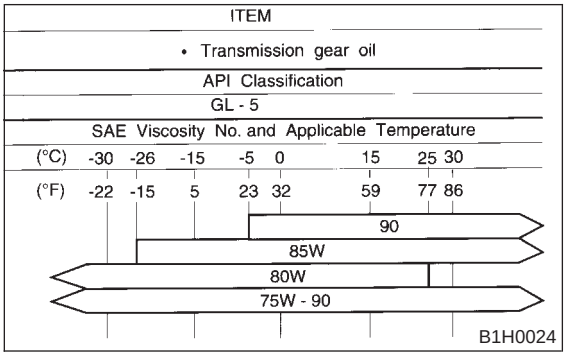
1. Manual Transmission and Differential

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

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

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

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

Selection of main shaft rear plate

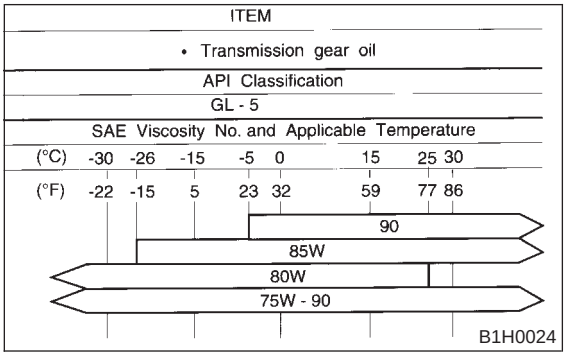
Main shaft rear plate		
Dimension “A” mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

1. Manual Transmission and Differential

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

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

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

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

Selection of main shaft rear plate

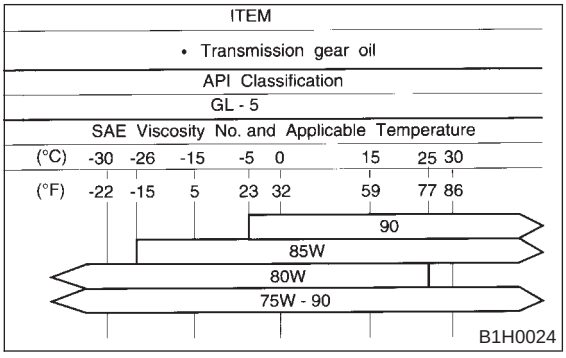
Main shaft rear plate		
Dimension “A” mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

1. Manual Transmission and Differential

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

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

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

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

Selection of main shaft rear plate

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

4. Drive Pinion Assembly

Preload adjustment of thrust bearing
Starting torque
0.3 — 0.8 N·m (0.03 — 0.08 kg-m, 0.2 — 0.6 ft-lb)

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

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

Assemble a driven shaft and 1st driven gear that are selected for the proper radial clearance adjustment

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA730
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA720

5. Reverse Idler Gear

Adjustment of reverse idler gear position
Reverse idler gear to transmission case (LH) wall clearance
6.0 — 7.5 mm (0.236 — 0.295 in)

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

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

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

4. Drive Pinion Assembly

Preload adjustment of thrust bearing
Starting torque
0.3 — 0.8 N·m (0.03 — 0.08 kg-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
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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)

Assemble a driven shaft and 1st driven gear that are selected for the proper radial clearance adjustment

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA730
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803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

6. Shifter Fork and Rod

Select suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.
Rod end clearance
A: 1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)
B: 3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)

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

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

5th shifter fork		
Part No.	Mark	Remarks
32812AA200	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	6	Become distant from 5th gear by 0.2 mm (0.008 in)

7. Transfer Case

Neutral position adjustment

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

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	X	Neutral position is closer to 1st.
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.

6. Shifter Fork and Rod

Select suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.
Rod end clearance
A: 1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)
B: 3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)

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

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

5th shifter fork		
Part No.	Mark	Remarks
32812AA200	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	6	Become distant from 5th gear by 0.2 mm (0.008 in)

7. Transfer Case

Neutral position adjustment

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
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Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	X	Neutral position is closer to 1st.
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33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

8. Extension Assembly

Thrust washer (52 × 61 × t) to ball bearing side clearance
0.05 — 0.30 mm (0.0020 — 0.0118 in)

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

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

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

9. Front Differential

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

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

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

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

8. Extension Assembly

Thrust washer (52 × 61 × t) to ball bearing side clearance
0.05 — 0.30 mm (0.0020 — 0.0118 in)

Thrust washer (52 × 61 × t)	
Part No.	Thickness mm (in)
803052021	0.50 (0.0197)
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Thrust washer to center differential side clearance
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803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
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9. Front Differential

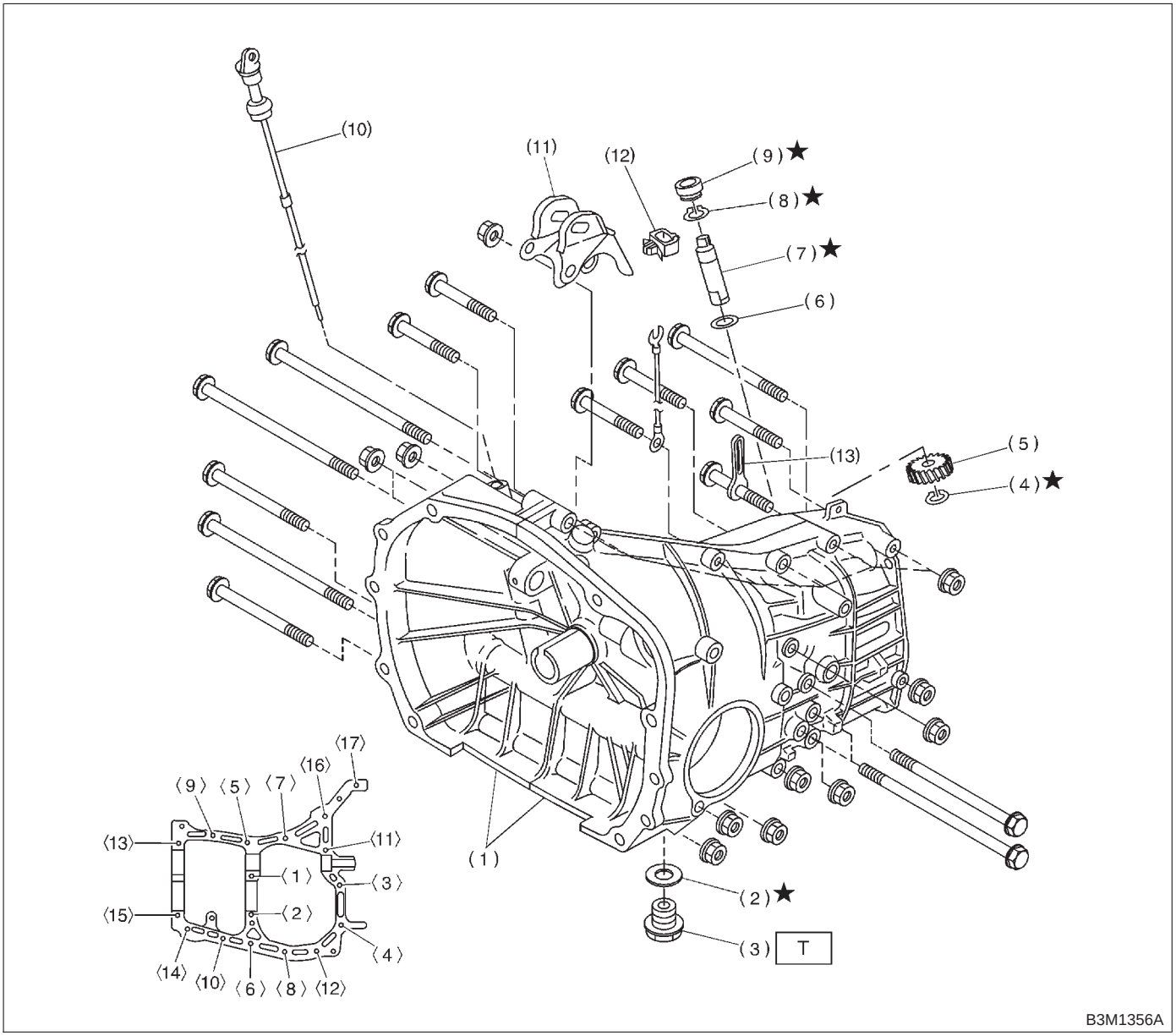
Bevel gear to pinion backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

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

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

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

1. Transmission Case

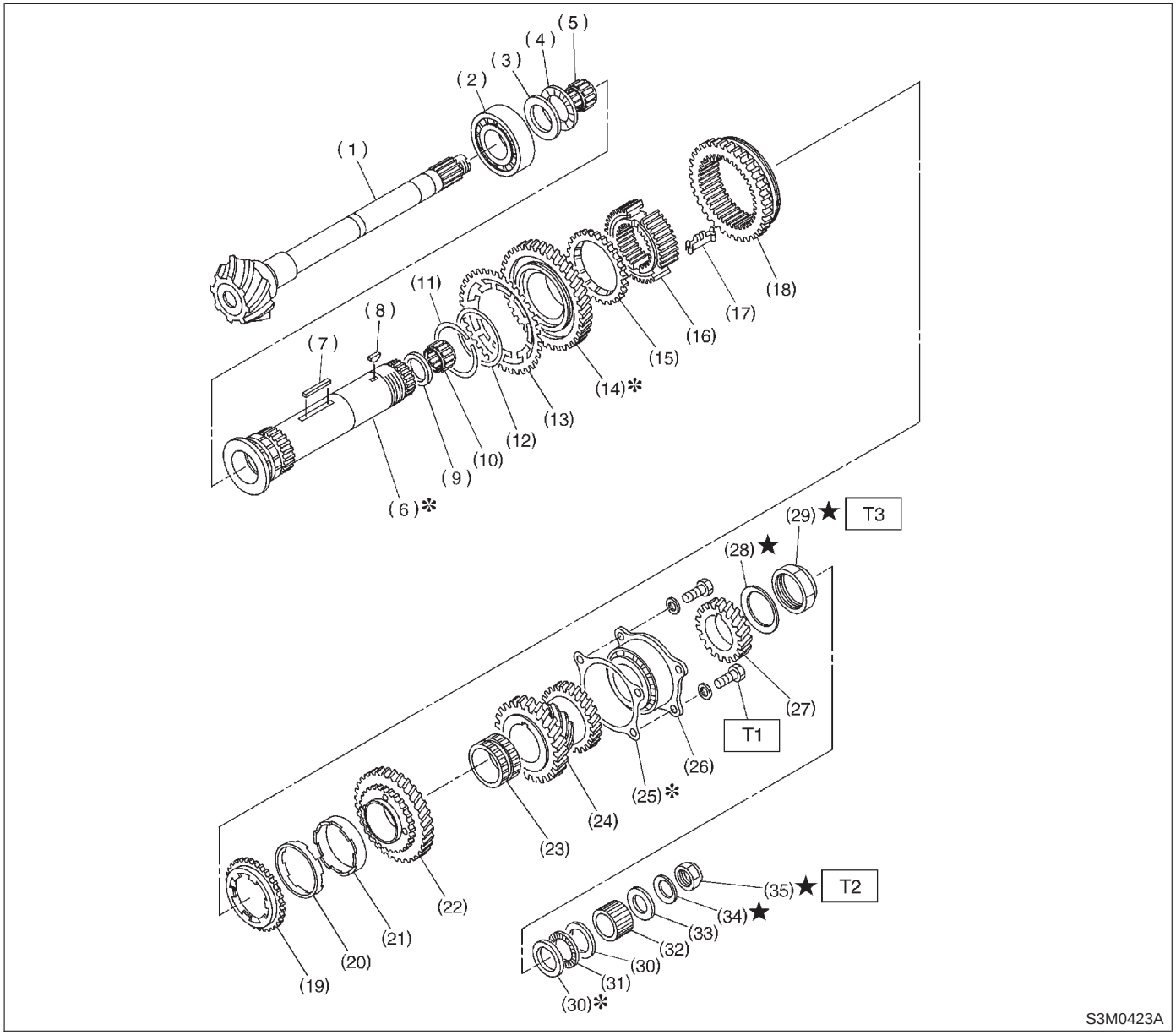


(1) Transmission case ASSY
(2) Gasket
(3) Drain plug
(4) Snap ring (Outer)
(5) Speedometer driven gear
(6) Washer
(7) Speedometer shaft
(8) Snap ring (Outer)
(9) Oil seal
(10) Oil level gauge
(11) Pitching stopper bracket
(12) Clamp
(13) Clip

Tightening torque: N·m (kg-m, ft-lb)
T: 44±3 (4.5±0.3, 32.5±2.2)

Size	All models	Torque
8 mm bolt	<5> — <15>	25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
10 mm bolt	<1> — <4> <16> — <17>	39±3 N·m (4.0±0.3 kg-m, 28.9±2.2 ft-lb)

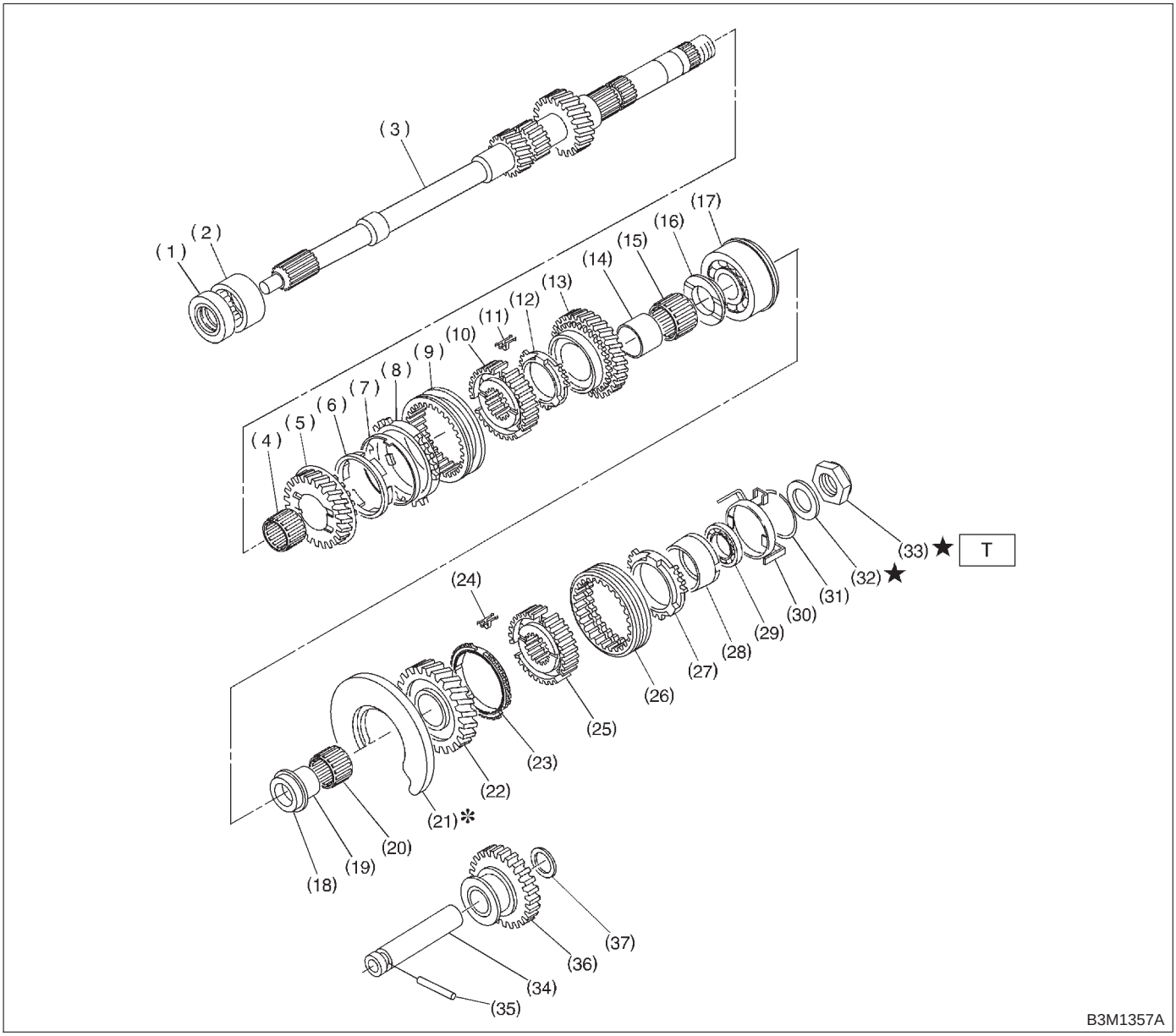
2. Drive Pinion Assembly



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

Tightening torque: N·m (kg-m, ft-lb)
T1: 29±3 (3.0±0.3, 21.7±2.2)
T2: 118±8 (12.0±0.8, 86.8±5.8)
T3: 265±10 (27±1, 195±7)

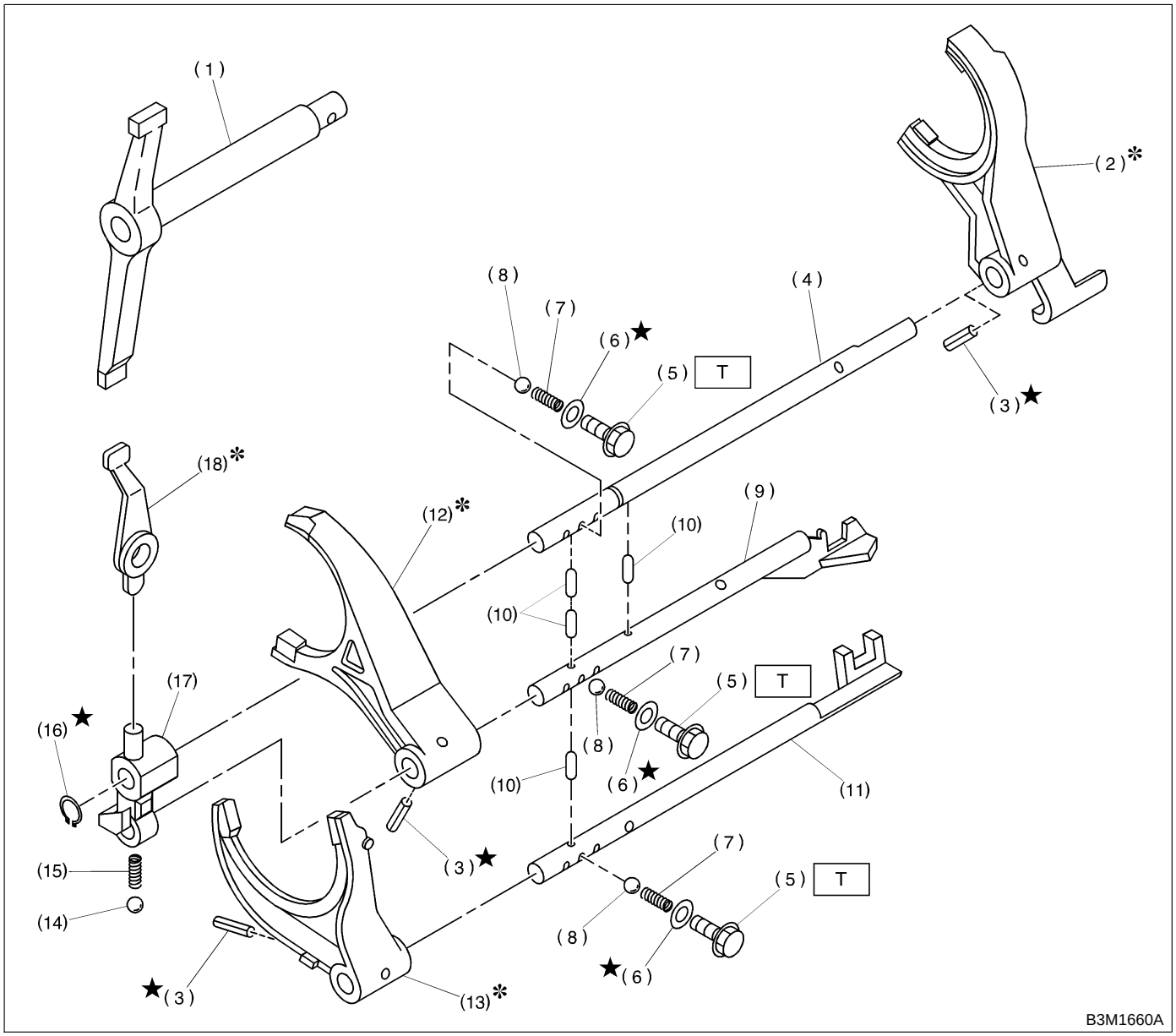
3. Main Shaft Assembly



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

Tightening torque: N·m (kg-m, ft-lb)
T: 118±6 (12.0±0.6, 86.8±4.3)

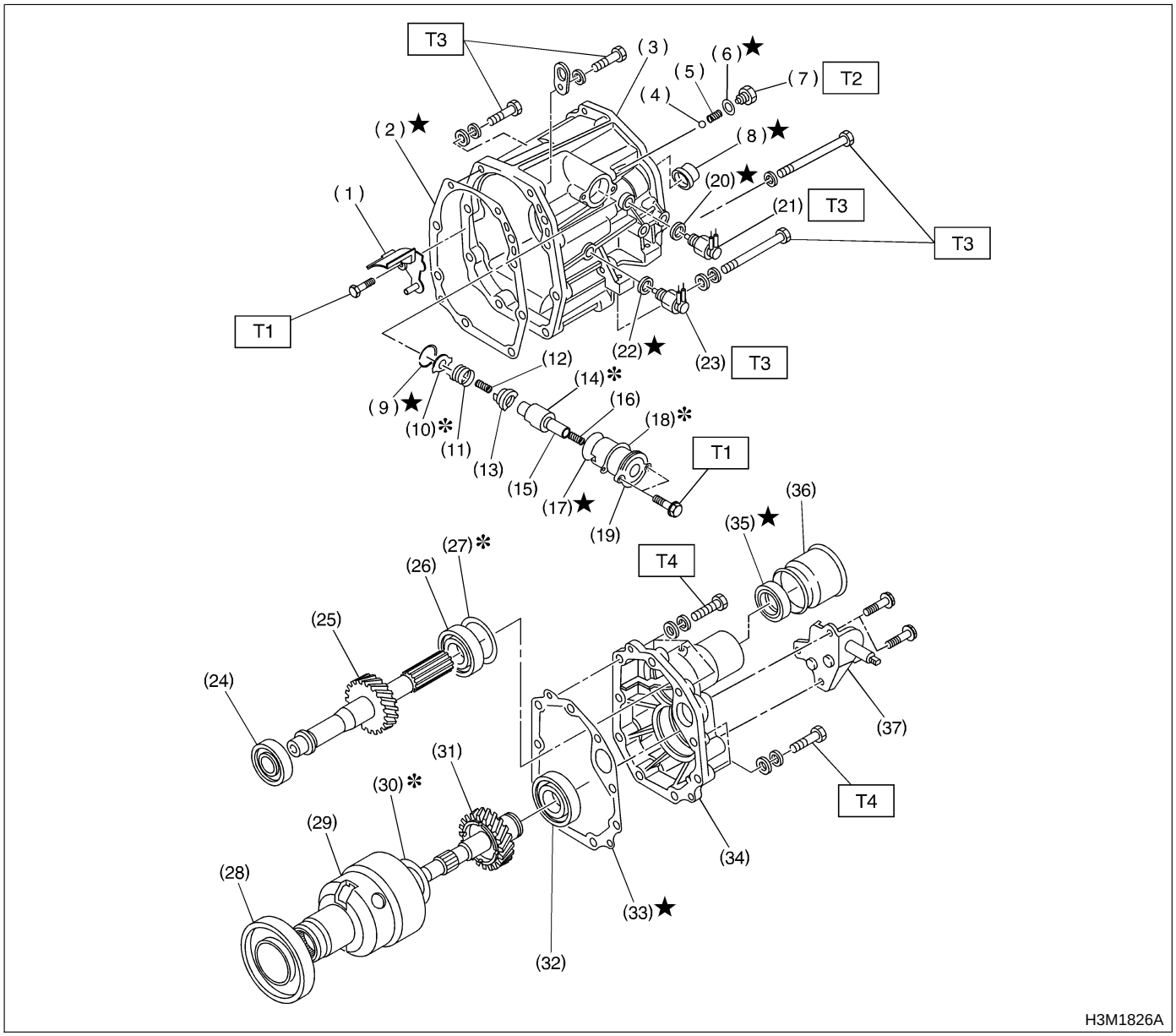
4. Shifter Fork and Shifter Rod



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

Tightening torque: N·m (kg-m, ft-lb)
T: 19.6±1.5 (2.00±0.15, 14.5±1.1)

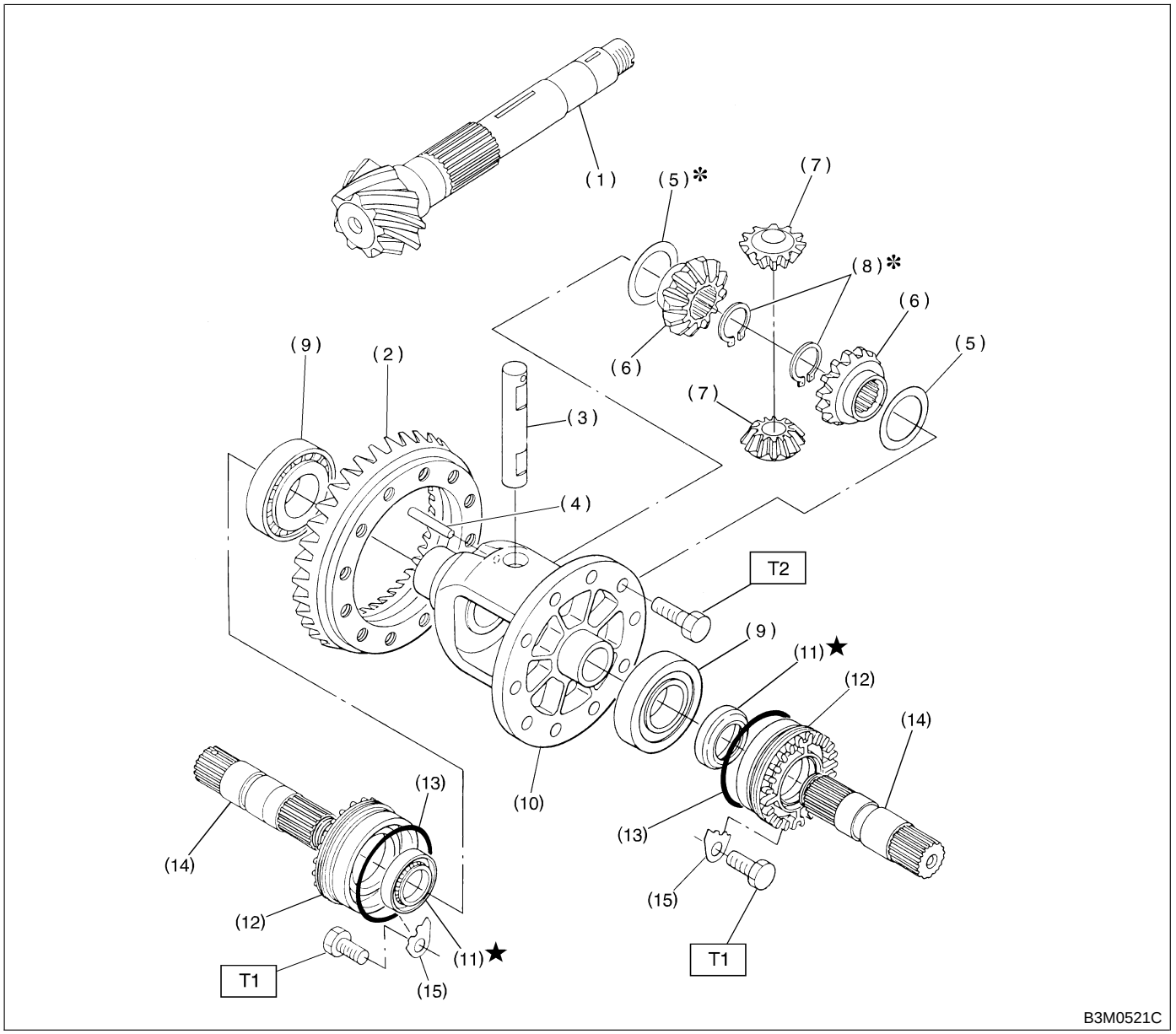
5. Transfer Case and Extension



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

Tightening torque: N·m (kg-m, ft-lb)
T1: 5±1 (0.5±0.1, 3.6±0.7)
T2: 10±1 (1.0±0.1, 7.2±0.7)
T3: 25±2 (2.5±0.2, 18.1±1.4)
T4: 37±3 (3.8±0.3, 27.5±2.2)

6. Front Differential



(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 (kg-m, ft-lb)
T1: 25±5 (2.5±0.5, 18.1±3.6)
T2: 62±5 (6.3±0.5, 45.6±3.6)

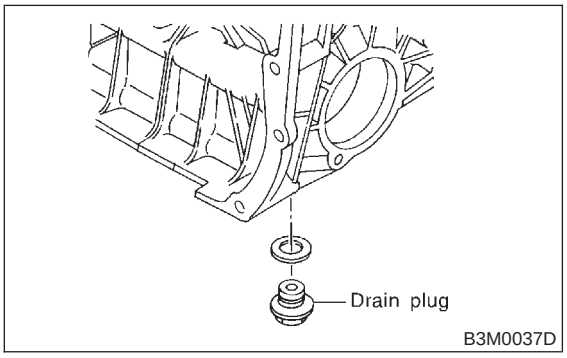
1. General

A: PRECAUTIONS

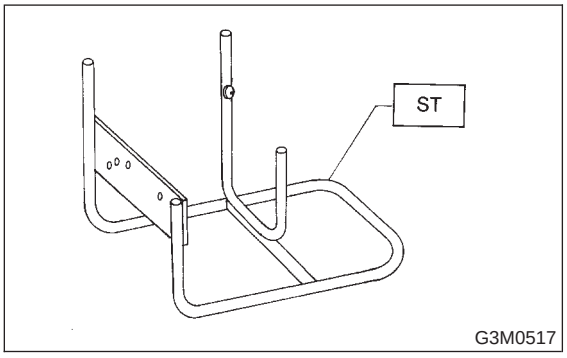
1) Clean oil, grease, dirt and dust from transmission.
2) Remove drain plug to drain oil. After draining, retighten it as before.

CAUTION:
Replace gasket with a new one.

Tightening torque:
44±3 N·m (4.5±0.3 kg-m, 32.5±2.2 ft-lb)



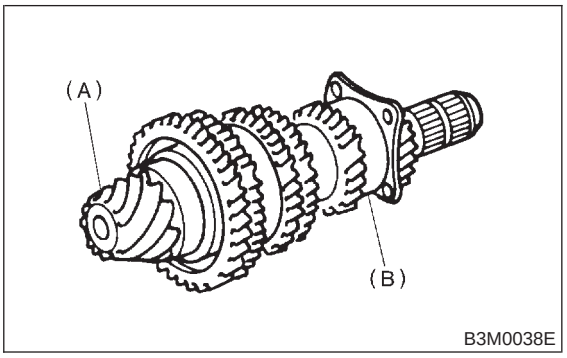
3) Attach transmission to ST.
ST 499937100 TRANSMISSION STAND SET



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.

B: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace bearings in the following cases:
● Bearings whose balls, outer races and inner races are broken or rusty.
● Worn bearings
● Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
● The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.

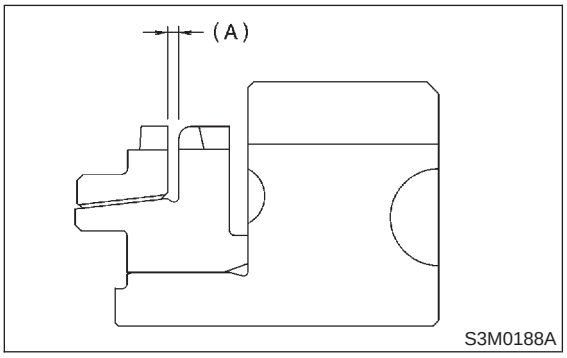


(A) Drive pinion shaft
(B) Ball bearing

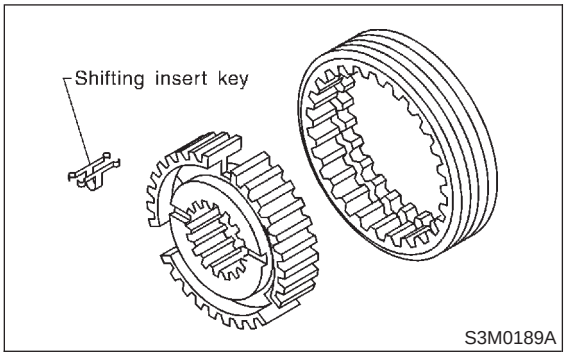
● Bearings having other defects
2) Bushing (each gear)
Replace the bushing in the following cases:
● When the sliding surface is damaged or abnormally worn.
● When the inner wall is abnormally worn.
3) Gears
● Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
● Correct or replace if the cone that contacts the baulk ring is rough or damaged.
● Correct or replace if the inner surface or end face is damaged.
4) Baulk ring
Replace the ring in the following cases:
● When the inner surface and end face are damaged.

● When the ring inner surface is abnormally or partially worn down.
● If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

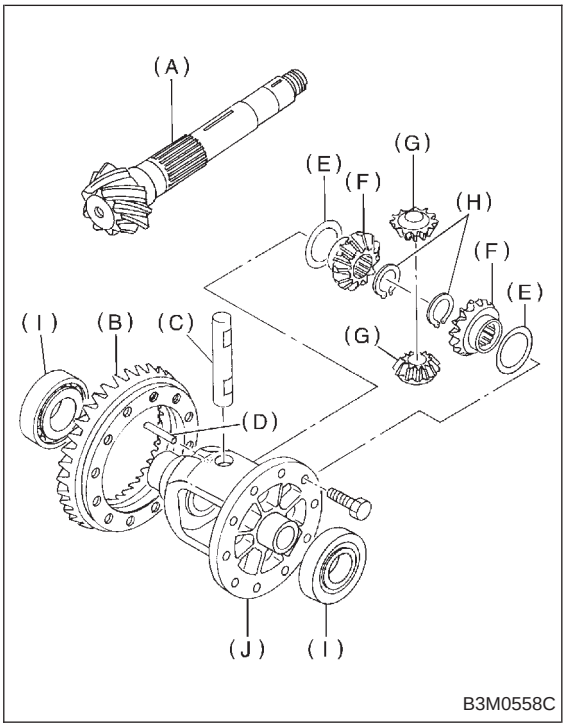
Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



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



6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.
9) Differential gear
Repair or replace the differential gear in the following cases:
● The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
● The roller bearing on the drive pinion shaft has a worn or damaged roller path.
● There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
● The differential case has worn or damaged sliding surfaces.

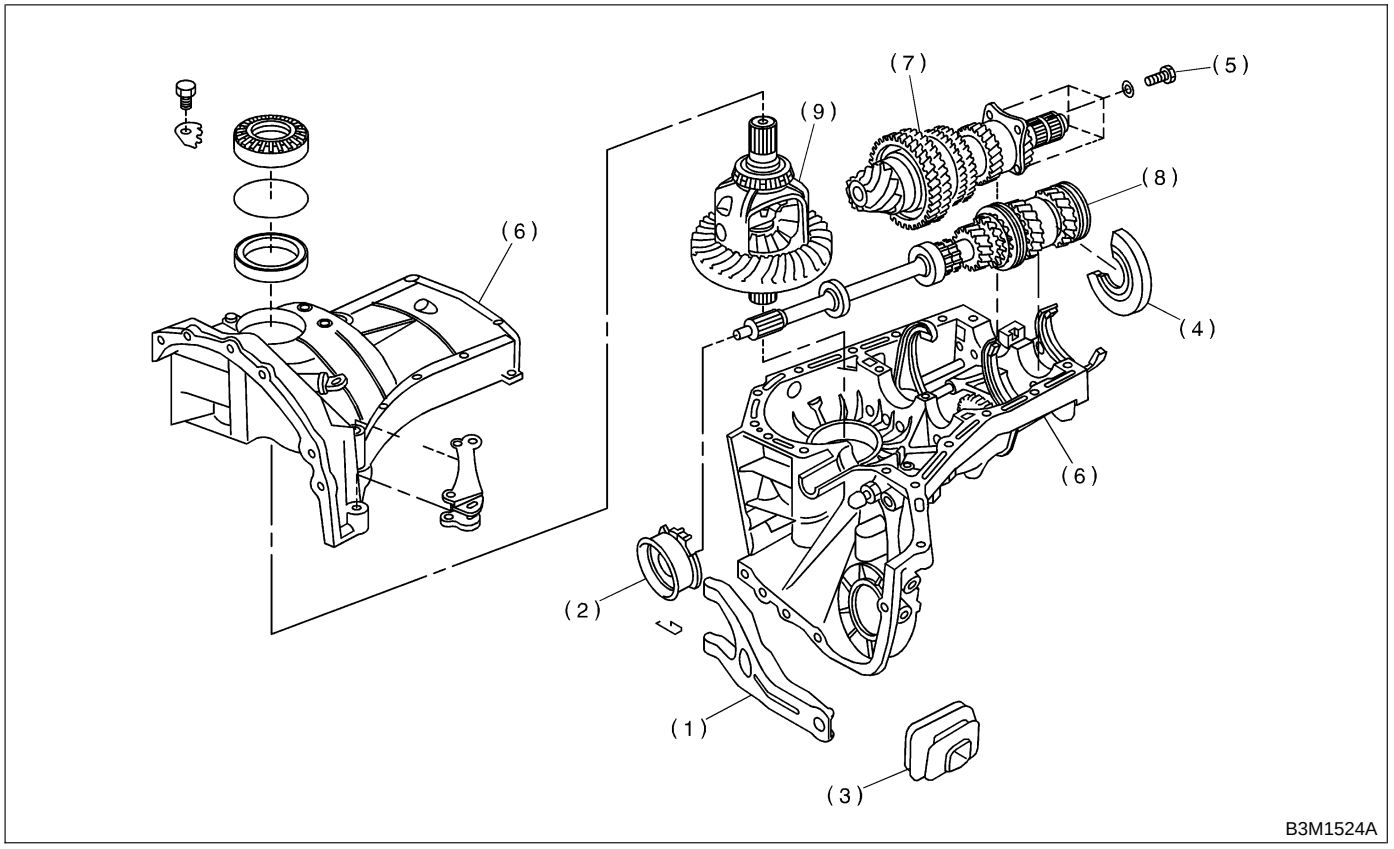


(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Snap ring
(I) Roller bearing
(J) Differential case

2. Transmission Case

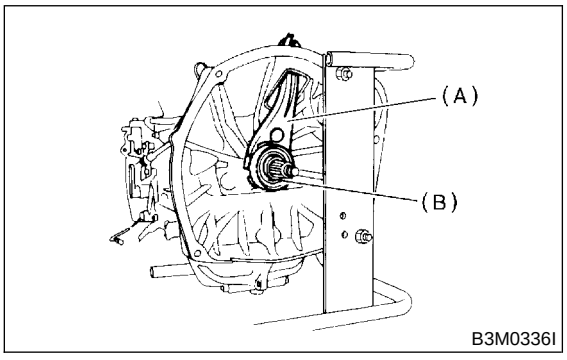
A: DISASSEMBLY

1. SEPARATION OF TRANSMISSION



(1) Release lever
(2) Release bearing
(3) Release lever sealing
(4) Main shaft rear plate
(5) Bolt
(6) Transmission case
(7) Drive pinion ASSY
(8) Main shaft ASSY
(9) Front differential

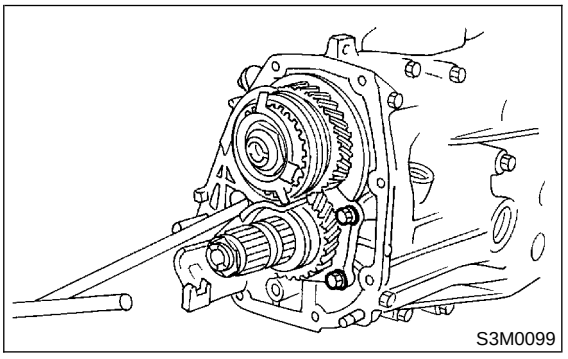
1) Remove clutch release lever. <Ref. to 2-10 [W3A0].>



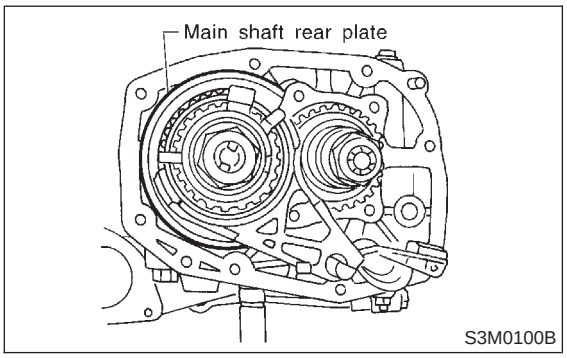
(A) Clutch release lever
(B) Release bearing

2) Remove transfer case assembly. <Ref. to 3-1 [W5A0].>

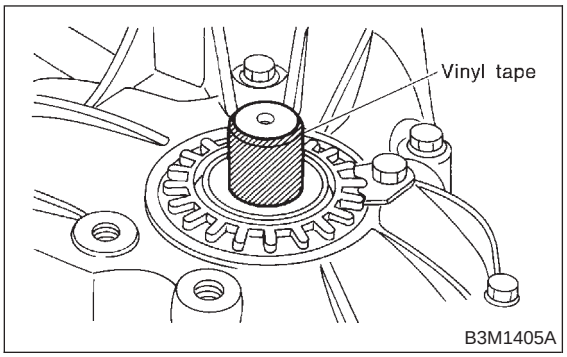
3) Remove bearing mounting bolts.



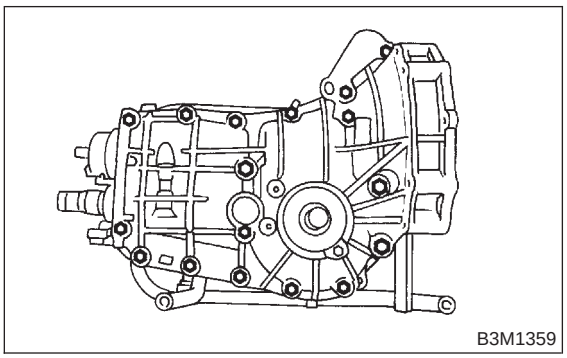
4) Remove main shaft rear plate.



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

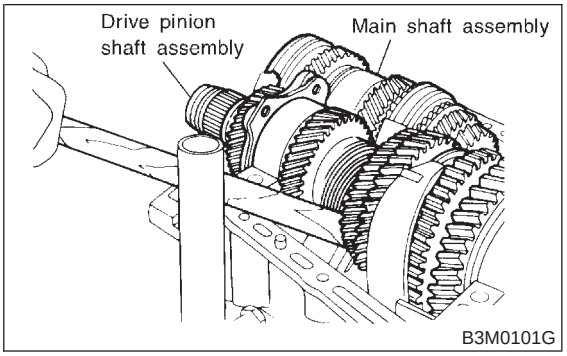


6) Separate transmission case into right and left cases by loosening seventeen coupling bolts and nuts.



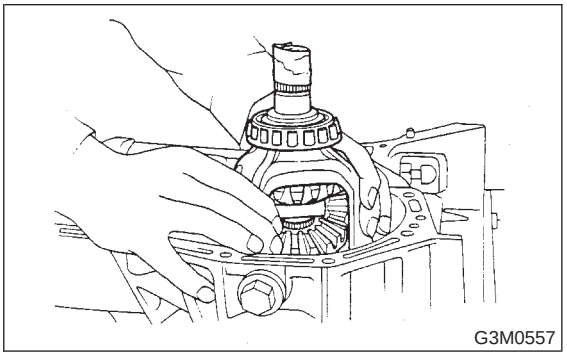
7) Remove drive pinion shaft assembly from left side transmission case.

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

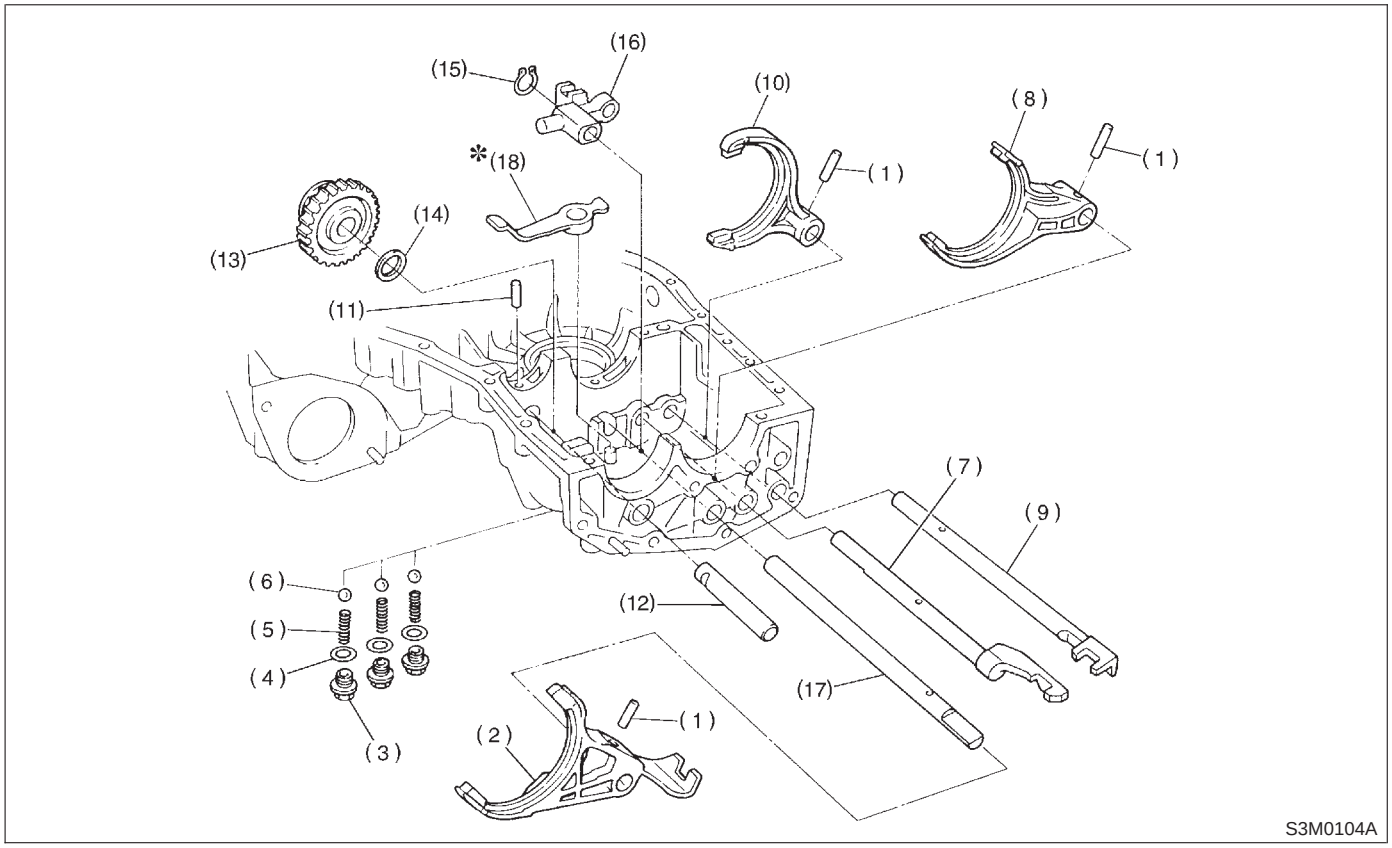


8) Remove main shaft assembly.
9) Remove differential assembly.

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

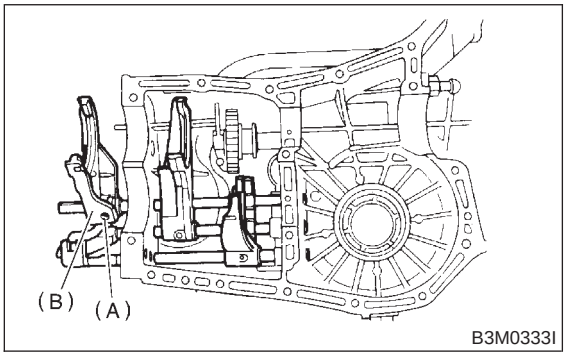


2. TRANSMISSION CASE



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

1) Drive out straight pin with ST, and remove 5th shifter fork.
ST 398791700 STRAIGHT PIN REMOVER

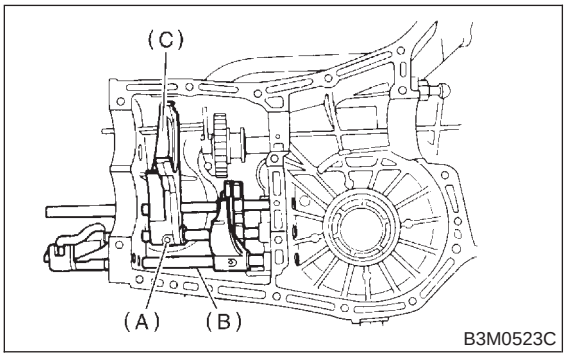


(A) Straight pin
(B) 5th shifter fork

2) Remove plugs, springs and checking balls.

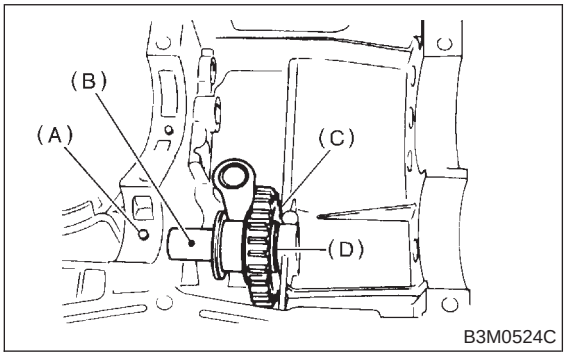
3) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:
When removing rod, keep other rods in neutral. Also, when pulling out straight pin, remove it toward inside of case so that it may not hit against case.



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

4) Drive out straight pin, and pull out 1-2 fork rod and shifter fork.
5) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.

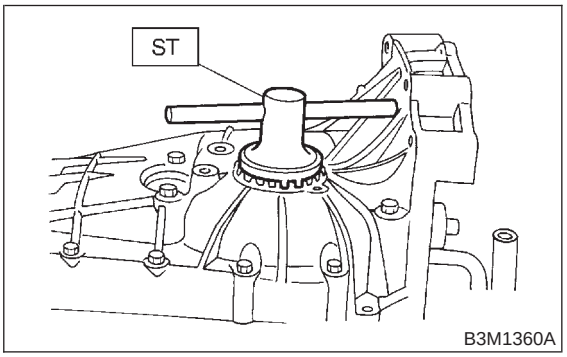


(A) Straight pin
(B) Idler gear shaft
(C) Idler gear
(D) Washer

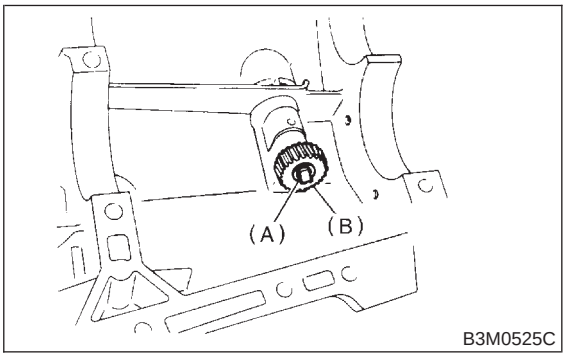
6) Remove outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out ball, spring and interlock plunger from rod.
And then remove rod.

NOTE:
When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

7) Remove reverse shifter lever.
8) Remove differential side retainers using ST.
ST 499787000 WRENCH ASSY



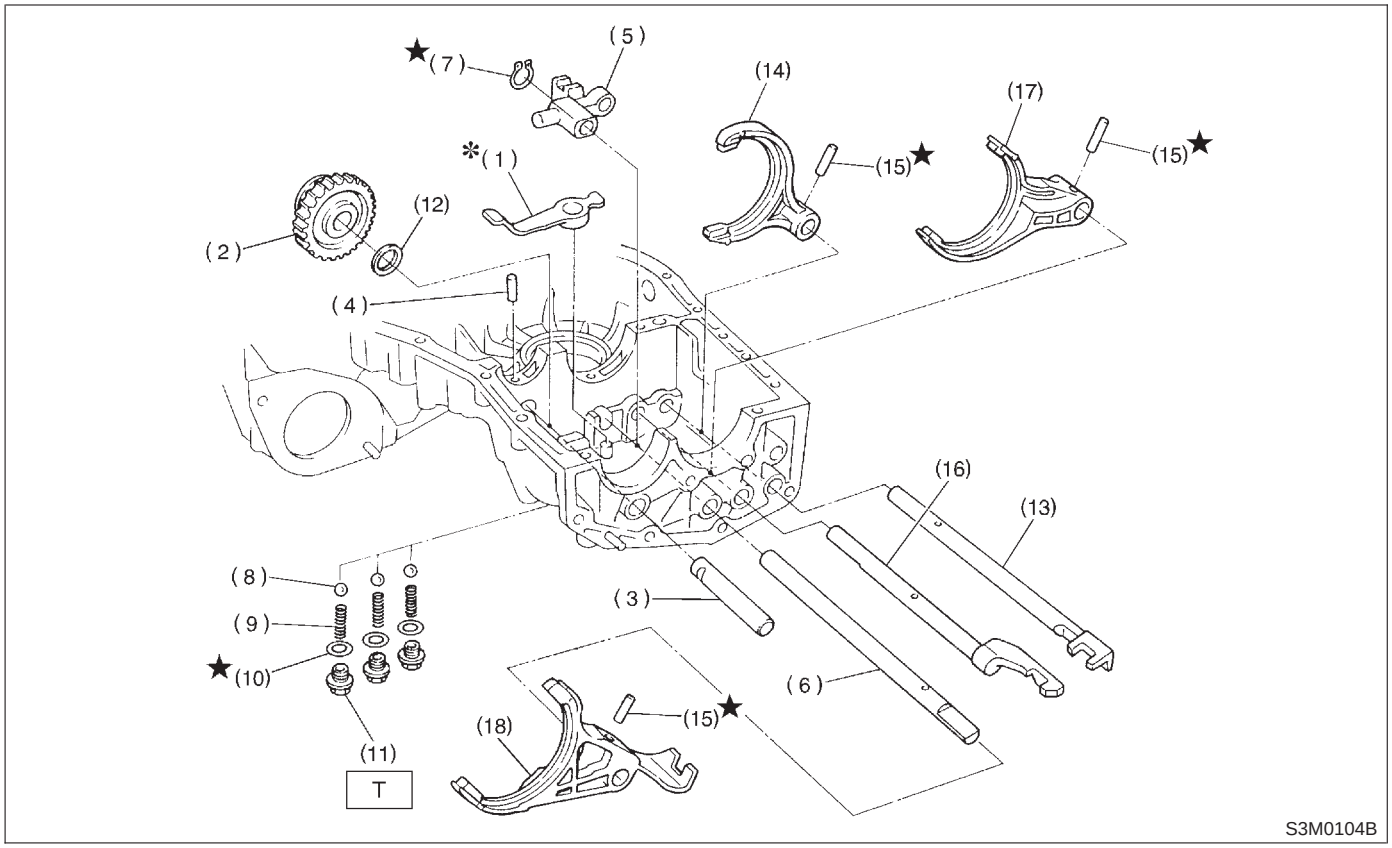
9) Remove outer snap ring and pull out speedometer driven gear. Next, remove vehicle speed sensor 2, oil seal, speedometer shaft and washer.



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

B: ASSEMBLY

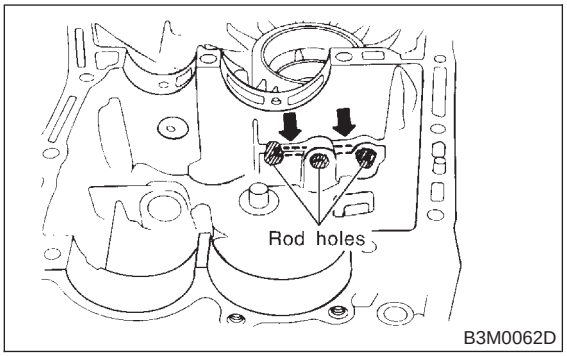
1. TRANSMISSION CASE



(1) Reverse shifter lever
(2) Reverse idler gear
(3) Reverse idler gear shaft
(4) Straight pin
(5) Reverse fork rod arm
(6) Reverse fork rod
(7) Snap ring
(8) Ball
(9) Checking ball spring
(10) Washer
(11) Checking ball plug
(12) Washer
(13) 1st-2nd fork rod
(14) 1st-2nd shifter fork
(15) Straight pin
(16) 3rd-4th fork rod
(17) 3rd-4th shifter fork
(18) 5th shifter fork

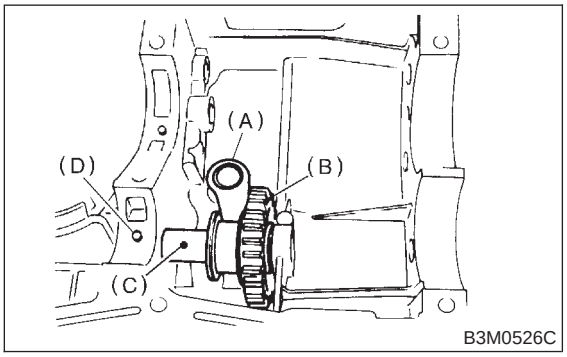
Tightening torque: N·m (kg-m, ft-lb)
T: 19.6±0.1
(2.00±0.015, 14.5±0.1)

1) Position interlock plungers (5.56 × 19.6), one plunger in hole between 1-2 and 3-4 fork rod holes, and one plunger in hole between 3-4 and reverse fork rod holes.



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

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



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

3) Install reverse arm fork spring, ball and interlock plunger (5.56 × 19.6) to reverse fork rod arm. Insert reverse fork rod into hole in reverse fork rod arm, and hold it with outer snap ring using ST.

CAUTION:
Apply grease to plunger to prevent it from falling.

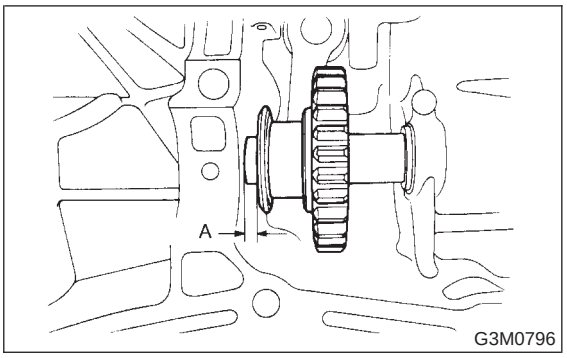
ST 399411700 ACCENT BALL INSTALLER

4) Position ball (7.1438), spring and gasket in reverse shifter rod hole, on left side transmission case, and tighten checking ball plug.

CAUTION:
Replace gasket with a new one.

5) Move reverse shifter rod toward REV side. Adjust clearance between reverse idler gear and transmission case wall, using reverse shifter lever.

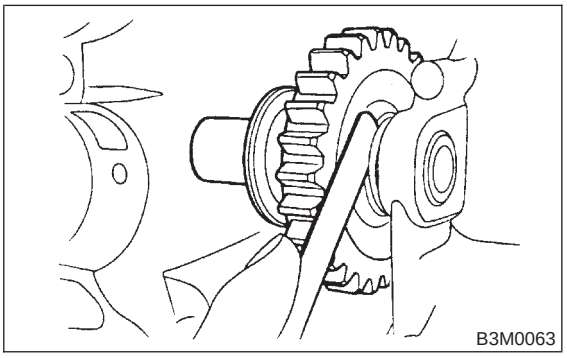
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



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

6) After installing a suitable reverse shifter lever, shift into neutral. Using a thickness gauge, measure clearance between reverse idler gear and transmission case wall and adjust with washer(s).

Clearance:
0 — 0.5 mm (0 — 0.020 in)



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

7) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of transmission case.

8) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes using ST.

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

9) Install interlock plunger (3 × 11.9) onto 3-4 fork rod.

CAUTION:
Apply a coat of grease to plunger to prevent it from falling.

10) Install 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.
11) Align the holes in rod and fork, and drive straight pin (6 × 22) into these holes.

CAUTION:
Replace straight pin with a new one.

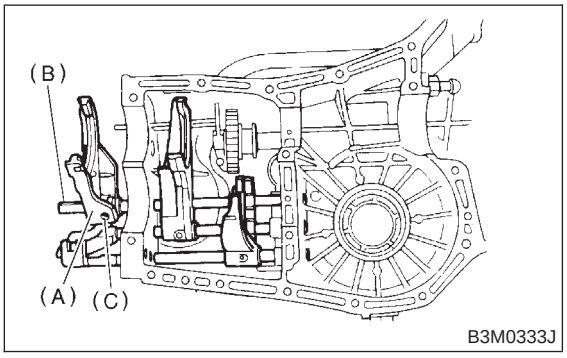
NOTE:
- Set reverse fork rod to neutral.
- Make sure interlock plunger (installed before) is on the reverse fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

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

CAUTION:
Replace straight pin with a new one.

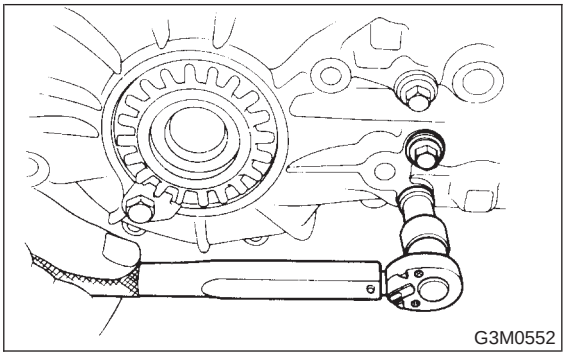
ST 398791700 STRAIGHT PIN REMOVER



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

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

CAUTION:
Replace gasket with a new one.



14) Install washer and speedometer shaft, and press fit oil seal with ST.

CAUTION:
Use new oil seal, if it has been removed.

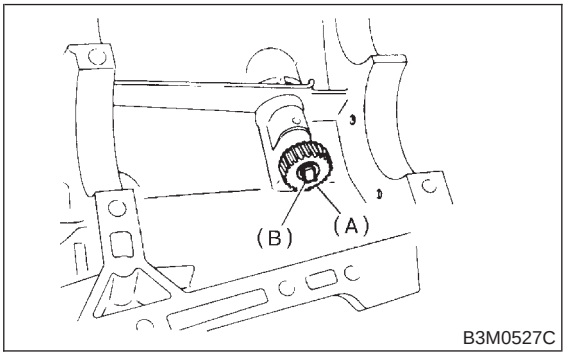
ST 899824100 or 499827000 PRESS
15) Install vehicle speed sensor 2.

CAUTION:
Use new vehicle speed sensor 2, if it has been removed.

Tightening torque:
5.9±1.5 N·m (60±15 kg-cm, 52±13 in-lb)

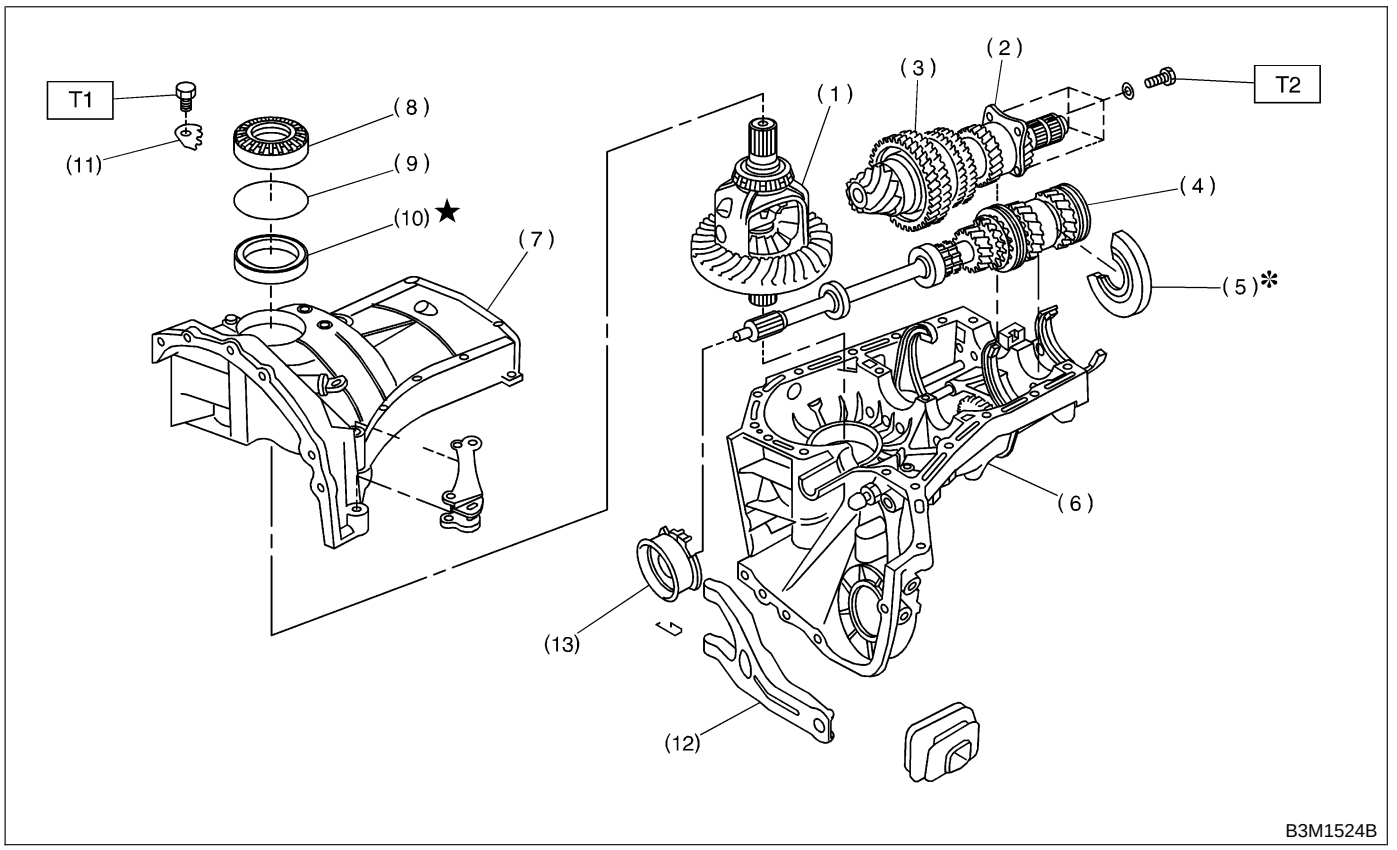
16) Install speedometer driven gear and snap ring.

CAUTION:
Use a new snap ring, if it has been removed.



(A) Speedometer driven gear
(B) Snap ring

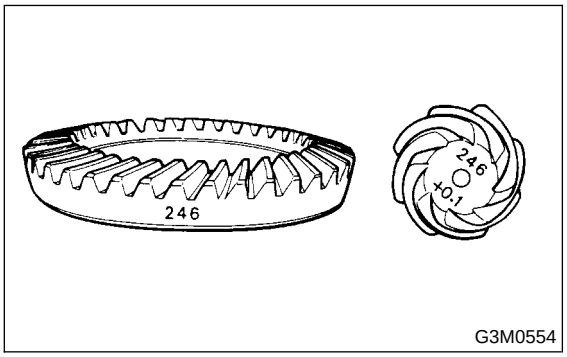
2. COMBINATION OF TRANSMISSION CASE



(1) Differential ASSY
(2) Drive pinion shim
(3) Drive pinion ASSY
(4) Main shaft ASSY
(5) Main shaft rear plate
(6) Transmission case (LH)
(7) Transmission case (RH)
(8) Differential side retainer
(9) O-ring
(10) Oil seal
(11) Retainer lock plate
(12) Release lever
(13) Release bearing

Tightening torque: N·m (kg-m, ft-lb)
T1: 25 (2.5, 18)
T2: 29±3 (3.0±0.3, 21.7±2.2)

1) Alignment marks/numbers on hypoid gear set
The upper number on driven pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.

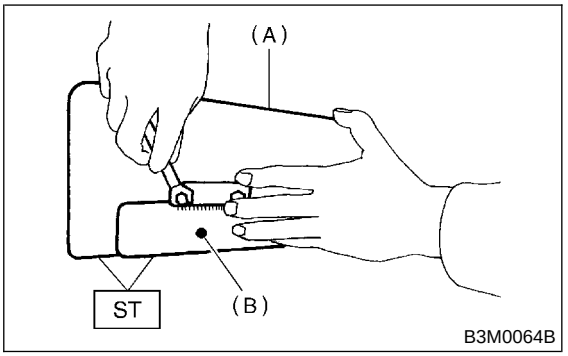


2) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.

3) Inspection and adjustment of ST

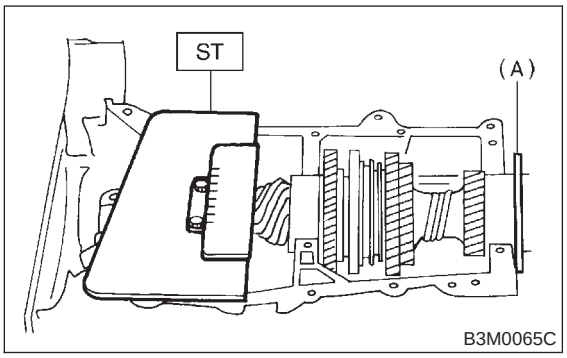
NOTE:
● Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
● Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



(A) Plate
(B) Scale

4) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.
ST 499917500 DRIVE PINION GAUGE ASSY
5) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.
ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust clearance to zero without shim.

6) The thickness of shim shall be determined by 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

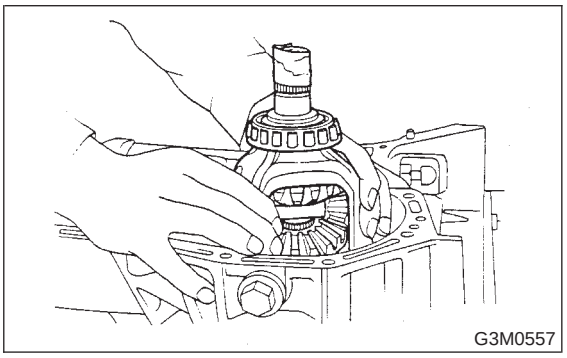
7) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

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

8) Install differential assembly on left hand transmission case.

CAUTION:
Be careful not to fold the sealing lip of oil seal.

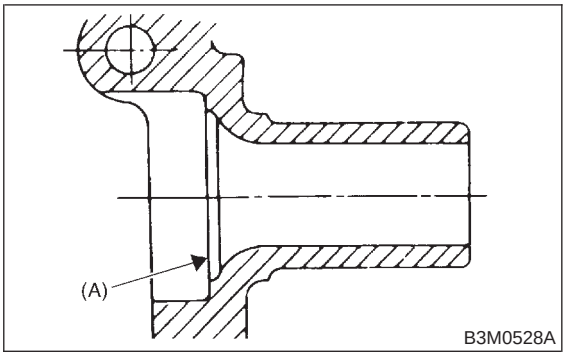
NOTE:
Wrap the left and right splined sections of axle shaft with vinyl tape to prevent scratches.



9) Install needle bearing and oil seal onto the front of transmission main shaft assembly, and position in left side transmission case.

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

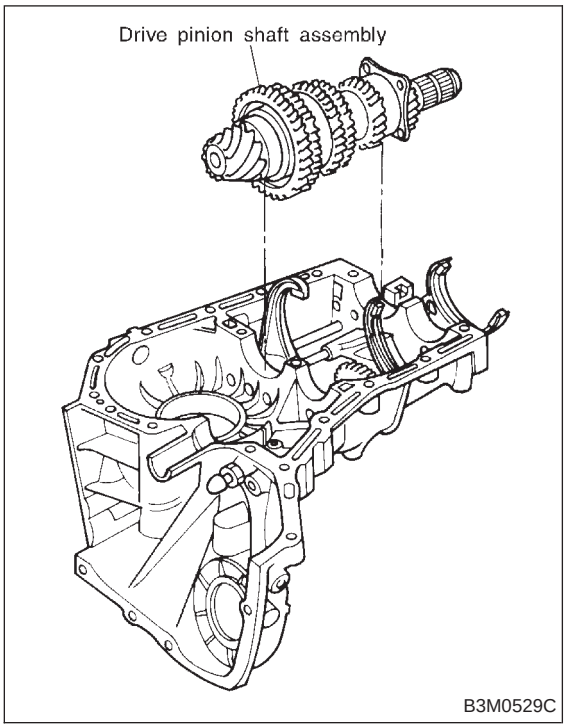
NOTE:
- Align the end face of seal with surface A of left side transmission main case when installing oil seal.



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

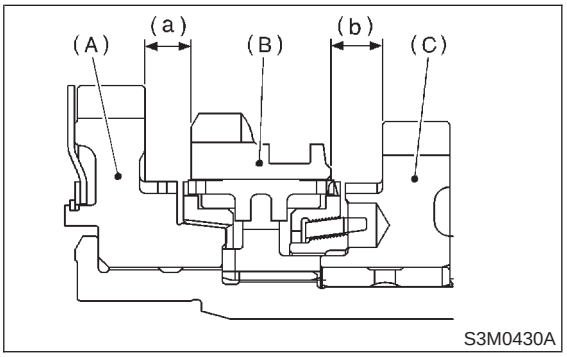
10) Install drive pinion shaft assembly with shims selected before into transmission case.

NOTE:
Ensure that the knock pin of the case is fitted into the hole in the bearing outer race.



11) Set transmission main shaft assembly and drive pinion shaft assembly in position (so there is no clearance between the two when moved all the way to the front). Select suitable 1st-2nd, 3rd-4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms.

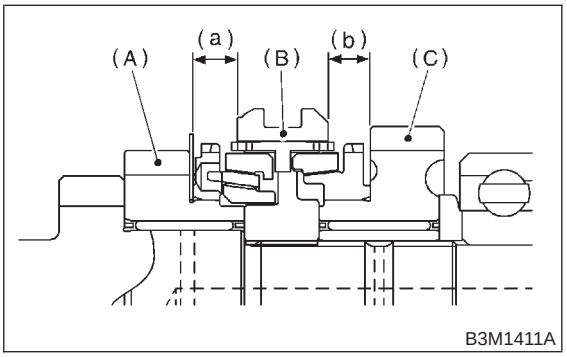
1st driven gear to reverse driven gear
Clearance (a): 9.5 mm (0.374 in)
Reverse driven gear to 2nd driven gear
Clearance (b): 9.5 mm (0.374 in)



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

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

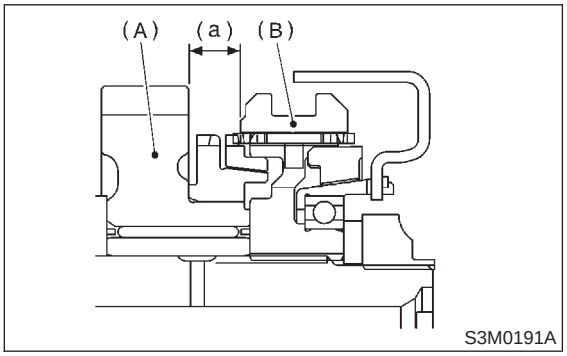
3rd-4th gear to coupling sleeve
Clearance (a): 9.3 mm (0.366 in)
Coupling sleeve to 4th driven gear
Clearance (b): 9.3 mm (0.366 in)



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

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

5th drive gear to coupling sleeve
Clearance (a): 9.3 mm (0.366 in)

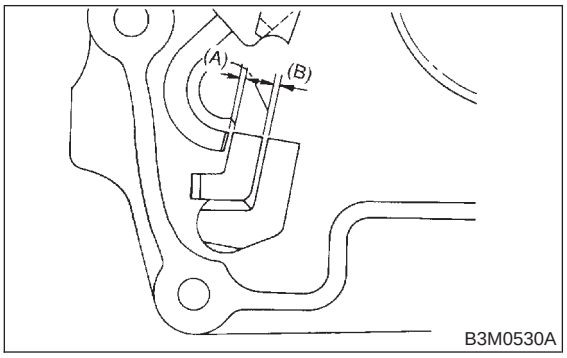


(A) 5th drive gear
(B) Coupling sleeve

5th shifter fork		
Part No.	No.	Remarks
32812AA200	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA210	No mark	Standard
32812AA220	6	Become distant from 5th gear by 0.2 mm (0.008 in)

12) Measure rod end clearances (A) and (B). If any clearance is not within specifications, replace rod or fork as required.

(A): 1st-2nd to 3rd-4th	0.4 — 1.4 mm (0.016 — 0.055 in)
(B): 3rd-4th to 5th	0.5 — 1.3 mm (0.020 — 0.051 in)



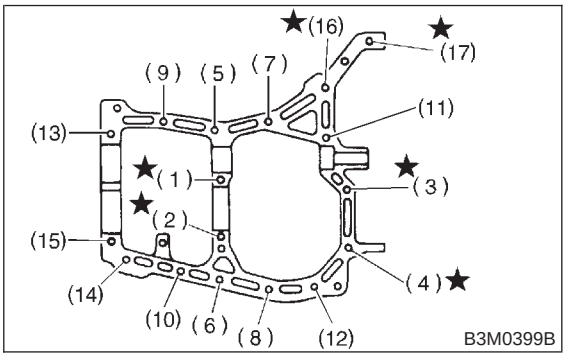
13) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline, and apply liquid gasket, and then put case right side and left side together.

Liquid gasket:
THREE BOND 1215 or equivalent

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

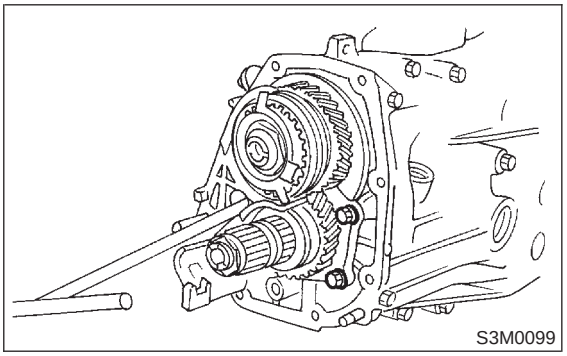
NOTE:
- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

Tightening torque:
8 mm bolt
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
★ 10 mm bolt
39±3 N·m (4.0±0.3 kg-m, 28.9±2.2 ft-lb)



15) Tighten ball bearing attachment bolts.

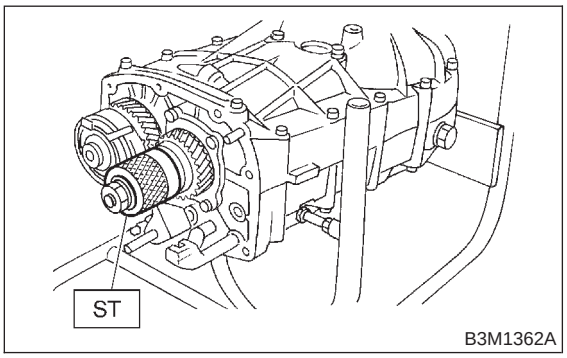
Tightening torque:
29±3 N·m (3.0±0.3 kg-m, 21.7±2.2 ft-lb)



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

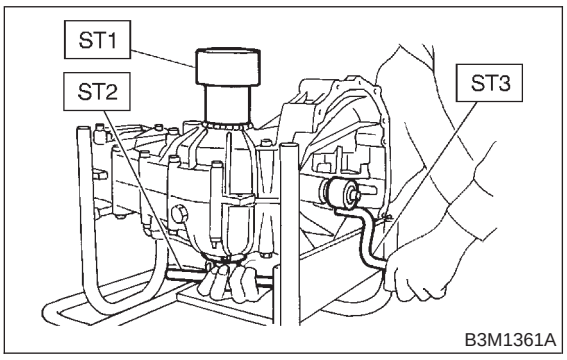
NOTE:
Support drive pinion assembly with ST.

ST 498427100 STOPPER



17) Place the transmission with case left side facing downward and put ST1 on bearing cup.
18) Screw retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

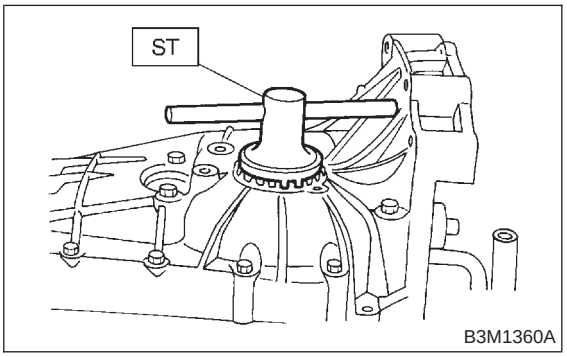
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



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

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

ST 499787000 WRENCH ASSY



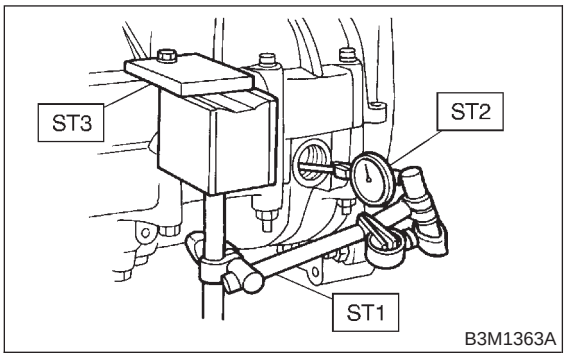
20) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:
The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

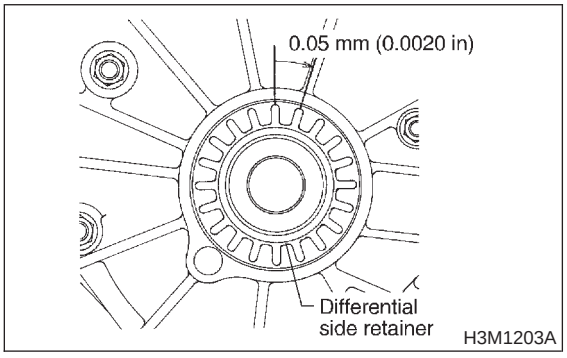
21) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
22) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.
23) Turn transmission main shaft several times while tapping around retainer lightly with plastic hammer.

24) Set ST1 and ST2. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE
ST3 498255400 PLATE

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

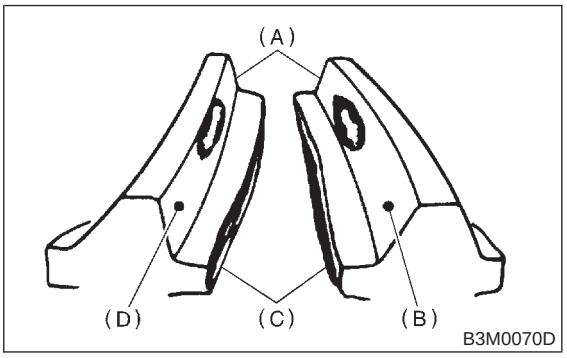


NOTE:
● If backlash is outside specified range, adjust it by turning holder in right side case.
● Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



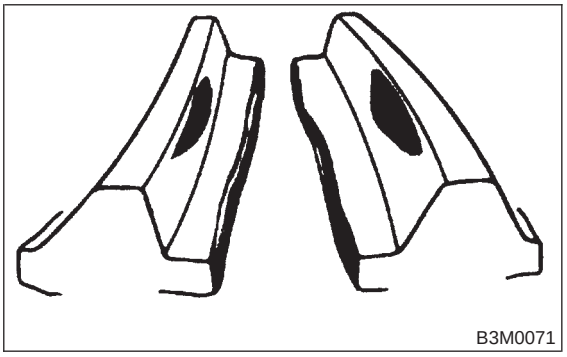
25) Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is incorrect, make the following correction.

● Tooth contact is correct.

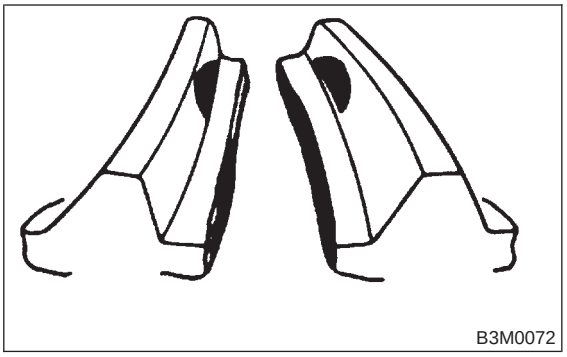


(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

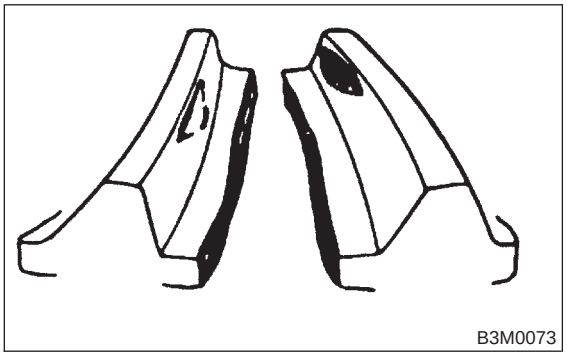
● Backlash is excessive.
To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.



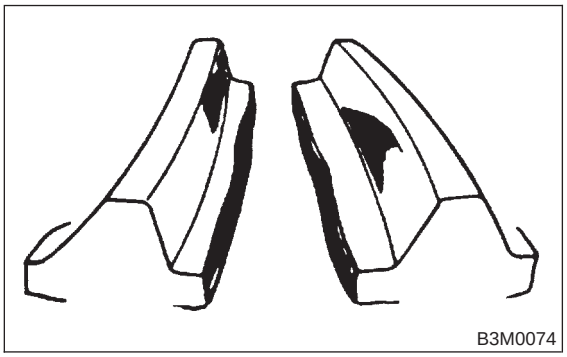
● Backlash is insufficient.
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



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


B3M0073

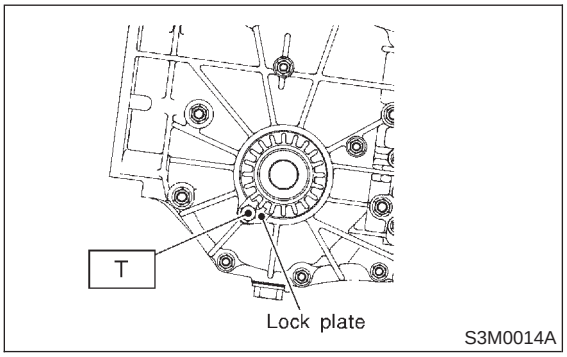
● The drive pinion shim selected before is too thin. Increase its thickness.


B3M0074

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

NOTE:
Carry out this job on both upper and lower retainers.

Tightening torque:
T: 25±3 N·m (2.5±0.3 kg-m, 18.1±2.2 ft-lb)

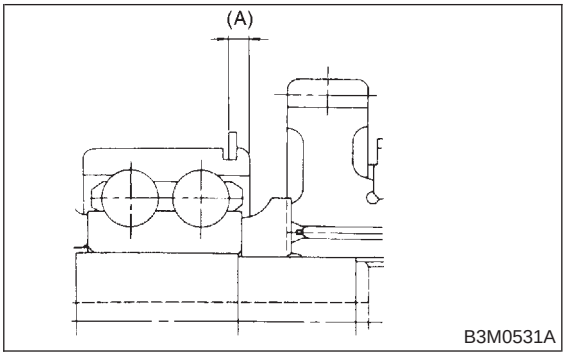


S3M0014A

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

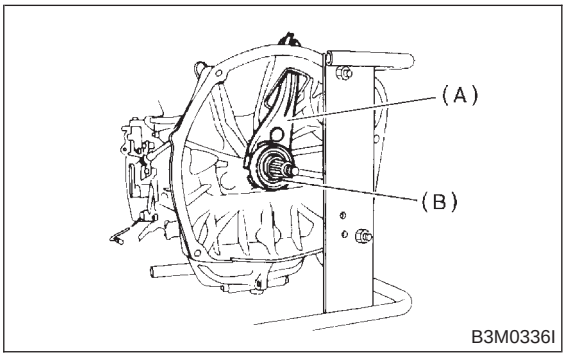
NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.
ST 498147000 DEPTH GAUGE

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



B3M0531A

28) Install clutch release lever and bearing. <Ref. to 2-10 [W3C0].>



B3M0336I

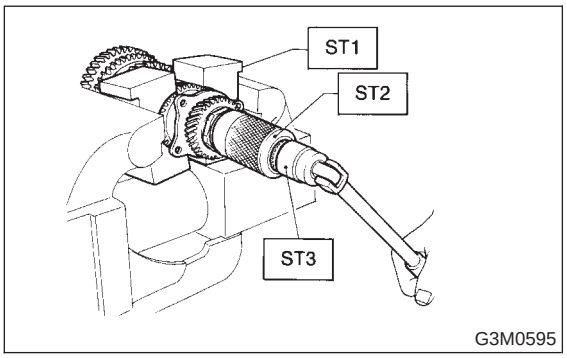
(A) Clutch release lever
(B) Release bearing

3. Drive Pinion Assembly

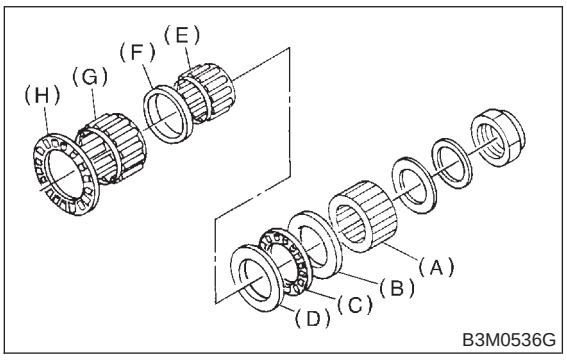
A: DISASSEMBLY

1. DRIVE PINION SHAFT

1) Straighten lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH



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

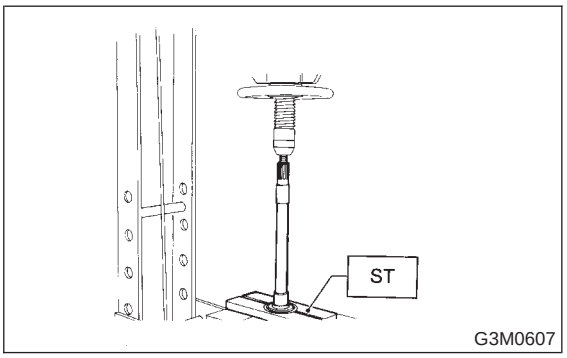


(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

3) Remove roller bearing and washer (33 × 50 × 5) using ST and press.

CAUTION:
Do not reuse roller bearing.

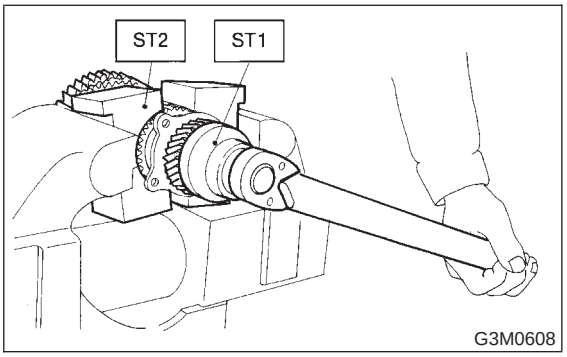
ST 498077000 REMOVER



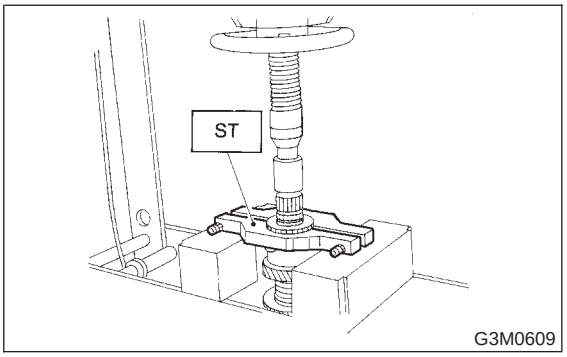
2. DRIVEN GEAR ASSEMBLY

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

1) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER

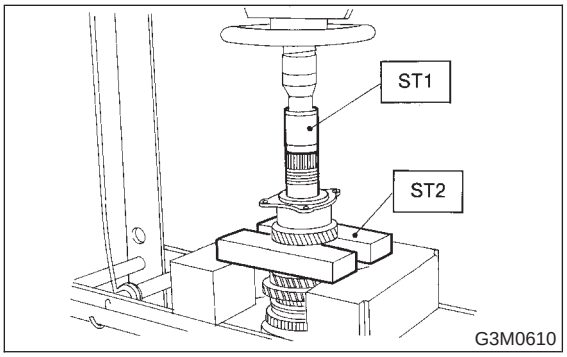


2) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

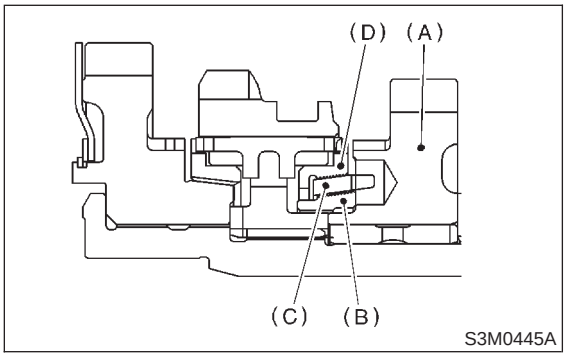


3) Remove woodruff key.

4) Remove roller bearing (42 × 74 × 40), 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER



5) Remove the key.
6) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.

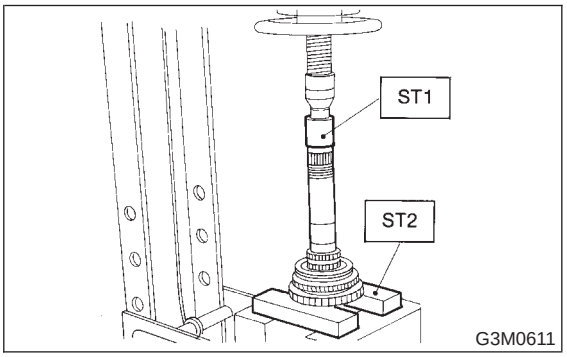


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

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

NOTE:
Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 SNAP RING PRESS
ST2 899714110 REMOVER



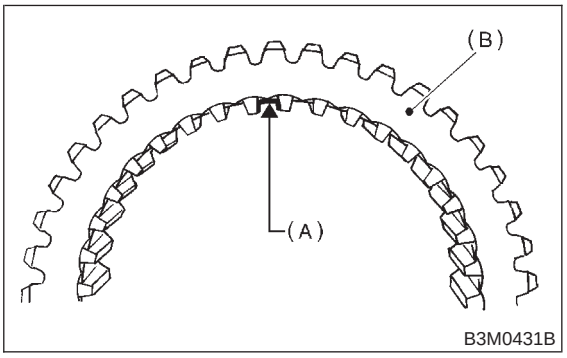
8) Remove sub gear for 1st driven gear.

B: ASSEMBLY

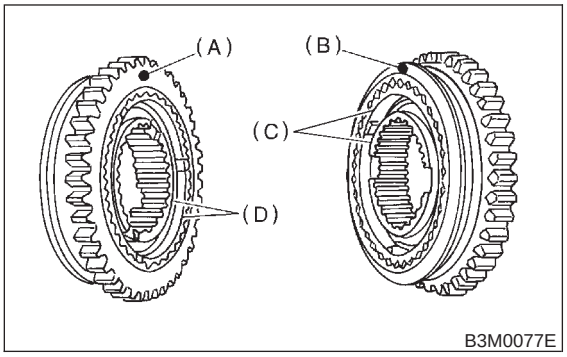
1. GEAR AND HUB ASSEMBLY

Assemble gear and hub assembly.

NOTE:
● Use new gear and hub assembly, if gear or hub have been replaced.
● Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.



(A) Key grooves
(B) Reverse driven gear

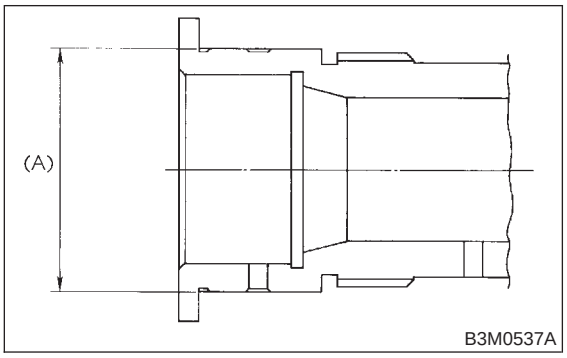


(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

2. DRIVEN GEAR ASSEMBLY

Assemble a driven shaft and 1st driven gear that select for adjustment the proper radial clearance.

Driven shaft		1st driven gear
Part No.	Diameter A mm (in)	Part No.
32229AA150	49.959 — 49.966 (1.9669 — 1.9672)	32231AA730
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA720



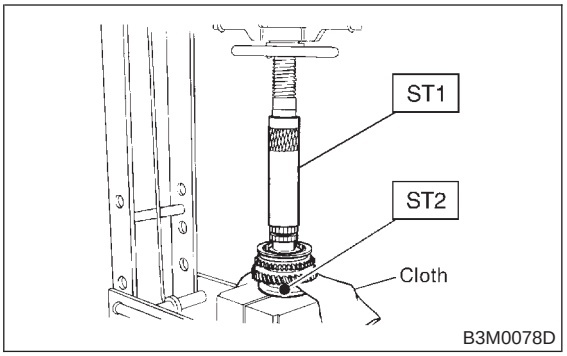
1) Install sub gear to 1st driven gear.
2) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:
● Take care to install gear and hub assembly in proper direction.
● Align baulk ring and gear & hub assembly with key groove.

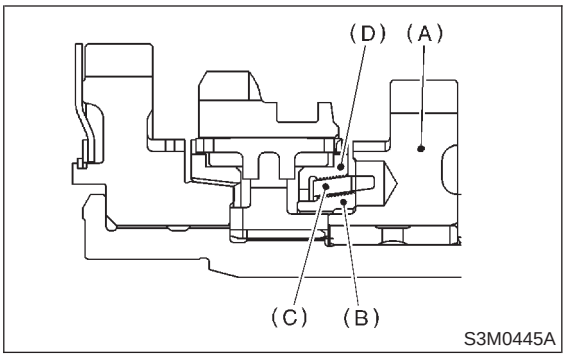
3) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

CAUTION:
● Attach a cloth to the end of driven shaft to prevent damage.
● Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

NOTE:
When press fitting, align oil holes of shaft and bush.
ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



4) Install 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.



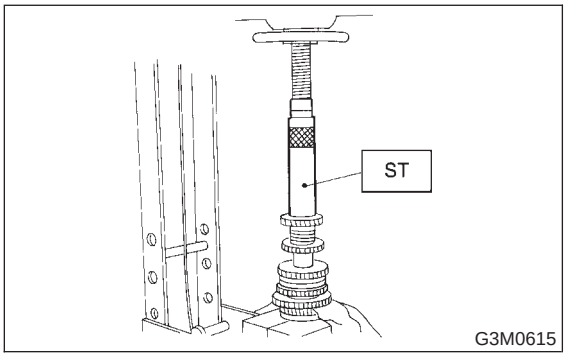
(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

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

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

NOTE:
Align groove in baulk ring with insert.

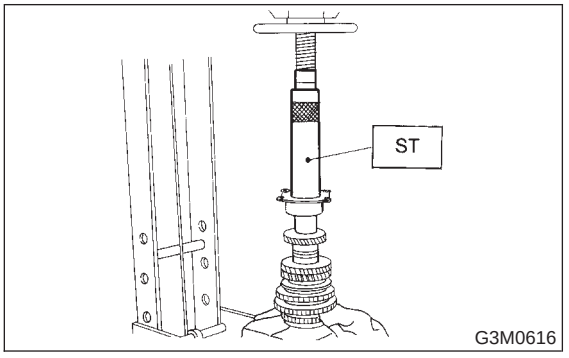
ST 499277200 INSTALLER



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

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

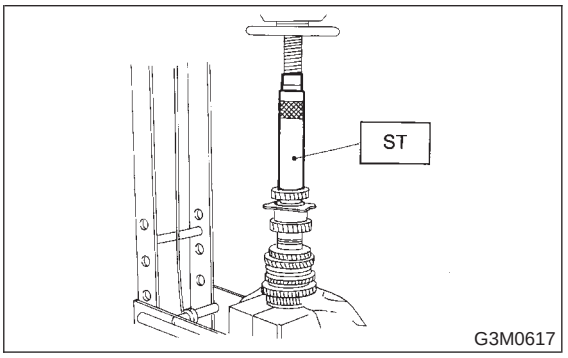
ST 499277200 INSTALLER



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

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

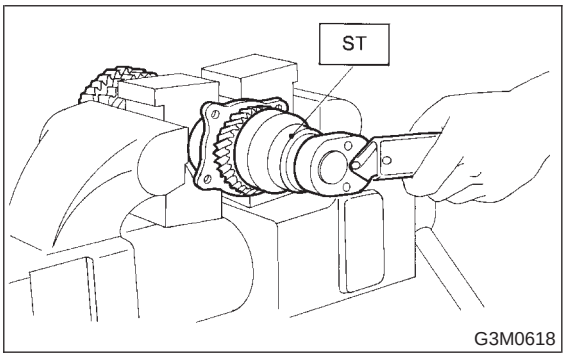
ST 499277200 INSTALLER



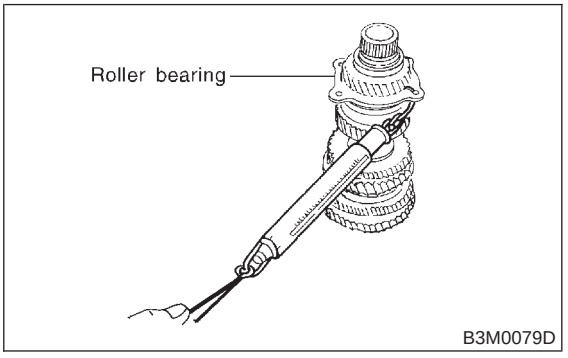
8) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

Tightening torque:
265±10 N·m (27±1 kg-m, 195±7 ft-lb)



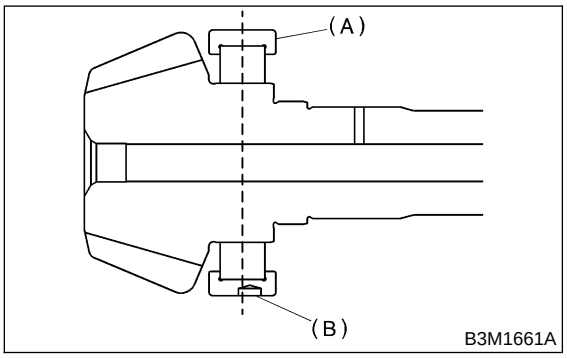
NOTE:
- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N·m (0.01 to 0.15 kg-m, 0.07 to 1.1 ft-lb).



3. DRIVE PINION SHAFT

1) 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.

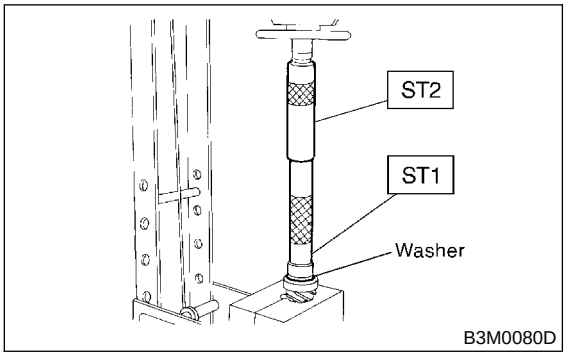


(A) Roller bearing
(B) Knock pin hole

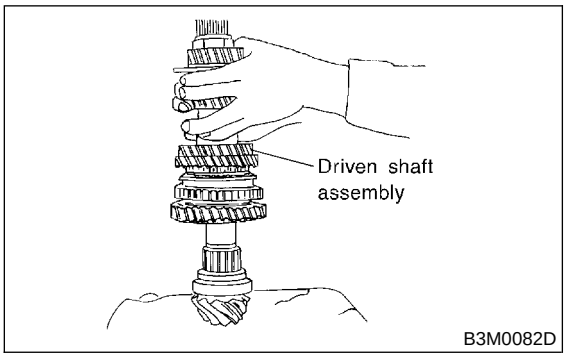
2) Install washer (33 × 50 × 5) using ST1, ST2 and press.

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

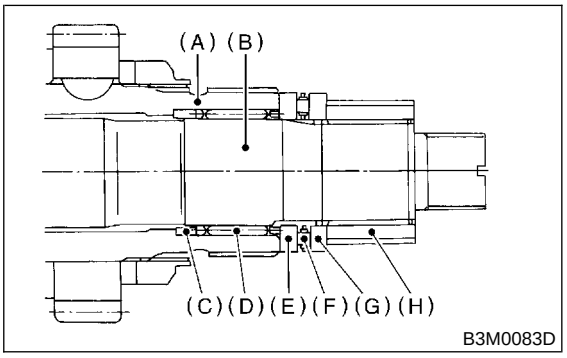


3) Install thrust bearing (33 × 50 × 3) and needle bearing (30 × 37 × 23). Install driven shaft assembly.



4) Install drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:
Be careful because spacer must be installed in proper direction.

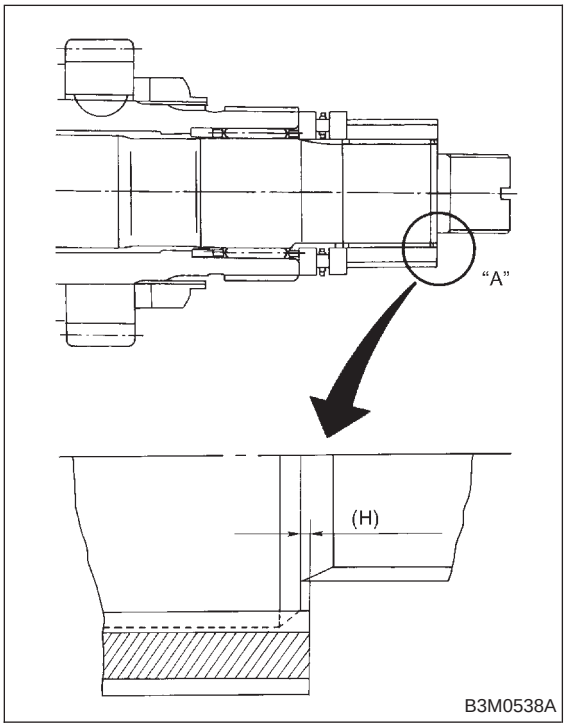


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

C: ADJUSTMENT

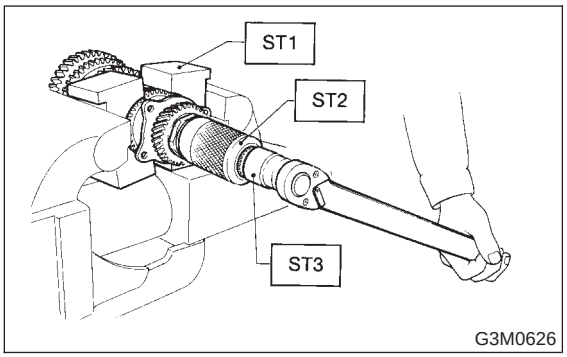
1. THRUST BEARING PRELOAD

1) After completing the preceding steps 1) through 3), select adjusting washer No. 1 so that dimension (H) is zero through visual check. Position washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



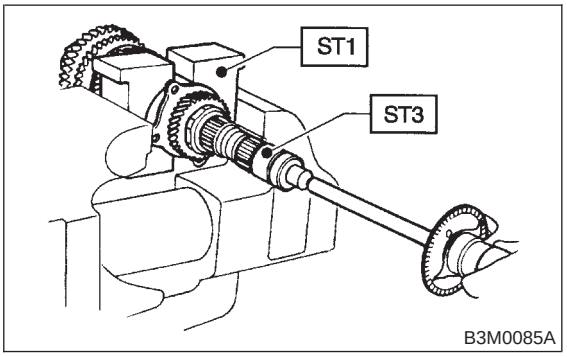
2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)

Tightening torque:
118±8 N·m (12±0.8 kg-m, 86.8±5.8 ft-lb)

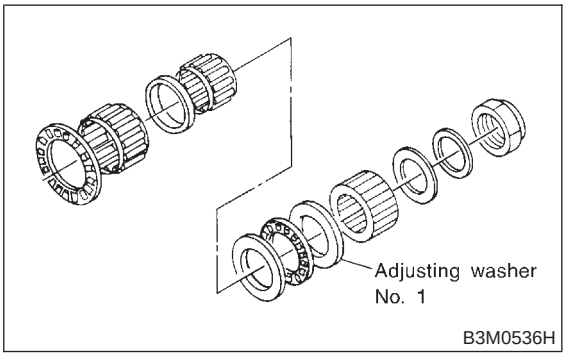


3) After removing ST2, measure starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

Starting torque:
54±25 N·m (5.5±2.5 kg-m, 40±18 ft-lb)

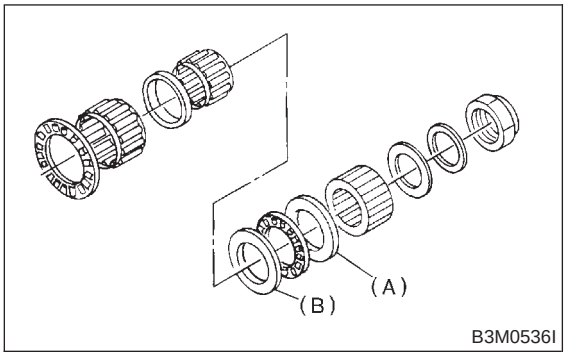


4) If starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.



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)

5) If specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 adjusting washer from those listed in the following table. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

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

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

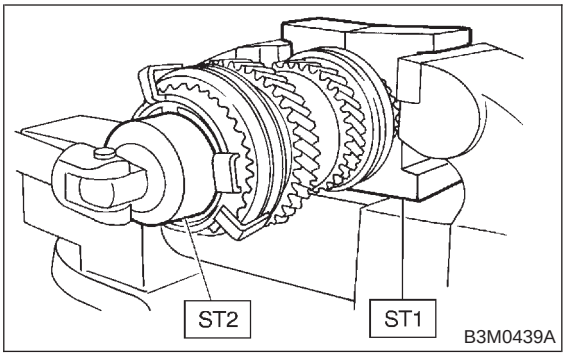
4. Main Shaft Assembly

A: DISASSEMBLY

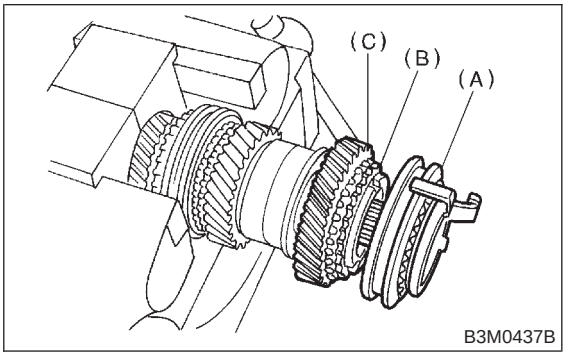
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)

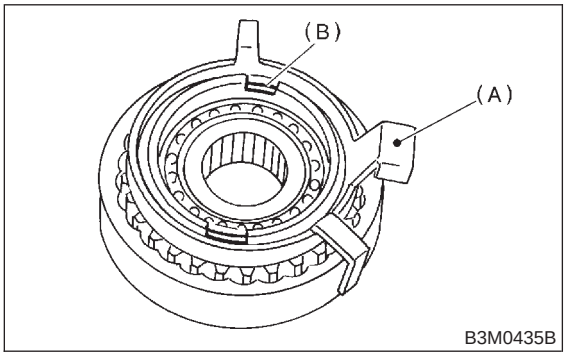


3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing (32 × 36 × 25.7).



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

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

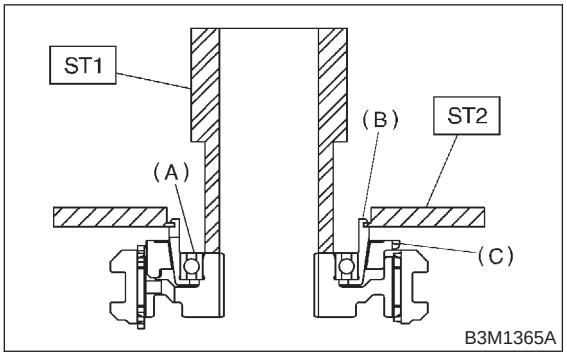


(A) Synchro cone stopper
(B) Snap ring

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

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

ST1 499757002 SNAP RING PRESS
ST2 498077400 SYNCHRO CONE REMOVER

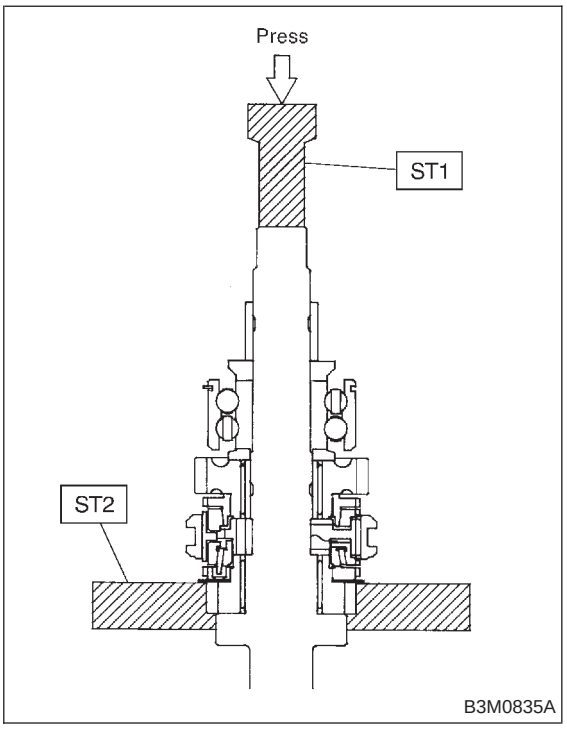


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

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

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

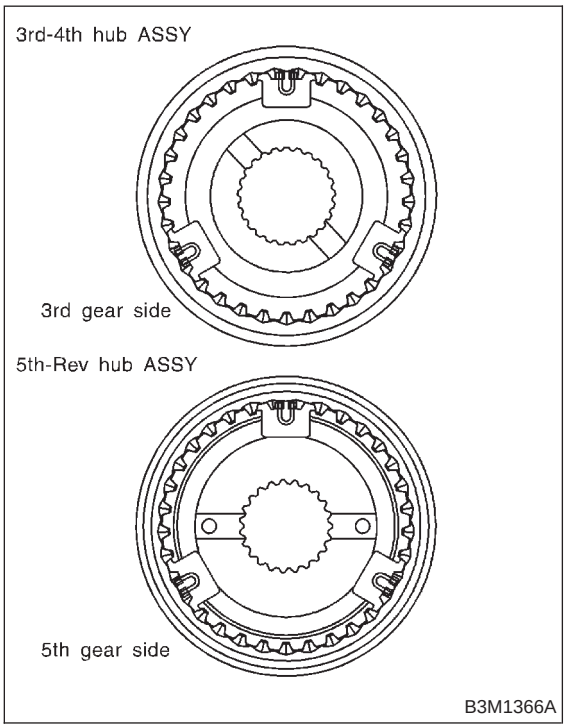
ST1 899864100 REMOVER
ST2 899714110 REMOVER



B: ASSEMBLY

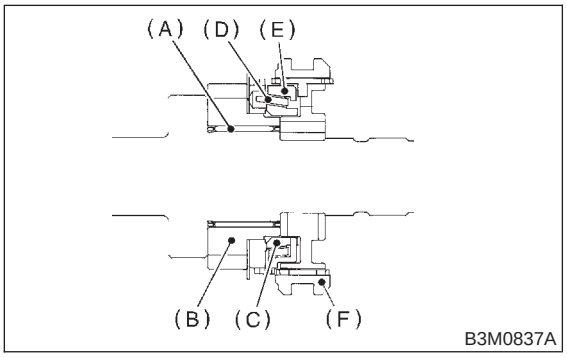
1) Assemble sleeve and hub assembly for 3rd-4th and, 5th synchronizing.

NOTE:
Position open ends of spring 120° apart.



2) Install 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

NOTE:
Align groove in baulk ring with shifting insert.

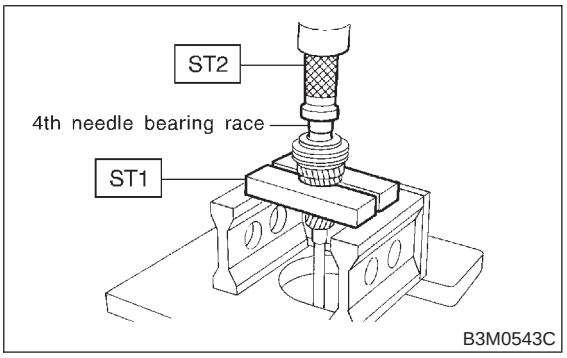


(A) 3rd needle bearing (32 × 36 × 25.7)
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve and hub ASSY

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

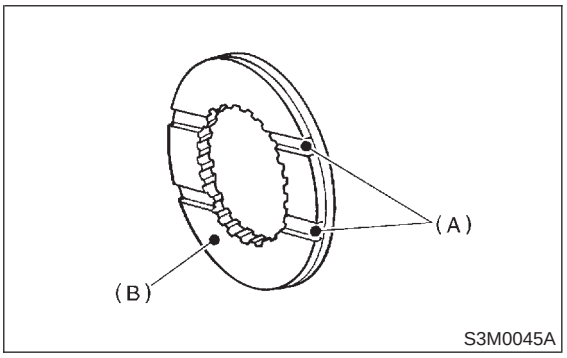
CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



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.

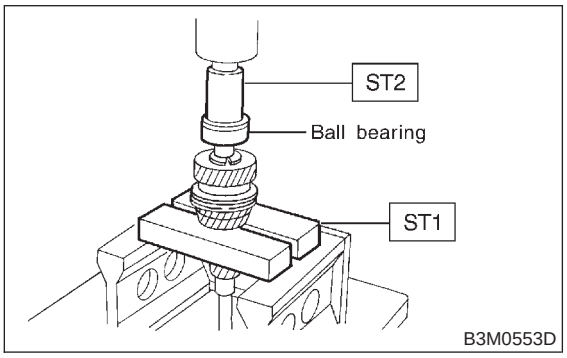


(A) Groove
(B) 4th gear side

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

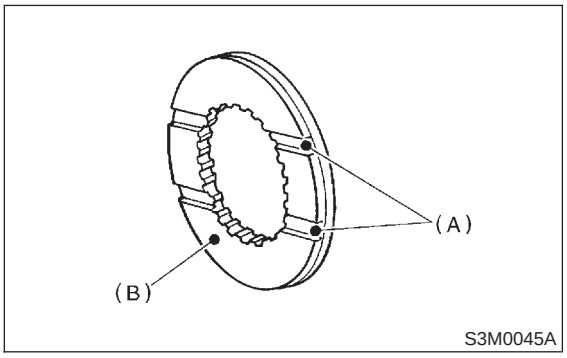


6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

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.

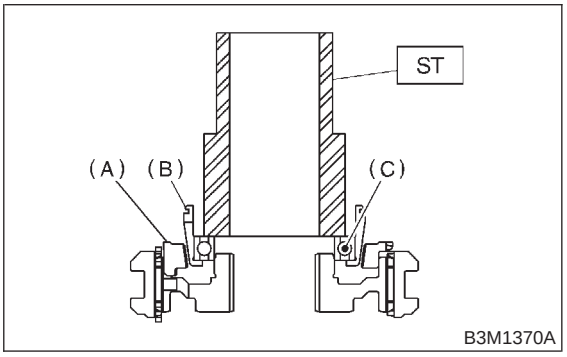
NOTE:
Align baulk ring and gear & hub assembly with key groove.

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).

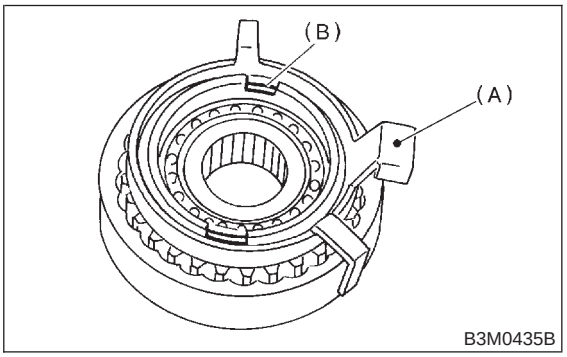
NOTE:
- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

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.

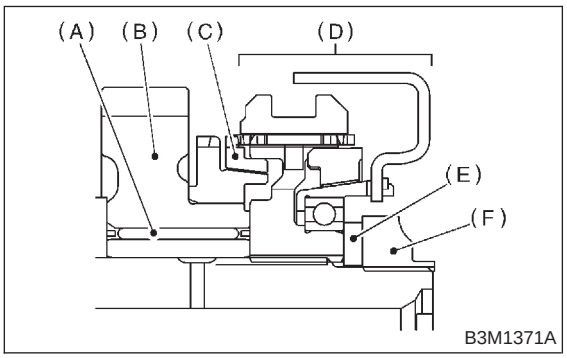


(A) Synchro cone stopper
(B) Snap ring

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

NOTE:
Align groove in baulk ring with shifting insert.

ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER



(A) Needle bearing (32 × 36 × 25.7)
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer (22 × 38 × 2)
(F) Lock nuts (22 × 13)

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

NOTE:
Secure lock nuts in two places after tightening.

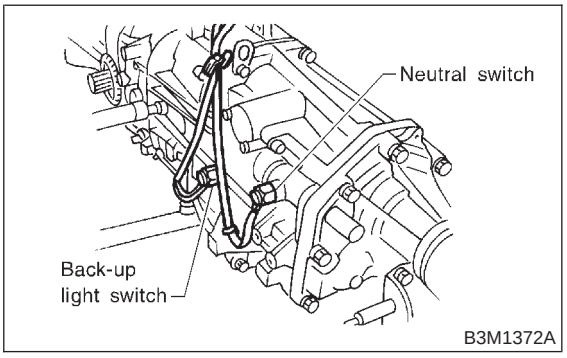
ST1 499987000 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
118±6 N·m (12.0±0.6 kg-m, 86.8±4.3 ft-lb)

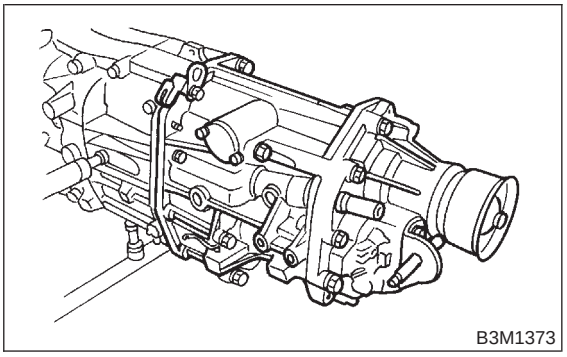
5. Transfer Case and Extension

A: REMOVAL

1) Remove back-up light switch and neutral switch.



2) Remove transfer case with extension assembly.

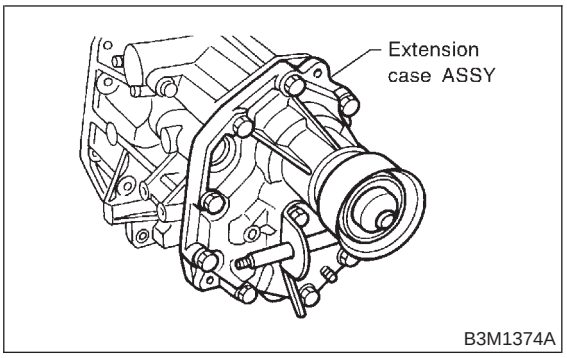


3) Remove shifter arm.

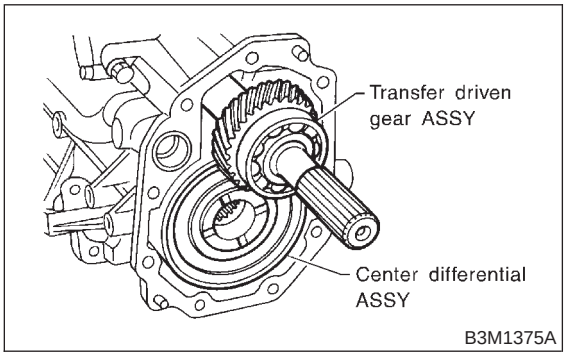
B: DISASSEMBLY

1. SEPARATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

1) Separate transfer case and extension assembly.



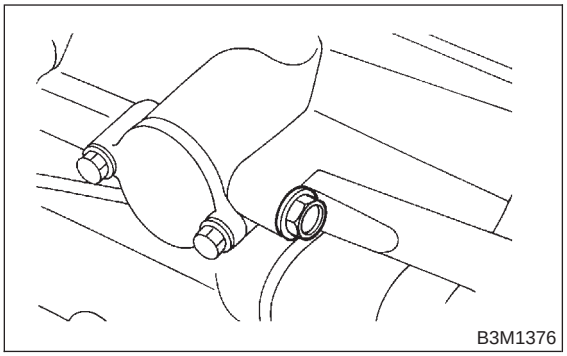
2) Remove transfer driven gear and center differential as a set.



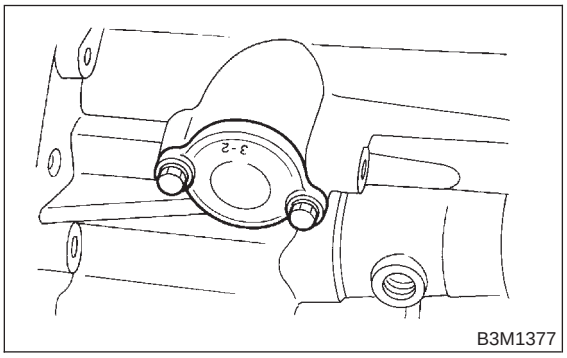
3) Remove thrust washer.

2. TRANSFER CASE

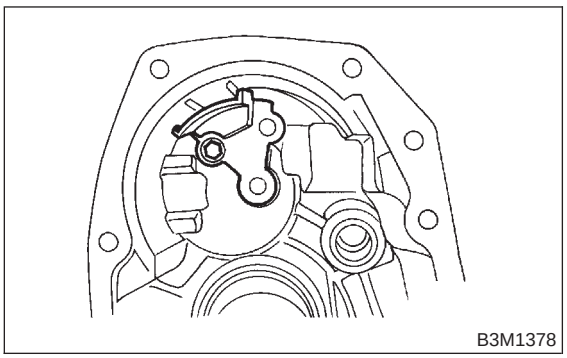
1) Remove plug, spring and reverse check ball.



2) Remove reverse check assembly.

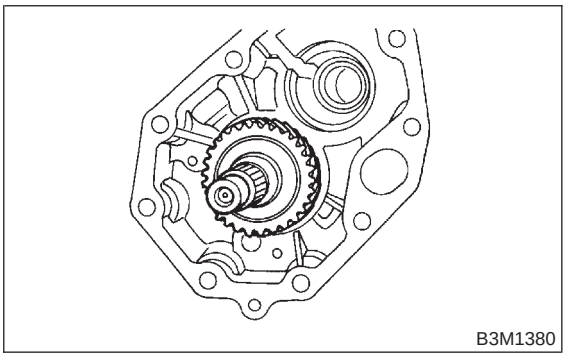


3) Remove oil guide.

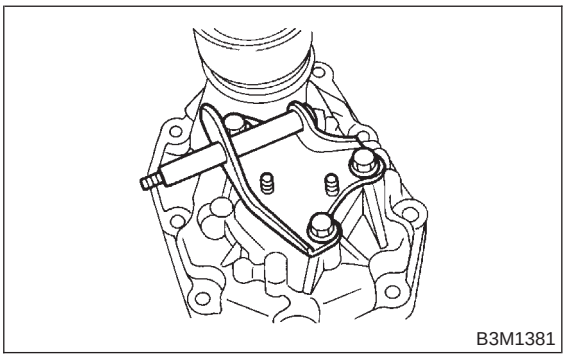


3. EXTENSION

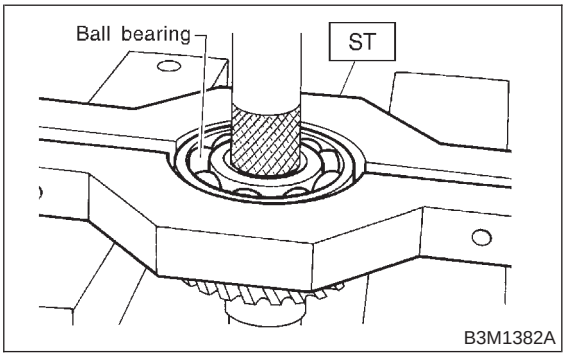
1) Remove transfer drive gear assembly.



2) Remove shift bracket.



3) Using ST, remove ball bearing from transfer drive gear.
ST 498077100 REMOVER

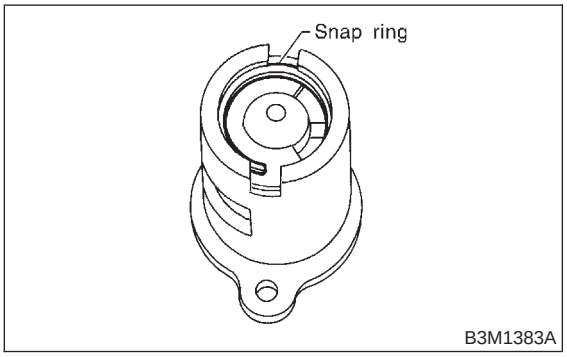


4) Remove oil seal from extension case.

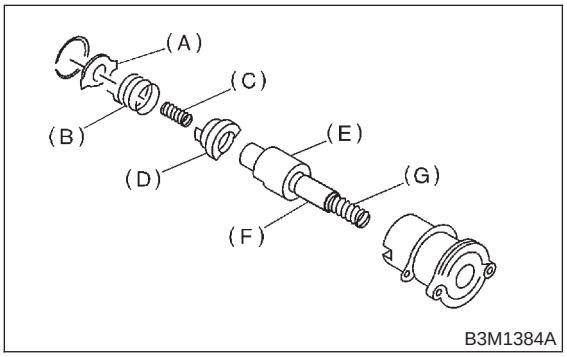
4. REVERSE CHECK SLEEVE

1) Using a standard screwdriver, remove snap ring.

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



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



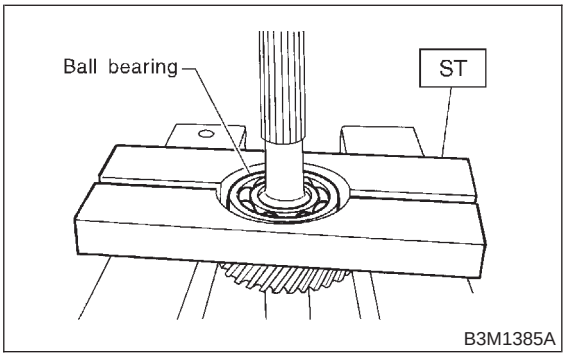
(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

3) Remove O-ring.

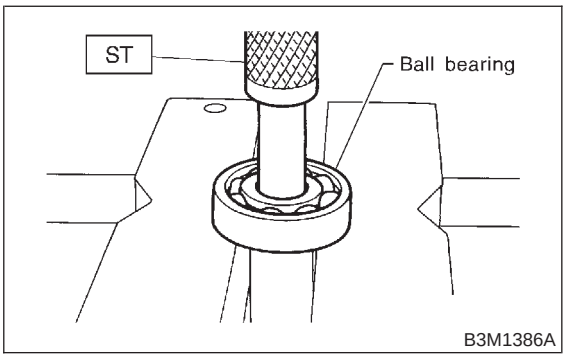
NOTE:
● Reverse check sleeve assembly uses an O-ring which should not be scratched.
● Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.

5. TRANSFER DRIVEN GEAR

1) Using ST, remove ball bearing from transfer driven gear.
ST 498077000 REMOVER



2) Using ST, remove ball bearing from transfer driven gear.
ST 899864100 REMOVER

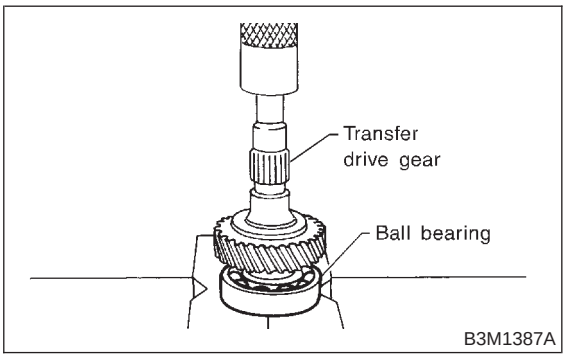


C: ASSEMBLY

1. EXTENSION

1) Install ball bearing to transfer drive gear.

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



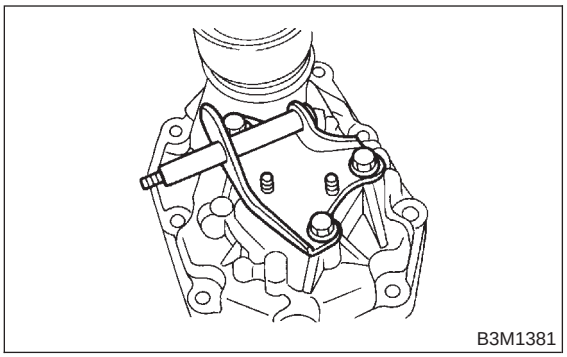
2) Using ST, install oil seal to extension case.

CAUTION:
Use new oil seal.

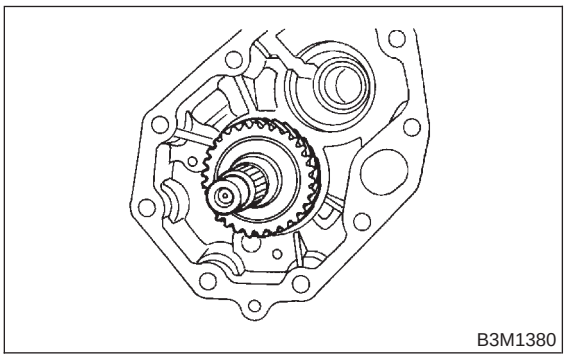
ST 498057300 INSTALLER

3) Install shift bracket to extension case.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)


B3M1381

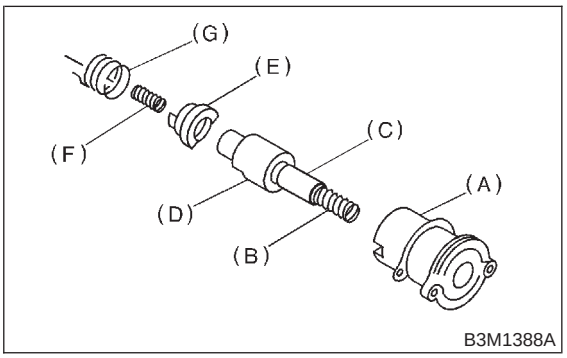
4) Install transfer drive gear to extension case.


B3M1380

2. REVERSE CHECK SLEEVE

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

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

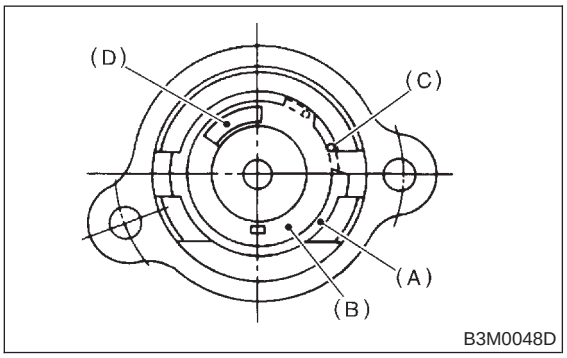


B3M1388A

(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.

CAUTION:
● Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
● Spin cam by hand for smooth rotation.
● Move cam and shaft all the way toward plate and release.
If cam does not return properly, replace reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace spring.



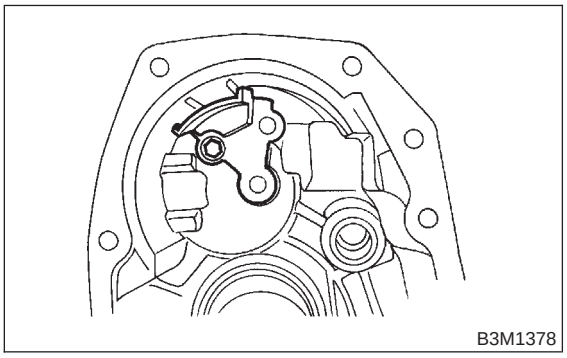
(A) Snap ring
(B) Reverse check plate
(C) Check spring
(D) Check cam

● Select a suitable reverse accent shaft and reverse check plate. <Ref. to 3-1 [W5E0].>

3. TRANSFER CASE

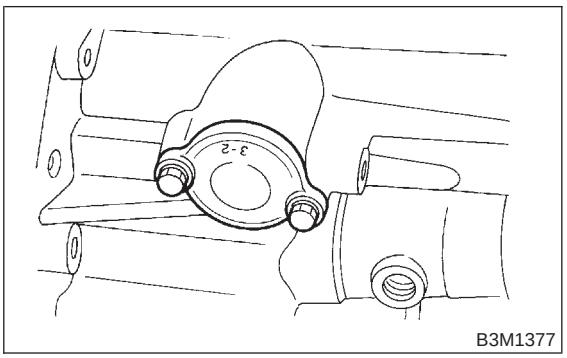
1) Install oil guide to transfer case.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



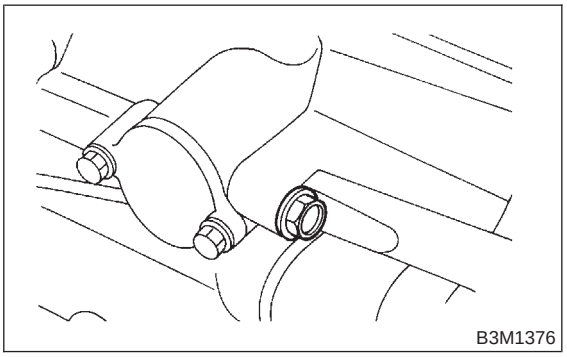
2) Install reverse check sleeve assembly to transfer case.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



3) Install ball, reverse accent spring, washer and plug to transfer case.

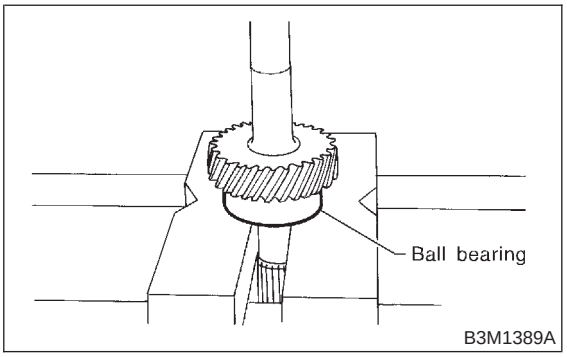
Tightening torque:
10±1 N·m (1.0±0.1 kg-m, 7.2±0.7 ft-lb)



4. TRANSFER DRIVEN GEAR

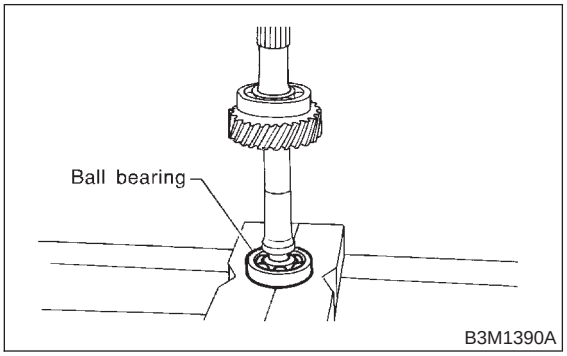
1) Install ball bearing to transfer driven gear.

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



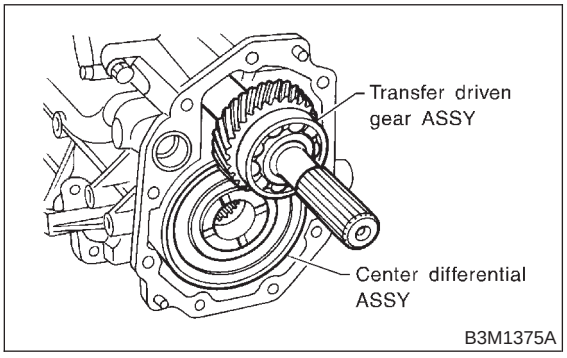
2) Install ball bearing to transfer driven gear.

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

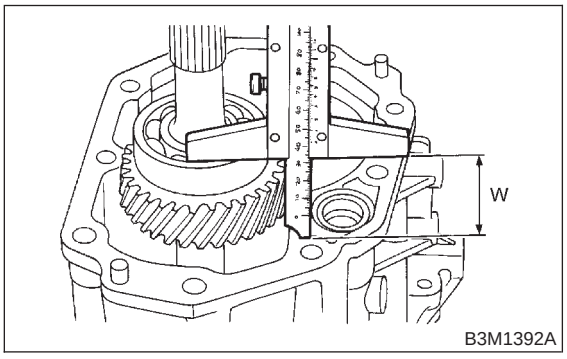


5. COMBINATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

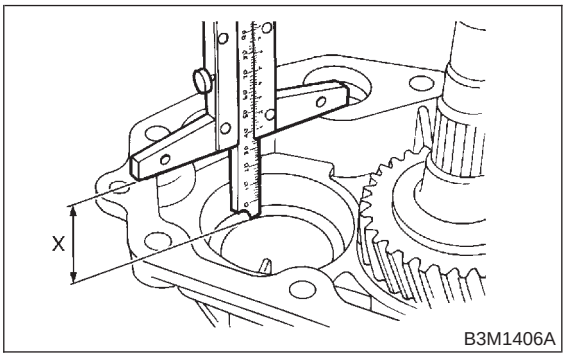
1) Install center differential and transfer driven gear into transfer case.



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



3) Measure depth “X”.

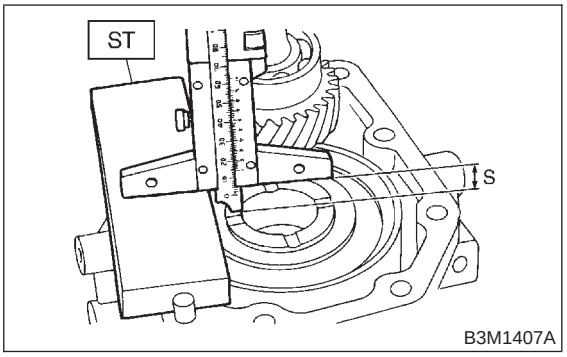


4) Calculate space “Y” using the following equation: Y = X − W + 0.24 mm (0.0094 in) [Thickness of gasket]
5) Select suitable washer in the following table:

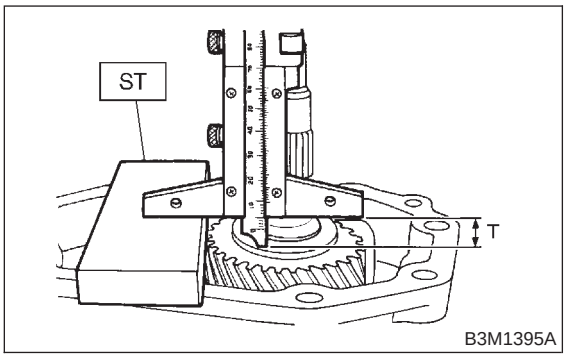
Standard clearance between thrust washer and ball bearing:
0.05 — 0.30 mm (0.0020 — 0.0118 in)

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

6) Fit thrust washers on transfer drive shaft.
7) Measure depth “S” between transfer case and center differential.
ST 398643600 GAUGE



8) Measure depth “T” between extension case and transfer drive gear.
ST 398643600 GAUGE



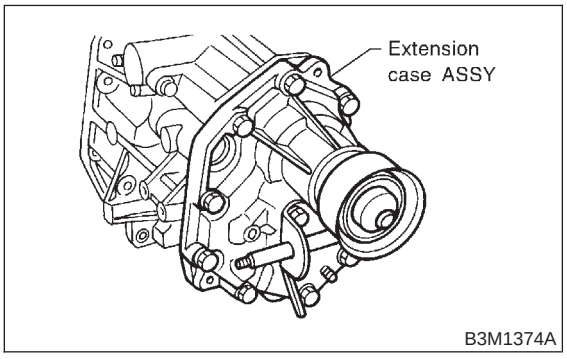
9) Calculate space “U” using the following equation: U = S + T − 0.24 mm (0.0094 in) [Thickness of gasket]
10) Select suitable washer in the following table:

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)

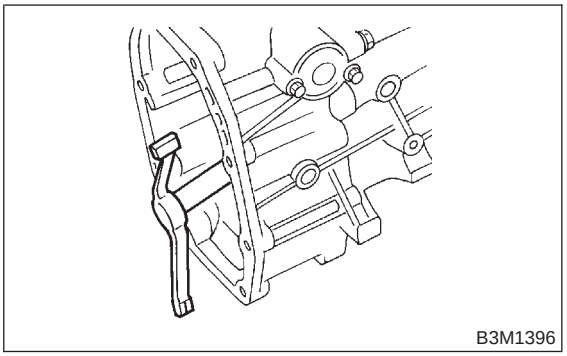
11) Fit thrust washer on center differential.
12) Install extension assembly into transfer case.

Tightening torque:
37±3 N·m (3.8±0.3 kg-m, 27.5±2.2 ft-lb)

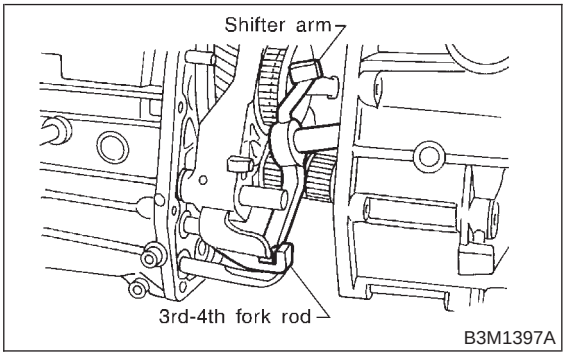


D: INSTALLATION

1) Install shifter arm to transfer case.

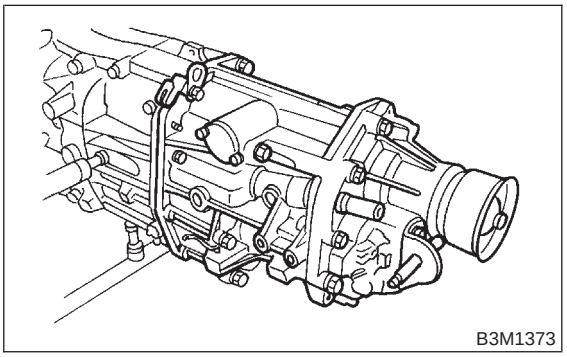


2) Hang the shifter arm on the 3rd-4th fork rod.



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

Tightening torque:
24.5±2.0 N·m (2.50±0.20 kg-m, 18.1±1.4 ft-lb)



E: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

1) Shift gear into 3rd gear position.
2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of the return spring, until arm contacts the stopper.
3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
4) To adjust, remove bolts holding reverse check sleeve assembly to the case, move sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

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

NOTE:
● When shim is removed, the neutral position will move closer to reverse; when shim is added, the neutral position will move closer to 1st gear.
● If shims alone cannot adjust the clearance, replace reverse accent shaft and re-adjust.

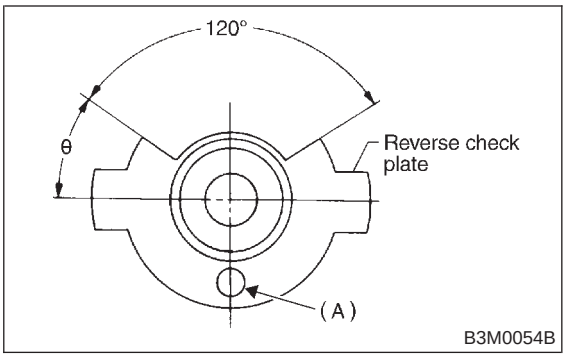
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

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

2. REVERSE CHECK PLATE ADJUSTMENT

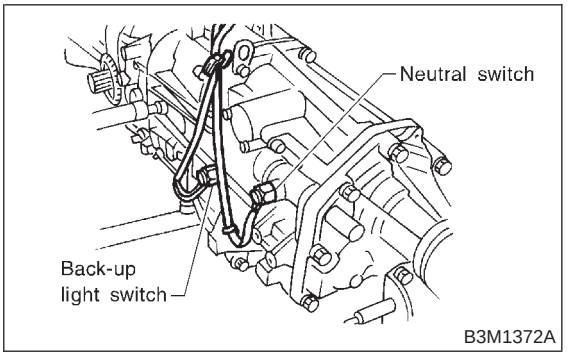
1) Shift shifter arm to “5th” and then to reverse to see if reverse check mechanism operates properly.
2) Also check to see if arm returns to neutral when released from the reverse position. If arm does not return properly, replace reverse check plate.

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



3) Install neutral position switch and back-up light switch to transfer case.

Tightening torque:
24.5±2.0 N·m (2.50±0.20 kg-m, 18.1±1.4 ft-lb)



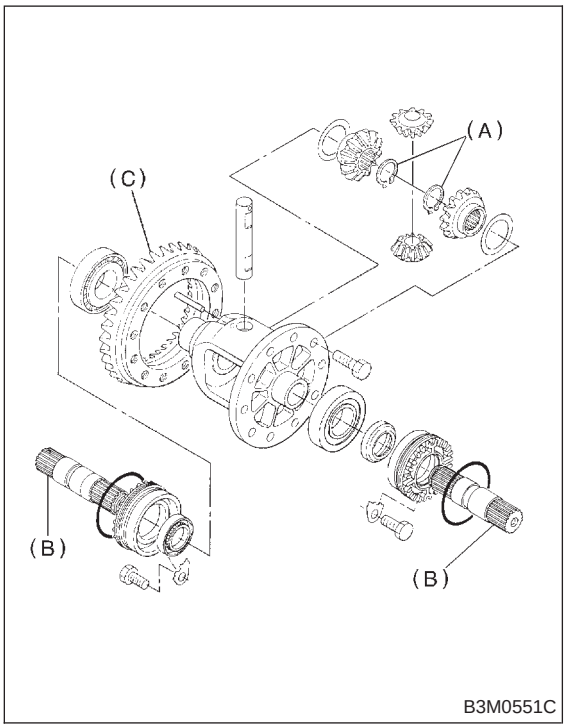
6. Front Differential

A: DISASSEMBLY

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

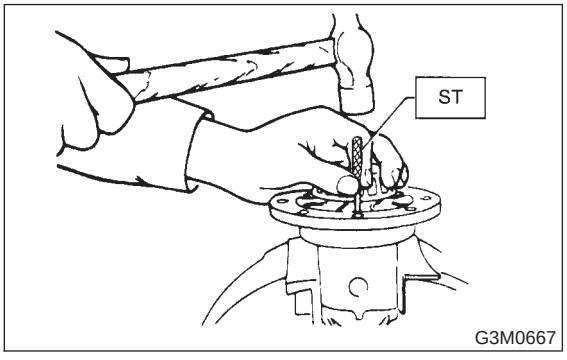
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts and remove hypoid driven gear.

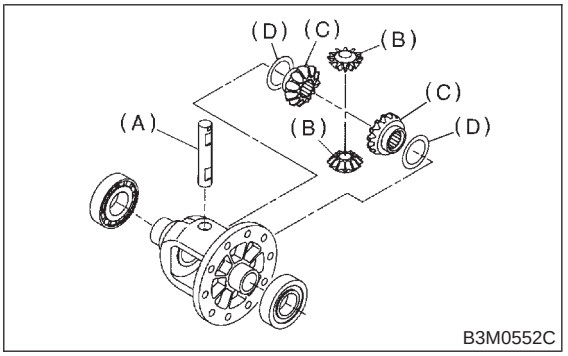


(A) Snap ring
(B) Axle drive shaft
(C) Hypoid driven gear

3) Drive out straight pin from differential assembly toward hypoid driven gear.
ST 899904100 REMOVER

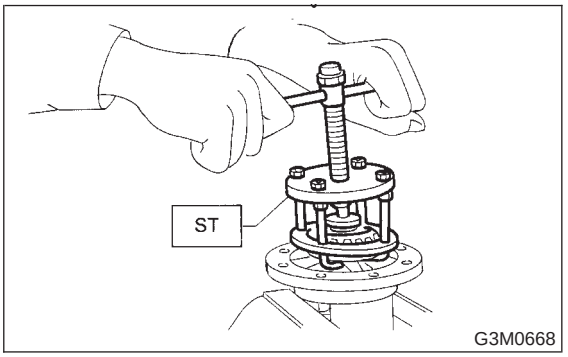


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



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

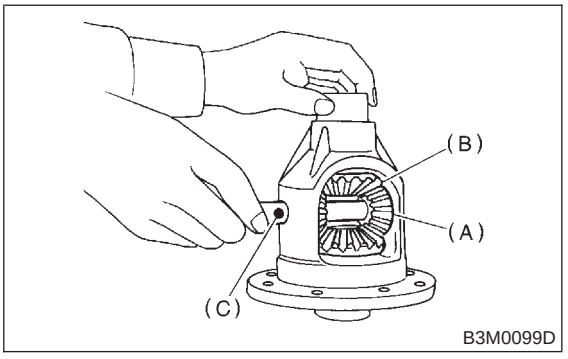
5) Remove roller bearing using ST.
ST 399527700 PULLER SET



B: ASSEMBLY

1) Install bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:
Face the chamfered side of washer toward gear.



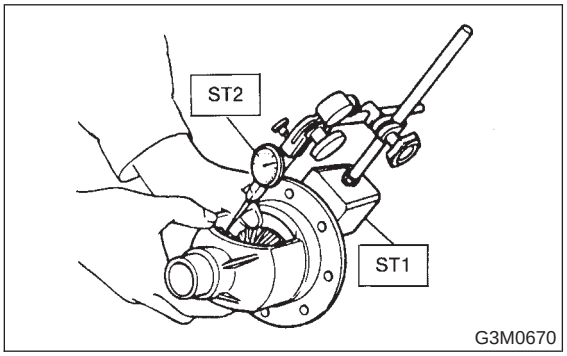
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

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

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

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

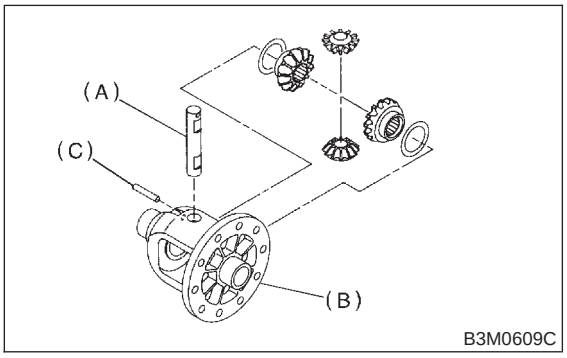


Washer (38.1 × 50 × t)	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

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



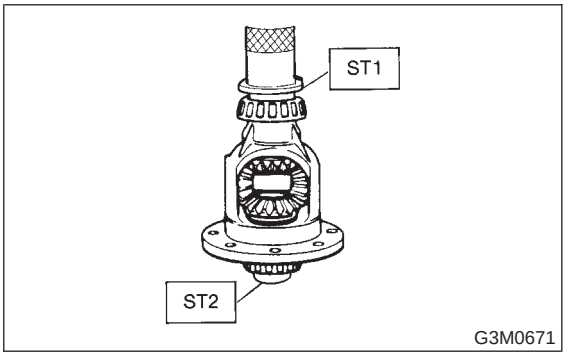
(A) Pinion shaft
(B) Differential case
(C) Straight pin

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).

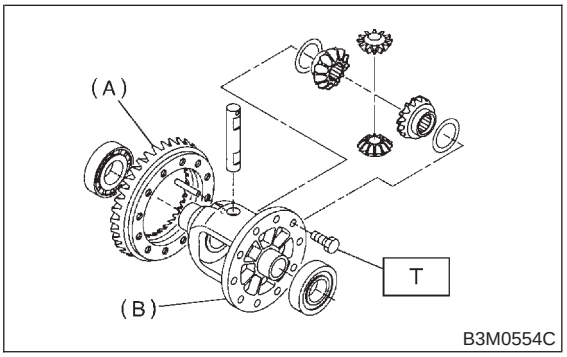
NOTE:
Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER
ST2 398497701 ADAPTER



5) Install hypoid driven gear to differential case using twelve bolts.

Tightening torque:
T: 62±5 N·m (6.3±0.5 kg-m, 45.6±3.6 ft-lb)

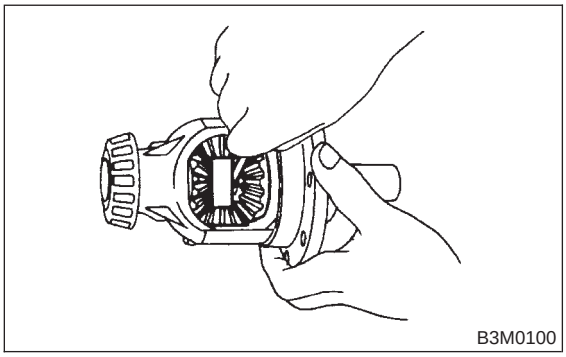


(A) Hypoid driven gear
(B) Differential case

6) Position drive axle shaft in differential case and hold it with outer snap ring (28). Using a thickness gauge, measure clearance between the shaft and case is within specifications.

NOTE:
If it is not within specifications, replace snap ring with a suitable one.

Clearance:
0 — 0.2 mm (0 — 0.008 in)



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

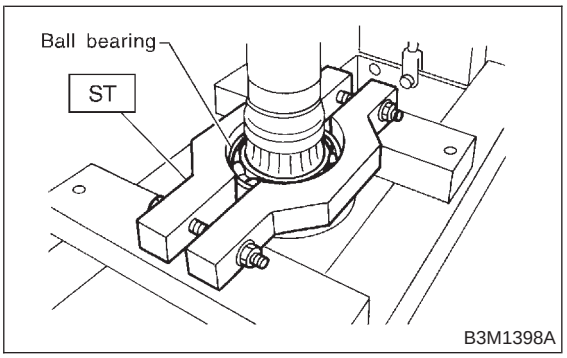
7. Center Differential

A: DISASSEMBLY AND ASSEMBLY

1) Remove ball bearing using ST.

CAUTION:
Do not reuse ball bearing.

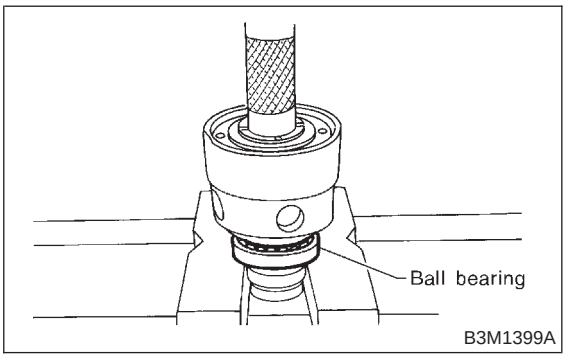
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



2) Install ball bearing to center differential assembly.

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

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



1. Manual Transmission

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

2. Differential

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

1. Torque Converter Clutch

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

2. Oil Pump

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

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2. Oil Pump

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

3. Transmission Control Element

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

4. Transmission Gear Ratio

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

3. Transmission Control Element

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

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

5. Planetary Gear and Plate

	EXCEPT OUTBACK	OUTBACK
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 & driven plate number of high clutch	4	
Drive & driven plate number of low clutch	6	
Drive & driven plate number of reverse clutch	2	
Drive & driven plate number of 2-4 brake	3	
Drive & driven plate number of low & reverse brake	6	

6. Selector Position

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

5. Planetary Gear and Plate

	EXCEPT OUTBACK	OUTBACK
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 & driven plate number of high clutch	4	
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Drive & driven plate number of 2-4 brake	3	
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1 (1st)	1st gear locked (Deceleration possible 1st ← 2nd ← 3rd ← 4th)
Control method	Hydraulic remote control

7. Hydraulic Control and Lubrication

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

8. Cooling and Harness

Cooling system	Liquid-cooled cooler incorporated in radiator
ATF cooling system (Radiation capacity)	4.630 kW (3,981 kcal/h, 15,797 BTU/h)
Inhibitor switch	12 poles
Transmission harness	17 poles

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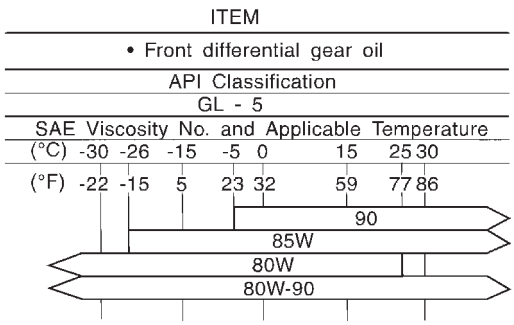
Inhibitor switch	12 poles
Transmission harness	17 poles

9. Transfer

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

10. Final Reduction

Model	BRIGHTON, L	GT, OUTBACK
Front final gear ratio	4.111 (37/9)	4.444 (40/9)
Lubrication oil		
Front differential oil capacity	1.2 ℓ (1.3 US qt, 1.1 Imp qt)	

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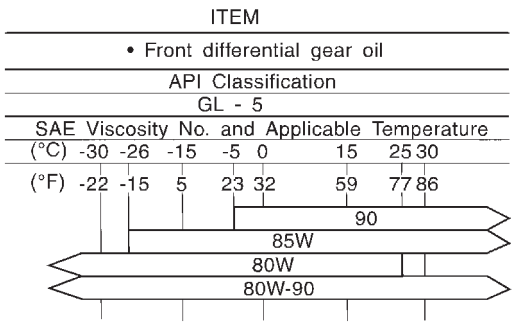
9. Transfer

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

10. Final Reduction

Model	BRIGHTON, L	GT, OUTBACK
Front final gear ratio	4.111 (37/9)	4.444 (40/9)
Lubrication oil		
Front differential oil capacity	1.2 ℓ (1.3 US qt, 1.1 Imp qt)	

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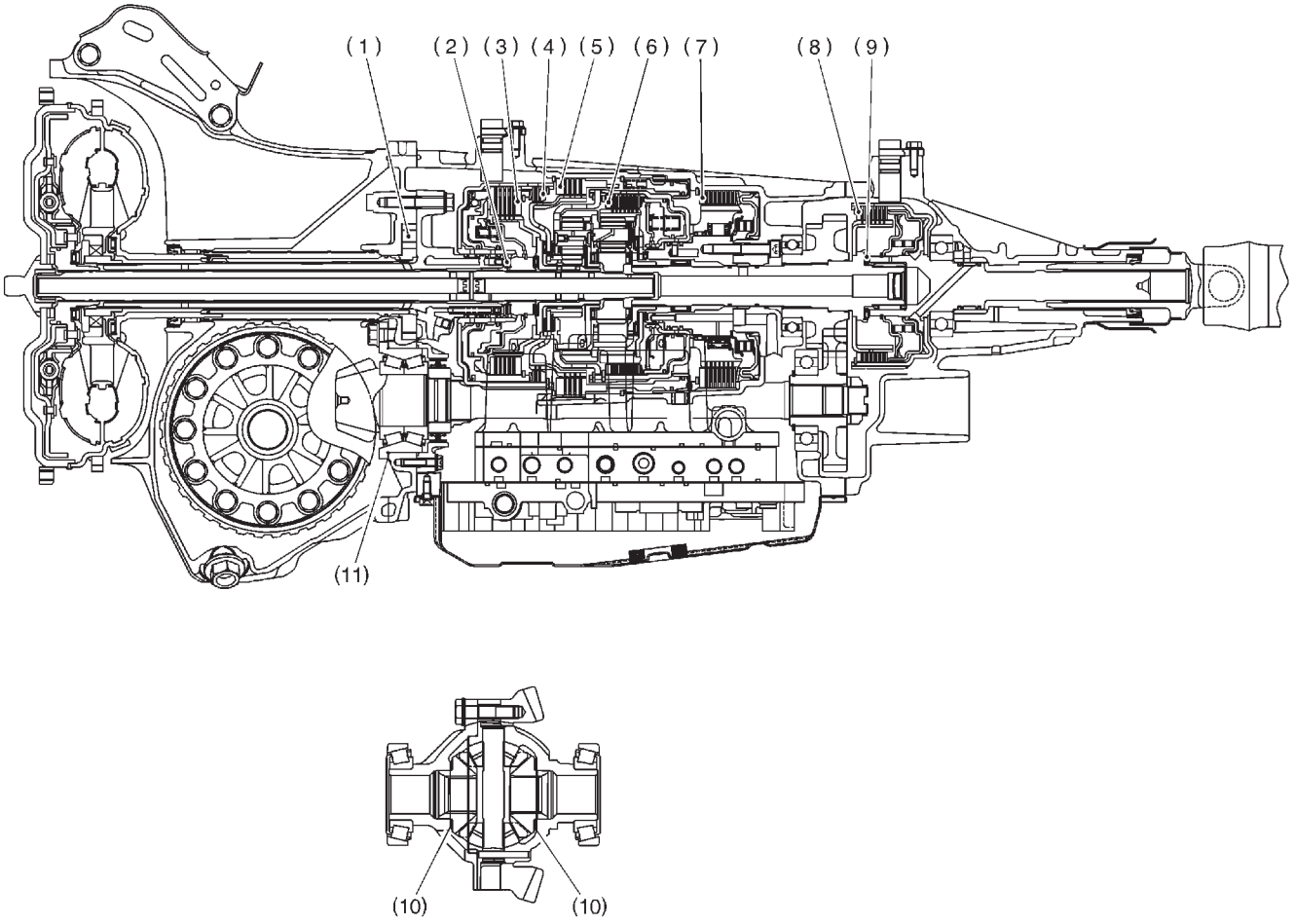
MEMO:

11. Adjusting Parts



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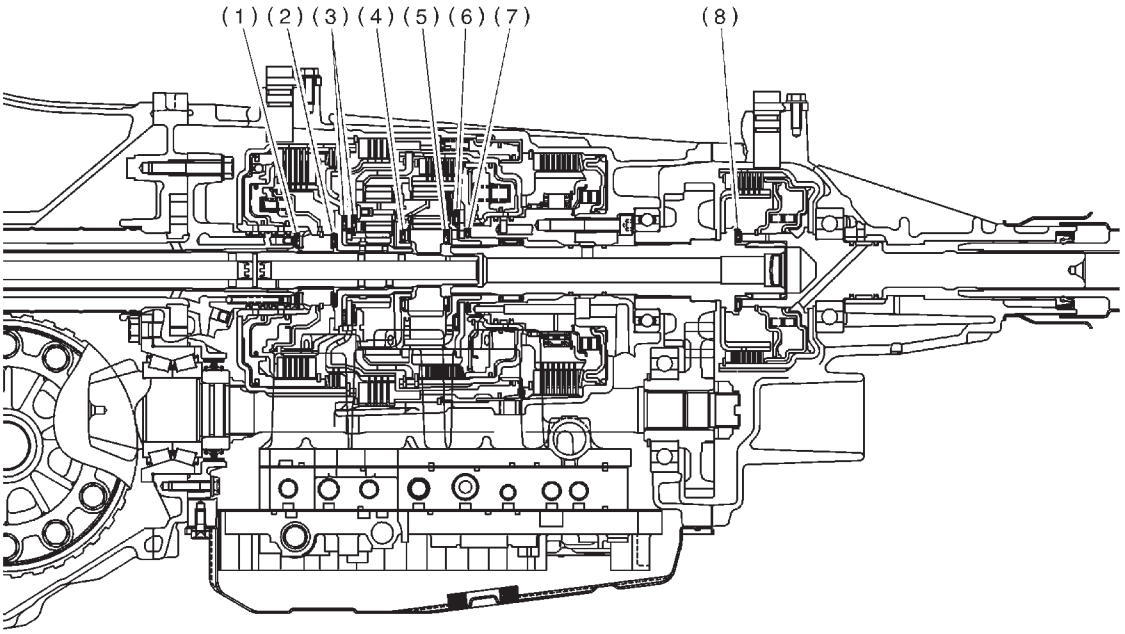
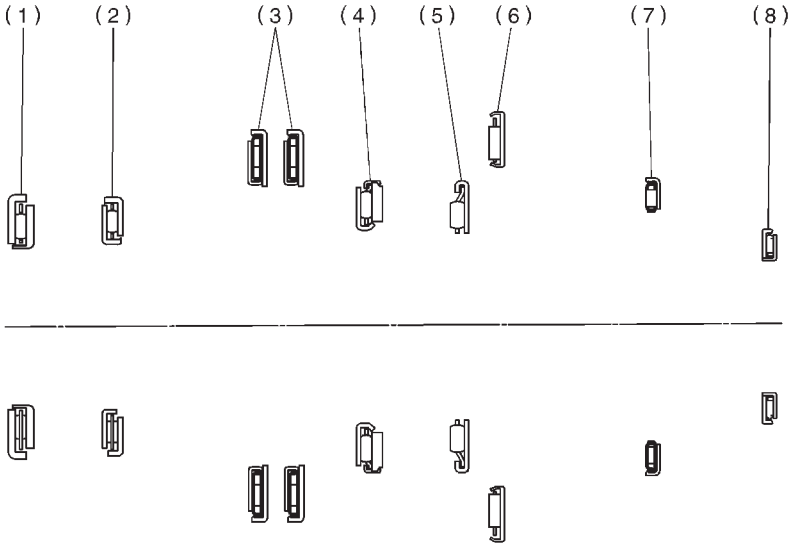
No.	Part Name	Part Number	Dimension mm (in)	Application
1	Rotor (Oil pump)	15008AA060 15008AA070 15008AA080	11.37 — 11.38 (0.4476 — 0.4480) 11.38 — 11.39 (0.4480 — 0.4484) 11.39 — 11.40 (0.4484 — 0.4488)	Adjusting side clearance of oil pump
2	Thrust bearing	806528050 806528060 806528070 806528080 806528090 806528100	4.11 (0.1618) 4.3 (0.169) 4.5 (0.177) 4.7 (0.185) 4.9 (0.193) 5.1 (0.201)	Adjusting total end play
3	Retaining plate (High clutch)	31567AA710 31567AA720 31567AA730 31567AA740 31567AA670 31567AA680 31567AA690 31567AA700	4.7 (0.185) 4.8 (0.189) 4.9 (0.193) 5.0 (0.197) 5.1 (0.201) 5.2 (0.205) 5.3 (0.209) 5.4 (0.213)	Adjusting clearance of high clutch
4	Retaining plate (Reverse clutch)	31567AA760 31567AA770 31567AA780 31567AA790 31567AA800	4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189)	Adjusting clearance of reverse clutch
5	Retaining plate (2-4 brake)	31567AA612 31567AA622 31567AA632 31567AA642 31567AA652 31567AA662	5.6 (0.220) 5.8 (0.228) 6.0 (0.236) 6.2 (0.244) 6.4 (0.252) 6.6 (0.260)	Adjusting clearance of 2-4 brake
6	Retaining plate (Low clutch)	31567AA830 31567AA840 31567AA850 31567AA860 31567AA870	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181)	Adjusting clearance of low clutch
7	Retaining plate (Low and reverse brake)	31667AA320 31667AA330 31667AA340 31667AA350 31667AA360 31667AA370 31667AA380	4.2 (0.165) 4.5 (0.177) 4.8 (0.189) 5.1 (0.201) 5.4 (0.213) 5.7 (0.224) 6.0 (0.236)	Adjusting clearance of low and reverse brake
8	Pressure plate (Transfer clutch)	31593AA151 31593AA161 31593AA171 31593AA181	3.3 (0.130) 3.7 (0.146) 4.1 (0.161) 4.5 (0.177)	Adjusting clearance of transfer clutch
9	Thrust bearing (Transfer clutch)	806536020 806535030 806535040 806535050 806535060 806535070 806535090	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	Adjusting end play of transfer clutch
10	Washer (Front differential)	803038021 803038022 803038023	0.95 (0.0374) 1.00 (0.0394) 1.05 (0.0413)	Adjusting backlash of differential bevel gear

No.	Part Name	Part Number	Dimension mm (in)	Application
11	Drive pinion shim	31451AA050 31451AA060 31451AA070 31451AA080 31451AA090 31451AA100	0.150 (0.0059) 0.175 (0.0069) 0.200 (0.0079) 0.225 (0.0089) 0.250 (0.0098) 0.275 (0.0108)	Adjusting drive pinion shim

MEMO:

12. Location and Installing Direction of Thrust Needle Bearing





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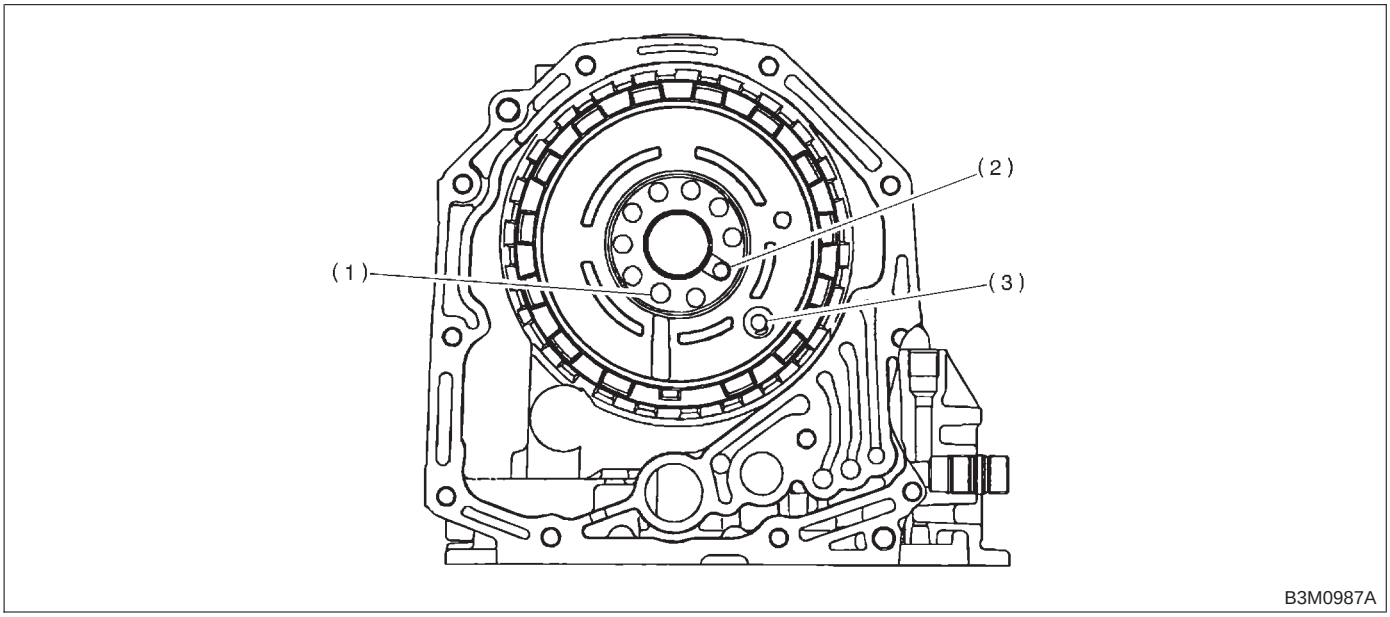
No.	Part Name	Part Number	Inside diameter mm (in)	Outside diameter mm (in)	Dimension mm (in)	Application
(1)	Thrust needle bearing	806528050 806528060 806528070 806528080 806528090 806528100	28.5 (1.122)	48 (1.89)	4.11 (0.1618) 4.3 (0.169) 4.5 (0.177) 4.7 (0.185) 4.9 (0.193) 5.1 (0.201)	Adjusting total end play
(2)	Thrust needle bearing	806530040	30 (1.18)	47 (1.85)	3.8 (0.150)	Place of high clutch
(3)	Thrust needle bearing	806551020	51 (2.01)	71 (2.80)	3.3 (0.130)	Place of front sun gear
(4)	Thrust needle bearing	806535120	35 (1.38)	53 (2.09)	4.8 (0.189)	Place of rear sun gear
(5)	Thrust needle bearing	806534060	35 (1.38)	53 (2.09)	3.3 (0.130)	Place of rear sun gear
(6)	Thrust needle bearing	806558030	58 (2.28)	78 (3.07)	2.8 (0.110)	Place of rear internal gear
(7)	Thrust needle bearing	806541020	39.7 (1.563)	54 (2.13)	3.6 (0.142)	Place of one-way clutch
(8)	Thrust needle bearing	806536020 806535030 806535040 806535050 806535060 806535070 806535090	36 (1.42)	53 (2.09)	3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181) 4.8 (0.189) 5.0 (0.197)	Adjusting end play of transfer clutch

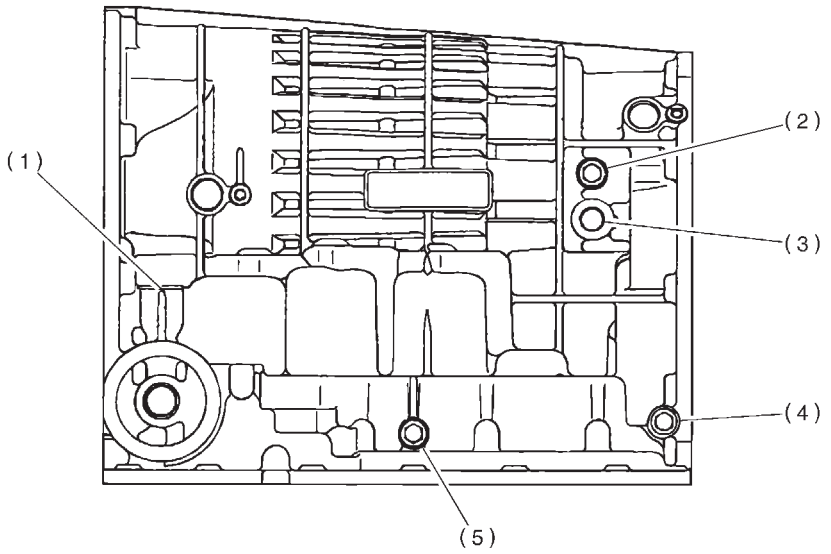
13. Fluid Passages

A: TRANSMISSION CASE (FRONT SIDE)



(1) Low clutch pressure
(2) Oil cooler inlet pressure
(3) Low & reverse brake pressure

B: TRANSMISSION CASE (LH SIDE)



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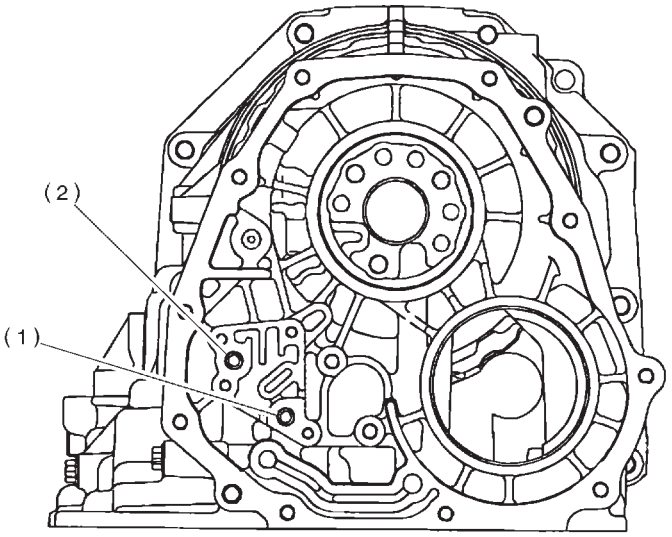
(1) Oil cooler outlet pressure
(2) Low & reverse brake pressure
(3) Oil cooler inlet pressure
(4) Low clutch pressure
(5) 2-4 brake pressure

C: TRANSMISSION CASE (REAR SIDE)



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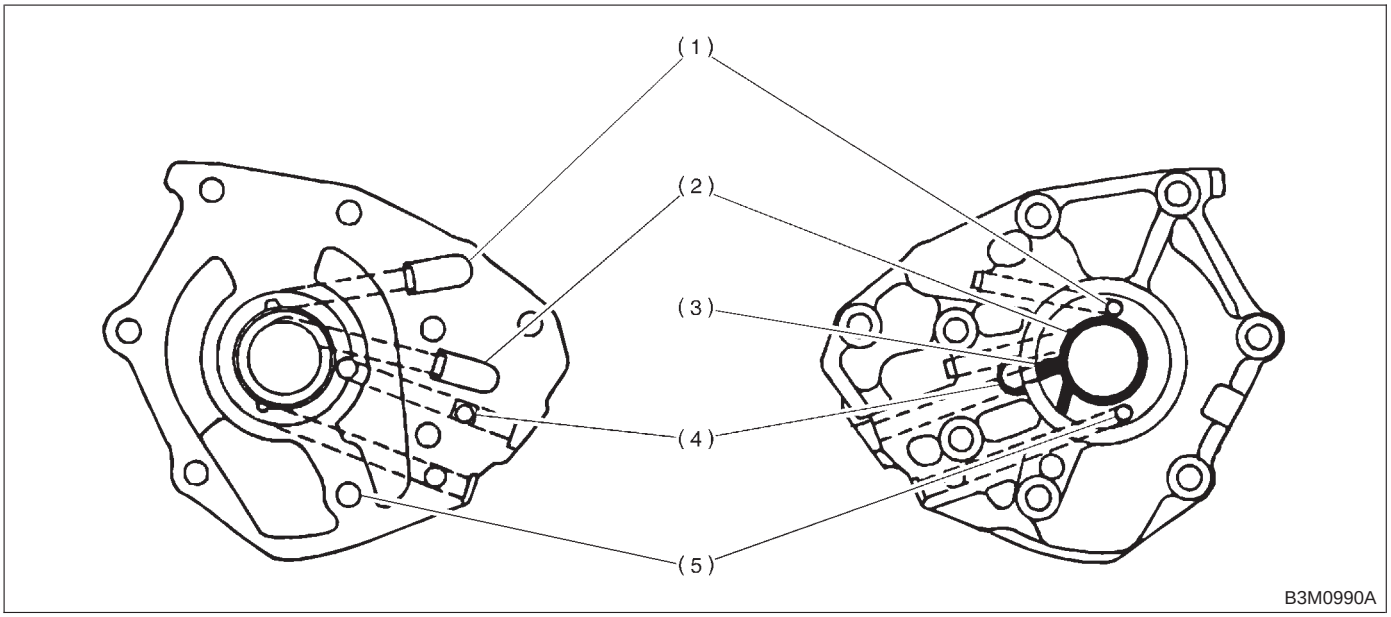
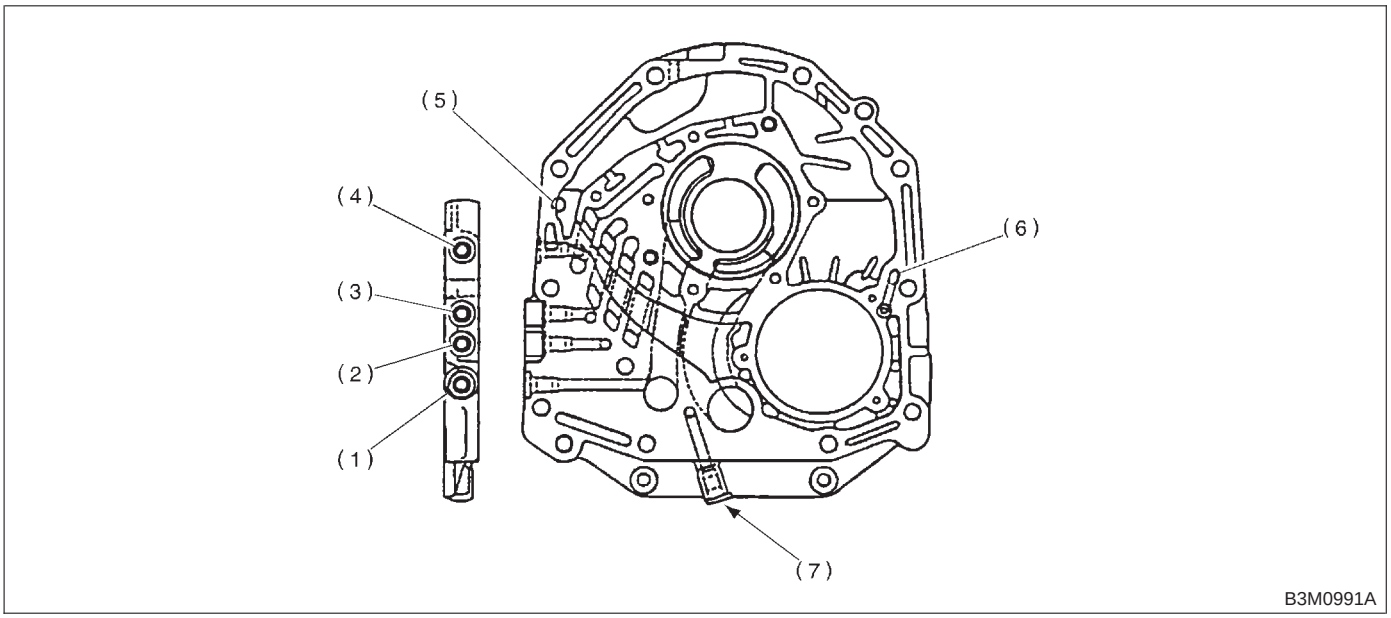
(1) Pilot pressure
(2) Line pressure

D: OIL PUMP COVER



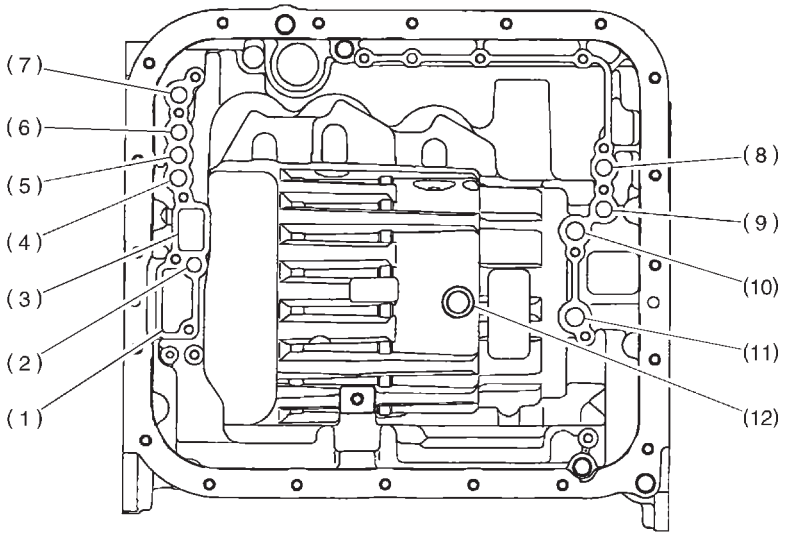
(1) High clutch pressure
(2) Lock-up release pressure
(3) Front lubricating hole
(4) Lock-up apply pressure
(5) Reverse clutch pressure

E: OIL PUMP HOUSING



(1) Oil pump outlet pressure
(2) Lock-up apply pressure
(3) Lock-up release pressure
(4) High clutch pressure
(5) Drain
(6) Air breather
(7) Reverse clutch pressure

F: TRANSMISSION CASE



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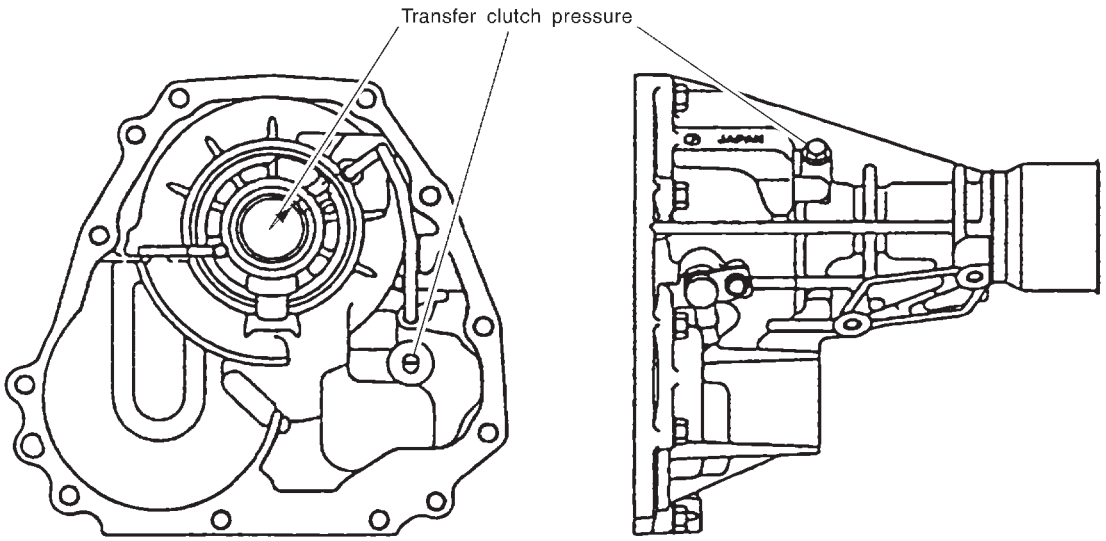
(1) Oil pump inlet port
(2) Reverse clutch pressure
(3) Oil pump outlet port
(4) Lock-up apply pressure
(5) Lock-up release pressure
(6) High clutch pressure
(7) Oil cooler outlet pressure
(8) Line pressure
(9) Pilot pressure
(10) Low & reverse brake pressure
(11) Low clutch pressure
(12) 2-4 brake pressure

G: EXTENSION CASE



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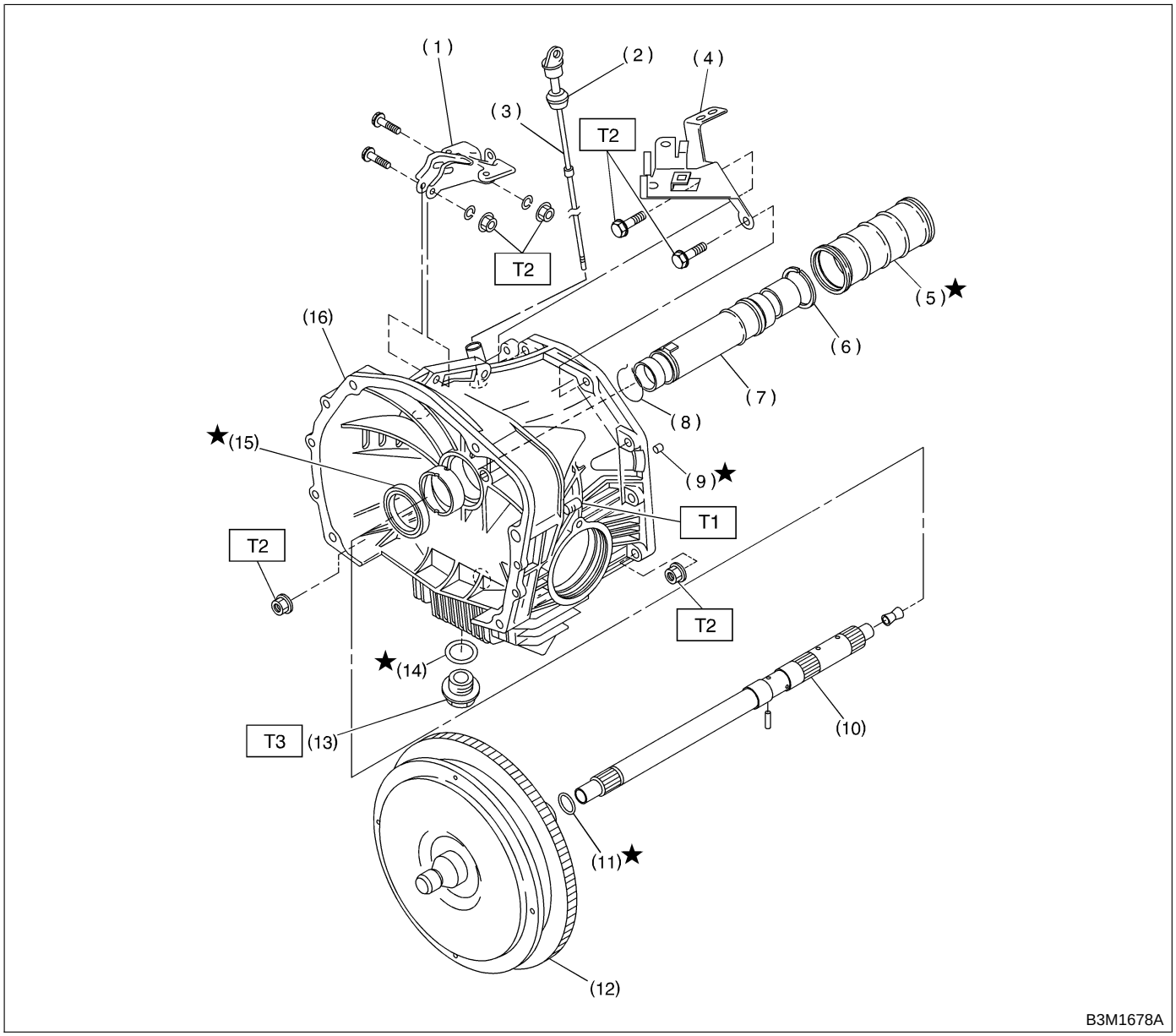
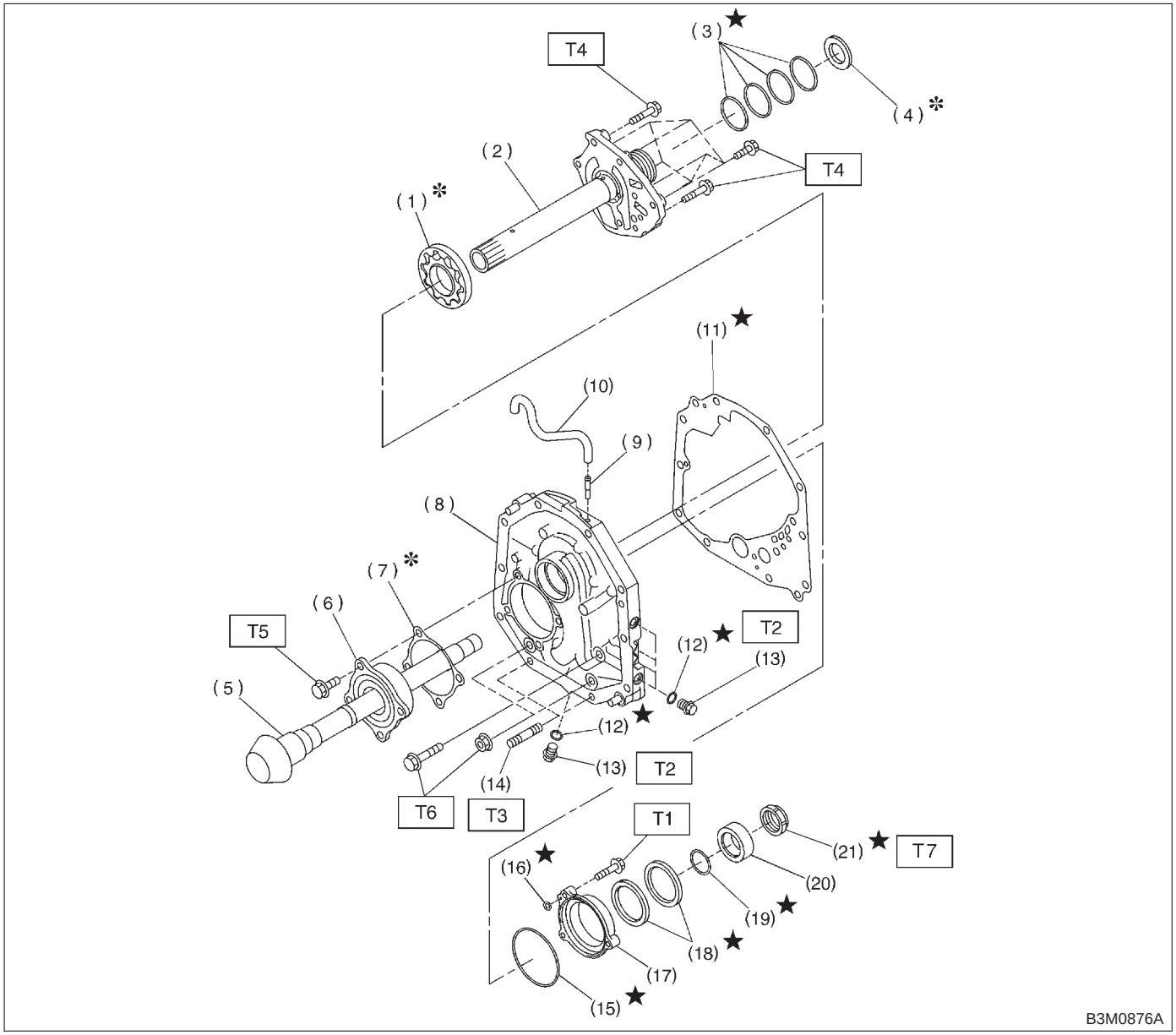
1. Torque Converter Clutch and Case



(1) Pitching stopper bracket
(2) O-ring
(3) Differential oil level gauge
(4) Stay
(5) Seal pipe
(6) Seal ring
(7) Oil pump shaft
(8) Clip
(9) Oil drain pipe
(10) Input shaft
(11) O-ring
(12) Torque converter clutch ASSY
(13) Drain plug
(14) Gasket
(15) Oil seal
(16) Torque converter clutch case

Tightening torque: N·m (kg-m, ft-lb)
T1: 18±5 (1.8±0.5, 13.0±3.6)
T2: 41±3 (4.2±0.3, 30.4±2.2)
T3: 44±3 (4.5±0.3, 32.5±2.2)

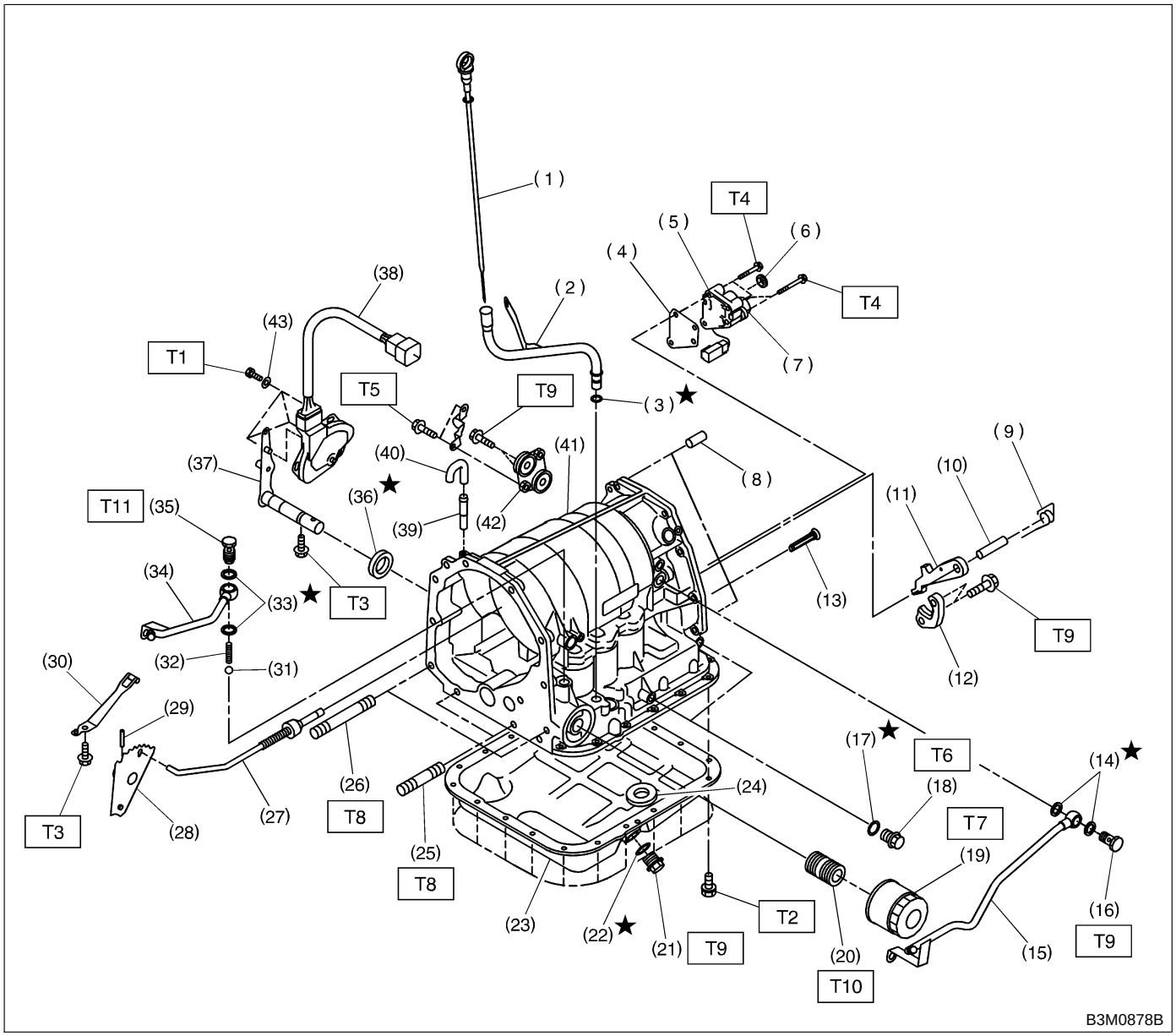
2. Oil Pump



(1) Oil pump rotor
(2) Oil pump cover
(3) Seal ring
(4) Thrust needle bearing
(5) Drive pinion shaft
(6) Roller bearing
(7) Shim
(8) Oil pump housing
(9) Nipple
(10) Air breather hose
(11) Gasket
(12) O-ring
(13) Test plug
(14) Stud bolt
(15) O-ring
(16) O-ring
(17) Oil seal retainer
(18) Oil seal
(19) O-ring
(20) Drive pinion collar
(21) Lock nut

Tightening torque: N·m (kg-m, ft-lb)
T1: 7±1 (0.7±0.1, 5.1±0.7)
T2: 13±1 (1.3±0.1, 9.4±0.7)
T3: 18±5 (1.8±0.5, 13.0±3.6)
T4: 25±2 (2.5±0.2, 18.1±1.4)
T5: 39±3 (4.0±0.3, 28.9±2.2)
T6: 41±3 (4.2±0.3, 30.4±2.2)
T7: 121±5 (12.3±0.5, 89.0±3.6)

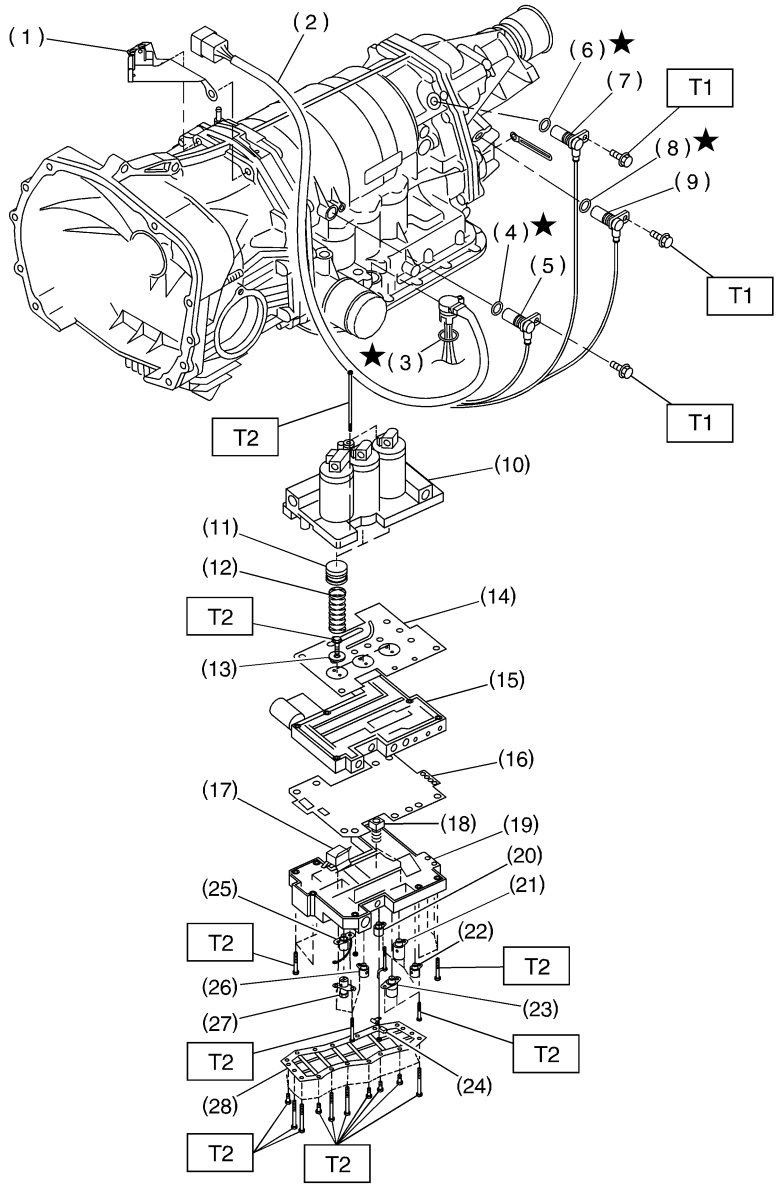
3. Transmission Case and Control Device



(1) Oil level gauge
(2) Oil charger pipe
(3) O-ring
(4) Transfer valve plate
(5) Transfer valve ASSY
(6) Transfer clutch seal
(7) Duty solenoid C (Transfer)
(8) Straight pin
(9) Return spring
(10) Shaft
(11) Parking pawl
(12) Parking support
(13) Inlet filter
(14) Gasket
(15) Inlet pipe
(16) Union screw
(17) O-ring
(18) Test plug
(19) Oil filter
(20) Oil filter stud bolt
(21) Drain plug
(22) Gasket
(23) Oil pan
(24) Magnet
(25) Stud bolt (Short)
(26) Stud bolt (Long)
(27) Parking rod
(28) Manual plate
(29) Spring pin
(30) Detention spring
(31) Ball
(32) Spring
(33) Gasket
(34) Outlet pipe
(35) Union screw
(36) Oil seal
(37) Select lever
(38) Inhibitor switch ASSY
(39) Nipple
(40) Air breather hose
(41) Transmission case
(42) Plate ASSY
(43) Washer

Tightening torque: N·m (kg-m, ft-lb)
T1: 3.4±0.5 (0.35±0.05, 2.5±0.4)
T2: 4.9±0.5 (0.50±0.05, 3.6±0.4)
T3: 5.9±1.0 (0.60±0.10, 4.3±0.7)
T4: 7.8±1.0 (0.80±0.10, 5.8±0.7)
T5: 12±3 (1.2±0.3, 8.7±2.2)
T6: 12.7±1.0 (1.30±0.10, 9.4±0.7)
T7: 13.7±2.0 (1.4±0.2, 10.1±1.4)
T8: 17.7±2.9 (1.80±0.30, 13.0±2.2)
T9: 24.5±2.0 (2.50±0.20, 18.1±1.4)
T10: 24.5±2.9 (2.5±0.3, 18.1±2.2)
T11: 44±4 (4.5±0.4, 32.5±2.9)

4. Control Valve and Harness Routing

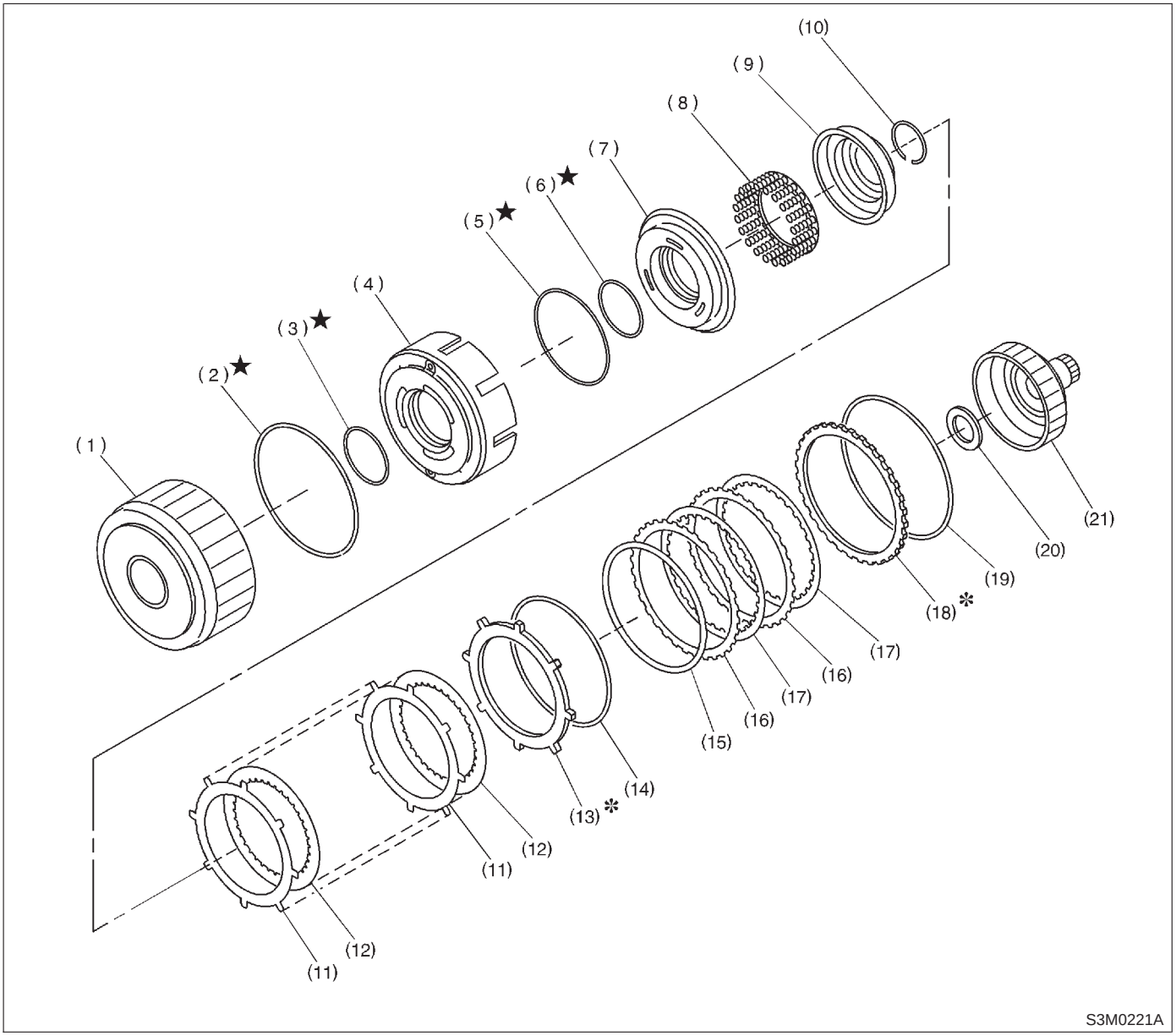


B3M1663A

(1) Stay
(2) Transmission harness
(3) O-ring
(4) O-ring
(5) Torque converter turbine speed sensor
(6) O-ring
(7) Vehicle speed sensor 2 (Front)
(8) O-ring
(9) Vehicle speed sensor 1 (Rear)
(10) Upper valve body
(11) Accumulator piston
(12) Accumulator spring
(13) Side plate
(14) Separate plate
(15) Middle valve body
(16) Separate plate
(17) Fluid filter
(18) Fluid filter
(19) Lower valve body
(20) Shift solenoid 2
(21) Shift solenoid 1
(22) 2-4 brake timing solenoid
(23) Duty solenoid D (2-4 brake)
(24) ATF temperature sensor
(25) Duty solenoid A (Line pressure)
(26) Low clutch timing solenoid
(27) Duty solenoid B (Lock-up)
(28) Oil strainer

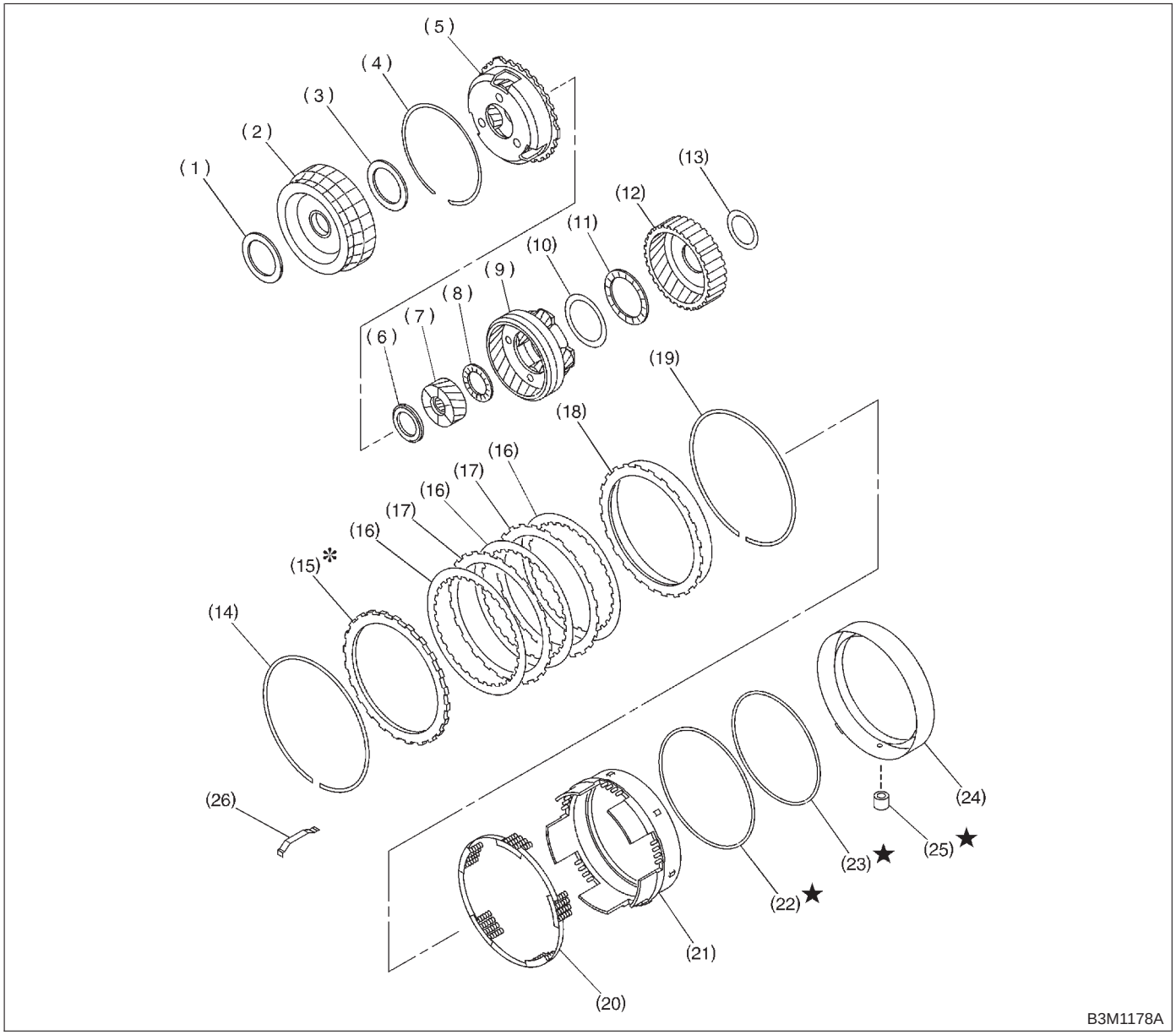
Tightening torque: N·m (kg-m, ft-lb)
T1: 7±1 (0.7±0.1, 5.1±0.7)
T2: 8±1 (0.8±0.1, 5.8±0.7)

5. High Clutch and Reverse Clutch



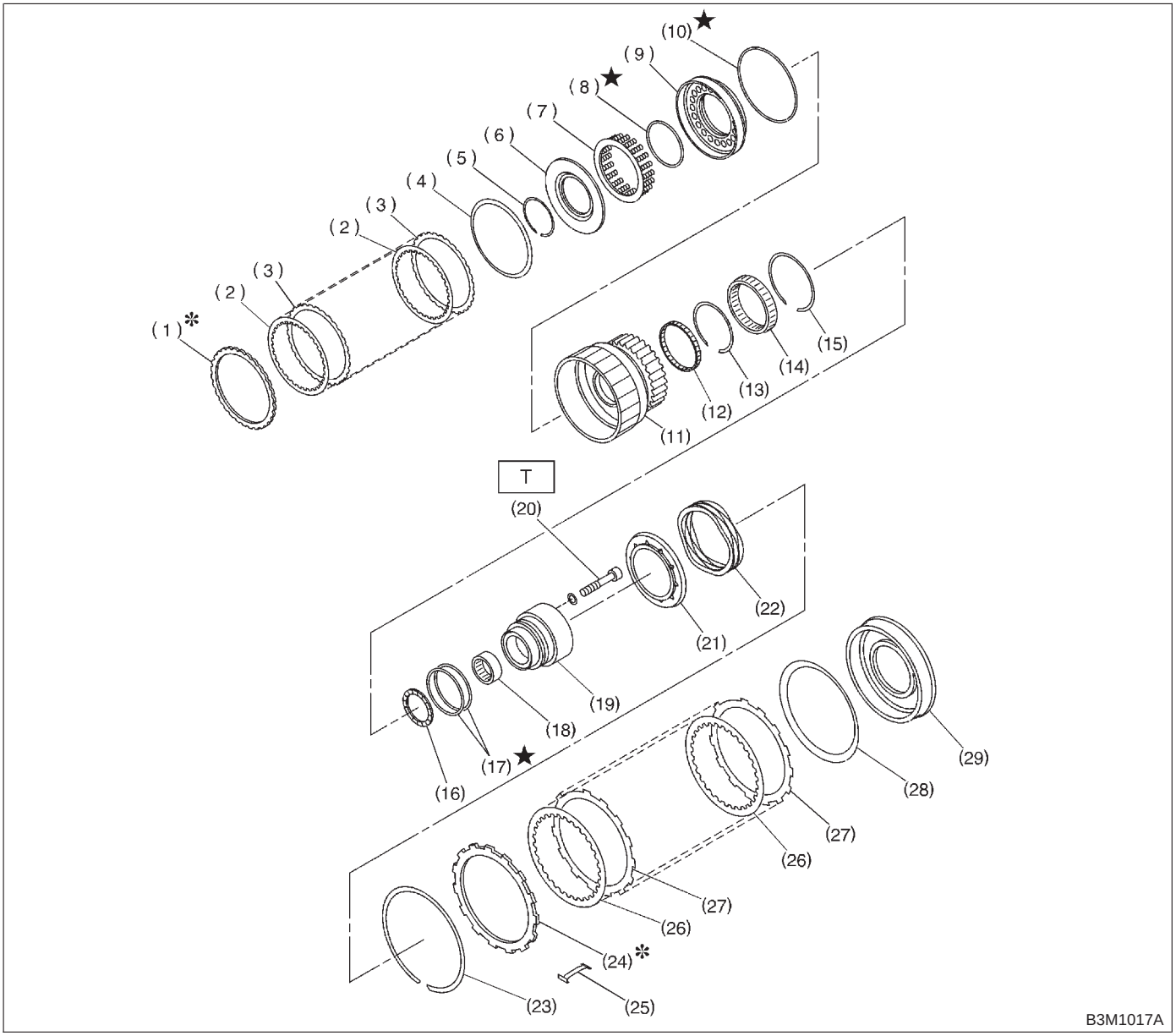
(1) High clutch drum
(2) Lip seal
(3) Lathe cut seal ring
(4) Reverse clutch piston
(5) Lathe cut seal ring
(6) Lathe cut seal ring
(7) High clutch piston
(8) Spring retainer
(9) Cover
(10) Snap ring
(11) Driven plate
(12) Drive plate
(13) Retaining plate
(14) Snap ring
(15) Dish plate
(16) Driven plate
(17) Drive plate
(18) Retaining plate
(19) Snap ring
(20) Thrust needle bearing
(21) High clutch hub

6. Planetary Gear and 2-4 Brake



(1) Thrust needle bearing
(2) Front sun gear
(3) Thrust needle bearing
(4) Snap ring
(5) Front planetary carrier
(6) Thrust needle bearing
(7) Rear sun gear
(8) Thrust needle bearing
(9) Rear planetary carrier
(10) Washer
(11) Thrust needle bearing
(12) Rear internal gear
(13) Washer
(14) Snap ring
(15) Retaining plate
(16) Drive plate
(17) Driven plate
(18) Pressure rear plate
(19) Snap ring
(20) Spring retainer
(21) 2-4 brake piston
(22) Lathe cut seal ring
(23) Lathe cut seal ring
(24) 2-4 brake piston retainer
(25) 2-4 brake seal
(26) Leaf spring

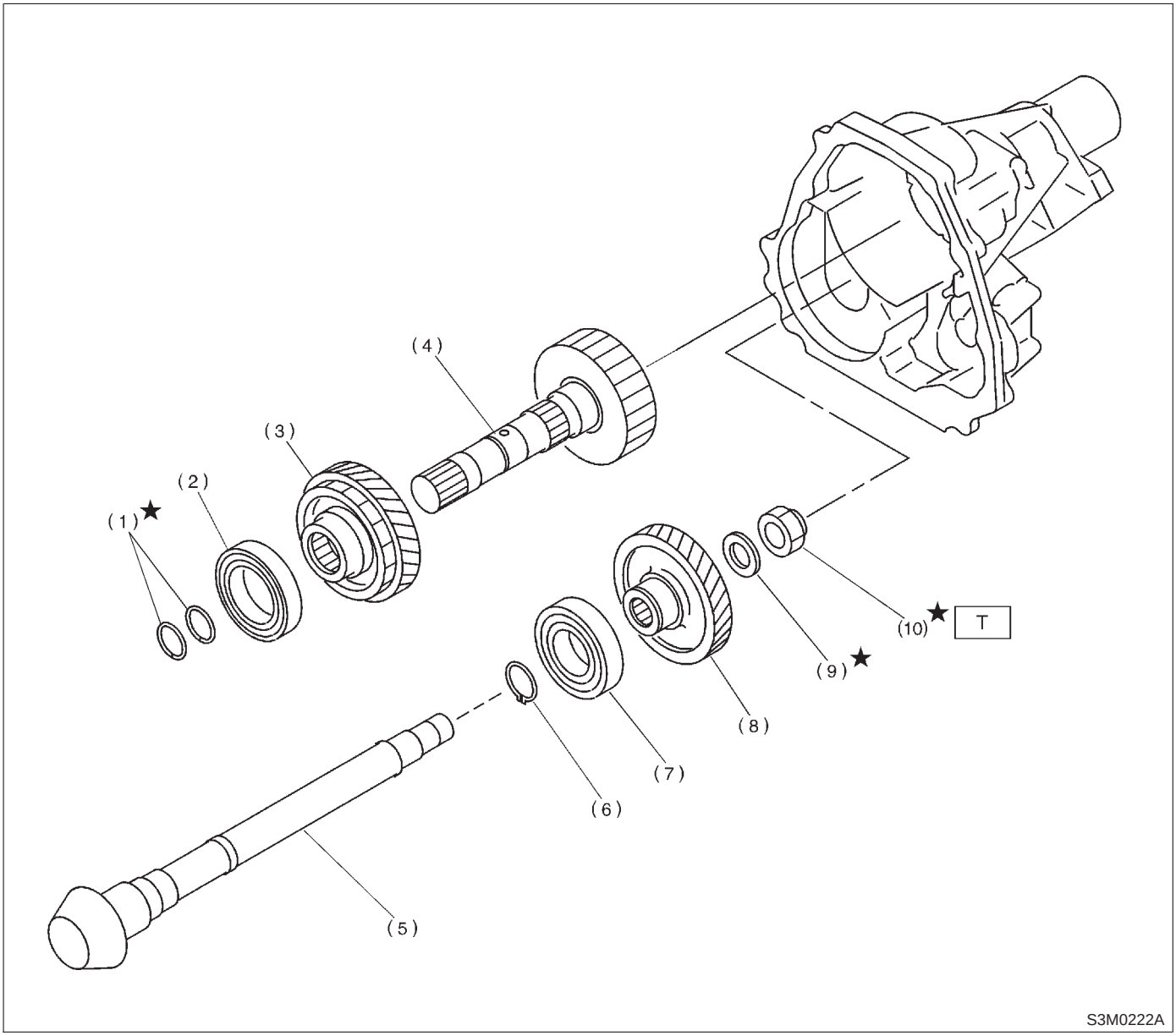
7. Low Clutch and Low & Reverse Brake



(1) Retaining plate
(2) Drive plate
(3) Driven plate
(4) Dish plate
(5) Snap ring
(6) Cover
(7) Spring retainer
(8) Lathe cut seal ring
(9) Low clutch piston
(10) Lathe cut seal ring
(11) Low clutch drum
(12) Needle bearing
(13) Snap ring (Inner)
(14) One-way clutch
(15) Snap ring (Outer)
(16) Thrust needle bearing
(17) Seal ring
(18) Needle bearing
(19) One-way clutch inner race
(20) Socket bolt
(21) Retainer
(22) Return spring
(23) Snap ring
(24) Retaining plate
(25) Leaf spring
(26) Drive plate
(27) Driven plate
(28) Dish plate
(29) Low and reverse brake piston

Tightening torque: N·m (kg-m, ft-lb)
T: 25±2 (2.5±0.2, 18.1±1.4)

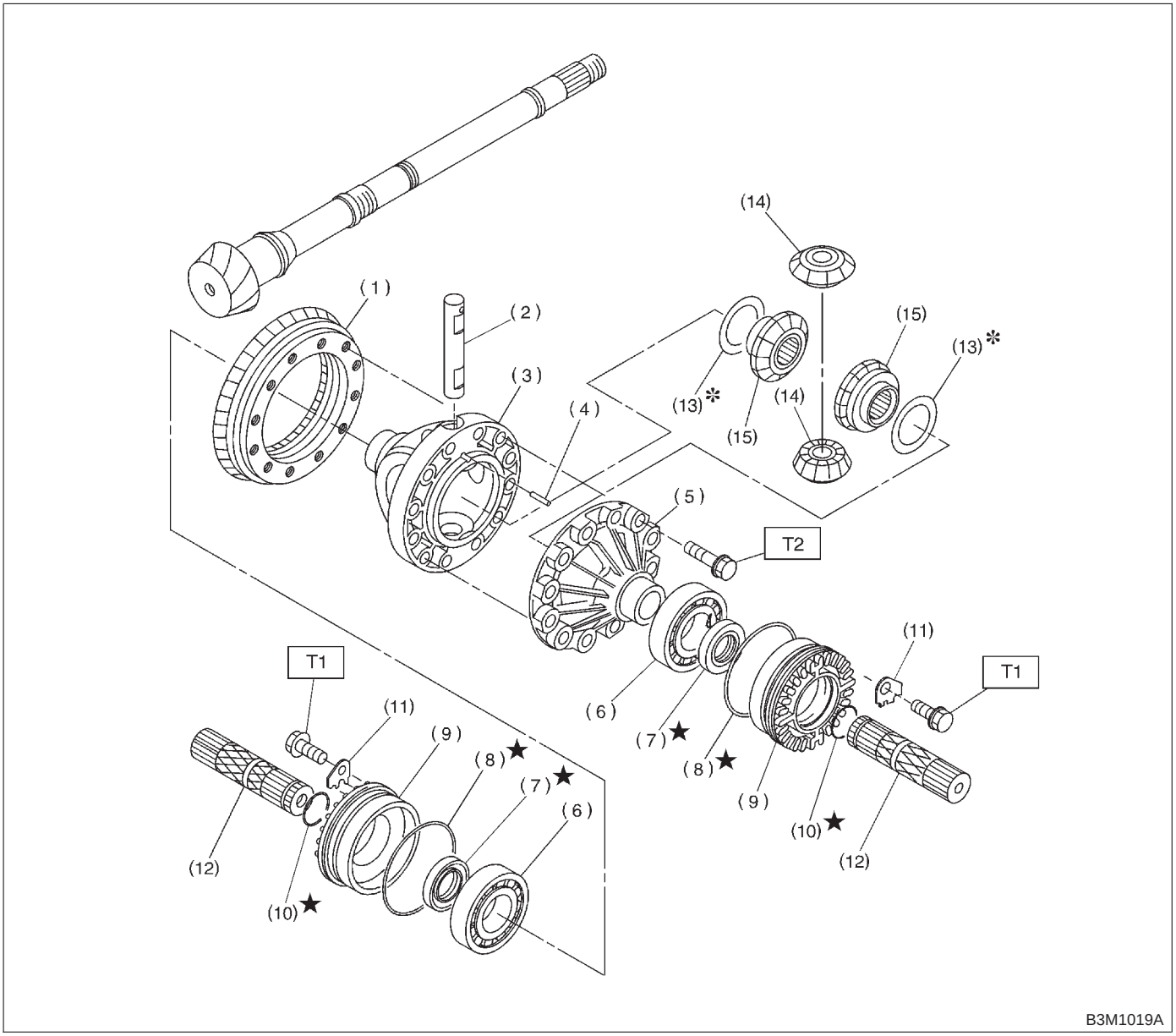
8. Reduction Gear



(1) Seal ring
(2) Ball bearing
(3) Reduction drive gear
(4) Reduction drive shaft
(5) Drive pinion shaft
(6) Snap ring
(7) Ball bearing
(8) Reduction driven gear
(9) Washer
(10) Lock nut

Tightening torque: N·m (kg-m, ft-lb)
T: 100±5 (10.2±0.5, 73.8±3.6)

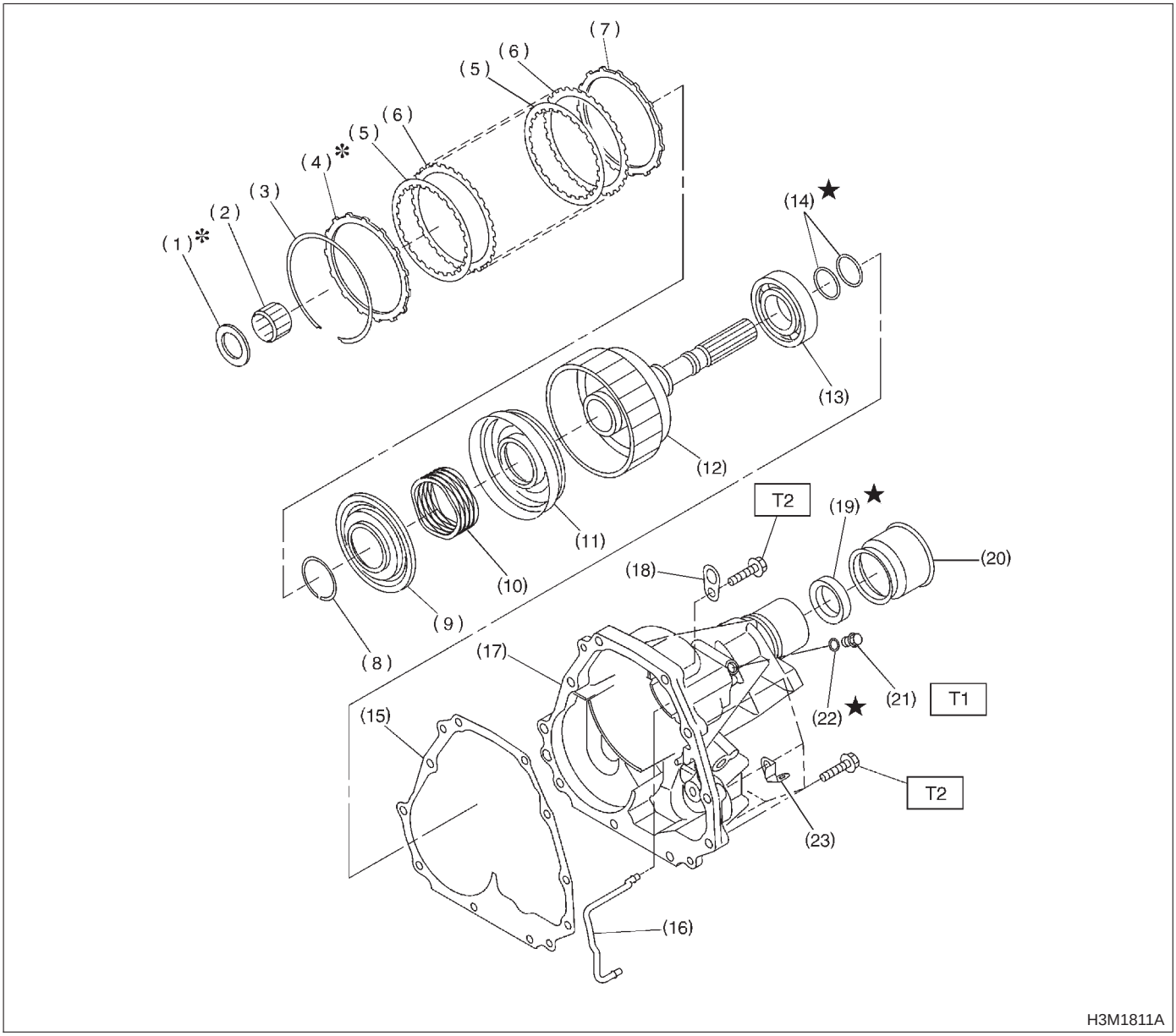
9. Differential Case



(1) Crown gear
(2) Pinion shaft
(3) Differential case (RH)
(4) Straight pin
(5) Differential case (LH)
(6) Taper roller bearing
(7) Oil seal
(8) O-ring
(9) Differential side retainer
(10) Circlip
(11) Lock plate
(12) Axle shaft
(13) Washer
(14) Differential bevel pinion
(15) Differential bevel gear

Tightening torque: N·m (kg-m, ft-lb)
T1: 25±2 (2.5±0.2, 18.1±1.4)
T2: 62±5 (6.3±0.5, 45.6±3.6)

10. Transfer and Extension



(1) Thrust needle bearing
(2) Needle bearing
(3) Snap ring
(4) Pressure plate
(5) Drive plate
(6) Driven plate
(7) Pressure plate
(8) Snap ring
(9) Transfer piston seal
(10) Return spring
(11) Transfer clutch piston
(12) Rear drive shaft
(13) Ball bearing
(14) Seal ring
(15) Gasket
(16) Transfer clutch pipe
(17) Extension case
(18) Transmission hanger
(19) Oil seal
(20) Dust cover
(21) Test plug
(22) O-ring
(23) Clip

Tightening torque: N·m (kg-m, ft-lb)
T1: 13±1 (1.3±0.1, 9.4±0.7)
T2: 25±2 (2.5±0.2, 18.1±1.4)

1. General

A: PRECAUTION

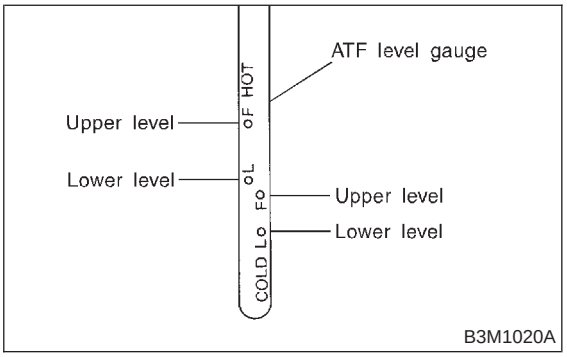
When disassembling or assembling the automatic transmission, observe the following instructions.
1) Workshop
Provide a place that is clean and free from dust. Principally the conventional workshop is suitable except for a dusty place. In a workshop where grinding work, etc. which produces fine particles is done, make independent place divided by the vinyl curtain or the equivalent.
2) Work table
The size of 1 x 1.5 m (40 x 60 in) is large enough to work, and it is more desirable that its surface be covered with flat plate like iron plate which is not rusted too much.
3) Cleaning of exterior
(1) Clean the exterior surface of transmission with steam and/or kerosene prior to disassembly, however it should be noted that vinyl tape be placed on the air breather or oil level gauge to prevent infiltration of the steam into the transmission and also the cleaning job be done away from the place of disassembly and assembly.
(2) Partial cleaning will do, depending on the extent of disassembly (such as when disassembly is limited to some certain parts).
4) Disassembly, assembly and cleaning
(1) Disassemble and assemble the transmission while inspecting the parts in accordance with the Diagnostics.
(2) During job, do not use gloves. Do not clean the parts with rags: Use chamois or nylon cloth.
(3) Pay special attention to the air to be used for cleaning. Get the moisture and the dust rid of the air as much as possible. Be careful not to scratch or dent any part while checking for proper operation with an air gun.
(4) Complete the job from cleaning to completion of assembly as continuously and speedily as possible in order to avoid occurrence of secondary troubles caused by dust. When stopping the job unavoidably cover the parts with clean chamois or nylon cloth to keep them away from any dust.
(5) Use kerosene, white gasoline or the equivalent as washing fluid. Use always new fluid for cleaning the automatic transmission parts and never reuse. The used fluid is usable in disassemble and assemble work of engine and manual transmission.
(6) Although the cleaning should be done by dipping into the washing fluid or blowing of the pressurized washing fluid, the dipping is more desirable. (Do not rub with a brush.) Assemble the parts immediately after the cleaning without exposure to the air for a while. Besides in case of washing rubber parts, perform the job quickly not to dip them into the washing fluid for long time.
(7) Apply the automatic transmission fluid (ATF) onto the parts immediately prior to assembly, and the specified tightening torque should be observed carefully.
(8) Use vaseline if it is necessary to hold parts in the position when assembling.
(9) Drain ATF and differential gear oil into a saucer so that the conditions of fluid and oil can be inspected.
(10) Do not support axle drive shaft, stator shaft, input shaft or various pipes when moving transmission from one place to another.
(11) Always discard old oil seals and O-ring, and install new ones.
(12) Be sure to replace parts which are damaged, worn, scratched, discolored, etc.

B: INSPECTION

1. ATF LEVEL

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

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



2) Make sure the vehicle is level. After selecting all positions (P, R, N, D, 3, 2, 1), set the selector leveler in “P” range. Measure fluid level with the engine idling.

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

3) If the fluid level is below the center between upper and lower marks, add the recommended ATF until the fluid level is found within the specified range (above the center between upper and lower marks). When the transmission is hot, the level

should be above the center of upper and lower marks, and when it is cold, the level should be found below the center of these two marks.

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

4) Fluid temperature rising speed
- By idling the engine

Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 25 minutes
<Reference>
Time for temperature rise to 30°C (86°F) with atmospheric temperature of 0°C (32°F): Approx. 8 minutes
- By running the vehicle

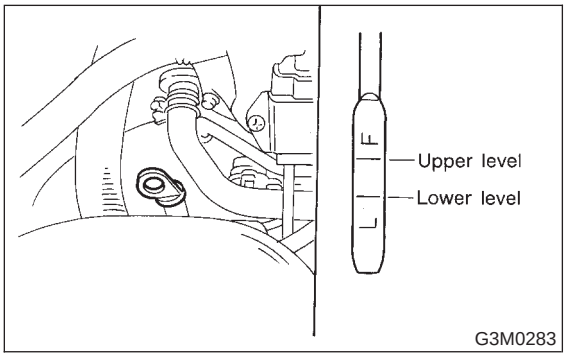
Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 10 minutes
5) Method for checking fluid level upon delivery or at periodic inspection
Check fluid level after a warm-up run of approx. 10 minutes. During the warm-up period, the automatic transmission functions can also be checked.

2. DIFFERENTIAL GEAR OIL LEVEL

1) Ensure the vehicle is in safe condition.

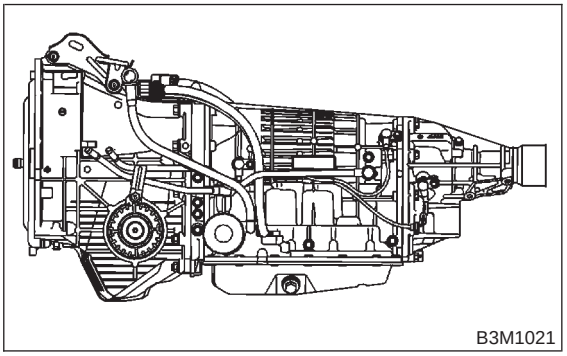
NOTE:
Do not check the oil level nor add oil to the case with the front end of the vehicle jacked-up; this will result in an incorrect reading of the oil level.

2) Check whether the oil level is between the upper (F) and lower (L) marks. If it is below the lower limit mark, add oil until the level reaches the upper mark.

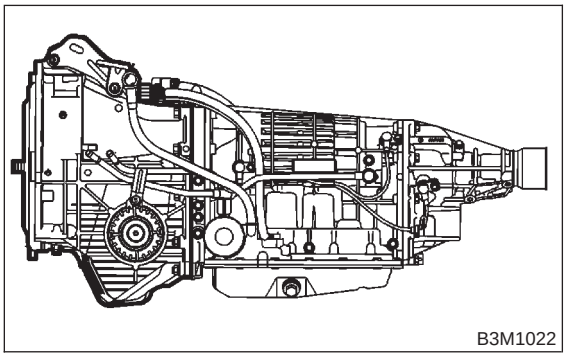


3. OIL LEAKAGE

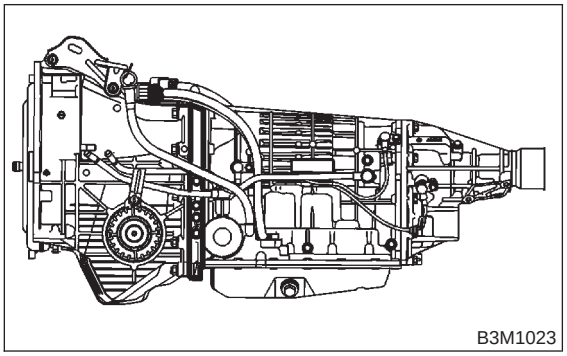
It is difficult to accurately determine the precise position of a oil leak, since the surrounding area also becomes wet with oil.
The points listed below should be checked for fluid leakage.
Checking method is as follows:
(1) Place the vehicle in the pit, and check whether the leaking oil is ATF or not. The ATF is wine red in color, and can be discriminated easily from engine oil and gear oil.
(2) Wipe clean the leaking oil and dust from a suspectable area, using a noninflammable organic solvent such as carbon tetrachloride.
(3) Run the engine to raise the fluid temperature, and set the selector lever to “D” in order to increase the fluid pressure and quickly detect a leaking point. Also check for fluid leaks while shifting select lever to “R”, “2”, and “1”.
The places where oil seals and gaskets are applied are:
1) Jointing portion of the case
- Transmission case and oil pump housing jointing portion
- Torque converter clutch case and oil pump housing jointing portion
- Transmission case and extension case jointing portion



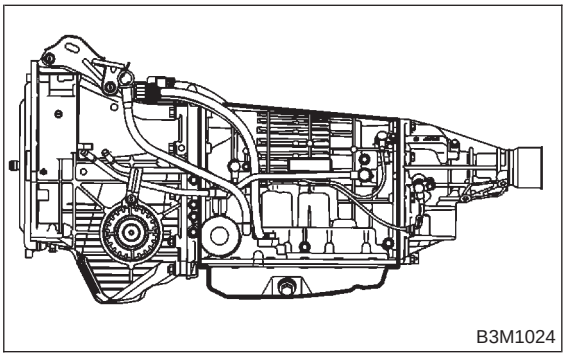
2) Torque converter clutch case
- Engine crankshaft oil seal
- Torque converter clutch impeller sleeve oil seal
- ATF cooler pipe connector
- Torque converter clutch
- Torque converter clutch case
- Axle shaft oil seal
- O-ring on the outside diameter of axle shaft oil seal holder
- O-ring on the differential oil gauge
- Differential oil drain plug
- Location of steel balls


B3M1022

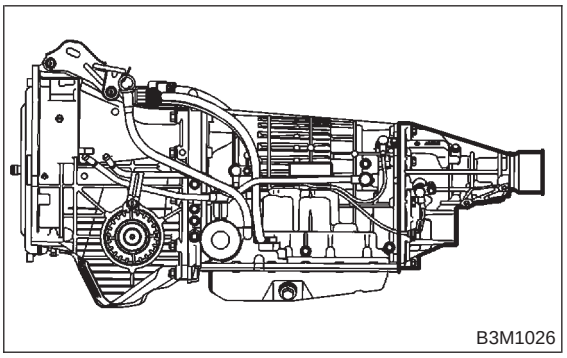
3) Oil pump housing
- Oil pump housing (Defective casting)
- O-ring on the test plugs
- Differential gear breather


B3M1023

4) Automatic transmission case
- Transmission case (Defective casting)
- Mating surface of oil pan
- O-ring on the test plugs
- Oil supply pipe connector
- ATF cooler pipe connector and gasket
- Oil pan drain plug
- O-ring on the transmission harness holder
- Oil pump plugs
- ATF breather
- Shift lever oil seal
- O-ring on the vehicle speed sensor 2 (Front)
- O-ring on the turbine revolution sensor
- ATF filter oil seal


B3M1024

5) Extension case
- Extension case (Defective casting)
- O-ring on the vehicle speed sensor 1 (Rear)
- Rear drive shaft oil seal
- O-ring on the test plugs


B3M1026

2. Inhibitor Switch

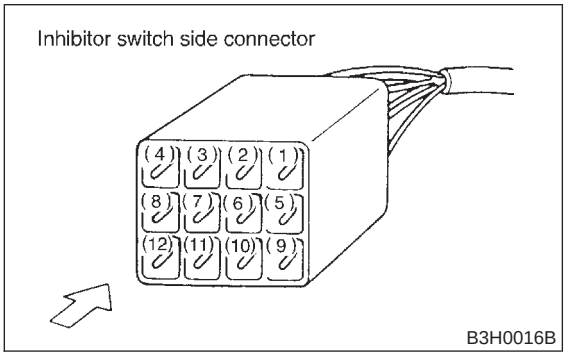
A: INSPECTION

When driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.
1) Disconnect inhibitor switch connector.
2) Check continuity in inhibitor switch circuits with select lever moved to each position.

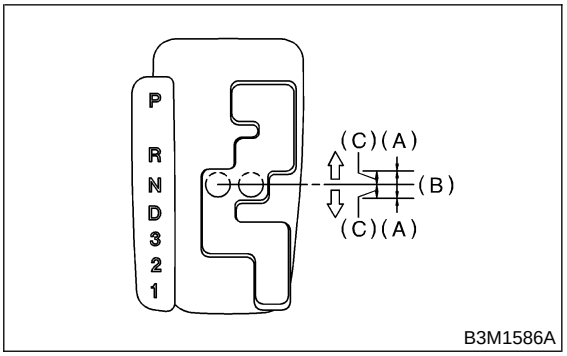
CAUTION:
Also check that continuity in ignition circuit does not exist when select lever is in R, D, 3, 2 and 1 ranges.

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

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



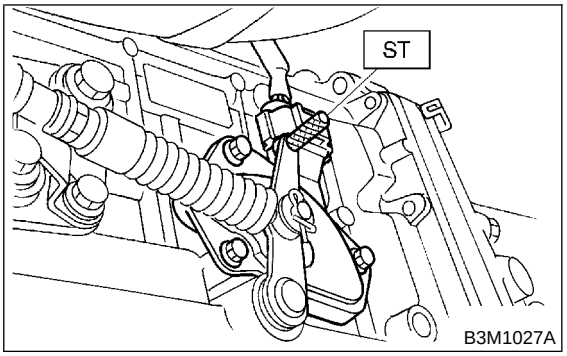
3) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from the N range.
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.



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

B: ADJUSTMENT

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



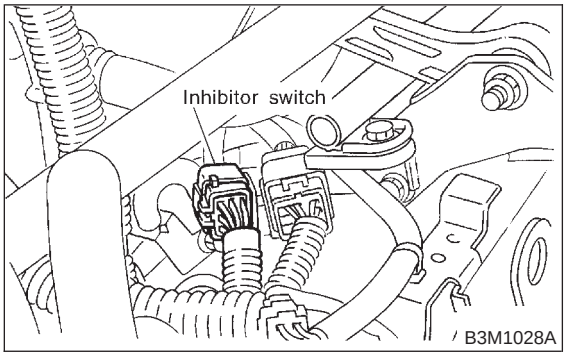
4) Tighten the three inhibitor switch bolts.

Tightening torque:
3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

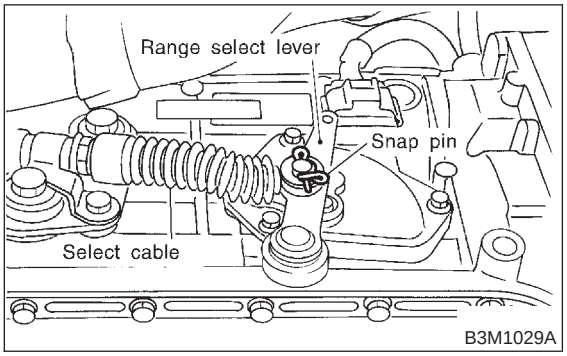
5) Repeat the above checks. If the inhibitor switch is determined to be “faulty”, replace it.

C: REMOVAL

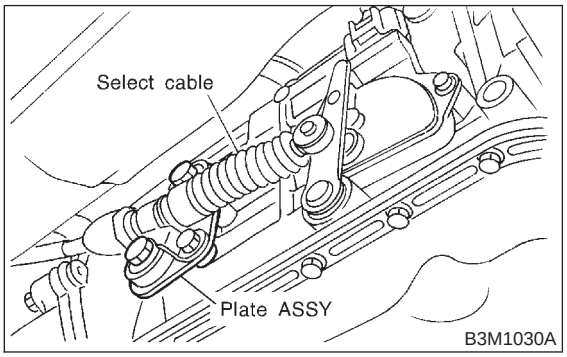
1) Move select lever to neutral position.
2) Remove air intake chamber and duct. <Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W2A0].>
3) Disconnect inhibitor switch connector.



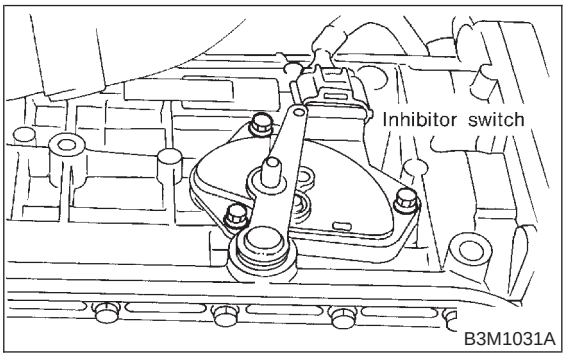
4) Remove front exhaust pipe. <Ref. to 2-9 [W1A0].>
5) Remove snap pin from range select lever.



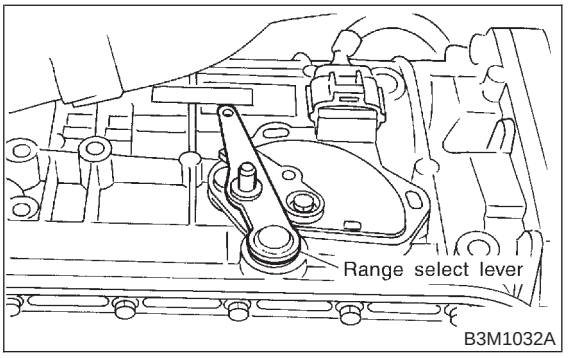
6) Remove plate assembly from transmission case.



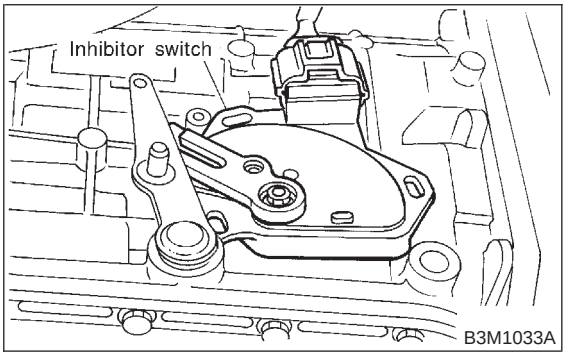
7) Remove bolts.



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

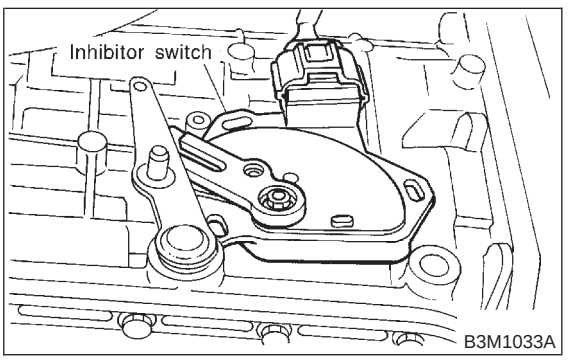


9) Remove inhibitor switch from transmission.

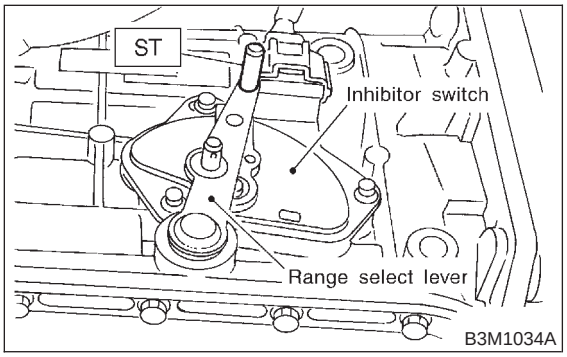


D: INSTALLATION

1) Install inhibitor switch to transmission case.

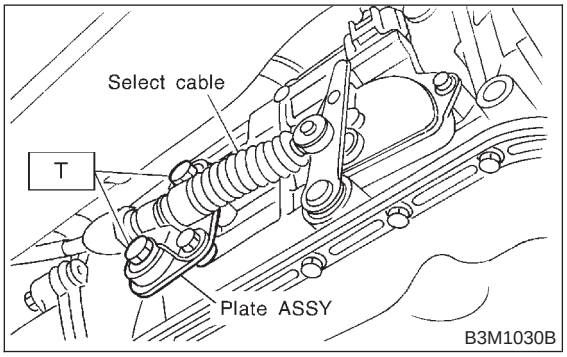


2) Move range select lever to neutral position.
3) Using ST, tighten bolts of inhibitor switch. <Ref. to 3-2 [W2B0].>
ST 499267300 STOPPER PIN

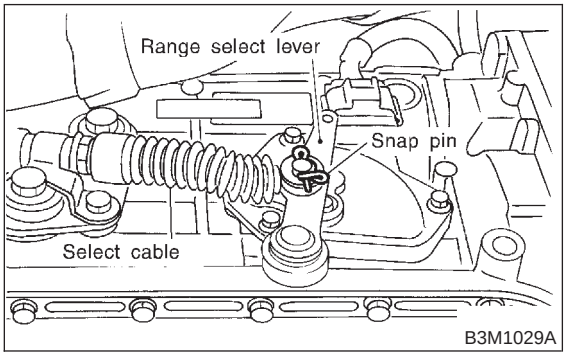


4) Install select cable to range select lever.
5) Install plate assembly to transmission.

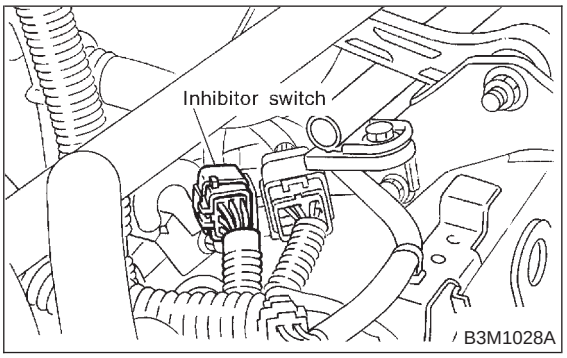
Tightening torque:
T: 24.5±2.0 N·m (2.50±0.20 kg-m, 18.1±1.4 ft-lb)



6) Install snap pin to range select lever.



7) Install front exhaust pipe. <Ref. to 2-9 [W1B0].>
8) Connect inhibitor switch connector.

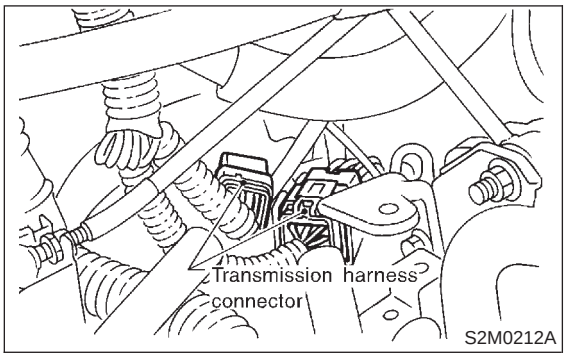


9) Install air intake chamber and duct. <Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W2A0].>

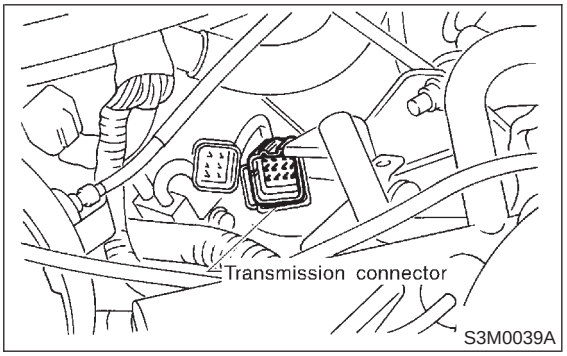
3. Sensor (in transmission)

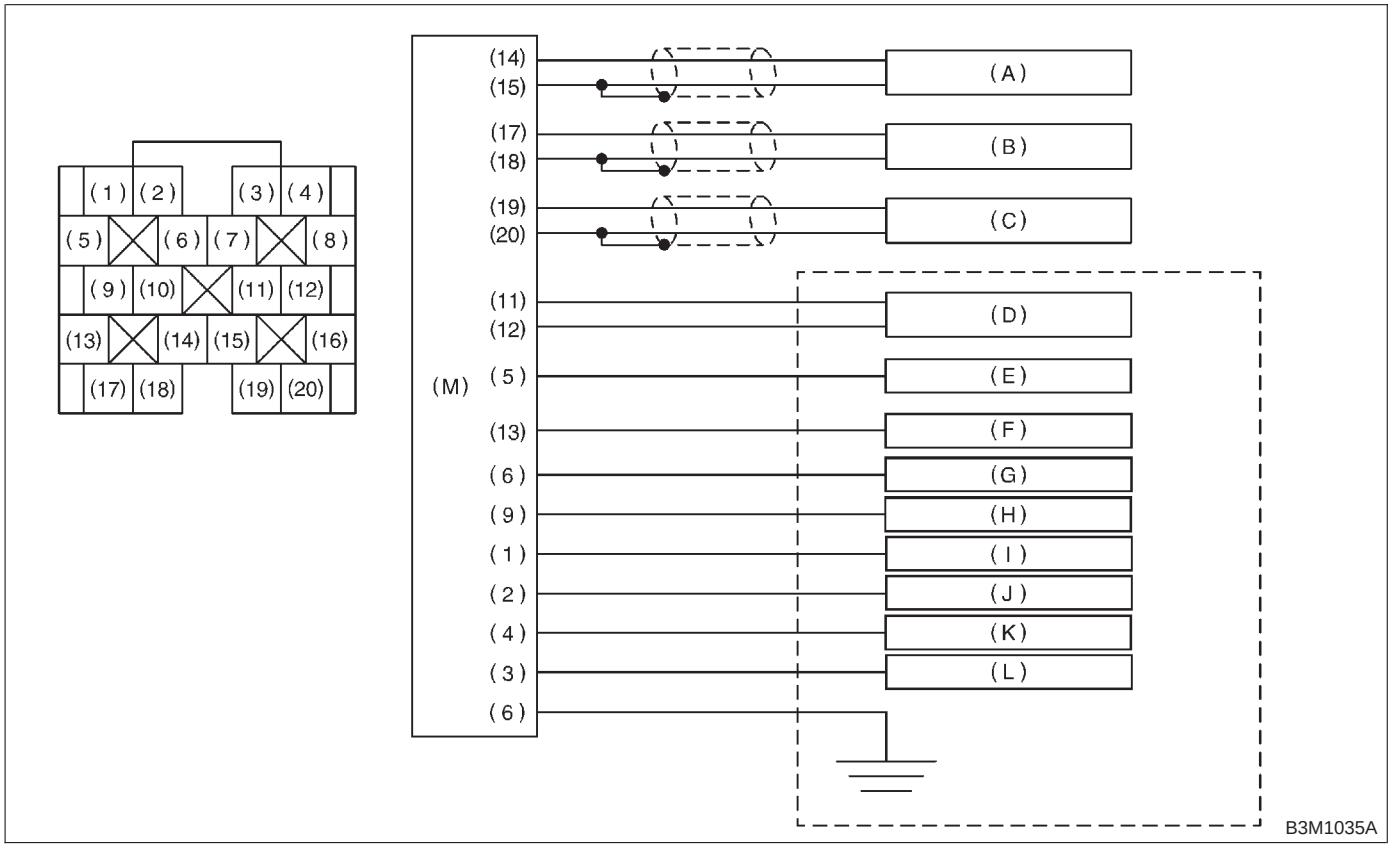
A: INSPECTION

1) Remove air intake chamber and duct.
2) Disconnect transmission connector.



3) Check each sensor, solenoid and ground system for short circuits.





(A) Torque converter turbine speed sensor
(B) Vehicle speed sensor 2 (Front)
(C) Vehicle speed sensor 1 (Rear)
(D) ATF temperature sensor
(E) Duty solenoid A (Line pressure)
(F) Duty solenoid B (Lock-up)
(G) Duty solenoid C (Transfer)
(H) Duty solenoid D (2-4 brake)
(I) Shift solenoid 1
(J) Shift solenoid 2
(K) 2-4 brake timing solenoid
(L) Low clutch timing solenoid
(M) Transmission connector

1. EVALUATION

NOTE:
If part is faulty, its resistance value will be different from the standard value indicated above.

Part name	Terminal	Resistance (Ω)
Vehicle speed sensor 1	17 — 18	450 — 650
Vehicle speed sensor 2	19 — 20	450 — 650
ATF temperature sensor	11 — 12	2,100 — 2,900/ 20°C (68°F) 275 — 375/ 80°C (176°F)
Torque converter turbine speed sensor	14 — 15	450 — 650
Shift solenoid 1	1 — 16	10 — 16
Shift solenoid 2	2 — 16	10 — 16
Duty solenoid A (Line pressure solenoid)	5 — 16	2.0 — 4.5
Duty solenoid B (Lock-up solenoid)	13 — 16	10 — 17
Duty solenoid D (2-4 brake solenoid)	9 — 16	2.0 — 4.5
Low clutch timing solenoid	3 — 16	10 — 16
2-4 brake timing solenoid	4 — 16	10 — 16
Duty solenoid C (Transfer clutch solenoid)	6 — 16	10 — 17

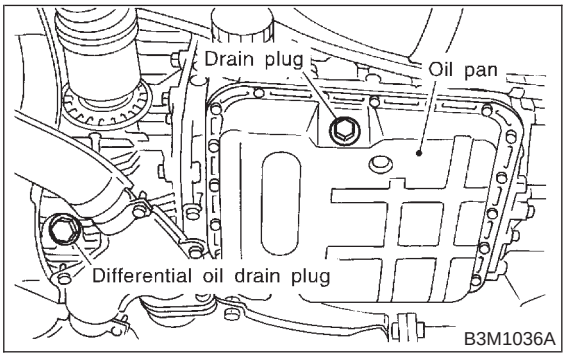
4. Shift Solenoid, Duty Solenoid and Valve

A: REMOVAL

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

NOTE:
Tighten ATF drain plug after draining ATF.

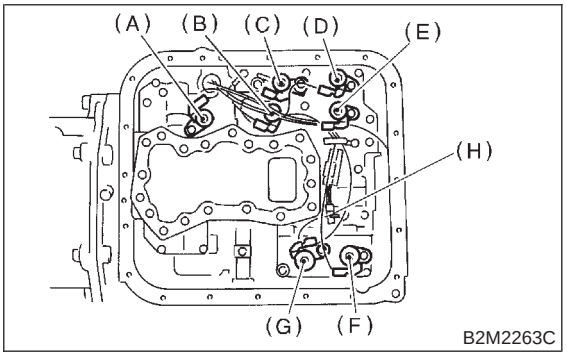
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



3) Remove oil pan.

NOTE:
Drain oil into a container.

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

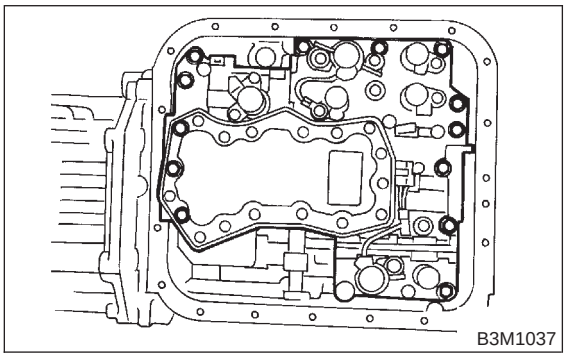


(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

5) Remove control valve body.

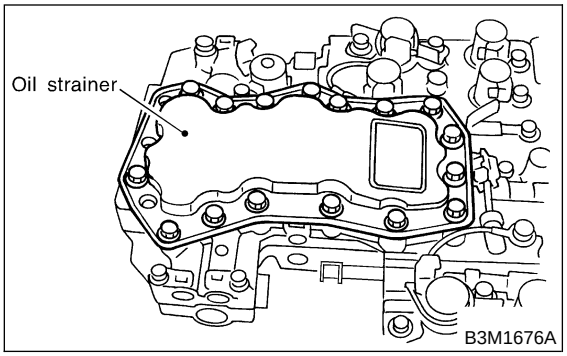
CAUTION:
When removing control valve body, be careful not to interfere with transfer duty solenoid C wiring.

NOTE:
Be careful because oil flows from valve body.

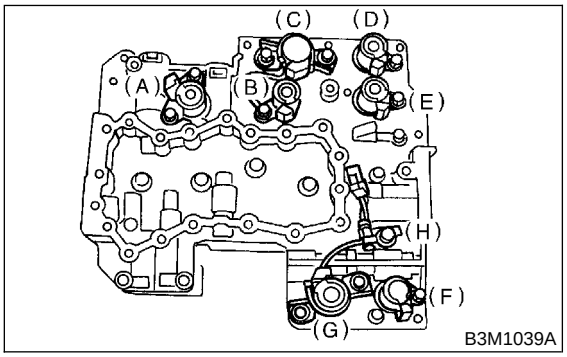


6) Remove oil strainer.

NOTE:
Be careful because oil flows from oil strainer.



7) Remove solenoids and duty solenoids.

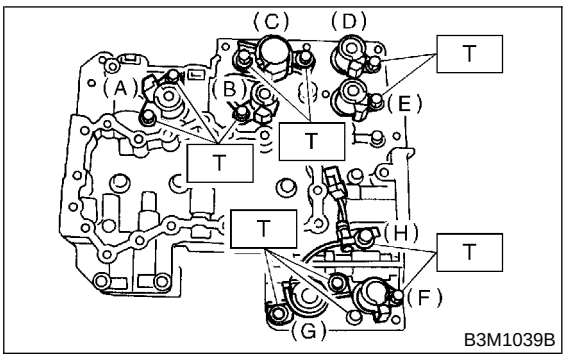


(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

B: INSTALLATION

1) Install 7 solenoids and ATF temperature sensor.

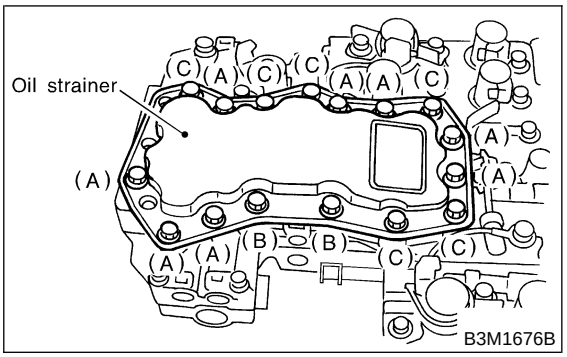
Tightening torque:
T: 8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



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

2) Install oil strainer.

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

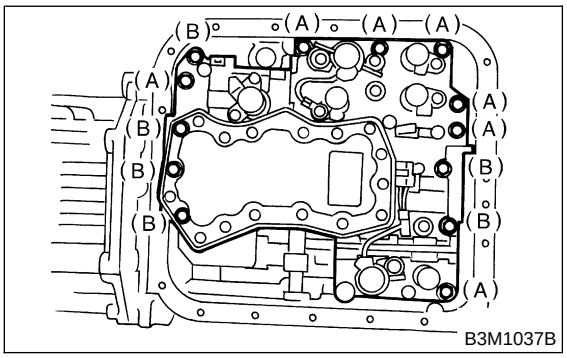


(A) Short bolt
(B) Middle bolt
(C) Long bolt

3) Install valve body to transmission case.
(1) Temporarily tighten the valve body on the transmission case.

CAUTION:
When installing control valve body, be careful not to interfere with transfer duty solenoid wiring (brown).

NOTE:
Align manual valve connections.

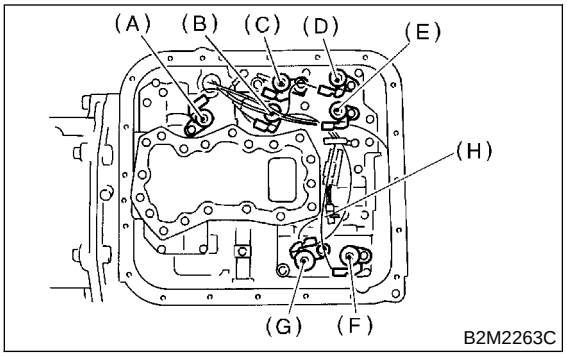


(A) Short bolts
(B) Long bolts

(2) Tighten the valve body to the specified torque.

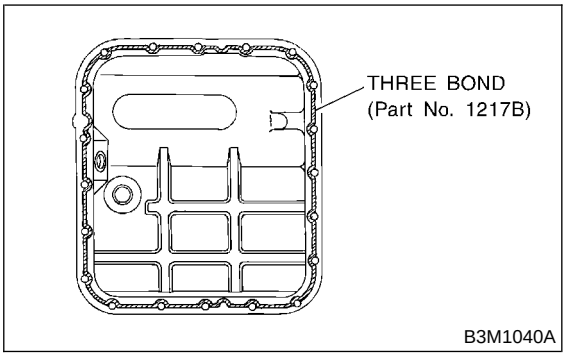
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

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



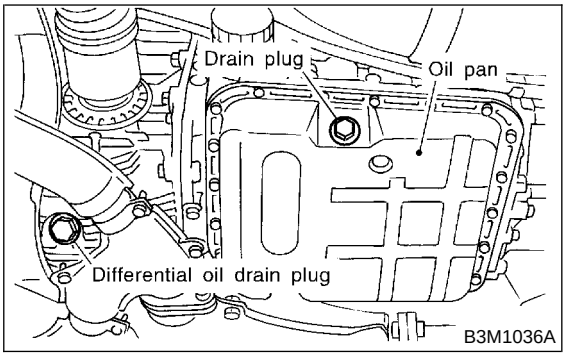
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

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



6) Install oil pan.

Tightening torque:
4.9±0.5 N·m (0.50±0.05 kg-m, 3.6±0.4 ft-lb)

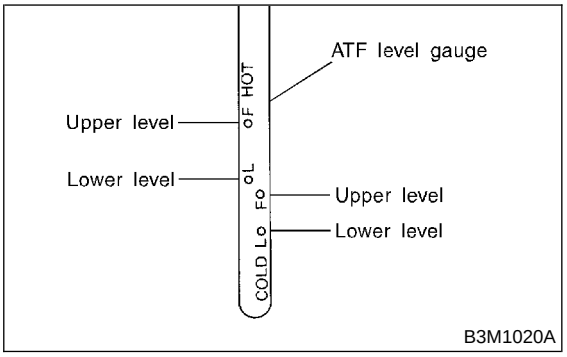


7) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole.

Recommended fluid:
Dexron IIE or Dexron III type automatic transmission fluid

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

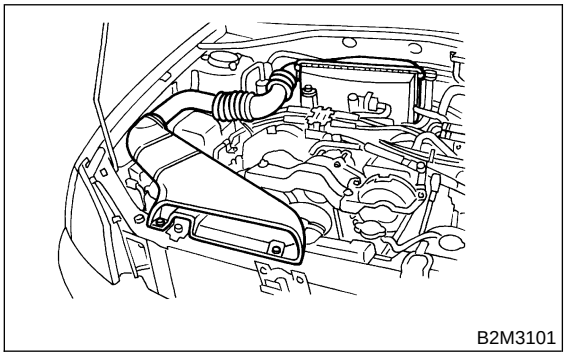
8) Run the vehicle until the ATF temperature rises from 60 to 80°C (140 to 176°F) and check the ATF level of the “HOT” side on level gauge.



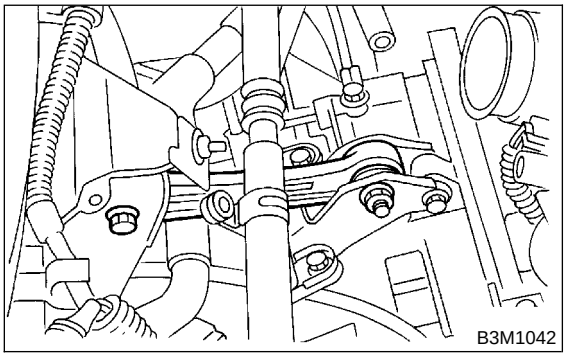
5. Duty Solenoid C and Transfer Valve Body

A: REMOVAL

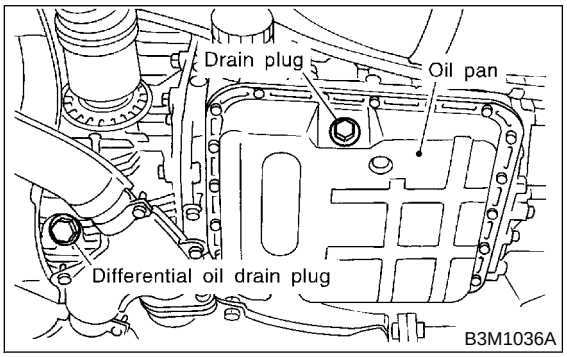
1) Remove air intake duct and chamber.
<Ref. to 2-7 [W1A0].> and <Ref. to 2-7 [W2A0].>


B2M3101

2) Remove pitching stopper.

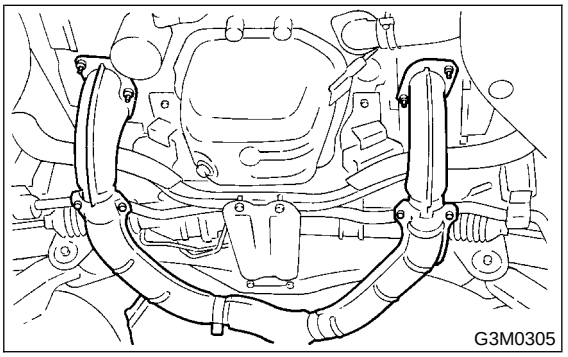

B3M1042

3) Raise vehicle and drain ATF.



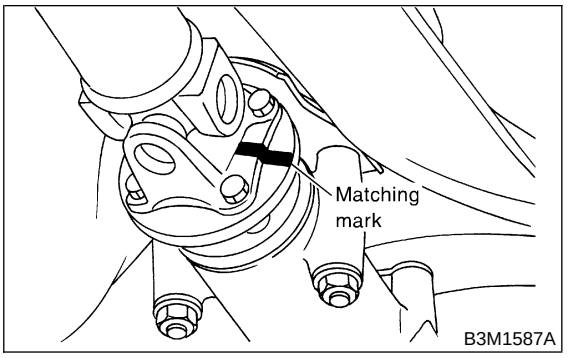
B3M1036A

4) Remove front exhaust pipe.
Disconnect oxygen sensor connector, and remove front and center exhaust pipe.
<Ref. to 2-9 [W1A0].>


G3M0305

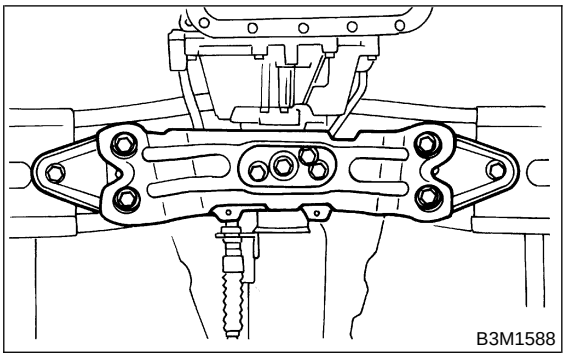
5) Remove heat shield cover.
6) Remove propeller shaft.
<Ref. to 3-4 [W1B0].>

NOTE:
Before removing propeller shaft, scribe matching marks on propeller shaft and rear differential coupling.

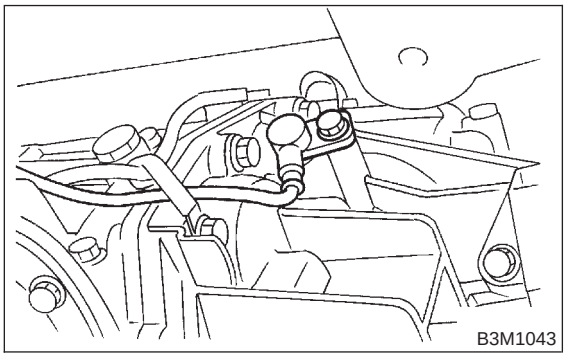


B3M1587A

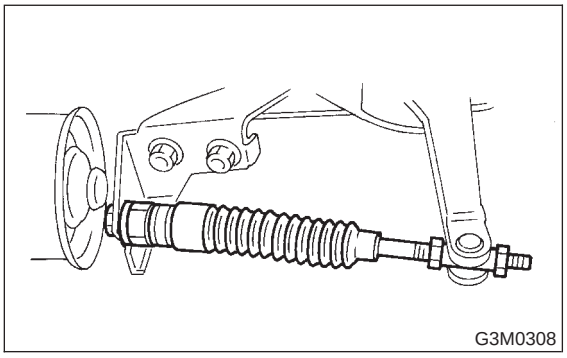
7) Remove rear crossmember.
(1) Support transmission using a transmission jack and raise slightly.
(2) Remove bolts and nuts as shown in Figure.


B3M1588

8) Remove vehicle speed sensor 1 (rear).

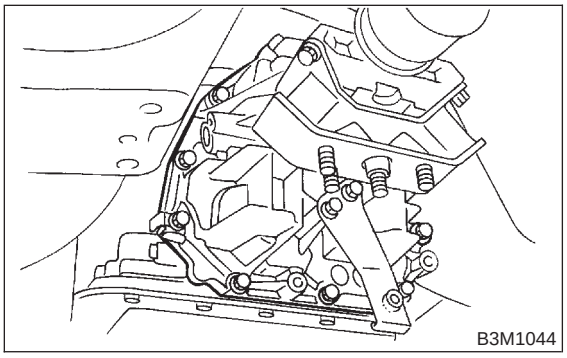

B3M1043

9) Remove extension and gasket.
(1) Remove select cable nut.

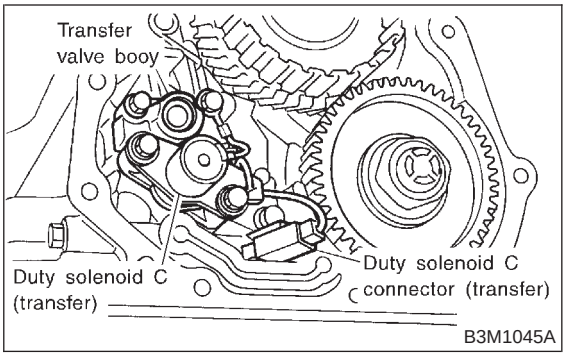

G3M0308

(2) Move gear select cable so that extension bolts can be removed.
(3) Remove bolts.
(4) Remove extension case.

NOTE:
Use a container to catch oil flowing from extension.


B3M1044

10) Disconnect duty solenoid C (transfer) connector.
11) Remove duty solenoid C (transfer) and transfer valve body.



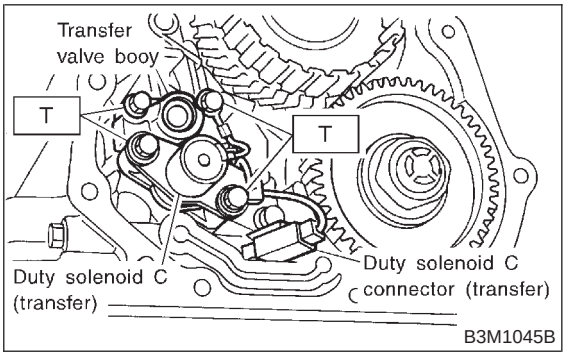
B3M1045A

B: INSTALLATION

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

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

(2) Connect duty solenoid C (transfer) connector.



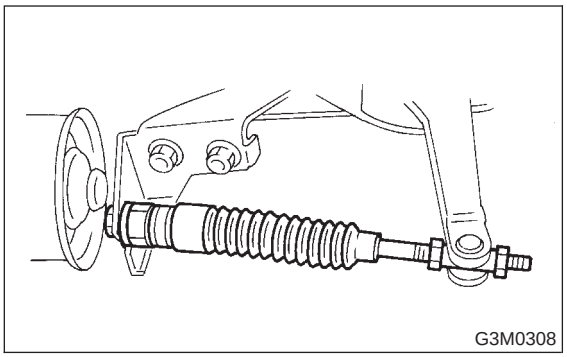
B3M1045B

2) Install extension case to transmission case.
(1) Tighten 11 bolts.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

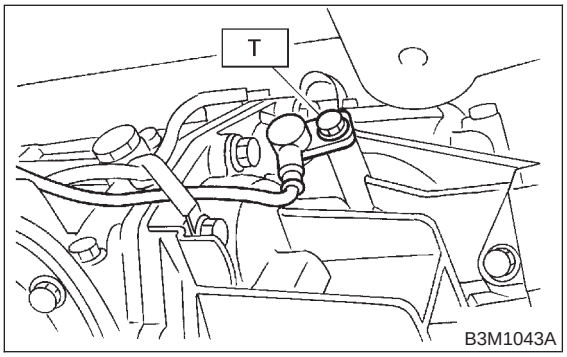
(2) Install select cable.

Tightening torque:
14±4 N·m (1.4±0.4 kg-m, 10.1±2.9 ft-lb)



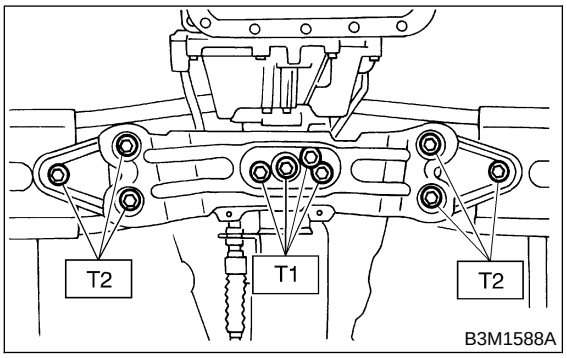
3) Install vehicle speed sensor 1 (rear).

Tightening torque:
T: 7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)



4) Install rear crossmember.
(1) Tighten bolts.

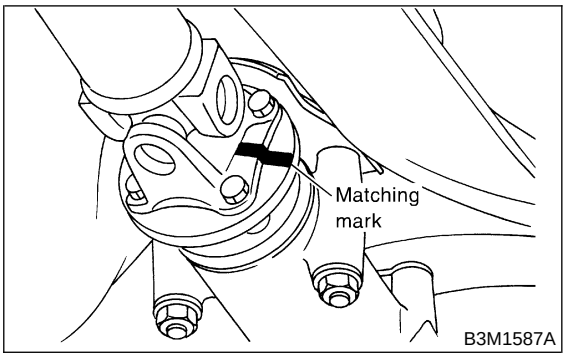
Tightening torque:
T1: 37±10 N·m (3.8±1.0 kg-m, 27±7 ft-lb)
T2: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)



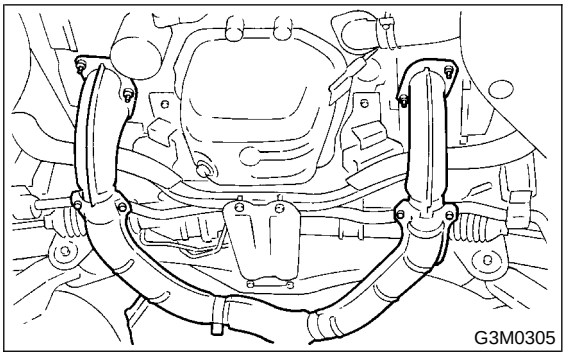
(2) Lower and remove transmission jack.

5) Install propeller shaft.
<Ref. to 3-4 [W1E0].>

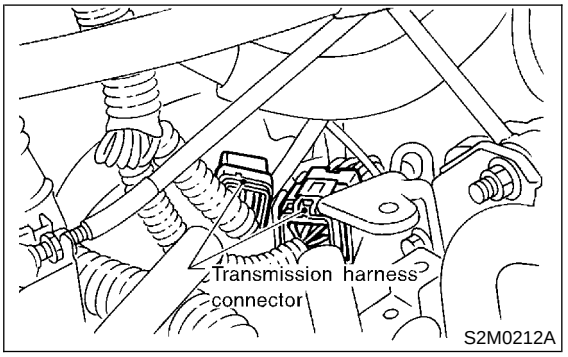
NOTE:
Align matching marks on propeller shaft and rear differential coupling.



6) Install heat shield cover.
7) Install front exhaust pipe.
<Ref. to 2-9 [W1A0].>

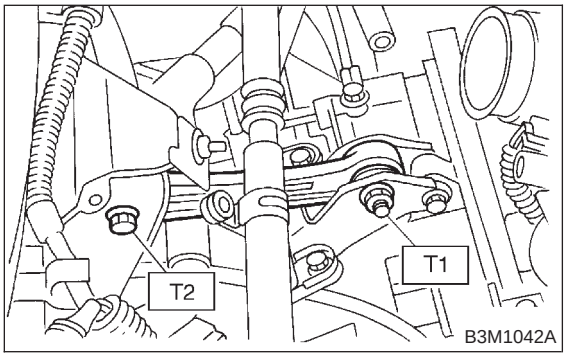


8) Lower and remove jack.
9) Connect the following parts:
(1) Oxygen sensor connector
(2) Transmission harness connector



10) Install pitching stopper.

Tightening torque:
T1: 49±5 N·m (5.0±0.5 kg-m, 36.2±3.6 ft-lb)
T2: 57±10 N·m (5.8±1.0 kg-m, 42±7 ft-lb)

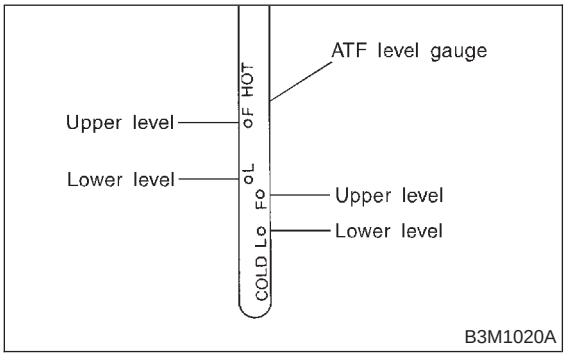


11) Install air cleaner case and duct. <Ref. to 2-7 [W1A0].>
12) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole.

Recommended fluid:
Dexron IIE or Dexron III type automatic transmission fluid

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

13) 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.



6. AT Oil Filter

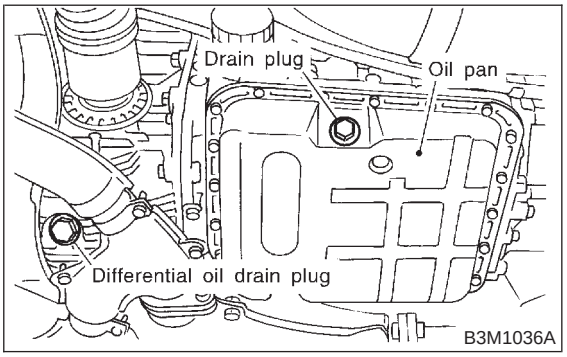
A: REMOVAL AND INSTALLATION

NOTE:
The AT oil 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.

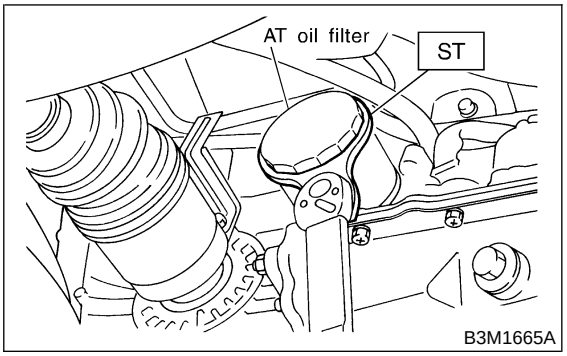
1) Drain ATF completely.

NOTE:
Tighten ATF drain plug after draining ATF.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



2) Using ST, remove AT oil filter.
ST 498545400 OIL FILTER WRENCH



3) Get new AT oil filter and apply a thin coat of ATF to the oil seal.
4) Install AT oil filter. Turn it by hand, being careful not to damage oil seal.
5) Using ST, tighten AT oil filter to transmission case.
Calculate AT oil filter torque specifications using the following formula.
$T2 = L2/(L1 + L2) \times T1$
T1: 14±2 N·m (1.4±0.2 kg-m, 10.1±1.4 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST length 0.078 m (3.07 in)
L2: Torque wrench length

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

ST 498545400 OIL FILTER WRENCH

6) Add ATF.

7. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

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

CAUTION:
When performing test, do not exceed posted speed limit.

2. SHIFT PATTERNS

Check “kick-down”.

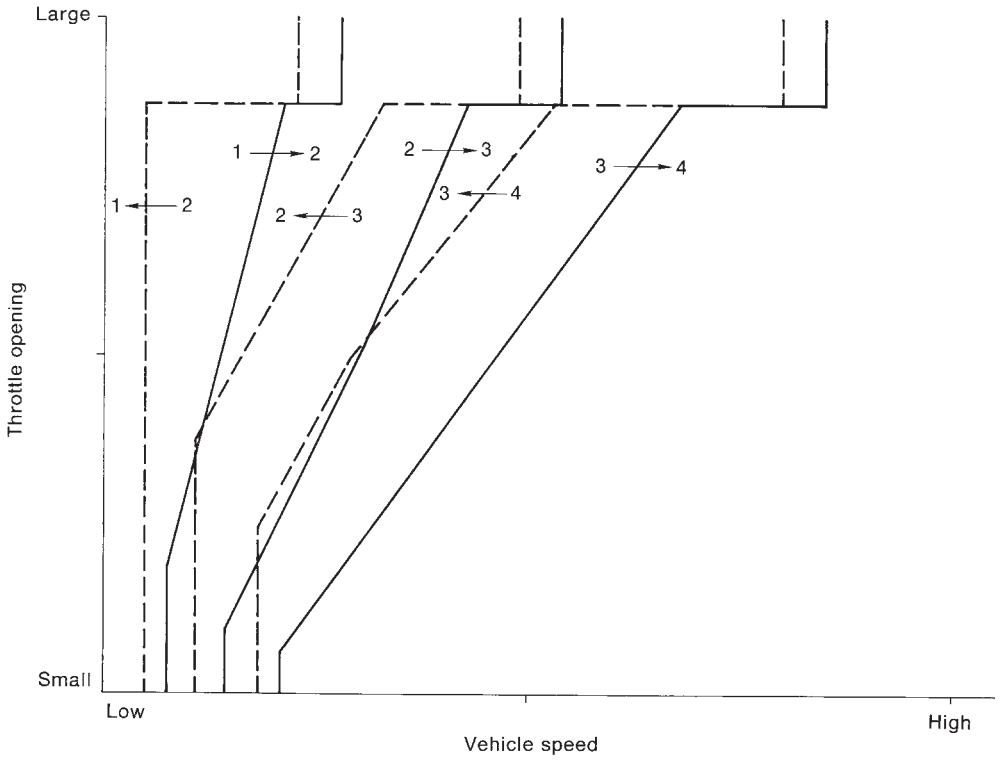
D range: 1st ←→ 2nd ←→ 3rd ←→ 4th

3 range: 1st ←→2nd ←→ 3rd ← 4th

2 range: 2nd ← 3rd ← 4th

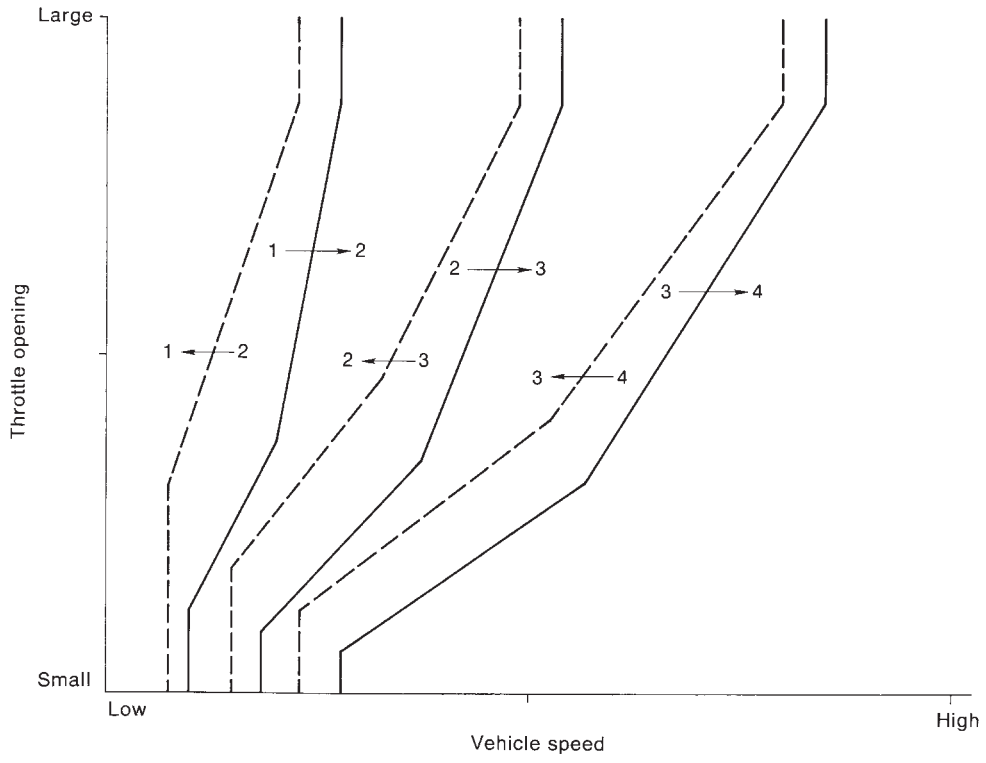
1 range: 1st ← 2nd ← 3rd ← 4th

AWD model “D” range (Normal pattern)



G3M0321

AWD model "D" range (Power pattern)



G3M0322

3. ENGINE BRAKE OPERATION

Engine brake operation:
D range → 4th gear
3 range → 3rd gear
2 range → 2nd gear
1 range → 1st gear

4. AWD FUNCTION

If "tight-corner braking" occurs when the steering wheel is fully turned at low speed:
1) Determine the applicable trouble code and check the corresponding duty solenoid C (transfer) for improper operation.
2) If the solenoid is operating properly, check transfer clutch pressure.
3) If oil pressure is normal but "tight-corner braking" occurs:
Check the transfer control valve for sticking, and the transfer clutch facing for wear. <Ref. to 3-2 [W21B0].> and <Ref. to 3-2 [W22B0].>

8. Stall Test

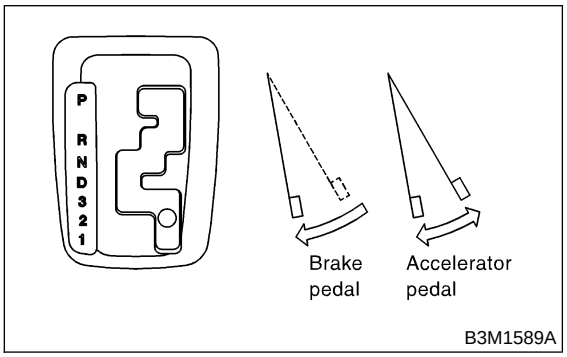
A: MEASUREMENT

1. GENERAL INFORMATION

The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in R and 2 ranges.
Purposes of the stall test:
1) To check the operation of the automatic transmission clutch.
2) To check the operation of the torque converter clutch.
3) To check engine performance.

2. TEST METHODS

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



6) When the engine speed is stabilized, read that speed quickly and release the accelerator pedal.
7) Shift the select lever to Neutral, and cool down the engine by idling it for more than one minute.
8) Record the stall speed.
9) If stall speed in 2 range is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify it, conduct the same test as above in D range.
10) Perform the stall tests with the select lever in the R range.

NOTE:
● Do not continue the stall test for MORE THAN FIVE SECONDS at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.
Be sure to cool down the engine for at least one minute after each stall test with the select lever set in the P or N range and with the idle speed lower than 1,200 rpm.
● If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):
Except OUTBACK; 2,100 — 2,600 rpm
OUTBACK; 2,200 — 2,700 rpm

3. EVALUATION

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

9. Time Lag Test

A: INSPECTION

1. GENERAL INFORMATION

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

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

2. TEST METHODS

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

3. EVALUATION

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

10. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

If the clutch or the brake shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.
● Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
● Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.
1) Line pressure measurement (under no load)

CAUTION:
● Before measuring line pressure, jack-up all wheels.
● Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in "N" or "P".)

2) Line pressure measurement (under heavy load)

CAUTION:
● Before measuring line pressure, apply both foot and parking brakes with all wheels chocked (Same as for "stall" test conditions).
● Measure line pressure when select lever is in "R", "2" with engine under stall conditions.
● Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)
● Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in "N" or "P".)

9. Time Lag Test

A: INSPECTION

1. GENERAL INFORMATION

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

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

2. TEST METHODS

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

3. EVALUATION

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

10. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

If the clutch or the brake shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.
● Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.
● Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.
1) Line pressure measurement (under no load)

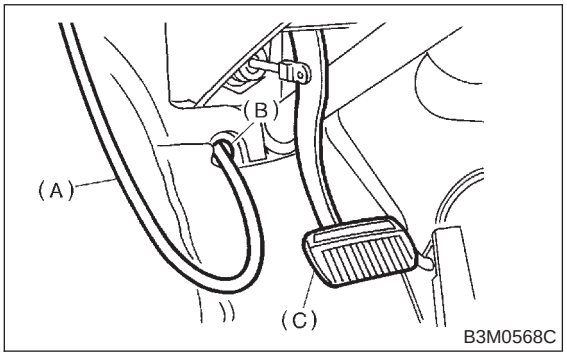
CAUTION:
● Before measuring line pressure, jack-up all wheels.
● Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in "N" or "P".)

2) Line pressure measurement (under heavy load)

CAUTION:
● Before measuring line pressure, apply both foot and parking brakes with all wheels chocked (Same as for "stall" test conditions).
● Measure line pressure when select lever is in "R", "2" with engine under stall conditions.
● Measure line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle and then stop. Wait for at least one minute before measurement.)
● Maintain the temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with the select lever in "N" or "P".)

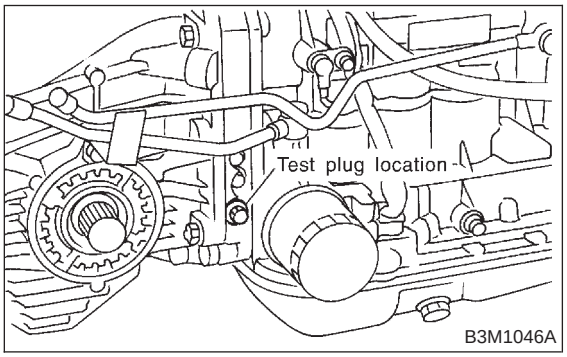
2. TEST METHODS

1) Temporarily attach the ST to a suitable place in the driver's compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to the engine compartment.
ST 498575400 OIL PRESSURE GAUGE ASSY



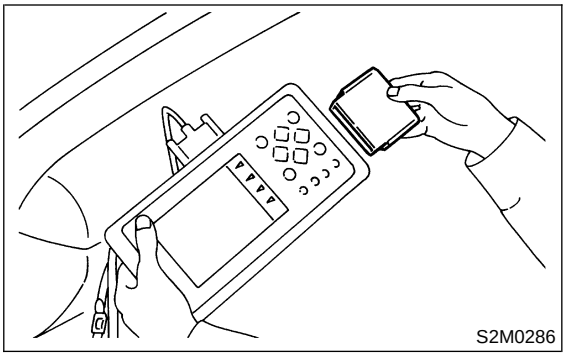
(A) Pressure gauge hose
(B) Hole in toe board (blank cap hole)
(C) Brake pedal

2) Remove the test plug and install ST instead.
ST 498897200 OIL PRESSURE GAUGE ADAPTER



3) Connect ST1 with ST2.
ST1 498897200 OIL PRESSURE GAUGE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

4) Check for duty ratio changes by opening and closing throttle valve using Subaru Select Monitor.
(1) Insert cartridge into Subaru Select Monitor. <Ref. to 1-6 [G1100].>



(2) Connect Subaru Select Monitor to data link connector.
5) Check line pressure in accordance with the following chart.

3. EVALUATION

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm^2, psi)
2	5	Full open	1,128 — 1,304 (11.5 — 13.3, 164 — 189)
R	5	Full open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	95	Full closed	304 — 412 (3.1 — 4.2, 44 — 60)

11. Transfer Clutch Pressure Test

A: MEASUREMENT

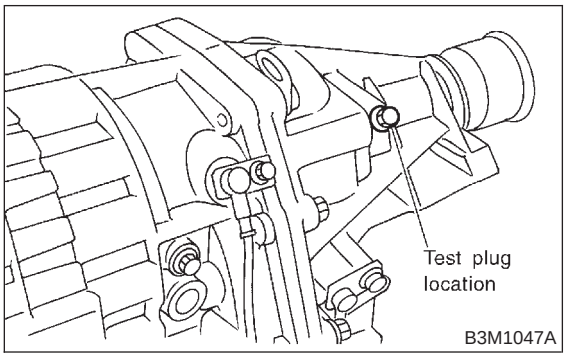
1. TEST METHODS

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

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

AWD mode: “D” range
FWD mode: “P” range, engine speed 2,000 rpm

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



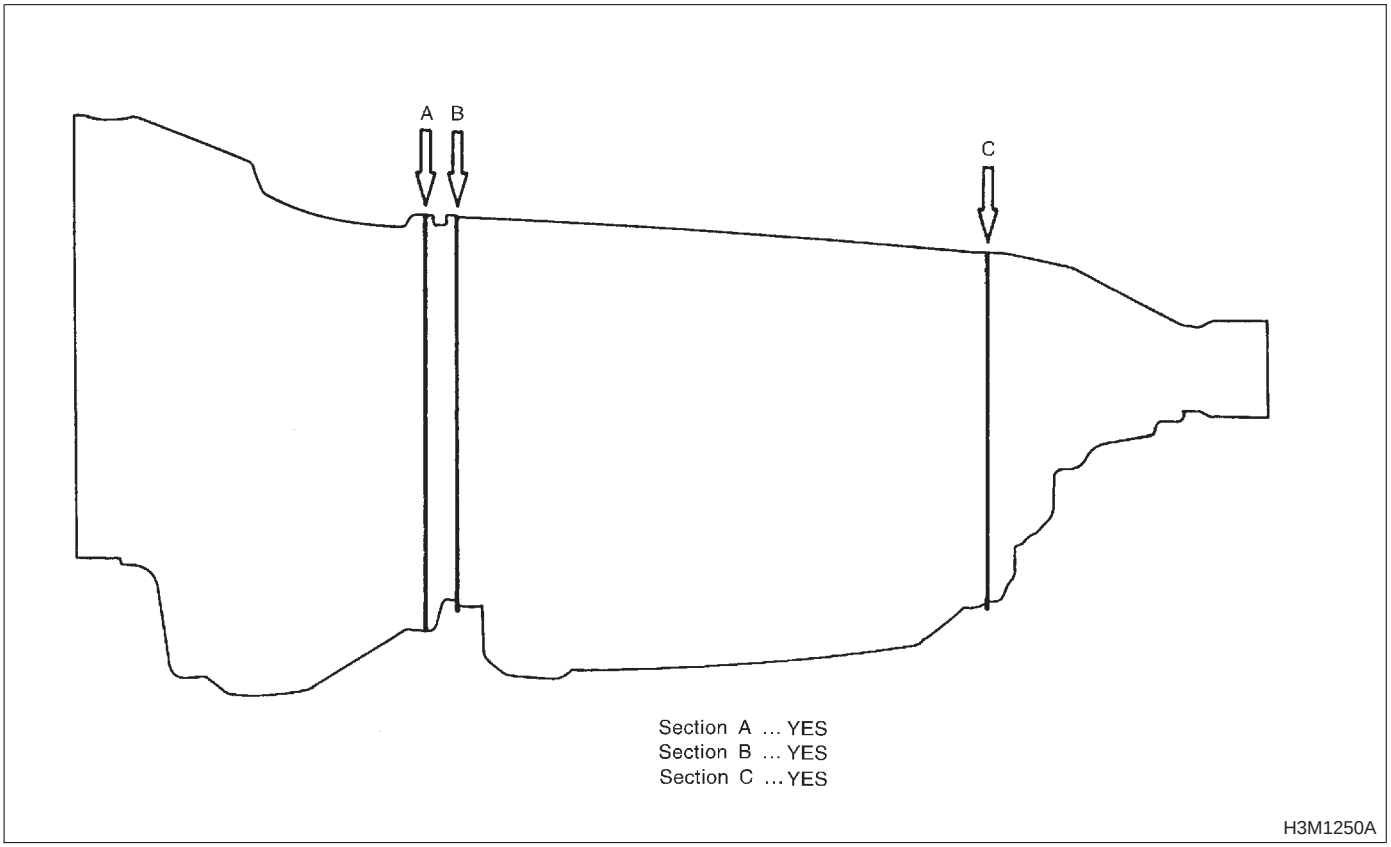
2. EVALUATION

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

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

12. Overall Transmission

A: SECTIONS THAT CAN BE DETACHED/ASSEMBLED

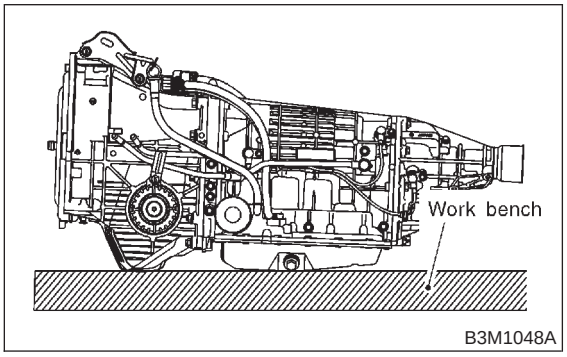


B: DISASSEMBLY

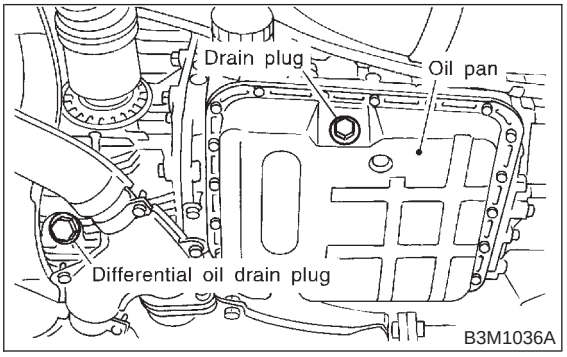
1. EXTERNAL PARTS

1) Place the transmission unit on a work bench, with the oil pan facing down.

CAUTION:
Be careful not to bend or damage external parts.

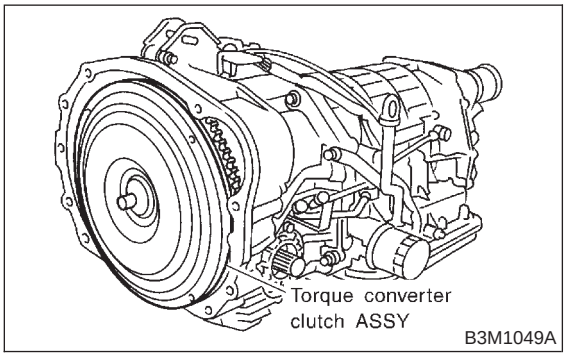


2) Remove the drain plug, and drain differential oil. Tighten the plug temporarily after draining.
3) Remove the drain plug, and drain automatic transmission fluid (ATF). Tighten the plug temporarily after draining.

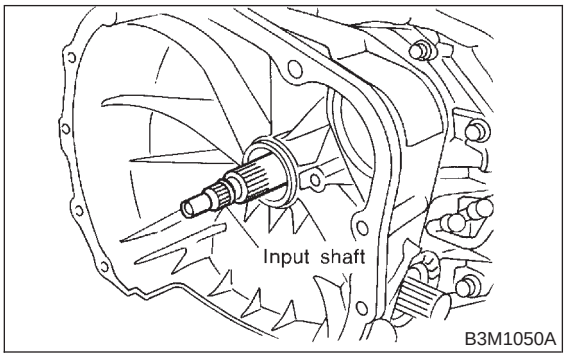


4) Extract the torque converter clutch assembly.

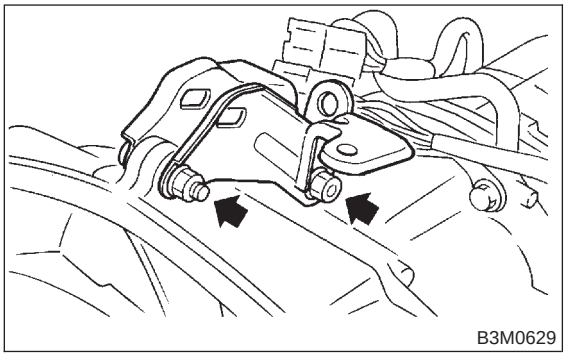
NOTE:
● Extract the torque converter clutch horizontally. Be careful not to scratch the bushing inside the oil pump shaft.
● Note that oil pump shaft also comes out.



5) Remove the input shaft.

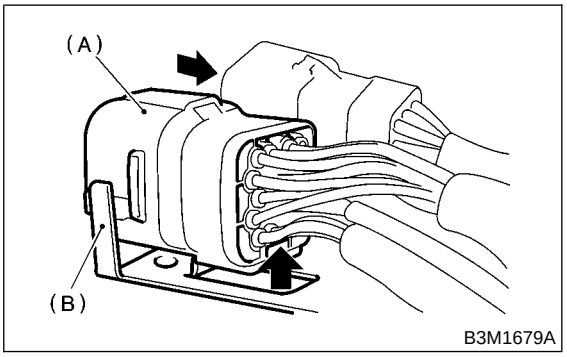


6) Remove the pitching stopper bracket.



7) Remove harnesses from stay.
(1) Disconnect transmission harness connector from stay.

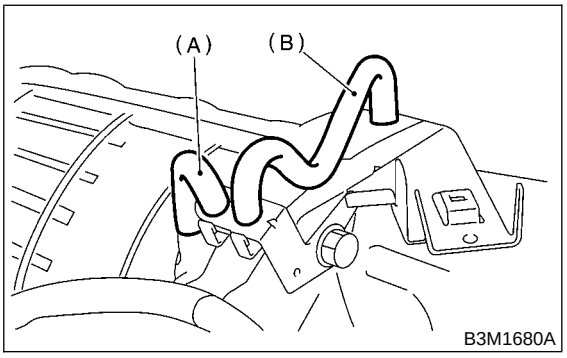
NOTE:
Lift-up lever behind the connector and disconnect it from stay.



(A) Transmission harness
(B) Stay

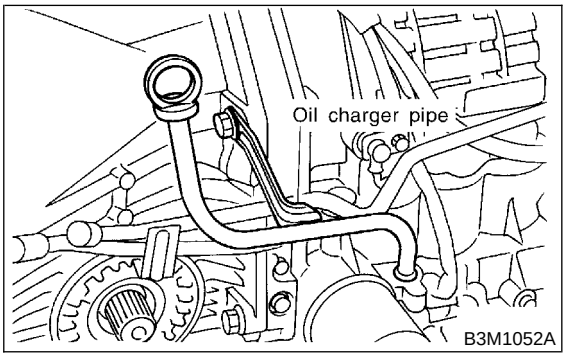
(2) Disconnect inhibitor switch connector from stay.

8) Disconnect the air breather hose.



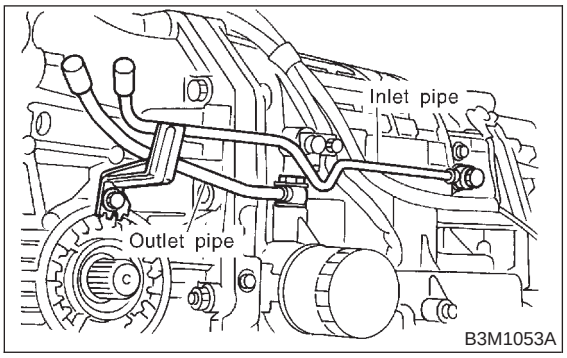
(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

9) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe.



10) Remove the oil cooler inlet and outlet pipes.

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

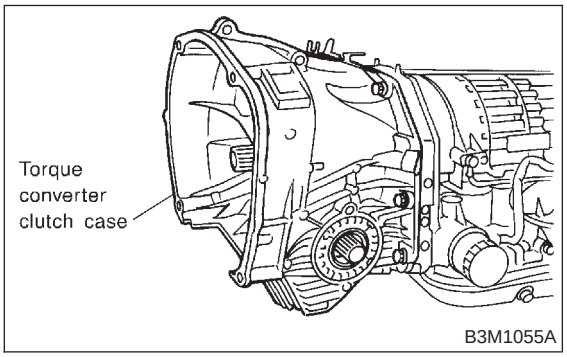


2. SEPARATION OF EACH SECTION

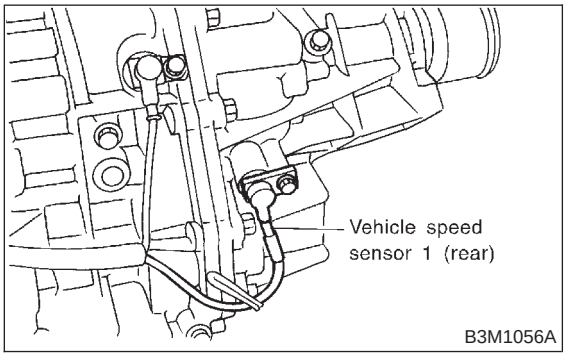
1) Separation of torque converter clutch case and transmission case sections

CAUTION:
- **Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.**
- **Be careful not to lose the rubber seal.**

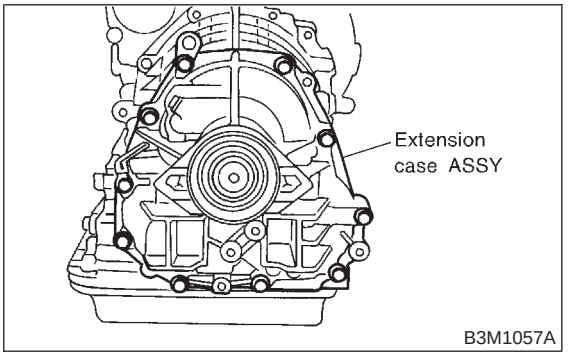
NOTE:
Separate these cases while tapping lightly on the housing.



2) Separation of transmission case and extension sections
(1) Remove vehicle speed sensor 1 (rear).



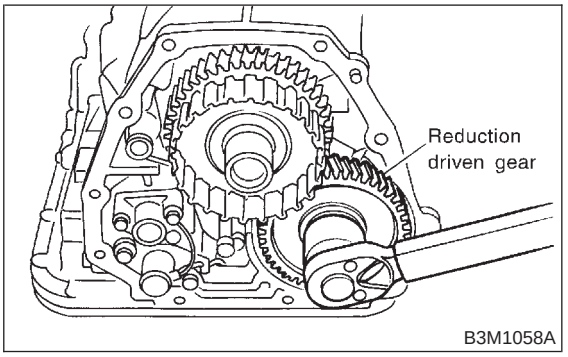
(2) Separation of transmission case and extension case sections



3. TRANSMISSION CASE SECTION

1) Remove the reduction driven gear.
(1) Straighten the staked portion, and remove the lock nut.

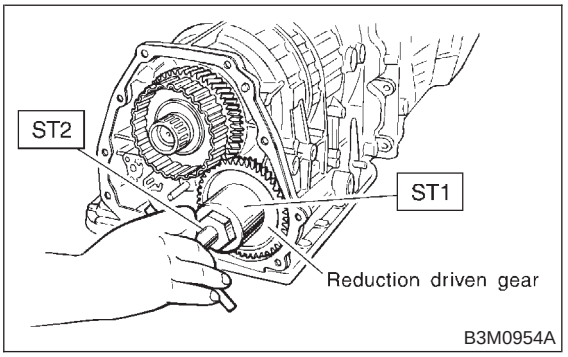
NOTE:
Set the range selector lever to “P”.



(2) Using the ST1 and ST2, extract the reduction driven gear.

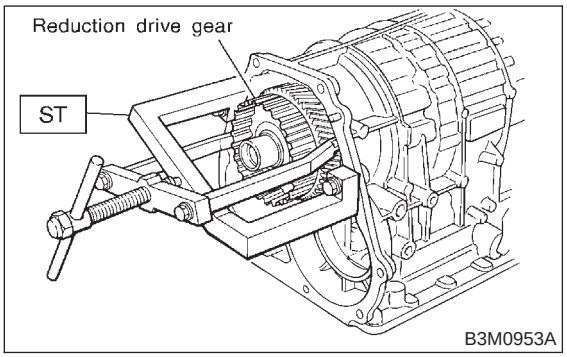
NOTE:

ST1 499737000 PULLER
ST2 899524100 PULLER SET



(3) Using the ST, extract the reduction drive gear.

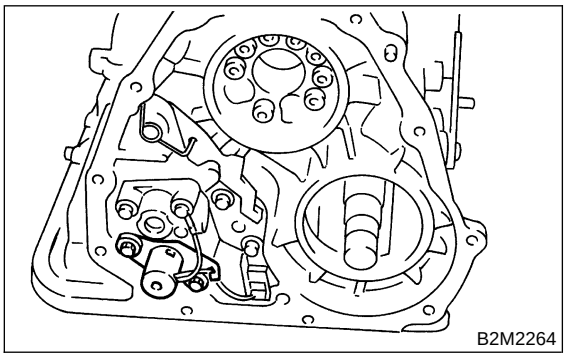
ST 499737100 PULLER SET



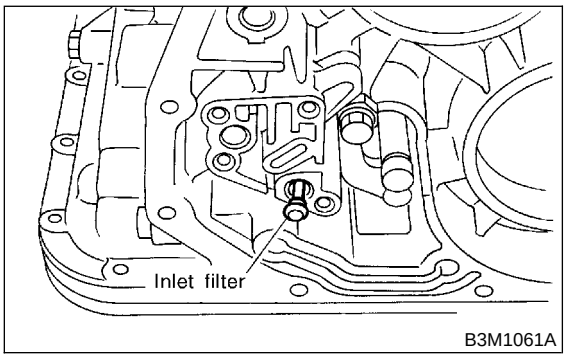
2) Remove transfer valve body and duty solenoid C (Transfer).

(1) Disconnect connector from duty solenoid C (Transfer).

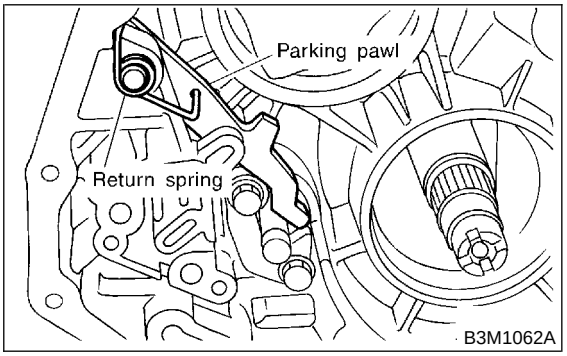
(2) Remove transfer valve body and duty solenoid C (Transfer).



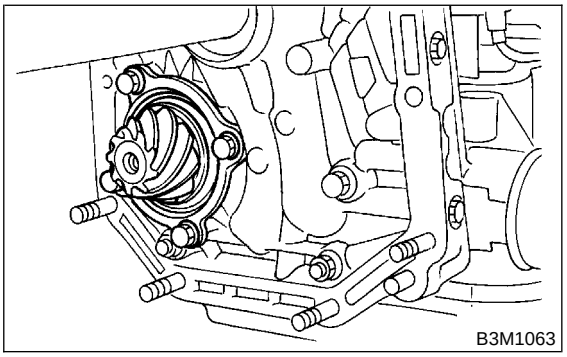
(3) Pull out inlet filter.



3) Remove the parking pawl, return spring and shaft.



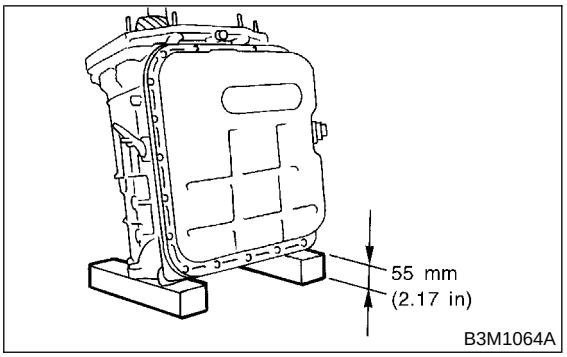
4) Loosen the taper roller bearing mounting bolts.



5) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

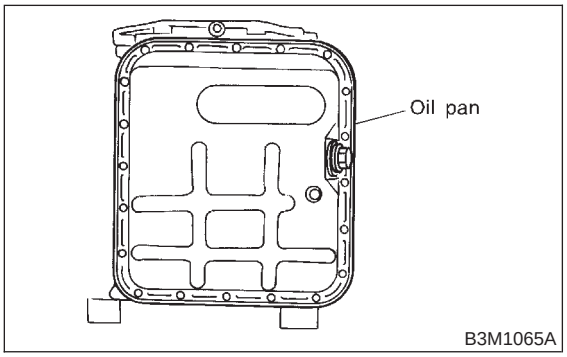
CAUTION:

- **Be careful not to scratch the rear mating surface of the transmission case.**
- **Note that the parking rod and drive pinion protrude from the mating surface.**

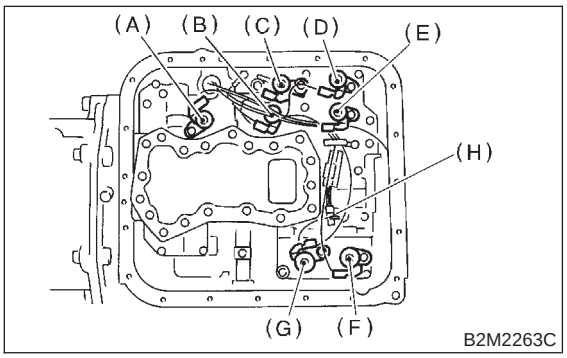


6) Remove the oil pan.

NOTE:
Use a scraper to remove oil pan.



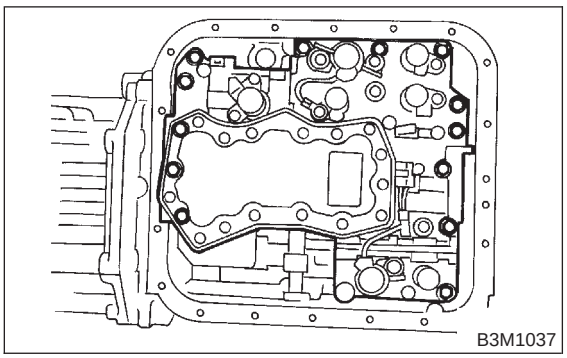
7) Disconnect the harness connectors for the solenoids, duty solenoids, ATF temperature sensor and the ground cord.



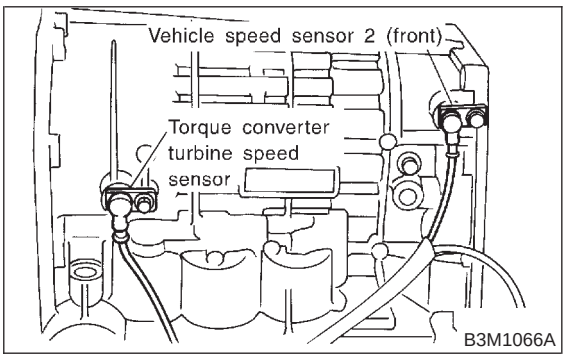
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

8) Remove the control valve body.

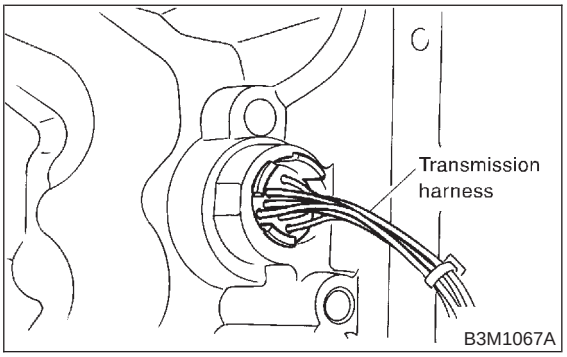
CAUTION:
When removing control valve body, be careful not to interfere with transfer duty solenoid C wiring.



9) Remove vehicle speed sensor 2 (front) and torque converter turbine speed sensor.

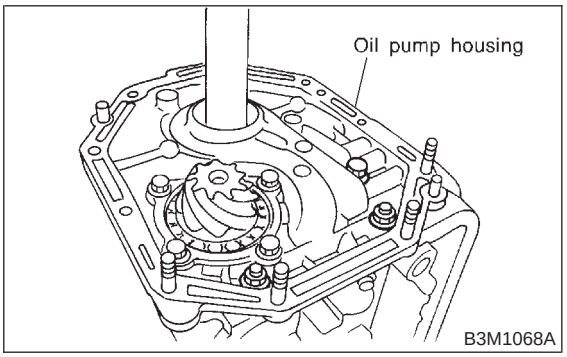


10) Remove transmission harness.

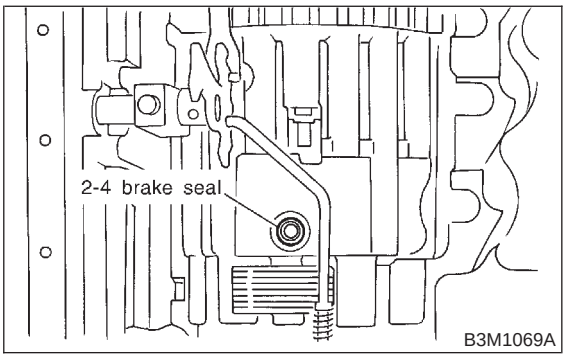


11) Remove the oil pump housing.

CAUTION:
Be careful not to lose the total end play adjusting thrust washer.

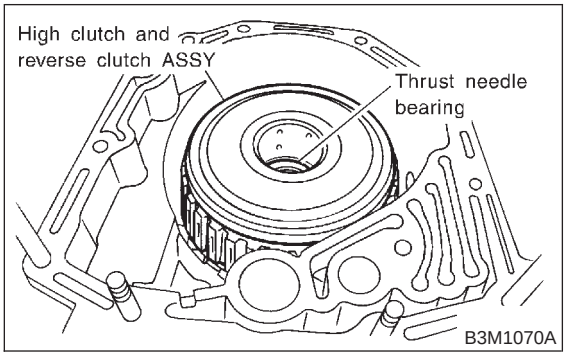


12) Remove 2-4 brake seal.

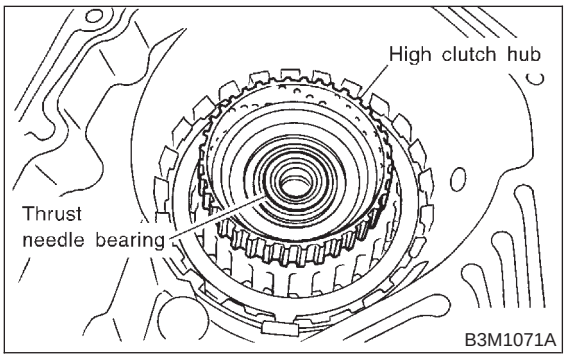


13) Take out the high clutch and reverse clutch assembly.

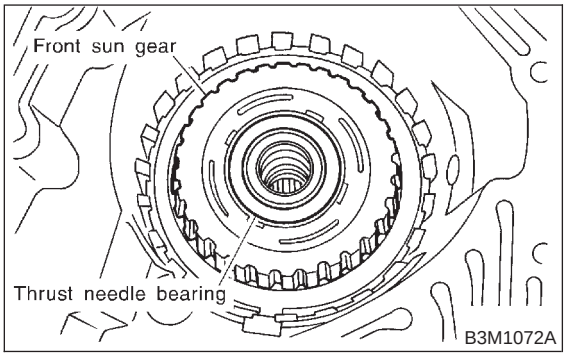
CAUTION:
Be careful not to lose thrust needle bearing.



14) Take out the high clutch hub and the thrust bearing.



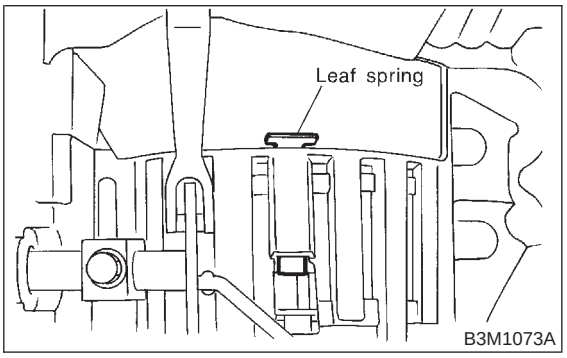
15) Take out the front sun gear and the thrust bearing.



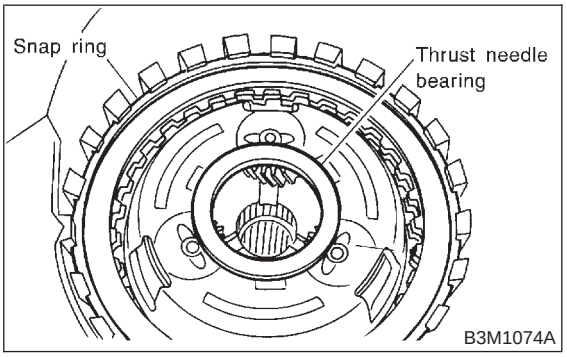
16) Pull out leaf spring.

CAUTION:
Be careful not to bend leaf spring during removal.

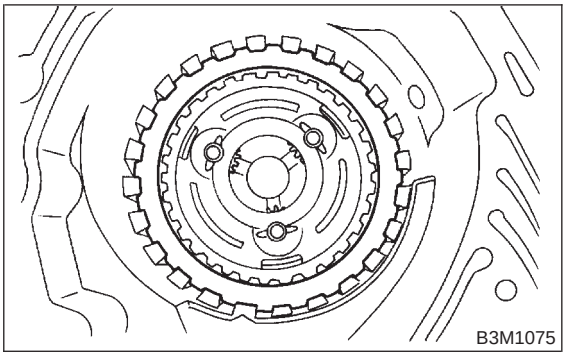
NOTE:
Remove it while pressing down on lower leaf spring.



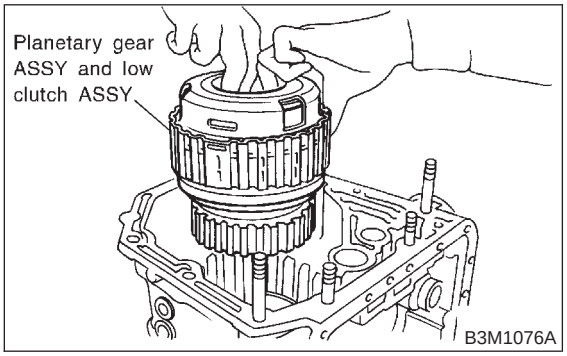
17) Remove snap ring and thrust needle bearing.



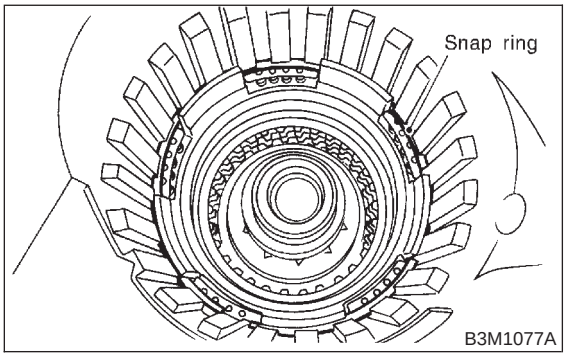
18) Take out retaining plate, drive plate and driven plate of 2-4 brake.



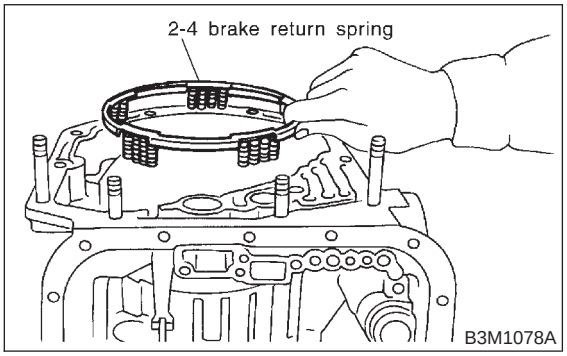
19) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



20) Remove snap ring.

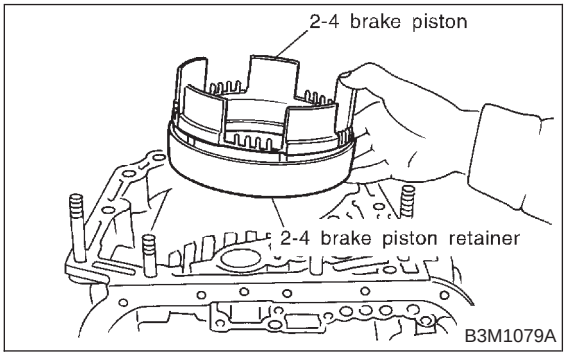


21) Take out 2-4 brake return spring.

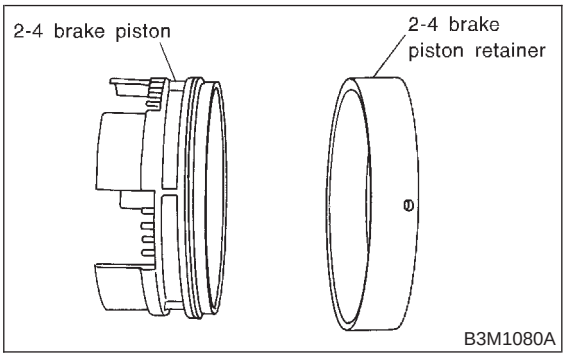


22) Take out 2-4 brake piston and piston retainer.

CAUTION:
When removing the brake piston 2-4 and piston retainer, be careful not to rub or bump them against the transmission case.

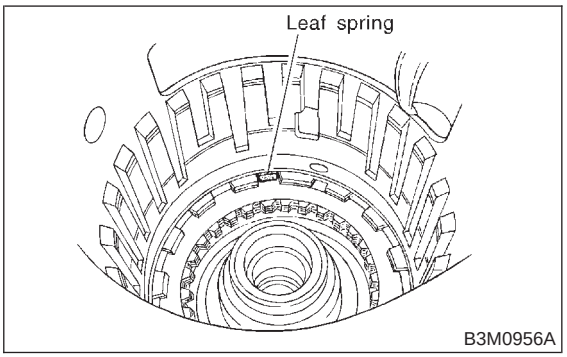


23) Separate 2-4 brake piston and piston retainer.

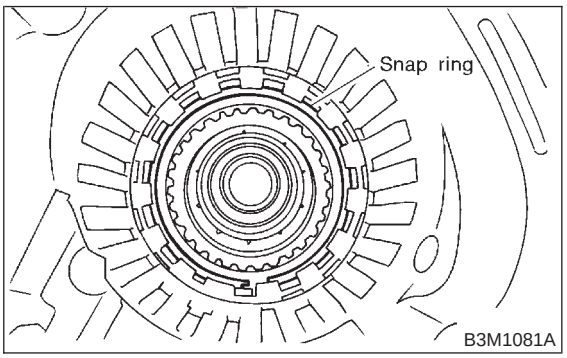


24) Pull out leaf spring.

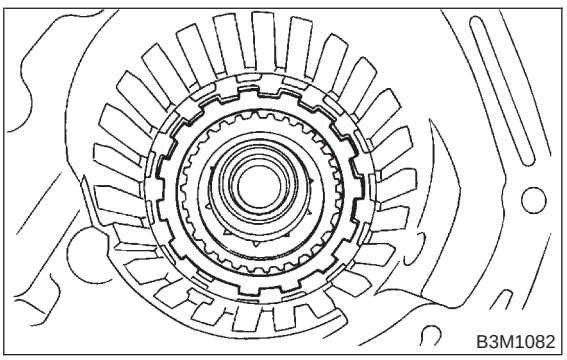
CAUTION:
Be careful not to bend leaf spring during removal.



25) Remove snap ring.

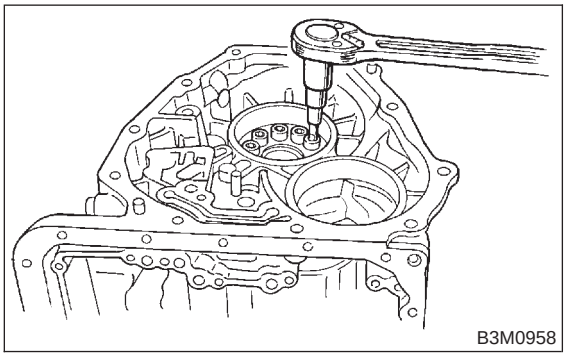


26) Take out retaining plate, drive plate, driven plate and dish plate.

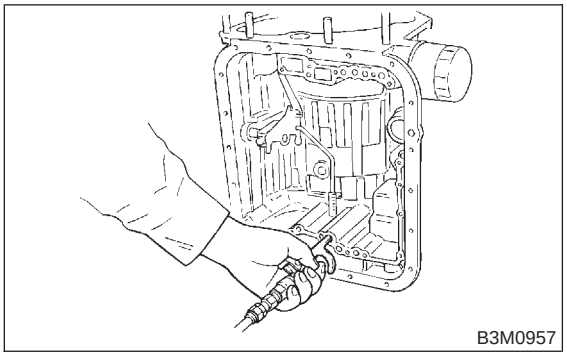


27) Turning the case upside down, take out the one-way clutch inner race, retainer and wave spring.

NOTE:
After loosening all socket bolts, place the side of the transmission case on the floor.


B3M0958

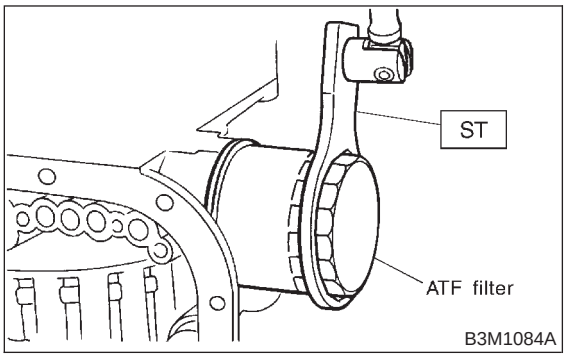
28) Take out the low & reverse piston by applying compressed air.


B3M0957

29) Using ST, remove ATF filter.

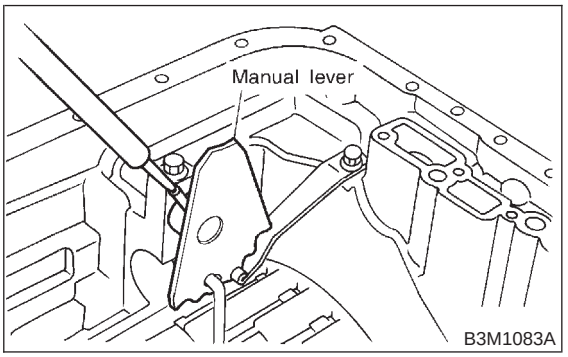
NOTE:
If any of the clutches or brakes are abnormally worn, replace ATF filter and oil seal with new ones.

ST 498545400 OIL FILTER WRENCH



B3M1084A

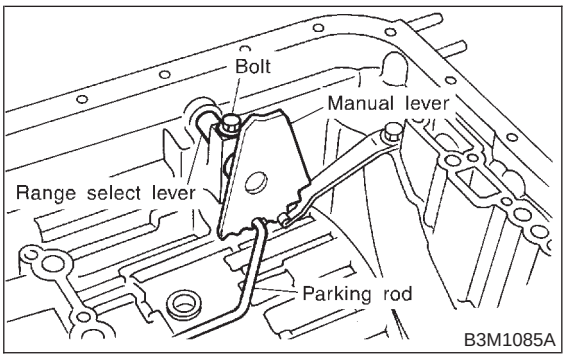
30) Pull off the straight pin of manual lever.



B3M1083A

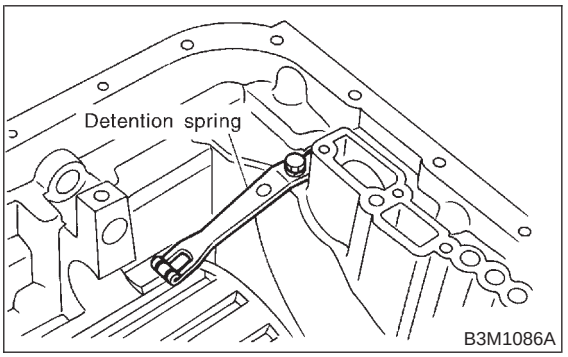
31) Remove bolts securing select lever, then remove select lever, manual lever and parking rod.

CAUTION:
Be careful not to damage the lips of the press-fitted oil seal in the case.



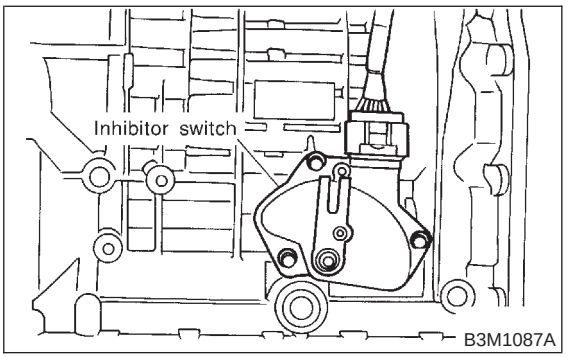
B3M1085A

32) Remove the detention spring.



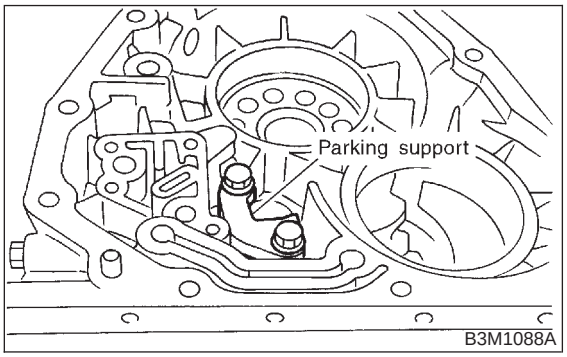
B3M1086A

33) Remove the inhibitor switch.



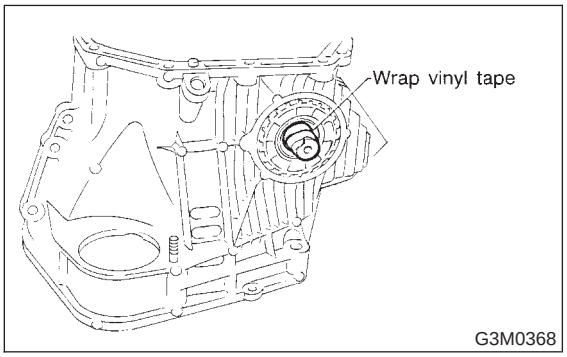
B3M1087A

34) Remove parking support.



4. TORQUE CONVERTER CLUTCH CASE SECTION

1) Wrap the axle shaft serration with vinyl tape.



2) Remove the differential side retainer with ST.

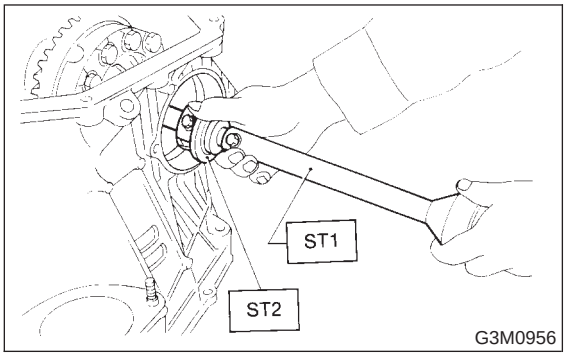
CAUTION:
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case and speedometer gears.

ST 499787000 WRENCH ASSY

3) Extract the axle shaft with ST1 and ST2.

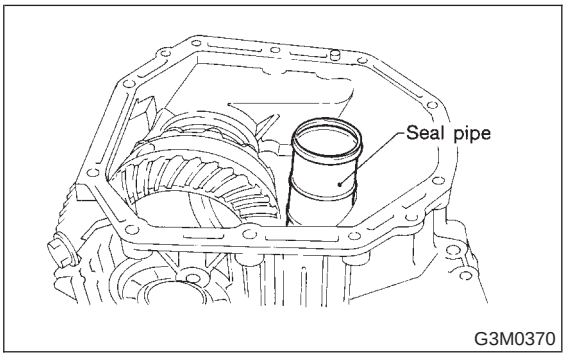
CAUTION:
Do not reuse the circlip.

ST1 499095500 REMOVER
ST2 499247300 INSTALLER



4) Remove the differential case assembly.

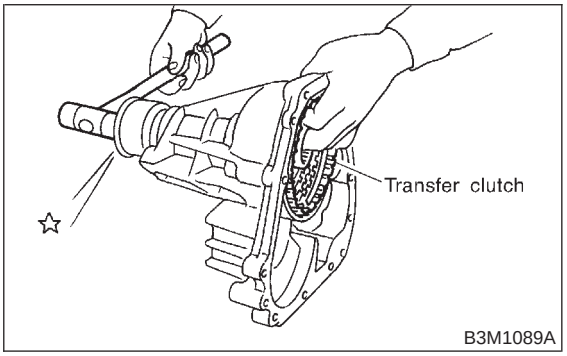
CAUTION:
● Remove the seal pipe if it is attached. (Reusing is not allowed.)
● Be careful not to damage the retainer mounting hole of the torque converter clutch case and the speedometer gears.



5. EXTENSION SECTION

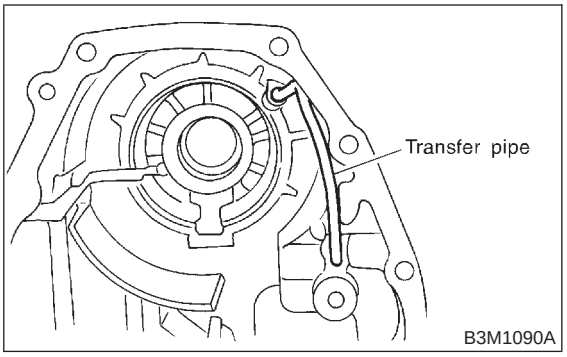
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

CAUTION:
Be careful not to damage the oil seal in the extension.



2) Remove the transfer pipe.

CAUTION:
Be careful not to bend the pipe.



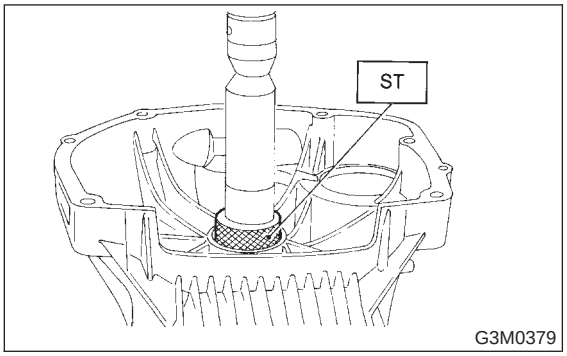
C: ASSEMBLY OF OVERALL TRANSMISSION

1. TORQUE CONVERTER CLUTCH CASE SECTION

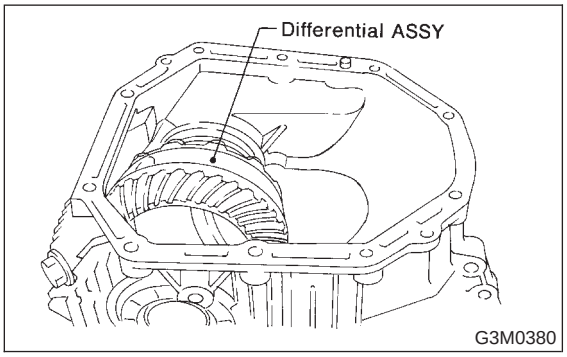
1) Check the appearance of each component and clean.

CAUTION:
Make sure each part is free of harmful cuts, damage and other faults.

2) Force-fit the oil seal to the torque converter clutch case with ST.
ST 398437700 DRIFT



3) Install the differential assembly to the case, paying special attention not to damage the inside of the case (particularly, the differential side retainer contact surface).

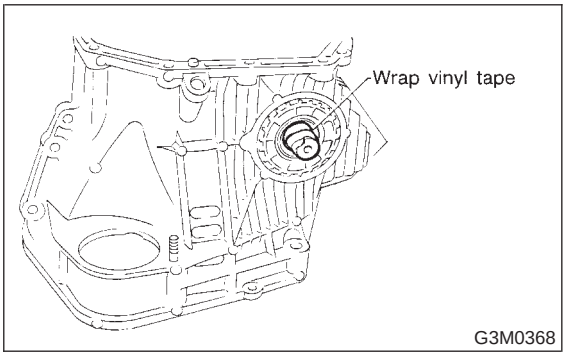


4) Install the circlip to the axle shaft, insert the shaft into the differential assembly, and tap it into position with a plastic hammer.

CAUTION:
- **If no play is felt, check whether the shaft is fully inserted. If shaft insertion is correct, replace the axle shaft.**
- **Be sure to use a new circlip.**

Thrust play:
0.3 — 0.5 mm (0.012 — 0.020 in)

5) Wrap vinyl tape around the splined portion of the axle shaft.



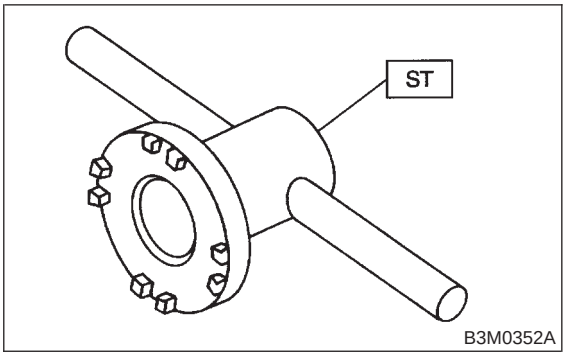
6) Install the oil seal and outer race (taper roller bearing) to the differential side retainer. Then screw in the retainer and the O-ring after coating the threads with oil.

CAUTION:
- **Pay attention not to damage the oil seal lips.**
- **Do not confuse the RH and LH oil seals.**
- **Keep the O-ring removed from the retainer.**

7) Using the ST, screw in the retainer until light contact is felt.

NOTE:
Screw in the RH side slightly deeper than the LH side.

ST 499787000 WRENCH ASSY

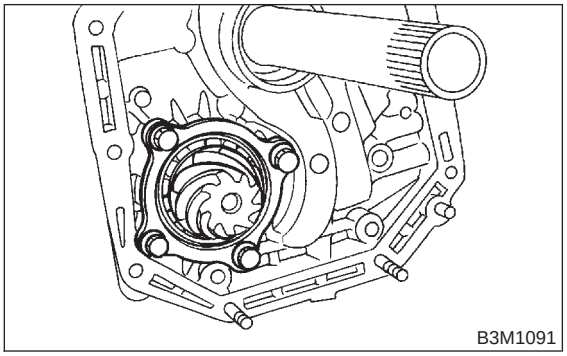


8) Hypoid gear backlash adjustment and tooth contact check
(1) Assemble the drive pinion assembly to the oil pump housing.

CAUTION:
- **Be careful not to bend the shims.**
- **Be careful not to force the pinion against the housing bore.**

(2) Tighten four bolts to secure the roller bearing.

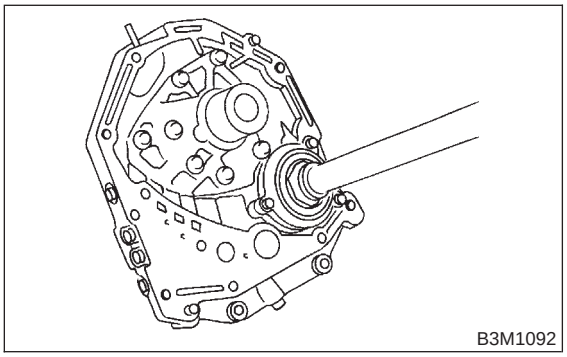
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)


B3M1091

(3) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

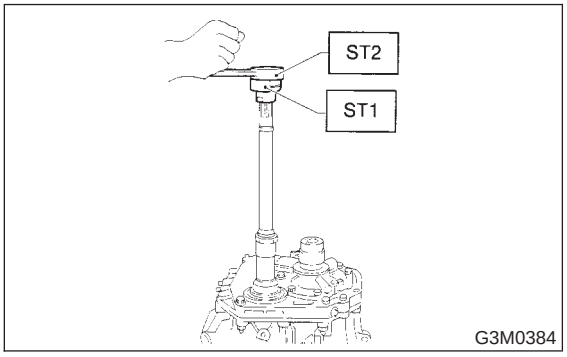
CAUTION:
● Thoroughly remove the liquid gasket from the case mating surface beforehand.
● Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)


B3M1092

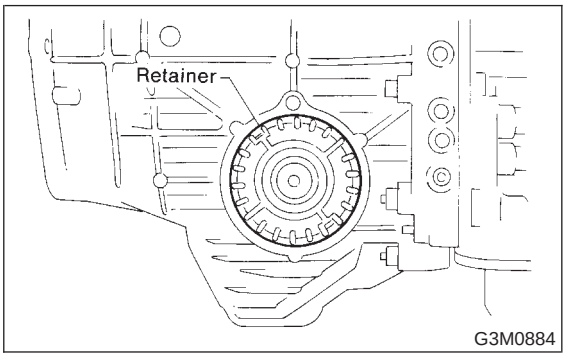
(4) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937100 HOLDER
ST2 499787700 WRENCH



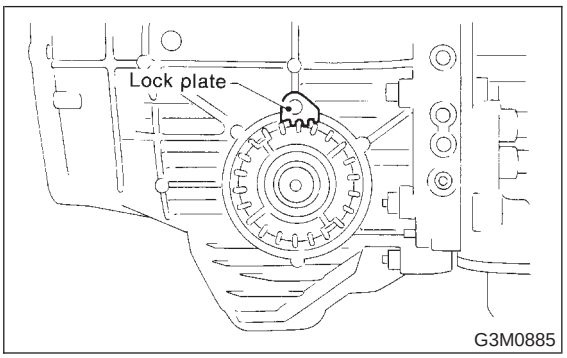
G3M0384

(5) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the “zero” state.



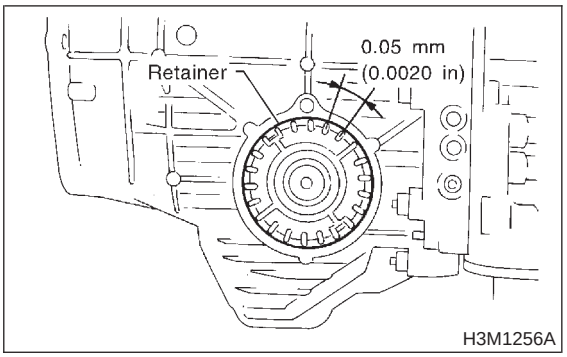
G3M0884

(6) After the “zero” state is established, back off the LH retainer 3 notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Repeat this procedure several times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



G3M0885

NOTE:
Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).



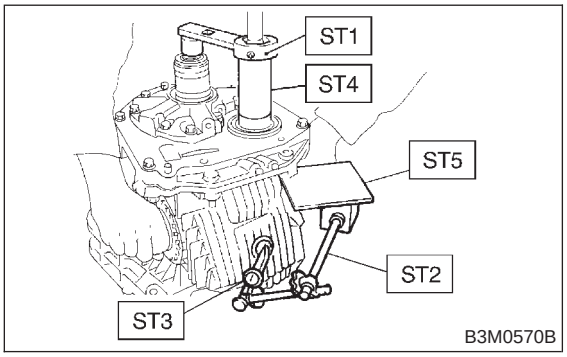
H3M1256A

(7) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

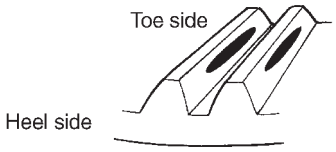
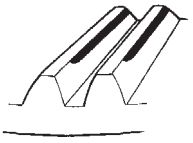
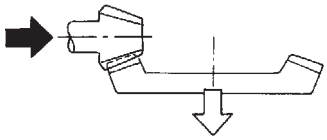
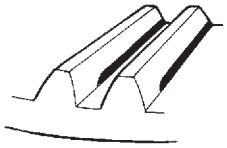
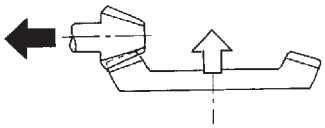
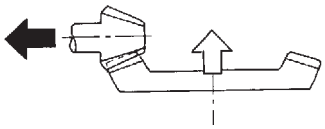
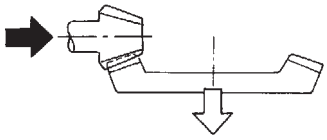
NOTE:
After confirming that the backlash is correct, check the tooth contact.

ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER WRENCH
ST5	498255400	PLATE

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



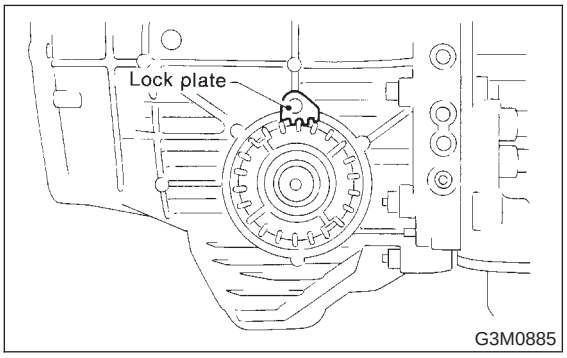
(8) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.
If tooth contact is improper, readjust the backlash or shim thickness.

Checking item	Contact pattern	Corrective action
Tooth contact Tooth contact pattern is slightly shifted toward to under no-load rotation. [When loaded, contact pattern moves toward heel.]	 B3M0317A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  B3M0319	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.  B3M0323
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  B3M0320	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  B3M0324
Toe contact (Inside end contact) Contact areas is small.	This may cause chipping at toe.  B3M0321	Adjust as for flank contact.  B3M0324
Heel contact (Outside end contact) Contact area is small.	This may cause chipping at heel ends.  B3M0322	Adjust as for face contact.  B3M0323

➡ : Adjusting direction of drive pinion
⇨ : Adjusting direction of crown gear

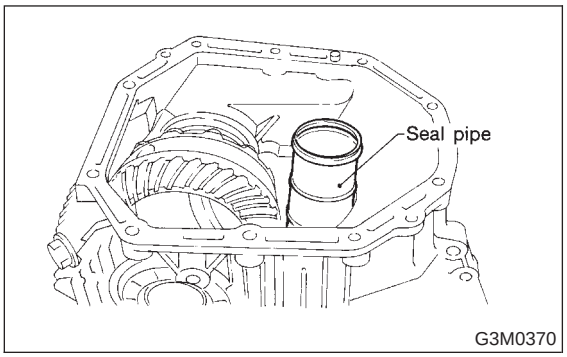
(9) If tooth contact is correct, mark the retainer position and loosen it. After fitting the O-ring, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



9) Install the seal pipe to the torque converter clutch case.

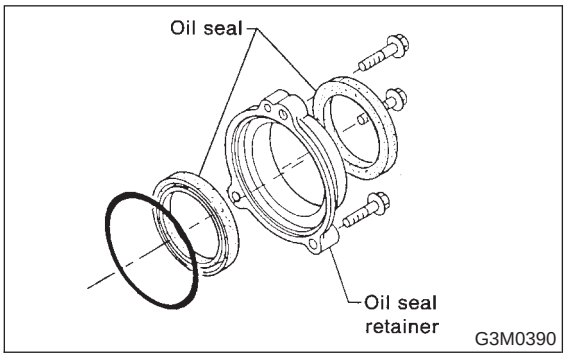
CAUTION:
Be sure to use a new seal pipe.



10) Install two oil seals to the oil seal retainer with ST.

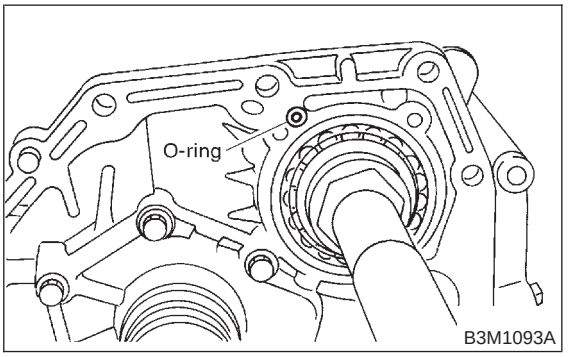
CAUTION:
● Always discard old oil seals, and install new ones.
● Pay attention to the orientation of the oil seals.

ST 499247300 INSTALLER



11) Attach the O-ring to the oil seal retainer with vaseline. Install the seal to the oil pump housing bore.

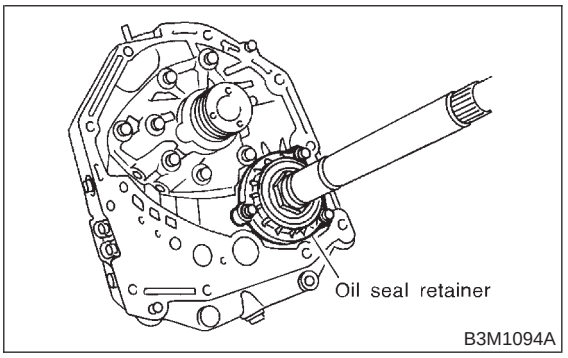
CAUTION:
Always discard old O-rings and install new ones.



12) Install the oil seal retainer taking care not to damage the oil seal lips. Then secure with three bolts.

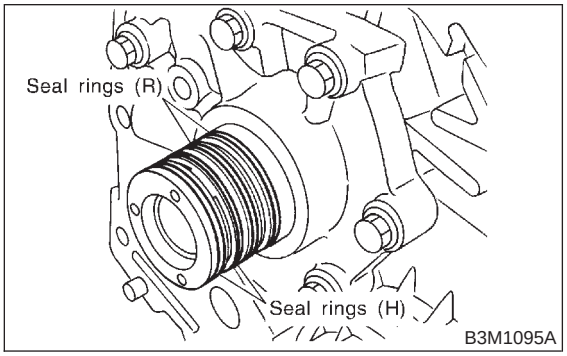
NOTE:
Make sure the O-ring is fitted correctly in position.

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)



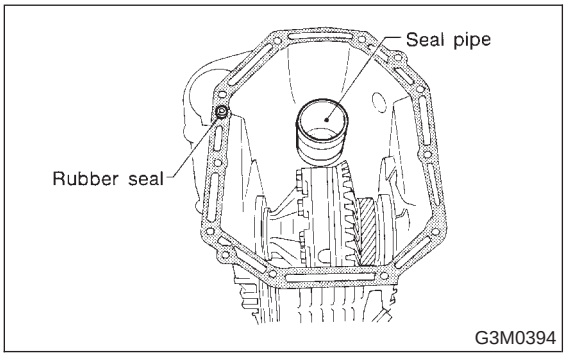
13) Apply vaseline to the groove on the oil pump cover, and install two (R) seal rings and two (H) seal rings.

NOTE:
● Fit the seal ring after compressing, and rub vaseline into the seal ring to avoid expansion.
● The “R” seal ring has a large diameter, while “H” has small diameter.



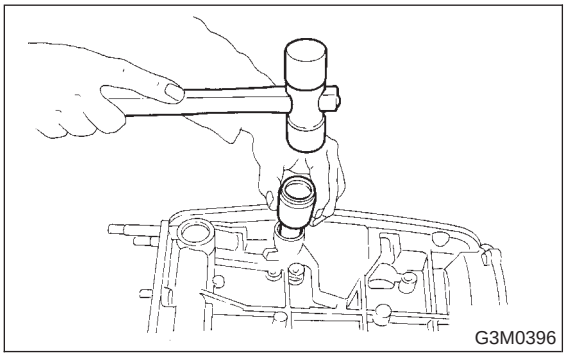
14) Install the rubber seal to the torque converter clutch case.

CAUTION:
Be careful not to lose the rubber seal.



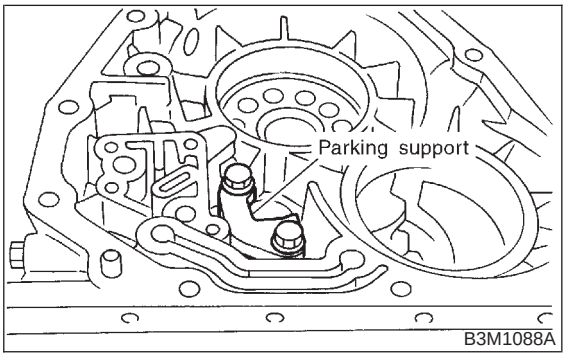
2. TRANSMISSION CASE SECTION

1) Using a plastic hammer, force-fit the oil seal.



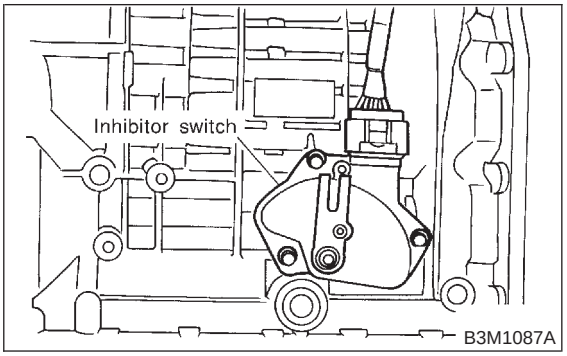
2) Install parking support to transmission case.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



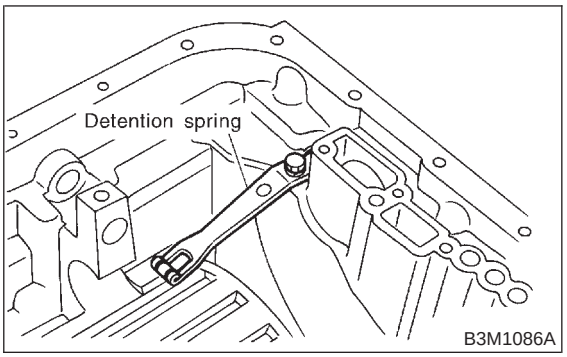
3) Install inhibitor switch to transmission case.

NOTE:
Temporary tighten inhibitor switch.



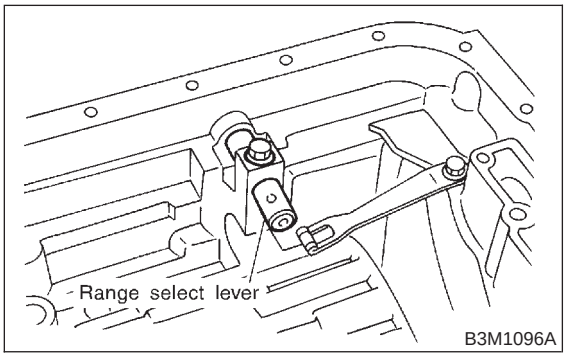
4) Install detention spring to transmission case.

Tightening torque:
6±1 N·m (0.6±0.1 kg-m, 4.3±0.7 ft-lb)

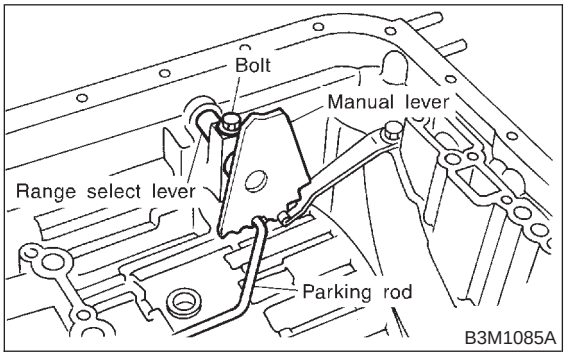


5) Insert range select lever, and tighten bolt.

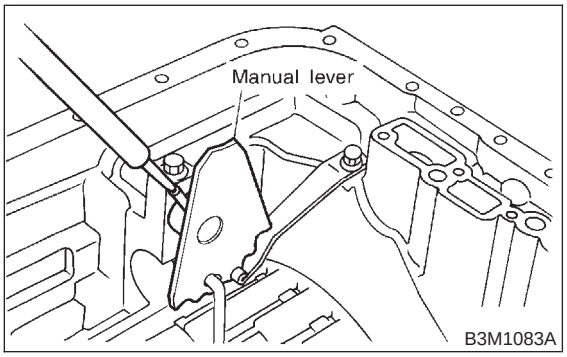
Tightening torque:
6±1 N·m (0.6±0.1 kg-m, 4.3±0.7 ft-lb)



6) Insert manual lever and parking rod.

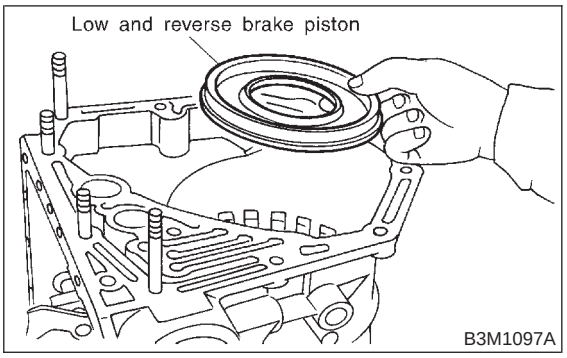


7) Insert spring pin to manual lever.

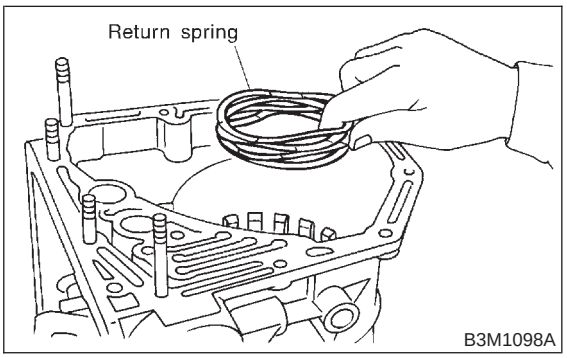


8) Install the low and reverse piston.

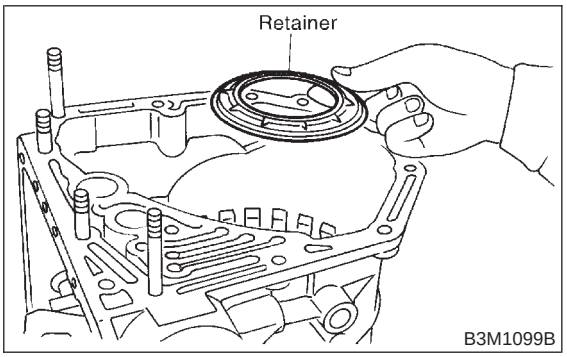
CAUTION:
● Be careful not to tilt the piston when installing.
● Be careful not to damage the lip seal.



9) Install return spring.



10) Install retainer.



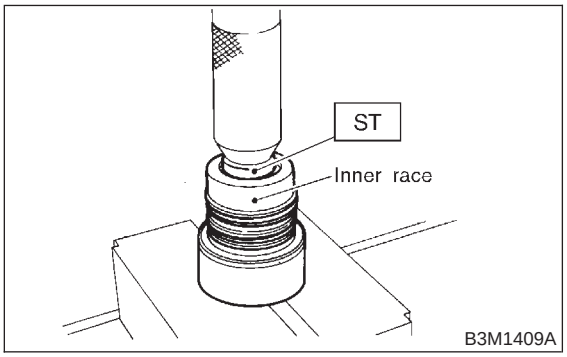
11) Install the one-way clutch inner race.

(1) Using a press and ST1, install the needle bearing to the inner race.

ST1 398497701 INSTALLER

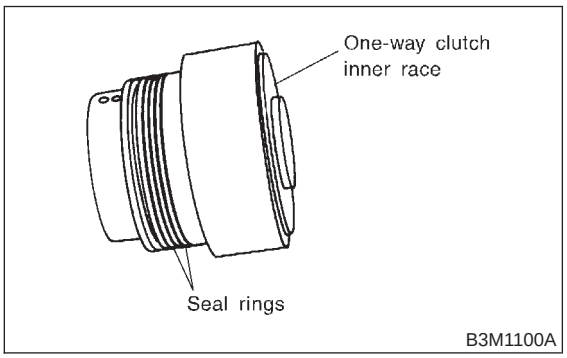
NOTE:
Use the following ST when removing.

ST 398527700 PULLER ASSY



(2) Install two seal rings to one-way clutch inner race.

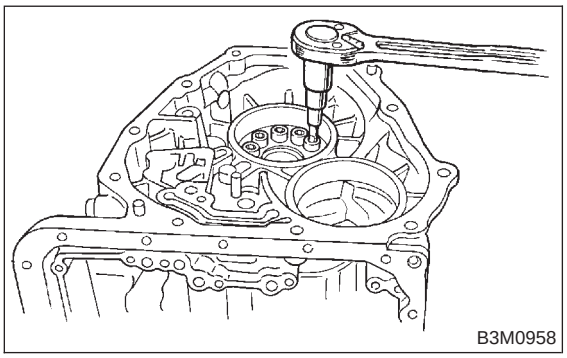
NOTE:
Apply vaseline to the groove of the inner race and to the seal ring after installation, so that the seal ring will not expand.



(3) Tighten eight socket head bolts from the rear side of the transmission case.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

CAUTION:
Be sure to tighten evenly.

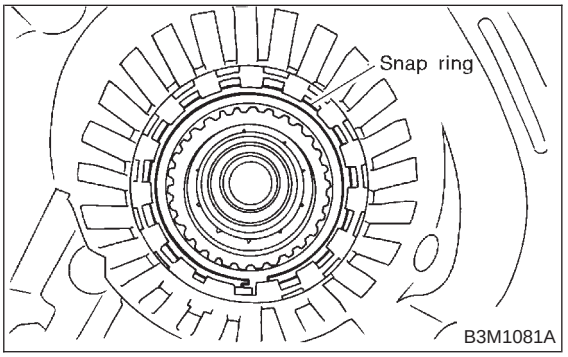


(4) Install thrust needle bearing.

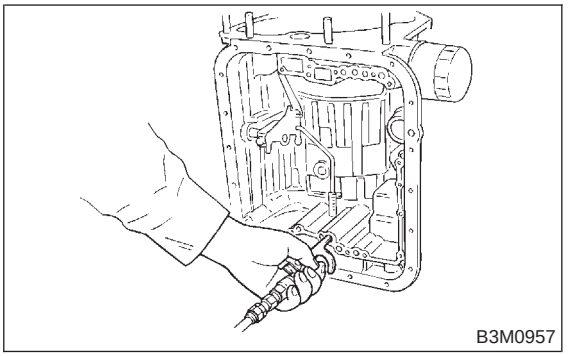
NOTE:
Place transmission case with the front facing up.

12) Installation of the low & reverse brake:
(1) Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

NOTE:
Pay attention to the orientation of the dish plate.



(2) Apply compressed air intermittently to check for operation.

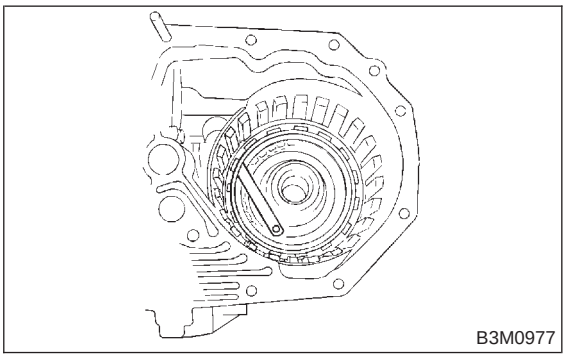


(3) Check the clearance. (Selection of retaining plate)

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.

Standard value:
0.7 — 1.2 mm (0.028 — 0.047 in)

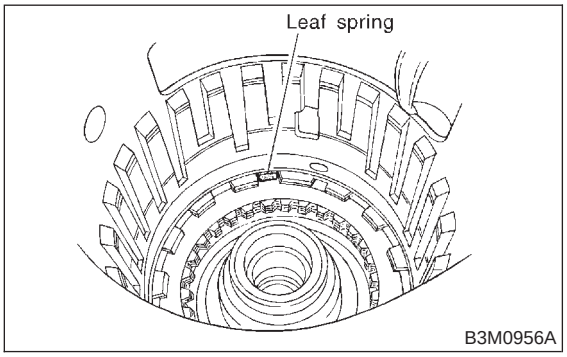
Allowable limit:
2.2 mm (0.087 in)



Available retaining plates	
Part No.	Thickness mm (in)
31667AA320	4.2 (0.165)
31667AA330	4.5 (0.177)
31667AA340	4.8 (0.189)
31667AA350	5.1 (0.201)
31667AA360	5.4 (0.213)
31667AA370	5.7 (0.224)
31667AA380	6.0 (0.236)

13) Install leaf spring of low and reverse brake.

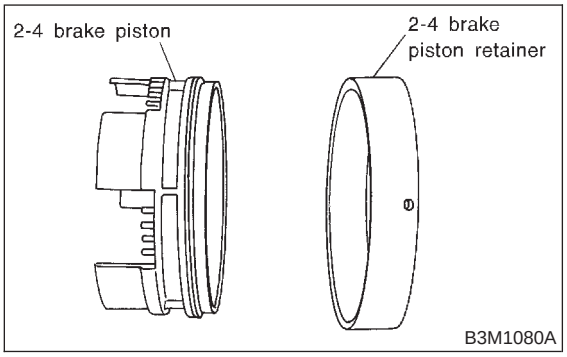
CAUTION:
Pay attention to the direction and position of leaf spring during installation.



14) Install O-ring to 2-4 brake piston.

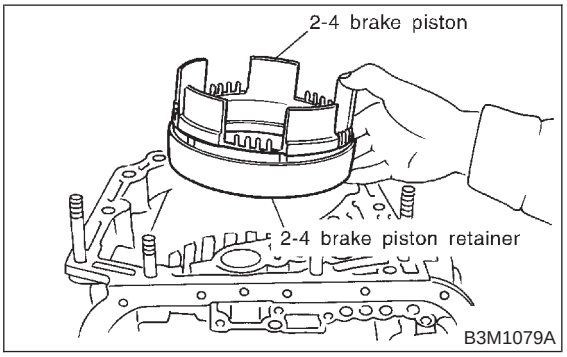
CAUTION:
- **If O-ring breaks or damage is noted, replace with new O-ring.**
- **Apply a coat of vaseline to inner side of O-ring before installation.**

15) Install 2-4 brake piston to 2-4 brake piston retainer.

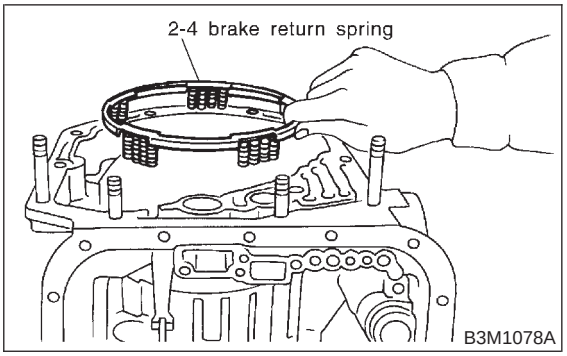


16) Install 2-4 brake piston and retainer to transmission case.

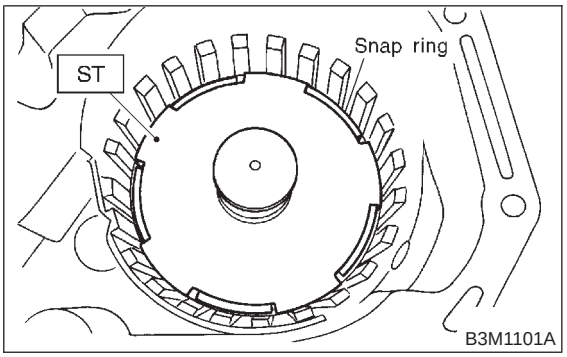
CAUTION:
Align the hole in the 2-4 brake seal of transmission case with the hole in 2-4 brake piston retainer during installation.



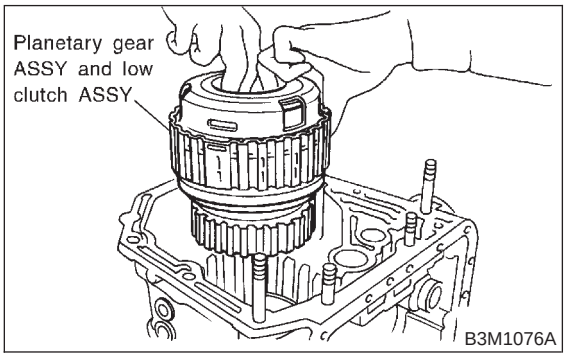
17) Install 2-4 brake piston return spring to transmission case.



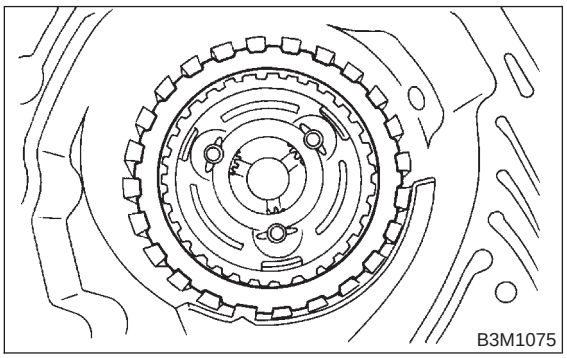
18) Position snap ring in transmission. Using ST, press the snap ring into place.
ST 498677100 COMPRESSOR



19) Install planetary gear and low clutch assembly to transmission case.
Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring.

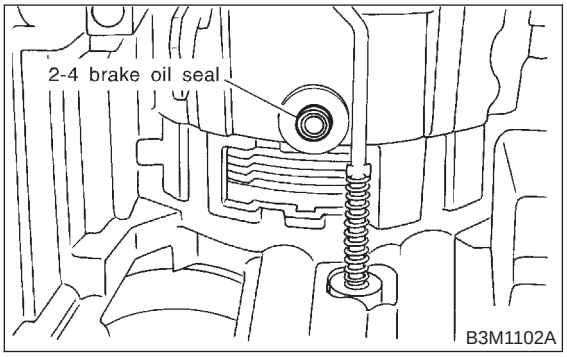


20) Installation of the 2-4 brake:
(1) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.

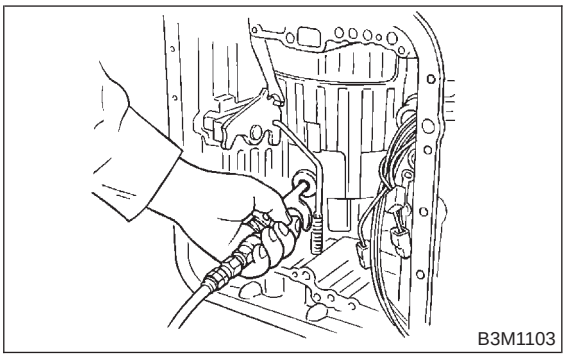


(2) Install 2-4 brake oil seal to transmission case.

CAUTION:
Be sure to use a new one.



(3) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.

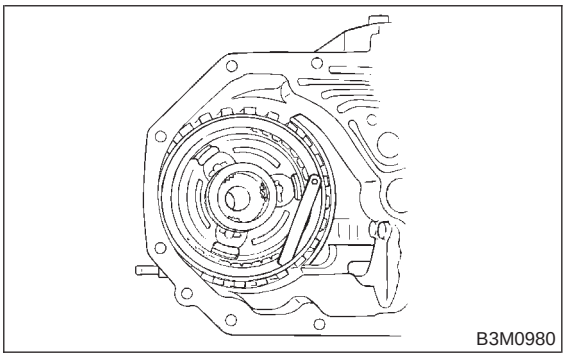


(4) Measure the clearance between the retaining plate and the snap ring.

NOTE:
Select a retaining plate with a suitable value from the following table, so that the clearance becomes the standard value.

Standard value:
0.8 — 1.2 mm (0.031 — 0.047 in)

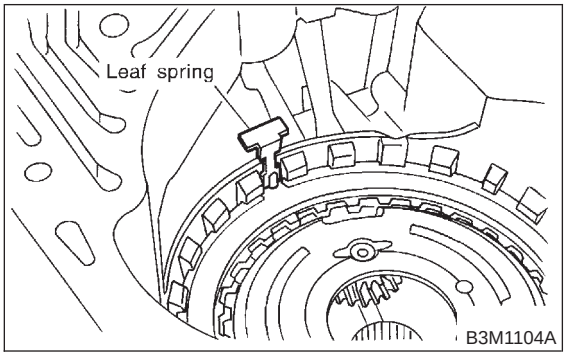
Allowable limit:
1.5 mm (0.059 in)



Available retaining plates	
Part No.	Thickness mm (in)
31567AA610	5.6 (0.220)
31567AA620	5.8 (0.228)
31567AA630	6.0 (0.236)
31567AA640	6.2 (0.244)
31567AA650	6.4 (0.252)
31567AA660	6.6 (0.260)

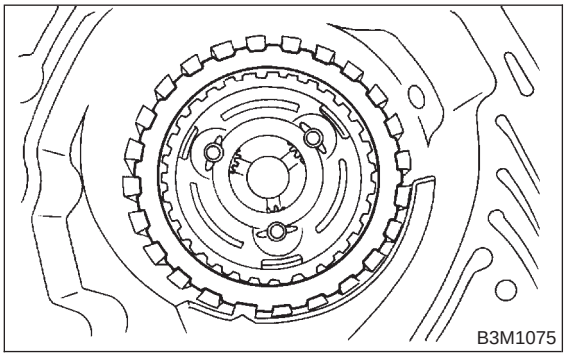
21) Install leaf spring of 2-4 brake.

NOTE:
Be careful not to mistake the location of the leaf spring to be inserted.



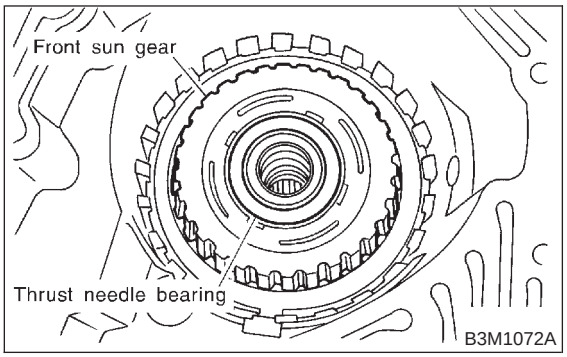
22) Install thrust needle bearing.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>



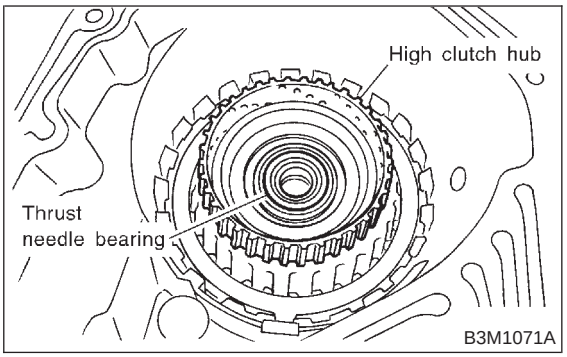
23) Install front sun gear and thrust needle bearing.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>



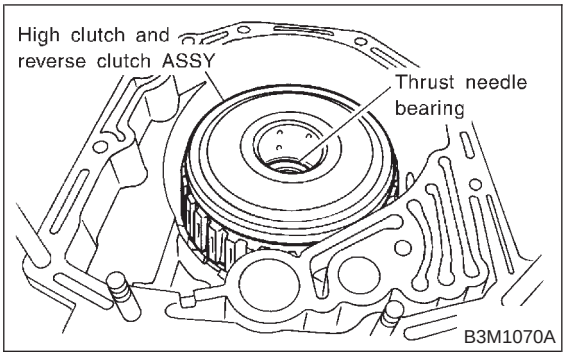
24) Install the high clutch hub and thrust needle bearing.
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>



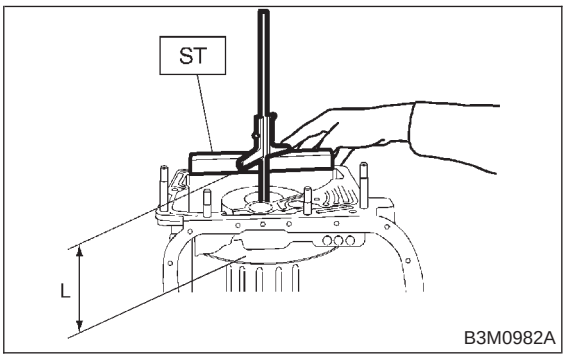
25) Install the high clutch assembly.

NOTE:
Correctly engage the high clutch hub and clutch splines.

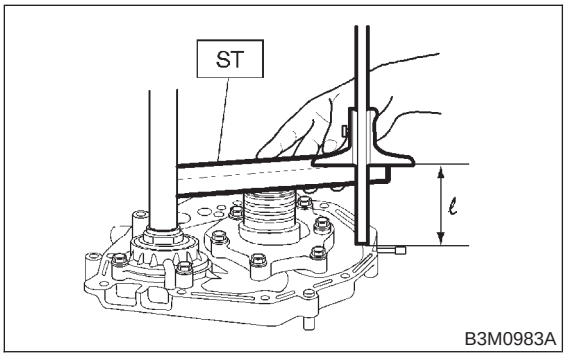


26) Adjustment of total end play:
(1) Using ST, measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum “L”.

ST 398643600 GAUGE

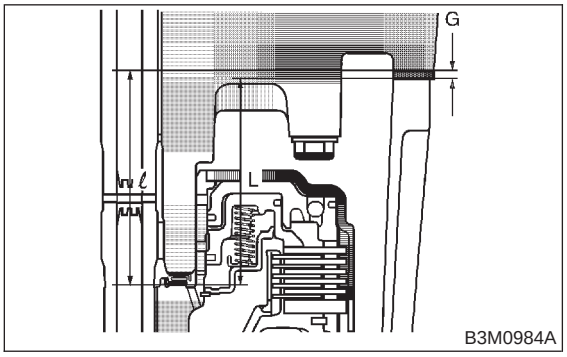


(2) Using ST, measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with thrust needle bearing.
ST 398643600 GAUGE



(3) Calculation of total end play
Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 — 0.55 mm (0.0098 — 0.0217 in) range.
C = (L + G) − ℓ

C	Clearance between concave portion of high clutch and end of clutch drum support
L	Length from case mating surface to concave portion of high clutch
G	Gasket thickness (0.28 mm, 0.0110 in)
ℓ	Height from housing mating surface to upper surface of clutch drum support



Thrust needle bearing	
Part No.	Thickness mm (in)
806528050	4.1 (0.161)
806528060	4.3 (0.169)
806528070	4.5 (0.177)
806528080	4.7 (0.185)
806528090	4.9 (0.193)
806528100	5.1 (0.201)

27) Install the oil pump housing assembly.
(1) After completing end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust needle bearing to the oil pump cover with vaseline.

(2) After correctly installing the gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

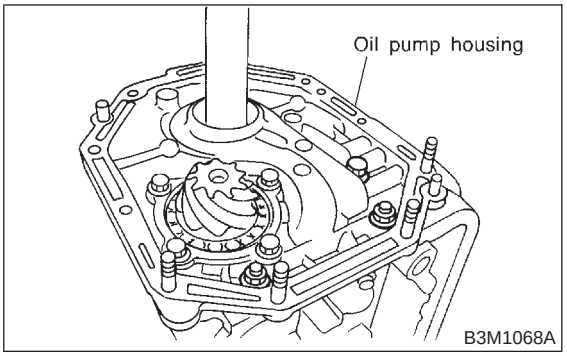
CAUTION:
- **Be careful not to damage the seal ring.**
- **Be sure to use a new gasket.**

(3) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

NOTE:
Any clearance suggests a damaged seal ring.

(4) Secure the housing with two nuts.

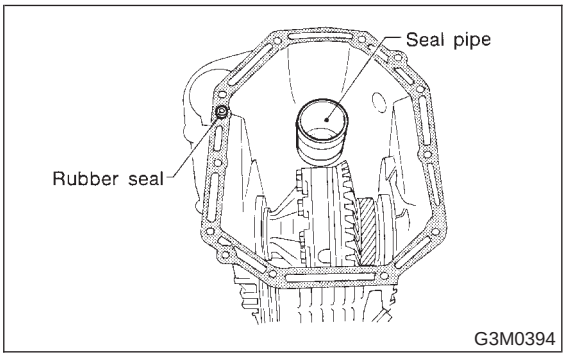
Tightening torque:
T: 41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



3. TORQUE CONVERTER CLUTCH CASE AND TRANSMISSION CASE

1) Apply proper amount of liquid gasket (THREE BOND Part No. 1215) to the entire torque converter clutch case mating surface.

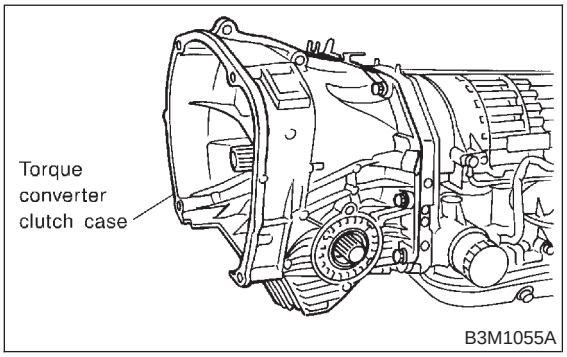
NOTE:
Make sure that the rubber seal and seal pipe are fitted in position.



2) Install the torque converter clutch case assembly to the transmission case assembly, and secure with six bolts and four nuts.

CAUTION:
When installing, be careful not to damage the torque converter clutch case bushing and oil seal.

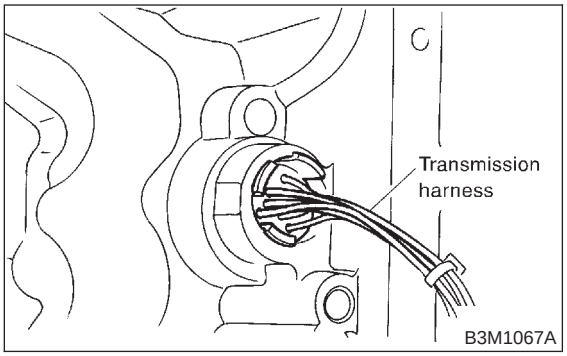
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



4. CONTROL VALVE AND OIL PAN

1) Install and route the transmission harness.

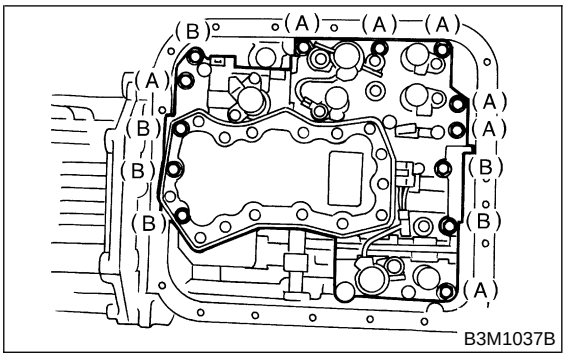
CAUTION:
Be careful not to damage the harness.



2) Install the control valve assembly.
(1) Set the select lever in range “N”.

(2) Temporarily tighten the valve body on the transmission case.

CAUTION:
Be sure to engage the manual valve with the manual plate during installation.

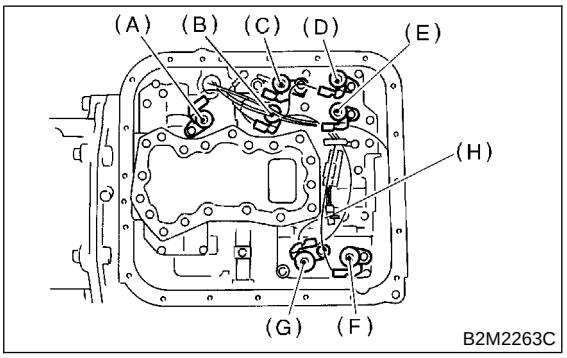


(A) Short bolts
(B) Long bolts

(3) Tighten the valve body to the specified torque.

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

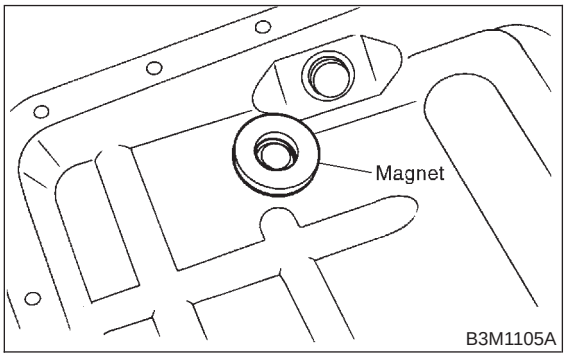
3) Connect all connectors.



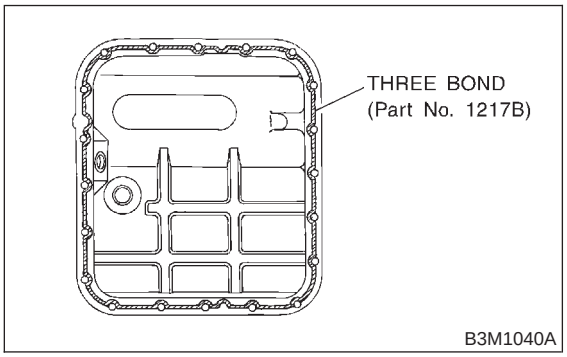
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor

4) Install the oil pan.

(1) Attach the magnet at the specified position.



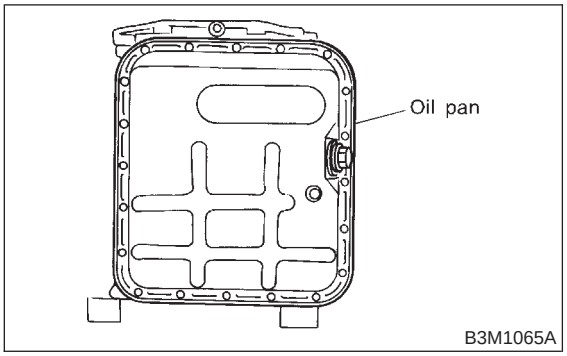
(2) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surace.



(3) Install the oil pan to the transmission case assembly, and secure with 20 bolts.

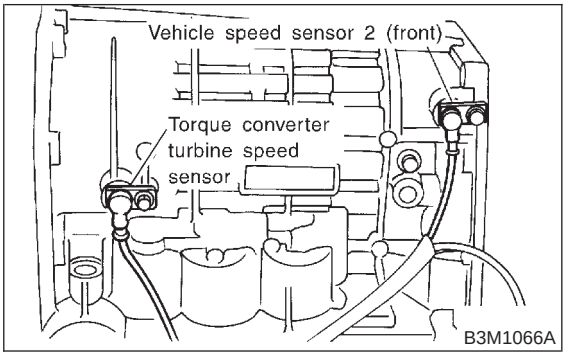
NOTE:
Tighten the bolts evenly.

Tightening torque:
4.9±0.5 N·m (0.50±0.05 kg-m, 3.6±0.4 ft-lb)



5) Install torque converter turbine speed sensor and vehicle speed sensor 2 (front).

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)

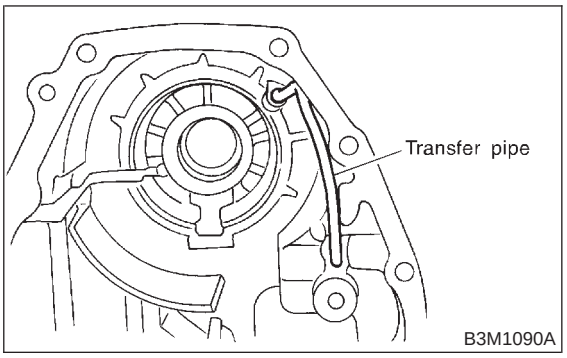


5. EXTENSION SECTION

NOTE:
When installing new oil seal into extension case, press it with ST.

ST 498057300 INSTALLER

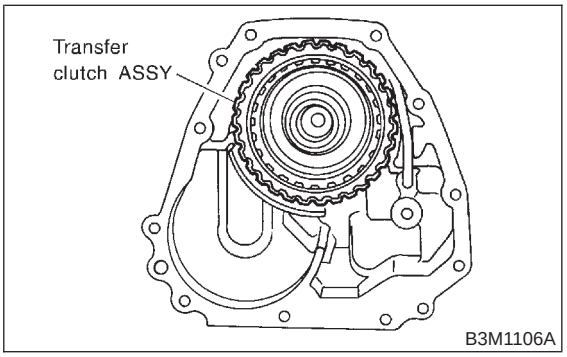
1) Install the transfer pipe to extension case.



2) Install the transfer clutch assembly to the case.

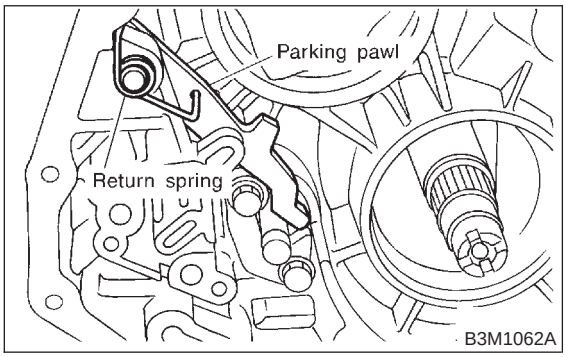
CAUTION:
Be careful not to damage the seal rings.

NOTE:
Insert the clutch assembly fully into position until the bearing shoulder bottoms.

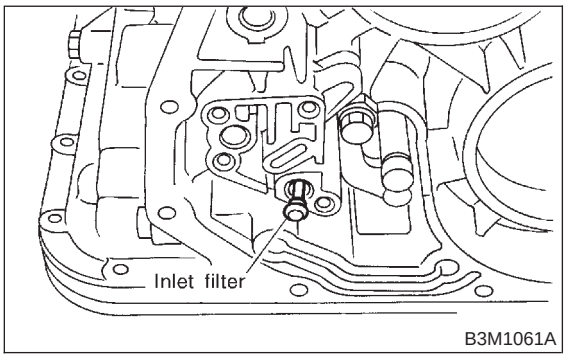


6. CONNECTION OF EACH SECTION

1) Install the parking pawl, shaft and return spring.



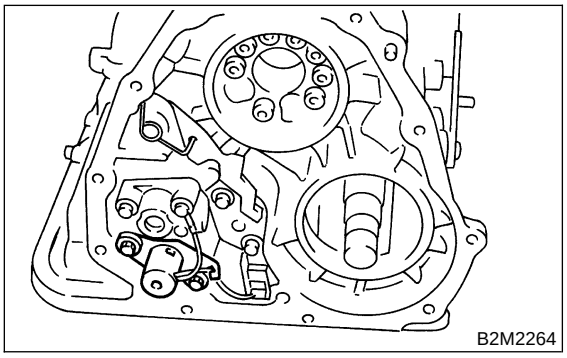
2) Install inlet filter to transmission case.



3) Install transfer valve plate, valve body and duty solenoid C (transfer) to transmission case.

CAUTION:
● Be sure to install transfer seal lip to transfer control valve body.
● If transfer seal lip is damaged, replace seal with new one.

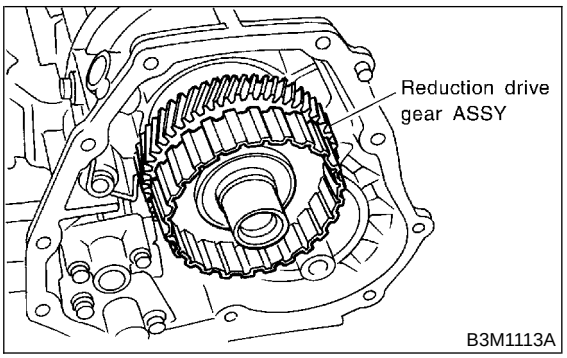
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



4) Connect connector to duty solenoid C (transfer).

5) Install the reduction drive gear assembly.

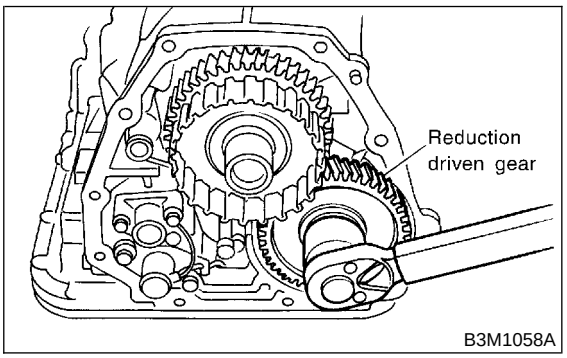
NOTE:
Insert it fully into position until the bearing shoulder bottoms.



6) Using a plastic hammer, install reduction driven gear assembly, and tighten drive pinion lock nut.

NOTE:
- Be sure to use a new lock nut and a washer.
- Set the select lever in the “P” range.
- After tightening, stake the lock nut securely.

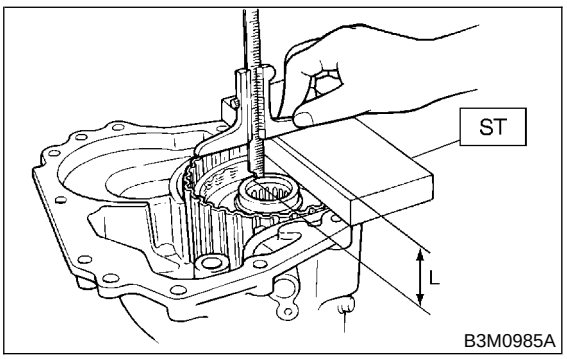
Tightening torque:
98±5 N·m (10.0±0.5 kg-m, 72.3±3.6 ft-lb)



7) Measurement and adjustment of extension end play
(1) Measure distance L from end of extension case and rear drive shaft with ST.

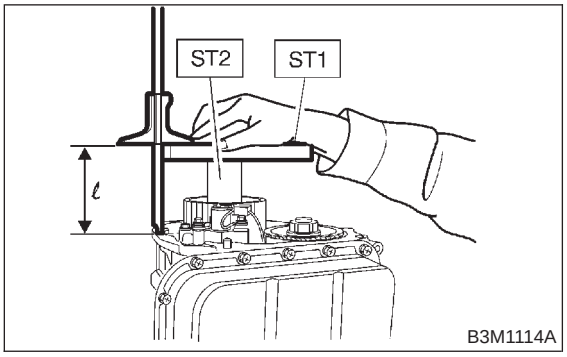
ST 398643600 GAUGE

L = Measured value − 15 mm



(2) Measure the distance "ℓ" from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.
ℓ = Measured value − 50 mm

ST1 398643600 GAUGE
ST2 499577000 GAUGE



(3) Calculation equation:

NOTE:
Add 0.05 mm (0.0020 in) and 0.20 mm (0.0079 in) thick shims to area "T". Calculate formula 2 to determine "H". The calculated "H" refers to the shim thickness range. Select shims of suitable thicknesses within the calculated "H" range.

T = (L + G) − ℓ − H
T : Shim clearance
L : Distance from end of extension case to end of rear drive shaft
G: Gasket thickness (0.45 mm, 0.0177 in)
ℓ : Height from end of transmission case to end of reduction drive gear
H : Thrust needle bearing thickness
0.05 — 0.25 mm (0.0020 — 0.0098 in)

Thrust needle bearing	
Part No.	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

8) Installation of extension case and transmission case

(1) Attach the selected thrust needle bearing to the end surface of reduction drive gear with vaseline.

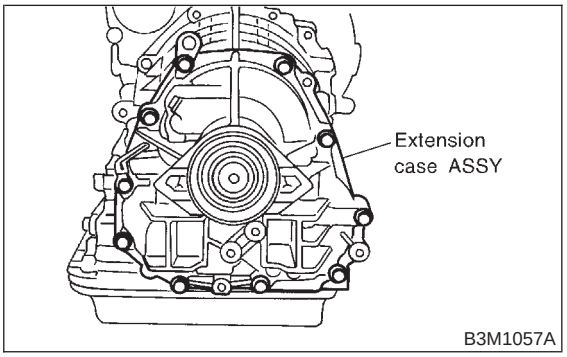
CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>

(2) Install the extension case to the transmission case.

CAUTION:
Be sure to use a new gasket.

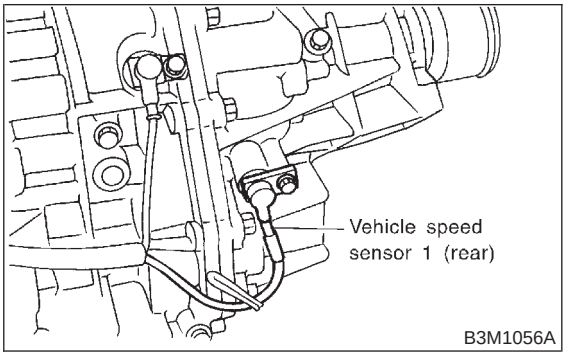
(3) Tighten bolts to secure the case.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



9) Install the vehicle speed sensor 1 (rear).

Tightening torque:
7±1 N·m (0.7±0.1 kg-m, 5.1±0.7 ft-lb)

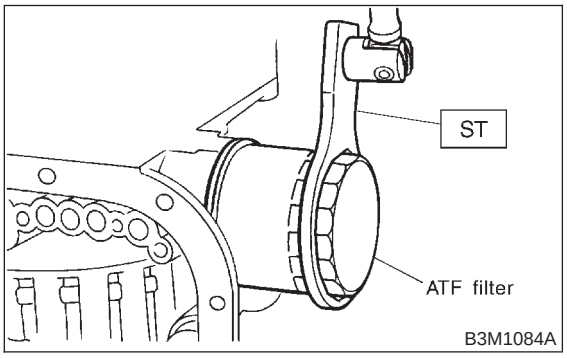


7. EXTERNAL PARTS

1) Using ST, install ATF filter to transmission case. Calculate ATF filter torque specifications using the following formula.
$T_2 = L_2/(L_1 + L_2) \times T_1$
T_1: 14±2 N·m (1.4±0.2 kg-m, 10.1±1.4 ft-lb) [Required torque setting]
T_2: Tightening torque
L_1: ST length 0.078 m (3.07 in)
L_2: Torque wrench length

CAUTION:
Align ST with torque wrench while tightening AFT filter.

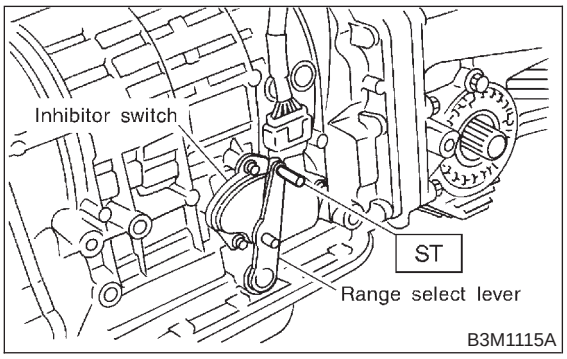
ST 498545400 OIL FILTER WRENCH



2) Adjustment of inhibitor switch
(1) With the select lever set to “N” adjust the inhibitor switch so that the hole of range select lever is aligned with the inhibitor switch hole with ST.

NOTE:
Ensure that gauge moves properly.

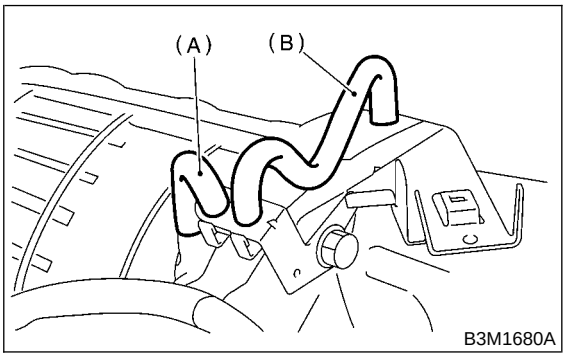
ST 499267300 STOPPER PIN



(2) With hole aligned, tighten three bolts to secure the inhibitor switch.

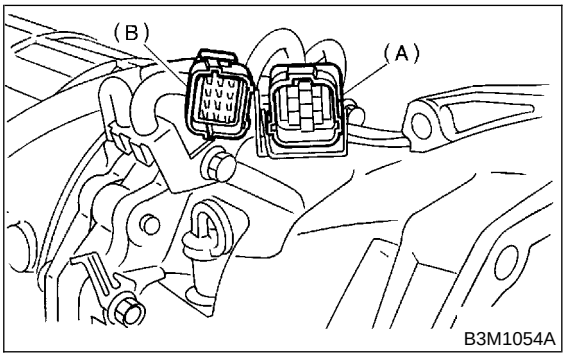
Tightening torque:
3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

3) Install air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

4) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

5) Install the oil cooler outlet pipe.

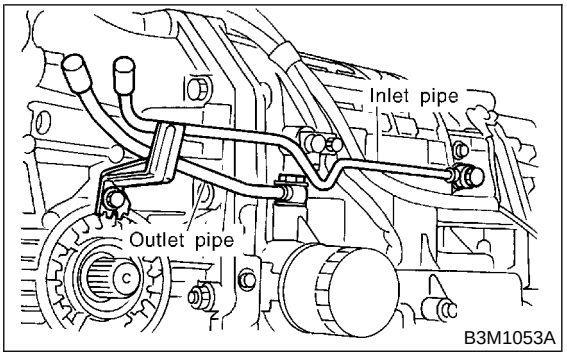
CAUTION:
Be sure to use a new aluminum washer.

Tightening torque:
34±3 N·m (3.5±0.3 kg-m, 25.3±2.2 ft-lb)

6) Install the oil cooler inlet pipe.

CAUTION:
Be sure to use a new aluminum washer.

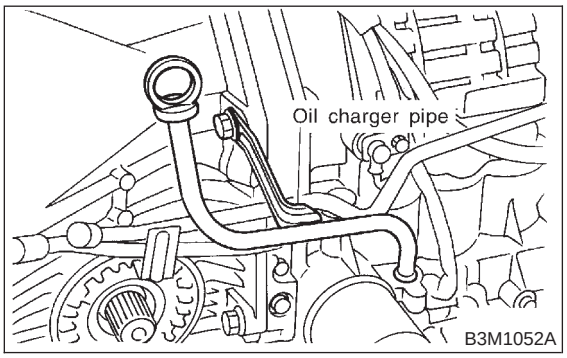
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



7) Install the oil charge pipe.

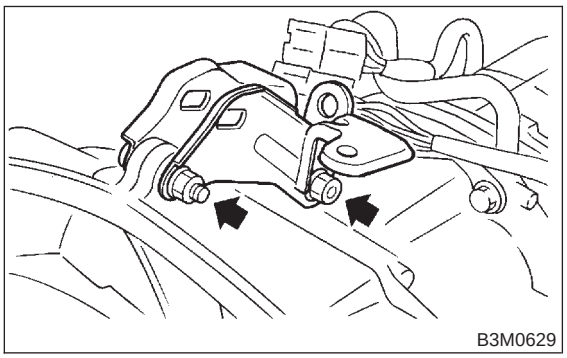
CAUTION:
Be careful not to damage the O-ring.

Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



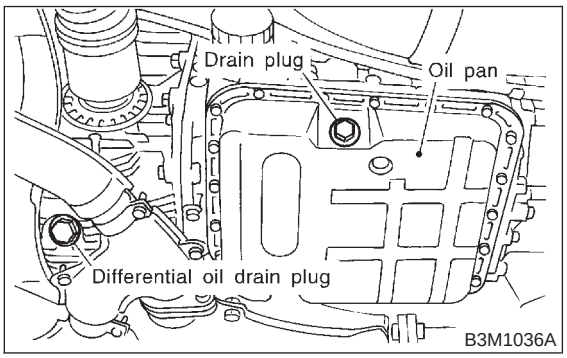
8) Install the pitching stopper bracket.

Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



9) Tighten the drain plugs.

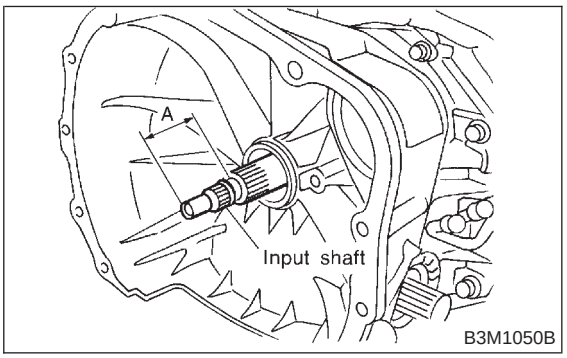
Tightening torque:
Diff.
44±3 N·m (4.5±0.3 kg-m, 32.5±2.2 ft-lb)
ATF
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



10) Insert the input shaft while turning lightly by hand.

CAUTION:
Be careful not to damage the bushing.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

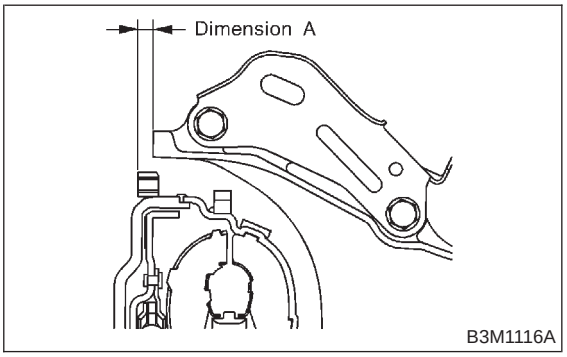


11) Install the torque converter clutch assembly.
(1) Install the oil pump shaft to the torque converter clutch.

NOTE:
Make sure the clip fits securely in its groove.

(2) Holding the torque converter clutch assembly by hand, carefully install it to the torque converter clutch case. Be careful not to damage the bushing. Also avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.
(3) Rotate the shaft lightly by hand to engage the splines securely.

Dimension A:
2.7 — 2.9 mm (0.106 — 0.114 in)

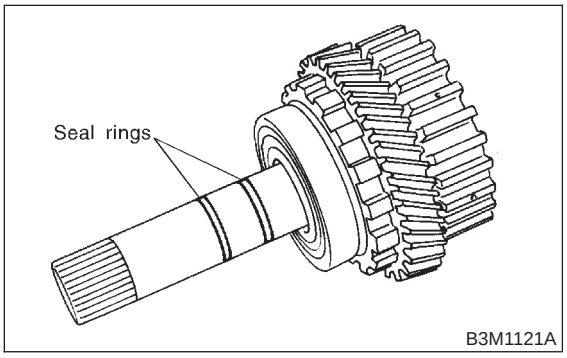


13. Reduction Drive Gear Assembly

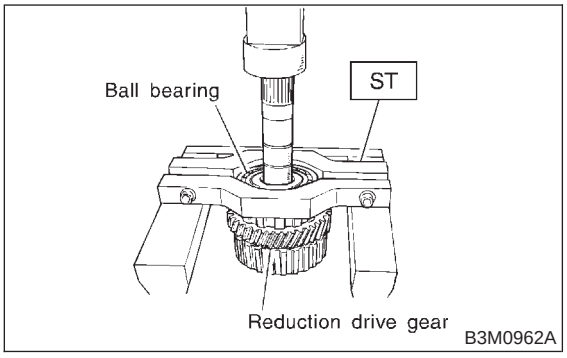
A: DISASSEMBLY

1) Take out the seal rings.

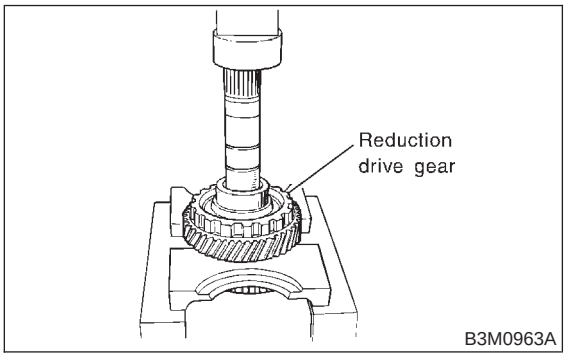
CAUTION:
Be careful not to damage the seal rings.



2) Using ST, remove the ball bearing.
ST 498077600 REMOVER



3) Using a press, remove the reduction drive gear.



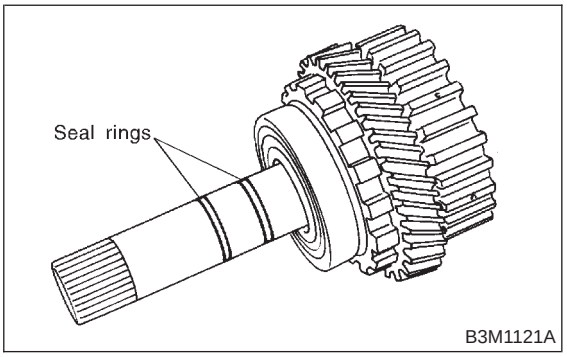
B: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.

C: ASSEMBLY

1) Press-fit the reduction drive gear to the shaft.
2) Press-fit the ball bearing to the reduction drive gear.
3) Attach two seal rings.

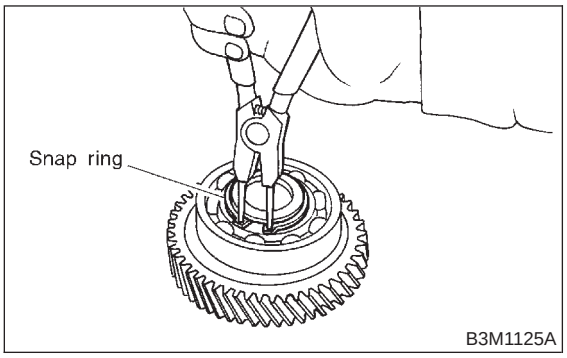
NOTE:
To make subsequent assembly easier, apply vaseline to the grooves of the shaft and to the exterior of the seal ring.



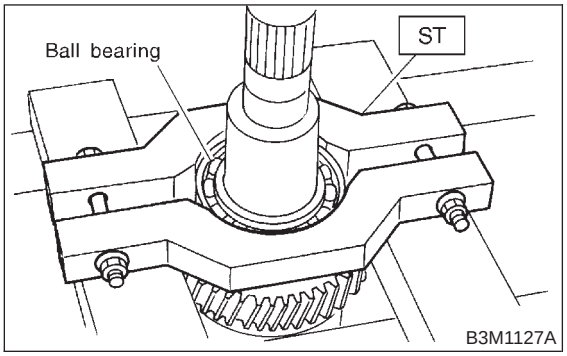
14. Reduction Driven Gear

A: DISASSEMBLY

1) Remove snap ring from reduction driven gear.



2) Using ST, remove ball bearing from reduction driven gear.
ST 498077600 REMOVER

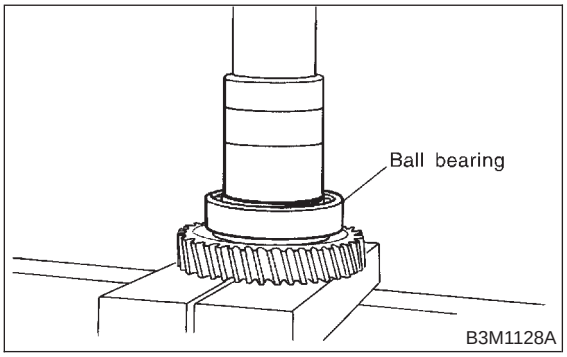


B: INSPECTION

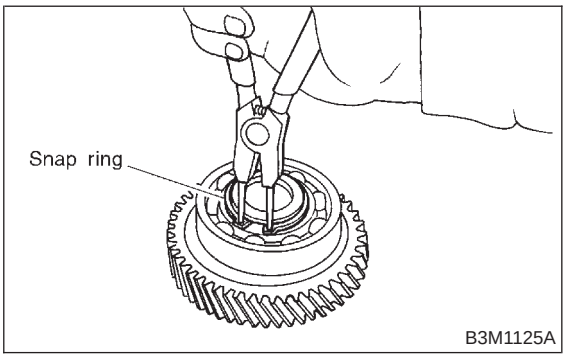
Check ball bearing and gear for dents or damage.

C: ASSEMBLY

1) Using a press, install ball bearing to reduction driven gear.



2) Install snap ring to reduction driven gear.

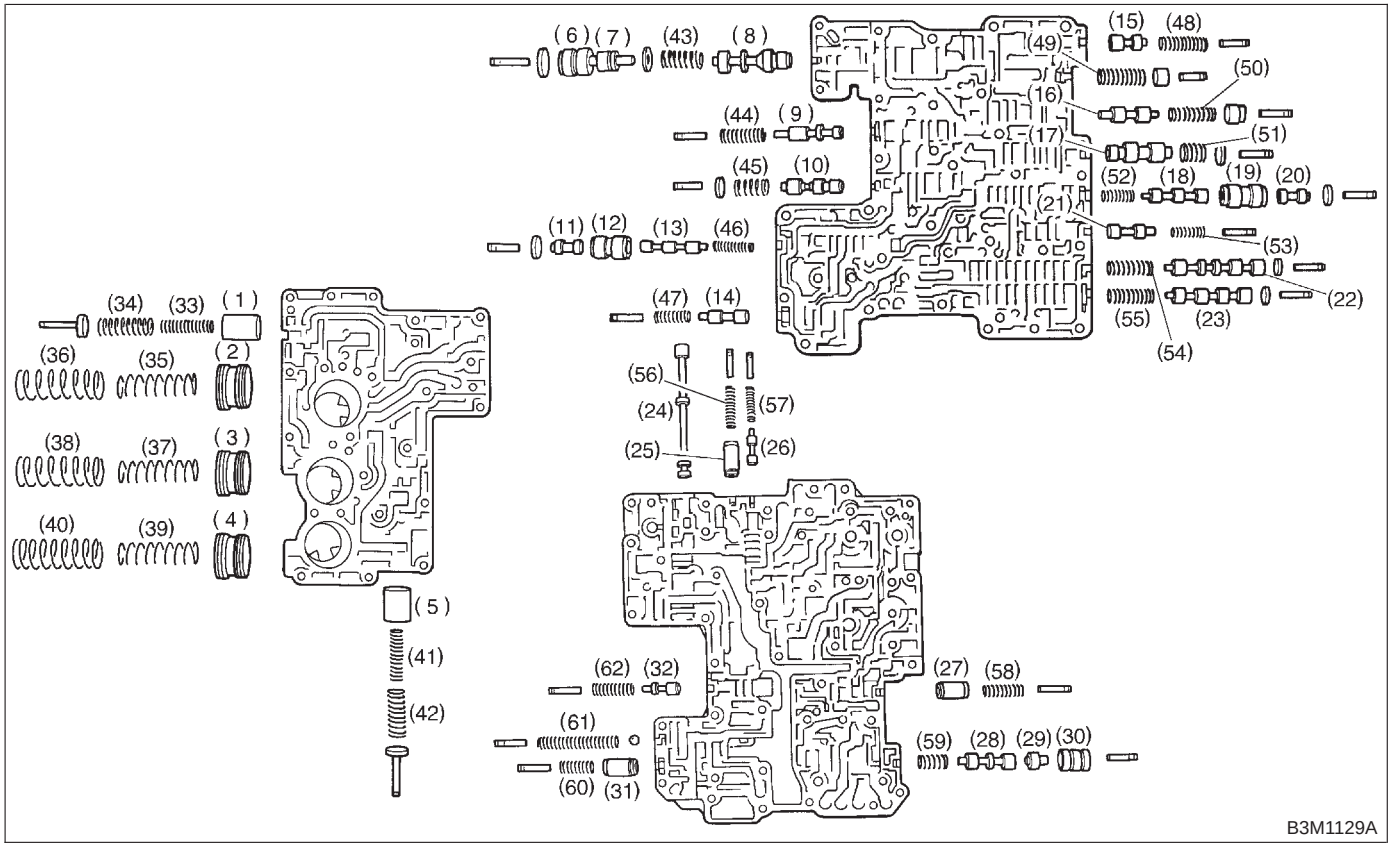


MEMO:

15. Control Valve Body

A: PRECAUTION

The control valve is composed of parts which are accurately machined to a high degree and should be handled carefully during disassembly and assembly. As these parts are similar in shape, they should be arranged in neat order on a table after disassembly so that they can be easily installed to their original positions. Spring loaded parts should be also handled carefully, as springs may jump out of place when the parts are disassembled or removed. Extreme care should be taken so as not to drop valves on the floor. Before assembling, the parts and valves should be dipped in a container filled with the ATF. Make sure that the valves are clean and free from any foreign material before assembly. Torque specifications should also be observed.

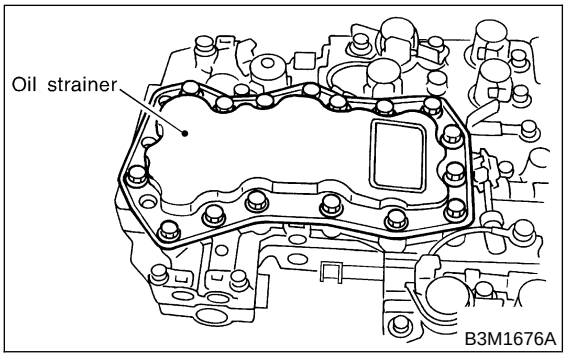


(1) 2-4 brake clutch accumulator piston B
(2) 2-4 brake clutch accumulator piston A
(3) Low clutch accumulator piston
(4) High clutch accumulator piston A
(5) High clutch accumulator piston B
(6) Pressure regulator sleeve
(7) Pressure regulator plug
(8) Pressure regulator valve
(9) Reverse inhibit valve
(10) Accumulator control valve B
(11) 2-4 brake timing plug
(12) 2-4 brake timing sleeve
(13) 2-4 brake timing valve A
(14) 2-4 brake timing valve B
(15) Torque convertor regulator valve
(16) Pressure modifier valve
(17) Accumulator control valve A
(18) Low clutch timing valve A
(19) Low clutch timing sleeve
(20) Low clutch timing plug
(21) Low clutch timing valve B
(22) Shift valve B
(23) Shift valve A
(24) Manual valve
(25) Throttle accumulator piston B
(26) 1st reducing valve
(27) Throttle accumulator piston A
(28) Lock-up control valve
(29) Lock-up control plug
(30) Lock-up control sleeve
(31) Modifier accumulator piston
(32) Pilot valve

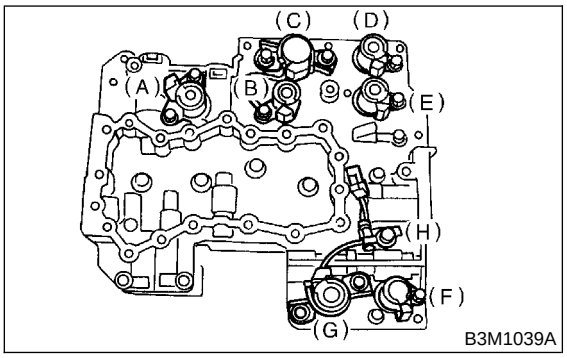
No.	Part name	Wire dia. mm (in)	Average dia. mm (in)	Effective turn	Free length mm (in)
33	2-4 brake accumulator B spring (Inlet)	1.6 (0.063)	9.3 (0.366)	14.6	47.0 (1.850)
34	2-4 brake accumulator B spring (Outlet)	2.3 (0.091)	13.7 (0.539)	8.79	45.0 (1.772)
35	2-4 brake accumulator A spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
36	2-4 brake accumulator A spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
37	Low clutch accumulator spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
38	Low clutch accumulator spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
39	High clutch accumulator A spring (Inlet)	1.8 (0.071)	21.3 (0.839)	8.0	69.1 (2.720)
40	High clutch accumulator A spring (Outlet)	1.7 (0.067)	25.3 (0.996)	6.3	69.1 (2.720)
41	High clutch accumulator B spring (Inlet)	1.6 (0.063)	9.3 (0.366)	14.6	47.0 (1.850)
42	High clutch accumulator B spring (Outlet)	2.3 (0.091)	13.7 (0.539)	8.79	45.0 (1.772)
43	Pressure regulator valve spring	1.0 (0.039)	13.5 (0.531)	6.5	35.0 (1.378)
44	Reverse inhibit valve spring	0.65 (0.0256)	8.4 (0.331)	7.7	26.5 (1.043)
45	Accumulator control valve B spring	0.5 (0.020)	10.5 (0.413)	4.5	21.5 (0.846)
46	2-4 brake timing valve A spring	0.5 (0.020)	6.5 (0.256)	7.78	19.3 (0.760)
47	2-4 brake timing valve B spring	0.60 (0.0236)	5.8 (0.228)	7.7	20.0 (0.787)
48	Torque converter regulator valve spring	1.40 (0.0551)	7.6 (0.299)	12.1	34.7 (1.366)
49	Plug hold spring	0.8 (0.031)	9.7 (0.382)	11.5	40.0 (1.575)
50	Pressure modifier valve spring	0.7 (0.028)	8.3 (0.327)	8.2	26.9 (1.059)
51	Accumulator control valve A	0.7 (0.028)	10.3 (0.406)	3.6	15.1 (0.594)
52	Low clutch timing valve A spring	0.5 (0.020)	6.5 (0.256)	7.78	19.3 (0.760)
53	Low clutch timing valve B spring	0.60 (0.0236)	5.8 (0.228)	7.7	20.0 (0.787)
54	Shift valve B spring	0.80 (0.0315)	8.2 (0.323)	7.9	25.2 (0.992)
55	Shift valve A spring	0.80 (0.0315)	8.2 (0.323)	7.9	25.2 (0.992)
56	Throttle accumulator B spring	1.6 (0.063)	8.4 (0.331)	9.77	36.0 (1.417)
57	1st reducing valve spring	0.75 (0.0295)	6.0 (0.236)	12.5	25.4 (1.000)
58	Throttle accumulator A spring	1.7 (0.067)	8.0 (0.315)	9.61	36.0 (1.417)
59	Lock-up control valve spring	0.9 (0.035)	11.2 (0.441)	4.0	19.7 (0.776)
60	Modifier accumulator spring	1.7 (0.067)	8.0 (0.315)	9.61	36.0 (1.417)
61	Line pressure relief valve spring	1.6 (0.063)	8.0 (0.315)	22.5	69.3 (2.728)
62	Pilot valve spring	1.1 (0.043)	7.9 (0.311)	10.76	30.6 (1.205)

B: DISASSEMBLY

1) Remove oil strainer from lower control valve body.

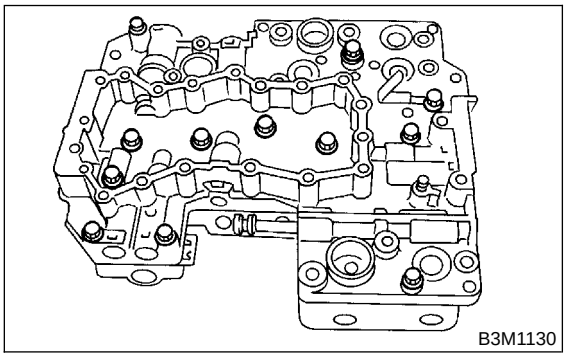


2) Remove the duty solenoid S, solenoids and sensor from the lower valve body.



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

3) Remove the upper-lower valve body tightening bolts.

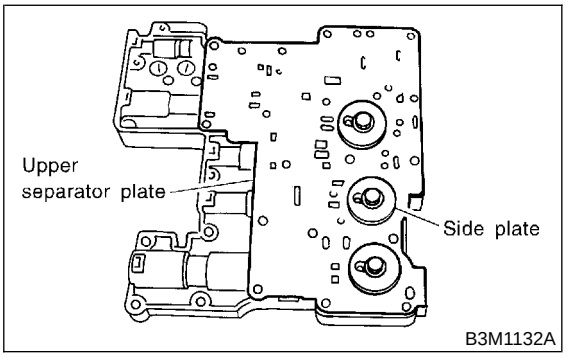


4) Separate the control valve body.

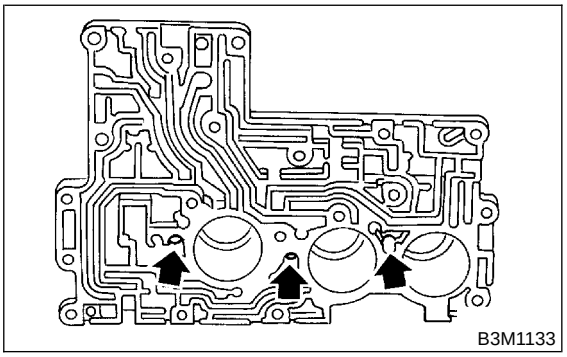
CAUTION:
● Do not lose the ten (10) steel balls contained in the upper valve body and middle valve body.
● Do not lose strainers contained in the lower valve body.

NOTE:
During ordinary servicing, clean the control valve bodies in this condition, without further disassembly. In the event of a seized clutch or other problem, disassemble the control valve bodies further, and clean the component parts.

5) Remove upper separator plate from middle valve body.



6) Remove valve springs from upper valve body.
7) Using air compressor, remove accumulator piston from upper valve body.



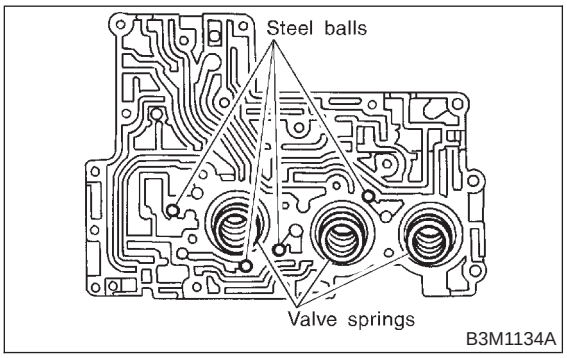
C: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.

D: ASSEMBLY

1) Install accumulator pistons, valve springs and steel balls to upper valve body.

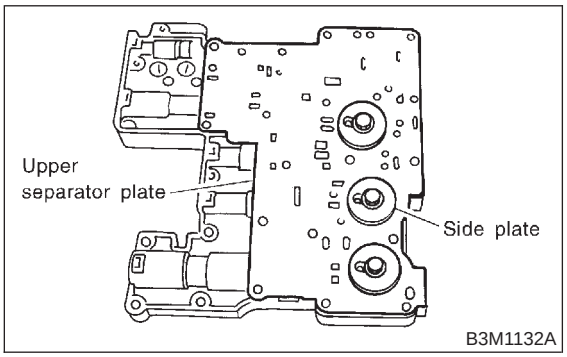
CAUTION:
Insert steel balls in their proper positions.



2) Install support plate and upper separate plate to middle valve body.

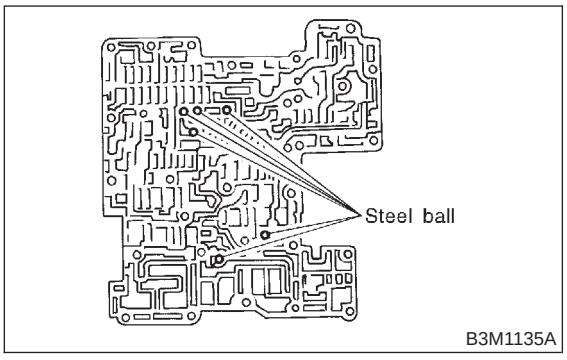
CAUTION:
Align the hole in support plate with the hole in separate plate.

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



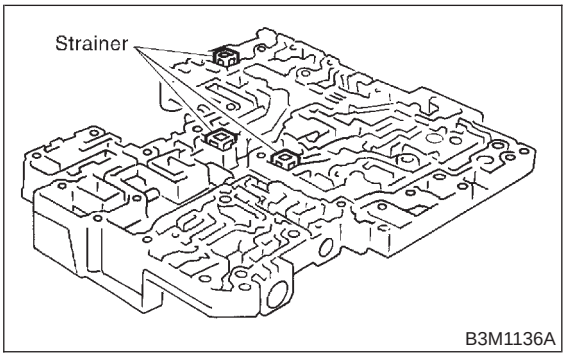
3) Install steel balls to middle valve body.

CAUTION:
Insert steel balls in their proper positions.

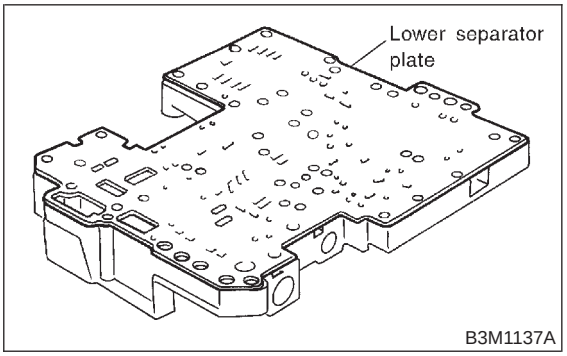


4) Install three filters to lower valve body.

CAUTION:
Pay attention to the location of filters.

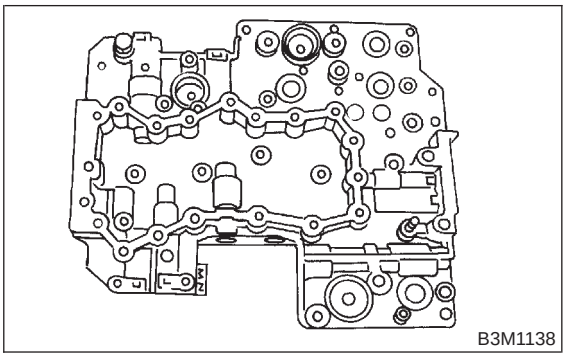


5) Install lower separate plate to lower valve body.



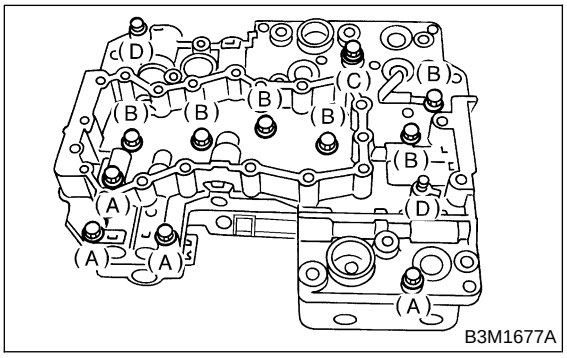
6) Temporarily assemble valve body.

CAUTION:
Be careful not to drop the middle valve body and upper body interior steel ball, or the lower body filter.



7) Tighten bolts.

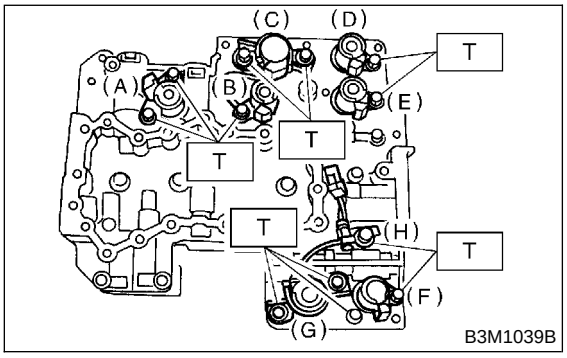
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



(A) Short bolts
(B) Middle bolts
(C) Long bolt
(D) Reamer bolts

8) Install the sensor, solenoids and duty solenoid S.

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



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

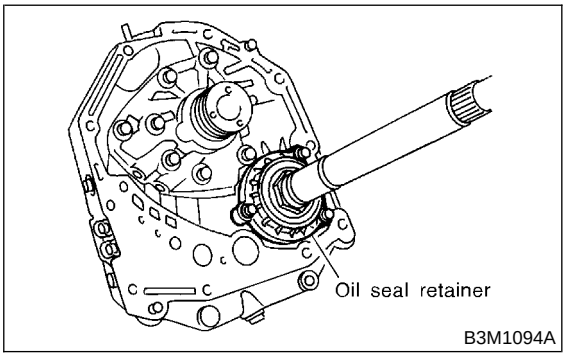
9) Install oil strainer to lower valve body.

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

16. Oil Pump Assembly

A: DISASSEMBLY

1) Remove the oil seal retainer.
Also remove the O-ring and oil seal (air breather).

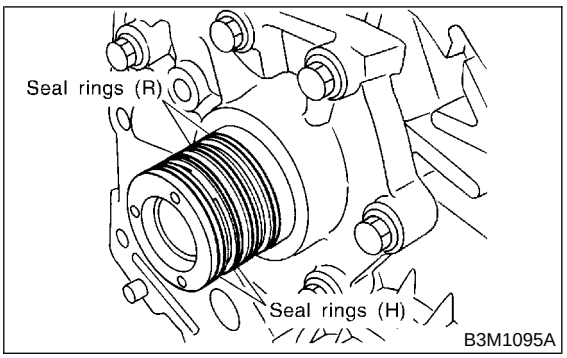


2) Remove O-rings from oil pump housing.

CAUTION:
Be careful not to damage O-ring.

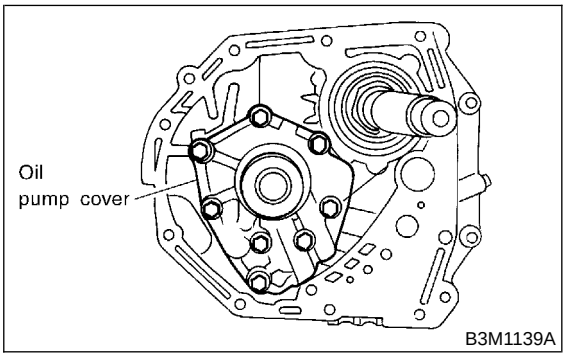
3) Remove four seal rings.

CAUTION:
Be careful not to damage O-ring.

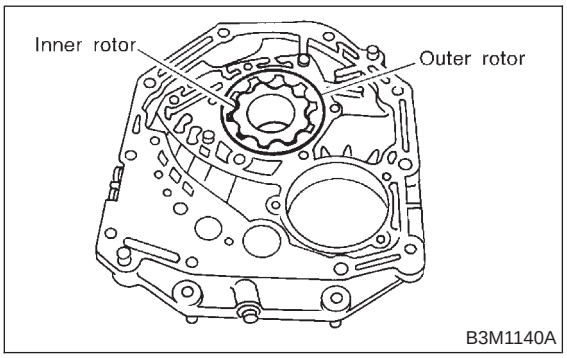


4) Remove the oil pump cover.

NOTE:
Lightly tap the end of the stator shaft to remove the cover.



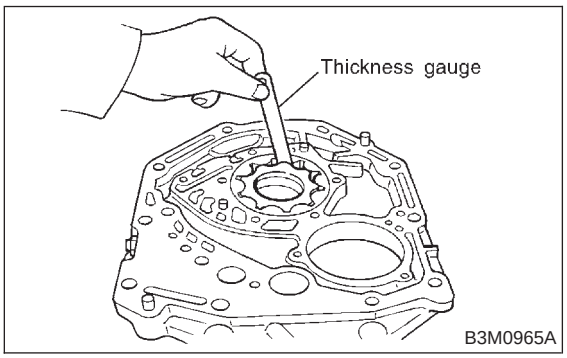
5) Remove the inner and outer rotor.



B: INSPECTION

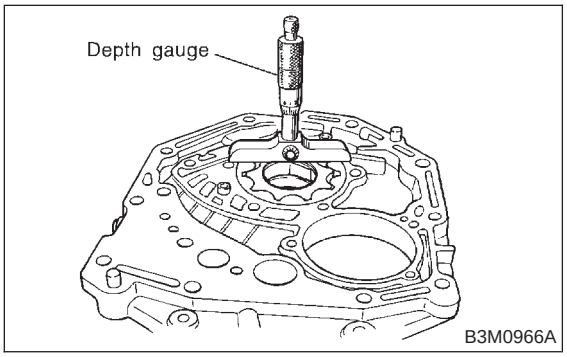
1) Check seal ring and O-ring oil seal for breaks or damage.
2) Check other parts for dents or abnormalities.
3) Selection of oil pump rotor assembly
(1) Tip clearance
Install inner rotor and outer rotor to oil pump. With rotor gears facing each other, measure crest-to-crest clearance.

Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(2) Side clearance
Set a depth gauge to oil pump housing, then measure oil pump housing-to-rotor clearances.

Side clearance:
0.02 — 0.04 mm (0.0008 — 0.0016 in)

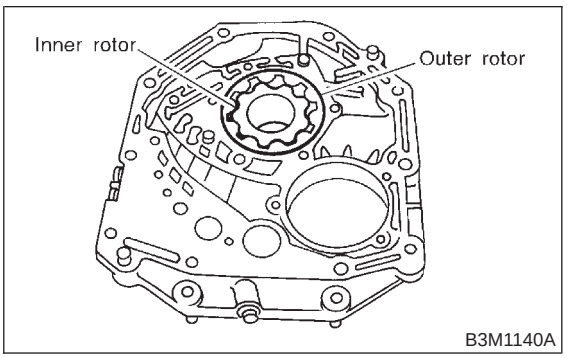


(3) If depth and/or side clearances are outside specifications, replace rotor assembly.

Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

C: ASSEMBLY

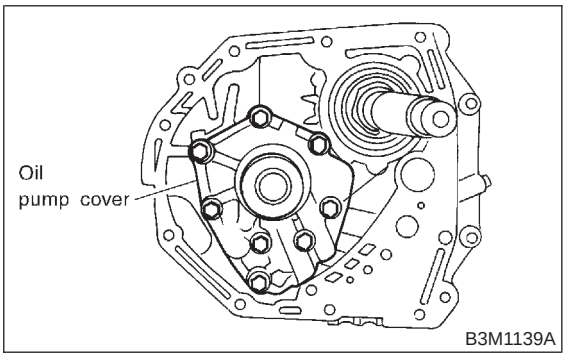
1) Install oil pump rotor assembly to oil pump housing.



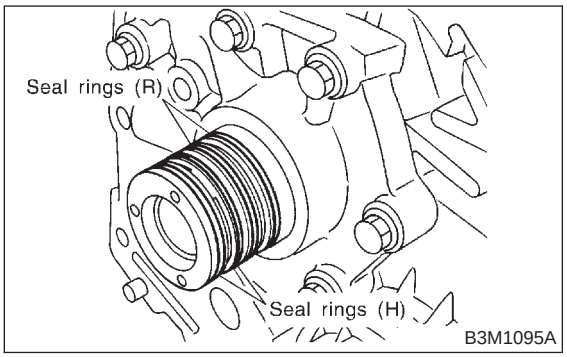
2) Install the oil pump cover.

Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)

NOTE:
● Align both pivots with the pivot holes of the cover, and install the cover being careful not to apply undue force to the pivots.
● After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.



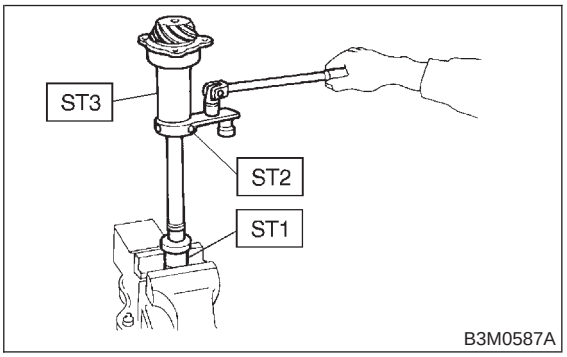
● Install the oil seal retainer and seal rings. After adjusting the drive pinion backlash and tooth contact.



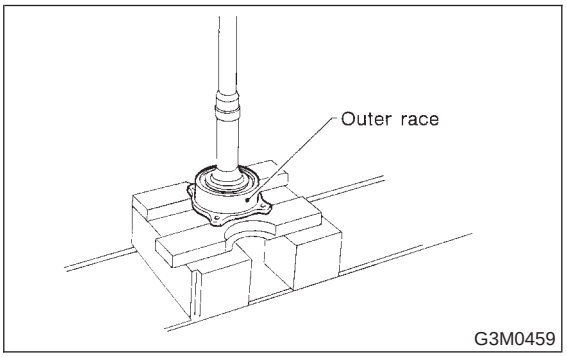
17. Drive Pinion Shaft

A: DISASSEMBLY

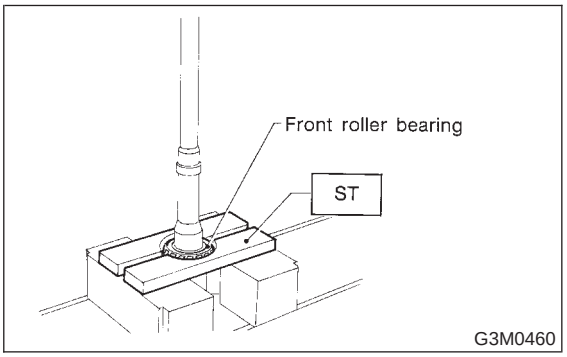
1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.
ST1 498937100 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER



2) Remove the O-ring.
3) Using a press, separate the rear roller bearing and outer race from the shaft.



4) Using a press and ST, separate the front roller bearing from the shaft.
ST 498517000 REPLACER

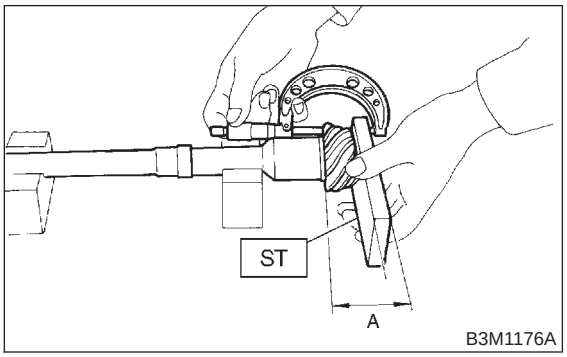


B: INSPECTION

Make sure that all component parts are free of harmful cuts, gouges, and other faults.

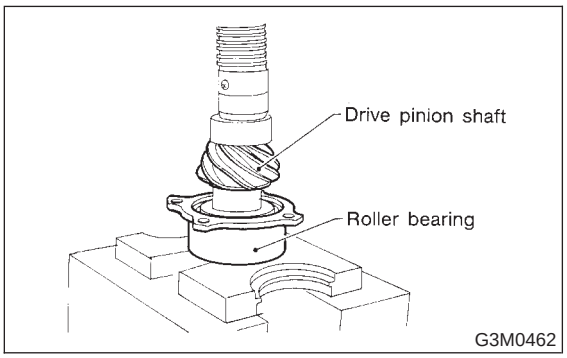
C: ASSEMBLY

1) Measure dimension “A” of the drive pinion shaft.
ST 398643600 GAUGE



2) Using a press, force-fit the roller bearing in position.

CAUTION:
Do not change the relative positions of the outer race and bearing cone.



3) After fitting the O-ring to the shaft, attach the drive pinion collar to the shaft.

CAUTION:
Be careful not to damage the O-ring.

4) Tighten the lock washer and lock nut with ST1, ST2 and ST3.
ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

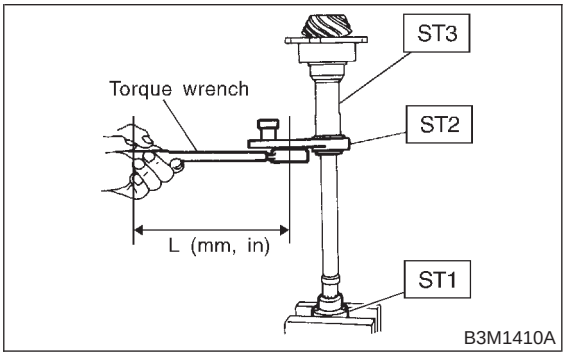
Actual tightening torque:
116±5 N·m (11.8±0.5 kg-m, 85.3±3.6 ft-lb)

NOTE:
- Pay attention to the orientation of lock washer.
- Tightening torque using torque wrench is determined by the following equation.

$$T_1 = L/_{L + 72.2} \times T$$

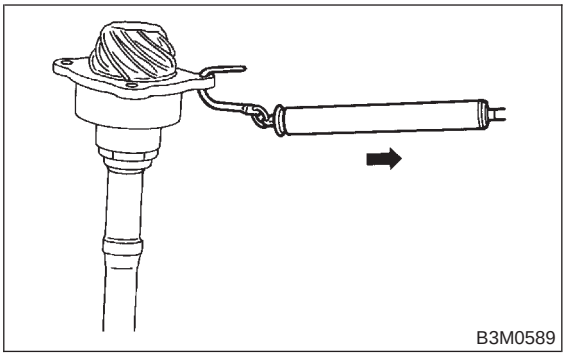
T: Actual tightening torque

- Install ST2 to torque wrench as straight as possible.



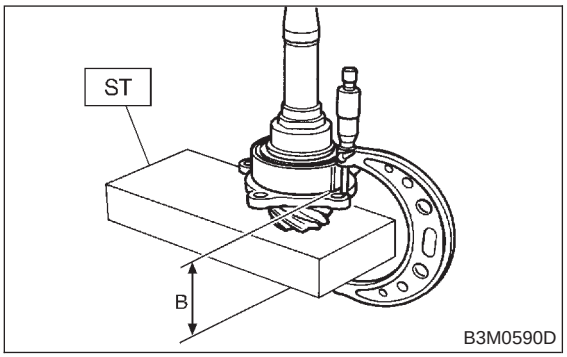
5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

Starting torque:
0.3 — 2.0 N·m (0.03 — 0.2 kg-m, 0.2 — 1.4 ft-lb)



6) Stake the lock nut securely at two places.

7) Measure dimension “B” of the drive pinion shaft.
ST 398643600 GAUGE



8) Determine the thickness “t” (mm) of the drive pinion shim.

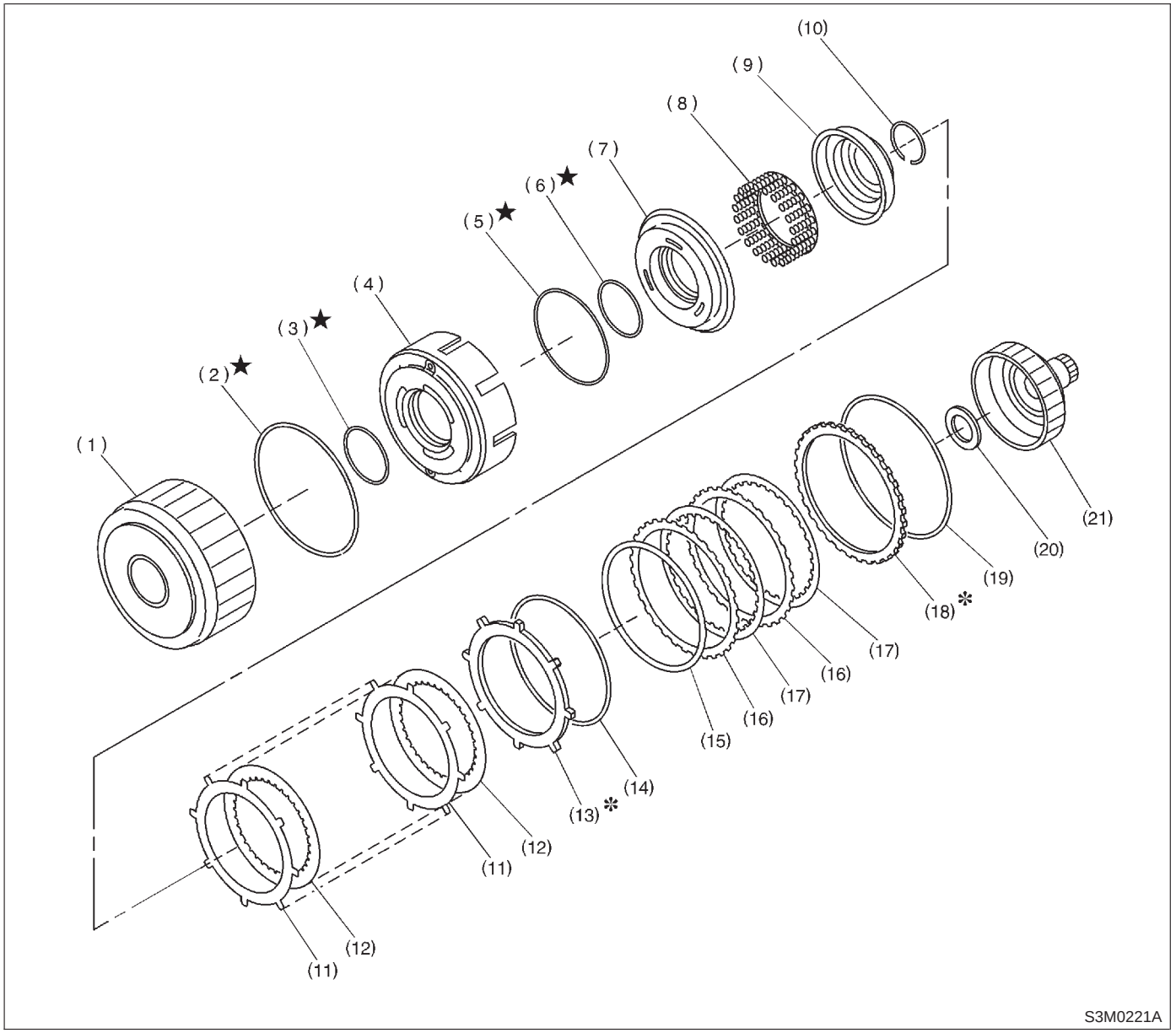
NOTE:
The number of shims must be three or less.

t = 6.5±0.0625 − (B − A)

Available drive pinion shims	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

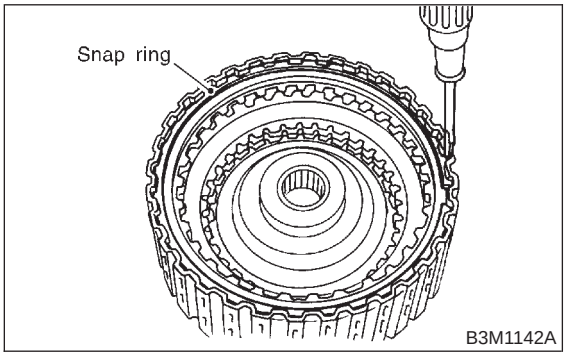
18. High Clutch and Reverse Clutch

A: DISASSEMBLY

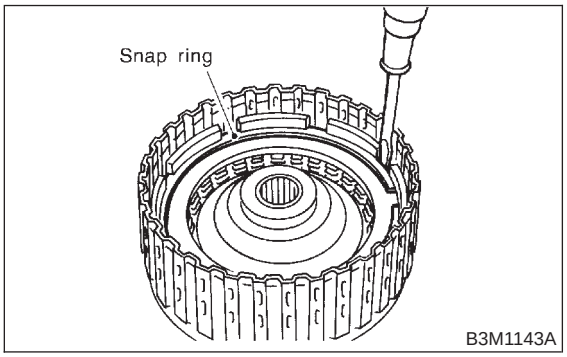


(1) Reverse clutch drum
(2) Lip seal
(3) Lathe cut seal ring
(4) Reverse clutch piston
(5) Lathe cut seal ring
(6) Lathe cut seal ring
(7) High clutch piston
(8) Spring retainer
(9) Cover
(10) Snap ring
(11) Driven plate
(12) Drive plate
(13) Retaining plate
(14) Snap ring
(15) Dish plate
(16) Driven plate
(17) Drive plate
(18) Retaining plate
(19) Snap ring
(20) Thrust needle bearing
(21) High clutch hub

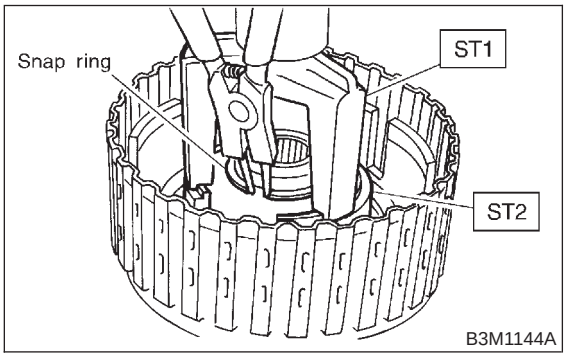
1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates.



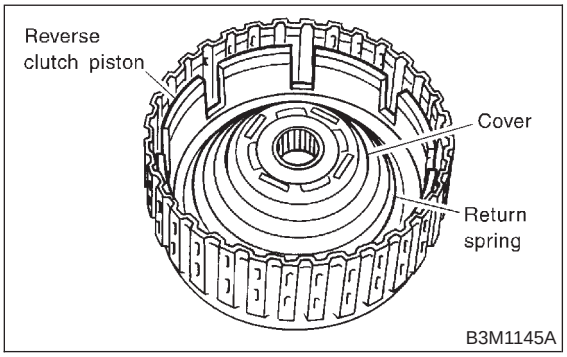
2) Remove snap ring, and take out the retaining plate, drive plates and driven plates.



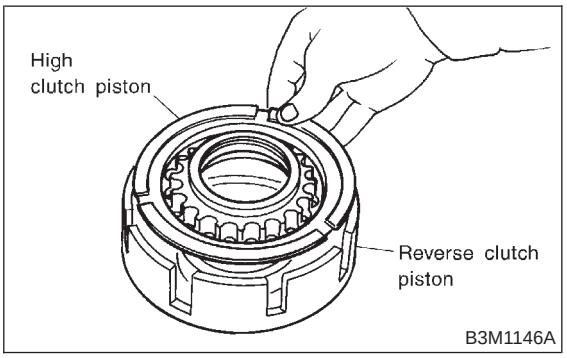
3) Using ST1 and ST2, remove snap ring.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT



4) Take out clutch cover, spring retainer, high clutch piston and reverse clutch piston.



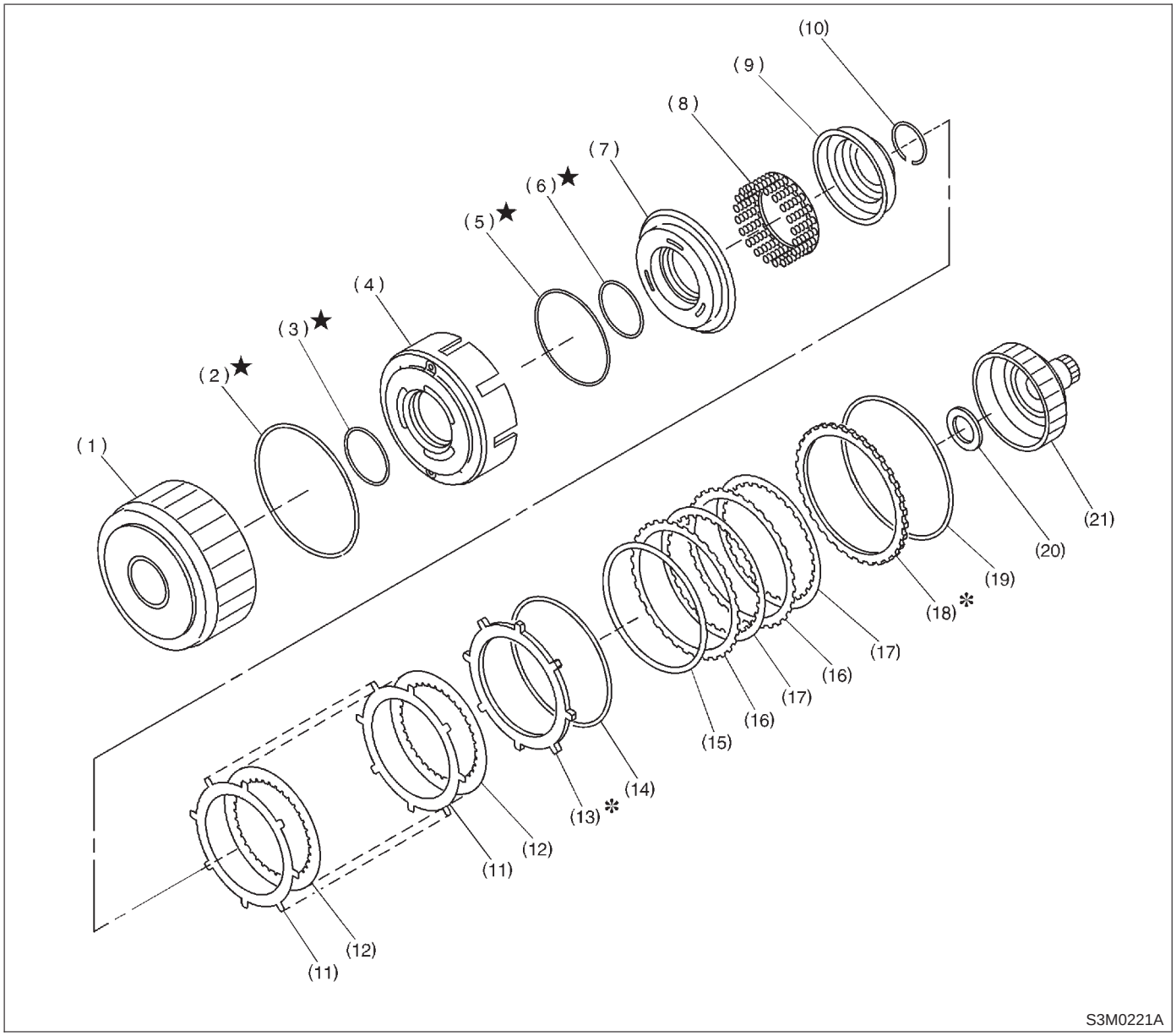
5) Remove seal rings and lip seal from high clutch piston and reverse clutch piston.



B: INSPECTION

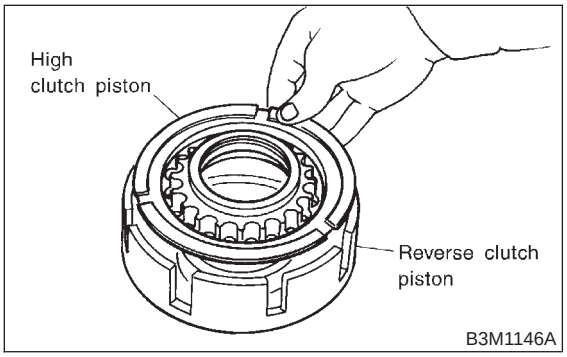
1) Drive plate facing for wear and damage
2) Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
3) Lip seal and lathe cut seal ring for damage
4) Piston check ball for operation

C: ASSEMBLY



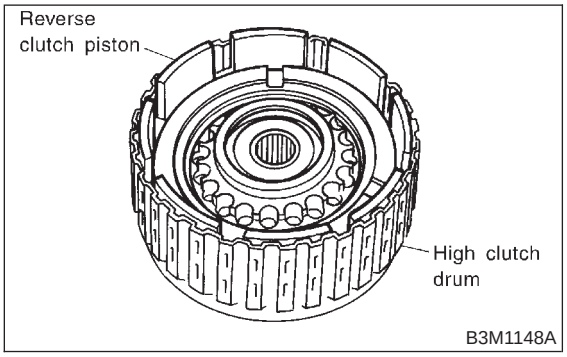
(1) Reverse clutch drum
(2) Lip seal
(3) Lathe cut seal ring
(4) Reverse clutch piston
(5) Lathe cut seal ring
(6) Lathe cut seal ring
(7) High clutch piston
(8) Spring retainer
(9) Cover
(10) Snap ring
(11) Driven plate
(12) Drive plate
(13) Retaining plate
(14) Snap ring
(15) Dish plate
(16) Driven plate
(17) Drive plate
(18) Retaining plate
(19) Snap ring
(20) Thrust needle bearing
(21) High clutch hub

1) Install seal rings and lip seal to high clutch piston and reverse clutch piston.
2) Install high clutch piston to reverse clutch piston.

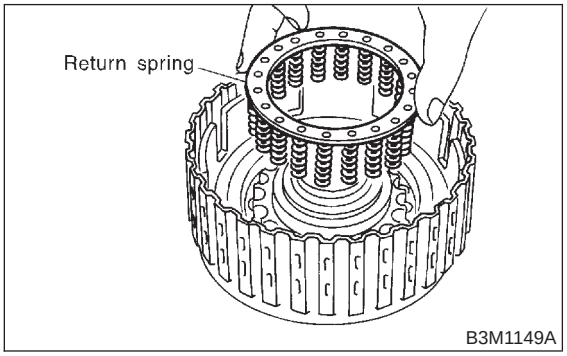


3) Install reverse clutch to high clutch drum.

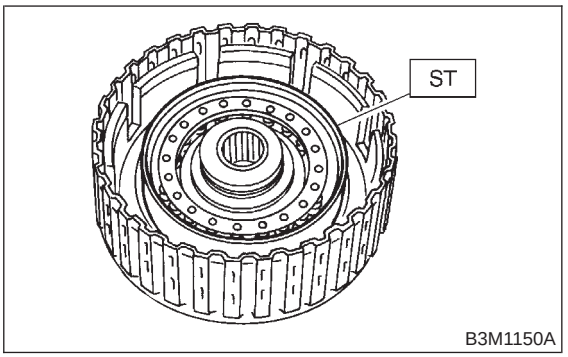
NOTE:
Align the groove on the reverse clutch piston with the groove on the high clutch drum during installation.



4) Install spring retainer to high clutch piston.



5) Install ST to high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GAUGE



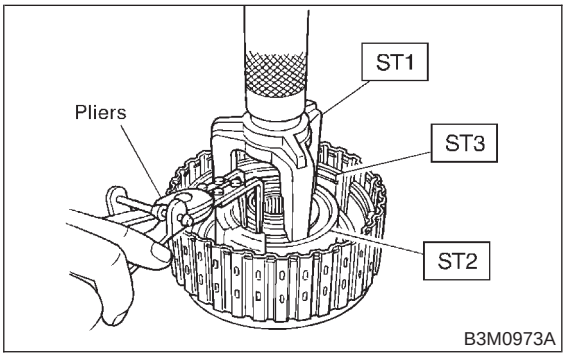
6) Install cover to high clutch piston.

CAUTION:
Be careful not to fold over the high clutch piston seal during installation.

7) Using ST1 and ST2, install snap ring.

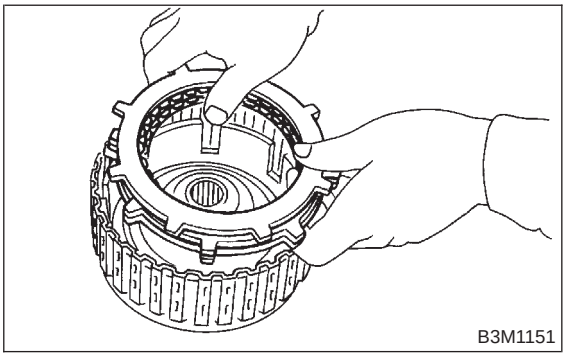
NOTE:
After installing snap ring, remove STs.

ST1 398673600 COMPRESSOR
ST2 498627100 SEAT
ST3 498437000 HIGH CLUTCH PISTON GAUGE



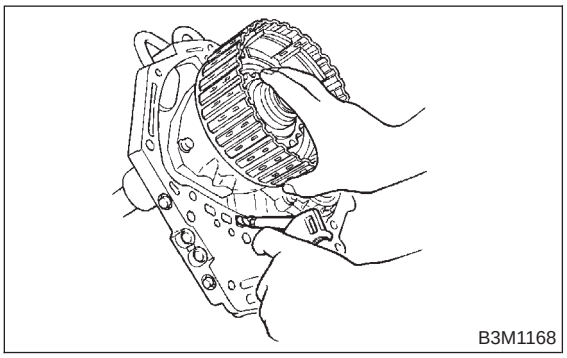
8) Install driven plate, drive plate and retaining plate to high clutch drum.

NOTE:
Install thicker driven plate on the piston side.



9) Install snap ring to high clutch drum.

10) Apply compressed air intermittently to check for operation.

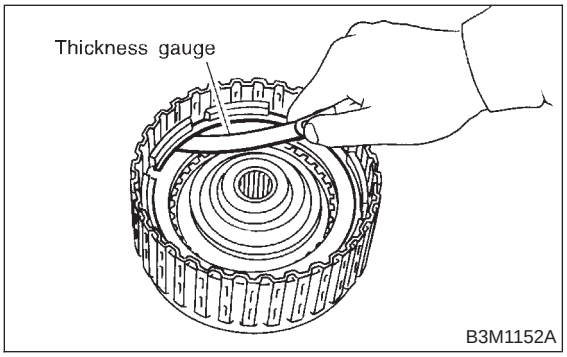


11) Measure the clearance between the retaining plate and snap ring.

CAUTION:
Do not press down retaining plate during clearance measurements.

Standard value:
0.8 — 1.1 mm (0.031 — 0.043 in)

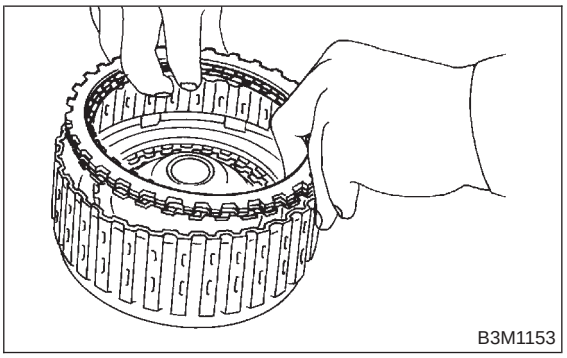
Allowable limit:
1.5 mm (0.059 in)



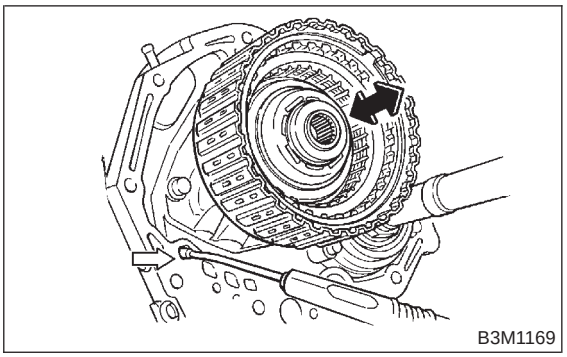
12) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

High clutch retaining plate	
Part No.	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

13) Install driven plate, drive plate, retaining plate and snap ring.



14) Apply compressed air intermittently to check for operation.

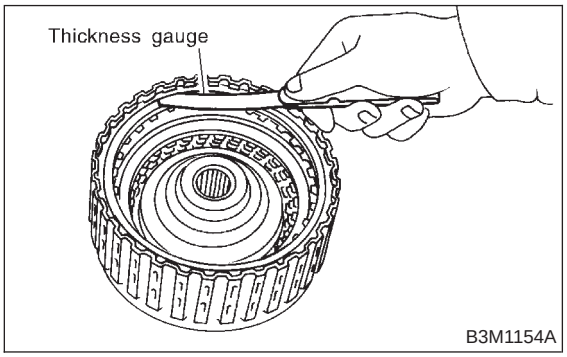


15) Measure the clearance between the retaining plate and snap ring.

CAUTION:
Do not press down retaining plate during clearance measurements.

Standard value:
0.5 — 0.8 mm (0.020 — 0.031 in)

Allowable limit:
1.2 mm (0.047 in)

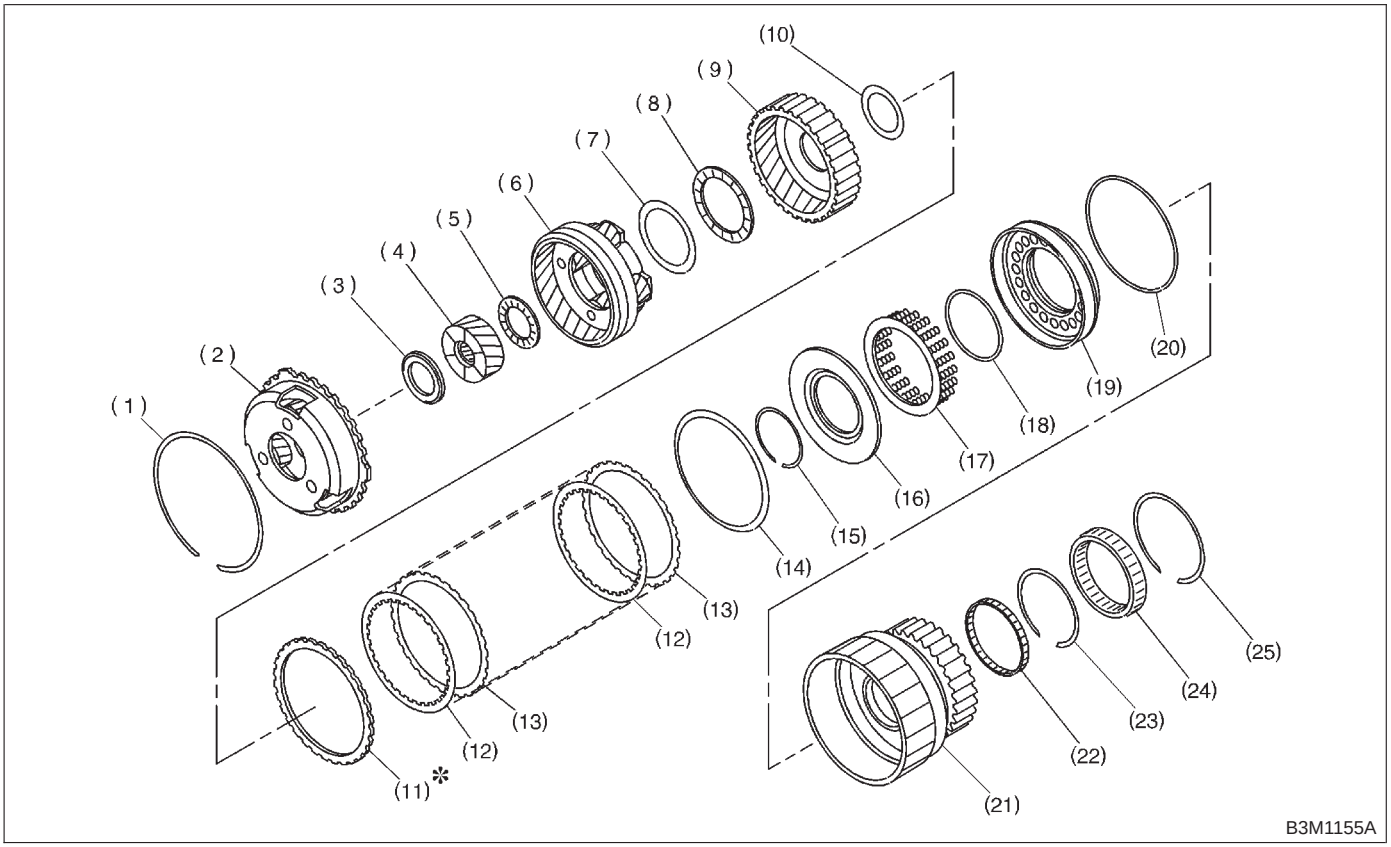


16) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

Reverse clutch retaining plates	
Part No.	Thickness mm (in)
31567AA760	4.0 (0.157)
31567AA770	4.2 (0.165)
31567AA780	4.4 (0.173)
31567AA790	4.6 (0.181)
31567AA800	4.8 (0.189)

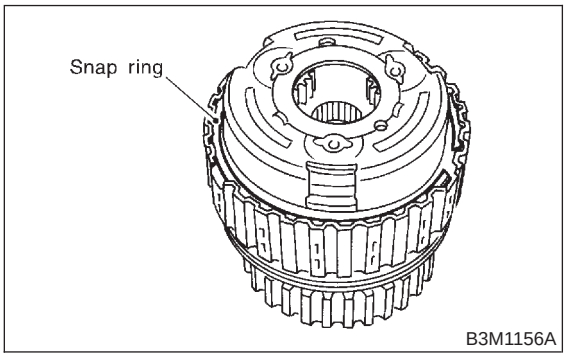
19. Low Clutch Drum and Planetary Gear

A: DISASSEMBLY

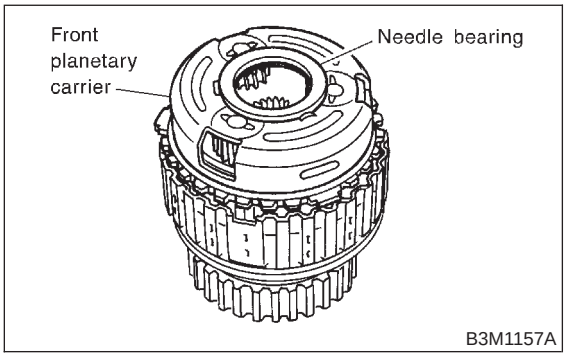


(1) Snap ring
(2) Front planetary carrier
(3) Thrust needle bearing
(4) Rear sun gear
(5) Thrust needle bearing
(6) Rear planetary carrier
(7) Washer
(8) Thrust needle bearing
(9) Rear internal gear
(10) Washer
(11) Retaining plate
(12) Drive plate
(13) Driven plate
(14) Dish plate
(15) Snap ring
(16) Cover
(17) Spring retainer
(18) Lathe cut seal ring
(19) Low clutch piston
(20) Lathe cut seal ring
(21) Low clutch drum
(22) Needle bearing
(23) Inner snap ring
(24) One-way clutch
(25) Outer snap ring

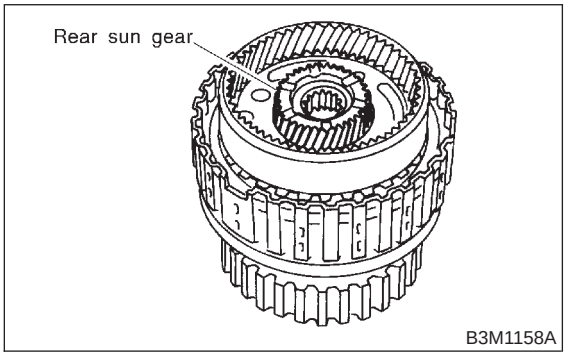
1) Remove snap ring from the low clutch drum.



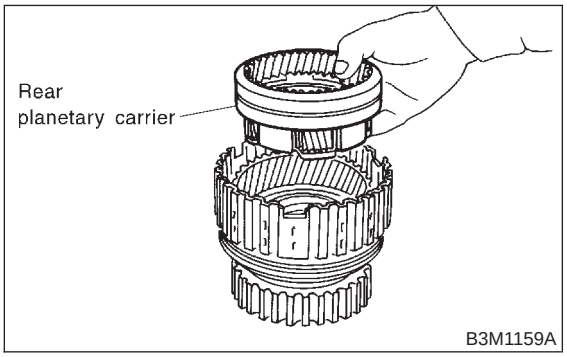
2) Take out front planetary carrier and thrust needle bearing from low clutch drum.



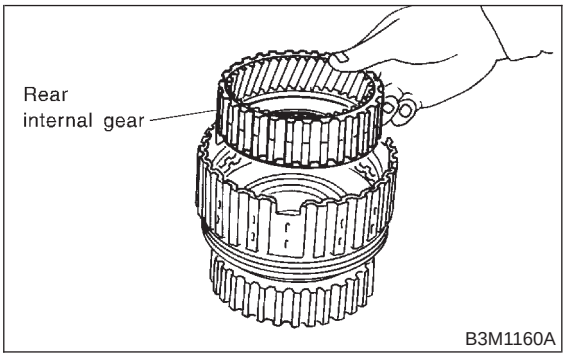
3) Take out rear sun gear.



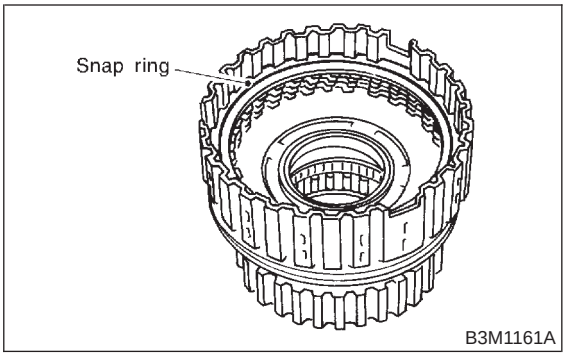
4) Take out rear planetary carrier, washer and thrust needle bearing.



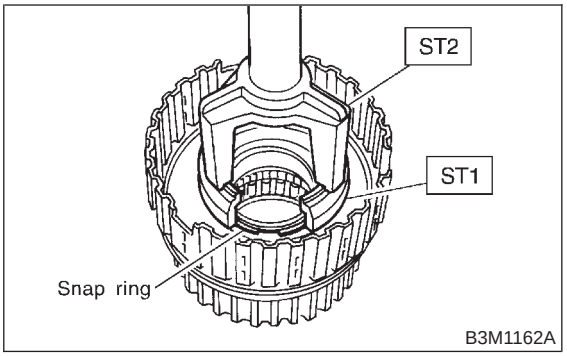
5) Take out rear internal gear.



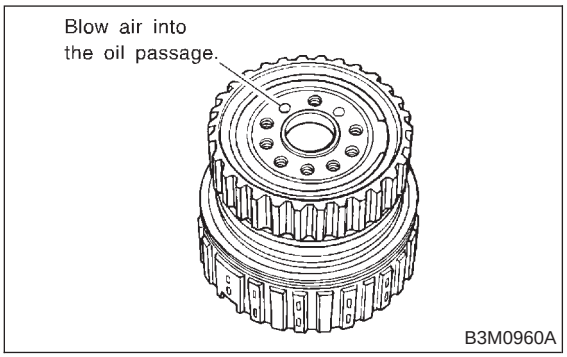
6) Remove the snap ring from the low clutch drum.



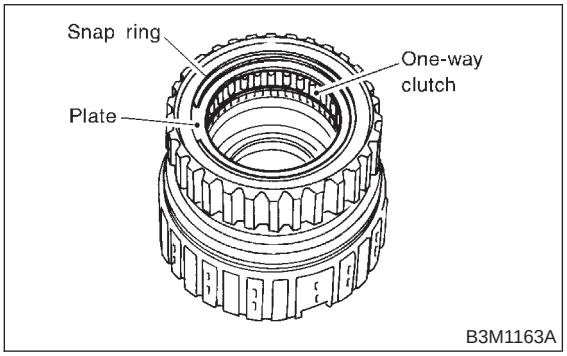
7) Remove the retaining plate, drive plates, driven plates and dish plate.
8) Compress the spring retainer, and remove the snap ring from the low clutch drum, by using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



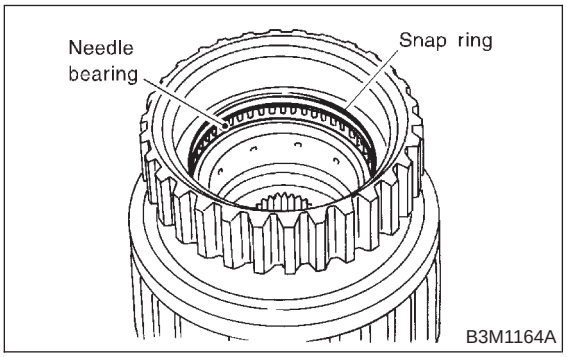
9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



10) Remove the one-way clutch inner race.
11) Remove the one-way clutch after taking out the snap ring.



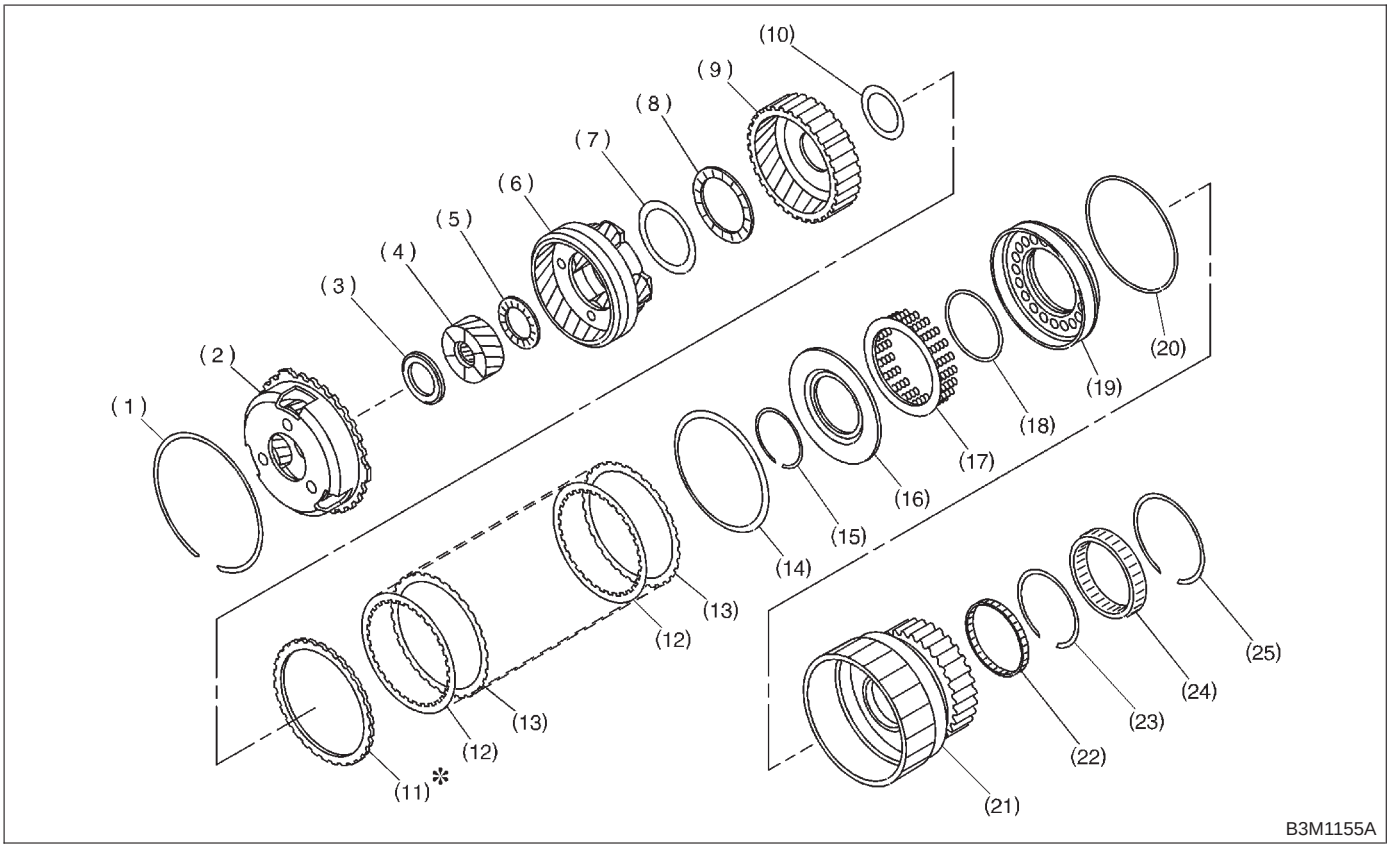
12) Remove the needle bearing after taking out the snap ring.



B: INSPECTION

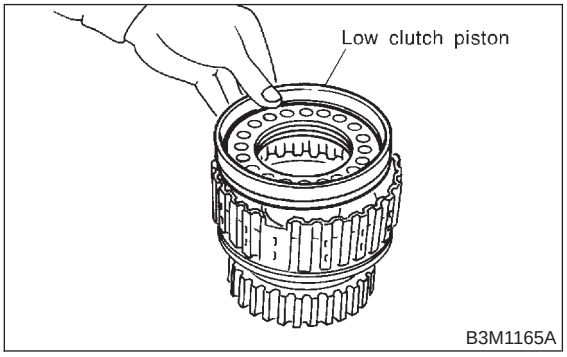
1) Drive plate facing for wear and damage
2) Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
3) Lip seal and lathe cut ring for damage
4) Piston and drum check ball for operation

C: ASSEMBLY

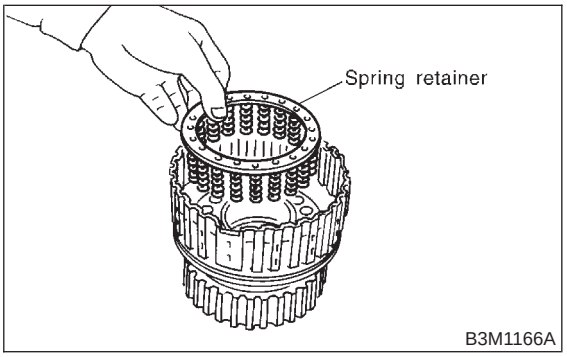


(1) Snap ring
(2) Front planetary carrier
(3) Thrust needle bearing
(4) Rear sun gear
(5) Thrust needle bearing
(6) Rear planetary carrier
(7) Washer
(8) Thrust needle bearing
(9) Rear internal gear
(10) Washer
(11) Retaining plate
(12) Drive plate
(13) Driven plate
(14) Dish plate
(15) Snap ring
(16) Cover
(17) Spring retainer
(18) Lathe cut seal ring
(19) Low clutch piston
(20) Lathe cut seal ring
(21) Low clutch drum
(22) Needle bearing
(23) Inner snap ring
(24) One-way clutch
(25) Outer snap ring

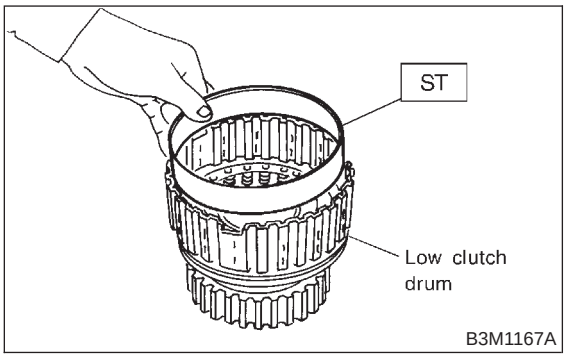
1) Install lathe cut seal ring to low clutch piston.
2) Fit the low clutch piston to the low clutch drum.



3) Install spring retainer to low clutch piston.



4) Install ST to low clutch drum.
ST 498437100 LOW CLUTCH PISTON GUIDE

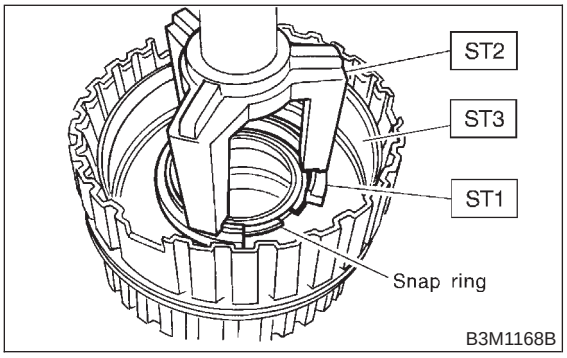


5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring.

CAUTION:
Be careful not to fold cover seal during installation.

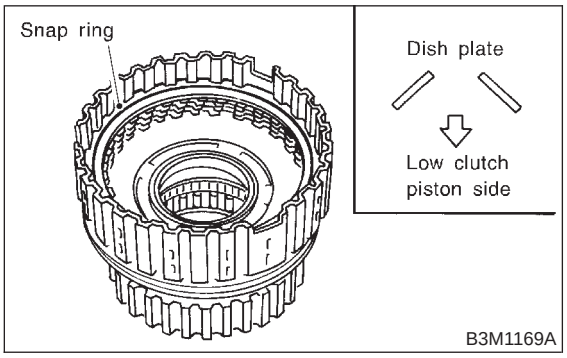
NOTE:
After installing snap ring, remove ST1, ST2 and ST3.

ST1 498627100 SEAT
ST2 398673600 COMPRESSOR
ST3 498437100 LOW CLUTCH PISTON GUIDE

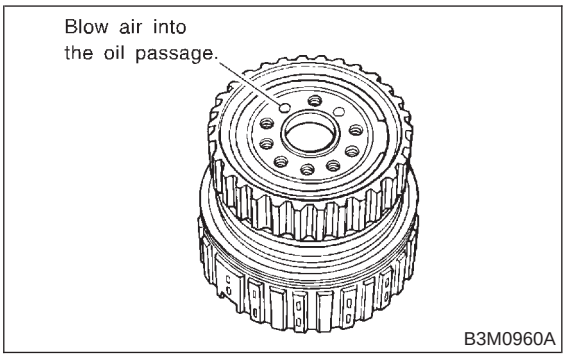


6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.

NOTE:
Pay attention to the orientation of the dish plate.



7) Check the low clutch for operation.
Set the one-way clutch inner race, and apply compressed air for checking.

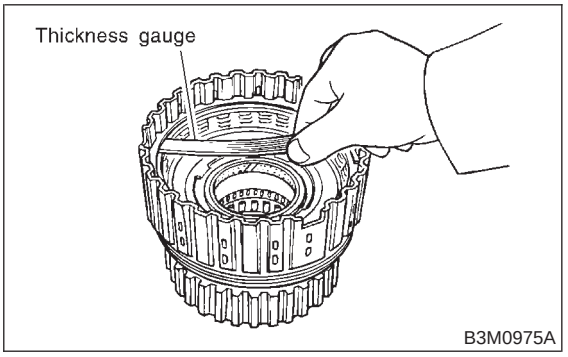


8) Checking low clutch clearance
Measure the gap between the retaining plate and the operation of the low clutch.

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting.
If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

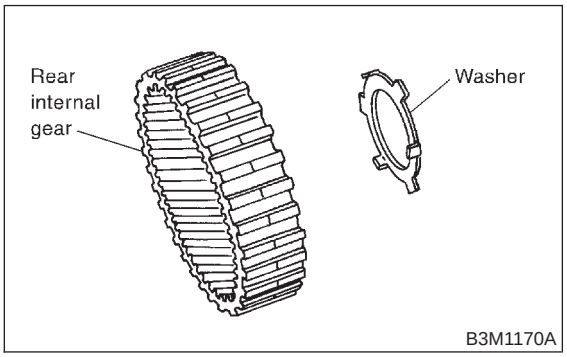
Standard value:
0.7 — 1.1 mm (0.028 — 0.043 in)

Allowable limit:
1.6 mm (0.063 in)

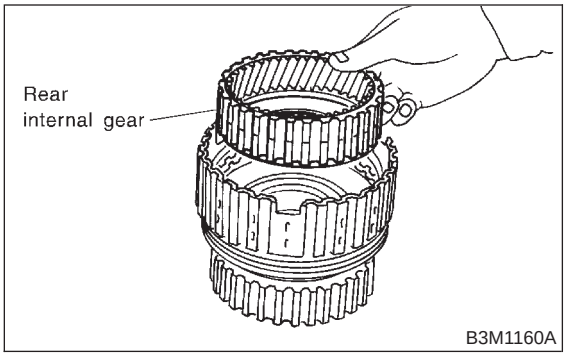


Available retaining plates	
Part No.	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

9) Install washer to rear internal gear.

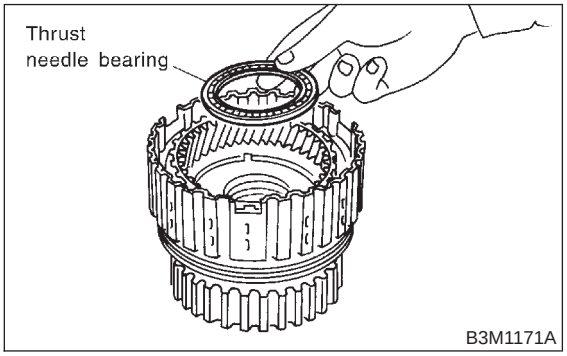


10) Install rear internal gear.



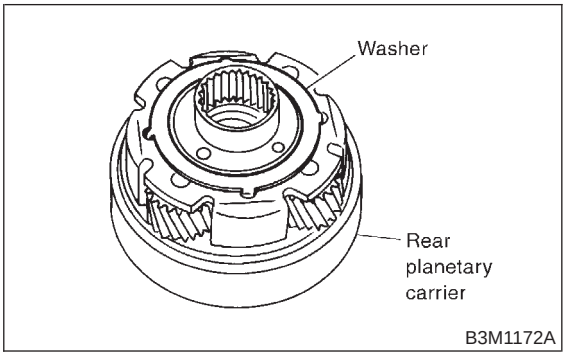
11) Install thrust needle bearing.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>

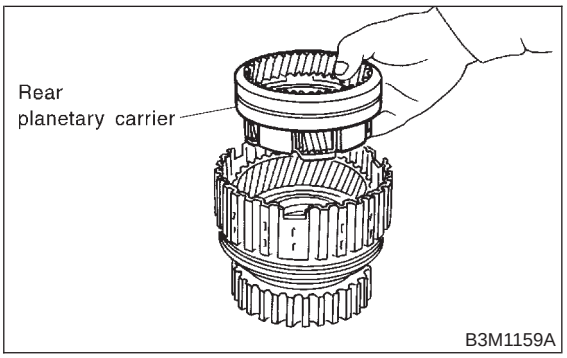


12) Install washer to rear planetary carrier.

NOTE:
Make sure washer tooth is inserted into hole on planetary carrier.

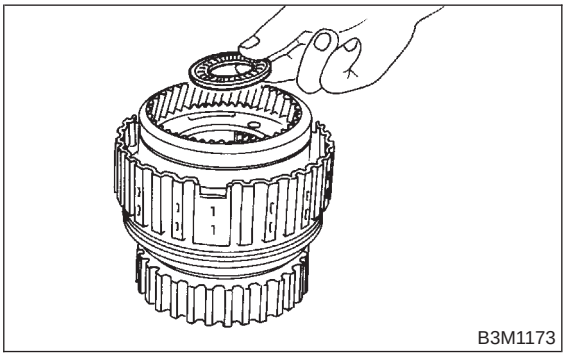


13) Install rear planetary carrier to low clutch drum.



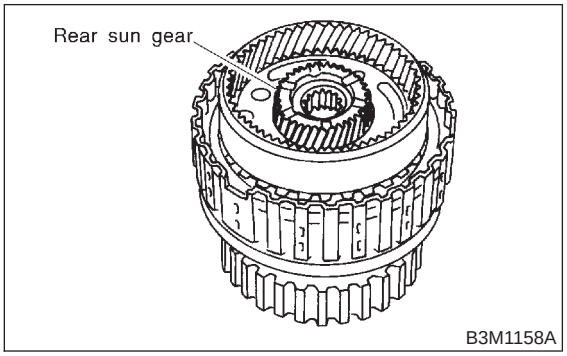
14) Install thrust needle bearing to rear planetary carrier.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1200].>



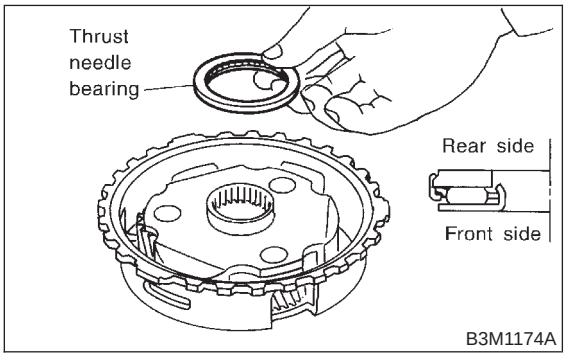
15) Install rear sun gear.

NOTE:
Pay attention to the orientation of the rear sun gear.

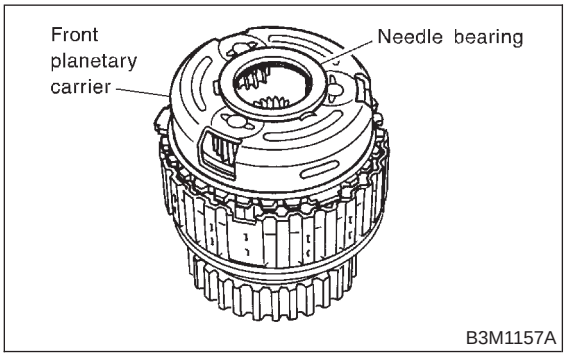


16) Install thrust needle bearing to front planetary carrier.

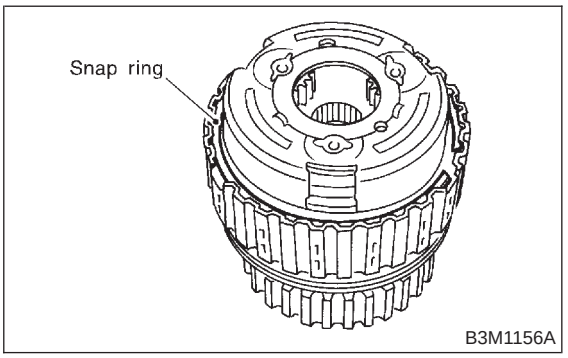
NOTE:
Pay attention to the orientation of the thrust needle bearing.



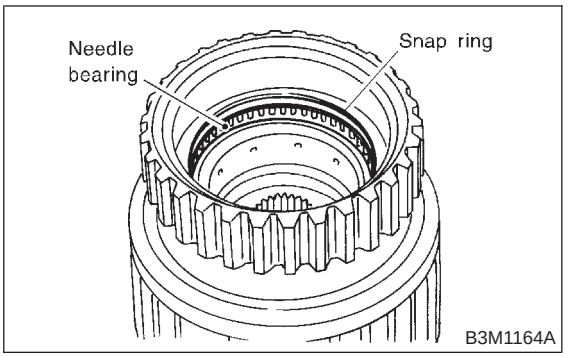
17) Install front planetary carrier to low clutch drum.



18) Install snap ring to low clutch drum.

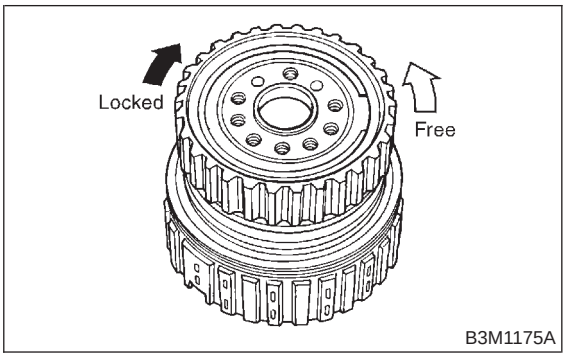


19) Install the needle bearing, and secure with the snap ring.



20) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

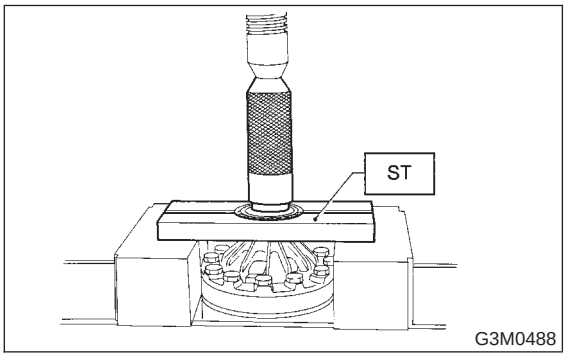
NOTE:
Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



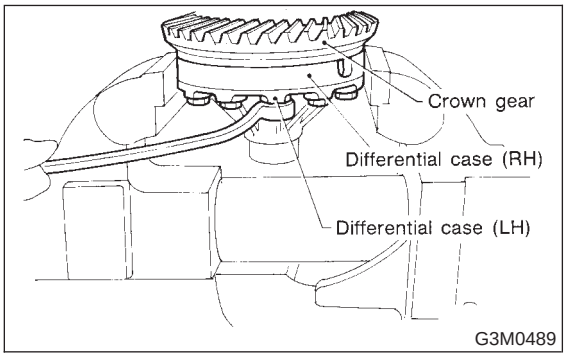
20. Differential Case Assembly

A: DISASSEMBLY

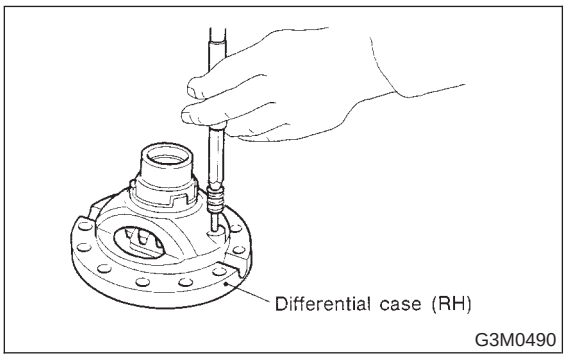
1) Using a press and ST, remove the taper roller bearing.
ST 498077000 REMOVER



2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.



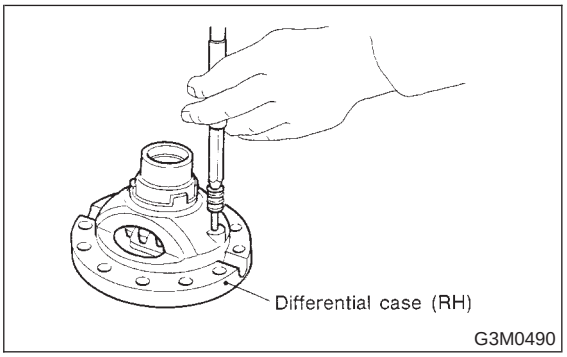
B: INSPECTION

Check each component for harmful cuts, damage and other faults.

C: ASSEMBLY

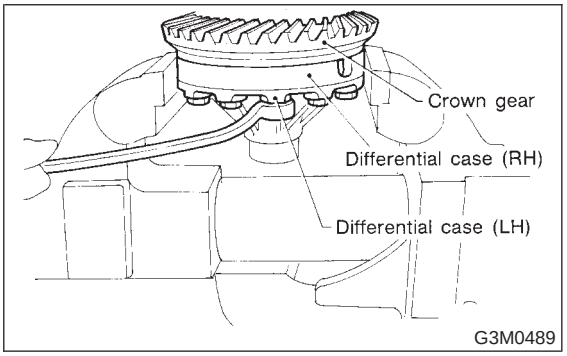
1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft, and fit the straight pin.

NOTE:
Install straight pin from reverse direction.



2) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.
3) Install the crown gear and secure by tightening the bolt.

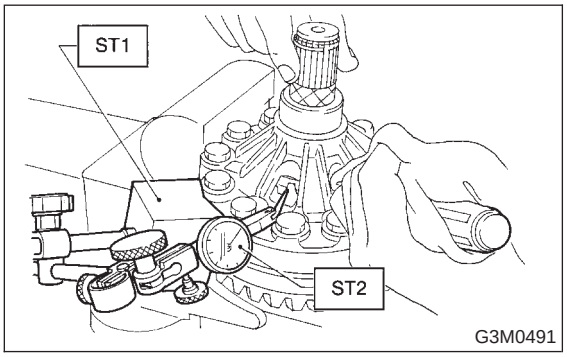
Standard tightening torque:
62±5 N·m (6.3±0.5 kg-m, 45.6±3.6 ft-lb)



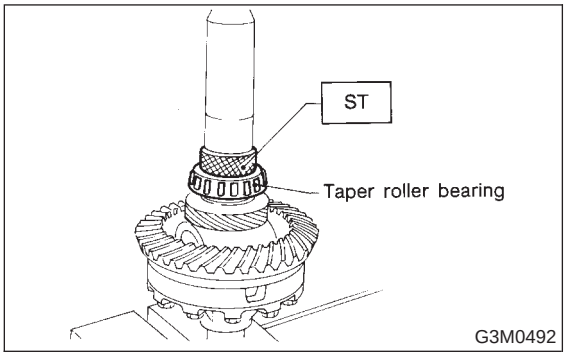
4) Measurement of backlash (Selection of washer)
Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:
Measure the backlash by applying a pinion tooth between two bevel gear teeth.

Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



5) Using ST, install taper roller bearing.
ST 398487700 DRIFT

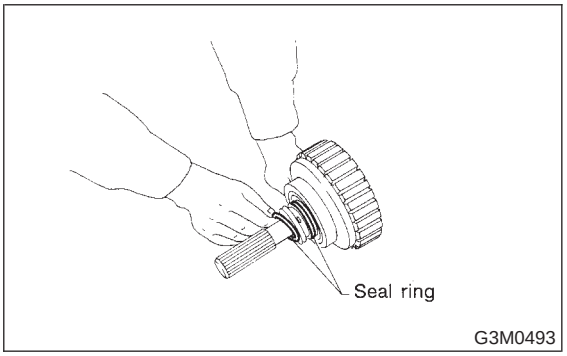


21. Transfer Clutch

A: DISASSEMBLY

1) Remove the seal ring.

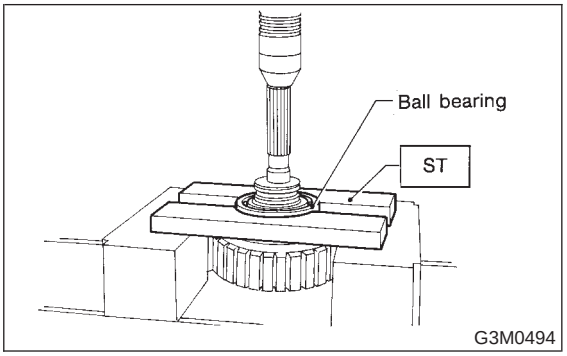
CAUTION:
Be careful not to damage the seal ring.



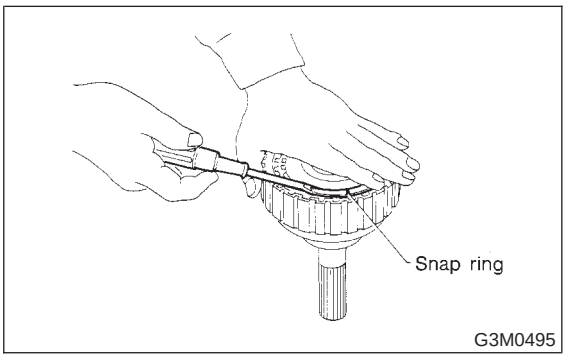
2) Using a press and ST, remove the ball bearing.

CAUTION:
Do not reuse the bearing.

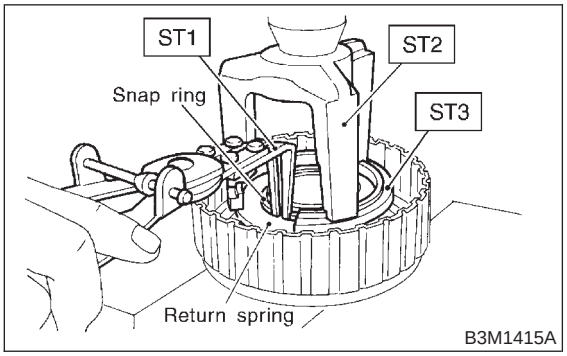
ST 498077600 REMOVER



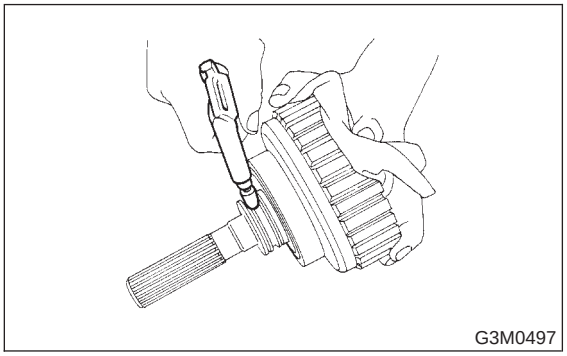
3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.



4) Remove the snap ring with ST1, ST2 and ST3, and take out the return spring and transfer clutch piston seal.
ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



5) Apply compressed air to the rear drive shaft to remove the piston.

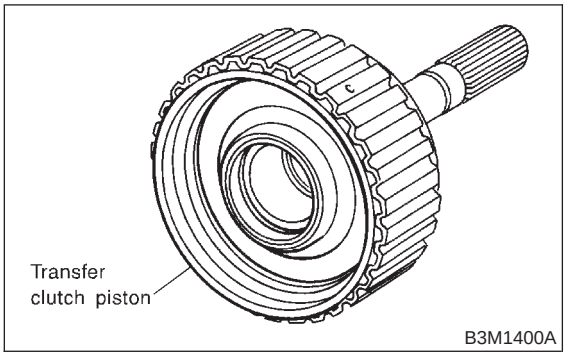


B: INSPECTION

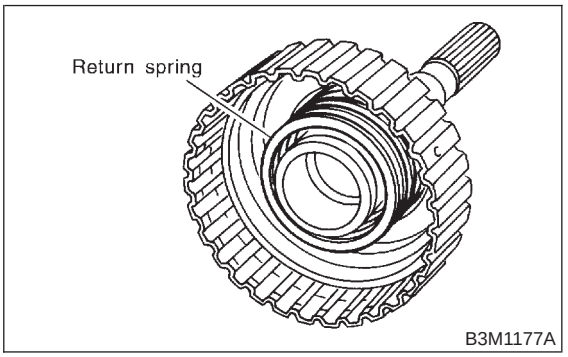
1) Check the drive plate facing for wear and damage.
2) Check the snap ring for wear, return spring for permanent set and breakage, and return spring for deformation.
3) Check the lathe cut ring for damage.

C: ASSEMBLY

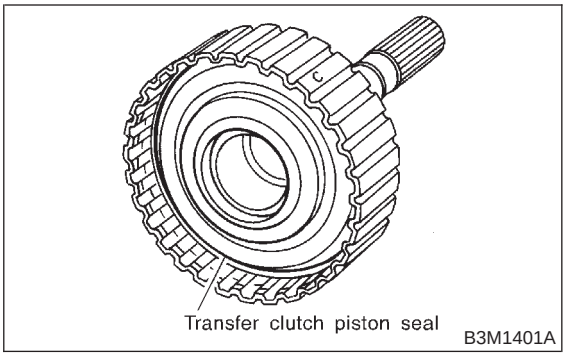
1) Install the transfer clutch piston.



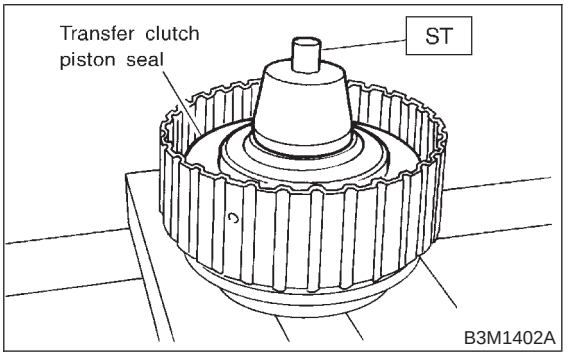
2) Install return spring to transfer piston.



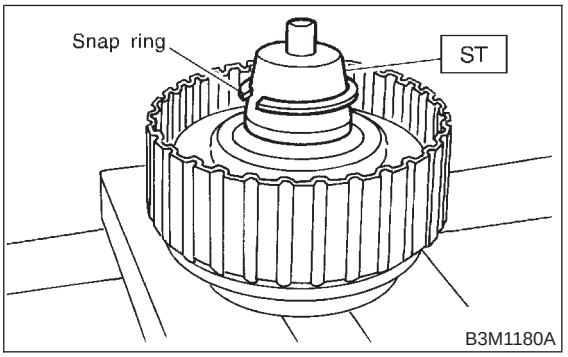
3) Install transfer clutch piston seal.



4) Install ST to rear drive shaft.
ST 499257300 SNAP RING OUTER GUIDE



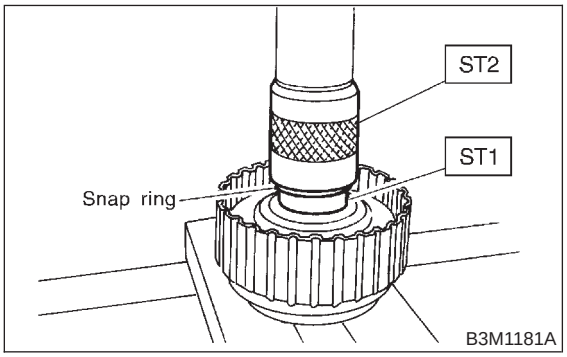
5) Install snap ring to ST.
ST 499257300 SNAP RING OUTER GUIDE



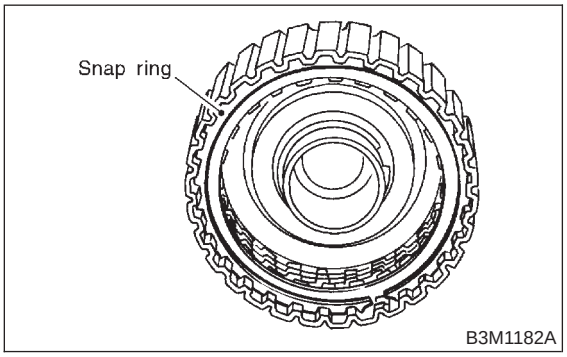
6) Using ST1 and ST2, install snap ring to rear drive shaft.

NOTE:
After installing snap ring, remove ST1 and ST2.

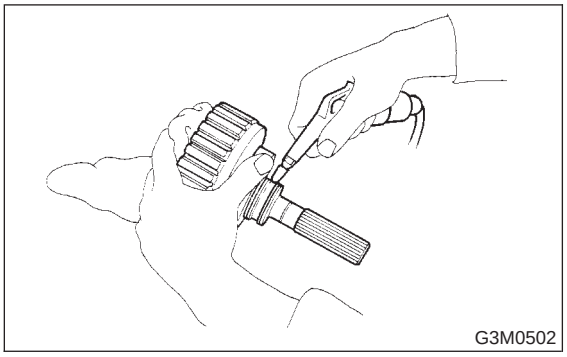
ST1 499257300 SNAP RING OUTER GUIDE
ST2 499247400 INSTALLER



7) Install the driven plates, drive plates, pressure plate and snap ring.



8) Apply compressed air to see if the assembled parts move smoothly.



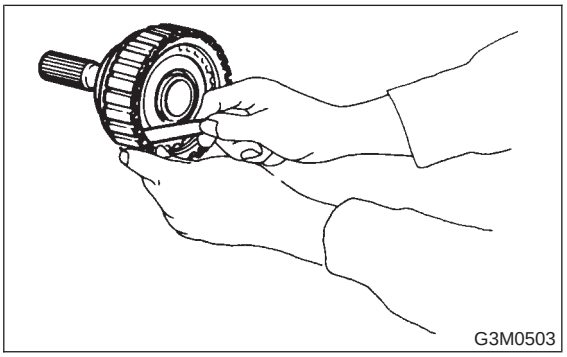
9) Check the clearance.

NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.

If the clearance is not within the specified range, select a proper pressure plate.

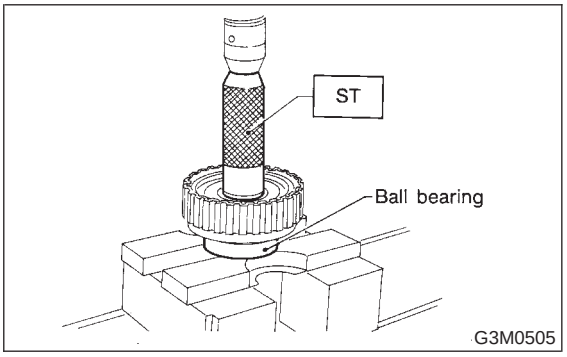
Standard value:
0.2 — 0.6 mm (0.008 — 0.024 in)

Allowable limit:
1.6 mm (0.063 in)



Available pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

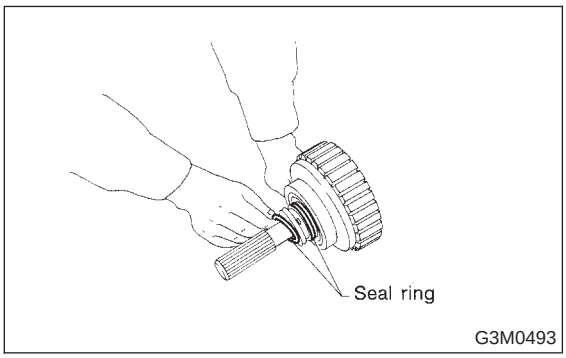
10) Press-fit the ball bearing with ST.
ST 899580100 INSTALLER



11) Coat the seal ring with vaseline, and install it in the seal ring groove of the shaft.

CAUTION:
Do not expand the seal ring excessively when installing.

ST 899580100 INSTALLER

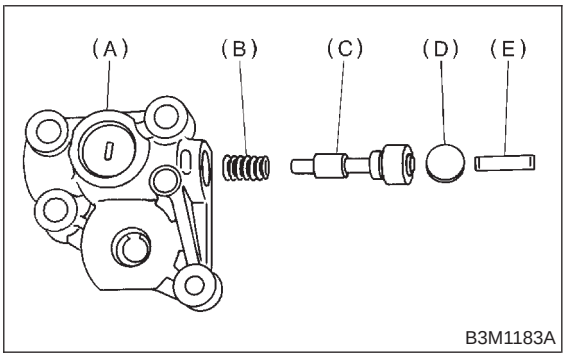


22. Transfer Valve Body

A: DISASSEMBLY

1) Separate duty solenoid C (transfer) and transfer valve body.
2) Remove the stopper plate and pry out the plug with a screwdriver. Then extract the spring and transfer control valve together.

CAUTION:
Be careful not to damage the valve and valve body.



(A) Transfer valve body
(B) Return spring
(C) Transfer control valve
(D) Plug
(E) Stopper plate

B: INSPECTION

Check each component for harmful cuts, damage, or other faults.

C: ASSEMBLY

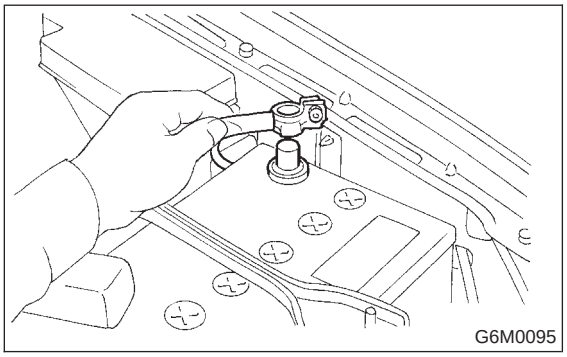
To assemble, reverse the removal sequence.

NOTE:
Make sure the valve slides smoothly after assembling.

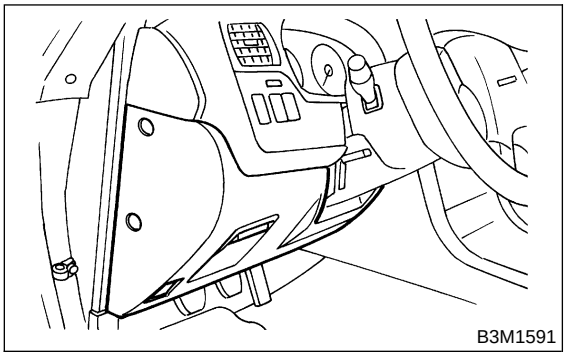
23. Transmission Control Module (TCM)

A: REMOVAL

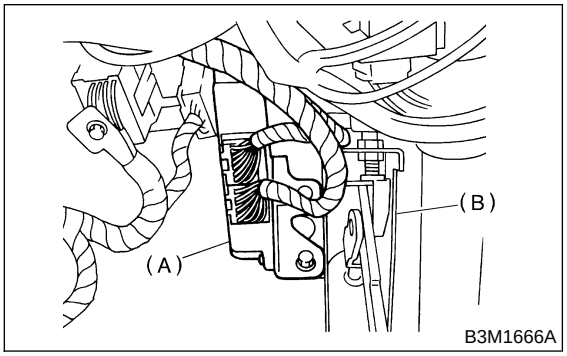
1) Disconnect battery ground cable.



2) Remove lower cover and then disconnect connector.

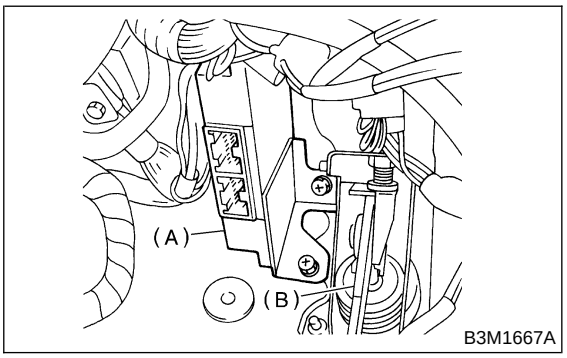


3) Disconnect connectors from transmission control module.



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

4) Remove transmission control module.

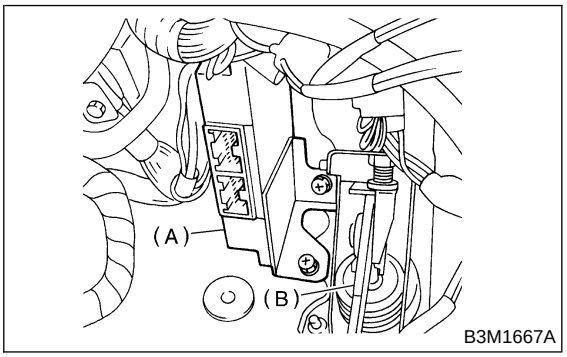


(A) Transmission control module
(B) Brake pedal bracket

B: INSTALLATION

1) Install transmission control module.

Tightening torque:
7.4±2 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)



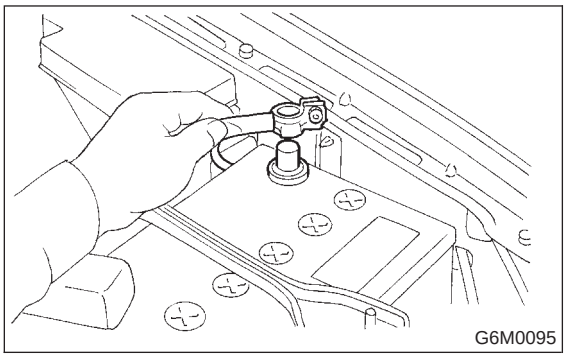
(A) Transmission control module
(B) Pedal bracket

2) Connect connectors to transmission control module.
3) Installing procedure hereafter is in the reverse order of removal.

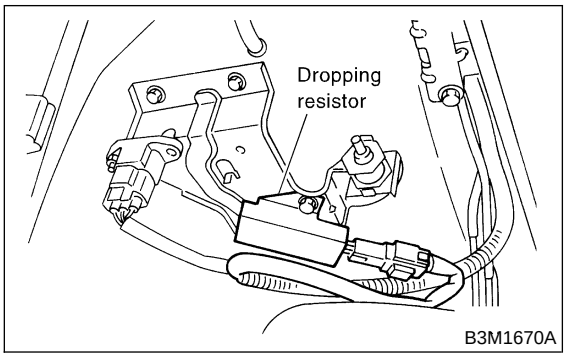
24. Dropping Resistor

A: REMOVAL AND INSTALLATION

1) Disconnect battery ground cable.

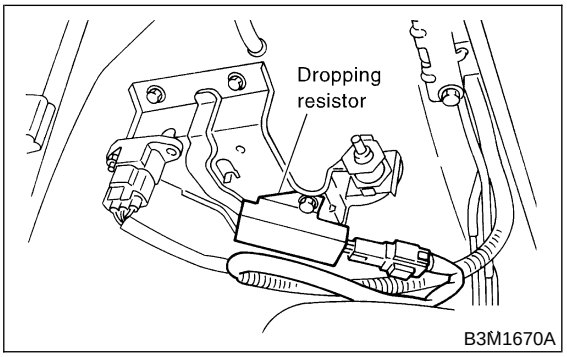


2) Remove air intake duct. <Ref. to 2-7 [W1A0].>
3) Disconnect connector from dropping resistor.
4) Remove dropping resistor from bracket.

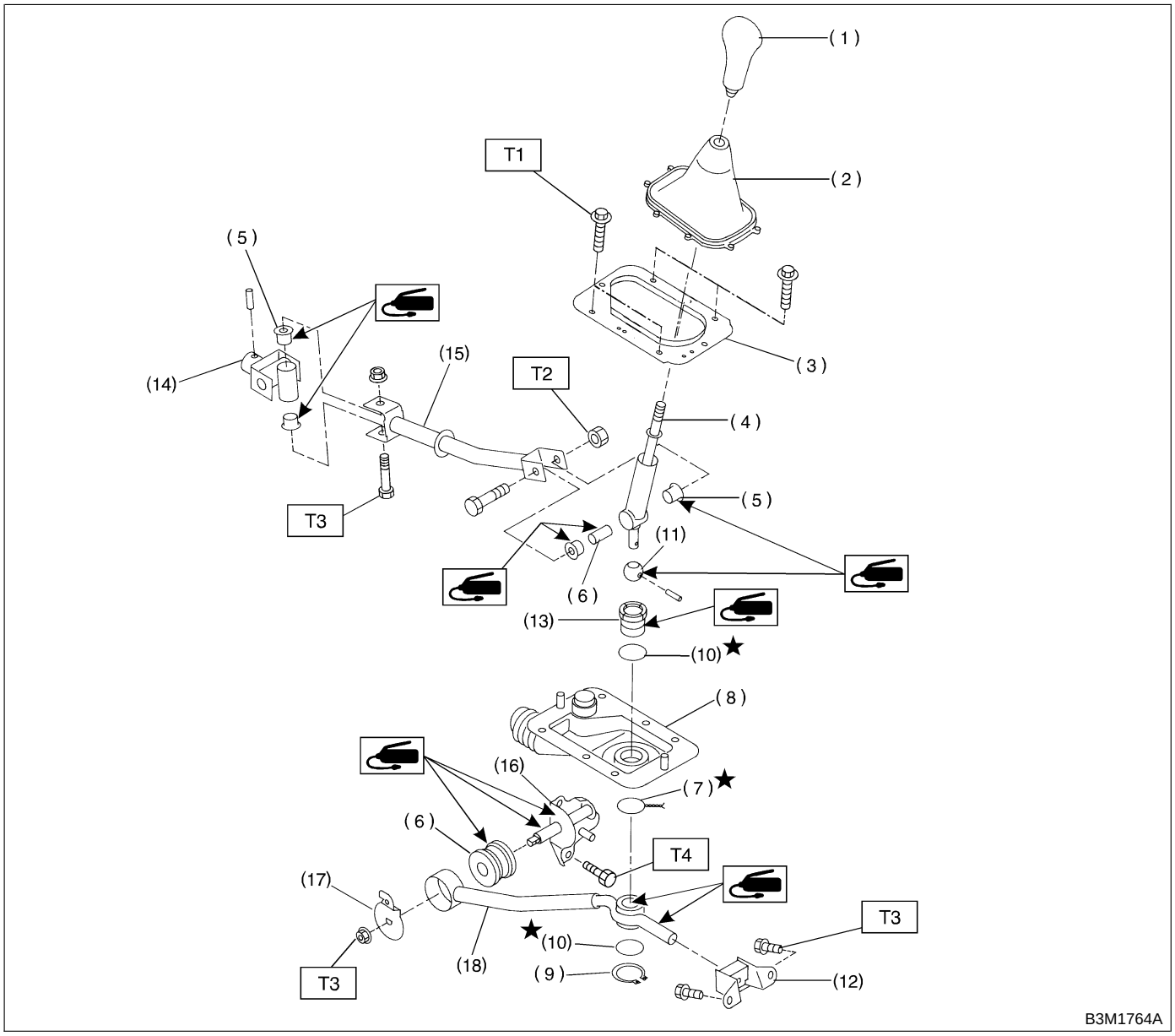


5) Installation is in the reverse order of removal.

Tightening torque:
6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)



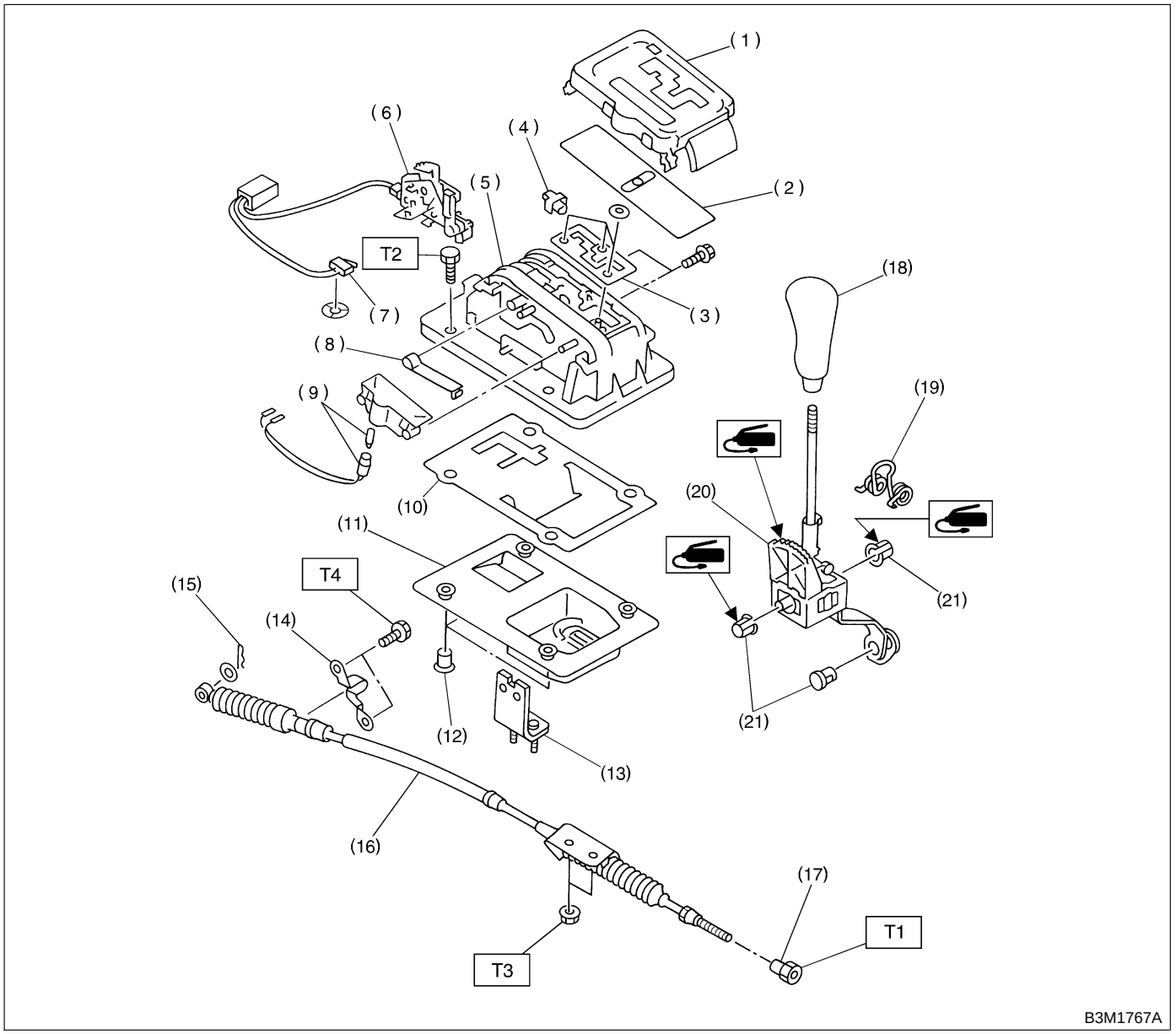
1. Gear Shift Lever



(1) Gear shift knob
(2) Console boot
(3) Boot plate
(4) Lever
(5) Bush
(6) Bush (Stay front)
(7) Locking wire
(8) Boot
(9) Snap ring
(10) O-ring
(11) Bush (Shift lever)
(12) Cushion rubber
(13) Bush (Stay rear)
(14) Joint
(15) Rod
(16) Bracket
(17) Washer
(18) Stay

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.5±2.0 (0.76±0.20, 5.5±1.4)
T2: 12±3 (1.2±0.3, 8.7±2.2)
T3: 18±5 (1.8±0.5, 13.0±3.6)
T4: 24.5±2 (2.50±0.20, 18.1±1.4)

2. Select Lever



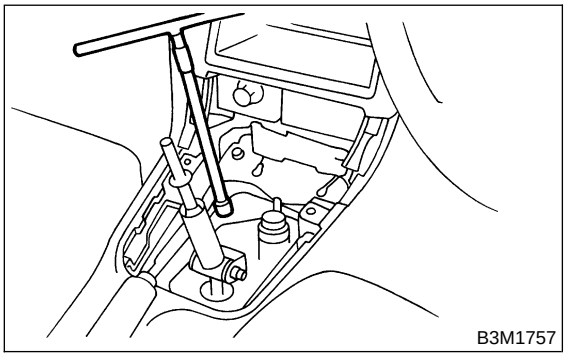
(1) Indicator cover
(2) Slider
(3) Pattern plate
(4) Stopper
(5) Frame
(6) Solenoid ASSY
(7) "P" position switch
(8) Detent spring
(9) Illumination bulb
(10) Plate
(11) Rubber boot
(12) Washer
(13) Cable bracket
(14) Cable clamp
(15) Snap pin
(16) Outer cable
(17) Nut
(18) Grip
(19) Spring
(20) Select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

Tightening torque: N·m (kg-m, ft-lb)
T1: 7.5±2.0 (0.76±0.20, 5.5±1.4)
T2: 13±3 (1.3±0.3, 9.4±2.2)
T3: 18±5 (1.8±0.5, 13.0±3.6)
T4: 33±10 (3.4±1.0, 25±7)

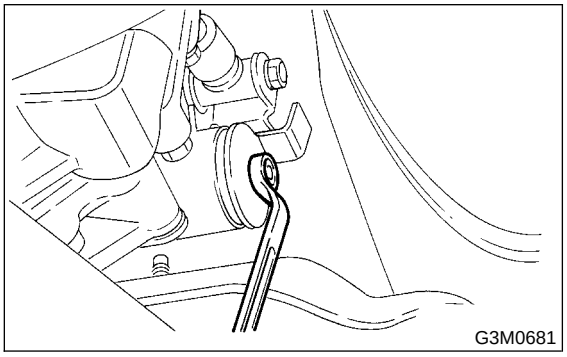
1. Gear Shift Lever

A: REMOVAL

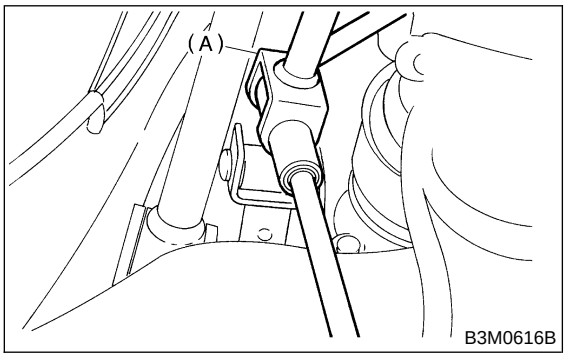
1) Remove console box. <Ref. to 5-4 [W1A0].>
2) Remove plate from the body.


B3M1757

3) Remove stay from bracket.

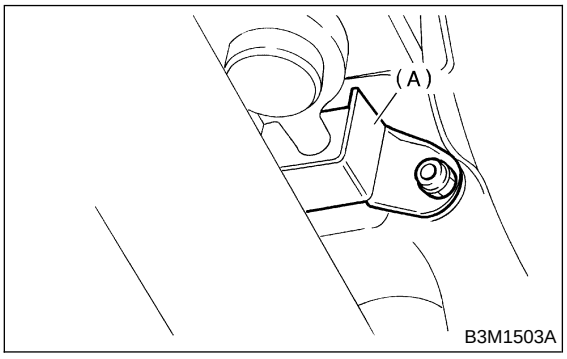

G3M0681

4) Remove rod (A) from joint.



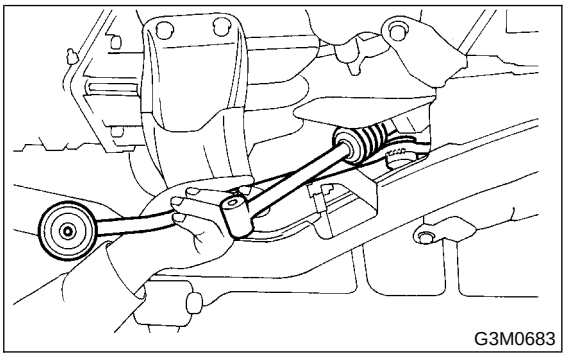
B3M0616B

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



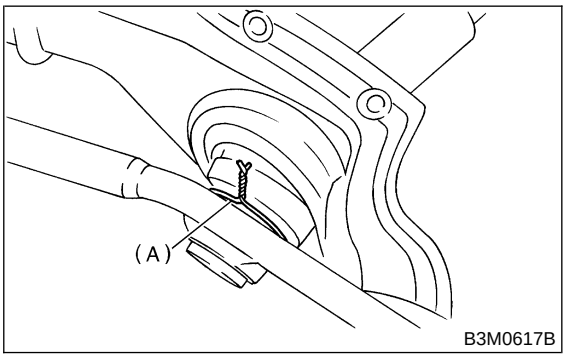
B3M1503A

6) Remove gear shift lever.


G3M0683

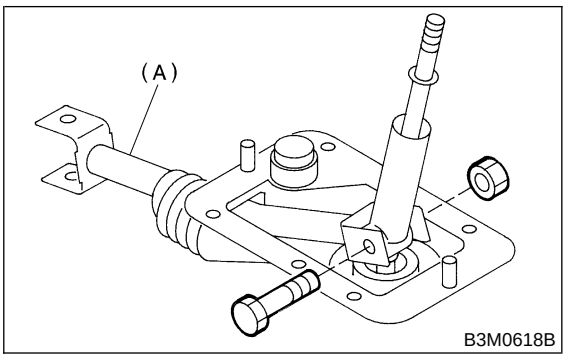
B: DISASSEMBLY

1) Disconnect locking wire (A).



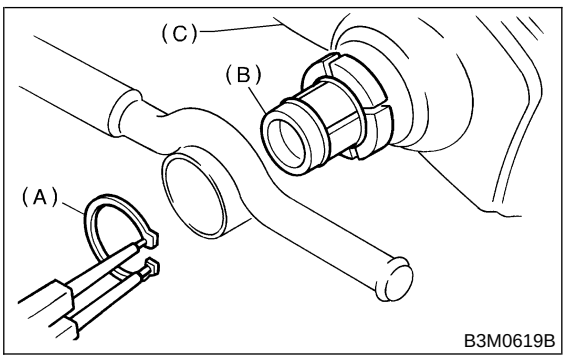
B3M0617B

2) Remove rod (A) from lever.



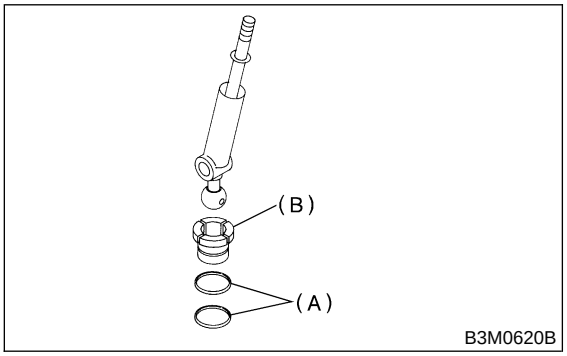
B3M0618B

3) Remove snap ring (A) from bush (B), then disconnect lever from stay.
4) Remove boot (C) from lever.

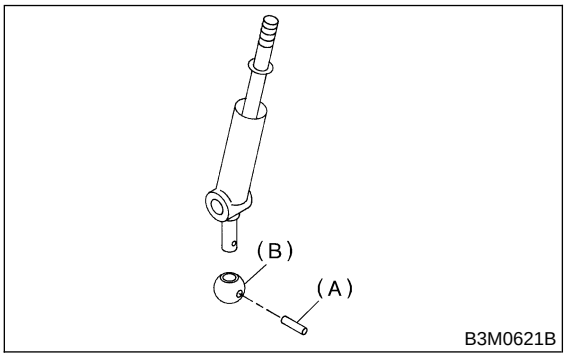


B3M0619B

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

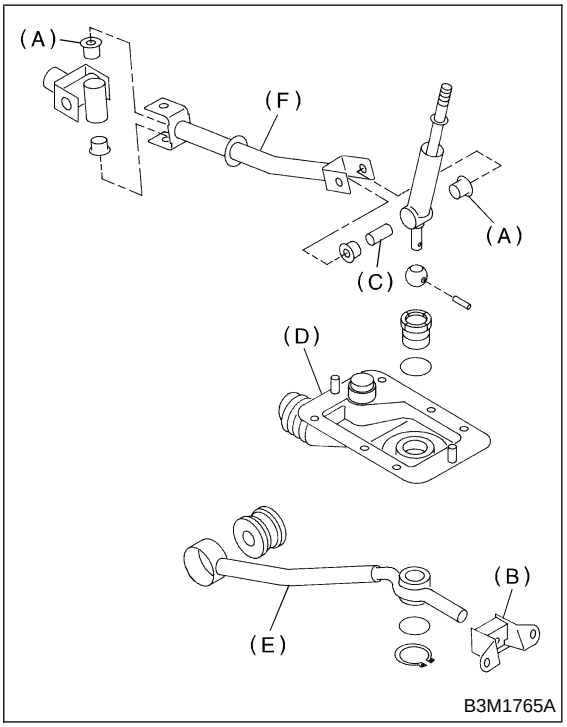


6) Draw out spring pin (A), then remove bush (Shift lever) (B) from lever.



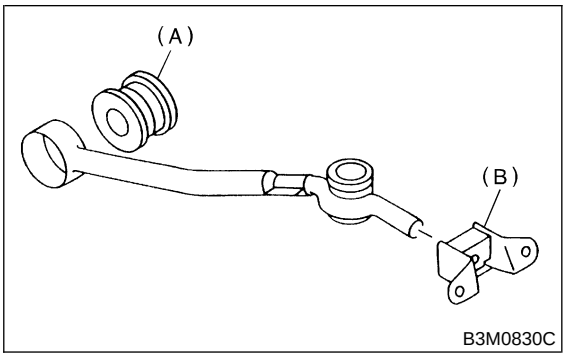
C: INSPECTION

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



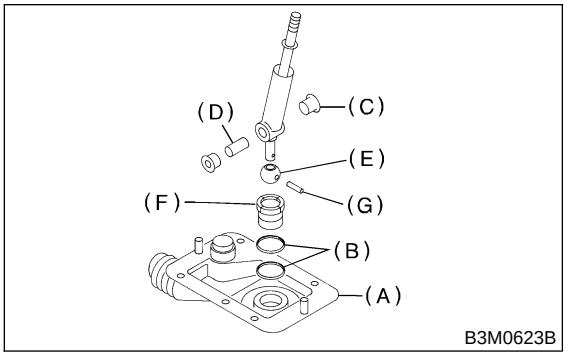
D: ASSEMBLY

1) Clean all parts before assembly.
2) Mount the bush (Stay front) (A) and cushion rubber (B) on the stay.

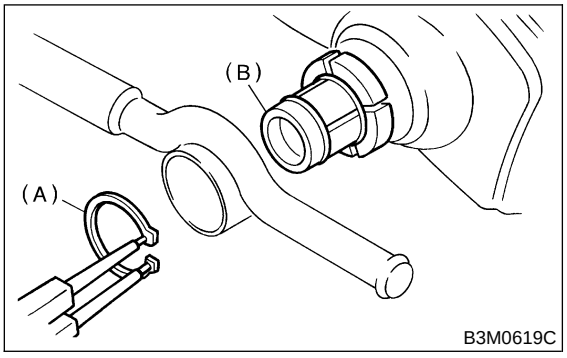


3) Mount each parts (Boot (A), O-ring (B), bush (C), spacer (D), bush (Shift lever) (E), bush (Stay rear) (F) and spring pin (G)) on the lever.

CAUTION:
- **Always use new O-rings.**
- **Apply grease [MULTEMP AC-D or equivalent] to the inner and side surfaces of the bush when installing spacer.**

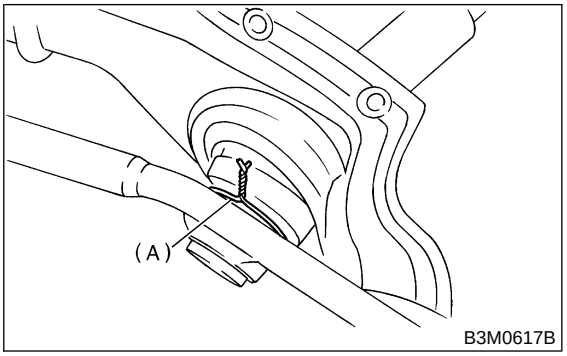


4) Insert the lever into the boot hole.
5) Mount lever on the stay.
6) Install snap ring (A) to the bottom of the bush (Stay rear) (B).



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

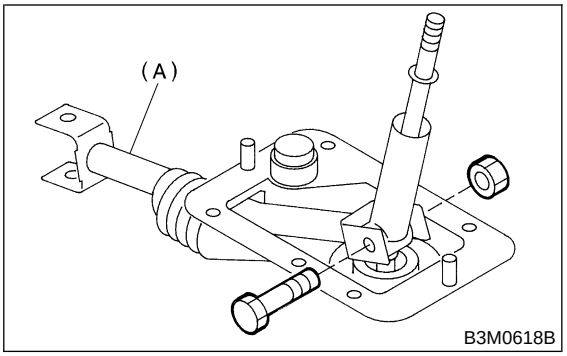
CAUTION:
Always use new locking wire.



8) Insert the rod into the boot hole.
9) Connect rod (A) to lever.

Tightening torque:
12±3 N·m (1.2±0.3 kg-m, 8.7±2.2 ft-lb)

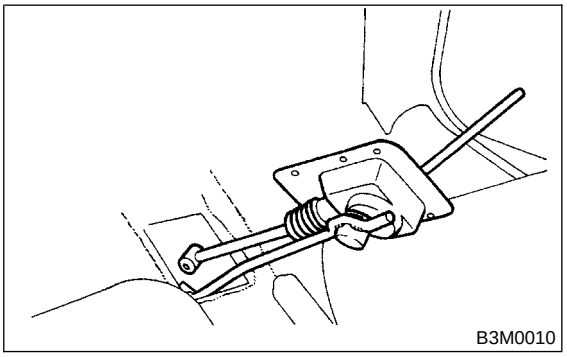
Rocking torque:
0.7 N·m (0.07 kg-m, 0.5 ft-lb) or less



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

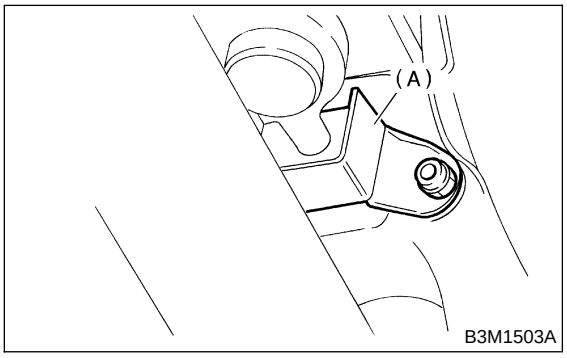
E: INSTALLATION

1) Put into gear shift lever from passenger compartment.
2) Mount plate on the body.
3) Install console box and gear shift knob. <Ref. to 5-4 [W1B0].>



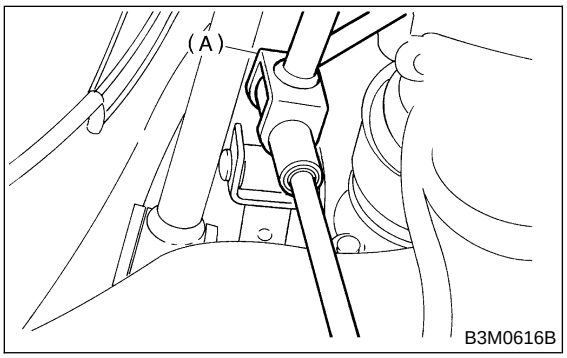
4) Mount cushion rubber (A) on the body.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)



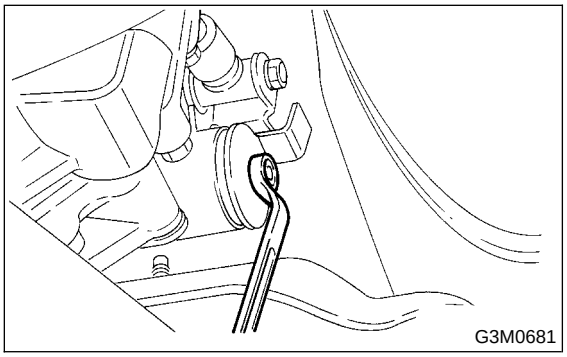
5) Connect rod (A) to the joint.

Tightening torque:
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)



6) Connect stay to the bracket.

Tightening torque:
18±5 N·m (1.8±0.51 kg-m, 13.0±3.6 ft-lb)

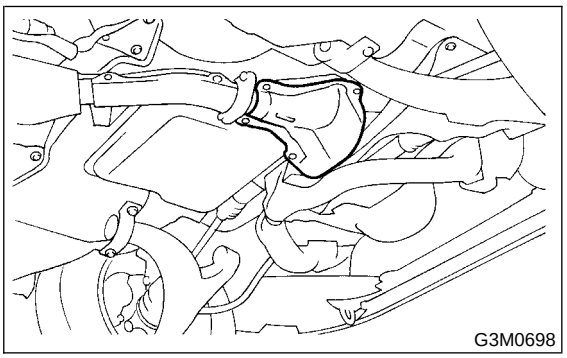


7) Install the exhaust cover.

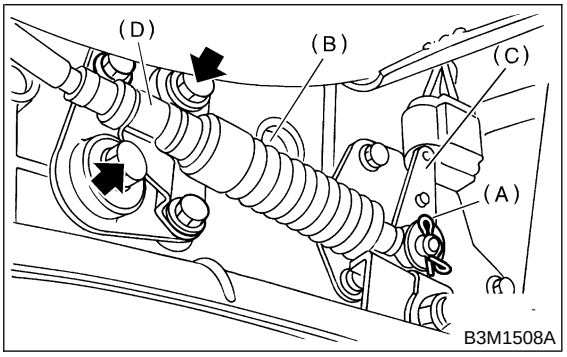
2. Select Lever

A: REMOVAL

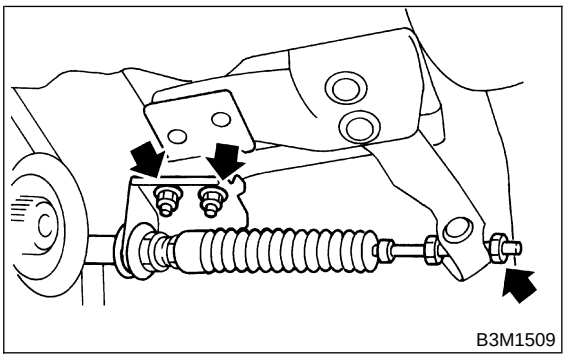
1) Remove the cable.
(1) Prior to removal, set lever to “N” position.
(2) Remove front exhaust pipe.



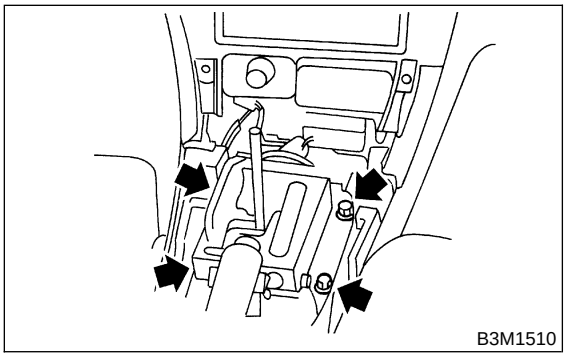
(3) Remove snap pin (A) and then separate cable (B) from transmission lever (C).
(4) Remove cable clamp (D) from transmission case.



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

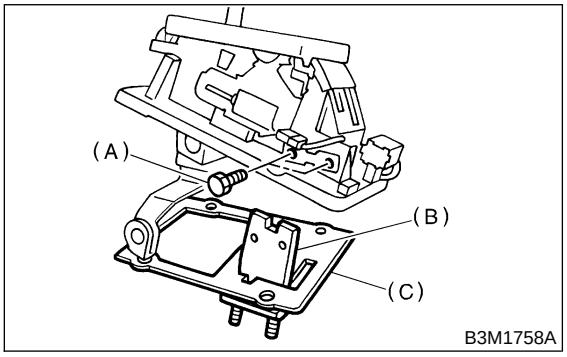


2) Remove console box. <Ref. to 5-4 [W1A0].>
3) Disconnect the connectors, then remove the four bolts to take out the selector lever assembly from the body.


B3M1510

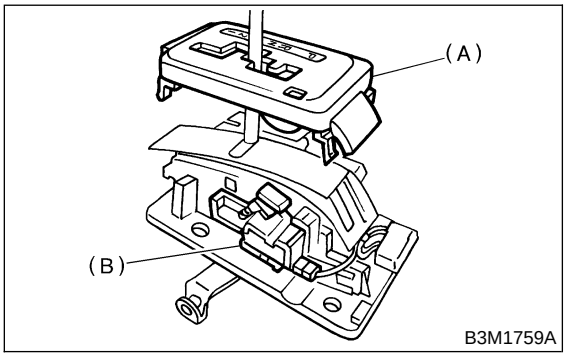
B: DISASSEMBLY

1) Remove four washers and then detach rubber boot.
2) Remove bolts (A) and then remove cable bracket (B) and plate (C).



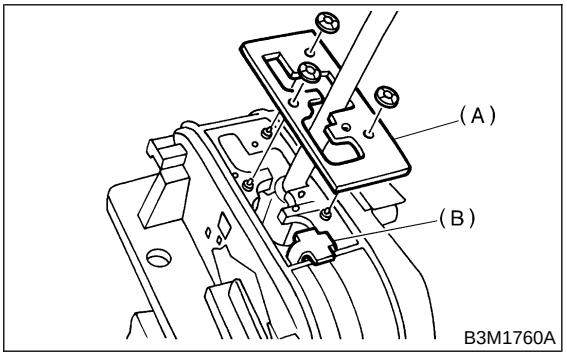
B3M1758A

3) Twist the select lever grip and then remove select lever grip.
4) Detach indicator cover (A).
5) Disconnect connector and then remove solenoid assembly (B).



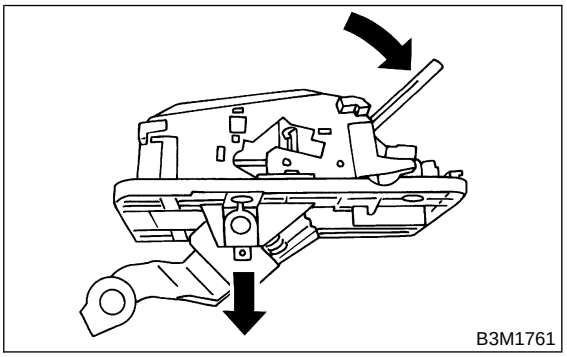
B3M1759A

6) Remove pattern plate (A).
7) Remove stopper (B).



B3M1760A

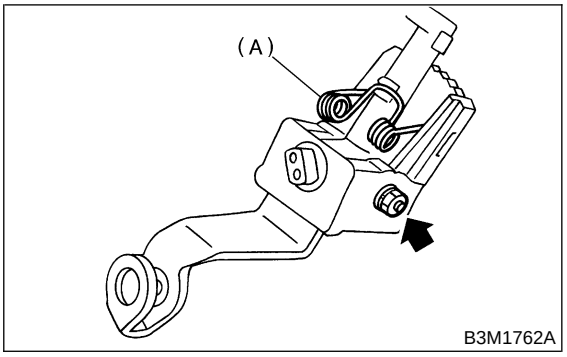
8) Tilt lever forward and pull down to separate it from frame.


B3M1761

9) Remove spring (A).

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

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



B3M1762A

C: INSPECTION

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

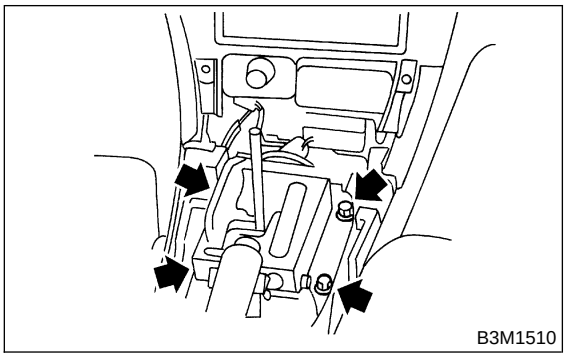
D: ASSEMBLY

1) Clean all parts before assembly.
2) Apply grease [MULTEMP AC-D or equivalent] to each parts. <Ref. to 3-3 [C200].>
3) Assembly is in the reverse order of disassembly.
4) After completion of fitting, transfer selector lever to range “P” — “1”, then check whether the indicator and selector lever agree, whether operating force is.

E: INSTALLATION

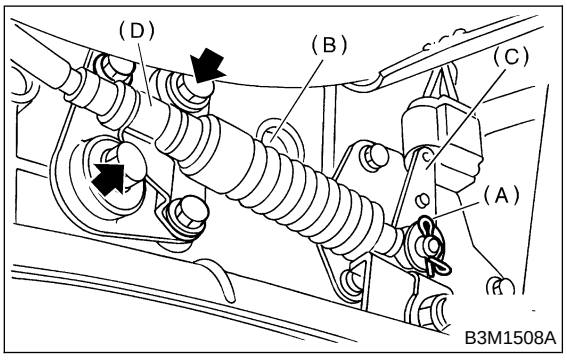
1) Mount the selector lever onto the vehicle body.
2) Tighten the four bolts to install the selector lever to the vehicle body, then connect connector.

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


B3M1510

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

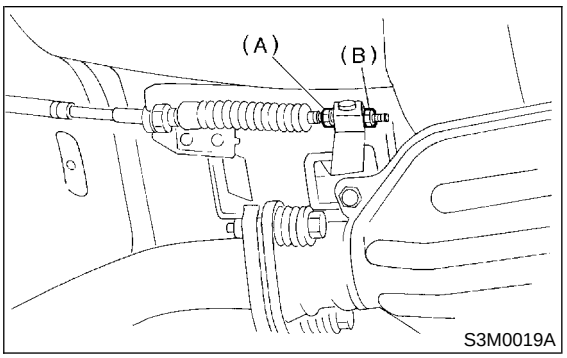
Tightening torque:
24.5±2.0 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



B3M1508A

8) Insert the thread portion of the other inner cable and into the connector hole of the selector lever, and fix the other outer cable end to the bracket.
9) Adjust the inner cable length.
(1) Put connector into contact with nut (A).
(2) Tighten nut (B).

Tightening torque:
7.5±2.0 N·m (0.76±0.20 kg-m, 5.5±1.4 ft-lb)



S3M0019A

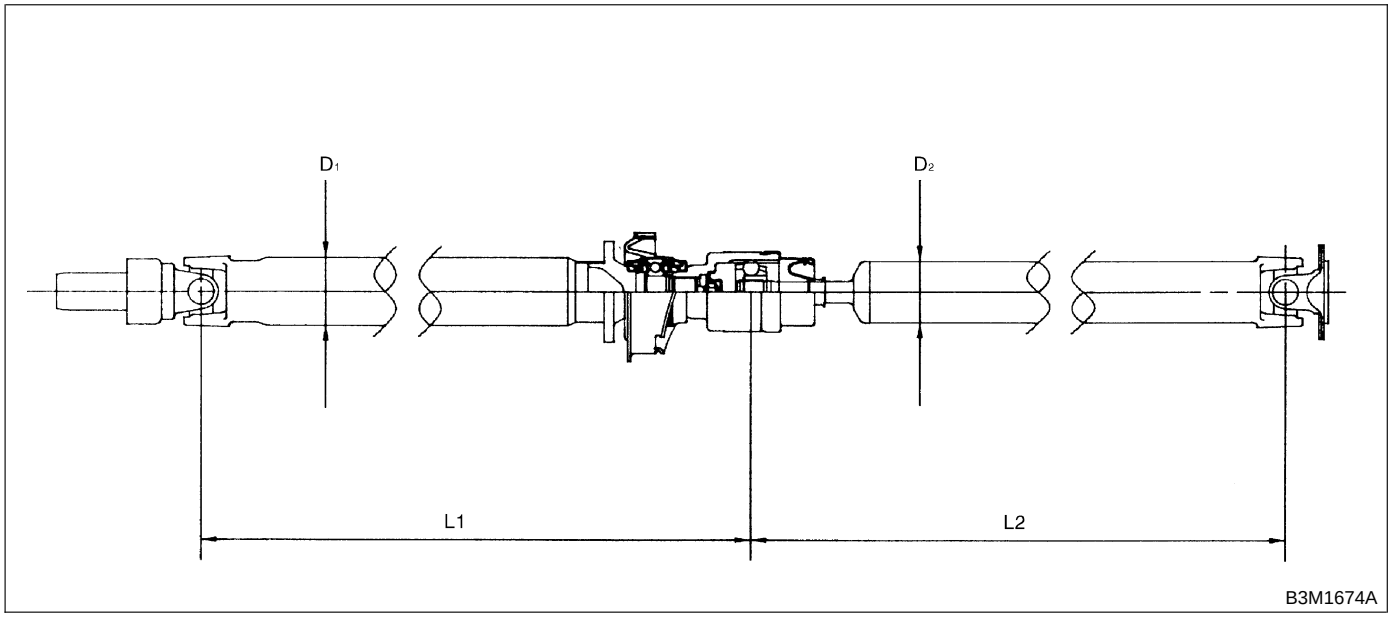
10) After completion of fitting, make sure that the selector lever operates smoothly all across the operating range.
11) Connect the harnesses and check the following items.
(1) The engine starts operating when selector lever is in position “P”, but not in other positions.
(2) The back-up light is lit when the selector lever is in position “R”, but not in other positions.
12) Check shift-lock system.
(1) Ensure ignition switch rotates from “ACC” to “LOCK” when the selector lever is set at “P”. Also check that ignition key can be removed only from the “LOCK” position.
(2) Ensure selector lever moves from “P” to any other position when the brake pedal is depressed with ignition key set at “ON” or “START”.

MEMO:

1. Propeller Shaft

A: SPECIFICATIONS

Propeller shaft type		DOJ type	
Front propeller shaft Joint-to-joint length: L_1 mm (in)	AT	629 (24.76)	
	MT	688 (27.09)	—
Rear propeller shaft Joint-to-joint length: L_2 mm (in)	AT	773 (30.43)	
	MT	773 (30.43)	—
Outside diameter of tube: mm (in)	D_1	63.5 (2.500)	
	D_2	57.0 (2.244)	



2. Rear Differential

A: SPECIFICATIONS

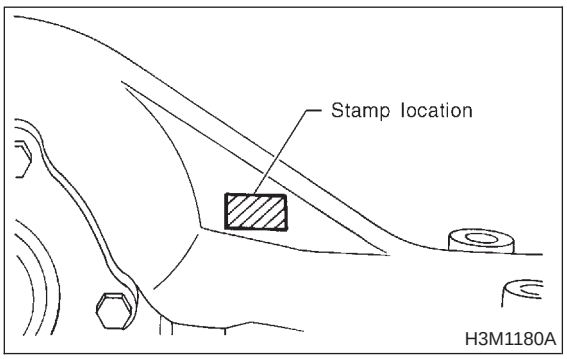
MODEL	BRIGHTON		L	
	MT	AT	MT	AT
Rear differential type	T1 type	T2 type	T1 type	T2 type
Gear	Hypoid gear			
Gear ratio (Number of gear teeth)	3.900 (39/10)	4.111 (37/9)	3.900 (39/10)	4.111 (37/9)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)			
Rear differential gear oil	GL-5			

MODEL	GT GT-LTD		OUTBACK		OUTBACK-CW OUTBACK-LTD		OUTBACK SEDAN
	MT	AT	MT	AT	MT	AT	AT
Rear differential type	BK type (with LSD)	CD type (with LSD)	T2 type	TP type	BK type (with LSD)	CD type (with LSD)	
Gear	Hypoid gear						
Gear ratio (Number of gear teeth)	4.111 (37/9)	4.444 (40/9)	4.111 (37/9)	4.444 (40/9)	4.111 (37/9)	4.444 (40/9)	
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)						
Rear differential gear oil	GL-5						

B: IDENTIFICATION

When replacing a rear differential assembly, select the correct one according to the following table.

CAUTION:
Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise when AWD is selected.



C: ADJUSTING PARTS

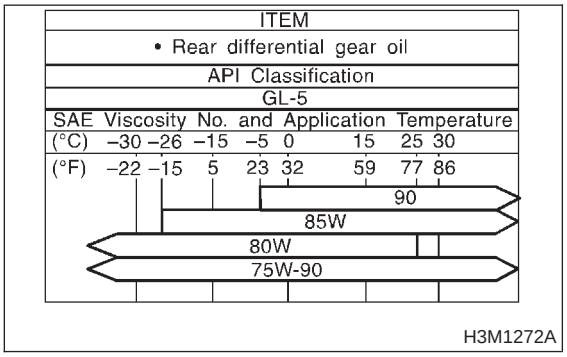
Front and rear bearing preload at companion flange bolt hole	New bearing	19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb)
	Used bearing	8.34 — 16.67 N (0.85 — 1.7 kg, 1.87 — 3.75 lb)
Preload adjusting spacer	Part No.	Length
	383695201	56.2 mm (2.213 in)
	383695202	56.4 mm (2.220 in)
	383695203	56.6 mm (2.228 in)
	383695204	56.8 mm (2.236 in)
	383695205	57.0 mm (2.244 in)
	383695206	57.2 mm (2.252 in)
Preload adjusting washer	Part No.	Thickness
	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
	383835200	2.33 mm (0.0917 in)
	383845200	2.31 mm (0.0909 in)
Pinion height adjusting shim	Part No.	Thickness
	383495200	3.09 mm (0.1217 in)
	383505200	3.12 mm (0.1228 in)
	383515200	3.15 mm (0.1240 in)
	383525200	3.18 mm (0.1252 in)
	383535200	3.21 mm (0.1264 in)
	383545200	3.24 mm (0.1276 in)
	383555200	3.27 mm (0.1287 in)
	383565200	3.30 mm (0.1299 in)
	383575200	3.33 mm (0.1311 in)
	383585200	3.36 mm (0.1323 in)
	383595200	3.39 mm (0.1335 in)
	383605200	3.42 mm (0.1346 in)
	383615200	3.45 mm (0.1358 in)
	383625200	3.48 mm (0.1370 in)
	383635200	3.51 mm (0.1382 in)
	383645200	3.54 mm (0.1394 in)
	383655200	3.57 mm (0.1406 in)
	383665200	3.60 mm (0.1417 in)
	383675200	3.63 mm (0.1429 in)
	383685200	3.66 mm (0.1441 in)
Side gear backlash	0.1 — 0.2 mm (0.0039 — 0.0079 in)	

Side gear thrust washer (Non-Turbo model)	Part No.	Thickness
	383445201	0.75 — 0.80 mm (0.0295 — 0.0315 in)
	383445202	0.80 — 0.85 mm (0.0315 — 0.0335 in)
	383445203	0.85 — 0.90 mm (0.0335 — 0.0354 in)
	383445204	0.90 — 0.95 mm (0.0354 — 0.0374 in)
	383445205	0.95 — 1.0 mm (0.0374 — 0.0394 in)
Side bearing standard width	—	20.00 mm (0.7874 in)
Side bearing retainer shim	Part No.	Thickness
	383475201	0.20 mm (0.0079 in)
	383475202	0.25 mm (0.0098 in)
	383475203	0.30 mm (0.0118 in)
	383475204	0.40 mm (0.0157 in)
	383475205	0.50 mm (0.0197 in)
Crown gear to drive pinion backlash	Limit	0.10 — 0.20 mm (0.0039 — 0.0079 in)
Crown gear runout on its back surface		0.05 mm (0.0020 in)

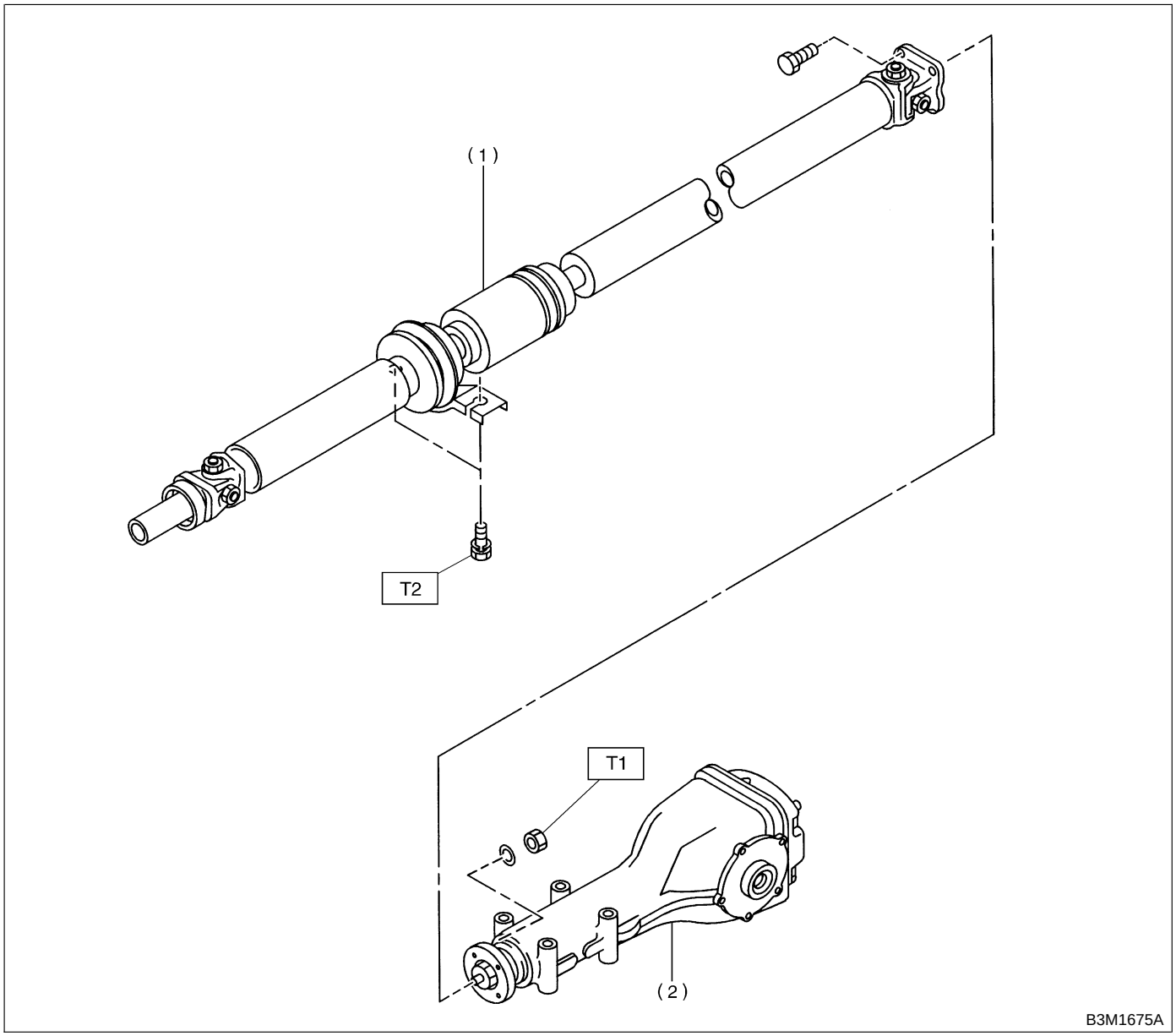
D: REAR DIFFERENTIAL GEAR OIL

- Recommended oil

CAUTION:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



1. Propeller Shaft

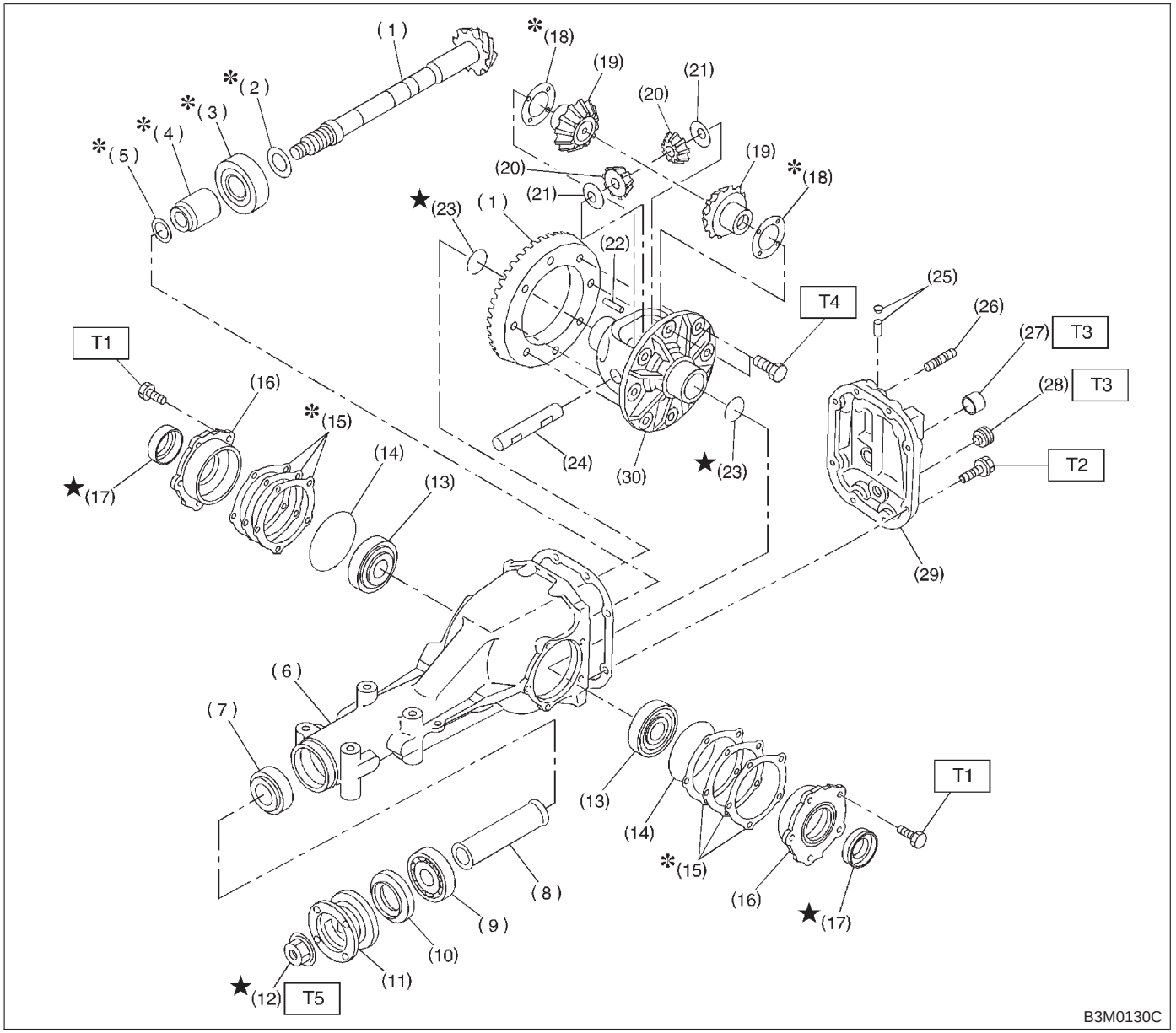


(1) Propeller shaft
(2) Rear differential

Tightening torque: N·m (kg-m, ft-lb)
T1: 31±8 (3.2±0.8, 23.1±5.8)
T2: 52±5 (5.3±0.5, 38.3±3.6)

2. Rear Differential Assembly

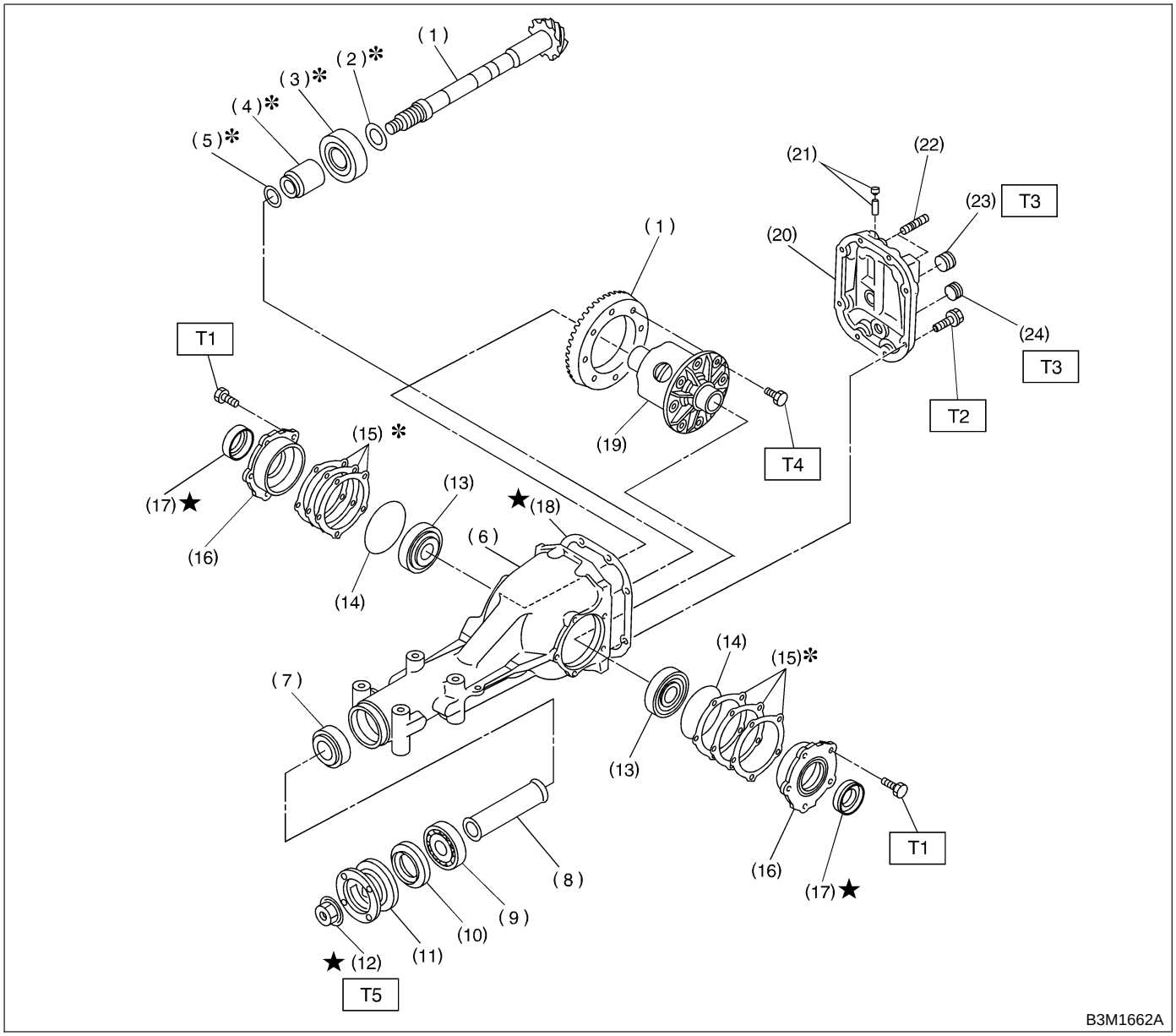
A: WITHOUT LSD



(1) Pinion crown gear set
(2) Pinion height adjusting washer
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Spacer
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Side gear thrust washer
(19) Side gear
(20) Pinion mate gear
(21) Pinion mate gear washer
(22) Pinion shaft lock pin
(23) Circlip
(24) Pinion mate shaft
(25) Air breather cap
(26) Stud bolt
(27) Oil filler plug
(28) Oil drain plug
(29) Rear cover
(30) Differential case

Tightening torque: N·m (kg-m, ft-lb)
T1: 10.3±1.5 (1.05±0.15, 7.6±1.1)
T2: 29.4±4.9 (3.00±0.50, 21.7±3.6)
T3: 49.0±9.8 (5.0±1.0, 36.2±7.2)
T4: 103.0±9.8 (10.50±1.00, 75.9±7.2)
T5: 181.4±14.7 (18.50±1.50, 133.8±10.8)

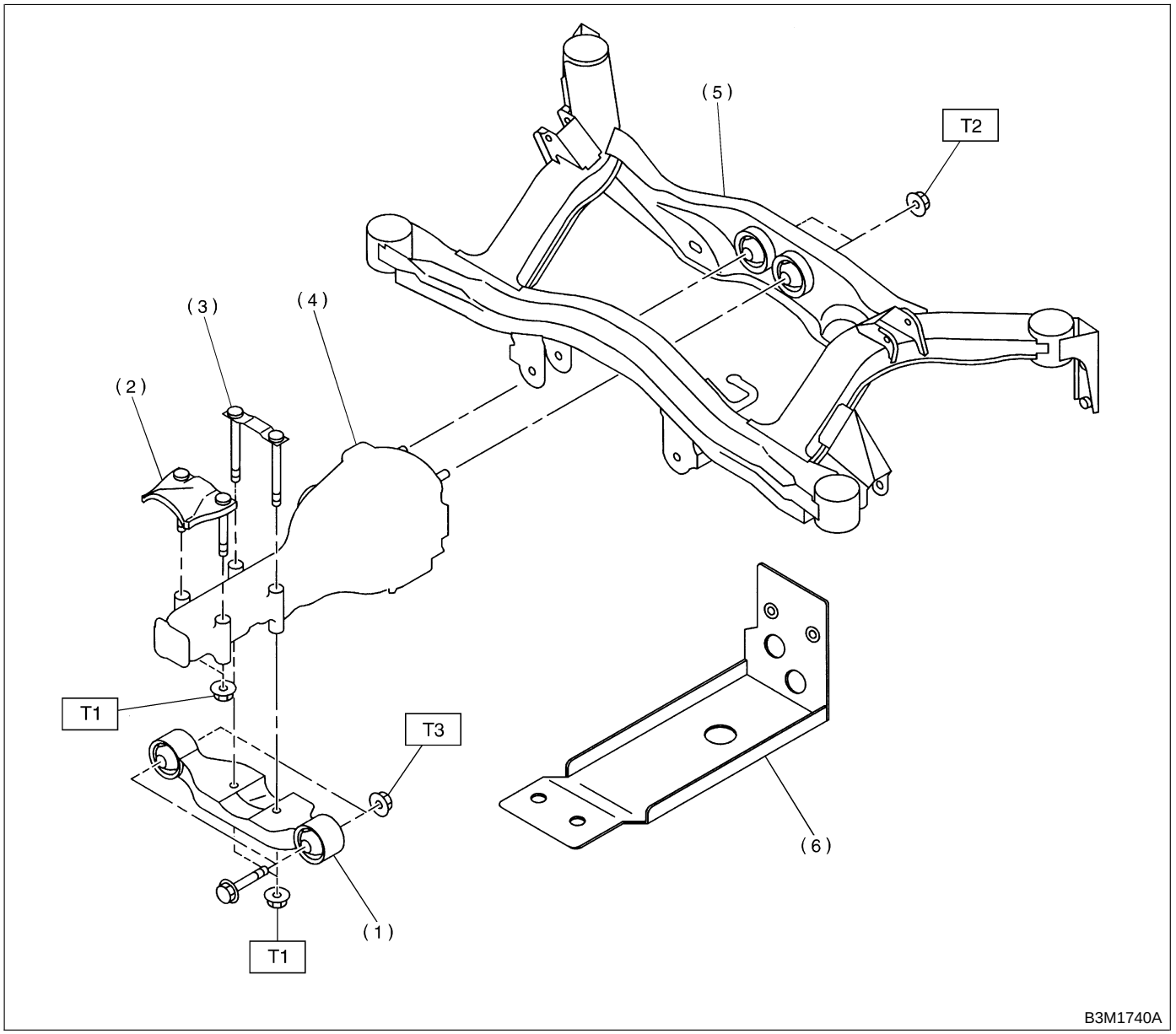
B: WITH LSD



(1) Pinion crown gear set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Gasket
(19) Differential case
(20) Rear cover
(21) Air breather cap
(22) Stud bolt
(23) Oil filler plug
(24) Oil drain plug

Tightening torque: N·m (kg-m, ft-lb)
T1: 10.3±1.5 (1.05±0.15, 7.6±1.1)
T2: 29.4±4.9 (3.00±0.50, 21.7±3.6)
T3: 49.0±9.8 (5.00±1.00, 36.2±7.2)
T4: 103.0±9.8 (10.50±1.00, 75.9±7.2)
T5: 181.4±14.7 (18.50±1.50, 133.8±10.8)

3. Rear Differential Mounting System



(1) Rear differential front member
(2) Protector
(3) Rear differential member plate
(4) Rear differential ASSY
(5) Sub flame
(6) Rear differential protector (if equipped)

Tightening torque: N·m (kg-m, ft-lb)
T1: 64±8 (6.5±0.8, 47.0±5.8)
T2: 69±8 (7.0±0.8, 50.6±5.8)
T3: 108±15 (11±1.5, 80±11)

1. Propeller Shaft

A: ON-CAR SERVICE

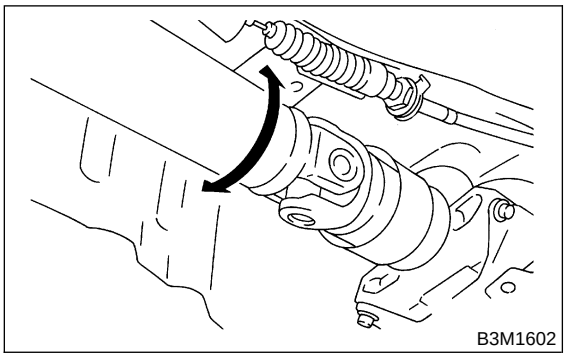
Check the following points with propeller shaft installed in vehicle.

1. JOINTS AND CONNECTIONS

1) Remove front and center exhaust pipes.
<Ref. to 2-9 [W1A0].>
2) Remove heat shield cover.
3) Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.

2. SPLINES AND BEARING LOCATIONS

1) Remove front and center exhaust pipes.
<Ref. to 2-9 [W1A0].>
2) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>
3) Remove heat shield cover.
4) Turn propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.

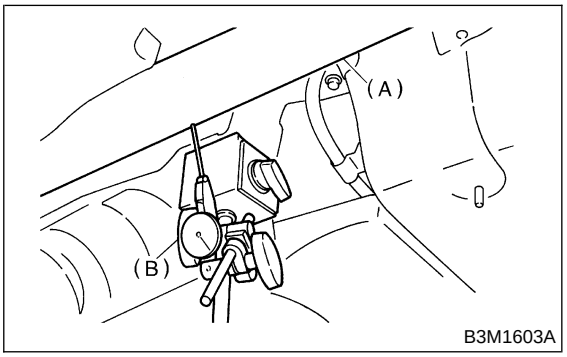

B3M1602

3. RUNOUT OF PROPELLER SHAFT

1) Remove front and center exhaust pipes.
<Ref. to 2-9 [W1A0].>
2) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>
3) Remove heat shield cover.
4) Turn rear wheels by hand to check for “runout” of propeller shaft.

NOTE:
Measure runout with a dial gauge at the center of front and rear propeller shaft tubes.

Runout:
Limit 0.6 mm (0.024 in)

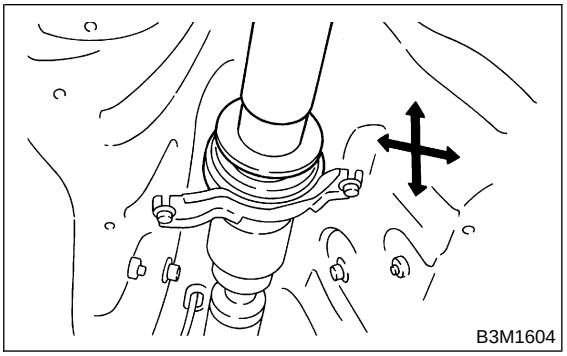


B3M1603A

(A) Propeller shaft
(B) Dial gauge

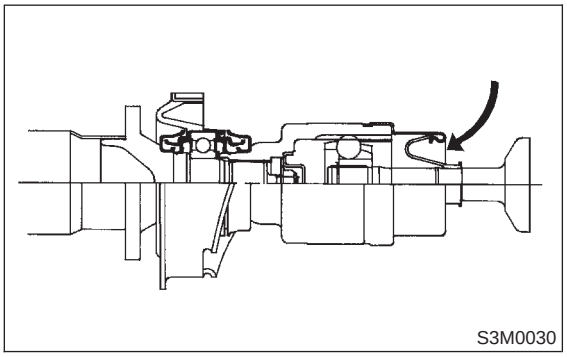
4. CENTER BEARING FREE PLAY

1) Remove front and center exhaust pipes.
<Ref. to 2-9 [W1A0].>
2) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>
3) Remove heat shield cover.
4) While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.

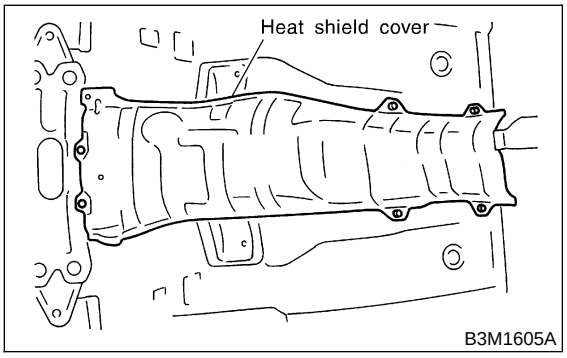

B3M1604

B: REMOVAL

NOTE:
● Before removing propeller shaft, wrap metal parts with a cloth or rubber material.
● In case of DOJ type, before removing propeller shaft, wrap metal parts (installed at the rubber boot of center DOJ) with a cloth or rubber material, as shown in the figure. Rubber boot may be damaged due to interference with adjacent metal parts while bending the DOJ during removal.


S3M0030

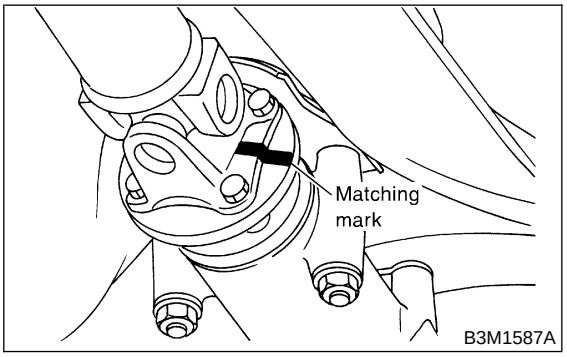
1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Jack-up vehicle and support it with sturdy racks.
5) Remove front and center exhaust pipes.
<Ref. to 2-9 [W1A0].>
6) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>
7) Remove heat shield cover.



B3M1605A

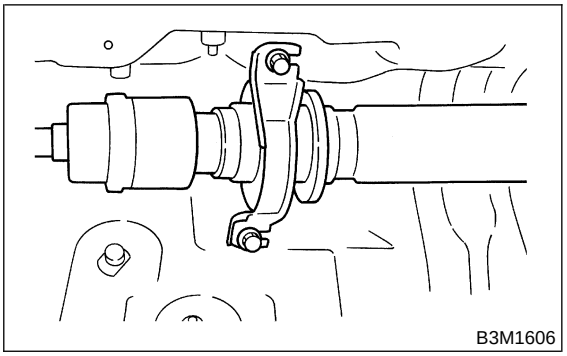
8) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:
● Put matching mark on affected parts before removal.
● Remove all but one bolt.



B3M1587A

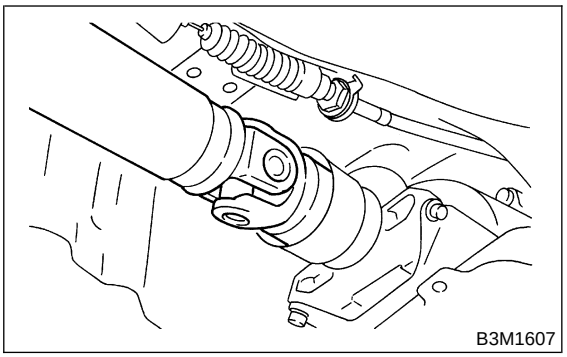
9) Remove the two bolts which hold center bearing to vehicle body.


B3M1606

10) Remove propeller shaft from transmission.

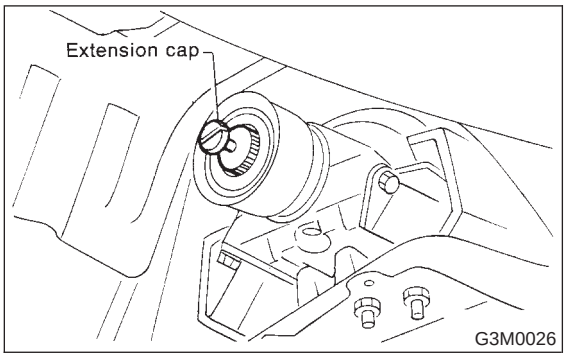
CAUTION:
Be sure not to damage oil seals and the frictional surface of sleeve yoke.

NOTE:
● Be sure to use an empty oil can to catch oil flowing out when removing propeller shaft.
● Be sure to plug the opening in transmission after removal of propeller shaft.


B3M1607

11) Install the extension cap to transmission.

NOTE:
If extension cap is not available, place vinyl bag over opening and fasten with string to prevent gear oil or ATF from leaking.



C: INSPECTION

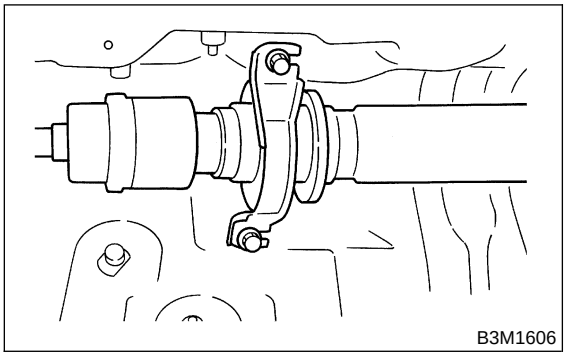
NOTE:
Do not disassemble propeller shaft. Check the following and replace if necessary.

1) Tube surfaces for dents or cracks
2) Splines for deformation or abnormal wear
3) Joints for non-smooth operation or abnormal noise
4) Center bearing for free play, noise or non-smooth operation
5) Oil seals for abnormal wear or damage
6) Center bearing for breakage

D: INSTALLATION

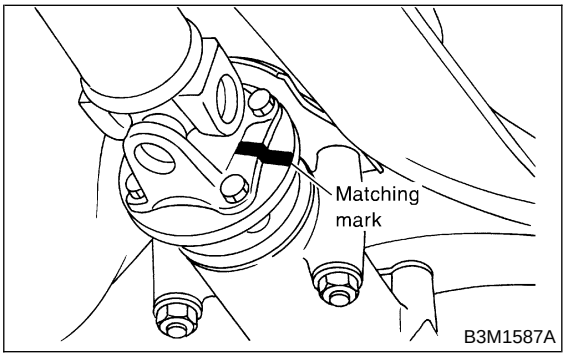
1) Insert sleeve yoke into transmission and attach center bearing to body.

Tightening torque:
52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)



2) Align matching marks and connect flange yoke and rear differential.

Tightening torque:
31±8 N·m (3.2±0.8 kg-m, 23.1±5.8 ft-lb)



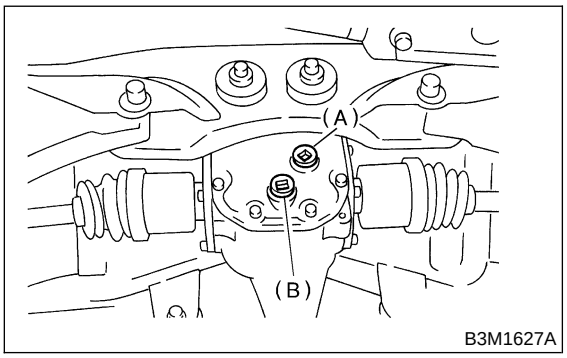
3) Install heat shield cover.
4) Install front and center exhaust pipes.
<Ref. to 2-9 [W1B0].>
5) Install rear exhaust pipe and muffler.
<Ref. to 2-9 [W2B0].> and <Ref. to 2-9 [W3A0].>

2. Rear Differential

A: ON-CAR SERVICE

1. FRONT OIL SEAL

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Remove rear differential protector. (if equipped)
5) Remove oil drain plug, and drain gear oil.

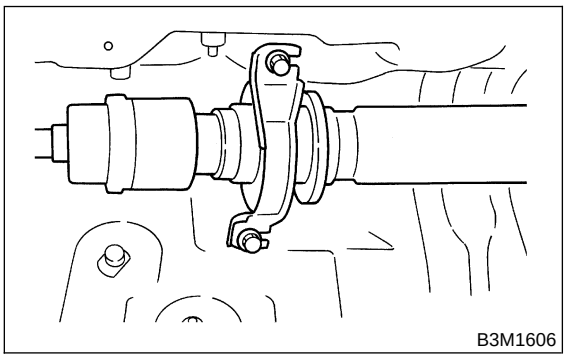


(A) Filler plug
(B) Drain plug

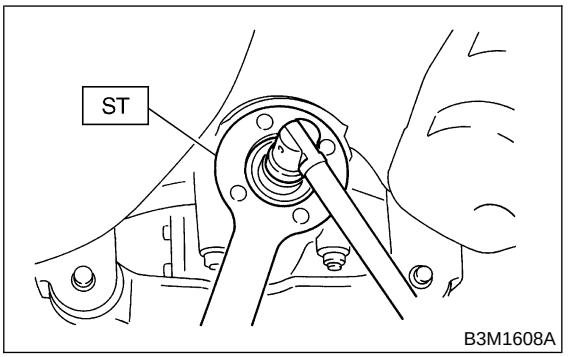
6) Install oil drain plug.

Tightening torque:
49±9.8 N·m (5.0±1.0 kg-m, 36.2±7.2 ft-lb)

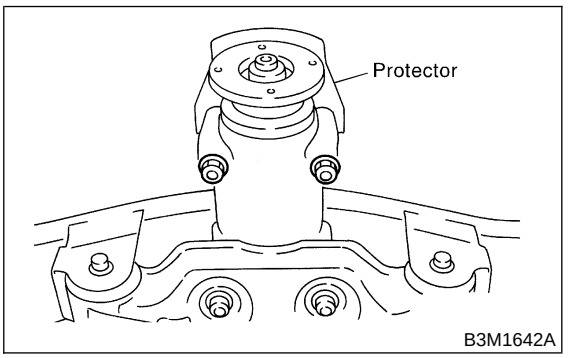
7) Jack-up rear wheels and support the vehicle body with sturdy racks.
8) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>
9) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>



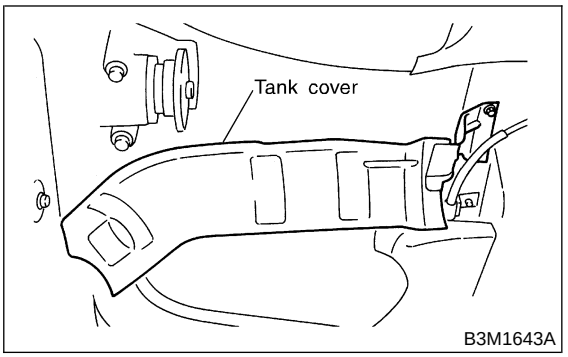
10) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



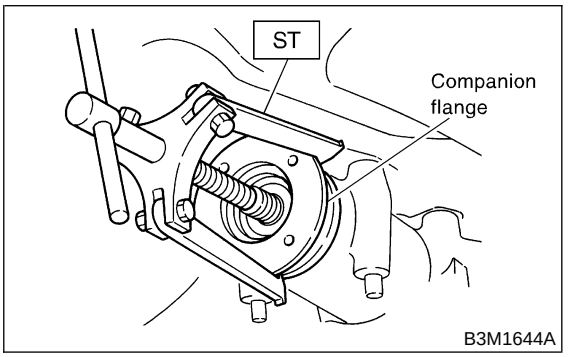
11) Remove nut of protector.



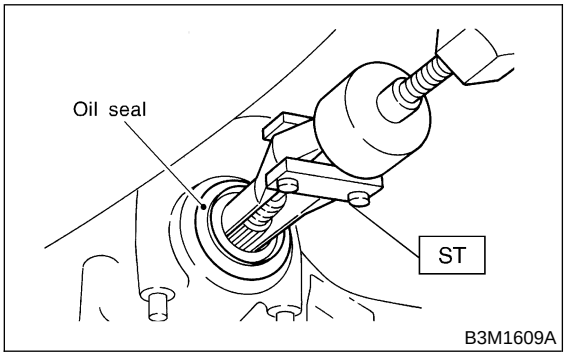
12) Remove tank cover.



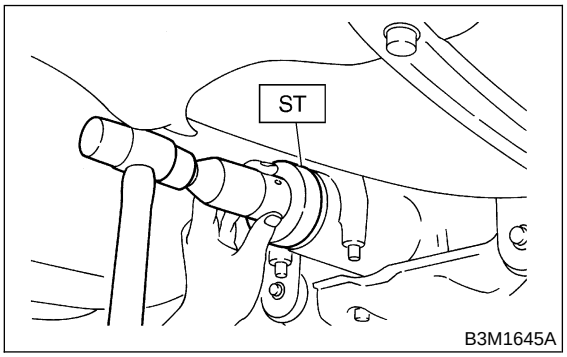
13) Extract companion flange using ST.
ST 399703602 PULLEY ASSY



14) Remove oil seal using ST.
ST 499705401 PULLER ASSY



15) Fit a new oil seal using ST.
ST 498447120 OIL SEAL INSTALLER



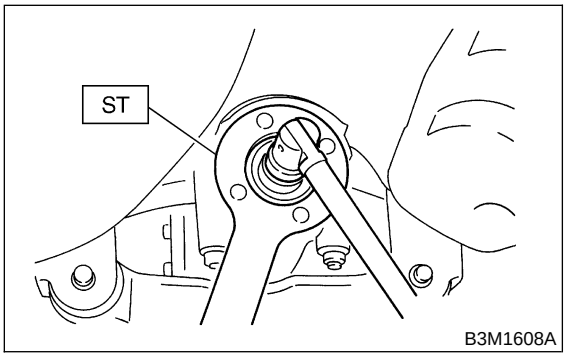
16) Install companion flange.

NOTE:
Use a plastic hammer to install companion flange.

17) Tighten self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that before replacing oil seal.
ST 498427200 FLANGE WRENCH

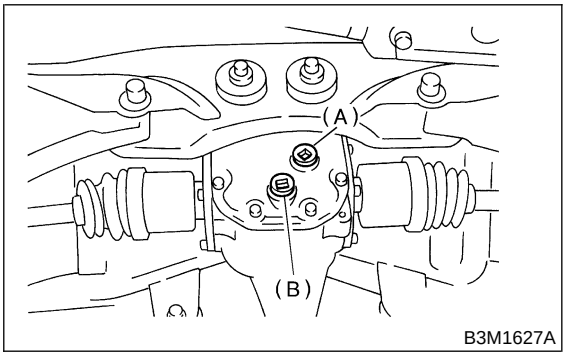
CAUTION:
Use a new self-locking nut.

Tightening torque:
181.4±14.7 N·m (18.50±1.50 kg-m, 133.8±10.8 ft-lb)



18) Reassembling procedure hereafter is the reverse of the disassembling.

19) Remove oil filler plug and add differential gear oil.



(A) Filler plug
(B) Drain plug

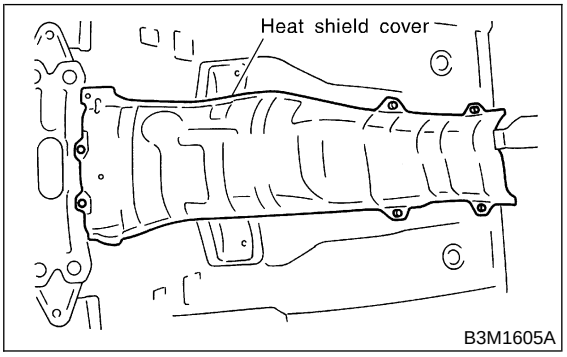
20) Tighten oil filler plug and connect connector to oil temperature sensor.

Tightening torque:
49.0±9.8 N·m (5.00±1.00 kg-m, 36.2±7.2 ft-lb)

21) Install rear differential protector. (if equipped)

B: REMOVAL

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Loosen wheel nuts.
4) Release the parking brake.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove wheels.
7) Remove front and center exhaust pipes.
<Ref. to 2-9 [W1A0].>
8) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W2A0].> and <Ref. to 2-9 [W3A0].>
9) Remove heat shield cover.

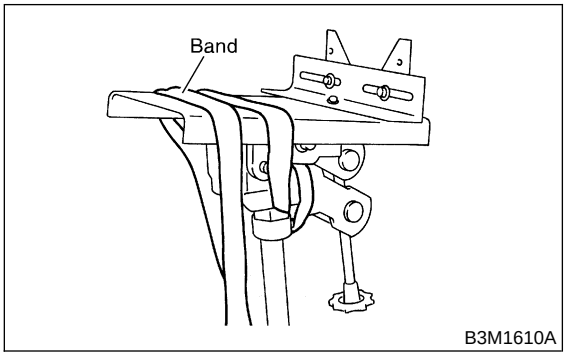


10) Remove propeller shaft.
<Ref. to 3-4 [W1B0].>

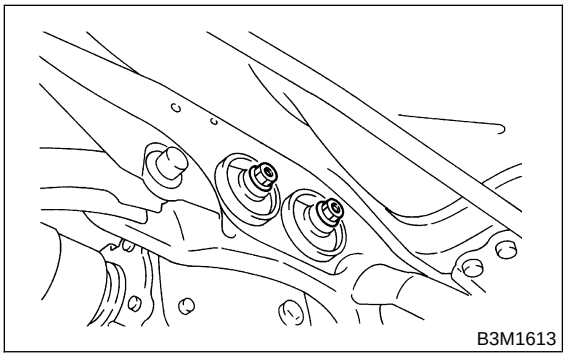
CAUTION:
When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

NOTE:
● Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
● Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.

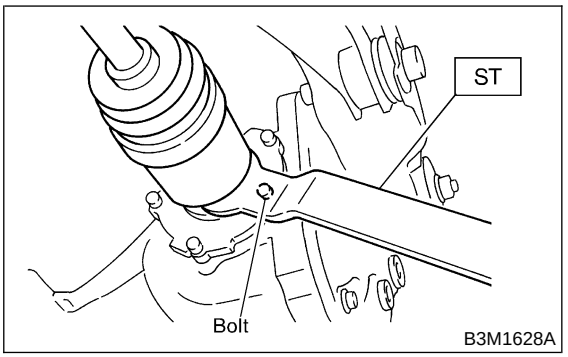
11) Remove rear differential protector. (if equipped)
12) Prepare a transmission jack and a band.



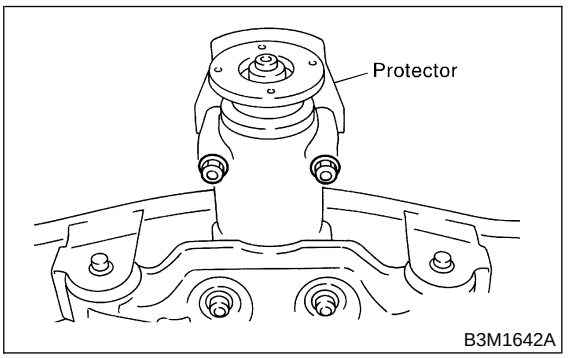
13) Loosen self-locking nuts connecting rear differential to rear crossmember.



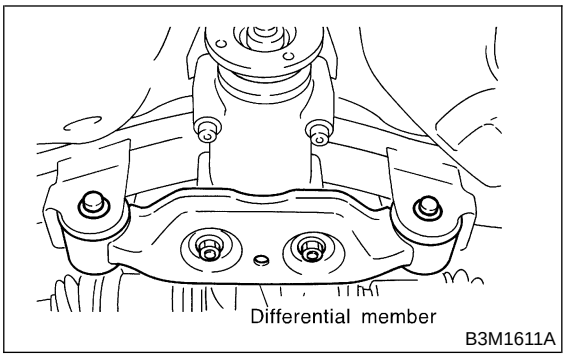
14) Remove DOJ of rear drive shaft from rear differential using ST.
ST 28099PA100 DRIVE SHAFT REMOVER



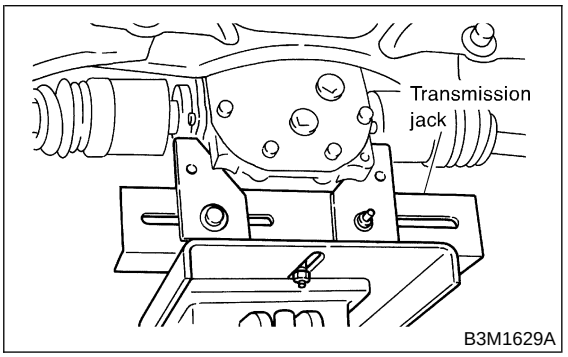
15) Remove protector nut.



16) Remove differential member.



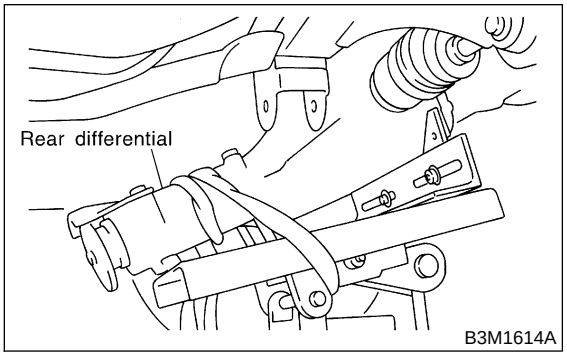
17) Support rear differential with transmission jack.



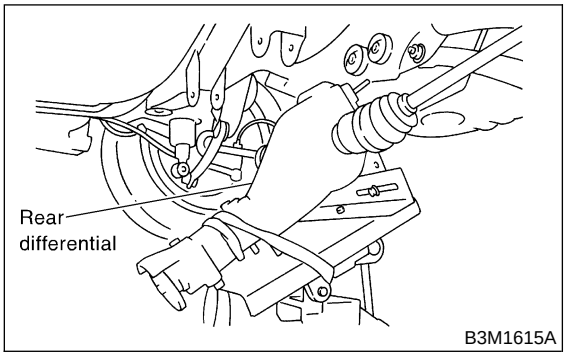
18) Remove differential member.
19) Fix rear differential at band.

20) Remove self-locking nuts connecting rear differential to crossmember.
21) Remove rear differential stud bolt from rear crossmember bushing.

NOTE:
Carefully adjust angle and position of transmission jack and jack stand as required during stud bolt removal.



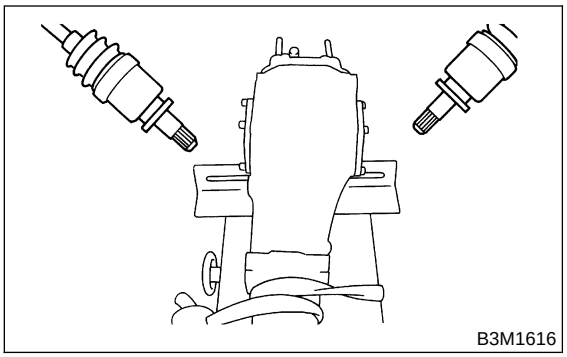
22) After removing rear differential stud bolt from rear crossmember, lower transmission jack stand. Do not allow rear drive shaft to strike lateral link bolt.



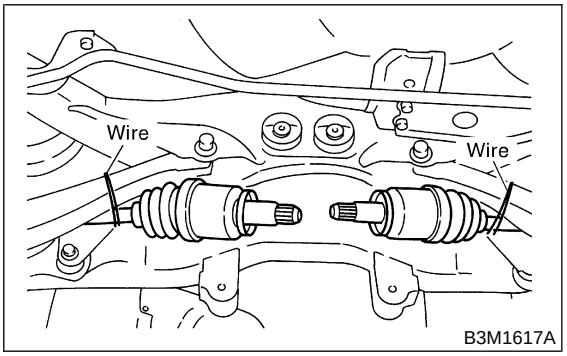
23) Pull out axle shaft from rear differential.

NOTE:
If axle shaft is difficult to remove from rear differential, use ST to remove it.

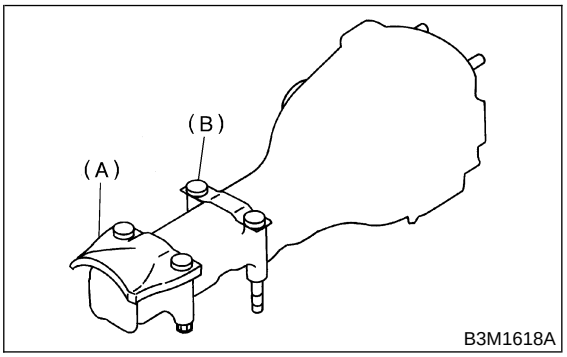
ST 28099PA100 DRIVE SHAFT REMOVER



24) Take down transmission jack.
25) Secure rear drive shaft to lateral link use wire.



26) Remove protector and plate from rear differential.

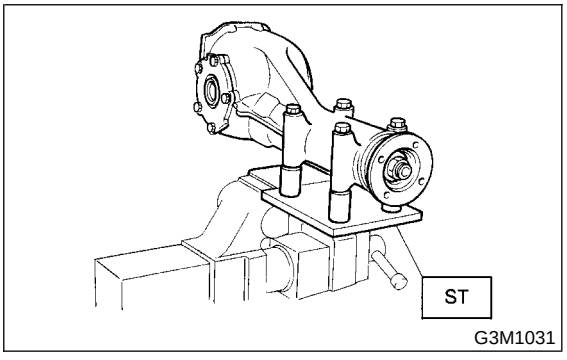


(A) Protector
(B) Plate

C: DISASSEMBLY

To detect real cause of trouble, inspect the following items before disassembling.
- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

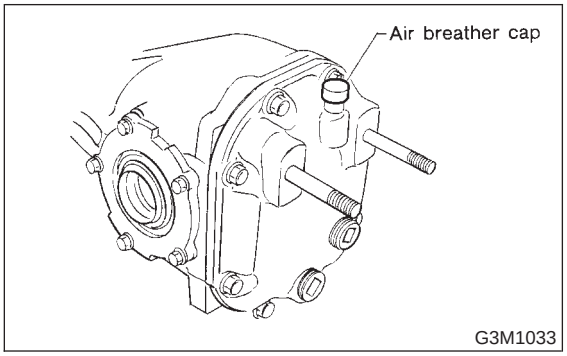
1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT



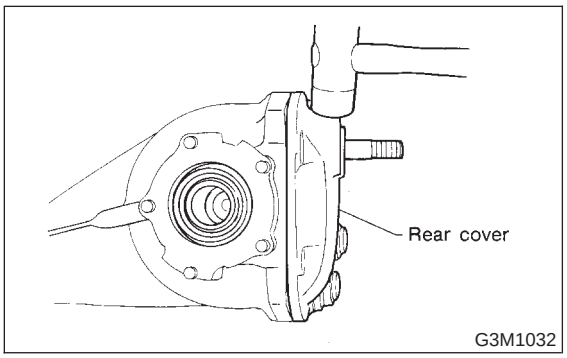
2) Drain gear oil by removing plug.

3) Remove the air breather cap.

NOTE:
Do not attempt to replace the air breather cap unless necessary.



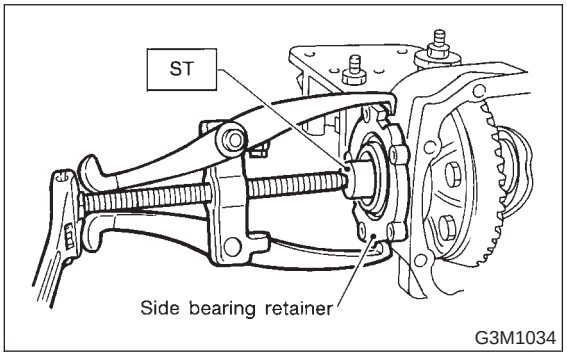
4) Remove rear cover by loosening retaining bolts.



5) Make right and left side bearing retainers in order to identify them at reassembly. Remove side bearing retainer attaching bolts, set ST to differential case, and extract right and left side bearing retainers with a puller.

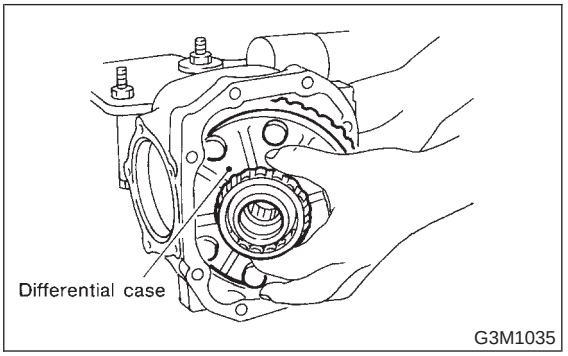
CAUTION:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT

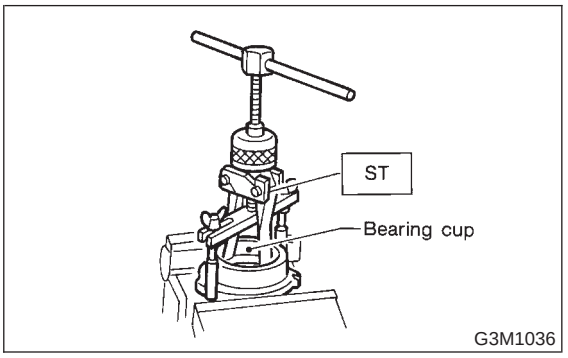


6) Pull out differential assembly from differential carrier.

CAUTION:
Be careful not to hit the teeth against the case.



7) When replacing side bearing, pull bearing cup from side bearing retainer using ST.
ST 398527700 PULLER ASSY

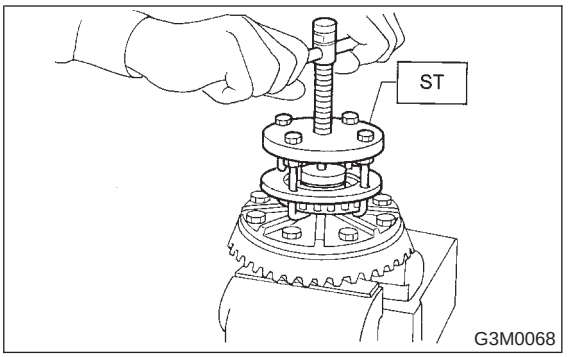


8) Extract bearing cone with ST.

CAUTION:
Do not attempt to disassemble the parts unless necessary.

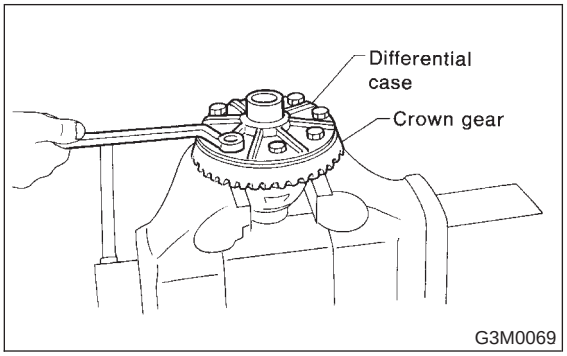
NOTE:
- Set puller so that its claws catch the edge of the bearing cone.
- Never mix up the right and left hand bearing races and cones.

ST 399527700 PULLER SET



9) Remove crown gear by loosening crown gear bolts.

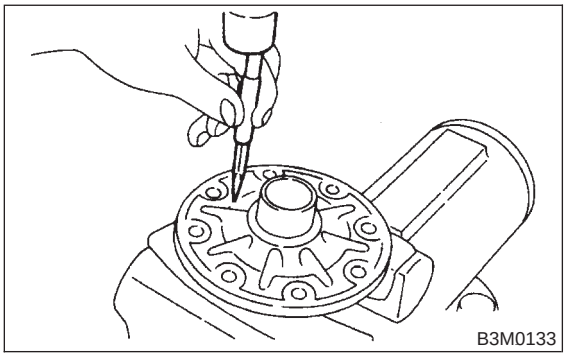
CAUTION:
Further disassembling is not allowed.



10) Drive out pinion shaft lock pin from crown gear side. (Without LSD)

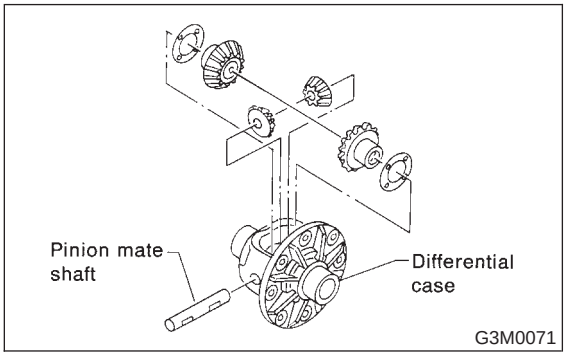
NOTE:
The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER

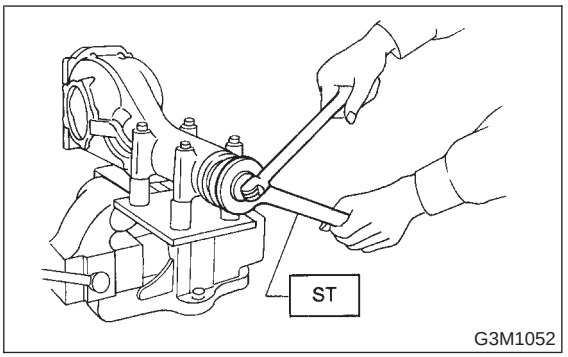


11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers. (Without LSD)

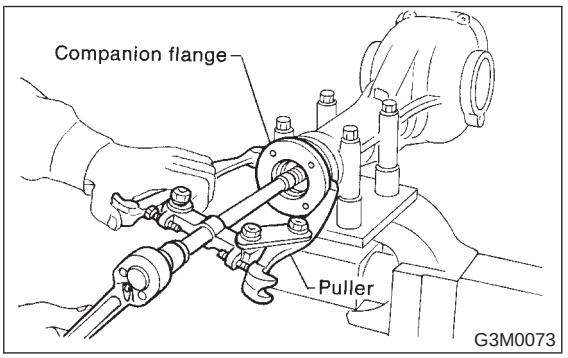
NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.



12) Hold companion flange with ST and remove drive pinion nut.
ST 498427200 FLANGE WRENCH



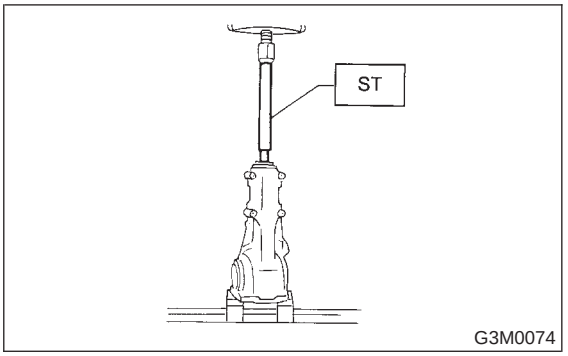
13) Extract the companion flange with a puller.



14) Press the end of drive pinion shaft and extract it together with rear bearing cone, preload adjusting spacer and washer.

NOTE:
Hold the drive pinion so as not to drop it.

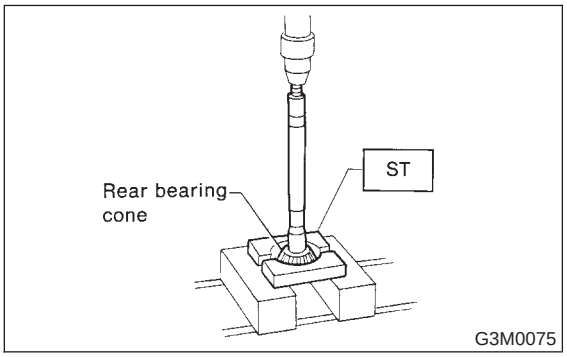
ST 398467700 DRIFT



15) Remove rear bearing cone from drive pinion by supporting cone with ST.

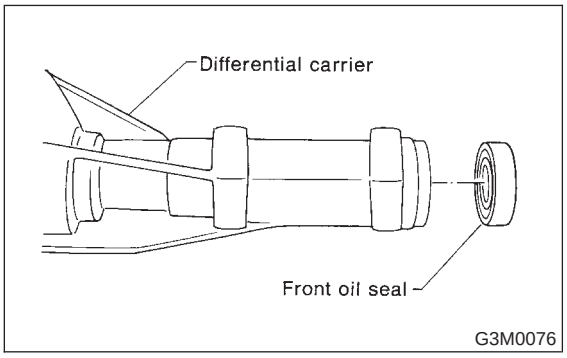
NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

ST 398517700 REPLACER



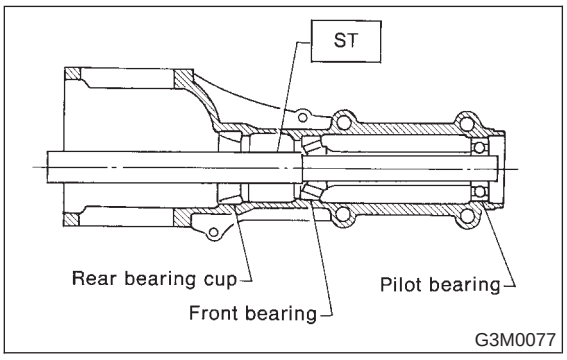
16) Remove front oil seal from differential carrier using ST.

ST 398527700 PULLER ASSY

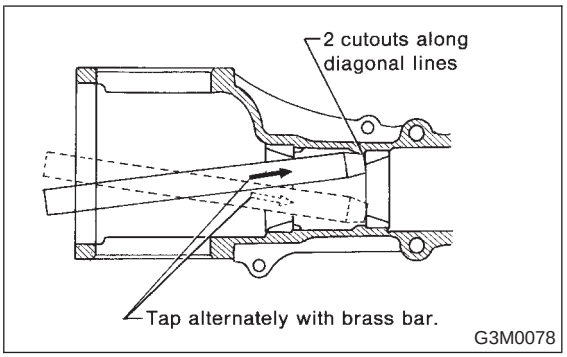


17) Remove pilot bearing together with front bearing cone using ST.

ST 398467700 DRIFT



18) When replacing bearings, tap front bearing cup and rear bearing cup in this order out of case by using a brass bar.



D: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.

1) Crown gear and drive pinion
- If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.
- If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.

2) Side gear and pinion mate gear
- Replace if crack, score, or other defects are evident on tooth surface.
- Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.

3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.

4) Thrust washers of side gear and pinion mate gear
Replace if seizure, flaw, abnormal wear or other defect is evident.

5) Oil seal
Replace if deformed or damaged, and at every disassembling.

6) Differential carrier
Replace if the bearing bores are worn or damaged.

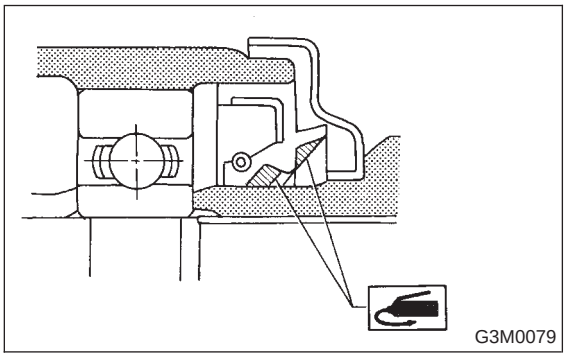
7) Differential case
Replace if its sliding surfaces are worn or cracked.

8) Companion flange
Replace if the oil seal lip contacting surfaces have flaws.

E: ASSEMBLY

1) Precautions for assembling
- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.

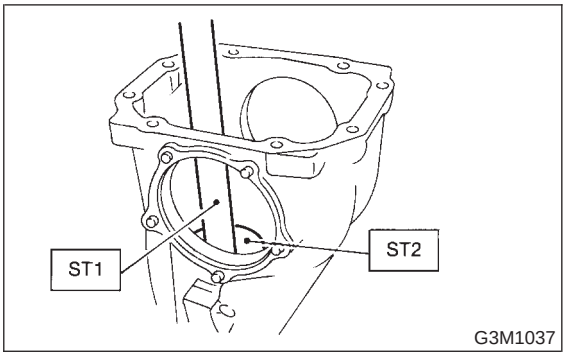
● Keep the shims and washers in order, so that they are not misinstalled.
● Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
● Apply gear oil when installing the bearings and thrust washers.
● Be careful not to mix up the right and left hand races of the bearings.
● Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.


G3M0079

2) Adjusting preload for front and rear bearings
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

(1) Press rear bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 398477703 DRIFT 2



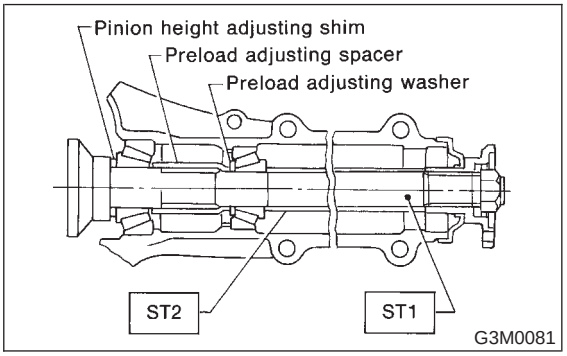
G3M1037

(2) Insert ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

CAUTION:
● **Re-use the used washer if not deformed.**
● **Use a new rear bearing cone.**

(3) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



G3M0081

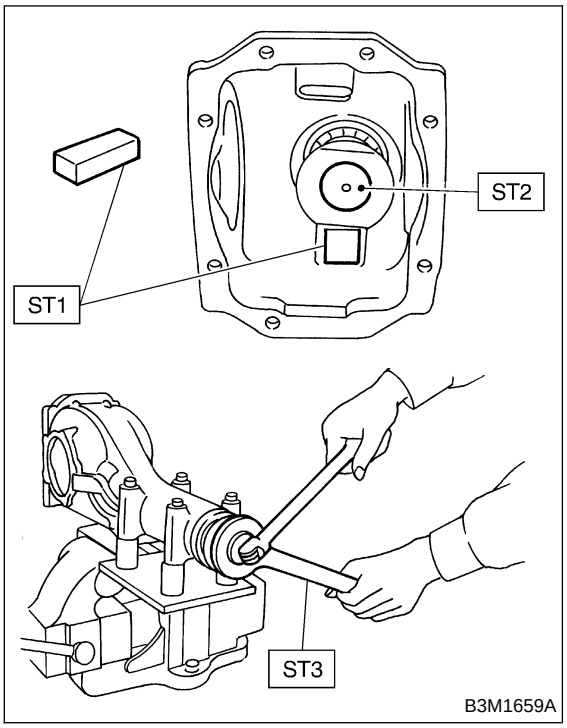
(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST3.

CAUTION:
Use a new lock nut.

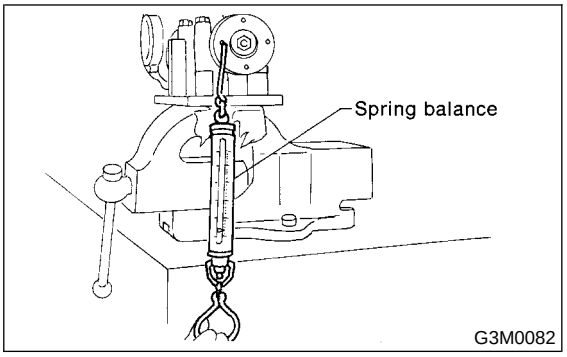
NOTE:
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

ST1 398507704 BLOCK
ST2 398507702 DUMMY SHAFT
ST3 498427200 FLANGE WRENCH

Tightening torque:
181±15 N·m (18.5±1.5 kg-m, 134±11 ft-lb)



Front and rear bearing preload
For new bearing: 19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb) at companion flange bolt hole



	Part No.	Thickness mm (in)
Preload adjusting washer	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
	Part No.	Length mm (in)
Preload adjusting spacer	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

3) Adjusting drive pinion height
Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

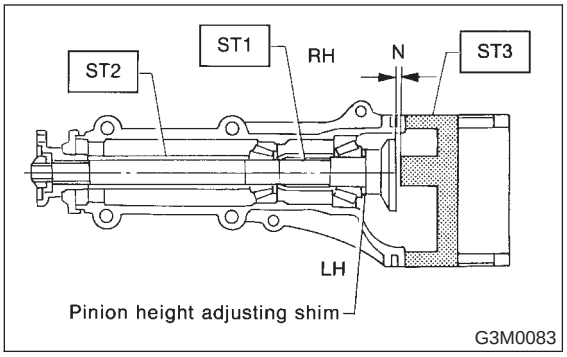
(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

Front and rear bearing preload
For new bearing: 19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb) at companion flange bolt hole

Adjusting preload for front and rear bearings

NOTE:
At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before.

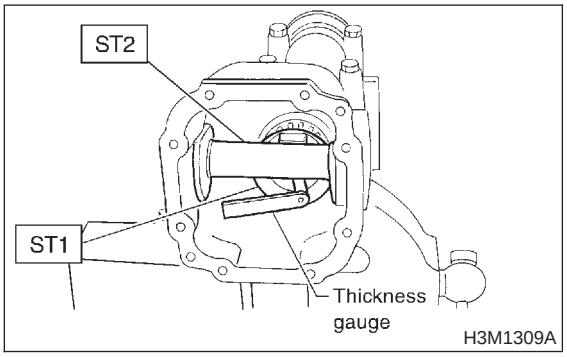
ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR
ST3 398507701 DIFFERENTIAL CARRIER GAUGE



(2) Measure the clearance N between the end of ST3 and the end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST3.

ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting shim to be inserted from the following formula, and replace the temporarily installed shim with this one.

T = To + N − (H x 0.01) − 0.20 (mm)

Where:

T = Thickness of pinion height adjusting shim (mm)

To = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)

H = Figure marked on drive pinion head

(Example of calculation)

To = 2.20 + 1.20 = 3.40 mm

N = 0.23 mm H = + 1,

T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42

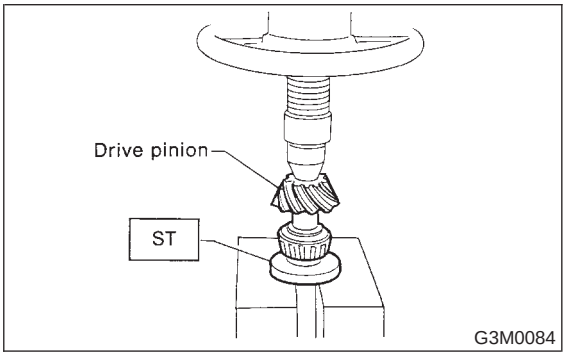
Result: Thickness = 3.42 mm

Therefore use the shim 383605200.

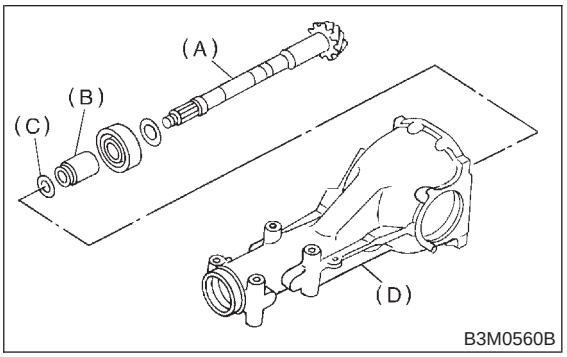
Pinion height adjusting shim	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200	3.39 (0.1335)
383605200	3.42 (0.1346)
383615200	3.45 (0.1358)
383625200	3.48 (0.1370)
383635200	3.51 (0.1382)
383645200	3.54 (0.1394)
383655200	3.57 (0.1406)
383665200	3.60 (0.1417)
383675200	3.63 (0.1429)
383685200	3.66 (0.1441)

4) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.

ST 398177700 INSTALLER

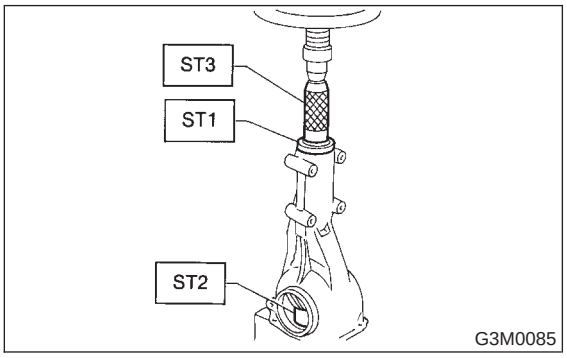


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

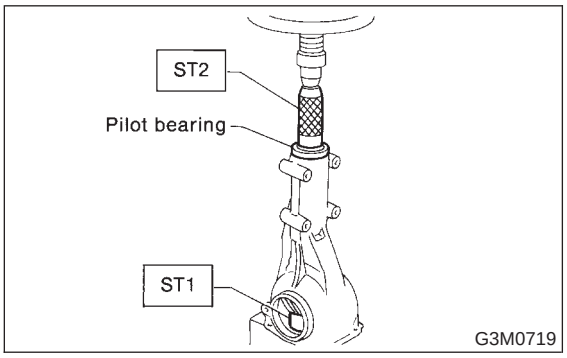


(A) Drive pinion
(B) Bearing adjusting spacer
(C) Washer
(D) Differential carrier

6) Press-fit front bearing cone into case with ST1, ST2 and ST3.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



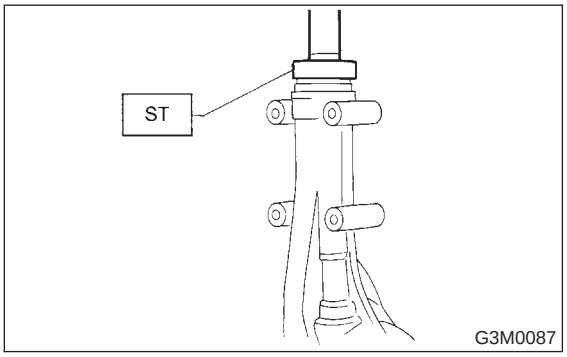
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



8) Fit a new oil seal with ST.

NOTE:
● Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
● Apply grease between the oil seal lips.

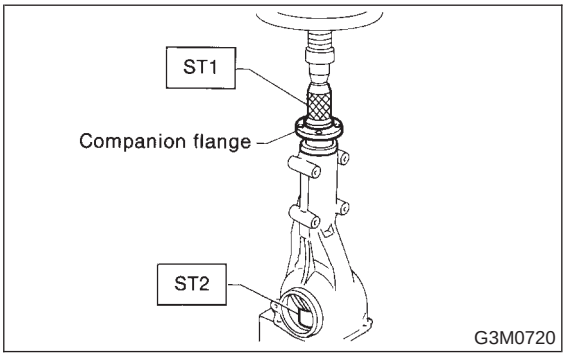
ST 498447120 OIL SEAL INSTALLER



9) Press-fit companion flange with ST1 and ST2.

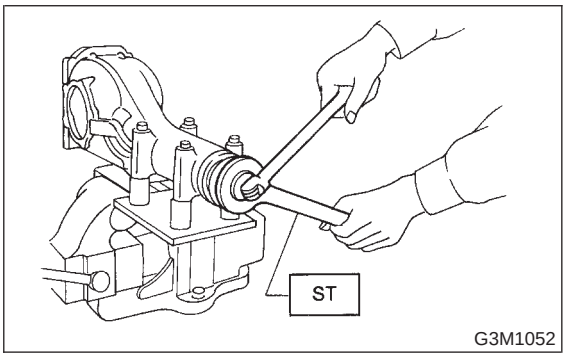
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



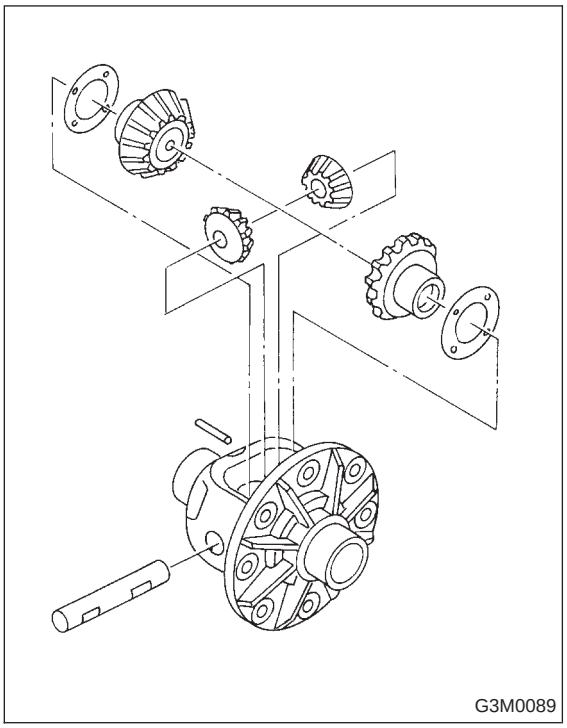
10) Install self-locking nut. Then tighten it with ST.
ST 498427200 FLANGE WRENCH

Tightening torque:
181±15 N·m (18.5±1.5 kg-m, 134±11 ft-lb)



11) Assembling differential case
Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case. (Without LSD)

CAUTION:
● Apply gear oil on both sides of the washer and on the side gear shaft before installing.
● Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(1) Measure the clearance between differential case and the back of side gear.
(2) Adjust the clearance as specified by selecting side gear thrust washer.

Side gear back clearance:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)
383445204	0.90 — 0.95 (0.0354 — 0.0374)
383445205	0.95 — 1.00 (0.0374 — 0.0394)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After inserting pinion shaft lock pin into differential case, stake the both sides of the hole to prevent pin from falling off.

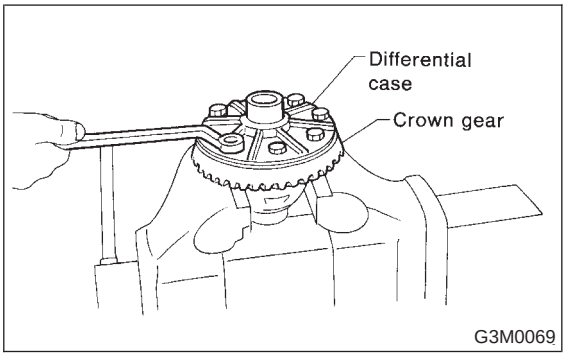
12) Install crown gear on differential case.

CAUTION:
Before installing bolts, apply Lock Tite to bolt threads.

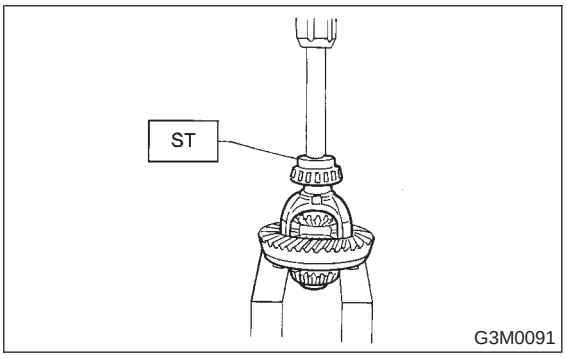
Lock Tite:
THREE BOND 1324 or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

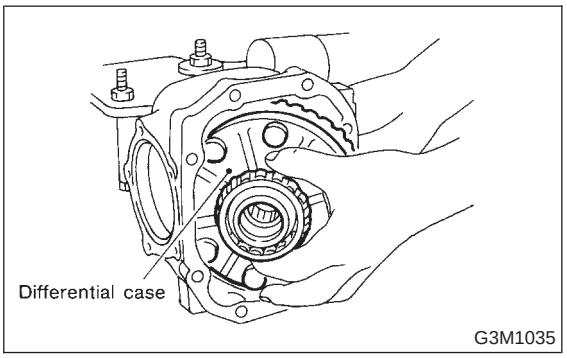
Tightening torque:
103±10 N·m (10.5±1.0 kg-m, 76±7 ft-lb)



13) Press side bearing cone onto differential case with ST.
ST 398487700 DRIFT



14) Adjusting side bearing retainer shims
(1) The driven gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.
(2) Install the differential case assembly into differential carrier in the reverse order of disassembly.



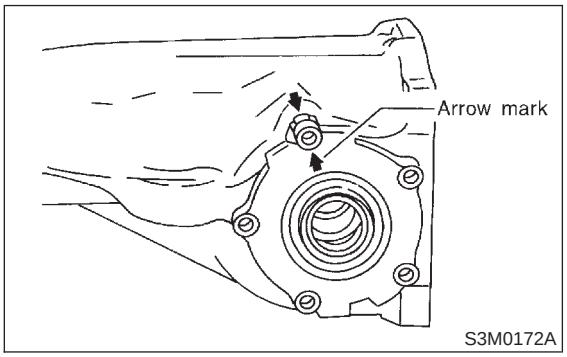
(3) Install side retainer shims and O-rings to the left and right retainers from which they were removed.

NOTE:
- Replace broken or cracked O-ring with new one.
- Replace broken or corroded side retainer shim with new one of same thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

(4) Align arrow marked on differential carrier with that marked on side retainer during installation.

CAUTION:
Be careful that side bearing outer race is not damaged by bearing roller.

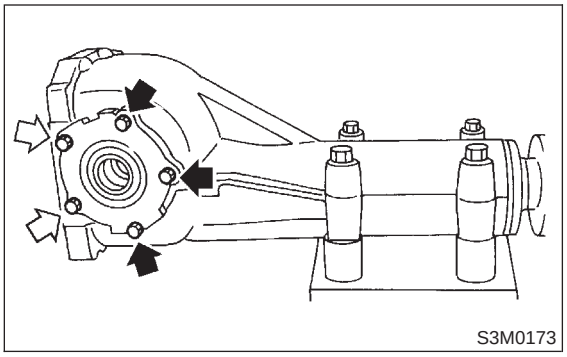


(5) Tighten side bearing retainer bolts.

CAUTION:
Before tightening the two side bearing retainer bolts, apply Lock Tite to bolt threads.

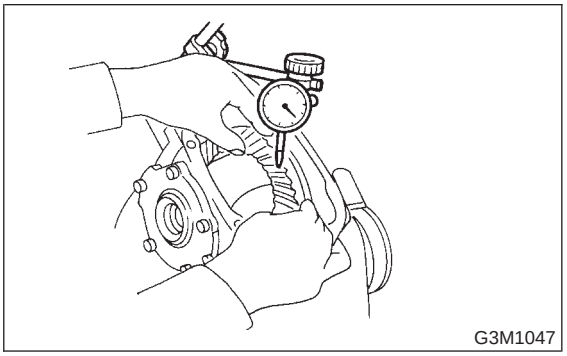
⇨ ***Lock Tite:***
THREE BOND 1105 or equivalent

Tightening torque:
10.3±1.5 N·m (1.05±0.15 kg-m, 7.6±1.1 ft-lb)



(6) Measure the crown gear-to-drive pinion backlash. Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

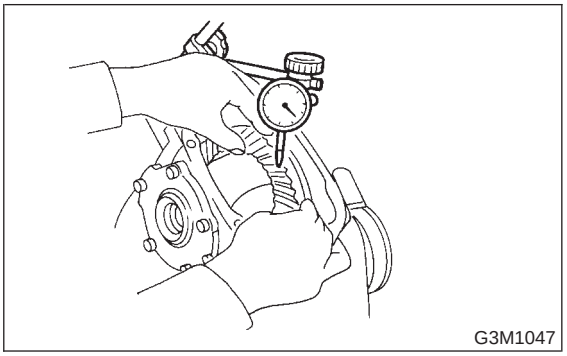


(7) At the same time, measure the turning resistance of drive pinion. Compared with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, readjust side bearing retainer shims.

Turning resistance increase:
2.9 — 10.8 N (0.3 — 1.1 kg, 0.7 — 2.4 ft)

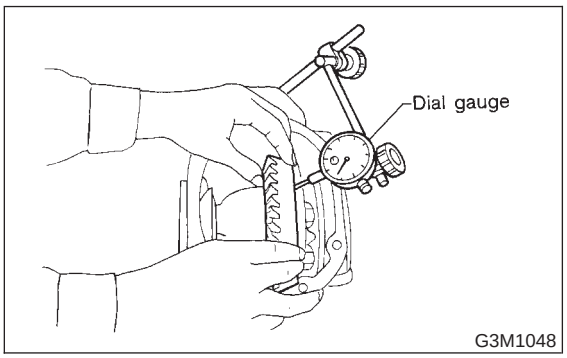
15) Re-check crown gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



16) Check the crown gear runout on its back surface, and make sure pinion and crown gear rotate smoothly.

Limit of runout:
Less than 0.05 mm (0.0020 in)



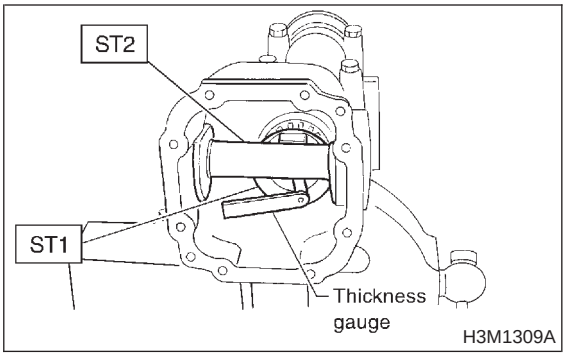
17) Checking and adjusting tooth contact of crown gear
(1) Apply an even coat of red lead on both sides of three or four teeth on the crown gear. Check the contact pattern after rotating crown gear several revolutions back and forth until a definite contact pattern appears on the crown gear.
(2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

18) If proper tooth contact is not obtained, once again adjust the drive pinion height changing RH and LH side bearing retainer shims and the hypoid gear backlash.

(1) Drive pinion height

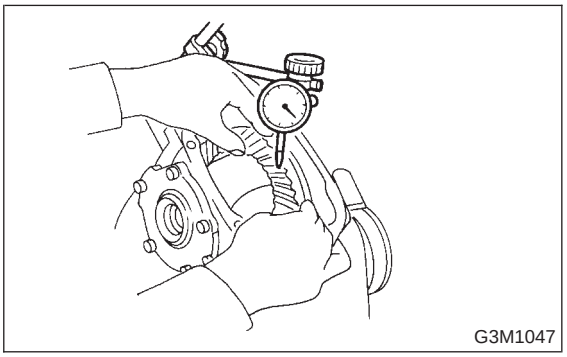
ST1	398507702	DUMMY SHAFT
ST2	398507701	DIFFERENTIAL CARRIER GAUGE

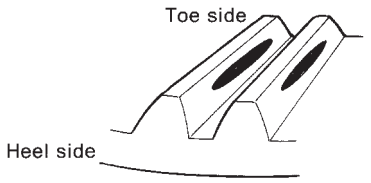
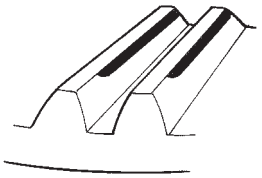
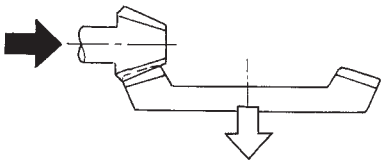
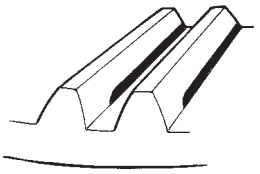
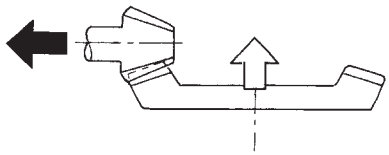
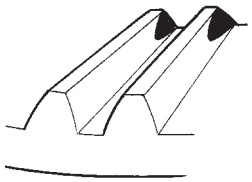
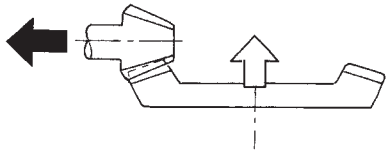
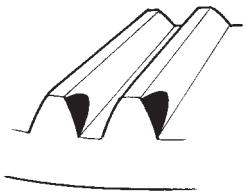
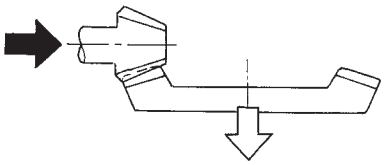


T = To + N − (H x 0.01) − 0.20 (mm)
Where:
T = Thickness of pinion height adjusting shim (mm)
To = Thickness of shim temporarily inserted (mm)
N = Reading of thickness gauge (mm)
H = Figure marked on drive pinion head

(2) Hypoid gear backlash

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



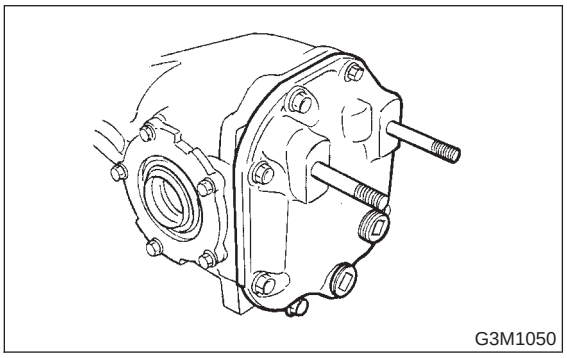
TOOTH CONTACT PATTERN		
Condition	Contact pattern	Adjustment
Correct tooth contact Tooth contact pattern slightly shifted towards toe under no load rotation. (When loaded, contact pattern moves toward heel.)	 G3M0098A	—
Face contact Backlash is too large.	This may cause noise and chipping at tooth ends.  G3M0098B	Increase thickness of drive pinion height adjusting shim in order to bring drive pinion closer to crown gear center.  G3M0098F
Flank contact Backlash is too small.	This may cause noise and stepped wear on surfaces.  G3M0098C	Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.  G3M0098G
Toe contact Contact area is small.	This may cause chipping at toe ends.  G3M0098D	Adjust as for flank contact.  G3M0098G
Heel contact Contact area is small.	This may cause chipping at heel ends.  G3M0098E	Adjust as for face contact.  G3M0098F

: Adjusting direction of drive pinion
: Adjusting direction of crown gear

19) Install rear cover and tighten bolts to specified torque.

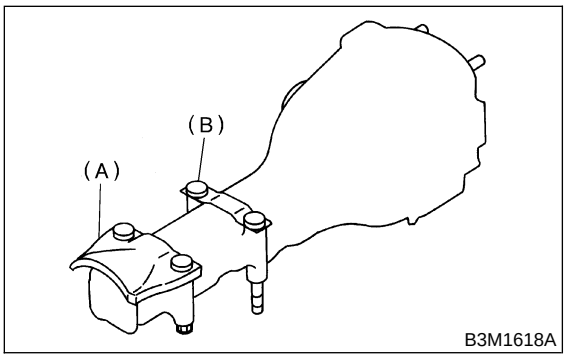
CAUTION:
Securely connect ground terminal of rear differential temperature sensor.

Tightening torque:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)


G3M1050

F: INSTALLATION

1) Install protector and plate to rear differential.



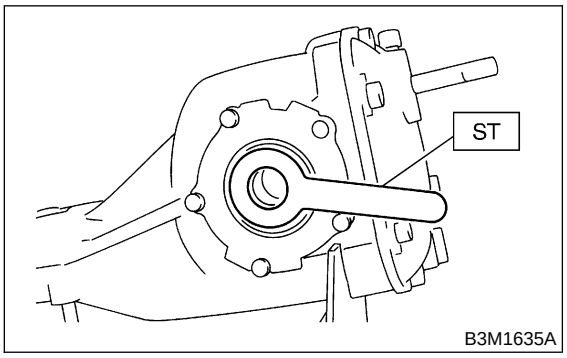
B3M1618A

(A) Protector
(B) Plate

2) Set rear differential to transmission jack.

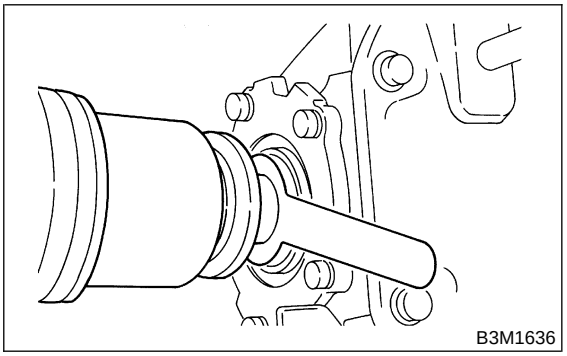
NOTE:
Secure rear differential to transmission jack using a band.

3) Install ST to rear differential.
ST 28099PA090 OIL SEAL PROTECTOR

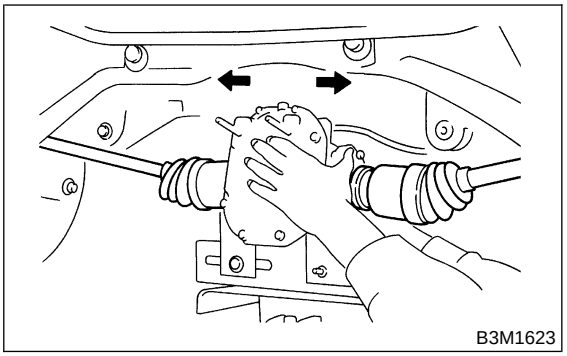


B3M1635A

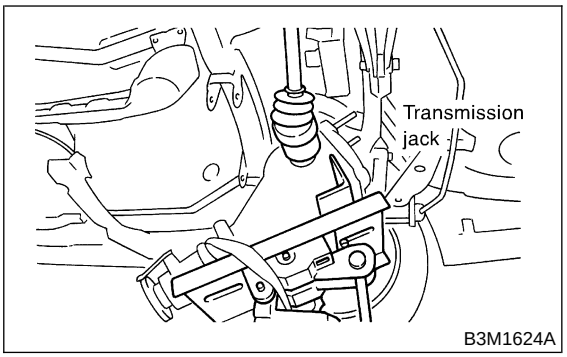
4) Insert the spline shaft until the spline portion is inside the side oil seal.


B3M1636

5) Remove ST from rear differential.
ST 28099PA090 OIL SEAL PROTECTOR
6) Completely insert axle shaft into rear differential by pressing rear differential.

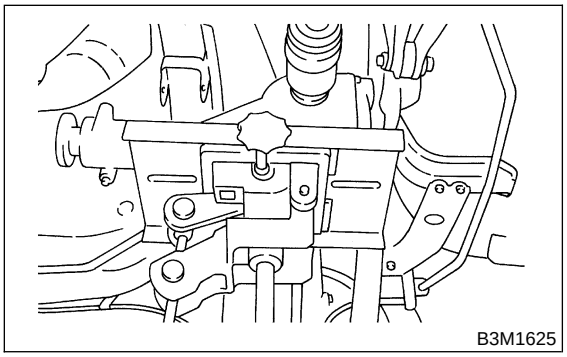

B3M1623

7) Adjust transmission jack as required so rear differential stud bolt is properly inserted into rear crossmember bushing.

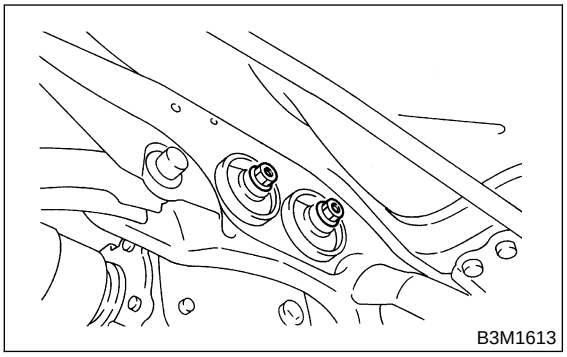


B3M1624A

8) After rear differential stud bolt has been inserted into rear crossmember bushing, raise transmission jack to make jack rear differential level.

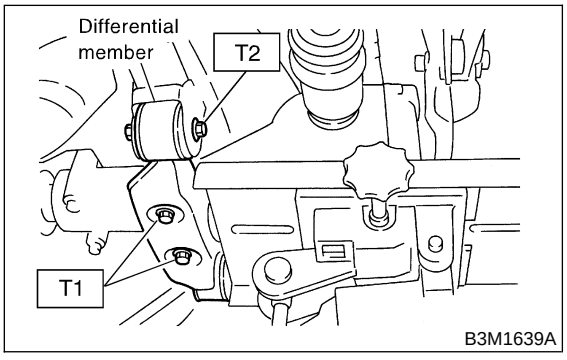

B3M1625

9) Temporarily tighten rear crossmember self-locking nuts.


B3M1613

10) Remove band from rear differential. Raise rear differential just enough to move transmission jack away from it.
11) Install differential member.

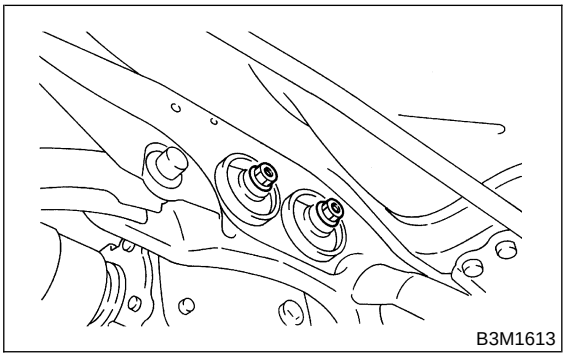
Tightening torque:
T1: 64±8 N·m (6.5±0.8 kg-m, 47.0±5.8 ft-lb)
T2: 108±15 N·m (11±1.5 kg-m, 80±11 ft-lb)



B3M1639A

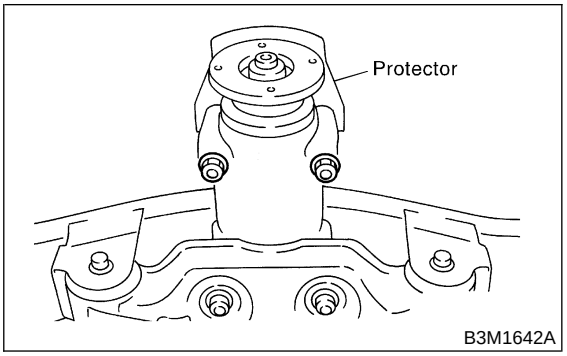
12) Tighten self-locking nut.

Tightening torque:
69±8 N·m (7.0±0.8 kg-m, 50.6±5.8 ft-lb)


B3M1613

13) Tighten protector nut.

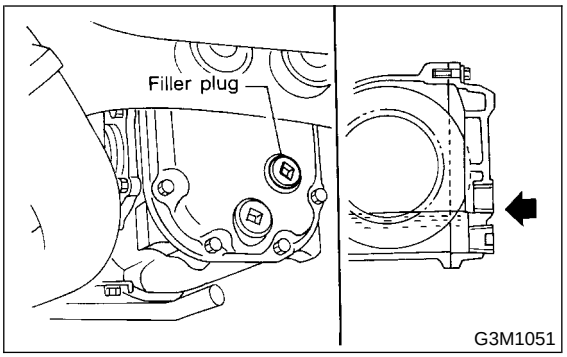
Tightening torque:
64±8 N·m (6.5±0.8 kg-m, 47.0±5.8 ft-lb)



B3M1642A

14) Take down transmission jack.
15) Install propeller shaft.
<Ref. to 3-4 [W1C0].>
16) Install heat shield cover.
17) Install rear exhaust pipe and muffler.
<Ref. to 2-9 [W2B0].> and <Ref. to 2-9 [W3A0].>
18) After installing rear differential carrier on vehicle, remove filler plug and replenish gear oil up to upper level mark.

Oil capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)



G3M1051

19) Tighten filler plug.

CAUTION:
Apply fluid packing to plug.

Fluid packing:
THREE BOND 1205 or equivalent

Tightening torque:
49.0±9.8 N·m (5.0±1.0 kg-m, 36.2±7.2 ft-lb)

20) Install rear differential protector. (if equipped)

1. Propeller Shaft

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptom	Possible cause	Remedy
1. Vibration of propeller shaft NOTE: Vibration is caused by propeller shaft during operation and is transferred to vehicle body. Generally vibration increase in proportion to vehicle speed.	(1) Worn or damaged universal joint.	Replace.
	(2) Unbalanced propeller shaft due to bend or dent.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Worn or damaged center bearing and damaged center mounting rubber.	Replace.
2. Tapping when starting and noise while cruising, caused by propeller shaft.	(1) Worn or damaged universal joint.	Replace.
	(2) Worn spline of sleeve yoke.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Loose installation of joint.	Replace.
	(5) Worn or damaged center bearing and damaged center mounting rubber.	Replace.

2. Rear Differential

Symptom or trouble	Possible cause	Remedy
1. Oil leakage	(1) Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
	(2) Clogged or damaged air breather.	Clean, repair or replace.
	(3) Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten bolts to specified torque. Replace O-ring.
	(4) Loose rear cover attaching bolts or damaged gasket.	Tighten bolts to specified torque. Replace gasket and apply liquid packing.
	(5) Loose oil filler or drain plug.	Retighten and apply liquid packing.
	(6) Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Repair or replace.
2. Seizure NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Insufficient backlash for hypoid gear.	Readjust or replace.
	(2) Excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.
3. Damage NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Improper backlash for hypoid gear.	Replace.
	(2) Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(4) Loose bolts and nuts such as crown gear bolt.	Retighten.
	(5) Damage due to overloading.	Replace.
4. Noises when starting or shifting gears NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	(1) Excessive backlash for hypoid gear.	Readjust.
	(2) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(3) Insufficient preload for front or rear bearing.	Readjust.
	(4) Loose drive pinion nut.	Tighten to specified torque.
	(5) Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	(1) Damaged differential gear.	Replace.
	(2) Excessive wear or damage of thrust washer.	Replace.
	(3) Broken pinion mate shaft.	Replace.
	(4) Seized or damaged side bearing.	Replace.
6. Gear noises NOTE: Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	(1) Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
	(2) Improper backlash for hypoid gear.	Readjust.
	(3) Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
	(4) Seized hypoid gear.	Replace hypoid gear set.
	(5) Improper preload for front or rear bearings.	Readjust.
	(6) Seized, scored, or chipped front or rear bearing.	Replace.
	(7) Seized, scored, or chipped side bearing.	Replace.
	(8) Vibrating differential carrier.	Replace.

1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM “AIRBAG”

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

CAUTION:
- **All Airbag system wiring harness and connectors are 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.**

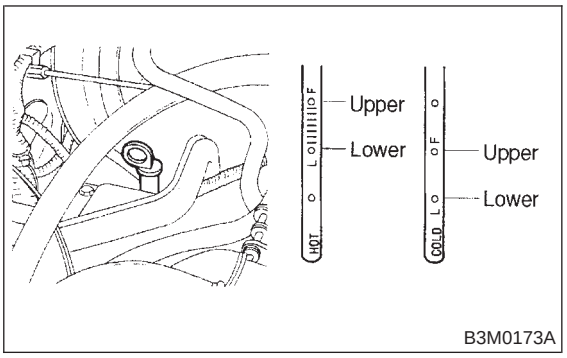
B: MEASUREMENT

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

2. Pre-inspection

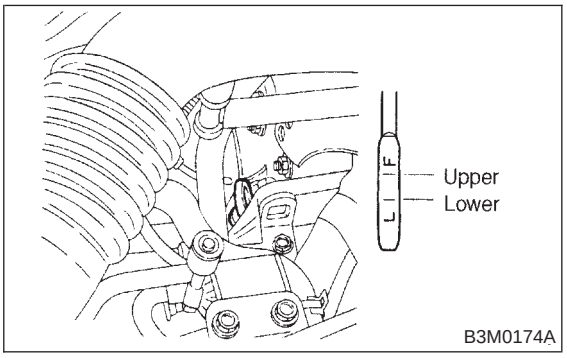
A: ATF LEVEL

Make sure that ATF level is in the specification.



B: FRONT DIFFERENTIAL OIL LEVEL

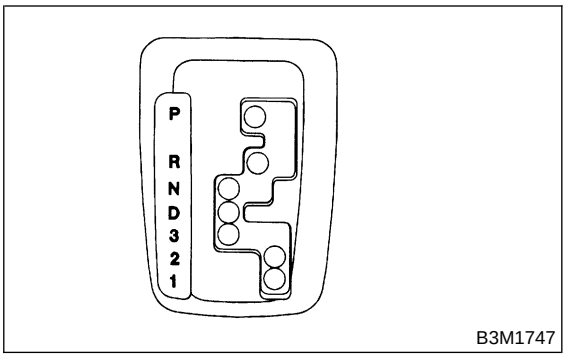
Make sure that front differential oil level is in the specification.



C: OPERATION OF SHIFT SELECTOR LEVER

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

WARNING:
Stop the engine while checking operation of selector lever.



1. Precaution

A: SUPPLEMENTAL RESTRAINT SYSTEM “AIRBAG”

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

CAUTION:
- **All Airbag system wiring harness and connectors are 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.**

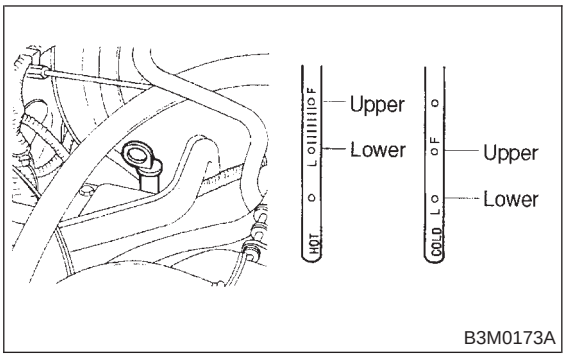
B: MEASUREMENT

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

2. Pre-inspection

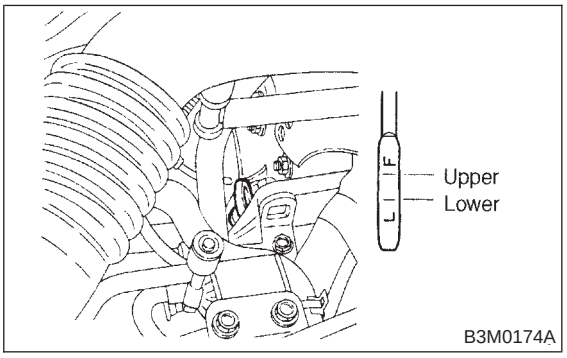
A: ATF LEVEL

Make sure that ATF level is in the specification.



B: FRONT DIFFERENTIAL OIL LEVEL

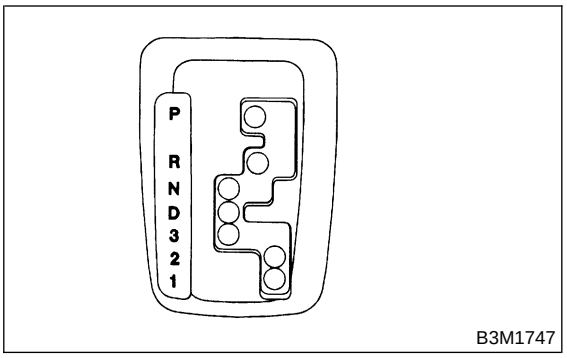
Make sure that front differential oil level is in the specification.



C: OPERATION OF SHIFT SELECTOR LEVER

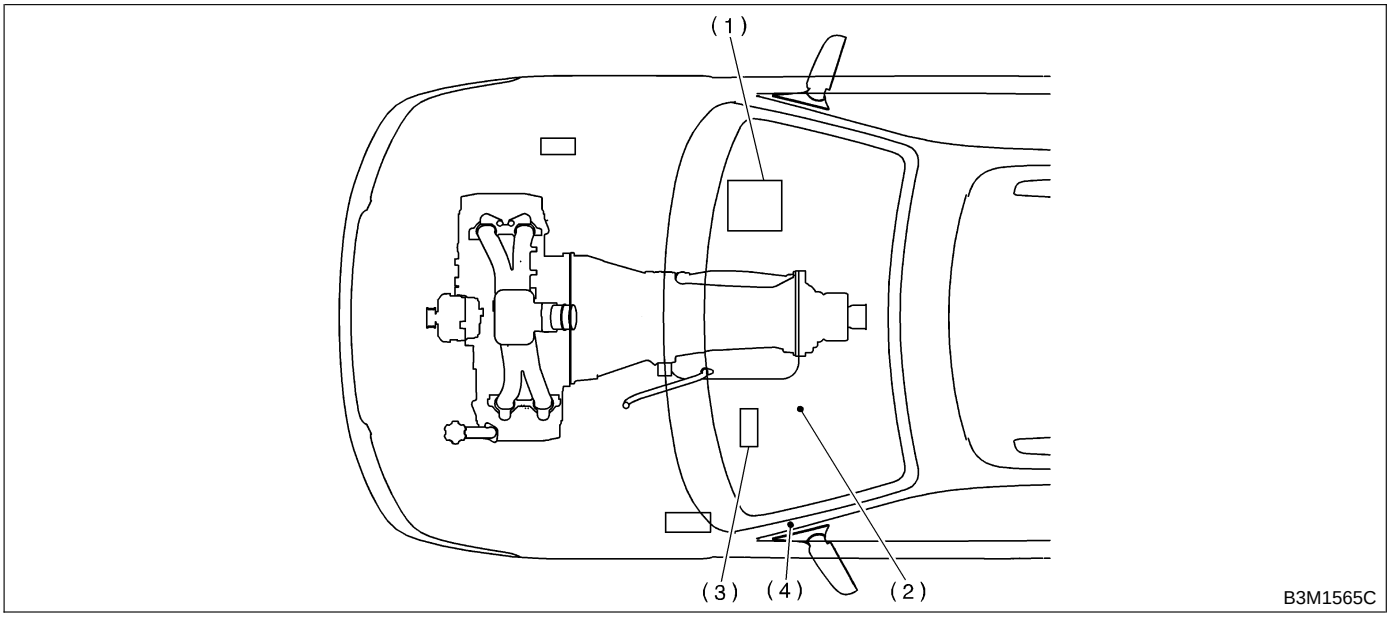
Make sure there is no abnormal noise, dragging or contact pattern in each select lever range.

WARNING:
Stop the engine while checking operation of selector lever.

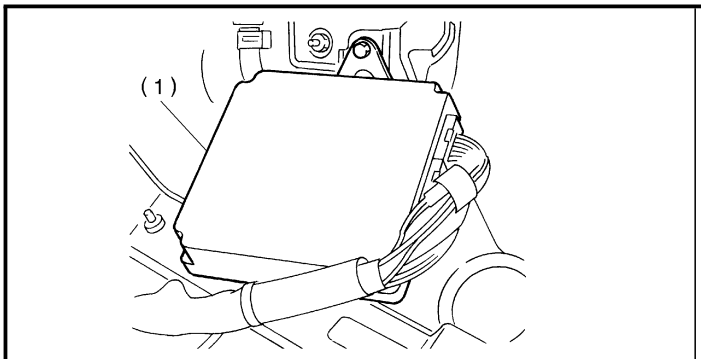


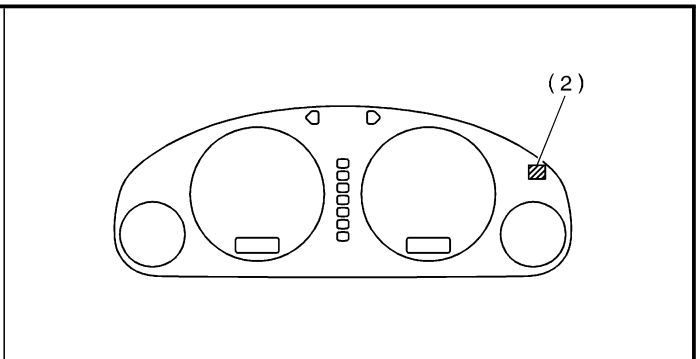
3. Electrical Components Location

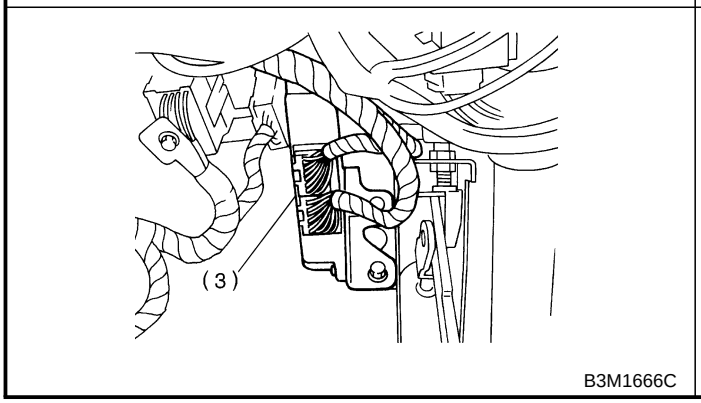
A: CONTROL MODULE

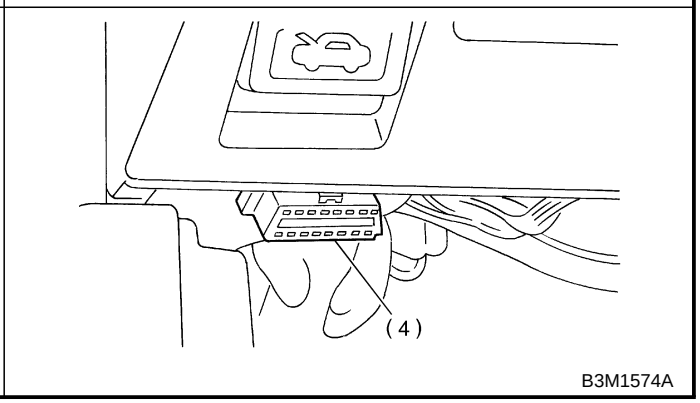


(1) Engine control module (ECM)
(2) Power indicator light (AT diagnostic indicator light)
(3) Transmission control module (TCM)
(4) Data link connector

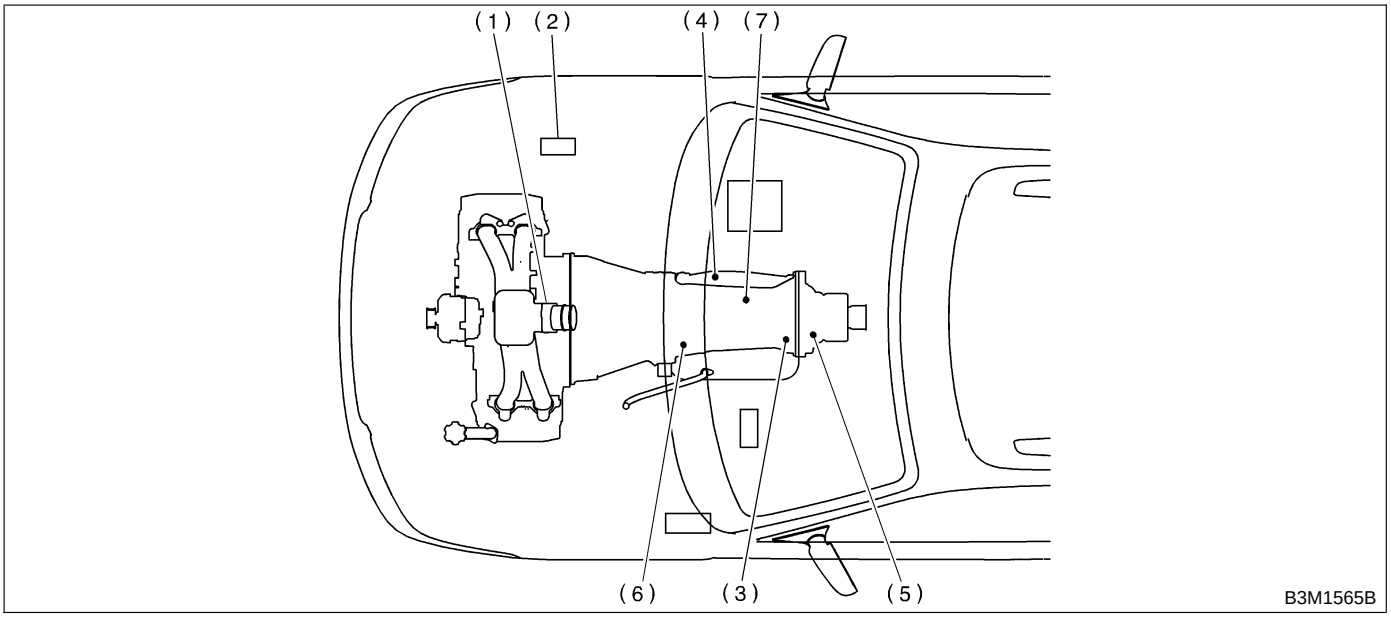




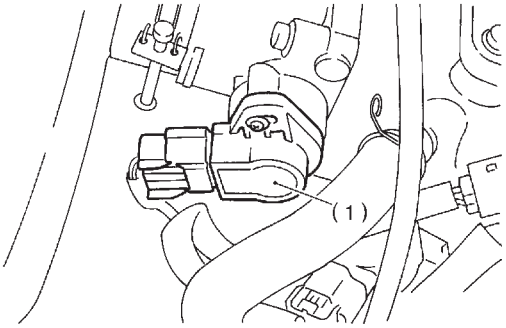




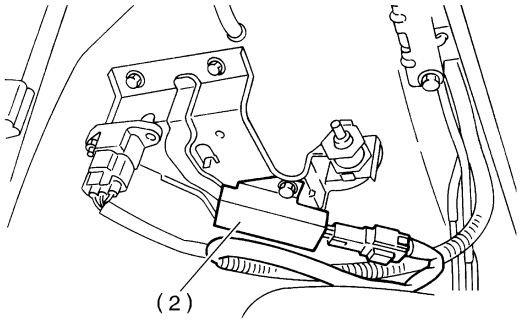
B: SENSOR



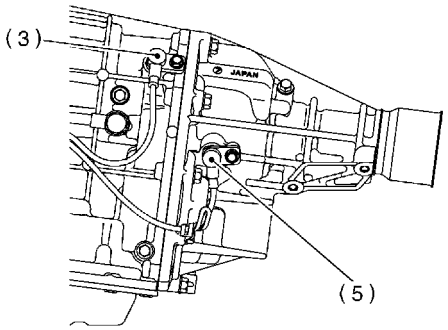
(1) Throttle position sensor
(2) Dropping resistor
(3) Vehicle speed sensor 2 (Front)
(4) Inhibitor switch
(5) Vehicle speed sensor 1 (Rear)
(6) Torque converter turbine speed signal
(7) ATF temperature sensor



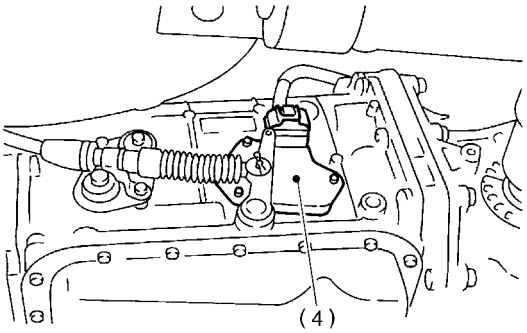
S2M0262B



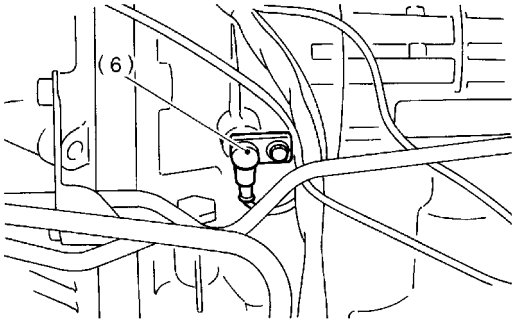
B3M1670B



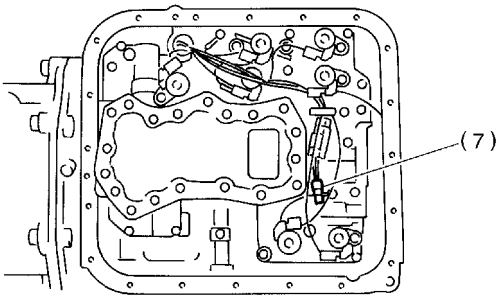
B2M2258C



B2M2246D

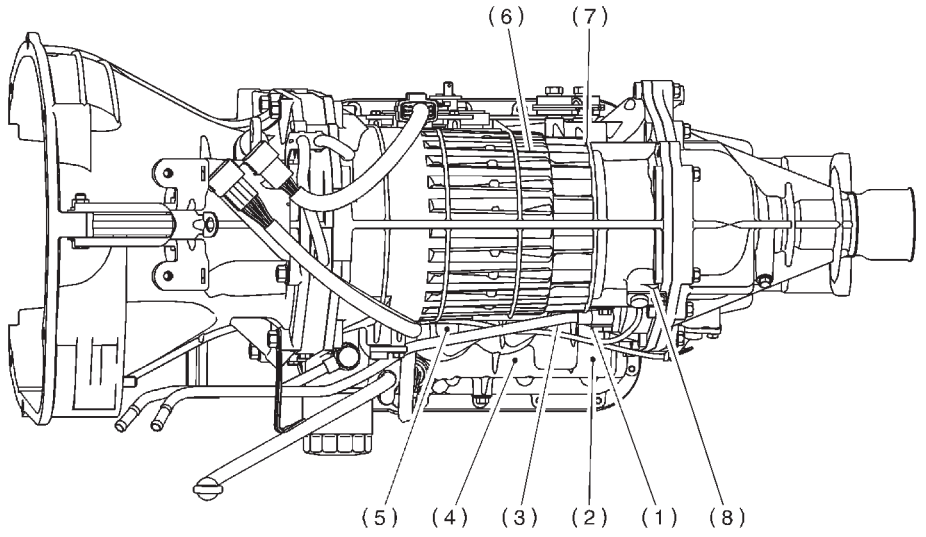


B2M2260C



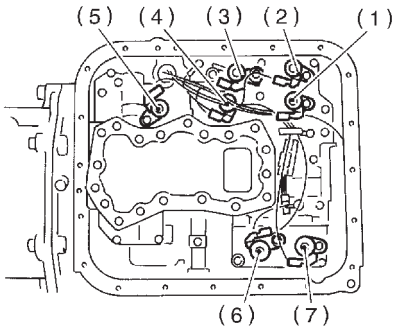
B2M2261C

C: SOLENOID

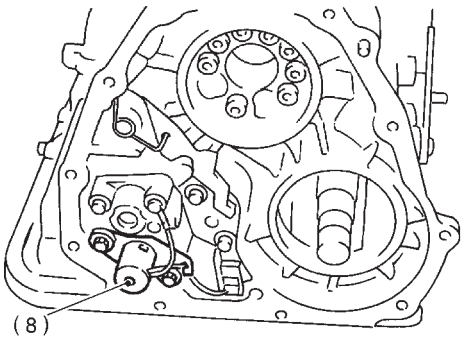


B3M1186A

(1) Solenoid 1
(2) Solenoid 2
(3) Duty solenoid A
(4) Low clutch timing solenoid
(5) Duty solenoid B
(6) Duty solenoid D
(7) 2-4 brake timing solenoid
(8) Duty solenoid C

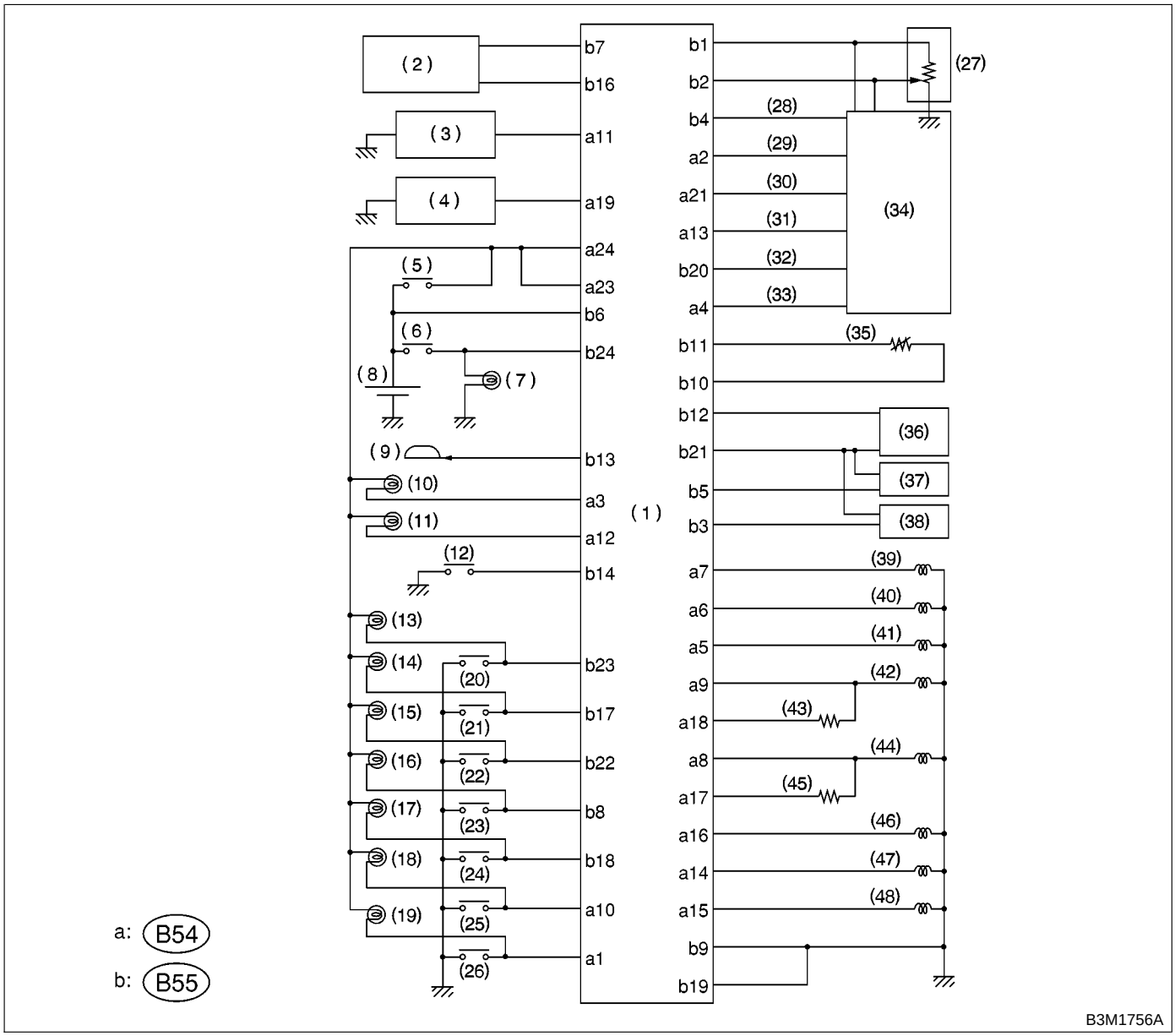


B2M2263D



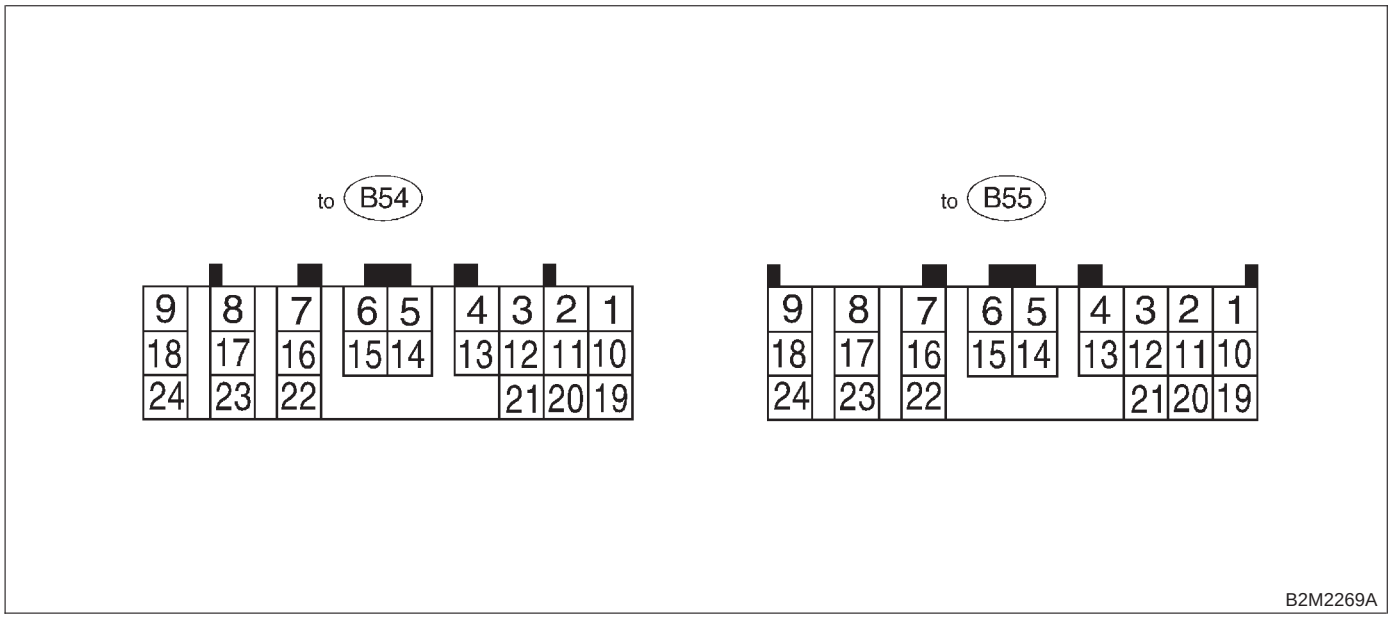
B2M2264E

4. Schematic



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

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



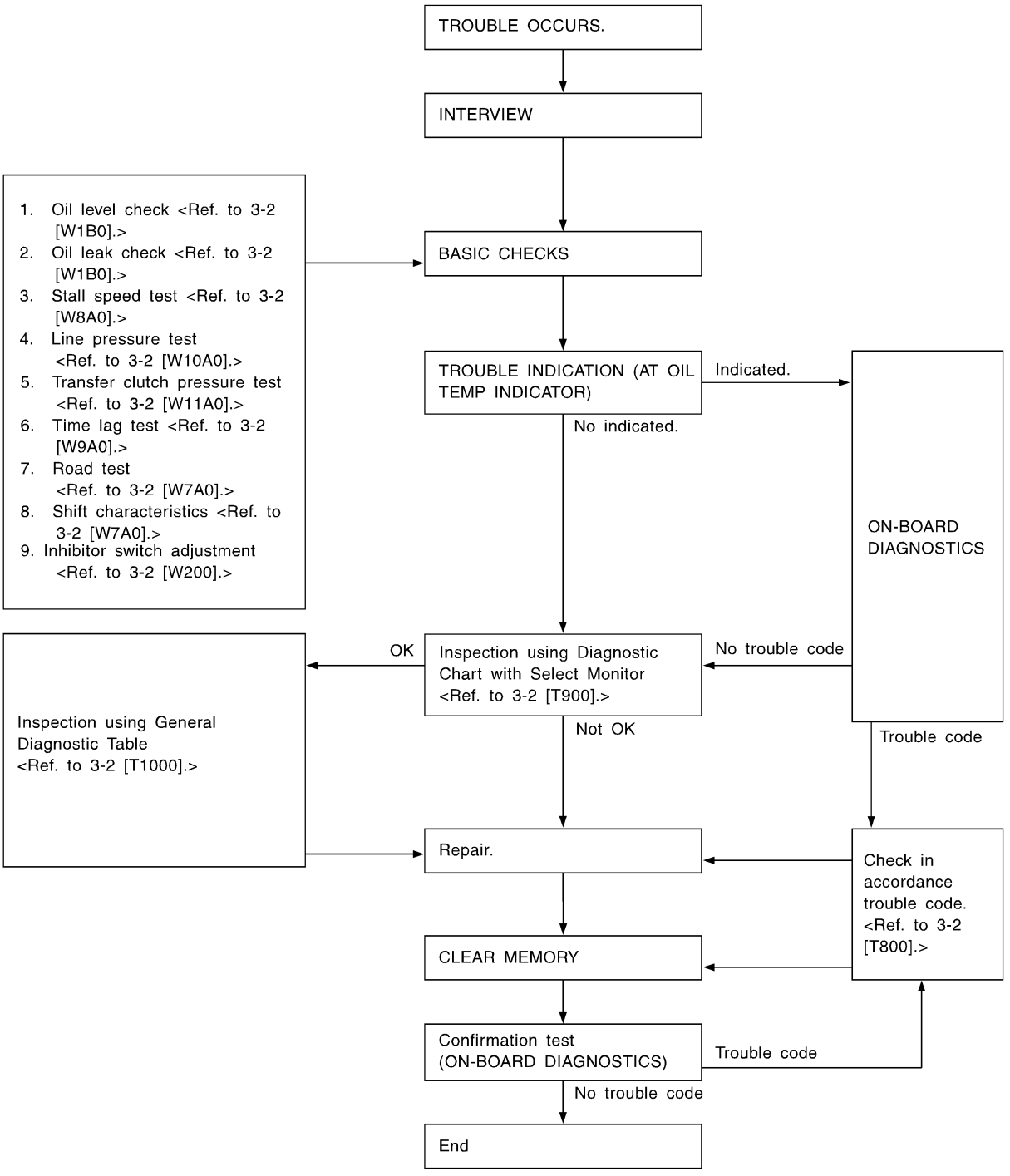
Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B55	6	Ignition switch OFF	10 — 16	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 16	—
		B54	24			
Inhibitor switch	"P" range switch	B55	23	Select lever in "P" range	Less than 1	—
				Select lever in any other than "P" range (except "N" range)	More than 8	
	"N" range switch	B55	22	Select lever in "N" range	Less than 1	—
				Select lever in any other than "N" range (except "P" range)	More than 8	
	"R" range switch	B55	17	Select lever in "R" range	Less than 1	—
				Select lever in any other than "R" range	More than 9.5	
	"D" range switch	B55	8	Select lever in "D" range	Less than 1	—
				Select lever in any other than "D" range	More than 9.5	
	"3" range switch	B55	18	Select lever in "3" range	Less than 1	—
				Select lever in any other than "3" range	More than 9.5	
	"2" range switch	B54	10	Select lever in "2" range	Less than 1	—
				Select lever in any other than "2" range	More than 9.5	
	"1" range switch	B54	1	Select lever in "1" range	Less than 1	—
				Select lever in any other than "1" range	More than 9.5	
Brake switch		B55	24	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
ABS signal		B54	19	ABS switch ON	Less than 1	—
				ABS switch OFF	6.5 — 15	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
AT OIL TEMP LAMP	B54	3	Lamp ON	Less than 1	—
			Lamp OFF	More than 9	
Throttle position sensor	B55	2	Throttle fully closed.	0.5±0.2	—
			Throttle fully open.	4.6±0.3	
Throttle position sensor power supply	B55	1	Ignition switch ON (With engine OFF)	5.05±0.25	—
ATF temperature sensor	B55	11	ATF temperature 20°C (68°F)	3.45±0.55	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	1.2±0.2	272 — 374
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)	5±1	—
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	
Duty solenoid A	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	
Duty solenoid B	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Duty solenoid C	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	
Duty solenoid D	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 lamp	B54	12	Fuse ON FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
AT diagnosis signal	B54	4	Ignition switch ON	Less than 1← →More than 4	—
Data link signal (Subaru Select Monitor)	B55	7	—	—	—
		16	—	—	

6. Diagnostic Chart for On-board Diagnostics System

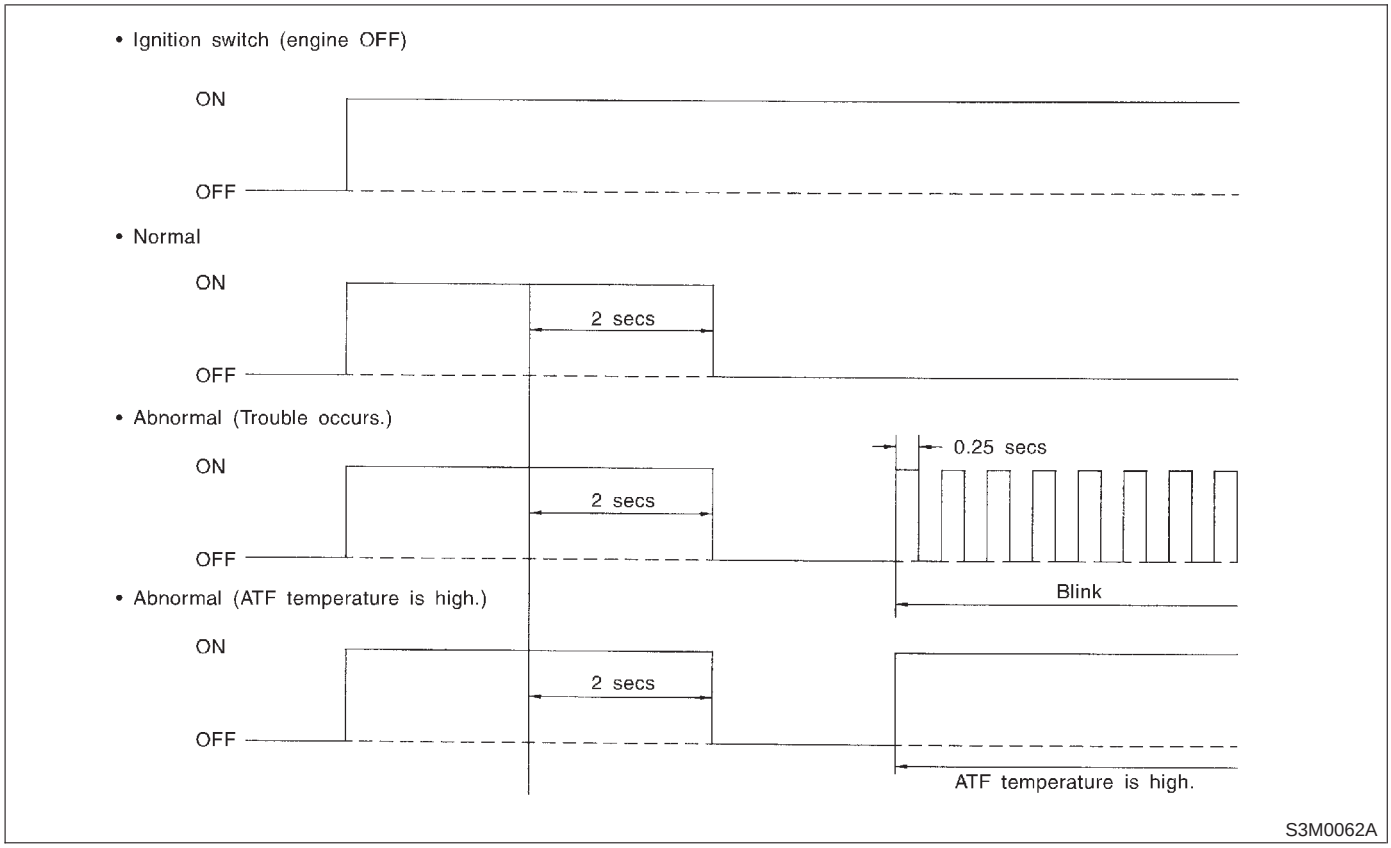
A: BASIC DIAGNOSTICS PROCEDURE



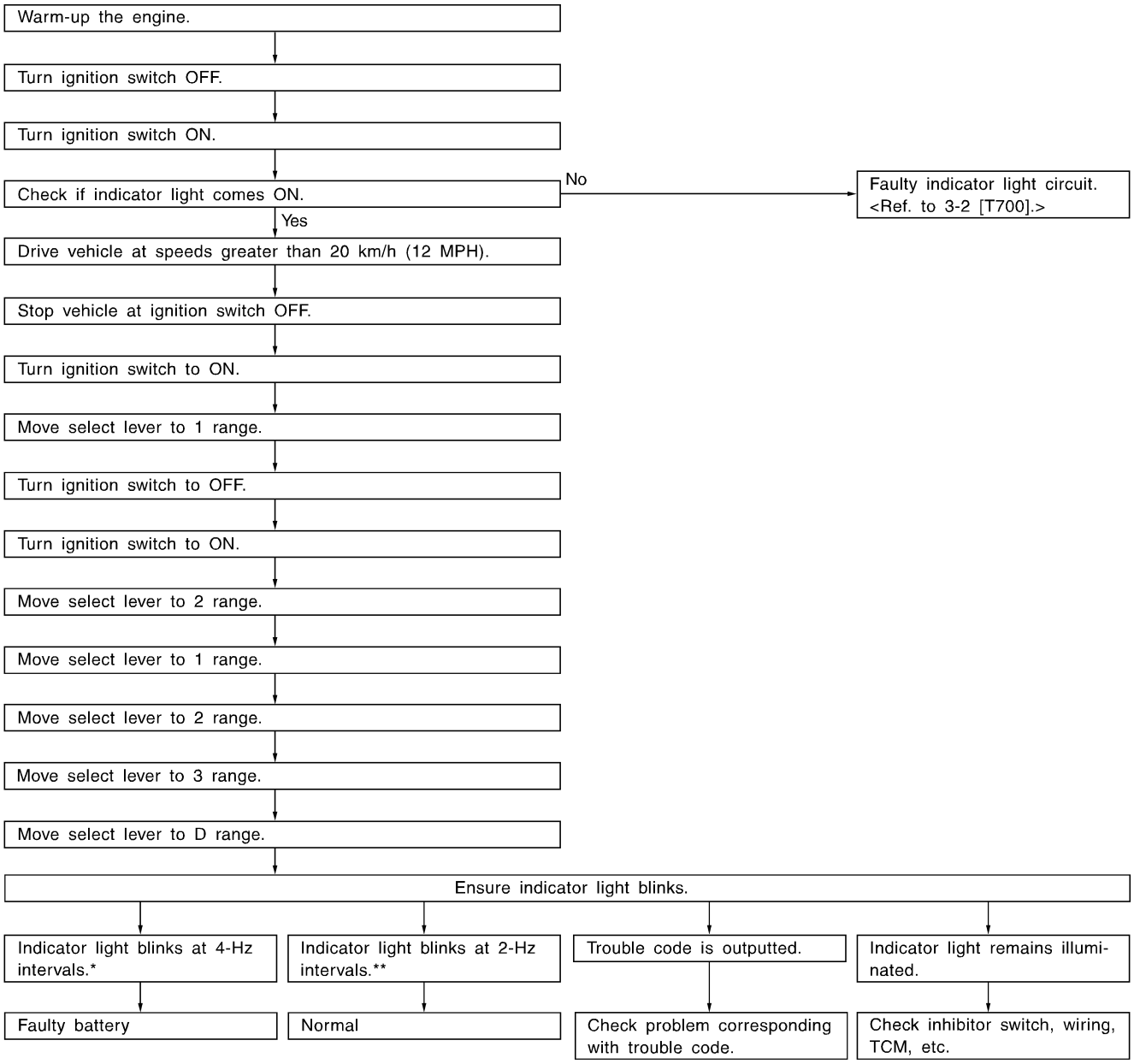
H3M1672H

B: ABNORMAL DISPLAY ON AT OIL TEMP INDICATOR

When any on-board diagnostics item is malfunctioning, the display on the AT OIL TEMP indicator lamp 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 indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the select monitor. Indicator signal is as shown in the figure.



C: ON-BOARD DIAGNOSTICS



* : Blinks every 0.125 (1/8) seconds (until ignition switch is turned OFF).
** : Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).

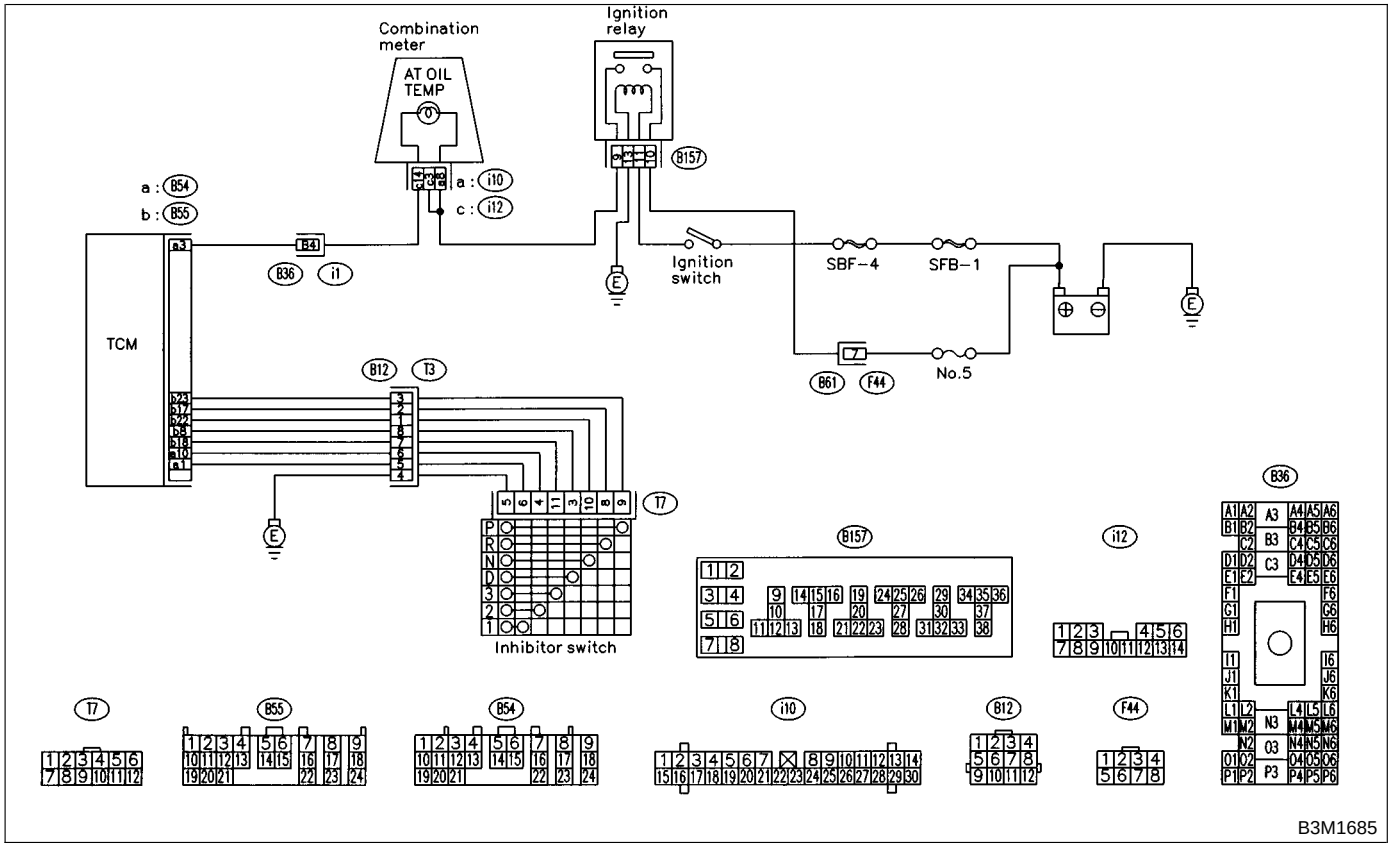
S3M0063B

7. Diagnostics for On-board Diagnostics Failed

A: AT OIL TEMP INDICATOR LIGHT

DIAGNOSIS:
The AT OIL TEMP indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
- When ignition switch is turned to ON (engine OFF), AT OIL TEMP indicator light does not illuminate.
- When on-board diagnostics is performed, AT OIL TEMP indicator light remains illuminated.

WIRING DIAGRAM:



7A1 : CHECK AT OIL TEMP INDICATOR LIGHT.

Turn ignition switch to ON (engine OFF).

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

7A2 : CHECK AT OIL TEMP INDICATOR LIGHT.

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

CHECK : ***Is AT OIL TEMP indicator light bulb OK?***
YES : Go to step **7A3**.
NO : Replace AT OIL TEMP indicator light bulb.

7A3 : CHECK AT OIL TEMP INDICATOR LIGHT.

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

CHECK : ***Does AT OIL TEMP indicator light blink?***

YES : A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM, inhibitor switch and combination meter.

NO : Go to step **7A11**.

7A4 : CHECK FUSE (NO. 5).

Remove fuse (No. 5).

CHECK : ***Is the fuse (No. 5) blown out?***

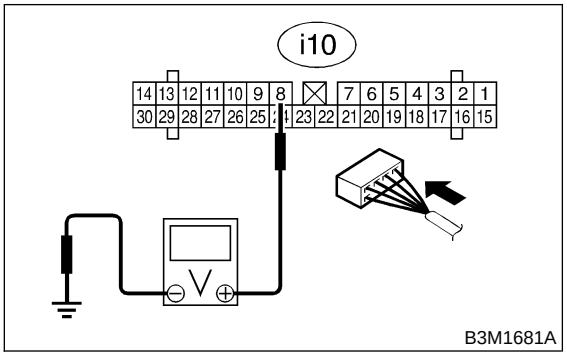
YES : Replace fuse (No. 5). If replaced fuse (No. 5) is blown out easily, repair short circuit in harness between fuse (No. 5) and combination meter.

NO : Go to step **7A5**.

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

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

Connector & terminal
(i10) No. 8 (+) — Chassis ground (−):



CHECK : ***Is voltage more than 10 V?***

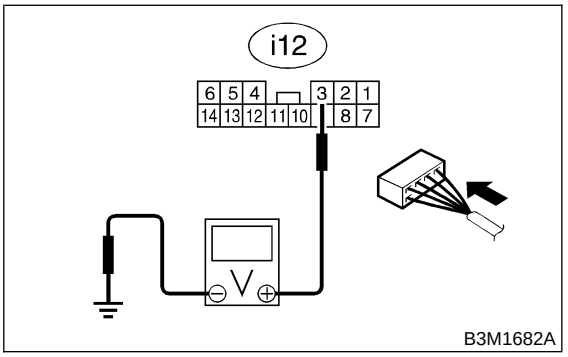
YES : Go to step **7A6**.

NO : Repair open circuit in harness between combination meter and battery.

7A6 : CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.

Measure voltage between combination meter connector and chassis ground.

Connector & terminal
(i12) No. 3 (+) — Chassis ground (−):



CHECK : ***Is voltage more than 10 V?***

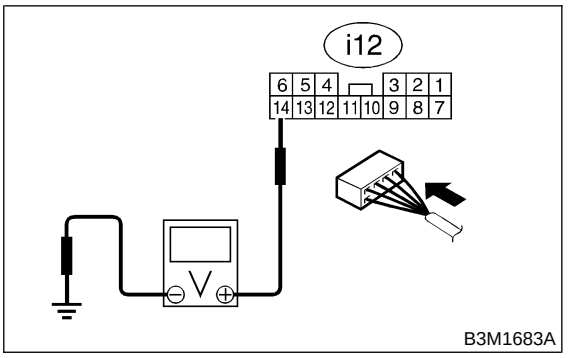
YES : Go to step **7A7**.

NO : Repair open circuit in harness between combination meter and battery.

7A7 : CHECK COMBINATION METER.

Measure voltage between combination meter connector and chassis ground.

Connector & terminal
(i12) No. 14 (+) — Chassis ground (−):



CHECK : ***Is voltage less than 1 V?***

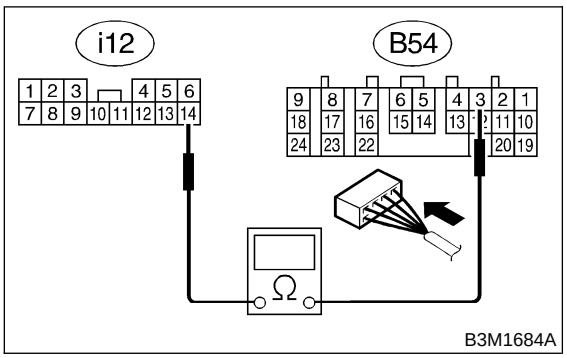
YES : Go to step **7A8**.

NO : Repair combination meter. <Ref. to 6-2 [K1A0].>

7A8 : 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 — (i12) No. 14:

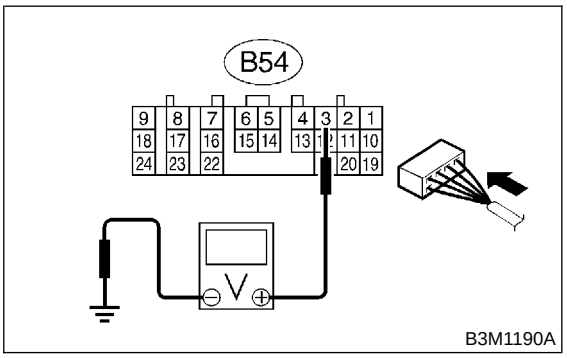


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7A9**.
NO : Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.

7A9 : 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 (−):



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

7A10 : CHECK INHIBITOR SWITCH.

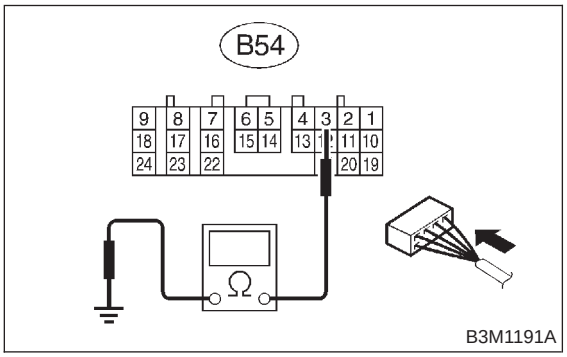
1) Connect Subaru Select Monitor to data link connector.
2) Turn ignition switch to ON.
3) Subaru Select Monitor to ON.
4) Read data of range switch using Subaru Select Monitor.
● Range switch is indicated in ON ⇔ OFF.

CHECK : ***When each range is selected, does LED of Subaru Select Monitor light up?***
YES : Go to step **7A11**.
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

7A11 : 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.

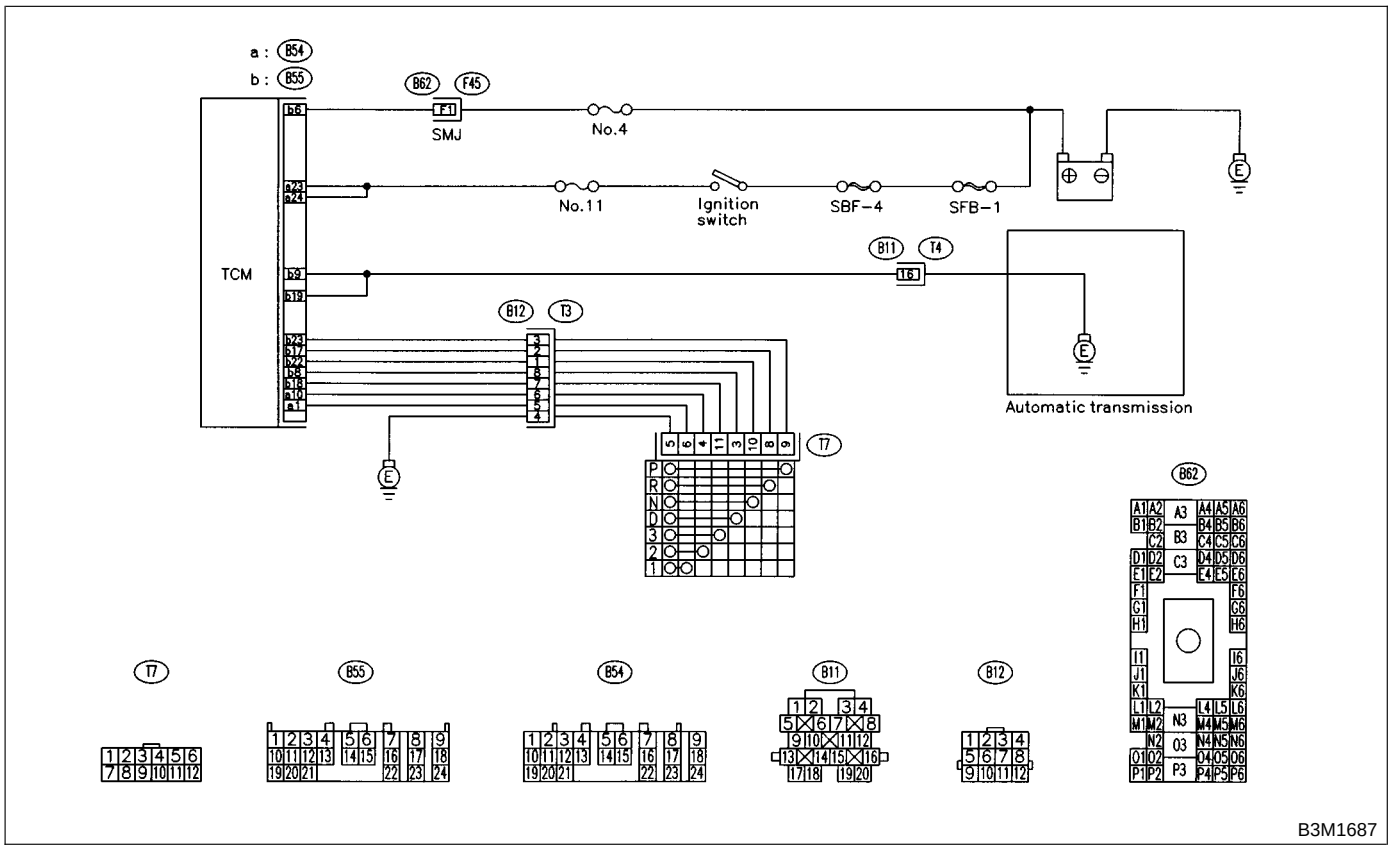
Connector & terminal/specified resistance (B54) No. 3 — Chassis ground:



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

B: CONTROL MODULE POWER SUPPLY AND GROUND LINE

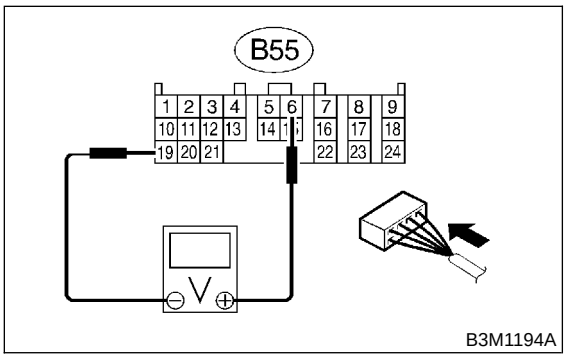
WIRING DIAGRAM:



7B1 : 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 (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **7B3**.
NO : Go to step **7B2**.

7B2 : CHECK FUSE (NO. 4).

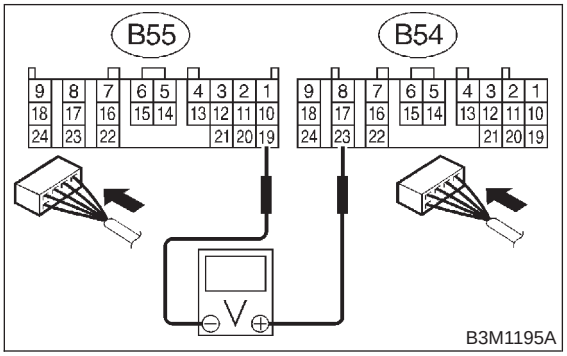
Remove fuse (No. 4).

CHECK : ***Is the fuse (No. 4) blown out?***
YES : Replace fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.
NO : Repair open circuit in harness between fuse (No. 4) and TCM, and poor contact in coupling connector.

7B3 : CHECK IGNITION POWER SUPPLY CIRCUIT.

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

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

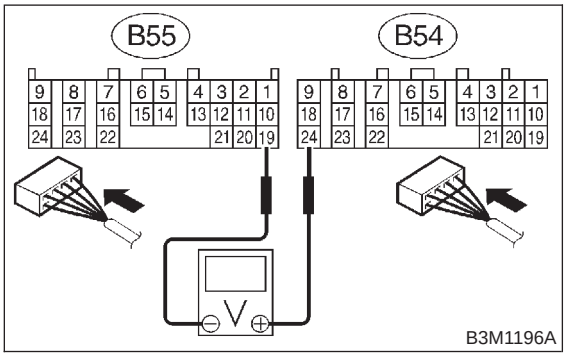


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **7B4**.
NO : Go to step **7B5**.

7B4 : CHECK IGNITION POWER SUPPLY CIRCUIT.

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

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



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

7B5 : CHECK FUSE (NO. 11).

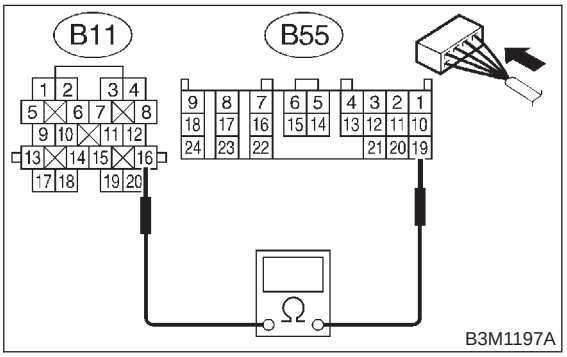
Remove fuse (No. 11).

CHECK : ***Is the fuse (No. 11) blown out?***
YES : Replace fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.
NO : Repair open circuit in harness between fuse (No. 11) and TCM, and poor contact in coupling connector.

7B6 : 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:

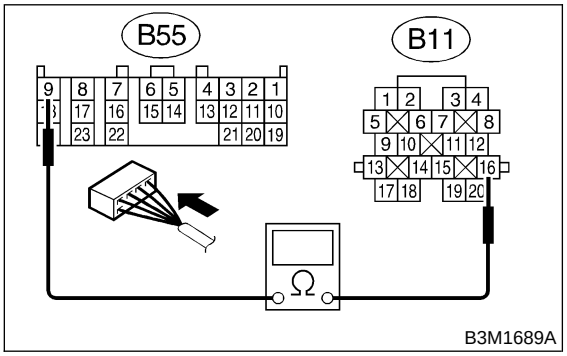


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7B7**.
NO : Repair open circuit in harness between TCM and transmission harness connector.

7B7 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TCM.

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

Connector & terminal
(B11) No. 16 — (B55) No. 9:

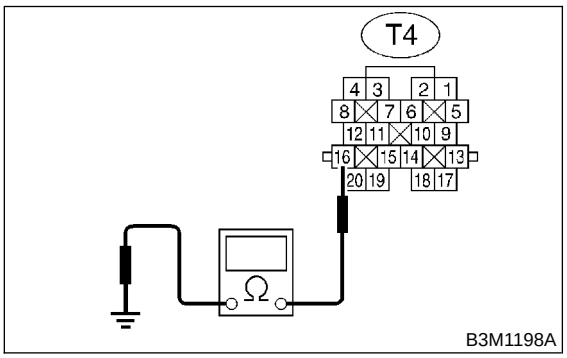


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7B8**.
NO : Repair open circuit in harness between TCM and inhibitor side connector, and poor contact in coupling connector.

7B8 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.

Measure resistance of harness between transmission and transmission ground.

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



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **7B9**.
NO : Repair open circuit in harness between transmission and transmission ground.

7B9 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in control module power supply and ground line?***
YES : Repair poor contact and ground terminal.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

MEMO:

8. Diagnostic Chart with Trouble Code

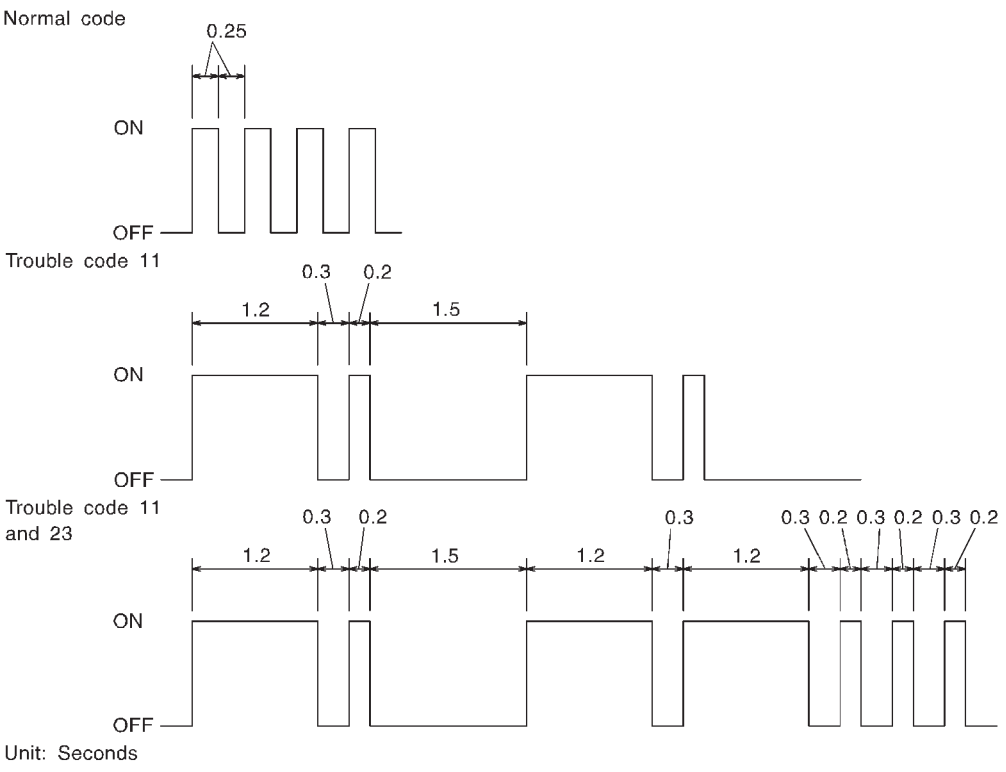
A: LIST OF TROUBLE CODE

1. TROUBLE CODE

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

2. HOW TO READ TROUBLE CODE OF INDICATOR LIGHT

The AT OIL TEMP indicator light flashes the code corresponding to the faulty part.
The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



B: CLEAR MEMORY

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

CLEAR MEMORY:

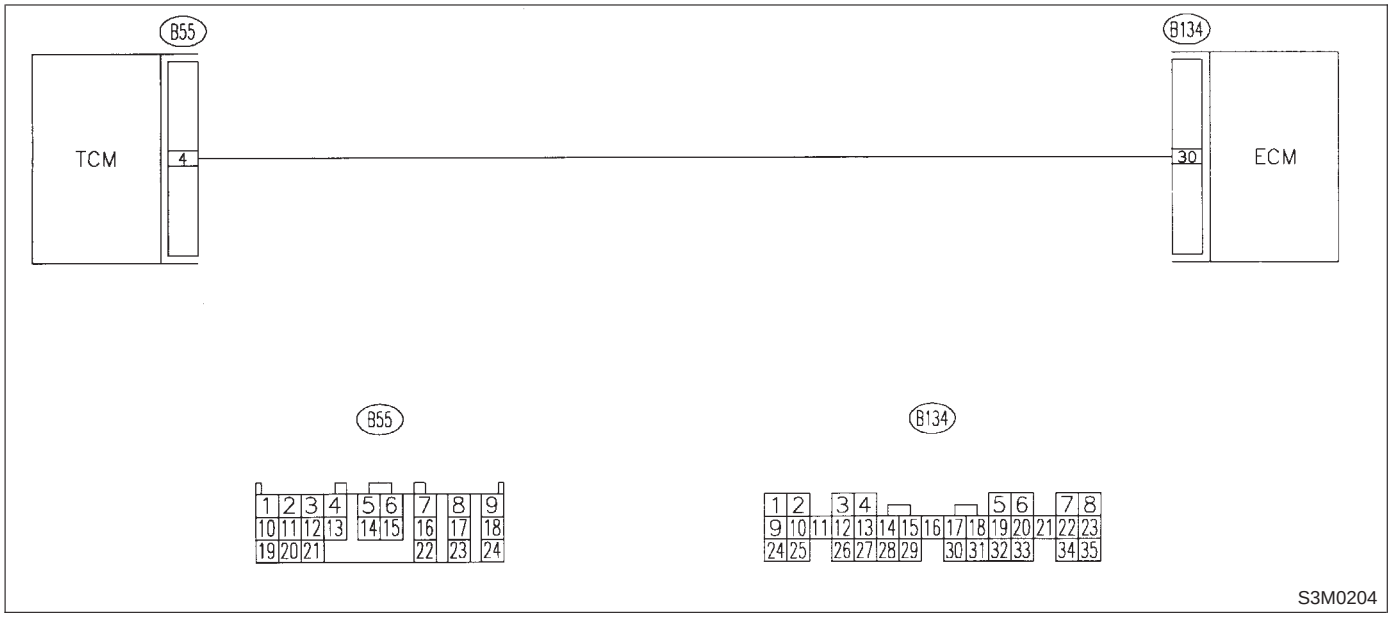
Removal of No. 4 fuse (for at least one minute)

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

C: TROUBLE CODE 11 — ENGINE SPEED SIGNAL —

DIAGNOSIS:
Engine speed input signal circuit is open or shorted.
TROUBLE SYMPTOM:
- No lock-up (after engine warm-up).
- AT OIL TEMP indicator remains on when vehicle speed is “0”.

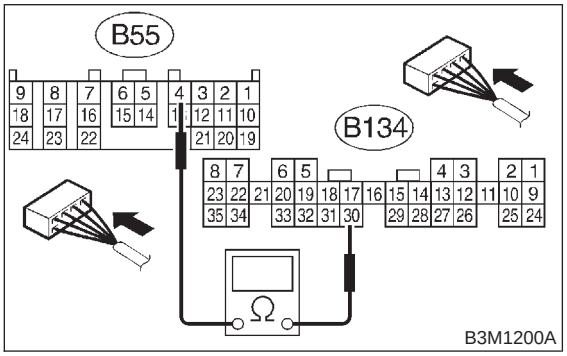
WIRING DIAGRAM:



8C1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

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

Connector & terminal
(B55) No. 4 — (B134) No. 30:

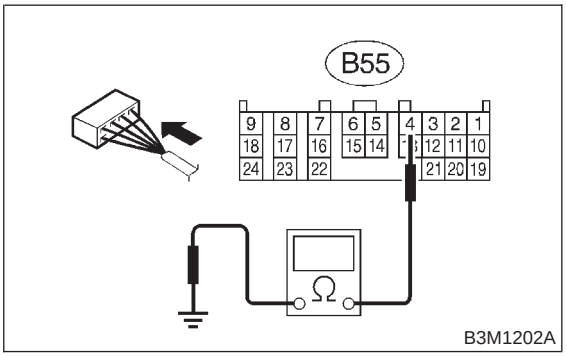


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8C2**.
NO : Repair open circuit in harness between TCM and ECM connector.

8C2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B55) No. 4 — Chassis ground:



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

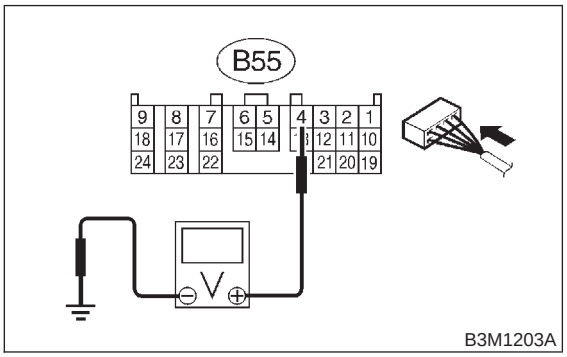
8C3 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8C5**.
NO : Go to step **8C4**.

8C4 : CHECK INPUT SIGNAL FOR TCM.

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

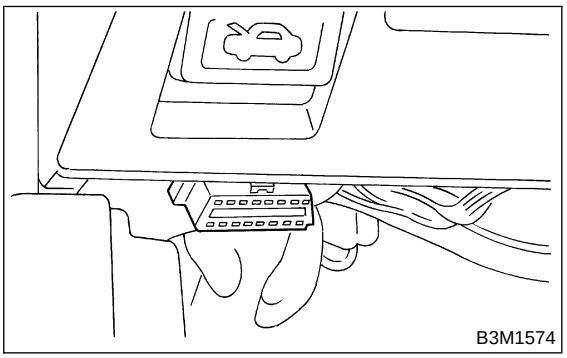
Connector & terminal
(B55) No. 4 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10.5 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8C6**.

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

1) Connect 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.

CHECK : ***Is the revolution value the same as the tachometer reading shown on the combination meter?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8C6**.

8C6 : CHECK POOR CONTACT.

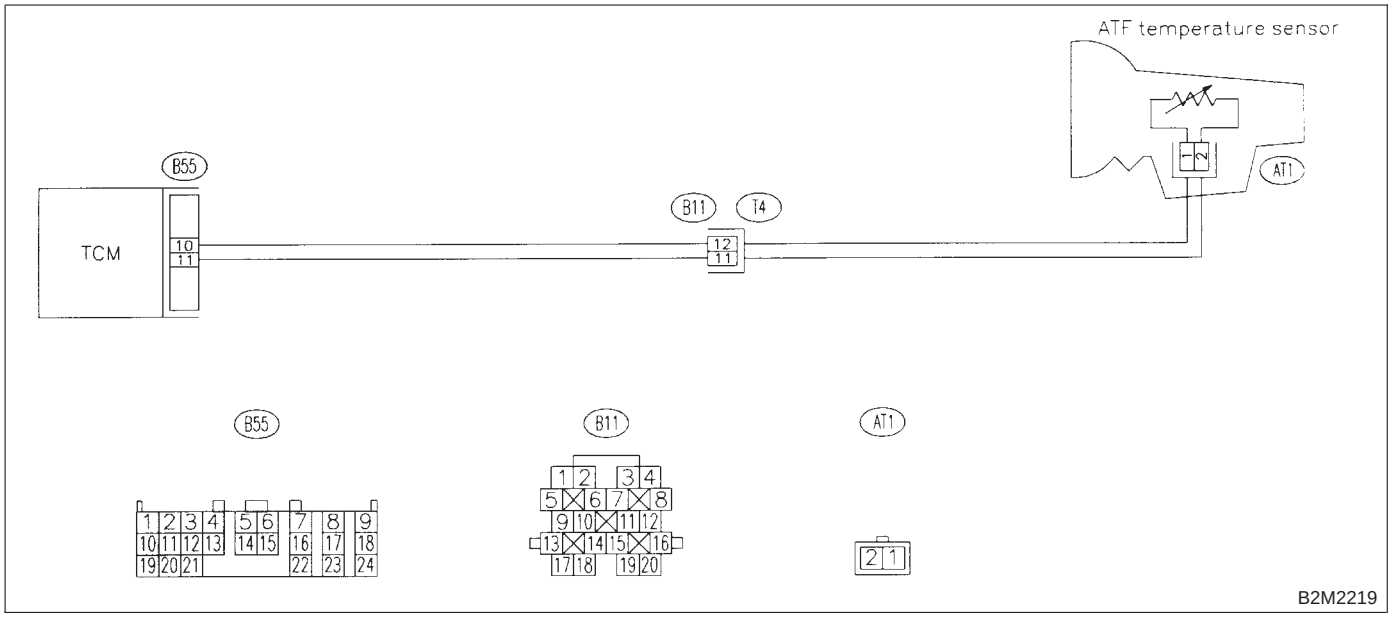
CHECK : ***Is there poor contact in engine speed signal circuit?***
YES : Repair poor contact.
NO : Go to step **8C7**.

8C7 : CONFIRM TROUBLE CODE 11.

CHECK : ***Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Replace ECM. <Ref. to 2-7 [W19A0].>

D: TROUBLE CODE 27 — ATF TEMPERATURE SENSOR —

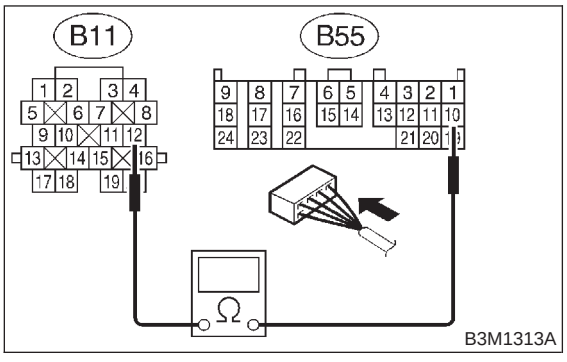
DIAGNOSIS:
Input signal circuit of TCM to ATF temperature sensor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



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

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:

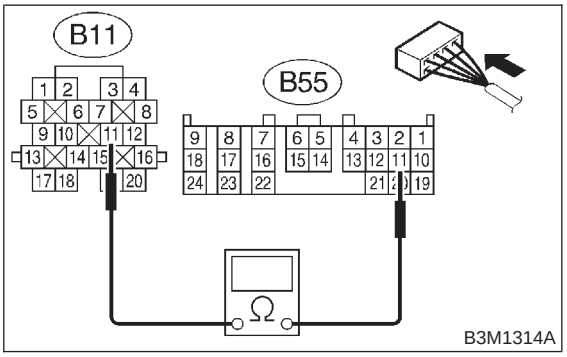


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D2**.
NO : Repair open circuit in harness between TCM and transmission connector.

8D2 : 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:

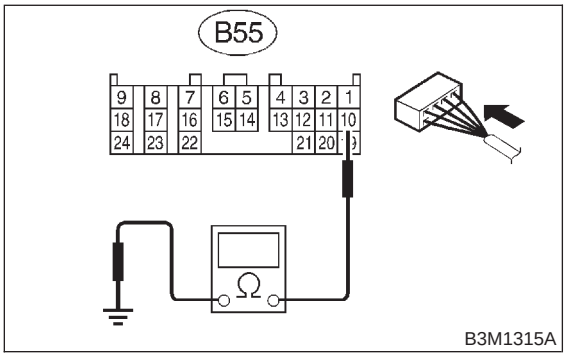


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D3**.
NO : Repair open circuit in harness between TCM and transmission connector.

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

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 10 — Chassis ground:

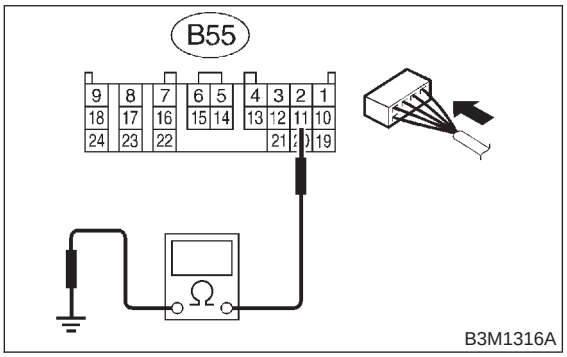


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8D4**.
NO : Repair short circuit in harness between TCM and transmission connector.

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

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 11 — Chassis ground:



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

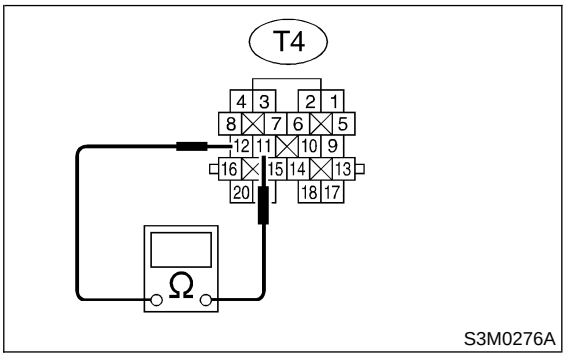
8D5 : CHECK ATF TEMPERATURE SENSOR.

1) Turn ignition switch to OFF.
2) Connect connectors to transmission 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:

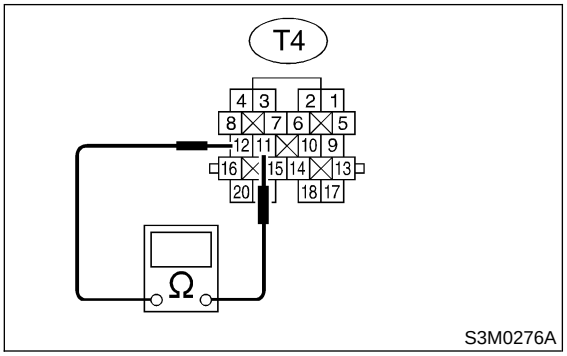


CHECK : ***Is the resistance between 275 and 375 Ω?***
YES : Go to step **8D6**.
NO : Go to step **8D13**.

8D6 : CHECK ATF TEMPERATURE SENSOR.

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

Connector & terminal
(T4) No. 11 — No. 12:



CHECK : ***Does the resistance value increase while the ATF temperature decreases?***
YES : Go to step **8D7**.
NO : Go to step **8D13**.

8D7 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8D10**.
NO : Go to step **8D8**.

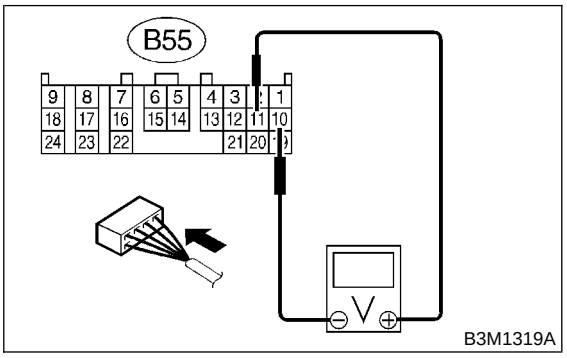
8D8 : CHECK INPUT SIGNAL FOR TCM.

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

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

2) Measure voltage between TCM connector terminal.

Connector & terminal
(B55) No. 11 (+) — No. 10 (−):

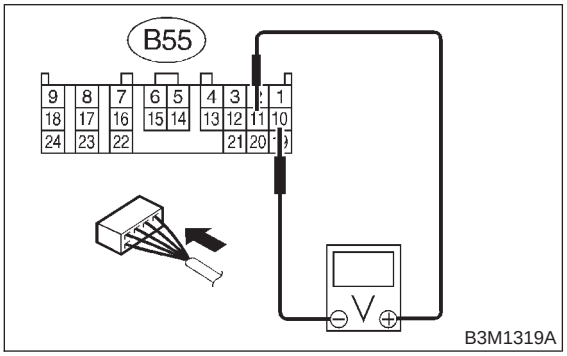


CHECK : ***Is the voltage between 2.9 and 4.0 V?***
YES : Go to step **8D9**.
NO : Go to step **8D12**.

8D9 : CHECK INPUT SIGNAL FOR TCM.

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

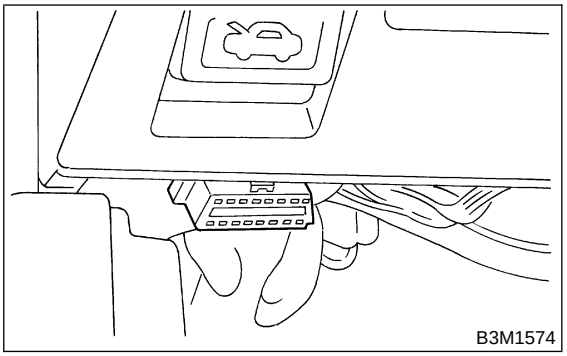
Connector & terminal
(B55) No. 11 (+) — No. 10 (−):



CHECK : ***Is the voltage between 1.0 and 1.4 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Go to step **8D12**.

8D10 : 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”.

CHECK : ***Is the ATF temperature between 70 and 110°C (158 and 230°F).***
YES : Go to step **8D11**.
NO : Go to step **8D12**.

8D11 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

Turn ignition switch to ON (engine OFF).

CHECK : ***Does the ATF temperature gradually decrease?***
YES : Even if “AT OIL TEMP” light up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.
NO : Go to step **8D12**.

8D12 : CHECK POOR CONTACT.

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

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

1) Turn ignition switch to OFF.
2) Disconnect connector from transmission.
3) Remove transmission connector from bracket.
4) Lift-up the vehicle and place safety stand.

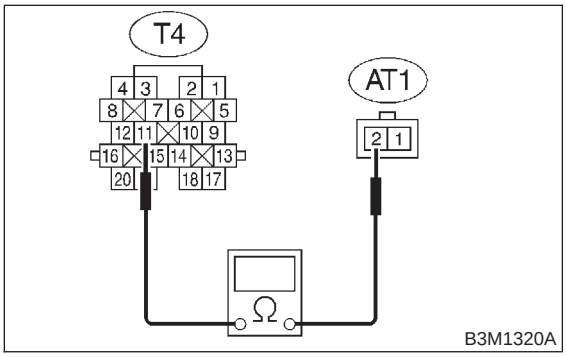
CAUTION:
On AWD models, raise all wheels off ground.

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:

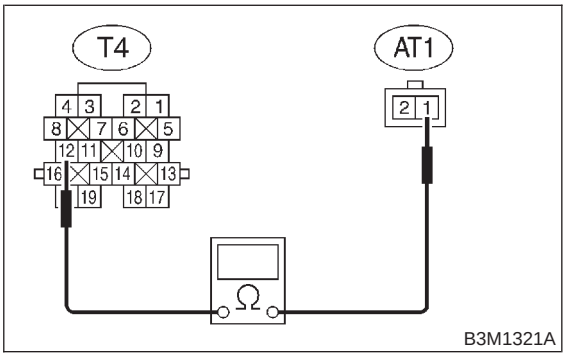


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D14**.
NO : Repair open circuit in harness between ATF temperature sensor and transmission connector.

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

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

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

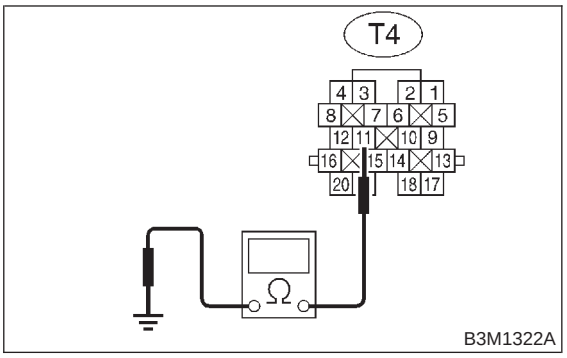


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8D15**.
NO : Repair open circuit in harness between ATF temperature sensor and transmission connector.

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

Measure resistance of harness between transmission connector and transmission ground.

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

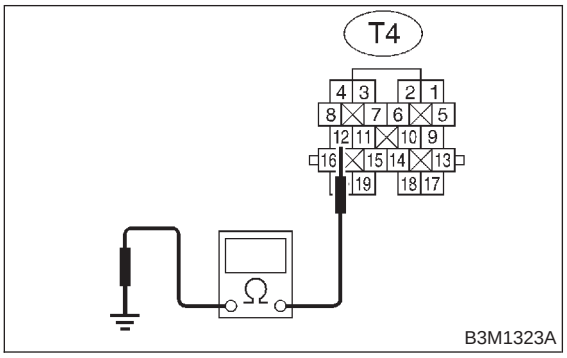


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8D16**.
NO : Repair short circuit in harness between ATF temperature sensor and transmission connector.

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

Measure resistance of harness between transmission connector and transmission ground.

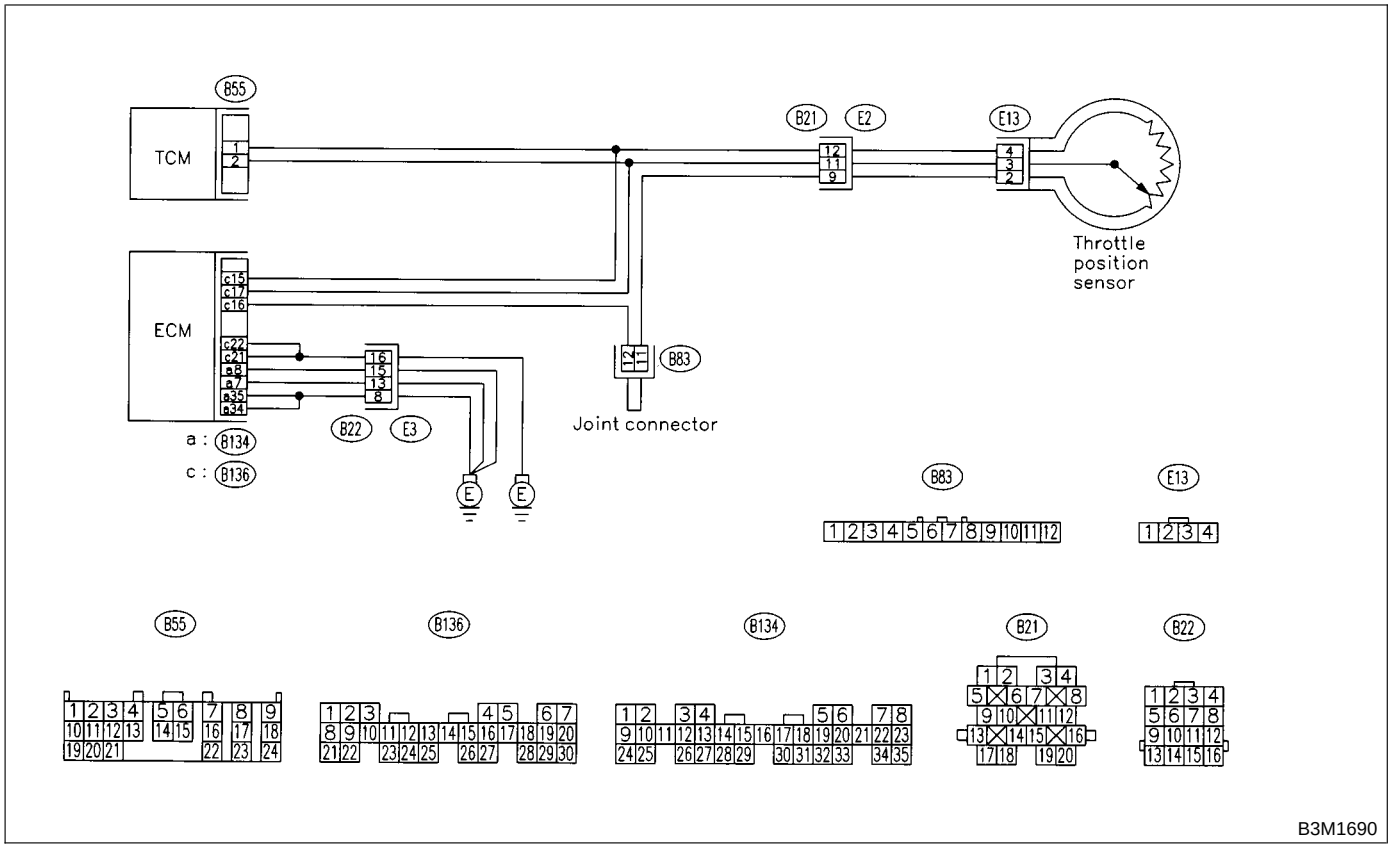
Connector & terminal
(T4) No. 12 — Transmission ground:



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

E: TROUBLE CODE 31 — THROTTLE POSITION SENSOR —

DIAGNOSIS:
Input signal circuit of throttle position sensor is open or shorted.
TROUBLE SYMPTOM:
Shift point too high or too low; engine brake not effected in “3” range: excessive shift shock; excessive tight corner “braking”.
WIRING DIAGRAM:



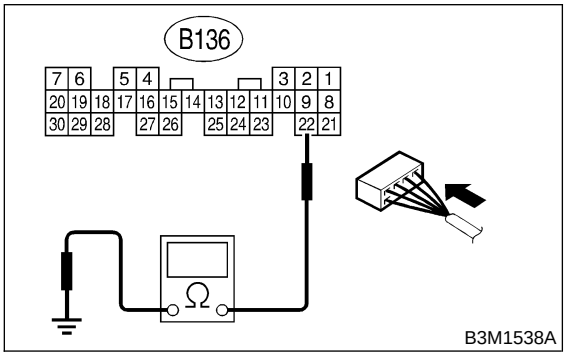
8E1 : CHECK ENGINE GROUND TERMINALS.

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

8E2 : CHECK GROUND CIRCUIT OF ECM.

1) Disconnect connector from ECM.
2) Measure resistance of harness between ECM and engine ground.

Connector & terminal
(B136) No. 22 — Engine ground:

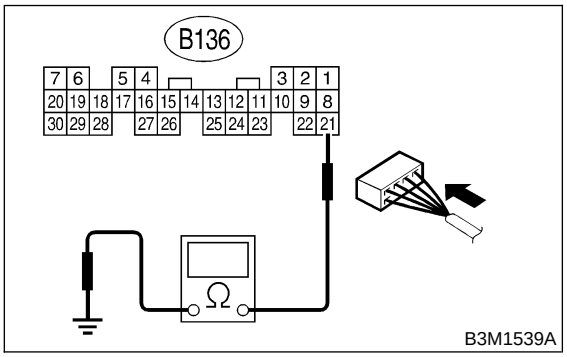


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8E3**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8E3 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and engine ground.

Connector & terminal
(B136) No. 21 — Engine ground:

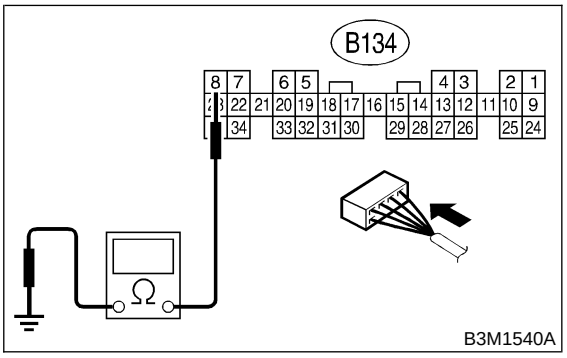


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8E4**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8E4 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and engine ground.

Connector & terminal
(B134) No. 8 — Engine ground:

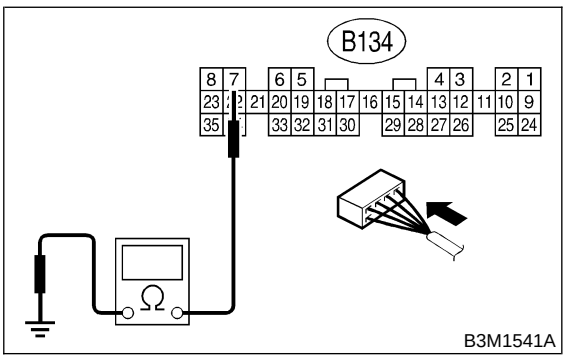


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8E5**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8E5 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B134) No. 7 — Chassis ground:

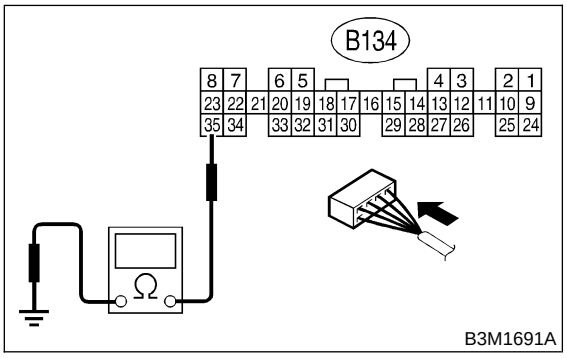


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8E6**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8E6 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and chassis ground.

Connector & terminal
(B134) No. 35 — Chassis ground:

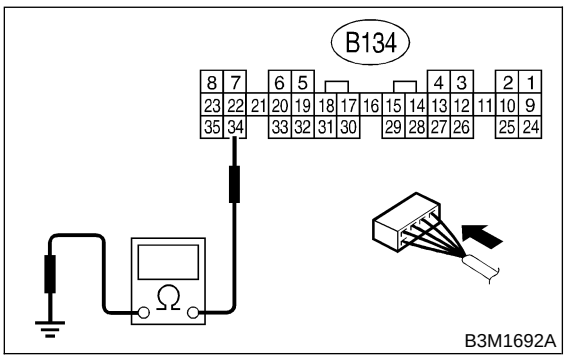


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8E7**.
NO : Repair open circuit in harness between ECM connector and engine ground terminal.

8E7 : CHECK GROUND CIRCUIT OF ECM.

Measure resistance of harness between ECM and engine ground.

Connector & terminal
(B134) No. 34 — Engine ground:

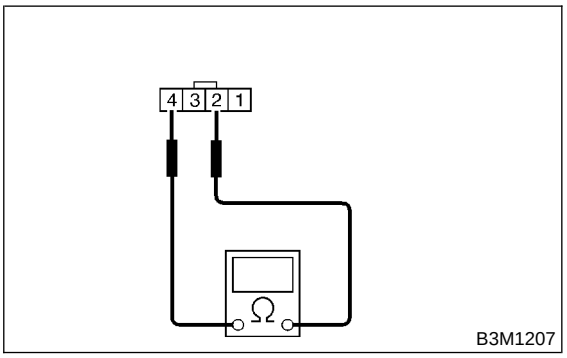


CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **8E8**.
NO : Repair open circuit in harness between ECM connector and engine grounding terminal.

8E8 : CHECK THROTTLE POSITION SENSOR.

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

Terminals
No. 4 — No. 2:

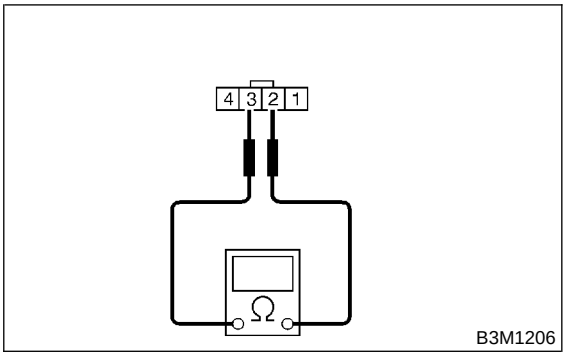


CHECK : ***Is the resistance between 0.3 and 0.7 kΩ?***
YES : Go to step **8E9**.
NO : Replace throttle position sensor. <Ref. to 2-7 [W10A0].>

8E9 : CHECK THROTTLE POSITION SENSOR.

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

Terminals
No. 2 — No. 3:

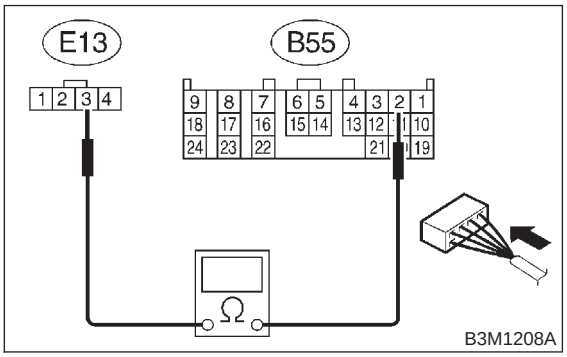


CHECK : ***Is the resistance between 3.5 and 6.5 kΩ?***
YES : Go to step **8E10**.
NO : Replace throttle position sensor. <Ref. to 2-7 [W10A0].>

8E10 : 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:

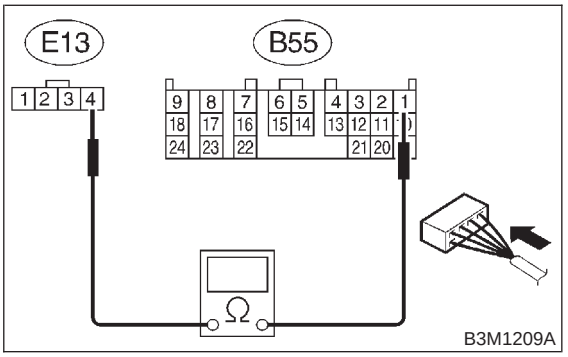


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E11**.
NO : Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

8E11 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

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

Connector & terminal
(B55) No. 1 — (E13) No. 4:

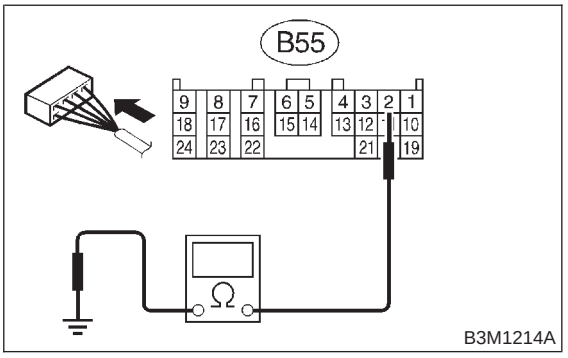


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E12**.
NO : Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

8E12 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B55) No. 2 — Chassis ground:

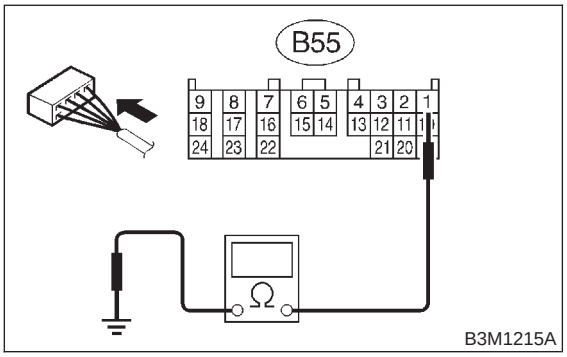


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8E13**.
NO : Repair short circuit in harness between TCM and throttle position sensor connector.

8E13 : CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B55) No. 1 — Chassis ground:

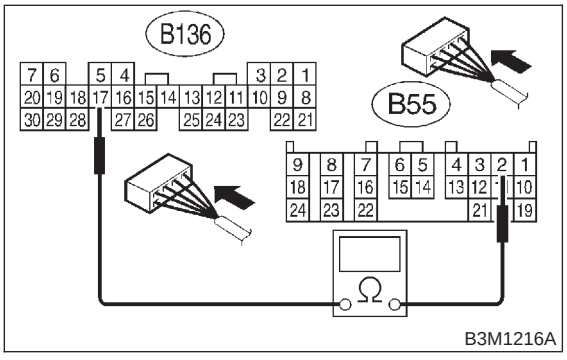


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8E14**.
NO : Repair short circuit in harness between TCM and throttle position sensor connector.

8E14 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

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

Connector & terminal
(B55) No. 2 — (B136) No. 17:

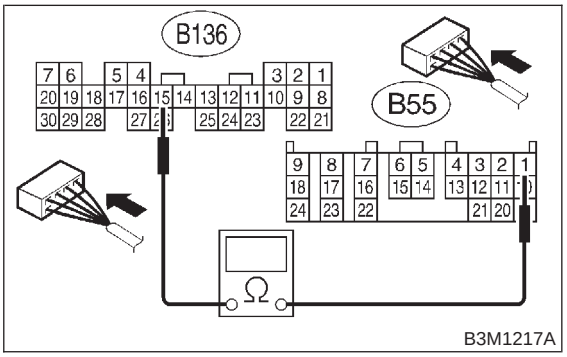


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E15**.
NO : Repair open circuit in harness between TCM and ECM connector.

8E15 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B55) No. 1 — (B136) No. 15:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8E16**.
NO : Repair open circuit in harness between TCM and ECM connector.

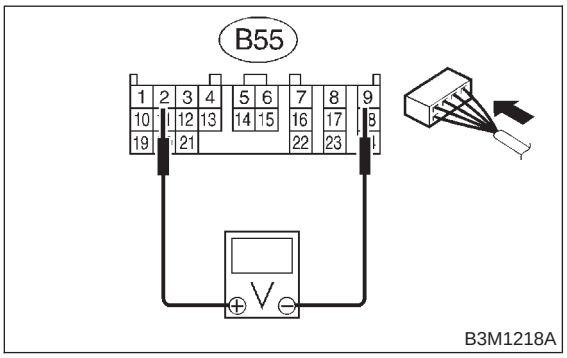
8E16 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8E19**.
NO : Go to step **8E17**.

8E17 : 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 (–):

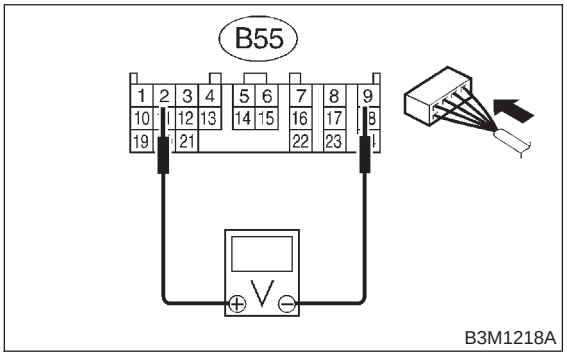


CHECK : ***Is the voltage between 0.3 and 0.7 V in throttle fully closed?***
YES : Go to step **8E18**.
NO : Go to step **8E23**.

8E18 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM connector terminals.

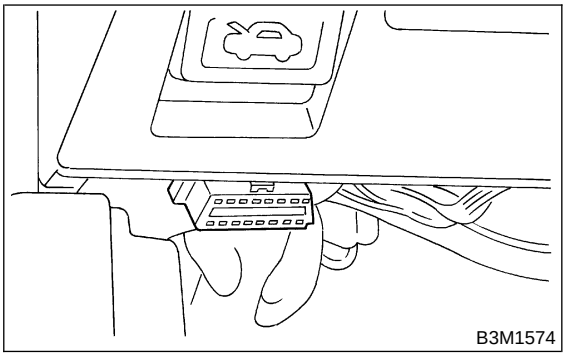
Connector & terminal
(B55) No. 2 (+) — No. 9 (–):



CHECK : ***Is the voltage between 4.3 and 4.9 V with throttle fully open?***
YES : Go to step **8E21**.
NO : Go to step **8E23**.

8E19 : 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.

CHECK : ***Is the value voltage between 0.3 and 0.7 V?***
YES : Go to step **8E20**.
NO : Go to step **8E23**.

8E20 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.

Throttle fully open.

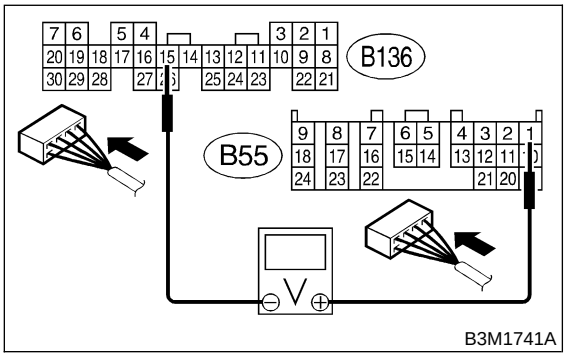
NOTE:
Must be changed correspondingly with accelerator pedal operation (from “released” to “depressed” position).

CHECK : ***Is the value voltage between 4.3 and 4.9 V?***
YES : Go to step **8E23**.
NO : Go to step **8E22**.

8E21 : CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY).

Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 1 (+) — (B136) No. 15 (−):



CHECK : ***Is the voltage between 5.02 and 5.22 V?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.

NO : Go to step **8E23**.

8E22 : CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY).

Read data of throttle position sensor power supply using Subaru Select Monitor.
● Throttle position sensor power supply voltage is indicated.

CHECK : ***Is the value voltage between 5.02 and 5.22 V?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.

NO : Go to step **8E23**.

8E23 : CHECK POOR CONTACT.

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

YES : Repair poor contact.

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

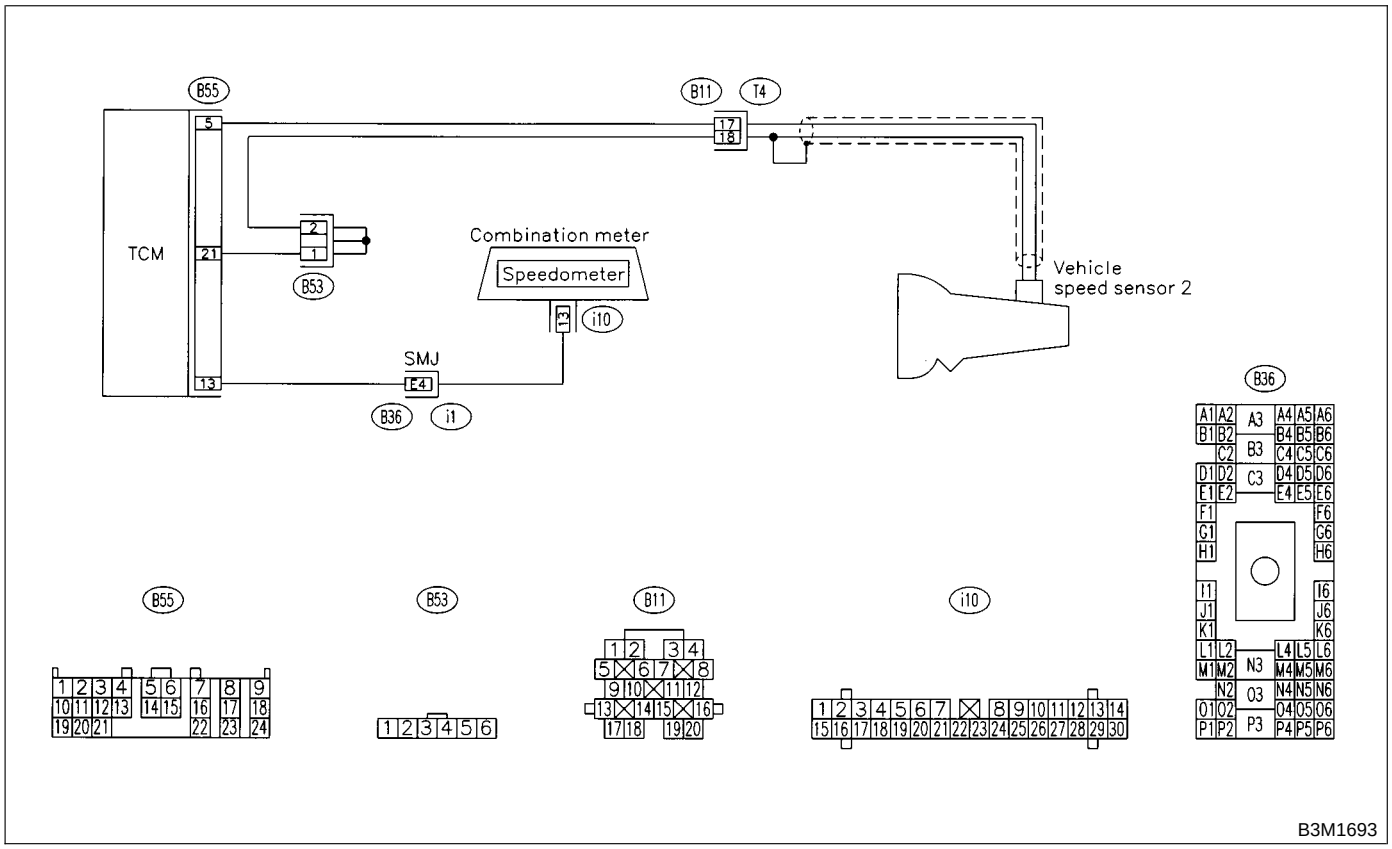
MEMO:

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

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

TROUBLE SYMPTOM:
- Erroneous idling.
- Engine stalls.
- Poor driving performance.

WIRING DIAGRAM:



B3M1693

8F1 : CHECK OPERATION OF SPEEDOMETER.

CHECK : ***Does speedometer operate normally?***

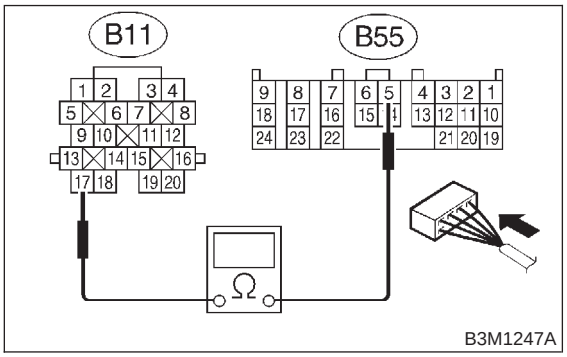
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

NO : Go to step **8F2**.

8F2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

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

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

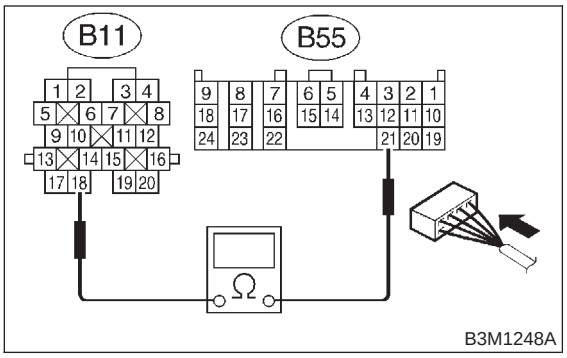


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F3**.
NO : Repair open circuit in harness between TCM and transmission connector.

8F3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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

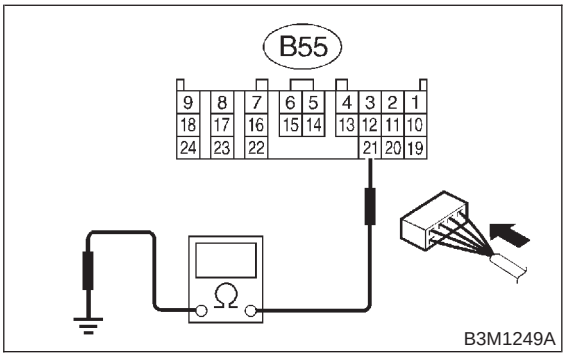


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F4**.
NO : Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.

8F4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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

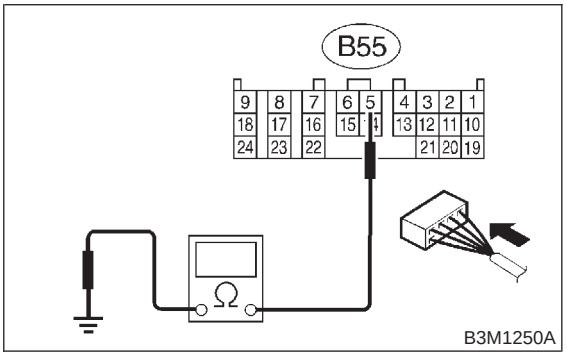


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8F5**.
NO : Repair short circuit in harness between TCM and transmission connector.

8F5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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

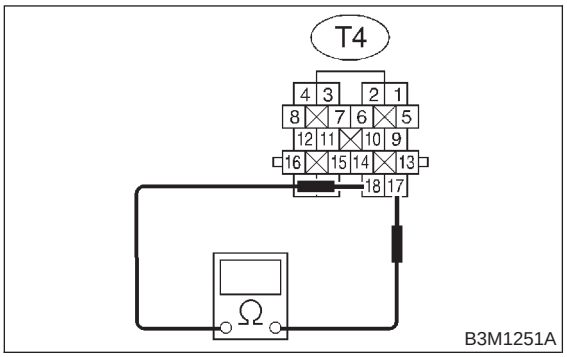


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8F6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8F6 : CHECK VEHICLE SPEED SENSOR 2.

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

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



CHECK : ***Is the resistance between 450 and 650 Ω?***
YES : Go to step **8F7**.
NO : Replace transmission harness connector. <Ref. to 3-2 [W12A0].>

8F7 : PREPARE OSCILLOSCOPE.

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

8F8 : PREPARE SUBARU SELECT MONITOR.

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

8F9 : CHECK INPUT SIGNAL FOR TCM.

1) Connect all connectors.
2) Lift-up or raise the vehicle and place safety stands.

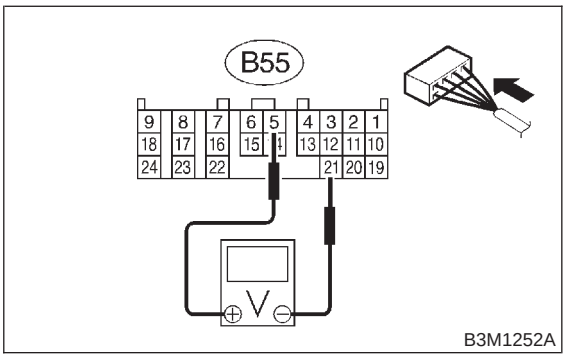
CAUTION:
On AWD models, raise all wheels off floor.

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 4-4 [T6D2].>

4) Measure voltage between TCM connector terminals.

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



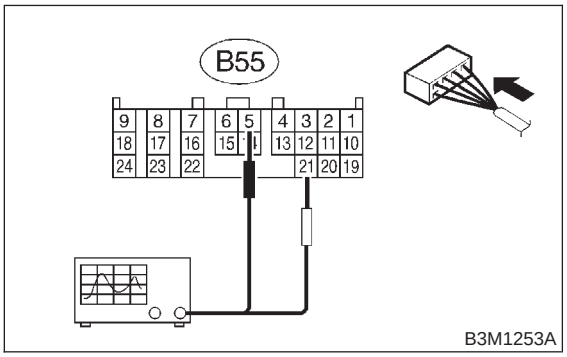
CHECK : ***Is the voltage more than AC 1 V?***
YES : Go to step **8F12**.
NO : Go to step **8F19**.

8F10 : CHECK VEHICLE SPEED SENSOR 2 USING OSCILLOSCOPE.

1) Connect all connectors.
2) Lift-up the vehicle and place safety stand.

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

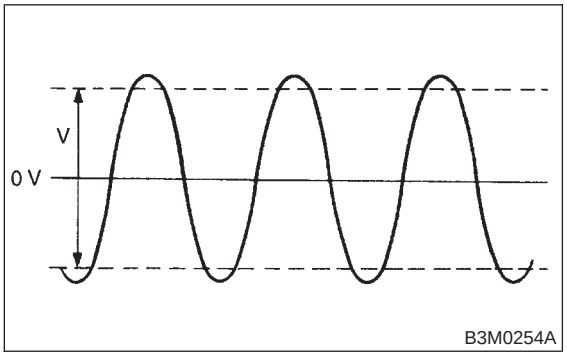
3) Set oscilloscope to TCM connector terminals.
Positive prove; (B55) No. 5
Earth lead; (B55) No. 21



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 4-4 [T6D2].>

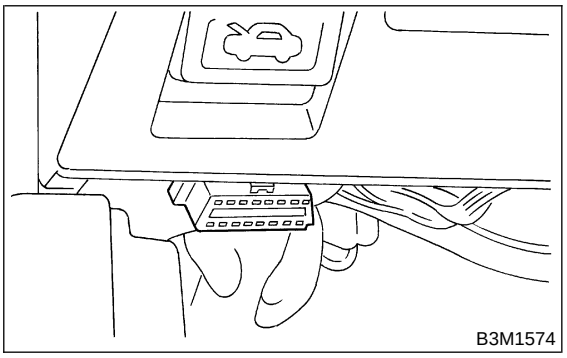
5) Measure signal voltage indicated on oscilloscope.



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

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

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



3) Lift-up or raise the vehicle and 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.

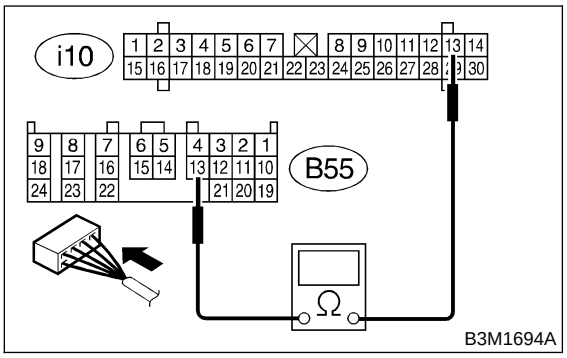
NOTE:
The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to 4-4 [T6D2].>

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

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

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

Connector & terminal
(B55) No. 13 — (i10) No. 13:

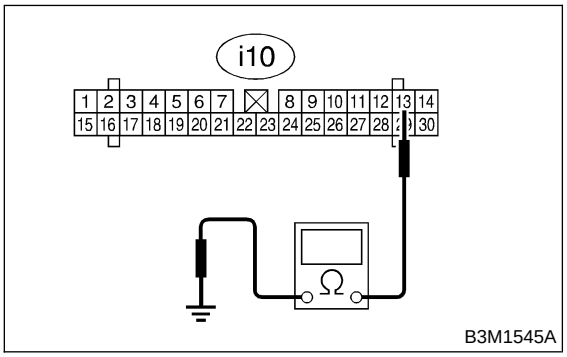


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8F13**.
NO : Repair open circuit in harness between TCM and combination meter connector, and poor contact in coupling connector.

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

Measure resistance of harness between combination meter and chassis ground.

Connector & terminal
(i12) No. 11 — Chassis ground:



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

8F14 : PREPARE OSCILLOSCOPE.

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

8F15 : PREPARE SUBARU SELECT MONITOR.

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

8F16 : CHECK OUTPUT SIGNAL FOR TCM.

1) Connect all connectors.
2) Lift-up the vehicle and place safety stand.

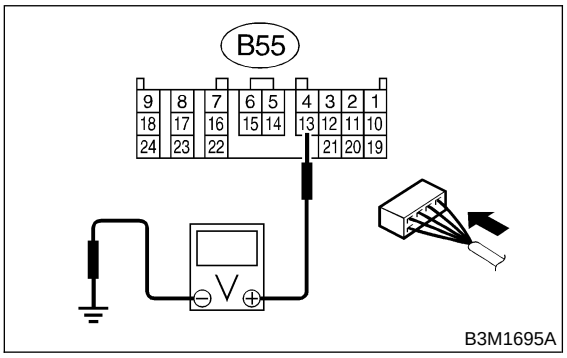
CAUTION:
On AWD models, raise all wheels off ground.

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 4-4 [T6D2].>

4) Measure voltage between TCM connector terminals.

Connector & terminal
(B55) No. 13 — Chassis ground:



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

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.

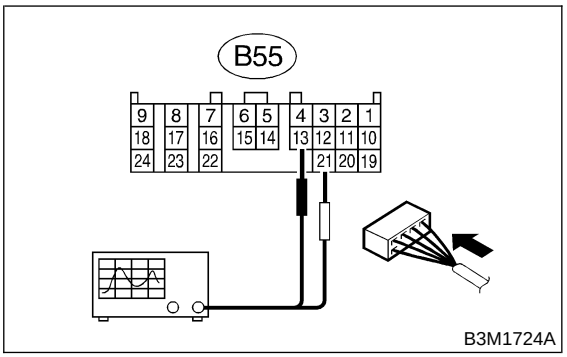
NO : Go to step **8F19**.

8F17 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

1) Connect connectors to TCM and combination meter.
2) Lift-up or raise the vehicle and place safety stands.

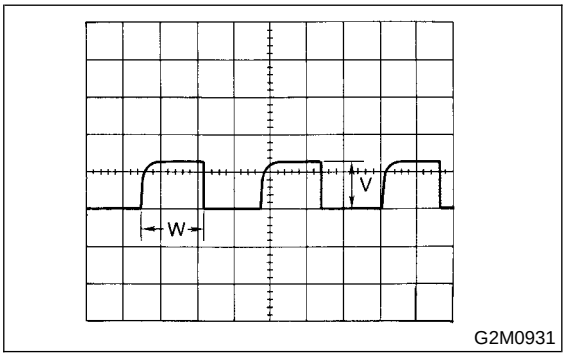
CAUTION:
On AWD models, raise all wheels off floor.

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



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

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



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

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.

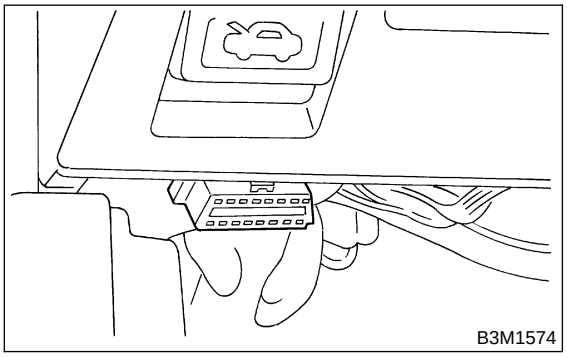
NO : Go to step **8F19**.

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

1) Connect all connectors.
2) Lift-up 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 4-4 [T6D2].>

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.
NO : Go to step **8F19**.

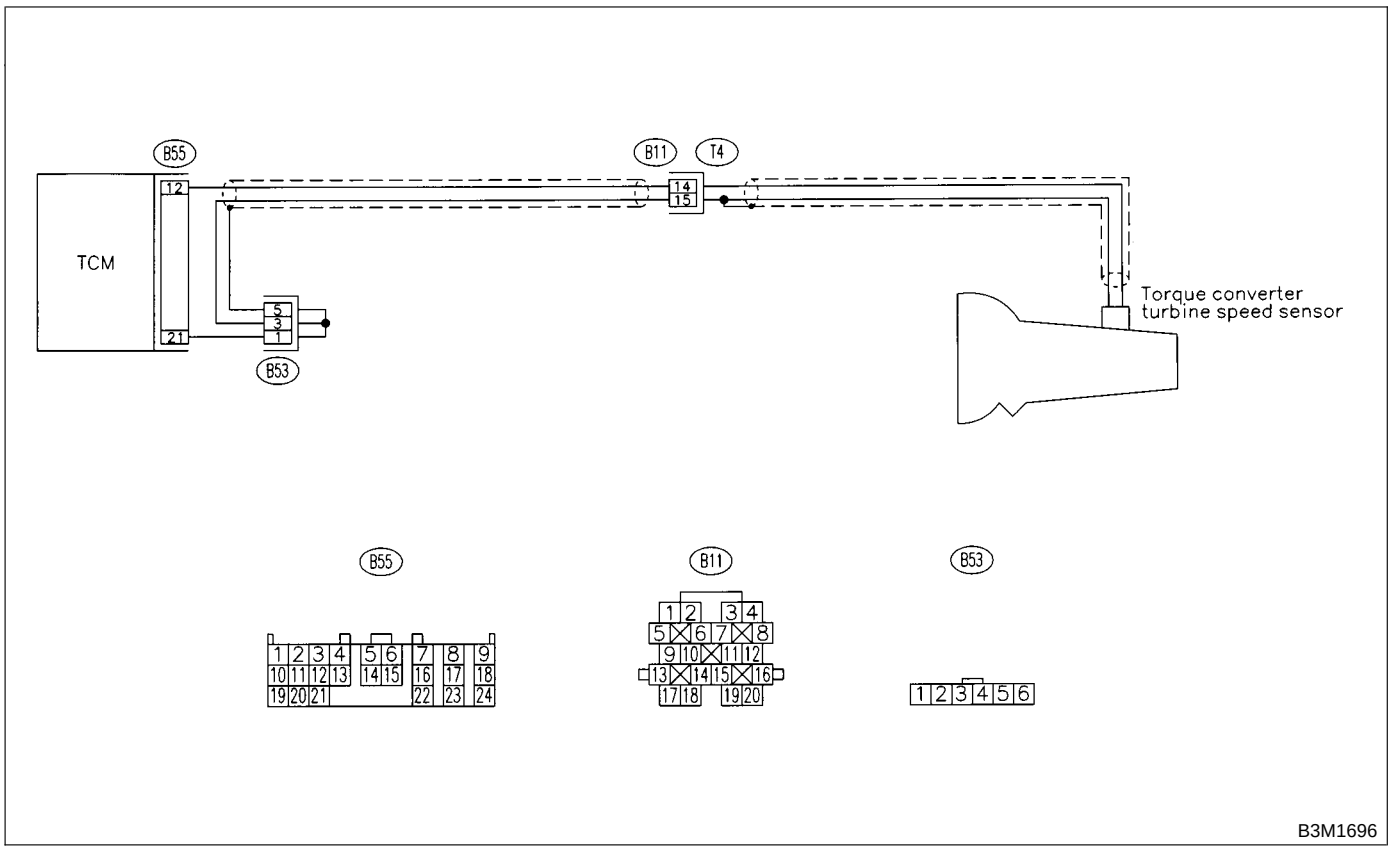
8F19 : CHECK POOR CONTACT.

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

MEMO:

G: TROUBLE CODE 36 — TORQUE CONVERTER TURBINE SPEED SENSOR —

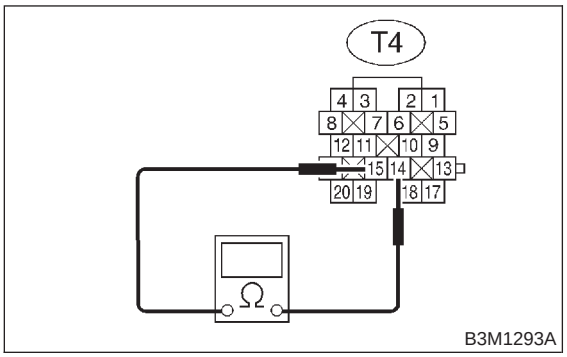
DIAGNOSIS:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



8G1 : CHECK VEHICLE SPEED SENSOR 1.

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

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

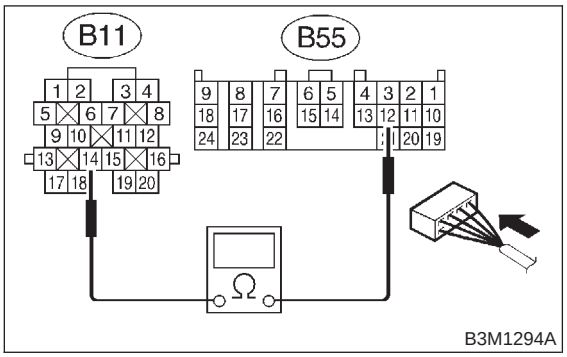


CHECK : ***Is the resistance between 450 and 650 Ω?***
YES : Go to step **8G2**.
NO : Replace turbine speed sensor. <Ref. to 3-2 [W12A0].>

8G2 : 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:

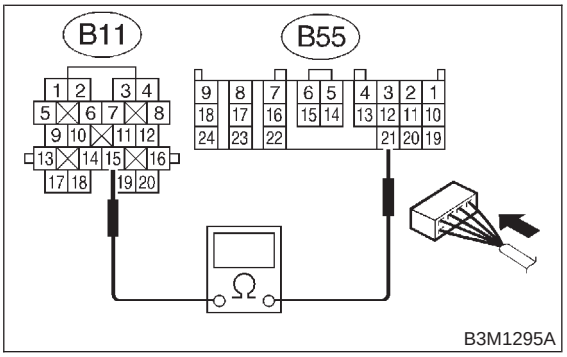


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8G3**.
NO : Repair open circuit in harness between TCM and transmission connector.

8G3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 21 — (B11) No. 15:

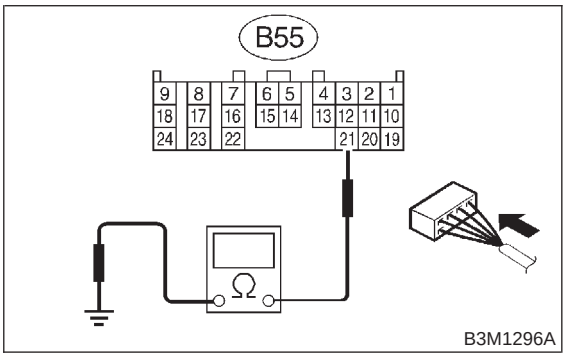


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8G4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8G4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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

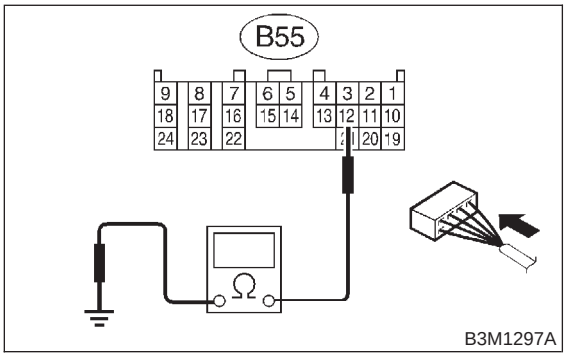


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8G5**.
NO : Repair short circuit in harness between TCM and transmission connector.

8G5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 12 — Chassis ground:



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

8G6 : PREPARE OSCILLOSCOPE.

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

8G7 : PREPARE SUBARU SELECT MONITOR.

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

8G8 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connectors to TCM and transmission.
2) Lift-up or raise the vehicle and place safety stands.

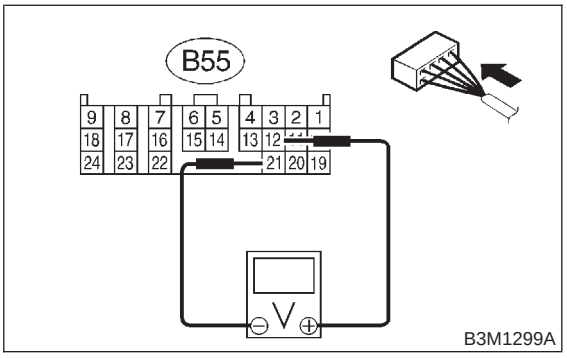
CAUTION:
Raise all wheels off floor.

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 4-4 [T6D2].>

4) Measure voltage between TCM connector terminals.

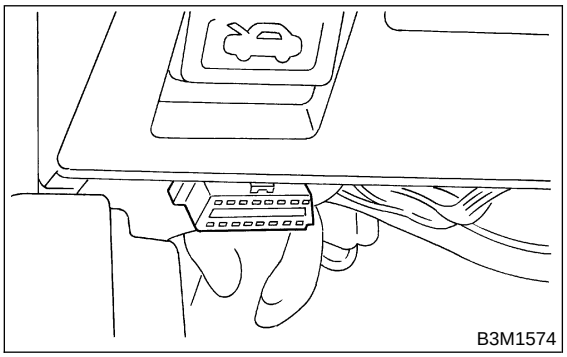
Connector & terminal
(B55) No. 12 (+) — No. 21 (−):



CHECK : ***Is the voltage more than AC 1 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.
NO : Go to step **8G11**.

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

1) Connect 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 4-4 [T6D2].>

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

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

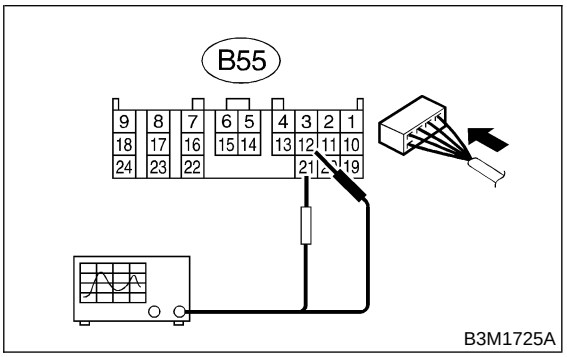
NO : Go to step **8G11**.

8G10 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

1) Connect connectors to TCM and transmission.
2) Lift-up or raise the vehicle and place safety stands.

CAUTION:
Raise all wheels off floor.

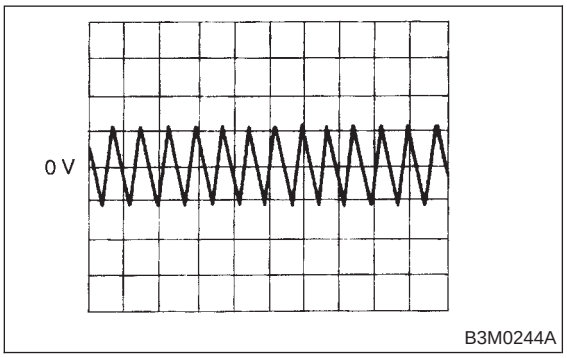
3) Set oscilloscope to TCM connector terminals.
Position prove; (B55) No. 12
Earth lead; (B55) No. 21



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

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

5) Measure signal voltage indicated on oscilloscope.



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

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

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

8G11 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in vehicle speed sensor 1 circuit?***

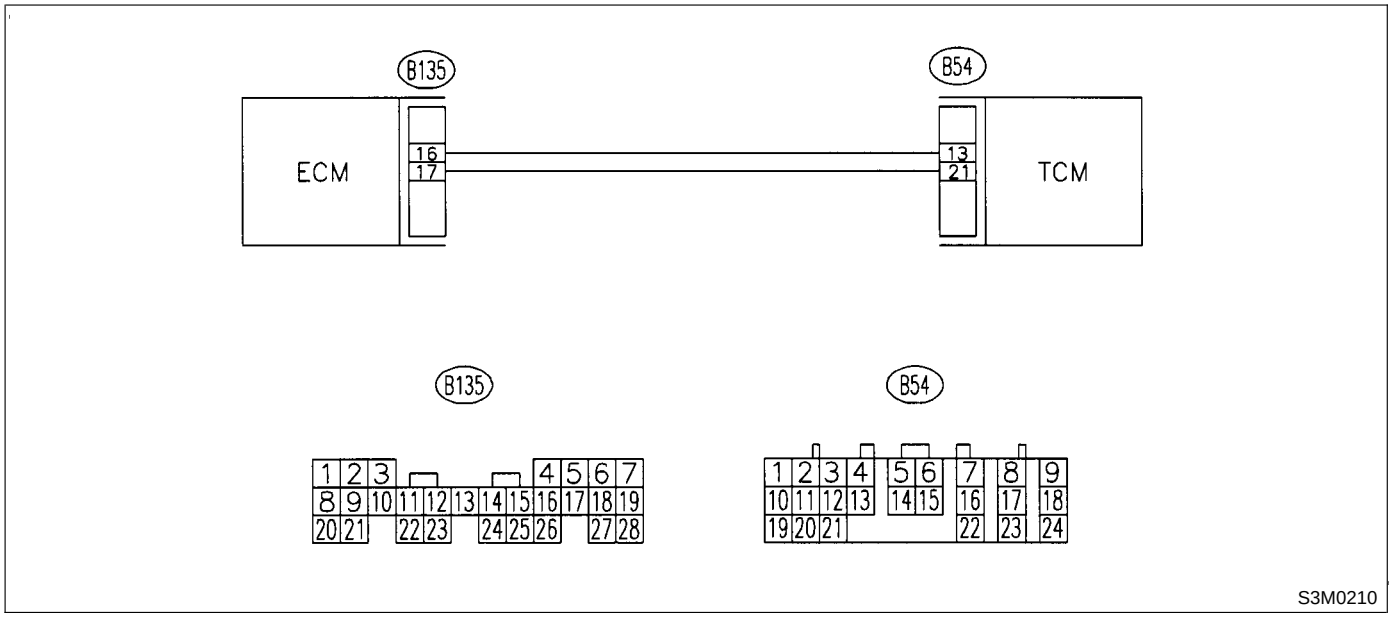
YES : Repair poor contact.

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

MEMO:

H: TROUBLE CODE 38 — TORQUE CONTROL SIGNAL —

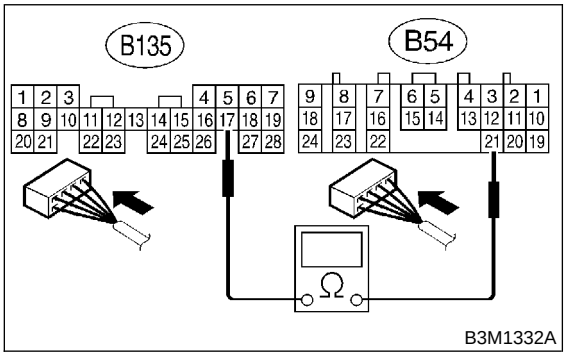
DIAGNOSIS:
● The signal circuit is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



8H1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

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

Connector & terminal
(B54) No. 21 — (B135) No. 17:

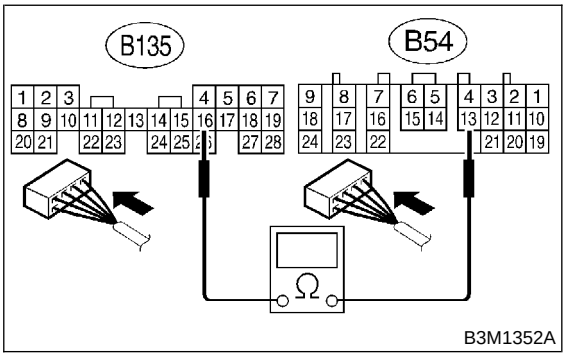


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8H2**.
NO : Repair open circuit in harness between TCM and ECM connector.

8H2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM and ECM connector.

Connector & terminal
(B54) No. 13 — (B135) No. 16:

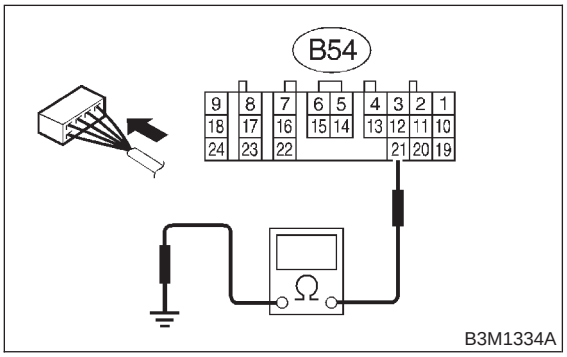


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8H3**.
NO : Repair open circuit in harness between TCM and ECM connector.

8H3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B54) No. 21 — Chassis ground:

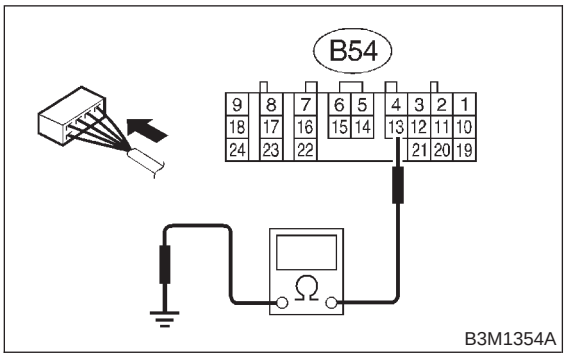


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8H4**.
NO : Repair short circuit in harness between TCM and ECM connector.

8H4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B54) No. 13 — Chassis ground:

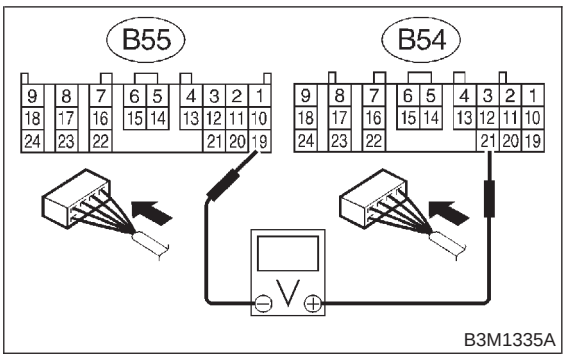


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8H5**.
NO : Repair short circuit in harness between TCM and ECM connector.

8H5 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) 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:

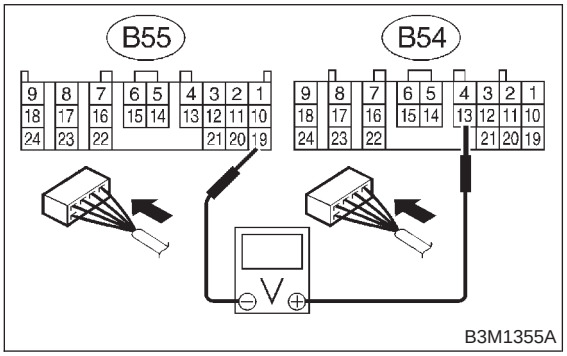


CHECK : ***Is the voltage more than 9 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8H6**.

8H6 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 13 (+) — (B55) No. 19 (–):



CHECK : ***Is the voltage more than 9 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8H7**.

8H7 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in torque control signal circuit?***
YES : Repair poor contact.
NO : Go to step **8H8**.

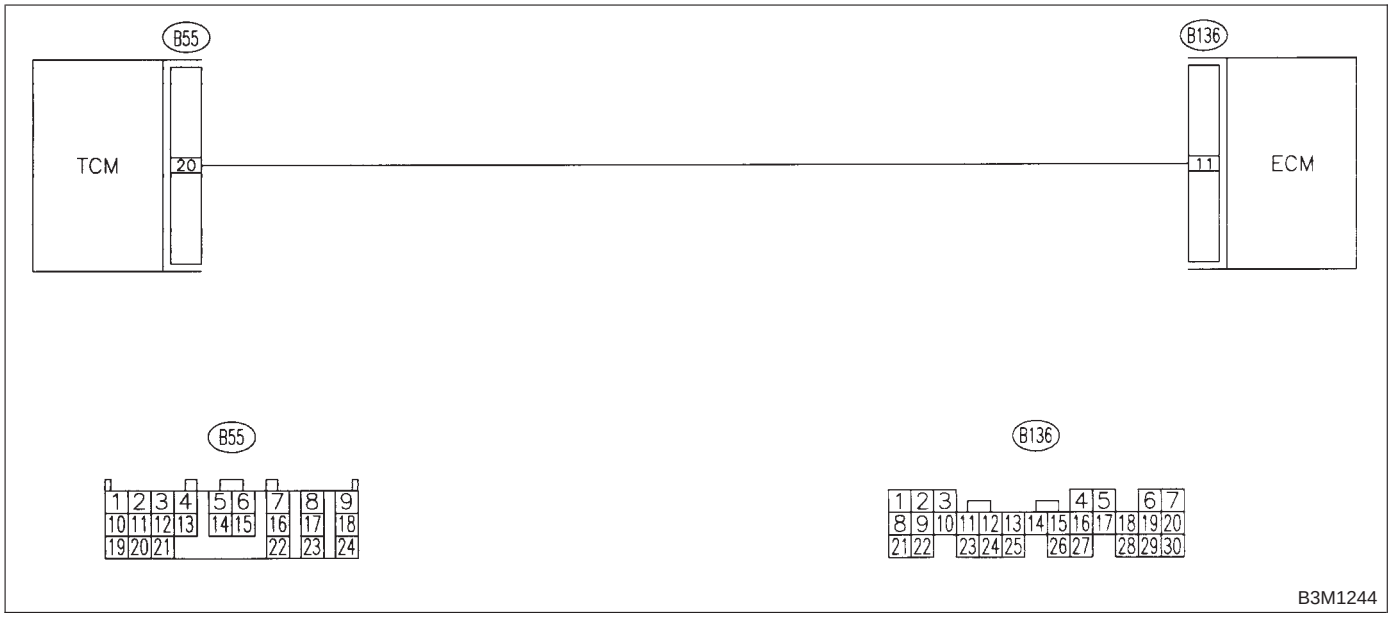
8H8 : CONFIRM TROUBLE CODE 38.

CHECK : ***Replace ECM with a new one. Does the trouble code appear again, after the memory has been cleared?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Replace ECM. <Ref. to 2-7 [W19A0].>

MEMO:

I: TROUBLE CODE 45 — INTAKE MANIFOLD PRESSURE SIGNAL —

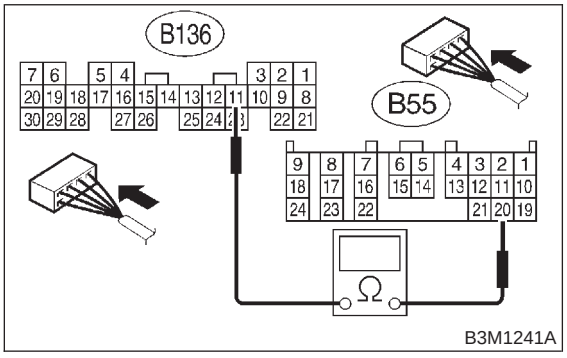
DIAGNOSIS:
Input signal circuit of TCM from ECM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



8I1 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

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

Connector & terminal
(B55) No. 20 — (B136) No. 11:

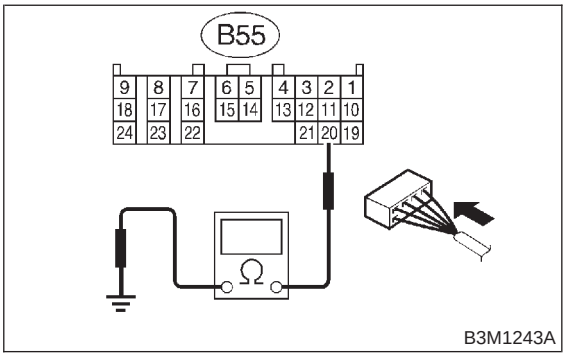


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8I2**.
NO : Repair open circuit in harness between TCM and ECM connector.

8I2 : CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.

Measure resistance of harness between TCM connector and chassis ground.

Connector & terminal
(B55) No. 20 — Chassis ground:



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

8I3 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8I5**.
NO : Go to step **8I4**.

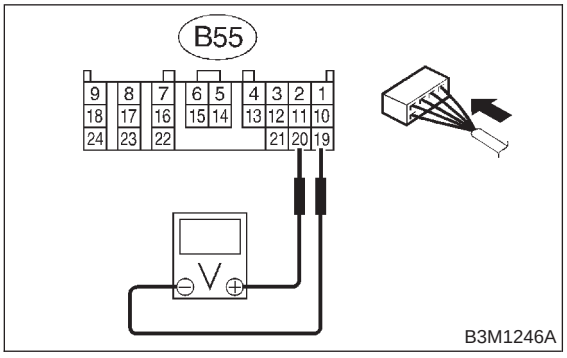
8I4 : CHECK INPUT SIGNAL FOR TCM.

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.

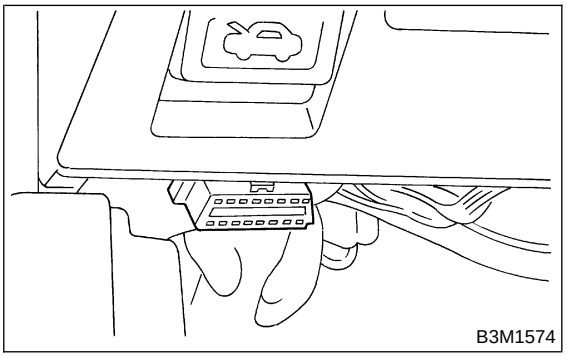
Connector & terminal
(B55) No. 20 (+) — No. 19 (−):



CHECK : ***Is the voltage between 1.2 and 1.8 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8I6**.

8I5 : 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.

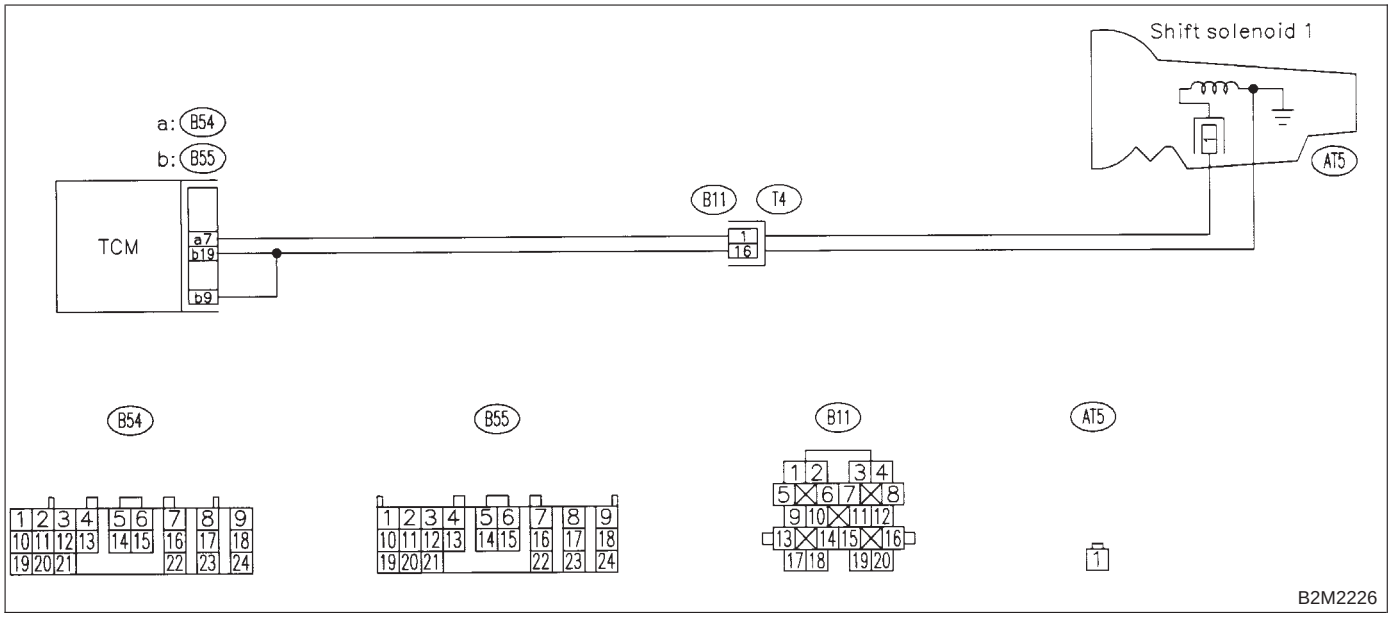
CHECK : ***Is the value between 1.2 and 1.8 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.
NO : Go to step **8I6**.

8I6 : CHECK POOR CONTACT.

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

J: TROUBLE CODE 71 — SHIFT SOLENOID 1 —

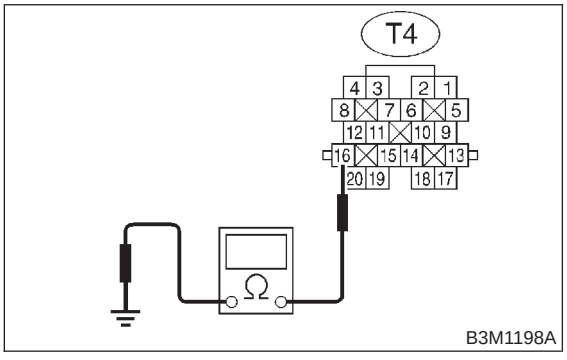
DIAGNOSIS:
Output signal circuit of shift solenoid 1 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



8J1 : CHECK SHIFT SOLENOID 1 GROUND LINE.

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

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

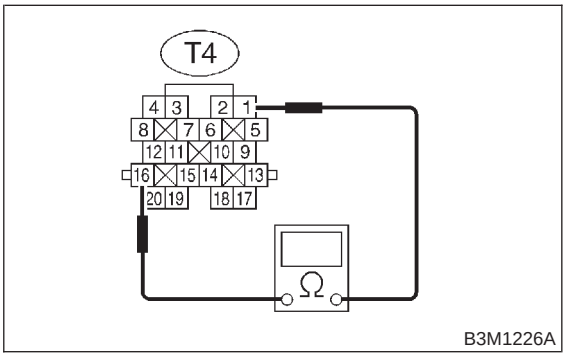


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8J2**.
NO : Repair open circuit in transmission harness.

8J2 : CHECK SHIFT SOLENOID 1.

Measure resistance between transmission connector terminals.

Connector & terminal
(T4) No. 1 — No. 16:

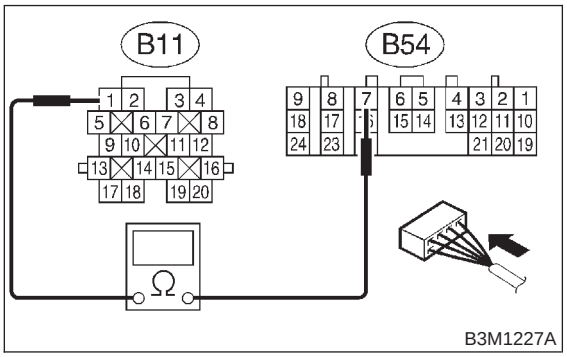


CHECK : ***Is the resistance between 10 and 16 Ω?***
YES : Go to step **8J3**.
NO : Go to step **8J9**.

8J3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and shift solenoid 1 connector.

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

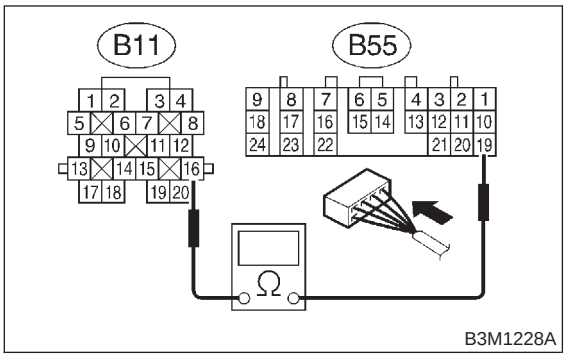


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8J4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8J4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

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

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

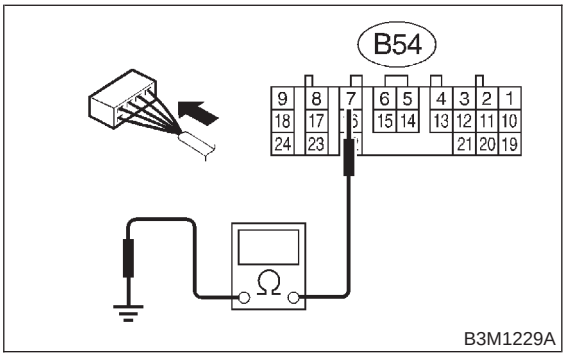


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8J5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8J5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

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

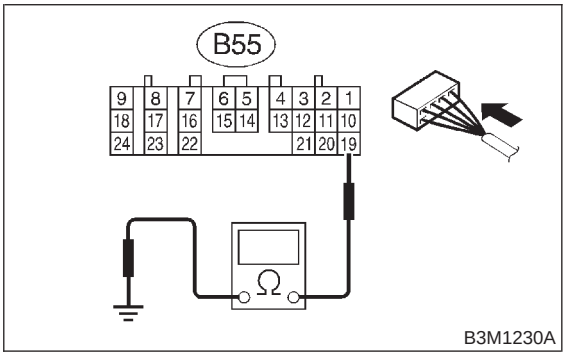


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8J6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8J6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness TCM connector and transmission ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8J7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8J7 : 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).

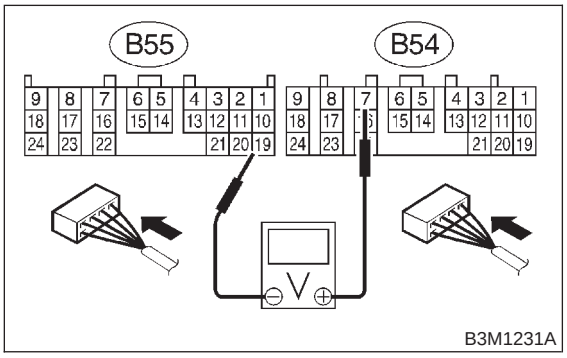
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

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 4-4 [T6D2].>

5) Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 7 (+) — (B55) No. 19 (−):



CHECK : ***Is the voltage 1 V → 9 V?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM.
NO : Go to step **8J8**.

8J8 : CHECK POOR CONTACT.

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

8J9 : CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).

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

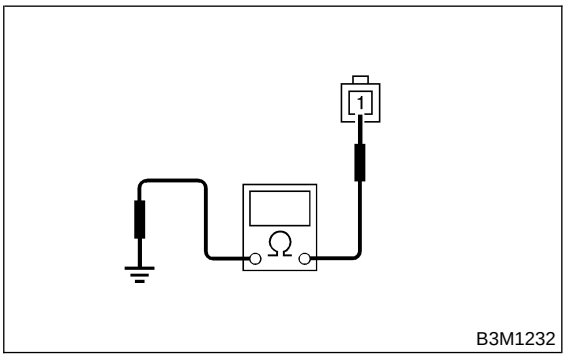
CAUTION:
On AWD models, raise all wheels off ground.

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:

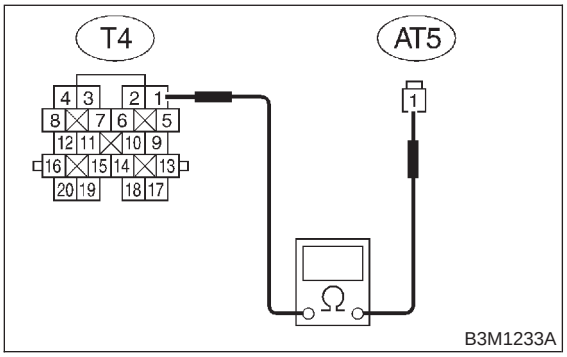


CHECK : ***Is the resistance between 10 and 16 Ω?***
YES : Go to step **8J10**.
NO : Replace shift solenoid 1. <Ref. to 3-2 [W4A0].>

8J10 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.

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

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

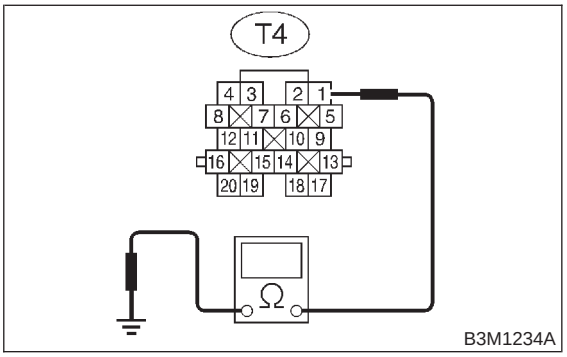


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8J11**.
NO : Repair open circuit in harness between TCM and transmission connector.

8J11 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.

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

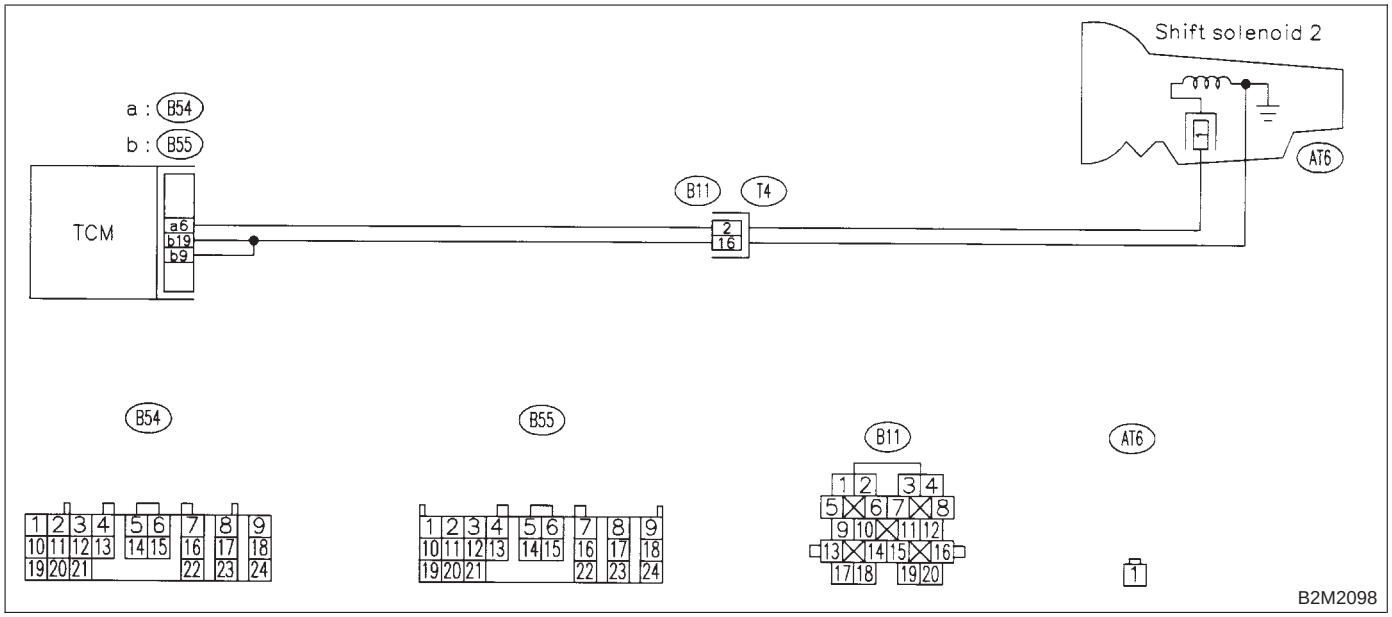
Connector & terminal
(T4) No. 1 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 1 and transmission.
NO : Repair short circuit harness between TCM and transmission connector.

K: TROUBLE CODE 72 — SHIFT SOLENOID 2 —

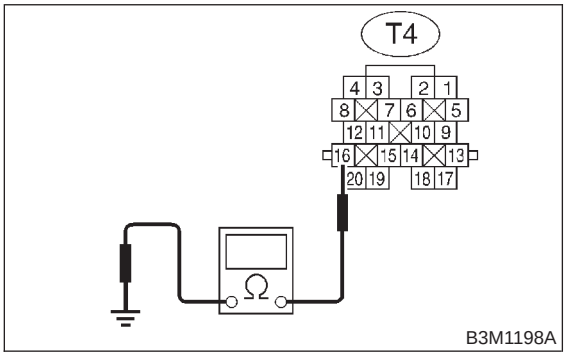
DIAGNOSIS:
Output signal circuit of shift solenoid 2 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



8K1 : CHECK SHIFT SOLENOID 2 GROUND LINE.

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

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

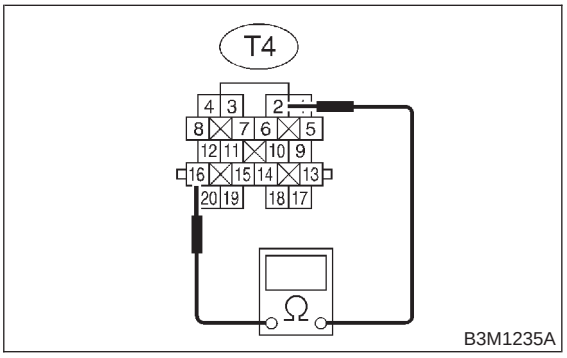


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8K2**.
NO : Repair open circuit in transmission harness.

8K2 : CHECK SHIFT SOLENOID 2.

Measure resistance between transmission connector terminals.

Connector & terminal
(T4) No. 2 — No. 16:

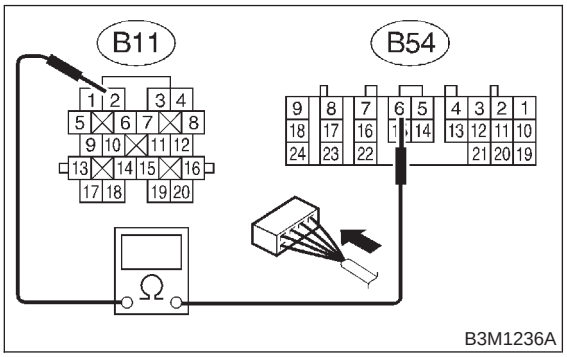


CHECK : ***Is the resistance between 10 and 16 Ω?***
YES : Go to step **8K3**.
NO : Go to step **8K9**.

8K3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

1) Disconnect connector from TCM.
2) Measure resistance of harness between TCM and shift solenoid 2 connector.

Connector & terminal
(B54) No. 6 — (B11) No. 2:

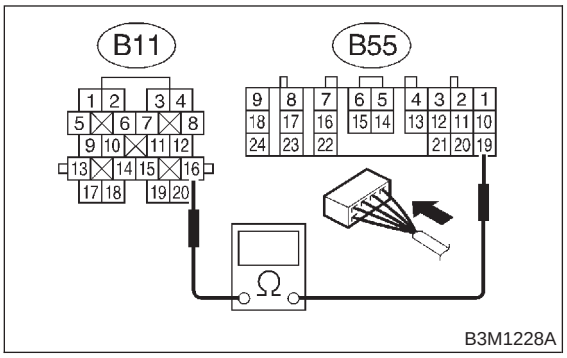


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8K4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8K4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

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

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

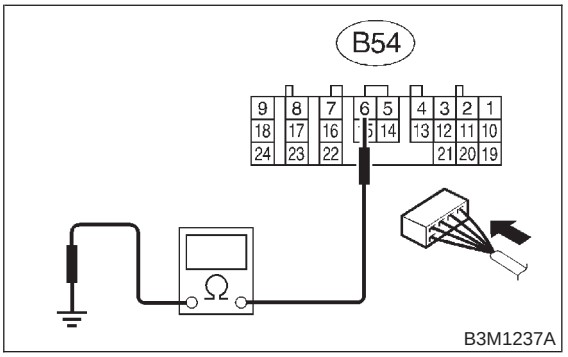


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8K5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8K5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B54) No. 6 — Chassis ground:

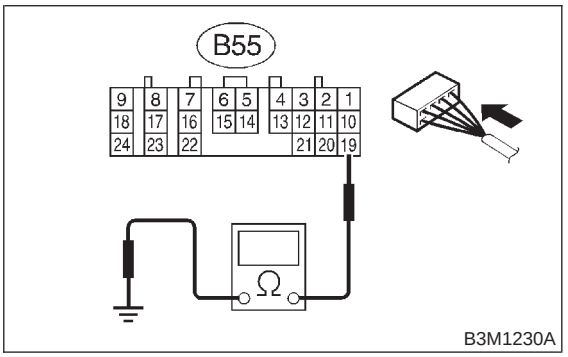


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8K6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8K6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8K7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8K7 : 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).

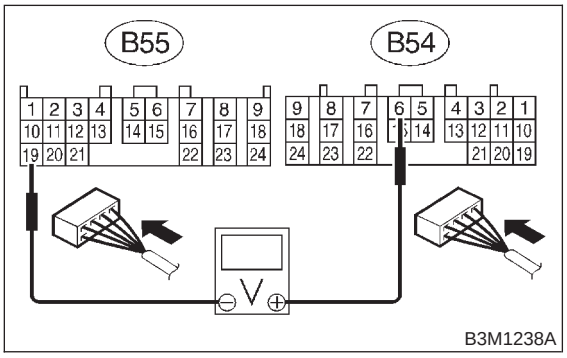
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

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 4-4 [T6D2].>

5) Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 6 (+) — (B55) No. 19:



CHECK : ***Is the voltage 9 V → 1 V?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Go to step **8K8**.

8K8 : CHECK POOR CONTACT.

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

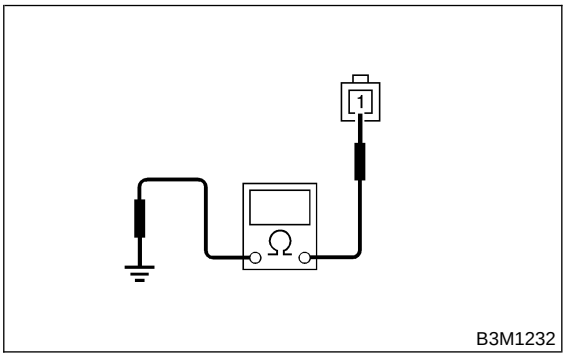
8K9 : CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).

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:

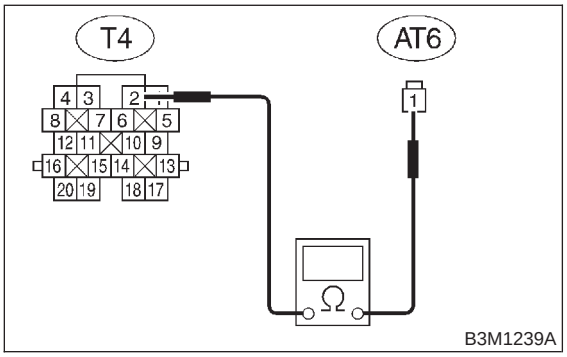


CHECK : ***Is the resistance between 10 and 16 Ω?***
YES : Go to step **8K10**.
NO : Replace shift solenoid assembly. <Ref. to 3-2 [W4A0].>

8K10 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.

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

Connector & terminal
(AT6) No. 1 — (T4) No. 2:

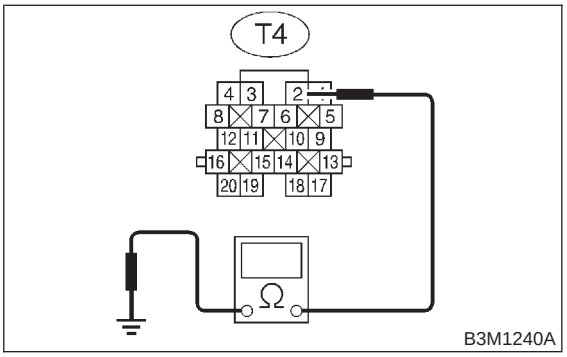


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8K11**.
NO : Repair open circuit in harness between shift solenoid 2 and transmission connector.

8K11 : CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.

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

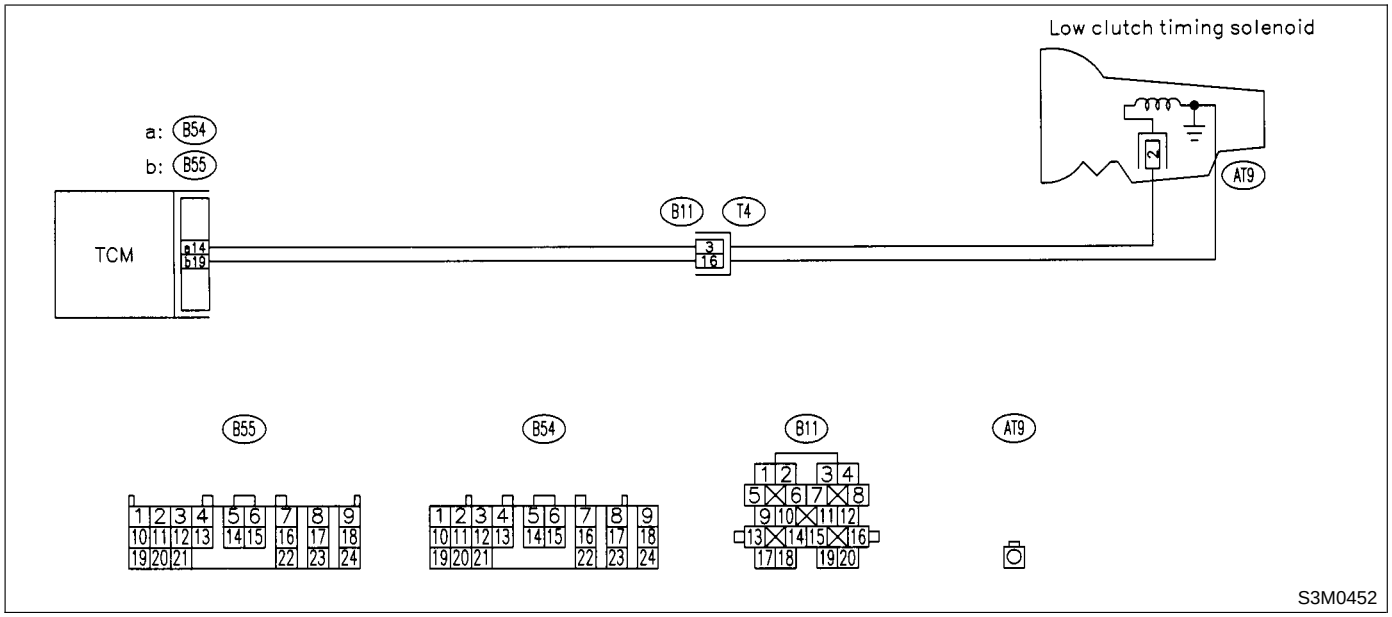
Connector & terminal
(T4) No. 2 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Repair short circuit harness between TCM and transmission connector.

L: TROUBLE CODE 73 — LOW CLUTCH TIMING SOLENOID —

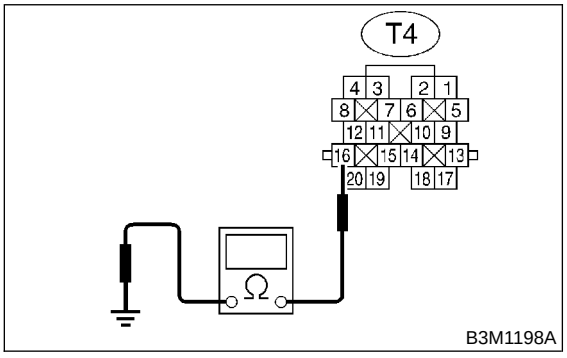
DIAGNOSIS:
Output signal circuit of low clutch timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



8L1 : CHECK LOW CLUTCH TIMING SOLENOID GROUND LINE.

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

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

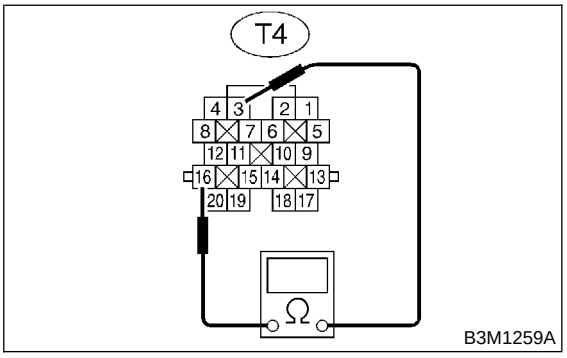


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8L2**.
NO : Repair open circuit in transmission harness.

8L2 : CHECK LOW CLUTCH TIMING SOLENOID.

Measure resistance between transmission connector terminals.

Connector & terminal
(T4) No. 3 — No. 16:

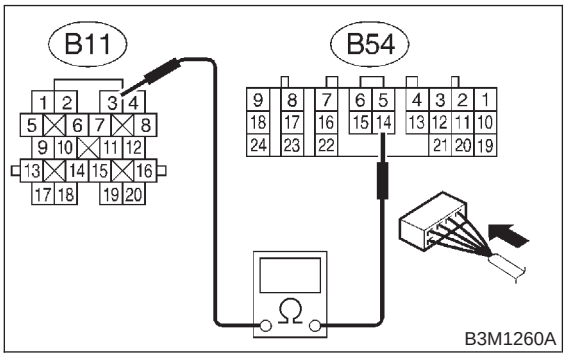


CHECK : ***Is the resistance between 10 and 16 Ω?***
YES : Go to step **8L3**.
NO : Go to step **8L10**.

8L3 : 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:

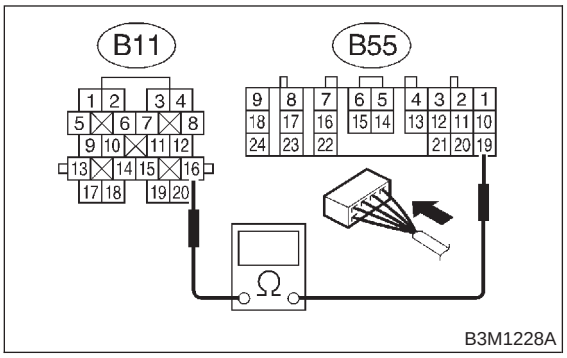


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8L4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8L4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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

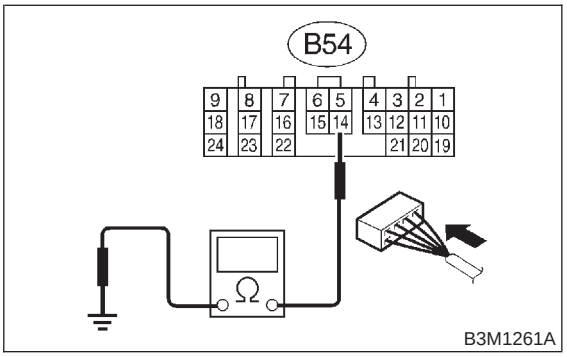


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8L5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8L5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B54) No. 14 — Chassis ground:

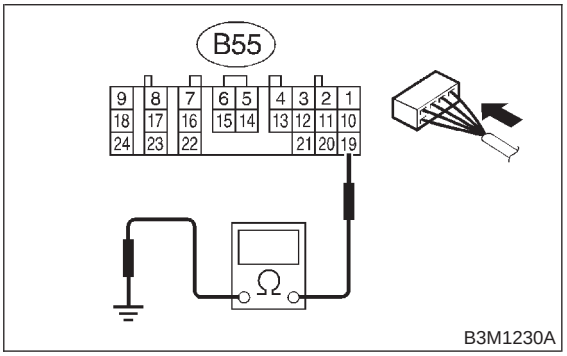


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8L6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8L6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8L7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8L7 : 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).

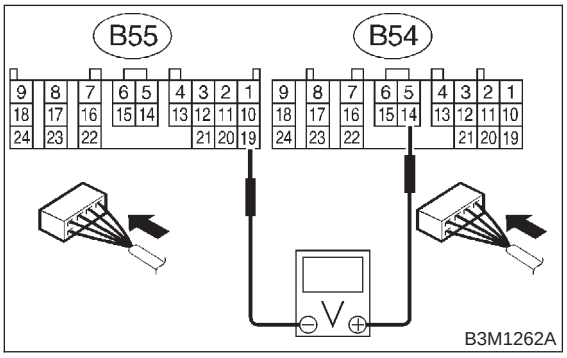
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

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 4-4 [T6D2].>

5) Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 14 (+) — (B55) No. 19 (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8L8**.
NO : Go to step **8L9**.

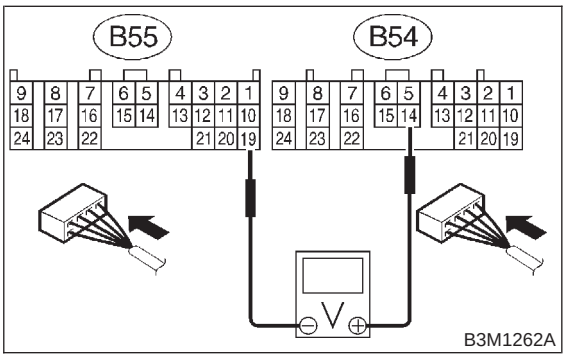
8L8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

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 4-4 [T6D2].>

2) Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 14 (+) — (B55) No. 19 (−):



CHECK : ***Is the voltage more than 9 V?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Go to step **8L9**.

8L9 : CHECK POOR CONTACT.

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

8L10 : 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.

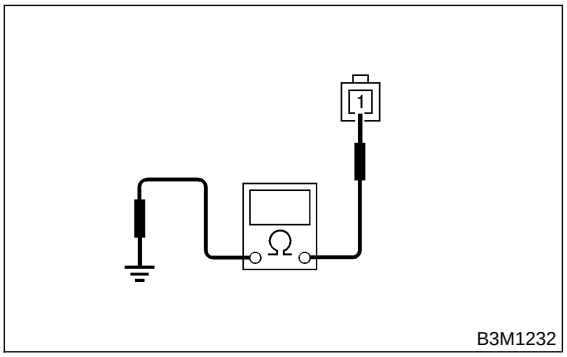
CAUTION:
On AWD models, raise all wheels off ground.

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:

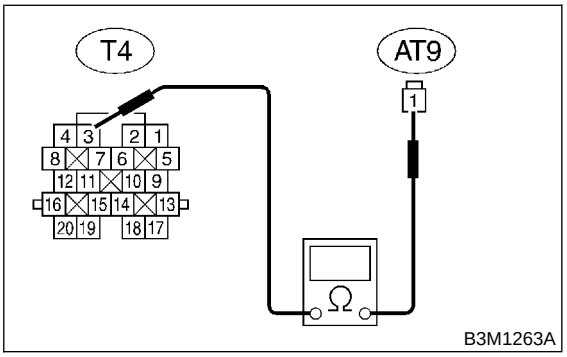


CHECK : ***Is the resistance between 10 and 16 Ω?***
YES : Go to step **8L11**.
NO : Replace low clutch timing solenoid. <Ref. to 3-2 [W4A0].>

8L11 : CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.

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

Connector & terminal
(AT9) No. 1 — (T4) No. 3:

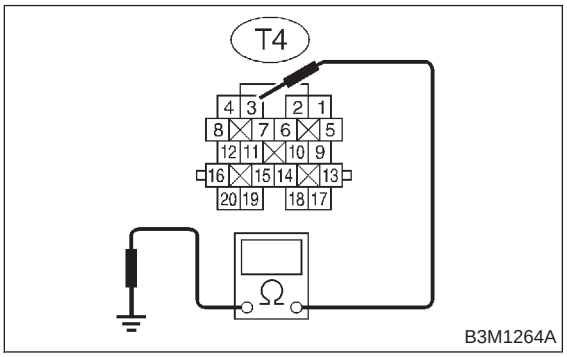


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8L12**.
NO : Repair open circuit in harness between low clutch timing solenoid and transmission connector.

8L12 : CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.

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

Connector & terminal
(T4) No. 3 — Transmission ground:



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

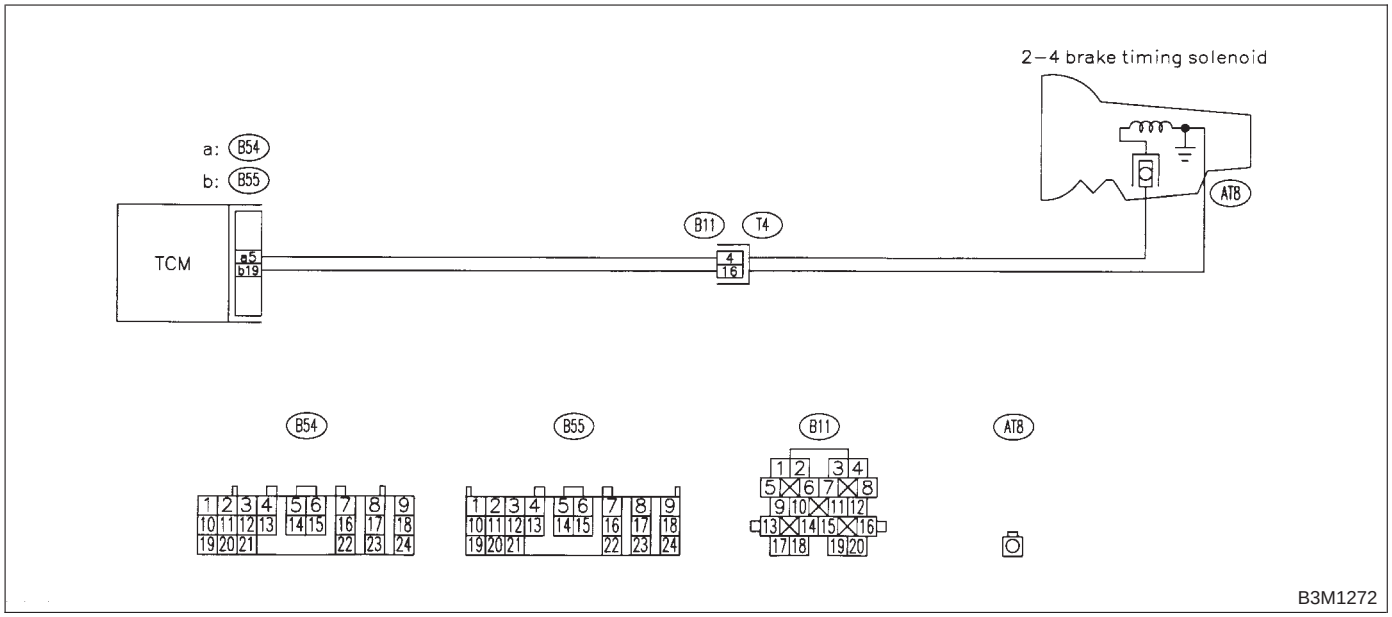
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in low clutch timing solenoid and transmission.

NO : Repair short circuit harness between TCM and transmission connector.

MEMO:

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

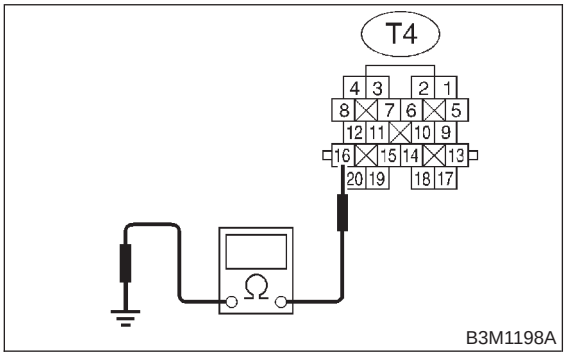
DIAGNOSIS:
Output signal circuit of 2-4 brake timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



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

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

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

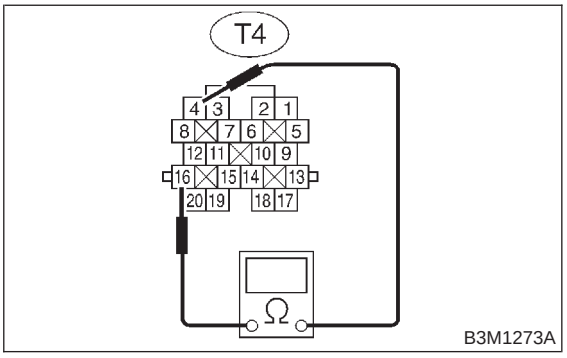


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8M2**.
NO : Repair open circuit in transmission harness.

8M2 : CHECK 2-4 BRAKE TIMING SOLENOID.

Measure resistance between transmission connector terminals.

Connector & terminal
(T4) No. 4 — No. 16:

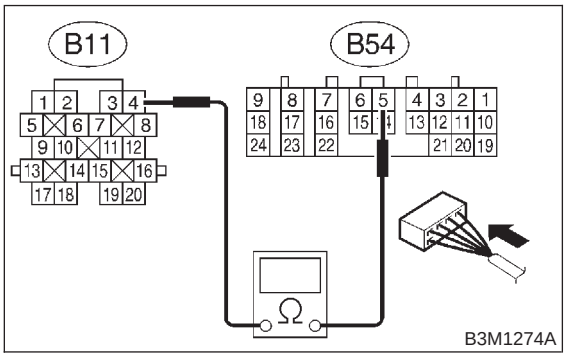


CHECK : ***Is the resistance between 10 and 16 Ω?***
YES : Go to step **8M3**.
NO : Go to step **8M10**.

8M3 : 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. 5 — (B11) No. 4:

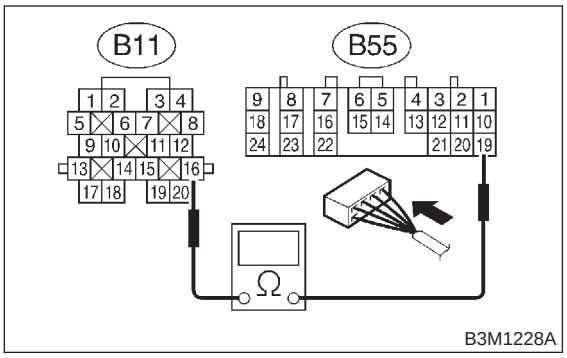


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8M4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8M4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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

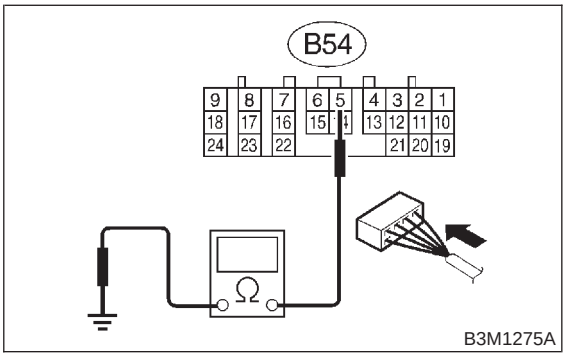


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8M5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8M5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B54) No. 5 — Chassis ground:

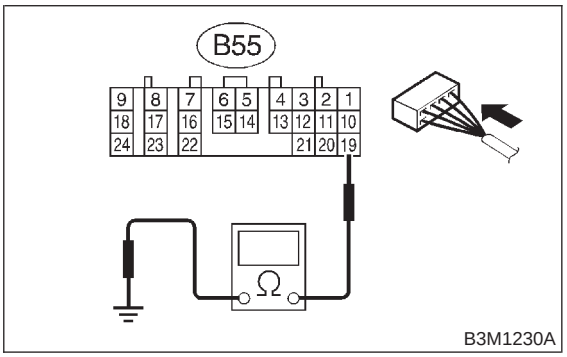


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8M6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8M6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM connector and transmission ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8M7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8M7 : 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).

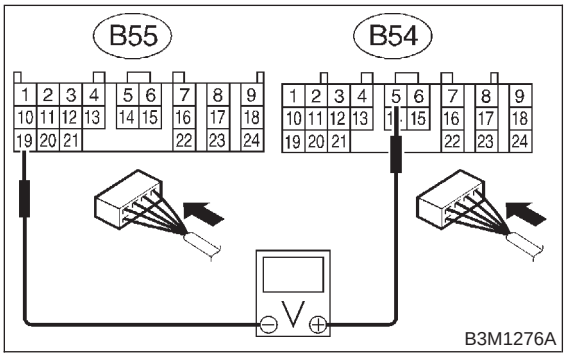
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

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 4-4 [T6D2].>

5) Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 5 (+) — (B55) No. 19 (−):



CHECK : ***Is the voltage less than 1 V?***
YES : Go to step **8M8**.
NO : Go to step **8M9**.

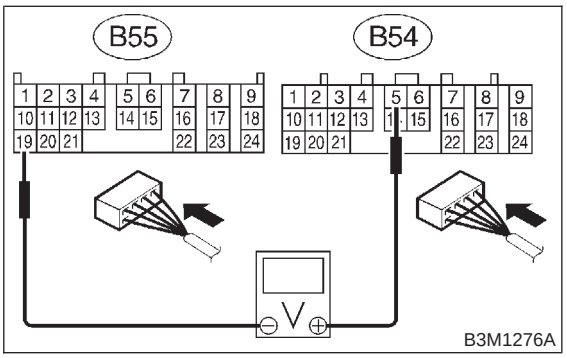
8M8 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

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 4-4 [T6D2].>

2) Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 5 (+) — (B55) No. 19 (−):



CHECK : ***Is the voltage more than 9 V?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.
NO : Go to step **8M9**.

8M9 : CHECK POOR CONTACT.

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

8M10 : 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.

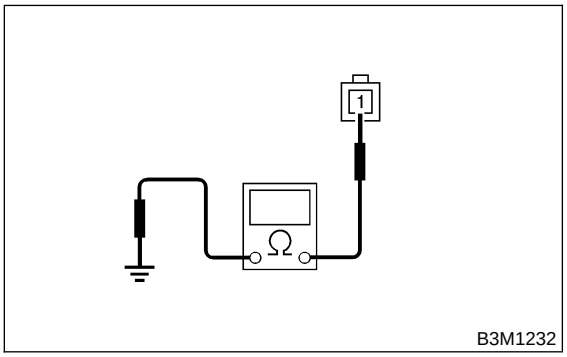
CAUTION:
On AWD models, raise all wheels off ground.

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:

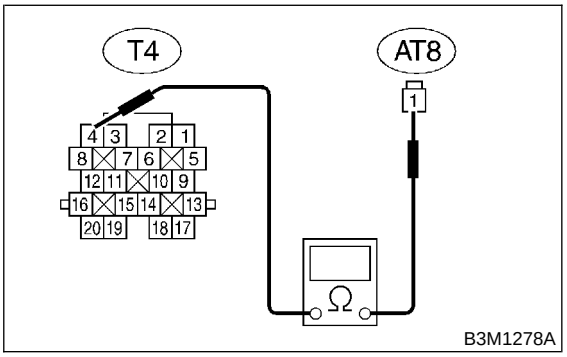


CHECK : ***Is the resistance between 10 and 16 Ω?***
YES : Go to step **8M11**.
NO : Replace 2-4 brake timing solenoid. <Ref. to 3-2 [W4A0].>

8M11 : CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.

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

Connector & terminal
(AT8) No. 1 — (T4) No. 4:

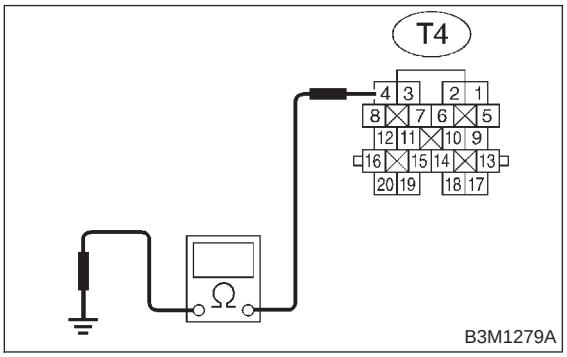


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8M12**.
NO : Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.

8M12 : CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.

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

Connector & terminal
(T4) No. 4 — Transmission ground:



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

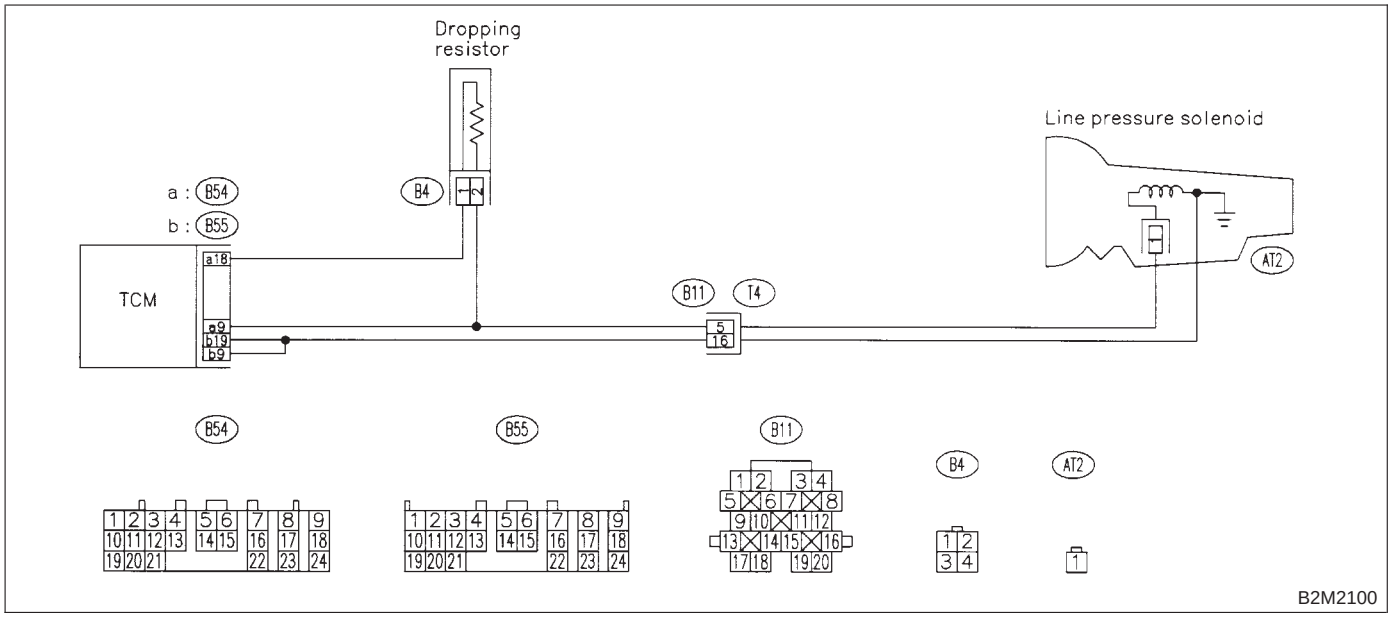
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 2-4 brake timing solenoid and transmission.

NO : Repair short circuit harness between TCM and transmission connector.

MEMO:

N: TROUBLE CODE 75 — LINE PRESSURE DUTY SOLENOID —

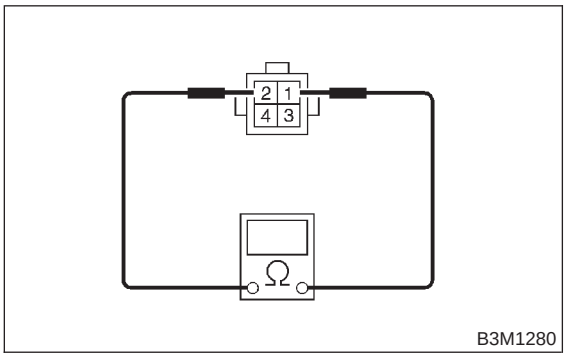
DIAGNOSIS:
Output signal circuit of line pressure duty solenoid or resistor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



8N1 : CHECK RESISTOR.

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

Terminals
No. 1 — No. 2:

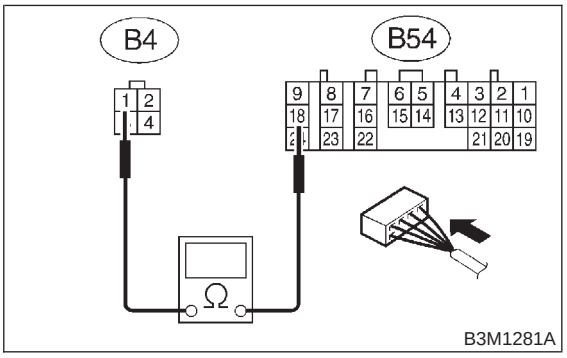


CHECK : ***Is the resistance between 9 and 15 Ω?***
YES : Go to step **8N2**.
NO : Replace dropping resistor. <Ref. to 3-2 [W24A0].>

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

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:

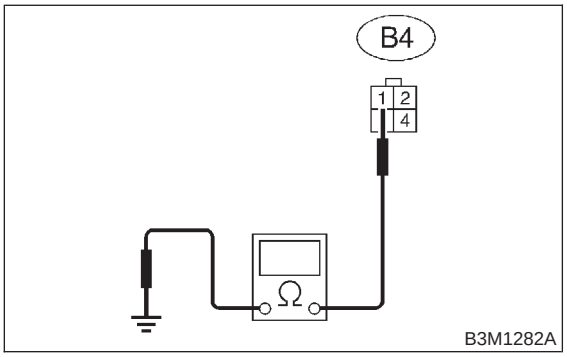


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8N3**.
NO : Repair open circuit in harness between TCM and dropping resistor connector.

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

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

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

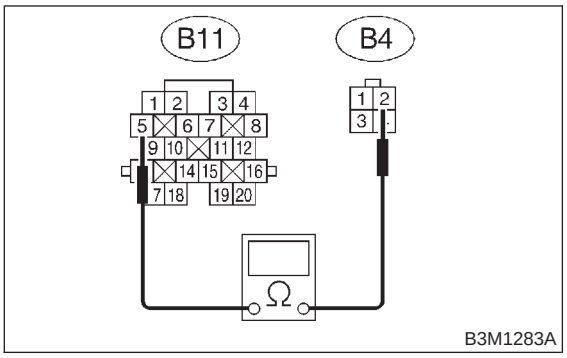


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8N4**.
NO : Repair short circuit in harness between TCM and dropping resistor connector.

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

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

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

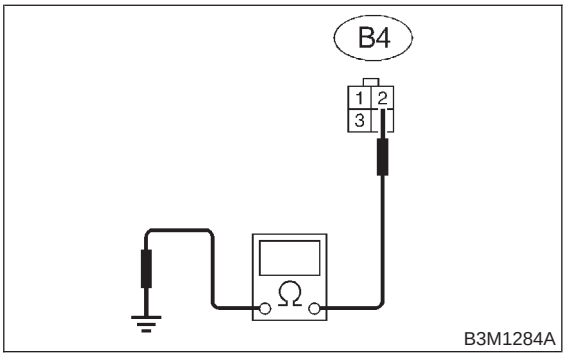


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8N5**.
NO : Repair open circuit in harness between dropping resistor and transmission connector.

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

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

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

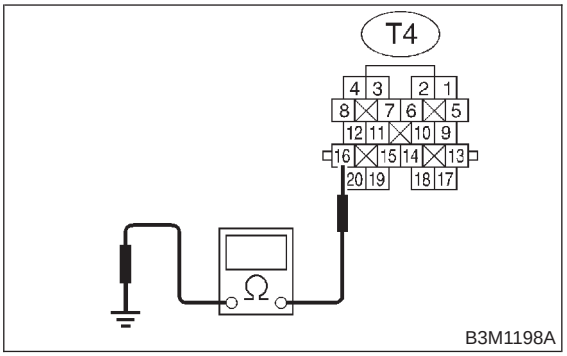


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8N6**.
NO : Repair short circuit in harness between dropping resistor and transmission connector.

8N6 : CHECK LINE PRESSURE DUTY SOLENOID GROUND LINE.

Measure resistance between transmission connector and transmission ground.

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

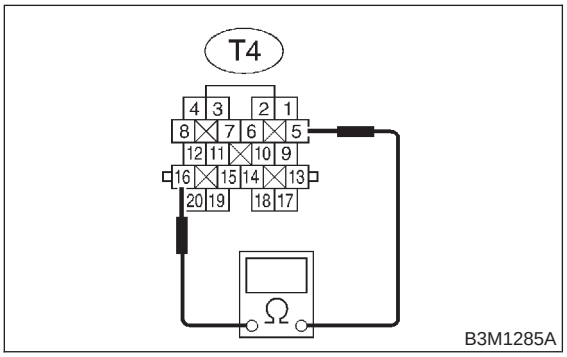


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8N7**.
NO : Repair open circuit in transmission harness.

8N7 : CHECK LINE PRESSURE DUTY SOLENOID.

Measure resistance between transmission connector receptacle's terminals.

Terminal
(T4) No. 5 — No. 16:

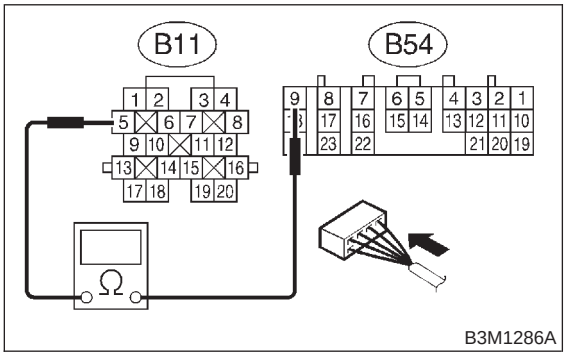


CHECK : ***Is the resistance between 2.0 and 4.5 Ω?***
YES : Go to step **8N8**.
NO : Go to step **8N20**.

8N8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B54) No. 9 — (B11) No. 5:

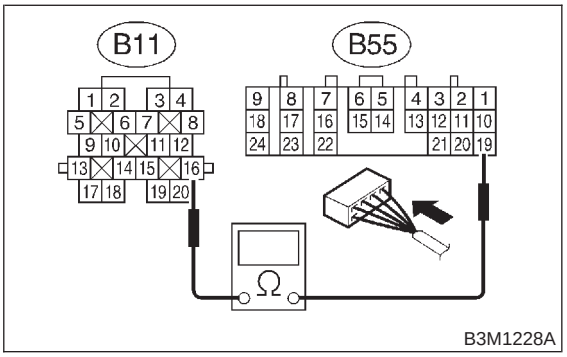


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8N9**.
NO : Repair open circuit in harness between TCM and transmission connector.

8N9 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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

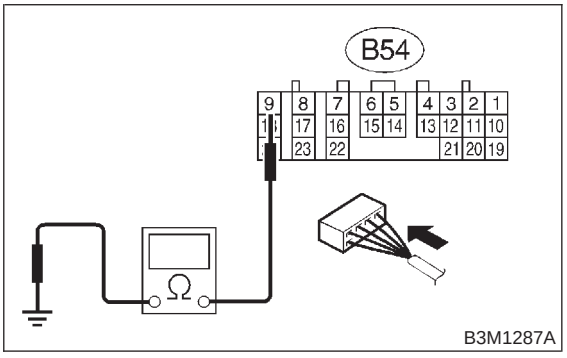


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8N10**.
NO : Repair open circuit in harness between TCM and transmission connector.

8N10 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 9 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8N11**.
NO : Repair short circuit in harness between TCM and transmission connector.

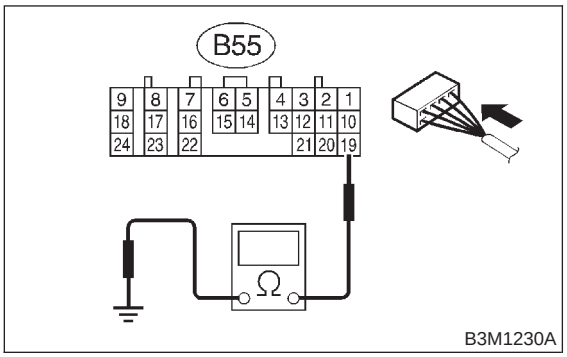
8N11 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8N17**.
NO : Go to step **8N12**.

8N12 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8N13**.
NO : Repair short circuit harness between TCM and transmission connector.

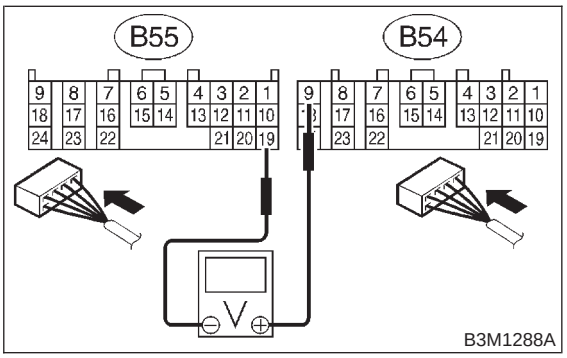
8N13 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

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 terminal.

Connector & terminal
(B54) No. 9 (+) — (B55) No. 19 (−):

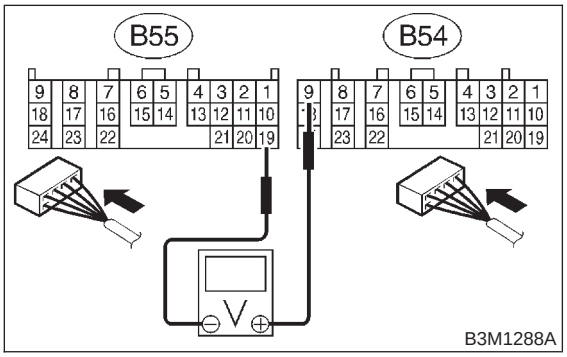


CHECK : ***Is the voltage between 1.5 and 4.0 V with throttle fully closed?***
YES : Go to step **8N14**.
NO : Go to step **8N19**.

8N14 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 9 (+) — (B55) No. 19 (−):



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

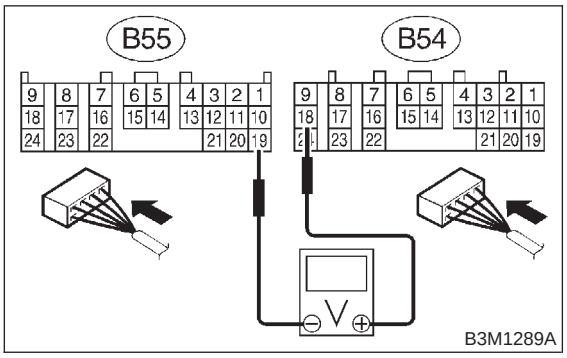
YES : Go to step **8N15**.

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

8N15 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 18 (+) — (B55) No. 19 (−):



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

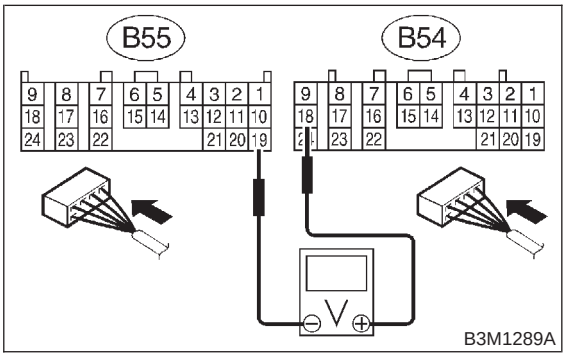
YES : Go to step **8N16**.

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

8N16 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 18 (+) — (B55) No. 19:



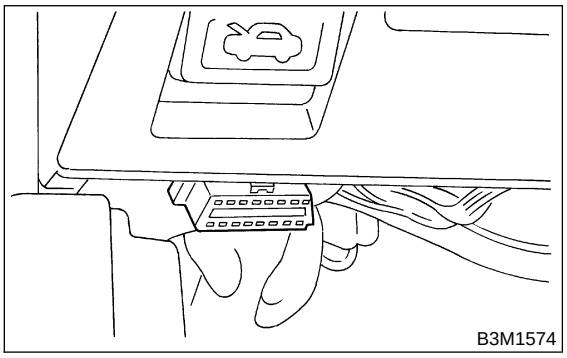
CHECK : ***Is the voltage less than 1 V with throttle fully open?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.

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

8N17 : 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 solenoid is indicated in "%".
8) Throttle is fully closed.

CHECK : ***Is the value 100%?***
YES : Go to step **8N18**.
NO : Go to step **8N19**.

8N18 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

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

CHECK : ***Is the value between 10 and 20%?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
NO : Go to step **8N19**.

8N19 : CHECK POOR CONTACT.

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

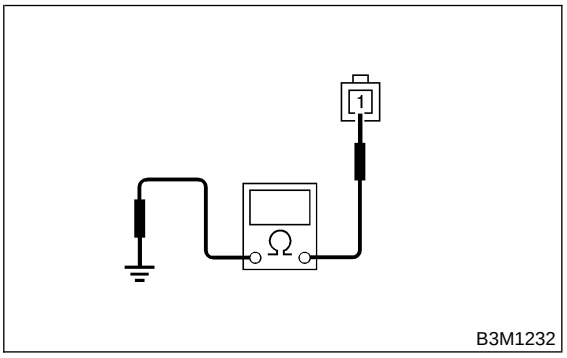
8N20 : CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION).

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:

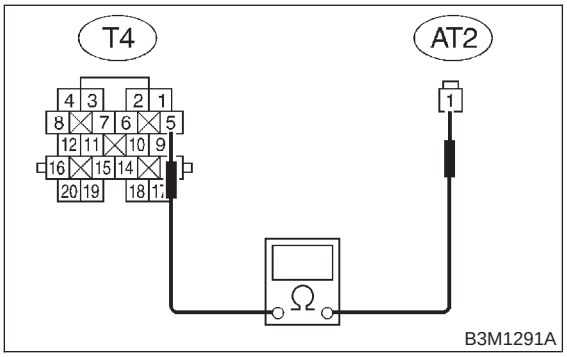


CHECK : ***Is the resistance between 2.0 and 4.5 Ω?***
YES : Go to step **8N21**.
NO : Replace line pressure duty solenoid. <Ref. to 3-2 [W4A0].>

8N21 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.

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

Connector & terminal
(T4) No. 5 — (AT2) No. 1:

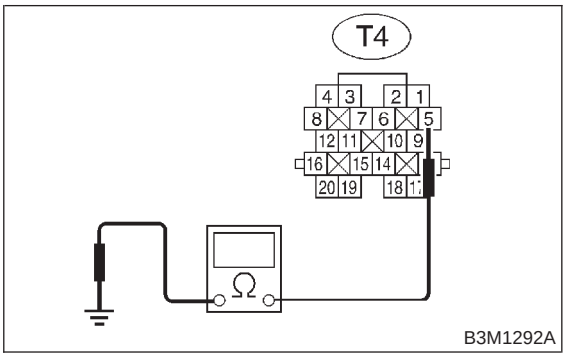


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8N22**.
NO : Repair open circuit in harness between line pressure duty solenoid and transmission connector.

8N22 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 5 — Transmission ground:

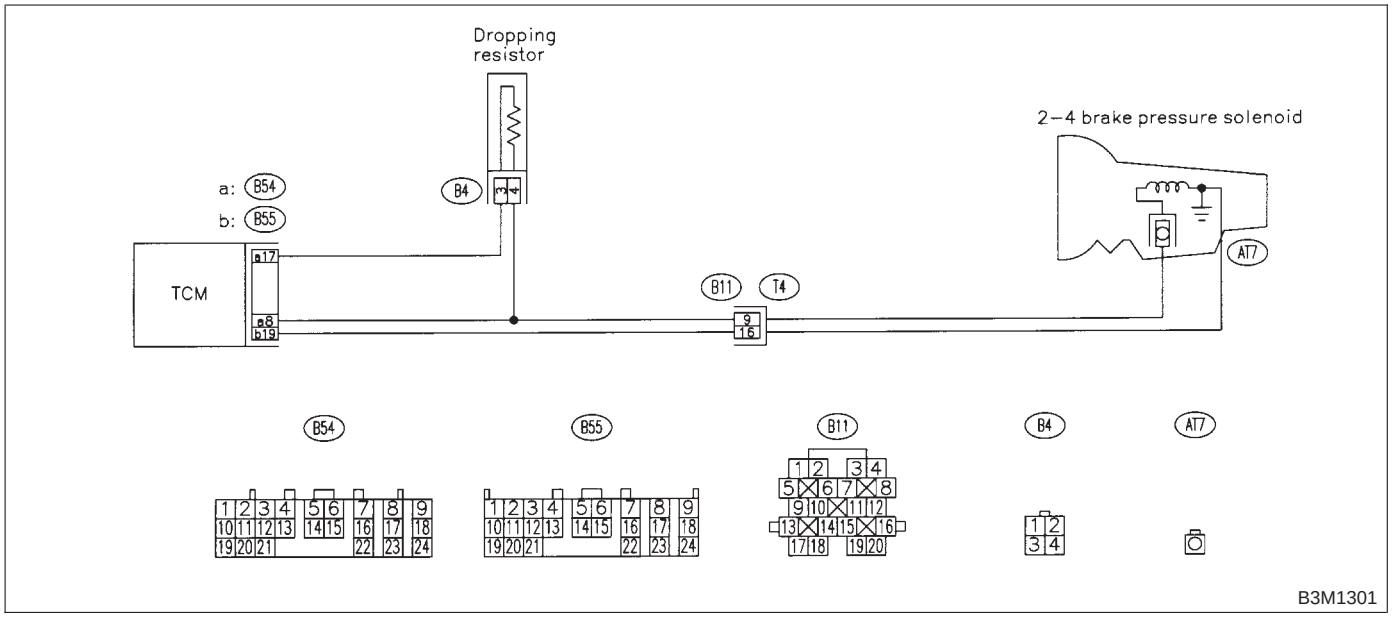


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission connector.
NO : Repair short circuit in harness between line pressure duty solenoid and transmission connector.

MEMO:

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

DIAGNOSIS:
Output signal circuit of 2-4 brake duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:

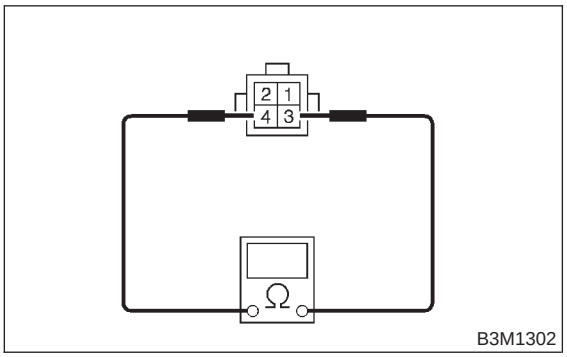


B3M1301

8O1 : CHECK RESISTOR.

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

Terminals
No. 3 — No. 4:

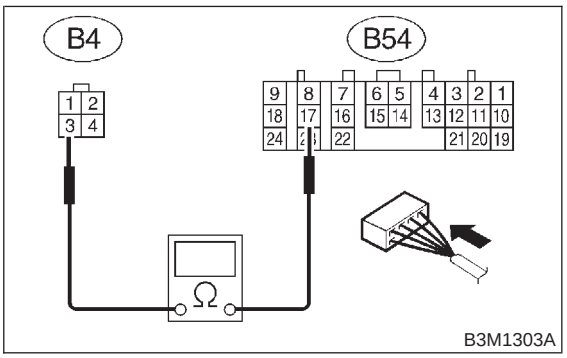

B3M1302

CHECK : ***Is the resistance between 9 and 15 Ω?***
YES : Go to step **8O2**.
NO : Replace dropping resistor. <Ref. to 3-2 [W24A0].>

8O2 : 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. 17 — (B4) No. 3:



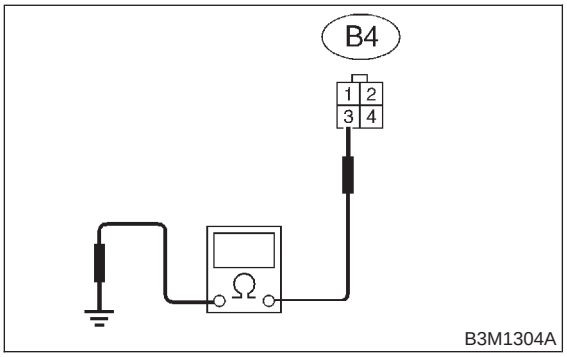
B3M1303A

CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8O3**.
NO : Repair open circuit in harness between TCM and dropping resistor connector.

8O3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR.

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

Connector & terminal
(B4) No. 3 — Chassis ground:

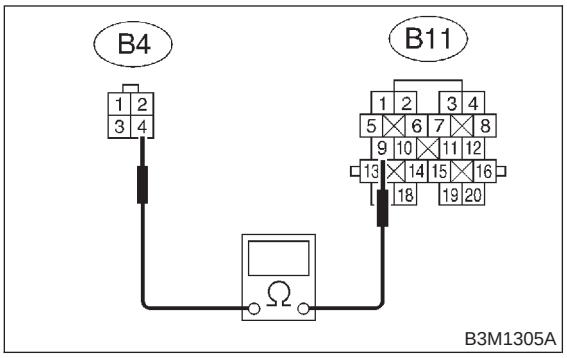


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8O4**.
NO : Repair short circuit in harness between TCM and dropping resistor connector.

8O4 : 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:

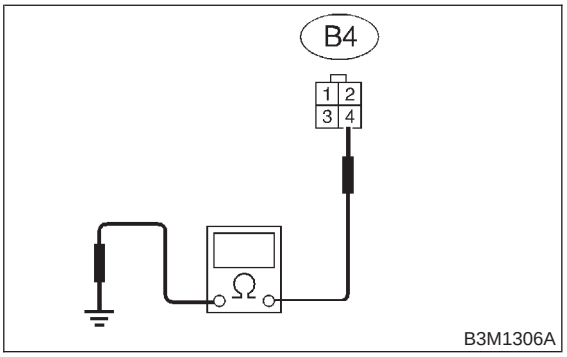


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8O5**.
NO : Repair open circuit in harness between dropping resistor and transmission connector.

8O5 : 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:

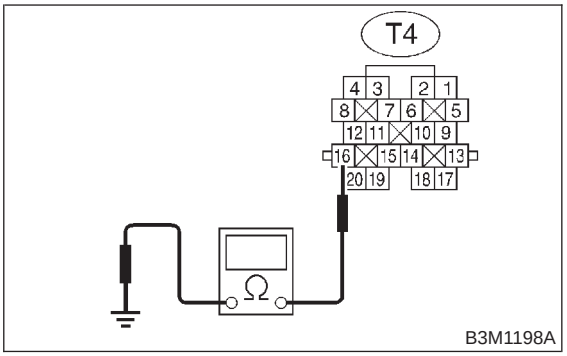


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8O6**.
NO : Repair short circuit in harness between dropping resistor and transmission connector.

8O6 : CHECK 2-4 BRAKE DUTY SOLENOID GROUND LINE.

Measure resistance between transmission connector and transmission ground.

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

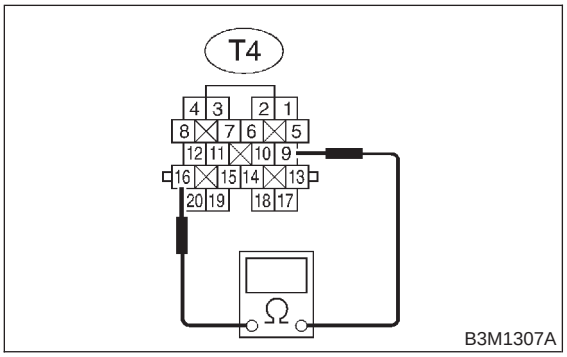


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8O7**.
NO : Repair open circuit in transmission harness.

8O7 : CHECK 2-4 BRAKE DUTY SOLENOID.

Measure resistance between transmission connector receptacle's terminals.

Terminal
(T4) No. 16 — No. 9:

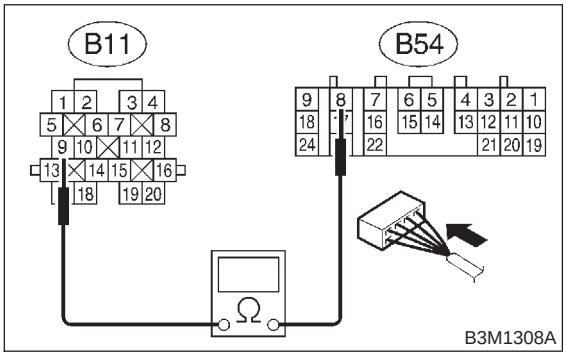


CHECK : ***Is the resistance between 2.0 and 4.5 Ω?***
YES : Go to step **8O8**.
NO : Go to step **8O20**.

8O8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B54) No. 8 — (B11) No. 9:

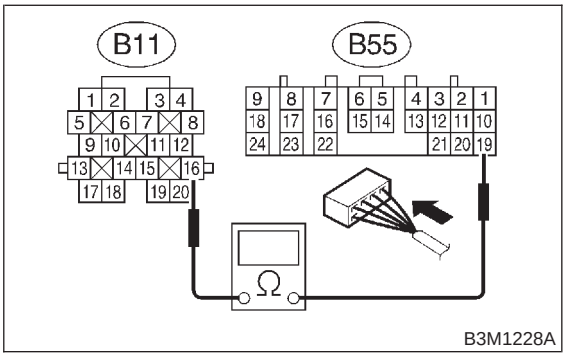


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8O9**.
NO : Repair open circuit in harness between TCM and transmission connector.

8O9 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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

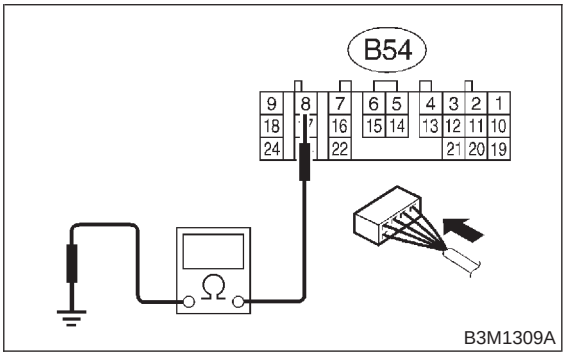


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8O10**.
NO : Repair open circuit in harness between TCM and transmission connector.

8O10 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B54) No. 8 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8O11**.
NO : Repair short circuit in harness between TCM and transmission connector.

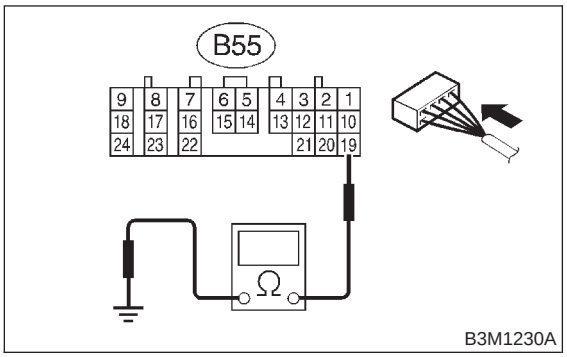
8O11 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8O17**.
NO : Go to step **8O12**.

8O12 : CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.

Measure resistance of harness between TCM and chassis ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8O13**.
NO : Repair short circuit harness between TCM and transmission connector.

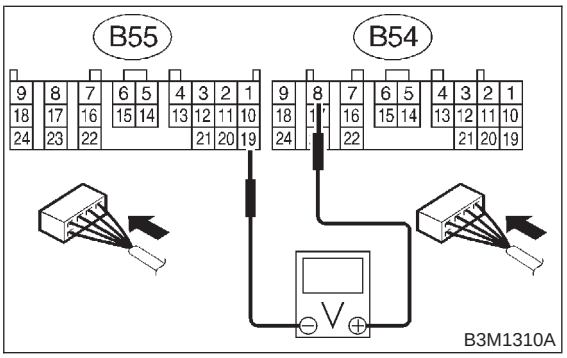
8O13 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

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 terminal.

Connector & terminal
(B54) No. 8 (+) — (B55) No. 19 (−):

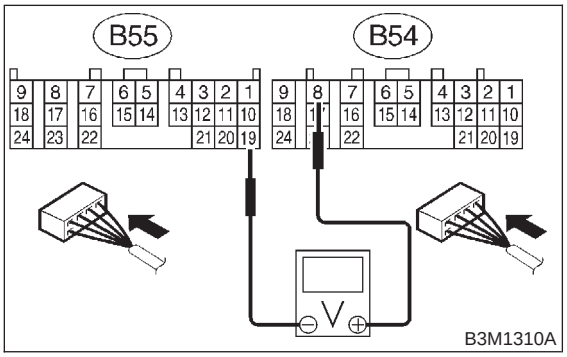


CHECK : ***Is the voltage between 1.5 and 4.0 V with throttle fully closed?***
YES : Go to step **8O14**.
NO : Go to step **8O19**.

8O14 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 8 (+) — (B55) No. 19 (−):



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

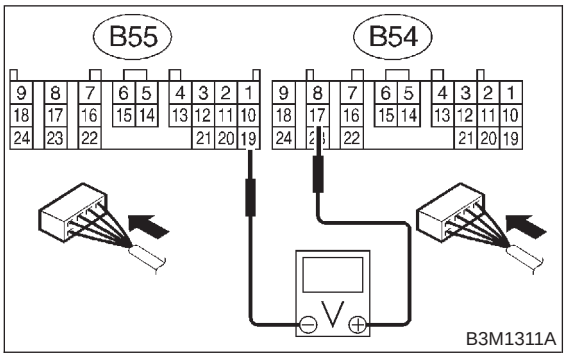
YES : Go to step **8O15**.

NO : Go to step **8O19**.

8O15 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 17 (+) — (B55) No. 19 (−):



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

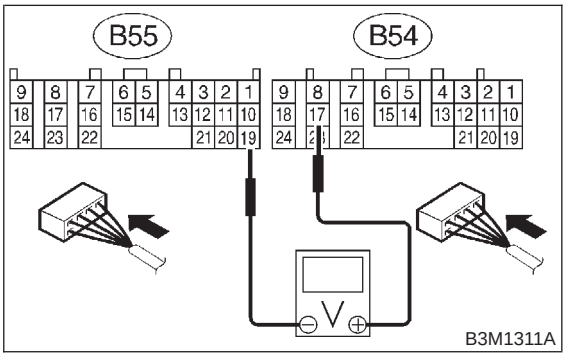
YES : Go to step **8O16**.

NO : Go to step **8O19**.

8O16 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminal.

Connector & terminal
(B54) No. 17 (+) — (B55) No. 19 (−):



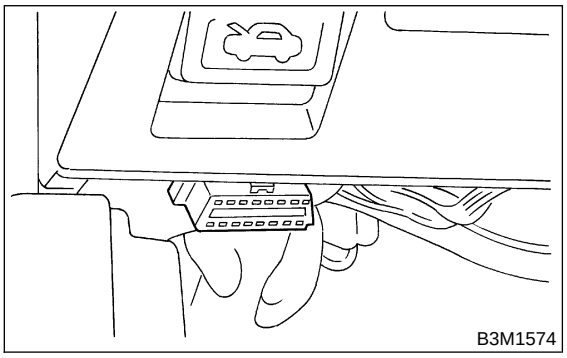
CHECK : ***Is the voltage less than 1 V with throttle fully open?***

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.

NO : Go to step **8O19**.

8O17 : 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.
● 2-4 brake duty solenoid is indicated in "%".
8) Throttle is fully closed.

CHECK : ***Is the value 100%?***
YES : Go to step **8O18**.
NO : Go to step **8O19**.

8O18 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

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

CHECK : ***Is the value between 10 and 20%?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
NO : Go to step **8O19**.

8O19 : CHECK POOR CONTACT.

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

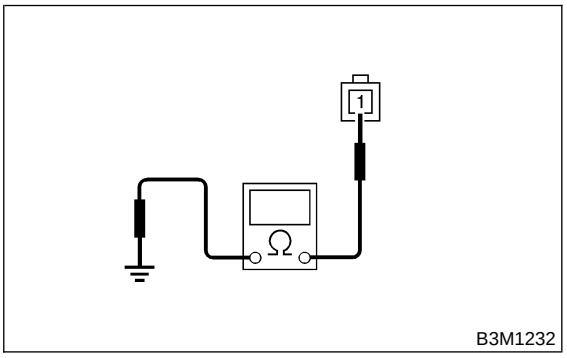
8O20 : CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).

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:

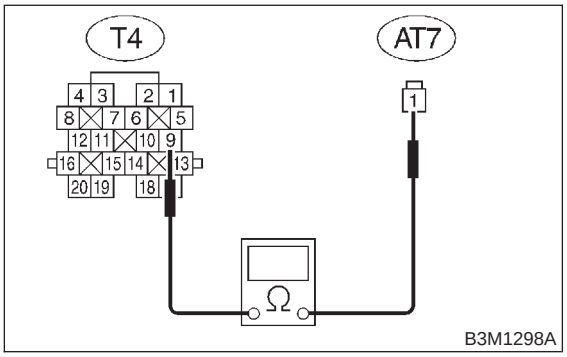


CHECK : ***Is the resistance between 2.0 and 4.5 Ω?***
YES : Go to step **8O21**.
NO : Replace 2-4 brake duty solenoid. <Ref. to 3-2 [W4A0].>

8O21 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.

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

Connector & terminal
(T4) No. 9 — (AT7) No. 1:

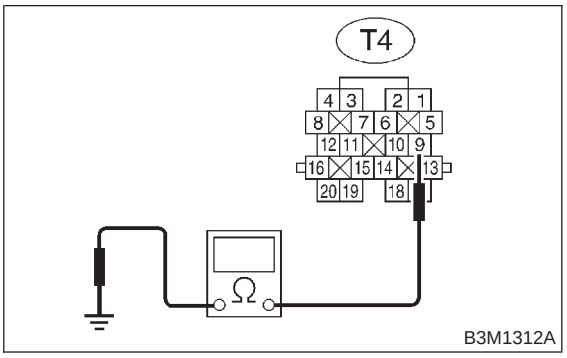


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8O22**.
NO : Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.

8O22 : CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 9 — Transmission ground:

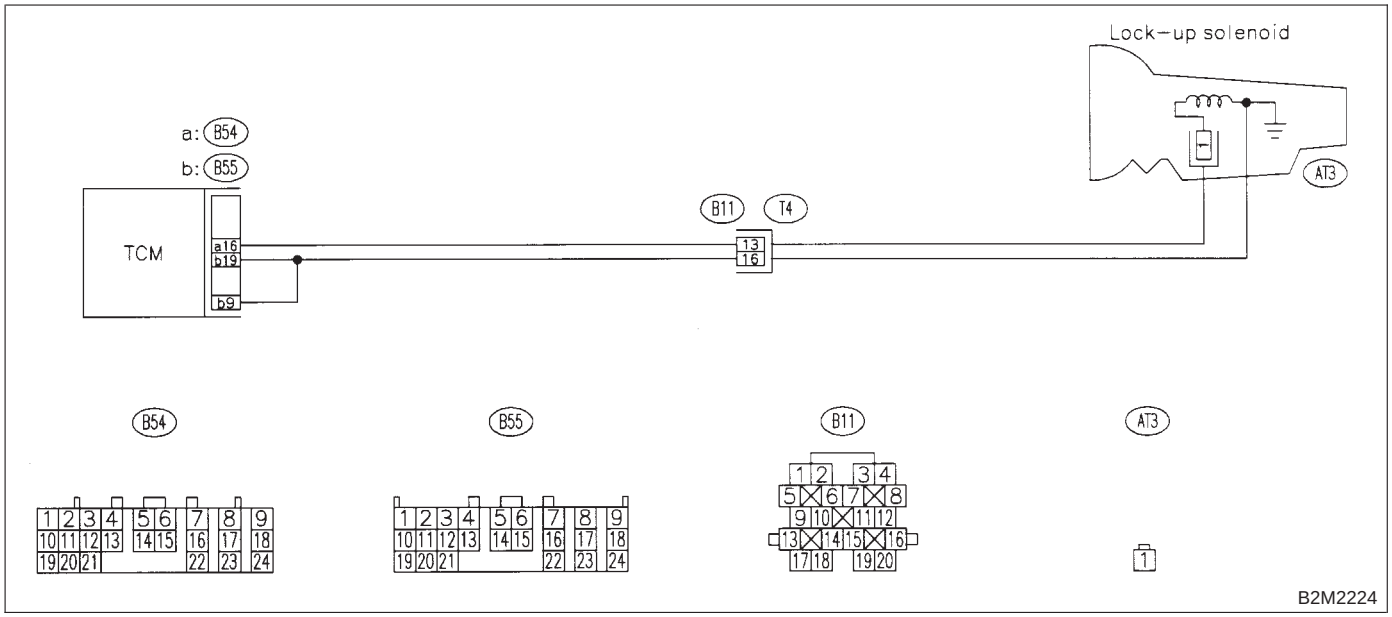


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission connector.
NO : Repair short circuit in harness between 2-4 brake duty solenoid and transmission connector.

MEMO:

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

DIAGNOSIS:
Output signal circuit of lock-up duty solenoid is open or shorted.
TROUBLE SYMPTOM:
No “lock-up” (after engine warm-up).
WIRING DIAGRAM:



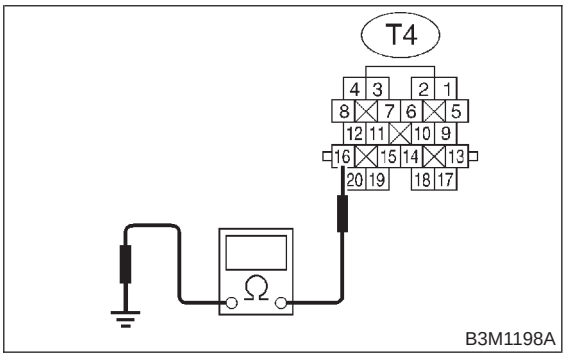
8P1 : CHECK TROUBLE CODE.

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

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

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

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

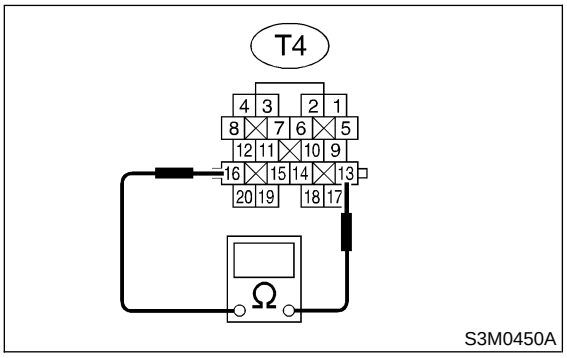


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8P3**.
NO : Repair open circuit in transmission harness.

8P3 : CHECK LOCK-UP DUTY SOLENOID.

Measure resistance between transmission connector receptacle's terminals.

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

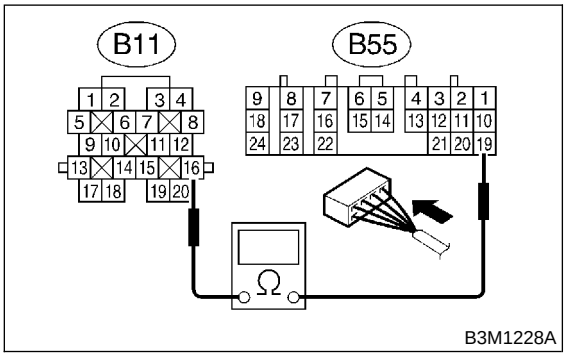


CHECK : ***Is the resistance between 9 and 15 Ω?***
YES : Go to step **8P4**.
NO : Go to step **8P14**.

8P4 : 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. 19 — (B11) No. 16:

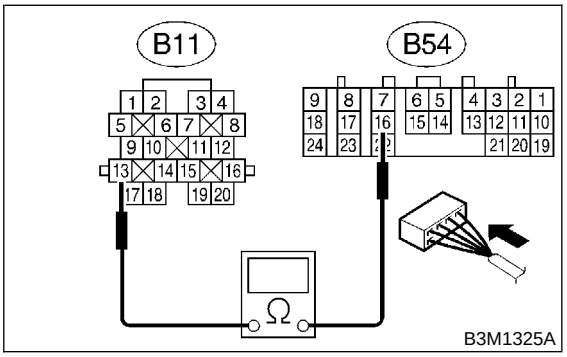


CHECK : ***Is the resistance than 1 Ω?***
YES : Go to step **8P5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8P5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and transmission.

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

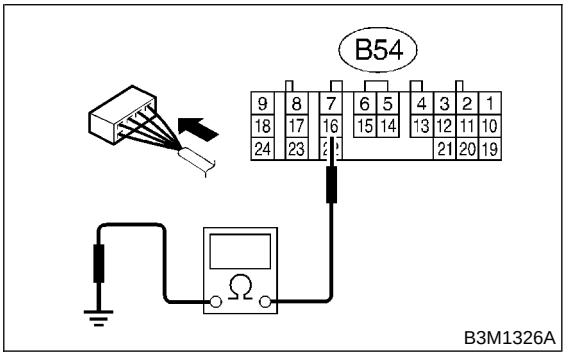


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8P6**.
NO : Repair open circuit in harness between TCM and transmission connector.

8P6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and chassis ground.

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

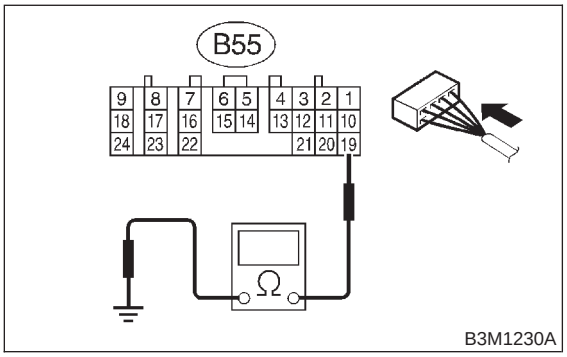


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8P7**.
NO : Repair short circuit in harness between TCM and transmission connector.

8P7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness connector between TCM and chassis ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8P8**.
NO : Repair short circuit in harness between TCM and transmission connector.

8P8 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8P11**.
NO : Go to step **8P9**.

8P9 : 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).

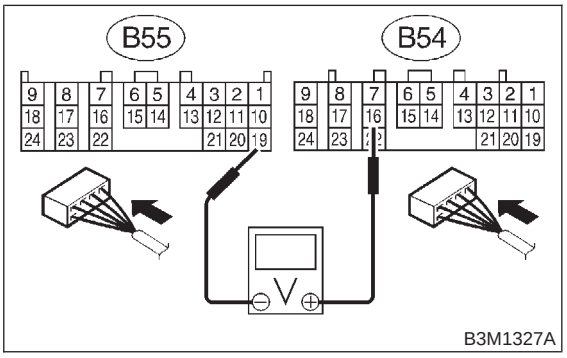
NOTE:
If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.

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 4-4 [T6D2].>

5) Measure voltage between TCM connector terminals.

Connector & terminal
(B54) No. 16 (+) — (B55) No. 19 (−):

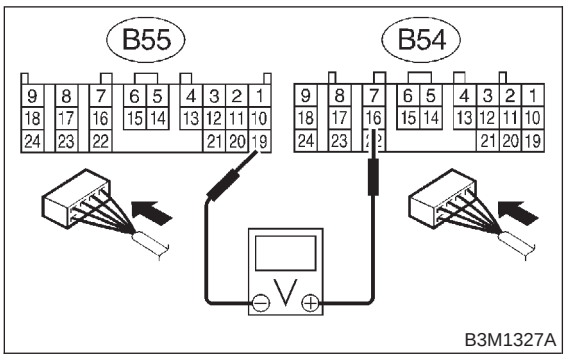


CHECK : ***Is the voltage more than 8.5 V?***
YES : Go to step **8P10**.
NO : Go to step **8P13**.

8P10 : 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 terminals.

Connector & terminal
(B54) No. 16 (+) — (B55) No. 19 (−):



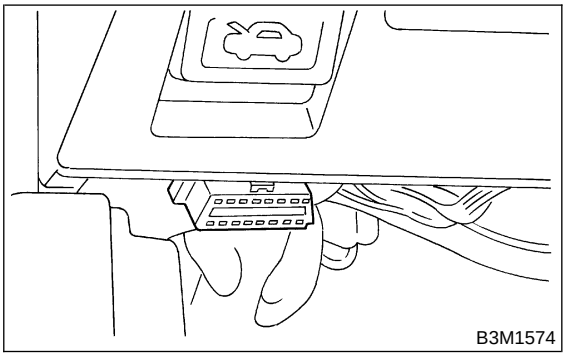
CHECK : ***Is the voltage less than 0.5 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
NO : Go to step **8P13**.

8P11 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

1) Connect connectors to TCM and transmission.
2) Lift-up the vehicle and place safety stand.

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

3) Connect Subaru Select Monitor to data link connector.



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

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

6) Read data of lock-up duty solenoid using Subaru Select Monitor.
● Lock-up duty solenoid is indicated in “%”.
7) Move selector lever to “D” and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.

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

CHECK : ***Is the value 95%?***
YES : Go to step **8P12**.
NO : Go to step **8P13**.

8P12 : 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 4-4 [T6D2].>

CHECK : ***Is the value 5%?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.
NO : Go to step **8P13**.

8P13 : CHECK POOR CONTACT.

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

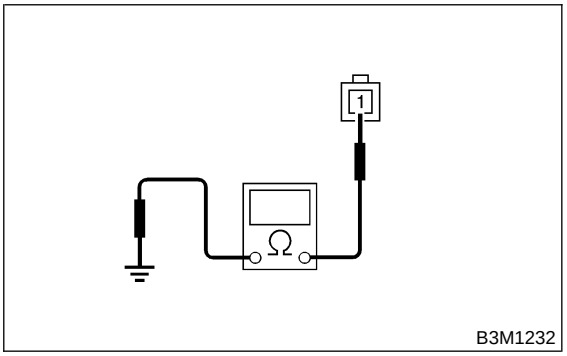
8P14 : CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).

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:

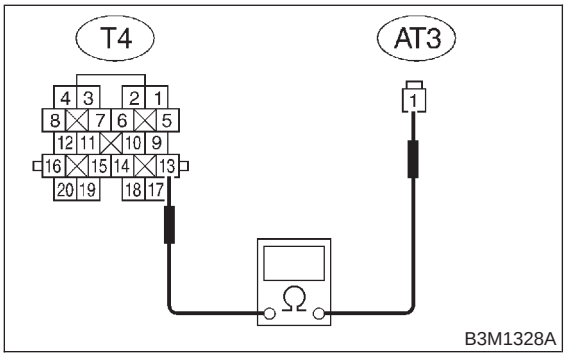


CHECK : ***Is the resistance between 10 and 17 Ω?***
YES : Go to step **8P15**.
NO : Replace lock-up duty solenoid. <Ref. to 3-2 [W4A0].>

8P15 : CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.

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

Connector & terminal
(T4) No. 13 — (AT3) No. 1:

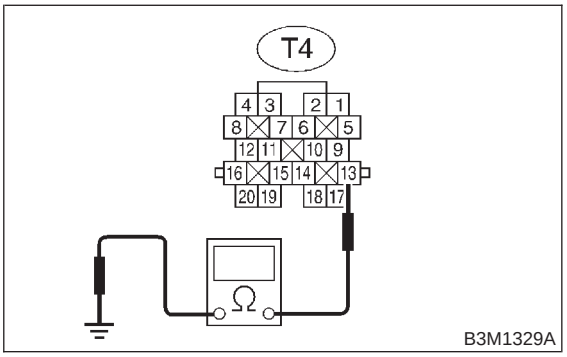


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8P16**.
NO : Repair open circuit in harness between TCM and transmission connector.

8P16 : CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.

Measure resistance of harness between transmission connector and transmission ground.

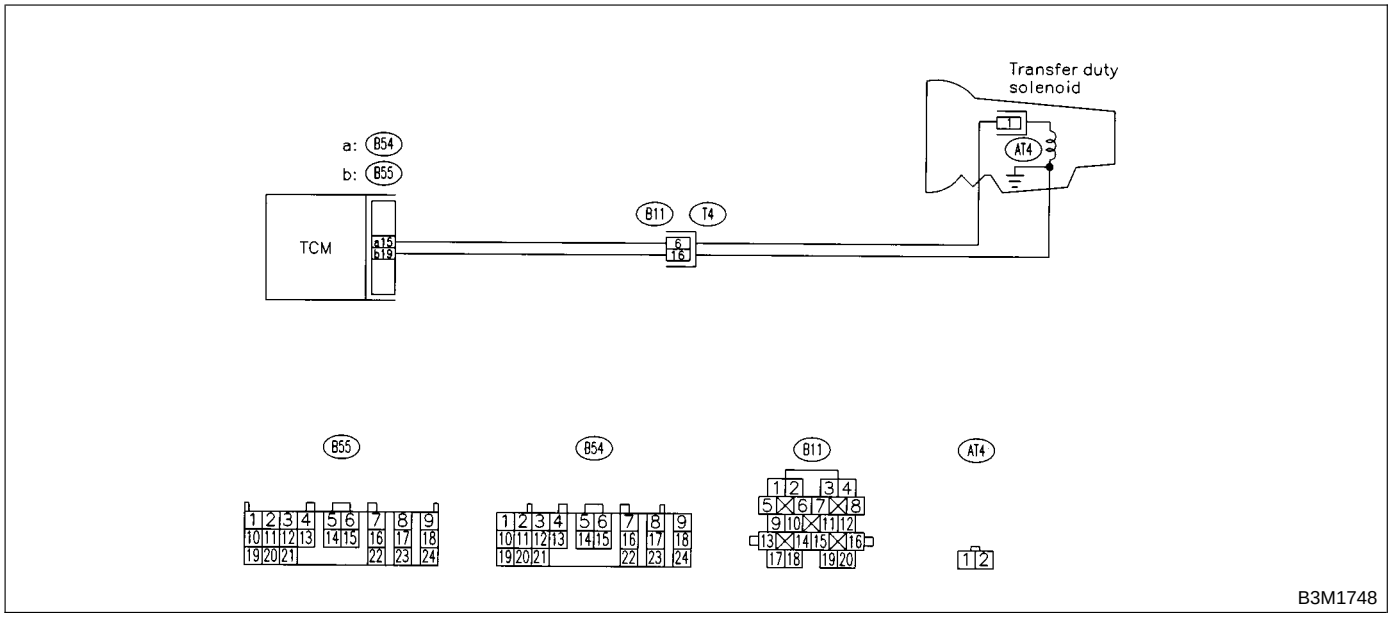
Connector & terminal
(T4) No. 13 — Transmission ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in lock-up duty solenoid and transmission.
NO : Repair short circuit in harness between TCM and transmission connector.

Q: TROUBLE CODE 79 — TRANSFER DUTY SOLENOID —

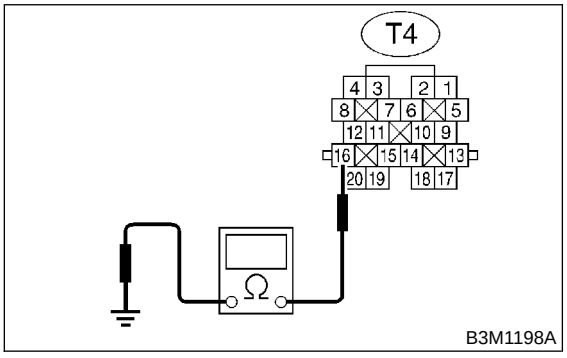
DIAGNOSIS:
Output signal circuit of transfer duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive “braking” in tight corners.
WIRING DIAGRAM:



8Q1 : CHECK TRANSFER DUTY SOLENOID GROUND LINE.

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

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

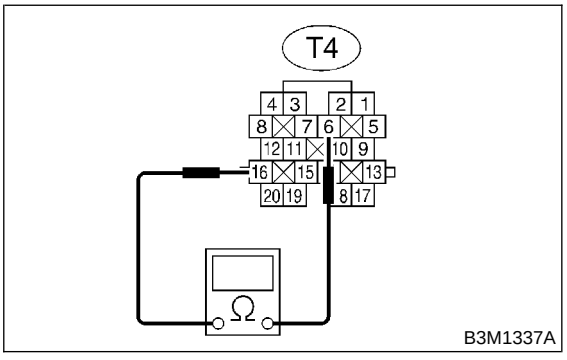


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8Q2**.
NO : Repair open circuit in transmission harness.

8Q2 : CHECK TRANSFER DUTY SOLENOID.

Measure resistance between transmission connector and transmission terminals.

Connector & terminal
(T4) No. 6 — No. 16:

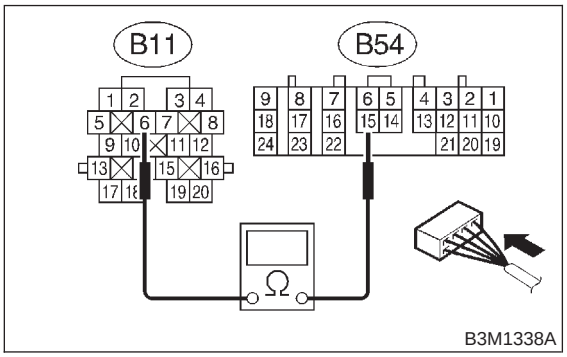


CHECK : ***Is the resistance between 10 and 17 Ω?***
YES : Go to step **8Q3**.
NO : Go to step **8Q13**.

8Q3 : 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:

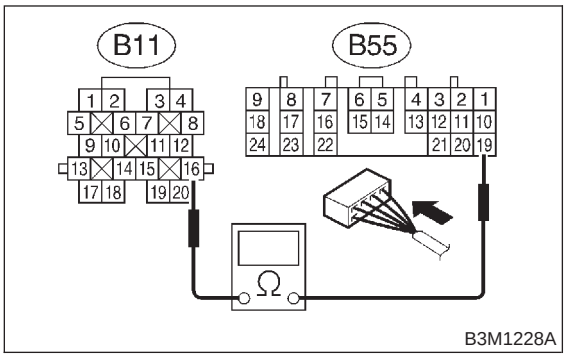


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8Q4**.
NO : Repair open circuit in harness between TCM and transmission connector.

8Q4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and transmission connector.

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

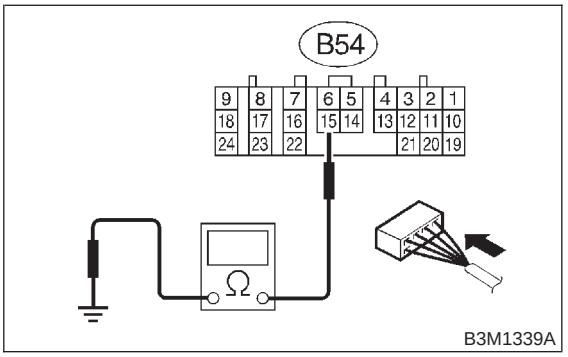


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8Q5**.
NO : Repair open circuit in harness between TCM and transmission connector.

8Q5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and chassis ground.

Connector & terminal
(B54) No. 15 — Chassis ground:

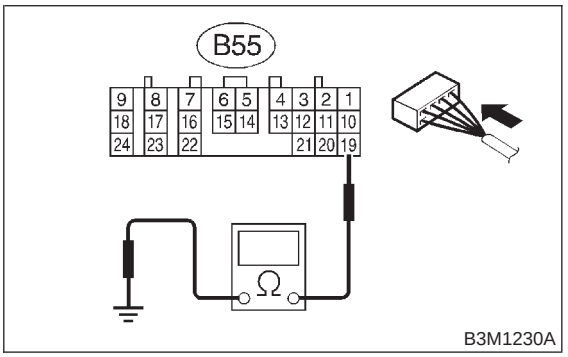


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8Q6**.
NO : Repair short circuit in harness between TCM and transmission connector.

8Q6 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance harness connector between TCM and chassis ground.

Connector & terminal
(B55) No. 19 — Chassis ground:



CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8Q7**.
NO : Repair short circuit in harness between TCM and transmission connector.

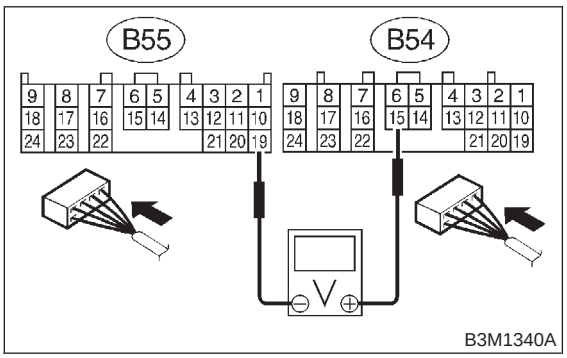
8Q7 : PREPARE SUBARU SELECT MONITOR.

CHECK : ***Do you have a Subaru Select Monitor?***
YES : Go to step **8Q10**.
NO : Go to step **8Q8**.

8Q8 : 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 terminals.

Connector & terminal
(B54) No. 15 (+) — (B55) No. 19 (−):

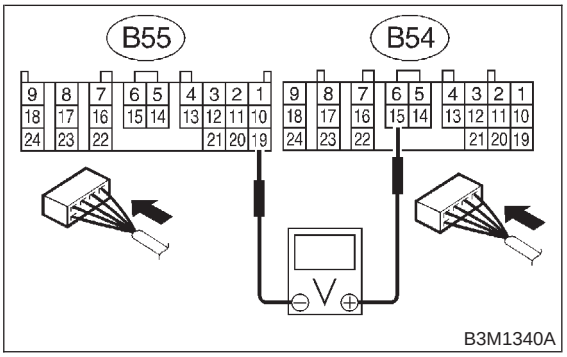


CHECK : ***Is the voltage less than 1 V in "P" range?***
YES : Go to step **8Q9**.
NO : Go to step **8Q12**.

8Q9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure voltage between TCM connector terminals.

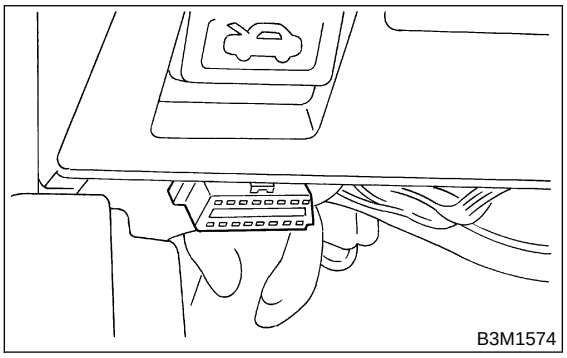
Connector & terminal
(B54) No. 15 (+) — (B55) No. 19 (−):



CHECK : ***Is the voltage between 5 and 7 V in "D" range?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the transfer duty solenoid and TCM connector.
NO : Go to step **8Q12**.

8Q10 : 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 "%".

CHECK : ***Is the value between 5 and 10%?***
YES : Go to step **8Q11**.
NO : Go to step **8Q12**.

8Q11 : CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.

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

CHECK : ***Is the value 95%?***
YES : Even if "AT OIL TEMP" lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the transfer duty solenoid and TCM connector.
NO : Go to step **8Q12**.

8Q12 : CHECK POOR CONTACT.

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

8Q13 : CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).

1) Lift-up the vehicle and place safety stand.

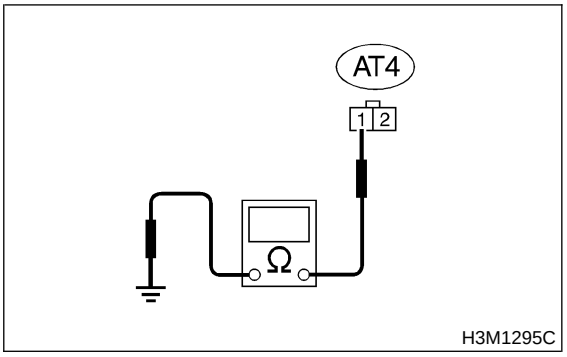
CAUTION:
On AWD models, raise all wheels off ground.

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:

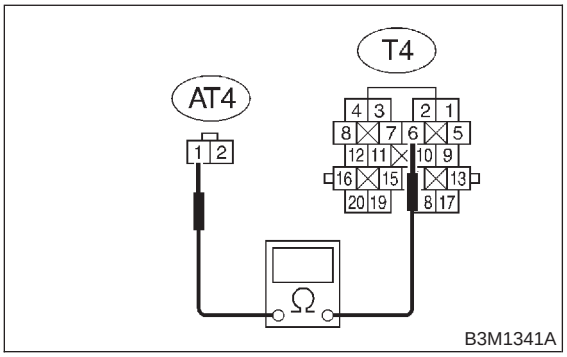


CHECK : ***Is the resistance between 10 and 17 Ω?***
YES : Go to step **8Q14**.
NO : Replace transfer duty solenoid. <Ref. to 3-2 [W5A0].>

8Q14 : CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.

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

Connector & terminal
(T4) No. 6 — (AT4) No. 1:

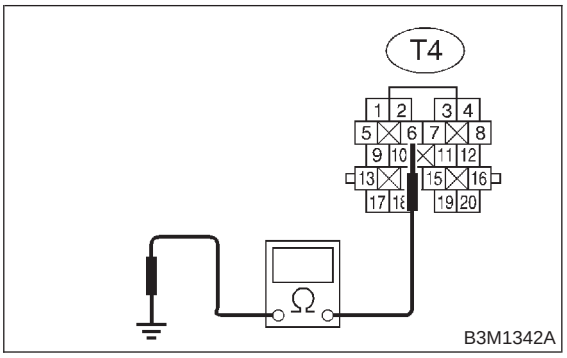


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8Q15**.
NO : Repair open circuit in harness between transfer duty solenoid and transmission connector.

8Q15 : CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.

Measure resistance of harness between transmission connector and transmission ground.

Connector & terminal
(T4) No. 6 — Transmission ground:

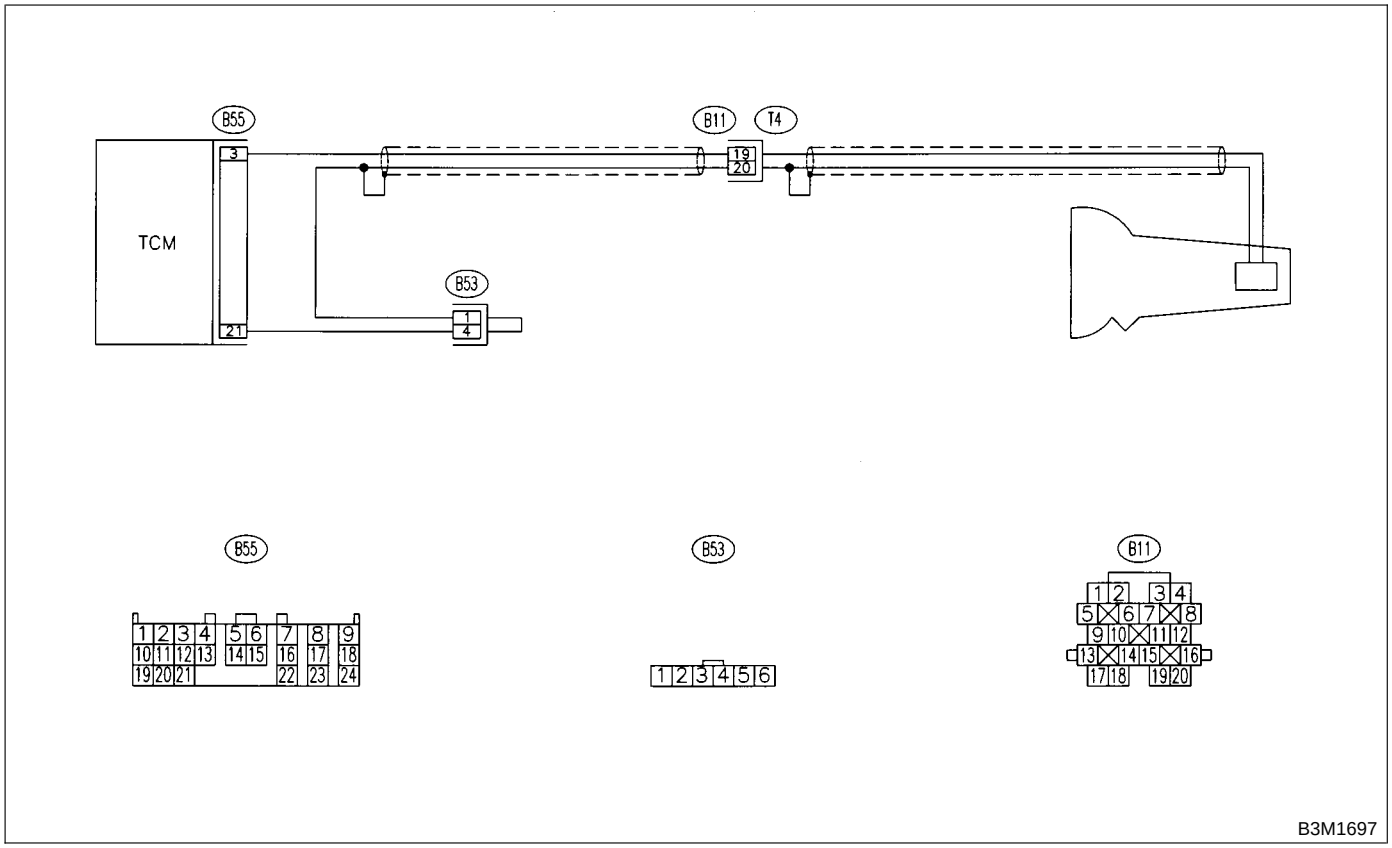


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transfer duty solenoid and transmission connector.
NO : Repair short circuit in harness between transfer duty solenoid and transmission connector.

MEMO:

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

DIAGNOSIS:
Input signal circuit of TCM is open or shorted.
TROUBLE SYMPTOM:
No lock-up or excessive tight corner “braking”.
WIRING DIAGRAM:



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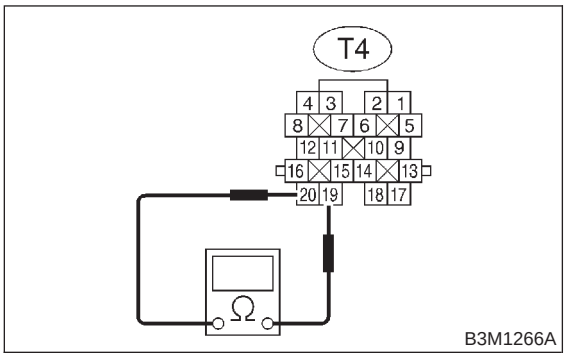
8R1 : CHECK VEHICLE SPEED SENSOR 1.

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

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

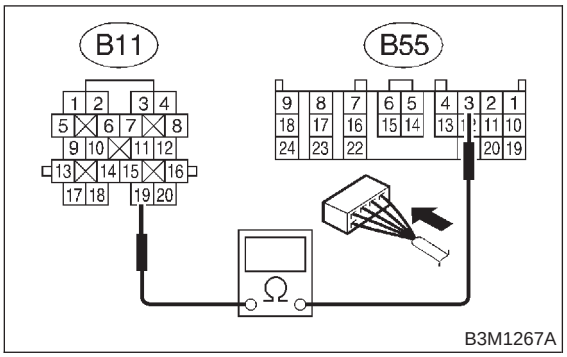


CHECK : ***Is the resistance between 450 and 650 Ω?***
YES : Go to step **8R1**.
NO : Replace transmission harness connector. <Ref. to 3-2 [W12A0].>

8R2 : 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. 3 — (B11) No. 19:

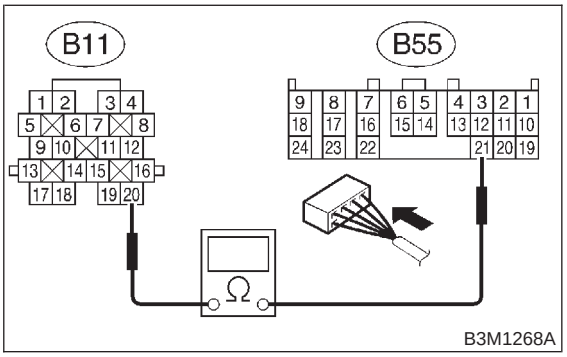


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8R3**.
NO : Repair open circuit in harness between TCM and transmission connector.

8R3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 21 — (B11) No. 20:

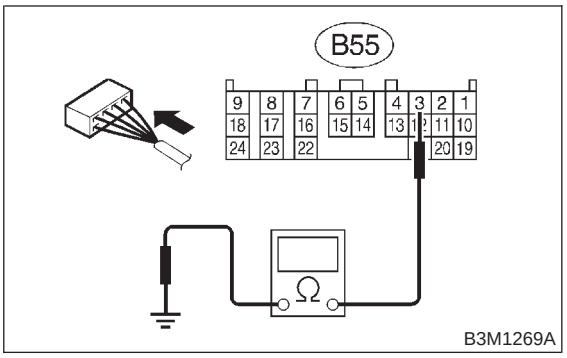


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **8R4**.
NO : Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.

8R4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

Connector & terminal
(B55) No. 3 — Chassis ground:

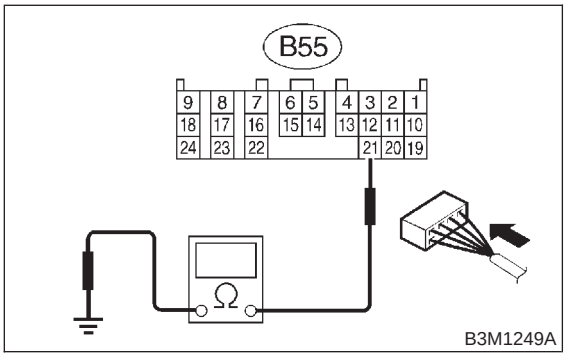


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **8R5**.
NO : Repair short circuit in harness between TCM and transmission connector.

8R5 : CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.

Measure resistance of harness between TCM and transmission connector.

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



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

8R6 : PREPARE OSCILLOSCOPE.

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

8R7 : PREPARE SUBARU SELECT MONITOR.

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

8R8 : CHECK INPUT SIGNAL FOR TCM.

1) Connect connectors to TCM and transmission.
2) Lift-up or raise the vehicle and place safety stands.

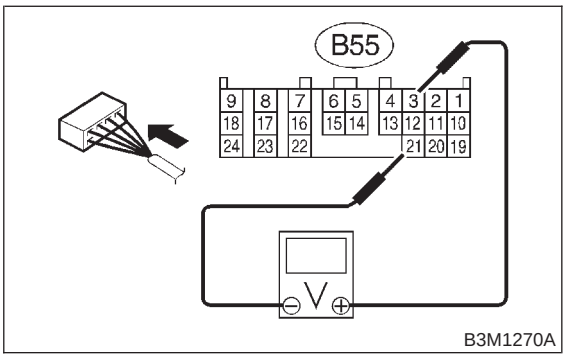
CAUTION:
On AWD models, raise all wheels off floor.

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 4-4 [T6D2].>

4) Measure voltage between TCM connector terminals.

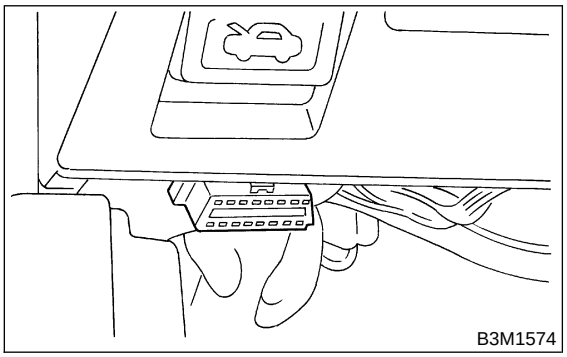
Connector & terminal
(B55) No. 3 (+) — No. 21 (−):



CHECK : ***Is the voltage more than AC 1 V?***
YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.
NO : Go to step **8R11**.

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

1) Connect 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 4-4 [T6D2].>

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

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

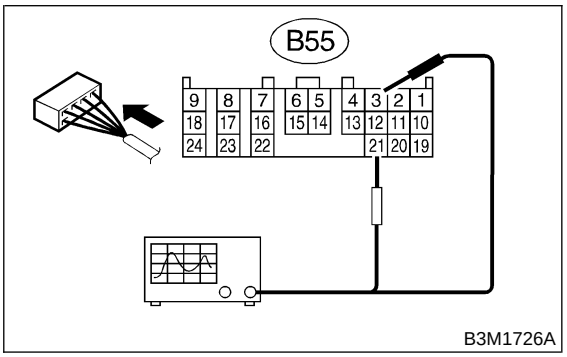
NO : Go to step **8R11**.

8R10 : CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.

1) Connect 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.

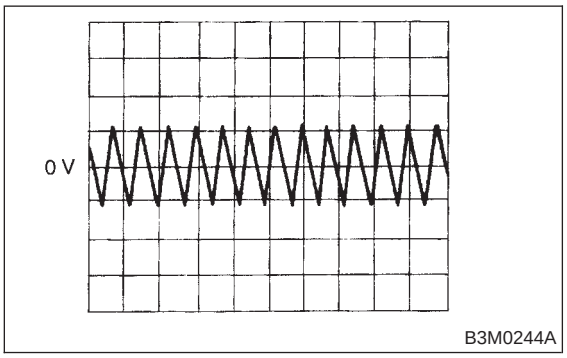
3) Set oscilloscope to TCM connector terminals.
Position prove; (B55) No. 3
Earth lead; (B55) No. 21



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

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

5) Measure signal voltage indicated on oscilloscope.



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

YES : Even if “AT OIL TEMP” lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.

NO : Go to step **8R11**.

8R11 : CHECK POOR CONTACT.

CHECK : ***Is there poor contact in vehicle speed sensor 1 circuit?***

YES : Repair poor contact.

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

9. Diagnostic Chart with Select Monitor

A: BASIC DIAGNOSTIC CHART

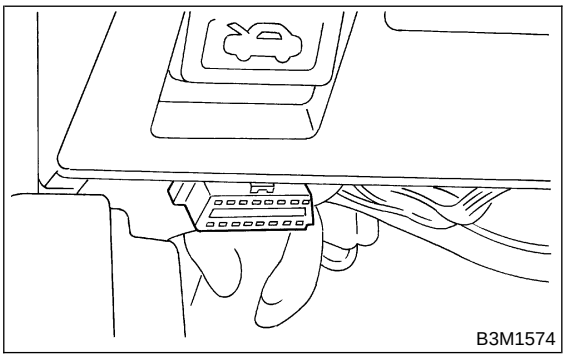
If no trouble codes appear in the on-board diagnostics operation (although problems have occurred or are occurring), measure performance characteristics of sensors, actuators, etc., in the Subaru Select Monitor and compare with the “basic data” to determine the cause of problems.

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

B: BATTERY VOLTAGE

9B1 : CHECK BATTERY VOLTAGE.

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



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

- Battery voltage applied to TCM.

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

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

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

C: CHECK VEHICLE SPEED SENSOR 1.

9C1 : CHECK VEHICLE SPEED SENSOR 1.

1) Lift-up the vehicle and place safety stand.

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

2) Read data of vehicle speed #1 using Subaru Select Monitor.
● Compare speedometer with Subaru Select Monitor indications.
● Vehicle speed is indicated in “MPH” or “km/h”.

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

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***
YES : Go to step VEHICLE SPEED SENSOR 2. <Ref. to 3-2 [T9D0].>
NO : Check vehicle speed sensor 1 circuit. <Ref. to 3-2 [T8R0].>

D: CHECK VEHICLE SPEED SENSOR 2.

9D1 : CHECK VEHICLE SPEED SENSOR 2.

Read data of vehicle speed #2 using Subaru Select Monitor.
● Compare speedometer with Subaru Select Monitor indications.
● Vehicle speed is indicated in “MPH” or “km/h”.

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

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***
YES : Go to step ENGINE SPEED SIGNAL. <Ref. to 3-2 [T9E0].>
NO : Check vehicle speed sensor 2 circuit. <Ref. to 3-2 [T8F0].>

E: CHECK ENGINE SPEED SIGNAL.

9E1 : CHECK ENGINE SPEED SIGNAL.

1) Turn A/C switch to OFF (with A/C models).
2) Warm-up the engine until engine coolant temperature is above 80°C (176°F).

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

3) Read data of engine speed using Subaru Select Monitor.
● Engine speed is indicated in “rpm”.

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

CHECK : ***Does the tachometer revolution increase as the Subaru Select Monitor revolution data increases?***
YES : Go to step ATF TEMPERATURE SENSOR. <Ref. to 3-2 [T9F0].>
NO : Check engine speed signal circuit. <Ref. to 3-2 [T8C0].>

F: CHECK ATF TEMPERATURE SENSOR.

9F1 : CHECK AT OIL TEMP WARNING LIGHT.

CHECK : ***Does the AT OIL TEMP warning light remain on 2 seconds after the engine has been started?***
YES : Go to step **9F2**.
NO : Check ATF temperature sensor and combination meter circuit. <Ref. to 3-2 [T8D0].>

9F2 : CHECK ATF TEMPERATURE SENSOR.

1) Read data of ATF temperature using Subaru Select Monitor.
● ATF temperature is indicated in "°F" or "°C".
2) Warm-up the transmission until ATF temperature is above 80°C (176°F).

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

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

CHECK : ***Does the ATF temperature change from 176°F (80°C)?***
YES : Go to step THROTTLE POSITION SENSOR. <Ref. to 3-2 [T9G0].>
NO : Check ATF temperature sensor circuit. <Ref. to 3-2 [T8D0].>

G: CHECK THROTTLE POSITION SENSOR.

9G1 : CHECK INPUT SIGNAL FOR TCM.

Read data of throttle position sensor using Subaru Select Monitor.
● Throttle position sensor input signal is indicated.

CHECK : ***Is voltage between 0.3 and 0.7 V when the accelerator pedal is completely released?***
YES : Go to step **9G2**.
NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8E0].>

9G2 : CHECK INPUT SIGNAL FOR TCM.

CHECK : ***Is voltage between 4.4 and 4.8 V when the accelerator pedal is completely depressed?***
YES : Go to step **9G3**.
NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8E0].>

9G3 : CHECK INPUT SIGNAL FOR TCM.

CHECK : ***Does voltage decrease smoothly when the accelerator pedal is fully depressed and then fully released?***
YES : Go to step GEAR POSITION. <Ref. to 3-2 [T9H0].>
NO : Check throttle position sensor circuit. <Ref. to 3-2 [T8E0].>

H: CHECK GEAR POSITION.

9H1 : CHECK GEAR POSITION.

1) Lift-up 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 4-4 [T6D2].>

CHECK : ***Does the transmission gear correspond to the gear which is shown on display?***
YES : Go to step LINE PRESSURE DUTY SOLENOID. <Ref. to 3-2 [T9I0].>
NO : Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to 3-2 [T8J0].> and <Ref. to 3-2 [T8K0].>

I: CHECK LINE PRESSURE DUTY SOLENOID.

9I1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

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

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

2) Stop the engine and turn ignition switch to ON (engine OFF).
3) Move selector lever to "N".
4) Read data of line pressure duty solenoid using Subaru Select Monitor.
● Line pressure duty solenoid is indicated in "%".

CHECK : ***Does the Subaru Select Monitor indicate 100% when the accelerator pedal is completely released?***
YES : Go to step **9I2**.
NO : Go to step **9I4**.

9I2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : ***Does the Subaru Select Monitor indicate between 10 and 20% when the accelerator pedal is completely depressed?***
YES : Go to step **9I3**.
NO : Go to step **9I4**.

9I3 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

CHECK : ***Does the Subaru Select Monitor change smoothly when the accelerator pedal is fully depressed and then fully released?***
YES : Go to step LOCK-UP DUTY SOLENOID. <Ref. to 3-2 [T9J0].>
NO : Go to step **9I4**.

9I4 : CHECK THROTTLE POSITION SENSOR.

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

CHECK : ***Is there any trouble in throttle position sensor circuit?***
YES : Repair or replace throttle position sensor circuit. <Ref. to 3-2 [T8E0].>
NO : Go to step **9I5**.

9I5 : CHECK ENGINE SPEED SIGNAL.

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

CHECK : ***Is there any trouble in engine speed signal circuit?***
YES : Repair or replace engine speed signal circuit. <Ref. to 3-2 [T8C0].>
NO : Go to step **9I6**.

9I6 : CHECK ATF TEMPERATURE SENSOR.

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

CHECK : ***Is there any trouble in ATF temperature sensor circuit?***
YES : Repair or replace ATF temperature sensor circuit. <Ref. to 3-2 [T8D0].>
NO : Go to step **9I7**.

9I7 : CHECK INHIBITOR SWITCH.

1) Turn ignition switch and Subaru Select Monitor to ON.
2) Read data of range switch using Subaru Select Monitor.
● Range switch is indicated in ON ⇔ OFF.

CHECK : ***When each range is selected, does LED of the range switch on Subaru Select Monitor light up?***
YES : Go to step LOCK-UP DUTY SOLENOID. <Ref. to 3-2 [T9J0].>
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

J: CHECK LOCK-UP DUTY SOLENOID.

9J1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Read data of lock-up duty solenoid using Subaru Select Monitor.
- Lock-up duty solenoid is indicated in "%".

CHECK : ***Does the Subaru Select Monitor indicate 5%?***
YES : Go to step **9J2**.
NO : Go to step **9J3**.

9J2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH).

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

CHECK : ***Does the Subaru Select Monitor indicate 95%?***
YES : Go to step TRANSFER DUTY SOLENOID. <Ref. to 3-2 [T9K0].>
NO : Go to step **9J3**.

9J3 : CHECK THROTTLE POSITION SENSOR.

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

CHECK : ***Is there any trouble in throttle position sensor circuit?***
YES : Repair or replace throttle position sensor circuit. <Ref. to 3-2 [T8E0].>
NO : Go to step **9J4**.

9J4 : CHECK VEHICLE SPEED SENSOR 1.

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

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

9J5 : CHECK VEHICLE SPEED SENSOR 2.

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

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

9J6 : CHECK ENGINE SPEED SIGNAL.

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

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

9J7 : CHECK INHIBITOR SWITCH.

Read data of range switch using Subaru Select Monitor.
- Range switch is indicated in ON ⇔ OFF.

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

K: CHECK TRANSFER DUTY SOLENOID.

9K1 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

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

CHECK : ***Does the duty ratio change in response to the depress-release motion of the accelerator pedal?***
YES : Go to step **9K2**.
NO : Go to step **9K3**.

9K2 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

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

CHECK : ***Does the Subaru Select Monitor indicate 95%?***
YES : Go to step THROTTLE POSITION SENSOR POWER SUPPLY. <Ref. to 3-2 [T9L0].>
NO : Go to step **9K3**.

9K3 : CHECK THROTTLE POSITION SENSOR.

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

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

9K4 : CHECK VEHICLE SPEED SENSOR 1.

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

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

9K5 : CHECK VEHICLE SPEED SENSOR 2.

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

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

9K6 : CHECK ATF TEMPERATURE SENSOR.

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

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

9K7 : CHECK INHIBITOR SWITCH.

Read data of range switch using Subaru Select Monitor.
- Range switch is indicated in ON ⇔ OFF.

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

9K8 : CHECK ABS SIGNAL.

1) Start the engine, and turn Subaru Select Monitor switch to ON.
2) Read data of ABS signal using Subaru Select Monitor.
● ABS switch is indicated in ON ⇔ OFF.

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

L: CHECK THROTTLE POSITION SENSOR POWER SUPPLY.

9L1 : CHECK THROTTLE POSITION SENSOR POWER SUPPLY.

Read data of throttle position sensor power supply using Subaru Select Monitor.
● Throttle position sensor power supply voltage is indicated.

CHECK : ***Is the value fixed between 5.02 and 5.22 V?***
YES : Go to step INTAKE MANIFOLD PRESSURE. <Ref. to 3-2 [T9M0].>
NO : Check throttle position sensor power supply circuit. <Ref. to 3-2 [T8F0].>

M: CHECK INTAKE MANIFOLD PRESSURE SIGNAL.

9M1 : CHECK INPUT SIGNAL FOR TCM.

1) Start the engine.
2) Warm-up the engine until engine coolant temperature is above 80°C (176°F).

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

3) Engine idling after warm-up.
4) Move selector lever to “N”.
5) Read data of intake manifold pressure signal using Subaru Select Monitor.
● Display shows intake manifold pressure signal value sent from ECM.

CHECK : ***Does voltage change in response to the depress-release motion of the accelerator pedal?***
YES : Go to step **9M2**.
NO : Check intake manifold pressure signal circuit. <Ref. to 3-2 [T8I0].>

9M2 : CHECK ECM.

CHECK : ***Has trouble been eliminated after ECM replacement?***
YES : Replace ECM. <Ref. to 2-7 [W19A0].>
NO : Go to step **9M3**.

9M3 : CHECK TCM.

NOTE:
Install former ECM.

CHECK : ***Has trouble been eliminated after TCM replacement?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Go to step TORQUE CONVERTER TURBINE SPEED SENSOR. <Ref. to 3-2 [T9N0].>

N: CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.

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

1) Lift-up the vehicle and place safety stand.

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

2) Read data of torque converter turbine speed sensor using Subaru Select Monitor.
● Compare speedometer with Subaru Select Monitor indications.
● Vehicle speed is indicated in “MPH” or “km/h”.

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

CHECK : ***Does the speedometer indication increase as the Subaru Select Monitor data increases?***
YES : Go to step 2-4 BRAKE DUTY SOLENOID. <Ref. to 3-2 [T9O0].>
NO : Check torque converter turbine speed sensor circuit. <Ref. to 3-2 [T8G0].>

O: CHECK 2-4 BRAKE DUTY SOLENOID.

9O1 :	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

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

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

2) Stop the engine and turn ignition switch to ON (engine OFF).
3) Move selector lever to “N”.
4) Read data of 2-4 brake duty solenoid using Subaru Select Monitor.
● 2-4 brake duty solenoid is indicated in “%”.

CHECK : ***Does the Subaru Select Monitor indicate 100% when the accelerator pedal is completely released?***
YES : Go to step **9O2**.
NO : Go to step **9O4**.

9O2 :	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

CHECK : ***Does the Subaru Select Monitor indicate between 10 and 20% when the accelerator pedal is completely depressed?***
YES : Go to step **9O3**.
NO : Go to step **9O4**.

9O3 :	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.**

CHECK : ***Does the Subaru Select Monitor change smoothly when the accelerator pedal is fully depressed and then fully released?***
YES : Go to step FWD SWITCH. <Ref. to 3-2 [T9Q0].>
NO : Go to step **9O4**.

9O4 : CHECK THROTTLE POSITION SENSOR.

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

CHECK : ***Is there any trouble in throttle position sensor circuit?***
YES : Repair or replace throttle position sensor circuit. <Ref. to 3-2 [T8E0].>
NO : Go to step **9O5**.

9O5 : CHECK ENGINE SPEED SIGNAL.

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

CHECK : ***Is there any trouble in engine speed signal circuit?***
YES : Repair or replace engine speed signal circuit. <Ref. to 3-2 [T8C0].>
NO : Go to step **9O6**.

9O6 : CHECK ATF TEMPERATURE SENSOR.

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

CHECK : ***Is there any trouble in ATF temperature sensor circuit?***
YES : Repair or replace ATF temperature sensor circuit. <Ref. to 3-2 [T8D0].>
NO : Go to step **9O7**.

9O7 : CHECK INHIBITOR SWITCH.

1) Turn ignition switch and Subaru Select Monitor to ON.
2) Read data of range switch using Subaru Select Monitor.
● Range switch is indicated in ON ⇔ OFF.

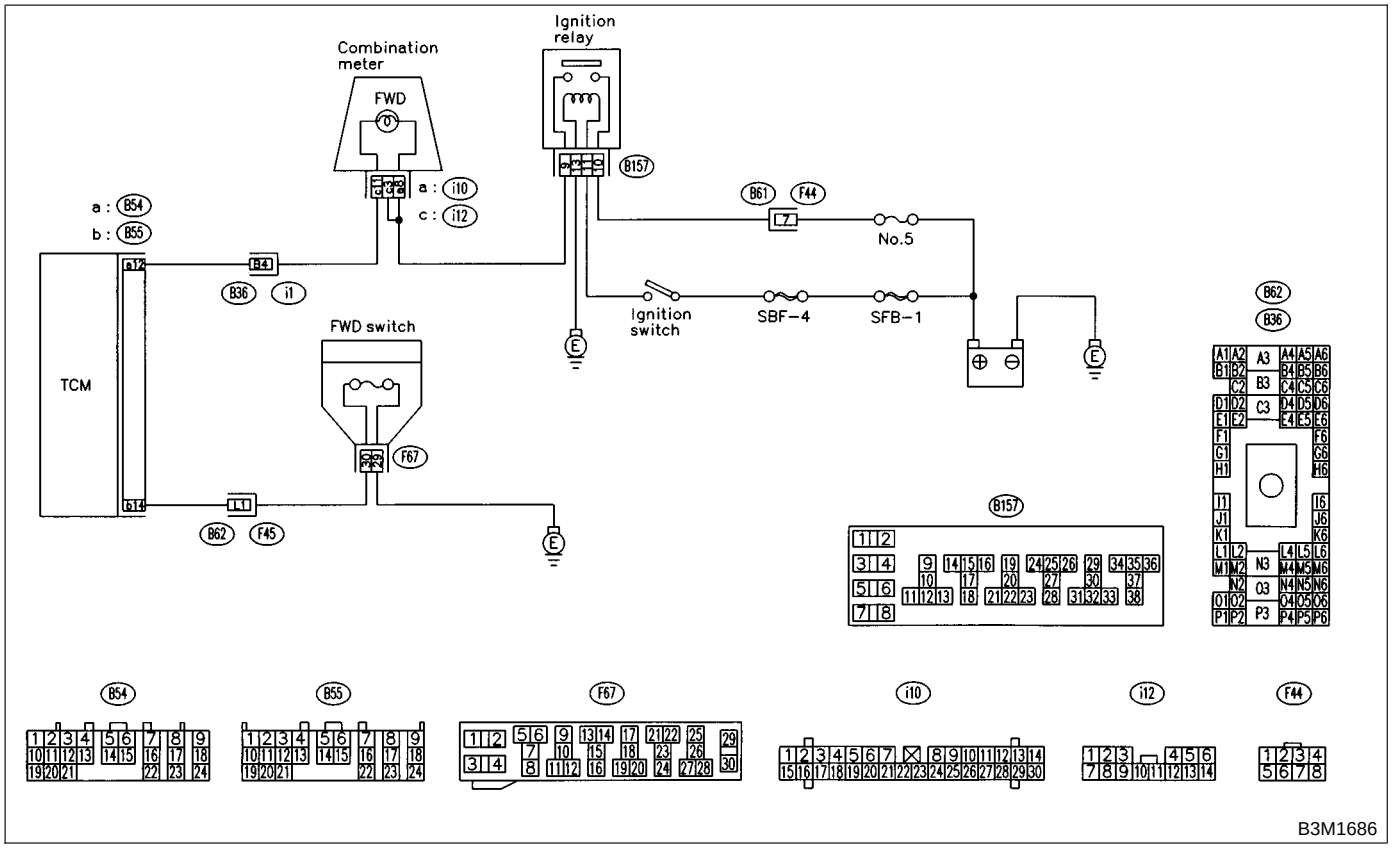
CHECK : ***When each range is selected, does LED of the range switch on Subaru Select Monitor light up?***
YES : Go to step FWD SWITCH. <Ref. to 3-2 [T9Q0].>
NO : Check inhibitor switch circuit. <Ref. to 3-2 [T9T0].>

MEMO:

P: CHECK FWD SWITCH.

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

WIRING DIAGRAM:



9P1 : CHECK FWD SWITCH.

CHECK : ***When fuse is inserted to FWD switch, does LED light up?***

YES : Go to step BRAKE SWITCH. <Ref. to 3-2 [T9Q0].>

NO : Go to step **9P2**.

9P2 : CHECK FWD INDICATOR LIGHT.

1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove FWD indicator light bulb from combination meter.

CHECK : ***Is FWD indicator light bulb OK?***

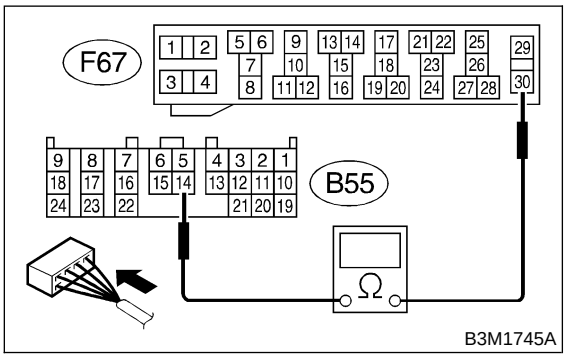
YES : Go to step **9P3**.

NO : Replace FWD indicator light bulb.

9P3 : CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.

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

Connector & terminal
(B55) No. 14 — (F67) No. 30:

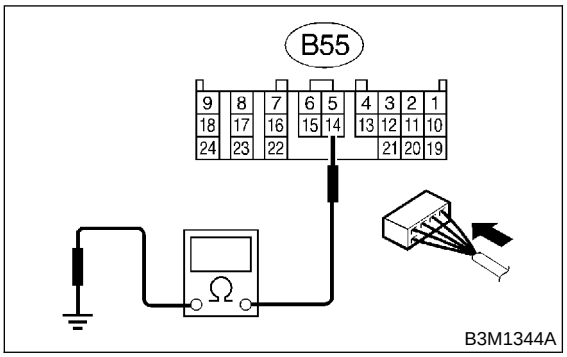


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9P4**.
NO : Repair open circuit in harness between TCM and FWD switch connector.

9P4 : CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.

Measure resistance of harness connector between TCM and body to make sure that circuit does not short.

Connector & terminal
(B55) No. 14 — Chassis ground:

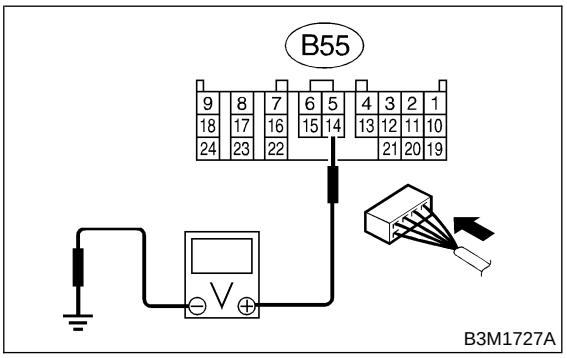


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9P5**.
NO : Repair short circuit in harness connector between TCM and chassis ground.

9P5 : 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 (−):

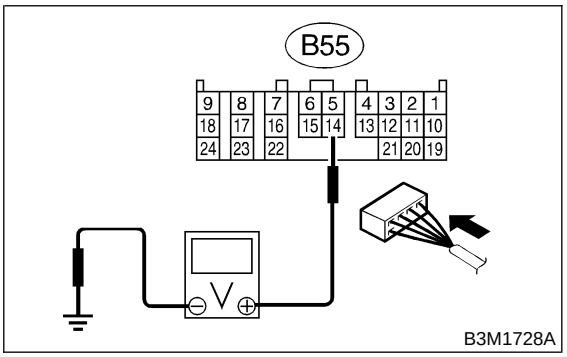


CHECK : ***Is the voltage less than 1 V in FWD switch while installing?***
YES : Go to step **9P6**.
NO : Go to step **9P11**.

9P6 : CHECK INPUT SIGNAL FOR TCM.

Measure signal voltage for TCM while removing the fuse from FWD switch connector.

Connector & terminal
(B55) No. 14 (+) — Chassis ground (−):

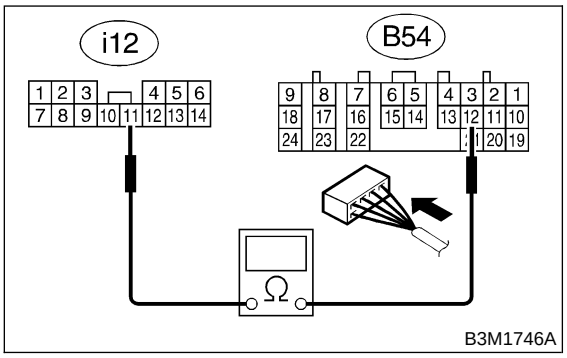


CHECK : ***Is the voltage more than 10 V in FWD switch while removing?***
YES : Go to step **9P7**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9P7 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

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

Connector & terminal
(B54) No. 12 — (i12) No. 11:

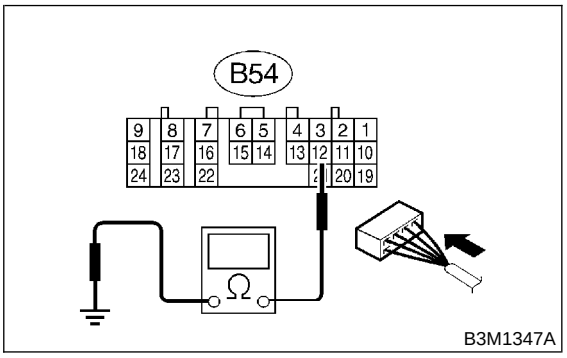


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9P8**.
NO : Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.

9P8 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short.

Connector & terminal
(B54) No. 12 — Chassis ground:

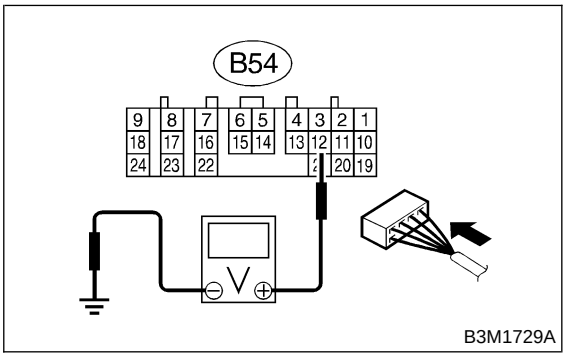


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9P9**.
NO : Repair short circuit in harness between TCM and combination meter connector.

9P9 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

1) Turn ignition switch to OFF.
2) Connect connector to 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:

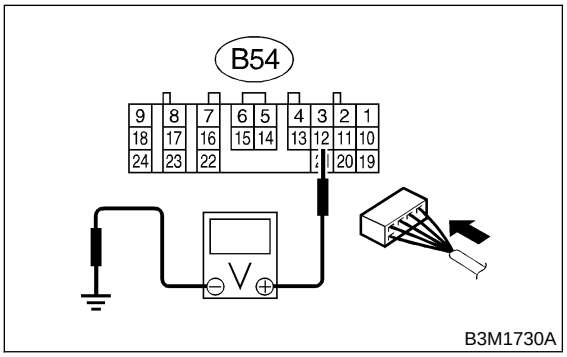


CHECK : ***Is the voltage less than 1 V in FWD switch while installing?***
YES : Go to step **9P10**.
NO : Go to step **9P11**.

9P10 : CHECK OUTPUT SIGNAL EMITTED FROM TCM.

Measure signal voltage for TCM while removing the fuse from FWD switch connector.

Connector & terminal
(B54) No. 12 — Chassis ground:



CHECK : ***Is the voltage more than 10 V in FWD switch while removing?***
YES : Go to step **9P11**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9P11 : CHECK POOR CONTACT.

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

Q: CHECK BRAKE SWITCH.

9Q1 : CHECK BRAKE SWITCH.

CHECK : ***When the brake pedal is depressed, does LED light up?***
YES : Go to step ABS SWITCH. <Ref. to 3-2 [T9S0].>
NO : Check brake switch circuit. <Ref. to 2-7 [T11AW0].>

R: CHECK ABS SWITCH.

9R1 : CHECK ABS SWITCH.

CHECK : ***Does the LED of ABS switch light up?***
YES : Check ABS switch circuit. <Ref. to 4-4 [T10Z0].> and <Ref. to 4-4 [T10Y0].>
NO : Go to step CRUISE CONTROL SWITCH. <Ref. to 3-2 [T9S0].>

S: CHECK CRUISE CONTROL SWITCH.

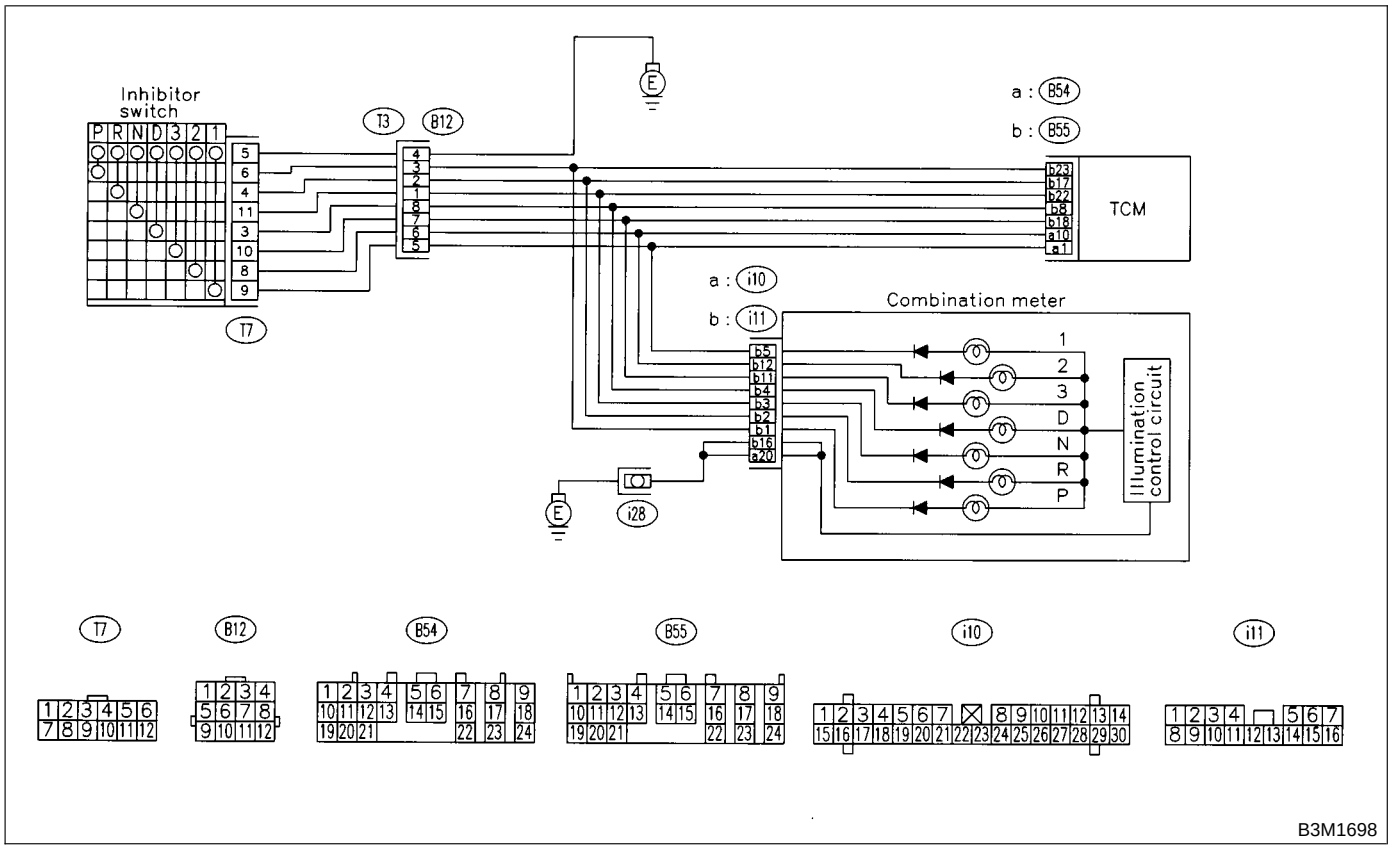
9S1 : CHECK CRUISE CONTROL SWITCH.

CHECK : ***When cruise control is set, does LED light up?***
YES : Go to step INHIBITOR SWITCH. <Ref. to 3-2 [T9T0].>
NO : Check cruise control. <Ref. to 6-2a [T2A0].>

T: CHECK INHIBITOR SWITCH.

DIAGNOSIS:
Input signal circuit of inhibitor switch is open or shorted.
TROUBLE SYMPTOM:
- Shift characteristics are erroneous.
- Engine brake is not effected when 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:



9T1 : CHECK “P” RANGE SWITCH.

CHECK : ***When “P” range is selected, does LED light up?***
YES : Go to step **9T2**.
NO : Go to step **9T22**.

9T2 : CHECK INDICATOR LIGHT.

CHECK : ***Does combination meter “P” range indicator illuminate?***
YES : Go to step **9T3**.
NO : Go to step **9T27**.

9T3 : CHECK “P” RANGE SWITCH.

CHECK : ***When the “R” range is selected, does “P” range LED light up?***
YES : Go to step **9T29**.
NO : Go to step **9T4**.

9T4 : CHECK “R” RANGE SWITCH.

CHECK : ***When the “R” range is selected, does LED light up?***
YES : Go to step **9T5**.
NO : Go to step **9T31**.

9T5 : CHECK INDICATOR LIGHT.

CHECK : ***Does combination meter "R" range indicator illuminate?***
YES : Go to step **9T6**.
NO : Go to step **9T35**.

9T6 : CHECK "R" RANGE SWITCH.

CHECK : ***When the "N" range is selected, does "R" range LED light up?***
YES : Go to step **9T37**.
NO : Go to step **9T7**.

9T7 : CHECK "N" RANGE SWITCH.

CHECK : ***When the "N" range is selected, does LED light up?***
YES : Go to step **9T8**.
NO : Go to step **9T39**.

9T8 : CHECK INDICATOR LIGHT.

CHECK : ***Does combination meter "N" range indicator illuminate?***
YES : Go to step **9T9**.
NO : Go to step **9T43**.

9T9 : CHECK "N" RANGE SWITCH.

CHECK : ***When the "D" range is selected, does "N" range LED light up?***
YES : Go to step **9T45**.
NO : Go to step **9T10**.

9T10 : CHECK "D" RANGE SWITCH.

CHECK : ***When the "D" range is selected, does LED light up?***
YES : Go to step **9T11**.
NO : Go to step **9T47**.

9T11 : CHECK INDICATOR LIGHT.

CHECK : ***Does combination meter "D" range indicator illuminate?***
YES : Go to step **9T12**.
NO : Go to step **9T51**.

9T12 : CHECK "D" RANGE SWITCH.

CHECK : ***When the "3" range is selected, does "D" range LED light up?***
YES : Go to step **9T53**.
NO : Go to step **9T13**.

9T13 : CHECK "3" RANGE SWITCH.

CHECK : ***When the "3" range is selected, does LED light up?***
YES : Go to step **9T14**.
NO : Go to step **9T55**.

9T14 : CHECK INDICATOR LIGHT.

CHECK : ***Does combination meter "3" range indicator illuminate?***
YES : Go to step **9T15**.
NO : Go to step **9T59**.

9T15 : CHECK "3" RANGE SWITCH.

CHECK : ***When the "2" range is selected, does "3" range LED light up?***
YES : Go to step **9T61**.
NO : Go to step **9T16**.

9T16 : CHECK "2" RANGE SWITCH.

CHECK : ***When the "2" range is selected, does LED light up?***
YES : Go to step **9T17**.
NO : Go to step **9T63**.

9T17 : CHECK INDICATOR LIGHT.

CHECK : ***Does combination meter "2" range indicator illuminate?***
YES : Go to step **9T18**.
NO : Go to step **9T67**.

9T18 : CHECK "2" RANGE SWITCH.

CHECK : ***When the "1" range is selected, does "2" range LED light up?***
YES : Go to step **9T69**.
NO : Go to step **9T19**.

9T19 : CHECK "1" RANGE SWITCH.

CHECK : ***When the "1" range is selected, does LED light up?***
YES : Go to step **9T20**.
NO : Go to step **9T71**.

9T20 : CHECK INDICATOR LIGHT.

CHECK : ***Does combination meter "1" range indicator illuminate?***
YES : Go to step **9T21**.
NO : Go to step **9T75**.

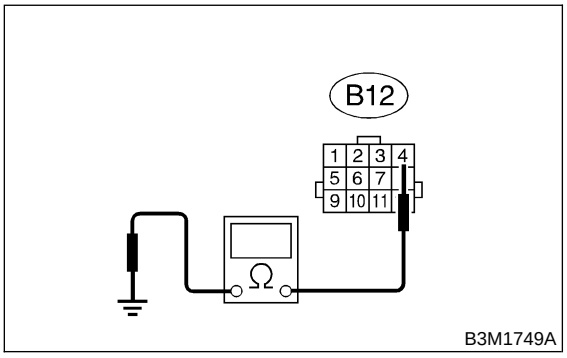
9T21 : CHECK "1" RANGE SWITCH.

CHECK : ***When the "P" range is selected, does "1" range LED light UP?***
YES : Go to step **9T77**.
NO : Go to step SHIFT SOLENOID 1. <Ref. to 3-2 [T9U0].>

9T22 : CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.

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

Connector & terminal
(B12) No. 4 — Chassis ground:

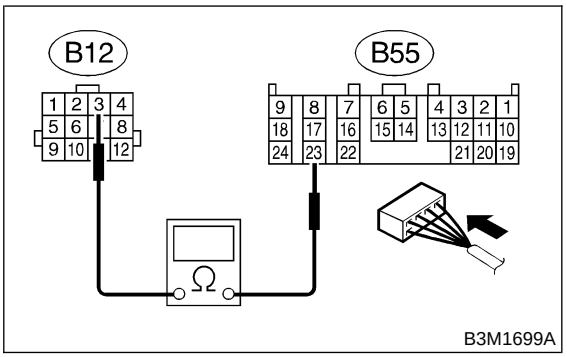


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T23**.
NO : Repair open circuit in harness between inhibitor switch connector and combination meter.

9T23 : 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:

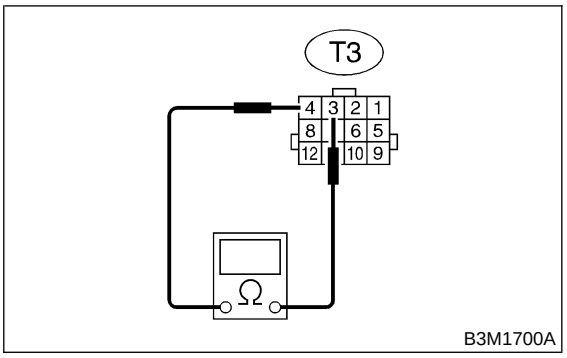


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T24**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T24 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
(T3) No. 4 — No. 3:

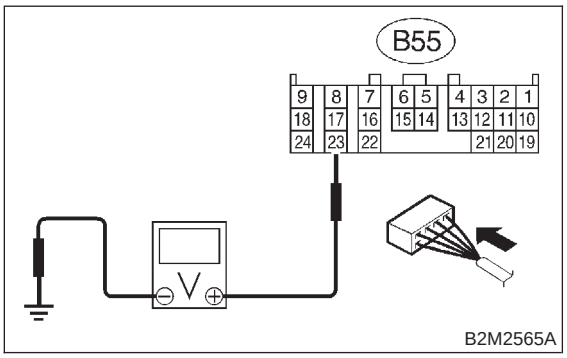


CHECK : ***Is the resistance less than 1 Ω in "P" range?***
YES : Go to step **9T25**.
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T25 : 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 (–):

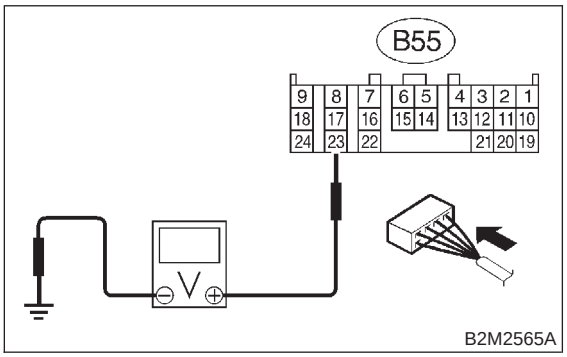


CHECK : ***Is the voltage less than 1 V in "P" range?***
YES : Go to step **9T26**.
NO : Go to step **9T79**.

9T26 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 23 (+) — Chassis ground (–):



CHECK : ***Is the voltage more than 8 V in other ranges?***
YES : Go to step **9T79**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9T27 : CHECK "P" RANGE INDICATOR LIGHT BULB.

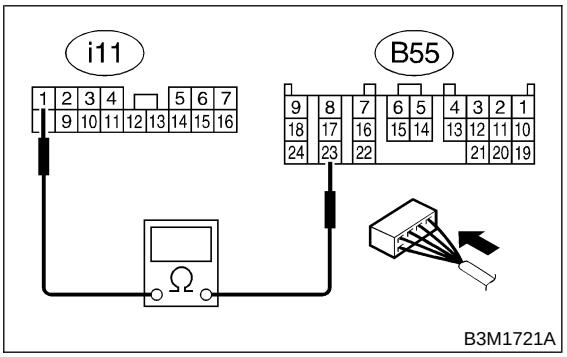
1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove "P" range indicator light bulb from combination meter.

CHECK : ***Is "P" range indicator light bulb OK?***
YES : Go to step **9T28**.
NO : Replace "P" range indicator light bulb. <Ref. to 6-2 [W8B0].>

9T28 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

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

Connector & terminal
(B55) No. 23 — (i11) No. 1:

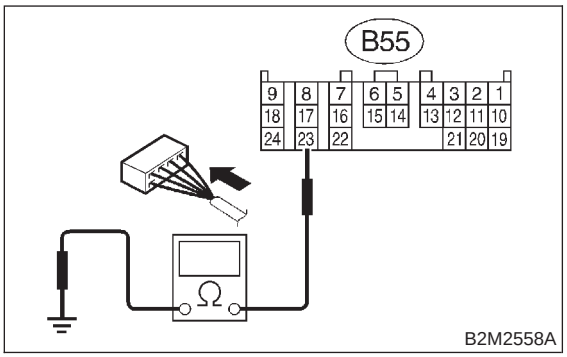


CHECK : ***Is the resistance more than 1 Ω?***
YES : Go to step **9T79**.
NO : Repair open circuit in harness between inhibitor switch connector and combination meter.

9T29 : 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:

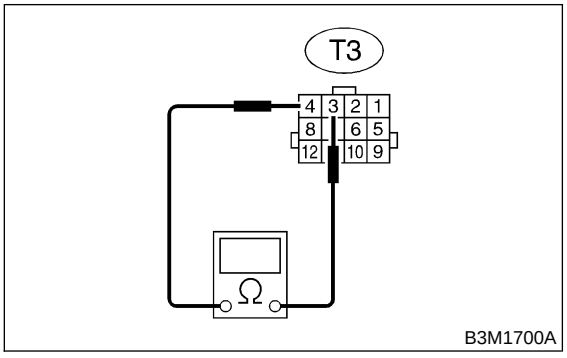


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T30**.
NO : Repair ground short circuit in "P" range circuit.

9T30 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
(T3) No. 4 — No. 3:

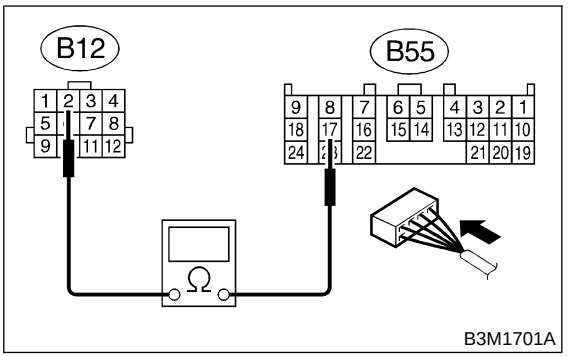


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T31 : 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:

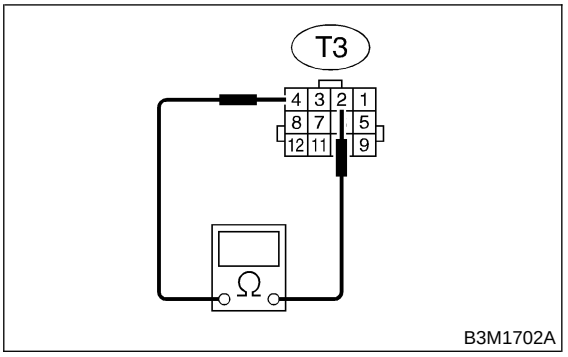


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T32**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T32 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
(T3) No. 2 — No. 4:

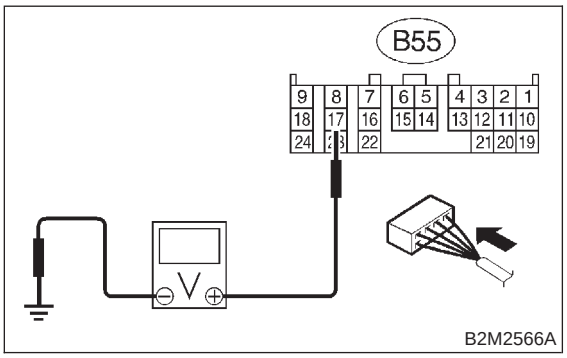


CHECK : ***Is the resistance less than 1 Ω in "R" range?***
YES : Go to step **9T33**.
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T33 : 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 (–):

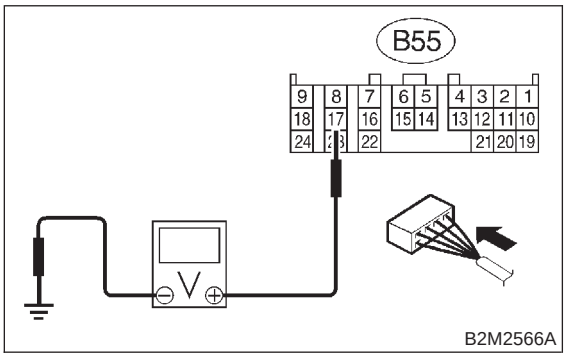


CHECK : ***Is the voltage less than 1 V in "R" range?***
YES : Go to step **9T34**.
NO : Go to step **9T79**.

9T34 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 17 (+) — Chassis ground (–):



CHECK : ***Is the voltage more than 9.5 V in other ranges?***
YES : Go to step **9T79**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9T35 : CHECK "R" RANGE INDICATOR LIGHT BULB.

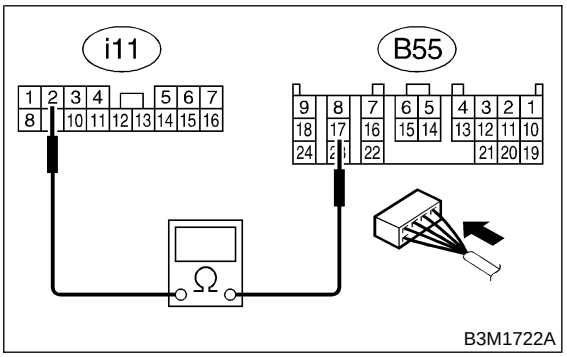
1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove "R" range indicator light bulb from combination meter.

CHECK : ***Is "R" range indicator light bulb OK?***
YES : Go to step **9T36**.
NO : Replace "R" range indicator light bulb. <Ref. to 6-2 [W8B0].>

9T36 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

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

Connector & terminal
(B55) No. 17 — (i11) No. 2

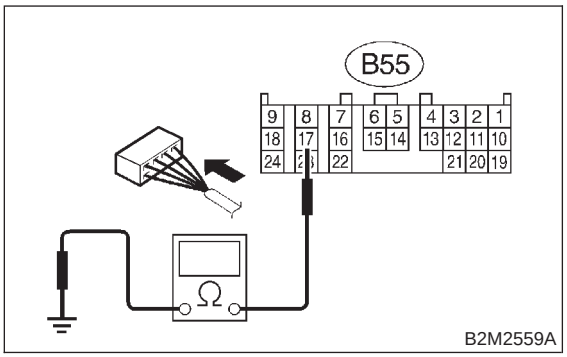


CHECK : ***Is the resistance more than 1 Ω?***
YES : Go to step **9T79**.
NO : Repair open circuit in harness between inhibitor switch connector and combination meter.

9T37 : 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:

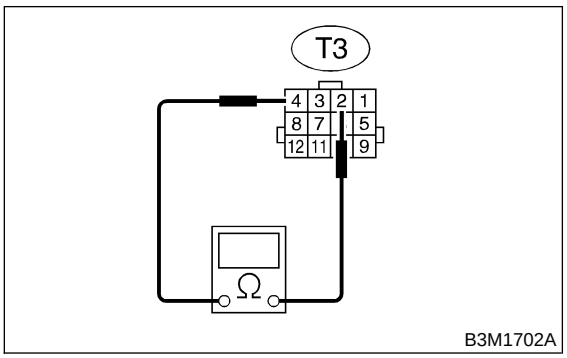


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T38**.
NO : Repair ground short circuit in “R” range circuit.

9T38 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Terminals
(T3) No. 2 — No. 4:

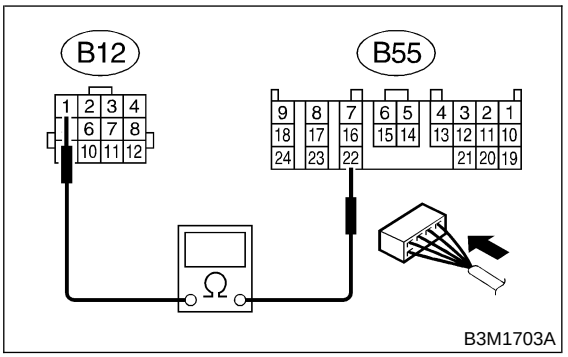


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T39 : 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:

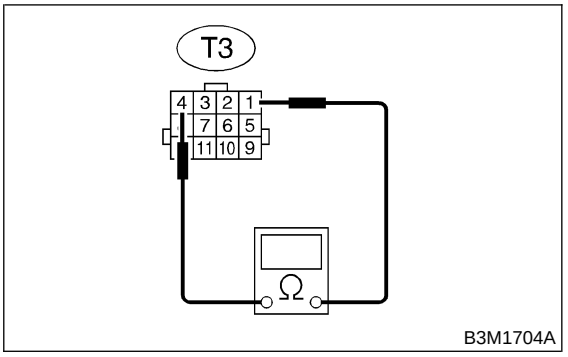


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T40**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T40 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Terminals
(T3) No. 4 — No. 1:

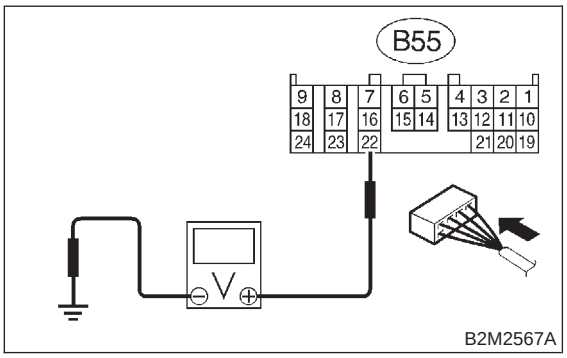


CHECK : ***Is the resistance less than 1 Ω in “N” range?***
YES : Go to step **9T41**.
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T41 : 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 (–):

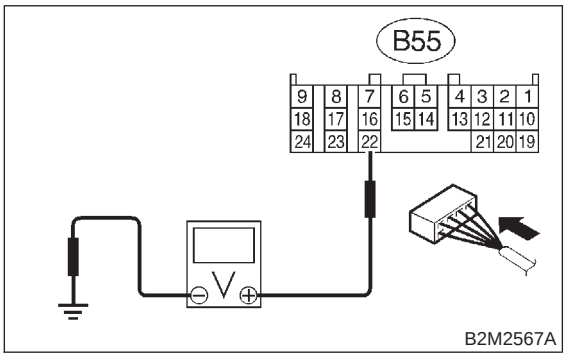


CHECK : ***Is the voltage less than 1 V in "N" range?***
YES : Go to step **9T42**.
NO : Go to step **9T79**.

9T42 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 22 (+) — Chassis ground (–):



CHECK : ***Is the voltage more than 8 V in other ranges?***
YES : Go to step **9T79**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9T43 : CHECK "N" RANGE INDICATOR LIGHT BULB.

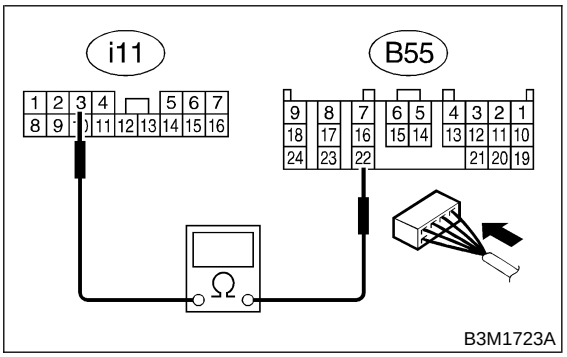
1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove "N" range indicator light bulb from combination meter.

CHECK : ***Is "N" range indicator light bulb OK?***
YES : Go to step **9T44**.
NO : Replace "N" range indicator light bulb. <Ref. to 6-2 [W8B0].>

9T44 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

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

Connector & terminal
(B55) No. 22 — (i11) No. 3:

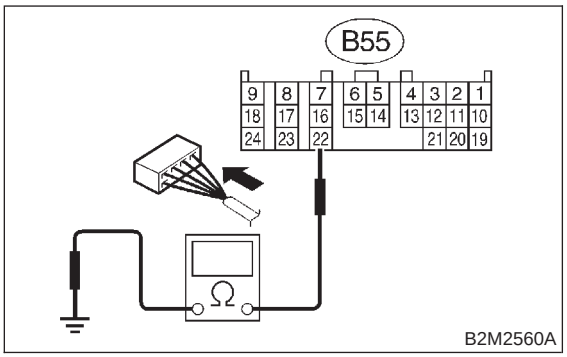


CHECK : ***Is the resistance more than 1 Ω?***
YES : Go to step **9T79**.
NO : Repair open circuit in harness between inhibitor switch connector and combination meter.

9T45 : 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:

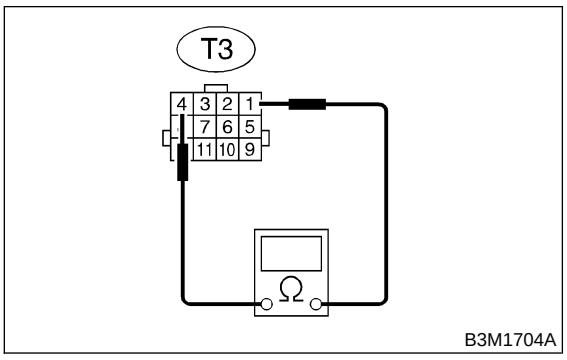


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T47**.
NO : Repair ground short circuit in "N" range circuit.

9T46 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
(T3) No. 1 — No. 4:

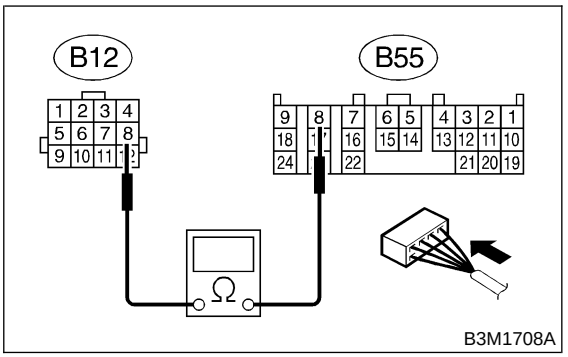


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T47 : 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:

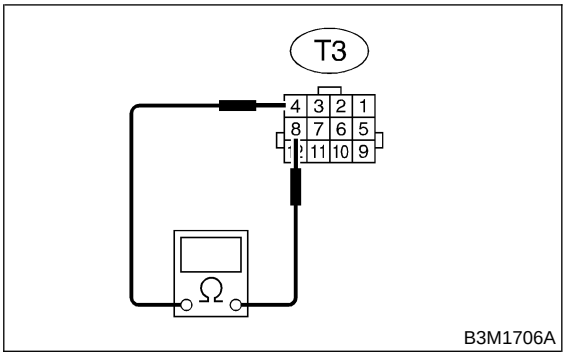


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T48**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T48 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
(T3) No. 4 — No. 8:

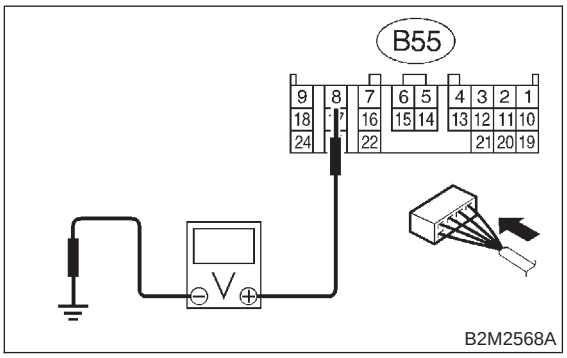


CHECK : ***Is the resistance less than 1 Ω in "D" range?***
YES : Go to step **9T49**.
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T49 : 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 (–):

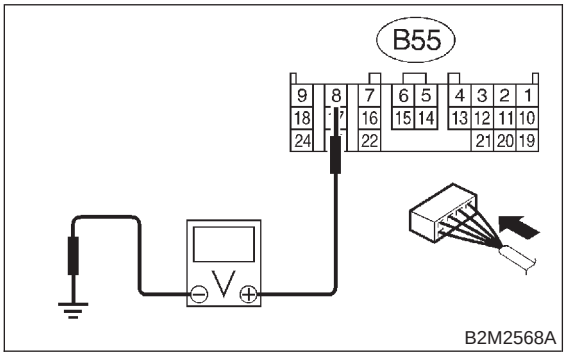


CHECK : ***Is the voltage less than 1 V in "D" range?***
YES : Go to step **9T50**.
NO : Go to step **9T79**.

9T50 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 8 (+) — Chassis ground (–):



CHECK : ***Is the voltage more than 9.5 V in other ranges?***
YES : Go to step **9T79**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9T51 : CHECK "D" RANGE INDICATOR LIGHT BULB.

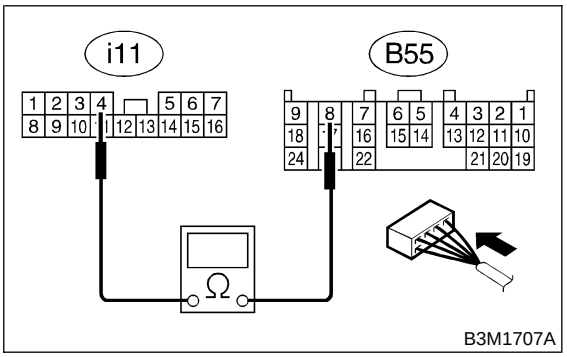
1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove "D" range indicator light bulb from combination meter.

CHECK : ***Is "D" range indicator light bulb OK?***
YES : Go to step **9T52**.
NO : Replace "D" range indicator light bulb. <Ref. to 6-2 [W8B0].>

9T52 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

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

Connector & terminal
(B55) No. 8 — (i11) No. 4:

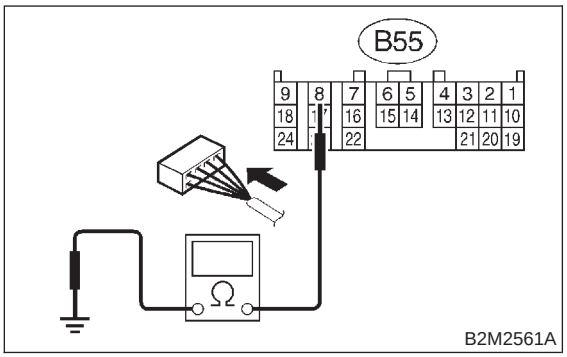


CHECK : ***Is the resistance more than 1 Ω?***
YES : Go to step **9T79**.
NO : Repair open circuit in harness between inhibitor switch connector and combination meter.

9T53 : 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:

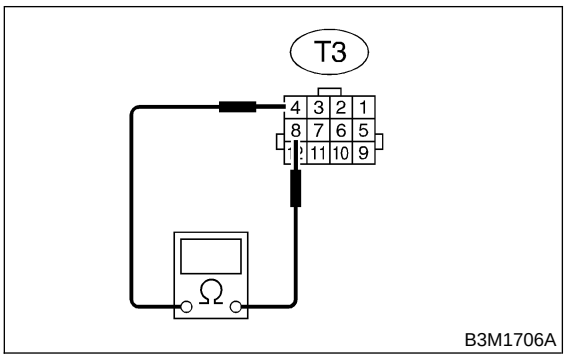


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T54**.
NO : Repair ground short circuit in "D" range circuit.

9T54 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
(T3) No. 4 — No. 8:

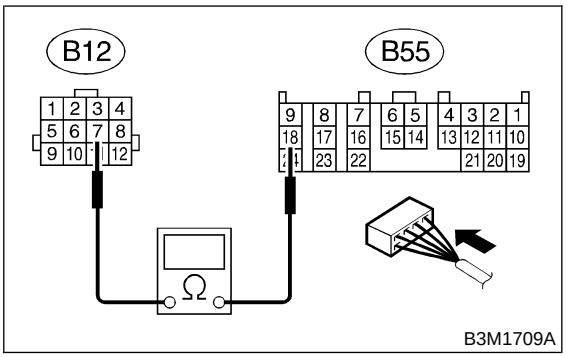


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T55 : 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:

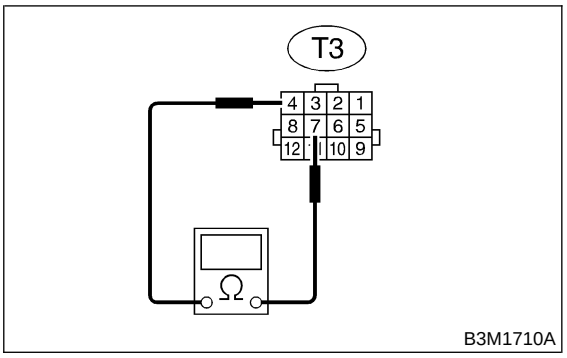


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T56**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T56 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
(T3) No. 4 — No. 7:

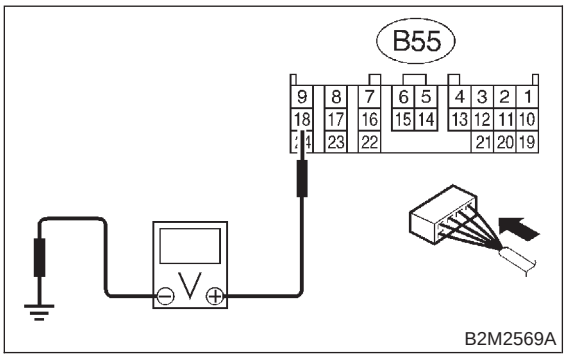


CHECK : ***Is the resistance less than 1 Ω in "3" range?***
YES : Go to step **9T57**.
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T57 : 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 (–):

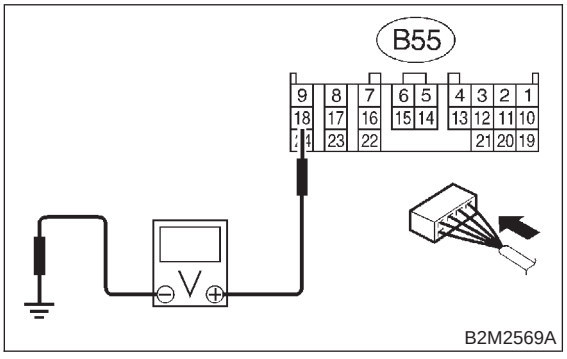


CHECK : ***Is the voltage less than 1 V in "3" range?***
YES : Go to step **9T58**.
NO : Go to step **9T79**.

9T58 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B55) No. 18 (+) — Chassis ground (–):



CHECK : ***Is the voltage more than 9.5 V in other ranges?***
YES : Go to step **9T79**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9T59 : CHECK "3" RANGE INDICATOR LIGHT BULB.

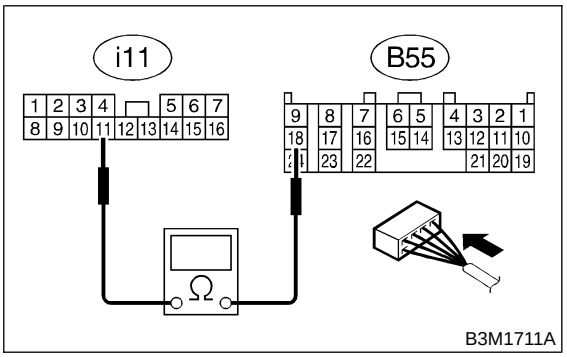
1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove "3" range indicator light bulb from combination meter.

CHECK : ***Is "3" range indicator light bulb OK?***
YES : Go to step **9T60**.
NO : Replace "3" range indicator light bulb. <Ref. to 6-2 [W8B0].>

9T60 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

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

Connector & terminal
(B55) No. 18 — (i11) No. 11:

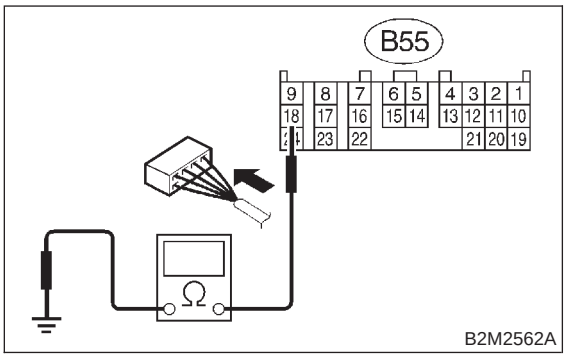


CHECK : ***Is the resistance more than 1 Ω?***
YES : Go to step **9T79**.
NO : Repair open circuit in harness between inhibitor switch connector and combination meter.

9T61 : 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:

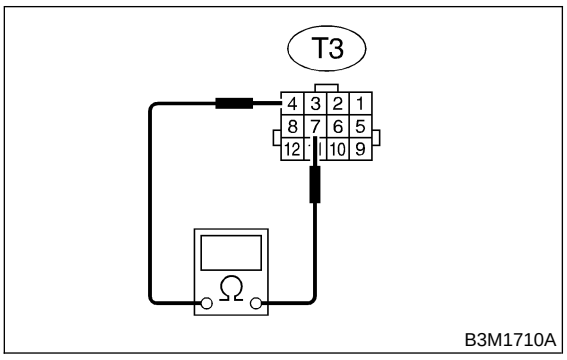


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T62**.
NO : Repair ground short circuit in “3” range circuit.

9T62 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Terminals
(T3) No. 4 — No. 7:

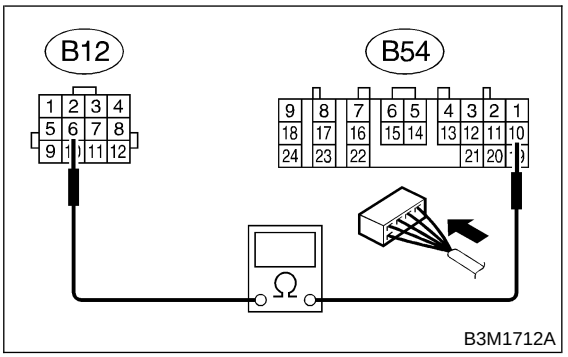


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T63 : 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:

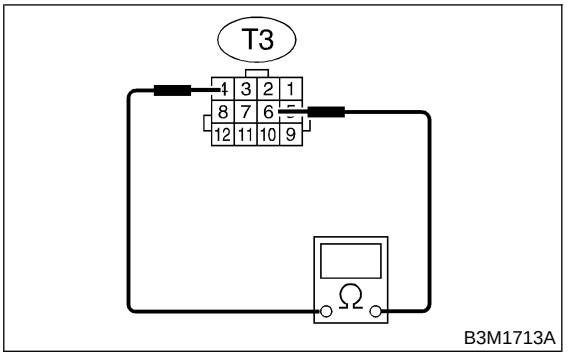


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T64**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T64 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Terminals
(T3) No. 6 — No. 4:

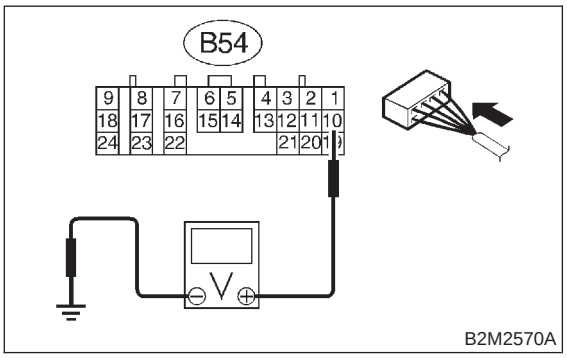


CHECK : ***Is the resistance less than 1 Ω in “2” range?***
YES : Go to step **9T65**.
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T65 : 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 (–):

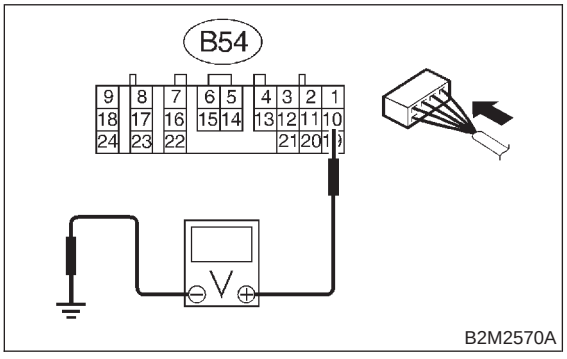


CHECK : ***Is the voltage less than 1 V in "2" range?***
YES : Go to step **9T66**.
NO : Go to step **9T79**.

9T66 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 10 (+) — Chassis ground (–):



CHECK : ***Is the voltage more than 9.5 V in other ranges?***
YES : Go to step **9T79**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9T67 : CHECK "2" RANGE INDICATOR LIGHT BULB.

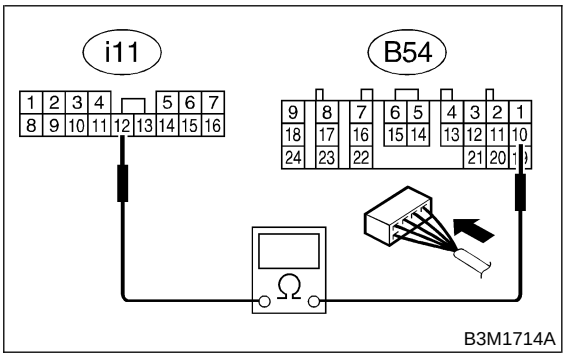
1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove "2" range indicator light bulb from combination meter.

CHECK : ***Is "2" range indicator light bulb OK?***
YES : Go to step **9T68**.
NO : Replace "2" range indicator light bulb. <Ref. to 6-2 [W8B0].>

9T68 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

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

Connector & terminal
(B54) No. 10 — (i11) No. 12:

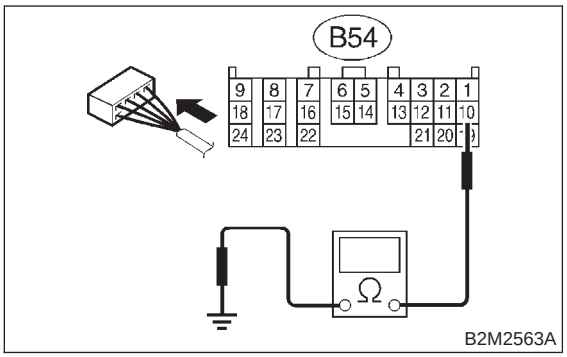


CHECK : ***Is the resistance more than 1 Ω?***
YES : Go to step **9T79**.
NO : Repair open circuit in harness between inhibitor switch and combination meter.

9T69 : 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:

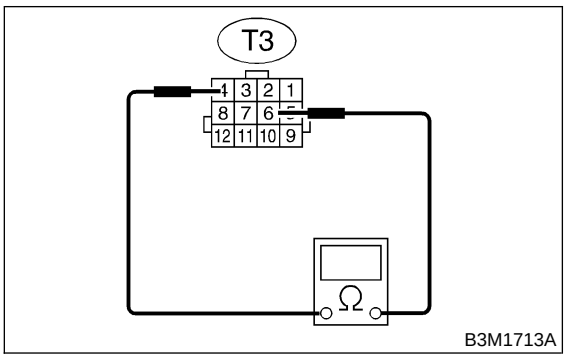


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T70**.
NO : Repair ground short circuit in “2” range circuit.

9T70 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Terminals
(T3) No. 6 — No. 4:

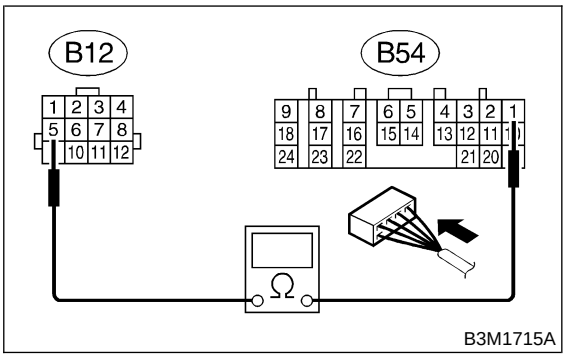


CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T71 : 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:

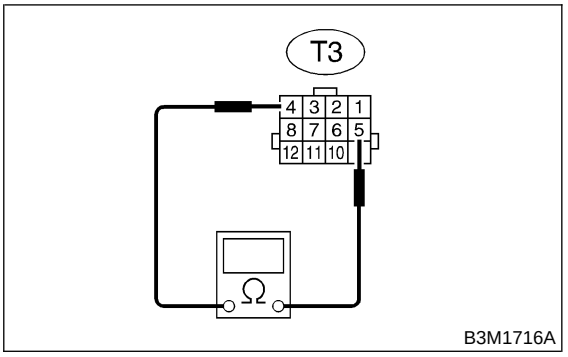


CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **9T72**.
NO : Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

9T72 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle’s terminals.

Terminals
(T3) No. 5 — No. 4:

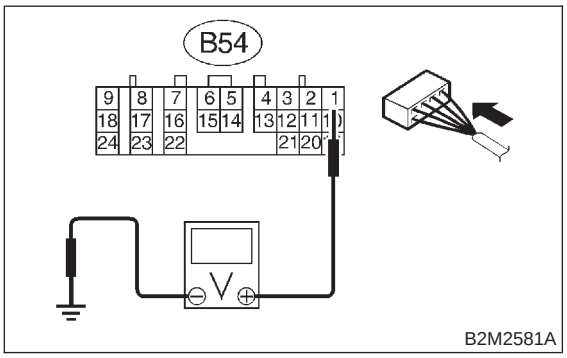


CHECK : ***Is the resistance less than 1 Ω in “1” range?***
YES : Go to step **9T73**.
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T73 : 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 (–):

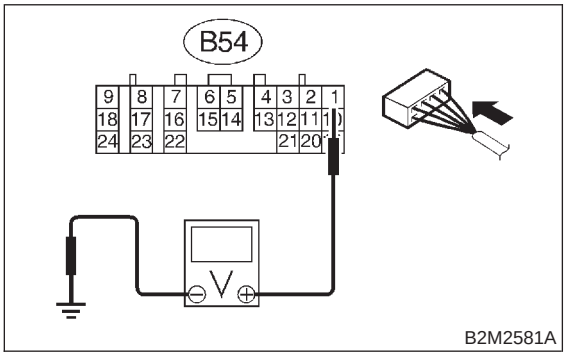


CHECK : ***Is the voltage less than 1 V in "1" range?***
YES : Go to step **9T74**.
NO : Go to step **9T79**.

9T74 : CHECK INPUT SIGNAL FOR TCM.

Measure voltage between TCM and chassis ground.

Connector & terminal
(B54) No. 1 (+) — Chassis ground (–):



CHECK : ***Is the voltage more than 9.5 V in other ranges?***
YES : Go to step **9T79**.
NO : Replace TCM. <Ref. to 3-2 [W23A0].>

9T75 : CHECK "1" RANGE INDICATOR LIGHT BULB.

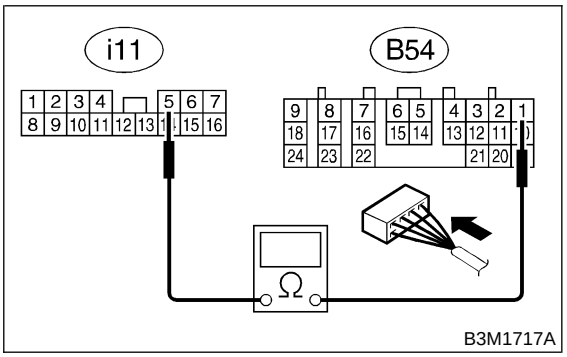
1) Turn ignition switch to OFF.
2) Remove combination meter.
3) Remove "1" range indicator light bulb from combination meter.

CHECK : ***Is "1" range indicator light bulb OK?***
YES : Go to step **9T76**.
NO : Replace "1" range indicator light bulb. <Ref. to 6-2 [W8B0].>

9T76 : CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.

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

Connector & terminal
(B54) No. 1 — (i11) No. 5:

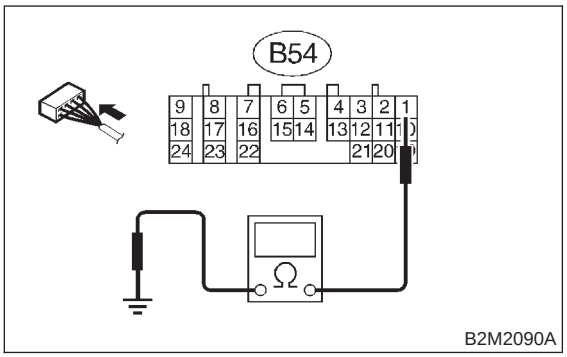


CHECK : ***Is the resistance more than 1Ω?***
YES : Go to step **9T79**.
NO : Repair open circuit in harnes between inhibitor switch and combination meter.

9T77 : 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:

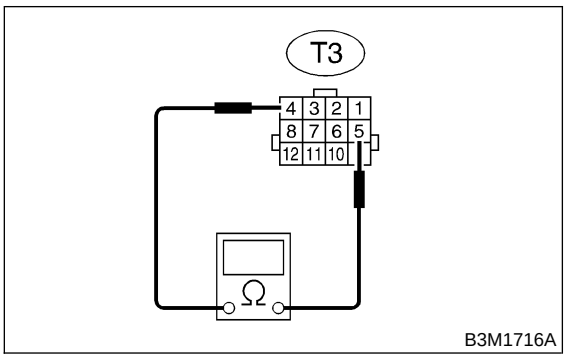


CHECK : ***Is the resistance more than 1 MΩ?***
YES : Go to step **9T78**.
NO : Repair ground short circuit in "1" range circuit.

9T78 : CHECK INHIBITOR SWITCH.

Measure resistance between inhibitor switch connector receptacle's terminals.

Terminals
(T3) No. 5 — No. 4:



CHECK : ***Is the resistance more than 1 MΩ in other ranges?***
YES : Replace TCM. <Ref. to 3-2 [W23A0].>
NO : Adjust inhibitor switch. <Ref. to 3-2 [W200].>

9T79 : CHECK POOR CONTACT.

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

U: CHECK SHIFT SOLENOID 1.

9U1 : CHECK SHIFT SOLENOID 1.

CHECK : ***Does the LED of shift solenoid 1 light up?***
YES : Go to step SHIFT SOLENOID 2. <Ref. to 3-2 [T9V0].>
NO : Check shift solenoid 1 circuit. <Ref. to 3-2 [T8J0].>

V: CHECK SHIFT SOLENOID 2.

9V1 : CHECK SHIFT SOLENOID 2.

CHECK : ***Does the LED of shift solenoid 2 light up?***
YES : Go to step TORQUE CONTROL 1 SIGNAL. <Ref. to 3-2 [T9W0].>
NO : Check shift solenoid 2 circuit. <Ref. to 3-2 [T8K0].>

W: CHECK TORQUE CONTROL 1 SIGNAL.

9W1 : CHECK TORQUE CONTROL 1 SIGNAL.

Turn ignition switch to ON (engine ON).

CHECK : ***Does the LED of torque control 1 signal light up?***
YES : Go to step TORQUE CONTROL 2 SIGNAL. <Ref. to 3-2 [T9X0].>
NO : Check torque control 1 signal circuit. <Ref. to 3-2 [T8H0].>

X: CHECK TORQUE CONTROL 2 SIGNAL.

9X1 :	CHECK TORQUE CONTROL 2 SIGNAL.

Turn ignition switch to ON (engine ON).

CHECK : ***Does the LED of torque control 2 signal light up?***

YES : Go to step 2-4 BRAKE TIMING SOLENOID. <Ref. to 3-2 [T9Y0].>

NO : Check torque control 2 signal circuit. <Ref. to 3-2 [T8H0].>

Y: CHECK 2-4 BRAKE TIMING SOLENOID.

9Y1 :	CHECK 2-4 BRAKE TIMING SOLENOID.

Turn ignition switch to ON, and select 1 range.

CHECK : ***Does the LED of 2-4 brake timing solenoid light up?***

YES : Go to step LOW CLUTCH TIMING SOLENOID. <Ref. to 3-2 [T9Z0].>

NO : Check 2-4 brake timing solenoid circuit. <Ref. to 3-2 [T8M0].>

Z: CHECK LOW CLUTCH TIMING SOLENOID.

9Z1 :	CHECK LOW CLUTCH TIMING SOLENOID.

Turn ignition switch to ON, and select 2 range.

CHECK : ***Does the LED of low clutch timing solenoid light up?***

YES : Go to step DIAGNOSIS LAMP. <Ref. to 3-2 [T9AA0].>

NO : Check low clutch timing solenoid circuit. <Ref. to 3-2 [T8L0].>

AA: CHECK DIAGNOSIS LAMP.

9AA1 :	CHECK DIAGNOSIS WARNING LAMP.

Turn ignition switch to ON (engine OFF).

CHECK : ***Does diagnosis lamp light up?***

YES : Go to step FWD LAMP. <Ref. to 3-2 [T9AB0].>

NO : Check diagnosis lamp circuit. <Ref. to 3-2 [T7A0].>

AB: CHECK FWD LAMP.

9AB1 :	CHECK FWD LAMP.

CHECK : ***Does the LED of FWD lamp light up?***

YES : Check FWD lamp circuit. <Ref. to 3-2 [T9P0].>

NO : Go to step General Diagnostic Table. <Ref. to 3-2 [T1000].>

10. General Diagnostic Table

Symptom	Problem parts
Starter does not rotate when select lever is in “P” or “N”; starter rotates when select lever is in “R”, “D”, “3” or “2”.	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 3) Reduction gear 4) Differential gear oil level too high or too low
Noise occurs while driving in “D2”.	
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) Control module 2) Low clutch
Shock occurs when select lever is moved from “N” to “D”.	1) Control module 2) Harness 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from “N” to “D”.	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) Control module 2) Harness 3) Control valve 4) ATF deterioration 5) Dropping resistor
Excessive time lag occurs when select lever is moved from “N” to “R”.	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	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) Control module 2) Control valve 3) High clutch 4) 2-4 brake 5) Planetary gear
Acceleration is poor when select lever is in “R” (normal stall rpm).	1) Control valve 2) High clutch 3) 2-4 brake 4) Planetary gear
No shift occurs from 1st to 2nd gear.	1) Control module 2) Vehicle speed sensor 1 (Rear) 3) Vehicle speed sensor 2 (Front) 4) Throttle position sensor 5) Shift solenoid 1 6) Control valve 7) 2-4 brake
No shift occurs from 2nd to 3rd gear.	1) Control module 2) Control valve 3) High clutch 4) Shift solenoid 2

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	1) Control module 2) Shift solenoid 1 3) ATF temperature sensor 4) Control valve 5) 2-4 brake
Engine brake is not effected when select lever is in “3” range.	1) Inhibitor switch 2) Control module 3) Throttle position sensor 4) Control valve
Engine brake is not effected when select lever is in “3” or “2” range.	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) Control module 3) Vehicle speed sensor 1 (Front) 4) Vehicle speed sensor 2 (Rear) 5) Throttle position sensor 6) Control valve 7) Ground earth
No lock-up occurs.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Control valve 5) Lock-up facing 6) Engine speed signal
Parking brake is not effected.	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) Control module 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake 8) ATF deterioration 9) Engine performance 10) Dropping resistor 11) 2-4 brake timing solenoid
Slippage occurs from 1st to 2nd gear.	1) Control module 2) Throttle position sensor 3) 2-4 brake duty solenoid 4) ATF temperature sensor 5) Line pressure duty solenoid 6) Control valve 7) 2-4 brake 8) 2-4 brake timing solenoid 9) High clutch

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

Symptom	Problem parts
Shock occurs when select lever is moved from “2” to “1” range.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) Low & reverse clutch 7) ATF deterioration 8) 2-4 brake duty solenoid 9) 2-4 brake timing solenoid 10) Low clutch timing solenoid
Shock occurs when accelerator pedal is released at medium speeds.	1) Control module 2) Throttle position sensor 3) ATF temperature sensor 4) Line pressure duty solenoid 5) Control valve 6) Lock-up damper 7) Engine performance 8) 2-4 brake duty solenoid 9) 2-4 brake timing solenoid 10) Low clutch timing solenoid
Vibration occurs during straight-forward operation.	1) Control module 2) Lock-up duty solenoid 3) Lock-up facing 4) Lock-up damper
Vibration occurs during turns (tight corner “braking” phenomenon).	1) Control module 2) Vehicle speed sensor 1 (Front) 3) Vehicle speed sensor 2 (Rear) 4) Throttle position sensor 5) ATF temperature sensor 6) Transfer clutch 7) Transfer valve 8) Transfer duty solenoid 9) ATF deterioration 10) Harness
Front wheel slippage occurs during standing starts.	1) Control module 2) Vehicle speed sensor 2 (Front) 3) FWD switch 4) Throttle position sensor 5) ATF temperature sensor 6) Control valve 7) Transfer clutch 8) Transfer valve 9) Transfer pipe 10) Transfer duty solenoid
Vehicle is not set in FWD mode.	1) Control module 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

MEMO: