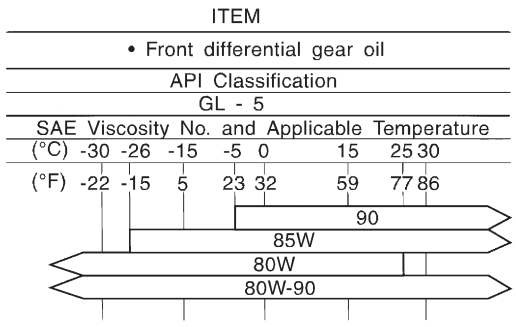
AUTOMATIC TRANSMISSION AND DIFFERENTIAL 3-2

1. Automatic Transmission and Differential

A: SPECIFICATIONS

Torque converter clutch	Type		Symmetric, 3 element, single stage, 2 phase torque converter		
	Stall torque ratio	2200 cc	2.1 — 2.3		
		2500 cc	1.8 — 2.0		
	Nominal diameter	2200 cc	236 mm (9.29 in)		
		2500 cc	246 mm (9.69 in)		
	Stall speed (at sea level)	2200 cc	2,200 — 2,600 rpm		
		2500 cc	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	2200 cc	2.785
				2500 cc	3.027
			2nd	2200 cc	1.545
				2500 cc	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	2200 cc	42
				2200 cc	37
			Rear pinion	2200 cc	17
				2500 cc	19
			Rear internal gear		75
		Clutch number of reverse clutch	Drive plate & driven plate		2
		Clutch number of high clutch	Drive plate & driven plate		2200 cc ... 4 2500 cc ... 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		5

Automatic transmission	Transmission	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 ←→ 2nd ←→ 3rd ←→ 4th
				3 (3rd)	Automatic gear change 1st ←→ 2nd ←→ 3rd ← 4th
				2 (2nd)	2nd gear locked (Deceleration possible 4th → 3rd → 2nd)
				1 (1st)	1st gear locked (Deceleration possible 4th → 3rd → 2nd → 1st)
		Control method		Hydraulic remote control	
	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	2200 cc	7.9 ℓ (8.4 US qt, 7.0 Imp qt)	
			2500 cc	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		FWD ... 11 poles AWD ... 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.	
		1st reduction gear ratio		1.000 (53/53)	

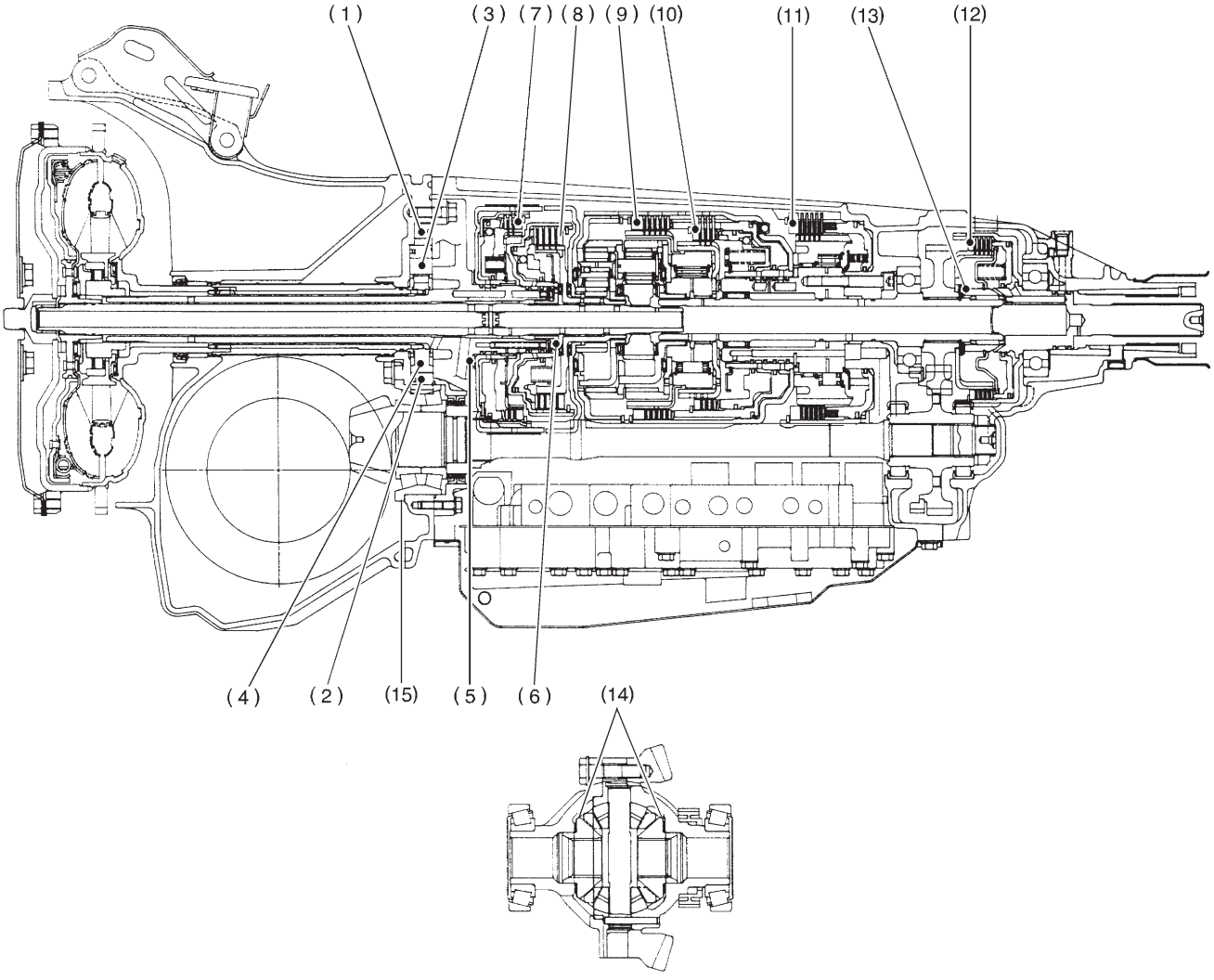
<table>
<tr><td rowspan="7">Final reduction</td><td rowspan="2">Final gear ratio</td><td rowspan="2">Front drive</td><td>2200 cc</td><td>4.111 (37/9)</td></tr>
<tr><td>2500 cc</td><td>4.444 (40/9)</td></tr>
<tr><td colspan="2" rowspan="2">Speedometer gear ratio</td><td>2200 cc</td><td>0.83 (19/23)</td></tr>
<tr><td>2500 cc</td><td>0.80 (20/25)</td></tr>
<tr><td colspan="2">Lubrication oil</td><td colspan="2"> 

H3M1235A</td></tr>
<tr><td colspan="2">Oil capacity</td><td>Front drive</td><td>1.2 ℓ (1.3 US qt, 1.1 Imp qt)</td></tr>
<tr><td colspan="2">ATF cooling system</td><td>Radiation capacity</td><td>1.977 kW (1,700 kcal/h, 6,746 BTU/h)</td></tr>
</table>

MEMO:

B: SERVICE DATA

1. ADJUSTING PARTS



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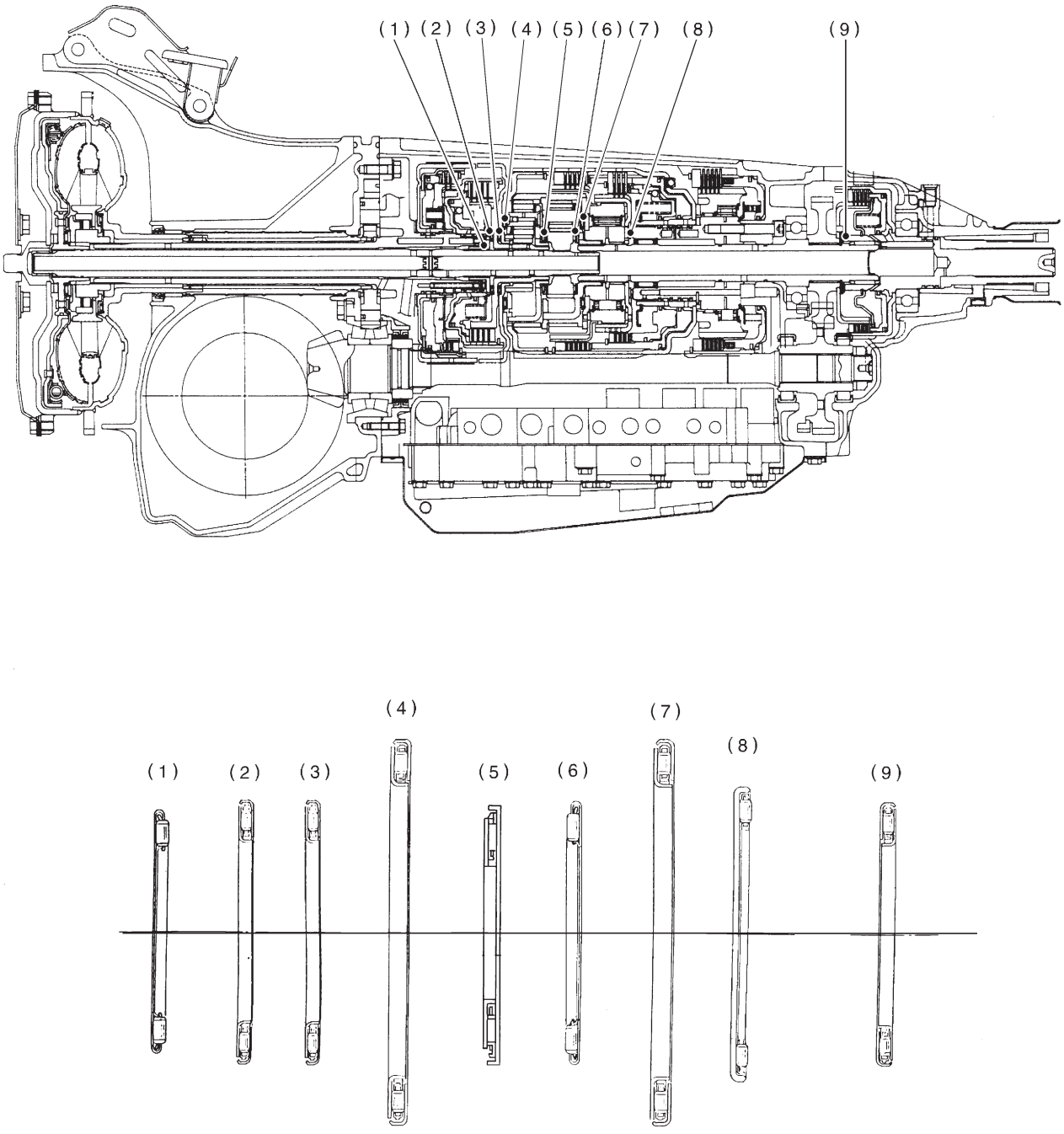
No.	Part Name		Part Number	Dimension mm (in)	Application
(1)	Control piston	2500 cc	31235AA000 — 030	$13.5^{-0.030}_{-0.037}$ ($0.5315^{-0.0012}_{-0.0015}$), $13.5^{-0.023}_{-0.030}$ ($0.5315^{-0.0009}_{-0.0012}$), $13.5^{-0.016}_{-0.023}$ ($0.5315^{-0.0006}_{-0.0009}$), $13.5^{-0.009}_{-0.016}$ ($0.5315^{-0.0004}_{-0.0006}$)	Adjusting side clearance of oil pump
		2200 cc	31235AA040 — 070		
(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 × 53 × 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 × 50 × 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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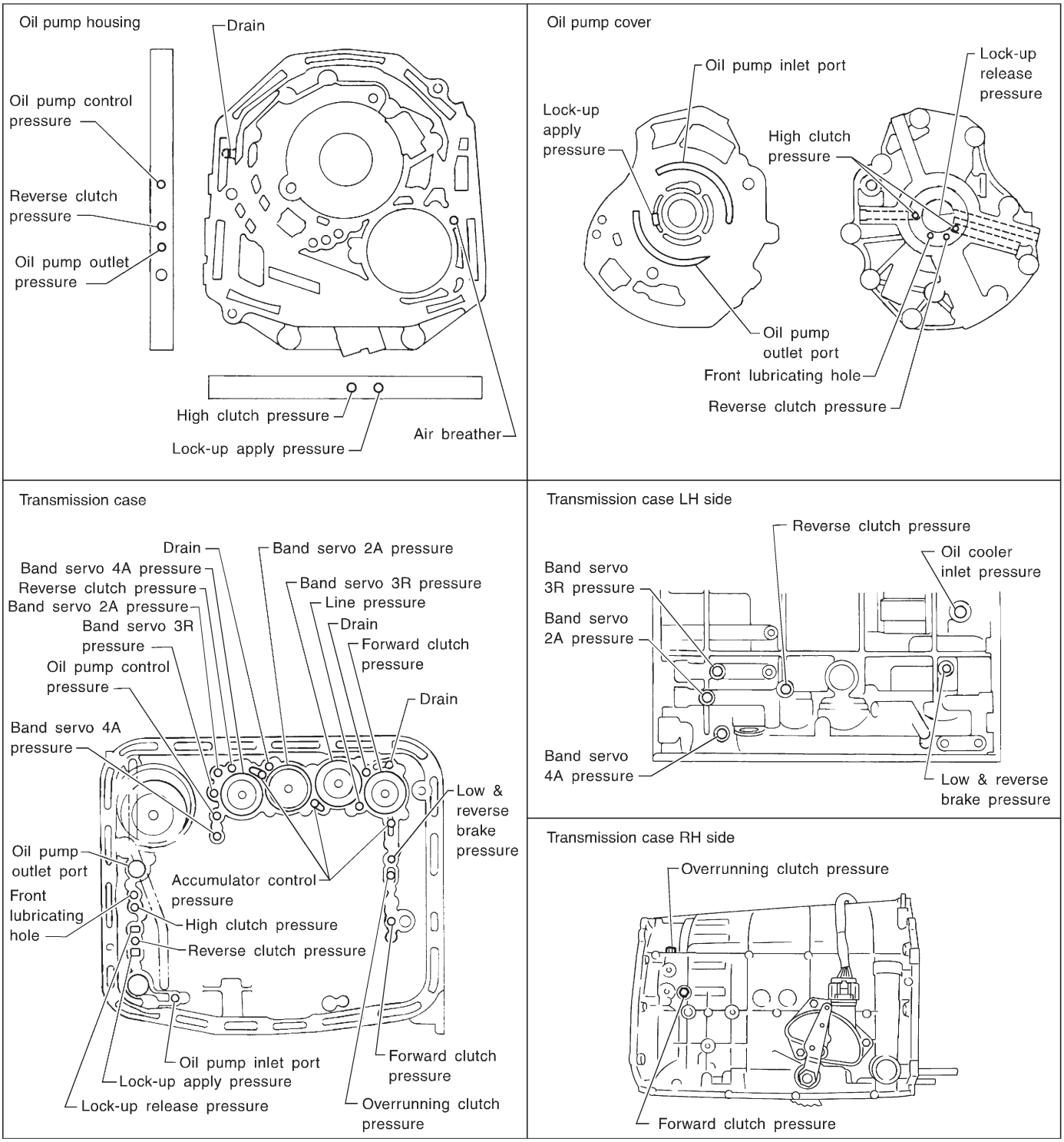
No.	Part Name	Part Number	Inside diameter mm (in)	Outside diameter mm (in)	Dimension mm (in)	Application
(1)	Thrust needle bearing	806530020	30 (1.18)	47 (1.85)	3.3 (0.130)	A place of high clutch
(2)	Thrust needle bearing	806537010	38 (1.50)	53 (2.09)	3.2 (0.126)	A place of high clutch hub
(3)	Thrust 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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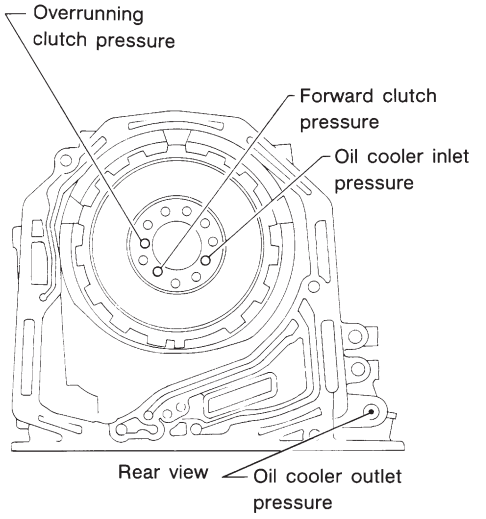
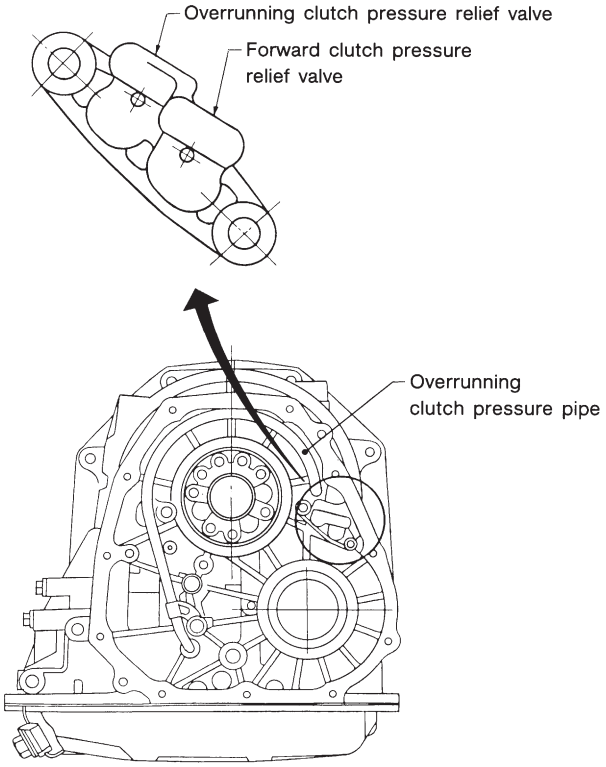
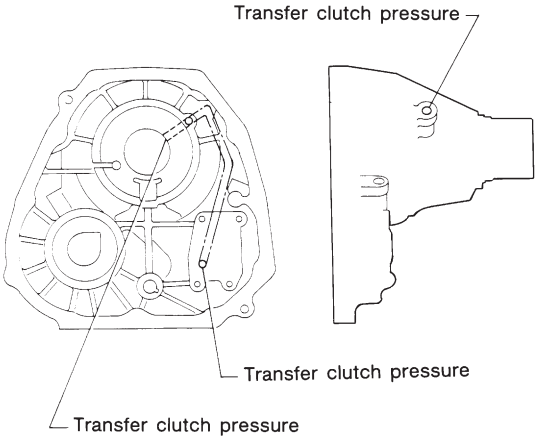
Transmission case



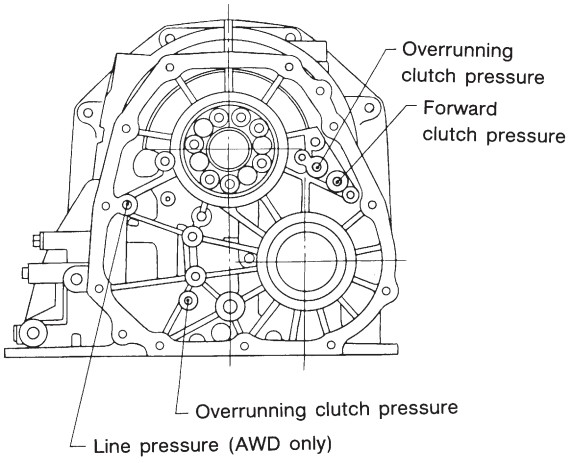
Transmission case



Extension case

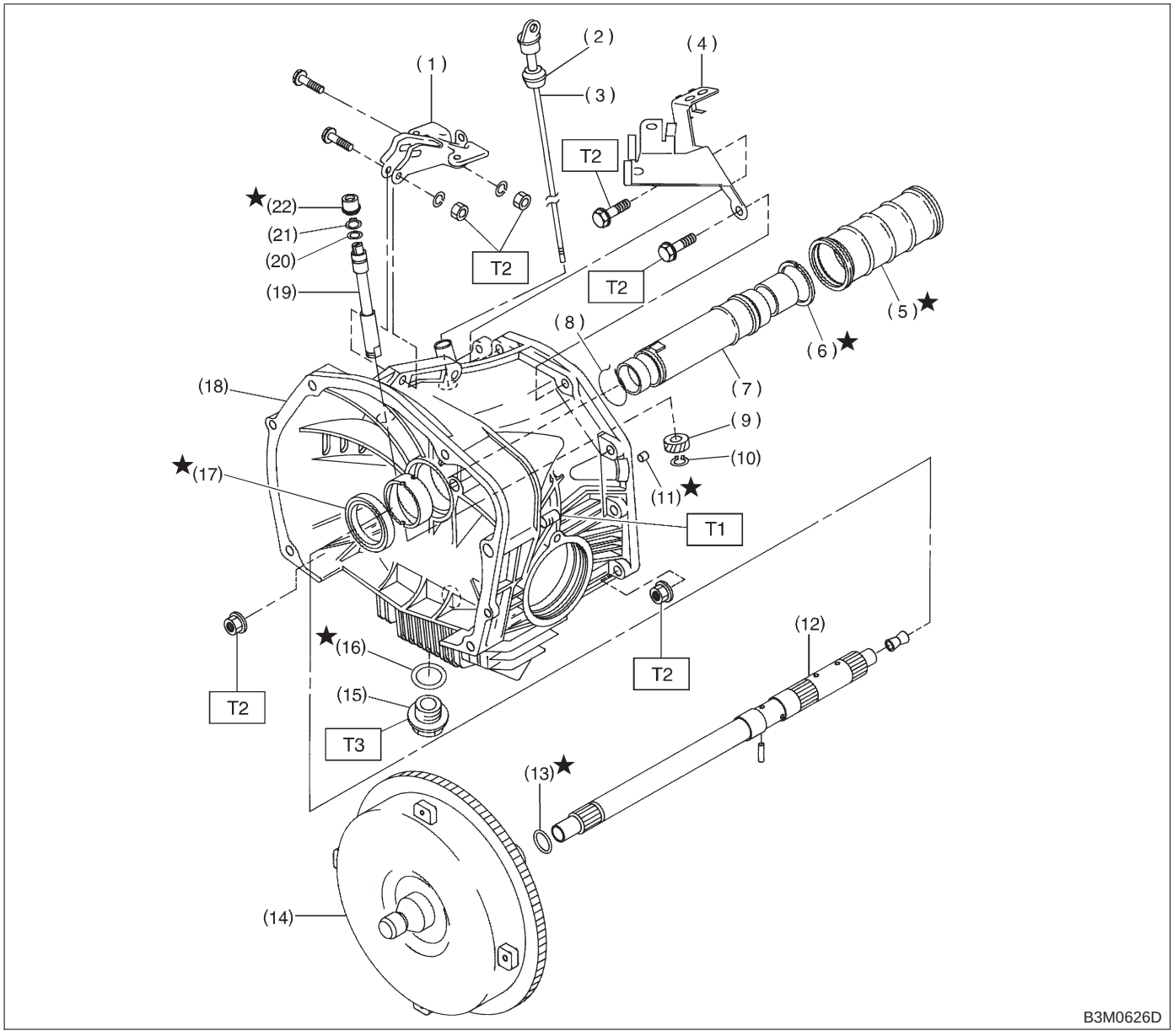


Transmission case



G3M0777

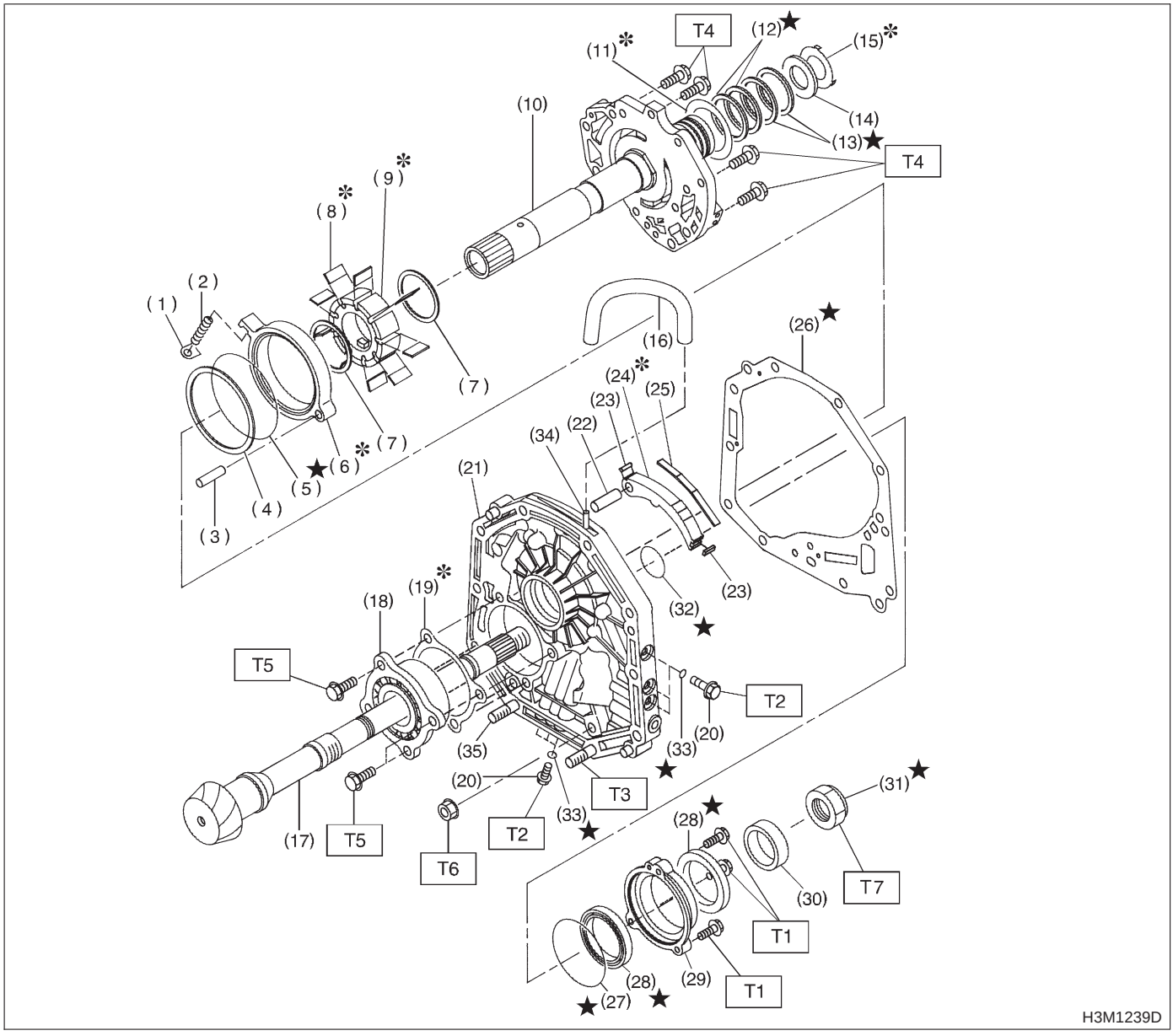
1. Torque Converter Clutch and Case



(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

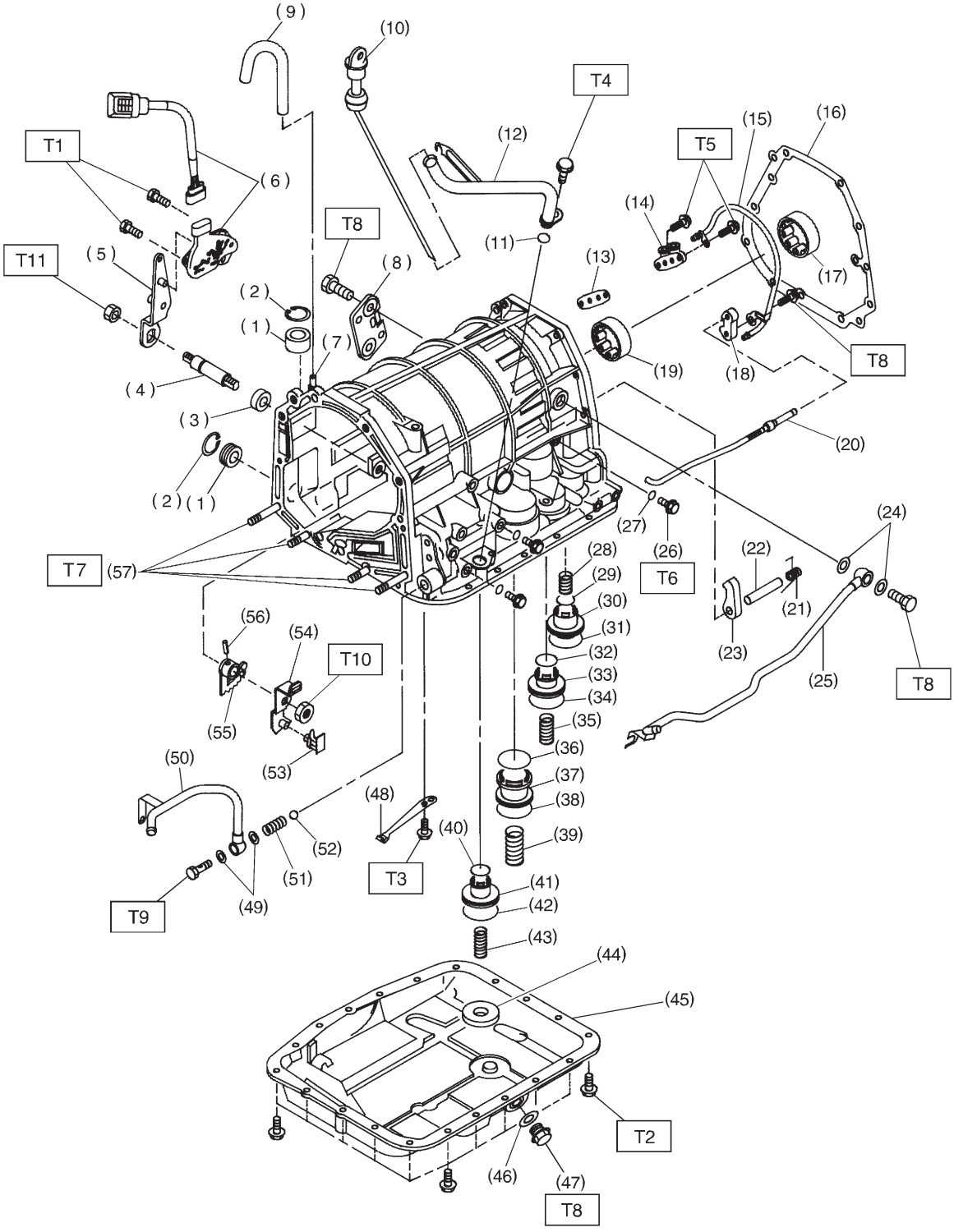


H3M1239D

(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



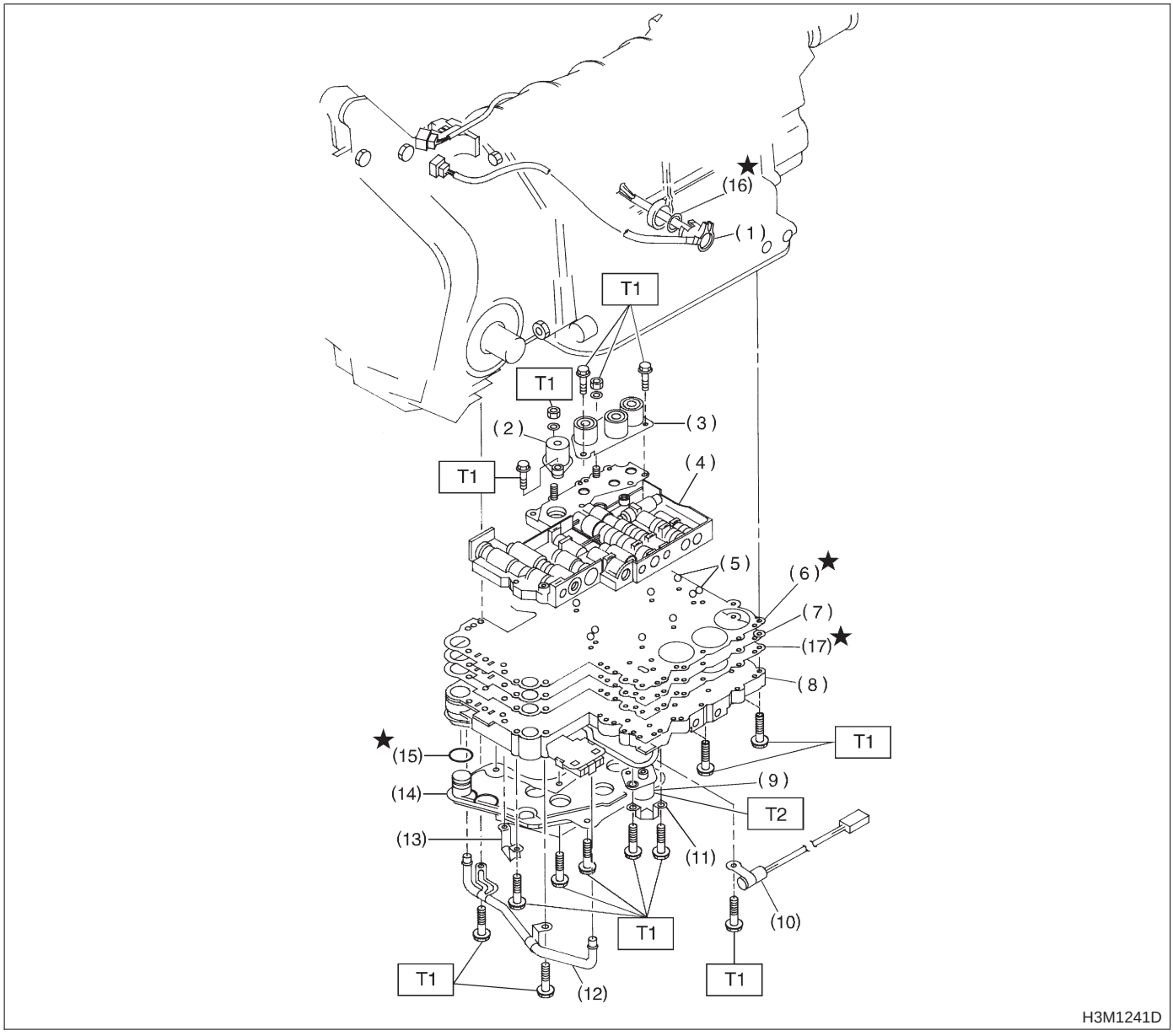
S3M0163A

(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) Roller bearing
(18) Parking support
(19) Ball bearing
(20) Parking rod
(21) Return spring
(22) Shaft
(23) Parking pawl
(24) Gasket
(25) Inlet pipe
(26) Test plug
(27) O-ring
(28) Spring
(29) O-ring
(30) Accumulator piston (N-D)
(31) O-ring
(32) O-ring
(33) Accumulator piston (2-3)
(34) O-ring
(35) Spring
(36) O-ring
(37) Accumulator piston (1-2)
(38) O-ring
(39) Spring
(40) O-ring
(41) Accumulator piston (3-4)
(42) O-ring
(43) Spring
(44) Magnet
(45) Oil pan
(46) Gasket
(47) Drain plug
(48) Detention spring
(49) Gasket
(50) Outlet pipe
(51) Spring
(52) Ball
(53) Stopper
(54) Manual lever
(55) Manual plate
(56) Spring pin
(57) 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)

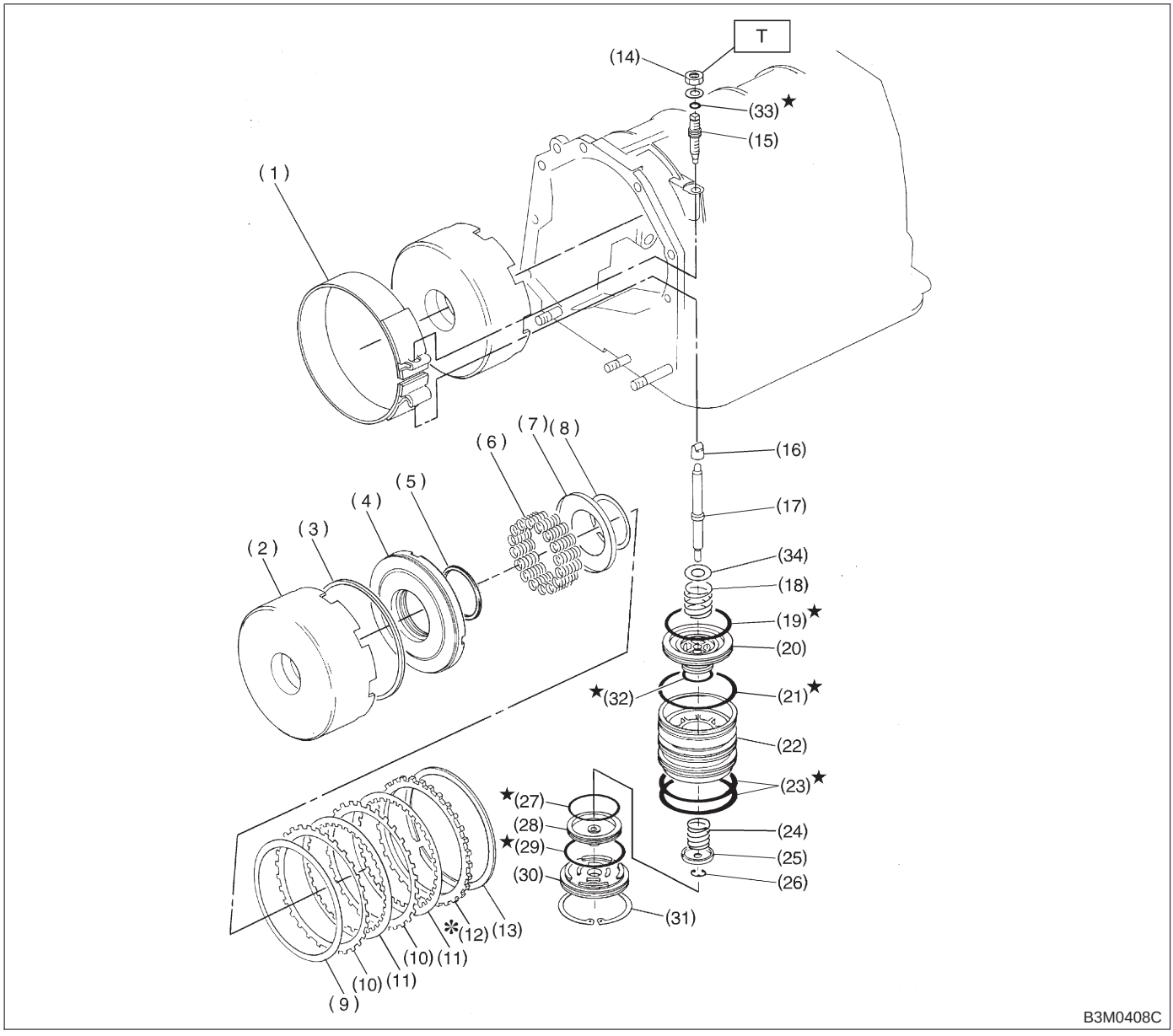
4. Control Valve and Harness Routing



(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)

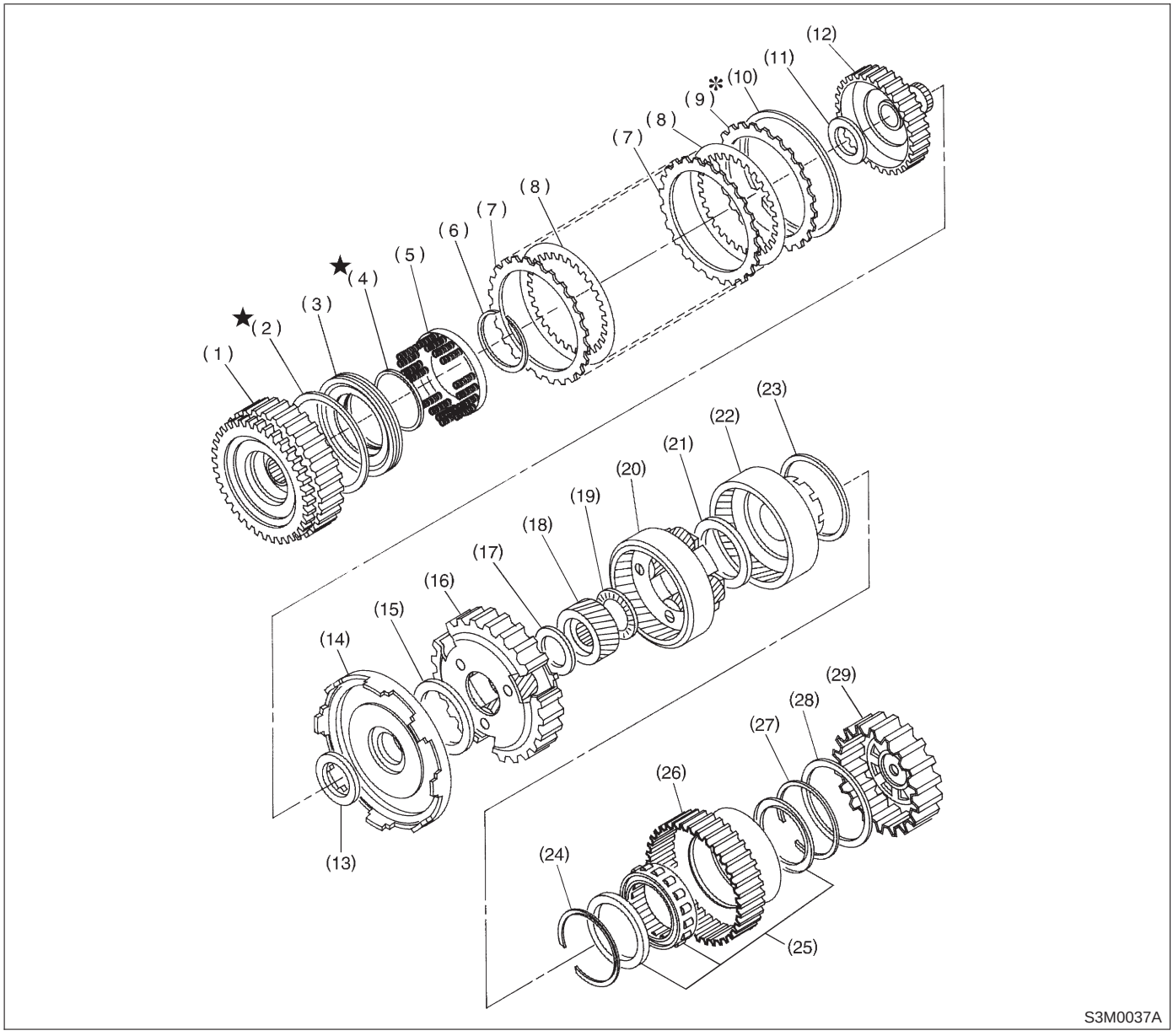
5. Reverse Clutch and Brake Band



(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

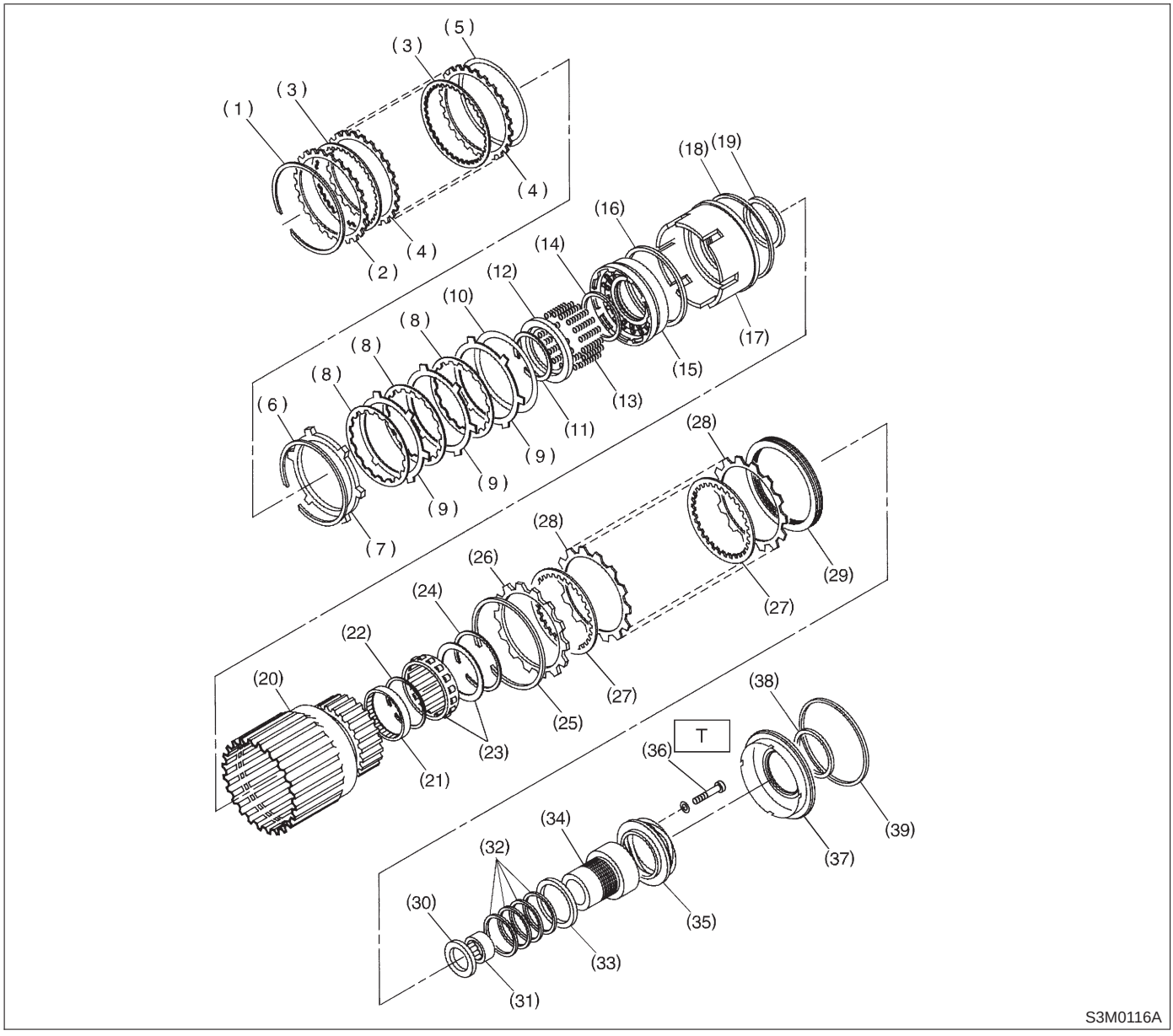
Tightening torque: N·m (kg-m, ft-lb)
T: 26±2 (2.7±0.2, 19.5±1.4)

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) Snap ring
(28) Thrust washer
(29) Overrunning clutch hub

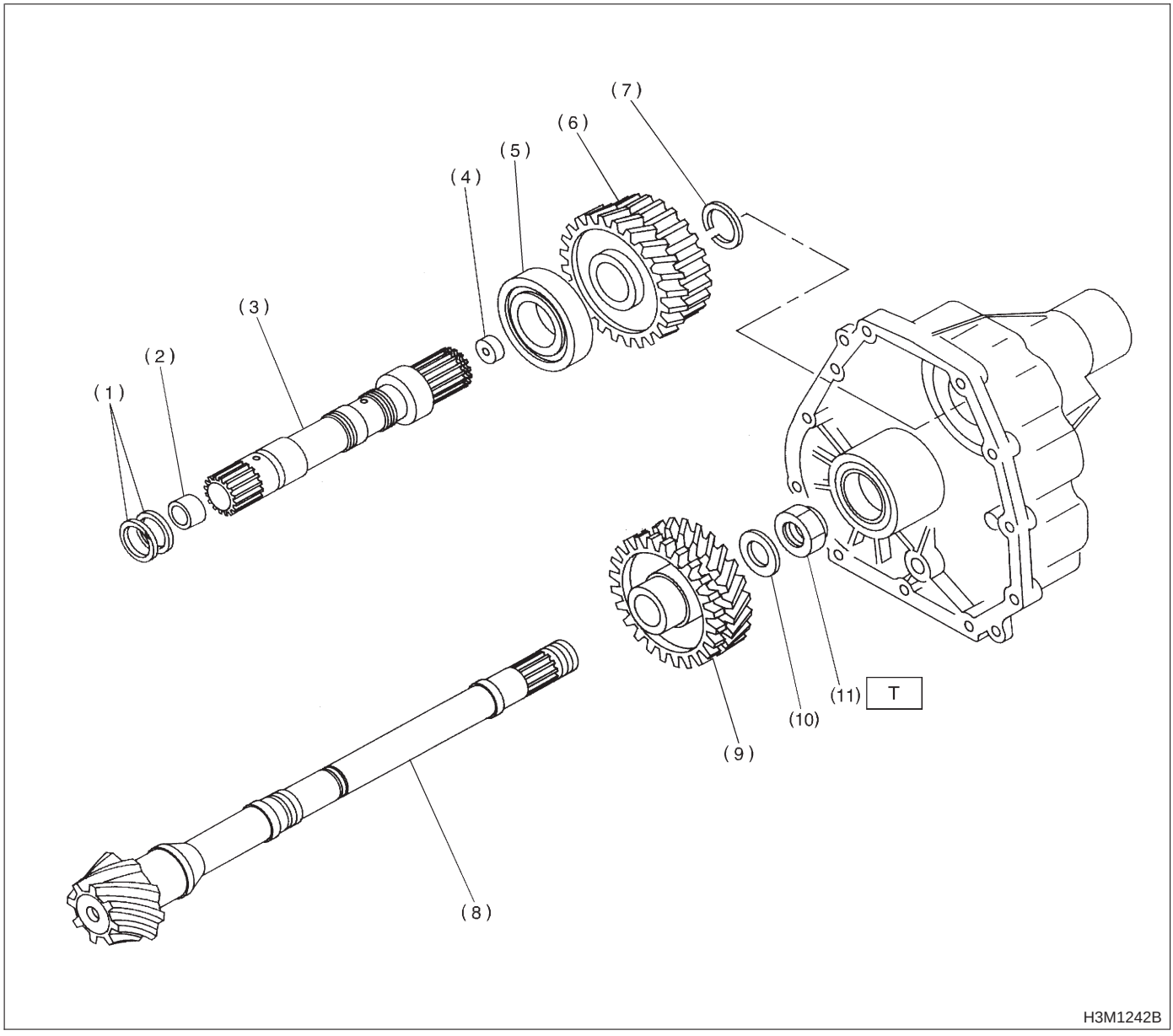
7. Forward Clutch and Low & Reverse Brake



(1) Snap ring
(2) Retaining plate
(3) Drive plate (5)
(4) Driven plate (5)
(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 (6)
(28) Driven plate (6)
(29) Wave spring
(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)

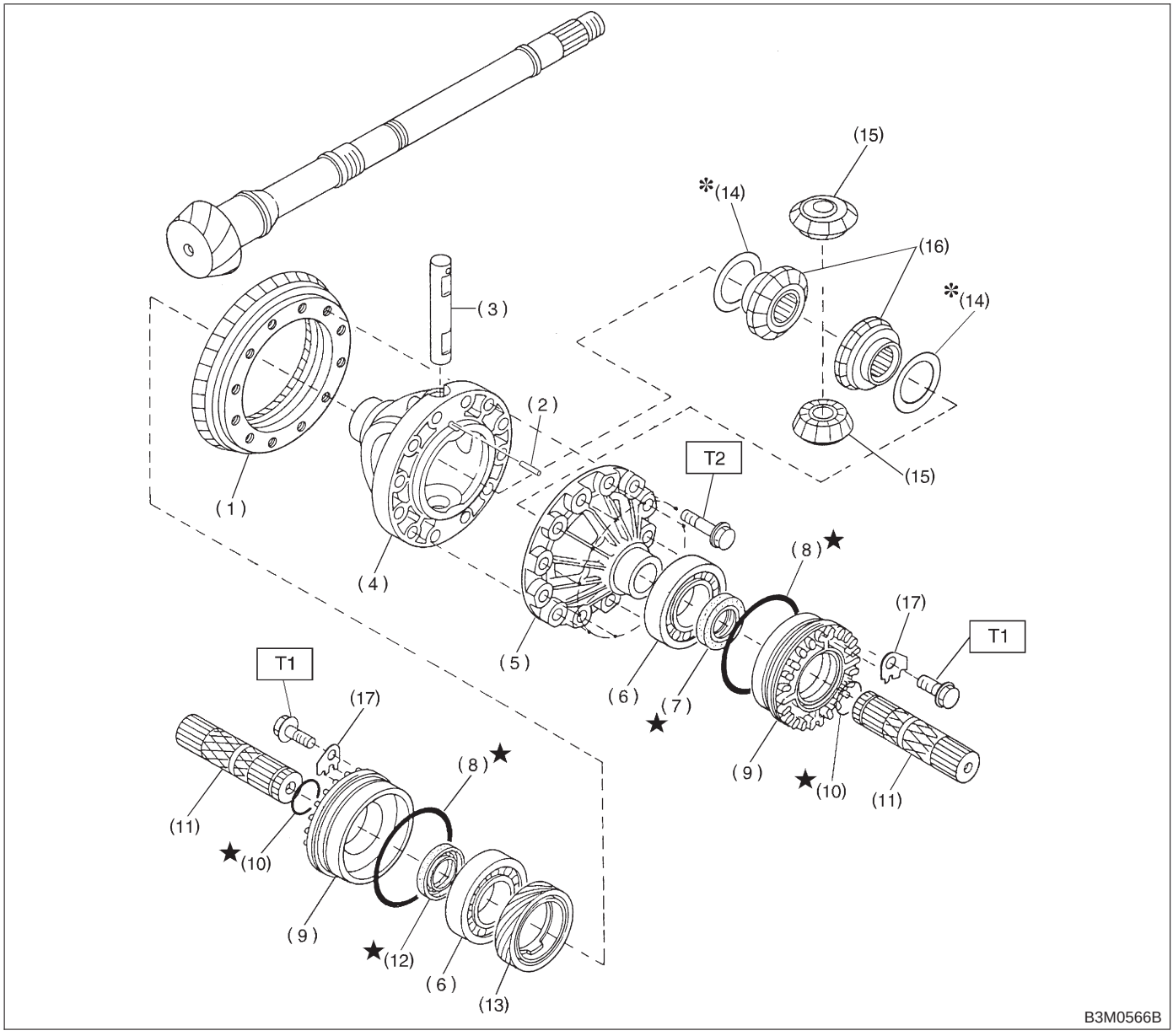
8. Reduction Gear



(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)

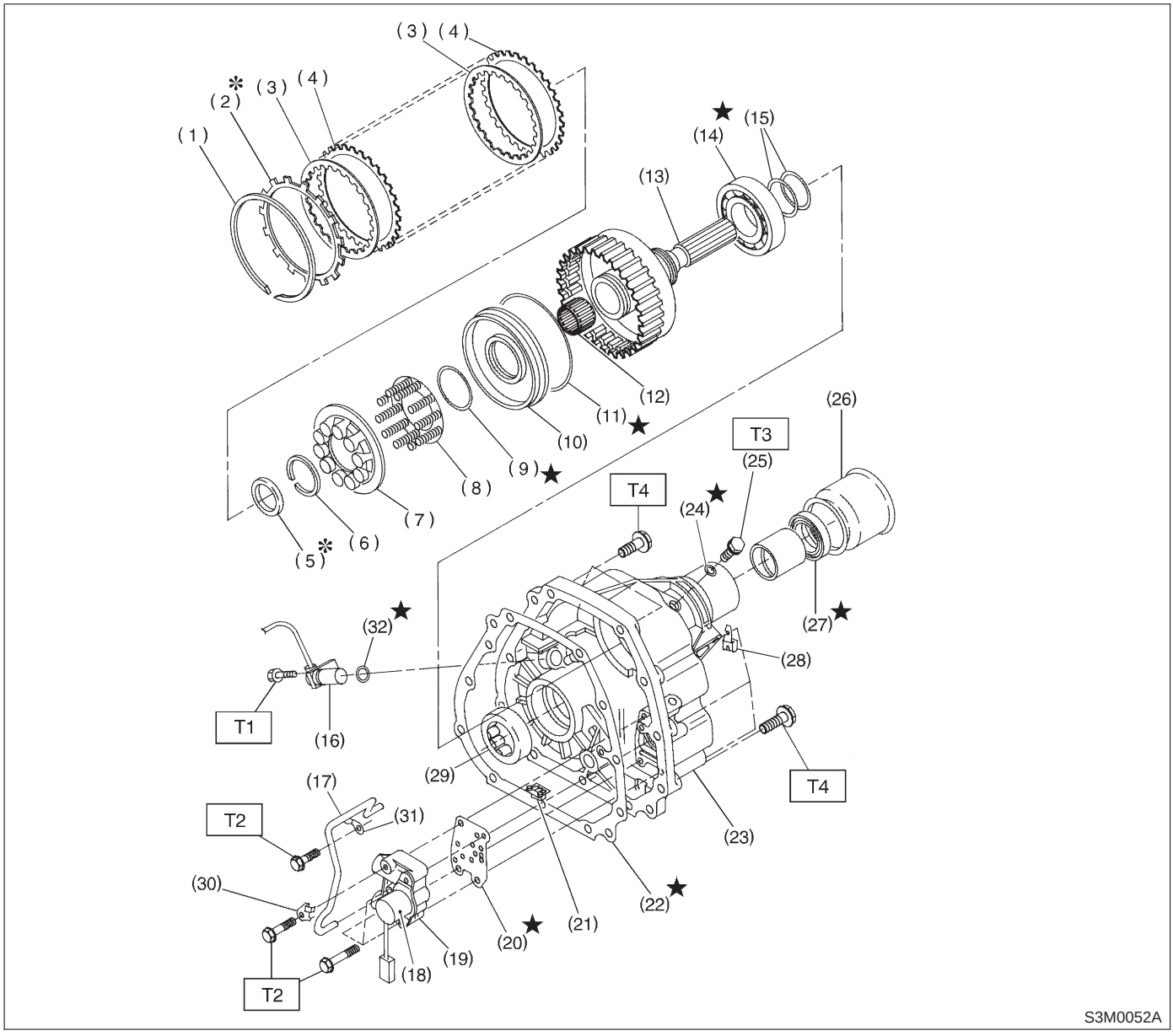
9. Differential Case



(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

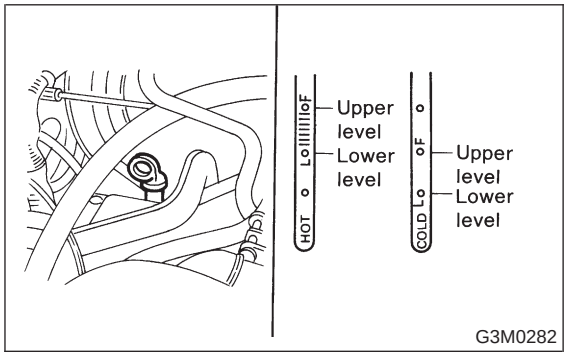
When disassembling or assembling the automatic transmission, observe the following instructions.
1) Workshop
Provide a place that is clean and free from dust. Principally the conventional workshop is suitable except for a dusty place. In a workshop where grinding work, etc. which produces fine particles 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 atmos- pheric temperature of 0°C (32°F): Approx. 8 minutes
- By running the vehicle

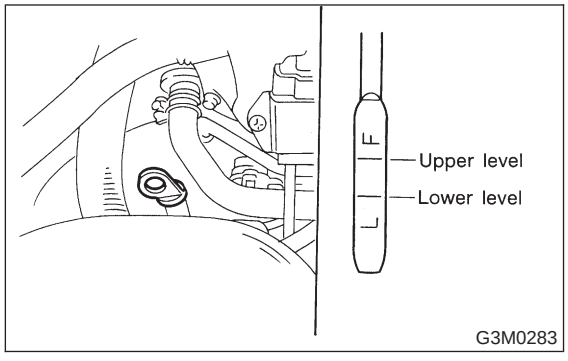
Time for temperature rise to 60°C (140°F) with atmos- pheric temperature of 0°C (32°F): More than 10 minutes
5) Method for checking fluid level upon delivery or at periodic inspection
Check fluid level after a warm-up run of approx. 10 minutes. During the warm-up period, the automatic transmission functions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

2. DIFFERENTIAL GEAR OIL LEVEL

1) Ensure the vehicle is in safe condition.

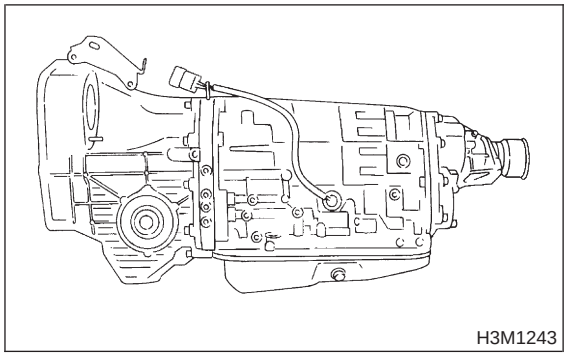
NOTE:
Do not check the oil level nor add oil to the case with the front end of the vehicle jacked-up; this will result in an incorrect reading of the oil level.

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.

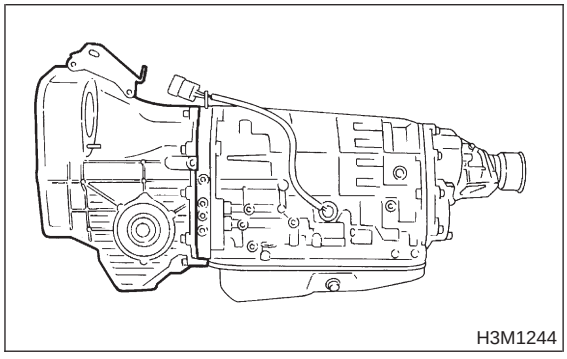


3. OIL LEAKAGE

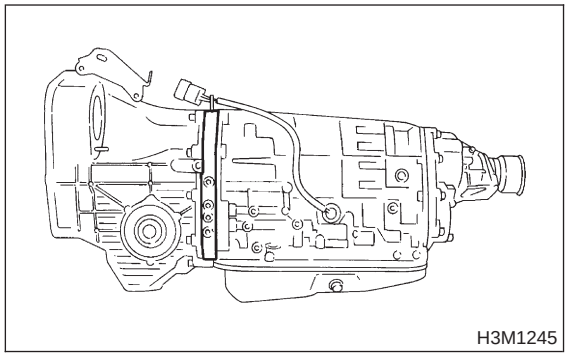
It is difficult to accurately determine the precise position of a oil leak, since the surrounding area also becomes wet with oil. The places where oil seals and gaskets are used are as follows:
1) Jointing portion of the case
- Transmission case and oil pump housing jointing portion
- Torque converter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



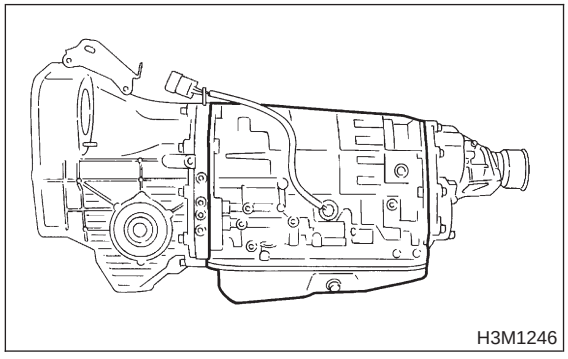
2) Torque converter clutch case
- Engine crankshaft oil seal
- Torque converter clutch impeller sleeve oil seal
- ATF cooler pipe connector
- Torque converter clutch
- Torque converter clutch case
- Axle shaft oil seal
- O-ring on the outside diameter of axle shaft oil seal holder
- O-ring on the differential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



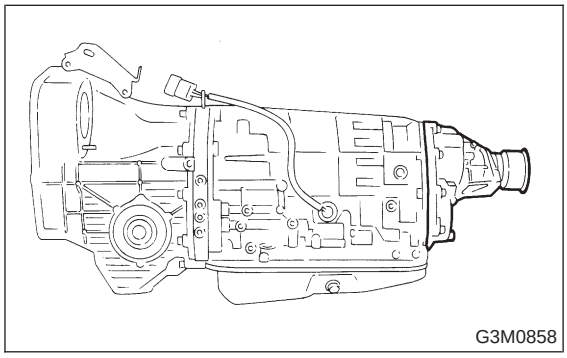
3) Oil pump housing
- Oil pump housing (Defective casting)
- O-ring on the test plugs
- Checking blind plugs
- Differential gear breather


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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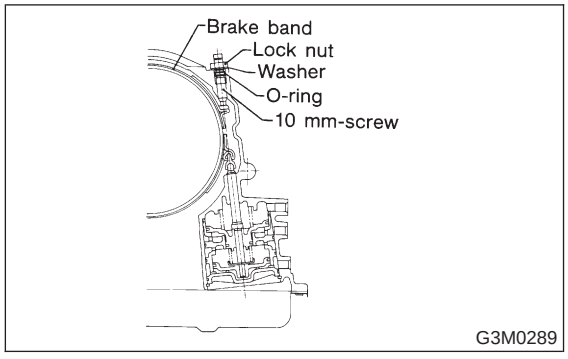
2. Brake Band

A: INSPECTION

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

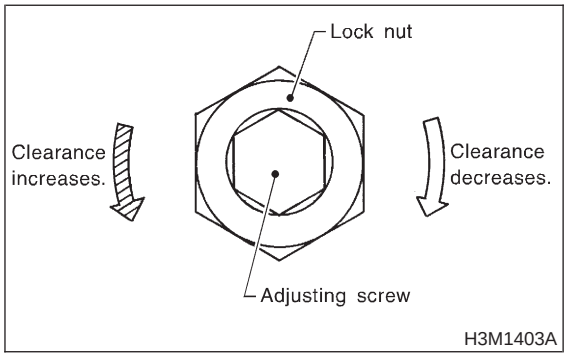
Improper brake band clearances and their symptoms	
Clearance	Problem
1. Too wide	Upshift from 1st directly to 3rd gear occurs.
2. Wide	● Engine rpm increases abruptly while upshifting from 1st to 2nd gear or 3rd to 4th gear. ● Time lag of at least one second occurs during kickdown operation from 3rd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

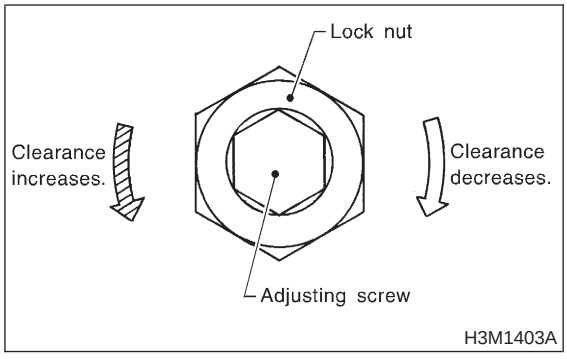
1) Immobilize the end of the 10 mm-screw projecting on the left side of the transmission case, and loosen the nut with a double-end wrench.
In the case of occurrence of problems 2. and 3. mentioned previously, perform the adjustment by loosening or tightening the nut within a range of 3/4 turn from this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

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



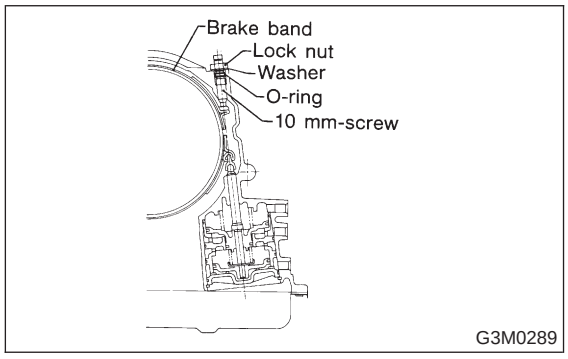
2) In case of the occurrence of problems 1. and 4. mentioned previously, perform the adjustment as follows: Adjusting procedure: Tighten adjust screw to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, then back off three turns.

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



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

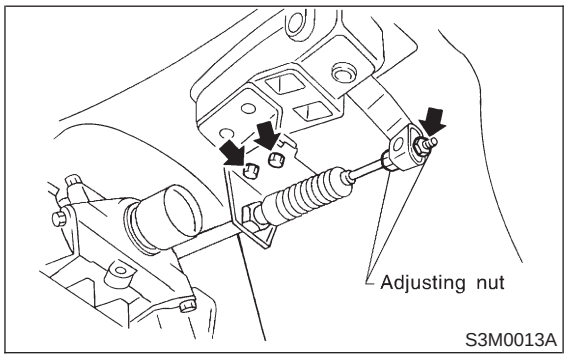
Tightening torque:
26±2 N·m (2.7±0.2 kg-m, 19.5±1.4 ft-lb)



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.

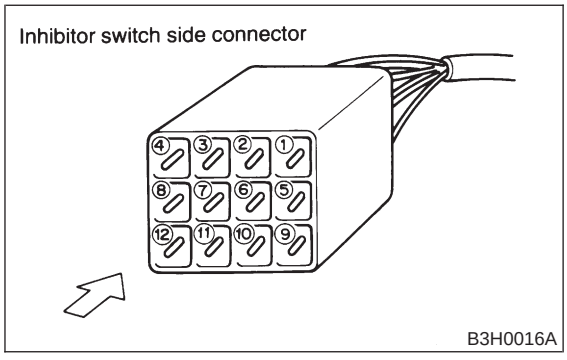


1) Disconnect cable end from select lever.
2) Disconnect inhibitor switch side connector.
3) Check continuity in inhibitor switch circuits with select lever moved to each position.

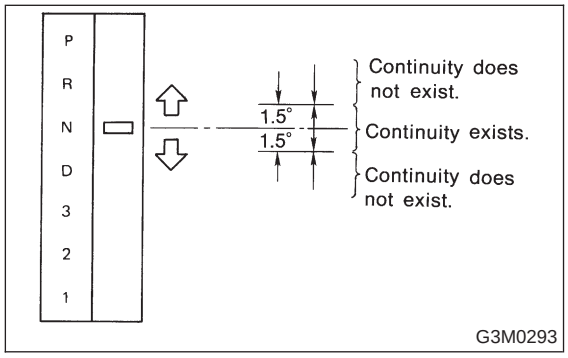
CAUTION:
Also check that continuity in ignition circuit does not exist when selector lever is in R, D, 3, 2 and 1 ranges.

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

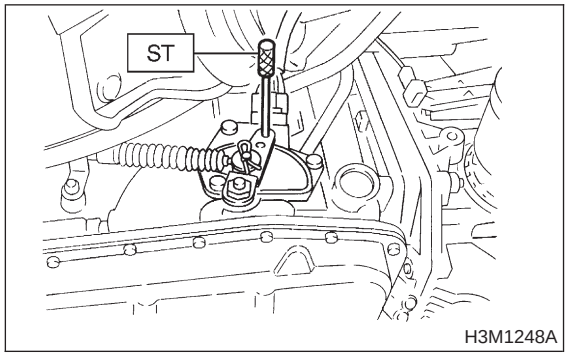


4) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from the N range.
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch.



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.

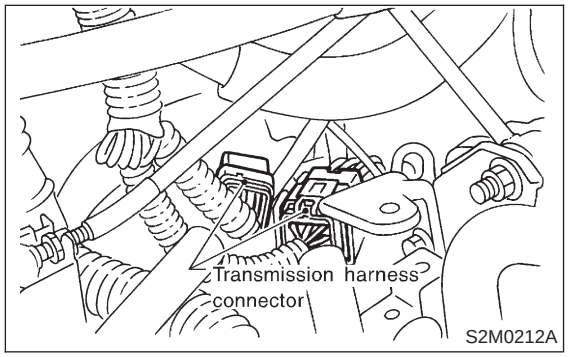
Tightening torque:
3.4±0.5 N·m (0.35±0.05 kg-m, 2.5±0.4 ft-lb)

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

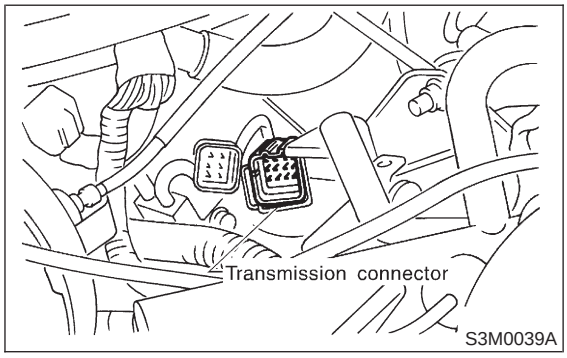
4. Sensor (in transmission)

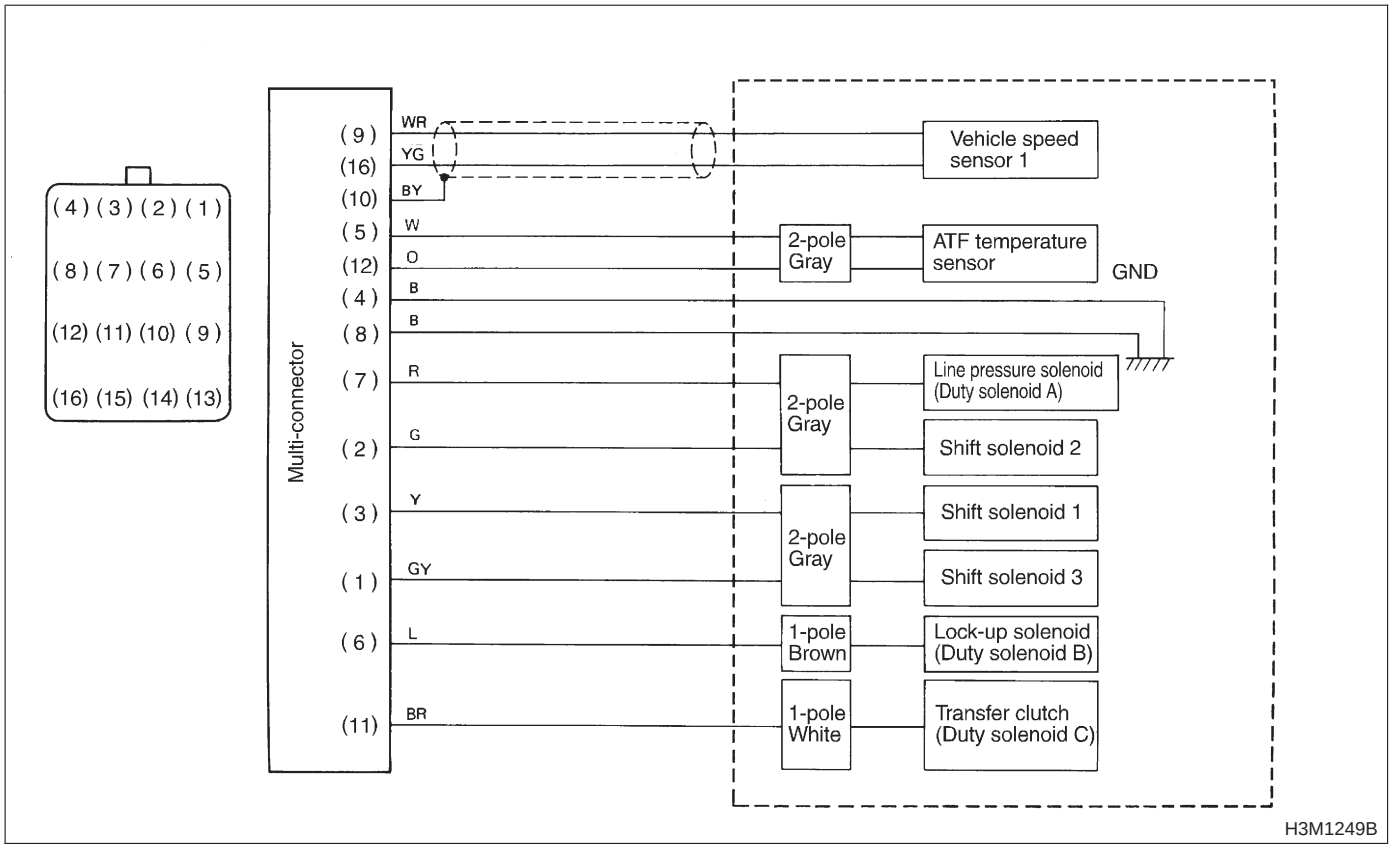
A: INSPECTION

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



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

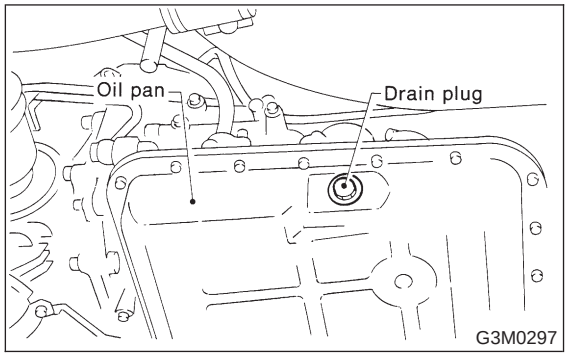
5. Shift Solenoid, Duty Solenoid and Valve Body

A: REMOVAL

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

NOTE:
Tighten ATF drain plug after draining ATF.

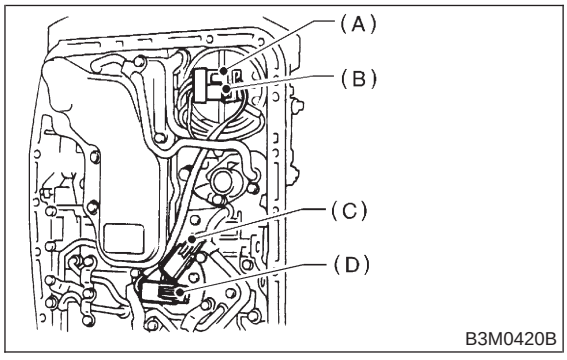
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



3) Remove oil pan and gasket.

NOTE:
Drain oil into a container.

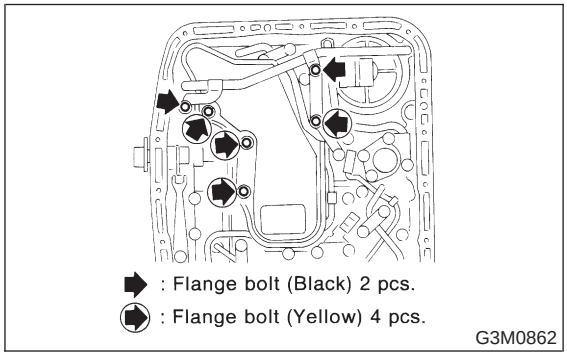
4) Disconnect solenoid valve connectors.
Remove connectors from clips and disconnect connectors at 4 places.



(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

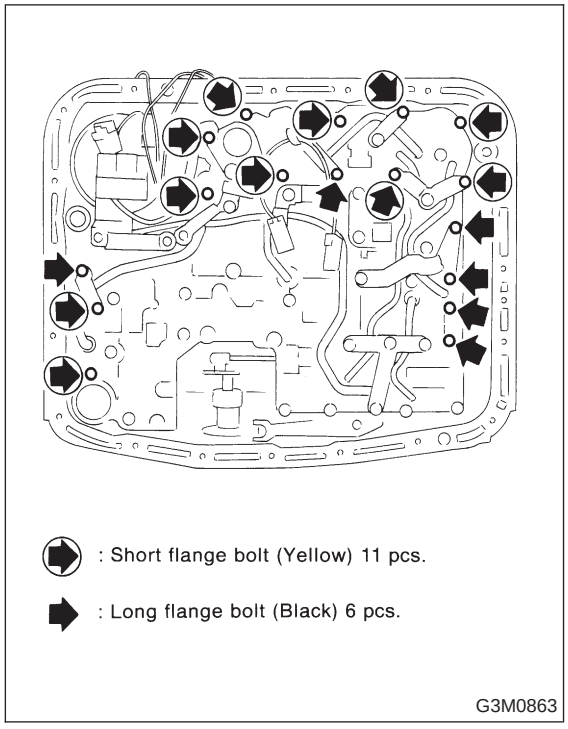
5) Remove oil strainer.
Disconnect oil pipe by removing the two bolts, and remove four bolts and oil strainer.

NOTE:
Be careful because oil flows from oil strainer.

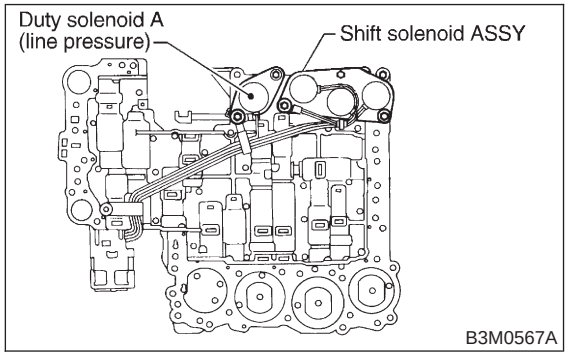


6) Remove control valve body and two brackets. Remove 6 long bolts (Black) and 11 short bolts (Yellow).

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.

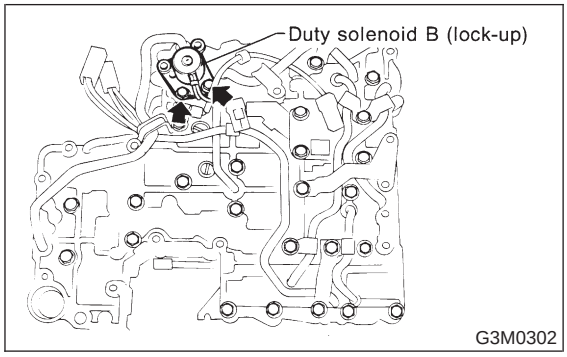


8) Remove duty solenoid B.

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)

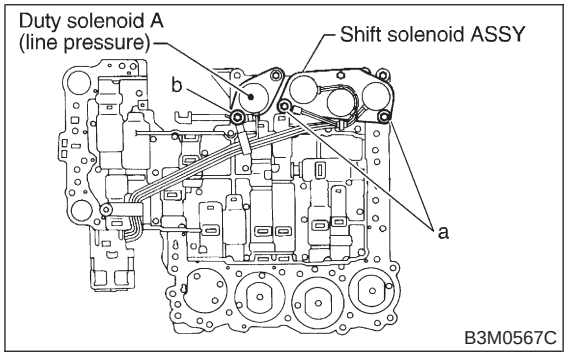


2) Install solenoid valves.
Shift solenoid assembly, and duty solenoid A (line pressure).

a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

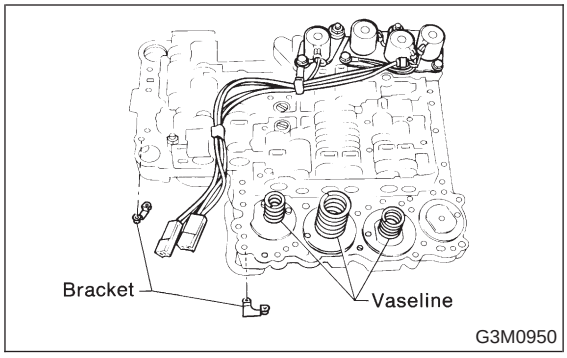
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



3) Install valve body and two brackets.

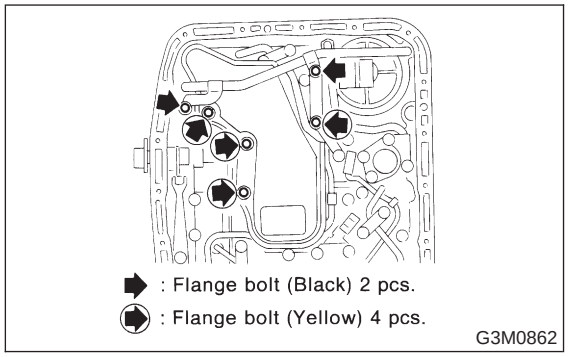
NOTE:
- Secure accumulator springs using vaseline.
- Align manual valve connections.

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

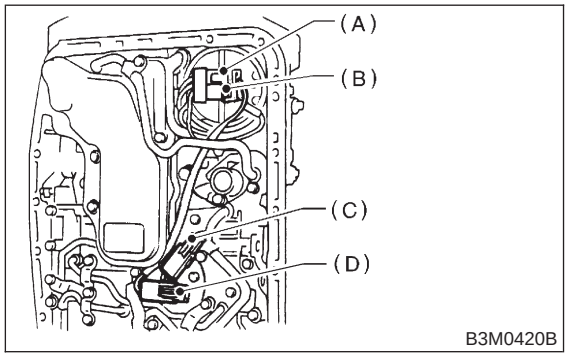


4) Install oil strainer.
Also install oil pipe and harness connector bracket.

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

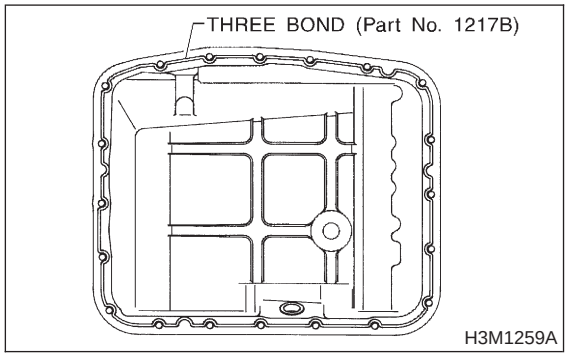


5) Connect harness connectors at 4 places.
Connect connectors of same color, and secure connectors to valve body using clips.



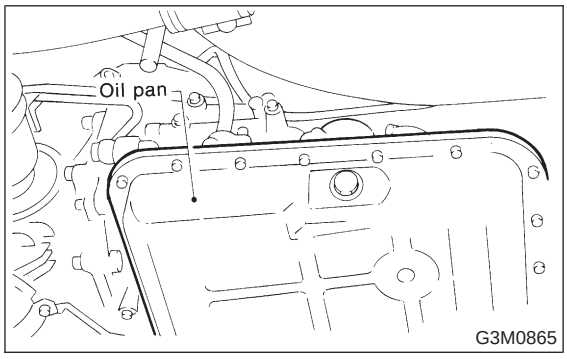
(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

6) Apply proper amount of liquid gasket (THREE BOND 1217B) to the entire oil pan mating surface.

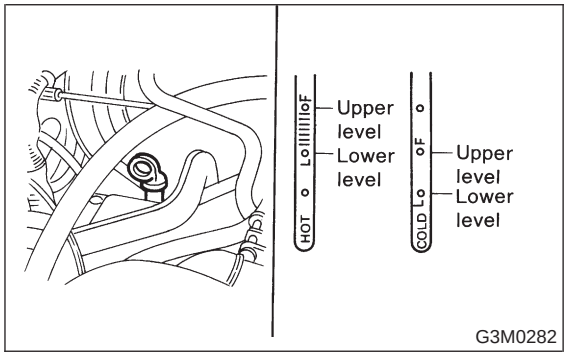


7) Install oil pan and gasket.

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



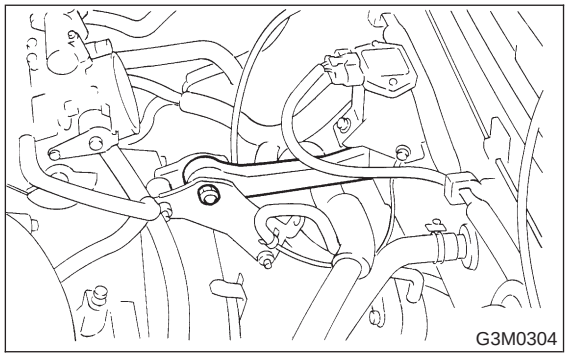
8) Add ATF and check level.



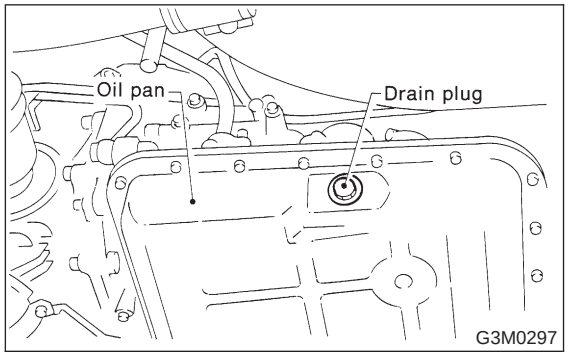
6. Duty Solenoid C and Transfer Valve Body

A: REMOVAL

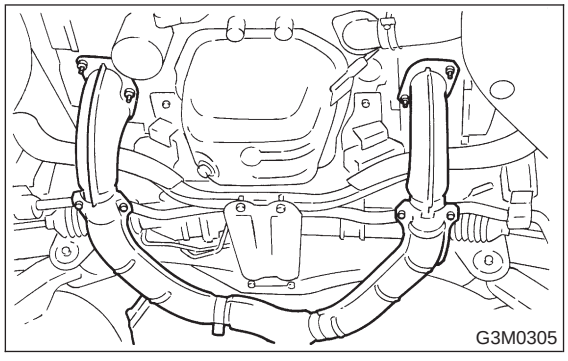
1) Remove air intake chamber.
2) Remove pitching stopper.



3) Raise vehicle and drain ATF.

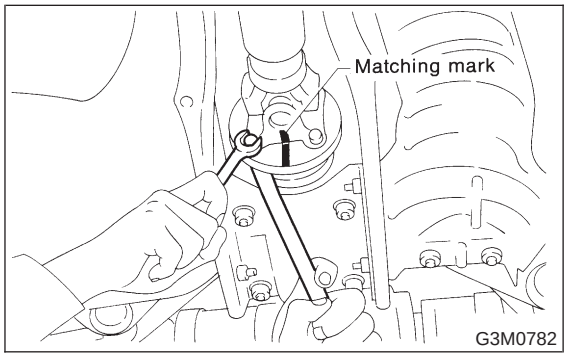


4) Remove front exhaust pipe.
Disconnect oxygen sensor connector, and remove exhaust pipe.

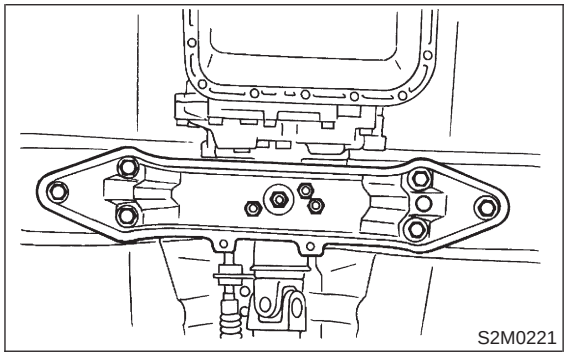


5) Remove propeller shaft.

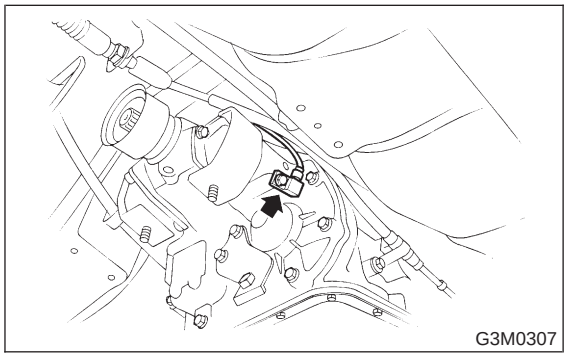
NOTE:
Before removing propeller shaft, scribe matching marks on propeller shaft and rear differential coupling.



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

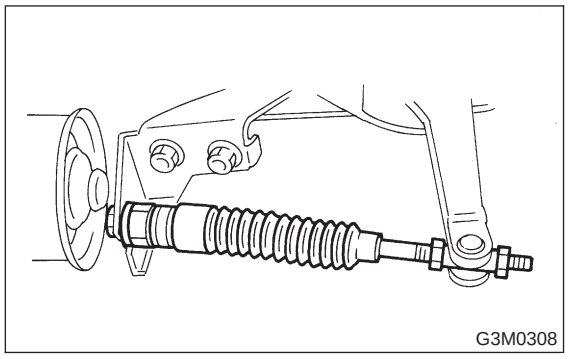


7) Remove vehicle speed sensor 1.



8) Remove extension and gasket.

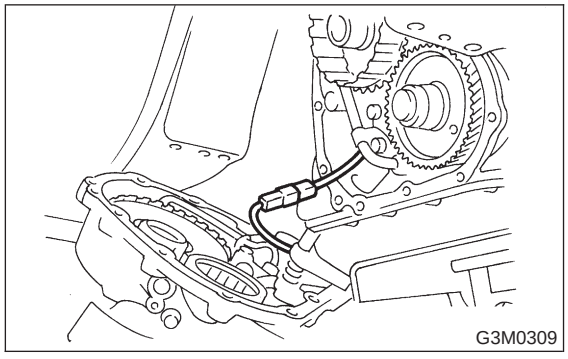
(1) Remove gear select cable nut.


G3M0308

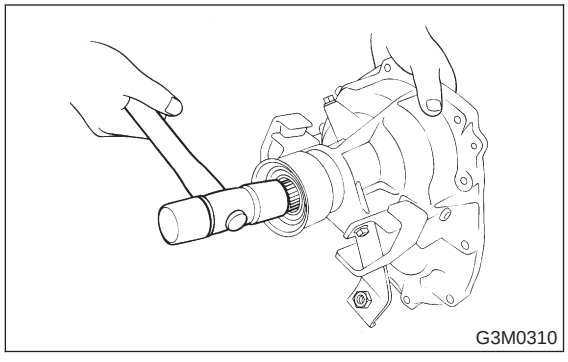
(2) Move gear select cable so that extension bolts can be removed.
(3) Remove bolts.
(4) Remove extension and disconnect duty solenoid C connector.

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

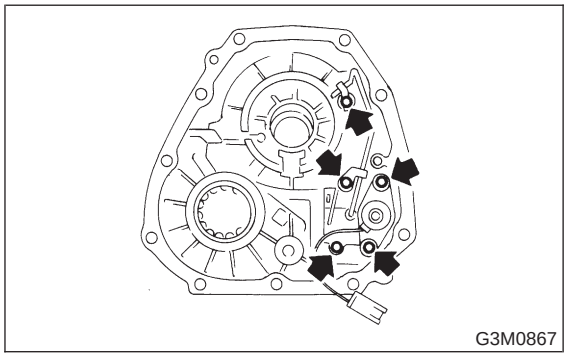
NOTE:
Use a container to catch oil flowing from extension.


G3M0309

9) Remove duty solenoid C and transfer valve body from extension.
(1) Remove transfer clutch drum.


G3M0310

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


G3M0867

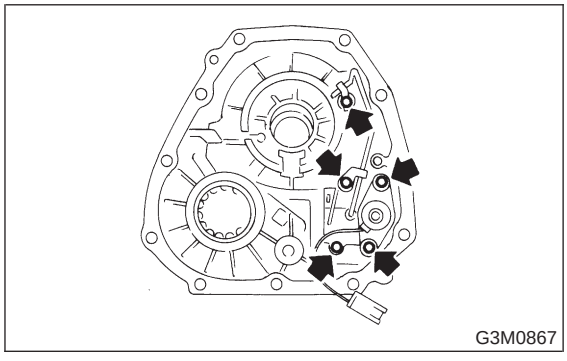
B: INSTALLATION

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

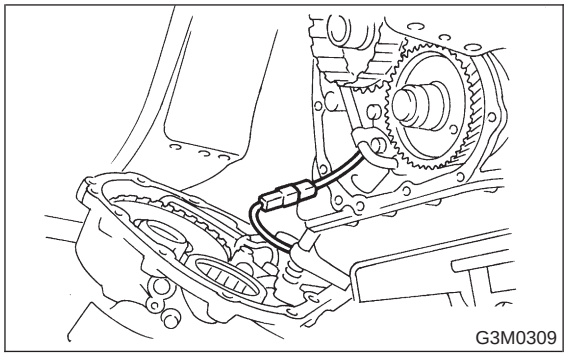
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)

(2) Install pipe and clamp.

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


G3M0867

(3) Install clutch drum.
2) Install extension.
(1) Connect connector.

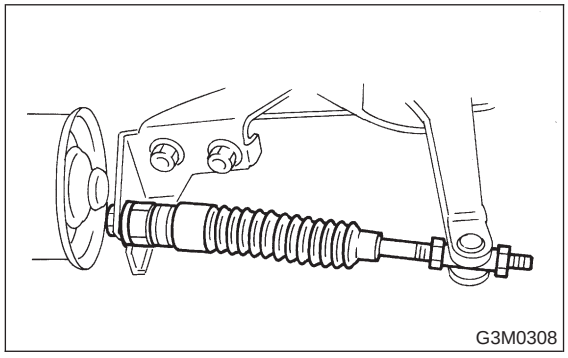

G3M0309

(2) Tighten 11 bolts.

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

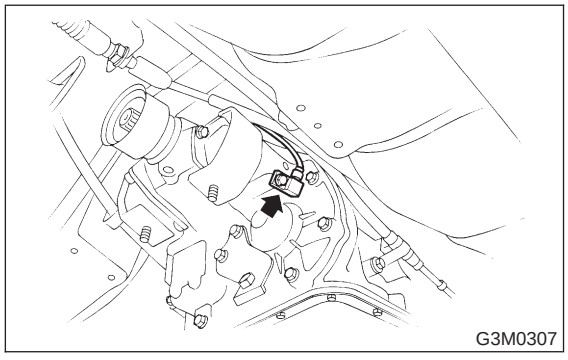
(3) Install gear select cable.

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


G3M0308

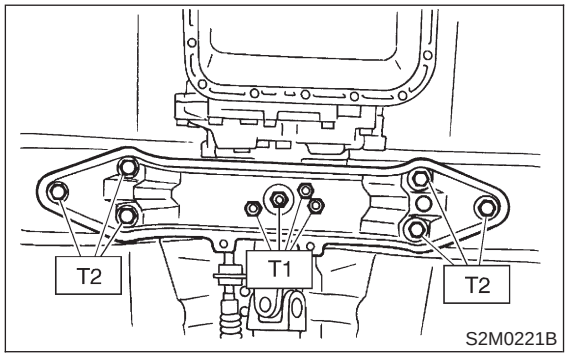
3) Install vehicle speed sensor 1.

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


G3M0307

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)



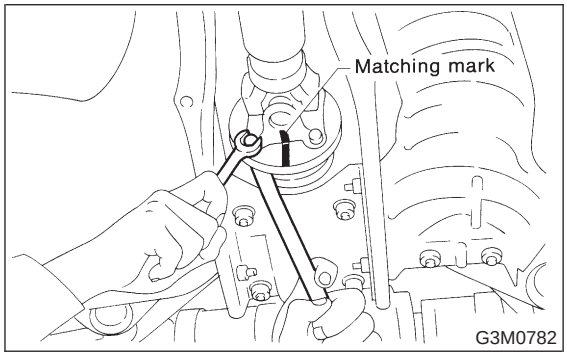
S2M0221B

(2) Lower and remove transmission jack.

5) Install propeller shaft.

Tightening torque:
At rear differential
23±5 N·m (2.3±0.5 kg-m, 16.6±3.6 ft-lb)
At center bearing
39±5 N·m (4.0±0.5 kg-m, 28.9±3.6 ft-lb)

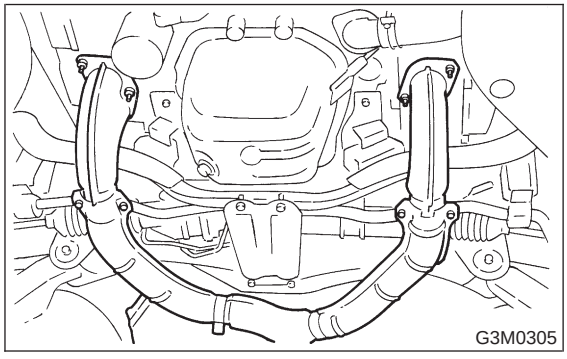
NOTE:
Align matching marks on propeller shaft and rear differential coupling.



G3M0782

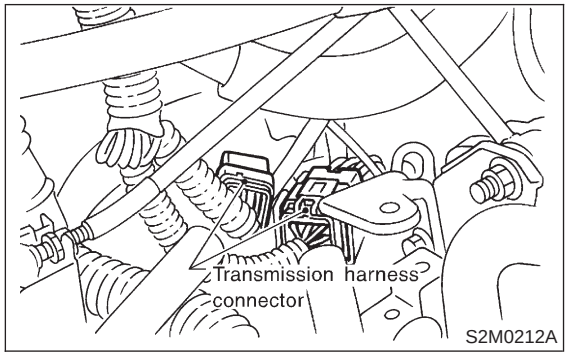
6) Install front exhaust pipe.

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)


G3M0305

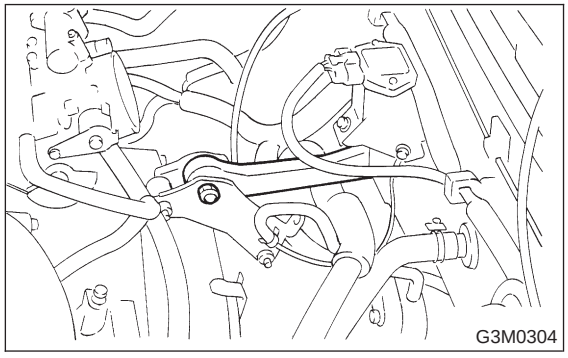
7) Lower and remove jack.
8) Connect the following parts:
(1) Oxygen sensor connector

(2) Transmission harness connector



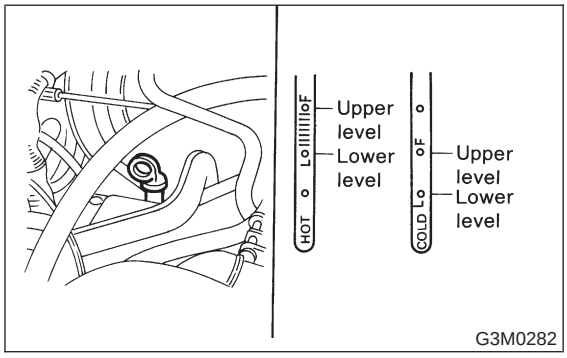
9) Install pitching stopper.

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



10) Install air intake chamber.

11) 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

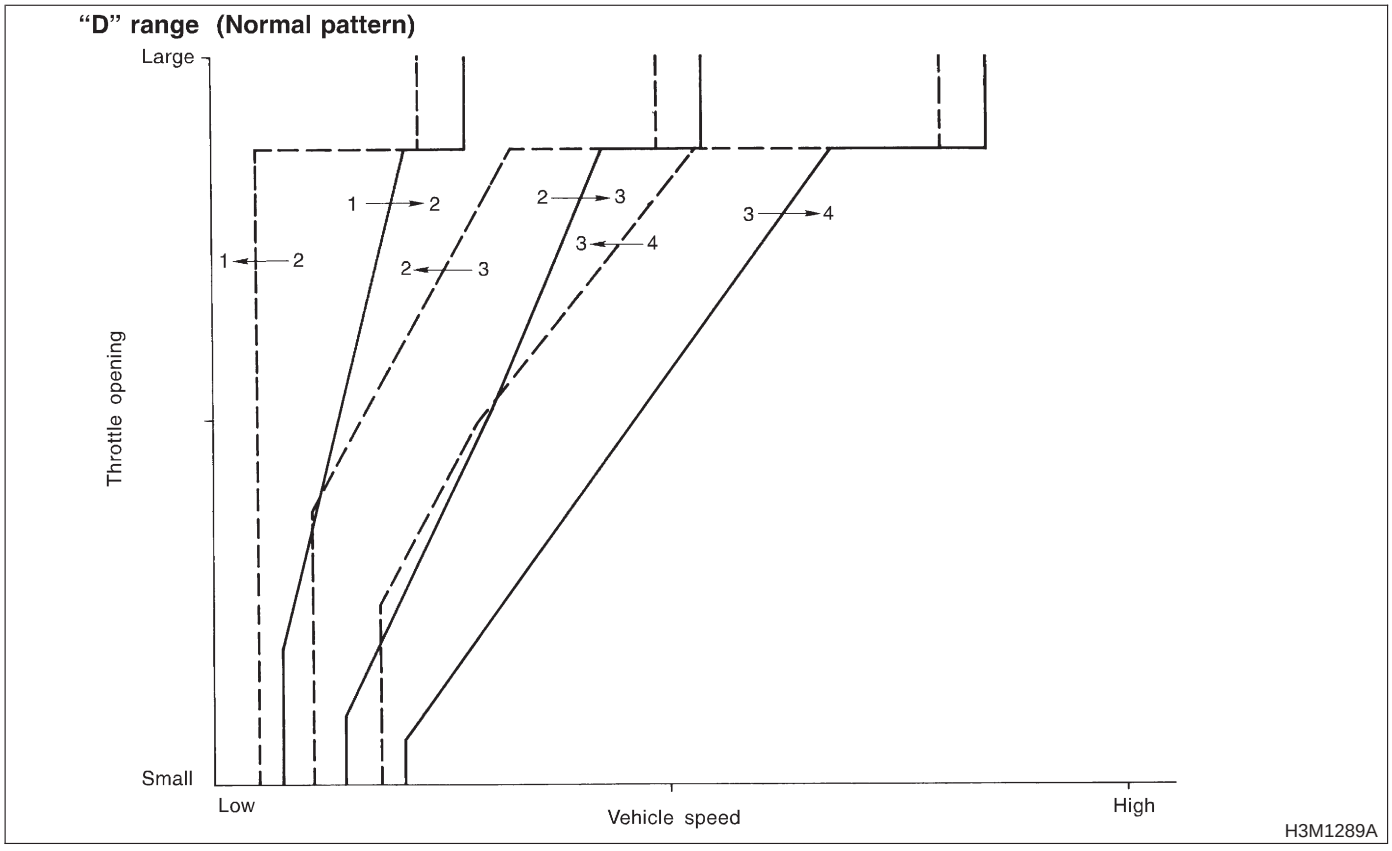
Check “kick-down”.

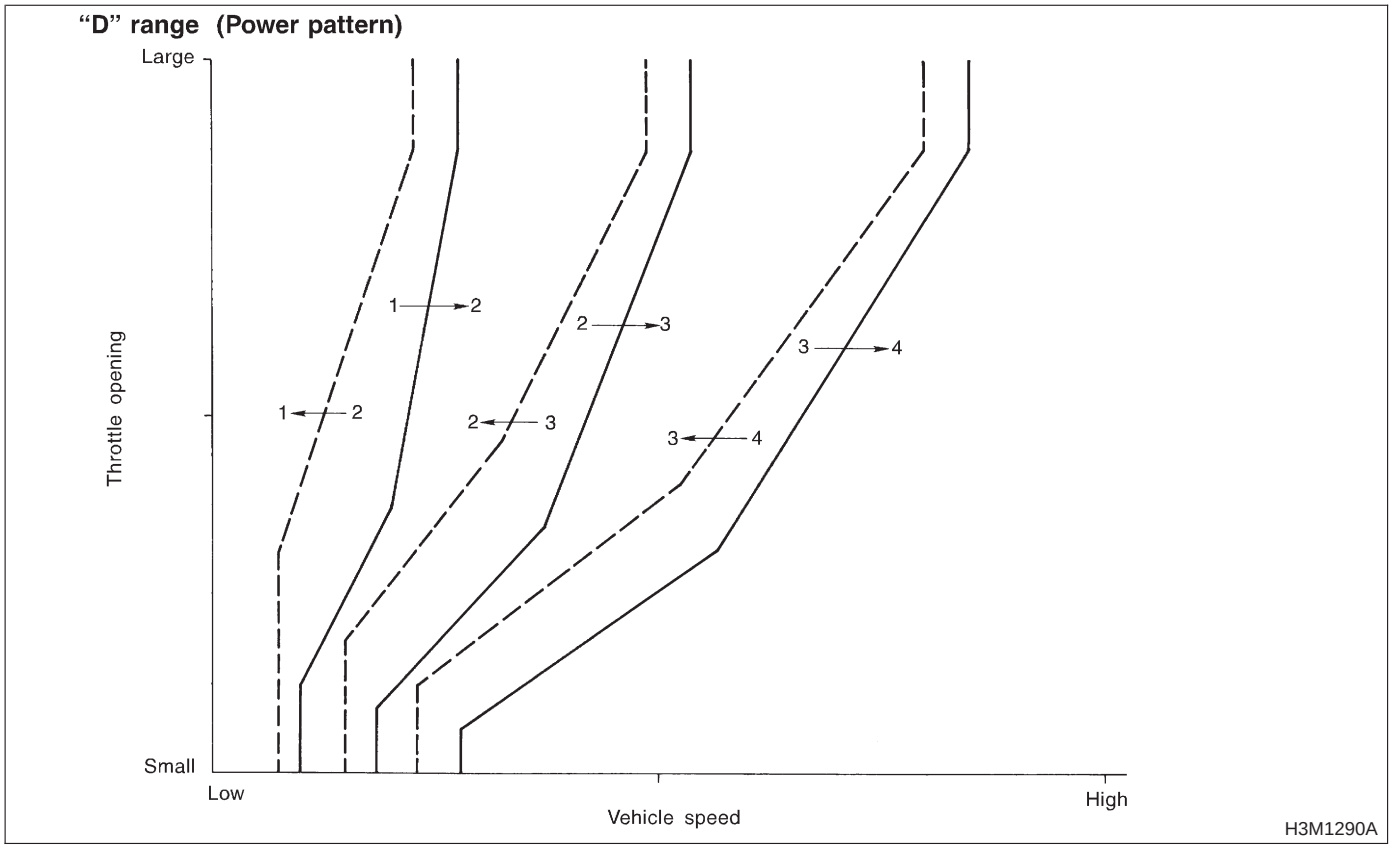
D range: 1st ←/→ 2nd ←/→ 3rd ←/→ 4th

3 range: 1st ←/→ 2nd ←/→ 3rd ← 4th

2 range: 2nd ← 3rd ← 4th

1 range: 1st ← 2nd ← 3rd ← 4th





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

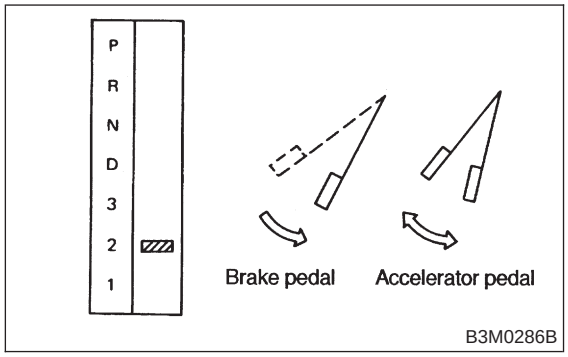
1. GENERAL INFORMATION

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):
2200 cc; 2,300 — 2,700 rpm
2500 cc; 2,200 — 2,600 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)

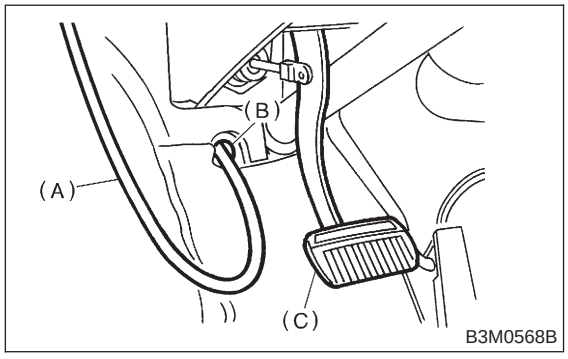
CAUTION:
- **Before measuring line pressure, jack-up all wheels.**
- **Maintain temperature of ATF at approximately 50°C (122°F) during measurement. (ATF will reach the above temperature after idling the engine for approximately 30 minutes with select lever in “N” or “P”.)**

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”.)**

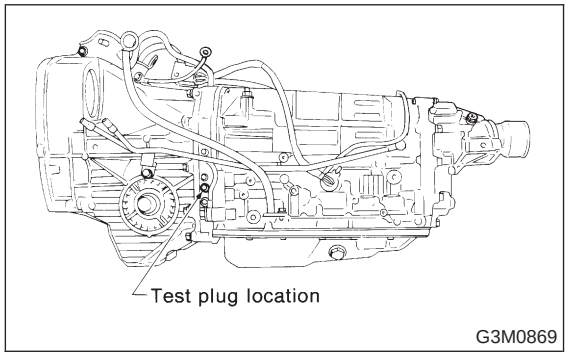
2. TEST METHODS

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 [T9I0].>
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)	
			2200 cc	2500 cc
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)	392 — 490 (4.0 — 5.0, 57 — 71)

11. Transfer Clutch Pressure Test

A: MEASUREMENT

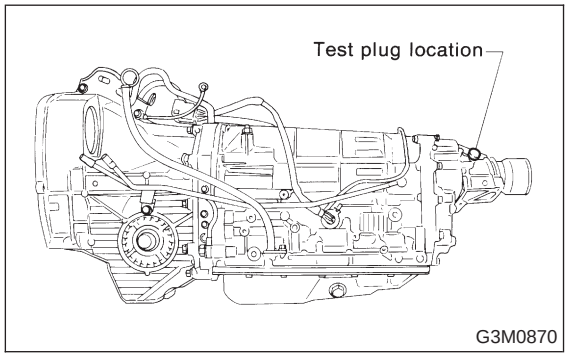
1. TEST METHODS

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.



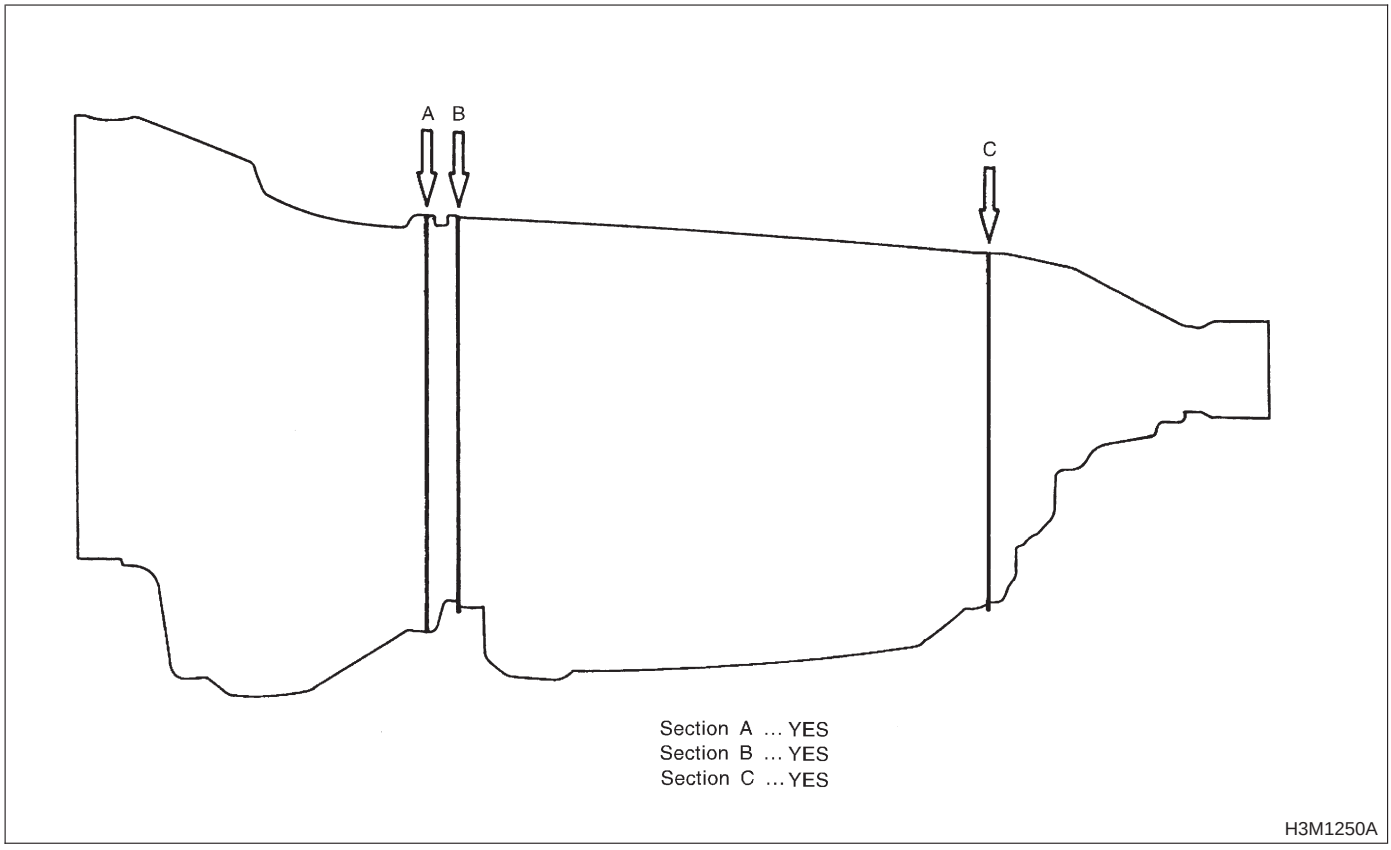
2. EVALUATION

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

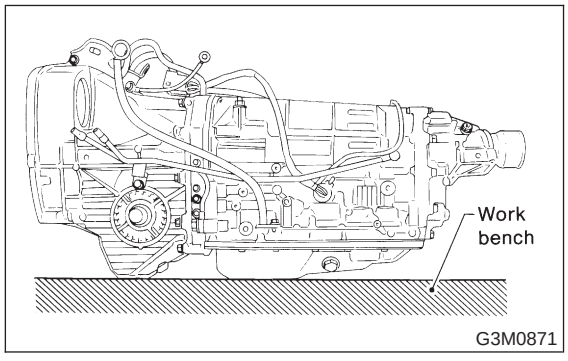


B: DISASSEMBLY

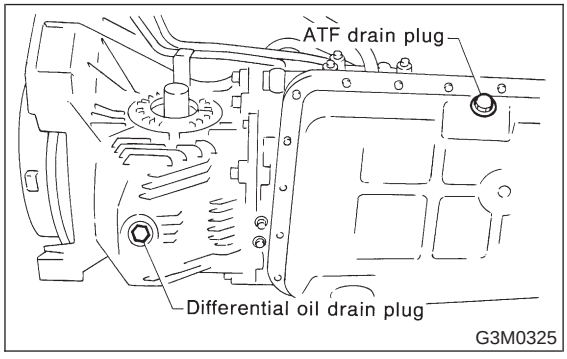
1. EXTERNAL PARTS

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

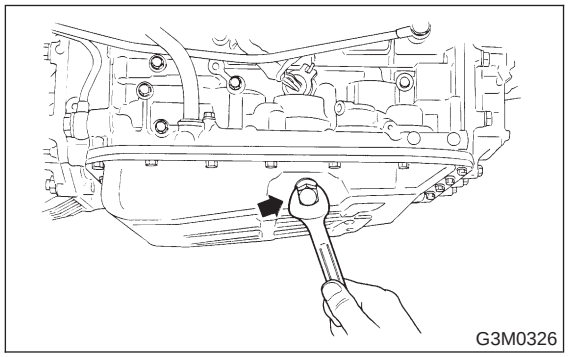
CAUTION:
Be careful not to bend or damage external parts.



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

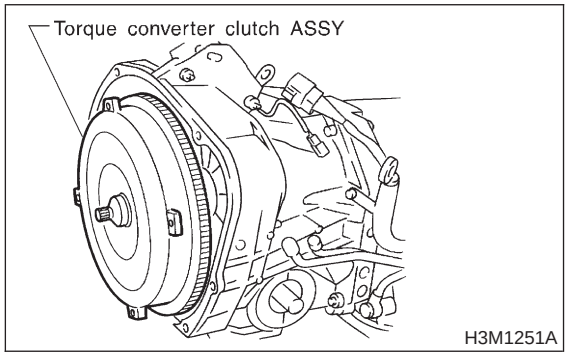


3) Remove the drain plug, and drain automatic transmission fluid (ATF). Tighten the plug temporarily after draining.


G3M0326

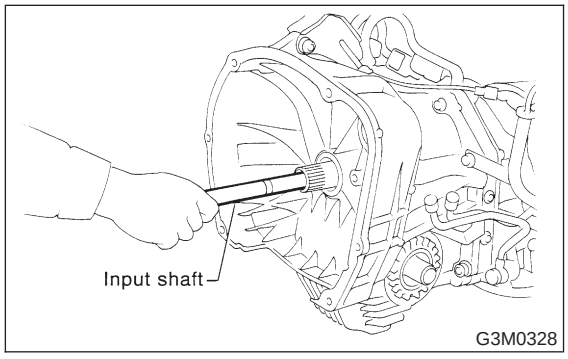
4) Extract the torque converter clutch assembly.

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.



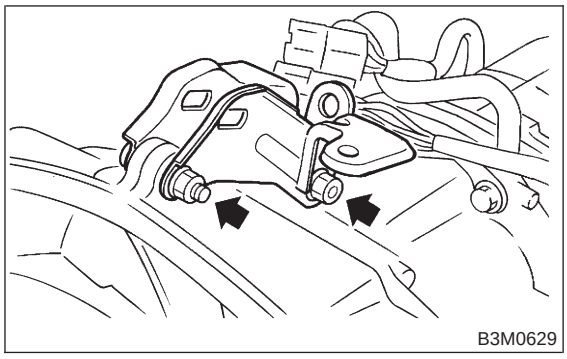
H3M1251A

5) Remove the input shaft.

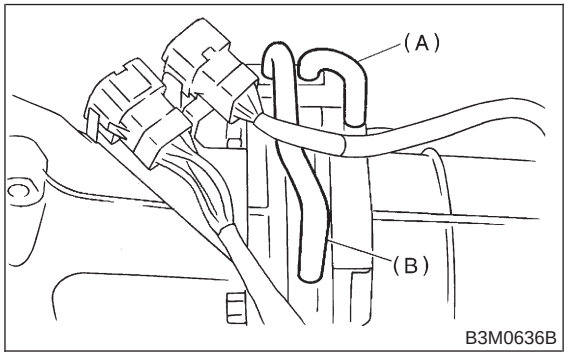


G3M0328

6) Remove the pitching stopper bracket.


B3M0629

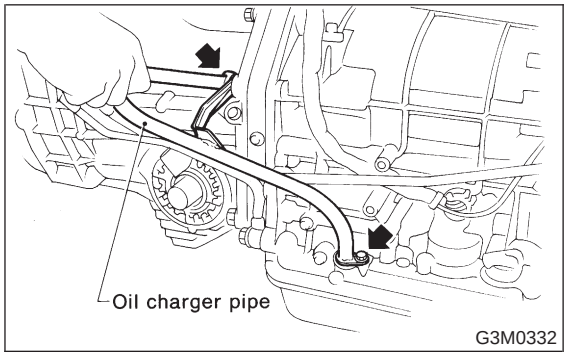
7) Disconnect the air breather hose.



B3M0636B

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

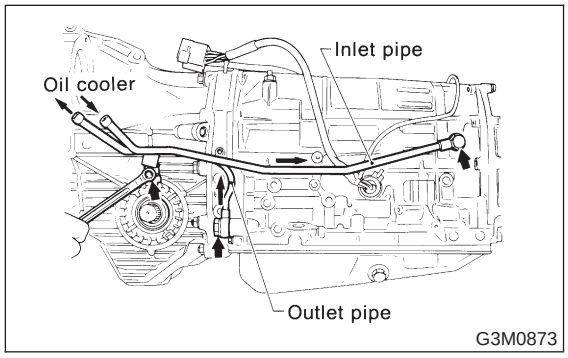
8) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe.



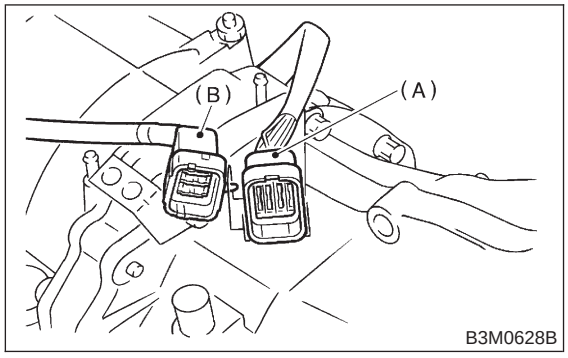
G3M0332

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.



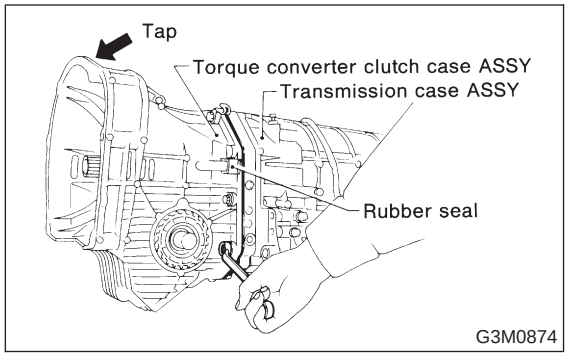
(A) Transmission harness
(B) Inhibitor switch cord

2. SEPARATION OF EACH SECTION

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

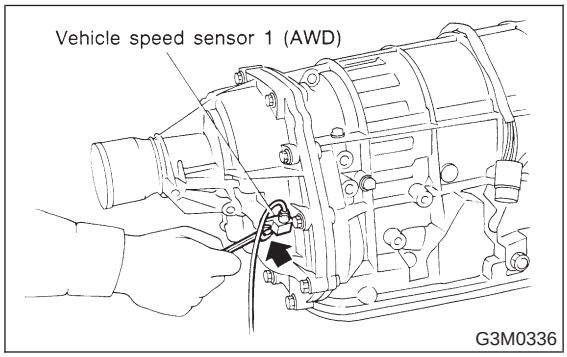
CAUTION:
● Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.
● Be careful not to lose the rubber seal.

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



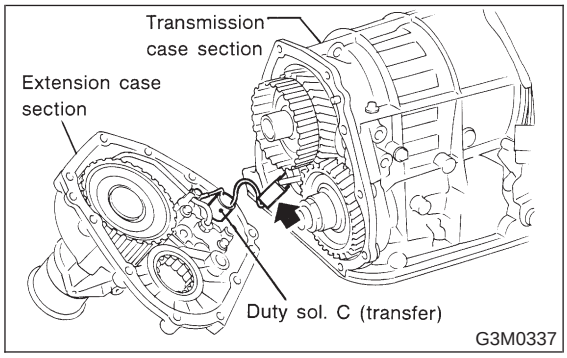
2) Separation of transmission case and extension sections

(1) Remove vehicle speed sensor 1.



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

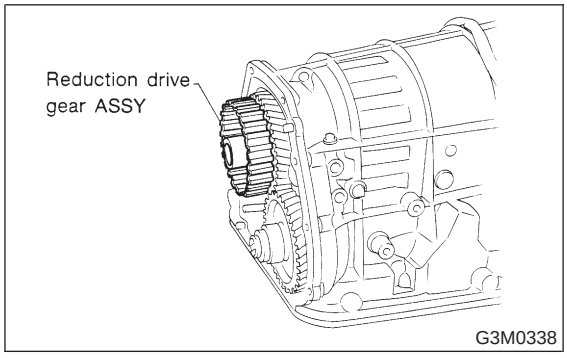
CAUTION:
Be careful not to cut the harness.



3) Separate both sections.

3. TRANSMISSION CASE SECTION

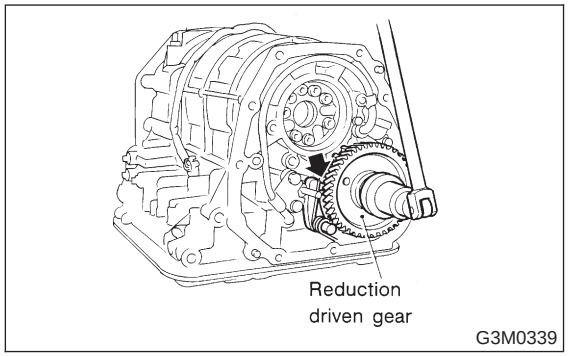
1) Remove the reduction drive gear assembly.



2) Remove the reduction driven gear.

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

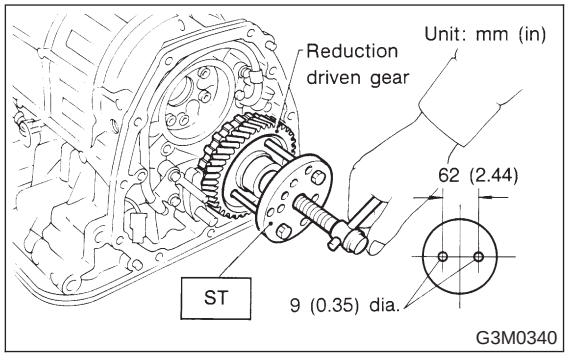
NOTE:
Set the range selector lever to “P”.



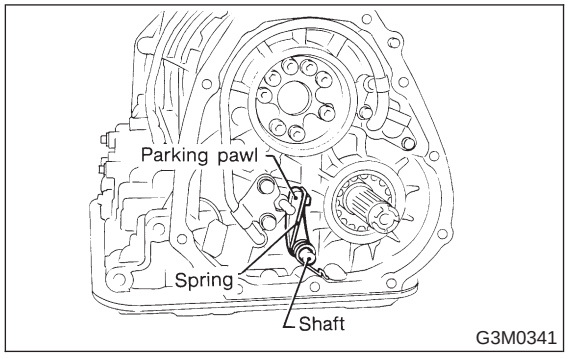
(2) Using the ST, extract the reduction driven gear.

ST 899524100 PULLER SET

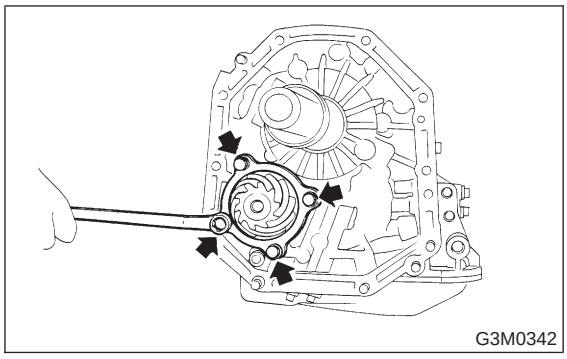
NOTE:
Drill two holes in the puller.



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

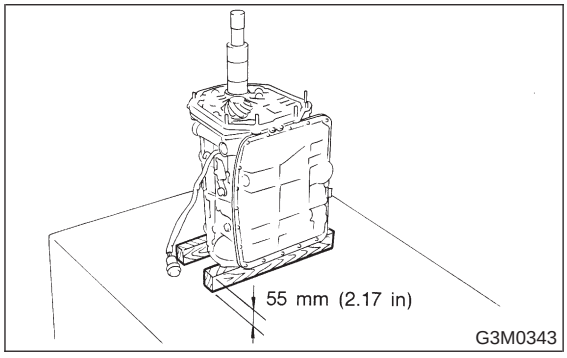


4) Loosen the taper roller bearing mounting bolts.



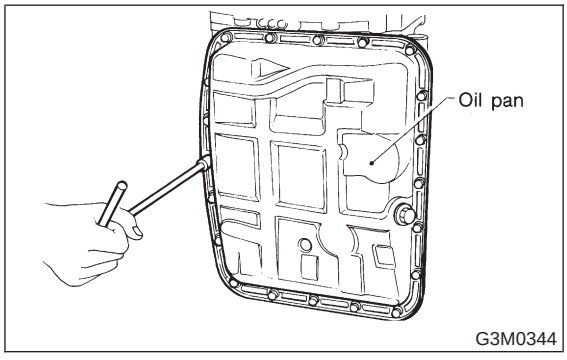
5) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

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.



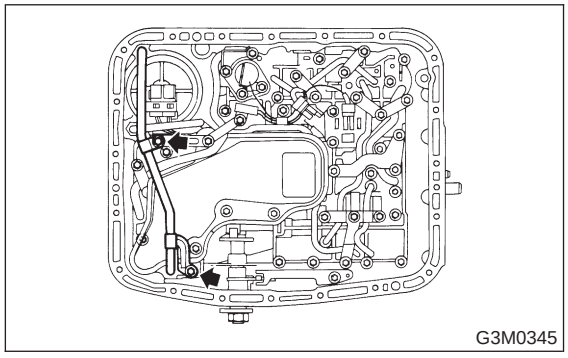
6) Remove the oil pan.

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

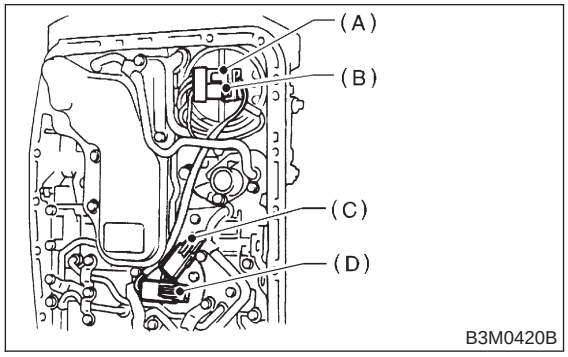


7) Remove the oil cooler outlet pipe.

CAUTION:
Be careful not to twist the pipe.



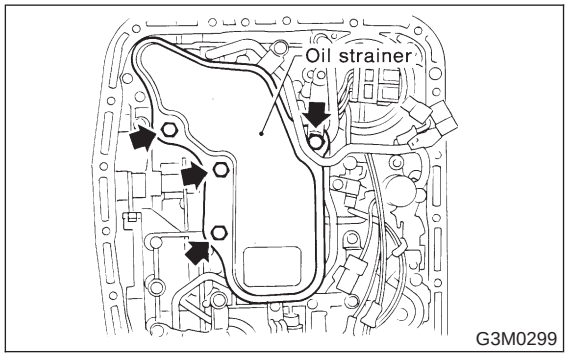
8) Disconnect the harness connectors for the solenoids and duty solenoids and the ground cord.



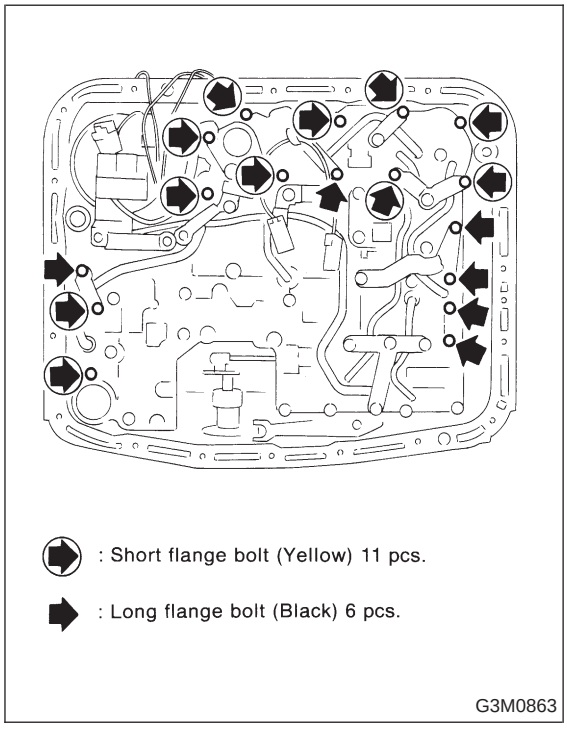
(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

9) Remove the oil strainer.

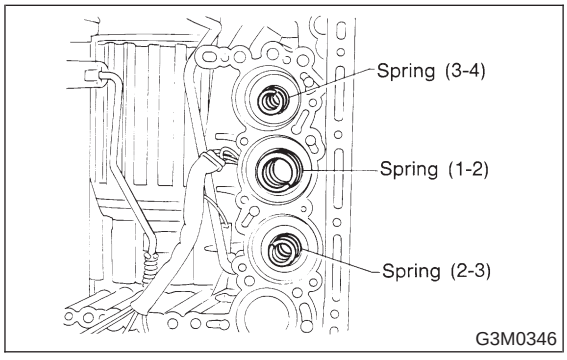
CAUTION:
Be careful not to damage O-ring on oil strainer.



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

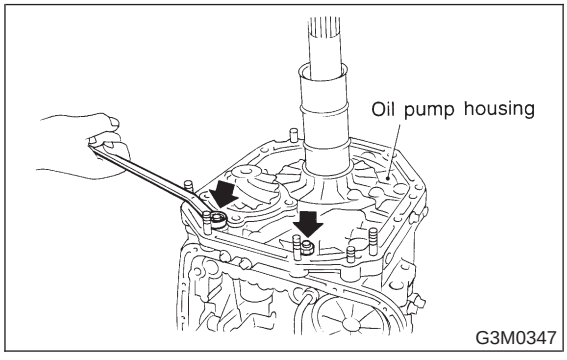


11) Remove the three accumulator springs.

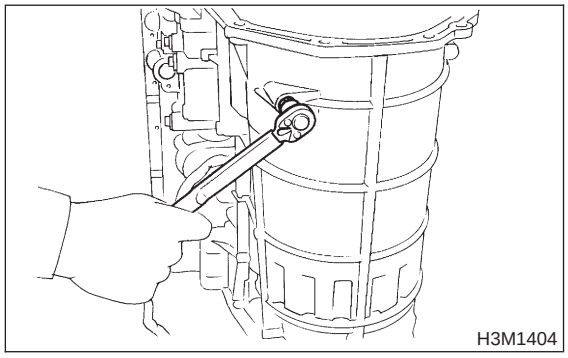


12) Loosen the reverse clutch drum lightly by turning the adjusting screw. Then remove the oil pump housing.

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

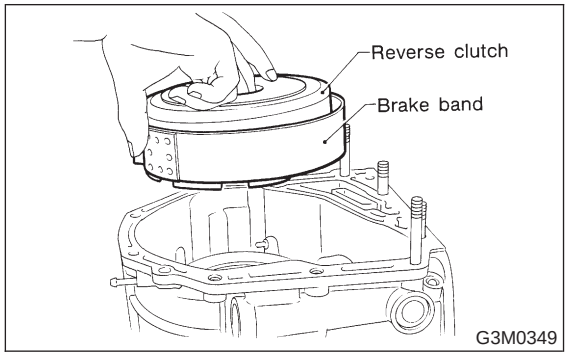


13) Loosen the brake band adjusting screw and take out the strut.



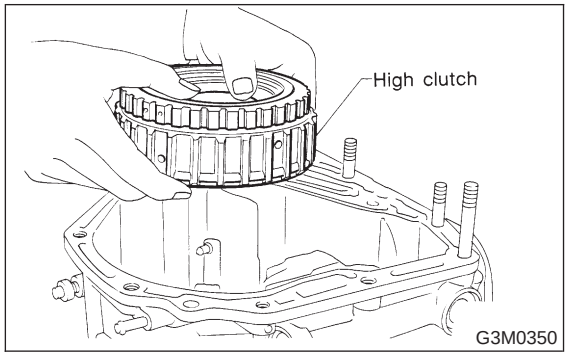
14) Remove the brake band and reverse clutch.

NOTE:
Contract the brake band with a clip.

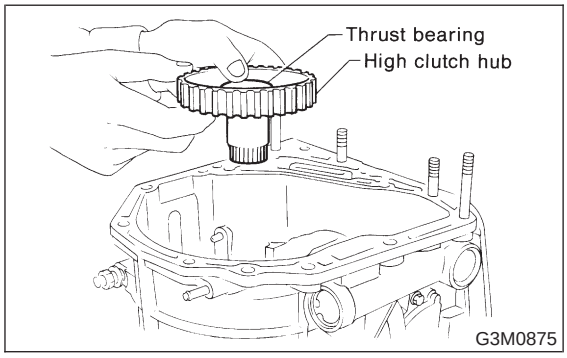


15) Take out the high clutch.

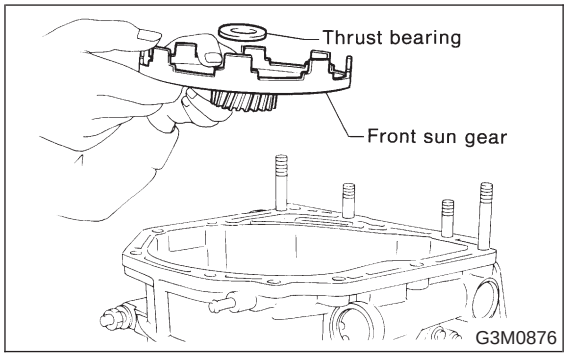
CAUTION:
Thrust needle bearing and bearing race are removed together with high clutch. Be careful not to lose them.



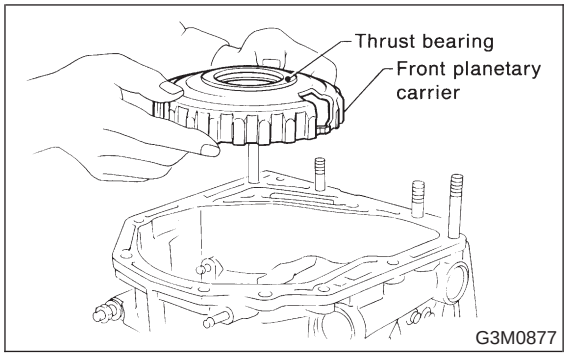
16) Take out the high clutch hub and the thrust bearing.



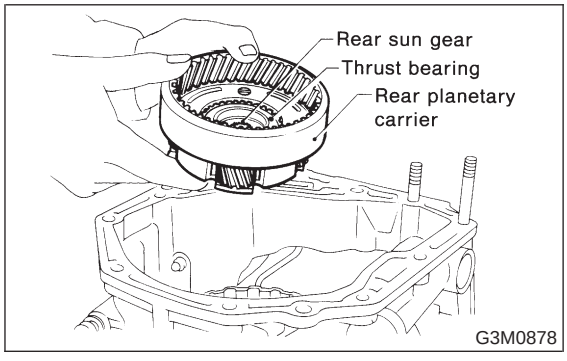
17) Take out the front sun gear and the thrust bearing.



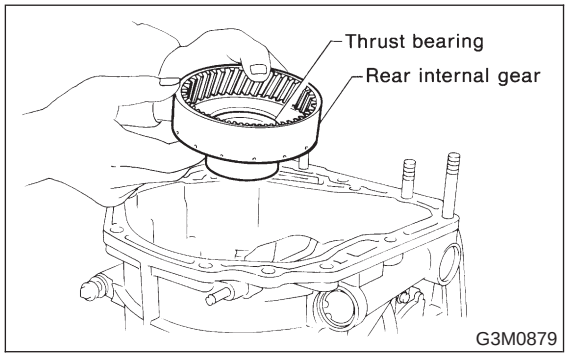
18) Take out the front planetary carrier and the thrust bearing.



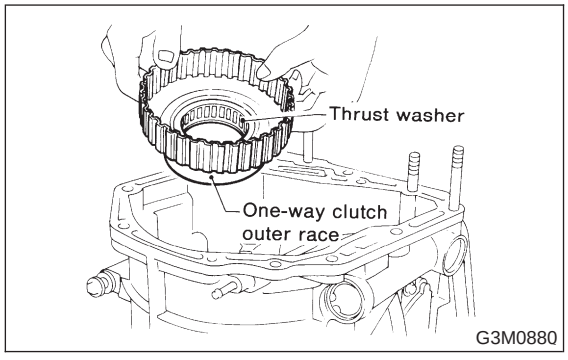
19) Take out the rear planetary carrier, rear sun gear and the thrust bearing.



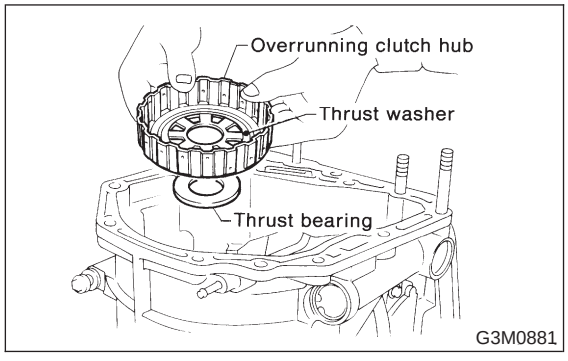
20) Take out the rear internal gear and the thrust bearing.



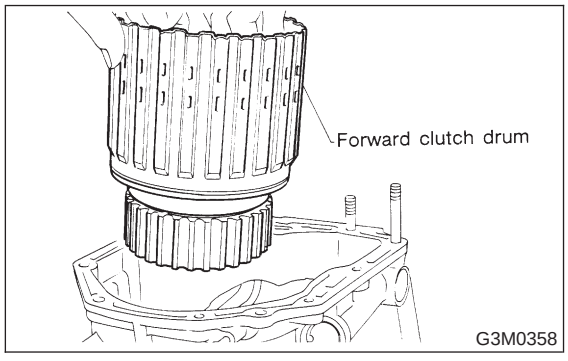
21) Take out the one-way clutch outer race and the thrust washer.



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

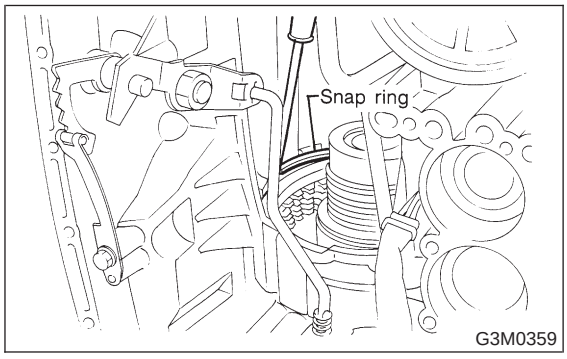


23) Take out the forward clutch drum.

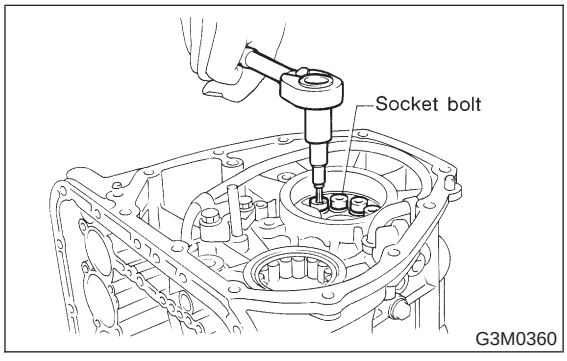


24) Take out the low & reverse brake section.

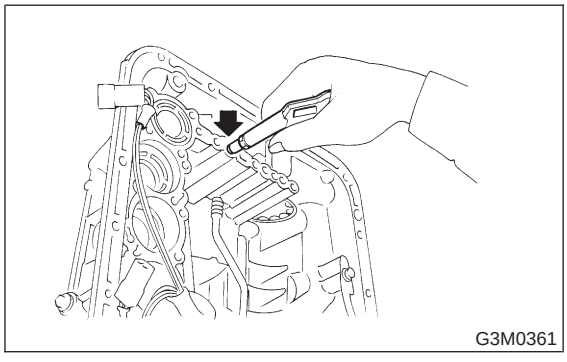
(1) Remove the snap ring. Then remove the retaining plate, drive plates, driven plates, and dish plates as a unit.



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

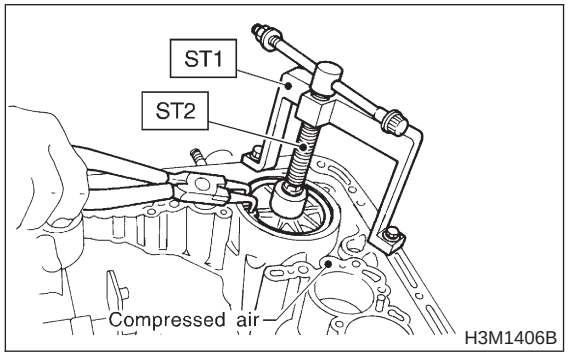


(3) Take out the low & reverse piston by applying compressed air.

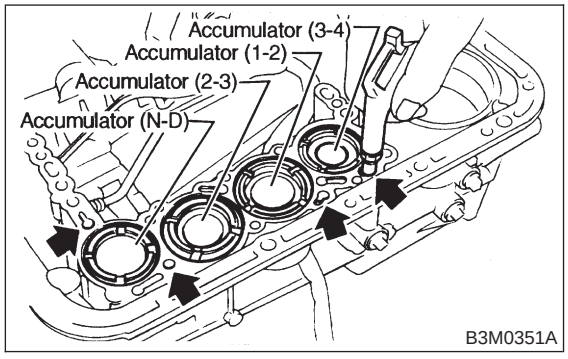


25) After removing the snap ring (inner), take out the servo piston by applying compressed air from the release pressure side.

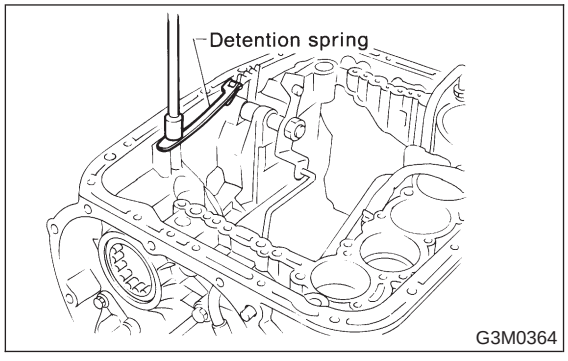
CAUTION:
Hold the servo piston with a rag so that it will not be ejected with the air pressure. In this case, do not allow your finger to be pinched between the pipe and retainer.
ST1 498677010 COMPRESSOR
ST2 399703600 PULLER ASSY



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).

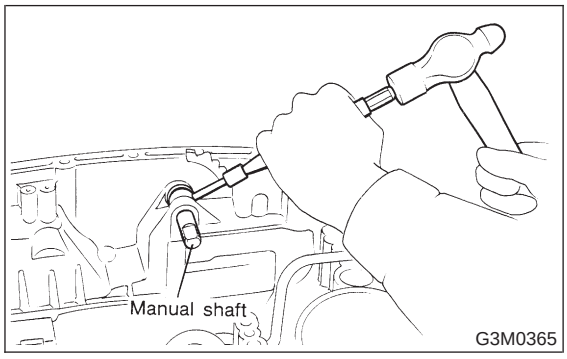


27) Remove the range select lever.
28) Remove the detention spring.

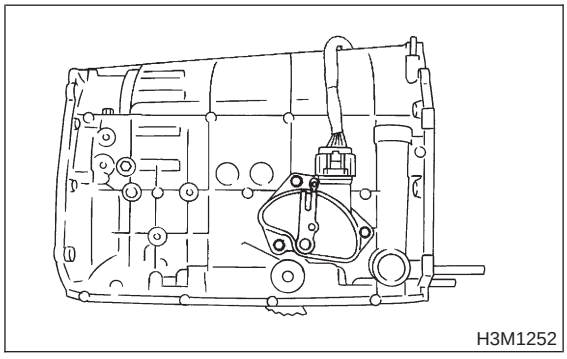


29) Remove the parking rod together with the manual lever. Then remove the manual shaft by pulling off the straight pin.

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

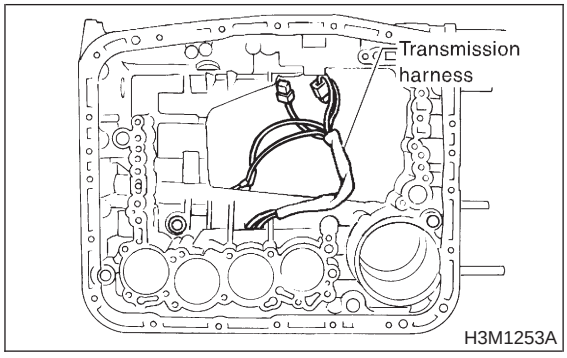


30) Remove the inhibitor switch.



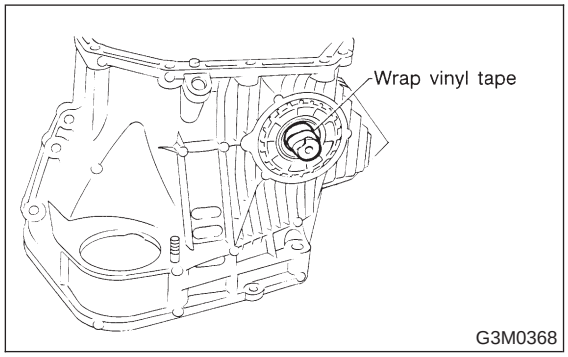
31) Remove the transmission harness.

CAUTION:
Be careful not to damage the cord insulation.



4. TORQUE CONVERTER CLUTCH CASE SECTION

1) Wrap the axle shaft serration with vinyl tape.

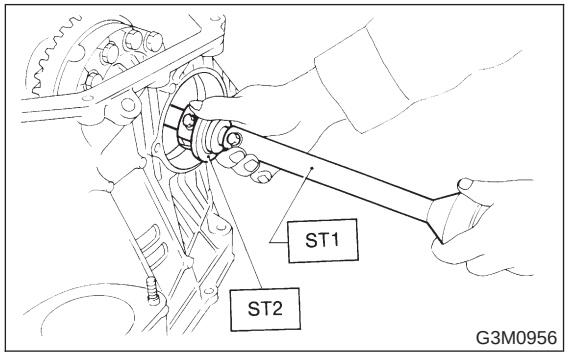


2) Remove the differential side retainer with ST.

CAUTION:
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case and speedometer gears.
ST 499787000 WRENCH ASSY

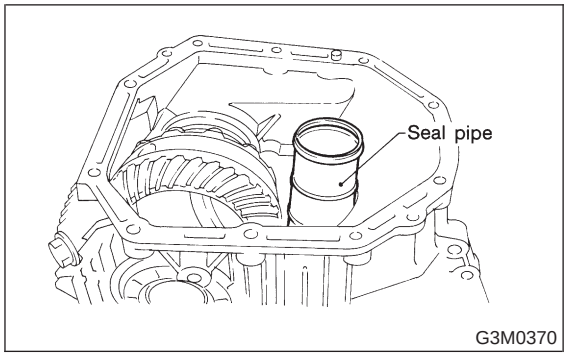
3) Extract the axle shaft with ST1 and ST2.

CAUTION:
Do not reuse the circlip.
ST1 499095500 REMOVER
ST2 499247300 INSTALLER

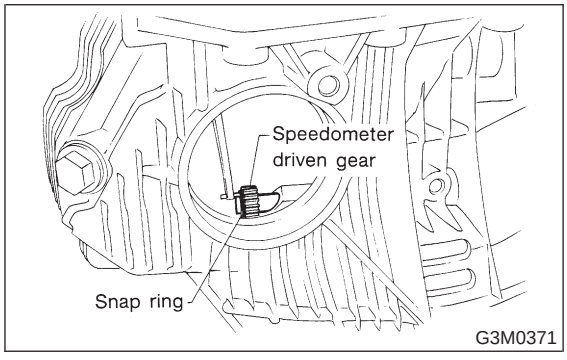


4) Remove the differential case assembly.

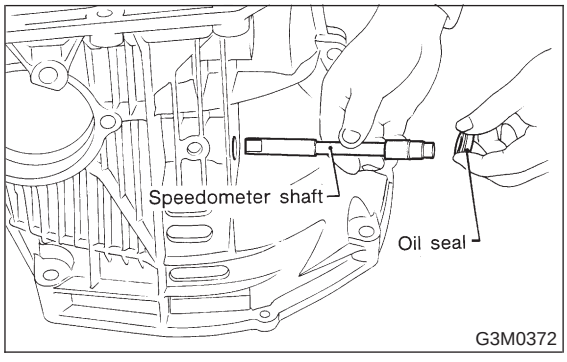
CAUTION:
- **Be careful not to damage the retainer mounting hole of the torque converter clutch case and the speedometer gears.**
- **Remove the seal pipe if it is attached. (Reusing is not allowed.)**



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



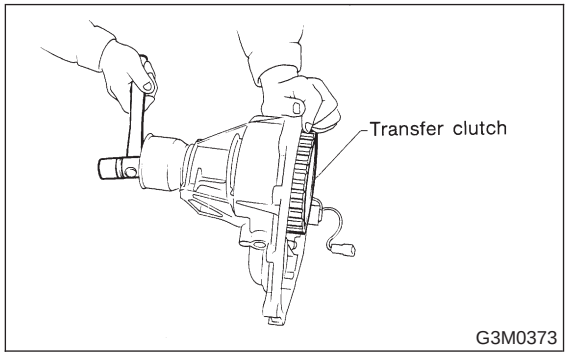
6) Tap out the speedometer shaft to the outside of the case, and remove the oil seal.



5. EXTENSION SECTION

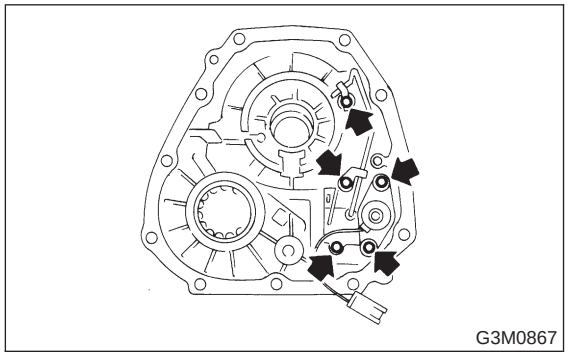
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

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

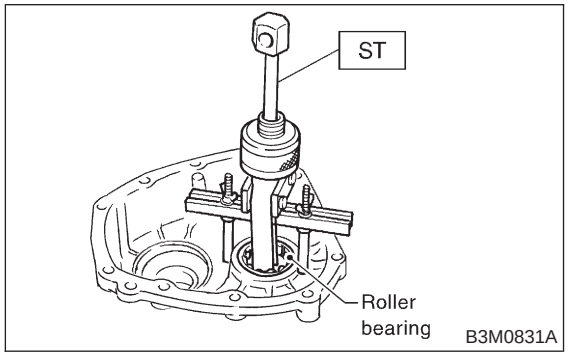


2) Remove duty solenoid C, transfer valve body and the transfer pipe.

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

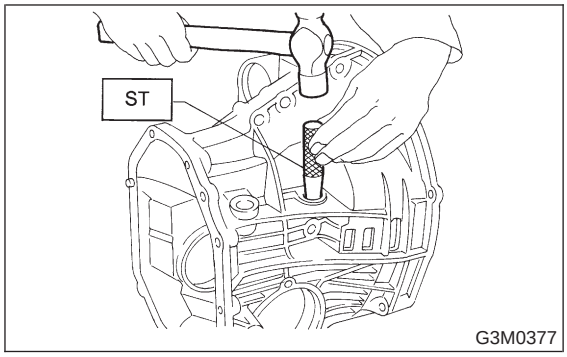
C: ASSEMBLY OF OVERALL TRANSMISSION

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.

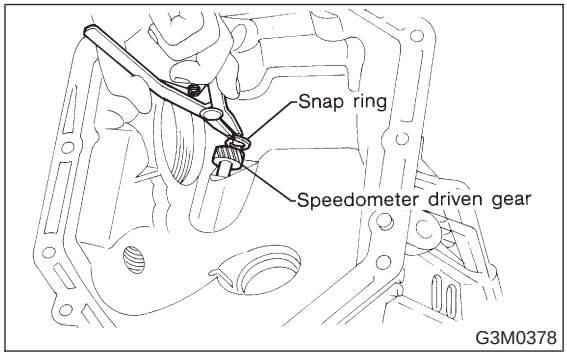
2) Install the washer and snap ring to the speedometer shaft with ST, and set the oil seal. Then force-fit the shaft to the torque converter clutch case.
ST 499827000 PRESS



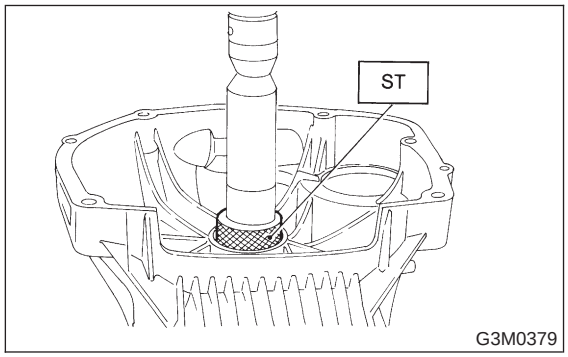
3) Install vehicle speed sensor 2.

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

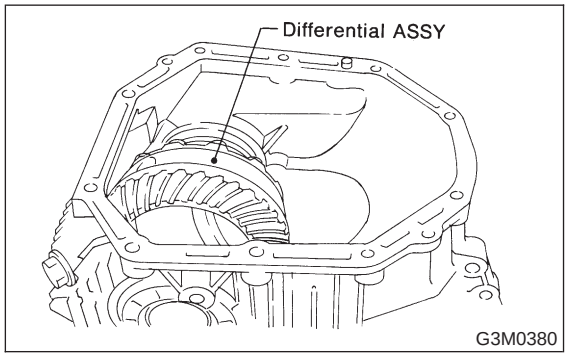
4) Install the speedometer driven gear to the speedometer shaft, and secure with a snap ring.



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



6) 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).

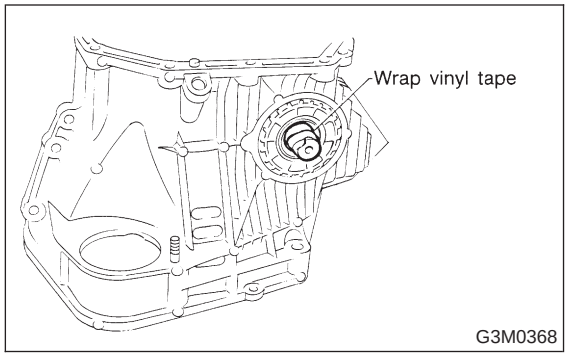


7) Install the circlip to the axle shaft, insert the shaft into the differential assembly, and tap it into position with a plastic hammer.

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.**

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

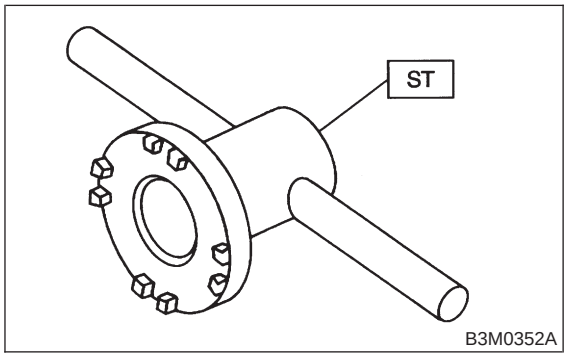


9) Install the oil seal and outer race (taper roller bearing) to the differential side retainer. Then screw in the retainer and the O-ring after coating the threads with oil.

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.**

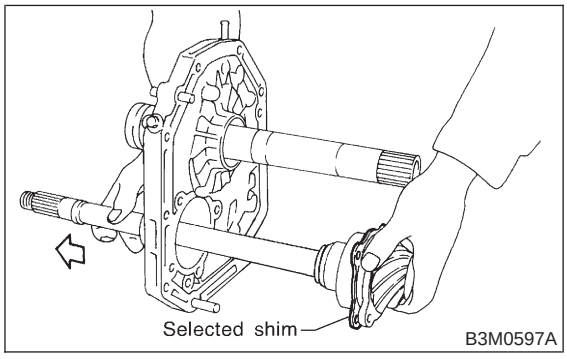
10) Using the ST, screw in the retainer until light contact is felt.
ST 499787000 WRENCH ASSY

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



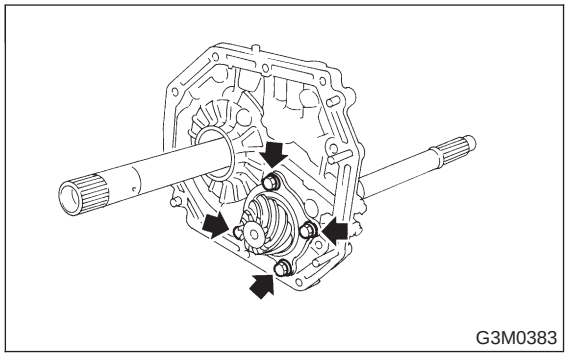
11) Hypoid gear backlash adjustment and tooth contact check
(1) Assemble the drive pinion assembly to the oil pump housing.

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.

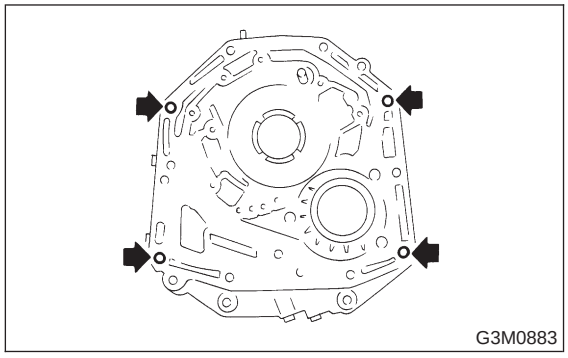
Tightening torque:
39±3 N·m (4.0±0.3 kg-m, 28.9±2.2 ft-lb)


G3M0383

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

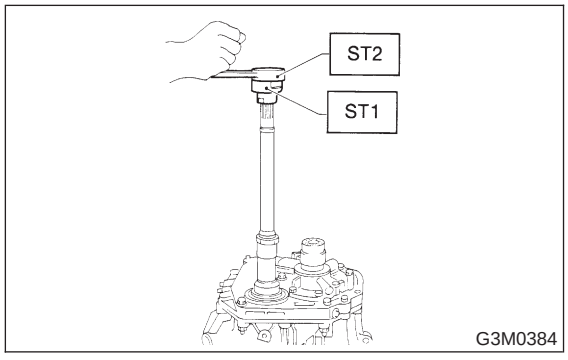
CAUTION:
● Thoroughly remove the liquid gasket from the case mating surface beforehand.
● Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

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


G3M0883

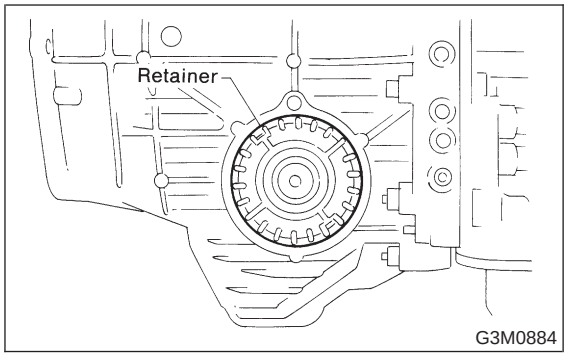
(4) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937100 HOLDER
ST2 499787100 WRENCH



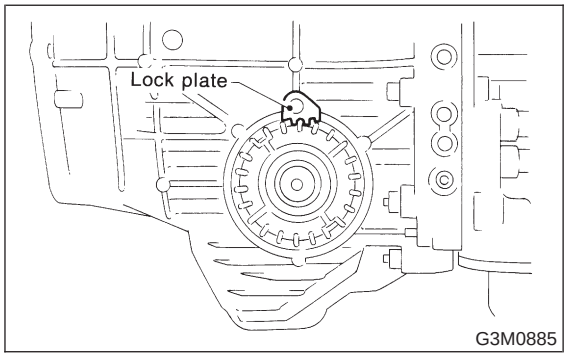
G3M0384

(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.



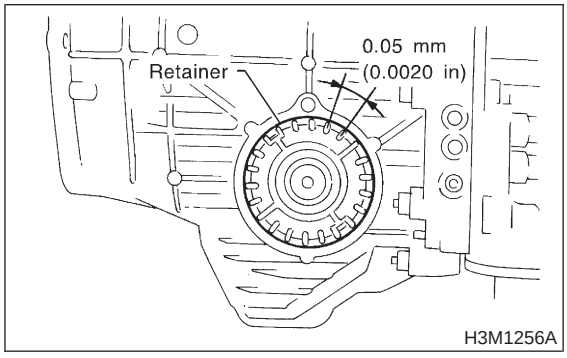
G3M0884

(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).



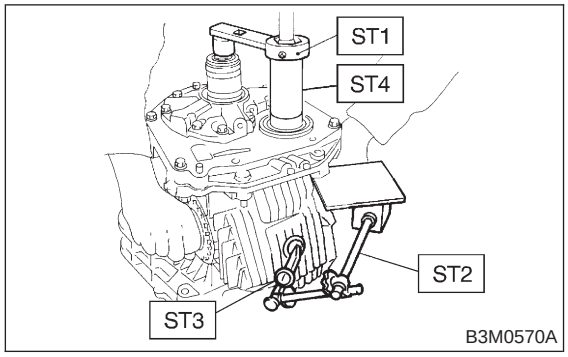
H3M1256A

(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.

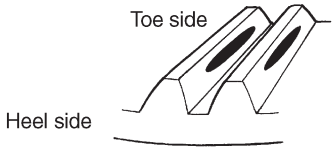
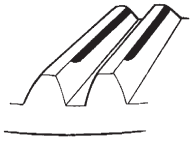
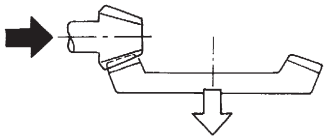
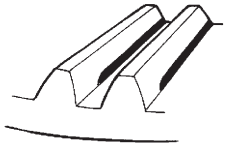
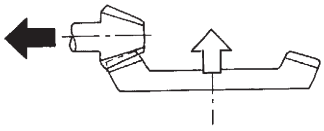
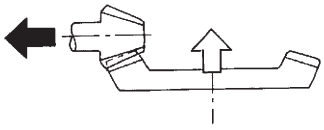
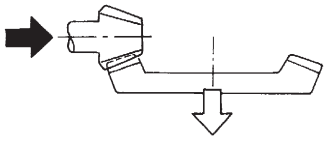
NOTE:
After confirming that the backlash is correct, check the tooth contact.

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)



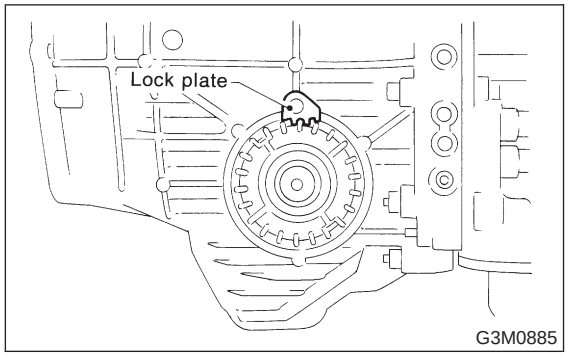
(8) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.
If tooth contact is improper, readjust the backlash or shim thickness.

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

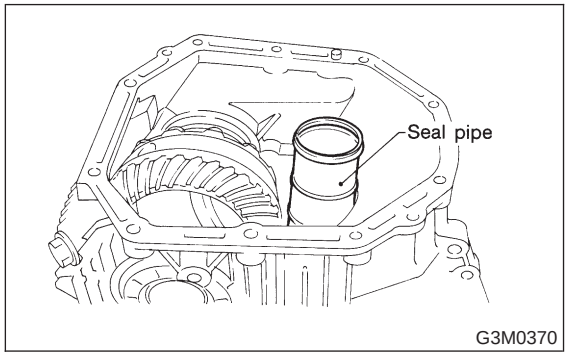
(9) If tooth contact is correct, mark the retainer position and loosen it. After fitting the O-ring, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

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



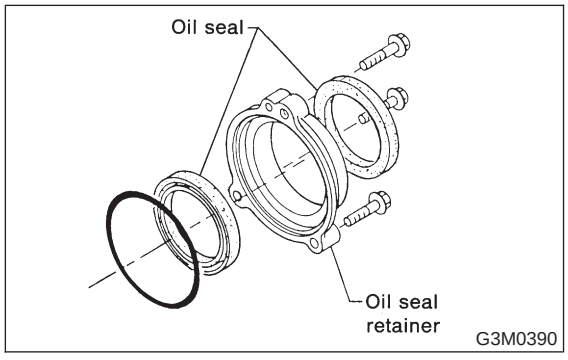
12) Install the seal pipe to the torque converter clutch case.

CAUTION:
Be sure to use a new seal pipe.



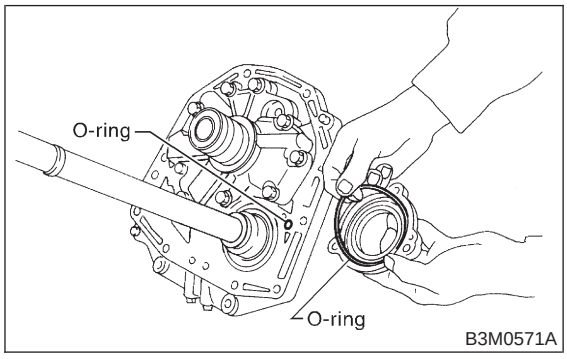
13) Install two oil seals to the oil seal retainer with ST.
ST 499247300 INSTALLER

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



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

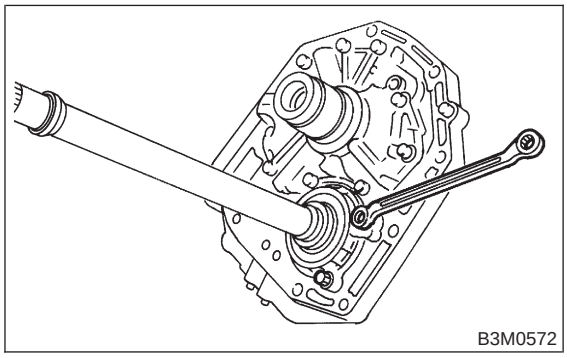
CAUTION:
Always discard old O-rings and install new ones.



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

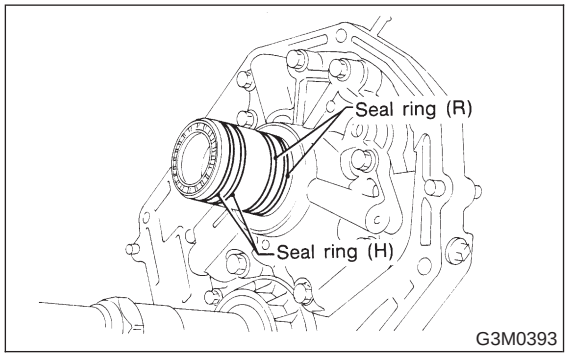
NOTE:
Make sure the O-ring is fitted correctly in position.

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



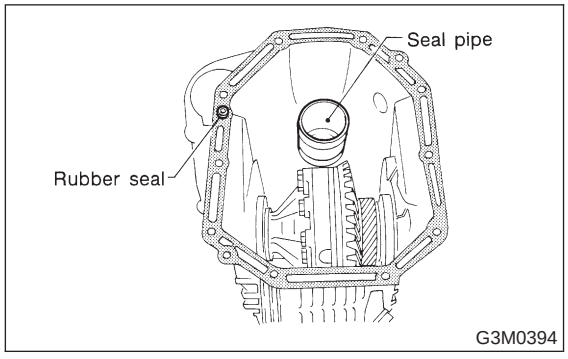
16) Apply vaseline to the groove on the oil pump cover, and install two (R) seal rings and two (H) seal rings.

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



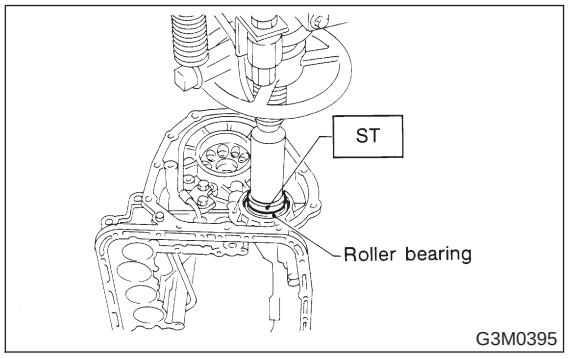
17) Install the rubber seal to the torque converter clutch case.

CAUTION:
Be careful not to lose the rubber seal.

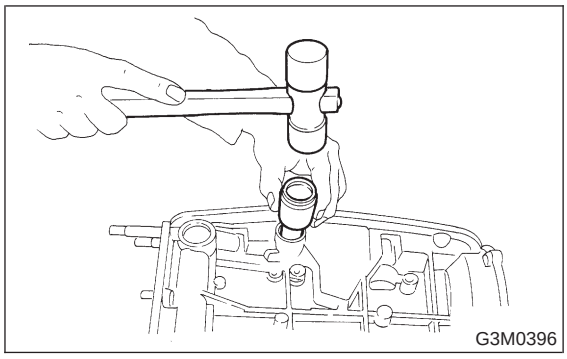


2. TRANSMISSION CASE SECTION

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



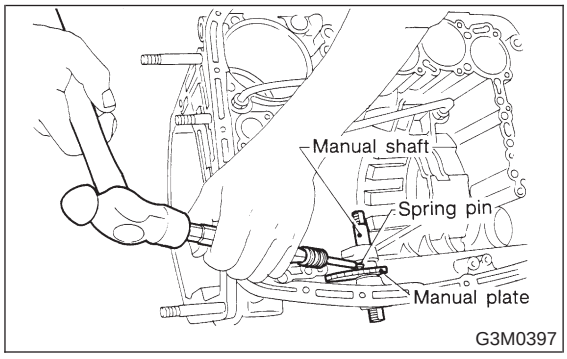
2) Using a plastic hammer, force-fit the oil seal.



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

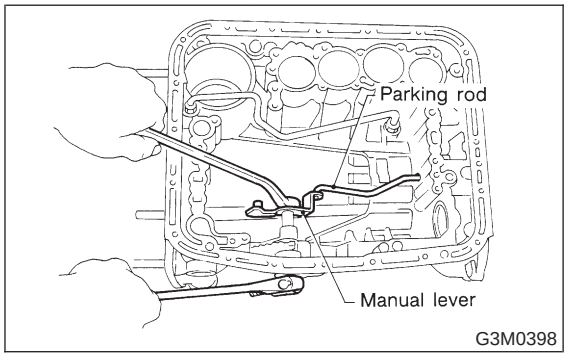
CAUTION:
Be careful not to damage the oil seal lip.

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.

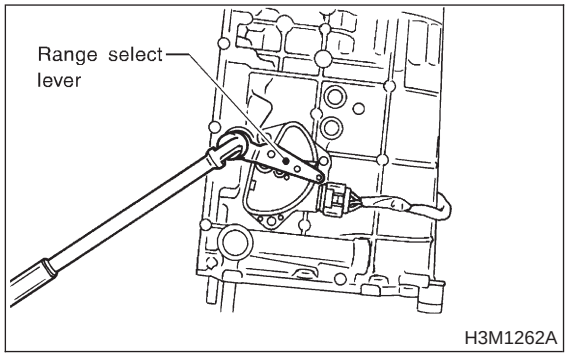
Tightening torque:
47±2 N·m (4.8±0.2 kg-m, 34.7±1.4 ft-lb)



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.

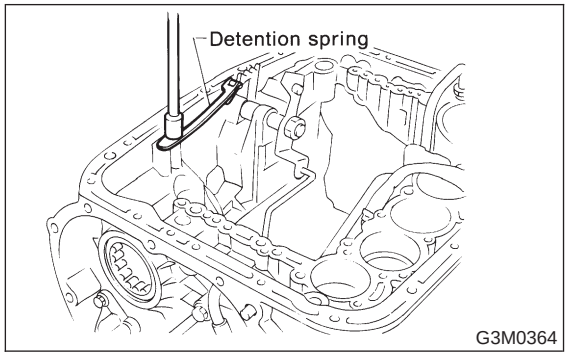
Tightening torque:
47±5 N·m (4.8±0.5 kg-m, 34.7±3.6 ft-lb)



6) Install the detention spring.

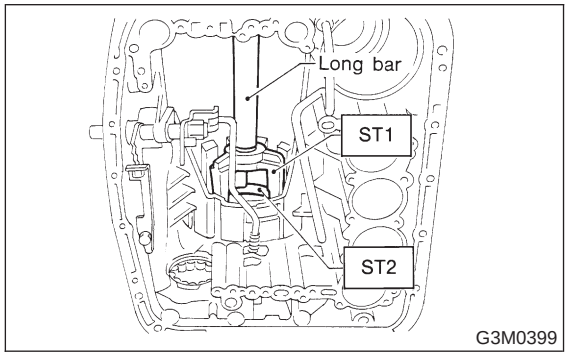
NOTE:
Position the spring so that its center is aligned with the center of the manual plate.

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



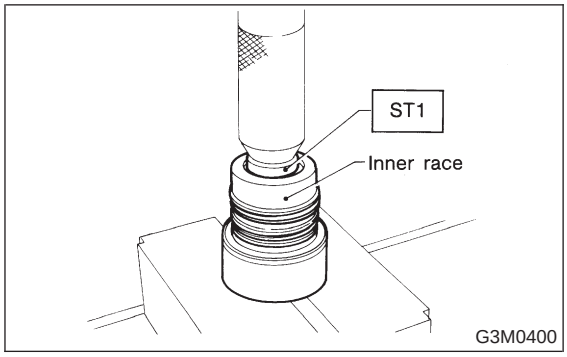
7) Install the lathe cut seal rings to the I.D./O.D. of the low and reverse piston. Then install the piston into the case with a press, ST1 and ST2.

CAUTION:
● Be careful not to tilt the piston when installing.
● Be careful not to damage the lip seal.
ST1 398673600 COMPRESSOR
ST2 498627000 SEAT



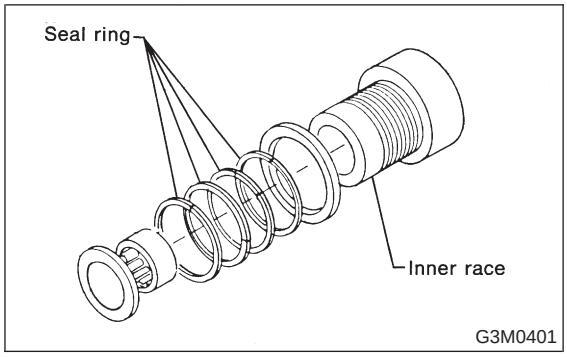
8) Install the one-way clutch inner race.
(1) Using a press and ST1, install the needle bearing to the inner race.
ST1 398497701 INSTALLER

NOTE:
Use the following ST when removing.
ST 398527700 PULLER ASSY



(2) Install four seal rings and thrust washer.

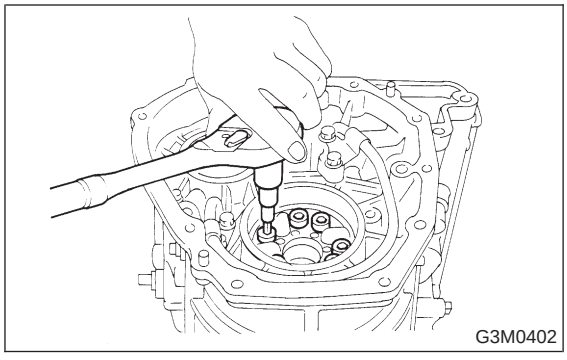
NOTE:
Apply vaseline to the groove of the inner race and to the seal ring after installation, so that the seal ring will not expand.



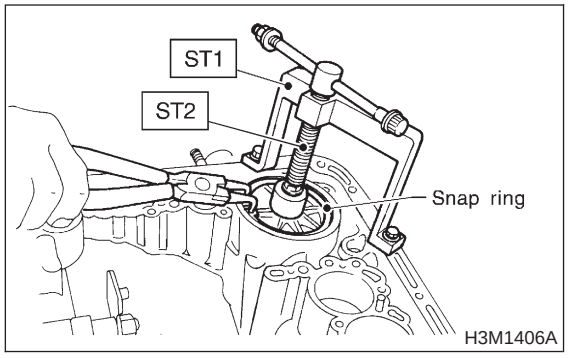
(3) Place the spring retainer on the inner race. Install the spring to the recessed portion of the piston. Then tighten eight socket head bolts from the rear side of the transmission case.

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.

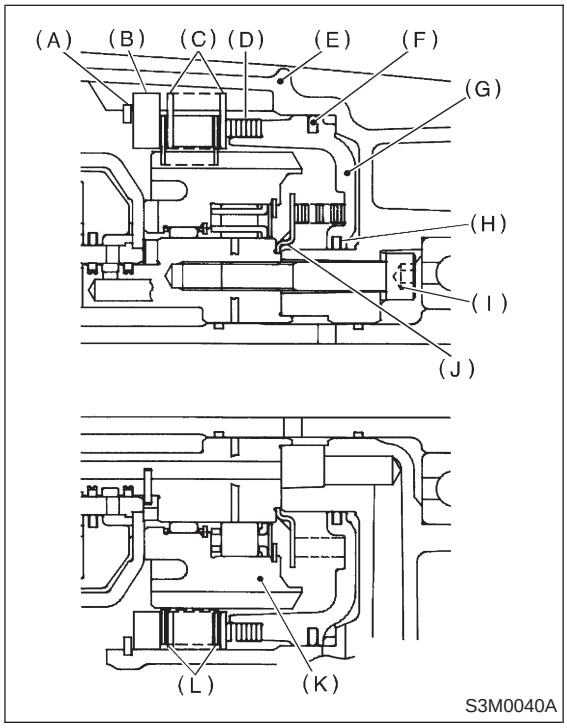
Standard value: 1.8 mm (0.071 in)

Allowable limit: 1.6 mm (0.063 in)

12) Installation of the low & reverse brake:

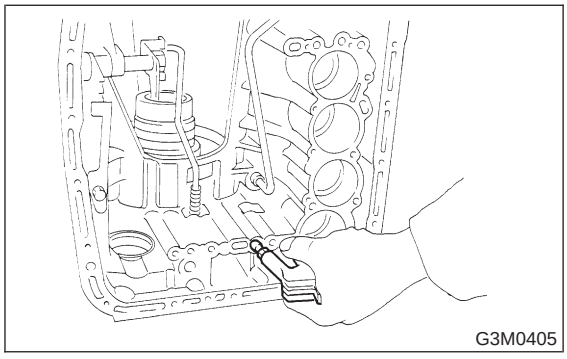
(1) Install wave spring, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

NOTE:
Pay attention to the orientation of the wave spring.



(A) Snap ring
(B) Retaining plate
(C) Driven plate
(D) Wave spring
(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.

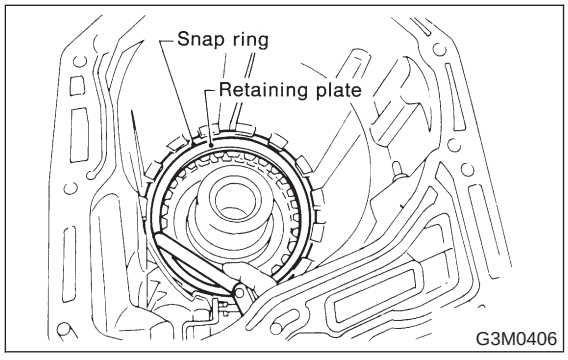


(3) Check the clearance. (Selection of retaining plate)

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

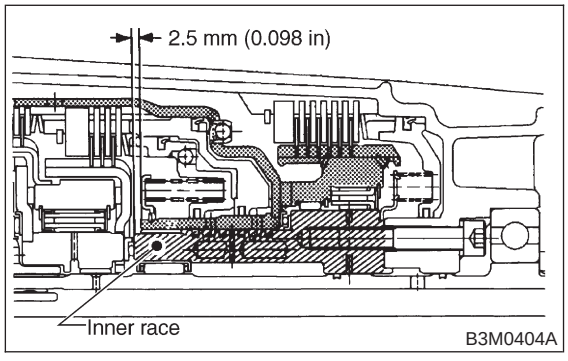
Standard value:
0.7 — 1.0 mm (0.028 — 0.039 in)

Allowable limit:
2.0 mm (0.079 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)

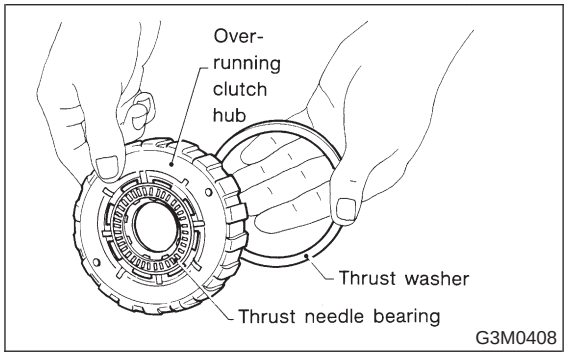
13) Install the forward clutch drum.
(1) Install carefully while rotating the forward clutch drum slowly paying special attention not to damage the seal ring.
(2) Installation is completed when the forward clutch drum recedes 2.5 mm (0.098 in) from the inner race surface.



14) Assemble the overrunning clutch hub.

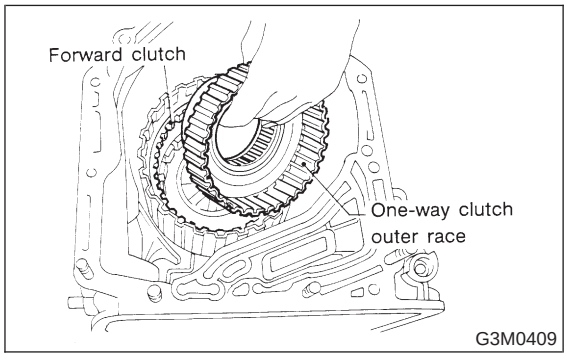
CAUTION:
Install thrust needle bearing in the correct direction. <Ref. to 3-2 [S1B2].>

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.

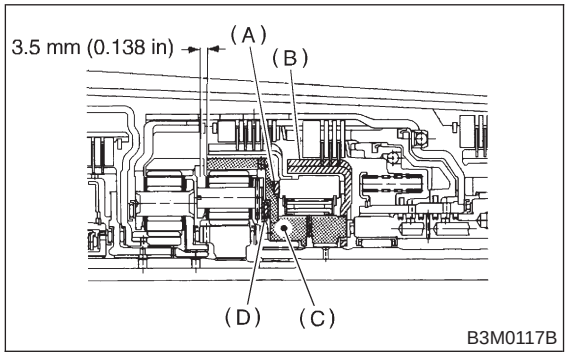
NOTE:
Make sure the forward clutch splines are engaged correctly.



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].>

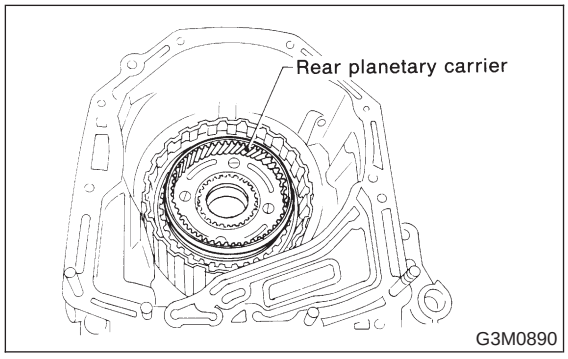
NOTE:
Installation is complete when the snap ring top surface of the forward clutch drum recedes approximately 3.5 mm (0.138 in).



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

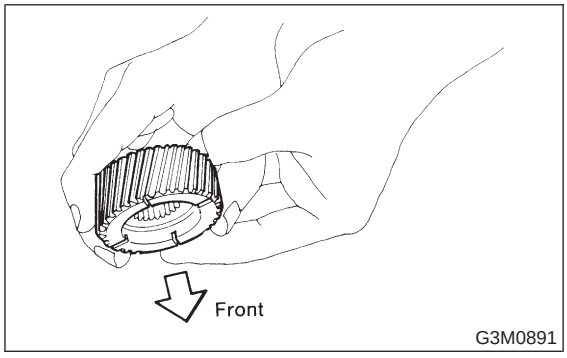
17) Install the rear planetary carrier.
Attach the thrust needle bearing to the inside of the carrier with vaseline. Then install the carrier while rotating slowly.

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



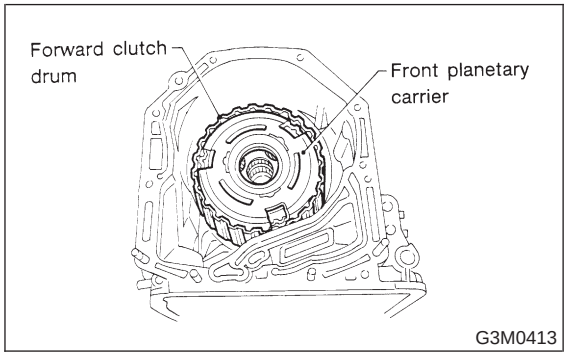
18) Install the rear sun gear.

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



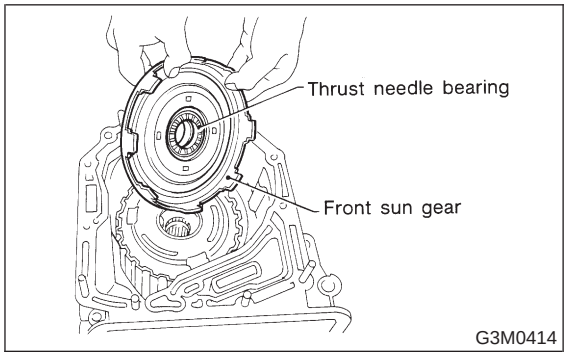
19) Install the front planetary carrier.
Attach the thrust needle bearings to both sides of the carrier with vaseline. Install the carrier carefully, while aligning with the splines of the forward clutch drum, and while rotating the pinion.

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



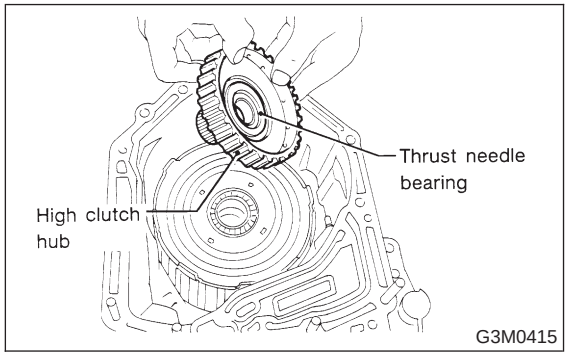
20) Install the front sun gear.
Attach the thrust needle bearing to the gear, and install the gear while turning slowly.

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



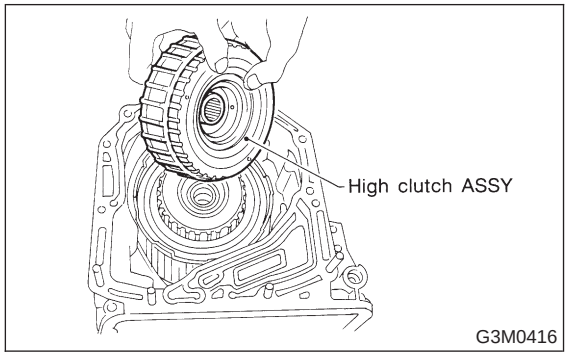
21) Install the high clutch hub.
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

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



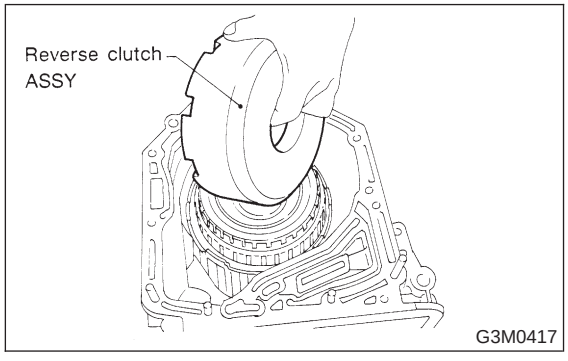
22) Install the high clutch assembly.

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



23) Install the reverse clutch assembly.

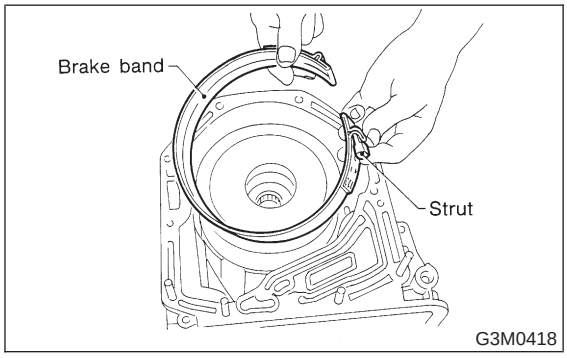
NOTE:
Engage the high clutch outer spline with the reverse clutch spline and the front sun gear with the cut-out portion of the reverse clutch drum correctly when installing.



24) Install the brake band.

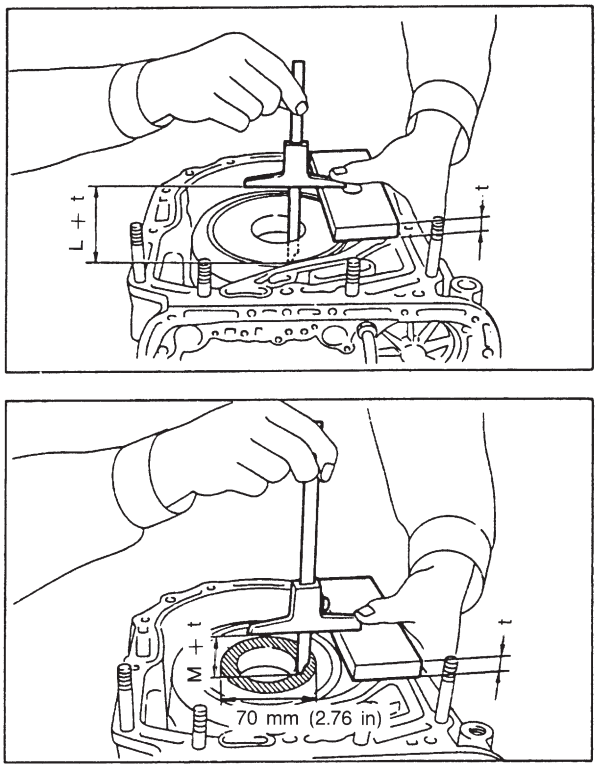
CAUTION:
Be careful not to damage the brake band when installing.

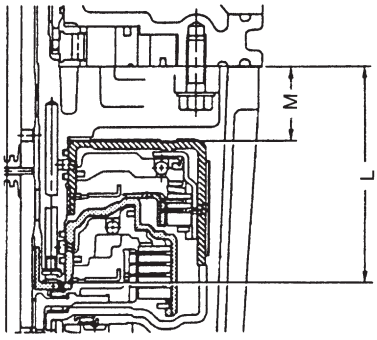
NOTE:
Install the strut to the band servo piston stem. Then tighten it temporarily to avoid tilting the band.



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

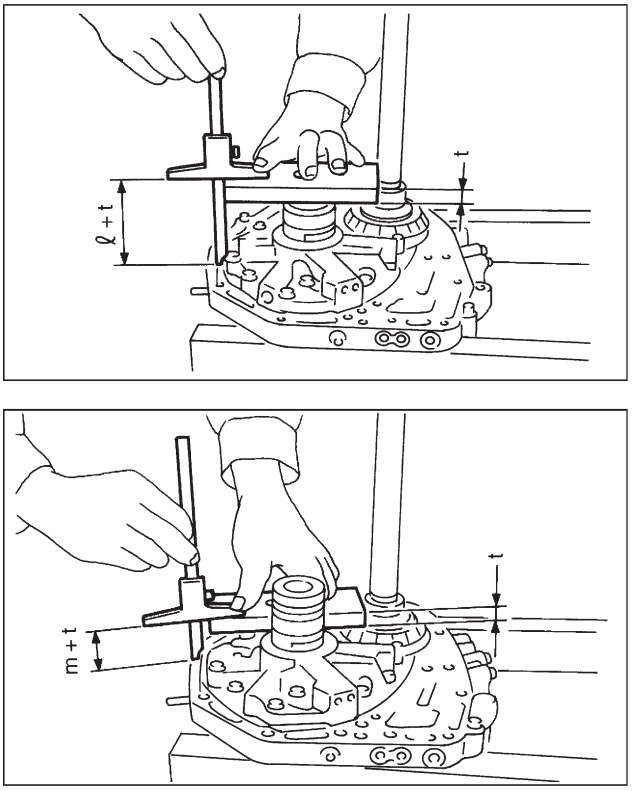
(1) Measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum “L”, and the distance to the top surface of the reverse clutch drum “M”.

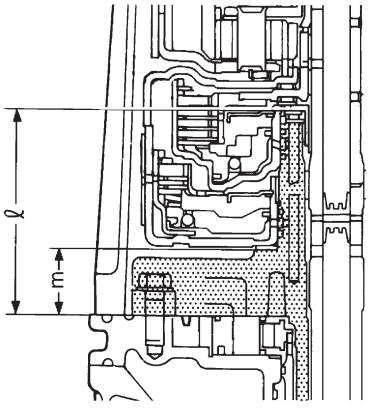




G3M0419

(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.





B3M0573A

(3) Equation for calculation

- Total end play
  C = (L + 0.4 mm) − ℓ

NOTE:
Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 — 0.55 mm (0.0098 — 0.0217 in) range.

C	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

Bearing race	
Part No.	Thickness mm (in)
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

NOTE:
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.

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

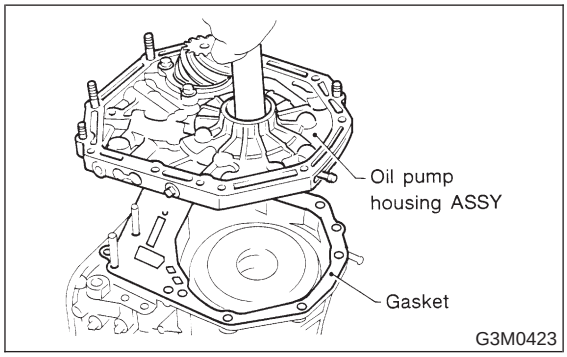
Thrust washer	
Part No.	Thickness mm (in)
31299AA000	0.7 (0.028)
31299AA010	0.9 (0.035)
31299AA020	1.1 (0.043)
31299AA030	1.3 (0.051)
31299AA040	1.5 (0.059)
31299AA050	1.7 (0.067)
31299AA060	1.9 (0.075)

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.

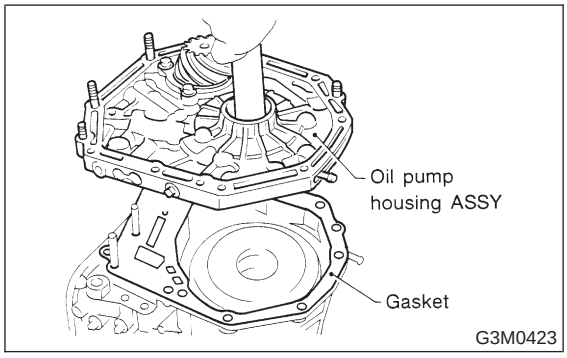
(2) After correctly installing the gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

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



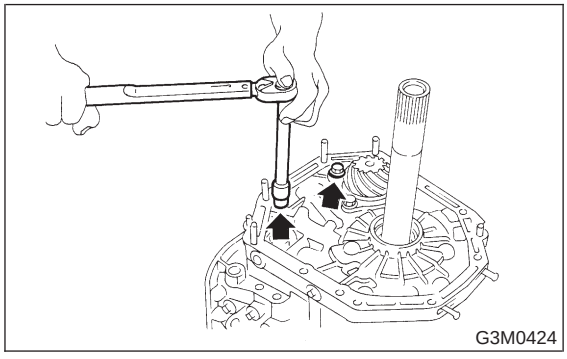
(3) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

NOTE:
Any clearance suggests a damaged seal ring.



(4) Secure the housing with two nuts.

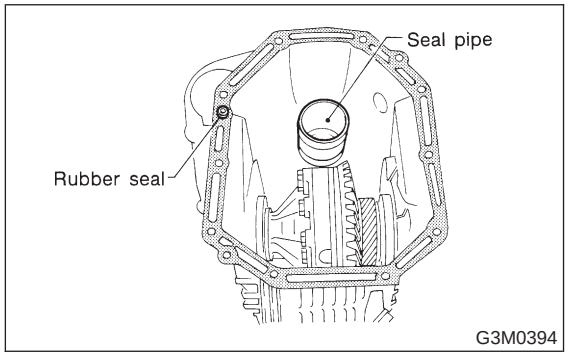
Tightening torque:
41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



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.

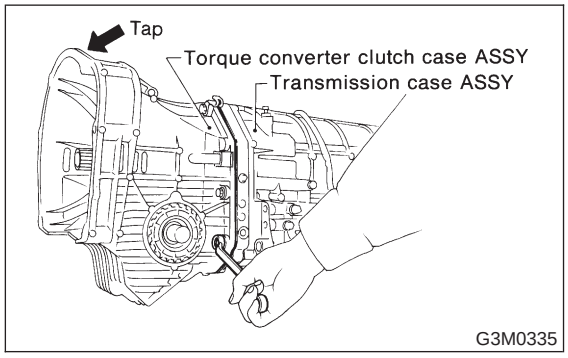
NOTE:
Make sure that the rubber seal and seal pipe are fitted in position.



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)

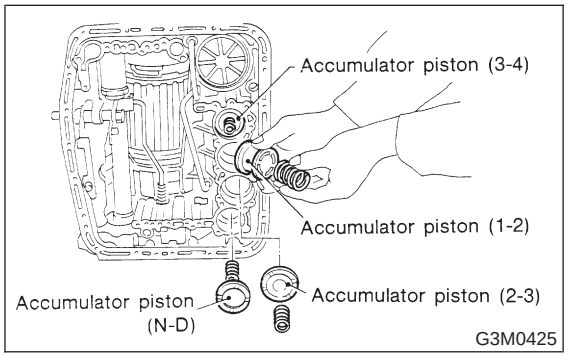


4. CONTROL VALVE AND OIL PAN

1) Install four accumulators with oil pans facing upward.

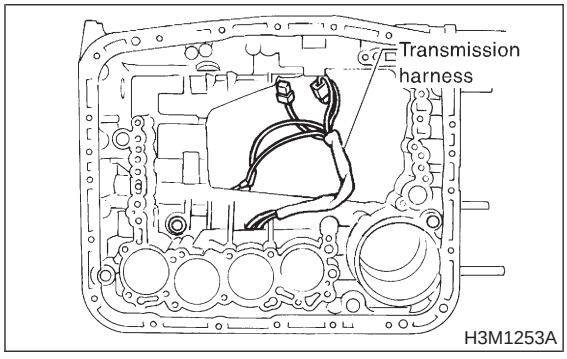
CAUTION:
Be careful not to confuse the springs and installation positions.

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.

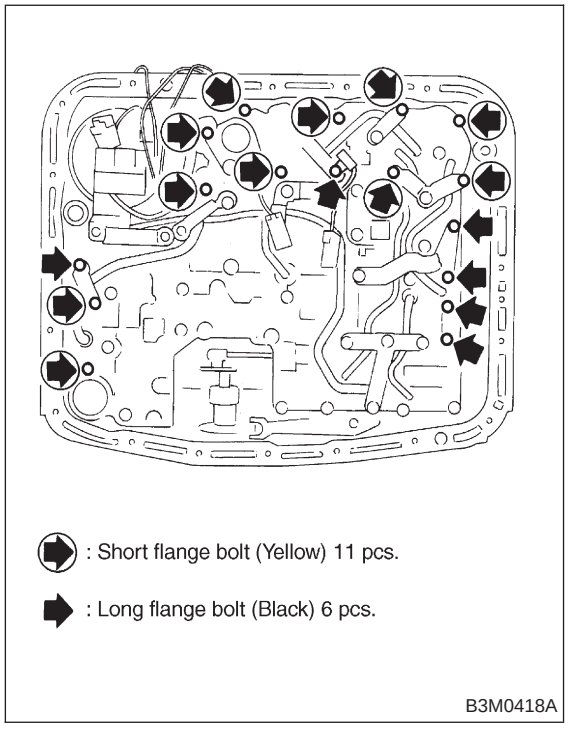


3) Install the control valve assembly.
(1) Set the select lever in range “2”.

(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.

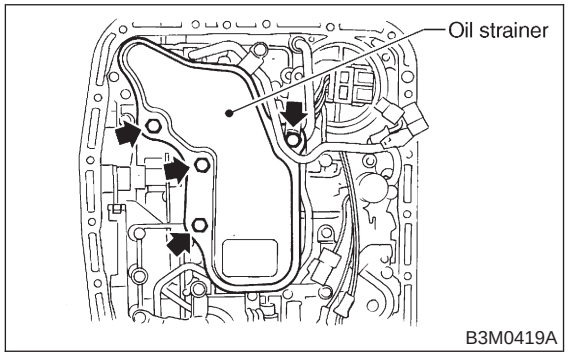
CAUTION:
● Be careful not to pinch the harness roll the gasket.
● Tighten the control valve mounting bolts evenly.

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

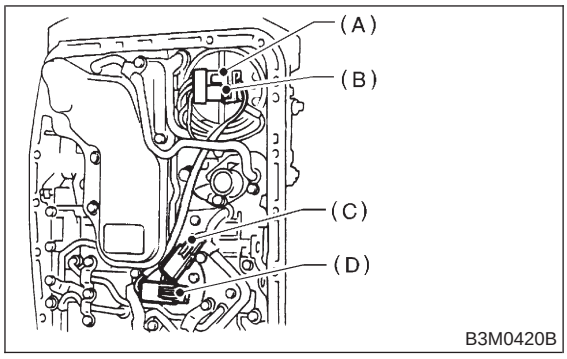


4) Install the oil strainer to the control valve. Be careful not to cut or break the O-ring. Then tighten four bolts.

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



5) Secure four solenoid valve connectors.

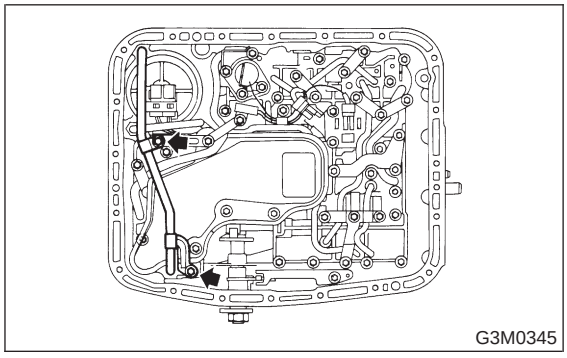


(A) Shift solenoid 2 and duty solenoid A connector
(B) Shift solenoid 1 and 3 connector
(C) Duty solenoid B connector
(D) ATF temperature sensor connector

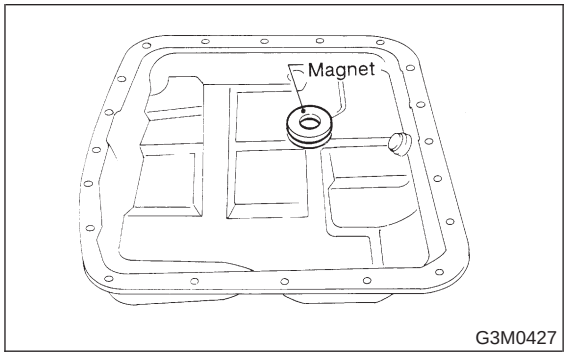
6) Install the oil cooler outlet pipe, and secure with two bolts.

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

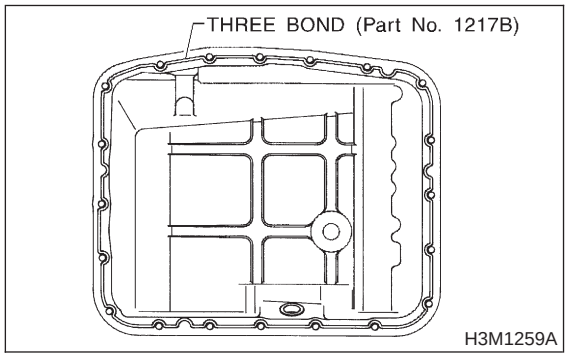
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



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



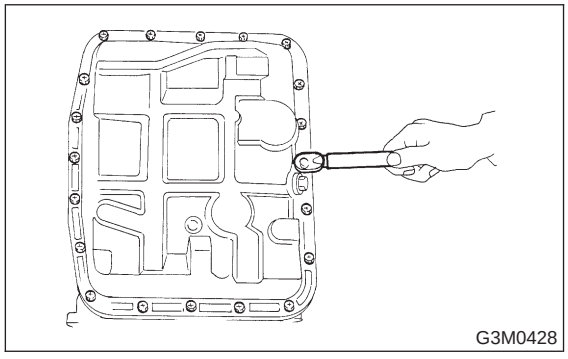
(2) Apply proper amount of liquid gasket (THREE BOND Part No. 1217B) to the entire oil pan mating surface.



(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

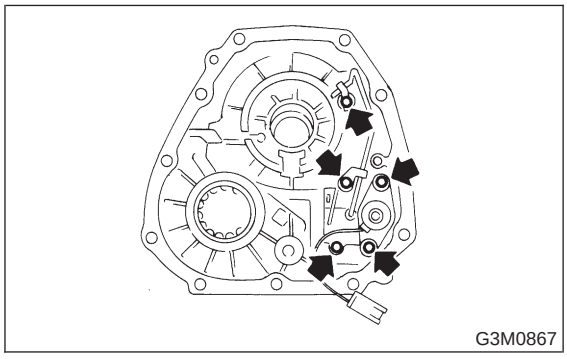
1) Install the filter in the extension case.

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.

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

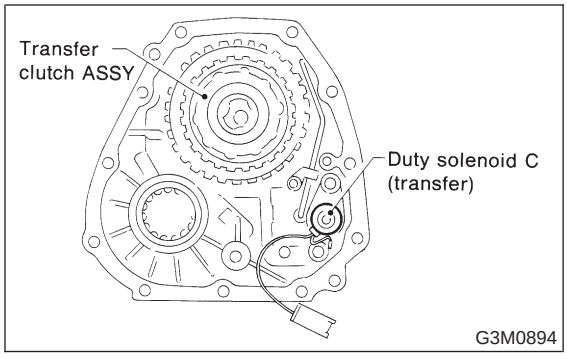
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



3) Install the transfer clutch assembly to the case.

CAUTION:
Be careful not to damage the seal rings.

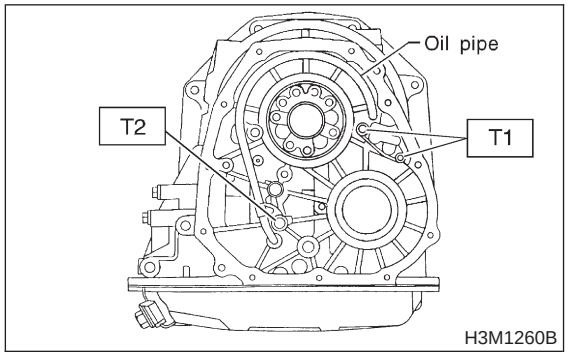
NOTE:
Insert the clutch assembly fully into position until the bearing shoulder bottoms.



6. CONNECTION OF EACH SECTION

1) Install oil pipe.

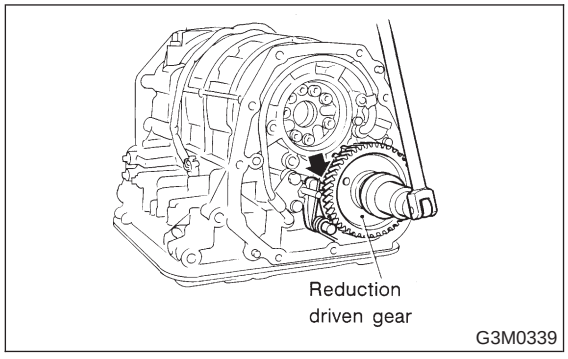
Tightening torque:
T1: 7.8±1.0 N·m (0.80±0.10 kg-m, 5.8±0.7 ft-lb)
T2: 24.5±2.0 N·m (2.50±0.20 kg-m, 18.1±1.4 ft-lb)



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.

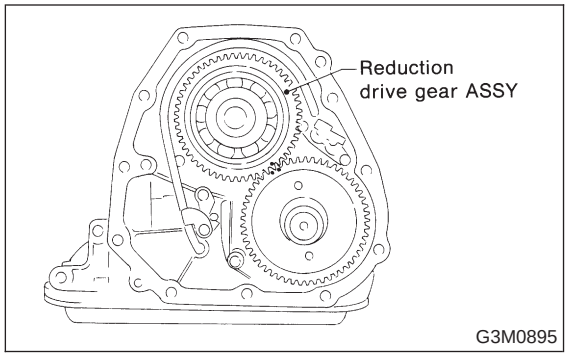
NOTE:
After tightening, stake the lock nut securely.

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

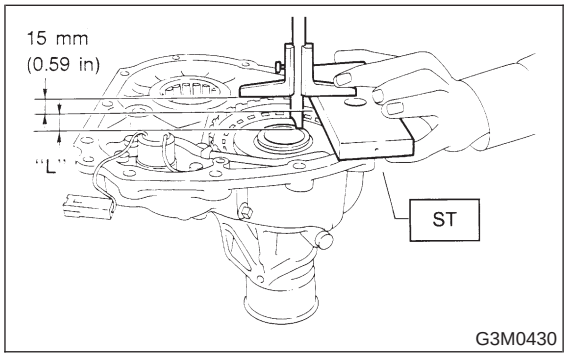


4) Install the reduction drive gear.

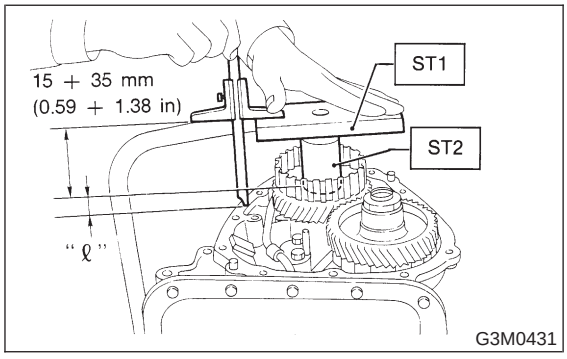
NOTE:
Insert it fully into position until the bearing shoulder bottoms.



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.

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.

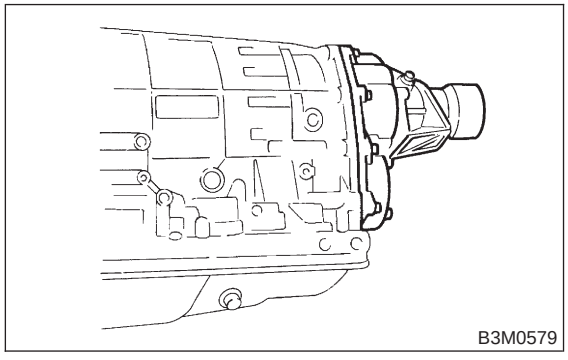
NOTE:
Be sure to engage the spline teeth correctly.

(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.**

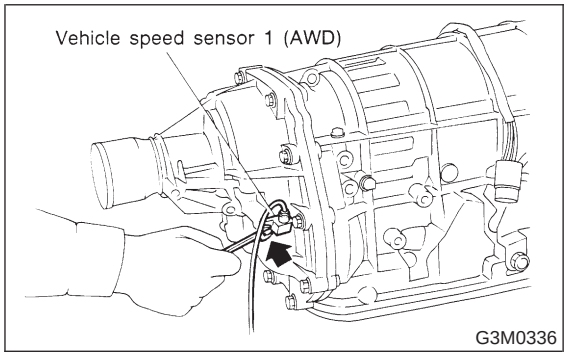
(5) Tighten bolts to secure the case.

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

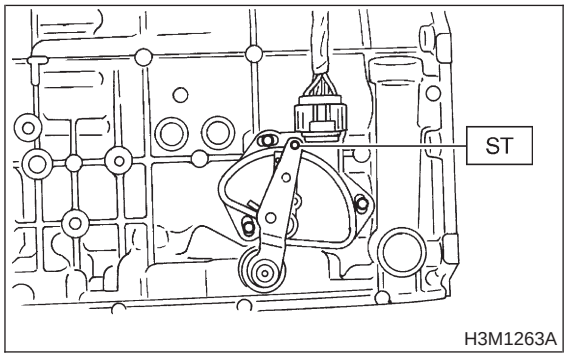
7. EXTERNAL PARTS

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

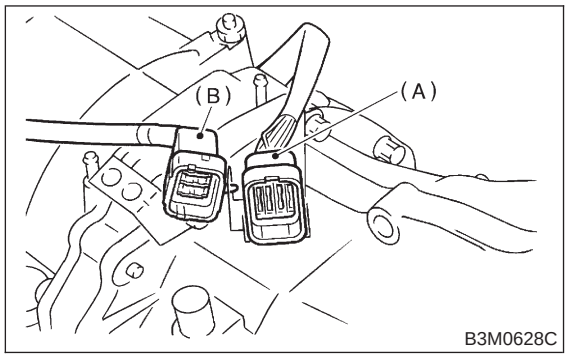


H3M1263A

(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.

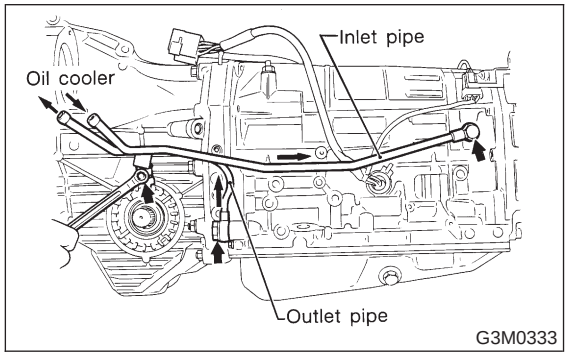
CAUTION:
Be sure to use a new aluminum washer.

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.

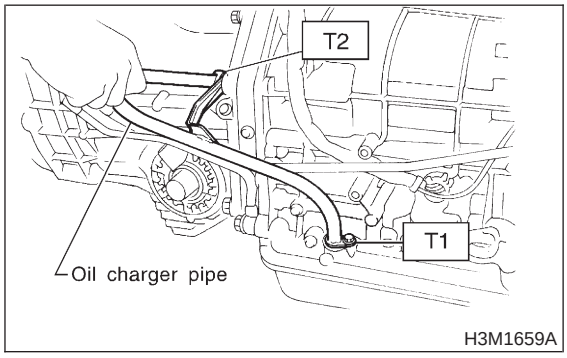
Tightening torque:
25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)



5) Install the oil charge pipe.

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

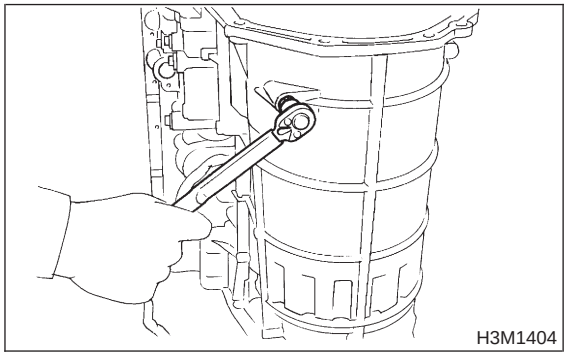
Tightening torque:
T1: 6.4±0.5 N·m (0.65±0.05 kg-m, 4.7±0.4 ft-lb)
T2: 41±3 N·m (4.2±0.3 kg-m, 30.4±2.2 ft-lb)



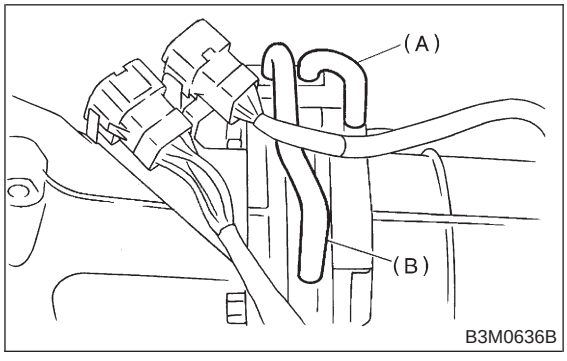
6) Adjustment of brake band
After tightening the brake band adjusting screw to 9 N·m (0.9 kg-m, 6.5 ft-lb) torque, back it off three turns. Then secure with a lock nut.

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)



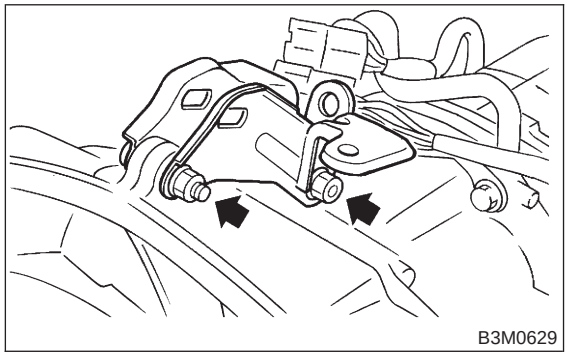
7) Install the air breather hose.



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

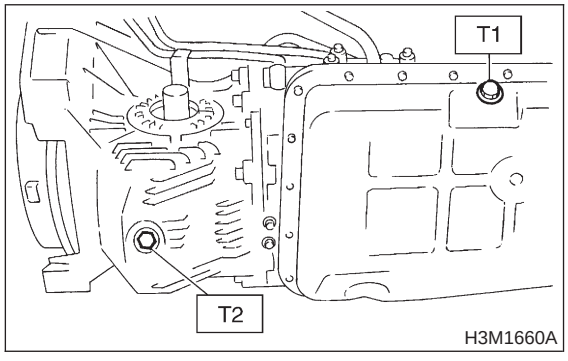
8) Install the pitching stopper bracket.

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.

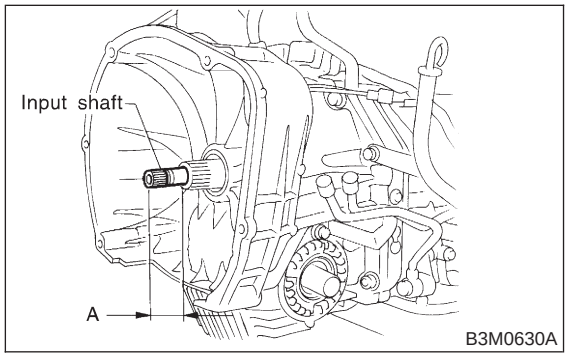
Tightening torque:
T1: 25±2 N·m (2.5±0.2 kg-m, 18.1±1.4 ft-lb)
T2: 44±3 N·m (4.5±0.3 kg-m, 32.5±2.2 ft-lb)



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

CAUTION:
Be careful not to damage the bushing.

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

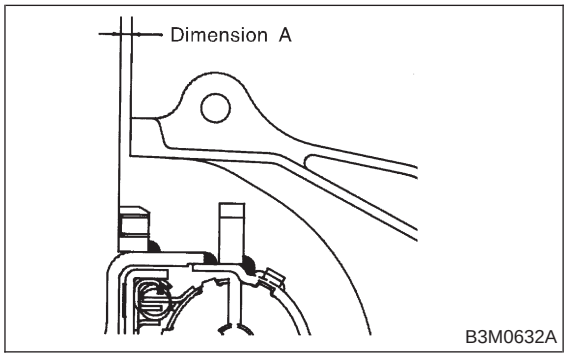


11) Install the torque converter clutch assembly.
(1) Install the oil pump shaft to the torque converter clutch.

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

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

Dimension A:
3.9 — 4.1 mm (0.154 — 0.161 in)



12) Fill ATF and differential gear oil.

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:
2200 cc model;
7.9 — 8.2 ℓ (8.4 — 8.7 US qt, 7.0 — 7.2 Imp qt)
2500 cc model;
9.5 — 9.8 ℓ (10.0 — 10.4 US qt, 8.4 — 8.6 Imp qt)

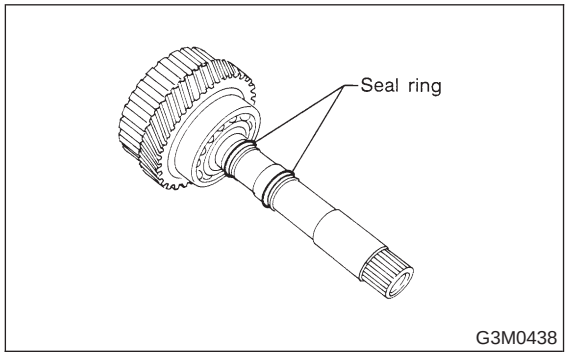
Recommended fluid:
Dexron II or Dexron III type automatic transmission

13. Reduction Drive Gear Assembly

A: DISASSEMBLY

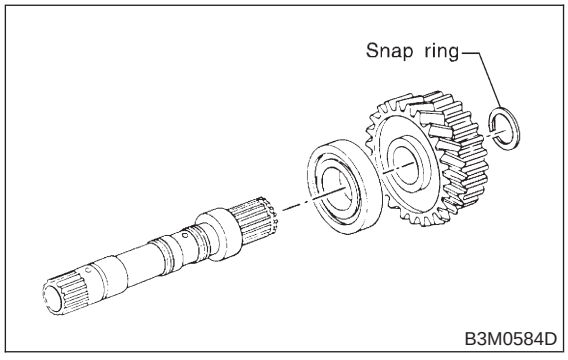
1) Take out the seal rings.

CAUTION:
Be careful not to damage the seal rings.

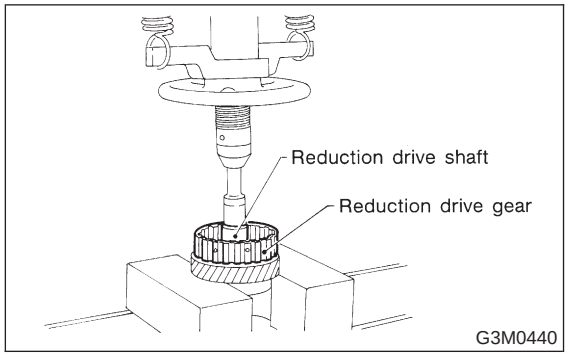


2) Take out the snap ring.

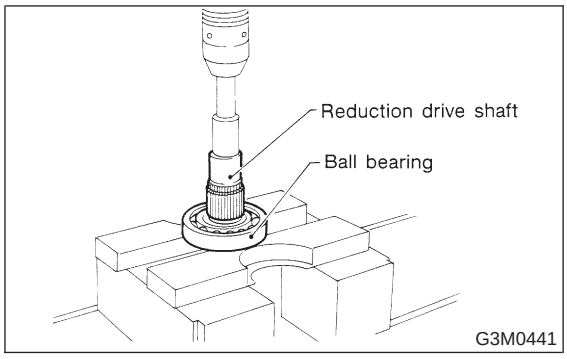
CAUTION:
Be careful not to damage the splines.



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



4) Using a press, remove the ball bearing.

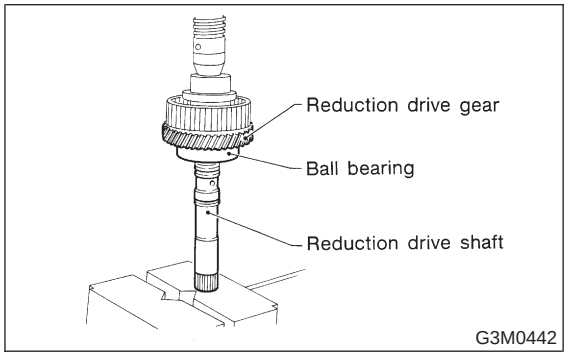


B: INSPECTION

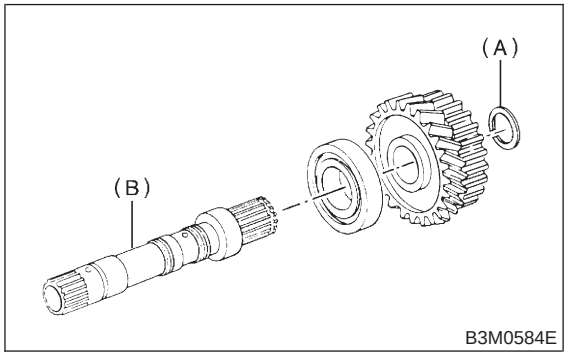
Make sure that each component is free of harmful gouges, cuts, or dust.

C: ASSEMBLY

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



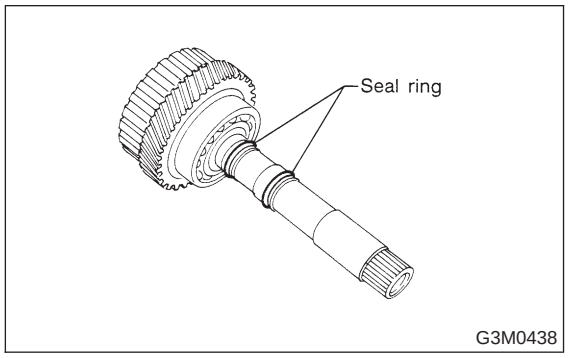
2) Fit the snap ring securely in the snap ring groove on the shaft.



(A) Snap ring
(B) Reduction drive shaft

3) Attach two seal rings.

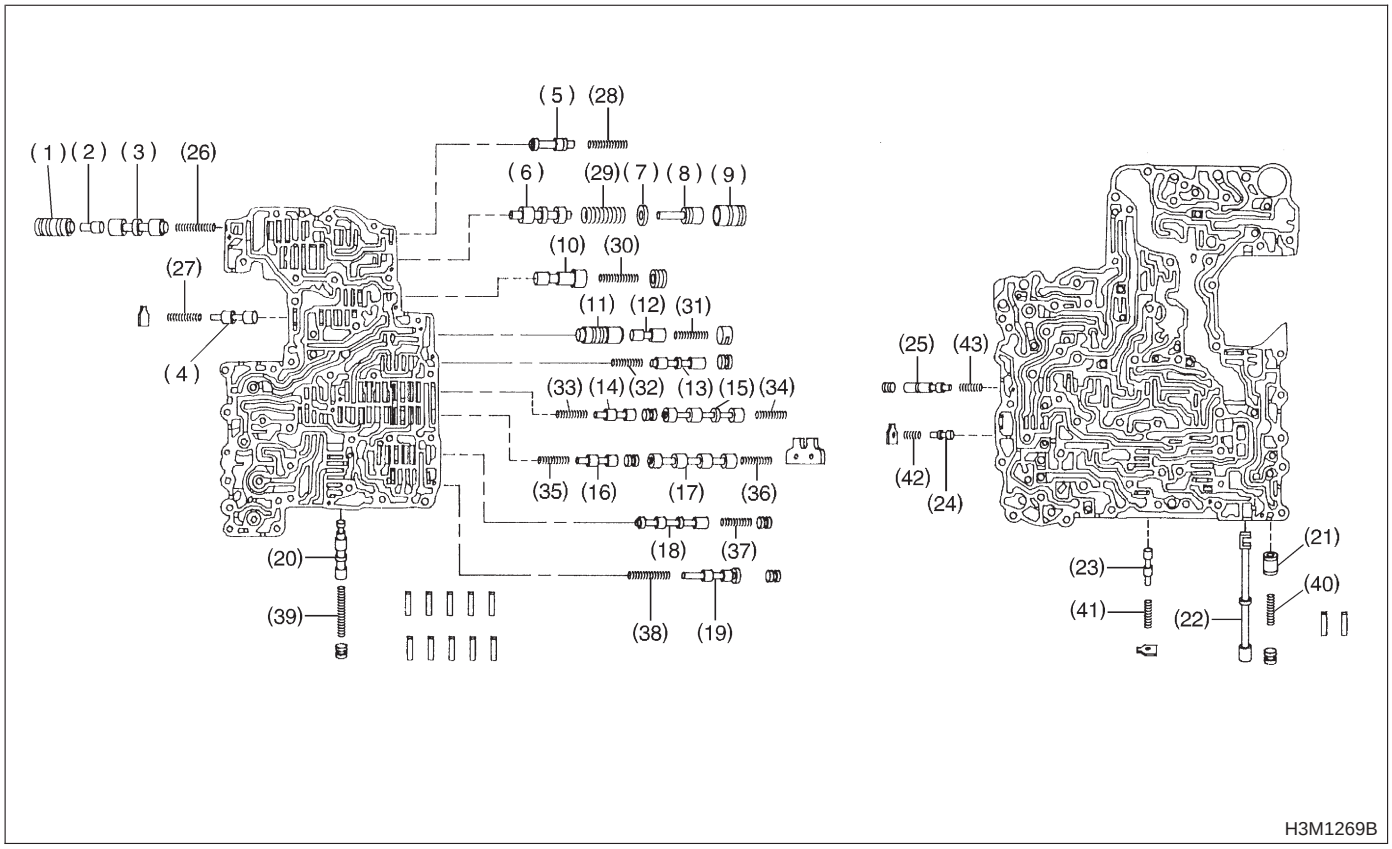
NOTE:
To make subsequent assembly easier, apply vaseline to the grooves of the shaft and to the exterior of the seal ring.



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.

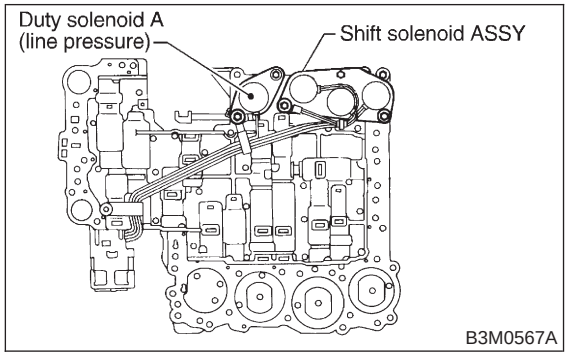


(1) Lock-up control sleeve
(2) Lock-up control plug
(3) Lock-up control valve
(4) Pilot valve
(5) Torque converter regulation valve
(6) Pressure regulator valve
(7) Washer
(8) Pressure regulator plug
(9) Pressure regulator sleeve
(10) Pressure modifier valve
(11) Accumulator control sleeve valve
(12) 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)

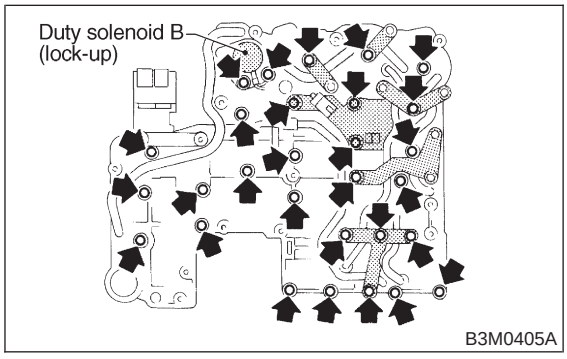
B: DISASSEMBLY

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

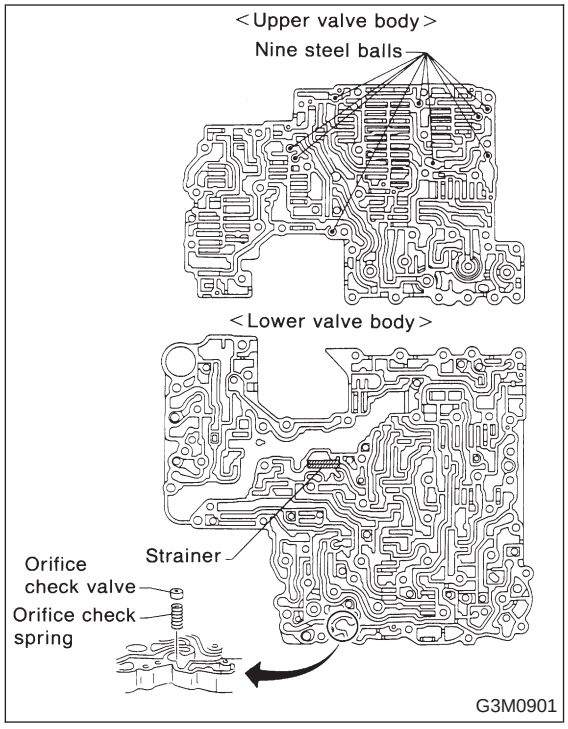


2) Remove the duty solenoid B and bracket from the lower valve body.
3) Separate the upper valve body and lower valve body.

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



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.

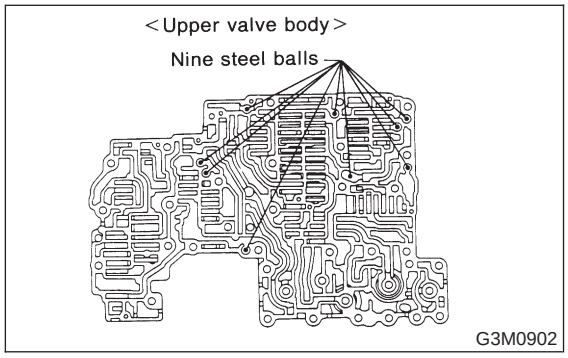


C: INSPECTION

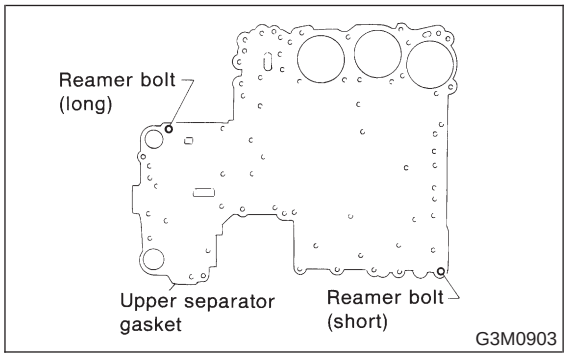
Make sure that each component is free of harmful gouges, cuts, or dust.

D: ASSEMBLY

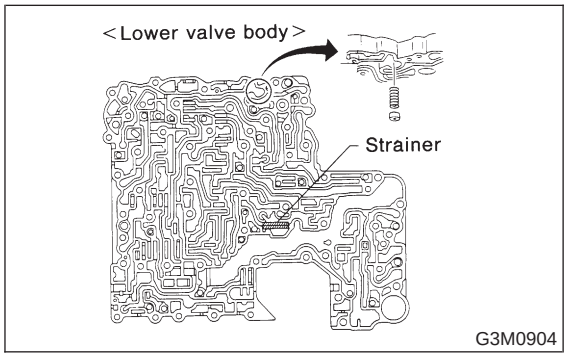
1) Install the nine steel balls to the upper valve body.



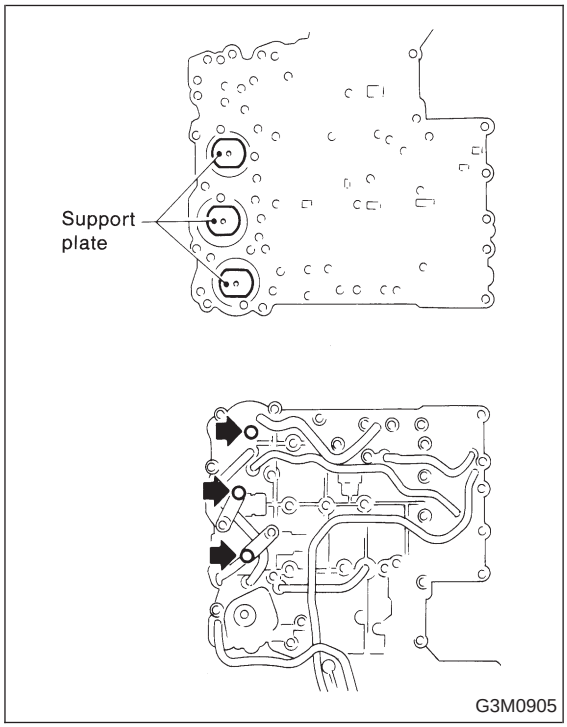
2) From under upper valve body, install two bolts using washers and position upper separator gasket.



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

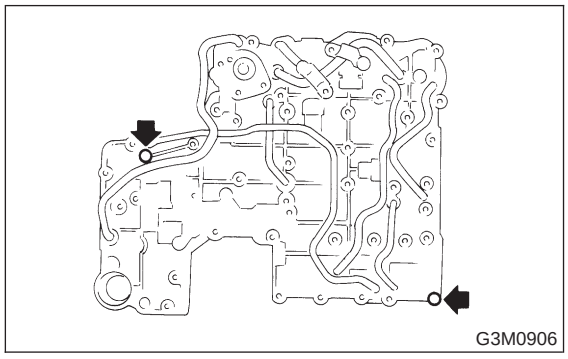


4) Install lower separate gasket and separate plate on lower body in that order, then temporarily tighten three support plates and two brackets.



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

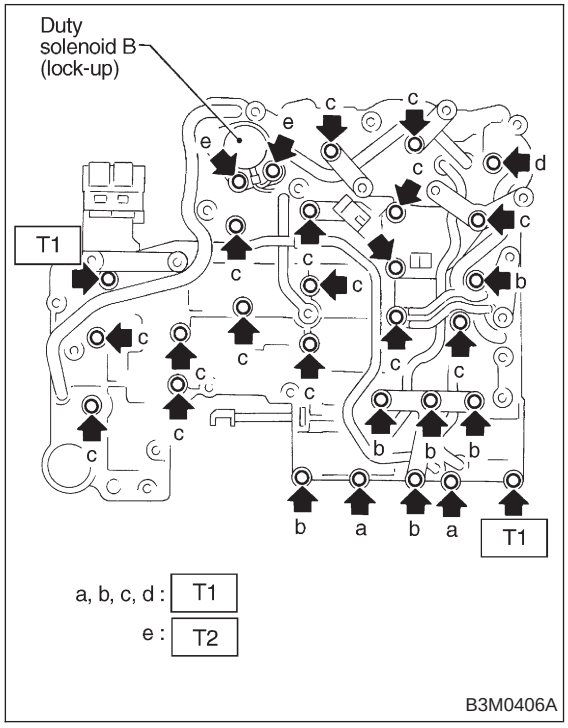
CAUTION:
Be careful not to drop the upper body interior steel ball, or the lower body interior filter, orifice check spring, or orifice check valve.



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

	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

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)

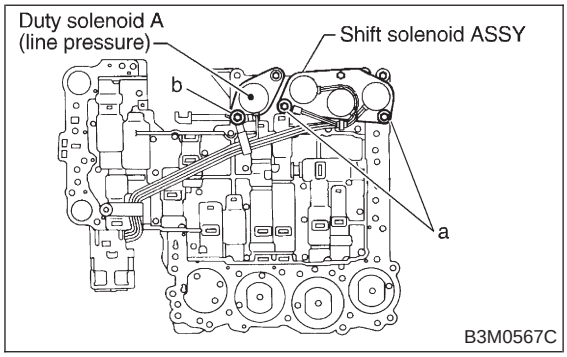


8) Install the shift solenoid assembly and duty solenoid A.

a length : 16 mm (0.63 in)

b length : 27 mm (1.06 in)

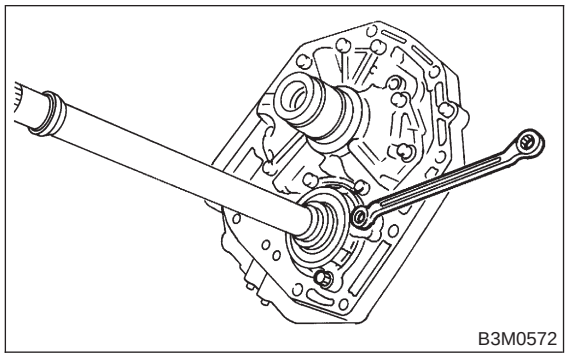
Tightening torque:
8±1 N·m (0.8±0.1 kg-m, 5.8±0.7 ft-lb)



15. Oil Pump Assembly

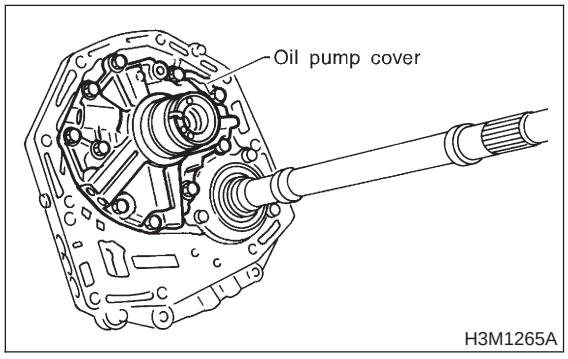
A: DISASSEMBLY

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

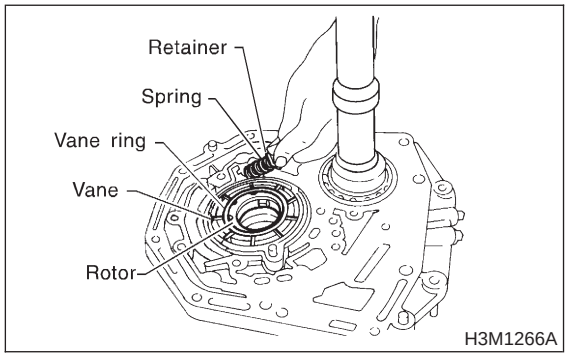


2) Remove the oil pump cover.

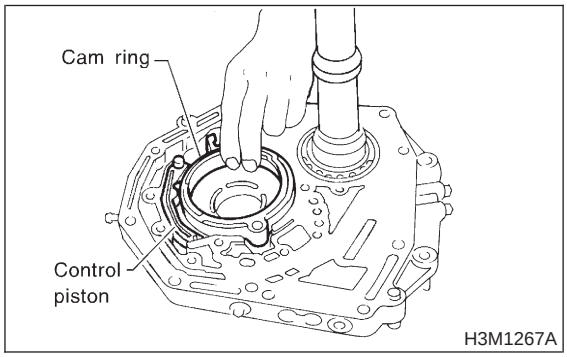
NOTE:
Lightly tap the end of the stator shaft to remove the cover.



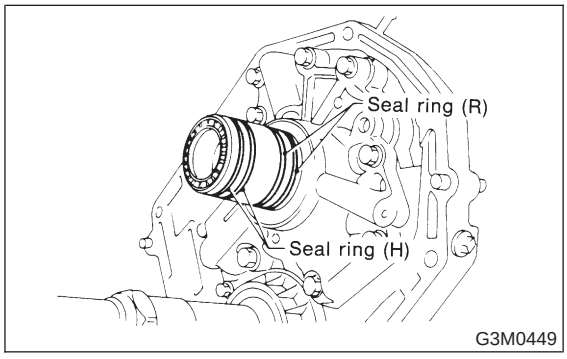
3) Remove the retainer and return spring. Then remove the rotor, two vane rings and nine vanes.



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



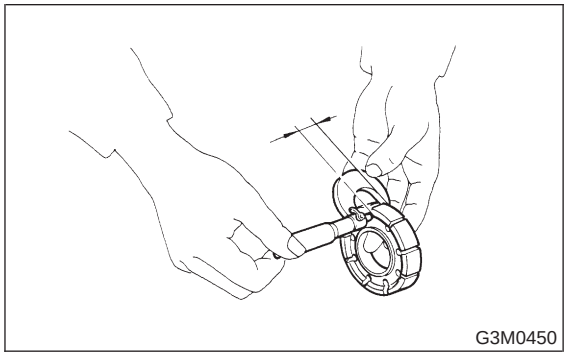
5) Remove two seal rings (R) and two seal rings (H).



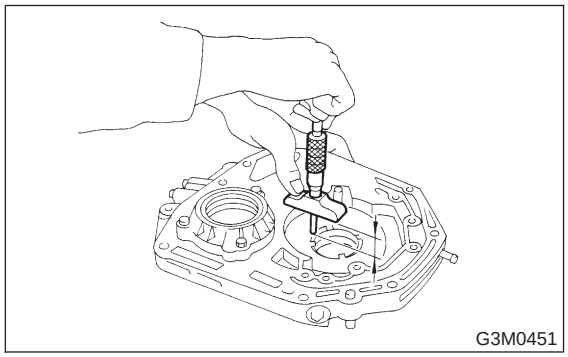
B: INSPECTION

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.



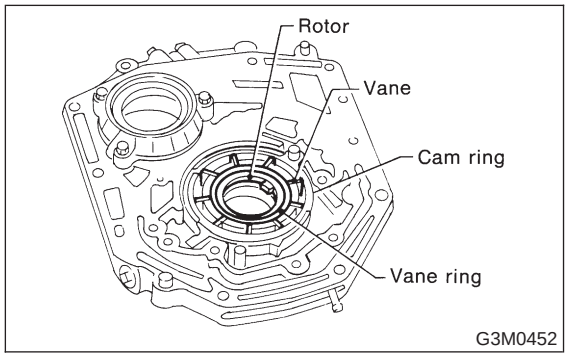
(2) Using a depth gauge, measure the depth of the oil pump housing contact and friction surfaces.


G3M0451

(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.

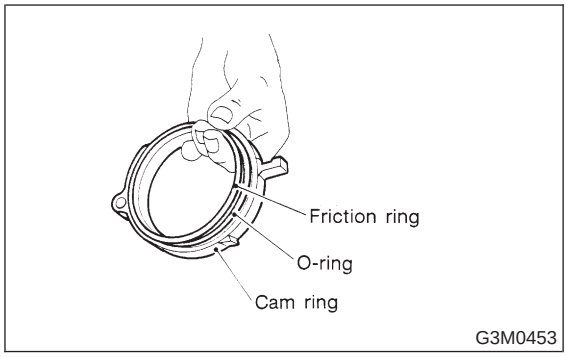
Part name	Wear limit mm (in)	Standard value mm (in)
Rotor, control piston, vanes	0.054 (0.0021)	0.030 — 0.044 (0.0012 — 0.0017)
Cam ring	0.034 (0.0013)	0.010 — 0.024 (0.0004 — 0.0009)



G3M0452

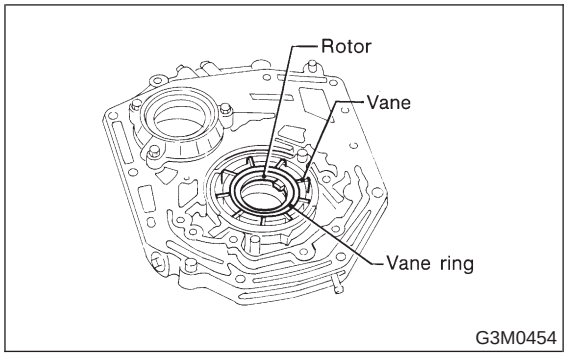
C: ASSEMBLY

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.



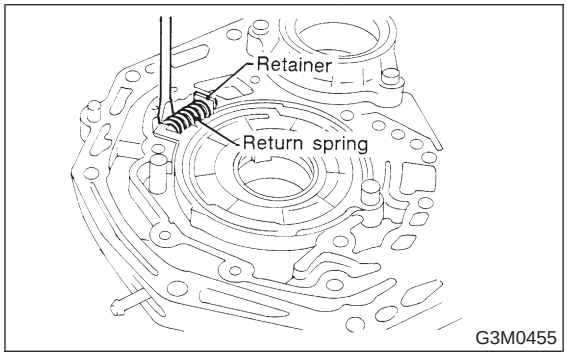
G3M0453

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



G3M0454

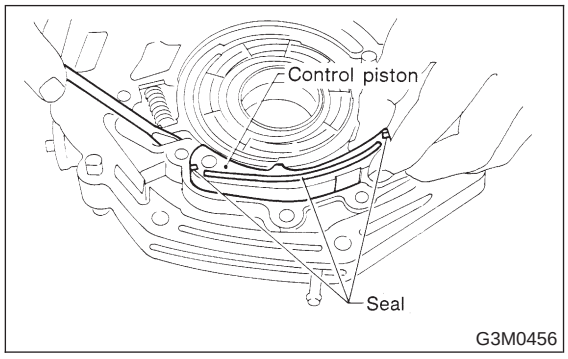
3) Install the return spring and retainer between the housing and cam ring.



G3M0455

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

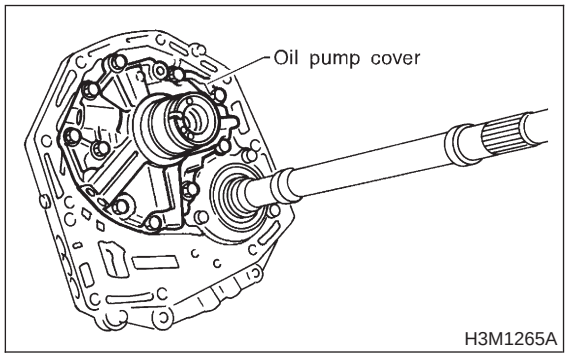
NOTE:
Fit the seal in the piston groove, with the red seals facing the top side. (Two side seals and one plain seal are attached.)



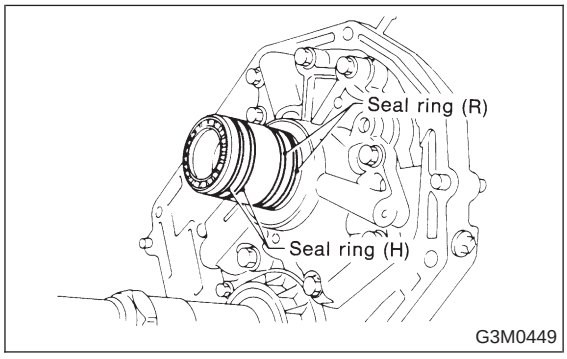
5) Set the rotor at the center of the housing bore. Apply ATF abundantly to each rotary portion.
6) Install the oil pump cover.

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.



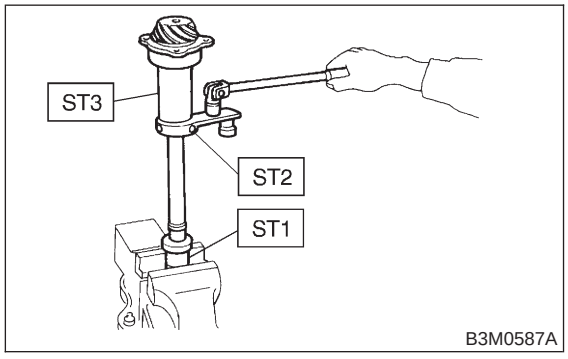
16. Drive Pinion Shaft

A: DISASSEMBLY

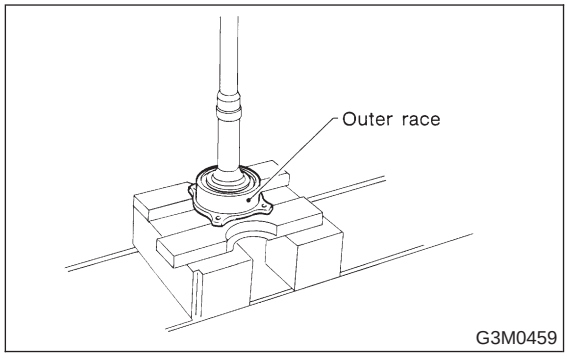
1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1, ST2 and ST3. Then pull off the drive pinion collar.

NOTE:
Remove the O-ring.

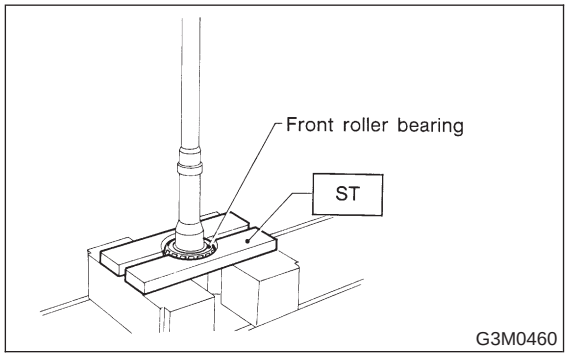
ST1 498937100 HOLDER
ST2 499787100 WRENCH
ST3 499757800 ADAPTER WRENCH



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

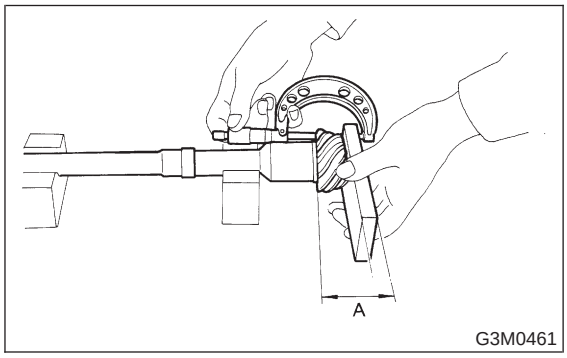


B: INSPECTION

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

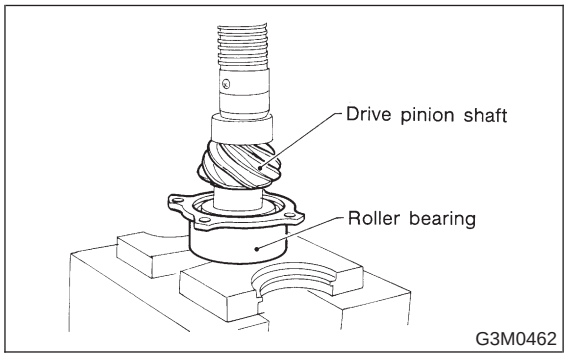
C: ASSEMBLY

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:

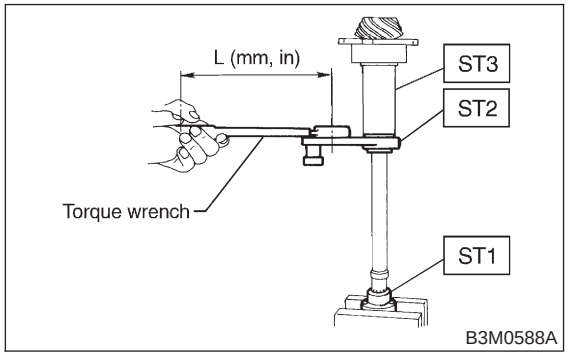
$T_1 = 72.2/L + 72.2 \times T$

T: Actual tightening torque

- Install ST2 to torque wrench as straight as possible.

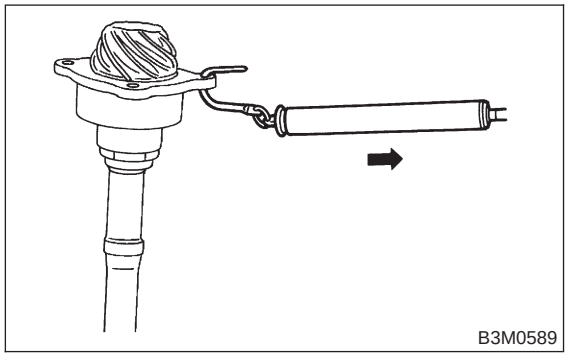
ST1 498937100 HOLDER
ST2 499787100 WRENCH
ST3 499787500 ADAPTER WRENCH

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



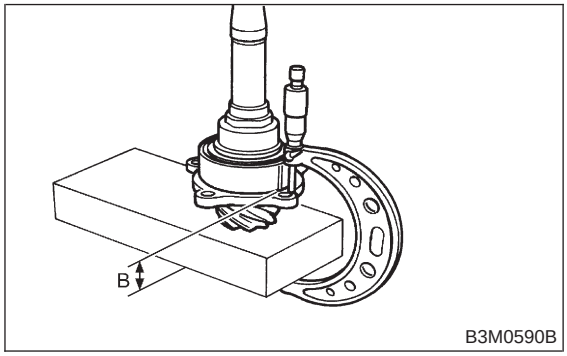
5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

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.

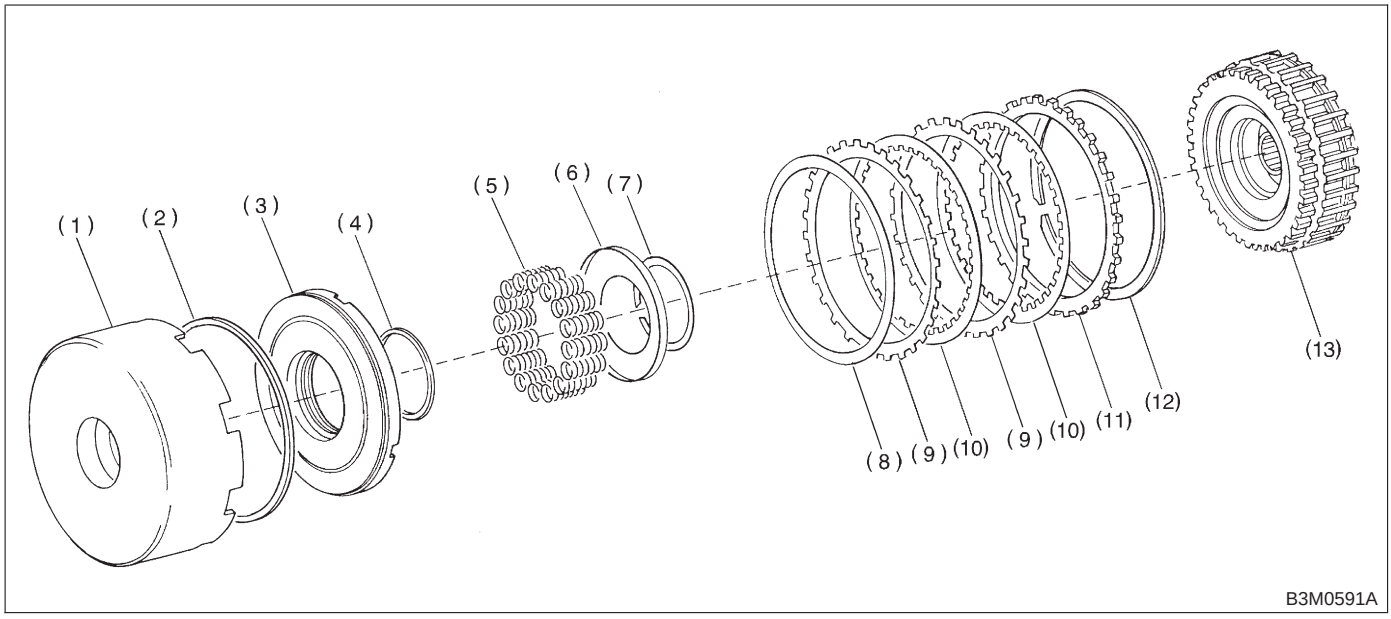
t = 6.5±0.0625 − (B − A)

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



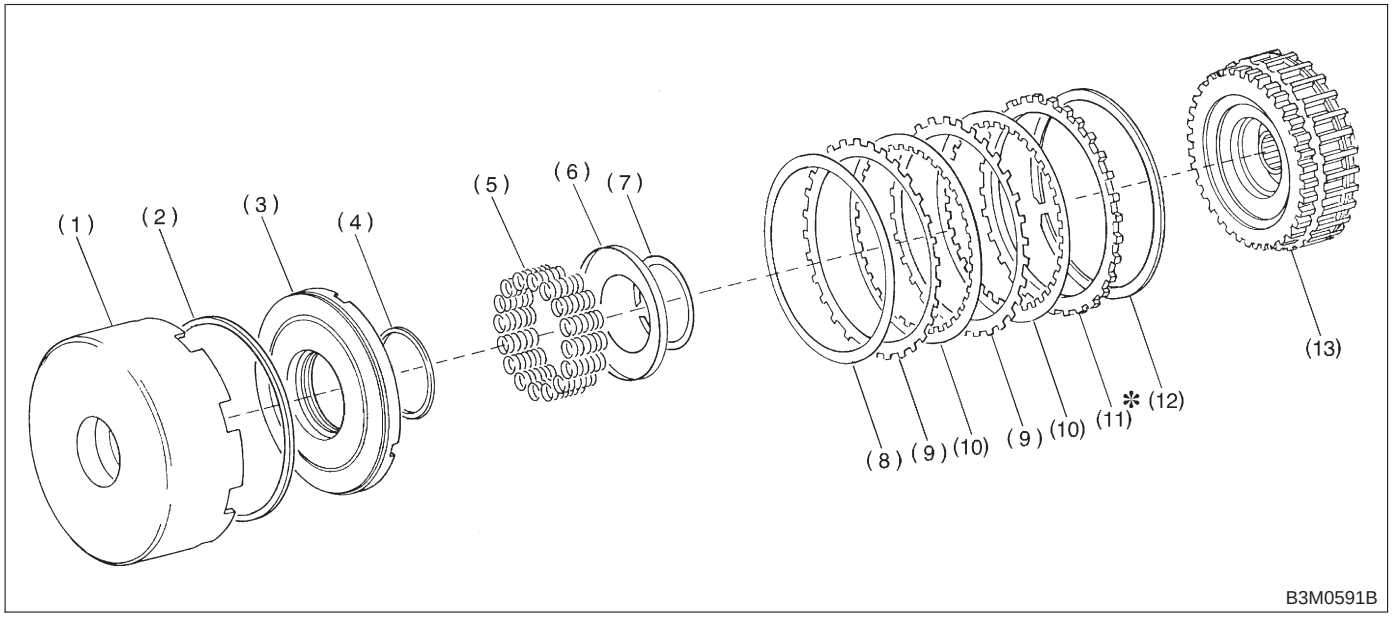
(1) Reverse clutch drum
(2) Lip seal
(3) Reverse clutch piston
(4) Lathe cut seal ring
(5) Spring
(6) Spring retainer
(7) Snap ring
(8) Dish plate
(9) Driven plate
(10) Drive plate
(11) Retaining plate
(12) Snap ring
(13) High clutch drum

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.

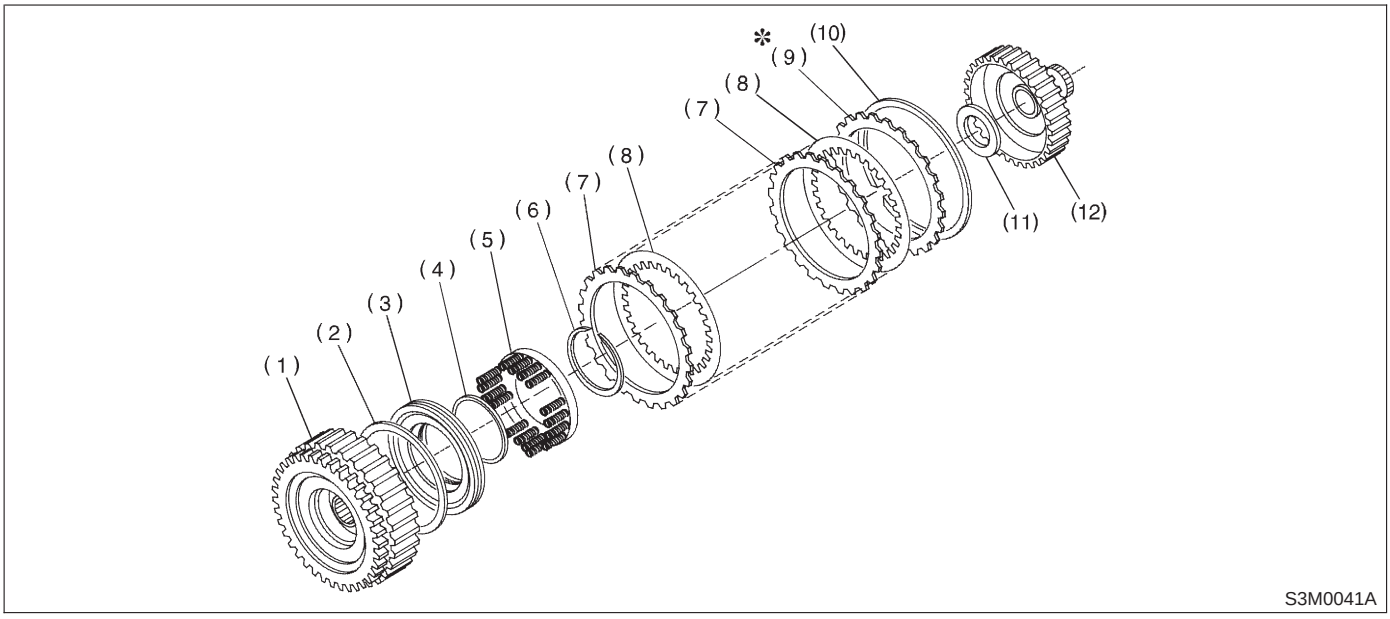
Standard value:
0.5 — 0.8 mm (0.020 — 0.031 in)

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



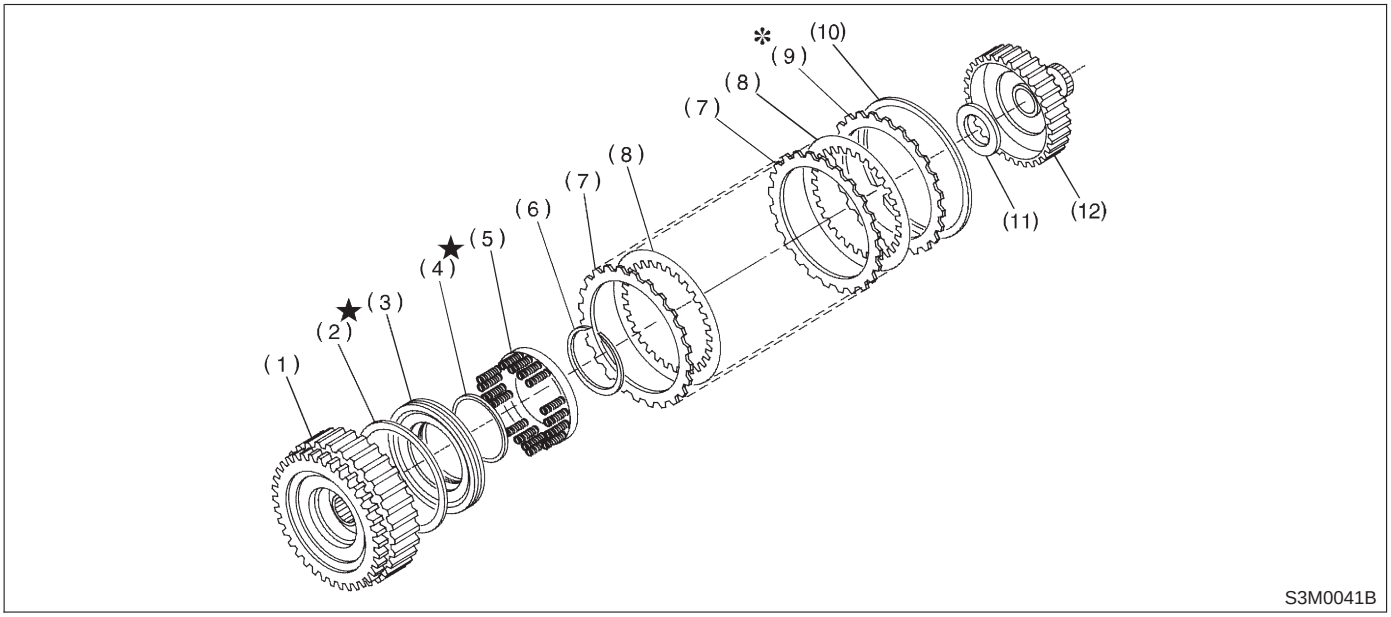
(1) High clutch drum
(2) Lathe cut seal ring
(3) High clutch piston
(4) Lathe cut seal ring
(5) Spring retainer
(6) Snap ring
(7) Driven plate
(8) Drive plate
(9) Retaining plate
(10) Snap ring
(11) Thrust needle bearing
(12) High clutch hub

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 plate, 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)

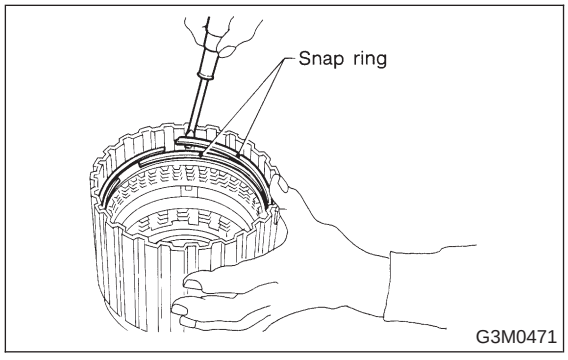
Allowable limit:
2.6 mm (0.102 in)

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)

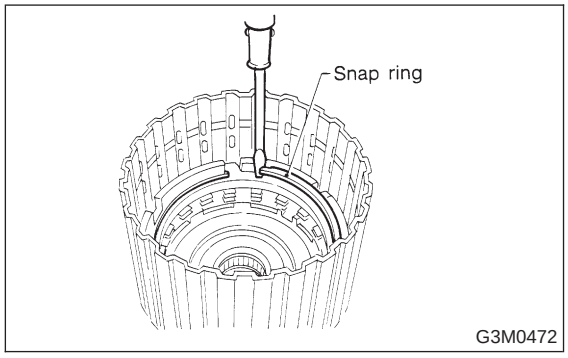
19. Forward Clutch Drum

A: DISASSEMBLY

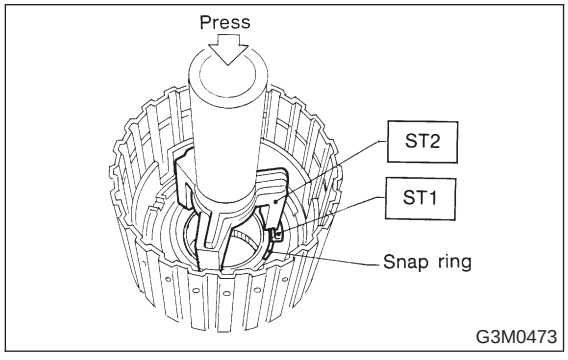
1) Remove two snap rings from the forward clutch drum.



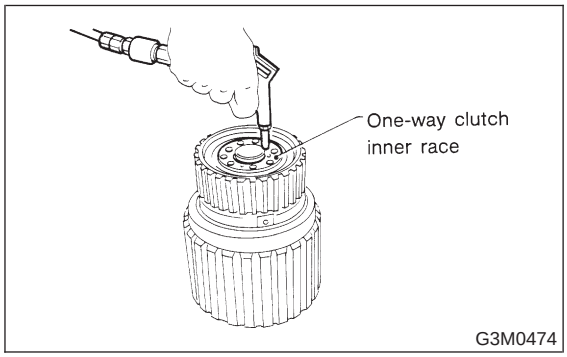
2) Remove the retaining plate, drive plates, driven plates and dish plate. (Forward clutch)
3) Remove the snap ring from the forward clutch drum.



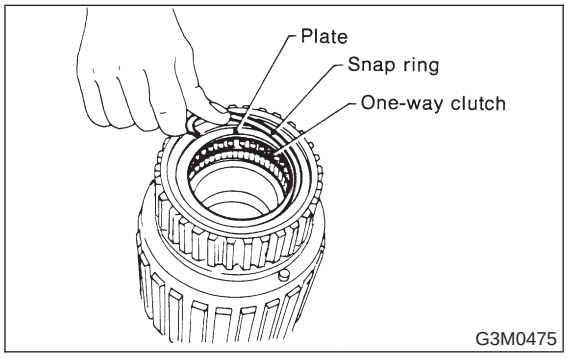
4) Remove the retaining plate, drive plates, driven plates and dish plate. (Overrunning clutch)
5) Compress the spring retainer, and remove the snap ring from the forward clutch, by using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



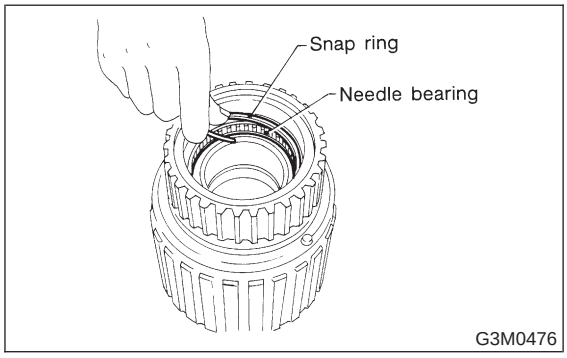
6) Install the one-way clutch inner race to the forward clutch drum, and apply compressed air to remove the overrunning piston and forward piston.



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



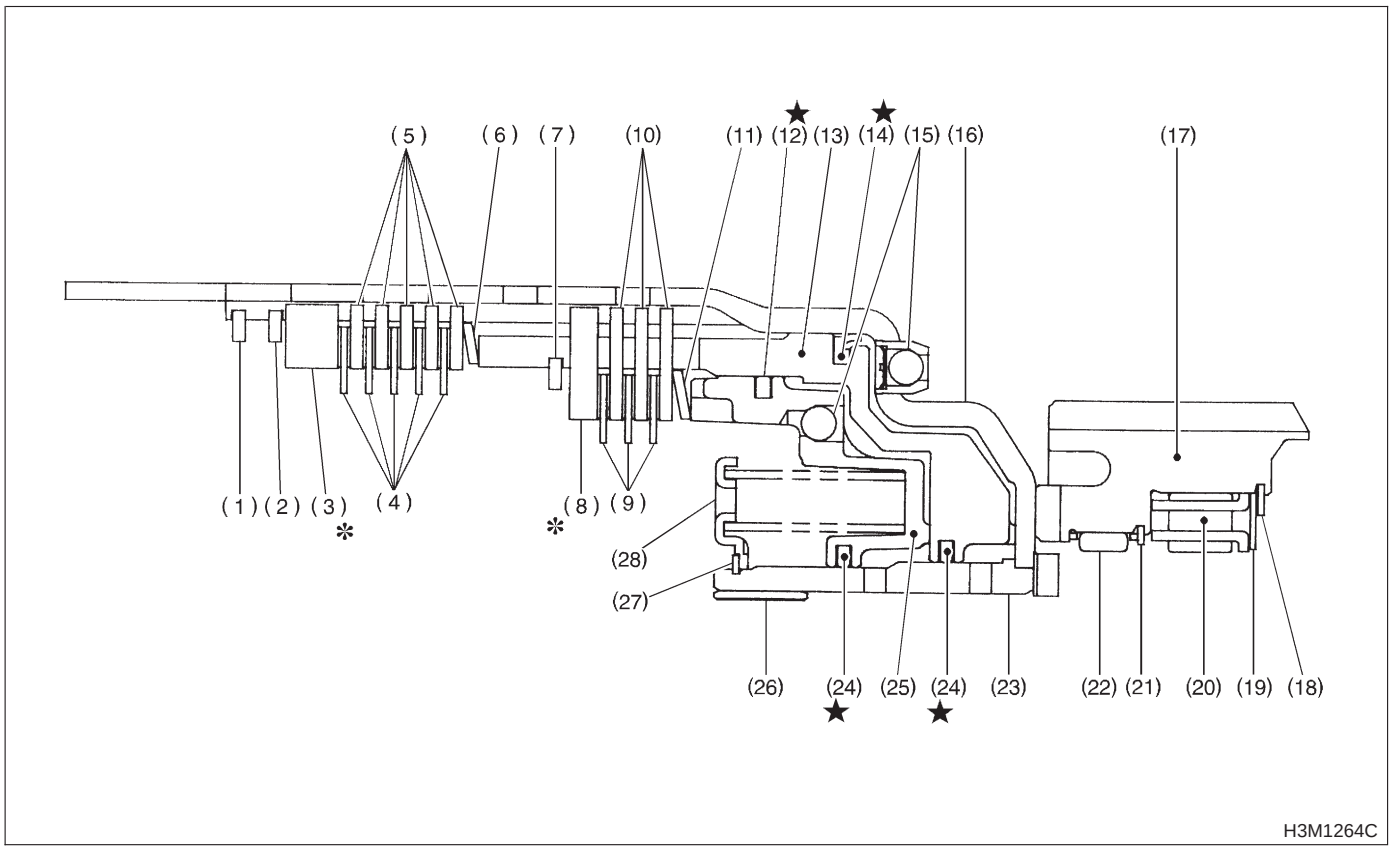
8) Remove the needle bearing after taking out the snap ring.



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

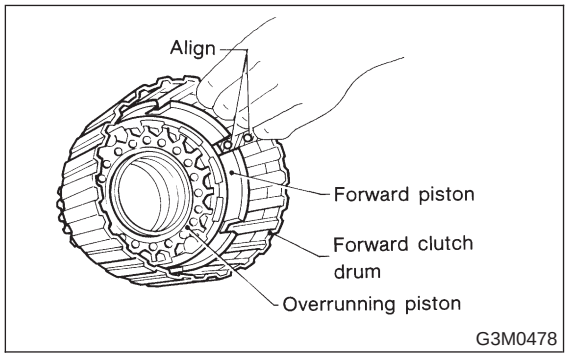
C: ASSEMBLY



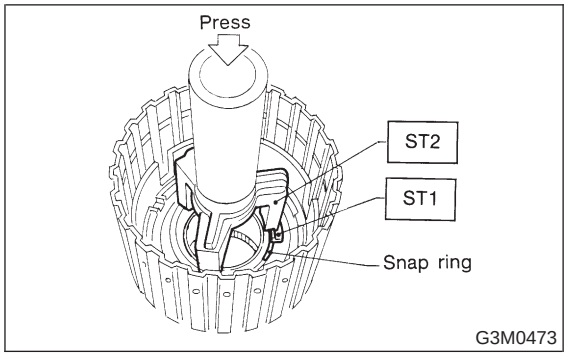
(1) Snap ring
(2) Snap ring
(3) Retaining plate
(4) Driven plate (Thinner)
(5) Driven plate (Thicker)
(6) Dish plate
(7) Snap ring
(8) Retaining plate
(9) Drive plate
(10) Driven plate
(11) Dish plate
(12) Lathe cut seal ring
(13) Forward clutch piston
(14) Lathe cut seal ring
(15) Drift ball
(16) Forward 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.

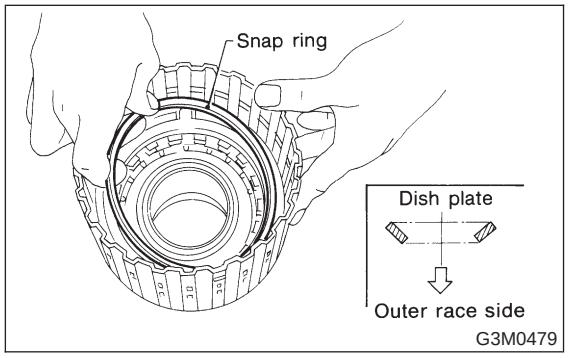


2) Set the retainer on the piston with a press using ST1 and ST2, and attach the snap ring.
ST1 498627000 SEAT
ST2 398673600 COMPRESSOR



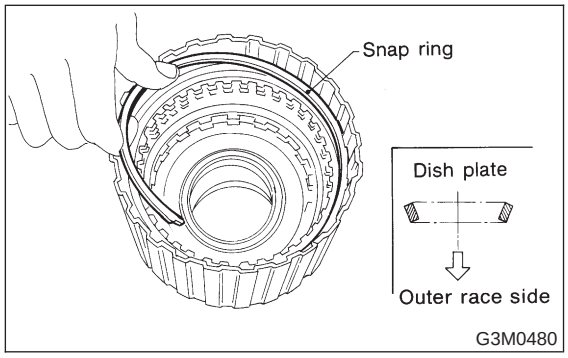
3) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Overrunning clutch)

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

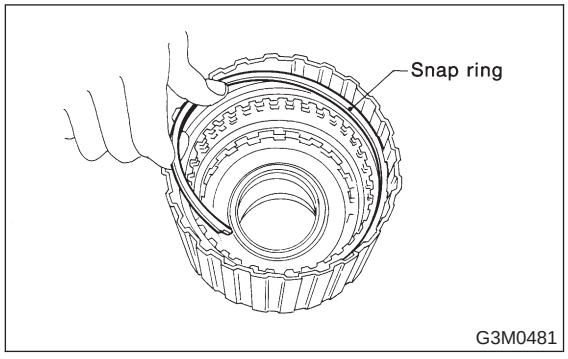


4) Install the dish plates, driven plates, drive plates, and retaining plate, and secure with the snap ring. (Forward clutch)

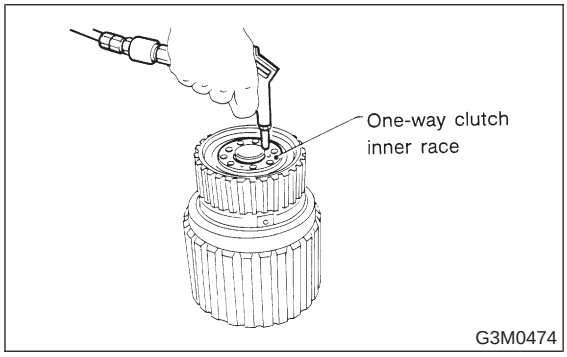
NOTE:
Pay attention to the orientation of the dish plate.



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.

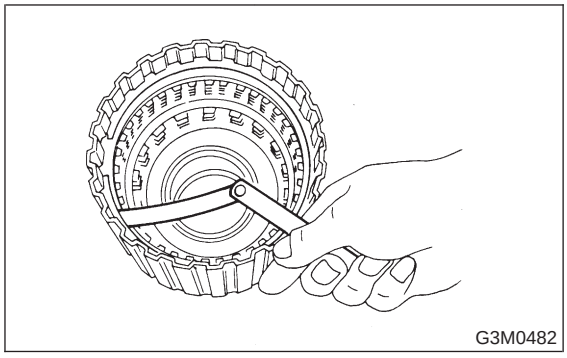


7) Checking forward clutch clearance:

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:

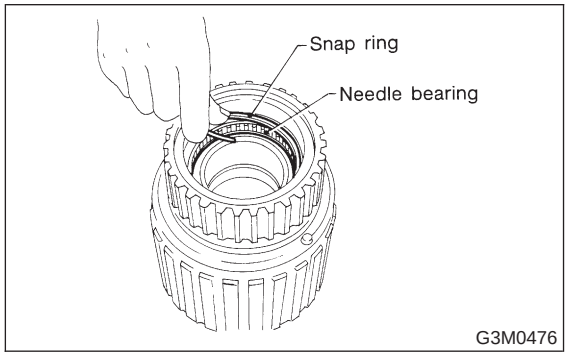
NOTE:
Before measuring clearance, place the same thickness of shim on both sides to prevent retaining plate from tilting. If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

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

Allowable limit:
2.0 mm (0.079 in)

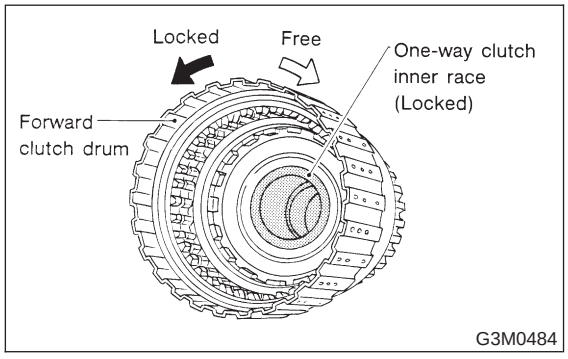
Retaining plates	
Part No.	Thickness mm (in)
31567AA120	8.0 (0.315)
31567AA130	8.2 (0.323)
31567AA140	8.4 (0.331)
31567AA150	8.6 (0.339)
31567AA160	8.8 (0.346)
31567AA170	9.0 (0.354)
31567AA180	9.2 (0.362)

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.

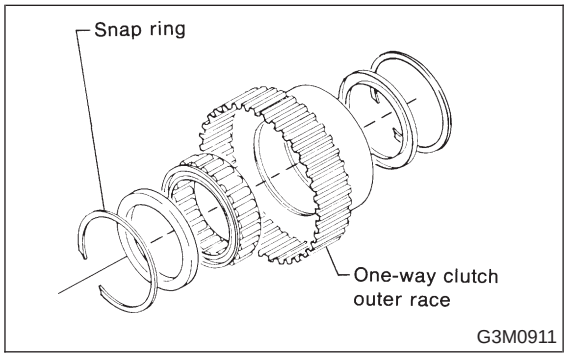
NOTE:
Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



20. One-way Clutch Outer Race

A: DISASSEMBLY

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



B: INSPECTION

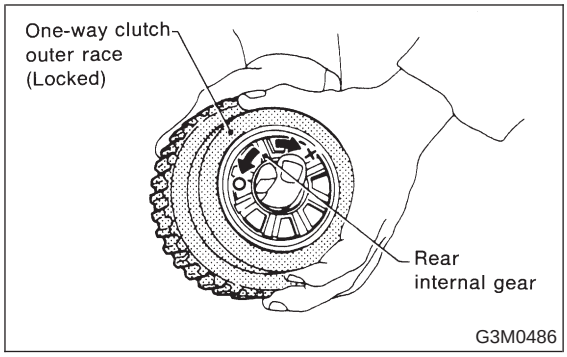
Check the sliding surface and one-way clutch (3-4) for any harmful cuts, damage, or other faults.

C: ASSEMBLY

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

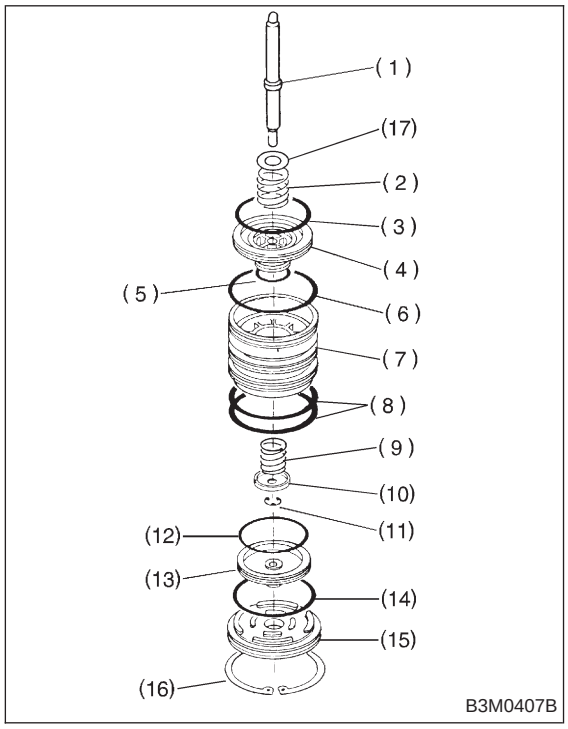
NOTE:
Pay attention to the orientation of the one-way clutch (3-4).

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.



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).

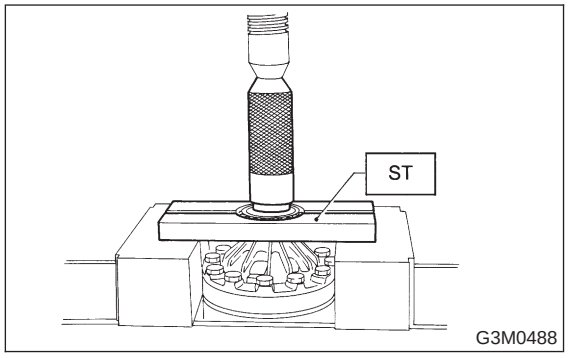
CAUTION:
● Many different O-rings and lathe cut rings are used. Be careful not to confuse them when installing.
● Be careful not to damage O-rings and lathe cut rings.

22. Differential Case Assembly

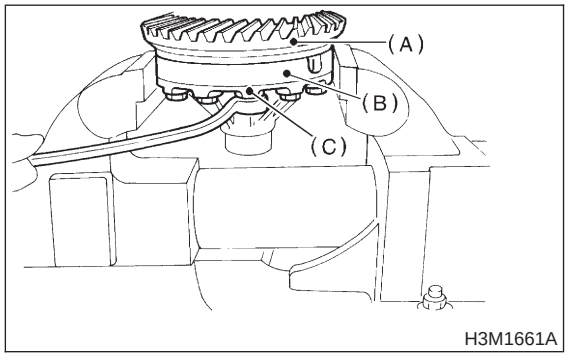
A: DISASSEMBLY

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

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

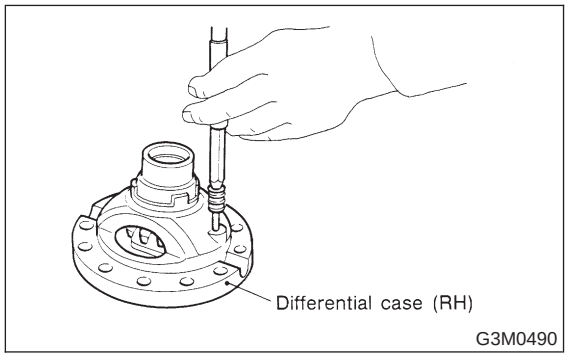


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



(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.



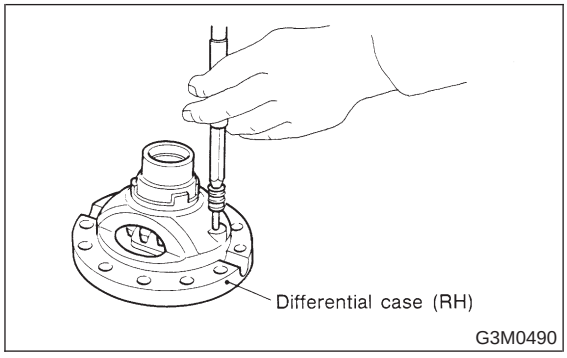
B: INSPECTION

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

C: ASSEMBLY

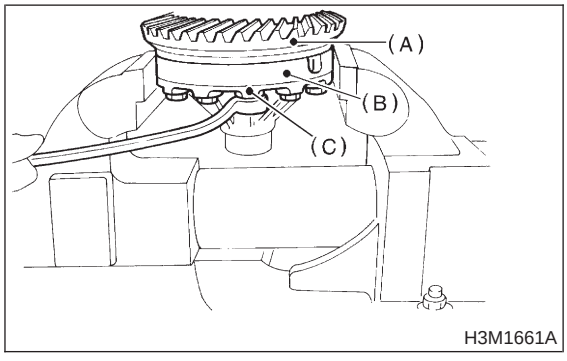
1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft, and fit the straight pin.

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)



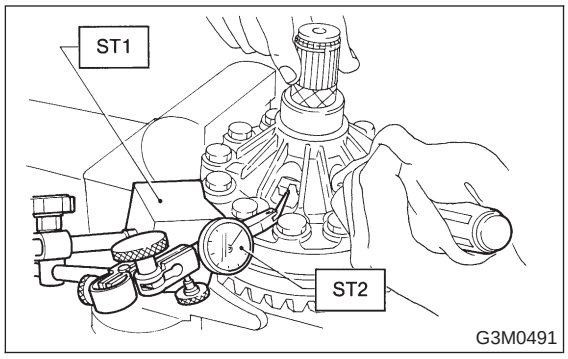
(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

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

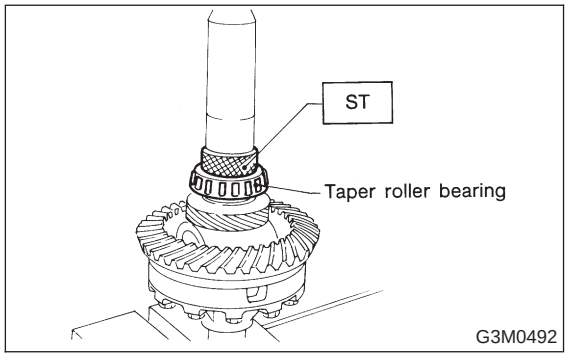
Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

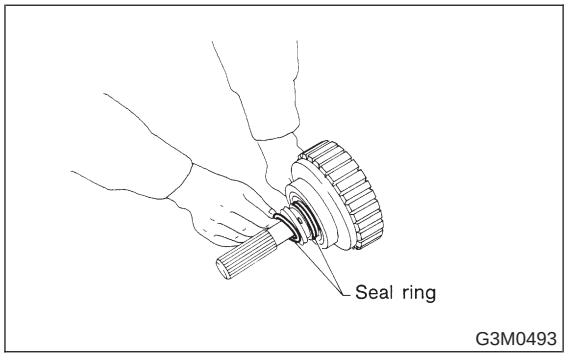


23. Transfer Clutch

A: DISASSEMBLY

1) Remove the seal ring.

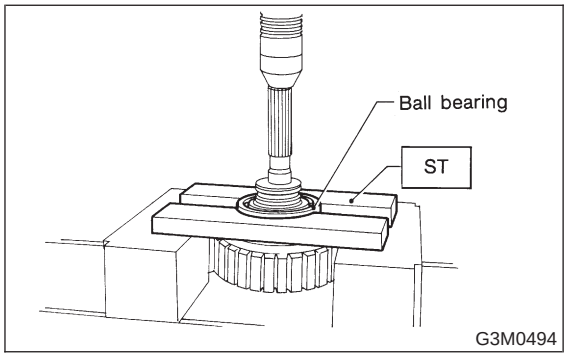
CAUTION:
Be careful not to damage the seal ring.



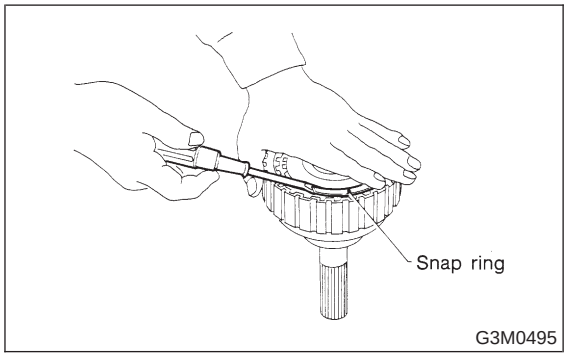
2) Using a press and ST, remove the ball bearing.

CAUTION:
Do not reuse the bearing.

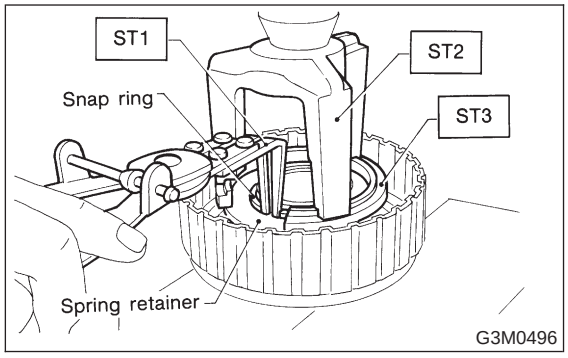
ST 498077000 REMOVER



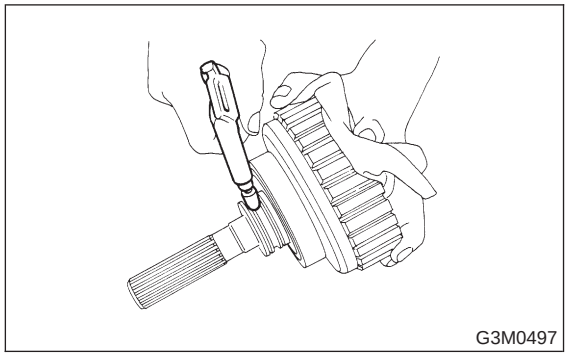
3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.



4) Remove the snap ring with ST1, ST2 and ST3, 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.

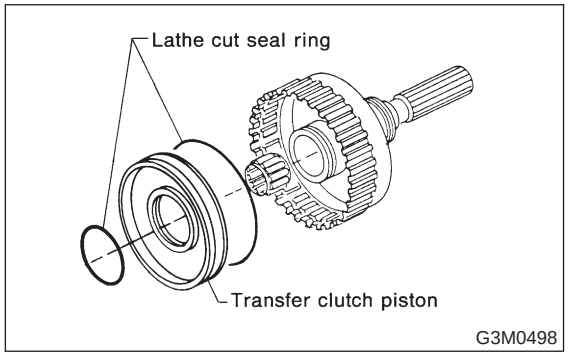


B: INSPECTION

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

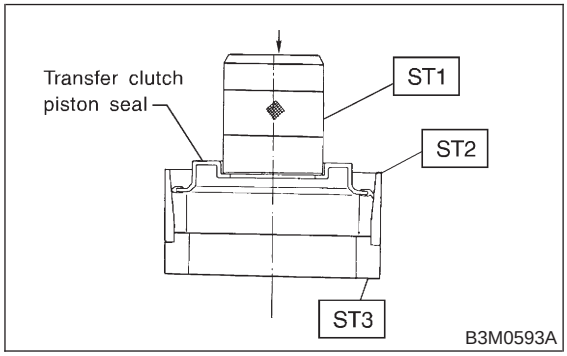
1) Install the lathe cut seal ring to the I.D./O.D. of the transfer clutch piston.



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.

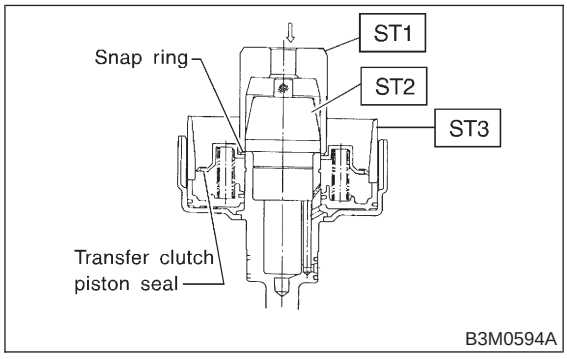
ST1 499247400 INSTALLER
ST2 499257400 PISTON GUIDE
ST3 498267400 TABLE



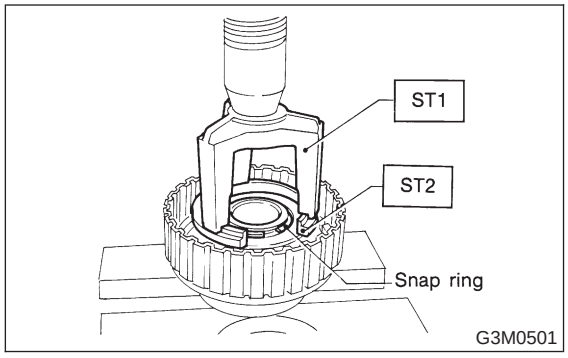
(4) Place ST3 onto rear drive shaft so that spring can be inserted into hole in transfer piston seal.
(5) Attach ST2 to rear drive shaft. Using ST1, press into place.

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

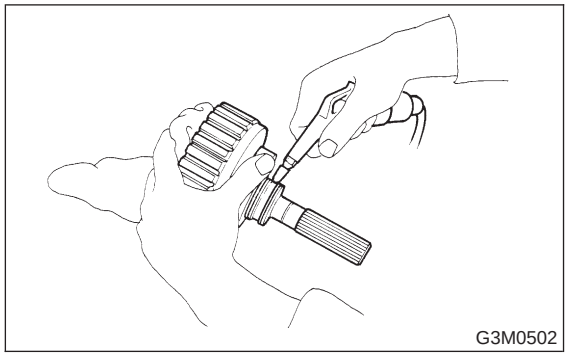
ST1 499247400 INSTALLER
ST2 499257300 SNAP RING OUTER GUIDE
ST3 499257400 PISTON GUIDE



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.

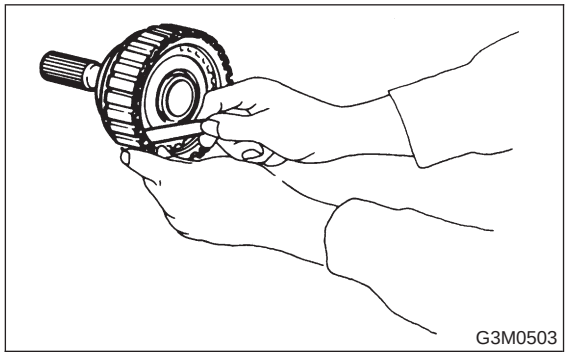


5) Check the clearance.

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.

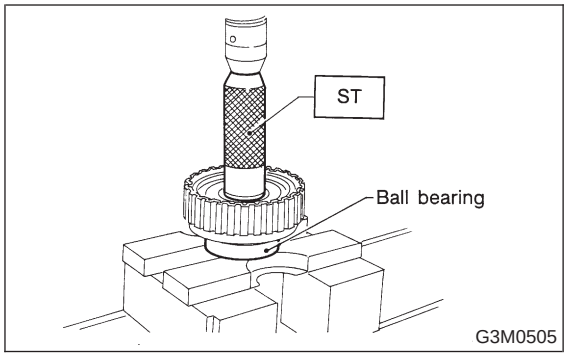
Standard value:
0.2 — 0.6 mm (0.008 — 0.024 in)

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)

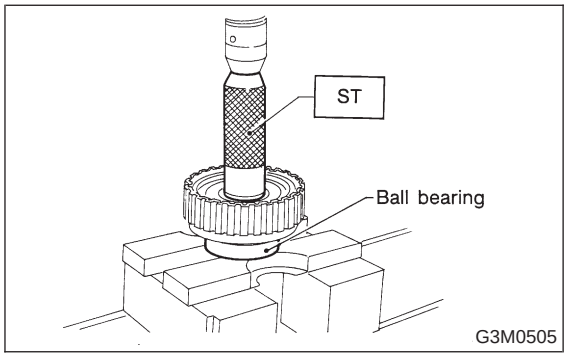
6) Press-fit the ball bearing with ST.
ST 899580100 INSTALLER



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.

ST 899580100 INSTALLER

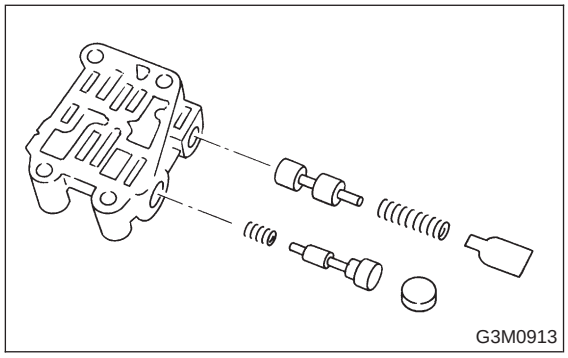


24. Transfer Valve Body

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

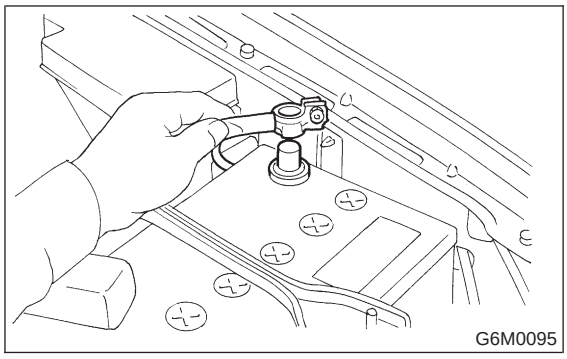
To assemble, reverse the removal sequence.

NOTE:
Make sure the valve slides smoothly after assembling.

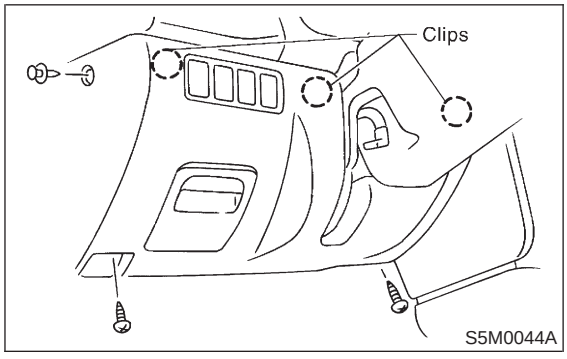
25. Transmission Control Module

A: REMOVAL

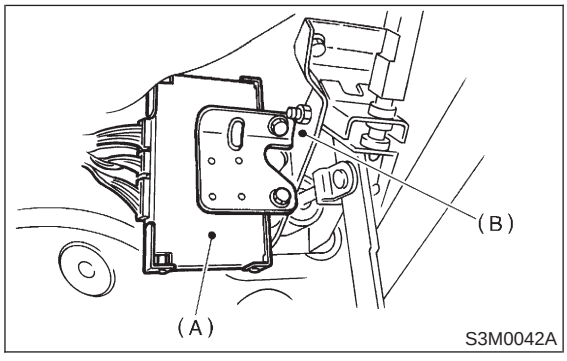
1) Disconnect battery ground cable.



2) Remove lower cover and then disconnect connector.



3) Remove transmission control module.



(A) Transmission control module
(B) Brake pedal

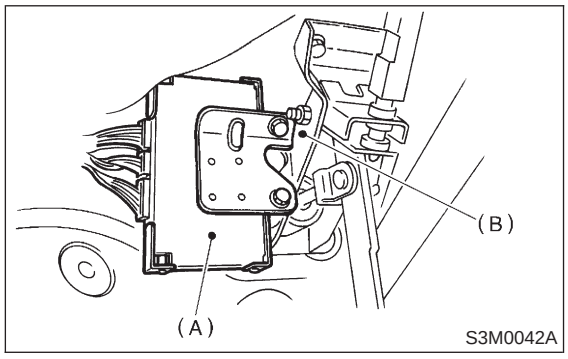
4) Disconnect connectors from transmission control module.

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) Brake pedal

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