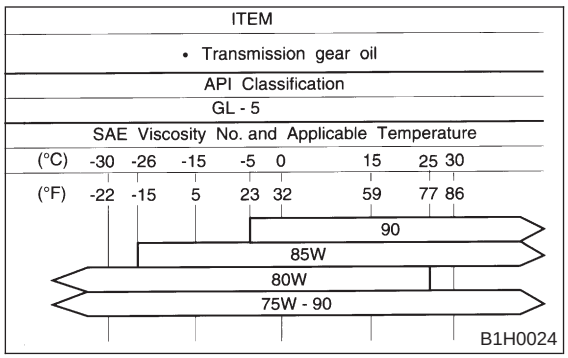
1. Manual Transmission and Differential

Item			Model
			AWD
			2500 cc
Type			5-forward speeds with synchromesh and 1-reverse
Transmission gear ratio		1st	3.545
		2nd	2.111
		3rd	1.448
		4th	1.088
		5th	0.780
		Reverse	3.416
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	4.111
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)
Transmission gear oil			GL-5
Transmission oil capacity			3.5 ℓ (3.7 US qt, 3.1 Imp qt)

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

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

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

Selection of main shaft rear plate

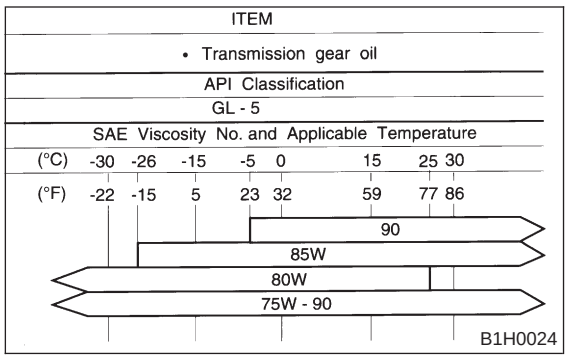
Main shaft rear plate		
Dimension “A” mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

1. Manual Transmission and Differential

Item			Model
			AWD
			2500 cc
Type			5-forward speeds with synchromesh and 1-reverse
Transmission gear ratio		1st	3.545
		2nd	2.111
		3rd	1.448
		4th	1.088
		5th	0.780
		Reverse	3.416
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	4.111
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)
Transmission gear oil			GL-5
Transmission oil capacity			3.5 ℓ (3.7 US qt, 3.1 Imp qt)

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

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

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

Selection of main shaft rear plate

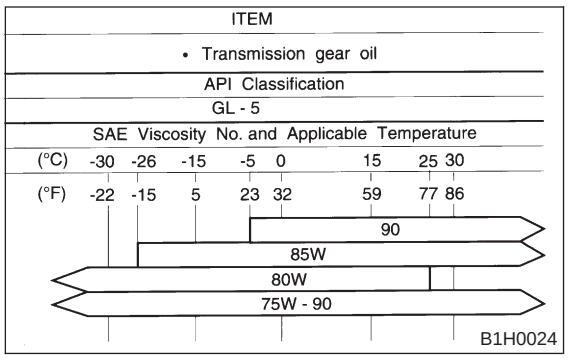
Main shaft rear plate		
Dimension “A” mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

1. Manual Transmission and Differential

Item			Model
			AWD
			2500 cc
Type			5-forward speeds with synchromesh and 1-reverse
Transmission gear ratio		1st	3.545
		2nd	2.111
		3rd	1.448
		4th	1.088
		5th	0.780
		Reverse	3.416
Front reduction gear	Final	Type of gear	Hypoid
		Gear ratio	4.111
Rear reduction gear	Transfer	Type of gear	Helical
		Gear ratio	1.000
	Final	Type of gear	Hypoid
		Gear ratio	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)
Transmission gear oil			GL-5
Transmission oil capacity			3.5 ℓ (3.7 US qt, 3.1 Imp qt)

2. Transmission Gear Oil

Recommended oil



3. Transmission Case Assembly

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

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

Selection of main shaft rear plate

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

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)	32231AA290
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA280

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
32820AA000	0	Further from case wall
32820AA010	No mark	Standard
32820AA020	2	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)
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)	32231AA290
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA280

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
32820AA000	0	Further from case wall
32820AA010	No mark	Standard
32820AA020	2	Closer to the case wall

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

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

6. Shifter Fork And Rod

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
32810AA060	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA070	No mark	Standard
32810AA100	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
32188AA040	1	Neutral position is closer to 1st.
32188AA011	No mark or 2	Standard
32188AA050	3	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
32810AA060	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA070	No mark	Standard
32810AA100	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
32188AA040	1	Neutral position is closer to 1st.
32188AA011	No mark or 2	Standard
32188AA050	3	Neutral position is closer to reverse gear.

Reverse check plate adjustment

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

8. Extension

Snap ring (Inner-72) to ball bearing side clearance
0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Inner-72)	
Part No.	Thickness mm (in)
805172071	1.78 (0.0701)
805172072	1.90 (0.0748)
805172073	2.02 (0.0795)

Snap ring (Outer-30) to ball bearing side clearance
0 — 0.15 mm (0 — 0.0059 in)

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

9. 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)

8. Extension

Snap ring (Inner-72) to ball bearing side clearance
0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Inner-72)	
Part No.	Thickness mm (in)
805172071	1.78 (0.0701)
805172072	1.90 (0.0748)
805172073	2.02 (0.0795)

Snap ring (Outer-30) to ball bearing side clearance
0 — 0.15 mm (0 — 0.0059 in)

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

9. 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)

10. 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)

11. Center Differential

Snap ring (Inner-110) to center differential case clearance
0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Inner-110)	
Part No.	Thickness mm (in)
805100061	2.10 (0.0827)
805100062	2.21 (0.0870)
805100063	2.32 (0.0913)

Backlash adjustment axial movement
0.62 — 0.86 mm (0.0244 — 0.0339 in)

Adjusting washer (45 × 62 × t)	
Part No.	Thickness mm (in)
803045041	1.60 (0.0630)
803045042	1.80 (0.0709)
803045043	2.00 (0.0787)
803045044	2.20 (0.0866)
803045045	2.40 (0.0945)

10. 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)

11. Center Differential

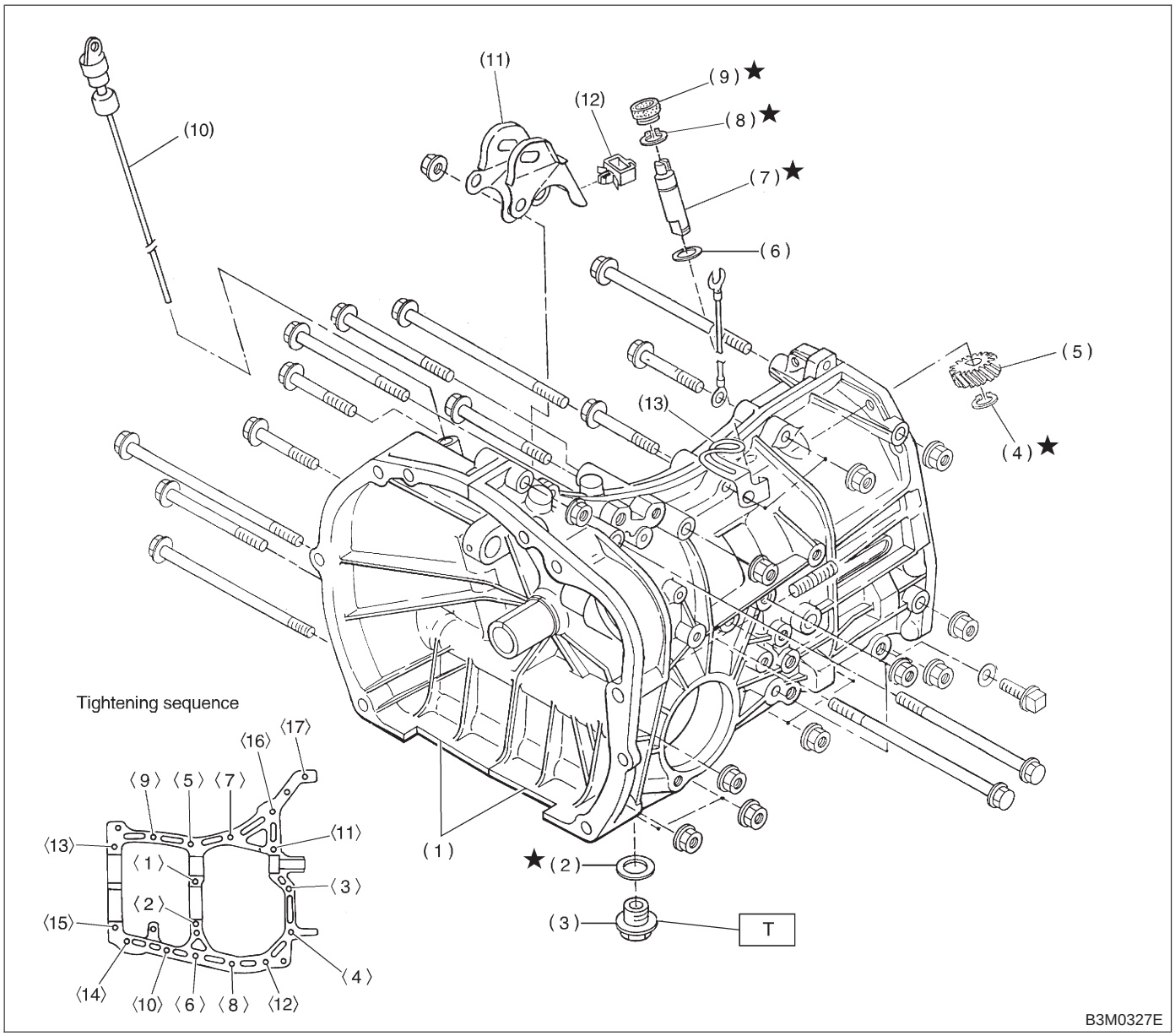
Snap ring (Inner-110) to center differential case clearance
0 — 0.15 mm (0 — 0.0059 in)

Snap ring (Inner-110)	
Part No.	Thickness mm (in)
805100061	2.10 (0.0827)
805100062	2.21 (0.0870)
805100063	2.32 (0.0913)

Backlash adjustment axial movement
0.62 — 0.86 mm (0.0244 — 0.0339 in)

Adjusting washer (45 × 62 × t)	
Part No.	Thickness mm (in)
803045041	1.60 (0.0630)
803045042	1.80 (0.0709)
803045043	2.00 (0.0787)
803045044	2.20 (0.0866)
803045045	2.40 (0.0945)

1. Transmission Case

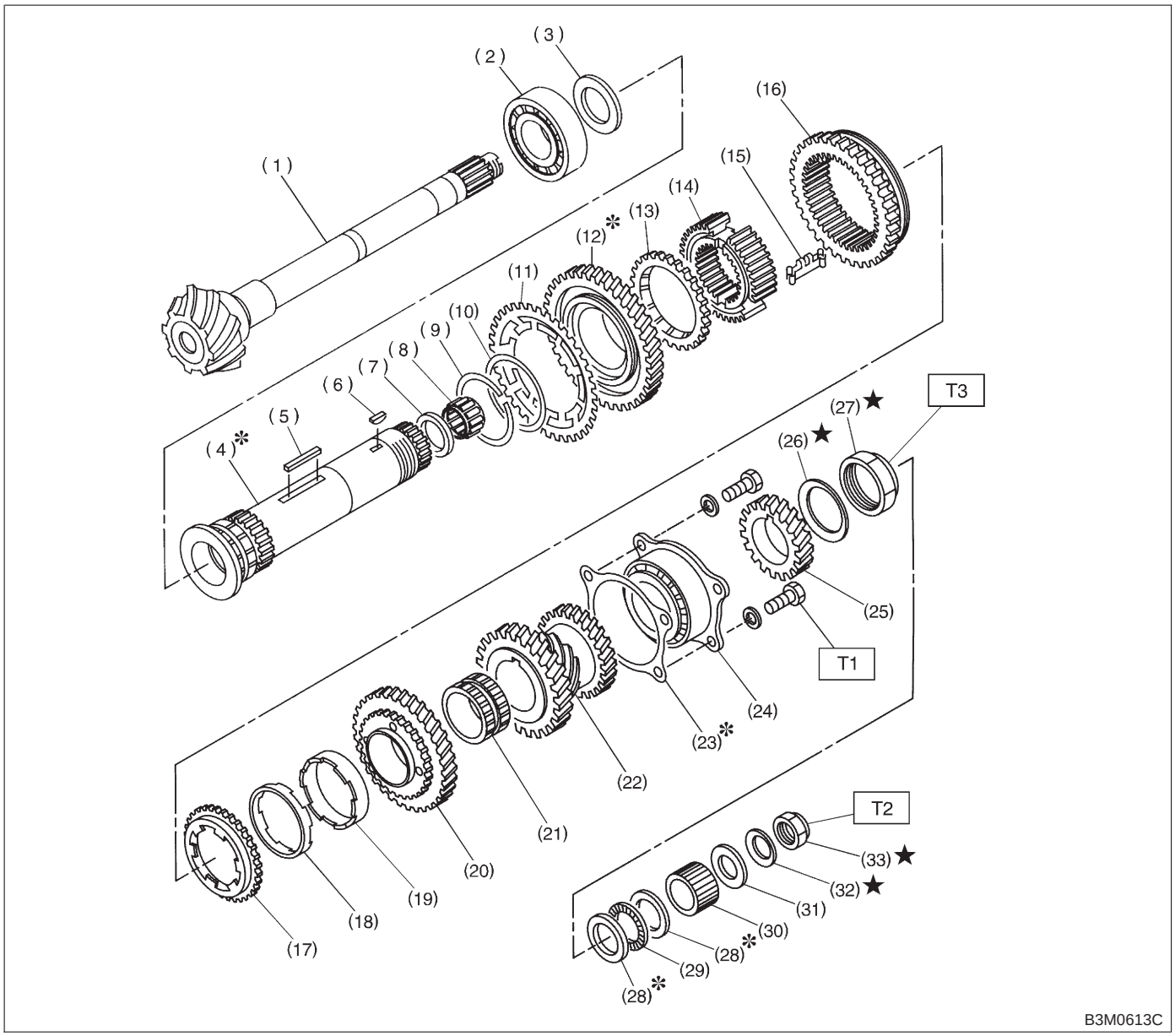


(1) Transmission case ASSY
(2) Gasket
(3) Drain plug
(4) Snap ring (Outer)
(5) Speedometer driven gear
(6) Washer
(7) Speedometer shaft
(8) Snap ring (Outer)
(9) Oil seal
(10) Oil level gauge
(11) Pitching stopper bracket
(12) Clamp
(13) Clip

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

Size	Number	Tightening 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±2 N·m (4.0±0.2 kg-m, 28.9±1.4 ft-lb)

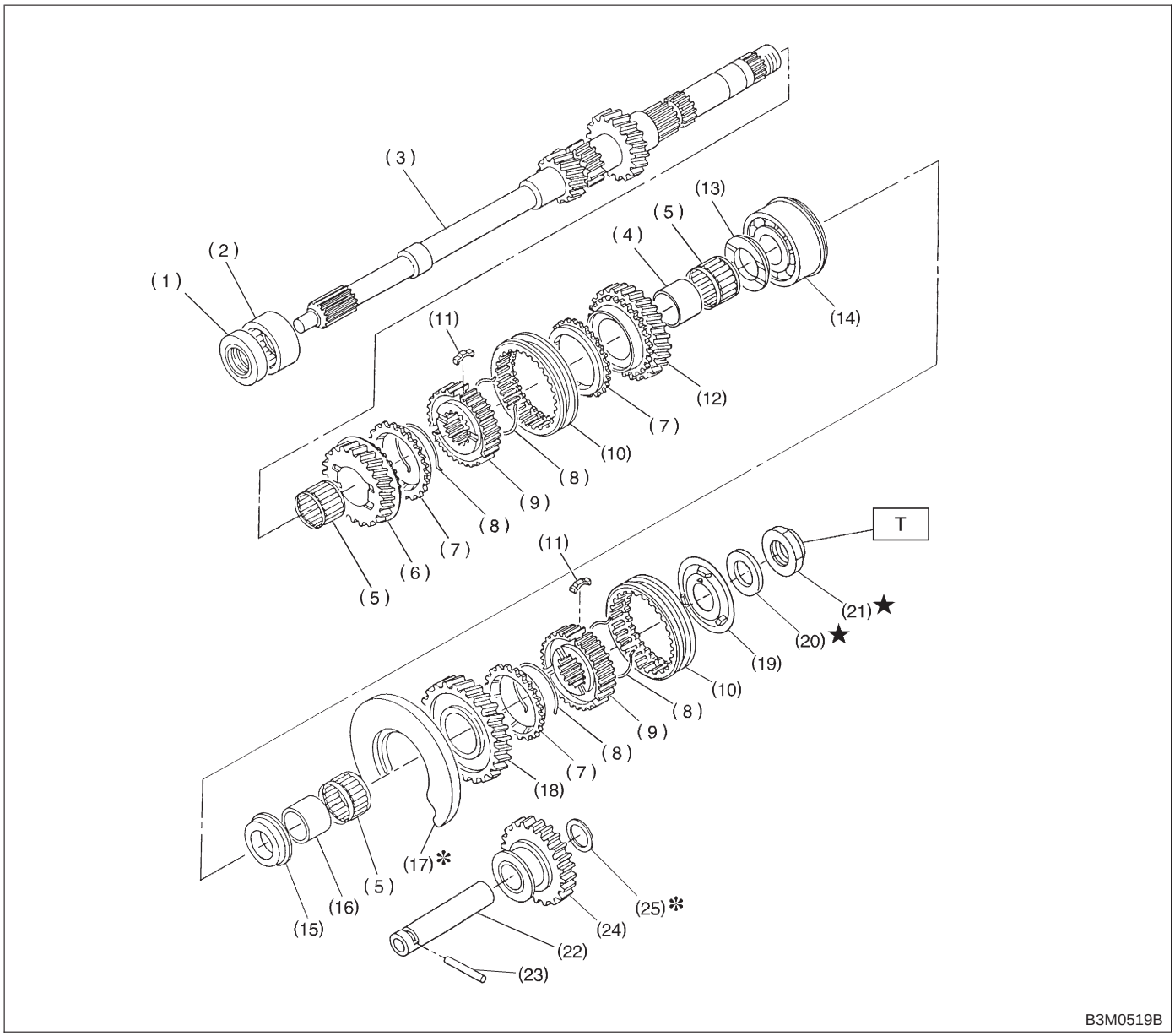
2. Drive Pinion Assembly



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

Tightening torque: N·m (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)

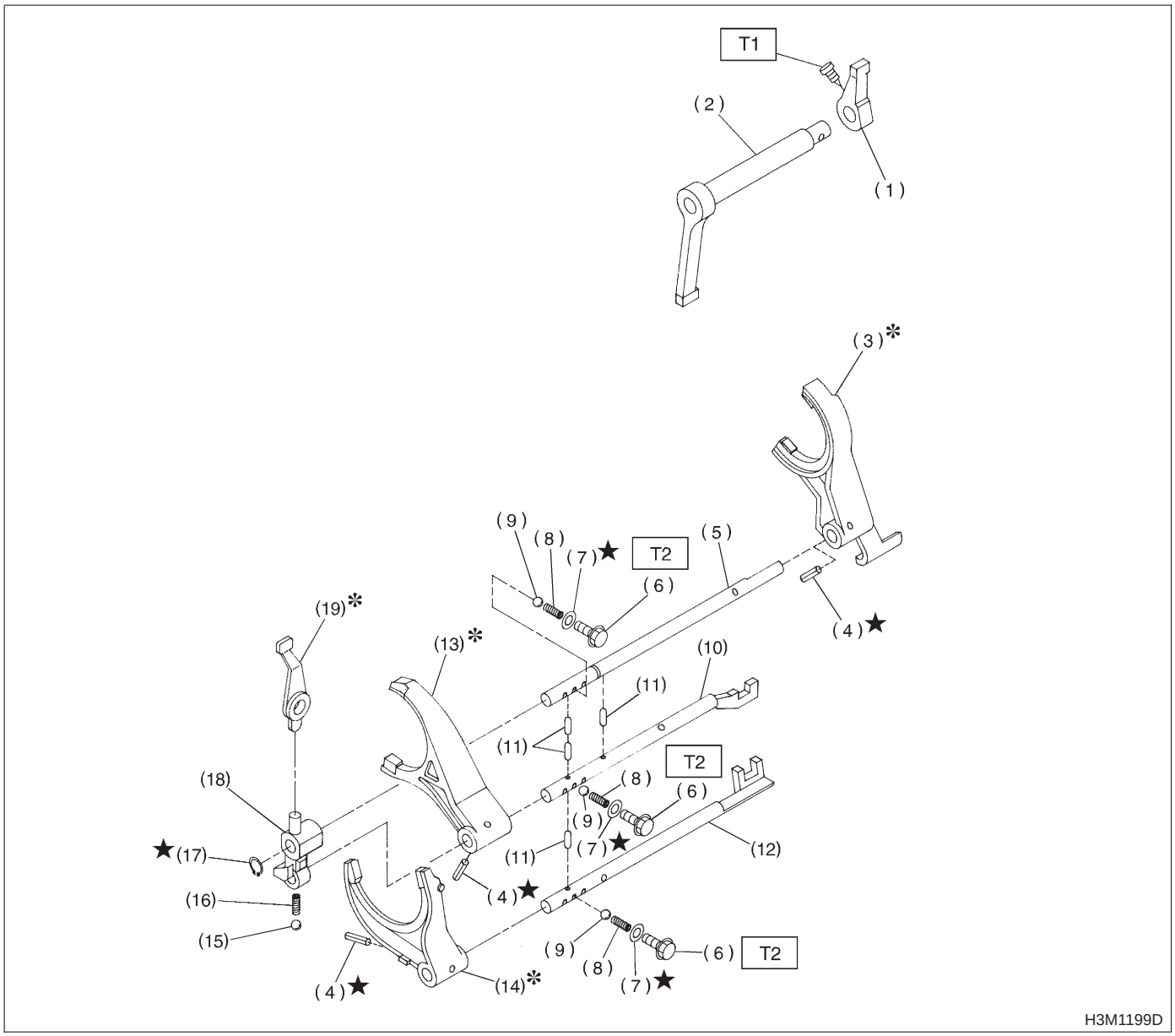
3. Main Shaft Assembly



(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) 4th needle bearing race
(5) Needle bearing
(6) 3rd drive gear
(7) Baulk ring
(8) Synchronizer spring
(9) Synchronizer hub
(10) Coupling sleeve
(11) Shifting insert
(12) 4th drive gear
(13) 4th gear thrust washer
(14) Ball bearing
(15) 5th gear thrust washer
(16) 5th needle bearing race
(17) Main shaft rear plate
(18) 5th drive gear
(19) Insert stopper plate
(20) Lock washer
(21) Lock nut
(22) Reverse idler gear shaft
(23) Straight pin
(24) Reverse idler gear
(25) Washer

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

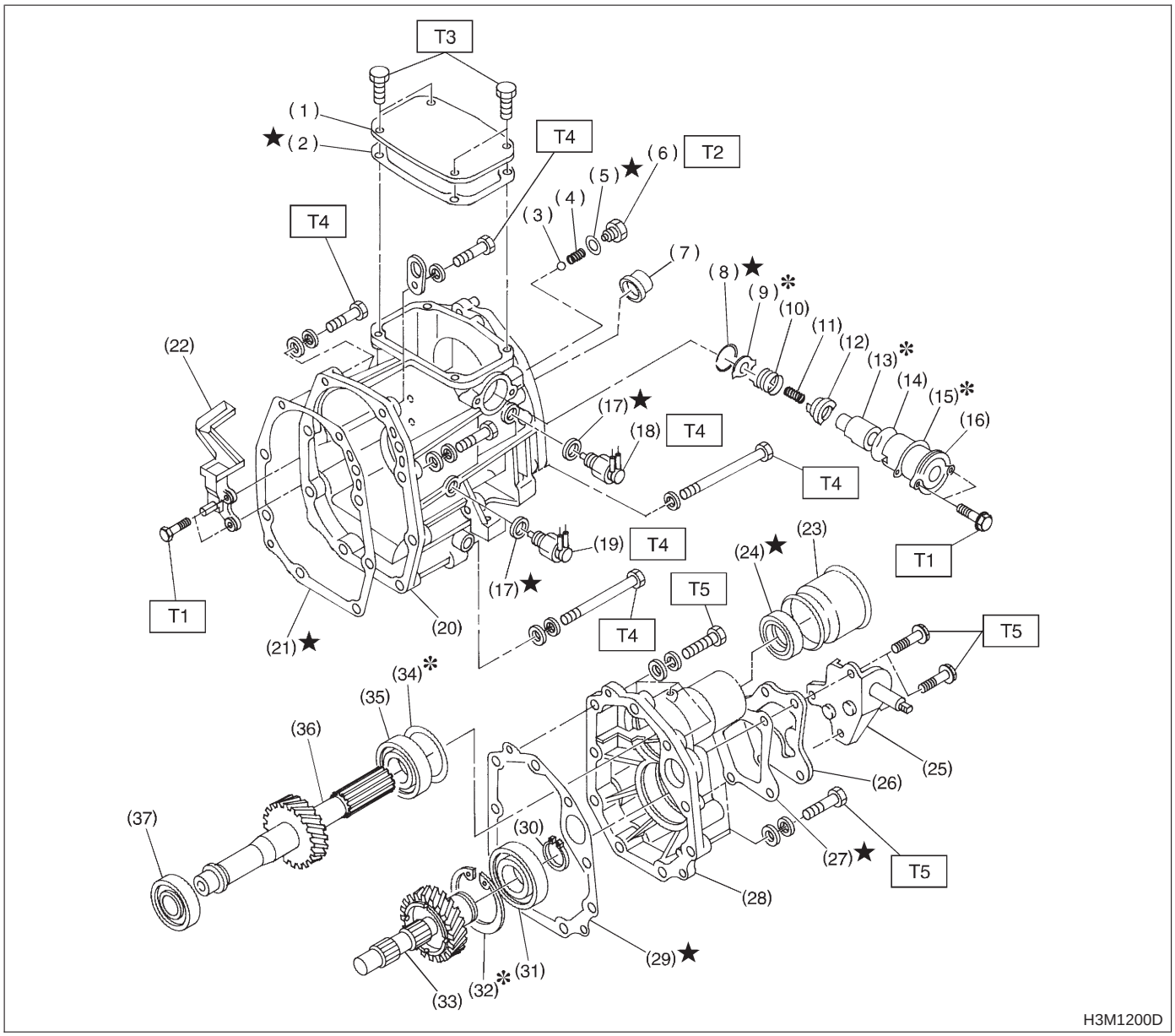
4. Shifter Fork and Shifter Rod



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

Tightening torque: N·m (kg-m, ft-lb)
T1: 10±1 (1.0±0.1, 7.2±0.7)
T2: 19.6±1.5 (2.00±0.15, 14.5±1.1)

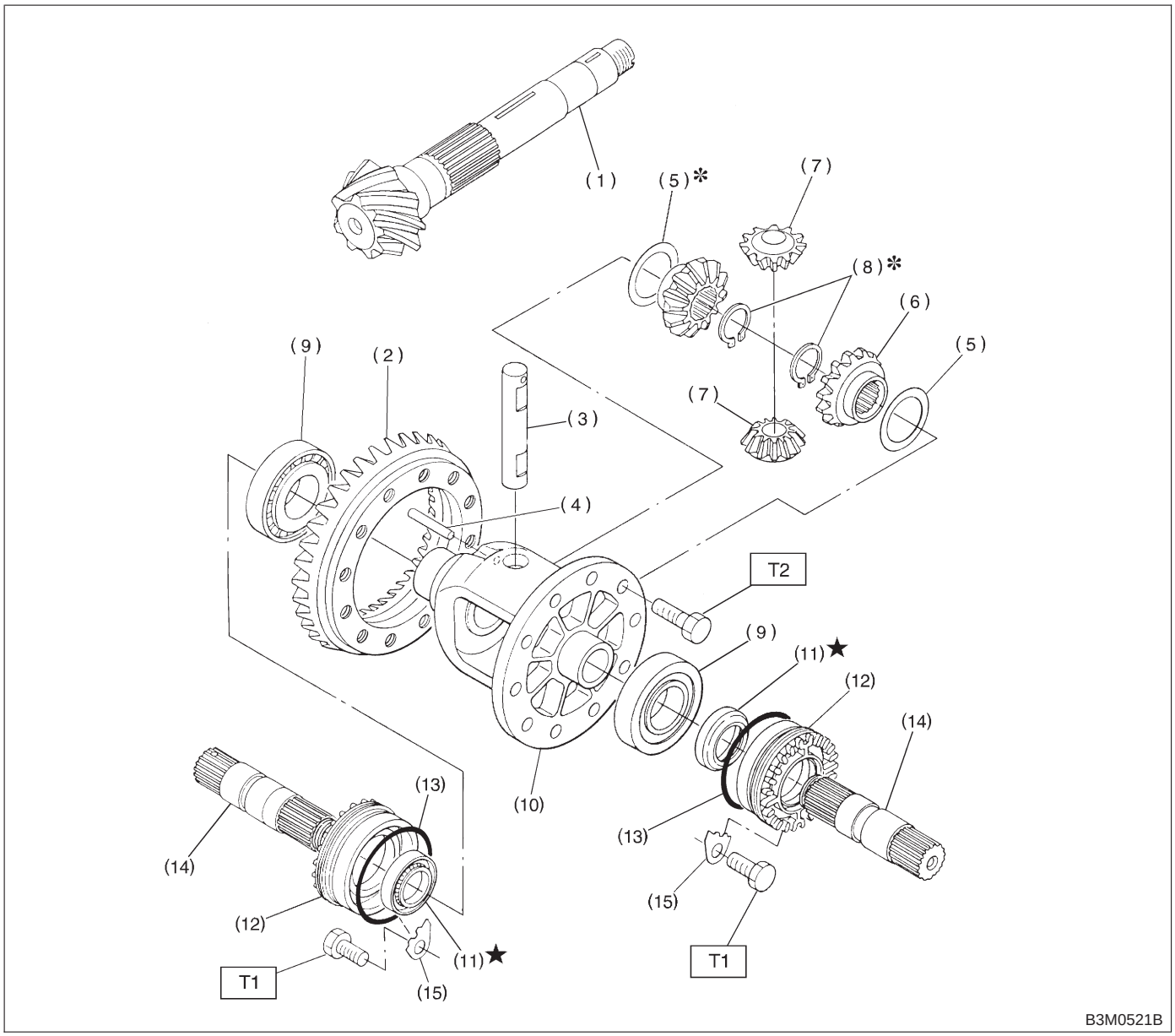
5. Transfer Case and Extension



(1) Transfer cover
(2) Cover gasket
(3) Ball
(4) Reverse accent spring
(5) Gasket
(6) Plug
(7) Oil seal
(8) Snap ring (Inner)
(9) Reverse check plate
(10) Reverse check spring
(11) Reverse return spring
(12) Reverse check cam
(13) Reverse accent shaft
(14) O-ring
(15) Adjusting select shim
(16) Reverse check sleeve
(17) Gasket
(18) Neutral switch
(19) Back-up light switch
(20) Transfer case
(21) Gasket
(22) Oil guide
(23) Dust cover
(24) Oil seal
(25) Shift bracket
(26) Extension cover
(27) Gasket
(28) Extension
(29) Gasket
(30) Snap ring (Outer-30)
(31) Ball bearing
(32) Snap ring (Inner-72)
(33) Transfer drive gear
(34) Adjusting washer
(35) Ball bearing
(36) Transfer driven gear
(37) Ball bearing

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: 15.7±1.5 (1.6±0.15, 11.6±1.1)
T4: 25±2 (2.5±0.2, 18.1±1.4)
T5: 37±3 (3.8±0.3, 27.5±2.2)

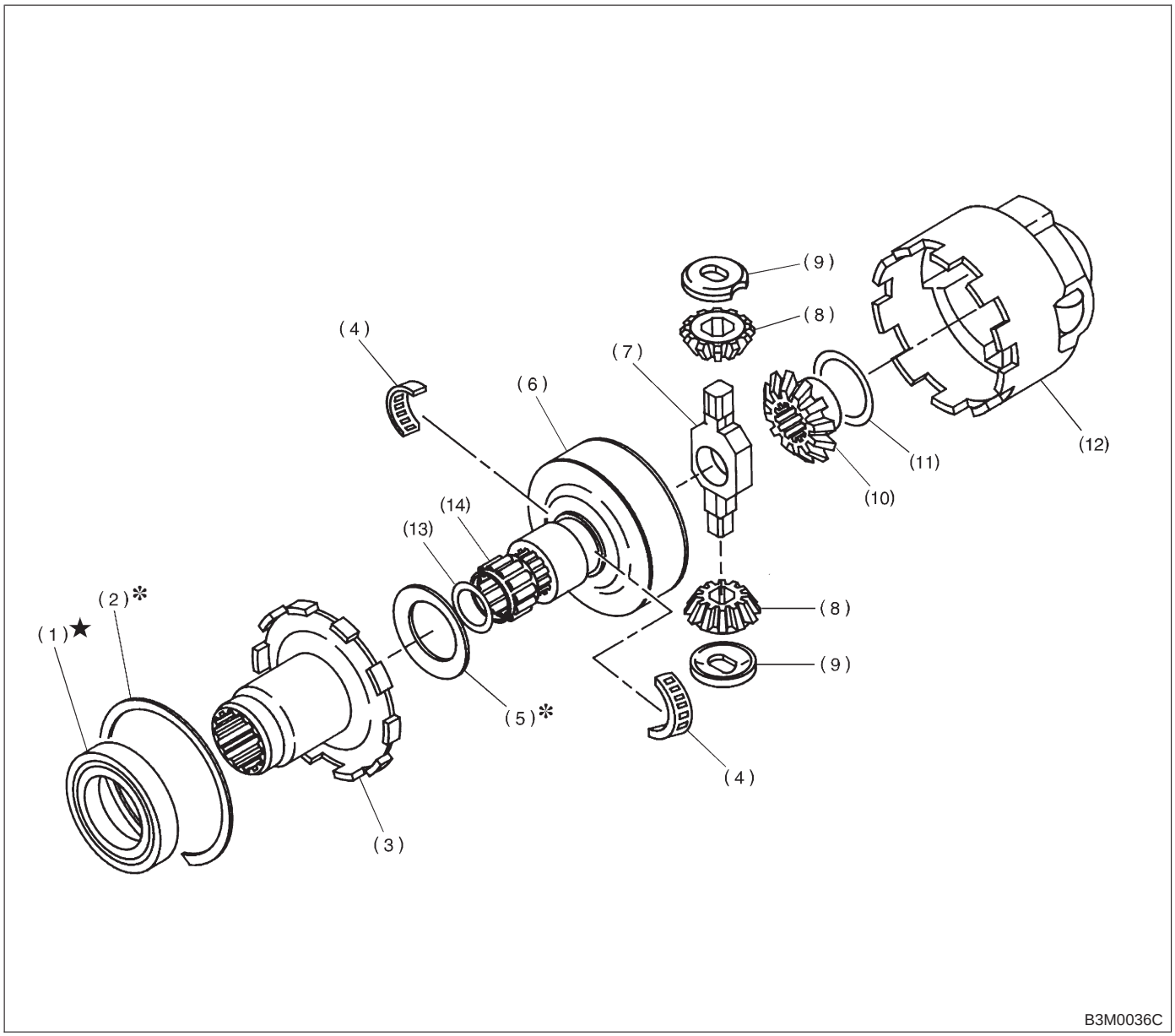
6. Front Differential



(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)

7. Center Differential



(1) Ball bearing
(2) Snap ring (Inner-110)
(3) Center differential cover
(4) Needle bearing
(5) Adjusting washer
(6) Viscous coupling
(7) Pinion shaft
(8) Differential bevel pinion
(9) Retainer
(10) Differential bevel gear
(11) Washer
(12) Center differential case
(13) Snap ring
(14) Roller bearing

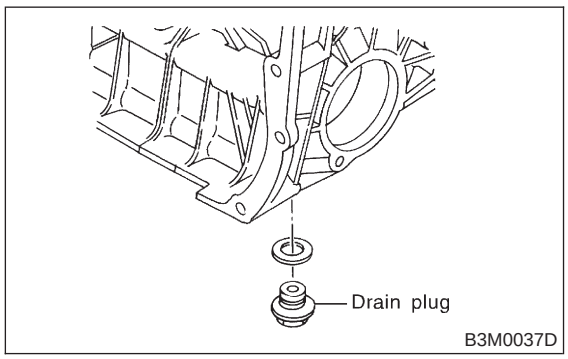
1. General

A: PRECAUTIONS

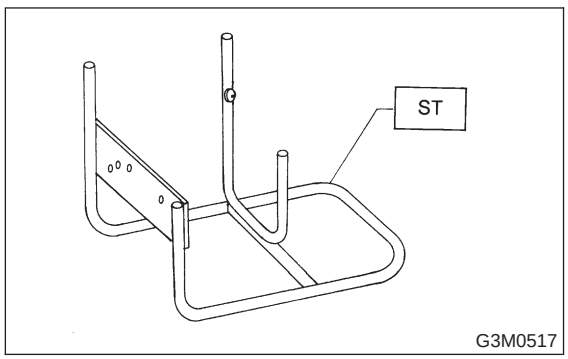
1) Clean oil, grease, dirt and dust from transmission.
2) Remove drain plug to drain oil. After draining, retighten it as before.

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

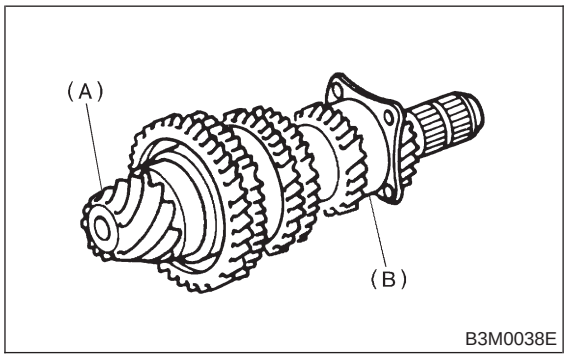


4) Rotating parts should be coated with oil prior to assembly.
5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
6) Gaskets and lock washers must be replaced with new ones.
7) Liquid gasket should be used where specified to prevent leakage.
8) Fill transmission gear oil through the oil level gauge hole up to upper point level gauge. <Ref. to 1-5 [G10A1].>

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

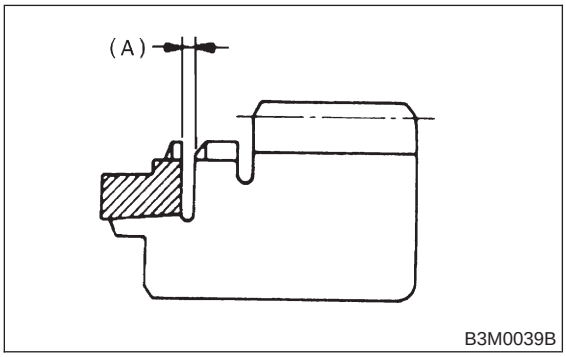
2) Bushing (each gear)
Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

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.

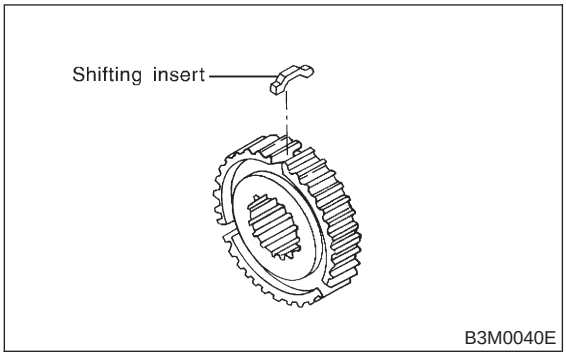
4) Baulk ring
Replace the ring in the following cases:
- When the inner surface and end face are damaged.

● 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.

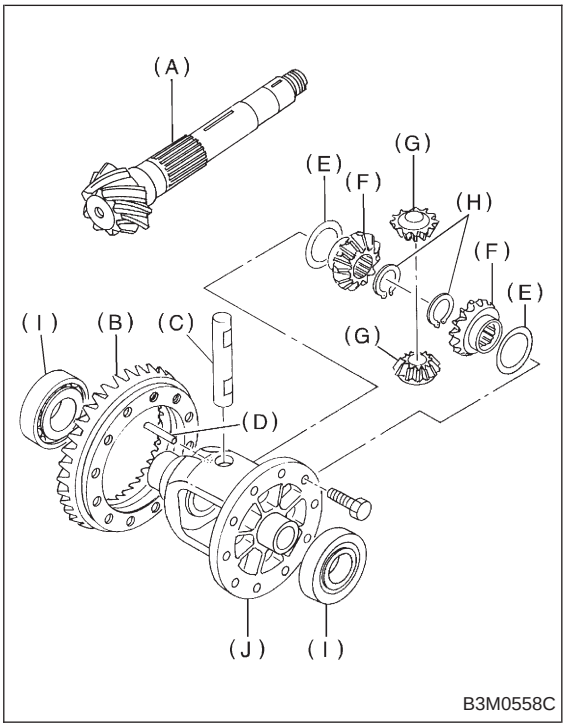
Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



● When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
5) Shifting insert
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.

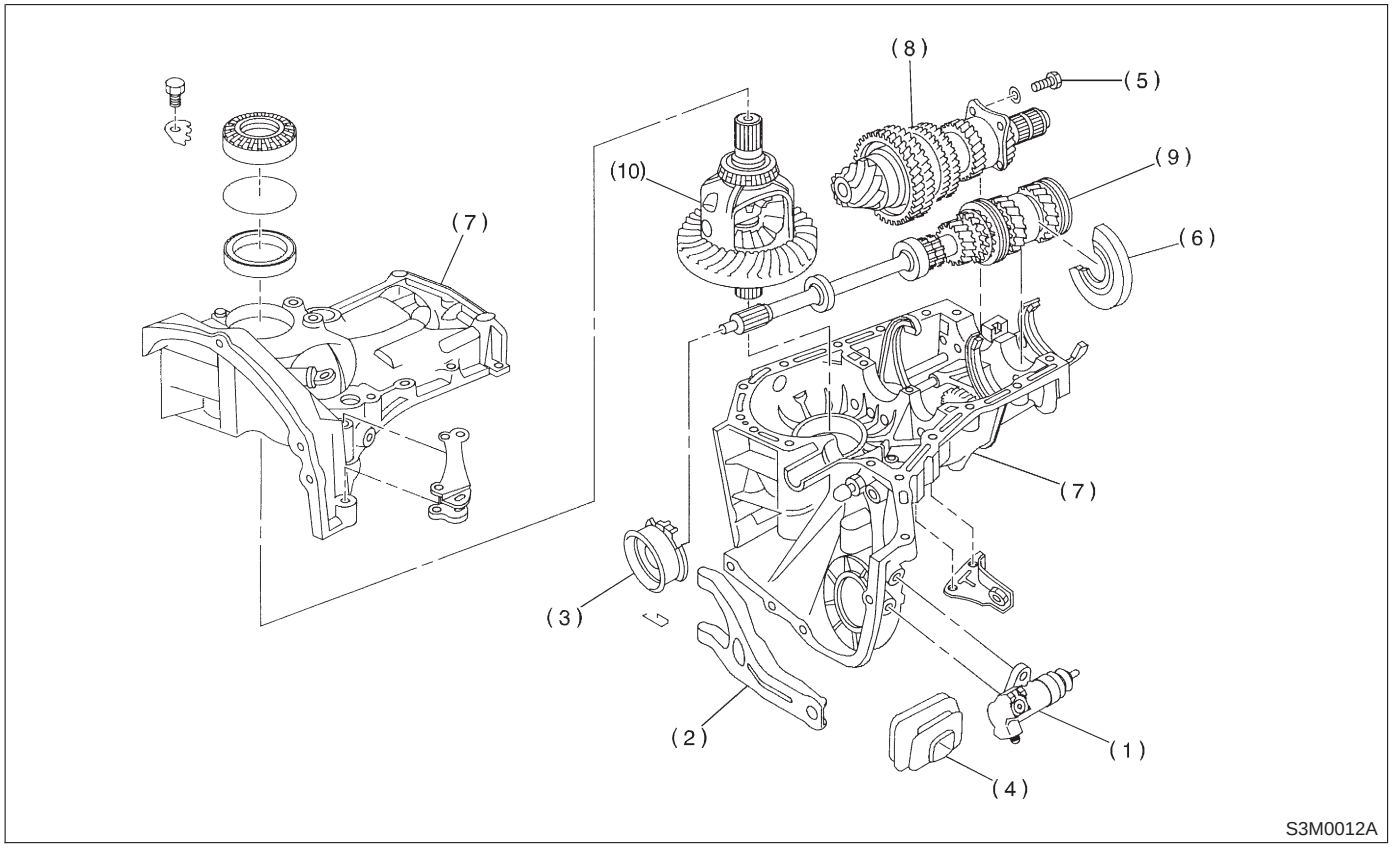


(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Snap ring
(I) Roller bearing
(J) Differential case

2. Transmission Case

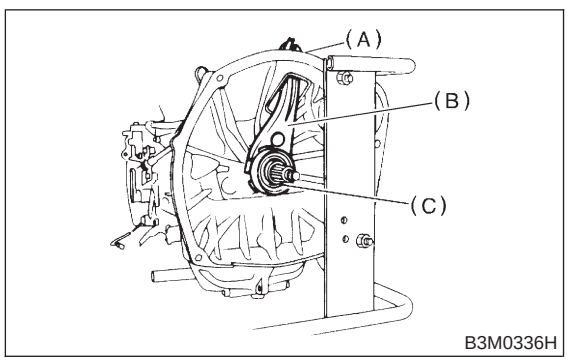
A: DISASSEMBLY

1. SEPARATION OF TRANSMISSION



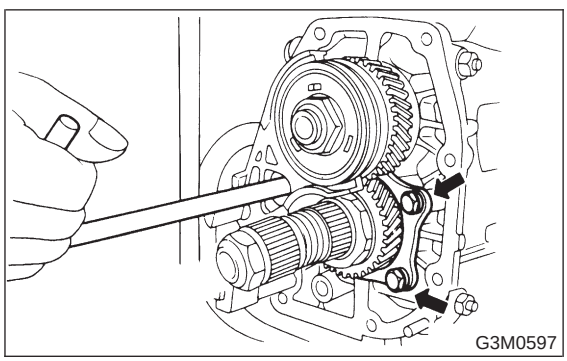
(1) Operating cylinder
(2) Release lever
(3) Release bearing
(4) Release lever sealing
(5) Bolt
(6) Main shaft rear plate
(7) Transmission case
(8) Drive pinion ASSY
(9) Main shaft ASSY
(10) Front differential

1) Remove operating cylinder and clutch release lever. <Ref. to 2-10 [W3A0].> and <Ref. to 2-10 [W5A0].>

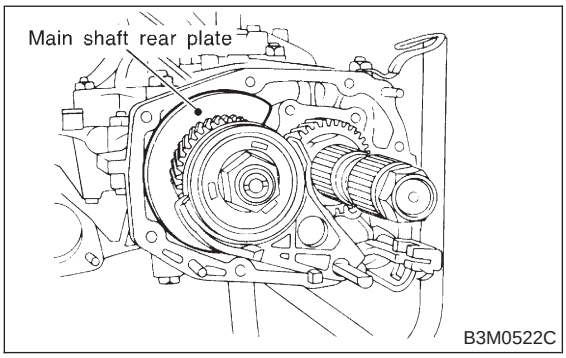


(A) Operating cylinder
(B) Clutch release lever
(C) Release bearing

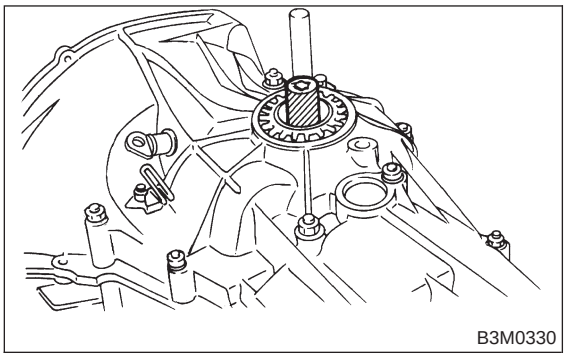
2) Remove transfer case assembly. <Ref. to 3-1 [W5A0].>
3) Remove bearing mounting bolts.



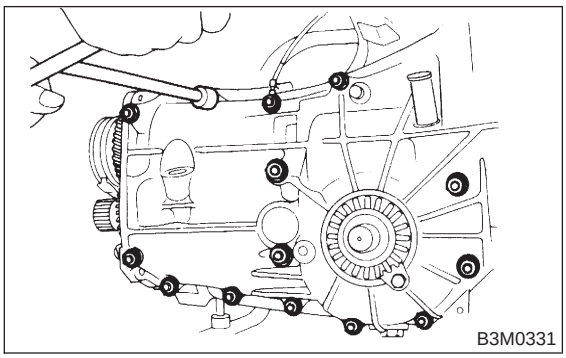
4) Remove main shaft rear plate.



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

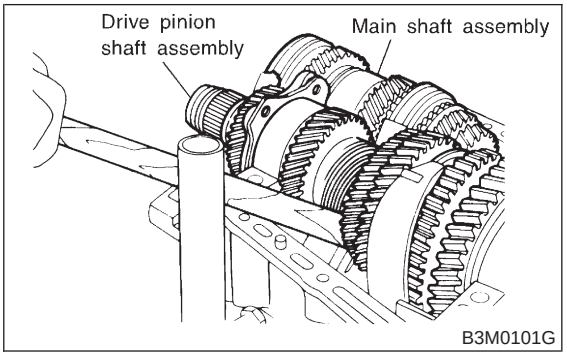


6) Separate transmission case into right and left cases by loosening seventeen coupling bolts and nuts.



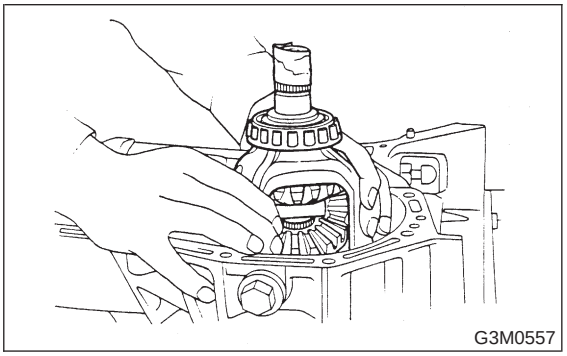
7) Remove drive pinion shaft assembly from left side transmission case.

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

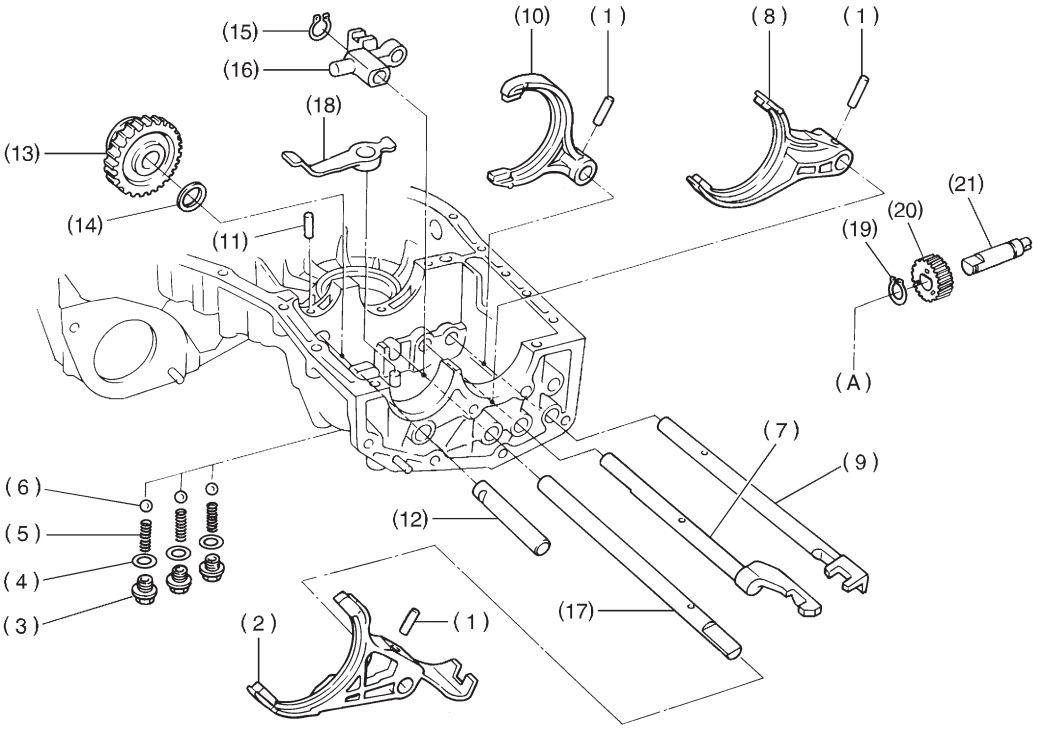


8) Remove main shaft assembly.
9) Remove differential assembly.

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

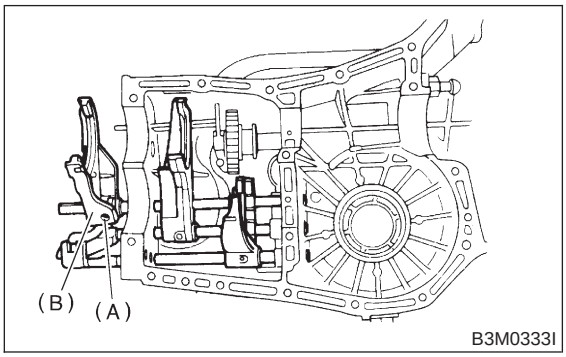


2. TRANSMISSION CASE



(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
(19) Snap ring (RH side)
(20) Speedometer driven gear (RH side)
(21) Speedometer shaft (RH side)
(A) Front right hand transmission case

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

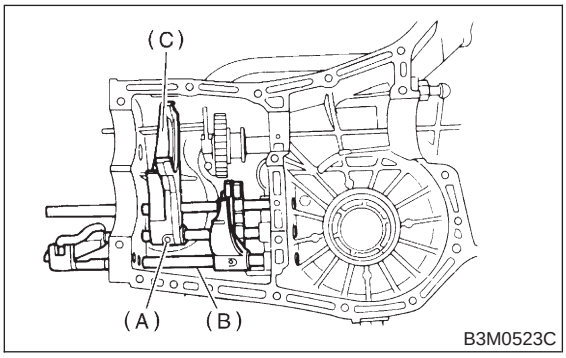


(A) Straight pin
(B) 5th shifter fork

2) Remove plugs, springs and checking balls.

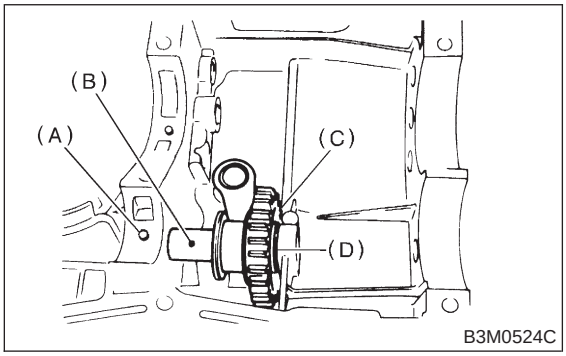
3) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

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.

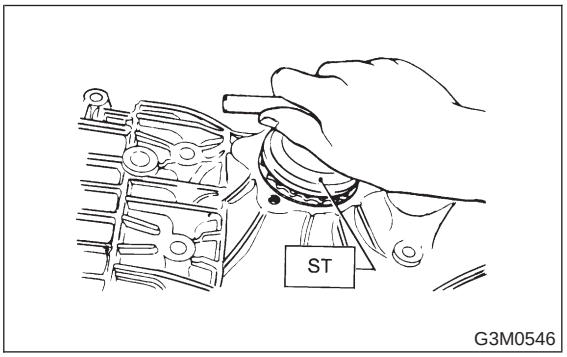


(A) Straight pin
(B) Idler gear shaft
(C) Idler gear
(D) Washer

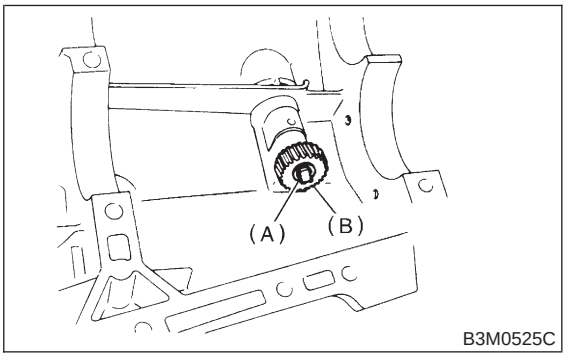
6) Remove outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out ball, spring and interlock plunger from rod.
And then remove rod.

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



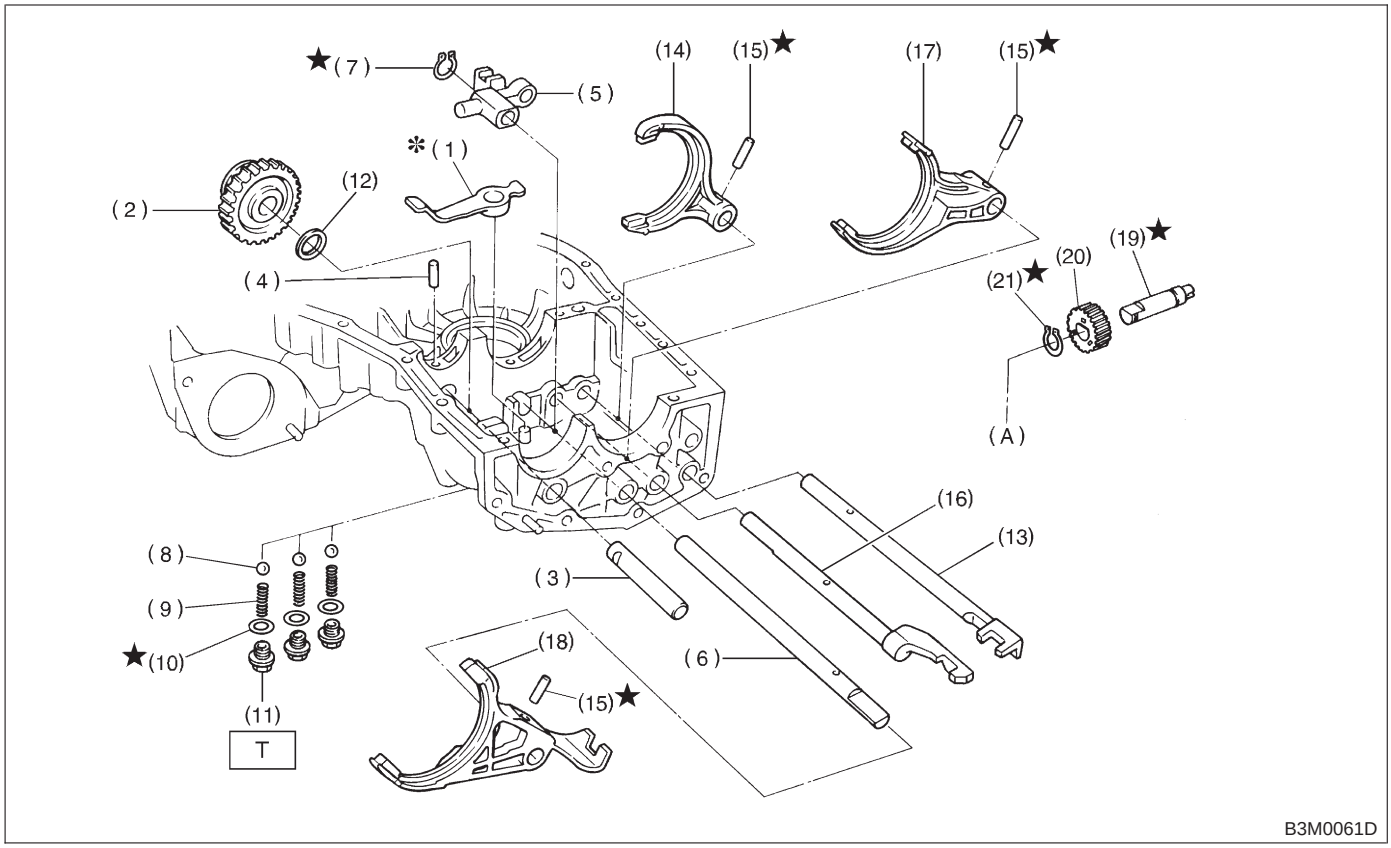
9) Remove outer snap ring and pull out speedometer driven gear. Next, remove vehicle speed sensor 2, oil seal, speedometer shaft and washer.



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

B: ASSEMBLY

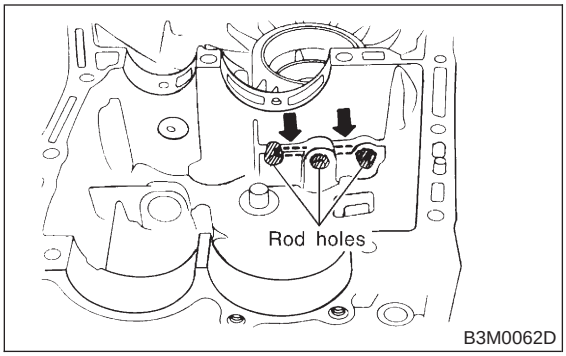
1. TRANSMISSION CASE



(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) Gasket
(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
(19) Speedometer shaft
(20) Speedometer driven gear
(21) Snap ring
(A) To right hand transmission case

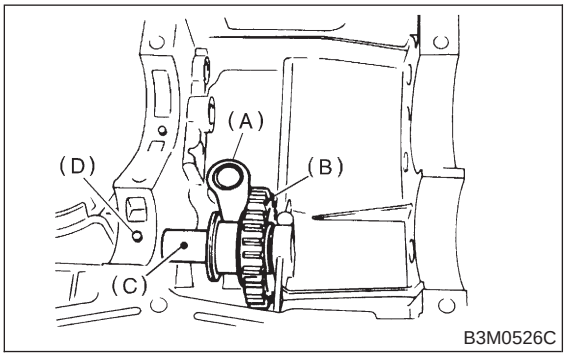
Tightening torque: N·m (kg-m, ft-lb)
T: 19.6±0.1 (2.00±0.015, 14.5±0.1)

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.

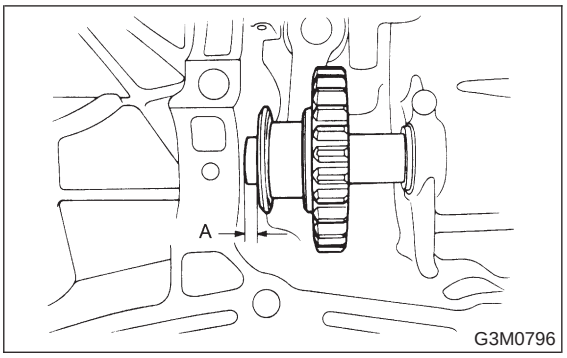
ST 399411700 ACCENT BALL INSTALLER

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.

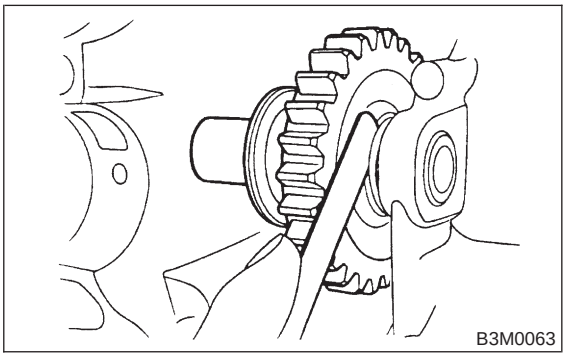
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



Reverse shifter lever		
Part No.	No.	Remarks
32820AA000	0	Further from case wall
32820AA010	No mark	Standard
32820AA020	2	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 position.
- 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.

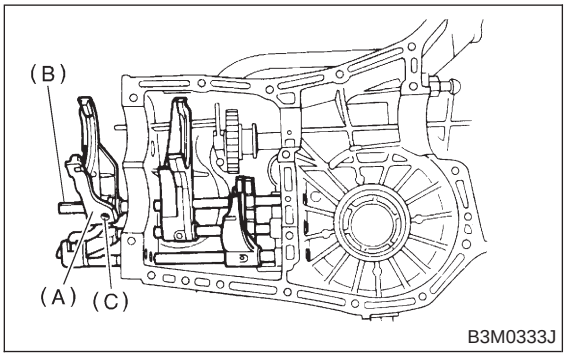
CAUTION:
Replace straight pin with a new one.

NOTE:
- Set reverse fork rod to neutral position.
- 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.

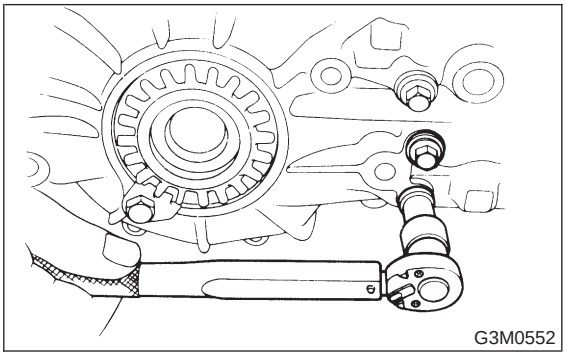
ST 398791700 STRAIGHT PIN REMOVER



(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, snap ring and speedometer shaft, if it has been removed.

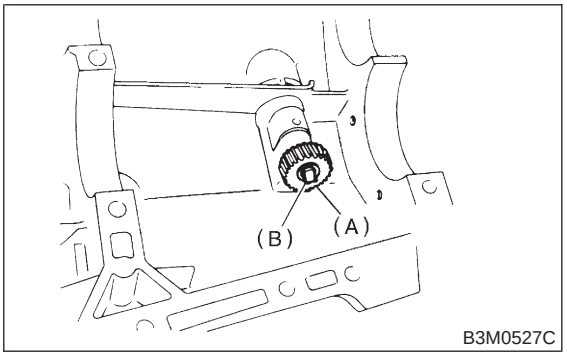
ST 899824100 or 499827000 PRESS
15) Install vehicle speed sensor 2.

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)

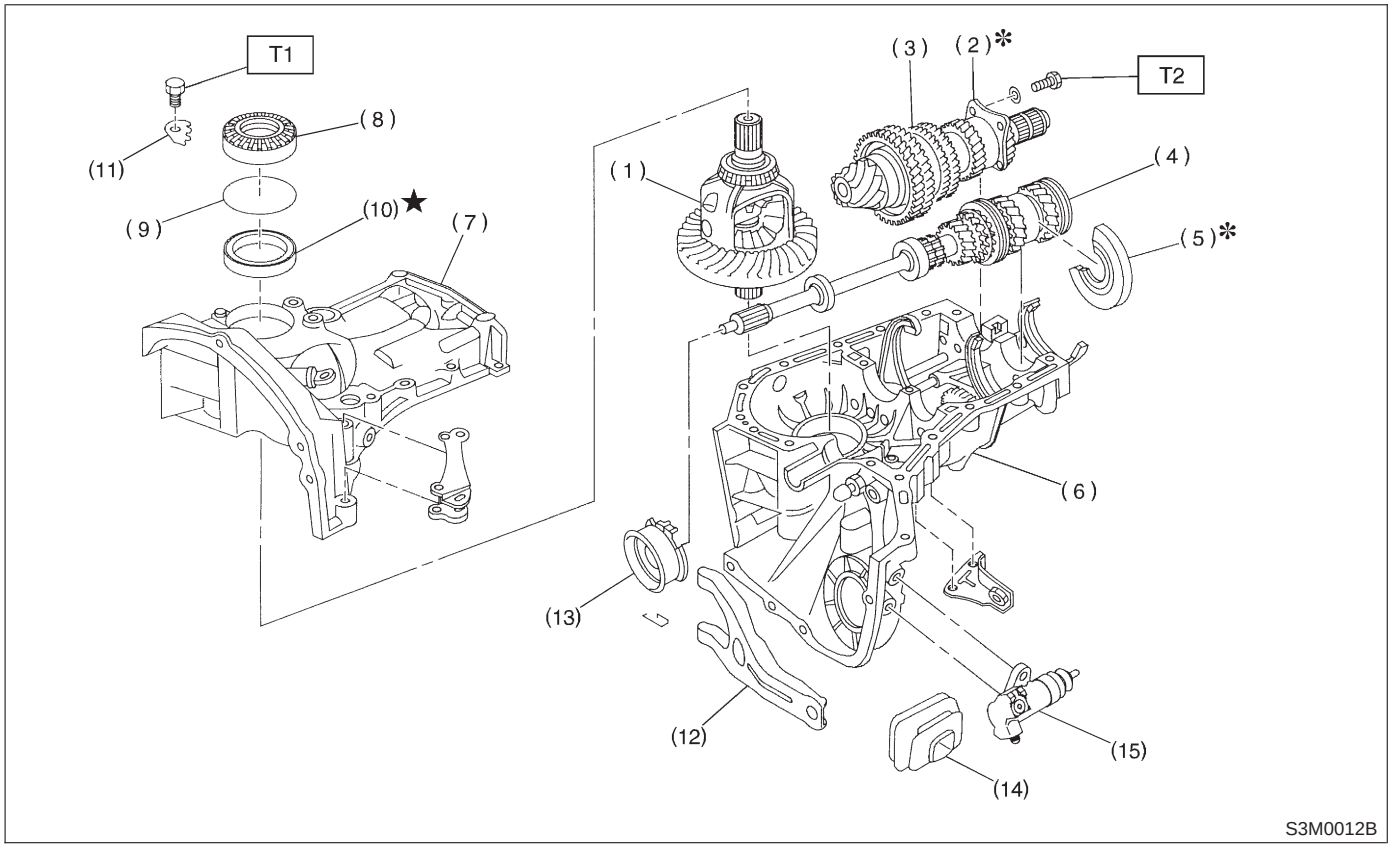
16) Install speedometer driven gear and snap ring.

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



(A) Speedometer driven gear
(B) Snap ring

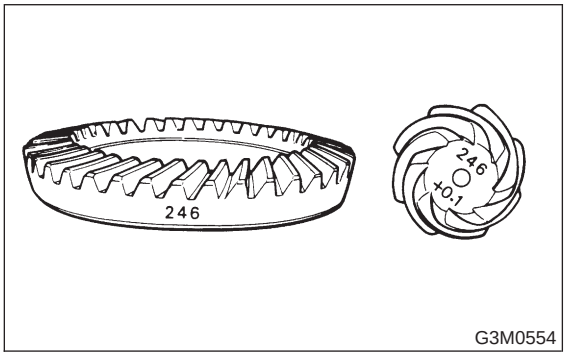
2. COMBINATION OF TRANSMISSION CASE



(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
(14) Release lever sealing
(15) Operating cylinder

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

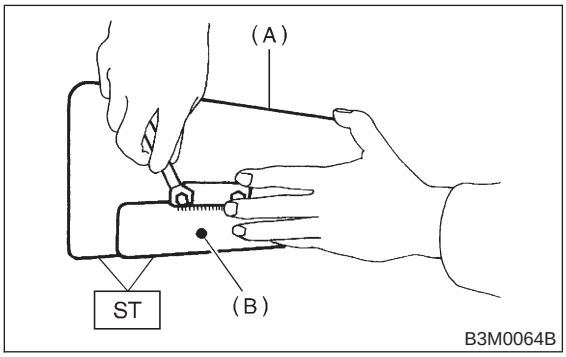
1) Alignment marks/numbers on hypoid gear set
The upper number on driven pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with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



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

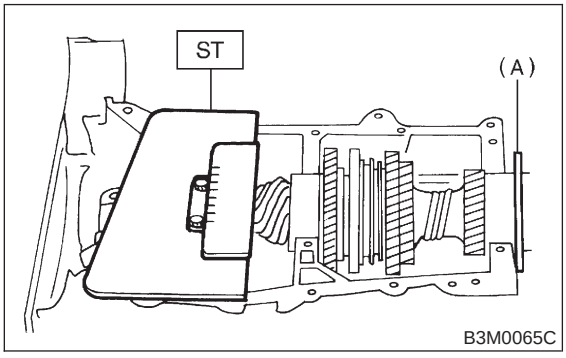
3) Inspection and adjustment of ST

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

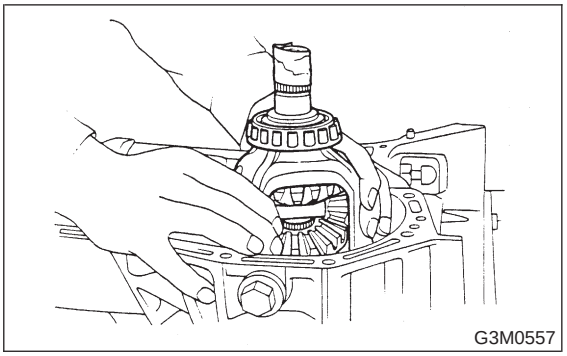
7) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

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.

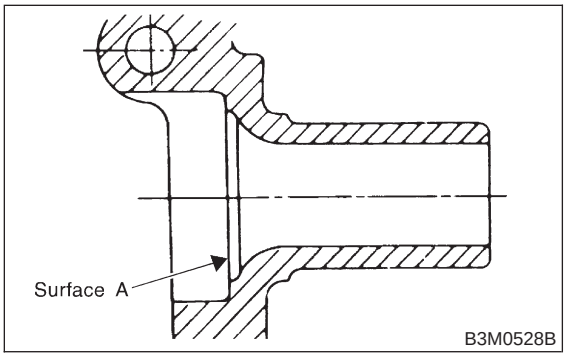
NOTE:
Wrap the left and right splined sections of axle shaft with vinyl tape to prevent scratches.



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.

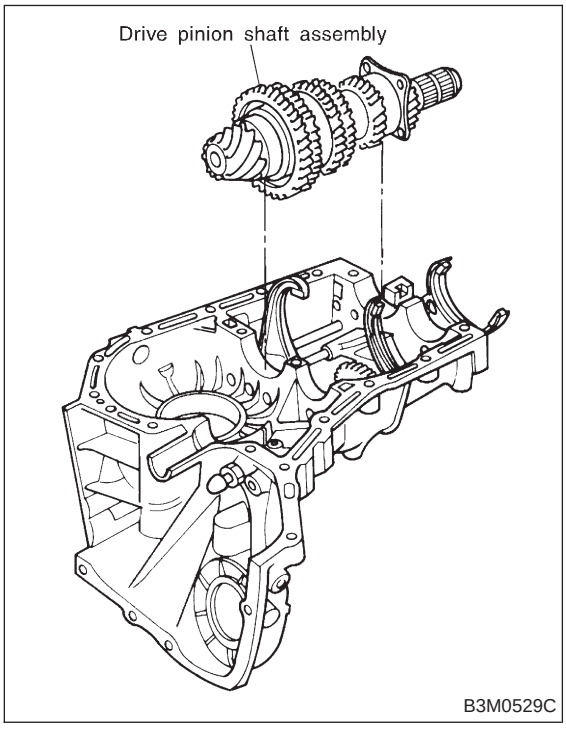
NOTE:
● Align the end face of seal with surface A of left side transmission main case when installing oil seal.



● 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.

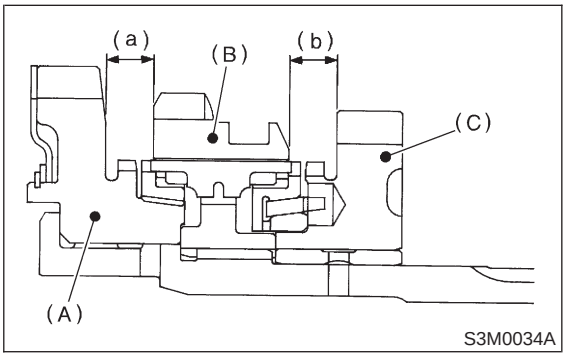
10) Install drive pinion shaft assembly with shims selected before into transmission case.

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.

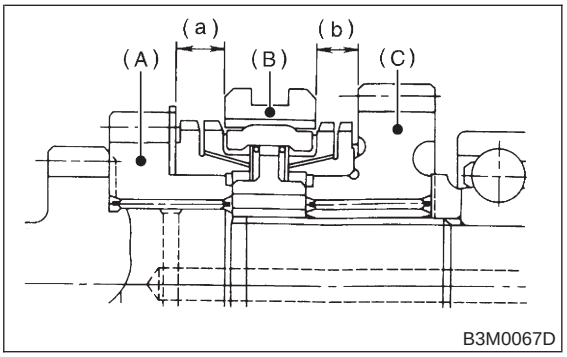
1st driven gear to reverse driven gear
Clearance (a): 9.5 mm (0.374 in)
Reverse driven gear to 2nd driven gear
Clearance (b): 9.5 mm (0.374 in)



(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)

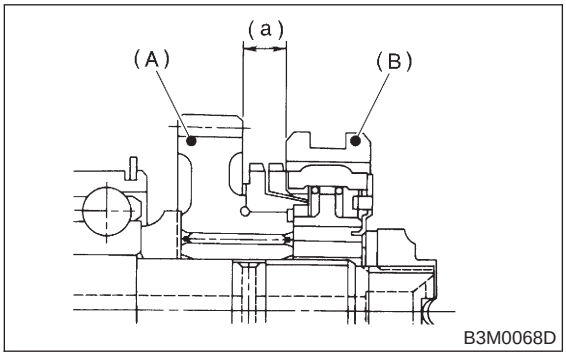
3rd-4th gear to coupling sleeve
Clearance (a): 9.3 mm (0.366 in)
Coupling sleeve to 4th driven gear
Clearance (b): 9.3 mm (0.366 in)



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

2nd-3rd shifter fork		
Part No.	No.	Remarks
32810AA060	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA070	No mark	Standard
32810AA100	3	Approach to 3rd gear by 0.2 mm (0.008 in)

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

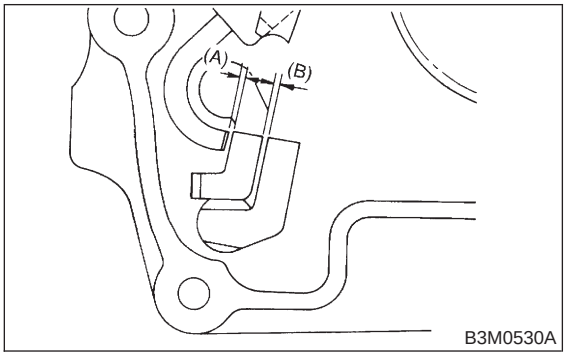


(A) 5th driven gear
(B) Coupling sleeve

5th shifter fork		
Part No.	No.	Remarks
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)



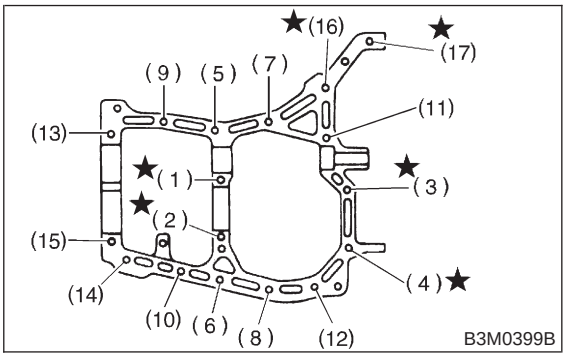
13) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline, and apply liquid gasket, and then put case right side and left side together.

Liquid gasket:
THREE BOND 1215 or equivalent

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

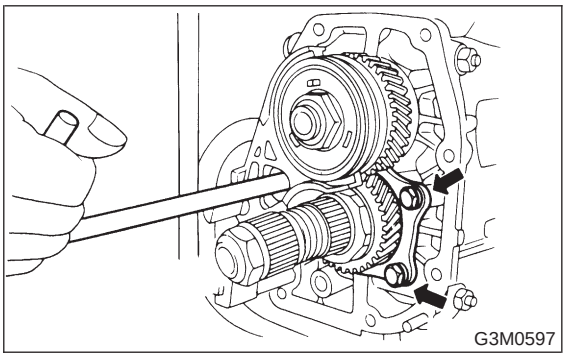
NOTE:
- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

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.

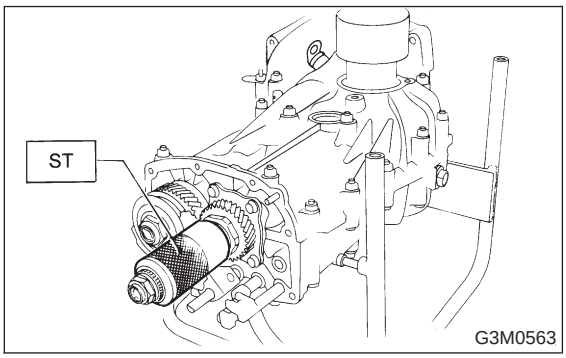
Tightening torque:
29±3 N·m (3.0±0.3 kg-m, 21.7±2.2 ft-lb)



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

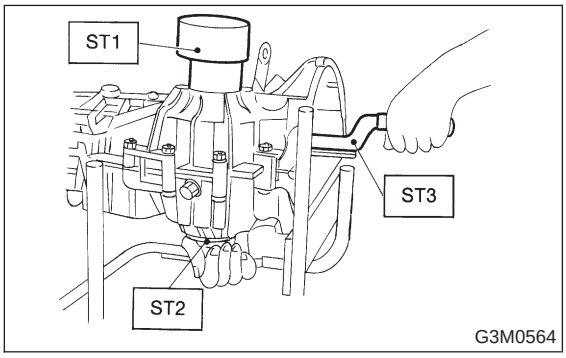
NOTE:
Support drive pinion assembly with ST.

ST 498427100 STOPPER



(1) Place the transmission with case left side facing downward and put ST1 on bearing cup.
(2) 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.

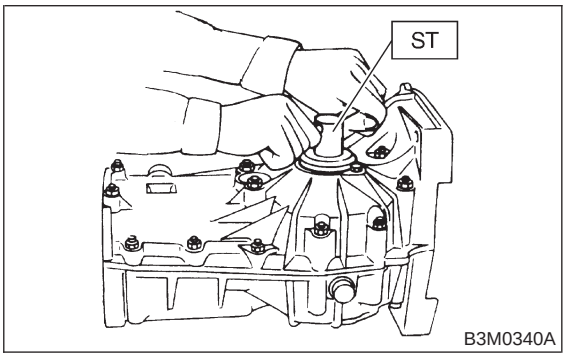
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



(3) 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



(4) 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.

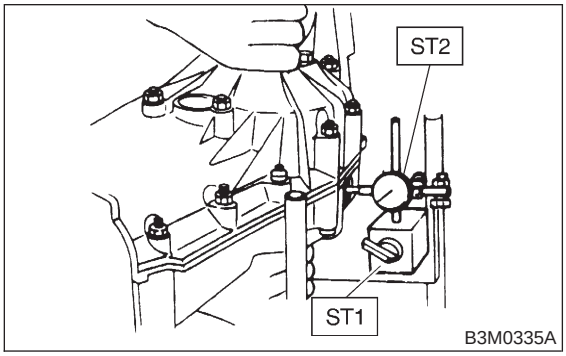
NOTE:
The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

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

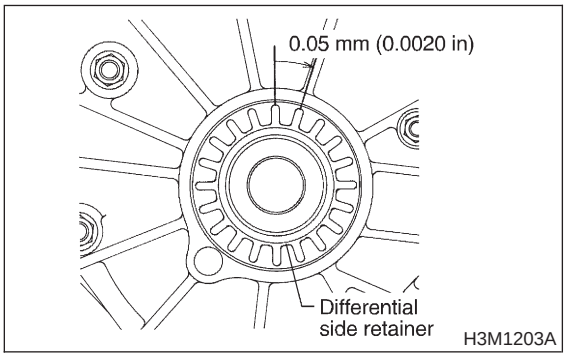
(8) Set ST1 and ST2. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

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

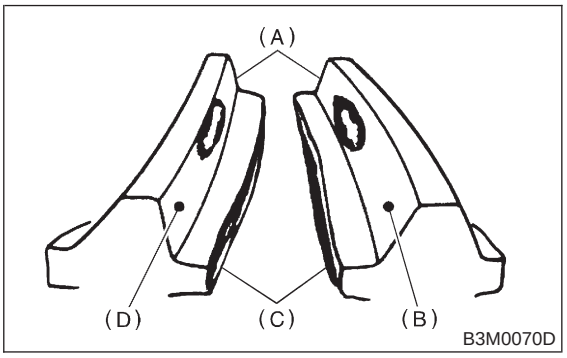


NOTE:
● If backlash is outside specified range, adjust it by turning holder in right side case.
● Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



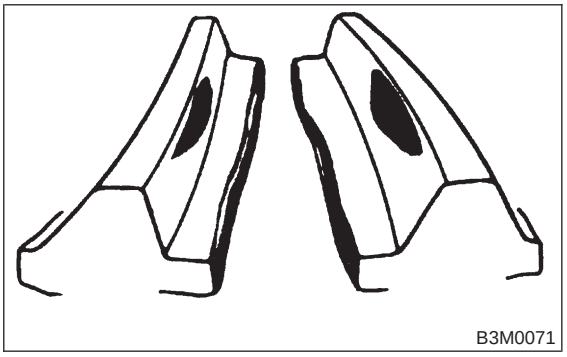
(9) Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether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

● Tooth contact is correct.

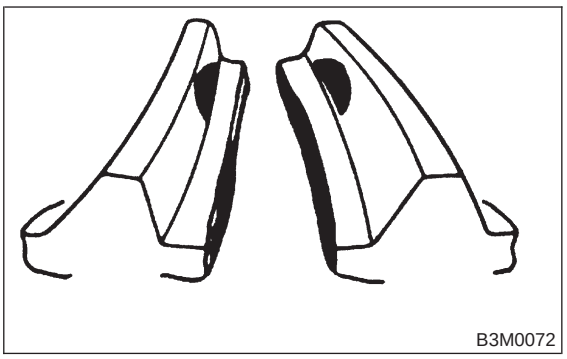


(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

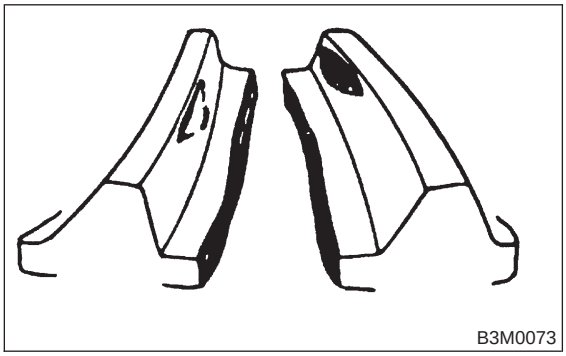
● Backlash is excessive.
To reduce backlash, loosen holder on the upper side (case right side) and turn in the holder on the lower side (case left side) by the same amount.



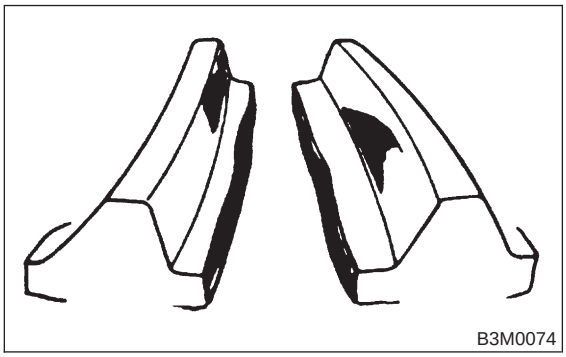
● Backlash is insufficient.
To increase backlash, loosen holder on the lower side (case left side) and turn in the holder on the upper side (case right side) by the same amount.



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


B3M0073

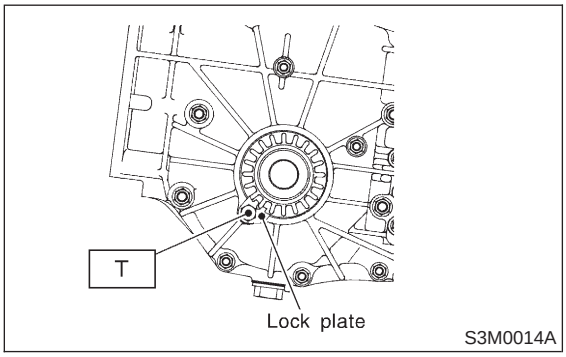
● The drive pinion shim selected before is too thin. Increase its thickness.


B3M0074

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

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

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

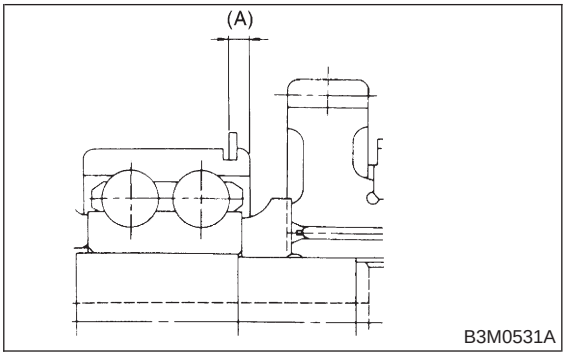


S3M0014A

18) 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:

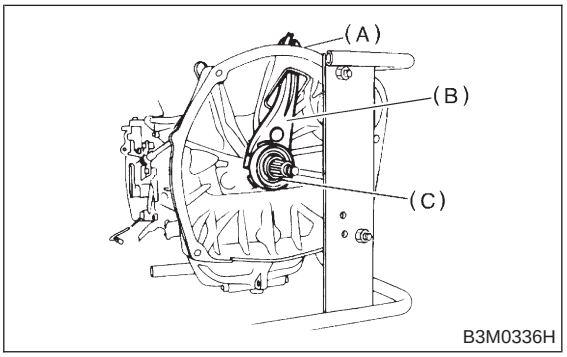
NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.
ST 498147000 DEPTH GAUGE

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

19) Install clutch release lever and bearing operating cylinder. <Ref. to 2-10 [W3C0], [W5A0].>



B3M0336H

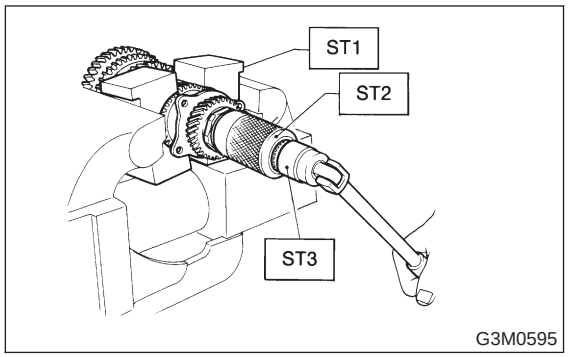
(A) Operating cylinder
(B) Release lever
(C) Release bearing

3. Drive Pinion Assembly

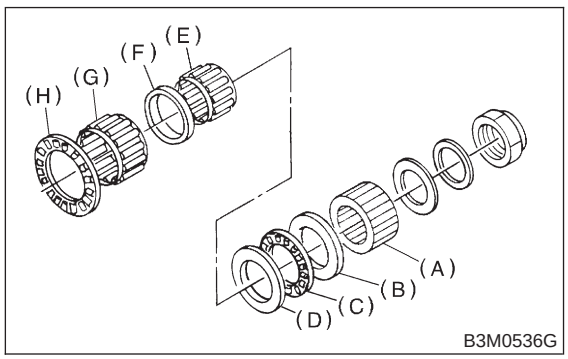
A: DISASSEMBLY

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.

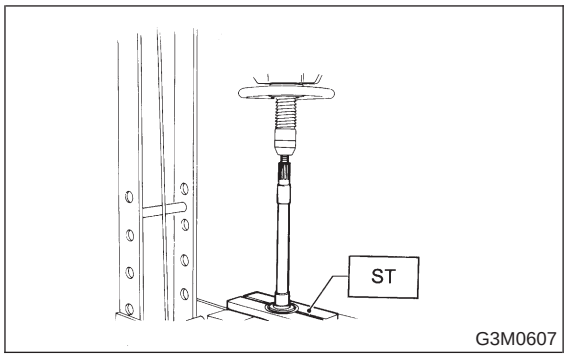


(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

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

CAUTION:
Do not reuse roller bearing.

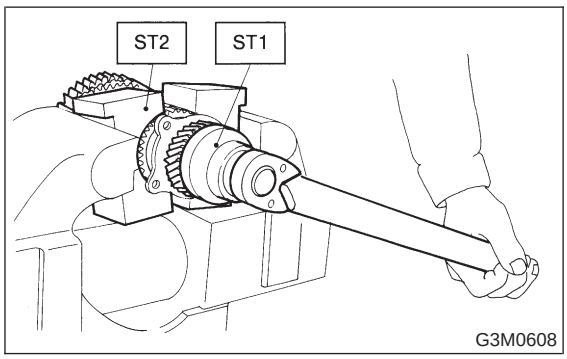
ST 498077000 REMOVER



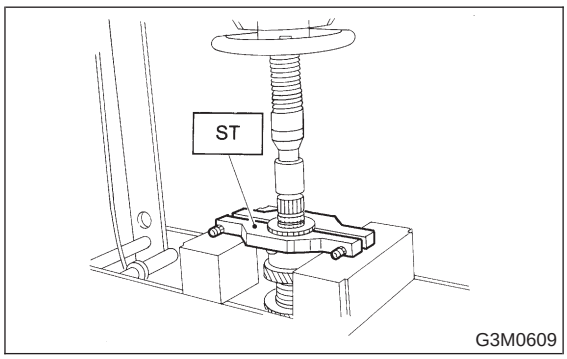
2. DRIVEN GEAR ASSEMBLY

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

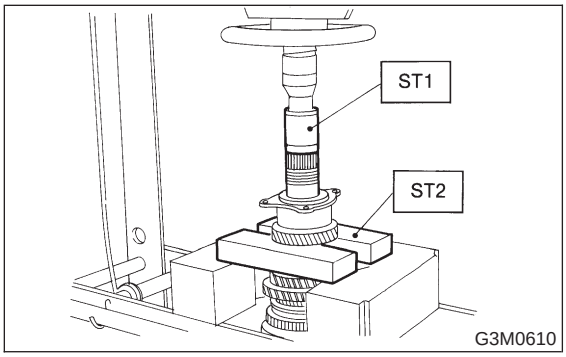


2) Remove 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

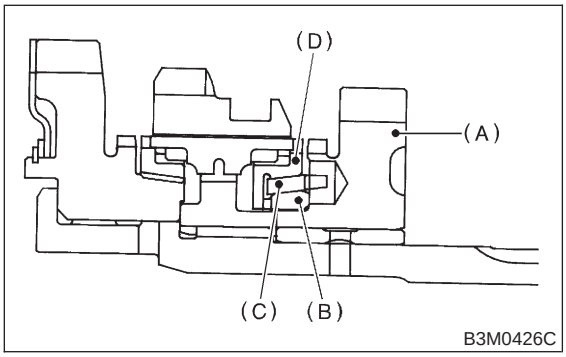


3) Remove woodruff key.

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.

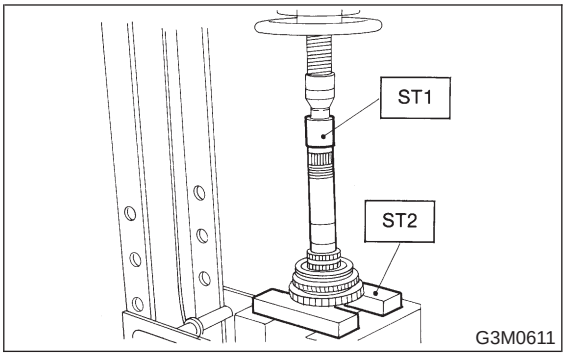


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

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



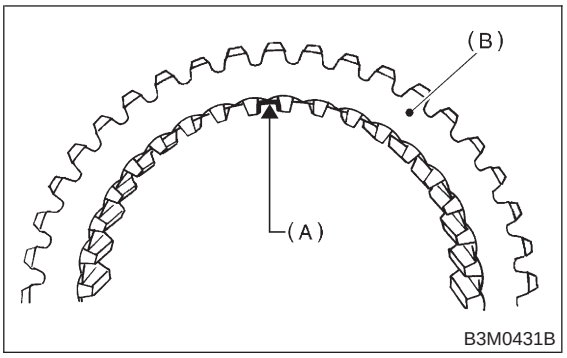
8) Remove sub gear for 1st driven gear.

B: ASSEMBLY

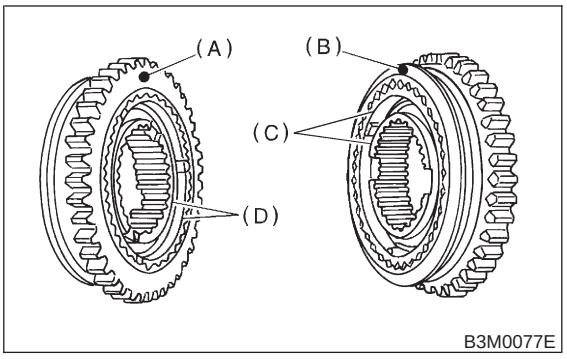
1. GEAR AND HUB ASSEMBLY

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

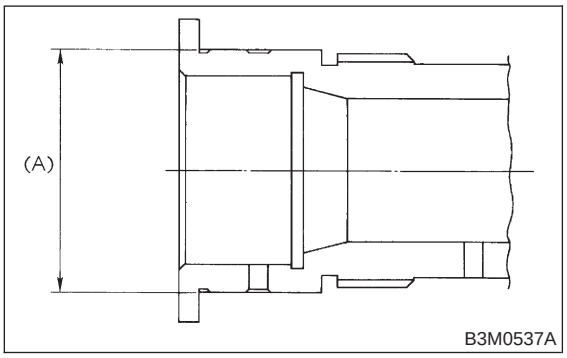


(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

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)	32231AA290
32229AA140	49.967 — 49.975 (1.9672 — 1.9675)	32231AA280



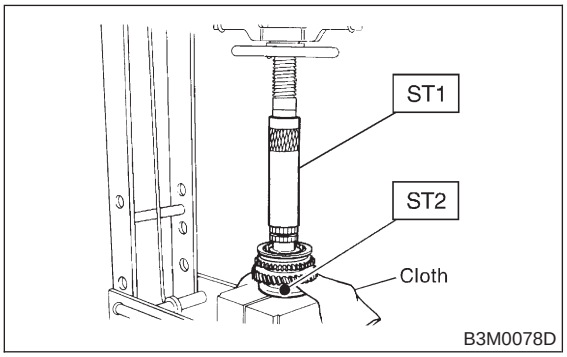
1) Install sub gear to 1st driven gear.
2) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:
Take care to install gear hub in proper direction.

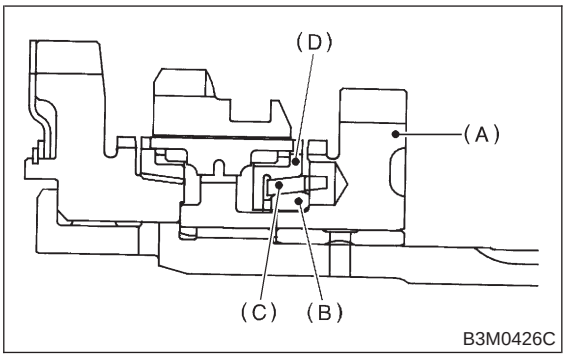
3) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

CAUTION:
Attach a cloth to the end of driven shaft to prevent damage.

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.

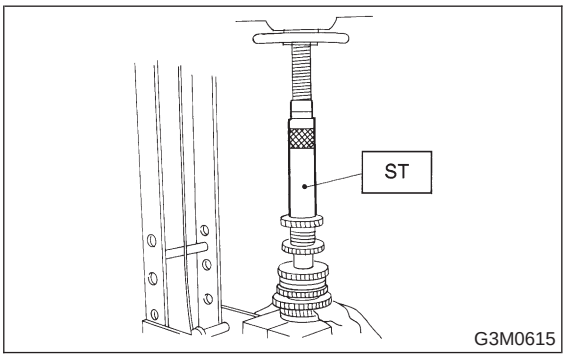


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

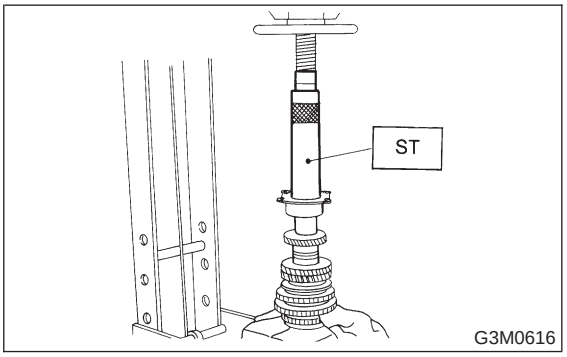
5) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

NOTE:
Align groove in baulk ring with insert.

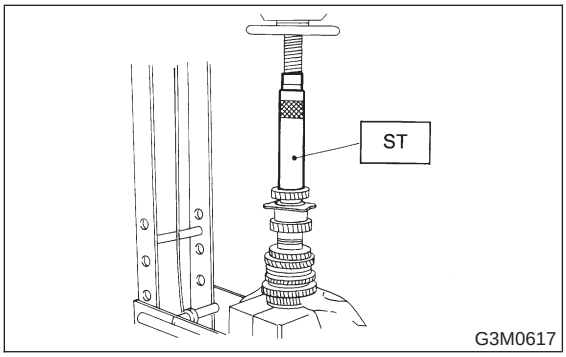
ST 499277200 INSTALLER



6) Install a set of roller bearings (42 × 74 × 40) onto the driven shaft using ST and press.
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.
ST 499277200 INSTALLER

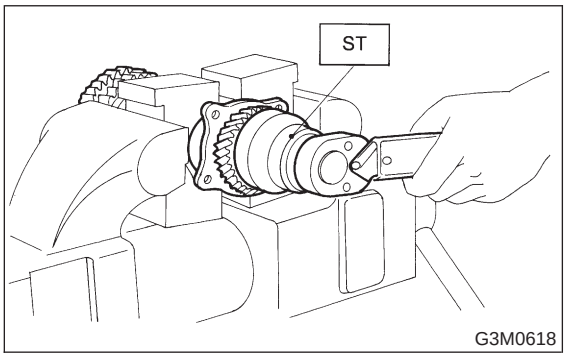


8) Install lock washer (42 × 53 × 2). Install lock nut (42 × 13) and tighten to the specified torque using ST.

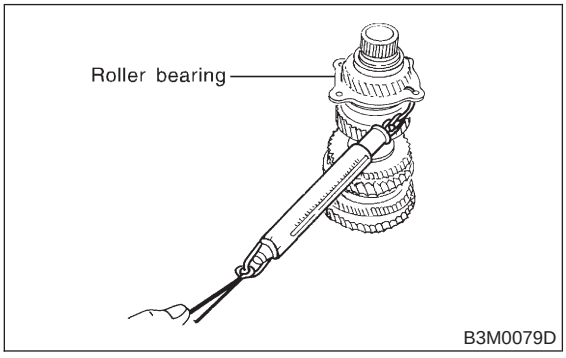
CAUTION:
Replace lock nut and lock nut washer with new ones.

ST 499987300 SOCKET WRENCH (50)

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

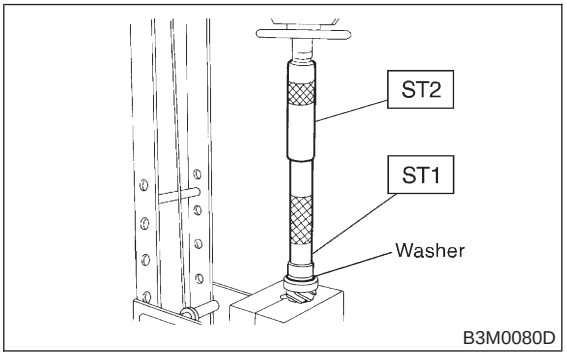


NOTE:
- Stake lock nut at two points.
- Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N·m (0.01 to 0.15 kg-m, 0.07 to 1.1 ft-lb).

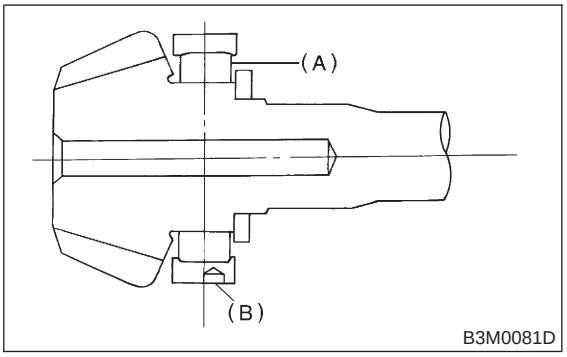


3. DRIVE PINION SHAFT

1) Install roller bearing onto drive pinion. Install washer (33 × 50 × 5) using ST1, ST2 and press.
ST1 499277100 BUSH 1-2 INSTALLER
ST2 499277200 INSTALLER

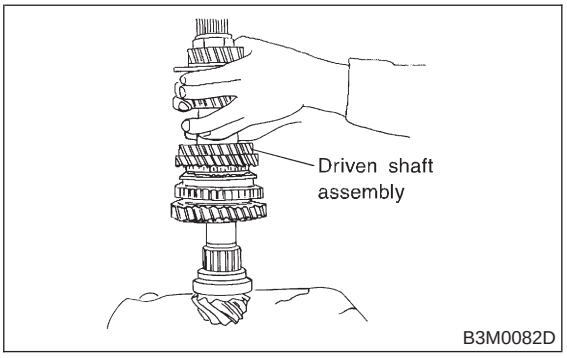


NOTE:
When installing roller bearing, note its directions (front and rear) because knock pin hole in outer race is offset.



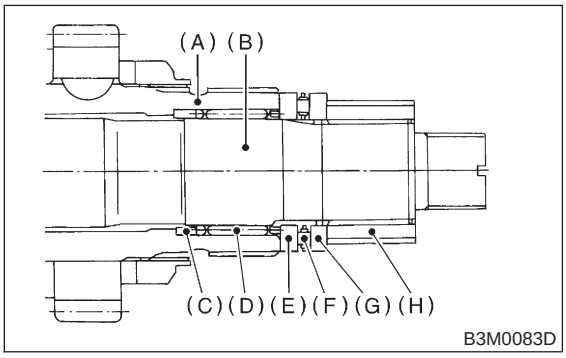
(A) Roller bearing
(B) Knock pin hole

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



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

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

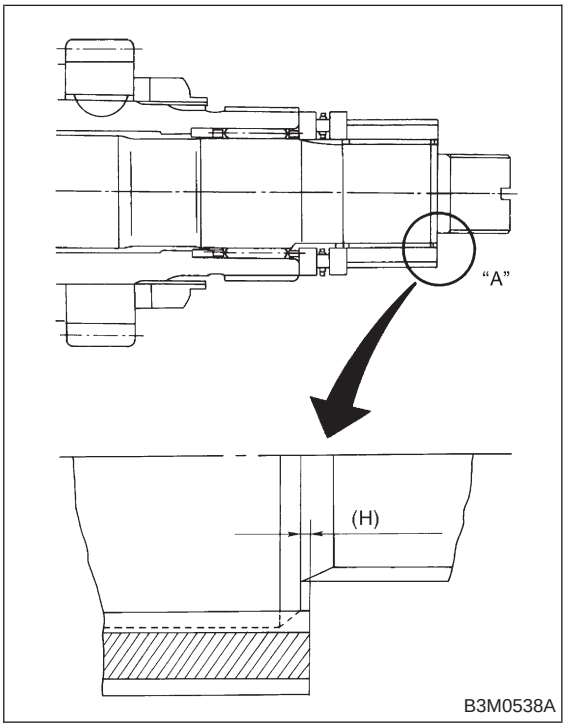


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

C: ADJUSTMENT

1. THRUST BEARING PRELOAD

1) After completing the preceding steps 1) through 3), select adjusting washer No. 2 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).

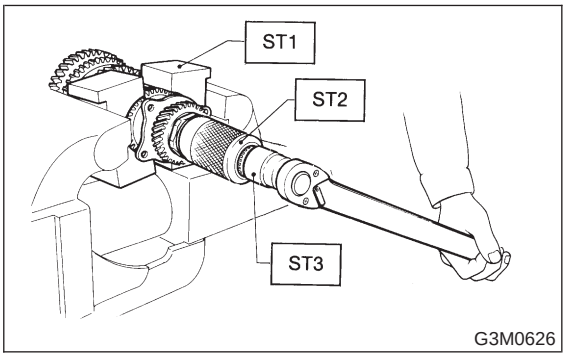


2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.

CAUTION:
Replace lock nut and lock nut washer with new ones.

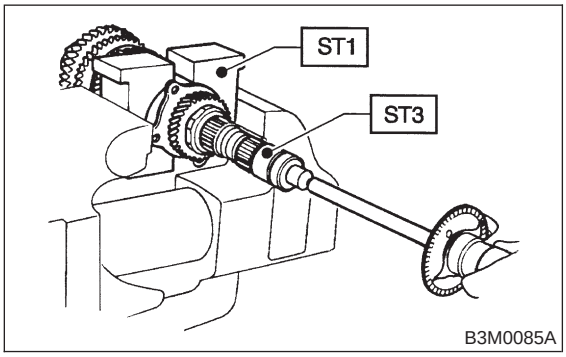
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)

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

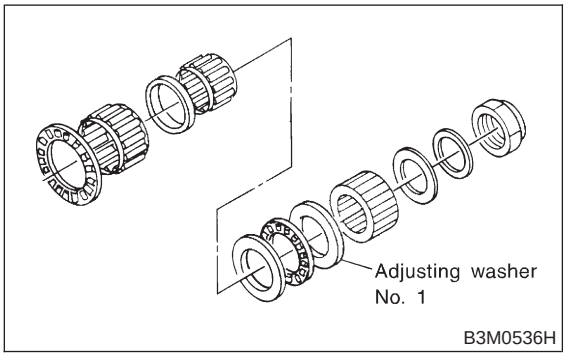


3) After removing ST2, measure starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

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.

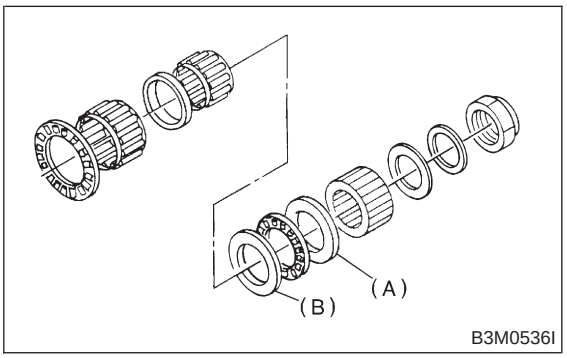


Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

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.

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)



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

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

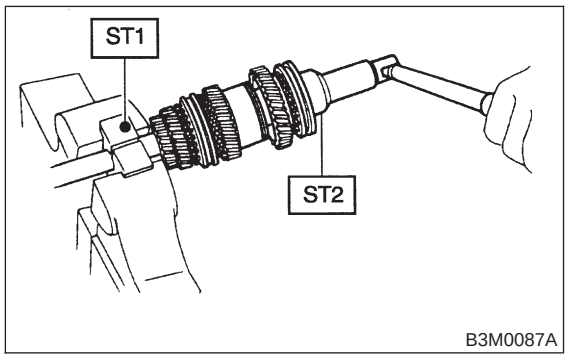
4. Main Shaft Assembly

A: DISASSEMBLY

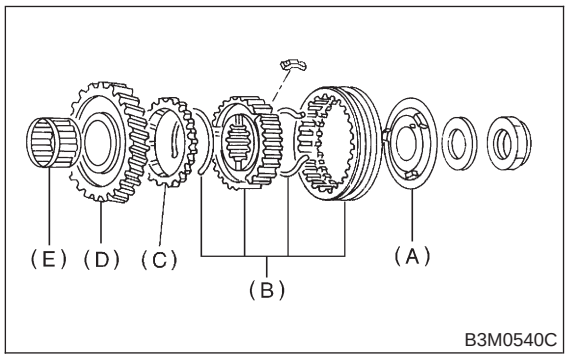
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut from transmission main shaft assembly.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



3) Remove insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear, and needle bearing.

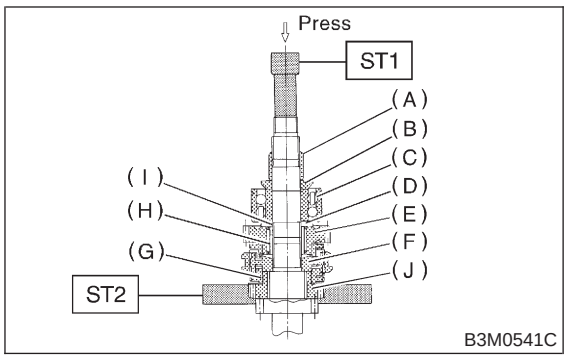


(A) Insert stopper plate
(B) Sleeve and hub assembly No. 2
(C) Baulk ring
(D) 5th drive gear
(E) Needle bearing (32 × 36 × 25.7)

4) 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, mark engagement point on splines beforehand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER

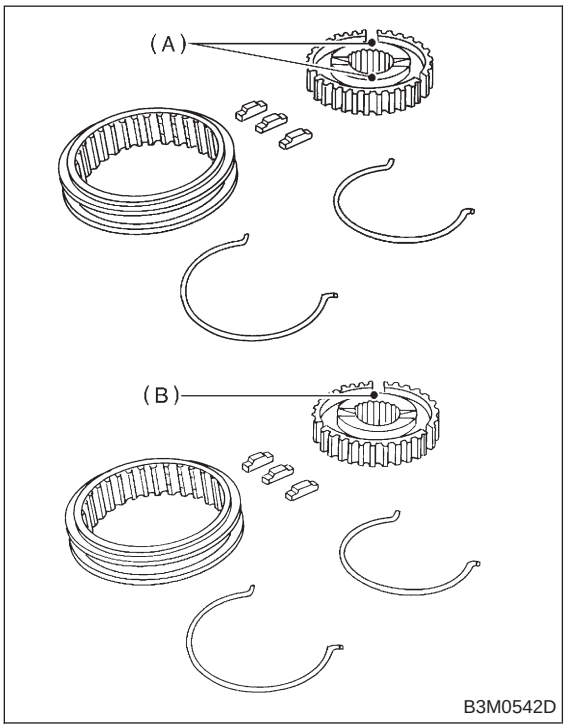


(A) 5th needle bearing inner race
(B) 5th gear thrust washer
(C) Ball bearing (25.5 × 65 × 31)
(D) 4th gear thrust washer
(E) 4th drive gear
(F) Sleeve and hub assembly
(G) Baulk ring
(H) 4th needle bearing
(I) 4th needle bearing inner race
(J) 3rd drive gear

B: ASSEMBLY

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

NOTE:
Position open ends of spring 120° apart.

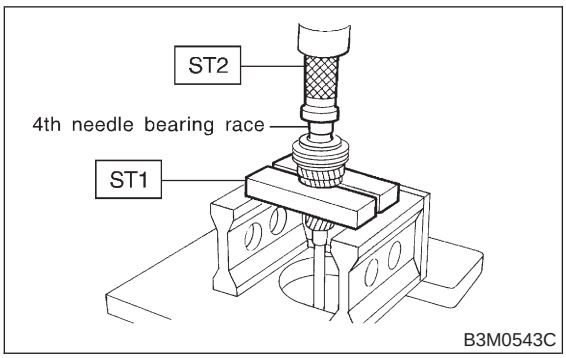


(A) Two holes for discrimination (3rd-4th hub)
(B) One hole for discrimination (5th hub)

2) Install 3rd drive gear, baulk ring, and sleeve and hub assembly for 3rd-4th needle bearing (32 × 36 × 25.7) on transmission main shaft.

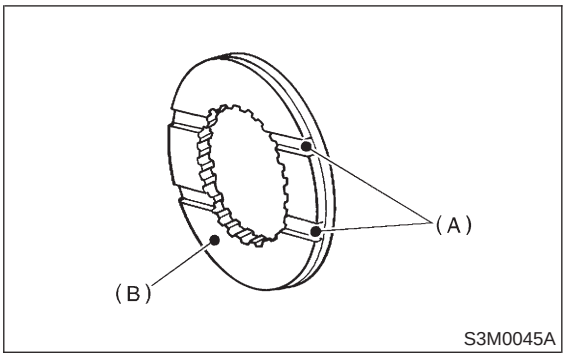
NOTE:
Align groove in baulk ring with shifting insert.

3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



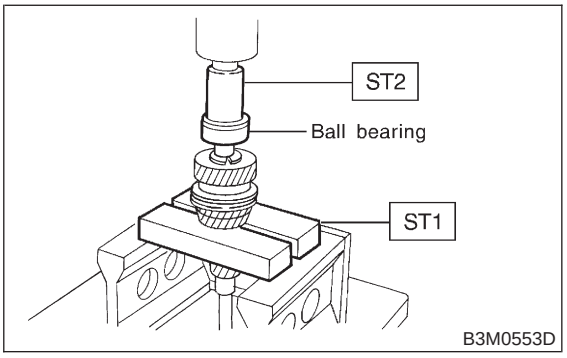
4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Face thrust washer in the correct direction.



(A) Groove
(B) 4th gear thrust washer

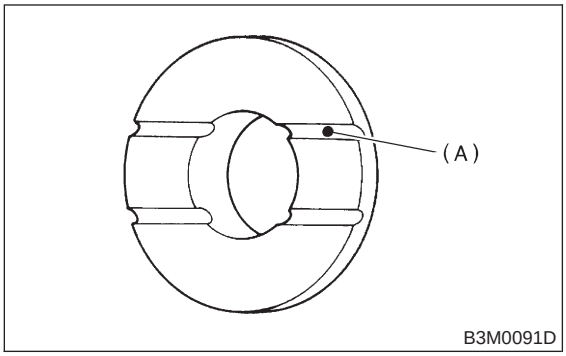
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the same tools as in step 5) above, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
Face thrust washer in the correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

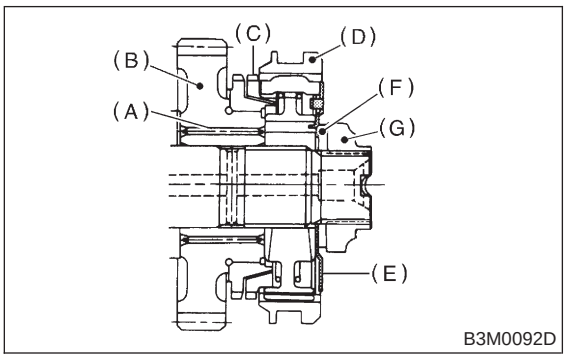


(A) Face this surface to 5th gear side.

7) Install the following parts to the rear section of transmission main shaft.

CAUTION:
Replace lock nut and lock nut washer with new ones.

NOTE:
- Align groove in baulk ring with shifting insert.
- Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.



(A) Needle bearing (32 × 36 × 25.7)
(B) 5th drive gear
(C) Baulk ring
(D) Sleeve and hub assembly
(E) Insert stopper plate
(F) Lock nut washer (22 × 38 × 2)
(G) Lock nut

8) Tighten lock nuts (22 × 13) to the specified torque using ST1 and ST2.

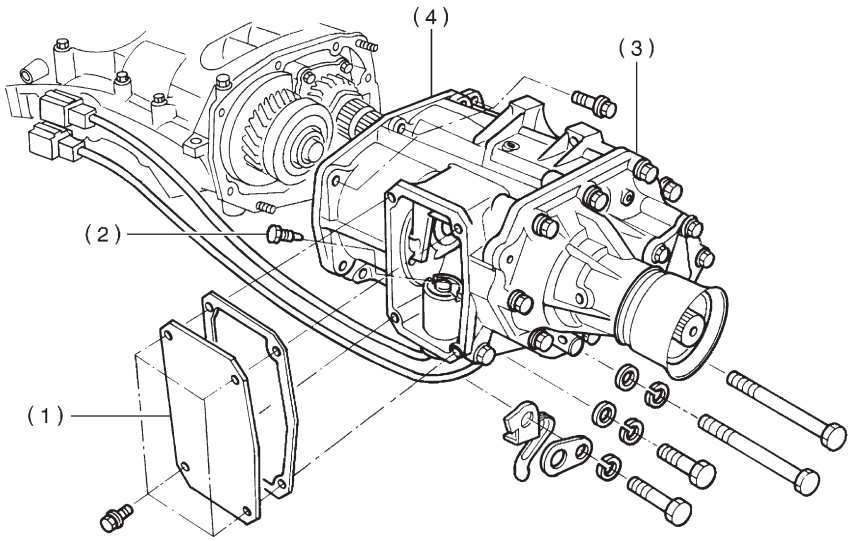
NOTE:
Secure lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH (35)
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



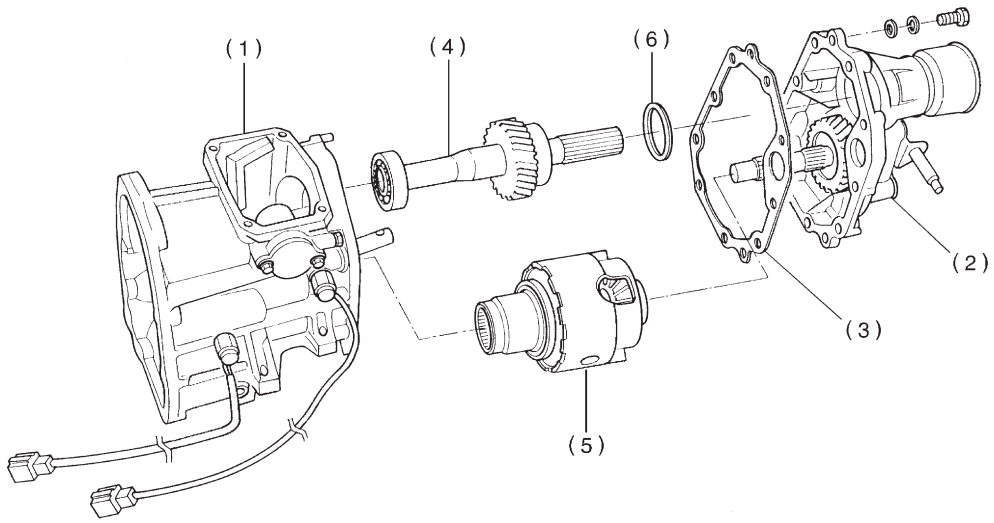
B3M0041B

(1) Transfer cover
(2) Shifter fork screw
(3) Extension ASSY
(4) Transfer case ASSY

1) Remove transfer cover.
2) Remove shifter fork screw which secures selector arm to shifter arm.
3) Remove transfer case with extension assembly.

B: DISASSEMBLY

1. SEPARATION OF TRANSFER CASE AND EXTENSION ASSEMBLY



B3M0546A

(1) Transfer case ASSY
(2) Extension ASSY
(3) Gasket
(4) Transfer driven gear
(5) Center differential
(6) Thrust washer

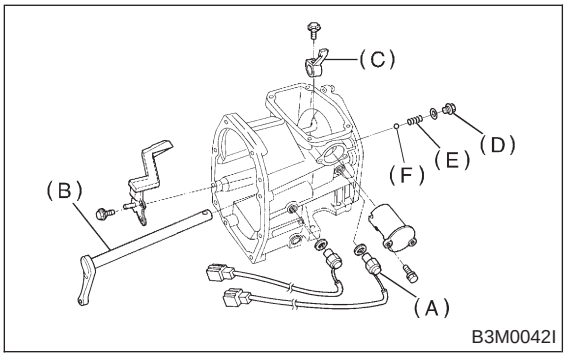
1) Separate transfer case and extension assembly.
2) Remove transfer driven gear and center differential as a set.
3) Remove thrust washer.

2. TRANSFER CASE

1) Remove neutral switch.

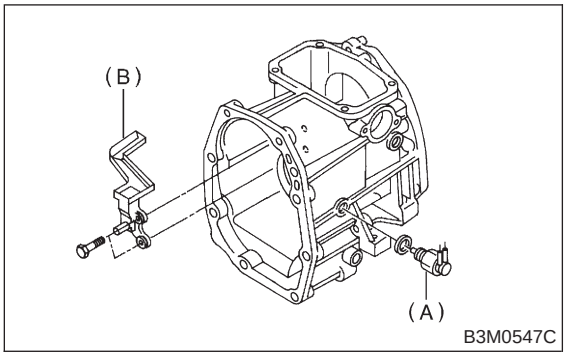
NOTE:
Before removing shifter arm, disconnect neutral switch.

2) Draw out shifter arm and remove selector arm.
3) Remove plug, spring and reverse check ball.



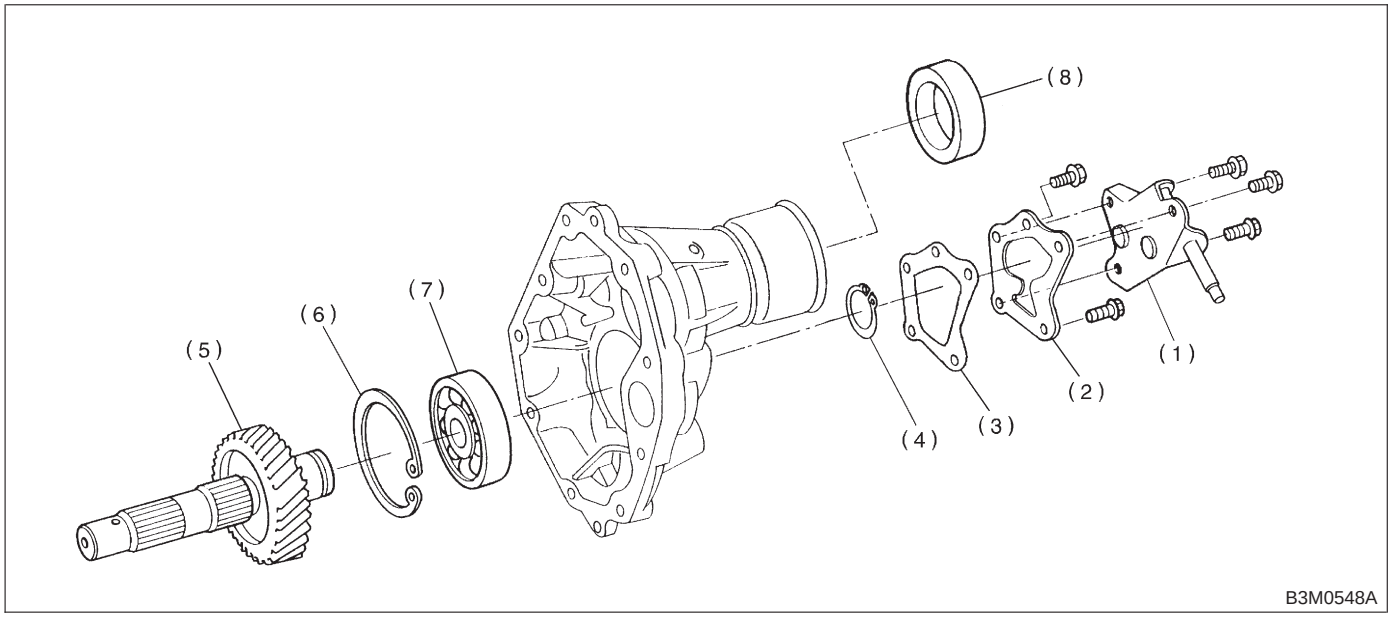
(A) Neutral switch
(B) Shifter arm
(C) Selector arm
(D) Plug
(E) Reverse accent spring
(F) Reverse check ball

4) Remove reverse check sleeve.
5) Remove back-up light switch and oil guide.



(A) Back-up light switch
(B) Oil guide

3. EXTENSION



(1) Shift bracket
(2) Extension cover
(3) Gasket
(4) Snap ring
(5) Transfer driven gear
(6) Snap ring
(7) Ball bearing
(8) Oil seal

1) Remove extension cover and shift bracket.
2) Remove snap ring.
3) Remove transfer drive gear.

CAUTION:
Do not remove ball bearing unless replacing.

4) Remove snap ring.
5) Remove ball bearing.

CAUTION:
Do not reuse ball bearing.

6) Remove oil seal.

CAUTION:
Do not reuse oil seal.

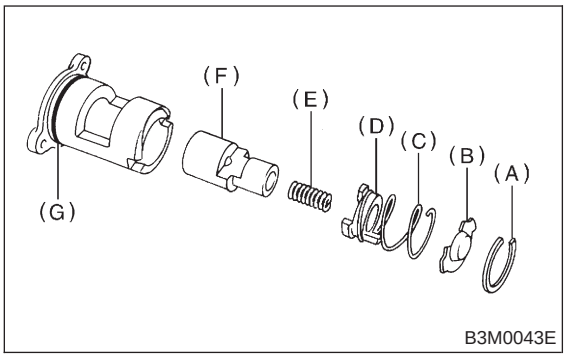
4. REVERSE CHECK SLEEVE

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.
3) Remove reverse check spring with cam.
4) Remove reverse return spring.
5) Remove reverse accent shaft.
6) Remove O-ring.

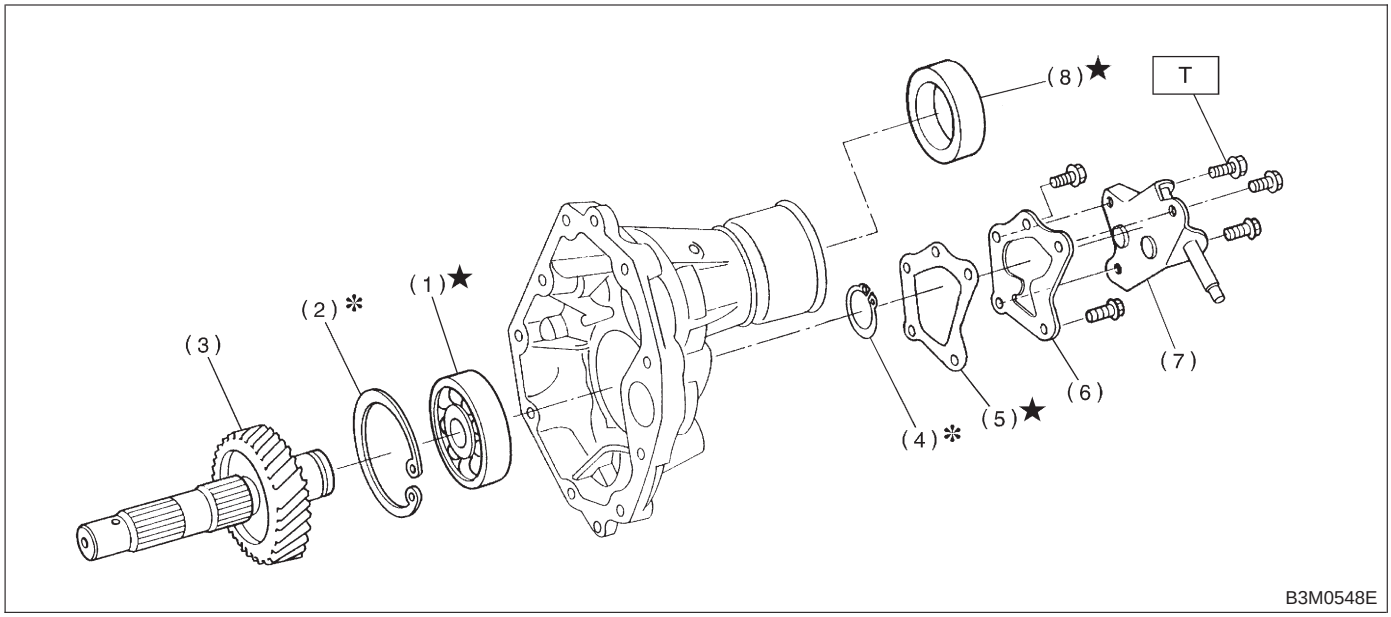
NOTE:
● Reverse check sleeve assembly uses an O-ring which should not be scratched.
● Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.



(A) Snap ring
(B) Reverse check plate
(C) Reverse check spring
(D) Reverse check cam
(E) Reverse return spring
(F) Reverse accent shaft
(G) O-ring

C: ASSEMBLY

1. EXTENSION



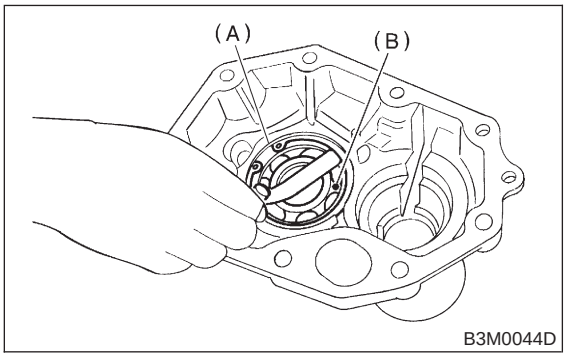
(1) Ball bearing
(2) Snap ring
(3) Transfer driven shaft
(4) Snap ring
(5) Gasket
(6) Extension cover
(7) Shift bracket
(8) Oil seal

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

1) Attach ball bearing to extension and install snap ring.
2) Measure clearance between snap ring and outer race of ball bearing with a thickness gauge.

CAUTION:
Replace ball bearing with a new one.

Clearance:
0 — 0.15 mm (0 — 0.0059 in)

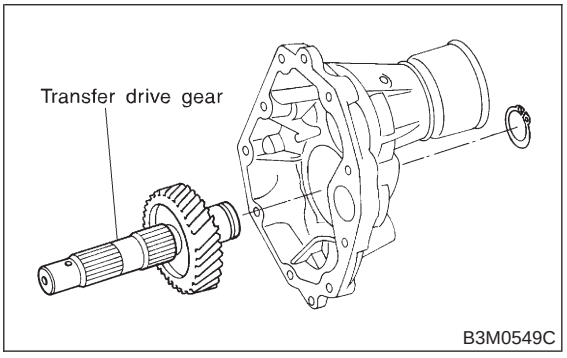


(A) Snap ring
(B) Ball bearing

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

Snap ring (Inner-72)	
Part No.	Thickness mm (in)
805172071	1.78 (0.0701)
805172072	1.90 (0.0748)
805172073	2.02 (0.0795)

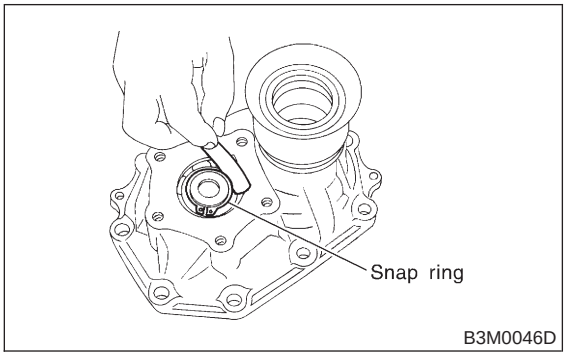
4) Press transfer drive gear into inner race of ball bearing.



5) Install snap ring on transfer drive shaft.

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

Clearance:
0 — 0.15 mm (0 — 0.0059 in)



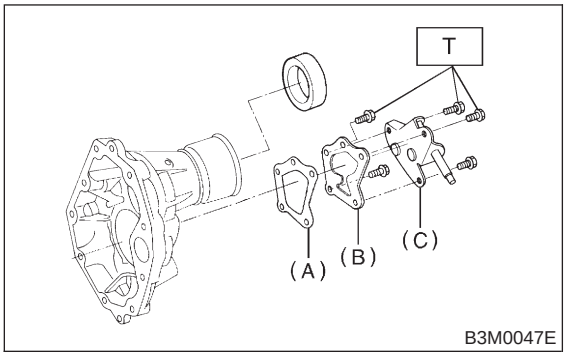
7) If the measurement is not within the specification, select suitable snap ring.

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

8) Install extension cover, gasket and shift bracket.

CAUTION:
Use new gasket.

Tightening torque:
T: 25±2 N·m (2.5±0.3 kg-m, 18.1±1.4 ft-lb)



(A) Gasket
(B) Extension cover
(C) Shift bracket

9) Install oil seal with ST.

CAUTION:
Use new oil seal.

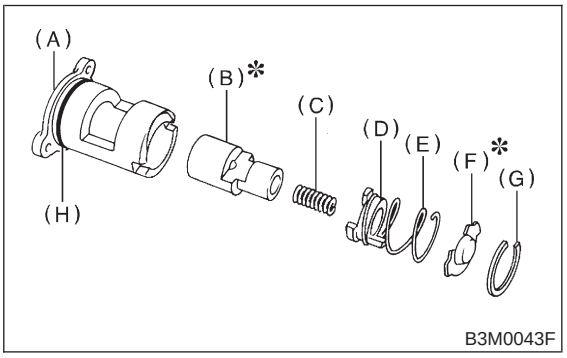
ST 498057300 INSTALLER

2. REVERSE CHECK SLEEVE

1) Install reverse accent shaft, check cam, return spring and check spring onto reverse check sleeve.

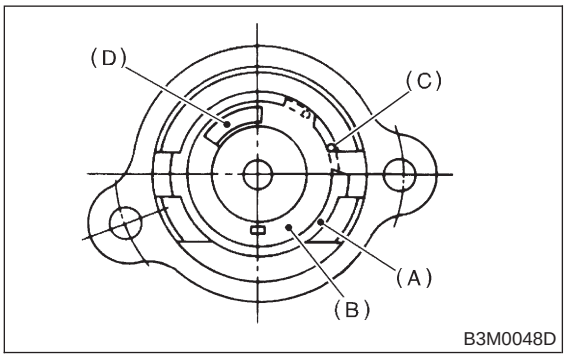
NOTE:
Be sure the bent section of reverse check spring is positioned in the groove in check cam.

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.



(A) Reverse check sleeve
(B) Reverse accent shaft
(C) Return spring
(D) Check cam
(E) Check spring
(F) Reverse check plate
(G) Snap ring
(H) O-ring

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].>

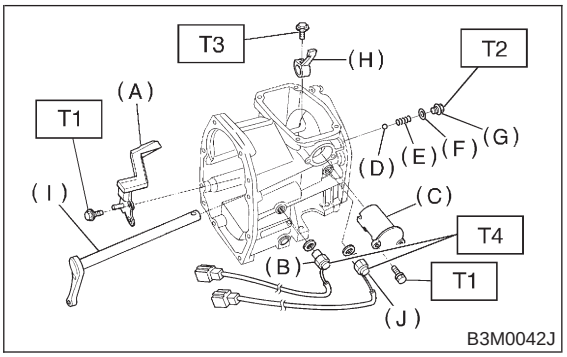
3. TRANSFER CASE

1) Assembly of transfer case is in the reverse order of disassembly.
2) Installation of shifter arm and selector arm
Install shifter arm into the partition from the front while inserting selector arm into the opening in reverse check sleeve. Pass shaft through hole in selector arm until its end comes out of the rear of transfer case.

CAUTION:
Use new gaskets.

NOTE:
Apply a coat of gear oil to shifter arm. Also make sure oil seal is positioned properly.

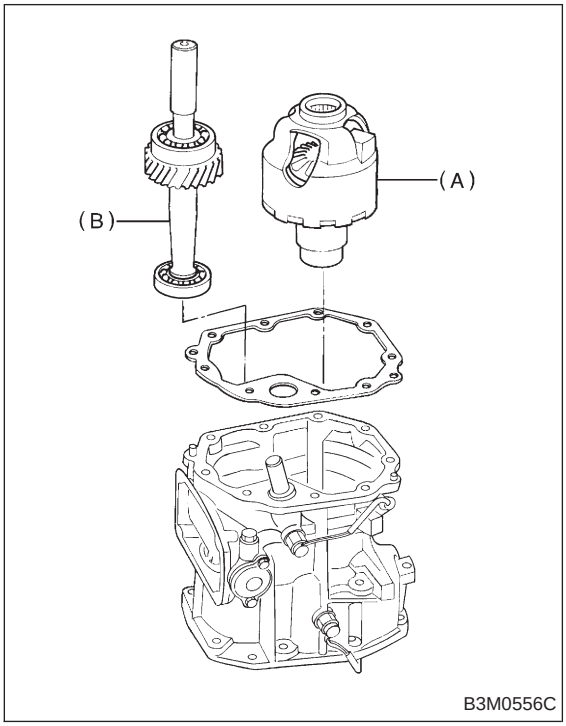
Tightening torque:
T1: 6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)
T2: 10±1 N·m (1.0±0.1 kg-m, 7.2±0.7 ft-lb)
T3: 19.6±1.5 N·m (2.00±0.15 kg-m, 14.5±1.1 ft-lb)
T4: 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



(A) Oil guide
(B) Back-up light switch
(C) Reverse check sleeve
(D) Ball
(E) Reverse accent spring
(F) Washer
(G) Plug
(H) Selector arm
(I) Shifter arm
(J) Neutral switch

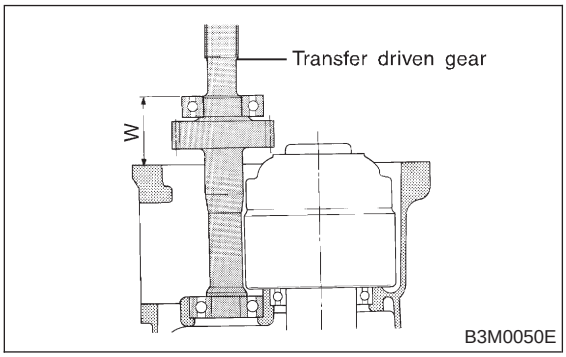
4. COMBINATION OF TRANSFER CASE AND EXTENSION ASSEMBLY

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

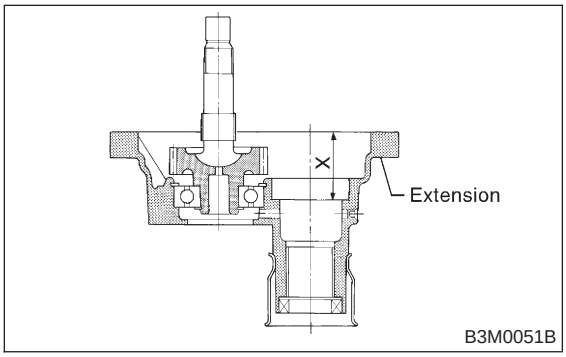


(A) Center differential
(B) Transfer driven gear

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



3) Measure depth “X” as shown in figure.



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:

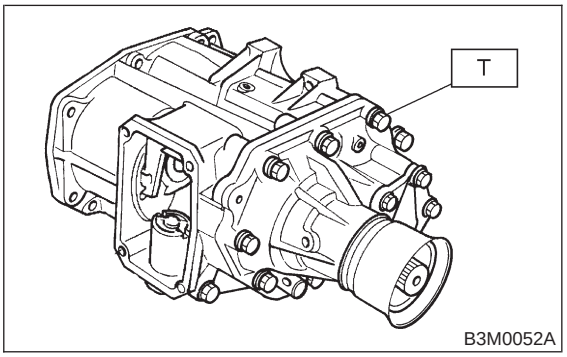
Space “Y” mm (in)	Thrust washer (52 × 61 × t)	
	Part No.	Thickness mm (in)
0.55 — 0.79 (0.0217 — 0.0311)	803052021	0.50 (0.0197)
0.80 — 1.04 (0.0315 — 0.0409)	803052022	0.75 (0.0295)
1.05 — 1.30 (0.0413 — 0.0512)	803052023	1.00 (0.0394)

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

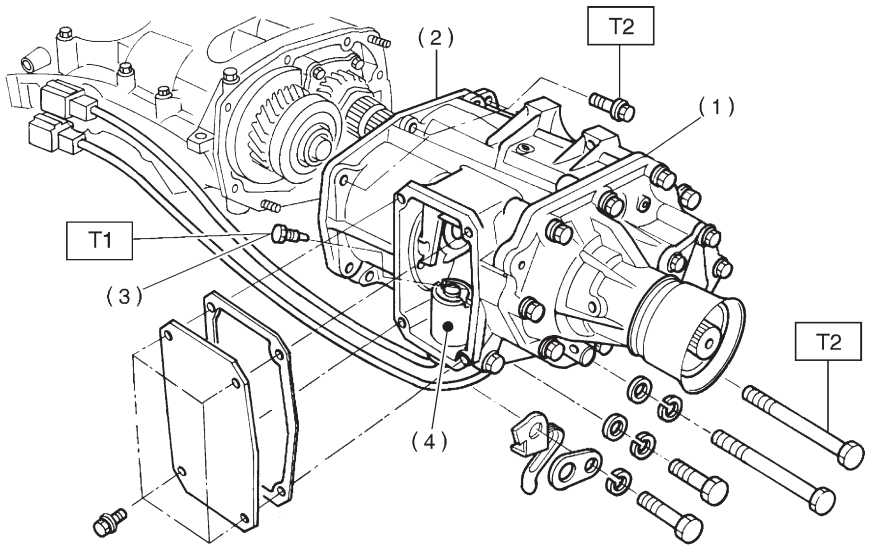
6) Fit thrust washers on transfer drive shaft.
7) Install extension assembly into transfer case.

CAUTION:
Use new gasket.

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



D: INSTALLATION



B3M0053E

(1) Extension case
(2) Transfer case
(3) Shifter fork screw
(4) Reverse check sleeve

Tightening torque: N·m (kg-m, ft-lb)
T1: 19.6±1.5 (2.00±0.15, 14.5±1.1)
T2: 24.5±2.0 (2.50±0.20, 18.1±1.4)

1) Install transfer case with extension assembly.
2) Secure selector arm to shifter arm with shifter fork screw. Shifter arm should be caught by pawl of rod. Selector arm must be engaged with reverse check sleeve assembly.

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).

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

- 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.

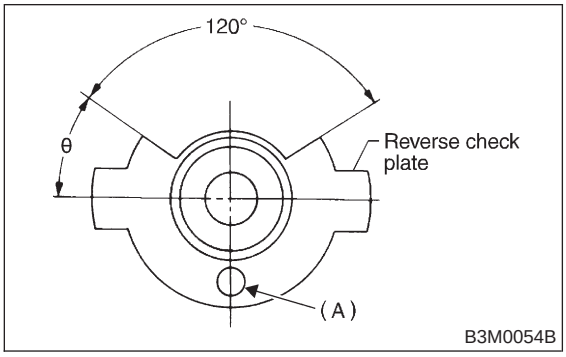
Reverse accent shaft		
Part No.	Mark	Remarks
32188AA040	1	Neutral position is closer to 1st gear.
32188AA011	No mark or 2	Standard
32188AA050	3	Neutral position is closer to reverse gear.

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.

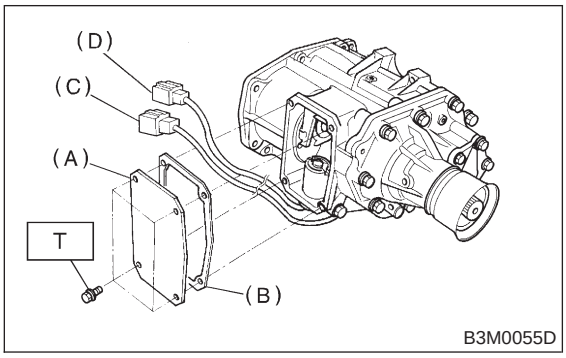
Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



3) Install transfer cover and gasket, and then connect each connector.

CAUTION:
Use new gasket.

Tightening torque:
T: 15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)



(A) Transfer cover
(B) Gasket
(C) Neutral position switch connector
(D) Back-up light switch connector

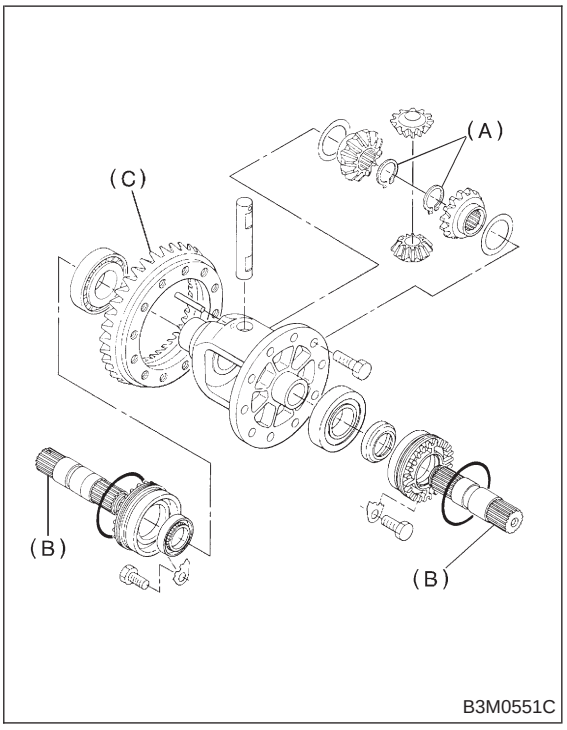
6. Front Differential

A: DISASSEMBLY

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

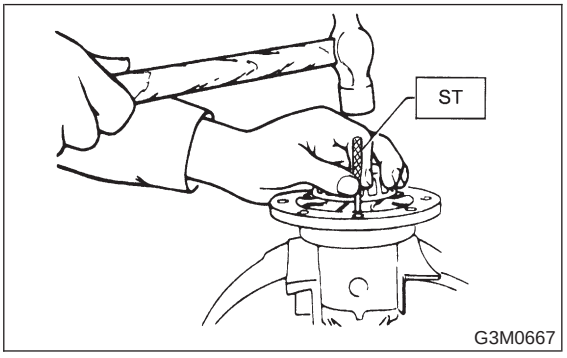
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts and remove hypoid drive gear.



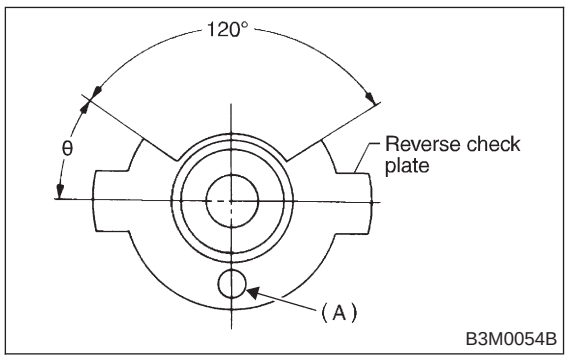
(A) Snap ring
(B) Axle drive shaft
(C) Hypoid drive gear

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



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.

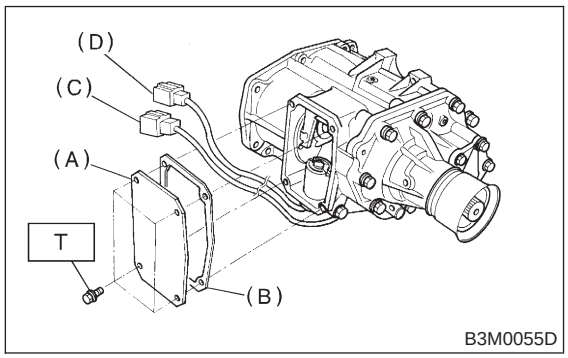
Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



3) Install transfer cover and gasket, and then connect each connector.

CAUTION:
Use new gasket.

Tightening torque:
T: 15.7±1.5 N·m (1.6±0.15 kg-m, 11.6±1.1 ft-lb)



(A) Transfer cover
(B) Gasket
(C) Neutral position switch connector
(D) Back-up light switch connector

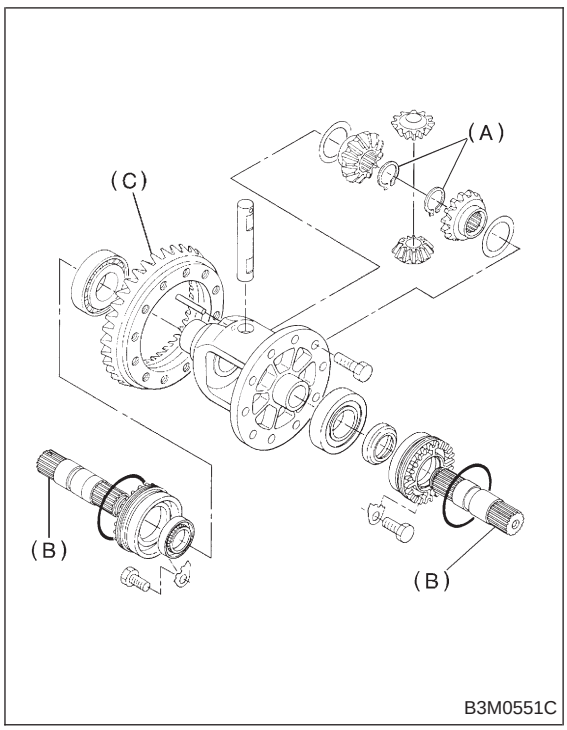
6. Front Differential

A: DISASSEMBLY

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

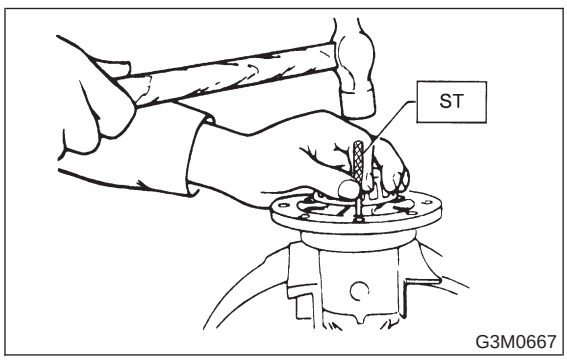
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen twelve bolts and remove hypoid drive gear.

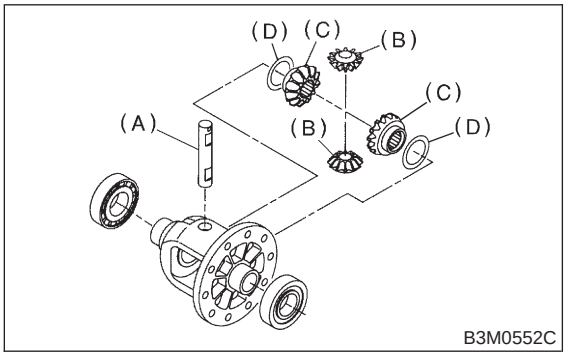


(A) Snap ring
(B) Axle drive shaft
(C) Hypoid drive gear

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

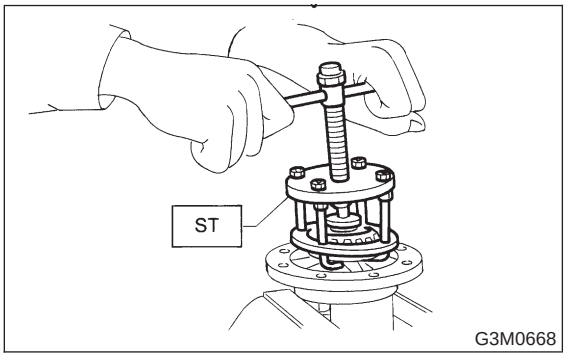


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



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

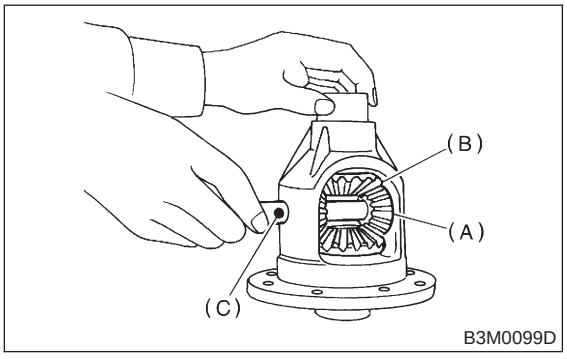
5) Remove roller bearing using ST.
ST 399527700 PULLER SET



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.



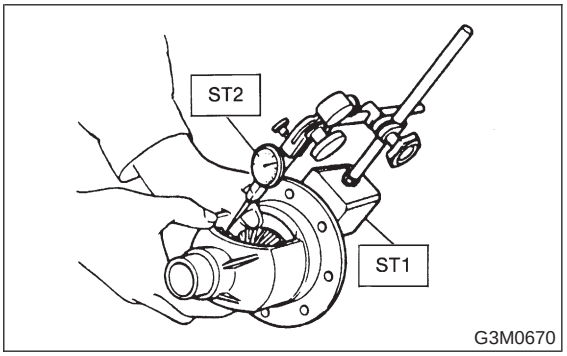
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

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)

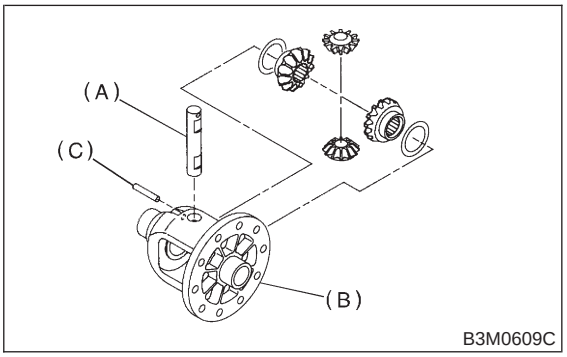


Washer (38.1 × 50 × t)	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

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

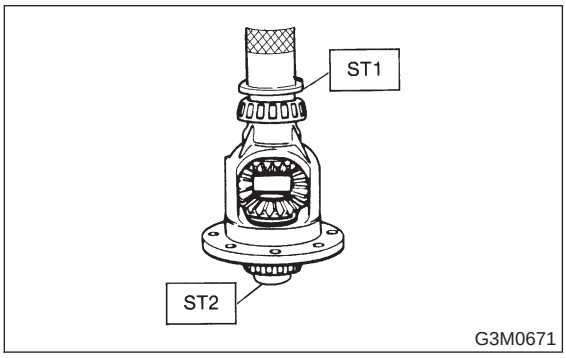


(A) Pinion shaft
(B) Differential case
(C) Straight pin

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

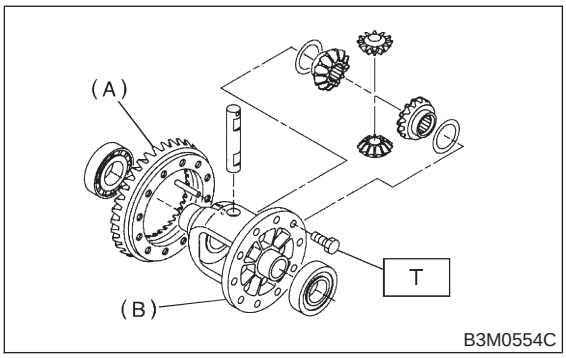
NOTE:
Be careful because roller bearing outer races are used as a set.

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)

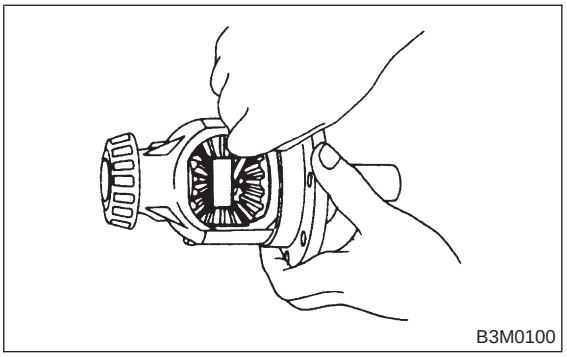


(A) Hypoid driven gear
(B) Differential case

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.

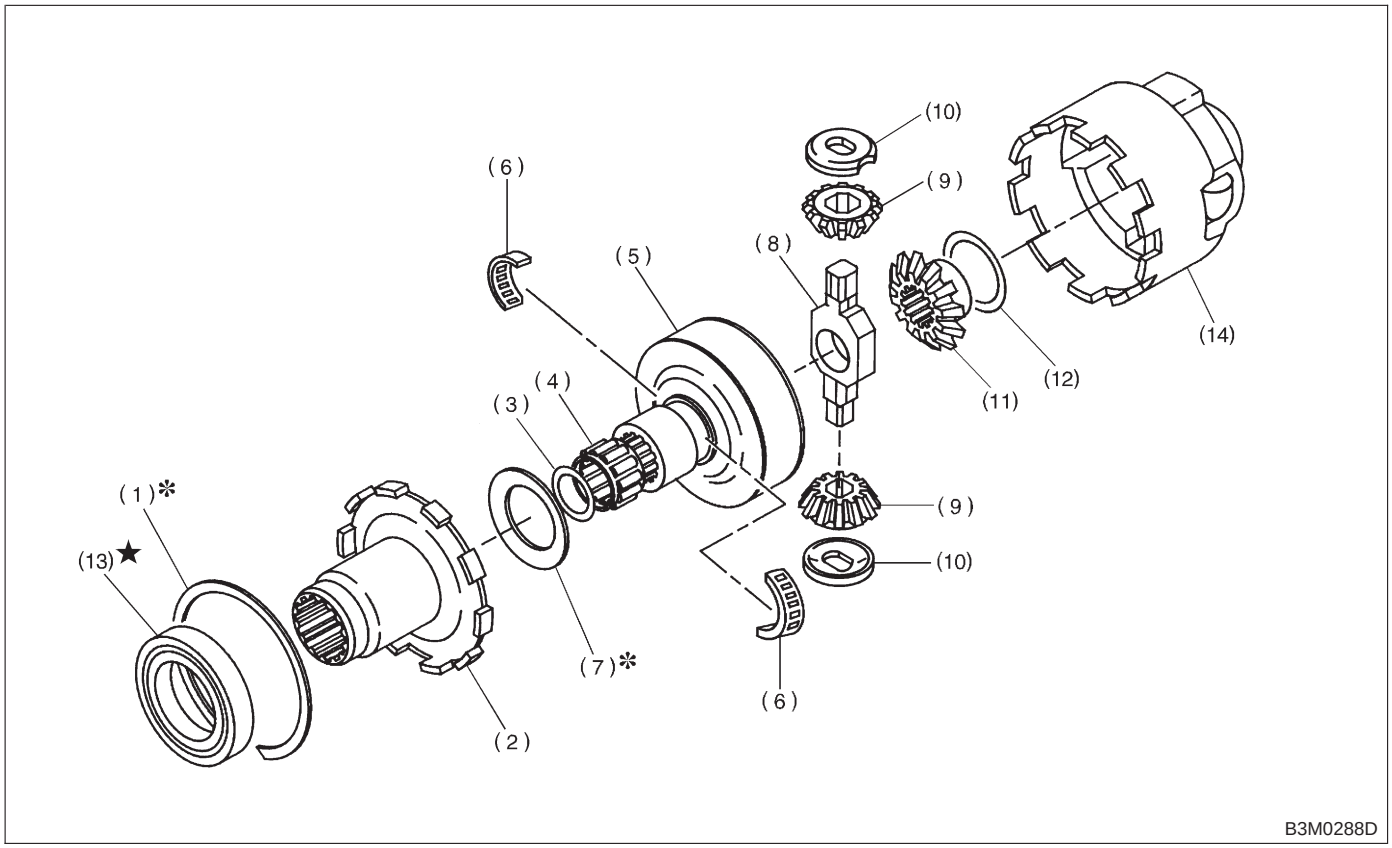
Clearance:
0 — 0.2 mm (0 — 0.008 in)



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

7. Center Differential

A: DISASSEMBLY

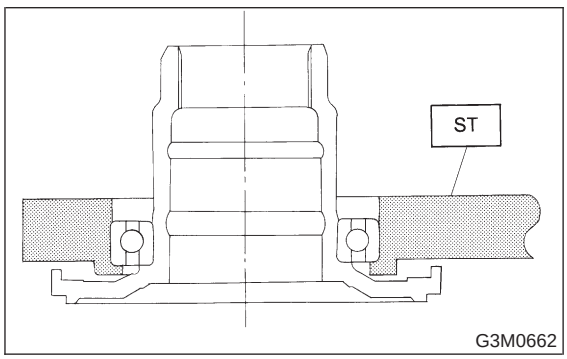


(1) Snap ring
(2) Center differential cover
(3) Snap ring
(4) Needle bearing
(5) Viscous coupling
(6) Needle bearing
(7) Adjusting washer
(8) Pinion shaft
(9) Bevel pinion
(10) Retainer
(11) Side gear
(12) Thrust washer
(13) Ball bearing
(14) Center differential case

1) Remove snap ring (Inner-110) using flat bladed screwdriver.
2) Remove center differential cover.
3) Remove snap ring and roller bearing.
4) Remove viscous coupling.
5) Remove needle bearings.
6) Remove adjusting washer (45 × 62 × t).
7) Remove pinion shaft, bevel pinions and retainers.
8) Remove side gear.
9) Remove thrust washer.
10) Remove ball bearing using ST.

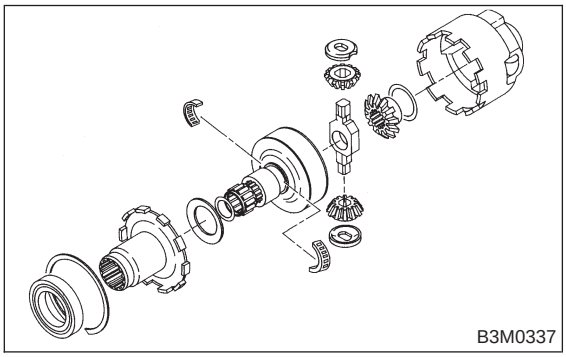
CAUTION:
Do not reuse ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



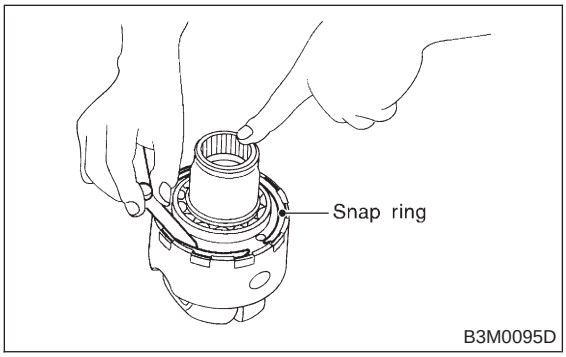
B: ASSEMBLY

1) Assembly is in the reverse order of disassembly.
Do the following:
● Install thrust washer with chamfered side of inner perimeter facing the side gear.
● Install adjusting washer with chamfered side of inner perimeter facing the viscous coupling using ST.
ST 499547300 INSTALLER SET



2) After assembling, using a thickness gauge measure clearance between snap ring and center differential case.

Clearance:
0 — 0.15 mm (0 — 0.0059 in)

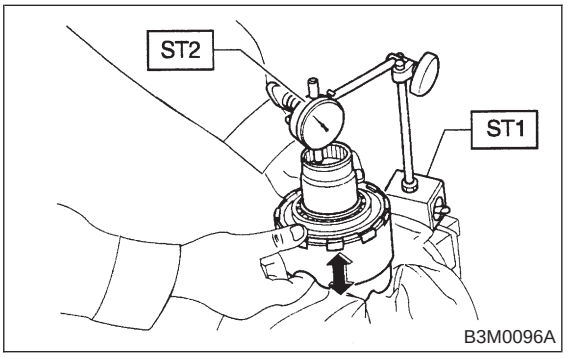


3) If the measurement is not within the specification, select suitable snap ring.

Snap ring (Inner-110)	
Part No.	Thickness mm (in)
805100061	2.10 (0.0827)
805100062	2.21 (0.0870)
805100063	2.32 (0.0913)

4) After assembling, set up a ST1 and ST2 to end of viscous coupling shaft. Move viscous coupling up and down, and measure backlash in the axial direction.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Backlash:
0.62 — 0.86 mm (0.0244 — 0.0339 in)



5) If the measurement is not within the specification, select suitable washer.

Adjusting washer (45 × 62 × t)	
Part No.	Thickness mm (in)
803045041	1.60 (0.0630)
803045042	1.80 (0.0709)
803045043	2.00 (0.0787)
803045044	2.20 (0.0866)
803045045	2.40 (0.0945)

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.

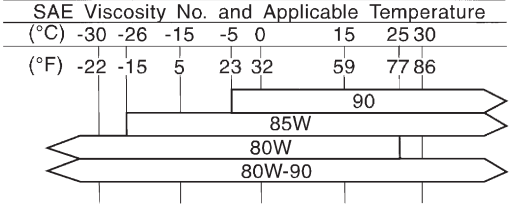
2. Differential

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. Automatic Transmission and Differential

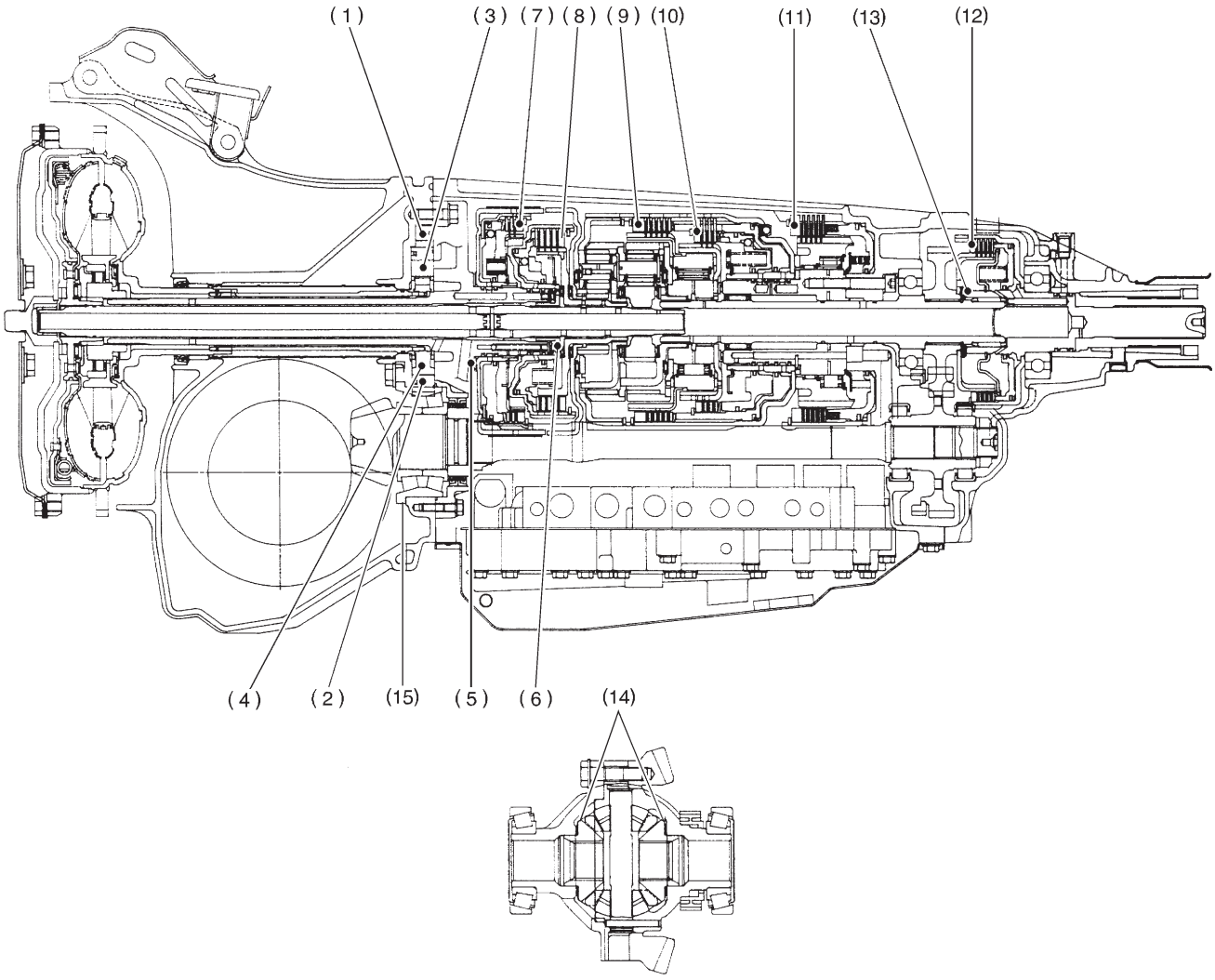
A: SPECIFICATIONS

Torque converter clutch	Type		Symmetric, 3 element, single stage, 2 phase torque converter clutch coupling	
	Stall torque ratio		2.1 — 2.3	
	Nominal diameter		246 mm (9.69 in)	
	Stall speed (at sea level)		2,300 — 2,700 rpm	
	One-way clutch		Sprague type one-way clutch	
Automatic transmission	Transmission	Type	4-forward, 1-reverse, double-row planetary gears	
		Control element	Multi-plate clutch	4 sets
			Multi-plate brake	1 set
			Band brake	1 set
			One-way clutch (sprague type)	2 sets
		Gear ratio	1st	3.027
			2nd	1.619
			3rd	1.000
			4th	0.694
			Reverse	2.272
		Tooth number of planetary gear	Front sun gear	33
			Front pinion	21
			Front internal gear	75
			Rear sun gear	37
			Rear pinion	19
			Rear internal gear	75
		Clutch number of reverse clutch	Drive plate & driven plate	2
		Clutch number of high clutch	Drive plate & driven plate	5
		Clutch number of forward clutch	Drive plate & driven plate	5
		Clutch number of overrunning clutch	Drive plate & driven plate	3
		Clutch number of low & reverse brake	Drive plate & driven plate	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 $\overleftarrow{}/\underrightarrow{}$ 2nd $\overleftarrow{}/\underrightarrow{}$ 3rd $\overleftarrow{}/\underrightarrow{}$ 4th
			3 (3rd)	Automatic gear change 1st $\overleftarrow{}/\underrightarrow{}$ 2nd $\overleftarrow{}/\underrightarrow{}$ 3rd $\leftarrow$ 4th
			2 (2nd)	2nd gear locked (Deceleration possible 4th $\rightarrow$ 3rd $\rightarrow$ 2nd)
			1 (1st)	1st gear locked (Deceleration possible 4th $\rightarrow$ 3rd $\rightarrow$ 2nd $\rightarrow$ 1st)
		Control method	Hydraulic remote control	

Automatic transmission	Oil pump	Type	Variable-capacity type vane pump
		Driving method	Driven by engine
		Number of vanes	9 pieces
	Hydraulic control	Type	Electronic/hydraulic control [Four forward speed changes by electrical signals of car speed and accelerator (throttle) opening]
		Fluid	Dexron II or Dexron III type Automatic transmission fluid
		Fluid capacity	9.5 ℓ (10.0 US qt, 8.4 Imp qt)
	Lubrication	Lubrication system	Forced feed lubrication with oil pump
		Oil	Automatic transmission fluid (above mentioned.)
	Cooling	Cooling system	Liquid-cooled cooler incorporated in radiator
	Harness	Inhibitor switch	12 poles
		Transmission harness	13 poles
	Transfer	Transfer clutch	Hydraulic multi-plate clutch
		Clutch number of transfer clutch	Drive plate & driven plate: 5
		Control method	Electronic, hydraulic type
		Lubricant	The same Automatic Transmission Fluid used in automatic transmission.
Final reduction	Final gear ratio	1st reduction gear ratio	1.000 (53/53)
		Front drive	4.444 (40/9)
	Speedometer gear ratio		0.76 (19/25)
	Recommended oil		ITEM • Front differential gear oil API Classification GL - 5 SAE Viscosity No. and Applicable Temperature  H3M1235A
	Oil capacity	Front drive	1.2 ℓ (1.3 US qt, 1.1 Imp qt)
	ATF cooling system	Radiation capacity	1.97 kW (1,700 kcal/h, 6,746 BTU/h)

B: SERVICE DATA

1. ADJUSTING PARTS



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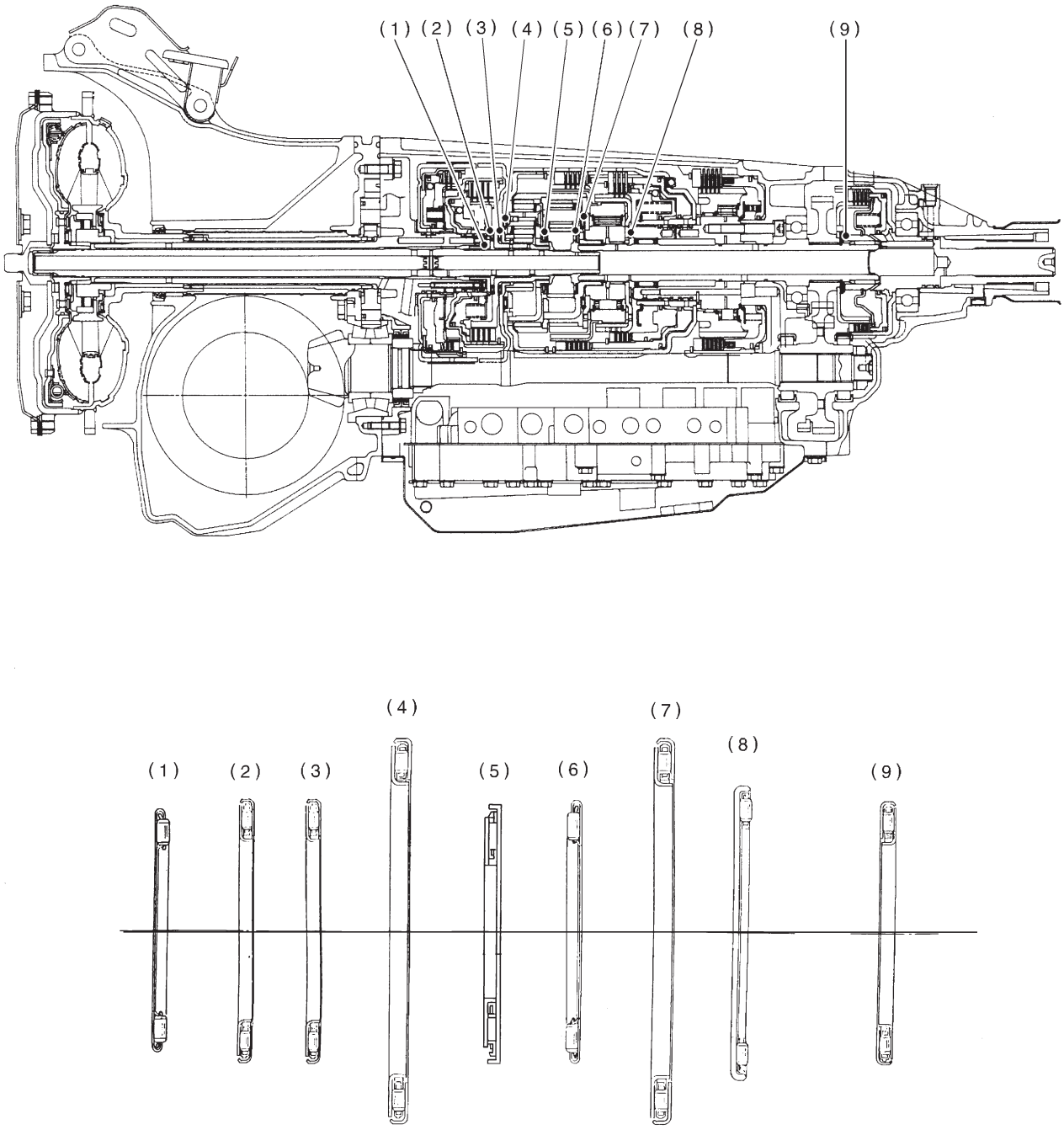
No.	Part Name	Part Number	Dimension mm (in)	Application
(1)	Control piston	31235AA000 — 030	$13.5^{-0.030}_{-0.037}$ ($0.5315^{-0.0012}_{-0.0015}$), $13.5^{-0.023}_{-0.030}$ ($0.5315^{-0.0009}_{-0.0012}$), $13.5^{-0.016}_{-0.023}$ ($0.5315^{-0.0006}_{-0.0009}$), $13.5^{-0.009}_{-0.016}$ ($0.5315^{-0.0004}_{-0.0006}$)	Adjusting side clearance of oil pump
(2)	Cam ring	31241AA001 — 031	$17^{-0.010}_{-0.017}$ ($0.6693^{-0.0004}_{-0.0007}$), $17^{-0.003}_{-0.010}$ ($0.6693^{-0.0001}_{-0.0004}$), $17^{+0.004}_{-0.003}$ ($0.6693^{+0.0002}_{-0.0001}$), $17^{+0.011}_{+0.004}$ ($0.6693^{+0.0004}_{+0.0002}$)	Adjusting side clearance of oil pump
(3)	Vane (Oil pump)	31243AA000 — 030	$17^{-0.030}_{-0.037}$ ($0.6693^{-0.0012}_{-0.0015}$), $17^{-0.023}_{-0.030}$ ($0.6693^{-0.0009}_{-0.0012}$), $17^{-0.016}_{-0.023}$ ($0.6693^{-0.0006}_{-0.0009}$), $17^{+0.009}_{+0.016}$ ($0.6693^{+0.0004}_{+0.0006}$)	Adjusting side clearance of oil pump
(4)	Rotor (Oil pump)	31240AA000 — 030	$17^{-0.030}_{-0.037}$ ($0.6693^{-0.0012}_{-0.0015}$), $17^{-0.023}_{-0.030}$ ($0.6693^{-0.0009}_{-0.0012}$), $17^{-0.016}_{-0.023}$ ($0.6693^{-0.0006}_{-0.0009}$), $17^{+0.009}_{+0.016}$ ($0.6693^{+0.0004}_{+0.0006}$)	Adjusting side clearance of oil pump
(5)	Thrust washer (Reverse clutch)	31299AA000 — 060	0.7, 0.9, 1.1, 1.3, 1.5, 1.7, 1.9) (0.028, 0.035, 0.043, 0.051, 0.059, 0.067, 0.075	Adjusting end play of reverse clutch drum
(6)	Bearing race	803031021 — 027	0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0 (0.031, 0.039, 0.047, 0.055, 0.063, 0.071, 0.079)	Adjusting total end play
(7)	Retaining plate	31567AA350 — 400	4.6, 4.8, 5.0, 5.2, 5.4, 5.6 (0.181, 0.189, 0.197, 0.205, 0.213, 0.220)	Adjusting clearance of reverse clutch
(8)	Retaining plate	31567AA190 — 260	3.6, 3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0 (0.142, 0.150, 0.157, 0.165, 0.173, 0.181, 0.189, 0.197)	Adjusting clearance of high clutch
(9)	Retaining plate	31567AA010, 31567AA060 — 110	4.0, 4.2, 4.4, 4.6, 4.8, 5.0, 5.2 (0.157, 0.165, 0.173, 0.181, 0.189, 0.197, 0.205)	Adjusting clearance of forward clutch
(10)	Retaining plate	31567AA410 — 470	8.0, 8.2, 8.4, 8.6, 8.8, 9.0, 9.2 (0.315, 0.323, 0.331, 0.339, 0.346, 0.354, 0.362)	Adjusting clearance of overrunning clutch
(11)	Retaining plate No. 2	31667AA180 — 250 31667AA310	6.5, 6.8, 7.1, 7.4, 7.7, 8.0, 8.2, 8.4, 8.6 (0.256, 0.268, 0.280, 0.291, 0.303, 0.315, 0.323, 0.331, 0.339)	Adjusting clearance of low and reverse brake
(12)	Pressure plate (Front)	31593AA151 — 181	3.3, 3.7, 4.1, 4.5 (0.130, 0.146, 0.161, 0.177)	Adjusting clearance of transfer clutch
(13)	Thrust bearing ($35 \times 53 \times T$)	806536020, 806535030 — 070, 090	3.8, 4.0, 4.2, 4.4, 4.6, 4.8, 5.0 (0.150, 0.157, 0.165, 0.173, 0.181, 0.189, 0.197)	Adjusting end play of transfer clutch
(14)	Washer ($38.1 \times 50 \times T$)	803038021 — 023	0.95, 1.00, 1.05 (0.0374, 0.0394, 0.0413)	Adjusting backlash of differential bevel gear
(15)	Drive pinion shim	31451AA050 — 100	0.150, 0.175, 0.200, 0.225, 0.250, 0.275 (0.0059, 0.0069, 0.0079, 0.0089, 0.0098, 0.0108)	Adjusting drive pinion height

2. LOCATION AND INSTALLING DIRECTION OF THRUST NEEDLE BEARING



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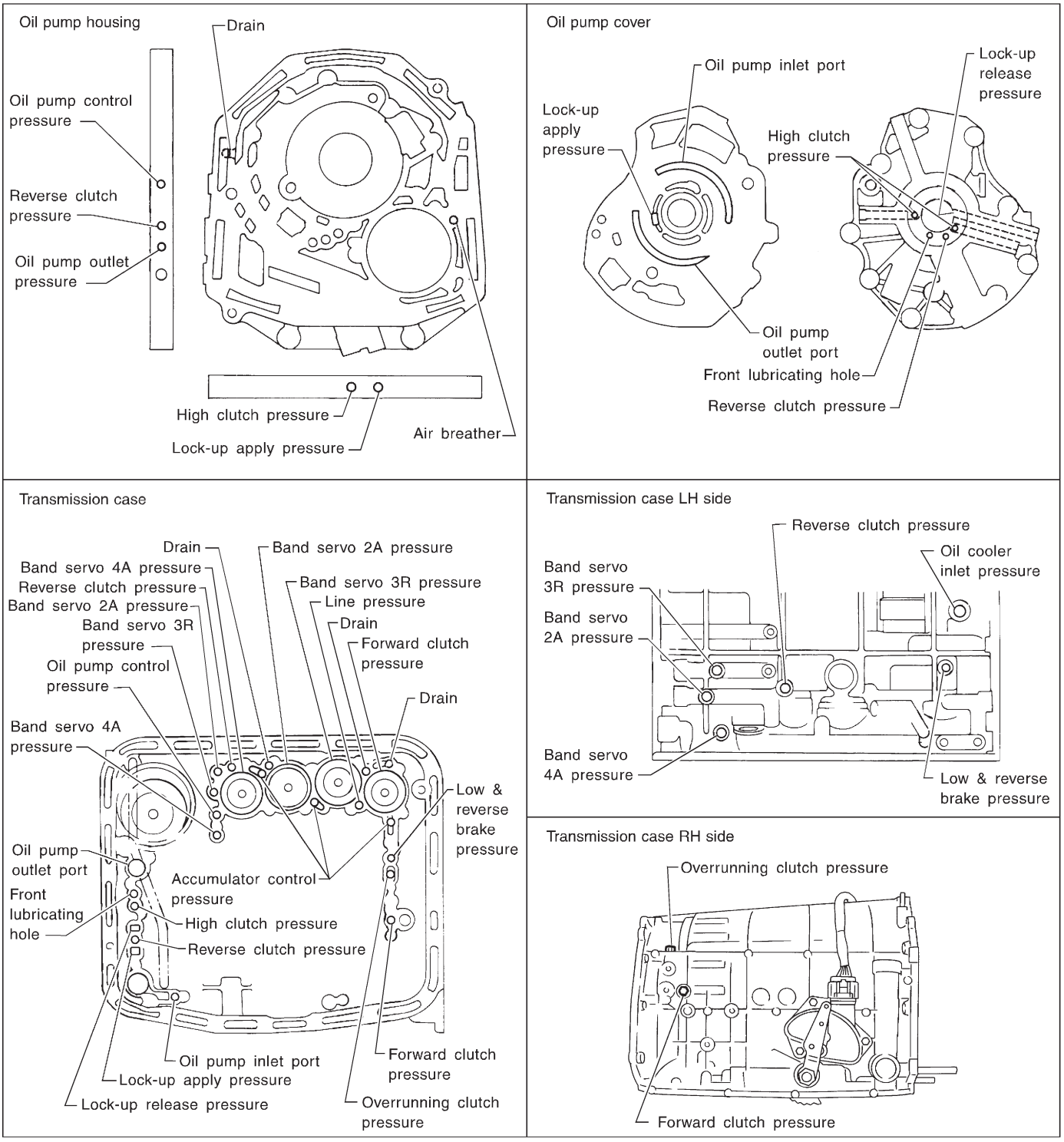
No.	Part Name	Part Number	Inside diameter mm (in)	Outside diameter mm (in)	Dimension mm (in)	Application
(1)	Thrust needle bearing	806530020	30 (1.18)	47 (1.85)	3.3 (0.130)	A place of high clutch
(2)	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of high clutch hub
(3)	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of front sun gear
(4)	Thrust needle bearing	806558020	58 (2.28)	78 (3.07)	4.0 (0.157)	A place of front planetary carrier
(5)	Thrust needle bearing	806535120	35 (1.38)	53 (2.09)	4.8 (0.189)	A place of rear sun gear
(6)	Thrust needle bearing	806534010	34 (1.34)	53 (2.09)	3.37 (0.1327)	A place of rear internal gear
(7)	Thrust needle bearing	806558020	58 (2.28)	78 (3.07)	4.0 (0.157)	A place of overrunning clutch hub
(8)	Thrust needle bearing	806542010	42 (1.65)	59 (2.32)	3.6 (0.142)	A place of low & reverse brake
(9)	Thrust needle bearing	806536020	36 (1.42)	53 (2.09)	3.8 (0.150)	Adjusting end play of transfer clutch
		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)	

3. FLUID PASSAGES



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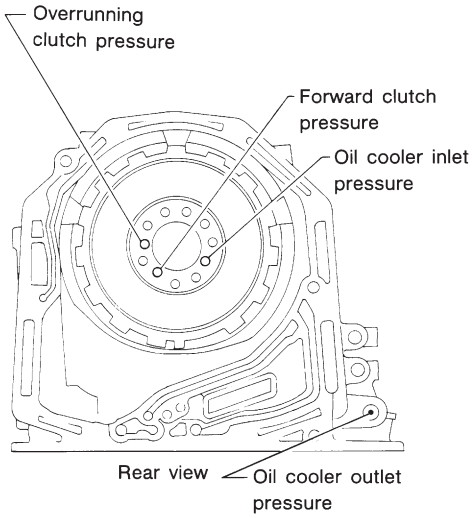
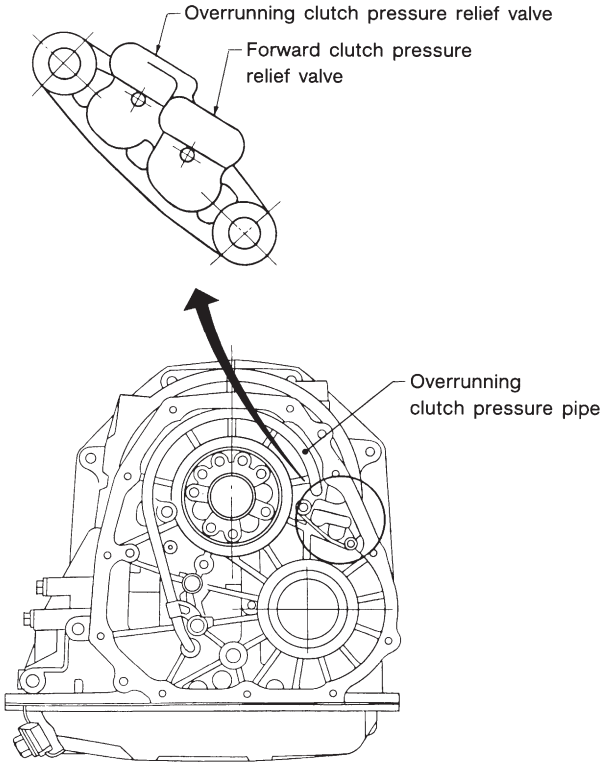
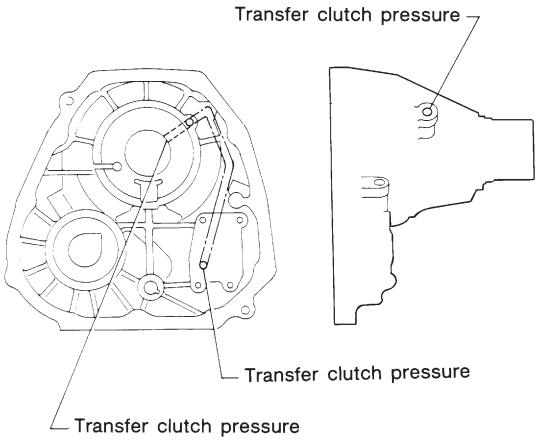
Transmission case



Transmission case



Extension case



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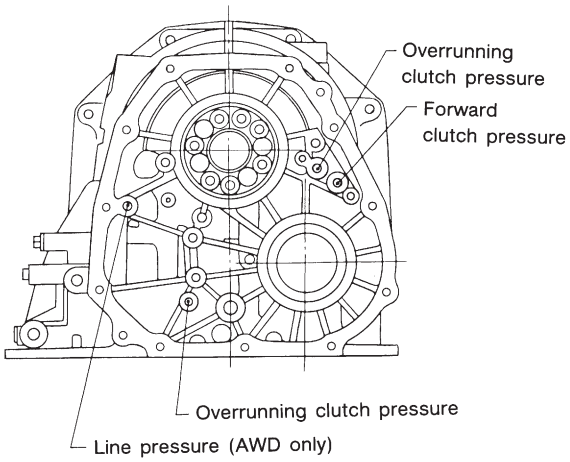
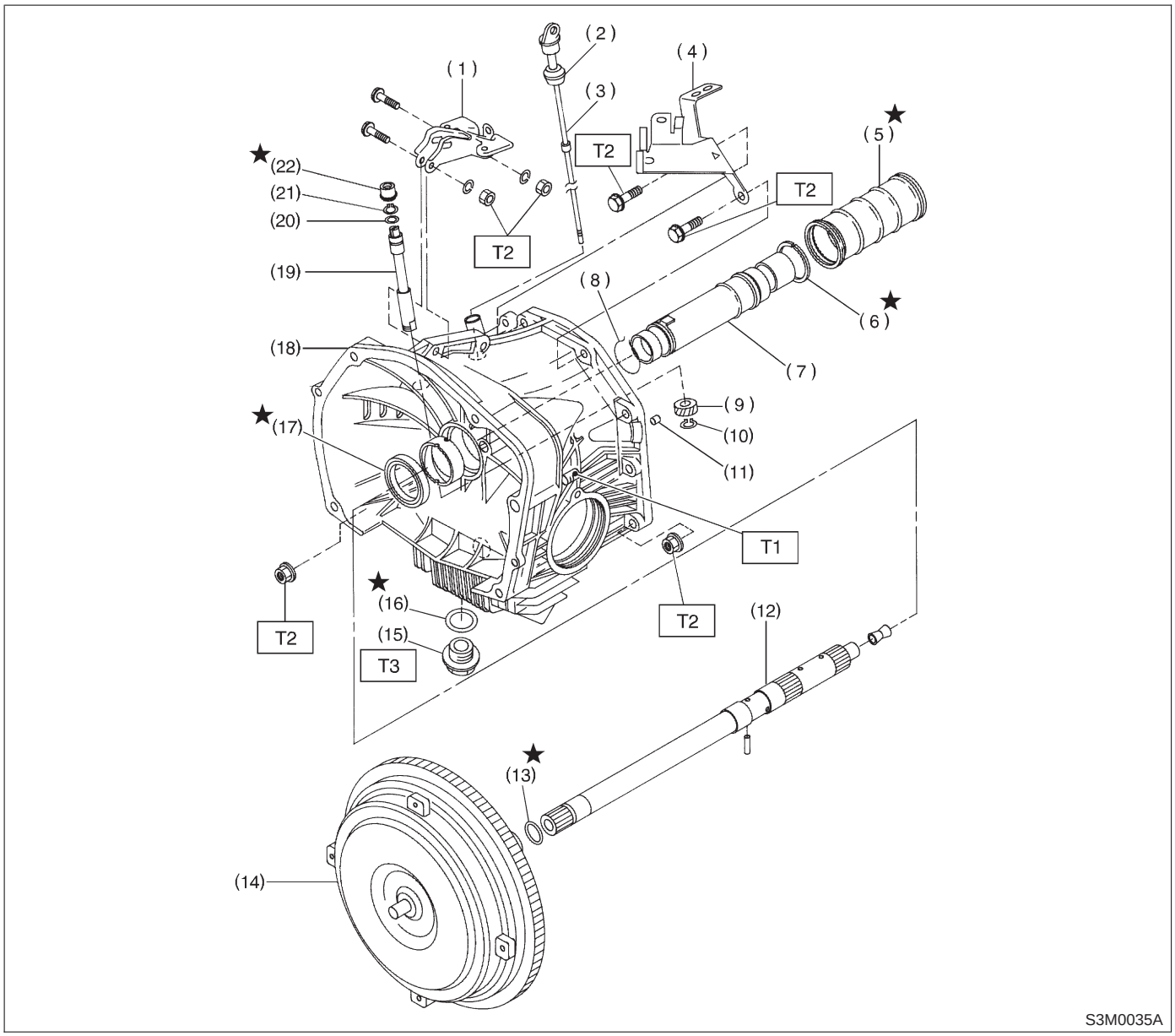


G3M0777

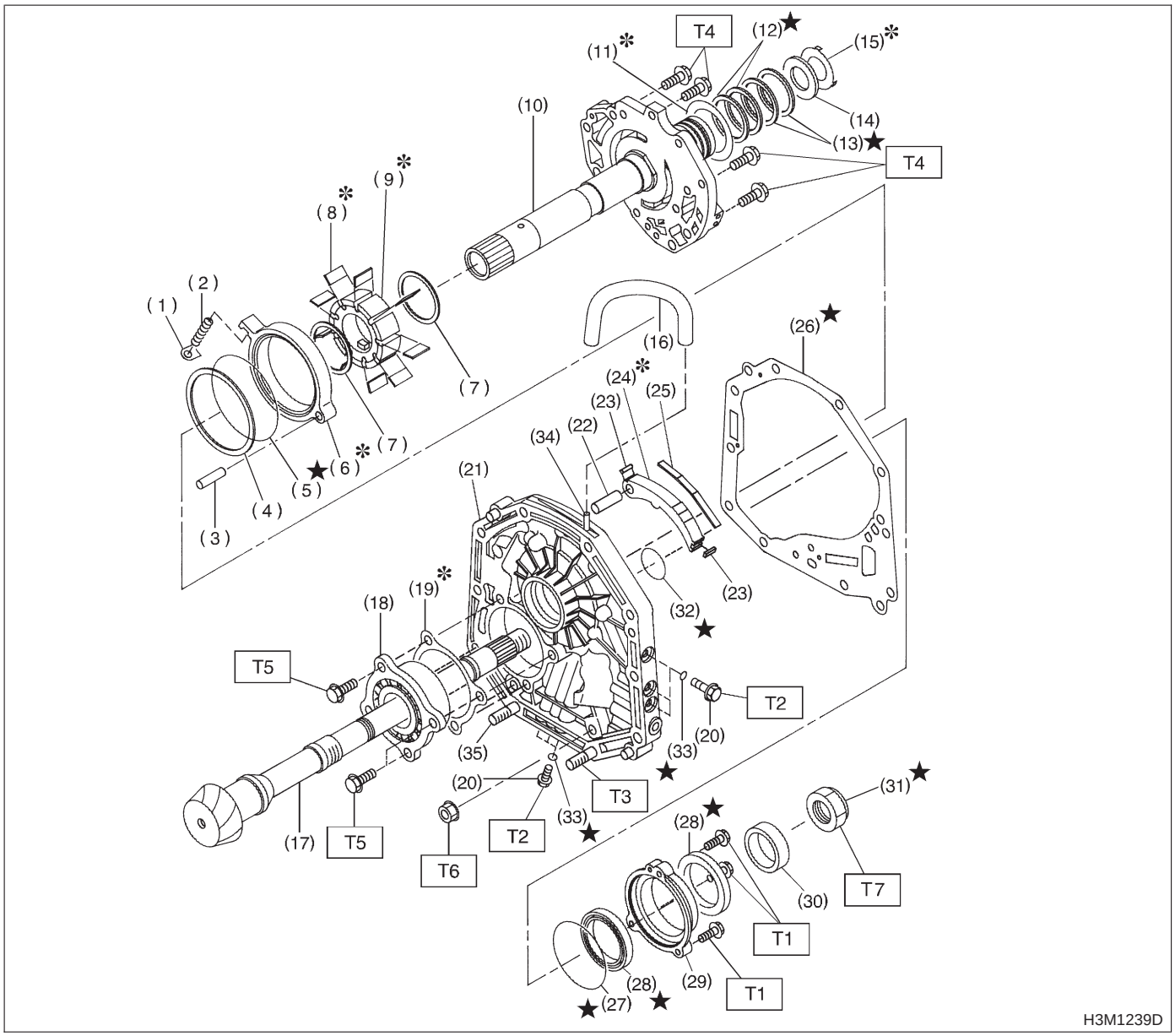
1. Torque Converter Clutch and Case



(1) Pitching stopper bracket
(2) O-ring
(3) Oil level gauge
(4) Stay
(5) Seal pipe
(6) Seal ring
(7) Oil pump shaft
(8) Clip
(9) Speedometer driven gear
(10) Snap ring
(11) Oil drain pipe
(12) Input shaft
(13) O-ring
(14) Torque converter clutch
(15) Drain plug
(16) Gasket
(17) Oil seal
(18) Torque converter clutch case
(19) Speedometer shaft
(20) Washer
(21) Snap ring
(22) Oil seal

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)

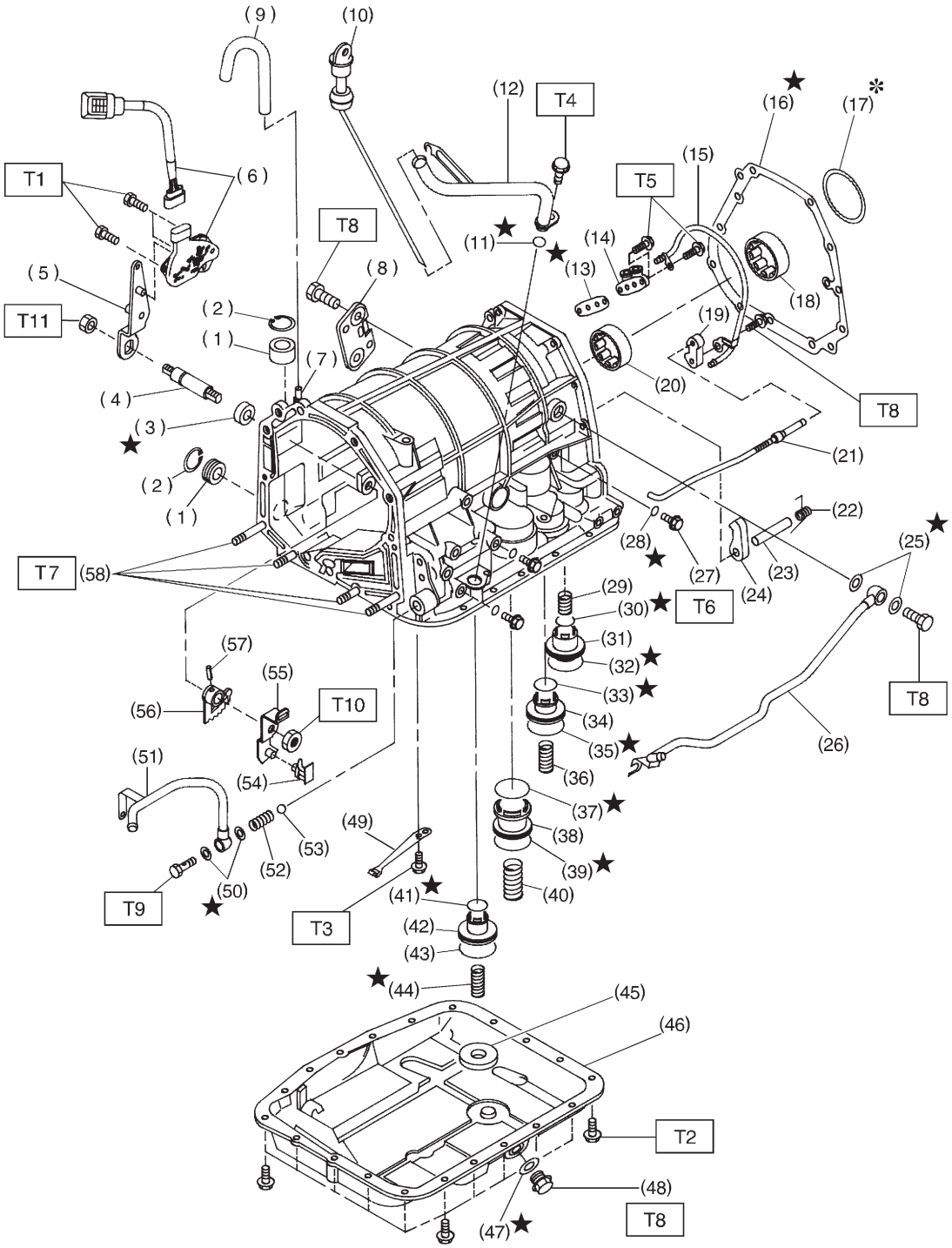
2. Oil Pump



(1) Retainer
(2) Return spring
(3) Pin
(4) Friction ring
(5) O-ring
(6) Cam ring
(7) Vane ring
(8) Vane
(9) Rotor
(10) Oil pump cover
(11) Thrust washer
(12) Seal ring (R)
(13) Seal ring (H)
(14) Thrust needle bearing
(15) Thrust washer
(16) Air breather hose
(17) Drive pinion shaft
(18) Roller bearing
(19) Shim
(20) Test plug
(21) Oil pump housing
(22) Pin
(23) Side seal
(24) Control piston
(25) Plane seal
(26) Gasket
(27) O-ring
(28) Oil seal
(29) Oil seal retainer
(30) Drive pinion collar
(31) Lock nut
(32) O-ring
(33) O-ring
(34) Nipple
(35) Stud bolt

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: 113±5 (11.5±0.5, 83.2±3.6)

3. Transmission Case, Transmission Cover and Control Device

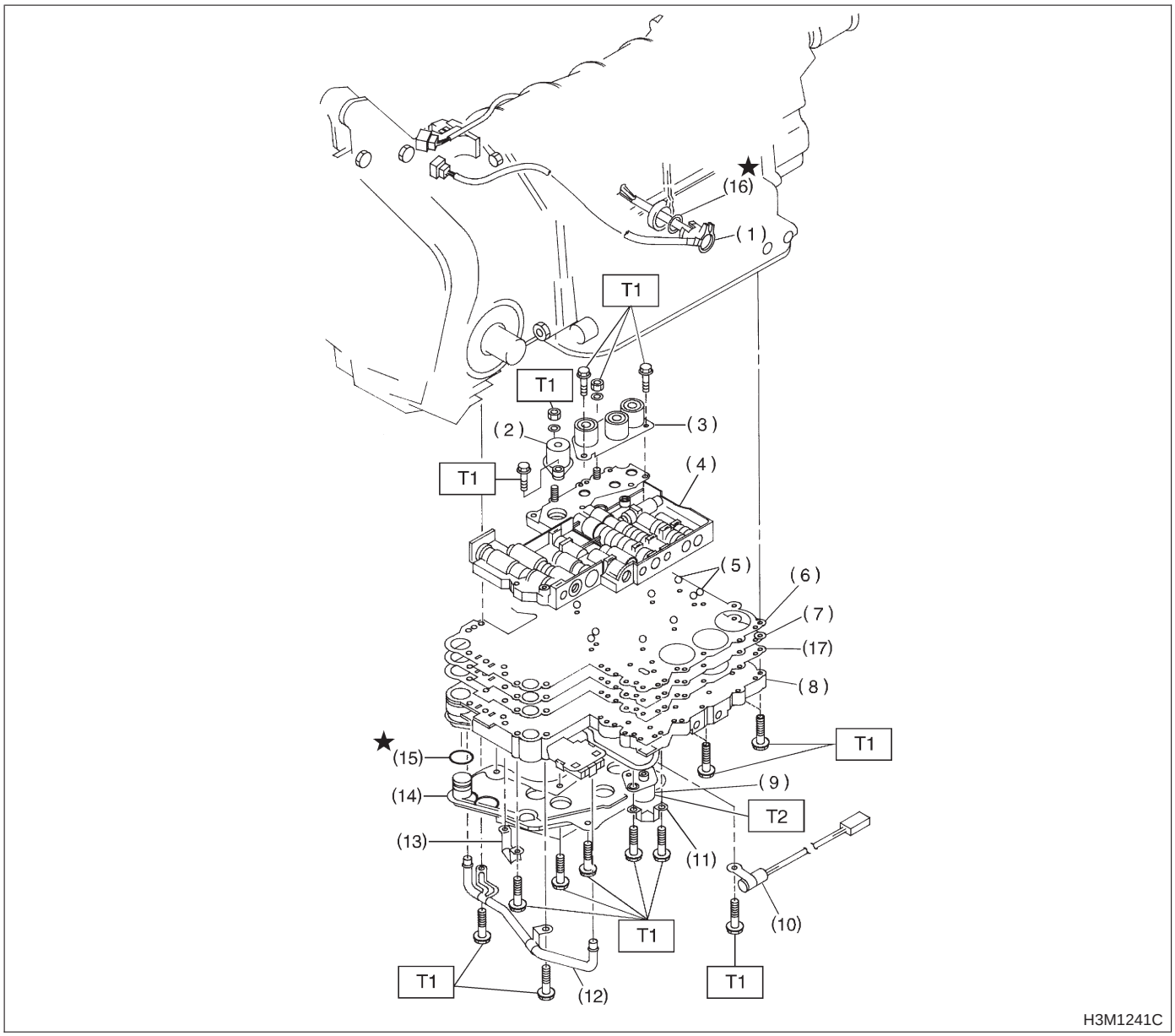


S3M0036A

(1) Plug
(2) Snap ring
(3) Oil seal
(4) Manual shaft
(5) Range select lever
(6) Inhibitor switch ASSY
(7) Nipple
(8) Plate ASSY
(9) Air breather hose
(10) Oil level gauge
(11) O-ring
(12) Oil charger pipe
(13) Gasket
(14) Relief valve
(15) Pipe
(16) Gasket
(17) Shim
(18) Roller bearing
(19) Parking support
(20) Ball bearing
(21) Parking rod
(22) Return spring
(23) Shaft
(24) Parking pawl
(25) Gasket
(26) Inlet pipe
(27) Test plug
(28) O-ring
(29) Spring
(30) O-ring
(31) Accumulator piston (N-D)
(32) O-ring
(33) O-ring
(34) Accumulator piston (2-3)
(35) O-ring
(36) Spring
(37) O-ring
(38) Accumulator piston (1-2)
(39) O-ring
(40) Spring
(41) O-ring
(42) Accumulator piston (3-4)
(43) O-ring
(44) Spring
(45) Magnet
(46) Oil pan
(47) Gasket
(48) Drain plug
(49) Detention spring
(50) Gasket
(51) Outlet pipe
(52) Spring
(53) Ball
(54) Stopper
(55) Manual lever
(56) Manual plate
(57) Spring pin
(58) Stud bolt

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: 6.4±0.5 (0.65±0.05, 4.7±0.4)
T5: 7.8±1.0 (0.80±0.10, 5.8±0.7)
T6: 12.7±1.0 (1.30±0.10, 9.4±0.7)
T7: 17.7±2.9 (1.80±0.30, 13.0±2.2)
T8: 24.5±2.0 (2.50±0.20, 18.1±1.4)
T9: 34.3±2.9 (3.50±0.30, 25.3±2.2)
T10: 47.1±2.0 (4.80±0.20, 34.7±1.4)
T11: 47.1±4.9 (4.80±0.50, 34.7±3.6)

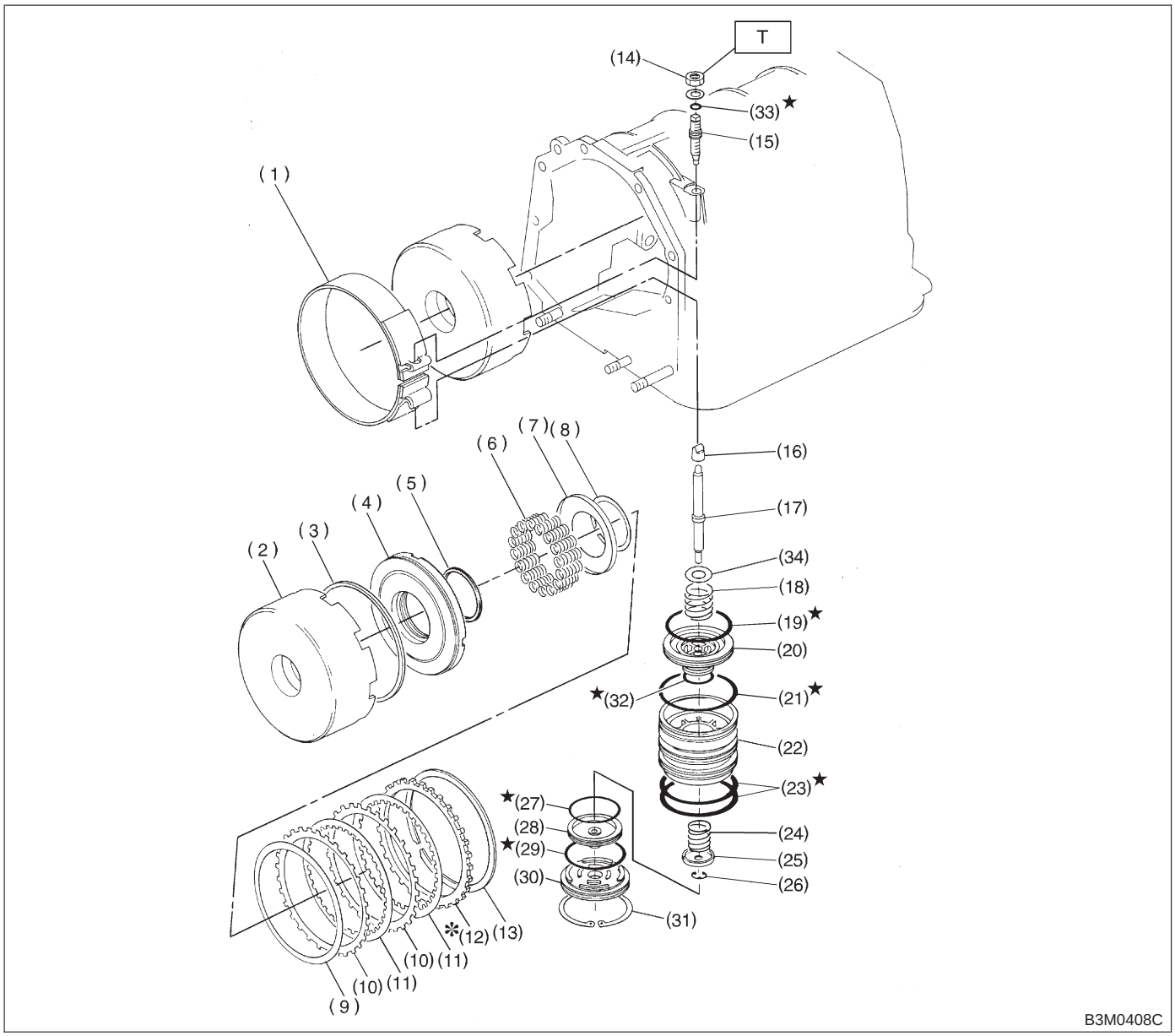
4. Control Valve and Harness Routing



(1) Transmission harness
(2) Duty solenoid A (Line pressure)
(3) Shift solenoid ASSY
(4) Upper valve body
(5) Ball
(6) Upper separator gasket
(7) Lower separator gasket
(8) Lower valve body
(9) Duty solenoid B (Lock-up)
(10) ATF temperature sensor
(11) Bracket
(12) Pipe
(13) Bracket
(14) Oil strainer
(15) O-ring
(16) O-ring
(17) Separator plate

Tightening torque: N·m (kg-m, ft-lb)
T1: 8±1 (0.8±0.1, 5.8±0.7)
T2: 11.3±1.5 (1.15±0.15, 8.3±1.1)

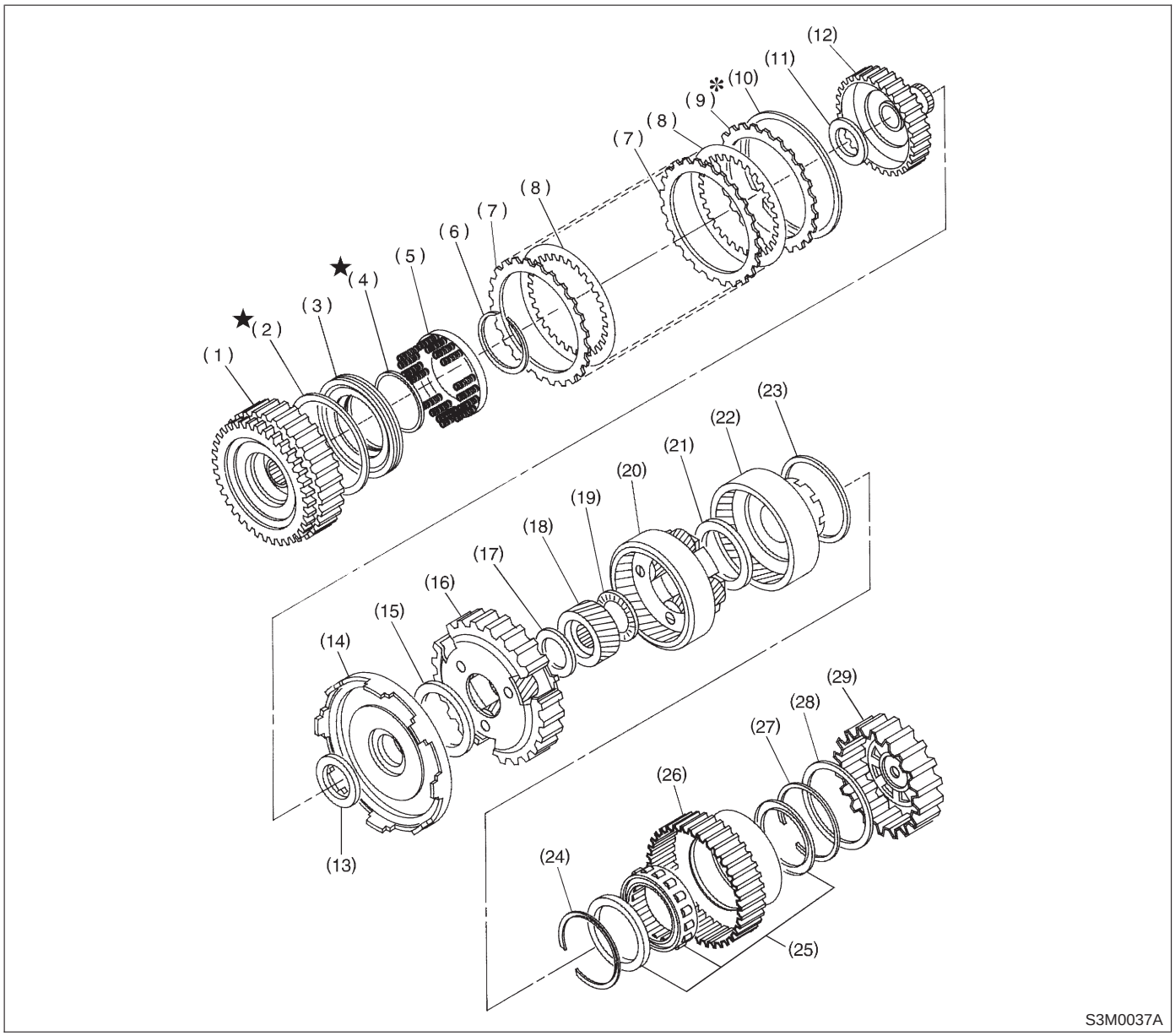
5. Reverse Clutch and Brake Band



(1) Brake band
(2) Reverse clutch drum
(3) Lip seal
(4) Piston
(5) Lathe cut seal ring
(6) Spring
(7) Spring retainer
(8) Snap ring
(9) Dish plate
(10) Driven plate
(11) Drive plate
(12) Retaining plate
(13) Snap ring
(14) Lock nut
(15) Brake band adjusting screw
(16) Strut
(17) Band servo piston stem
(18) Spring
(19) Lathe cut seal ring
(20) Band servo piston (1-2)
(21) O-ring
(22) Retainer
(23) O-ring
(24) Spring
(25) Retainer
(26) Circlip
(27) Lathe cut seal ring
(28) Band servo piston (3-4)
(29) O-ring
(30) O.D. servo retainer
(31) Snap ring
(32) Lathe cut seal ring
(33) O-ring
(34) Washer

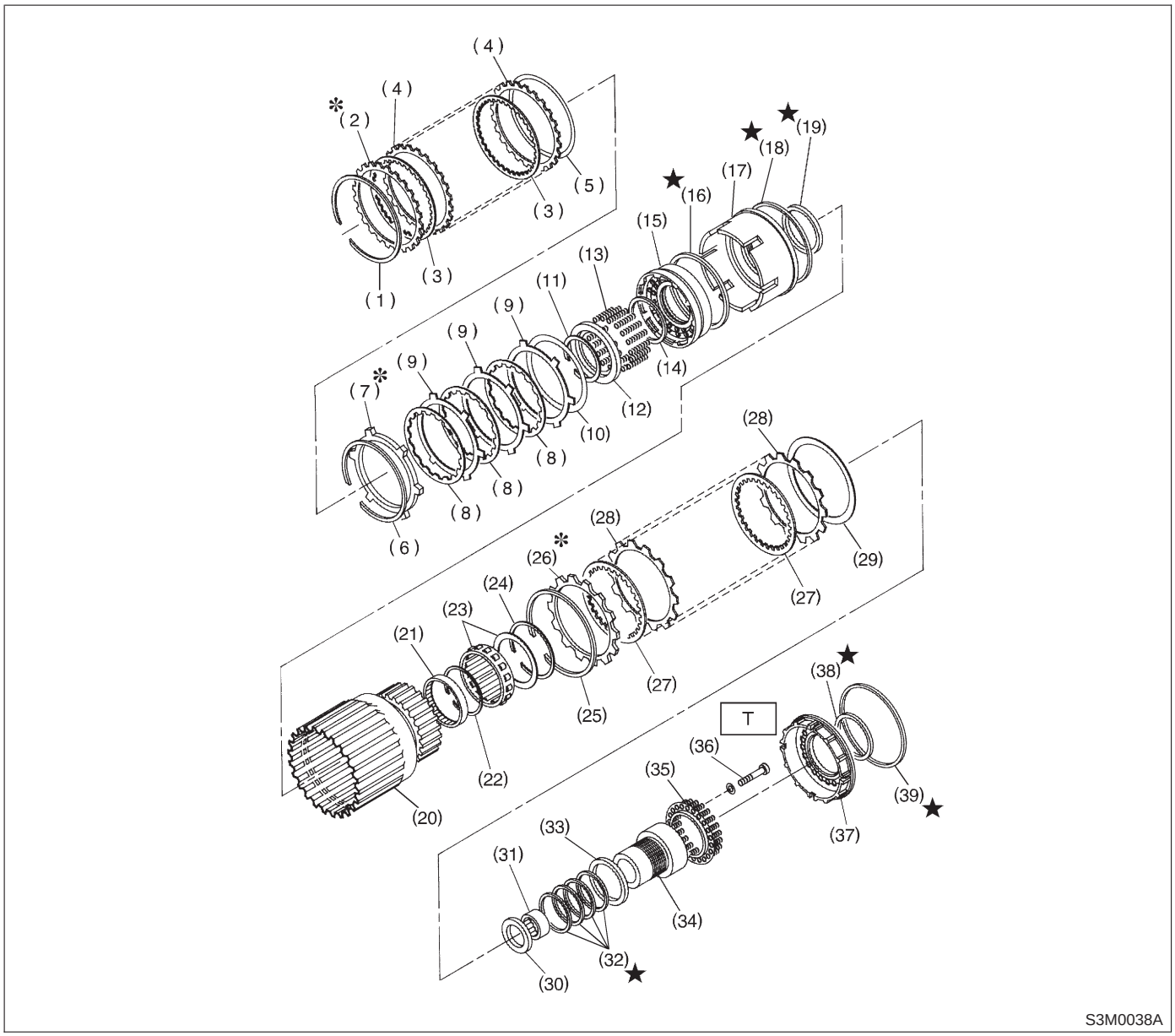
Tightening torque: N·m (kg-m, ft-lb)
T: 26±2 (2.7±0.2, 19.5±1.4)

6. High Clutch and Planetary Gear



(1) High clutch drum
(2) Lathe cut seal ring
(3) Piston
(4) Lathe cut seal ring
(5) Spring retainer
(6) Snap ring
(7) Driven plate
(8) Drive plate
(9) Retaining plate
(10) Snap ring
(11) Thrust needle bearing
(12) High clutch hub
(13) Thrust needle bearing
(14) Front sun gear
(15) Thrust needle bearing
(16) Front planetary carrier
(17) Thrust needle bearing
(18) Rear sun gear
(19) Thrust needle bearing
(20) Rear planetary carrier
(21) Thrust needle bearing
(22) Rear internal gear
(23) Thrust washer
(24) Snap ring
(25) One-way clutch (3-4)
(26) One-way clutch outer race (3-4)
(27) Overrunning clutch hub

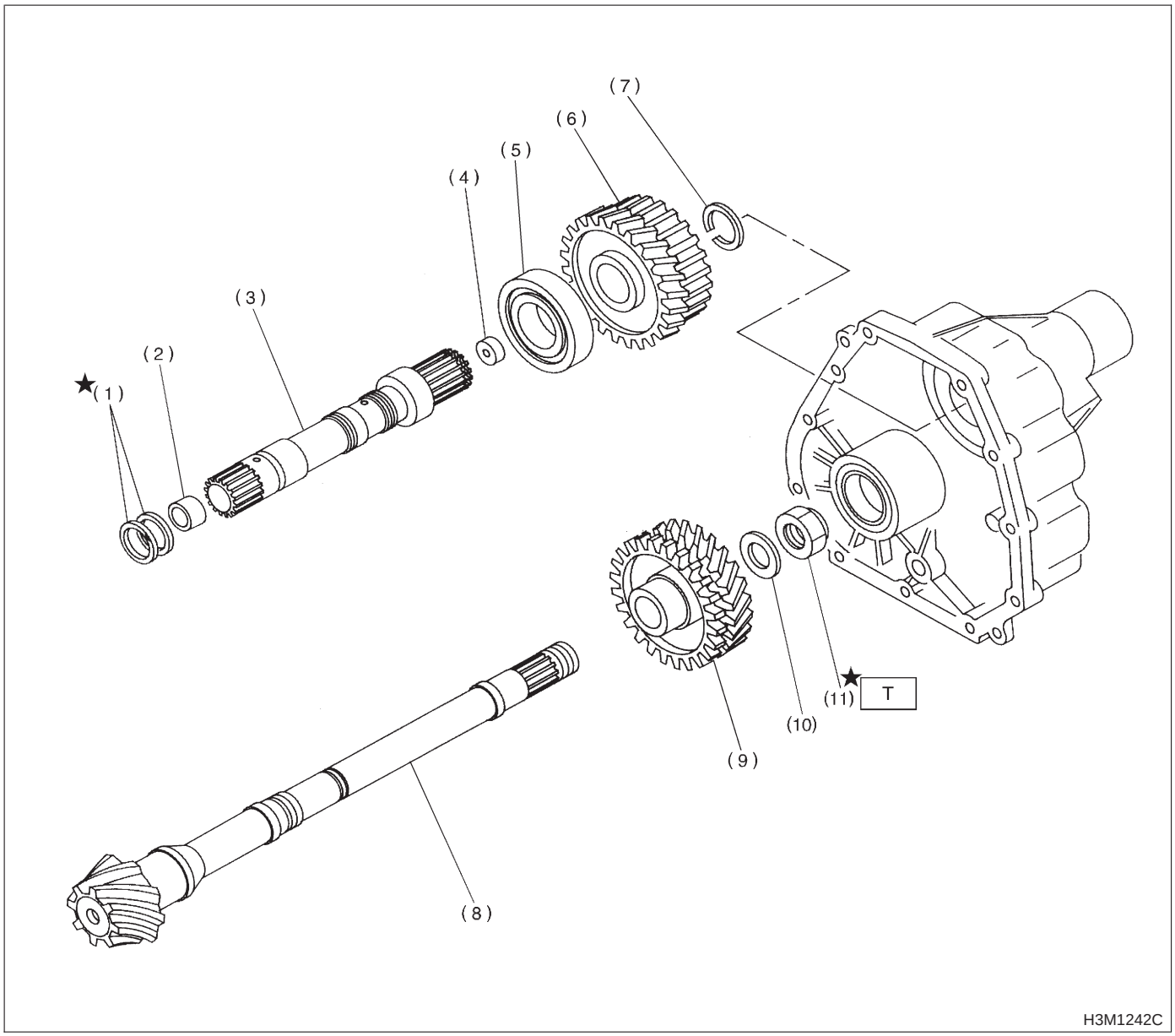
7. Forward Clutch and Low & Reverse Brake



(1) Snap ring
(2) Retaining plate
(3) Drive plate
(4) Driven plate
(5) Dish plate
(6) Snap ring
(7) Retaining plate
(8) Drive plate
(9) Driven plate
(10) Dish plate
(11) Snap ring
(12) Spring retainer
(13) Spring
(14) Lathe cut seal ring
(15) Overrunning piston
(16) Lathe cut seal ring
(17) Forward piston
(18) Lip seal
(19) Lathe cut seal ring
(20) Forward clutch drum
(21) Needle bearing
(22) Snap ring
(23) One-way clutch (1-2)
(24) Snap ring
(25) Snap ring
(26) Retaining plate
(27) Drive plate
(28) Driven plate
(29) Dish plate
(30) Thrust needle bearing
(31) Needle bearing
(32) Seal ring
(33) Thrust washer
(34) One-way clutch inner race (1-2)
(35) Spring retainer
(36) Socket bolt
(37) Low & reverse piston
(38) Lathe cut seal ring
(39) Lathe cut seal ring

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

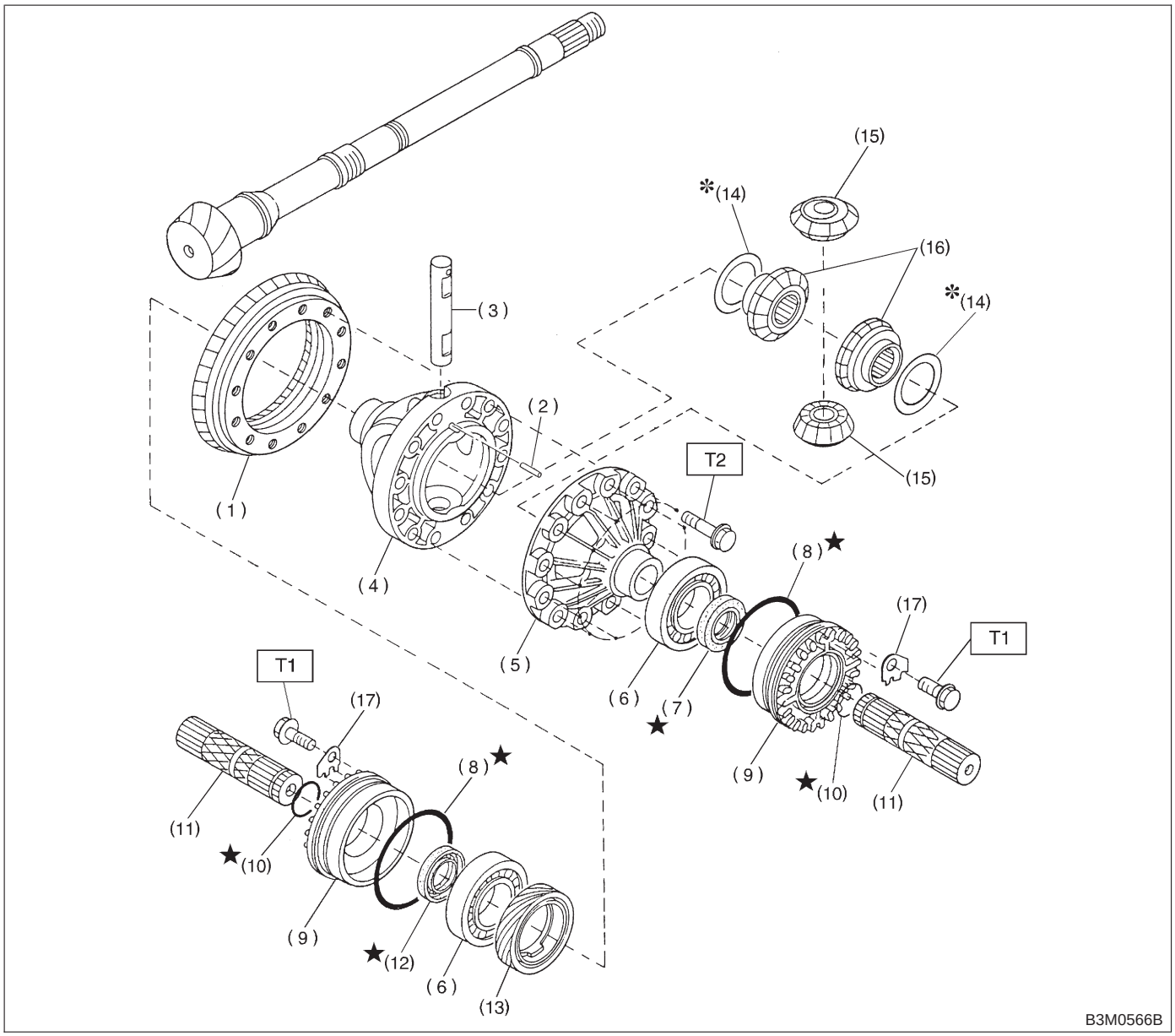
8. Reduction Gear



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

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

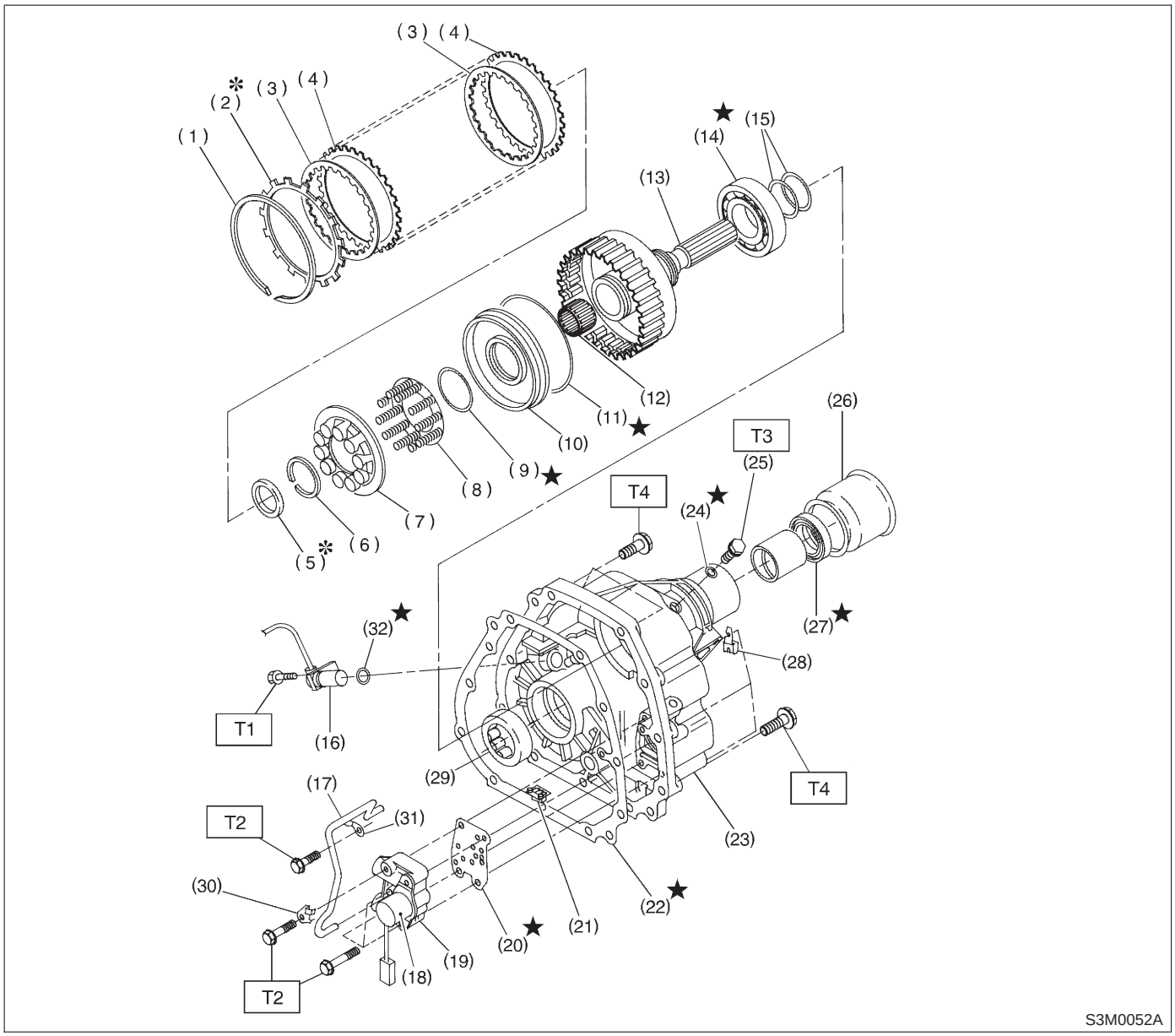
9. Differential Case



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

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) Snap ring
(2) Pressure plate
(3) Drive plate
(4) Driven plate
(5) Thrust needle bearing
(6) Snap ring
(7) Seal transfer piston
(8) Spring retainer
(9) Lathe cut seal ring
(10) Transfer clutch piston
(11) Lathe cut seal ring
(12) Needle bearing
(13) Rear drive shaft
(14) Ball bearing
(15) Seal ring
(16) Vehicle speed sensor 1
(17) Transfer clutch pipe
(18) Duty solenoid C (Transfer clutch)
(19) Transfer valve body
(20) Transfer valve plate
(21) Filter
(22) Gasket
(23) Extension case
(24) O-ring
(25) Test plug
(26) Dust seal
(27) Oil seal
(28) Clip
(29) Roller bearing
(30) Clip
(31) Stay
(32) O-ring

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)
T3: 13±1 (1.3±0.1, 9.4±0.7)
T4: 25±2 (2.5±0.2, 18.1±1.4)

1. General

A: PRECAUTION

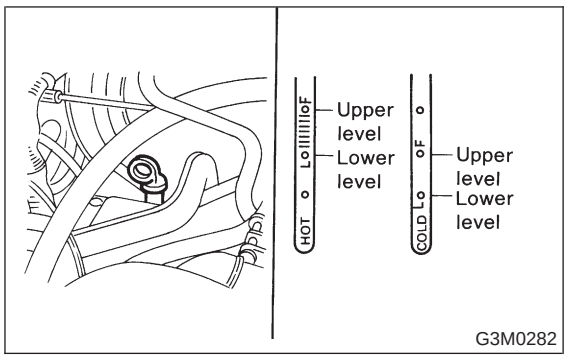
When disassembling or assembling the automatic transmission, observe the following instructions.
1) Workshop
Provide a place that is clean and free from dust. Principally the conventional workshop is suitable except for a dusty place. In a workshop where grinding work, etc. which produces fine particles is done, make independent place divided by the vinyl curtain or the equivalent.
2) Work table
The size of 1 × 1.5 m (40 × 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, don't use gloves. Don't 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) Do not reuse old aluminum (overrunning clutch pipes, etc.) pipes, gaskets, spring pins. Install new ones.
(13) 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

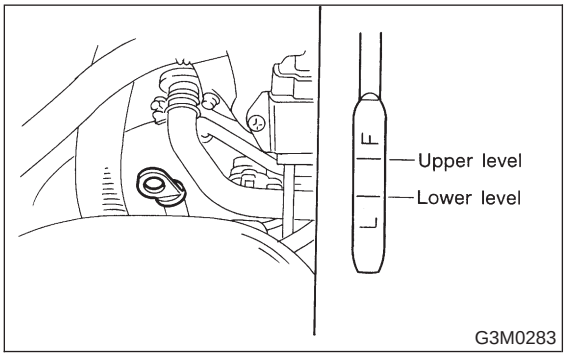
Time for temperature rise to 60°C (140°F) with atmospheric temperature of 0°C (32°F): More than 10 minutes
5) Method for checking fluid level upon delivery or at periodic inspection
Check fluid level after a warm-up run of approx. 10 minutes. During the warm-up period, the automatic transmission functions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

2. DIFFERENTIAL GEAR OIL LEVEL

1) Ensure the vehicle is in safe condition.

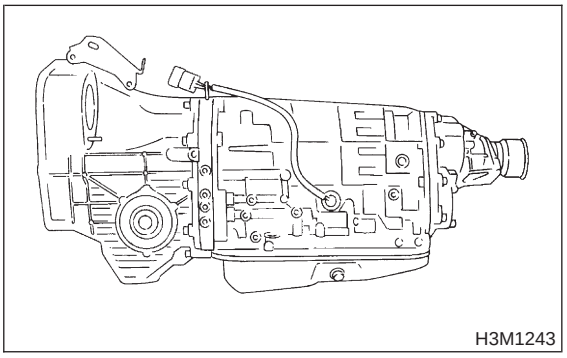
NOTE:
Do not check the oil level nor add oil to the case with the front end of the vehicle jacked-up; this will result in an incorrect reading of the oil level.

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.

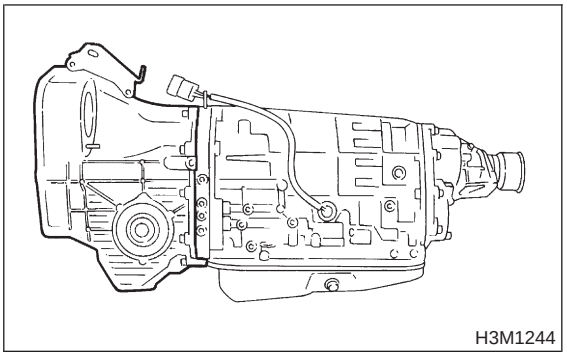


3. OIL LEAKAGE

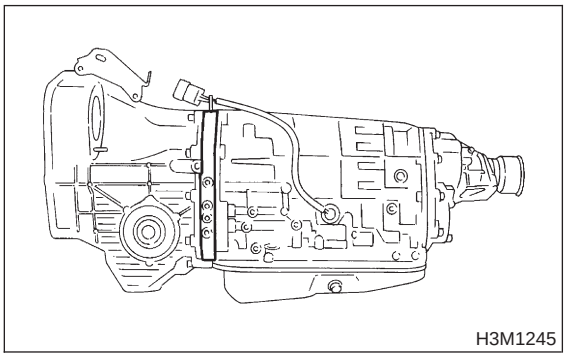
It is difficult to accurately determine the precise position of a oil leak, since the surrounding area also becomes wet with oil. The places where oil seals and gaskets are used are as follows:
1) Jointing portion of the case
- Transmission case and oil pump housing jointing portion
- Torque converter clutch case and oil pump housing jointing portion
- Transmission case and extension case jointing portion



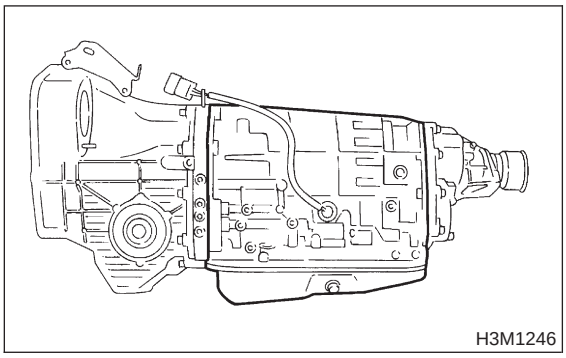
2) Torque converter clutch case
- Engine crankshaft oil seal
- Torque converter clutch impeller sleeve oil seal
- ATF cooler pipe connector
- Torque converter clutch
- Torque converter clutch case
- Axle shaft oil seal
- O-ring on the outside diameter of axle shaft oil seal holder
- O-ring on the differential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



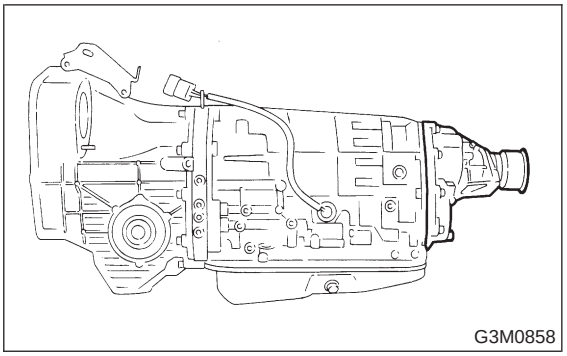
3) Oil pump housing
- Oil pump housing (Defective casting)
- O-ring on the test plugs
- Checking blind plugs
- Differential gear breather


H3M1245

4) Automatic transmission case
- Transmission case (Defective casting)
- Mating surface of oil pan
- O-ring on the test plugs
- Checking blind plugs (Steel balls)
- 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


H3M1246

5) Extension case
- Extension case (Defective casting)
- O-ring on the vehicle speed sensor
- Rear drive shaft oil seal
- Checking blind plugs (Steel ball)
- O-ring on the test plugs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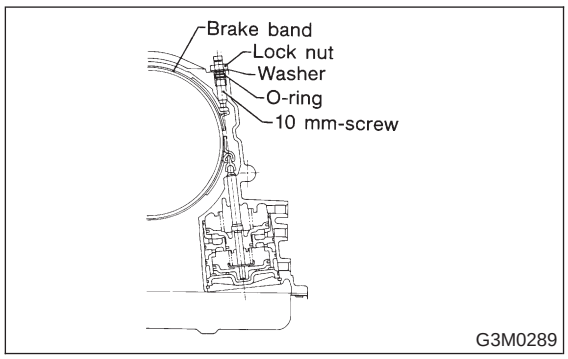
2. Brake Band

A: INSPECTION

If the following abnormal shifting conditions are noted in a road test, the brake band must be adjusted.

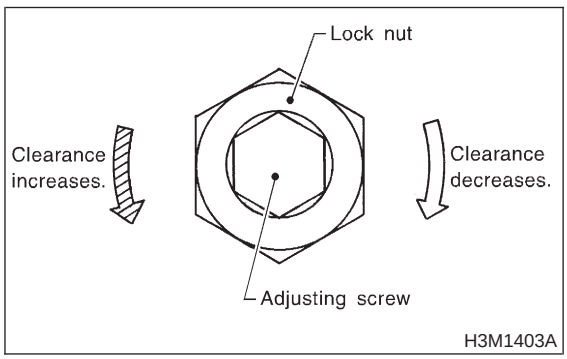
Improper brake band clearances and their symptoms	
Clearance	Problem
1. Too wide	Upshift from 1st directly to 3rd gear occurs.
2. Wide	● Engine rpm increases abruptly while upshifting from 1st to 2nd gear or 3rd to 4th gear. ● Time lag of at least one second occurs during kickdown operation from 3rd to 2nd gear.
3. Small	"Braking" symptom occurs while upshifting from 2nd to 3rd gear.
4. Too small	Upshifts from 2nd to 4th gear and downshifts from 4th to 2nd gear occur repeatedly.



B: ADJUSTMENT

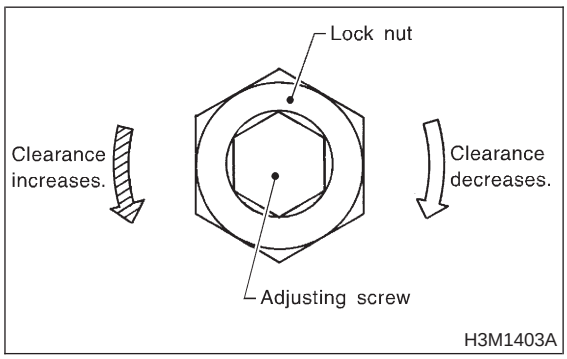
1) Immobilize the end of the 10 mm-screw projecting on the left side of the transmission case, and loosen the nut with a double-end wrench.
In the case of occurrence of problems 2. and 3. mentioned previously, perform the adjustment by loosening or tightening the nut within a range of 3/4 turn from this state.

CAUTION:
Do not loosen excessively; otherwise, the band strut on the servo piston will drop off.



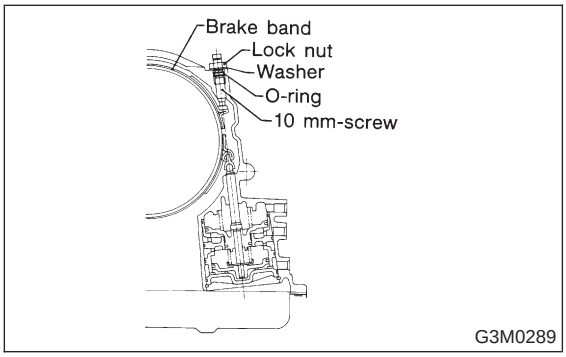
2) In case of the occurrence of problems 1. and 4. mentioned previously, perform the adjustment as follows: Adjusting procedure: Tighten adjust screw to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, then back off three turns.

CAUTION:
Do not tighten the adjusting screw with an excessively large torque.



3) With the adjusting screw immobilized, tighten the lock nut.

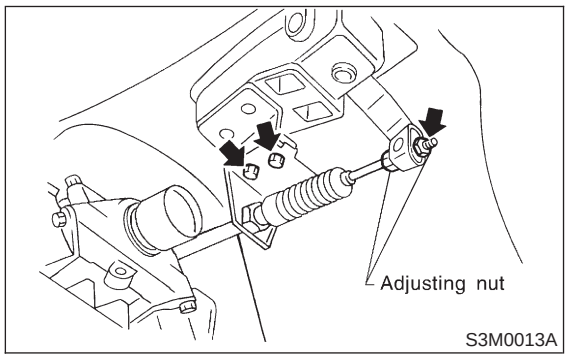
Tightening torque:
26±2 N·m (2.7±0.2 kg-m, 19.5±1.4 ft-lb)



3. 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.

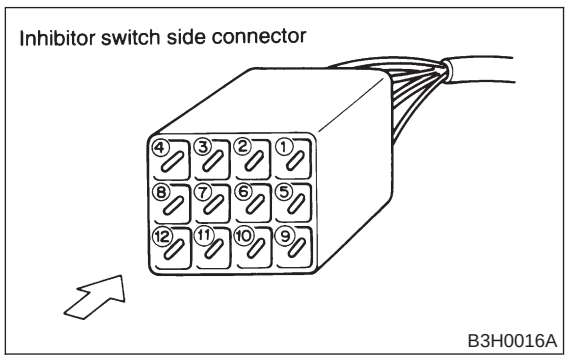


1) Remove heat shield cover.
2) Disconnect cable end from select lever.
3) Remove air intake chamber and duct.
4) Disconnect inhibitor switch side connector.
5) Check continuity in inhibitor switch circuits with select lever moved to each position.

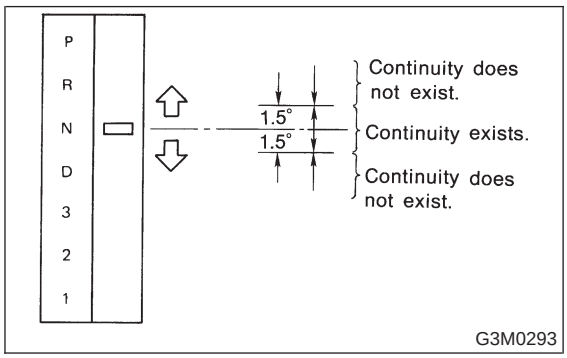
CAUTION:
Also check that continuity in ignition circuit does not exist when selector lever is in R, D, 3, 2 and 1 ranges.

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

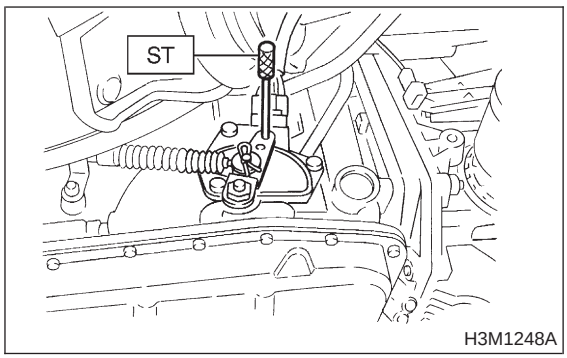


6) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from the N range.
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.



B: ADJUSTMENT

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.

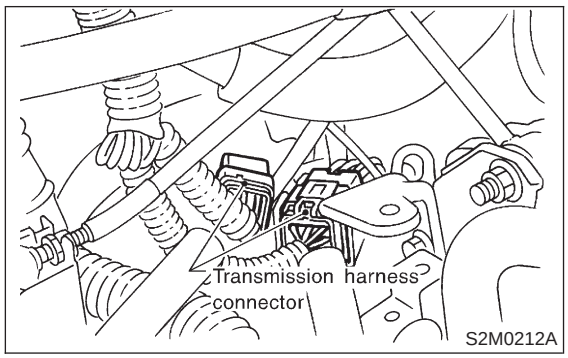
Tightening torque:
3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

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

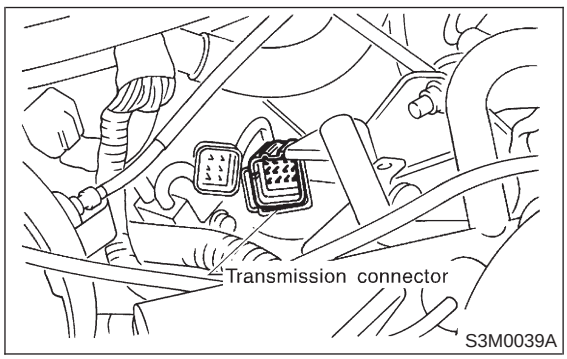
4. Sensor (in transmission)

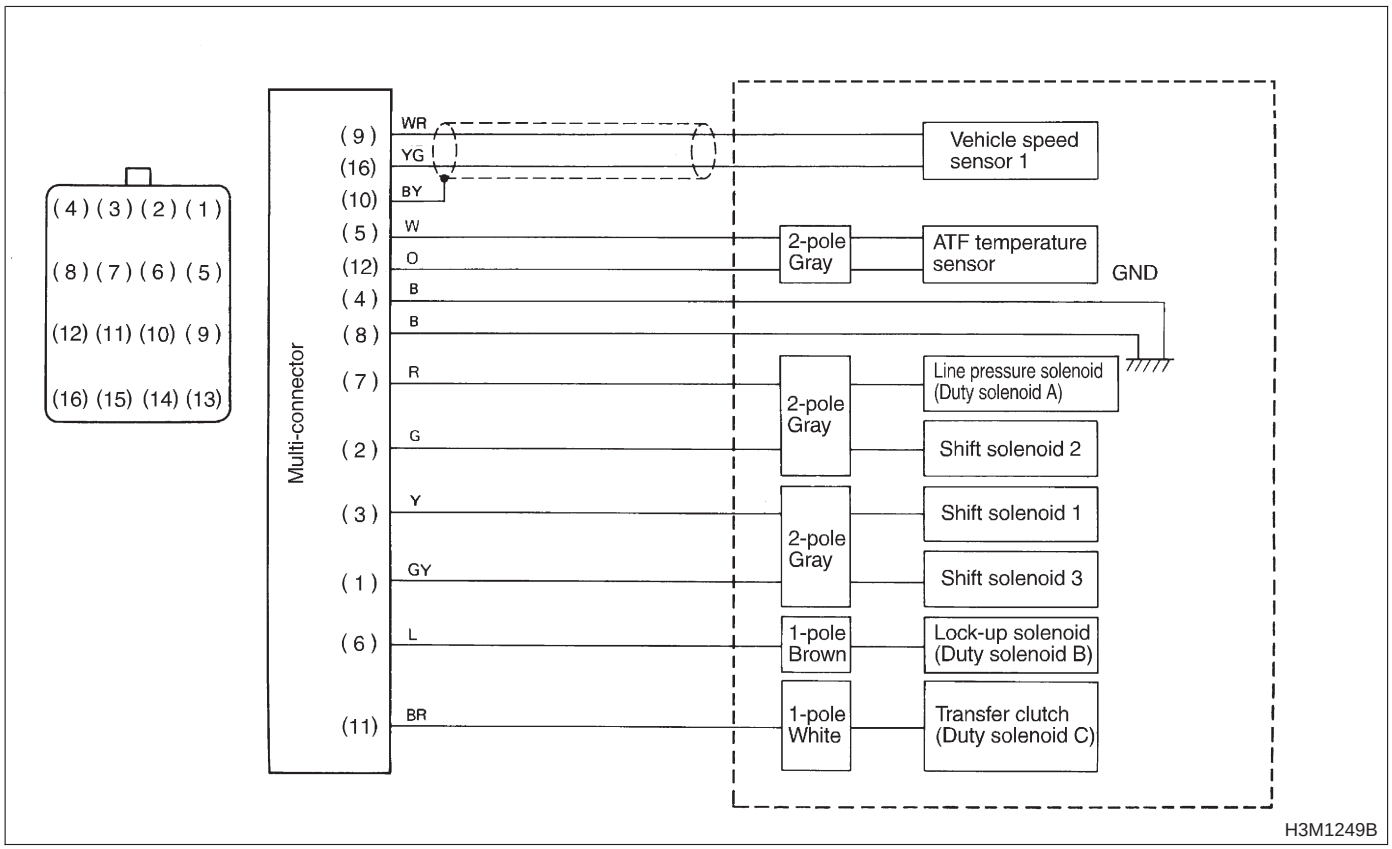
A: INSPECTION

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



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





1. EVALUATION

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

Part name	Terminal	Resistance (Ω)
Vehicle speed sensor 1	9 — 16	450 — 720
ATF temperature sensor	5 — 12	2,100 — 2,900/20°C (68°F)
		275 — 375/80°C (176°F)
Duty solenoid A (Line pressure solenoid)	7 — 4, 8	1.5 — 4.5
Duty solenoid B (Lock-up solenoid)	6 — 4, 8	9 — 17
Shift solenoid 1	3 — 4, 8	20 — 32
Shift solenoid 2	2 — 4, 8	20 — 32
Shift solenoid 3	1 — 4, 8	20 — 32
Duty solenoid C (Transfer clutch solenoid)	11 — 4, 8	9 — 17

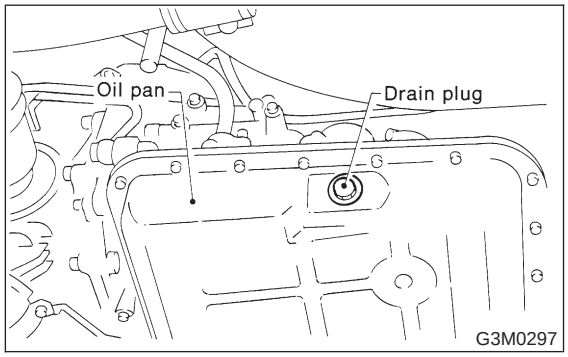
5. Shift Solenoid, Duty Solenoid and Valve Body

A: REMOVAL

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

NOTE:
Tighten ATF drain plug after draining ATF.

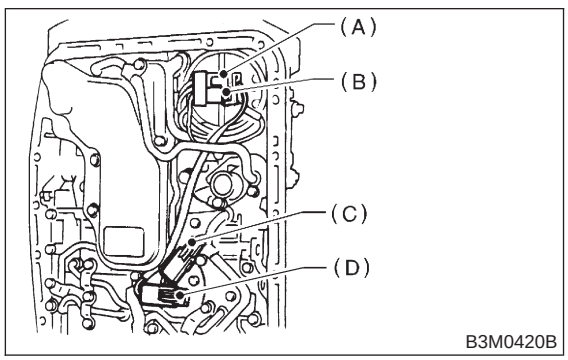
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



3) Remove oil pan.

NOTE:
Drain oil into a container.

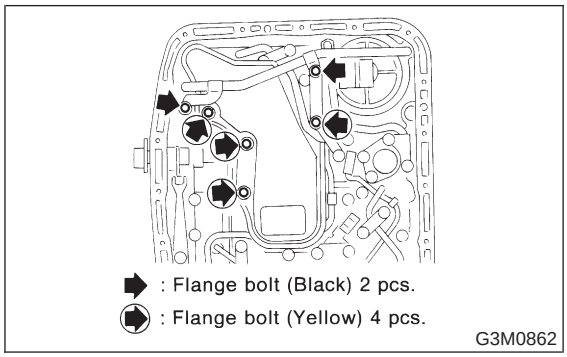
4) Disconnect solenoid valve connectors.
Remove connectors from clips and disconnect connectors at 4 places.



(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

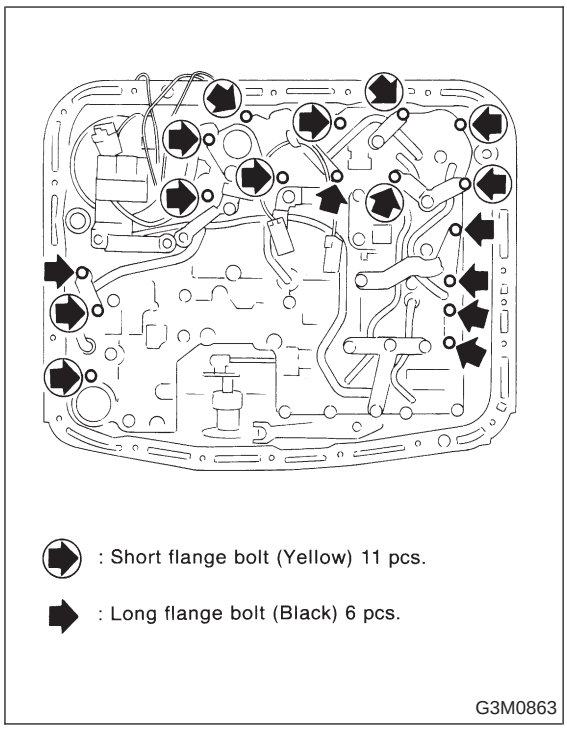
5) Remove oil strainer.
Disconnect oil pipe by removing the two bolts, and remove four bolts and oil strainer.

NOTE:
Be careful because oil flows from oil strainer.

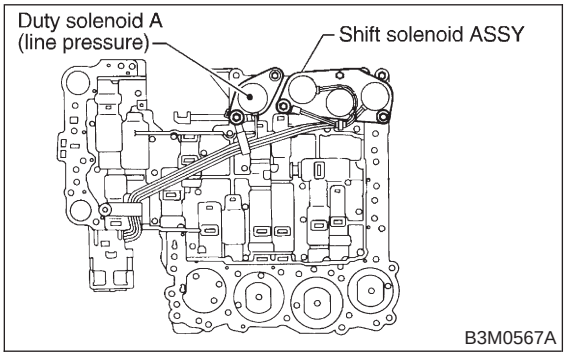


6) Remove control valve body and two brackets.
Remove 6 long bolts (Black) and 11 short bolts (Yellow).

NOTE:
- Be careful because oil flows from valve body.
- Be careful not to damage accumulator spring at rear of control valve.



7) Remove shift solenoid assembly, and duty solenoid A.

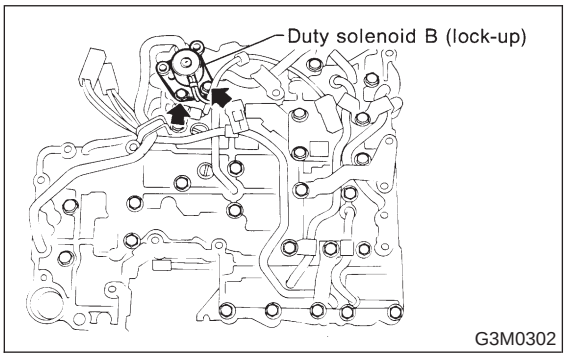


8) Remove duty solenoid B.

B: INSTALLATION

1) Install duty solenoid B (lock-up).

Tightening torque:
11.3±1.5 N·m (1.15±0.15 kg-m, 8.3±1.1 ft-lb)

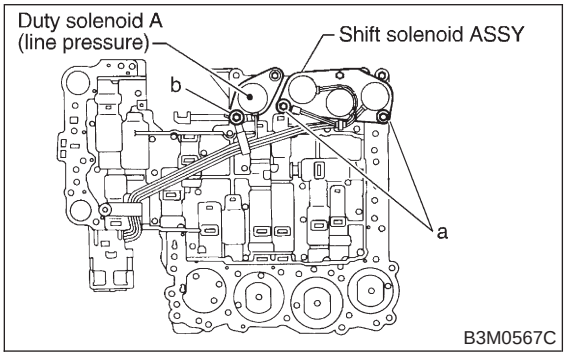


2) Install solenoid valves.
Shift solenoid assembly, and duty solenoid A (line pressure).

a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

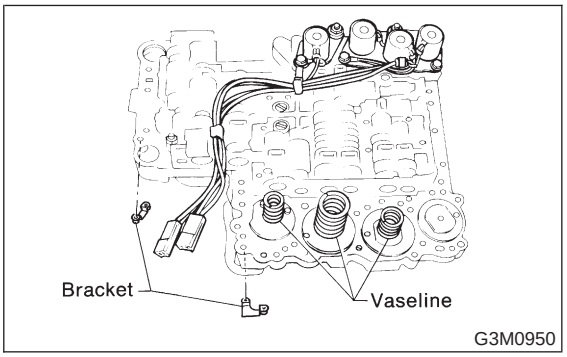
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



3) Install valve body and two brackets.

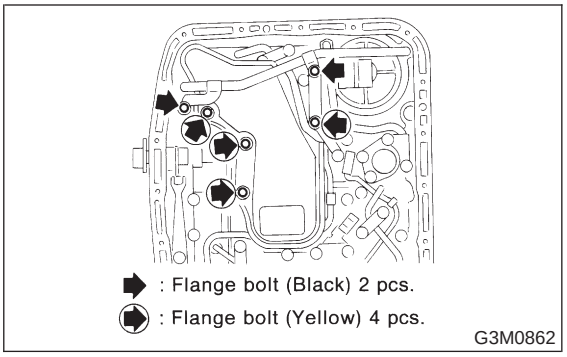
NOTE:
- Secure accumulator springs using vaseline.
- Align manual valve connections.

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

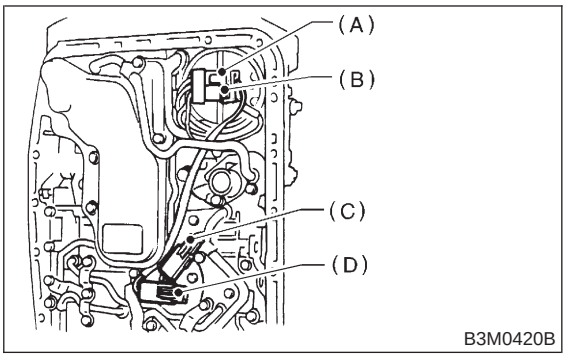


4) Install oil strainer.
Also install oil pipe and harness connector bracket.

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

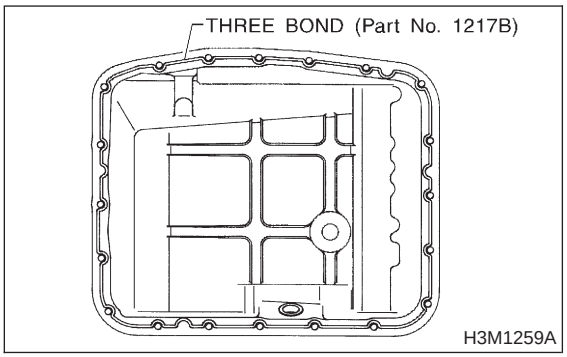


5) Connect harness connectors at 4 places.
Connect connectors of same color, and secure connectors to valve body using clips.



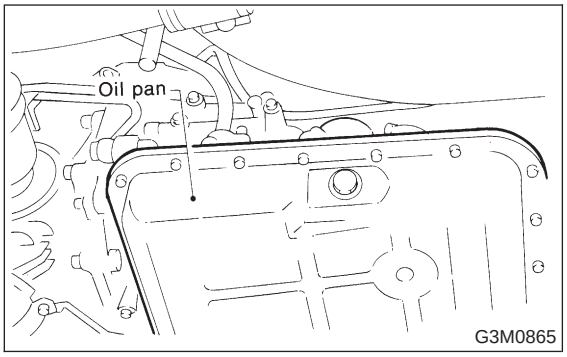
(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

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

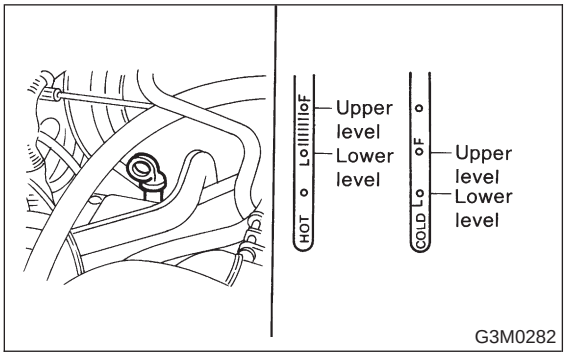


7) Install oil pan to transmission case.

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



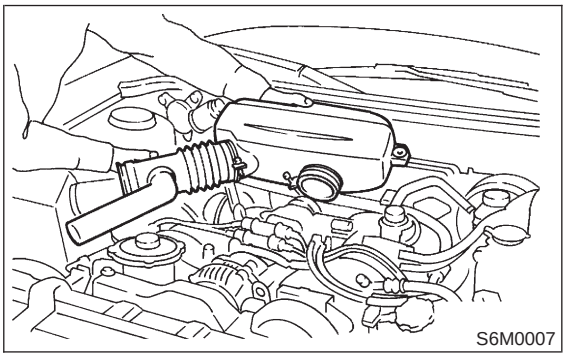
8) Add ATF and check level.



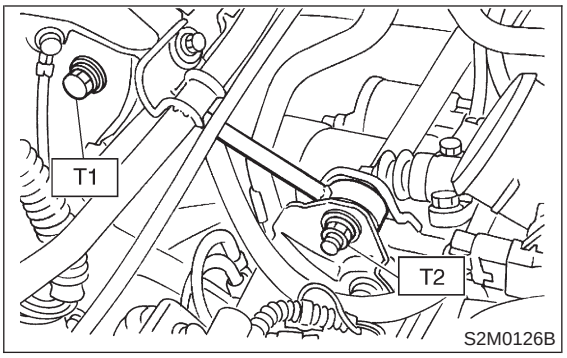
6. Duty Solenoid C and Transfer Valve Body

A: REMOVAL

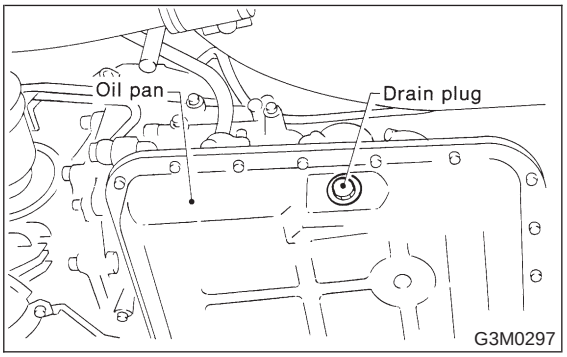
1) Remove air intake duct and chamber.



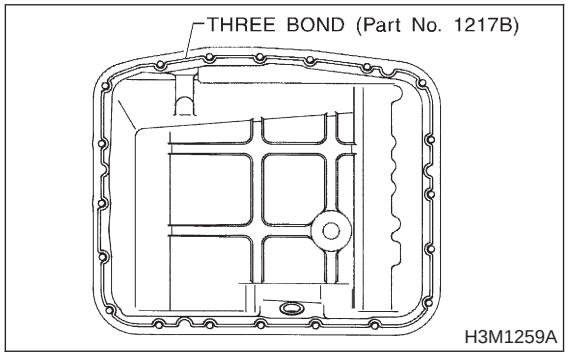
2) Remove pitching stopper.



3) Raise vehicle and drain ATF.

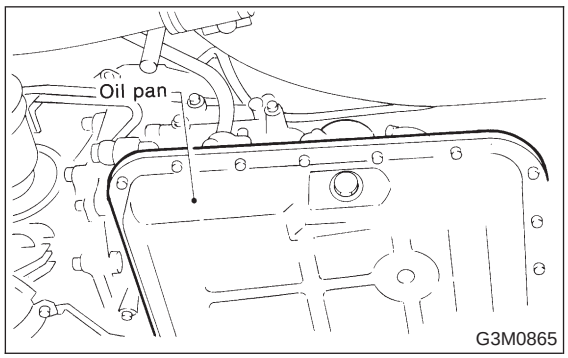


6) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.

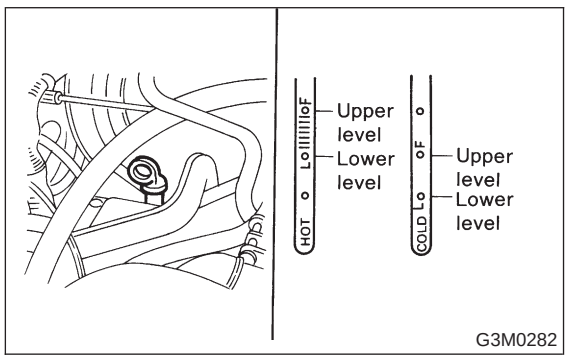


7) Install oil pan to transmission case.

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



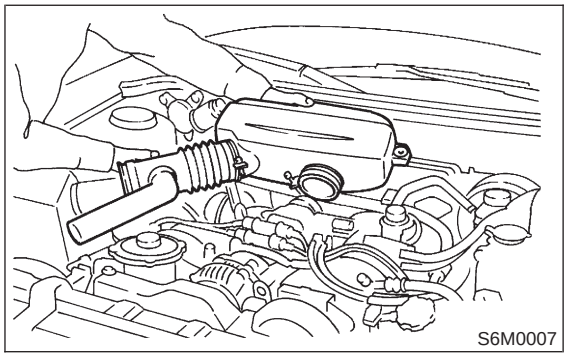
8) Add ATF and check level.



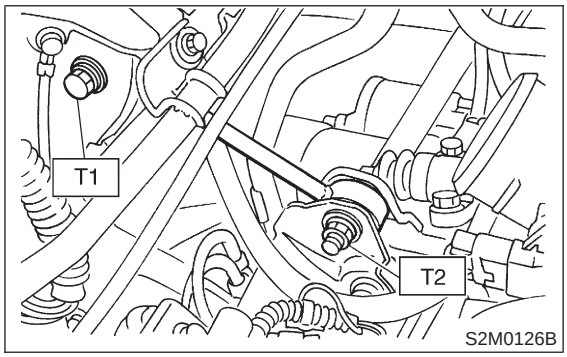
6. Duty Solenoid C and Transfer Valve Body

A: REMOVAL

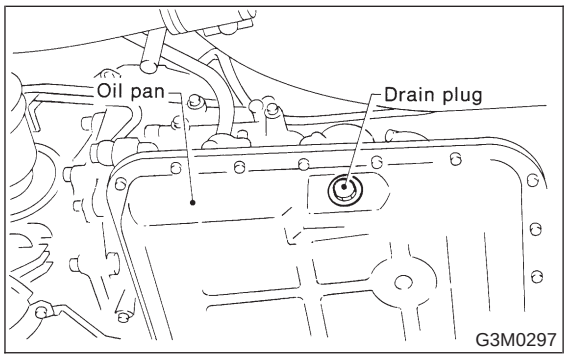
1) Remove air intake duct and chamber.



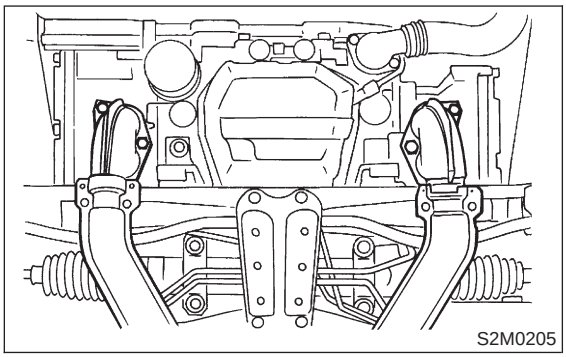
2) Remove pitching stopper.



3) Raise vehicle and drain ATF.

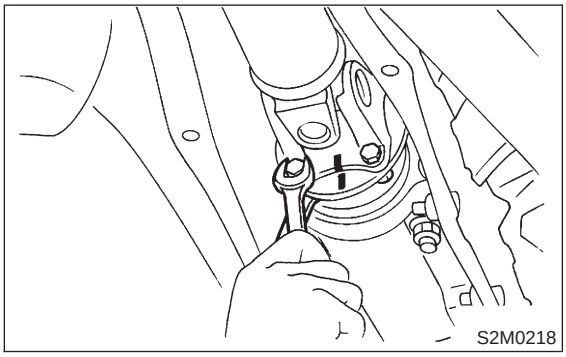


4) Remove front exhaust pipe and under cover. Disconnect oxygen sensor connector, and remove exhaust pipe and under cover.

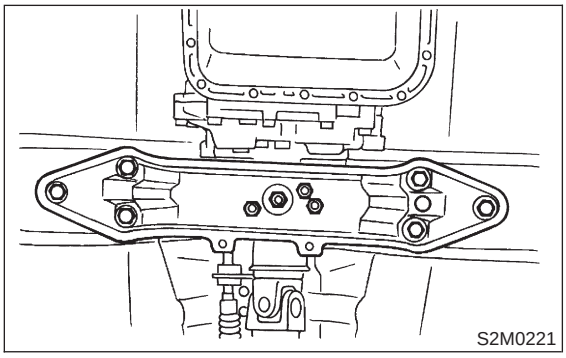

S2M0205

5) Remove propeller shaft and front exhaust cover.

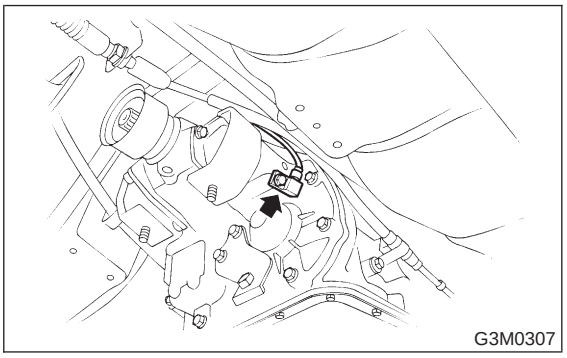
NOTE:
Before removing propeller shaft, scribe matching marks on propeller shaft and rear differential coupling.


S2M0218

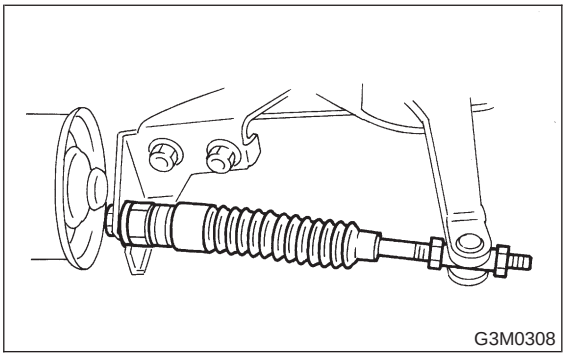
6) Remove rear crossmember.
(1) Support transmission using a transmission jack and raise slightly.
(2) Remove bolts and nuts as shown in Figure.


S2M0221

7) Remove vehicle speed sensor 1.


G3M0307

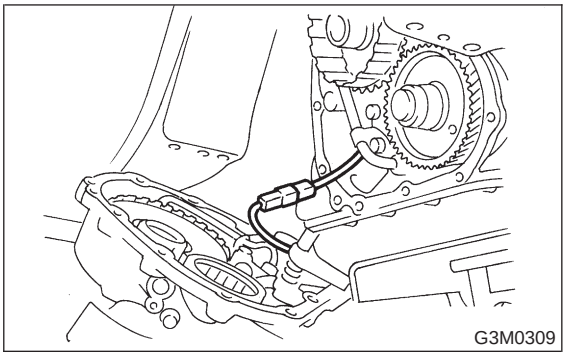
8) Remove extension and gasket.
(1) Remove gear select cable nut.


G3M0308

(2) Move gear select cable so that extension bolts can be removed.
(3) Remove bolts.
(4) Remove extension and disconnect duty solenoid C connector.

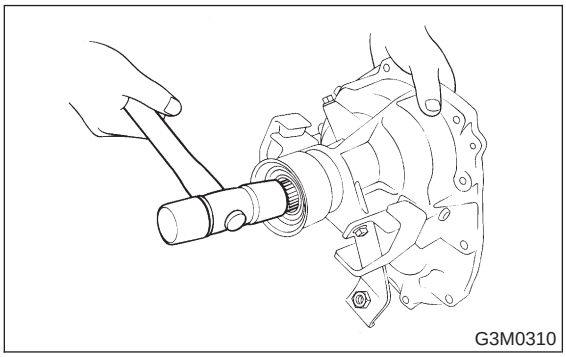
CAUTION:
Do not force extension back before disconnecting solenoid connector. Otherwise, harness may be damaged.

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

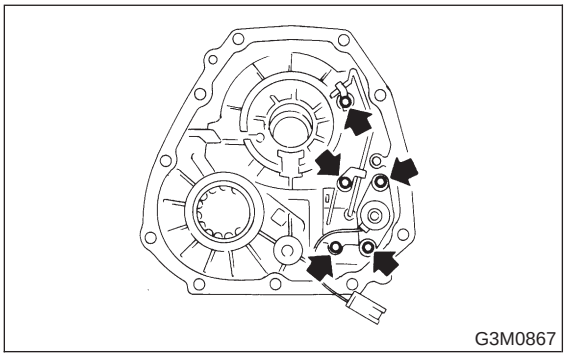

G3M0309

9) Remove duty solenoid C and transfer valve body from extension.

(1) Remove transfer clutch drum.



(2) Remove clamp which secures pipe.
(3) Remove bolts.



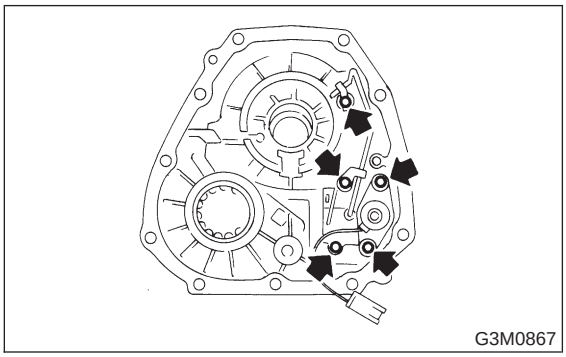
B: INSTALLATION

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

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

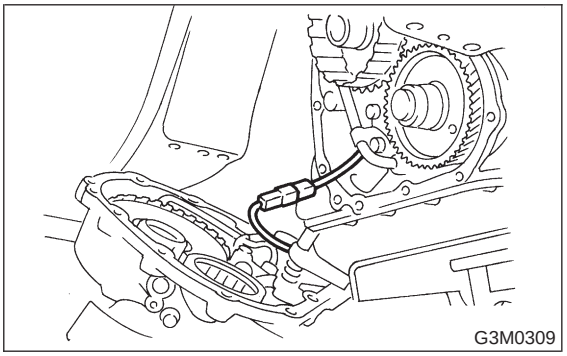
(2) Install pipe and clamp.

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



(3) Install clutch drum.

2) Install extension.
(1) Connect connector.

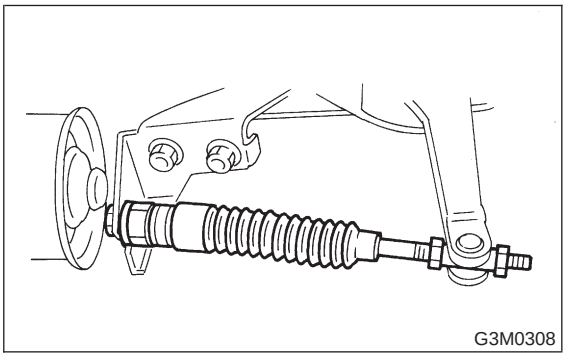


(2) Tighten 11 bolts.

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

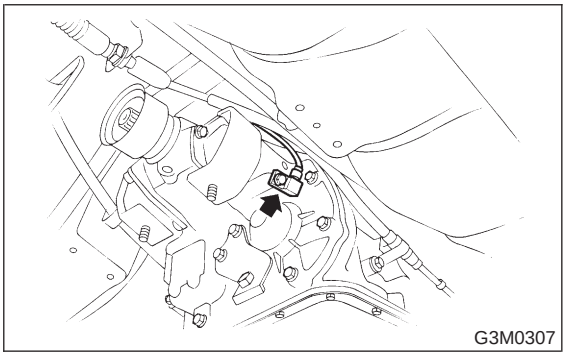
(3) Install gear select cable.

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



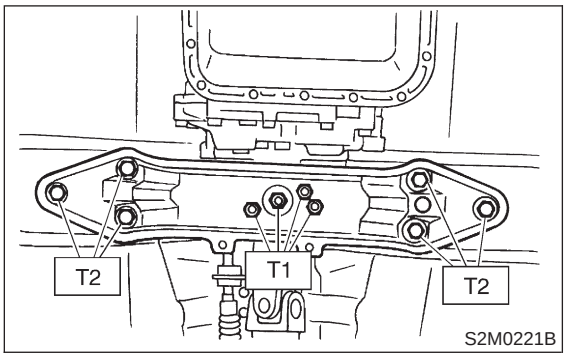
3) Install vehicle speed sensor 1.

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



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

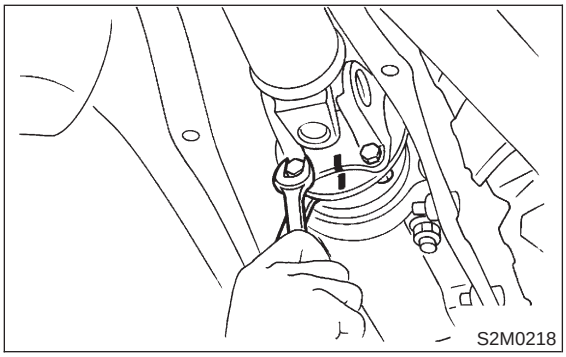
Tightening torque:
T1: 37±10 N·m (3.8±1.0 kg-m, 27±7 ft-lb)
T2: 69±15 N·m (7.0±1.5 kg-m, 51±11 ft-lb)



   (2) Lower and remove transmission jack.
5) Install propeller shaft.

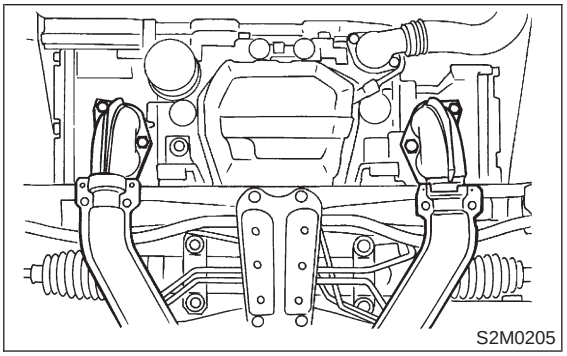
Tightening torque:
At rear differential
31±8 N·m (3.2±0.8 kg-m, 23.1±5.8 ft-lb)
At center bearing
52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)

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

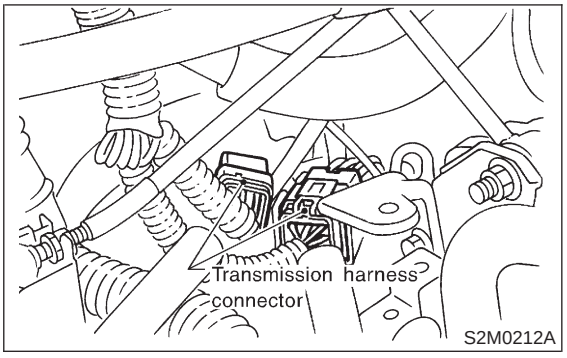


6) Install front exhaust pipe.

Tightening torque:
At engine
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)
At hanger
30±5 N·m (3.1±0.5 kg-m, 22.4±3.6 ft-lb)
At front and rear connections
18±5 N·m (1.8±0.5 kg-m, 13.0±3.6 ft-lb)

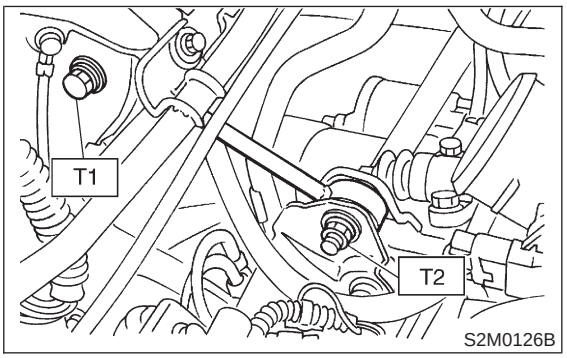


7) Lower and remove jack.
8) Connect the following parts:
   (1) Oxygen sensor connector
   (2) Transmission harness connector

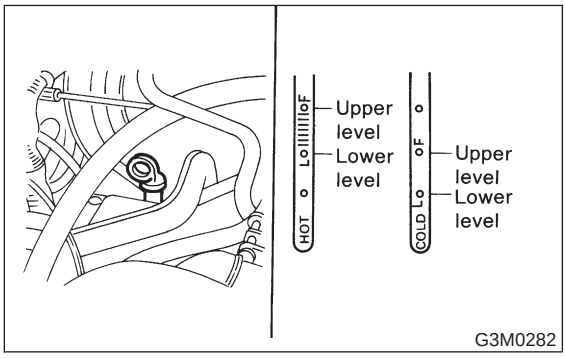


9) Install pitching stopper.

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



10) Replenish ATF and check oil level. Check for leaks.



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

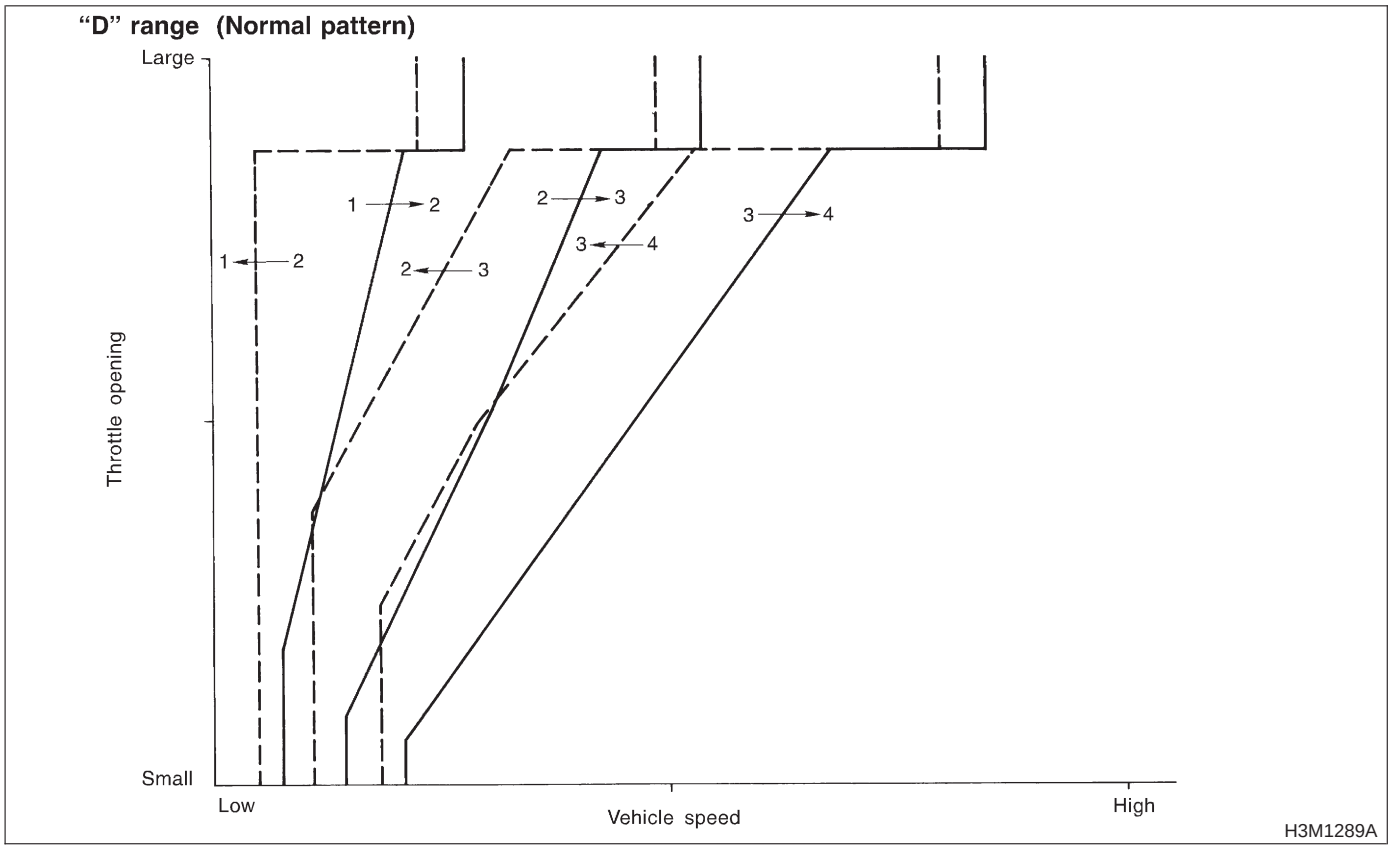
Check “kick-down”.

D range: 1st ←/→ 2nd ←/→ 3rd ←/→ 4th

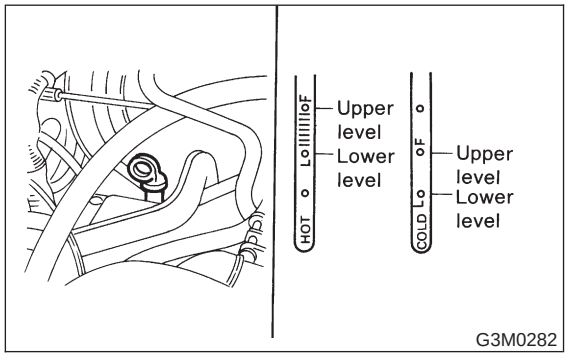
3 range: 1st ←/→ 2nd ←/→ 3rd ← 4th

2 range: 2nd ← 3rd ← 4th

1 range: 1st ← 2nd ← 3rd ← 4th



10) Replenish ATF and check oil level. Check for leaks.



7. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

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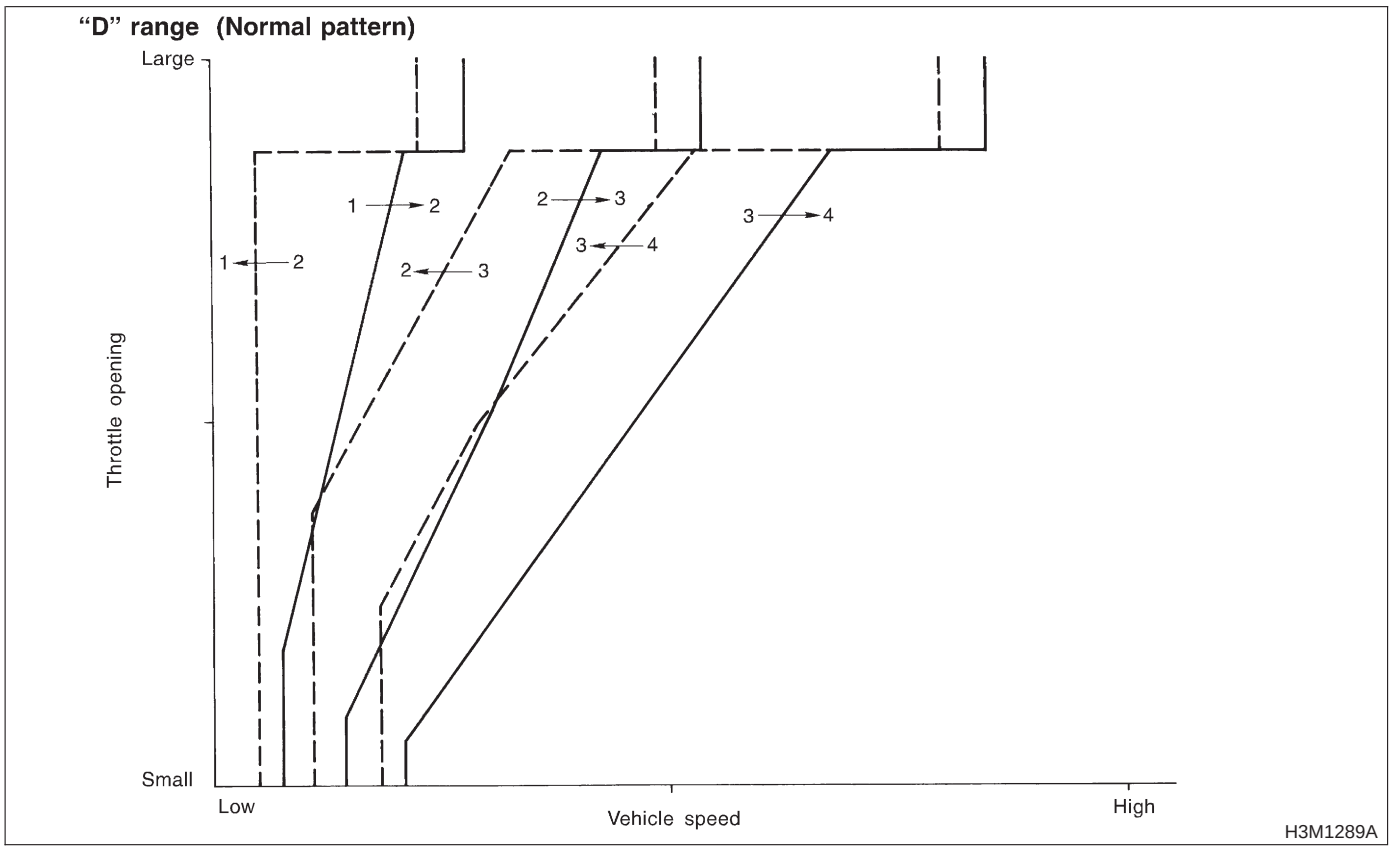
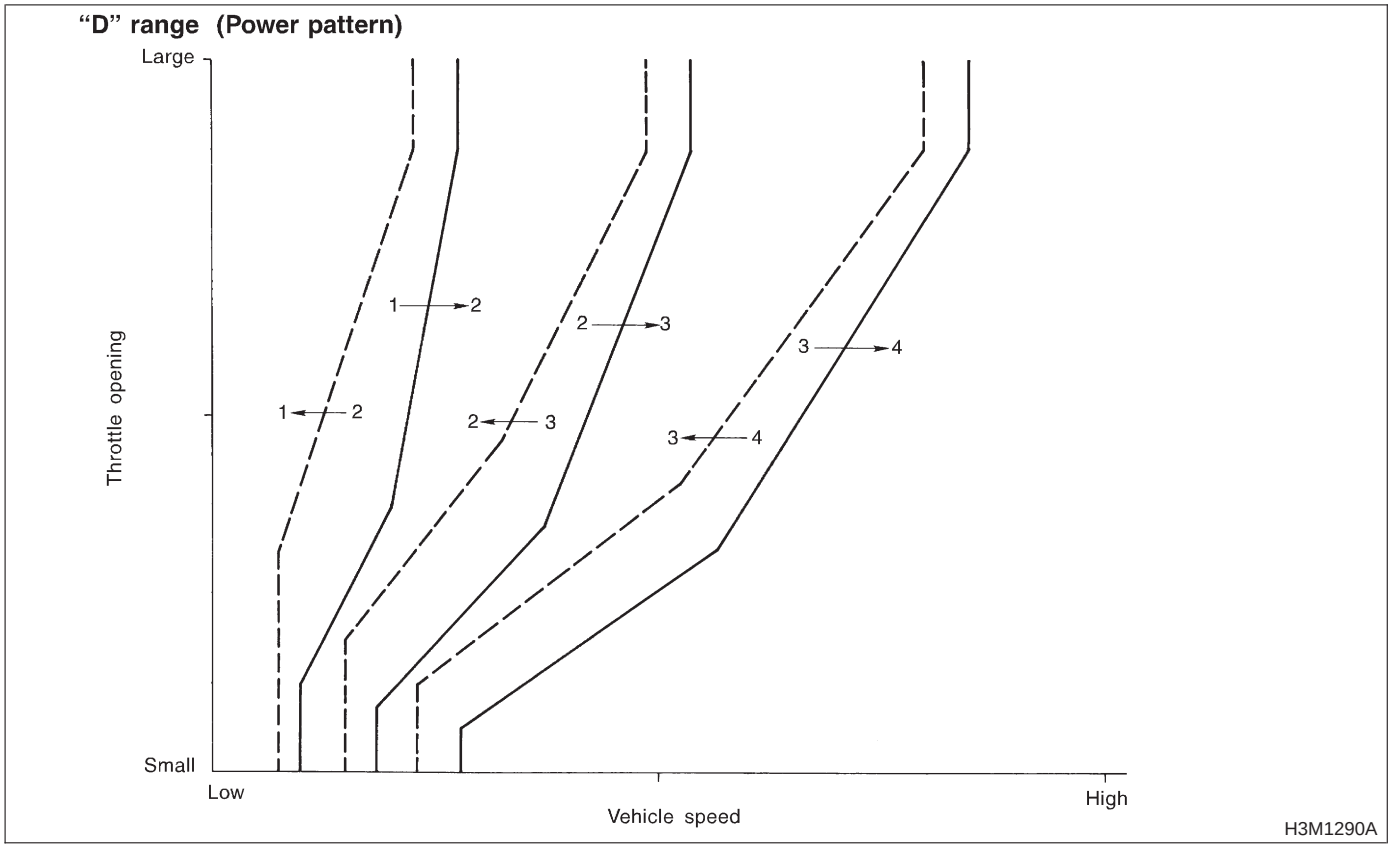
2 range: 2nd ← 3rd ← 4th

1 range: 1st ← 2nd ← 3rd ← 4th





3. ENGINE BRAKE OPERATION

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

4. AWD FUNCTION

If "tight-corner braking" occurs when the steering wheel is fully turned at low speed:
1) Determine the applicable trouble code and check the corresponding 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 [W23A0].>

8. Stall Speed Test

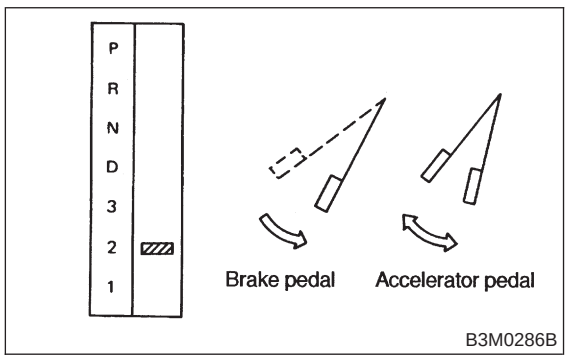
A: MEASUREMENT

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 all shift ranges except the P and N 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 60 to 80°C (140 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, forward clutch slipping on brake band 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.

CAUTION:
● 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 band 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.

Specifications

Stall speed (at sea level):
2,300 — 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	● Forward clutch slipping ● One-way clutch (1-2) malfunctioning
	R	● Line pressure too low ● Reverse clutch slipping ● Low & reverse brake slipping
	2	● Line pressure too low ● Forward clutch slipping ● Brake band slipping ● One-way clutch (3-4) malfunctioning

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 forward clutch, reverse clutch, low & reverse brake, forward one-way clutch and low 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).
"N" range: 800±100 rpm
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
● Forward clutch worn
● Low 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
● Forward one-way clutch not operating properly

10. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

If the clutch or the brake band 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 band 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 forward clutch, reverse clutch, low & reverse brake, forward one-way clutch and low 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).
"N" range: 800±100 rpm
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
● Forward clutch worn
● Low 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
● Forward one-way clutch not operating properly

10. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

If the clutch or the brake band 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 band or control valve.
1) Line pressure measurement (under no load)

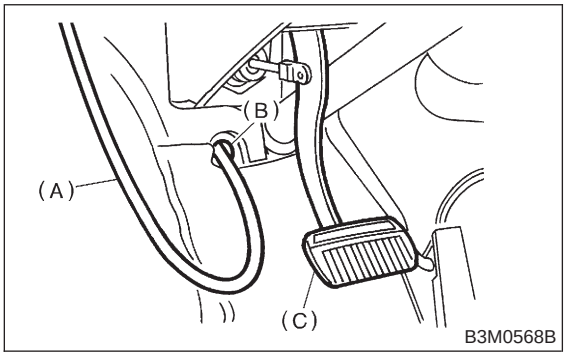
CAUTION:
● Before measuring line pressure, jack-up all wheels.
● Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in "N" or "P".)

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".)

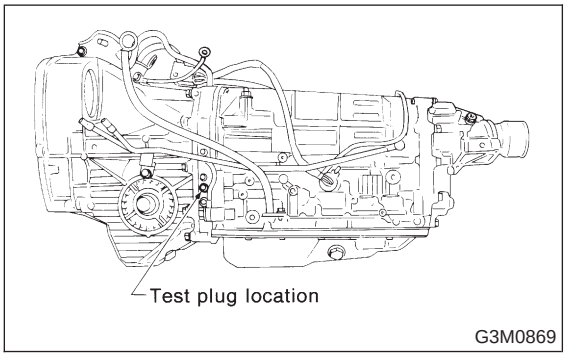
2. TEST METHODS

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 select monitor. <Ref. to 3-2 [T9K0].>
5) Check line pressure in accordance with the following chart.

3. EVALUATION

NOTE:
- Under no load: "D"
- Under full load: "R", "2"

(With engine running at stall speed)

Standard line pressure			
Duty ratio (%)	"2" range kPa (kg/cm^2, psi)	"R" range kPa (kg/cm^2, psi)	"D" range kPa (kg/cm^2, psi)
5	1,167 — 1,363 (11.9 — 13.9, 169 — 198)	1,432 — 1,569 (14.6 — 16.0, 208 — 228)	—
22	—	—	765 — 902 (7.8 — 9.2, 111 — 131)
100	—	—	235 — 481 (2.4 — 4.9, 34 — 70)

11. Transfer Clutch Pressure Test

A: MEASUREMENT

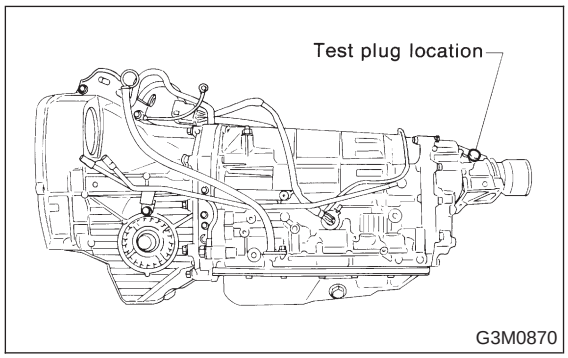
1. TEST METHODS

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

ST 499897700 OIL PRESSURE ADAPTER SET
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: “D” range
FWD mode: “P” range, engine speed 2000 rpm

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



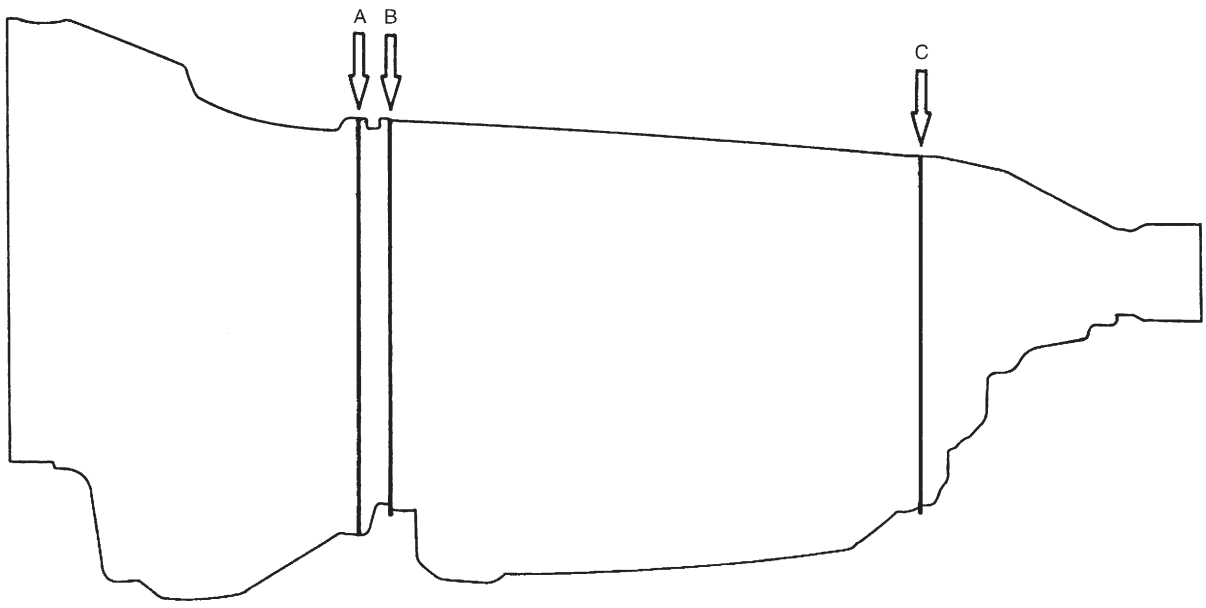
2. EVALUATION

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		
Duty ratio (%)	AWD mode kPa (kg/cm^2, psi)	FWD mode kPa (kg/cm^2, psi)
5	667 — 804 (6.8 — 8.2, 97 — 117)	667 — 804 (6.8 — 8.2, 97 — 117)
40	137 — 226 (1.4 — 2.3, 20 — 33)	—
95	0 (0, 0)	—

12. Overall Transmission

A: SECTIONS THAT CAN BE DETACHED/ASSEMBLED



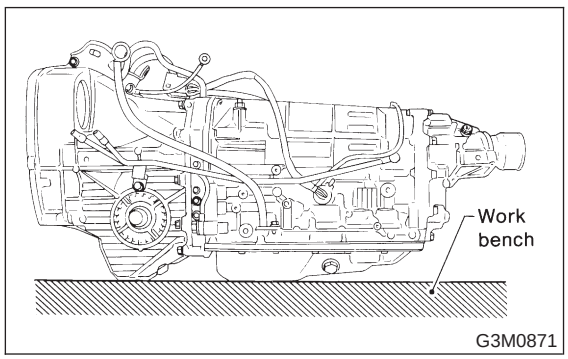
H3M1250A

B: DISASSEMBLY

1. EXTERNAL PARTS

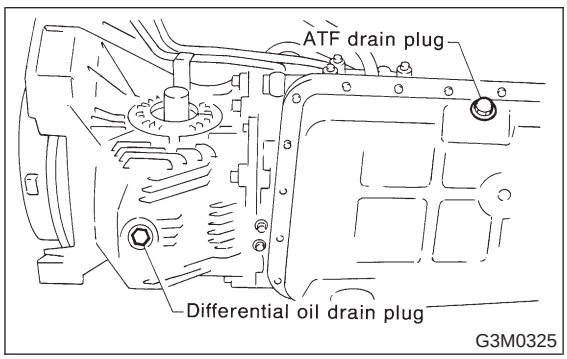
1) Place the transmission unit on a work bench, with the oil pan facing down.

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



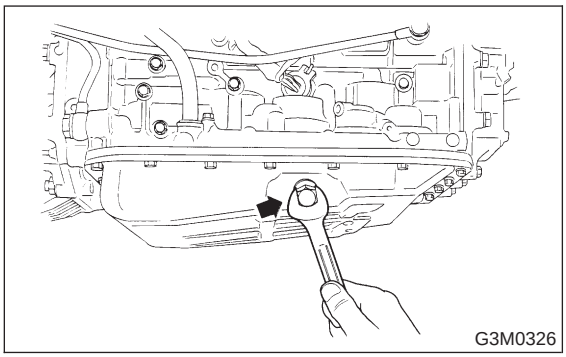
G3M0871

2) Remove the drain plug, and drain differential oil. Tighten the plug temporarily after draining.



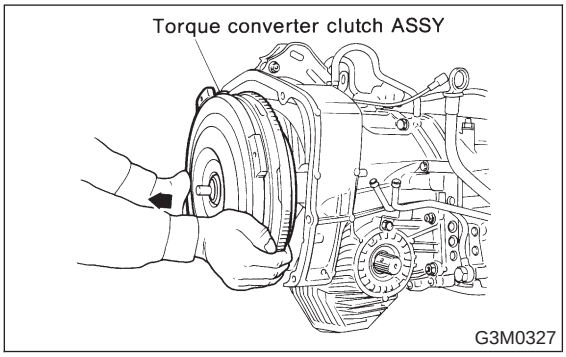
G3M0325

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


G3M0326

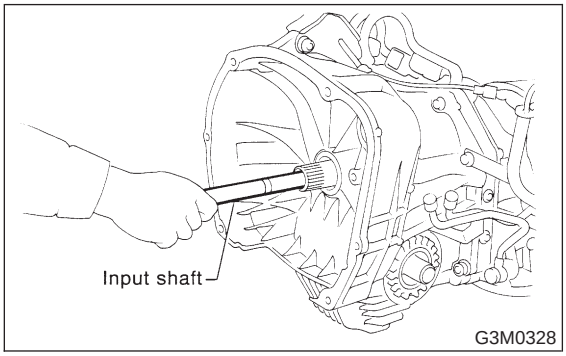
4) Extract the torque converter clutch assembly.

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.



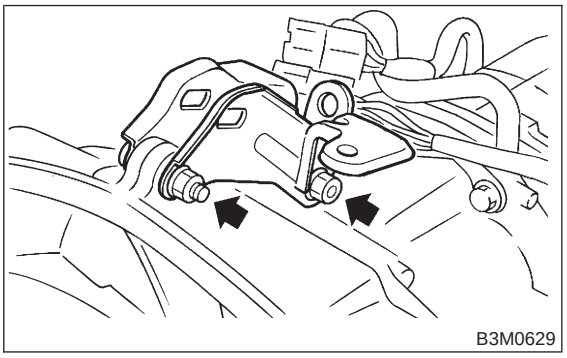
G3M0327

5) Remove the input shaft.

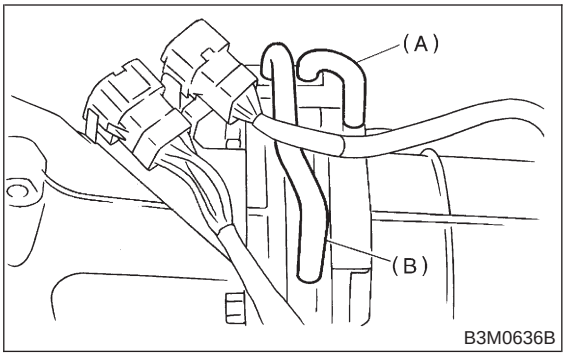


G3M0328

6) Remove the pitching stopper bracket.


B3M0629

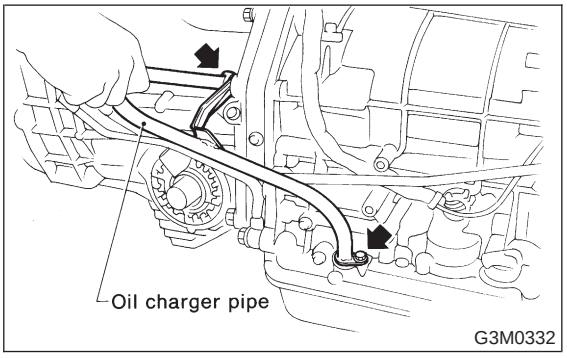
7) Disconnect the air breather hose.



B3M0636B

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

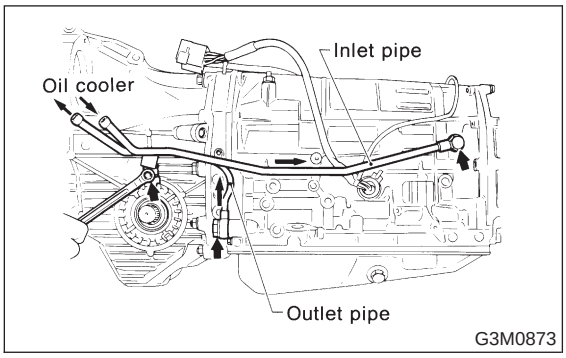
8) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe.



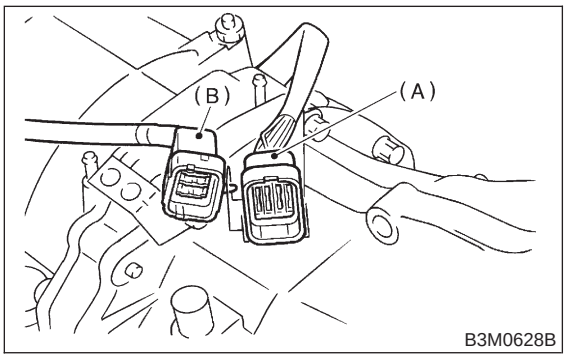
G3M0332

9) 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.



10) Remove harnesses from bracket.



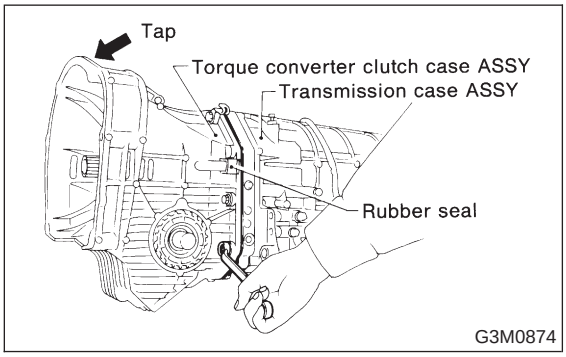
(A) Transmission harness
(B) Inhibitor switch cord

2. SEPARATION OF EACH SECTION

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

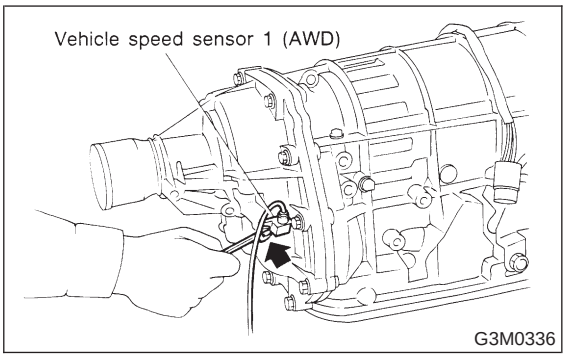
CAUTION:
● Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.
● Be careful not to lose the rubber seal.

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



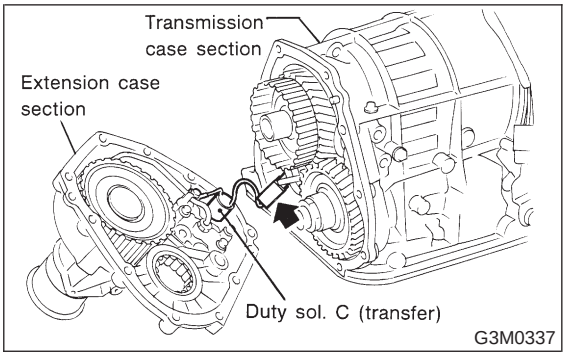
2) Separation of transmission case and extension sections

(1) Remove vehicle speed sensor 1.



(2) While pulling the extension slightly, disconnect the connector for the duty solenoid C (transfer).

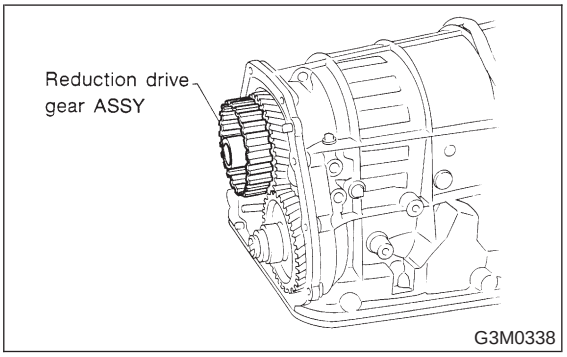
CAUTION:
Be careful not to cut the harness.



3) Separate both sections.

3. TRANSMISSION CASE SECTION

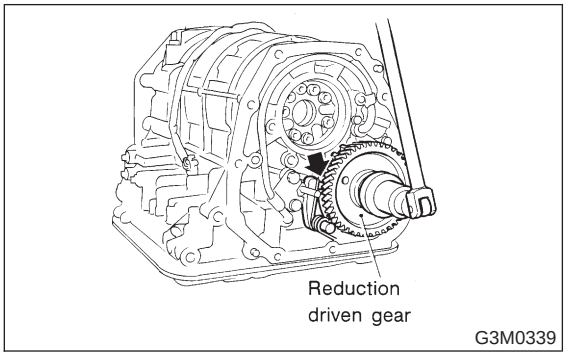
1) Remove the reduction drive gear assembly.



2) Remove the reduction driven gear.

(1) Straighten the staked portion, and remove the lock nut.

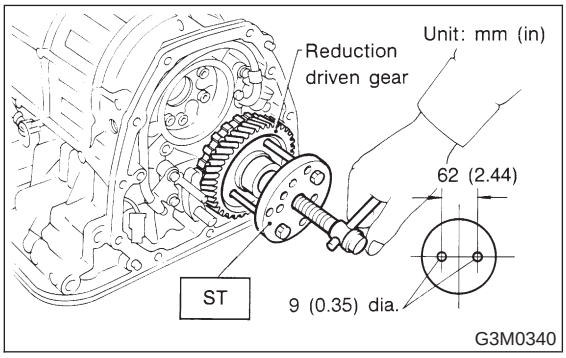
NOTE:
Set the range selector lever to “P”.



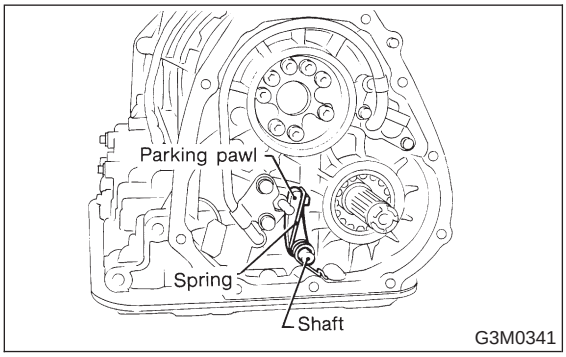
(2) Using the ST, extract the reduction driven gear.

ST 899524100 PULLER SET

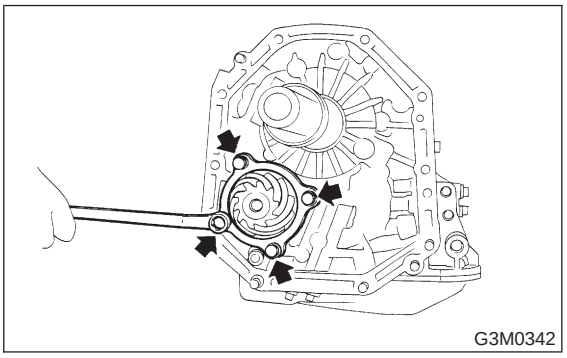
NOTE:
Drill two holes in the puller.



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

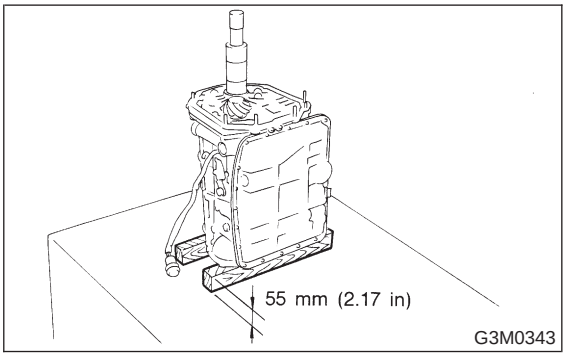


4) Loosen the taper roller bearing mounting bolts.



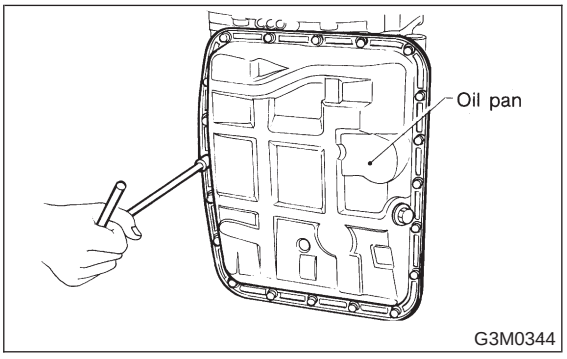
5) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

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.



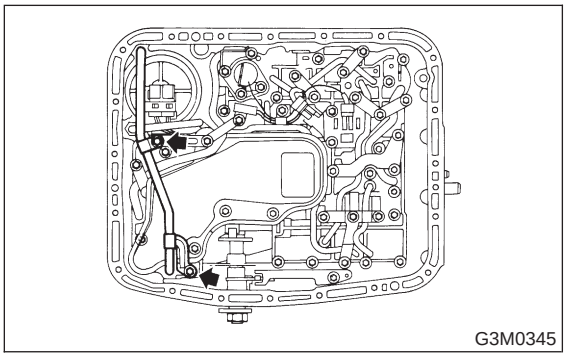
6) Remove the oil pan.

NOTE:
Tap the corners of the oil pan when removing.

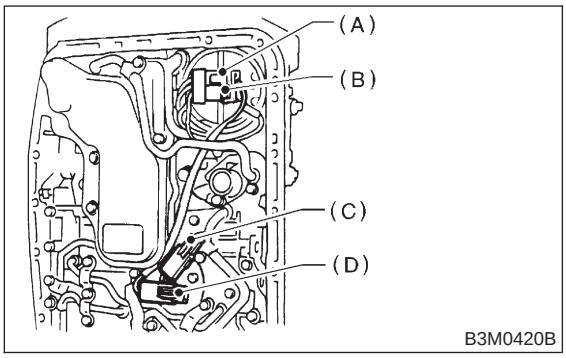


7) Remove the oil cooler outlet pipe.

CAUTION:
Be careful not to twist the pipe.


G3M0345

8) Disconnect the harness connectors for the solenoids and duty solenoids and the ground cord.

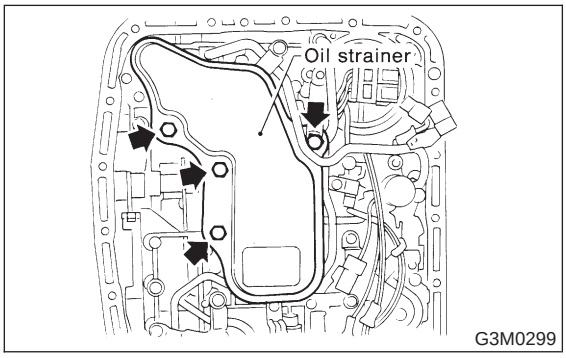


B3M0420B

(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

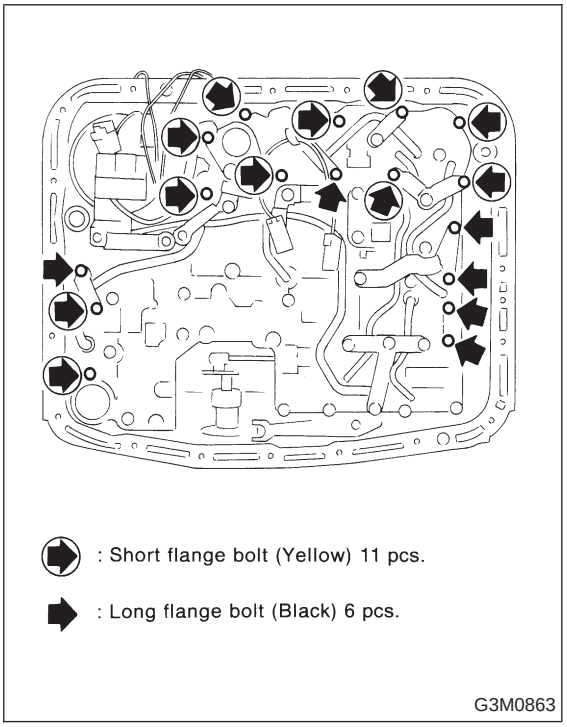
9) Remove the oil strainer.

CAUTION:
Be careful not to damage O-ring on oil strainer.



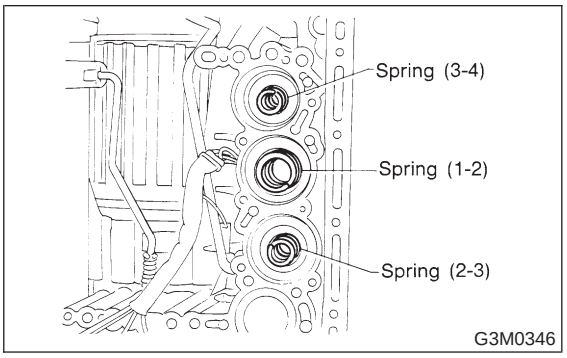
G3M0299

10) Remove the control valve body and the two brackets.



G3M0863

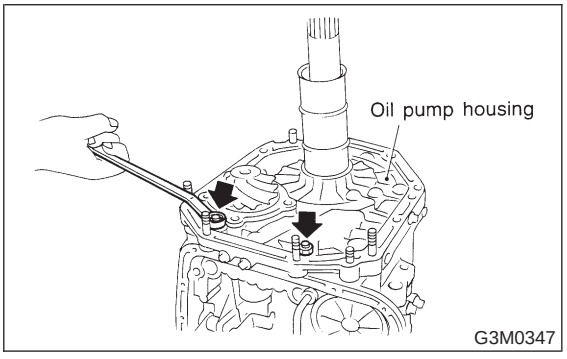
11) Remove the three accumulator springs.



G3M0346

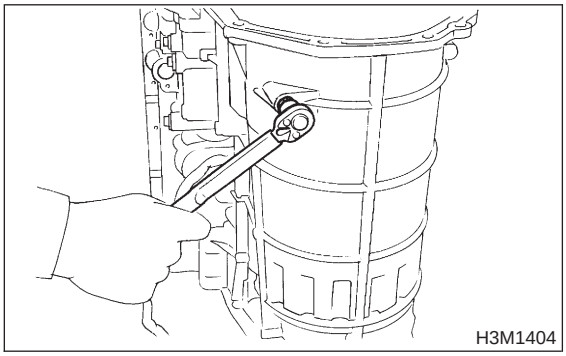
12) Loosen the reverse clutch drum lightly by turning the adjusting screw. Then remove the oil pump housing.

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



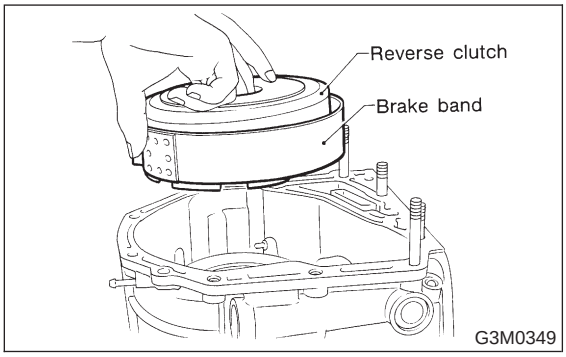
G3M0347

13) Loosen the brake band adjusting screw and take out the strut.



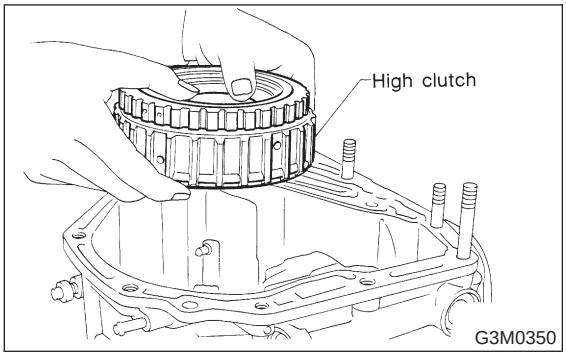
14) Remove the brake band and reverse clutch.

NOTE:
Contract the brake band with a clip.

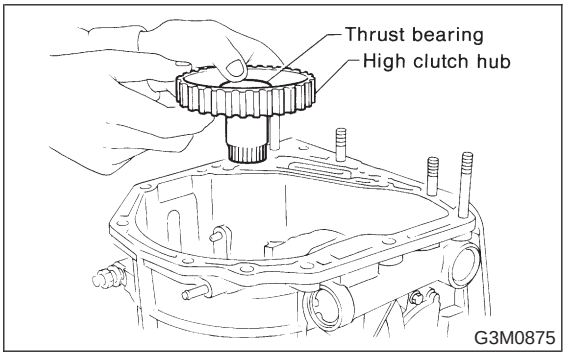


15) Take out the high clutch.

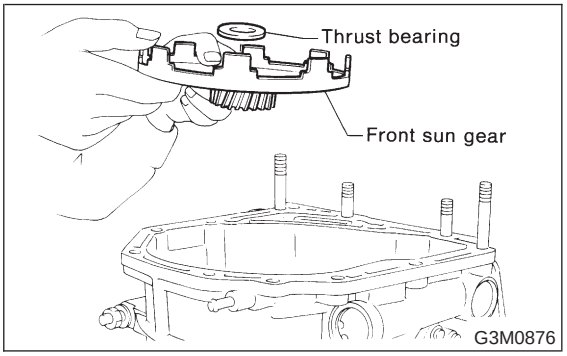
CAUTION:
Thrust needle bearing and bearing race are removed together with high clutch. Be careful not to lose them.



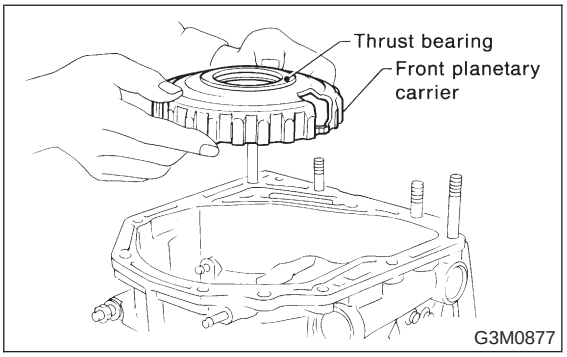
16) Take out the high clutch hub and the thrust bearing.



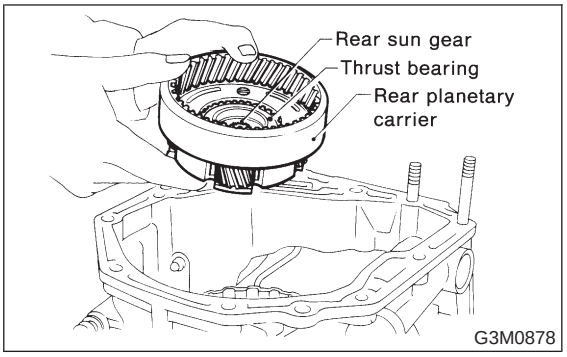
17) Take out the front sun gear and the thrust bearing.



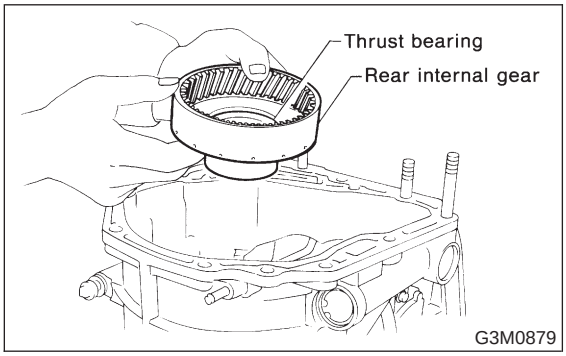
18) Take out the front planetary carrier and the thrust bearing.



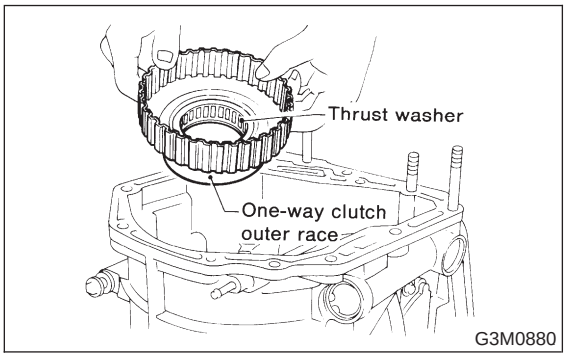
19) Take out the rear planetary carrier, rear sun gear and the thrust bearing.



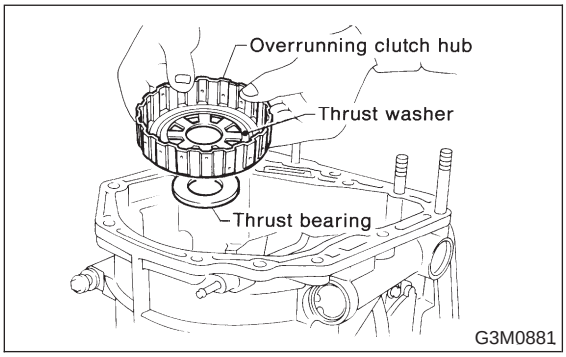
20) Take out the rear internal gear and the thrust bearing.



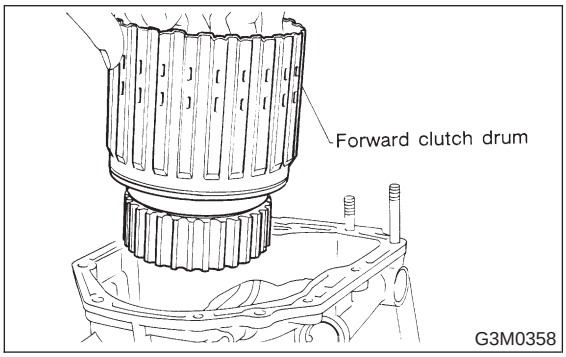
21) Take out the one-way clutch outer race and the thrust washer.



22) Take out the overrunning clutch hub, the thrust washer and the thrust bearing.

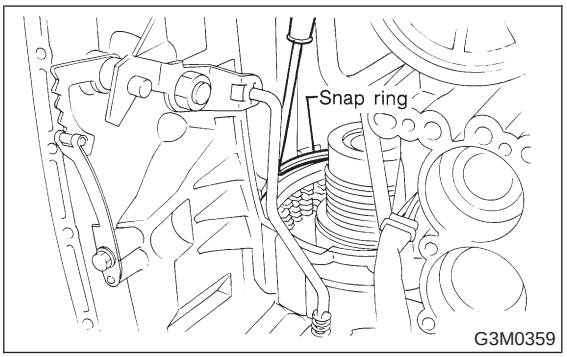


23) Take out the forward clutch drum.

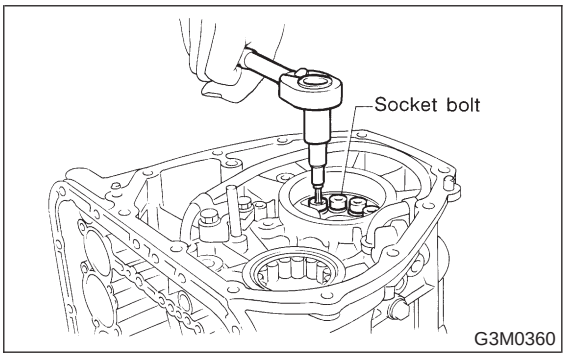


24) Take out the low & reverse brake section.

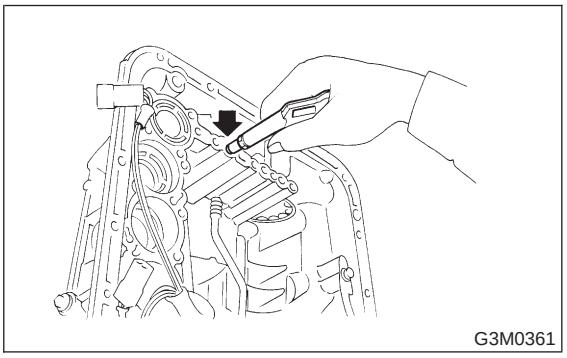
(1) Remove the snap ring. Then remove the retaining plate, drive plates, driven plates, and dish plates as a unit.



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



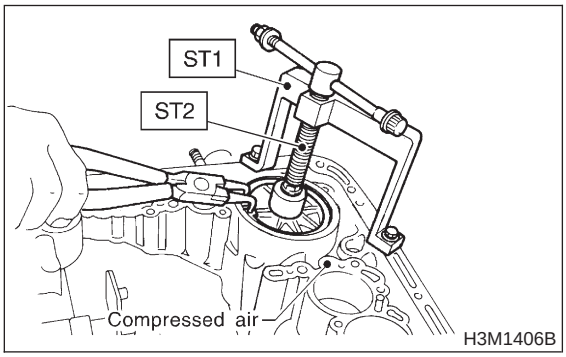
(3) Take out the low & reverse piston by applying compressed air.



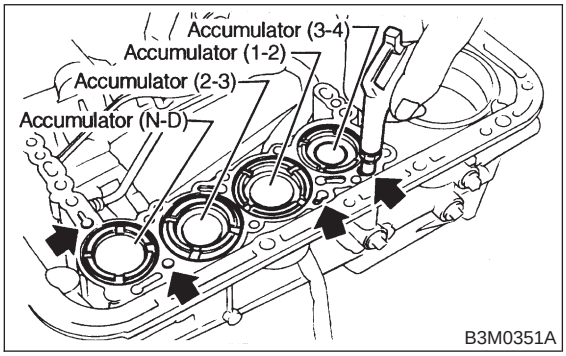
25) After removing the snap ring (inner), take out the servo piston by applying compressed air from the release pressure side.

CAUTION:
Hold the servo piston with a rag so that it will not be ejected with the air pressure. In this case, do not allow your finger to be pinched between the pipe and retainer.

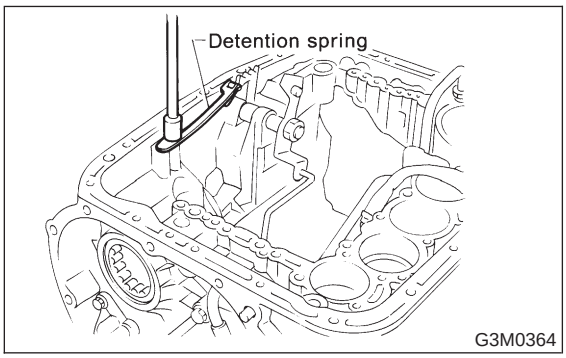
ST1 498677010 COMPRESSOR
ST2 399703600 PULLY ASSY



26) Apply compressed air from the operating pressure side, and take out accumulator (3-4), accumulator (1-2), accumulator (2-3), accumulator and spring (N-D).

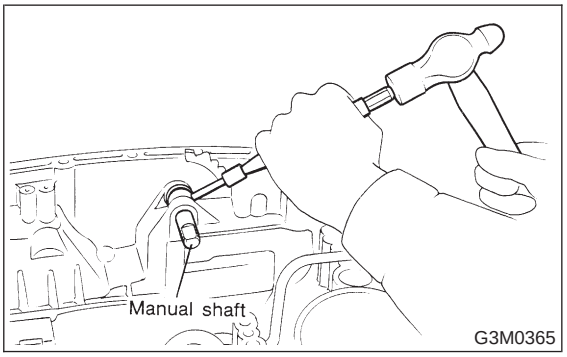


27) Remove the range select lever.
28) Remove the detention spring.

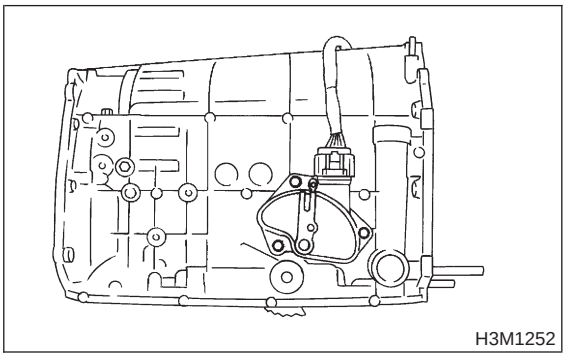


29) Remove the parking rod together with the manual lever. Then remove the manual shaft by pulling off the straight pin.

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

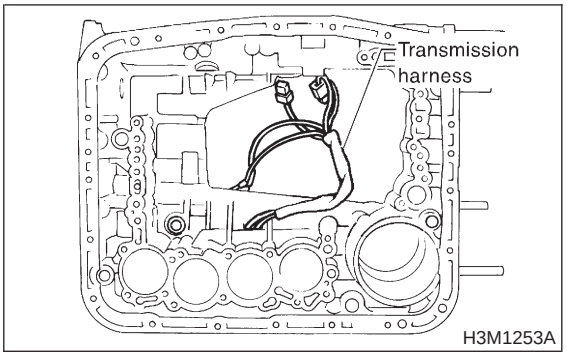


30) Remove the inhibitor switch.



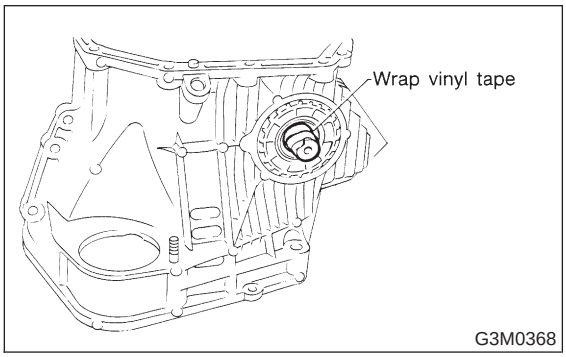
31) Remove the transmission harness.

CAUTION:
Be careful not to damage the cord insulation.



4. TORQUE CONVERTER CLUTCH CASE SECTION

1) Wrap the axle shaft serration with vinyl tape.

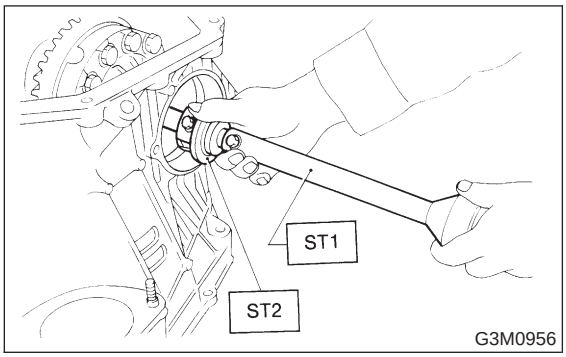


2) Remove the differential side retainer with ST.
ST 499787000 WRENCH ASSY

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

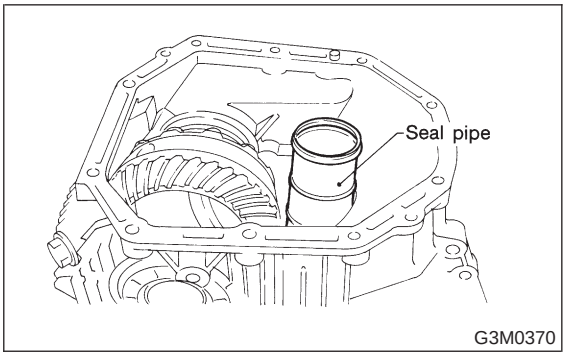
3) Extract the axle shaft with ST1 and ST2.
ST1 499095500 REMOVER
ST2 499247300 INSTALLER

CAUTION:
Do not reuse the circlip.

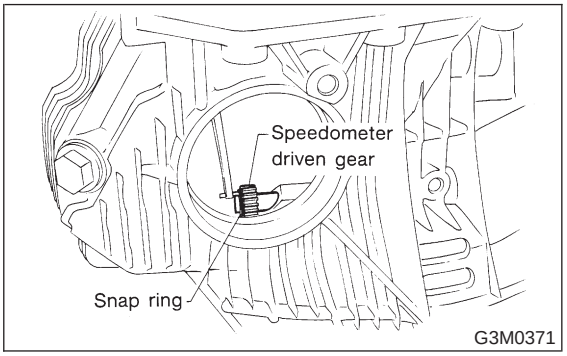


4) Remove the differential case assembly.

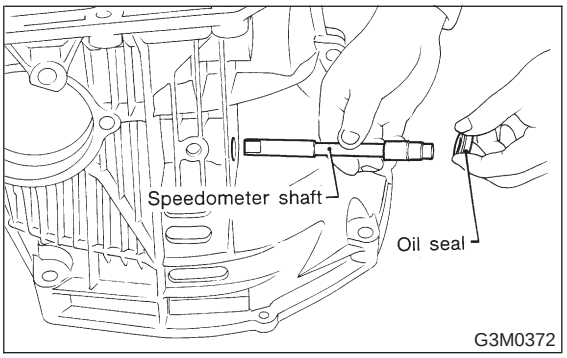
CAUTION:
- **Be careful not to damage the retainer mounting hole of the torque converter clutch case and the speedometer gears.**
- **Remove the seal pipe if it is attached. (Reusing is not allowed.)**



5) Remove the snap ring. Then remove the speedometer driven gear.



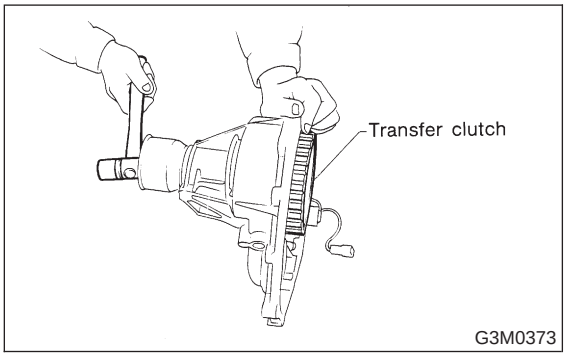
6) Tap out the speedometer shaft to the outside of the case, and remove the oil seal.



5. EXTENSION SECTION

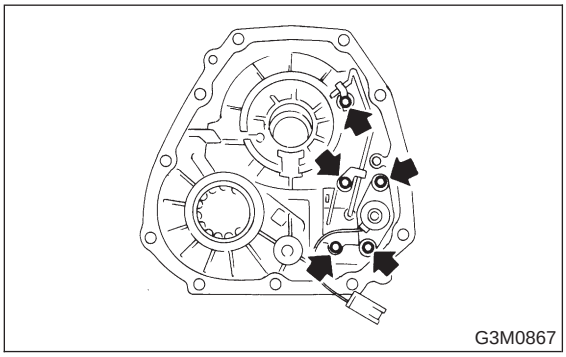
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

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

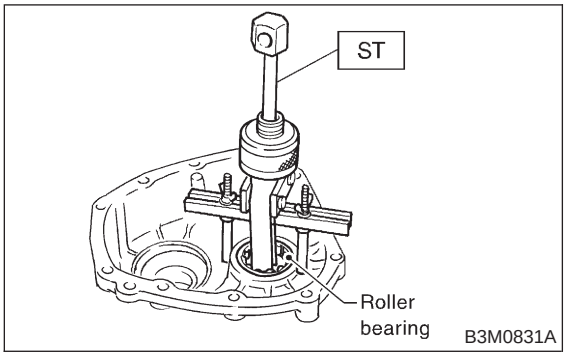


2) Remove duty solenoid C, transfer valve body and the transfer pipe.

CAUTION:
- **Take out the inlet filter.**
- **Do not damage the O-ring.**
- **Be careful not to bend the pipe.**



3) Take out the roller bearing inner race with ST.
ST 398527700 PULLER



4) Take out the roller bearing outer race with ST.

NOTE:
Hook ST in the inner side of the roller bearing outer race.

ST 398527700 PULLER

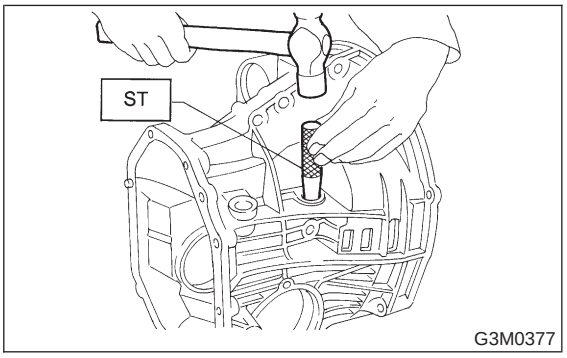
C: ASSEMBLY OF OVERALL TRANSMISSION

1. TORQUE CONVERTER CLUTCH CASE SECTION

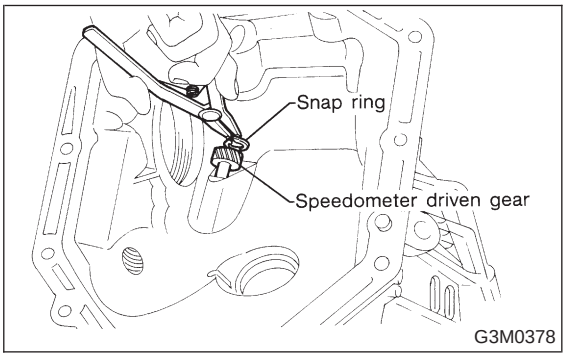
1) Check the appearance of each component and clean.

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

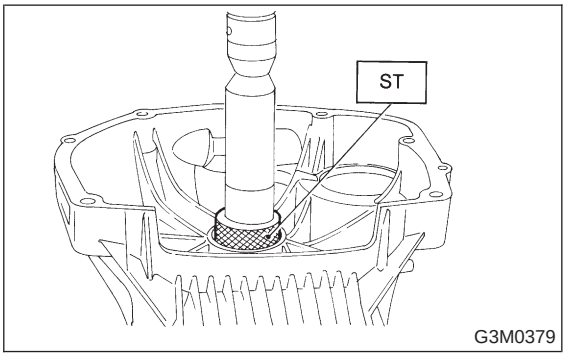
2) Install the washer and snap ring to the speedometer shaft with ST, and set the oil seal. Then force-fit the shaft to the torque converter clutch case.
ST 499827000 PRESS



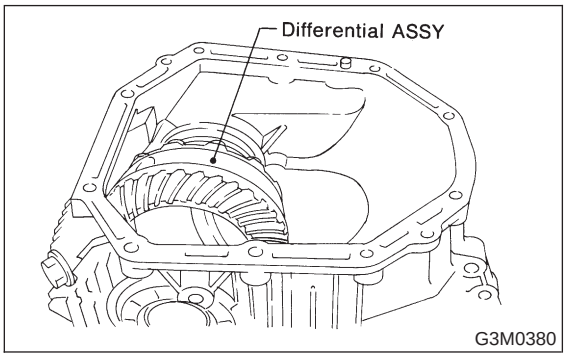
3) Install the speedometer driven gear to the speedometer shaft, and secure with a snap ring.



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



5) Install the differential assembly to the case, paying special attention not to damage the speedometer gears (drive and driven) and the inside of the case (particularly, the differential side retainer contact surface).

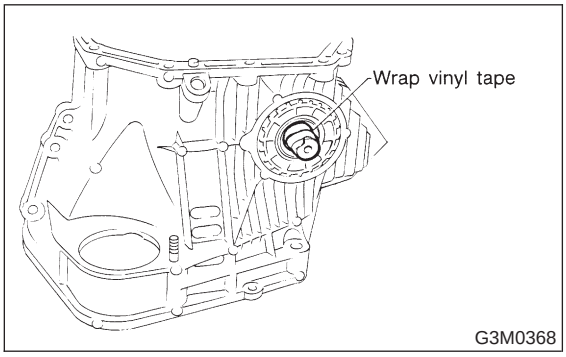


6) Install the circlip to the axle shaft, insert the shaft into the differential assembly, and tap it into position with a plastic hammer.

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

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.**

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

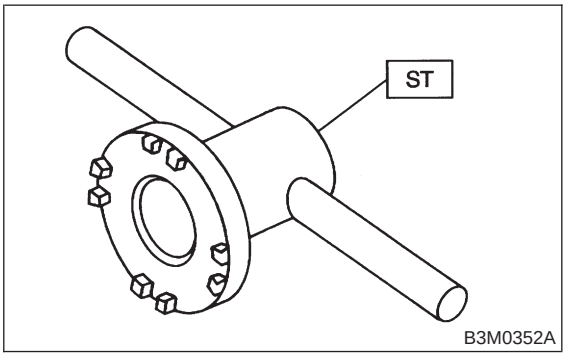


8) Install the oil seal and outer race (taper roller bearing) to the differential side retainer. Then screw in the retainer and the O-ring after coating the threads with oil.

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.**

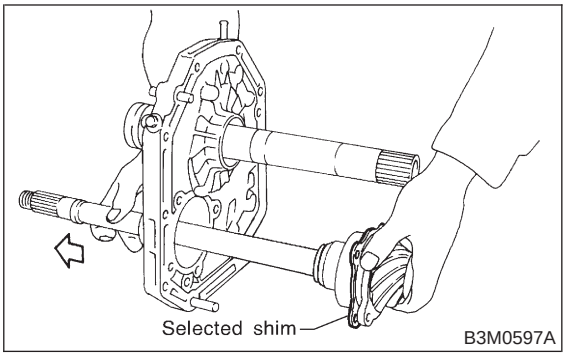
9) Using the ST, screw in the retainer until light contact is felt.
ST 499787000 WRENCH ASSY

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



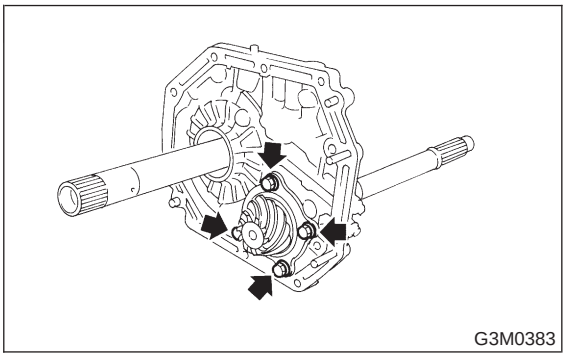
10) Hypoid gear backlash adjustment and tooth contact check
(1) Assemble the drive pinion assembly to the oil pump housing.

CAUTION:
- **Be careful not to bend the shims. <Ref. to 3-2 [W16C0].>**
- **Be careful not to force the pinion against the housing bore.**



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

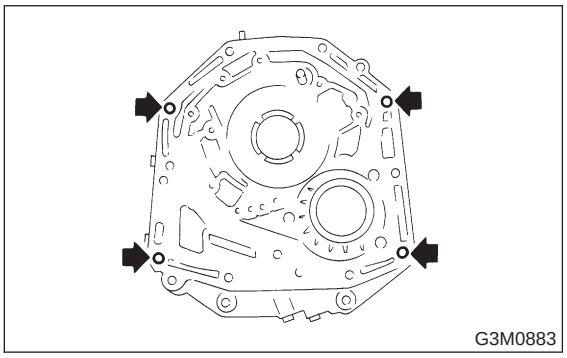
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



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

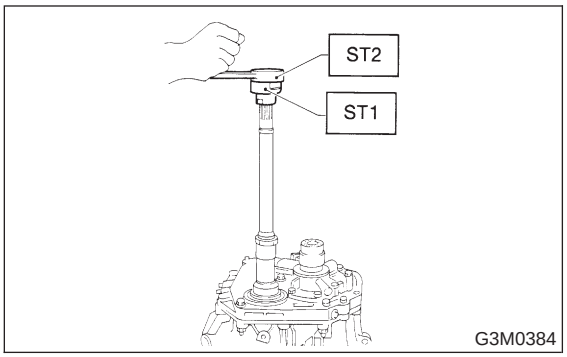
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)

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.


G3M0883

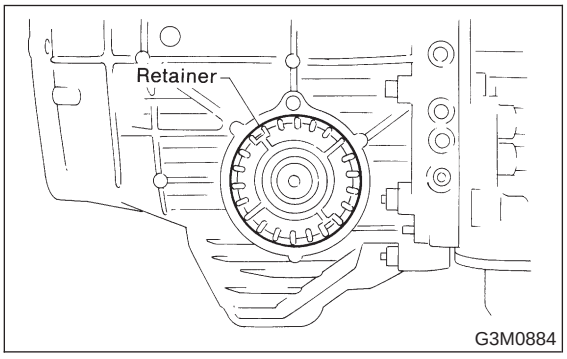
(4) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937100 HOLDER
ST2 499787100 WRENCH



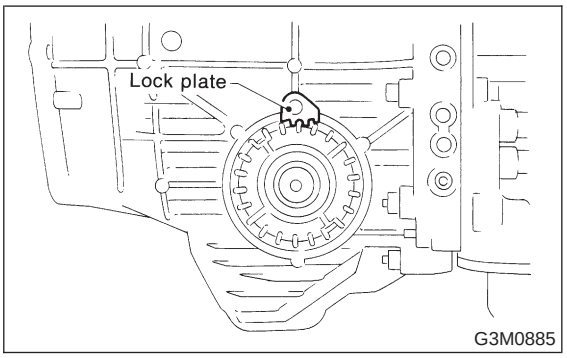
G3M0384

(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.



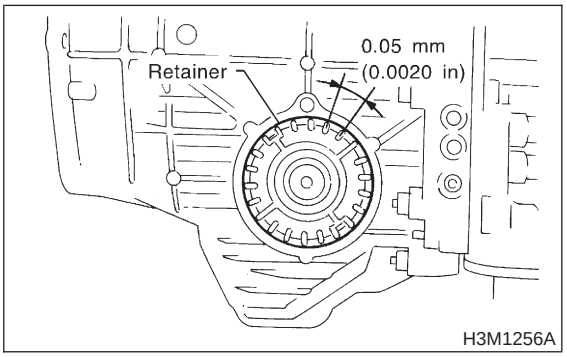
G3M0884

(6) After the “zero” state is established, back off the LH retainer 3 teeth 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 teeth 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).



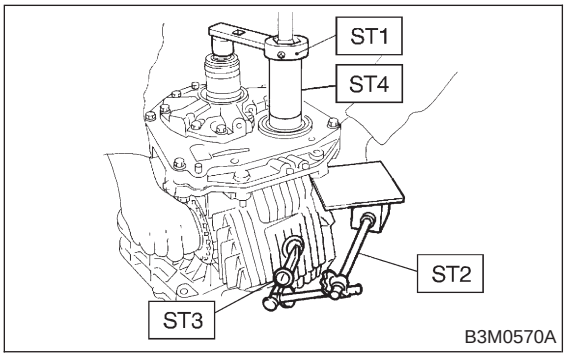
H3M1256A

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

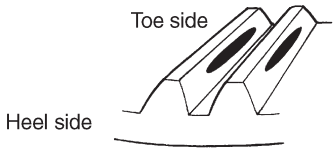
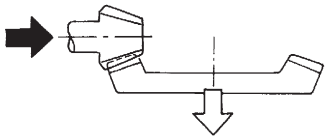
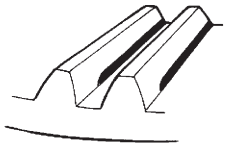
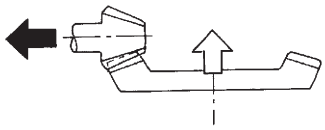
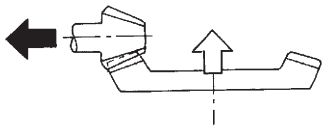
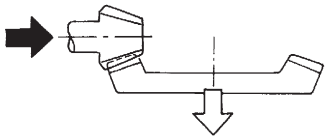
NOTE:
After confirming that the backlash is correct, check the tooth contact.

ST1	499787100	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499757800	ADAPTER WRENCH

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



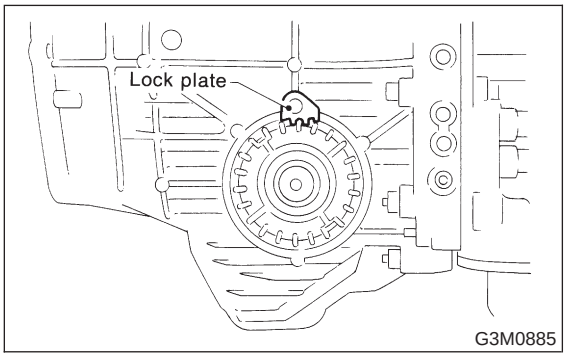
(8) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.
If tooth contact is improper, readjust the backlash or shim thickness.

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 ends.  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

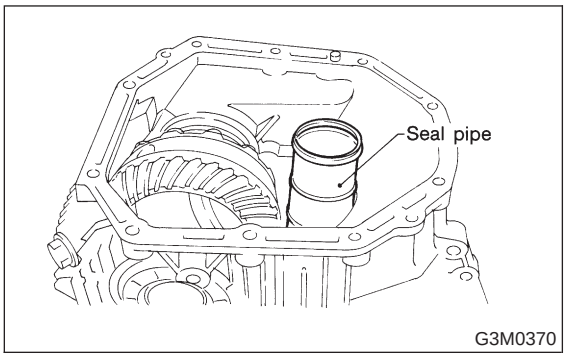
(9) If tooth contact is correct, mark the retainer position and loosen it. After fitting the O-ring, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

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



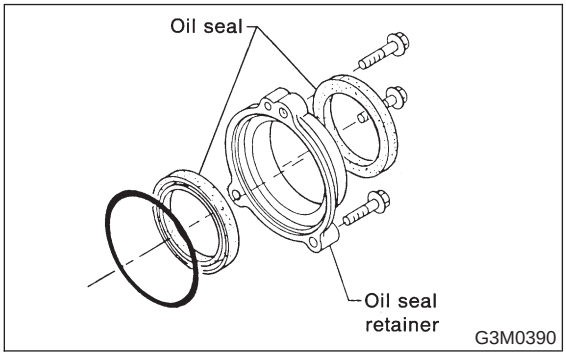
11) Install the seal pipe to the torque converter clutch case.

CAUTION:
Be sure to use a new seal pipe.



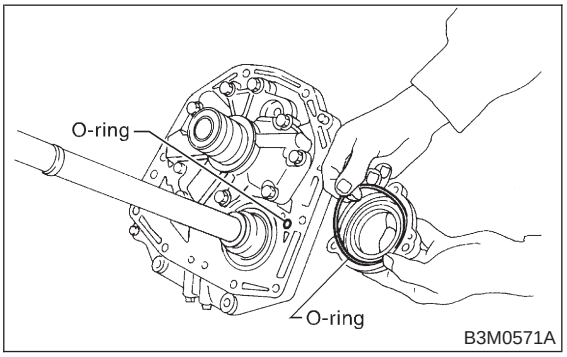
12) Install two oil seals to the oil seal retainer with ST.
ST 499247300 INSTALLER

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



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

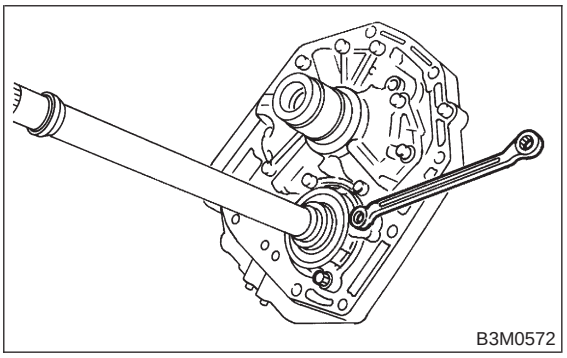
CAUTION:
Always discard old O-rings and install new ones.



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

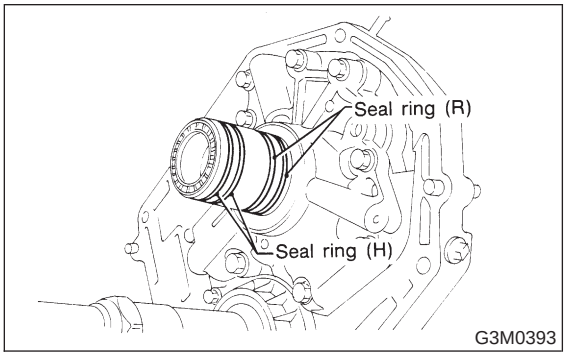
NOTE:
Make sure the O-ring is fitted correctly in position.

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



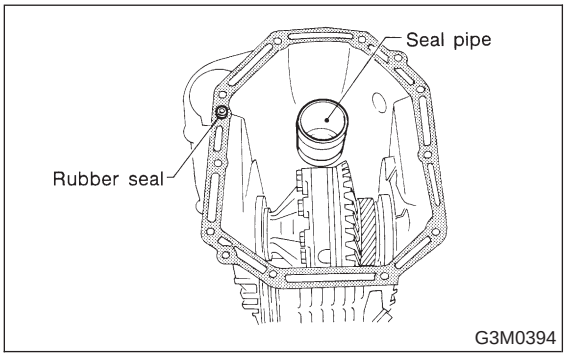
15) Apply vaseline to the groove on the oil pump cover, and install two (R) seal rings and two (H) seal rings.

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.



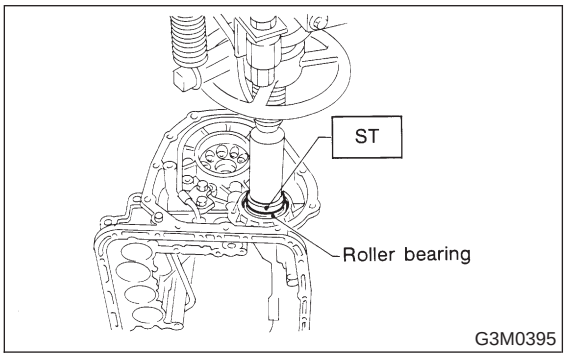
16) Install the rubber seal to the torque converter clutch case.

CAUTION:
Be careful not to lose the rubber seal.

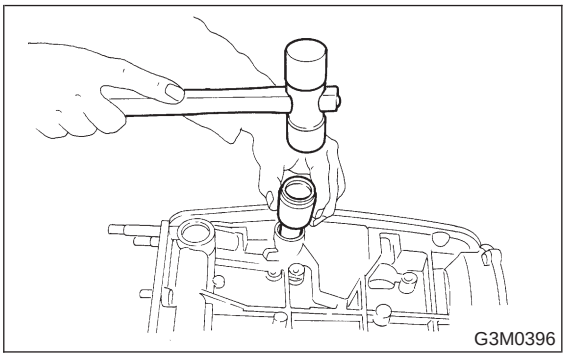


2. TRANSMISSION CASE SECTION

1) Press-fit the roller bearing to the transmission case with ST.
ST 398487700 DRIFT



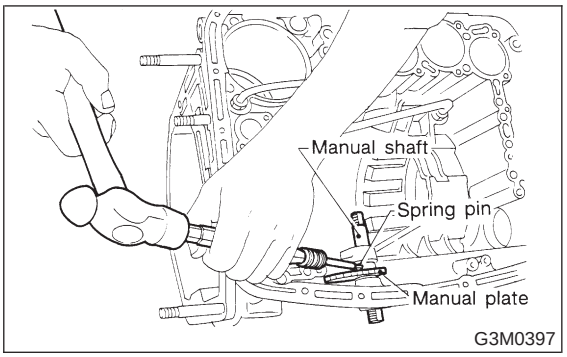
2) Using a plastic hammer, force-fit the oil seal.



3) Install the manual plate and shaft, and secure with a spring pin.

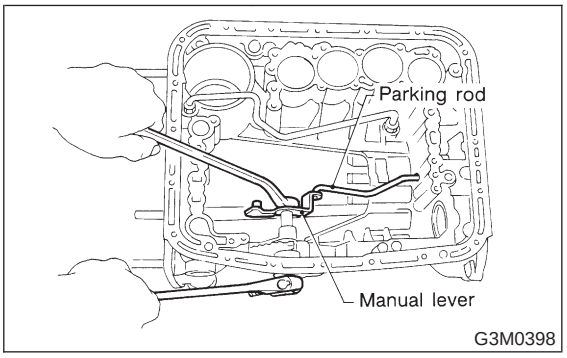
CAUTION:
Be careful not to damage the oil seal lip.

NOTE:
After installation, make sure of smooth movement.



4) Assemble the manual lever and parking rod to the inside shaft, and secure with a nut.

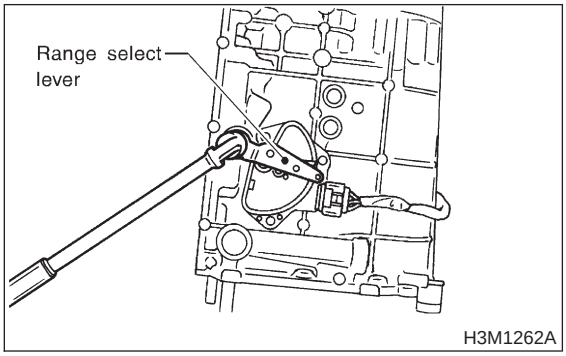
Tightening torque:
47±2 N·m (4.8±0.2 kg-m, 34.7±1.4 ft-lb)



5) Install inhibitor switch.
(1) Install the inhibitor switch to the transmission case. Fit the projecting portion of the switch in the recessed portion of the case, and tighten three bolts temporarily.

(2) Insert the range select lever into the shaft, and tighten the nut.

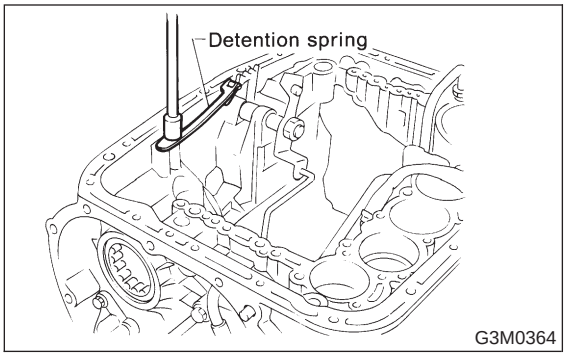
Tightening torque:
47±5 N·m (4.8±0.5 kg-m, 34.7±3.6 ft-lb)



6) Install the detention spring.

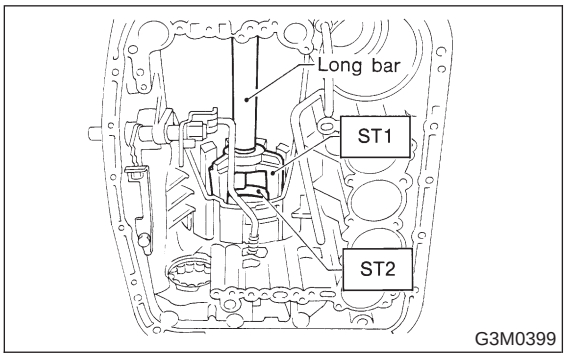
NOTE:
Position the spring so that its center is aligned with the center of the manual plate.

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



7) Install the lathe cut seal rings to the I.D./O.D. of the low and reverse piston. Then install the piston into the case with a press, ST1 and ST2.
ST1 398673600 COMPRESSOR
ST2 498627000 SEAT

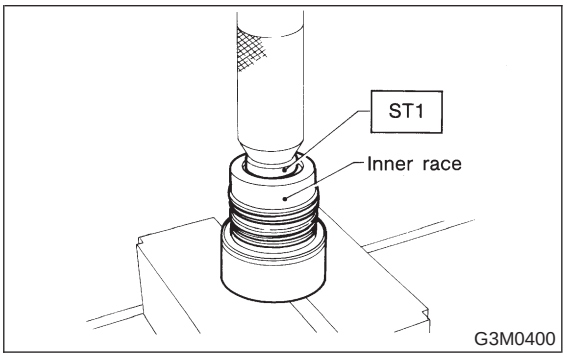
CAUTION:
● Be careful not to tilt the piston when installing.
● Be careful not to damage the lip seal.



8) 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.

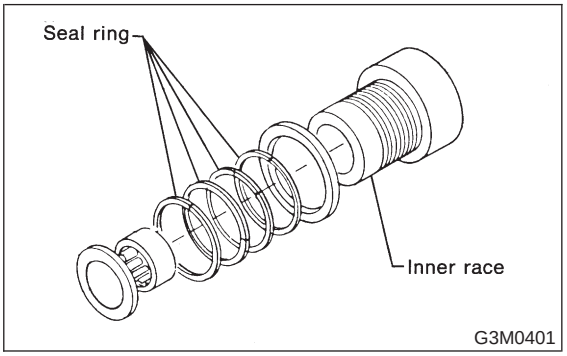
ST 398527700 PULLER ASSY



(2) Install four seal rings and thrust washer.

CAUTION:
Always discard old seal rings, and install new ones.

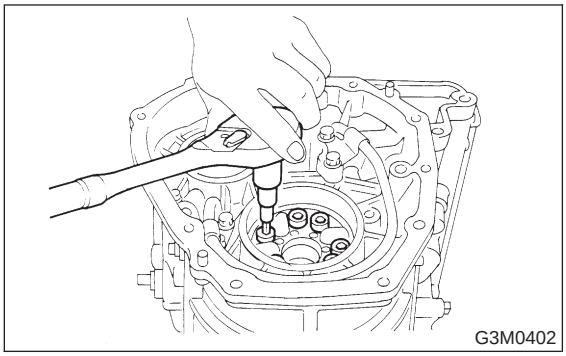
NOTE:
Apply vaseline to the groove of the inner race and to the seal ring after installation, so that the seal ring will not expand.



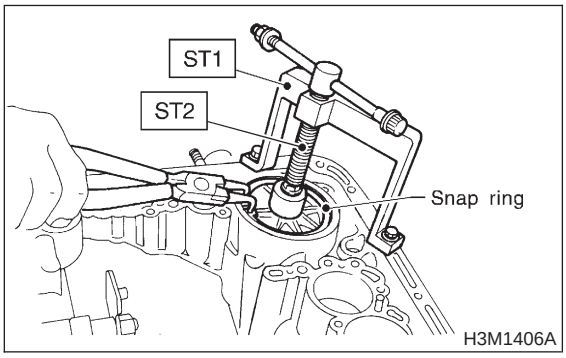
(3) Place the spring retainer on the inner race. Install the spring to the recessed portion of the piston. Then tighten eight socket head bolts from the rear side of the transmission case.

CAUTION:
Be sure to tighten evenly.

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



9) Install the band servo sub assembly.
10) Press the O.D. servo retainer into position with ST1 and ST2, and secure with a snap ring.
ST1 498677010 COMPRESSOR
ST2 399703600 PULLER ASSY



CAUTION:
Perform the following operations with the transmission case set vertically on wooden blocks.

11) Measure the drive plates thickness of the low & reverse brake.

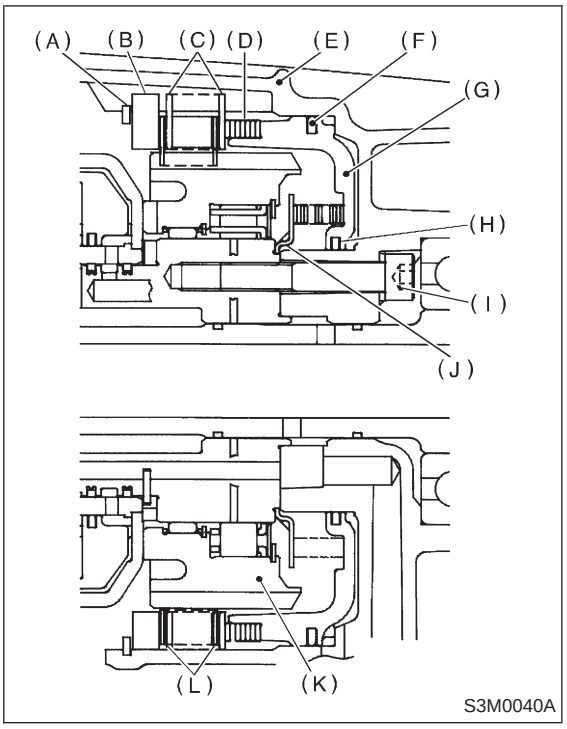
Standard value: 1.8 mm (0.071 in)

Allowable limit: 1.6 mm (0.063 in)

12) Installation of the low & reverse brake:

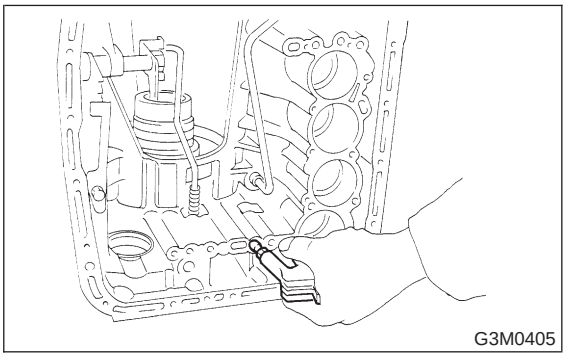
(1) Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

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



(A) Snap ring
(B) Retaining plate
(C) Driven plate
(D) Dish plate
(E) Transmission case
(F) Lathe cut seal ring
(G) Piston
(H) Lathe cut seal ring
(I) Bolt
(J) Clutch spring retainer
(K) Forward clutch drum
(L) Drive plate

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

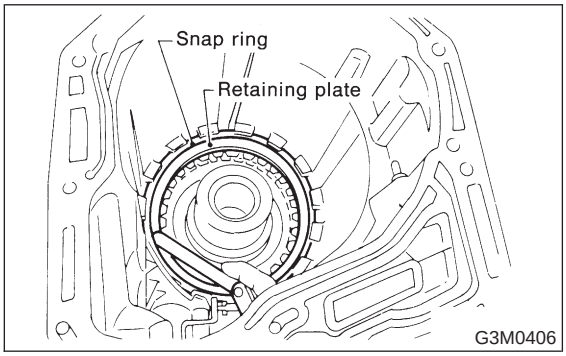


(3) Check the clearance. (Selection of retaining plate)

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

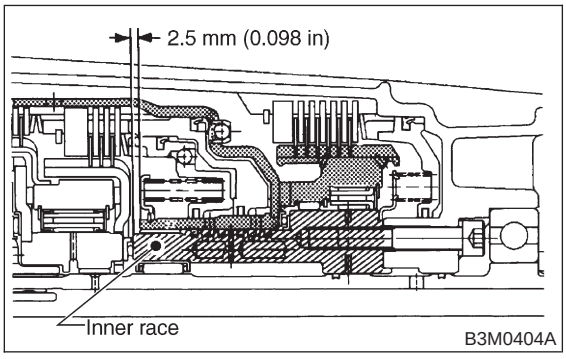
Standard value:
0.7 — 1.0 mm (0.028 — 0.039 in)

Allowable limit:
2.2 mm (0.087 in)



Available retaining plates	
Part No.	Thickness mm (in)
31667AA180	6.5 (0.256)
31667AA190	6.8 (0.268)
31667AA200	7.1 (0.280)
31667AA210	7.4 (0.291)
31667AA220	7.7 (0.303)
31667AA230	8.0 (0.315)
31667AA240	8.2 (0.323)
31667AA250	8.4 (0.331)
31667AA310	8.6 (0.339)

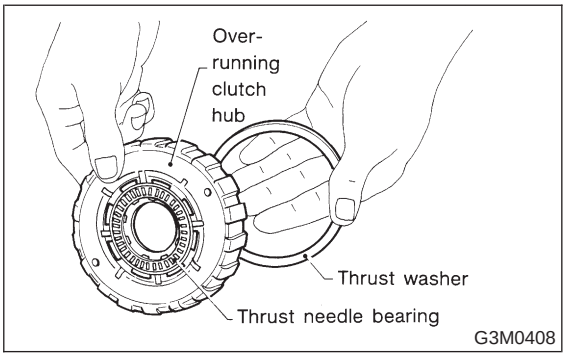
13) Install the forward clutch drum.
(1) Install carefully while rotating the forward clutch drum slowly paying special attention not to damage the seal ring.
(2) Installation is completed when the forward clutch drum recedes 2.5 mm (0.098 in) from the inner race surface.



14) Assemble the overrunning clutch hub.

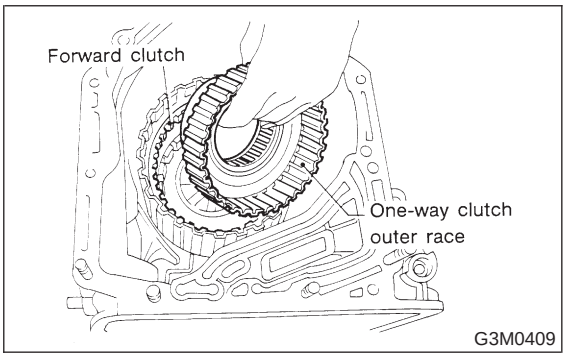
CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>

NOTE:
● Join the thrust needle bearing and thrust washer with vaseline, and then install them together.
● Make sure that the splines are engaged correctly.



15) Install the one-way clutch outer race.

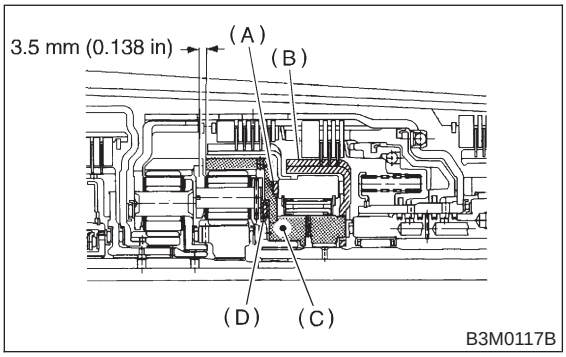
NOTE:
Make sure the forward clutch splines are engaged correctly.



16) Assemble the rear internal gear.
(1) Join the thrust needle bearing and thrust washer to the internal gear with vaseline, and install the internal gear while rotating it.
(2) Securely engage the bearing with the dog of the overrunning clutch hub.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>

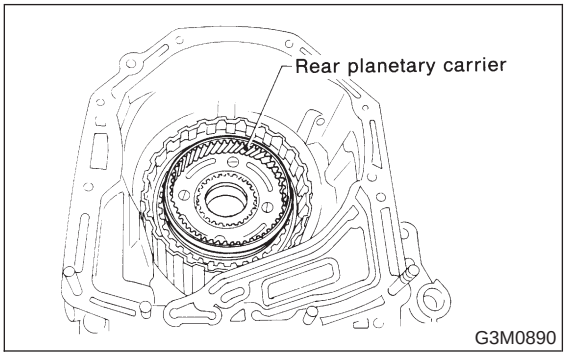
NOTE:
Installation is complete when the snap ring top surface of the forward clutch drum recedes approximately 3.5 mm (0.138 in).



(A) Thrust washer
(B) Overrunning clutch hub
(C) Rear internal gear
(D) Thrust needle bearing

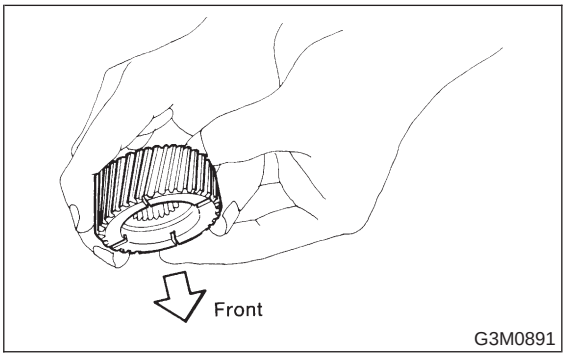
17) Install the rear planetary carrier.
Attach the thrust needle bearing to the inside of the carrier with vaseline. Then install the carrier while rotating slowly.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>



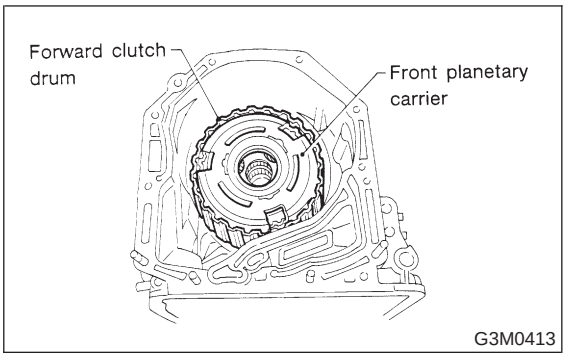
18) Install the rear sun gear.

NOTE:
Install the gear with the oil groove facing up.



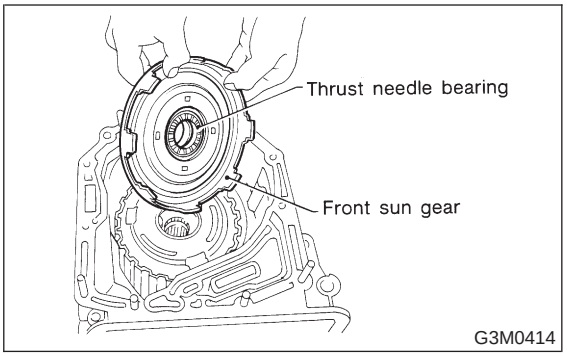
19) Install the front planetary carrier.
Attach the thrust needle bearings to both sides of the carrier with vaseline. Install the carrier carefully, while aligning with the splines of the forward clutch drum, and while rotating the pinion.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>



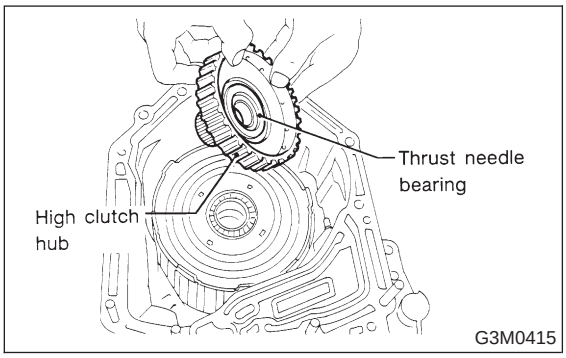
20) Install the front sun gear.
Attach the thrust needle bearing to the gear, and install the gear while turning slowly.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>



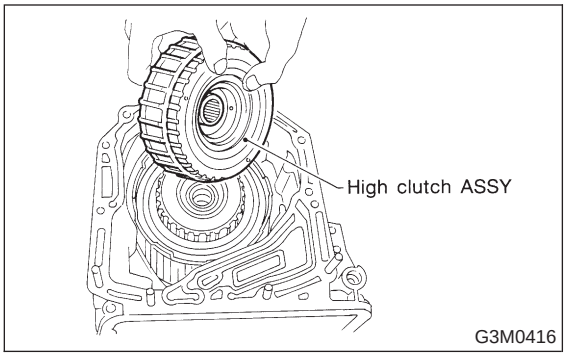
21) Install the high clutch hub.
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>



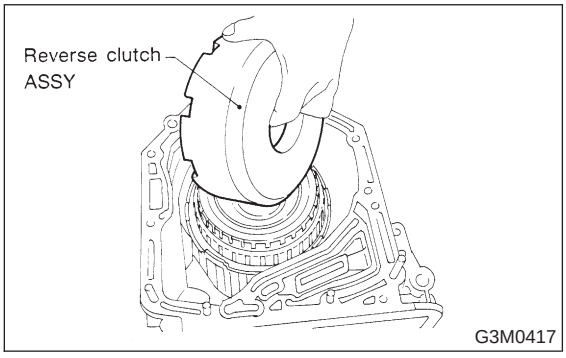
22) Install the high clutch assembly.

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



23) Install the reverse clutch assembly.

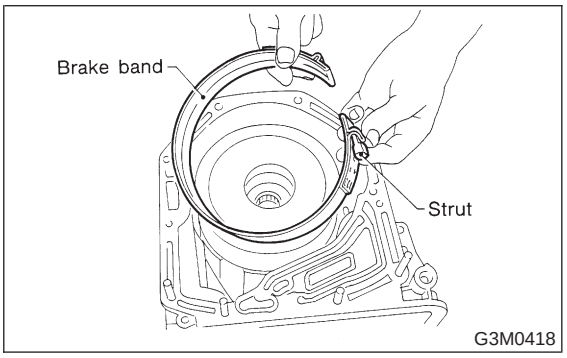
NOTE:
Engage the high clutch outer spline with the reverse clutch spline and the front sun gear with the cut-out portion of the reverse clutch drum correctly when installing.



24) Install the brake band.

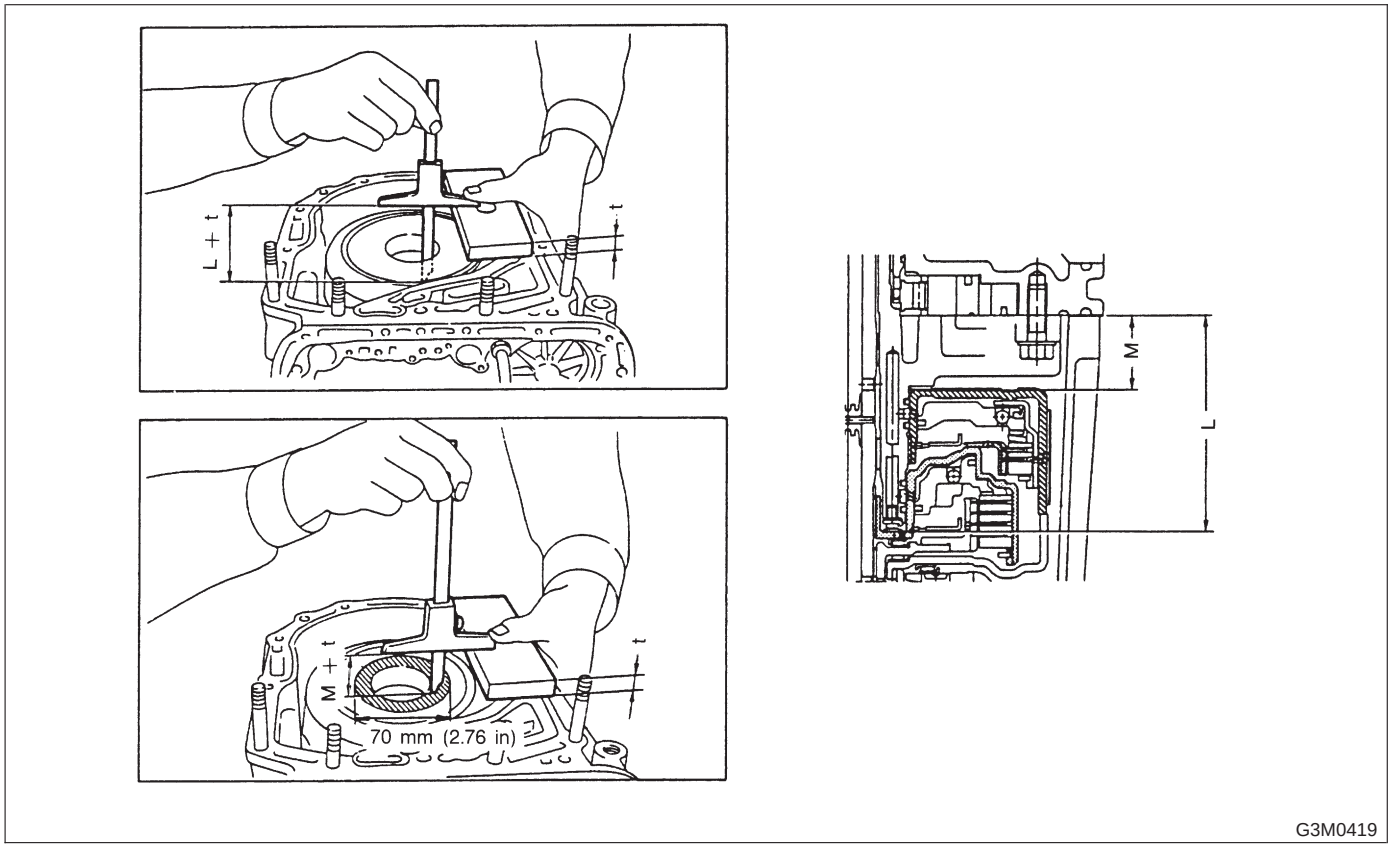
CAUTION:
Be careful not to damage the brake band when installing.

NOTE:
Install the strut to the band servo piston stem. Then tighten it temporarily to avoid tilting the band.



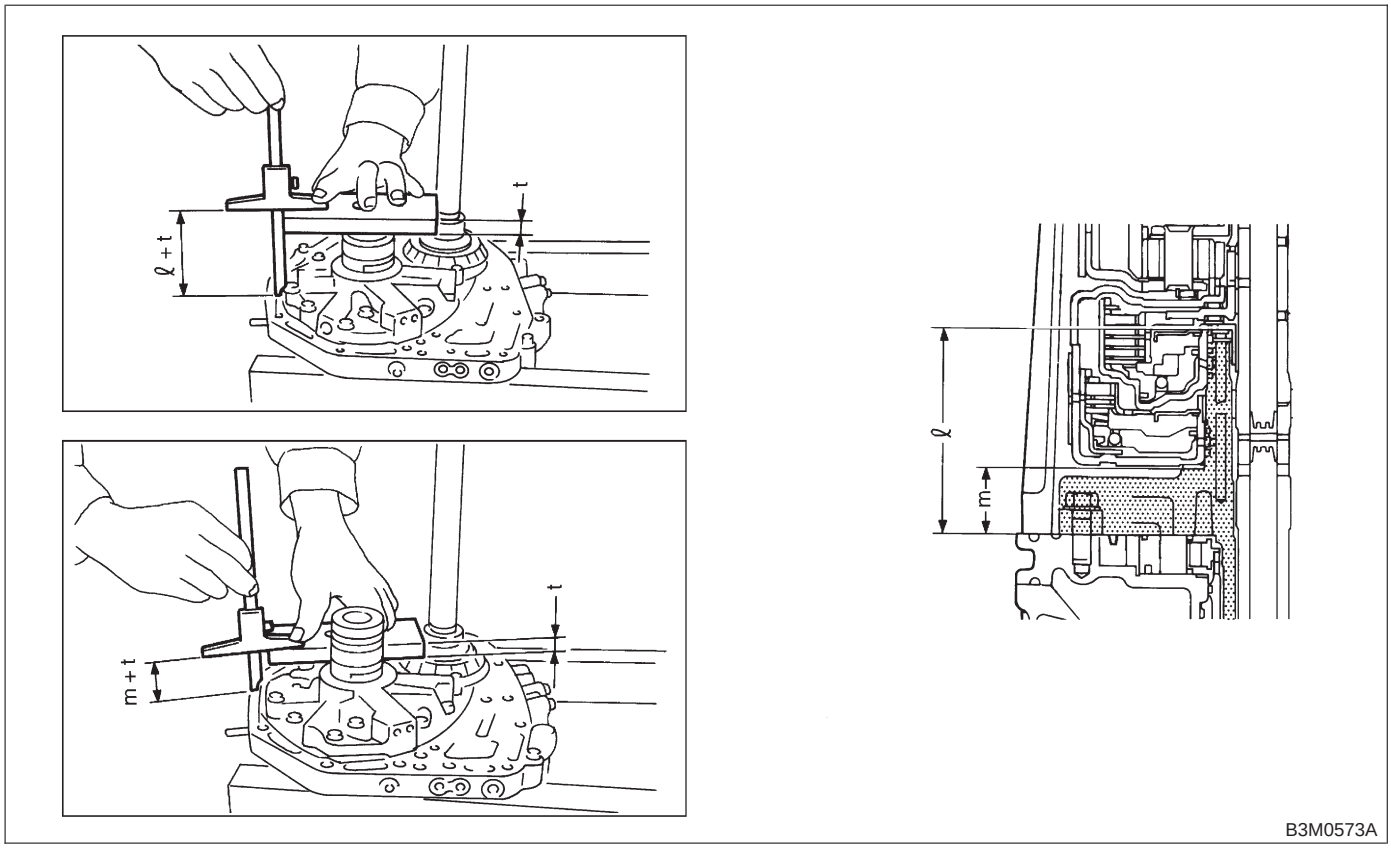
25) Adjustment of total end play and reverse clutch end play

(1) Measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum “L”, and the distance to the top surface of the reverse clutch drum “M”.



G3M0419

(2) Measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with needle bearing, and to the thrust surface of the reverse clutch.



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(3) Equation for calculation

- Total end play
  C = (L + 0.4 mm) − 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
0.4	Gasket thickness
ℓ	Height from housing mating surface to upper surface of clutch drum support

	Part No.	Thickness mm (in)
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.	803031021	0.8 (0.031)
	803031022	1.0 (0.039)
	803031023	1.2 (0.047)
	803031024	1.4 (0.055)
	803031025	1.6 (0.063)
	803031026	1.8 (0.071)
	803031027	2.0 (0.079)

- Reverse clutch end play
  C = (M + 0.4 mm) − m

C	Clearance between oil pump housing hose and end of reverse clutch
M	Distance from case mating surface to upper surface of reverse clutch
0.4	Gasket thickness
m	Height from housing mating surface to thrust-receiving area of reverse clutch

	Part No.	Thickness mm (in)
Select suitable thrust washer from among those listed in this table so that clearance C is in the 0.55 — 0.90 mm (0.0217 — 0.0354 in) range.	31299AA000	0.7 (0.028)
	31299AA010	0.9 (0.035)
	31299AA020	1.1 (0.043)
	31299AA030	1.3 (0.051)
	31299AA040	1.5 (0.059)
	31299AA050	1.7 (0.067)
	31299AA060	1.9 (0.075)

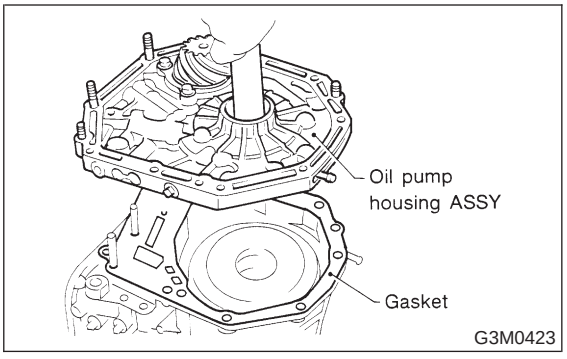
26) Install the oil pump housing assembly.

(1) After completing end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust washer and 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.

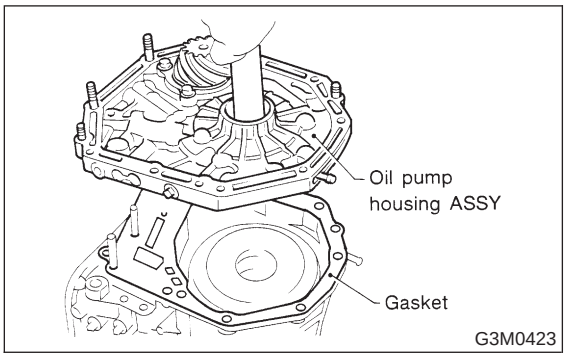
CAUTION:

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



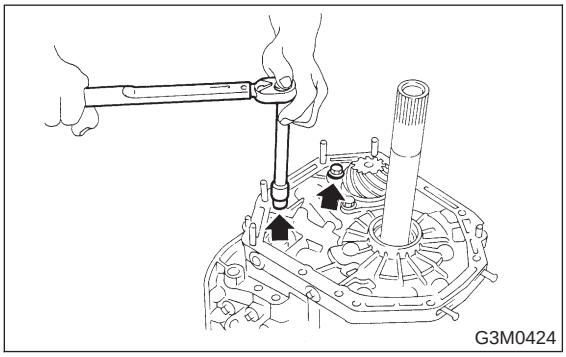
(3) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

NOTE:
Any clearance suggests a damaged seal ring.



(4) Secure the housing with two nuts.

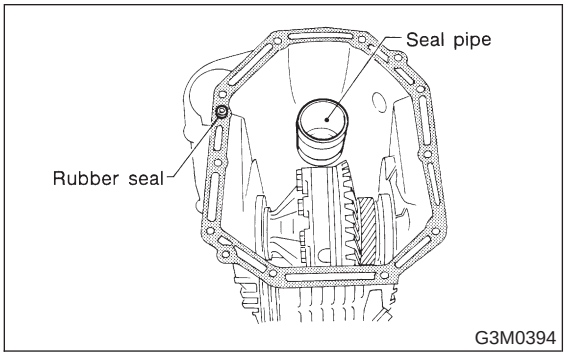
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



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.

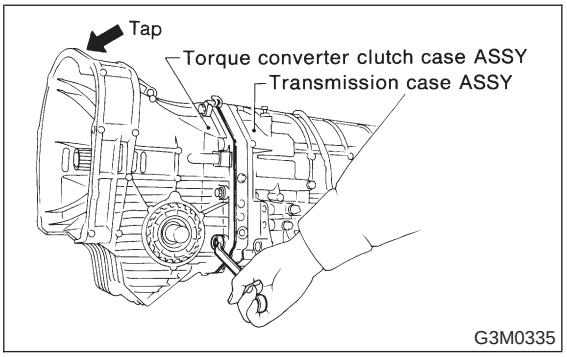
NOTE:
Make sure that the rubber seal and seal pipe are fitted in position.



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)

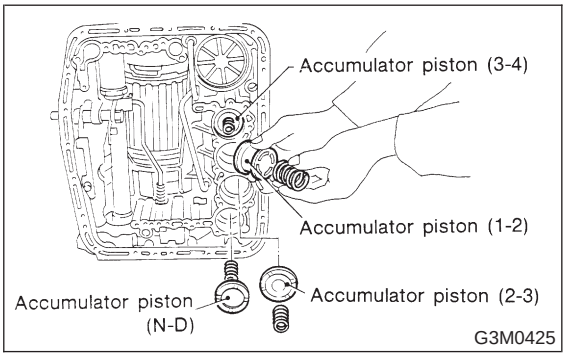


4. CONTROL VALVE AND OIL PAN

1) Install four accumulators with oil pans facing upward.

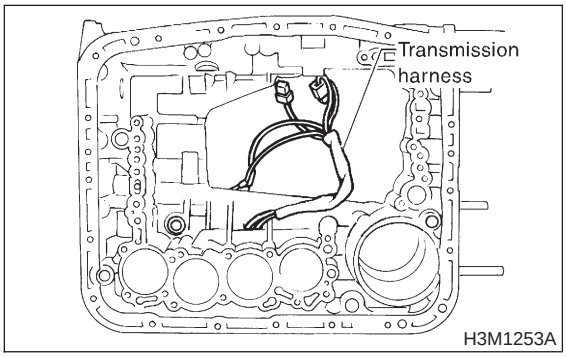
CAUTION:
Be careful not to confuse the springs and installation positions.

Spring specification		
Accumulator spring	Outer diameter mm (in)	Free length mm (in)
1 — 2	28.5 (1.122)	44.5 (1.752)
2 — 3	20.5 (0.807)	31.0 (1.220)
3 — 4	17.3 (0.681)	43.7 (1.720)
N — D	17.8 (0.701)	36.5 (1.437)



2) Install and route the transmission harness.

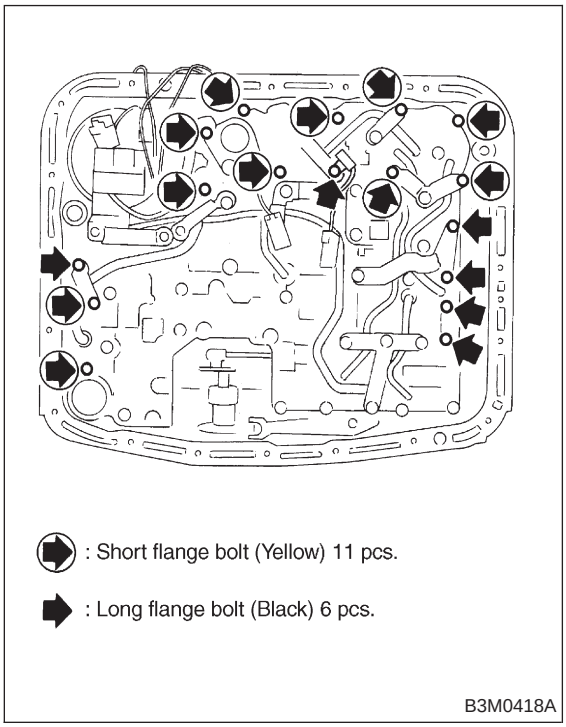
CAUTION:
Be careful not to damage the harness.



3) Install the control valve assembly.
(1) Set the select lever in range "2".
(2) Install the two brackets, ATF temperature sensor and the control valve by engaging the manual valve and manual lever, then tighten the 17 bolts.

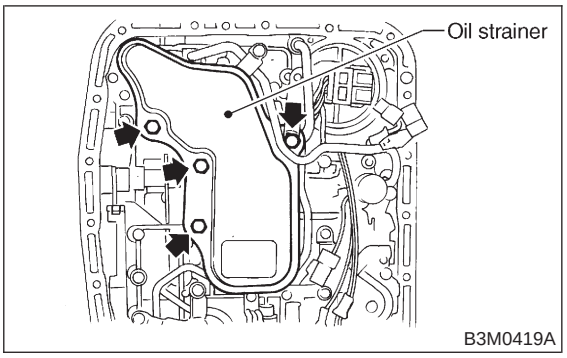
CAUTION:
● Be careful not to pinch the harness roll the gasket.
● Tighten the control valve mounting bolts evenly.

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

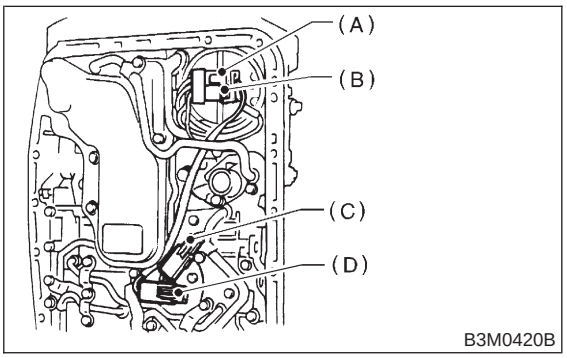


4) Install the oil strainer to the control valve. Be careful not to cut or break the O-ring. Then tighten four bolts.

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



5) Secure four solenoid valve connectors.

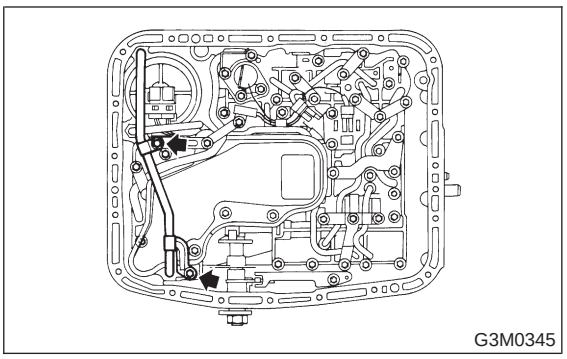


(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

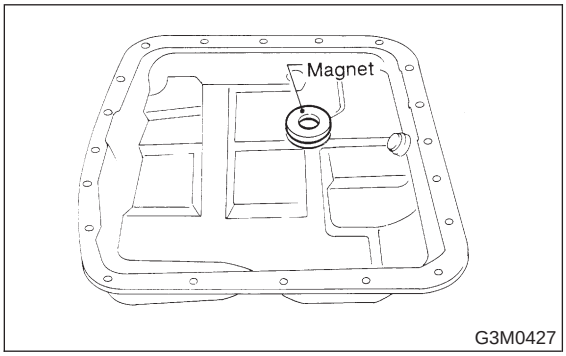
6) Install the oil cooler outlet pipe, and secure with two bolts.

CAUTION:
Fit the pipe into position. Be careful to avoid twisting.

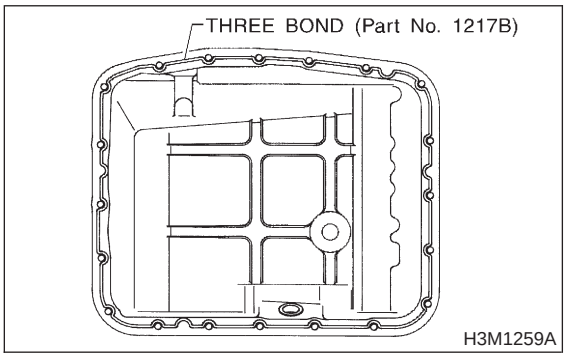
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



7) Install the oil pan.
(1) Attach the magnet at the specified position.



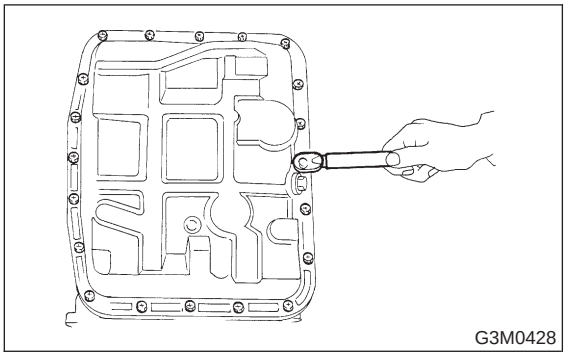
(2) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



(3) Install the oil pan to transmission case.

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. EXTENSION SECTION

NOTE:
When installing new oil seal into extension case, press it with ST.
ST 498057300 INSTALLER

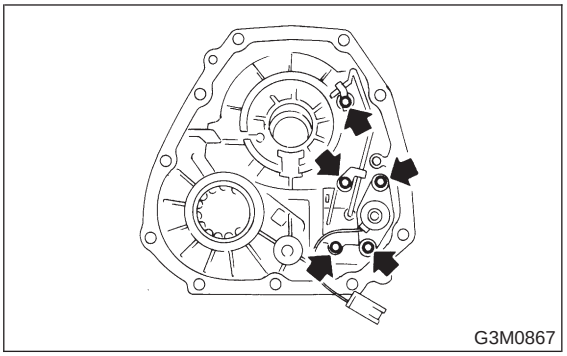
1) Install the filter in the extension case.

NOTE:
Pay attention to the orientation of the filter.

2) Install the transfer clutch valve assembly, transfer pipe, and the stay then secure with five bolts.

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

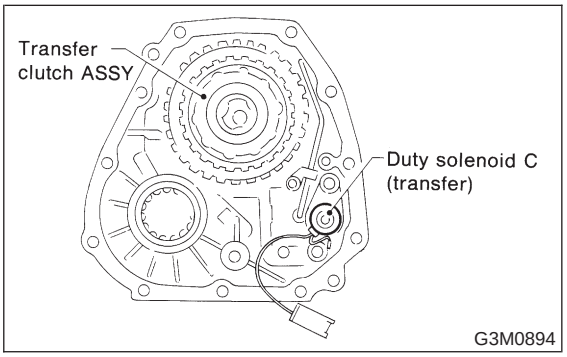
CAUTION:
● Be sure to tighten the going lead with one of these bolts.
● Be sure to use a new gasket.



3) Install the transfer clutch assembly to the case.

CAUTION:
Be careful not to damage the seal rings.

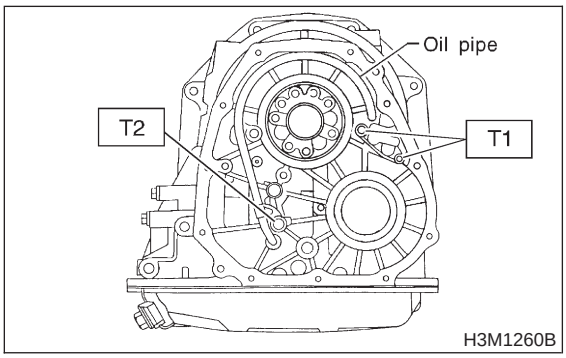
NOTE:
Insert the clutch assembly fully into position until the bearing shoulder bottoms.



6. CONNECTION OF EACH SECTION

1) Install oil pipe.

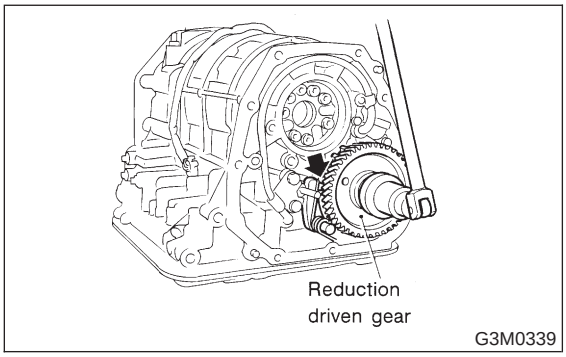
Tightening torque:
T1: 7.8±1.0 N·m (0.80±0.10 kg-m, 5.8±0.7 ft-lb)
T2: 24.5±2.0 N·m (2.50±0.20 kg-m, 18.1±1.4 ft-lb)



2) Install the reduction driven gear.
3) Install the parking pawl and shaft, set the select lever in the "P" range and tighten the drive pinion lock nut.

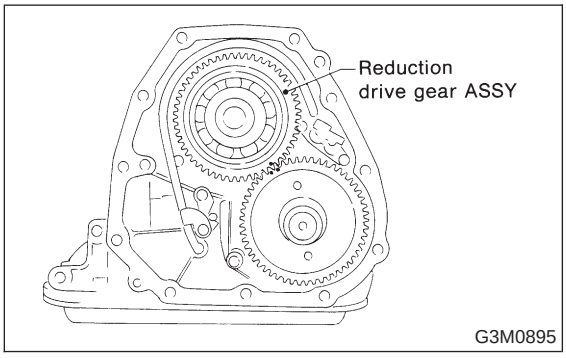
NOTE:
After tightening, stake the lock nut securely.

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

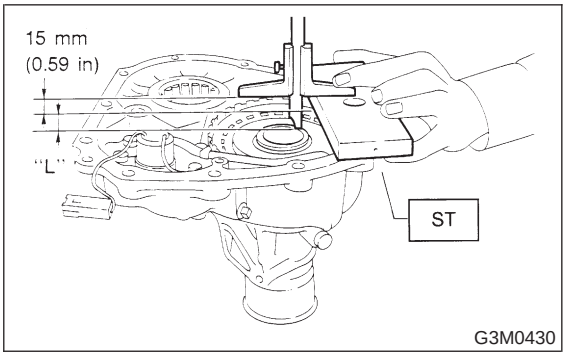


4) Install the reduction drive gear.

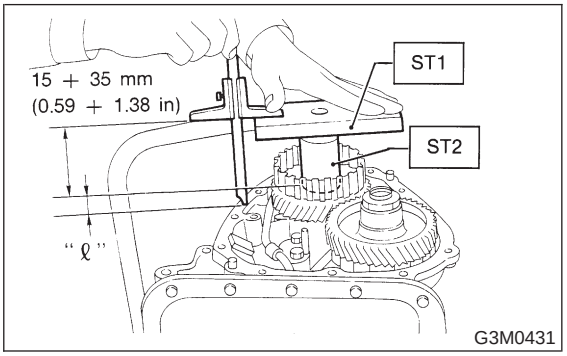
NOTE:
Insert it fully into position until the bearing shoulder bottoms.



5) Measurement and adjustment of extension end play
(1) Measure distance L from end of extension case and rear drive shaft with ST.
L = Measured value − 15 mm
ST 398643600 GAUGE



(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:
T = (L + 0.4 mm) − ℓ

T	Clearance between end of reduction drive gear and end of rear drive shaft.
L	Distance from end of extension case to end of rear drive shaft.
0.4	Gasket thickness
ℓ	Height from end of transmission case to end of reduction drive gear.

(4) Select suitable thrust needle bearing from among those listed in the following table to adjust clearance in the 0.05 — 0.20 mm (0.0020 — 0.0079 in) range.

NOTE:
Select from one to five shims so that clearance is within specifications.

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)

6) Installation of extension case and transmission case.

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

(2) Set the parking return spring.

(3) Remove the transfer clutch from the extension case.

Set the needle bearing on the reduction drive shaft and then install transfer clutch to the transfer clutch hub.

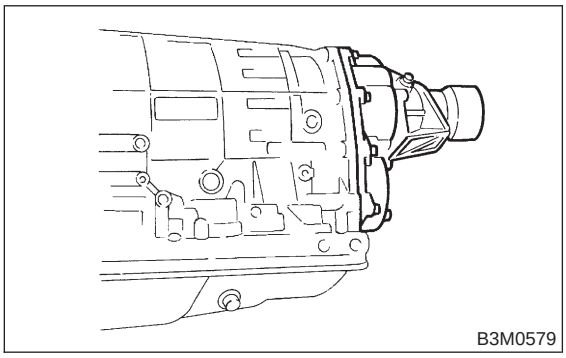
NOTE:
Be sure to engage the spline teeth correctly.

(4) With gasket inserted between them, install the extension case to the transmission case.

CAUTION:
- **Be sure to use a new gasket.**
- **After inserting the extension case halfway, connect the connector for duty solenoid C. Be careful not to jam the cord in the case.**
- **Be careful not to damage the rear drive shaft seal ring.**

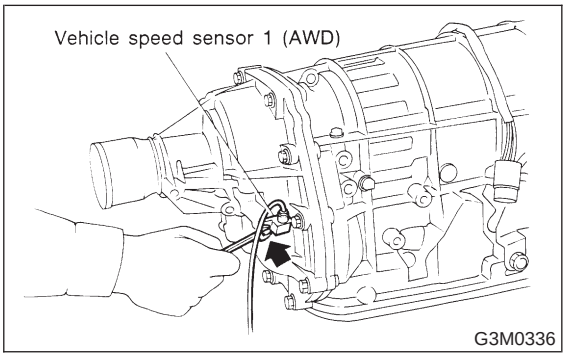
(5) Tighten bolts to secure the case.

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


B3M0579

7) Install the vehicle speed sensor 1.

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



G3M0336

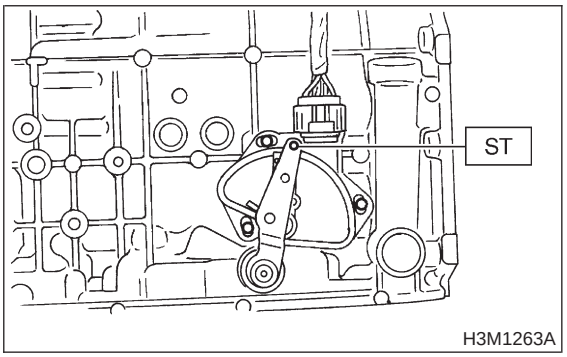
7. EXTERNAL PARTS

1) Adjustment of inhibitor switch.

(1) With the selector 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

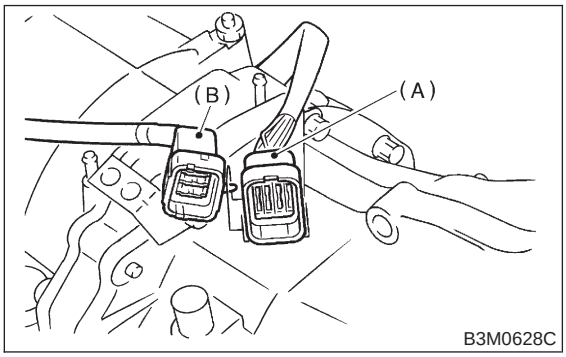


H3M1263A

(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)

2) Clip the following cords and harness.



(A) Transmission harness
(B) Inhibitor switch cord

3) Install the oil cooler outlet pipe.

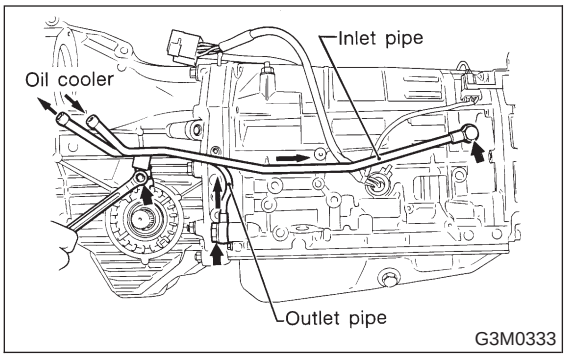
CAUTION:
Be sure to use a new aluminum washer.

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

4) Install the oil cooler inlet pipe.

CAUTION:
Be sure to use a new aluminum washer.

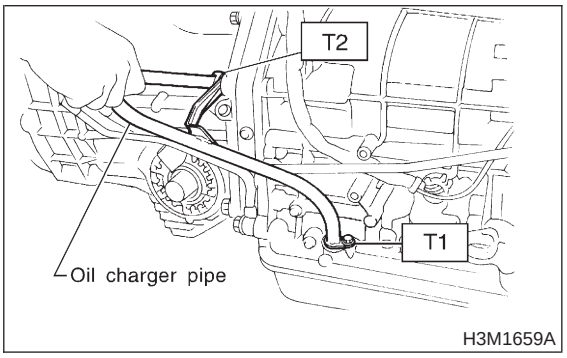
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



5) Install the oil charge pipe.

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

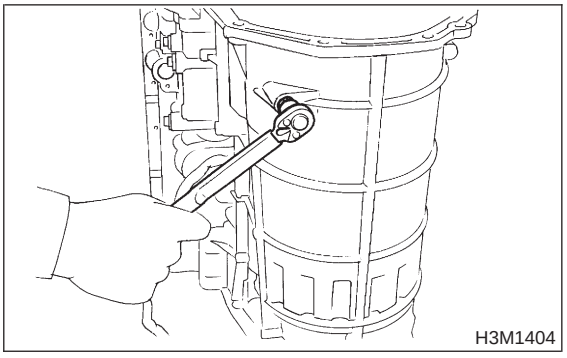
Tightening torque:
T1: 6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)
T2: 41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



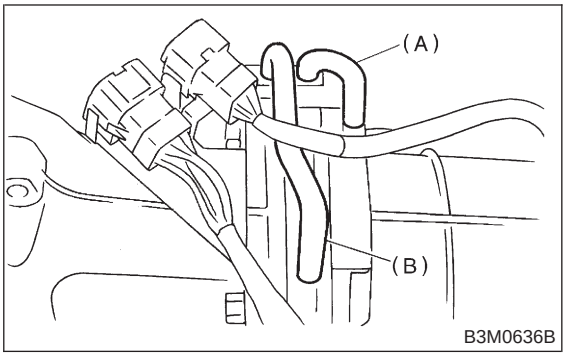
6) Adjustment of brake band
After tightening the brake band adjusting screw to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, back it off three turns. Then secure with a lock nut.

NOTE:
When tightening the lock nut, be careful not to turn the adjusting screw.

Tightening torque:
26±2 N·m (2.7±0.2 kg-m, 19.5±1.4 ft-lb)



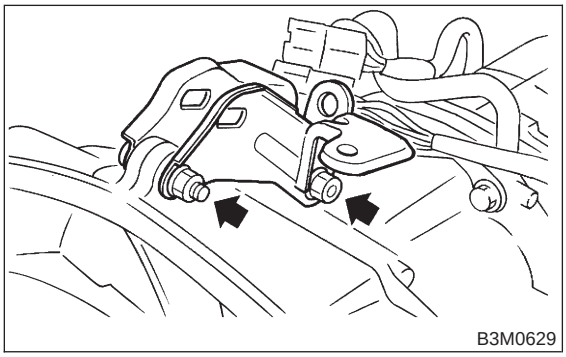
7) Install the air breather hose.



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

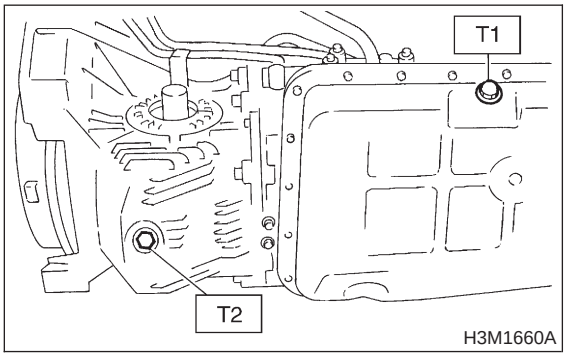
8) Install the pitching stopper bracket.

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



9) Tighten the ATF and differential gear oil drain plugs.

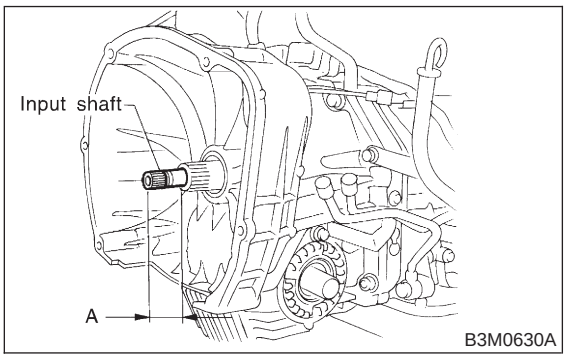
Tightening torque:
T1: 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
T2: 44±3 N·m (4.5±0.3 kg-m, 32.5±2.2 ft-lb)



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

CAUTION:
Be careful not to damage the bushing.

Normal protrusion A:
28 — 32 mm (1.10 — 1.26 in)

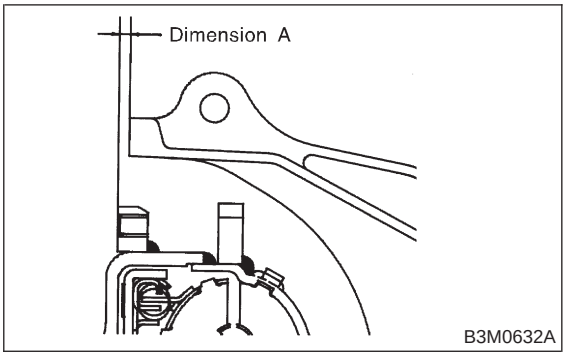


11) Install the torque converter clutch assembly.
(1) Install the oil pump shaft to the torque converter clutch.

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:
7.9 — 8.1 mm (0.311 — 0.319 in)



12) Fill ATF and differential gear oil.
<Ref. to 3-2 [S1A0].>

NOTE:
After filling oil, insert the oil level gauge into the oil inlet.

Differential gear oil capacity:
1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

Automatic transmission fluid capacity:
9.5 — 9.8 ℓ (10.0 — 10.3 US qt, 8.4 — 8.6 Imp qt)

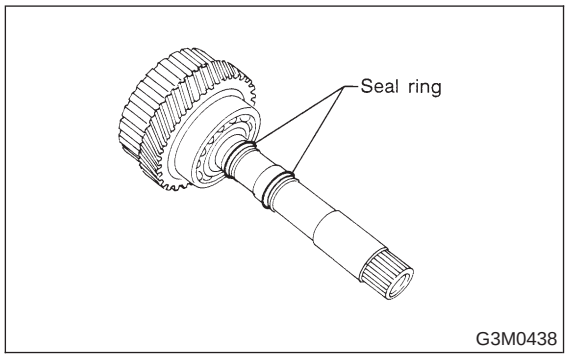
Recommended fluid:
Dexron II or Dexron III type automatic transmission

13. Reduction Drive Gear Assembly

A: DISASSEMBLY

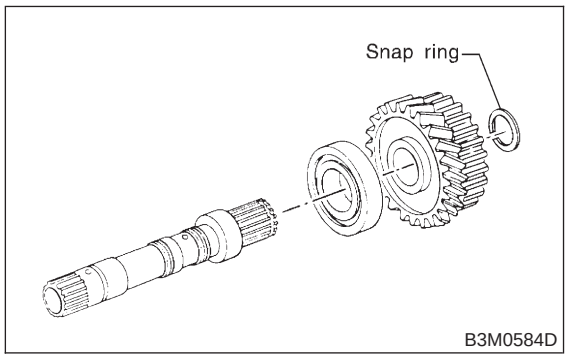
1) Take out the seal rings.

CAUTION:
Be careful not to damage the seal rings.

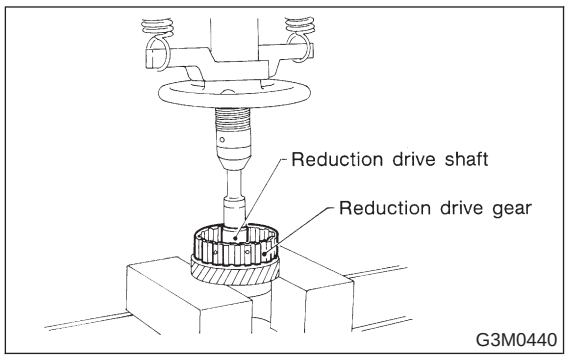


2) Take out the snap ring.

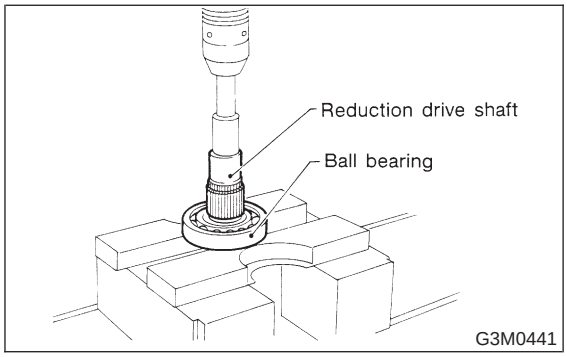
CAUTION:
Be careful not to damage the splines.



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



4) Using a press, remove the ball bearing.

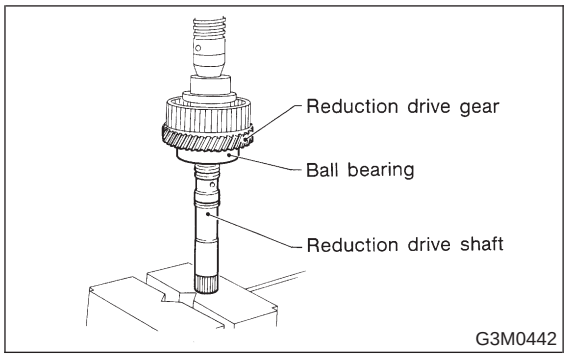


B: INSPECTION

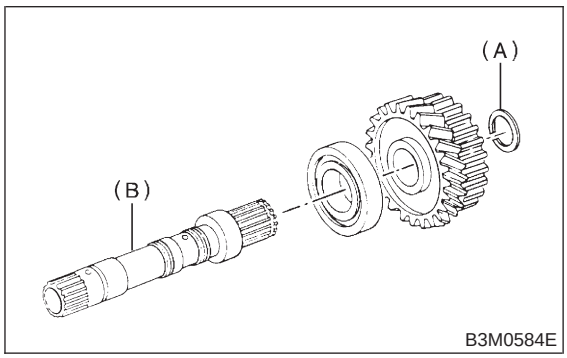
Make sure that each component is free of harmful gouges, cuts, or dust.

C: ASSEMBLY

1) Press-fit the ball bearing and reduction drive gear to the shaft.



2) Fit the snap ring securely in the snap ring groove on the shaft.

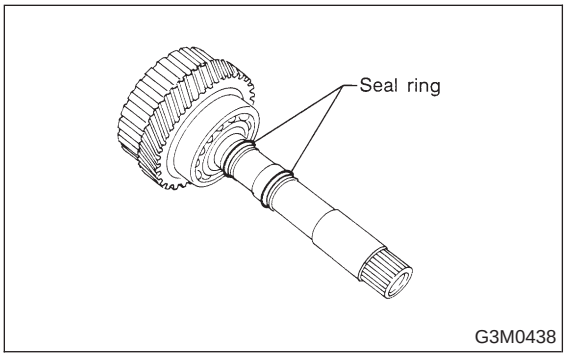


(A) Snap ring
(B) Reduction drive shaft

3) Attach two seal rings.

CAUTION:
Always discard old seal rings, and install new ones.

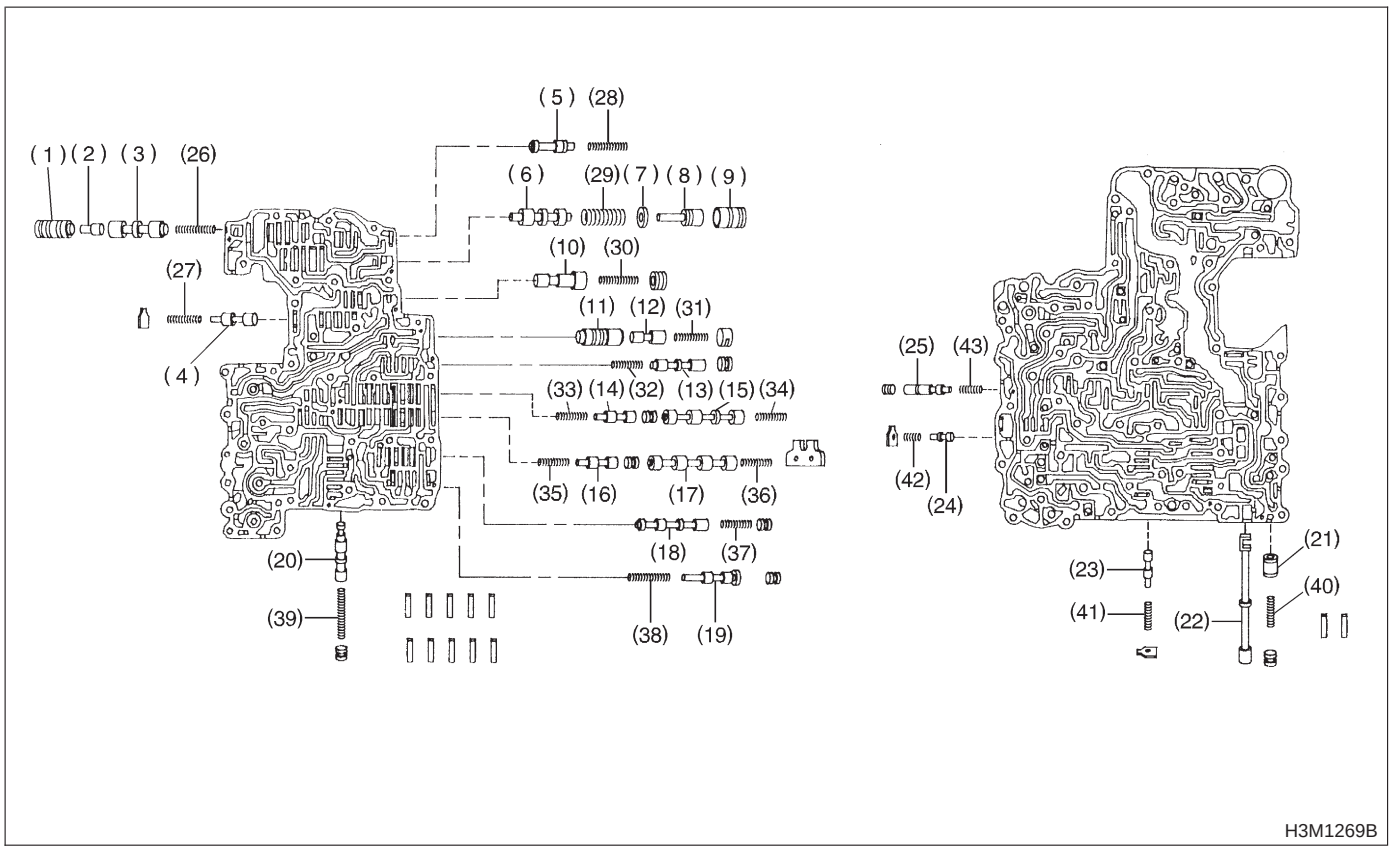
NOTE:
To make subsequent assembly easier, apply vaseline to the grooves of the shaft and to the exterior of the seal ring.



14. 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.

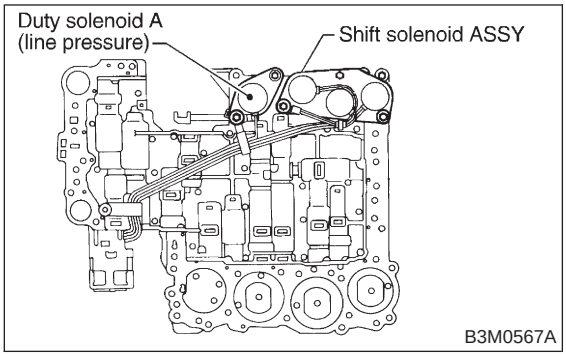


(1) Lock-up control sleeve
(2) Lock-up control plug
(3) Lock-up control valve
(4) Pilot valve
(5) Torque converter regulation valve
(6) Pressure regulator valve
(7) Washer
(8) Pressure regulator plug
(9) Pressure regulator sleeve
(10) Pressure modifier valve
(11) Accumulator control sleeve valve
(12) Accumulator control plug valve
(13) Shuttle duty shift valve
(14) 4-2 sequence valve
(15) Shift valve B
(16) 4-2 relay valve
(17) Shift valve A
(18) Overrunning clutch control valve
(19) Overrunning clutch reducing valve
(20) Shuttle shift valve
(21) Accumulator modifier piston
(22) Manual valve
(23) 1st reducing valve
(24) 3-2 timing valve
(25) Servo charger valve
(26) Lock-up control spring
(27) Pilot spring
(28) Torque converter regulator spring
(29) Pressure regulator spring
(30) Pressure modifier spring
(31) Accumulator control spring
(32) Shuttle shift spring
(33) 4-2 sequence spring
(34) Shift B spring
(35) 4-2 relay spring
(36) Shift A spring
(37) Overrunning clutch control spring
(38) Overrunning clutch reducing spring
(39) Shuttle duty shift spring
(40) Modifier accumulator spring
(41) 1st reducing spring
(42) 3-2 timing spring
(43) Servo charger spring

No.	Part name	Wire dia. mm (in)	Outer dia. mm (in)	Effective turn mm (in)	Free length mm (in)
26	Lock-up control spring	0.75 (0.0295)	13.0 (0.512)	3.5	18.5 (0.728)
27	Pilot spring	1.1 (0.043)	9.1 (0.358)	8.3	25.7 (1.012)
28	Torque converter regulator spring	1.3 (0.051)	9.0 (0.354)	11.7	38.0 (1.496)
29	Pressure regulator spring	1.6 (0.063)	14.0 (0.551)	5.6	31.5 (1.240)
30	Pressure modifier spring	0.8 (0.031)	6.8 (0.268)	10.0	31.95 (1.2579)
31	Accumulator control spring	0.4 (0.016)	6.6 (0.260)	11.0	27.5 (1.083)
32	Shuttle shift spring	0.65 (0.0256)	5.65 (0.2224)	27.6	51.0 (2.008)
33	4-2 sequence spring	0.55 (0.0217)	6.95 (0.2736)	11.0	29.1 (1.146)
34	Shift B spring	0.65 (0.0256)	7.0 (0.276)	9.5	25.0 (0.984)
35	4-2 relay spring	0.55 (0.0217)	6.95 (0.2736)	11.0	29.1 (1.146)
36	Shift A spring	0.5 (0.020)	7.0 (0.276)	9.5	25.0 (0.984)
37	Overrunning clutch control spring	0.7 (0.028)	6.0 (0.236)	12.0	26.5 (1.043)
38	Overrunning clutch reducing spring	1.05 (0.0413)	7.05 (0.2776)	15.21	34.7 (1.366)
39	Shuttle duty shift spring	0.75 (0.0295)	5.65 (0.2224)	27.6	51.0 (2.008)
40	Modifier accumulator spring	1.3 (0.051)	9.8 (0.386)	8.8	30.5 (1.201)
41	1st reducing spring	0.75 (0.0295)	6.75 (0.2657)	12.5	25.4 (1.000)
42	3-2 timing spring	0.75 (0.0295)	6.75 (0.2657)	7.5	20.55 (0.8091)
43	Servo charger spring	0.7 (0.028)	6.7 (0.264)	9.0	23.0 (0.906)

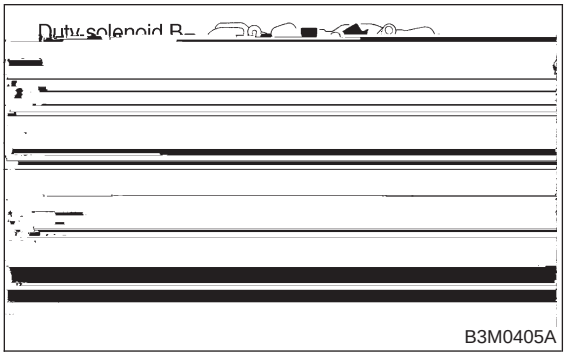
B: DISASSEMBLY

1) Remove the shift solenoid assembly and duty solenoid A from the upper valve body.

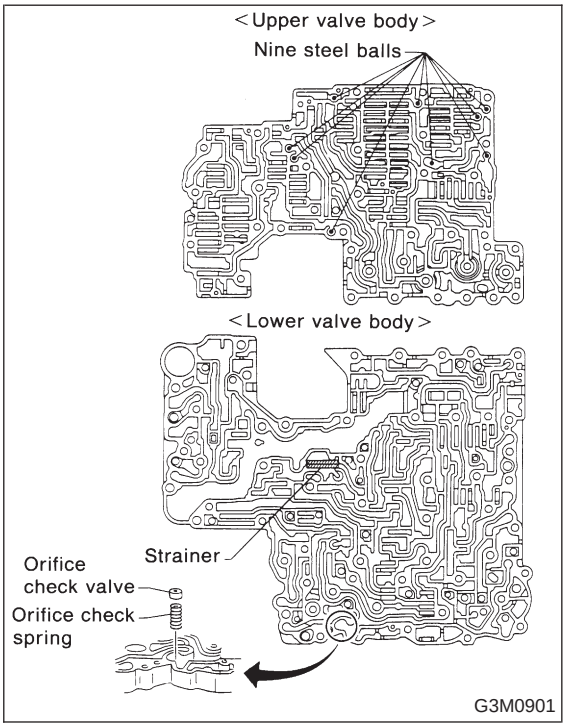


2) Remove the duty solenoid B and bracket from the lower valve body.
3) Separate the upper valve body and lower valve body.

NOTE:
Remove the upper-lower valve body tightening bolts. Then remove two locating bolts. (⬅)



CAUTION:
● Do not lose the nine (9) steel balls contained in the upper valve body.
● Do not lose an orifice and a strainer contained in the lower valve body.



NOTE:
During ordinary servicing, clean the control valve bodies in this condition, without further disassembly.

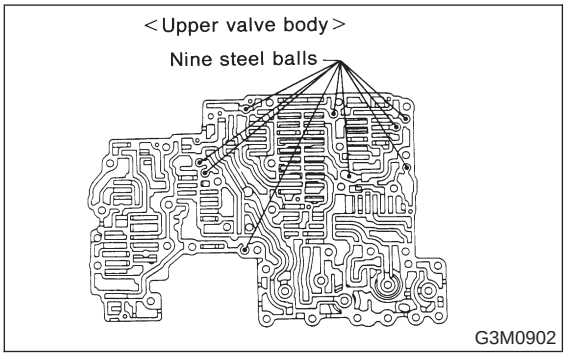
In the event of a seized clutch or other problem, disassemble the control valve bodies further, and clean the component parts.

C: INSPECTION

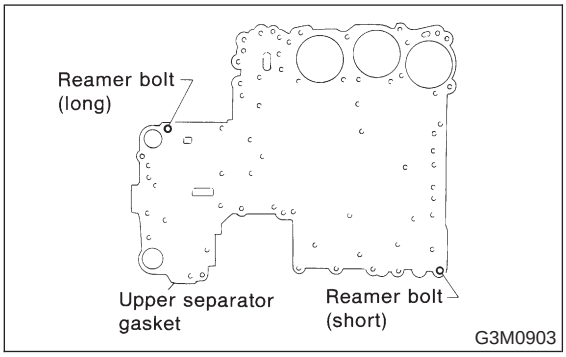
Make sure that each component is free of harmful gouges, cuts, or dust.

D: ASSEMBLY

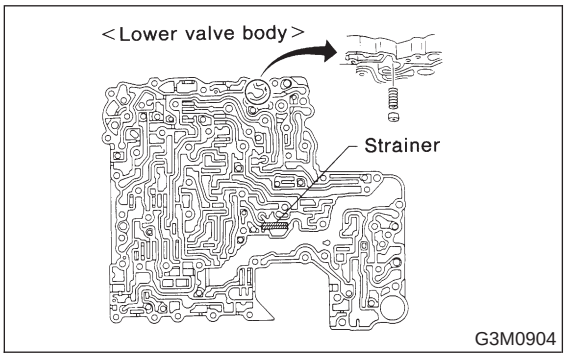
1) Install the nine steel balls to the upper valve body.



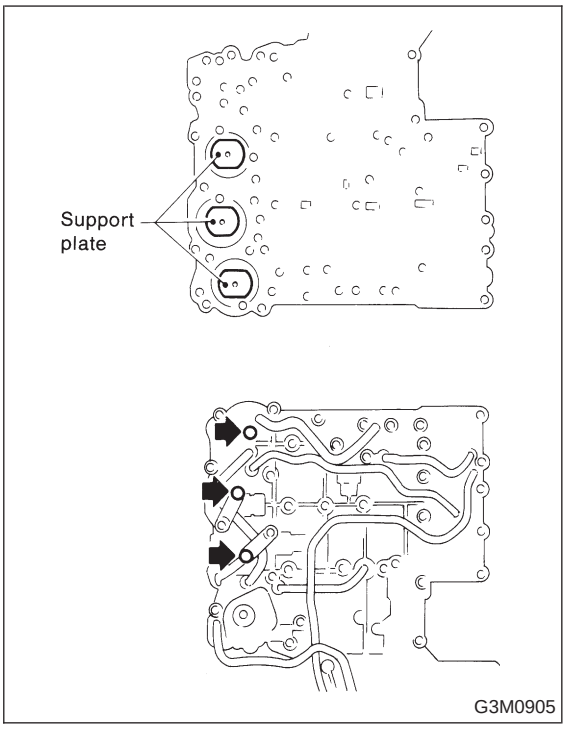
2) From under upper valve body, install two bolts using washers and position upper separator gasket.



3) Install the orifice check valve, orifice check spring and filter to the lower valve body.

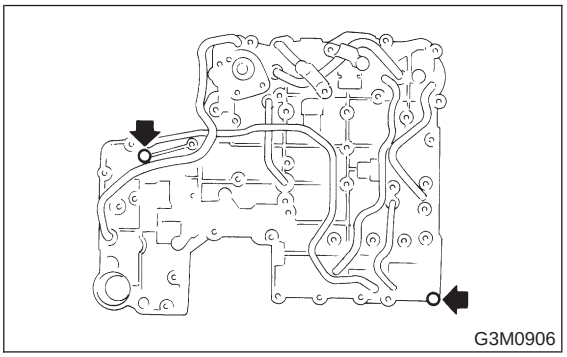


4) Install lower separate gasket and separate plate on lower body in that order, then temporarily tighten three support plates and two brackets.



5) Temporarily assemble lower valve body to upper valve body.

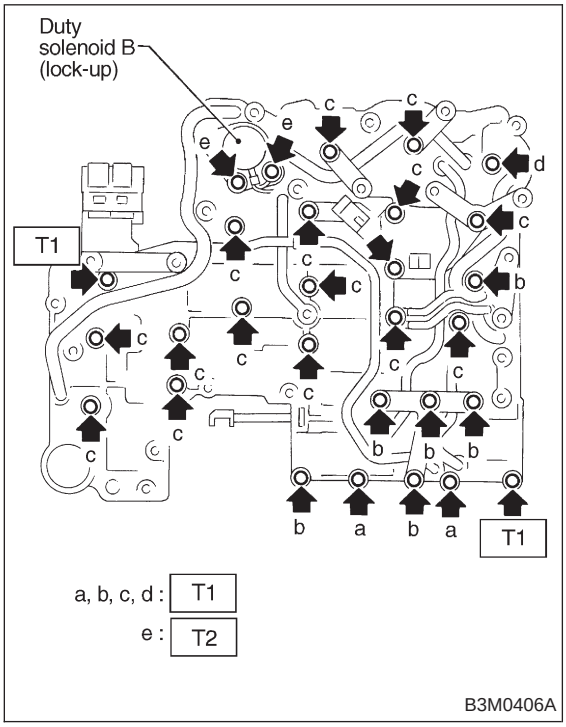
CAUTION:
Be careful not to drop the upper body interior steel ball, or the lower body interior filter, orifice check spring, or orifice check valve.



6) Install the duty solenoid B and the four brackets.
7) Tighten twenty seven bolts & washers and two reamer bolts.

Tightening torque:
T1: 8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)
T2: 11.3±1.5 N·m (1.15±0.15 kg-m, 8.3±1.1 ft-lb)

	a	b	c	d	e
Length mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)	28 (1.10)
Numbers	2	6	16	1	2

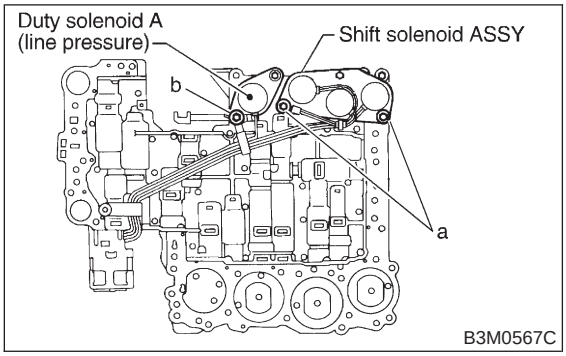


8) Install the shift solenoid assembly and duty solenoid A.

a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

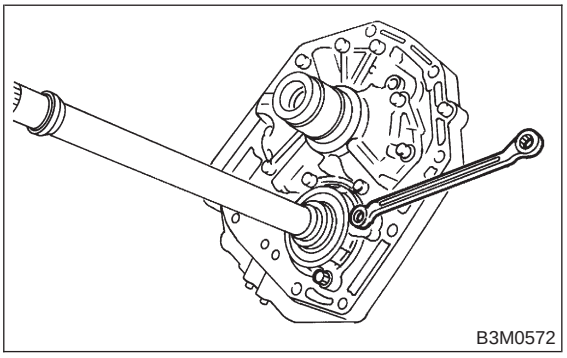
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



15. Oil Pump Assembly

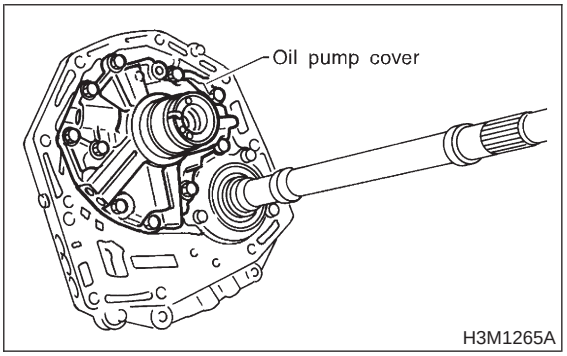
A: DISASSEMBLY

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

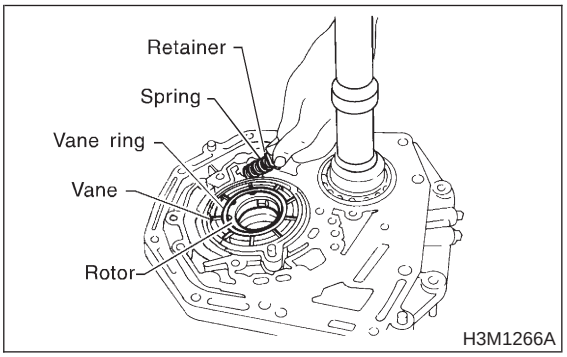


2) Remove the oil pump cover.

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



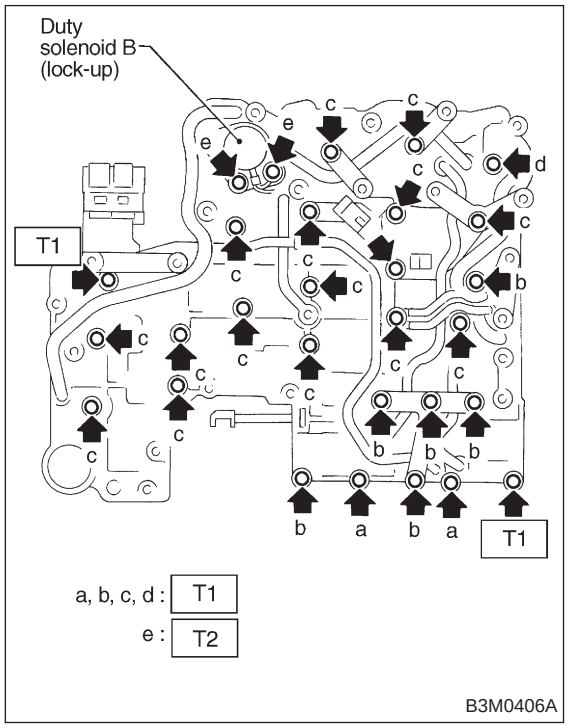
3) Remove the retainer and return spring. Then remove the rotor, two vane rings and nine vanes.



6) Install the duty solenoid B and the four brackets.
7) Tighten twenty seven bolts & washers and two reamer bolts.

Tightening torque:
T1: 8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)
T2: 11.3±1.5 N·m (1.15±0.15 kg-m, 8.3±1.1 ft-lb)

	a	b	c	d	e
Length mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)	28 (1.10)
Numbers	2	6	16	1	2

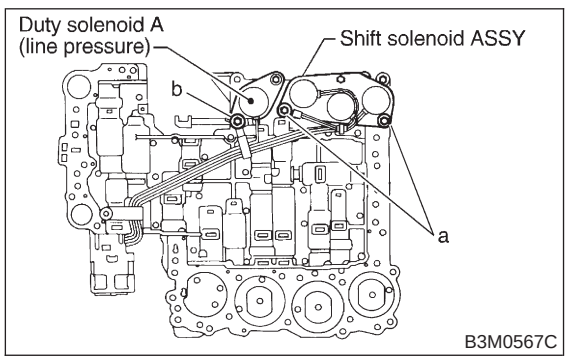


8) Install the shift solenoid assembly and duty solenoid A.

a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

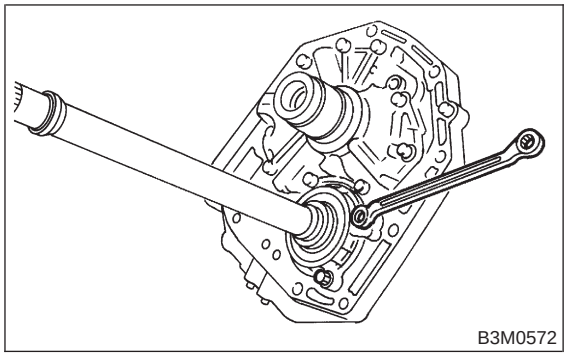
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



15. Oil Pump Assembly

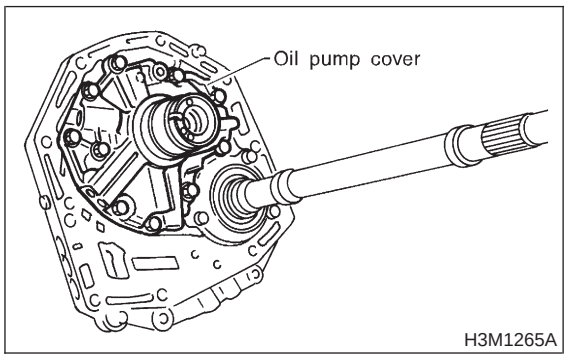
A: DISASSEMBLY

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

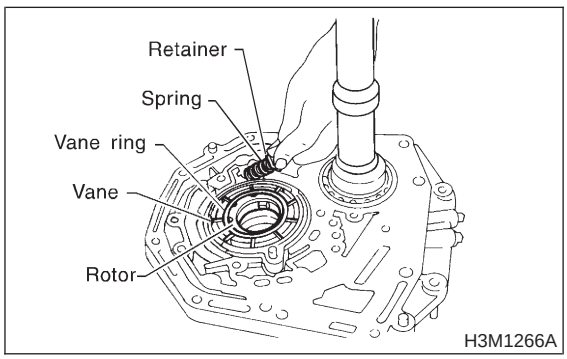


2) Remove the oil pump cover.

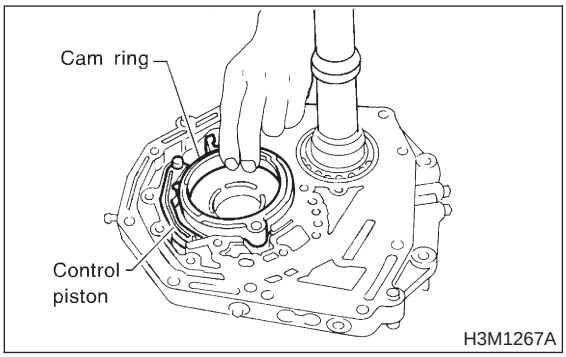
NOTE:
Lightly tap the end of the stator shaft to remove the cover.



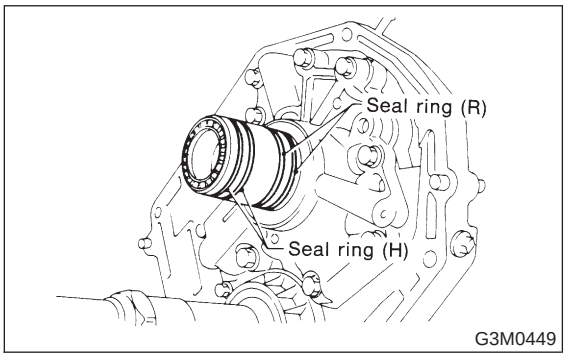
3) Remove the retainer and return spring. Then remove the rotor, two vane rings and nine vanes.



4) Remove the cam ring and control piston.
Also remove the O-ring, friction ring, two side seals, and plain seal.



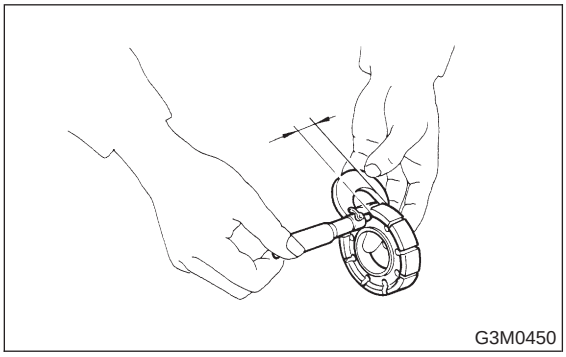
5) Remove two seal rings (R) and two seal rings (H).



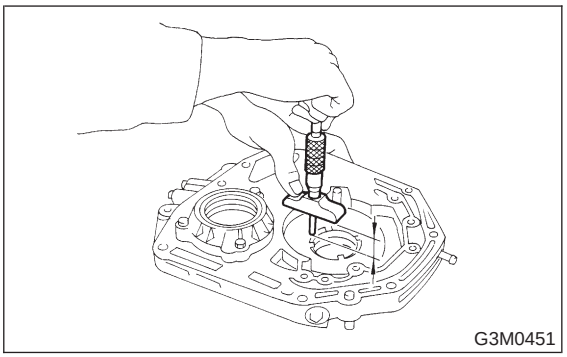
B: INSPECTION

1) Make sure that each component is free of harmful gouges, cuts, and dust.
2) Selection of oil pump components (rotor, vanes, control piston and cam ring)
(1) Using a micrometer, measure the height of the rotor, vanes, control piston and cam ring in at least four positions. (Measure the height at one place for each of the nine vanes.)

NOTE:
● Remove the control piston seals when measuring.
● Remove the friction ring from the cam ring when measuring.



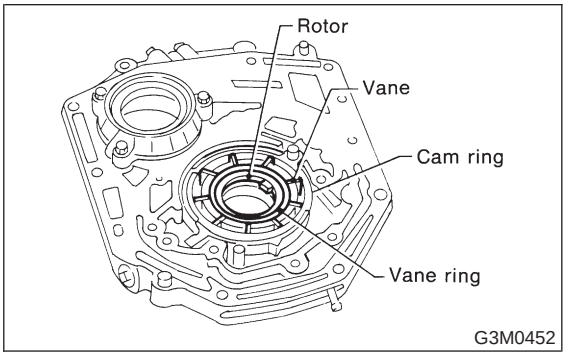
(2) Using a depth gauge, measure the depth of the oil pump housing contact and friction surfaces.



(3) Make sure that the clearances are within the specified wear limits. If the wear limit is exceeded, select pump components so that the standard clearance can be obtained.

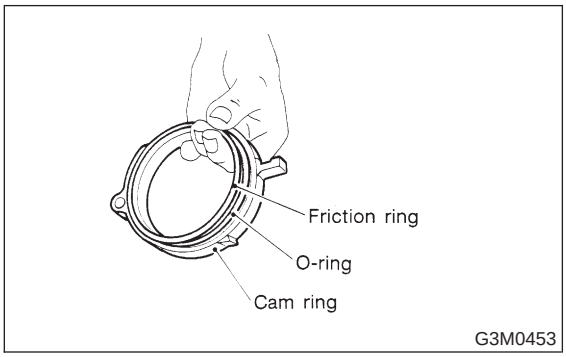
NOTE:
Select vanes which are the same height as the rotor.

Part name	Wear limit mm (in)	Standard value mm (in)
Rotor, control piston, vanes	0.054 (0.0021)	0.030 — 0.044 (0.0012 — 0.0017)
Cam ring	0.034 (0.0013)	0.010 — 0.024 (0.0004 — 0.0009)

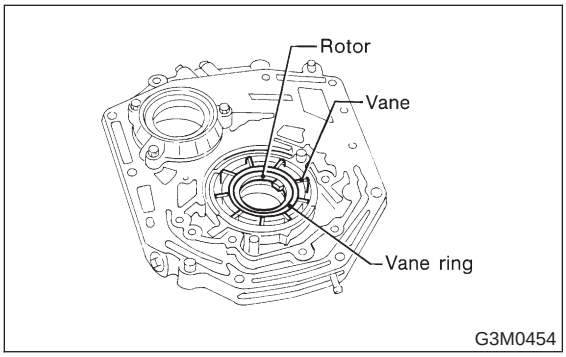


C: ASSEMBLY

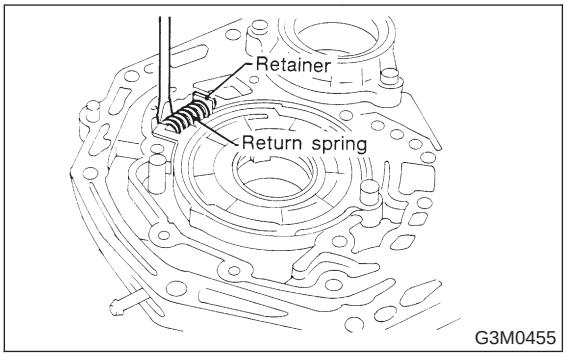
1) Coat both the O-ring and friction ring with vaseline and attach to the cam ring. Then fit them into the oil pump housing.



2) Install the vane ring, rotor and vanes into the housing in this sequence.

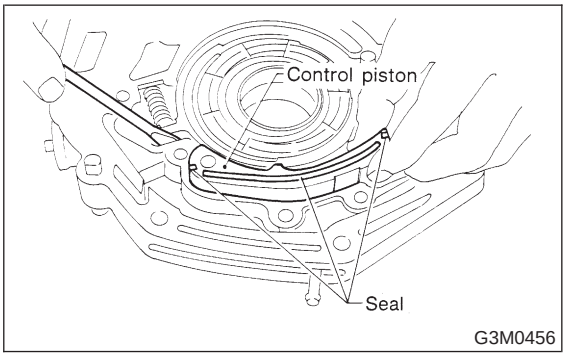


3) Install the return spring and retainer between the housing and cam ring.



4) Install the control piston to the oil pump housing.

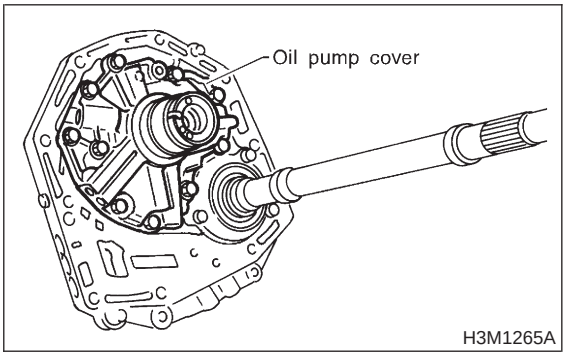
NOTE:
Fit the seal in the piston groove, with the red seals facing the top side. (Two side seals and one plain seal are attached.)



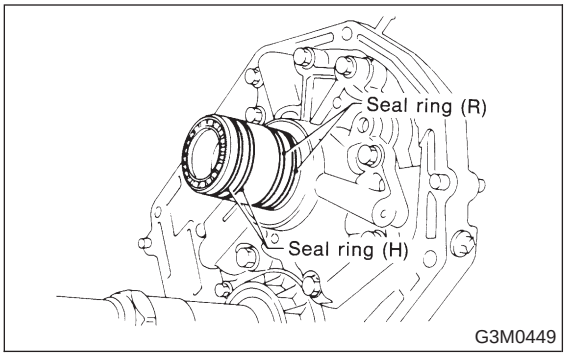
5) Set the rotor at the center of the housing bore. Apply ATF abundantly to each rotary portion.
6) Install the oil pump cover.

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.

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



NOTE:
● Install the oil seal retainer and seal rings (R) and (H) after adjusting the drive pinion backlash and tooth contact.



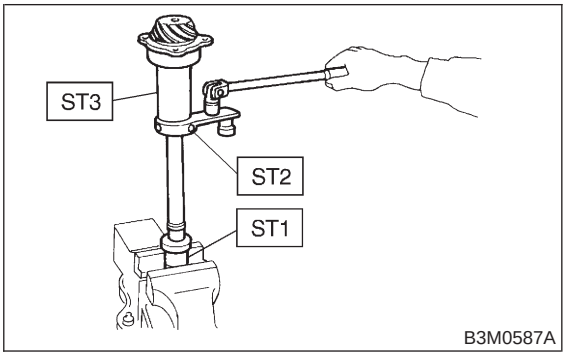
16. Drive Pinion Shaft

A: DISASSEMBLY

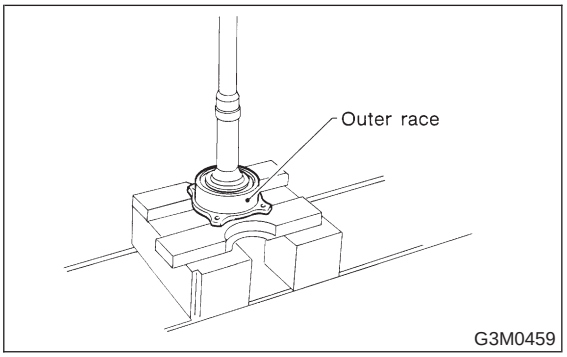
1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1, ST2 and ST3. Then pull off the drive pinion collar.

NOTE:
Remove the O-ring.

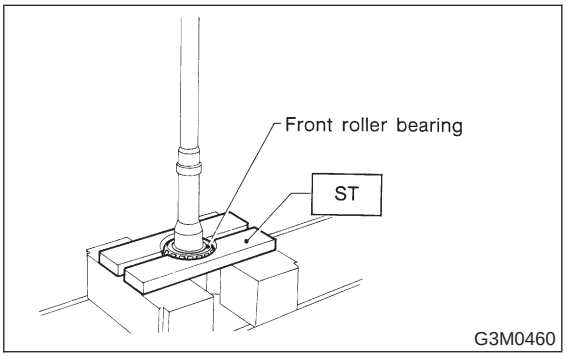
ST1 498937100 HOLDER
ST2 499787100 WRENCH
ST3 499757800 ADAPTER WRENCH



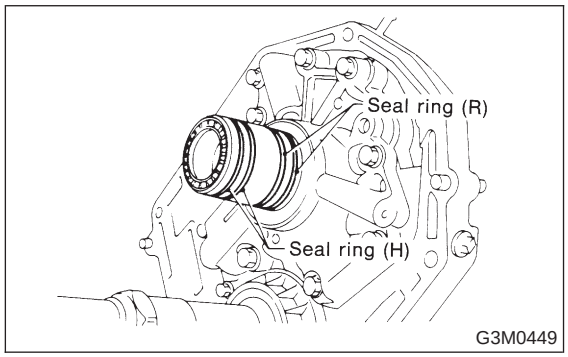
2) Using a press, separate the rear roller bearing and outer race from the shaft.



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



NOTE:
● Install the oil seal retainer and seal rings (R) and (H) after adjusting the drive pinion backlash and tooth contact.



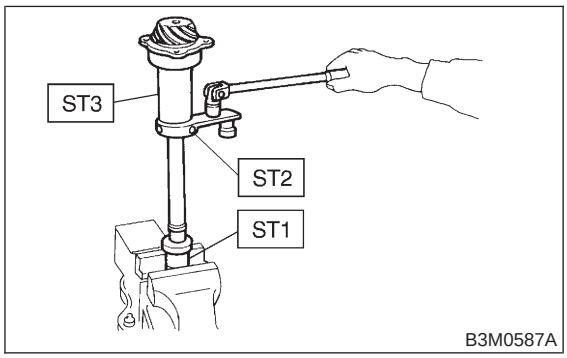
16. Drive Pinion Shaft

A: DISASSEMBLY

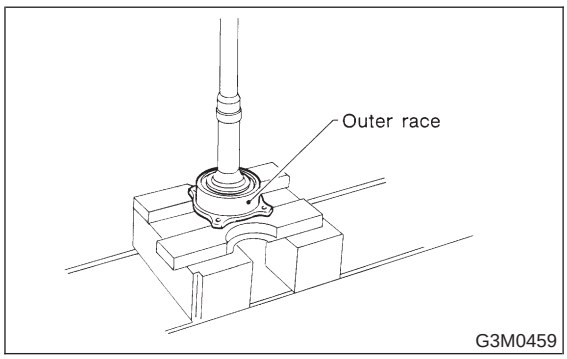
1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1, ST2 and ST3. Then pull off the drive pinion collar.

NOTE:
Remove the O-ring.

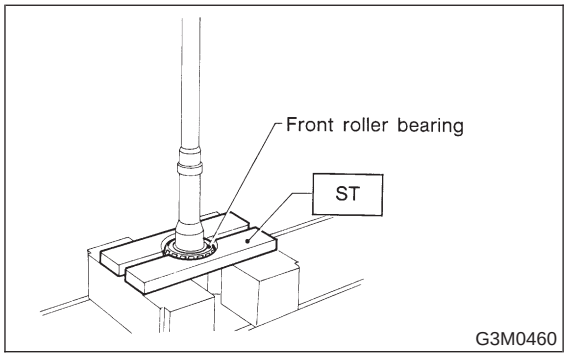
ST1 498937100 HOLDER
ST2 499787100 WRENCH
ST3 499757800 ADAPTER WRENCH



2) Using a press, separate the rear roller bearing and outer race from the shaft.



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

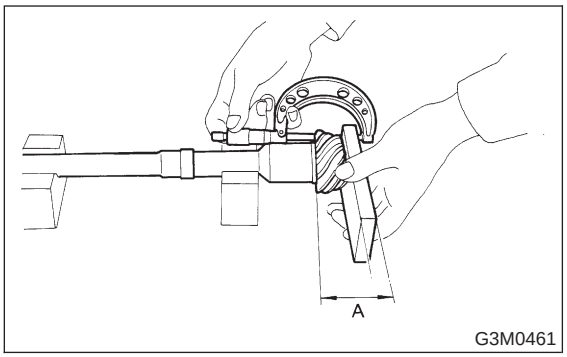


B: INSPECTION

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

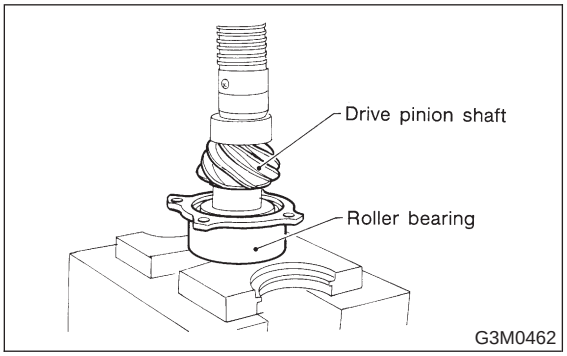
C: ASSEMBLY

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



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.

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

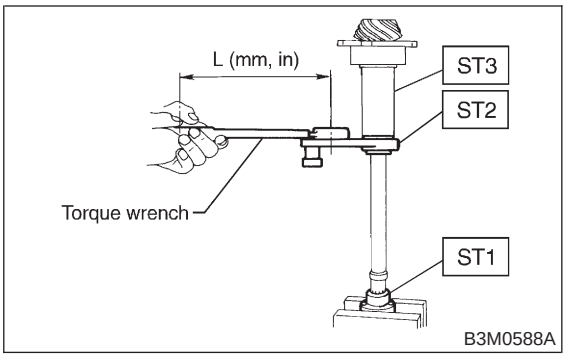
$T_1 = 72.2/L + 72.2 \times T$

T: Actual tightening torque

- Install ST2 to torque wrench as straight as possible.

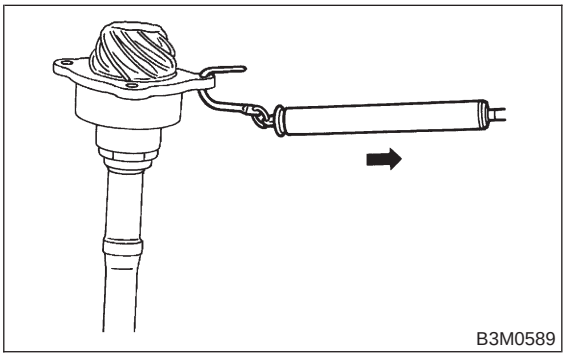
ST1	498937100	HOLDER
ST2	499787100	WRENCH
ST3	499787500	ADAPTER WRENCH

Actual tightening torque:
113±5 N·m (11.5±0.5 kg-m, 83.2±3.6 ft-lb)



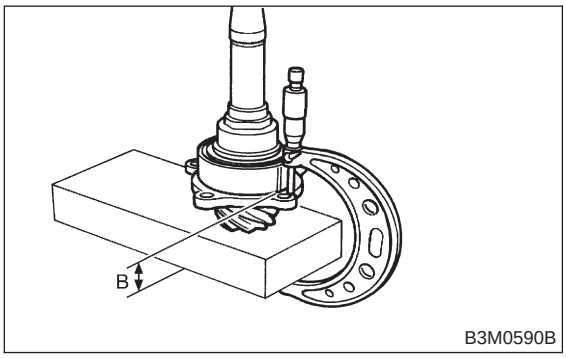
5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

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.



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

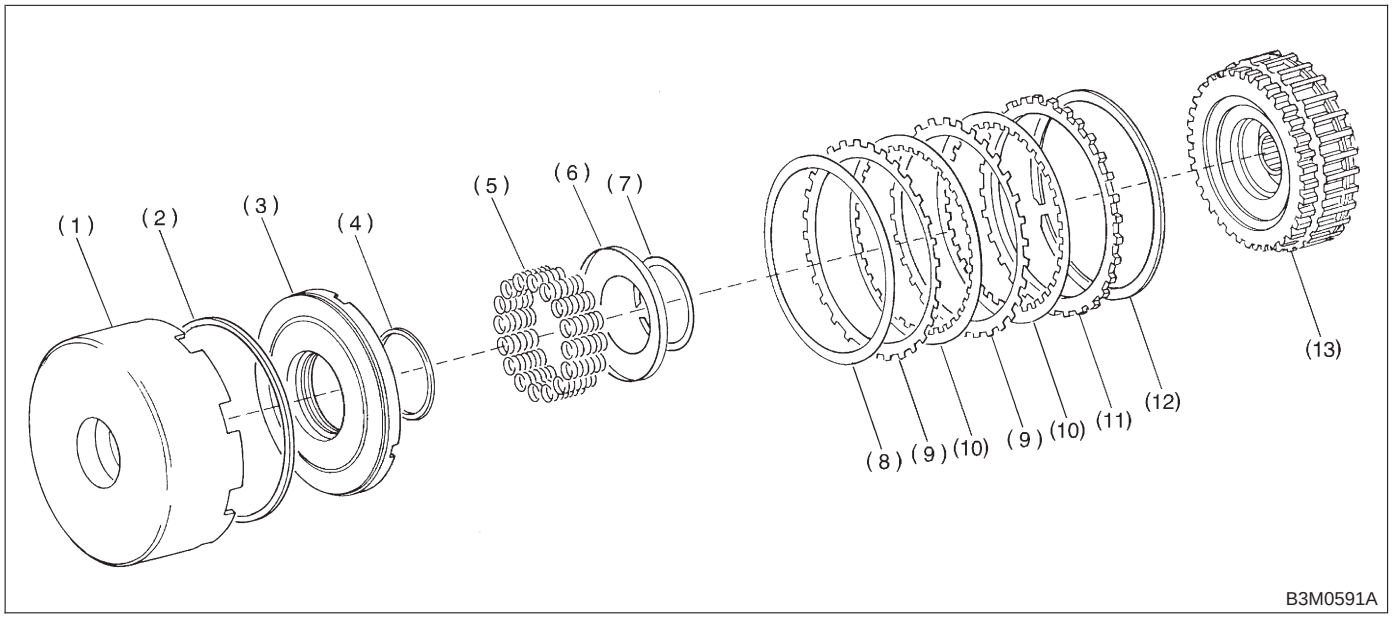
t = 6.5±0.0625 − (B − A)

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

Drive pinion shim	
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)

17. Reverse Clutch

A: DISASSEMBLY



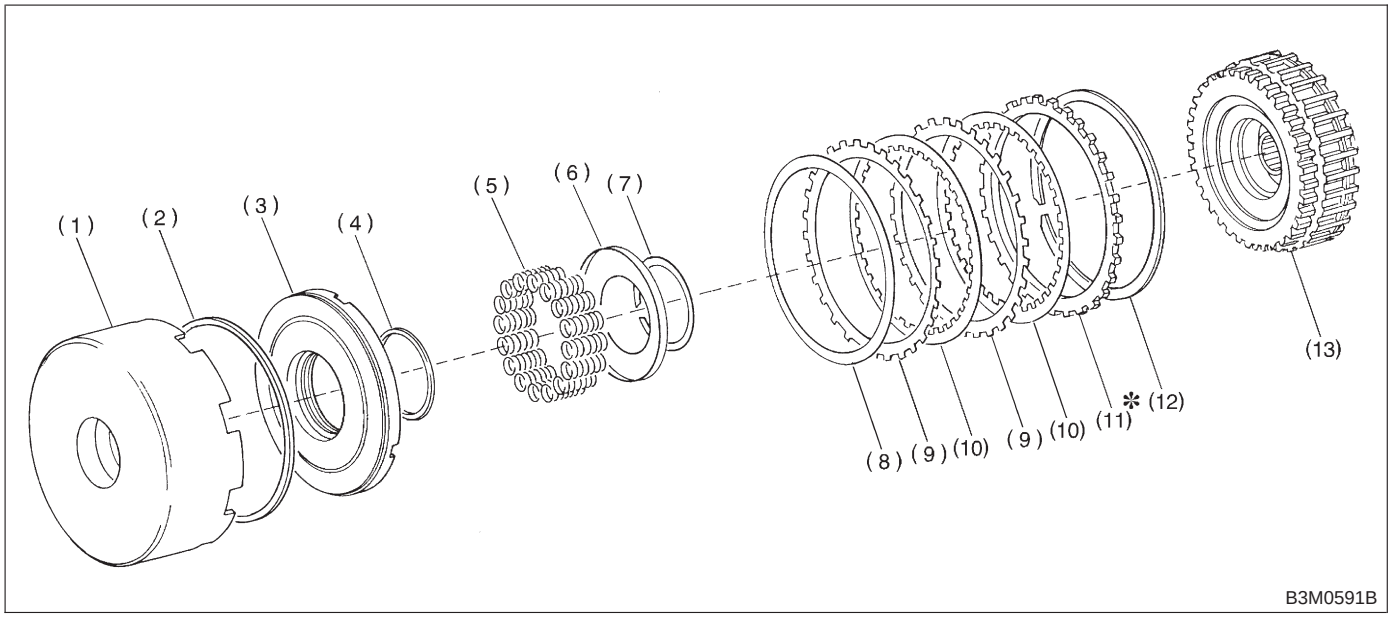
(1) Reverse clutch drum
(2) Lip seal
(3) Reverse clutch piston
(4) Lathe cut seal ring
(5) Spring
(6) Spring retainer
(7) Snap ring
(8) Dish plate
(9) Driven plate
(10) Drive plate
(11) Retaining plate
(12) Snap ring
(13) High clutch drum

1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates, and dish plate.
2) Using the ST1, ST2 and ST3, remove the snap ring and take out the spring retainer and springs.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
3) Take out the piston by applying compressed air.

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) Reverse clutch piston
(4) Lathe cut seal ring
(5) Spring
(6) Spring retainer
(7) Snap ring
(8) Dish plate
(9) Driven plate
(10) Drive plate
(11) Retaining plate
(12) Snap ring
(13) High clutch drum

1) Using the ST1, ST2 and ST3 as those used in disassembling, assemble piston the springs, spring retainer and snap ring.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
2) Assemble the dish plate, driven plates, drive plates and retaining plate in that order and attach the snap ring.

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

3) Checking operation:
Apply compressed air intermittently to the oil hole, and check the reverse clutch for smooth operation.
4) Measuring clearance (Retaining plate selection)

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

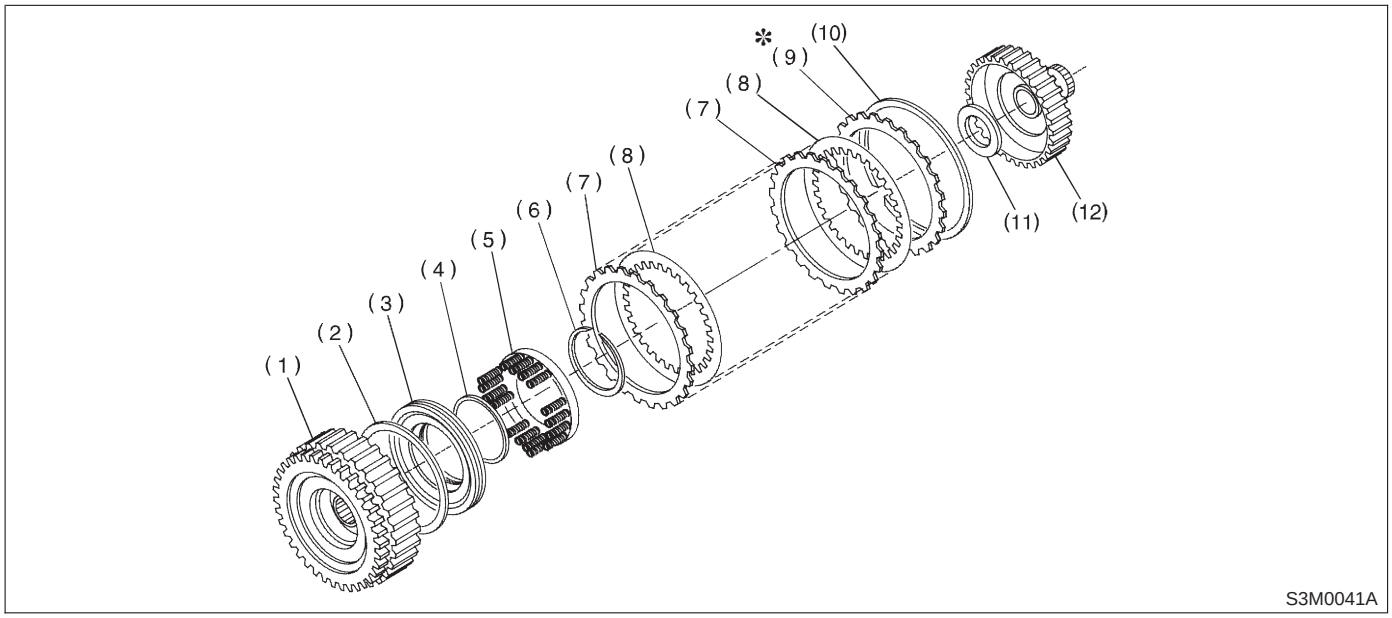
Standard value:
0.5 — 0.8 mm (0.020 — 0.031 in)

Allowable limit:
1.2 mm (0.047 in)

Retaining plates	
Part No.	Thickness mm (in)
31567AA350	4.6 (0.181)
31567AA360	4.8 (0.189)
31567AA370	5.0 (0.197)
31567AA380	5.2 (0.205)
31567AA390	5.4 (0.213)
31567AA400	5.6 (0.220)

18. High Clutch

A: DISASSEMBLY



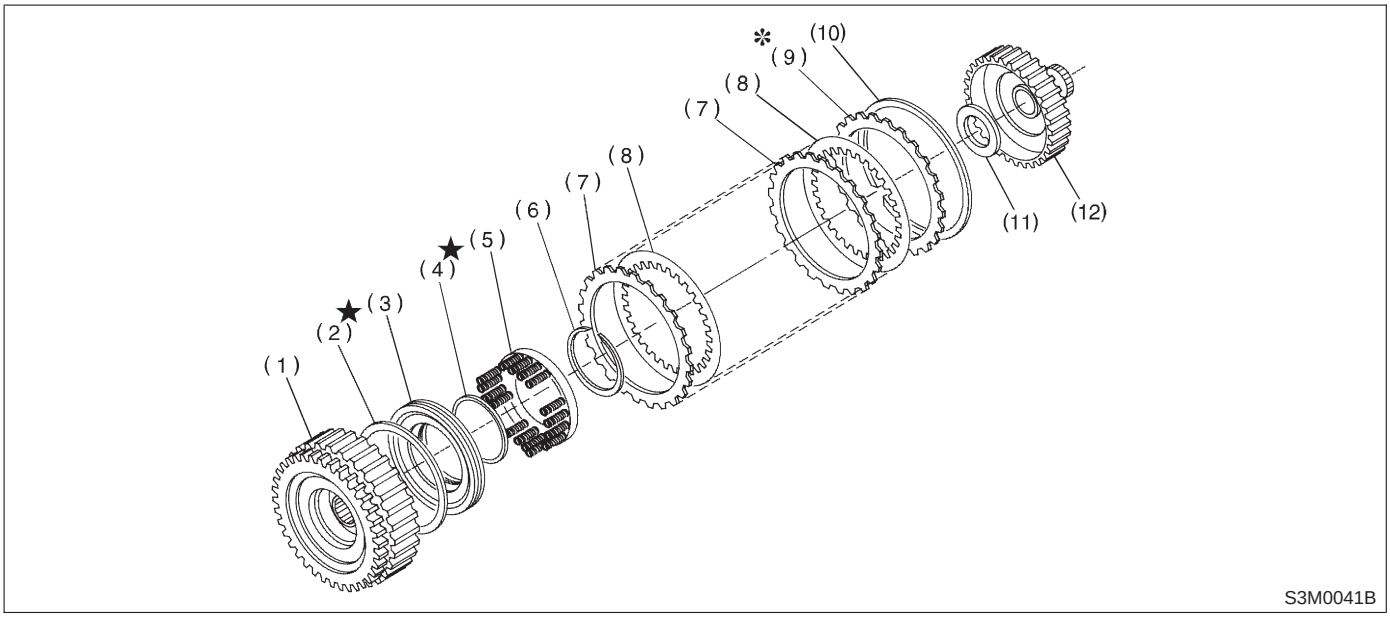
(1) High clutch drum
(2) Lathe cut seal ring
(3) High clutch piston
(4) Lathe cut seal ring
(5) Spring retainer
(6) Snap ring
(7) Driven plate
(8) Drive plate
(9) Retaining plate
(10) Snap ring
(11) Thrust needle bearing
(12) High clutch hub

1) Remove the snap ring, and take out the retaining plate, drive plates, and driven plates.
2) Using the ST1, ST2 and ST3, remove the snap ring and take out the spring retainer.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
3) Apply compressed air to the clutch drum to remove the piston.

B: INSPECTION

1) Drive plate facing for wear and damage
2) Snap ring for wear, return spring for setting and breakage, and spring retainer for deformation
3) Lathe cut seal rings (large) (small) for damage
4) Piston check ball for smooth operation

C: ASSEMBLY



(1) High clutch drum
(2) Lathe cut seal ring
(3) High clutch piston
(4) Lathe cut seal ring
(5) Spring retainer
(6) Snap ring
(7) Driven plate
(8) Drive plate
(9) Retaining plate
(10) Snap ring
(11) Thrust needle bearing
(12) High clutch hub

1) Using the ST1, ST2 and ST3 as those used in disassembling, assemble the piston, spring retainer, and snap ring.
ST1 398673600 COMPRESSOR
ST2 398177700 INSTALLER
ST3 399893600 PLIERS
2) Install the driven plates, drive plates and retaining plate in that order. Then attach the snap ring.
3) Checking operation:
Apply compressed air intermittently to the oil hole, and check the high clutch for smooth operation.
4) Measuring clearance (Retaining plate selection)

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

Standard value:
1.8 — 2.2 mm (0.071 — 0.087 in)

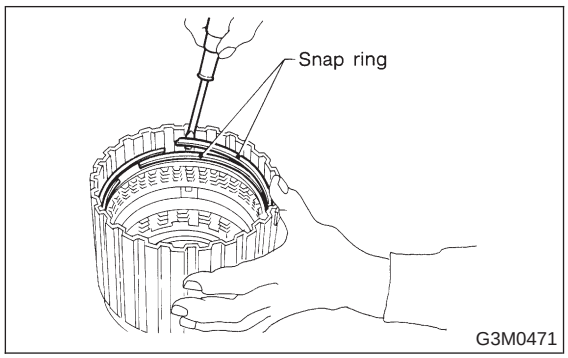
Allowable limit:
2.6 mm (0.102 in)

Retaining plates	
Part No.	Thickness mm (in)
31567AA190	3.6 (0.142)
31567AA200	3.8 (0.150)
31567AA210	4.0 (0.157)
31567AA220	4.2 (0.165)
31567AA230	4.4 (0.173)
31567AA240	4.6 (0.181)
31567AA250	4.8 (0.189)
31567AA260	5.0 (0.197)

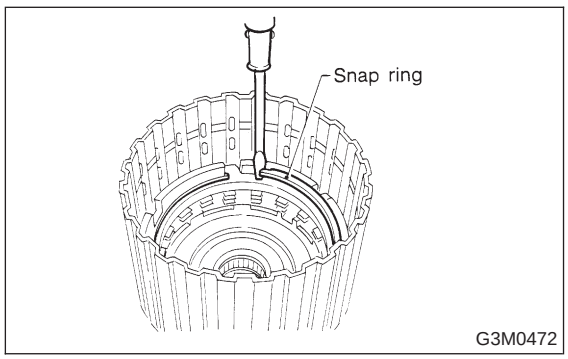
19. Forward Clutch Drum

A: DISASSEMBLY

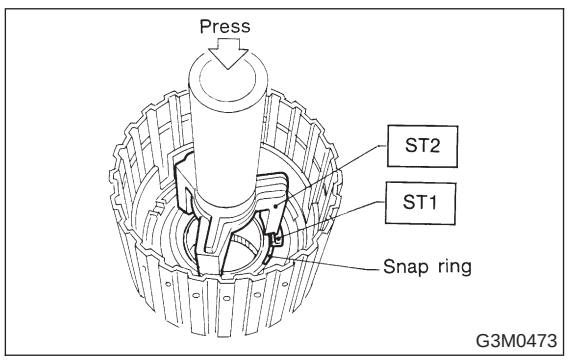
1) Remove two snap rings from the forward clutch drum.



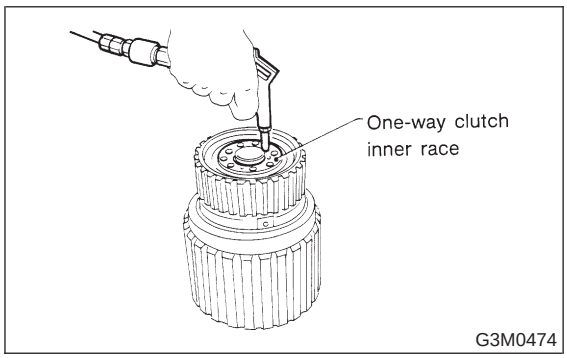
2) Remove the retaining plate, drive plates, driven plates and dish plate. (Forward clutch)
3) Remove the snap ring from the forward clutch drum.



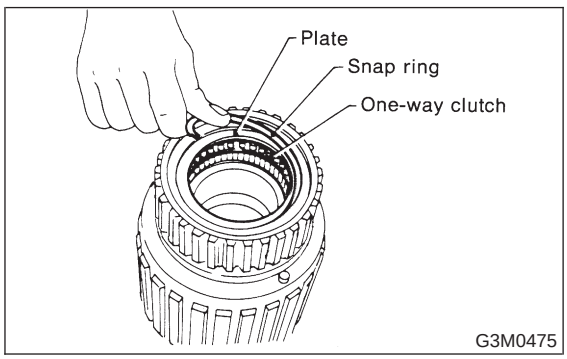
4) Remove the retaining plate, drive plates, driven plates and dish plate. (Overrunning clutch)
5) Compress the spring retainer, and remove the snap ring from the forward clutch, by using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



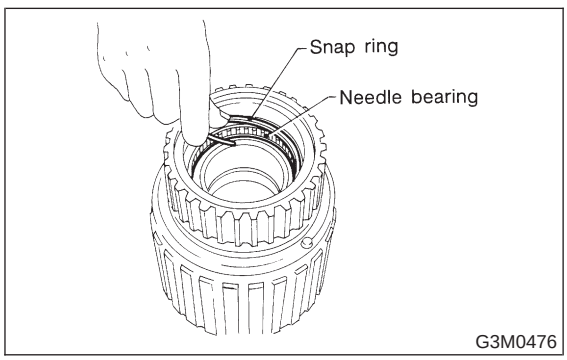
6) Install the one-way clutch inner race to the forward clutch drum, and apply compressed air to remove the overrunning piston and forward piston.



7) Remove the one-way clutch after taking out the snap ring.



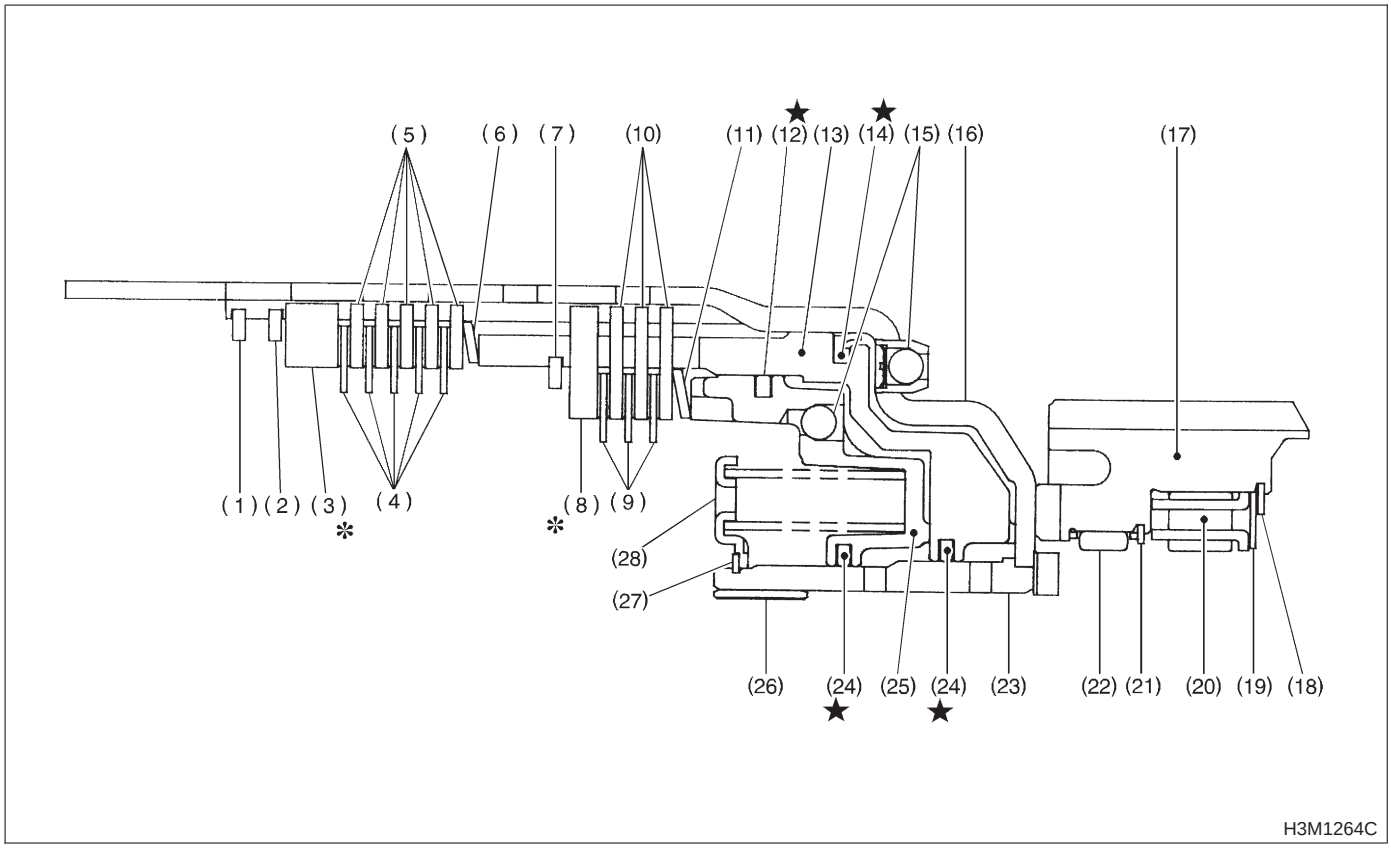
8) Remove the needle bearing after taking out the snap ring.



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

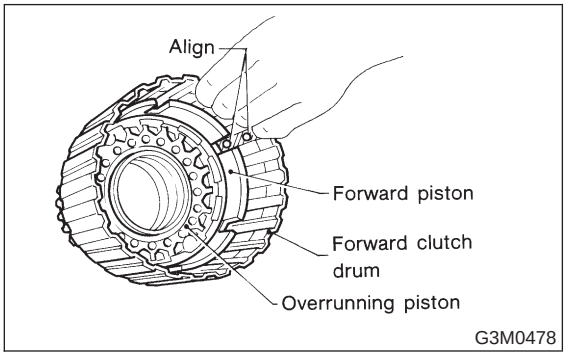
C: ASSEMBLY



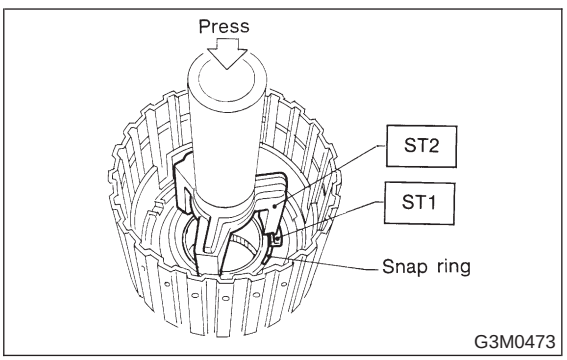
(1) Snap ring
(2) Snap ring
(3) Retaining plate
(4) Driven plate (Thinner)
(5) Driven plate (Thicker)
(6) Dish plate
(7) Snap ring
(8) Retaining plate
(9) Drive plate
(10) Driven plate
(11) Dish plate
(12) Lathe cut seal ring
(13) Forward clutch piston
(14) Lathe cut seal ring
(15) Drift ball
(16) Forward clutch drum
(17) Outer race
(18) Snap ring
(19) Plate
(20) O.W.C. (1-2)
(21) Snap ring
(22) Needle bearing
(23) Sleeve
(24) Lathe cut seal ring
(25) Overrunning clutch piston
(26) Bushing
(27) Snap ring
(28) Retainer

1) Fit the forward piston and overrunning piston to the forward clutch drum.

NOTE:
Align the forward piston cut-out portion with the spline of the drum.

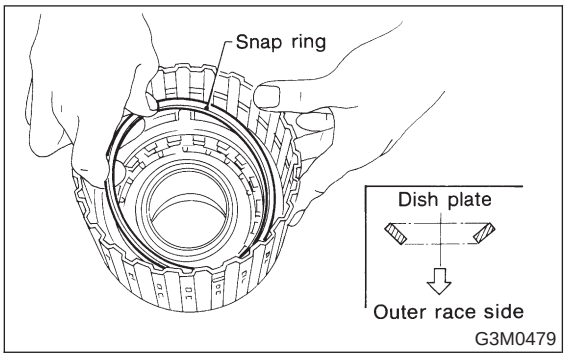


2) Set the retainer on the piston with a press using ST1 and ST2, and attach the snap ring.
ST1 498627000 SEAT
ST2 398673600 COMPRESSOR



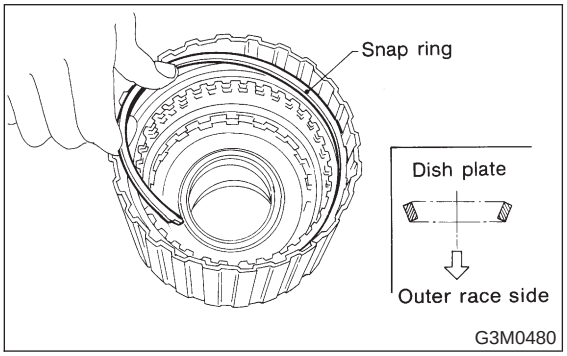
3) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Overrunning clutch)

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

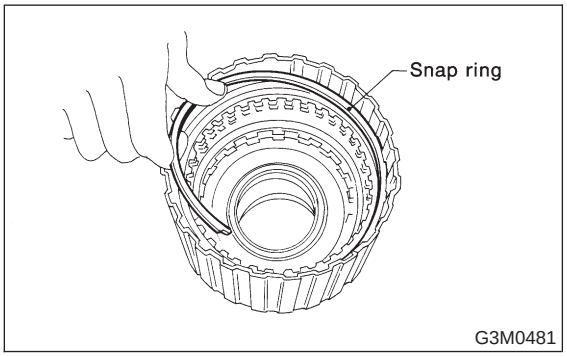


4) Install the dish plates, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Forward clutch)

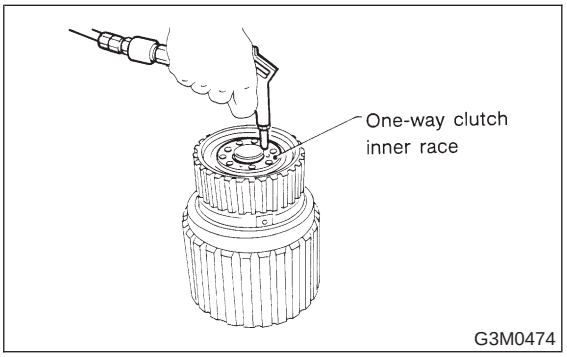
NOTE:
Pay attention to the orientation of the dish plate.



5) Install the snap ring (for front planetary carrier).



6) Check the forward clutch and overrunning clutch for operation.
Set the one-way clutch inner race, and apply compressed air for checking.

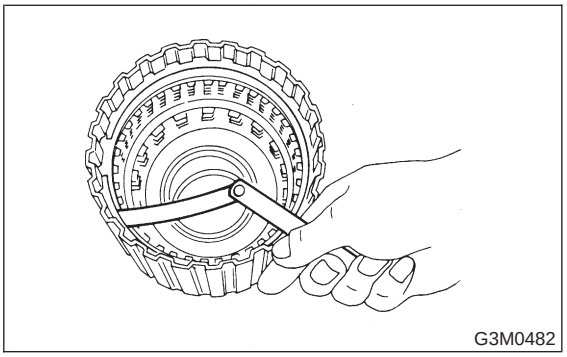


7) Checking forward clutch clearance:

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:
0.45 — 0.85 mm (0.0177 — 0.0335 in)

Allowable limit:
1.6 mm (0.063 in)



Retaining plates	
Part No.	Thickness mm (in)
31567AA270	4.0 (0.157)
31567AA280	4.2 (0.165)
31567AA290	4.4 (0.173)
31567AA300	4.6 (0.181)
31567AA310	4.8 (0.189)
31567AA320	5.0 (0.197)
31567AA330	5.2 (0.205)

8) Checking overrunning clutch clearance:

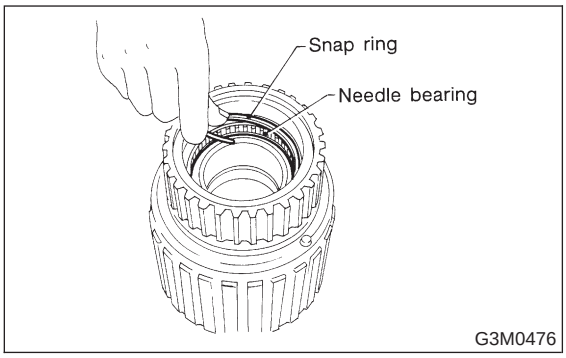
NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting. If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Standard value:
1.0 — 1.4 mm (0.039 — 0.055 in)

Allowable limit:
2.0 mm (0.079 in)

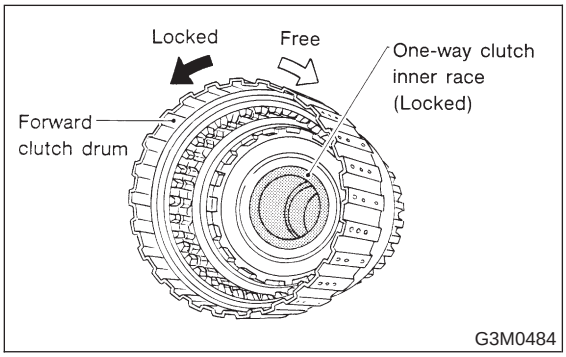
Retaining plates	
Part No.	Thickness mm (in)
31567AA120	8.0 (0.315)
31567AA130	8.2 (0.323)
31567AA140	8.4 (0.331)
31567AA150	8.6 (0.339)
31567AA160	8.8 (0.346)
31567AA170	9.0 (0.354)
31567AA180	9.2 (0.362)

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



10) Install the one-way clutch (1-2) and plate, and secure with the snap ring.

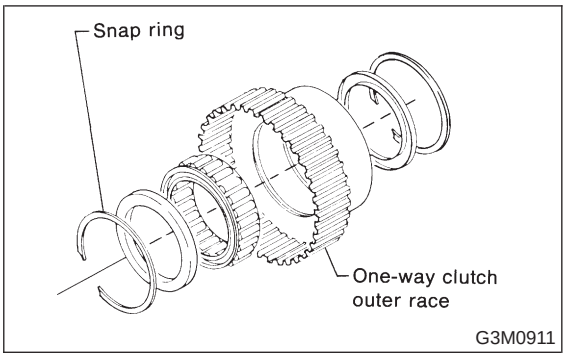
NOTE:
Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



20. One-way Clutch Outer Race

A: DISASSEMBLY

Remove the snap ring. Then remove the one-way clutch (3-4).



B: INSPECTION

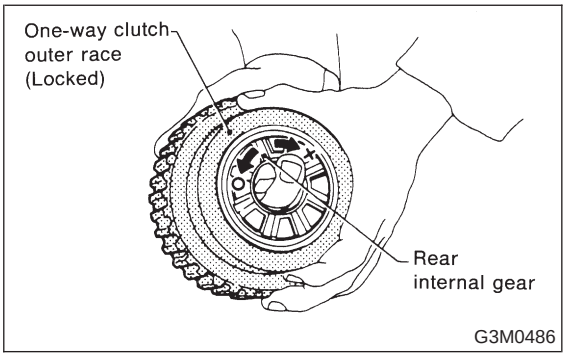
Check the sliding surface and one-way clutch (3-4) for any harmful cuts, damage, or other faults.

C: ASSEMBLY

1) Assemble the one-way clutch (3-4), and secure with the snap ring.

NOTE:
Pay attention to the orientation of the one-way clutch (3-4).

2) Assemble the rear internal gear, and secure the outer race. Make sure that the internal gear is locked in the clockwise direction, and free to rotate in the counterclockwise direction.



8) Checking overrunning clutch clearance:

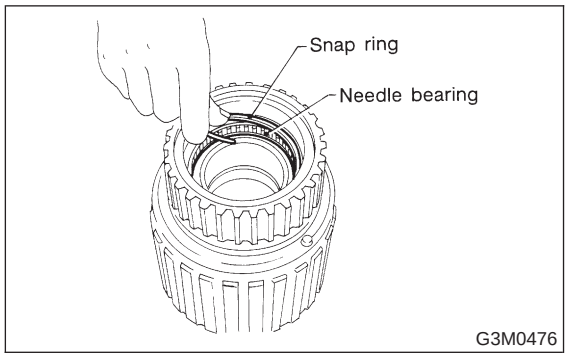
NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting. If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Standard value:
1.0 — 1.4 mm (0.039 — 0.055 in)

Allowable limit:
2.0 mm (0.079 in)

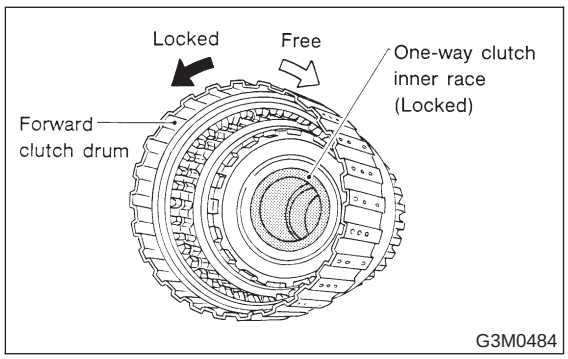
Retaining plates	
Part No.	Thickness mm (in)
31567AA120	8.0 (0.315)
31567AA130	8.2 (0.323)
31567AA140	8.4 (0.331)
31567AA150	8.6 (0.339)
31567AA160	8.8 (0.346)
31567AA170	9.0 (0.354)
31567AA180	9.2 (0.362)

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



10) Install the one-way clutch (1-2) and plate, and secure with the snap ring.

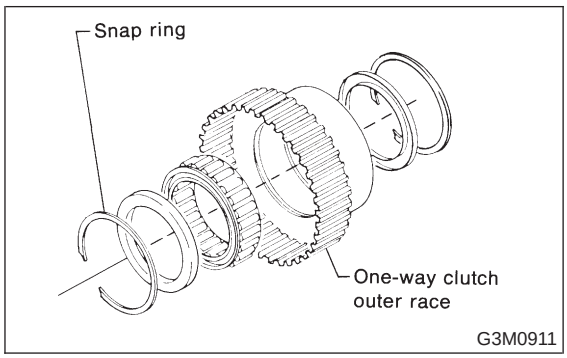
NOTE:
Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



20. One-way Clutch Outer Race

A: DISASSEMBLY

Remove the snap ring. Then remove the one-way clutch (3-4).



B: INSPECTION

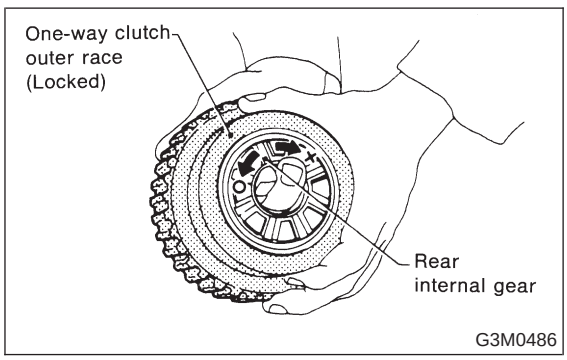
Check the sliding surface and one-way clutch (3-4) for any harmful cuts, damage, or other faults.

C: ASSEMBLY

1) Assemble the one-way clutch (3-4), and secure with the snap ring.

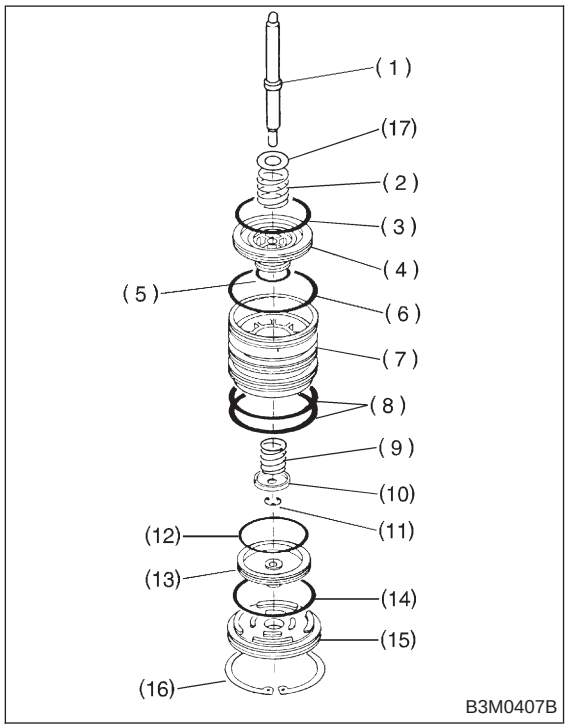
NOTE:
Pay attention to the orientation of the one-way clutch (3-4).

2) Assemble the rear internal gear, and secure the outer race. Make sure that the internal gear is locked in the clockwise direction, and free to rotate in the counterclockwise direction.



21. Servo Piston

A: DISASSEMBLY



(1) Band servo piston stem
(2) Spring
(3) Lathe cut seal ring
(4) Band servo piston (1-2)
(5) Lathe cut seal ring
(6) O-ring
(7) Band servo retainer
(8) O-ring
(9) Spring
(10) Retainer
(11) Snap ring
(12) Lathe cut seal ring
(13) Band servo piston (3-4)
(14) O-ring
(15) O.D. servo retainer
(16) Snap ring
(17) Washer

1) Remove the spring.
2) Remove the band servo piston (3-4).
3) While compressing the retainer from above, remove the snap ring. Then remove the retainer, spring and stem.
4) Take out the band servo piston (1-2).

B: INSPECTION

1) Check each component for harmful cuts, damage, or other faults.
2) Check the O-ring and lathe cut ring for damage.

C: ASSEMBLY

1) Install the band servo piston (1-2) to the retainer, and insert the stem.
2) Put the spring and retainer on the piston. Fit the snap ring securely while compressing the spring.
3) Install the band servo piston (3-4).
4) Install the spring securely to the band servo piston (1-2).

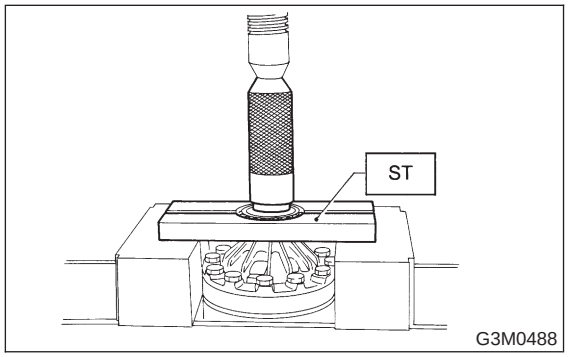
CAUTION:
● Always discard old O-rings and lathe cut seal rings, and install new ones.
● Many different O-rings and lathe cut rings are used. Be careful not to confuse them when installing.
● Be careful not to damage O-rings and lathe cut rings.

22. Differential Case Assembly

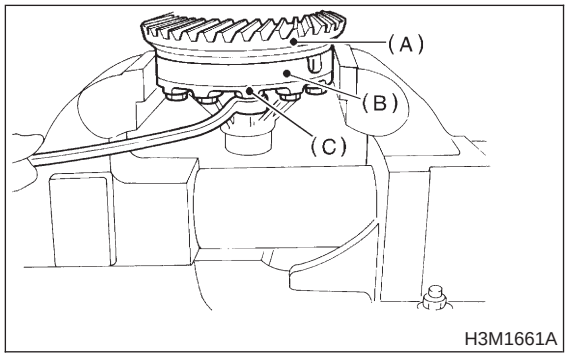
A: DISASSEMBLY

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

CAUTION:
Be careful not to damage the speedometer drive gear.

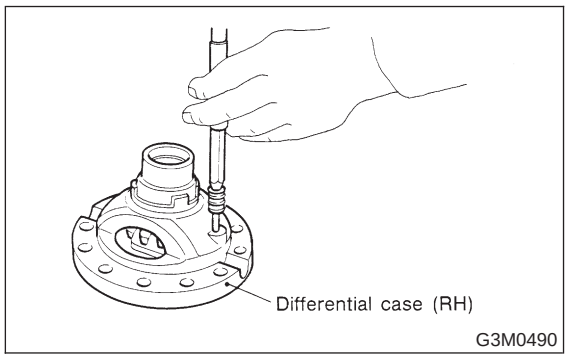


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

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



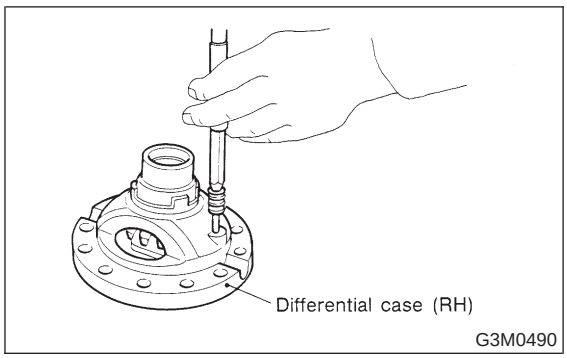
B: INSPECTION

Check each component for harmful cuts, damage and other faults.

C: ASSEMBLY

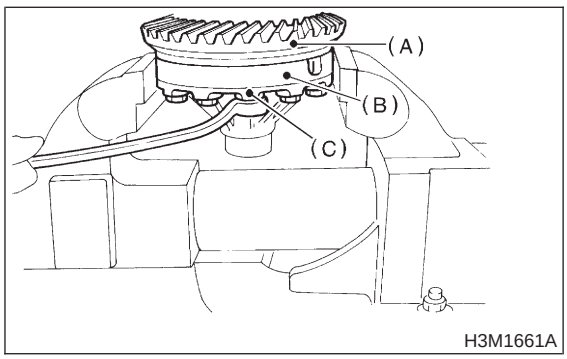
1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft, and fit the straight pin.

NOTE:
Install straight pin from reverse direction.



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 hypoid driven 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)



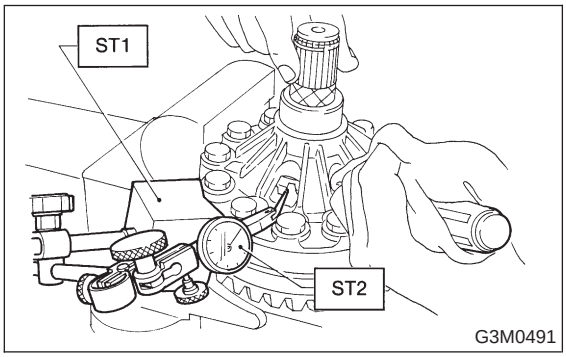
(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

4) Measurement of backlash (Selection of washer)
Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.

NOTE:
Measure the backlash by applying a pinion tooth between two bevel gear teeth.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

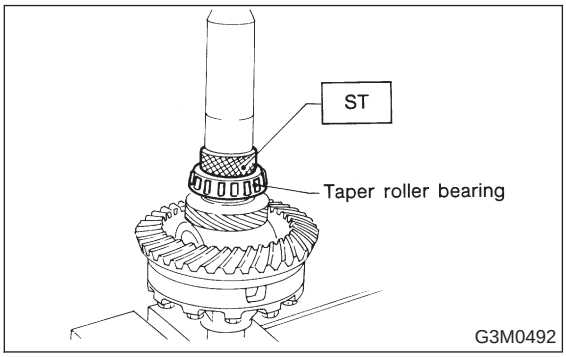
Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



5) Install the speedometer drive gear. Then force-fit the taper roller bearing with a press and ST.

CAUTION:
Be sure to position correctly the locking end of the speedometer drive gear.

ST 398487700 DRIFT

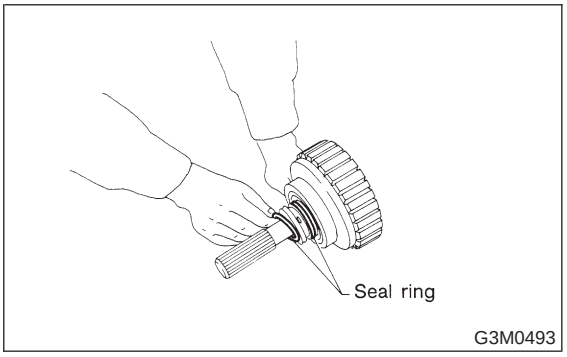


23. Transfer Clutch

A: DISASSEMBLY

1) Remove the seal ring.

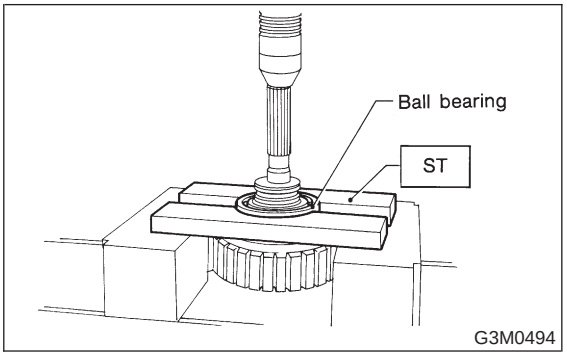
CAUTION:
Be careful not to damage the seal ring.



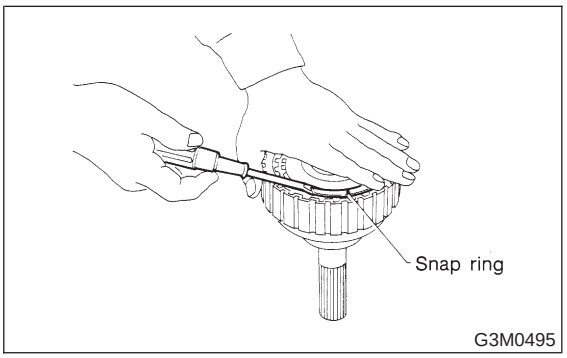
2) Using a press and ST, remove the ball bearing.

CAUTION:
Do not reuse the bearing.

ST 498077000 REMOVER



3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.

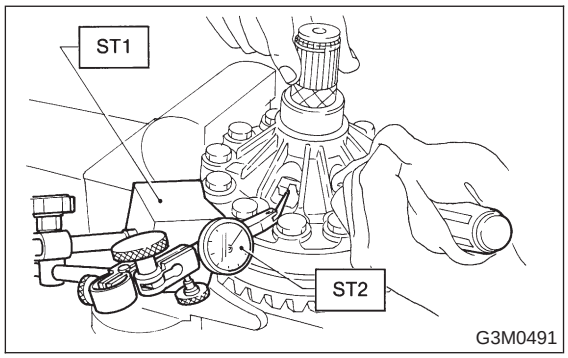


4) Measurement of backlash (Selection of washer)
Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.

NOTE:
Measure the backlash by applying a pinion tooth between two bevel gear teeth.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

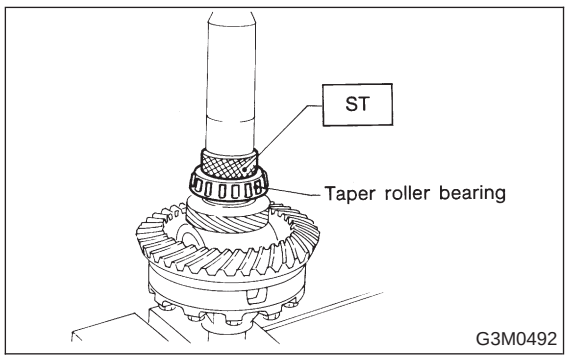
Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



5) Install the speedometer drive gear. Then force-fit the taper roller bearing with a press and ST.

CAUTION:
Be sure to position correctly the locking end of the speedometer drive gear.

ST 398487700 DRIFT

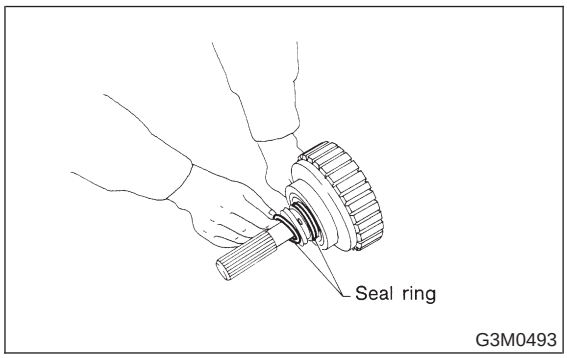


23. Transfer Clutch

A: DISASSEMBLY

1) Remove the seal ring.

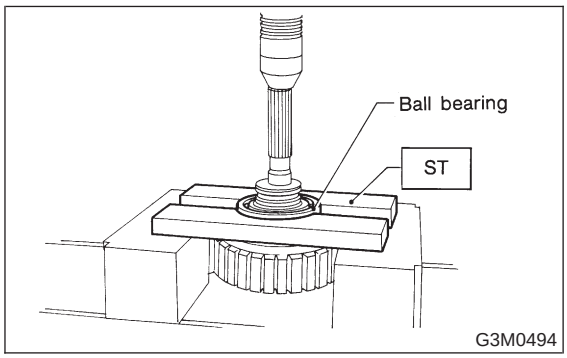
CAUTION:
Be careful not to damage the seal ring.



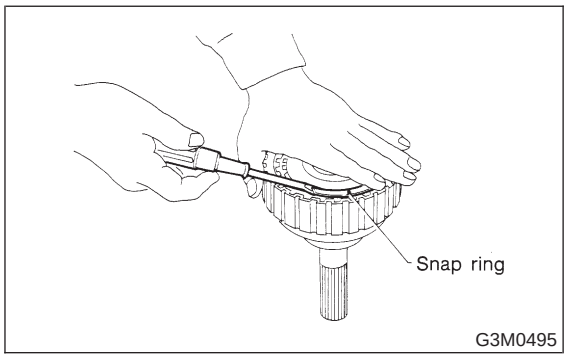
2) Using a press and ST, remove the ball bearing.

CAUTION:
Do not reuse the bearing.

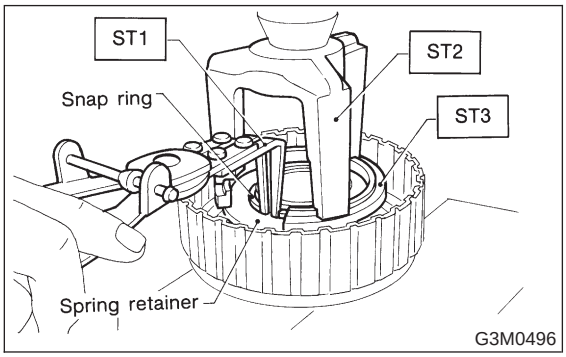
ST 498077000 REMOVER



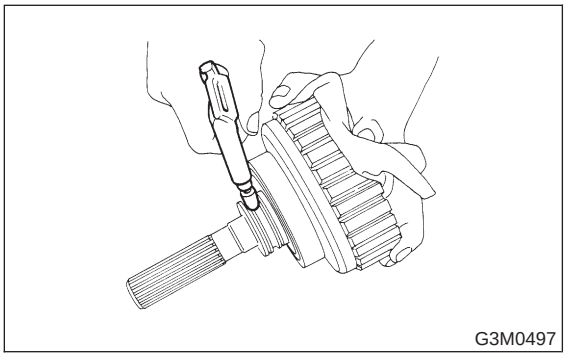
3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.



4) Remove the snap ring with ST1, ST2, ST3 and press, and take out the spring retainer.
ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 498627000 SEAT



5) Apply compressed air to the rear drive shaft to remove the piston.



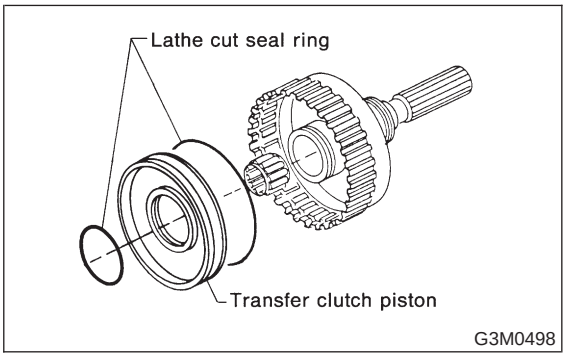
B: INSPECTION

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 spring retainer for deformation.
3) Check the lathe cut ring for damage.

C: ASSEMBLY

1) Install the lathe cut seal ring to the I.D./O.D. of the transfer clutch piston.

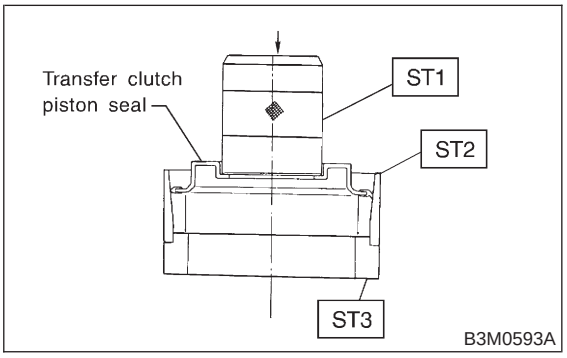
CAUTION:
Always discard lathe cut seal rings, and install new ones.



2) Install piston.
(1) Connect transfer clutch piston to rear drive shaft (until it reaches hole in valve body).
(2) Install spring retainer to transfer clutch piston.
(3) Using ST1, ST2 and ST3, attach transfer piston seal to ST2.

CAUTION:
Be careful not to tilt transfer piston seal.

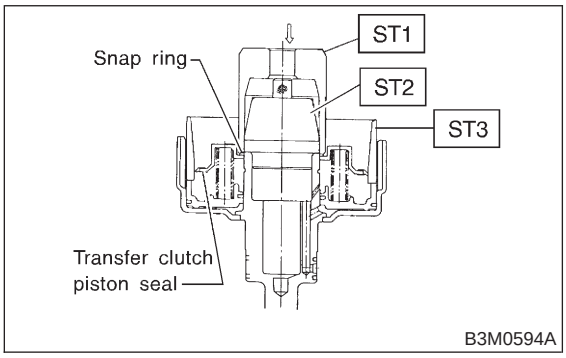
ST1 499247400 INSTALLER
ST2 499257400 PISTON GUIDE
ST3 498267400 TABLE



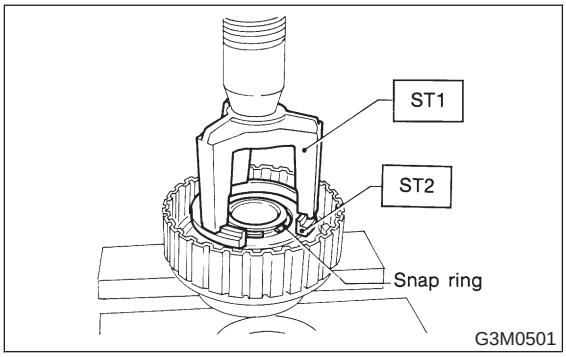
(4) Place ST3 onto rear drive shaft so that spring can be inserted into hole in transfer piston seal.
(5) Attach ST2 to rear drive shaft. Using ST1, press into place.

CAUTION:
Do not allow lip of transfer piston seal to fold back.

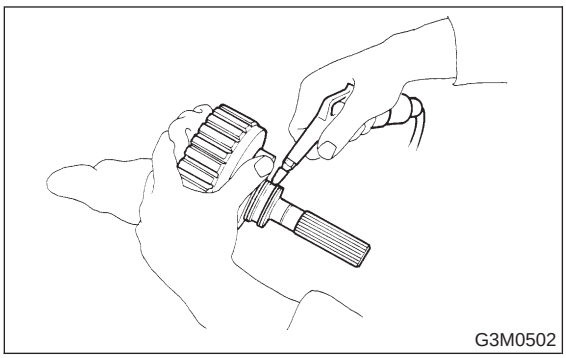
ST1 499247400 INSTALLER
ST2 499257300 SNAP RING OUTER GUIDE
ST3 499257400 PISTON GUIDE



3) Install the driven plates, drive plates, and pressure plate, and secure with a snap ring with ST1, ST2 and a press.
ST1 398673600 COMPRESSOR
ST2 498627000 SEAT



4) Apply compressed air to see if the assembled parts move smoothly.

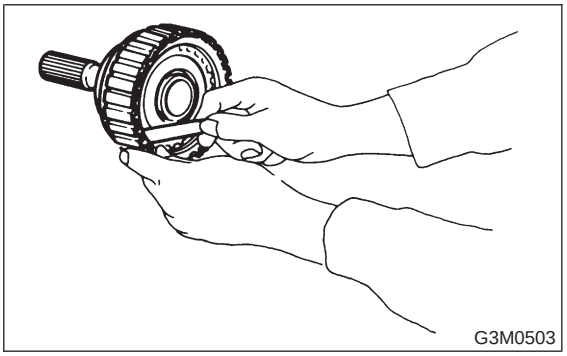


5) Check the clearance.

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.

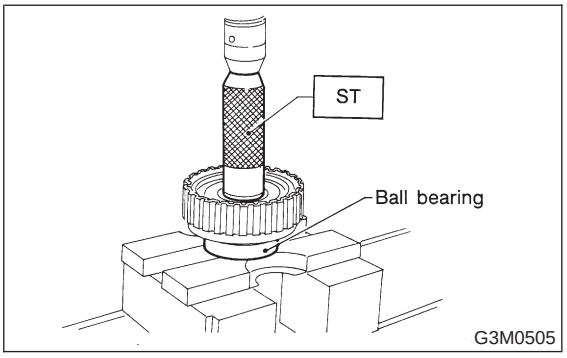
Standard value:
0.2 — 0.6 mm (0.008 — 0.024 in)

Allowable limit:
1.6 mm (0.063 in)



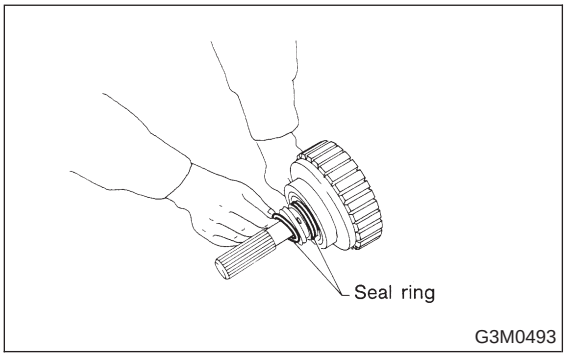
Pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

6) Press-fit the ball bearing with ST.
ST 899580100 INSTALLER



7) 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.

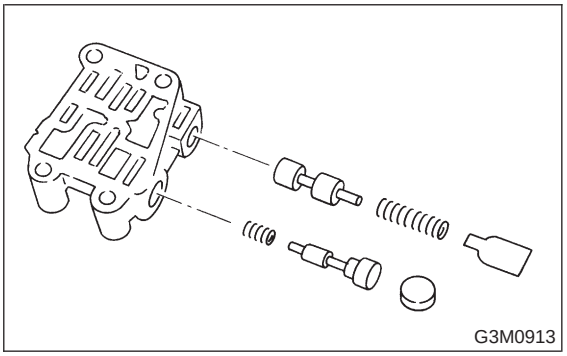


24. Transfer Valve Body

A: DISASSEMBLY

1) Remove the plate. Then remove the spring and pilot valve together.
2) Remove the straight pin and pry out the plug with a screwdriver. Then extract the spring and transfer clutch valve together.

CAUTION:
Be careful not to damage the valve and valve body.



B: INSPECTION

Check each component for harmful cuts, damage, or other faults.

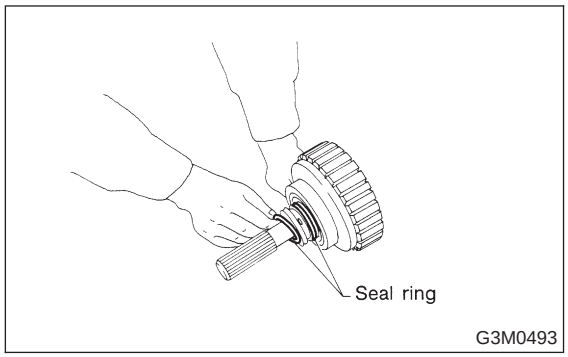
C: ASSEMBLY

To assemble, reverse the removal sequence.

NOTE:
Make sure the valve slides smoothly after assembling.

7) 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.

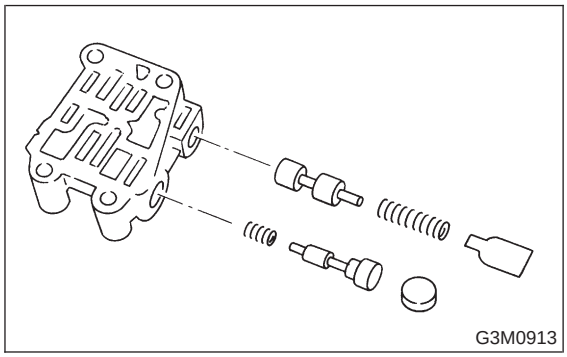


24. Transfer Valve Body

A: DISASSEMBLY

1) Remove the plate. Then remove the spring and pilot valve together.
2) Remove the straight pin and pry out the plug with a screwdriver. Then extract the spring and transfer clutch valve together.

CAUTION:
Be careful not to damage the valve and valve body.



B: INSPECTION

Check each component for harmful cuts, damage, or other faults.

C: ASSEMBLY

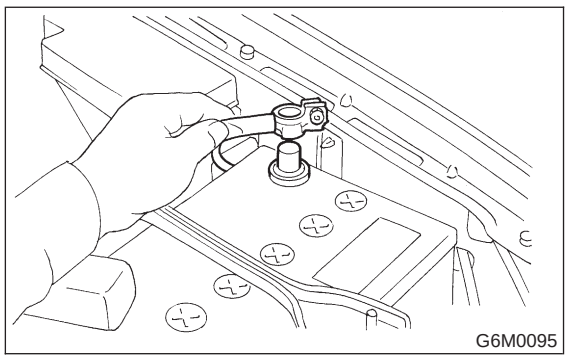
To assemble, reverse the removal sequence.

NOTE:
Make sure the valve slides smoothly after assembling.

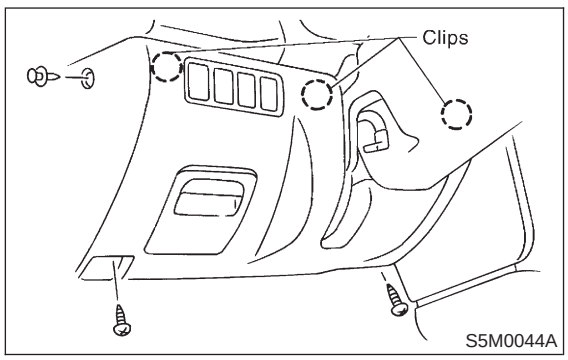
25. Transmission Control Module

A: REMOVAL

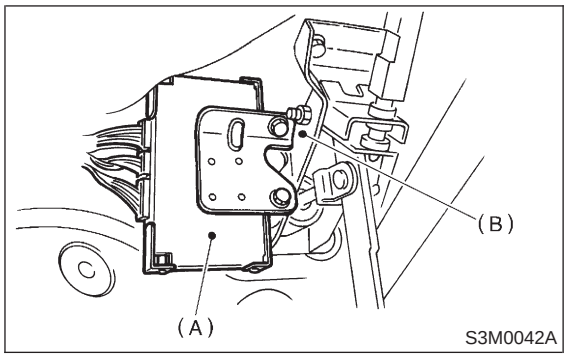
1) Disconnect battery ground cable.



2) Remove lower cover and then disconnect connector.



3) Remove transmission control module.



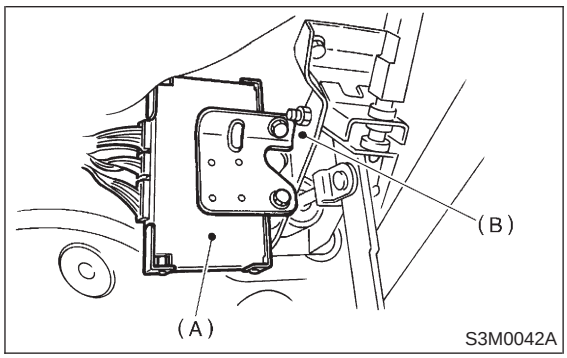
(A) Transmission control module
(B) Pedal bracket

4) Disconnect connectors from transmission control module.

B: INSTALLATION

1) Connect connectors to transmission control module.
2) Install transmission control module.

Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)

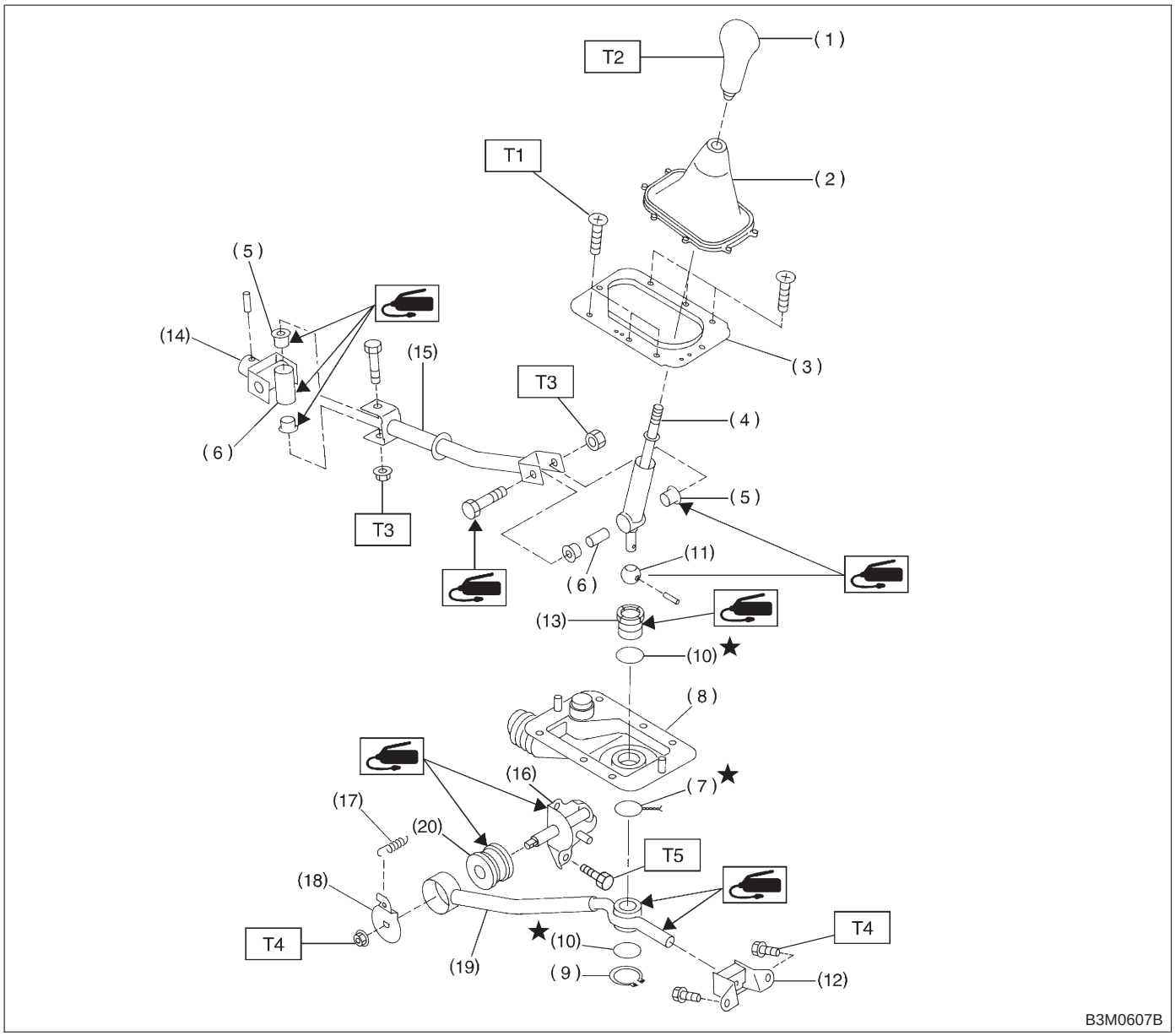


(A) Transmission control module
(B) Pedal bracket

3) Installing procedure hereafter is in the reverse order of removal.

MEMO:

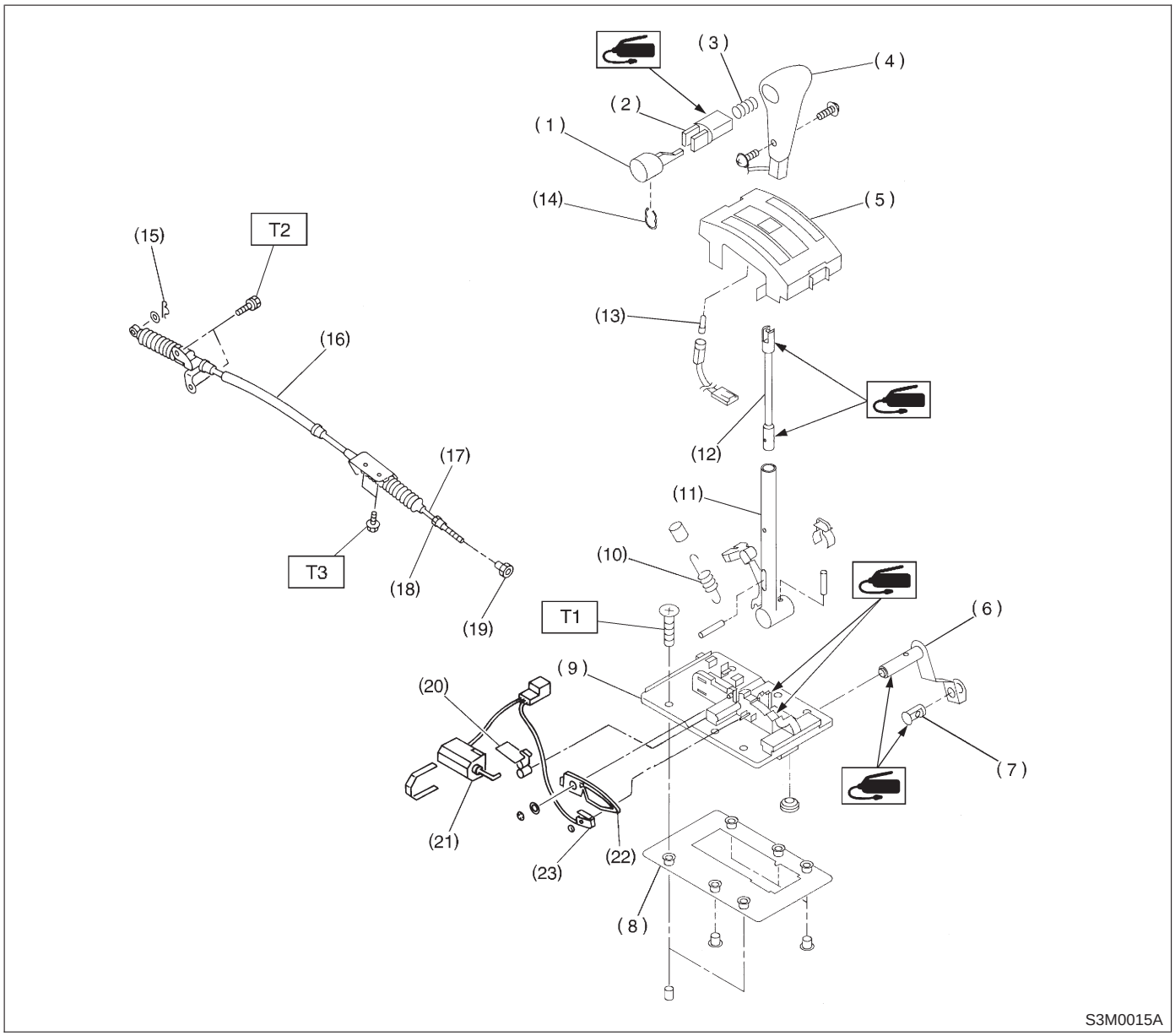
1. Gear Shift Lever



(1) Gear shift knob
(2) Console boot
(3) Boot plate
(4) Gear shift lever
(5) Bush
(6) Spacer
(7) Locking wire
(8) Boot
(9) Snap ring
(10) O-ring
(11) Bush (Shift lever)
(12) Cushion rubber
(13) Bush (Stay rear)
(14) Joint
(15) Rod
(16) Bracket
(17) Spring
(18) Washer
(19) Stay
(20) Bush (Stay front)

Tightening torque: N·m (kg-m, ft-lb)
T1: 4.4±1.5 (0.45±0.15, 3.3±1.1)
T2: 5 (0.51, 3.7)
T3: 12±3 (1.2±0.3, 8.7±2.2)
T4: 18±5 (1.8±0.5, 13.0±3.6)
T5: 24.5±2 (2.50±0.20, 18.07±1.48)

2. Select Lever



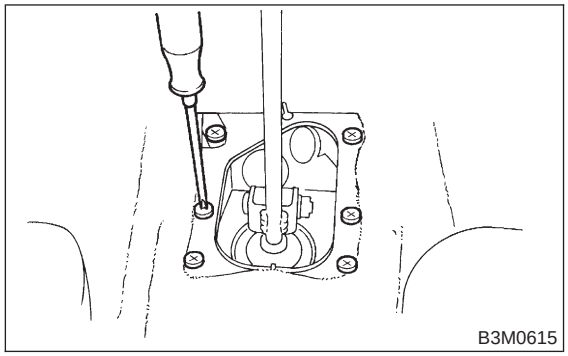
(1) Button A
(2) Button B
(3) Spring (button)
(4) Grip
(5) Indicator cover
(6) Selector lever lower
(7) Pin
(8) Packing
(9) Plate
(10) Detent spring
(11) Selector lever upper
(12) Rod
(13) Indicator light bulb
(14) Retainer spring
(15) Snap pin
(16) Outer cable
(17) Inner cable
(18) Nut (front)
(19)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

Tightening torque: N·m (kg-m, ft-lb)
T1: 5.9±1.5 (0.6±0.15, 4.3±1.1)
T2: 12±3 (1.2±0.3, 8.7±2.2)
T3: 25±7 (2.5±0.7, 18.1±5.1)

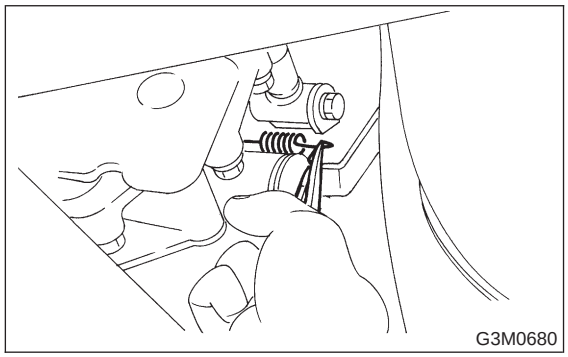
1. Gear Shift Lever

A: REMOVAL

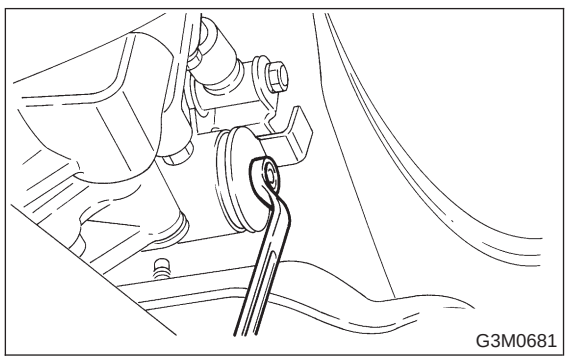
1) Remove console box. <Ref. to 5-4 [W1A0].>
2) Remove boot plate from the body.



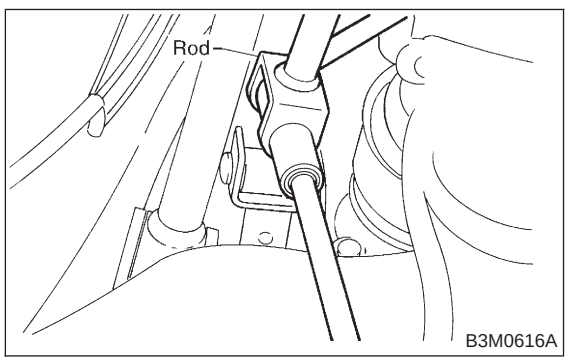
3) Remove the spring between the joint and bracket.



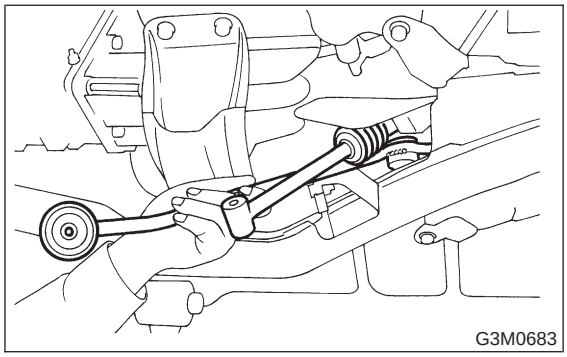
4) Remove stay from bracket.



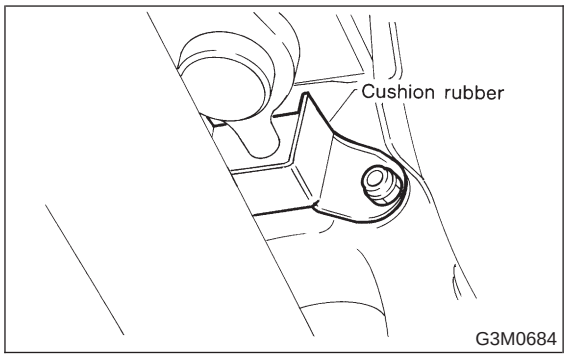
5) Remove rod from joint.



6) Remove gearshift lever.

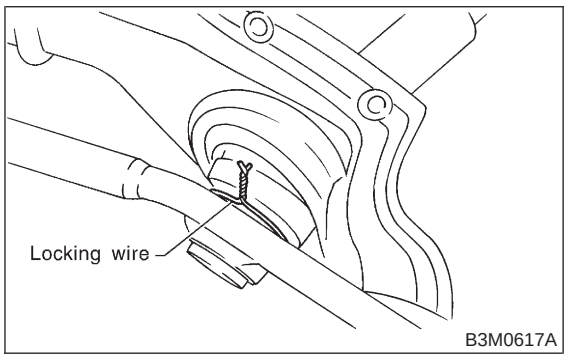


7) Remove the exhaust cover and remove cushion rubber from the body.

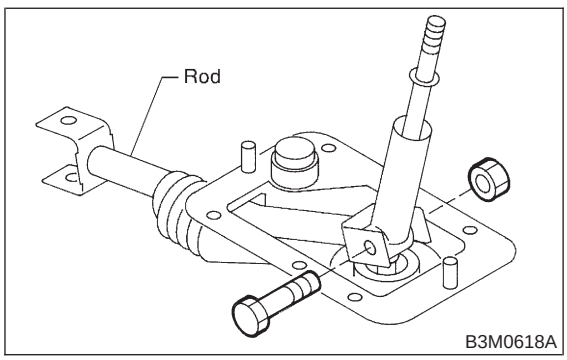


B: DISASSEMBLY

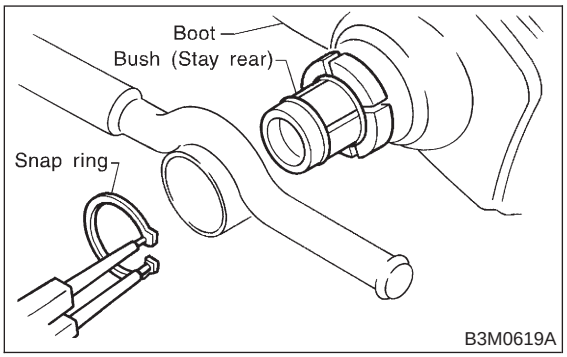
1) Disconnect locking wire.



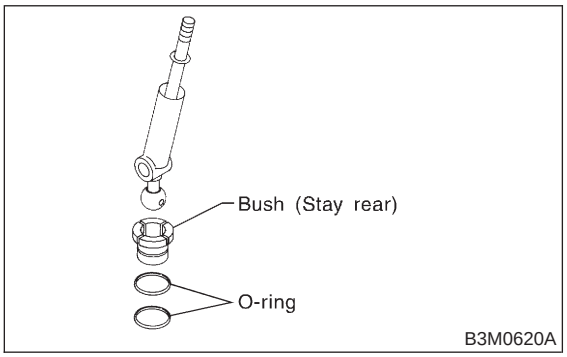
2) Remove rod from gearshift lever.



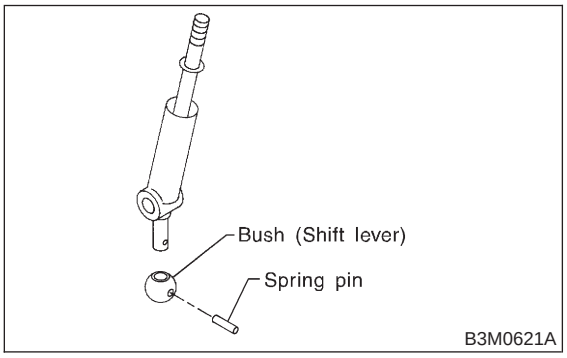
3) Remove snap ring, then disconnect gearshift lever from stay.
4) Remove boot from gearshift lever.



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

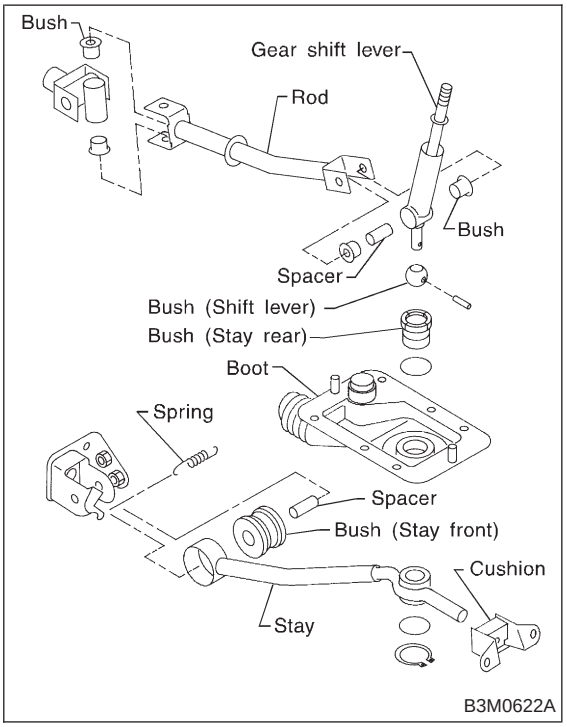


6) Draw out spring pin, then remove bush (Shift lever) from gearshift lever.



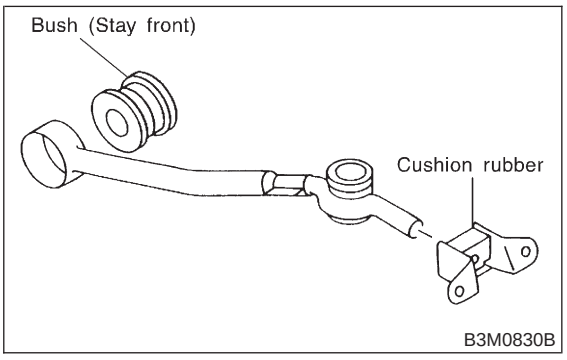
C: INSPECTION

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



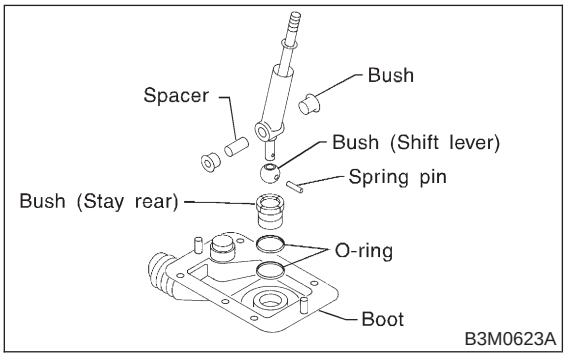
D: ASSEMBLY

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

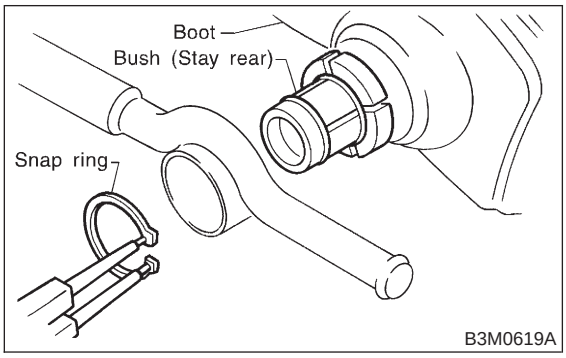


3) Mount each parts (Boot, O-ring, bush and spacer) on the gearshift lever.

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

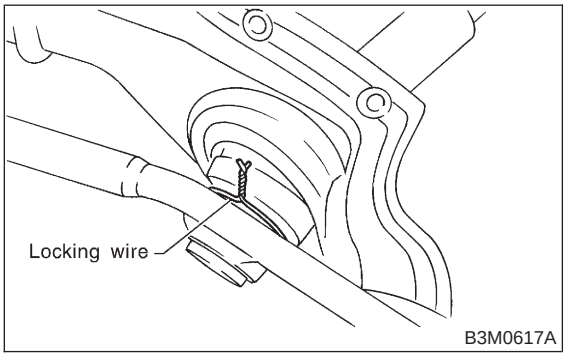


4) Insert the gearshift lever into the boot hole.
5) Mount gearshift lever on the stay.
6) Install snap ring to the bottom of the bush (Stay rear).



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

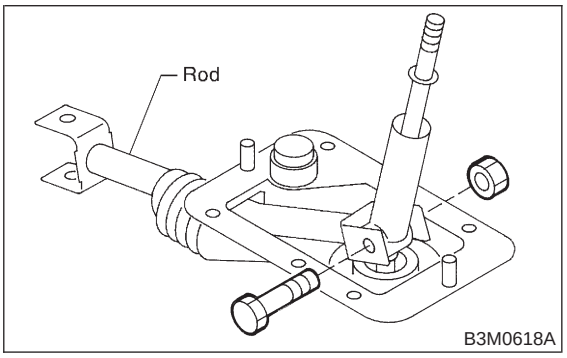
CAUTION:
Always use new locking wire.



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

Tightening torque:
12±3 N·m (1.2±0.3 kg-m, 8.7±2.2 ft-lb)

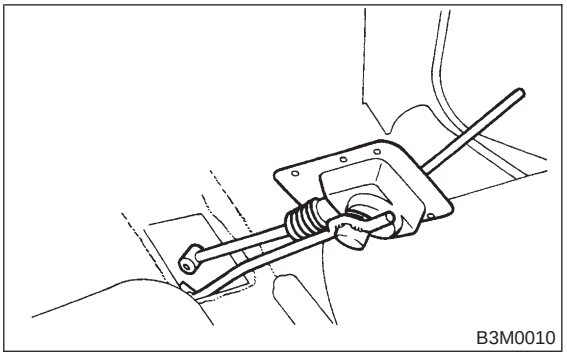
Rocking torque:
0.74±0.25 N·m (0.075±0.025 kg-m, 0.54±0.18 ft-lb) or less



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

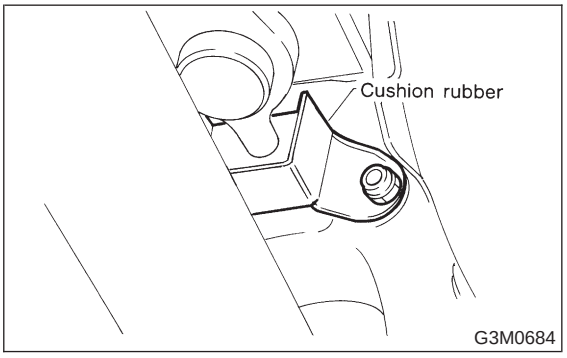
E: INSTALLATION

1) Put into gearshift lever from passenger compartment.
2) Mount boot plate on the body.
3) Install console box and gearshift knob. <Ref. to 5-4 [W1B0].>



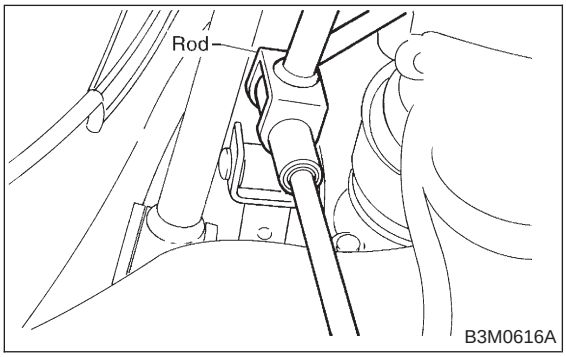
4) Mount cushion rubber on the body.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)



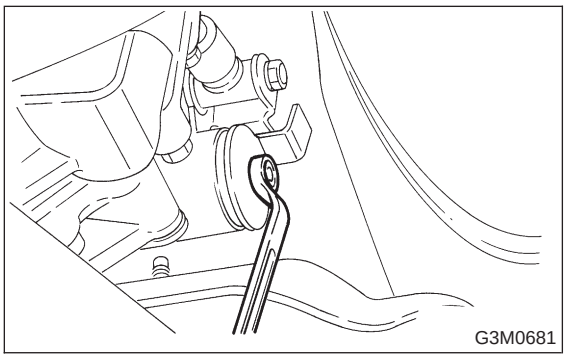
5) Connect rod to the joint.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)



6) Connect stay to the bracket.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)

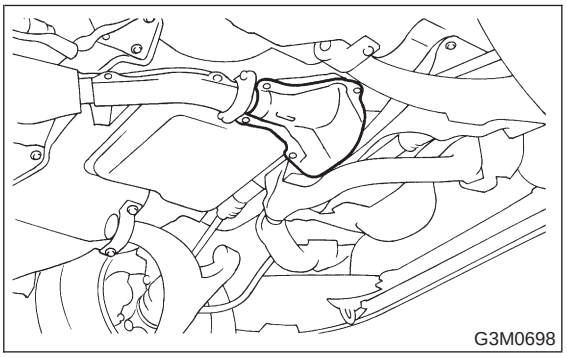


7) Install the exhaust cover.

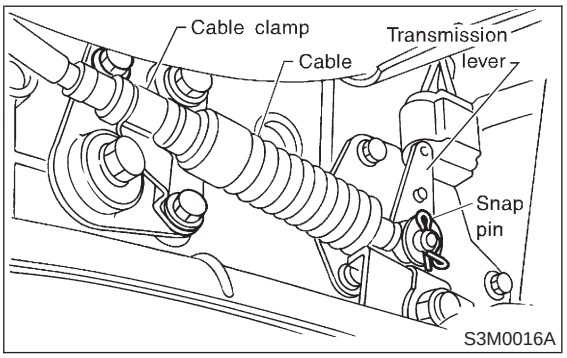
2. Select Lever

A: REMOVAL

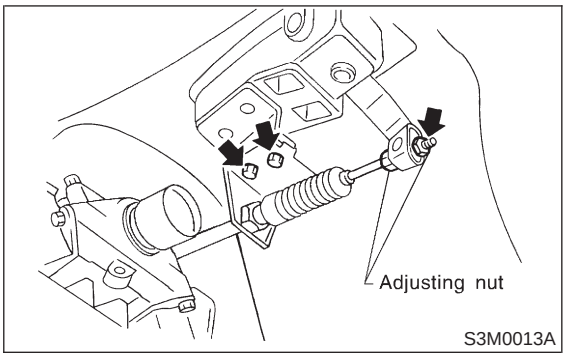
1) Remove the cable.
(1) Prior to removal, set lever to “N” position.
(2) Remove front exhaust pipe.



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

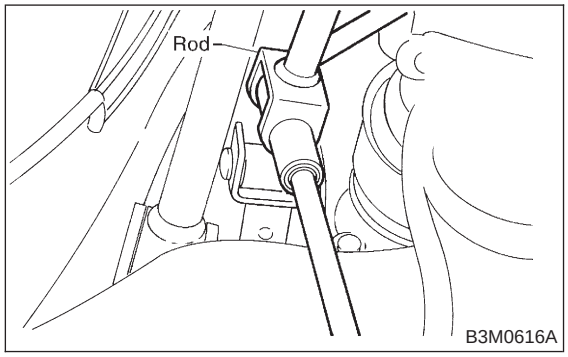


(5) Disconnect cable from selector lever and then remove cable bracket.



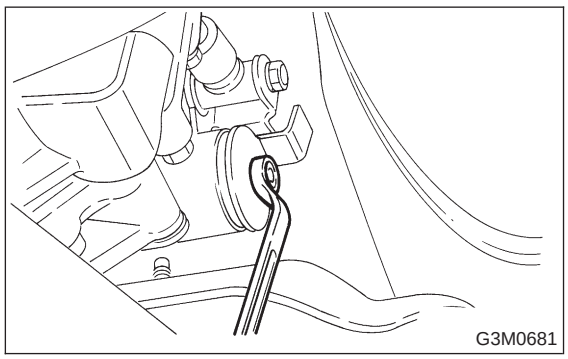
5) Connect rod to the joint.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)



6) Connect stay to the bracket.

Tightening torque:
18±5 N·m (1.84±0.51 kg-m, 13.3±3.7 ft-lb)

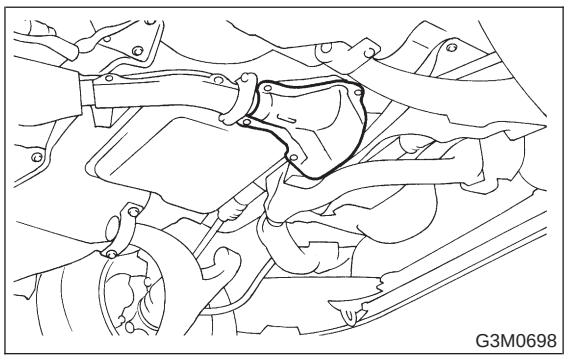


7) Install the exhaust cover.

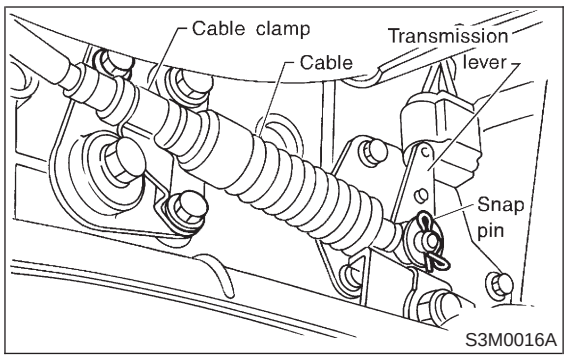
2. Select Lever

A: REMOVAL

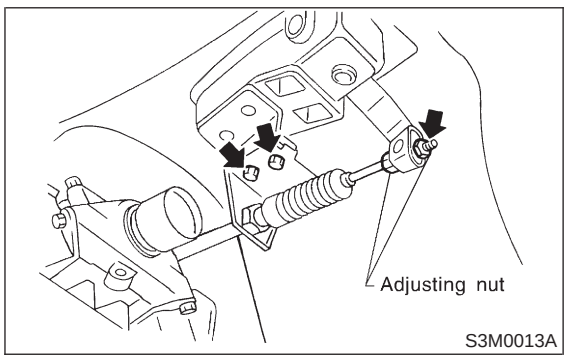
1) Remove the cable.
   (1) Prior to removal, set lever to “N” position.
   (2) Remove front exhaust pipe.



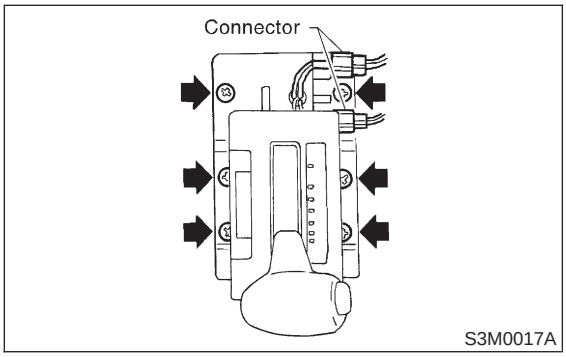
   (3) Separate cable from transmission lever.
   (4) Remove clamp from transmission case.



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

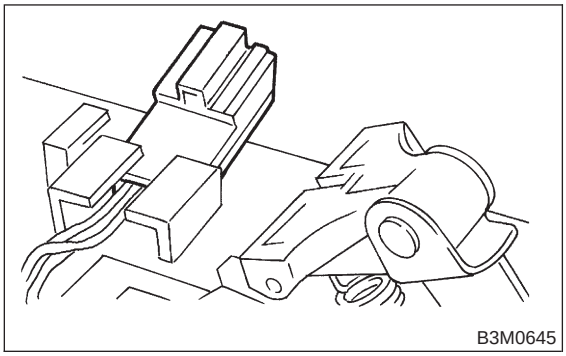


2) Remove console box. <Ref. to 5-4 [W1A0].>
3) Disconnect the connectors, then remove the six screws to take out the selector lever assembly from the body.



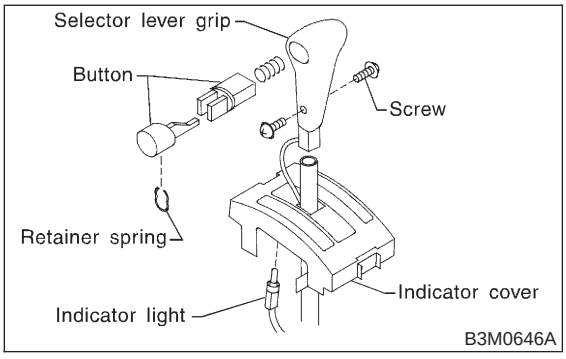
B: DISASSEMBLY

1) Remove connector from plate.

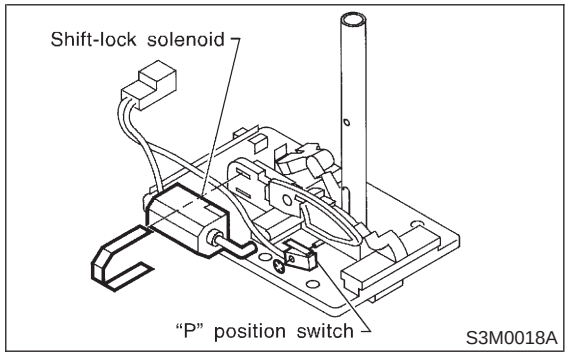


2) Remove indicator light and two screws.
3) Remove retainer spring, then pull up selector lever grip with indicator cover for holding selector lever button.

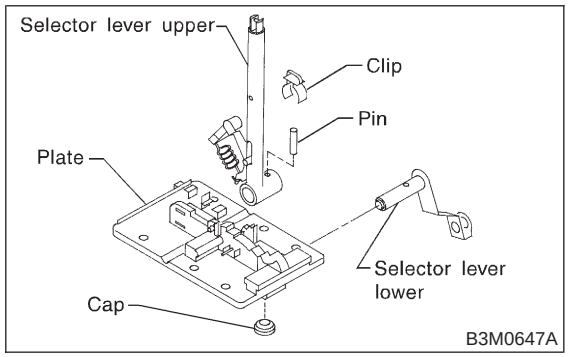
CAUTION:
Pull the selector lever grip carefully so that the selector lever button may not jump out.



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



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



C: INSPECTION

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

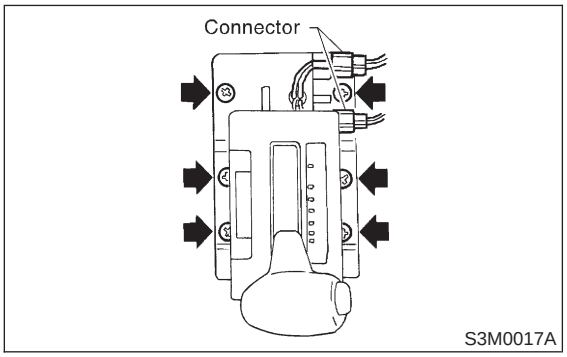
D: ASSEMBLY

1) Clean all parts before assembly.
2) Apply grease [NIGTIGHT LYW No. 2 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”, pressing the button of the grip; then check whether the indicator and selector lever agree, whether the pointer and position mark agree and what the operating force is.

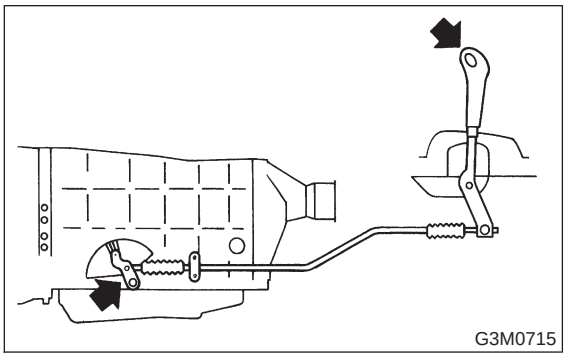
E: INSTALLATION

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

Tightening torque:
5.9±1.5 N·m (0.6±0.15 kg-m, 4.3±1.1 ft-lb)

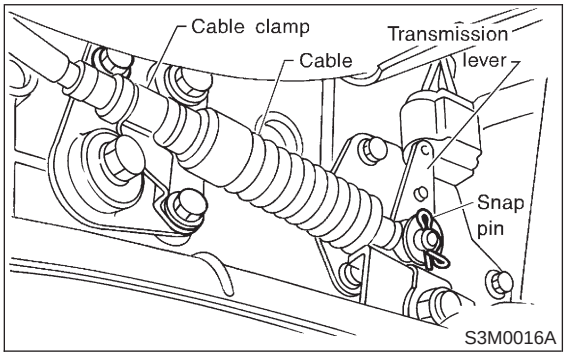


3) Install console box.
4) Set location of selector lever at “N” position.
5) Set location of selector arm installed on the transmission body at “N” position.



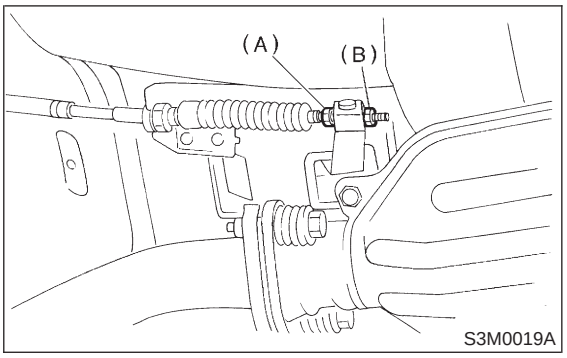
6) Pass inner cable through selector arm pin and then connect it using a washer and snap pin.
7) Attach outer cable to plate on transmission case with the bolts.

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



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).

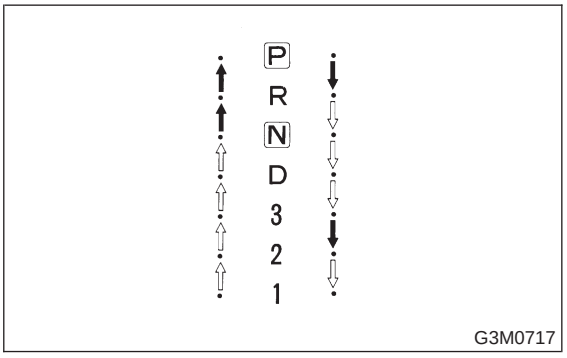
Tightening torque:
7.4±2.0 N·m (0.75±0.2 kg-m, 5.4±1.4 ft-lb)



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 selector lever operation.

WARNING:
Stop the engine while checking operation of selector lever.

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



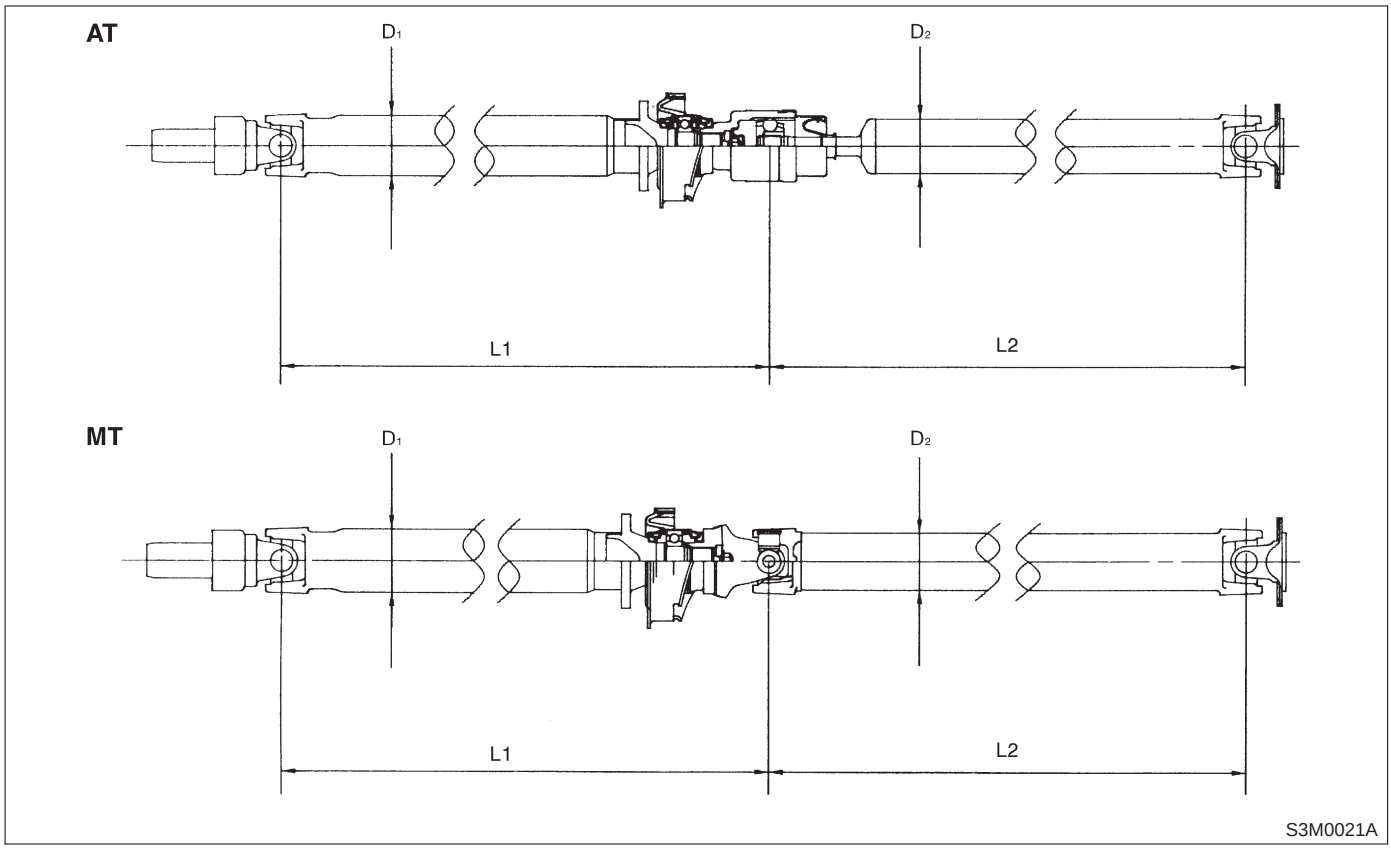
13) Check shift-lock system.
(1) Ensure ignition switch rotates from “ACC” to “LOCK” when the selector lever is set at “P”. Also check that ignition key can be removed only from the “LOCK” position.

(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”.

1. Propeller Shaft

A: SPECIFICATIONS

Front propeller shaft Joint-to-joint length:	AT	580 (22.83)
L_1 mm (in)	MT	644 (25.35)
Rear propeller shaft Joint-to-joint length:	AT	712 (28.03)
L_2 mm (in)	MT	707 (27.83)
Outside dia. of tube	D_1	63.5 (2.500)
mm (in)	D_2	57.0 (2.244)



2. Rear Differential

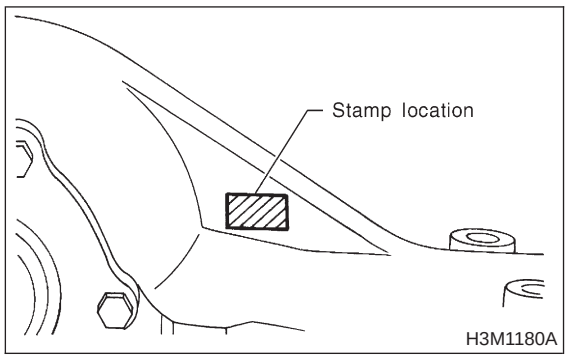
A: SPECIFICATIONS

Type of gear	Hypoid	
	MT	AT
Gear ratio (Number of gear teeth)	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.



Gear ratio		Part number	Stamp on rear differential
MT	4.111	27011AA342	 B3M0127
AT	4.444	27011AA412	 B3M0421

C: ADJUSTING PARTS

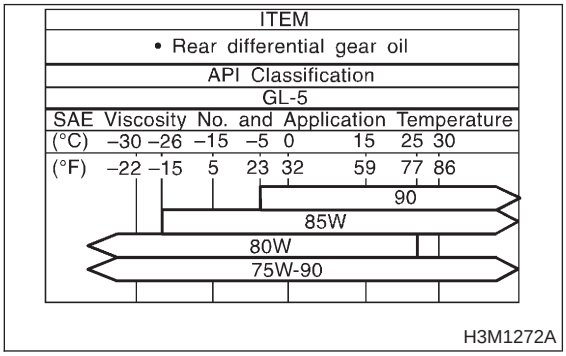
Front and rear bearing preload at companion flange bolt hole	New bearing	19.6 — 28.4 N (2.0 — 2.9 kg, 4.4 — 6.4 lb)
	Used bearing	8.34 — 16.67 N (0.85 — 1.70 kg, 1.87 — 3.75
Preload adjusting spacer	Part No.	Length
	383695201	56.2 mm (2.213 in)
	383695202	56.4 mm (2.220 in)
	383695203	56.6 mm (2.228 in)
	383695204	56.8 mm (2.236 in)
	383695205	57.0 mm (2.244 in)
	383695206	57.2 mm (2.252 in)
Preload adjusting washer	Part No.	Thickness
	383705200	2.59 mm (0.1020 in)
	383715200	2.57 mm (0.1012 in)
	383725200	2.55 mm (0.1004 in)
	383735200	2.53 mm (0.0996 in)
	383745200	2.51 mm (0.0988 in)
	383755200	2.49 mm (0.0980 in)
	383765200	2.47 mm (0.0972 in)
	383775200	2.45 mm (0.0965 in)
	383785200	2.43 mm (0.0957 in)
	383795200	2.41 mm (0.0949 in)
	383805200	2.39 mm (0.0941 in)
	383815200	2.37 mm (0.0933 in)
	383825200	2.35 mm (0.0925 in)
	383835200	2.33 mm (0.0917 in)
	383845200	2.31 mm (0.0909 in)
Pinion height adjusting shim	Part No.	Thickness
	383495200	3.09 mm (0.1217 in)
	383505200	3.12 mm (0.1228 in)
	383515200	3.15 mm (0.1240 in)
	383525200	3.18 mm (0.1252 in)
	383535200	3.21 mm (0.1264 in)
	383545200	3.24 mm (0.1276 in)
	383555200	3.27 mm (0.1287 in)
	383565200	3.30 mm (0.1299 in)
	383575200	3.33 mm (0.1311 in)
	383585200	3.36 mm (0.1323 in)
	383595200	3.39 mm (0.1335 in)
	383605200	3.42 mm (0.1346 in)
	383615200	3.45 mm (0.1358 in)
	383625200	3.48 mm (0.1370 in)
	383635200	3.51 mm (0.1382 in)
	383645200	3.54 mm (0.1394 in)
	383655200	3.57 mm (0.1406 in)
	383665200	3.60 mm (0.1417 in)
	383675200	3.63 mm (0.1429 in)
	383685200	3.66 mm (0.1441 in)
Side gear backlash	—	0.10 — 0.20 mm (0.0039 — 0.0079 in)

Side gear thrust washer	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)
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)
Oil capacity		0.8 ℓ (0.8 US qt, 0.7 Imp qt)

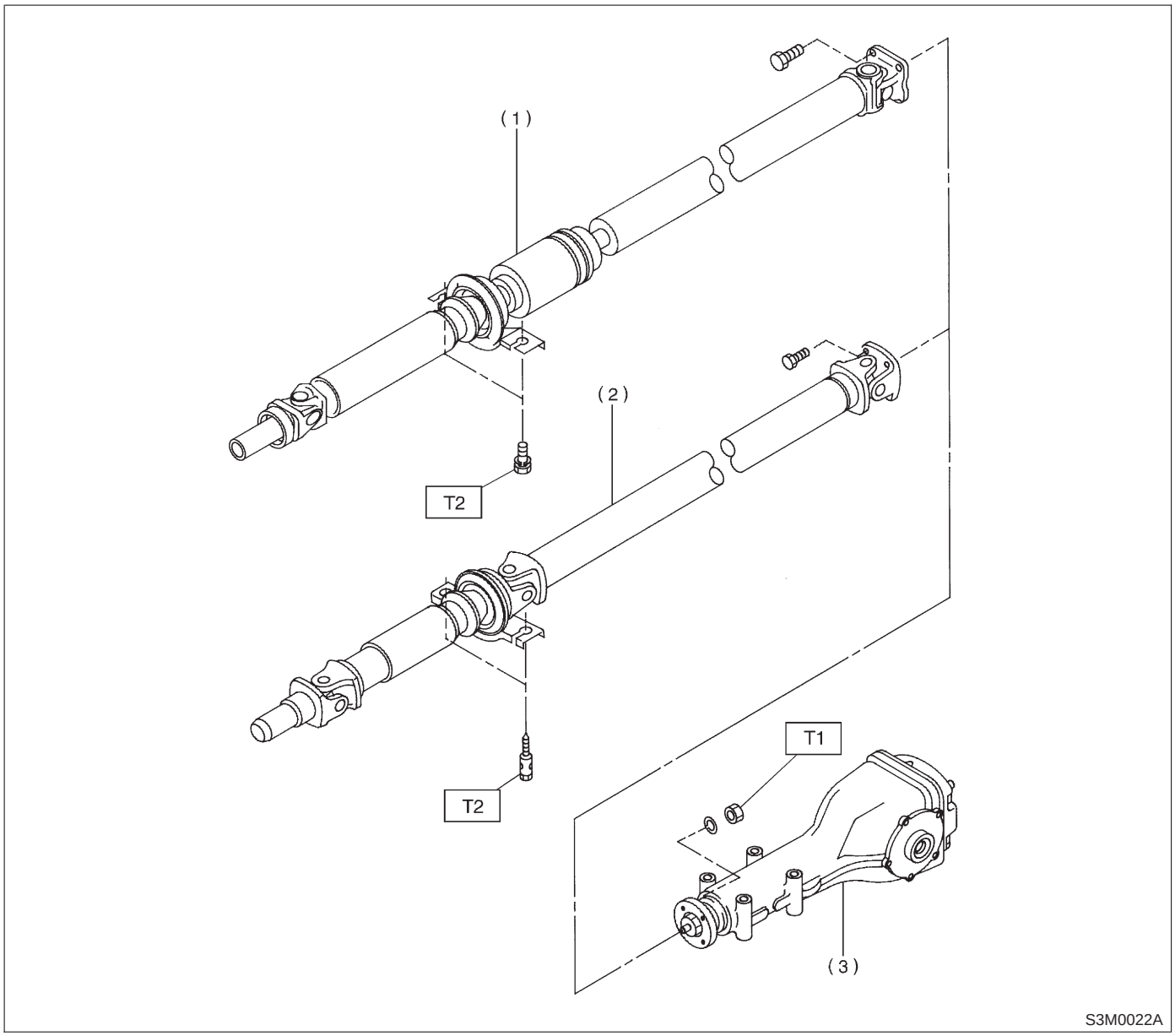
D: REAR DIFFERENTIAL GEAR OIL

- Recommended oil

CAUTION:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



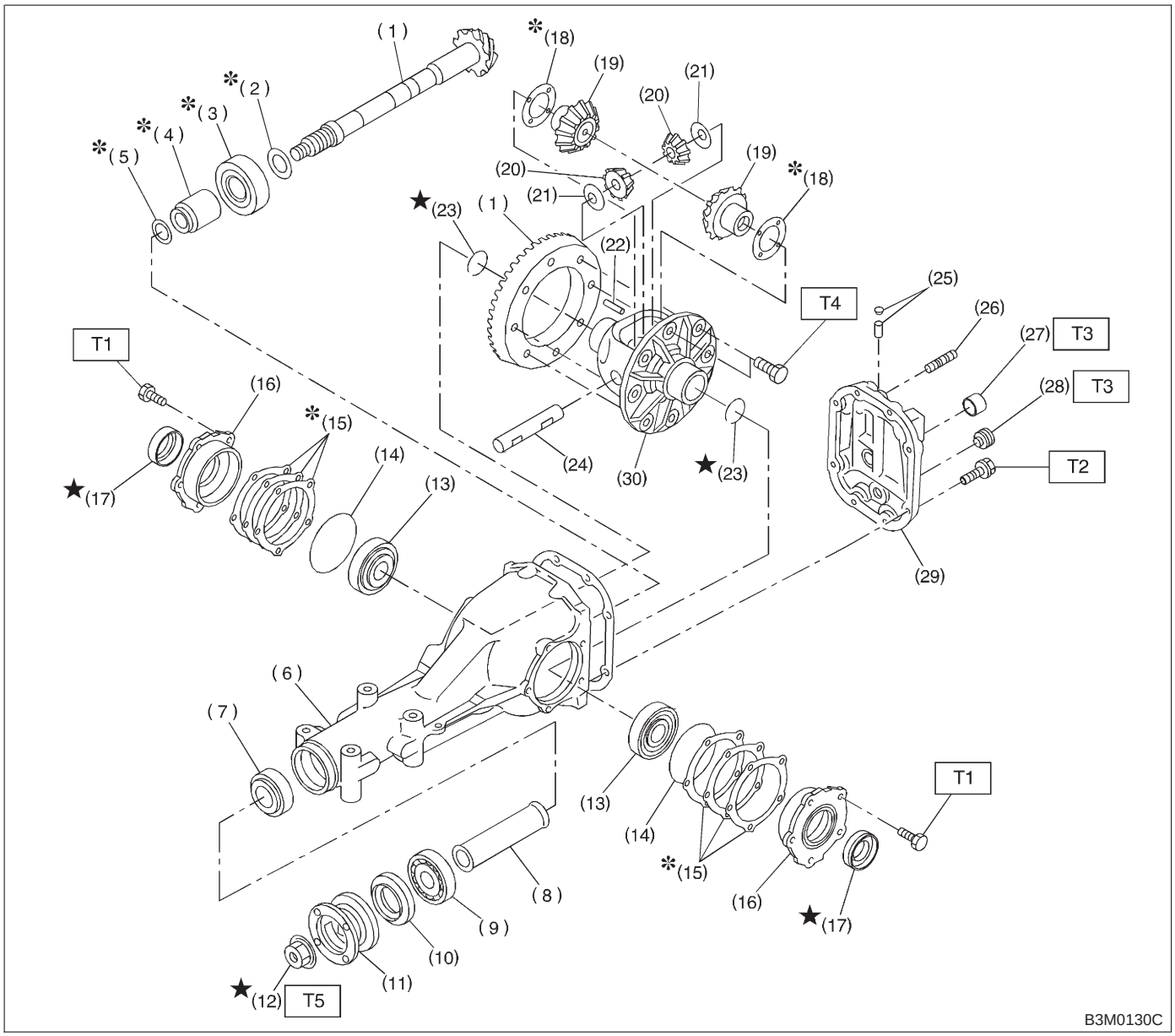
1. Propeller Shaft



(1) Propeller shaft (AT model)
(2) Propeller shaft (MT model)
(3) Rear differential

Tightening torque: N·m (kg-m, ft-lb)
T1: 31±8 (3.2±0.8, 23.1±5.8)
T2: 52±5 (5.3±0.5, 38.3±3.6)

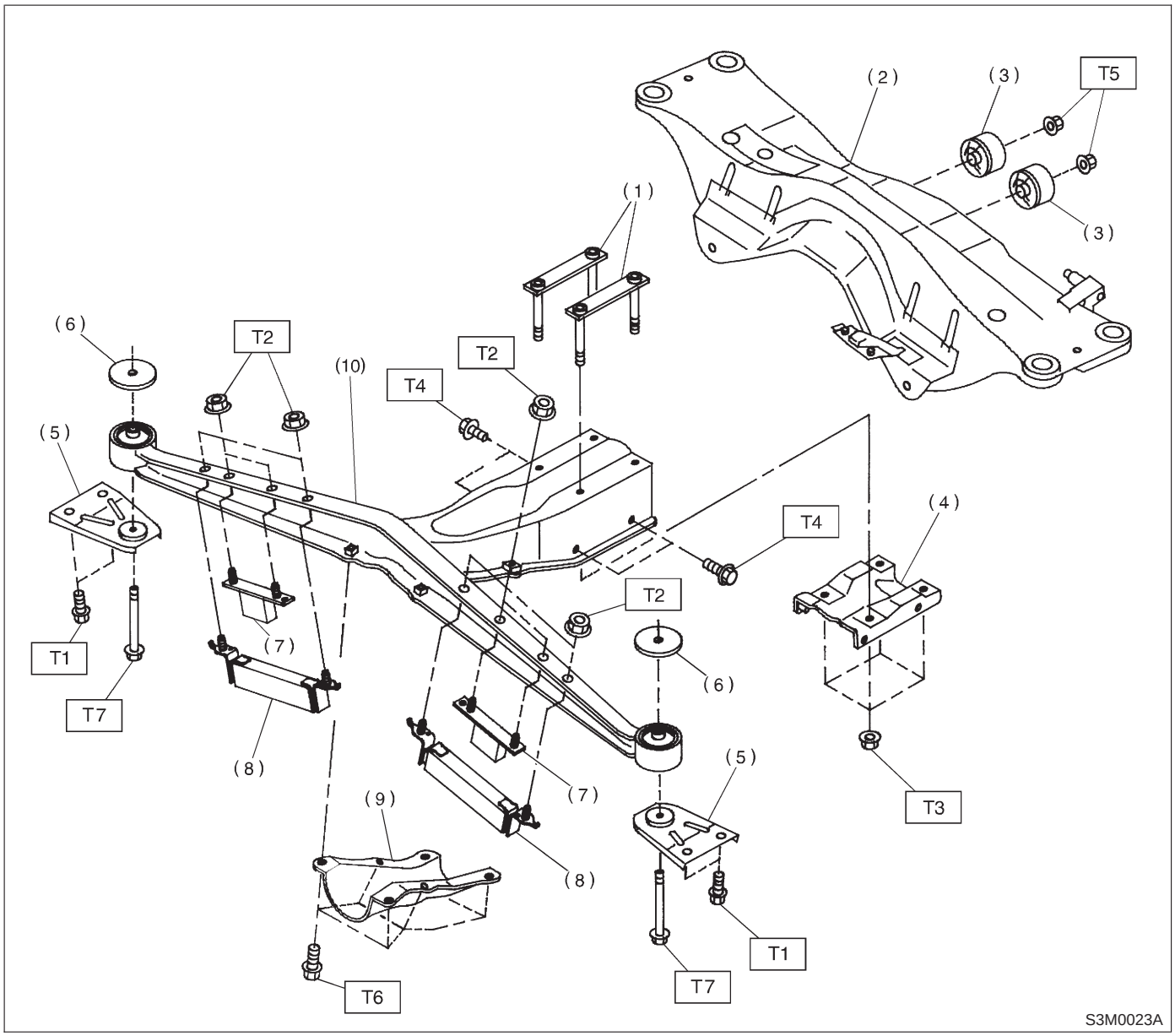
2. Rear Differential Assembly



(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: 44.1±3.9 (4.50±0.40, 32.5±2.9)
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



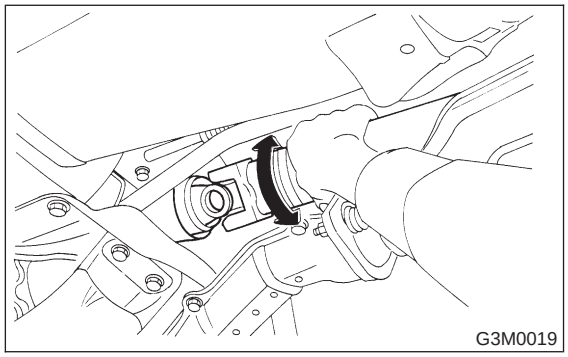
(1) Plate
(2) Crossmember
(3) Rear bushing
(4) Differential mount lower bracket
(5) Differential mount bracket
(6) Stopper
(7) Mass damper (AT vehicles)
(8) Dynamic damper (MT vehicles)
(9) Differential mount front cover
(10) Differential front member

Tightening torque: N·m (kg-m, ft-lb)
T1: 32±8 (3.3±0.8, 23.9±5.8)
T2: 40±10 (4.1±1.0, 29.7±7.2)
T3: 64±8 (6.5±0.8, 47.0±5.8)
T4: 69±10 (7.0±1.0, 51.0±7.2)
T5: 69^{+13}_{-8} ($7.0^{+1.3}_{-0.8}$, $50.6^{+9.4}_{-5.8}$)
T6: 88±10 (9.0±1.0, 65.0±7.2)
T7: 98±10 (10.0±1.0, 72.0±7.2)

1. Propeller Shaft

A: ON-CAR SERVICE

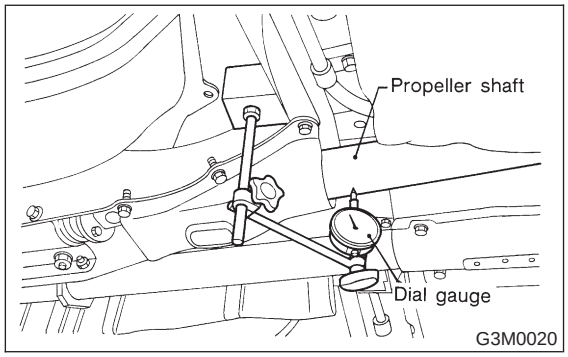
1) Joints and connections
Check for any looseness of yoke flange connecting bolts and center bearing retaining bolts.
2) Splines and bearing locations
Turn propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.


G3M0019

3) Runout of propeller shaft
Turn rear wheels by hand to check for “runout” of propeller shaft.

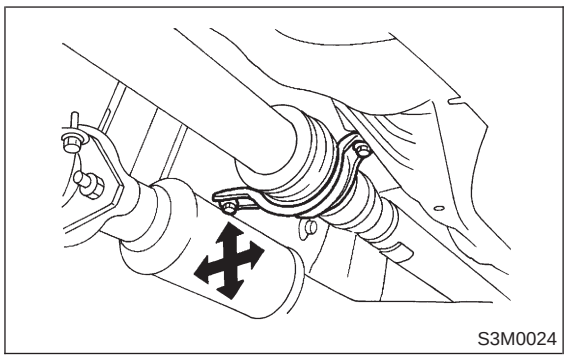
NOTE:
Measure runout with a dial gauge at the center of front and rear propeller shaft tubes.

Runout:
Limit 0.6 mm (0.024 in)



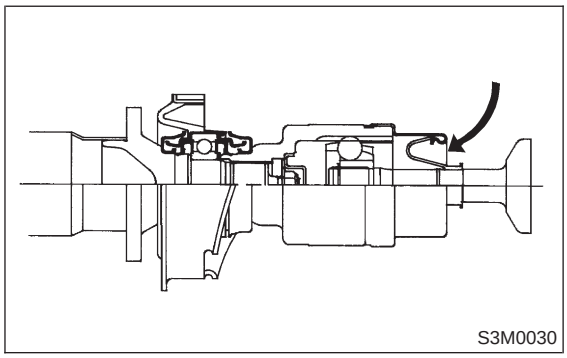
G3M0020

4) Center bearing free play
While holding propeller shaft near center bearing with your hand, move it up and down, and left and right to check for any abnormal bearing free play.

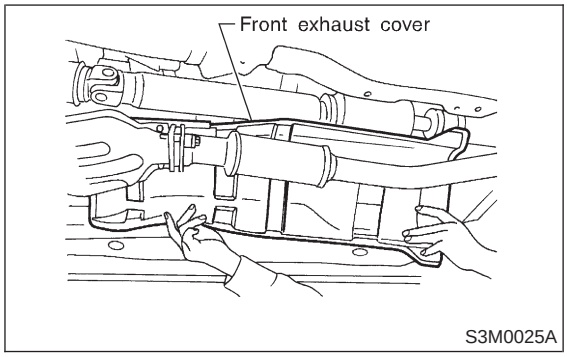

S3M0024

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.

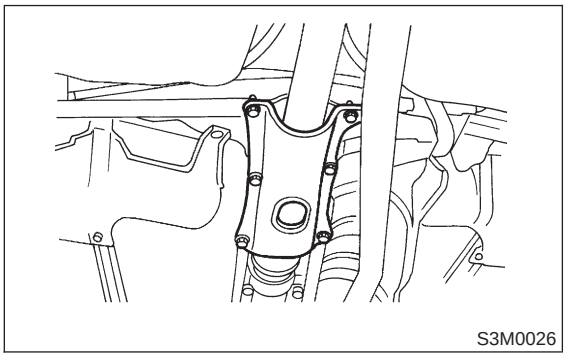

S3M0030

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 exhaust cover.



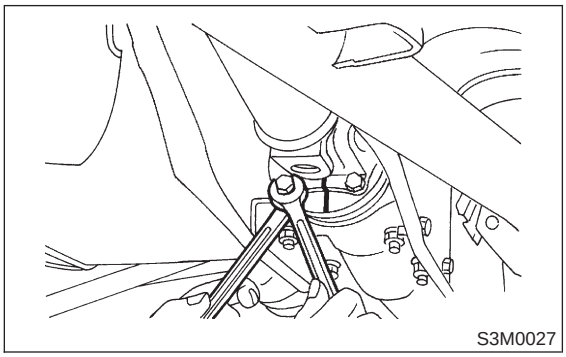
S3M0025A

6) Remove differential mount front cover.

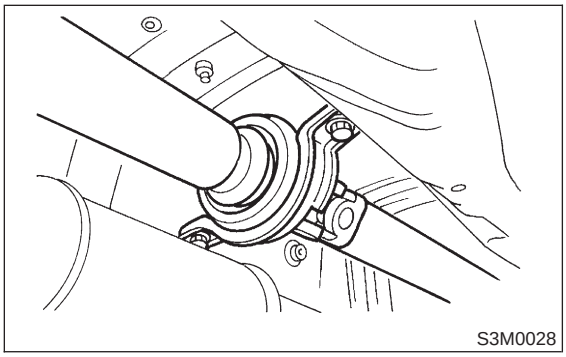


7) Remove the four bolts which hold propeller shaft to rear differential.

NOTE:
● Put matching mark on affected parts before removal.
● Remove all but one bolt.



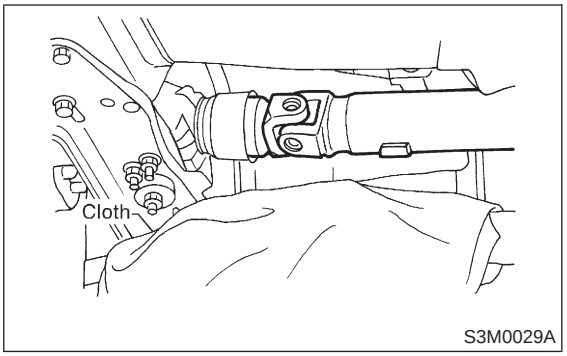
8) Remove the two bolts which hold center bearing to vehicle body.



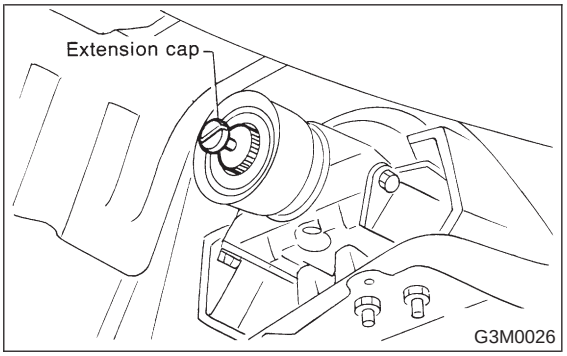
9) Remove propeller shaft from transmission.

CAUTION:
● Be sure not to damage oil seals and the frictional surface of sleeve yoke.
● Cover the center exhaust pipe with a cloth because ATF or oil may be spilled from transmission, when removing propeller shaft.

NOTE:
● Be sure to use an empty oil can to catch oil flowing out when removing propeller shaft.
● Be sure to plug the opening in transmission after removal of propeller shaft.



10) Install the extension cap to transmission.



C: DISASSEMBLY AND ASSEMBLY

NOTE:
Do not disassemble propeller shaft. It is a single unit.

D: INSPECTION

NOTE:
Do not disassemble propeller shaft. Check the following and replace if necessary.

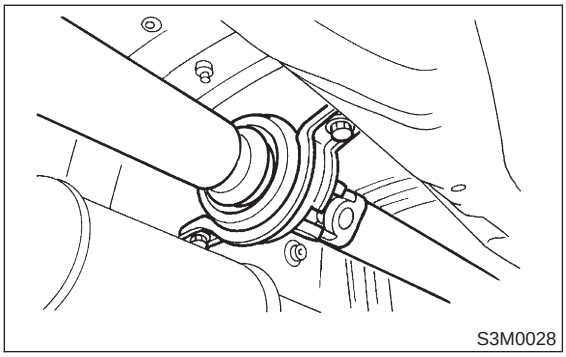
1) Tube surfaces for dents or cracks
2) Splines for deformation or abnormal wear
3) Joints for non-smooth operation or abnormal noise
4) Center bearing for free play, noise or non-smooth operation
5) Oil seals for abnormal wear or damage
6) Center bearing for breakage or damage to rubber boot

E: INSTALLATION

NOTE:
Be careful not to damage rubber boot (installed at DOJ) while installing propeller shaft.

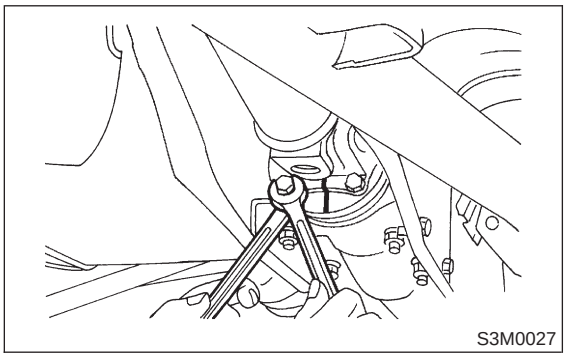
1) Insert sleeve yoke into transmission and attach center bearing to vehicle body.

Tightening torque:
52±5 N·m (5.3±0.5 kg-m, 38.3±3.6 ft-lb)


S3M0028

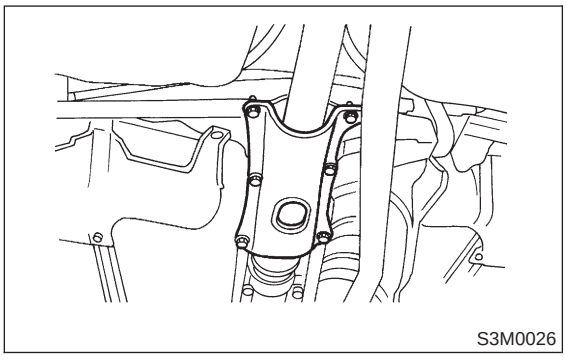
2) Align matching marks and connect flange yoke and rear differential.

Tightening torque:
31±8 N·m (3.2±0.8 kg-m, 23.1±5.8 ft-lb)

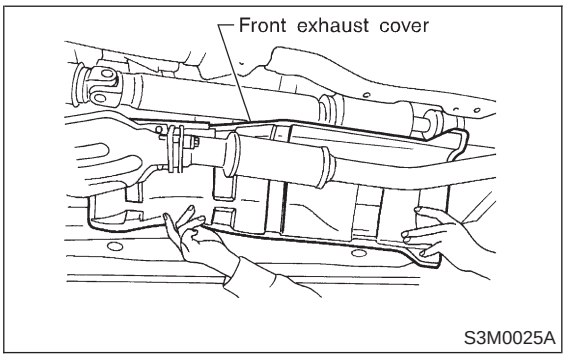

S3M0027

3) Install differential mount front cover.

Tightening torque:
88±10 N·m (9.0±1.0 kg-m, 65±7 ft-lb)


S3M0026

4) Install front exhaust cover.



S3M0025A

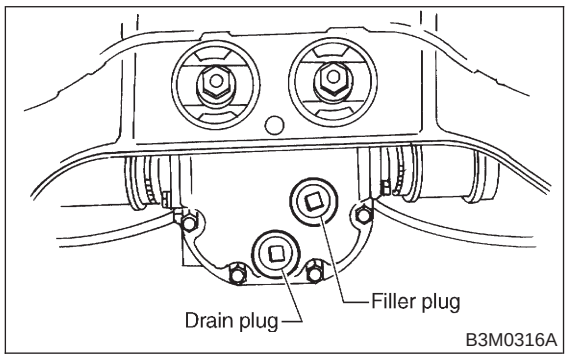
5) Install rear exhaust pipe and muffler.

2. Rear Differential

A: ON-CAR SERVICE

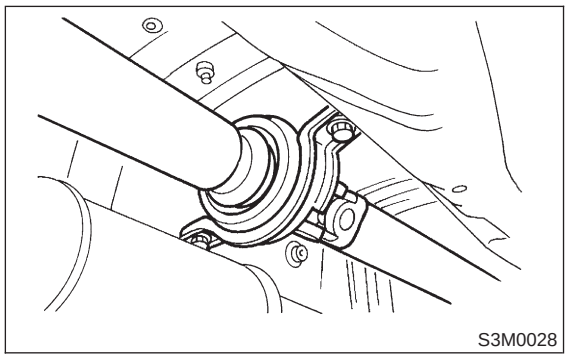
1. FRONT OIL SEAL

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Remove oil drain plug, and drain gear oil.

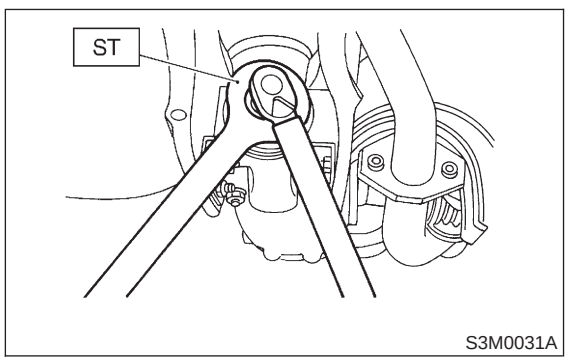


5) Jack-up rear wheels and support the vehicle body with sturdy racks.
6) Remove propeller shaft from body. <Ref. to 3-4 [W1B0].>

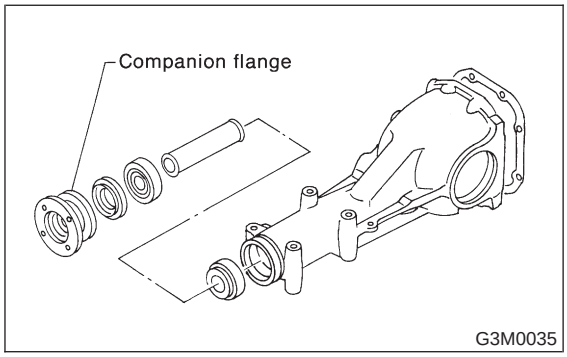
CAUTION:
Wrap metal parts with a cloth or rubber material to prevent damage from adjacent metal parts.



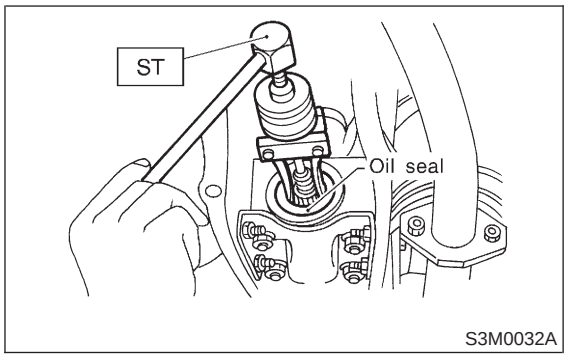
7) Remove self-locking nut while holding companion flange with ST.
ST 498427200 FLANGE WRENCH



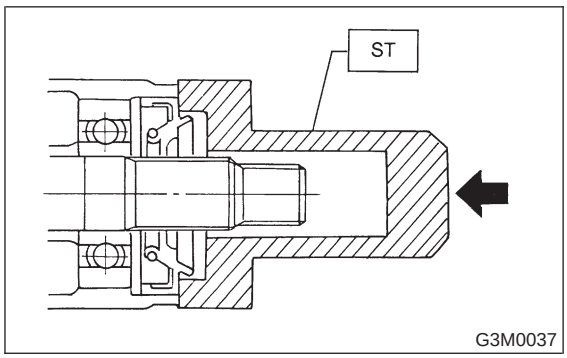
8) Extract companion flange with a puller.



9) Remove oil seal using ST.
ST 499705401 PULLER ASSY



10) Fit a new oil seal using ST.
ST 498447120 OIL SEAL INSTALLER



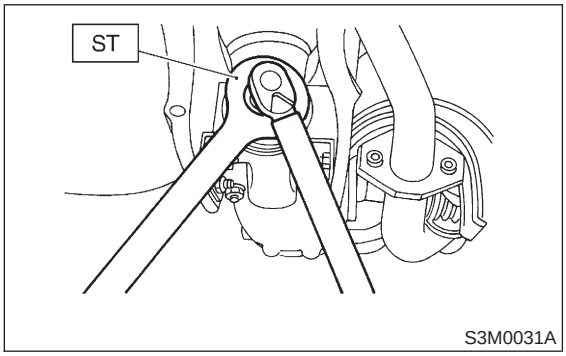
11) Install companion flange.

12) Tighten self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that before replacing oil seal.

CAUTION:
Use a new self-locking nut.

ST 498427200 FLANGE WRENCH

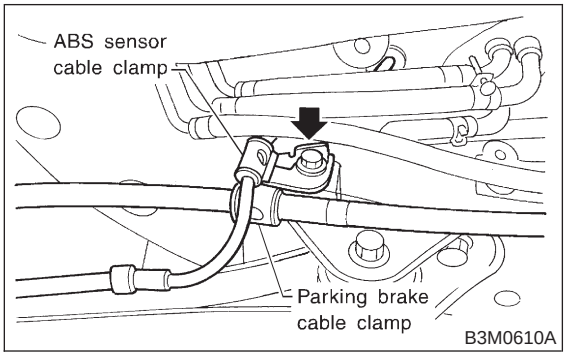
Tightening torque:
181.4±14.7 N·m (18.50±1.50 kg-m, 133.8±10.8 ft-lb)



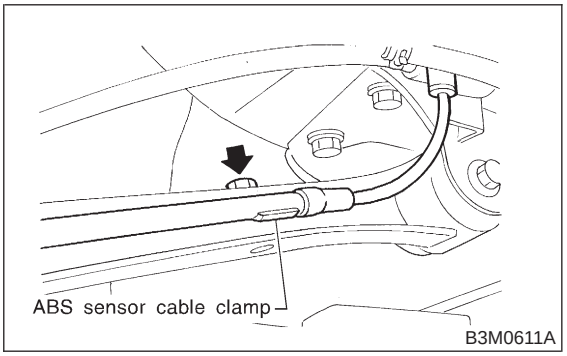
13) Reassembling procedure hereafter is the reverse of the disassembling.

2. SIDE OIL SEAL

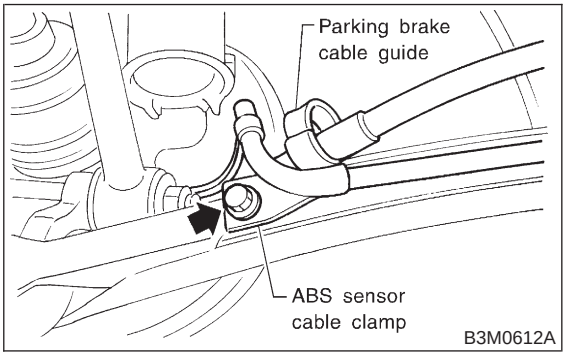
1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen both wheel nuts.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove wheels.
7) Remove muffler. <Ref. to 2-9 [W4A0].>
8) Remove the ABS sensor cable clamp and parking brake cable clamp from bracket.



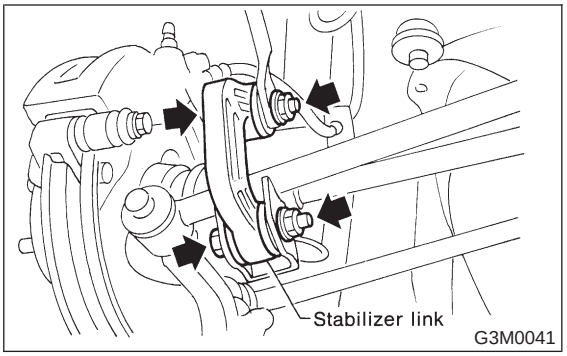
9) Remove the ABS sensor cable clamp from the trailing link.



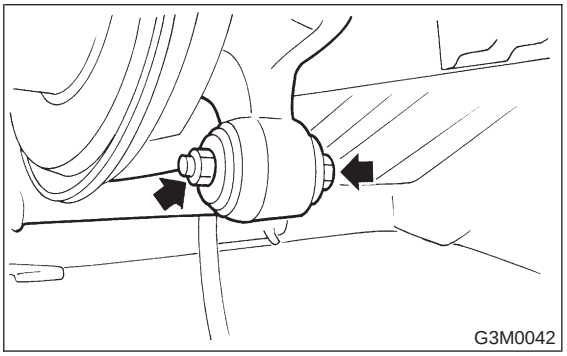
10) Remove the ABS sensor cable clamp and parking brake cable guide from the trailing link.



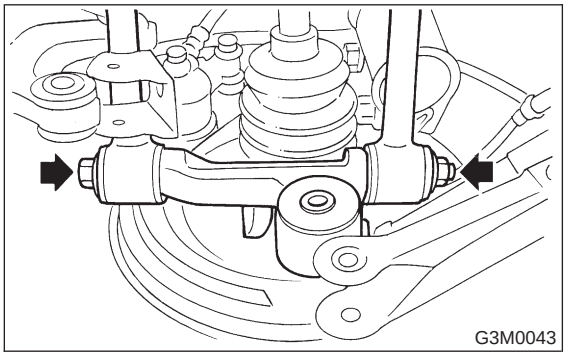
11) Remove the rear stabilizer link.



12) Remove the bolts which secure the trailing link to the rear housing.



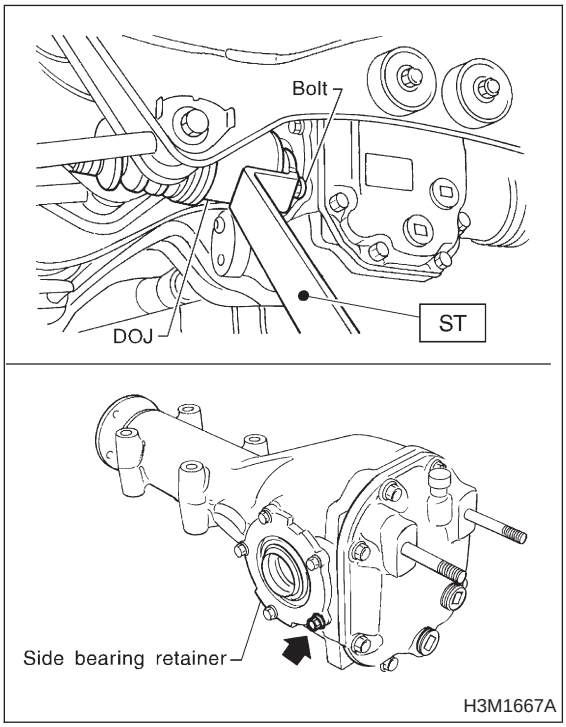
13) Remove the bolts which secure the front and rear lateral link to the rear housing.



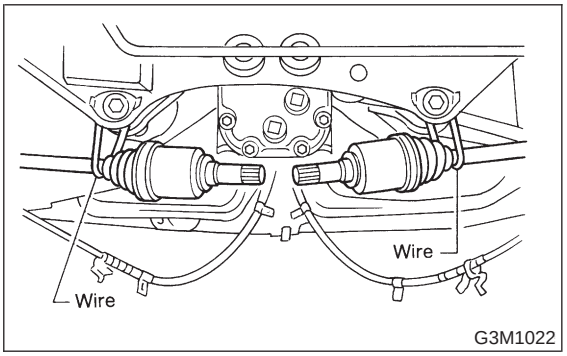
14) Remove the DOJ from the rear differential by using ST.

CAUTION:
When removing the DOJ from the rear differential, fit ST to the bolt as shown in figure so as not to damage the side bearing retainer.

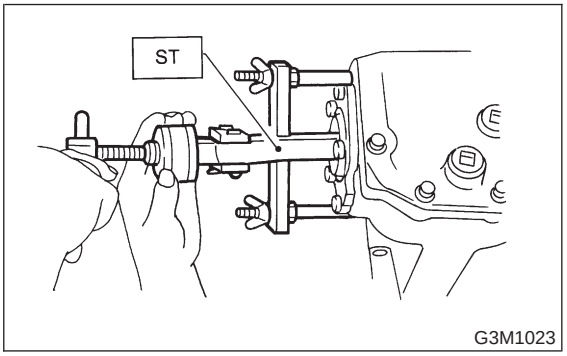
ST 208099PA100 DRIVE SHAFT REMOVER



15) Secure rear drive shaft to rear crossmember using wire.



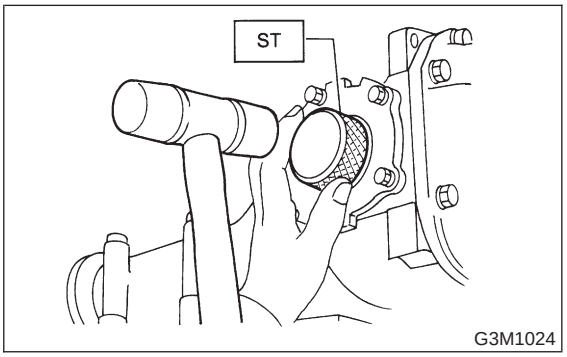
16) Remove side oil seal with ST.
ST 398527700 PULLER ASSY



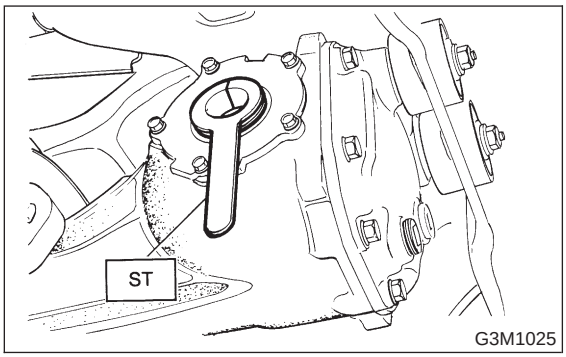
17) Drive in a new side oil seal with ST.

CAUTION:
Apply chassis grease between the oil seal lips.

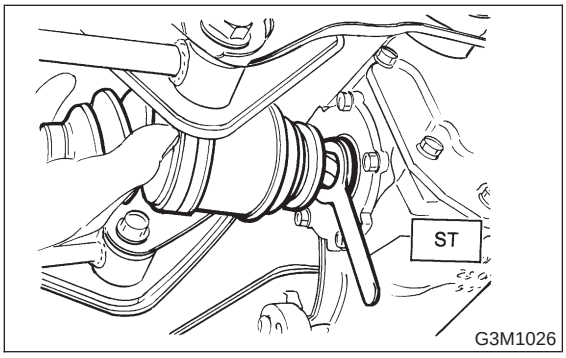
ST 398437700 DRIFT



18) Install ST to rear differential.
ST 28099PA090 SIDE OIL SEAL PROTECTOR



19) Insert the spline shaft until the spline portion is inside the side oil seal.
ST 28099PA090 SIDE OIL SEAL PROTECTOR

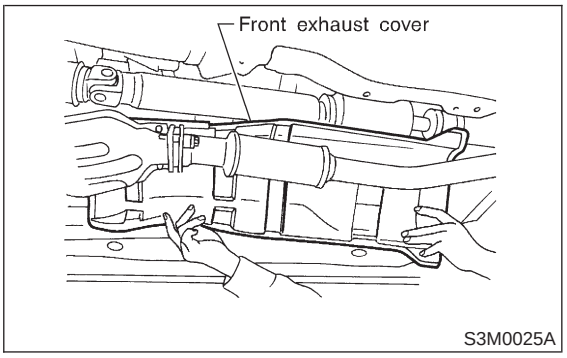


20) Remove ST.
ST 28099PA090 SIDE OIL SEAL PROTECTOR
21) Hereafter, re-assemble in reverse order of disassembly.

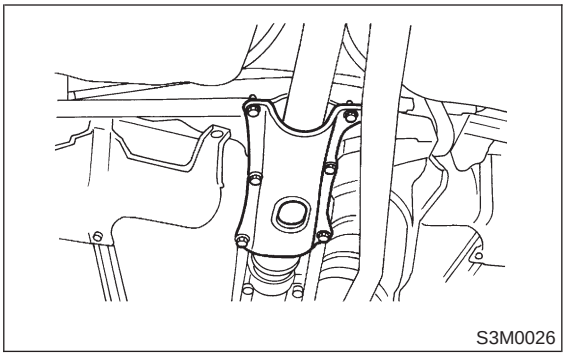
B: REMOVAL

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen wheel nuts.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove wheels.
7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].>, <Ref. to 2-9 [W4A0].>

8) Remove front exhaust cover.



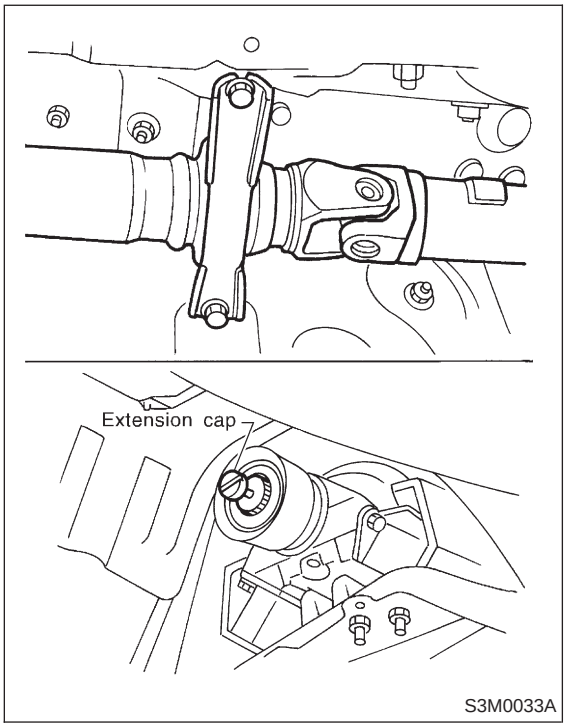
9) Remove front cover of rear differential mount.



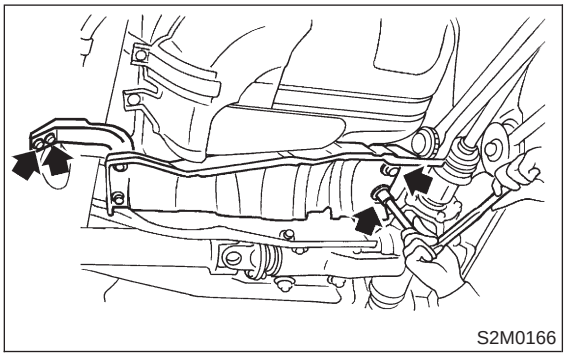
10) Remove propeller shaft.

CAUTION:
When removing propeller shaft, pay attention not to damage the sliding surfaces of rear drive shaft (extension) spline, oil seal and sleeve yoke.

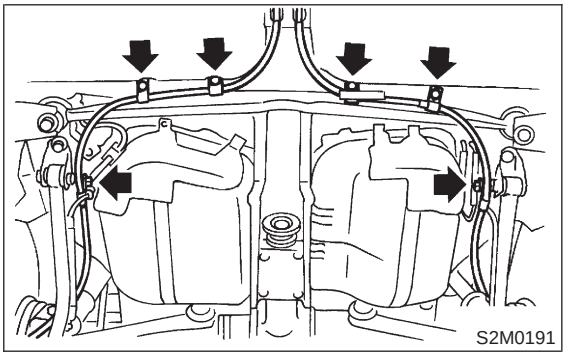
NOTE:
● Prepare an oil can and cap since the transmission oil flows out from the extension at removing propeller shaft.
● Insert the cap into the extension to prevent transmission oil from flowing out immediately after removing the propeller shaft.



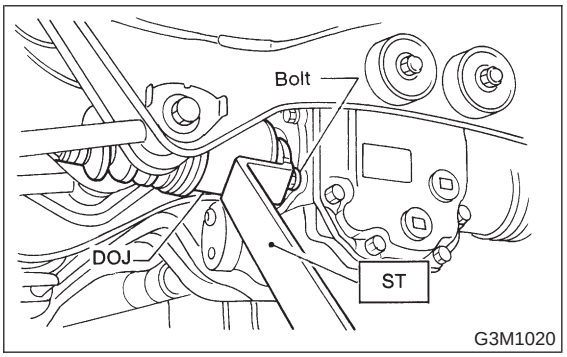
11) Remove heat sealed cover.



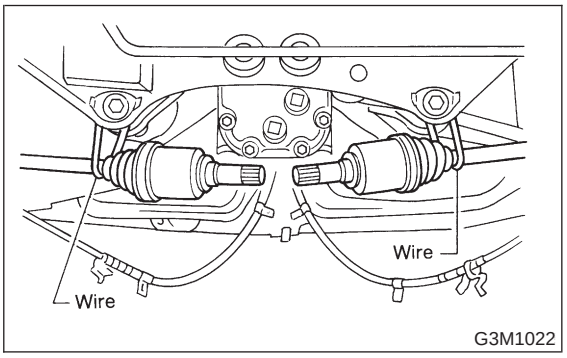
12) Remove clamps and bracket of parking brake cable.



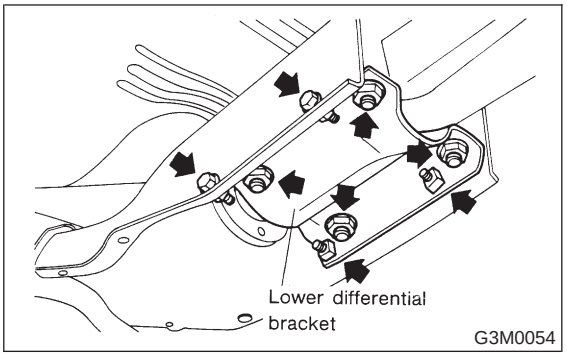
13) Remove DOJ of rear drive shaft from rear differential using ST. <Ref. to 3-4 [W2A2].>
ST 28099PA100 DRIVE SHAFT REMOVER



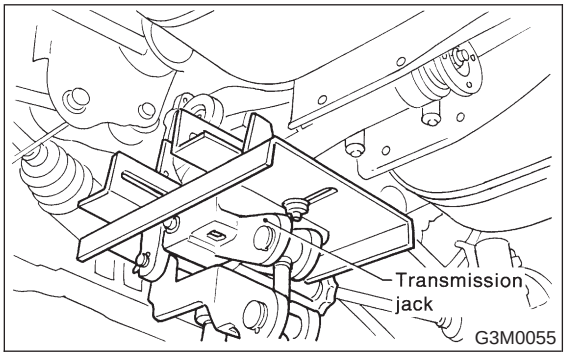
14) Secure rear drive shaft to rear crossmember using wire.



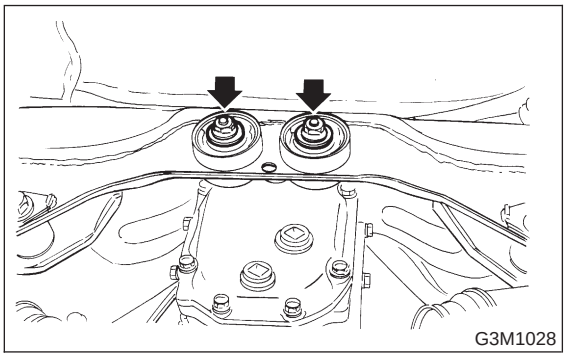
15) Remove lower differential bracket.



16) Support rear differential with transmission jack.



17) Remove self-locking nuts connecting rear differential to rear crossmember.

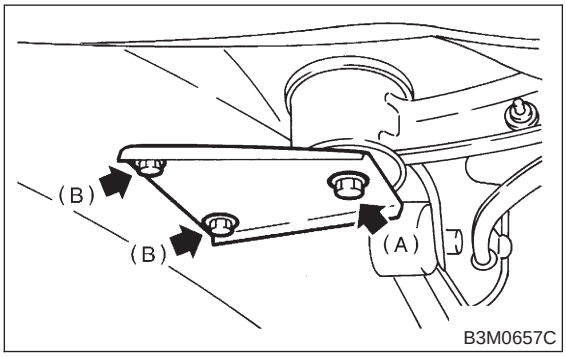


18) Remove bolts which secure rear differential front member to body.

(1) Loosen bolt A first, then remove bolts B.

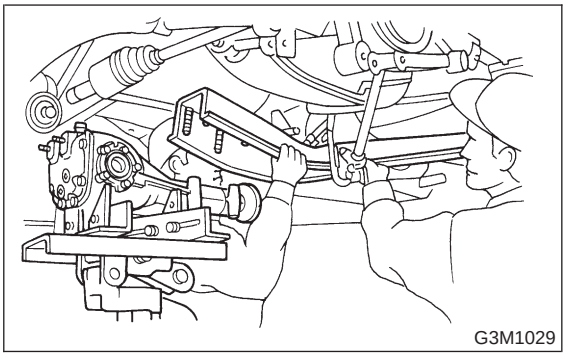
NOTE:
Support front member with the use of a helper to prevent it from dropping.

(2) Remove bolt A.

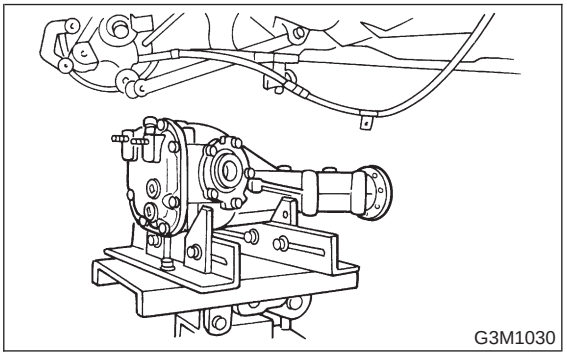


(A) Bolt A
(B) Bolt B

19) While slowly lowering transmission jack, move rear differential forward and remove front member and rear differential from body.



20) Remove rear differential from front member.

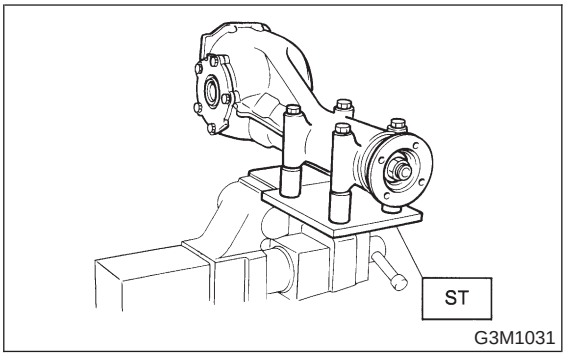


C: DISASSEMBLY

NOTE:
To detect real cause of trouble, inspect the following items before disassembling. <Ref. to 3-4 [W2E0].>

- Tooth contact of crown gear and pinion, and backlash
- Runout of crown gear at its back surface
- Turning resistance of drive pinion

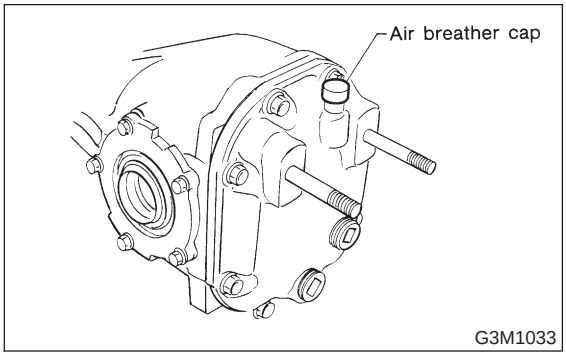
1) Set ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT



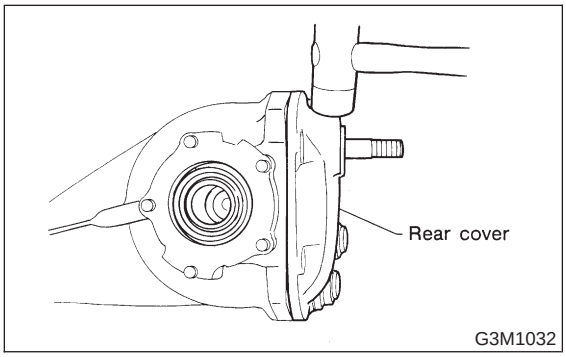
2) Drain gear oil by removing plug.

3) Remove the air breather cap.

NOTE:
Do not attempt to replace the air breather cap unless necessary.



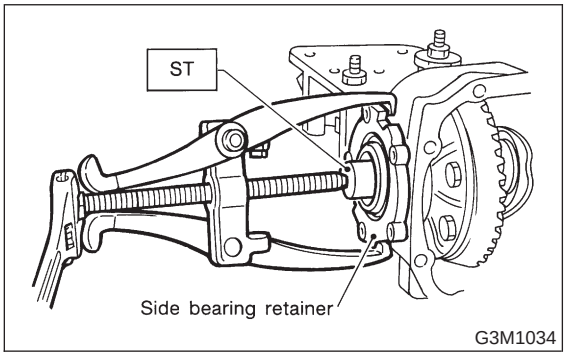
4) Remove rear cover by loosening retaining bolts.



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.

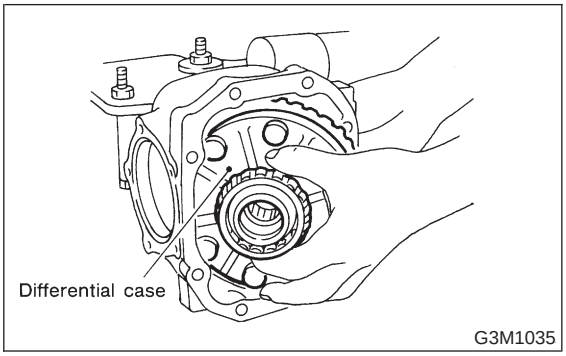
CAUTION:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT

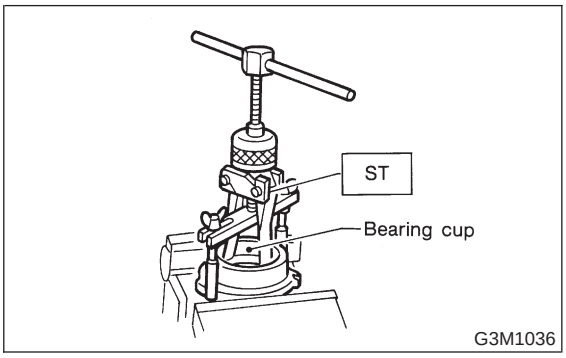


6) Pull out differential assembly from differential carrier.

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

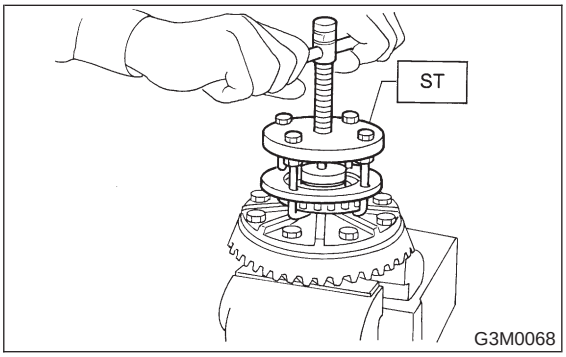


8) Extract bearing cone with ST.

CAUTION:
Do not attempt to disassemble the parts unless necessary.

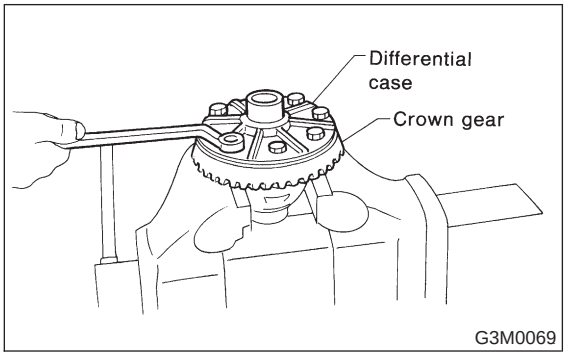
NOTE:
- Set puller so that its claw catch the edge of the bearing cone.
- Never mix up the right and left hand bearing cups and cones.

ST 399527700 PULLER SET



9) Remove crown gear by loosening crown gear bolts.

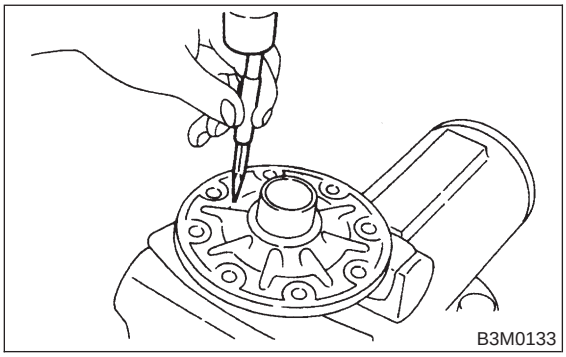
CAUTION:
Further disassembling is not allowed.



10) Drive out pinion shaft lock pin from crown gear side.

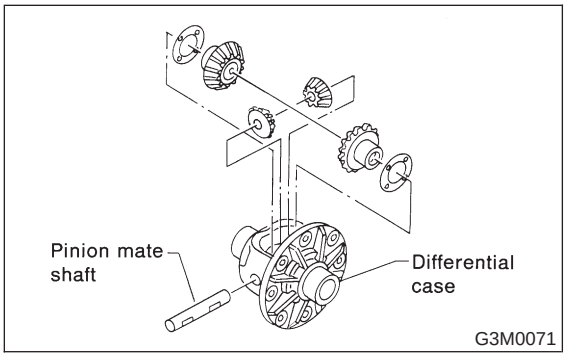
NOTE:
The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER

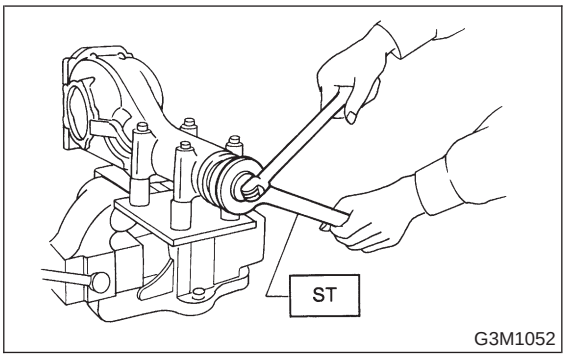


11) Draw out pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

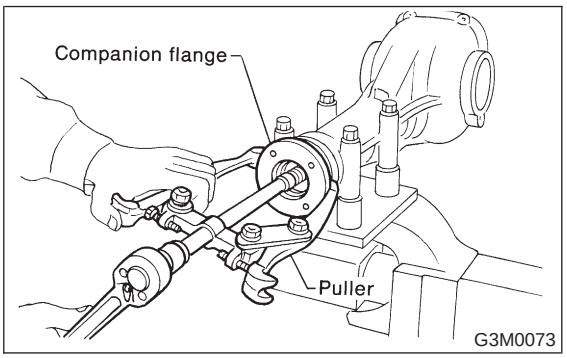
NOTE:
The gears as well as thrust washers should be marked or kept separated left and right, and front and rear.



12) Hold companion flange with ST and remove drive pinion nut.
ST 498427200 FLANGE WRENCH



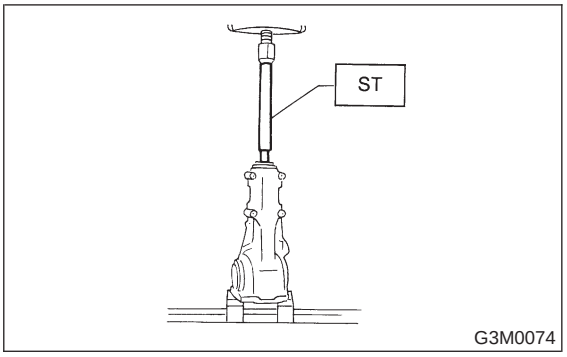
13) Extract the companion flange with a puller.



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.

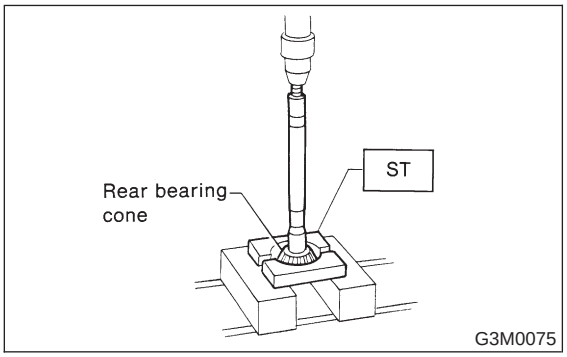
ST 398467700 DRIFT



15) Remove rear bearing cone from drive pinion by supporting cone with ST.

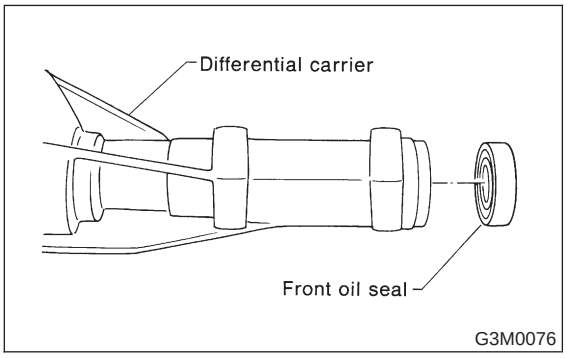
NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER



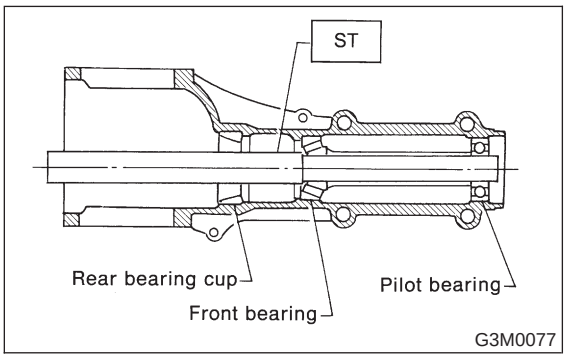
16) Remove front oil seal from differential carrier using ST.

ST 398527700 PULLER ASSY

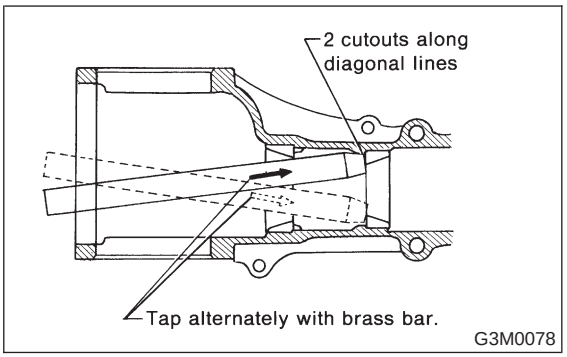


17) Remove pilot bearing together with front bearing cone using ST.

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.

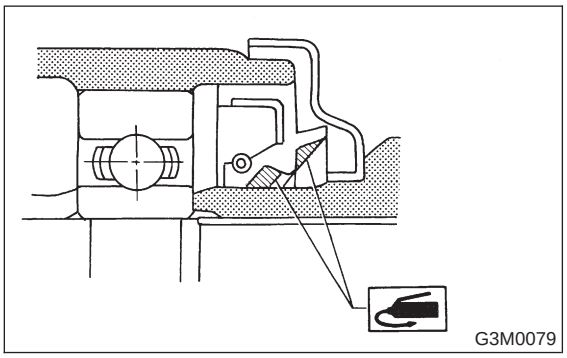
7) Differential case
Replace if its sliding surfaces are worn or cracked.

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.

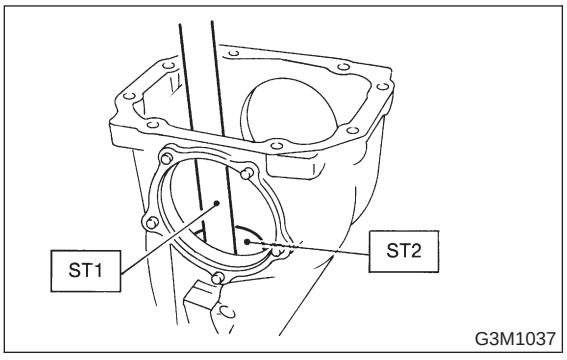
● Keep the shims and washers in order, so that they are not misinstalled.
● Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
● Apply gear oil when installing the bearings and thrust washers.
● Be careful not to mix up the right and left hand cups of the bearings.
● Replace the oil seal with new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.


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 washers are not affected by this adjustment. The adjustment must be carried out without the oil seal inserted.

(1) Press rear bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 398427703 DRIFT 2



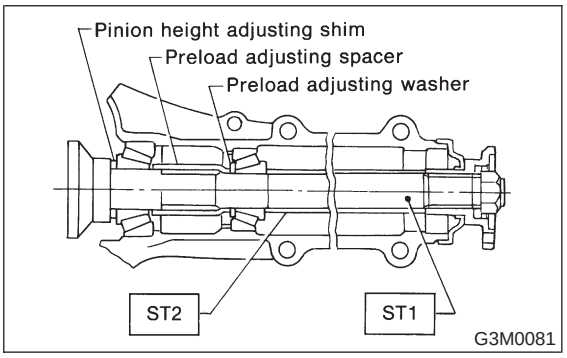
G3M1037

(2) Insert ST1 into case with pinion height adjusting washer and rear bearing cone fitted onto it.

CAUTION:
● **Re-use the used washer if not deformed.**
● **Use a new rear bearing cone.**

(3) Then install preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



G3M0081

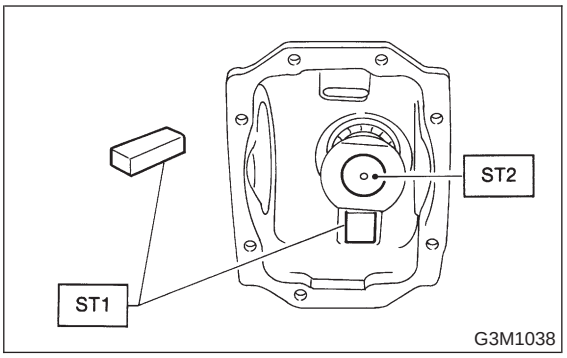
(4) Turn ST1 with hand to make it seated, and tighten drive pinion nut while measuring the preload with spring balance. Select preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque with ST2.

ST1 398507704 BLOCK
ST2 398507702 DUMMY SHAFT

CAUTION:
Use a new lock nut.

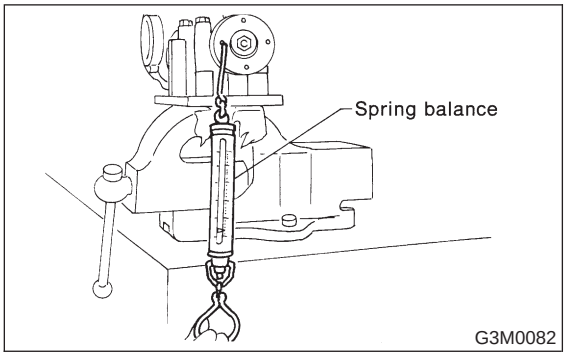
NOTE:
● Be careful not to give excessive preload.
● When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.

Tightening torque:
181±15 N·m (18.5±1.5 kg-m, 134±11 ft-lb)



G3M1038

Front and rear bearing preload
For new bearing: 17.7 — 25.5 N (1.8 — 2.6 kg, 4.0 — 5.7 lb) at companion flange bolt hole



	Part No.	Thickness mm (in)
● Preload adjusting washer	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
	Part No.	Length mm (in)
● Preload adjusting spacer	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

3) Adjusting drive pinion height

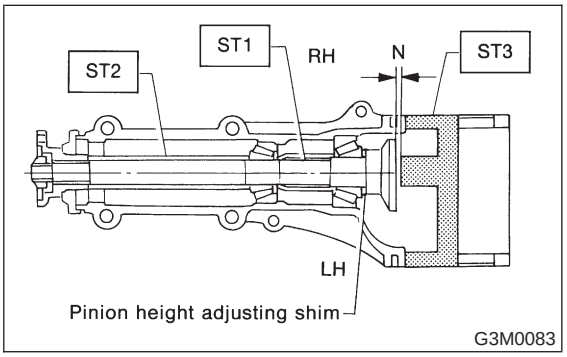
Adjust drive pinion height with shim installed between rear bearing cone and the back of pinion gear.

(1) Install ST1, ST2 and ST3, as shown in the figure, and apply the specified preload on the bearings.

Front and rear bearing preload
For new bearing: 17.7 — 25.5 N (1.8 — 2.6 kg, 4.0 — 5.7 lb) at companion flange bolt hole

Adjust preload for front and rear bearings.

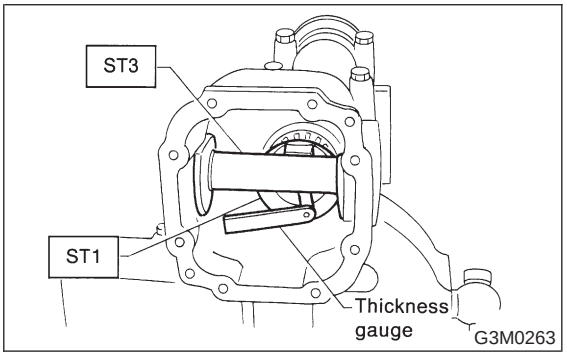
NOTE:
At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before.



(2) Measure the clearance N between the end of ST3 and the end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST3.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR
ST3 398507701 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting shim to be inserted from the following formula, and replace the temporarily installed shim with this one.

$T = To + N - (H \times 0.01) - 0.20$ (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,

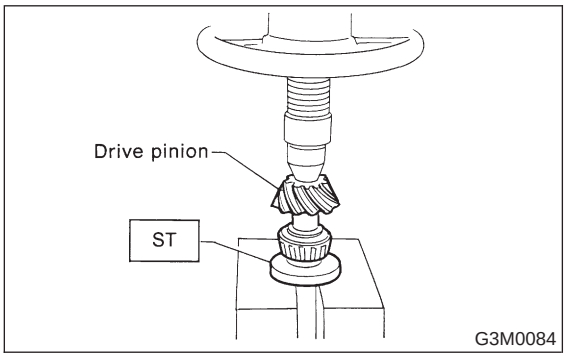
T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42

Result: Thickness = 3.42 mm

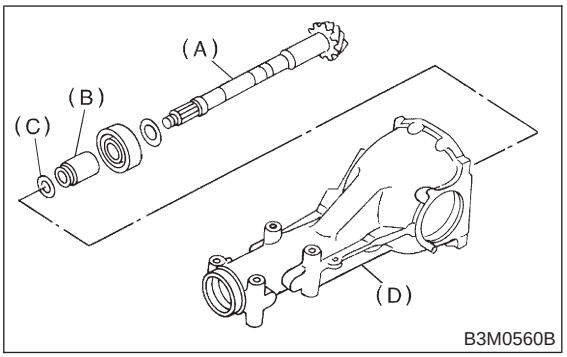
Therefore use the shim 383605200.

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

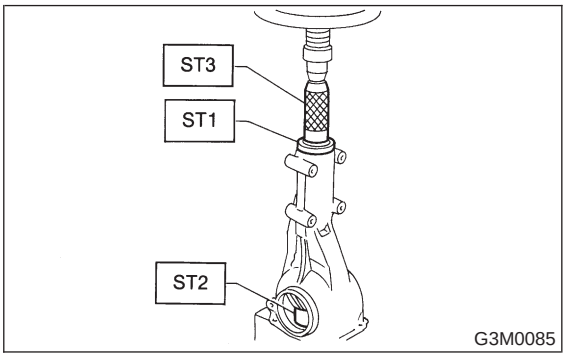


5) Insert drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

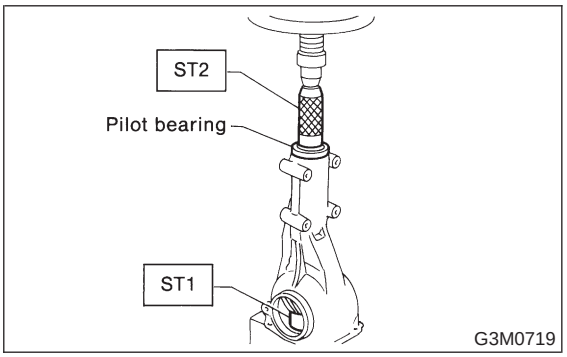


(A) Drive pinion
(B) Bearing preload adjusting spacer
(C) Washer
(D) Differential carrier

6) Press-fit front bearing cone into case with ST1, ST2 and ST3.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



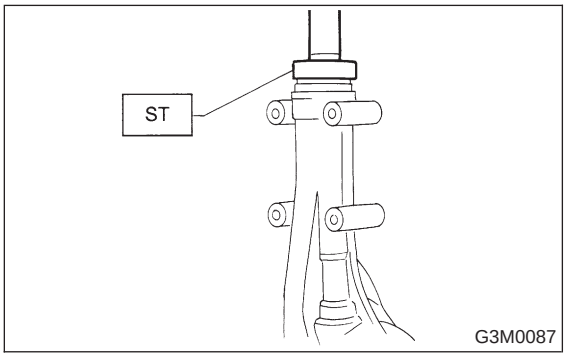
7) Insert spacer, then press-fit pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



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. <Ref. to 3-4 [W2E0].>

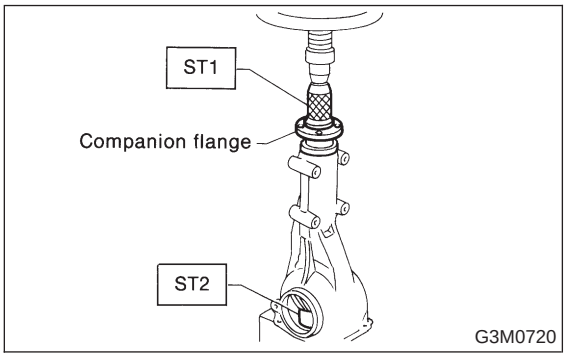
ST 498447120 OIL SEAL INSTALLER



9) Press-fit companion flange with ST1 and ST2.

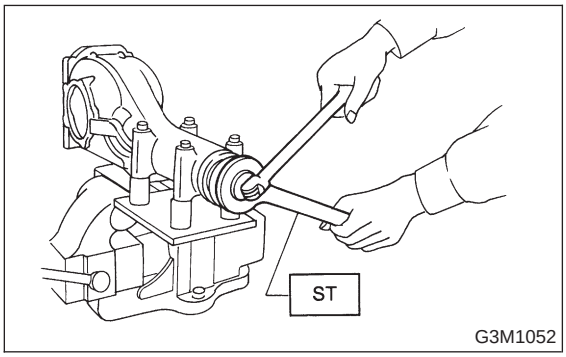
CAUTION:
Be careful not to damage bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



10) Install self-locking nut. Then tighten it with ST.
ST 498427200 FLANGE WRENCH

Tightening torque:
181±15 N·m (18.5±1.5 kg-m, 134±11 ft-lb)



11) Assembly of differential case
12) Install side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

CAUTION:
● Apply gear oil on both sides of the washer and on the side gear shaft before installing.
● Insert the pinion mate shaft into the differential case by aligning the lock pin holes.

(1) Measure the clearance between differential case and the back of side gear.
(2) Adjust the clearance as specified by selecting side gear thrust washer.

Side gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)
383445204	0.90 — 0.95 (0.0354 — 0.0374)
383445205	0.95 — 1.0 (0.0374 — 0.0394)

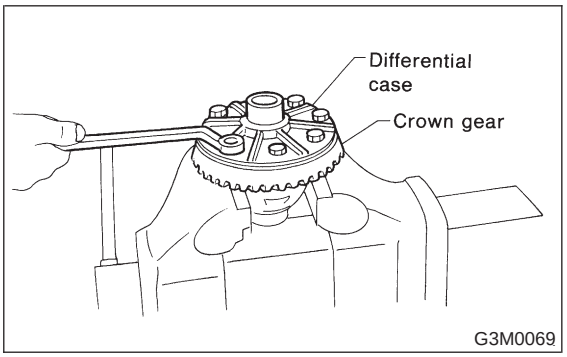
(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After inserting pinion shaft lock pin into differential case, stake the both sides of the hole to prevent pin from falling off.
(5) Install crown gear on differential case.

CAUTION:
Before installing bolts, apply Lock Tite to bolt threads.

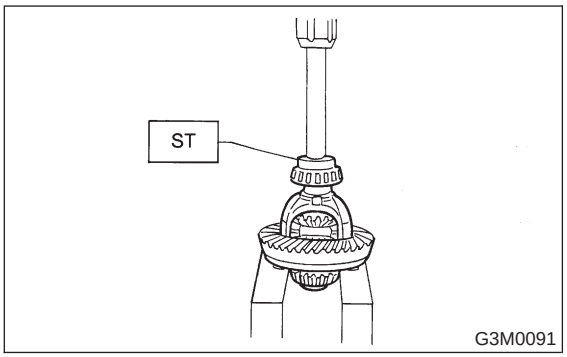
Lock Tite:
THREE BOND 1324 or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

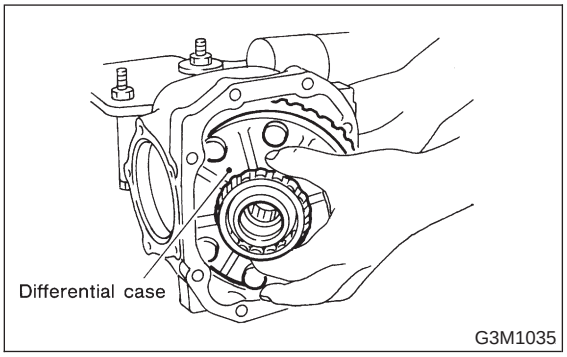
Tightening torque:
103±10 N·m (10.5±1.0 kg-m, 76±7 ft-lb)



13) Press side bearing cone onto differential case with ST1.
ST1 398487700 DRIFT



14) Adjusting side bearing retainer shims
(1) TThe 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.



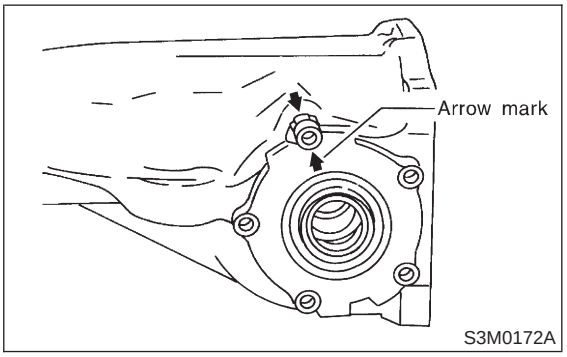
(3) Install side retainer shims and O-rings to the left and right retainers from which they were removed.

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.

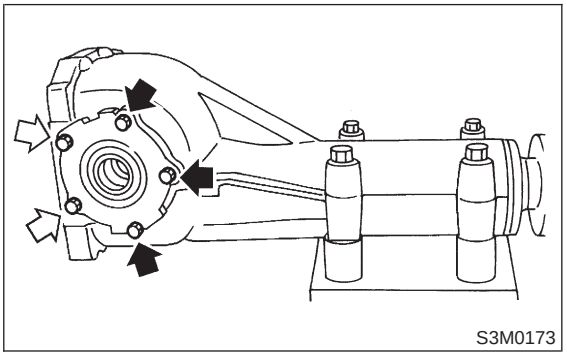


(5) Tighten side bearing retainer bolts.

CAUTION:
Before tightening the two side bearing retainer bolts, apply Lock Tite to bolt threads.

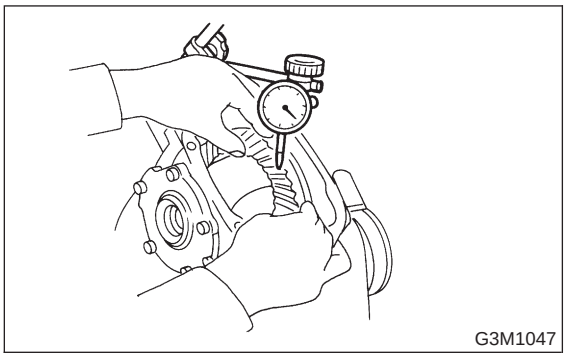
⇨ ***Lock Tite:***
THREE BOND 1105 or equivalent

Tightening torque:
10.13±1.5 N·m (1.05±0.15 kg-m, 7.6±1.1 ft-lb)



(6) Measure the crown gear-to-drive pinion backlash.
Set magnet base on differential carrier. Align contact point of dial gauge with tooth face of crown gear, and move crown gear while holding drive pinion still. Read value indicated on dial gauge.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



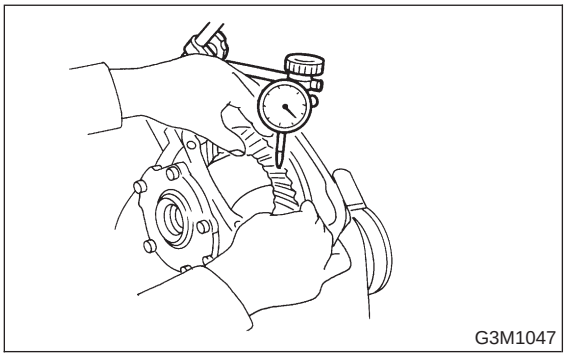
(7) At the same time, measure the turning resistance of drive pinion. Compared with the resistance when differential case is not installed, if the increase of the resistance is not within the specified range, readjust side bearing retainer shims.

NOTE:
If measured backlash is not within specified range, repeat procedure for adjustment of side bearing retainer shims.

Turning resistance increase:
2.9 — 10.8 N (0.3 — 1.1 kg, 0.7 — 2.4 lb)

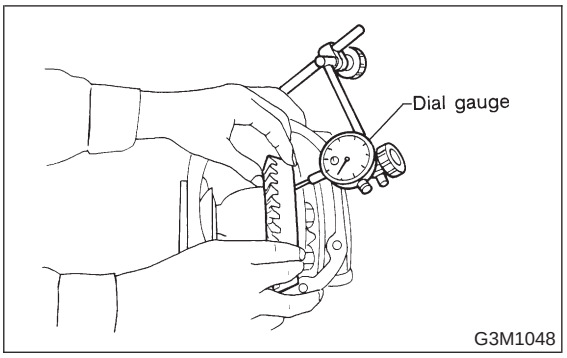
15) Re-check crown gear-to-pinion backlash.

Backlash:
.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)

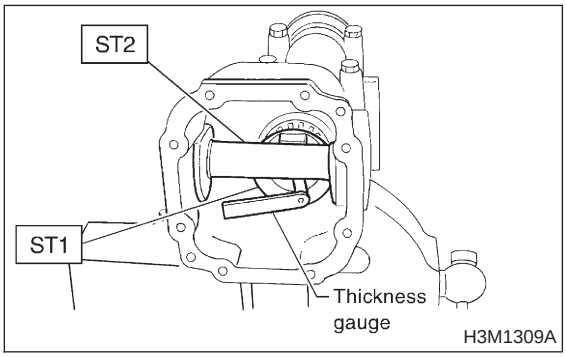
Where:

T = Thickness of pinion height adjusting shim (mm)

To = Thickness of shim temporarily inserted (mm)

N = Reading of thickness gauge (mm)

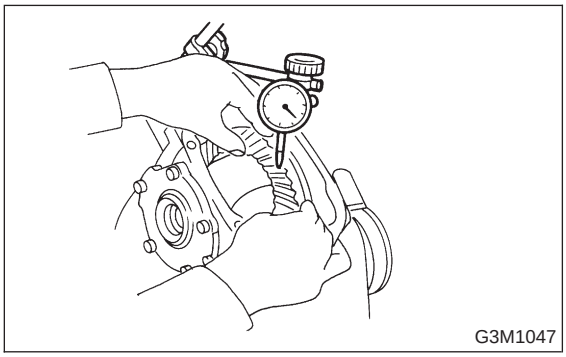
H = Figure marked on drive pinion head



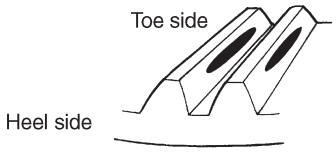
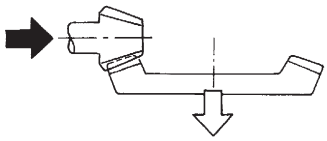
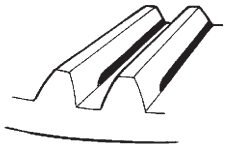
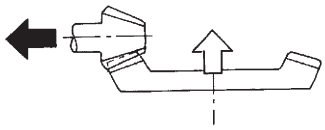
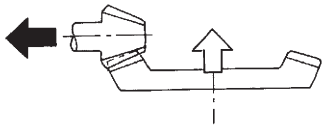
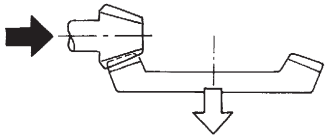
(2) Hypoid gear backlash

Backlash:

0.10 — 0.20 mm (0.0039 — 0.0079 in)

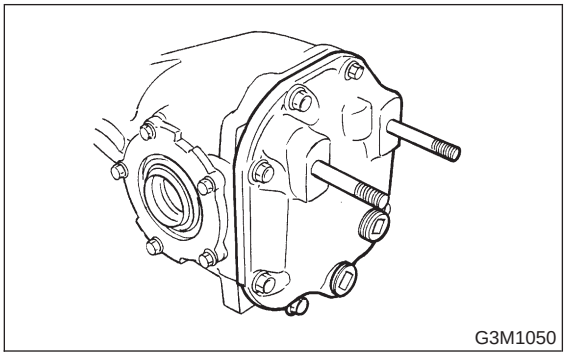


➡ : Adjusting direction of drive pinion
⇨ : Adjusting direction of crown gear

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.)	 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 closer to crown gear center.  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 Contact area is small.	This may cause chipping at toe ends.  B3M0321	Adjust as for flank contact.  B3M0324
Heel contact Contact area is small.	This may cause chipping at heel ends.  B3M0322	Adjust as for face contact.  B3M0323

19) Install rear cover and tighten bolts to specified torque.

Tightening torque:
29±5 N·m (3.0±0.5 kg-m, 21.7±3.6 ft-lb)


G3M1050

F: INSTALLATION

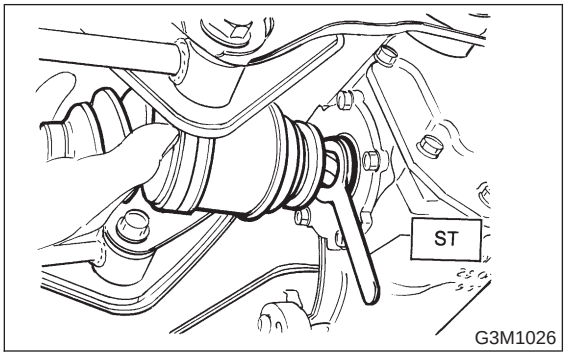
To install, reverse the removal sequence.
1) Install the air breather cap tapping with a plastic hammer.

CAUTION:
Be sure to install new air breather cap.

2) Position front member on body by passing it under parking brake cable and securing to rear differential.

NOTE:
When installing rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

3) Install DOJ of rear drive shaft into rear differential.
<Ref. to 3-4 [W2F0].>
ST 28099PA090 SIDE OIL SEAL PROTECTOR



G3M1026

4) Installing procedure hereafter is in the reverse order of removal.

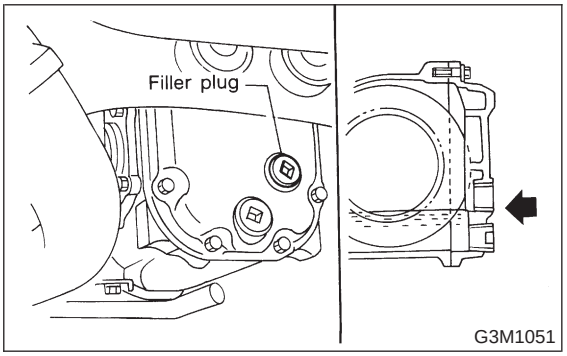
5) After installation, fill differential carrier with gear oil to the upper plug level.

CAUTION:
Apply fluid packing to plug.

Fluid packing:
THREE BOND 1205 or equivalent

Oil capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)

Tightening torque:
44±4 N·m (4.5±0.4 kg-m, 32.5±2.9 ft-lb)



G3M1051

3. Rear Differential Front Member

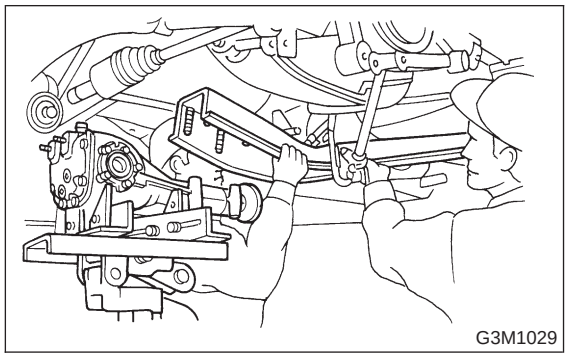
A: REMOVAL

1) Disconnect ground cable from battery.
2) Move selector lever or gear shift lever to “N”.
3) Release the parking brake.
4) Loosen wheel nuts.
5) Jack-up vehicle and support it with sturdy racks.
6) Remove wheels.
7) Remove rear exhaust pipe and muffler.
<Ref. to 2-9 [W3A0].>, <Ref. to 2-9 [W4A0].>
8) Remove rear differential front member.

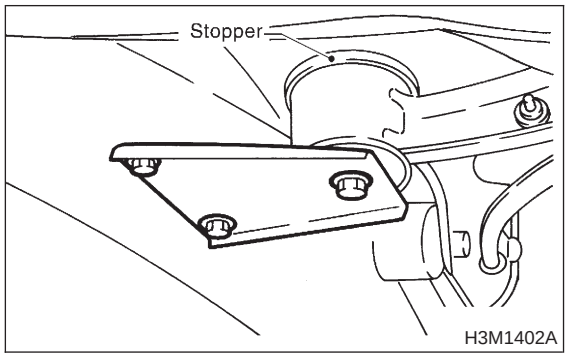
NOTE:
When removing rear differential front member, work the removal procedure as rear differential.
<Ref. to 3-4 [W2B0].>

B: INSTALLATION

To install, reverse the removal sequence.
1) Position front member on body by passing it under parking brake cable and securing to rear differential.


G3M1029

NOTE:
When installing rear differential front member, do not confuse the installation sequence of the stopper.

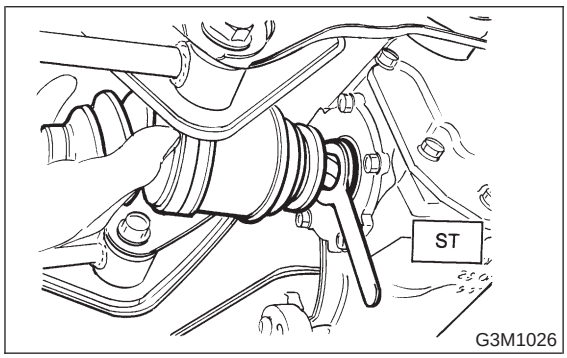


H3M1402A

2) Insert DOJ of rear drive shaft into rear differential.

CAUTION:
Before inserting, replace the differential side oil seal and the circlip at the end of the spline shaft with a new one.

ST 28099PA090 SIDE OIL SEAL PROTECTOR



G3M1026

3) Installing procedure hereafter is in the reverse order of removal.

1. Propeller Shaft

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptom	Possible cause	Remedy
1. Vibration of propeller shaft NOTE: Vibration is caused by propeller shaft during operation and is transferred to vehicle body. Generally vibration increase in proportion to vehicle speed.	(1) Worn or damaged universal joint/ DOJ.	Replace.
	(2) Unbalanced propeller shaft due to bend or dent.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Worn or damaged center bearing and damaged center mounting rubber.	Replace.
2. Tapping when starting and noise while cruising, caused by propeller shaft.	(1) Worn or damaged universal joint/ DOJ.	Replace.
	(2) Worn spline of sleeve yoke.	Replace.
	(3) Loose installation of propeller shaft.	Retighten.
	(4) Loose installation of joint.	Replace.
	(5) Worn or damaged center bearing and damaged center mounting rubber.	Replace.

2. Rear Differential

Symptom	Possible cause	Remedy
1. Oil leakage	(1) Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
	(2) Clogged or damaged air breather.	Clean, repair or replace.
	(3) Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten bolts to specified torque. Replace O-ring.
	(4) Loose rear cover attaching bolts or damaged gasket.	Tighten bolts to specified torque. Replace gasket and apply liquid packing.
	(5) Loose oil filler or drain plug.	Retighten and apply liquid packing.
	(6) Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Repair or replace.
2. Seizure NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Insufficient backlash for hypoid gear.	Readjust or replace.
	(2) Excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.
3. Damage NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Improper backlash for hypoid gear.	Replace.
	(2) Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(4) Loose bolts and nuts such as crown gear bolt.	Retighten.
	(5) Damage due to overloading.	Replace.
4. Noises when starting or shifting gears NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	(1) Excessive backlash for hypoid gear.	Readjust.
	(2) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(3) Insufficient preload for front or rear bearing.	Readjust.
	(4) Loose drive pinion nut.	Tighten to specified torque.
	(5) Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	(1) Damaged differential gear.	Replace.
	(2) Excessive wear or damage of thrust washer.	Replace.
	(3) Broken pinion mate shaft.	Replace.
	(4) Seized or damaged side bearing.	Replace.
6. Gear noises NOTE: Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	(1) Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
	(2) Improper backlash for hypoid gear.	Readjust.
	(3) Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
	(4) Seized hypoid gear.	Replace hypoid gear set.
	(5) Improper preload for front or rear bearings.	Readjust.
	(6) Seized, scored, or chipped front or rear bearing.	Replace.
	(7) Seized, scored, or chipped side bearing.	Replace.
	(8) Vibrating differential carrier.	Replace.