

15. ATF Filter S502226

A: REMOVAL S502226A18

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.

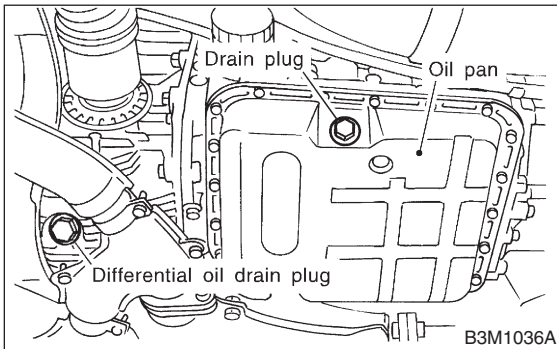
- 1) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

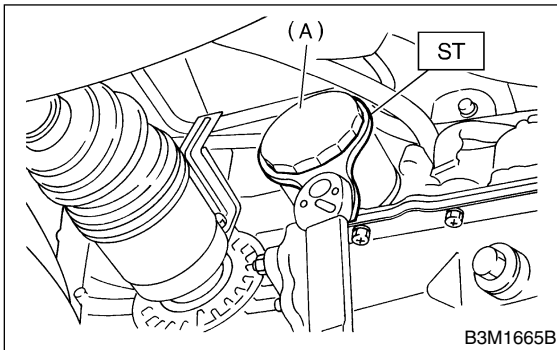
Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- 2) Using ST, remove ATF filter.

ST 498545400 OIL FILTER WRENCH



(A) ATF filter

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

B: INSTALLATION S502226A11

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

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

Calculate ATF filter torque specifications using the following formula.

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

T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

CAUTION:

Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH

- 3) 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.

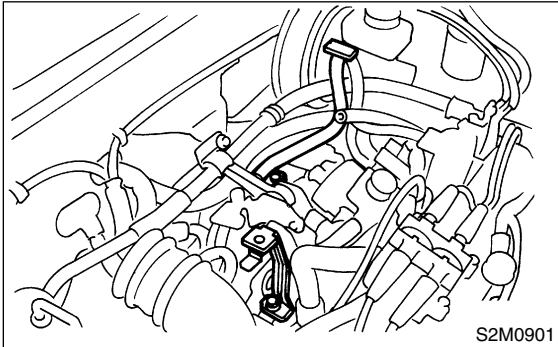
9. Automatic Transmission Assembly

S502207

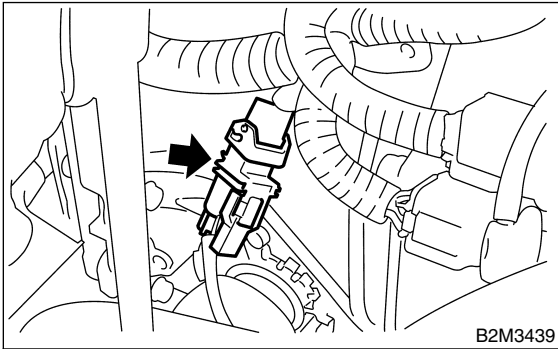
A: REMOVAL

S502207A18

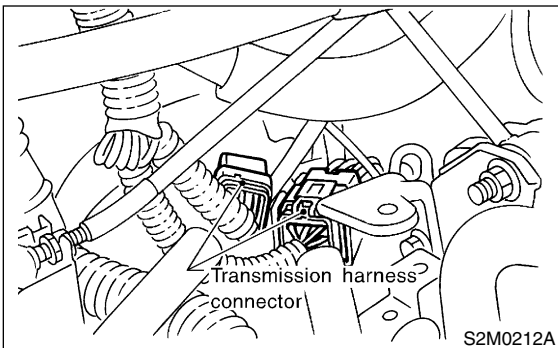
- 1) Open front hood fully, and support with stay.
- 2) Disconnect battery ground terminal.
- 3) Remove air intake duct <Ref. to IN-5 REMOVAL, Air Intake Duct.> and air cleaner case. <Ref. to IN-4 REMOVAL, Air Cleaner Case.>
- 4) Remove air cleaner case stay.



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

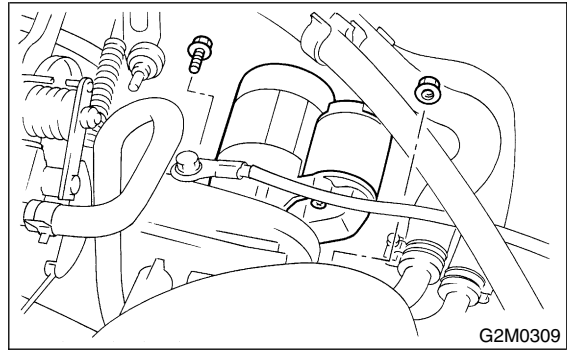


- (2) Transmission harness connector

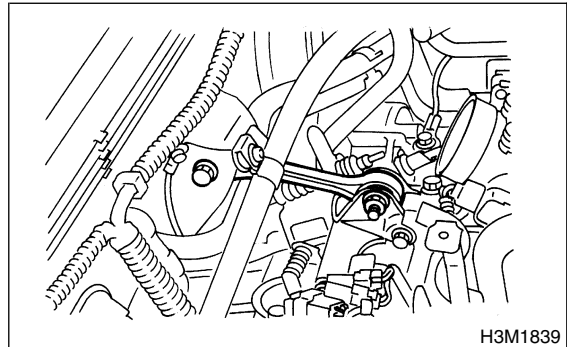


- (3) Transmission ground terminal
- 6) Remove starter.
 - (1) Disconnect connectors and terminal from starter.
 - (2) Remove bolt which installs upper side of starter.

- (3) Remove nut which installs lower side of starter, and remove starter from transmission.



- 7) Remove pitching stopper.



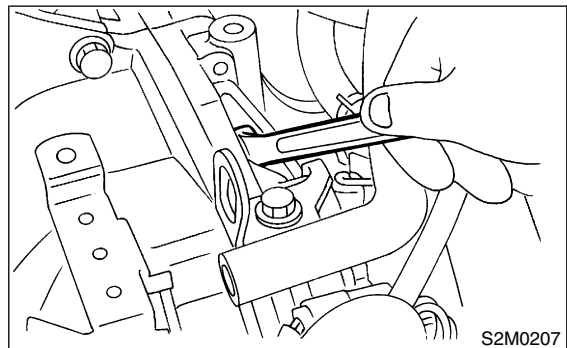
- 8) Separate torque converter from drive plate.
 - (1) Remove service hole plug.
 - (2) Remove bolts which hold torque converter to drive plate.
 - (3) While rotating the engine, remove other bolts using ST.

2200 cc vehicles:
ST 499977300 CRANK PULLEY WRENCH

2500 cc vehicles:
ST 499977100 CRANK PULLEY WRENCH

CAUTION:

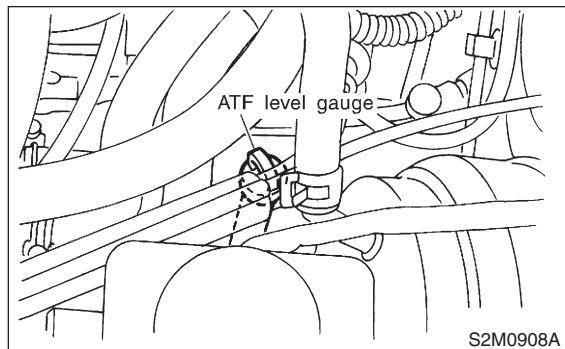
Be careful not to drop bolts into torque converter housing.



9) Remove ATF level gauge.

CAUTION:

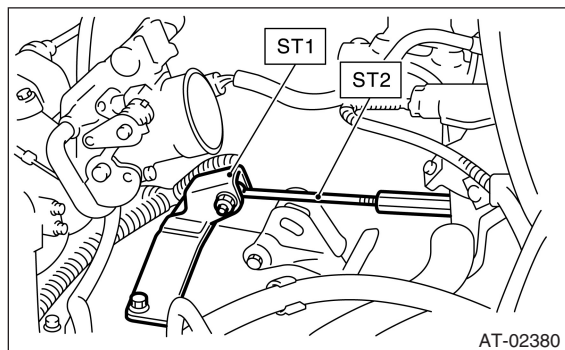
Plug opening to prevent entry of foreign particles into transmission fluid.



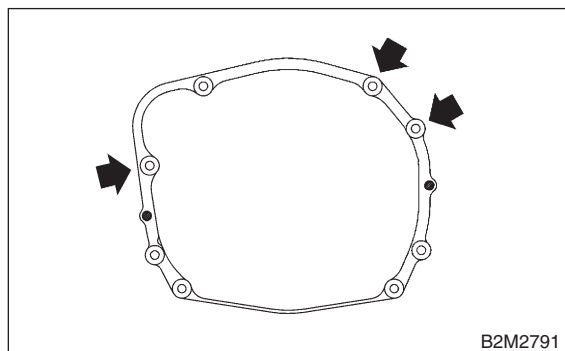
10) Set ST.

ST1 41099AA010 ENGINE SUPPORT BRACKET

ST2 41099AA020 ENGINE SUPPORT



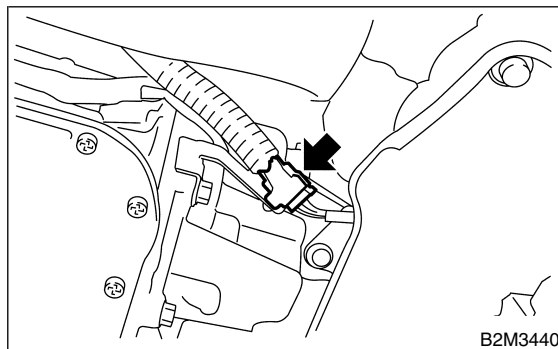
11) Remove bolt which holds right upper side of transmission to engine.



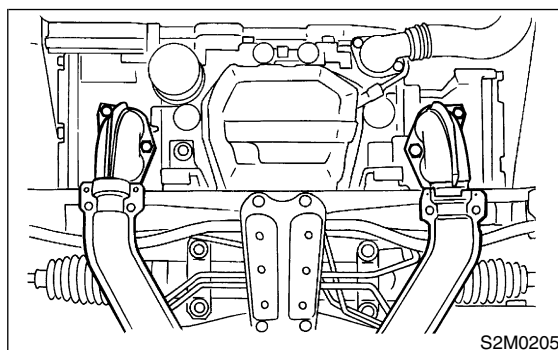
12) Remove exhaust system.

(1) Lift-up the vehicle.

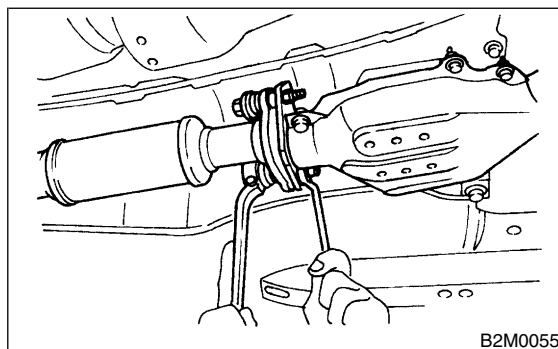
(2) Disconnect connector from rear oxygen sensor.



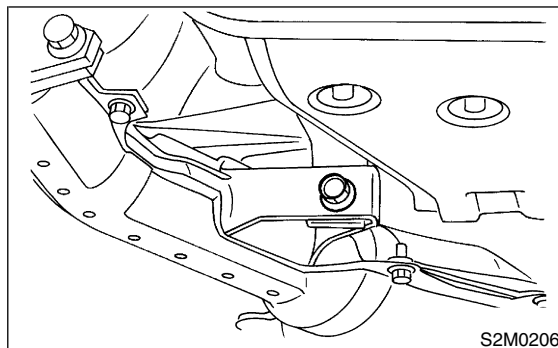
(3) Remove nuts which install front exhaust pipe onto engine.



(4) Separate center exhaust pipe from rear exhaust pipe.



(5) Remove bolt which installs center exhaust pipe to hanger bracket.



(6) Take off front and center exhaust pipes.

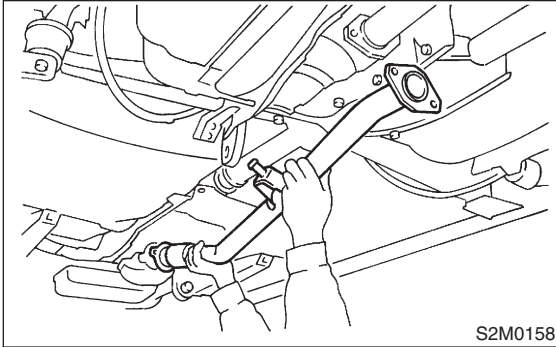
AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

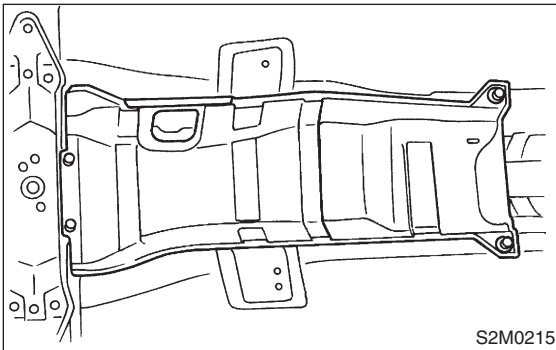
(7) Remove rear exhaust pipe.

CAUTION:

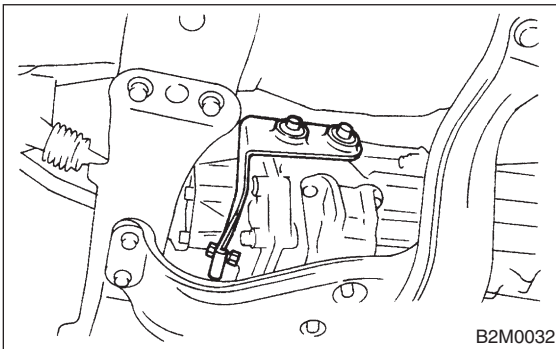
When removing exhaust pipes, be careful each exhaust pipe does not drop out.



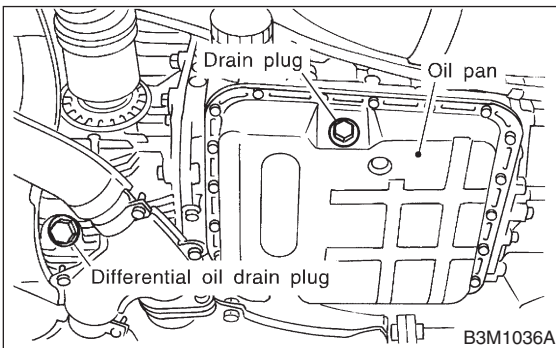
(8) Remove heat shield cover of rear exhaust pipe.



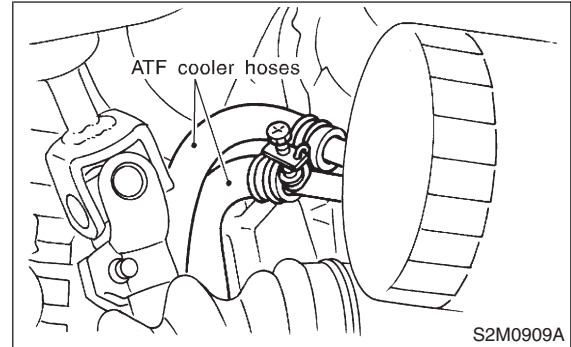
(9) Remove hanger bracket from right side of transmission.



13) Drain ATF to remove ATF drain plug.



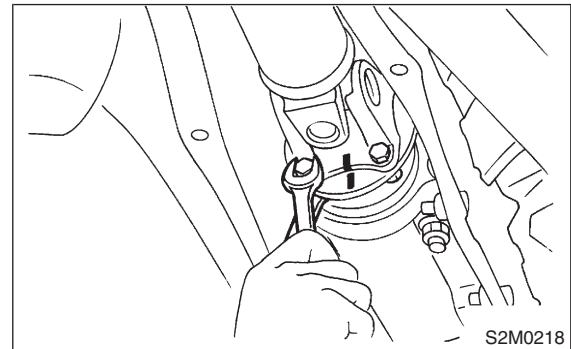
14) Disconnect ATF cooler hoses from pipes of transmission side, and remove ATF level gauge guide.



15) Remove propeller shaft.

(1) Remove front cover of rear differential mount.

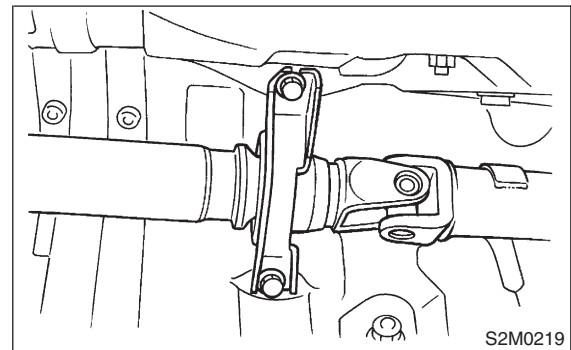
(2) Separate propeller shaft from rear differential.



(3) Remove bolts which hold center bearing onto body.

CAUTION:

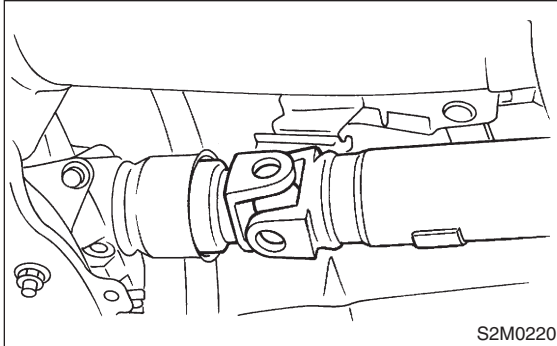
Be careful not to drop propeller shaft.



(4) Remove propeller shaft from transmission.

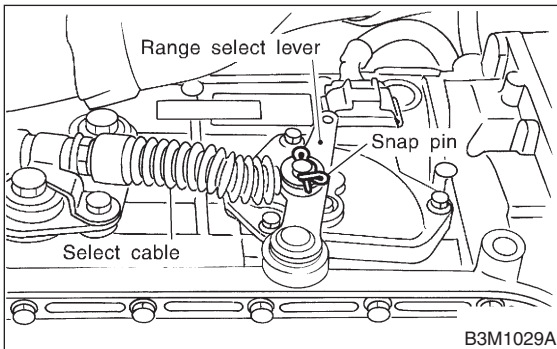
CAUTION:

- Be sure to use an empty container to catch oil flowing out when removing propeller shaft.
- Be sure not to damage oil seals and the frictional surface of sleeve yoke.
- Be sure to plug the opening in transmission after removal of propeller shaft.

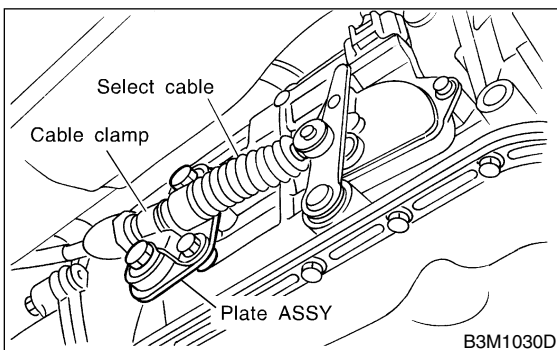


16) Remove shift selector cable.

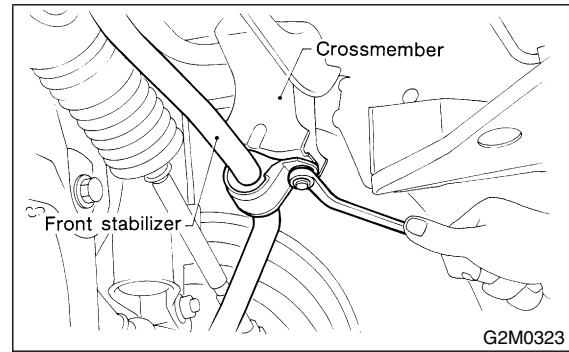
(1) Remove snap pin from range select lever.



(2) Remove select cable from plate assembly.

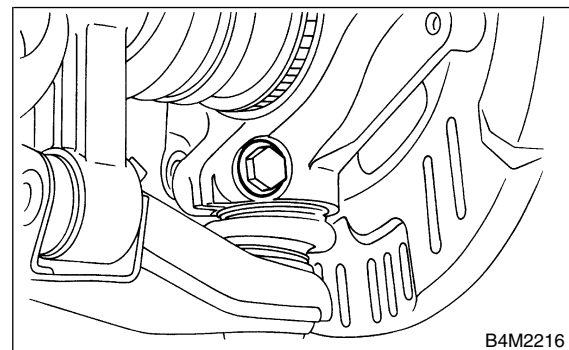


17) Remove bolts which install stabilizer clamps onto crossmember.



18) Remove front drive shafts from transmission.

(1) Remove transverse link from housing.

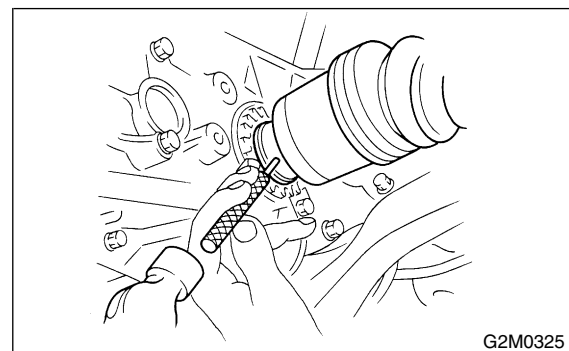


(2) Lower transverse link.

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

CAUTION:

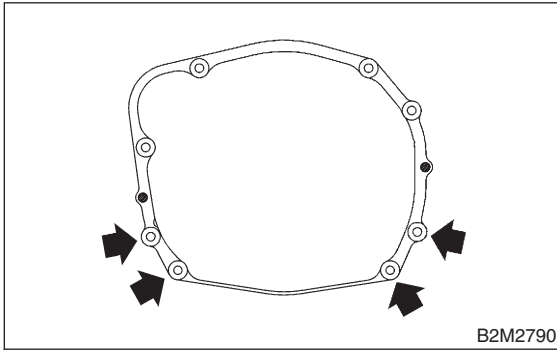
Discard removing spring pin. Replace with a new one.



AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

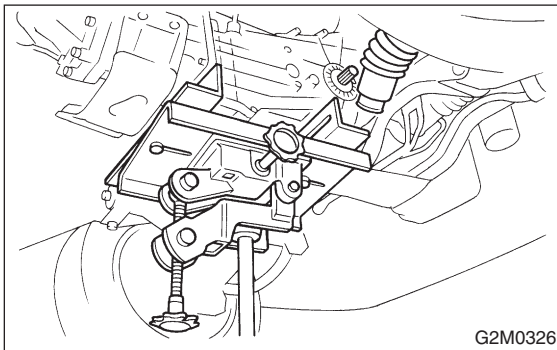
19) Remove nuts which hold lower side of transmission to engine.



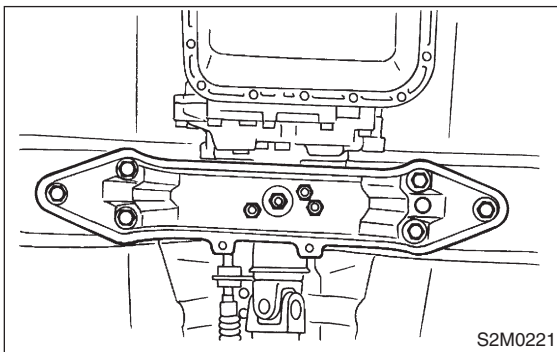
20) Place transmission jack under transmission.

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.



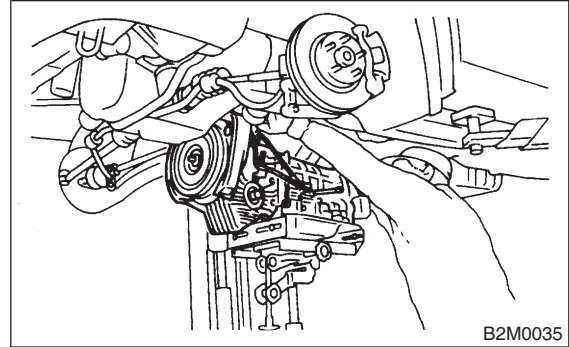
21) Remove transmission rear crossmember.



22) Remove transmission.

CAUTION:

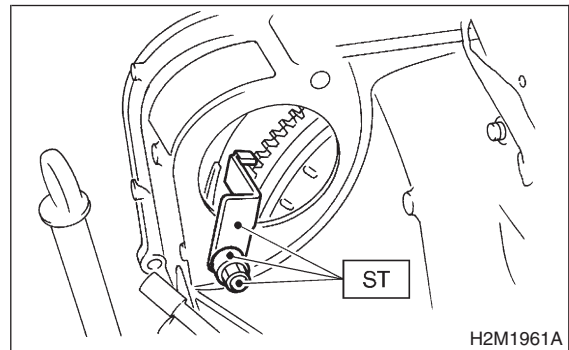
Move transmission and torque converter as a unit away from engine.



B: INSTALLATION

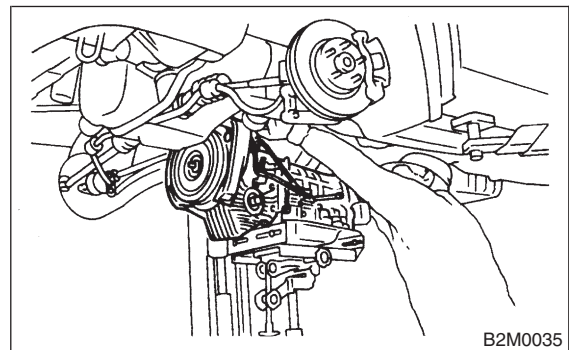
S502207A11

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



2) Install transmission to engine.

(1) Gradually raise transmission with transmission jack.



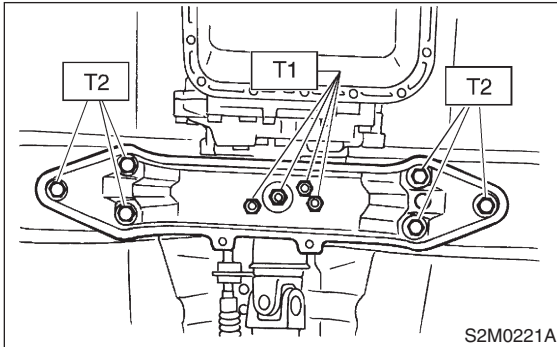
(2) Engage them at splines.

3) Install transmission rear crossmember.

Tightening torque:

T1: 34 N·m (3.5 kgf-m, 25.3 ft-lb)

T2: 69 N·m (7.0 kgf-m, 51 ft-lb)

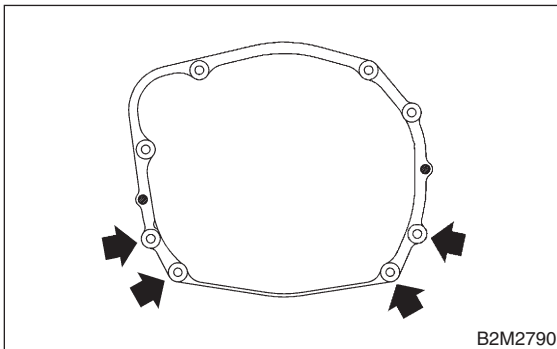


4) Take off transmission jack.

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

Tightening torque:

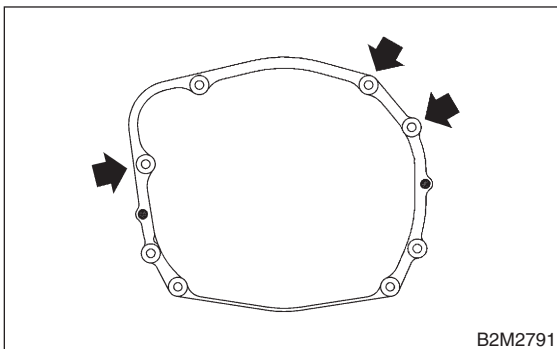
50 N·m (5.1 kgf-m, 36.9 ft-lb)



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

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



7) Install torque converter to drive plate.

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

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

2200 cc vehicles:

ST 499977300 CRANK PULLEY WRENCH

2500 cc vehicles:

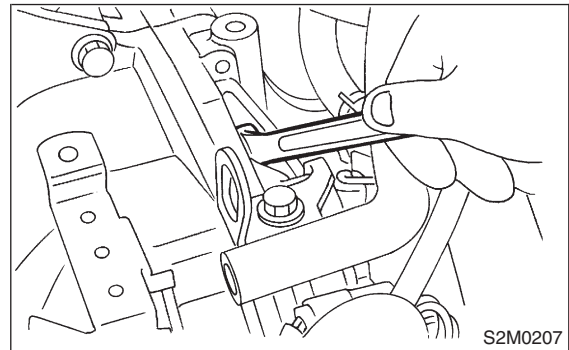
ST 499977100 CRANK PULLEY WRENCH

CAUTION:

Be careful not to drop bolts into torque converter housing.

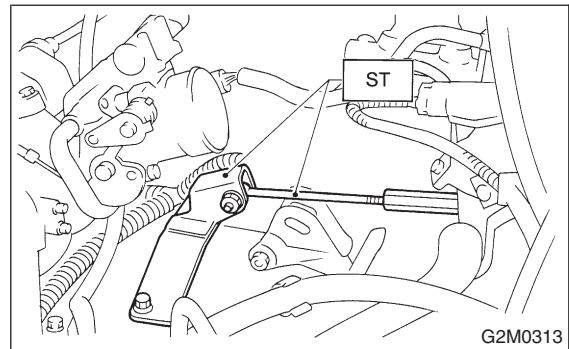
Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



(3) Clog plug onto service hole.

8) Remove special tools.

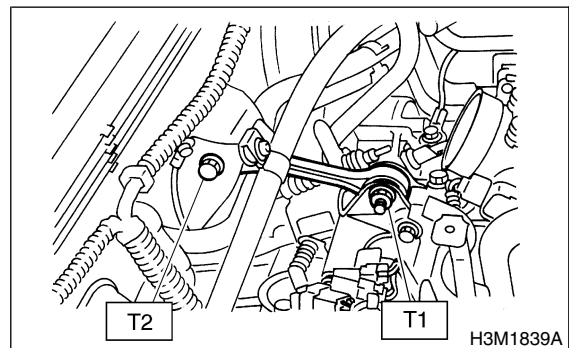


9) Install pitching stopper.

Tightening torque:

T1: 49 N·m (5.0 kgf-m, 36.2 ft-lb)

T2: 57 N·m (5.8 kgf-m, 42 ft-lb)



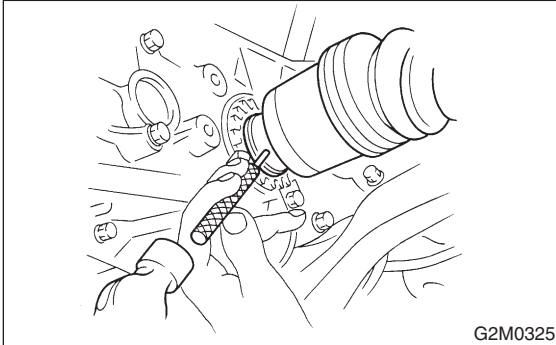
AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

- 10) 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:

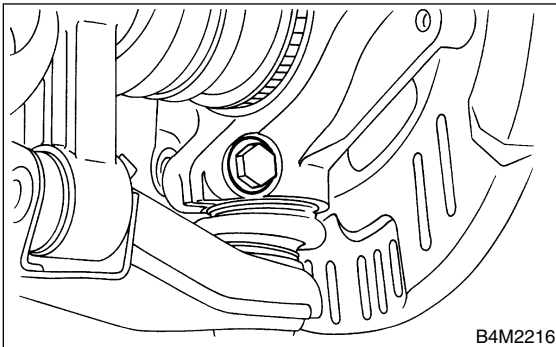
Always use a new spring pin.



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

Tightening torque:

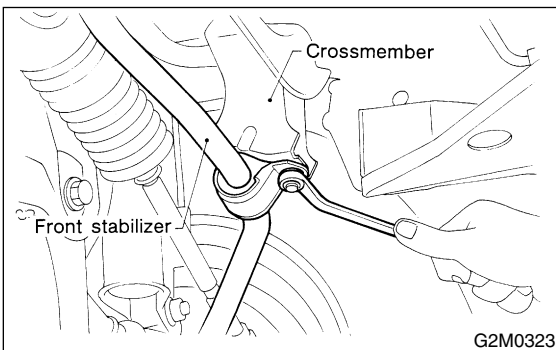
49 N·m (5.0 kgf-m, 36 ft-lb)



- 11) Install stabilizer clamps onto front crossmember.

Tightening torque:

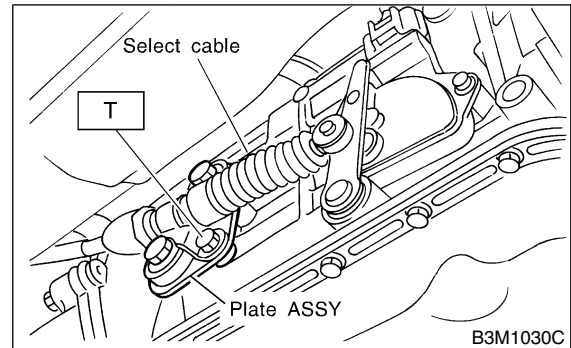
25 N·m (2.5 kgf-m, 18.1 ft-lb)



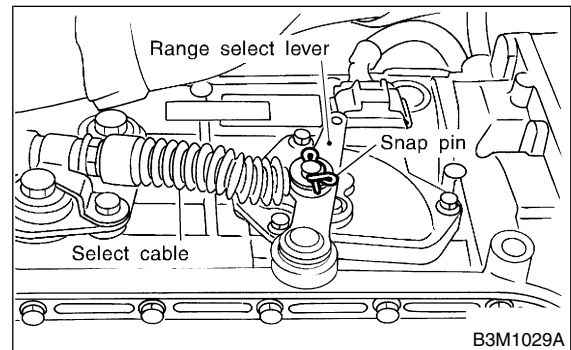
- 12) Install shift selector cable onto selector lever.
- (1) Install selector cable to range select lever.
 - (2) Install cable clamp to plate assembly.

Tightening torque:

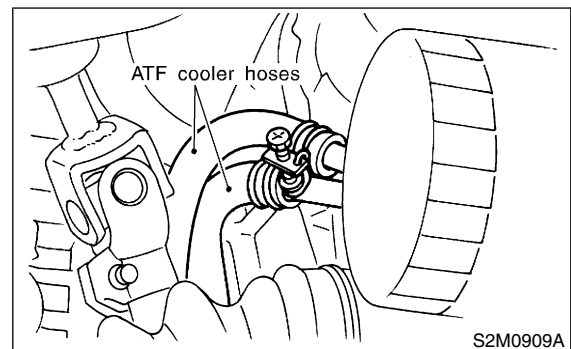
T: 32 N·m (3.3 kgf-m, 24 ft-lb)



- (3) Install snap pin to range select lever.



- 13) Install ATF level gauge guide, and ATF cooler hoses onto pipe.

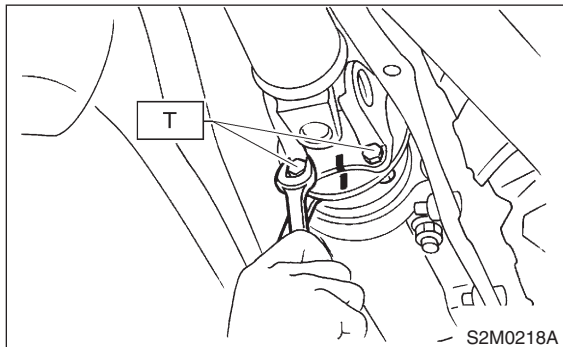


14) Install propeller shaft.

- (1) Install propeller shaft into transmission.
- (2) Tighten bolts which install propeller shaft onto companion flange of rear differential.

Tightening torque:

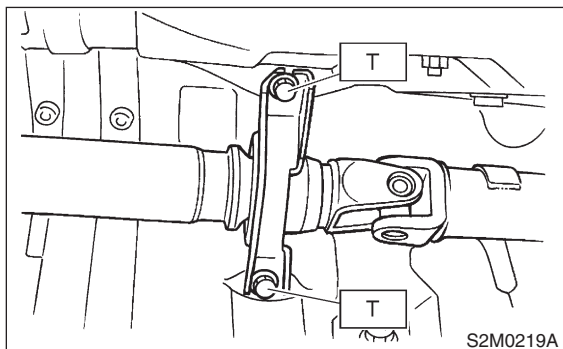
T: 31 N·m (3.2 kgf-m, 23.1 ft-lb)



(3) Install center bearing bracket on body.

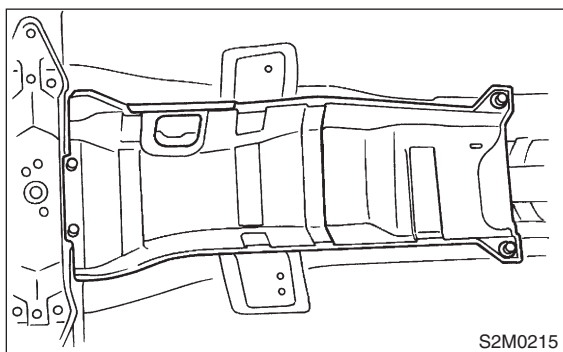
Tightening torque:

T: 52 N·m (5.3 kgf-m, 38.3 ft-lb)



15) Install exhaust system.

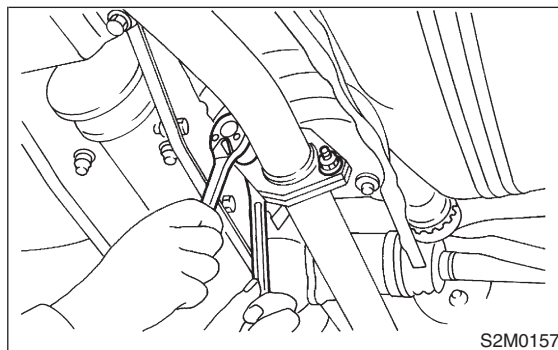
- (1) Install heat shield cover.



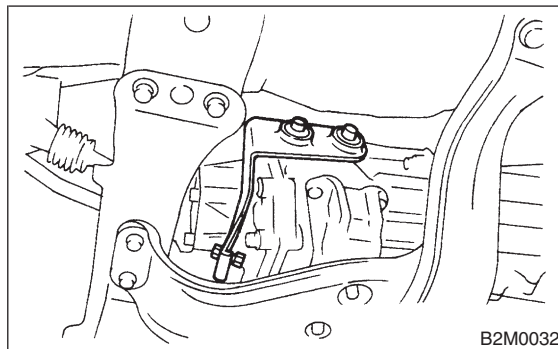
(2) Install rear exhaust pipe to muffler.

Tightening torque:

48 N·m (4.9 kgf-m, 35.4 ft-lb)



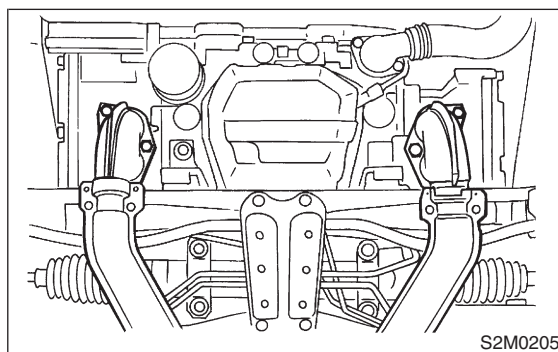
(3) Install hanger bracket on right side of transmission.



(4) Install front exhaust pipe onto engine.

Tightening torque:

30 N·m (3.1 kgf-m, 22.4 ft-lb)



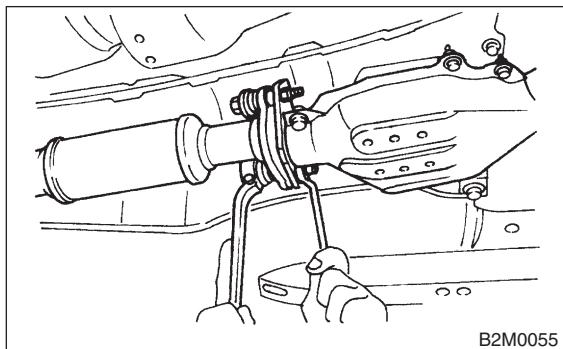
AUTOMATIC TRANSMISSION ASSEMBLY

Automatic Transmission

- (5) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:

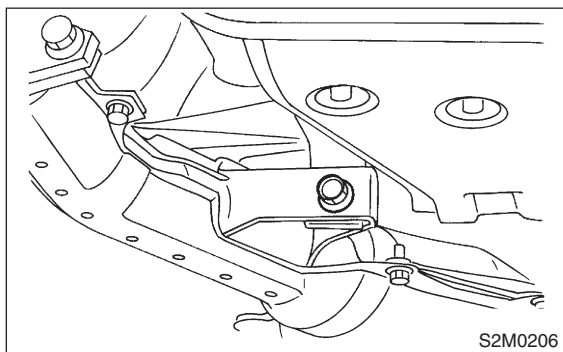
18 N·m (1.8 kgf-m, 13.0 ft-lb)



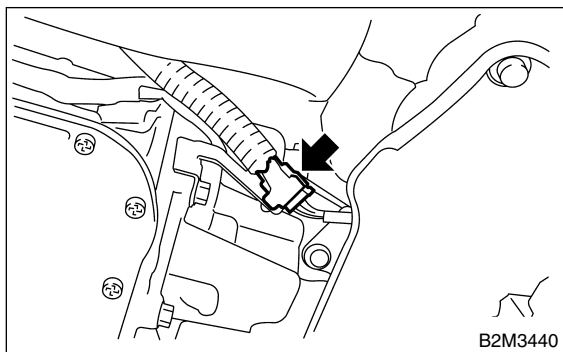
- (6) Tighten bolt which installs center exhaust pipe to hanger bracket.

Tightening torque:

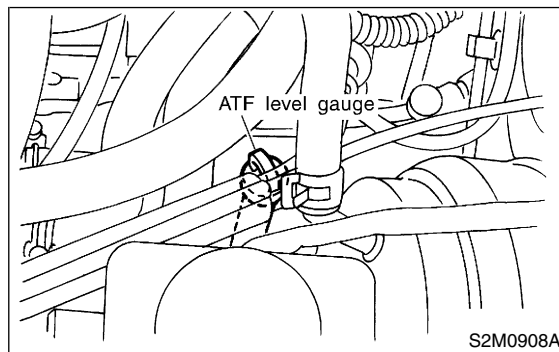
35 N·m (3.6 kgf-m, 26.0 ft-lb)



- (7) Connect connector to rear oxygen sensor.

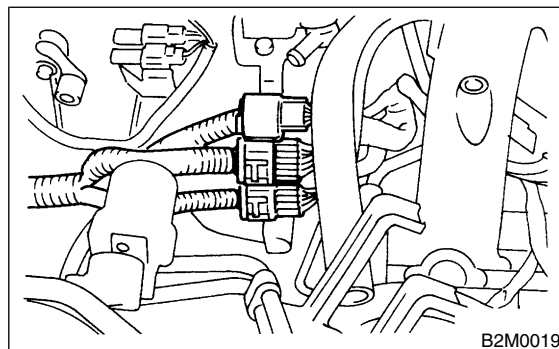


- 16) Install ATF level gauge.



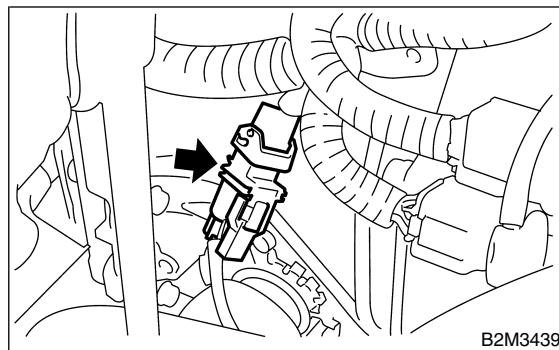
- 17) Connect the following connectors.

- (1) Transmission harness connectors



- (2) Transmission ground terminal

- (3) Front oxygen sensor connector



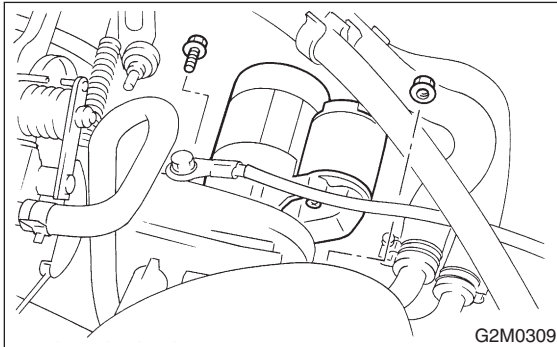
18) Install starter.

<Ref. to AT-11 INSPECTION, Road Test.>

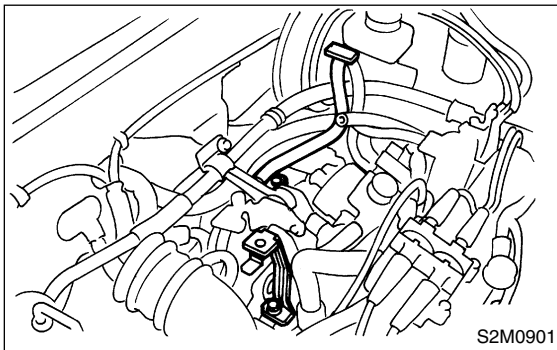
- (1) Install starter onto transmission case, and connect connectors and terminals.
- (2) Tighten bolt and nut which install starter onto transmission.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



19) Install air cleaner case stay.



20) Install air intake duct <Ref. to IN-5 INSTALLATION, Air Intake Duct.> and air cleaner case. <Ref. to IN-4 INSTALLATION, Air Cleaner Case.>

21) Connect battery ground terminal.

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

Recommended fluid:

Dexron IIE or Dexron III type automatic transmission fluid

Fluid capacity:

2200 cc

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

2500 cc

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

23) Check selector lever operation.

<Ref. to AT-5 INSPECTION, General Description.>

24) Take off vehicle from lift arms.

25) Run the vehicle until ATF temperature rises from 60 to 80°C (140 to 176°F) and check the ATF level of the "HOT" side on level gauge.

26) Check the vehicle on road tester.

2. Automatic Transmission Fluid

S502248

A: REPLACEMENT

S502248A20

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

CAUTION:

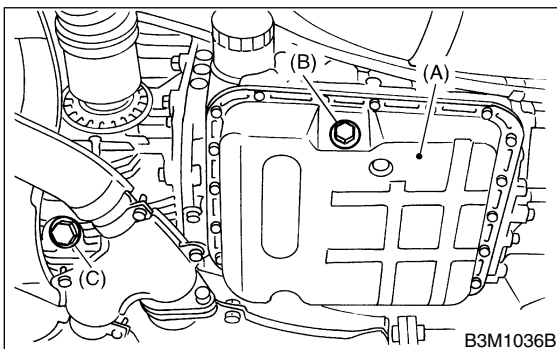
After running the engine or after idling for a long time, the ATF is hot. Be careful not to burn yourself.

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 IIE or Dexron III type automatic transmission fluid

Fluid capacity:

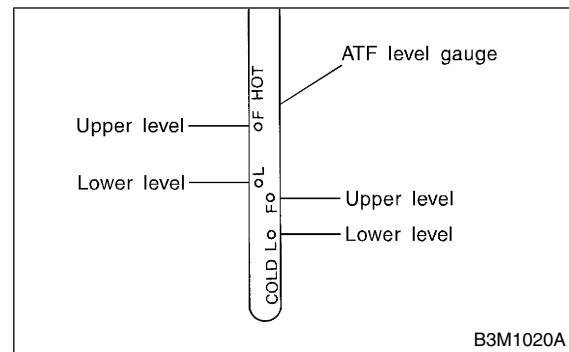
2200 cc model; 8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)

2500 cc model; 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.

13. Control Valve Body S502564

A: REMOVAL S502564A18

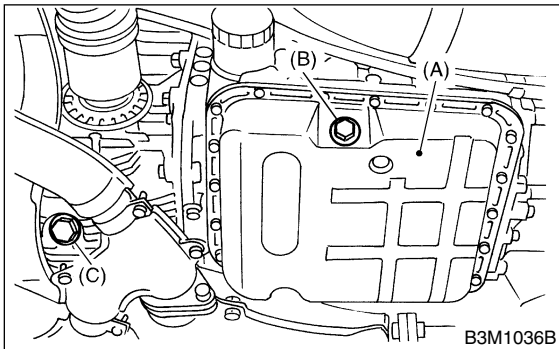
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



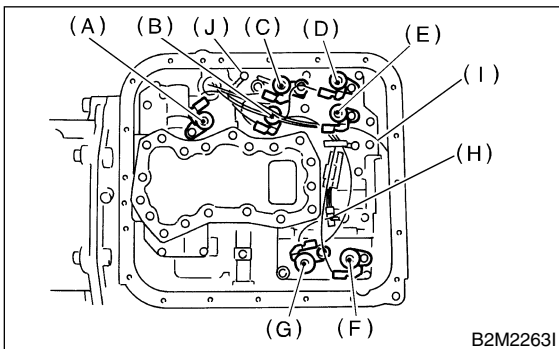
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 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.

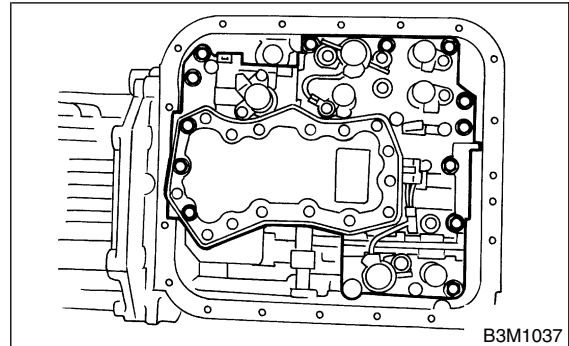


- (A) Lock-up duty solenoid (Blue)
- (B) Ground earth
- (C) Low clutch timing solenoid (Gray)
- (D) Lining pressure duty solenoid (Red)
- (E) Shift solenoid 2 (Yellow)
- (F) Shift solenoid 1 (Green)
- (G) 2-4 brake timing solenoid (Black)
- (H) 2-4 brake duty solenoid (Red)
- (I) ATF temperature sensor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

- 5) Remove the control valve.

CAUTION:

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

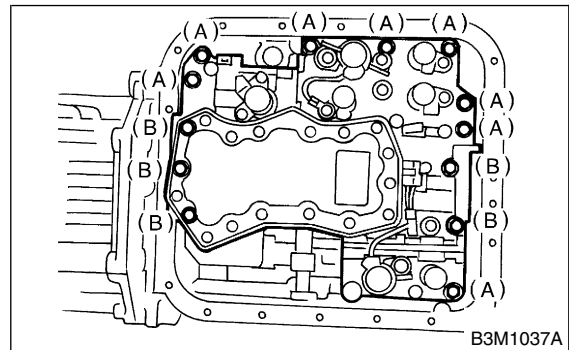


B: INSTALLATION S502564A11

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

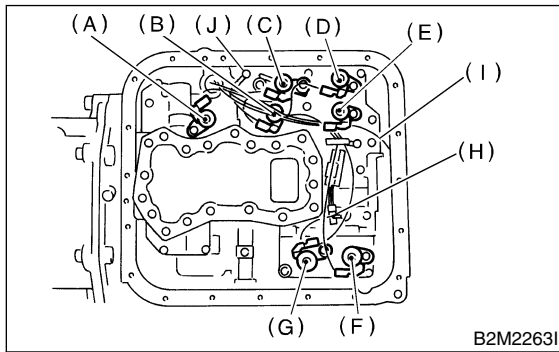
Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



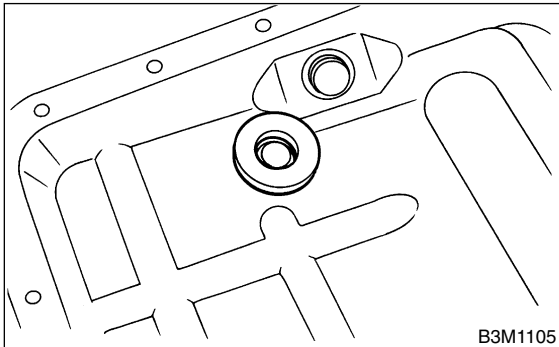
- (A) Short bolts
- (B) Long bolts

3) Connect all connector.

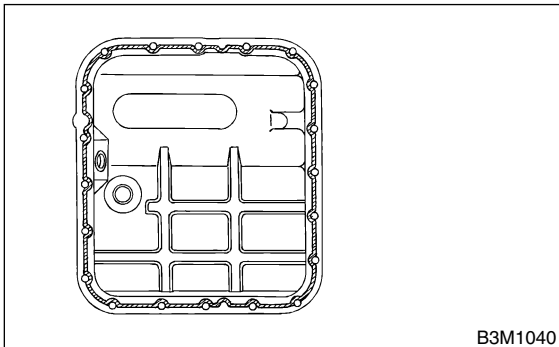


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Lining pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) ATF temperature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

4) Attach the magnet at the specified position.



5) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



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 “AT” section, a separate publication.

D: ASSEMBLY S502564A02

Refer to “AT” section, a separate publication.

E: INSPECTION S502564A10

Refer to “AT” section, a separate publication.

3. Differential Gear Oil S502150

A: REPLACEMENT S502150A20

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

CAUTION:

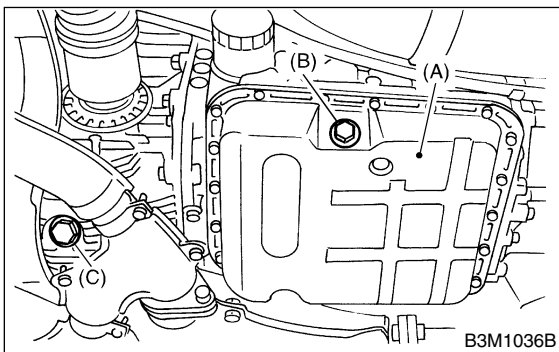
After running the engine or after idling for a long time, the differential gear oil is hot. Be careful not to burn yourself.

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:

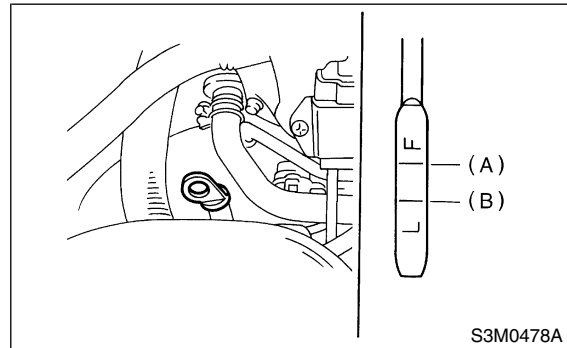
1.2 ℓ (1.3 US qt, 1.1 Imp qt)

- 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

DROPPING RESISTOR

Automatic Transmission

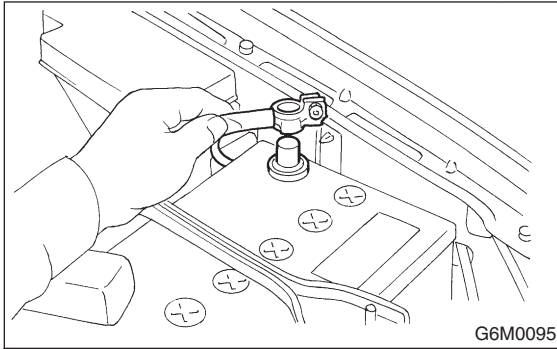
17. Dropping Resistor

S502218

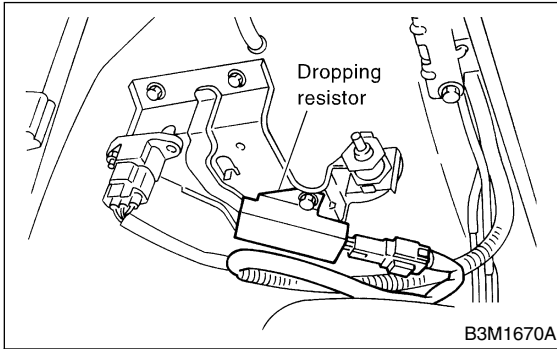
A: REMOVAL

S502218A18

- 1) Disconnect battery ground terminal.



- 2) Remove air intake duct. <Ref. to IN-5 REMOVAL, Air Intake Duct.>
- 3) Disconnect connector from dropping resistor.
- 4) Remove dropping resistor from bracket.



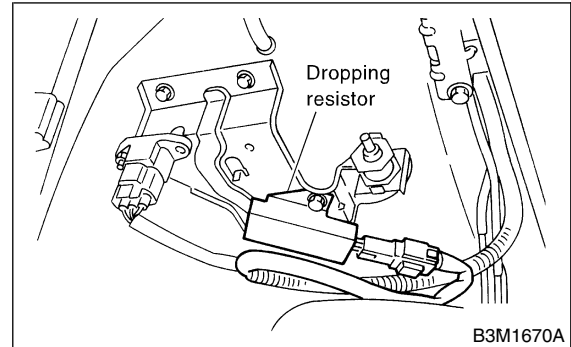
B: INSTALLATION

S502218A11

Install in the reverse order of removal.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



C: INSPECTION

S502218A10

No.	Step	Check	Yes	No
1	CHECK RESISTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminal. Terminals No. 1 — No. 2:	Is the resistance between 9 and 15 Ω ?	Go to step 2.	Replace dropping resistor. <Ref. to AT-42 REMOVAL, Dropping Resistor.>
2	CHECK RESISTOR. Measure resistance between dropping resistor terminal. Terminals No. 3 — No. 4:	Is the resistance between 9 and 15 Ω ?	Dropping resistor is normal.	Replace dropping resistor. <Ref. to AT-42 REMOVAL, Dropping Resistor.>

GENERAL DESCRIPTION

Automatic Transmission

1. General Description SS02001

A: SPECIFICATIONS SS02001E49

1. TORQUE CONVERTER CLUTCH SS02001E4901

Model	2500 cc	2200 cc
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	1.9 — 2.1	2.1 — 2.3
Nominal diameter	246 mm (9.69 in)	236 mm (9.29 in)
Stall speed (at sea level)	2,100 — 2,600 rpm	2,000 — 2,500 rpm
One-way clutch	Sprague type one-way clutch	

2. OIL PUMP SS02001E4902

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

3. TRANSMISSION CONTROL ELEMENT SS02001E4903

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 SS02001E4904

Model	2200 cc	2500 cc
1st	2.785	3.027
2nd	1.545	1.619
3rd	1.000	
4th	0.694	
Rev	2.272	

5. PLANETARY GEAR AND PLATE SS02001E4905

	2200 cc	2500 cc
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
Tooth number of rear pinion	17	19
Tooth number of rear internal gear	75	
Drive plate number of high clutch	4	5
Drive plate number of low clutch	5	6
Drive plate number of reverse clutch	2	
Drive plate number of 2-4 brake	3	
Drive plate number of low & reverse brake	5	6

6. SELECTOR POSITION SS02001E4906

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	Automatic gear change 1st $\leftarrow$ 2nd $\leftarrow$ 3rd $\leftarrow$ 4th
3 (3rd)	Automatic gear change 1st $\leftarrow$ 2nd $\leftarrow$ 3rd $\leftarrow$ 4th
2 (2nd)	2nd gear locked (Deceleration possible 2nd $\leftarrow$ 3rd $\leftarrow$ 4th)
1 (1st)	1st gear locked (Deceleration possible 1st $\leftarrow$ 2nd $\leftarrow$ 3rd $\leftarrow$ 4th)
Control method	Wire cable

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 Dexron III type Automatic transmission fluid	
Fluid capacity	2200 cc	8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
	2500 cc	9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)
Lubrication system	Forced feed lubrication with oil pump	
Oil	Automatic transmission fluid (above mentioned)	

8. COOLING AND HARNESS

S502001E4908

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

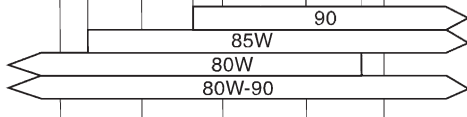
9. TRANSFER

S502001E4909

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

10. FINAL REDUCTION

S502001E4910

Model	2200 cc	2500 cc
Front final gear ratio	4.111 (37/9)	4.444 (40/9)
Lubrication oil	ITEM • Front differential gear oil API Classification GL - 5 SAE Viscosity No. and Applicable Temperature (°C) -30 -26 -15 -5 0 15 25 30 (°F) -22 -15 5 23 32 59 77 86 	
Front differential oil capacity	1.2 ℓ (1.3 US qt, 1.1 Imp qt)	

H3M1235A

GENERAL DESCRIPTION

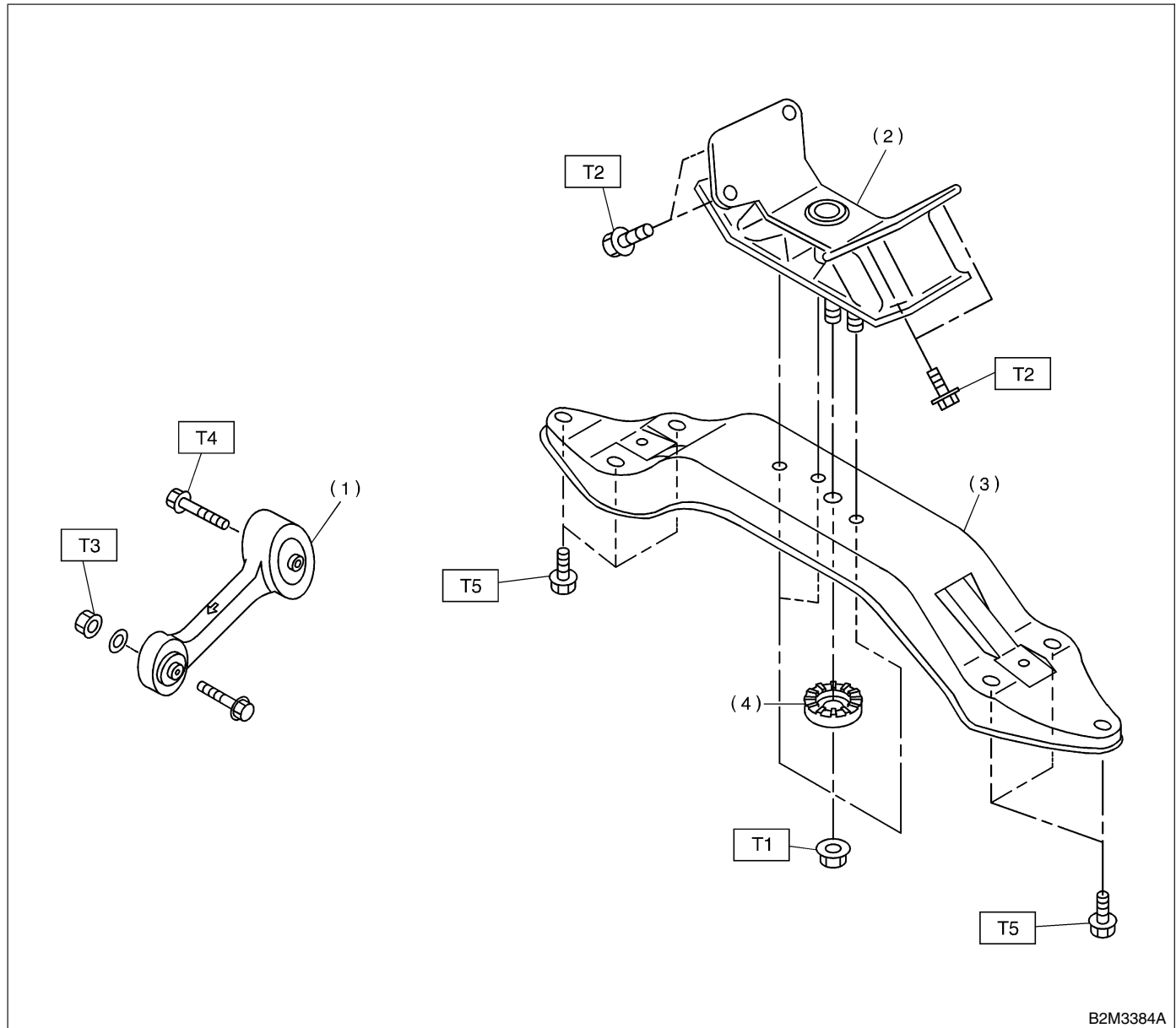
Automatic Transmission

B: COMPONENT S502001A05

NOTE:

For information about other transmission mounting components, refer to “AT ”section, a separate publication.

1. TRANSMISSION MOUNTING S502001A0501



B2M3384A

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

Tightening torque: N·m (kgf-m, ft-lb)

T1: 34 (3.5, 25.3)

T2: 38 (3.9, 28)

T3: 49 (5.0, 36.2)

T4: 57 (5.8, 42)

T5: 69 (7.0, 51)

C: CAUTION S502001A03

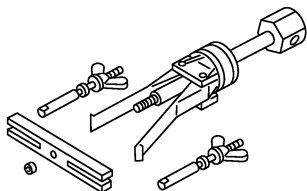
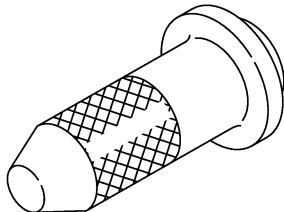
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Until the oil pan is removed, 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.

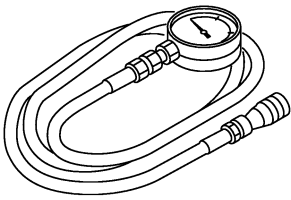
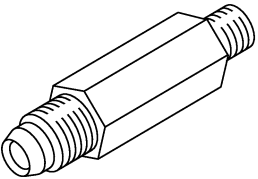
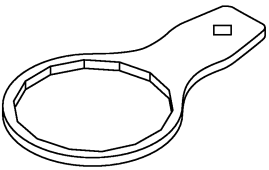
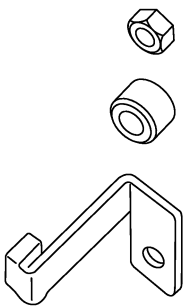
D: PREPARATION TOOL S502001A17

1. SPECIAL TOOL S502001A1701

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

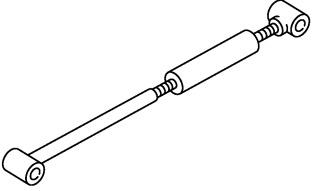
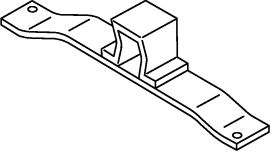
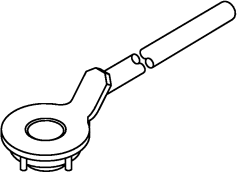
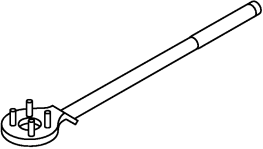
GENERAL DESCRIPTION

Automatic Transmission

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

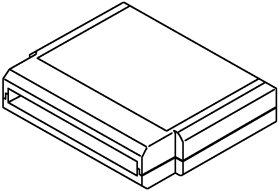
GENERAL DESCRIPTION

Automatic Transmission

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 H5M0977	499977300	CRANK PULLEY WRENCH	- Used for stopping rotating of crankshaft pulley when loosening and tightening crankshaft pulley bolts. - For 2200 cc engine.
 B2M3870	499977100	CRANK PULLEY WRENCH	- Used for stopping rotating of crankshaft pulley when loosening and tightening crankshaft pulley bolts. - For 2500 cc engine.

GENERAL DESCRIPTION

Automatic Transmission

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B2M3876	24082AA150	CARTRIDGE	Troubleshooting for electrical systems.
 B2M3877	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. ● English: 22771AA030 (Without printer) ● German: 22771AA070 (Without printer) ● French: 22771AA080 (Without printer) ● Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL S502001A1702

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

11. 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.

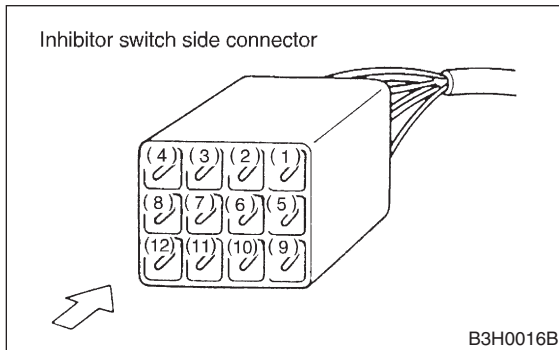
CAUTION:

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

NOTE:

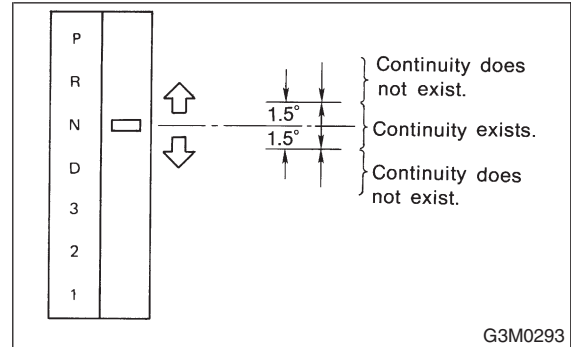
If inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	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.

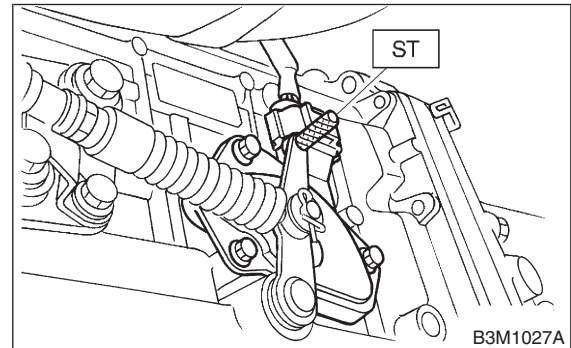
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.



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.

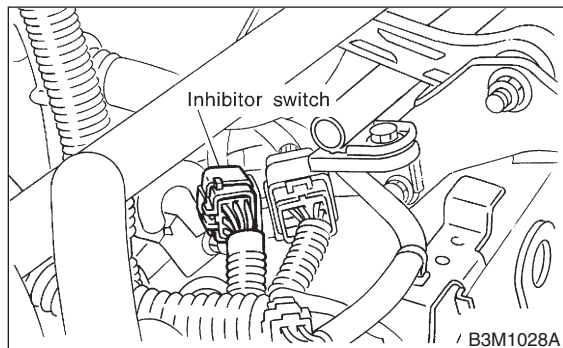
Tightening torque:

3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

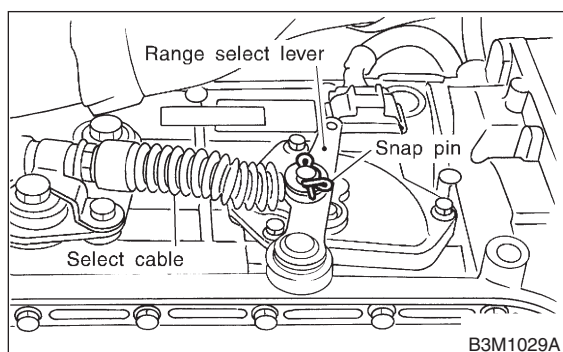
- 5) Repeat the above checks. If the inhibitor switch is determined to be "faulty", replace it.

C: REMOVAL S502243A18

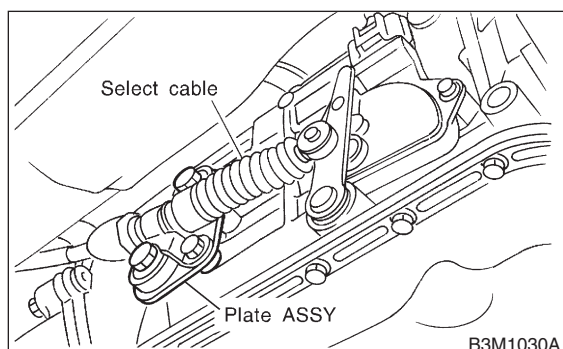
- 1) Move select lever to neutral position.
- 2) Remove air cleaner case <Ref. to IN-4 REMOVAL, Air Cleaner Case.> and air intake duct. <Ref. to IN-5 REMOVAL, Air Intake Duct.>
- 3) Disconnect inhibitor switch connector.



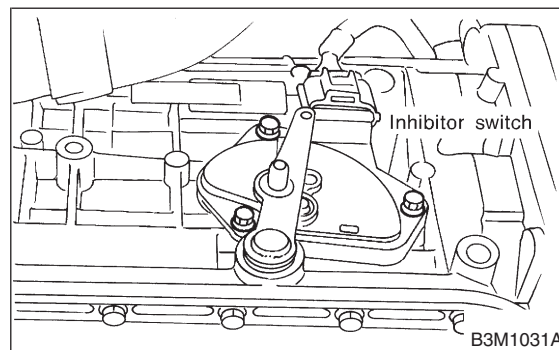
- 4) Remove front exhaust pipe <Ref. to EX-6 REMOVAL, Front Exhaust Pipe.> and center exhaust pipe. <Ref. to EX-9 REMOVAL, Center Exhaust Pipe.>
- 5) Remove snap pin from range select lever.



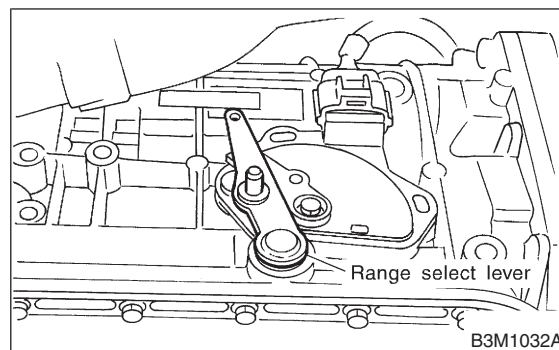
- 6) Remove plate assembly from transmission case.



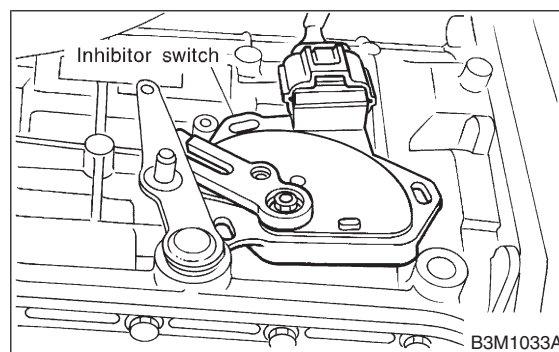
- 7) Remove bolts.



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



- 9) Remove inhibitor switch from transmission.

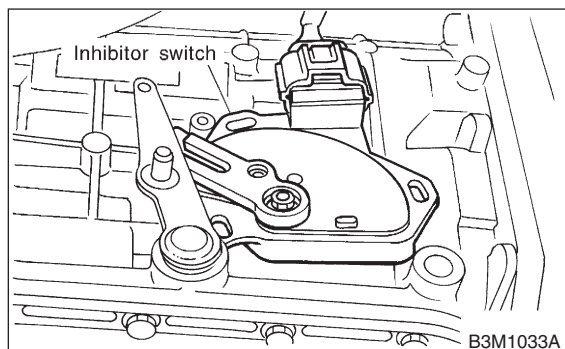


INHIBITOR SWITCH

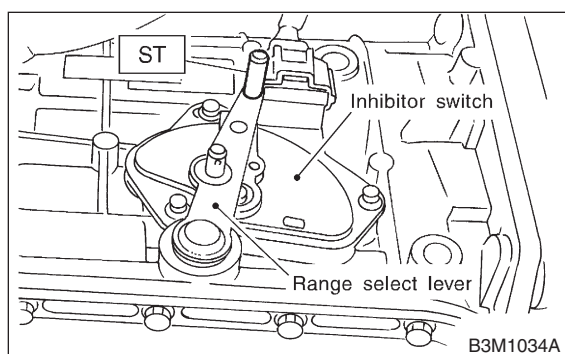
D: INSTALLATION

S502243A11

- 1) Install inhibitor switch to transmission case.



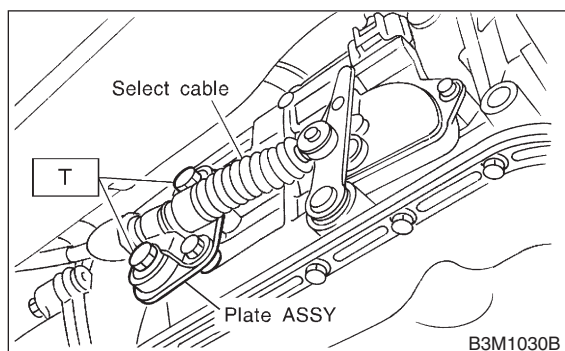
- 2) Move range select lever to neutral position.
 3) Using ST, tighten bolts of inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
 ST 499267300 STOPPER PIN



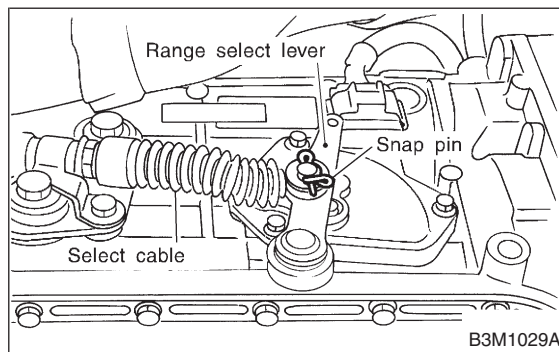
- 4) Install select cable to range select lever.
 5) Install plate assembly to transmission.

Tightening torque:

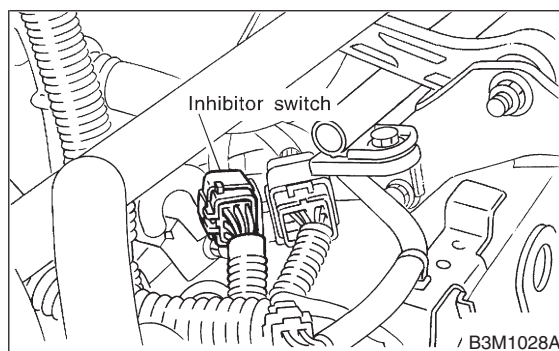
T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



- 6) Install snap pin to range select lever.



- 7) Install front exhaust pipe <Ref. to EX-7 INSTALLATION, Front Exhaust Pipe.> and center exhaust pipe. <Ref. to EX-9 INSTALLATION, Center Exhaust Pipe.>
 8) Connect inhibitor switch connector.



- 9) Install air cleaner case <Ref. to IN-4 INSTALLATION, Air Cleaner Case.> and air intake duct. <Ref. to IN-5 INSTALLATION, Air Intake Duct.>

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.)

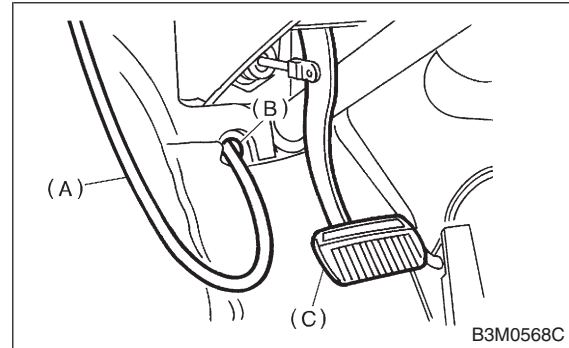
- Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in "N" or "P".)

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



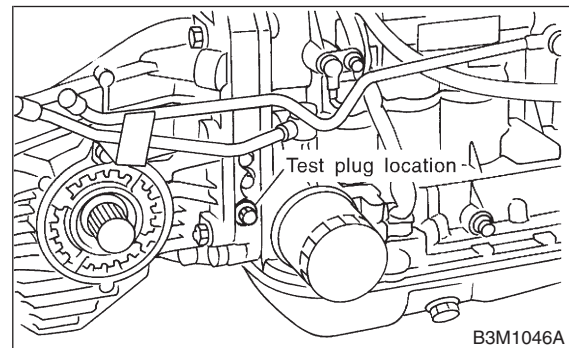
(A) Pressure gauge hose

(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



3) Connect ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

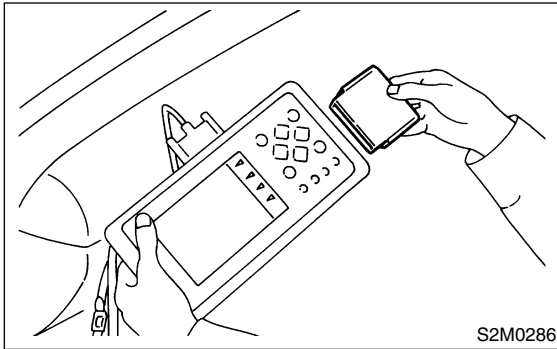
ST2 498575400 OIL PRESSURE GAUGE ASSY

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.



(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 ² , psi)
2	5	Full open	1,128 — 1,304 (11.5 — 13.3, 164 — 189)
R	5	Full open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	95	Full closed	304 — 412 (3.1 — 4.2, 44 — 60)

4. Road Test S501247

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 while driving on flat roads at normal speed in "D" 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.

14. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

S502227

A: REMOVAL

S50227A18

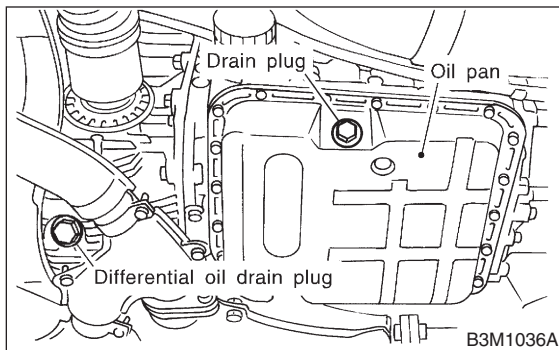
- 1) Clean transmission exterior.
- 2) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



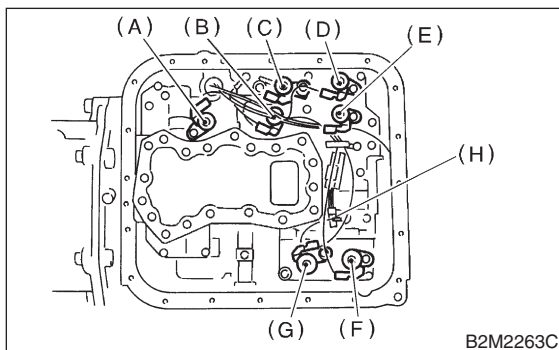
B3M1036A

- 3) Remove oil pan.

NOTE:

Drain oil into a container.

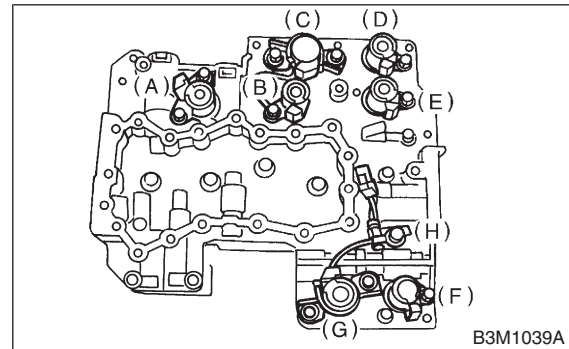
- 4) Disconnect solenoid and sensor connectors. Remove connectors from clip and disconnect connectors at 8 places.



B2M2263C

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

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



B3M1039A

- (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

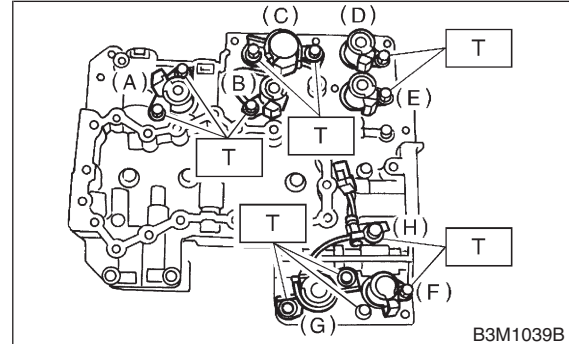
B: INSTALLATION

S50227A11

- 1) Install solenoids and ATF temperature sensor.

Tightening torque:

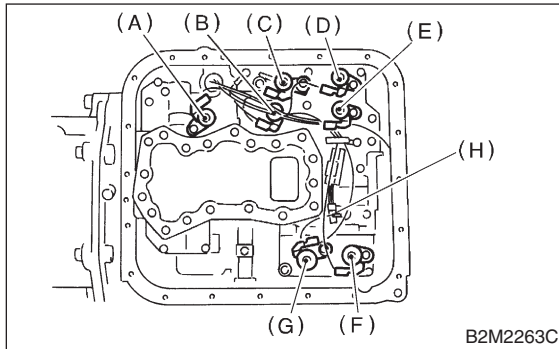
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



B3M1039B

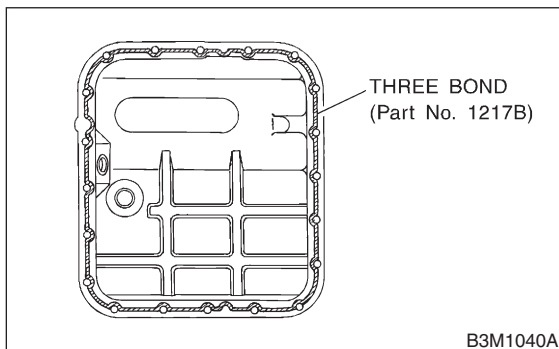
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor

2) Connect harness connectors 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

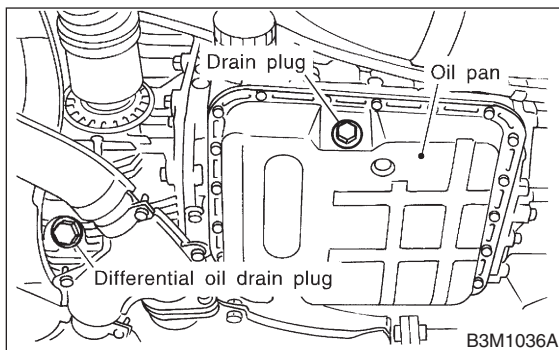
3) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



4) Install oil pan.

Tightening torque:

4.9 N·m (0.50 kgf-m, 3.6 ft-lb)



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

Recommended fluid:

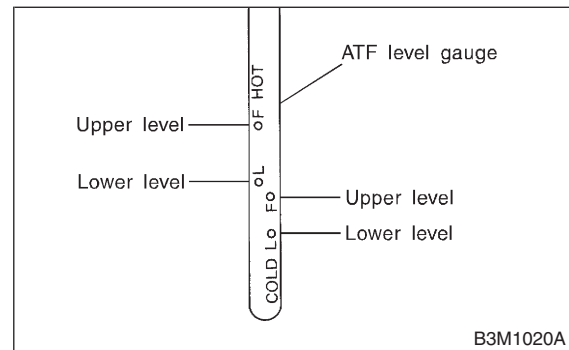
Dexron IIE or Dexron III type automatic transmission fluid

Fluid capacity:

2200 cc model; 8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)

2500 cc model; 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.



5. Stall Test SS02246

A: INSPECTION SS02246A10

1. GENERAL INFORMATION SS02246A1001

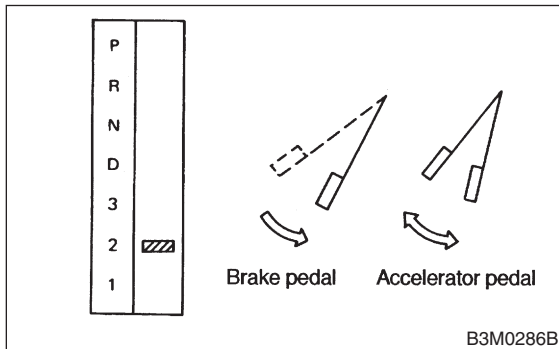
The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.

Purposes of the stall test:

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

2. TEST METHODS SS02246A1002

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



- 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):

2200 cc 2,000 — 2,500 rpm

2500 cc 2,100 — 2,600 rpm

STALL TEST

Automatic Transmission

3. EVALUATION S502246A1003

Stall speed (at sea level)	Position	Cause
Less than specifications	2 R	● Throttle valve not fully open ● Erroneous engine operation ● Torque converter clutch's one-way clutch slipping
Greater than specifications	D	● Low clutch slipping ● One-way clutch malfunctioning
	R	● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	● Line pressure too low ● Low clutch slipping ● 2-4 brake slipping

6. Time Lag Test S502245

A: INSPECTION S502245A10

1. GENERAL INFORMATION S502245A1001

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

CAUTION:

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

2. TEST METHODS S502245A1002

- 1) Fully apply the parking brake.
- 2) Start the engine.
Check engine speed is idling speed (A/C OFF).
- 3) Shift the shift lever from "N" to "D" range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
Time lag: Less than 1.2 seconds
- 4) In same manner, measure the time lag for "N" → "R".
Time lag: Less than 1.5 seconds

3. EVALUATION S502245A1003

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

8. Transfer Clutch Pressure Test

S502159

A: INSPECTION

S502159A10

1. TEST METHODS

S502159A1001

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

ST 499897700 OIL PRESSURE ADAPTER SET

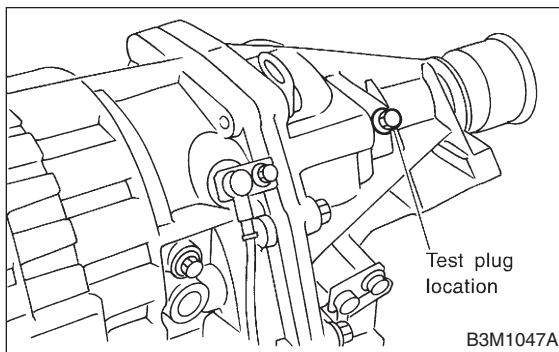
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

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

CAUTION:

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



2. EVALUATION

S502159A1002

NOTE:

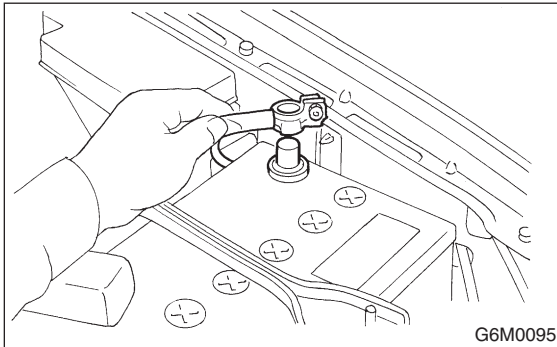
If oil pressure is not produced or if it does not change in the AWD mode, the transfer duty solenoid or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

Standard transfer clutch pressure kPa (kg/cm ² , psi)			
Duty ratio (%)	Throttle position	AWD mode	FWD mode
5	Full closed	932 — 1,089 (9.5 — 11.1, 135 — 158)	—
60	2/3 throttle	216 — 304 (2.2 — 3.1, 31 — 44)	—
95	Full open	—	0 (0, 0)

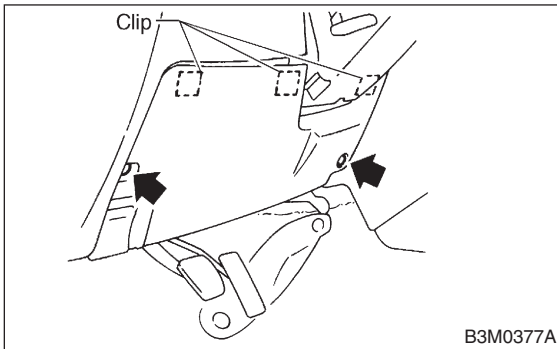
16. Transmission Control Module (TCM) S502225

A: REMOVAL S502225A18

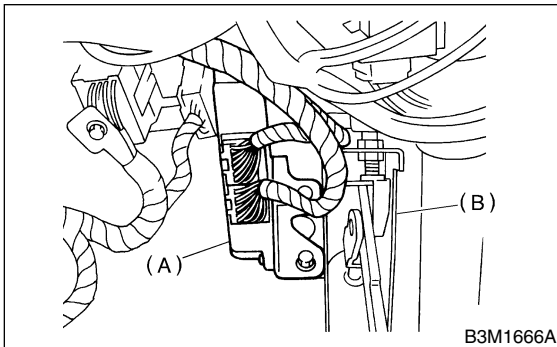
- 1) Disconnect battery ground terminal.



- 2) Remove lower cover and then disconnect connector.



- 3) Disconnect connectors from TCM.
- 4) Remove transmission control module.

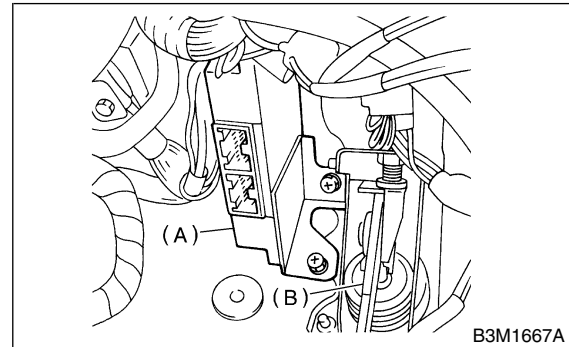


- (A) Transmission control module
(B) Brake pedal bracket

B: INSTALLATION S502225A11

- 1) Install TCM to pedal bracket.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



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

- 2) Connect connectors to TCM.
- 3) Install lower cover and then connect connector.
- 4) Connect battery ground terminal.

10. Transmission Mounting System

S502233

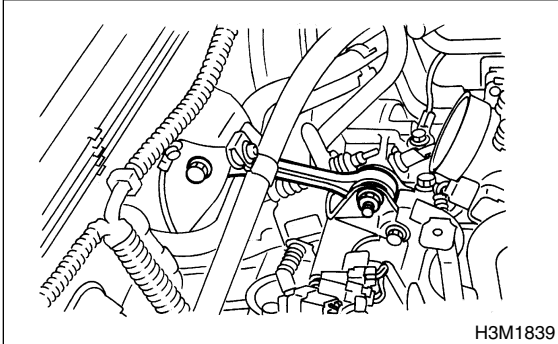
A: REMOVAL

S502233A18

1. PITCHING STOPPER

S502233A1801

- 1) Disconnect battery ground terminal.
- 2) Remove the air intake duct <Ref. to IN-5 REMOVAL, Air Intake Duct.> and air cleaner case. <Ref. to IN-4 REMOVAL, Air Cleaner Case.>
- 3) Remove the pitching stopper.



2. CROSSMEMBER AND CUSHION RUBBER

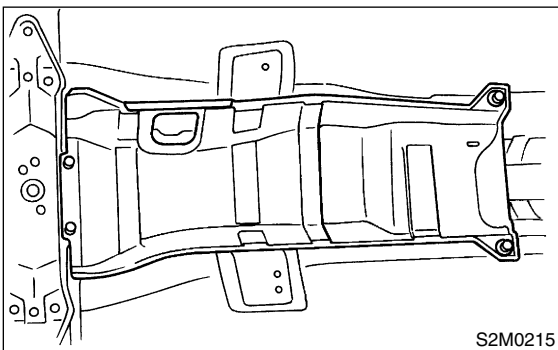
S502233A1802

- 1) Disconnect battery ground terminal.
- 2) Jack-up vehicle and support it with sturdy racks.
- 3) Remove the center exhaust pipe <Ref. to EX-9 REMOVAL, Center Exhaust Pipe.>, rear exhaust pipe <Ref. to EX-10 REMOVAL, Rear Exhaust Pipe.> and muffler. <Ref. to EX-12 REMOVAL, Muffler.>

CAUTION:

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

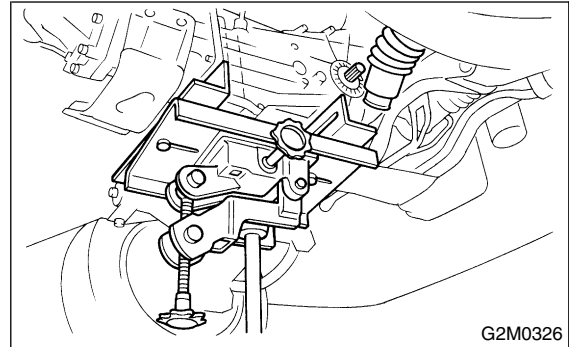
- 4) Remove the heat shield cover.



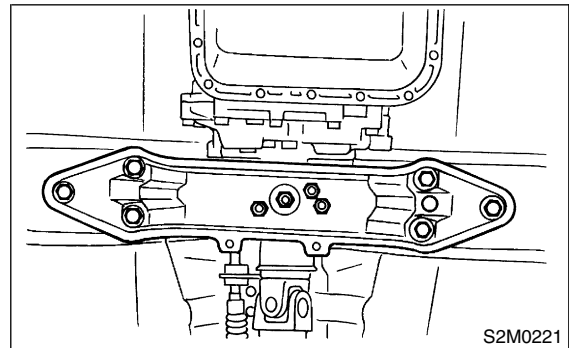
- 5) Set the transmission jack under the transmission.

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

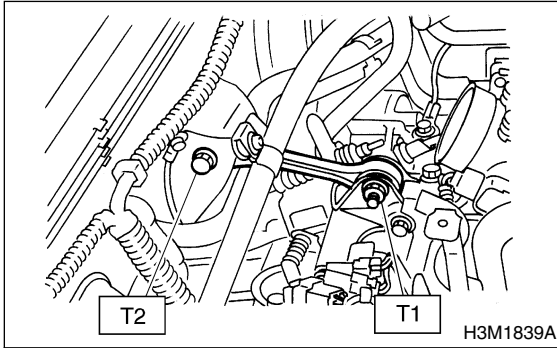
1. PITCHING STOPPER S502233A1101

- 1) Install the pitching stopper.

Tightening torque:

T1: 49 N·m (5.0 kgf-m, 36.2 ft-lb)

T2: 57 N·m (5.8 kgf-m, 42 ft-lb)



- 2) Install the air intake duct <Ref. to IN-5 INSTALLATION, Air Intake Duct.> and air cleaner case. <Ref. to IN-4 INSTALLATION, Air Cleaner Case.>

2. CROSSMEMBER AND CUSHION RUBBER S502233A1102

- 1) Install the rear cushion rubber.

Tightening torque:

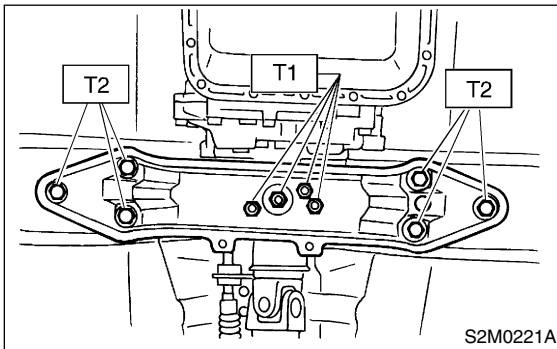
38 N·m (3.9 kgf-m, 28 ft-lb)

- 2) Install the crossmember.

Tightening torque:

T1: 34 N·m (3.5 kgf-m, 25.3 ft-lb)

T2: 69 N·m (7.0 kgf-m, 51 ft-lb)



- 3) Remove the transmission jack.
- 4) Install the heat shield cover.
- 5) Install the center exhaust pipe <Ref. to EX-9 INSTALLATION, Center Exhaust Pipe.>, rear exhaust pipe <Ref. to EX-10 INSTALLATION, Rear Exhaust Pipe.> and the muffler. <Ref. to EX-12 INSTALLATION, Muffler.>

C: INSPECTION S502233A10

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

1. PITCHING STOPPER S502233A1001

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

2. CROSSMEMBER AND CUSHION RUBBER S502233A1002

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

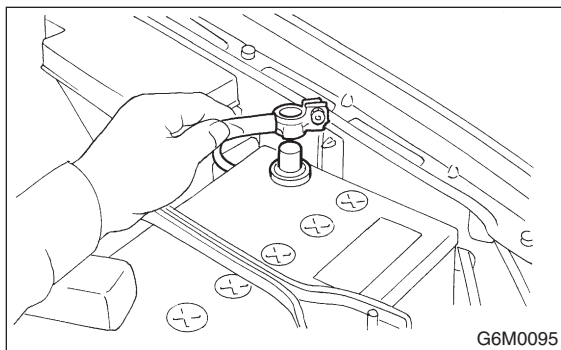
12. Vehicle Speed Sensor 1, 2, Torque Converter Turbine Speed Sensor and Harness Assembly

S502563

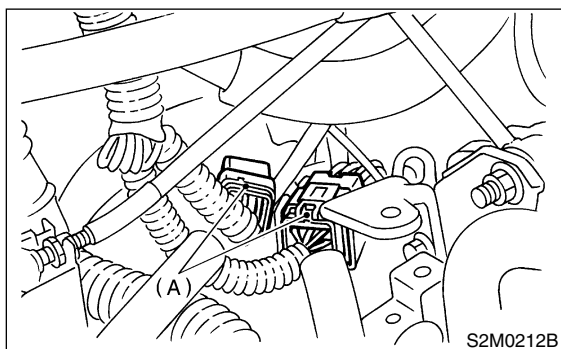
A: REMOVAL

S502563A18

- 1) Disconnect battery ground cable.



- 2) Disconnect transmission connector.



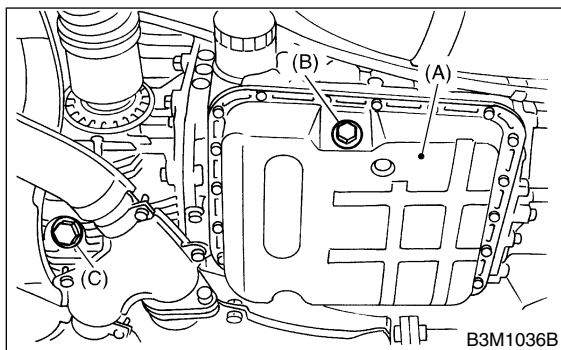
- 3) Remove the transmission connector from stay.
- 4) Lift-up the vehicle.
- 5) Clean transmission exterior.
- 6) Drain ATF completely.

NOTE:

Tighten ATF drain plug after draining ATF.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)

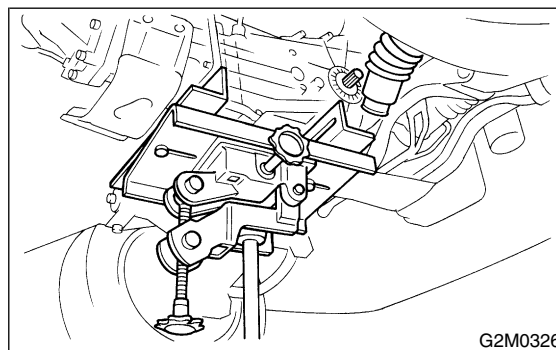


- (D) Oil pan
- (E) Drain plug
- (F) Differential oil drain plug

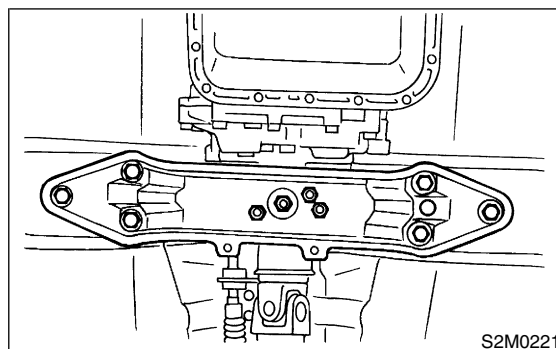
- 7) Remove the propeller shaft. <Ref. to DS-13 REMOVAL, Propeller Shaft.>
- 8) Remove the shield cover.
- 9) Place transmission jack under transmission.

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.



- 10) Remove the transmission rear crossmember bolts.



- 11) Lower the AT jack.

NOTE:

Do not separate the AT jack and transmission.

- 12) Remove the oil cooler outlet pipe.

CAUTION:

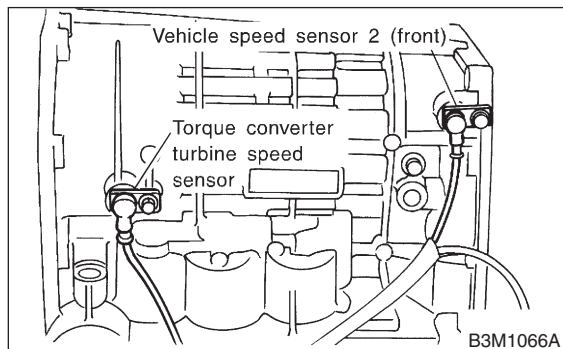
When removing outlet pipe, be careful not to lose balls and springs used with retaining screws.

VEHICLE SPEED SENSOR 1, 2, TORQUE CONVERTER TURBINE SPEED SENSOR AND HARNESS ASSEMBLY

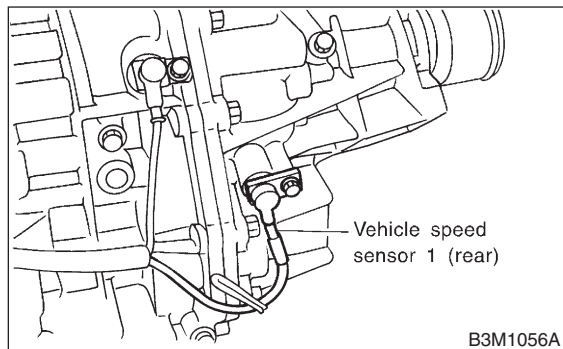
Automatic Transmission

13) Remove vehicle speed sensor 1, 2, and torque converter turbine speed sensor with harness assembly.

● Vehicle speed sensor 2 and torque converter turbine speed sensor



● Vehicle speed sensor 1

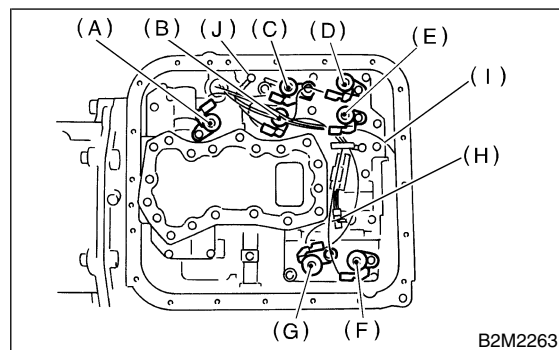


14) Remove oil pan.

NOTE:

Drain oil into a container.

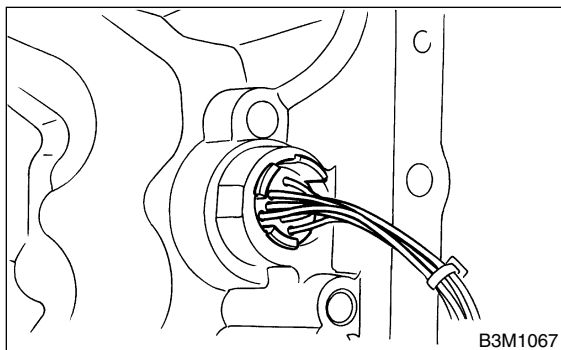
15) Disconnect duty solenoids and ATF temperature sensor connectors. Remove connectors from clip and disconnect connectors at 8 places.



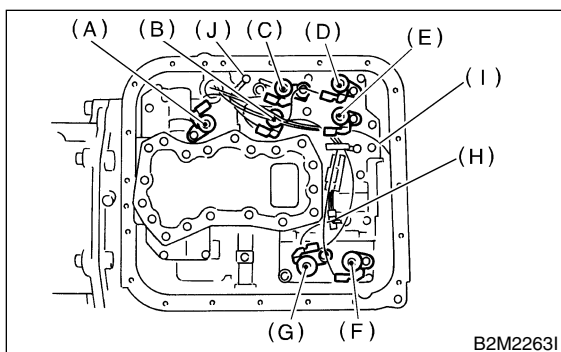
- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Lining pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

B: INSTALLATION S502563A11

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

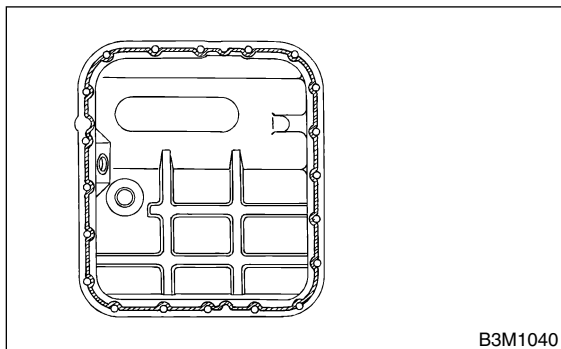


- 2) Connect harness connectors at 9 places. Connect connectors of same color, and secure connectors to valve body sing clips.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Lining 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 (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



- 4) Install the oil pan.

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

- 5) Install the vehicle speed sensor 1 and 2, 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. <Ref. to AT-25 INSTALLATION, Oil Cooler Pipes.>

- 7) Install transmission rear crossmember bolts.

Tightening torque:
69 N·m (7.0 kgf-m, 51 ft-lb)

- 8) Install shield cover.

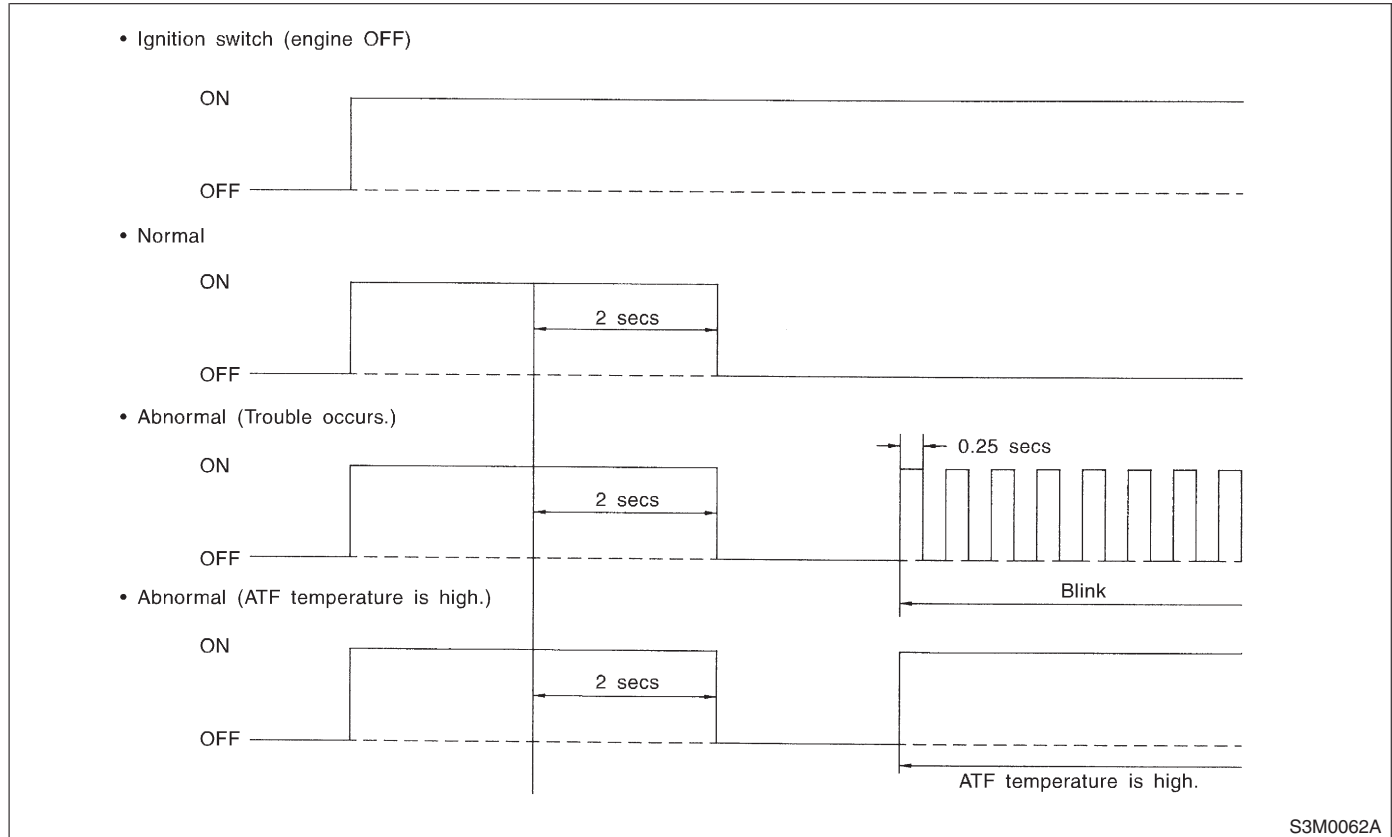
- 9) Install propeller shaft. <Ref. to DS-14 INSTALLATION, Propeller Shaft.>

- 10) Install the transmission connector to the stay.

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.



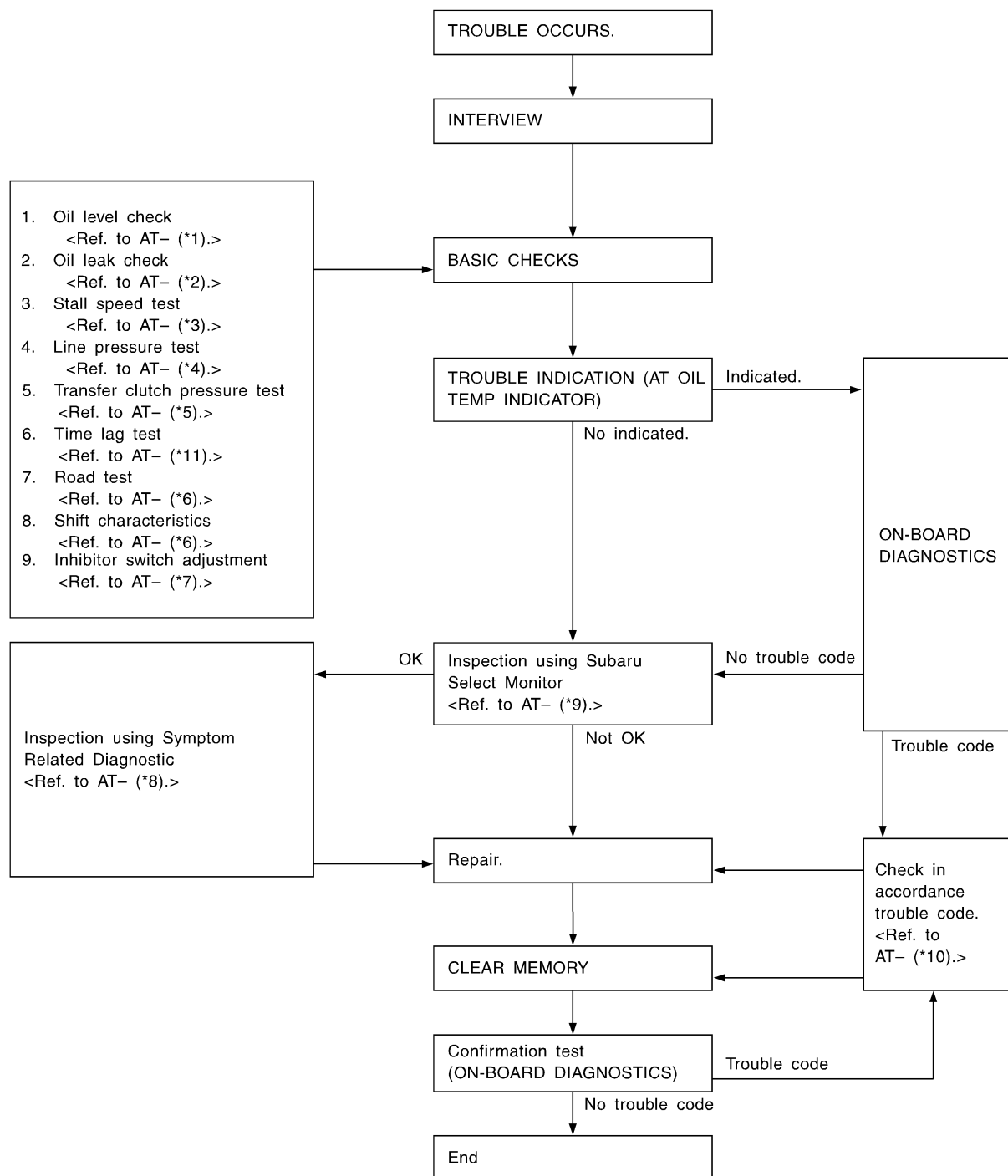
BASIC DIAGNOSTIC PROCEDURE

Automatic Transmission

1. Basic Diagnostic Procedure

S004501

A: PROCEDURE S004501E45



H3M1672I

BASIC DIAGNOSTIC PROCEDURE

Automatic Transmission

-
- | | | |
|---|---|--|
| *1: <Ref. to AT-5 INSPECTION,
General Description.> | *5: <Ref. to AT-17 INSPECTION,
Transfer Clutch Pressure Test.> | *9: <Ref. to AT-16 OPERATION,
Subaru Select Monitor.> |
| *2: <Ref. to AT-11 INSPECTION,
Road Test.> | *6: <Ref. to AT-11 INSPECTION,
Road Test.> | *10: <Ref. to AT-23 LIST, List of diag-
nostic Trouble Code.> |
| *3: <Ref. to AT-12 INSPECTION,
Stall Test.> | *7: <Ref. to AT-30 ADJUSTMENT,
Inhibitor Switch.> | *11: <Ref. to AT-14 INSPECTION,
Time Lag Test.> |
| *4: <Ref. to AT-15 MEASUREMENT,
Line Pressure Test.> | *8: <Ref. to AT-93 INSPECTION,
symptom Related Diagnostic.> | |

CHECK LIST FOR INTERVIEW

Automatic Transmission

2. Check List for Interview S004502

A: CHECK S004502A04

Check the following items when problem has occurred.

NOTE:

Use copies of this page for interviewing customers.

Customer's name		
Data vehicle brought in		
Data of repair		
Trans. model	TRANSMISSION	VIN
Odometer reading	km/h or mile	
Frequency	☐ Continuous ☐ Intermittent (times a day)	
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others ()	
Place	☐ High ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Rough road ☐ Others ()	
Outdoor temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold	
Vehicle speed	km/h (MPH)	
Malfunction indicator lamp (MIL)	☐ Continuously lit	☐ Not lit
Select lever position	☐ P ☐ R ☐ N ☐ D ☐ 3 ☐ 2 ☐ 1	
Driving condition	☐ Not affected ☐ At racing ☐ While decelerating	☐ At starting ☐ While accelerating ☐ While turning (☐ RH/ ☐ LH) ☐ While idling ☐ While cruising
POWER switch	☐ ON ☐ OFF	
HOLD switch	☐ ON ☐ OFF	
Symptoms	☐ No up-shift ☐ No down-shift ☐ No kick down ☐ Vehicle does not move (☐ Any position ☐ Particular position) ☐ Lock-up malfunction ☐ Noise or vibration ☐ Shift shock or slip ☐ Select lever does not move ☐ Others ()	

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-16 OPERATION, Subaru Select Monitor.>

6. Data Link Connector S004505

A: NOTE S004505A15

Refer to “EN section” for information about the data link connector. <Ref. to EN-47 NOTE, Data Link Connector.>

13. Diagnostic Procedure for AT Oil Temp Warning Light

S004617

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

S004617F14

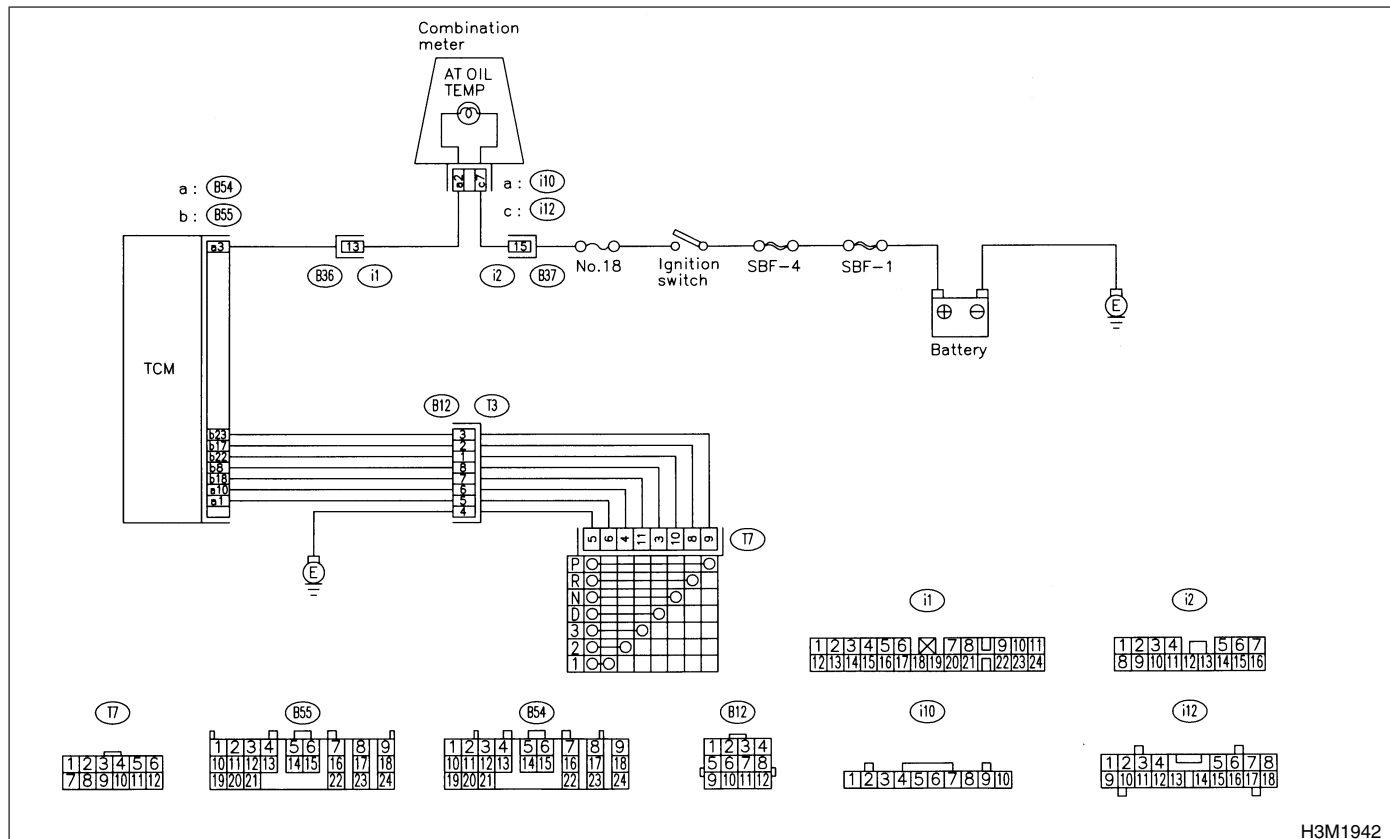
DIAGNOSIS:

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.

WIRING DIAGRAM:



H3M1942

No.	Step	Check	Yes	No
1	CHECK AT OIL TEMP WARNING LIGHT. Turn ignition switch to ON (engine OFF).	Does AT OIL TEMP warning light illuminate?	Go to step 4.	Go to step 2.
2	CHECK FUSE (No. 18). Remove fuse (No. 18).	Is the fuse (No. 18) blown out?	Replace fuse (No. 18). If replaced fuse (No. 18) is blown out easily, repair short circuit in harness between fuse (No. 18) and combination meter.	Go to step 3.
3	CHECK AT OIL TEMP WARNING LIGHT. 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 5.	Replace AT OIL TEMP warning light bulb.

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

Automatic Transmission

No.	Step	Check	Yes	No
4	CHECK AT OIL TEMP WARNING LIGHT. Read diagnostic trouble code. <Ref. to AT-18 OPERATION, 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 8.
5	CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH. 1) Turn ignition switch to ON (engine OFF). 2) Measure voltage between combination meter connector and chassis ground. Connector & terminal (i12) No. 7 (+) — Chassis ground (-):	Is voltage more than 10 V?	Go to step 6.	Repair open circuit in harness between combination meter and battery, and poor contact in coupling connector.
6	CHECK OPEN CIRCUIT OF HARNESS. 1) Disconnect connector from combination meter connector. 2) Measure resistance of harness between combination meter. Connector & terminal (B54) No. 3 — (i10) No. 2:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
7	CHECK INPUT SIGNAL FOR TCM. 1) Connect connector to TCM and combination meter. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 3 (+) — Chassis ground (-):	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-41 REMOVAL, Transmission Control Module (TCM).>
8	CHECK INHIBITOR SWITCH. 1) Connect Subaru Select Monitor to data link connector. 2) Turn ignition switch to ON. 3) Subaru Select Monitor to ON. 4) Read data of range switch using Subaru Select Monitor. ● Range switch is indicated in ON $\leftrightarrow$ OFF.	When each range is selected, does LED of Subaru Select Monitor light up?	Go to step 9.	Check inhibitor switch circuit. <Ref. to AT-30 INSPECTION, Inhibitor Switch.>
9	CHECK SHORT CIRCUIT OF HARNESS. 1) Disconnect connector from TCM. 2) Remove combination meter. 3) Disconnect connector from combination meter. 4) Measure resistance of harness connector between TCM and combination meter. Connector & terminal/specified resistance (B54) No. 3 — Chassis ground:	Is the resistance less than 1 M Ω ?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Repair short circuit in harness between combination meter connector and TCM connector.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

15. Diagnostic Procedure for No-trouble Code

S004618

A: CHECK GEAR POSITION.

S004618F15

No.	Step	Check	Yes	No
1	CHECK GEAR POSITION. 1) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 2) Start the engine. 3) Move select lever to “D”, and drive vehicle. 4) Read data of gear position using Subaru Select Monitor. ● Gear position is indicated. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.>	Does the transmission gear correspond to the gear which is shown on display?	Go to step CHECK FWD SWITCH. <Ref. to AT-81 CHECK FWD SWITCH., Diagnostic Procedure for No-Trouble Code.>	Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to AT-51 TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.> and <Ref. to AT-54 TROUBLE CODE 72 — SHIFT SOLENOID 2 —, Diagnostic Procedure with Trouble Code.>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

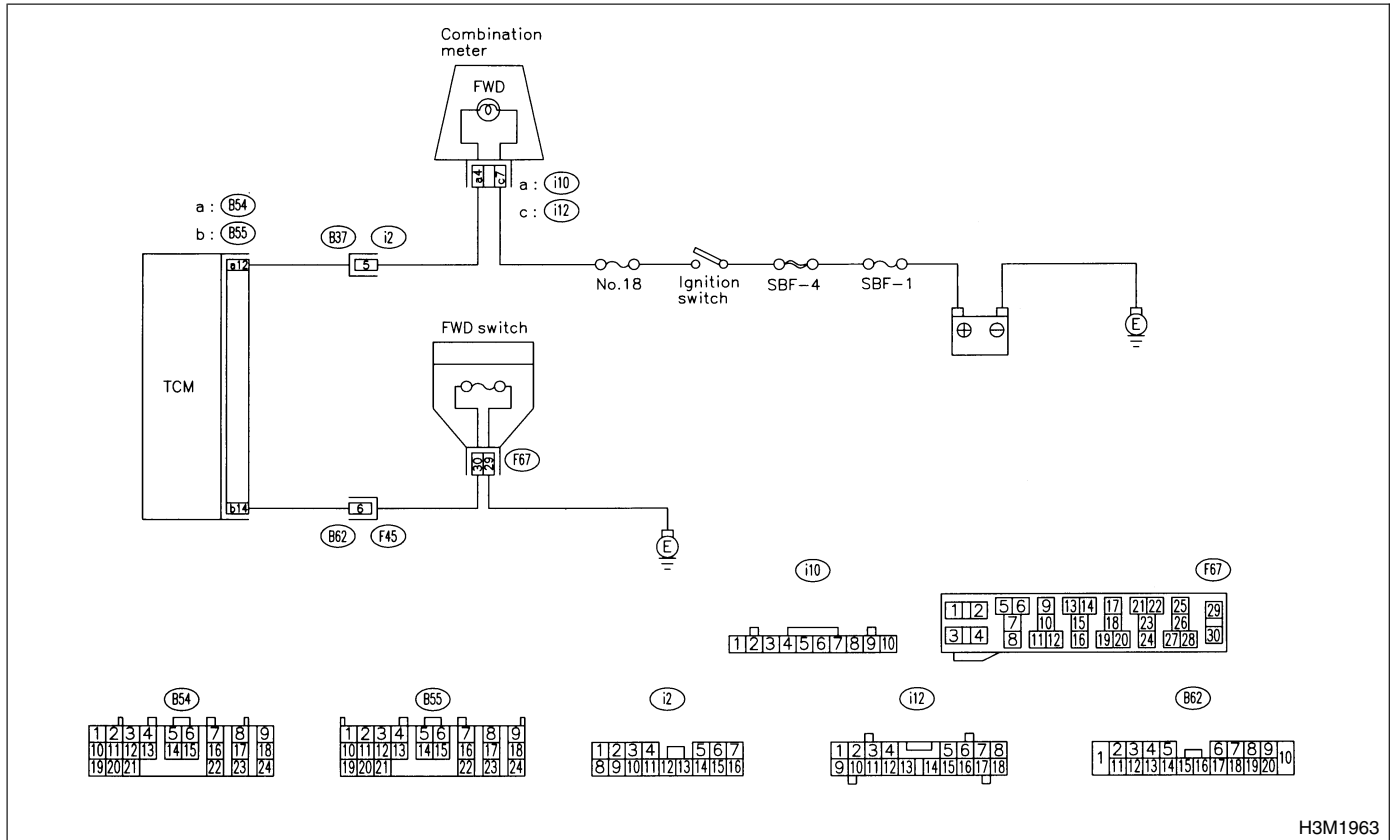
B: CHECK FWD SWITCH.

S004618F16

DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or short.

WIRING DIAGRAM:



H3M1963

No.	Step	Check	Yes	No
1	CHECK FWD SWITCH.	When fuse is inserted to FWD switch, does LED light up?	Go to step CHECK BRAKE SWITCH. <Ref. to AT-83 CHECK BRAKE SWITCH., Diagnostic Proce- dure for No-Trouble Code.>	Go to step 2.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and FWD switch. 3) Measure resistance of harness between TCM and FWD switch connector. Connector & terminal (F67) No. 30 — (B55) No. 14:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and FWD switch connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. Measure resistance of harness connector between TCM and body to make sure that circuit does not short. Connector & terminal (B55) No. 14 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness connector between TCM and chassis ground.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
4	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and FWD switch. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing the fuse to FWD switch connector. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage less than 1 V in FWD switch while installing?	Go to step 5.	Go to step 11.
5	CHECK INPUT SIGNAL FOR TCM. Measure signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B55) No. 14 (+) — Chassis ground (-):	Is the voltage more than 10 V in FWD switch while removing?	Go to step 6.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>
6	CHECK FWD INDICATOR LIGHT. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove FWD indicator light bulb from combination meter.	Is FWD indicator light bulb OK?	Go to step 7.	Replace FWD indicator light bulb.
7	CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and combination meter. 3) Measure resistance of harness between TCM and combination meter. Connector & terminal (B54) No. 12 — (i10) No. 4:	Is the resistance less than 1 Ω ?	Go to step 8.	Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. Connector & terminal (B54) No. 12 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 9.	Repair short circuit in harness between TCM and combination meter connector.
9	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and combination meter. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing and removing the fuse to FWD switch connector. Connector & terminal (B54) No. 12 (+) — Chassis ground (-):	Is the voltage less than 1 V in FWD switch while installing?	Go to step 10.	Go to step 11.
10	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B54) No. 12 (+) — Chassis ground (-):	Is the voltage more than 10 V in FWD switch while removing?	Go to step 11.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>
11	CHECK POOR CONTACT.	Is there poor contact in FWD switch circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

C: CHECK BRAKE SWITCH. S004618F17

No.	Step	Check	Yes	No
1	CHECK BRAKE SWITCH.	When the brake pedal is depressed, does LED light up?	Go to step CHECK ABS SWITCH. <Ref. to AT-83 CHECK ABS SWITCH., Diagnostic Procedure for No-Trouble Code.>	Check brake switch circuit. <Ref. to BR-58 INSPECTION, Stop Light Switch.>

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-20 LIST, List of Diagnostic Trouble Code.> and <Ref. to ABS-52 TROUBLE CODE 38 — ABNORMAL OUTLET SOLENOID VALVE CIRCUIT(S) IN ABSCM&H/U (REAR LH) —, Diagnostics Chart with Diagnosis Connector.>	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to AT-83 CHECK CRUISE CONTROL SWITCH., Diagnostic Procedure for No-Trouble Code.>

E: CHECK CRUISE CONTROL SWITCH. S004618F19

No.	Step	Check	Yes	No
1	CHECK CRUISE CONTROL SWITCH.	When cruise control is set, does LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to AT-84 CHECK INHIBITOR SWITCH, Diagnostic Procedure for No-Trouble Code.>	Check cruise control. <Ref. to CC-2 PROCEDURE, Basic Diagnostic Procedure.>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

F: CHECK INHIBITOR SWITCH. S004618F20

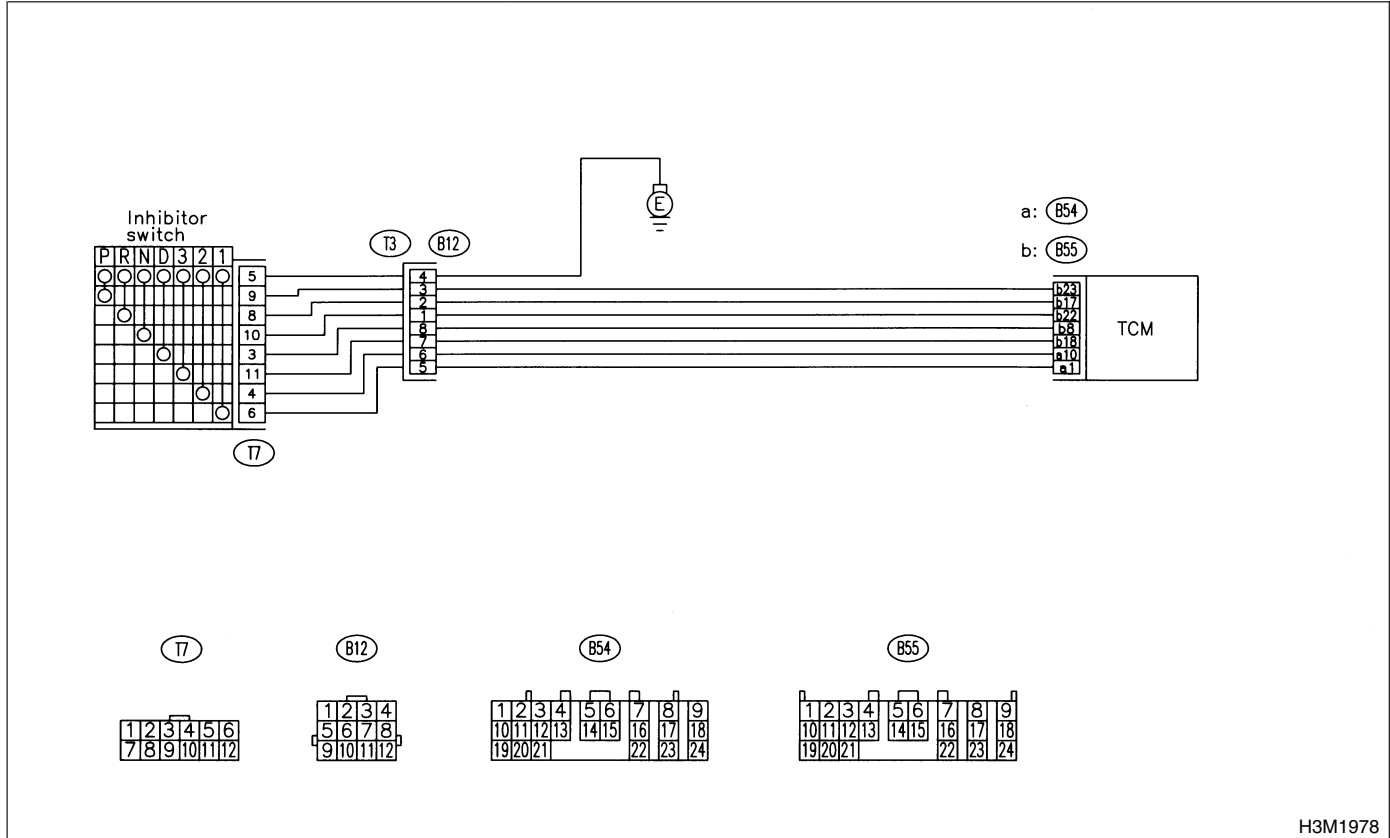
DIAGNOSIS:

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.

WIRING DIAGRAM:



H3M1978

No.	Step	Check	Yes	No
1	CHECK “P” RANGE SWITCH.	When “P” range is selected, does LED light up?	Go to step 2.	Go to step 15.
2	CHECK “P” RANGE SWITCH.	When the “R” range is selected, does “P” range LED light up?	Go to step 20.	Go to step 3.
3	CHECK “R” RANGE SWITCH.	When the “R” range is selected, does LED light up?	Go to step 4.	Go to step 22.
4	CHECK “R” RANGE SWITCH.	When the “N” range is selected, does “R” range LED light up?	Go to step 26.	Go to step 5.
5	CHECK “N” RANGE SWITCH.	When the “N” range is selected, does LED light up?	Go to step 6.	Go to step 28.
6	CHECK “N” RANGE SWITCH.	When the “D” range is selected, does “N” range LED light up?	Go to step 32.	Go to step 7.

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
7	CHECK "D" RANGE SWITCH.	When the "D" range is selected, does LED light up?	Go to step 8.	Go to step 34.
8	CHECK "D" RANGE SWITCH.	When the "3" range is selected, does "D" range LED light up?	Go to step 38.	Go to step 9.
9	CHECK "3" RANGE SWITCH.	When the "3" range is selected, does LED light up?	Go to step 10.	Go to step 40.
10	CHECK "3" RANGE SWITCH.	When the "2" range is selected, does "3" range LED light up?	Go to step 44.	Go to step 11.
11	CHECK "2" RANGE SWITCH.	When the "2" range is selected, does LED light up?	Go to step 12.	Go to step 46.
12	CHECK "2" RANGE SWITCH.	When the "1" range is selected, does "2" range LED light up?	Go to step 50.	Go to step 13.
13	CHECK "1" RANGE SWITCH.	When the "1" range is selected, does LED light up?	Go to step 14.	Go to step 52.
14	CHECK "1" RANGE SWITCH.	When the "P" range is selected, does "1" range LED light UP?	Go to step 56.	Go to step SHIFT SOLENOID 1. <Ref. to AT-51 TROUBLE CODE 71 — SHIFT SOLENOID 1 —, Diagnostic Procedure with Trouble Code.>
15	CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. 1) Turn ignition switch to OFF. 2) Disconnect connector from inhibitor switch. 3) Measure resistance of harness between inhibitor switch and chassis ground. Connector & terminal (B12) No. 4 — Chassis ground:	Is the resistance less than 1 Ω?	Go to step 16.	Repair open circuit in harness between inhibitor switch connector and combination meter.
16	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 23 — (B12) No. 3:	Is the resistance less than 1 Ω?	Go to step 17.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
17	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 4 — No. 3:	Is the resistance less than 1 Ω in "P" range?	Go to step 18.	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
18	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 23 (+) — Chassis ground (-):	Is the voltage less than 1 V in "P" range?	Go to step 19.	Go to step 58.
19	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 23 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 58.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>
20	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 23 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 21.	Repair ground short circuit in "P" range circuit.
21	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 4 — No. 3:	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
22	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 17 — (B12) No. 2:	Is the resistance less than 1 Ω?	Go to step 23.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
23	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 2 — No. 4:	Is the resistance less than 1 Ω in "R" range?	Go to step 24.	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
24	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 17 (+) — Chassis ground (-):	Is the voltage less than 1 V in "R" range?	Go to step 25.	Go to step 58.
25	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 17 (+) — Chassis ground (-):	Is the voltage more than 9.5 V in other ranges?	Go to step 58.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
26	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 17 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 27.	Repair ground short circuit in "R" range circuit.
27	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 2 — No. 4:	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
28	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 22 — (B12) No. 1:	Is the resistance less than 1 Ω?	Go to step 29.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
29	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 4 — No. 1:	Is the resistance less than 1 Ω in "N" range?	Go to step 30.	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
30	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 22 (+) — Chassis ground (-):	Is the voltage less than 1 V in "N" range?	Go to step 31.	Go to step 58.
31	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 22 (+) — Chassis ground (-):	Is the voltage more than 8 V in other ranges?	Go to step 58.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>
32	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 22 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 33.	Repair ground short circuit in "N" range circuit.
33	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 1 — No. 4:	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
34	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 8 — (B12) No. 8:	Is the resistance less than 1 Ω ?	Go to step 35.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
35	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 4 — No. 8:	Is the resistance less than 1 Ω in "D" range?	Go to step 36.	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
36	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 8 (+) — Chassis ground (-):	Is the voltage less than 1 V in "D" range?	Go to step 39.	Go to step 58.
37	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 8 (+) — Chassis ground (-):	Is the voltage more than 9.5 V in other ranges?	Go to step 58.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>
38	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 8 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 39.	Repair ground short circuit in "D" range circuit.
39	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 4 — No. 8:	Is the resistance more than 1 M Ω in other ranges?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
40	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B55) No. 18 — (B12) No. 7:	Is the resistance less than 1 Ω ?	Go to step 41.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
41	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 4 — No. 7:	Is the resistance less than 1 Ω in "3" range?	Go to step 42.	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
42	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 18 (+) — Chassis ground (-):	Is the voltage less than 1 V in "3" range?	Go to step 43.	Go to step 58.
43	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B55) No. 18 (+) — Chassis ground (-):	Is the voltage more than 9.5 V in other ranges?	Go to step 58.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>
44	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 18 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 45.	Repair ground short circuit in "3" range circuit.
45	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 4 — No. 7:	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
46	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B54) No. 10 — (B12) No. 6:	Is the resistance less than 1 Ω?	Go to step 47.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
47	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 6 — No. 4:	Is the resistance less than 1 Ω in "2" range?	Go to step 48.	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
48	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B54) No. 10 (+) — Chassis ground (-):	Is the voltage less than 1 V in "2" range?	Go to step 49.	Go to step 58.
49	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B54) No. 10 (+) — Chassis ground (-):	Is the voltage more than 9.5 V in other ranges?	Go to step 58.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
50	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 10 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 51.	Repair ground short circuit in "2" range circuit.
51	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 6 — No. 4:	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
52	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal (B54) No. 1 — (B12) No. 5:	Is the resistance less than 1 Ω?	Go to step 53.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
53	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 5 — No. 4:	Is the resistance less than 1 Ω in "1" range?	Go to step 54.	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>
54	CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Measure voltage between TCM and chassis ground. Connector & terminal (B54) No. 1 (+) — Chassis ground (-):	Is the voltage less than 1 V in "1" range?	Go to step 55.	Go to step 58.
55	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM and chassis ground. Connector & terminal (B54) No. 1 (+) — Chassis ground (-):	Is the voltage more than 9.5 V in other ranges?	Go to step 58.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>
56	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 1 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 57.	Repair ground short circuit in "1" range circuit.
57	CHECK INHIBITOR SWITCH. Measure resistance between inhibitor switch connector receptacle's terminals. Terminals (T3) No. 5 — No. 4:	Is the resistance more than 1 MΩ in other ranges?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Adjust inhibitor switch. <Ref. to AT-30 ADJUSTMENT, Inhibitor Switch.>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
58	CHECK POOR CONTACT.	Is there poor contact in inhibitor switch circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE FOR NO-TROUBLE CODE

Automatic Transmission

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-81 CHECK FWD SWITCH., Diagnostic Procedure for No-Trouble Code.>	Go to step Symptom Related Diagnostic. <Ref. to AT-93 INSPECTION, Symptom Related Diagnostic.>

14. Diagnostic Procedure with Trouble Code

S004509

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

S004509E34

1. CONTROL MODULE POWER SUPPLY AND GROUND LINE

S004509E3401

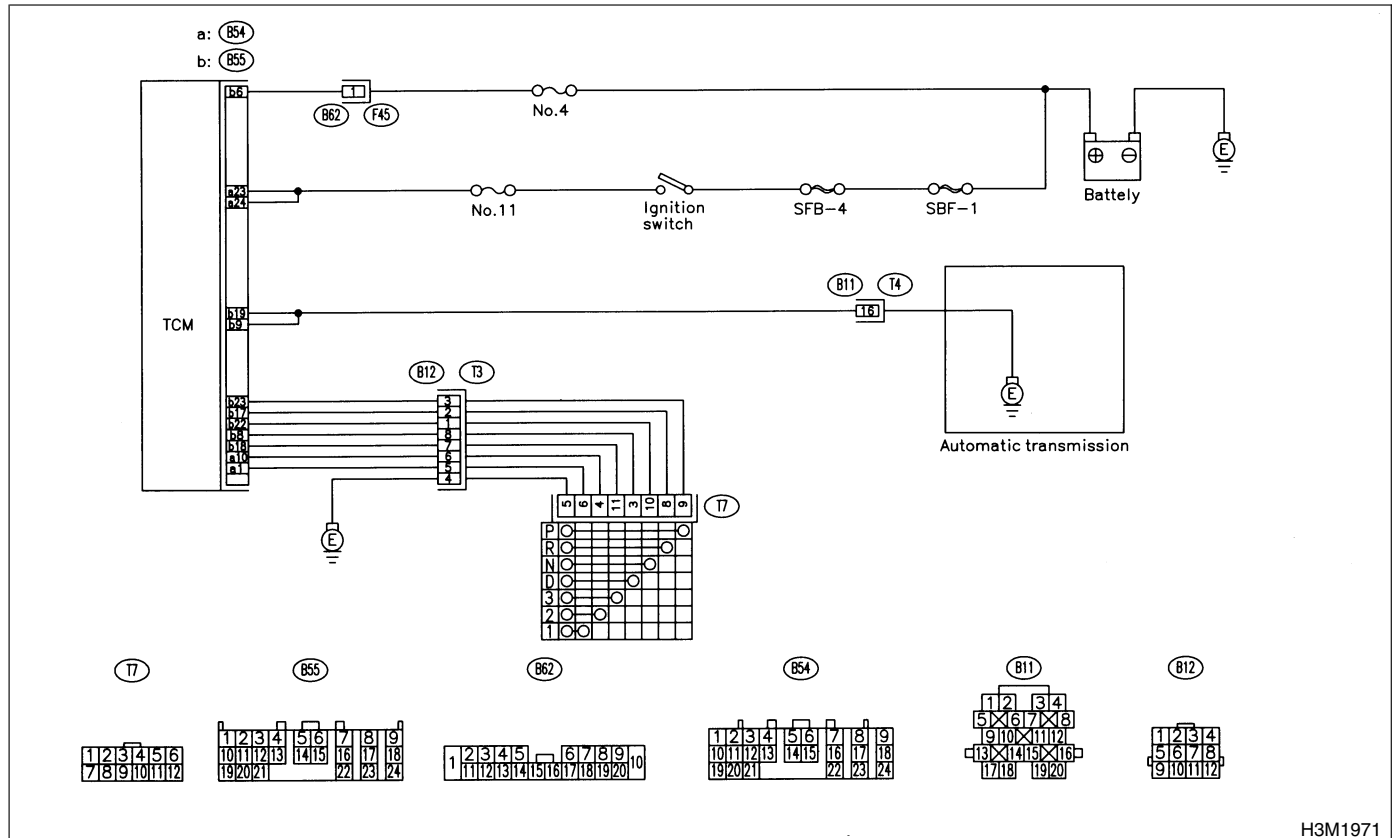
DIAGNOSIS:

- Faulty harness connector

TROUBLE SYMPTOM:

- AT OIL TEMP warning light remains on.

WIRING DIAGRAM:



H3M1971

No.	Step	Check	Yes	No
1	CHECK FUSE (NO. 4). Remove fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Go to step 2.
2	CHECK BACK-UP POWER SUPPLY CIRCUIT. 1) Turn ignition switch to ON. 2) Measure back-up power supply voltage between TCM connector terminal. Connector & terminal (B55) No. 6 (+) — No. 19 (-):	Is the voltage more than 10 V?	Go to step 3.	Repair open circuit harness between TCM and battery, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
3	CHECK FUSE (NO. 11). Remove fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Go to step 4.
4	CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn ignition switch to ON (engine OFF). 2) Measure ignition power supply voltage between TCM connector terminal. Connector & terminal (B54) No. 23 (+) — (B55) No. 19 (-):	Is the voltage more than 10 V?	Go to step 5.	Go to step 6.
5	CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn ignition switch to ON (engine OFF). 2) Measure ignition power supply voltage between TCM connector terminal. Connector & terminal (B54) No. 24 (+) — (B55) No. 19 (-):	Is the voltage more than 10 V?	Go to step 6.	Repair open circuit in harness between TCM and battery, and poor contact in coupling connector.
6	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 19 — (B11) No. 16:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair open circuit in harness between TCM and transmission harness connector.
7	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND. Measure resistance of harness between transmission and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between transmission and transmission ground.
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from inhibitor switch. 3) Measure resistance of harness between inhibitor switch side connector and TCM. Connector & terminal (B11) No. 16 — (B55) No. 9:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between TCM and inhibitor side connector, and poor contact in coupling connector.
9	CHECK POOR CONTACT.	Is there poor contact in control module power supply and ground line?	Repair poor contact and ground terminal.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

B: TROUBLE CODE 11 — ENGINE SPEED SIGNAL — S004509C39

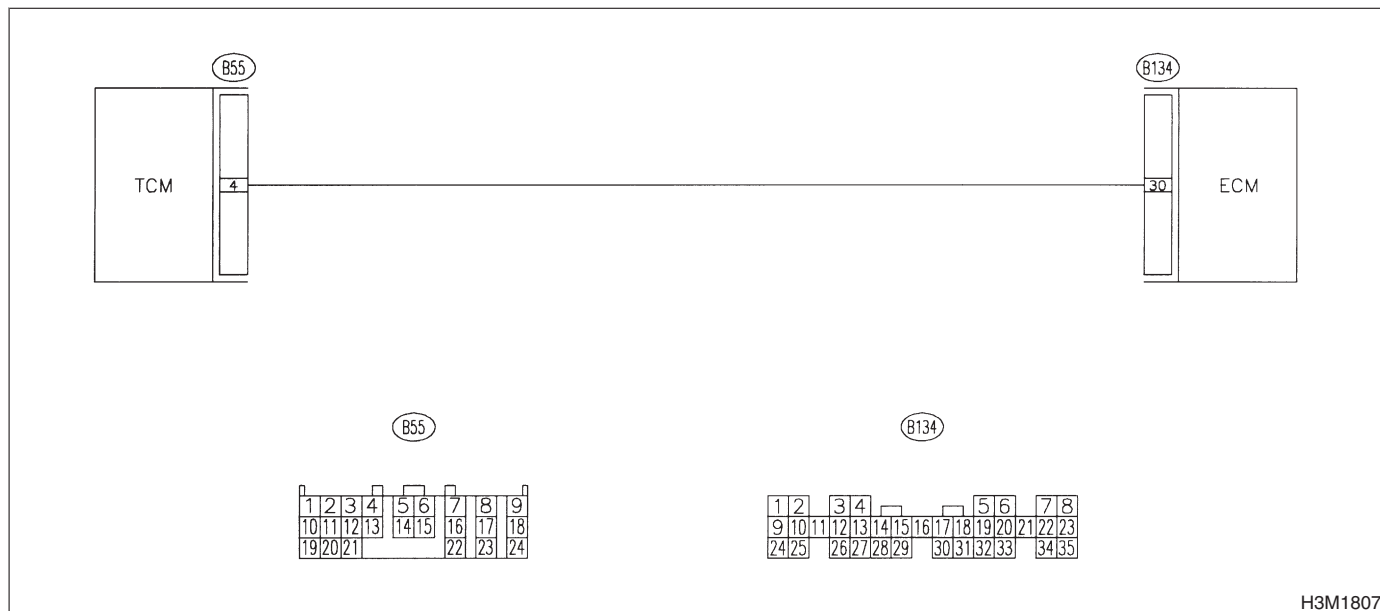
DIAGNOSIS:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. <i>Connector & terminal</i> <i>(B55) No. 4 — (B134) No. 30:</i>	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. <i>Connector & terminal</i> <i>(B55) No. 4 — Chassis ground:</i>	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
3	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 5.	Go to step 4.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
4	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. Connector & terminal (B55) No. 4 (+) — 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	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of engine speed using Subaru Select Monitor. ● Display shows engine speed signal value sent from ECM.	Is the revolution value the same as the tachometer reading shown on the combination meter?	Even if "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	CHECK POOR CONTACT.	Is there poor contact in engine speed signal circuit?	Repair poor contact.	Go to step 7.
7	CONFIRM TROUBLE CODE 11.	Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Replace ECM. <Ref. to FU-60 REMOVAL, Engine Control Module.>

C: TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —

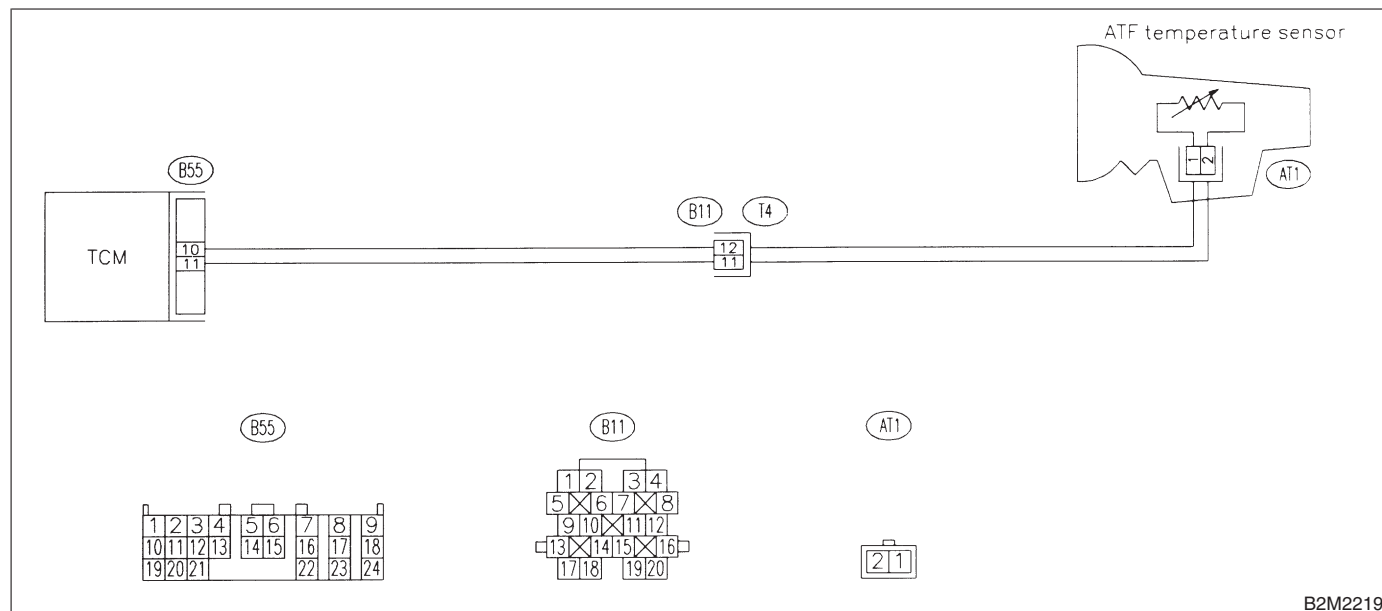
S004509C76

DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:

B2M2219

No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 10 — (B11) No. 12:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 11 — (B11) No. 11:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 10 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 11 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
5	CHECK ATF TEMPERATURE SENSOR. 1) Turn ignition switch to OFF. 2) Connect connectors to transmission and TCM. 3) Turn ignition switch to ON and start engine. 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Measure resistance between transmission connector terminals. 6) Disconnect connector from transmission. Connector & terminal (T4) No. 11 — No. 12:	Is the resistance between 275 and 375 Ω?	Go to step 6.	Go to step 12.
6	CHECK ATF TEMPERATURE SENSOR. 1) Turn ignition switch to ON (engine OFF). 2) Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 12:	Does the resistance value increase while the ATF temperature decreases?	Go to step 7.	Go to step 12.
7	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.
8	CHECK INPUT SIGNAL FOR TCM. 1) Warm-up the transmission until ATF temperature is about 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 2) Measure voltage between TCM connector terminal. Connector & terminal (B55) No. 11 (+) — No. 10 (-):	Is the voltage between 0.5 and 0.8 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 contact in the TCM.	Go to step 11.
9	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Turn ignition switch to OFF. 2) Connect connectors to TCM and transmission. 3) Connect Subaru Select Monitor to data link connector. 4) Start the engine, and turn Subaru Select Monitor switch to ON. 5) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read data of ATF temperature using Subaru Select Monitor. ● ATF temperature is indicated in "°F" or "°C".	Is the ATF temperature between 70 and 110°C (158 and 230°F)?	Go to step 10.	Go to step 11.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
10	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 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 11.
11	CHECK POOR CONTACT.	Is there poor contact in ATF temperature sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>
12	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Remove transmission connector from bracket. 4) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 5) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 6) Remove oil pan, and disconnect connector from ATF temperature sensor connector. 7) Measure resistance of harness between ATF temperature sensor and transmission connector. Connector & terminal (T4) No. 11 — (AT1) No. 2:	Is the resistance less than 1 Ω ?	Go to step 13.	Repair open circuit in harness between ATF temperature sensor and transmission connector.
13	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure resistance of harness between ATF temperature sensor and transmission connector. Connector & terminal (T4) No. 12 — (AT1) No. 1:	Is the resistance less than 1 Ω ?	Go to step 14.	Repair open circuit in harness between ATF temperature sensor and transmission connector.
14	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 11 — Transmission ground:	Is the resistance more than 1 M Ω ?	Go to step 15.	Repair short circuit in harness between ATF temperature sensor and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
15	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 12 — Transmission ground:	Is the resistance more than 1 M Ω ?	Replace ATF temperature sensor. <Ref. to AT-38 REMOVAL, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>	Repair short circuit in harness between ATF temperature sensor and transmission connector.

D: TROUBLE CODE 31 — THROTTLE POSITION SENSOR — S004509C94

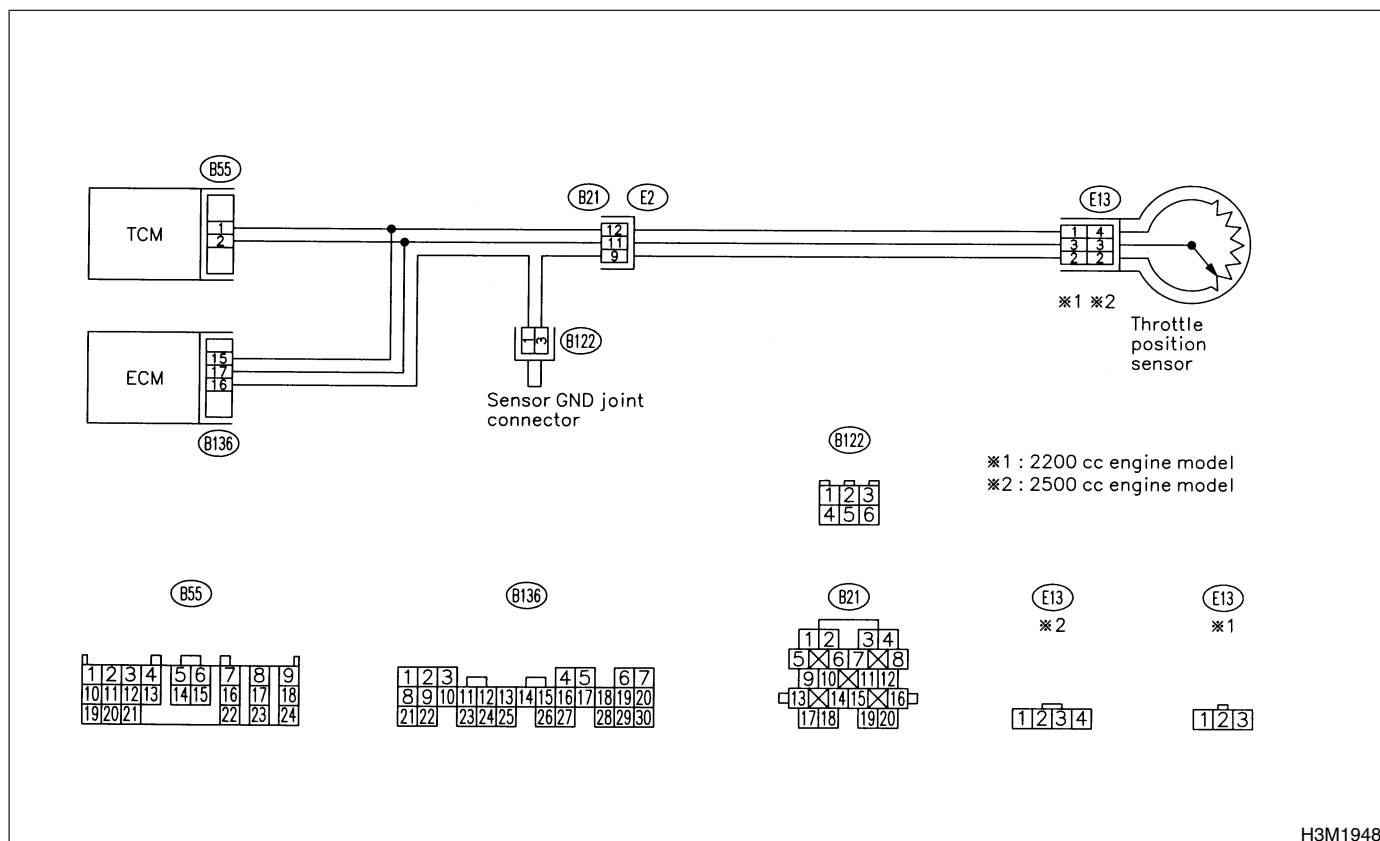
DIAGNOSIS:

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

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



H3M1948

No.	Step	Check	Yes	No
1	CHECK 2200 cc ENGINE VEHICLES.	Is the vehicle 2200 cc engine vehicle?	Go to step 6.	Go to step 2.
2	CHECK THROTTLE POSITION SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from throttle position sensor. 3) Measure resistance between throttle position sensor connector receptacle's terminals. Terminals No. 4 — No. 2:	Is the resistance between 0.3 and 0.7 kΩ?	Go to step 3.	Replace throttle position sensor. <Ref. to FU-43 REMOVAL, Throttle Position Sensor.>
3	CHECK THROTTLE POSITION SENSOR. Measure resistance between throttle position sensor connector receptacle's terminals. Terminals No. 2 — No. 3:	Is the resistance between 3.5 and 6.5 kΩ?	Go to step 4.	Replace throttle position sensor. <Ref. to FU-43 REMOVAL, Throttle Position Sensor.>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and throttle position sensor connector. Connector & terminal (B55) No. 2 — (E13) No. 3:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM and throttle position sensor connector. Connector & terminal (B55) No. 1 — (E13) No. 4:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
6	CHECK THROTTLE POSITION SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from throttle position sensor. 3) Measure resistance between throttle position sensor connector receptacle's terminals. Terminals No. 1 — No. 2:	Is the resistance between 0.3 and 0.7 k Ω ?	Go to step 7.	Replace throttle position sensor. <Ref. to FU-43 REMOVAL, Throttle Position Sensor.>
7	CHECK THROTTLE POSITION SENSOR. Measure resistance between throttle position sensor connector receptacle's terminals. Terminals No. 2 — No. 3:	Is the resistance between 3.5 and 6.5 k Ω ?	Go to step 8.	Replace throttle position sensor. <Ref. to FU-43 REMOVAL, Throttle Position Sensor.>
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and throttle position sensor connector. Connector & terminal (B55) No. 2 — (E13) No. 3:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
9	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM and throttle position sensor connector. Connector & terminal (B55) No. 1 — (E13) No. 1:	Is the resistance less than 1 Ω ?	Go to step 10.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
10	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 2 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 11.	Repair short circuit in harness between TCM and throttle position sensor connector.
11	CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 1 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 12.	Repair short circuit in harness between TCM and throttle position sensor connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
12	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 15.	Go to step 13.
13	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector terminals. Connector & terminal (B55) No. 2 (+) — No. 9 (-):	Is the voltage between 0.3 and 0.7 V in throttle fully closed?	Go to step 14.	Go to step 19.
14	CHECK INPUT SIGNAL FOR TCM. Measure voltage between TCM connector terminals. Connector & terminal (B55) No. 2 (+) — No. 9 (-):	Is the voltage between 4.3 and 4.9 V with throttle fully open?	Go to step 17.	Go to step 19.
15	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF). 4) Turn Subaru Select Monitor switch to ON. 5) Throttle fully closed. 6) Read data of throttle position sensor using Subaru Select Monitor. ● Throttle position sensor input signal is indicated.	Is the value voltage between 0.3 and 0.7 V?	Go to step 16.	Go to step 19.
16	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. Throttle fully open. NOTE: Must be changed correspondingly with accelerator pedal operation (from “released” to “depressed” position).	Is the value voltage between 4.3 and 4.9 V ?	Go to step 17.	Go to step 19.
17	CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY). Measure voltage between TCM connector terminals and chassis ground. Connector & terminal (B55) No. 1 (+) — 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.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
18	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY). Read data of throttle position sensor power supply using Subaru Select Monitor. ● Throttle position sensor power supply voltage is indicated.	Is the value voltage between 4.8 and 5.3 V?	Even if "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	CHECK POOR CONTACT.	Is there poor contact in throttle position sensor circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

E: TROUBLE CODE 33 — VEHICLE SPEED SENSOR 2 (FRONT) — S004509D04

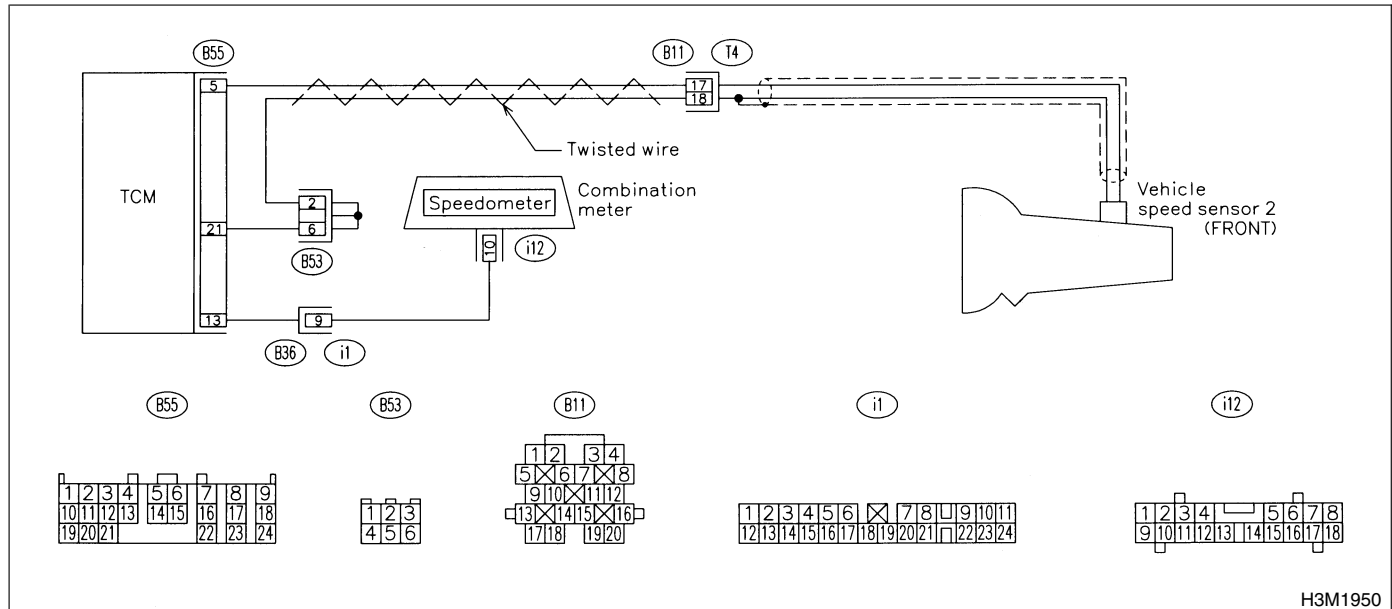
DIAGNOSIS:

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

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK OPERATION OF SPEEDOMETER.	Does speedometer operate normally?	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 2.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 5 — (B11) No. 17:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 21 — (B11) No. 18:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 21 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 5 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair short circuit in harness between TCM and transmission connector.
6	CHECK VEHICLE SPEED SENSOR 2. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 17 — No. 18:	Is the resistance between 450 and 650 Ω ?	Go to step 7.	Replace vehicle speed sensor 2. <Ref. to AT-33 REMOVAL, Vehicle Speed Sensor 1, 2, Torque Converter Turbine Speed Sensor and Harness Assembly.>
7	PREPARE OSCILLOSCOPE.	Do you have oscilloscope?	Go to step 10.	Go to step 8.
8	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 11.	Go to step 9.
9	CHECK INPUT SIGNAL FOR TCM. 1) Connect all connectors. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 4) Measure voltage between TCM connector terminals. Connector & terminal (B55) No. 5 (+) — No. 21 (-):	Is the voltage more than AC 1 V?	Go to step 12.	Go to step 19.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
10	CHECK VEHICLE SPEED SENSOR 2 USING OSCILLOSCOPE. 1) Connect all connectors. 2) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 5 Earth lead; (B55) No. 21 4) Start the engine, and drive the wheels slowly. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 5) Measure signal voltage indicated on oscilloscope.	Is the voltage more than AC 4 V?	Go to step 12.	Go to step 19.
11	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read data of vehicle speed using Subaru Select Monitor. ● Compare speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in "km/h" or "MPH". 7) Slowly increase vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Go to step 12.	Go to step 19.
12	CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and combination meter. 3) Measure resistance of harness between TCM and combination meter connector. Connector & terminal (B55) No. 13 — (i12) No. 10:	Is the resistance less than 1 Ω?	Go to step 13.	Repair open circuit in harness between TCM and combination meter connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
13	CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. Measure resistance of harness between combination meter and chassis ground. Connector & terminal (i12) No. 10 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 14.	Repair short circuit in harness between TCM and combination meter connector.
14	PREPARE OSCILLOSCOPE.	Do you have oscilloscope?	Go to step 17.	Go to step 15.
15	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 18.	Go to step 16.
16	CHECK OUTPUT SIGNAL FOR TCM. 1) Connect all connectors. 2) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Set vehicle in 10 km/h (6 MPH) condition. NOTE: The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure on on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 4) Measure voltage between TCM connector terminals. Connector & terminal (B55) No. 13 (+) — Chassis ground (-):	Is the voltage less than 1 V ←→ more than 4 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 19.
17	CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Connect connectors to TCM and combination meter. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 13 Earth lead; (B55) No. 21 4) Start the engine. 5) Shift on the gear position, and keep the vehicle speed at constant. 6) Measure signal voltage indicated on oscilloscope. NOTE: ● If vehicle speed increases, the width of amplitude (W) decreases. ● The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.>	Is the voltage more than AC 2 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 19.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
18	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect all connectors. 2) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Connect Subaru Select Monitor to data link connector. 4) Turn ignition switch to ON and Subaru Select Monitor switch to ON. 5) Start the engine, and drive all wheels. 6) Read data of vehicle speed using Subaru Select Monitor. ● Compare speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in "km/h" or "MPH". 7) Slowly increase vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.>	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.	Go to step 19.
19	CHECK POOR CONTACT.	Is there poor contact in vehicle speed sensor 2 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

F: TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR

S004509D17

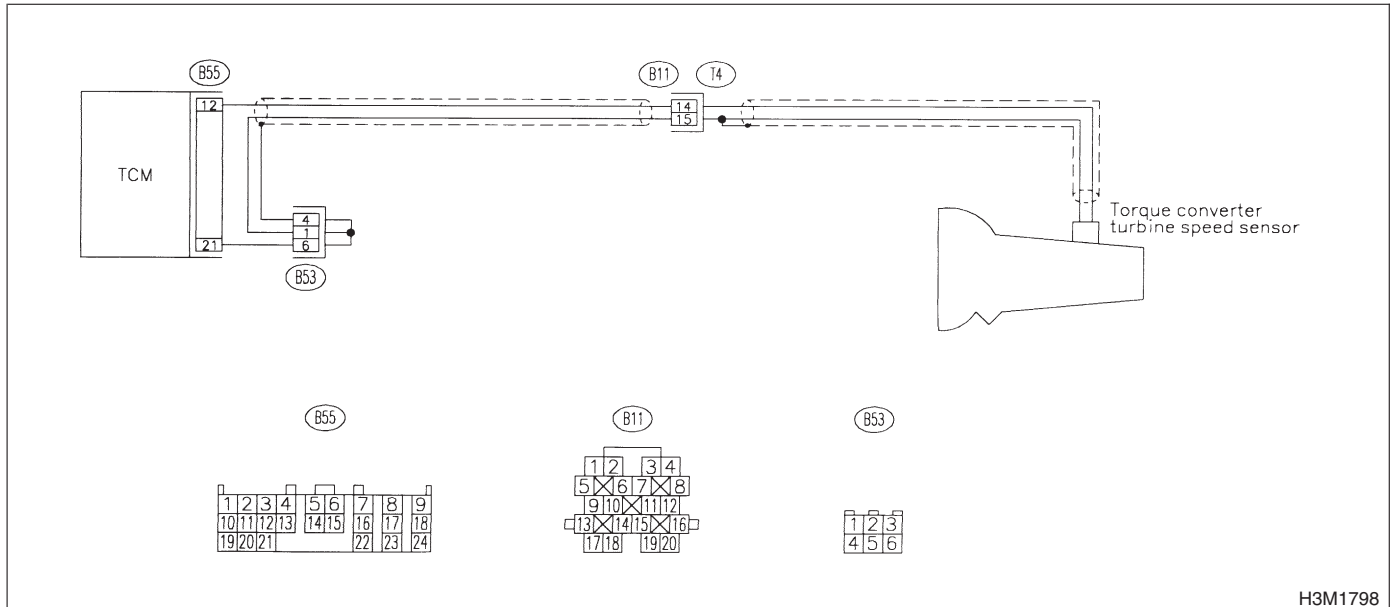
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



H3M1798

No.	Step	Check	Yes	No
1	CHECK TORQUE CONVERTER TURBINE SPEED SENSOR 1. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 14 — No. 15:	Is the resistance between 450 and 650 Ω ?	Go to step 2.	Replace torque converter turbine speed sensor. <Ref. to AT-33 REMOVAL, Vehicle Speed Sensor 1, 2, Torque Converter Turbine Speed Sensor and Harness Assembly.>
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 12 — (B11) No. 14:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 21 — (B11) No. 15:	Is the resistance less than 1 Ω ?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 21 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 12 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 6.	Repair short circuit in harness between TCM and transmission connector.
6	PREPARE OSCILLOSCOPE.	Do you have oscilloscope?	Go to step 10.	Go to step 7.
7	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.
8	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: Raise all wheels off floor. 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 4) Measure voltage between TCM connector terminals. Connector & terminal (B55) No. 12 (+) — No. 21 (-):	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.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
9	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. CAUTION: Raise all wheels off floor. 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read data of vehicle speed using Subaru Select Monitor. ● Compare speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in "km/h" or "MPH". 7) Slowly increase vehicle speed to 20 km/h or 12 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.>	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	CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: Raise all wheels off floor. 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 12 Earth lead; (B55) No. 21 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 5) Measure signal voltage indicated on oscilloscope.	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	CHECK POOR CONTACT.	Is there poor contact in vehicle speed sensor 1 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

G: TROUBLE CODE 38 — TORQUE CONTROL SIGNAL — S004509D26

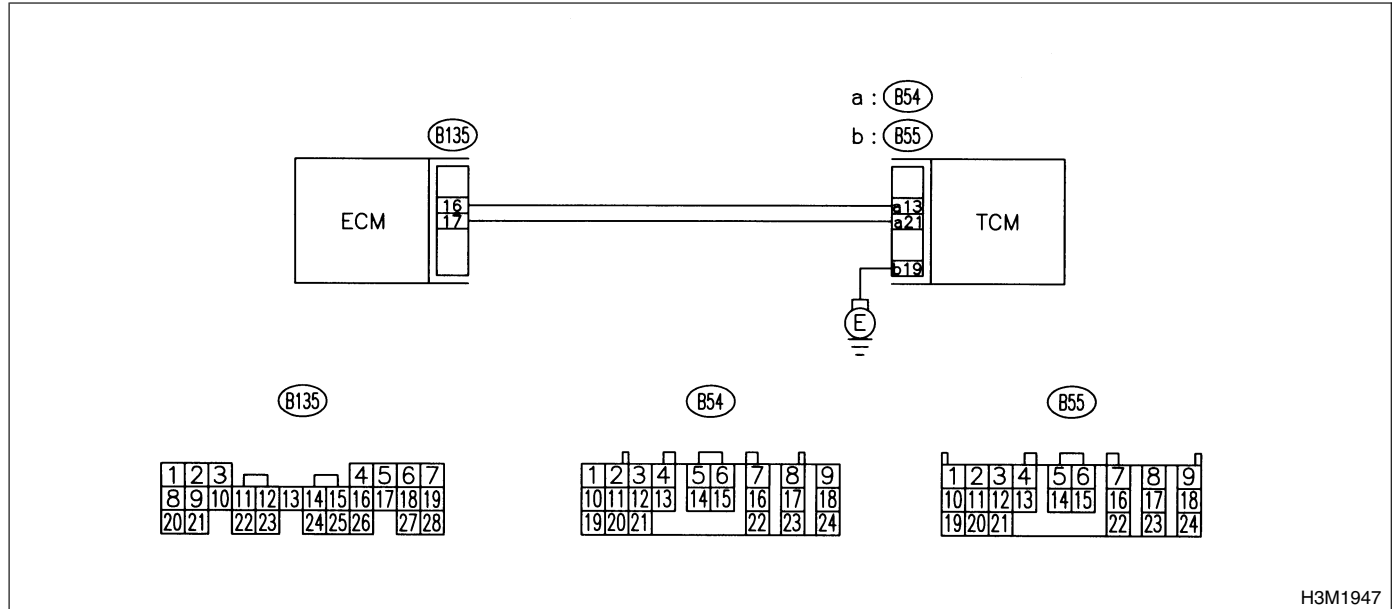
DIAGNOSIS:

- The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. Connector & terminal (B54) No. 21 — (B135) No. 17:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM and ECM connector. Connector & terminal (B54) No. 13 — (B135) No. 16:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in harness between TCM and ECM connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 21 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 4.	Repair short circuit in harness between TCM and ECM connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 13 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and ECM connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector terminals. Connector & terminal (B54) No. 21 (+) — (B55) No. 19 (-):	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 connector in the TCM and ECM.	Go to step 6.
6	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector terminals. Connector & terminal (B54) No. 13 (+) — (B55) No. 19 (-):	Is the voltage between 4 and 6 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	CHECK POOR CONTACT.	Is there poor contact in torque control signal circuit?	Repair poor contact.	Go to step 8.
8	CONFIRM TROUBLE CODE 38.	Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>	Replace ECM. <Ref. to FU-60 REMOVAL, Engine Control Module.>

H: TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL — S004509D48

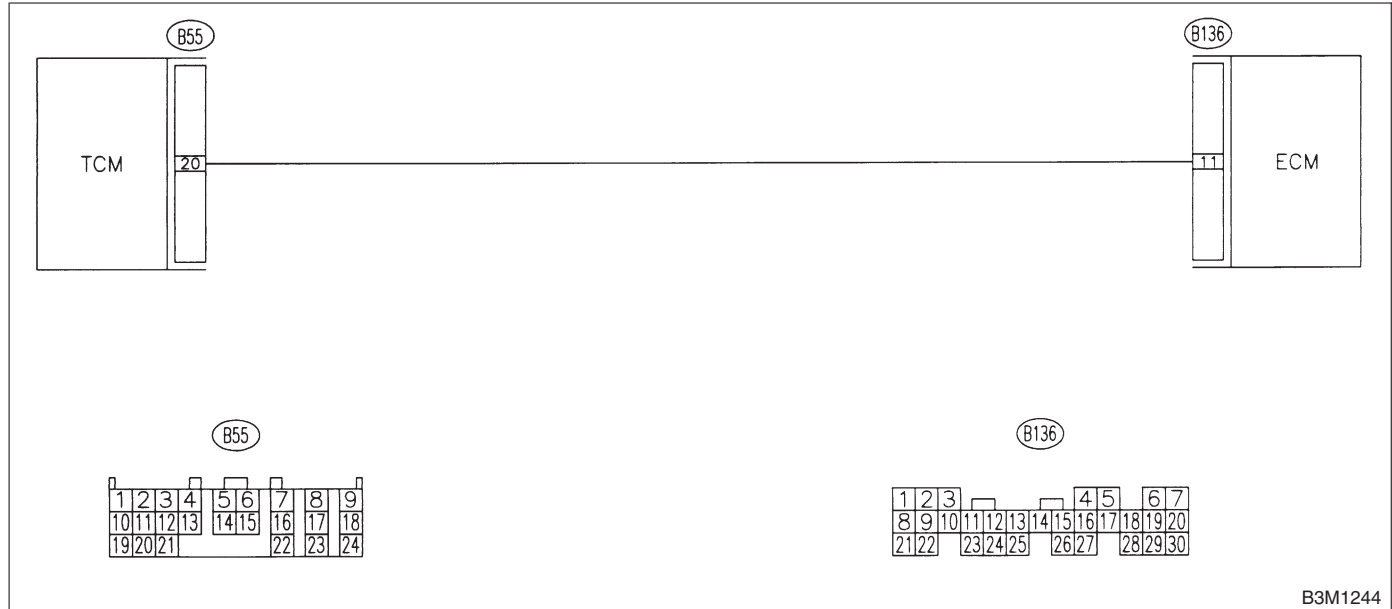
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. Connector & terminal (B55) No. 20 — (B136) No. 11:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B55) No. 20 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
3	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 5.	Go to step 4.
4	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and ECM. 2) 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 connectors. Connector & terminal (B55) No. 20 (+) — No. 19 (-):	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 6.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
5	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 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.	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 6.
6	CHECK POOR CONTACT.	Is there poor contact in intake manifold pressure signal circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

I: TROUBLE CODE 71 — SHIFT SOLENOID 1 — S004509D91

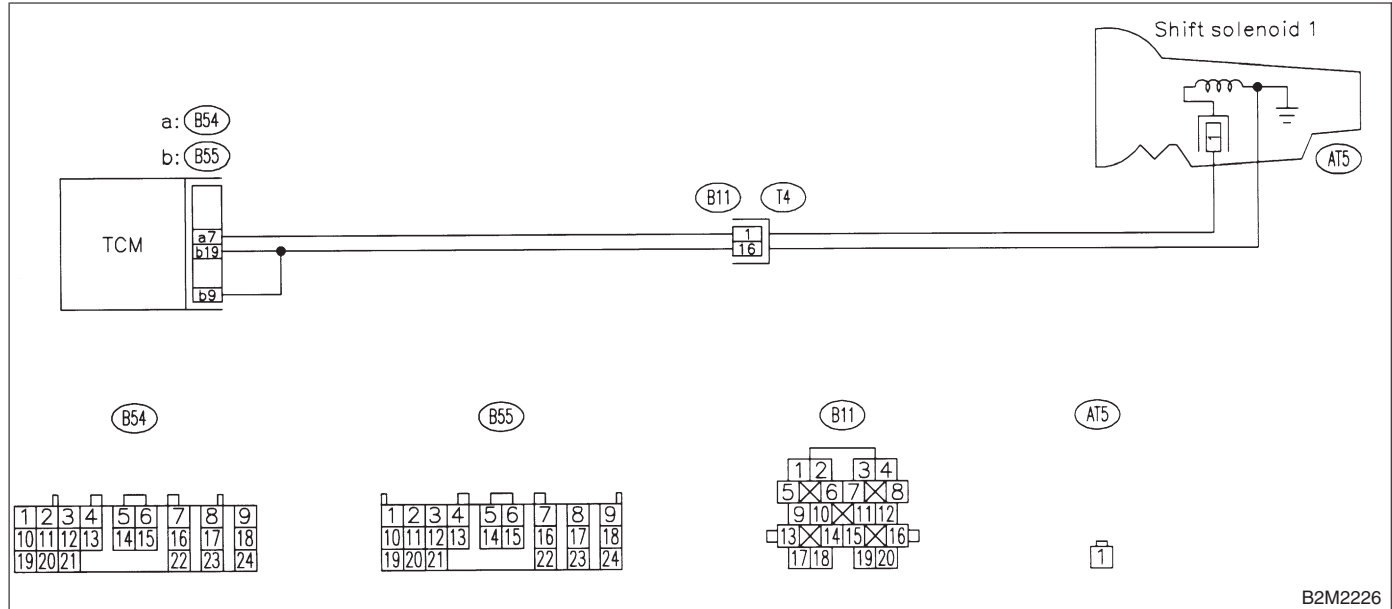
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK SHIFT SOLENOID 1 GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in transmission harness.
2	CHECK SHIFT SOLENOID 1. Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω?	Go to step 3.	Go to step 6.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 7 — (B11) No. 1:	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 7 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 7 (+) — Chassis ground (-):	Is the voltage 1 V → 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 connector in the TCM.	Go to step 8.
6	CHECK SHIFT SOLENOID 1 (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from shift solenoid 1. 5) Measure resistance between shift solenoid 1 connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω?	Go to step 7.	Replace shift solenoid 1. <Ref. to AT-38 REMOVAL, Shift Solenoid, Duty Solenoids and ATF Temperature Sensor.>
7	CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION. Measure resistance of harness between shift solenoid 1 and transmission connector. Connector & terminal (AT5) No. 1 — (T4) No. 1:	Is the resistance less than 1 Ω?	Go to step 8.	Repair open circuit in harness between shift solenoid 1 and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
8	CHECK POOR CONTACT.	Is there poor contact in shift solenoid 1 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

J: TROUBLE CODE 72 — SHIFT SOLENOID 2 — S004509D98

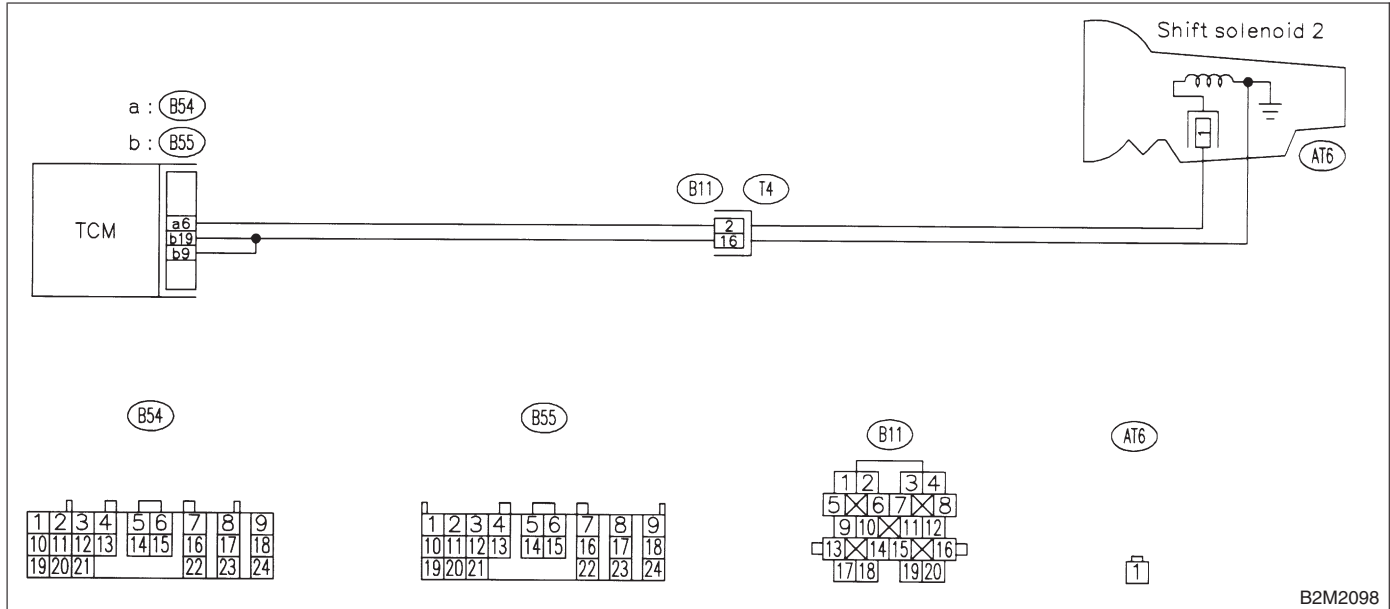
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:



B2M2098

No.	Step	Check	Yes	No
1	CHECK SHIFT SOLENOID 2 GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in transmission harness.
2	CHECK SHIFT SOLENOID 2. Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 2 — Transmission ground:	Is the resistance between 10 and 16 Ω?	Go to step 3.	Go to step 6.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 6 — (B11) No. 2:	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 6 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 6 (+) — Chassis ground (-):	Is the voltage 9 V → 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 8.
6	CHECK SHIFT SOLENOID 2 (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from shift solenoid 2. 4) Measure resistance between shift solenoid 2 connector and transmission ground. Connector & terminal No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω?	Go to step 7.	Replace shift solenoid assembly. <Ref. to AT-38 REMOVAL, Shift Solenoid, Duty Solenoids and ATF Temperature Sensor.>
7	CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION. Measure resistance of harness between shift solenoid 2 and transmission connector. Connector & terminal (AT6) No. 1 — (T4) No. 2:	Is the resistance less than 1 Ω?	Go to step 8.	Repair open circuit in harness between shift solenoid 2 and transmission connector.
8	CHECK POOR CONTACT.	Is there poor contact in shift solenoid 2 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

K: TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID — S004509E05

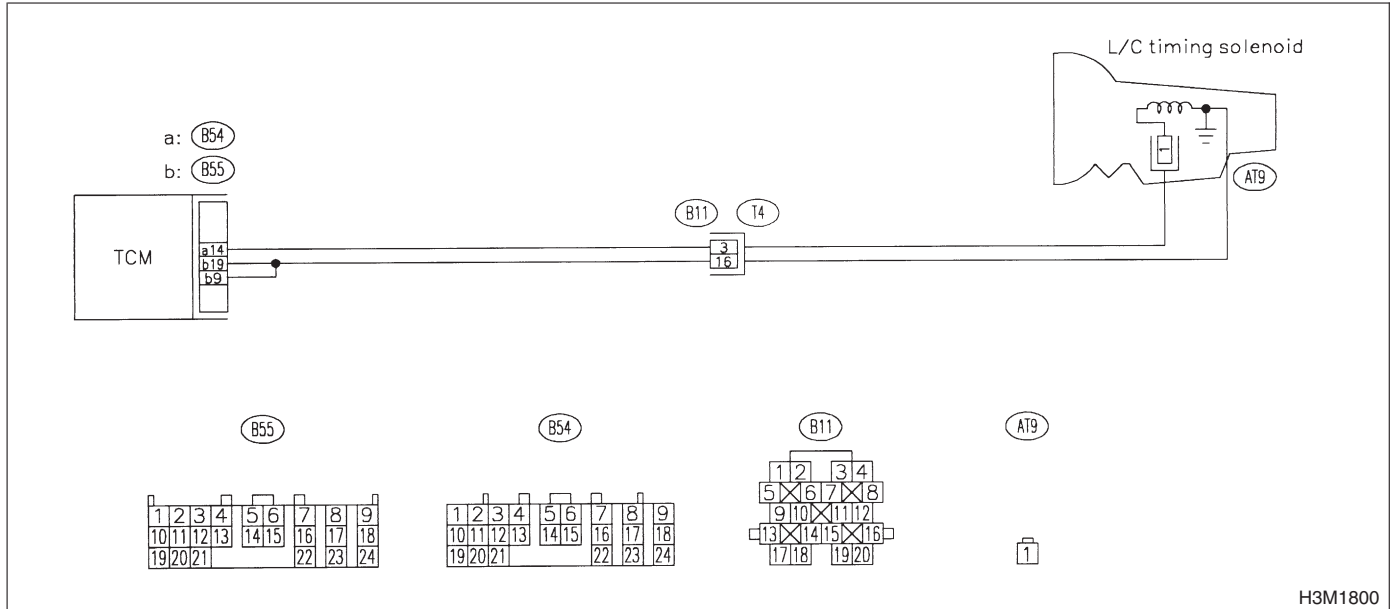
DIAGNOSIS:

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	CHECK LOW CLUTCH TIMING SOLENOID GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in transmission harness.
2	CHECK LOW CLUTCH TIMING SOLENOID. Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 3 — Transmission ground:	Is the resistance between 10 and 16 Ω?	Go to step 3.	Go to step 7.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 14 — (B11) No. 3:	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 14 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to "2", and slowly increase vehicle speed to 35 km/h (22 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 14 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 6.	Go to step 9.
6	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move selector lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 14 (+) — Chassis ground (-):	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 9.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
7	CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from low clutch timing solenoid. 5) Measure resistance between low clutch timing solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω ?	Go to step 8.	Replace low clutch timing solenoid. <Ref. to AT-38 REMOVAL, Shift Solenoid, Duty Solenoids and ATF Temperature Sensor.>
8	CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between low clutch timing solenoid and transmission connector. Connector & terminal (AT9) No. 1 — (T4) No. 3:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between low clutch timing solenoid and transmission connector.
9	CHECK POOR CONTACT.	Is there poor contact in low clutch timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

L: TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID — S004509E07

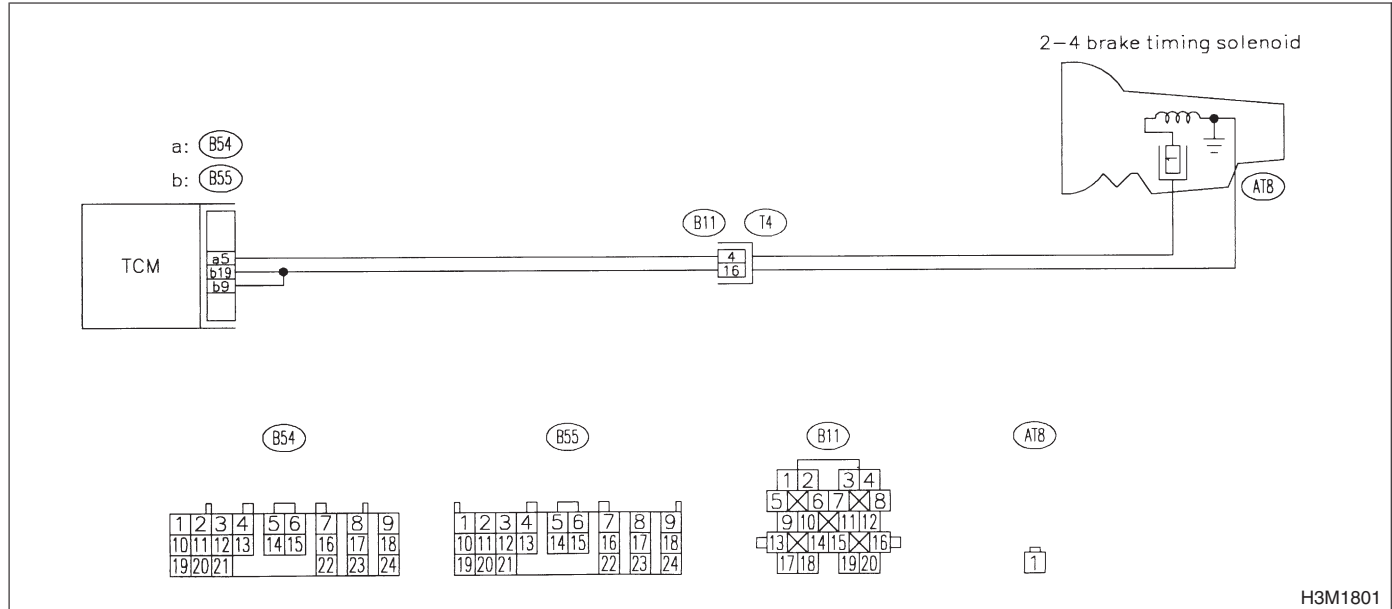
DIAGNOSIS:

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	CHECK 2-4 BRAKE TIMING SOLENOID GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 16 — Transmission ground:</i>	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in transmission harness.
2	CHECK 2-4 BRAKE TIMING SOLENOID. Measure resistance between transmission connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 4 — Transmission ground:</i>	Is the resistance between 10 and 16 Ω?	Go to step 3.	Go to step 7.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>(B54) No. 5 — (B11) No. 4:</i>	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. <i>Connector & terminal</i> <i>(B54) No. 5 — Chassis ground:</i>	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
5	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to "1", and slowly increase vehicle speed to 10 km/h (6 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 5 (+) — Chassis ground (-):	Is the voltage less than 1 V?	Go to step 6.	Go to step 9.
6	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move selector lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 5 (+) — Chassis ground (-):	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 9.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
7	CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from 2-4 brake timing solenoid. 5) Measure resistance between 2-4 brake timing solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 10 and 16 Ω ?	Go to step 8.	Replace 2-4 brake timing solenoid. <Ref. to AT-38 REMOVAL, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between 2-4 brake timing solenoid and transmission connector. Connector & terminal (AT8) No. 1 — (T4) No. 4:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.
9	CHECK POOR CONTACT.	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

M: TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID — S004509E14

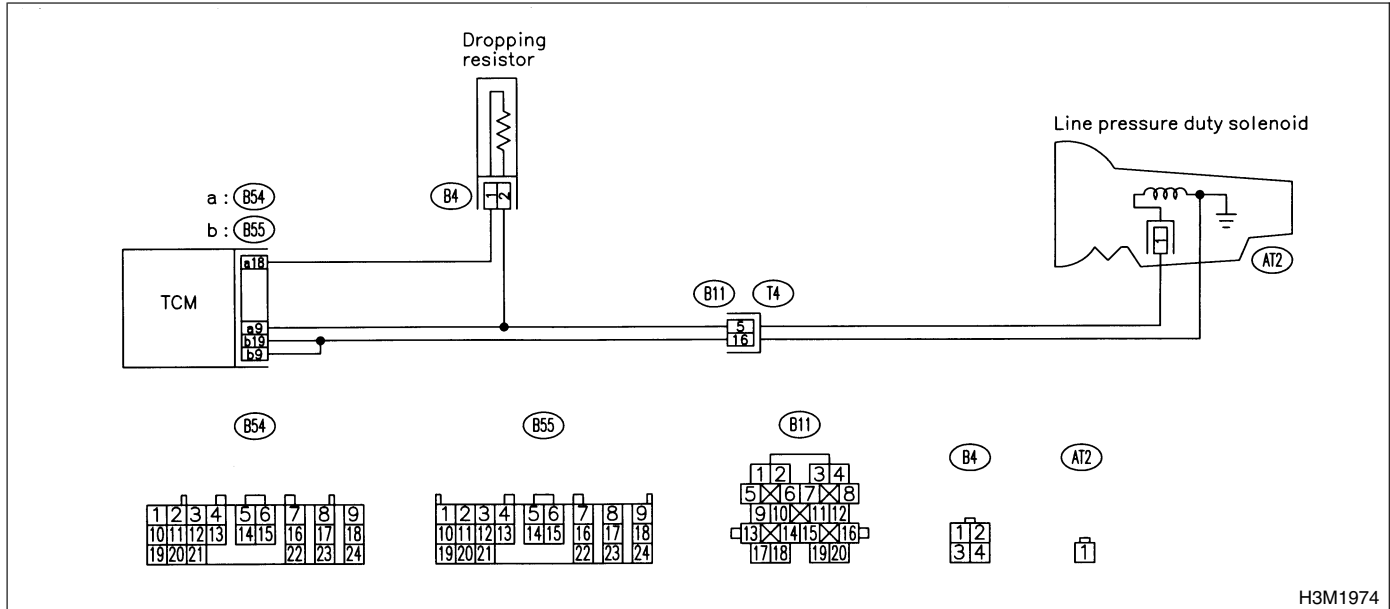
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



H3M1974

No.	Step	Check	Yes	No
1	CHECK RESISTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminal. Terminals No. 1 — No. 2:	Is the resistance between 9 and 15 Ω ?	Go to step 2.	Replace dropping resistor. <Ref. to AT-42 REMOVAL, Dropping Resistor.>
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and dropping resistor connector. Connector & terminal (B54) No. 18 — (B4) No. 1:	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and dropping resistor connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. Measure resistance of harness between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 1 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair short circuit in harness between TCM and dropping resistor connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
4	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR. 1) Disconnect connector from transmission. 2) Measure resistance of harness between transmission and dropping resistor connector. <i>Connector & terminal</i> <i>(B4) No. 2 — (B11) No. 5:</i>	Is the resistance less than 1 Ω ?	Go to step 5.	Repair open circuit in harness between dropping resistor and transmission connector.
5	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR. Measure resistance of harness between dropping resistor connector and chassis ground. <i>Connector & terminal</i> <i>(B4) No. 2 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair short circuit in harness between dropping resistor and transmission connector.
6	CHECK LINE PRESSURE DUTY SOLENOID GROUND LINE. Measure resistance between transmission connector and transmission ground. <i>Connector & terminal</i> <i>(T4) No. 16 — Transmission ground:</i>	Is the resistance less than 1 Ω ?	Go to step 7.	Repair open circuit in transmission harness.
7	CHECK LINE PRESSURE DUTY SOLENOID. Measure resistance between transmission connector and transmission ground. <i>Terminal</i> <i>(T4) No. 5 — Transmission ground:</i>	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 8.	Go to step 17.
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>(B54) No. 9 — (B11) No. 5:</i>	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between TCM and transmission connector.
9	CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure resistance of harness between TCM and chassis ground. <i>Connector & terminal</i> <i>(B54) No. 9 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 10.	Repair short circuit in harness between TCM and transmission connector.
10	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 15.	Go to step 11.
11	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn ignition switch to ON (engine OFF). 4) Move selector lever to "N". 5) Measure voltage between TCM connector and chassis ground. <i>Connector & terminal</i> <i>(B54) No. 9 (+) — Chassis ground (-):</i>	Is the voltage between 1.5 and 4.0 V with throttle fully closed?	Go to step 12.	Go to step 19.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
12	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector terminal and chassis ground. Connector & terminal (B54) No. 9 (+) — Chassis ground (-):	Is the voltage less than 1 V with throttle fully open?	Go to step 13.	Go to step 19.
13	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 18 (+) — Chassis ground (-):	Is the voltage more than 8.5 V with throttle fully closed?	Go to step 14.	Go to step 19.
14	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 18 (+) — Chassis ground (-):	Is the voltage less than 1 V with throttle fully open?	Even if "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 19.
15	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move selector lever to "N". 7) Read data of line pressure duty solenoid using Subaru Select Monitor. ● Line pressure duty is indicated in "%". 8) Throttle is fully closed.	Is the value 100%?	Go to step 15.	Go to step 19.
16	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn ignition switch to ON (Engine OFF). 2) Throttle is fully open.	Is the value 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 19.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
17	CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from line pressure duty solenoid. 4) Measure resistance between line pressure duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 18.	Replace line pressure duty solenoid. <Ref. to AT-38 REMOVAL, Shift Solenoid, Duty Solenoids and ATF Temperature Sensor.>
18	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID. Measure resistance of harness between line pressure duty solenoid and transmission connector. Connector & terminal (T4) No. 5 — (AT2) No. 1:	Is the resistance less than 1 Ω ?	Go to step 19.	Repair open circuit in harness between line pressure duty solenoid and transmission connector.
19	CHECK POOR CONTACT.	Is there poor contact in line pressure duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

N: TROUBLE CODE 76 — 2-4 BRAKE DUTY SOLENOID — S004509E15

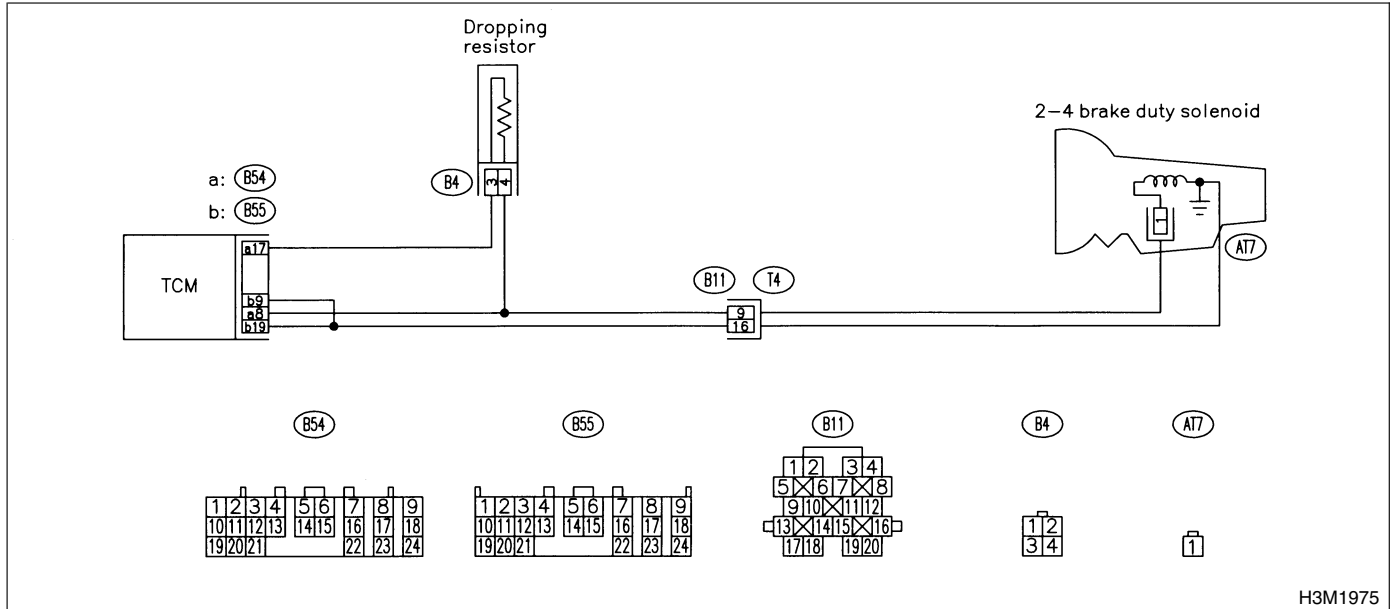
DIAGNOSIS:

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

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



H3M1975

No.	Step	Check	Yes	No
1	CHECK RESISTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminal. <i>Terminals</i> <i>No. 3 — No. 4:</i>	Is the resistance between 9 and 15 Ω ?	Go to step 2.	Replace dropping resistor. <Ref. to AT-42 REMOVAL, Dropping Resistor.>
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and dropping resistor connector. <i>Connector & terminal</i> <i>(B54) No. 17 — (B4) No. 3:</i>	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and dropping resistor connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. Measure resistance of harness between dropping resistor connector and chassis ground. <i>Connector & terminal</i> <i>(B4) No. 3 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 4.	Repair short circuit in harness between TCM and dropping resistor connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
4	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR. 1) Disconnect connector from transmission. 2) Measure resistance of harness between transmission and dropping resistor connector. Connector & terminal (B4) No. 4 — (B11) No. 9:	Is the resistance less than 1 Ω ?	Go to step 5.	Repair open circuit in harness between dropping resistor and transmission connector.
5	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND DROPPING RESISTOR. Measure resistance of harness between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 4 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 6.	Repair short circuit in harness between dropping resistor and transmission connector.
6	CHECK 2-4 BRAKE DUTY SOLENOID GROUND LINE. Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground:	Is the resistance less than 1 Ω ?	Go to step 7.	Repair open circuit in transmission harness.
7	CHECK 2-4 BRAKE DUTY SOLENOID. Measure resistance between transmission connector receptacle's terminals. Terminal (T4) No. 16 — No. 9:	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 8.	Go to step 17.
8	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 8 — (B11) No. 9:	Is the resistance less than 1 Ω ?	Go to step 9.	Repair open circuit in harness between TCM and transmission connector.
9	CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 8 — Chassis ground:	Is the resistance more than 1 M Ω ?	Go to step 10.	Repair short circuit in harness between TCM and transmission connector.
10	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 15.	Go to step 11.
11	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn ignition switch to ON (engine OFF). 4) Move selector lever to "N". 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 8 (+) — Chassis ground (-):	Is the voltage between 1.5 and 4.0 V with throttle fully closed?	Go to step 12.	Go to step 19.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
12	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector terminal and chassis ground. Connector & terminal (B54) No. 8 (+) — Chassis ground (-):	Is the voltage less than 1 V with throttle fully open?	Go to step 13.	Go to step 19.
13	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector terminal and chassis ground. Connector & terminal (B54) No. 17 (+) — Chassis ground (-):	Is the voltage more than 8.5 V with throttle fully closed?	Go to step 14.	Go to step 19.
14	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector terminal and chassis ground. Connector & terminal (B54) No. 17 (+) — Chassis ground (-):	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 19.
15	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move selector lever to "N". 7) Read data of 2-4 brake duty solenoid using Subaru Select Monitor. ● Line pressure duty is indicated in "%". 8) Throttle is fully closed.	Is the value 100%?	Go to step 16.	Go to step 19.
16	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn ignition switch to ON (Engine OFF). 2) Throttle is fully open.	Is the value 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 19.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
17	CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from 2-4 brake duty solenoid. 4) Measure resistance between 2-4 brake duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 2.0 and 4.5 Ω ?	Go to step 18.	Replace 2-4 brake duty solenoid. <Ref. to AT-38 REMOVAL, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
18	CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID. Measure resistance of harness between 2-4 brake duty solenoid and transmission connector. Connector & terminal (T4) No. 9 — (AT7) No. 1:	Is the resistance less than 1 Ω ?	Go to step 19.	Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.
19	CHECK POOR CONTACT.	Is there poor contact in line pressure duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

O: TROUBLE CODE 77 — LOCK-UP DUTY SOLENOID — S004509E16

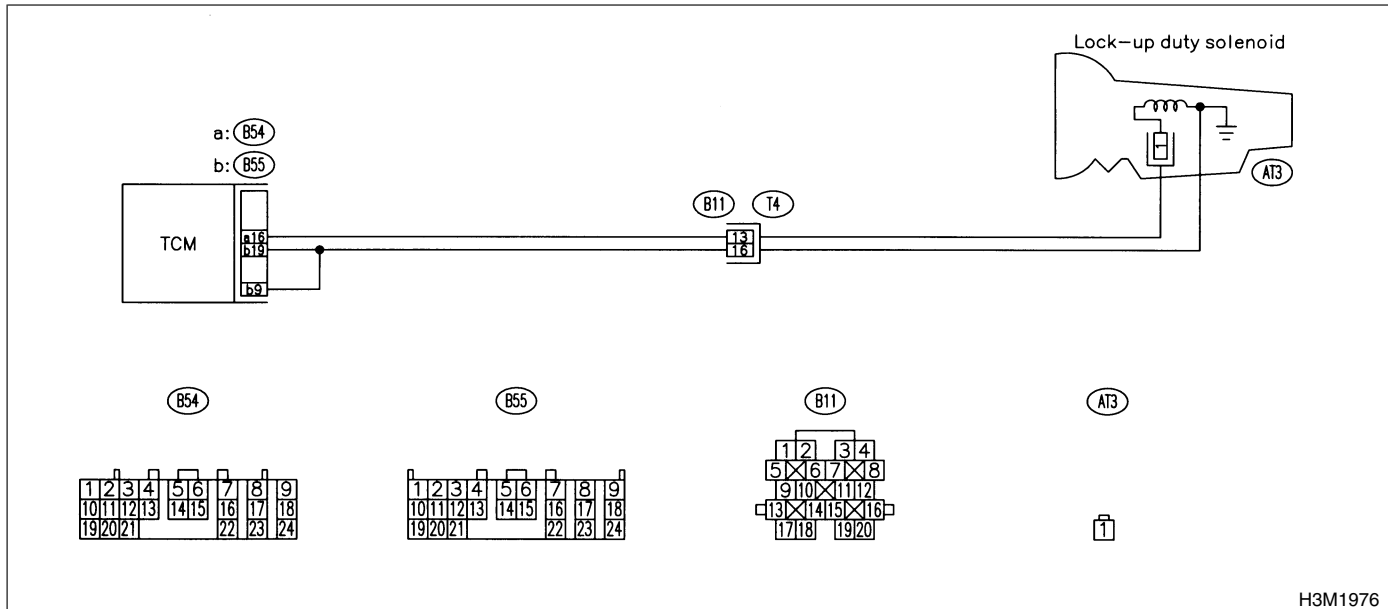
DIAGNOSIS:

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	CHECK TROUBLE CODE.	Do multiple trouble codes appear in the on-board diagnostics test mode?	Go to another trouble code.	Go to step 2.
2	CHECK LOCK-UP DUTY SOLENOID GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground:	Is the resistance less than 1 Ω?	Go to step 3.	Repair open circuit in transmission harness.
3	CHECK LOCK-UP DUTY SOLENOID. Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 13 — Transmission ground:	Is the resistance less than 1 Ω?	Go to step 4.	Go to step 12.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness connector between TCM and transmission. Connector & terminal (B54) No. 16 — (B11) No. 13:	Is the resistance less than 1 Ω?	Go to step 5.	Repair open circuit in harness between TCM and transmission connector.
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness connector between TCM and chassis ground. Connector & terminal (B54) No. 16 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 6.	Repair short circuit in harness between TCM and transmission connector.
6	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 7.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
7	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 4) Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 5) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 16 (+) — Chassis ground (-):	Is the voltage more than 8.5 V?	Go to step 8.	Go to step 13.
8	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Return the engine to idling speed and move selector lever to "N". 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 16 (+) — Chassis ground (-):	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 13.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
9	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 3) Connect Subaru Select Monitor to data link connector. 4) Start the engine, and turn Subaru Select Monitor switch to ON. 5) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read data of lock-up duty solenoid using Subaru Select Monitor. ● Lock-up duty is indicated in “%”. 7) Move selector lever to “D” and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.>	Is the value 95%?	Go to step 10.	Go to step 13.
10	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. Return the engine to idling speed and move selector lever to “N”. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.>	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 13.
11	CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from lock-up duty solenoid. 4) Measure resistance between lock-up duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground:	Is the resistance between 10 and 17 Ω?	Go to step 12.	Replace lock-up duty solenoid. <Ref. to AT-38 REMOVAL, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
12	CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between lock-up duty solenoid and transmission connector. <i>Connector & terminal (T4) No. 13 — (AT3) No. 1:</i>	Is the resistance less than 1 Ω ?	Go to step 13.	Repair open circuit in harness between lock-up duty solenoid and transmission connector.
13	CHECK POOR CONTACT.	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

P: TROUBLE CODE 79 — TRANSFER DUTY SOLENOID — S004509E17

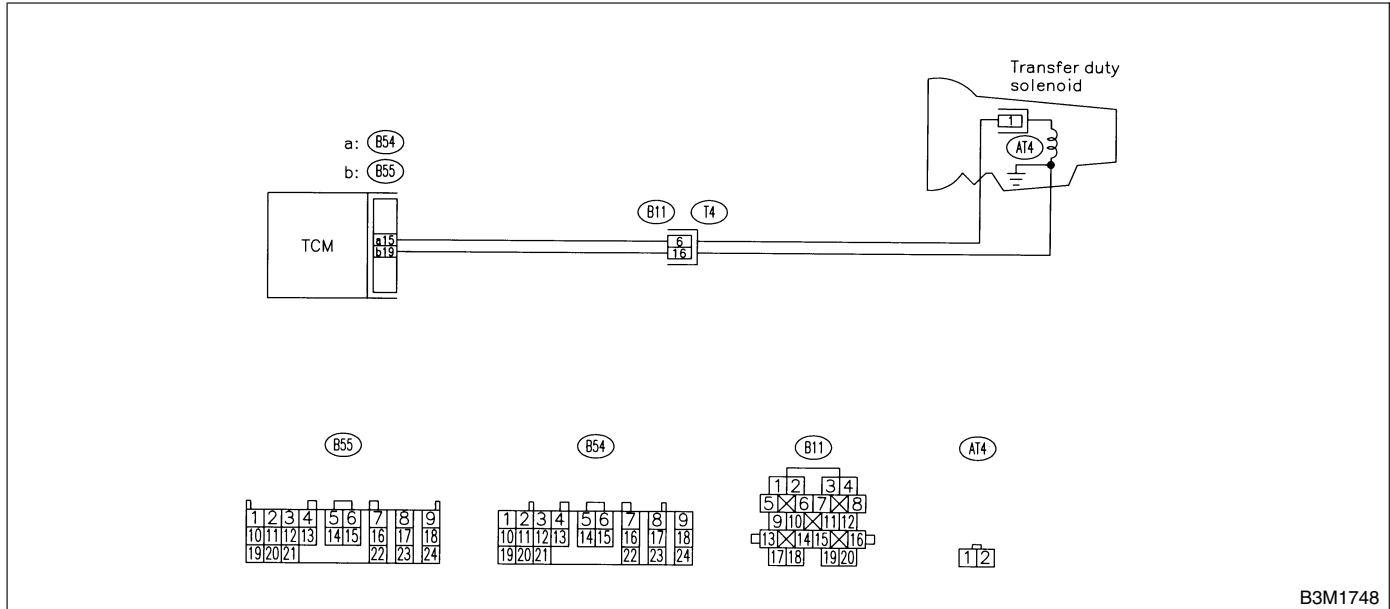
DIAGNOSIS:

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	CHECK TRANSFER DUTY SOLENOID GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground:	Is the resistance less than 1 Ω?	Go to step 2.	Repair open circuit in transmission harness.
2	CHECK TRANSFER DUTY SOLENOID. Measure resistance between transmission connector and transmission ground. Connector & terminal (T4) No. 6 — Transmission ground:	Is the resistance between 10 and 17 Ω?	Go to step 3.	Go to step 10.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 15 — (B11) No. 6:	Is the resistance less than 1 Ω?	Go to step 4.	Repair open circuit in harness between TCM and transmission connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance harness connector between TCM and chassis ground. Connector & terminal (B54) No. 15 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 8.	Go to step 6.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
6	CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Throttle is fully closed. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 15 (+) — Chassis ground (-):	Is the voltage less than 1 V in "P" range?	Go to step 7.	Go to step 12.
7	CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector terminals and chassis ground. Connector & terminal (B54) No. 15 (+) — Chassis ground (-):	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.
8	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON. 4) Move selector lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5) Read data of transfer duty solenoid using Subaru Select Monitor. ● Transfer duty solenoid is indicated in "%".	Is the value between 5 and 10%?	Go to step 9.	Go to step 12.
9	CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Set FWD mode. 2) Throttle fully closed.	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.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
10	CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION). 1) Lift-up the vehicle and place safety stand. CAUTION: On AWD models, raise all wheels off ground. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove extension case, and disconnect connector from transfer duty solenoid. 4) Measure resistance between transfer duty solenoid connector and transmission ground. Connector & terminal (AT4) No. 1 — Transmission ground:	Is the resistance between 10 and 17 Ω ?	Go to step 11.	Replace transfer duty solenoid. <Ref. to AT-42 REMOVAL, Transfer Duty Solenoid and Valve Body.>
11	CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between transfer duty solenoid and transmission connector. Connector & terminal (T4) No. 6 — (AT4) No. 1:	Is the resistance less than 1 Ω ?	Go to step 12.	Repair open circuit in harness between transfer duty solenoid and transmission connector.
12	CHECK POOR CONTACT.	Is there poor contact in transfer duty solenoid circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

Q: TROUBLE CODE 93 — VEHICLE SPEED SENSOR 1 (REAR) — S004509E21

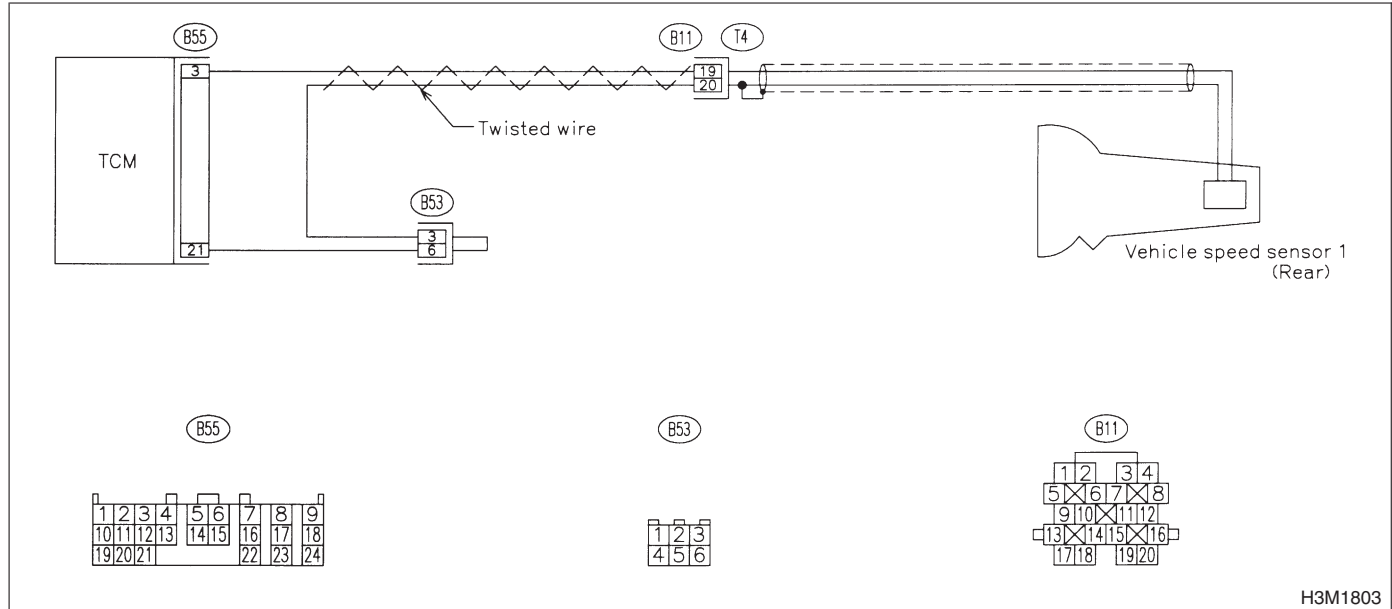
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

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

WIRING DIAGRAM:



No.	Step	Check	Yes	No
1	CHECK VEHICLE SPEED SENSOR 1. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector receptacle's terminals. <i>Connector & terminal</i> <i>(T4) No. 19 — No. 20:</i>	Is the resistance between 450 and 650 Ω ?	Go to step 2.	Replace transmission harness connector. <Ref. to AT-33 REMOVAL, Vehicle Speed Sensor 1, 2, Torque Converter Turbine Speed Sensor and Harness Assembly.>
2	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>(B55) No. 3 — (B11) No. 19:</i>	Is the resistance less than 1 Ω ?	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. <i>Connector & terminal</i> <i>(B55) No. 21 — (B11) No. 20:</i>	Is the resistance less than 1 Ω ?	Go to step 4.	Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.
4	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. <i>Connector & terminal</i> <i>(B55) No. 3 — Chassis ground:</i>	Is the resistance more than 1 M Ω ?	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.

DIAGNOSTIC PROCEDURE WITH TROUBLE CODE

Automatic Transmission

No.	Step	Check	Yes	No
5	CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B55) No. 21 — Chassis ground:	Is the resistance more than 1 MΩ?	Go to step 6.	Repair short circuit in harness between TCM and transmission connector.
6	PREPARE OSCILLOSCOPE.	Do you have oscilloscope?	Go to step 10.	Go to step 7.
7	PREPARE SUBARU SELECT MONITOR.	Do you have a Subaru Select Monitor?	Go to step 9.	Go to step 8.
8	CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 4) Measure voltage between TCM connector terminals. Connector & terminal (B55) No. 3 (+) — No. 21 (-):	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	CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read data of vehicle speed using Subaru Select Monitor. ● Compare speedometer with Subaru Select Monitor indications. ● Vehicle speed is indicated in "km/h" or "MPH". 7) Slowly increase vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.>	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

No.	Step	Check	Yes	No
10	CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. CAUTION: On AWD models, raise all wheels off floor. 3) Set oscilloscope to TCM connector terminals. Positive probe; (B55) No. 3 Earth lead; (B55) No. 21 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-18 OPERATION, Clear Memory Mode.> 5) Measure signal voltage indicated on oscilloscope.	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	CHECK POOR CONTACT.	Is there poor contact in vehicle speed sensor 1 circuit?	Repair poor contact.	Replace TCM. <Ref. to AT-41 REMOVAL, Transmission Control Module (TCM).>

ELECTRICAL COMPONENTS LOCATION

Automatic Transmission

4. Electrical Components Location

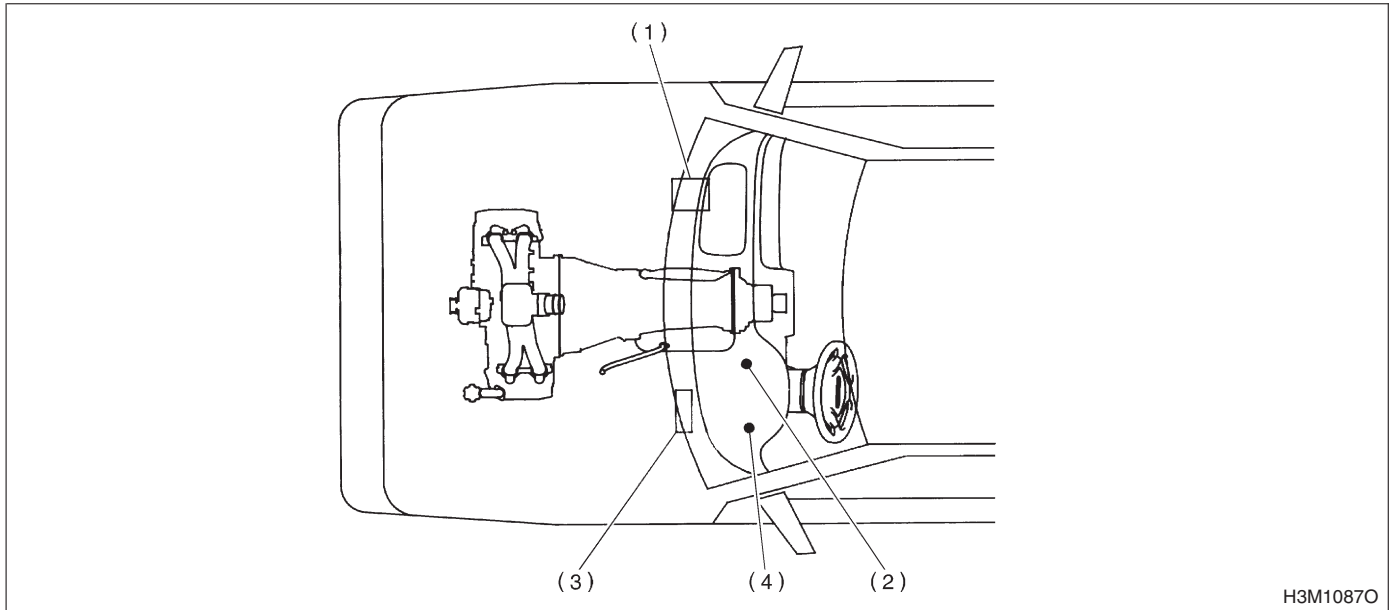
S004507

A: LOCATION

S004507A13

1. CONTROL MODULE

S004507A1301



H3M1087O

(1) ECM

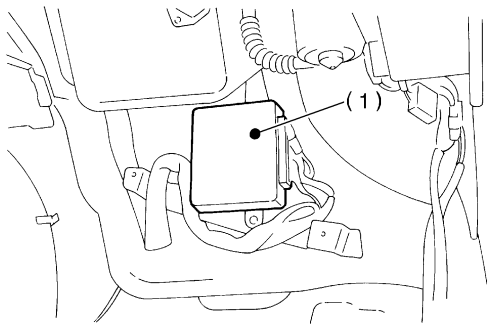
(2) AT OIL TEMP warning light (AT diagnostic indicator light)

(3) TCM

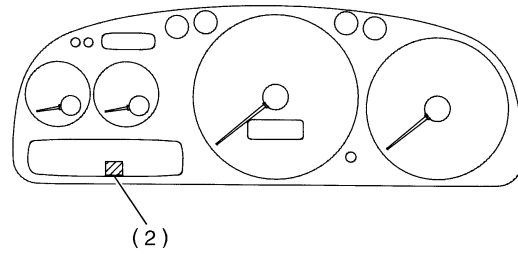
(4) Data link connector (for Subaru select monitor and OBD-II general scan tool)

ELECTRICAL COMPONENTS LOCATION

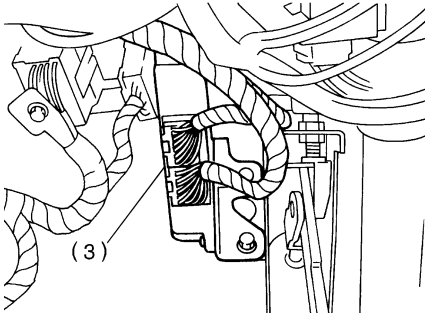
Automatic Transmission



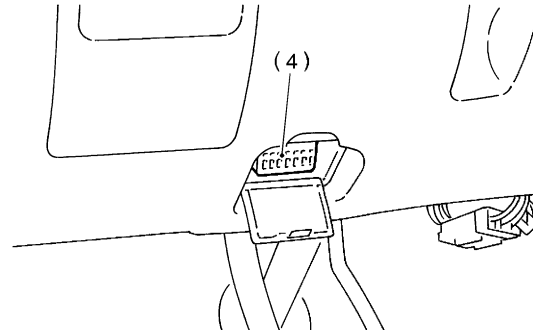
B3M0183E



H3M1675C



B3M1666C

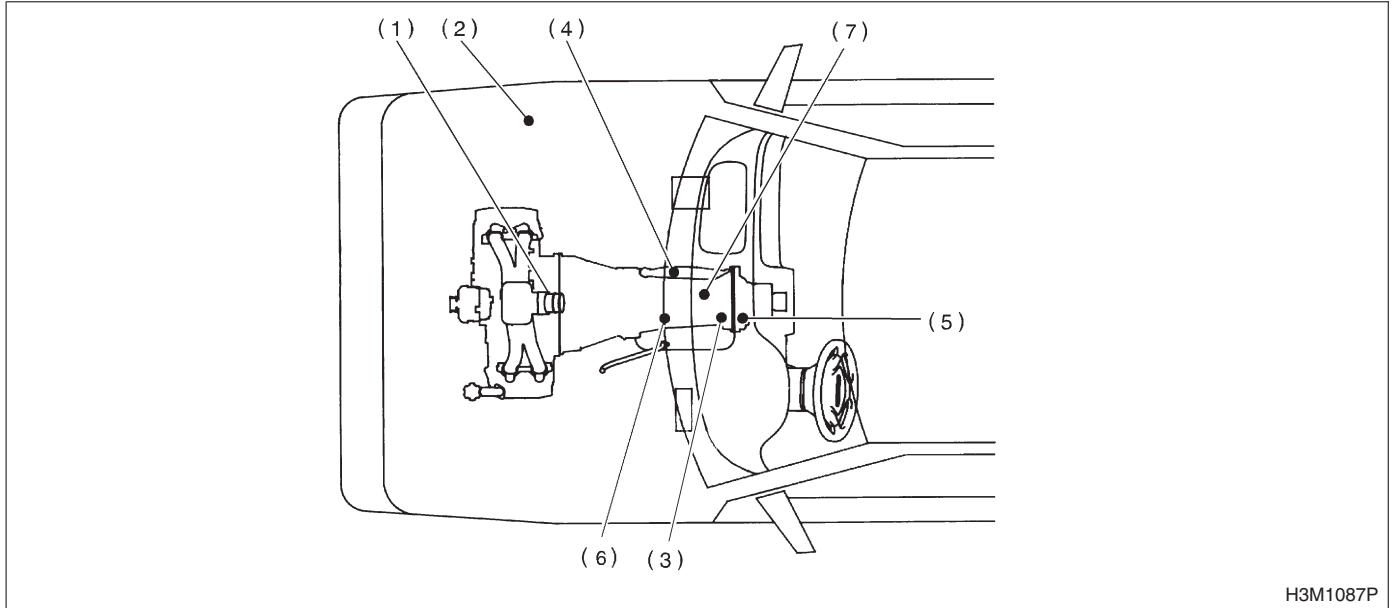


S2M0258C

ELECTRICAL COMPONENTS LOCATION

Automatic Transmission

2. SENSOR S004507A1302

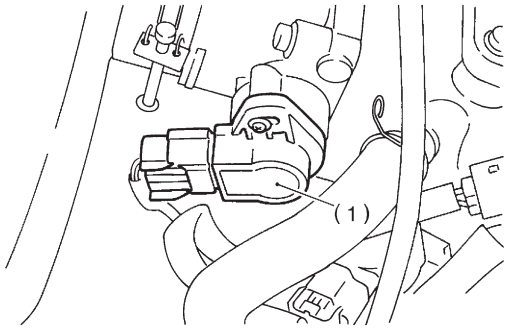


H3M1087P

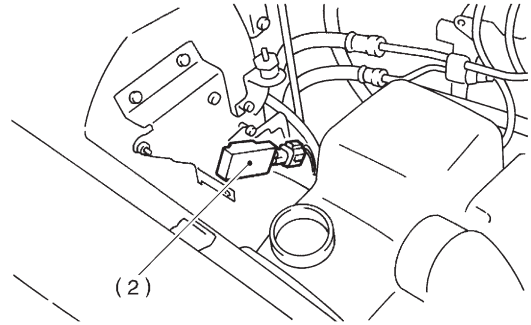
- | | | |
|------------------------------------|-----------------------------------|---|
| (1) Throttle position sensor | (4) Inhibitor switch | (6) Torque converter turbine speed sensor |
| (2) Dropping resistor | (5) Vehicle speed sensor 1 (Rear) | (7) ATF temperature sensor |
| (3) Vehicle speed sensor 2 (Front) | | |

ELECTRICAL COMPONENTS LOCATION

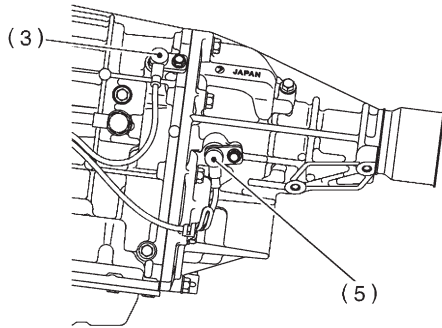
Automatic Transmission



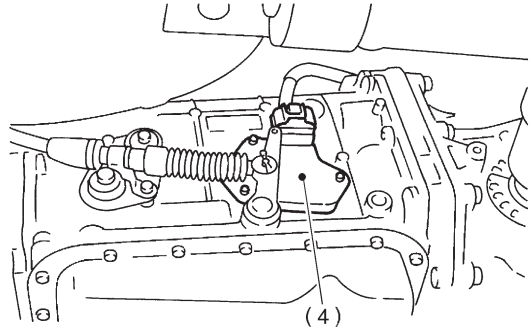
S2M0262B



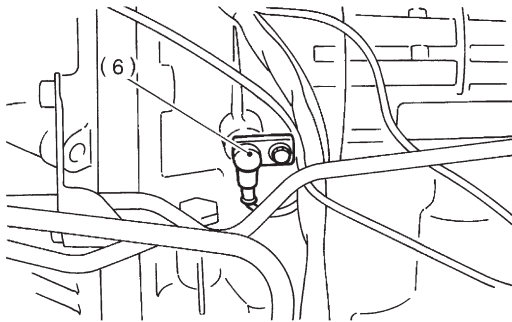
B2M2262C



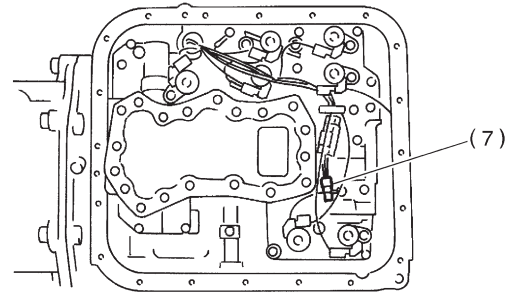
B2M2258C



B2M2246D



B2M2260C

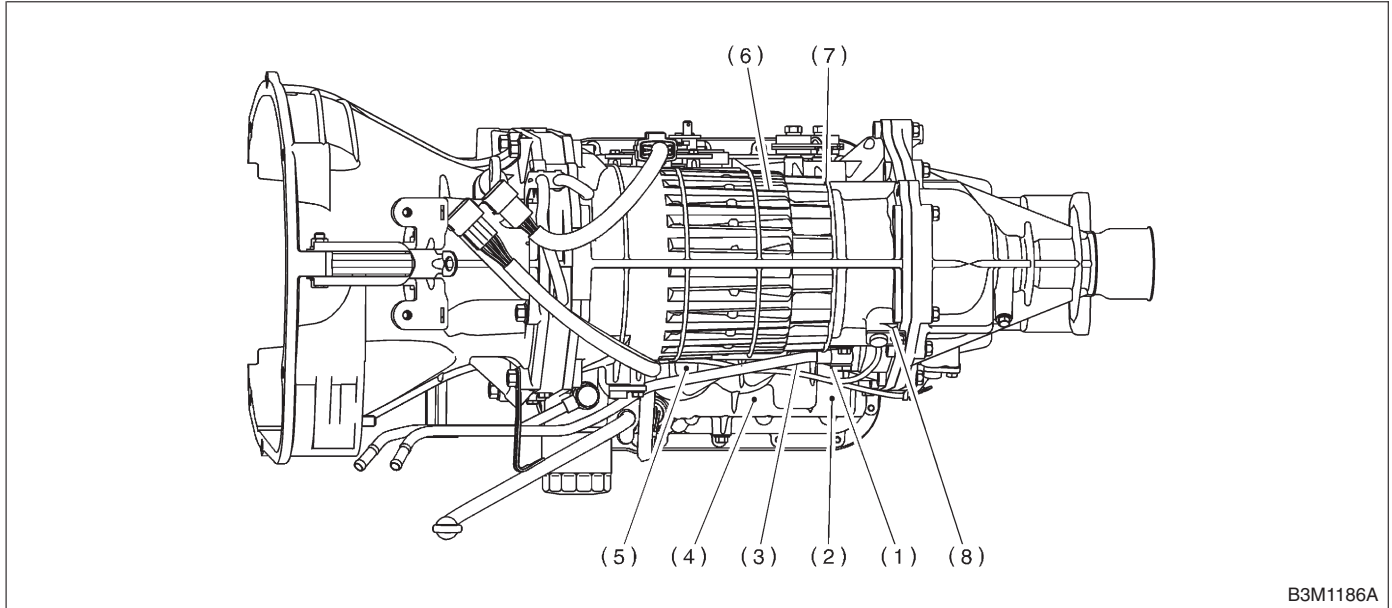


B2M2261C

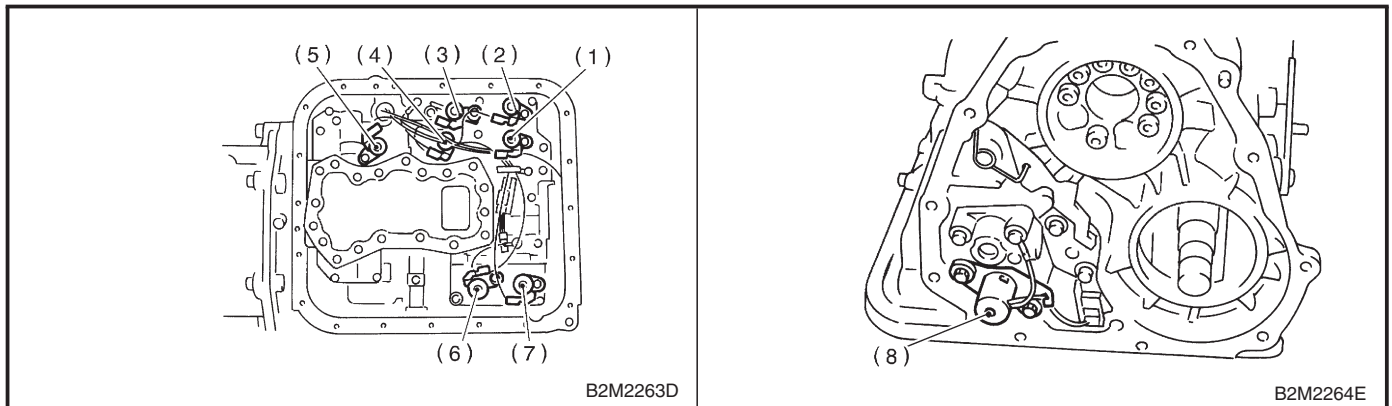
ELECTRICAL COMPONENTS LOCATION

Automatic Transmission

3. SOLENOID S004507A1303



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



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

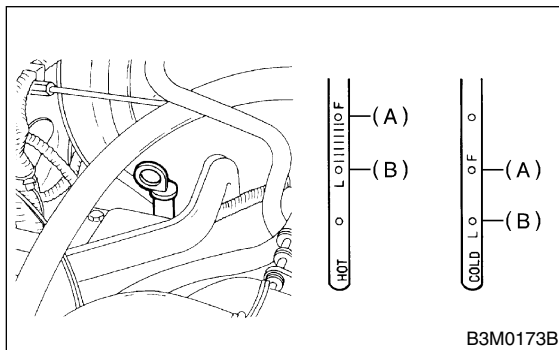
Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12V or more

Specific gravity: Above 1.260

2. ATF LEVEL S004001A1003

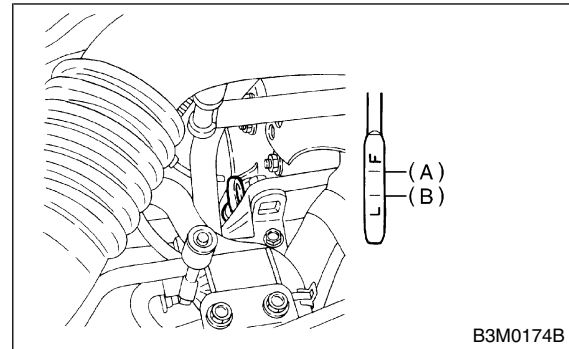
Make sure that ATF level is in the specification.



- (A) Upper level
(B) Lower level

3. FRONT DIFFERENTIAL OIL LEVEL S004001A1004

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



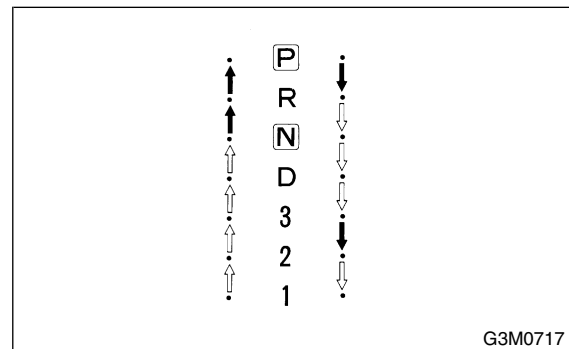
- (A) Upper level
(B) Lower level

4. OPERATION OF SHIFT SELECT LEVER S004001A1005

WARNING:

Stop the engine while checking operation of selector lever.

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



G3M0717

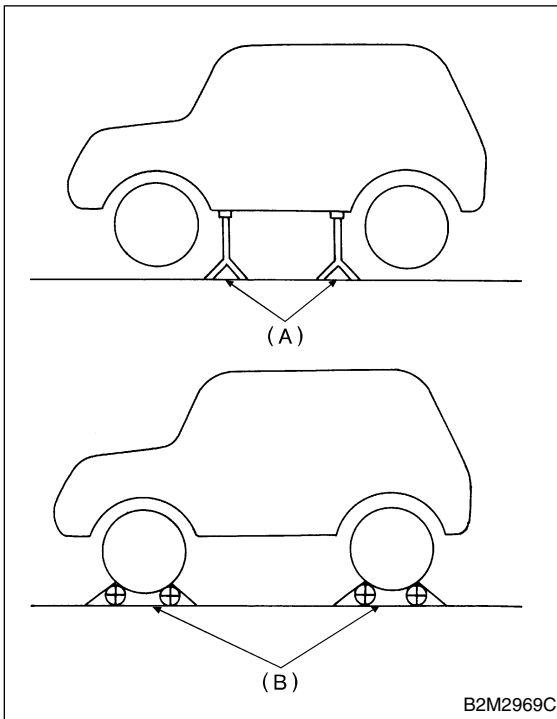
9. Inspection Mode S004510

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

12. List of Diagnostic Trouble Code

S004511

A: LIST

S004511A12

Trouble code	Item	Content of diagnosis	Title index No.
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to AT-29 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-31 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-35 TROUBLE CODE 31 — THROTTLE POSITION SENSOR —, Diagnostic Procedure with Trouble Code.>
33	Vehicle speed sensor 2 (Front)	Detects open or shorted input signal circuit.	<Ref. to AT-39 TROUBLE CODE 33 — VEHICLE SPEED SENSOR 2 (FRONT) —, Diagnostic Procedure with Trouble Code.>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-44 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-47 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-49 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-51 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-54 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-56 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-59 TROUBLE CODE 74 — 2-4 BRAKE TIMING SOLENOID —, Diagnostic Procedure with Trouble Code.>

LIST OF DIAGNOSTIC TROUBLE CODE

Automatic Transmission

Trouble code	Item	Content of diagnosis	Title index No.
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-62 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-66 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-70 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-74 TROUBLE CODE 79 — TRANSFER DUTY SOLENOID —, Diagnostic Procedure with Trouble Code.>
93	Vehicle speed sensor 1 (Rear)	Detects open or shorted input signal circuit.	<Ref. to AT-77 TROUBLE CODE 93 — VEHICLE SPEED SENSOR 1 (REAR) —, Diagnostic Procedure with Trouble Code.>

READ DIAGNOSTIC TROUBLE CODE

Automatic Transmission

8. Read Diagnostic Trouble Code

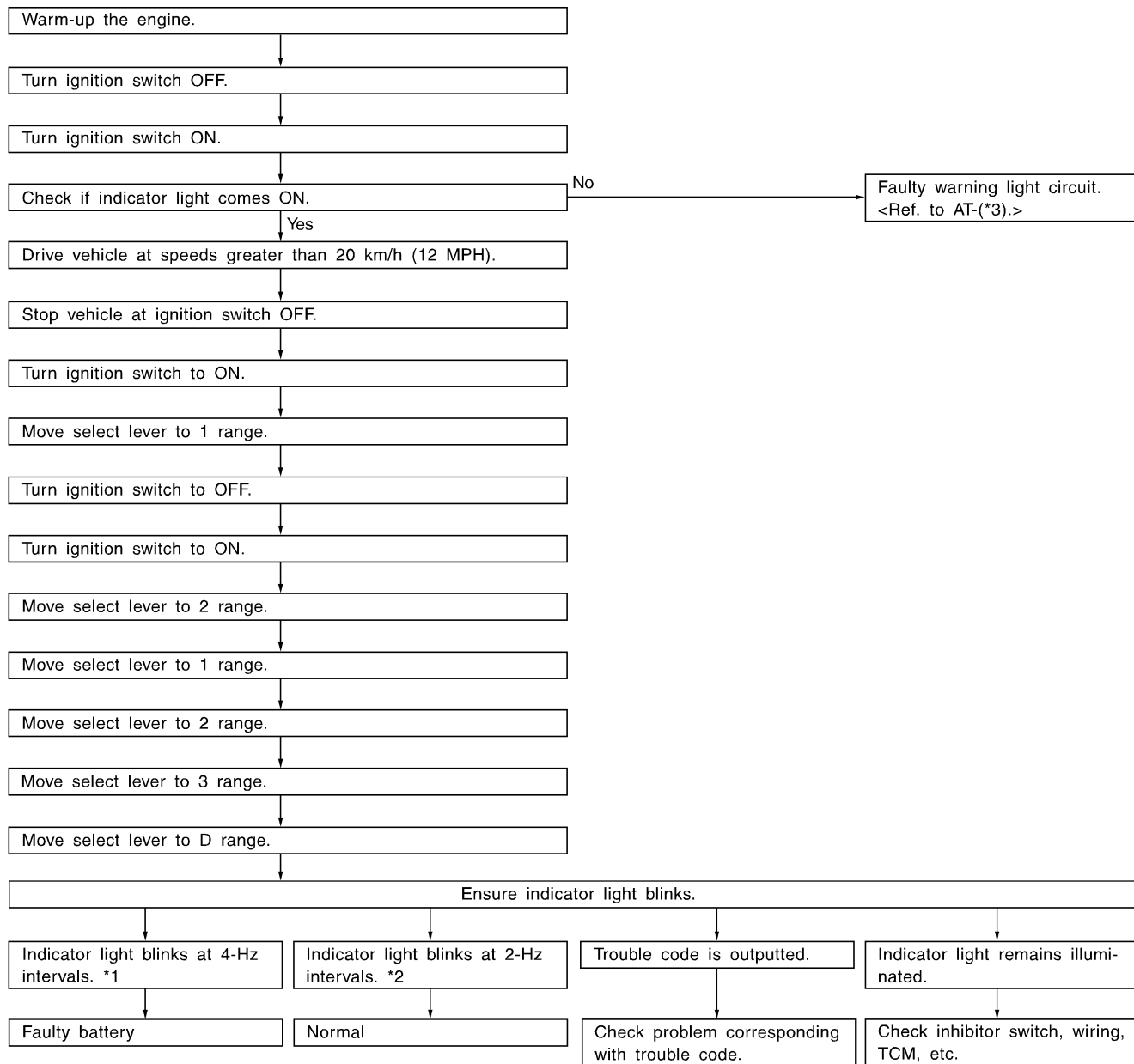
S004508

A: OPERATION

S004508A16

1. WITHOUT SUBARU SELECT MONITOR

S004508A1601



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

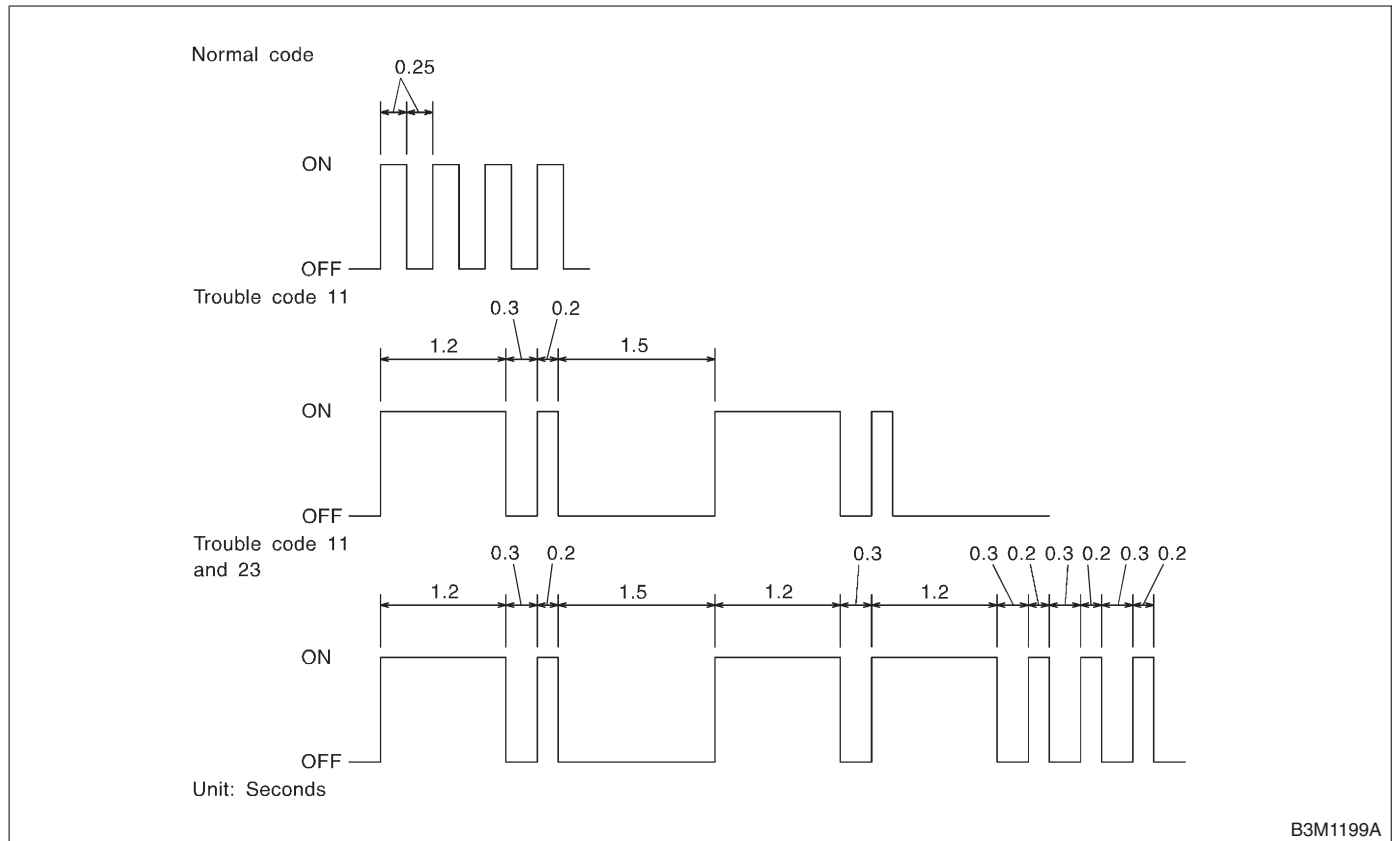
*2 : Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).

S3M0063C

*3: <Ref. to AT-25 AT OIL TEMP WARNING LIGHT DOES NOT COME ON OR GO OFF, Diagnostic Procedure for AT Oil Temp Warning Light.>

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

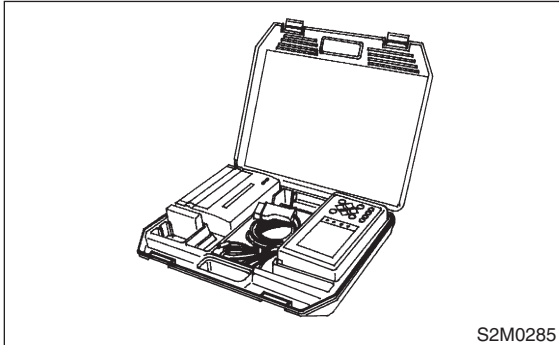
Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to AT-16 OPERATION, Subaru Select Monitor.>

7. Subaru Select Monitor S004503

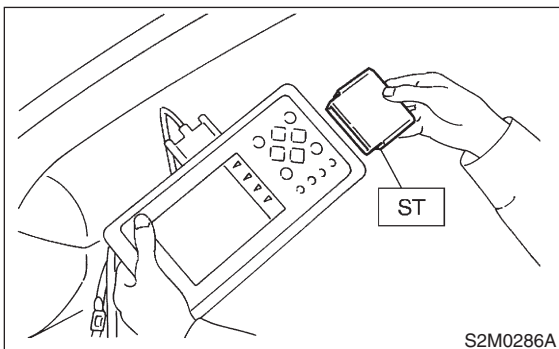
A: OPERATION S004503A16

1. READ DIAGNOSTIC TROUBLE CODE S004503A1601

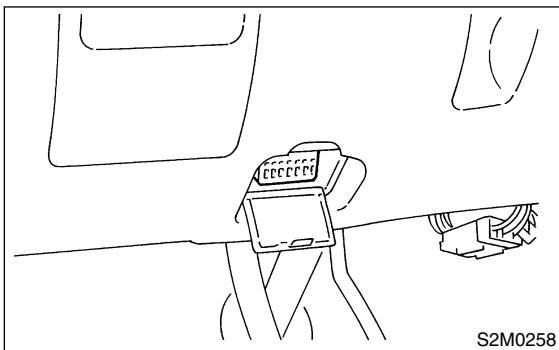
- 1) Prepare Subaru Select Monitor kit.



- 2) Connect diagnosis cable to Subaru Select Monitor.
- 3) Insert cartridge into Subaru Select Monitor.



- 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).

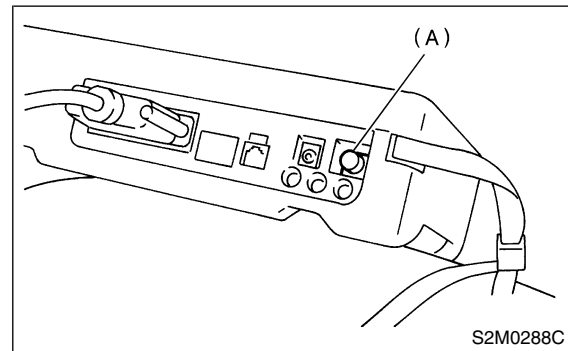


- (2) Connect diagnosis cable to data link connector.

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 "List of Diagnostic Trouble Code". <Ref. to AT-23 LIST, 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.

- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Vehicle speed sensor 1 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
Kick down switch signal	Kick Down 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.

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".	1) Inhibitor switch 2) Select cable 3) Select lever 4) Starter motor and harness
Abnormal noise when select lever is in "P" or "N".	1) Strainer 2) Transfer duty solenoid 3) Oil pump 4) Drive plate 5) ATF level too high or too low
Hissing noise occurs during standing start.	1) Strainer 2) ATF level too high or too low
Noise occurs while driving in "D1".	1) Final gear 2) Planetary gear
Noise occurs while driving in "D2".	3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in "D3".	1) Final gear 2) Low & reverse brake 3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in "D4".	1) Final gear 2) Low & reverse brake 3) Planetary gear 4) Reduction gear 5) Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	1) Control valve 2) Lock-up damper 3) Engine performance 4) Input shaft
Vehicle moves when select lever is in "N".	1) TCM 2) Low clutch
Shock occurs when select lever is moved from "N" to "D".	1) TCM 2) Harness 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from "N" to "D".	1) Control valve 2) Low clutch 3) Line pressure duty solenoid 4) Seal ring 5) Front gasket transmission case
Shock occurs when select lever is moved from "N" to "R".	1) TCM 2) Harness 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from "N" to "R".	1) Control valve 2) Low & reverse clutch 3) Reverse clutch 4) Line pressure duty solenoid 5) Seal ring 6) Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	1) Parking brake mechanism 2) Planetary gear

SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	1) Strainer 2) Line pressure duty solenoid 3) Control valve 4) Drive pinion 5) Hypoid gear 6) Axle shaft 7) Differential gear 8) Oil pump 9) Input shaft 10) Output shaft 11) Planetary gear 12) Drive plate 13) ATF level too low 14) Front gasket transmission case
Vehicle does not start in "R" range only (engine revving up).	1) Select cable 2) Select lever 3) Control valve 4) Low & reverse clutch 5) Reverse clutch
Vehicle does not start in "R" range only (engine stalls).	1) Low clutch 2) 2-4 brake 3) Planetary gear 4) Parking brake mechanism
Vehicle does not start in "D", "3" range only (engine revving up).	1) Low clutch 2) One-way clutch
Vehicle does not start in "D", "3" or "2" range only (engine revving up).	1) Low clutch
Vehicle does not start in "D", "3" or "2" range only (engine stalls).	1) Reverse clutch
Vehicle starts in "R" range only (engine revving up).	1) Control valve
Acceleration during standing starts is poor (high stall rpm).	1) Control valve 2) Low clutch 3) Reverse clutch 4) ATF level too low 5) Front gasket transmission case 6) Differential gear oil level too high or too low
Acceleration during standing starts is poor (low stall rpm).	1) Oil pump 2) Torque converter one-way clutch 3) Engine performance
Acceleration is poor when select lever is in "D", "3" or "2" range (normal stall rpm).	1) TCM 2) Control valve 3) High clutch 4) 2-4 brake 5) Planetary gear
Acceleration is poor when select lever is in "R" (normal stall rpm).	1) Control valve 2) High clutch 3) 2-4 brake 4) Planetary gear
No shift occurs from 1st to 2nd gear.	1) TCM 2) Vehicle speed sensor 1 (Rear) 3) Vehicle speed sensor 2 (Front) 4) Throttle position sensor 5) Shift solenoid 1 6) Control valve 7) 2-4 brake
No shift occurs from 2nd to 3rd gear.	1) TCM 2) Control valve 3) High clutch 4) Shift solenoid 2

SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	1) TCM 2) Shift solenoid 1 3) ATF temperature sensor 4) Control valve 5) 2-4 brake
Engine brake is not effected when select lever is in "3" range.	1) Inhibitor switch 2) TCM 3) Throttle position sensor 4) Control valve
Engine brake is not effected when select lever is in "3" or "2" range.	1) Control valve
Engine brake is not effected when select lever is in "1" range.	1) Control valve 2) Low & reverse brake
Shift characteristics are erroneous.	1) Inhibitor switch 2) TCM 3) Vehicle speed sensor 1 (Front) 4) Vehicle speed sensor 2 (Rear) 5) Throttle position sensor 6) Control valve 7) Ground earth
No lock-up occurs.	1) TCM 2) Throttle position sensor 3) ATF temperature sensor 4) Control valve 5) Lock-up facing 6) Engine speed signal
Parking brake is not effected.	1) Select cable 2) Select lever 3) Parking mechanism
Shift lever cannot be moved or is hard to move from "P" range.	
ATF spurts out.	1) ATF level too high
Differential oil spurts out.	1) Differential gear oil too high
Differential oil level changes excessively.	1) Seal pipe 2) Double oil seal
Odor is produced from ATF supply pipe.	1) High clutch 2) 2-4 brake 3) Low & reverse clutch 4) Reverse clutch 5) Lock-up facing 6) ATF deterioration
Shock occurs from 1st to 2nd gear.	1) TCM 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake 8) ATF deterioration 9) Engine performance 10) Dropping resistor 11) 2-4 brake timing solenoid
Slippage occurs from 1st to 2nd gear.	1) TCM 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake 8) 2-4 brake timing solenoid 9) High clutch

SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	1) TCM 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) High clutch 8) 2-4 brake 9) ATF deterioration 10) Engine performance 11) 2-4 brake timing solenoid
Slippage occurs from 2nd to 3rd gear.	1) TCM 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) High clutch 8) 2-4 brake 9) 2-4 brake timing solenoid
Shock occurs from 3rd to 4th gear.	1) TCM 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake timing solenoid 8) 2-4 brake 9) ATF deterioration 10) Engine performance 11) Low clutch timing solenoid 12) Low clutch
Slippage occurs from 3rd to 4th gear.	1) TCM 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake 8) 2-4 brake timing solenoid
Shock occurs when select lever is moved from "3" to "2" range.	1) TCM 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) 2-4 brake duty solenoid 7) 2-4 brake 8) ATF deterioration 9) 2-4 brake timing solenoid
Shock occurs when select lever is moved from "D" to "1" range.	1) TCM 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) ATF deterioration 7) 2-4 brake duty solenoid 8) 2-4 brake timing solenoid 9) Low clutch timing solenoid

SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission

Symptom	Problem parts
Shock occurs when select lever is moved from “2” to “1” range.	1) TCM 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) Low & reverse clutch 7) ATF deterioration 8) 2-4 brake duty solenoid 9) 2-4 brake timing solenoid 10) Low clutch timing solenoid
Shock occurs when accelerator pedal is released at medium speeds.	1) TCM 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) Lock-up damper 7) Engine performance 8) 2-4 brake duty solenoid 9) 2-4 brake timing solenoid 10) Low clutch timing solenoid
Vibration occurs during straight-forward operation.	1) TCM 2) Lock-up duty solenoid 3) Lock-up facing 4) Lock-up damper
Vibration occurs during turns (tight corner “braking” phenomenon).	1) TCM 2) Vehicle speed sensor 1 (Front) 3) Vehicle speed sensor 2 (Rear) 4) Throttle position sensor 5) ATF temperature sensor 6) Transfer clutch 7) Transfer valve 8) Transfer duty solenoid 9) ATF deterioration 10) Harness
Front wheel slippage occurs during standing starts.	1) TCM 2) Vehicle speed sensor 2 (Front) 3) FWD switch 4) Throttle position sensor 5) ATF temperature sensor 6) Control valve 7) Transfer clutch 8) Transfer valve 9) Transfer pipe 10) Transfer duty solenoid
Vehicle is not set in FWD mode.	1) TCM 2) FWD switch 3) Transfer clutch 4) Transfer valve 5) Transfer duty solenoid
Select lever is hard to move.	1) Select cable 2) Select lever 3) Detent spring 4) Manual plate
Select lever is too high to move (unreasonable resistance).	1) Detent spring 2) Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	1) Select cable 2) Select lever 3) Detent spring 4) Manual plate

SYMPTOM RELATED DIAGNOSTIC

Automatic Transmission

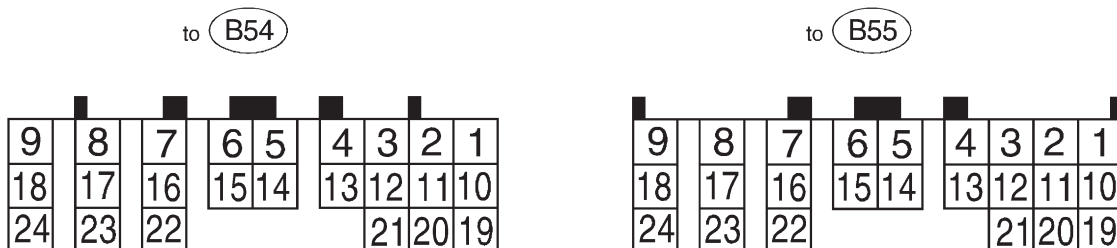
MEMO:

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

S004506

A: ELECTRICAL SPECIFICATION

S004506A08



B2M2269A

Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B55	6	Ignition switch OFF	10 — 16	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 16	—
		B54	24			
Inhibitor switch	“P” range switch	B55	23	Select lever in “P” range	Less than 1	—
				Select lever in any other than “P” range (except “N” range)	More than 8	
	“N” range switch	B55	22	Select lever in “N” range	Less than 1	—
				Select lever in any other than “N” range (except “P” range)	More than 8	
	“R” range switch	B55	17	Select lever in “R” range	Less than 1	—
				Select lever in any other than “R” range	More than 9.5	
	“D” range switch	B55	8	Select lever in “D” range	Less than 1	—
				Select lever in any other than “D” range	More than 9.5	
	“3” range switch	B55	18	Select lever in “3” range	Less than 1	—
				Select lever in any other than “3” range	More than 9.5	
	“2” range switch	B54	10	Select lever in “2” range	Less than 1	—
				Select lever in any other than “2” range	More than 9.5	
	“1” range switch	B54	1	Select lever in “1” range	Less than 1	—
				Select lever in any other than “1” range	More than 9.5	
Brake switch		B55	24	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
ABS signal	B54	19	ABS switch ON	Less than 1	—
			ABS switch OFF	6.5 — 15	
AT OIL TEMP warning light	B54	3	Light ON	Less than 1	—
			Light OFF	More than 9	
Throttle position sensor	B55	2	Throttle fully closed.	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
Vehicle speed sensor 1 (Rear)	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed sensor 2 (Front)	B55	5	Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range) 4	450 — 650
Torque converter turbine speed sensor	B55	12	Vehicle stopped	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Vehicle speed output signal	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1← →More than 4	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF)	More than 10.5	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B54	11	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B54	13	Ignition switch ON (with engine ON)	4 — 6	—
Torque control signal 2	B54	21	Ignition switch ON (with engine ON)	More than 9	—
Torque control cut signal	B54	2	Ignition switch ON	8	—
Intake manifold pressure signal	B55	20	Engine idling after warm-up.	1.2 — 1.8	—
Shift solenoid 1	B54	7	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	6	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Dropping resistor	B54	18	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission

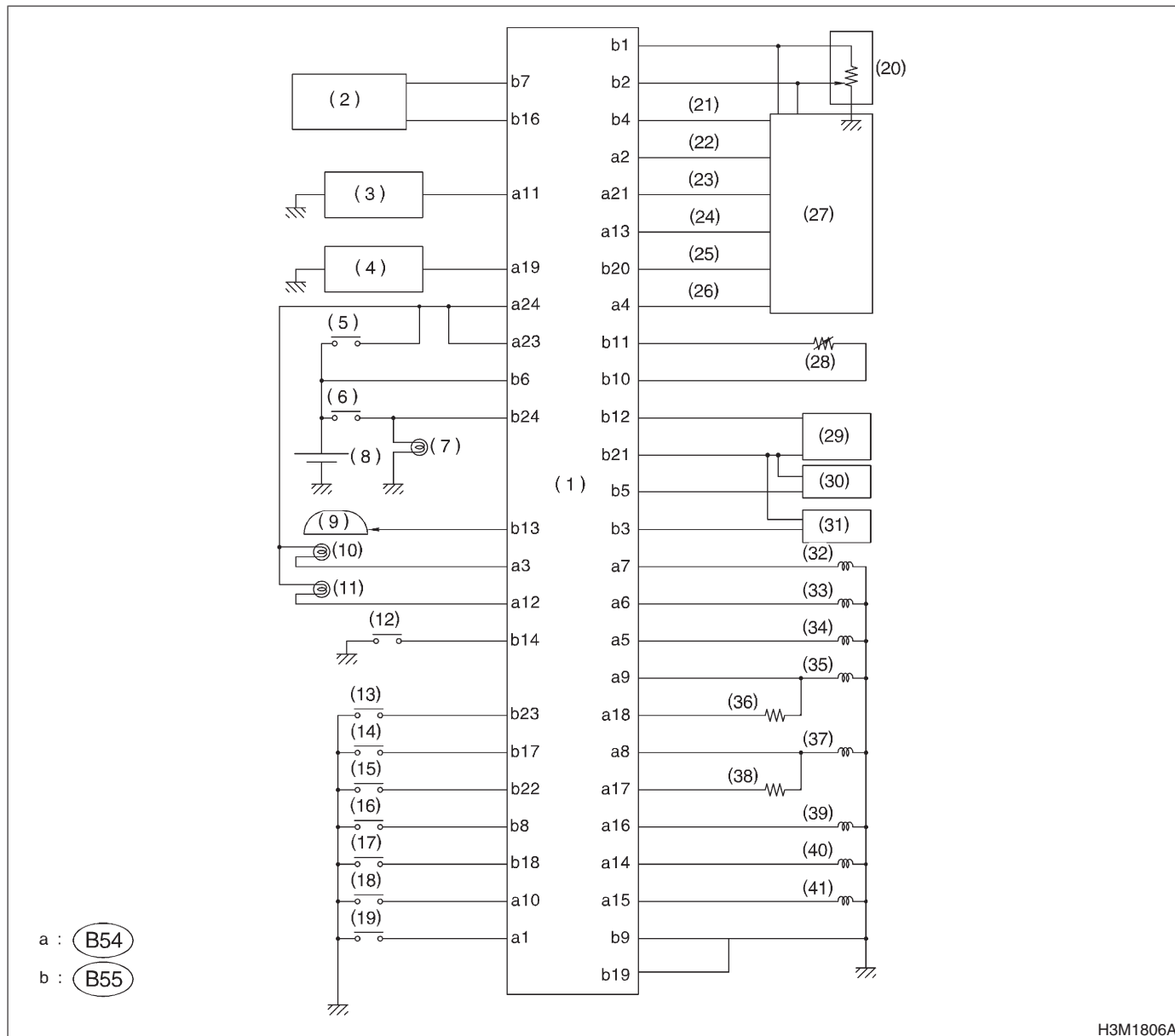
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Transfer duty solenoid	B54	15	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	8	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake dropping resistor	B54	17	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	5	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	14	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B55	10	—	0	Less than 1
Sensor ground line 2	B55	21	—	0	Less than 1
System ground line	B55	9	—	0	Less than 1
		19			
FWD switch	B55	14	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	
FWD indicator light	B54	12	Fuse ON FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
AT diagnosis signal	B54	4	Ignition switch ON	Less than 1← →More than 4	—
Data link signal (Subaru Select Monitor)	B55	7	—	—	—
		16	—	—	

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

Automatic Transmission

B: SCHEMATIC

S004506A21

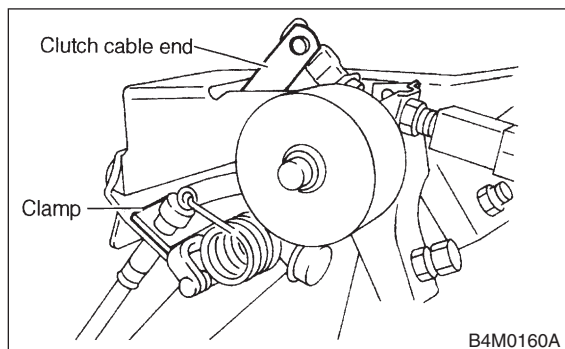


- | | | |
|---|--|--------------------------------------|
| (1) Transmission control module | (17) "3" range switch | (33) Shift solenoid 2 |
| (2) Data link connector | (18) "2" range switch | (34) 2-4 brake timing solenoid |
| (3) Cruise control module | (19) "1" range switch | (35) Line pressure duty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

10. Clutch Cable S504259

A: REMOVAL S504259A18

- 1) Disconnect clutch cable from release lever.
- 2) Remove clutch cable clamp from pedal bracket.



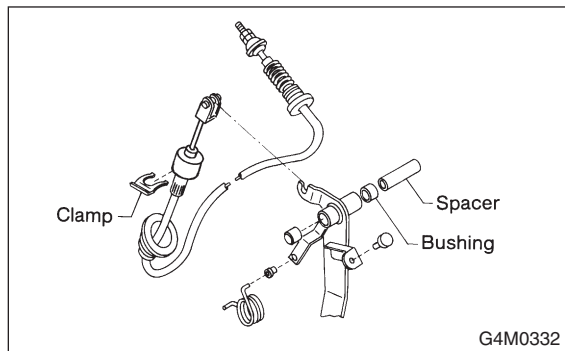
- 3) Disconnect clutch cable from pedal bracket and pedal end.
- 4) Remove clutch cable from body.

CAUTION:

Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.

B: INSTALLATION S504259A11

- 1) Clean clutch pedal fitting hole, and apply grease. Connect clutch cable to clutch pedal.

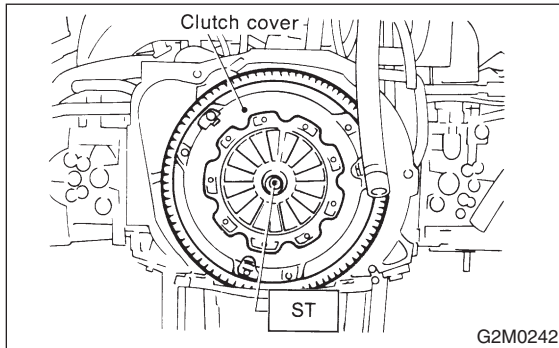


- 2) Fit clutch pedal to pedal bolt, and connect clutch cable to bracket with clamp.
- 3) Connect clutch cable end to pedal end.
- 4) Connect clutch cable from release lever.
- 5) Install grommet to toe board.
- 6) Adjust after cable installation. <Ref. to CL-26 INSTALLATION, Clutch Cable.>

2. Clutch Disc and Cover S504252

A: REMOVAL S504252A18

- 1) Install ST on flywheel.
ST 498497100 CRANKSHAFT STOPPER

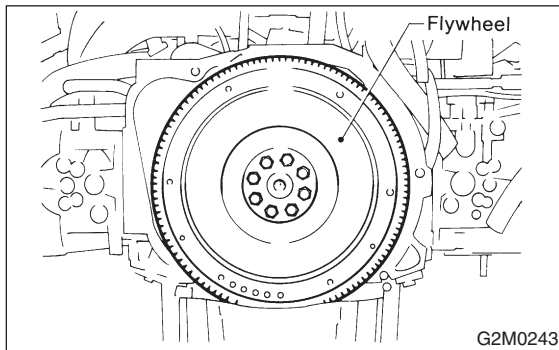


- 2) Remove clutch cover and clutch disc.

CAUTION:

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

- 3) Remove flywheel.



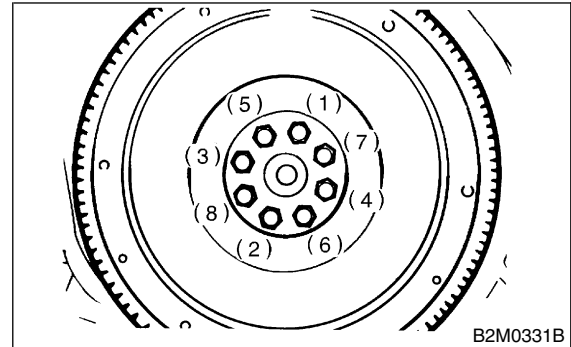
- 2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:

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

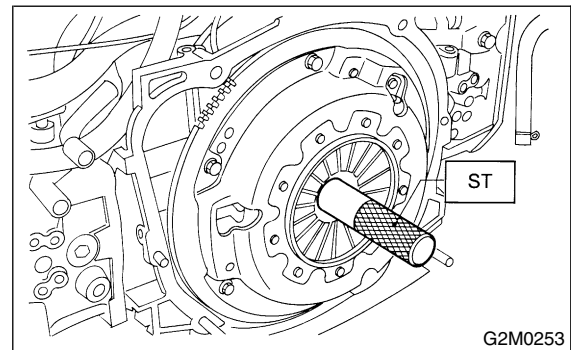
Tightening torque:

72 N·m (7.3 kgf-m, 52.8 ft-lb)



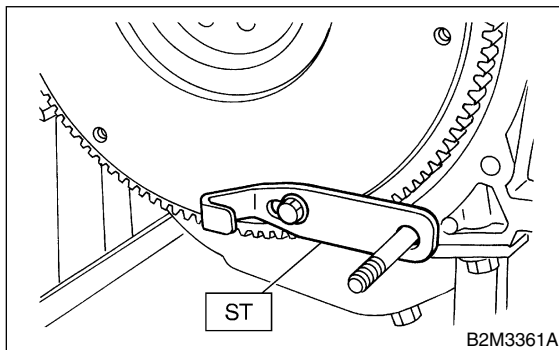
- 3) Insert ST into the clutch disc and install them on the flywheel by inserting the ST end into the pilot bearing.

ST 499747100 CLUTCH DISC GUIDE



B: INSTALLATION S504252A11

- 1) Install flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



CLUTCH DISC AND COVER

Clutch System

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

NOTE:

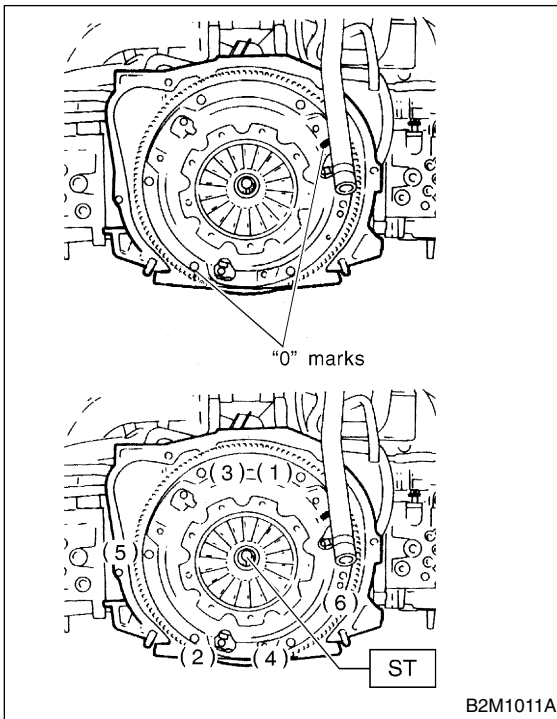
- When installing the clutch cover on the flywheel, position the clutch cover so that there is a gap of 120° or more between "0" marks on the flywheel and clutch cover. ("0" marks indicate the directions of residual unbalance.)
- Note the front and rear of the clutch disc when installing.
- Tighten clutch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

Tightening torque:

15.7 N·m (1.6 kgf-m, 11.6 ft-lb)

5) Remove ST.

ST 499747100 CLUTCH DISC GUIDE



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.

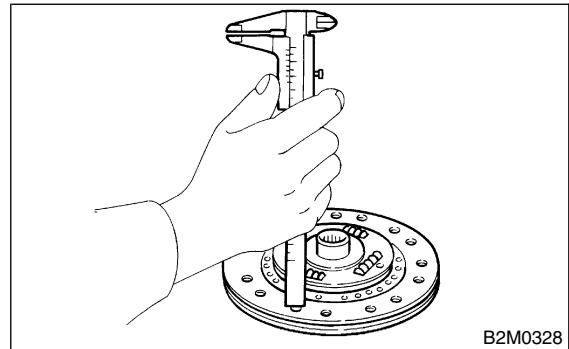
CAUTION:

Do not wash clutch disc with any cleaning fluid.

Depth of rivet head:

Limit of sinking

0.3 mm (0.012 in)

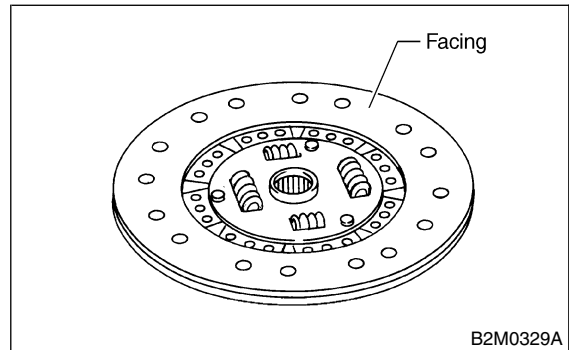


2) Hardened facing

Correct by using emery paper or replace.

3) Oil soakage on facing

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

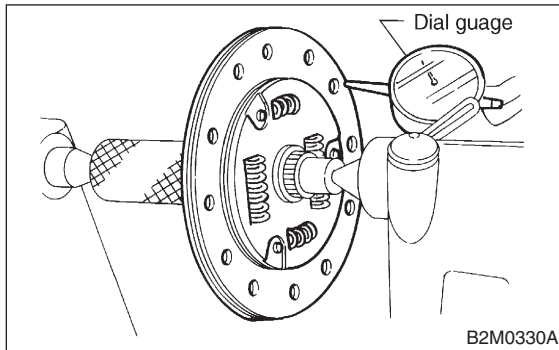


4) Deflection on facing

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

Limit for runout:

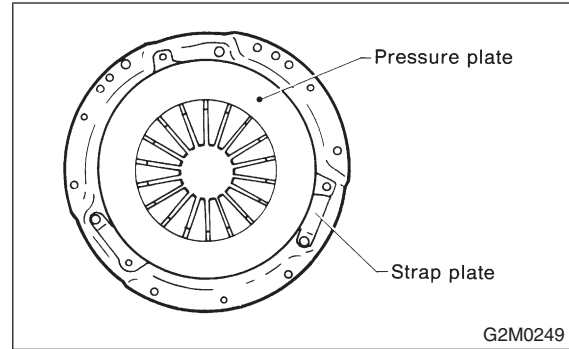
1.0 mm (0.039 in) at R = 107 mm (4.21 in)



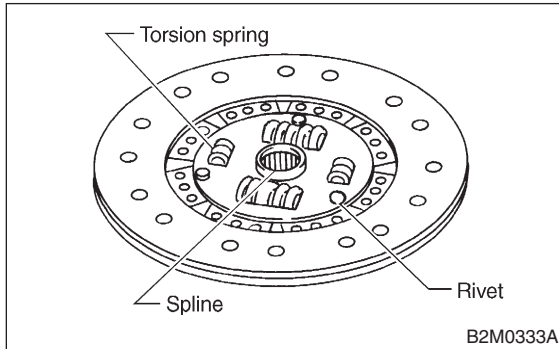
3) Damaged or worn disc contact surface of pressure plate.

4) Loose strap plate setting bolt.

5) Worn diaphragm sliding surface.



5) Worn spline, loose rivets and torsion spring failure Replace defective parts.



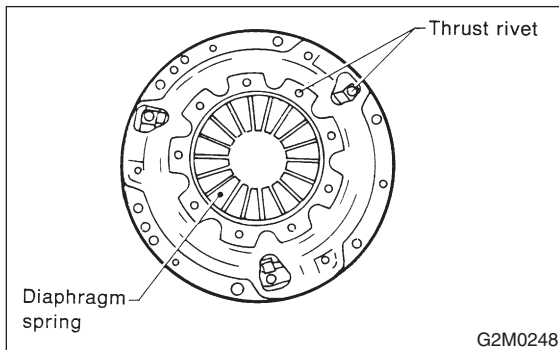
2. CLUTCH COVER

S504252A1002

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.



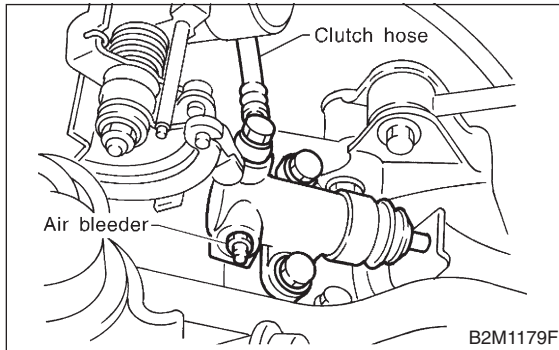
8. Clutch Fluid Air Bleeding S504260

A: PROCEDURE S504260E45

NOTE:

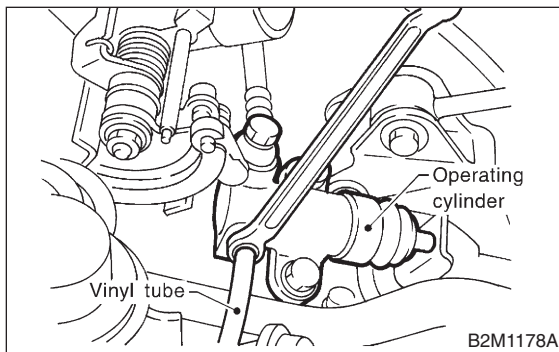
Bleed air from oil line with the help of a co-worker.

- 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.



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

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



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

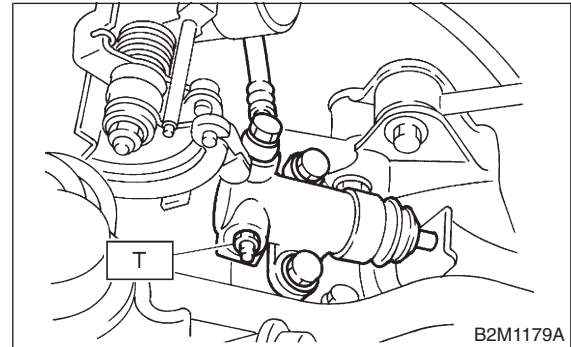
CAUTION:

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

- 5) Tighten air bleeder.

Tightening torque:

T: 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.

7. Clutch Fluid SS04261

A: REPLACEMENT SS04261A20

CAUTION:

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

NOTE:

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

Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

- 5) Bleed air from oil line with the help of a co-worker.
- <Ref. to CL-21 PROCEDURE, Clutch Fluid Air Bleeding.>

9. Clutch Pedal S504256

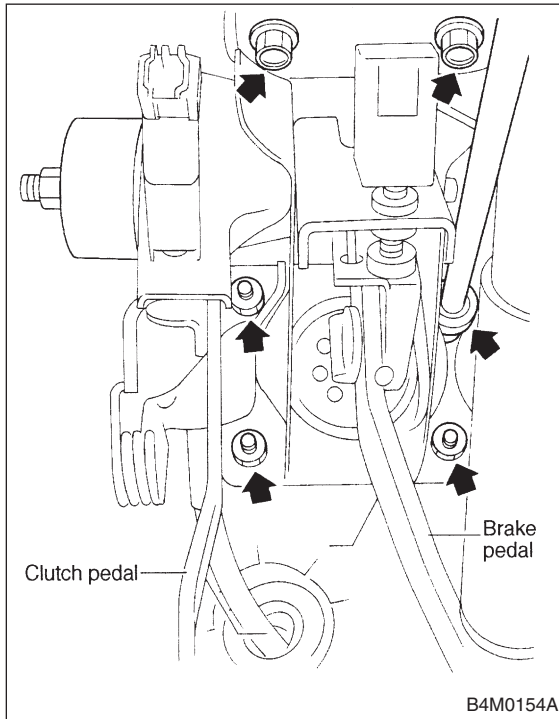
A: REMOVAL S504256A18

1. MECHANICAL APPLICATION TYPE S504256A1801

- 1) Disconnect ground cable from battery.
- 2) Disconnect clutch cable from release lever.
- 3) Remove instrument panel lower cover from instrument panel.
- 4) Disconnect the following parts from pedal bracket.
 - (1) Operating rod of brake booster
 - (2) Electrical connectors (for stop light switch, etc.)
- 5) Remove clevis pin which secures pedal to push rod.
- 6) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal bracket and clutch cable as a unit.

CAUTION:

Before removing clutch cable from toe board, remove grommet. Slowly remove clutch cable, being careful not to scratch it.



- 7) Depress clutch pedal, disconnect clutch cable from clutch pedal.

2. HYDRAULIC APPLICATION TYPE S504256A1802

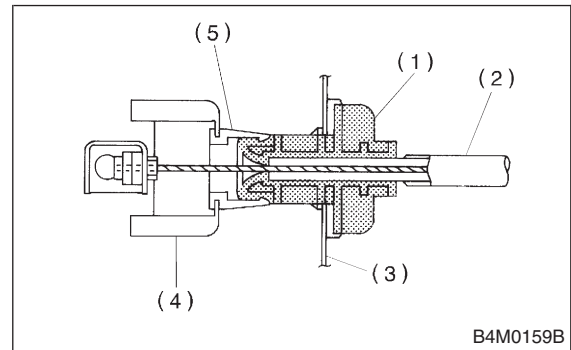
- 1) Remove steering bolts.
- 2) Raise vehicle on hoist and remove the two bolts which secure steering unit to underside of body.
- 3) Lower vehicle to floor.
- 4) Remove instrument panel lower cover from instrument panel.
- 5) Disconnect the following parts from pedal bracket.
 - Operating rod of brake booster
 - Electrical connectors (for stop light switch, etc.)
- 6) Remove clevis pin which secures lever to push rod.
- 7) Remove nut which secures clutch master cylinder.
- 8) Remove steering assembly.
- 9) Remove bolts and nuts which secure brake and clutch pedals, and remove pedal assembly.

B: INSTALLATION S504256A11

- 1) Install in the reverse order of removal.

CAUTION:

- Be careful not to bend clutch cable too much.
- Never fail to cover outer cable end with boot.
- Be careful not to kink accelerator cable.
- Make sure that holder and casing cap are securely connected.



- (1) Casing cap
- (2) Accelerator cable
- (3) Toe board
- (4) Accelerator pedal bracket
- (5) Holder

- 2) Adjust clutch pedal (2500 cc model) <Ref. to CL-24 ADJUSTMENT, Clutch Pedal.>
- 3) Adjustment after pedal installation <Ref. to CL-24 ADJUSTMENT, Clutch Pedal.>

C: ASSEMBLY SS04256A02

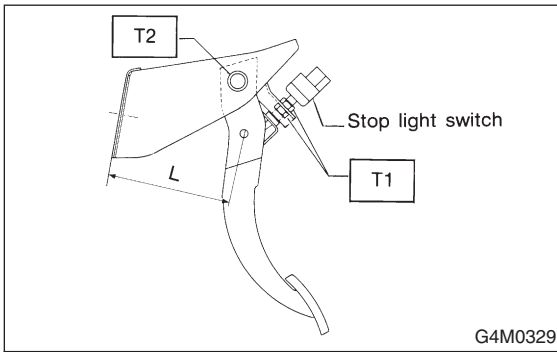
- 1) Attach stop light switch, etc. to pedal bracket temporarily.
- 2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
- 3) Align bores of pedal bracket, clutch pedal and brake pedal, attach brake pedal return spring and clutch pedal effort reducing spring,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

NOTE:

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

Tightening torque:

T2: 29 N·m (3.0 kgf-m, 21.7 ft-lb)



- 4) Set brake pedal position by adjusting position of stop light switch.

Pedal position: L

125.9 mm (4.96 in)

Tightening torque:

T1: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

D: INSPECTION SS04256A10

1. CLUTCH PEDAL SS04256A1001

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

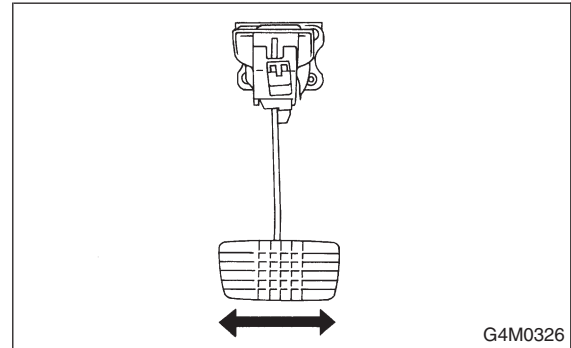
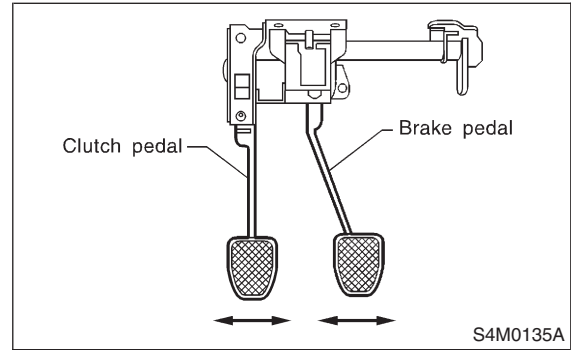
CAUTION:

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

Deflection of brake and clutch pedal:

Service limit

5.0 mm (0.197 in) or less

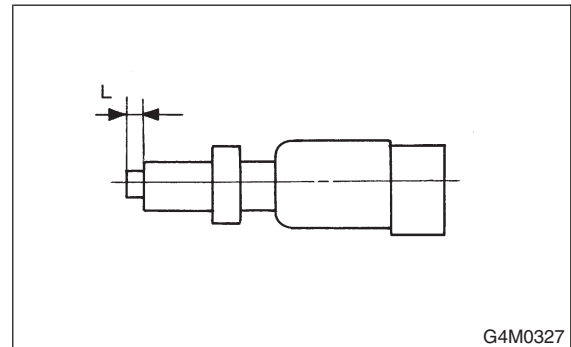


2. CLUTCH SWITCH SS04256A1002

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

Specified position: L

$2^{+1.5}_{-0} \text{ mm (0.079}^{+0.059}_{-0} \text{ in)}$



CLUTCH PEDAL

Clutch System

E: ADJUSTMENT

S504256A01

1. MECHANICAL APPLICATION TYPE

S504256A0102

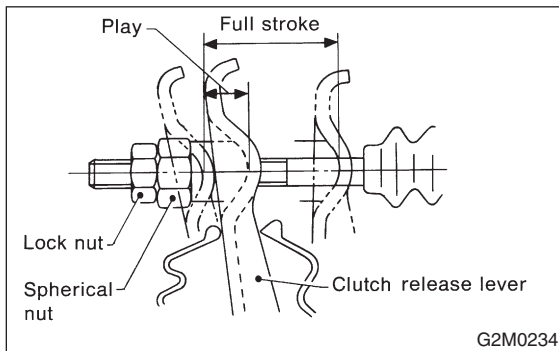
- 1) Remove clutch release lever return spring from lever.
- 2) Adjust spherical nut so that the play is within the specified value at the lever end (center of spherical nut).

CAUTION:

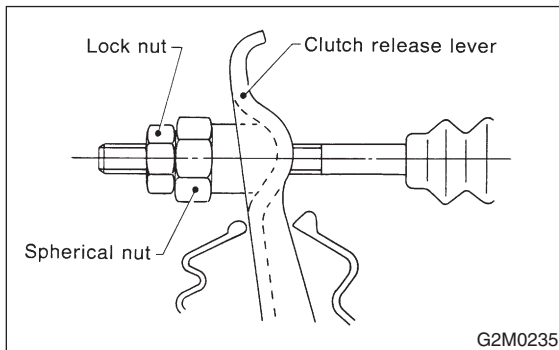
Take care not to twist the cable during adjustment.

Play: 3 — 4 mm (0.12 — 0.16 in)

Full stroke: 24 — 26 mm (0.94 — 1.02 in)



- 3) Upon completion of adjustment, securely lock spherical nut with lock nut.

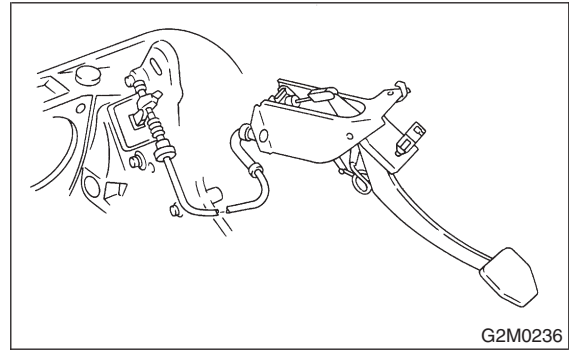


- 4) Install return spring on lever.

NOTE:

Hook the long hook side of the return spring with the lever.

- 5) Depress clutch pedal to assure there is no abnormality in the clutch system.



2. HYDRAULIC APPLICATION TYPE

S504256A0103

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

CAUTION:

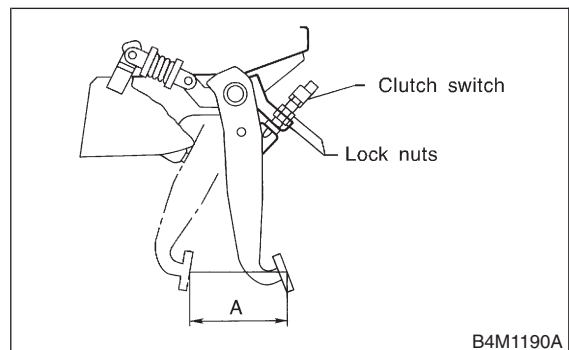
Do not attempt to turn clutch switch to adjust clutch pedal full stroke length.

NOTE:

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

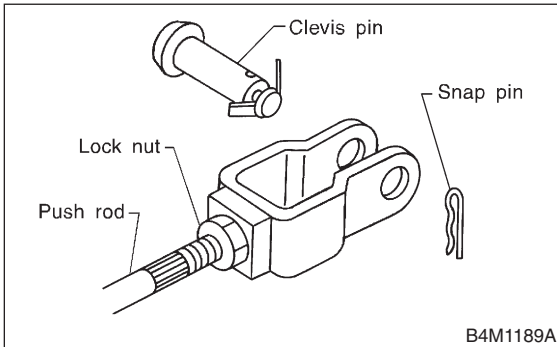
Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):
8 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):
10 N·m (1.0 kgf-m, 7.2 ft-lb)



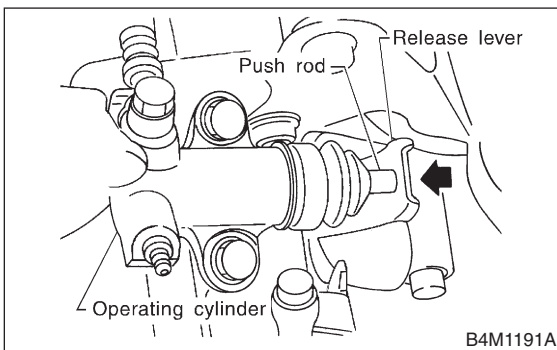
3) Depress and release clutch pedal 2 to 3 times to ensure that clutch pedal and release fork operate smoothly. If clutch pedal and release fork do not operate smoothly, bleed air from clutch hydraulic system. <Ref. to CL-21 PROCEDURE, Clutch Fluid Air Bleeding.>

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.

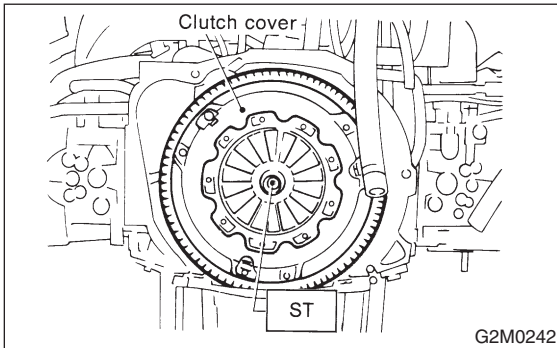
6) Push release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace master cylinder with new one. <Ref. to CL-18 INSTALLATION, Master Cylinder.>



3. Flywheel S504250

A: REMOVAL S504250A18

- 1) Install ST on flywheel.
ST 498497100 CRANKSHAFT STOPPER

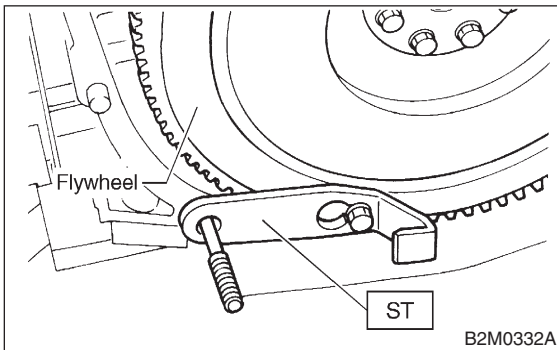


- 2) Remove clutch cover and clutch disc.

CAUTION:

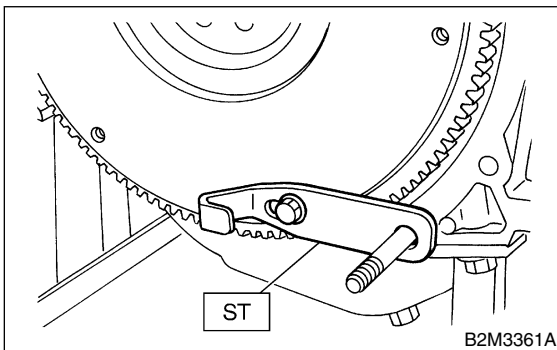
- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either clutch cover or clutch disc.

- 3) Remove flywheel.



B: INSTALLATION S504250A11

- 1) Install flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



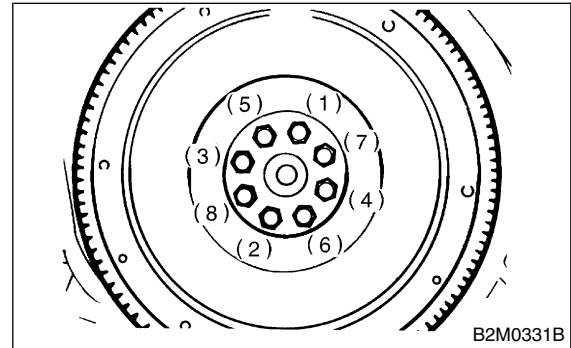
- 2) Tighten the flywheel attaching bolts to the specified torque.

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)

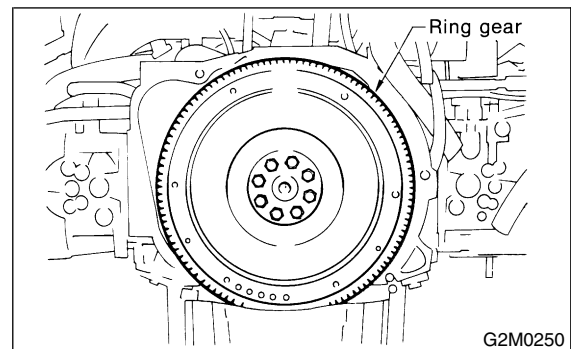


C: INSPECTION S504250A10

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.



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

GENERAL DESCRIPTION

Clutch System

1. General Description SS04001

A: SPECIFICATIONS SS04001E49

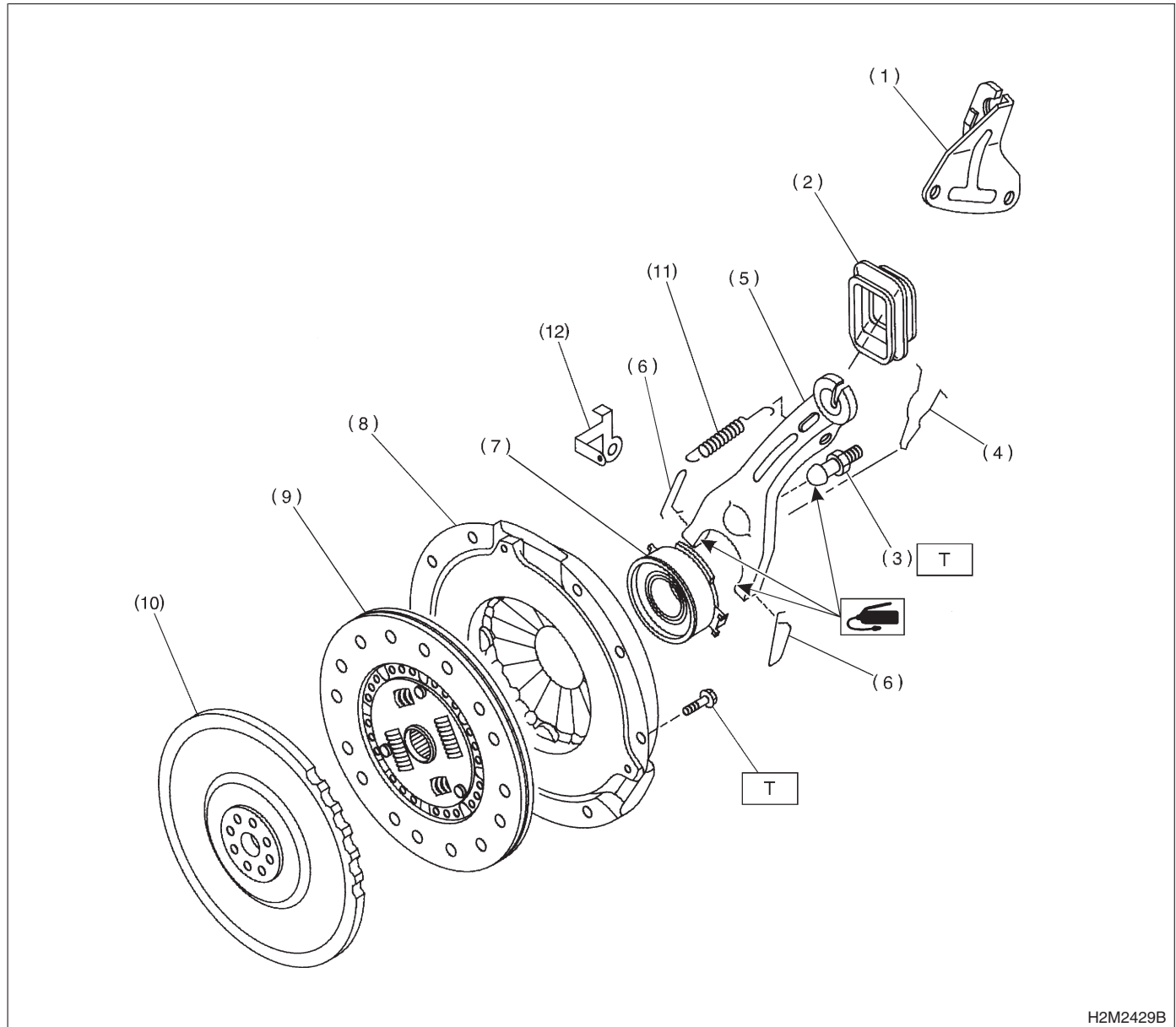
			2200 cc	2500 cc
Clutch cover			450 (992)	580 (1,279)
Clutch disc	Diaphragm set load	kg (lb)		
	Facing material		Woven	
	O.D. × I.D. × thickness	mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)	
	Spline O.D. (No. of teeth)	mm (in)	25.2 (0.992) (24)	
	Depth of rivet head mm (in)	Limit of sinking	0.3 (0.012)	
Limit for runout			1.0 (0.039) at R = 107 (4.21)	
Clutch release lever ratio			3.0	1.6
Clutch release lever	Stroke	mm (in)	24 — 26 (0.94 — 1.02)	12 — 13.6 (0.472 — 0.535)
	Play at clutch release lever center	mm (in)	3 — 4 (0.12 — 0.16)	—
Clutch release bearing			Grease-packed self-aligning	
Clutch pedal	Full stroke	mm (in)	140 — 145 (5.51 — 5.71)	130 — 135 (5.12 — 5.31)
	Free play	mm (in)	10 — 20 (0.39 - 0.79)	4 — 13 (0.16 - 0.51)

O.D.; Outer Diameter I.D.; Inner Diameter

B: COMPONENT S504001A05

1. CLUTCH SYSTEM S504001A0501

● Mechanical Application Type



H2M2429B

- (1) Clutch cable bracket
- (2) Clutch release lever sealing
- (3) Pivot
- (4) Retainer spring
- (5) Clutch release lever

- (6) Clip
- (7) Clutch release bearing
- (8) Clutch cover
- (9) Clutch disc
- (10) Flywheel

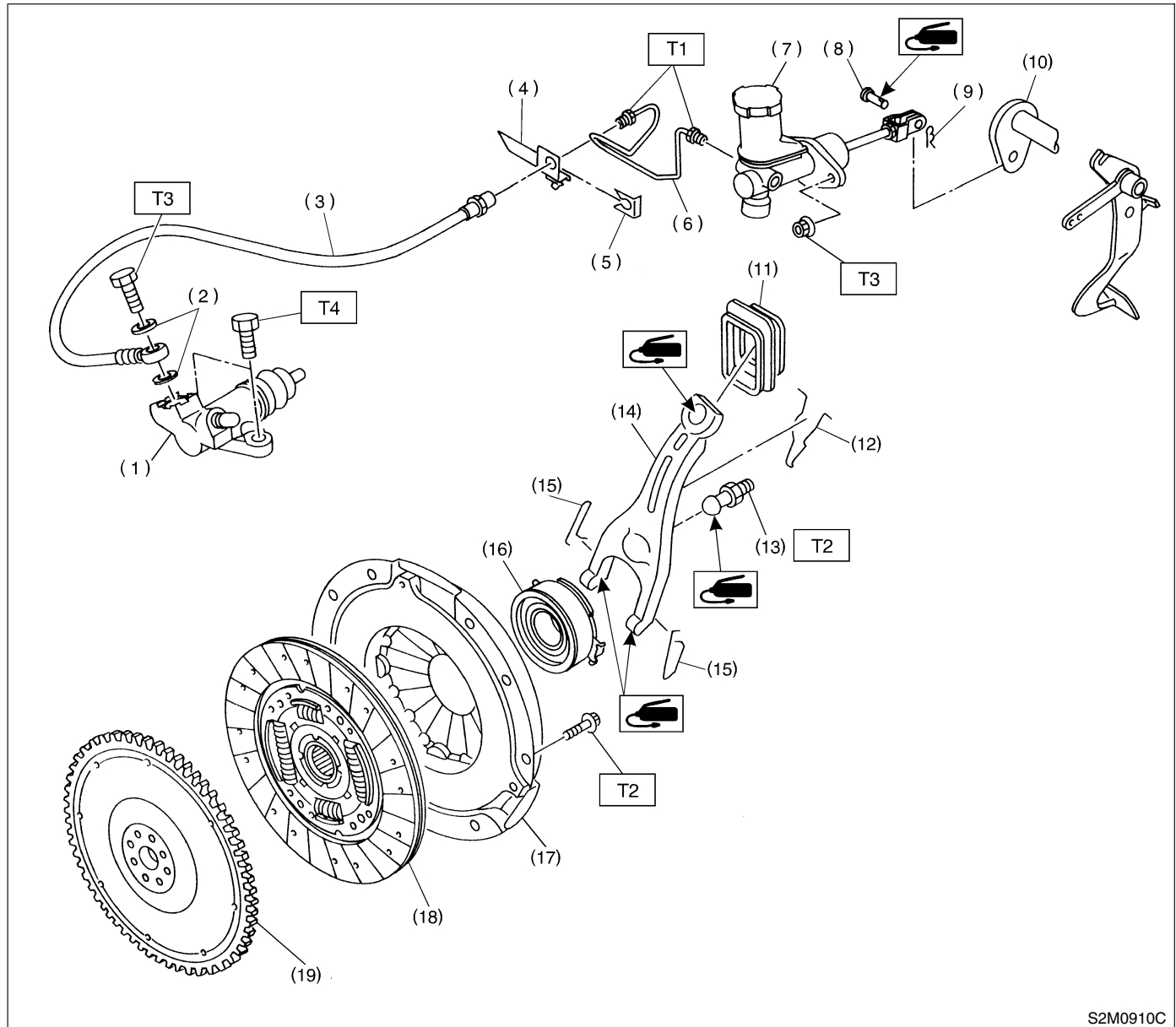
- (11) Return spring
- (12) Clutch return spring bracket

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

GENERAL DESCRIPTION

Clutch System

● Hydraulic Application Type



S2M0910C

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

Tightening torque: N·m (kgf-m, ft-lb)

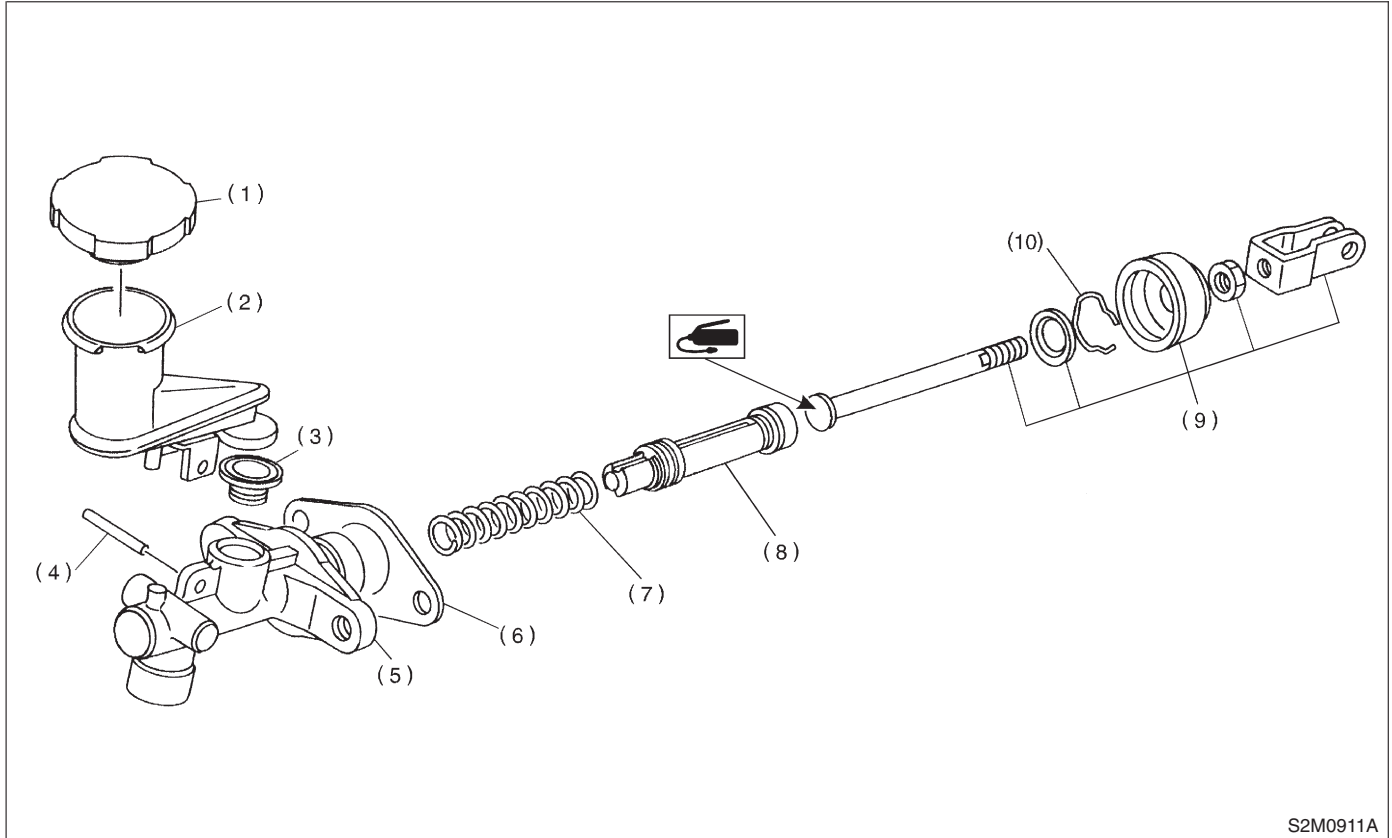
T1: 15 (1.5, 10.8)

T2: 15.7 (1.6, 11.6)

T3: 18 (1.8, 13.0)

T4: 37 (3.8, 27.5)

2. MASTER CYLINDER S504001A0502



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

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

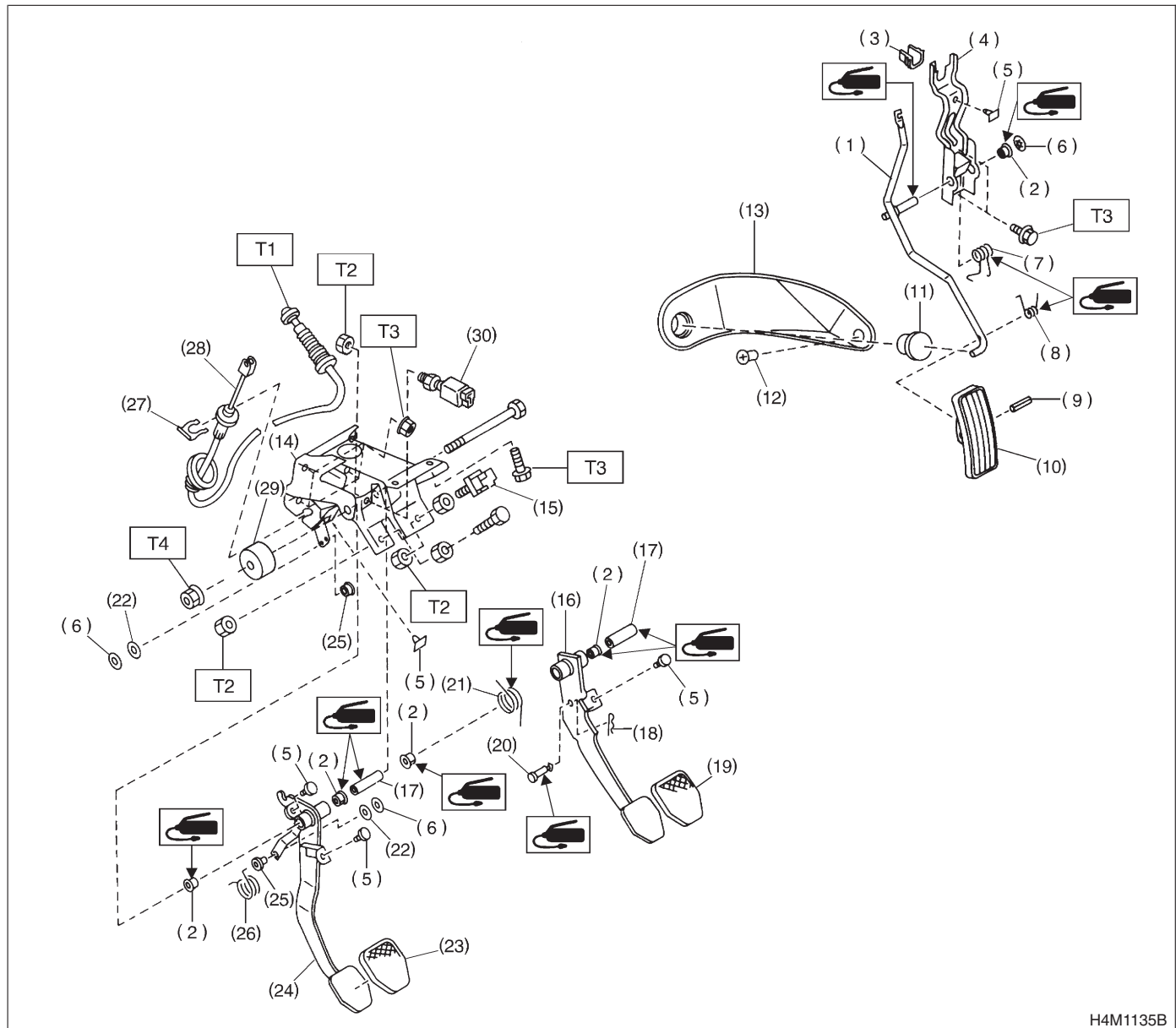
- (9) Push rod
- (10) Piston stop ring

GENERAL DESCRIPTION

Clutch System

3. CLUTCH PEDAL S504001A0503

● 2200 cc Model



H4M1135B

- | | | |
|------------------------------|-------------------------|--|
| (1) Accelerator pedal | (14) Pedal bracket | (27) Clutch cable clamp |
| (2) Bushing | (15) Stop light switch | (28) Clutch cable |
| (3) Holder | (16) Brake pedal | (29) Mass damper |
| (4) Accelerator bracket | (17) Spacer | (30) Clutch switch (Starter interlock) |
| (5) Stopper | (18) Snap pin | |
| (6) Clip | (19) Brake pedal pad | |
| (7) Accelerator spring | (20) Clevis pin | |
| (8) Accelerator pedal spring | (21) Brake pedal spring | |
| (9) Spring pin | (22) Washer | |
| (10) Accelerator pedal pad | (23) Clutch pedal pad | |
| (11) Accelerator stopper | (24) Clutch pedal | |
| (12) Clip | (25) Bushing assist | |
| (13) Accelerator plate | (26) Spring assist | |

Tightening torque: N·m (kgf-m, ft-lb)

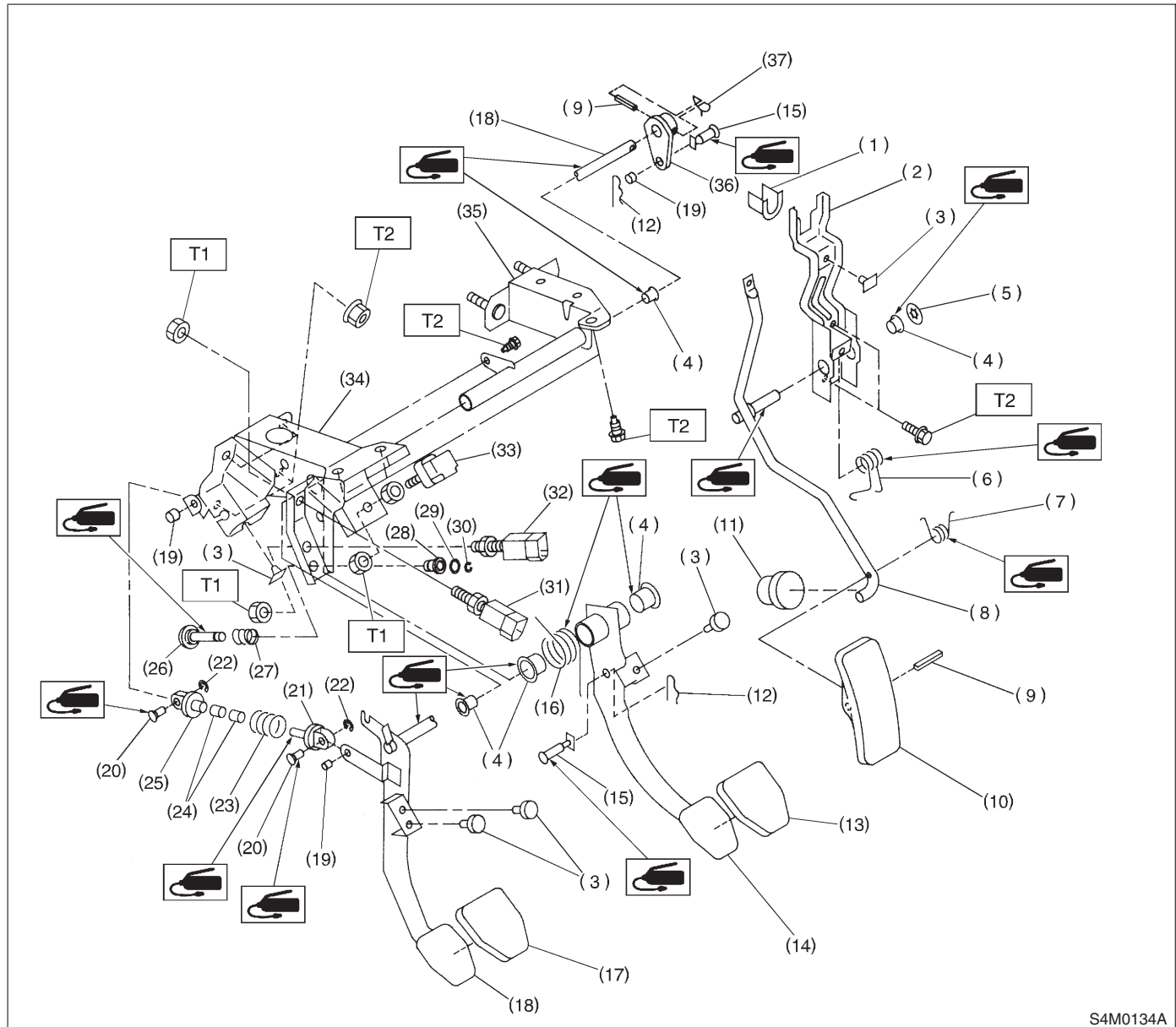
T1: 5.9 (0.60, 4.3)

T2: 8 (0.8, 5.8)

T3: 18 (1.8, 13.0)

T4: 29 (3.0, 21.7)

● 2500 cc Model



S4M0134A

- | | | |
|------------------------------|-------------------------|--|
| (1) Holder | (16) Brake pedal spring | (31) Clutch switch (Starter interlock) |
| (2) Accelerator bracket | (17) Clutch pedal pad | (32) Clutch switch (With cruise control) |
| (3) Stopper | (18) Clutch pedal | (33) Stop light switch |
| (4) Bushing | (19) Bushing C | (34) Pedal bracket |
| (5) Clip | (20) Clutch clevis pin | (35) Clutch master cylinder bracket |
| (6) Accelerator spring | (21) Assist rod A | (36) Lever |
| (7) Accelerator pedal spring | (22) Clip | (37) Lock wire |
| (8) Accelerator pedal | (23) Assist spring | |
| (9) Spring pin | (24) Assist bushing | |
| (10) Accelerator pedal pad | (25) Assist rod B | |
| (11) Accelerator stopper | (26) Rod S | |
| (12) Snap pin | (27) Spring S | |
| (13) Brake pedal pad | (28) Bushing S | |
| (14) Brake pedal | (29) O-ring | |
| (15) Clevis pin | (30) Clip | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.8)

T2: 18 (1.8, 13.0)

GENERAL DESCRIPTION

Clutch System

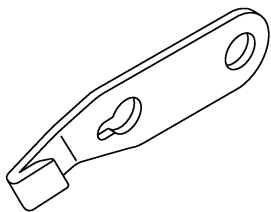
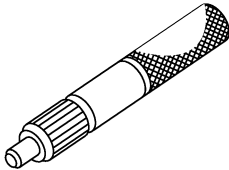
C: CAUTION S504001A03

- 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 TOOL S504001A1701

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

2. GENERAL TOOL S504001A1702

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

11. General Diagnostic Table

S504257

A: INSPECTION

S504257A10

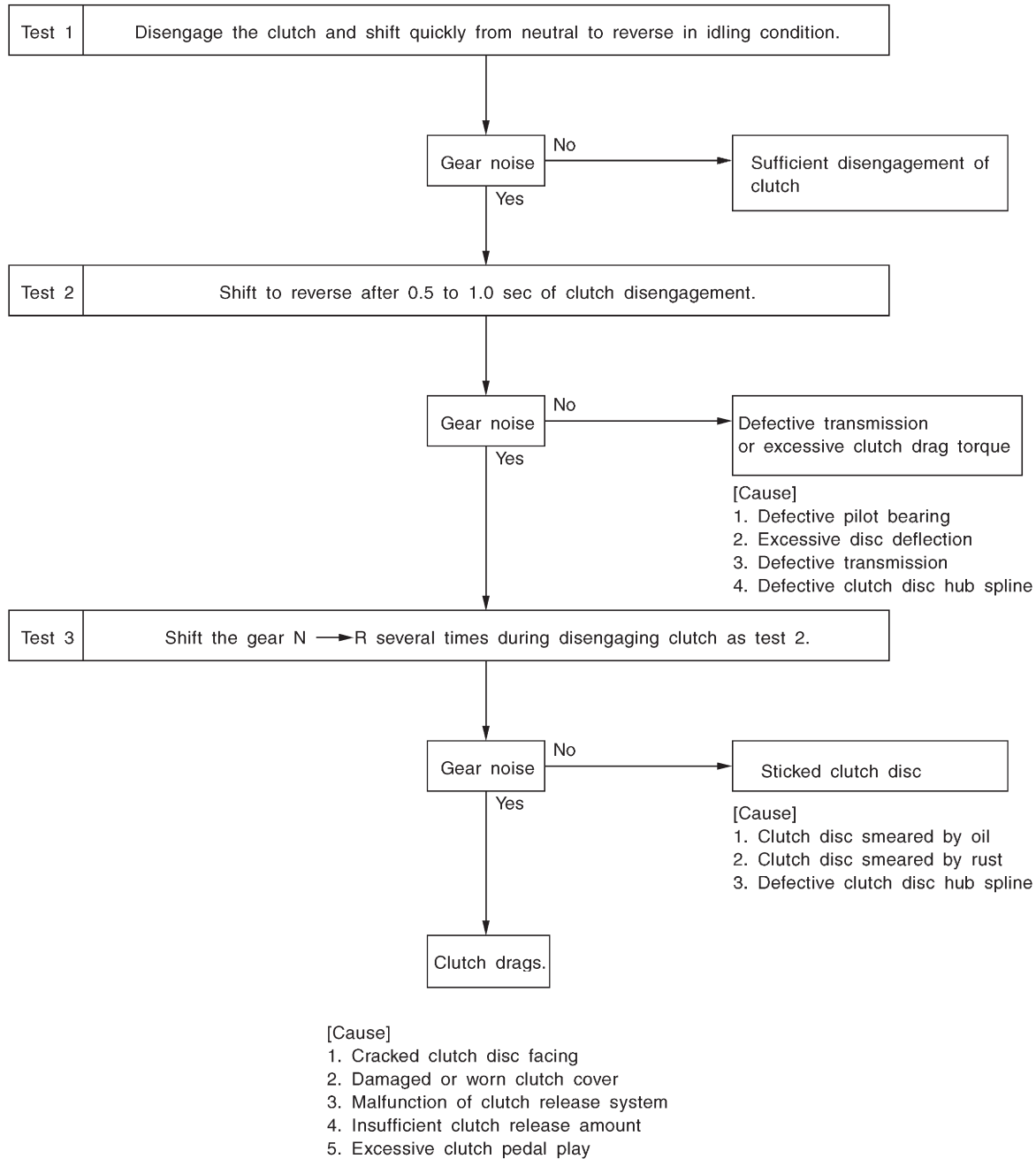
Symptom	Possible cause	Corrective action
1. Clutch slippage It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms. • Engine revs up when shifting. • High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. • Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. • Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.	(a) No clutch pedal play	Readjust.
	(b) No clutch release lever end play	Readjust.
	(c) Clutch facing smeared by oil	Replace.
	(d) Worn clutch facing	Replace.
	(e) Deteriorated diaphragm spring	Replace.
	(f) Distorted pressure plate or flywheel	Correct or replace.
	(g) Defective clutch release bearing holder	Correct or replace.
	(h) Defective pedal and cable system	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after. • Method of testing: Refer to "1. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG". It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Excessive clutch pedal play	Readjust.
	(b) Excessive clutch release lever play	Readjust.
	(c) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(d) Excessive deflection of clutch disc facing	Correct or replace.
	(e) Seized crankshaft pilot needle bearing	Replace.
	(f) Malfunction of pedal and cable system	Correct or replace.
	(g) Cracked clutch disc facing	Replace.
	(h) Sticked clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Improper clutch cable routing	Correct.
	(b) Adhesion of oil on the facing	Replace clutch disc.
	(c) Weak or broken torsion spring	Replace clutch disc.
	(d) Defective facing contact or excessive disc	Replace clutch disc deflection.
	(e) Warped pressure plate or flywheel	Correct or replace.
	(f) Loose disc rivets	Replace clutch disc.
	(g) Loose engine mounting	Retighten or replace mounting.
	(h) Improper adjustment of pitching stopper	Adjustment.

GENERAL DIAGNOSTIC TABLE

Clutch System

Symptom	Possible cause	Corrective action
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated clutch release bearing	Replace clutch 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	Take off rust, apply grease or replace clutch shaft disc or mainshaft.
	(d) Deteriorated or broken torsion spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.
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.

1. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG SS04257A1001



B2M1012A

GENERAL DIAGNOSTIC TABLE

Clutch System

MEMO:

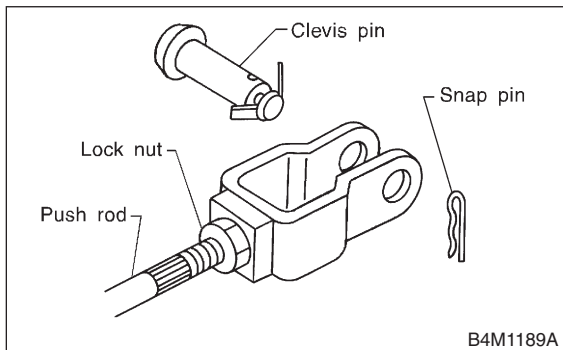
MASTER CYLINDER

Clutch System

6. Master Cylinder S504168

A: REMOVAL S504168A18

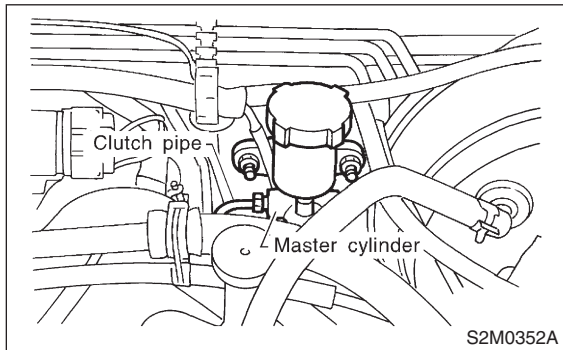
- 1) Thoroughly drain brake fluid from reservoir tank.
- 2) Remove snap pin, clevis pin and separate push rod of master cylinder from clutch pedal.



- 3) Remove clutch pipe from master cylinder.
- 4) Remove master cylinder with reservoir tank.

CAUTION:

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



B: INSTALLATION S504168A11

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

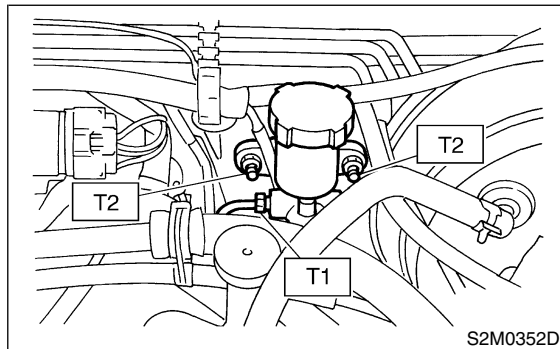
CAUTION:

Check that pipe is routed properly.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

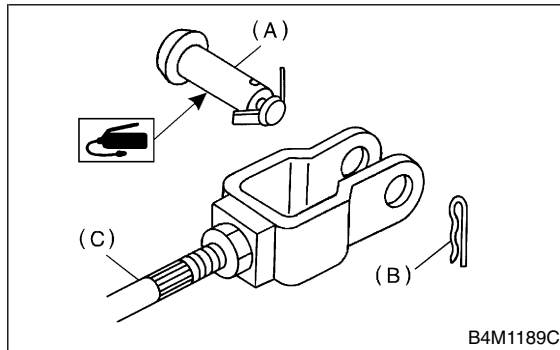
T2: 18 N·m (1.8 kg-m, 13.0 ft-lb)



- 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

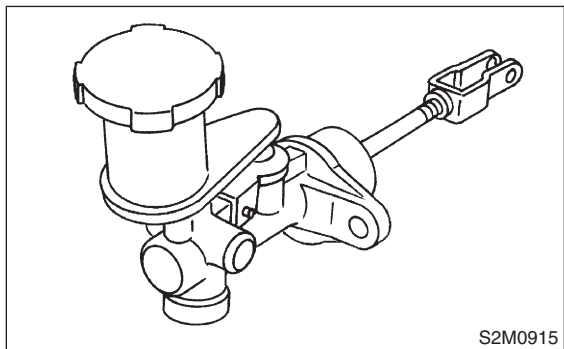
- 3) After bleeding air from system, ensure that clutch operates properly.

<Ref. to CL-21 PROCEDURE, Clutch Fluid Air Bleeding.>

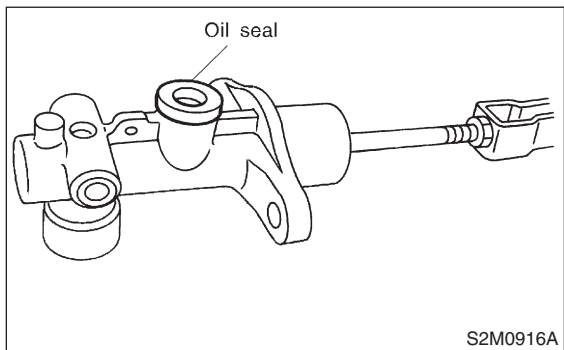
C: DISASSEMBLY

S504168A06

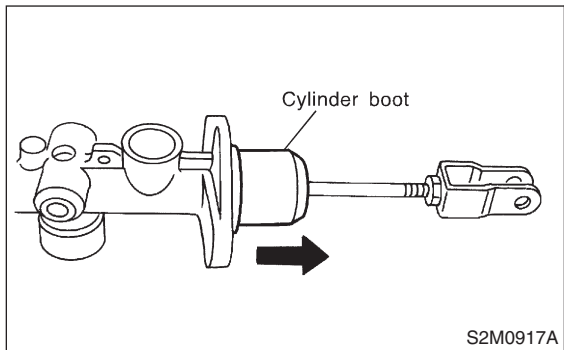
- 1) Remove straight pin and reservoir tank.



- 2) Remove oil sealing.



- 3) Move the cylinder boot backward.



- 4) Remove snap ring.

CAUTION:

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

D: ASSEMBLY

S504168A02

CAUTION:

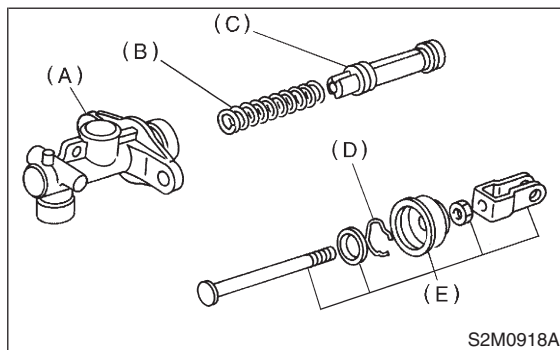
Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

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.

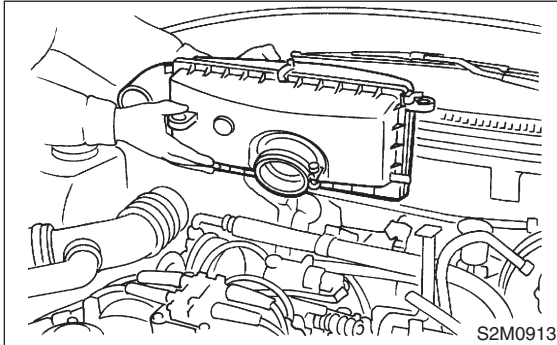


- (A) Master cylinder body
- (B) Return spring
- (C) Piston
- (D) Snap ring
- (E) Rod ASSY

5. Operating Cylinder S504253

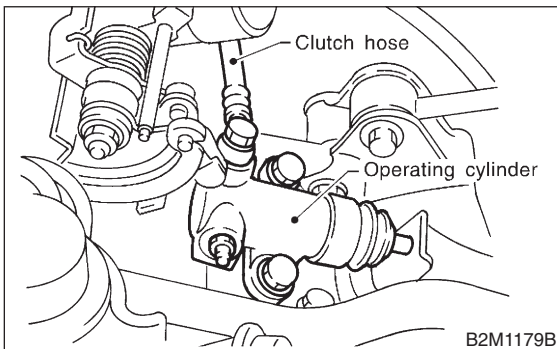
A: REMOVAL S504253A18

- 1) Remove air cleaner case.
<Ref. to IN-4 REMOVAL, Air Cleaner Case.>

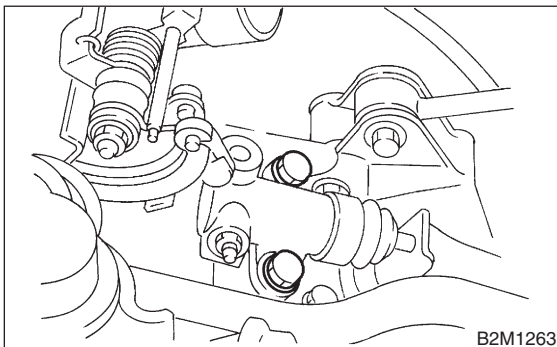


- 2) Remove clutch hose from operating cylinder.

CAUTION:
Cover hose joint to prevent brake fluid from flowing out.



- 3) Remove operating cylinder from transmission.



B: INSTALLATION S504253A11

- 1) Install in the reverse order of removal.

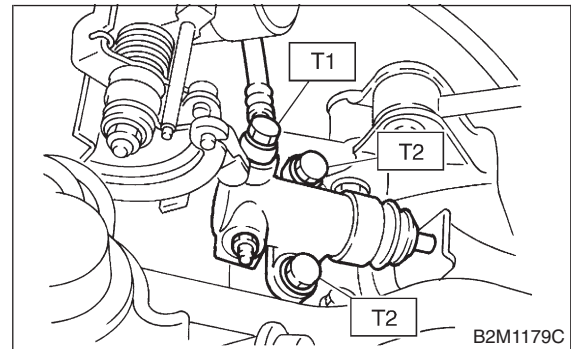
NOTE:

Before installing operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of clutch 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-21 PROCEDURE, 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.

4. Release Bearing and Lever

S504251

A: REMOVAL S504251A18

1. MECHANICAL APPLICATION TYPE

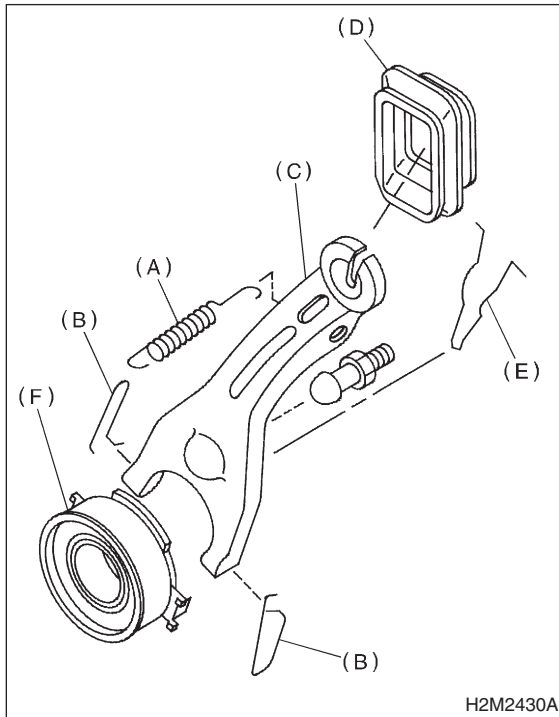
S504251A1801

- 1) Remove clutch release lever return spring.
- 2) Remove the two clips from clutch release lever and remove clutch release bearing.

CAUTION:

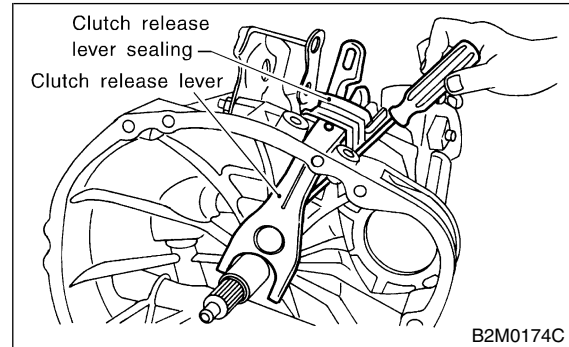
Be careful not to deform clips.

- 3) Remove clutch release lever sealing.



- (A) Clutch release lever return spring
- (B) Clip
- (C) Clutch release lever
- (D) Clutch release lever sealing
- (E) Retainer spring
- (F) Clutch release bearing

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



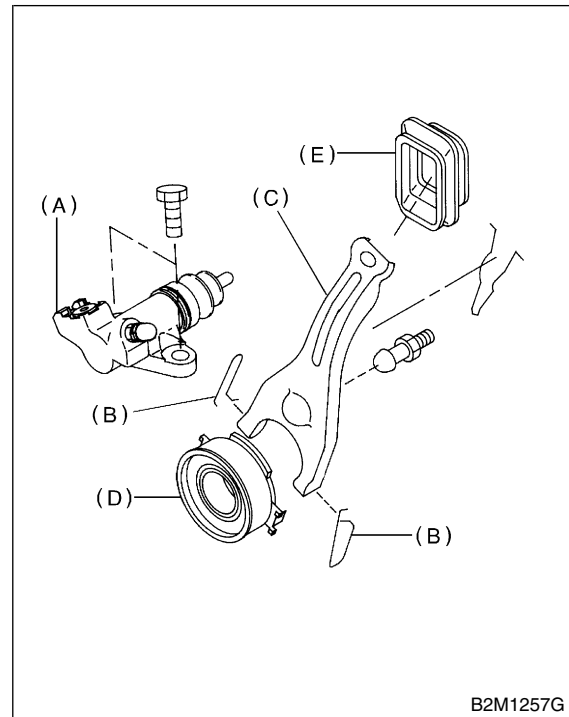
2. HYDRAULIC APPLICATION TYPE S504251A1802

- 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 clutch release bearing.

CAUTION:

Be careful not to deform clips.

- 3) Remove clutch release lever sealing.

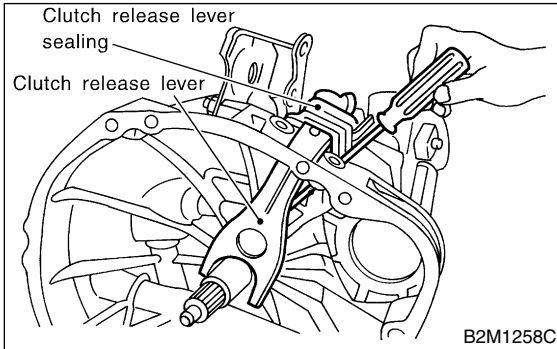


- (A) Operating cylinder
- (B) Clip
- (C) Clutch release lever
- (D) Clutch release bearing
- (E) Clutch release lever sealing

RELEASE BEARING AND LEVER

Clutch System

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



B: INSTALLATION

S504251A11

1. MECHANICAL APPLICATION TYPE

S504251A1101

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.)

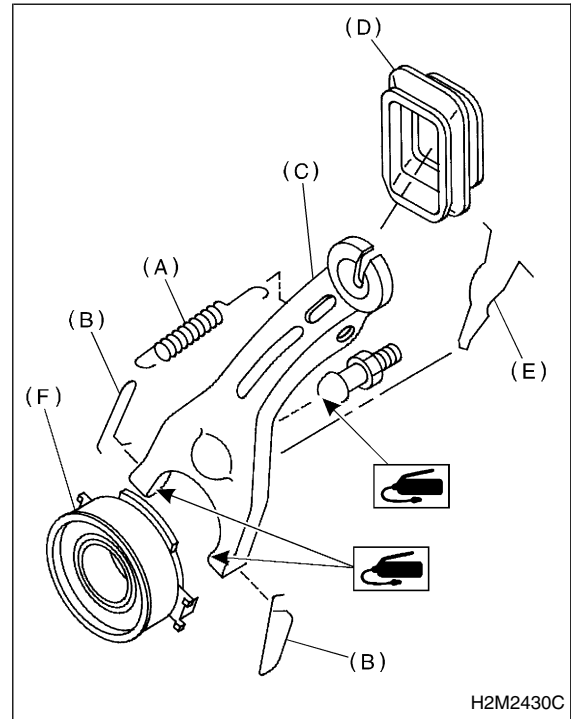
1) While pushing clutch release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:

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

2) Install clutch release bearing and fasten it with two clips.

3) Install clutch release lever sealing.

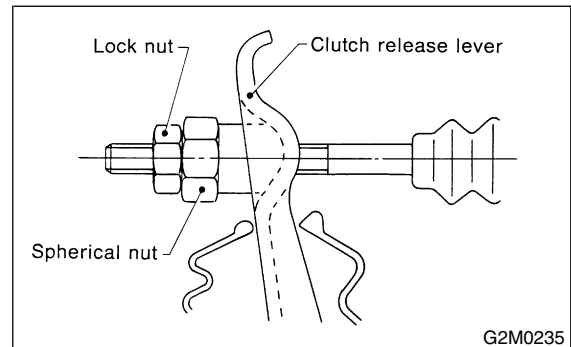


- (A) Clutch release lever return spring
- (B) Clip
- (C) Clutch release lever
- (D) Clutch release lever sealing
- (E) Retainer spring
- (F) Clutch release bearing

4) After remounting engine and transmission on body, make adjustment of the clutch release lever end play.

CAUTION:

Take care not to twist the cable during adjustment.



5) Install clutch release lever return spring.

NOTE:

Hook up the return spring to right side hole of the clutch release lever.

2. HYDRAULIC APPLICATION TYPE SS04251A1102**CAUTION:**

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

- Inner groove of clutch release bearing
- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)

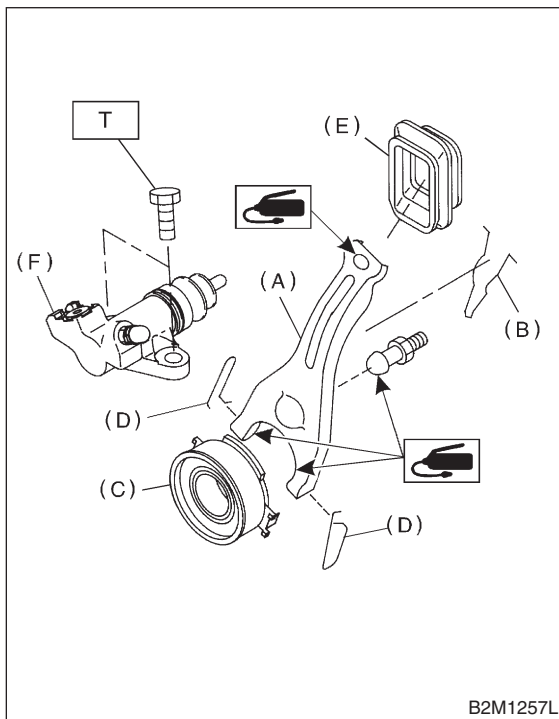
1) While pushing clutch release lever to pivot and twisting it to both sides, fit retainer spring onto the constricted portion of pivot.

NOTE:

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

Tightening torque:

T: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



- (A) Clutch release lever
 (B) Retainer spring
 (C) Clutch release bearing
 (D) Clip
 (E) Clutch release lever sealing
 (F) Operating cylinder

5) After remounting engine and transmission on body.

<Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

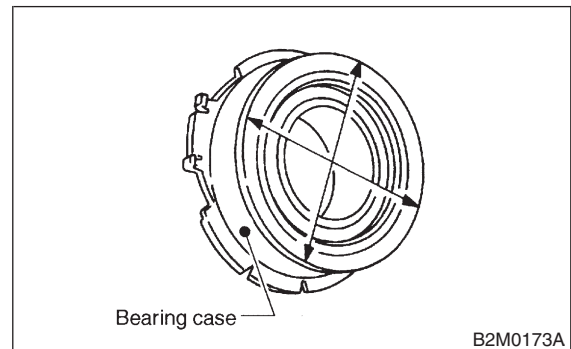
6) Bleed air from oil line with the help of a co-worker.

<Ref. to CL-21 PROCEDURE, Clutch Fluid Air Bleeding.>

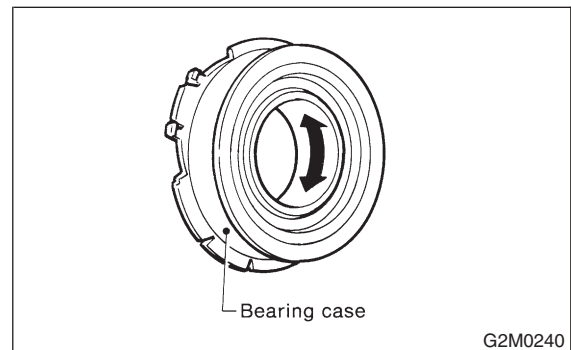
C: INSPECTION SS04251A10**1. RELEASE BEARING** SS04251A1001**CAUTION:**

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

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



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



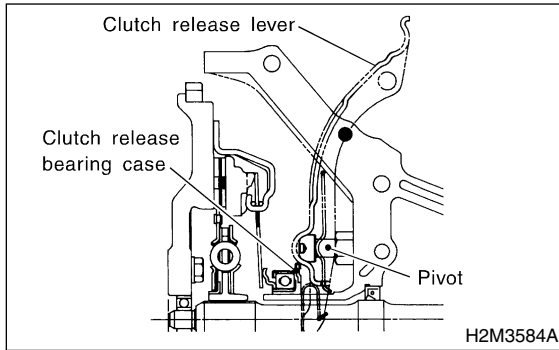
3) Check wear and damage of bearing case surface contacting with lever.

RELEASE BEARING AND LEVER

Clutch System

2. RELEASE LEVER S504251A1002

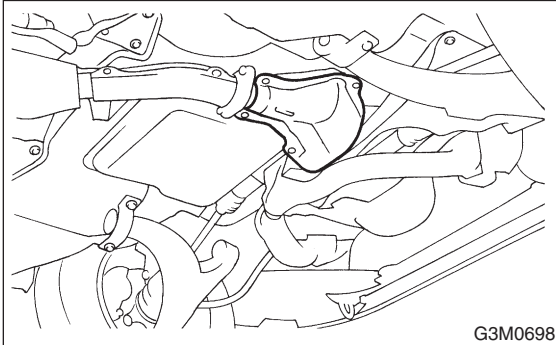
Check lever pivot portion and the point of contact with clutch release bearing case for wear.



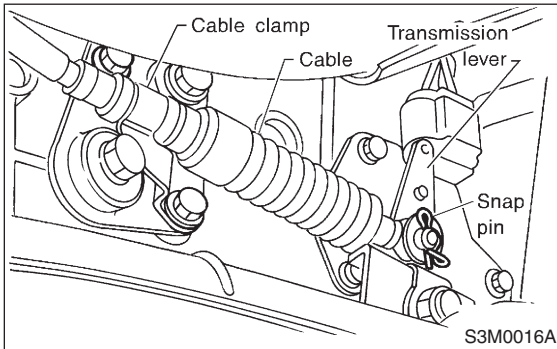
2. AT Select Lever S501548

A: REMOVAL S501548A18

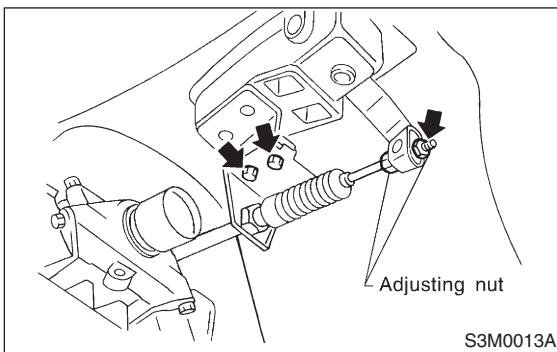
- 1) Remove the cable.
 - (1) Prior to removal, set lever to "N" position.
 - (2) Remove front exhaust pipe.



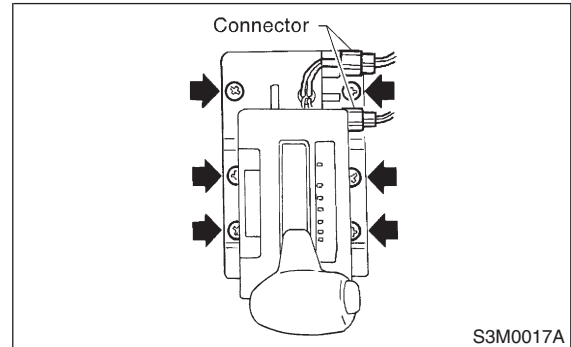
- (3) Separate cable from transmission lever.
- (4) Remove clamp from transmission case.



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



- 2) Remove console box. <Ref. to EI-24 REMOVAL, Console Box.>
- 3) Disconnect the connectors, then remove the six screws to take out the select lever assembly from the body.

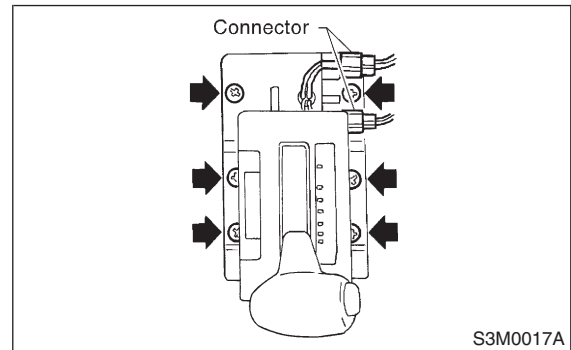


B: INSTALLATION S501548A11

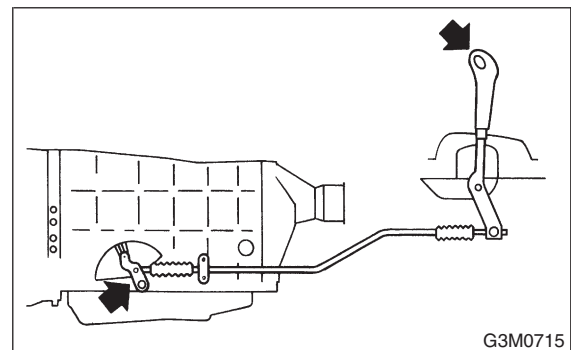
- 1) Mount the select lever onto the vehicle body.
- 2) Tighten the six bolts to install the select lever to the vehicle body, then connect connectors.

Tightening torque:

4.5 N·m (0.46 kgf·m, 3.3 ft·lb)



- 3) Install console box.
- 4) Set location of select lever at "N" position.
- 5) Set location of selector arm installed on the transmission body at "N" position.



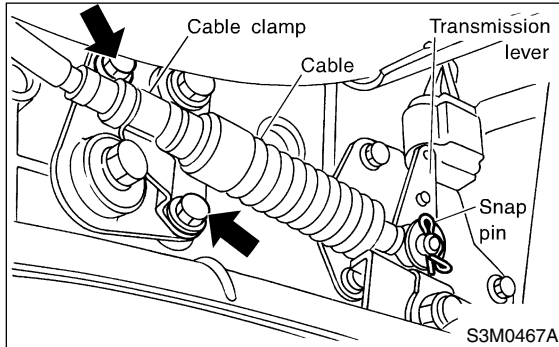
AT SELECT LEVER

Control Systems

- 6) Pass inner cable through selector arm pin and then connect it using a washer and snap pin.
- 7) Attach outer cable to plate on transmission case with the bolts.

Tightening torque:

33 N·m (3.4 kgf-m, 25 ft-lb)



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

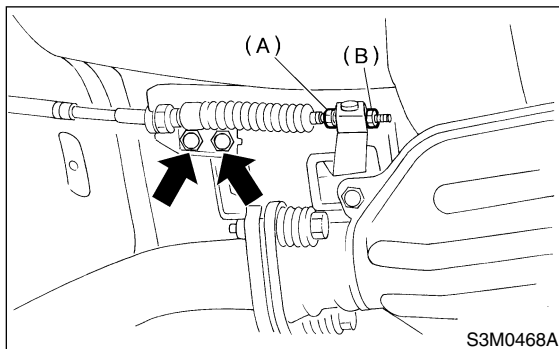
Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

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

Tightening torque:

7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



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

- 11) Connect the harnesses and check the following items.

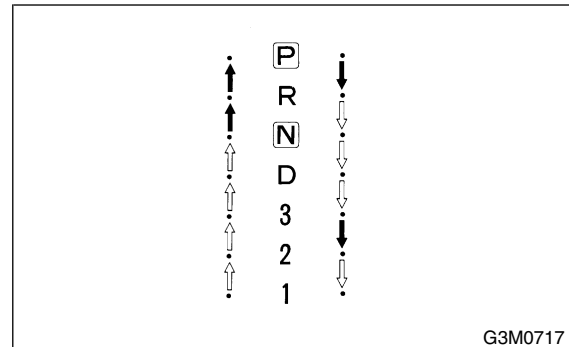
- (1) The engine starts operating when select lever is in position "P", but not in other positions.
- (2) The back-up light is lit when the select lever is in position "R", but not in other positions.

- 12) Check select lever operation.

WARNING:

Stop the engine while checking operation of select lever.

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



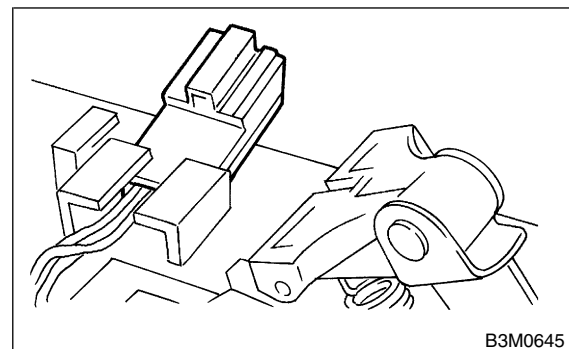
- 13) Check shift-lock system.

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

C: DISASSEMBLY

S501548A06

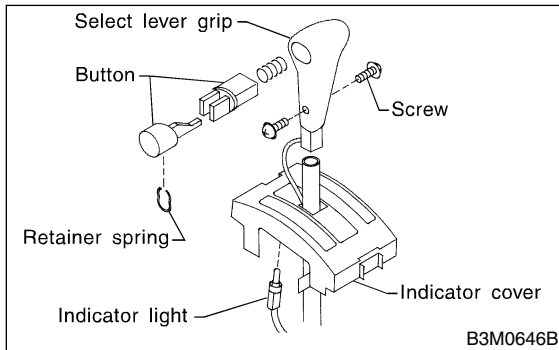
- 1) Remove connector from plate.



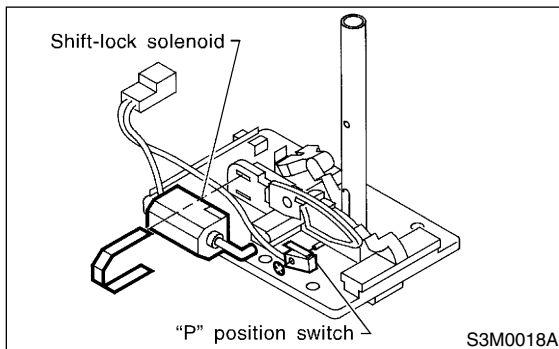
- 2) Remove indicator light and two screws.
- 3) Remove retainer spring, then pull up select lever grip with indicator cover for holding select lever button.

CAUTION:

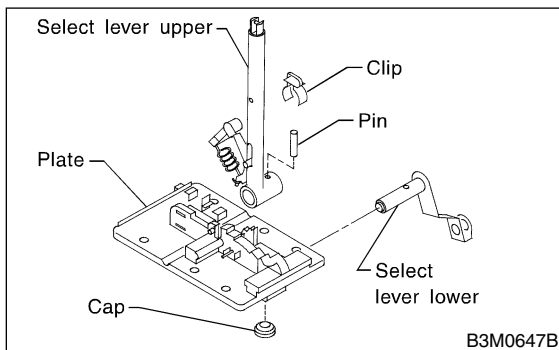
Pull the select lever grip carefully so that the select lever button may not jump out.



- 4) Remove shift-lock solenoid and "P" position switch.



- 5) Remove cap and clip, then extract pin.
- 6) Remove select lever lower then take away select lever upper from plate.



D: ASSEMBLY

S501548A02

- 1) Clean all parts before assembly.
- 2) Apply grease [NIGHTIGHT LYW No. 2 or equivalent] to each parts. <Ref. to CS-2 COMPONENT, General Description.>
- 3) Assemble in the reverse order of disassembly.
- 4) After completion of fitting, transfer select lever to range "P" — "1", pressing the button of the grip; then check whether the indicator and select lever agree, whether the pointer and position mark agree and what the operating force is.

E: INSPECTION

S501548A10

- 1) Inspect removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
- 2) Confirm the following parts for operating condition before assembly.
 - (1) Sliding condition of the button in the grip ... it should move smoothly.
 - (2) Insertion of the grip on the select lever ... when pushing the grip on the select lever by hand, screw holes should be aligned.
 - (3) Operation of select lever and rod ... they should move smoothly.

GENERAL DESCRIPTION

Control Systems

1. General Description

S501001

A: SPECIFICATIONS

S501001E49

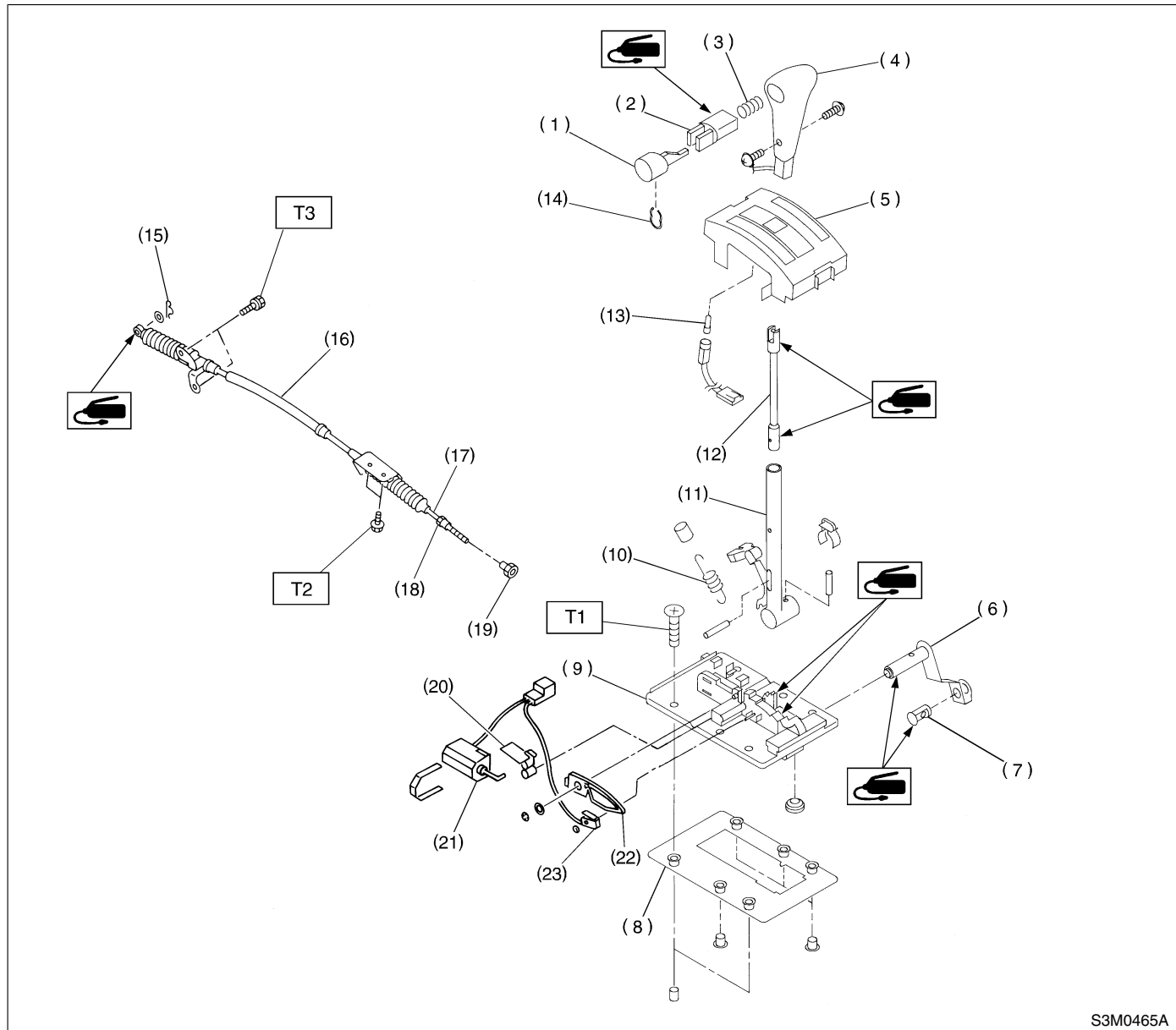
Item		Specification
Vibration torque of rod against lever	N·m (kgf-m, ft-lb)	0.74 (0.075, 0.54) or less

B: COMPONENT

S501001A05

1. AT SELECT LEVER

S501001A0501



S3M0465A

- | | | |
|--------------------------|---------------------------|--------------------------|
| (1) Button A | (11) Select lever (upper) | (21) Shift-lock solenoid |
| (2) Button B | (12) Rod | (22) Lock arm |
| (3) Spring (button) | (13) Indicator light bulb | (23) "P" position switch |
| (4) Grip | (14) Retainer spring | |
| (5) Indicator cover | (15) Snap pin | |
| (6) Select lever (lower) | (16) Outer cable | |
| (7) Pin | (17) Inner cable | |
| (8) Packing | (18) Nut (front) | |
| (9) Plate | (19) Nut (rear) | |
| (10) Detent spring | (20) Lock plate | |

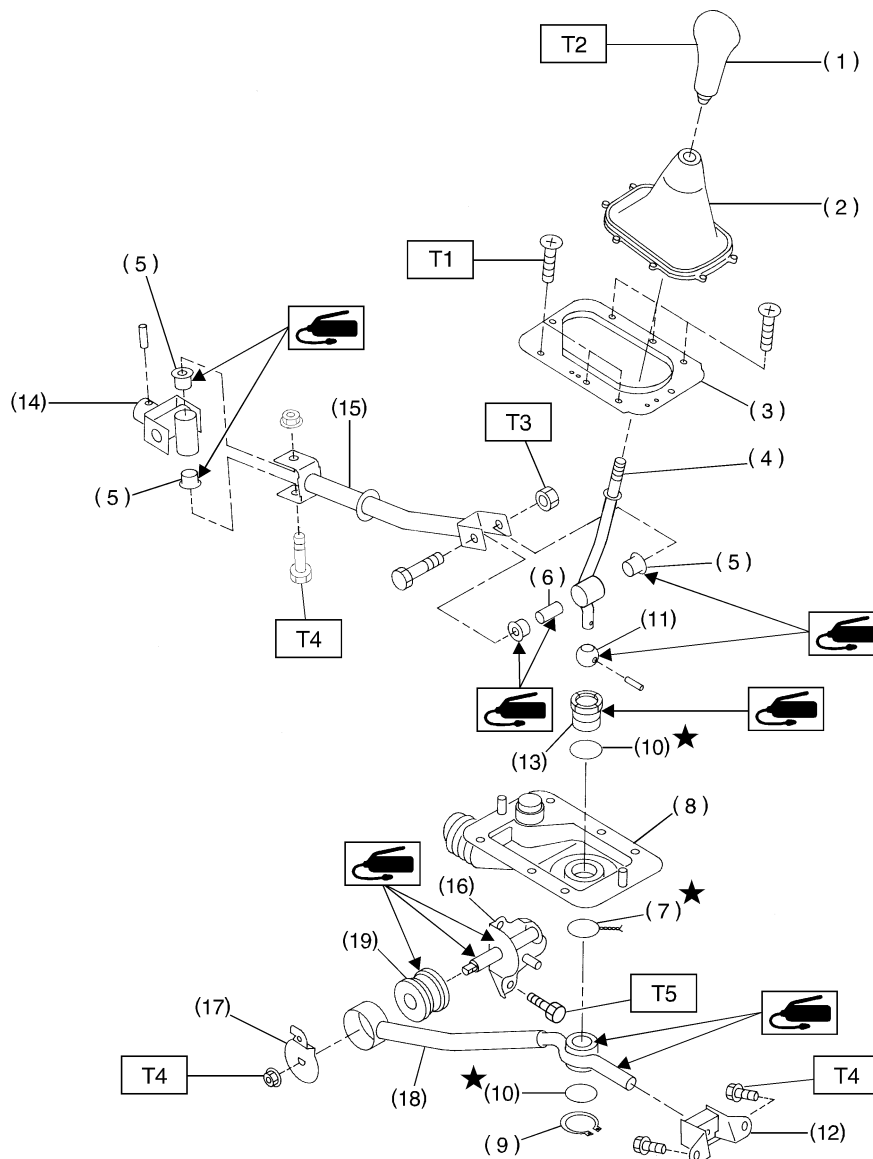
Tightening torque: N·m (kgf-m, ft-lb)

T1: 4.5 (0.46, 3.3)

T2: 18 (1.8, 13.0)

T3: 33 (3.4, 25)

2. MT GEAR SHIFT LEVER S501001A0502



H3M1968A

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

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

- (19) Bush (Stay front)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 4.5 (0.46, 3.3)

T2: 5 (0.51, 3.7)

T3: 12 (1.2, 8.7)

T4: 18 (1.8, 13.0)

T5: 24.5 (2.50, 18.07)

GENERAL DESCRIPTION

Control Systems

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.

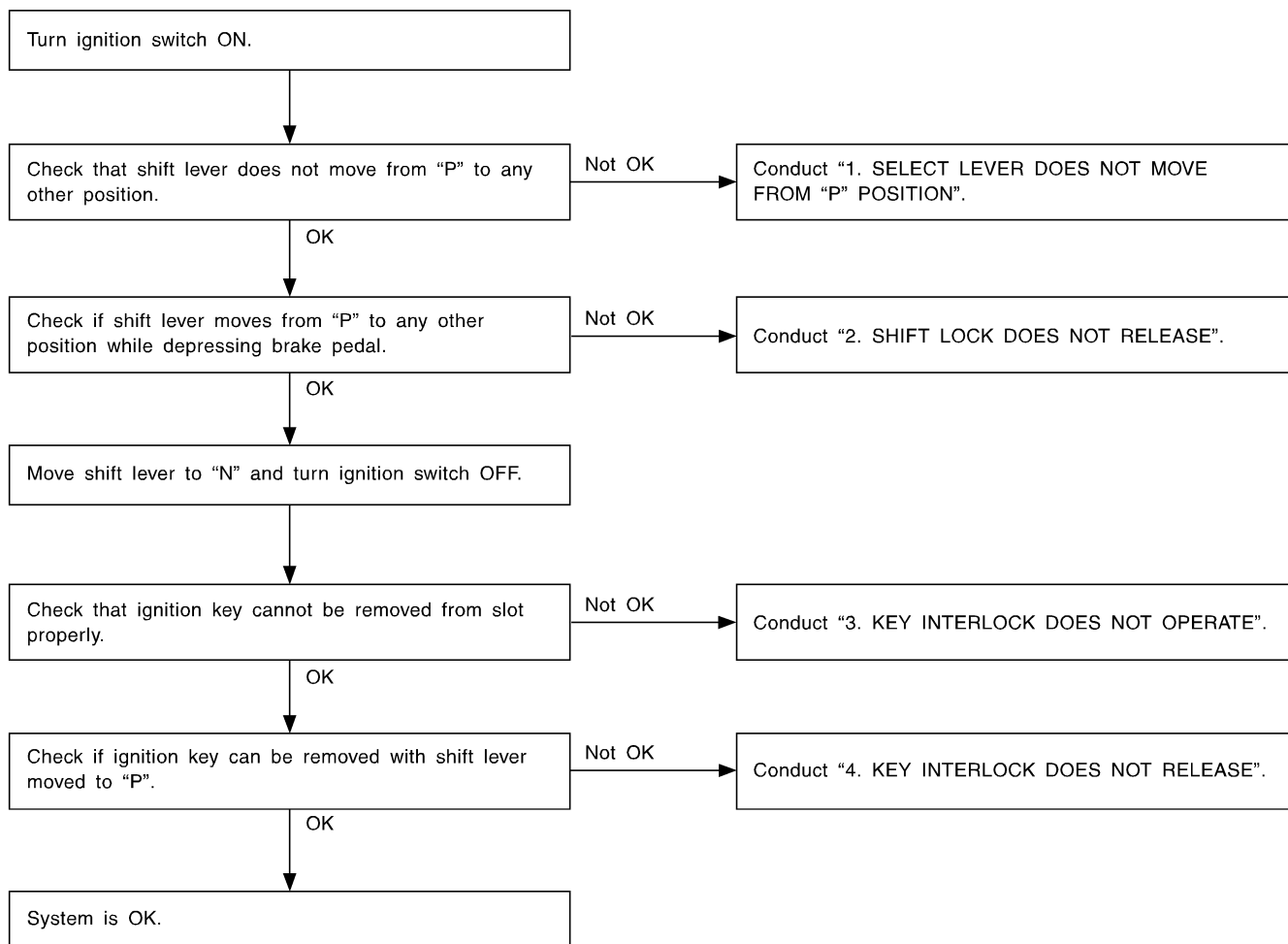
D: PREPARATION TOOL S501001A17

1. GENERAL TOOL S501001A1701

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

4. General Diagnostic S501278

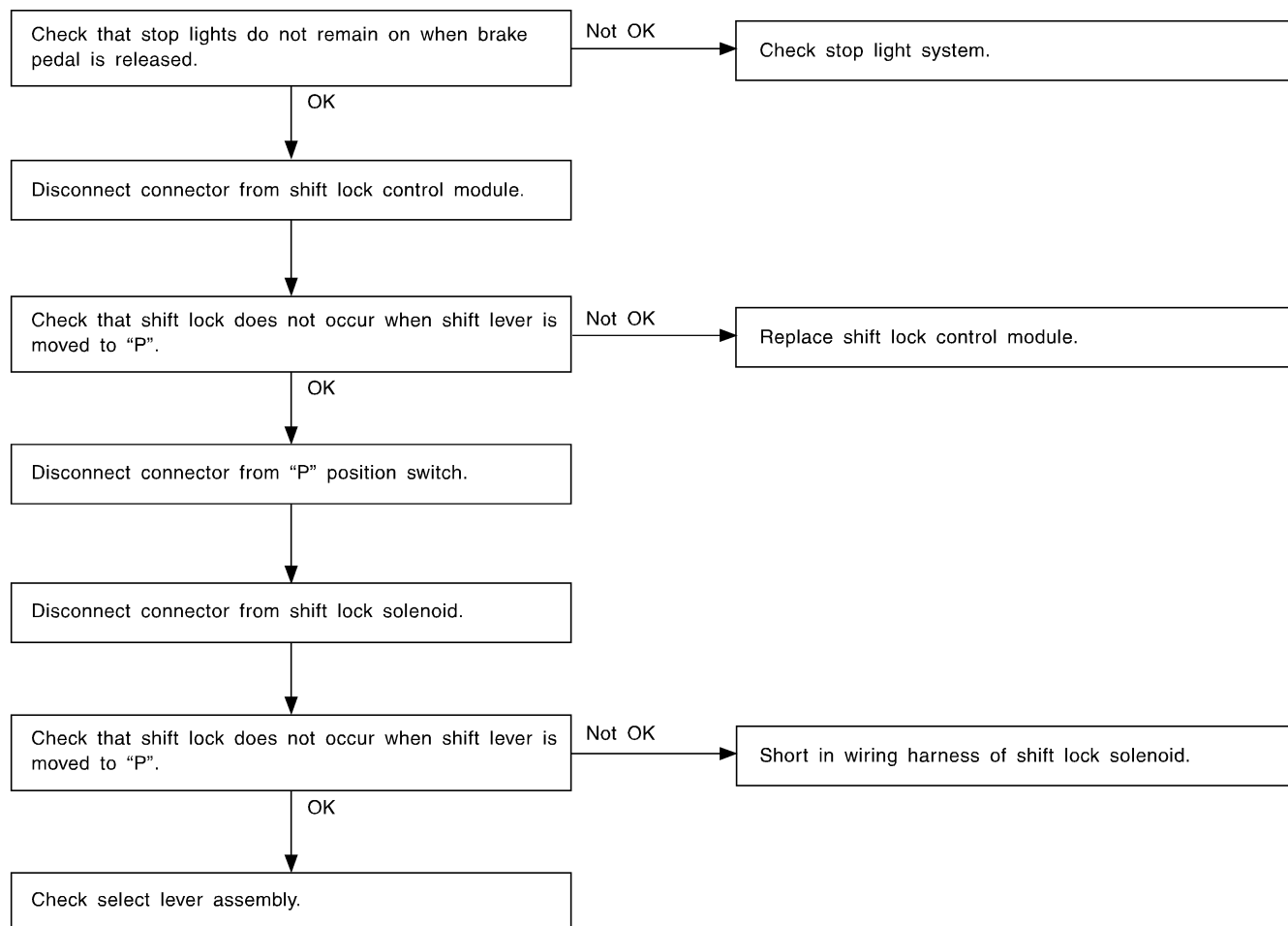
A: INSPECTION S501278A10



H6M0504C

**1. SELECT LEVER DOES NOT MOVE
FROM "P" POSITION**

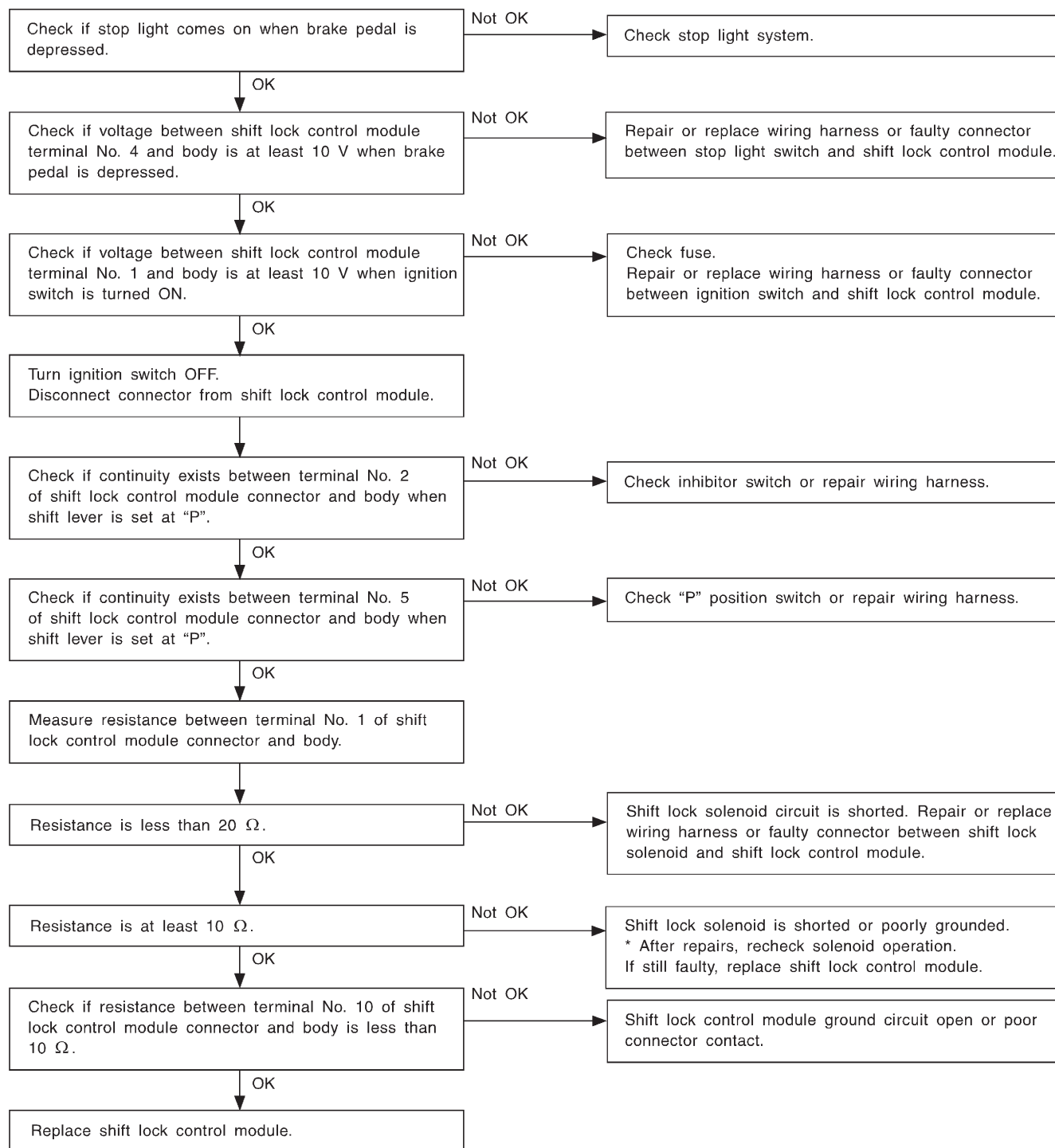
SS01278A1001



H6M0505B

2. SHIFT LOCK DOES NOT RELEASE

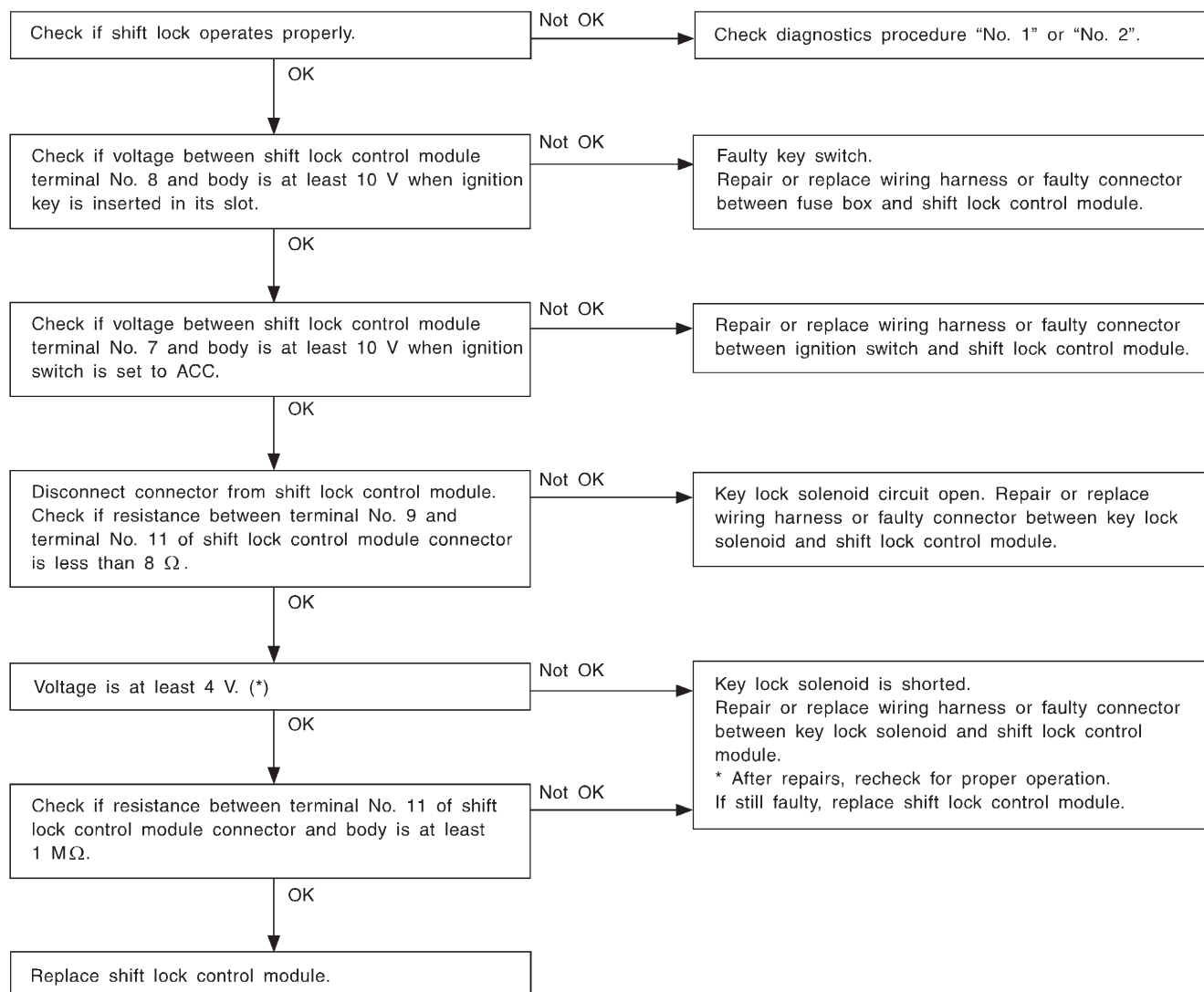
S501278A1002



H6M0506

3. KEY INTERLOCK DOES NOT OPERATE

S501278A1003

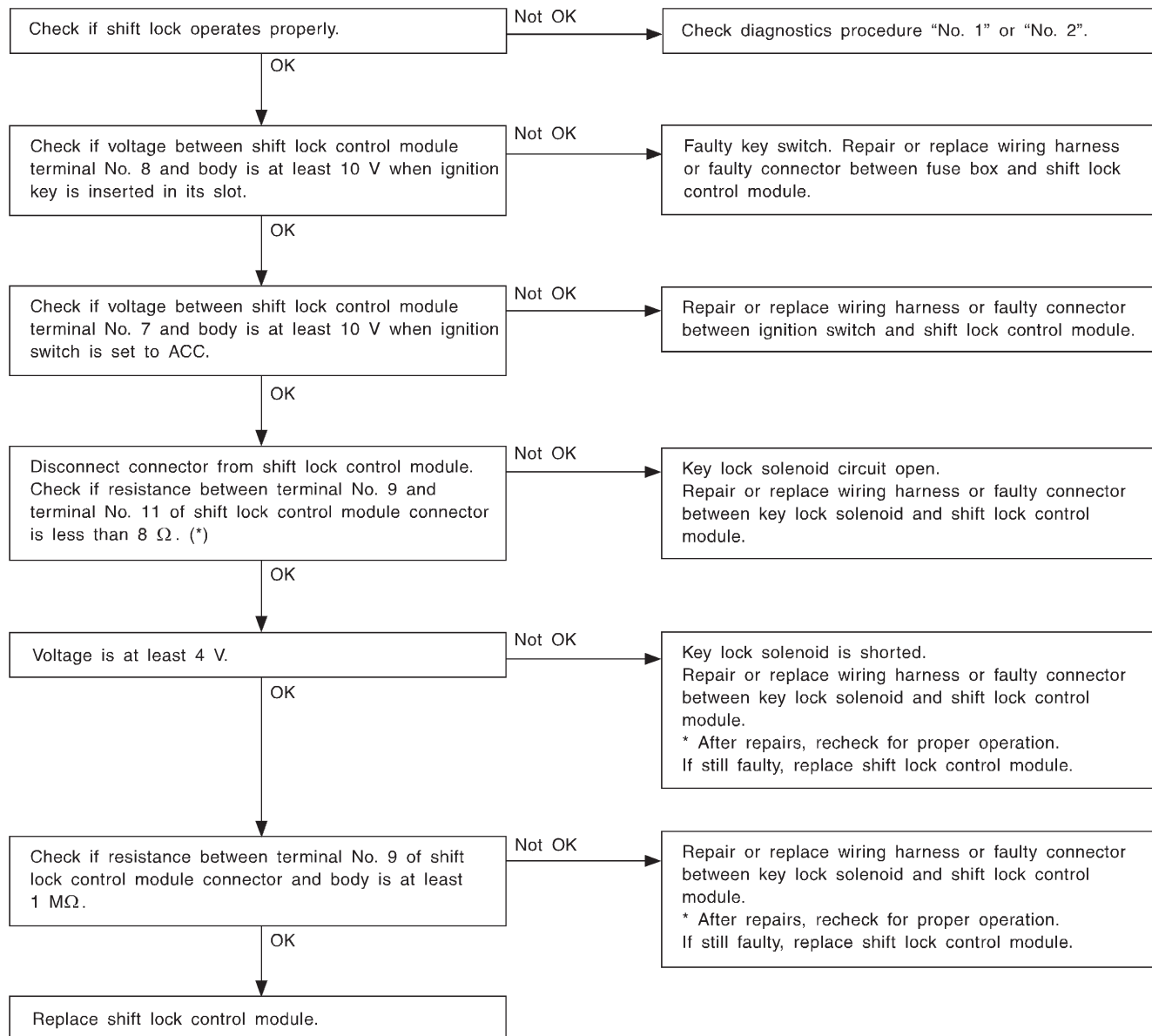


*: When conducting operational checks of the key lock solenoid, do not apply 12 V to solenoid for more than one second, since this may break solenoid circuit.

H6M0507

4. KEY INTERLOCK DOES NOT RELEASE

S501278A1004



*: When conducting operational checks of the key lock solenoid, do not apply 12 V to solenoid for more than one second, since this may break solenoid circuit.

H6M0508

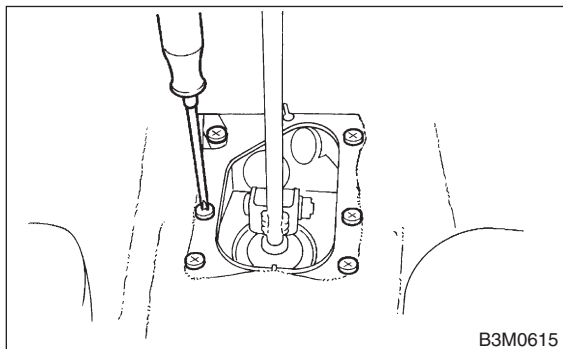
3. MT Gear Shift Lever

S501236

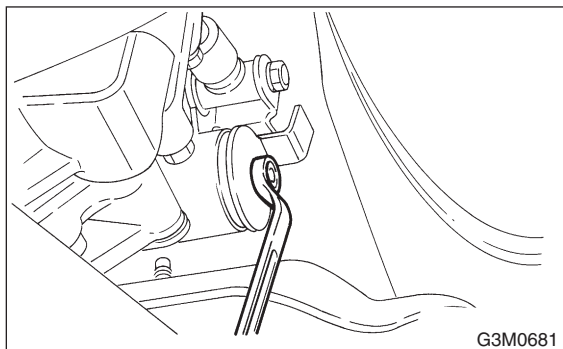
A: REMOVAL

S501236A18

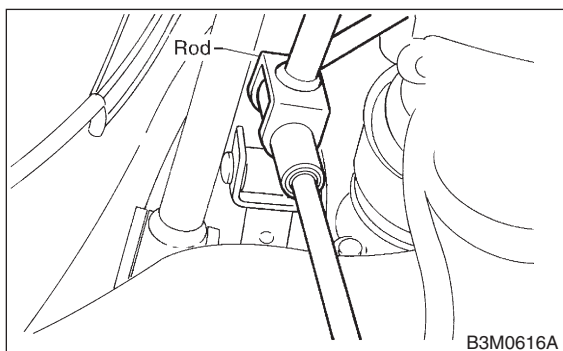
- 1) Remove console box. <Ref. to EI-24 REMOVAL, Console Box.>
- 2) Remove plate from the body.



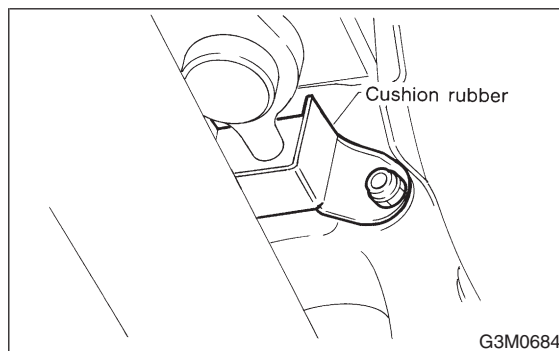
- 3) Remove stay from bracket.



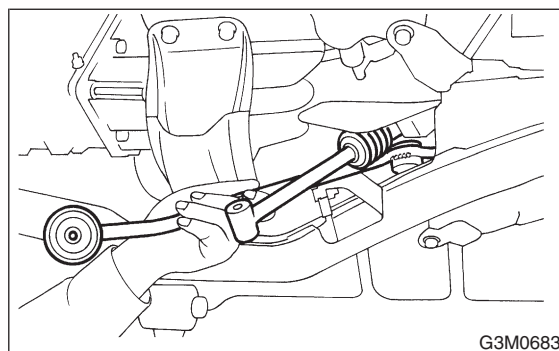
- 4) Remove rod from joint.



- 5) Remove the exhaust cover and remove cushion rubber from the body.



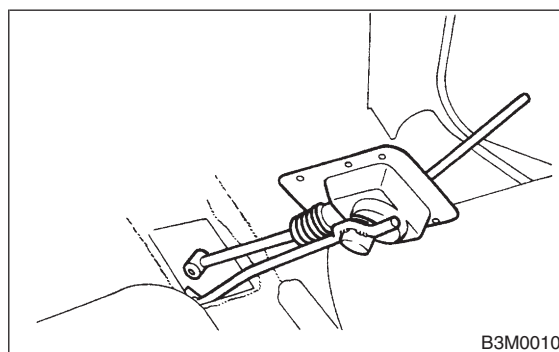
- 6) Remove gearshift lever.



B: INSTALLATION

S501236A11

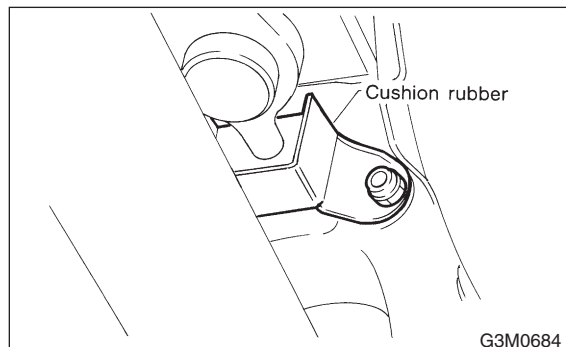
- 1) Put into gearshift lever to passenger compartment.
- 2) Mount boot plate on the body.
- 3) Install console box <Ref. to EI-24 INSTALLATION, Console Box.> and gearshift knob.



4) Mount cushion rubber on the body.

Tightening torque:

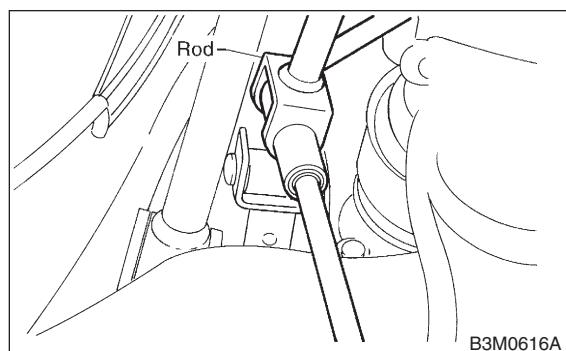
18 N·m (1.8 kgf-m, 13.0 ft-lb)



5) Connect rod to the joint.

Tightening torque:

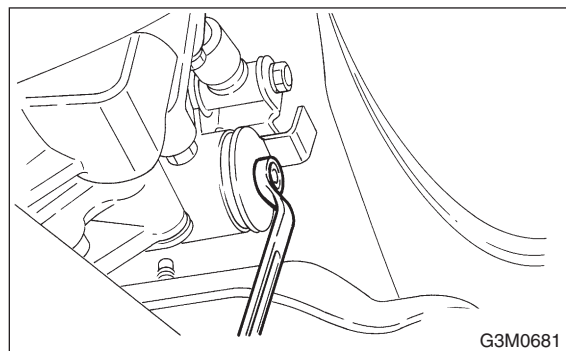
18 N·m (1.8 kgf-m, 13.0 ft-lb)



6) Connect stay to the bracket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)

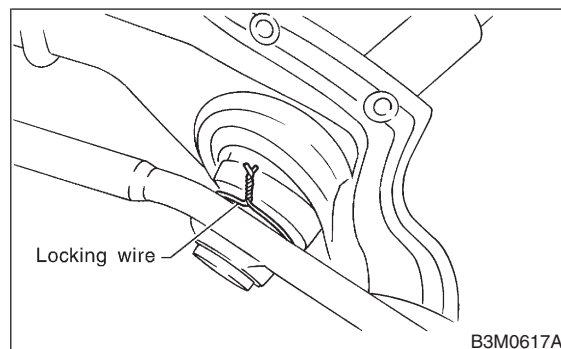


7) Install the exhaust cover.

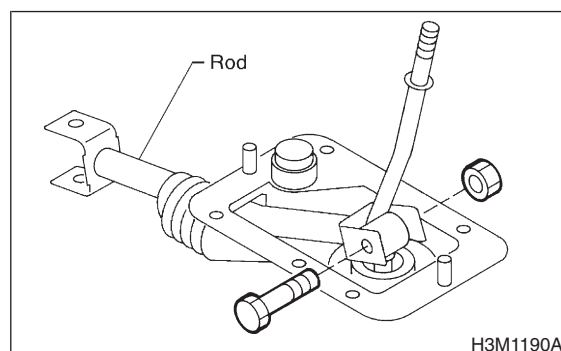
C: DISASSEMBLY

S501236A06

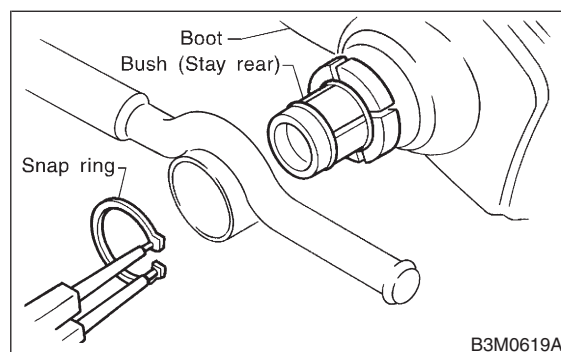
1) Disconnect locking wire.



2) Remove rod from lever.

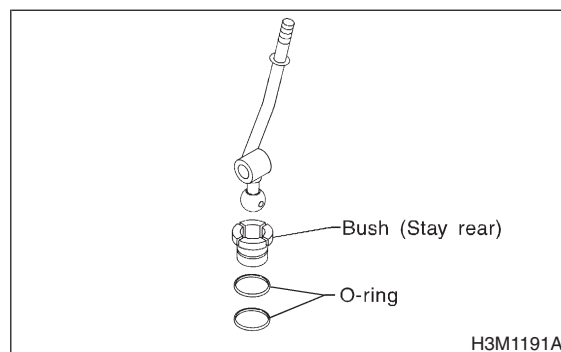


3) Remove snap ring, then disconnect lever from stay.



4) Remove boot from gearshift lever.

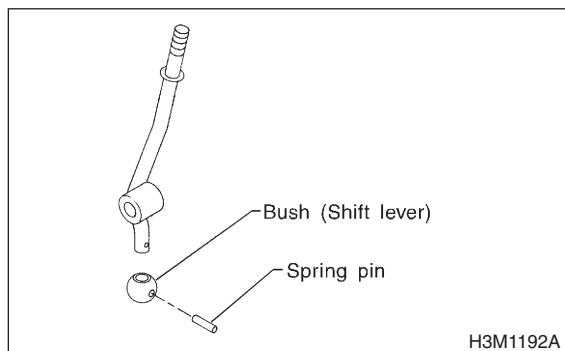
5) Remove O-ring, then disconnect bush (Stay rear).



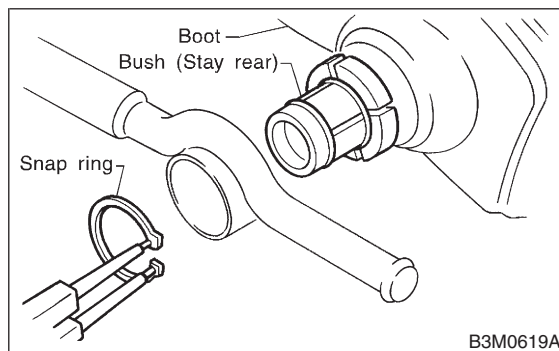
MT GEAR SHIFT LEVER

Control Systems

6) Draw out spring pin, then remove bush (Shift lever) from lever.

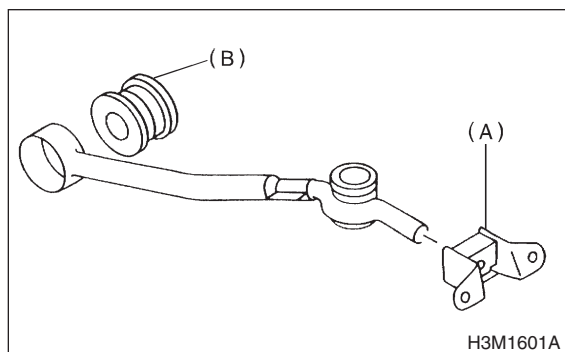


6) Install snap ring to the bottom of the bush (Stay rear).



D: ASSEMBLY S501236A02

- 1) Clean all parts before assembly.
- 2) Mount the following parts on the stay.

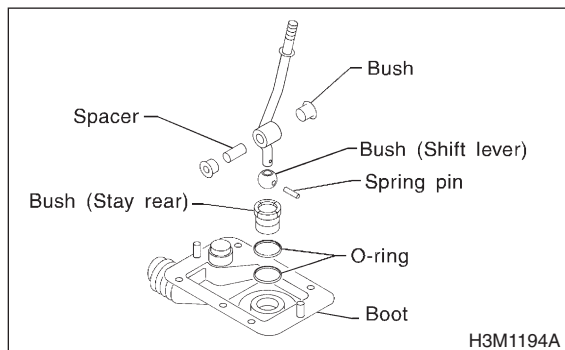


- (A) Cushion rubber
(B) Bush (Stay front)

3) Mount each parts (Boot, O-ring, bush and spacer) on the gearshift lever.

CAUTION:

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

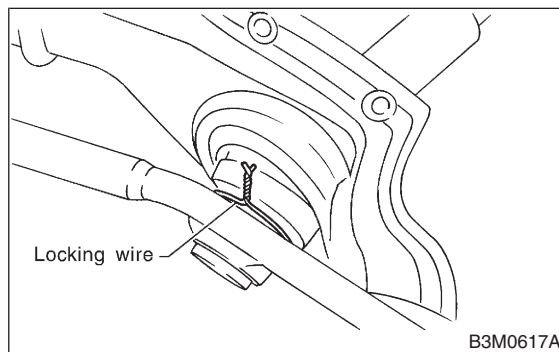


- 4) Insert the lever into the boot hole.
- 5) Mount lever on the stay.

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

CAUTION:

Always use new locking wire.



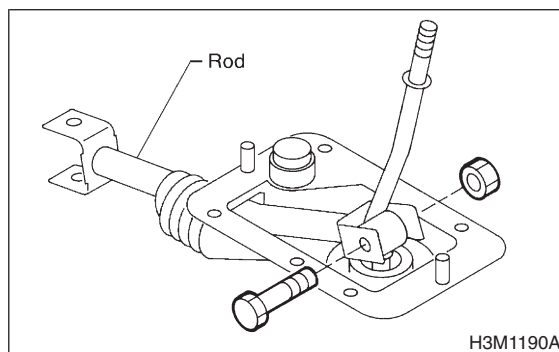
- 8) Insert the rod into the boot hole.
- 9) Connect rod to gearshift lever.

Tightening torque:

12 N·m (1.2 kgf-m, 8.7 ft-lb)

Rocking torque:

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

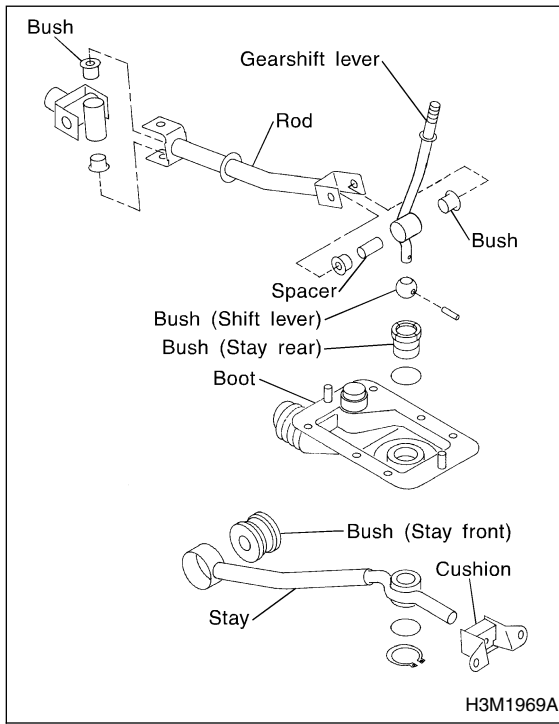


10) Check that there is no excessive play and that parts move smoothly.

E: INSPECTION

S501236A10

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



10. Center Differential

S503158

A: REMOVAL

S503158A18

- 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.
- 3) Remove the transfer case and extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Remove the transfer driven gear. <Ref. to MT-45 REMOVAL, Transfer Driven Gear.>
- 6) 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 transfer case and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install back-up light switch and neutral position switch.
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

S503158A06

NOTE:

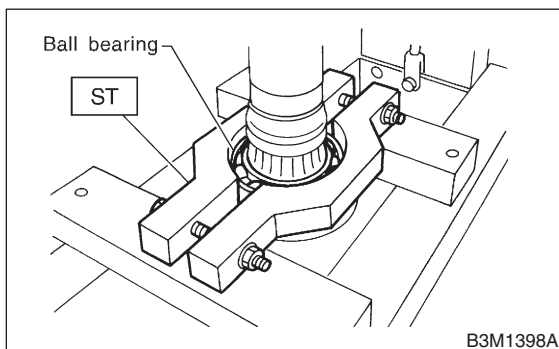
Do not disassemble center differential because it is a non-disassemble part.

Remove ball bearing using ST.

CAUTION:

Do not reuse ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



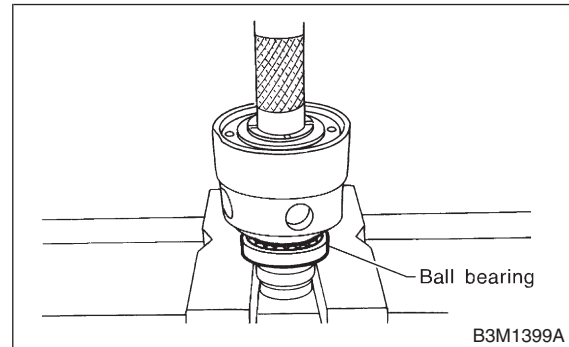
D: ASSEMBLY

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).



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

14. Drive Pinion Shaft Assembly

S503269

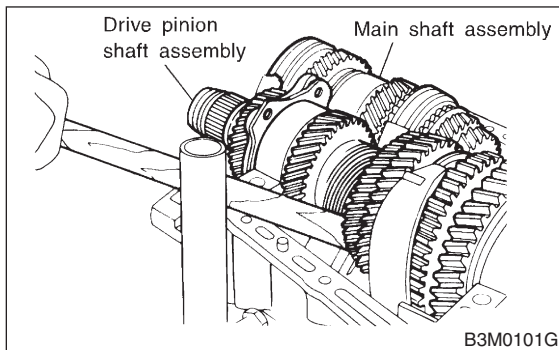
A: REMOVAL

S503269A18

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-51 REMOVAL, Transmission Case.>
- 5) Remove drive pinion shaft assembly.

NOTE:

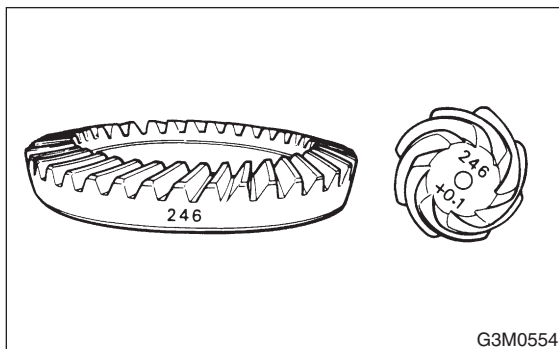
Use a hammer handle, etc. to remove if too tight.



B: INSTALLATION

S503269A11

- 1) Remove differential assembly. <Ref. to MT-69 REMOVAL, Front 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 the margin of error used for matching. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.



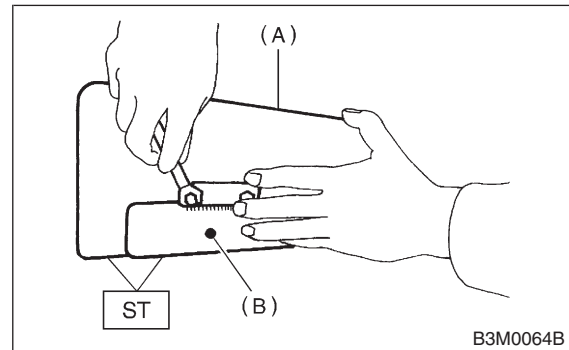
- 3) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.

- 4) Inspection and adjustment of ST

NOTE:

- Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
- Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



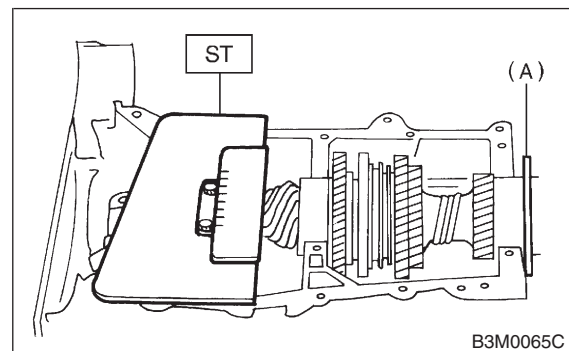
- (A) Plate
(B) Scale

- 5) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

- 6) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



- (A) Adjust clearance to zero without shim.

- 7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by -.)

ST 499917500 DRIVE PINION GAUGE ASSY

DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

8) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

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

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

10) Set transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect suitable 1st — 2nd, 3rd — 4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their cynchronizing mechanisms. <Ref. to MT-64 INSPECTION, Drive Pinion Shaft Assembly.>

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

12) Install transfer case and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install back-up light switch and neutral position switch.

14) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY S503269A06

CAUTION:

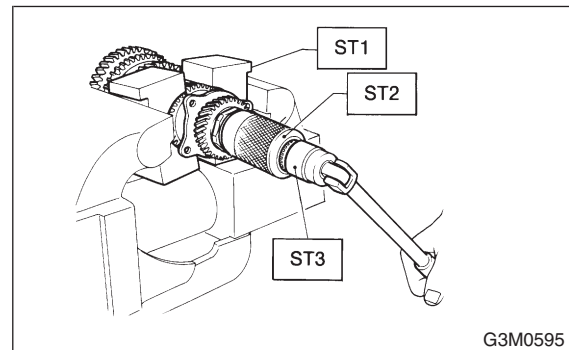
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

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

ST1 899884100 HOLDER

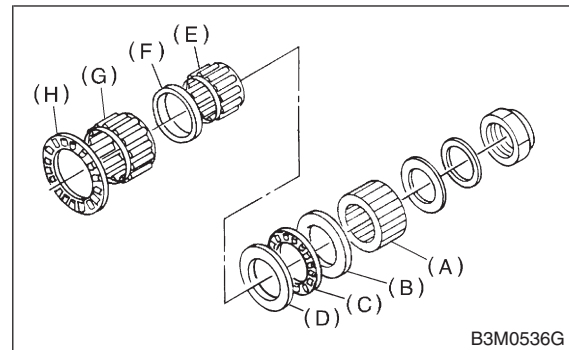
ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH



G3M0595

2) Withdraw drive pinion from driven shaft. Remove differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.



B3M0536G

- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Washer No. 2 (25 × 37.5 × 4)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

DRIVE PINION SHAFT ASSEMBLY

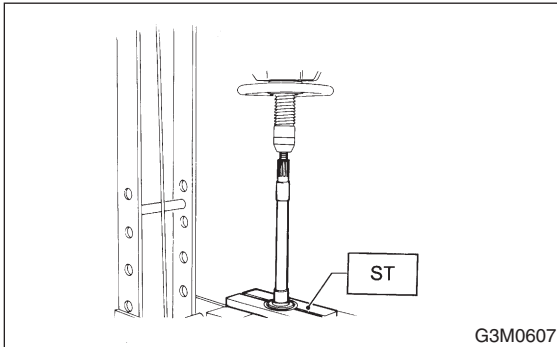
Manual Transmission and Differential

3) Remove roller bearing and washer ($33 \times 50 \times 5$) using ST and press.

CAUTION:

Do not reuse roller bearing.

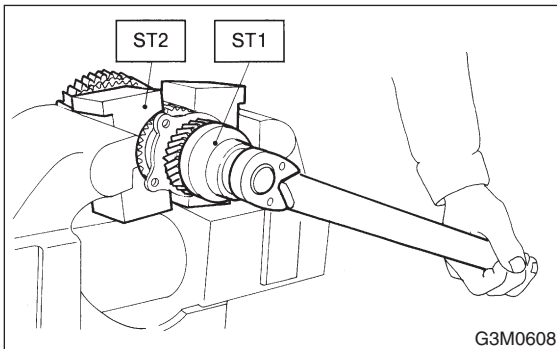
ST 498077000 REMOVER



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

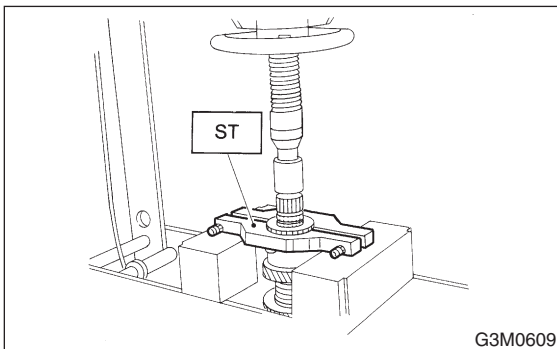
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



5) Remove 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR REMOVER

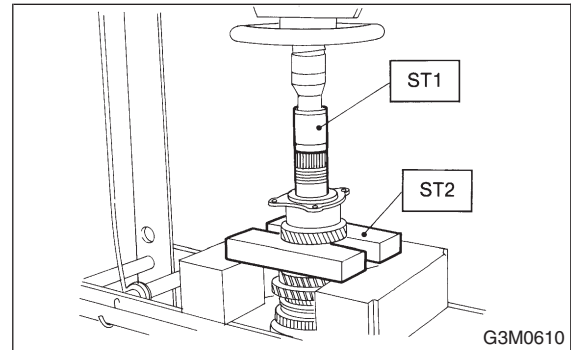


6) Remove woodruff key.

7) Remove roller bearing ($42 \times 74 \times 40$), 3rd-4th driven gear using ST1 and ST2.

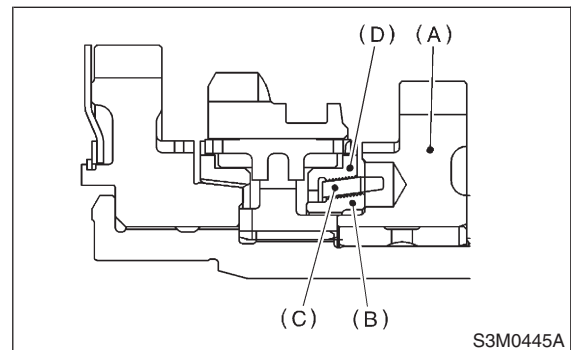
ST1 499757002 SNAP RING PRESS

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

DRIVE PINION SHAFT ASSEMBLY

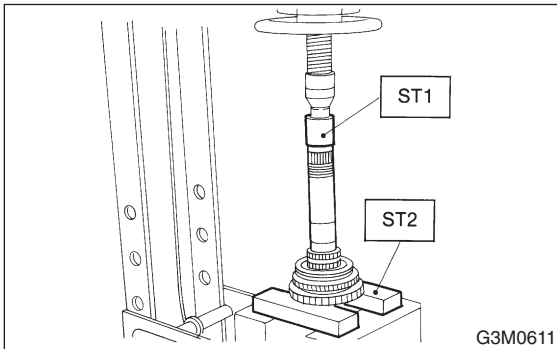
Manual Transmission and Differential

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



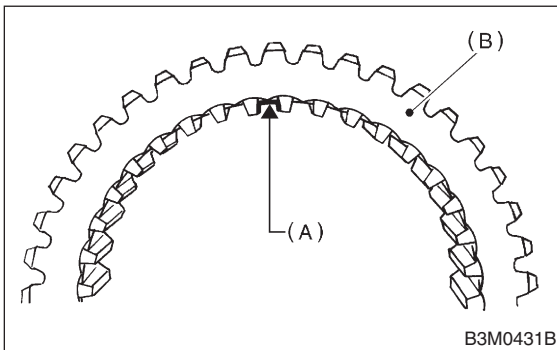
11) Remove sub gear for 1st driven gear.

D: ASSEMBLY S503269A02

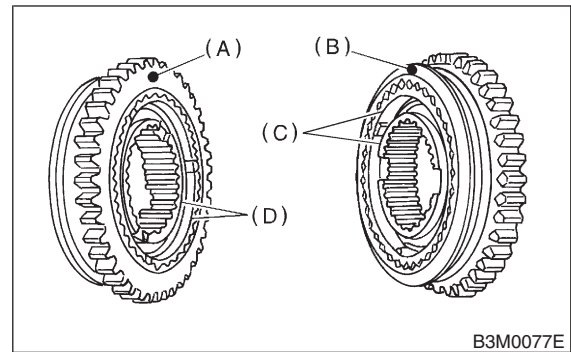
1) Assemble gear and hub assembly.

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.

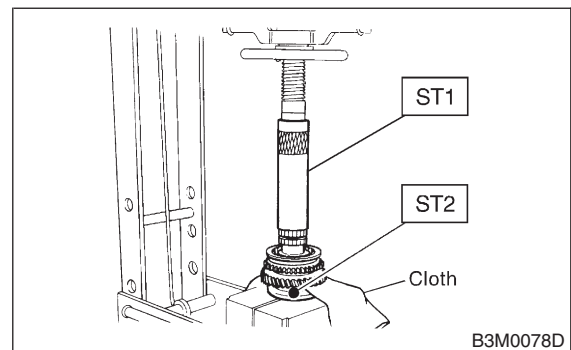
CAUTION:

- 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.

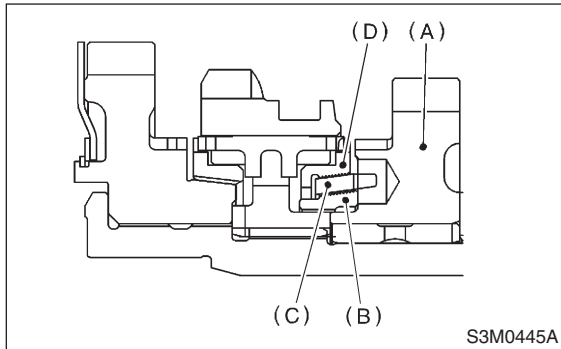
ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

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

6) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

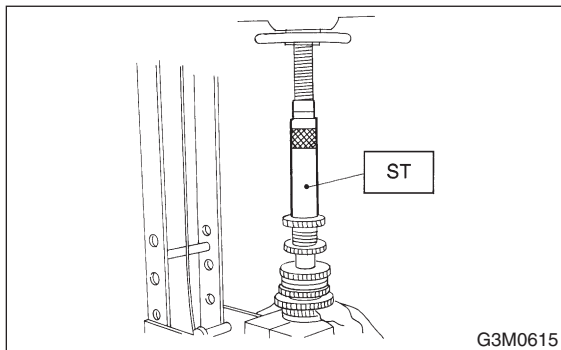
CAUTION:

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

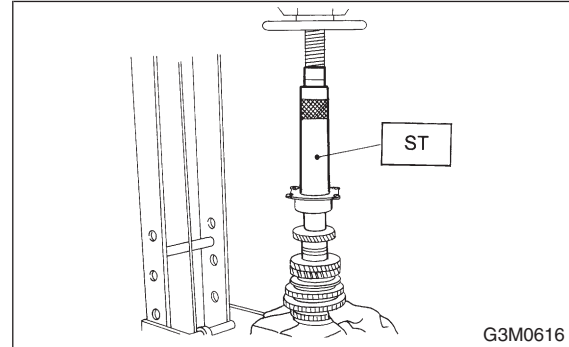


7) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.

CAUTION:

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

ST 499277200 INSTALLER

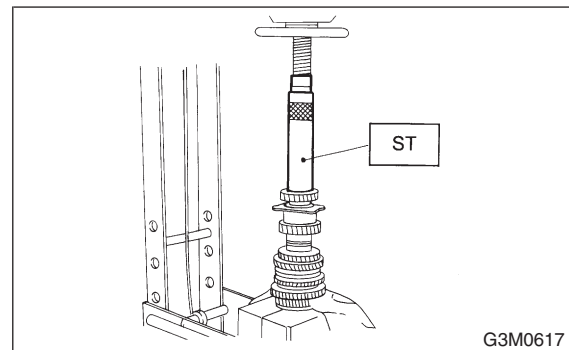


8) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

CAUTION:

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

ST 499277200 INSTALLER

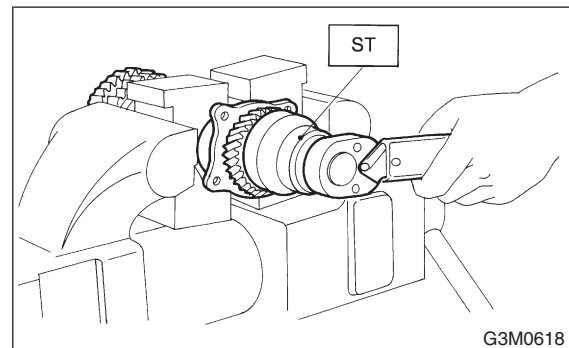


9) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

Tightening torque:

265 N·m (27 kgf·m, 195 ft-lb)

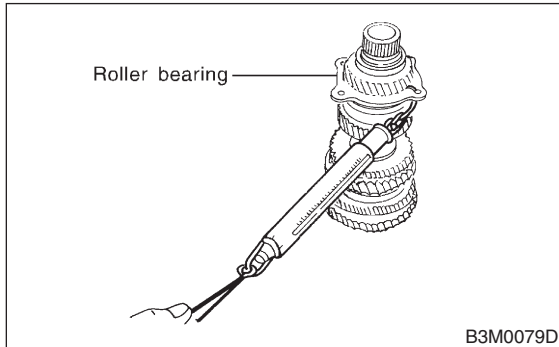


DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

NOTE:

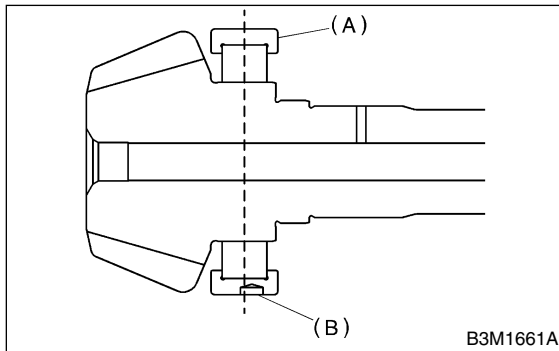
- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N·m (0.01 to 0.15 kgf-m, 0.07 to 1.1 ft-lb).



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.



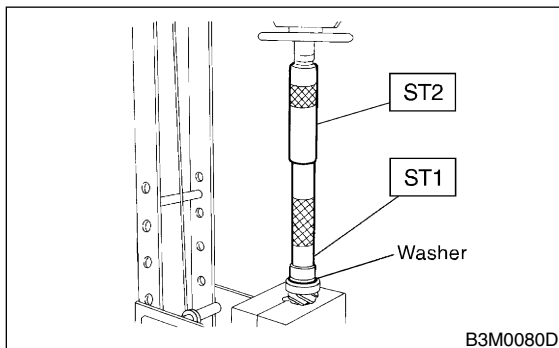
- (A) Roller bearing
(B) Knock pin hole

11) Install washer (33 × 50 × 5) using ST1, ST2 and press.

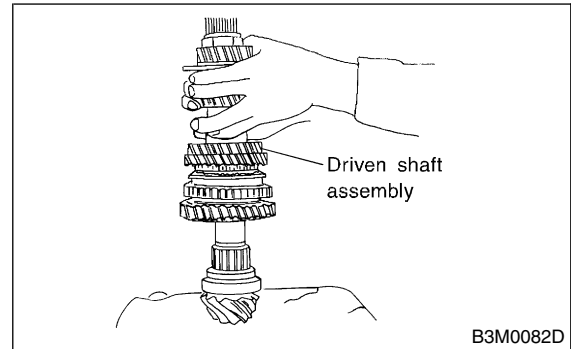
CAUTION:

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



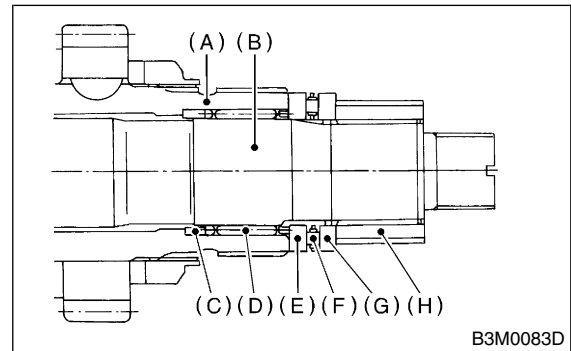
12) Install thrust bearing (33 × 50 × 3) and needle bearing (30 × 37 × 23). Install driven shaft assembly.



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

SS03269A10

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

1) Bearings

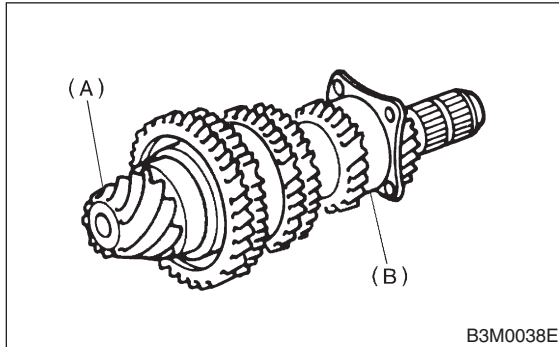
Replace bearings in the following cases:

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

DRIVE PINION SHAFT ASSEMBLY

Manual Transmission and Differential

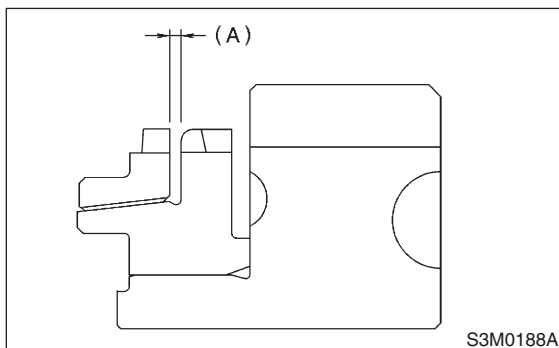
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



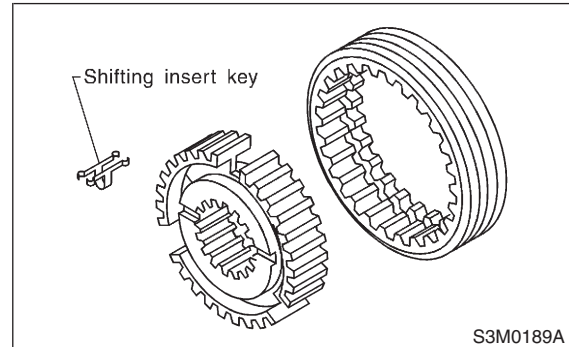
(A) Drive pinion shaft
(B) Ball bearing

- Bearings having other defects
- 2) Bushing (each gear)
Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
 - When the inner wall is abnormally worn.
- 3) Gears
- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
 - Correct or replace if the cone that contacts the baulk ring is rough or damaged.
 - Correct or replace if the inner surface or end face is damaged.
- 4) Baulk ring
Replace the ring in the following cases:
- When the inner surface and end face are damaged.
 - When the ring inner surface is abnormally or partially worn down.
 - If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)

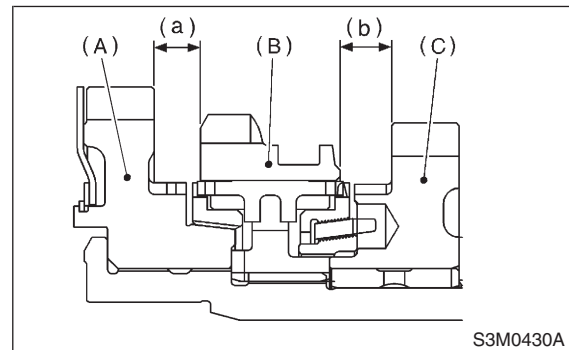


- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
- 5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.



- 6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
- 7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.
- 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.

Clearance (a) and (b):
9.5 mm (0.374 in)



(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

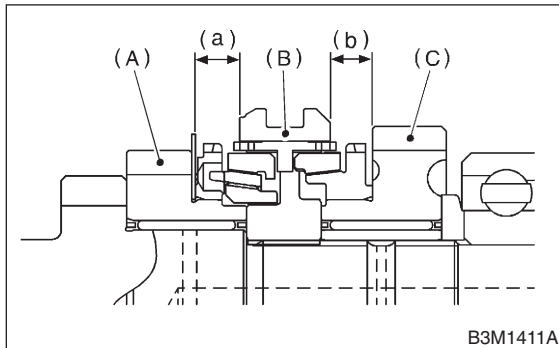
5th shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

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)

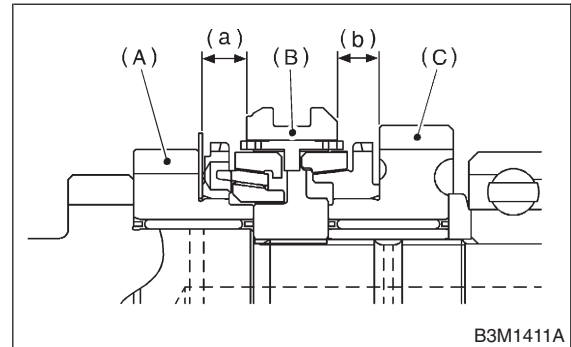


- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

5th 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 (0.374 in)



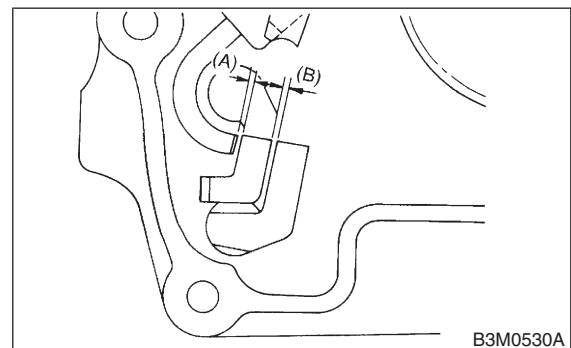
- (A) 5th drive gear
- (B) Coupling sleeve

5th shifter fork		
Part No.	Mark	Remarks
32812AA200	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA210	—	Standard
32812AA220	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)



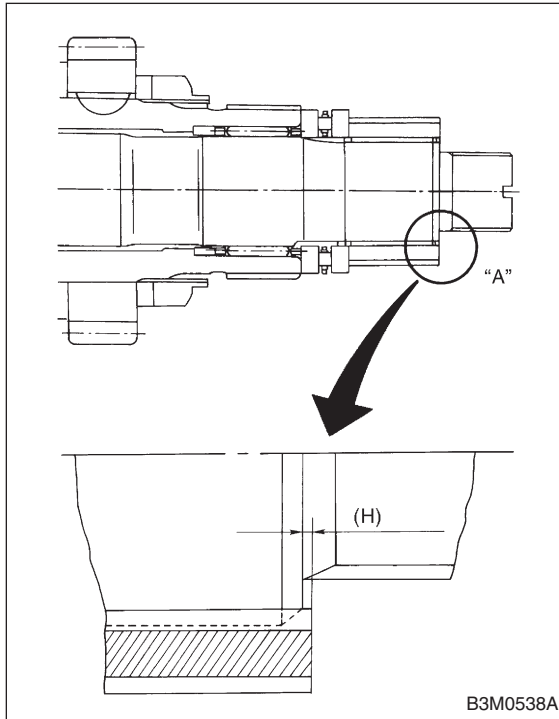
F: ADJUSTMENT

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).

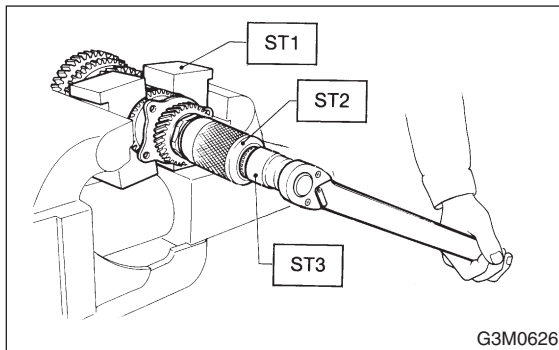


2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.

ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

118 N·m (12 kgf-m, 86.8 ft-lb)



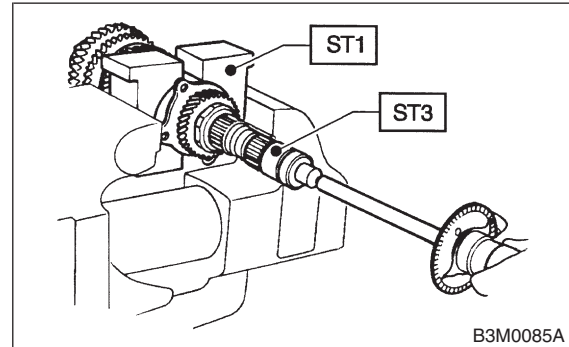
3) After removing ST2, measure starting torque using torque driver.

ST1 899884100 HOLDER

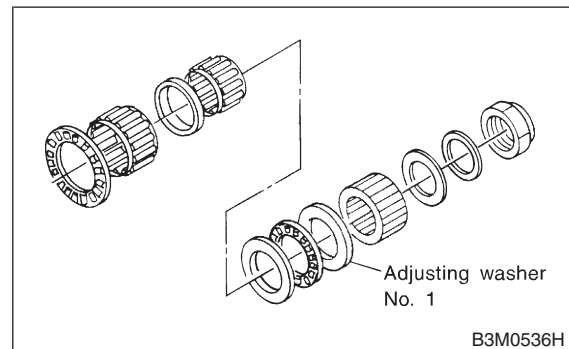
ST3 899988608 SOCKET WRENCH (27)

Starting torque:

54 N·m (5.5 kgf-m, 40 ft-lb)



4) If starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.

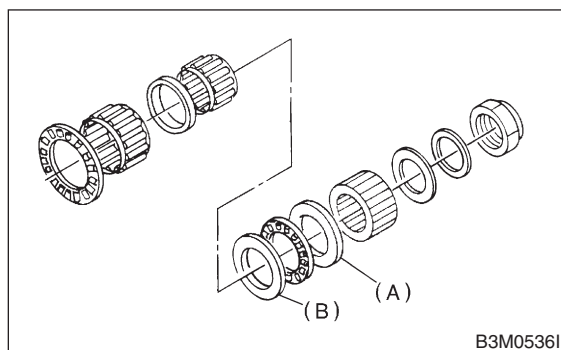


Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

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.

15. Front Differential Assembly

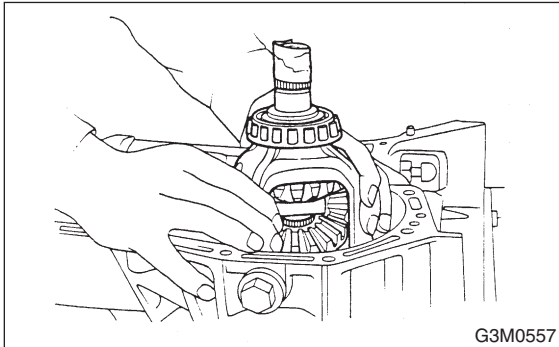
S503152

A: REMOVAL S503152A18

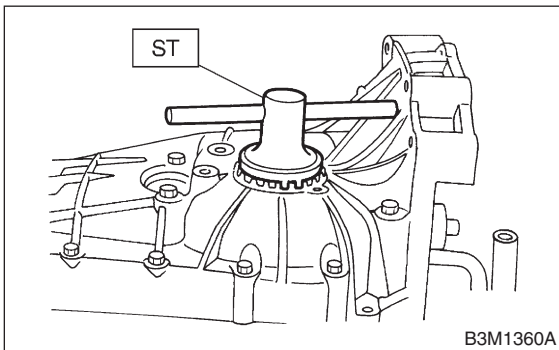
- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 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.>

CAUTION:

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



- 8) Remove differential side retainers using ST. ST 499787000 WRENCH ASSY



B: INSTALLATION S503152A11

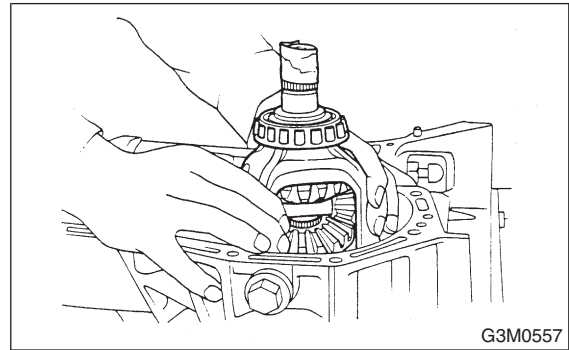
- 1) Install differential assembly. <Ref. to MT-69 INSTALLATION, Front Differential Assembly.>

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 shaft 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 and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install back-up light switch and neutral position switch.
- 7) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

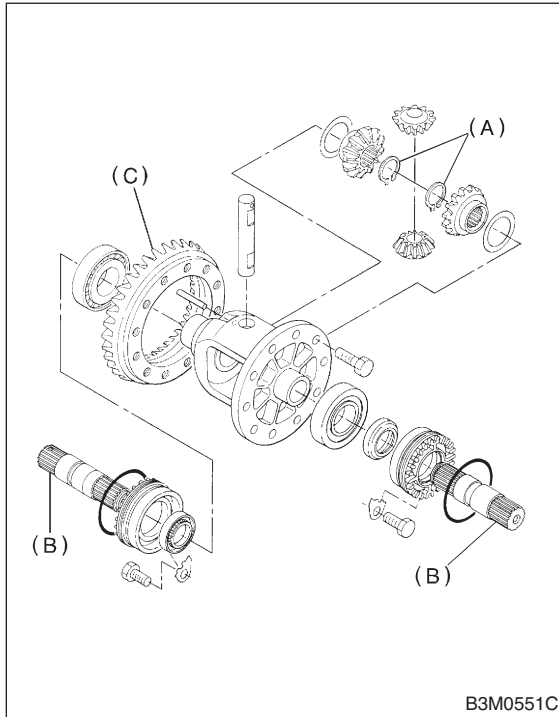
C: DISASSEMBLY S503152A06

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.

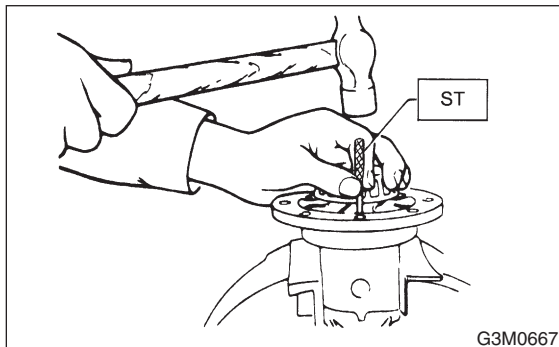
2) Loosen twelve bolts and remove hypoid driven gear.



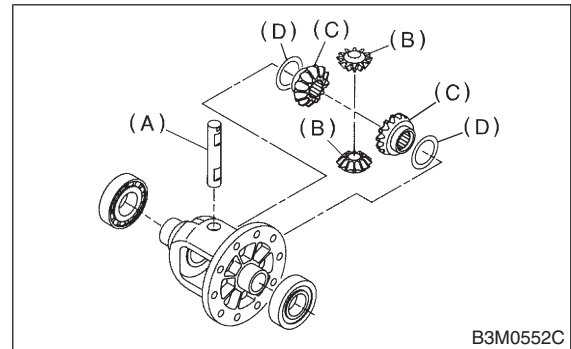
- (A) Snap ring
- (B) Axle drive shaft
- (C) Hypoid driven gear

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

ST 899904100 REMOVER

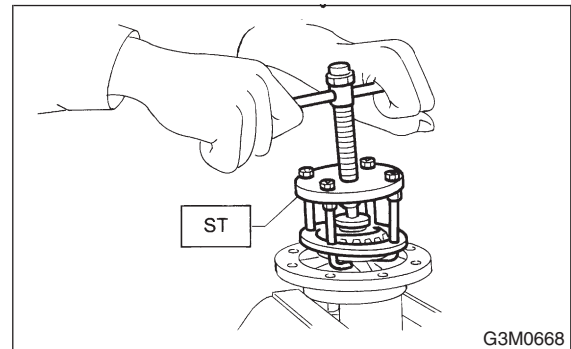


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

5) Remove roller bearing using ST.
ST 399527700 PULLER SET

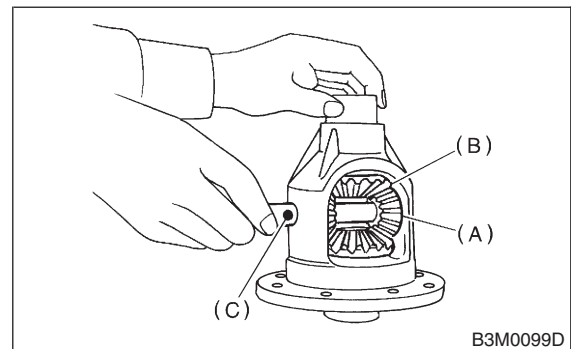


D: ASSEMBLY S503152A02

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.

NOTE:

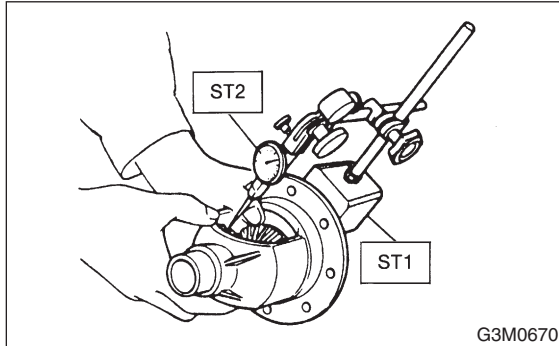
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



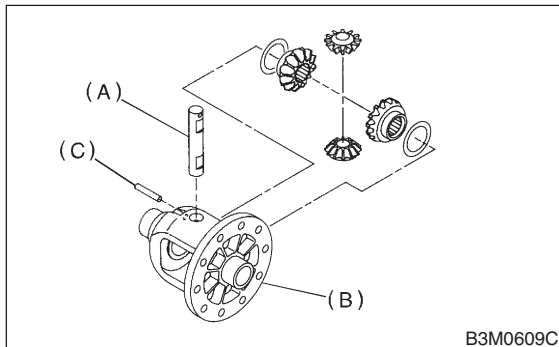
Washer (38.1 × 50 × t)	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

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

NOTE:

Lock straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

4) Install roller bearing (40 × 80 × 19.75) to differential case.

CAUTION:

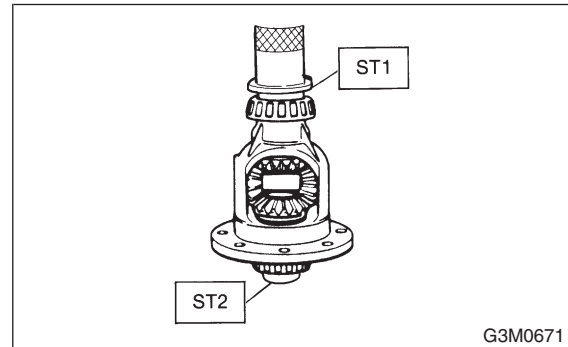
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:

Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER

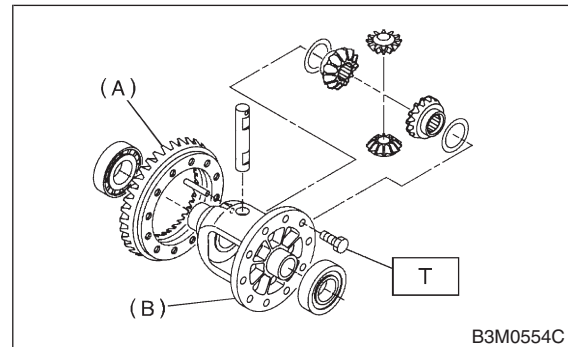
ST2 398497701 ADAPTER



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

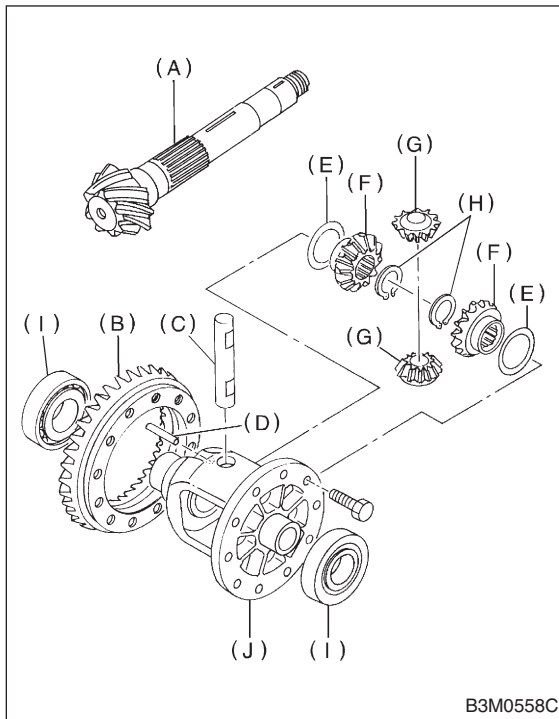
FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

E: INSPECTION S503152A10

Repair or replace the differential gear in the following cases:

- The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
- The roller bearing on the drive pinion shaft has a worn or damaged roller path.
- There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
- The differential case has worn or damaged sliding surfaces.



- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Snap ring
- (I) Roller bearing
- (J) Differential case

1. BEVEL PINION GEAR BACKLASH S503152A1001

Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

NOTE:

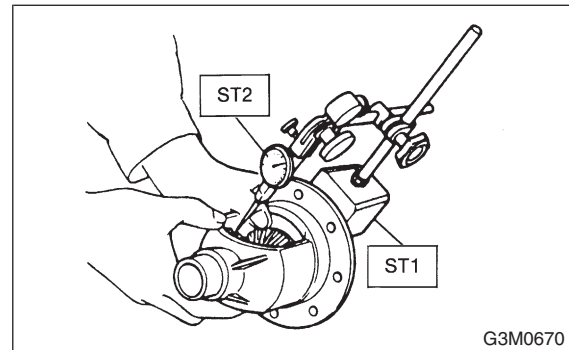
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH S503152A1002

Set ST1 and ST2. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.

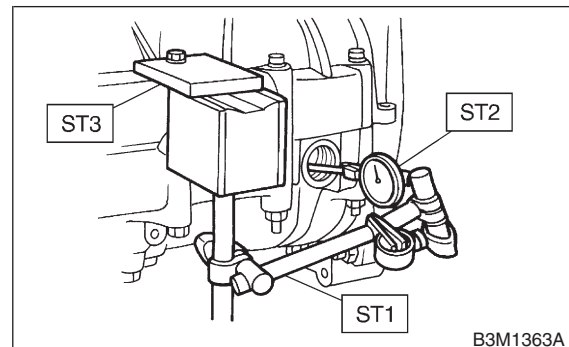
ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

ST3 498255400 PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



NOTE:

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

FRONT DIFFERENTIAL ASSEMBLY

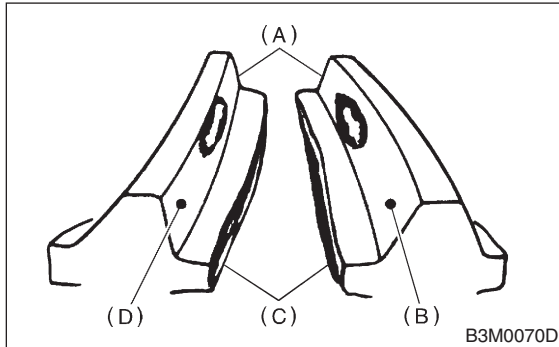
Manual Transmission and Differential

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 incorrect, make the following correction.

- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

F: ADJUSTMENT

S503152A01

1. BEVEL PINION GEAR BACKLASH

S503152A0101

- 1) Disassemble the front differential. <Ref. to MT-70 DISASSEMBLY, Front Differential Assembly.>
- 2) Select a different washer from the table and install. <Ref. to MT-70 ASSEMBLY, Front Differential Assembly.>

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:

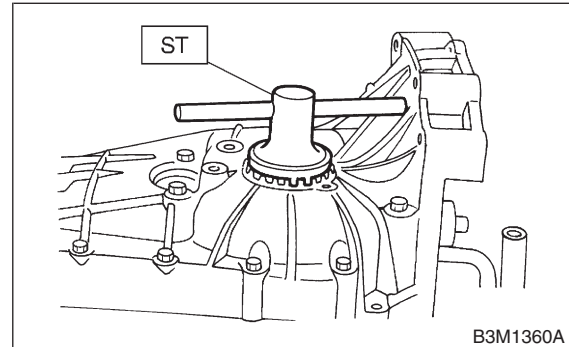
0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

S503152A0102

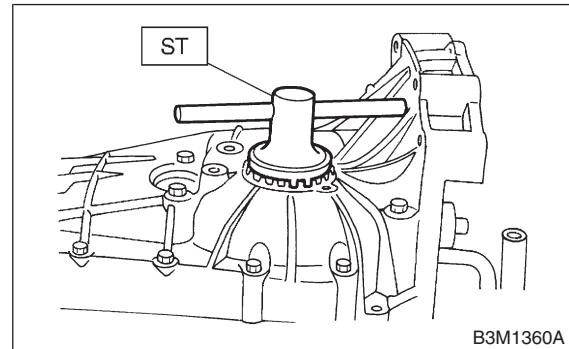
Adjust backlash by turning holder in right side case.

ST 499787000 WRENCH ASSY



NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.12 in).



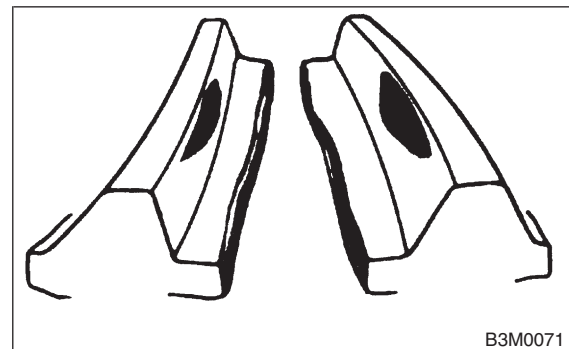
3. TOOTH CONTACT OF HYPOID GEAR

S503152A0103

Adjust until the teeth contact is correct.

- Backlash is excessive.

To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.

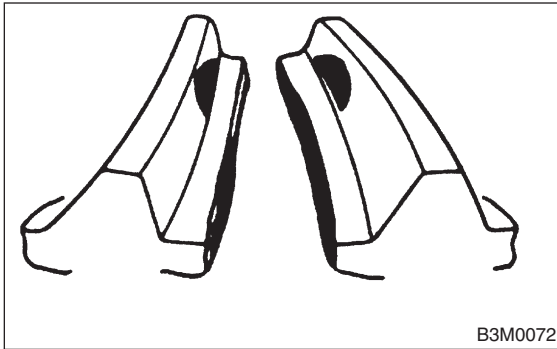


FRONT DIFFERENTIAL ASSEMBLY

Manual Transmission and Differential

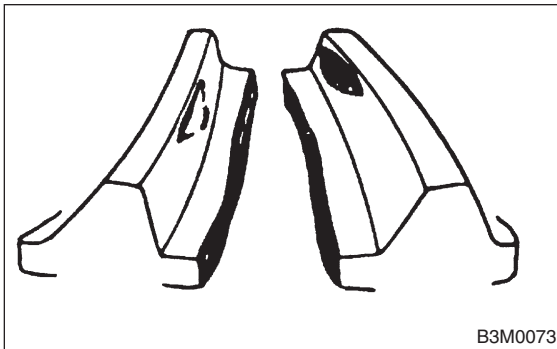
- Backlash is insufficient.

To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



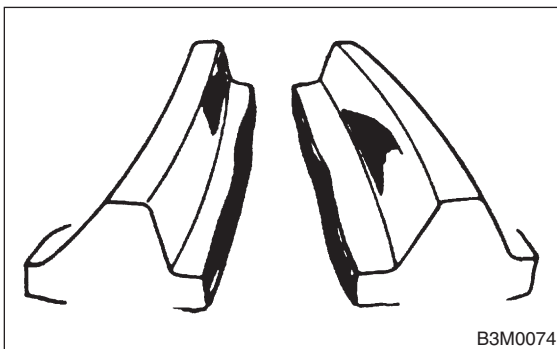
- The drive pinion shim selected before is too thick.

Reduce its thickness.



- The drive pinion shim selected before is too thin.

Increase its thickness.



GENERAL DESCRIPTION

Manual Transmission and Differential

1. General Description S503001

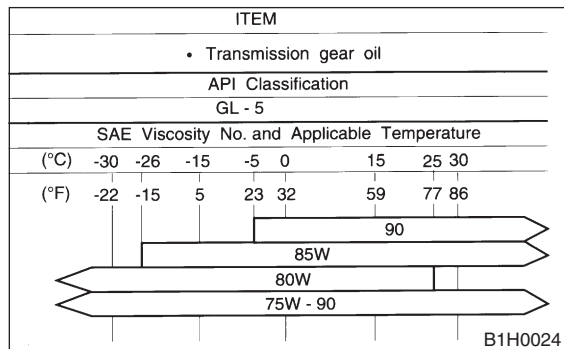
A: SPECIFICATIONS S503001E49

1. MANUAL TRANSMISSION AND DIFFERENTIAL S503001E4901

Item		Model	
		AWD	
		2200 cc	2500 cc
Type		5-forward speeds with synchromesh and 1-reverse	
Transmission gear ratio	1st	3.545	
	2nd	2.111	
	3rd	1.448	
	4th	1.088	
	5th	0.780	
	Reverse	3.333	
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

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)

Hypoid gear backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

Selection of main shaft rear plate

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

4. DRIVE PINION ASSEMBLY S503001E4904

Preload adjustment of thrust bearing

Starting torque

0.3 — 0.8 N·m

(0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

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

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

5. REVERSE IDLER GEAR S503001E4905

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance

6.0 — 7.5 mm (0.236 — 0.295 in)

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

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

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

6. SHIFTER FORK AND ROD S503001E4906

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

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)

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)

GENERAL DESCRIPTION

Manual Transmission and Differential

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	X	Neutral position is closer to 1st gear.
32188AA100	Y	Standard
32188AA110	Z	Neutral position is closer to reverse gear.

Reverse check plate adjustment

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

8. EXTENSION ASSEMBLY S503001E4908

Thrust washer (52 × 61 × t) to ball bearing side clearance

0.05 — 0.30 mm (0.0020 — 0.0118 in)

Thrust washer (52 × 61 × t)	
Part No.	Thickness mm (in)
803052021	0.50 (0.0197)
803052022	0.75 (0.0295)
803052023	1.00 (0.0394)

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

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

9. FRONT DIFFERENTIAL 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 — 0.25 mm (0 — 0.0098 in)

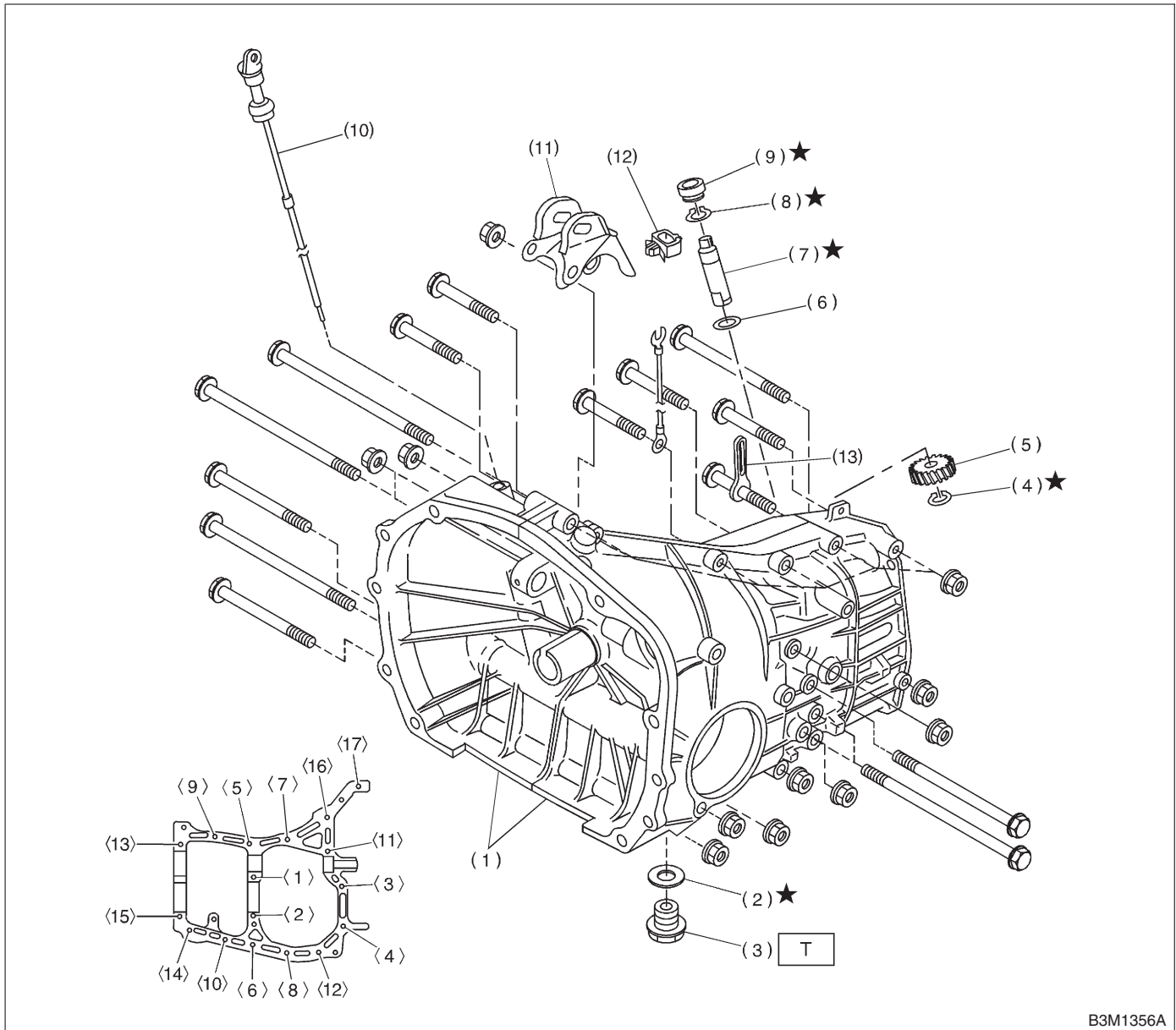
Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

B: COMPONENT

S503001A05

1. TRANSMISSION CASE

S503001A0501



- | | |
|-----------------------------|-------------------------------|
| (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)

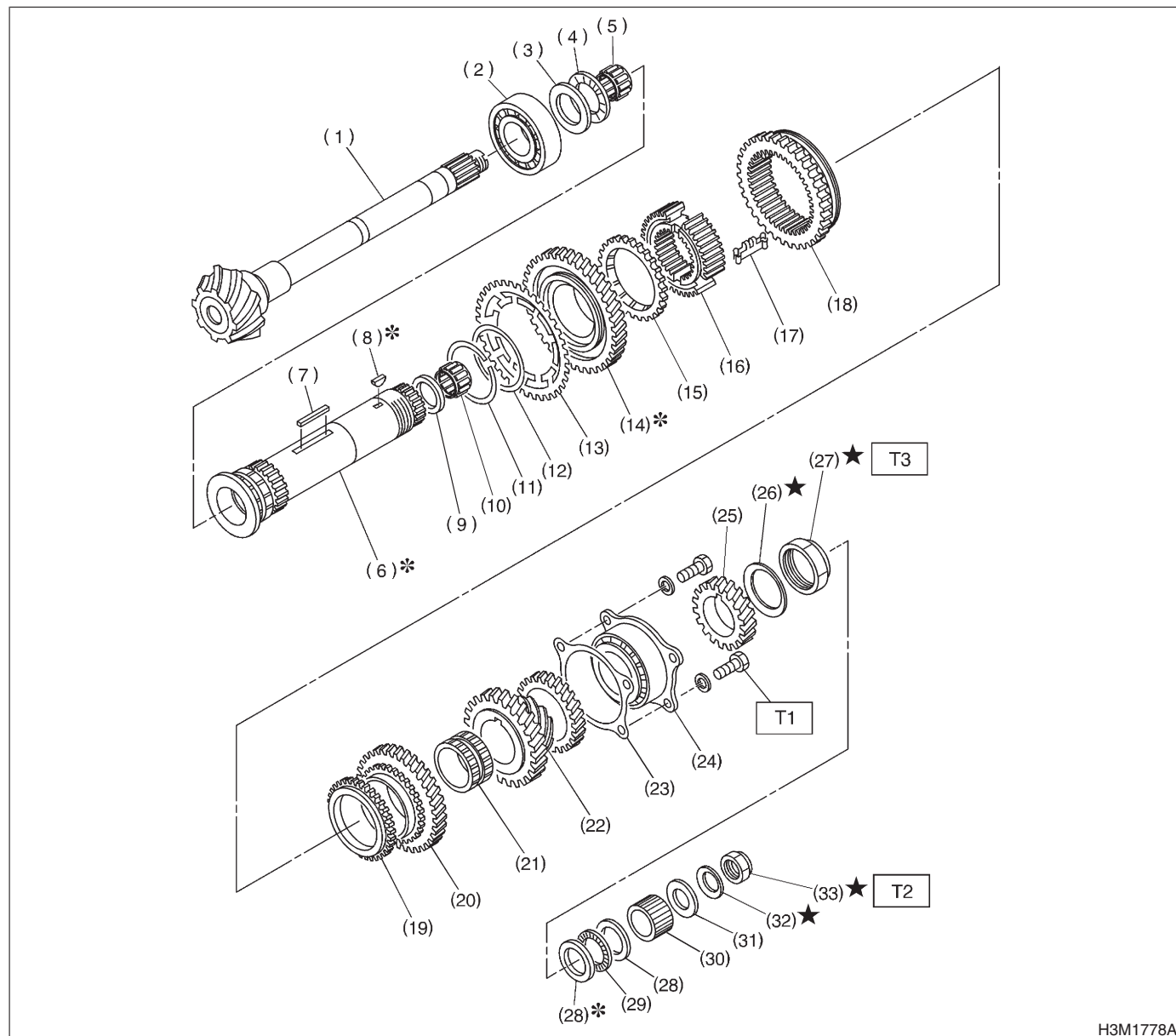
GENERAL DESCRIPTION

Manual Transmission and Differential

2. DRIVE PINION ASSEMBLY

S503001A0502

● 2200 cc Model



H3M1778A

- (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) Baulk ring
- (20) 2nd driven gear
- (21) 2nd driven gear bush
- (22) 3rd-4th driven gear
- (23) Driven pinion shim
- (24) Roller bearing
- (25) 5th driven gear
- (26) Lock washer

- (27) Lock nut
- (28) Washer
- (29) Thrust bearing
- (30) Differential bevel gear sleeve
- (31) Washer
- (32) Lock washer
- (33) Lock nut

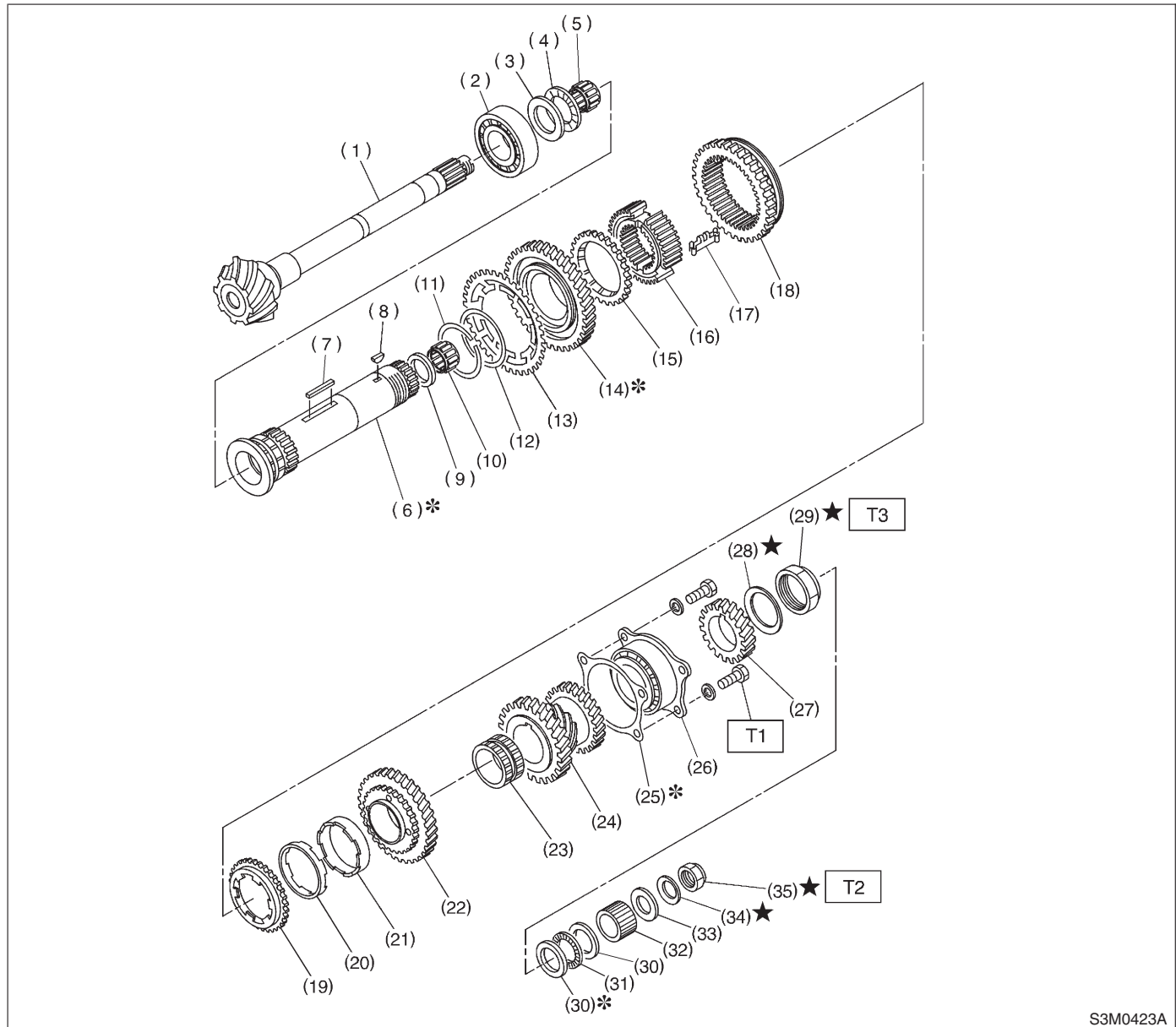
Tightening torque: N·m (kgf-m, ft-lb)

T1: 29 (3.0, 21.7)

T2: 118 (12.0, 86.8)

T3: 265 (27, 195)

● 2500 cc Model



S3M0423A

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

Tightening torque: N·m (kgf-m, ft-lb)

T1: 29 (3.0, 21.7)

T2: 118 (12.0, 86.8)

T3: 265 (27, 195)

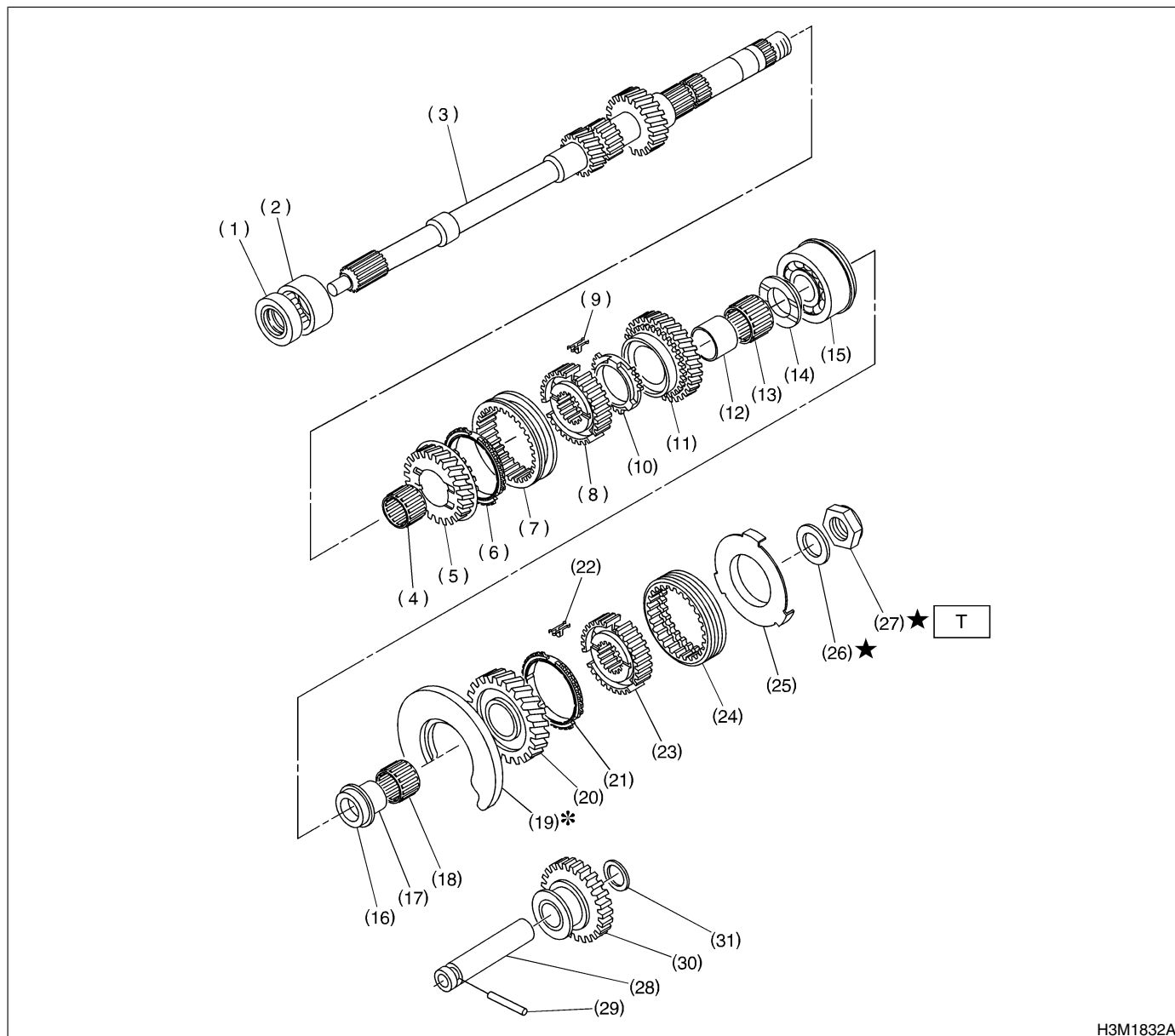
GENERAL DESCRIPTION

Manual Transmission and Differential

3. MAIN SHAFT ASSEMBLY

S502001A0503

● 2200 cc Model



H3M1832A

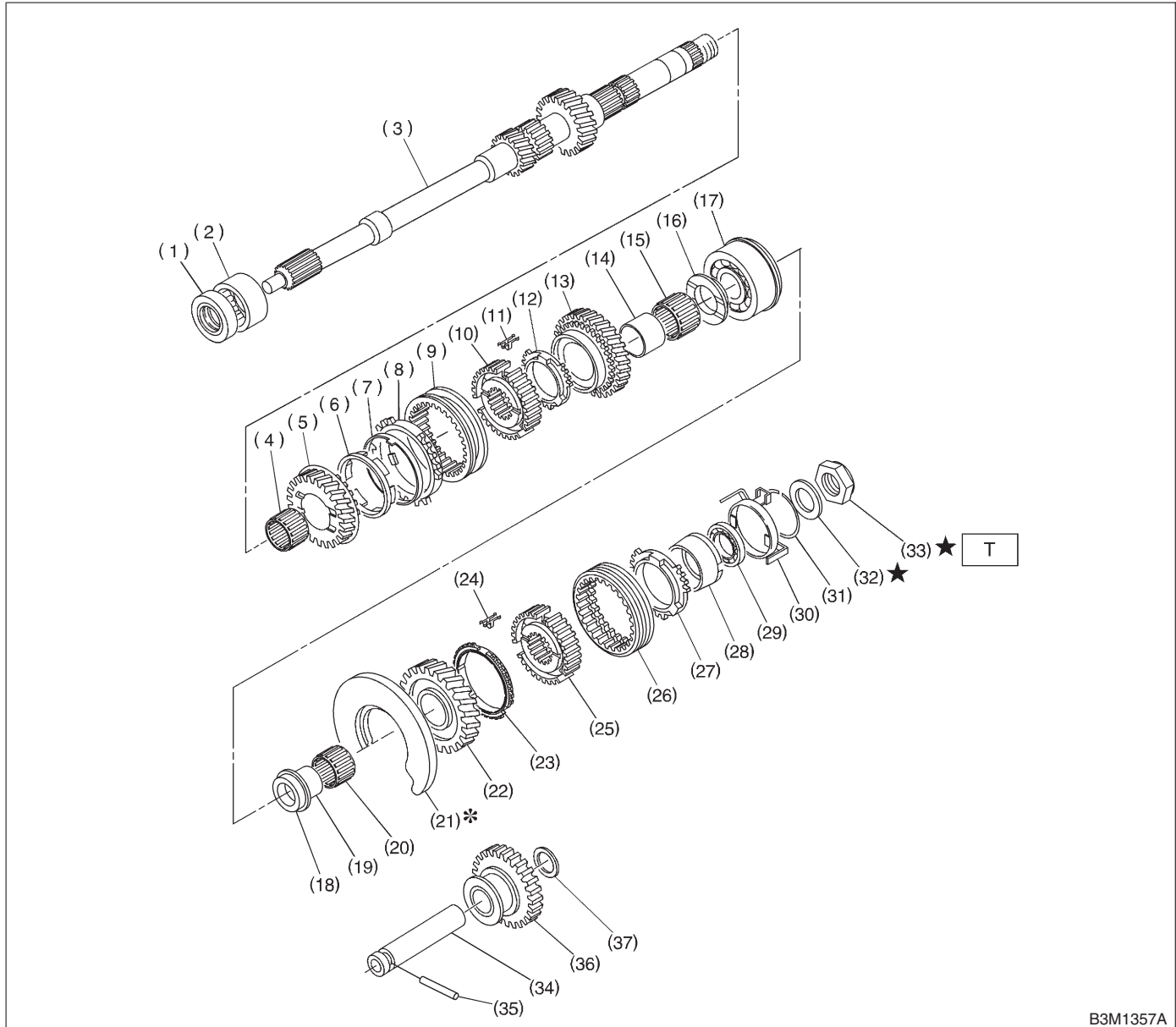
- (1) Oil seal
- (2) Needle bearing
- (3) Transmission main shaft
- (4) Needle bearing
- (5) 3rd drive gear
- (6) 3rd baulk ring
- (7) Coupling sleeve
- (8) Synchronizer hub
- (9) Shifting insert key
- (10) 4th baulk ring
- (11) 4th drive gear
- (12) 4th needle bearing race

- (13) Needle bearing
- (14) 4th gear thrust washer
- (15) Ball bearing
- (16) 5th gear thrust washer
- (17) 5th needle bearing race
- (18) Needle bearing
- (19) Main shaft rear plate
- (20) 5th drive gear
- (21) 5th baulk ring
- (22) Shifting insert key (5th-Rev)
- (23) Synchronizer hub (5th-Rev)
- (24) Coupling sleeve (5th-Rev)

- (25) Insert stopper plate
- (26) Lock washer
- (27) Lock nut
- (28) Straight pin
- (29) Reverse idler gear shaft
- (30) Reverse idler gear
- (31) Washer

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

● 2500 cc Model



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) | |

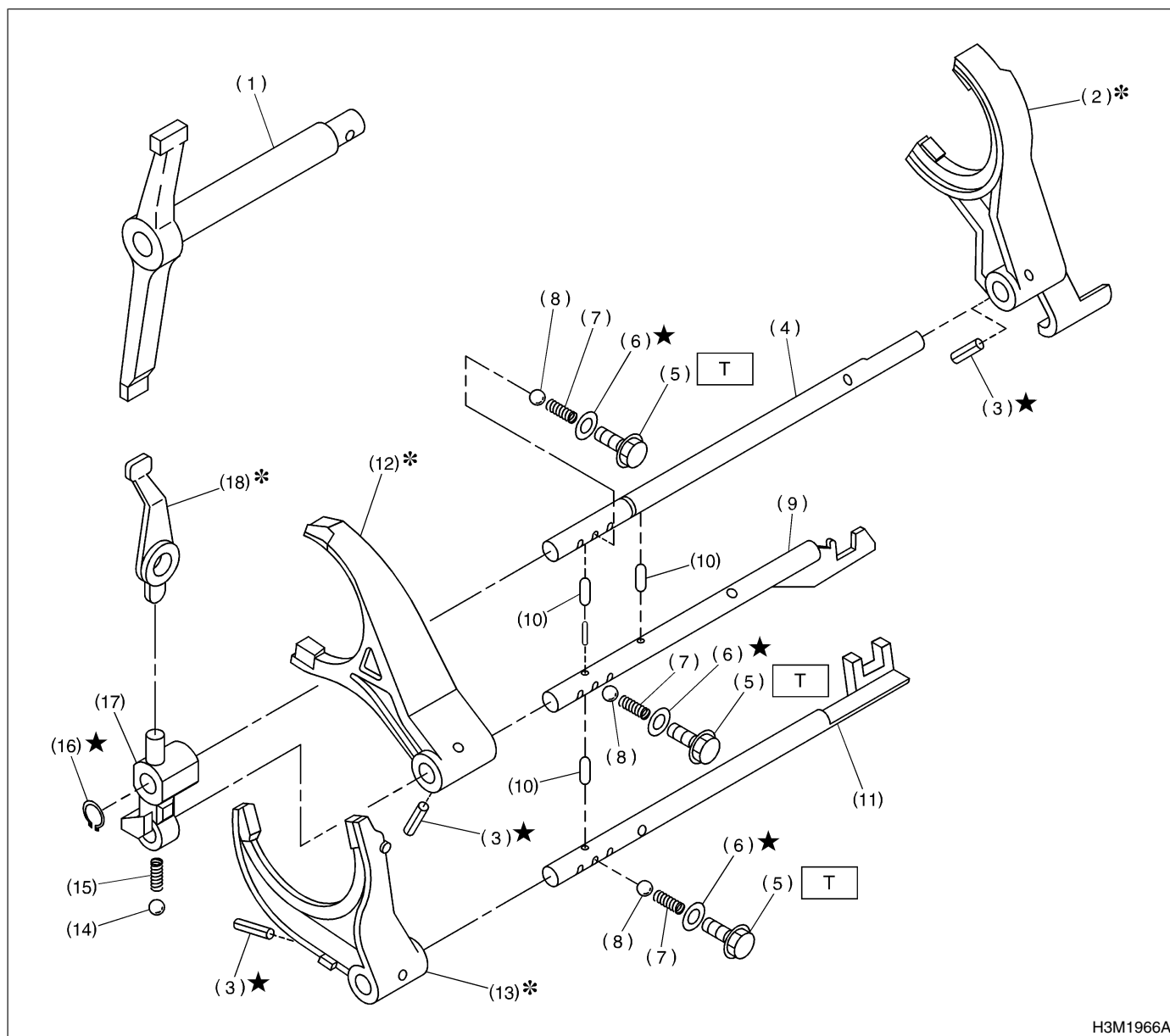
Tightening torque: N·m (kgf-m, ft-lb)
T: 118 (12.0, 86.8)

GENERAL DESCRIPTION

Manual Transmission and Differential

4. SHIFTER FORK AND SHIFTER ROD

S503001A0504



H3M1966A

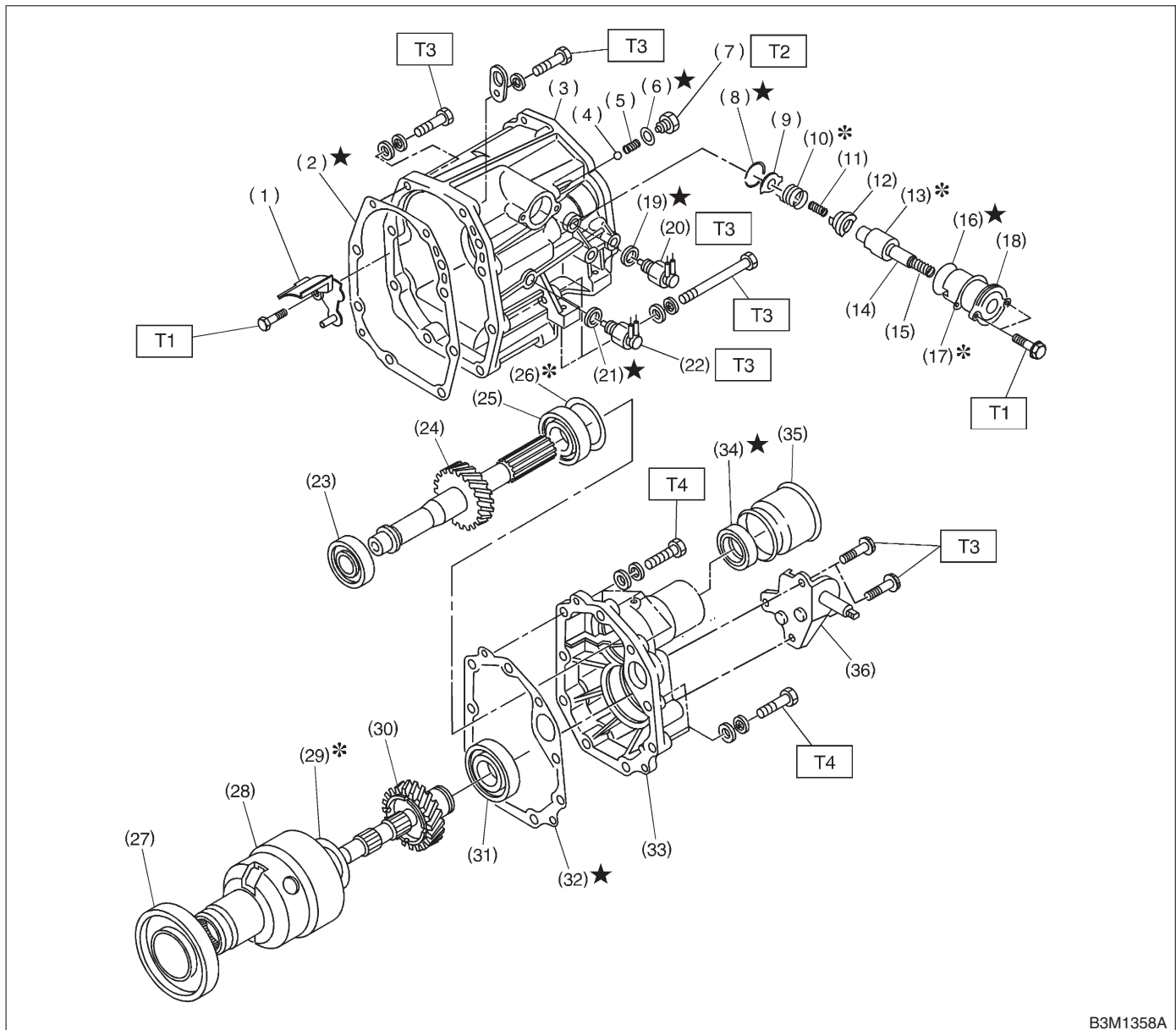
- | | |
|--------------------------|---------------------------|
| (1) Shifter arm | (9) 3rd-4th fork rod |
| (2) 5th shifter fork | (10) Interlock plunger |
| (3) Straight pin | (11) 1st-2nd fork rod |
| (4) Reverse fork rod | (12) 3rd-4th shifter fork |
| (5) Checking ball plug | (13) 1st-2nd shifter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

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

Tightening torque: N·m (kgf-m, ft-lb)
T: 19.6 (2.00, 14.5)

5. TRANSFER CASE AND EXTENSION

S503001A0505



B3M1358A

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

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.65, 4.7)

T2: 10 (1.0, 7.2)

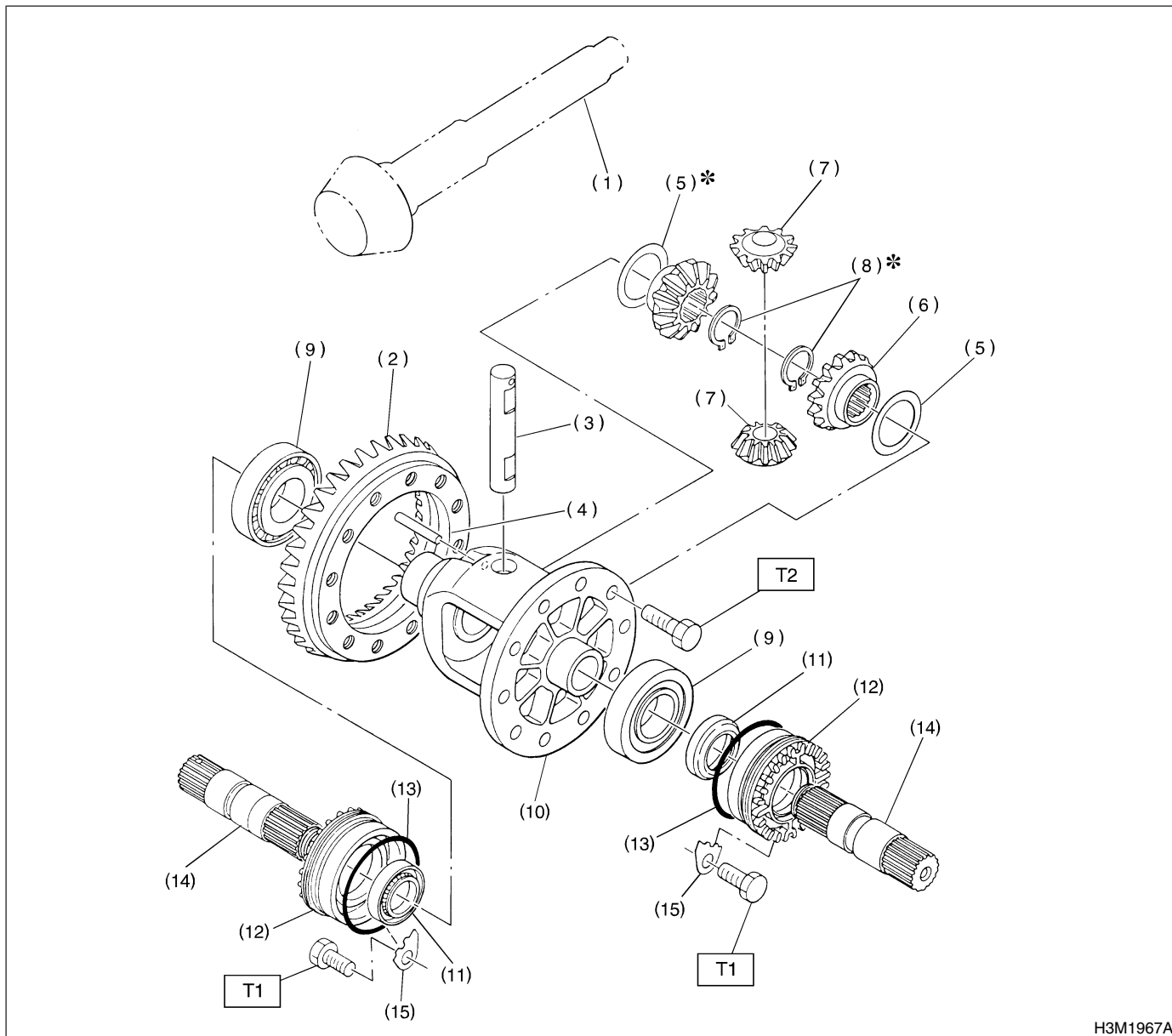
T3: 25 (2.5, 18.1)

T4: 37 (3.8, 27.5)

GENERAL DESCRIPTION

Manual Transmission and Differential

6. FRONT DIFFERENTIAL S503001A0506



H3M1967A

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

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

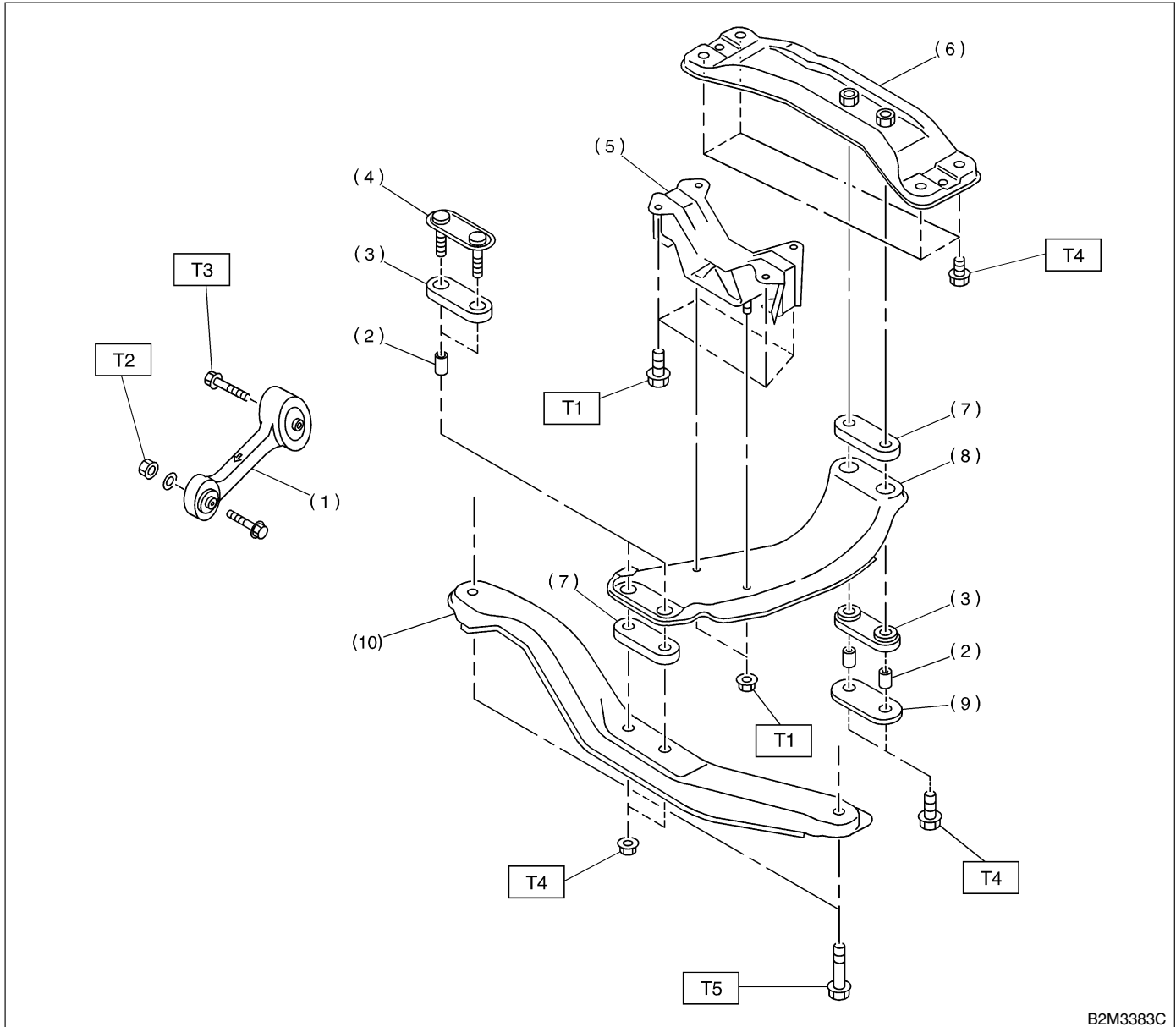
- (15) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)

T1: 25 (2.5, 18.1)

T2: 62 (6.3, 45.6)

7. TRANSMISSION MOUNTING SS03001A0507



B2M3383C

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

Tightening torque: N·m (kgf-m, ft-lb)

T1: 34 (3.5, 25.3)

T2: 49 (5.0, 36.2)

T3: 57 (5.8, 42)

T4: 69 (7.0, 51)

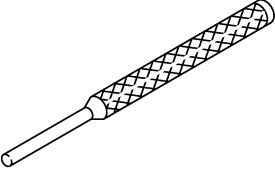
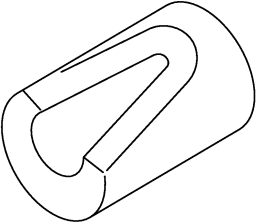
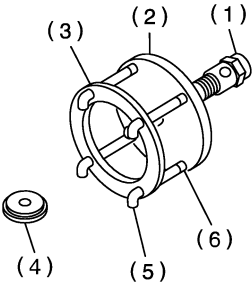
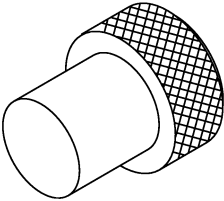
T5: 137 (14, 101)

C: CAUTION SS03001A03

- 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.

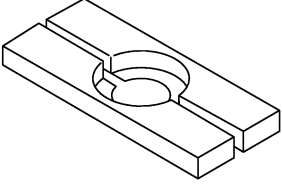
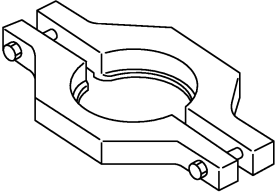
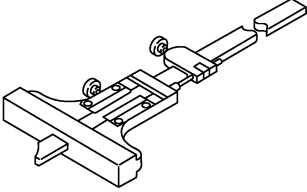
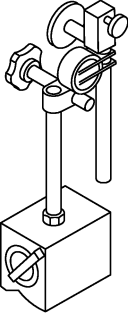
D: PREPARATION TOOL S503001A17

1. SPECIAL TOOL S503001A1701

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1938	398791700	REMOVER II	Used for removing and installing spring pin (6 mm).
 B3M1939	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.
 B3M1940A	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)
 B3M1941	399780104	WEIGHT	Used for measuring preload on roller bearing.

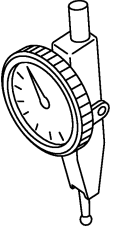
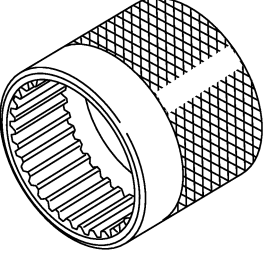
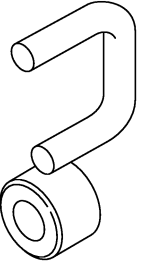
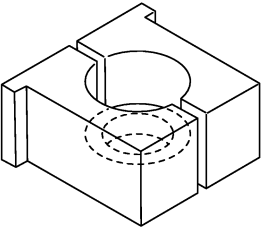
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1942	498077000	5TH DRIVEN GEAR REMOVER	Used for removing roller bearing of drive pinion shaft.
 B3M1943	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.
 B3M1944	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 B3M1945	498247001	MAGNET BASE	- Used for measuring backlash between side gear and pinion, and hypoid gear. - Used with DIAL GAUGE (498247100).

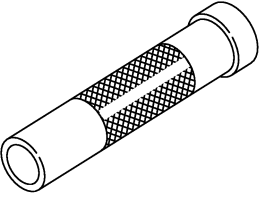
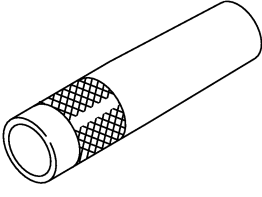
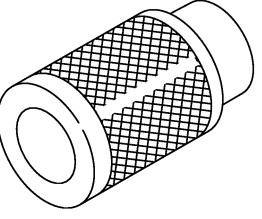
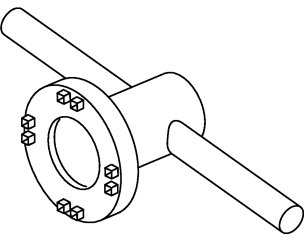
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1946	498247100	DIAL GAUGE	- Used for measuring backlash between side gear and pinion, and hypoid gear. - Used with MAGNET BASE (498247001).
 B3M1947	498427100	STOPPER	Used for removing and installing drive pinion shaft assembly lock nut.
 B3M1948	498787100	MAIN SHAFT STOP- PER	Used for removing and installing transmission main shaft.
 B3M1949	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.

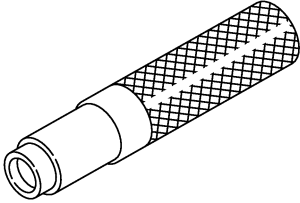
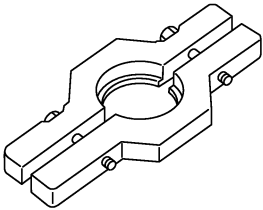
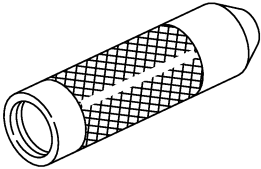
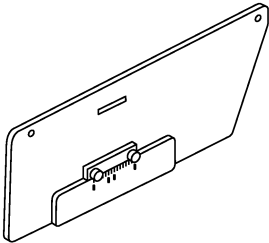
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1950	499277100	BUSH 1-2 INSTALLER	Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bush.
 B3M1951	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings, and 5th driven gear onto the driven shaft.
 B3M1952	499757002	SNAP RING PRESS	Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17).
 B3M1953	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.

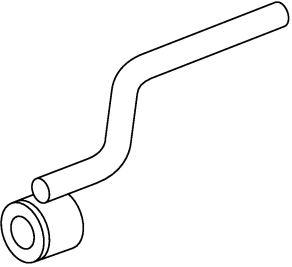
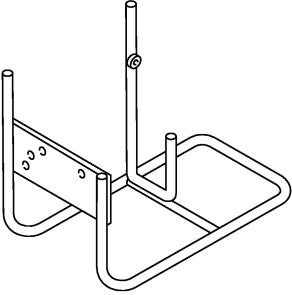
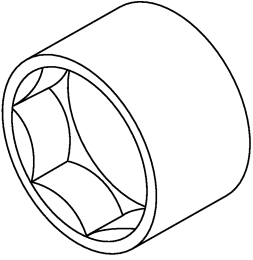
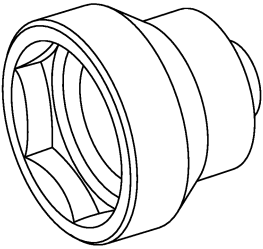
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1954	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 B3M1955	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.
 B3M1956	499877000	RACE 4-5 INSTALLER	- Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. - Used with REMOVER (899714110).
 B3M1957	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.

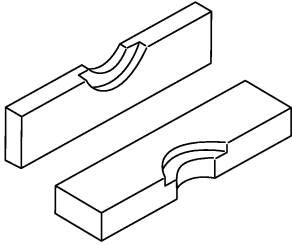
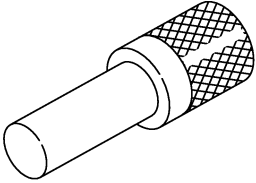
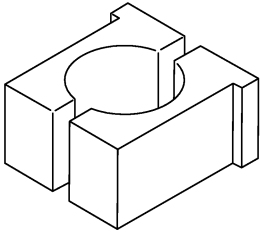
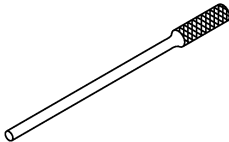
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1958	499927100	HANDLE	Used for fitting transmission main shaft.
 B3M1959	499937100	TRANSMISSION STAND	Stand used for transmission disassembly and assembly.
 B3M1960	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 B3M1961	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.

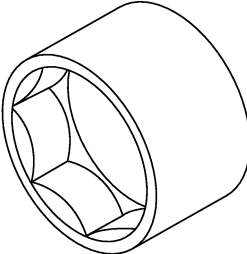
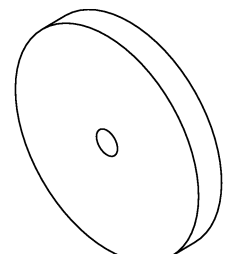
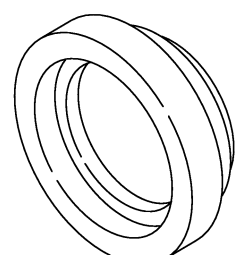
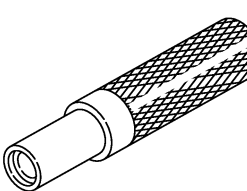
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1962	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion, rear drive shaft.
 B3M1963	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.
 B3M1964	899884100	HOLDER	Used for tightening lock nut on sleeve.
 B3M1965	899904100	REMOVER	Used for removing and installing straight pin.

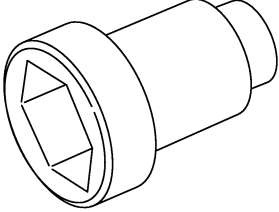
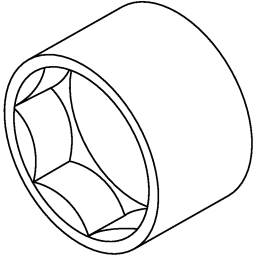
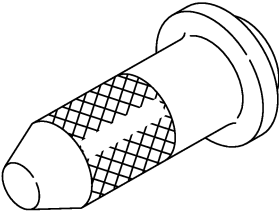
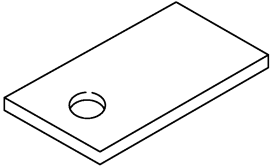
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1966	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.
 B3M1967	398497701	ADAPTER	- Used for installing roller bearing onto differential case. - Used with INSTALLER (499277100).
 B3M1968	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 B3M1969	899824100	PRESS	Used for installing speedometer shaft oil seal.

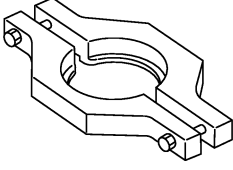
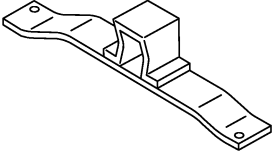
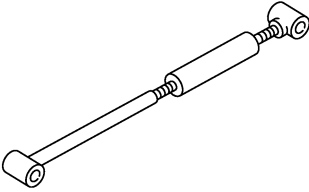
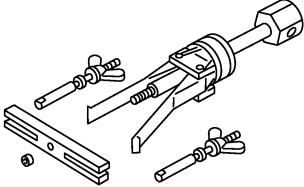
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1970	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 B3M1971	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 B3M1972	498057300	INSTALLER	Used for installing extension oil seal.
 B3M1973	498255400	PLATE	Used for measuring backlash.

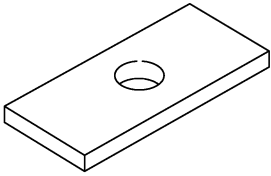
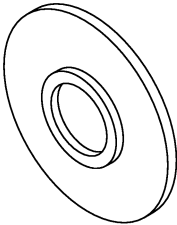
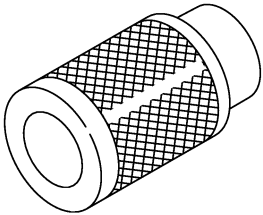
GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1974	498077400	SYNCHRONIZER CONE REMOVER	- Used for removing synchronizer cone of main shaft. - For 2500 cc engine.
 B3M1975	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 B3M1976	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 B3M1977	398527700	PULLER ASSY	Used for removing and installing extension case roller bearing.

GENERAL DESCRIPTION

Manual Transmission and Differential

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 B3M1978	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 B3M1905	38177700	INSTALLER	Used for installing bearing cone of transfer driven gear (transfer case side).
 B3M1952	499757002	INSTALLER	Used for installing bearing cone of transfer driven gear (extension case side).

2. GENERAL TOOL S503001A1702

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

19. General Diagnostic SS03278

A: INSPECTION SS03278A10

1. MANUAL TRANSMISSION SS03278A1001

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

GENERAL DIAGNOSTIC

Manual Transmission and Differential

2. DIFFERENTIAL S503278A1002

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. ● Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. ● Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment ● Bearing noise when driving or when coasting: Cracked, broken or damaged bearings ● Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

MAIN SHAFT ASSEMBLY

Manual Transmission and Differential

13. 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 back-up light switch and neutral position switch.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 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.

B: INSTALLATION S503562A11

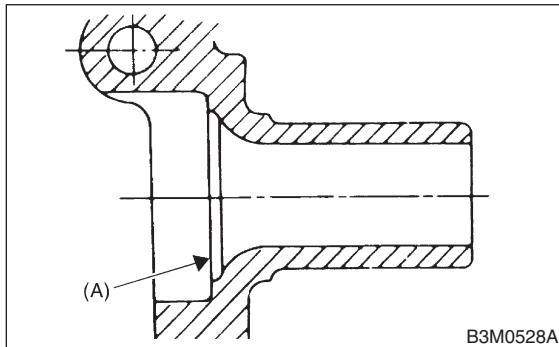
- 1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

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 and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install back-up light switch and neutral position switch.

- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

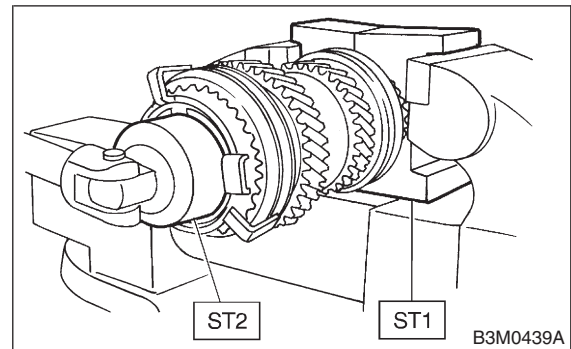
C: DISASSEMBLY S503562A06

- 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.

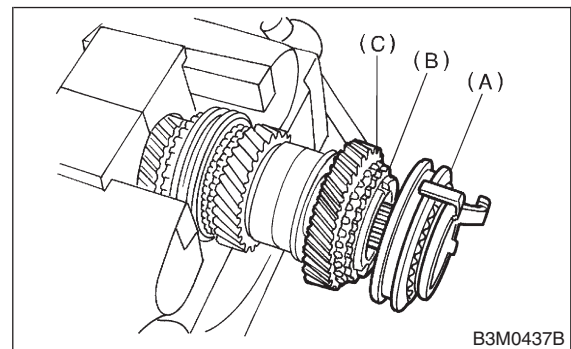
NOTE:

Remove caulking before taking off lock nut.

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

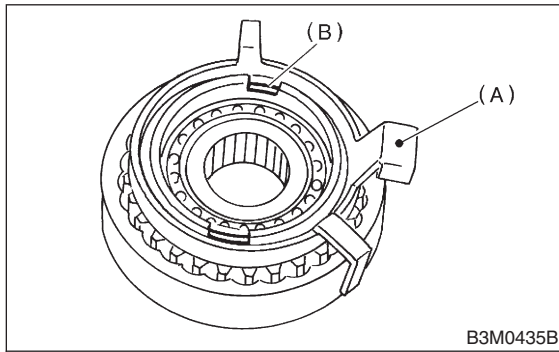


- 3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing (32 × 36 × 25.7).



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

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



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

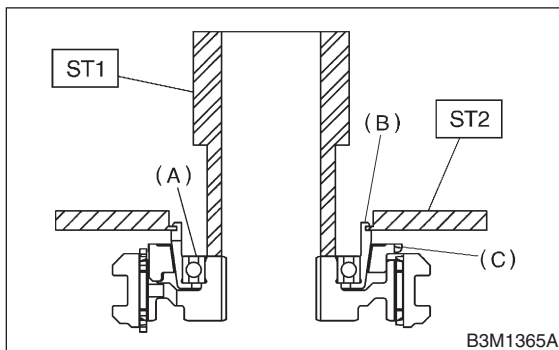
5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

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



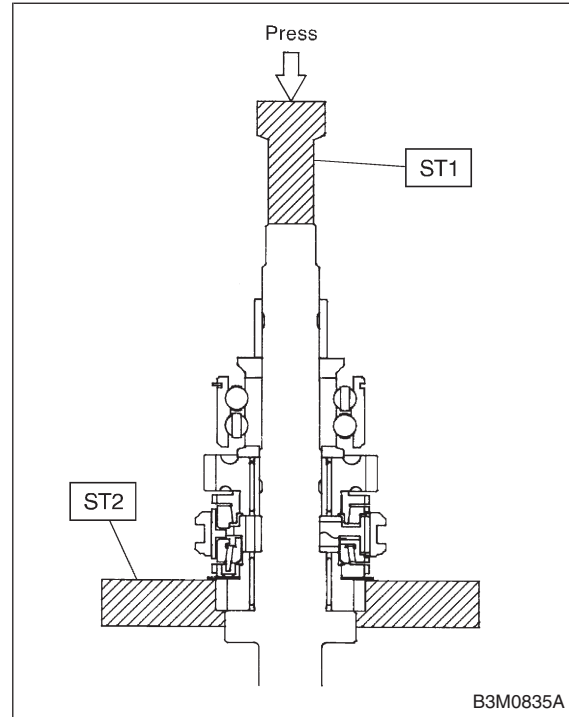
- (A) Ball bearing
- (B) Synchro cone
- (C) Baulk ring

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

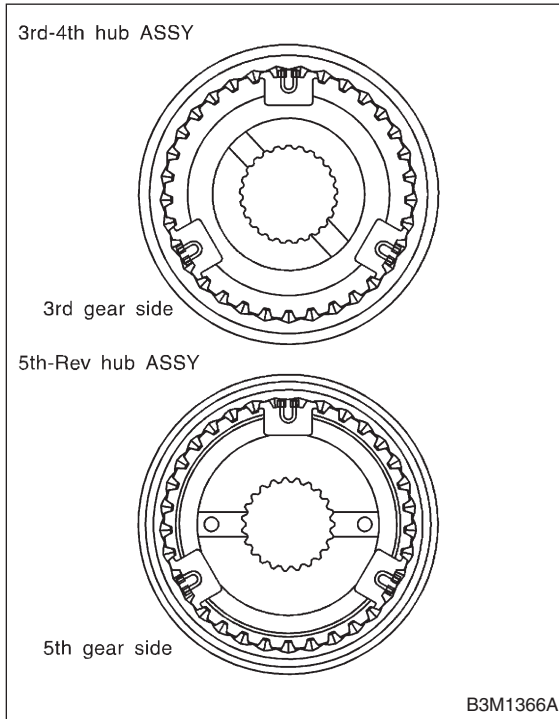
Manual Transmission and Differential

D: ASSEMBLY S503562A02

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

NOTE:

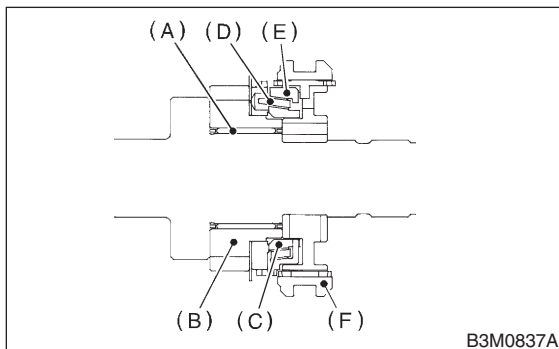
Position open ends of spring 120° apart.



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

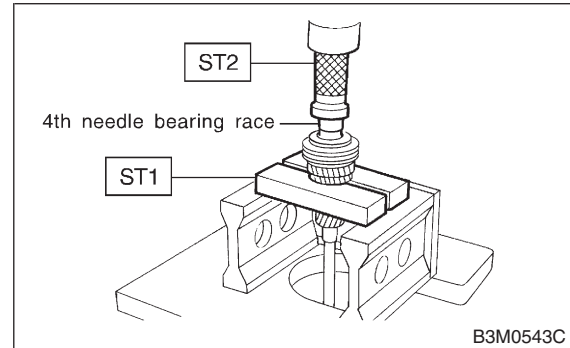
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

CAUTION:

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

ST1 899714110 REMOVER

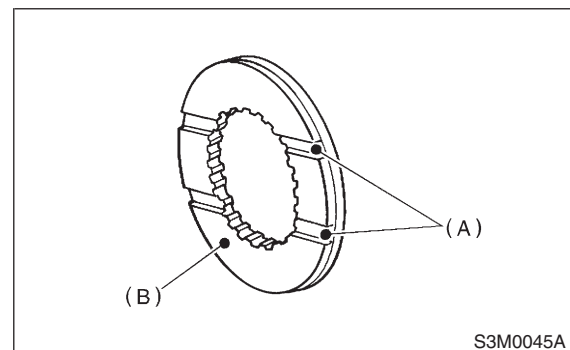
ST2 499877000 RACE 4-5 INSTALLER



4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:

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



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

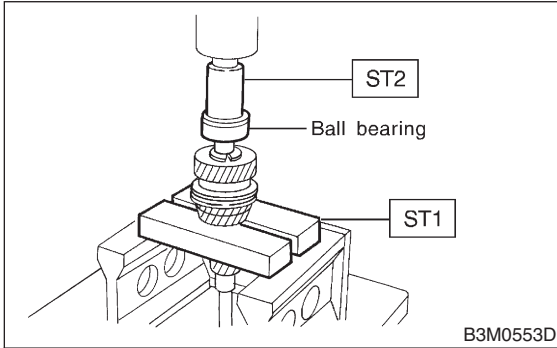
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

CAUTION:

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

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



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:

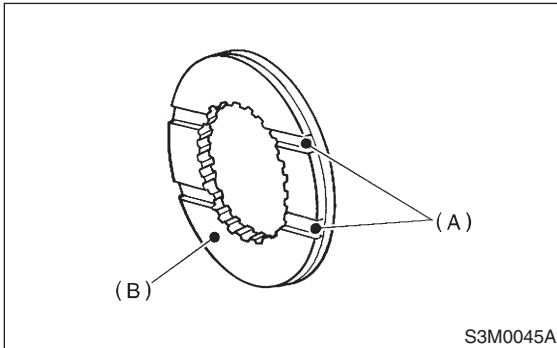
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

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.

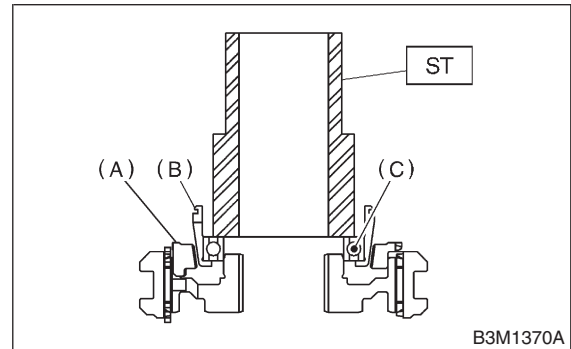
CAUTION:

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

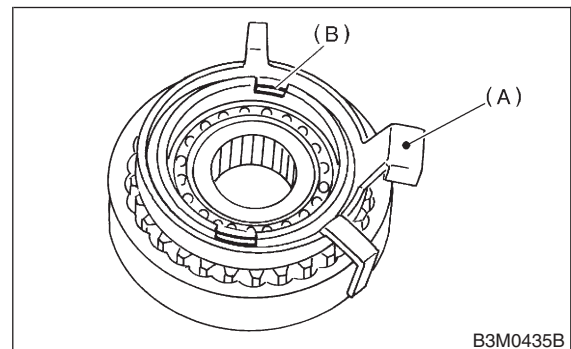


(A) Baulk ring

(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

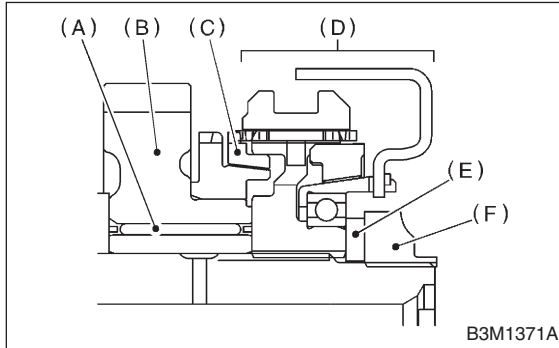
Manual Transmission and Differential

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.

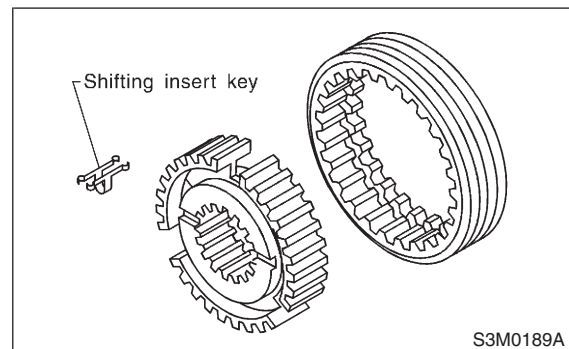
4) Baulk ring

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.

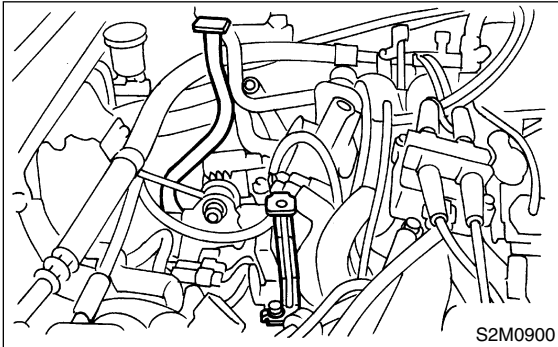
3. Manual Transmission Assembly

S503224

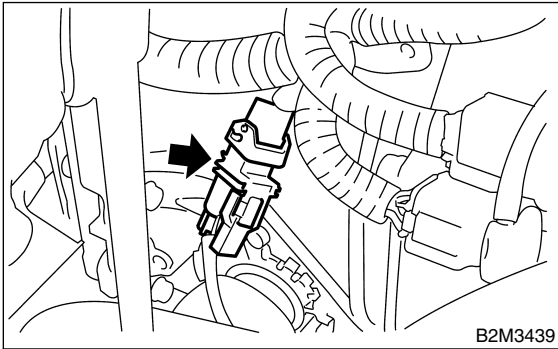
A: REMOVAL

S503224A18

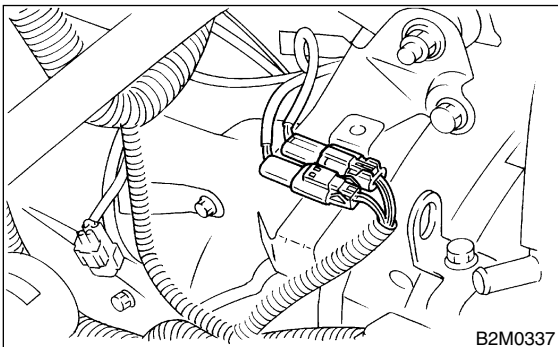
- 1) Open front hood fully, and support with stay.
- 2) Disconnect battery ground terminal.
- 3) Remove air intake duct <Ref. to IN-5 REMOVAL, Air Intake Duct.> and air cleaner case. <Ref. to IN-4 REMOVAL, Air Cleaner Case.>
- 4) Remove air cleaner case stay.



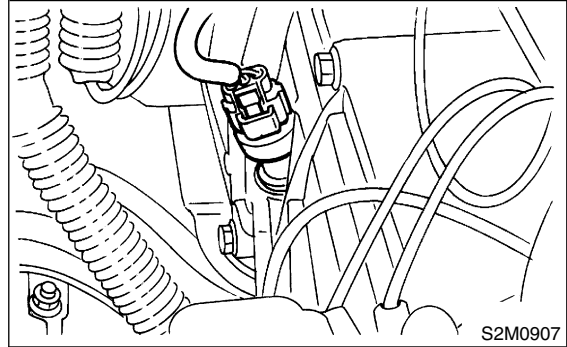
- 5) Disconnect the following connectors.
 - (1) Front oxygen sensor connector



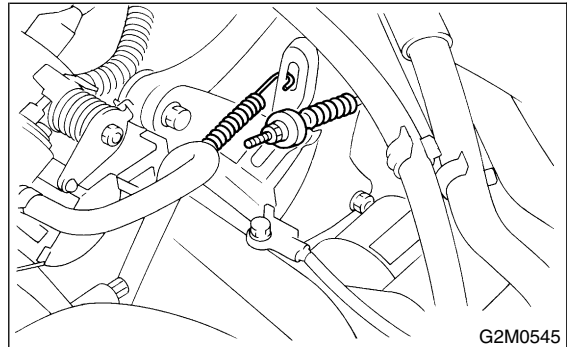
- (2) Transmission ground terminal
- (3) Neutral position switch connector
- (4) Back-up light switch connector



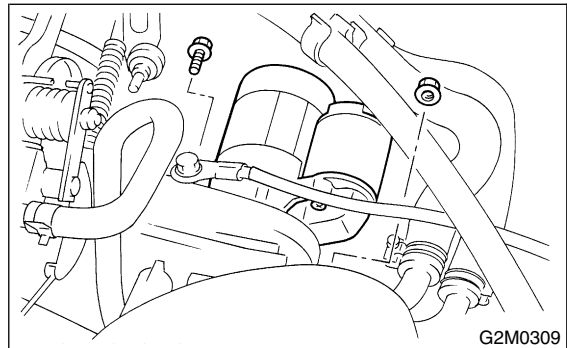
- (5) Vehicle speed sensor connector



- 6) Disconnect the following cable. (2200 cc vehicle)



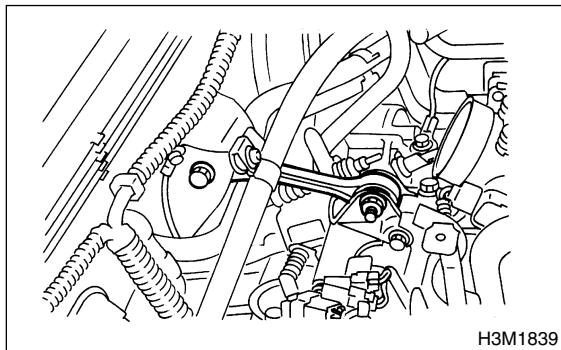
- 7) Remove starter.
 - (1) Disconnect connectors and terminal from starter.
 - (2) Remove bolt which installs upper side of starter.
 - (3) Remove nut which installs lower side of starter, and remove starter from transmission.



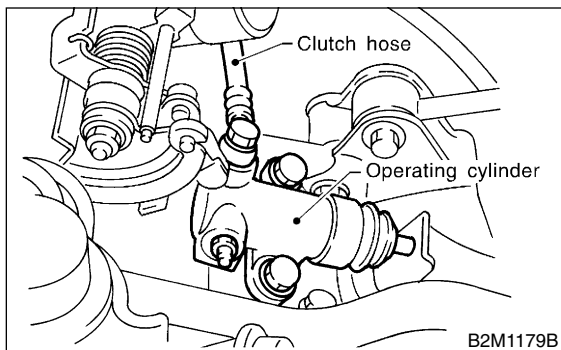
MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

8) Remove pitching stopper.

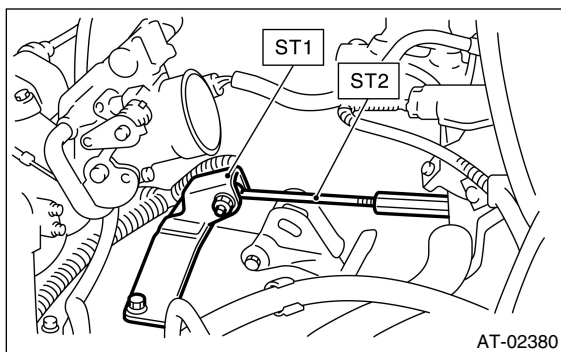


9) Remove operating cylinder. (2500 cc vehicle)

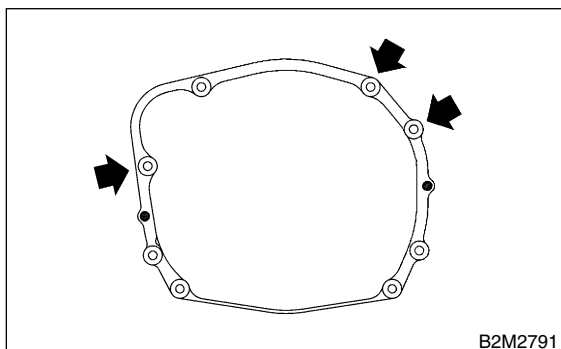


10) Set ST.

ST1 41099AA010 ENGINE SUPPORT
ST2 41099AA020 ENGINE SUPPORT

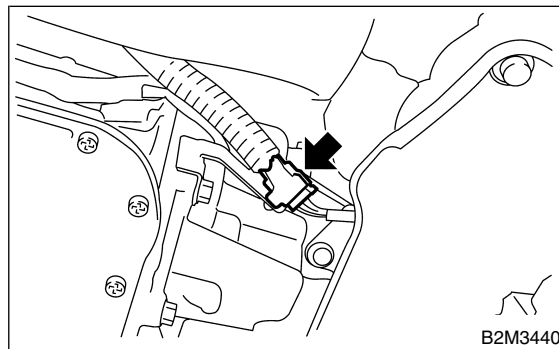


11) Remove bolt which holds right upper side of transmission to engine.

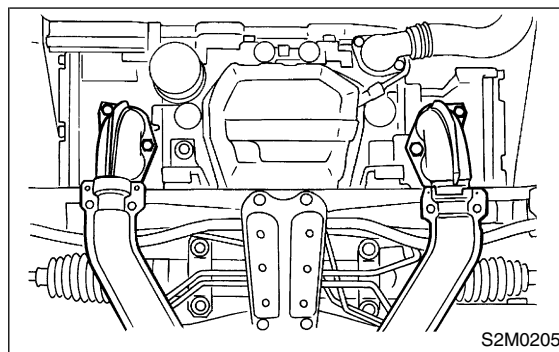


12) Remove exhaust system.

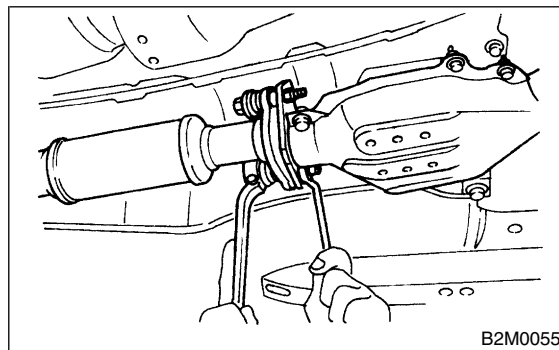
- (1) Lift-up the vehicle.
- (2) Disconnect connector from rear oxygen sensor.



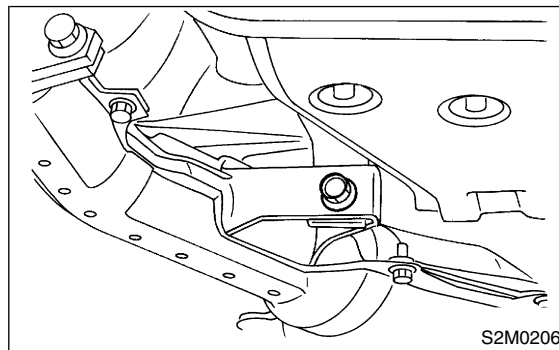
- (3) Remove nuts which install front exhaust pipe onto engine.



- (4) Separate center exhaust pipe from rear exhaust pipe.



- (5) Remove bolt which installs center exhaust pipe to hanger bracket.



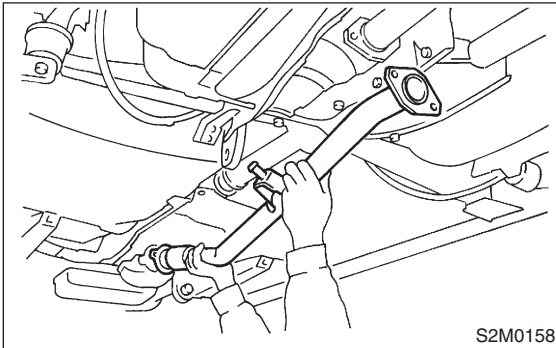
MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

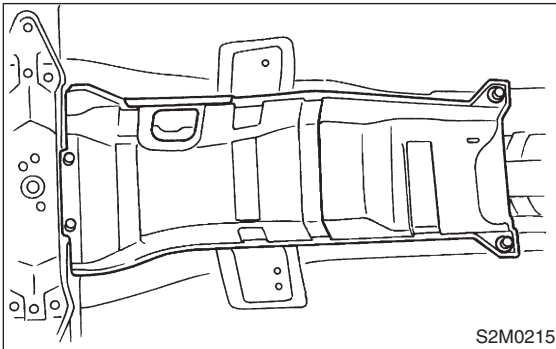
- (6) Take off front and center exhaust pipes.
- (7) Remove rear exhaust pipe.

CAUTION:

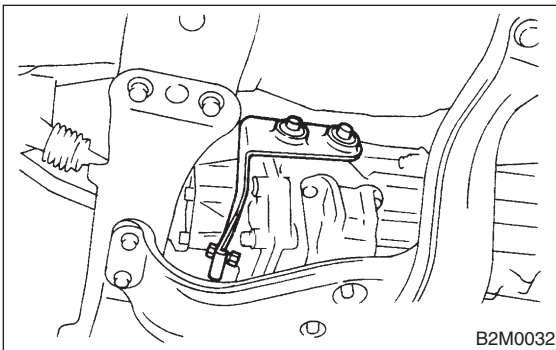
When removing exhaust pipes, be careful each exhaust pipe does not drop out.



- (8) Remove heat shield cover of rear exhaust pipe.

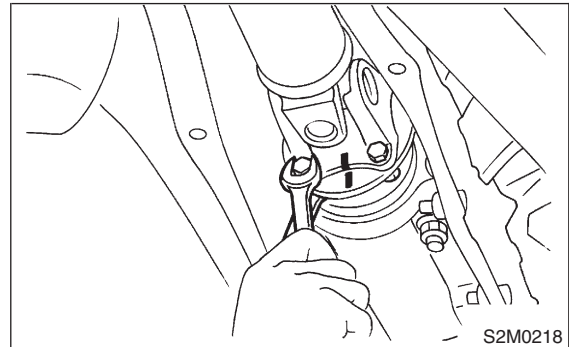


- (9) Remove hanger bracket from right side of transmission.



- 13) Remove propeller shaft.

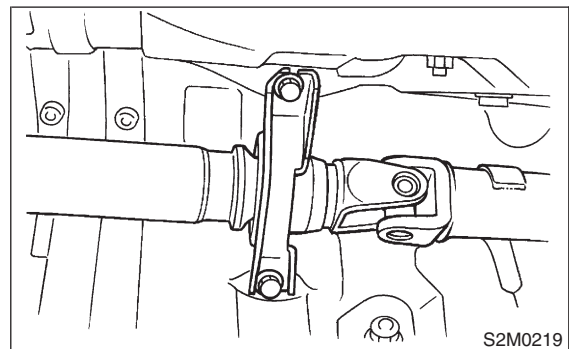
- (1) Remove front cover of rear differential mount.
- (2) Separate propeller shaft from rear differential.



- (3) Remove bolts which hold center bearing onto body.

CAUTION:

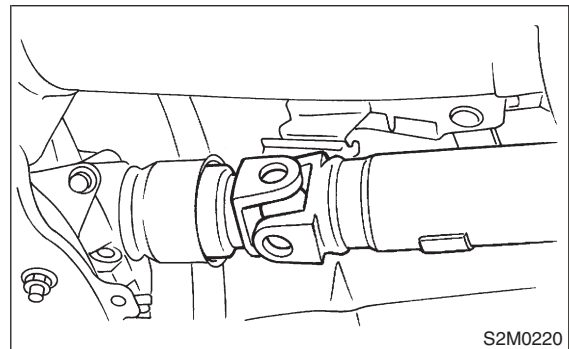
Be careful not to drop propeller shaft.



- (4) Remove propeller shaft from transmission.

CAUTION:

- Be sure to use an empty container to catch oil flowing out when removing propeller shaft.
- Be sure not to damage oil seals and the frictional surface of sleeve yoke.
- Be sure to plug the opening in transmission after removal of propeller shaft.

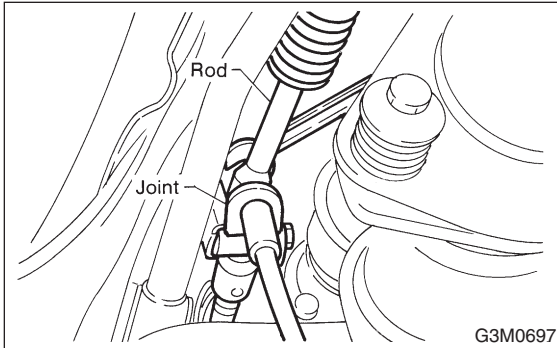


MANUAL TRANSMISSION ASSEMBLY

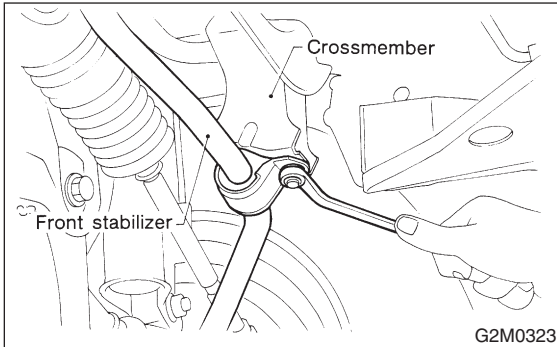
Manual Transmission and Differential

14) Remove gear shift rod and stay from transmission.

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

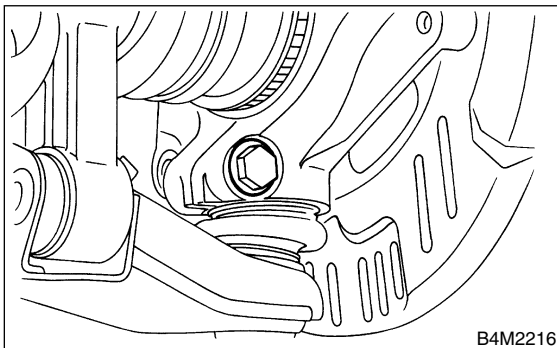


15) Remove bolts which install stabilizer clamps onto crossmember.



16) Remove front drive shafts from transmission.

- (1) Remove transverse link from housing.

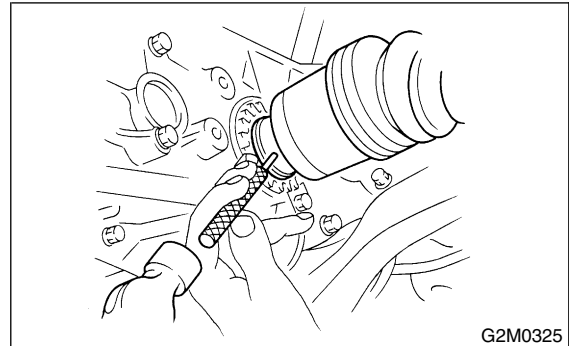


- (2) Lower transverse link.

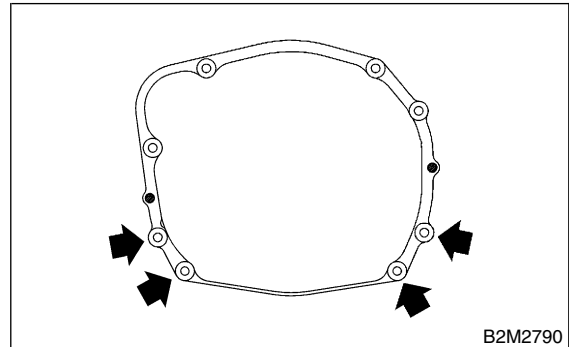
(3) Remove spring pins and separate front drive shafts from each side of the transmission.

CAUTION:

Discard removing spring pin. Replace with a new one.



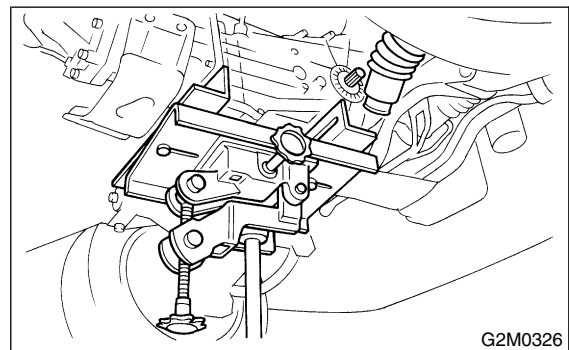
17) Remove nuts which hold lower side of transmission to engine.



18) Place transmission jack under transmission.

CAUTION:

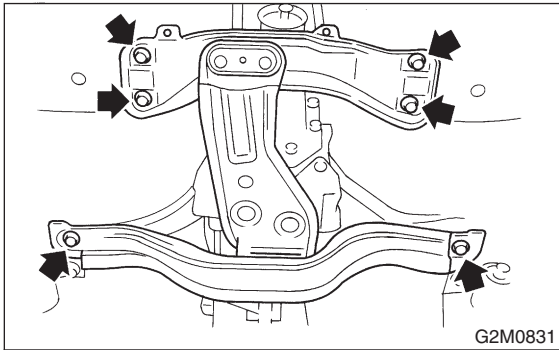
Always support transmission case with a transmission jack.



MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

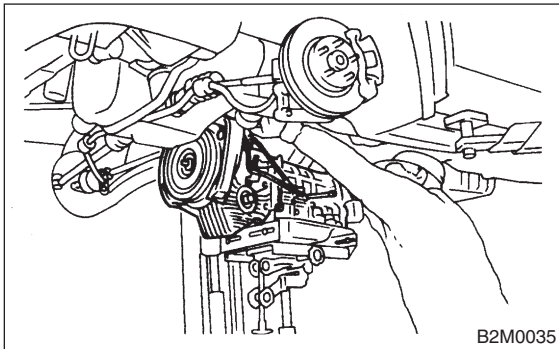
- 19) Remove transmission rear crossmember.



- 20) Remove transmission.

CAUTION:

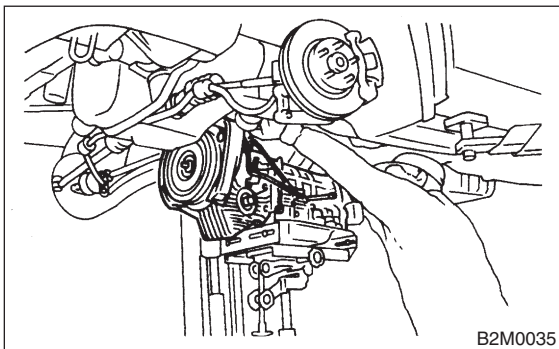
Move transmission jack toward rear until main-shaft is withdrawn from clutch cover.



B: INSTALLATION

S503224A11

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



- (2) Engage them at splines.

CAUTION:

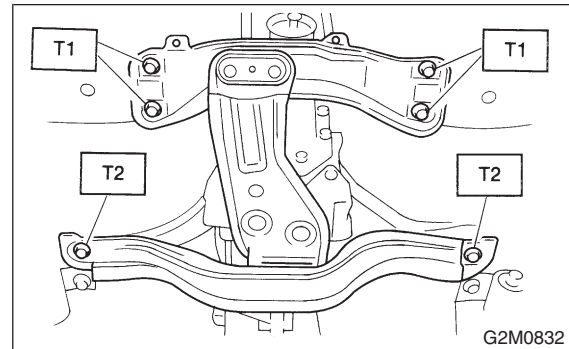
Be careful not to strike main shaft against clutch cover.

- 2) Install transmission rear crossmember.

Tightening torque:

T1: 69 N·m (7.0 kgf-m, 51 ft-lb)

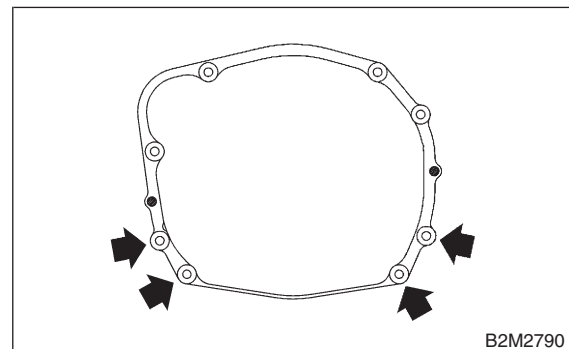
T2: 137 N·m (14 kgf-m, 101 ft-lb)



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

Tightening torque:

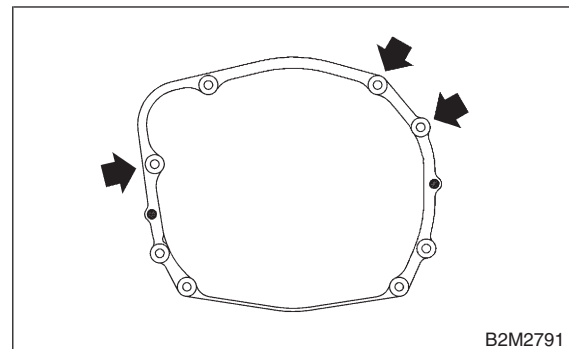
50 N·m (5.1 kgf-m, 36.9 ft-lb)



- 5) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



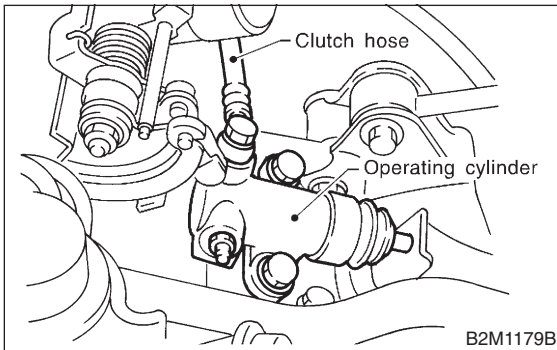
MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

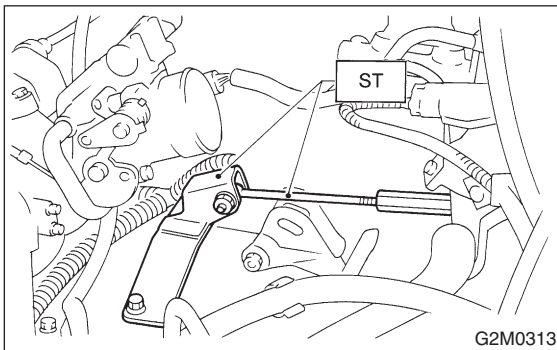
6) Install operating cylinder. (2500 cc vehicle)

Tightening torque:

37 N·m (3.8 kgf-m, 27.5 ft-lb)



7) Remove special tools.

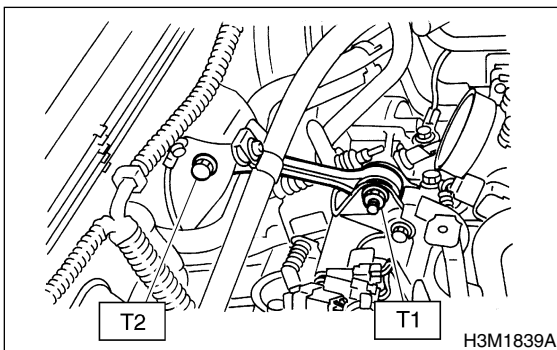


8) Install pitching stopper.

Tightening torque:

T1: 49 N·m (5.0 kgf-m, 36.2 ft-lb)

T2: 57 N·m (5.8 kgf-m, 42 ft-lb)



9) Install front drive shafts into transmission.

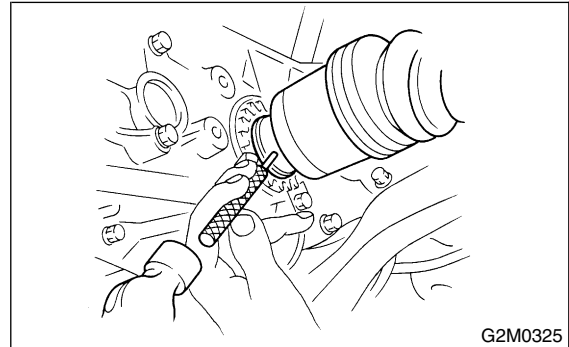
(1) Lift-up the vehicle.

(2) Install front drive shaft into transmission.

(3) Drive spring pin into chamfered hole of drive shaft.

CAUTION:

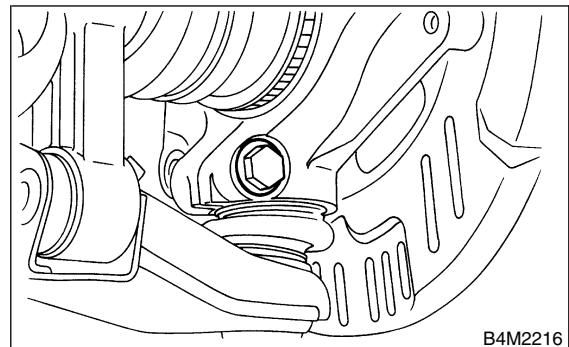
Always use a new spring pin.



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

Tightening torque:

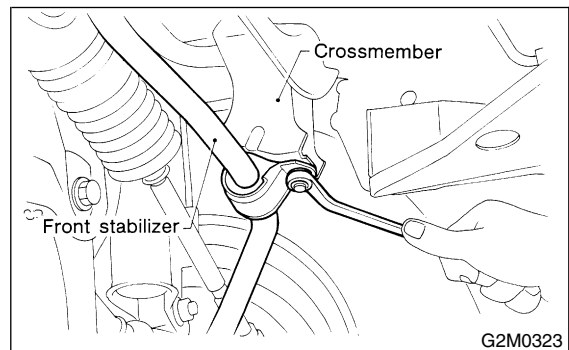
49 N·m (5.0 kgf-m, 36 ft-lb)



10) Install stabilizer clamps onto front crossmember.

Tightening torque:

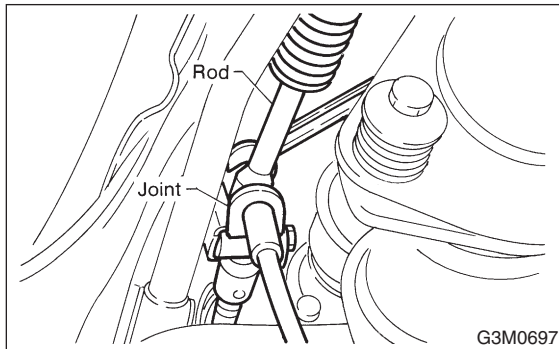
25 N·m (2.5 kgf-m, 18.1 ft-lb)



- 11) Install gear shift rod and stay.
(1) Install gear shift rod onto transmission.

Tightening torque:

18 N·m (1.8 kgf-m, 13.6 ft-lb)



- (2) Install stay onto transmission.

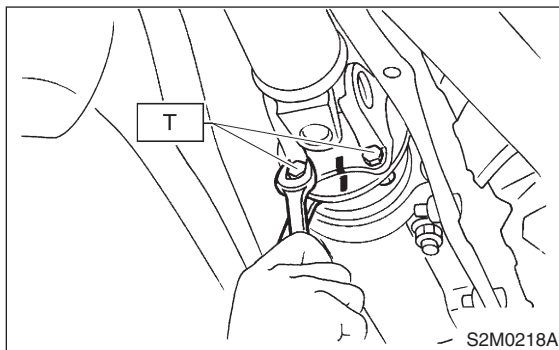
Tightening torque:

18 N·m (1.8 kgf-m, 13.6 ft-lb)

- 12) Install propeller shaft.
(1) Install propeller shaft into transmission.
(2) Tighten bolts which install propeller shaft onto companion flange of rear differential.

Tightening torque:

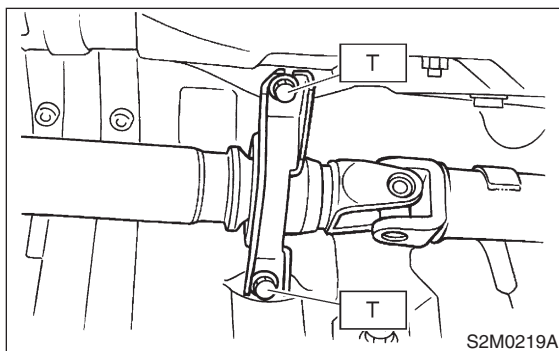
T: 31 N·m (3.2 kgf-m, 23.1 ft-lb)



- (3) Install center bearing bracket on body.

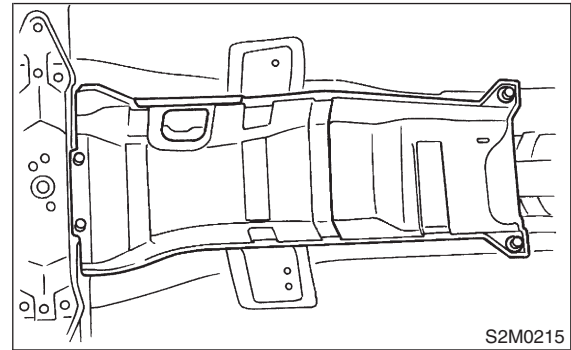
Tightening torque:

T: 52 N·m (5.3 kgf-m, 38.3 ft-lb)



- 13) Install exhaust system.

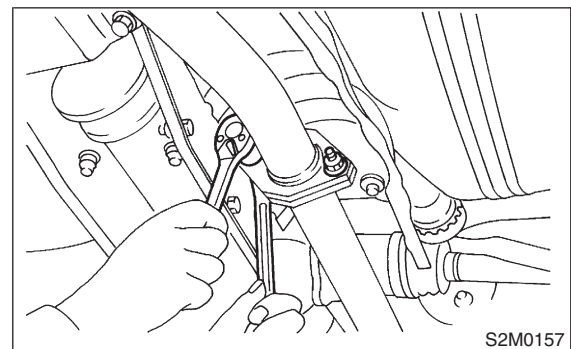
- (1) Install heat shield cover.



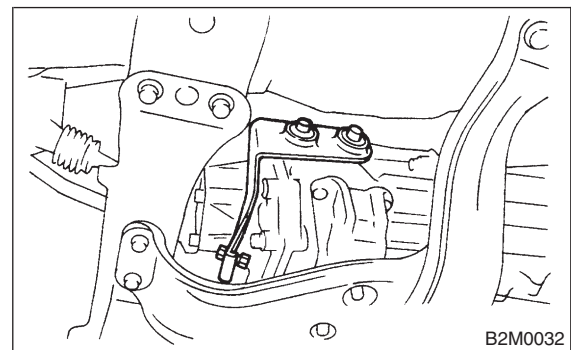
- (2) Install rear exhaust pipe to muffler.

Tightening torque:

48 N·m (4.9 kgf-m, 35.4 ft-lb)



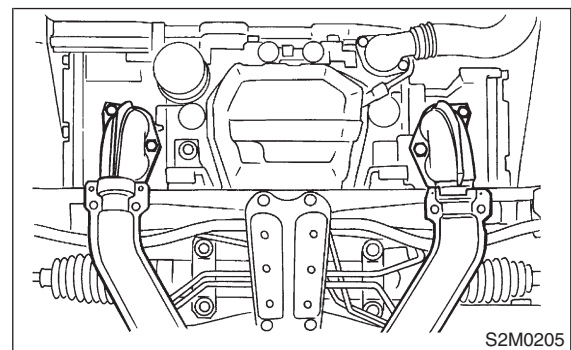
- (3) Install hanger bracket on right side of transmission.



- (4) Install front exhaust pipe onto engine.

Tightening torque:

30 N·m (3.1 kgf-m, 22.4 ft-lb)



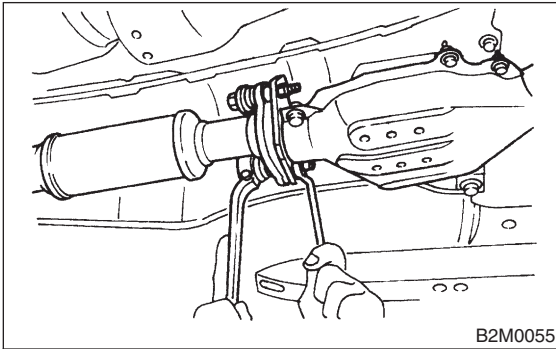
MANUAL TRANSMISSION ASSEMBLY

Manual Transmission and Differential

- (5) Install center exhaust pipe to rear exhaust pipe.

Tightening torque:

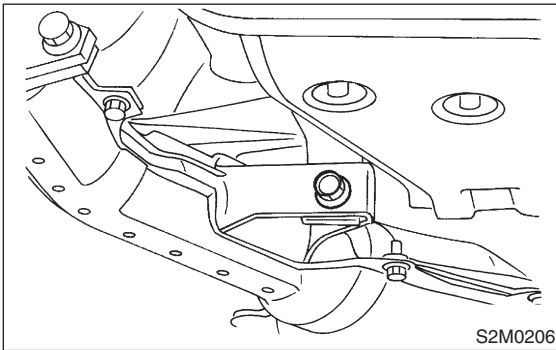
18 N·m (1.8 kgf-m, 13.0 ft-lb)



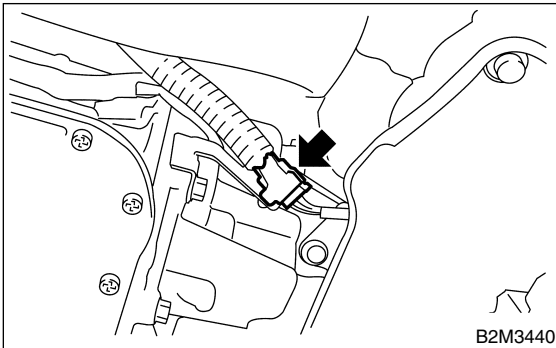
- (6) Tighten bolt which installs center exhaust pipe to hanger bracket.

Tightening torque:

35 N·m (3.6 kgf-m, 26.0 ft-lb)

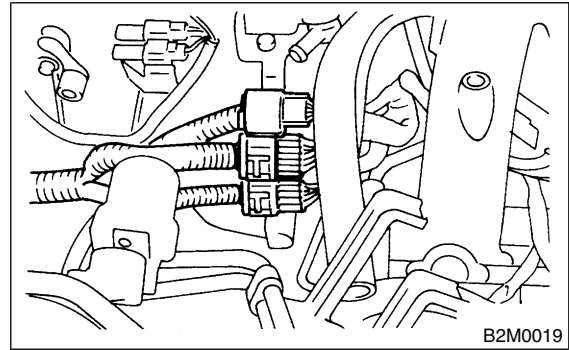


- (7) Connect connector to rear oxygen sensor.



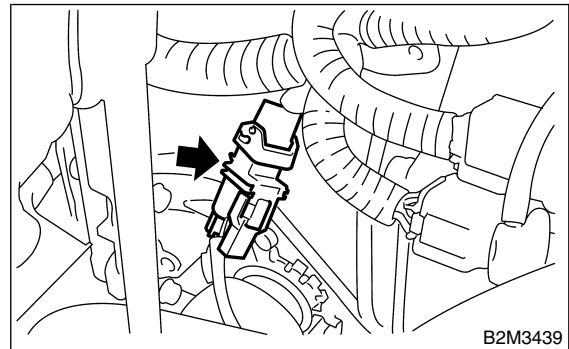
- 14) Connect the following connectors.

- (1) Transmission harness connectors

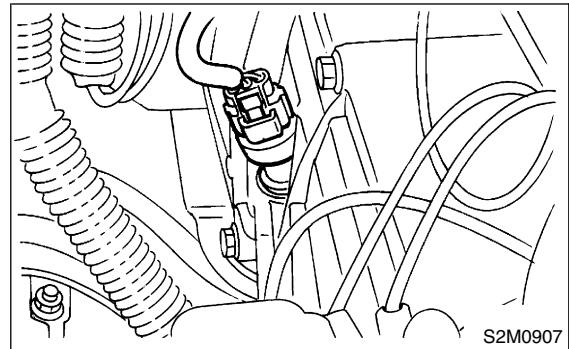


- (2) Transmission ground terminal

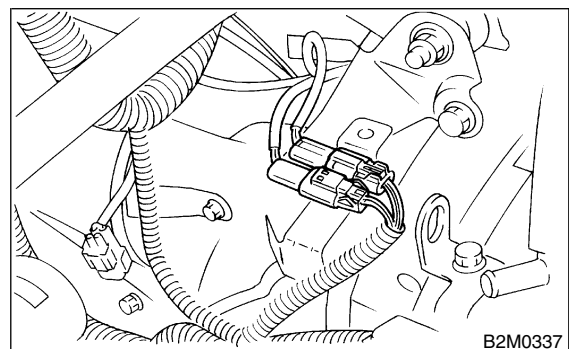
- (3) Front oxygen sensor connector



- (4) Vehicle speed sensor connector



- (5) Neutral position and back-up light switch connector



MANUAL TRANSMISSION ASSEMBLY

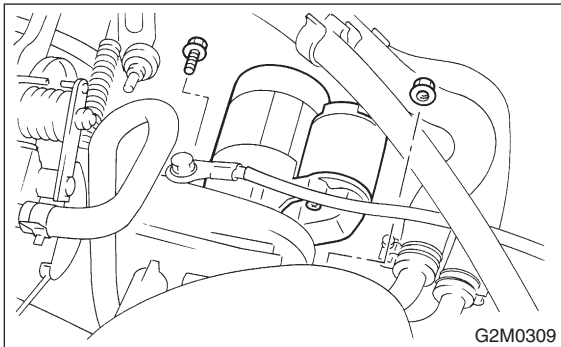
Manual Transmission and Differential

15) Install starter.

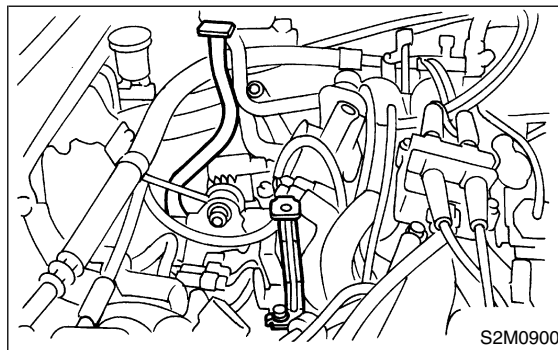
- (1) Install starter onto transmission case, and connect connectors and terminals.
- (2) Tighten bolt and nut which install starter onto transmission.

Tightening torque:

50 N·m (5.1 kgf-m, 36.9 ft-lb)



16) Install air cleaner case stay.



17) Install air intake duct <Ref. to IN-5 INSTALLATION, Air Intake Duct.> and air cleaner case. <Ref. to IN-4 INSTALLATION, Air Cleaner Case.>

18) Connect battery ground terminal.

19) Take off vehicle from lift arms.

6. Preparation for Overhaul

S503091

A: PROCEDURE

S503091E45

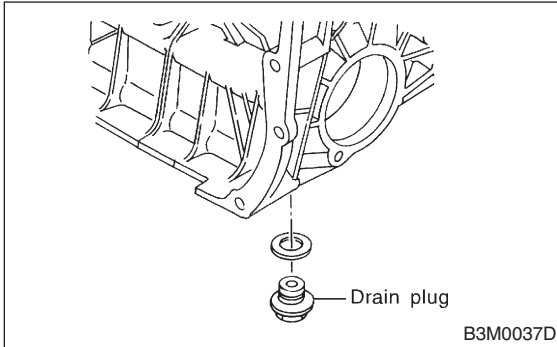
- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove drain plug to drain oil. After draining, retighten it as before.

CAUTION:

Replace gasket with a new one.

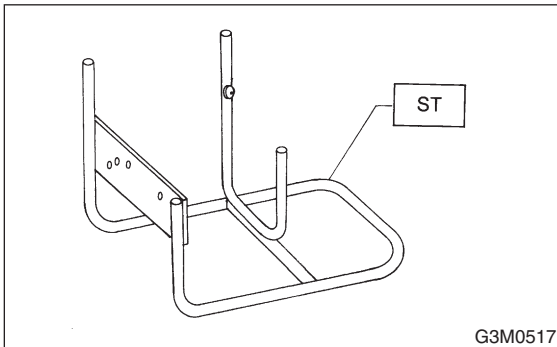
Tightening torque:

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.

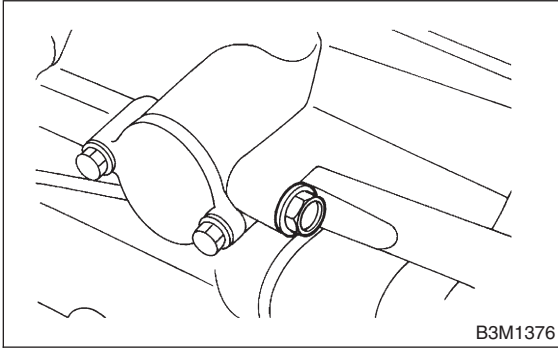
REVERSE CHECK SLEEVE

Manual Transmission and Differential

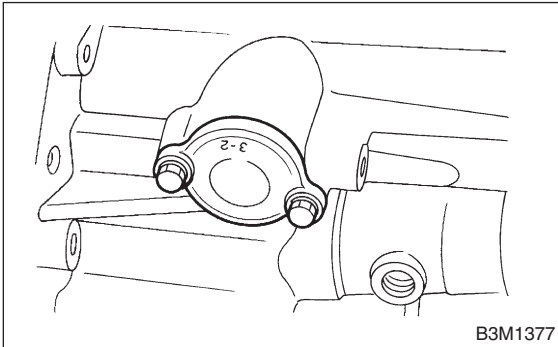
11. Reverse Check Sleeve S503267

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.



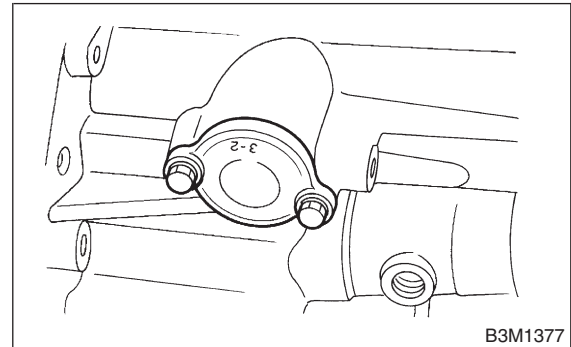
- 3) Remove the reverse check sleeve.



B: INSTALLATION S503267A11

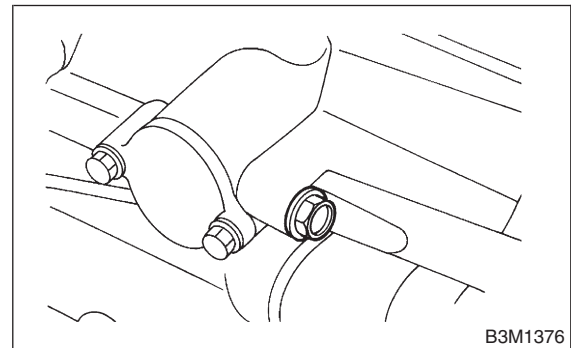
- 1) Install the reverse check sleeve.

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-31 INSTALLATION, Manual Transmission Assembly.>

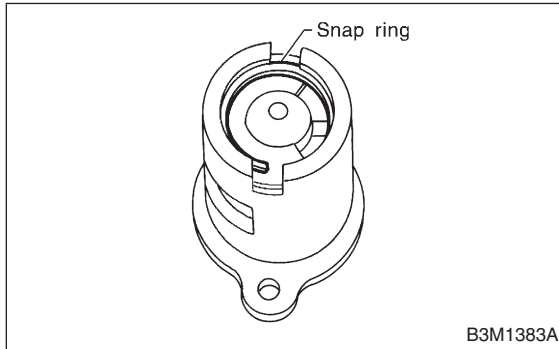
C: DISASSEMBLY

S503267A06

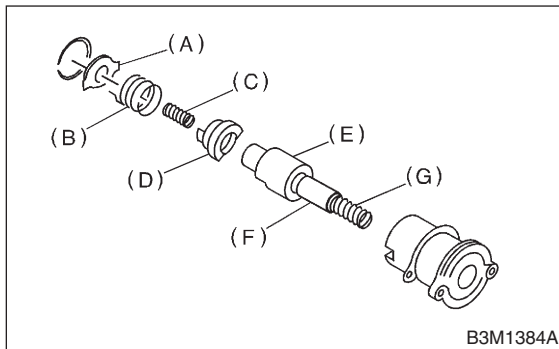
1) Using a standard screwdriver, remove snap ring.

NOTE:

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



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.

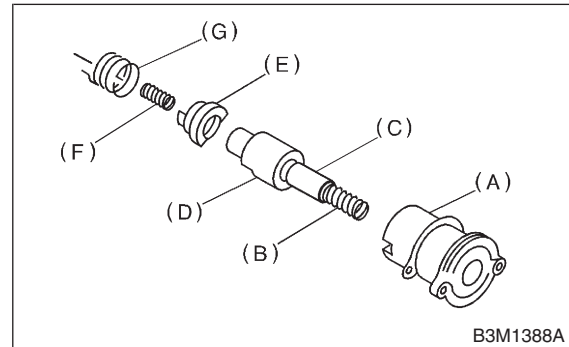
D: ASSEMBLY

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.

REVERSE CHECK SLEEVE

Manual Transmission and Differential

E: INSPECTION

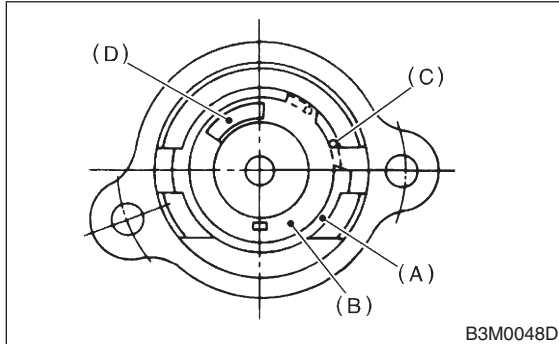
S503267A10

- 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

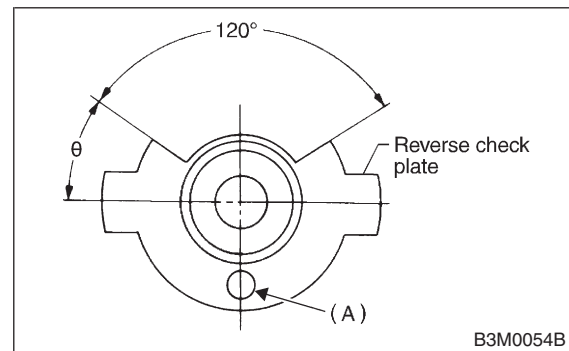
- Select a suitable reverse accent shaft and reverse check plate. <Ref. to MT-50 ADJUSTMENT, Reverse Check Sleeve.>

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.

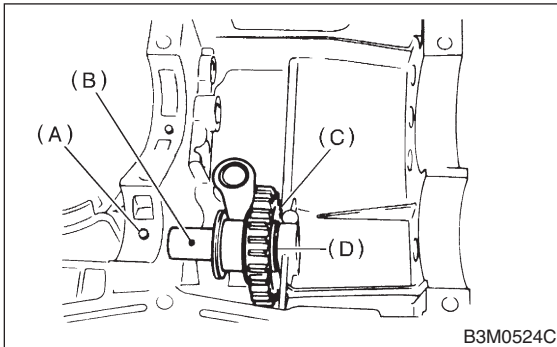
Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



17. 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.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 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) Remove shifter forks and rods. <Ref. to MT-79 REMOVAL, Shifter Fork and Rod.>
- 9) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.



- (A) Straight pin
- (B) Idler gear shaft
- (C) Idler gear
- (D) Washer

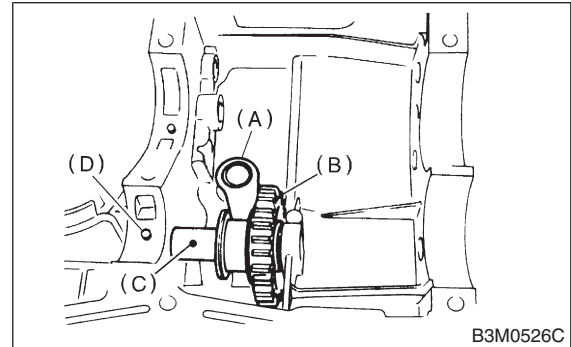
- 10) Remove reverse shifter lever.

B: INSTALLATION S503263A11

- 1) Install reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

NOTE:

Be sure to install reverse idler shaft from the rear side.



- (A) Reverse shifter lever
- (B) Reverse idler gear
- (C) Reverse idler gear shaft
- (D) Straight pin

- 2) 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-77 INSPECTION, Reverse Idler Gear.> and <Ref. to MT-78 ADJUSTMENT, Reverse Idler Gear.>
- 5) Install shifter forks and rods. <Ref. to MT-79 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 Pinion Shaft Assembly.>
- 9) Install transmission case. <Ref. to MT-51 INSTALLATION, Transmission Case.>

REVERSE IDLER GEAR

Manual Transmission and Differential

10) Install transfer case and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>

11) Install back-up light switch and neutral position switch.

12) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

S503263A10

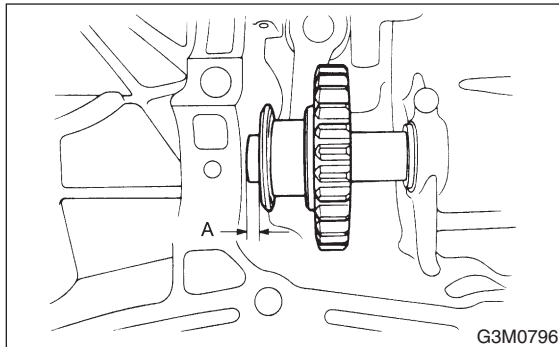
1) Move the reverse shifter rod toward the reverse side. Inspect clearance between reverse idler gear and transmission case wall.

If out of specification, select the appropriate reverse shifter lever and adjust.

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

Clearance A:

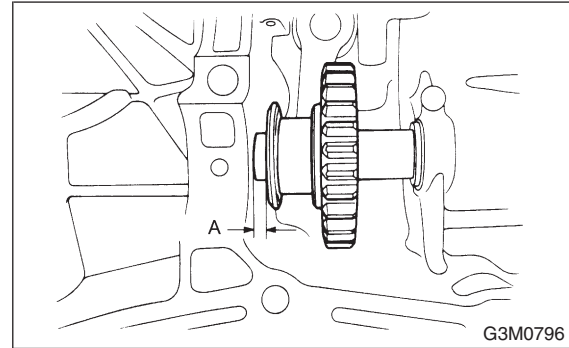
6.0 — 7.5 mm (0.236 — 0.295 in)



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)



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)

3) Check the reverse idler gear and shaft for damage. Replace if damaged.

REVERSE IDLER GEAR

Manual Transmission and Differential

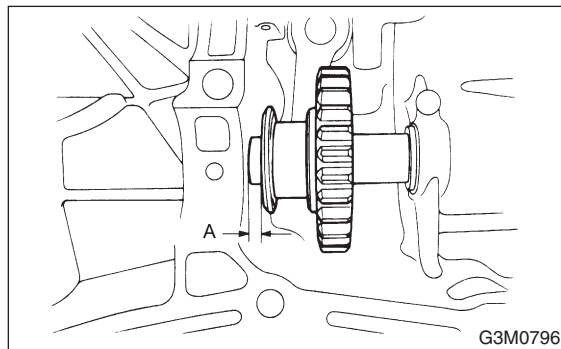
D: ADJUSTMENT

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)

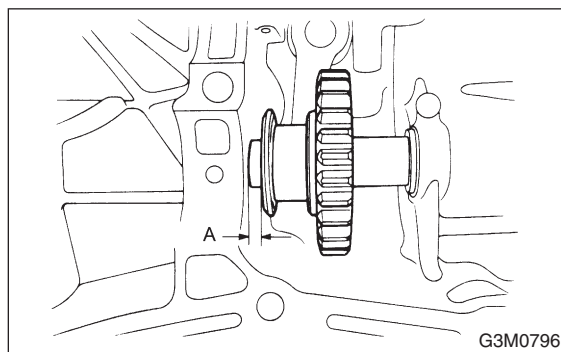


Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

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)



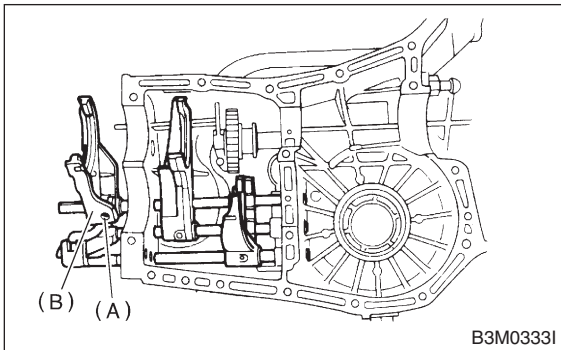
Washer (20.5 × 26 × t)	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

18. 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.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 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

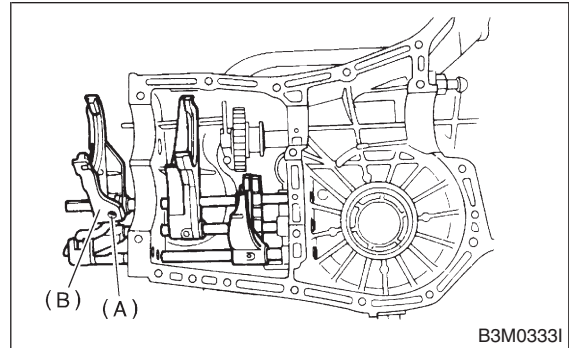


- (A) Straight pin
(B) 5th shifter fork

- 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.

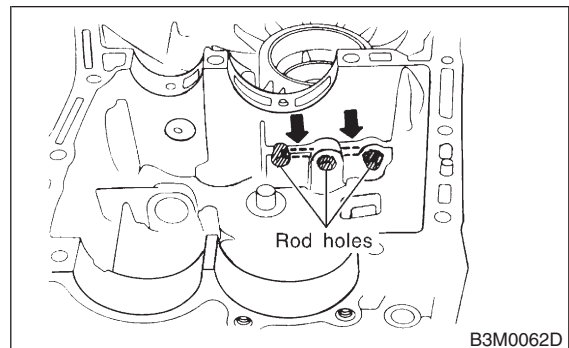


- (A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

- 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.



- 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

SHIFTER FORK AND ROD

Manual Transmission and Differential

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.

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.

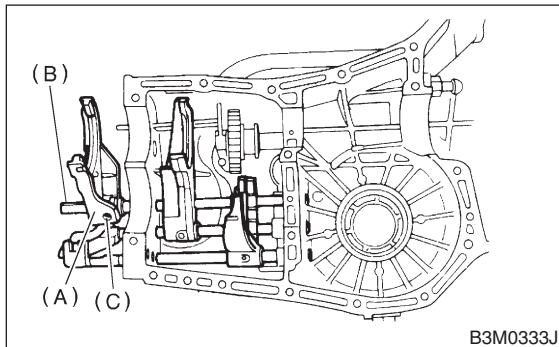
ST 398791700 STRAIGHT PIN REMOVER

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



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

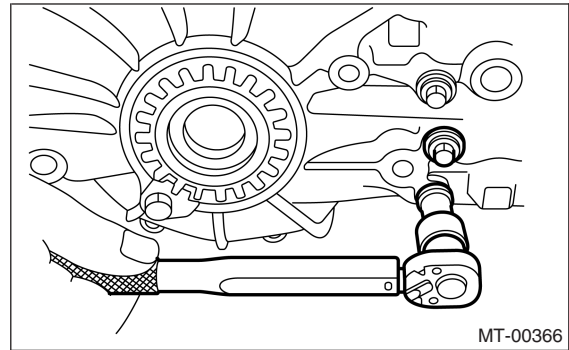
8) Position balls, checking ball springs and gaskets into 3-4 and 1-2 rod holes, and install plugs.

CAUTION:

Replace gasket with a new one.

Tightening torque:

T: 20 N·m (2.0 kgf-m, 14.1 ft-lb)



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 Pinion Shaft Assembly.>

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

13) Install transfer case and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>

14) Install back-up light switch and neutral position switch.

15) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

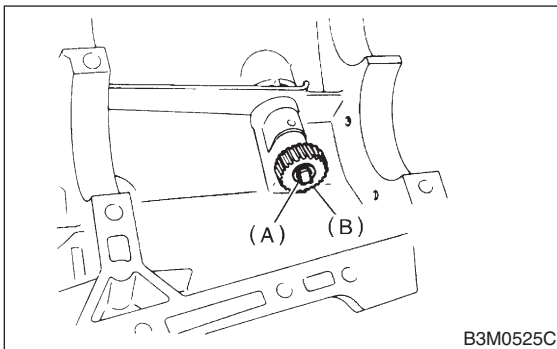
C: INSPECTION SS03255A10

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

16. 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.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-51 REMOVAL, Transmission Case.>
- 5) 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:

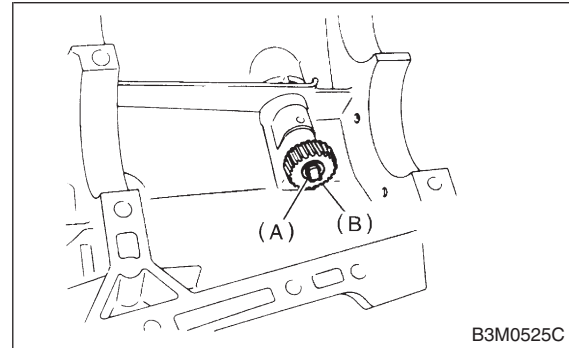
Use new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS

- 2) Install vehicle speed sensor. <Ref. to MT-38 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 and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install back-up light switch and neutral position switch.
- 7) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION S503268A10

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

TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

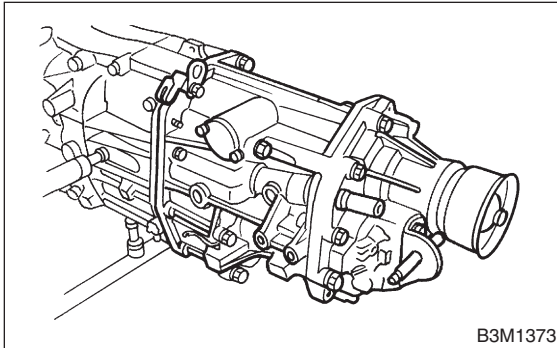
7. Transfer Case and Extension Case Assembly

S503561

A: REMOVAL

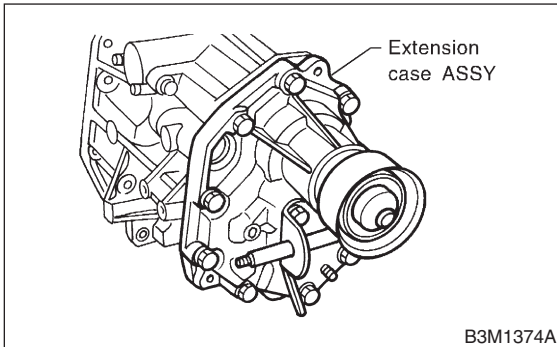
S503561A18

- 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.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>



B3M1373

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

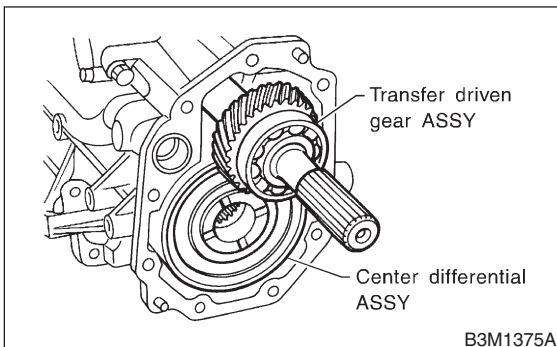


B3M1374A

B: INSTALLATION

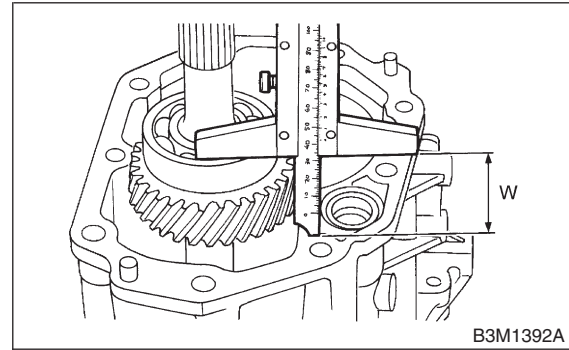
S503561A11

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



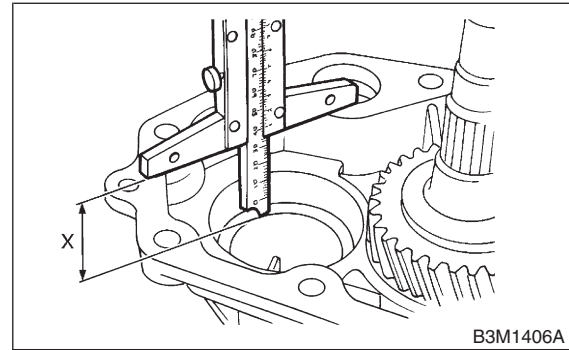
B3M1375A

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



B3M1392A

- 3) Measure depth "X".



B3M1406A

- 4) Calculate space "Y" using the following equation: $Y = X - W + 0.24 \text{ mm (0.0094 in)}$ [Thickness of gasket]
- 5) Select suitable washer in the following table:

Standard clearance between thrust washer and ball bearing:

0.05 — 0.30 mm (0.0020 — 0.0118 in)

Space "Y" mm (in)	Thrust washer	
	Part No.	Thickness mm (in)
0.55 — 0.79 (0.0217 — 0.0311)	803052021	0.50 (0.0197)
0.80 — 1.04 (0.0315 — 0.0409)	803052022	0.75 (0.0295)
1.05 — 1.30 (0.0413 — 0.0512)	803052023	1.00 (0.0394)

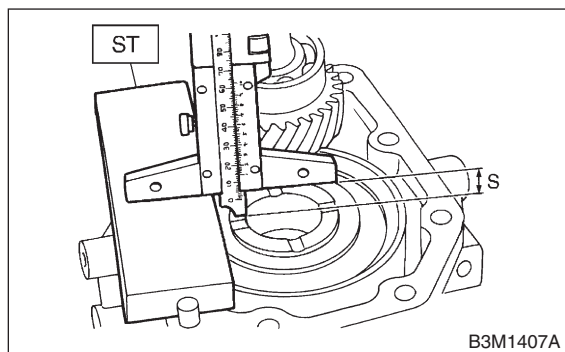
- 6) Fit thrust washers on transfer drive shaft.

TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

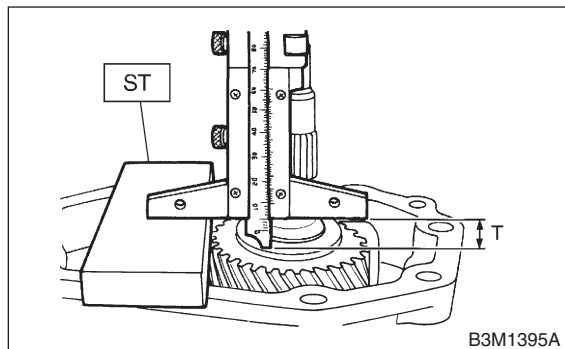
7) Measure depth "S" between transfer case and center differential.

ST 398643600 GAUGE



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

ST 398643600 GAUGE



9) Calculate space "U" using the following equation: $U = S + T - 0.24 \text{ mm (0.0094 in)}$ [Thickness of gasket]

10) Select suitable washer in the following table:

Standard clearance:

0.15 — 0.35 mm (0.0059 — 0.0138 in)

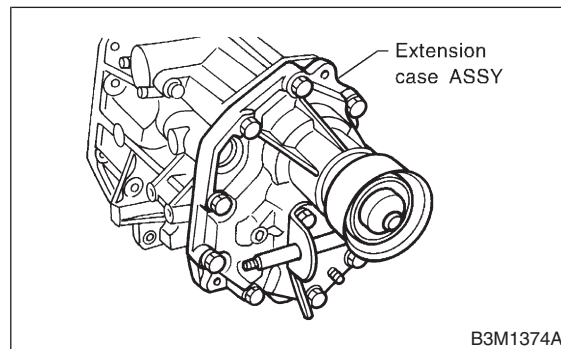
Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

11) Fit thrust washer on center differential.

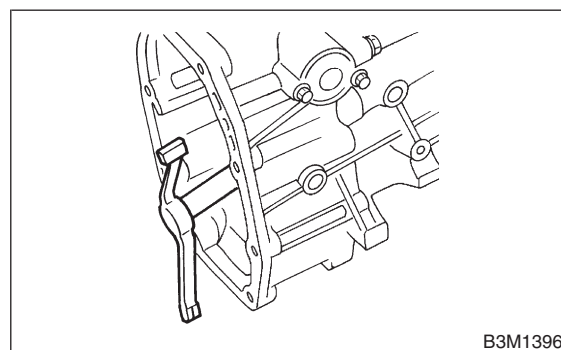
12) Install extension assembly into transfer case.

Tightening torque:

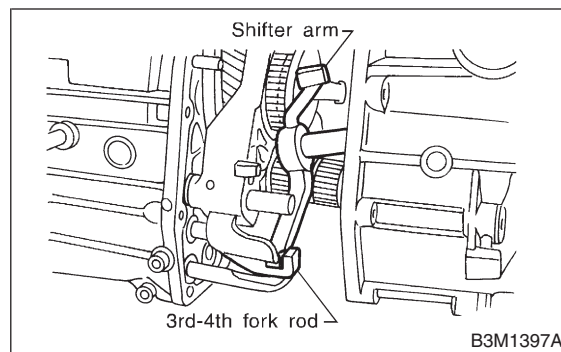
37 N·m (3.8 kgf·m, 27.5 ft·lb)



13) Install shifter arm to transfer case.



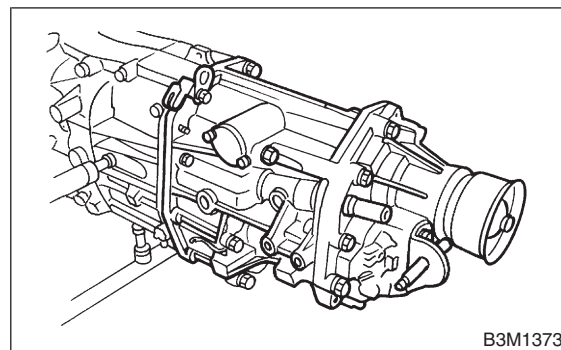
14) Hang the shifter arm on the 3rd-4th fork rod.



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

Tightening torque:

24.5 N·m (2.50 kgf·m, 18.1 ft·lb)



TRANSFER CASE AND EXTENSION CASE ASSEMBLY

Manual Transmission and Differential

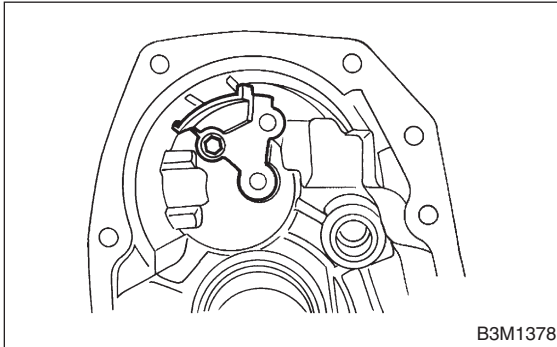
C: DISASSEMBLY

S503561A06

1. TRANSFER CASE

S503561A0601

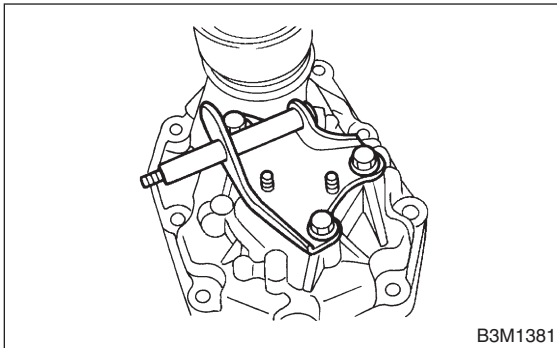
- 1) Remove reverse check sleeve assembly. <Ref. to MT-48 REMOVAL, Reverse Check Sleeve.>
- 2) Remove oil guide.



2. EXTENSION CASE

S503561A0602

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



- 3) Remove oil seal from extension case.

D: ASSEMBLY

S503561A02

1. EXTENSION CASE

S503561A0201

- 1) Using ST, install oil seal to extension case.

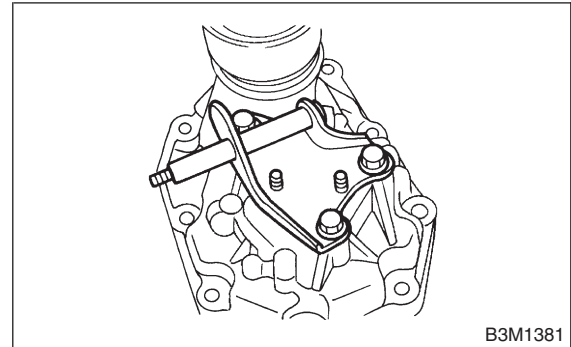
CAUTION:

Use new oil seal.

- 2) Install shift bracket to extension case.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



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

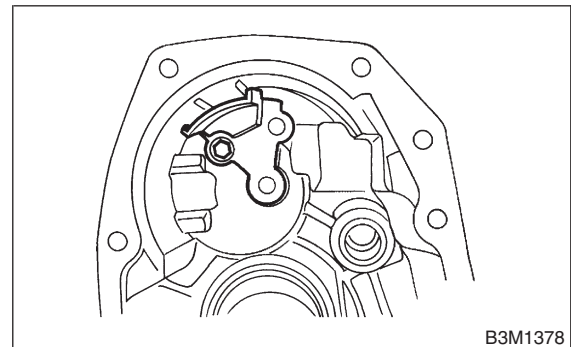
2. TRANSFER CASE

S503561A0202

- 1) Install oil guide to transfer case.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



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

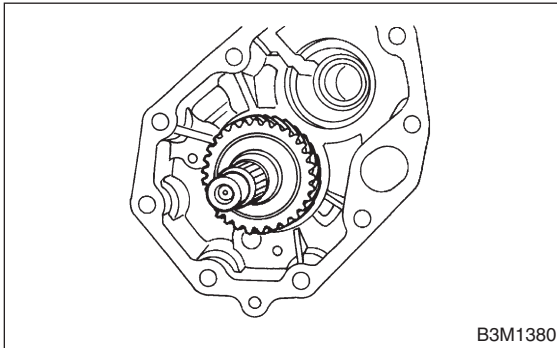
8. Transfer Drive Gear

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.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Remove transfer drive gear.

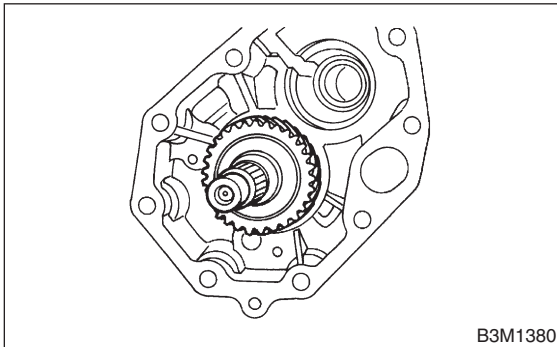


B3M1380

B: INSTALLATION

S503229A11

- 1) Install transfer drive gear.



B3M1380

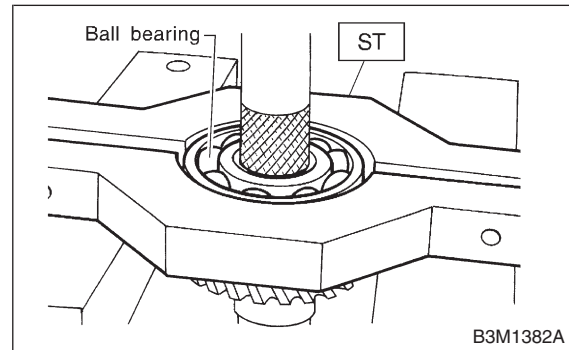
- 2) Install transfer case and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 3) Install back-up light switch and neutral position switch.
- 4) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

S503229A06

Using ST, remove ball bearing.

ST 498077100 REMOVER



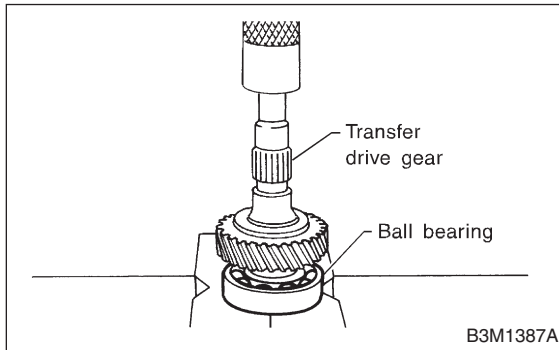
B3M1382A

D: ASSEMBLY S503229A02

Install ball bearing.

CAUTION:

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



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 broken, damage, or excessively.

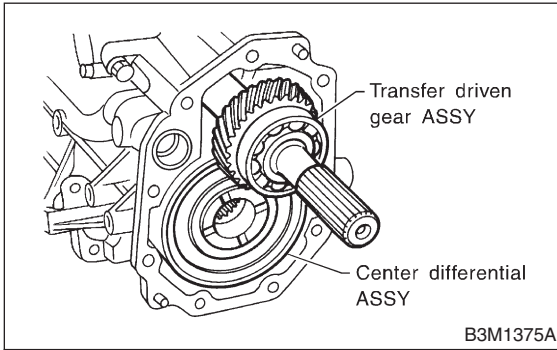
9. Transfer Driven Gear

S503223

A: REMOVAL

S503223A18

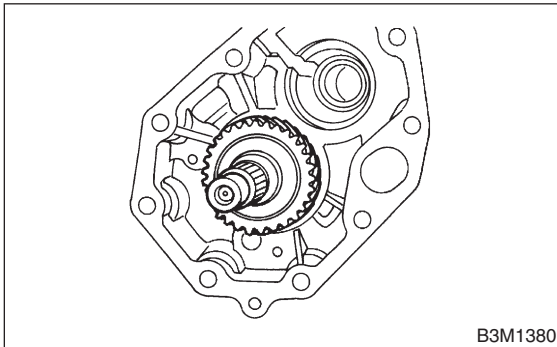
- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-27 REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch.
- 3) Remove transfer case and extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Remove transfer driven gear.



B: INSTALLATION

S503223A11

- 1) Install transfer driven gear.

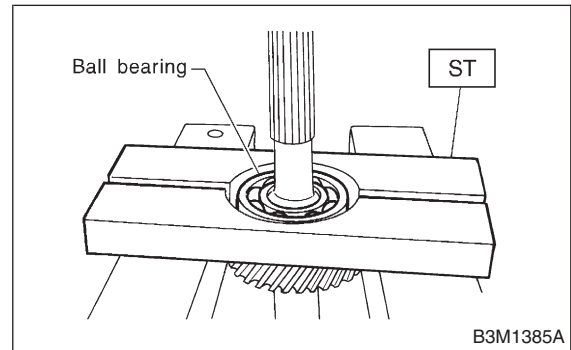


- 2) Install transfer case and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>
- 3) Install back-up light switch and neutral position switch.
- 4) Install the manual transmission assembly to vehicle. <Ref. to MT-31 INSTALLATION, Manual Transmission Assembly.>

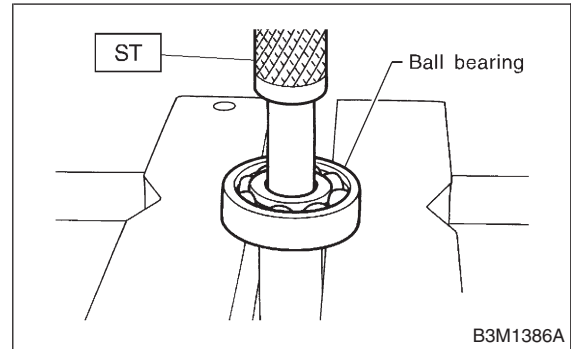
C: DISASSEMBLY

S503223A06

- 1) Using ST, remove ball bearing.
ST 498077000 REMOVER



- 2) After using ST, remove ball bearing.
ST 899864100 REMOVER

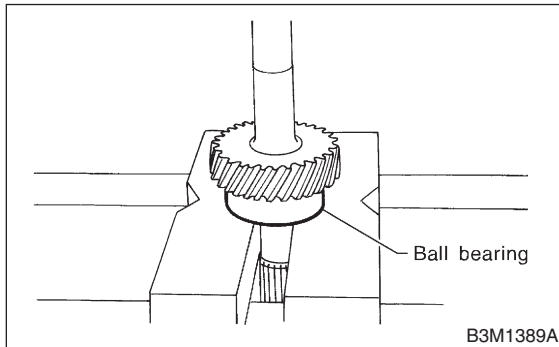


D: ASSEMBLY S503223A02

1) Install ball bearing.

CAUTION:

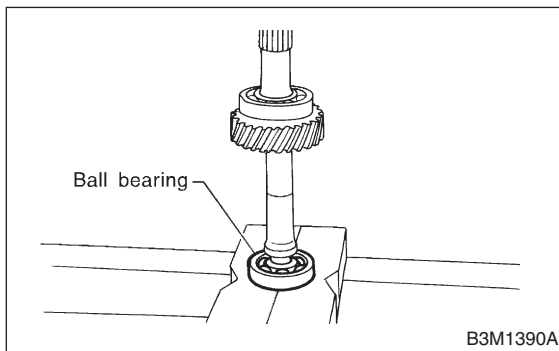
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



2) Install ball bearing.

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

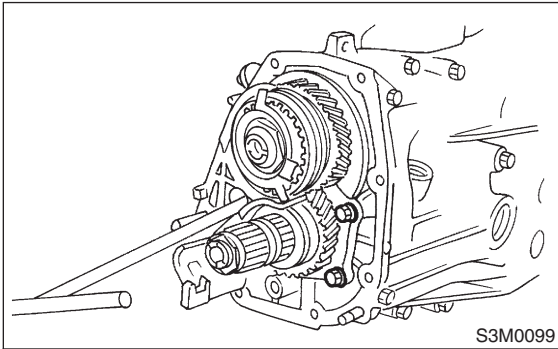
Replace driven gear in the following cases:

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

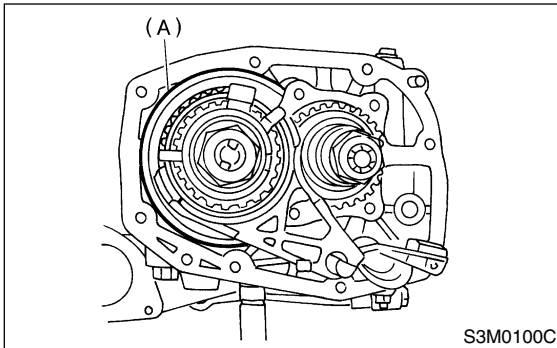
12. Transmission Case S503266

A: REMOVAL S503266A18

- 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.
- 3) Remove clutch release lever. <Ref. to CL-13 REMOVAL, Release Bearing and Lever.>
- 4) Remove transfer case and extension case assembly. <Ref. to MT-40 REMOVAL, Transfer Case and Extension Case Assembly.>
- 5) Remove bearing mounting bolts.

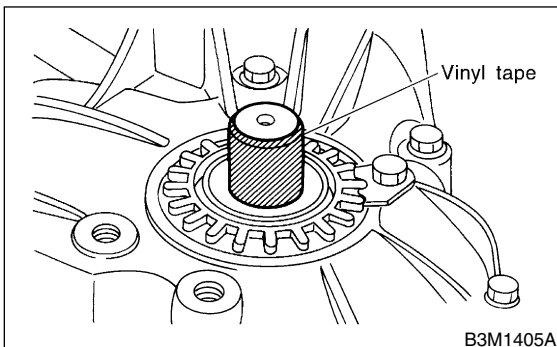


- 6) Remove main shaft rear plate.

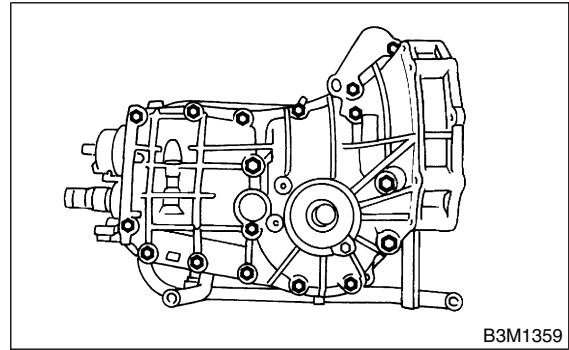


(A) Main shaft rear plate

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



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



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.

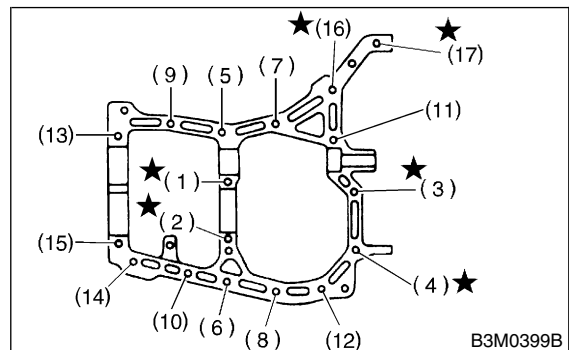
Tightening torque:

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)



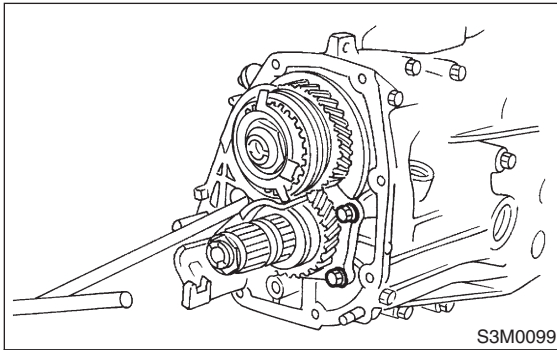
TRANSMISSION CASE

Manual Transmission and Differential

3) Tighten ball bearing attachment bolts.

Tightening torque:

29 N·m (3.0 kgf-m, 21.7 ft-lb)

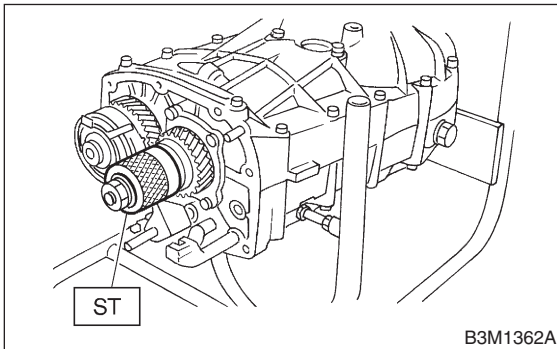


4) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



5) Inspect and adjust backlash and tooth contact of hypoid gear. <Ref. to MT-72 INSPECTION, Front Differential Assembly.>

6) 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.

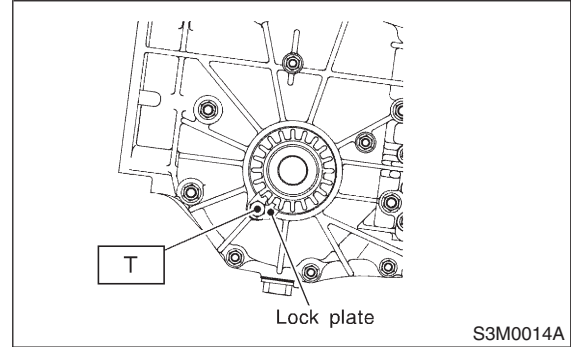
Tighten lock plate.

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)



7) Selecting of main shaft rear plate

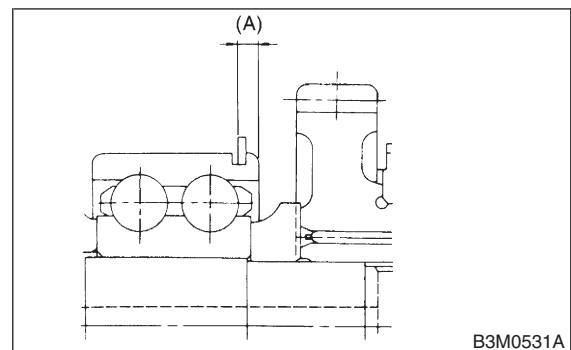
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

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



8) Install clutch release lever and bearing. <Ref. to CL-14 INSTALLATION, Release Bearing and Lever.>

9) Install transfer case and extension case assembly. <Ref. to MT-40 INSTALLATION, Transfer Case and Extension Case Assembly.>

10) Install back-up light switch and neutral position switch.

11) Install the manual transmission assembly into the vehicle. <Ref. to MT-31 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.

2. Transmission Gear Oil S503219

A: REPLACEMENT S503219A20

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

CAUTION:

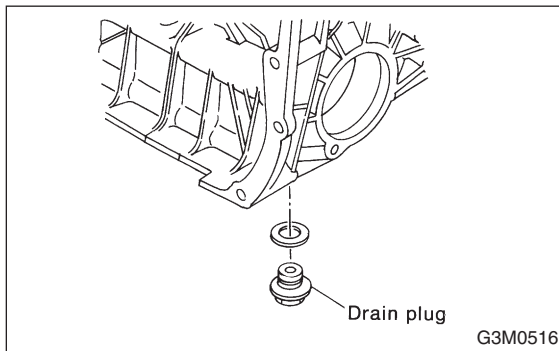
Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.

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)



- 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.
<Ref. to MT-2 SPECIFICATIONS, General Description.>

TRANSMISSION MOUNTING SYSTEM

Manual Transmission and Differential

4. Transmission Mounting System

S503233

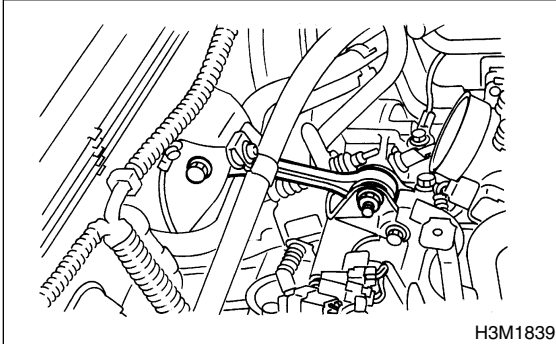
A: REMOVAL

S503233A18

1. PITCHING STOPPER

S503233A1801

- 1) Disconnect battery ground terminal.
- 2) Remove the air intake duct <Ref. to IN-5 REMOVAL, Air Intake Duct.> and air cleaner case. <Ref. to IN-4 REMOVAL, Air Cleaner Case.>
- 3) Remove the pitching stopper.



2. CROSSMEMBER AND CUSHION RUBBER

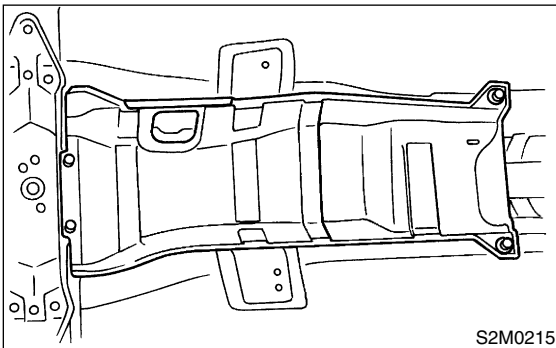
S503233A1802

- 1) Disconnect battery ground terminal.
- 2) Jack-up vehicle and support it with sturdy racks.
- 3) Remove the center exhaust pipe <Ref. to EX-9 REMOVAL, Center Exhaust Pipe.>, rear exhaust pipe <Ref. to EX-10 REMOVAL, Rear Exhaust Pipe.> and muffler. <Ref. to EX-12 REMOVAL, Muffler.>

CAUTION:

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

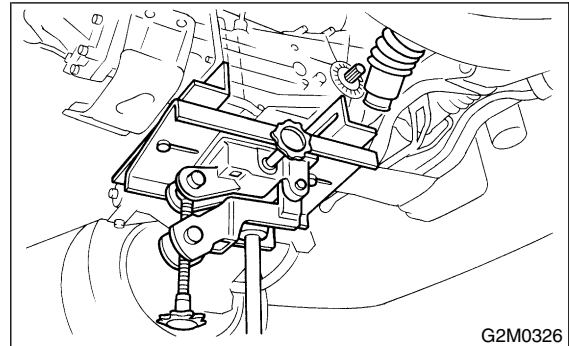
- 4) Remove the heat shield cover.



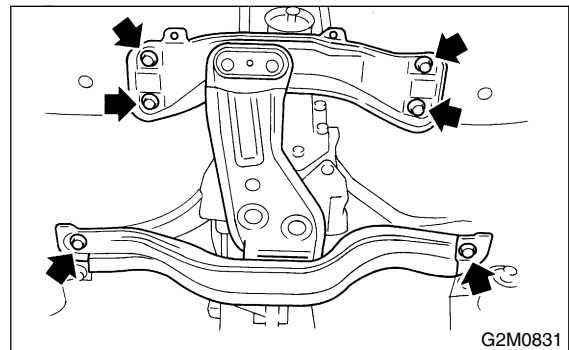
- 5) Set the transmission jack under the transmission.

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

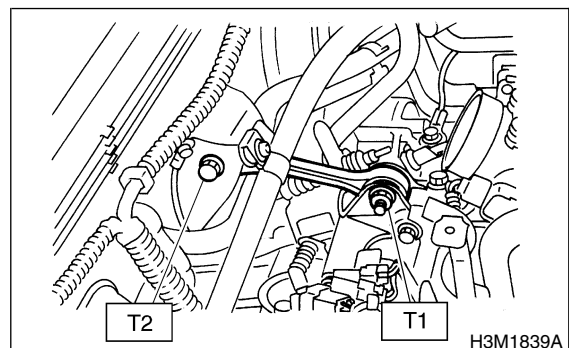
S503233A1101

- 1) Install the pitching stopper.

Tightening torque:

T1: 49 N·m (5.0 kgf·m, 36.2 ft·lb)

T2: 57 N·m (5.8 kgf·m, 42 ft·lb)



- 2) Install the air intake duct <Ref. to IN-5 INSTALLATION, Air Intake Duct.> and air cleaner case. <Ref. to IN-4 INSTALLATION, Air Cleaner Case.>

2. CROSSMEMBER AND CUSHION RUBBER

S503233A1102

1) Install the rear cushion rubber.

Tightening torque:

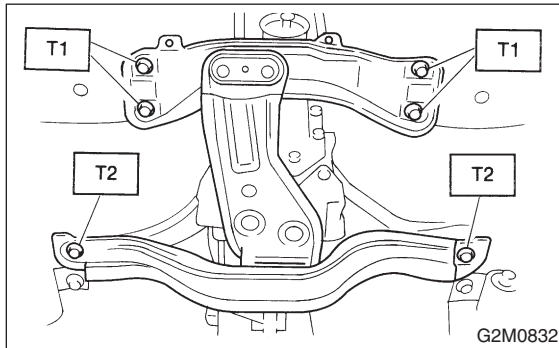
34 N·m (3.5 kgf-m, 25.3 ft-lb)

2) Install the crossmember.

Tightening torque:

T1: 69 N·m (7.0 kgf-m, 51 ft-lb)

T2: 137 N·m (14 kgf-m, 101 ft-lb)



3) Remove the transmission jack.

4) Install the heat shield cover.

5) Install the center exhaust pipe <Ref. to EX-9 INSTALLATION, Center Exhaust Pipe.>, rear exhaust pipe <Ref. to EX-10 INSTALLATION, Rear Exhaust Pipe.> and the muffler. <Ref. to EX-12 INSTALLATION, Muffler.>

C: INSPECTION

S503233A10

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

1. PITCHING STOPPER

S503233A1001

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

2. CROSSMEMBER AND CUSHION RUBBER

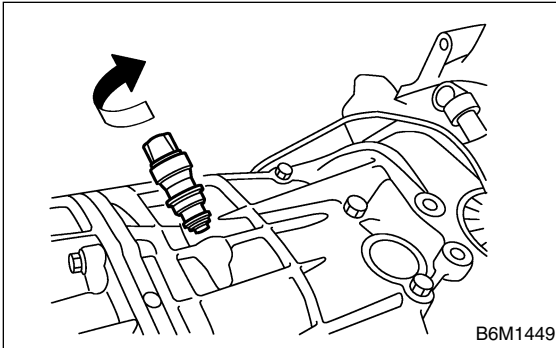
S503233A1002

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

5. Vehicle Speed Sensor S503231

A: REMOVAL S503231A18

- 1) Disconnect ground terminal from battery.
- 2) Lift-up the vehicle.
- 3) Remove center exhaust pipe <Ref. to EX-9 REMOVAL, Center Exhaust Pipe.>, rear exhaust pipe <Ref. to EX-10 REMOVAL, Rear Exhaust Pipe.> and muffler. <Ref. to EX-12 REMOVAL, 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 center exhaust pipe <Ref. to EX-9 INSTALLATION, Center Exhaust Pipe.>, rear exhaust pipe <Ref. to EX-10 INSTALLATION, Rear Exhaust Pipe.> and muffler. <Ref. to EX-12 INSTALLATION, Muffler.>

C: INSPECTION S503231A10

The vehicle speed sensor cannot be inspected as a single unit. Check if speedometer operates normally. If it does not operate normally, inspect the combination meter system.