No. 4 — No. 7:</p>	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
63	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b>                      1) Turn ignition switch to OFF.                      2) Disconnect connector from TCM and inhibitor switch.                      3) Measure resistance of harness between TCM and inhibitor switch connector.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 10 — (B12) No. 6:  <b>WITH VDC SYSTEM</b>                      (B55) No. 6 — (B12) No. 6:</p>	Is the resistance less than 1 Ω?	Go to step 64.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
64	<p><b>CHECK INHIBITOR SWITCH.</b>                      Measure resistance between inhibitor switch connector receptacle's terminals.</p> <p><b>Terminals</b>                      (T3) No. 6 — No. 4:</p>	Is the resistance less than 1 Ω in "2" range?	Go to step 65.	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
65	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      1) Turn ignition switch to OFF.                      2) Connect connector to TCM and inhibitor switch.                      3) Turn ignition switch to ON.                      4) Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 10 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 6 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V in "2" range?	Go to step 66.	Go to step 79.
66	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 10 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 6 (+) — Chassis ground (-):</p>	Is the voltage more than 9.5 V in other ranges?	Go to step 79.	Replace TCM. <Ref. to xx.>
67	<p><b>CHECK "2" RANGE INDICATOR LIGHT BULB.</b>                      1) Turn ignition switch to OFF.                      2) Remove combination meter.                      3) Remove "2" range indicator light bulb from combination meter.</p>	Is "2" range indicator light bulb OK?	Go to step 68.	Replace "2" range indicator light bulb. <Ref. to IDI-17 Combination Meter Assembly.>
68	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b>                      1) Disconnect connectors from TCM and combination meter.                      2) Measure resistance of harness between TCM and combination meter.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 10 — (i11) No. 12:  <b>WITH VDC SYSTEM</b>                      (B55) No. 6 — (i11) No. 12:</p>	Is the resistance more than 1 Ω?	Go to step 79.	Repair open circuit in harness between inhibitor switch and combination meter.

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
69	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b>                      1) Turn ignition switch to OFF.                      2) Disconnect connectors from TCM, inhibitor switch and combination meter.                      3) Measure resistance of harness between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 10 — Chassis ground:  <b>WITH VDC SYSTEM</b>                      (B55) No. 6 — Chassis ground:</p>	Is the resistance more than 1 MΩ?	Go to step 70.	Repair ground short circuit in "2" range circuit.
70	<p><b>CHECK INHIBITOR SWITCH.</b>                      Measure resistance between inhibitor switch connector receptacle's terminals.</p> <p><b>Terminals</b>                      (T3) No. 6 — No. 4:</p>	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
71	<p><b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b>                      1) Turn ignition switch to OFF.                      2) Disconnect connectors from TCM and inhibitor switch.                      3) Measure resistance of harness between TCM and inhibitor switch connector.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 1 — (B12) No. 5:  <b>WITH VDC SYSTEM</b>                      (B55) No. 7 — (B12) No. 5:</p>	Is the resistance less than 1 Ω?	Go to step 72.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
72	<p><b>CHECK INHIBITOR SWITCH.</b>                      Measure resistance between inhibitor switch connector receptacle's terminals.</p> <p><b>Terminals</b>                      (T3) No. 5 — No. 4:</p>	Is the resistance less than 1 Ω in "1" range?	Go to step 73.	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
73	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      1) Turn ignition switch to OFF.                      2) Connect connector to TCM and inhibitor switch.                      3) Turn ignition switch to ON.                      4) Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 1 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 7 (+) — Chassis ground (-):</p>	Is the voltage less than 1 V in "1" range?	Go to step 74.	Go to step 79.
74	<p><b>CHECK INPUT SIGNAL FOR TCM.</b>                      Measure voltage between TCM and chassis ground.</p> <p><b>Connector &amp; terminal</b>  <b>WITHOUT VDC SYSTEM</b>                      (B54) No. 1 (+) — Chassis ground (-):  <b>WITH VDC SYSTEM</b>                      (B55) No. 7 (+) — Chassis ground (-):</p>	Is the voltage more than 9.5 V in other ranges?	Go to step 79.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

No.	Step	Check	Yes	No
75	<b>CHECK "1" RANGE INDICATOR LIGHT BULB.</b> 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "1" range indicator light bulb from combination meter.	Is "1" range indicator light bulb OK?	Go to step 76.	Replace "1" range indicator light bulb. <Ref. to ID1-17 Combination Meter Assembly.>
76	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.</b> 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. <i><b>Connector &amp; terminal</b></i> <i><b>WITHOUT VDC SYSTEM</b></i> <i><b>(B54) No. 1 — (i11) No. 5:</b></i> <i><b>WITH VDC SYSTEM</b></i> <i><b>(B55) No. 7 — (i11) No. 5:</b></i>	Is the resistance more than 1Ω?	Go to step 79.	Repair open circuit in harness between inhibitor switch and combination meter.
77	<b>CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.</b> 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. <i><b>Connector &amp; terminal</b></i> <i><b>WITHOUT VDC SYSTEM</b></i> <i><b>(B54) No. 1 — Chassis ground:</b></i> <i><b>WITH VDC SYSTEM</b></i> <i><b>(B55) No. 7 — Chassis ground:</b></i>	Is the resistance more than 1 MΩ?	Go to step 78.	Repair ground short circuit in "1" range circuit.
78	<b>CHECK INHIBITOR SWITCH.</b> Measure resistance between inhibitor switch connector receptacle's terminals. <i><b>Terminals</b></i> <i><b>(T3) No. 5 — No. 4:</b></i>	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to CS-21 AT Select Lever.> and <Ref. to CS-24 Select Cable.>
79	<b>CHECK POOR CONTACT.</b>	Is there poor contact in inhibitor switch circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-42 Transmission Control Module (TCM).>

# DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission (DIAGNOSTICS)

## G: CHECK FWD LIGHT. S004618F21

No.	Step	Check	Yes	No
1	CHECK FWD LIGHT.	Does the LED of FWD light illuminate?	Check FWD light circuit. <Ref. to AT-120 CHECK FWD SWITCH, Diagnostic Procedure for No-trouble Code.>	Go to step Symptom Related Diagnostic. <Ref. to AT-138 Symptom Related Diagnostic.>



# SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission (DIAGNOSTICS)

## 16. Symptom Related Diagnostic S004519

### A: INSPECTION S004519A10

Symptom	Problem parts
Starter does not rotate when select lever is in "P" or "N"; starter rotates when select lever is in "R", "D", "3" or "2".	<ul style="list-style-type: none"> <li>● Inhibitor switch</li> <li>● Select cable</li> <li>● Select lever</li> <li>● Starter motor and harness</li> </ul>
Abnormal noise when select lever is in "P" or "N".	<ul style="list-style-type: none"> <li>● Strainer</li> <li>● Transfer duty solenoid</li> <li>● Oil pump</li> <li>● Drive plate</li> <li>● ATF level too high or too low</li> </ul>
Hissing noise occurs during standing start.	<ul style="list-style-type: none"> <li>● Strainer</li> <li>● ATF level too high or too low</li> </ul>
Noise occurs while driving in "D1".	<ul style="list-style-type: none"> <li>● Final gear</li> <li>● Planetary gear</li> </ul>
Noise occurs while driving in "D2".	<ul style="list-style-type: none"> <li>● Reduction gear</li> <li>● Differential gear oil level too high or too low</li> </ul>
Noise occurs while driving in "D3".	<ul style="list-style-type: none"> <li>● Final gear</li> <li>● Low &amp; reverse brake</li> <li>● Reduction gear</li> <li>● Differential gear oil level too high or too low</li> </ul>
Noise occurs while driving in "D4".	<ul style="list-style-type: none"> <li>● Final gear</li> <li>● Low &amp; reverse brake</li> <li>● Planetary gear</li> <li>● Reduction gear</li> <li>● Differential gear oil level too high or too low</li> </ul>
Engine stalls while shifting from one range to another.	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Lock-up damper</li> <li>● Engine performance</li> <li>● Input shaft</li> </ul>
Vehicle moves when select lever is in "N".	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Low clutch</li> </ul>
Shock occurs when select lever is moved from "N" to "D".	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Harness</li> <li>● Control valve</li> <li>● ATF deterioration</li> <li>● Dropping resistor</li> </ul>
Excessive time lag occurs when select lever is moved from "N" to "D".	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Low clutch</li> <li>● Line pressure duty solenoid</li> <li>● Seal ring</li> <li>● Front gasket transmission case</li> </ul>
Shock occurs when select lever is moved from "N" to "R".	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Harness</li> <li>● Control valve</li> <li>● ATF deterioration</li> <li>● Dropping resistor</li> </ul>
Excessive time lag occurs when select lever is moved from "N" to "R".	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Low &amp; reverse clutch</li> <li>● Reverse clutch</li> <li>● Line pressure duty solenoid</li> <li>● Seal ring</li> <li>● Front gasket transmission case</li> </ul>
Vehicle does not start in any shift range (engine stalls).	<ul style="list-style-type: none"> <li>● Parking brake mechanism</li> <li>● Planetary gear</li> </ul>

# SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission (DIAGNOSTICS)

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	<ul style="list-style-type: none"> <li>● Strainer</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● Drive pinion</li> <li>● Hypoid gear</li> <li>● Axle shaft</li> <li>● Differential gear</li> <li>● Oil pump</li> <li>● Input shaft</li> <li>● Output shaft</li> <li>● Planetary gear</li> <li>● Drive plate</li> <li>● ATF level too low</li> <li>● Front gasket transmission case</li> </ul>
Vehicle does not start in "R" range only (engine revving up).	<ul style="list-style-type: none"> <li>● Select cable</li> <li>● Select lever</li> <li>● Control valve</li> <li>● Low &amp; reverse clutch</li> <li>● Reverse clutch</li> </ul>
Vehicle does not start in "R" range only (engine stalls).	<ul style="list-style-type: none"> <li>● Low clutch</li> <li>● 2-4 brake</li> <li>● Planetary gear</li> <li>● Parking brake mechanism</li> </ul>
Vehicle does not start in "D", "3" range only (engine revving up).	<ul style="list-style-type: none"> <li>● Low clutch</li> <li>● One-way clutch</li> </ul>
Vehicle does not start in "D", "3" or "2" range only (engine revving up).	<ul style="list-style-type: none"> <li>● Low clutch</li> </ul>
Vehicle does not start in "D", "3" or "2" range only (engine stalls).	<ul style="list-style-type: none"> <li>● Reverse clutch</li> </ul>
Vehicle starts in "R" range only (engine revving up).	<ul style="list-style-type: none"> <li>● Control valve</li> </ul>
Acceleration during standing starts is poor (high stall rpm).	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Low clutch</li> <li>● Reverse clutch</li> <li>● ATF level too low</li> <li>● Front gasket transmission case</li> <li>● Differential gear oil level too high or too low</li> </ul>
Acceleration during standing starts is poor (low stall rpm).	<ul style="list-style-type: none"> <li>● Oil pump</li> <li>● Torque converter one-way clutch</li> <li>● Engine performance</li> </ul>
Acceleration is poor when select lever is in "D", "3" or "2" range (normal stall rpm).	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Control valve</li> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● Planetary gear</li> </ul>
Acceleration is poor when select lever is in "R" (normal stall rpm).	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● Planetary gear</li> </ul>
No shift occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Rear vehicle speed sensor</li> <li>● Front vehicle speed sensor</li> <li>● Throttle position sensor</li> <li>● Shift solenoid 1</li> <li>● Control valve</li> <li>● 2-4 brake</li> </ul>
No shift occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Control valve</li> <li>● High clutch</li> <li>● Shift solenoid 2</li> </ul>

## SYMPTOM RELATED DIAGNOSTIC

### Automatic Transmission (DIAGNOSTICS)

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Shift solenoid 1</li> <li>● ATF temperature sensor</li> <li>● Control valve</li> <li>● 2-4 brake</li> </ul>
Engine brake is not effected when select lever is in "3" range.	<ul style="list-style-type: none"> <li>● Inhibitor switch</li> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● Control valve</li> </ul>
Engine brake is not effected when select lever is in "3" or "2" range.	<ul style="list-style-type: none"> <li>● Control valve</li> </ul>
Engine brake is not effected when select lever is in "1" range.	<ul style="list-style-type: none"> <li>● Control valve</li> <li>● Low &amp; reverse brake</li> </ul>
Shift characteristics are erroneous.	<ul style="list-style-type: none"> <li>● Inhibitor switch</li> <li>● TCM</li> <li>● Front vehicle speed sensor</li> <li>● Rear vehicle speed sensor</li> <li>● Throttle position sensor</li> <li>● Control valve</li> <li>● Ground earth</li> </ul>
No lock-up occurs.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Control valve</li> <li>● Lock-up facing</li> <li>● Engine speed signal</li> </ul>
Parking brake is not effected.	<ul style="list-style-type: none"> <li>● Select cable</li> </ul>
Shift lever cannot be moved or is hard to move from "P" range.	<ul style="list-style-type: none"> <li>● Select lever</li> <li>● Parking mechanism</li> </ul>
ATF spurts out.	<ul style="list-style-type: none"> <li>● ATF level too high</li> </ul>
Differential oil spurts out.	<ul style="list-style-type: none"> <li>● Differential gear oil too high</li> </ul>
Differential oil level changes excessively.	<ul style="list-style-type: none"> <li>● Seal pipe</li> <li>● Double oil seal</li> </ul>
Odor is produced from ATF supply pipe.	<ul style="list-style-type: none"> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● Low &amp; reverse clutch</li> <li>● Reverse clutch</li> <li>● Lock-up facing</li> <li>● ATF deterioration</li> </ul>
Shock occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● 2-4 brake</li> <li>● ATF deterioration</li> <li>● Engine performance</li> <li>● Dropping resistor</li> <li>● 2-4 brake timing solenoid</li> </ul>
Slippage occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● 2-4 brake</li> <li>● 2-4 brake timing solenoid</li> <li>● High clutch</li> </ul>

# SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission (DIAGNOSTICS)

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● ATF deterioration</li> <li>● Engine performance</li> <li>● 2-4 brake timing solenoid</li> </ul>
Slippage occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● High clutch</li> <li>● 2-4 brake</li> <li>● 2-4 brake timing solenoid</li> </ul>
Shock occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● 2-4 brake timing solenoid</li> <li>● 2-4 brake</li> <li>● ATF deterioration</li> <li>● Engine performance</li> <li>● Low clutch timing solenoid</li> <li>● Low clutch</li> </ul>
Slippage occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● 2-4 brake duty solenoid</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● 2-4 brake</li> <li>● 2-4 brake timing solenoid</li> </ul>
Shock occurs when select lever is moved from "3" to "2" range.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● 2-4 brake duty solenoid</li> <li>● 2-4 brake</li> <li>● ATF deterioration</li> <li>● 2-4 brake timing solenoid</li> </ul>
Shock occurs when select lever is moved from "D" to "1" range.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● ATF deterioration</li> <li>● 2-4 brake duty solenoid</li> <li>● 2-4 brake timing solenoid</li> <li>● Low clutch timing solenoid</li> </ul>

## SYMPTOM RELATED DIAGNOSTIC

### Automatic Transmission (DIAGNOSTICS)

Symptom	Problem parts
Shock occurs when select lever is moved from "2" to "1" range.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● Low &amp; reverse clutch</li> <li>● ATF deterioration</li> <li>● 2-4 brake duty solenoid</li> <li>● 2-4 brake timing solenoid</li> <li>● Low clutch timing solenoid</li> </ul>
Shock occurs when accelerator pedal is released at medium speeds.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Line pressure duty solenoid</li> <li>● Control valve</li> <li>● Lock-up damper</li> <li>● Engine performance</li> <li>● 2-4 brake duty solenoid</li> <li>● 2-4 brake timing solenoid</li> <li>● Low clutch timing solenoid</li> </ul>
Vibration occurs during straight-forward operation.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Lock-up duty solenoid</li> <li>● Lock-up facing</li> <li>● Lock-up damper</li> </ul>
Vibration occurs during turns (tight corner "braking" phenomenon).	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Front vehicle speed sensor</li> <li>● Rear vehicle speed sensor</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Transfer clutch</li> <li>● Transfer valve</li> <li>● Transfer duty solenoid</li> <li>● ATF deterioration</li> <li>● Harness</li> </ul>
Front wheel slippage occurs during standing starts.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● Vehicle speed sensor 2 (Front)</li> <li>● FWD switch</li> <li>● Throttle position sensor</li> <li>● ATF temperature sensor</li> <li>● Control valve</li> <li>● Transfer clutch</li> <li>● Transfer valve</li> <li>● Transfer pipe</li> <li>● Transfer duty solenoid</li> </ul>
Vehicle is not set in FWD mode.	<ul style="list-style-type: none"> <li>● TCM</li> <li>● FWD switch</li> <li>● Transfer clutch</li> <li>● Transfer valve</li> <li>● Transfer duty solenoid</li> </ul>
Select lever is hard to move.	<ul style="list-style-type: none"> <li>● Select cable</li> <li>● Select lever</li> <li>● Detent spring</li> <li>● Manual plate</li> </ul>
Select lever is too high to move (unreasonable resistance).	<ul style="list-style-type: none"> <li>● Detent spring</li> <li>● Manual plate</li> </ul>
Select lever slips out of operation during acceleration or while driving on rough terrain.	<ul style="list-style-type: none"> <li>● Select cable</li> <li>● Select lever</li> <li>● Detent spring</li> <li>● Manual plate</li> </ul>