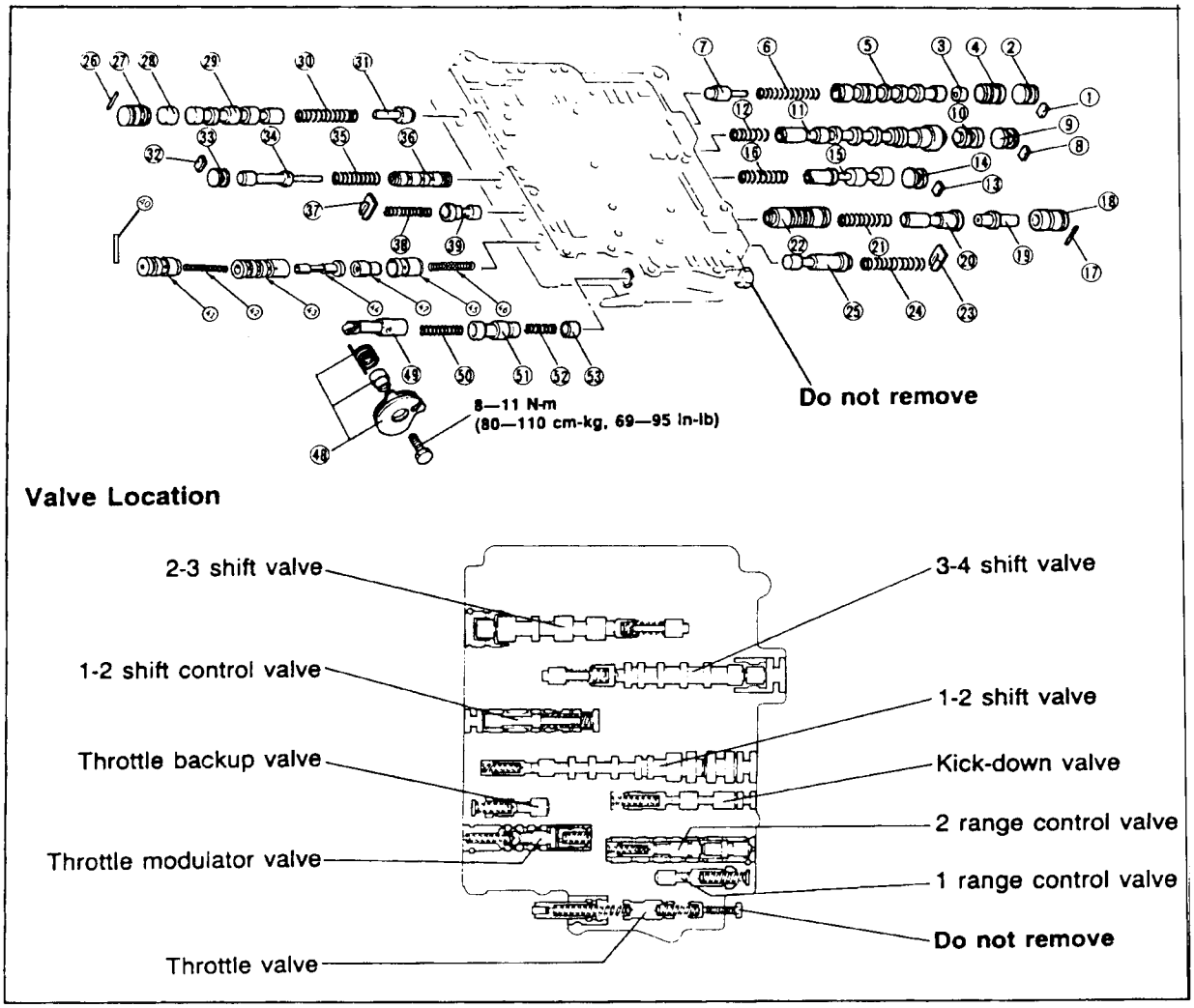
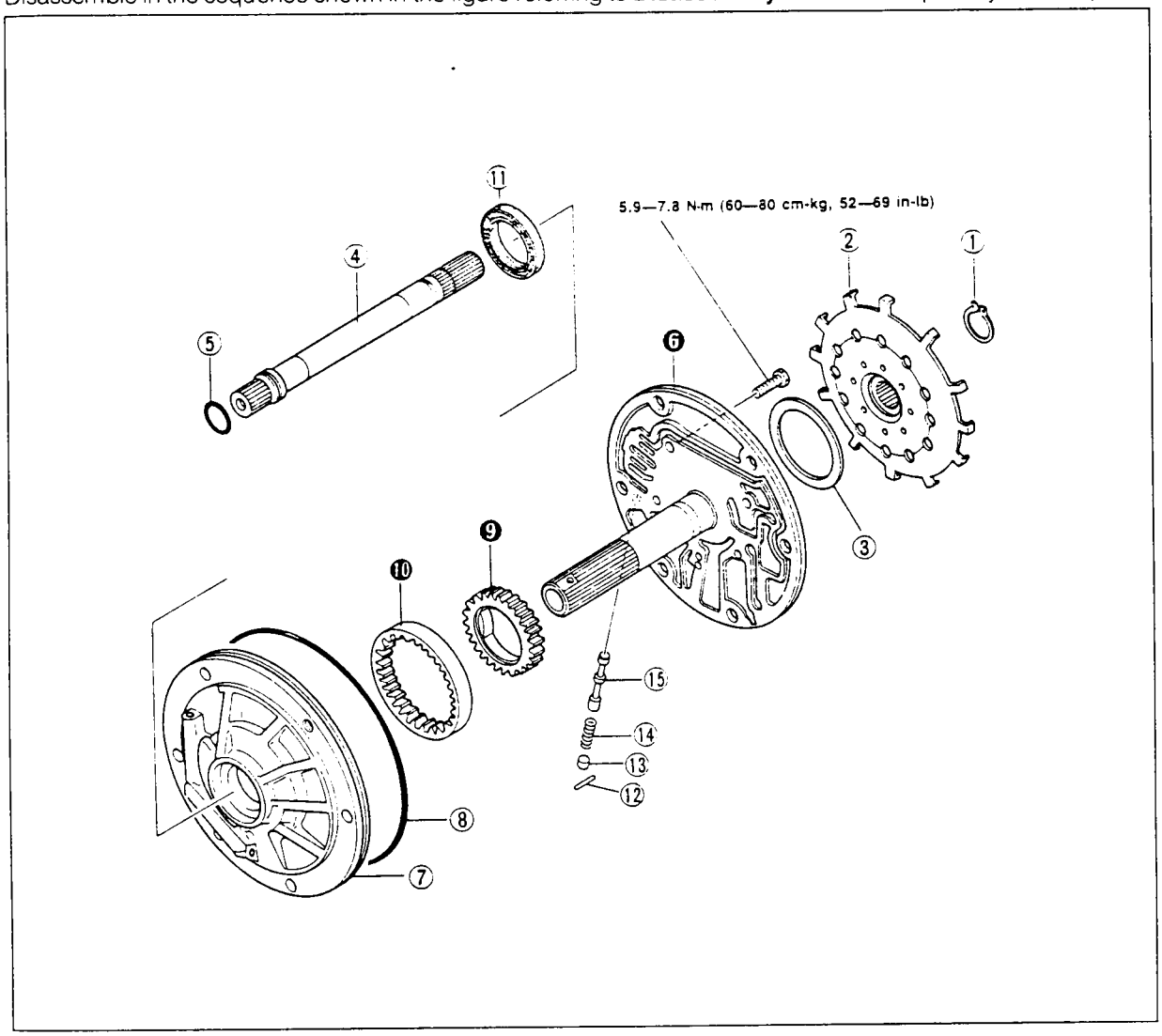
Main Control Body
Disassembly
Disassemble in the sequence shown in the figure.

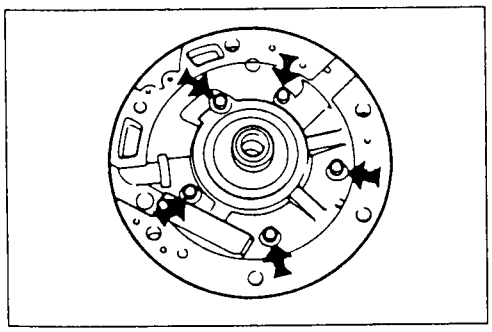


1. Stopper pin
2. Stopper plug
3. 3-4 shift front plug
4. 3-4 shift sleeve
5. 3-4 shift valve
6. 3-4 shift spring
7. 3-4 shift rear plug
8. Stopper pin
9. Stopper plug
10. 1-2 shift plug
11. 1-2 shift valve
12. 1-2 shift spring
13. Stopper pin
14. Stopper plug
15. Kick-down valve
16. Kick-down spring
17. Stopper pin
18. 2 range control front sleeve
19. 2 range control plug
20. 2 range control valve
21. 2 range control spring
22. 2 range control rear sleeve
23. Retainer
24. 1 range control spring
25. 1 range control valve
26. Stopper pin
27. 2-3 shift sleeve
28. 2-3 shift front plug
29. 2-3 shift valve
30. 2-3 shift spring
31. 2-3 shift rear plug
32. Stopper pin
33. Stopper plug
34. 1-2 shift control valve
35. 1-2 shift control spring
36. 1-2 shift control sleeve
37. Retainer
38. Throttle backup spring
39. Throttle backup valve
40. Stopper pin
41. Throttle modulator sleeve A
42. Throttle modulator front spring
43. Throttle modulator sleeve B
44. Throttle modulator valve
45. Throttle modulator sleeve C
46. Throttle modulator rear spring
47. Throttle modulator plug
48. Throttle cam assembly
49. Throttle plug assembly
50. Throttle spring
51. Throttle valve
52. Throttle assist spring
53. Throttle adjust plug

OIL PUMP
Disassembly
Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked parts.

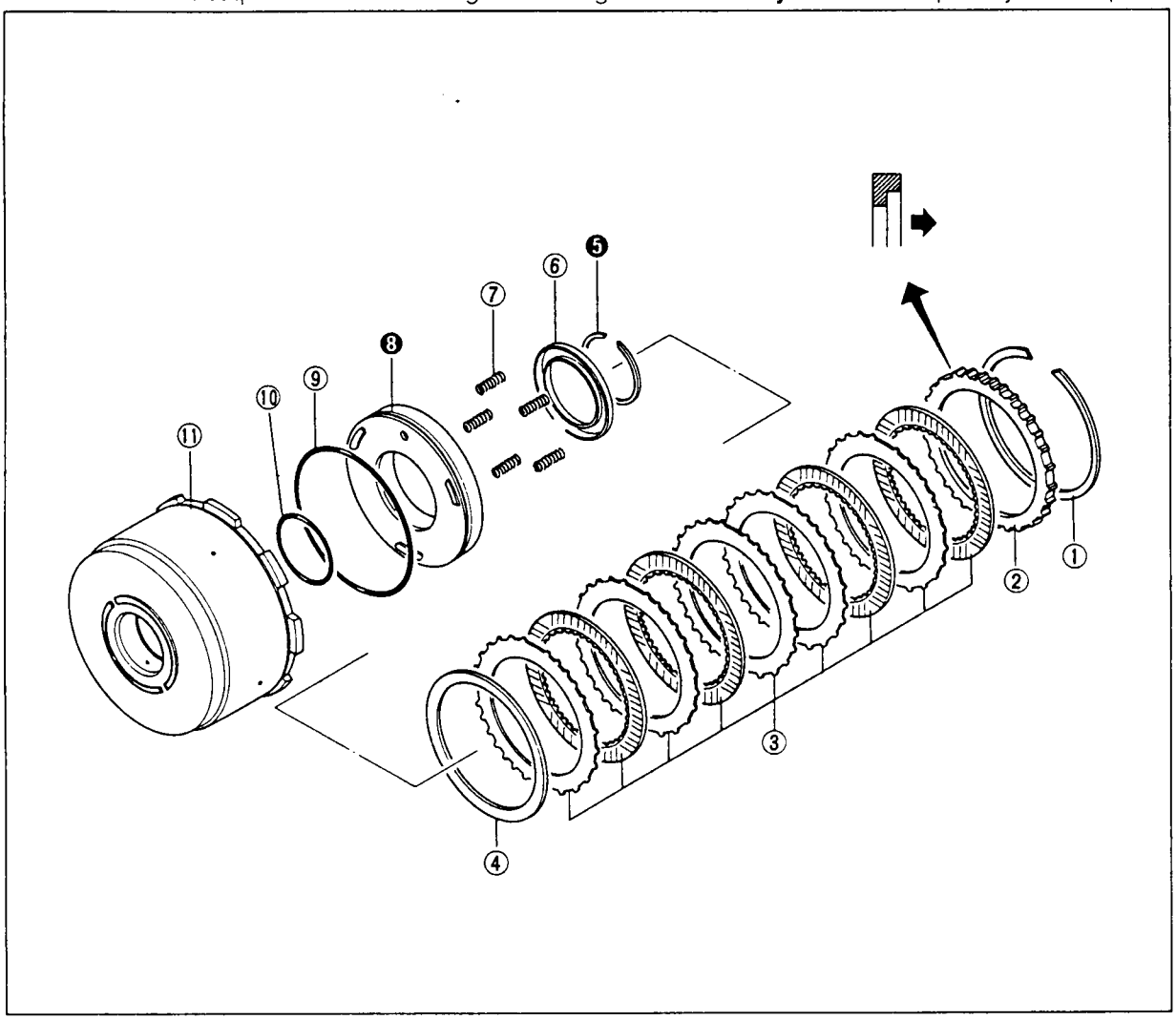


1. Snap ring
2. Sensing rotor
3. Bearing
4. Input shaft
5. O-ring
6. Pump cover
7. Pump housing
8. O-ring
9. Inner gear
10. Outer gear
11. Oil seal
12. Roll pin
13. Plug
14. Spring
15. Lockup control valve

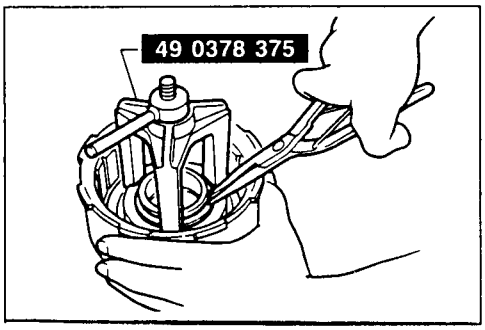


Disassembly note
Pump cover
Remove the mounting bolts and remove the pump cover from the housing.

FRONT CLUTCH
Disassembly
Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked parts.



1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
4. Dished plate
5. Snap ring
6. Spring retainer
7. Spring
8. Piston
9. Seal ring
10. O-ring
11. Front clutch drum



Disassembly note
Snap ring
1. Compress the spring with the **SST**, then remove the snap-ring with snap-ring pliers.
2. Remove the spring retainer and spring.

SST = SPECIAL SERVICE TOOL

INTRODUCTION
GF4EAT

The GF4EAT is currently found in the 1993 Ford Probe with *2.5 liter engine and Mazda 626 with 2.0 and 2.5 liter engines. It is a fully computer controlled four speed transaxle, and contains seven solenoids which provide up and down shift cycles, lockup, lockup control and line pressure control. Both Ford and Mazda utilize their own system of torque reduction control. The onboard vehicle computers together with a full compliment of sensors, determines the proper operation of the powertrain combination. This manual contains the necessary electrical and mechanical diagnosis as well as complete teardown and assembly procedures. This manual also provides transaxle specifications and a special service tool section showing the specialized tools required to service this unit. *Ford Probe with 2.0 liter engine will require the ATSG CD4E manual.

We thank Ford and Mazda for the illustrations and information that has made this manual possible.

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for their reliability, but ATSG does not guarantee its accuracy.

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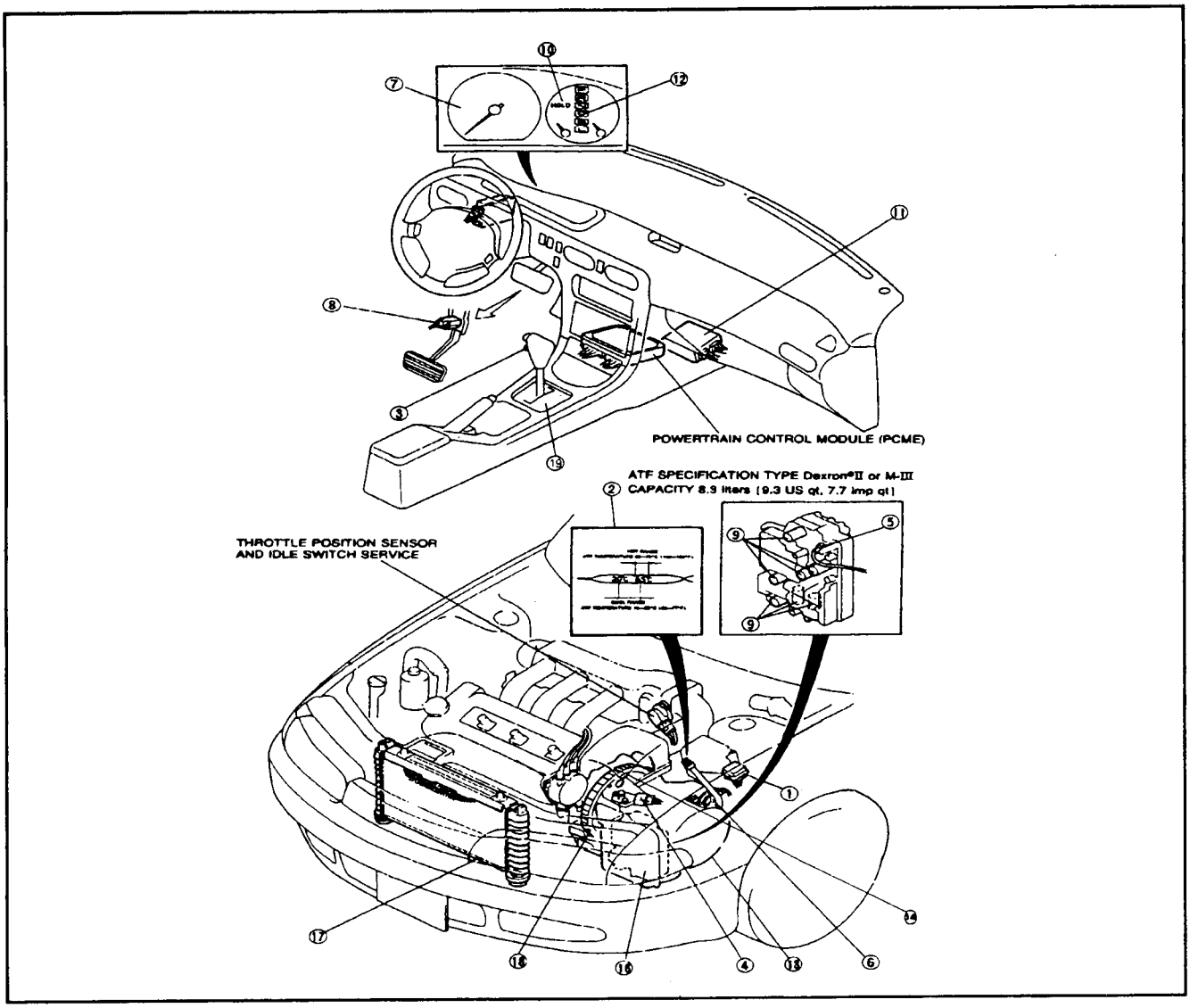
AUTOMATIC TRANSMISSION SERVICE GROUP
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GF4EAT

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AUTOMATIC TRANSMISSION SERVICE GROUP
9200 S. DADELAND BLVD. STE 720
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1. DATA LINK CONNECTOR
2. ATF LEVEL
3. HOLD SWITCH
4. INHIBITOR SWITCH
5. ATF THERMO SENSOR
6. PULSE GENERATOR
7. SPEEDOMETER
8. STOP LIGHT SWITCH
9. SOLENOIDS
10. HOLD INDICATOR
11. POWERTRAIN CONTROL MODULE
12. SELECTOR INDICATOR LAMP
13. TRANSAXLE
14. VEHICLE SPEED SENSOR
15. THROTTLE POSITION SENSOR
16. CONTROL VALVE BODY
17. OIL COOLER
18. DRIVE PLATE
19. SHIFT LOCK SYSTEM



Technical Service Information

B+: Battery positive voltage

Terminal	Color	Component	Connected to	Voltmeter + terminal	Voltmeter – terminal	Correct voltage	Condition	Possible cause
1G (Input)	GY	ATF thermosensor	ATF thermosensor	1G	2R	Approx. 0.6—4.8V	Verify that voltage decreases according to ATF temperature rise **Note** • **ATF temperature 20°C (68°F) Approx. 3.5V** **ATF temperature 130°C (266°F) Approx. 0.6V**	• ATF thermosensor • Wiring and/or connector from 1G terminal to ATF thermosensor
1H (Input)	BR/B	Hold switch	Hold switch	1H	Ground	B+	Switch released	• Hold switch
						0V	Switch depressed	
1I (Input)	R/Y	Inhibitor switch (R range)	Inhibitor switch	1I		B+	R range	• Inhibitor switch • Wiring and/or connector from 1I terminal to inhibitor switch
						0V	Other ranges	
1J (Output)	BR/W	Reduce torque signal 1	Powertrain control module (PCME)	1J		Below 1.0V	1→2, 2→3 shift, and throttle opening 4/8 or more	• Wiring and/or connector from 1J terminal to powertrain control module (PCME) 1S terminal
						B+	Other than above	
1K (Input)	Y/L	Torque reduced signal/engine coolant temperature signal	Powertrain control module (PCME)	1K		B+	Water temperature more than 60°C (140°F)	• Wiring and/or connector from 1K terminal to powertrain control module (PCME) 1K terminal
						Below 1.0V	Water temperature: less than 60°C (140°F) or torque control during shifting	
1L (Output)	L	Reduce torque signal 2	Powertrain control module (PCME)	1L		Below 1.0V	O/D→2, O/D→1, 3→2, 3→1, 2→1 shift and throttle opening 3/8 or more	• Wiring and/or connector from 1L terminal to powertrain control module (PCME) 1V terminal
						B+	Other than above	
1M (Input)	G/O	Barometric absolute pressure sensor	Powertrain control module (PCME)	1M		Above approx. 3.5V	Atmospheric pressure more than 89.6 kPa (672 mmHg, 26.5 inHg) (below approx. 1,500 m (4,921 ft))	• Wiring and/or connector from 1M terminal to powertrain control module (PCME) 2A terminal
						Below approx. 3.5V	Atmospheric pressure less than 89.6 kPa (672 mmHg, 26.5 inHg) (above approx. 1,500 m (4,921 ft))	
1N (Input)	O	Engine rpm signal (Ne1 signal)	Distributor	1N	Ground	0V or 4.5—5.5V	Engine stopped (ignition switch ON)	• Wiring and/or connector from 1N terminal to distributor • Distributor
						2.0—3.0V	Engine running at idle	
1O (Input)	BR	Idle switch	Throttle position sensor	1O		B+	Accelerator pedal depressed	• Throttle position sensor • Wiring and/or connector from 1O terminal to throttle position sensor
						0V	Accelerator pedal released	
1P (Input)	G/R	Vehicle speed sensor	Speedometer	1P		0V or 4.0—5.0V	Vehicle stopped	• Speedometer • Vehicle speed sensor
						2.0—3.0V	Vehicle moving	
2A (Input)	BR/Y	V_{REF} (throttle position sensor)	Throttle position sensor	2A		0V	Ignition switch OFF	• Wiring and/or connector from 2A terminal to throttle position sensor
						4.5—5.5V	Ignition switch ON	
2B (Input)	B/Y	Inhibitor switch (P and N ranges)	Inhibitor switch	2B		0V	P and N ranges	• Wiring and/or connector from 2B terminal to inhibitor switch • Wiring and/or connector from 2B terminal to ignition switch • Inhibitor switch • Ignition switch
						B+	Other ranges	
2C (Output)	W/B	Solenoid valve (lockup)	Solenoid valve (lockup)	2C		Below 1.0V	No lockup	• Solenoid valve (lockup) • Wiring and/or connector from 2C terminal to solenoid valve (lockup)
						B+ → Below 1.0V	Slip lockup → Lockup	
2D (Input)	R/L	Inhibitor switch (D range)	Inhibitor switch	2D		B+	D range	• Inhibitor switch • Wiring and/or connector from 2D terminal to inhibitor switch
						0V	Other ranges	

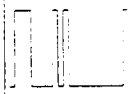
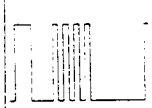
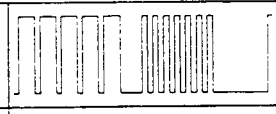
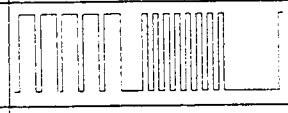
B+: Battery positive voltage

Terminal	Color	Component	Connected to	Voltmeter + terminal	Voltmeter – terminal	Correct voltage	Condition	Possible cause
2E (Output)	P	Solenoid valve (1-2 shift)	Solenoid valve (1-2 shift)	2E	Ground	B+	Solenoid valve ON	• Solenoid valve (1-2 shift) • Wiring and/or connector from 2E terminal to solenoid valve (1-2 shift)
						0V	Solenoid valve OFF	
2F (Input)	Y/B	Inhibitor switch (S range)	Inhibitor switch	2F		B+	S range	• Inhibitor switch • Wiring and/or connector from 2F terminal to inhibitor switch
						0V	Other ranges	
2G (Output)	L/B	Solenoid valve (2-3 shift)	Solenoid valve (2-3 shift)	2G		B+	Solenoid valve ON	• Solenoid valve (2-3 shift) • Wiring and/or connector from 2G terminal to solenoid valve (2-3 shift)
						0V	Solenoid valve OFF	
2H (Input)	L/O	Inhibitor switch (L range)	Inhibitor switch	2H		B+	L range	• Inhibitor switch • Wiring and/or connector from 2H terminal to inhibitor switch
						0V	Other ranges	
2I (Output)	G/B	Solenoid valve (3-4 shift)	Solenoid valve (3-4 shift)	2I		B+	Solenoid valve ON	• Solenoid valve (3-4 shift) • Wiring and/or connector from 2I terminal to solenoid valve (3-4 shift)
						0V	Solenoid valve OFF	
2J (Input)	W	Vehicle speed pulse generator	Vehicle speed pulse generator	2J*	2L	Approx. 0V (AC)	Engine stopped	• Pulse generator • Wiring and/or connector from 2J terminal to vehicle speed pulse generator
						0.1—1.0V (AC)	Engine running (P range)	
2K (Output)	L/W	Solenoid valve (lockup control)	Solenoid valve (lockup control)	2K	Ground	B+	Lockup	• Solenoid valve (lockup control) • Wiring and/or connector from 2K terminal to solenoid valve (lockup control)
						0V	No lockup	

* Check the 2J (pulse generator) terminal voltage by using the AC range.

2L (Ground)	R	Ground (vehicle speed pulse generator)	Vehicle speed pulse generator	2L	Ground	0V	Constant	• Vehicle speed pulse generator • Wiring and/or connector from 2L terminal to pulse generator
2M (Output)	R/W	Solenoid valve (3-2 timing)	Solenoid valve (3-2 timing)	2M		B+	1→2, 2→3, 3→O/D, 3→2, 3→1, 2→1 shift or select R range from other ranges	• Solenoid valve (3-2 timing) • Wiring and/or connector from 2M terminal to solenoid valve (3-2 timing)
						0V	Other than above	
2N (Output)	R/G	Solenoid valve (line pressure)	Solenoid valve (line pressure)	2N		B+	Throttle valve fully closed (engine running)	• Solenoid valve (line pressure) • Wiring and/or connector from 2N terminal to solenoid valve (line pressure)
						Approx. 1.6V	Throttle valve fully open (engine running)	
2O	L/R	Battery (backup)	ROOM fuse	2O		B+	Constant	• Wiring and/or connector from 2O terminal to ROOM fuse • ROOM fuse
2P (Ground)	B/R	Ground (powertrain control module (transmission) (PCMT))	—	2P		0V	Constant	• Wiring and/or connector from 2P terminal to ground
2Q	B/Y	Battery	METER fuse	2Q		B+	Ignition switch ON	• Wiring and/or connector from 2Q terminal to METER fuse • METER fuse
						0V	Ignition switch OFF	
2R (Ground)	L/G	Ground (ATF thermosensor)	ATF thermosensor	2R		0V	Constant	• ATF thermosensor • Wiring and/or connector from 2R terminal to ATF thermosensor
2S	B/Y	Battery	METER fuse	2S		B+	Ignition switch ON	• Wiring and/or connector from 2S terminal to METER fuse • METER fuse
						0V	Ignition switch OFF	
2T (Input)	Y	Throttle position sensor (TVO)	Throttle position sensor	2T	Ground	0.1—1.1V	Throttle valve fully closed	• Wiring and/or connector from 2T terminal to throttle position sensor • Throttle position sensor
						3.1—4.4V	Throttle valve fully open	
							Note • **Change throttle valve position from full open to full closed and verify that voltage changes accordingly.**	

Diagnostic trouble code number

Code No.	Buzzer Pattern	Diagnosed circuit	Condition	Point	Memorized
01		Engine rpm signal (Ne1 signal)	No input signal from distributor Ne1 signal while driving at drum speed above 600 rpm in D, S, or L ranges	• Distributor connector • Wiring from distributor to powertrain control module (transmission) (PCMT)	Yes
06		Vehicle speed sensor	No input signal from vehicle speed sensor while driving at drum speed above 600 rpm in D, S, or L ranges	• Vehicle speed sensor connector • Wiring from vhicle speed sensor to instrument cluster • Wiring from instrument cluster to powertrain control module (transmission) (PCMT) • Vehiche speed sensor resistance	Yes
12		Throttle position sensor	Open or short circuit	• Throttle position sensor connector • Wiring from throttle position sensor to powertrain control module (transmission) (PCMT) • Throttle position sensor resistance	Yes
14		Barometric absolute pressure sensor	Open or short circuit	• Barometric absolute pressure sensor connector • Wiring from atmospheric pressure sensor to powertrain control module (PCME)	Yes
55		Vehicle speed pulse generator	No input signal from vehicle speed pulse generator while driving at vehicle speed 40 km/h (25 mph) or higher in D, S or L range	• Vehicle speed pulse generator connector • Wiring from vehicle speed pulse generator to powertrain control module (transmission) (PCMT) • Vehicle speed pulse generator resistance	Yes
56		ATF thermosensor	Open or short circuit	• ATF thermosensor connector • Wiring from ATF thermosensor to powertrain control module (transmission) (PCMT) • ATF thermosensor resistance	Yes
57		Reduce torque signal 1	Open or short circuit of reduce torque signal 1 wire harness	• Wiring from powertrain control module (PCME) to powertrain control module (transmission) (PCMT)	Yes
58		Reduce torque signal 2	Open or short circuit of reduce torque signal 2 wire harness	• Wiring from powertrain control module (PCME) to powertrain control module (transminnion) (PCMT)	Yes
59		Torque reduced signal/engine coolant temperature signal	Open or short circuit of torque reduced signal/engine coolant temperature signal wire harness	• Wiring from powertrain control module (PCME) to powertrain control module (transmission) (PCMT)	Yes
60		Solenoid valve (1-2 shift)	Open or short circuit of solenoid valve and/or wiring	• Solenoid valve connector • Wiring from solenoid valve to powertrain control module (transmission) (PCMT) • Solenoid valve resistance	Yes

Code No.	Buzzer Pattern	Diagnosed circuit	Condition	Point	Memorized
61		Solenoid valve (2-3 shift)	Open or short circuit of solenoid valve and/or wiring	• Solenoid valve connector • Wiring from solenoid valve to powertrain control module (transmission) (PCMT) • Solenoid valve resistance	Yes
62		Solenoid valve (3-4 shift)	Open or short circuit of solenoid valve and/or wiring	• Solenoid valve connector • Wiring from solenoid valve to powertrain control module (transmission) (PCMT) • Solenoid valve resistance	Yes
63		Solenoid valve (lockup control)	Open or short circuit of solenoid valve and/or wiring	• Solenoid valve connector • Wiring from solenoid valve to powertrain control module (transmission) (PCMT) • Solenoid valve resistance	Yes
64		Solenoid valve (3-2 timing)	Open or short circuit of solenoid valve and/or wiring	• Solenoid valve connector • Wiring from solenoid valve to powertrain control module (transmission) (PCMT) • Solenoid valve resistance	Yes
65		Solenoid valve (lockup)	Open or short circuit of solenoid valve and/or wiring	• Solenoid valve connector • Wiring from solenoid valve to powertrain control module (transmission) (PCMT) • Solenoid valve resistance	Yes
66		Solenoid valve (line pressure)	Open or short circuit of solenoid valve and/or wiring	• Solenoid valve connector • Wiring from solenoid valve to powertrain control module (transmission) (PCMT) • Solenoid valve resistance	Yes

NOTE...The memory of a malfunction can be canceled by disconnecting the negative battery terminal for approximately 20 seconds and the brake pedal is depressed.

Shift Solenoid Valve Chart

Manual Lever Position Range	Mode	Gear		Solenoid Valves			
				1 – 2 Shift	2 – 3 Shift	3 – 4 Shift	Lockup Control
P	—	—		OFF	OFF	ON	OFF
R	—	Reverse	Below approx. 2.5 mph (4 km/h)	OFF	ON	ON	OFF
			Above approx. 2.5 mph (4 km/h)	OFF	OFF	OFF	OFF
N	—	—	Below approx. 2.5 mph (4 km/h)	OFF	OFF	ON	OFF
			Above approx. 3 mph (5 km/h)	ON	OFF	OFF	OFF
D	Power or Normal[1]	1st		OFF	ON	ON	OFF
		2nd		ON	ON	ON	●
		3rd		ON	OFF	OFF	●
		O/D		ON	OFF	ON	●
2	Power[2]	2nd		ON	ON	OFF	OFF
		3rd*		ON	OFF	OFF	●
		O/D*		ON	OFF	ON	OFF
1	Power[2]	1st		OFF	ON	OFF	OFF
		2nd*		ON	ON	OFF	OFF

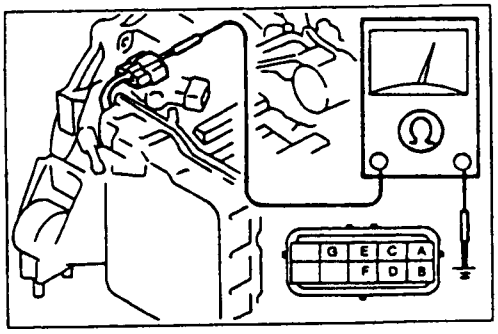
● Available for lockup but may not necessarily be activated.

[1] The Transaxle Control Module (TCM) automatically switches between POWER and NORMAL depending on the speed of the accelerator pedal depression.

[2] Cannot be selected.

* Overspeed protection only. Transaxle will not upshift into these gears.

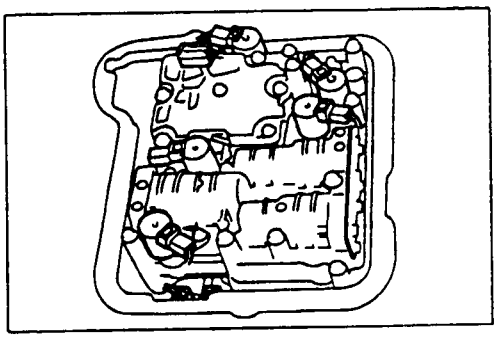
NOTE: The power mode and the normal mode are automatically selected by **BOTH** the **PCME** (Powertrain Control Module Engine), and the **PCMT** (Powertrain Control Module Transmission).
There is **NO O/D** when the ATF temperature is below 50 degrees F.(10 C)
There is **NO O/D** when the cruise control is operating and there is a 5 mph (8km/h) difference between the preset cruise speed and the vehicle speed, or the RESUME/ACCEL switch is on.
There is **NO LOCKUP** when the engine coolant temperature is below 140 degrees F. (60 C)
There is **NO LOCKUP** when the idle switch is on.
There is **NO LOCKUP** when the stoplight switch is on.
There is **NO PARTIAL LOCKUP** when the ATF temperature is below 68 degrees F. (20 C)
There is **NO PARTIAL LOCKUP** when the accelerator pedal is depressed rapidly.



SOLENOID VALVES
Inspection

ATF temperature: −40—160°C {−40—320°F}

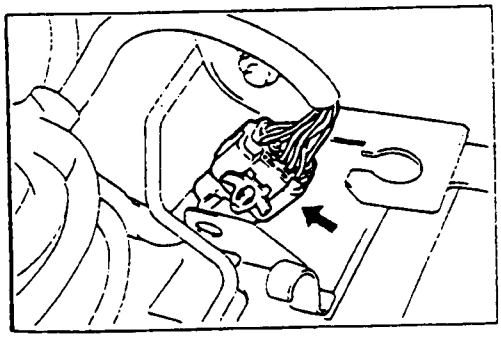
Terminal	Solenoid valve	Resistance (Ω)
A	1-2 shift	11—27
B	2-3 shift	11—27
C	3-4 shift	11—27
D	Lockup control	11—27
E	3-2 timing	11—27
F	Lockup	9—18
G	Line pressure	9—18



MANUAL OPERATION TEST
Inspection

1. Disconnect the solenoid connector.

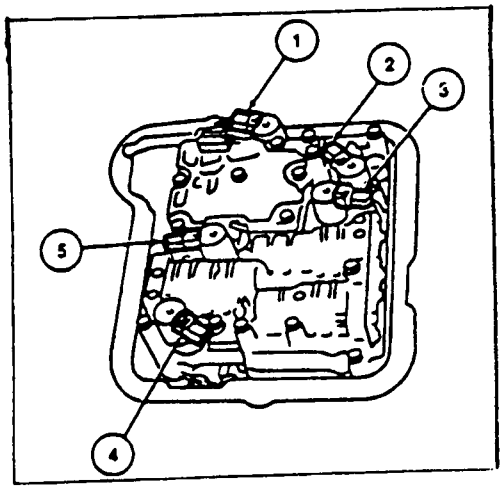
Note
- **Determine the gear position by noting the conditions upon accelerating from a stop and the engine speed (drum rpm) while cruising.**
- **Engine rpm at 40 km/h (25 mph)**
  1st gear: Approx. 4,250 rpm...2.5 engine
  Approx. 3,900 rpm...2.0 engine
  3rd gear: Approx. 1,500 rpm...2.5 engine
  Approx. 1,400 rpm...2.0 engine



2. Verify the gear position of each range.

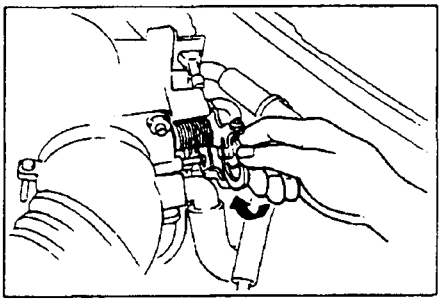
Range	Gear Position
D range	3rd. fixed
S range	3rd. fixed
L range	1st. fixed
R range	Reverse

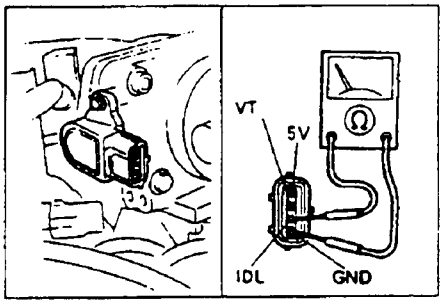
3. If not within the specification. check the oil pressure or transaxle.

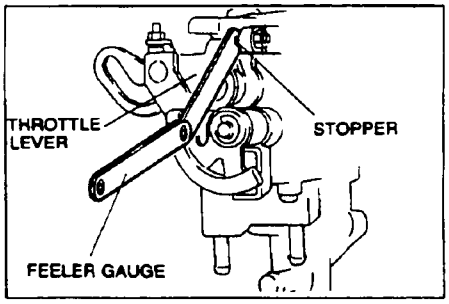


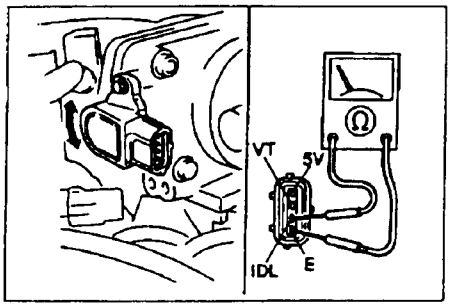
Item	Part Number	Description
1	—	Torque Converter Clutch (TCC) Solenoid
2	—	Line Pressure Solenoid (LPS)
3	—	Downshift Solenoid
4	—	Torque Converter Clutch Control
5	—	1-2 Shift Solenoid

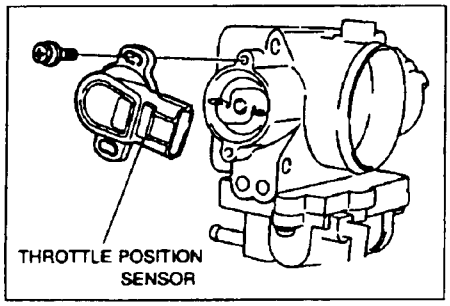
Solenoids 6 (2-3 shift solenoid) and 7 (3-4 shift solenoid) are located on the back side of the valve body.











Throttle Position Sensor (TPS)

1. Rotate the throttle link by hand and verify that the voltage is within the specification.

Specification

PCME terminal	Throttle valve position	
	Fully closed	Fully open
2F	0.1-1.1V	3.1-4.4V

2. If not as specified, adjust the throttle position sensor.

Idle switch

1. Disconnect the throttle position sensor connector.
2. Connect an ohmmeter to terminals IDL and GND.
3. Insert a feeler gauge between the throttle stop screw and the stopper lever. Check continuity of the switch.

Specification

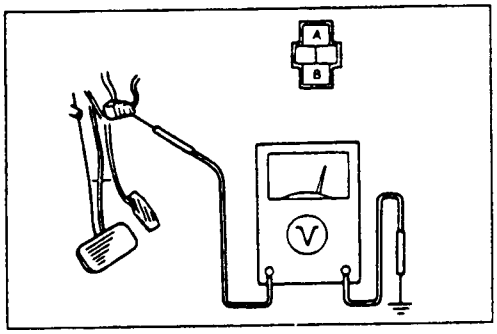
Clearance	Continuity
0.15mm {0.006 in}	Yes
0.50mm {0.020 in}	No

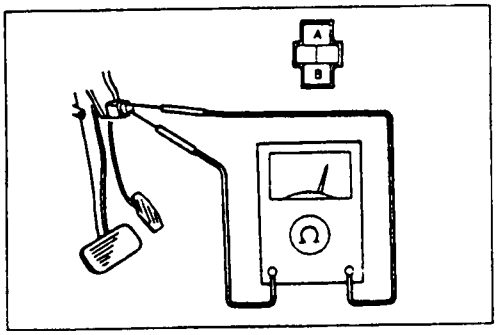
4. If not as specified, loosen the throttle position sensor screws.
5. Insert a **0.15mm {0.006 in}** feeler gauge between the throttle stop screw and stopper lever.
6. Rotate the throttle position sensor clockwise approximately 30 degrees, then rotate it back counterclockwise until there is continuity.
7. Replace the feeler gauge with a **0.50mm {0.020 in}** feeler gauge and verify that there is no continuity.
8. Tighten the attaching screws.

Tighting torque:
1.6—2.3 N·m {16—24 kgf·cm, 14—20 in·lbf}

Replacement

1. Disconnect the throttle position sensor connector.
2. Remove the attaching screws.
3. Replace the throttle position sensor.
4. Verify that the throttle valve is fully closed.
5. Set the throttle position sensor against the throttle body with it turned clockwise **approx. 60—120 Degrees**
6. Rotate the throttle position sensor counterclockwise until the mounting holes line up.
7. Adjust the throttle position sensor.





STOPLIGHT SWITCH

Inspection

Note

- **Check the stoplight switch terminal of the powertrain control module (PCME, PCMT). If not correct, check the stoplight switch, refer to below.**

Inspection of voltage

1. Turn the ignition switch ON.
2. Measure voltage at the stoplight switch connector.

B+: Battery positive voltage

Condition		Connector terminal (V)	
		A	B
Pedal depressed	(V)	B+	0
Pedal released	(V)	0	0

3. If not as specified, check the wiring harness (Stop fuse—Stoplight switch, Stoplight switch—powertrain control module (PCME, PCMT)) and the continuity of the switch.

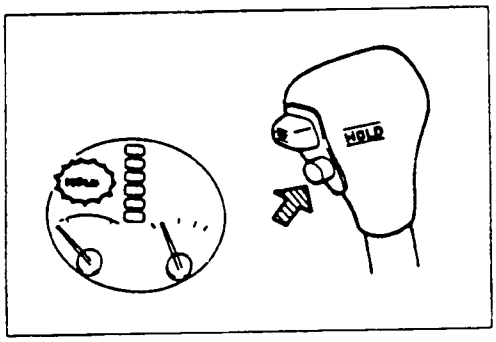
Inspection of continuity

1. Disconnect the negative battery cable.
2. Disconnect the stoplight switch connector.
3. Check continuity between terminals A and B of the switch.

Condition	Terminal	
	A	B
Pedal depressed		
Pedal released	O	O

O——O: Continuity

4. If not as specified, replace the stoplight switch.
5. Connect the stoplight switch connector.
6. Connect the negative battery cable.



HOLD INDICATOR

Inspection

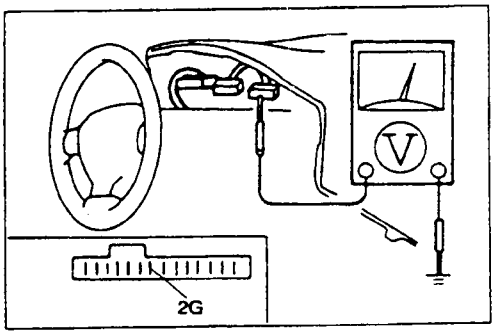
Inspection of operation

1. Turn the ignition switch from OFF to ON.
2. Verify that the hold indicator is not illuminated.
3. Depress the switch and verify that the hold indicator illuminates.

Note

- **If a malfunction occurs in any of the EC-AT system components, the hold indicator flashes.**

4. If the hold switch function is not as specified, after checking the hold switch.check the terminal voltage of the hold indicator.

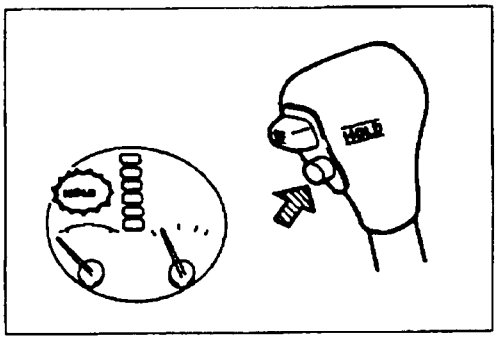


Inspection of voltage

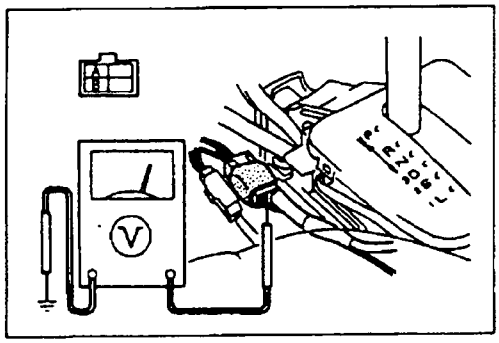
1. Remove the instrument cluster.
2. Turn the ignition switch ON.
3. Measure voltage between terminal 2G and a ground.

B+: Battery positive voltage

Voltage	Action
B+	Go to next step
Other	• Replace METER fuse • Repair wiring harness (METER fuse—Instrument cluster)



HOLD SWITCH
Inspection
Inspection of operation
1. Turn the ignition switch from OFF to ON.
2. Verify that the hold indicator is not illuminated. Depress the hold switch and verify that the hold indicator illuminates.
3. If not as specified, check the terminal voltage of the hold switch.

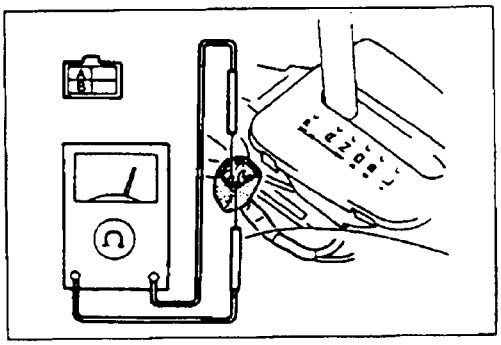


Inspection of voltage
1. Remove the front console.
2. Turn the ignition switch ON.
3. Measure voltage at the hold switch connector.

B+: Battery positive voltage

Position	Connector terminal	
	A	B
Normal (V)	B+	0
Depressed (V)	0	0

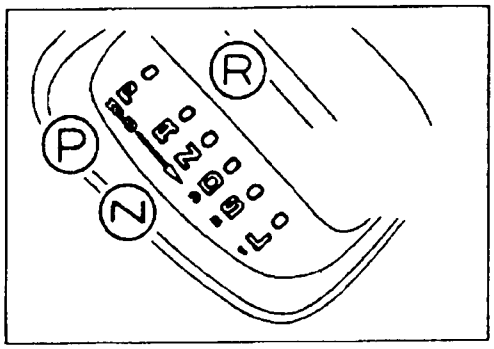
4. If not as specified, check the continuity of the hold switch.



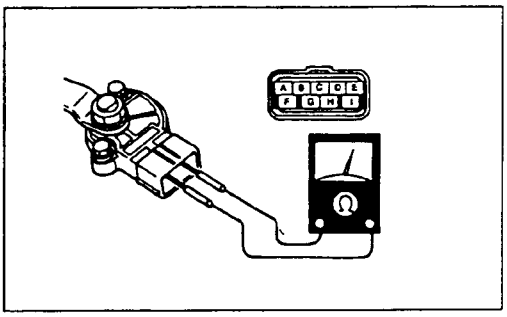
Inspection of continuity
1. Disconnect the negative battery cable.
2. Disconnect the hold switch connector.
3. Check continuity of the switch.

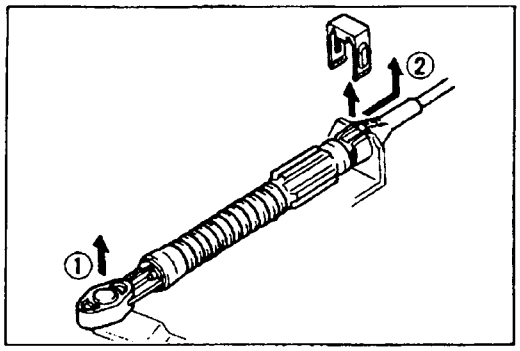
Position	Terminal	
	A	B
Normal		
Depressed	O	O

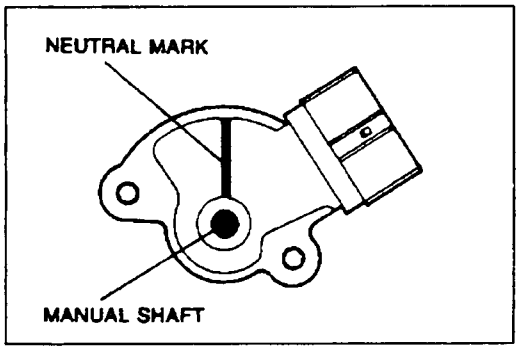
O——O: Continuity

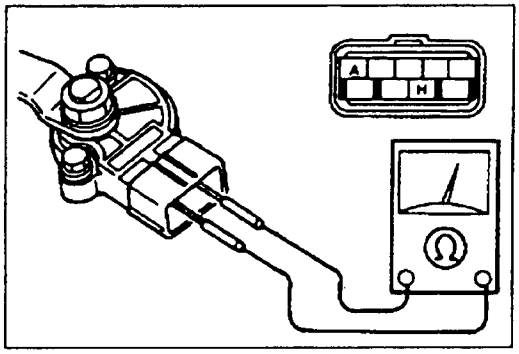


INHIBITOR SWITCH
Inspection
Inspection of operation
1. Verify that the starter operates only with the ignition switch at the START position and the selector lever in P and N ranges.
2. Verify that the back-up lights illuminate when shifted to R range with the ignition switch in the ON position.
3. Verify that the positions of the selector lever and the selector indicator lamp of the instrument cluster are aligned.
4. Check the inhibitor switch if not as specified.









Inspection of continuity

1. Disconnect the negative battery cable.
2. Remove the resonance chamber, fresh air duct, and air cleaner assembly.
3. Disconnect the inhibitor switch connector.
4. Check continuity of the inhibitor switch.

Position	Connector terminal								
	A	B	C	D	E	F	G	H	I
P	○				○				
						○			○
R	○			○					
N	○							○	
						○			○
D	○	○							
S	○						○		
L	○		○						

○——○: Continuity

5. If not as specified, replace or adjust the inhibitor switch.
6. Connect the inhibitor switch connector.
7. Install the resonance chamber, fresh air duct, and air cleaner assembly.
8. Connect the negative battery cable.

Replacement

1. Disconnect the negative battery cable.
2. Remove the resonance chamber,fresh air duct, and air cleaner assembly.
3. Disconnect the inhibitor switch connector.
4. Remove the clip.
5. Remove the selector cable in the order shown in the figure.
   ① Disconnect the selector cable from the manual shaft lever.
   ② Pull out the selector cable from the cable bracket and remove it.
6. Remove the manual shaft nut.
7. Remove the lock-washer and lever.
8. Remove the inhibitor switch.
9. Rotate the manual shaft to N position.
10. Turn the inhibitor switch so that the neutral mark is in line with the flat, straight surfaces on either side of the manual shaft.
11. Loosely tighten the inhibitor switch bolts.
12. Verify that there is continuity between terminals A and H of the inhibitor switch connector.
13. Tighten the inhibitor switch mounting bolts.

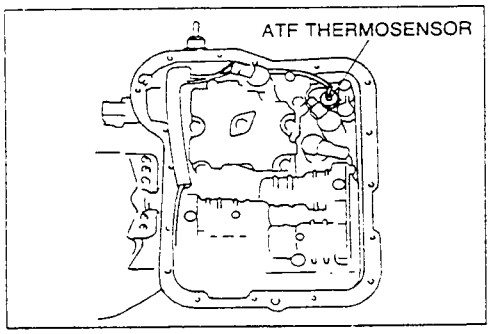
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}

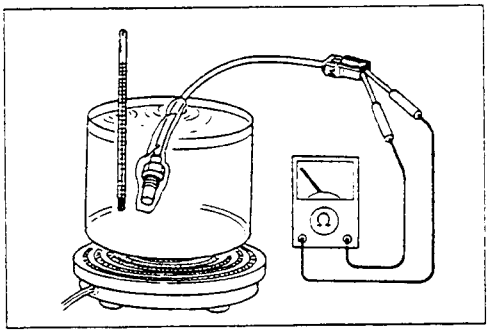
14. Install the lever and spring washer.

Caution
- **Do not tighten the manual shaft nut by using an impact wrench.**

15. Tighten the manual shaft nut.

Tightening torque:
32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}



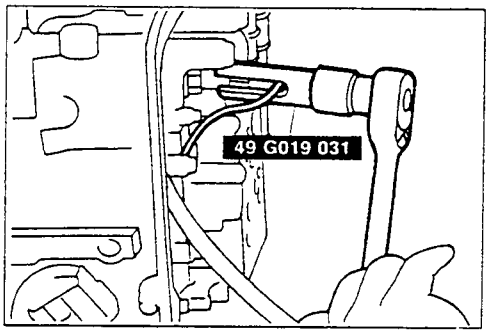


ATF THERMOSENSOR
Inspection

1. Refer to "Replacement" below for removal of the ATF thermosensor.
2. Place the ATF thermosensor in ATF with a thermosensor as shown and heat the ATF gradually.
3. Measure resistance between the terminals of the ATF thermosensor.

ATF temperature°C {°F}	Resistance (kΩ)
-20 {-4}	13.47—17.17
0 {32}	5.445—6.678
20 {68}	2.441—2.894
40 {104}	1.193—1.374
60 {140}	0.6284—0.7048
80 {176}	0.3527—0.3865
100 {212}	0.2091—0.2245
120 {248}	0.1301—0.1372
130 {266}	0.1044—0.1090

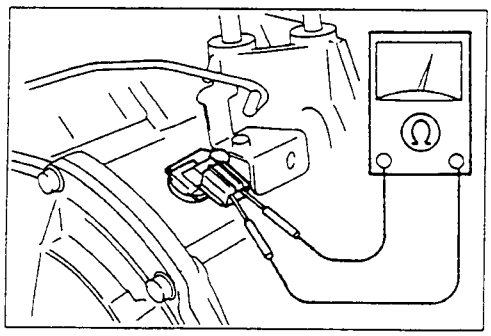
4. If not correct, replace the ATF thermosensor.



Replacement

1. Remove the control valve body cover.
2. Disconnect the ATF thermosensor connector.
3. Remove the ATF thermosensor by using the **SST**.
4. Install a new ATF thermosensor by using the **SST**.

SST=SPECIAL SERVICE TOOL

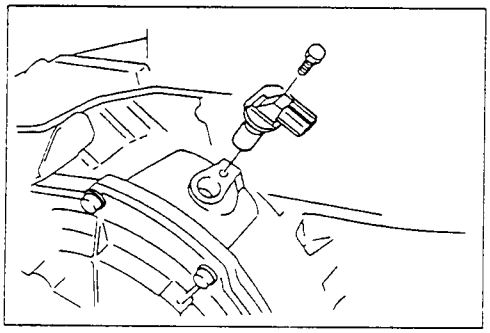


VEHICLE SPEED PULSE GENERATOR
Inspection

1. Refer to "Replacement" below for disconnection of the vehicle speed pulse generator connector.
2. Measure resistance between the terminals of the vehicle speed pulse generator.

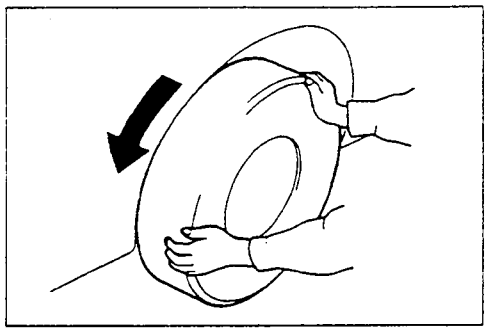
Resistance: 253—604 Ω
(ATF temperature: -40—160°C {-40—320°F})

3. If not correct, replace the vehicle speed pulse generator.
4. Refer to "Replacement" for connection of the vehicle speed pulse generator connector.



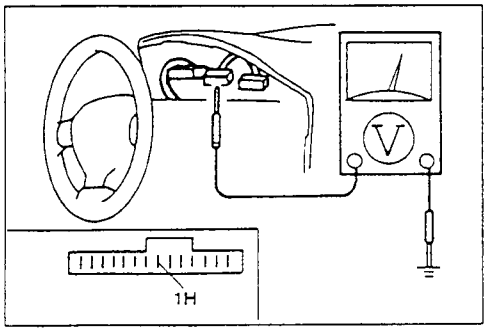
Replacement

1. Disconnect the negative battery cable.
2. Remove the resonance chamber, fresh air duct, and air cleaner assembly.
3. Remove the fuel filter mounting nuts.
4. Disconnect the vehicle speed pulse generator connector.
5. Remove the vehicle speed pulse generator.
6. Apply ATF to a new O-ring and install it on a new vehicle speed pulse generator.
7. Install the vehicle speed pulse generator.



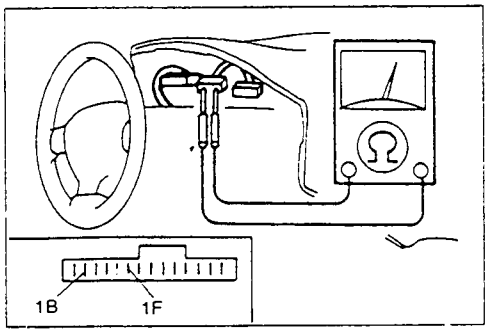
SPEEDOMETER
Inspection

Note
- **Check the speedometer terminal of the EC-AT control unit. If not correct, check the speedometer and speedometer sensor, refer to below.**



Inspection of speedometer
1. Remove the instrument cluster.
2. Measure voltage between terminal 1H and a ground when rotating the front wheels.

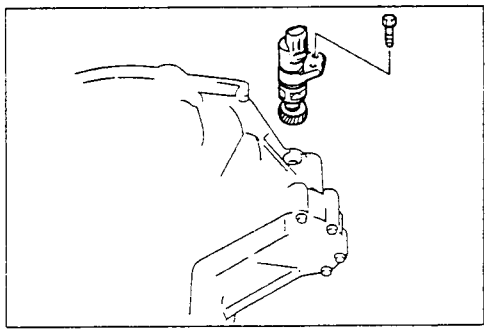
Meter needle	Action
Moves slightly under 5V	Repair wiring harness (Instrument cluster—powertrain control module (PCME, PCMT))
Does not move	Go to next step



3. Measure voltage between terminals 1B and 1F of the vehicle harness when rotating the front wheels.

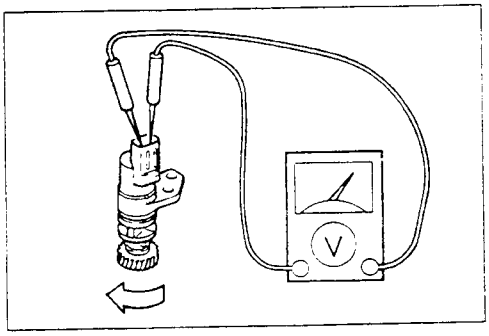
Note
- **The vehicle speed sensor is an alternating current generator. If the DC range is used, the voltage rise will not follow the increase of the wheel speed. If the AC range is used, the voltage will rise when increasing the rotation speed.**

Meter needle	Action
Moves slightly under 5V	Replace speedometer (Refer to Body Electrical Troubleshooting segment Section C)
Does not move	Go to next step



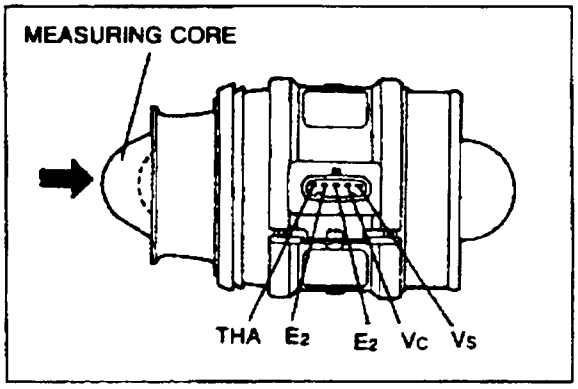
Inspection of speedometer sensor
1. Remove the vehicle speed sensor.

Note
- **The vehicle speed sensor is an alternating current generator. If the DC range is used, the voltage rise will not follow the increase of the wheel speed. If the AC range is used, the voltage will rise when increasing the rotation speed.**



2. Measure voltage between terminals of the vehicle speed sensor while rotating the driven gear.

Meter needle	Action
Moves slightly under 5V	Repair wiring harness (Instrument cluster—vehicle speed sensor)
Does not move	Replace vehicle speed sensor

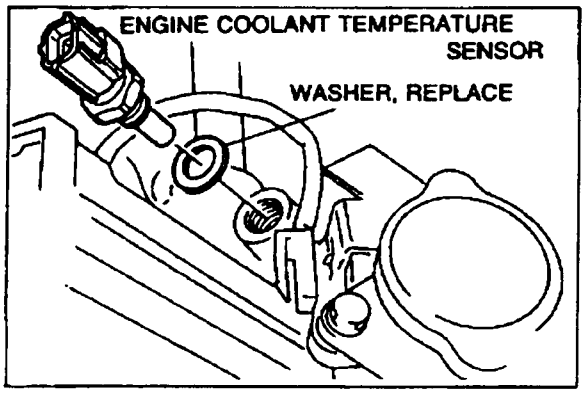


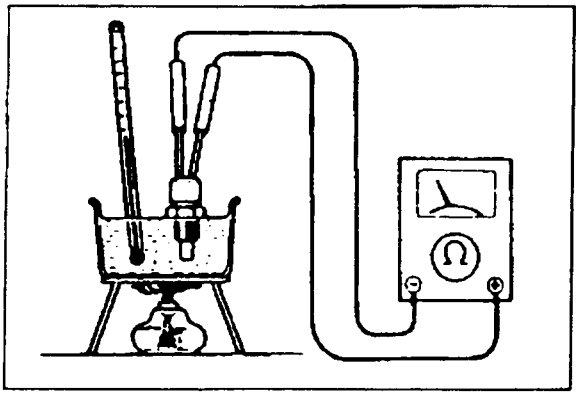
AIR FLOW SENSOR

Inspection

1. Check the air flow sensor body for cracks and damage.
2. Verify that the measuring core opens smoothly.
3. Measure resistance of the air flow sensor.

Terminal	Resistance (Ω)
E2 ↔ Vs	20—600 (Closed: 20°C {68°F}) 20—1,000 (Open: 20°C {68°F})
E2 ↔ Vc	200—400 (Closed ↔ Open: 20°C {68°F})
E2 ↔ THA (intake air temperature sensor)	−20°C {−4°F} 10,000—20,000 20°C {68°F} 2,000— 3,000 60°C {140°F} 400— 700





ENGINE COOLANT TEMPERATURE SENSOR (CIS)

Removal / Installation

Warning

- **Never remove the engine coolant temperature sensor while the engine is hot.**

1. Disconnect the engine coolant temperature sensor connector.
2. Remove the engine coolant temperature sensor connector.
3. Install a new gasket and the engine coolant temperature sensor.

Tighting torque:
16—23 N·m {1.6—2.4 kgf·m, 12—17 ft·lbf}

Inspection

1. Place the sensor in water with a thermometer and heat the water gradually.
2. Measure resistance of the sensor.

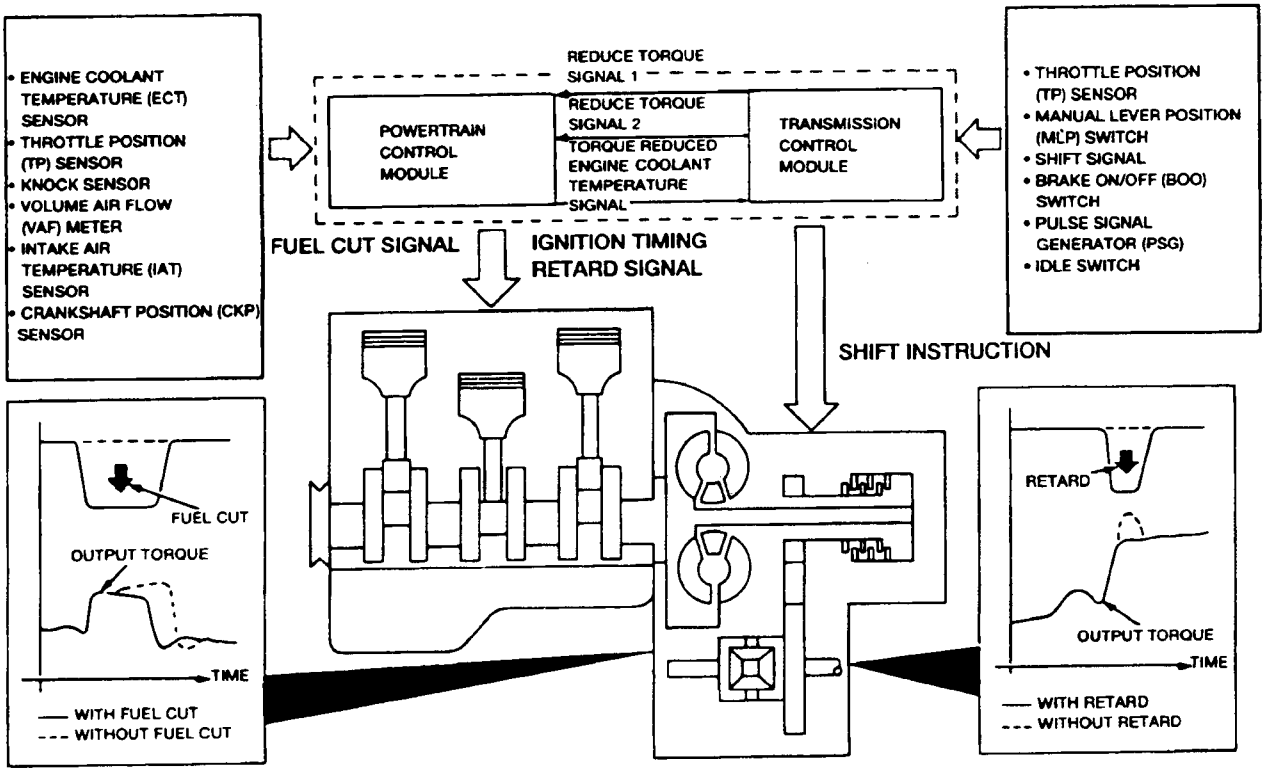
Coolant	Resistance (kΩ)
20°C {68°F}	2.2—2.7
40°C {104°F}	1.0—1.3
60°C {140°F}	0.50—0.65
80°C {176°F}	0.29—0.35

3. If not as specified, replace the engine coolant temperature sensor.

TORQUE REDUCTION CONTROL SYSTEM

Description and Operation

In order to minimize shift shock, a torque reduction control system is used. This system temporarily reduces engine torque to improve shift quality by cutting off fuel delivery during upshifts and retarding ignition timing during downshifts. If torque reduction is not possible, the Transmission Control Module (TCM) adjusts line pressure to a pre-programmed amount to reduce shift shock. The TCM sends two reduce torque signals (Reduce Torque Signal 1 for upshifts, Reduce Torque Signal 2 for downshifts) to the Powertrain Control Module (PCM). The PCM sends a Torque Reduced / Engine Coolant Temperature signal to the TCM which notifies the transaxle of torque reduction.



NOTE...The system shown here is found in the Ford Probe, the system found in the Mazda 626 is similar.

SERVICE POINTS

OUTLINE

Hold Switch

- If there is an open or short circuit in the hold switch or harness, selection to/from hold mode is not possible.

Inhibitor Switch

- If a malfunciton occurs in the wiring of the inhibitor switch, the powertrain control module (PCME, PCMT) cannot determine the range position, and shifting may be abnormal in D, S, and L ranges. There may not be a shift to O/D.

Throttle Position Sensor

- If there is an open or short circuit in the throttle position sensor or harness, diagnostic trouble code No.12 is displayed by the self-diagnosis function, and hold mode is canceled.
- If a malfunction occurs in the throttle position sensor, the powertrain control module (PCME, PCMT) judges the throttle opening to be at a constant 4/8 stroke.

Idle Switch

- If there is an open circuit in the idle switch or harness, the powertrain control module (PCME, PCMT) does not correct throttle characteristics. In case of misadjustment of throttle position sensor, lockup is not canceled when cruising (throttle fully closed) and vehicle jolts when accelerator pedal is depressed or released.
- If there is a short circuit in the idle switch or harness, the line pressure will be low (does not match throttle characteristics) and the transaxle may slip when shifting.

Vehicle Speed Pulse Generator

- If there is no input signal from the vehicle speed pulse generator, diagnostic trouble code No.55 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the vehicle speed pulse generator, shifting is made based on signals from speedometer.
- If a malfunction occurs in the vehicle speed pulse generator and vehicle speed sensor at the same time, solenoid valve (1-2, 2-3 and 3-4 shift) go OFF, and D and S ranges go to 3rd gear position. L range goes to 1st gear position, and lockup is inhibited.

Vehicle Speed Sensor

- If there is no input signal from the vehicle speed sensor, diagnostic trouble code No.06 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the vehicle speed sensor, shifting is made normal based on signals from vehicle speed pulse generator.

Stoplight Switch

- If there is an open circuit in the stoplight switch or harness, lockup is not canceled when brake pedal is pressed.
- If there is a short circuit in the stoplight switch or harness, lockup and slip lockup is inhibited, but slip lockup functions when coasting.

ATF Thermosensor

- If there is an open or short circuit in the ATF thermosensor or harness, diagnostic trouble code No.56 is displayed by the self-diagnosis function but hold mode operates normally.
- If a malfunction occurs in the ATF thermosensor, shift shock will be strong.
- The hold indicator lamp does not flash if there is an open and short circuit in the ATF thermosensor or harness; however the diagnostic trouble code No. is memorized in the powertrain control module (PCME, PCMT), and the diagnostic trouble code No. is displayed when TAT [TEN] terminal is grounded.

{TEN}=2.0 ENGINE

CONTINUED...

O/D Inhibit Signal (ASC signal)
- If there is an open circuit in the O/D inhibit circuit, there is no input signal from the cruise control unit and acceleration feeling (driving performance) will deteriorate when the vehicle speed drops 8 km/h (5 mph) below the set speed or RESUME/ACCEL switch is operated during cruise control operation.
- If there is a short in the O/D inhibit signal circuit, there is no shift to O/D.

Engine RPM Signal (Ne1 signal)
- If there is no input signal from the engine rpm signal, diagnostic trouble code No.01 [02] is displayed by the self-diagnosis function, and hold mode is canceled.

Barometric Absolute Pressure Sensor
- If there is an open or short circuit in the barometric absolute pressure sensor circuit, the line pressure is not controlled correctly at high altitude and shift shock will be strong.

Torque Reduced Signal/Engine Coolant Temperature Signal
- If there is an open or short in the torque reduced signal circuit/engine coolant temperature signal circuit, diagnostic trouble code No.59 is displayed by the self-diagnosis function but hold mode is normal.
- If a malfunction occurs in the torque reduced signal/engine coolant temperature signal, the torque reduction control function is inhibited and line pressure will be high at shifting. Shift shock may be slightly strong.
- The hold indicator lamp does not flash if there is an open and short circuit in the torque reduced signal/engine coolant temperature signal circuit; however the service code No. is memorized in the EC-AT control unit, and the service code No. is displayed when TAT [TEN] terminal is grounded.

TAT Terminal (Data Link Connector)
- If there is an open circuit in the TAT terminal or harness, diagnostic trouble code(s) are not displayed by the self-diagnosis function.
- If there is a short circuit in the TAT terminal or harness, diagnostic trouble code(s) memorized in the powertrain control module (transmission) (PCMT) are displayed by hold indicator.

TEN Terminal (Data Link Connector) (2.0 MAZDA ONLY)
- If there is an open circuit in the TEN terminal, diagnostic trouble code(s) are not displayed by the self-diagnosis function.
- If there is a short circuit in the TEN terminal, diagnostic trouble code(s) memorized in the powertrain control module (PCME) are displayed.

Solenoid Valve (1-2 shift)
- If there is an open or short circuit in the solenoid valve (1-2 shift) or harness, diagnostic trouble code No.60 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the solenoid valve (1-2 shift), the solenoid valve goes OFF and lockup is canceled.

Solenoid Valve (2-3 shift)
- If there is an open or short circuit in the solenoid valve (2-3 shift) or harness, diagnostic trouble code No.61 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the solenoid valve (2-3 shift), the solenoid valve goes OFF and lockup is canceled.

Solenoid Valve (3-4 shift)
- If there is an open or short circuit in the solenoid valve (3-4 shift) or harness, diagnostic trouble code No.62 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the solenoid valve (3-4 shift), the solenoid valve goes OFF and lockup is canceled.

{TEN=2.0 ENGINE}

CONTINUED...

Solenoid Valve (Lockup control)
- If there is an open or short circuit in the solenoid valve (lockup control) or harness, diagnostic trouble code No.63 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the solenoid valve (lockup control), the solenoid valve goes OFF and lockup is canceled.

Solenoid Valve (3-2 timing)
- If there is an open or short circuit in the solenoid valve (3-2 timing) or harness, diagnostic trouble code No.64 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the solenoid valve (3-2 timing), the solenoid valve goes OFF and lockup is canceled.

Solenoid Valve (Lockup)
- If there is an open or short circuit in the solenoid valve (lockup) or harness, diagnostic trouble code No.65 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the solenoid valve (lockup), the solenoid valve goes OFF and lockup is canceled.

Solenoid Valve (Line pressure)
- If there is an open or short circuit in the solenoid valve (line pressure) or harness, diagnostic trouble code No.66 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the solenoid valve (line pressure), line pressure is set at maximum to make driving possible.
- If a malfunction occurs in solenoid valve (line pressure), lockup is conceled.

Hold Indicator Lamp
- If there is an open circuit in the hold indicator lamp harness or the bulb is burnt out, the lamp will not illuminate.
- If there is a short circuit in the hold indicator lamp harness, the lamp will remain illuminated.
- If the wiring between the FAT terminal and 1C or 1B terminal is open or shorted, diagnostic trouble code(s) will not be displayed by the self-diagnosis function. (2.5 engine)

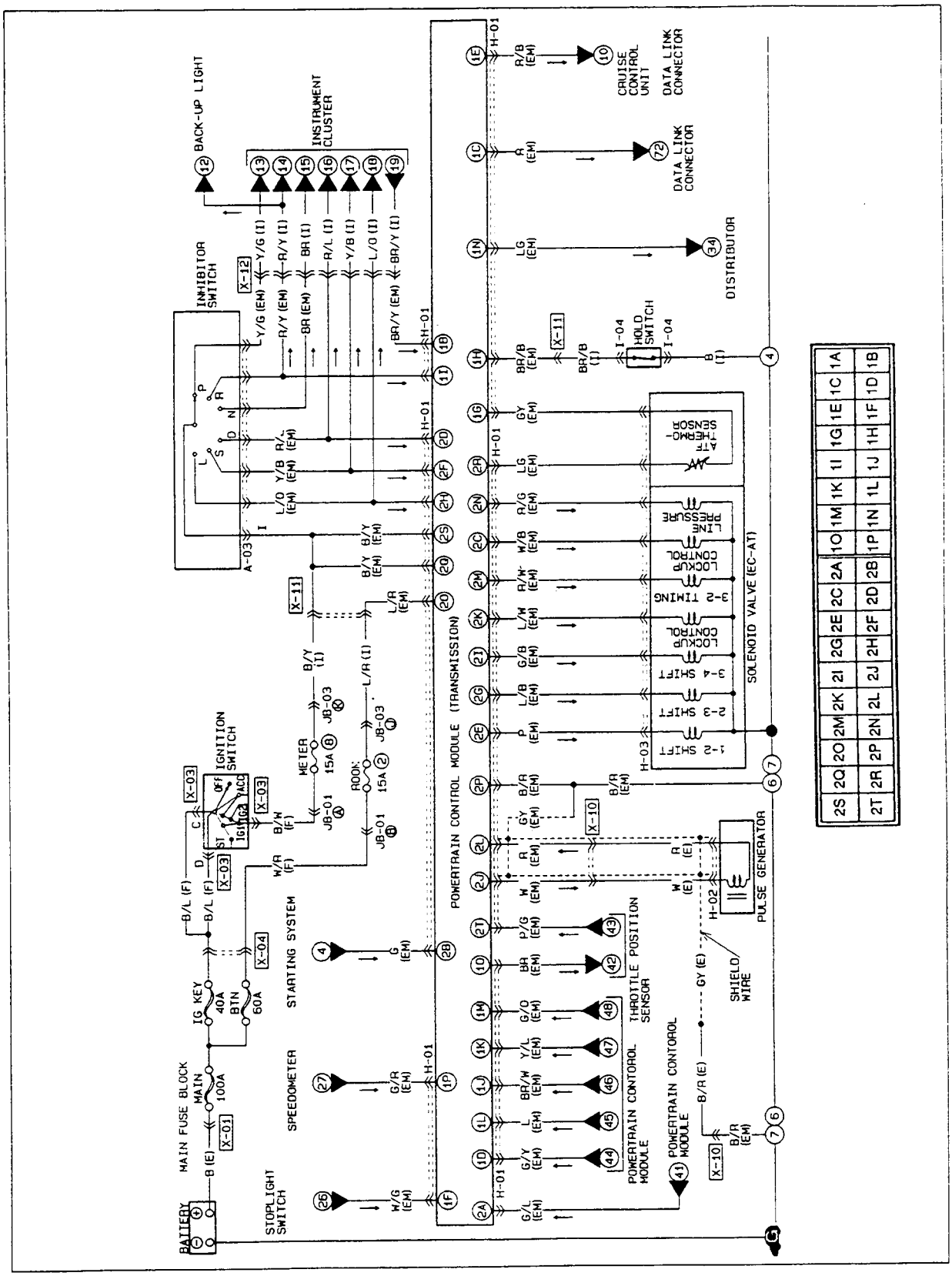
Note
- **If the wiring between the FAT terminal and 1C terminal is open or shorted, diagnostic trouble codes are not displayed on the SST (Self-Diagnosis Checker)**
- **If the wiring between the FAT terminal and 1B terminal is open or shorted, the hold indicator lamp does not display the service code(s).**

Reduce Torque Signal 1 (2.5 engine)
- If there is an open or short in the reduce torque signal 1 circuit, diagnostic trouble code No.57 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the reduce torque signal 1, the torque reduction control function is inhibited and line pressure will be high at shifting. Shift shock may be slightly strong.

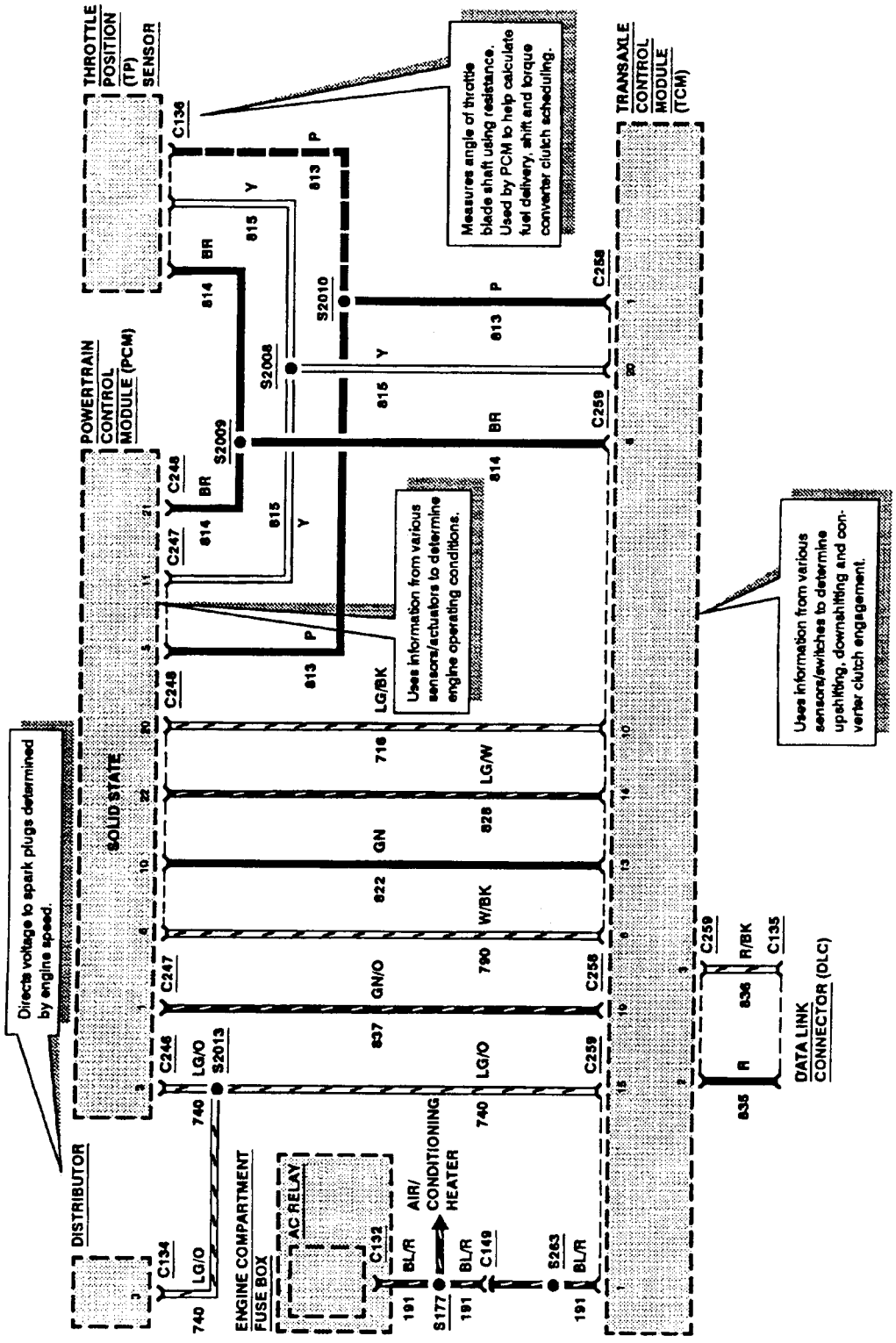
Reduce Torque Signal 2 (2.5 engine)
- If there is an open or short circuit in the reduce torque signal 2 circuit, diagnostic trouble code No.58 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the reduce torque signal 2, the torque reduction control function is inhibited and line pressure will be high at shifting. Shift shock may be slightly strong.

Inhibitor Signal (2.5 engine)
- If there is an open circuit in the inhibitor signal circuit, the engine speed will be slightly low in P and N ranges.
- If there is a short circuit in the inhibitor signal circuit, the engine speed will be slightly high in R, D, S, and L ranges.

WIRING DIAGRAM.....MAZDA 626.....2.5 LITER ENGINE

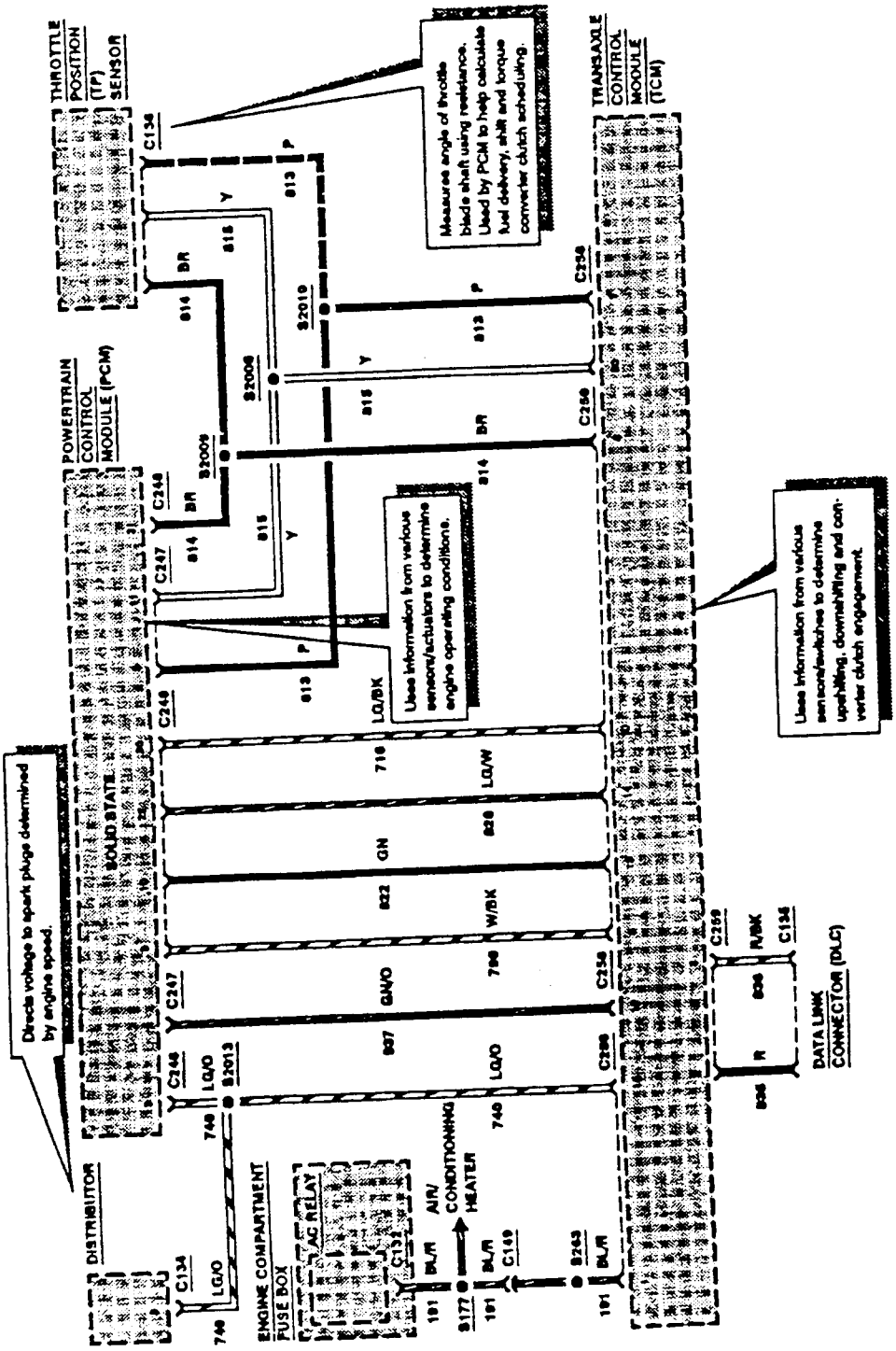


WIRING DIAGRAM.....FORD PROBE.....2.5 LITER ENGINE



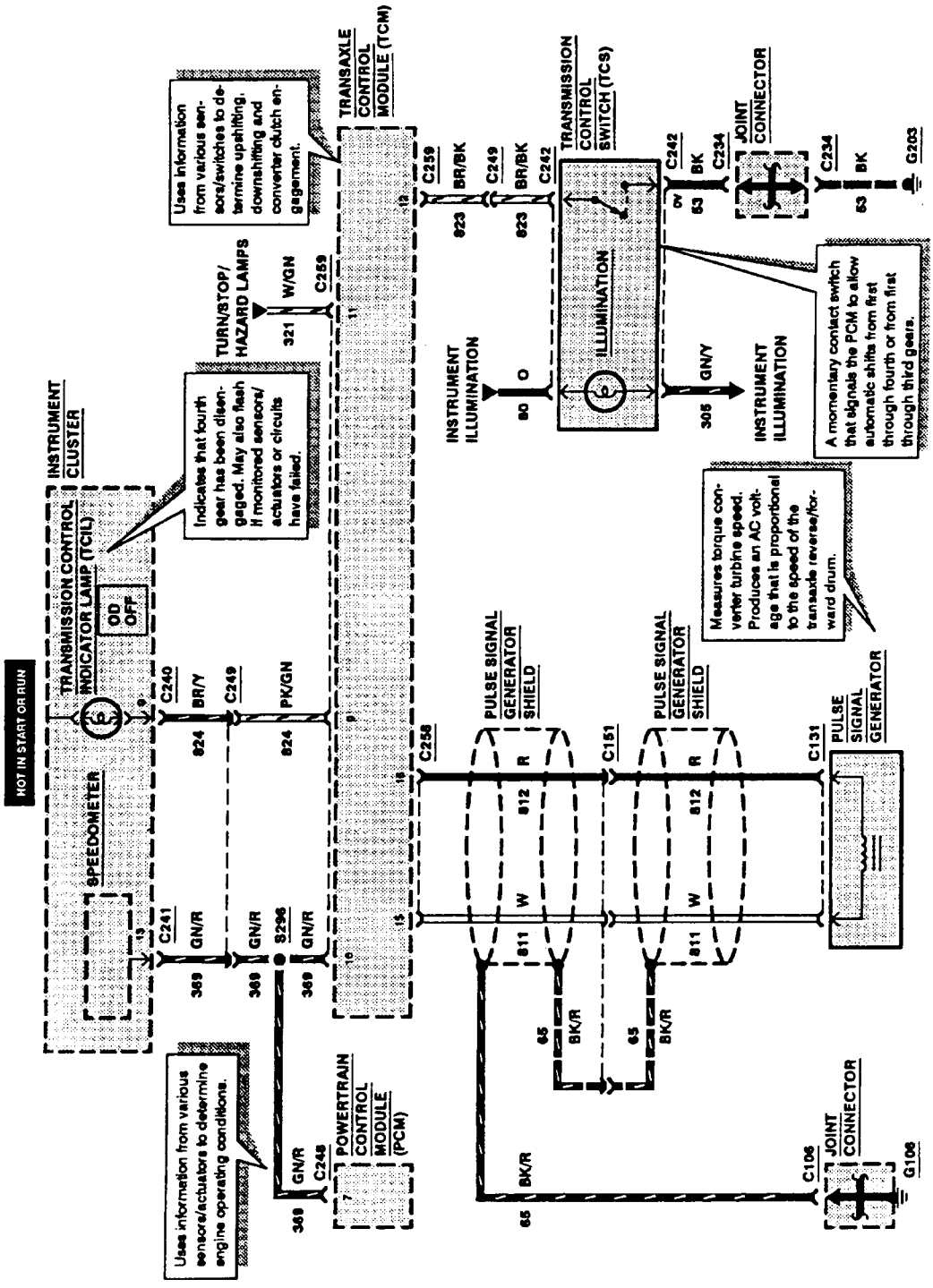
Part 1 of 3...

WIRING DIAGRAM.....FORD PROBE CONTINUED.....



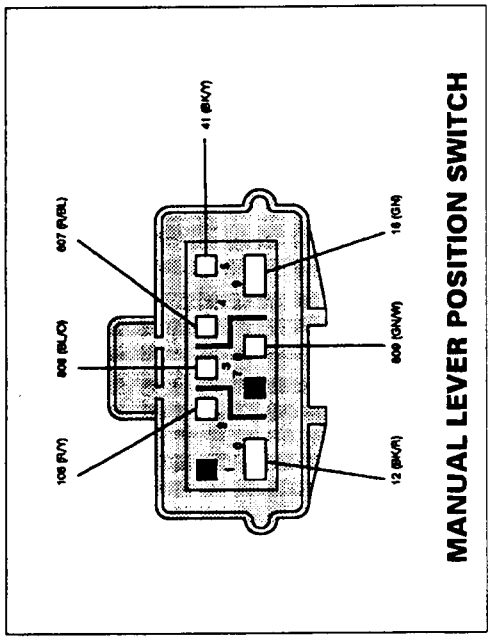
Part 2 of 2...

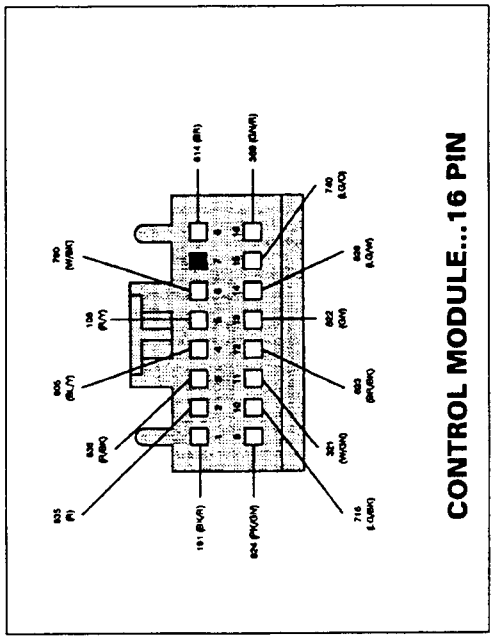
WIRING DIAGRAM.....FORD PROBE CONTINUED.....

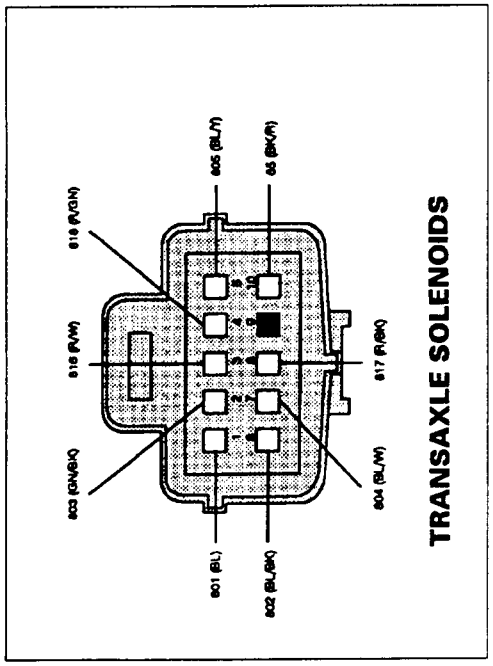


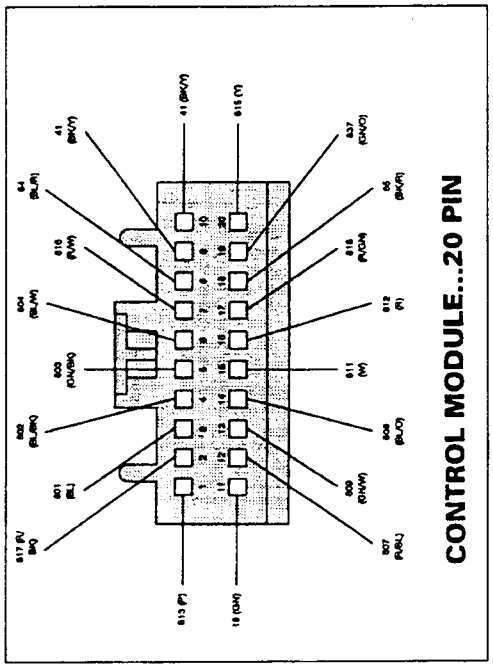
Part 3 of 3

FORD PROBE PIN IDENTIFICATION









PIN	CIRCUIT	CIRCUIT FUNCTION
1	191 (BL/R)	A/C On Input
2	835 (R)	Data Link Connector (DLC)
3	836 (R/BK)	Data Link Connector (DCL)
4	805 (BL/Y)	Transaxle Fluid Temperature Input
5	108 (R/Y)	Manual Lever Position Switch ("R" Range)
6	790 (W/BK)	Torque Reduced Input
7	—	NOT USED
8	814 (BR)	Closed Throttle Input
9	824 (PK/GN)	Overdrive Off Indicator Output
10	718 (LG/BK)	Park/Neutral Position Output (PN/P)
11	321 (W/GN)	Brake Input
12	823 (BR/BK)	Transmission Control Switch Input
13	822 (GN)	Reduce Torque Signal 1 Output
14	828 (LG/W)	Reduce Torque Signal 2 Output
15	740 (LG/O)	Crankshaft Position (CKP) Signal
16	359 (GN/R)	Vehicle Speed Sensor Input (+)

PIN	CIRCUIT	CIRCUIT FUNCTION
1	813 (P)	Reference Voltage
2	817 (R/BK)	Torque Converter Control Output
3	801 (BL)	1–2 Shift Solenoid Output
4	802 (BL/BK)	2–3 Shift Solenoid Output
5	803 (GN/BK)	3–4 Shift Solenoid Output
6	804 (BL/W)	Torque Converter On/Off Output
7	816 (R/W)	Downshift Timing Solenoid Output
8	84 (BL/R)	Battery Back-up
9	41 (BK/Y)	Module Power
10	41 (BK/Y)	Module Power
11	18 (GN)	Start Signal Input
12	807 (R/BL)	Manual Lever Position Switch Input ("D" Range)

PIN	CIRCUIT	CIRCUIT FUNCTION
13	809 (GN/W)	Manual Lever Position Switch Input ("2" Range)
14	808 (BL/O)	Manual Lever Position Switch Input ("1" Range)
15	811 (W)	Pulse Signal Generator (+)
16	812 (R)	Pulse Signal Generator (–)
17	818 (R/GN)	Line Pressure Solenoid Output
18	65 (BK/R)	Module Ground
19	837 (GN/O)	Barometric Pressure Input
20	815 (Y)	Throttle Position Sensor Input

TROUBLE SHOOTING CHART

CONDITION	POSSIBLE SOURCE	ACTION
• Engine Stalls When put into Gear	• Torque converter. • Main control valve body. • Control valves. • Oil pump. • Idle air control.	• INSPECT torque converter. • INSPECT main control valve body. • INSPECT control valves. • INSPECT oil pump. • INSPECT idle air control.
• No Kickdown	• Line pressure solenoid. • Main control valve body.	• GO to Pinpoint Test A1. • INSPECT main control valve body.
• Poor Fuel Economy	• Torque converter clutch solenoid. • Torque converter clutch control solenoid.	• INSPECT torque converter clutch solenoid. • INSPECT torque converter clutch control solenoid.
• Lack of Power	• Torque converter. • Reverse clutch.	• INSPECT/REPLACE torque converter. • INSPECT reverse clutch.
• Surges While Cruising	• Main control valve body.	• INSPECT main control valve body.
• Poor Acceleration • Engine will not Crank in any Shift Control Selector Lever Position	• Torque converter clutch control solenoid. • Main control valve body. • Manual lever position switch stuck, inoperative, damaged or disconnected.	• INSPECT torque converter clutch control solenoid. • INSPECT main control valve body. • INSPECT/SERVICE the manual lever position switch.
• Engine does not Crank in P and/or N	• Shift control selector lever and transmission shift cable out of adjustment. • Manual lever position switch not correctly aligned to automatic transaxle.	• CONFIRM shift control selector lever or transmission shift cable adjustment and operation. • ADJUST manual lever position switch.
• Engine Starts in Shift Control Selector Lever Positions Other Than P or N	• Transmission shift cable or shift control selector lever damaged or out of adjustment. • Manual lever position switch.	• CONFIRM transmission shift cable or shift control selector lever adjustment and operation. • CONFIRM manual lever position switch adjustment.
• Vehicle Moves in P Range or Transaxle Stays in PARK When not in P Range	• Shift control selector lever and transmission shift cable out of adjustment. • Parking pawl.	• CONFIRM shift control selector lever or transmission shift cable adjustment and operation. • INSPECT parking pawl.
• Vehicle Moves in N	• Shift control selector lever and transmission shift cable out of adjustment. • Main control valve body damaged. • Torque converter damaged. • Forward clutch damaged.	• CONFIRM shift control selector lever or transmission shift cable adjustment and operation. • INSPECT main control valve body, SERVICE or REPLACE as required. • INSPECT, SERVICE or REPLACE torque converter. • INSPECT, SERVICE or REPLACE forward clutch.
• Vehicle does not Move in D, 2, 1, or R	• Control valves. • Transmission shift cable damaged. • Improper fluid level. • Oil pump dirty, broken, or bad seals. • Torque converter damaged. • Solenoid valves. • Clutches. • Parking mechanism.	• INSPECT control valves. • INSPECT transmission shift cable. • CHECK and FILL ATF. • INSPECT oil pump. • INSPECT torque converter. • INSPECT/REPLACE solenoid valves. • INSPECT clutches. • INSPECT/REPAIR or REPLACE parking mechanism.

CONTINUED...

CONDITION	POSSIBLE SOURCE	ACTION
• Vehicle does not Move in any Forward Shift Position. REVERSE OK	• Control valves. • Forward clutch worn or damaged. • One-way clutch worn or damaged. • Oil flow to forward clutch blocked.	• INSPECT control valves. • INSPECT clutch. • INSPECT one-way clutch. • GO to Pinpoint Test A1.
• Vehicle does not Move in REVERSE. Forward OK	• Reverse clutch worn or damaged. • Low and reverse clutch slipping.	• INSPECT clutch. • INSPECT clutch adjustment. • GO to operational tests.
• Noise Severe Under Acceleration or Deceleration, OK in PARK, NEUTRAL or Steady Speed	• Torque converter failure. • Gear or clutch failure. • Transmission shift cable binding or casing is damaged. • Front engine support insulators grounding out.	• EXAMINE / SERVICE torque converter. • EXAMINE / SERVICE gear and clutch. • INSTALL and ROUTE transmission shift cable as specified. • REPAIR / REPLACE front engine support insulators.
• Noise in PARK or NEUTRAL - does not Stop in DRIVE	• Loose flywheel-to-converter bolts. • Oil pump worn. • Torque converter failure.	• TORQUE to specification. • EXAMINE / SERVICE oil pump. • EXAMINE / SERVICE torque converter. • GO to Pinpoint Test A1.
• Noise in all Gears - Changes Acceleration to Deceleration	• Differential worn. • ATF level. • Front wheel driveshaft joints.	• EXAMINE / SERVICE differential. • CHECK ATF level. • SERVICE front wheel driveshaft joints as required.
• Noise in all Gears - does not Change Power to Coast	• Defective speedometer gear. • Bearings worn or damaged. • Front planet noisy.	• EXAMINE / REPLACE speedometer gear. • EXAMINE / REPLACE bearings. • SERVICE front planet.
• Harsh Shifts (any gears)	• Line pressure incorrect. • Main control valve body. • Sticking accumulators. • Front wheel driveshaft joints. • Front engine support insulators loose. • Pressure regulator valve sticking. • 2-4 band adjustment. • 2-4 band servo. • Pressure modulator valve sticking. • Torque reduce signals. • Manual lever position switch. • Transmission oil temperature sensor. • Oil pump. • Clutches. • Torque converter. • Pulse signal generator wire.	• GO to Pinpoint Test A1. • INSPECT main control valve body. • INSPECT accumulators. • SERVICE front wheel driveshaft joints as required. • SERVICE front engine support insulators. • INSPECT pressure regulator valve. • CHECK 2-4 band adjustment. • INSPECT 2-4 band servo. • INSPECT pressure modulator valve. • CHECK torque reduce signals. • INSPECT/ADJUST manual lever position switch. • CHECK transmission oil temperature sensor. • INSPECT oil pump. • INSPECT clutches. • INSPECT torque converter. • INSPECT pulse signal generator wire.
• Soft Shifts (any gears)	• Line pressure. • Oil pump worn. • Internal ATF leakage. • 2-4 band adjustment. • 2-4 band servo. • Pressure regulator damaged. • ATF level. • Main control valve body. • Sticking accumulators.	• GO to Pinpoint Test A1. • INSPECT oil pump. • INSPECT automatic transaxle. • CHECK 2-4 band adjustment. • INSPECT 2-4 band servo. • INSPECT pressure regulator. • CHECK and FILL ATF. • INSPECT main control valve body. • INSPECT accumulators.

CONTINUED...

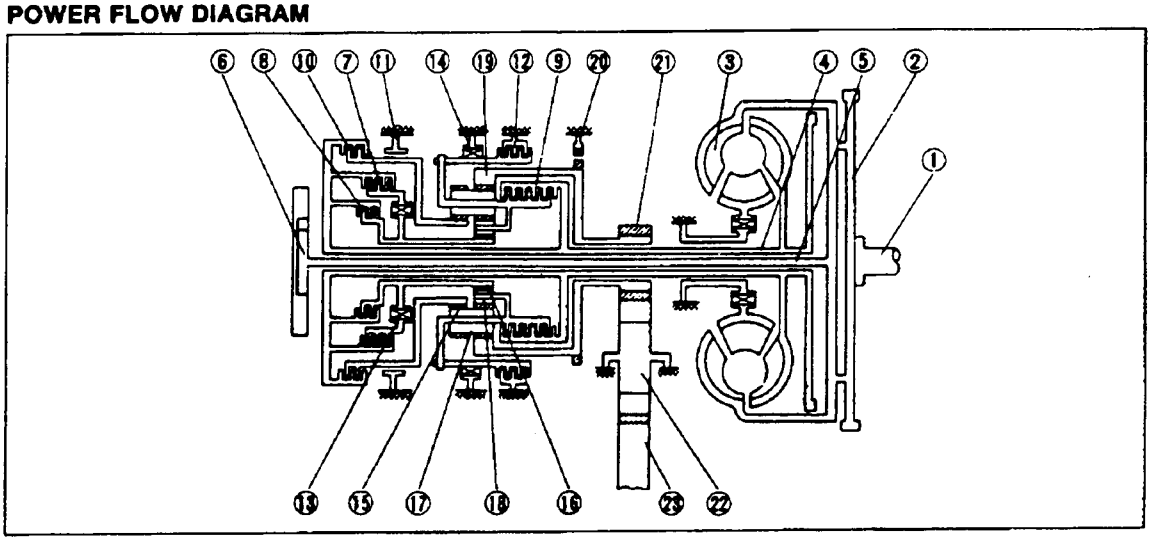
CONDITION	POSSIBLE SOURCE	ACTION
• Erratic Shifting, Incorrect Shift Points, Incorrect Shift Sequence	• Line pressure solenoid sticking. • Control valves. • 2-4 band adjustment. • Clutches slipping. • Fluid level and quality. • Pulse signal generator wire. • Oil pump. • Clutches. • Transmission oil temperature sensor.	• GO to Pinpoint Test A1. • INSPECT control valves. • CHECK 2-4 band adjustment. • INSPECT clutches. • CHECK and FILL ATF. • INSPECT pulse signal generator wire. • EXAMINE / SERVICE oil pump. • CHECK clutches. • INSPECT transmission oil temperature sensor.
• Improper Lockup	• Control valves. • Torque converter.	• INSPECT control valves. • INSPECT torque converter.
• Skipping Gears (shift 1st to 3rd, or 2nd to O/D, for example)	• Control valves. • Transmission oil temperature sensor. • Main control valve body. • 2-4 band.	• INSPECT control valves. • INSPECT transmission oil temperature sensor. • INSPECT main control valve body. • CHECK 2-4 band adjustment.
• Transaxle Overheating NOTE: Excessive overheating may cause damage to internal components. Always retest 4EAT for other symptoms after overheating problem is resolved, the burned fluid is replaced, and / or the automatic transaxle is repaired.	• Improper fluid level. • Poor engine performance. • Worn clutch, incorrect band application, or poor oil pressure control. • Restriction in oil cooler tube. • Transmission oil temperature sensor. • Clogged transmission oil cooler. • Main control valve body. • Solenoid valves.	• CHECK fluid level. • ADJUST according to specifications • GO to Pinpoint Test A1. • CHECK oil cooler tube for kinks and damage. CLEAN, SERVICE or REPLACE oil cooler tube. • INSPECT transmission oil temperature sensor. • INSPECT transmission oil cooler for plugging. SERVICE as required. INSPECT and CLEAN the automatic transaxle internally. • INSPECT main control valve body. • INSPECT solenoid valves.
• Drags in REVERSE like Parking Brake is Applied	• 2-4 band. • Brakes.	• INSPECT 2-4 band adjustment.
• Drags in Forward Gears	• 2-4 band. • Brakes.	• INSPECT 2-4 band adjustment.
• Engine Runaway on Upshift or Accelerating	• ATF level low. • Main control valve body. • Transmission oil temperature sensor. • Oil pump. • Damaged bypass valve. • Clutches slipping.	• CHECK fluid level. • INSPECT main control valve body, solenoid valves. • INSPECT transmission oil temperature sensor. • INSPECT oil pump. • INSPECT bypass valve. • INSPECT clutches.
• Engine Runaway on Downshift	• Coasting bypass valve sticking. • Clutches slipping. • ATF level. • Oil pump.	• GO to Pinpoint Test A1. • INSPECT clutches. • CHECK fluid level. • INSPECT oil pump.
• Excessive Creep	• Torque converter. • Ignition timing and idle speed. • Line pressure solenoid. • Oil pump.	• INSPECT torque converter. • CORRECT or ADJUST ignition timing or idle speed. • GO to Pinpoint Test A1. • INSPECT oil pump.
• No Creep	• ATF level and condition. • Shift control selector lever. • Main control valve body. • Control valves. • Forward clutch. • Reverse clutch. • Oil pump.	• CHECK ATF level and condition. • CONFIRM transmission shift cable adjustment and operation. • INSPECT main control valve body. • INSPECT control valves. • INSPECT clutch. • INSPECT clutch. • INSPECT oil pump.

Band and Clutch Application Chart

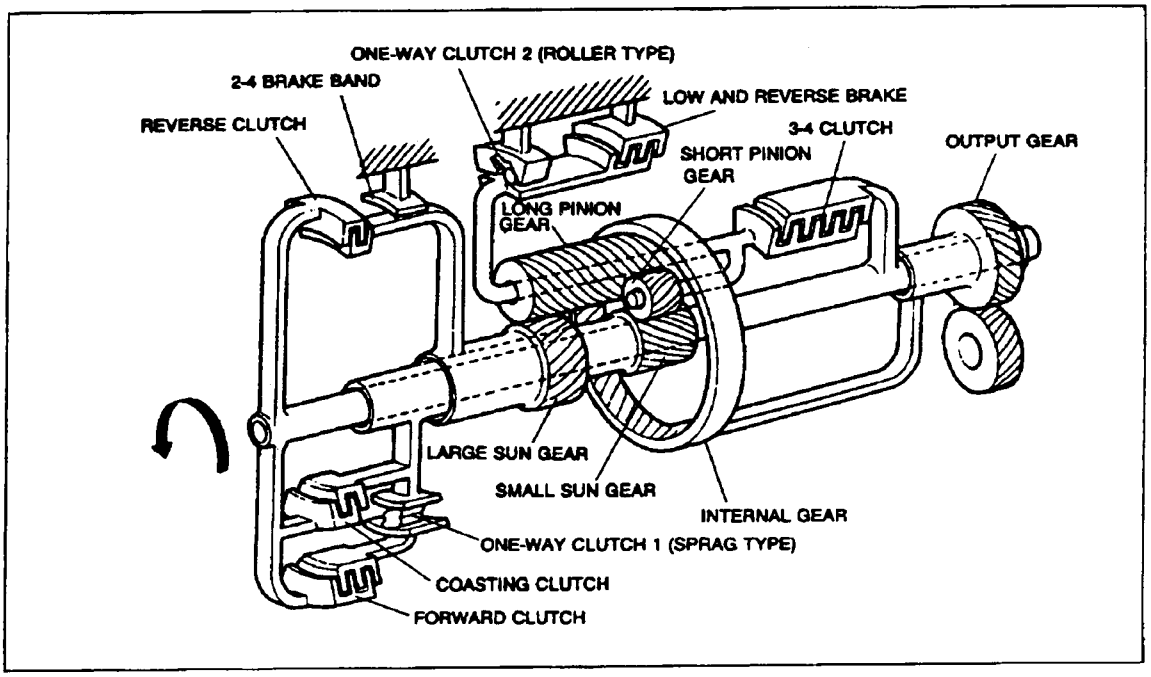
Range	Mode	Gear		Engine braking effect	Forward clutch	Coasting clutch	3-4 clutch	Reverse clutch	2-4 brake		Low and reverse brake	One-way clutch 1 (Sprag type)	One-way clutch 2 (Roller type)
									Applied	Released			
P	—	—		—									
R	—	Reverse	Below approx. 4 km/h (2.5 mph)	Yes				O			O		
			Above approx. 5 km/h (3 mph)	Yes				O			O		
		—	Above approx. 30 km/h (19 mph)	No				O					
N	—	—	Below approx. 4 km/h (2.5 mph)	—									
			Above approx. 5 km/h (3 mph)	—									
D	Power☆ Normal (Except hold)	1st		No	O							O	O
		2nd		No	O				O			O	
		3rd		Yes	O	O	O		⊗	O		O	
		O/D		Yes	O		O		O			O	
	Hold	2nd	Below approx. 15 km/h (9.3 mph) (2.0) 14 km/h (8.7 mph) (2.5)	Yes	O	O			O			O	
			Above approx. 18 km/h (11.2 mph) (2.0) 17 km/h (10.5 mph) (2.5)	No	O				O			O	
		3rd		Yes	O	O	O		⊗	O		O	
		* O/D		Yes	O		O		O			O	
S	Power (Except hold)	1st		No	O							O	O
		2nd		No	O				O			O	
		3rd		Yes	O	O	O		⊗	O		O	
		* O/D		Yes	O		O		O			O	
	Hold	2nd		Yes	O	O			O			O	
		* 3rd		Yes	O	O	O		⊗	O		O	
		* O/D		Yes	O		O		O			O	
L	Power (Except hold)	1st		No	O						O	O	O
		2nd		Yes	O	O			O			O	
	Hold	1st		Yes	O	O					O	O	O
		*2nd		Yes	O	O			O			O	

O Operating.
⊗ Operating but not contributing to the power transaxle.
O Power is not transmitted.
* Engine overspeed protection.
☆ The Powertrain control module (PCME, PCMT) automatically switches between power and normal modes corresponding to the speed at which the accelerator pedal is depressed.

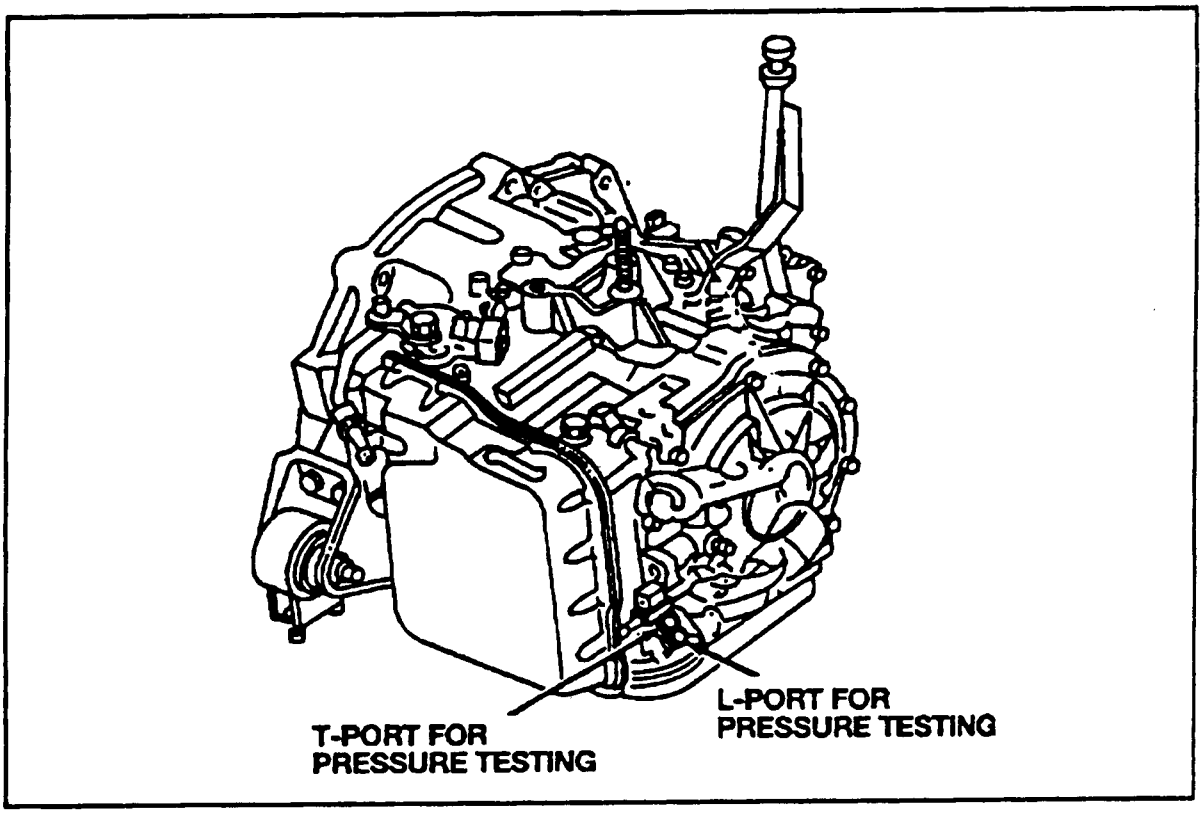
POWER FLOW DIAGRAM



1. Crankshaft
2. Drive plate
3. Torque converter
4. Turbine shaft
5. Oil pump shaft
6. Oil pump
7. Forward clutch
8. Coasting clutch
9. 3-4 clutch
10. Reverse clutch
11. 2-4 brake band
12. Low and reverse brake
13. One-way clutch 1 (Sprag type)
14. One-way clutch 2 (Roller type)
15. Large sun gear
16. Small sun gear
17. Long pinion gear
18. Short pinion gear
19. Internal gear
20. Parking gear
21. Output gear
22. Idler gear
23. Ring gear



HYDRAULIC PRESSURE TESTING



Specified line pressure: **Line Pressure is Checked at the Port Marked "L"**

Range	Line pressure kPa {kgf/cm², psi}	
	Idle	Stall
D, S, L	420—530 {4.2—5.5, 60—78}	1,100—1,170 {11.2—12.0, 160—170}
R	730—1,010 {7.4—10.3, 110—146}	1,910—2,030 {19.4—20.7, 276—294}

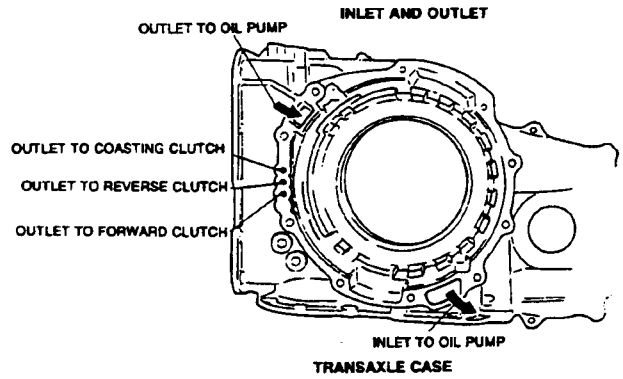
Evaluation of Line Pressure Test

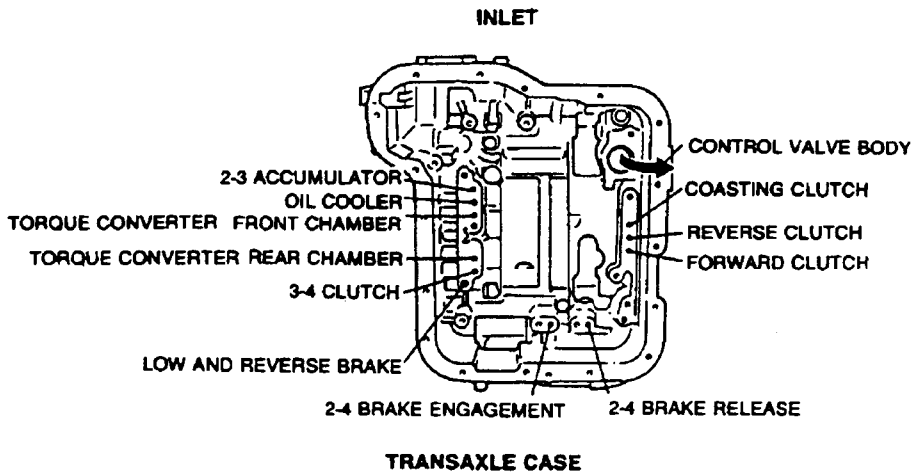
Line pressure	Possible cause
Low pressure in every position	Worn oil pump Oil leaking from oil pump, control valve body, and/or transaxle case Pressure regulator valve sticking Solenoid valve (line pressure) malfunction Pressure modulator valve sticking
Low pressure in D and S only	Oil leaking from hydraulic circuit of forward clutch
Low pressure in L and R only	Oil leaking from hydraulic circuit of low and reverse brake
Low pressure in R only	Oil leaking from hydraulic circuit of reverse clutch
Higher than specification	Solenoid valve (line pressure) malfunction Pressure regulator valve sticking Pressure modulator valve sticking

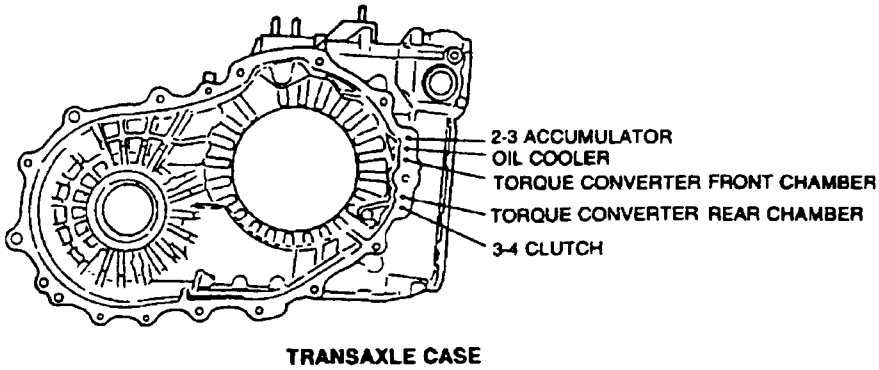
Evaluation of Solenoid Reducing Pressure Test **Reducing Pressure is Checked at Port Marked "T"**

Solenoid reducing pressure	Possible cause
Not within specification	Solenoid reducing valve sticking

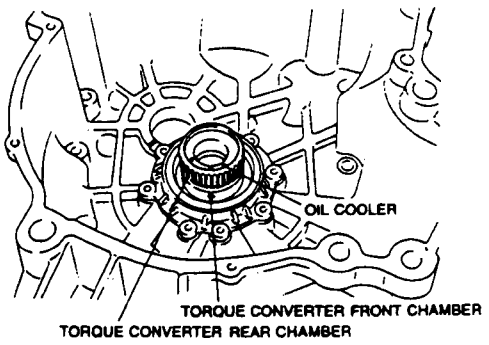
FLUID PASSAGE LOCATIONS



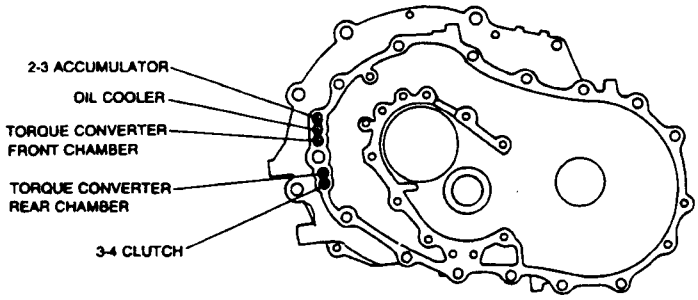




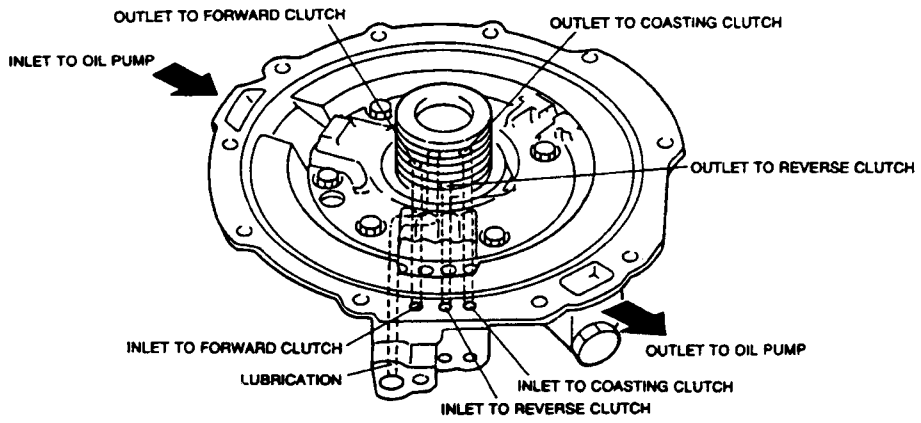
FLUID PASSAGE LOCATIONS



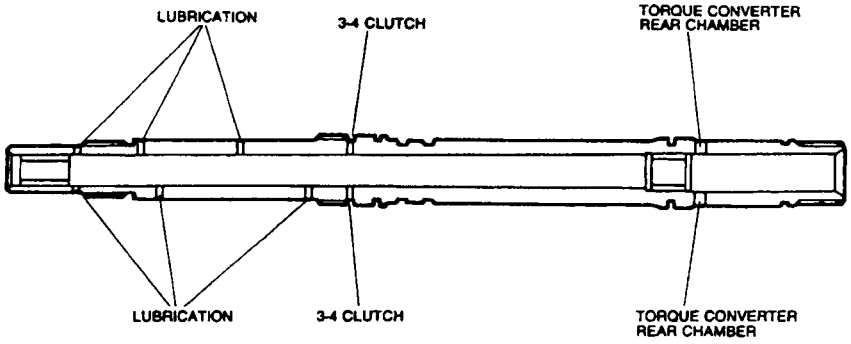
INLET



TRANSAXLE HOUSING



OIL PUMP

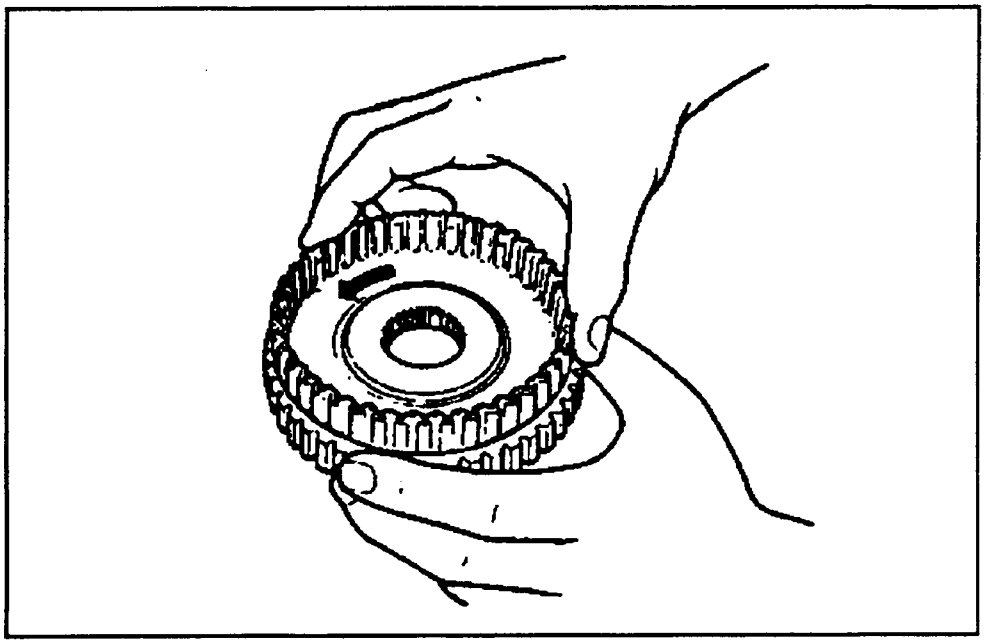


TURBINE SHAFT

ONE-WAY CLUTCH ROTATION

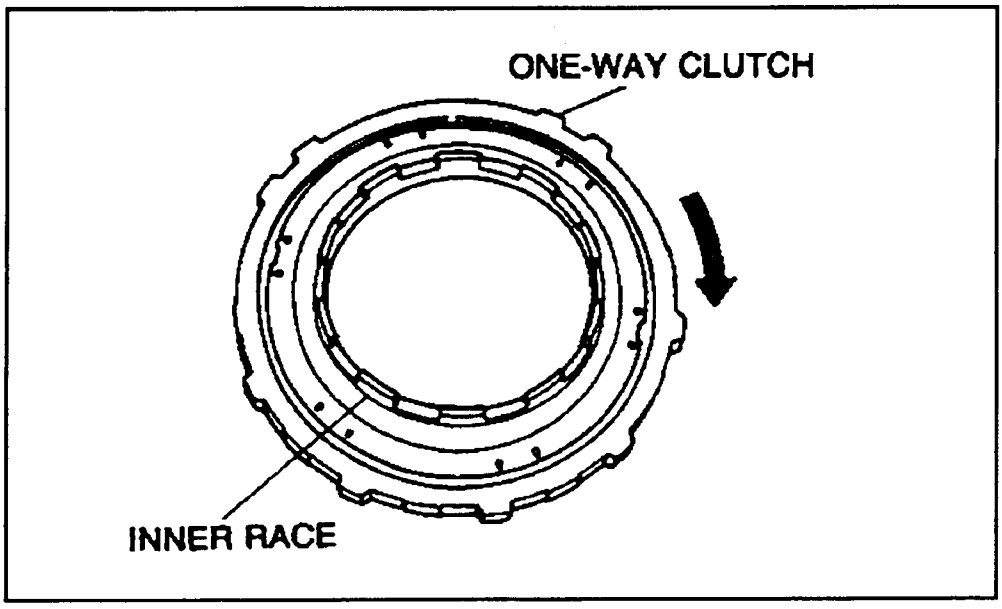
ONE-WAY CLUTCH 1

Hold the one-way clutch outer race. The inner race must rotate when turned counterclockwise.

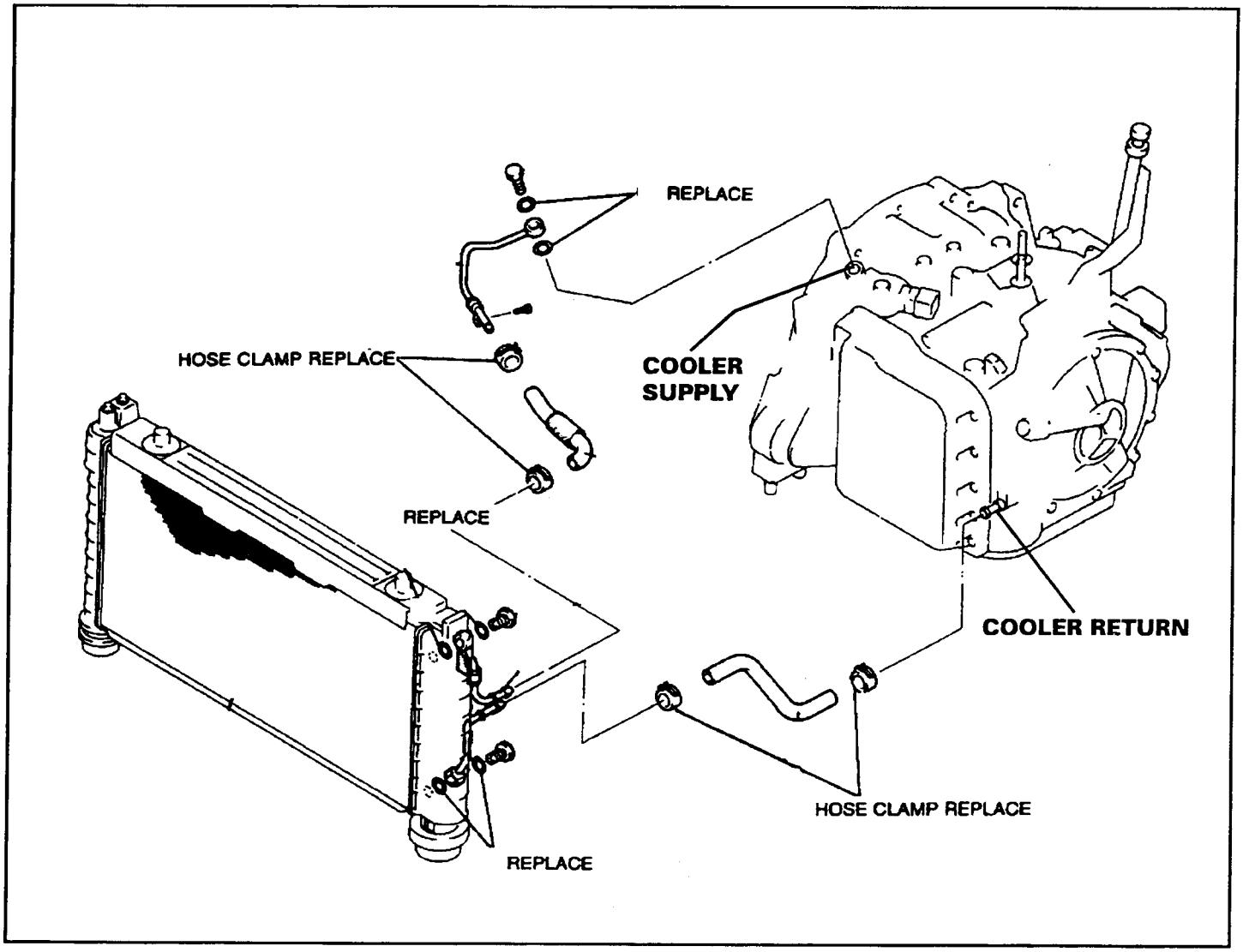


ONE-WAY CLUTCH 2

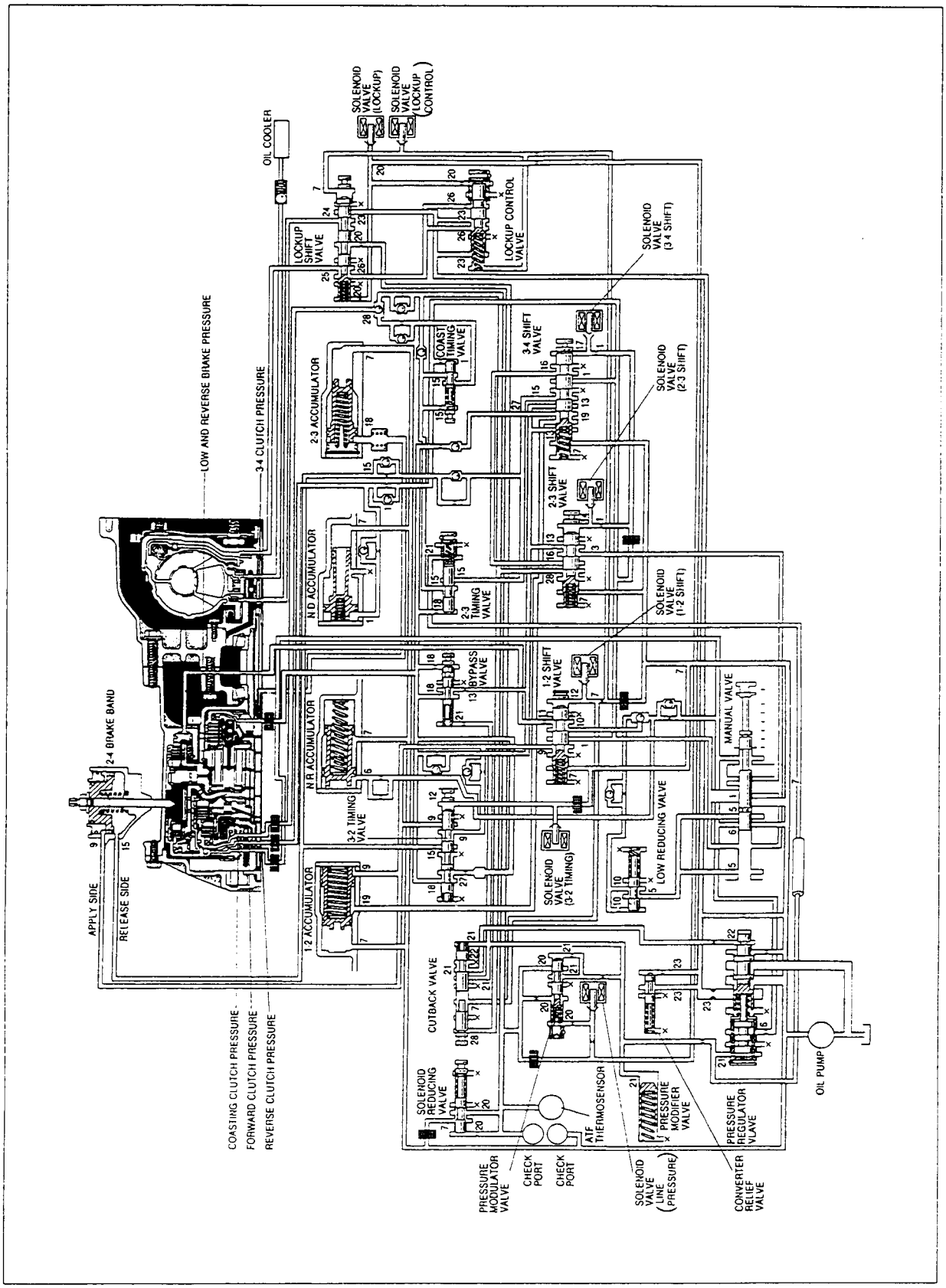
Hold the inner race. The outer race must rotate when turned clockwise



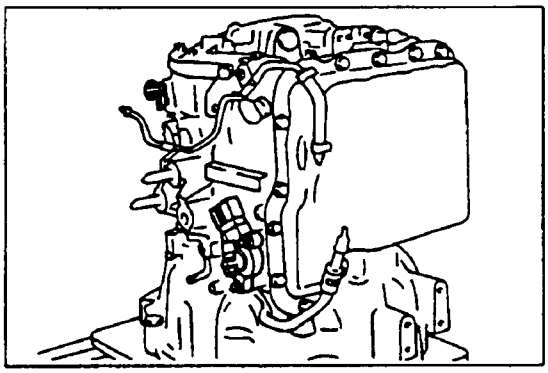
COOLER FLOW


REPLACE
HOSE CLAMP REPLACE
COOLER SUPPLY
REPLACE
COOLER RETURN
HOSE CLAMP REPLACE
REPLACE

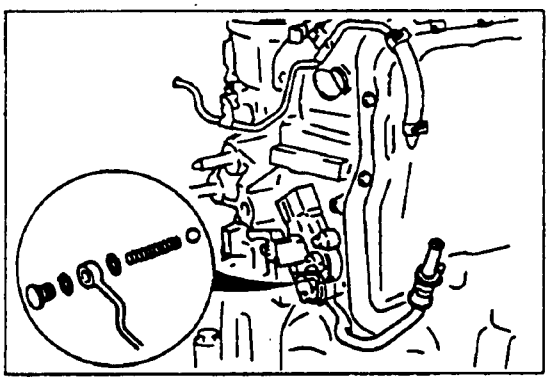
HYDRAULIC CIRCUIT



DISASSEMBLY

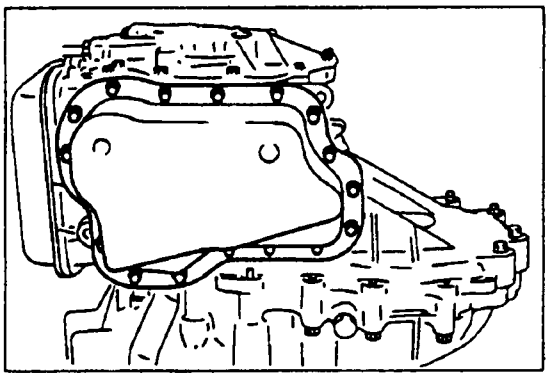


Remove the vehicle speed pulse generator, and inhibitor switch.



Caution
- **Do not lose the spring and steel ball.**

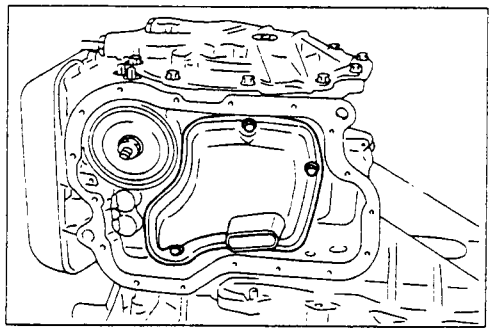
Remove the connector bolt.
Remove the packings, oil pipe, spring, and steel ball.



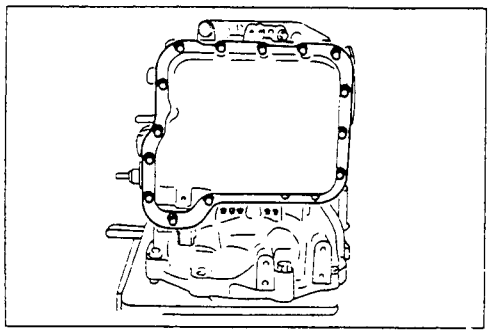
Remove the oil pan and gasket.
Examine any material found in the pan or on the magnet to determine the condition of the transaxle.

Clutch facing material.....	Drive plate and brake band wear
Steel (magnetic).....	Bearing, gear, and driven plate wear
Aluminum (nonmagnetic).....	Bushing of cast aluminum part wear

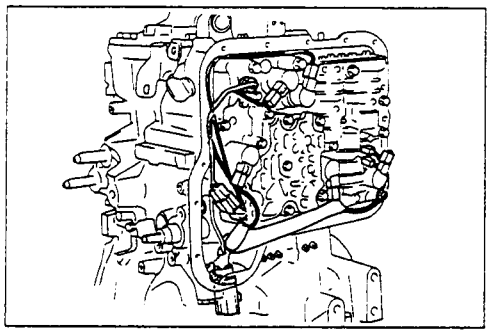
If large amounts of material are found, replace the torque converter and carefully check the transaxle for the cause.



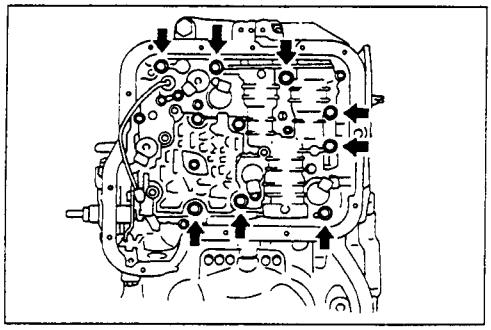
Remove the oil strainer and O-ring.



Remove the control valve body cover and gasket.

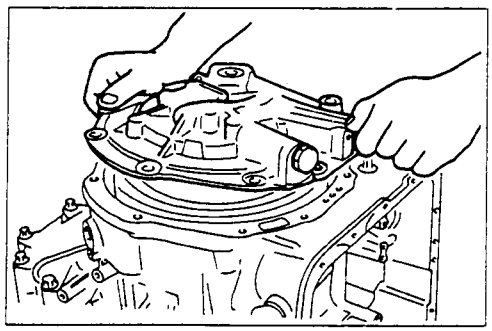


Disconnect the solenoid connectors and ATF thermosensor connector.
Remove the coupler assembly.

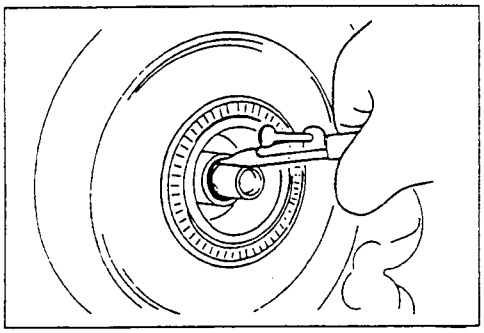


Note
- **Loosen the bolts evenly and gradually.**

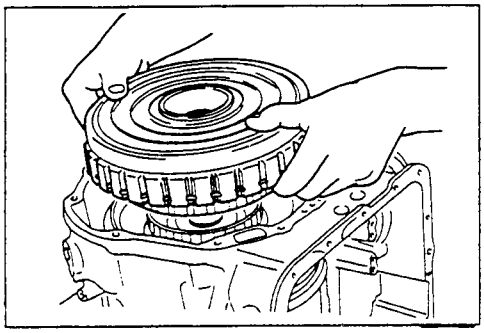
Remove the control valve body as an assembly.



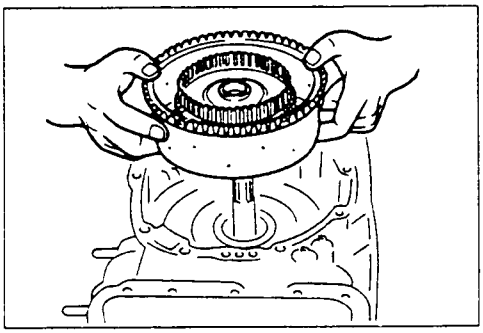
Remove the oil pump and gasket.



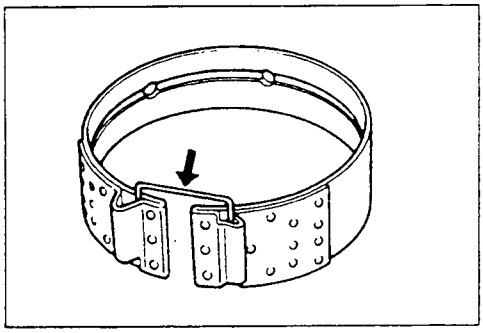
Remove the clutch assembly.
(1) Remove the turbine shaft snap ring.



(2) Pull the reverse forward drum and remove the clutch assembly.

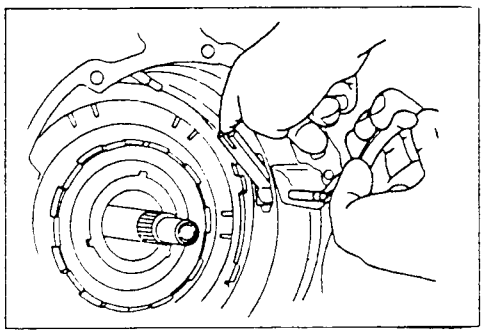


Remove the small sun gear and one-way clutch 1.

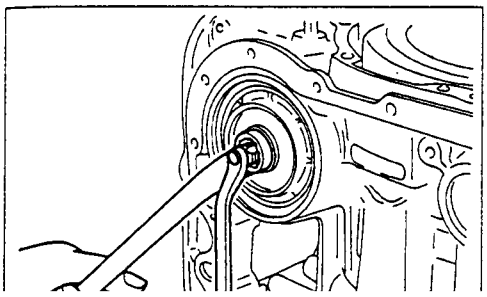


Note
- **Use a piece of wire to secure the brake band so that it is not damaged by being stretched.**

Remove the 2-4 brake band.

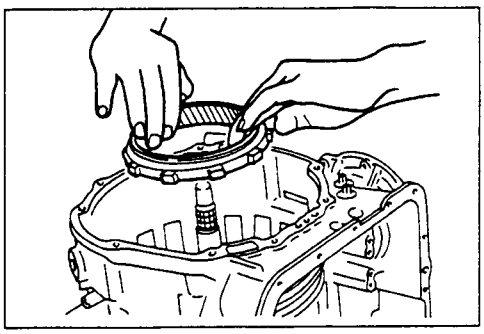


Pull the anchor shaft while holding the strut, then remove the strut.

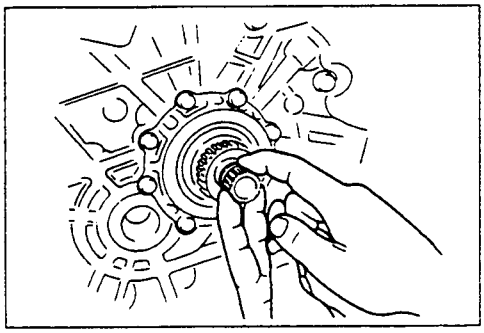


Remove the piston stem from the band servo.

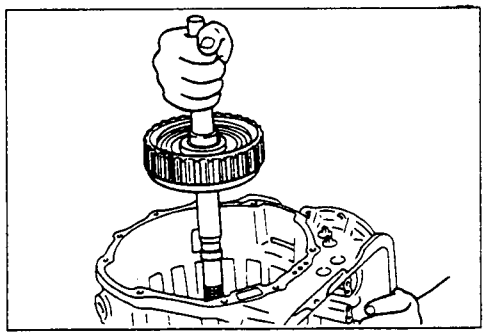
NOTE...The servo cover (not illustrated) is a pressed in dust cover.



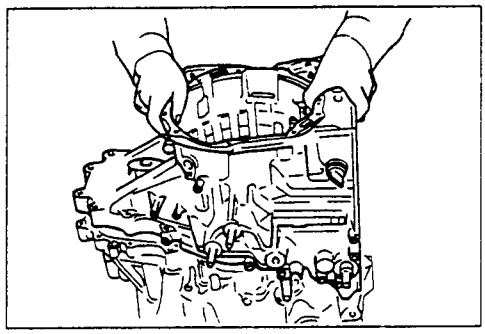
(2) Remove the internal gear from the output shell.



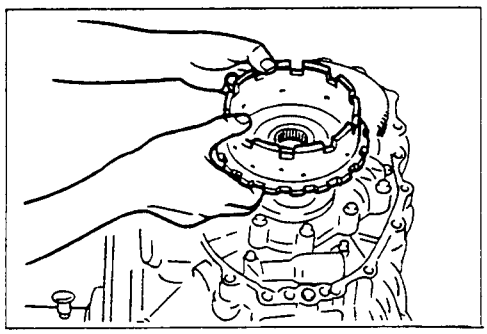
Remove the 3-4 clutch assembly.
(1) Remove the O-ring from the turbine shaft at the converter housing side.



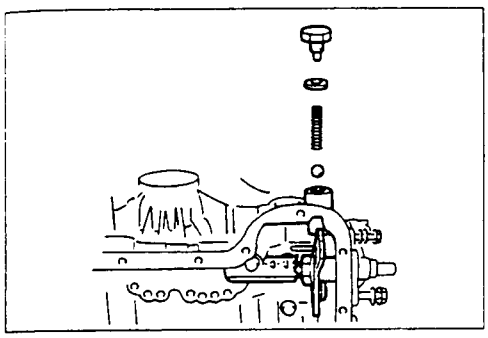
(2) Pull out the turbine shaft to remove the 3-4 clutch assembly.
(3) Remove the 3-4 clutch assembly.



Remove the bolts, and remove the transaxle case by tapping lightly with a plastic hammer.



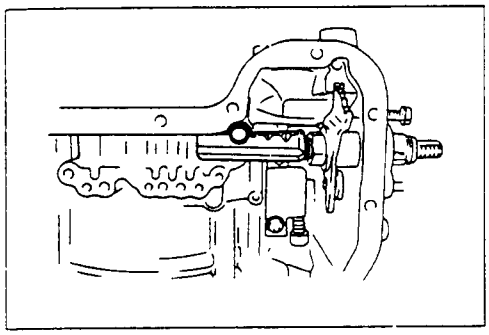
Remove the output shell from the output gear.



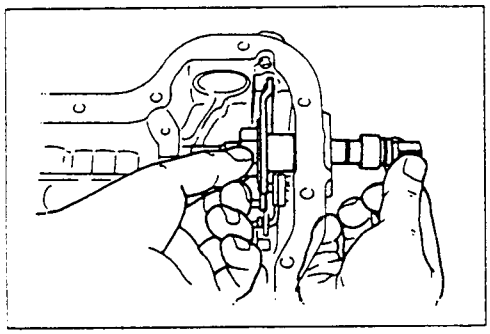
Remove the manual shaft and manual plate.

Caution
- **Do not lose the spring and detent ball.**

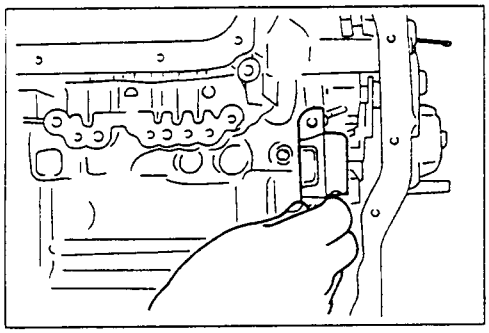
(1) Remove the plug, packing, spring, and detent ball.



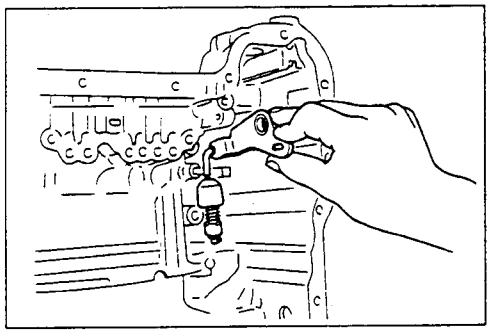
(2) Remove the bracket.



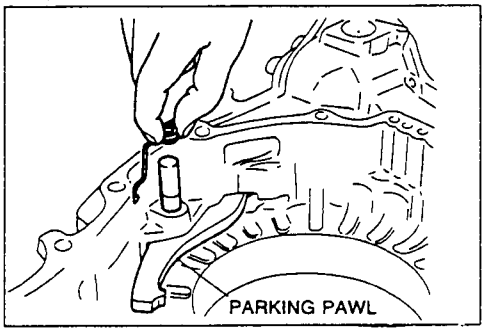
(3) Loosen the nut and puli out the manual shaft.
(4) Remove the nut, washer, spacer, and manual plate.



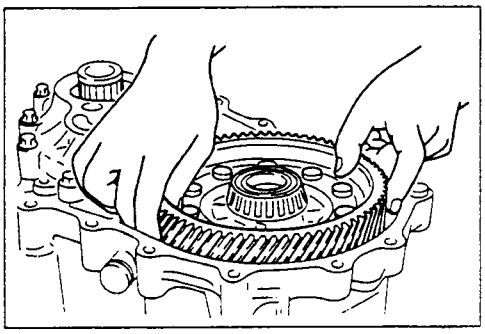
Remove the actuator support.



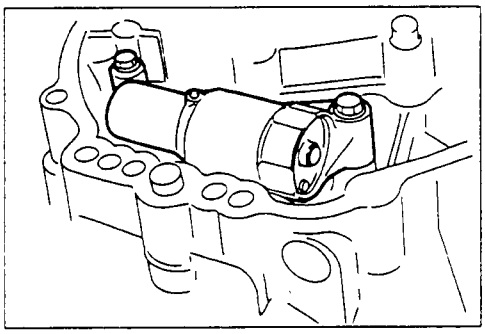
Remove the snap ring and remove the parking assist lever.



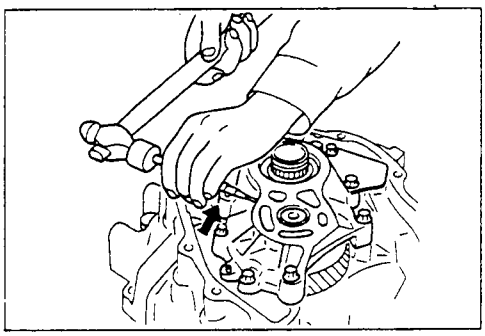
Remove the parking pawl.
(1) Remove the snap ring.
(2) Pull the parking shaft, and remove the spring and parking pawl.



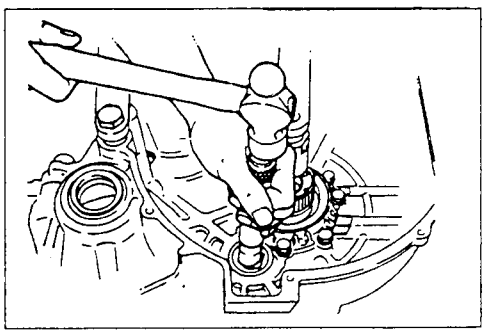
Remove the differential assembly.



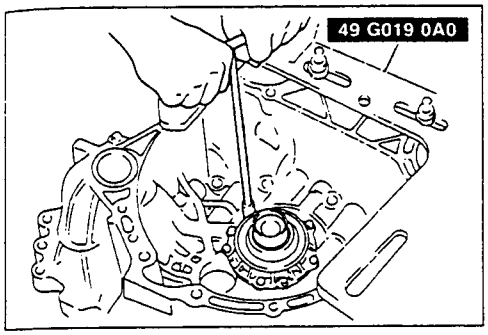
Remove the 2-3 accumulator.
Remove the orifice check valve spring and orifice check valve.



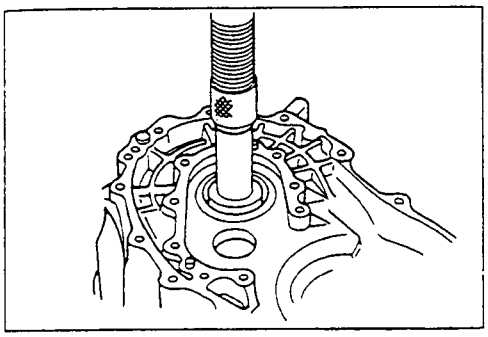
Remove the bearing housing.
(1) Remove the bolt indicated in the figure for access to the roll pin.
(2) Remove the roll pin by using a pin punch.
(3) Remove the baffle plate.
(4) Remove the bearing housing by tapping lightly with a plastic hammer.



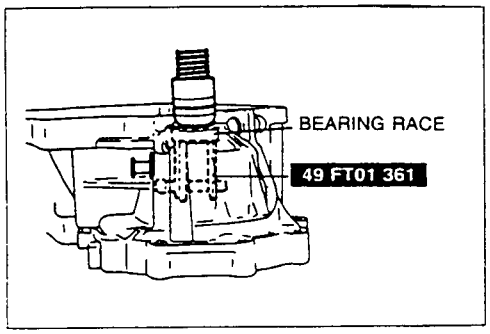
Remove the idler gear and output gear by tapping out from the torque converter side.



Remove the bearing cover assembly.
(1) Remove the converter housing from the **SST** (transaxle hanger).
(2) Remove the bearing cover bolts.

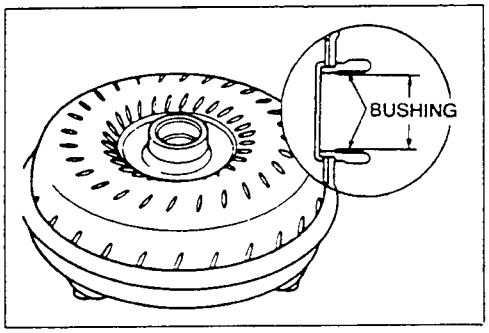


(3) Press the bearing cover assembly out of the converter housing by using a suitable pipe [approx. 80mm {3.1 in} dia].



Note
- **Install the bearing race during reassembly to adjust the preload.**

Press out the bearing races by using the **SST**.

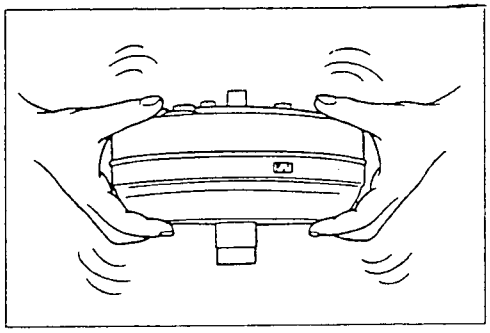


TORQUE CONVERTER

The torque converter is welded together and cannot be disassembled.

Inspection
1. Check the outer part of the converter for damage or cracks, and replace if necessary.
2. Check whether there is any rust on the pilot hub of the converter or on the boss. If there is any, remove it completely.
3. Measure the bushing of the converter boss. Replace the converter assembly if the bushing is excessively worn.

Bushing inner diameter
Standard: 53.030mm {2.0878 in}
Maximum: 53.075mm {2.0896 in}



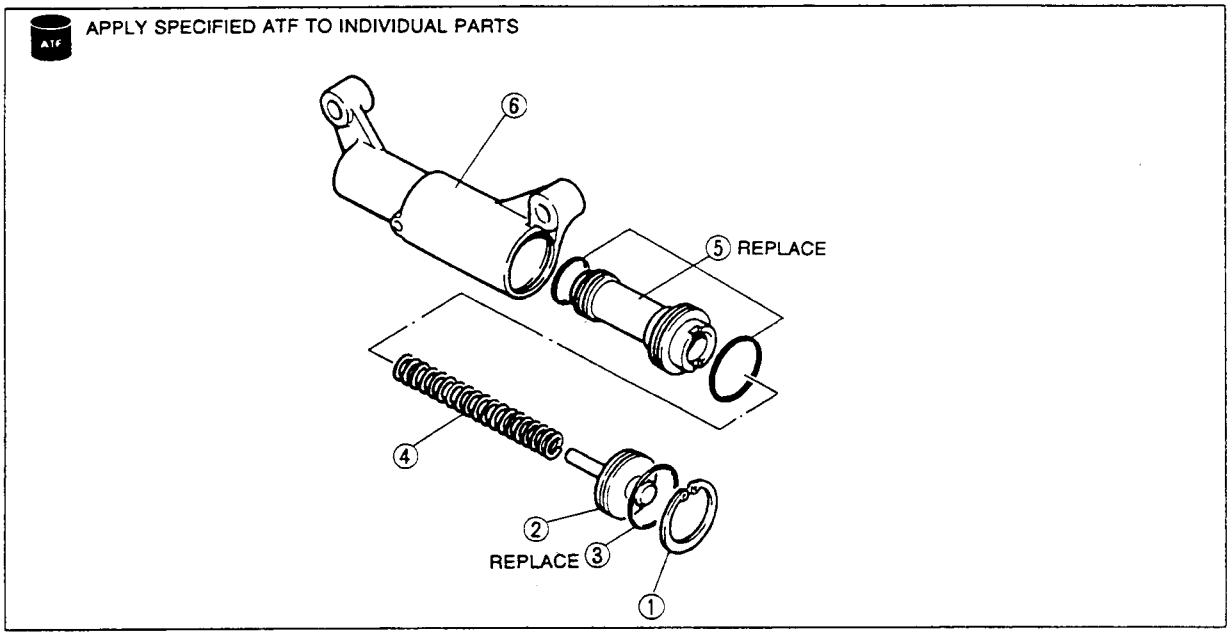
Wash Inside of Converter
1. Drain any ATF remaining in the converter.
2. Pour in ATF **[approx. 0.5 liters {0.5 US qt, 0.4 Imp qt}]**.
3. Shake the converter to clean the inside. Pour out the ATF.
4. Pour in ATF again.
5. Shake the converter to clean the inside. Pour out the ATF.

COMPONENT DISASSEMBLY AND ASSEMBLY

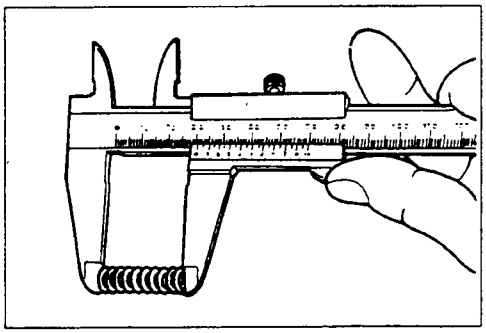
2-3 ACCUMULATOR

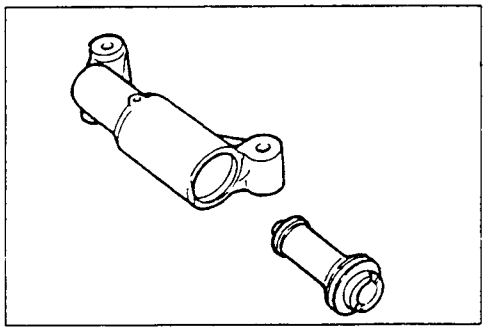
Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Snap ring
2. Stopper plug
3. O-ring
4. 2-3 accumulator spring
   Inspection ..... below
5. 2-3 accumulator piston
6. 2-3 accumulator body
   Inspect for wear and damage





Inspection
2-3 accumulator spring

Note
- **Do not compress the spring when measuring with vernier calipers.**

1. Measure the spring free length.

Specification

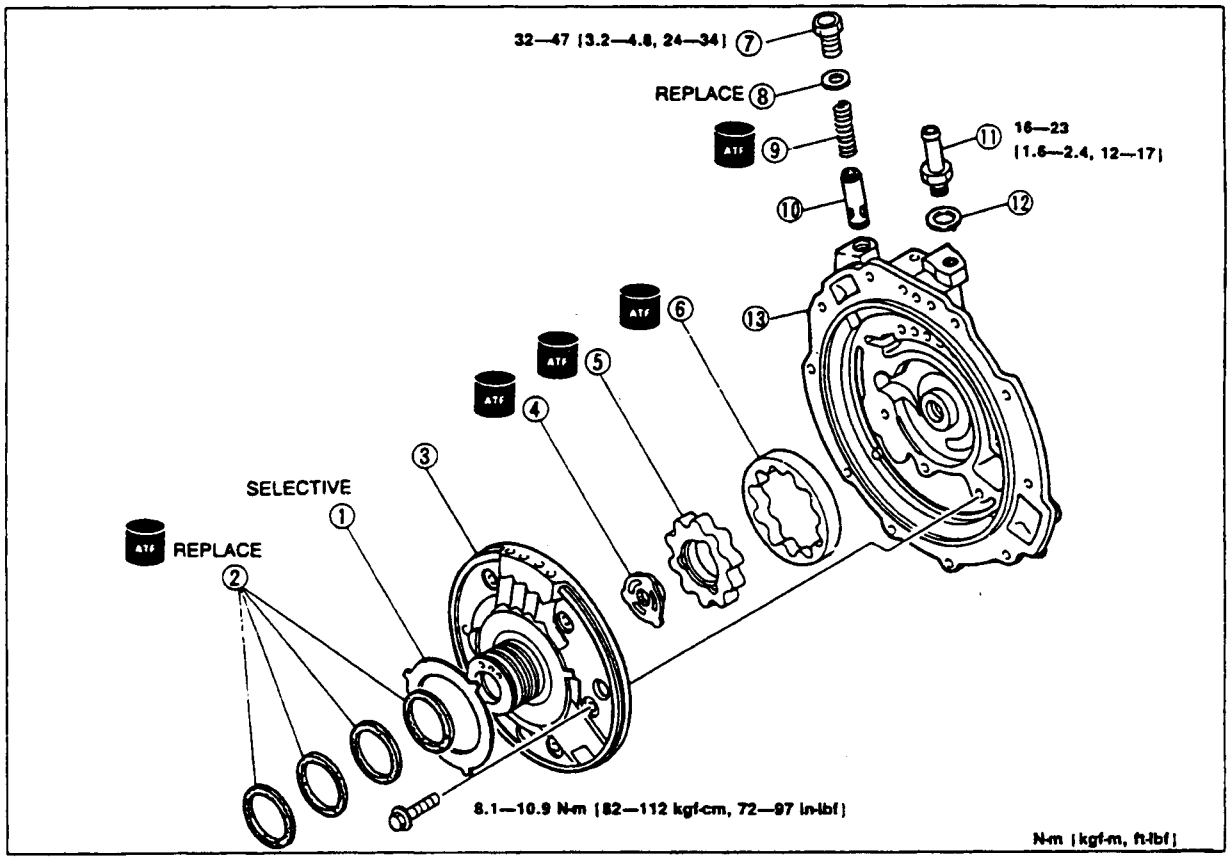
Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
11.5 {0.453}	77.7 {3.06}	23.3	1.4 {0.055}

2. If not as specified, replace the spring.

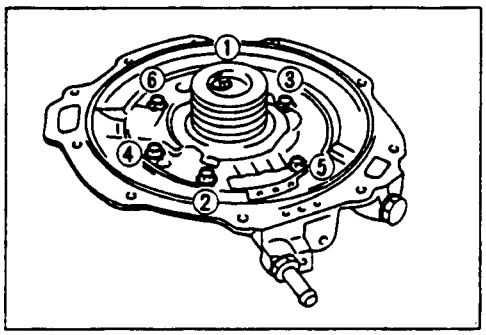
Assembly procedure
1. Apply ATF to the large and small seal rings and install them on to the accumulator piston.

Seal ring inner diameter
Large seal ring: 23.6mm {0.929 in}
Small seal ring: 14.6mm {0.575 in}

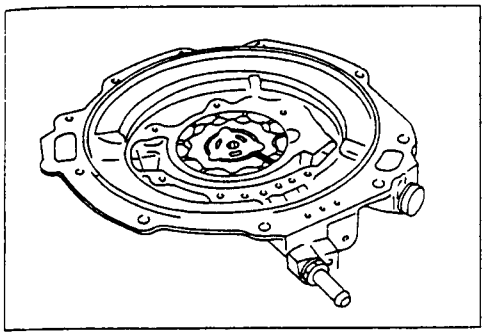
OIL PUMP
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Bearing Race
2. Sealing Rings
3. Oil Pump Cover
4. Oil Pump Flange
5. Inner Rotor
6. Outer Rotor
7. Plug
8. Packing
9. Spring
10. Spool Valve
11. Oil Pipe
12. Packing
13. Oil Pump Housing



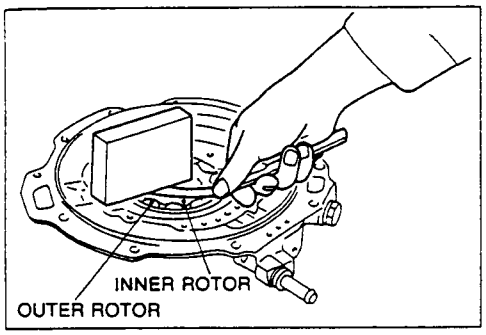
Disassembly note
Oil pump cover
1. Loosen the mounting bolts evenly in the order shown.
2. Remove the oil pump cover from the oil pump housing.



Inner rotor, outer rotor

Caution
- **Do not use a punch to mark the outer and inner rotors.**

Mark the outer and inner rotors and remove them from the oil pump housing.

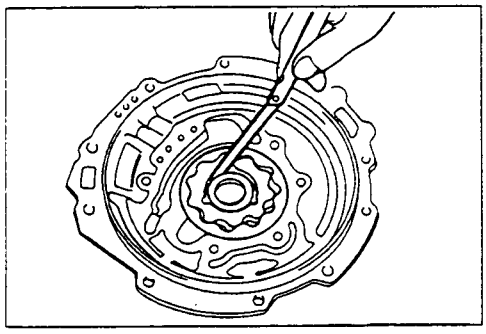


Inspection
Oil pump housing, outer rotor, inner rotor

1. Measure the clearance between the end of the oil pump housing and the outer rotor and inner rotor at four places along their circumferences.

Clearance
Standard: 0.02—0.04mm {0.0008—0.0015 in}
Maximum: 0.05mm {0.0019 in}

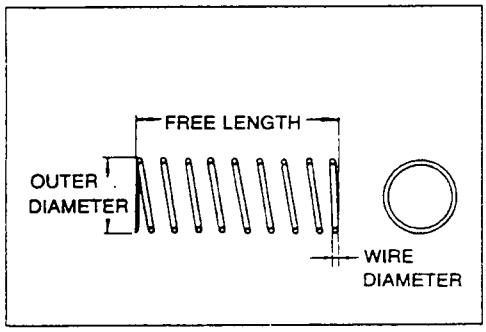
2. If not as specified, replace the pump assembly.



3. Measure the clearance between the oil pump boss and the inner rotor.

Oil clearance
Standard: 0.040—0.115mm {0.0016—0.0045 in}
Maximum: 0.125mm {0.0049 in}

4. If not within the specification, replace the oil pump assembly.



Spring

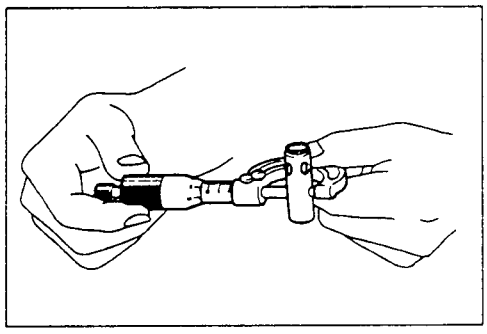
Note
- **Do not compress the spring when measuring with vernier calipers.**

1. Measure the spring free length.

Specification

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
13.0 {0.512}	53.0 {2.09}	12.0	1.2 {0.047}

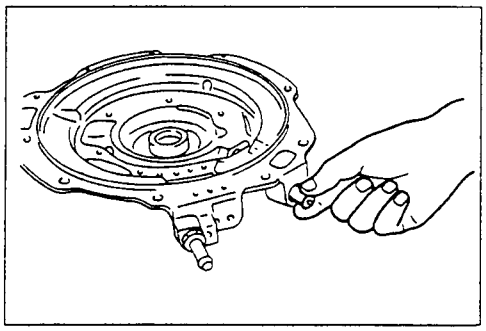
2. If not as specified, replace the spring.



Spool
1. Measure the spool diameter.

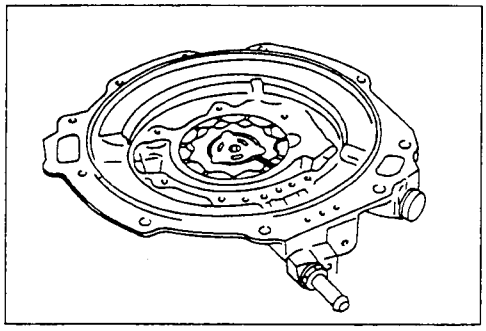
Outer diameter
Standard:
13.970—13.980mm {0.5500—0.5503 in}
Minimum: 13.970mm {0.5500 in}

2. If not as specified, replace the oil pump assembly.

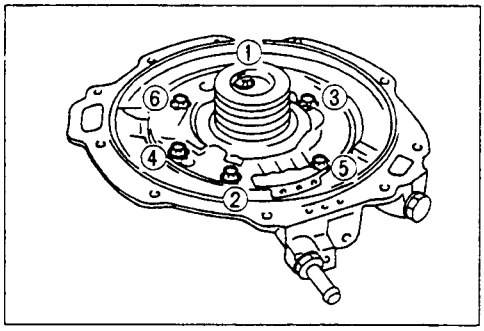


2. Install the spool and spring into the oil pump housing.
3. Verify that the spool moves smoothly.
4. Install a new packing and the plug.

Tightening torque:
32—47 N·m {3.2—4.8 kgf·m, 24—34 ft·lbf}

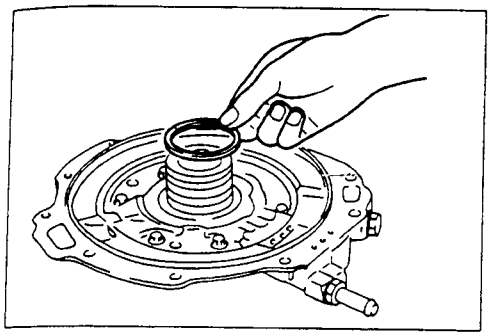


5. Align the marks and install the outer and inner rotors.
6. Install the oil pump flange.



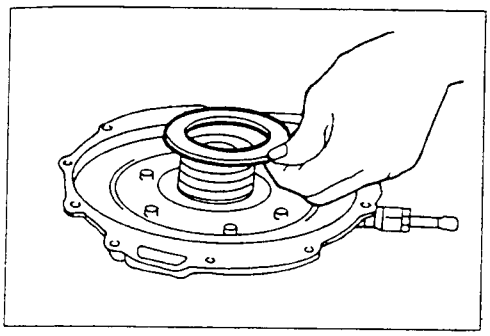
7. Mount the oil pump cover onto the oil pump housing.
8. Tighten the bolts evenly and gradually in the order shown.

Tightening torque:
8.1—10.9 N·m {82—112 kgf·cm, 72—97 in·lbf}



10. Apply ATF to the new seal rings and install them onto the oil pump cover.

Seal ring inner diameter: 55.9mm {2.20 in}

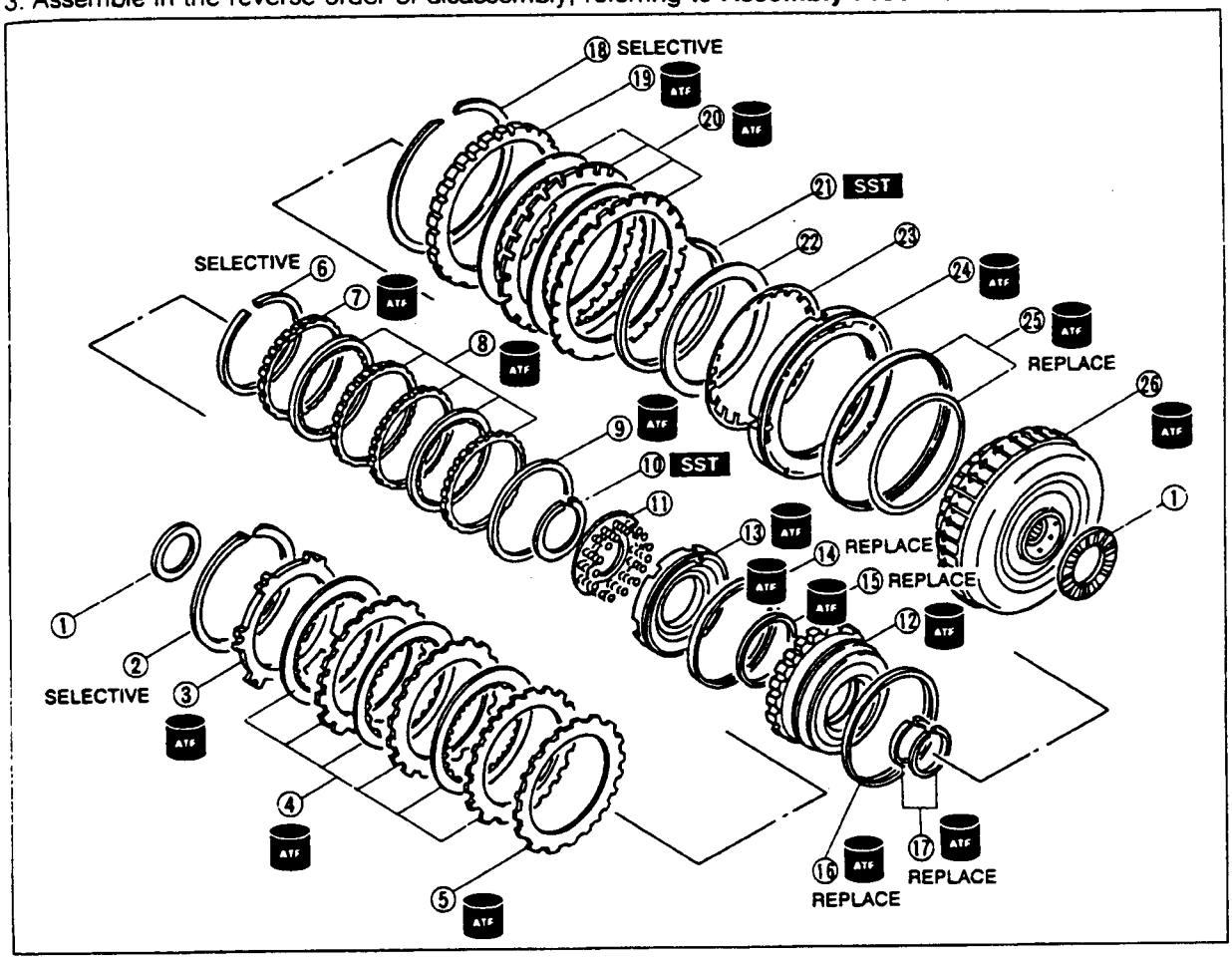


11. Apply petroleum jelly to the bearing race and secure it onto the oil pump cover.

Bearing race outer diameter: 88.0mm {3.46 in}

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts, and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



1. Thrust Bearing

-Forward Clutch-

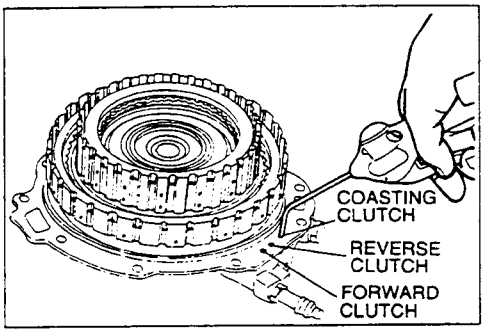
2. Snap Ring
3. Retaing Plate
4. Drive and Driven Plates
5. Dished Plate

-Coast Clutch-

6. Snap Ring
7. Retaining Plate
8. Drive and Driven Plate
9. Dished Plate
10. Snap Ring
11. Spring and Retainer Assembly
12. Coast Clutch Drum
13. Coast Piston
14. Outer Seal
15. Inner Seal
16. Outer Seal
17. Sealing Rings

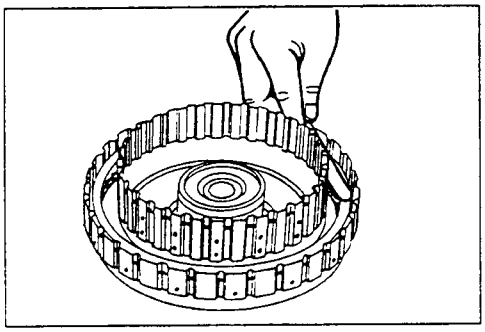
-Reverse Clutch-

18. Snap Ring
19. Retaining Plate
20. Drive and Driven Plates
21. Snap Ring
22. Return Sprig Stopper
23. Piston Return Spring
24. Reverse Piston
25. Inner and Outer Seals
26. Reverse / Forward Drum



Preinspection
Reverse, forward, coasting clutch operation
1. Set the clutch assemblies onto the oil pump.
2. Check the clutch operation by applying compressed air through the fluid passages shown.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.



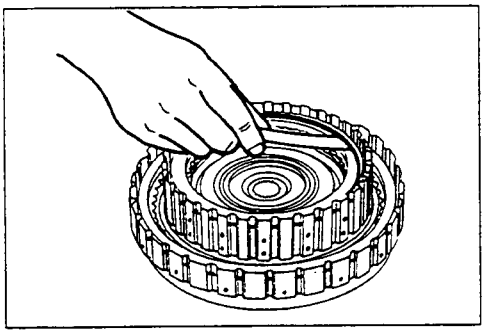
Clutch clearance
Reverse clutch

Note
- **Make several measurements and calculate the average value.**

1. Measure the clearance between the retaining plate and the drive plate.

Clearance: 1.5—1.8mm {0.059—0.071 in}

2. If not as specified, replace parts as necessary.
3. Select and install the correct snap ring when assembling.



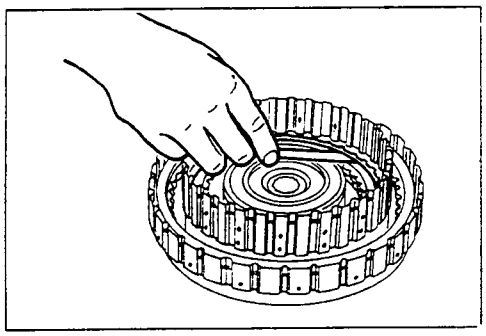
Forward clutch

Note
- **Make several measurements and calculate the average value.**

1. Measure the clearance between the retaining plate and the snap ring.

Clearance: 1.0—1.2mm {0.039—0.047 in}

2. If not as specified, replace parts as necessary.
3. Select and install the correct snap ring when assembling.



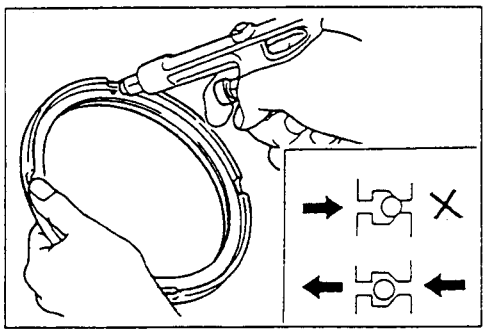
Coasting clutch

Note
- **Make several measurements and calculate the average value.**

1. Remove the snap ring, retaining plate, drive plates, driven plates and dished plate of the forward clutch.
2. Measure the clearance between the retaining plate and the snap ring.

Clearance: 1.0—1.2mm {0.039—0.047 in}

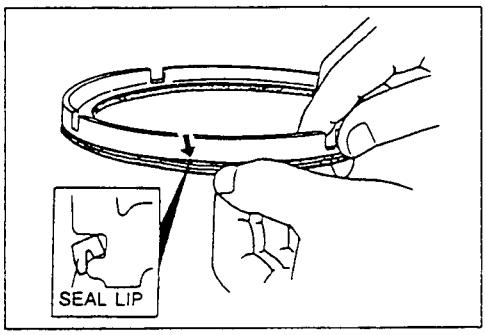
3. If not as specified, replace parts as necessary.
4. Select and install the correct snap ring when assembling.



Reverse piston

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

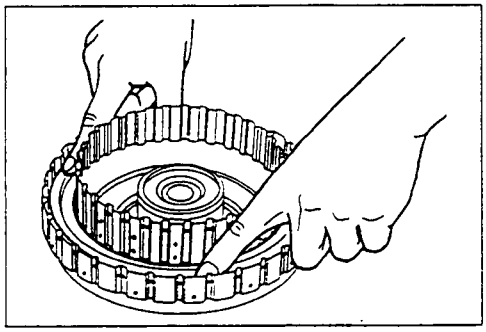


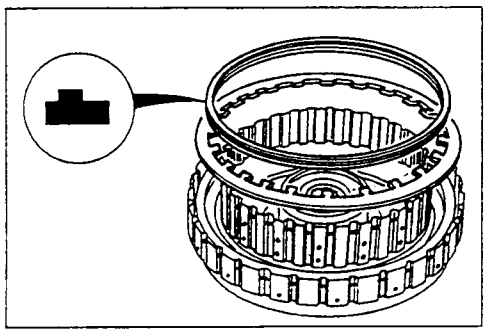
Assembly procedure
Reverse clutch

1. Install the reverse piston.
   (1) Apply ATF to the inner and outer faces of the seals and install them to the reverse piston.

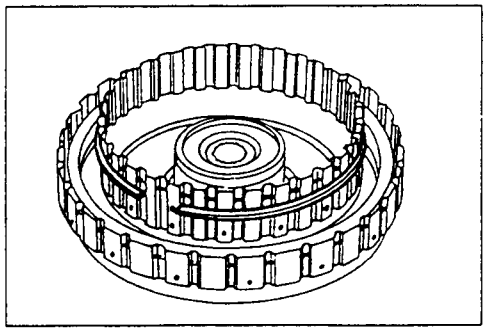
Seal ring inner diameter
Inner seal: 160.5mm {6.319 in}
Outer seal: 188.0mm {7.402 in}

   (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the reverse forward drum.
   (3) Install the reverse piston by pushing evenly around the circumference, being careful not to damage the seal rings.

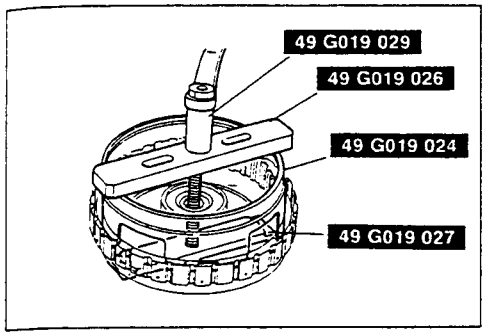


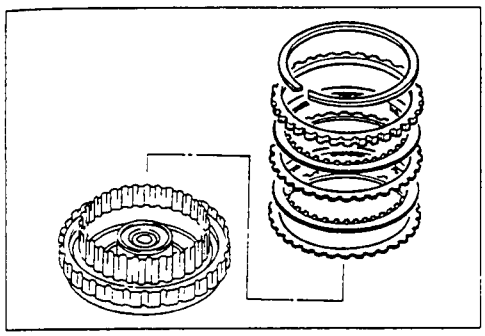


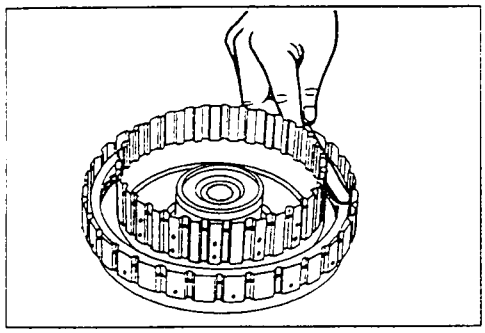
2. Install the piston return spring with the tabs facing up ward away from the reverse piston.
3. Install the return spring stopper with the step facing upward.

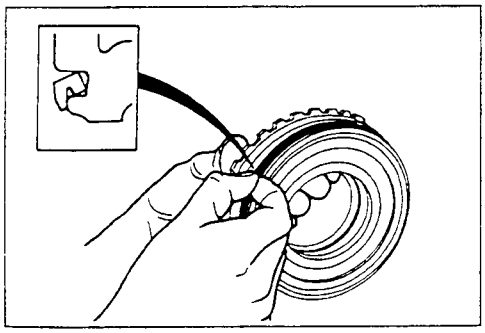


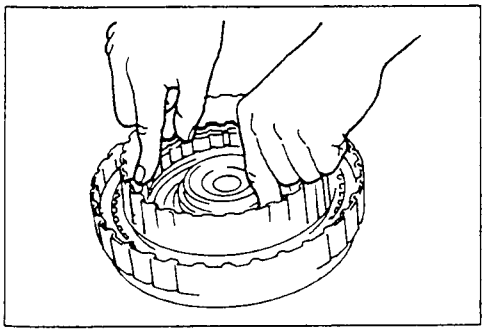
4. Install the snap ring half-way down the reverse forward drum as shown.











5. Install the **SST** on the reverse forward drum.

Caution
- **Depress the piston return spring only enough to install the snap ring.**

6. Compress the piston return spring assembly.

Caution
- **Do not deform the snap ring when installing it.**

7. Install the snap ring by using a screwdriver.
8. Remove the **SST**.

Note
- **Installation order: Driven-Drive-Driven-Drive**

9. Install the drive and driven plates.
10. Install the retaining plate.
11. Install the snap ring by using a screwdriver.
12. Measure the reverse clutch clearance.
    (1) Measure the clearance between the retaining plate and the drive plate.
    (2) If the clearance is not within the specification, adjust it by selecting a proper snap ring from below.

Reverse clutch clearance:
1.5—1.8mm {0.059—0.071 in}

Snap ring sizes

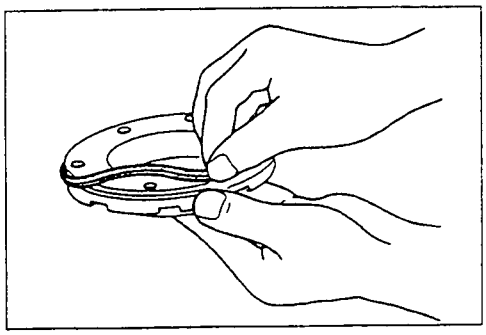
mm {in}

2.0 {0.079}	2.2 {0.087}	2.4 {0.094}
2.6 {0.102}	2.8 {0.110}	—

Coasting clutch
1. Install the coasting clutch drum.
   (1) Apply ATF to the inner and outer faces of the seals, and install them onto the coasting clutch drum.

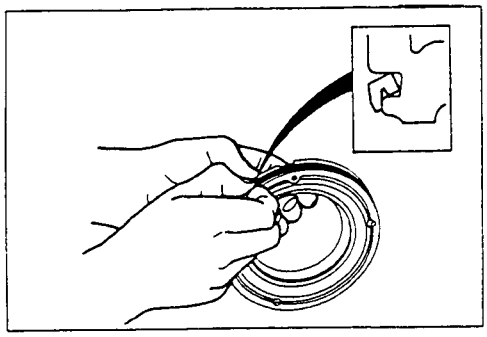
Seal ring inner diameter
Inner seal: 71.02mm {2.796 in}
Outer seal: 137.0mm {5.394 in}

   (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the reverse forward drum.
   (3) Install the coasting clutch drum into the reverse forward drum as shown.

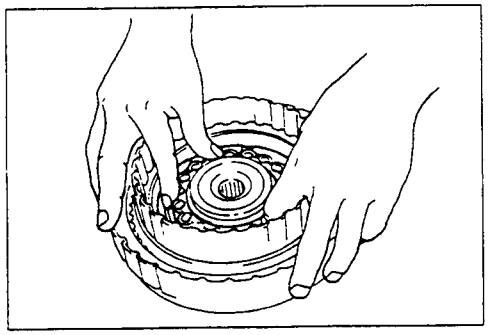


2. Install the coasting piston.
   (1) Apply ATF to the inner and outer faces of the seals and install them onto the coasting piston.

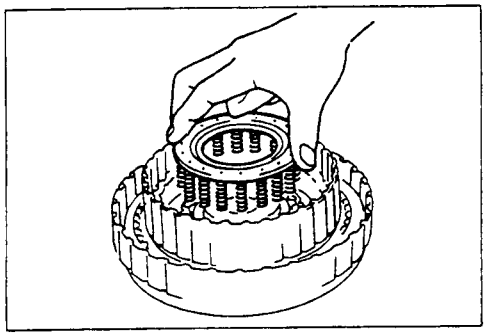
Seal ring inner diameter
Outer seal: 122.0mm {4.803 in}



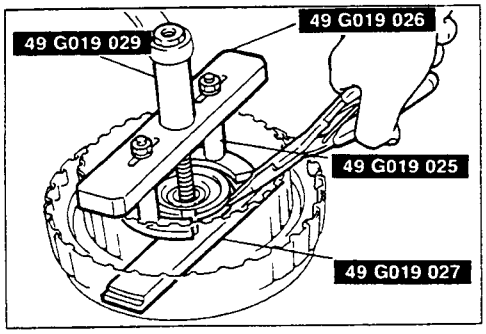
(2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the coasting clutch drum.



(3) Install the coasting piston by pushing evenly around the circumference being careful not to damage the outer seal.



3. Install the spring and retainer assembly.



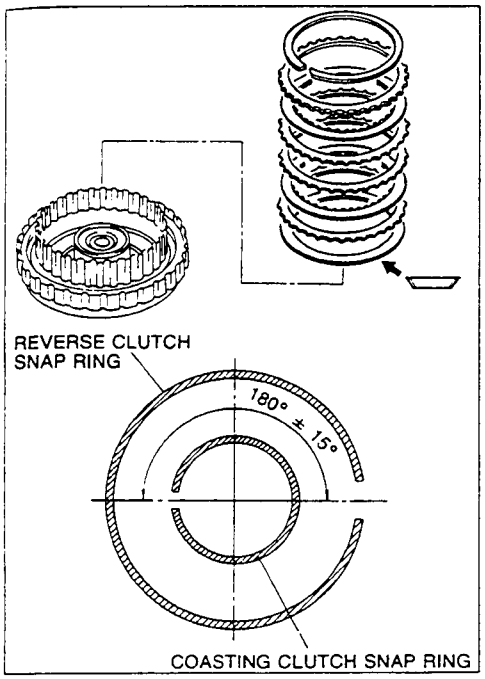
4. Install the **SST** in the coasting clutch.

Caution
- **Depress the spring and retainer assembly only enough to install the snap ring.**

5. Compress the spring and retainer assembly.

Caution
- **Do not align the snap ring end gap with the spring and retainer stopper.**
- **Do not deform the snap ring when installing it.**

6. Install the snap ring.
7. Remove the **SST**.



8. Install the dished plate with the dished side upward.

Note
- **Installation order:**
  Driven-Drive-Dirven-Driven-Drive

9. Install the drive and driven plates.
10. Install the retaining plate.

Caution
- **Verify that the coasting clutch snap ring is facing as shown.**

11. Install the snap ring.

12. Measure the coasting clutch clearance.

Note
- **Make several measurements and calculate the average value.**

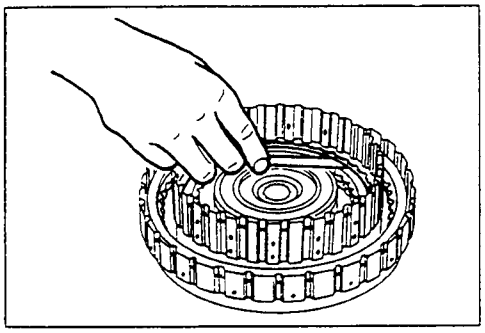
(1) Measure the clearance between the snap ring and the retaining plate.
(2) If the clearance is not within the specification, adjust it by selecting a proper snap ring from below.

Coasting clutch clearance:
1.0—1.2mm {0.039—0.047 in}

Snap ring sizes

mm {in}

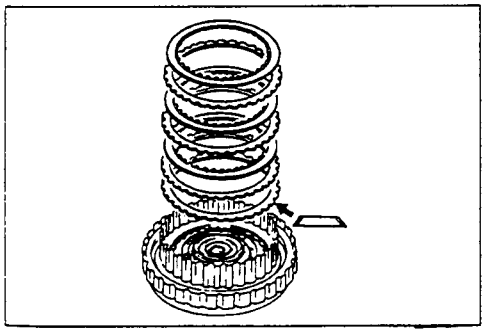
1.50 {0.059}	1.65 {0.065}	1.80 {0.071}
1.95 {0.077}	2.10 {0.083}	2.25 {0.089}

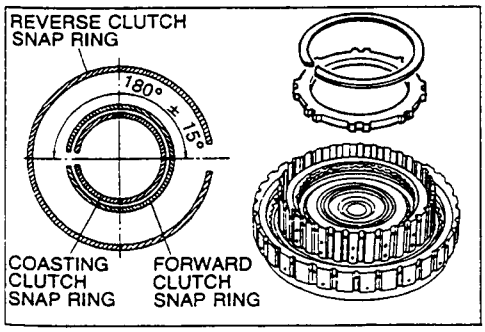


Forward clutch
1. Install the dished plate with the dished side downward.

Note
- **Installation order:**
  Driven-Drive-Driven-Drive-Driven-Drive

2. Install the drive and driven plates.

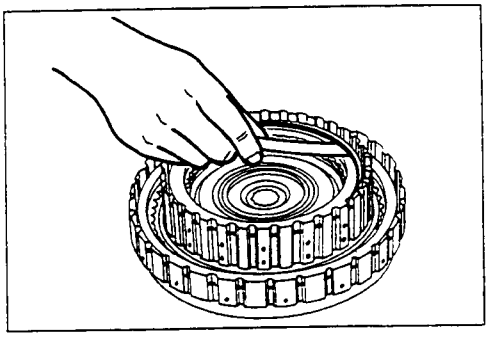


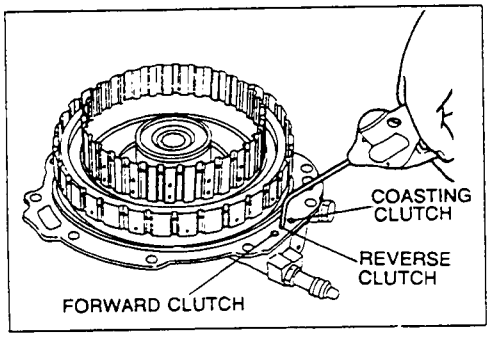


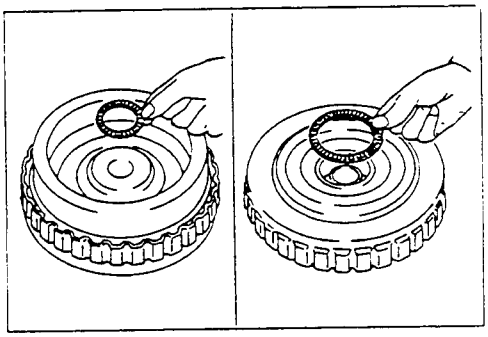
3. Install the retaining plate.

Caution
- **Do not deform the snap ring when installing it.**
- **Verify that the forward clutch snap ring is facing as shown.**

4. Install the snap ring.







5. Measure the forward clutch clearance.

Note
- **Make several measurements and calculate the average value.**

(1) Measure the clearance between the snap ring and the retaining plate of the forward clutch.
(2) If the clearance is not within the specification, adjust it by selecting a proper snap ring from below.

Forward clutch clearance:
1.0—1.2mm {0.039—0.047 in}

Snap ring sizes

mm {in}

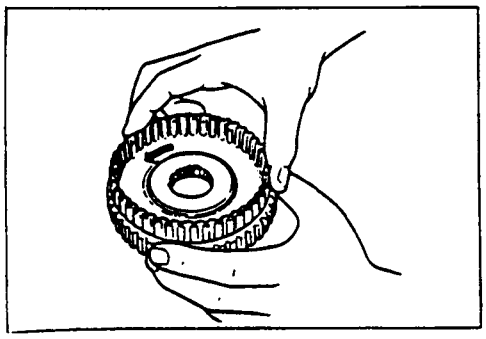
2.00 {0.079}	2.15 {0.085}	2.30 {0.091}
2.45 {0.097}	2.60 {0.102}	2.75 {0.108}

6. Check the clutch operation as follows.
(1) Set the clutch assembly onto the oil pump.
(2) Check the clutch operation by applying compressed air through the fluid passages shown.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

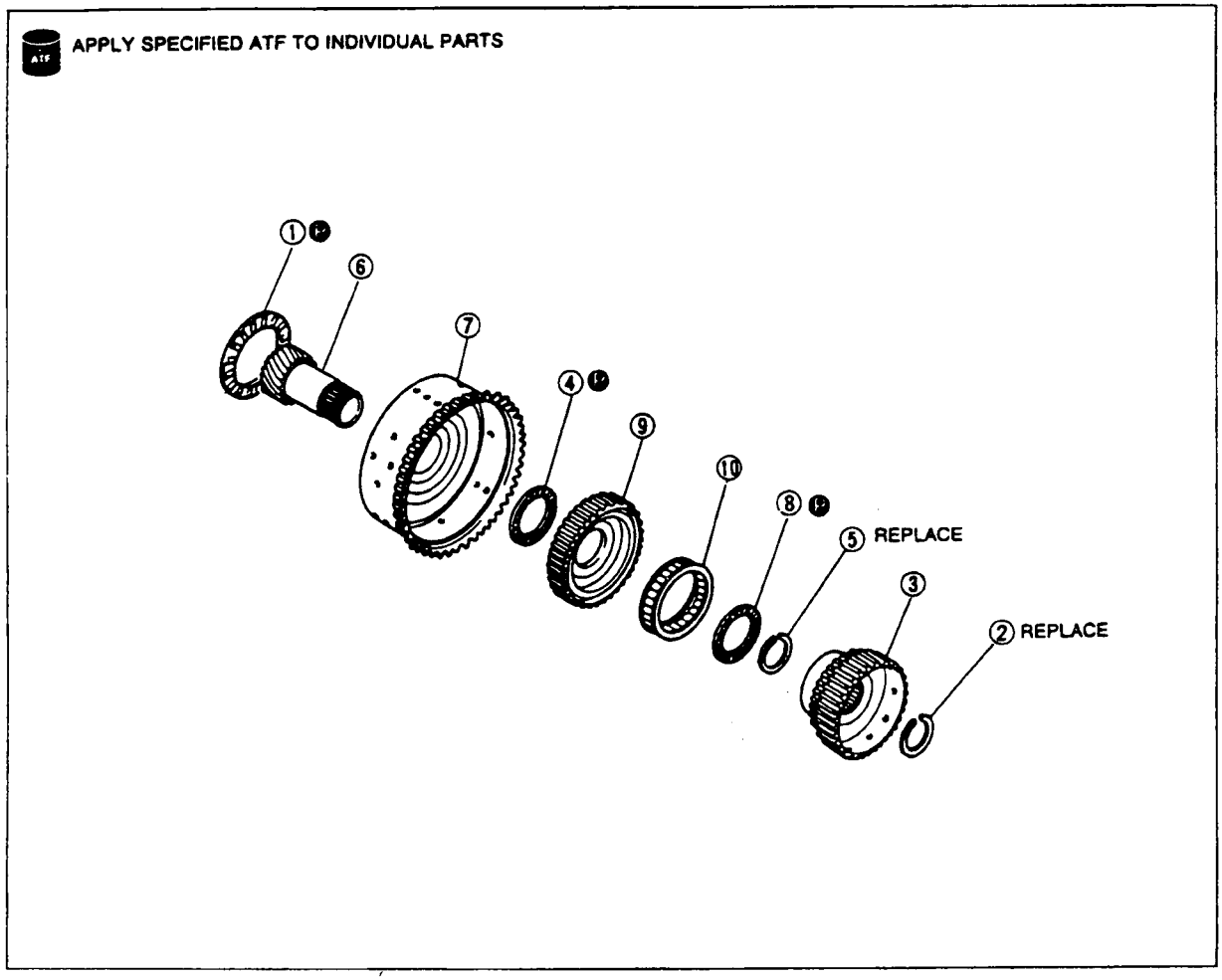
7. Apply petroleum jelly to the thrust bearings, and secure them on the reverse forward drum.

Thrust bearing outer diameter
Oil pump side: 86.0mm {3.39 in}
Small sun gear and one-way clutch side: 56.1mm {2.21 in}

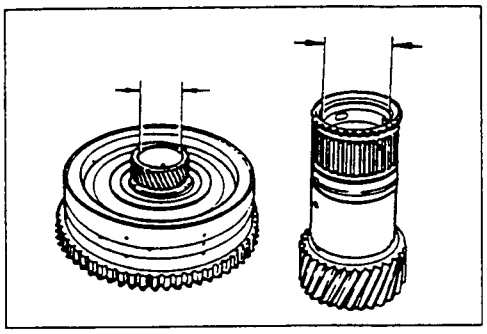


SMALL SUN GEAR AND ONE-WAY CLUTCH 1
Preinspection
One-way clutch 1 operation

While holding the one-way clutch outer race, verify that the one-way clutch inner race rotates smoothly when turned counterclockwise and locks when turned clockwise. If not as specified, replace the one-way clutch 1.



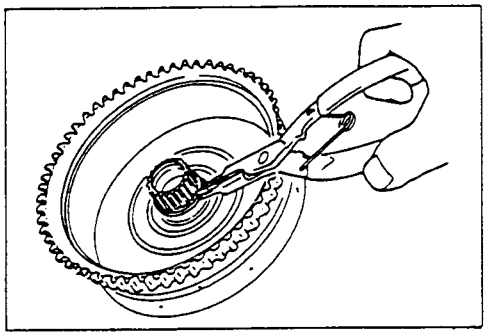
1. Thrust Bearing
2. Snap Ring
3. One-way Clutch Inner Race
4. Thrust Bearing
5. Snap Ring
6. Small Sun Gear
7. Sun Gear Drum
8. Thrust Bearing
9. One-way Clutch Outer Race
10. One-way Clutch 1



Inspection
Small sun gear, sun gear drum
1. Measure the small sun gear and sun gear drum inner diameters.

Inner diameter
Small sun gear: 24.0mm {0.945 in} max.
Sun gear drum: 33.4mm {1.31 in} max.

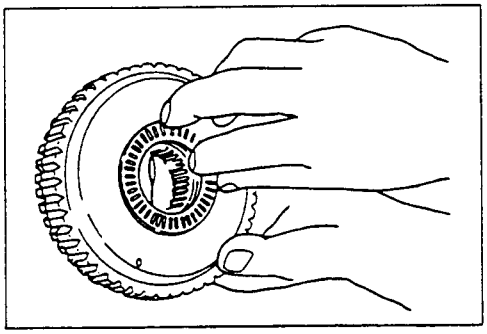
2. If not within the specification, replace the small sun gear or sun gear drum.



Assembly procedure
1. Install the small sun gear into the sun gear drum.

Caution
- **Do not deform the snap ring when installing it.**

2. Install a new snap ring.



3. Apply petroleum jelly to the thrust bearing and secure it to the one-way clutch inner race.

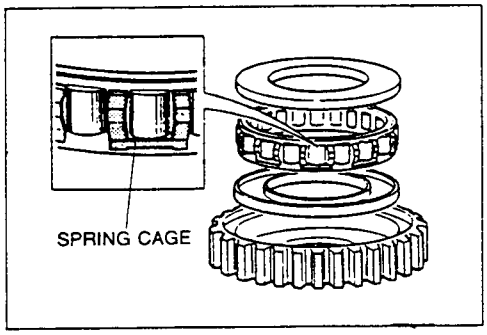
Thrust bearing outer diameter: 62.5mm {2.46 in}

Caution
- **Verify that the spring cage of the one-way clutch faces toward the outer race as shown.**

4. Install the one-way clutch 1 into the one-way clutch outer race.
5. Apply petroleum jelly to the thrust bearing and secure it to the one-way clutch 1.

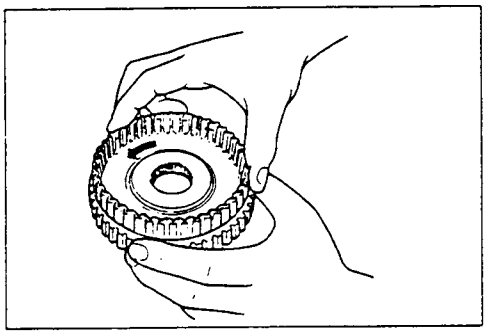
Thrust bearing outer diameter: 62.5mm {2.46 in}

Note
- **Align the splines of the one-way clutch inner race and small sun gear clutch hub.**

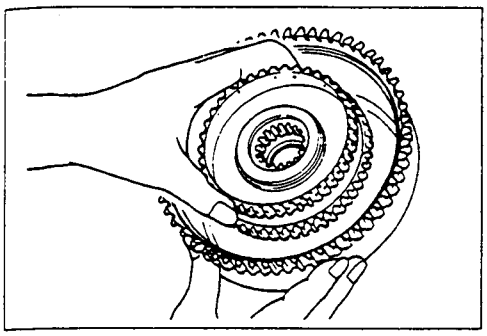


6. Install the one-way clutch inner race into the one-way clutch outer race by turning the inner race counterclockwise.

Note
- **If the one-way clutch inner race turns or locks in both directions (clockwise and counterclockwise), replace the one-way clutch 1.**
- **If the one-way clutch inner race turns only clockwise, the one-way clutch inner race may be installed in the opposite direction.**

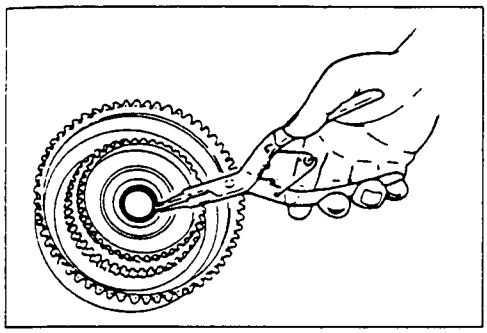


7. Hold the one-way clutch outer race. Verify that the inner race rotates smoothly when turned counterclockwise only.



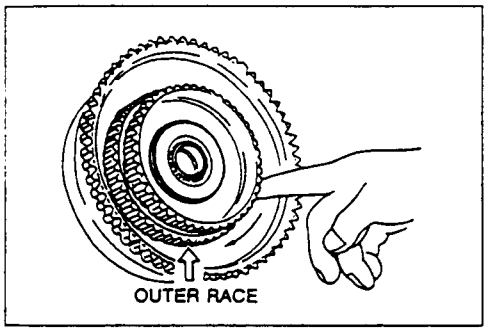
Note
- **Align the splines of the one-way clutch inner race and small sun gear clutch hub.**

8. Install the one-way clutch inner and outer race to the sun gear drum.

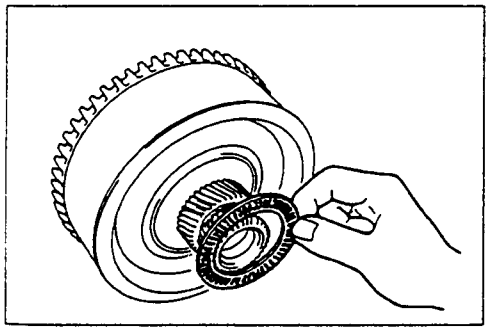


Caution
- **Do not deform the snap ring when installing it.**

9. Install a new snap ring.

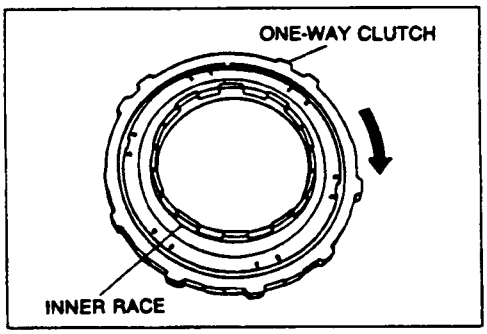


10. Verify that when the small sun gear is held, the one-way clutch outer race turns smoothly and only clockwise.



11. Apply petroleum jelly to the thrust bearing and secure it to the sun gear drum.

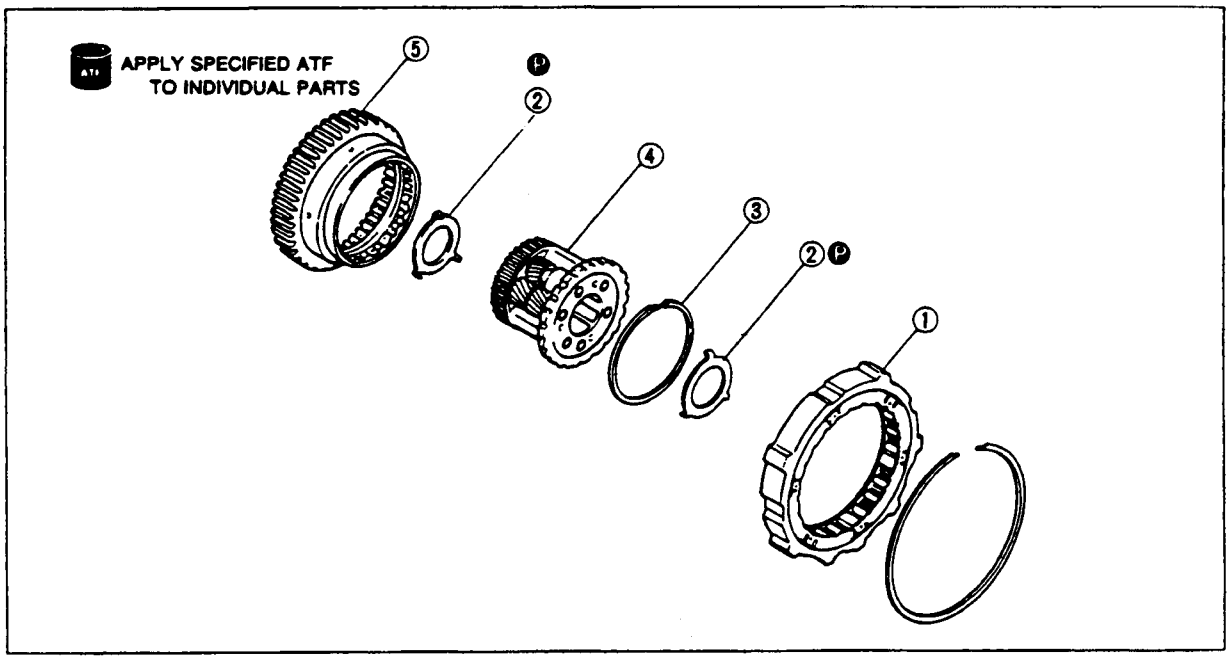
Thrust bearing outer diameter: 72.0mm {2.83 in}



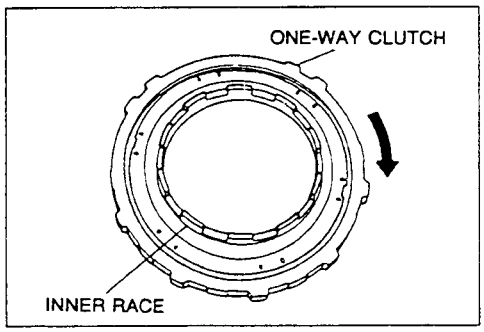
ONE-WAY CLUTCH 2 AND CARRIER HUB ASSEMBLY

Preinspection

While holding the one-way clutch inner race, verify that the one-way clutch rotates smoothly when turned clockwise and locks when turned counterclockwise. If not as specified, replace the one-way clutch 2.



1. One-way Clutch 2
2. Bearing Race
3. Snap Ring
4. Carrier Hub Assembly
5. Inner Race



One-way clutch 2

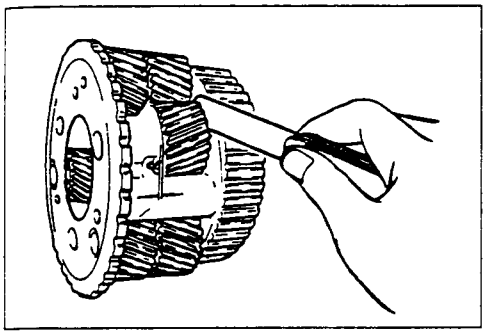
Check the one-way clutch 2 operation.

(1) Assemble the inner race to the one-way clutch 2.

Note

- **If the one-way clutch 2 turns or locks in both directions (clockwise and counterclockwise), replace the one-way clutch 2.**
- **If the one-way clutch 2 turns only counterclockwise, the one-way clutch 2 may be installed in the opposite direction.**

(2) Verify that when the inner race is held the one-way clutch 2 turns smoothly and only clockwise.



Carrier hub assembly

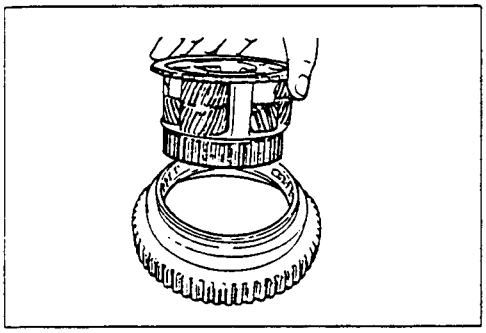
Check for the following and repair or replace as necessary.

(1) Damaged or worn gear and operation.

(2) Clearance between pinion washers and planetary carrier.

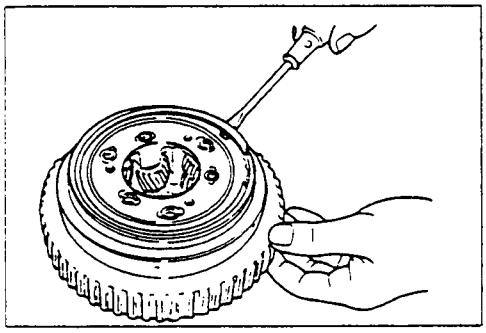
Clearance: 0.2—0.7mm {0.008—0.028 in}

(3) If not within the specification, replace the carrier hub assembly.

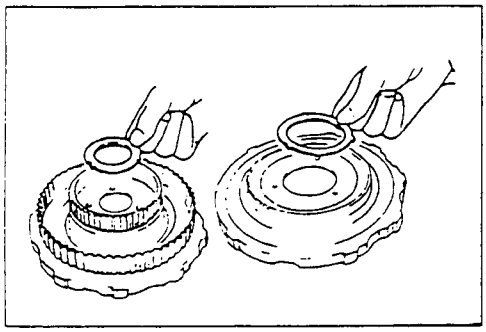


Assembly procedure

1. Install the carrier hub assembly to the inner race.



2. Install the snap ring.



Note

- **Install the tabs of the bearing race into the alignment holes.**

3. Apply petroleum jelly to the bearing race and thrust bearing, install them to the one-way clutch and carrier hub assembly.

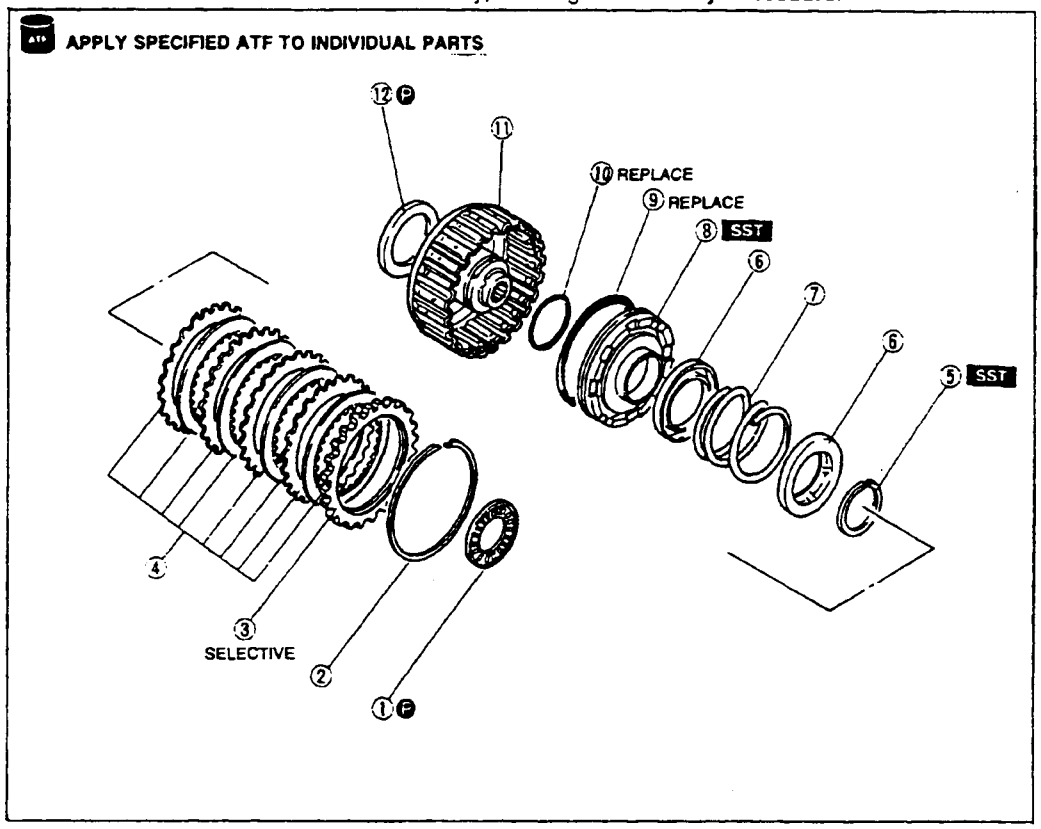
Bearing race outer diameter

Sun gear drum side: 72.0mm {2.83 in}

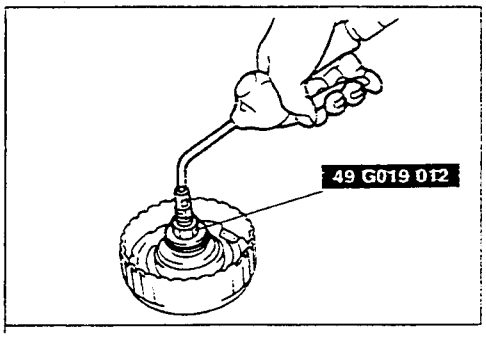
3-4 clutch side: 57.0mm {2.24 in}

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



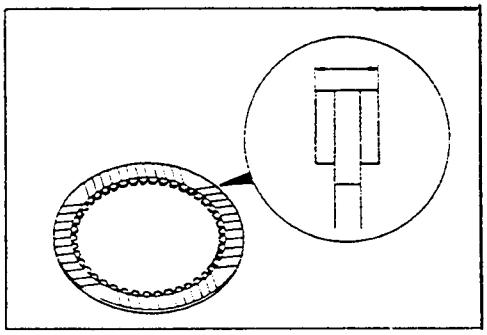
1. Thrust Bearing
2. Snap Ring
3. Retaining Plate
4. Dive and Driven Plates
5. Snap Ring
6. Spring Retainer
7. Return Spring
8. 3-4 Clutch Piston
9. Outer Seal
10. Inner Seal
11. 3-4 Clutch Drum
12. Bearing Race



3-4 clutch piston

Remove the 3-4 clutch piston by using the **SST** and compressed air.

Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.



Inspection

Drive plates

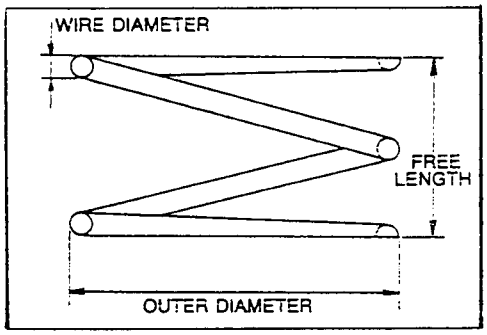
1. Measure the facing thickness in three places, and calculate the average value.

Standard: 1.6mm {0.063 in}
Minimum: 1.4mm {0.055 in}

2. If not within the specification, replace the drive plates.

Return spring

Note
- **Do not compress the spring when measuring with vernier calipers.**

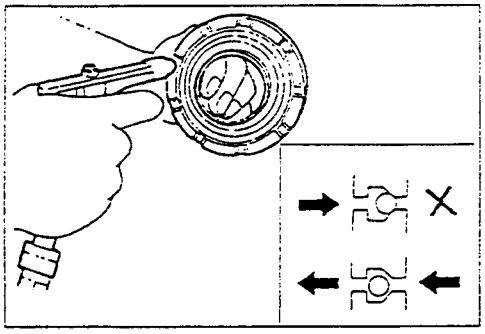


1. Measure the spring free length.

Specifications

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
83.3 {3.28}	38.7 {1.52}	1.0	5.5 {0.22}

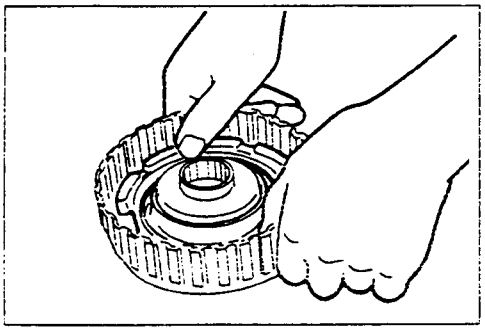
2. If not within the specifications, replace the spring.



3-4 clutch piston

1. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
2. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

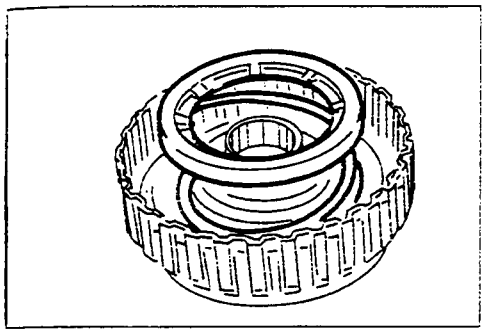
Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.



Assembly Procedure

1. Install the 3-4 clutch piston.
   (1) Apply ATF to the inner and outer seals, and install them onto the 3-4 clutch piston.
   (2) Install the piston by pushing evenly around the circumference, being careful not to damage the seal rings.

Seal ring inner diameter
Inner seal: 59.0mm {2.32 in}
Outer seal: 105.5mm {4.154 in}

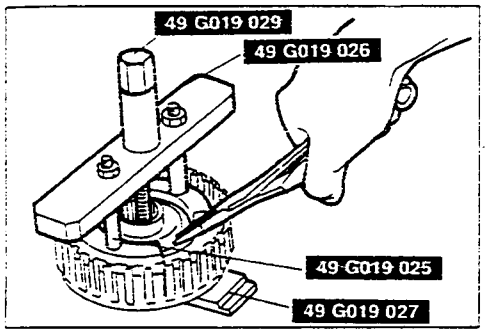


2. Install the return spring and spring retainer.
3. Install the **SST** to the 3-4 clutch as shown.

Caution
- **Compress the return spring only enough to install the snap ring.**

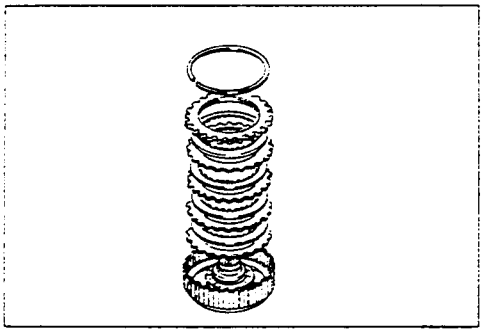
4. Compress the return spring and spring retainer.

Caution
- **Do not align the snap ring end gap with the return spring stopper.**
- **Do not deform the snap ring when installing it.**



5. Install the snap ring.
6. Remove the **SST**.

Note
- **Installation order:**
  Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

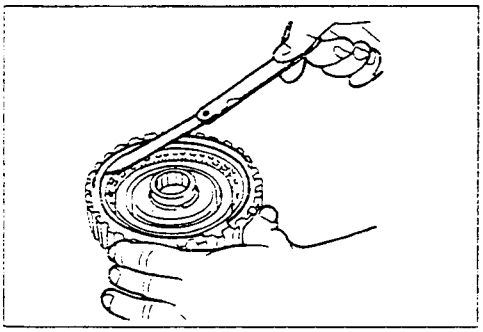


7. Install the drive and driven plates.
8. Install the retaining plate.

Caution
- **Do not align the snap ring end gap with the return spring stopper.**
- **Do not deform the snap ring when installing it.**

9. Install the snap ring.
10. Measure the 3-4 clutch clearance.

Note
- **Make several measurements and calculate the average value.**



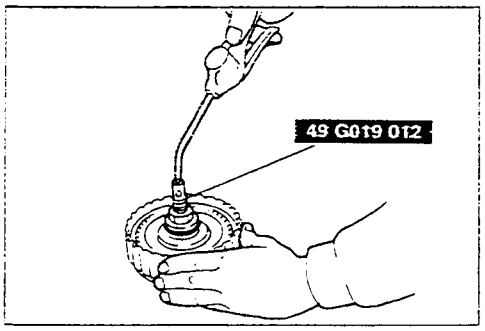
(1) Measure the clearance between the snap ring and the retaining plate.
(2) If the clearance is not within the specification, adjust it by selecting a proper retaining plate from below.

3-4 clutch clearance: 1.3—1.5mm {0.051—0.059 in}

Retaining plate

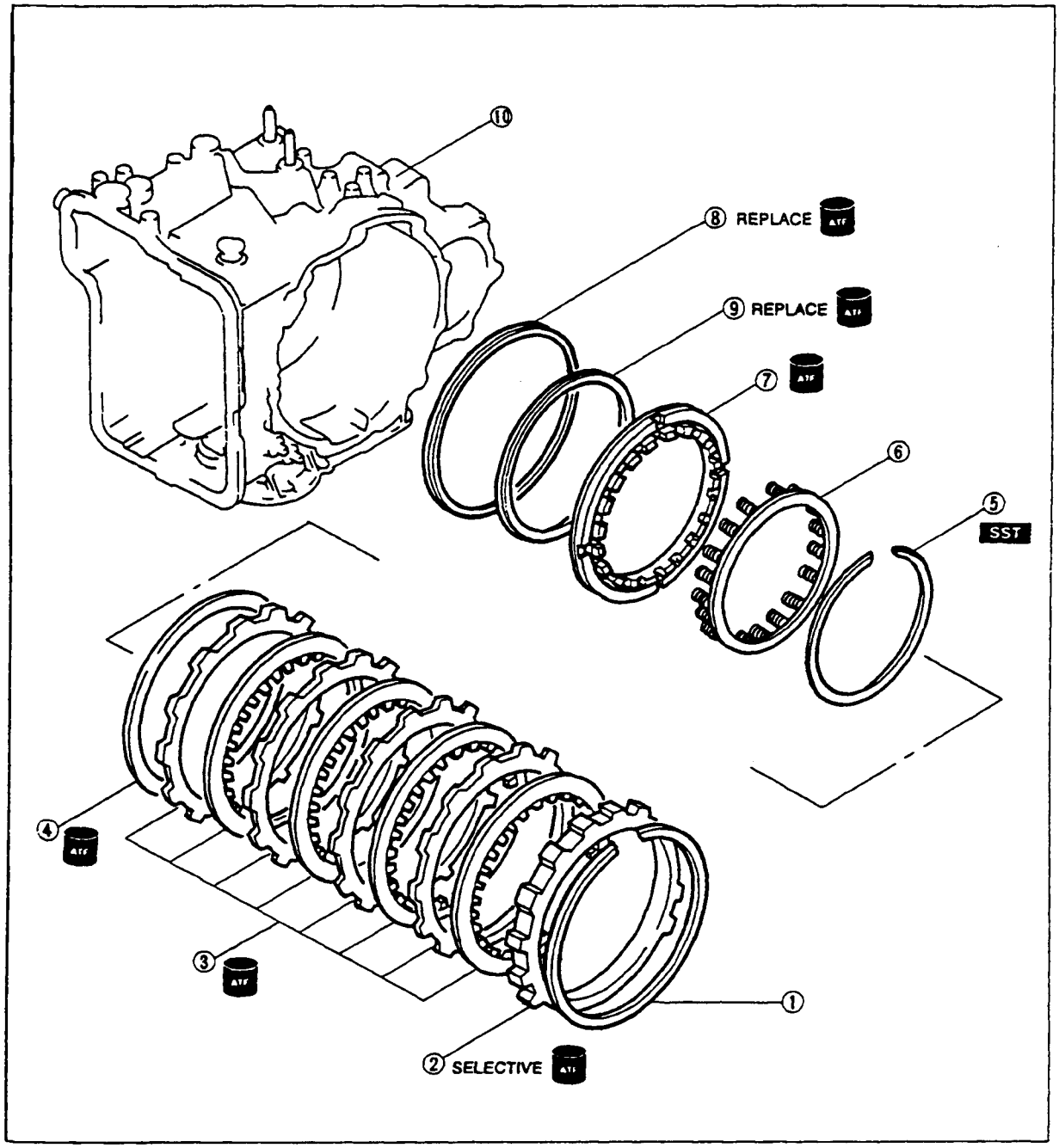
mm {in}

3.8 {0.15}	4.0 {0.16}	4.2 {0.17}
4.4 {0.17}	4.6 {0.18}	4.8 {0.19}

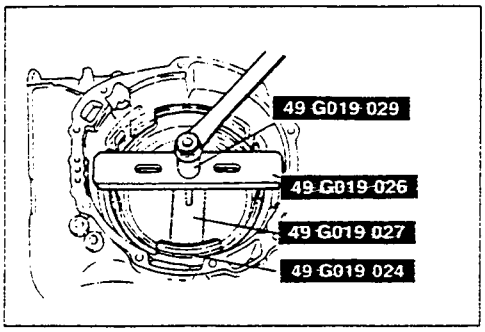


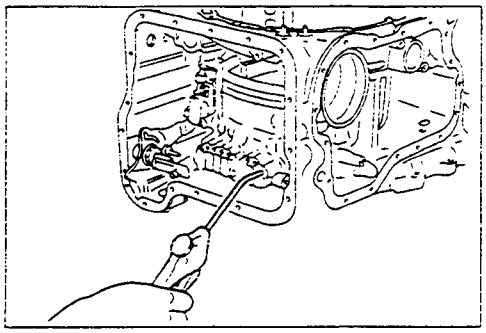
1. Install the **SST** as shown, and check clutch operation by applying compressed air.

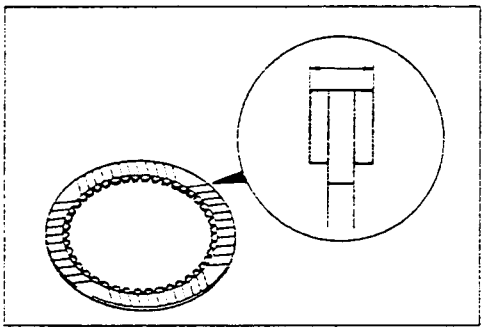
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

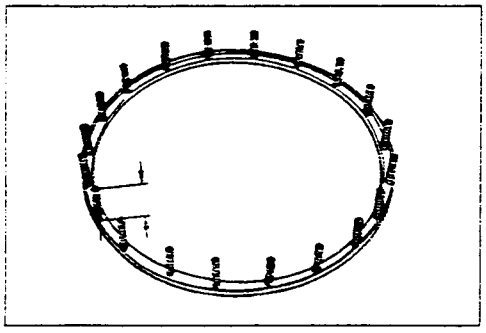


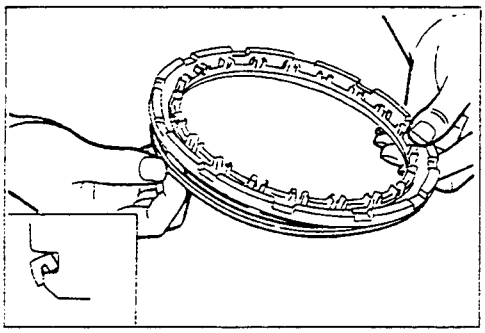
1. Snap Ring
2. Retaining Plate
3. Drive and Driven Plates
4. Dished Plate
5. Snap Ring
6. Spring and Retainer Assembly
7. Low and Reverse Brake Piston
8. Outer Seal
9. Inner Seal
10. Transaxle Case











Disassembly Note
Snap ring

1. Install the **SST** in the transaxle case as shown.

Caution
- **Depress the spring and retainer assembly only enough to remove the snap ring.**

2. Compress the spring and retainer assembly.

Caution
- **Do not deform the snap ring when removing it.**

3. Remove the snap ring.
4. Remove the **SST** and remove the spring and retainer assembly.

Low and reverse brake piston

Remove the low and reverse brake piston by a applying compressed air through the fluid passage.

Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

Inspection
Drive plates

1. Measure the facing thickness in three places, and determine the average of the three readings.

Standard: 1.6mm {0.063 in}
Minimum: 1.4mm {0.055 in}

2. If not within the specification, replace the drive plates.

Spring and retainer assembly

Note
- **Do not compress the spring when measuring with vernier calipers.**

1. Measure the free length of each spring and check for deformation.

Free length: 18.07mm {0.7114 in}

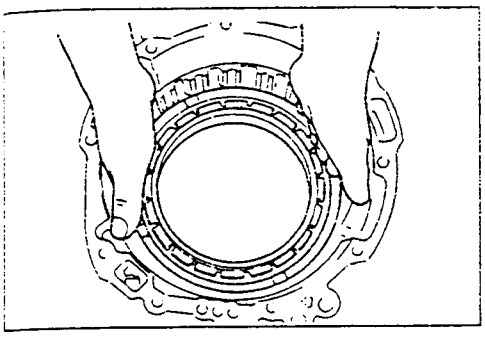
2. If not within the specification, replace the spring and retainer assembly.

Assembly Procedure

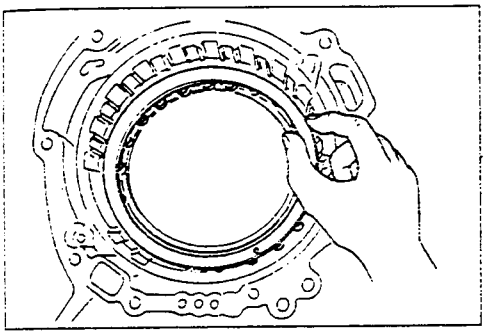
1. Install the low and reverse brake piston.
   (1) Apply ATF to the new inner and outer seals, and install them onto the low and reverse brake piston.

Seal ring inner diameter
Inner seal: 156.5mm {6.161 in}
Outer seal: 188.0mm {7.402 in}

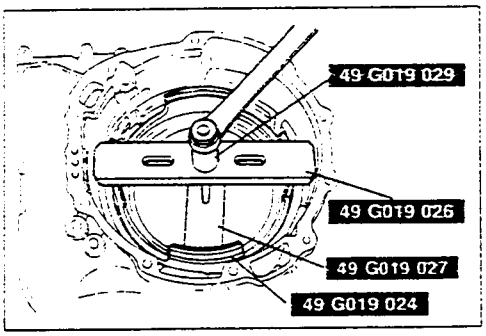
   (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the case.



(3) Install the low and reverse brake piston by pushing evenly around the circumference, being careful not to damage the outer seal.



2. Install the spring and retainer assembly.



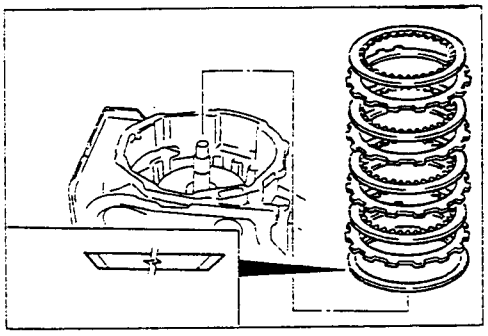
3. Install the **SST** in the transaxle case as shown.

Caution
- **Depress the spring and retainer assembly only enough to install the snap ring.**

4. Compress the spring and retainer assembly.

Caution
- **Do not deform the snap ring when installing it.**

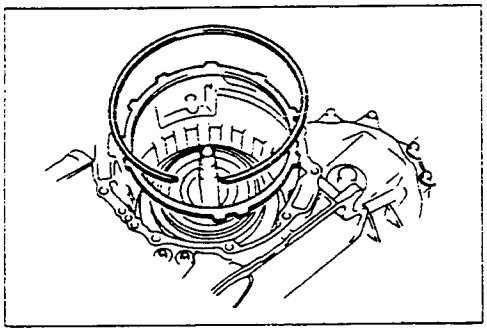
5. Install the snap ring.
6. Remove the **SST**.



7. Install the dished plate as shown in the figure.

Note
- **Installation order:**
  Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

8. Install the drive and driven plates.



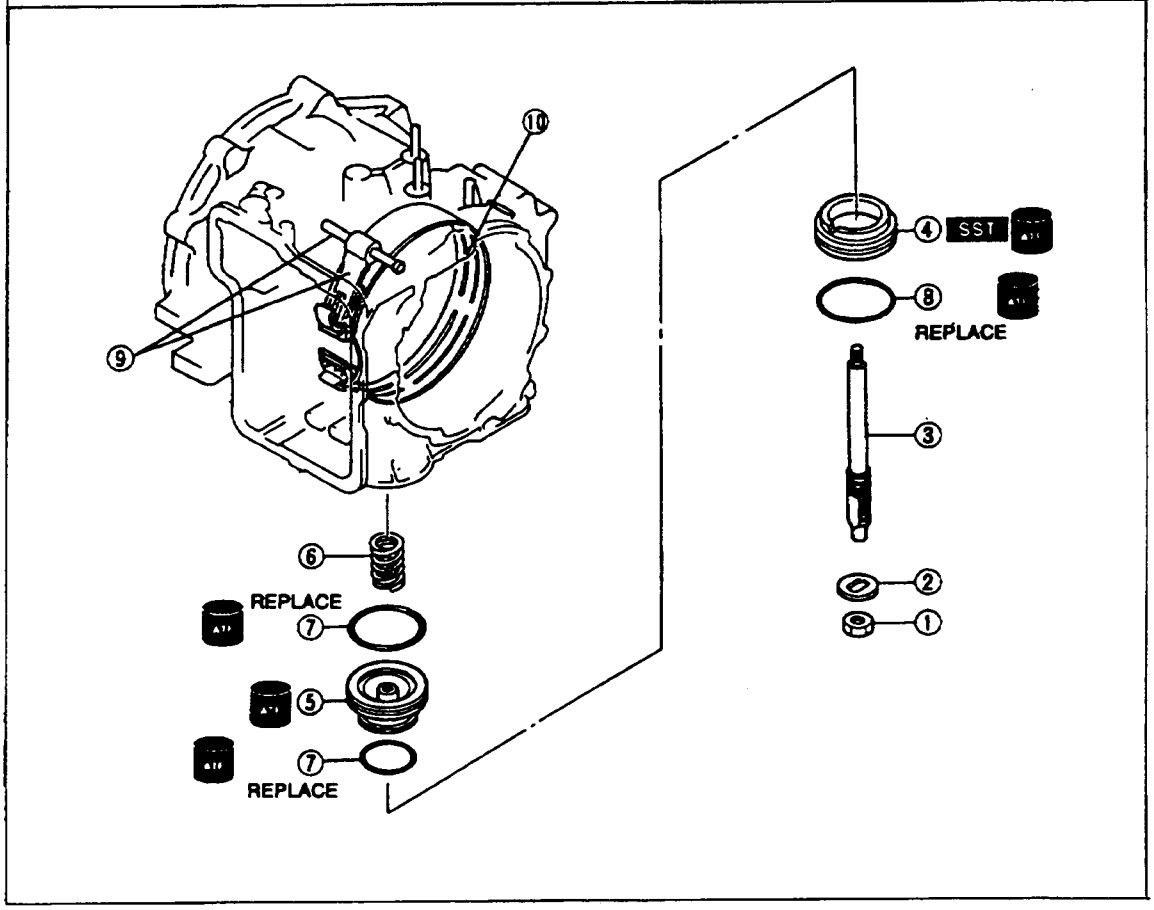
9. Install the retaining plate.

Caution
- **Do not deform the snap ring when installing it.**

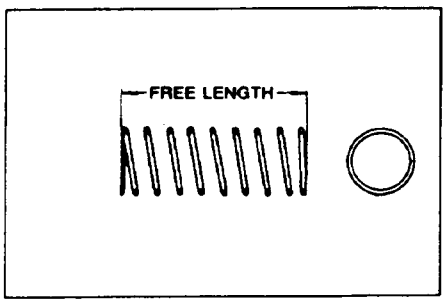
10. Install the snap ring.

2-4 BRAKE BAND

Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.



1. Nut
2. Washer
3. Piston Stem
4. Servo Retainer
5. Band Servo Piston
6. Servo Return Spring
7. D-ring
8. O-ring
9. Band Strut
10. 2-4 Brake Band



Inspection
Servo return spring

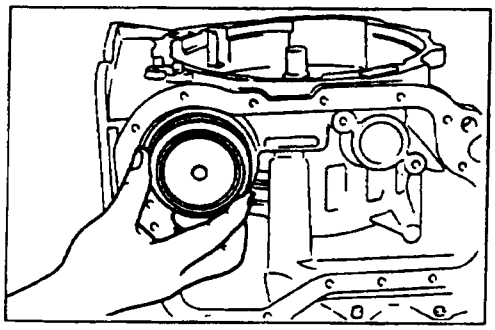
Note
- **Do not compress the spring when measuring with vernier calipers.**

1. Measure the spring free length.

Specifications

Outer diameter mm (in)	Free length mm (in)	No. of coils	Wire diameter mm (in)
27.7 (1.09)	43.25 (1.703)	4.5	3.2 (0.13)

2. If not within the specifications, replace the spring.

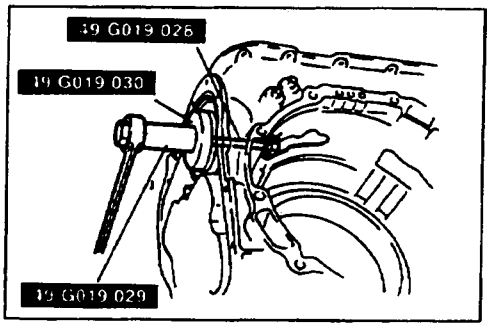


Assembly note
Servo retainer, Band servo piston
Install the servo into the transaxle case.
(1) Apply ATF to a new D-ring and install it onto the band servo piston.

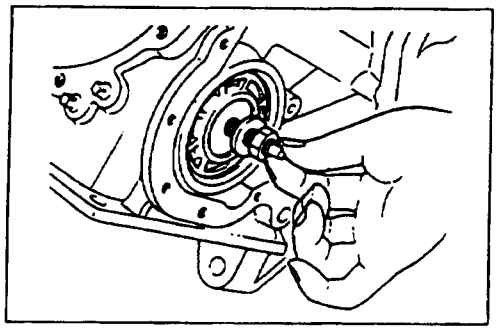
D-ring inner diameter
Small D-ring: 2.0 Engine...47.7mm {1.88in.}
2.5 Engine...29.4mm {1.16in.}
Large D-ring: 65.9mm {2.59 in}

(2) Assemble the servo piston and servo retainer.
(3) Apply ATF to new O-rings and install them onto the servo retainer.

O-ring inner diameter: 72.9mm {2.87 in}

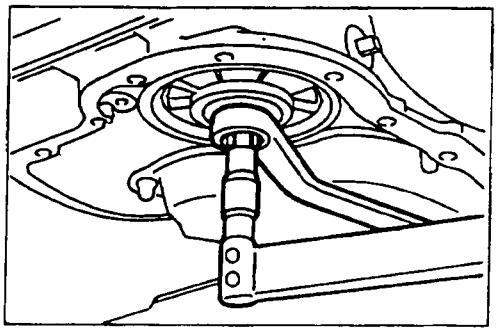


(4) Install the servo return spring and servo retainer assembly into the transaxle case.
(5) Press the servo retainer assembly by using the **SST**.
(6) Install the snap ring.



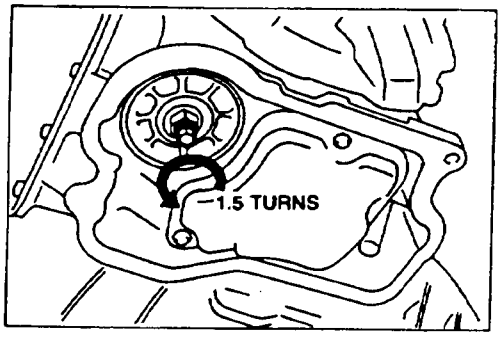
(7) Install the piston stem, washer, and nut to the band servo piston.

Note
- **Adjust the brake band when assembling the transaxle unit.**



8. Loosen the locknut and tighten the piston stem to the specified torque.

Tightening torque:
11.8—14.7 N·m {120—150 kgf·cm, 105—130 in·lbf}

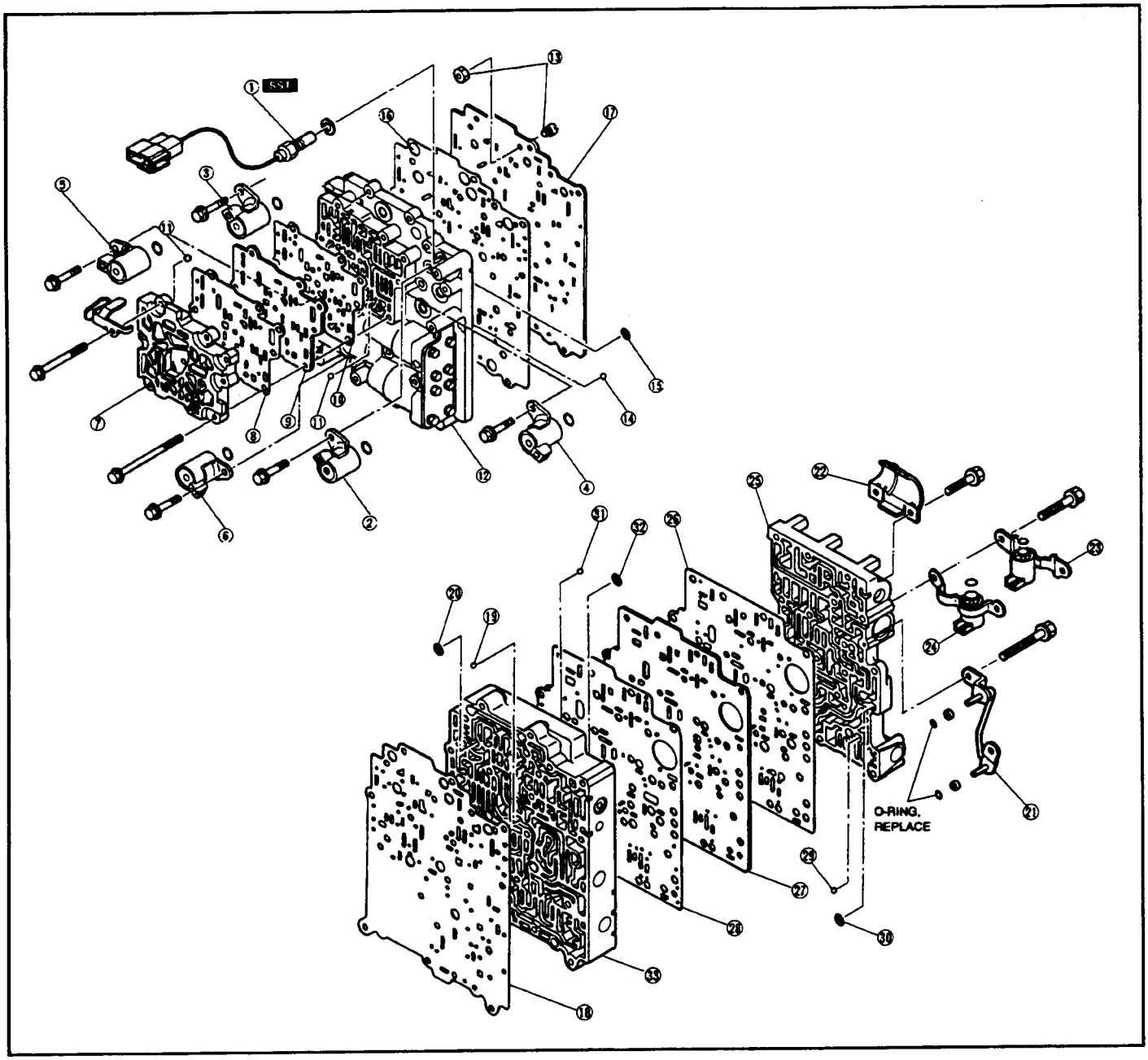


9. Loosen the piston stem 1.5 turns.
10. Hold the piston stem and tighten the locknut to the specified torque.

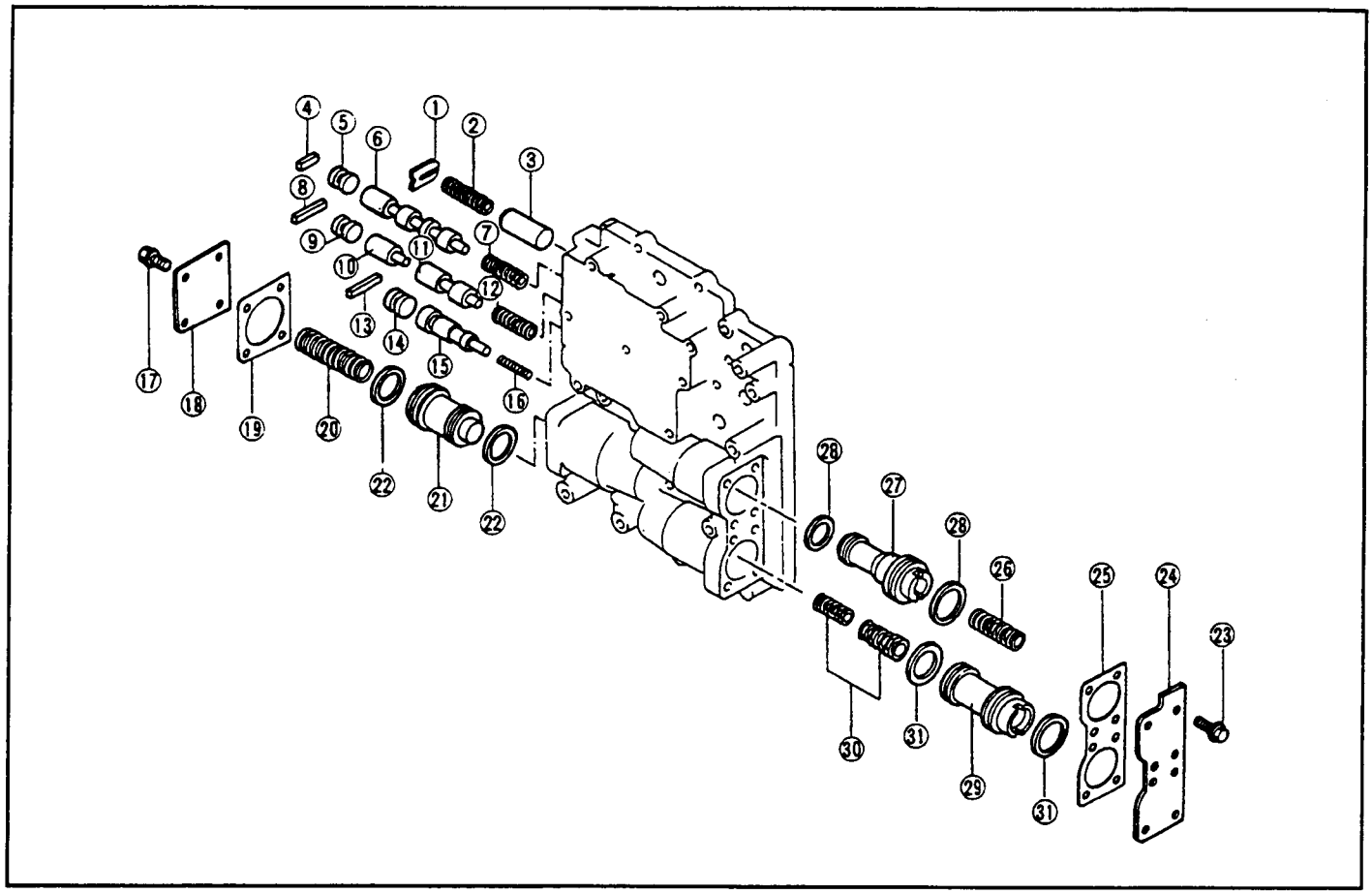
Tightening torque:
25—39 N·m {2.5—4.0 kgf·m, 19—28 ft·lbf}

NOTE: The servo cover {not shown} is a press in metal dust cover

VALVE BODY...DISASSEMBLY/ASSEMBLY

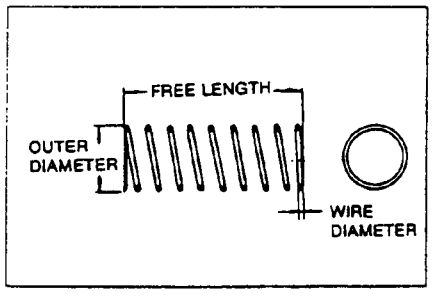


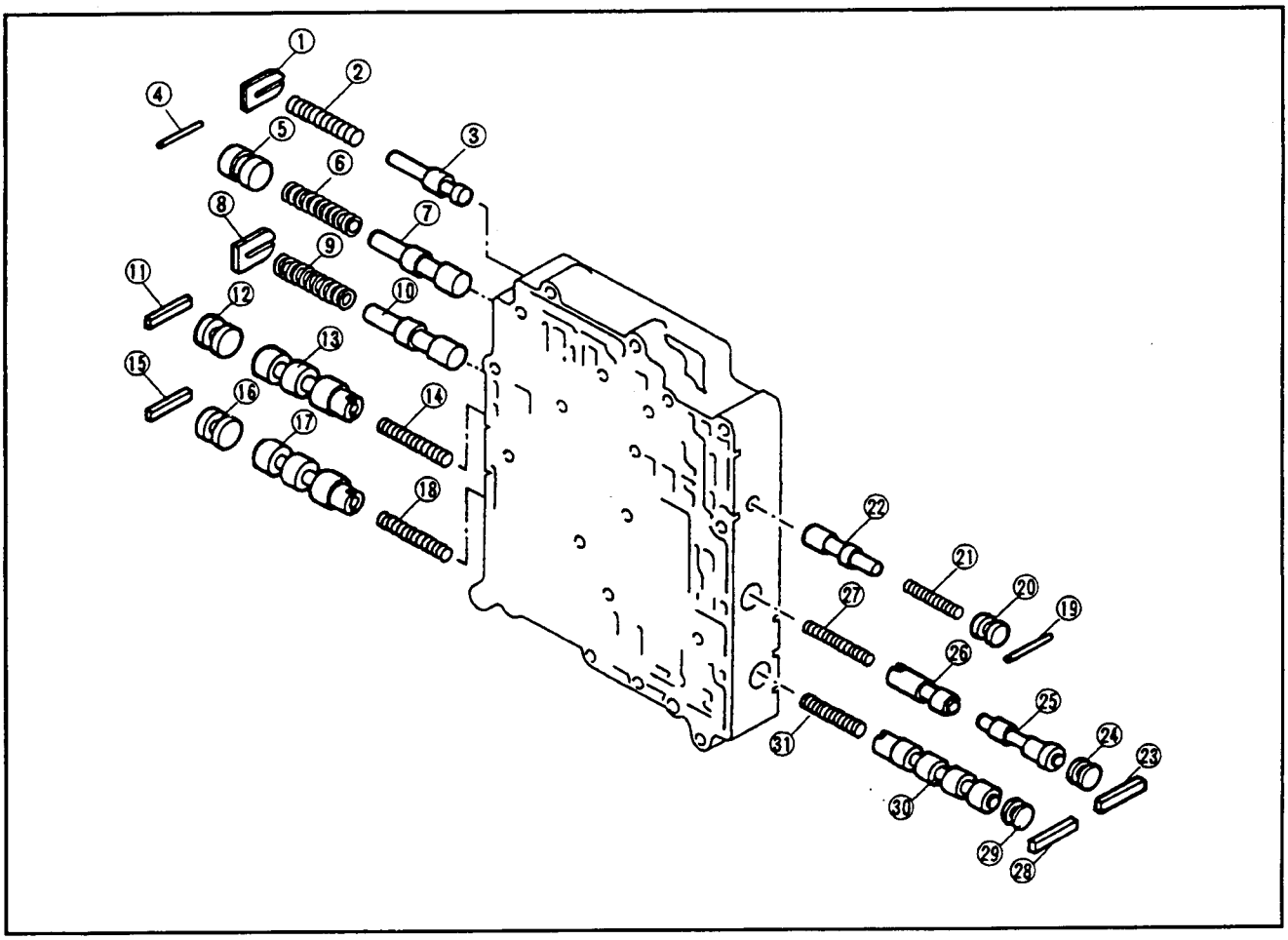
1. ATF Sensor
2. Line Pressure Solenoid
3. Lockup Solenoid
4. 3-2 Timing Solenoid
5. 1-2 Shift Solenoid
6. Lockup Control Solenoid
7. Front Control Valve Body
8. Front Premain Front Gasket
9. Premain Separator Plate
10. Front Premain Rear Gasket
11. Rubber Checkballs
12. Premain Separator Plate
13. Jet Orifices and Nuts
14. Rubber Checkballs
15. Oil Strainer
16. Premain Front Gasket
17. Main Separator Plate
18. Premain Rear Gasket
19. Rubber Checkballs
20. Oil Strainer
21. Oil Pipe Assembly
22. Oil Baffle
23. 2-3 Shift Solenoid
24. 3-4 Shift Solenoid
25. Rear Control Valve Body
26. Main Rear Gasket
27. Rear Separator Plate
28. Main Rear Front Gasket
29. Rubber Checkballs
30. Oil Strainers
31. Rubber Checkballs
32. Oil Strainers
33. Main Control Valve Body



1. Spring Retainer
2. Pressure Modifier Accumulator Spring
3. Pressure Modifier Accumulator Valve
4. Stop Pin
5. Stop Plug
6. 3-2 Timing Valve
7. 3-2 Timing Spring
8. Stop Pin
9. Stop Plug
10. Cut Back Valve A
11. Cut Back Valve B
12. Cut Back Spring
13. Stop Pin
14. Stop Plug
15. Bypass Valve
16. Bypass Spring
17. Bolts
18. 1-2 Accumulator Plate
19. 1-2 Accumulator Gasket
20. 1-2 Accumulator Spring
21. 1-2 Accumulator Piston
22. 1-2 Accumulator Sealing Rings
23. Bolts
24. N-R Accumulator Plate
25. N-R Accumulator Gasket
26. N-D Accumulator Spring
27. N-D Accumulator Piston
28. N-D Accumulator Sealing Rings
29. N-R Accumulator Piston
30. N-R Accumulator Spring
31. N-R Accumulator Sealing Rings

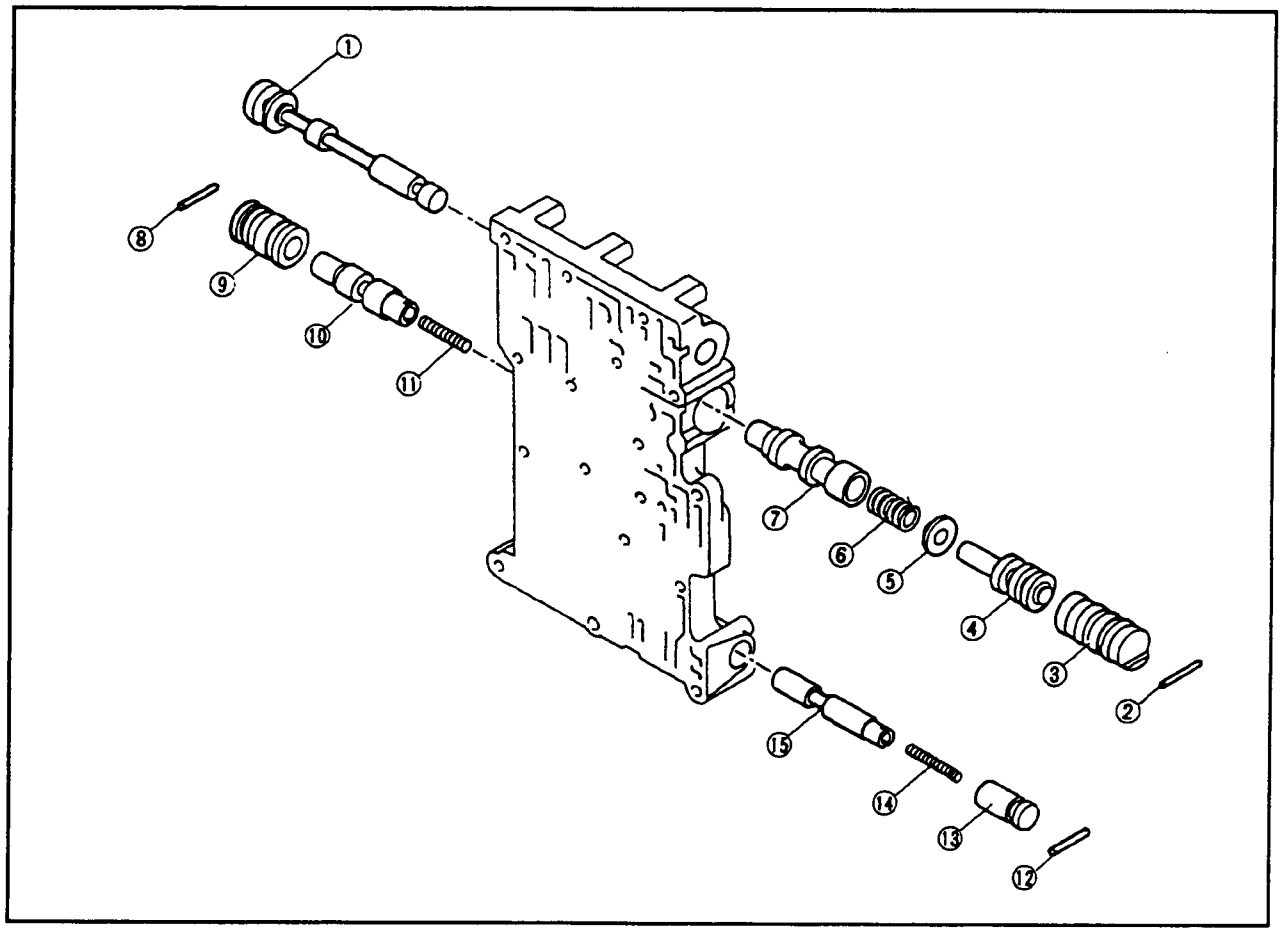
Spring \ Item			Outer diameter mm (in)	Free length mm (in)	No. of coils	Wire diameter mm (in)	Identification color
Pressure modifier accumulator spring			8.2 (0.32)	38.2 (1.50)	16.5	1.2 (0.047)	Light green
3-2 timing spring			8.25 (0.325)	35.4 (1.394)	12.5	0.85 (0.033)	Light blue
Cut back spring			8.2 (0.32)	29.8 (1.17)	7.4	0.6 (0.02)	Purple
Bypass spring			6.3 (0.25)	29.5 (1.16)	11.7	0.6 (0.02)	Dark green
1-2 accumulator spring			20.2 (0.795)	74.6 (2.94)	11.7	2.5 (0.098)	Light blue
	2.0	Small	14.8 (0.583)	81.6 (3.21)	17.7	1.7 (0.067)	Gray
	2.5	Large	20.2 (0.795)	81.6 (3.21)	12.5	2.3 (0.091)	Dark green
N-D accumulator spring			9.8 (0.39)	52.9 (2.08)	12.0	1.0 (0.039)	White
N-R accumulator spring		Small	7.2 (0.28)	60.1 (2.37)	26.2	1.0 (0.039)	Light blue
		Large	11.2 (0.441)	56.0 (2.20)	15.2	1.6 (0.063)	Red



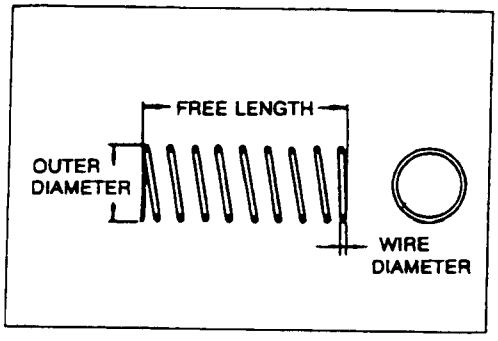


1. Spring Retainer
2. Converter Relief Spring
3. Converter Relief
4. Stop Pin
5. Stop Plug
6. Solenoid Reducing Spring
7. Solenoid Reducing Valve
8. Spring Retainer
9. Low Reducing Spring
10. low Reducing Valve
11. Stop Pin
12. Stop Plug
13. 1-2 Shift Valve
14. 1-2 Shift Spring
15. Stop Pin
16. Stop Plug
17. 2-3 Shift Valve
18. 2-3 Shift Spring
19. Stop Pin
20. Stop Plug
21. Coast Timing Spring
22. Coast Timing Valve
23. Stop Pin
24. Stop Plug
25. Lockup Shift Valve A
26. Lockup Shift Valve B
27. Lockup Shift Spring
28. Stop Pin
29. Stop Plug
30. 3-4 Shift Valve
31. 3-4 Shift Spring

Spring \ Item		Outer diameter mm (in)	Free length mm (in)	No. of coils	Wire diameter mm (in)	Identification color
Convertor relief spring		7.4 (0.29)	32.3 (1.27)	13.5	1.1 (0.043)	Light blue
Solenoid reducing spring		8.0 (0.31)	39.7 (1.56)	12.0	0.9 (0.03)	Red
Low reducing spring		8.7 (0.34)	38.3 (1.51)	12.5	0.9 (0.03)	Yellow
1-2 shift spring		7.4 (0.29)	36.6 (1.44)	12.0	0.8 (0.031)	Purple
2-3 shift spring		7.4 (0.29)	36.6 (1.44)	12.0	0.8 (0.031)	Purple
Coast timing spring	2.0	6.3 (0.25)	29.7 (1.17)	14.5	0.65 (0.026)	Maroon
	2.5	6.2 (0.24)	28.0 (1.10)	16.0	0.6 (0.02)	Light blue
Lockup shift spring		6.0 (0.24)	40.0 (1.57)	13.8	0.5 (0.02)	White
3-4 shift spring		7.4 (0.29)	36.6 (1.44)	12.0	0.8 (0.031)	Purple



1. Manual Valve
2. Stop Pin
3. Pressure Regulator Sleeve
4. Pressure Regulator Plug
5. Pressure Regulator Spring Seat
6. Pressure Regulator Spring
7. Pressure Regulator Valve
8. Stop Pin
9. Lockup Control Plug
10. Lockup Control Valve
11. Lockup Control Spring
12. Stop Pin
13. 2-3 Timing Plug
14. 2-3 Timing Spring
15. 2-3 Timing Valve

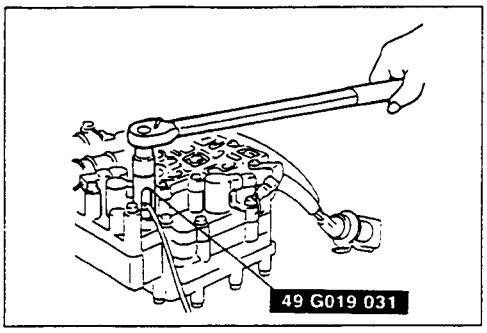


Inspection

Note
- **Do not compress the spring when measuring it.**

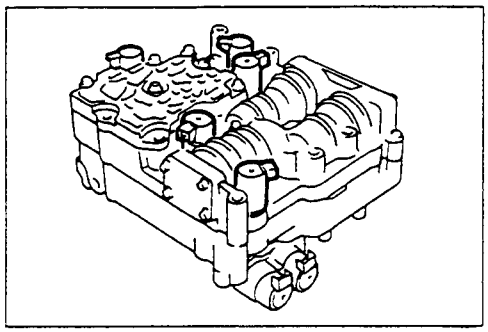
Measure the spring free length.
If not within the specifications, replace the spring.

Item / Spring	Outer diameter mm (in)	Free length mm (in)	No. of coils	Wire diameter mm (in)	Identification color
Pressure regulator spring	12.0 (0.472)	33.9 (1.34)	7.0	1.1 (0.043)	Dark blue
Lockup control spring	5.8 (0.23)	33.1 (1.30)	12.6	0.55 (0.022)	White
2-3 timing spring	4.7 (0.19)	22.3 (0.878)	14.0	0.65 (0.026)	White

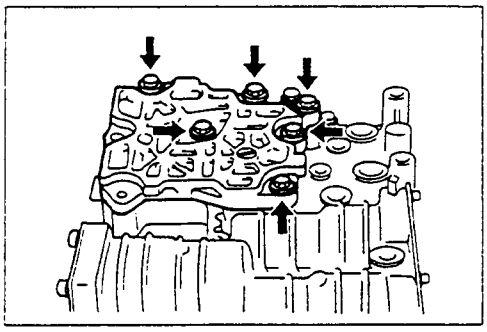


Disassembly Procedure

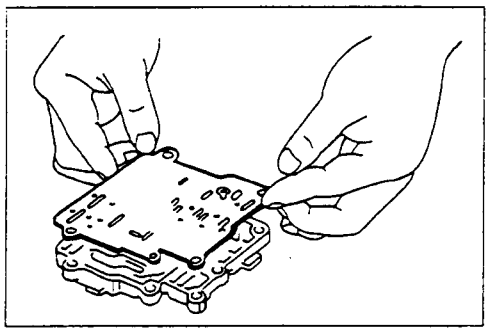
1. Remove the ATF thermosensor by using the **SST**.



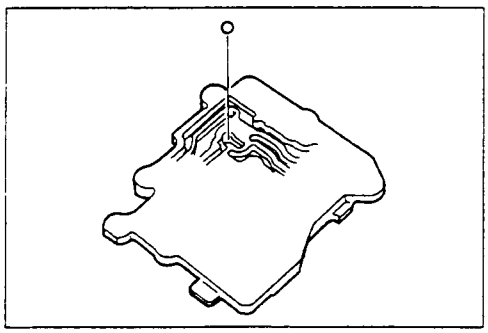
2. Remove the solenoid valves (line pressure. lockup, 3-2 timing, 1-2 shift, lockup control).
3. Remove the O-rings from the solenoid valves.



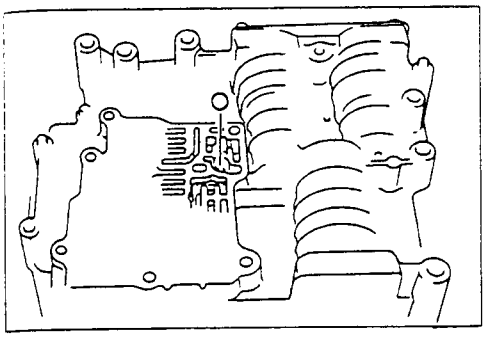
4. Remove the bolts indicated and remove the front control valve body and premain separator plate and gaskets.



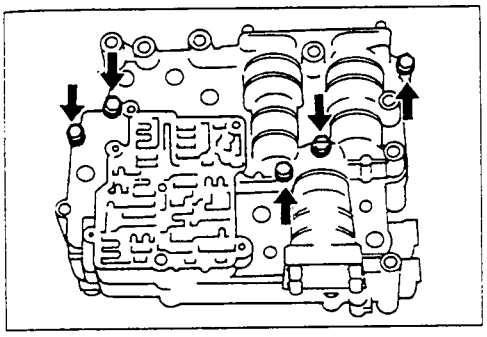
5. Remove the front/premain gaskets and separator plate from the front control body.



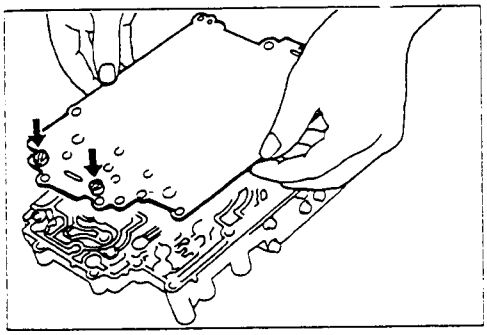
6. Remove the rubber ball from the front control valve body.



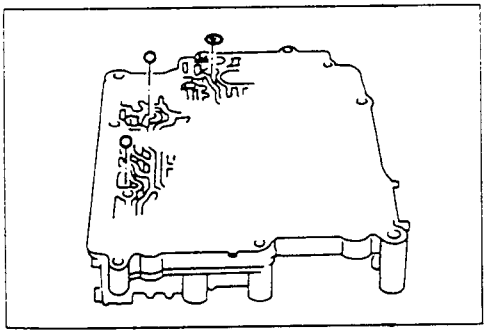
7. Remove the rubber ball from the premain control valve body.



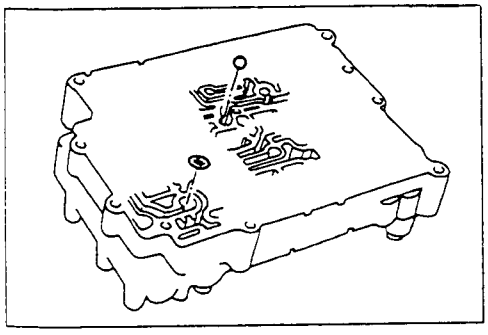
8. Remove the bolts and remove the premain control body and the main separator plate and gaskets.



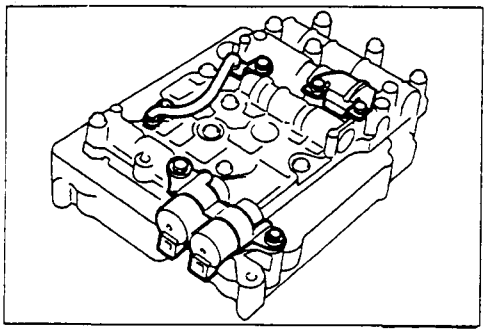
9. Remove the premain/main gaskets and separator from the premain control body.
10. Remove the jet orifices and nuts from the main separator plate.



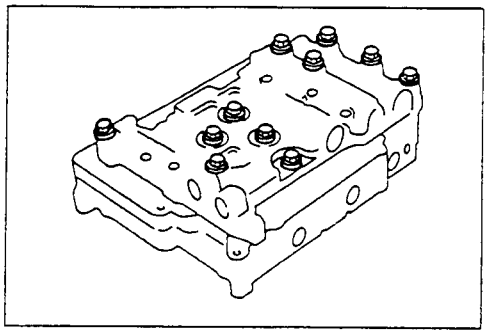
11. Remove the rubber balls and oil strainer from the premain control body.



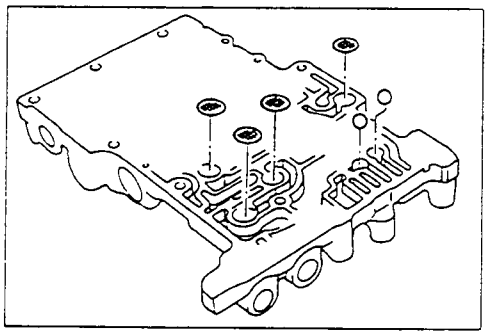
12. Remove the rubber balls and oil strainer from the main control valve body.



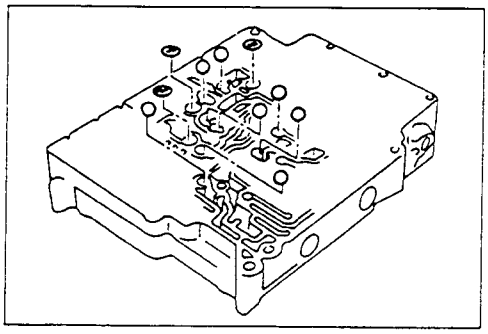
13. Turn the assembly over and remove the oil pipe, oil baffle and solenoid valves (2-3 shift, 3-4 shift).



14. Remove the bolts shown in the figure and remove the rear separator plate and gaskets.

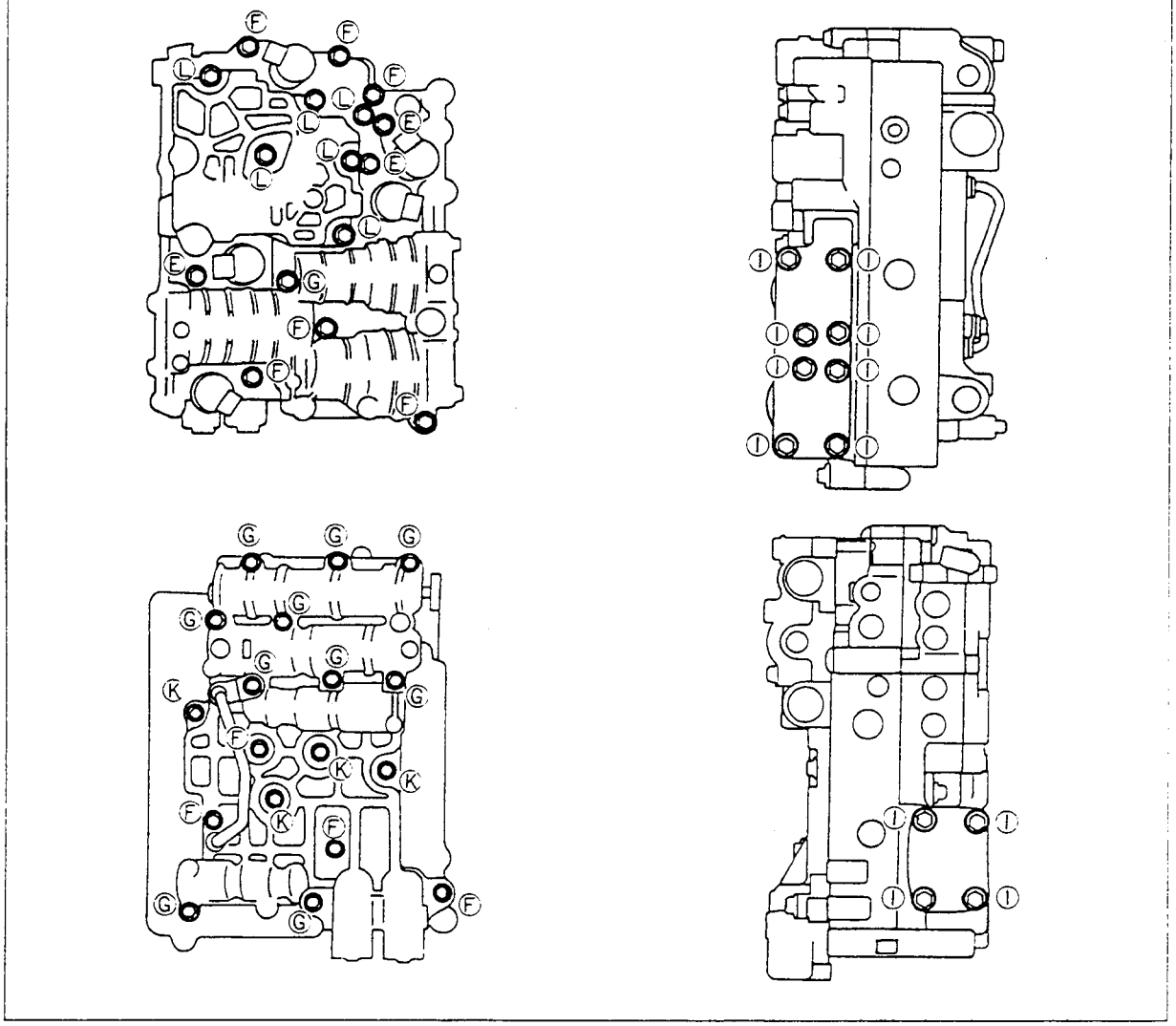


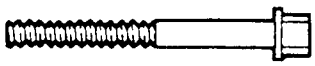
15. Remove the main/rear gaskets and separator from the rear control valve body.
16. Remove the rubber balls and oil strainers from the rear control valve body.

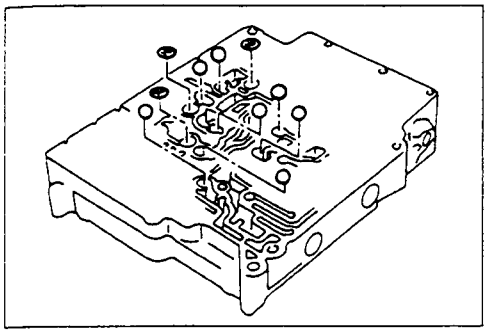


17. Remove the rubber balls and oil strainers from the main control body.

Bolt installation positions and external parts locations

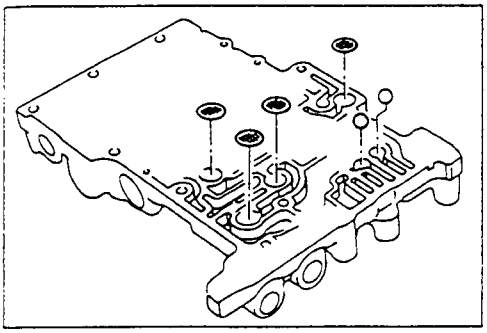


Identification mark	Bolt	Length mm {in}	Tightening torque N·m {kgf-cm, in-lbf}
L		50 {2.0}	6.5—7.8 {66—80, 58—69}
G		40 {1.6}	
F		30 {1.2}	
K		20 {0.79}	
E		12 {0.47}	
I		16 {0.63}	

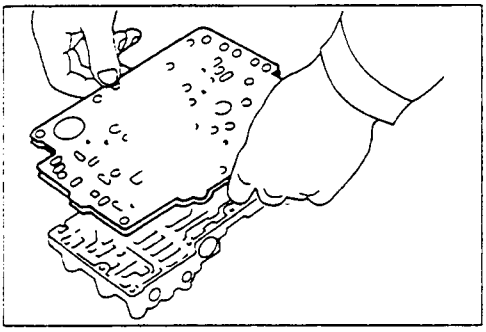


Assembly procedure

1. Install the oil strainers and rubber balls into the main control valve body.

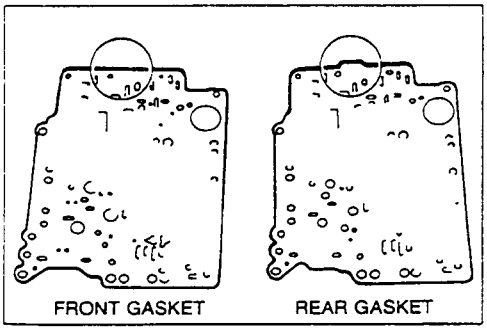


2. Install the oil strainers and rubber balls into the rear control valve body.

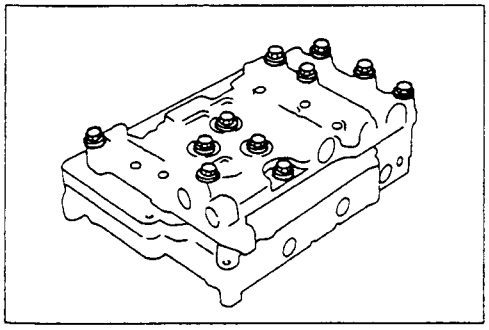


Caution

- **Do not confuse the main/rear front gasket and main/rear rear gasket.**



3. Set the new main/rear front gasket, rear separator plate, and new main/rear rear gasket on the rear control valve body.

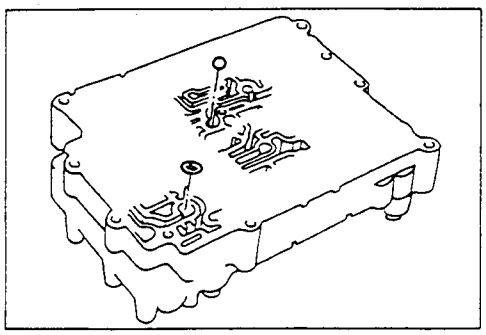


4. Set the rear control valve body onto the main control valve body.

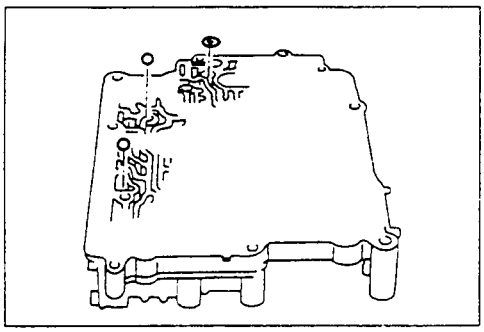
Note

- **Match the bolt head letters as shown.**

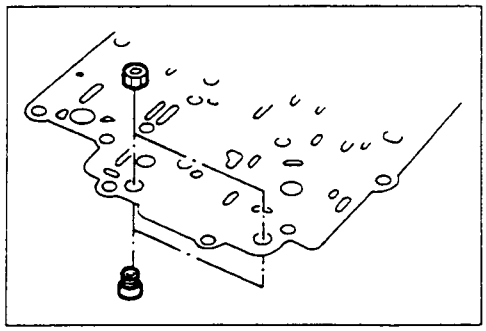
5. Install and loosely tighten the bolts.



6. Install the oil strainer and rubber balls into the main control valve body.

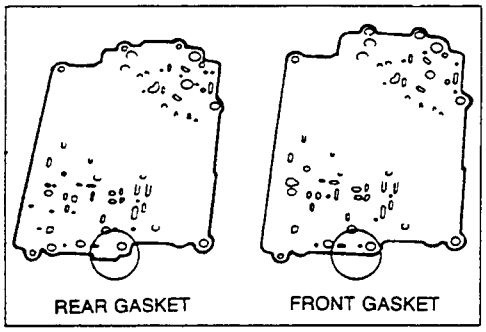


7. Install the oil strainer and rubber balls into the premain control valve body.

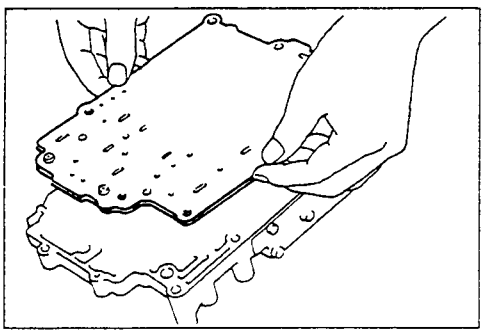


8. Install the jet orifices and nuts to the main separator plate.

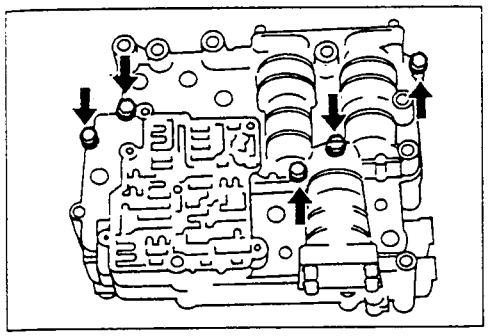
Tightening torque:
1.7—2.2 N·m {17—23 kgf·cm, 15—19 in·lbf}



Caution
- **Do not confuse the premain/main front gasket and premain/main rear gasket.**



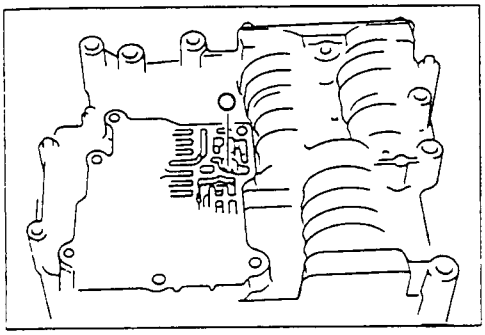
9. Set a new premain/main rear gasket, main separator plate, and new premain/main front gasket on the premain control valve body.



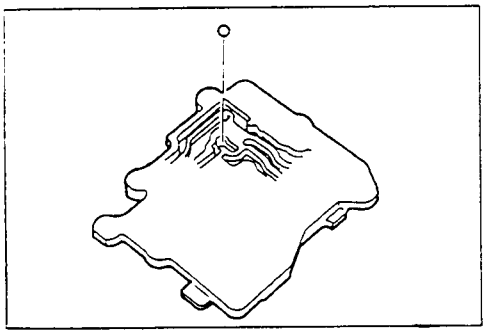
10. Set the premain control valve body onto the main control valve body.

Note
- **Match the bolt head letters.**

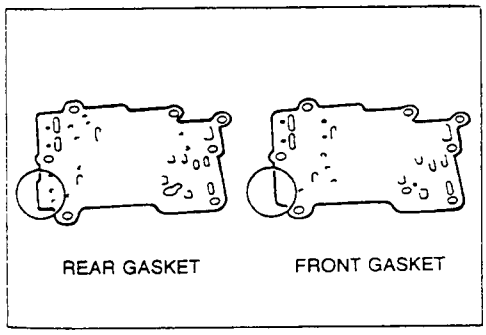
11. Install and loosely tighten the bolts.



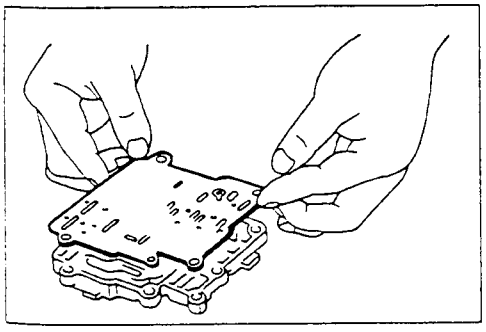
12. Install the rubber ball into the premain control valve body.



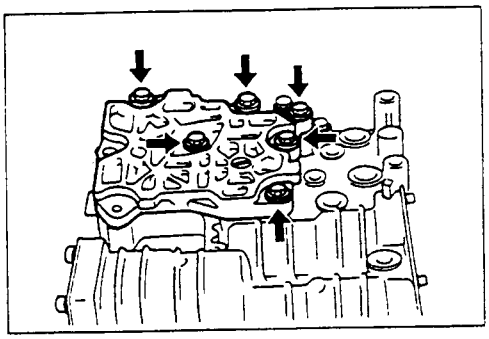
13. Install the rubber ball into the front control valve body.



Caution
- **Do not confuse the front/premain front gasket and front/premain rear gasket.**



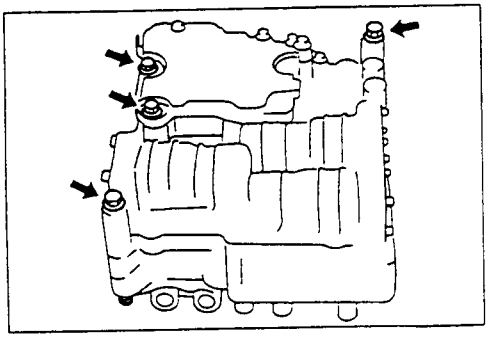
14. Set a new front/premain rear gasket, premain separator plate, and new front/premain front gasket on the front control valve body.



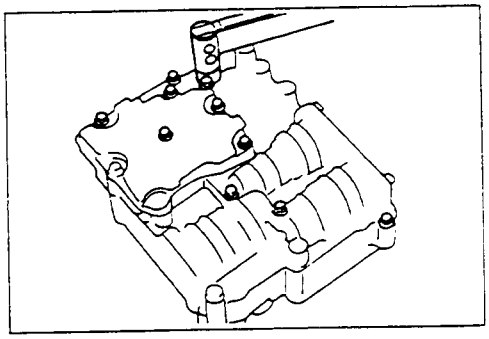
15. Set the front control valve body onto the premain control valve body.

Note
- **Match the bolt head letters as shown.**

16. Install and loosely tighten the bolts.

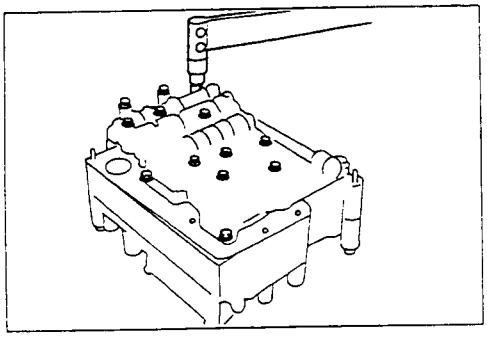


17. Install four control valve body bolts as shown for alignment.



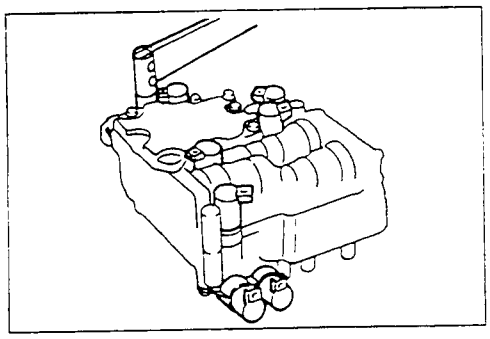
18. Tighten the mounting bolts.
    (1) Tighten the front control body.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



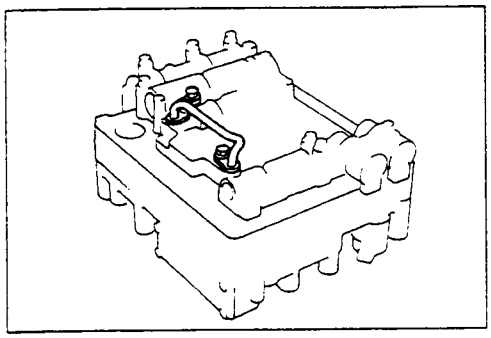
(2) Tighten the rear control valve body.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



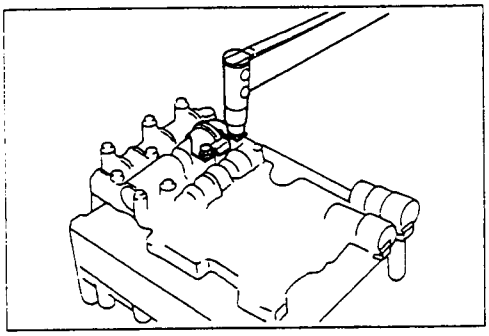
19. Apply ATF to new O-rings and install them onto the solenoid valves.
20. Install the solenoid valves.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



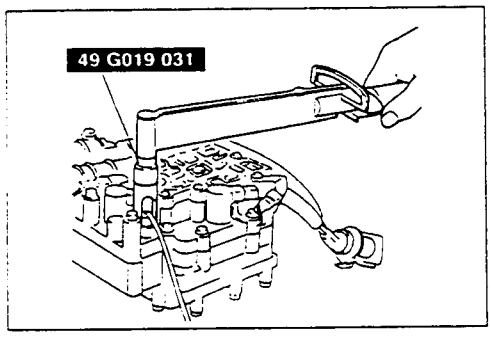
21. Apply ATF to new O-rings and install them onto the oil pipe assembly.
22. Install the oil pipe assembly.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}



23. Install the oil baffle.

Tightening torque:
6.5—7.8 N·m {66—80 kgf·cm, 58—69 in·lbf}

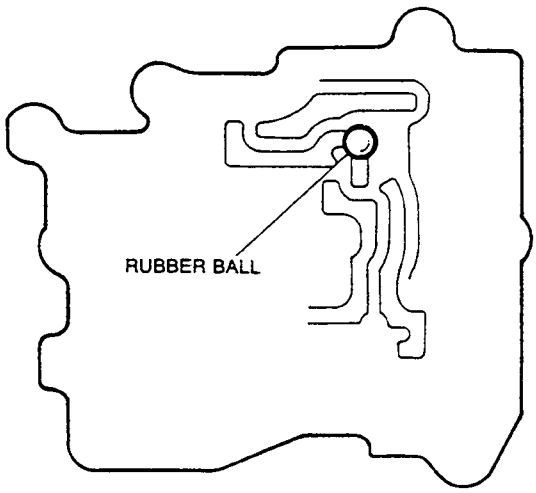


24. Install the ATF thermosensor by using the **SST**.

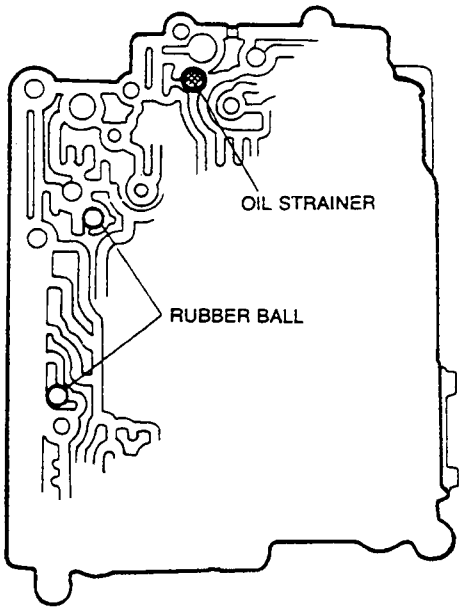
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}

Rubber ball, oil strainer installation positions

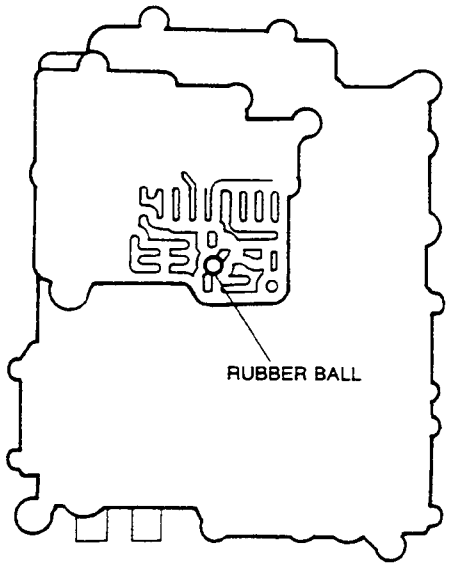
FRONT CONTROL VALVE BODY



PREMAIN CONTROL VALVE BODY
(MAIN CONTROL VALVE BODY SIDE)

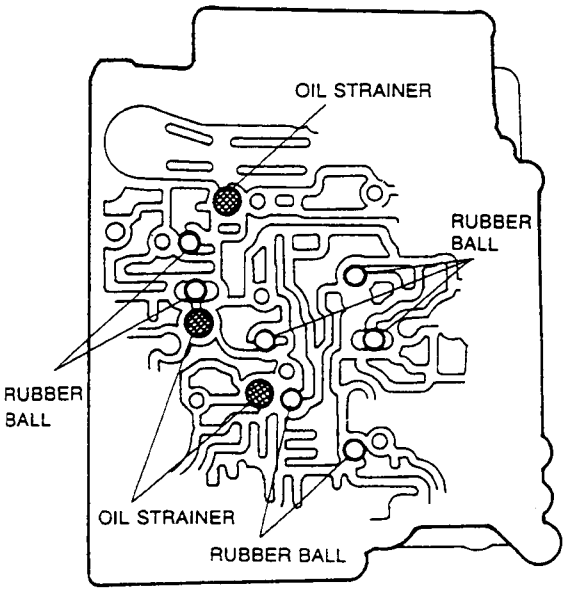


(FRONT CONTROL VALVE BODY SIDE)

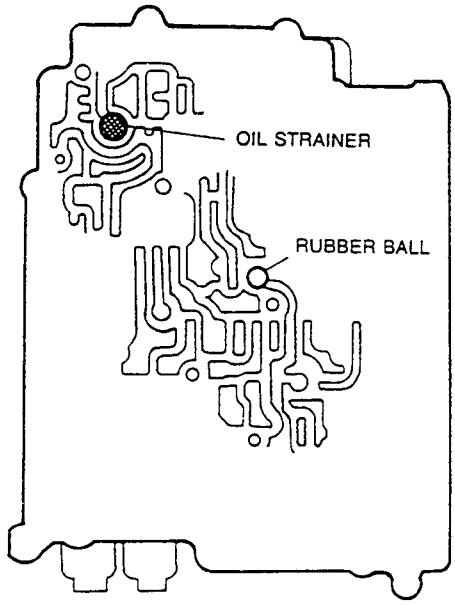


MAIN CONTROL VALVE BODY

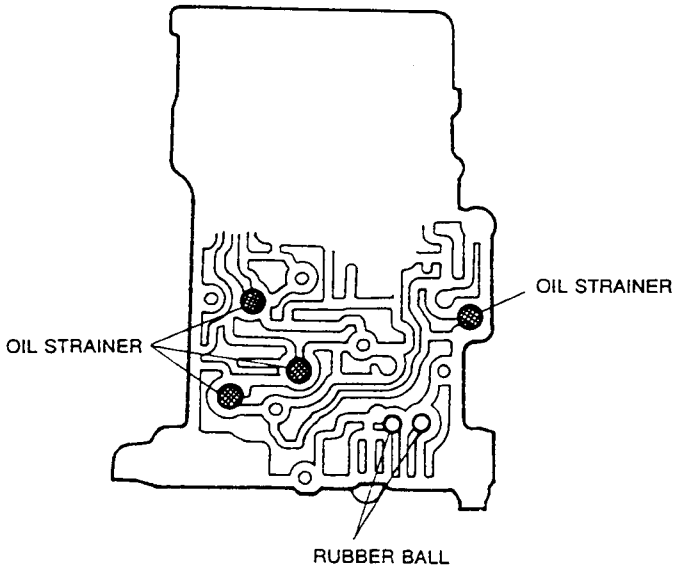
(REAR CONTROL VALVE BODY SIDE)



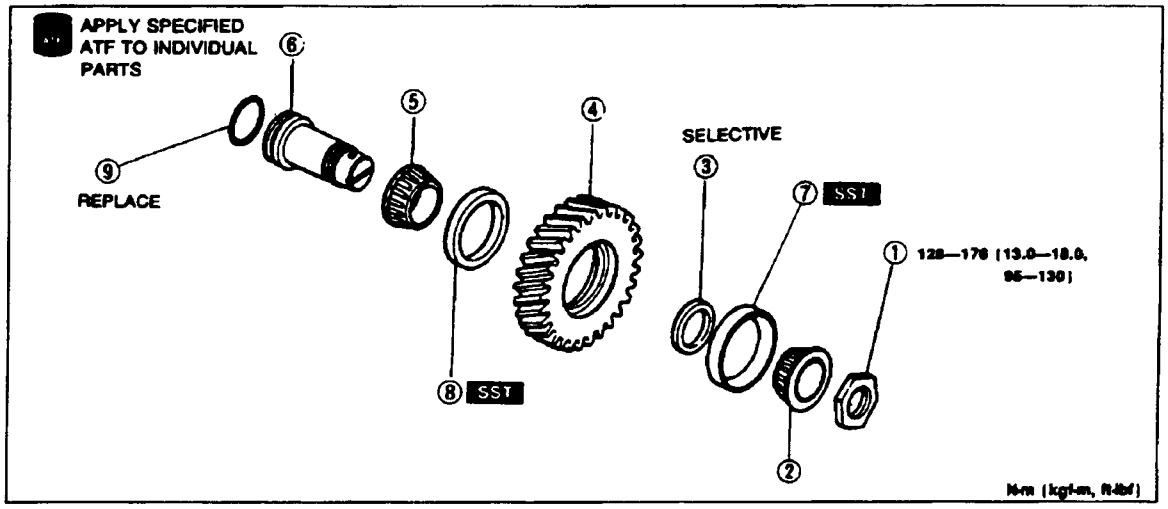
(PREMAIN CONTROL VALVE BODY SIDE)



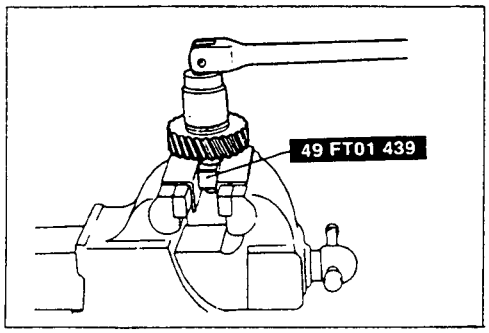
REAR CONTROL VALVE BODY



IDLER GEAR ASSEMBLY



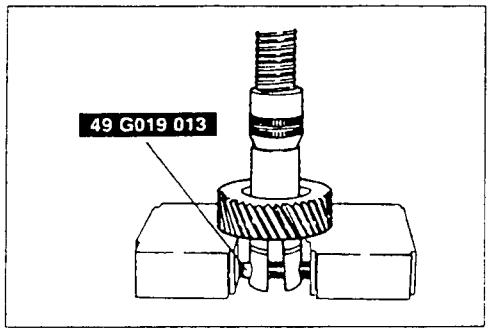
1. Locknut
2. Bearing
3. Spacer
4. Idler Gear
5. Bearing
6. Idler Gear Shaft
7. Bearing Race
8. Bearing Race
9. o-Ring



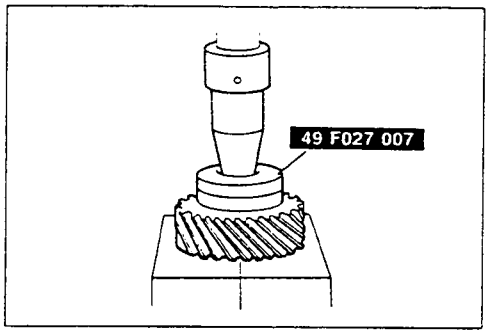
Disassembly Note
Locknut

Note
- **Use protective plates in the vise to prevent damage to the SST.**

1. Secure the **SST** and the idler gear assembly in a vise.
2. Remove the locknut.

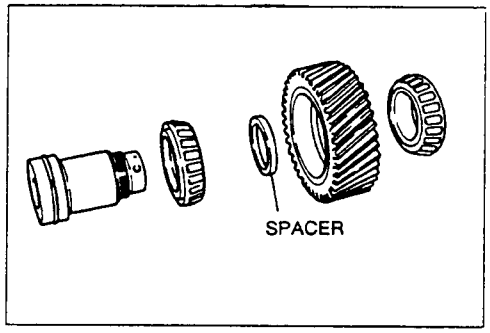


Bearing race
Remove the bearing race from the idler gear by using the **SST**.



Assembly Procedure

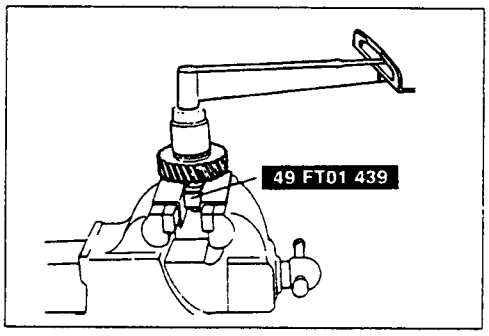
1. Press the new bearing race in by using the **SST**.



2. Install the bearing onto the idler gear shaft, then install the idler gear, spacer,and bearing.

Note

- **Use protective plates in the vise to prevent damage to the SST.**

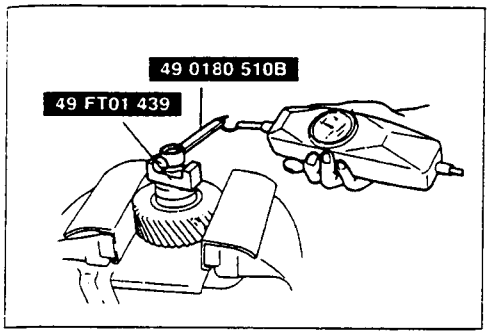


3. Secure the **SST** and the idler gear assembly in a vise.
4. Install the locknut.

Tightening torque:
128—176 N·m {13.0—18.0 kgf·m, 95—130 ft·lbf}

5. Apply ATF to a new O-ring and install it onto the idler gear shaft.

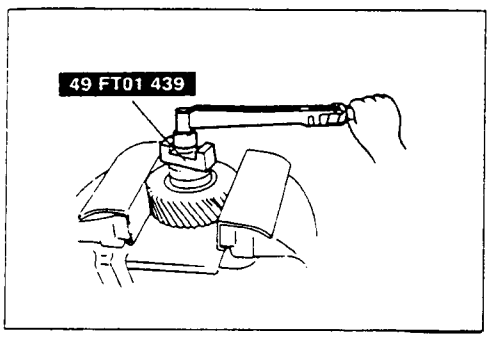
O-ring inner diameter: 33.0mm {1.30 in}



Note

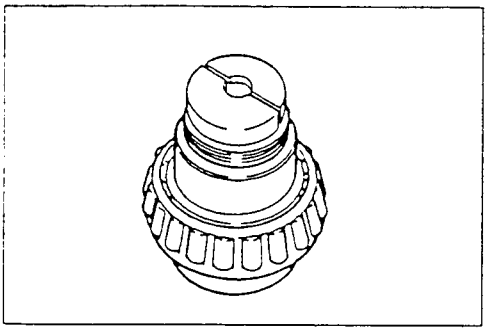
- **Use protective plates in the vise to prevent damage to the idler gear.**
- **Read the preload when the idler shaft starts to turn.**

6. Secure the idler gear in a vise.
7. Measure the bearing preload by using the **SST**.



Preload:
0.03—0.88 N·m {0.3—9.0 kgf·cm, 0.3—7.8 in·lbf}

Pull scale reading:
0.3—8.8 N {0.03—0.90 kgf, 0.07—1.98 lbf}



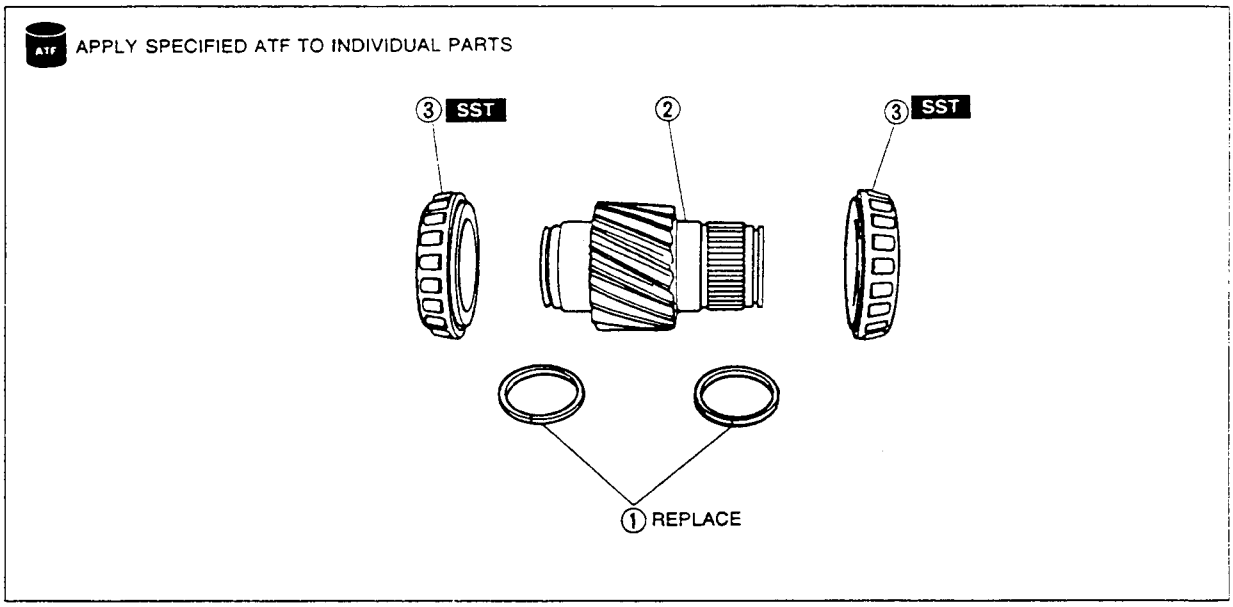
Note

- **Preload is reduced by increasing the thickness of the adjustment spacers or increased by reducing the thickness.**

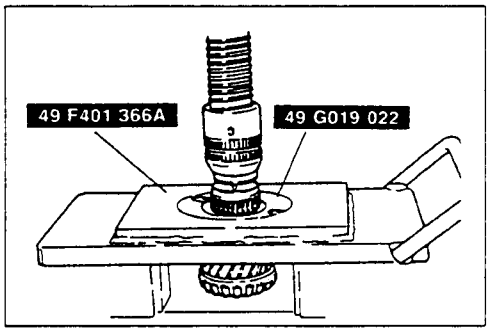
8. If the specified preload cannot be obtained within the specified tightening torque, adjust by selecting the proper adjustment spacers from below.

Thickness of shim mm {in}			
4.540 {0.179}	4.575 {0.180}	4.610 {0.181}	4.645 {0.183}
4.680 {0.184}	4.715 {0.186}	4.750 {0.187}	4.785 {0.188}
4.820 {0.190}	4.855 {0.191}	4.890 {0.193}	4.925 {0.194}
4.960 {0.195}	4.995 {0.197}	5.030 {0.198}	5.065 {0.199}
5.100 {0.201}	5.135 {0.202}	5.170 {0.204}	5.205 {0.205}
5.240 {0.206}	5.275 {0.208}	5.310 {0.209}	

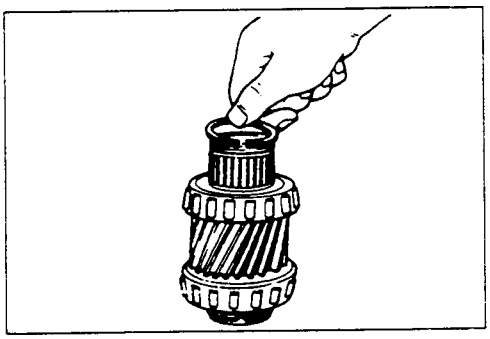
OUTPUT GEAR ASSEMBLY



1. Seal rings
2. Output gear
   Inspect for wear and cracks
3. Bearing
   Disassembly Note..... below
   Inspect for wear and rough rotation



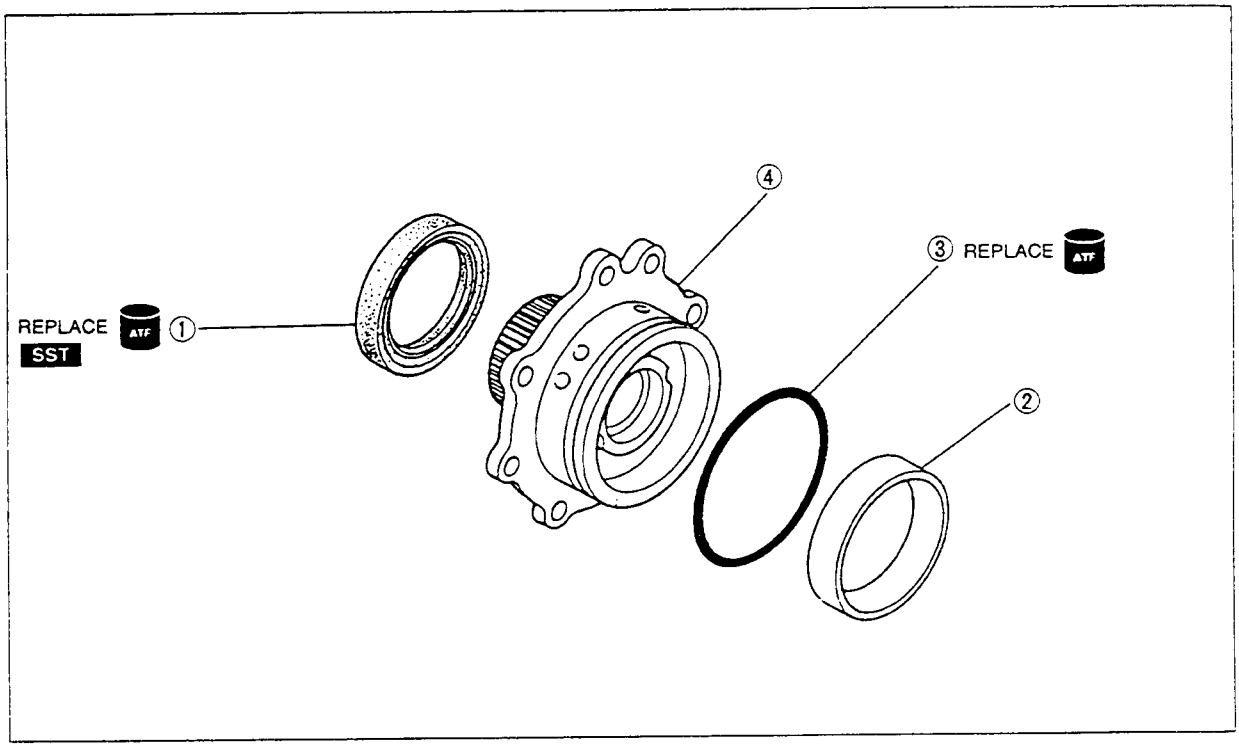
Disassembly note
Bearing
Remove the bearings from the output gear by using the **SST**.



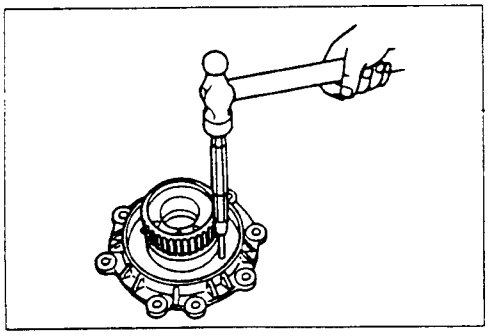
Note
- **Do not damage the seal ring when installing it.**

Apply ATF to new seal rings and assemble them to each side of the output gear.

Seal ring outer diameter: 36.9mm {1.45 in}



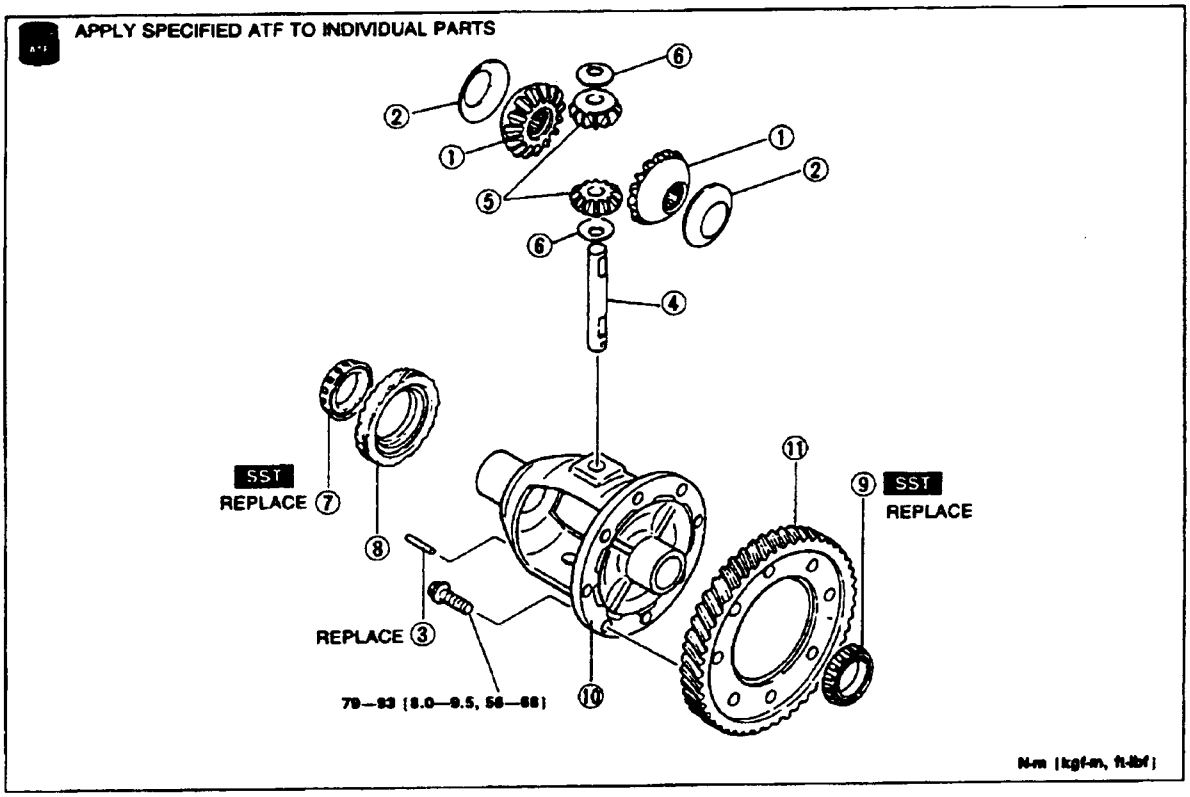
1. Oil seal
2. Bearing race
   Disassembly Note..... below
   Inspect bearing surface for scoring and scratches
3. O-ring
4. Bearing cover



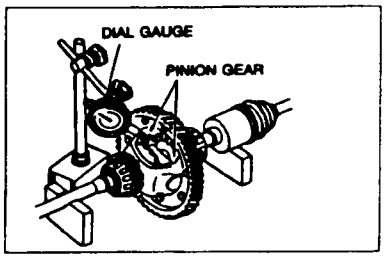
Disassembly note
Bearing race
Remove the bearing race by using a pin punch and a hammer.

O-ring inner diameter: 85.1mm {3.35 in}

DIFFERENTIAL...DISASSEMBLY / ASSEMBLY



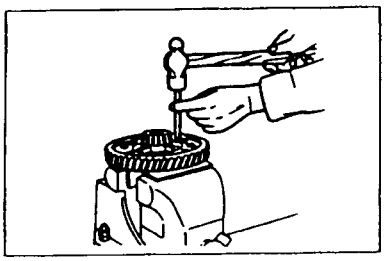
1. Side Gear
2. Thrust Washer
3. Roll Pin
4. Pinion Shaft
5. Pinion Gear
6. Thrust Washer
7. Bearing
8. Speedometer Drive Gear
9. Bearing
10. Gear Case
11. Ring Gear



Preinspection
Backlash of side gear and pinion gear
Before disassembly, measure the backlash of the side gears.

Backlash
Standard : 0.05—0.15mm {0.0020—0.0059 in}
Maximum: 0.50mm {0.020 in}

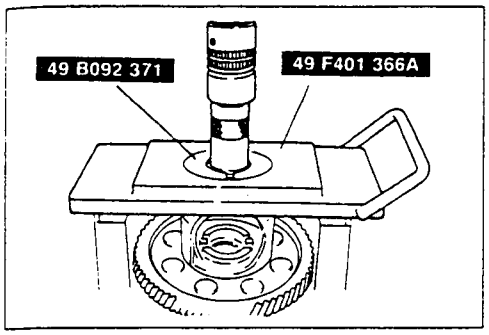
If not within the specification, replace worn and damage parts.



Disassembly Note
Roll pin

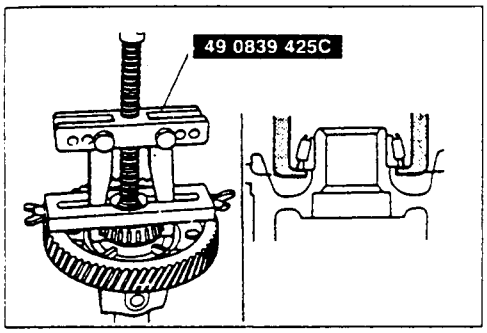
Note
- **Use protective plates in the vise to prevent damage to the differential.**
- **Insert the punch into the roll pin hole from the ring gear side.**

Place the gear case in a vise and knock the pin out with a suitable pin punch (**ϕ2.0mm {0.079 in}**) and hammer.

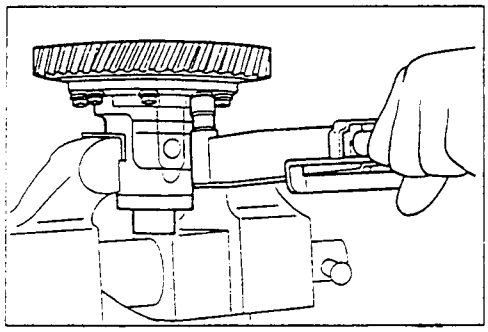


Bearing

1. Remove the bearing (speedometer drive gear side) from the gear case by using the **SST**.



2. Remove the bearing (ring gear side) by using a combination of parts from the **SST**.

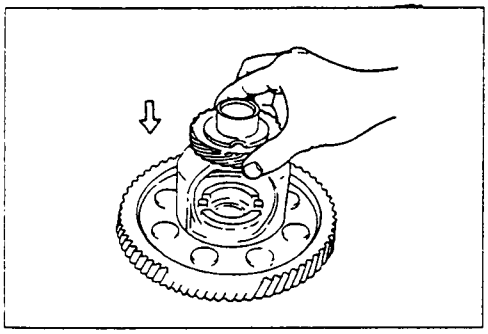


Assembly procedure

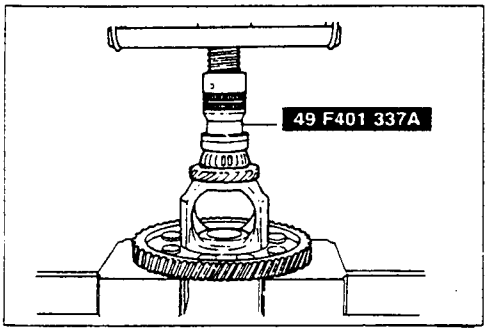
Caution
- **Use pads in the vise to prevent damaging the part.**

1. Install the ring gear to the gear case.

Tightening torque:
79—93 N·m {8.0—9.5 kgf·m, 58—68 ft·lbf}

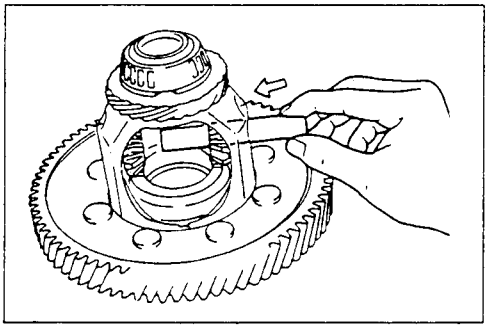


2. Set the speedometer drive gear onto the gear case assembly.

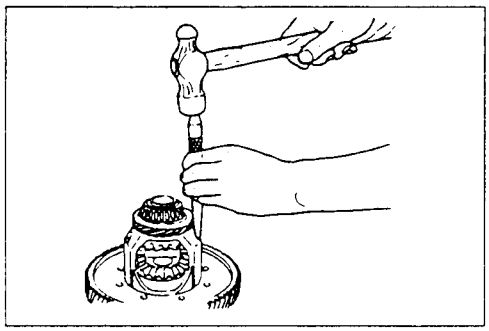


Caution
- **Do not reuse bearings that have been removed.**

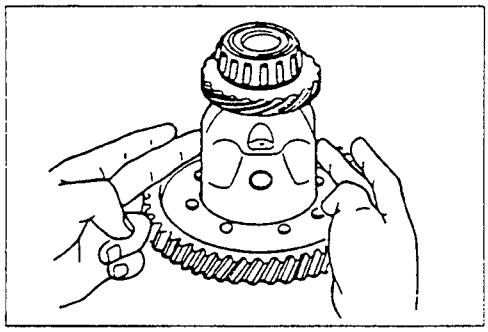
3. Install the new bearing.
   (1) Press the new bearing (speedometer drive gear side) onto the gear case by using the **SST**.
   (2) Press on the other new bearing (ring gear side) in the same manner.



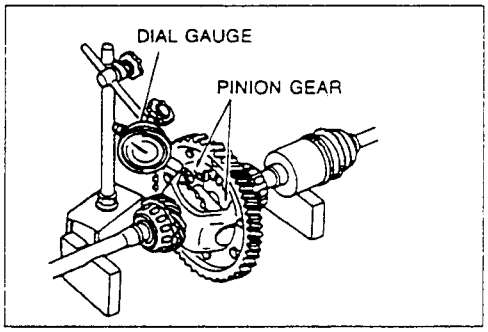
4. Apply ATF to the thrust washers and pinion shaft.
5. Install the pinion gears and thrust washers into the gear case.
6. Install the pinion shaft.



7. Install the roll pin, and crimp it to prevent it from coming out of the gear case.



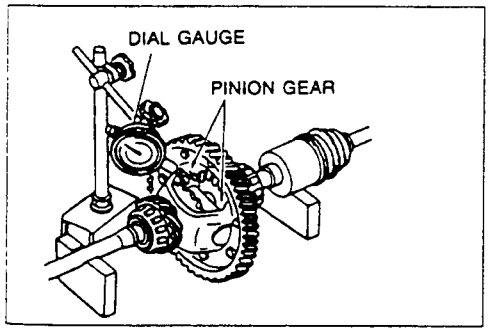
8. Apply ATF to the thrust washers.
9. Install the thrust washers and side gears into the gear case, then turn the side gears and align them with the drive shaft holes.



10. Measure the backlash of the side gears as follows:
    (1) Install the left and right drive shafts in the differential assembly.
    (2) Support the drive shafts on V-blocks.
    (3) Measure the backlash of both side gears.

    Backlash
    Standard : 0.05—0.15mm {0.0020—0.0059 in}
    Maximum: 0.50mm {0.020 in}

11. If the backlash is not within the specification, rebuild or replace the differential assembly.

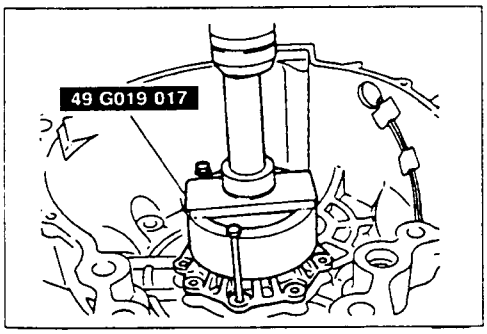


Preinspection
Backlash of side gear and pinion gear

1. Before disassembly, measure the backlash of the side gears.

Backlash
Standard : 0.05—0.15mm {0.0020—0.0059 in}
Maximum: 0.50mm {0.020 in}

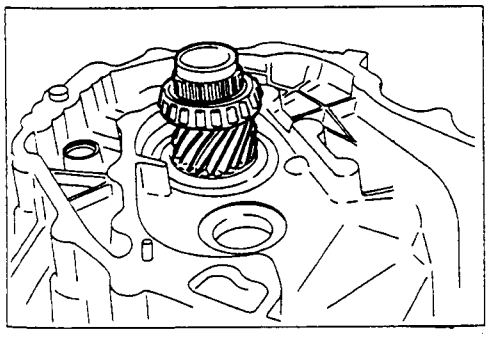
2. If not within the specification, replace worn and damage parts.



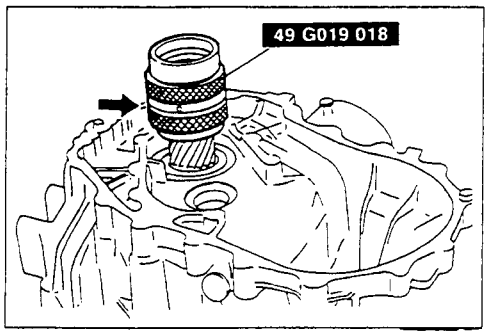
(1) Align the bearing cover with guide bolts as shown.
(2) Press in the bearing cover by using the **SST**.
(3) Remove the guide bolts and install the bearing cover installation bolts.

Tightening torque:
10.8—13.7 N·m {110—140 kgf·cm, 96—121 in·lbf}

(4) Mount the converter housing onto the **SST** (transaxle hanger).
(5) Remove the bearing race and adjustment shims from the bearing housing using a pin punch and hammer.

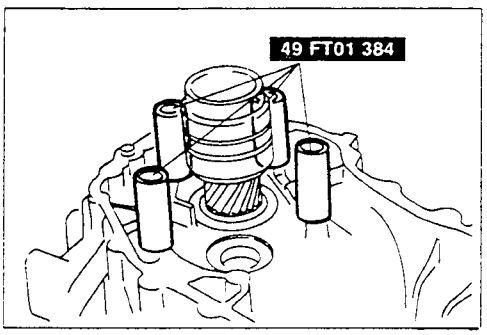


(6) Set the output gear into the converter housing.

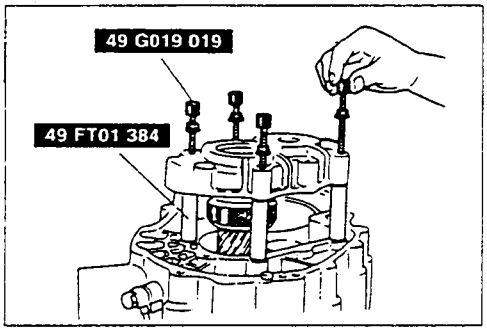


Caution
- **Eliminate the gap (arrow) by turning A or B of the selector.**

(7) Install the bearing race removed in Step (3) to the **SST** and set them onto the output gear.

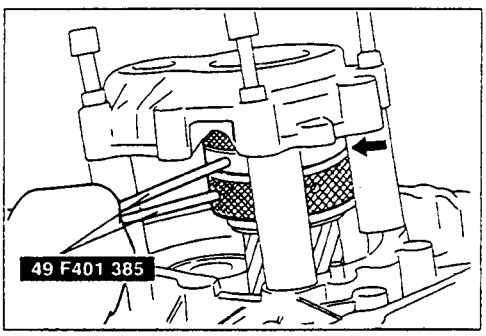


(8) Set the four **SST**s on the converter housing in the positions shown.



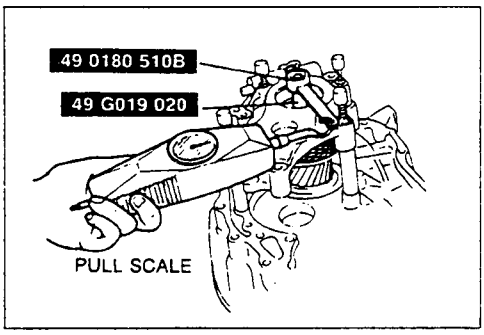
(9) Set the bearing housing on the **SST**s (selector) and install the four **SST**s (bolts). Tighten the bolts to the specified torque.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



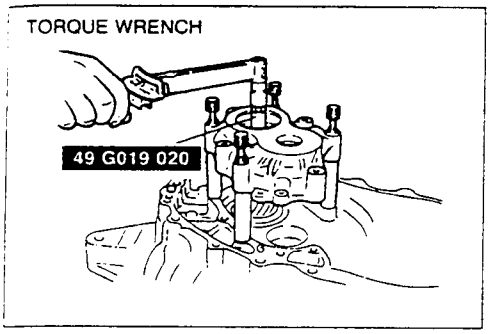
Note
• This is to seat the bearing.

(10) Turn the **SST** (selector) to increase the clearance (arrow) with the **SST** (bars) until it no longer turns.
(11) Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).

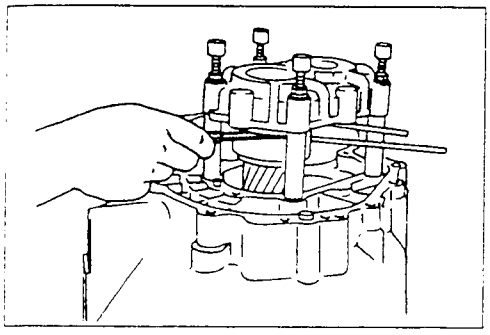


(12) Mount the **SST** and a pull scale or a torque wrench on the output gear.
(13) Adjust the clearance of the **SST** (selector) to obtain the specified preload/pull scale reading.

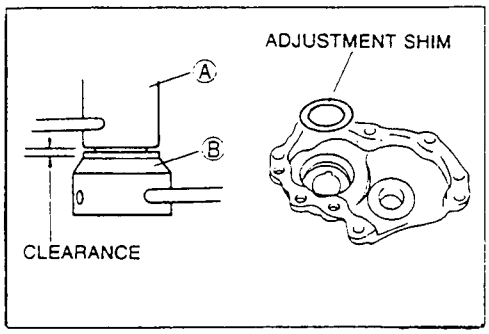
Preload:
1.1—1.9 N·m {11—20 kgf·cm, 10—17 in·lbf}
Reading on pull scale:
11—19 N {1.1—2.0 kgf, 2.5—4.4 lbf}



Note
• Read the preload when the output gear starts to turn.

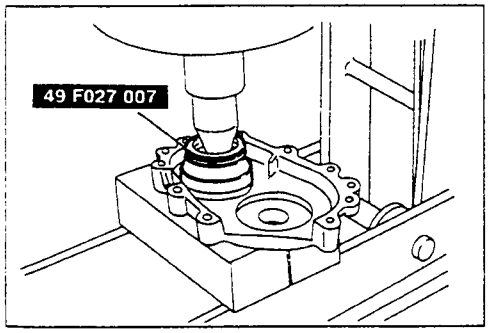


Caution
• Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.
• The maximum allowable number of shims is one.



(14) Measure the clearance between Ⓐ and Ⓑ of the selector. Select adjustment shim(s) equivalent to the measured clearance.

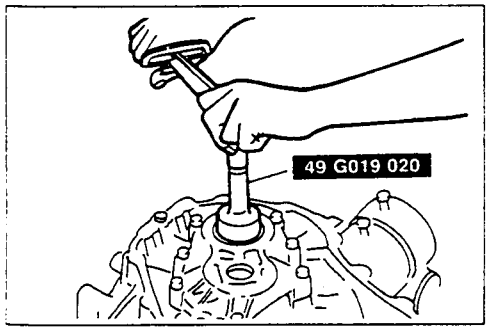
Thickness of shim mm {in}		
0.350 {0.0138}	0.375 {0.0148}	0.400 {0.0157}
0.425 {0.0167}	0.450 {0.0177}	0.475 {0.0187}
0.500 {0.0197}	0.525 {0.0207}	0.550 {0.0217}
0.575 {0.0226}	0.600 {0.0236}	0.625 {0.0246}
0.650 {0.0256}	0.675 {0.0266}	0.700 {0.0276}
0.725 {0.0285}	0.750 {0.0295}	0.775 {0.0305}
0.800 {0.0315}	0.825 {0.0325}	0.850 {0.0335}
0.875 {0.0344}	0.900 {0.0354}	0.925 {0.0364}
0.950 {0.0374}	0.975 {0.0384}	1.000 {0.0394}
1.025 {0.0404}	1.050 {0.0413}	1.075 {0.0423}
1.100 {0.0433}	1.125 {0.0443}	1.150 {0.0453}
1.175 {0.0463}	1.200 {0.0472}	1.225 {0.0482}
1.250 {0.0492}	1.275 {0.0502}	1.300 {0.0512}
1.325 {0.0522}	1.350 {0.0531}	1.375 {0.0541}
1.400 {0.0551}		



(15) Remove the bearing housing and **SST**.
(16) Install the required shim(s) and press the bearing race into the bearing housing by using the **SST**.

(17) Install the bearing housing.

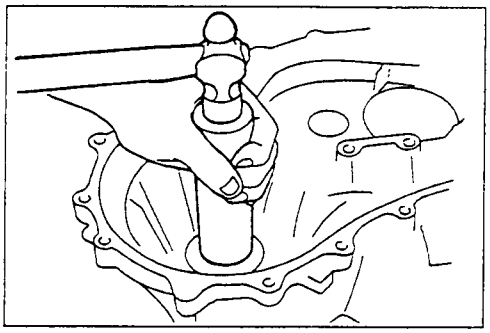
Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



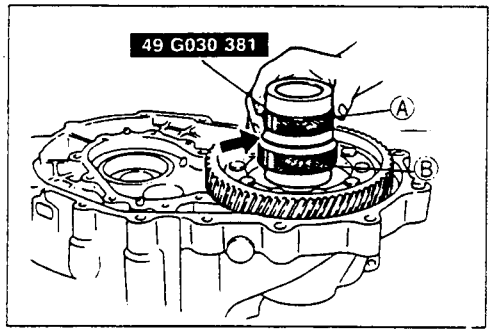
(18) Check that the preload/pull scale reading is within the specification. If not, return to Step (5).

Preload:
1.1—1.9 N·m {11—20 kgf·cm, 10—17 in·lbf}
Reading on pull scale:
11—19 N {1.1—2.0 kgf, 2.5—4.4 lbf}

(19) Remove the bearing housing and output gear assembly.



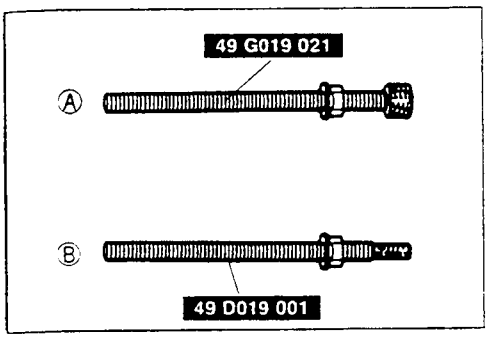
(1) Remove the bearing race and adjustment shims from the transaxie case.
(2) Install the bearing race into the converter housing by using a suitable pipe.

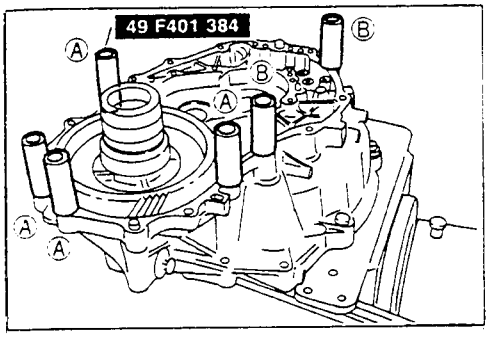


(3) Set the differential assembly into the converter housing.

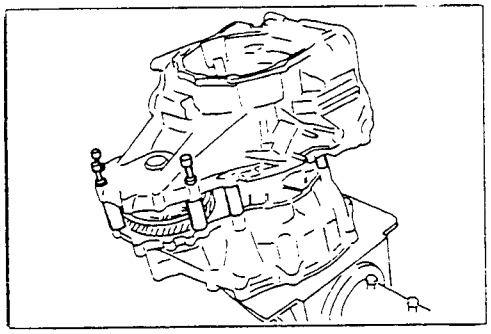
Caution
- **Eliminate the gap (arrow) by turning either A or B of the selector.**

(4) Install the bearing race removed in Step (1) into the **SST** and set them onto the differential assembly.



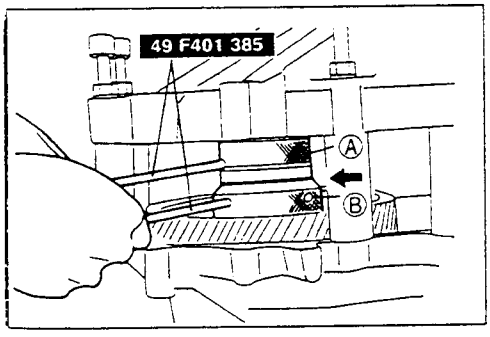


(5) Set the six **SST**s in the positions shown.



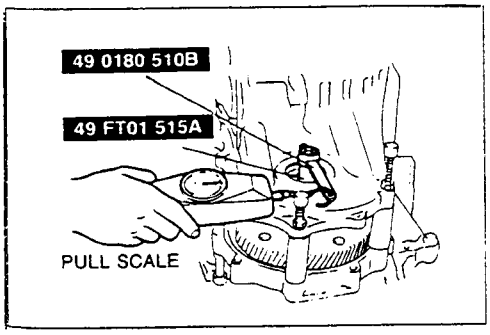
(6) Set the transaxle case on the **SST**s (selectors).
(7) Tighten the **SST**s (bolts) to the specified torque.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



Note
- **This is to seat the bearings.**

(8) Turn the **SST** (selector) to increase the clearance (arrow) by using the **SST** (bars), until it no longer turns.
(9) Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).

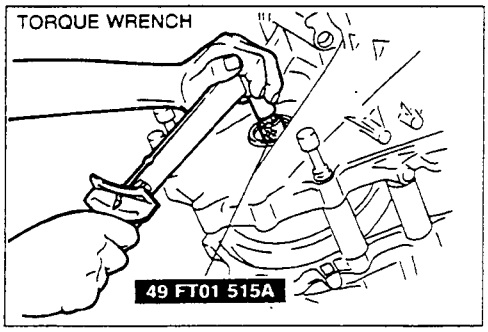


(10) Insert the **SST** through the oil seal hole of the transaxle case and attach it to the pinion shaft.
(11) Mount the **SST** and a pull scale or a torque wrench to the **SST**.

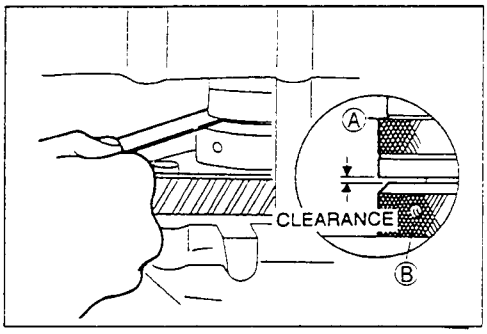
Note
- **Read the preload when the differential starts to turn.**

(12) Adjust the clearance of the **SST** (selector) to obtain the specified preload/pull scale reading.

Preload: 0.49 N·m {5.0 kgf·cm, 4.3 in·lbf}
Reading on pull scale: 4.9 N {0.5 kgf, 1.1 lbf}

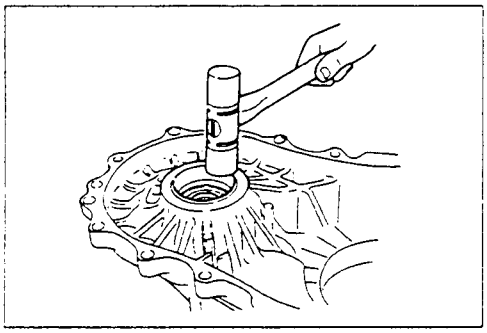


(13) Measure the clearance between A and B of the selector.
(14) Add **0.3mm {0.012 in}** to the measured clearance, and select the shim(s) closest in value to that measurement.

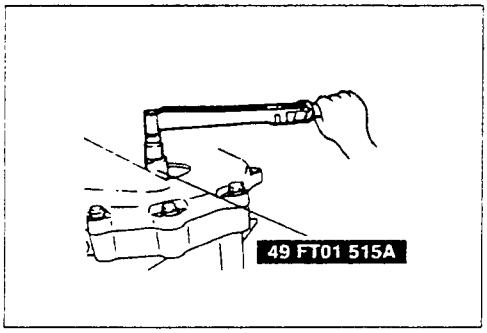


Caution
- **Measure the clearance around the entire circumference.**
- **The maximum allowable number of shims is three.**

Thickness of shim mm {in}			
0.10 {0.004}	0.15 {0.006}	0.20 {0.008}	0.25 {0.010}
0.30 {0.012}	0.35 {0.014}	0.40 {0.016}	0.45 {0.018}
0.50 {0.020}	0.55 {0.022}	0.60 {0.024}	0.65 {0.026}
0.70 {0.028}	0.75 {0.030}	0.80 {0.031}	0.85 {0.033}
0.90 {0.035}	0.95 {0.037}	1.00 {0.039}	1.05 {0.041}
1.10 {0.043}	1.15 {0.045}	1.20 {0.047}	



(15) Remove the transaxle case and **SST** (selector).
(16) Install the required shim(s) and tap the bearing race into the transaxle case.



(17) Install the transaxle case.

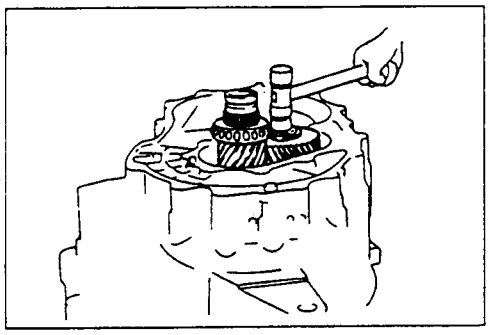
Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

(18) Check that the preload is within the specification. If not, return to Step (1).

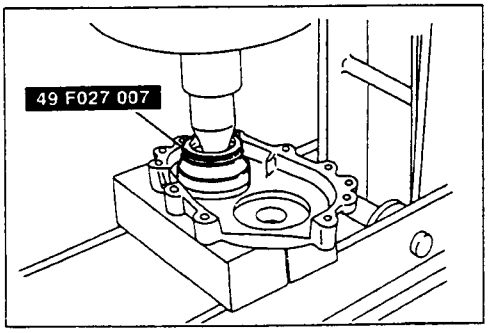
Preload:
3.0—3.9 N·m {30—40 kgf·cm, 27—34 in·lbf}
Reading on pull scale:
30—39 N {3.0—4.0 kgf, 6.6—8.8 lbf}

(19) Remove the transaxle case.

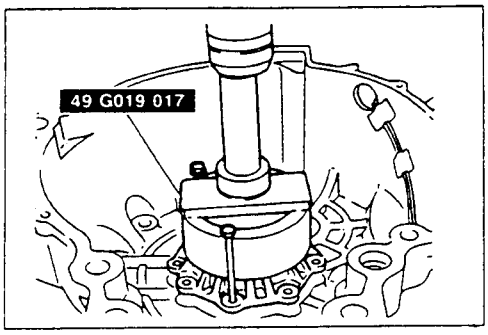
ASSEMBLY



Install the idler gear and output gear by tapping in with a plastic hammer.



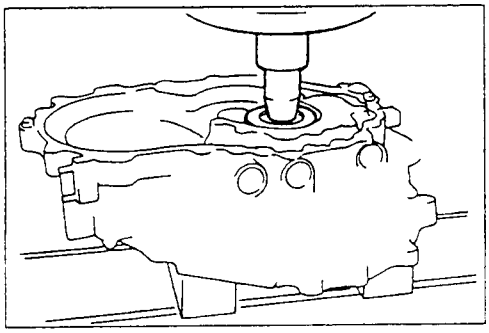
Install the selected shim(s) and bearing race into the bearing housing by using the **SST**.



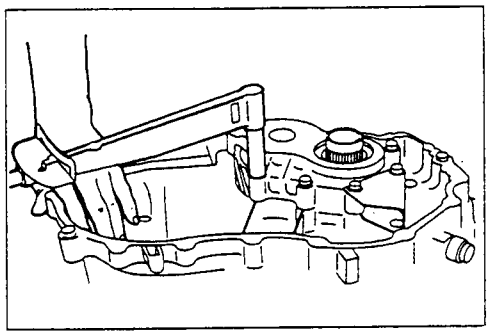
Assembly Procedure

Align the bearing cover with guide bolts as shown and press it in. Install and tighten the mounting bolts.

Tightening torque:
10.8—13.7 N·m {110—140 kgf·cm, 96—121 in·lbf}



Press the bearing race into the converter housing.

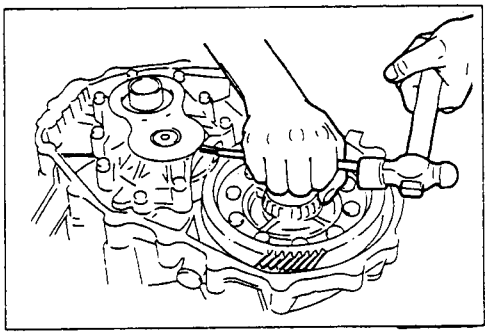


Install the bearing housing.

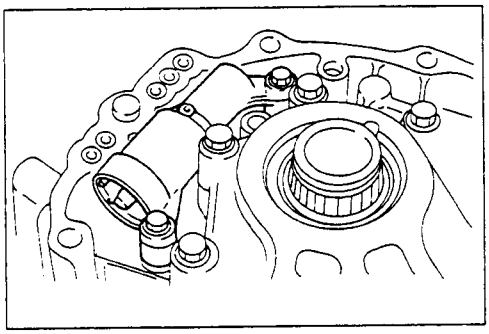
Note
- **Tighten the bolts evenly and gradually.**

(1) Mount the bearing housing on the converter housing.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

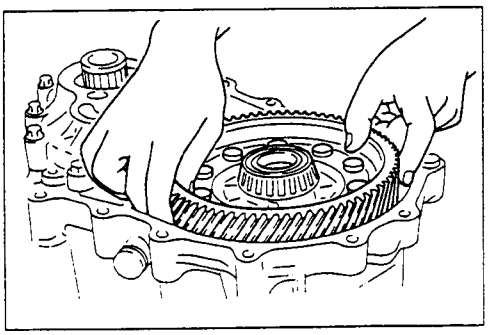


(2) Align the slot of the idler shaft with the mark on the bearing housing.
(3) Tap a new roll pin in by using a pin punch and a hammer.

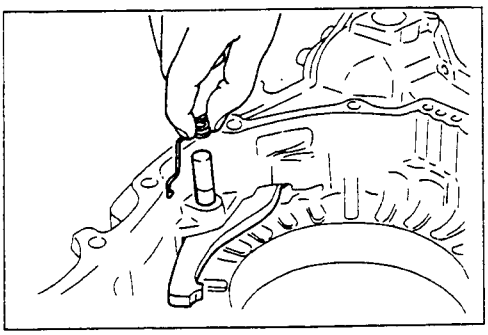


Install the 2-3 accumulator piston.
(1) Install the orifice check valve spring and orifice check valve.
(2) Apply ATF to new O-rings and install them into the 2-3 accumulator.
(3) Install the 2-3 accumulator piston.

Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 69.5—95.4 in·lbf}



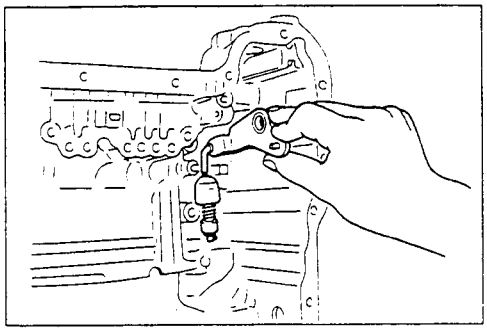
Install the bearing race into the bearing housing.
Install the differential.
Install the selected shim(s) and bearing race into the transaxle case.



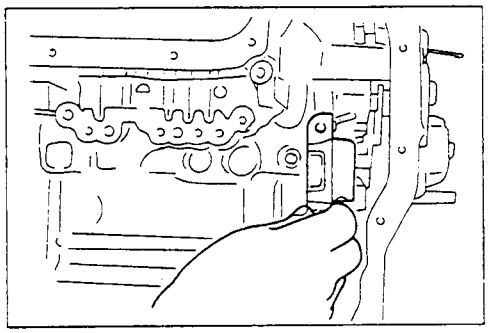
Install the parking pawl.
(1) Install the parking pawl and shaft.

Caution
- **Do not deform the snap ring when installing it.**

(2) Install the spring and snap ring.

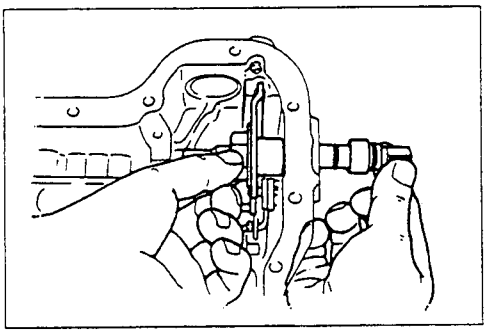


Install the parking assist lever and snap ring.



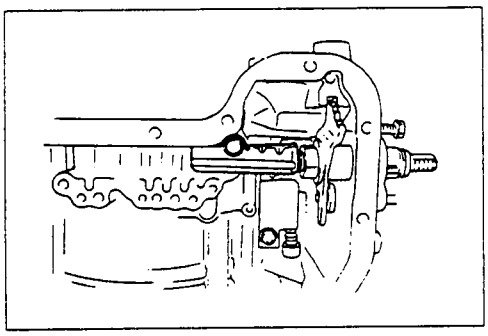
Install the actuator support.

Tightening torque:
10.8—13.7 N·m {110—140 kgf·cm, 96—121 in·lbf}



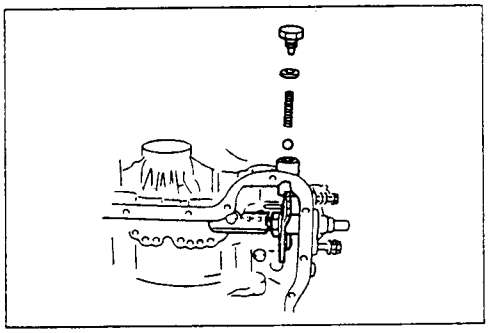
Install the manual shaft and manual plate.
(1) Install the manual plate, spacer, washer, and nut.
(2) Tighten the nut to the specified torque.

Tightening torque:
42—54 N·m {4.2—5.6 kgf·m, 31—40 ft·lbf}



(3) Install the bracket.

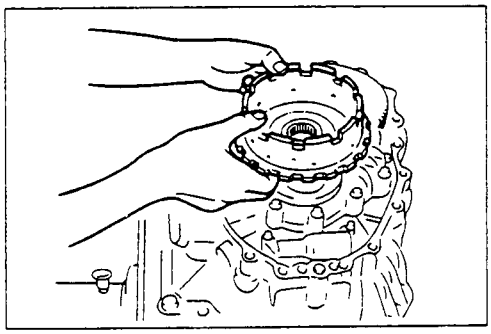
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}



(4) Install the detent ball, spring, washer and plug. Tighten the plug.

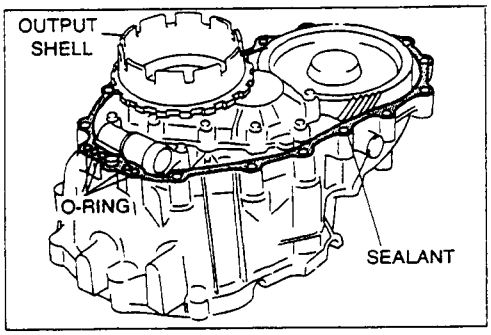
Tightening torque:
11.8—17.6 N·m {120—180 kgf·cm, 105—156 in·lbf}

(5) Move the manual shaft and verify that the parking pawl operates correctly.



Install the output shell to the output gear, and install the thrust bearing onto the output shell.

Thrust bearing outer diameter: 71.0mm {2.80 in}



Apply a light coat of silicone sealant to the contact surfaces of the converter housing and the transaxle case.

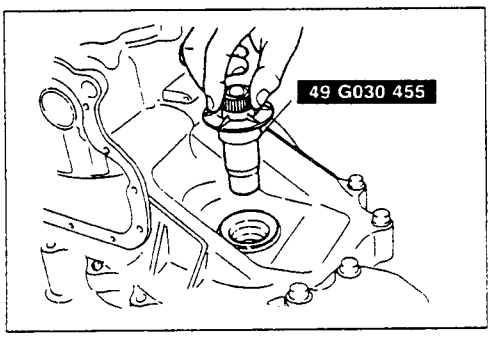
Note
- **Do not damage the O-ring when installing it.**

Install new O-rings into the converter housing.

Note
- **Tighten the bolts evenly and gradually.**

Mount the transaxle case to the converter housing.

Tightening torque:
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

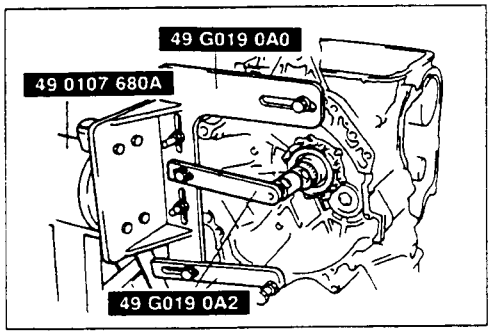


Install the engine mount No.1.

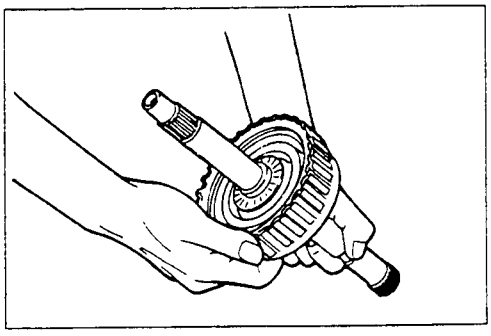
Tightening torque:
68—77 N·m {6.9—7.9 kgf·m, 50—57 ft·lbf}

Caution
- **Failure to install the SST may allow the differential side gears to become mispositioned.**

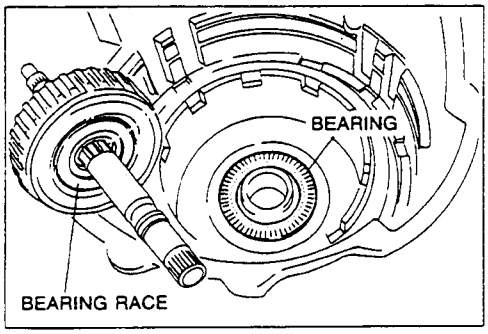
Install the **SST** into the differential side gears.



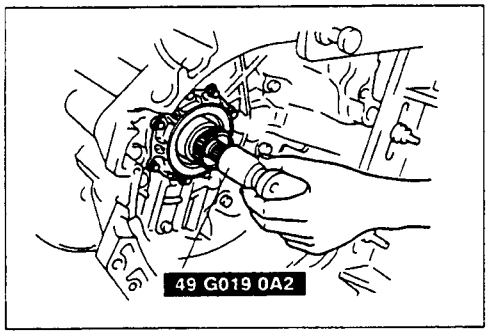
Install the **SST** to hold the turbine shaft.



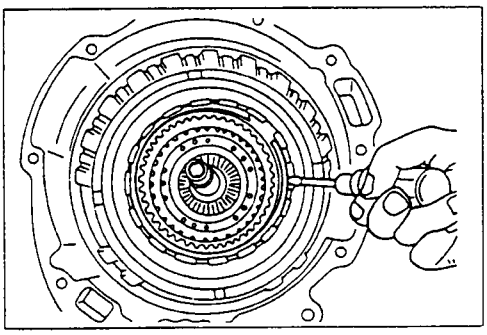
Install the turbine shaft and 3-4 clutch assembly.
(1) Assemble the turbine shaft and 3-4 clutch assembly.



(2) Verify that the thrust bearing and race are properly installed.
(3) Install the turbine shaft and 3-4 clutch assembly into the transaxle case.



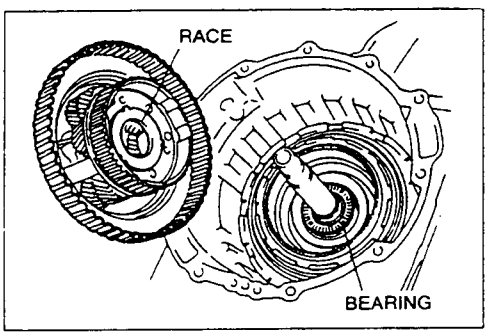
Adjust the **SST** position so that it contacts and holds the turbine shaft.



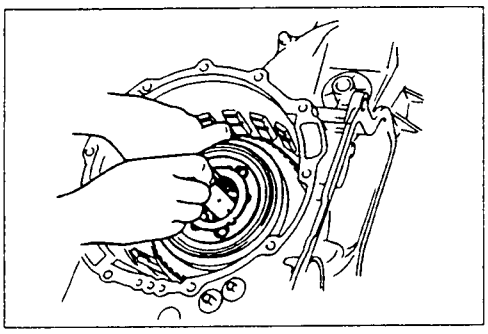
Install the internal gear.
(1) Install the internal gear to the output shell.

Caution
- **Do not deform the snap ring when installing it.**

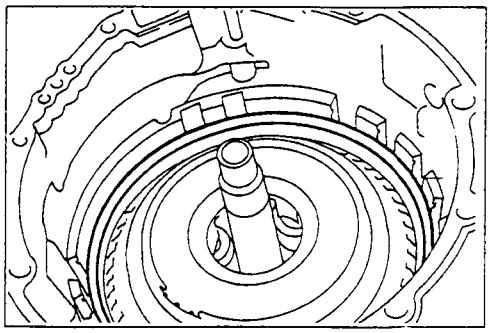
(2) Install the snap ring.



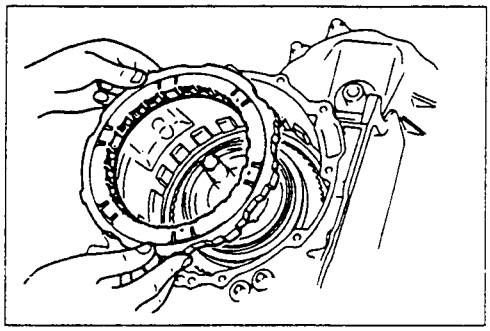
Install the carrier hub assembly.
(1) Verify that the thrust bearing and bearing race are installed in the correct position.



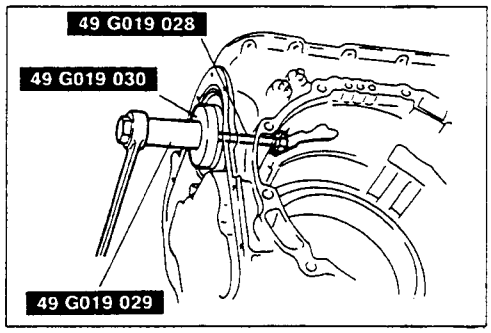
(2) Hold the turbine shaft with one hand to prevent it from rotating.
(3) Install the carrier hub assembly into the 3-4 clutch drum by rotating it.



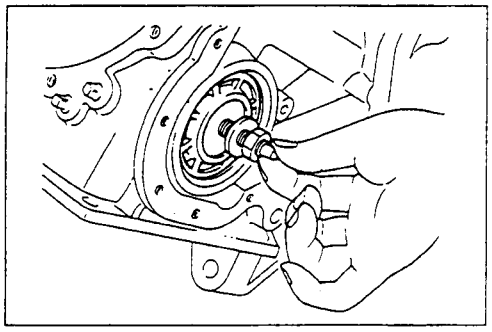
Install the friction plate.



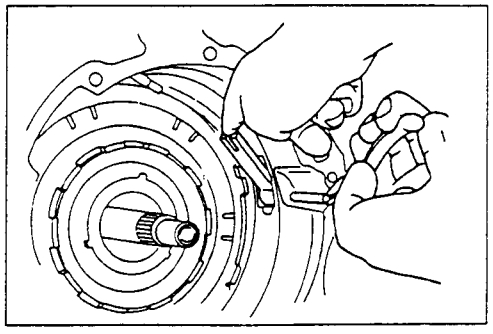
Install the one-way clutch 2.
(1) Hold the one-way clutch 2 horizontally.
(2) Install it by turning the carrier hub assembly counter-clockwise.
(3) Install the snap ring.



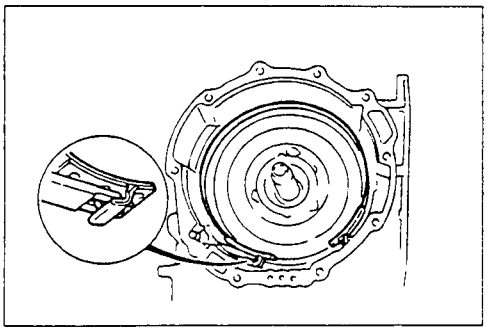
Install the band servo to the transaxle case.
(1) Install the servo return spring and band servo.
(2) Compress the servo by using the **SST**.
(3) Install the snap ring.
(4) Remove the **SST**.



Install the piston stem.
Loosely tighten the piston stem by hand.



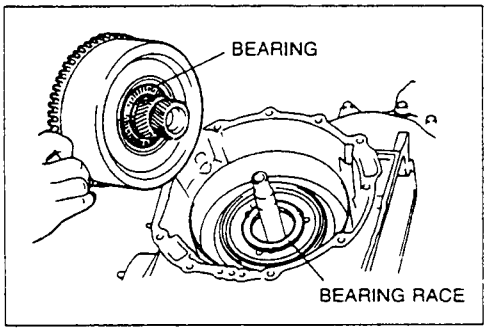
Install the anchor strut.



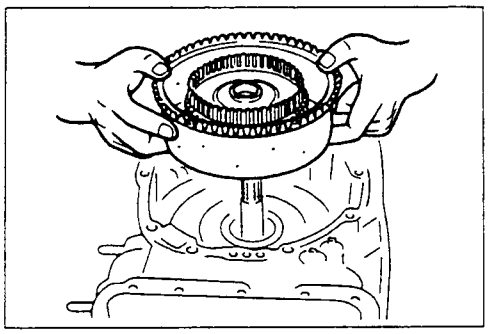
Note

- **Interlock the 2-4 brake band and anchor strut as shown.**

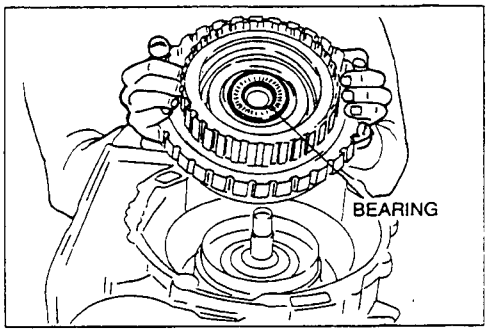
Install the 2-4 brake band in the transaxle case so that it is fully expanded.



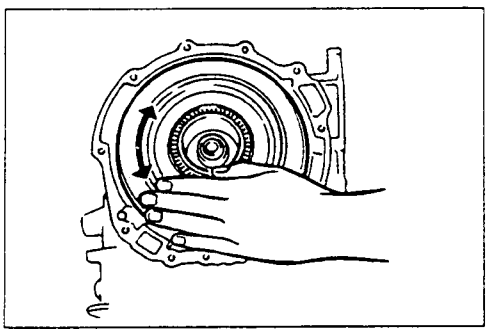
Install the small sun gear and one-way clutch 1.
(1) Verify that the thrust bearing and bearing race are installed in the correct position.



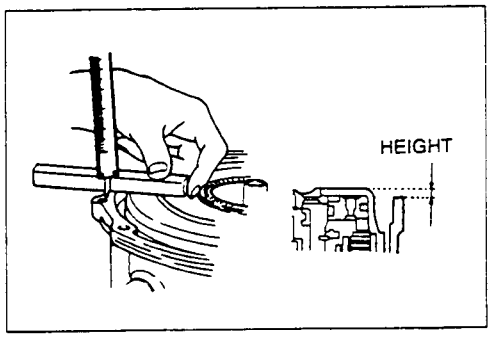
(2) Install the small sun gear and one-way clutch 1 assembly by rotating it.



Install the clutch assembly.
(1) Verify that the thrust bearing is installed in the correct position.

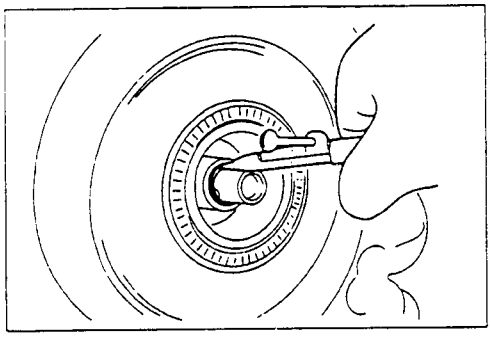


(2) Install the clutch assembly by rotating it.



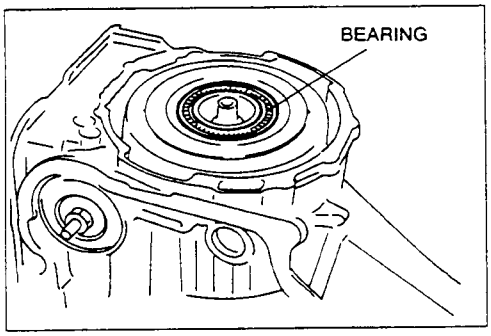
Note
- **Measure the height difference between the reverse and forward drum and the transaxle case.**
- **If not within specification, reassemble begining with Step 22.**

Height difference:
0.7—1.9mm {0.028—0.075 in} max.

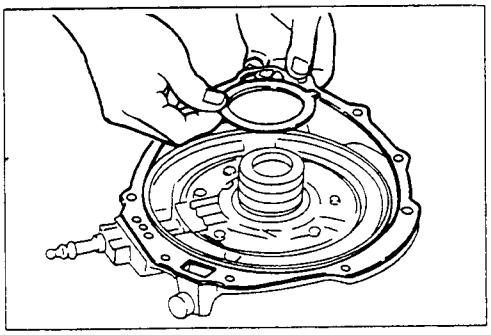


Caution
- **Do not deform the snap ring when installing it.**

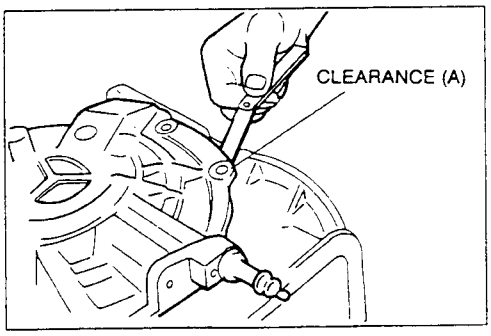
Install the new snap ring into the bottom ring groove of the turbine shaft.



Use the following procedure to adjust the total end play and select a suitable bearing race.
(1) Set the thrust bearing onto the clutch assembly.



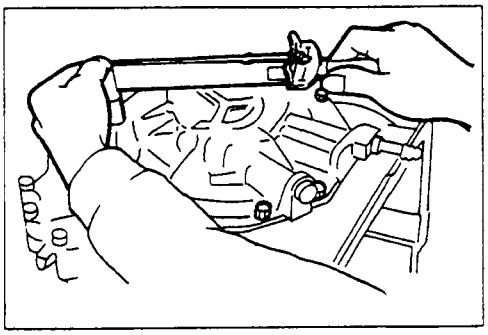
(2) Remove the bearing race and the oil pump gasket.
(3) Set the thickest bearing race **(2.2mm {0.087 in})** onto the oil pump.
(4) Set the oil pump onto the clutch assembly.



Note
- **Take several measurements and calculate the average value.**

(5) Measure clearance A between the transaxle case and the oil pump.
(6) Select a suitable bearing race from the chart below.

Clearance A mm {in}	Select this bearing race mm {in}
0.91—1.10 {0.036—0.043}	1.2 {0.047}
0.71—0.90 {0.028—0.035}	1.4 {0.055}
0.51—0.70 {0.020—0.027}	1.6 {0.063}
0.31—0.50 {0.012—0.019}	1.8 {0.071}
0.11—0.30 {0.004—0.011}	2.0 {0.078}
0—0.10 {0—0.003}	2.2 {0.087}

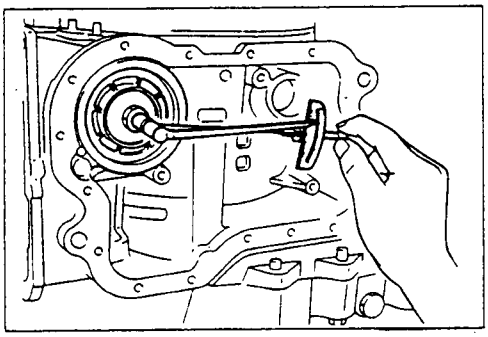


(7) Remove the oil pump.
(8) Place the selected bearing race and a new gasket onto the oil pump.

Note
- **Tighten the bolts evenly and gradually.**
- **If the bolts are difficult to tighten, the gasket may be out of place. Remove the oil pump and reset the gasket.**

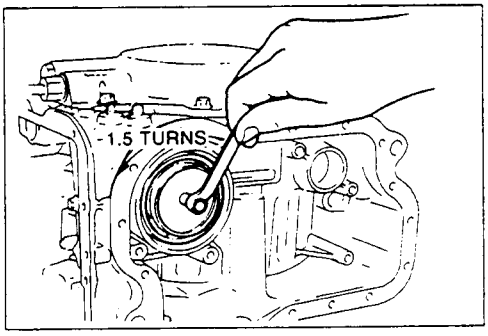
(9) Install the oil pump onto the clutch assembly.

Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



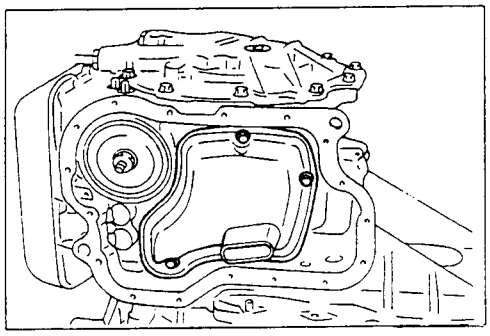
(10) Install the oil pipe.
Adjust the 2-4 brake band.
(1) Loosen the locknut and tighten the piston stem to the specified torque.

Tightening torque:
11.8—14.7 N·m {120—150 kgf·cm, 105—130 in·lbf}



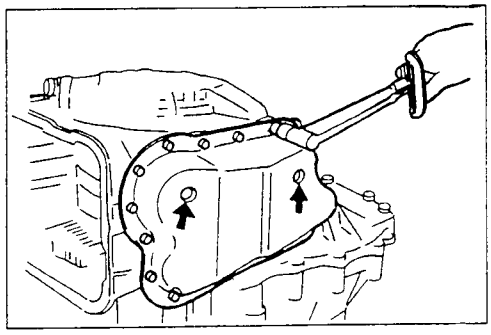
(2) Loosen the piston stem 1.5 turns.
(3) Hold the piston stem and tighten the locknut to the specified torque.

Tightening torque:
25—39 N·m {2.5—4.0 kgf·m, 19—28 ft·lbf}



Install a new O-ring and oil strainer to the transaxle.

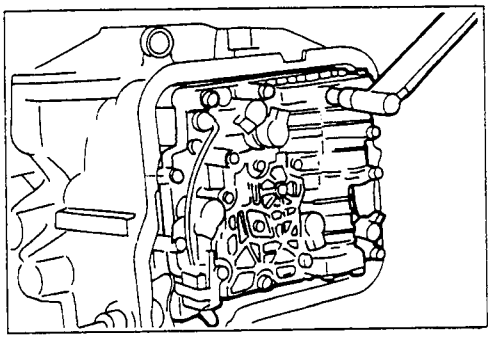
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}



Note
- **Attach the magnets inside the oil pan in the positions shown in the illustration.**

Install a new gasket and the oil pan.

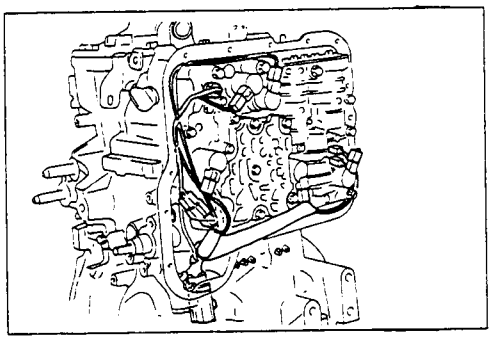
Tightening torque:
8.4—10.7 N·m {85—110 kgf·cm, 74—95 in·lbf}



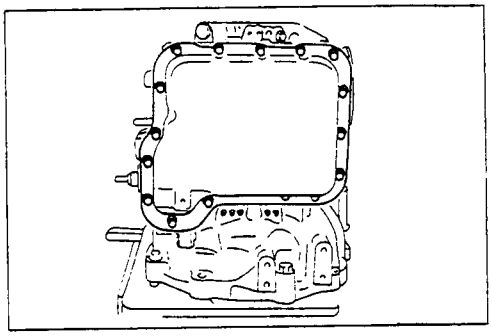
Note
- **Tighten the bolts evenly and gradually.**

Align the manual valve with the pin on the manual plate, and install the control valve body into the transaxle case.

Tightening torque:
10.8—14.7 N·m {110—150 kgf·cm, 96—130 in·lbf}



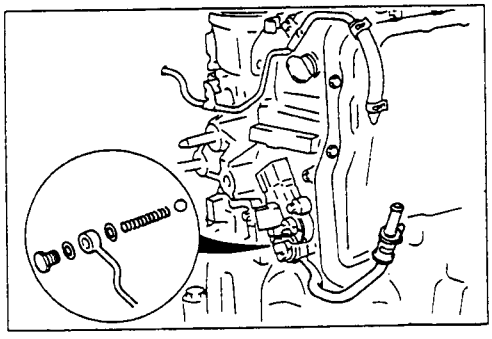
41. Install a new O-ring to the coupler assembly.
42. Install the coupler assembly.
43. Match the harness colors, and connect the solenoid connectors and ATF thermosensor connector.



Note
- **Tighten the bolts evenly and gradually.**
- **If the bolts are difficult to tighten, the gasket may be out of place. Remove the oil pan and reset the gasket.**

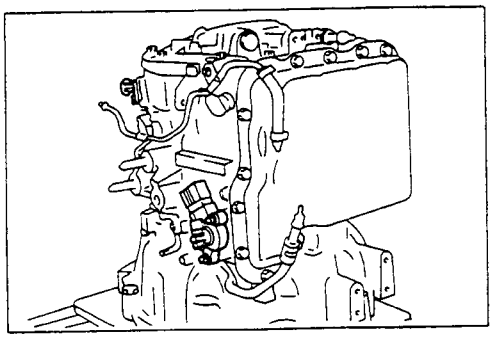
Install a new gasket and control valve body cover.

Tightening torque:
8.4—10.7 N·m {85—110 kgf·cm, 74—95 in·lbf}



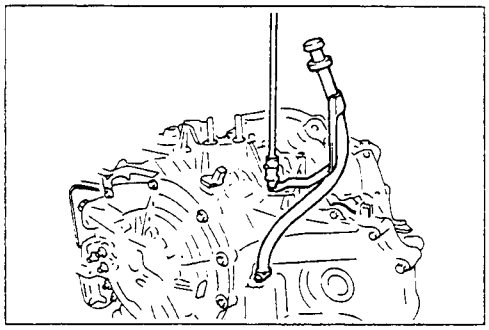
Install the steel ball, spring, oil pipe, and packing.
Install the connecting bolt.

Tightening torque:
11.8—17.6 N·m {120—180 kgf·cm, 105—156 in·lbf}



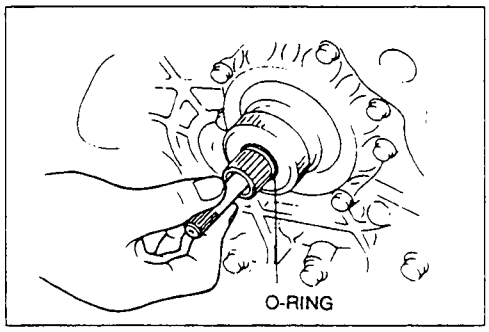
Install the vehicle speed pulse generator.

Tightening torque:
5.4—7.8 N·m {55—80 kgf·cm, 48—69 in·lbf}

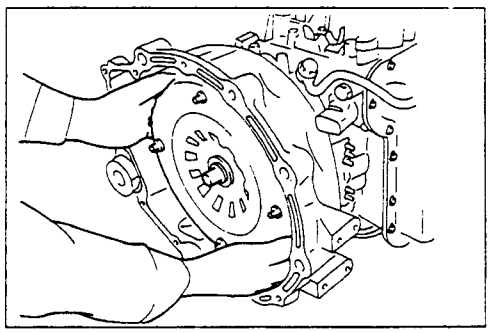


Install the ATF dipstick and oil filler tube along with a new O-ring to the transaxle case.

Tightening torque:
6.9—9.8 N·m {70—100 kgf·cm, 61—86 in·lbf}



Install the oil pump shaft.
Install a new O-ring onto the turbine shaft.

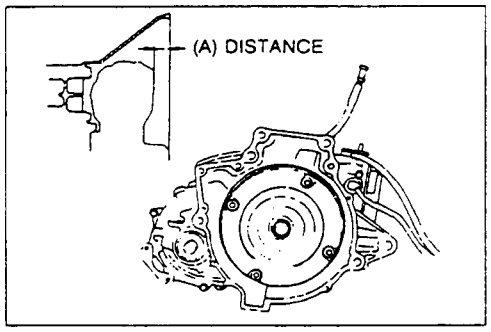


Fill the torque converter with ATF if it has been drained and washed.

ATF type: Dexron®II or M-III

Install the torque converter in the converter housing while rotating it to align the splines.

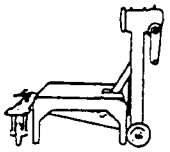
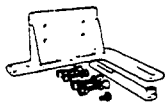
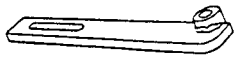
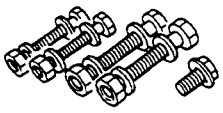
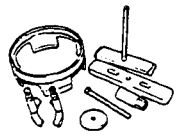
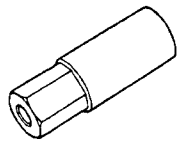
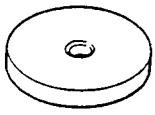
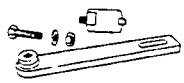
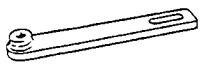
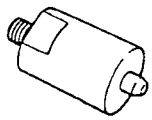
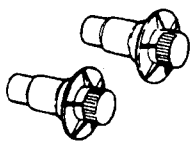
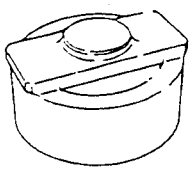
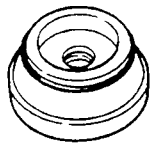
Caution
- **Hold the torque converter in an erect position when filling it with ATF, do not allow the fluid to overflow.**
- **If the converter does not fit in easily, do not try to force it; install carefully.**

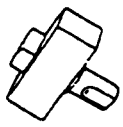
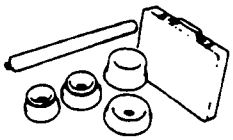
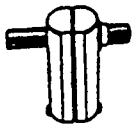
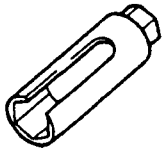
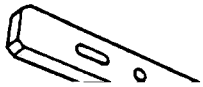


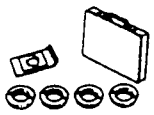
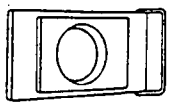
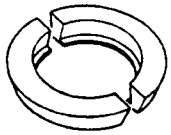
To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the face of the converter housing.

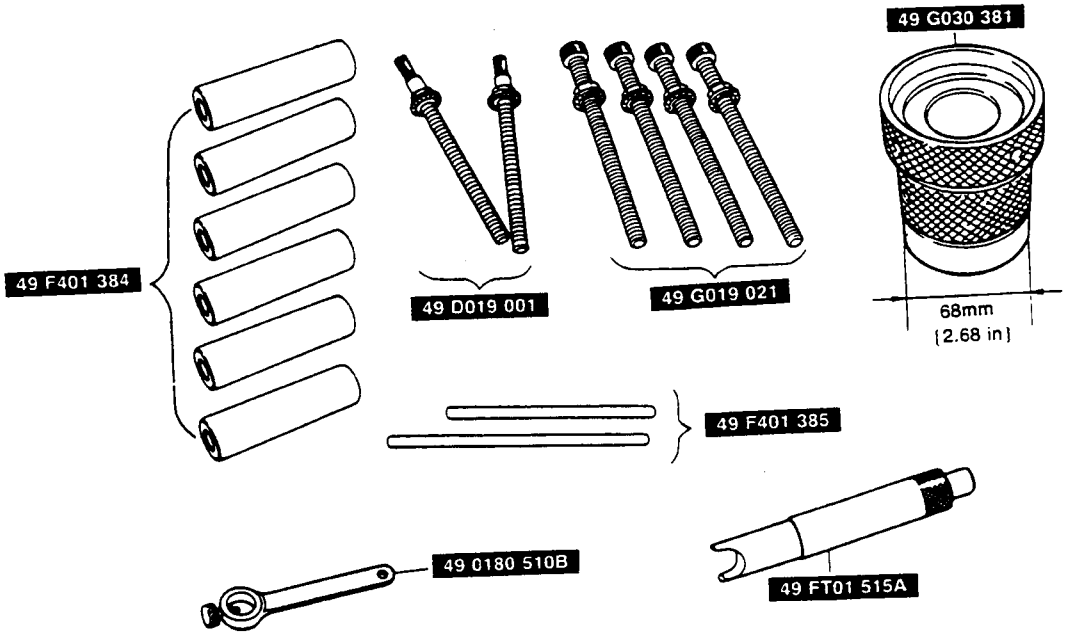
Distance A
2.0 15.3mm {0.602 in}
2.5 14.0mm {0.551 in}

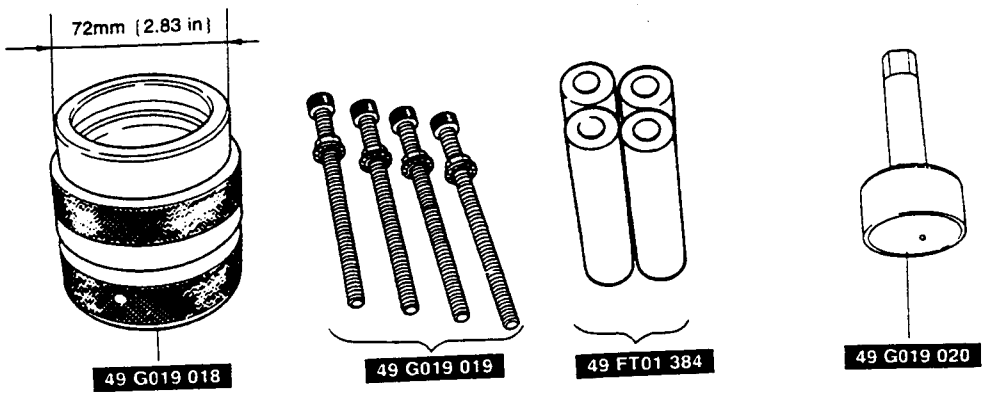
SPECIAL SERVICE TOOLS (SST)

49 0107 680A Engine stand 	For assembly of transaxle	49 G019 0A0 Hanger, transaxle 	For assembly of transaxle
49 G019 001 Body (Part of 49 G019 0A0) 	For assembly of transaxle	49 G019 002 Stay (Part of 49 G019 0A0) 	For assembly of transaxle
49 G019 003 Bolt set (Part of 49 G019 0A0) 	For assembly of transaxle	49 G019 0A7A Compressor set, return spring 	For assembly of low and reverse brake piston
49 G019 028 Bolt (Part of 49 G019 0A7A) 	For assembly of low and reverse brake piston	49 G019 029 Nut (Part of 49 G019 0A7A) 	For assembly of low and reverse brake piston
49 G019 030 Plate (Part of 49 G019 0A7A) 	For assembly of band servo	49 G019 0A2 Holder, turbine shaft 	For holding turbine shaft
49 G019 014 Stay (Part of 49 G019 0A2) 	For holding turbine shaft	49 G019 015 Adaptor (Part of 49 G019 0A2) 	For holding turbine shaft
49 G019 016 Bolt (Part of 49 G019 0A2) 	For holding turbine shaft	49 G030 455 Holder, differential side gear 	For holding differential side gear
49 G019 017 Installer, oil seal 	For installation of bearing cover	49 F027 007 Attachment ϕ72 	For installation of bearing rece

49 FT01 439 Holder, idler gear shaft 	For removal / installation of locknut	49 G019 013 Remover, bearing 	For removal of bearing race
49 F027 0A1 Installer set, bearing 	For installation of bearing race	49 G019 012 Leak checker 	For clutch operation inspection
49 0180 510B Preload attachment 	For adjustment of bearing preload	49 FT01 361 Remover, bearing 	For removal of bearing outer race
49 G019 031 Wrench 	For disassembly / assembly of ATF thermosensor	49 G019 024 Body A (Part of 49 G019 0A7A) 	For disassembly / assembly of reverse clutch
49 G019 025 Body B 	For disassembly / assembly of	49 G019 026 Plate 	For disassembly / assembly of

49 G017 1A0 Remover set, bearing 	For removal of bearing	49 F401 366A Plate (Part of 49 G017 1A0) 	For removal of bearing
49 G019 022 Attachment K 	For removal of bearing	49 G019 011 Installer, bearing 	For installation of bearing







SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Automatic Transmission/Transaxle			2.5L
Transaxle control			Floor shift
Lock mechanism			Equipped
Torque converter stall torque ratio			2.05
Gear ratio		1st 2nd 3rd O/D Reverse	2.800 1.540 1.000 0.700 2.333
Final Gear ratio			4.157
Automatic Transaxle Fluid (ATF)		Type Capacity ltr (qts)	MERCON® 8.8 (9.3)
2-4 Band (piston outer dia / retainer inner dia)			78.0 / 40.0mm (3.07 / 1.57 inches)
Number of planetary gear teeth		Rear sun gear and drum Primary sun gear Long pinion gear Short pinion gear Ring Gear	38 30 24 22 84
Number of output gear teeth			84
Number of idler gear teeth			19
Number of ring gear teeth			42
Engine stall speed		D, 2, 1 and R ranges	2,270-2,500 rpm
Time lag	sec.	N-D range N-R range	Approx. 0.9 max. Approx. 1.1 max.
Line pressure kPa (psi)	At Idle . At stall	D, 2 and 1 ranges R range D, 2 and 1 ranges R range	420 - 530 (60 - 76) 730 - 1,010 (110-146) 1,100 - 1,170 (160 - 170) 1,910 - 2,020 (276 - 294)
Solenoid reducing pressure kPa (psi)			380 - 400 (52 - 58)

CLUTCH PACK SPECIFICATIONS

Clutch Pack	Amount
Description	2.5L
Low and Reverse Clutch	
External Spline Clutch Plates (Metal)	4
Internal Spline Clutch Plates (Friction)	4
Forward Clutch	
External Spline Clutch Plates (Metal)	3
Internal Spline Clutch Plates (Friction)	3
Coasting Clutch	
External Spline Clutch Plates (Metal)	3
Internal Spline Clutch Plates (Friction)	2
Reverse Clutch	
External Spline Clutch Plates (Metal)	2

CLUTCH PACK SPECIFICATIONS

Clutch Pack	Amount
Description	2.5L
Internal Spline Clutch Plates (Friction)	2
3-4 Clutch	
External Spline Clutch Plates (Metal)	4
Internal Spline Clutch Plates (Friction)	4

TORQUE SPECIFICATIONS

Description	N-m	Lb-Ft	Lb-In
Transmission Oil Pan Bolts	8-10	—	71-88
Transmission Case Plug	40-60	30-36	—
Transmission Control Module (TCM) Bolts	19-26	14-18	—
Pulse Signal Generator Bolt	8-10	—	71-88
LH Transaxle Support Insulator Nuts and Bolt	67-93	50-68	—
Neutral / Reverse Accumulator Plate Bolts	6.5-7.8	—	58-69
1-2 Accumulator Plate Bolts	6.5-7.8	—	58-69
Locknut	126-176	95-130	—
Manual Lever Position Switch Nut	32-46	24-33	—

TORQUE SPECIFICATIONS (Cont'd)

Description	N-m	Lb-Ft	Lb-In
LH Transaxle Support Insulator Through Bolt	86-116	63-86	—
Fuel Filter Bracket Bolts	8-10	—	71-88
Manual Lever Position Switch Bolts	8-10	—	71-88
Transmission Oil Temperature (TOT) Sensor	8-10	—	71-88
Front Fender Splash Shield Screws	8-10	—	71-88
Solenoid Bolt	6.5-7.8	—	58-69
Main Control Cover Bolts	8-10	—	71-88
Main Control Valve Body Bolts	11-14	—	97-130
Wheel Hub Bolt Nuts	89-117	66-86	—
Engine-to-Transaxle Bolts	68-99	50-73	—
Rear Engine Mounting Bracket Bolts	67-93	50-68	—
Torque Converter-to-Flywheel Nuts	44-60	32-45	—
Intake Manifold Support Bolts	37-52	27-38	—
Oil Level Indicator Bolts	8-10	—	71-88
Front Engine Support Insulator Bolts	67-93	50-68	—
Rear Engine Support Bolts and Nuts	67-93	50-68	—
Rear Engine Support Nuts	75-104	55-77	—
Rear Engine Support Bolts	44-60	32-44	—
Transverse Member Bolts	94-131	68-96	—
Transaxle-to-Engine Bolts	68-99	50-73	—
Battery Tray Bolts	8-10	—	71-88
Bearing Housing Bolts	26-30	19-22	—
Transaxle Case Bolts	38-51	28-38	—
Front Pump Support Bolts	10.8-13.7	—	96-121
2-3 Accumulator Bolts	8-10	—	71-88
Park Actuator Support Bolts	11-13	—	96-121
Manual Control Lever Nut	42-54	31-40	—
Main Control Bracket Bolt	8-10	—	71-88
Oil Pressure Relief Plug	12-17	9-12	—
Oil Pump Bolts	19-25	14-18	—
Piston Stem Locknut	25-39	19-28	—
Seal and Gasket Bolts	8-10	—	71-88
Oil Cooler Tube Connector Plug	12-17	—	105-156
Spool Valve Plug	32-47	24-34	—
Oil Pump Cover Bolts	8-10	—	71-88
Jet Orifice Nuts	1.7-2.2	—	15-19
Main Control Valve Body Bolts	6.5-7.8	—	58-69
Oil Pipe Bolts	6.5-7.8	—	58-69
Oil Baffle Bolts	6.5-7.8	—	58-69



INTRODUCTION
MAZDA G4A-EL

The Mazda G4A four speed automatic transaxle can come with hydraulic shift control or computer control. Although both units share common parts there are many major differences. The computer control (EL) unit does not have a governor assembly, but has a heavy wire harness by the inhibitor switch that makes this unit readily identifiable. This unit has a converter clutch. This booklet contains information on diagnosing, teardown and assembly of this unit.

We thank Mazda Motors
for the information and illustrations that
have made this booklet possible

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for there reliability, but ATSG does not guarantee its accuracy

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REVISED 1993

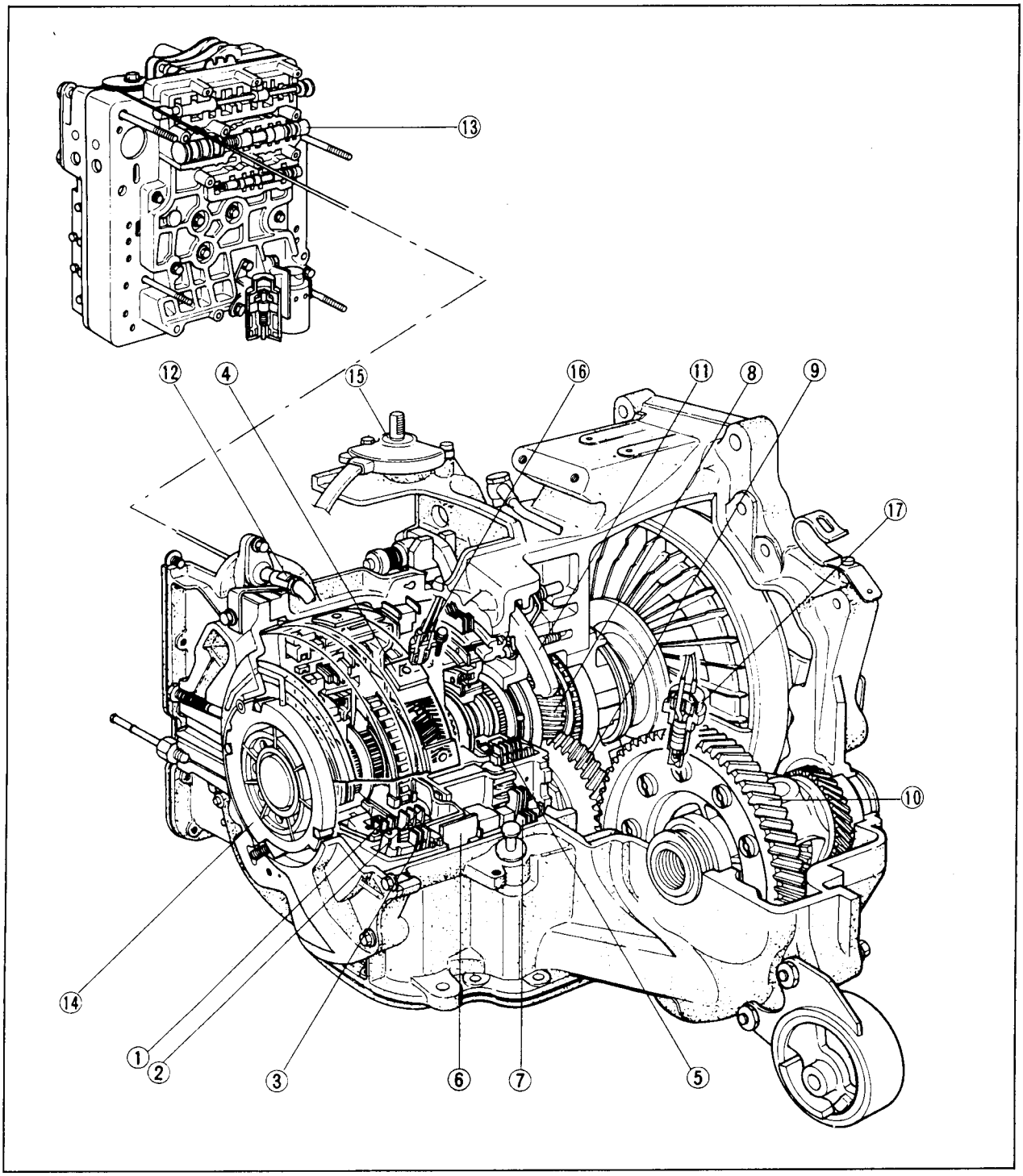


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AUTOMATIC TRANSMISSION SERVICE GROUP

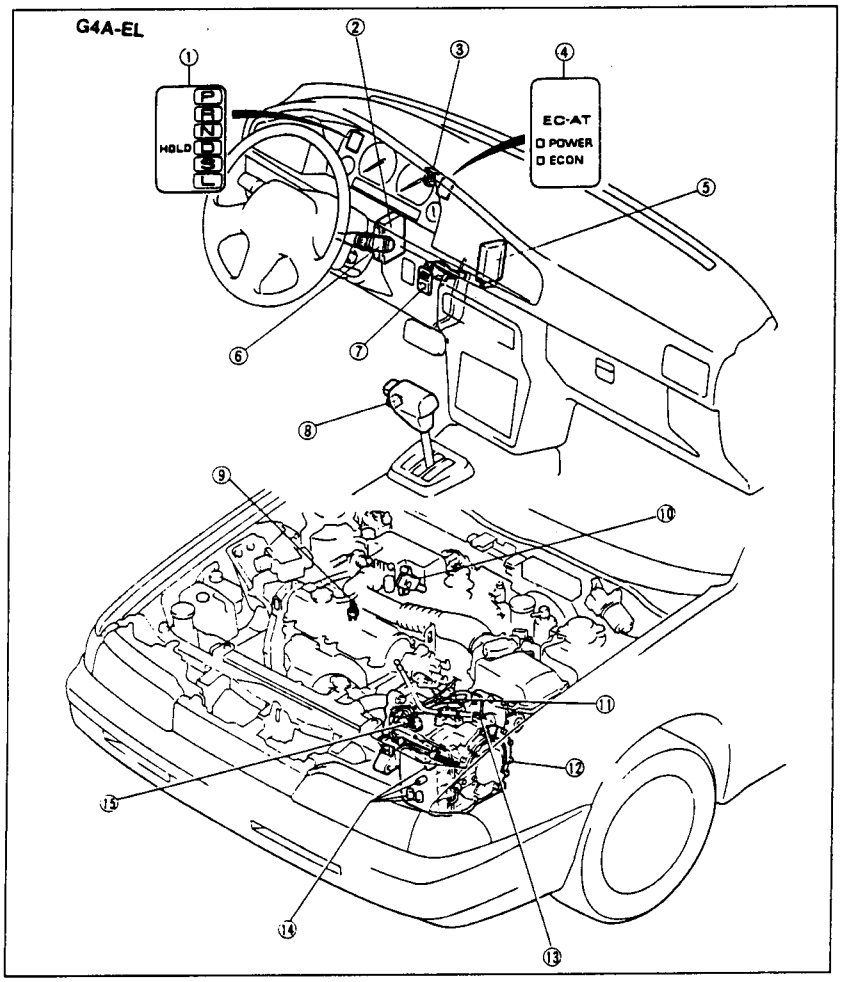
STRUCTUAL VIEW



1. Coasting clutch
2. Forward clutch
3. Reverse clutch
4. Reverse and forward drum
5. 3-4 clutch
6. 2-4 brake band
7. Low and reverse brake
8. Output gear
9. Idle gear
10. Differential
11. Parking pawl
12. Throttle cable
13. Control body
14. Oil pump
15. Inhibitor switch
16. Pulse generator
17. Fluid temperature switch

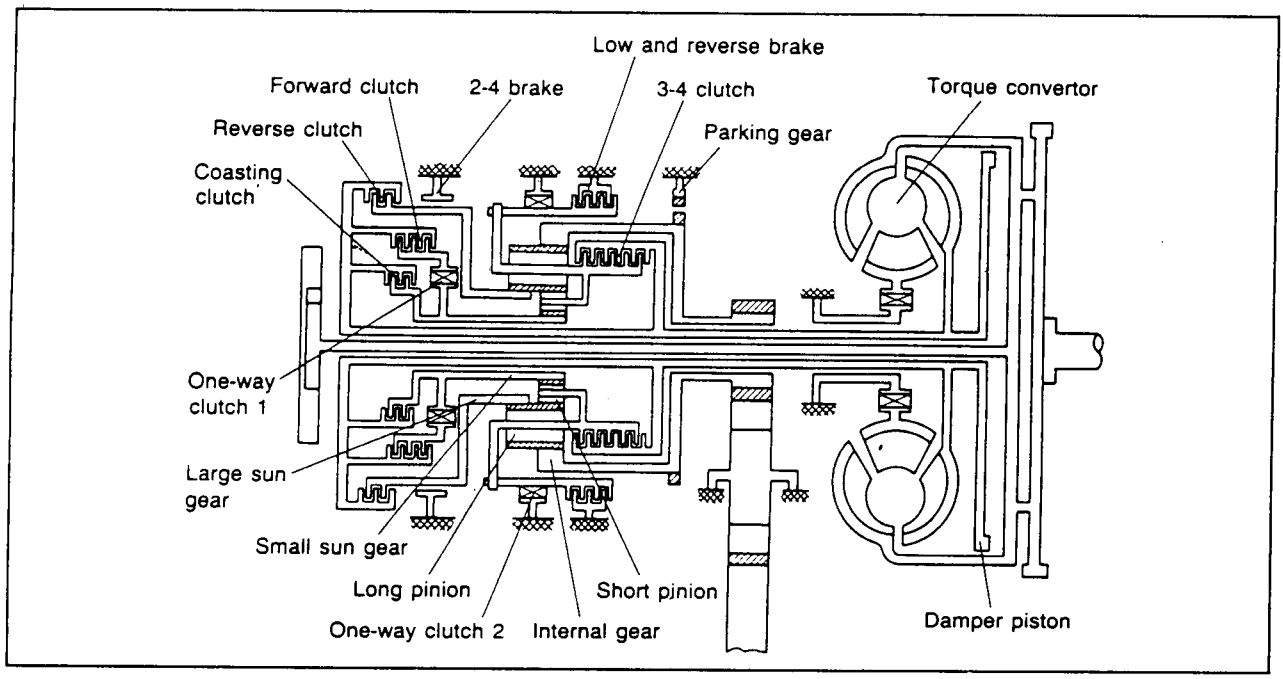
SPECIFICATIONS

Model		G4A-EL (EC-AT)	G4A-HL (4-speed)	
			FE engine	F8 engine
Torque converter stall torque ratio		1.710—1.900 : 1	1.900—2.100 : 1	
Gear ratio	First	2.800		
	Second	1.540		
	Third	1.000		
	Fourth (OD)	0.700		
	Reverse	2.333		
Final gear ratio		3.700		
Number of drive plates/ driven plates	Forward clutch	3/3		
	Coasting clutch	2/2		
	3-4 clutch	5/5	4/4	
	Reverse clutch	2/2		
	Low and reverse brake	3/3	4/4	
Servo diameter (Piston outer dia./retainer inner dia.) mm (in)		78/53 (3.07/2.09)	78/49 (3.07/1.93)	78/56 (3.07/2.20)
Speedometer gear ratio (Driven/Drive gear)		20 : 25 or 21 : 25		
Automatic transmission fluid	Type	Dexron II or MIII		
	Capacity liters (US qt, Imp qt)	6.8 (7.2, 6.0)		



1. Hold indicator light
2. EC-AT control unit
3. Vehicle speed sensor
4. Mode indicator light
5. Cruise control unit
6. Cruise control switch
7. Mode switch
8. Hold switch
9. Water temperature switch
10. Throttle sensor and idle switch
11. Fluid temperature switch
12. EC-AT
13. Pulse genelator
14. Solenoid valves
15. Inhibitor switch

OPERATION OF COMPONENTS



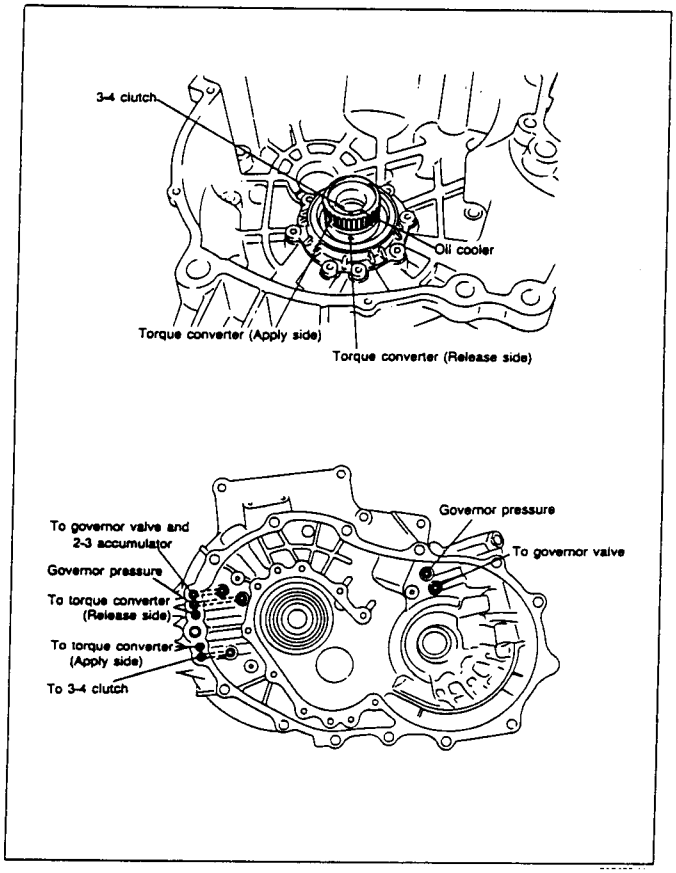
Operation Table (G4A-EL)

Range	Gear		Engine braking effect	Operation elements								
				Forward clutch	Coasting clutch	3-4 clutch	Reverse clutch	2-4 brake Applied	2-4 brake Released	Low & reverse brake	One-way clutch 1	One-way clutch 2
P	—		—									
R	Reverse		Yes				○			○		
N	—		—									
D	1st		No	○							○	○
	2nd		No	○				○			○	
	3rd	Below approx. 40 km/h (25 mph)	Yes	○	○	○			○		○	
		Above approx. 40 km/h (25 mph)	Yes	○	○	○		⊗	○		○	
	OD		Yes	◎		○		○				
S	1st		No	○							○	○
	2nd		No	○				○			○	
	3rd	Below approx. 40 km/h (25 mph)	Yes	○	○	○			○		○	
		Above approx. 40 km/h (25 mph)	Yes	○	○	○		⊗	○		○	
L	1st		No	○						○	○	○
	2nd		Yes	○	○			○			○	
HOLD D	2nd		No	○				○			○	
	3rd	Below approx. 40 km/h (25 mph)	Yes	○	○	○			○		○	
		Above approx. 40 km/h (25 mph)	Yes	○	○	○		⊗	○		○	
HOLD S	2nd		Yes	○	○			○			○	
	3rd	Below approx. 40 km/h (25 mph)	Yes	○	○	○			○		○	
		Above approx. 40 km/h (25 mph)	Yes	○	○	○		⊗	○		○	
HOLD L	1st		Yes	○	○					○	○	○
	2nd		Yes	○	○			○			○	

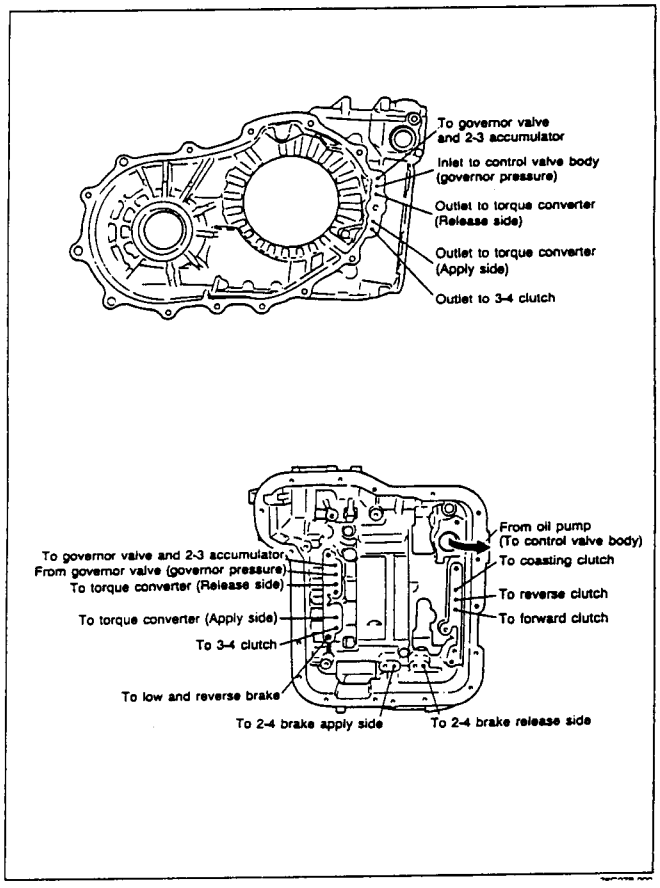
⊗ : Indicates fluid pressure to servo but band not applied due to pressure difference in servo.
◎ : Indicates that it does not function transmission power.

FLUID PASSAGES

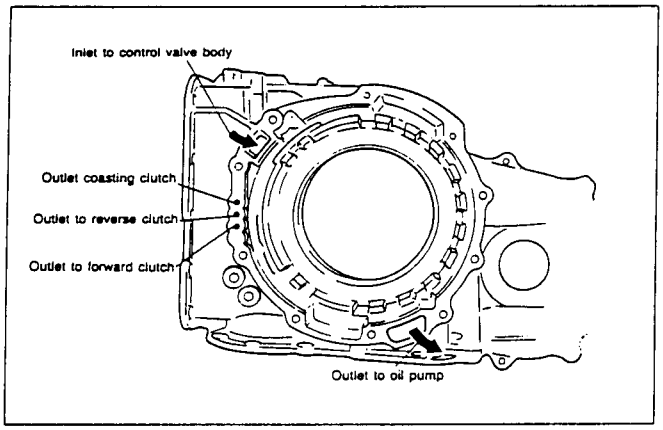
FLUID PASSAGE LOCATION
Converter Housing



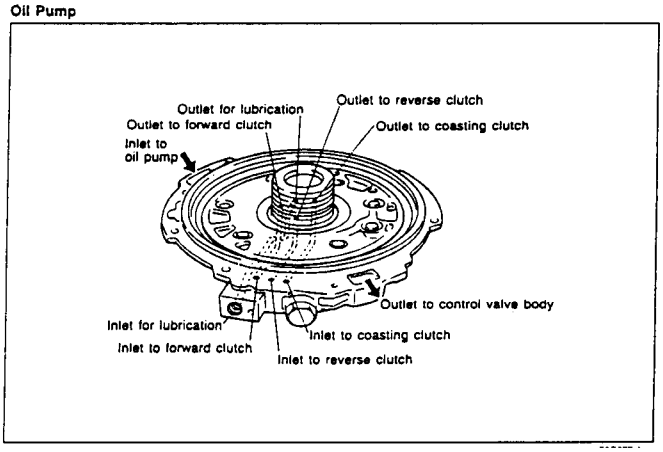
Transaxle Case



Transaxle Case



Oil Pump



TROUBLESHOOTING (G4A-EL)

GENERAL NOTE

In the event of a problem with the EC-AT, the cause may be in the engine, EC-AT power train, hydraulic control system, or electronic control system.
When troubleshooting, therefore, it is recommended to begin from those points that can be judged quickly and easily. The recommended troubleshooting sequence is described below.

STEP 1: WARNING CODE RETRIEVAL Check self-diagnosed warning code memorized in the EC-AT control unit with the **EC-AT TESTER**	..... This step checks the major electronic components. • Throttle sensor and circuit • Pulse genelator and circuit • Vehicle speed sensor and circuit • All solenoid valves and circuits • EC-AT control unit
STEP 2: PRELIMINARY INSPECTION Check preliminary check items • ATF level and condition • Oil leakage • Selector lever position • Idle speed • Tire inflation pressure • Inhibitor switch • Throttle cable	..... This step checks conditions surrounding the automatic transaxle.
STEP 3: SIGNAL INSPECTION Check signals to the EC-AT control unit with the **EC-AT TESTER**	..... This step checks the electronic control system. • All input signals to EC-AT control unit • All output signals
STEP 4: STALL TEST Check engine stall speed	..... This step checks the power train. • Friction element slipping • Torque converter capacity
STEP 5: TIME LAG TEST Check time lag of oil pressure supply	..... This step checks operation of the hydraulic control system. • Accumulators • Friction elements slipping • Regulating valves
STEP 6: OIL PRESSURE TEST Check line and throttle pressures	..... This step checks major points of the hydraulic control system. • Oil pump • Line pressure control • Throttle pressure control
STEP 7: ROAD TEST Check items on road test • Shift point • Shift schedule • Kick-down • Shift shock • Lock-up and OD inhibition	..... This step checks functions of the EC-AT control unit and hydraulic control system.

By following the above seven steps, the cause of the problem should be located.
As another guide to faster location of the causes of problems, the Quick Diagnosis Chart is included

In this chart, a circle is used to indicate the components that might be the cause of trouble for 23 types of problems. It is only necessary to check those components indicated by circles, at each step of the troubleshooting process, in order to quickly locate the cause of the problem.

Quick Diagnosis Chart
The Quick Diagnosis Chart shows various problems and the relationship of various components that might be the cause of the problem.

1. Components indicated in the "Self-Diag." column are diagnosed by the EC-AT control unit self-diagnosis function.
   The **EC-AT Tester** can be used for easy retrieval of these signals.
2. Components indicated in the "Adjustment" column indicate that there is a possibility that the problem may be the result of an incorrect adjustment.
   Check the adjustment of each component, and readjust if necessary.
3. Input and outout signals of the EC-AT control unit for the components indicated in the "EC-AT TESTER" column can be easily checked by using of the **EC-AT Tester**.
4. Components indicated in the "Stall Test" column can be checked for malfunction by the results of the stall test.
5. Components indicated in the "Time Lag Test" column can be checked for malfunction by the results of the time lag test.
6. Components indicated in the "Oil Pressure Test" column can be checked for malfunction by the results of the oil pressure test.
7. Components indicated in the "Road Test" column can be checked for malfunction by the results of the road test.
8. The checking, adjusting, repair or replacement procedures for each component

Inspection point / Item	Electronic control system													Prelimi-nary			Hydraulic control system				Power train										
	Brake light switch	Inhibitor switch	Mode switch	Hold switch	Idle switch	Throttle sensor	Cruise control switch	Water temp. switch	Vehicle speed sensor	Pulse generator	1-2 solenoid	2-3 solenoid	3-4 solenoid	Lock-up solenoid	ATF level and condition	Selector lever	Throttle cable	Idle speed and ignition timing	Control valves	Accumulators	Oil pump	Hydraulic circuit	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3-4 clutch	2-4 brake band and servo	Low and reverse brake	One-way clutch 1	One-way clutch 2	Parking gear	Planetary gear	Differential assembly
Self-diag.						○			○	○	○	○	○	○																			
Adjustment		○			○	○									○	○	○	○										○					
EC-AT TESTER	○	○	○	○	○	○	○	○	○	○	○	○	○	○																			
Stall Test																			○		○		○	○		○		○		○	○		
Time Lag Test																				○				○					○				
Oil Pressure Test																	○		○		○	○											
Road Test																							○	○			○	○	○	○			

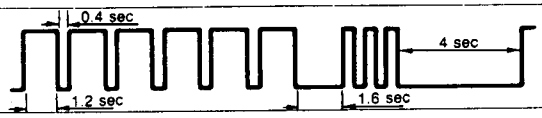
		ON VEHICLE																		OFF VEHICLE														
	Inspection point and reference page / Condition	Electronic control system													Prelim-inary			Hydraulic control system				Power train												
		Brake light switch	Inhibitor switch	Mode switch	Hold switch	Idle switch	Throttle sensor	Cruise control switch	Water temp. switch	Vehicle speed sensor	Pulse generator	1-2 solenoid	2-3 solenoid	3-4 solenoid	Lock-up solenoid	ATF level and condition	Selector lever	Throttle cable	Idle speed and ignition timing	Control valves	Accumulators	Oil pump	Hydraulic circuit	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3-4 clutch	2-4 brake band and servo	Low and reverse brake	One-way clutch 1	One-way clutch 2	Parking gear	Planetary gear	Differential assembly
Accelerating	Vehicle does not move in D, S, L, or R range															○	○			○		○	○	○	○		○			○	○	○		
	Vehicle moves in N range																○			○														
	Excessive creep																	○	○					○											
	No creep at all															○	○	○		○		○	○		○		○							
Shifting	No shift		○		○							○	○	○		○	○			○		○												
	Abnormal shift sequence		○		○		○	○	○		○	○	○	○		○	○			○								○						
	Frequent shifting		○	○			○	○			○	○	○	○	○					○														
	Excessively high or low shift point		○	○	○	○	○				○	○	○	○			○			○														
	No lock-up	○					○	○	○		○	○	○	○	○		○							○											
	No kick-down		○		○		○										○																		
Slipping	Engine run away or slip when starting vehicle		○													○				○		○			○					○				
	Engine run away or slip when up- or down-shifting		○													○				○		○			○		○	○	○	○				
Shift shock	Excessive N to D or N to R shift shock															○			○	○	○				○		○							
	Excessive shift shock when upshifting or downshifting															○		○		○	○					○		○	○					
	Excessive shift shock when changing range		○														○			○						○				○				
Noise	Transaxle noisy in N or P range															○						○		○										○
	Transaxle noisy in D, S, L, or R range															○									○					○			○	
Others	No engine braking												○	○						○			○			○				○				
	No mode change		○	○	○		○		○	○	○	○	○	○	○																			
	Transaxle overheats														○	○				○		○		○										
	Vehicle moves in "P", or parking gear not disengaged when "P" is disengaged																○															○		
	Hold indicator flashes					○		○	○	○	○	○	○																					
	Engine will not start	○															○																	

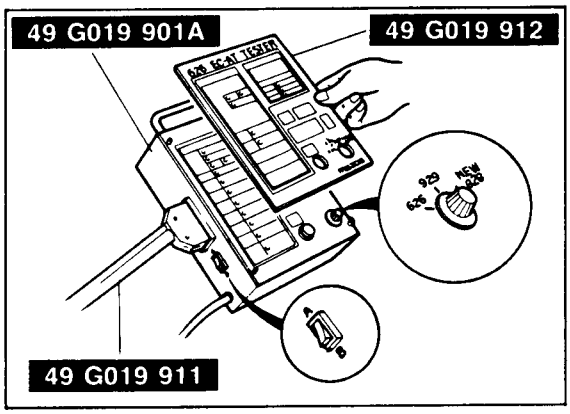
(WARNING CODE RETRIEVAL)

Self-diagnosis Function

The self-diagnosis system, which is integrated in the EC-AT control unit, diagnoses malfunction of the main sensors (input) and solenoid valves (output), and the EC-AT control unit.
Malfunctions which have happened or are continuing are memorized in the EC-AT control unit as specific codes.
The **EC-AT Tester** is used to retrieve these warning codes. Each malfunction is indicated by a code number and buzzer as shown the table below.

Code Number

Code number	Location of malfunction	Buzzer
06	Vehicle speed sensor or circuit	
12	Throttle sensor or circuit	
55	Pulse genelator or circuit	
60	1-2 shift solenoid valve or circuit	
61	2-3 shift solenoid valve or circuit	
62	3-4 shift solenoid valve or circuit	
63	Lock-up solenoid valve or circuit	

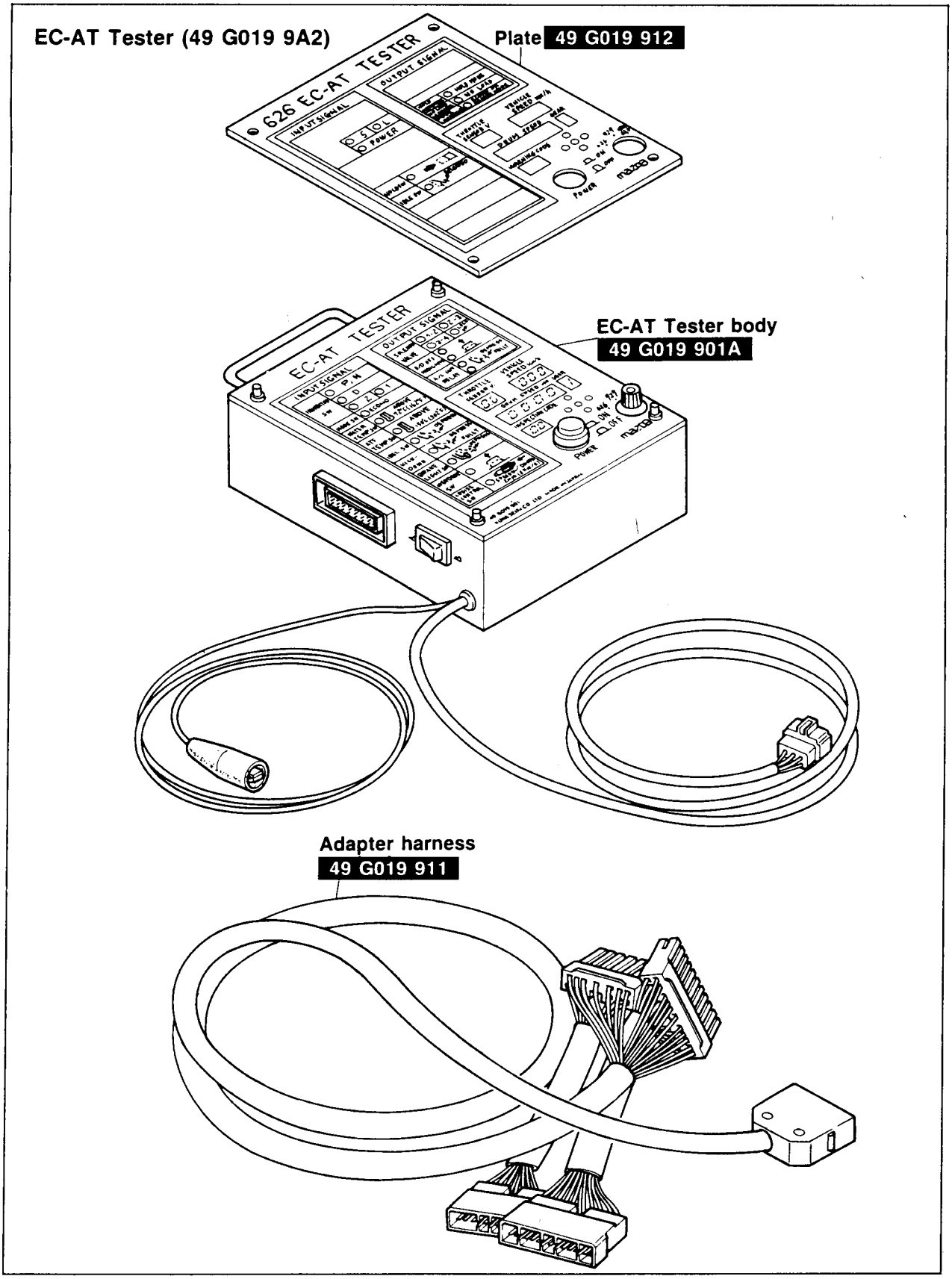


EC-AT Tester

Assembly of EC-AT tester

1. Set the **plate** (49 G019 912) onto the **EC-AT tester body** (49 G019 901A).
2. Connect the **adapter harness** (49 G019 911) to the **EC-AT tester body**.
3. Select the code select switch to A position.
4. Select the select switch to NEW 626 position.

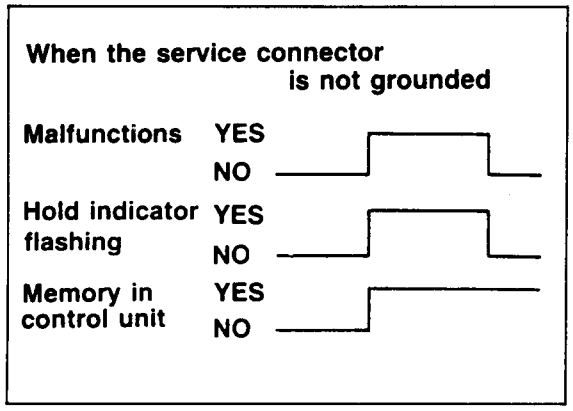
Components


EC-AT Tester (49 G019 9A2)
Plate 49 G019 912
626 EC-AT TESTER
EC-AT Tester body
49 G019 901A
EC-AT TESTER
Adapter harness
49 G019 911

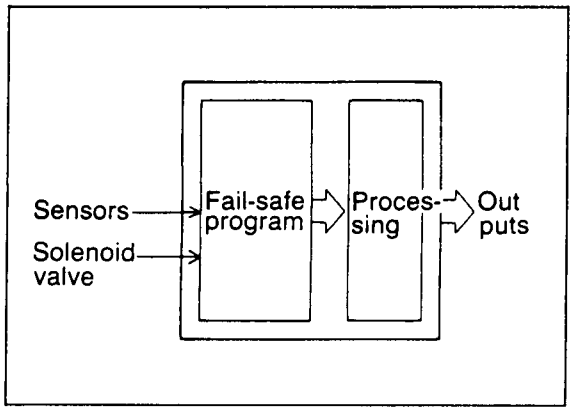
06 → 4 second period →
55 → 4 second period →
63 → 4 second period →
Repeats above

General Note

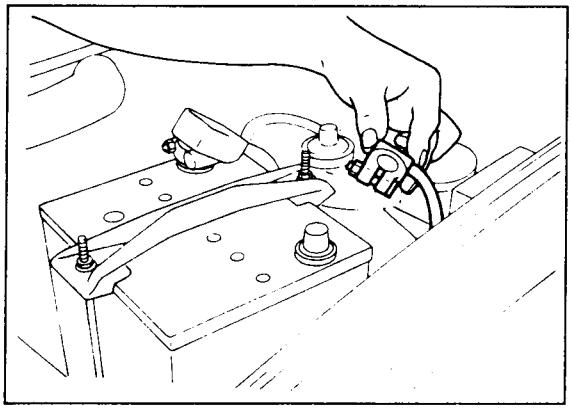
1. If there is more than one malfunction, the code numbers will be displayed on the tester one by one in a numerical order. In the case of malfunctions, 55, 06, and 63, the code numbers are displayed in an order of 06, 55, then 63. The display is as shown.



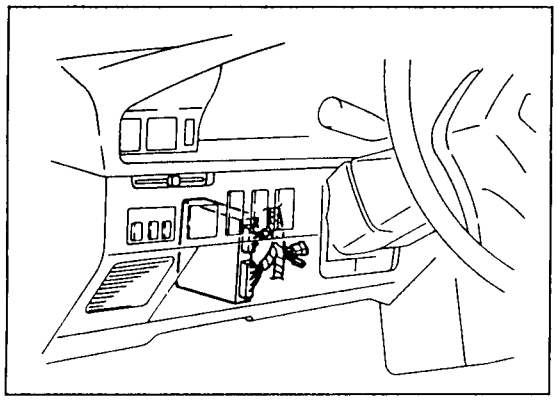
2. The hold indicator flashes to indicate the same pattern as the buzzer of the EC-AT Tester when the EC-AT service connector is grounded.
When the EC-AT service connector is not grounded, the indicator flashes in a constant frequency while a malfunction is occurring and goes out if the malfunction recovers. However, the warning code is memorized in the EC-AT control unit.



3. The EC-AT control unit has a built-in fail-safe function for the throttle sensor, the pulse generator, and the 1-2, 2-3, and 3-4 shift solenoid valves.
If a malfunction occurs, the EC-AT control unit will control operation of the remaining components according to a preset fail-safe program.
The vehicle may still be driven, although the driving performance will be slightly affected.



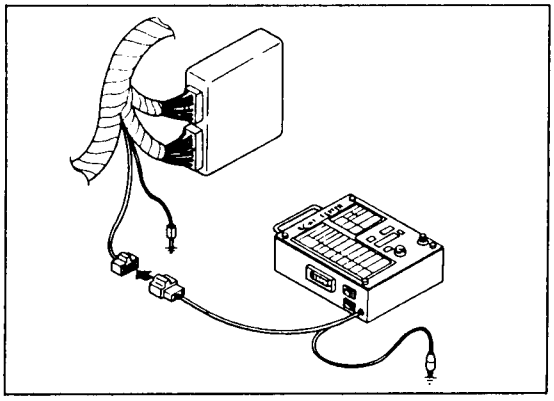
4. The memory of warning codes is canceled by disconnecting the negative battery terminal for approx. five seconds.



Retrieval Procedure

Locate the service connector.

NOTE: On some models grounding the 1 pin service connector will display the service codes. If this procedure is ineffective, it will be necessary to use a scanner or EC-AT Tester to retrieve stored codes.



Ground the ground connector of the **EC-AT Tester**.

Connect the 6-pin connector of the **EC-AT Tester** to the service connector.

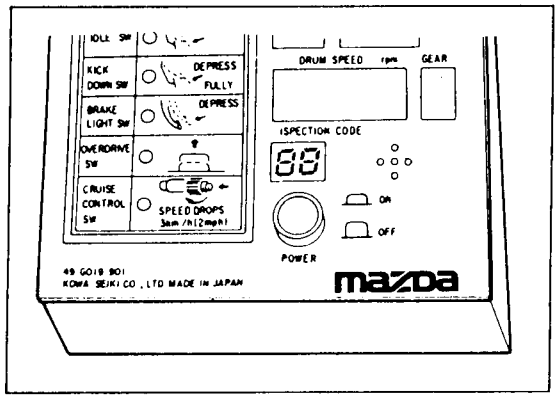
Note

The service connector is blue-colored connector.

Ground the 1 pin service connector.

Note

The service connector is blue-colored connector.



Turn the ignition switch ON.

Check that "**88**" flashes on the digital display and the buzzer sounds for three seconds after turning the ignition switch ON.

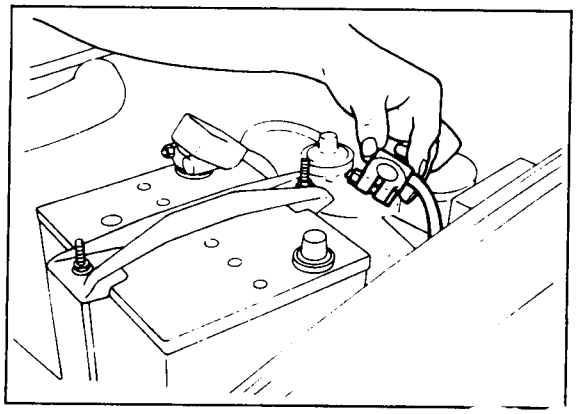
If "**88**" does not flash, check the service connector wiring.

If "**88**" flashes and the buzzer sounds continuously for more than **20 seconds,** check wiring to 2M terminal of the EC-AT control unit for short-circuit then replace the EC-AT control unit and repeat steps 3 and 4.

Note the code numbers and check for the causes by referring to the Inspection Procedure shown repair as necessary.

Note

After repairs are made, recheck for code numbers by performing the "After-repair procedure."



After-repair Procedure

Cancel the memory of malfunctions by disconnecting the negative battery terminal for at least five seconds, then reconnect it.
Remove the EC-AT tester if it is connected.

Drive at 50 km/h (31 mph)

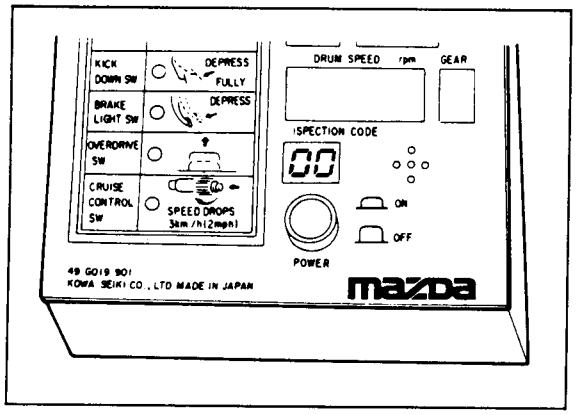
↓

Kick-down

↓

Stop the vehicle

Drive the vehicle at 50 km/h (31 mph), then depress the accelerator pedal fully to activate kick-down. Stop the vehicle gradually.



Reconnect the **EC-AT tester** to the 6-pin service connector.
Ground the 1-pin service connector with a jumper wire.
Turn the ignition switch ON.
Check that no code numbers are displayed.

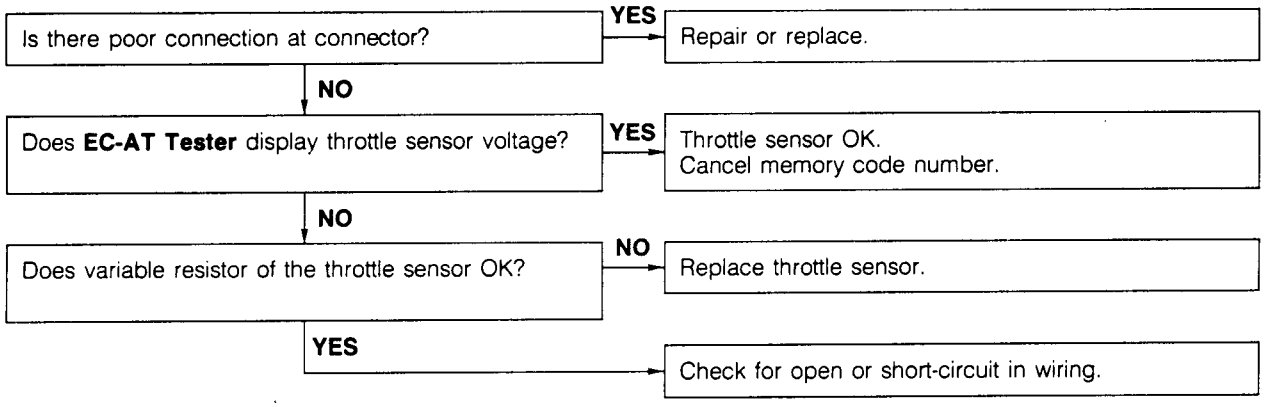
Inspection Procedure
No. 06 code display (Vehicle speed sensor)

Is there poor connection at connector?
- YES → Repair or replace.
- NO ↓

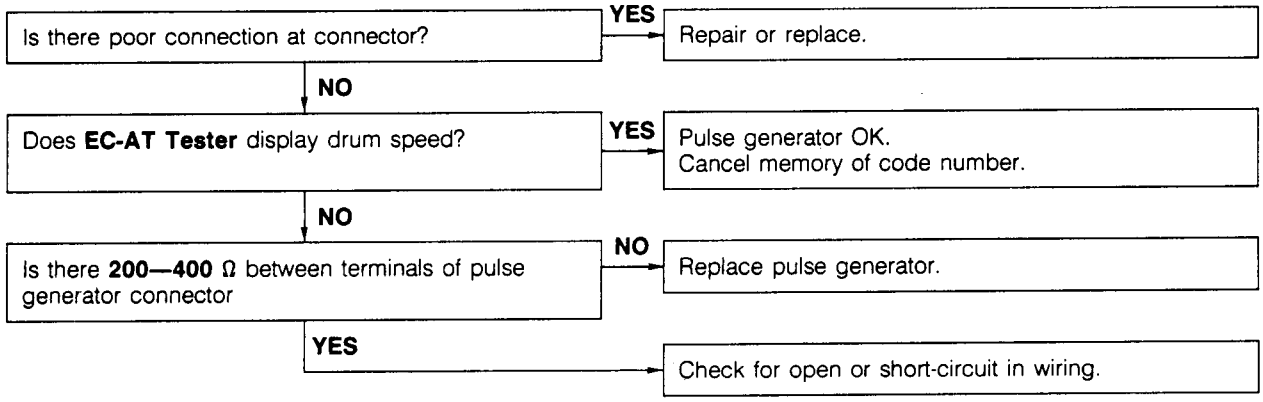
Does **EC-AT Tester** display vehicle speed? (Refer to STEP 3-Signal Inspection)
- YES → Vehicle speed sensor OK. Cancel memory of code number.
- NO ↓

Does vehicle speed sensor operate correctly?
- NO → Check speedometer.
- YES → Check for open or short-circuit in wiring.

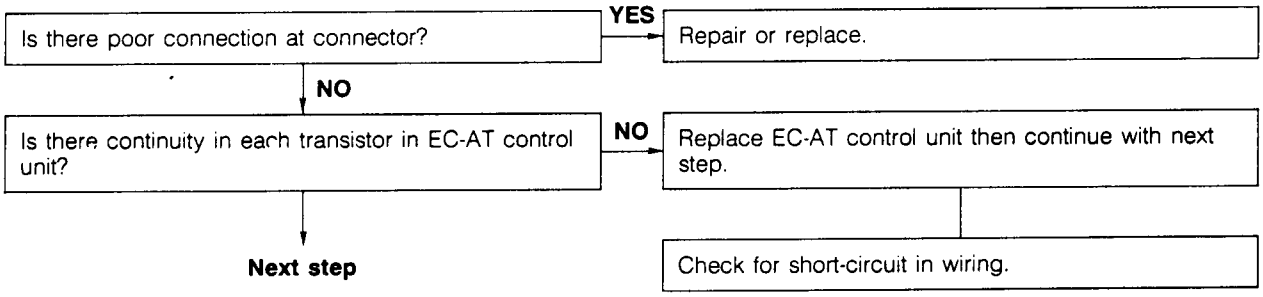
No. 12 code display (Throttle sensor)

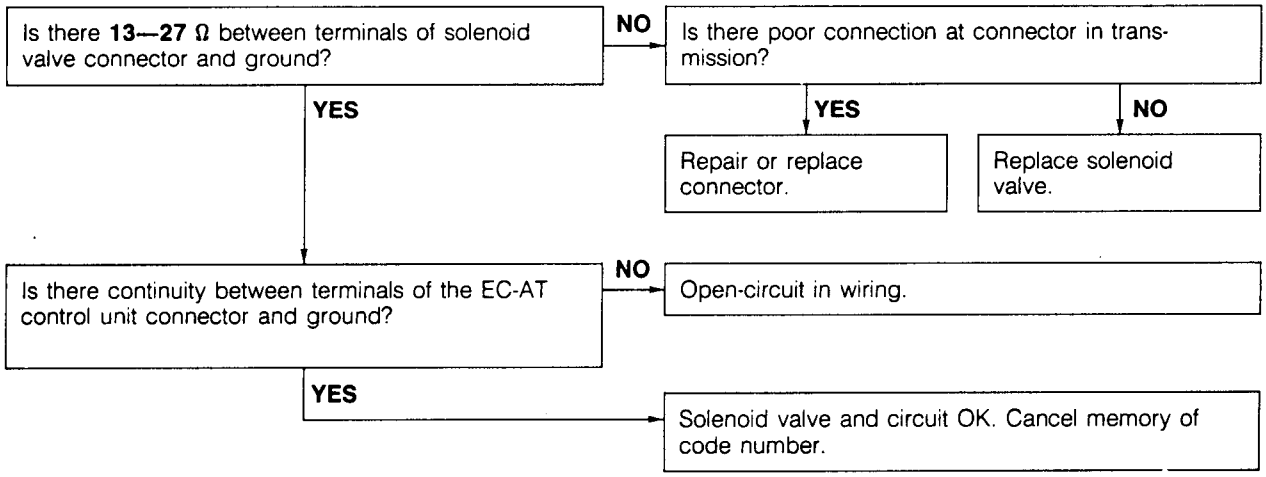


No. 55 code display (Pulse generator)

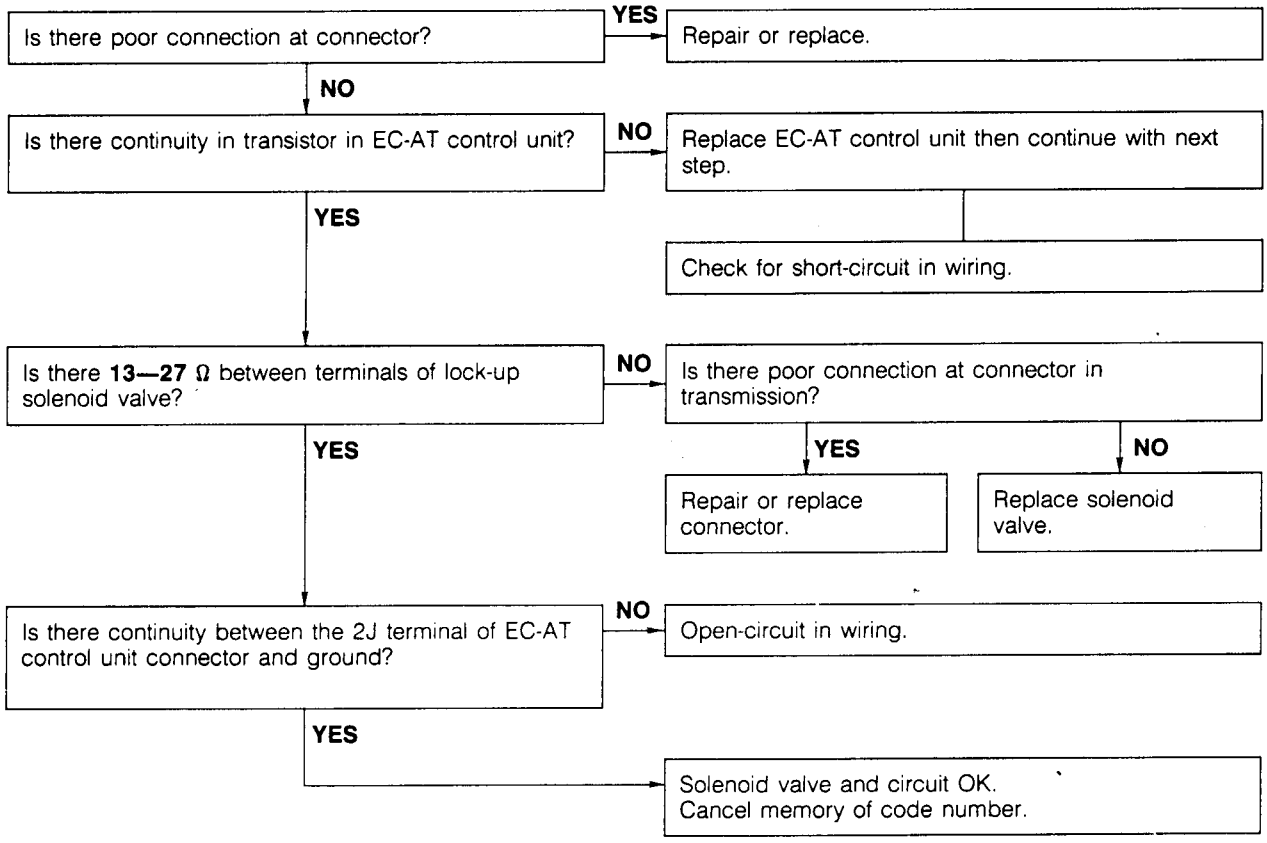


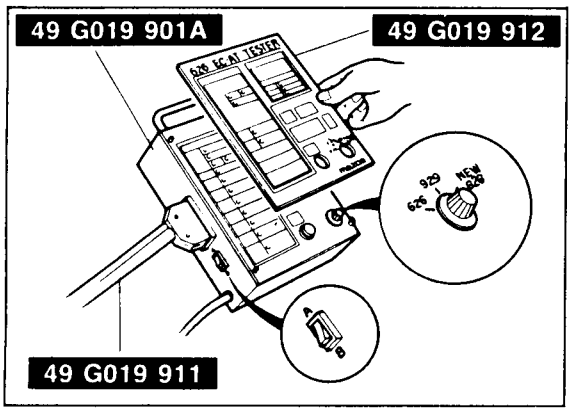
No. 60, 61, 62, or 64 code display (1-2 shift, 2-3 shift, or 3-4 shift solenoid valve)





No. 63 code display (Lock-up solenoid valve)

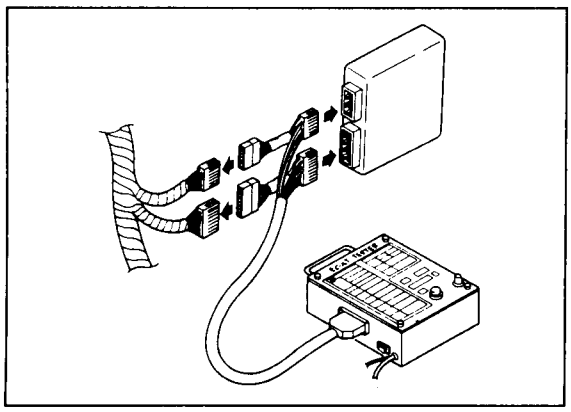




(SIGNAL INSPECTION)

In this step, the input and output signals are checked with the **EC-AT Tester**.

The Tester checks for proper operation of the various switches and sensors in the EC-AT system. It also checks the control unit for output of the various control signals. Powertrain slippage is also checked.



Inspection Procedure

1. Disconnect the connectors from the EC-AT control unit.
2. Connect the adaptor harness between the control unit and the connectors.
3. Turn the ignition switch and main switch ON.
4. Check indication of the respective light or digital display in each condition, referring to the indication table below.

Indication table of light and digital display

Item		Indication	Condition	Possible cause
Input (Light)				
INHIBITOR SW	L	ON	L range	Inhibitor switch or wiring
		OFF	Other ranges	
	S	ON	S range	
		OFF	Other ranges	
	D	ON	D range	
		OFF	Other ranges	
	P,N	ON	P or N range	
		OFF	Other ranges	
HOLD SW		ON	Hold switch pushed	Hold switch or wiring
		OFF	Hold switch released	
MODE SW		ON	Power mode	Mode switch or wiring
		OFF	Economy mode	
IDLE SW		ON	Throttle valve fully closed	Idle switch or wiring
		OFF	Throttle valve open	

Item	Indication	Condition	Possible cause
BRAKE LIGHT SW	ON	Brake pedal depressed	Brake light switch or wiring
	OFF	Brake pedal released	
WATER TEMP SW	ON	Coolant temperature 72°C (162°F) or above	Water temp switch or wiring
	OFF	Coolant temperature lower than 65°C (149°F)	
ATF TEMP SW	ON	ATF temperature 150°C (302°F) or above	Fluid temperature switch or wiring
	OFF	ATF temperature lower than 143°C (289°F)	
CRUISE CONTROL SW	Not used	—	—
Input (Digital display)			
THROTTLE SENSOR	EC-AT control unit terminal voltage	All the time	Throttle sensor, idle switch or wirings
VEHICLE SPEED*	Vehicle speed calculated from speed sensor signal	All the time	Vehicle speed sensor, speedometer cable, or wiring
DRUM SPEED*	Drum speed	All the time	Pulse generator or wirings
Output (Light)			
1-2 SOLENOID VALVE*	ON	Refer to page 7B—26 solenoid valve operation table	Control unit, 1-2 shift sol., or wiring
	OFF		
2-3 SOLENOID VALVE*	ON		Control unit, 2-3 shift sol., or wiring
	OFF		
3-4 SOLENOID VALVE*	ON		Control unit, 3-4 shift sol., or wiring
	OFF		
LOCK-UP SOLENOID VALVE*	ON	Lock-up condition	Control unit, lock-up sol., or wiring
	OFF	Non-lock-up condition	
HOLD INDICATOR	ON	Hold mode	Control unit, Hold switch, or wiring
	OFF	Other modes	
MODE INDICATOR	ON	Power or economy mode	Control unit, hold switch, mode switch, or wiring
	OFF	Hold mode	
NO LOAD SIGNAL	Not used	—	—

Item	Indication	Condition
OUTPUT (Digital display)		
GEAR*	1	1st gear position
	2	2nd gear position
	3	3rd gear position
	4	Overdrive (OD) gear position

Note
a) The back-up condition is as following condition
S range, hold mode, and the accelerator pedal depressed fully.
b) The * marked items should be checked during the engine running or driving.

Comprehensive Usage

The **EC-AT Tester** can be used to inspect slippage of friction elements, shift points, and shift sequence during the road test.
The inspection procedure is shown in (ROAD TEST).

Solenoid valve operation table

RANGE		GEAR			SOLENOID VALVES			
					1-2	2-3	3-4	Lock-up
P		Non					ON	
R		Reverse			ON			
N		—	Below approx. 18 km/h (11 mph)				ON	
			Above approx. 18 km/h (11 mph)		ON			
D		1st				ON	ON	
		2nd			ON	ON	ON	
		3rd	Below approx. 40 km/h (25 mph)					
			Above approx. 40 km/h (25 mph)	Lock-up OFF	ON			
				Lock-up ON	ON			ON
		OD	Lock-up OFF		ON		ON	
			Lock-up ON		ON		ON	ON
S		1st				ON	ON	
		2nd			ON	ON	ON	
		3rd	Below approx. 40 km/h (25 mph)					
			Above approx. 40 km/h (25 mph)		ON			
L		1st				ON	ON	
		2nd	Below approx. 110 km/h (68 mph)		ON	ON		
			Above approx. 110 km/h (68 mph)		ON			
HOLD	D	2nd			ON	ON	ON	
		3rd	Below approx. 40 km/h (25 mph)					
			Above approx. 40 km/h (25 mph)		ON			
	S	2nd			ON	ON		
		3rd	Below approx. 40 km/h (25 mph)					
			Above approx. 40 km/h (25 mph)		ON			
	L	1st				ON		
		2nd	Below approx. 110 km/h (68 mph)		ON	ON		
			Above approx. 110 km/h (68 mph)		ON			

(STALL TEST)

This step is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

Preparation

Check the following items prior to testing:

1. Engine coolant, engine oil and ATF levels.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (50—80°C, 122—176°F).
3. Engage the parking brake and use wheel chocks at the front and rear wheels.

1. Connect a tachometer to the engine.
2. Shift the selector lever to D range.
3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read and note the engine speed as soon as it becomes constant, then release the accelerator pedal.

Caution
Steps 3 to 4 must be performed within 5 seconds.

5. Shift the selector to N range and run the engine at idle speed for at least one minutes.

Note
This one minute idle period is performed to cool the ATF and prevent oil degradation.

6. Perform stall tests for the following ranges in the same manner.
   (1) 2 range
   (2) 1 range
   (3) R range

Standard stall speed:

FE engine
D.S.L range 2430—2530 rpm
R range 2390—2490 rpm

F8 engine
D.S.L range 2180—2280 rpm
R range 2140—2240 rpm

Caution
Always provide adequate cooling time between individual range stall tests.

7. Perform the stall test for the following ranges in the same manner.
   (1) D range
   (2) D range (Hold)
   (3) S range (Hold)
   (4) L range
   (5) L range (Hold)

Caution
Be sure to allow sufficient cooling time between each stall test.
Engine stall speed: D.S.L range 2170—2270 rpm
R range 2130—2230 rpm

Note
The stall test can be performed with the EC-AT Tester in place of a tachometer.
Drum stall speed indication: 0 rpm

Evaluation

Condition		Possible cause	
Above specification	In all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve, and/or transmission case
			Stuck pressure regulator valve
	In forward ranges	Forward clutch slipping One-way clutch 1 slipping	
	In D range	One-way clutch 2 slipping	
	In S (Hold) and L (Hold) ranges	Coasting clutch slipping	
	In D (Hold) and S (Hold) ranges	2-4 brake band slipping	
	In R, L and L (Hold) ranges	Low and reverse brake slipping	
	In R range	Low and reverse brake slipping Reverse cluch slipping Perform road test to determine whether problem is low and reverse brake or reverse clutch a) Engine brake applied in 1st ...Reverse clutch b) Engine brake not applied in 1st ...Low and reverse brake	
Within specification		All shift control elements within transmission are functioning normally.	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

(TIME LAG TEST)

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step checks this time lag for checking condition of the 1-2, N-R, and N-D accumulators, forward, and one-way clutches, 2-4 brake band, and low and reverse brake.

Procedure

1. Start the engine and check the idle speed in P range.

   Idle speed: 900 $\pm^{50}_{0}$ rpm

2. Shift from N range to D range
3. Measure the time it takes from shifting until shock is felt, with a stop watch.
4. Shift the selector to N range and run the engine at idle speed for at least one minute.
5. Perform the test for the following shifts in the same manner.
   (1) N → D range (Hold mode)
   (2) N → R range

Note
Make three measurements for each test and take the average value.

Specified time lag: N → D range ..... 0.5—1.0 second
N → R range ..... 0.5—1.0 second

Evaluation

Condition		Possible Cause
N → D (Economy) shifting	More than specification	Insufficient line pressure Forward clutch slipping One-way clutch 1 slipping One-way clutch 2 slipping
	Less than specification	N-D accumulator not operating properly Excessive line pressure
N → D (Hold) shifting	More than specification	Insufficient line pressure Forward clutch slipping 2-4 brake band slipping One-way clutch 1 slipping
	Less than specification	1-2 accumulator not operating properly Excessive line pressure
N → R shifting	More than specification	Insufficient line pressure Low and reverse brake slipping Revese clutch slipping
	Less than specification	N-R accumulator not operating properly Excessive line pressure

1. Start the engine and check the idle speed in P range

   Idle speed: 900 $\pm^{50}_{0}$ rpm

2. Shift the selector lever to D range and read the line pressure at idle.
3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

Caution
Steps 3 to 4 must be performed within 5 seconds.

5. Shift the selector lever to N range and run the engine at idle for at least one minute.
6. Read the line pressure at idle and engine stall speeds for each range in the same manner.

Throttle Pressure Test
This step checks line pressure for checking the hydraulic components and for improper adjustment of throttle cable.

1. Start the engine and check the idle speed in P range.

   Idle speed: 900 $\pm^{50}_{0}$ rpm

2. Shift the selector lever to D range and read the throttle pressure at idle.
3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read the throttle pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

Caution
Steps 3 to 4 must be performed within 5 seconds.

Specified throttle pressure:

	Throttle pressure kPa (kg/cm^2, psi)
When idling	39—88 (0.4—0.9, 6—13)
At stall speed	471—589 (4.8—6.0, 68—85)

Evaluation

Throttle pressure	Possible location of problem
Not within specification	Throttle valve sticking Pressure regulator valve sticking Improper adjustment of throttle cable

Specified line pressure:

	Line pressure kPa, (kg/cm^2, psi)	
Range	D S L	R
When idling	353—432 (3.6—4.4, 51—63)	598—942 (6.1—9.6, 87—137)
At stall speed	873—1040 (8.9—10.6, 127—151)	1668—2011 (17.0—20.5, 242—292)

Evaluation

Line pressure	Possible location of problem
Low pressure in every position	Worn oil pump Fluid leaking from oil pump, control valve body, or transaxle case Pressure regulator valve sticking
Low pressure in D and S only	Fluid leaking from hydraulic circuit of forward clutch
Low pressure in R only	Fluid leaking from hydraulic circuit of low and reverse brake
Higher than specification	Throttle valve sticking Throttle modulator valve sticking Pressure regulator valve sticking

(ROAD TEST)

This step is performed to inspect for problems at the various ranges. If these tests show any problems, adjust or replace by referring to the electronic system component or mechanical sections.

Caution
Perform the test at normal ATF operating temperature (50—80°C, 122—176°F).

D Range Test

Shift point, shift pattern, and shift shock

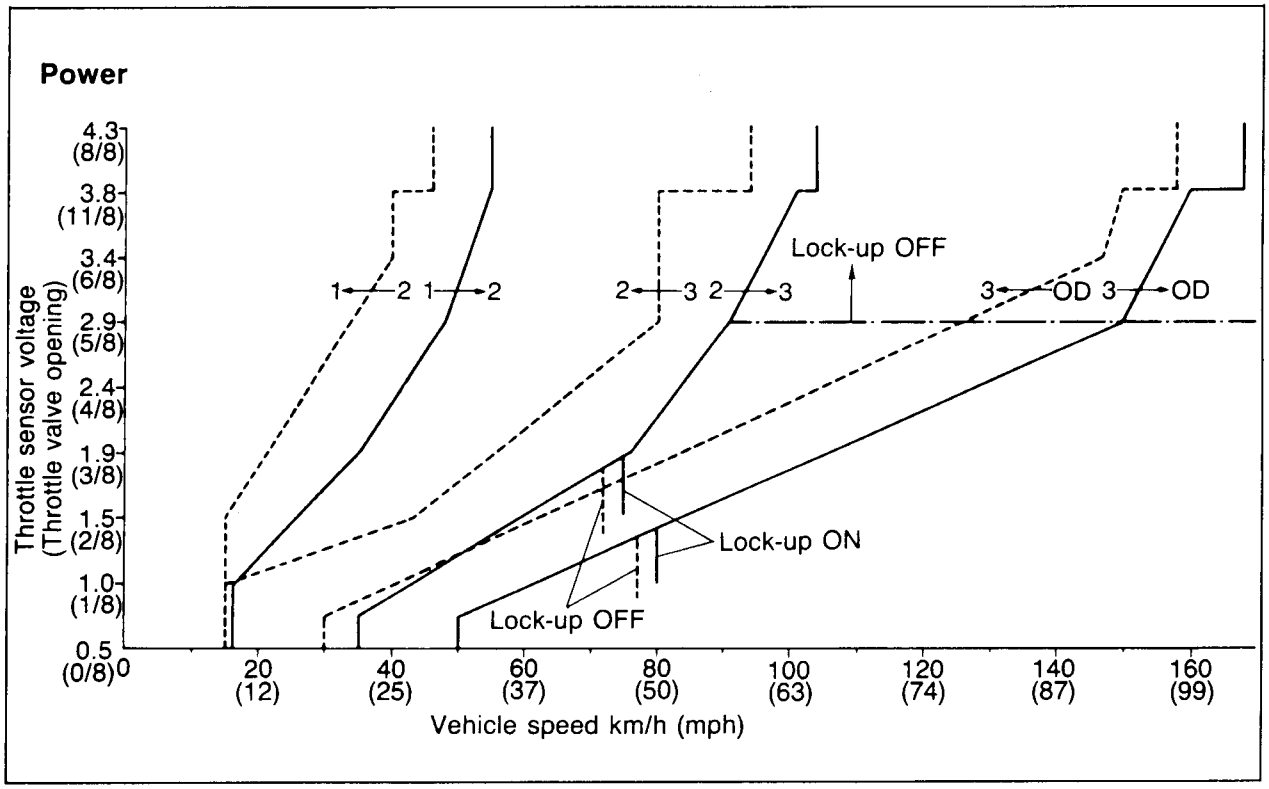
1. Shift the selector lever to D range and select the Power mode.
2. Accelerate the vehicle with half and full throttle valve opening.

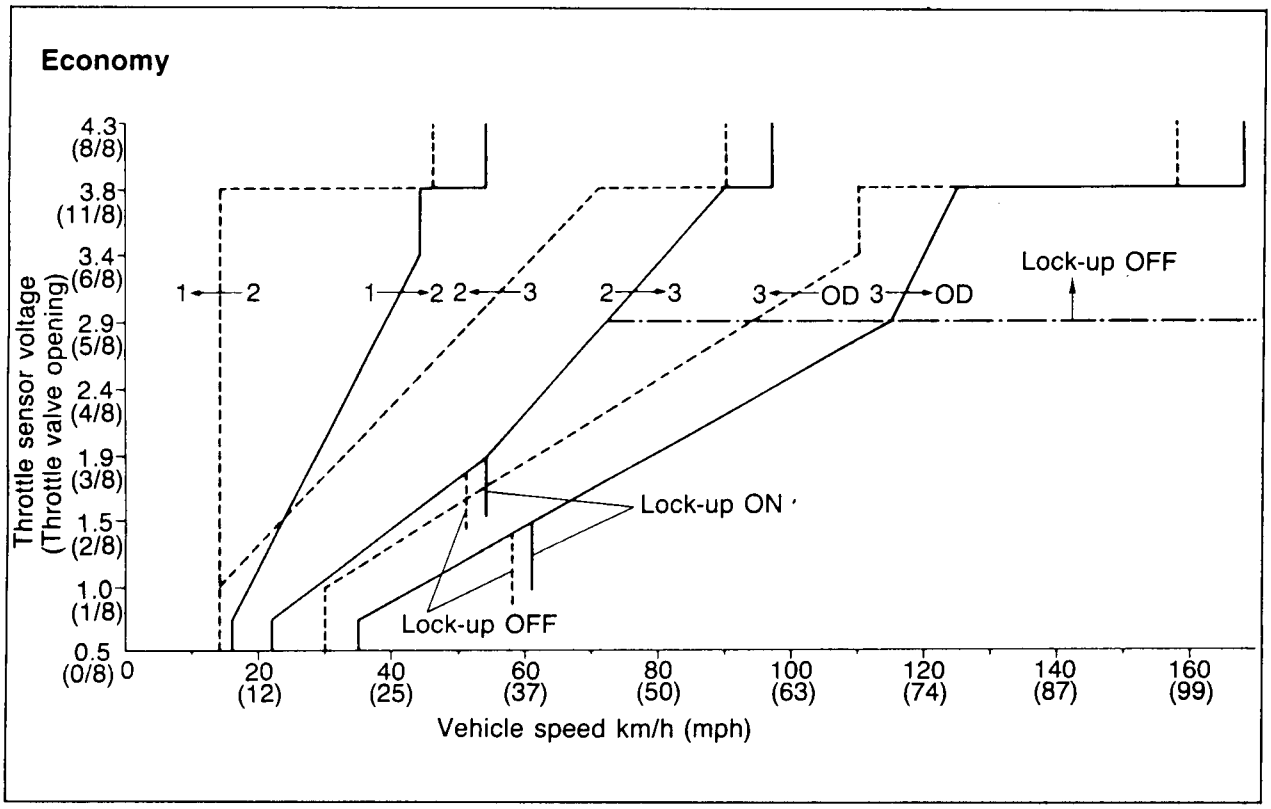
Note
Throttle sensor voltage of the EC-AT Tester represents the throttle valve opening.

3. Check that 1-2, 2-3 and 3-OD up-shifts and downshifts and lock-up are obtained. The shift points must be as shown in the D range (Power) shift diagram.

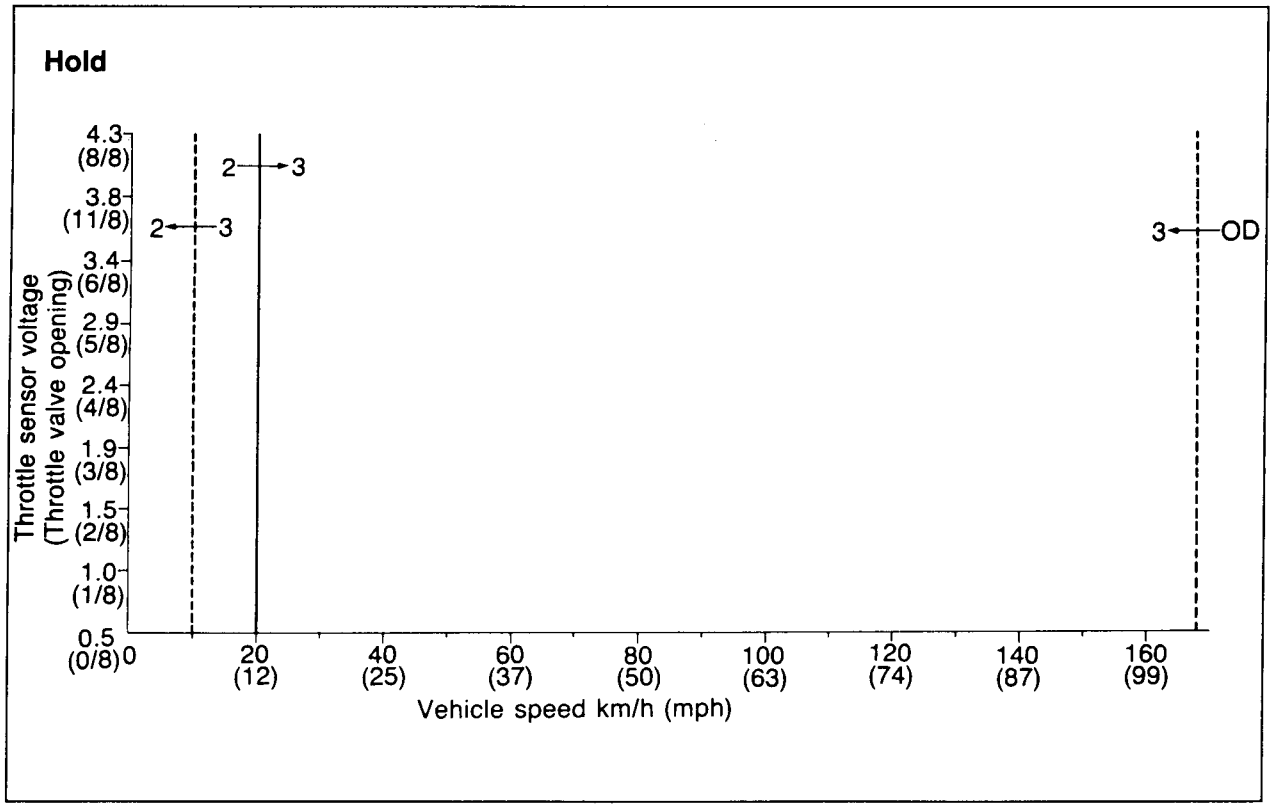
Note
a) Drum speed (rpm) of the EC-AT Tester represents the shift point.
b) Vehicle speed of the EC-AT Tester and speedometer and vehicle speed on a chassis roller may not meet the specified shift pattern because of tire size. Therefore, check the shift points with the Drum speed.
c) There is no lock-up when the coolant temperature is below 72°C (162°F).
d) There is no overdrive when the cruise control is operating and there is a 3 km/h (1.9 mph) difference between the pre-set cruise speed and vehicle speed, or set or resume switch is ON.
e) There is no lock-up when the brake pedal is depressed.

4. Check the up-shifts for shift shock or slippage in the same manner.
5. While driving in OD, shift the selector lever to S range and check that 4-3 downshift immediately occurs, then decelerate and check that engine braking effect is felt in only 3rd gear.





6. Select D range (Hold mode).
7. Accelerate the vehicle and check 2-3 up- and down-shifts, no 1st, and no OD is obtained and that the 2-3 shift points are as shown in the D range (Hold) shift diagram.



Slippage Test
This step is performed to inspect slippage of the friction elements.

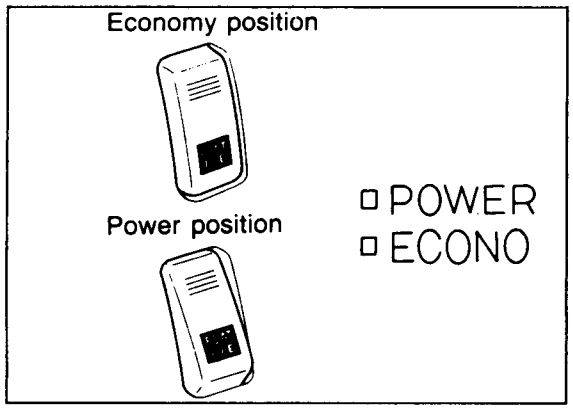
Preparation
1. Perform the preparation procedure shown in STEP 4 (STALL TEST).
2. Connect a tachometer to the engine and set it in the cabin.
3. Connect the **EC-AT Tester** and the **adaptor harness** between the EC-AT control unit and wiring harness.

Procedure
Drive the vehicle in each of the gears indicated below and check whether the vehicle speed or engine speed is above or below specification excessively as shown by the drum speed.

Driving condition			Speed	Drum speed (rpm)			
No.	Gears	Other condition		1,000	2,000	3,000	4,000
1	1st	L range, Hold mode	Vehicle speed km/h (mph)	11 (7)	22 (14)	33 (20)	44 (27)
2	1st	D range, Economy mode		11 (7)	22 (14)	33 (20)	44 (27)
3	2nd	S range, Hold mode		20 (12)	40 (25)	60 (37)	80 (50)
4	3rd	D range, Hold mode		31 (19)	61 (38)	92 (57)	123 (76)
5	OD	D range, Economy mode		44 (27)	88 (55)	131 (81)	173 (107)
6	OD	D range, Economy mode, Lock-up	Engine speed (rpm)	1,000	2,000	3,000	4,000

Evaluation
When there is no malfunction in the electrical system or hydraulic system, but vehicle speed or engine speed is below specification, the problem can be attributed to slippage of the friction elements.

Driving conditions below specification	Possible Cause
No.1 condition only	Low and reverse brake
No.2 condition only	One-way clutch
No.3 condition only	2-4 brake band
No.4 condition only	Coasting clutch
No.5 condition only	3-4 clutch
No.1-No.5 conditions	Forward clutch
No.6 condition only	Lock-up piston (in torque converter)

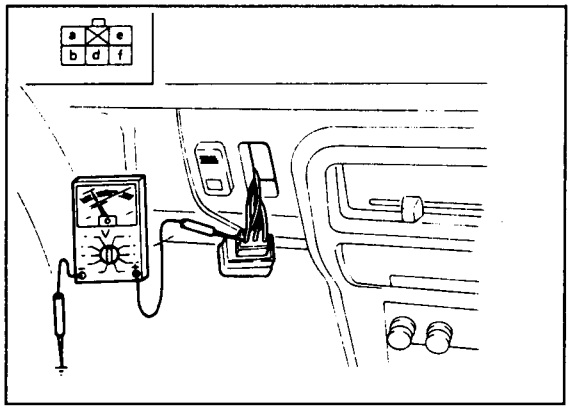


ELECTRICAL SYSTEM COMPONENTS

MODE SWITCH (G4A-EL)

Inspection of Operation

1. Turn the ignition switch ON.
2. Check that the mode indicator illuminates at each model.
3. If it is not working properly, check terminal voltage of mode switch.

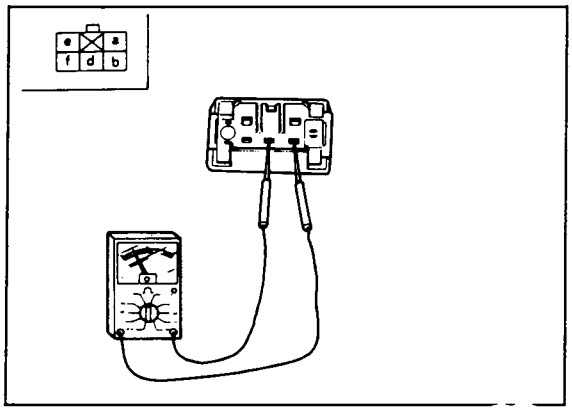


Inspection of Continuity

1. Disconnect the mode switch.
2. Turn the ignition switch ON and light switch OFF.
3. Check the voltage between each terminal and ground.

Mode	Voltage				
	a	b	d	e	f
Power	Approx. 12V	Below 1.5 V	Below 1.5 V	Below 1.5 V	Below 1.5 V
Economy	Below 1.5 V	Below 1.5 V	Below 1.5 V	Below 1.5 V	Approx. 12V

4. If correct, check for continuty between the terminal.



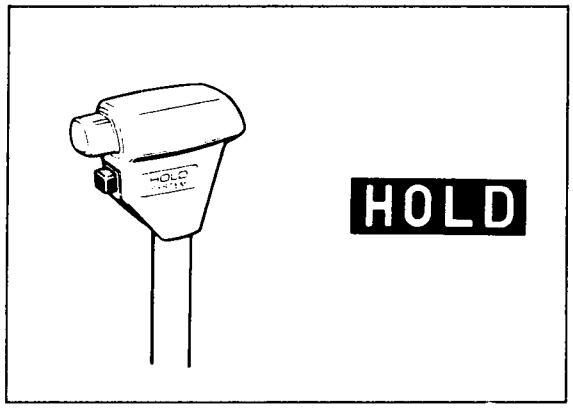
Inspection of Terminal Voltage

1. Disconnect the mode switch connector.
2. Check continuity of the terminals.

Mode	Connector terminal				
	a	f	d	e	b
Economy	○	○	○	○	
Power	○	○	○		○

○—○: Indicates continuity

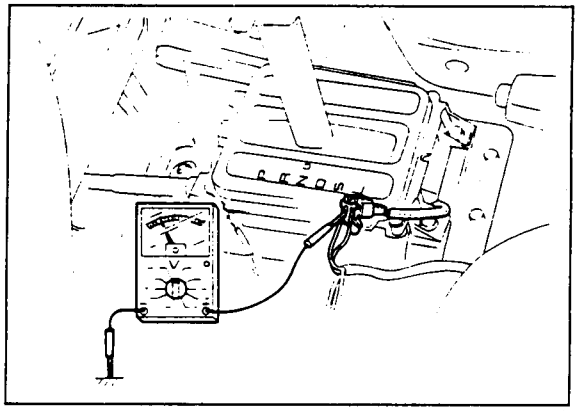
3. If not correct, replace the mode switch.



HOLD SWITCH (G4A-EL)

Inspection of Operation

1. Turn the ignition switch ON.
2. Check that the hold indicator illuminates while switch depressed. Release the switch and mode indicator lights are out.
3. If it is not working properly, check terminal voltage of hold switch.

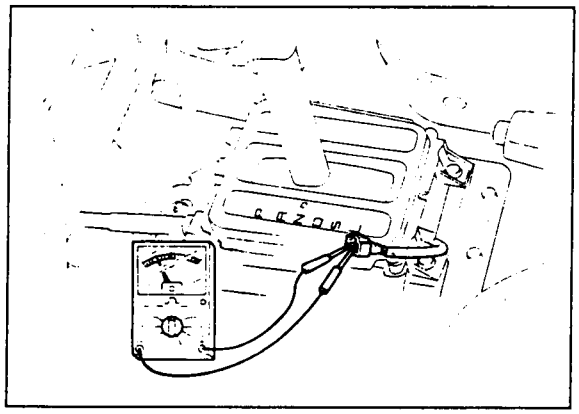


Inspection of Terminal Voltage

1. Remove the consol box.
2. Turn the ignition switch ON.
3. Check the voltage between the terminal (B) and ground while depressing the switch.

Terminal voltage	Switch
Approx. 12V	Depressed
Below 1.5V	Released

4. If correct, check continuty between the terminal.

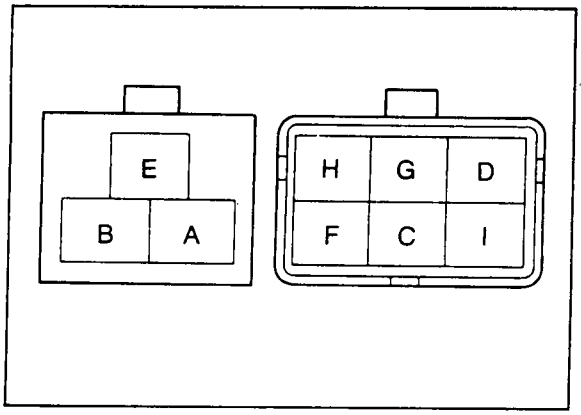


Inspection of Continuity

1. Disconnect the hold switch connector.
2. Check for continuity between the terminals while depressing the switch.

Continuity	Switch
YES	Released
NO	Depressed

3. If not correct, replace the hold switch.



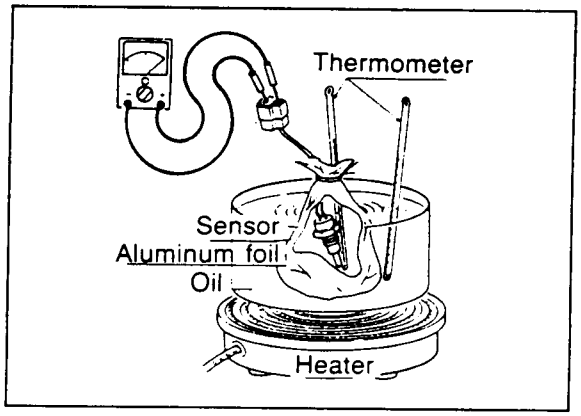
Inspection of continuity

1. Disconnect the inhibitor switch connector.
2. Check continuity of the terminals.

G4A-EL

Position	Connector terminal								
	A	B	C	D	E	F	G	H	I
P	○—○		○—○						
R			○—	—○					
N	○—○		○—			—○			
D			○—				—○		
S			○—					—○	
L			○—						—○

○—○: Indicates continuity



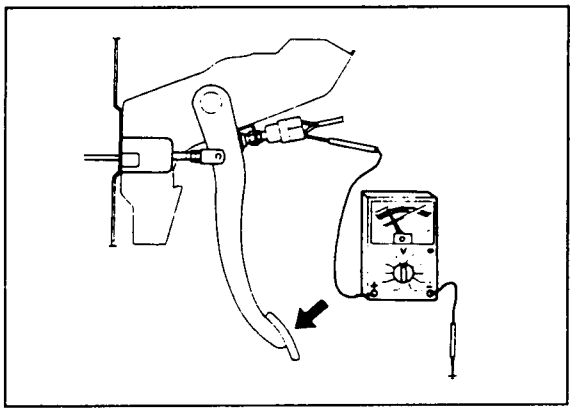
FLUID TEMPERATURE SWITCH (G4A-EL)

Inspection

1. Remove the fluid temperature switch.
2. Place the switch in oil with a thermometer as shown and heat it up gradually.
3. Check the continuity of the terminals. If necessary replace the switch.

Connection guide

Fluid temperature	Continuity
Above 150°C (302°F)	Yes
Below 143°C (289°F)	No

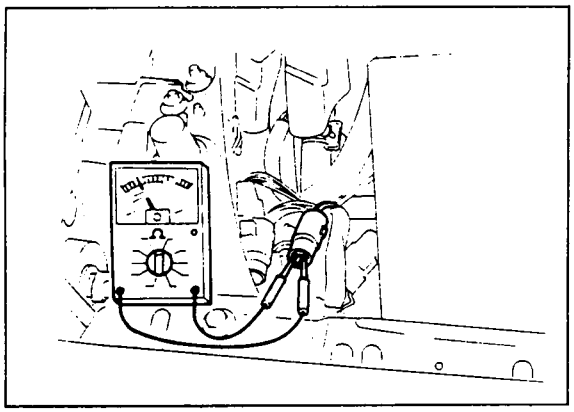


BRAKE LIGHT SWITCH (G4A-EL)
Inspection of Terminal Voltage

1. Turn the ignition switch ON.
2. Check the voltage between terminal (WG) and ground while depressing the brake pedal.

Terminal voltage	Brake pedal
Approx. 12V	Depressed
Below 1.5V	Released

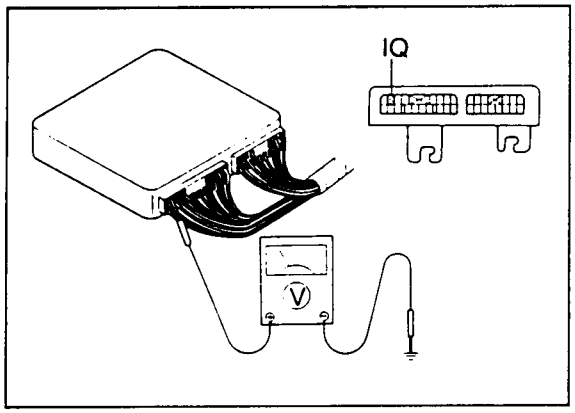
3. If not correct, check continuity of the switch.



PULSE GENERATOR (G4A-EL)
Inspection

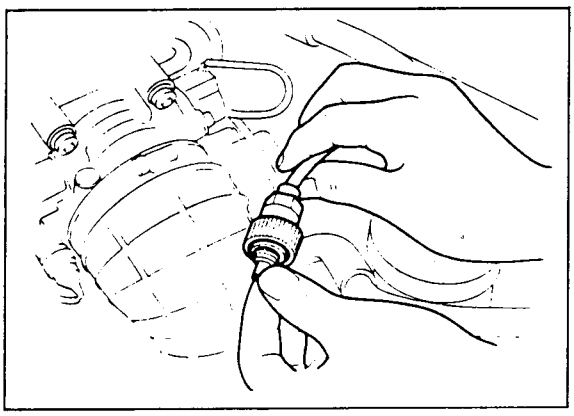
1. Disconnect the pulse generator connector.
2. Check for continuity between the terminals, if necessary replace the pulse generator.

Resistance: 200—400Ω



VEHICLE SPEED SENSOR (G4A-EL)
Inspection of voltage

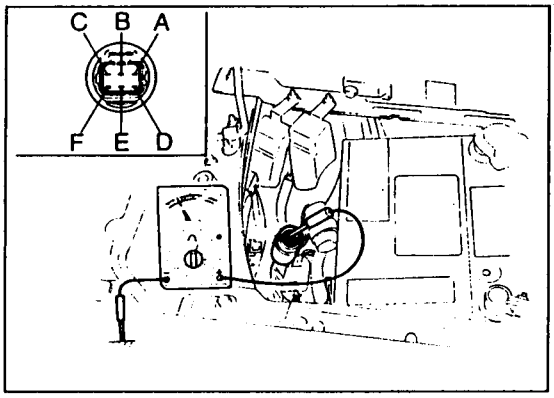
1. Connect a voltmeter between the 1Q terminal of the EC-AT control unit and ground as shown.
2. Turn the ignition switch ON.



3. Remove the speedometer cable from the transaxle.
4. Slowly turn the speedometer cable one turn.
5. Check that approx. 4.5V is shown 4 times.
6. If not correct, check the combination meter.

CRUISE CONTROL SWITCH (CRUISE CONTROL UNIT)

IDLE SWITCH AND THROTTLE SENSOR (G4A-EL)



Internal wire colors.
1-2 sol. wire in trans is green.
2-3 sol. wire in trans is blue.
3-4 sol. wire in trans is yellow.
LU. sol. wire in trans is red.

SOLENOID VALVES (G4A-EL)
Inspection of Resistance
1. Disconnect the negative battery cable.
2. Disconnect the solenoid valve connector.
3. Measure the resistance of the terminals except (A) terminal, if necessary replace the solenoid valve.

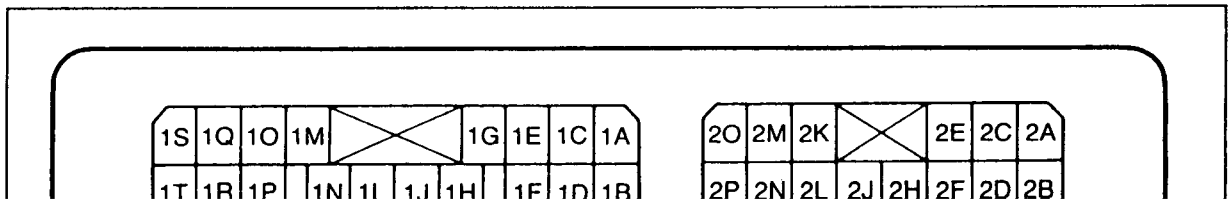
Resistance: 13—27Ω

Note
1-2 solenoid valve : F
2-3 solenoid valve : C,E
3-4 solenoid valve : B
Lock-up solenoid valve : D

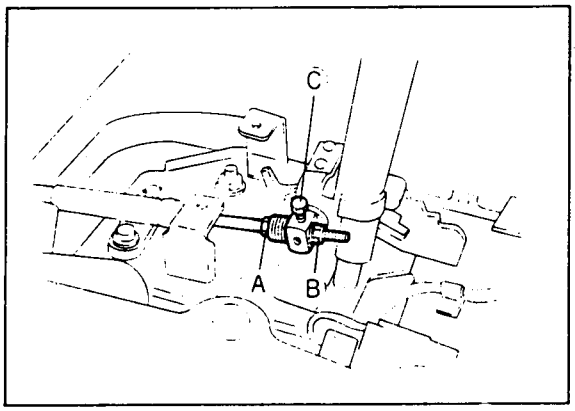
GEAR	1-2 SOL	2-3 SOL	3-4 SOL
FIRST	OFF	ON	ON
SECOND	ON	ON	ON
THIRD	*	OFF	OFF
FOURTH	ON	OFF	ON

* ON IN THIRD CANCELS ENGINE BRAKING

EC-AT CONTROL UNIT (G4A-EL)

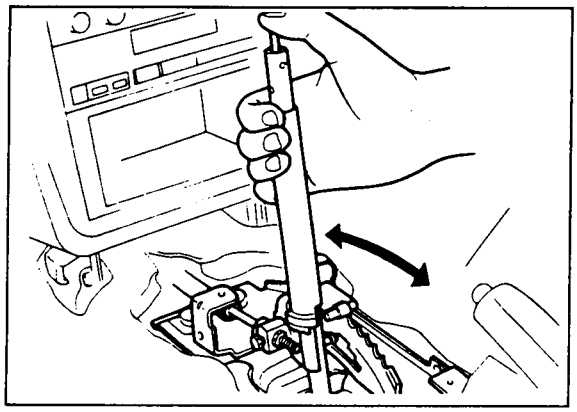


Terminal	Connected to	Voltage	Condition
1J	—	—	—
1K	—	—	—
1L (Input)	Idle switch	Below 1.5V	At idle
		Approx. 12V	Other speeds
1M	—	—	—
1N (Input)	Brake light switch	Approx. 12V	Brake pedal depressed
		Below 1.5V	Brake pedal released
1O (Input)		Approx. 5V	Ignition switch ON

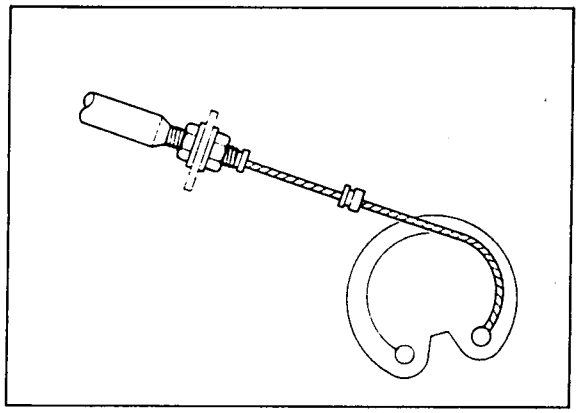


Adjustment
1. Loosen locknuts A, B, and C.
2. Shift the selector lever to the P range.
3. Shift the transmission to the P range by moving the manual shaft of the transmission.
4. Tighten locknut C to the specified torque.

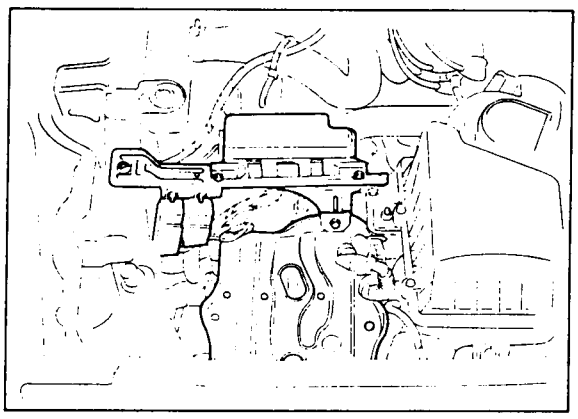
Tightening torque:
8—11 N·m (80—110 cm-kg, 67—96 in-lb)



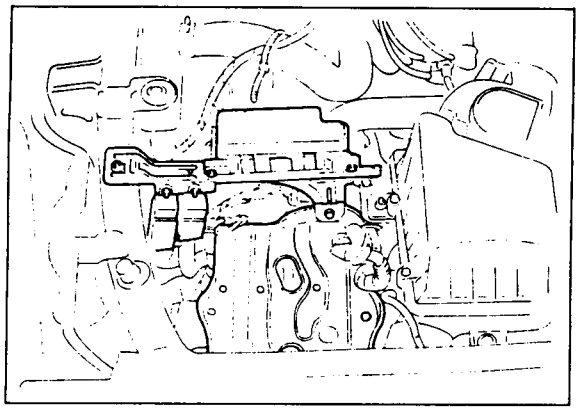
7. Verify that there is a click at each range when shifted from the P ↔ L range.
8. Check that the position of the selector lever and the indicator are exact.
9. Check that the button returns smoothly when used to shift the selector.
10. If necessary, check the spring condition.



THROTTLE CABLE
Inspection
1. Check the inner and outer cable for damage.
2. Make sure that the accelerator operates smoothly.



Removal
1. Remove the battery and battery carrier.
2. Disconnect the main fuse block. (G4A-EL)

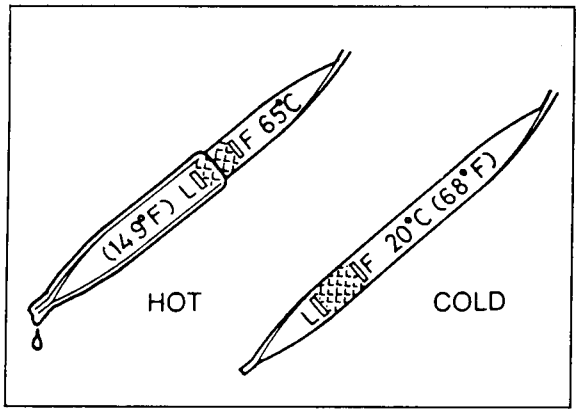


Main fuse block (G4A-EL)
Install the main fuse block.

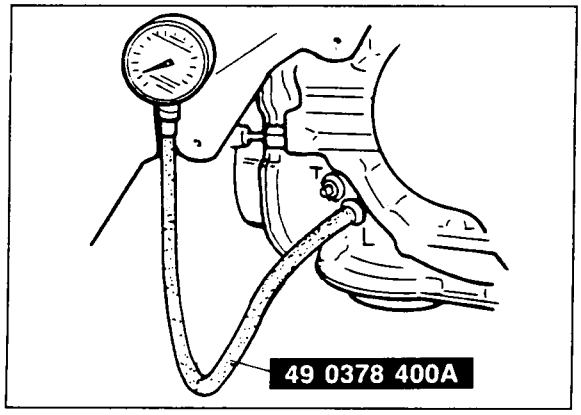
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)

Battery carrier
Install the battery carrier.

Tightening torque:
31—40 N·m (3.2—4.1 m-kg, 23—30 ft-lb)

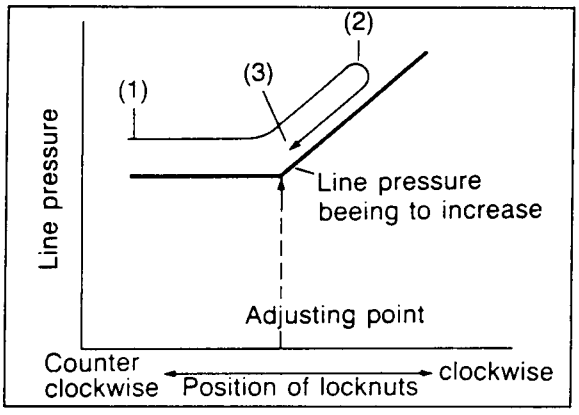


ATF level
After installation, add ATF, and with the engine idling, check the fluid level and for leaks.



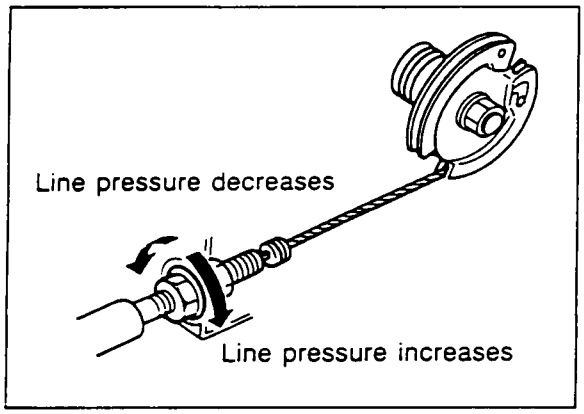
Adjustment (G4A-EL)
1. Remove the splash shield next to the left front tire.
2. Remove the square head plug L and install the **SST**.
3. Shift into P range and start the engine. Warm up the engine to normal operating temperature, and adjust the idle speed.

Idle speed: 950 $\pm^{50}_{0}$ rpm



4. Adjust locknuts as follows:
When the locknuts are moved, line pressure is increased or decreased as shown. Adjust the locknuts to the correct position using the following procedure.

(1) Initially install the locknuts fully away from the throttle cam. (Loosen the cable all the way)
(2) Adjust the locknuts in a clockwise direction as viewed from the front of the vehicle until the line pressure begins to increase above the specification shown below.

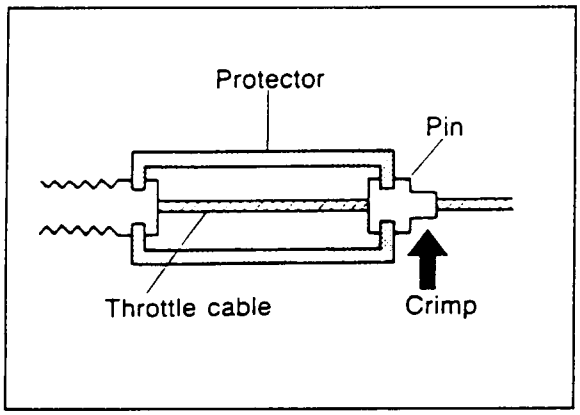


(3) Adjust the locknuts in a counterclockwise direction until the line pressure decreases to the specification. Tighten the locknuts.

Specified pressure: 432—450 kPa (4.4—4.6 kg/cm^2, 63—66 psi)

Note
Transmission in P range

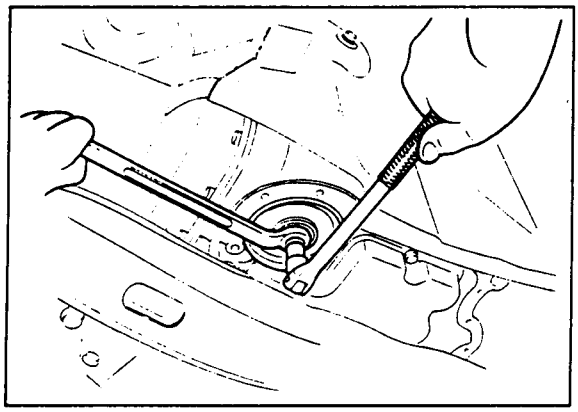
5. Turn off the engine.



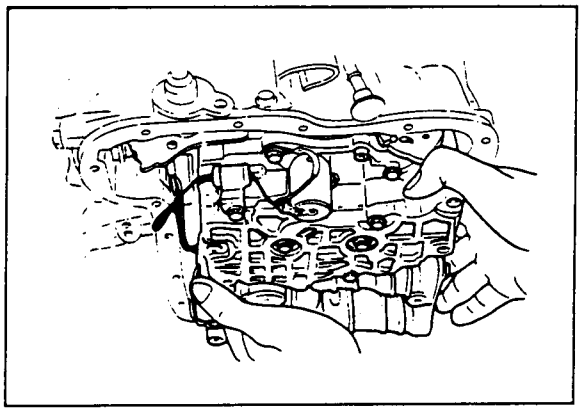
6. Reinstall the square head plug.

Tightening torque:
5—10 N·m (50—100 cm-kg, 43—87 in-lb)

7. Fully open the throttle valve; then crimp the pin with the protector installed as shown.
8. Remove the protector.



ADJUSTMENT OF 2-4 BRAKE BAND
1. Remove the oil pan.
2. Adjust the 2-4 brake band.

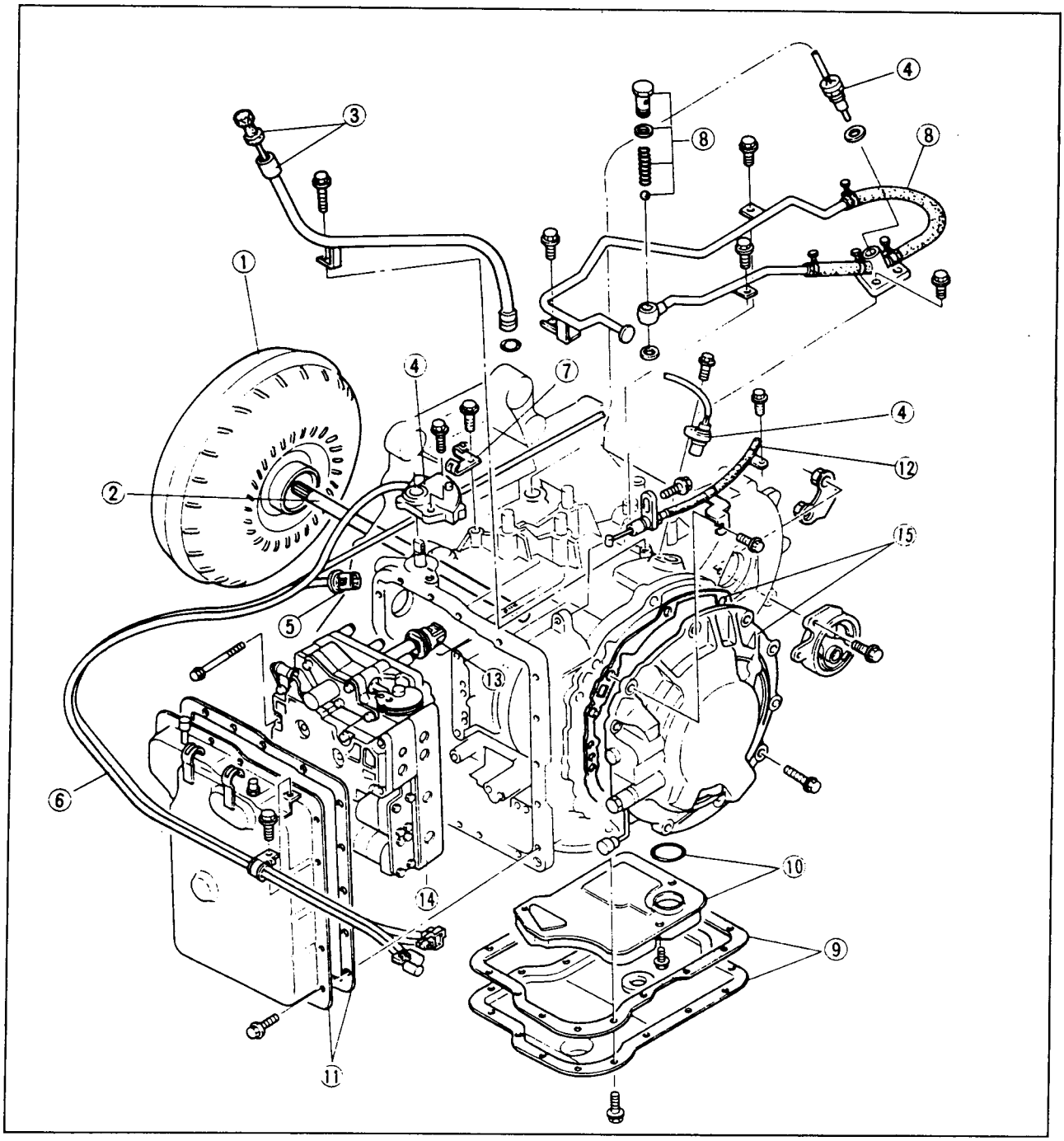


3. Remove the control valve body.

Disassembly, Inspection and Assembly
Refer to control valve body section of INSPECTION AND REPAIR.

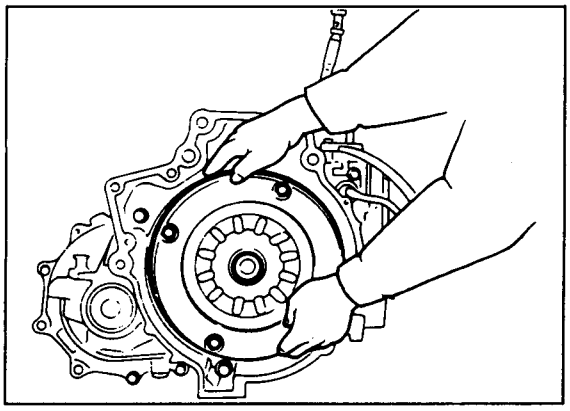
DISASSEMBLY

DISASSEMBLY
Components



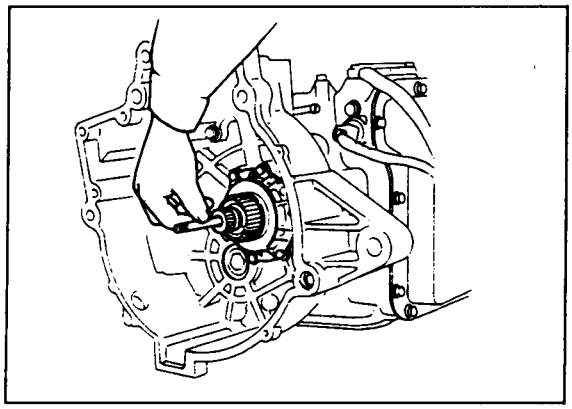
1. Torque converter
2. Oil pump shaft
3. Oil level gauge and oil filler tube
4. Pulse generator, fluid temperature switch, and inhibitor switch
5. Solenoid connector
6. Wire harnesses
7. Harness clip
8. Oil pipes, oil hoses, and switch box
9. Oil pan and gasket
10. Oil strainer and O-ring
11. Control valve body cover and gasket
12. Throttle cable
13. Solenoid connector (Valve body side)
14. Control valve body
15. Oil pump and gasket

Procedure
Precaution
(1) Drain the ATF before removing the transaxle from the vehicle.
(2) Disassemble the transaxle in a clean area (dustproof workspace) to prevent dust entry into the mechanisms.
(3) Clean the transaxle exterior thoroughly with steam and/or cleaning solvents prior to disassembly.
(4) Inspect the individual transaxle components in accordance with the Troubleshooting during disassembly.
(5) Use plastic hammers when applying force to separate the light alloy case joints.
(6) Do not use rags during disassembly.
(7) Neatly arrange the removed parts in order during disassembly.

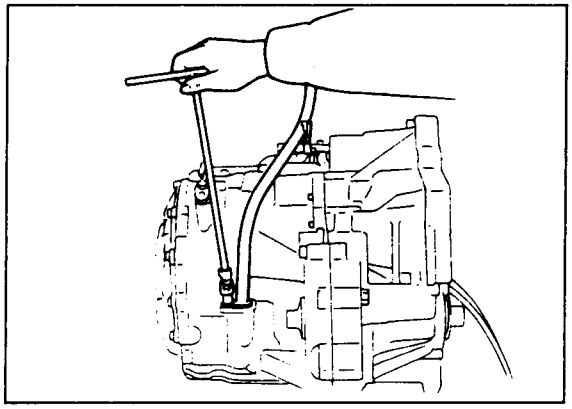


Remove the torque converter from the converter housing.

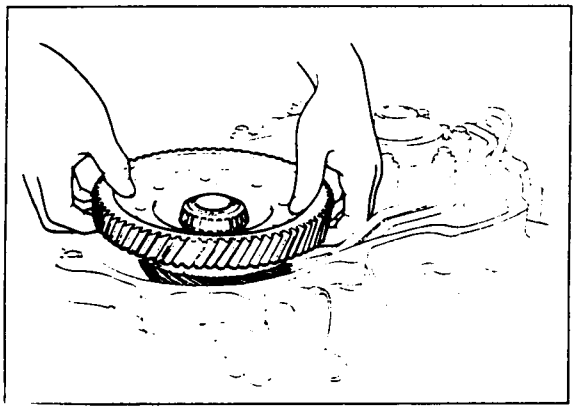
Note
Do not allow the ATF to spill when removing the torque converter.



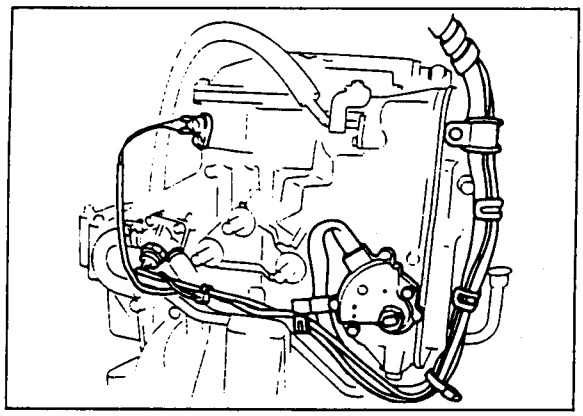
Pull out the oil pump shaft by hand.



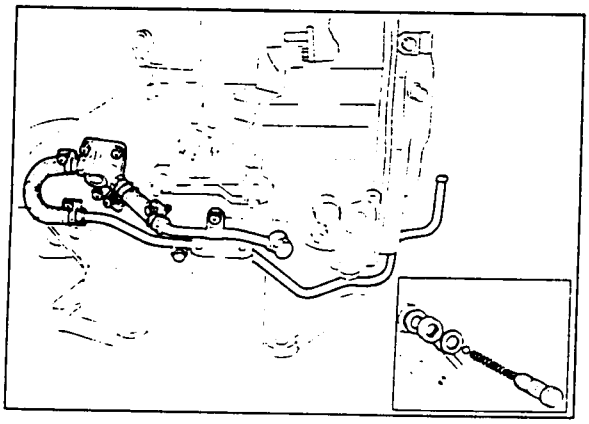
Remove the oil level gauge and oil filler tube.



Remove the differential assembly.

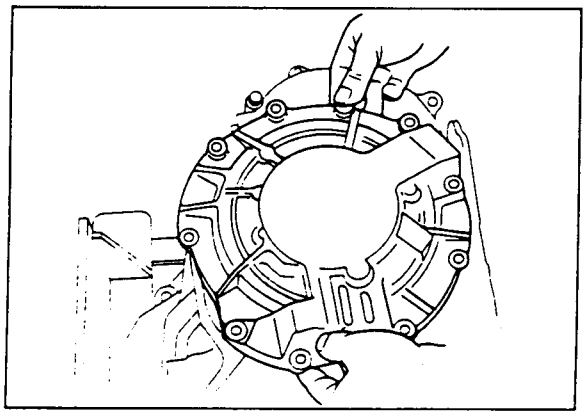


G4A-EL
Remove the pulse generator, fluid temperature switch, and inhibitor switch.

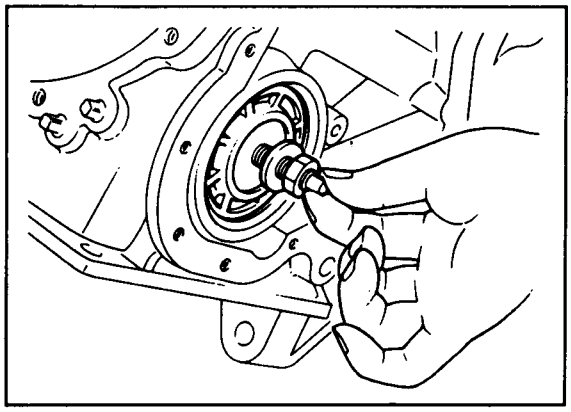


G4A-EL
Remove the harness clip, then remove the oil pipes, oil hoses and switch box as an assembly.

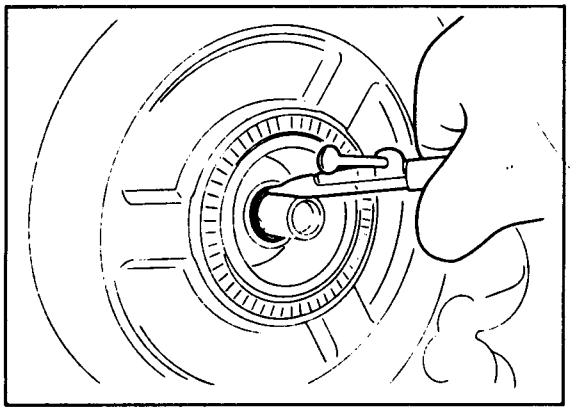
Note
Remove the ball from the case.



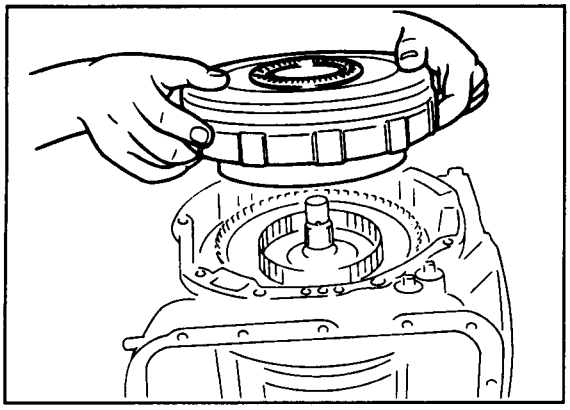
Remove the oil pump as an assembly.



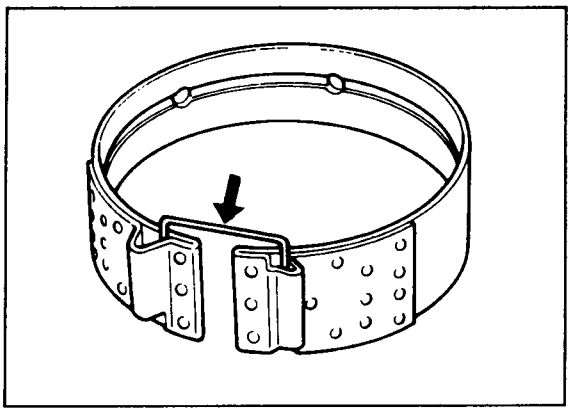
Procedure
Remove the piston stem from the servo.



Remove the clutch assembly.
(1) Remove the turbine shaft snap ring.

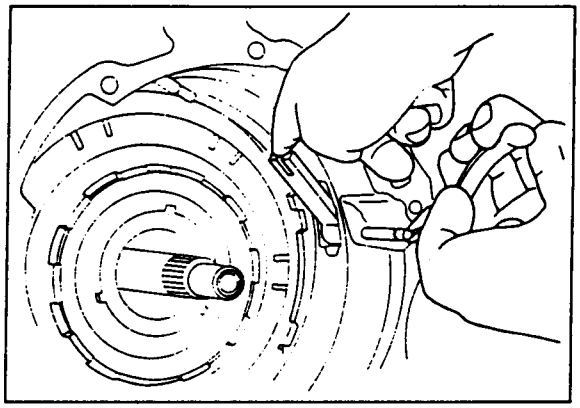


(2) Pull the reverse and forward drum and remove the clutch assembly.

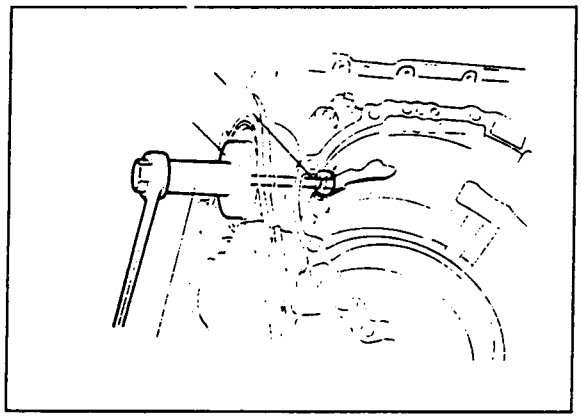


Remove the 2-4 brake band.

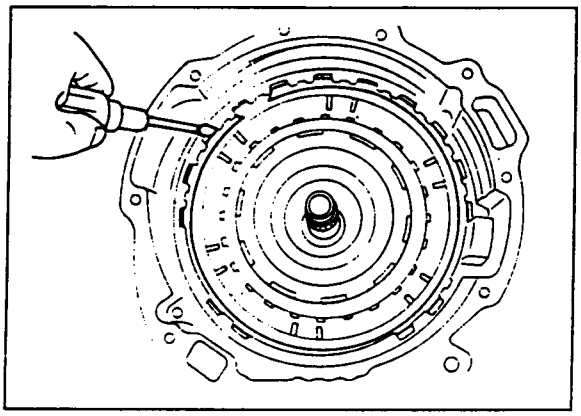
Note
Use a piece of wire to secure the brake band so that it is not damaged by being stretched.



Pull the anchor shaft while holding the strut, then remove the strut.

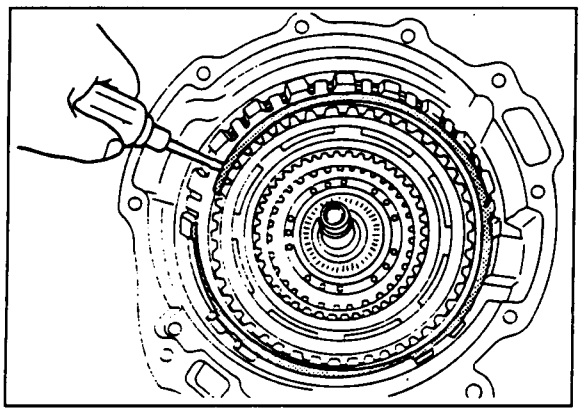


Remove the servo.
(1) Remove the snap ring with the
(2) Remove the servo and spring.



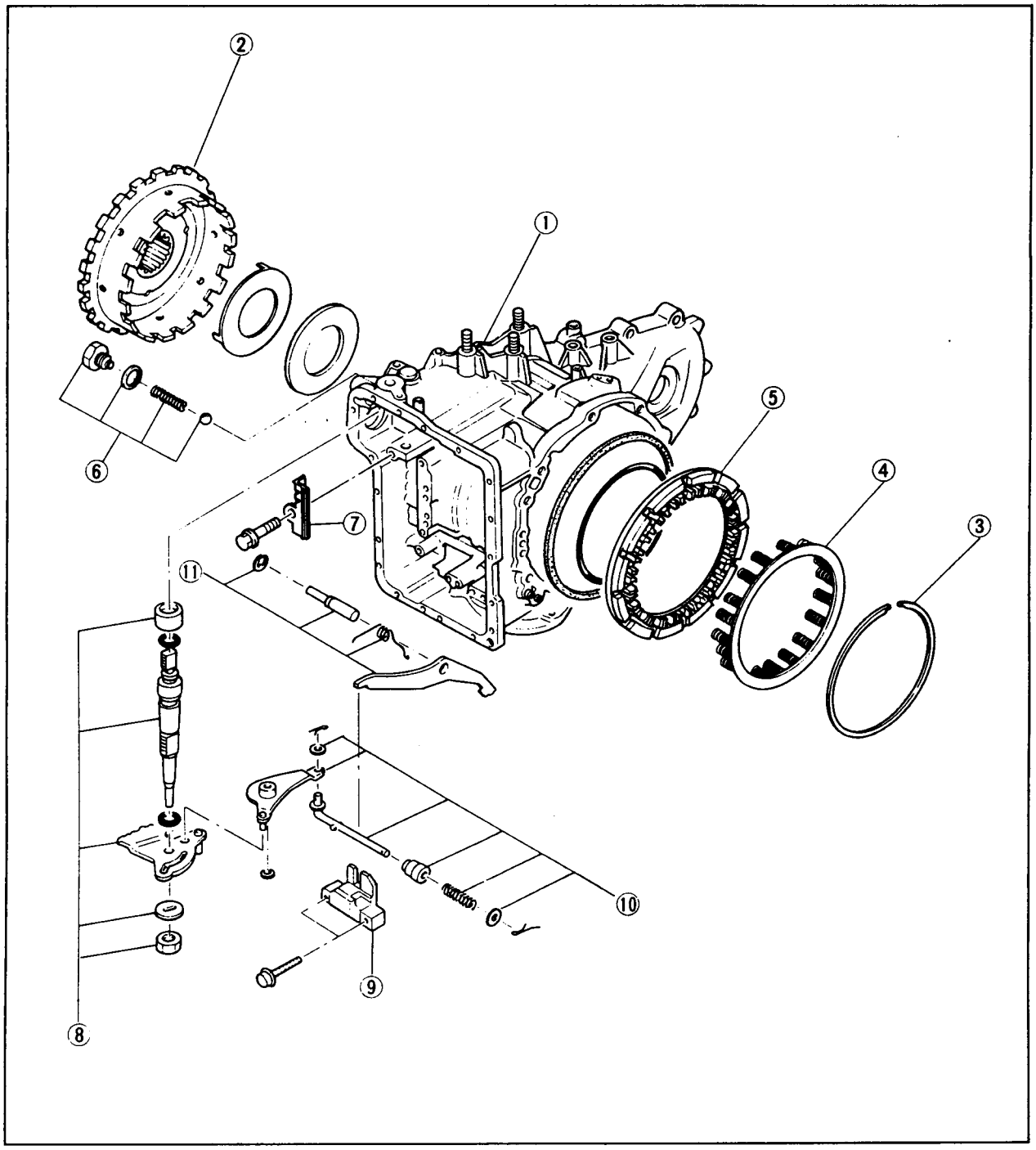
Remove the one-way clutch and carrier hub assembly.
Remove the snap ring.

Remove the internal gear from the 3-4 clutch drum.

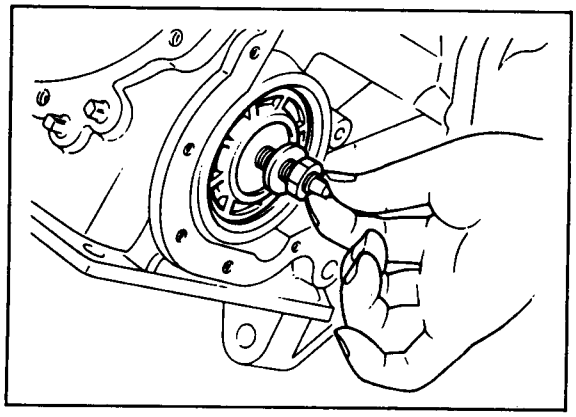


Remove the low and reverse brake assembly.
Remove the snap ring.

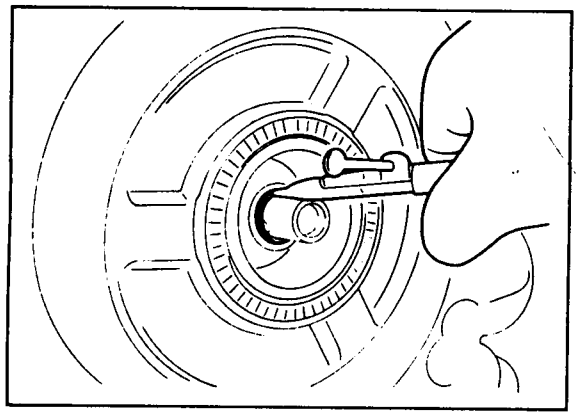
DISASSEMBLY
Component



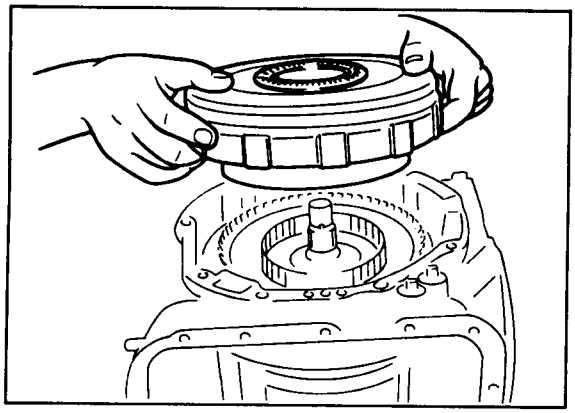
1. Transaxle case
2. Output shell
3. Snap ring
4. Spring and retainer assembly
5. Low and reverse brake piston
6. Plug, washer, spring, and detent ball
7. Bracket
8. Manual shaft and manual plate
9. Actuator support
10. Parking assist lever
11. Parking pawl



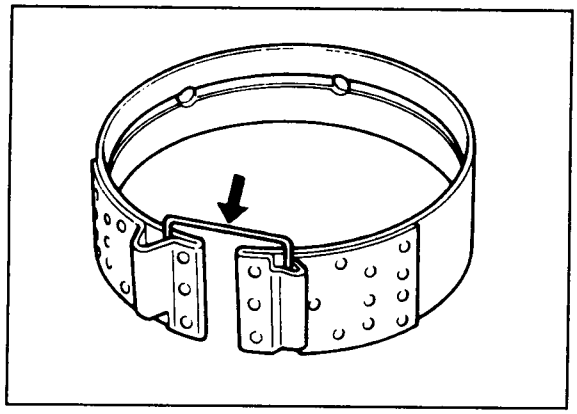
Procedure
Remove the piston stem from the servo.



Remove the clutch assembly.
(1) Remove the turbine shaft snap ring.

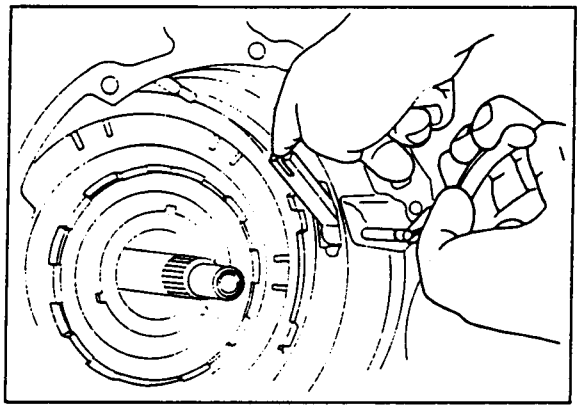


(2) Pull the reverse and forward drum and remove the clutch assembly.

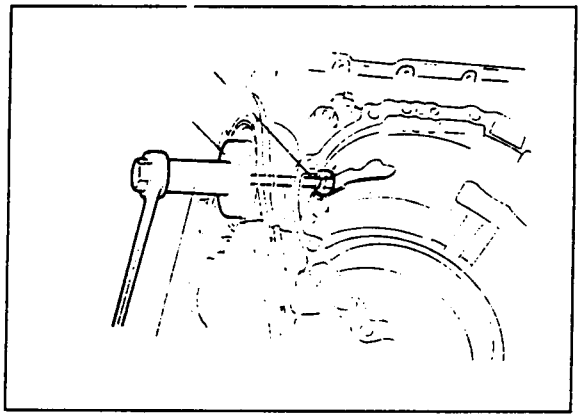


Remove the 2-4 brake band.

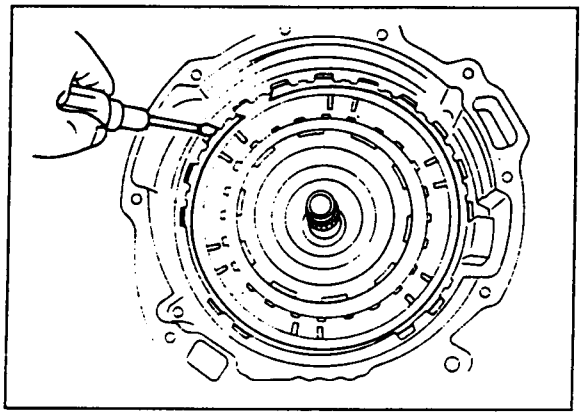
Note
Use a piece of wire to secure the brake band so that it is not damaged by being stretched.



Pull the anchor shaft while holding the strut, then remove the strut.

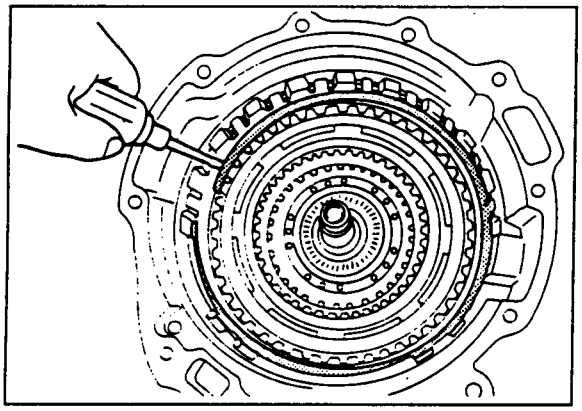


Remove the servo.
(1) Remove the snap ring with the
(2) Remove the servo and spring.

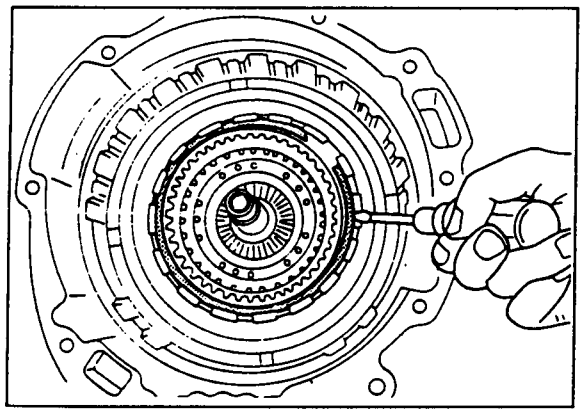


Remove the one-way clutch and carrier hub assembly.
Remove the snap ring.

Remove the internal gear from the 3-4 clutch drum.

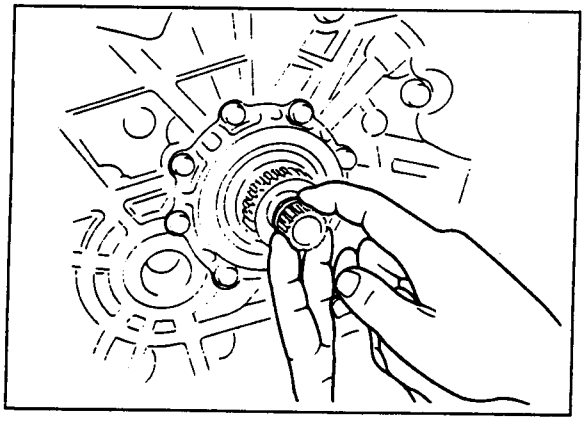


Remove the low and reverse brake assembly.
Remove the snap ring.

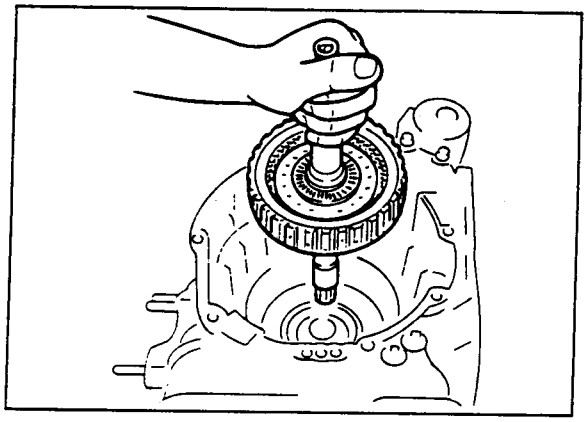


Remove the internal gear.
Remove the snap ring.

Remove the retaining plate and the drive and driven plates.



Remove the 3-4 clutch assembly.
Remove the O-ring from the turbine shaft at the converter housing side.



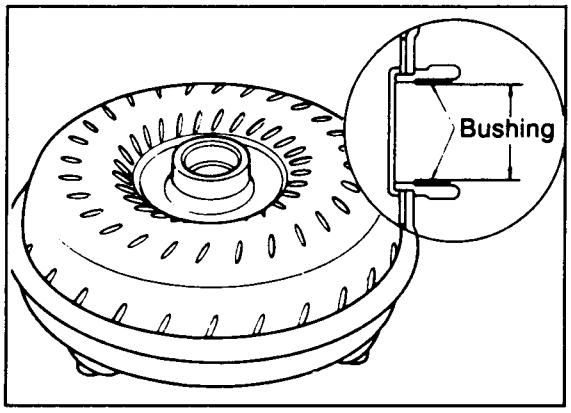
Pull out the turbine shaft to remove the 3-4 clutch assembly.
Remove the 3-4 clutch assembly.

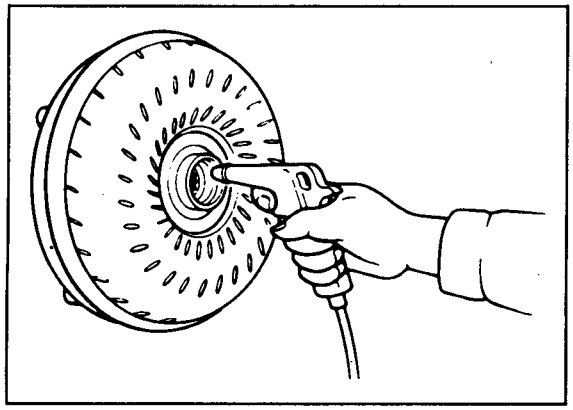
INSPECTION AND REPAIR

PRECAUTION

(1) Several of the parts resemble each other; organize them so that they do not get mixed up.
(2) Clean each part with cleaning oil, clean out the oil holes and oil passages with compressed air, and check that there are no obstructions.
(3) When using cleaning oil and compressed air, wear protective eyewear.
(4) If a clutch plate or brake band is replaced with a new one, soak it in ATF for 2 hours or more before installing.
(5) Before assembly, apply ATF to all seal rings, rotating parts, and sliding parts.
(6) All seals, gaskets and roll pins must be replaced with new ones during assembly.
(7) Use petroleum jelly, not grease where required.
(8) When it is necessary to replace a bushing, replace the assembly which includes that bushing.

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TORQUE CONVERTER

The torque converter is welded together and cannot be disassembled.

Inspection

1. Check the outer part of the converter for damage or cracks, and replace it if necessary.
2. Check whether there is any rust on the pilot hub of the converter or on the boss. If there is any, remove it completely.
3. Measure the bushing of the converter boss. Replace the converter assembly if the bushing is worn.

Bushing inner diameter
Standard: 53.030 mm (2.088 in)
Maximum: 53.076 mm (2.090 in)

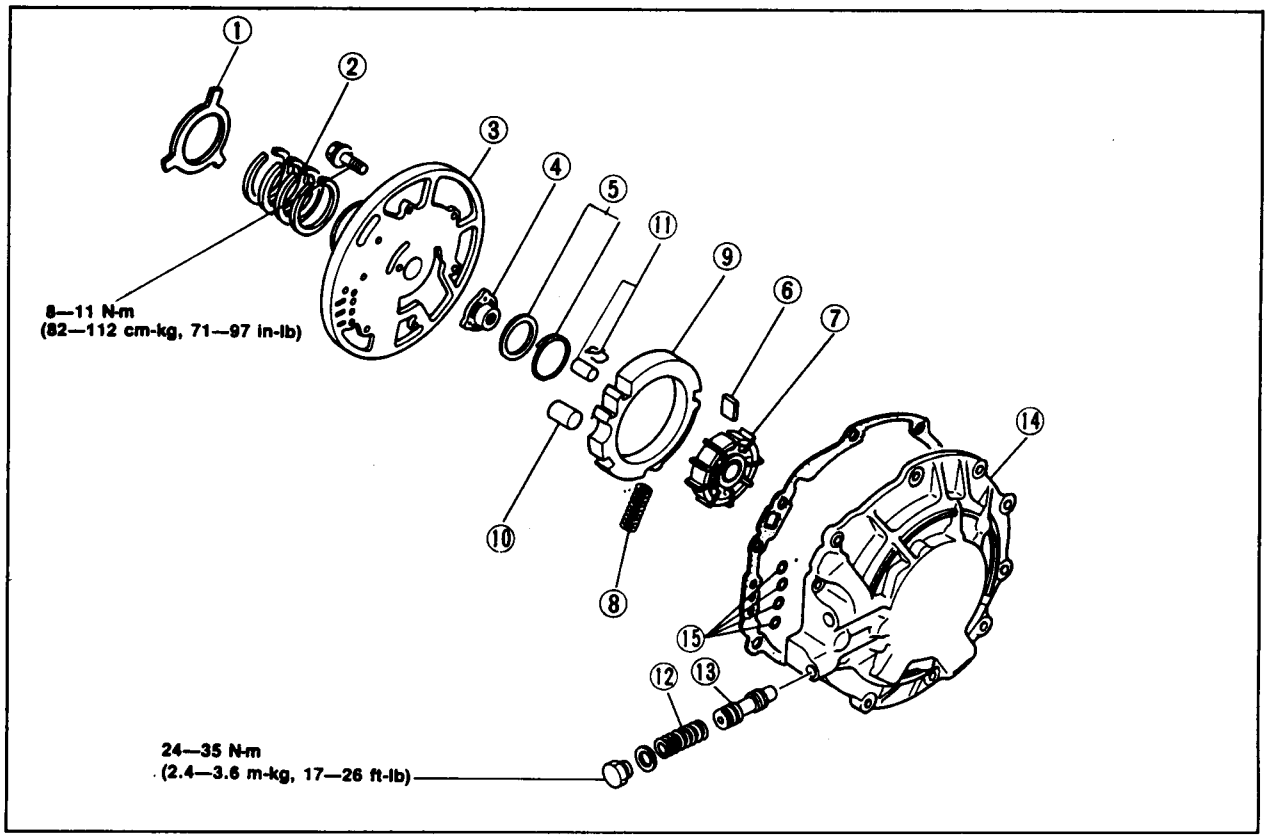
Washing Inside of Converter

1. Drain any ATF remaining in the converter.
2. Pour in solvent [approximately **0.5 liter (0.53 US qt, 0.44 Imp qt)**].
3. Shake the converter to clean the inside. Pour out the solvent.
4. Clean the inside of the converter with compressed air so that the inside is perfectly empty.
5. Pour in ATF.
6. Shake the converter to clean the inside. Pour out the ATF.

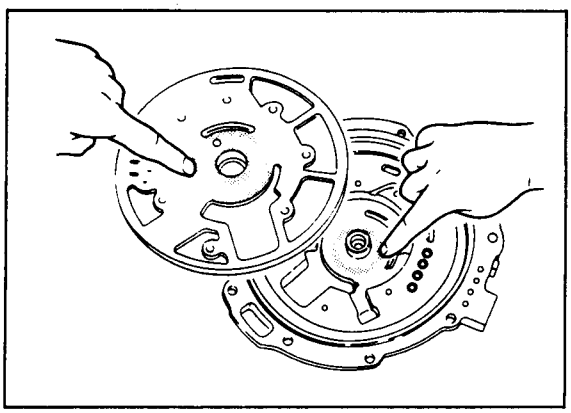
OIL PUMP

Disassembly

Disassemble in the sequence shown in the figure.



1. Bearing race
2. Seal rings
3. Oil pump cover
4. Pump flange
5. Guide ring and guide spring
6. Vane
7. Rotor
8. Spring
9. Cam ring
10. Pivot roller
11. Seal pin and spring
12. Spring
13. Valve
14. Oil pump body
15. O-ring



Inspection

Check the following and replace any faulty parts.

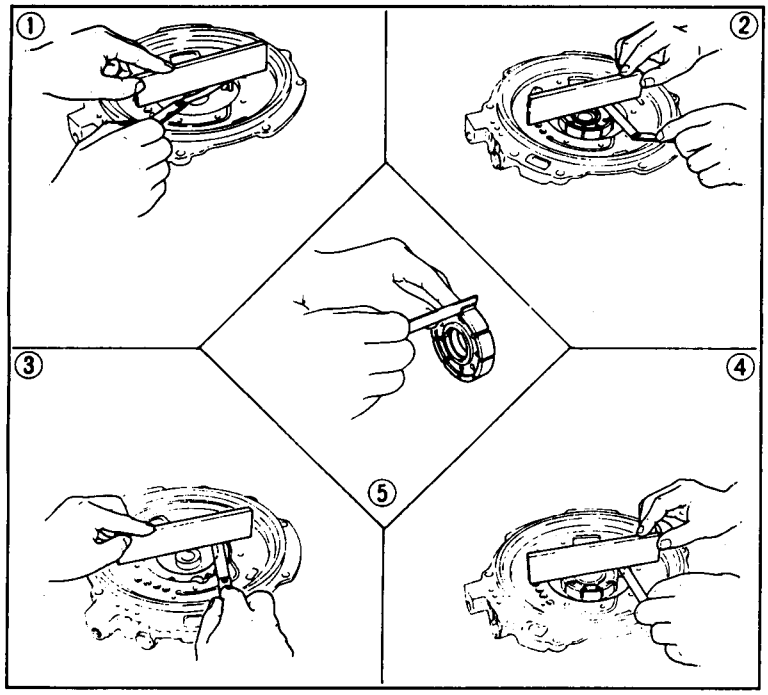
1. Sliding surfaces of the oil pump cover and oil pump body for damage or wear
2. Broken or worn seal ring
3. Weakened spring

Free length of springs:

(1) For the cam ring (No. 8)
41.6 mm (1.64 in)

(2) For the valve (No. 12)
35.0 mm (1.38 in)

4. Clearance
Measure the clearances below; if not within specification, replace the oil pump.



1. Seal pin—Oil pump cover
Standard:
0.005—0.020 mm
(0.0002—0.0008 in)
Maximum: 0.060 mm (0.002 in)

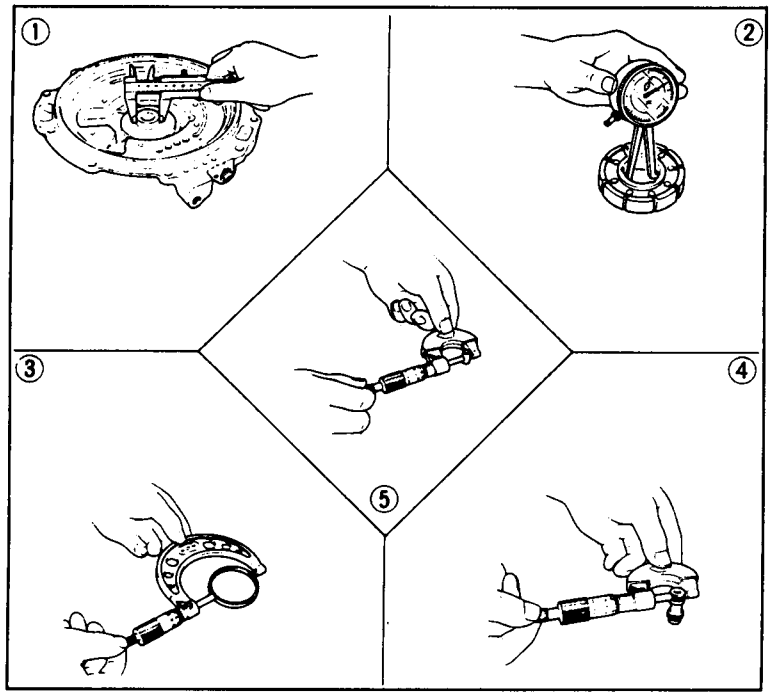
2. Rotor—Oil pump cover
Standard:
0.005—0.020 mm
(0.0002—0.0008 in)
Maximum: 0.030 mm (0.0012 in)

3. Cam ring—Oil pump cover
Standard:
0.005—0.020 mm
(0.0002—0.0008 in)
Maximum: 0.080 mm (0.003 in)

4. Vane—Oil pump cover
Standard:
0.015—0.050 mm
(0.0006—0.0020 in)
Maximum: 0.080 mm (0.003 in)

5. Vane—Rotor groove
Standard:
0.010—0.045 mm
(0.0004—0.0018 in)
Maximum: 0.065 mm (0.0026 in)

5. Wear limit
Check each part for wear; if not within specification, replace the oil pump.



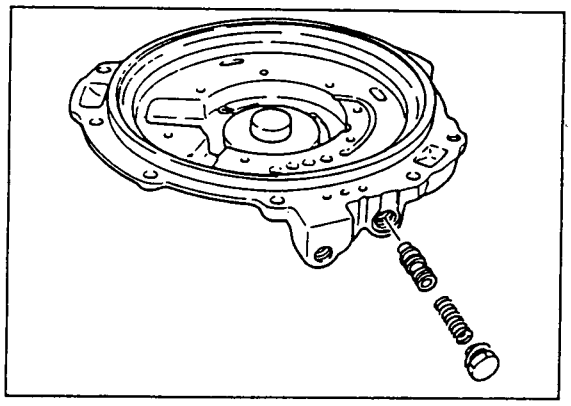
1. Oil pump body sleeve.. outer diameter
Standard: 28.00 mm (1.102 in)

2. Rotor bushing .... inner diameter
Standard: 28.00 mm (1.102 in)
Maximum: 28.05 mm (1.104 in)

3. Guide ring ..... outer diameter
Standard: 57.85 mm (2.278 in)
Minimum: 57.70 mm (2.272 in)

4. Valve..... outer diameter
Standard: 12.00 mm (0.472 in)
Minimum: 11.86 mm (0.467 in)

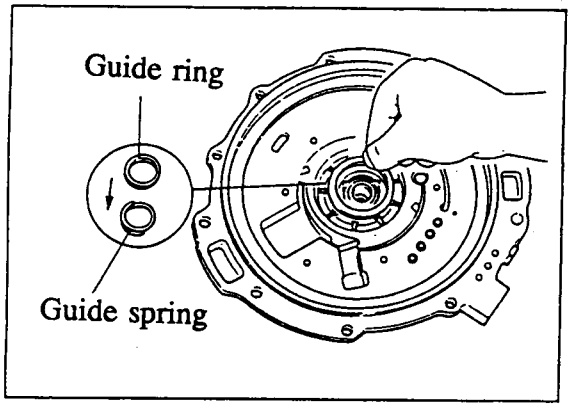
5. Seal pin..... outer diameter
Standard: 5.00 mm (0.197 in)
Minimum: 4.90 mm (0.193 in)



Assembly

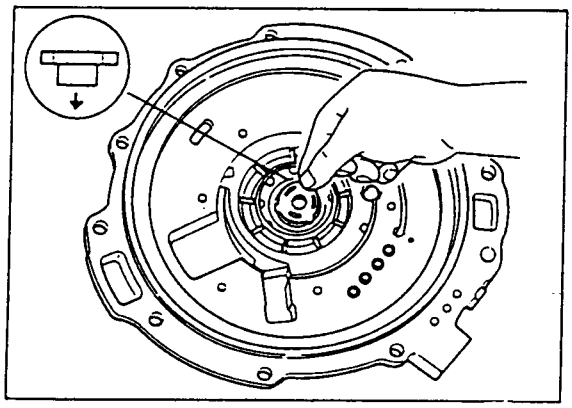
Install the valve and spring into the oil pump body, and check that the valve moves smoothly. Install the plug.

Tightening torque:
24—35 N·m (2.4—3.6 m-kg, 17—26 ft-lb)

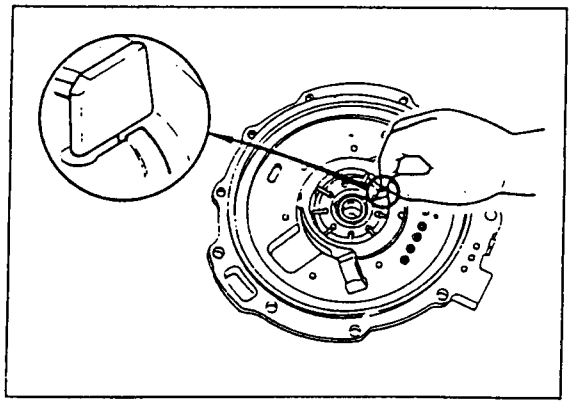


Install the guide spring and guide ring while expanding the vanes toward the cam ring.

The guide ring and spring are on top of the rotor and the guide spring is split.



Install the pump flange onto the rotor.

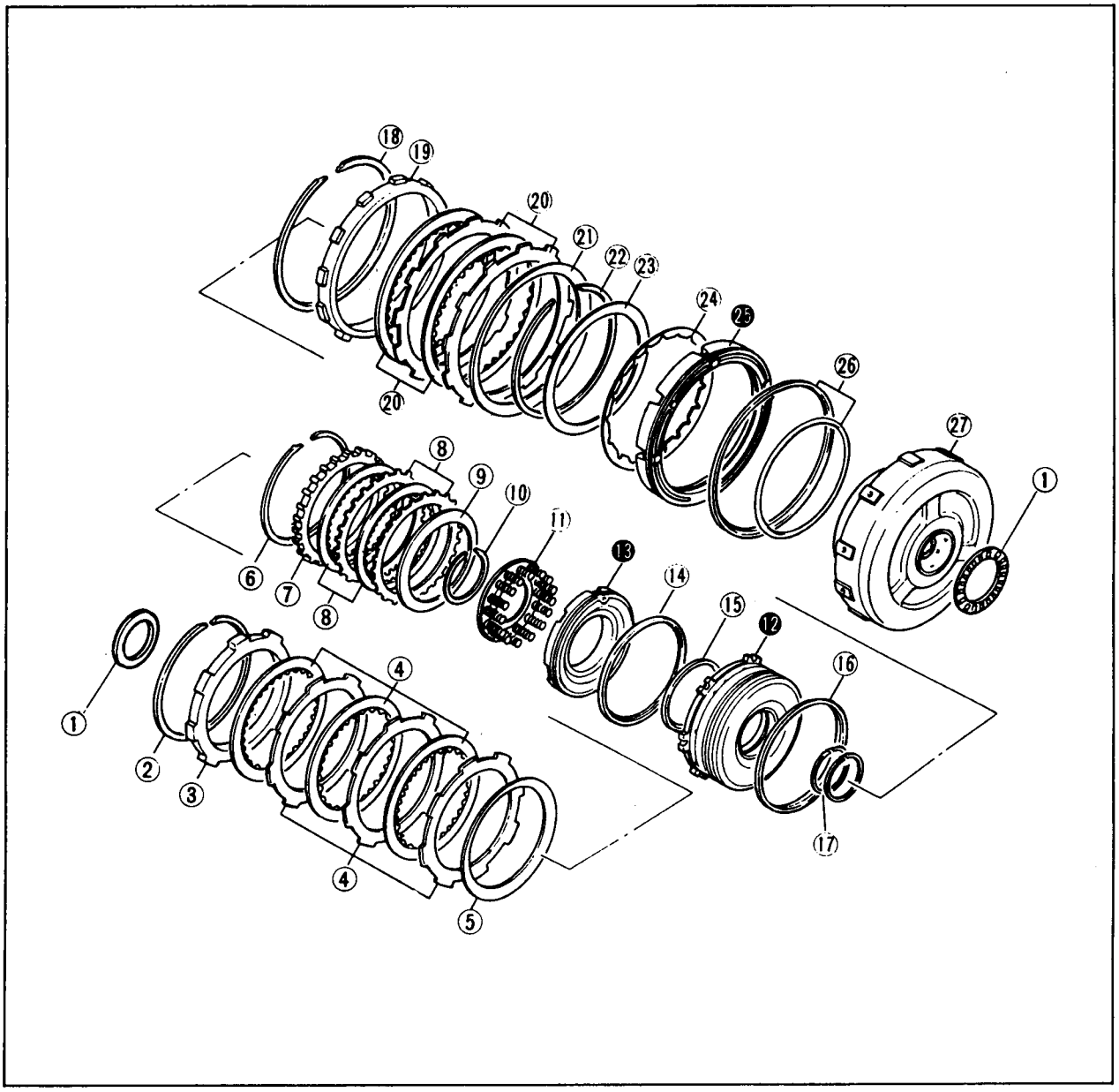


Install the vanes into the rotor as shown.

CLUTCH ASSEMBLY

Disassembly

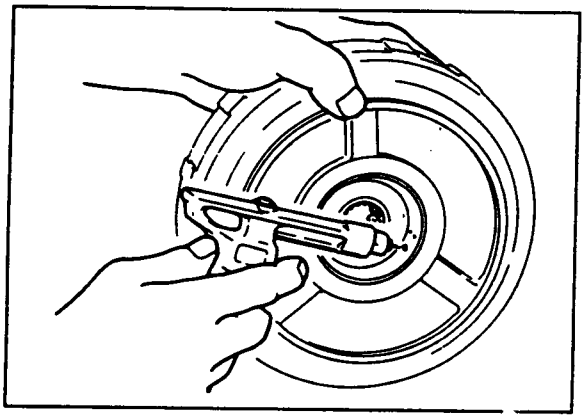
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



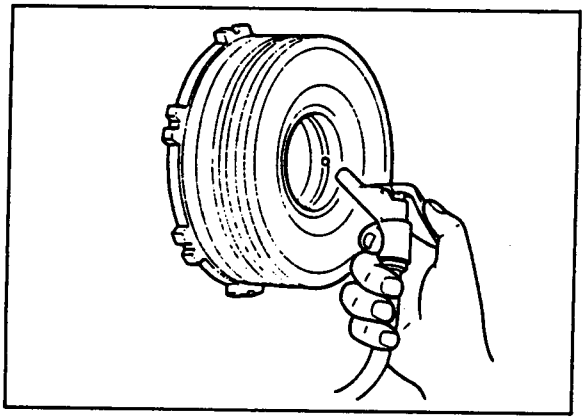
—Forward clutch—
1. Thrust bearings
2. Snap ring
3. Retaining plate
4. Drive and driven plates
5. Dished plate

—Coasting clutch—
6. Snap ring
7. Retaining plate
8. Drive and driven plates
9. Dished plate
10. Snap ring
11. Spring and retainer assembly
12. Coasting clutch drum
13. Coasting piston
14. Outer seal
15. Inner seal
16. Outer seal
17. Seal rings

—Reverse clutch—
18. Snap ring
19. Retaining plate
20. Drive and driven plates
21. Dished plate
22. Snap ring
23. Return spring stopper
24. Piston return spring
25. Reverse piston
26. Seal rings (inner and outer)
27. Reverse and forward drum

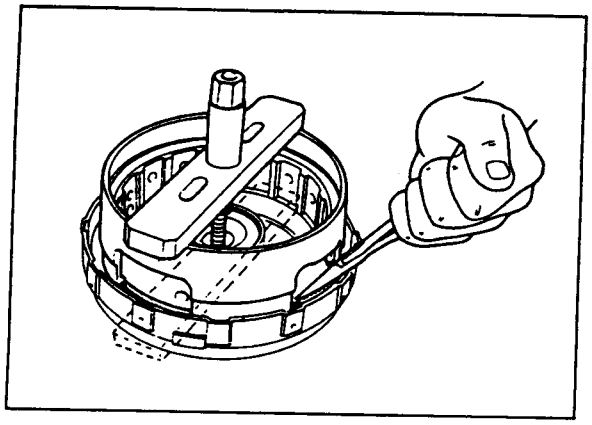


Remove the coasting clutch drum from the reverse and forward drum by applying compressed air through the fluid passage.

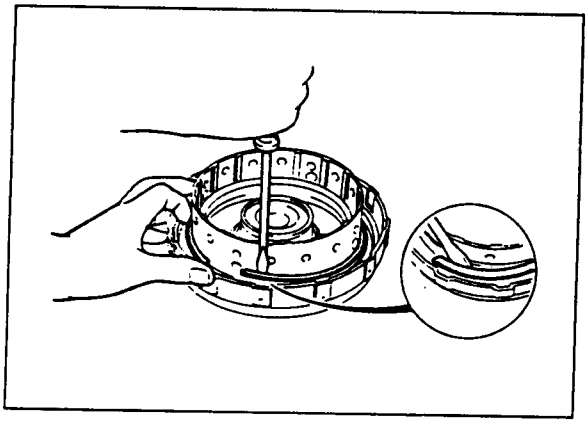


Coasting piston

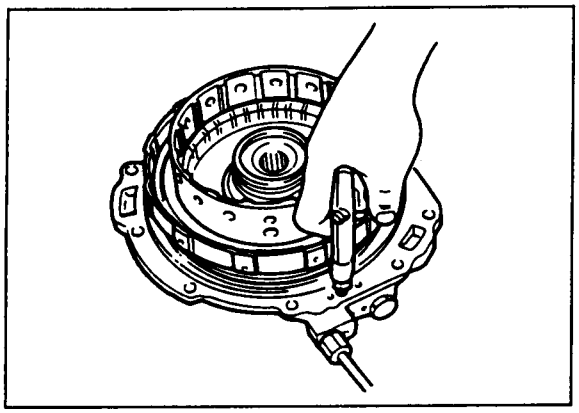
Remove the coasting clutch piston from the coasting clutch drum by applying compressed air through the fluid passage.



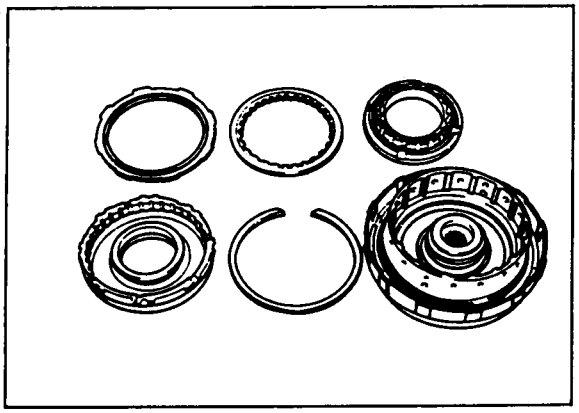
Remove one end of the snap ring from the groove with snap ring pliers.



Remove the **SST** from the reverse and forward drum.
Remove the snap ring with a screw driver.



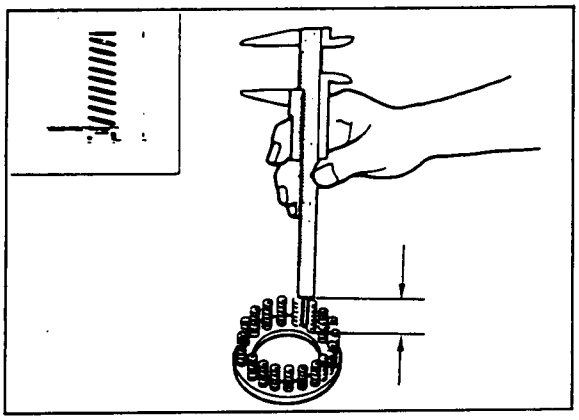
Place the reverse and forward drum on the oil pump.
Remove the reverse piston by applying compressed air through the fluid passage.



Inspection
Check the following and repair or replace any faulty parts.
1. Drive and driven plates for damage or wear

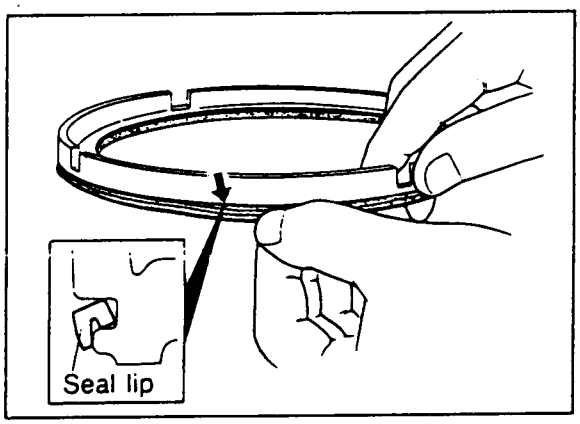
Drive plate thickness
Standard: 1.6 mm (0.063 in)
Minimum: 1.4 mm (0.055 in)

2. Clutch piston for damage or cracks
3. Clutch drum for damage or deformation
4. Seal contact area for damage
5. Check ball for leaking sticking
6. Broken or worn snap ring
7. Broken or weakened spring

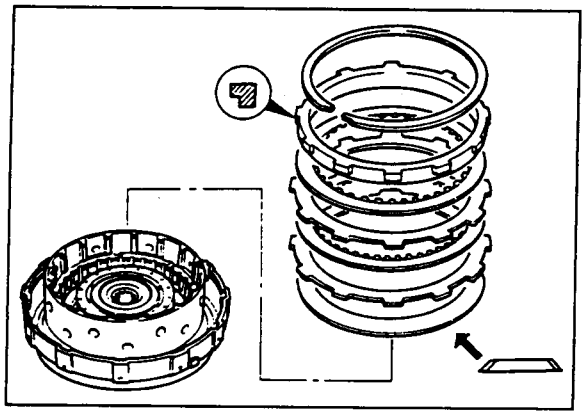


6. Spring and retainer assembly for separation or deformation

Free length of spring:
29.8 mm (1.173 in)



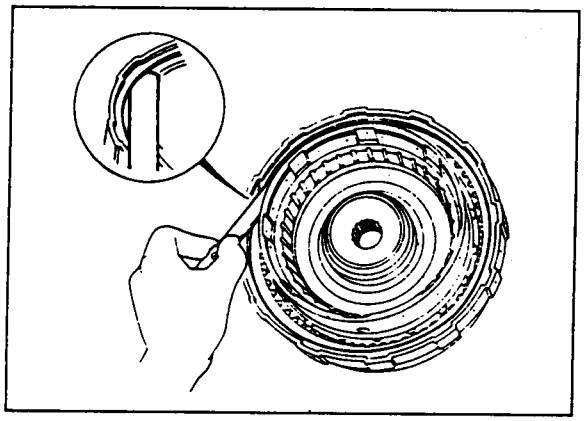
Assembly
Reverse clutch
Install the reverse piston.
(1) Apply ATF to inner and outer faces of the seals, and install them to the reverse piston.
(2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the reverse clutch drum.



Install the dished plate with the dished side facing the piston as shown.
Install the drive and driven plates.

Note
Installation order:
Driven-Drive-Driven-Drive

Install the retaining plate with the step facing downward.
Install the snap ring.

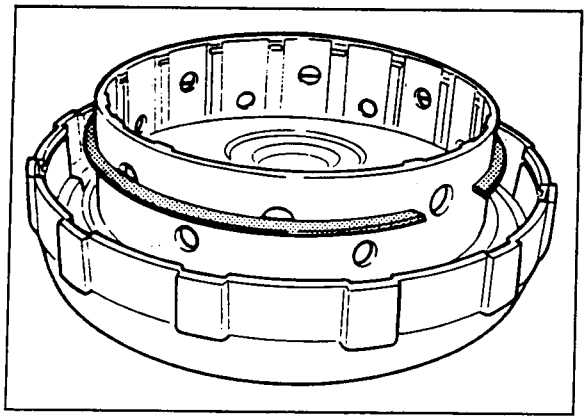


Check the reverse clutch clearance.
(1) Measure the clearance between the snap ring and the retaining plate of the reverse clutch.
(2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

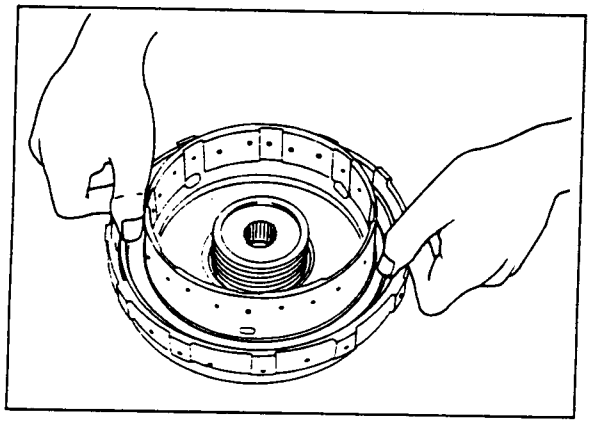
Reverse clutch clearance:
2.1—2.4 mm (0.083—0.094 in)

Retaining plate sizes mm (in)

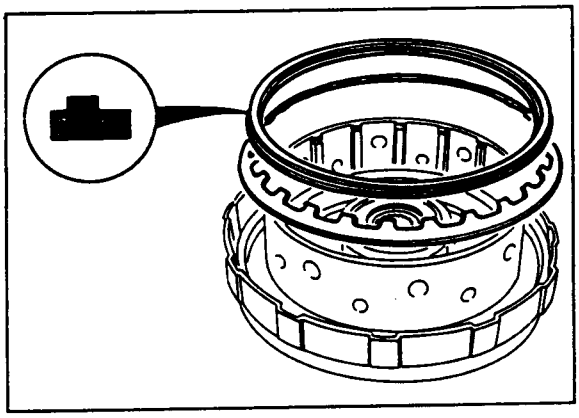
6.6 (0.260)	6.8 (0.268)	7.0 (0.276)
7.2 (0.283)	7.4 (0.291)	7.6 (0.299)



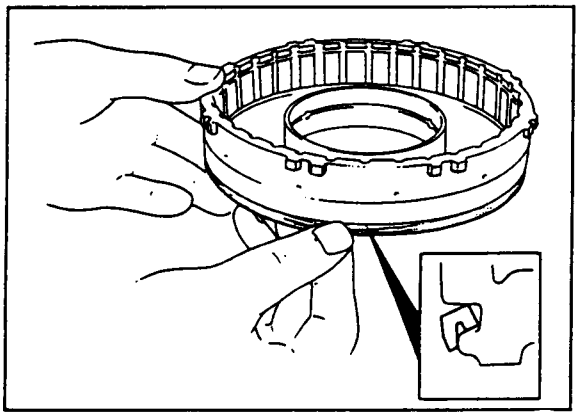
Install the snap ring half-way down the reverse forward drum as shown.



(3) Install the reverse piston by pushing evenly around the circumference, being careful not to damage the seal rings.



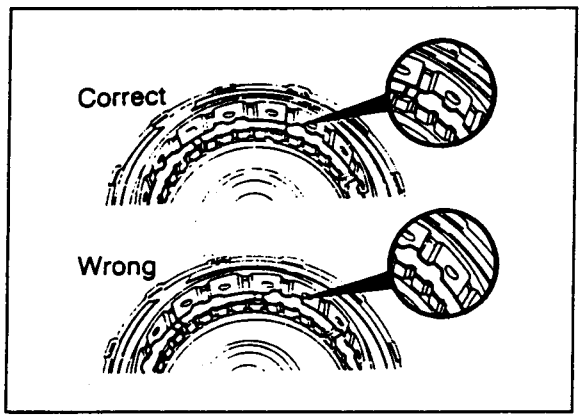
Install the piston return spring with the tabs facing away from the reverse piston.
Install the return spring stopper with the step facing upwards.



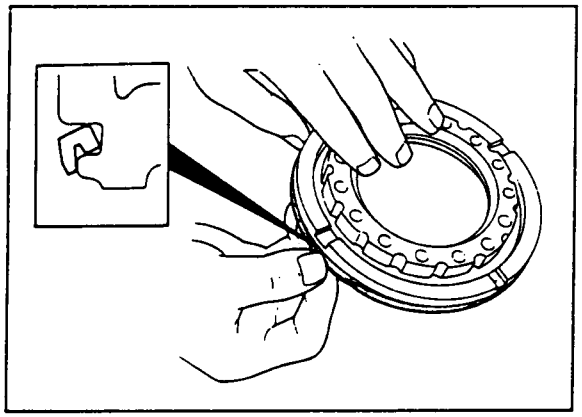
Coasting clutch

Install the coasting clutch drum.

(1) Apply ATF to inner and outer faces of the seal, and install it onto the coasting clutch drum.
(2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the drum.

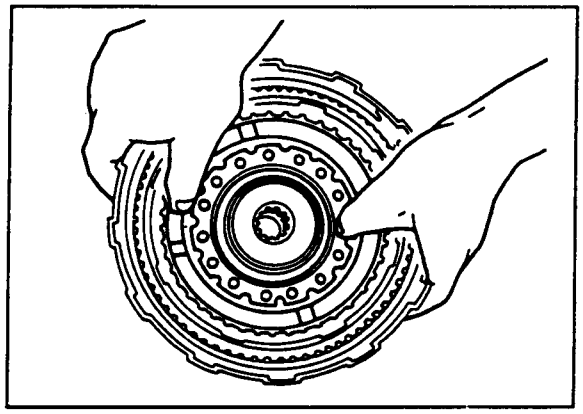


(3) Install the coasting clutch drum the correct position in the reverse and forward drum.
(4) Push evenly around the circumference, being careful not to damage the outer seal.

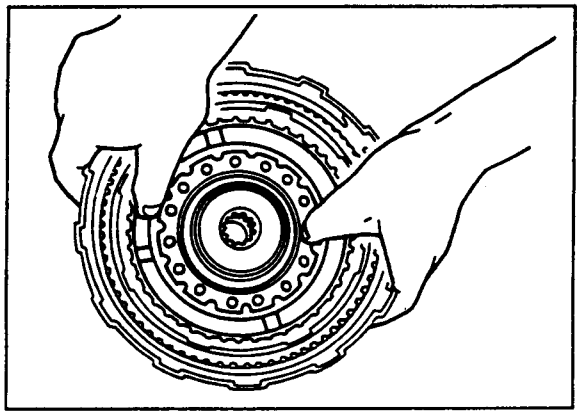


Install the coasting piston

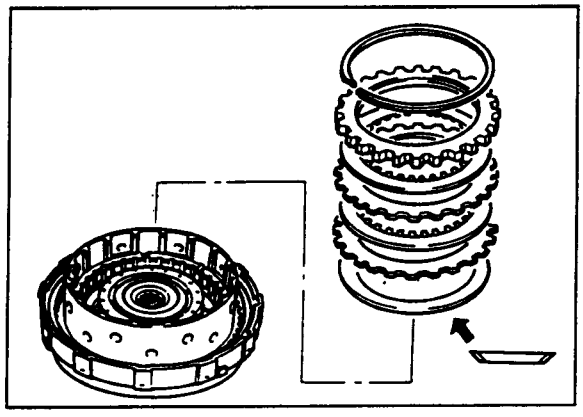
(1) Apply ATF to inner and outer faces of the seals and install them onto the coasting piston.
(2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the drum.



(3) Install the coasting piston by pushing evenly around the circumference, being careful not to damage the outer seal.



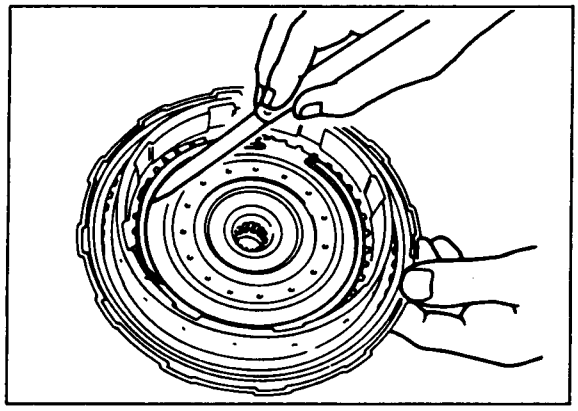
Install the spring and retainer assembly.



Install the dished plate with the dished side upward.
Install the drive and driven plates.

Note
Installation order:
Driven-Drive-Driven-Drive

Install the retaining plate.
Install the snap ring.

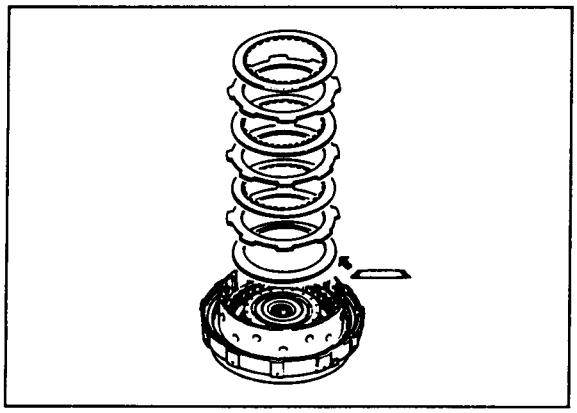


Check the coasting clutch clearance.
(1) Measure the clearance between the snap ring and the retaining plate of the coasting clutch.
(2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

Coasting clutch clearance:
1.0—1.2 mm (0.040—0.047 in)

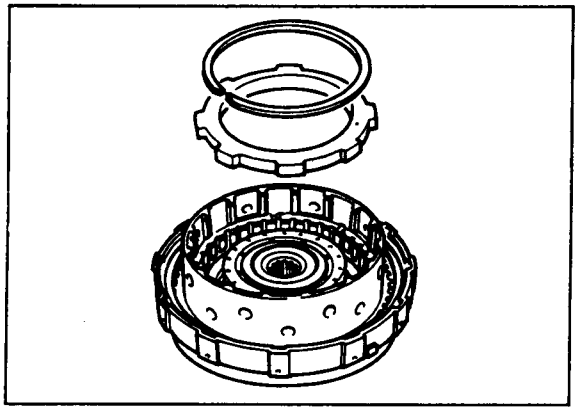
Retaining plate sizes mm (in)

4.6 (0.181)	4.8 (0.189)	5.0 (0.197)
5.2 (0.205)	5.4 (0.213)	5.6 (0.220)

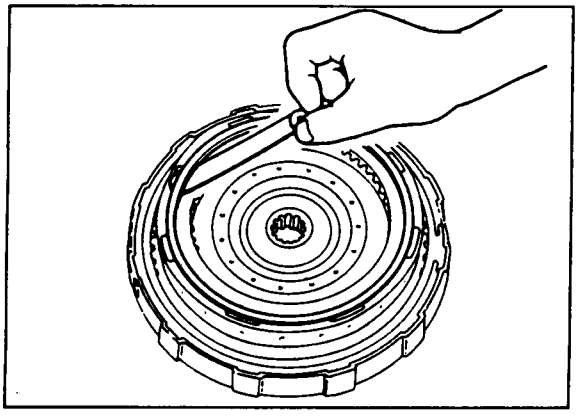


Forward clutch
1. Install the dished plate with the dished side downward.
2. Install the drive and driven plates.

Note
Installation order:
Driven-Drive-Driven-Drive-Driven-Drive



3. Install the retaining plate.
4. Install the snap ring.

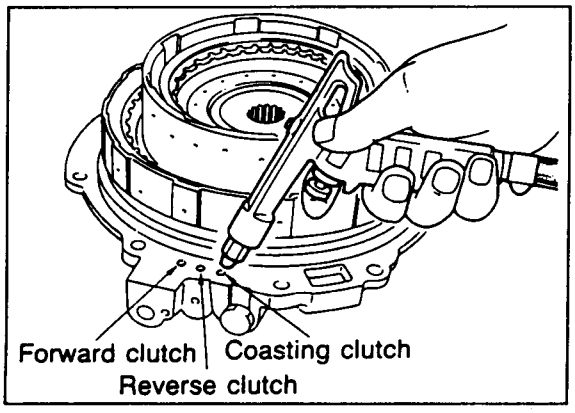


5. Check the forward clutch clearance.
(1) Measure the clearance between the snap ring and the retaining plate of the forward clutch.
(2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

Forward clutch clearance:
1.0—1.2 mm (0.040—0.047 in)

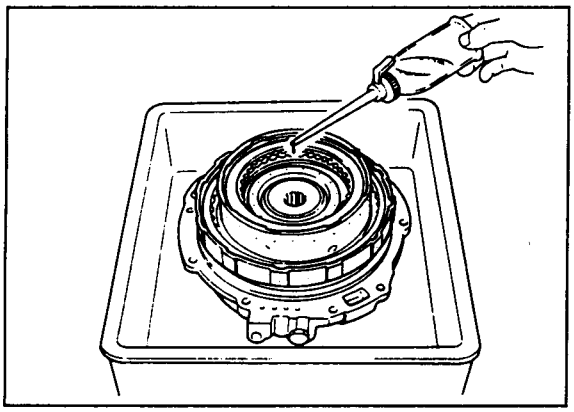
Retaining plate sizes mm (in)

5.9 (0.232)	6.1 (0.240)	6.3 (0.248)
6.5 (0.256)	6.7 (0.264)	8.9 (0.350)

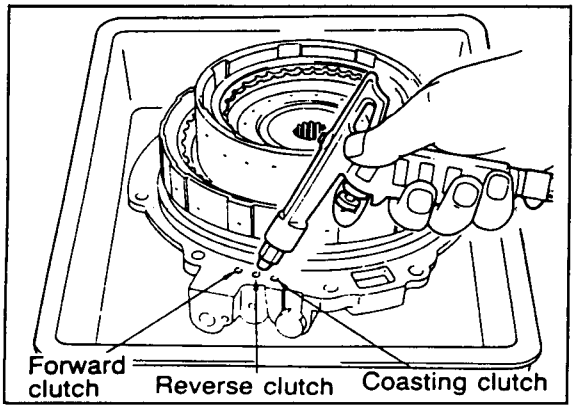


6. Check for the clutch operation as follows.
   (1) Set the clutch assembly onto the oil pump.
   (2) Check the clutch operation by applying compressed air through the fluid passages as shown.

Applied air pressure:
392 kPa (4.0 kg/cm^2, 57 psi)

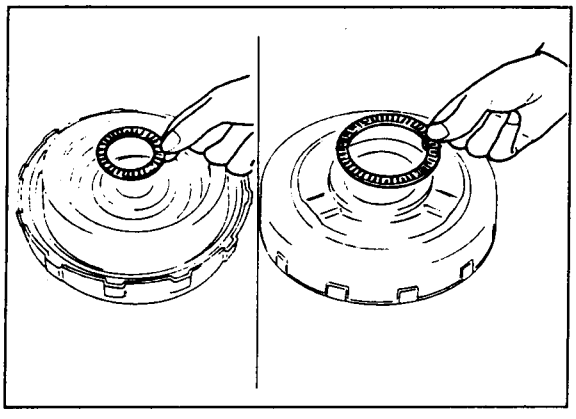


(3) Pour in ATF so that the reverse piston, coasting clutch drum, and coasting clutch piston are fully submerged.



(4) Check that no bubbles come from between the piston and drum seal when applying compressed air through the fluid passages as shown.

Caution
The compressed air must be under 392 kPa (4.0 kg/cm^2, 57 psi), and should not applied for over 3 seconds.



7. Apply petroleum jelly to the thrust bearings to secure them; then install them on both sides of the reverse and forward drum.

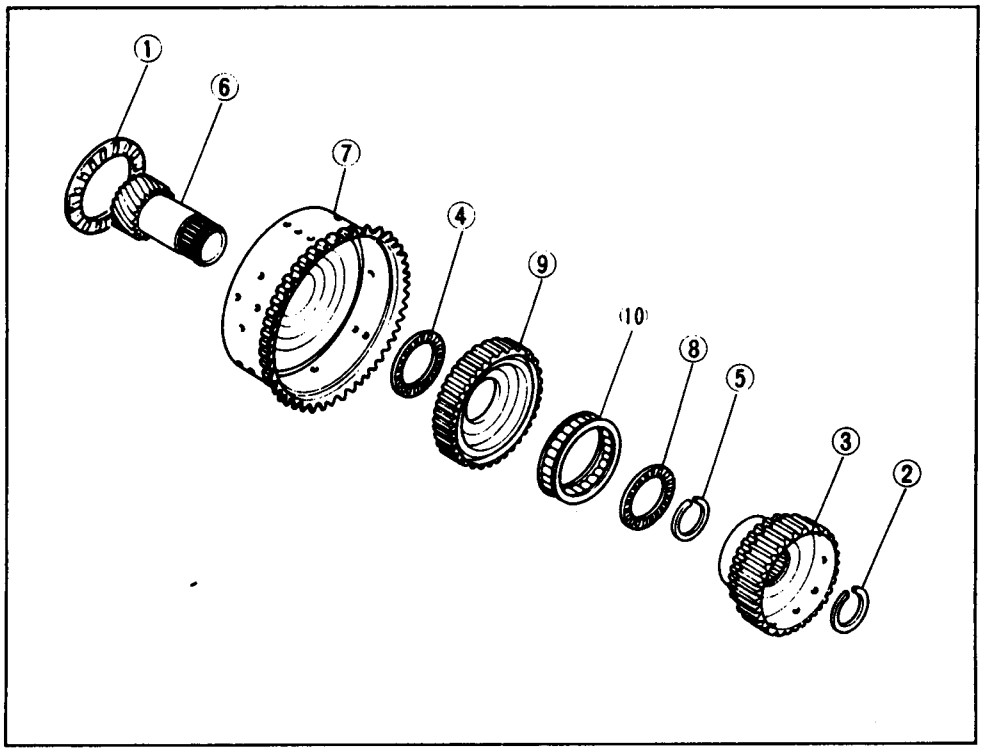
Thrust bearing outer diameter
Oil pump side: 86.0 mm (3.39 in)

Small sun gear and one-way clutch side:
56.1 mm (2.21 in)

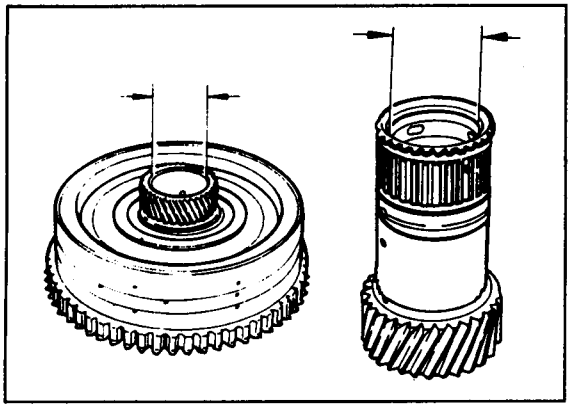
SMALL SUN GEAR AND ONE-WAY CLUTCH

Disassembly

Disassemble in the sequence shown in the figure.



1. Thrust bearing
2. Snap ring
3. One-way clutch inner race
4. Thrust bearing
5. Snap ring
6. Small sun gear
7. Sun gear drum
8. Thrust bearing
9. One-way clutch outer race
10. One-way clutch



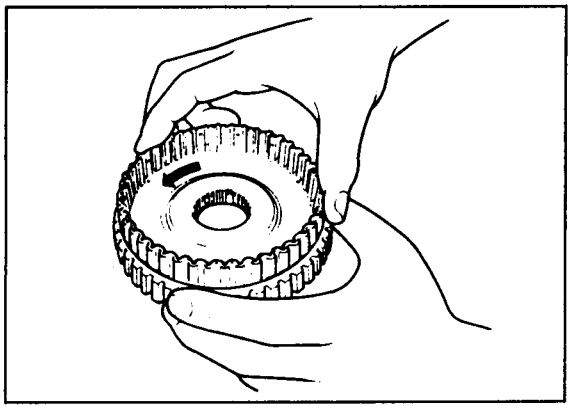
Inspection

Check the following and replace any faulty parts.

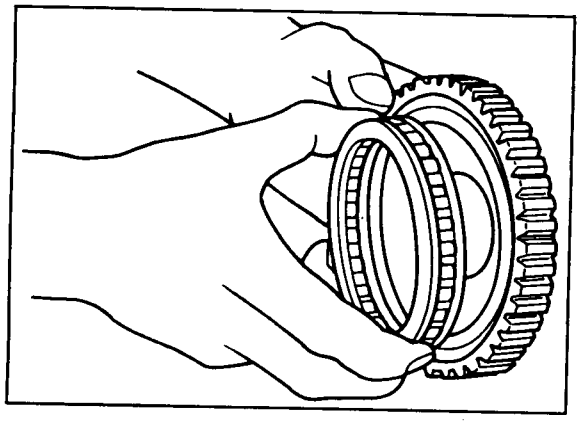
1. Sun gear drum and small sun gear for damage or wear
2. Bushing for damage or wear

Specification:

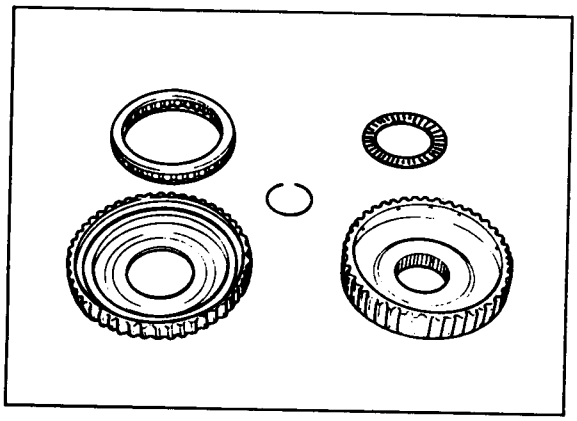
Sun gear drum: 33.425 mm (1.316 in) max.
Small sun gear: 24.021 mm (0.946 in) max.



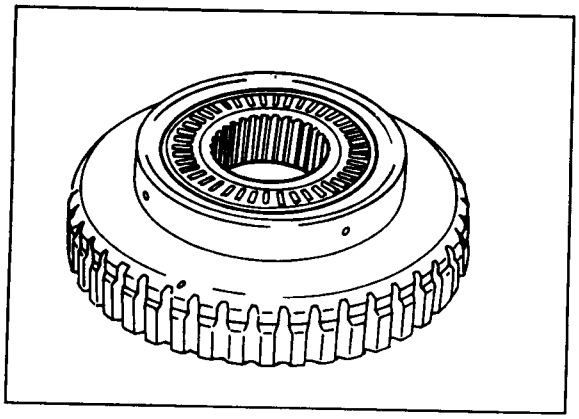
3. Inner and outer race for damage or wear
4. Damaged or worn clutch hub
5. Damaged or worn gear
6. Damaged or worn thrust bearing
7. Broken or worn snap ring
8. One-way clutch operation
   Hold the one-way clutch outer race. Check that the inner race turns only counterclockwise.



Replacement of one-way clutch
Remove the one-way clutch inner race.
Remove the one-way clutch.
Remove the thrust bearing.

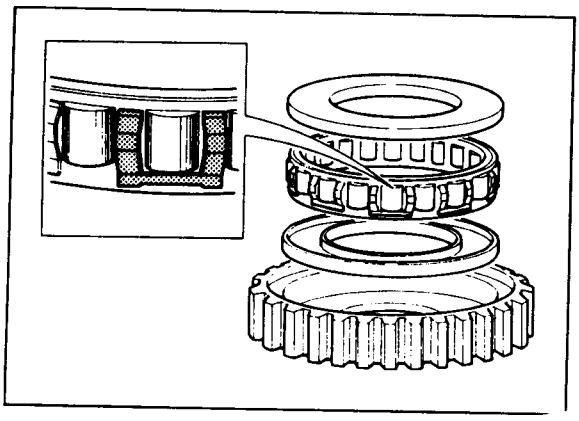


Inspect the one-way clutch inner and outer race, and replace if necessary.



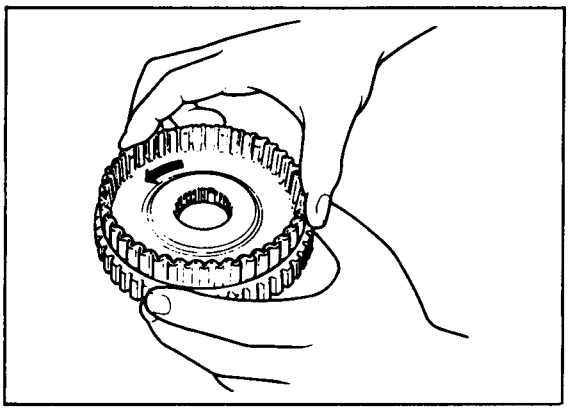
Apply petroleum jelly to the thrust bearing to secure it; then install it to the one-way clutch inner race.

Thrust bearing outer diameter:
62.1 mm (2.44 in)

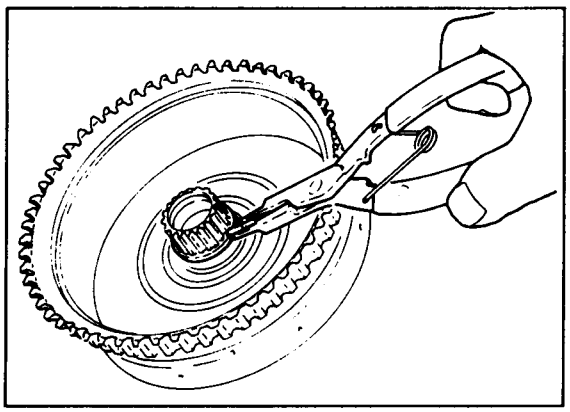


Install the one-way clutch into the one-way clutch outer race.

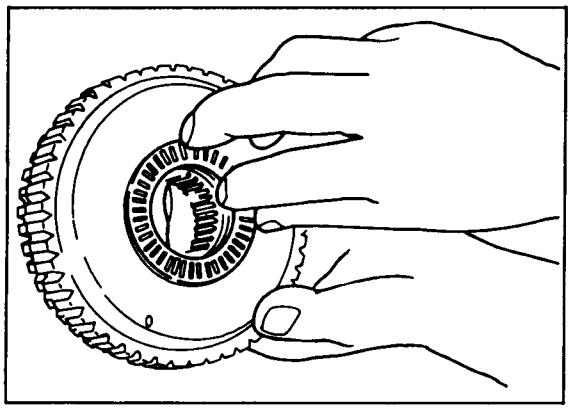
Caution
Check that the spring cage of the one-way clutch faces toward the outer race.



Install the one-way clutch inner race into the one-way clutch outer race by turning inner race counterclockwise.
Hold the one-way clutch outer race. Check that the inner race turns only counterclockwise.

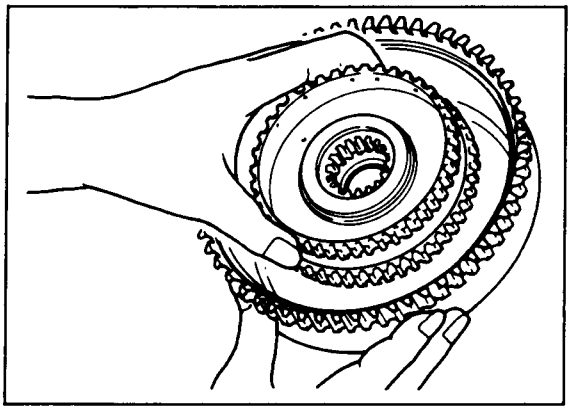


Assembly
Install the small sun gear into the sun gear drum.
Install the snap ring.



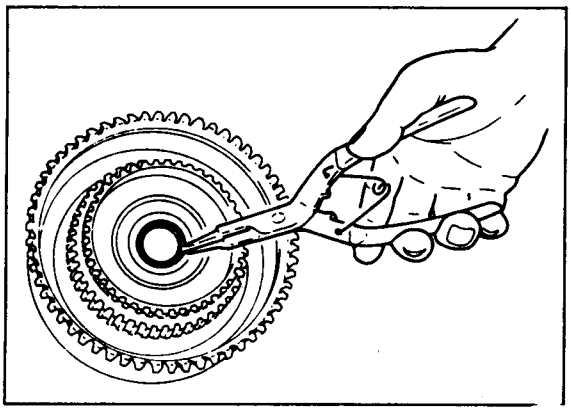
Apply petroleum jelly to the thrust bearing to secure it; then install it to the one-way clutch inner race.

Thrust bearing outer diameter:
62.1 mm (2.44 in)

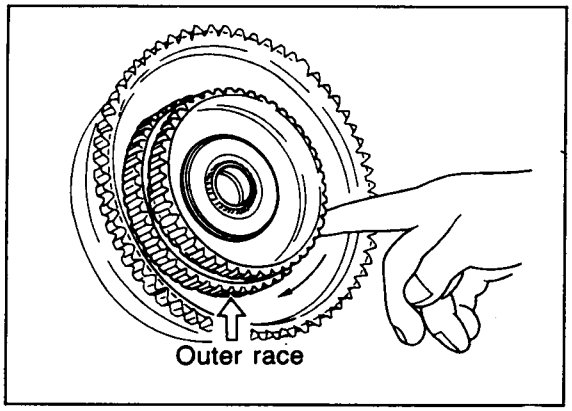


Install the one-way clutch inner and outer race to the sun gear drum.

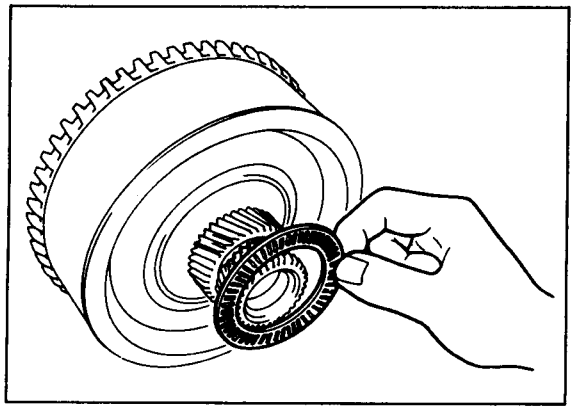
Note
Align the splines of the one-way clutch inner race and small sun gear clutch hub.



Install the snap ring.



Check that when the small sun gear is held, the one-way clutch outer race turns smoothly and only clockwise.



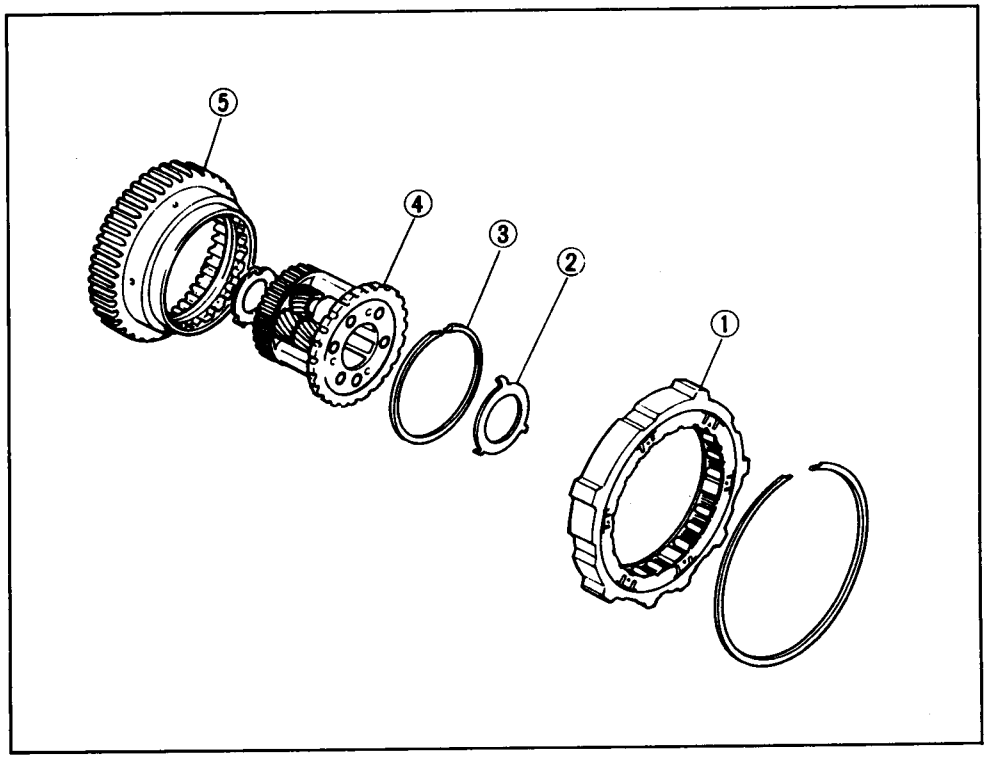
Apply petroleum jelly to the thrust bearing to secure it; then install it to the sun gear drum.

Thrust bearing outer diameter:
72.0 mm (2.83 in)

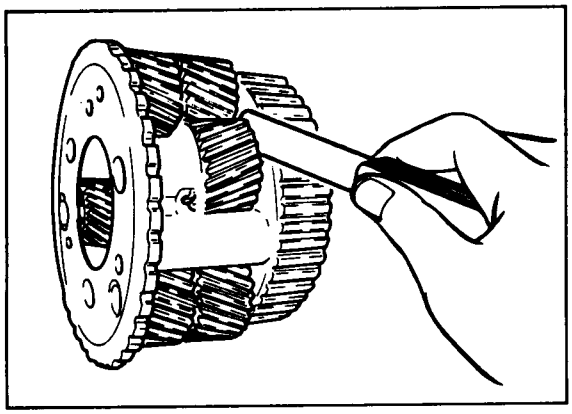
ONE-WAY CLUTCH AND CARRIER HUB ASSEMBLY

Disassembly

Disassemble in the sequence shown in the figure.



1. One-way clutch
2. Bearing races
3. Snap ring
4. Carrier hub assembly
5. Inner race (Low and reverse hub)

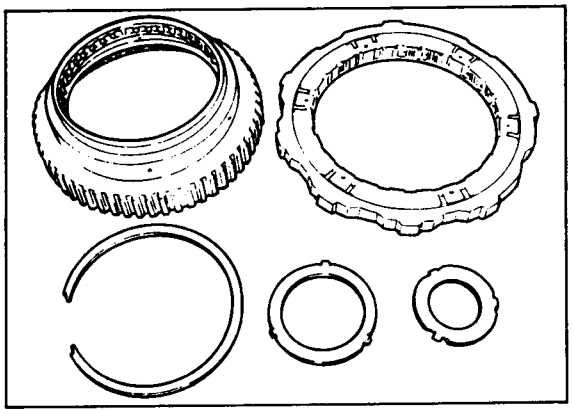


Inspection

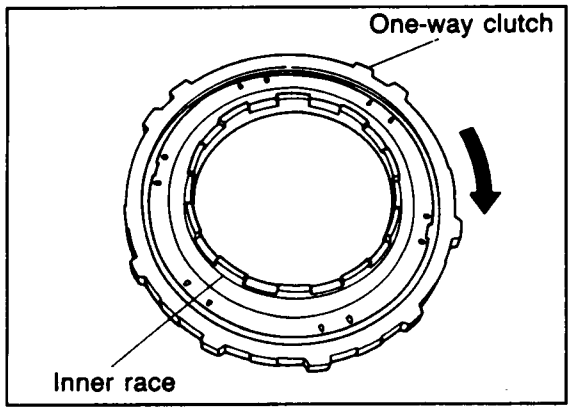
Check the following and replace any faulty parts.

1. Damaged or worn gear and operation
2. Clearance between pinion washer and planetary carrier

Clearance:
0.2—0.7 mm (0.008—0.028 in)

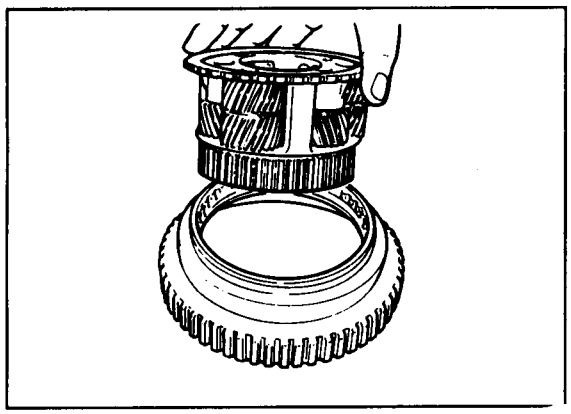


3. Damaged or worn inner race
4. Broken or worn snap ring
5. Damaged or worn bearing race

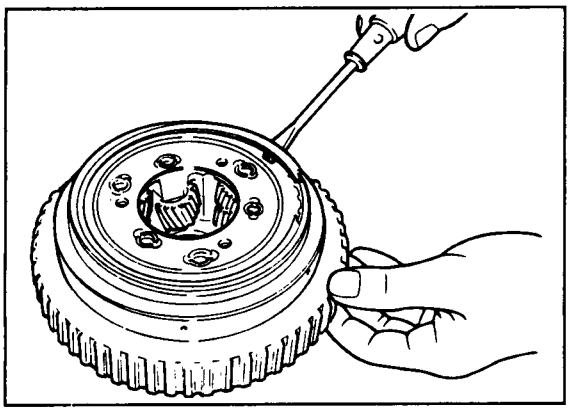


6. Damaged or worn one-way clutch and operation
7. Detached roller

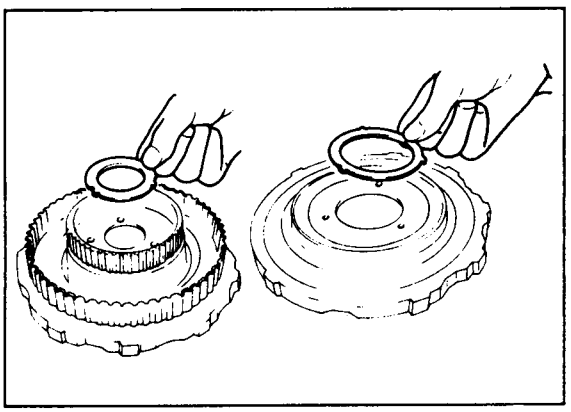
Note
Assemble the one-way clutch and the inner race, then confirm that the one-way clutch rotates only clockwise and smoothly.



Assembly
Assemble the carrier hub assembly to the inner race.



Install th snap ring.

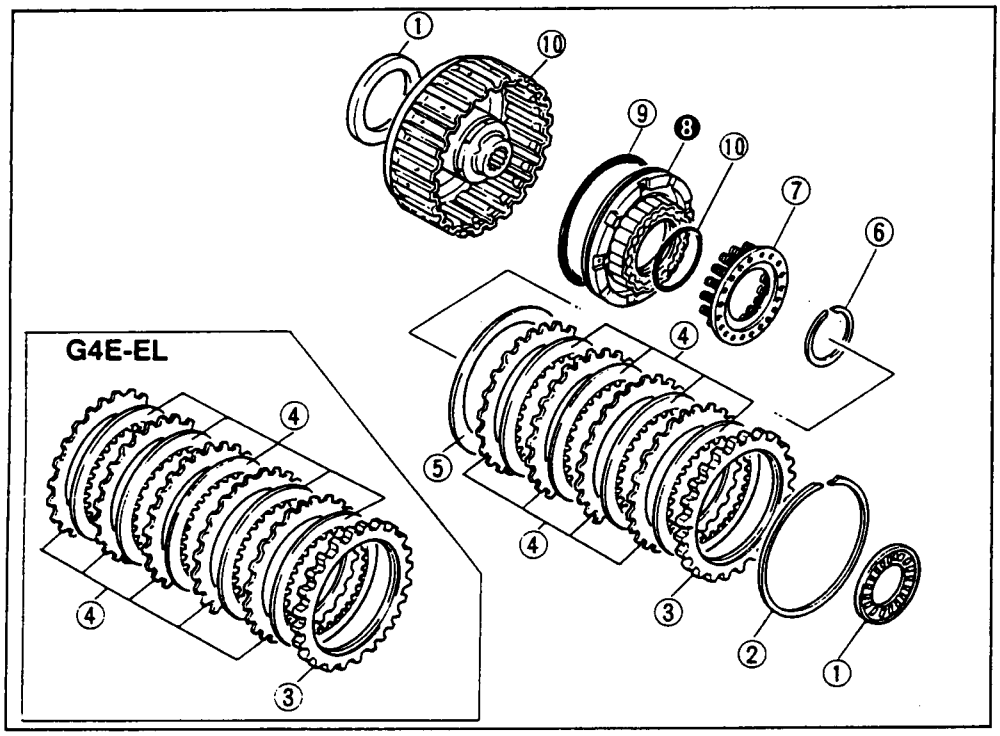


Apply petroleum jelly to the bearing races to secure them; then install them to both sides of the one-way clutch and carrier hub assembly.

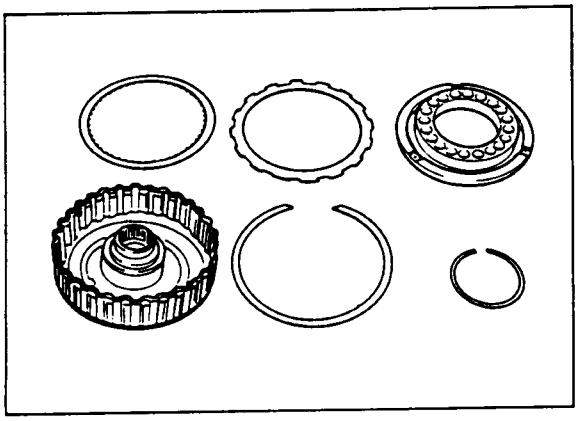
Bearing race outer diameter
Sun gear drum side: 72.0 mm (2.83 in)
3-4 clutch side: 57.0 mm (2.21 in)

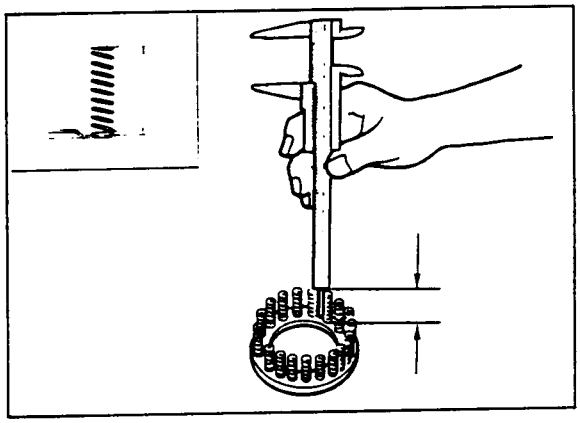
Note
Install the tabs of the bearing race into the alignment holes.

3-4 CLUTCH
Disassembly
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked part.



1. Thrust bearings
2. Snap ring
3. Retaining plate
4. Drive and driven plates
5. Dished plate (G4A-HL)
6. Snap ring
7. Spring and retainer assembly
8. 3-4 clutch piston
9. Outer seal
10. Inner seal
11. 3-4 clutch drum





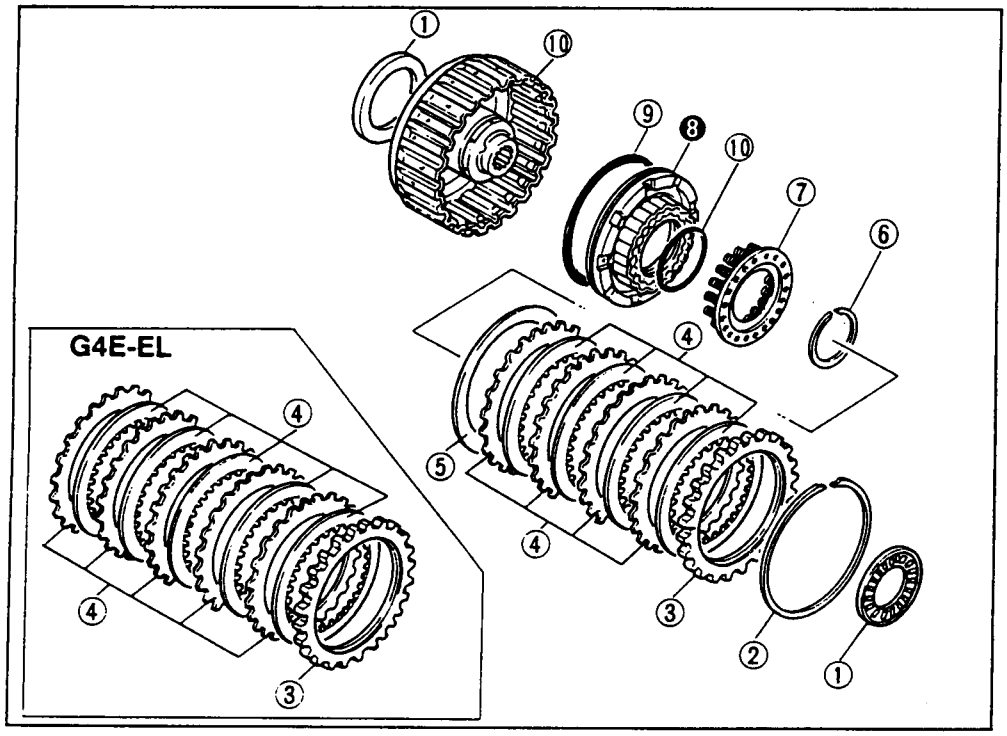
Inspection
Check the following and repair or replace any faulty parts.
1. Drive and driven plates for damage or wear

Drive plate thickness
Standard: 1.6 mm (0.063 in)
Minimum: 1.4 mm (0.055 in)

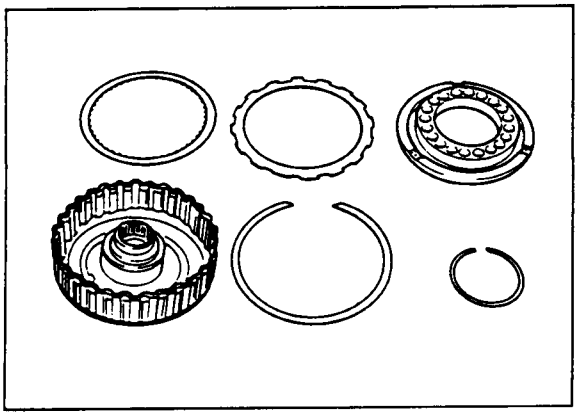
2. Clutch piston for damage or cracks
3. Clutch drum for damage or deformation
4. Seal contact areas for damage
5. Check ball for leaking or sticking
6. Spring and retainer assembly for separation or deformation
7. Broken or worn snap ring
8. Broken or weakened spring

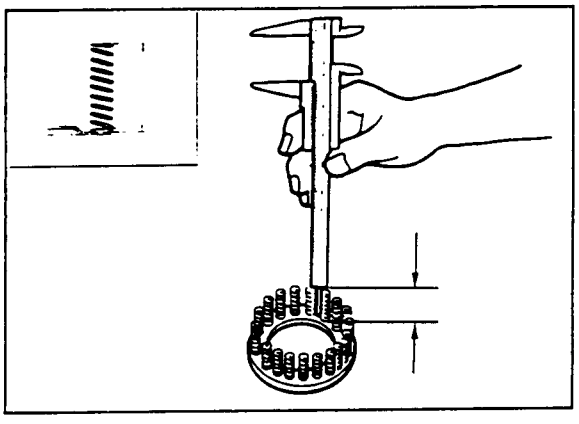
Free length of spring:
33.2 mm (1.307 in)

3-4 CLUTCH
Disassembly
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked part.



1. Thrust bearings
2. Snap ring
3. Retaining plate
4. Drive and driven plates
5. Dished plate (G4A-HL)
6. Snap ring
7. Spring and retainer assembly
8. 3-4 clutch piston
9. Outer seal
10. Inner seal
11. 3-4 clutch drum



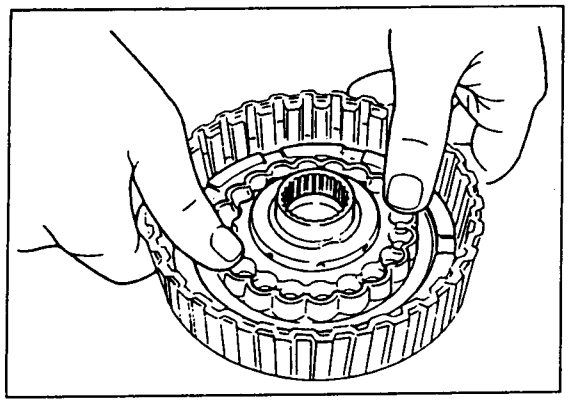


Inspection
Check the following and repair or replace any faulty parts.
1. Drive and driven plates for damage or wear

Drive plate thickness
Standard: 1.6 mm (0.063 in)
Minimum: 1.4 mm (0.055 in)

2. Clutch piston for damage or cracks
3. Clutch drum for damage or deformation
4. Seal contact areas for damage
5. Check ball for leaking or sticking
6. Spring and retainer assembly for separation or deformation
7. Broken or worn snap ring
8. Broken or weakened spring

Free length of spring:
33.2 mm (1.307 in)

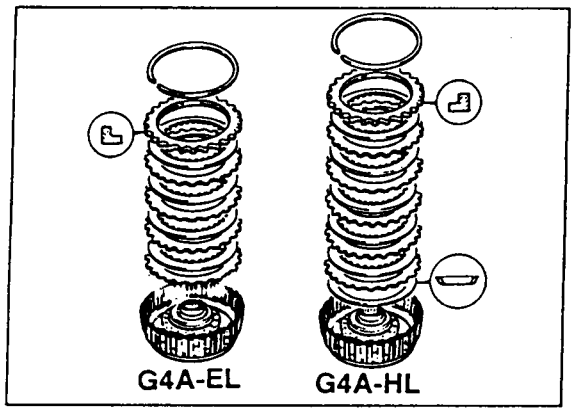


Assembly

Install the 3-4 clutch piston.

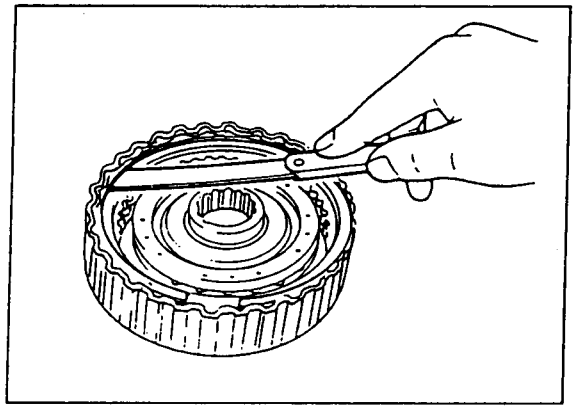
(1) Apply ATF to the inner and outer seals, and install them onto the 3-4 clutch piston.
(2) Install the piston by pushing evenly around the circumference, being careful not to damage the seal rings.

Install the spring and retainer assembly.



Install the dished plate the dished side up ward (G4A-HL).
Install the drive and driven plates.

Note
Installation order:
G4A-EL
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive
G4A-HL
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



Install the retaining plate with the step facing upward.
Install the snap ring.

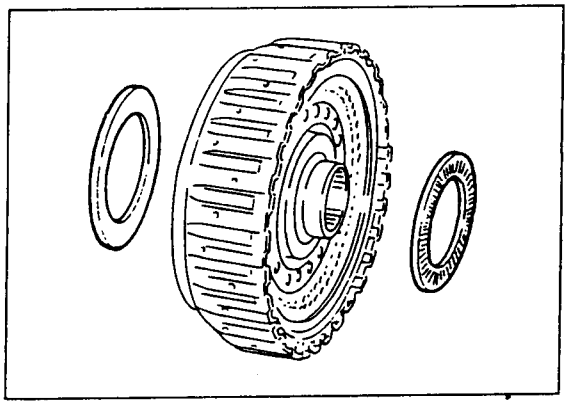
Check the 3-4 clutch clearance.

(1) Measure the clearance between the snap ring and the retaining plate of the 3-4 clutch.
(2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

3-4 clutch clearance:
1.3—1.5 mm (0.051—0.059 in)

G4A-EL

3.8 (0.150)	4.0 (0.157)	4.2 (0.165)
4.4 (0.173)	4.6 (0.181)	4.8 (0.189)



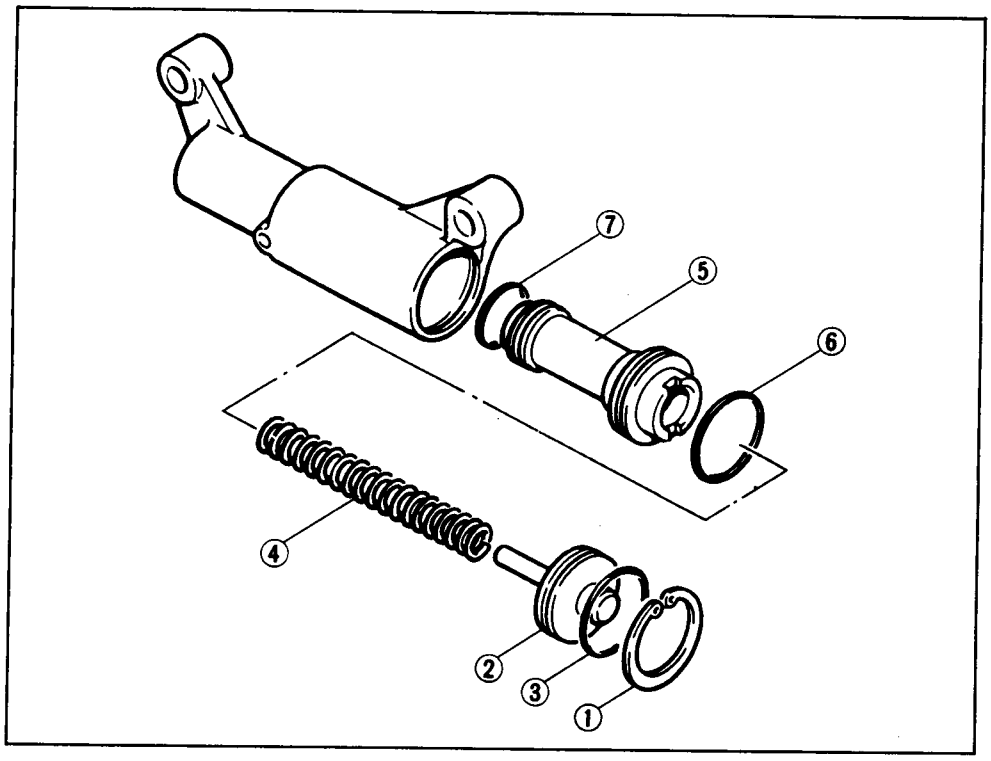
Apply petroleum jelly to the thrust bearings and secure them to both sides of the 3-4 clutch drum.

Thrust bearing outer diameter
Carrier hub side: 56.1 mm (2.21 in)
Output shell side: 72.1 mm (2.84 in)

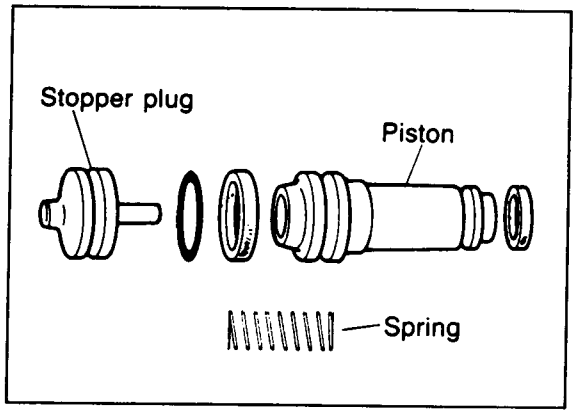
2-3 ACCUMULATOR

Disassembly

Disassemble in the sequence shown in the figure.



1. Snap ring
2. Stopper plug
3. O-ring
4. 2-3 accumulator spring
5. 2-3 accumulator piston
6. Large seal ring
7. Small sea ring

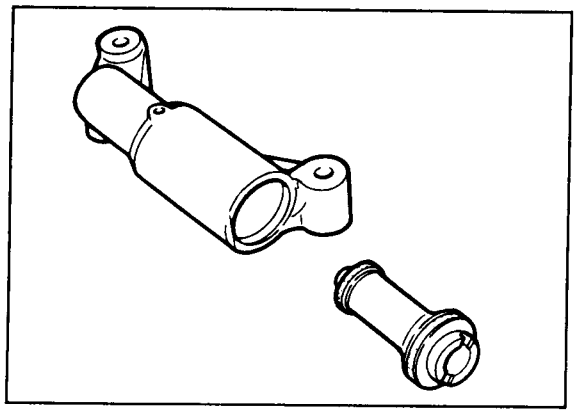


Inspection

Check the following and replace any faulty parts.

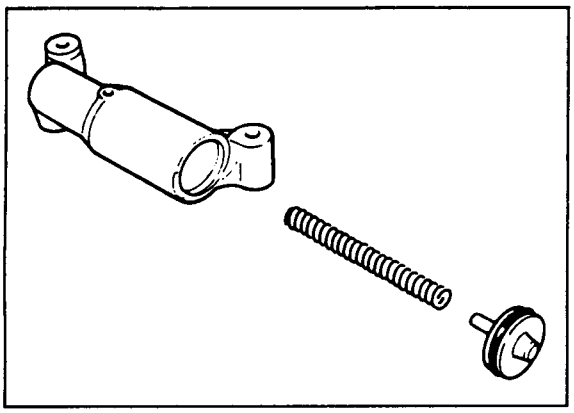
1. Damaged or worn piston
2. Damaged or worn stopper plug
3. Broken or weakened spring

Free length of spring:
G4A-EL 83.3 mm (3.280 in)
G4A-HL 76.0 mm (2.992 in)

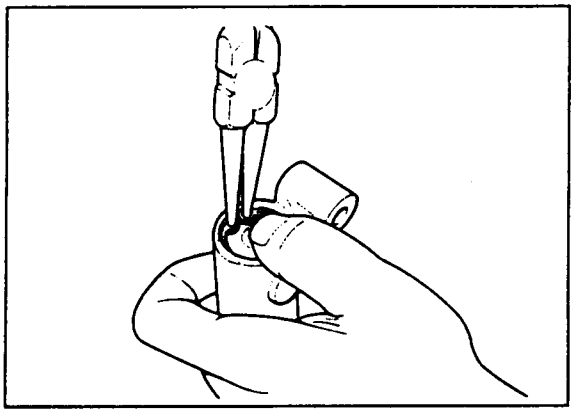


Assembly

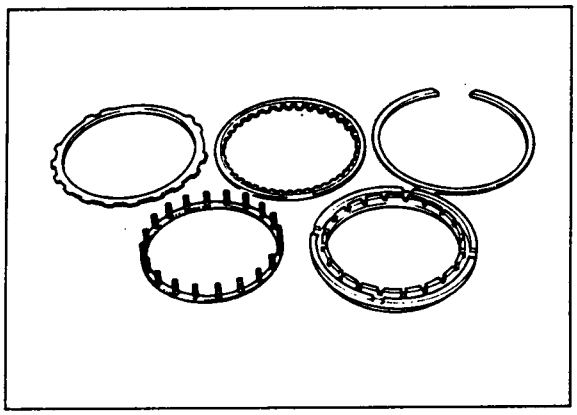
1. Install the 2-3 accumulator.
   (1) Apply ATF to large and small seal rings; then install them to the accumulator piston.
   (2) Insert the 2-3 accumulator.



2. Install the spring to the piston.
3. Install the stopper plug.
   (1) Apply ATF to O-ring, and install it onto the stopper plug.
   (2) Install the stopper plug.



4. Install the snap ring while holding in the stopper plug.



LOW AND REVERSE BRAKE

Inspection

Check the following and replace any faulty parts.

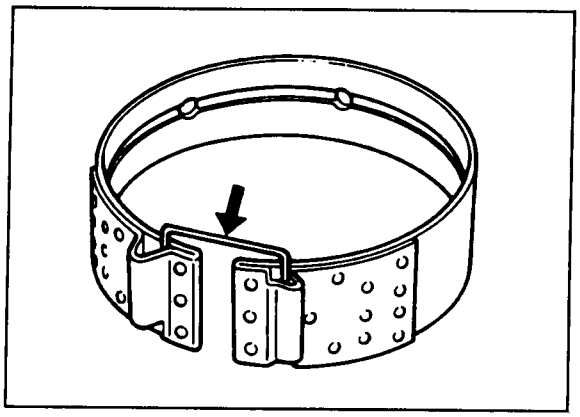
1. Damaged or worn drive and driven plates

   Drive plate thickness
   Standard: 1.6 mm (0.063 in)
   Minimum: 1.4 mm (0.055 in)

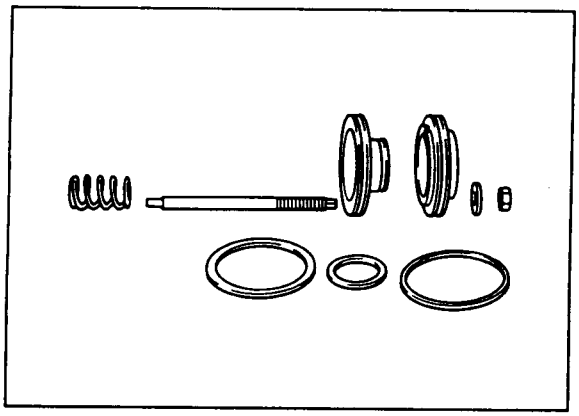
2. Broken or worn snap ring
3. Deformed or detached spring and retainer assembly
4. Broken or weakened spring

   Free length of spring:
   20.5 mm (0.807 in)

5. Damaged or worn piston
6. Damaged seal contact area of transaxle case

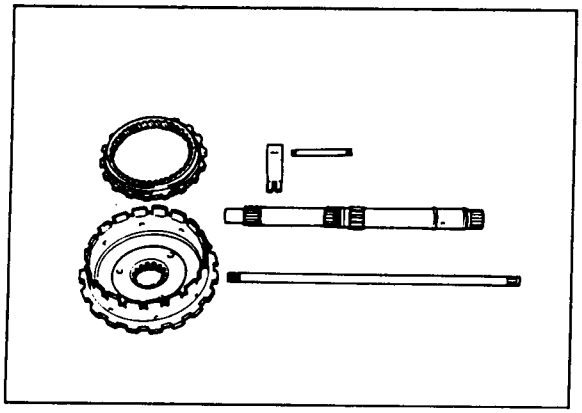


2-4 BRAKE BAND
Inspection
Check the following and replace if necessary.
1. Damaged or worn 2-4 brake band

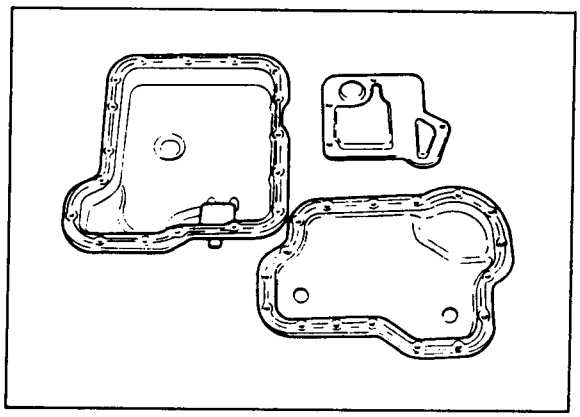


BAND SERVO
Inspection
Check the following and replace any faulty parts.
1. Damaged or worn piston
2. Weakened return spring

Free length of spring:
G4A-EL: 43.25 mm (1.703 in)
G4A-HL: FE engine 42.0 mm (1.654 in)
F8 engine 43.25 mm (1.703 in)

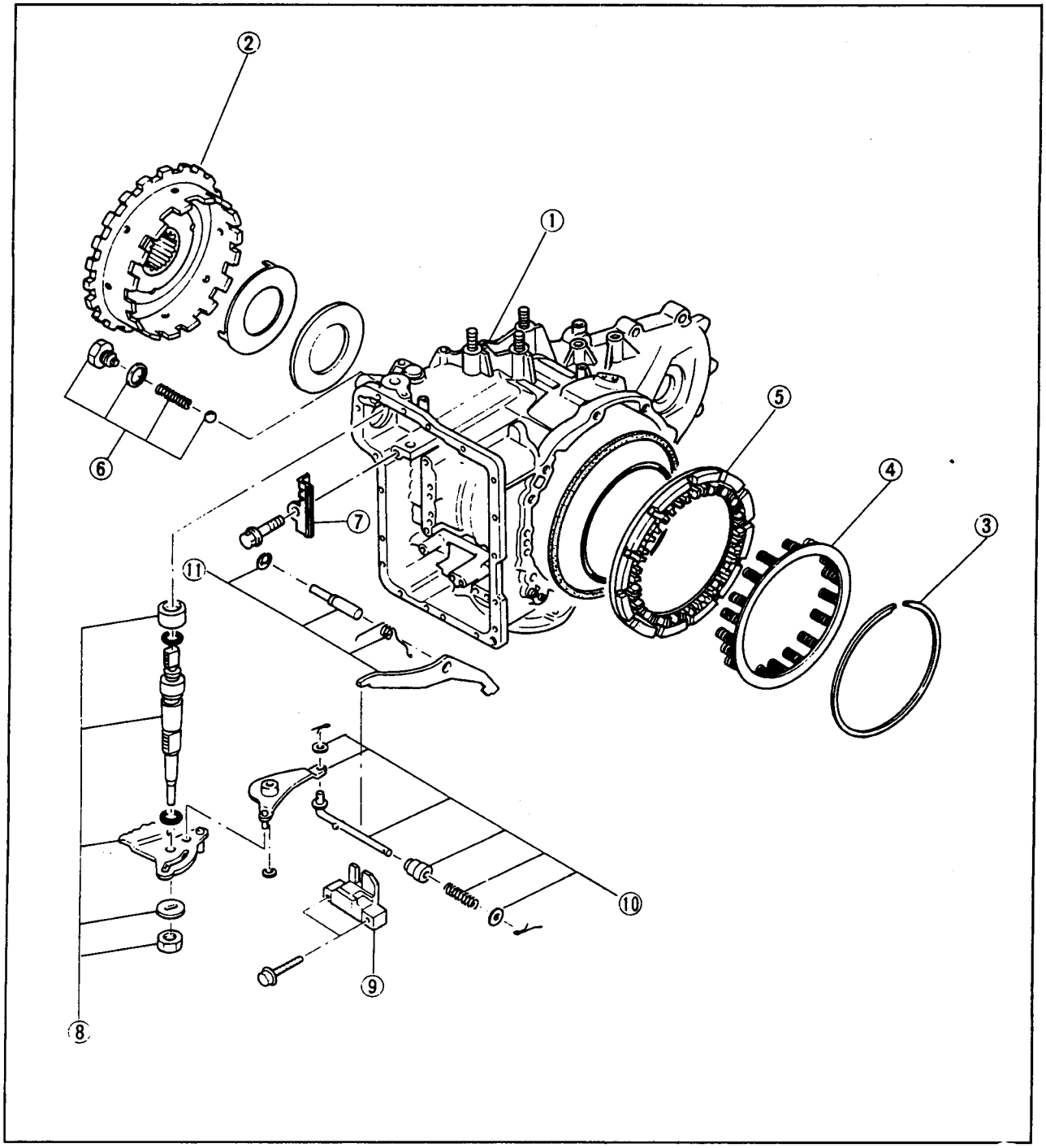


OTHER INSPECTION
Check the following and replace any faulty parts.
1. Damaged or worn output shell
2. Damaged or worn internal gear
3. Damaged or worn turbine shaft
4. Damaged or worn oil pump shaft
5. Damaged or worn anchor strut and shaft

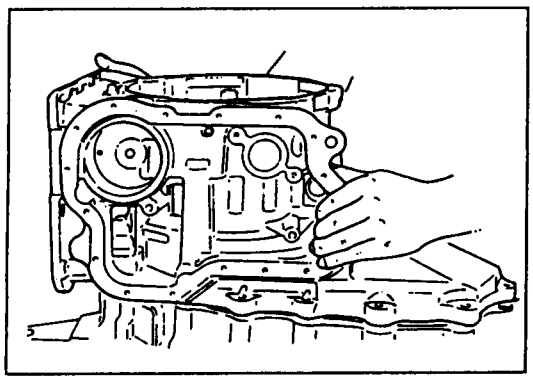


6. Damaged or cracked valve body cover
7. Damaged or cracked oil pan
8. Damaged or clogged oil strainer

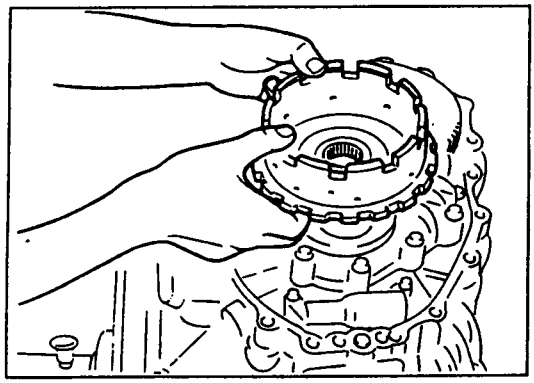
DISASSEMBLY
Component



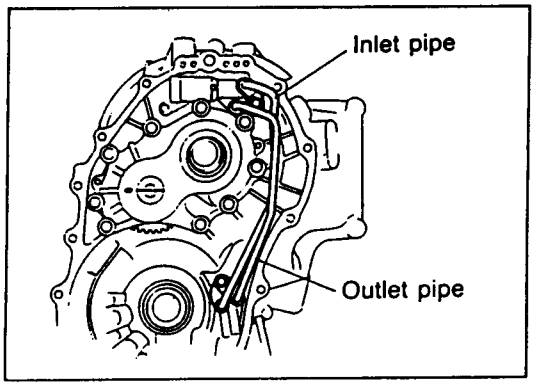
1. Transaxle case
2. Output shell
3. Snap ring
4. Spring and retainer assembly
5. Low and reverse brake piston
6. Plug, washer, spring, and detent ball
7. Bracket
8. Manual shaft and manual plate
9. Actuator support
10. Parking assist lever
11. Parking pawl



1. Remove the bolts; then remove the transaxle case by tapping lightly with a plastic hammer.

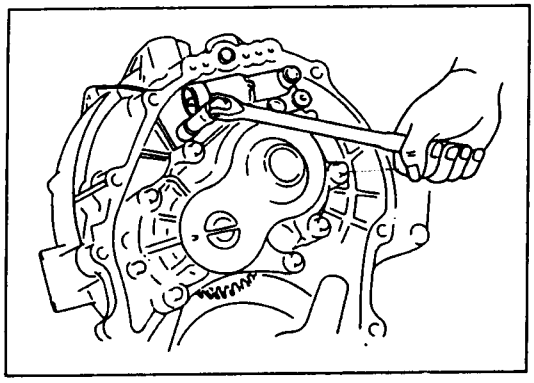


2. Remove the output shell from the output gear.

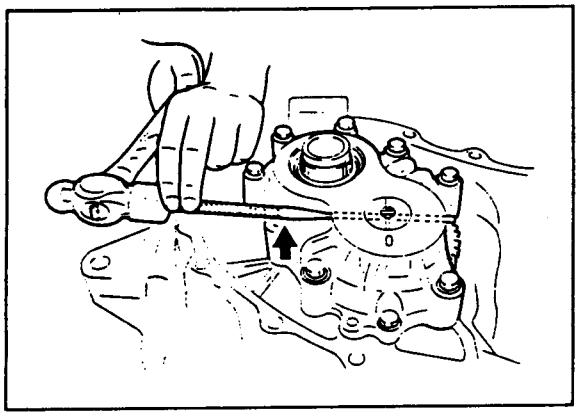


3. Remove the governor outlet pipe, governor inlet pipe, and O-rings.

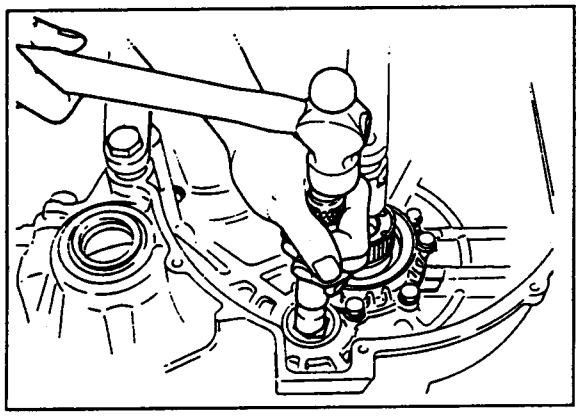
G4A-HL only



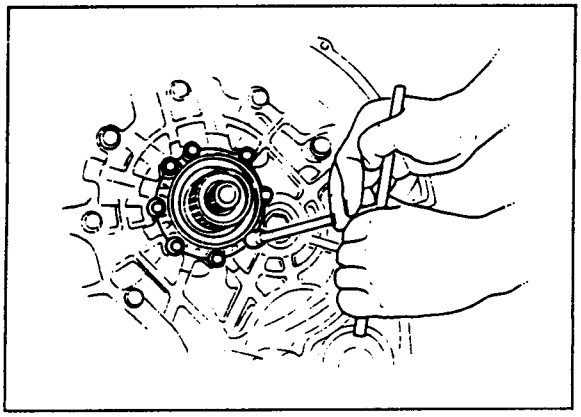
4. Remove the 2-3 accumulator piston assembly and O-rings.



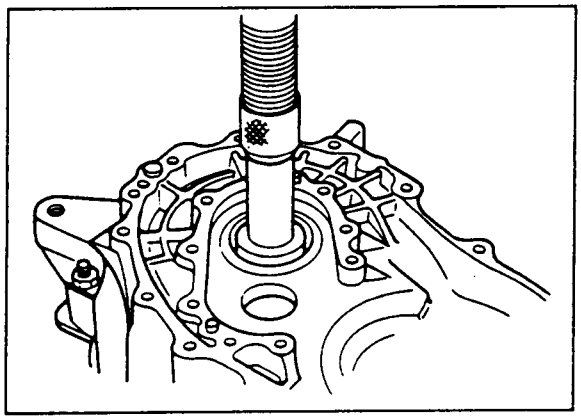
5. Remove the bearing housing.
   (1) Remove the bolt indicated in the figure.
   (2) Remove the roll pin with a pin punch.
   (3) Remove the bearing housing by tapping lightly with a plastic hammer.



6. Remove the idle gear assembly and output gear assembly by tapping out from the torque converter side.



7. Remove the bearing cover.
   (1) Remove the converter housing from the transaxle hanger.
   (2) Remove the bearing cover bolts.



(3) Press the bearing cover assembly out of the converter housing.

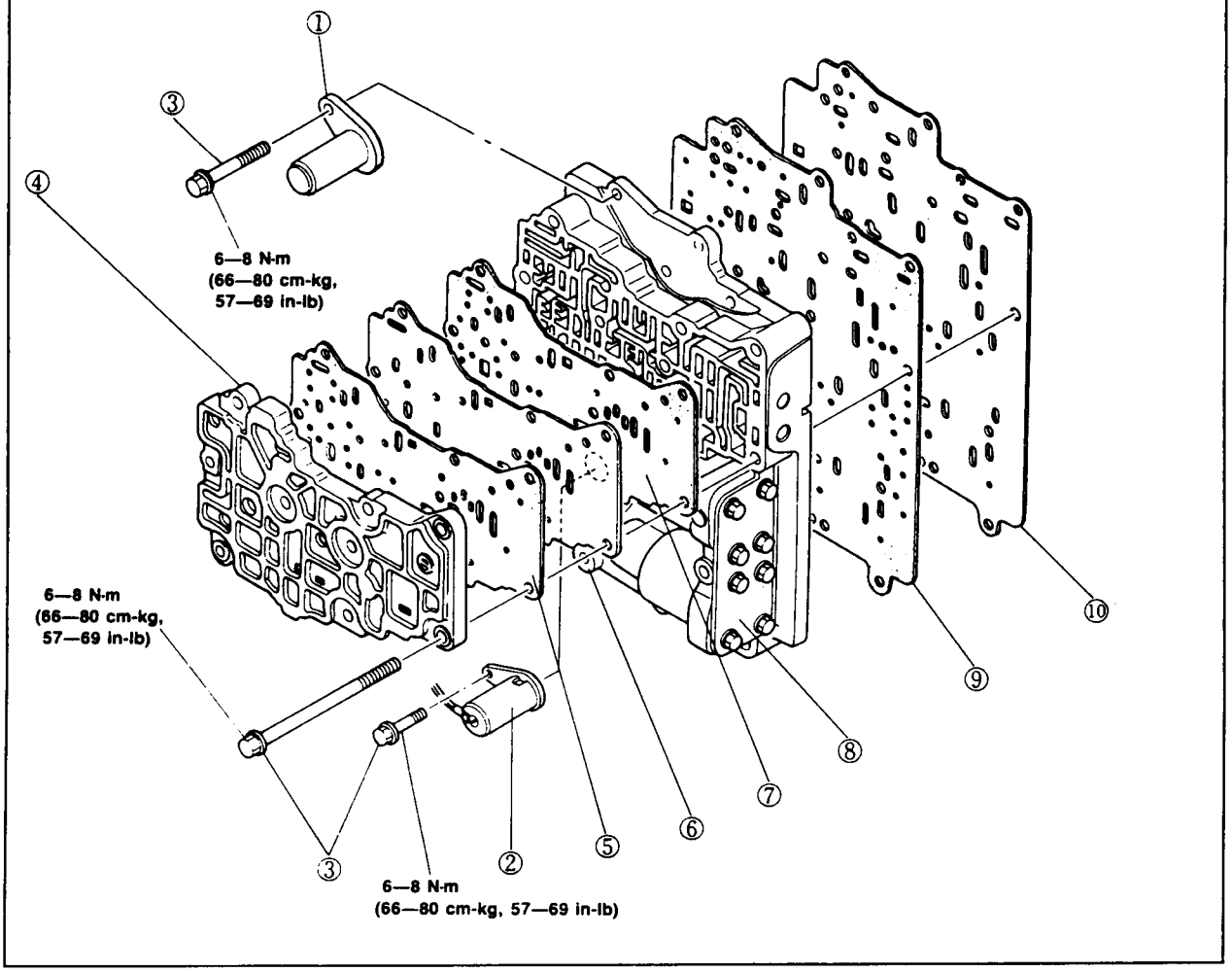
CONTROL VALVE BODY (G4A-EL)

Precaution

(1) Pay close attention when handling the control valve because it consists of the most precise and delicate parts of the transaxle.
(2) Neatly arrange the removed parts in order to avoid mixing up similar parts.
(3) Disassemble the control valve assembly and thoroughly clean it when the clutch and/or brake bands are burned, and/or when the automatic transaxle fluid is degenerated.

Components I

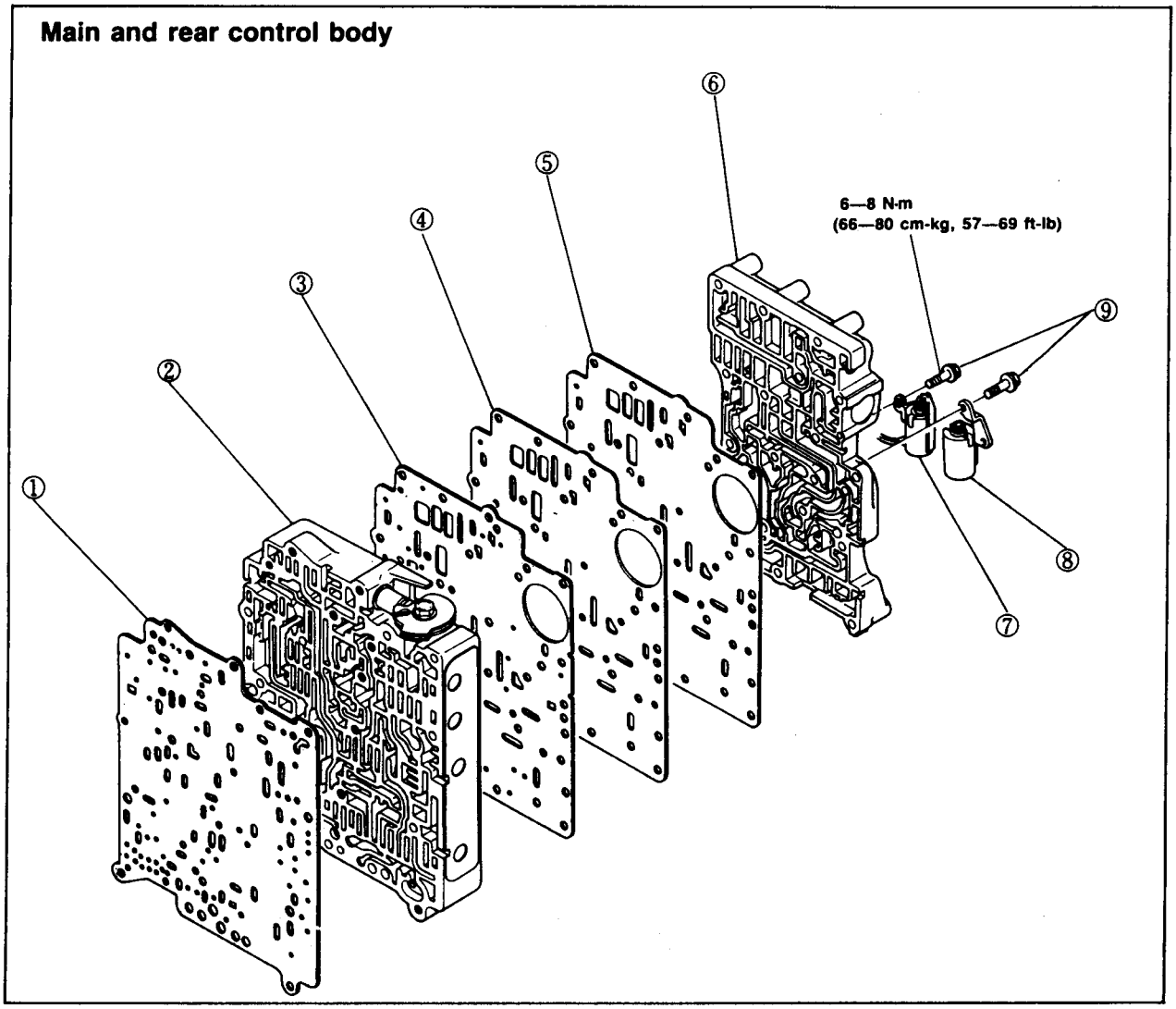
Front and premain control body



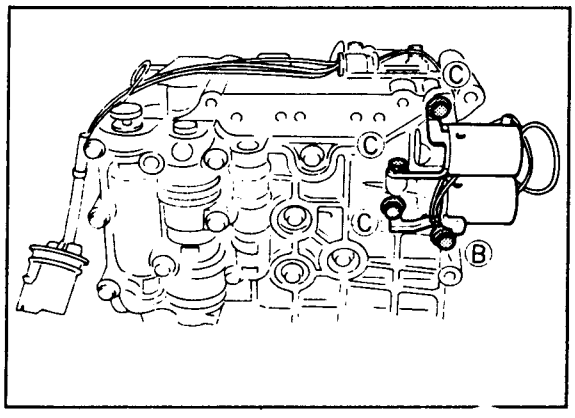
1. 1-2 Solenoid valve
2. 2-3 Solenoid valve
3. Bolts
4. Front control body
5. Front/premain front gasket
6. Premain separator
7. Front/premain rear gasket
8. Premain control body
9. Premain/main front gasket
10. Main separator

Components II

Main and rear control body

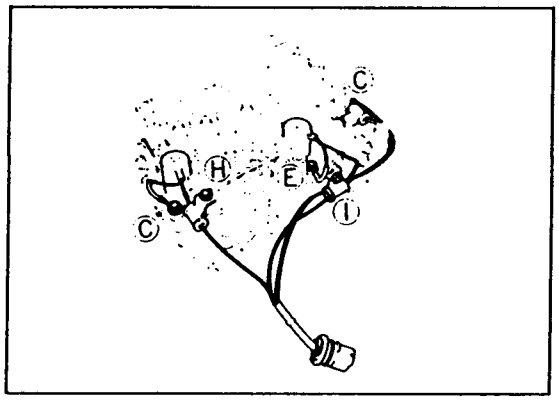


1. Premain/main rear gasket
2. Main control body
3. Main/rear front gasket
4. Rear separator
5. Main/rear rear gasket
6. Rear control body
7. 3-4 solenoid valve
8. Lock-up solenoid valve
9. Bolts

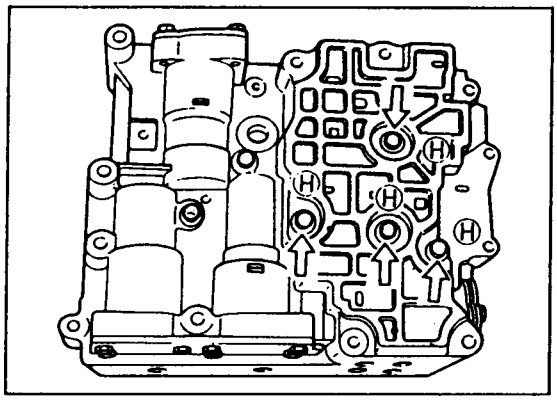


Disassembly of Control Valve Body

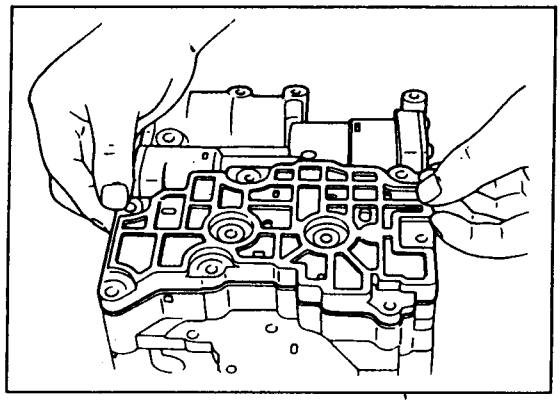
1. Remove the 3-4 solenoid valve and lock-up solenoid valve.
2. Remove the O-rings and oil strainers.



3. Remove the 1-2 solenoid valve and 2-3 solenoid valve and wire harness.
4. Remove the O-rings and oil strainers.

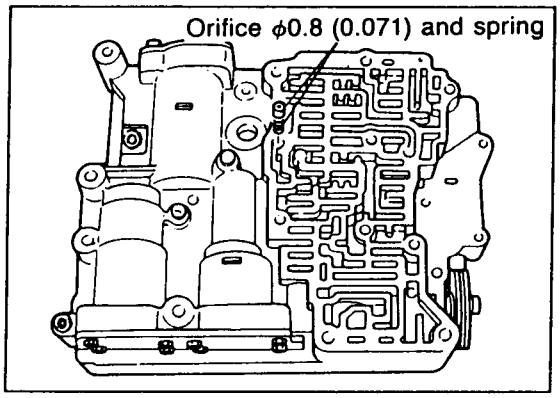


5. Remove the front indicated bolts and pull out the front control body with premain separator as a unit.



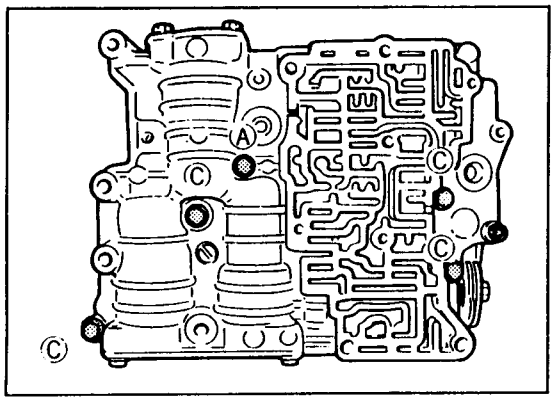
6. Remove the front/premain gaskets and separator from the front control body.

There are two(2) balls located under this plate on some models.

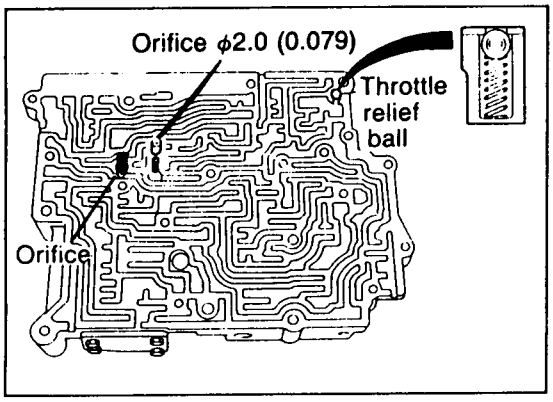


7. Remove the orifice check valve (ϕ0.8 mm, 0.071 in) and spring from the premain control body.

(3-4 Clutch Feed Orifice.)

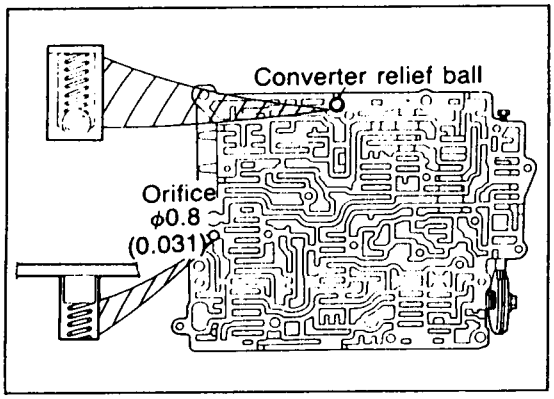


8. Remove the bolts and hexagonal head bolt and remove the premain control body and the main separator as a unit.



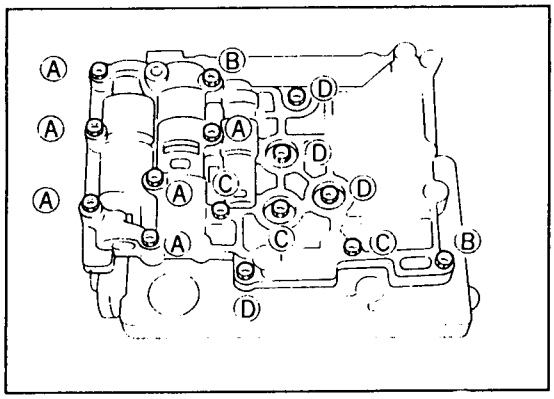
9. Remove the premain/main gaskets and separator from the premain control body.
10. Remove the orifice check valve (φ2.0 mm, 0.079 in) and spring, and the throttle relief ball and spring from the premain control body.

(.079 in. Orifice Is Forward Clutch Feed.)
(Orifice is 2-4 Servo For The 3-4 Shift.)

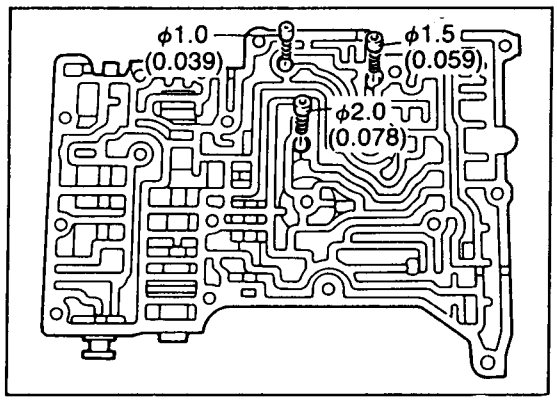


11. Remove the converter relief ball and spring, and the orifice check valve (φ0.8 mm, 0.031 in) and spring from the main control body.

(Orifice is TV 2nd.)

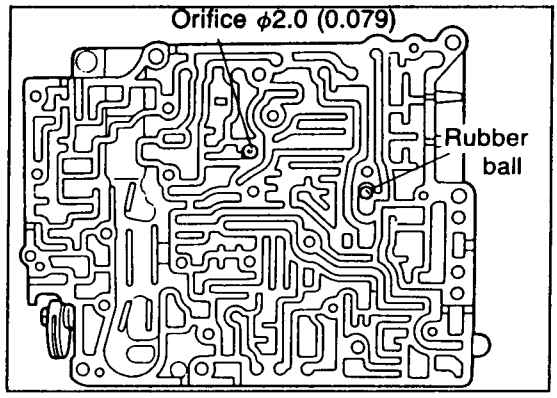


12. Turn the assembly over and remove the bolts shown in the figure. Remove the rear separator as a unit.



13. Remove the main/rear gaskets and separator from the rear control body.
14. Remove the orifice check valves (ϕ1.5 mm, 0.059 in; ϕ1.0 mm, 0.039 in; ϕ2.0 mm, 0.079 in) and spring from the rear control body.

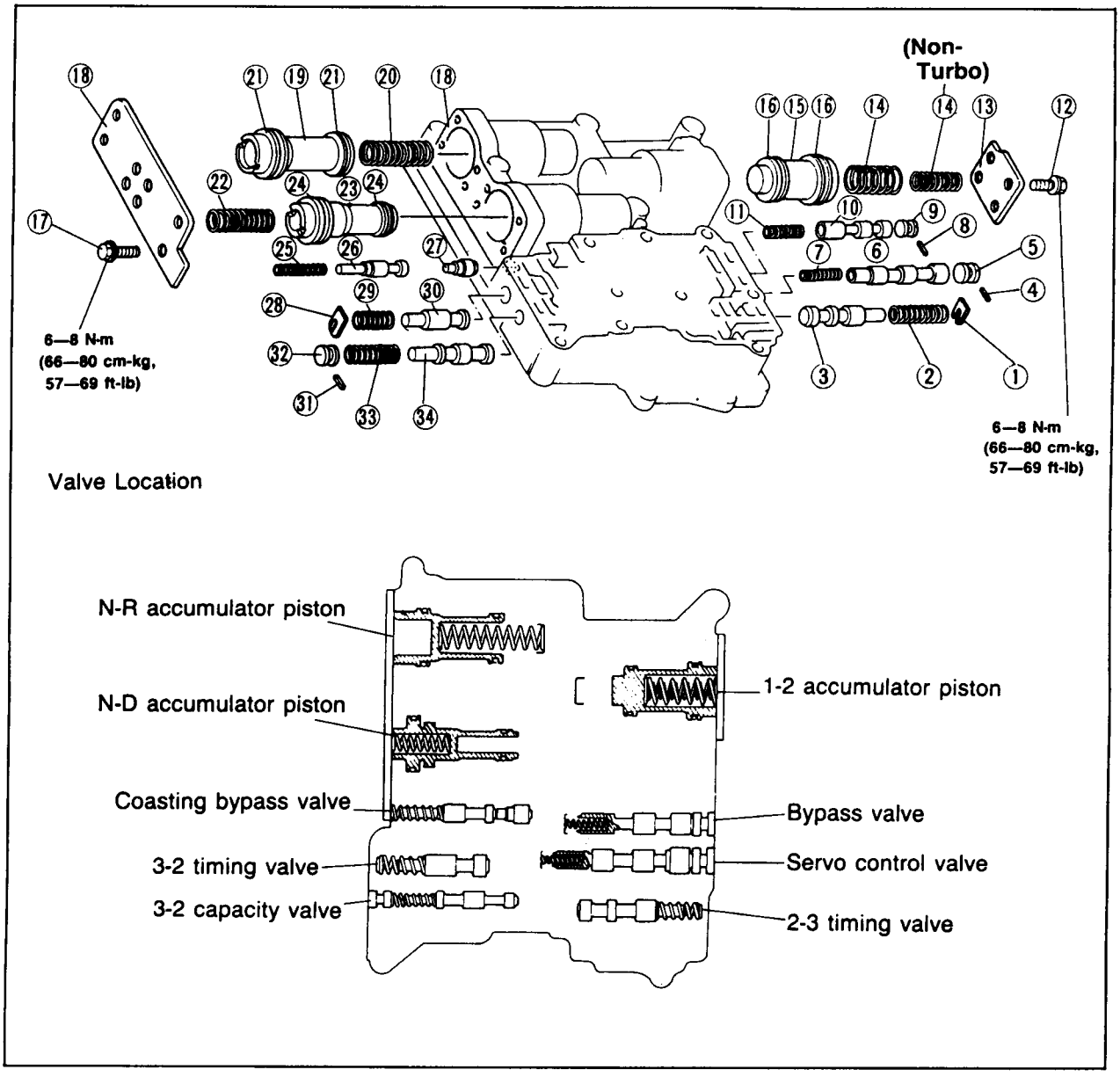
(.039 in. Orifice Is For Over-run Clutch Feed.)
(.059 in. Orifice Is The Reverse Clutch Feed.)
(.078 in. Orifice Is The L/R Clutch Exhaust.)



15. Remove the orifice check valve (ϕ2.0 mm, 0.079 in) and spring and the rubber ball from the main control body.

(Low Rev. Brake Used In Manual Low.)

Premain Control Body
Disassembly
Disassemble in the sequence shown in the figure.

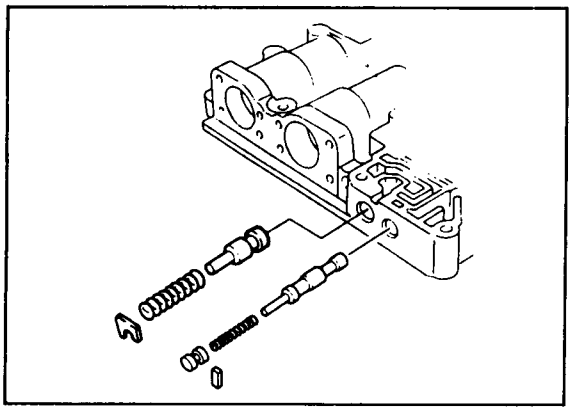


1. Retainer
2. 2-3 timing spring
3. 2-3 timing valve
4. Stopper pin
5. Stopper plug
6. Servo control valve
7. Servo control spring
8. Stopper pin
9. Stopper plug
10. Bypass valve
11. Bypass spring
12. Bolt
13. 1-2 accumulator plate and gasket
14. 1-2 accumulator spring
15. 1-2 accumulator piston
16. 1-2 accumulator seal rings
17. Bolt
18. N-R accumulator plate and gasket
19. N-R accumulator piston
20. N-R accumulator rear spring
21. N-R accumulator seal rings
22. N-D accumulator front spring
23. N-D accumulator piston
24. N-D accumulator seal rings
25. Coasting bypass spring
26. Coasting bypass valve
27. Coasting bypass plug
28. Retainer
29. 3-2 timing spring
30. 3-2 timing valve
31. Stopper pin
32. Stopper plug
33. 3-2 capacity spring
34. 3-2 capacity valve

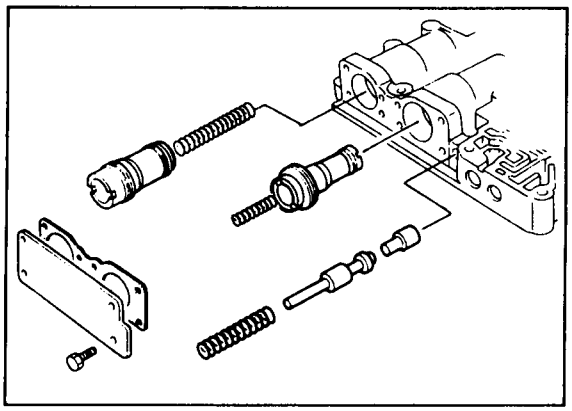
Inspection
Check the following and replace any faulty parts.
1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
1-2 accumulator small spring	11.0 (0.433)	88.1 (3.348)	1.4 (0.055)	Gray
1-2 accumulator large spring	16.0 (0.630)	78.0 (3.071)	2.0 (0.079)	Blue
Bypass, Servo control spring	5.0 (0.197)	33.4 (1.315)	0.55 (0.022)	Maroon
2-3 timing spring	8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
N-R accumulator rear spring	11.1 (0.437)	62.0 (2.441)	1.2 (0.047)	Light green
N-D accumulator front spring	9.8 (0.386)	52.9 (2.083)	1.0 (0.039)	Brown
Coasting bypass spring	5.8 (0.228)	37.7 (1.484)	0.6 (0.024)	Dark blue
3-2 timing spring	8.2 (0.323)	28.6 (1.126)	0.8 (0.031)	Red
3-2 capacity spring	5.4 (0.213)	30.6 (1.205)	0.5 (0.020)	White
Throttle relief ball spring	6.6 (0.260)	21.6 (0.850)	0.8 (0.031)	—

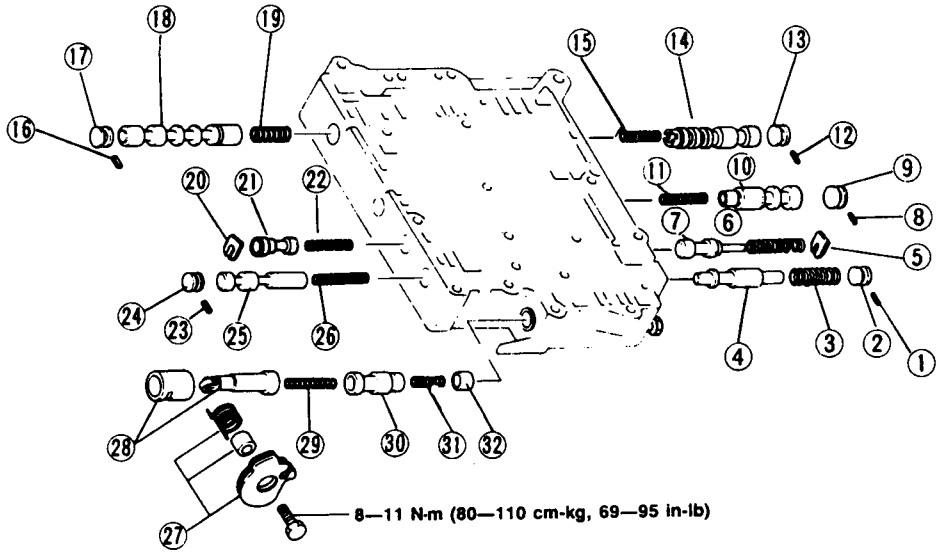


Assembly
1. Install the 3-2 capacity valve, 3-2 capacity spring, and stopper plug; then install the stopper pin.
2. Install the 3-2 timing valve, the 3-2 timing spring, and retainer.

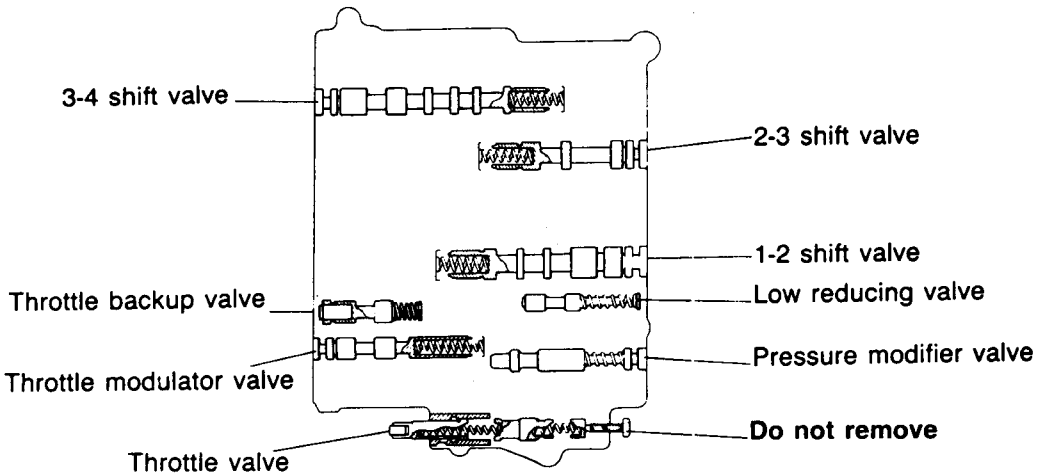


3. Install the coasting bypass plug, coasting bypass valve and coasting bypass spring.
4. Apply ATF to the O-rings, and install them to the piston; then insert the N-R accumulator rear spring and N-R accumulator piston.
5. Apply ATF to the O-rings, and install them to the piston; then insert the N-D accumulator piston and N-D accumulator front spring.

Main Control Body
Disassembly
Disassemble in the sequence shown in the figure.



Valve Location

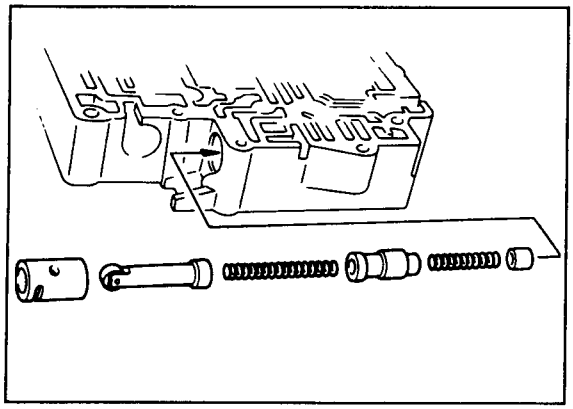


1. Stopper pin
2. Stopper plug
3. Pressure modifier spring
4. Pressure modifier valve
5. Retainer
6. Low reducing spring
7. Low reducing valve
8. Stopper pin
9. Stopper plug
10. 1-2 shift valve
11. 1-2 shift spring
12. Stopper pin
13. Stopper plug
14. 2-3 shift valve
15. 2-3 shift spring
16. Stopper pin
17. Stopper plug
18. 3-4 shift valve
19. 3-4 shift spring
20. Retainer
21. Throttle backup valve
22. Throttle backup spring
23. Stopper pin
24. Stopper plug
25. Throttle modulator valve
26. Throttle modulator spring
27. Throttle cam assembly
28. Throttle plug assembly
29. Throttle spring
30. Throttle valve
31. Throttle assist spring
32. Throttle adjust plug

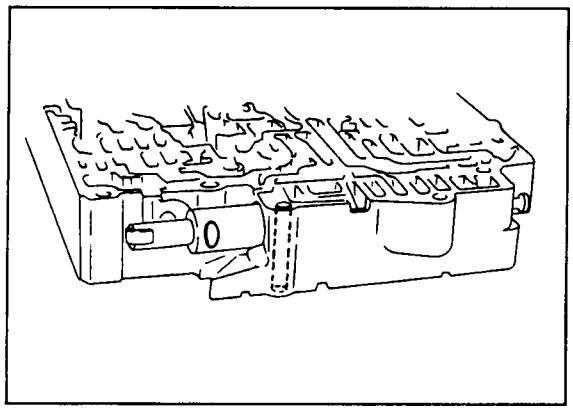
Inspection
Check the following and replace any faulty parts.
1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
Pressure modifier spring	8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
Low reducing spring	8.7 (0.343)	38.3 (1.508)	0.9 (0.035)	Black
1-2 shift spring	8.7 (0.343)	41.3 (1.626)	1.0 (0.039)	Yellow
2-3, 3-4 shift spring	7.4 (0.291)	36.6 (1.441)	0.8 (0.031)	Gray
Throttle backup spring	9.65 (0.380)	26.9 (1.059)	0.55 (0.022)	Red
Throttle modulator spring	6.3 (0.248)	47.9 (1.886)	0.8 (0.031)	—
Throttle assist spring	5.15 (0.203)	32.3 (1.272)	0.55 (0.022)	Dark green
Throttle spring	5.4 (0.213)	47.2 (1.858)	0.8 (0.031)	Pink
Converter relief ball spring	6.9 (0.272)	24.1 (0.949)	0.9 (0.035)	Maroon
Orifice check valve spring	5.0 (0.197)	12.5 (0.492)	0.23 (0.009)	—

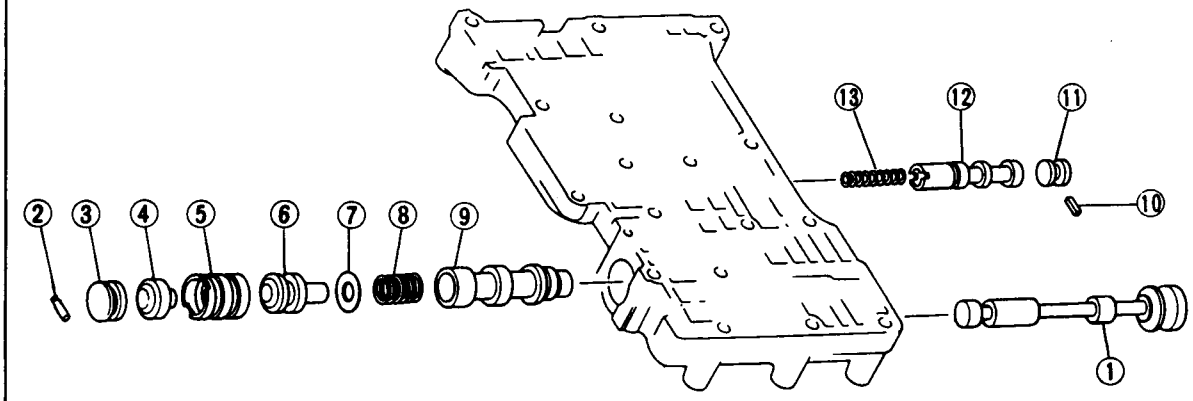


Assembly
1. Install the throttle adjust plug, throttle assist spring, throttle valve, and throttle plug assembly.

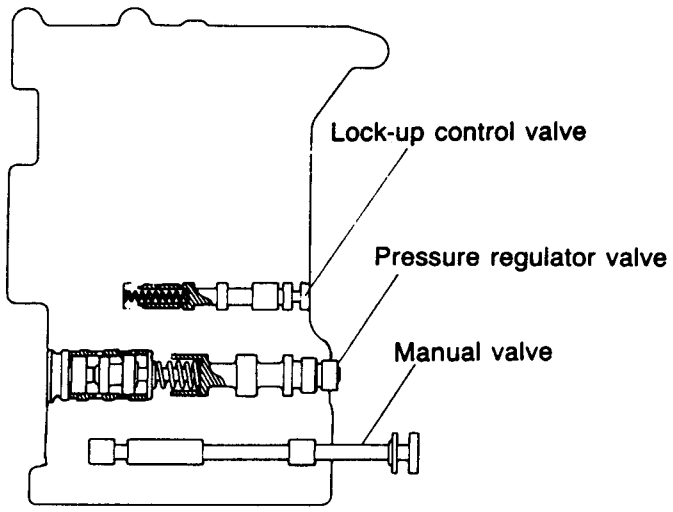


Caution
Install the throttle plug assembly with the groove aligned with the bolt hole.

Rear Control Body
Disassembly
Disassemble in the sequence shown in the figure.



Valve Location

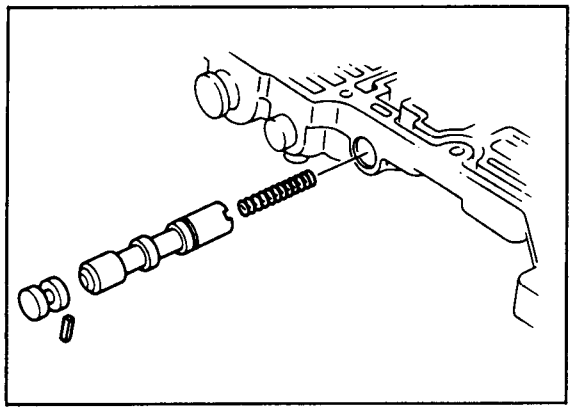


1. Manual valve
2. Stopper pin
3. Stopper plug
4. Pressure regulator backup plug
5. Pressure regulator plug sleeve
6. Pressure regulator plug
7. Pressure regulator spring seat
8. Pressure regulator spring
9. Pressure regulator valve
10. Stopper pin
11. Stopper plug
12. Lock-up control valve
13. Lock-up control spring

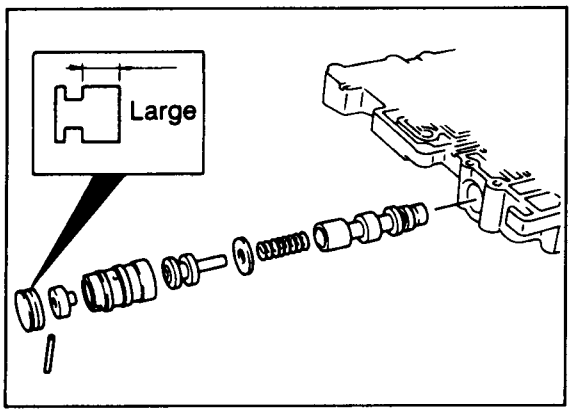
Inspection
Check the following and replace any faulty parts.
1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
Pressure regulator spring	11.5 (0.453)	26.5 (1.043)	1.0 (0.039)	Maroon
Lock-up control spring	5.0 (0.197)	35.2 (1.386)	0.6 (0.024)	Purple

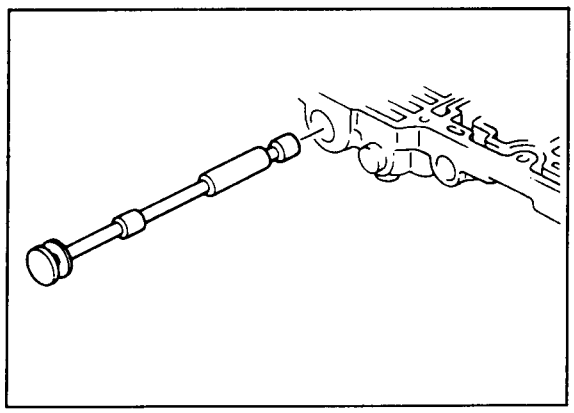


Assembly
1. Install the lock-up control spring, lock-up control valve, stopper plug, and stopper pin.

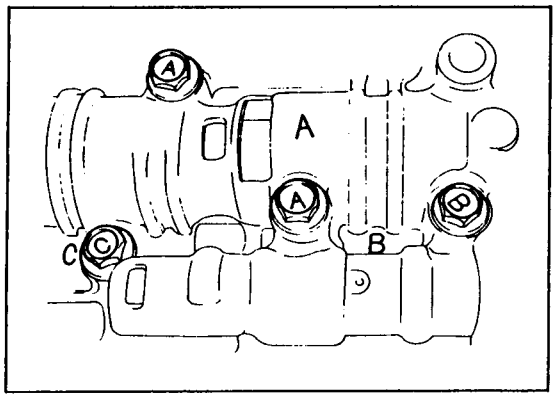


2. Install the pressure regulator valve, pressure regulator spring, pressure regulator spring seat, pressure regulator plug, pressure regulator plug sleeve, pressure regulator backup plug, stopper plug, and stopper pin.

Note
Install the stopper plug larger end first.

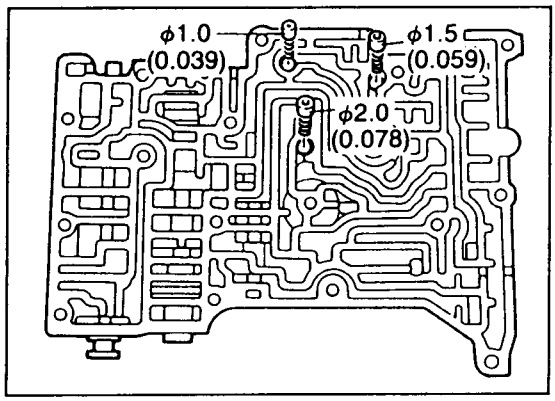


3. Install the manual valve.



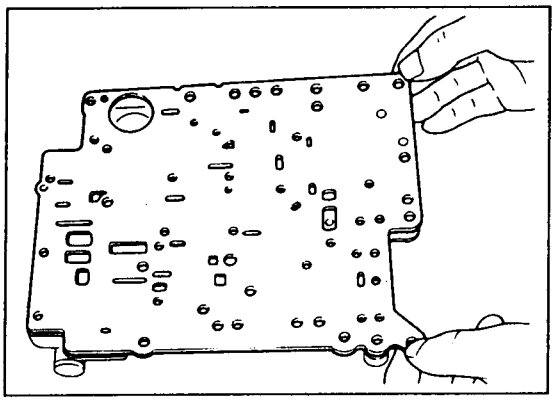
Assembly of Control Valve Body

Note
a) Do not mix-up the front and rear gaskets during assembly.
b) Match the bolt head letter and the control valve body letter.

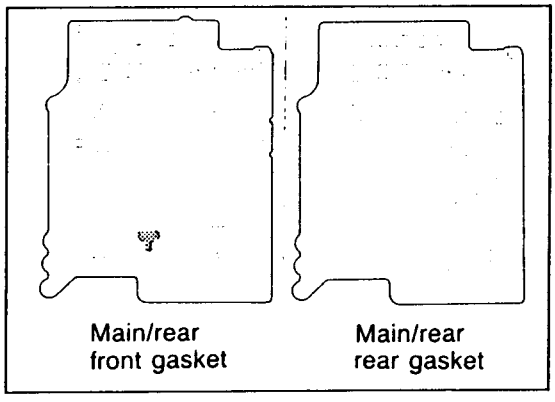


Install the orifice check valves (ϕ1.5 mm, 0.059 in; ϕ1.0 mm, 0.039 in; ϕ2.0 mm, 0.079 in) and springs in the rear control body as shown.

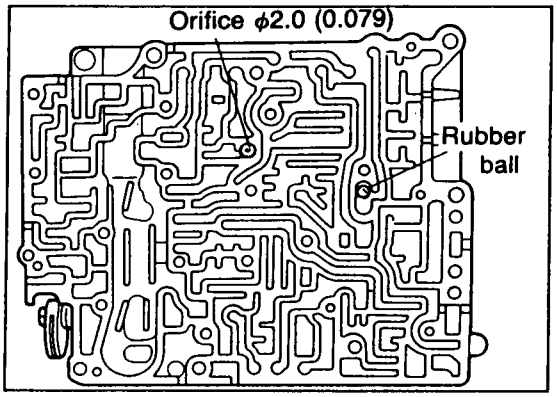
(.039 in. Orifice Is For Over-run Clutch Feed.)
(.059 in. Orifice Is The Reverse Clutch Feed.)
(.078 in. Orifice Is The L/R Clutch Exhaust.)



Install the gaskets on both sides of the rear separator; then install it onto the rear control body.

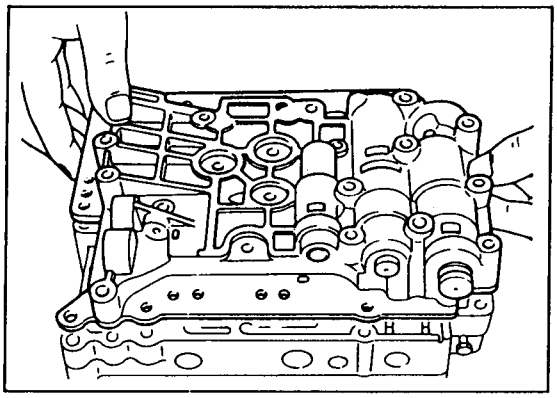


Note
The main/rear rear gasket and main/rear front gasket are not interchangeable.

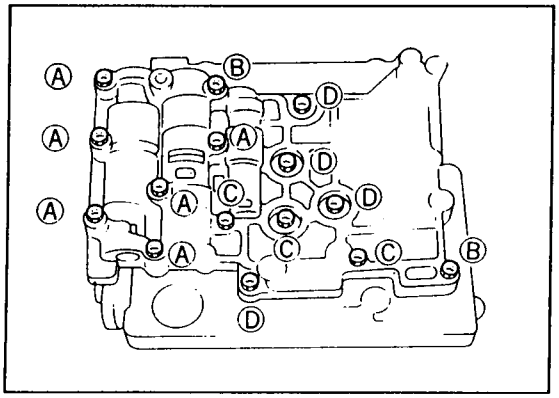


Install the orifice check valve (ϕ2.0 mm, 0.079 in) and spring, and the rubber ball in the main control body as shown.

(Low/Rev. Brake Used In Manual Low.)

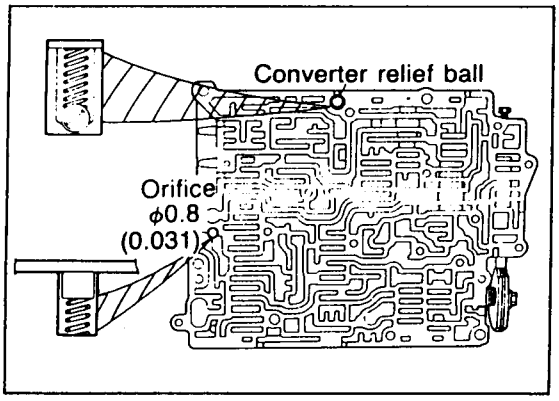


Install the rear control body to the main control body.



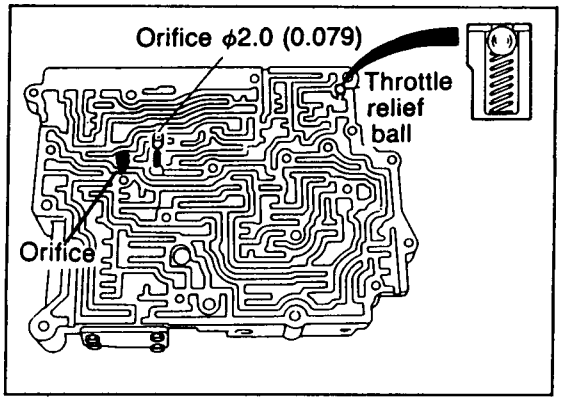
Loosely tighten the bolts.

Note
Match the bolt head letter as shown.



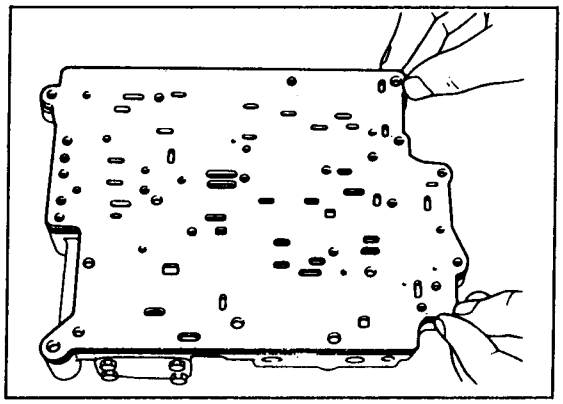
Turn the assembly over and install the orifice check valve (ϕ0.8 mm, 0.031 in) and spring, and the converter relief ball and spring in the main control body as shown.

(2-4 Servo Orifice For 1-2 Shift.)

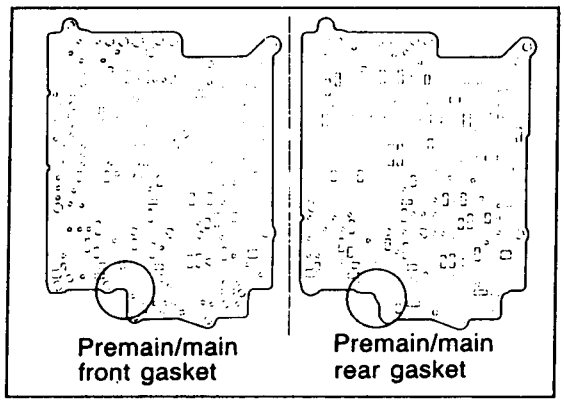


Install the orifice check valve (ϕ2.0 mm, 0.079 in) and spring, and the throttle relief ball and spring in the premain control body as shown.

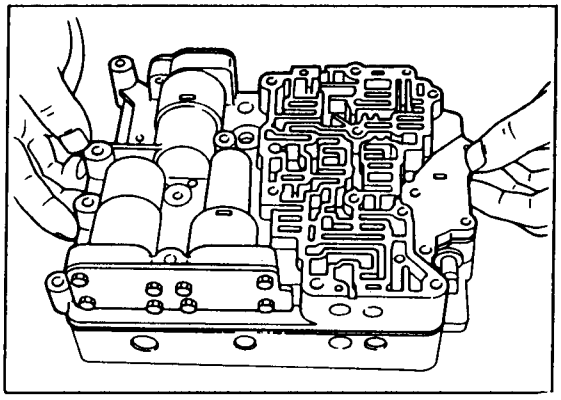
(.079 in. Orifice Is Forward Clutch Feed.)
(Orifice is 2-4 Servo For The 3-4 Shift.)



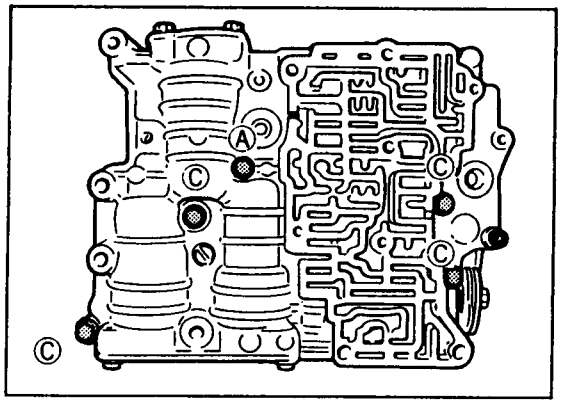
Install the gaskets on both sides of the main separator; then install it onto the premain control body.



Note
The premain/main rear gasket and premain/main front gasket are not interchangeable.

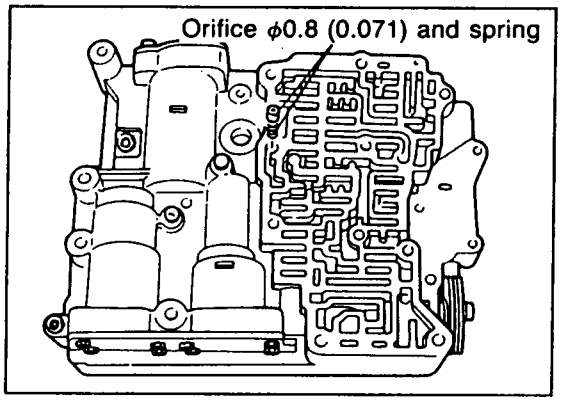


Set the premain control body onto the main control body.



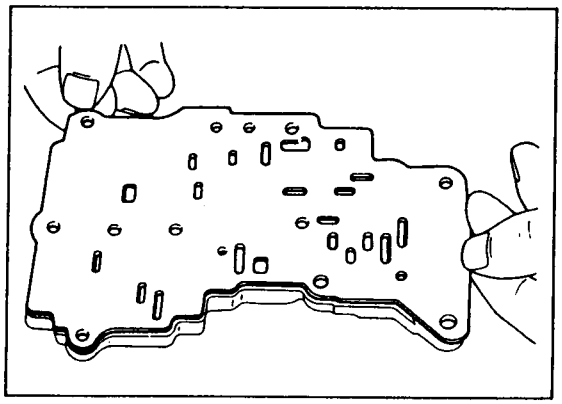
Loosely tighten the bolts.

Note
Match the bolt head letter as shown.



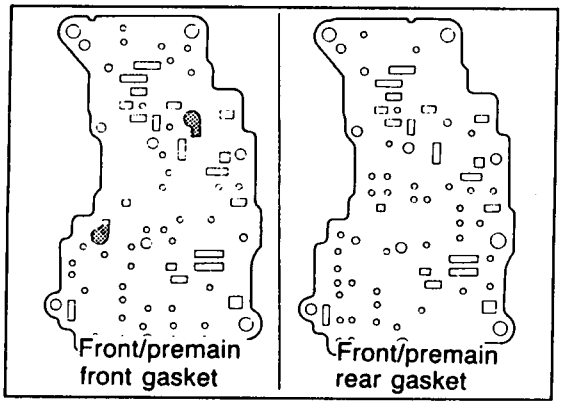
Install the orifice check valve (ϕ0.8 mm, 0.071 in) and spring in the premain control body as shown.

(3-4 Clutch Feed Orifice.)

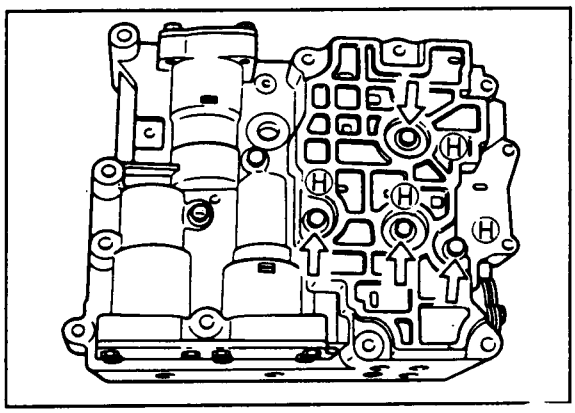


Install the gaskets on both sides of the premain separator; then install it onto the front control body.

There are two(2) balls located under this plate.

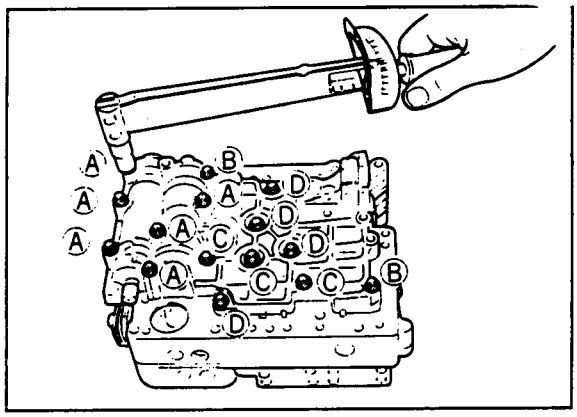


Note
The front/premain front gasket and front/premain rear gasket are not interchangeable.



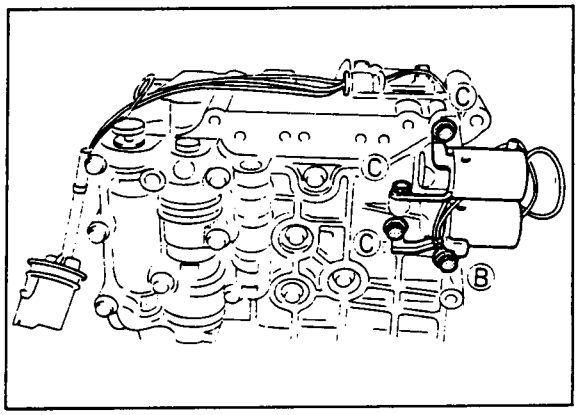
Loosely tighten the bolts.

Note
Match the bolt head letter as shown.



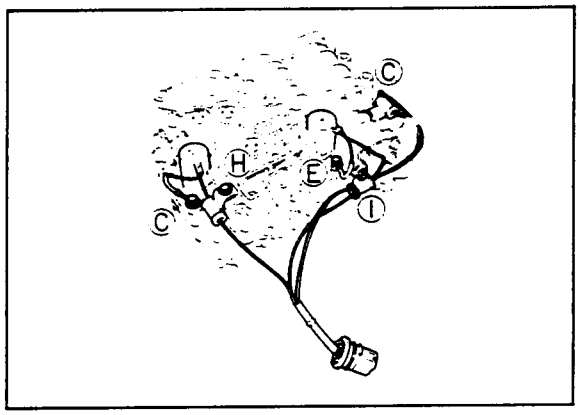
(2) Tighten the rear control body.

Tightening torque:
6—8 N·m (66—80 cm-kg, 57—69 in-lb)



Install the 3-4 solenoid valve and lock-up solenoid valve along with new O-rings and oil strainers.

Tightening torque:
6—8 N·m (66—80 cm-kg, 57—69 in-lb)



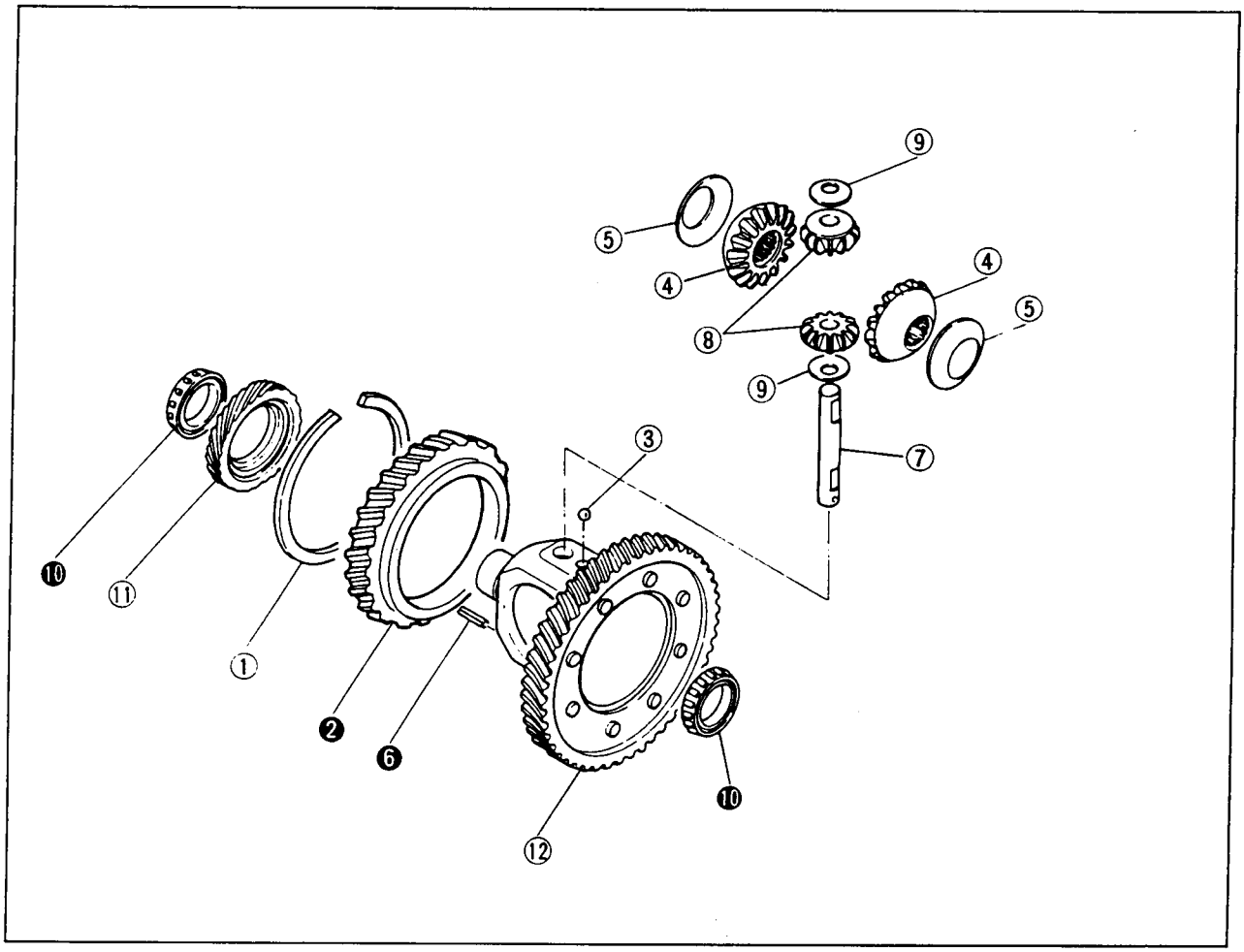
Install the 1-2 solenoid valve and 2-3 solenoid valve along with new O-rings and oil strainers.

Tightening torque:
6—8 N·m (66—80 cm-kg, 57—69 in-lb)

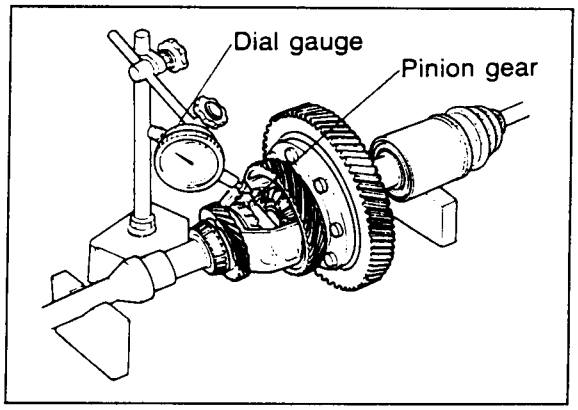
DIFFERENTIAL

Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Snap ring (G4A-HL)
2. Governor drive gear (G4A-HL)
3. Steel ball (G4A-HL)
4. Side gear
5. Side gear thrust washer
6. Roll pin
7. Pinion shaft
8. Pinion gear
9. Pinion gear thrust washer
10. Side bearing inner race
11. Speedometer drive gear
12. Ring gear and gear case assembly

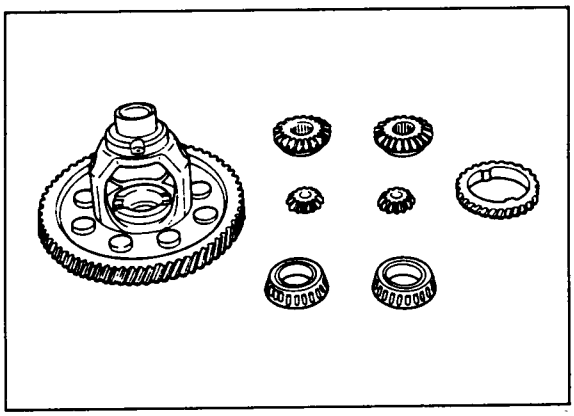


Disassembly note

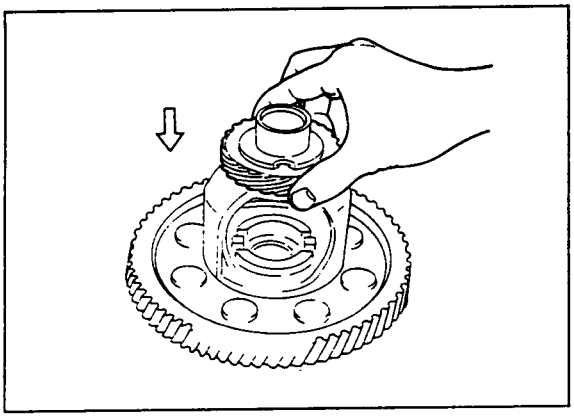
Checking backlash

Before disassembly, measure the backlash of the side gears and pinion gears. If it is not within specification, replace the differential assembly.

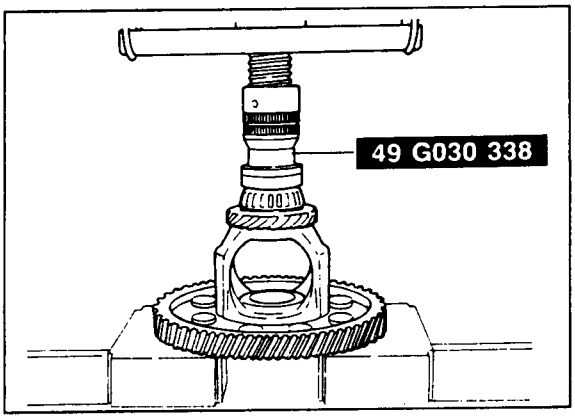
Backlash:
Standard 0.025—0.1 mm (0.001—0.004 in)
Maximum 0.5 mm (0.020 in)



Inspection
Check the following and replace any faulty parts.
1. Damaged or worn gears
2. Cracked or damaged gear case
3. Damaged bearings

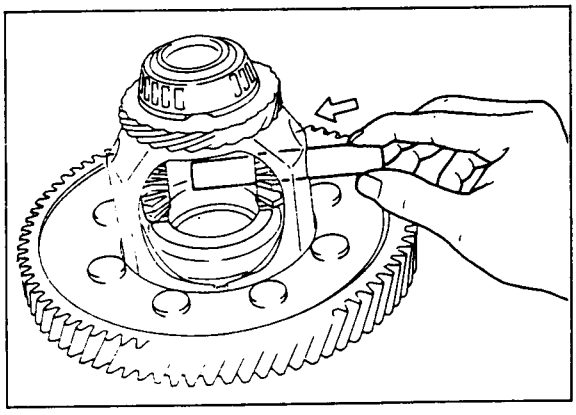


Assembly
1. Set the speedometer drive gear onto the ring gear and case assembly.



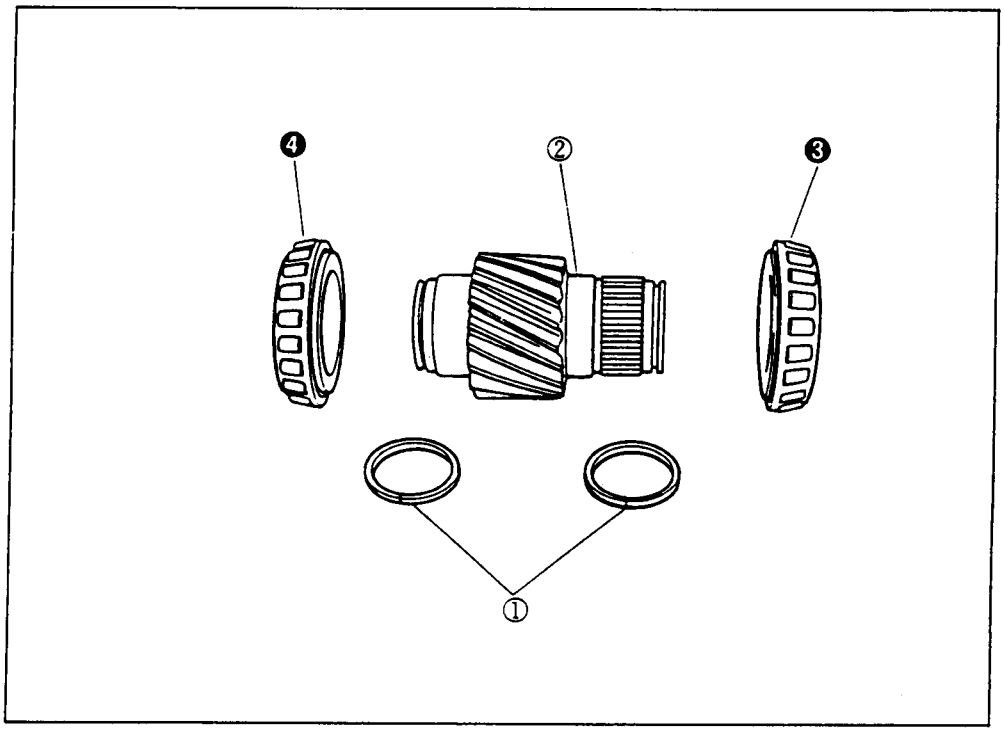
2. Install the side bearing inner races.
   (1) Press the side bearing inner race (side opposite the ring gear) onto the ring gear and case assembly with the **SST**.
   (2) Press on the other side bearing inner race (ring gear side) in the same manner.

Caution
Do not reuse the bearings if they were removed.



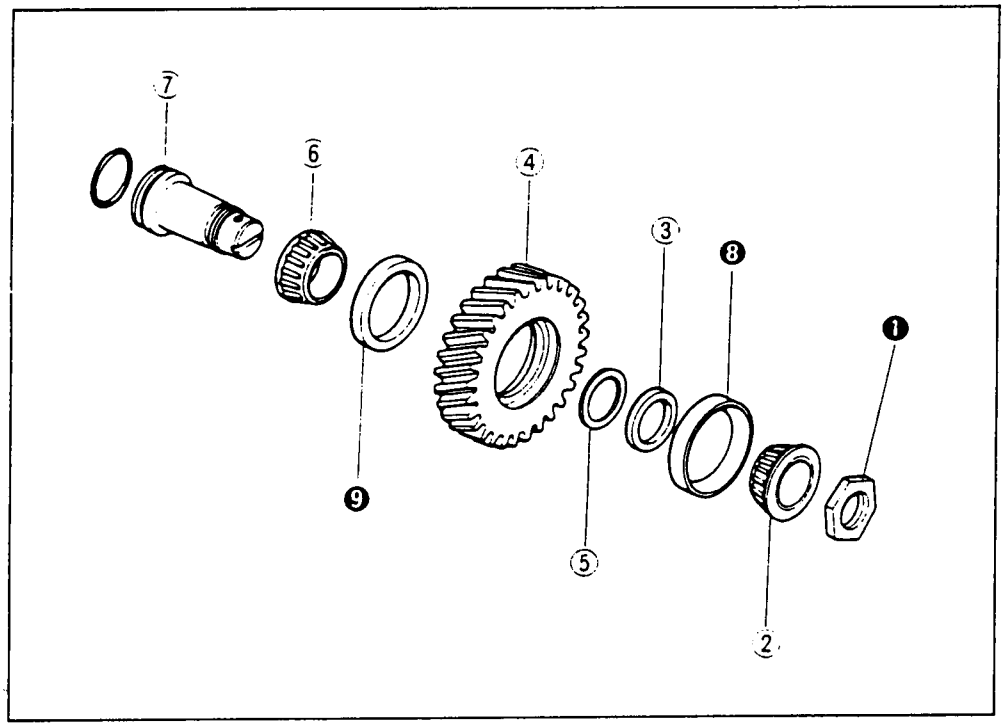
3. Install the pinion gears and thrust washers into the case.
4. Install the pinion shaft.

OUTPUT GEAR
Disassembly
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Seal ring
2. Output gear
3. Output gear bearing
4. Output gear bearing

IDLE GEAR
Disassembly
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.

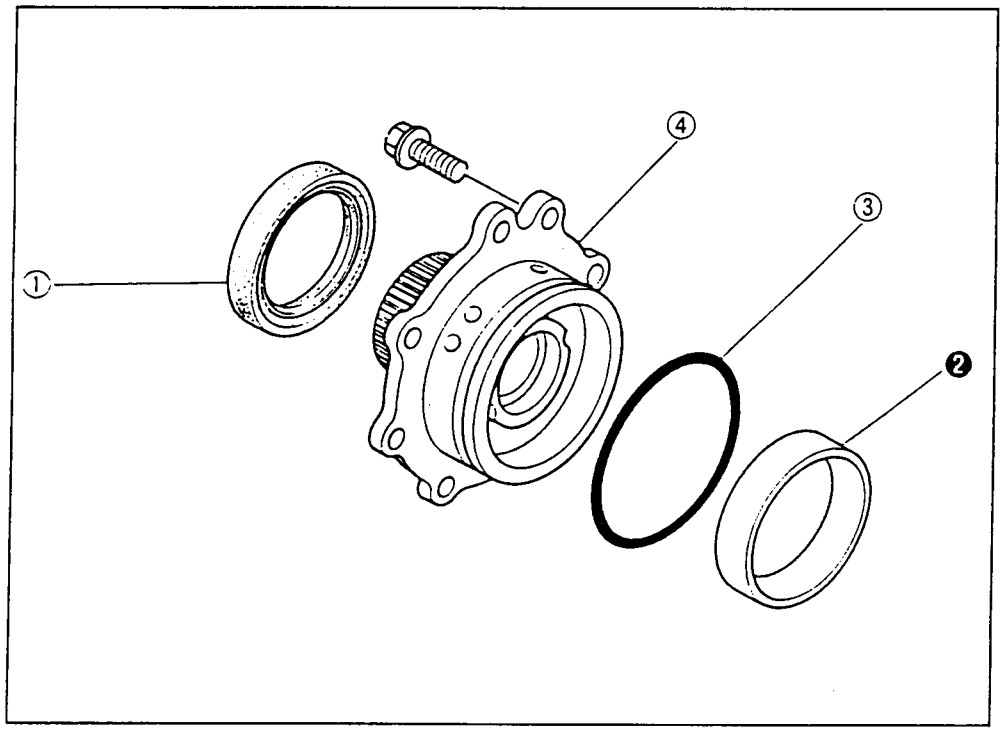


1. Locknut
2. Idle gear bearing
3. Spacer
4. Idle gear
5. Adjust shim
6. Idle gear bearing
7. Idle shaft
8. Bearing outer race
9. Bearing outer race

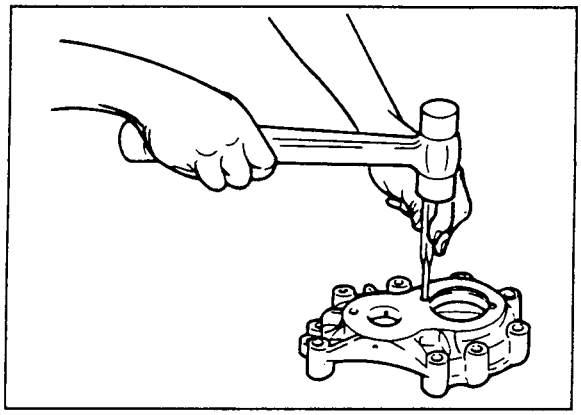
BEARING COVER ASSEMBLY

Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Oil seal
2. Bearing outer race
3. O-ring
4. Bearing cover



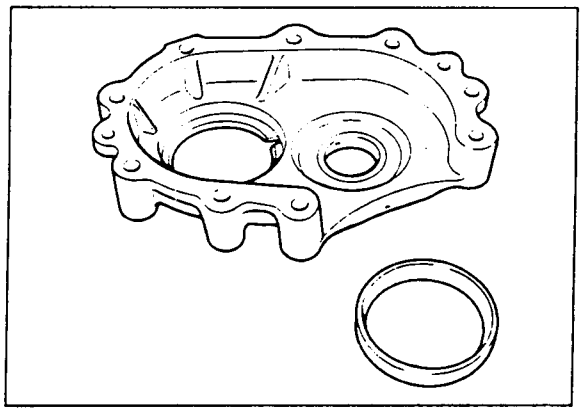
BEARING HOUSING

Disassembly

Remove the bearing outer race with a pin punch and hammer.

Note

Install the bearing outer race during reassembly of transaxle to adjust the preload.



Inspection

Check the following and replace any faulty parts.

1. Damaged bearing housing
2. Damaged bearing outer race

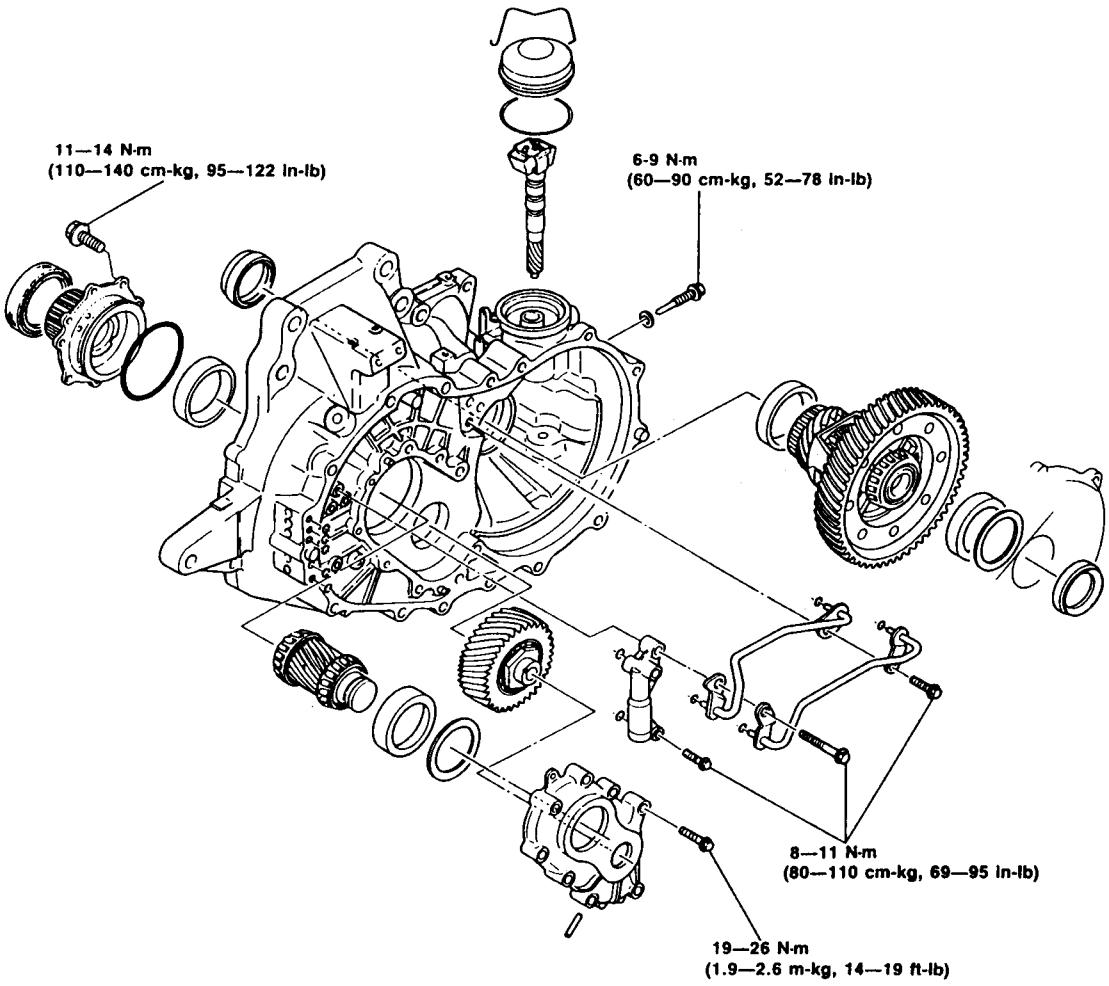
ASSEMBLY

PRECAUTION

(1) The automatic transaxle consists of high-precision-finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage or affect performance.
(2) Clean out oil holes and oil passages with compressed air, and check that there are no obstructions.
(3) Before assembly, apply ATF to each O-ring, seal ring, rotating part, and friction part.
(4) If the brake band or drive plates are replaced with new ones, first soak them in ATF for at least 2 hours before installing.
(5) Each seal gasket and O-ring must be replaced with a new one.
(6) Be sure to install all thrust bearings and races in the correct direction and position.

ASSEMBLY—STEP 1
Torque Specifications

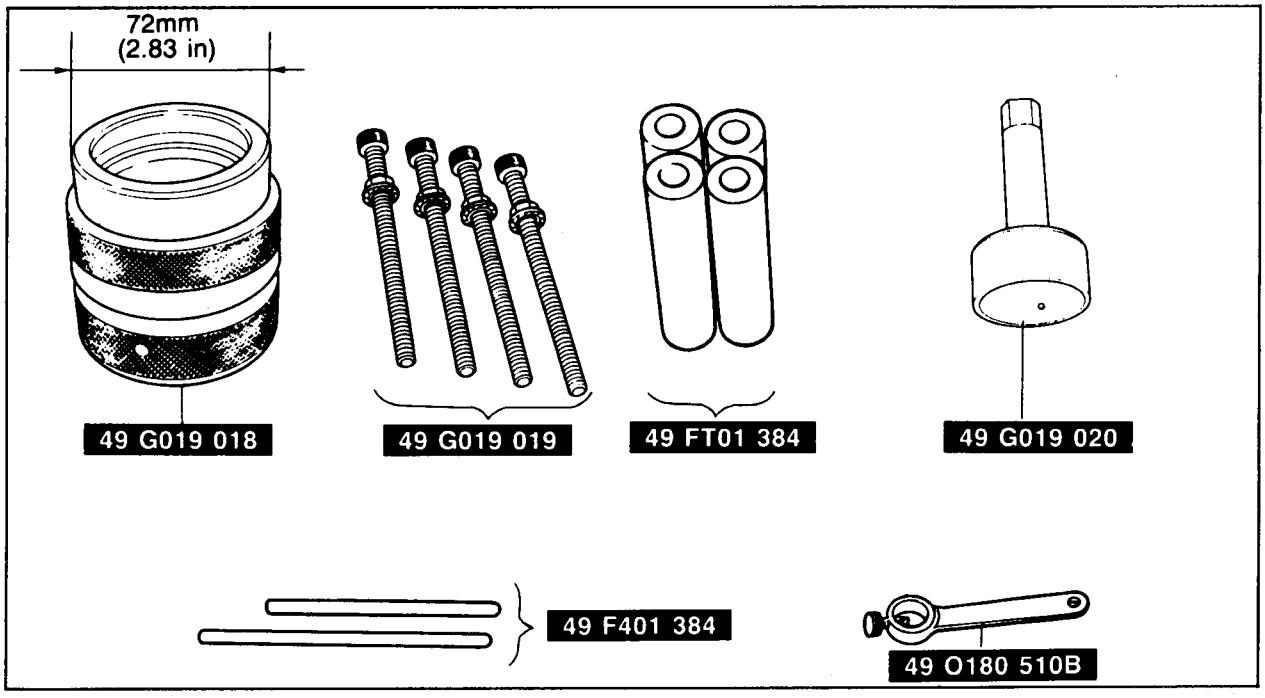
G4A-HL only uses governor and pipes.

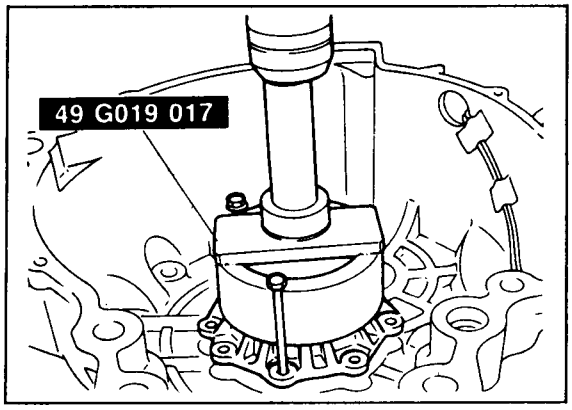


Procedure

1. Adjust the preload of the output gear bearing and select the adjust shim(s) as described below.

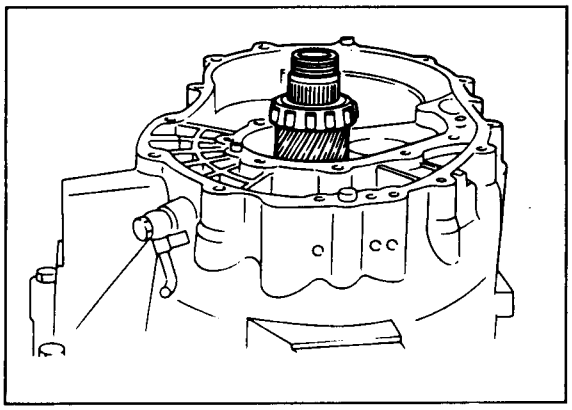
Note
To adjust the preload, use the SST shown below.





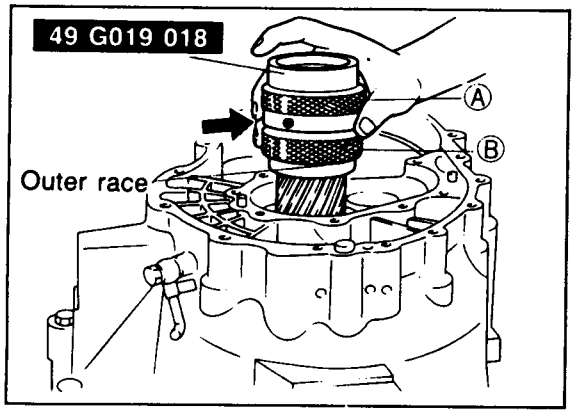
Press the bearing cover in after aligning it with guide bolts as shown.

Tightening torque: 11—14 N·m (110—140 cm-kg, 95—122 in-lb)



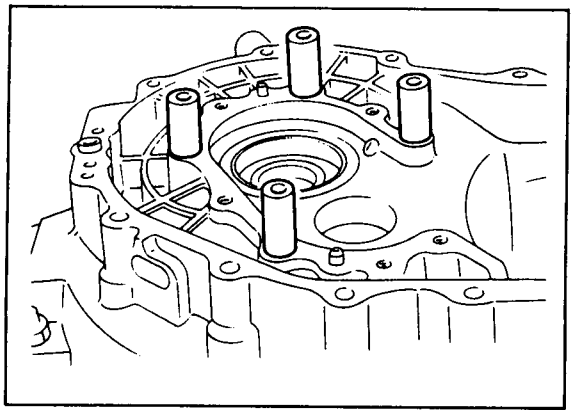
Install the converter housing onto the **SST**. Remove the bearing outer race and adjust shims from the bearing housing.

Mount the output gear assembly onto the converter housing.

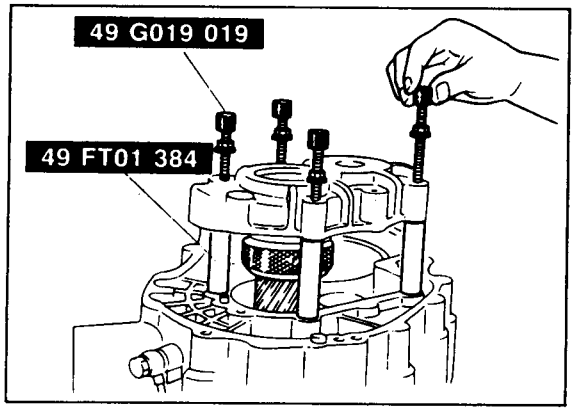


Install the outer race removed in step (2) to the **SST**; then mount them on the output gear assembly.

Caution
Eliminate the gap (arrow) by turning A or B of the selector.

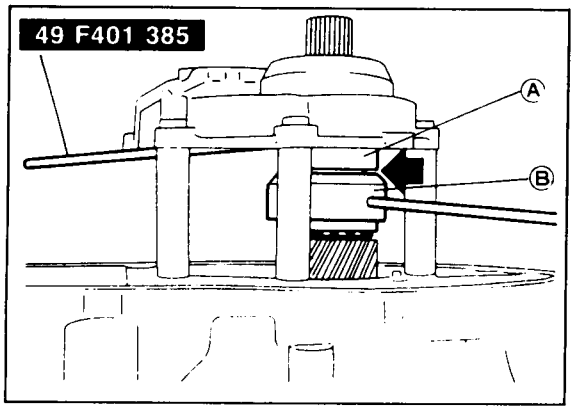


Set the four **SST** on the converter housing in the positions shown.



Set the bearing housing on the **SST** (selector) and install the four **SST** (bolts); then tighten them to the specified torque.

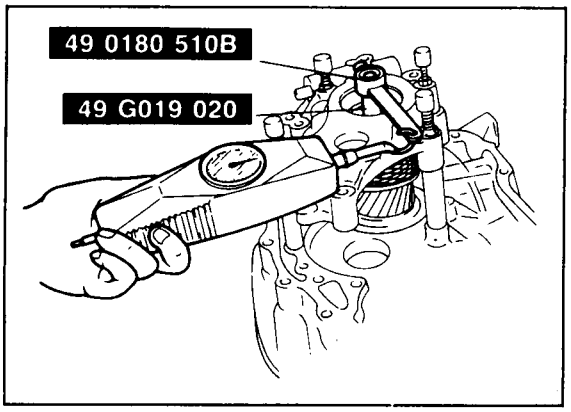
Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



Turn the **SST** (selector) to increase the clearance indicated by the arrow with the **SST** (bars) until it no longer turns.

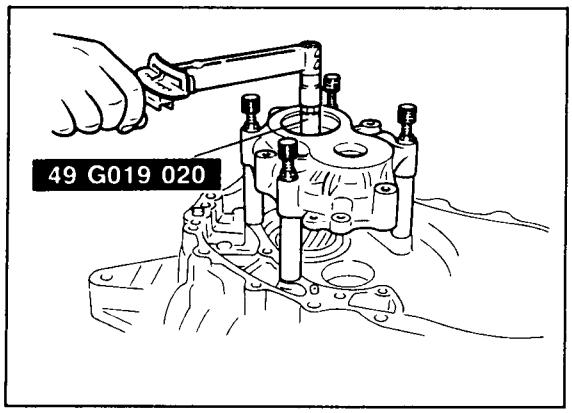
Note
This is to seat the bearing.

Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).

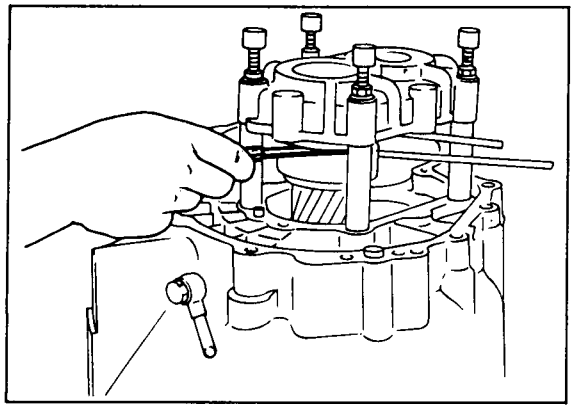


Mount the **SST** and pull scale or torque wrench on the output gear.
Increase the clearance between A and B to obtain the specified preload/pull scale reading.

Preload: 0.5—0.9 N·m
(5.0—9.0 cm-kg, 4.34—7.81 in-lb)
Reading on pull scale: 5—9 N
(0.5—0.9 kg, 1.1—1.98 lb)

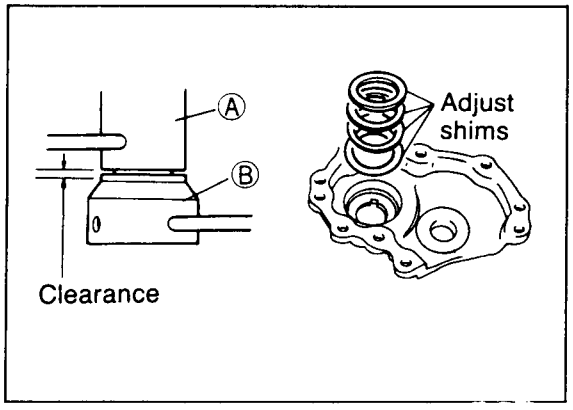


Note
Read the preload when the output gear starts to turn.

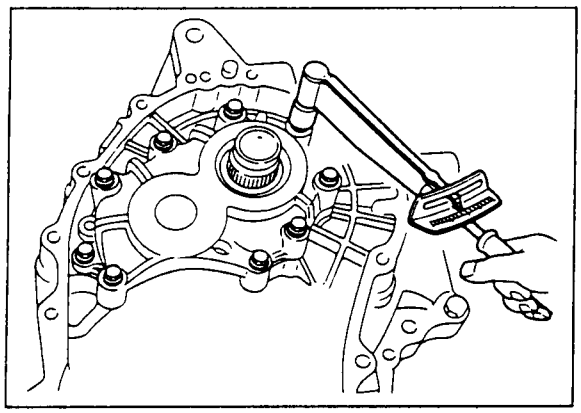


Measure the clearance. Select adjust shim(s) equivalent to the measured clearance.

Thickness of shim	
0.10 mm (0.004 in)	0.18 mm (0.007 in)
0.12 mm (0.005 in)	0.20 mm (0.008 in)
0.14 mm (0.006 in)	0.50 mm (0.020 in)
0.16 mm (0.0063 in)	



Caution
a) Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.
b) The maximum allowable number of shims is 7.



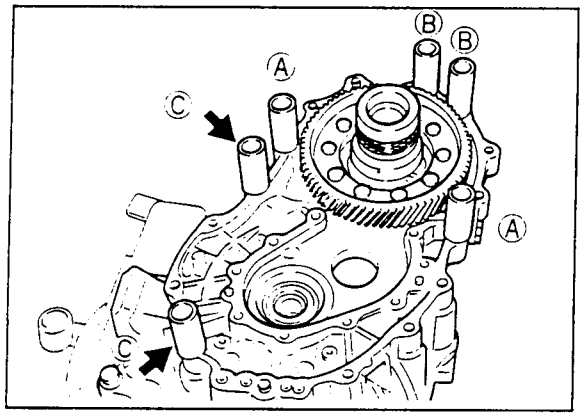
Install the bearing housing.

Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)

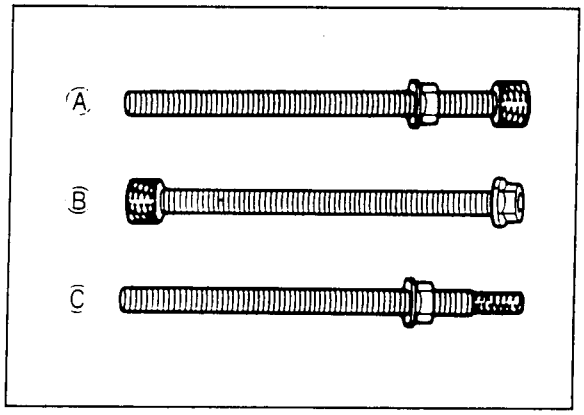
Check that the preload/pull scale reading is within specification. If not within specification return to step (2).

Preload: 0.03—0.9 N·m
(0.3—9.0 cm-kg, 0.26—7.81 in-lb)
Reading on pull scale:
0.3—9 N (0.03—0.9 kg, 0.066—1.98 lb)

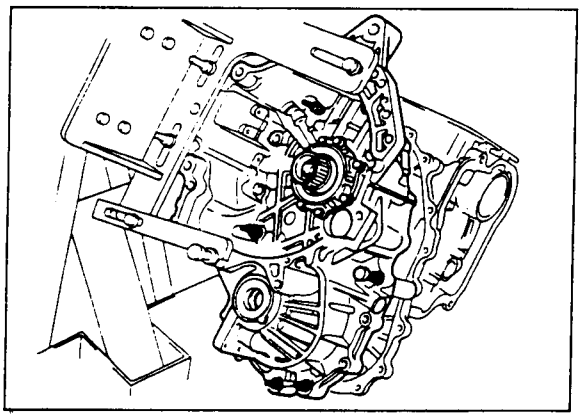
Remove the bearing housing.



Set the six **SST** in the positions shown.

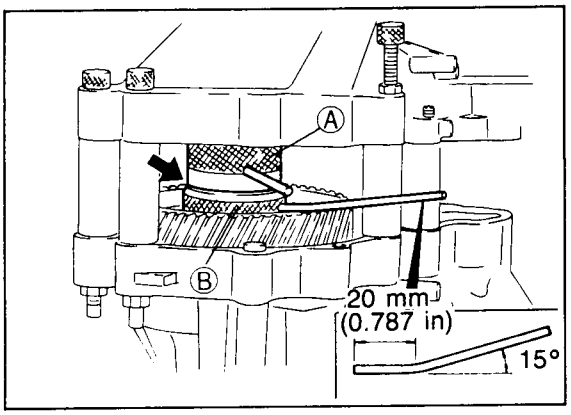


Note
Install the bolts in the positions shown in the illustration above.



Set the transaxle case on the selectors.
Tighten the **SST** (bolts) to the specified torque.

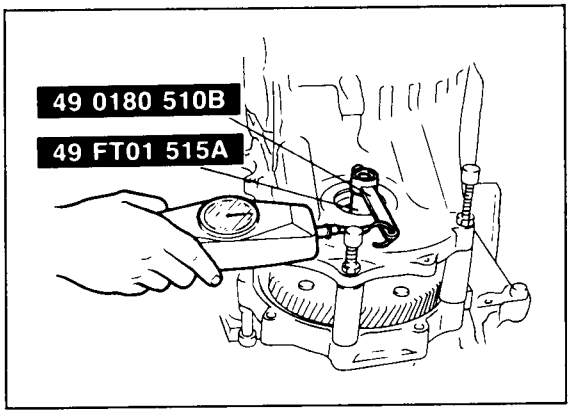
Tightening torque:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)



Turn the **SST** (selector) to increase the clearance indicated by the arrow with the **SST** (bars), until it no longer turns.

Note
a) This is to seat the bearings.
b) To turn the SST (B), bend the bar as shown.

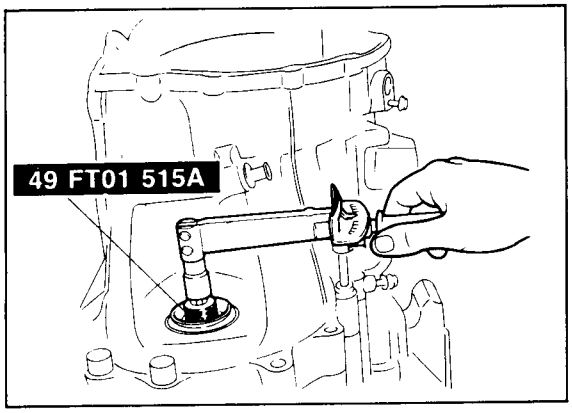
Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).



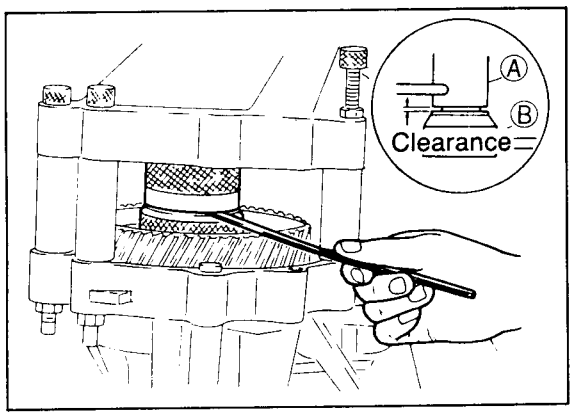
Insert the **SST** through the oil seal hole of the transaxle case and attach it to the pinion shaft. Mount the **SST** and pull scale or torque wrench.
Widen the clearance between A and B to obtain the specified preload/pull scale reading.

Preload:
0.5 N·m (5 cm-kg, 4.3 in-lb)
Reading on pull scale:
5 N (0.5 kg, 1.1 lb)

Note
Read the preload when the differential starts to turn.

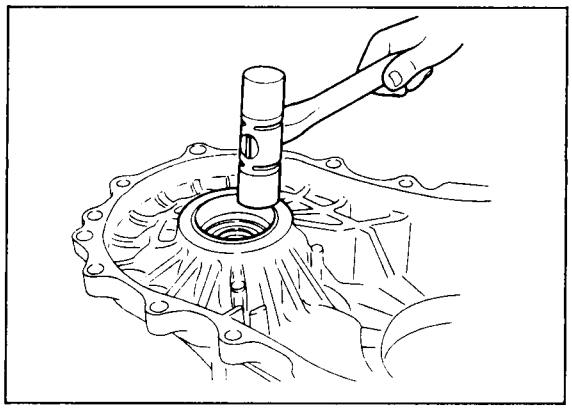


Measure the clearance between A and B. Add **0.3 mm (0.0118 in)** to the measured clearance, and select the shim(s) closest in valve to that measurement.

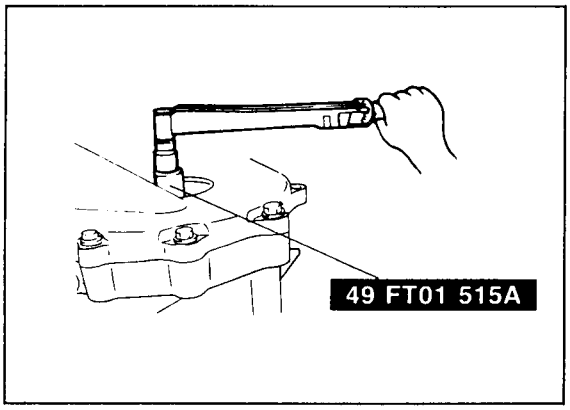


Thickness of shim	
0.10 mm (0.004 in)	0.20 mm (0.008 in)
0.12 mm (0.005 in)	0.50 mm (0.020 in)
0.14 mm (0.006 in)	0.70 mm (0.028 in)
0.16 mm (0.0063 in)	1.00 mm (0.039 in)
0.18 mm (0.007 in)	

Caution
a) Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.
b) The maximum allowable number of shims is 3.



Remove the transaxle case and selector. Install the required shim(s) and tap the bearing race into the transaxle case.



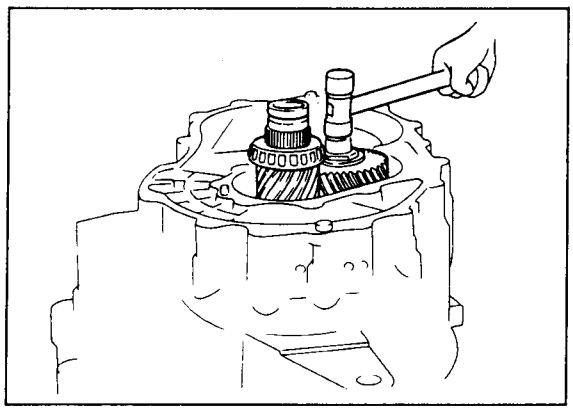
Install the transaxle case.

Tightening torque:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)

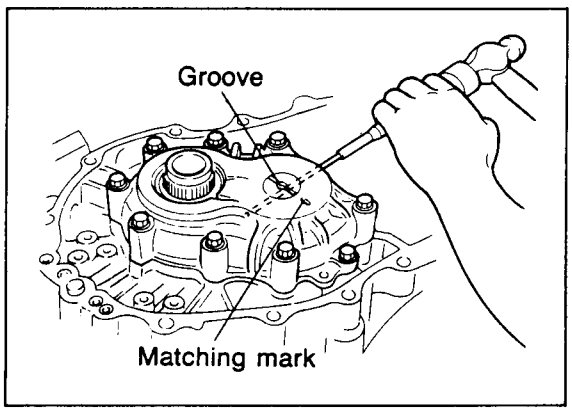
Check that the preload is within specification. If not within specification, return to step (2).

Preload: 2.9—3.9 N·m
(30—40 cm-kg, 26—35 in-lb)
Reading on pull scale: 29—39 N
(3.0—4.0 kg, 6.6—8.8 lb)

Remove the transaxle case and differential assembly.



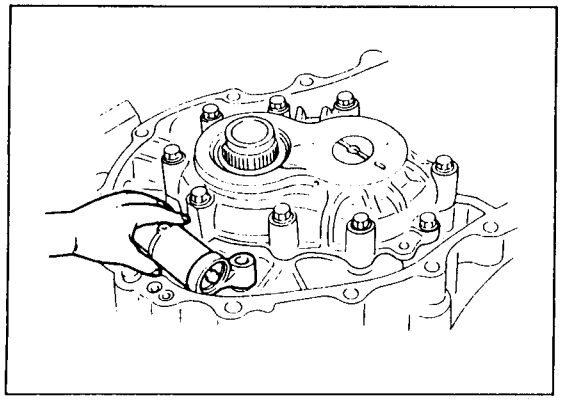
Install the idle gear and output gear as an assembly by tapping in with a plastic hammer.



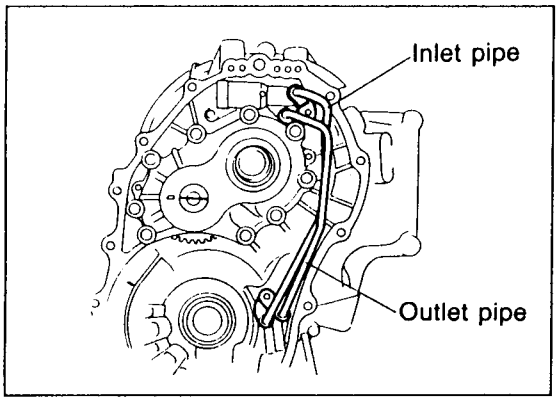
Install the bearing housing.
(1) Install the bearing housing on the converter housing.

Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)

(2) Align the groove on the idle shaft with the matching mark on the bearing housing.
(3) Tap the roll pin in with a pin punch and hammer.

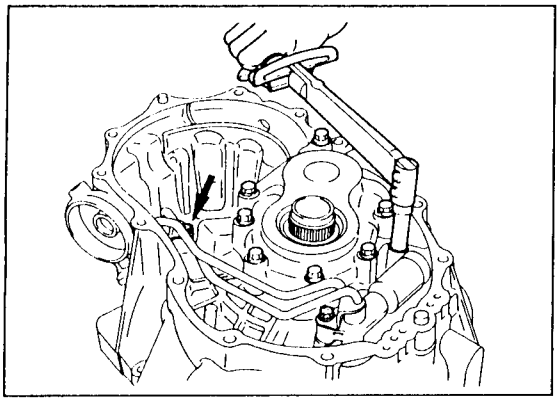


Apply ATF to the O-rings and install them into the 2-3 accumulator; then temporarily install the 2-3 accumulator piston assembly in the converter housing.



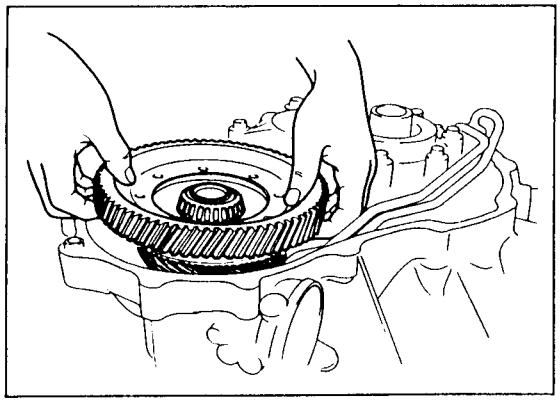
Apply ATF to the O-rings and install them onto the governor inlet pipe and governor outlet pipe; then temporarily install the inlet and outlet pipes.

G4A-HL only



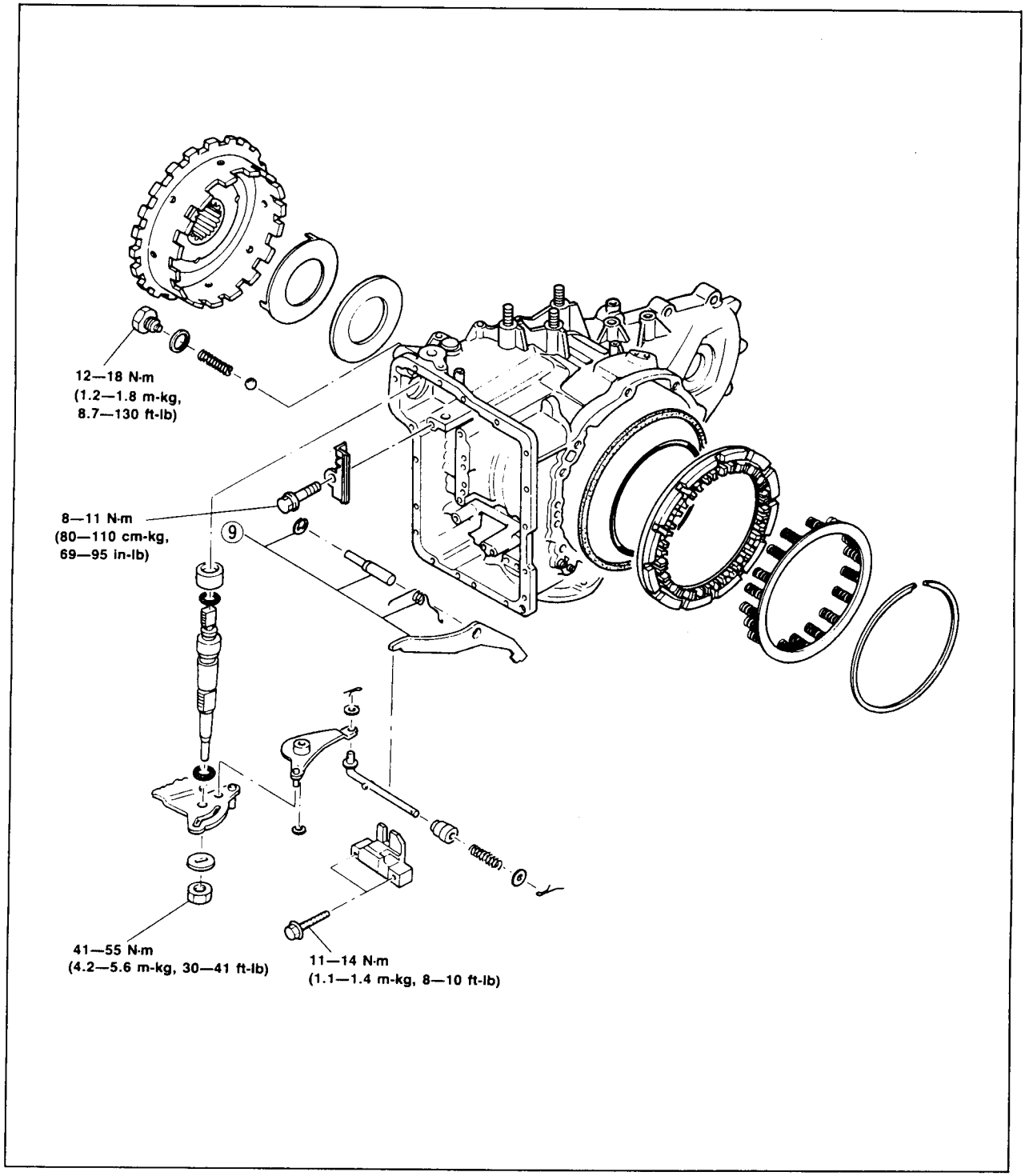
Tighten the bolts.

Tightening torque: 8—11 N·m (80—110 cm-kg, 69—95 in-lb)

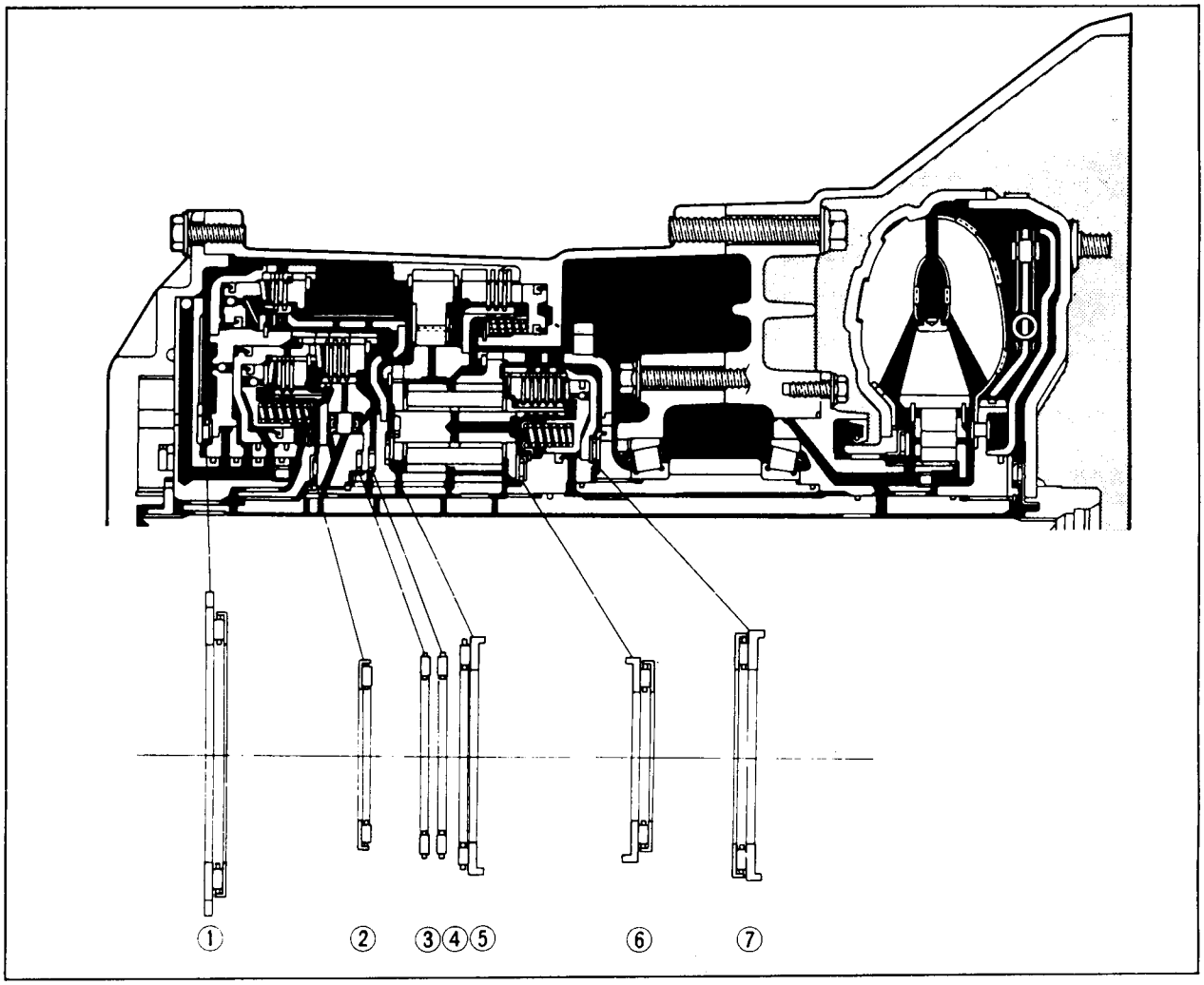


Set the differential assembly into the converter housing.

ASSEMBLY
Torque Specifications



Thrust Washer, Bearing, and Race Locations

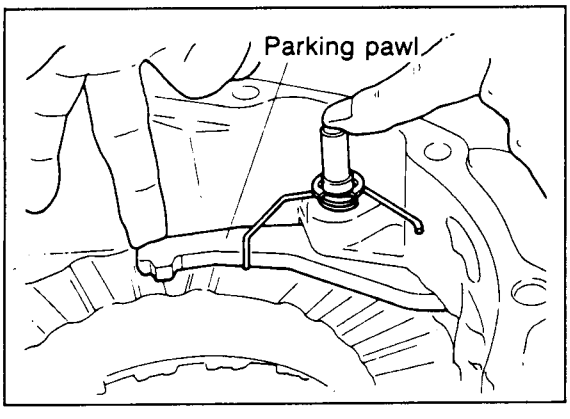


Outer diameter of bearing and race

mm (in)

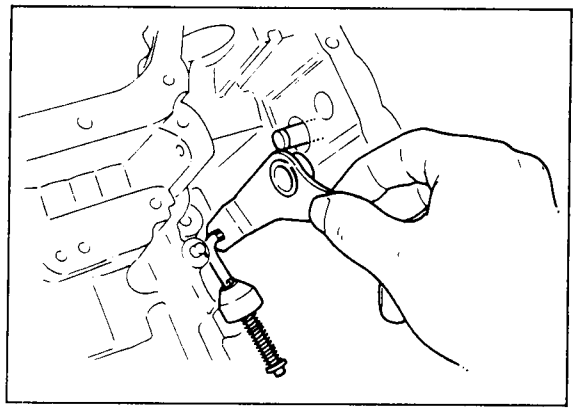
	1	2	3	4	5	6	7
Bearing	86.0 (3.39)	56.1 (2.21)	62.1 (2.44)	62.1 (2.44)	72.0 (2.83)	56.1 (2.21)	72.1 (2.84)
Race	88.0 (3.46)	—	—	—	72.0 (2.83)	57.0 (2.21)	72.0 (2.83)

Note: Install with petroleum jelly to prevent the thrust bearing or bearing race from falling out.

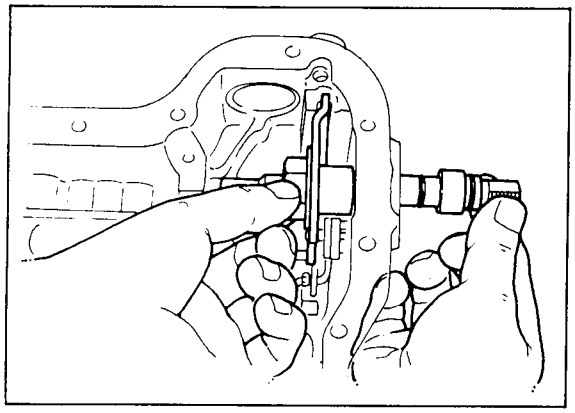


Procedure

1. Install the parking pawl.
   (1) Install the parking pawl and shaft.
   (2) Install the spring and snap ring.
   (3) Move the manual shaft and check that the parking pawl operates.

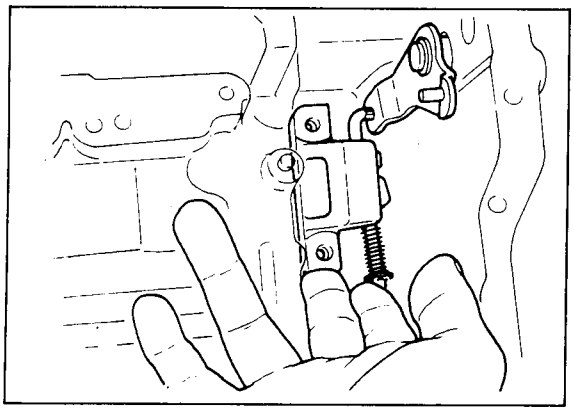


Install the parking assist lever and snap ring.



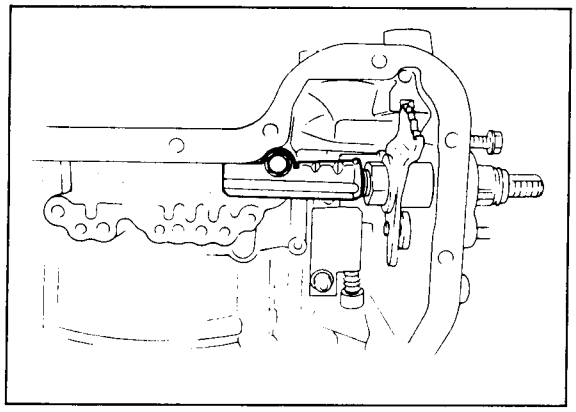
Install the actuator support.

Tightening torque:
11—14 N·m (1.1—1.4 m-kg, 8.0—10 ft-lb)



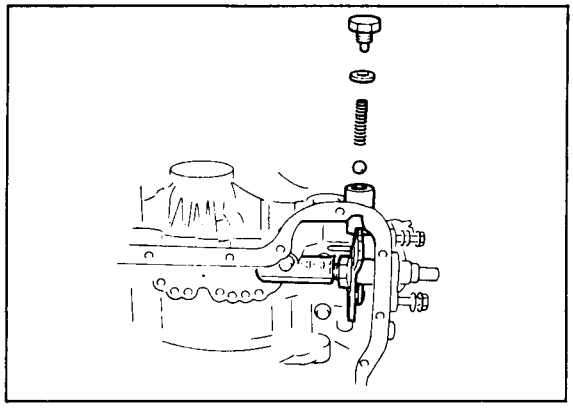
Install the manual shaft and manual plate.
(1) Install the manual plate, spacer, washer, and nut.
(2) Tighten the nut to specified torque.

Tightening torque:
41—55 N·m (4.2—5.6 m-kg, 30—41 ft-lb)



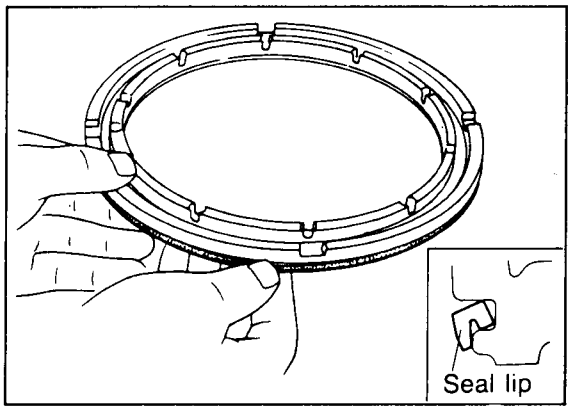
(3) Install the bracket.

Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)

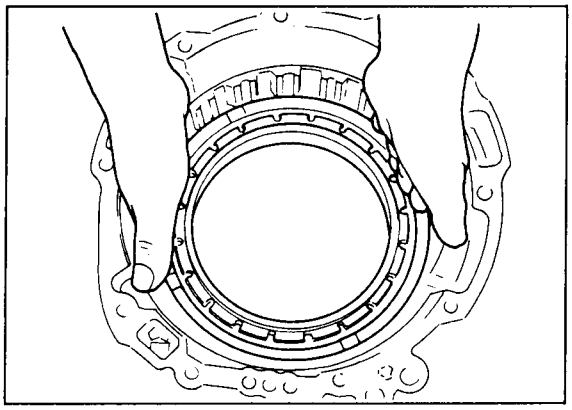


(4) Install the detent ball, spring, washer and plug; then tighten the plug.

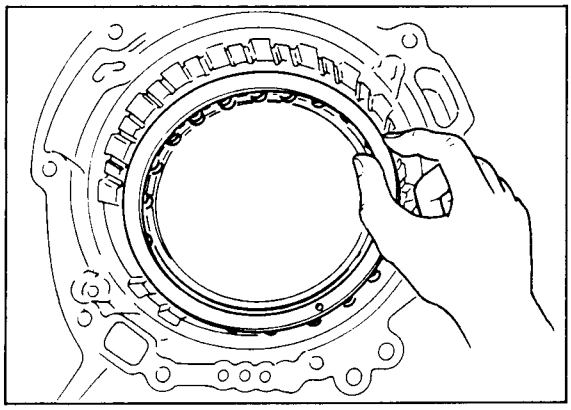
Tightening torque:
12—18 N·m (1.2—1.8 m-kg, 8.7—13 ft-lb)



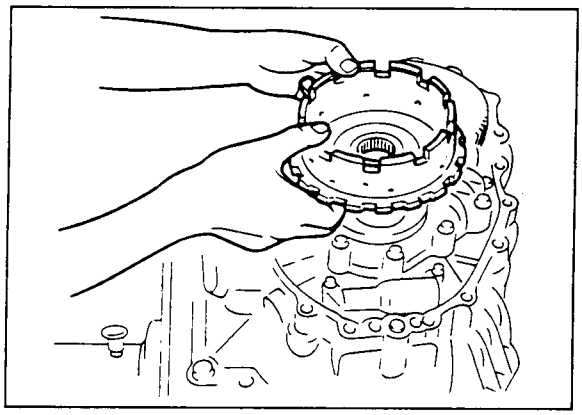
Install the low and reverse brake piston.
(1) Apply ATF to the inner and outer seals, and install them to the low and reverse brake piston.
(2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the case.



(3) Install the low and reverse brake piston by pushing evenly around the circumference, being careful not to damage the outer seal.

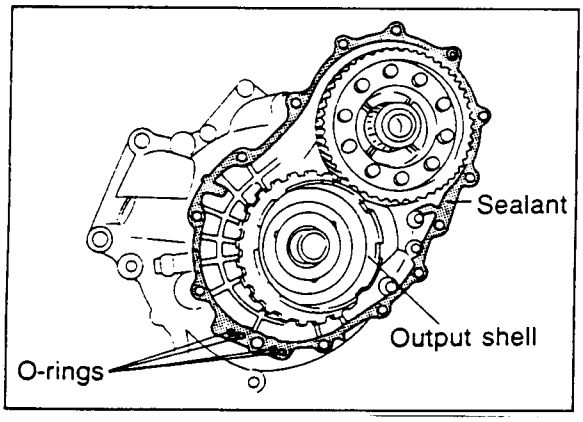


(4) Install the spring and retainer assembly.



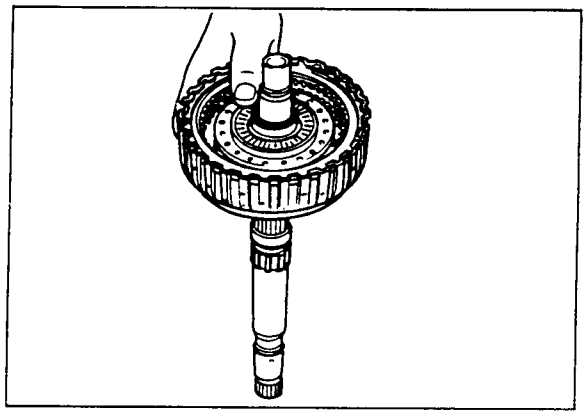
Install the output shell to the output gear, and install the bearing race onto the output shell.

Bearing race outer diameter.
72.0 mm (2.83 in)

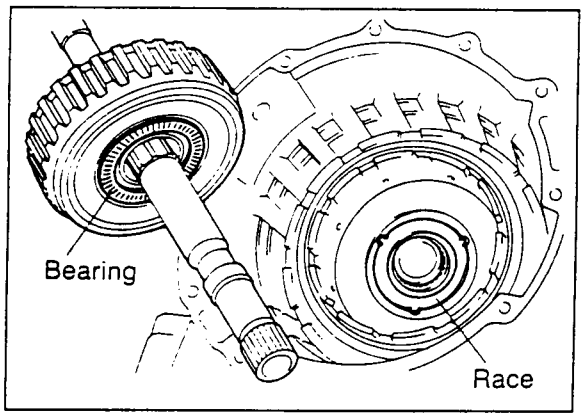


Apply a thin coat of silicon sealant to the contact surfaces of the converter housing and transaxle case.
Install the O-rings.
Install the transaxle case to the converter housing.

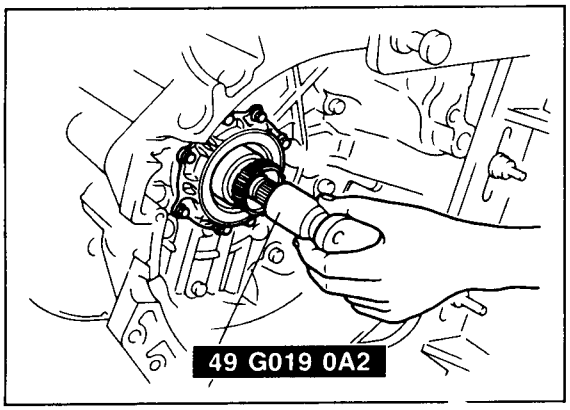
Tightening torque:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)



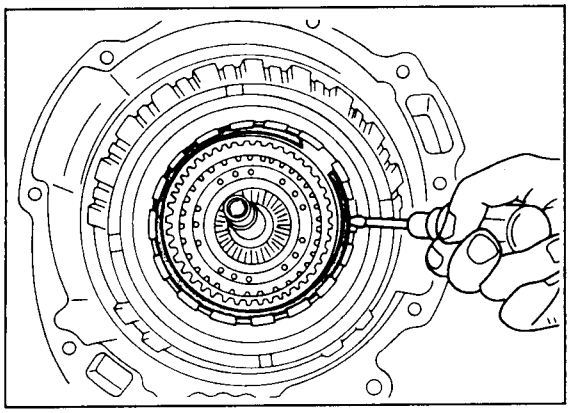
Install the turbine shaft and 3-4 clutch assembly.
(1) Assemble the turbine shaft and 3-4 clutch assembly.



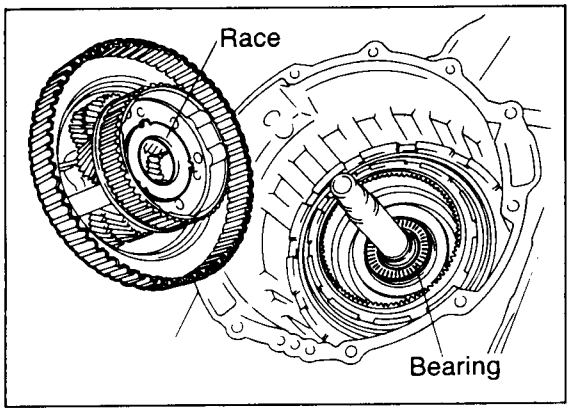
(2) Check that the thrust bearing and bearing race are installed in the correct position.
(3) Install the turbine shaft and 3-4 clutch assembly into the transaxle case.



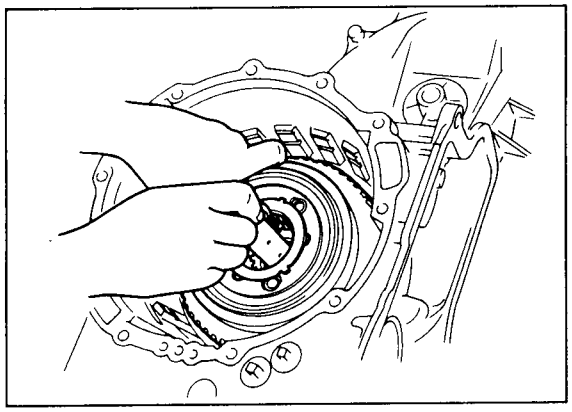
Adjust the **SST** position so that it contacts and holds the turbine shaft.



Install the internal gear.
(1) Install the internal gear to the 3-4 clutch drum.
(2) Install the snap ring.

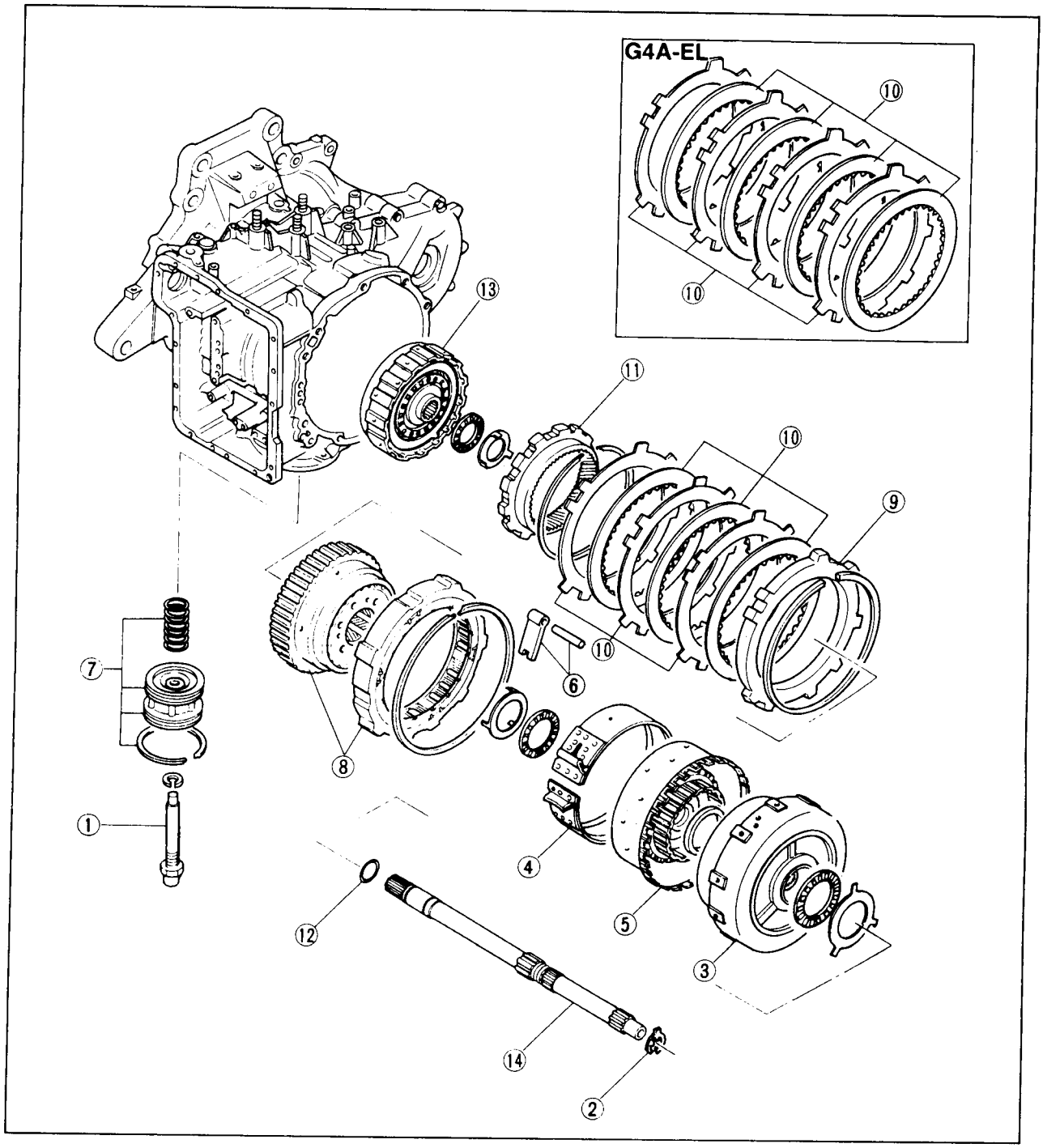


Install the carrier hub assembly.
(1) Check that the thrust bearing and bearing race are installed in the correct position.



(2) Hold the turbine shaft with one hand to prevent it from rotating.
(3) Install the carrier hub assembly into the 3-4 clutch drum by rotating it.

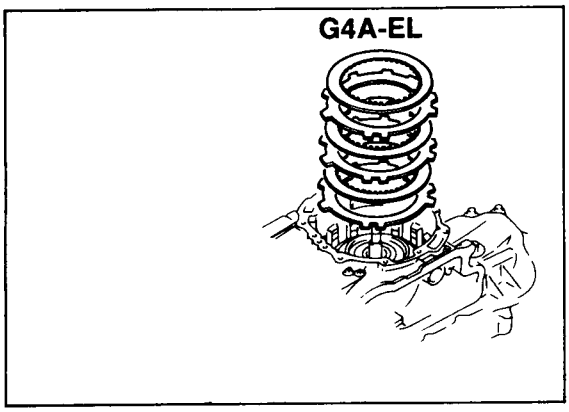
DISASSEMBLY
Components



1. Piston stem
2. Snap ring
3. Clutch assembly
4. 2-4 brake band
5. Small sun gear and one-way clutch
6. Anchor strut and shaft
7. Servo
8. One-way clutch and carrier hub assembly

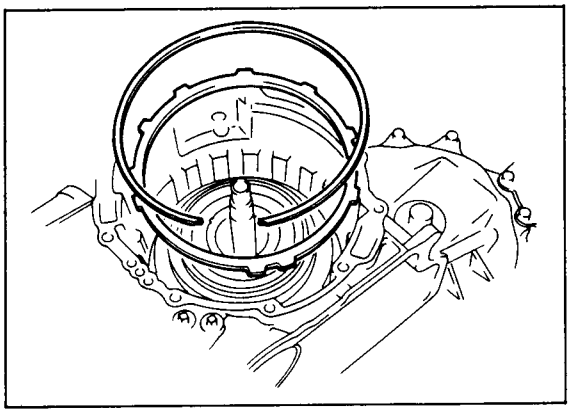
—Low and reverse brake—

9. Retaining plate
10. Drive and driven plates
11. Internal gear
12. O-ring
13. 3-4 clutch assembly
14. Turbine shaft

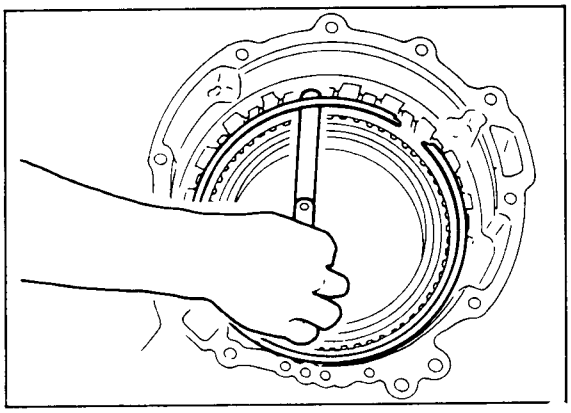


Install the drive and driven plates.

Note
Installation order:
G4A-EL
Driven-Drive-Driven-Drive-Driven-Drive



Install the retaining plate.
Install the snap ring.

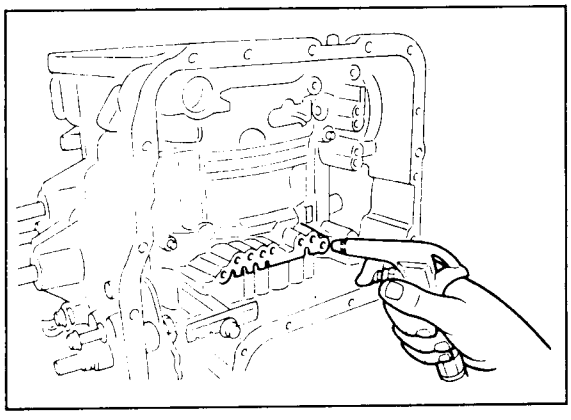


Check the low and reverse brake clearance.
(1) Measure the clearance between the snap ring and the low and reverse brake retaining plate.
(2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

Low and reverse brake clearance:
2.1—2.4 mm (0.083—0.094 in)

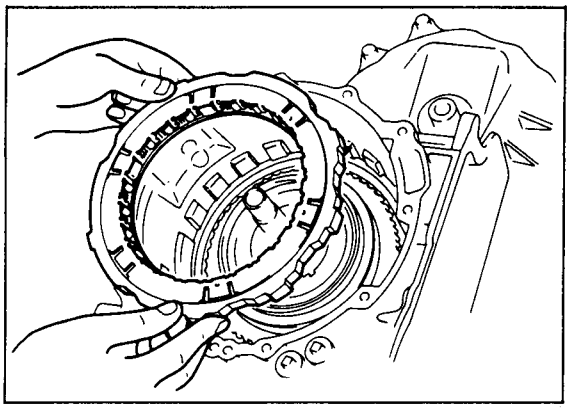
Retaining plate sizes mm (in)
G4A-EL

10.0 (0.394)	10.2 (0.402)	10.4 (0.410)
10.6 (0.417)	10.8 (0.425)	

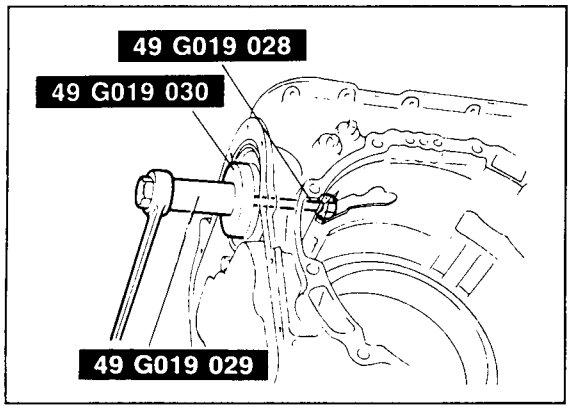


Check the low and reverse brake operation by applying compressed air through the fluid passage as shown in the figure.

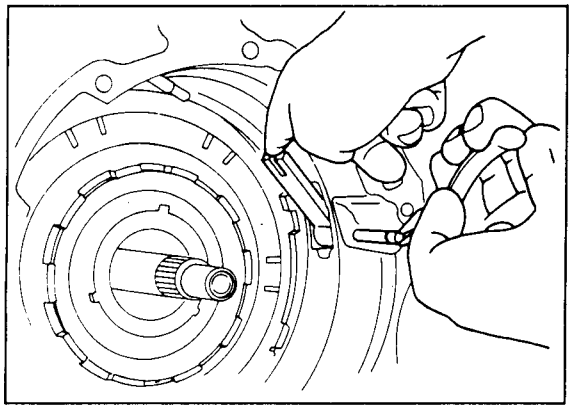
Air pressure:
392 kPa (4.0 kg/cm^2, 57 psi)



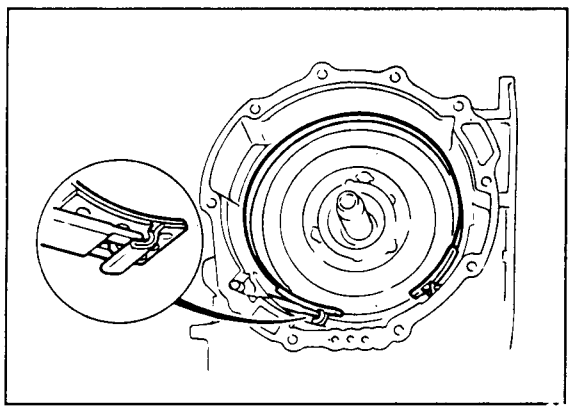
Install the one-way clutch.
(1) Hold the one-way clutch horizontally.
(2) Install it by turning the carrier hub assembly counterclockwise.
(3) Install the snap ring.



Install the servo to the transaxle case.
(1) Install the servo spring and servo.
(2) Compress the servo with the **SST**.
(3) Install the snap ring.
(4) Remove the **SST**.
(5) Install the piston stem.

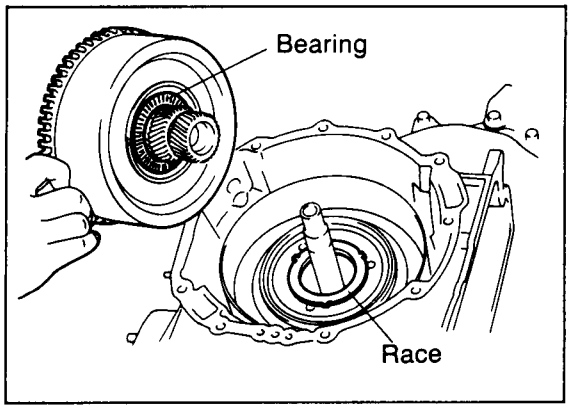


Install the anchor strut.

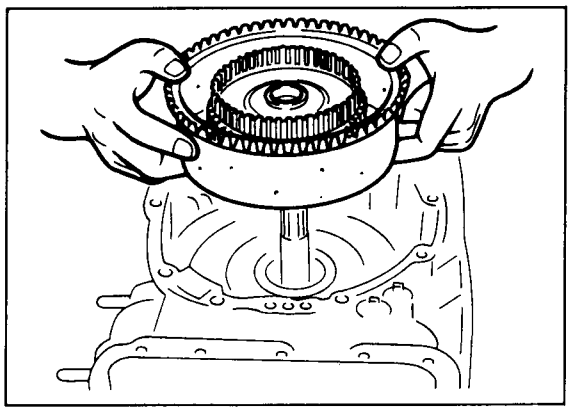


Install the 2-4 brake band in the transaxle case so that it is expanded fully.

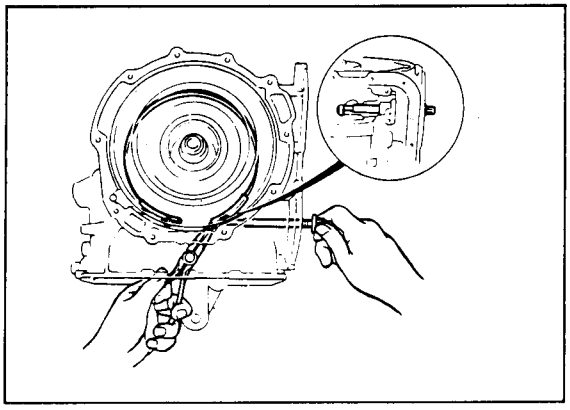
Note
Interlock the 2-4 brake band and anchor strut as shown.



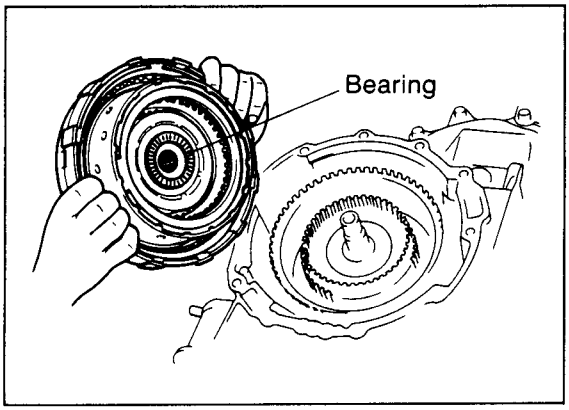
Install the small sun gear and one-way clutch.
(1) Check that the thrust bearing and bearing race are installed in the correct position.



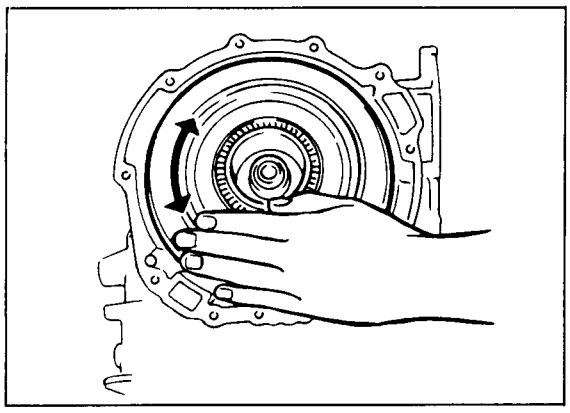
(2) Install the small sun gear and one-way clutch by rotating it.



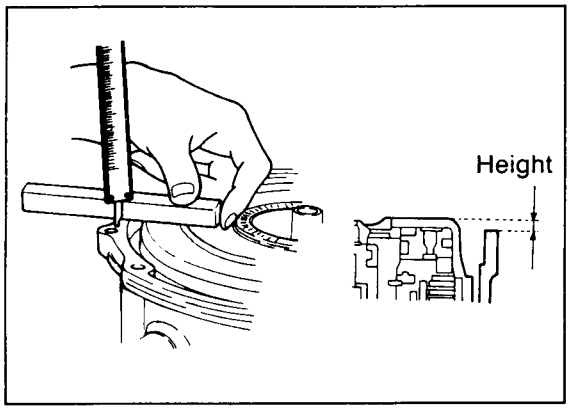
Install the piston stem in the position while pulling out the 2-4 brake band with a pliers; then loosely tighten the piston stem by hand.



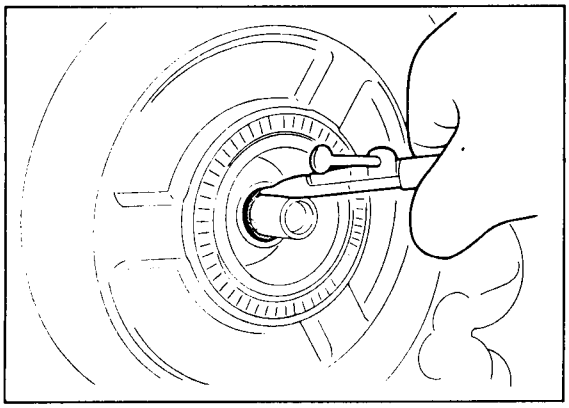
Install the clutch assembly.
(1) Check that the thrust bearing is installed in the correct position.



(2) Install the clutch assembly by rotating it.

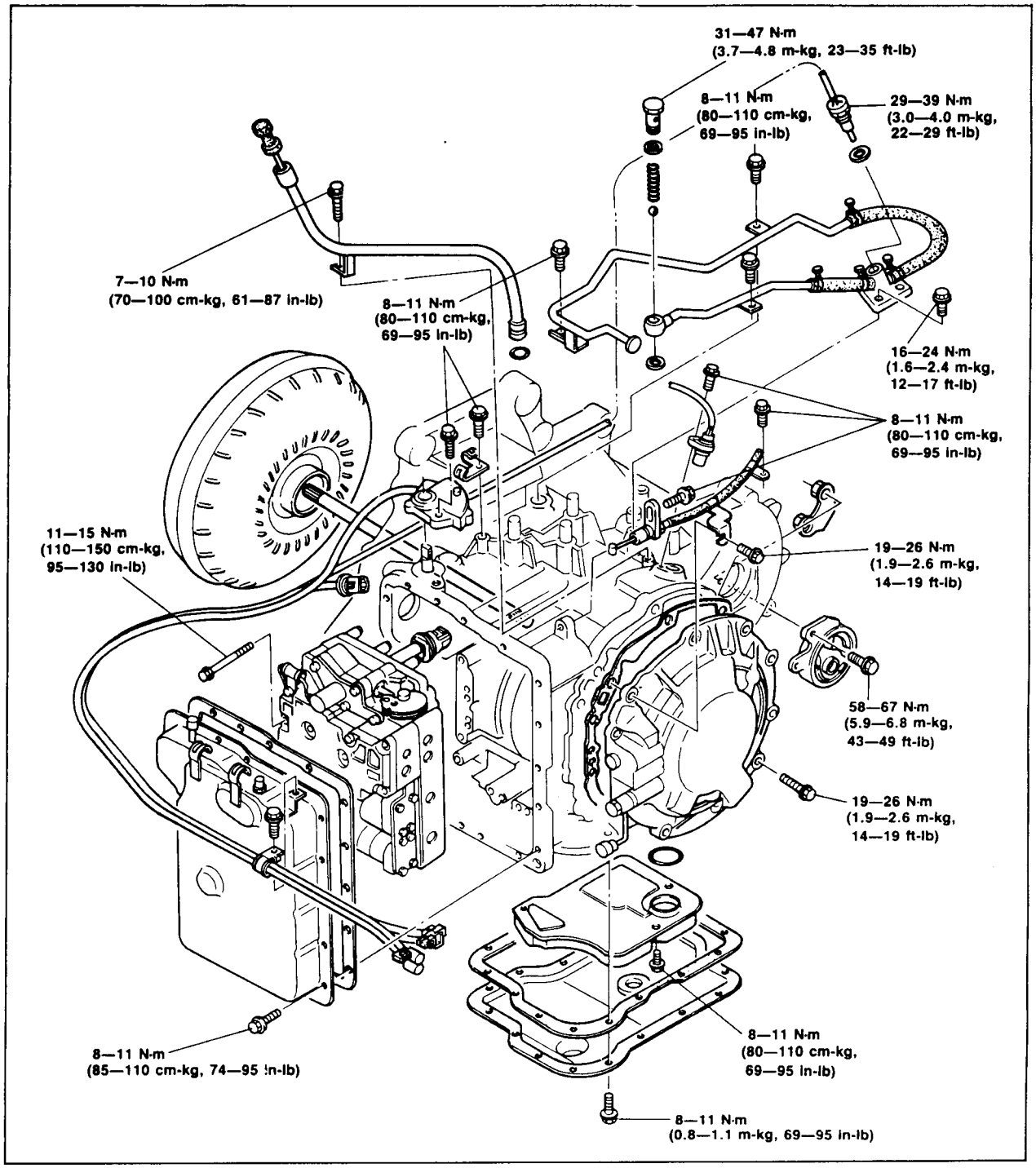


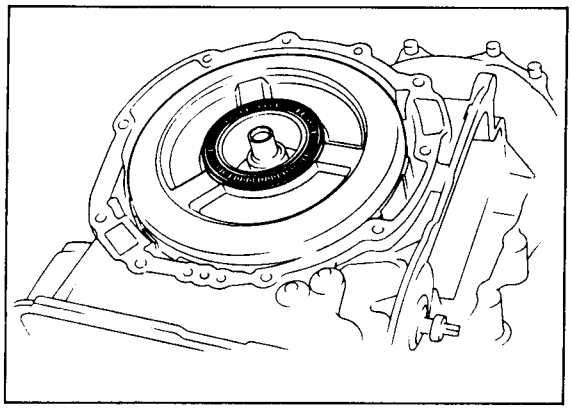
Note
Measure the height difference between the reverse and forward drum and transaxle case.
Standard height: 0.8 mm (0.032 in)



Install the snap ring into the bottom ring groove of the turbine shaft.

ASSEMBLY
Torque Specifications

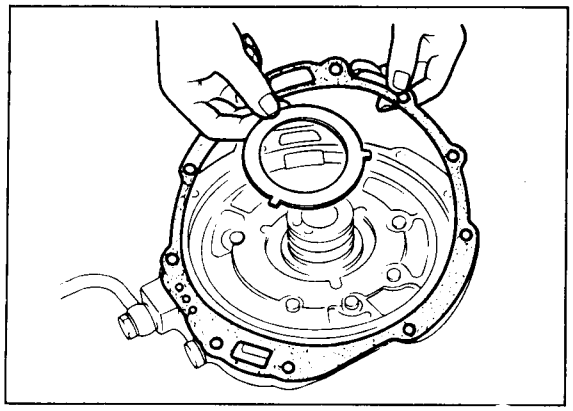




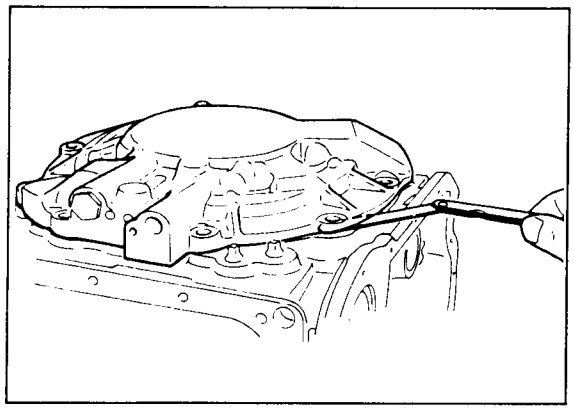
Procedure

Use the following procedure to adjust the total end play and select a suitable bearing race.

(1) Set the thrust bearing onto the clutch assembly.

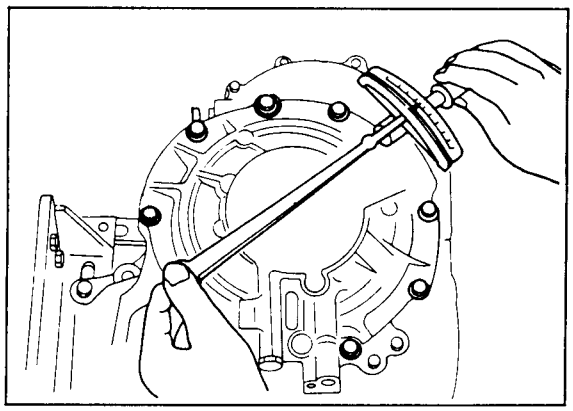


(2) Remove the previous race and gasket..
(3) Set the thickest bearing race **2.2 mm (0.087 in)** onto the oil pump.
(4) Set the oil pump onto the clutch assembly.



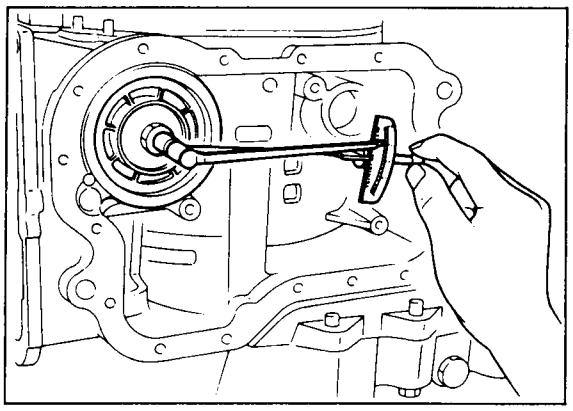
(5) Measure clearance between the transaxle case and oil pump.
(6) Select a suitable bearing race from the chart below.

Clearance mm (in)	Select this bearing race mm (in)
0.91—1.10 (0.036—0.043)	1.2 (0.047)
0.71—0.90 (0.028—0.035)	1.4 (0.055)
0.51—0.70 (0.020—0.027)	1.6 (0.063)
0.31—0.50 (0.012—0.019)	1.8 (0.071)
0.11—0.30 (0.004—0.011)	2.0 (0.078)
0—0.10 (0—0.003)	2.2 (0.087)



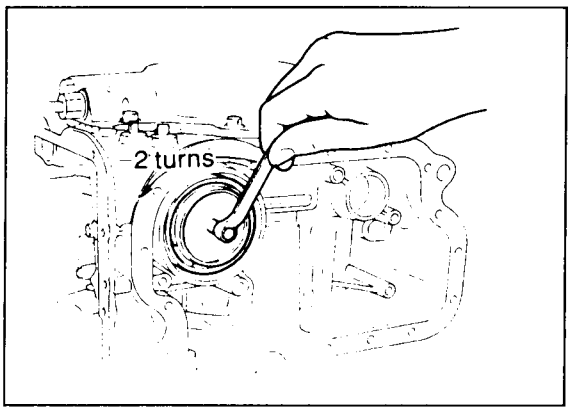
(7) Remove the oil pump.
(8) Place the selected bearing race and a new gasket onto the oil pump.
(9) Install the oil pump onto the clutch assembly.

Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



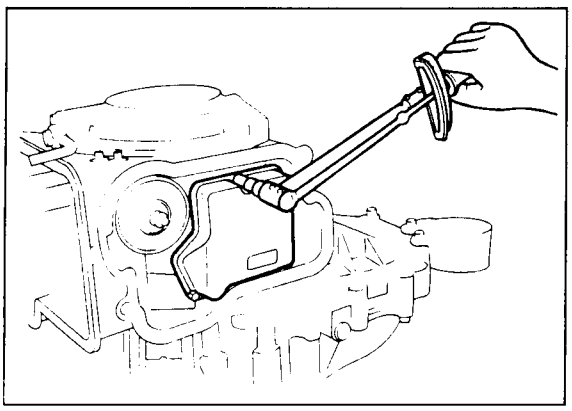
Adjust the 2-4 brake band.
(1) Loosen the locknut and tighten the piston stem to the specified torque.

Tightening torque:
9—11 N·m (90—110 cm-kg, 78—95 in-lb)



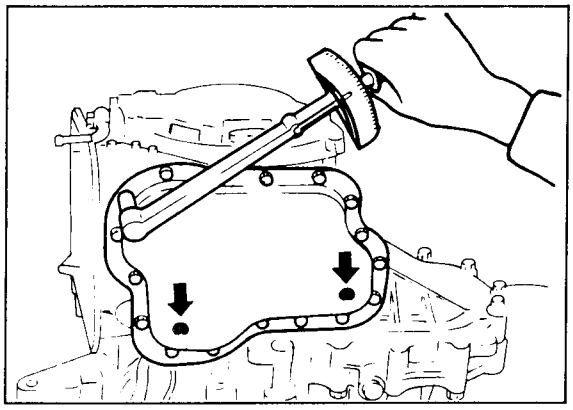
(2) Loosen the piston stem 2 turns.
(3) Tighten the locknut to the specified torque.

Tightening torque:
25—39 N·m (2.5—4.0 m-kg, 18—29 ft-lb)



Install the oil strainer along with a new O-ring to the transaxle.

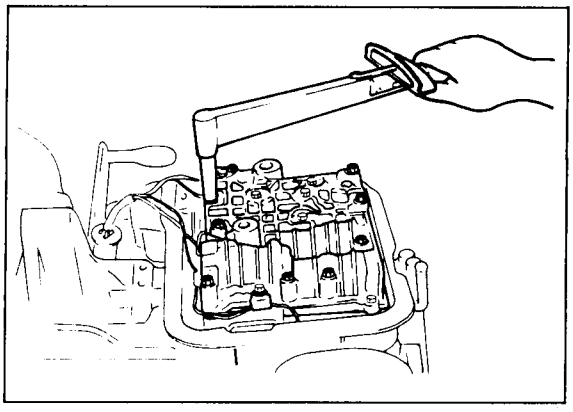
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)



Install the oil pan along with a new gasket.

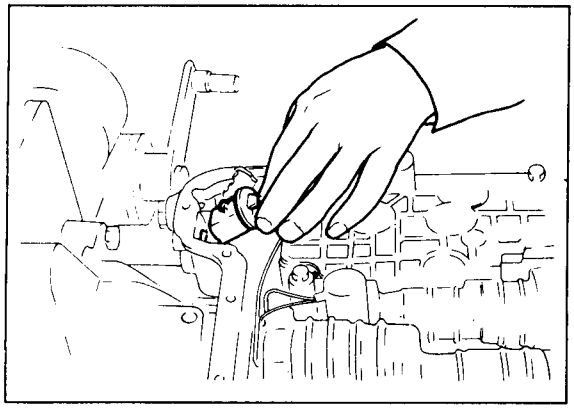
Tightening torque:
8—11 N·m (85—110 cm-kg, 74—95 in-lb)

Note
Install the magnets in the positions shown in the illustration.

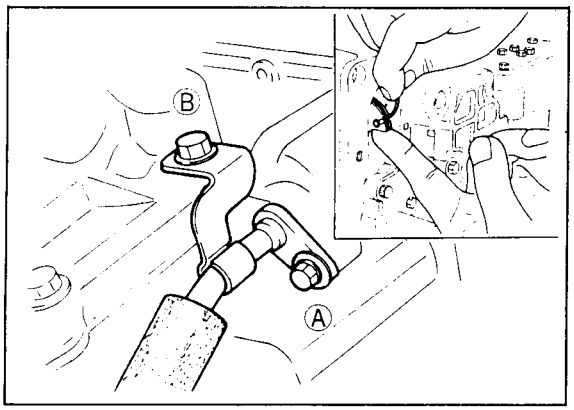


Align the manual valve with the pin on the manual plate, and install the control valve body into the transaxle case.

Tightening torque:
11—15 N·m
(110—150 cm-kg, 95—130 in-lb)

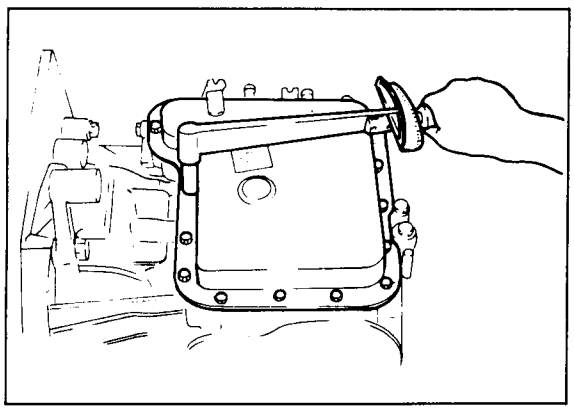


Install the solenoid connector and a new O-ring in the transaxle case.



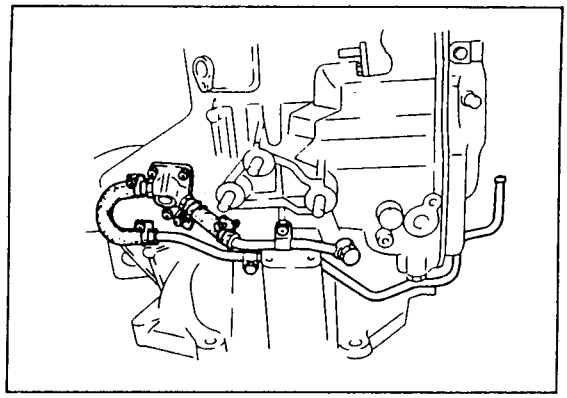
Install a new O-ring on the bracket; then feed the throttle cable through the transaxle case and connect it to the throttle cam.
Install the throttle cable attaching bolts and bracket.

Tightening torque:
Ⓐ 8—11 N·m
(80—110 cm-kg, 69—95 in-lb)
Ⓑ 19—26 N·m
(1.9—2.6 m-kg, 14—19 ft-lb)



Install the control valve body cover along with a new gasket.

Tightening torque:
8—11 N·m (85—110 cm-kg, 74—95 in-lb)

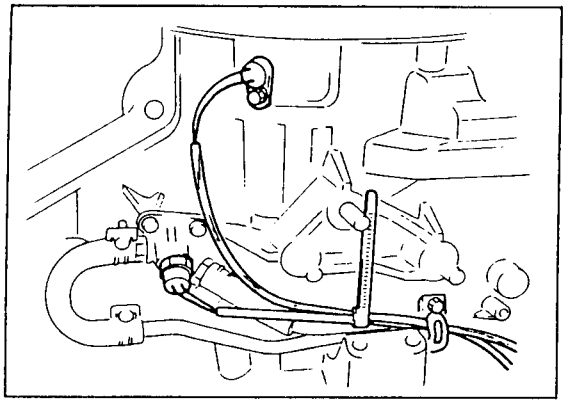


G4A-EL

(1) Install the oil pipes, oil hoses, and switch box as an assembly; then install the harness clip.

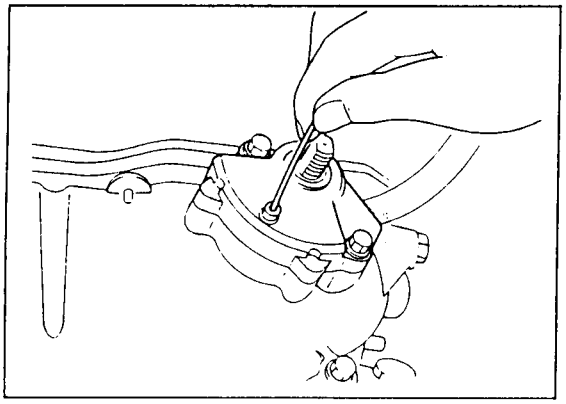
Tightening torque:
Switch box
16—24 N·m (1.6—2.4 m-kg, 12—17 ft-lb)
Harness clip
8—11 N·m (80—110 cm-kg, 69—95 in-lb)

NOTE: Before installing the oil pipe, be certain that the check ball and spring are in the case under the fitting.



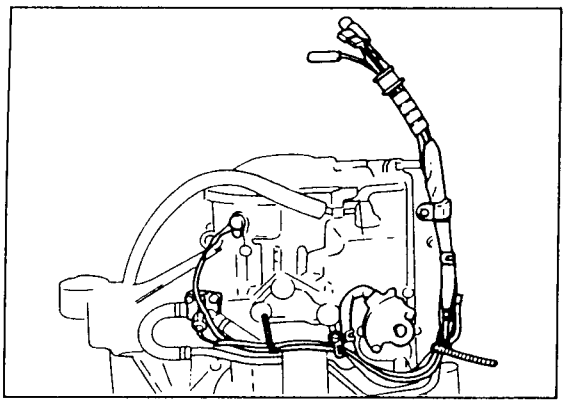
Install the pulse generator and fluid temperature switch.

Tightening torque:
Pulse generator
8—11 N·m (80—110 cm-kg, 69—95 in-lb)
Fluid temperature switch
29—39 N·m (3.0—4.0 m-kg, 22—29 in-lb)



Install the inhibitor switch.
(1) Turn the manual shaft to the "N" position.
(2) Install the inhibitor switch and loosely tighten the bolts.
(3) Remove the screw and move the inhibitor switch so that the alignment hole is aligned with the screw hole.
(4) Insert a **2.0 mm (0.079 in)** diameter pin through the holes.
(5) Install the screw; then tighten the bolts to the specified torque.

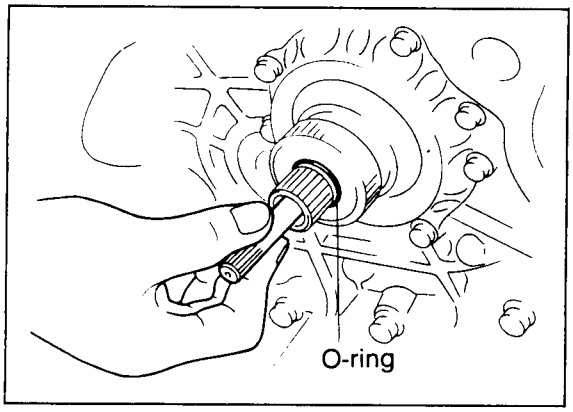
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)



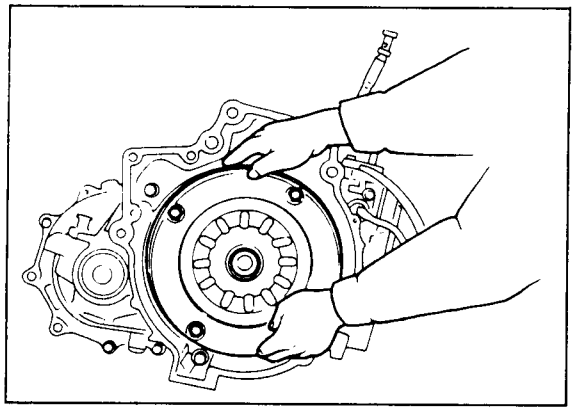
Install the harness with the remaining clip.

Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)

Remove the transaxle from the **SST**.



Install the oil pump shaft.
Install a new O-ring onto the turbine shaft.

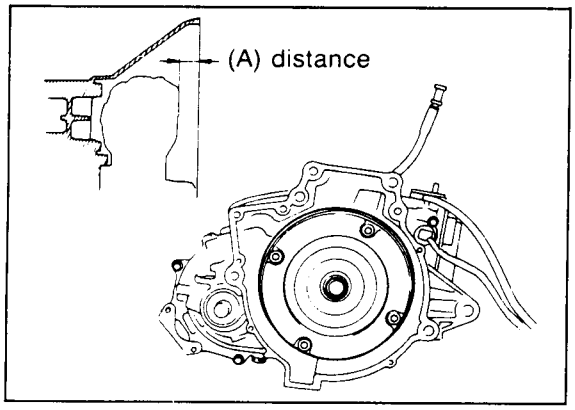


Fill the torque converter with ATF if it has been drained and washed.

ATF type: Dexron II or M III

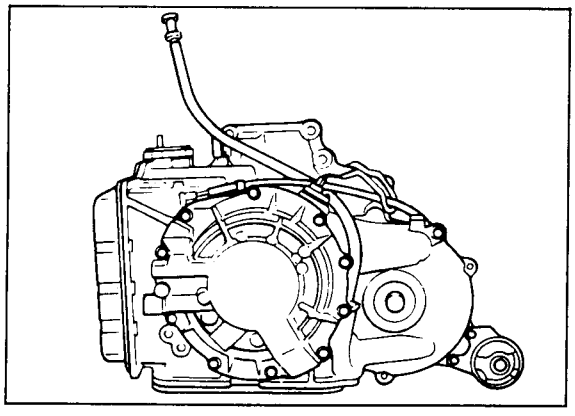
Install the torque converter in the converter housing while rotating it to align the splines.

Caution
a) Hold the torque converter in an erect position when filling it with ATF, do not allow the fluid to overflow.
b) If the converter does not fit in easily, do not try to force it; install carefully.



To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the end of the converter housing.

(A): approx. 25 mm (0.98 in)



Install the engine mount No.1

Tightening torque:
58—67 N·m (5.9—6.8 m-kg, 43—49 ft-lb)

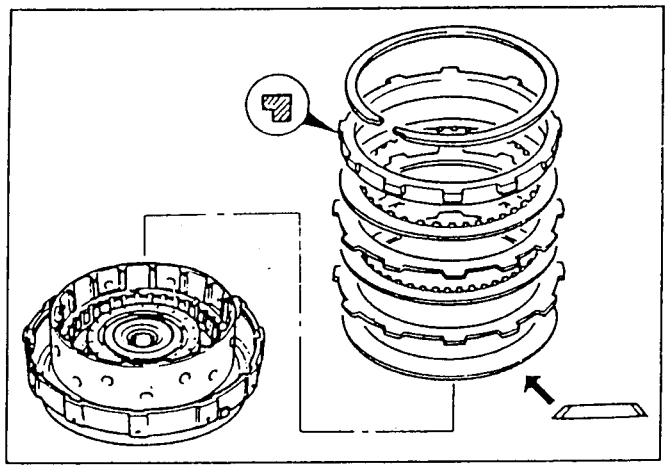
Technical Service Information

COMPLAINT: Bind up in Reverse.

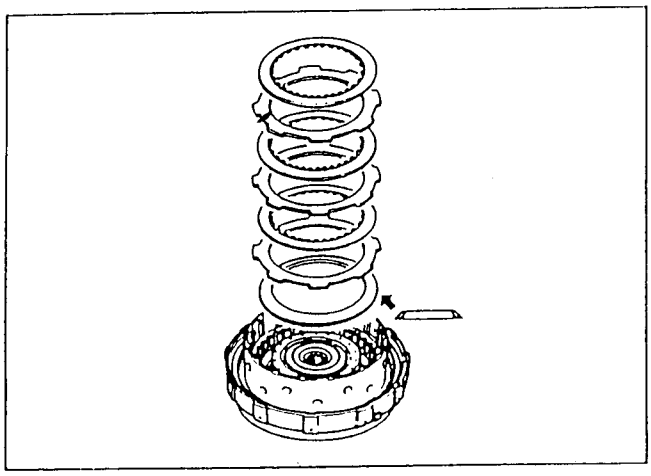
CAUSE: Dished Plates installed incorrectly.

CORECTION: Install dished plates as shown below.

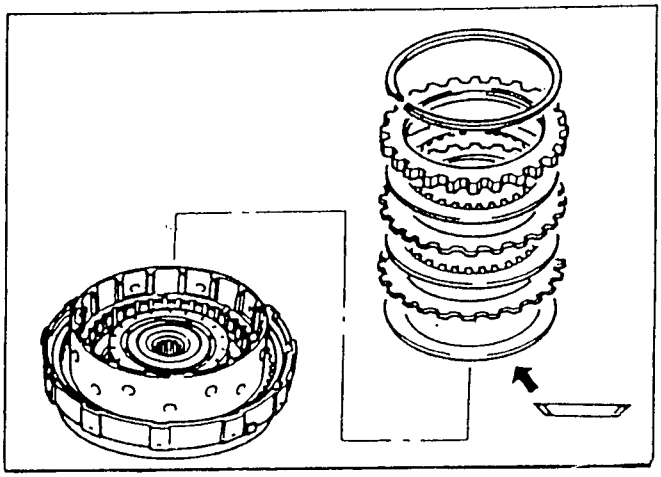
REVERSE CLUTCH



FORWARD CLUTCH



COASTING CLUTCH



ATSG Technical Service Information

MAZDA G4A-EL / FORD PROBE

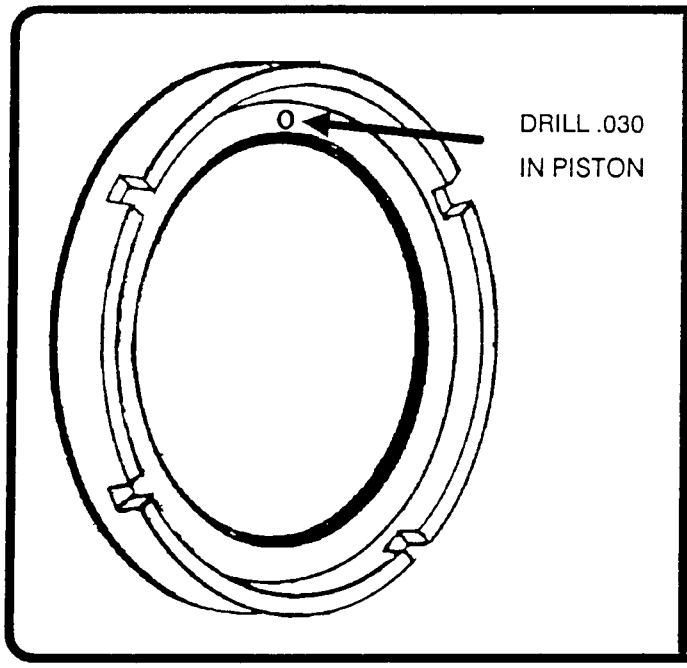
REVERSE CLUTCH FAILURE

COMPLAINT: *Repeated reverse clutch failure.*

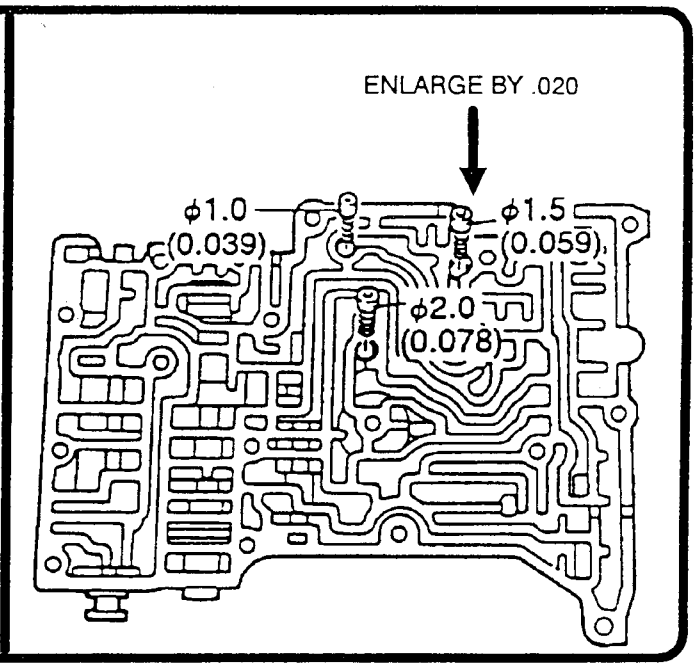
CAUSE: *Cross leak causing the reverse clutch to drag while in forward gears.*

CORRECTION: *Drill a .030 hole through the reverse piston (figure 1), also enlarge the reverse feed orifice by .020 (figure 2). Example: measure existing orifice size, if it is .059 then enlarge to .079.*

NOTE: Always use factory rings from Ford. These rings will work on on both Mazda and Probe. (part # E92Z-7D019-A).



(Figure 1)



(Figure 2)

ATSG Technical Service Information

MAZDA G4A-EL / FORD PROBE

LOW PUMP PRESSURE

COMPLAINT: *Low pump pressure.*

CAUSE: *The spool valve in the pump did not have a seat for the spring. The spring will hang the valve and cause low line pressure (figure 1).*

CORRECTION: *Order updated valve from Ford. It has a seat formed on the valve for the spring and will work on both units (figure 2) part # FO2Z-7Z306-A.*

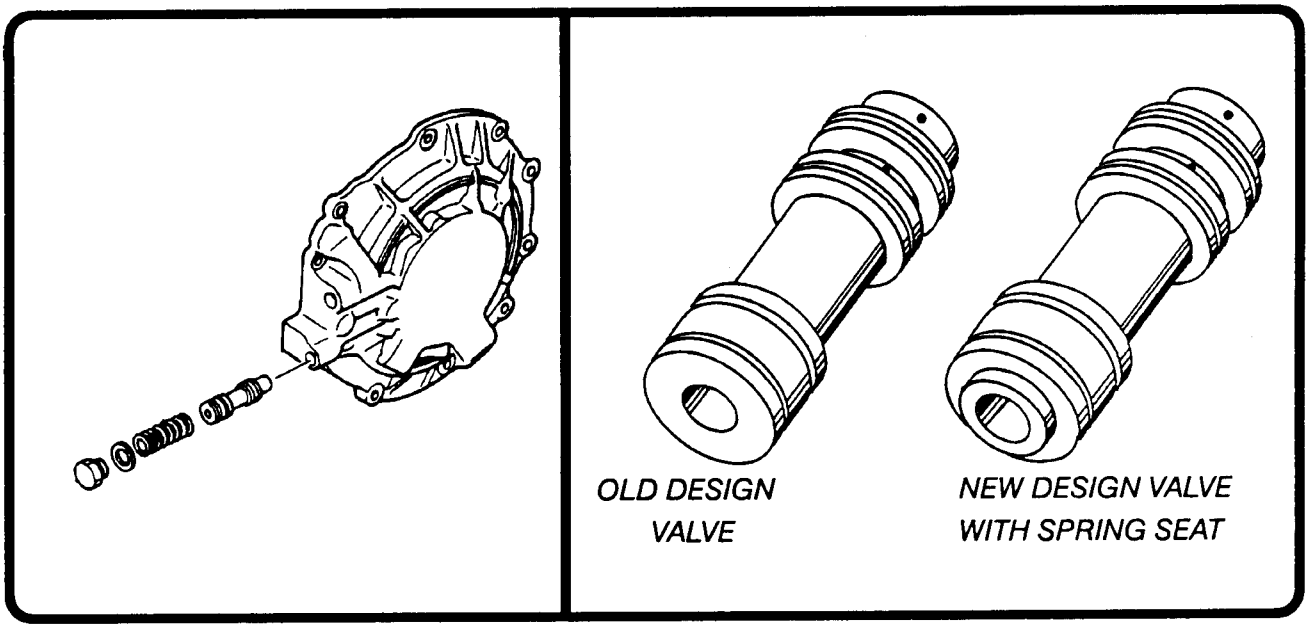
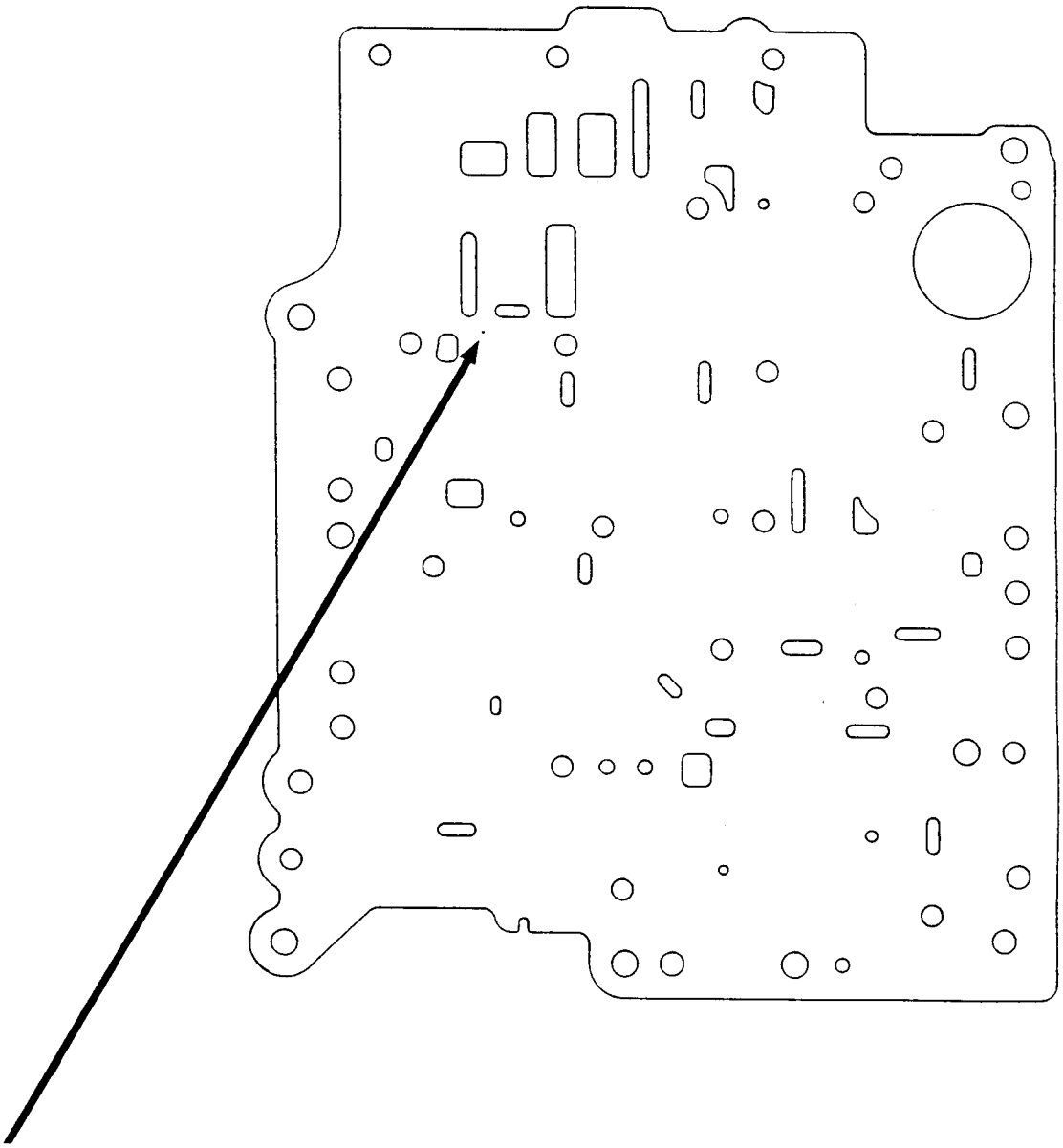


FIGURE 1

FIGURE 2

MAIN SEPARATOR PLATE



DRILL THIS HOLE TO .040" TO PREVENT CONVERTER CLUTCH HANG-UP COMING TO A STOP.



Technical Service Information

INTRODUCTION
MAZDA G4A-HL

The Mazda G4A four speed automatic transaxle can come with hydraulic or computer shift control. Although both units share common parts there are many major differences. The hydraulic control (HL) unit is readily identifiable by the governor assembly on the top right front of the unit. This unit has a converter clutch. This booklet contains information on the teardown - assembly, and diagnosing of this unit.

We thank Mazda Motors for the illustrations and information that have made this booklet possible.

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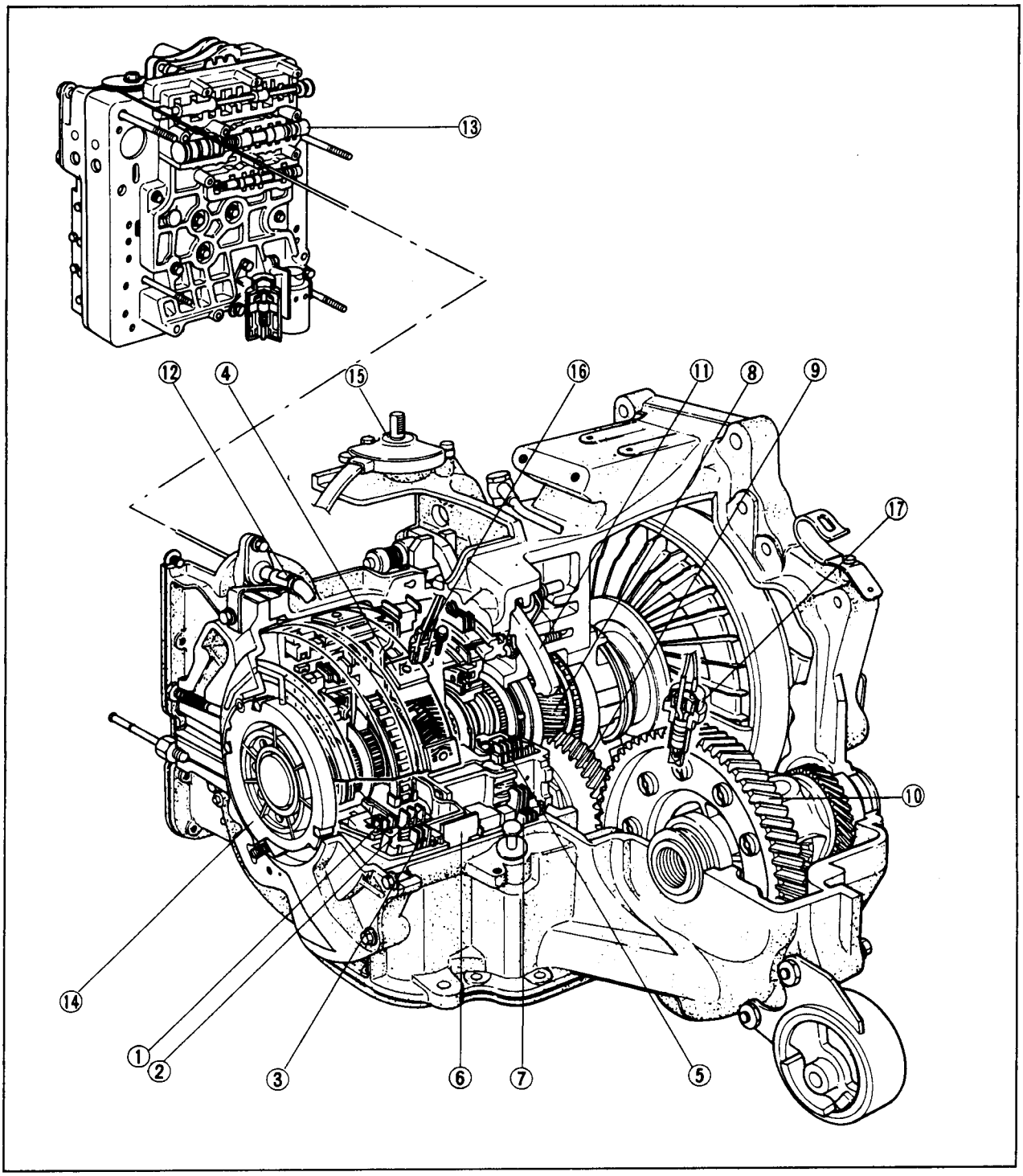


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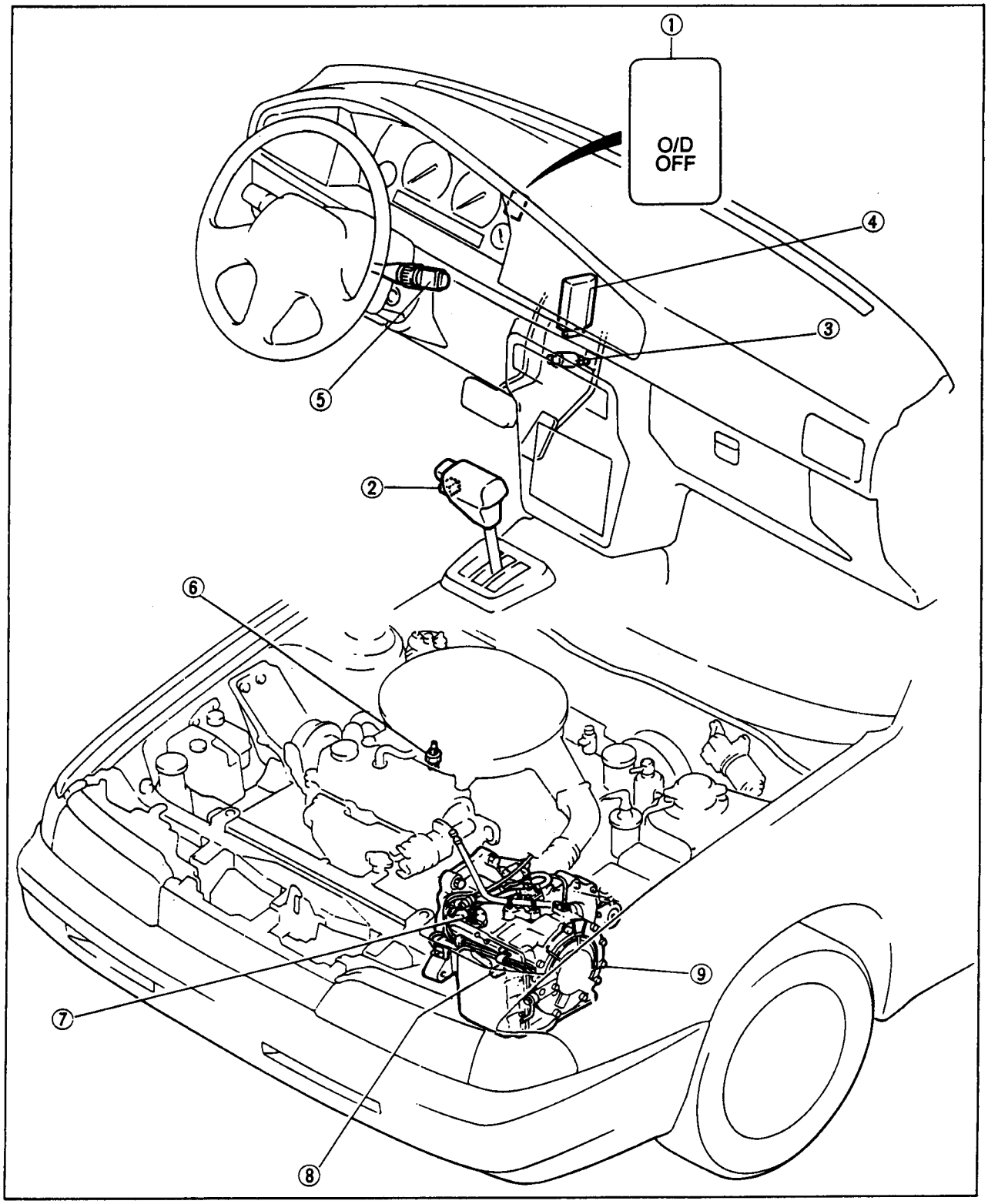
AUTOMATIC TRANSMISSION SERVICE GROUP

STRUCTUAL VIEW



1. Coasting clutch
2. Forward clutch
3. Reverse clutch
4. Reverse and forward drum
5. 3-4 clutch
6. 2-4 brake band
7. Low and reverse brake
8. Output gear
9. Idle gear
10. Differential
11. Parking pawl
12. Throttle cable
13. Control body
14. Oil pump
15. Inhibitor switch
16. Pulse generator
17. Fluid temperature switch

G4A-HL

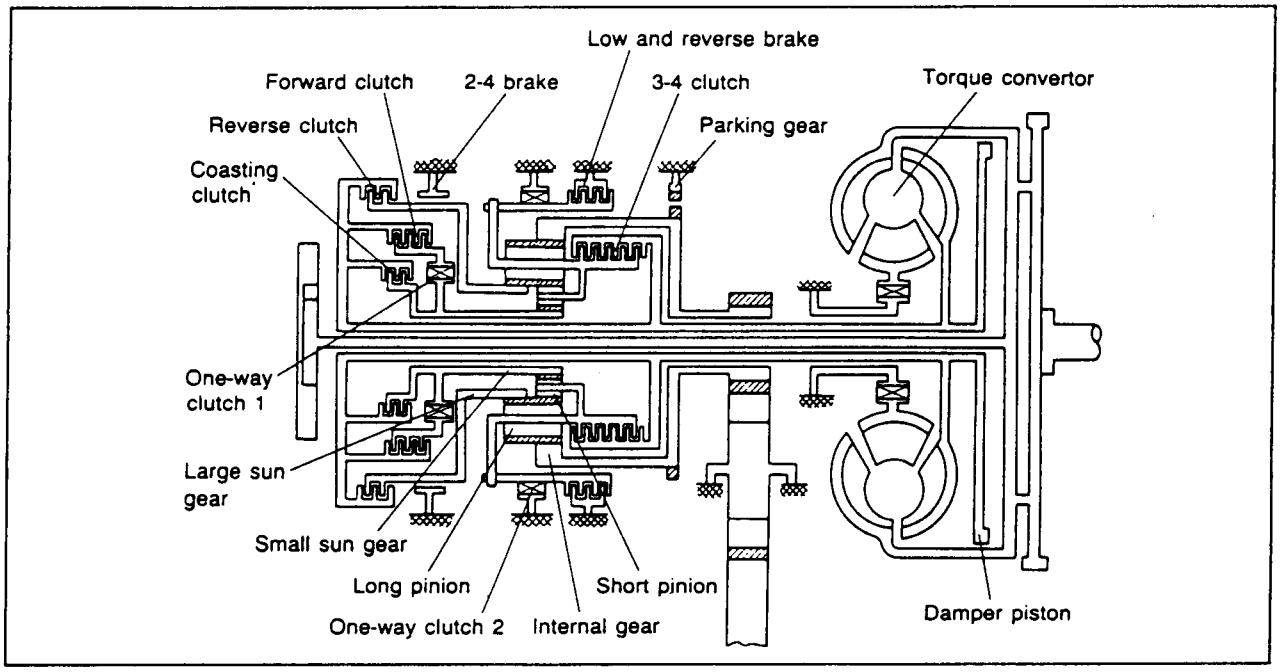


1. OD OFF indicator light
2. OD OFF switch
3. Kick-down switch
4. Cruise control unit
5. Cruise control switch
6. Water temperature switch
7. Inhibitor switch
8. OD release solenoid valve
9. Automatic transaxle

SPECIFICATIONS

Model		G4A-EL (EC-AT)	G4A-HL (4-speed)	
			FE engine	F8 engine
Torque converter stall torque ratio		1.710—1.900 : 1	1.900—2.100 : 1	
Gear ratio	First	2.800		
	Second	1.540		
	Third	1.000		
	Fourth (OD)	0.700		
	Reverse	2.333		
Final gear ratio		3.700		
Number of drive plates/ driven plates	Forward clutch	3/3		
	Coasting clutch	2/2		
	3-4 clutch	5/5	4/4	
	Reverse clutch	2/2		
	Low and reverse brake	3/3	4/4	
Servo diameter (Piston outer dia./retainer inner dia.) mm (in)		78/53 (3.07/2.09)	78/49 (3.07/1.93)	78/56 (3.07/2.20)
Speedometer gear ratio (Driven/Drive gear)		20 : 25 or 21 : 25		
Automatic transmission fluid	Type	Dexron II or MIII		
	Capacity liters (US qt, Imp qt)	6.8 (7.2, 6.0)		

OPERATION OF COMPONENTS

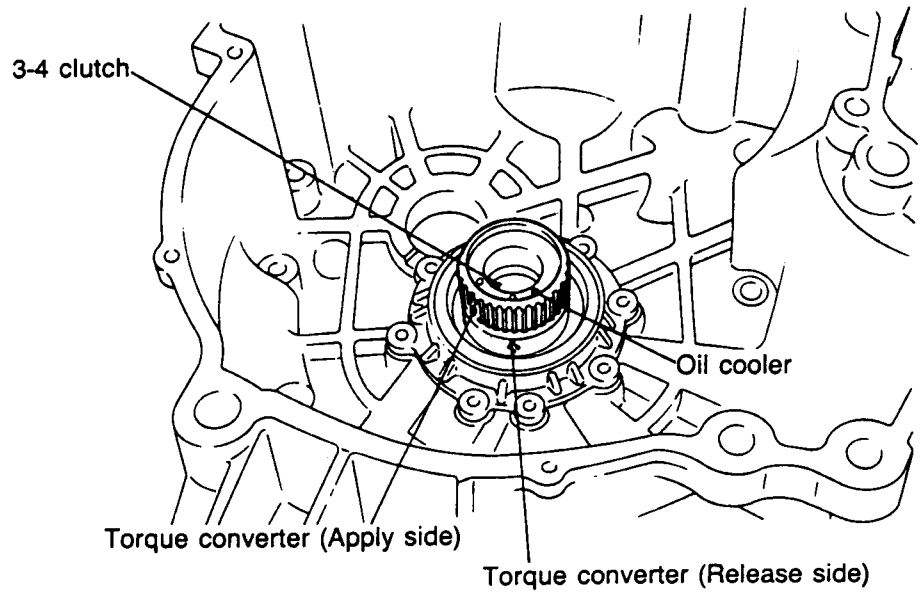


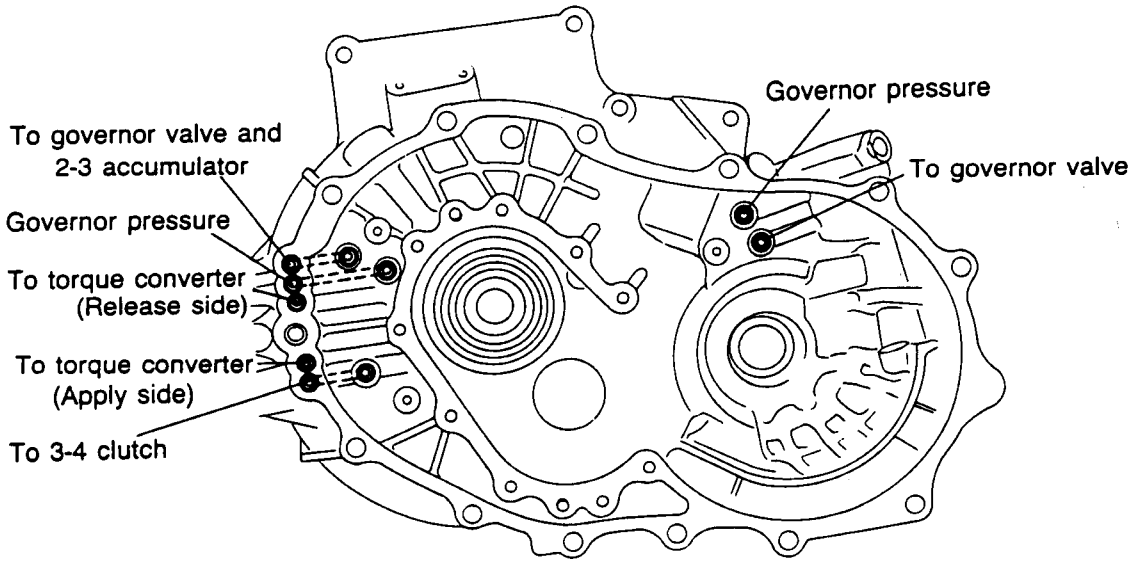
Operation Table (G4A-HL)

Range	Gear	Operation elements									
		Engine braking effect	Forward clutch	Coasting clutch	3-4 clutch	Reverse clutch	2-4 brake		Low & reverse brake	One-way clutch 1	One-way clutch 2
							Applied	Released			
P	—	—									
R	—	Yes				○			○		
N	—	—									
D	1st	No	○							○	○
	2nd	No	○				○			○	
	3rd	Yes	○	○	○		⊗	○		○	
	OD	Yes	◎		○		○				
2	2nd	Yes	○	○			○			○	
1	1st	Yes	○	○				○	○	○	
	2nd	Yes	○	○			○			○	

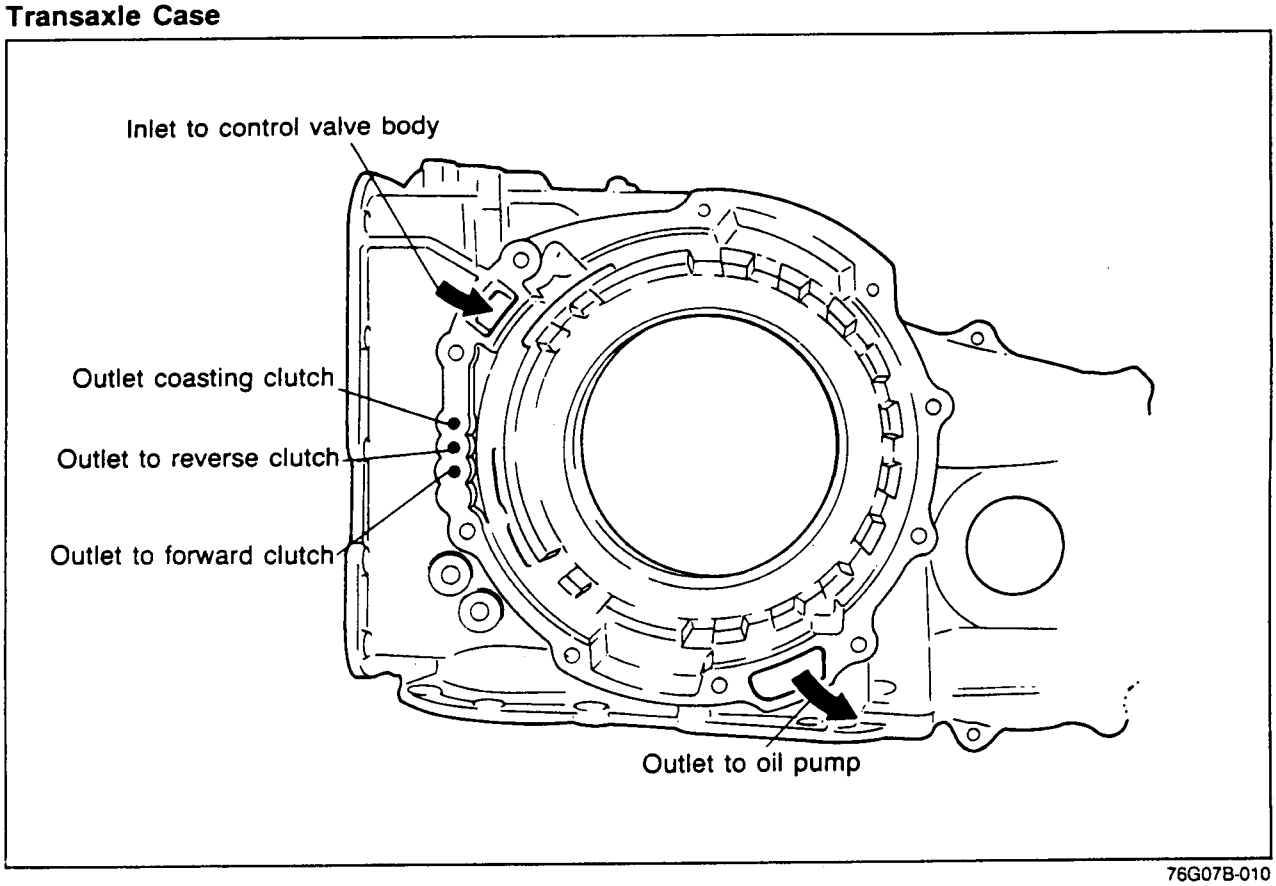
⊗ : Indicates fluid pressure to servo but band not applied due to pressure difference in servo.
◎ : Indicates that it does not function to transmit power.

FLUID PASSAGE LOCATION
Converter Housing



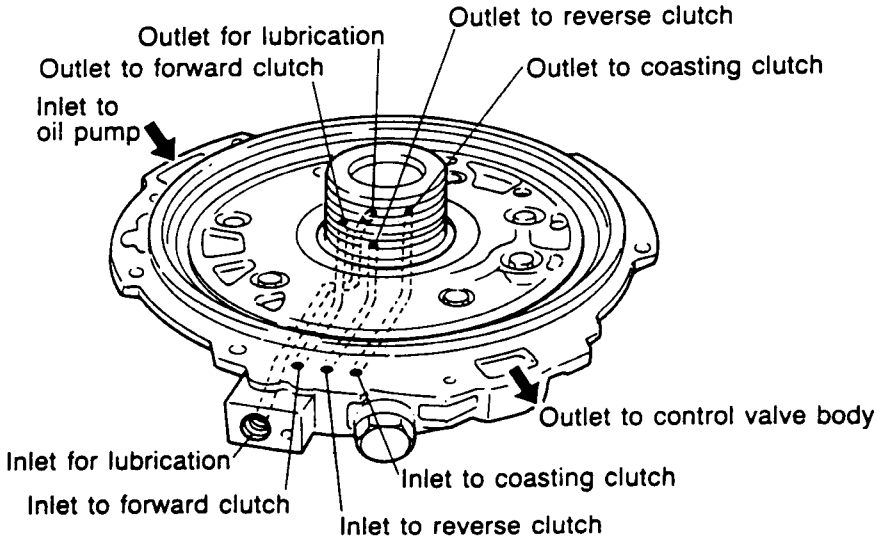


Transaxle Case

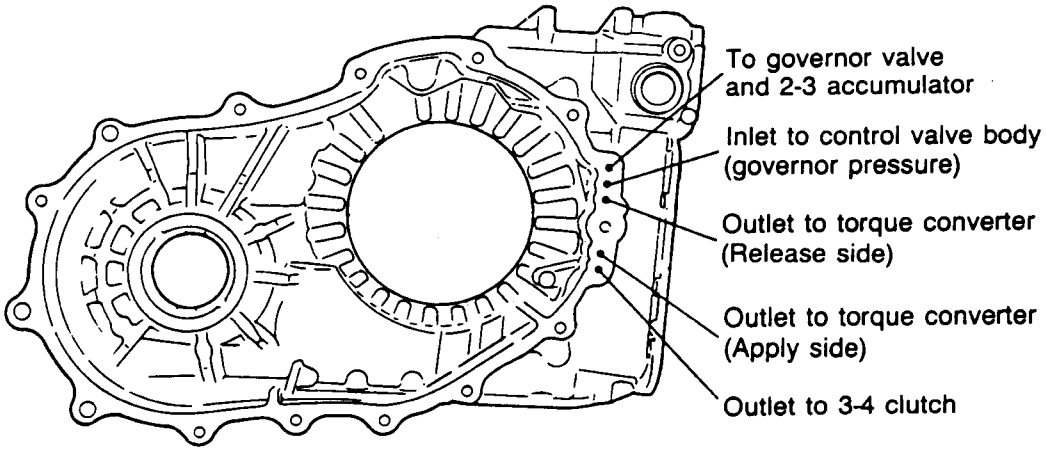


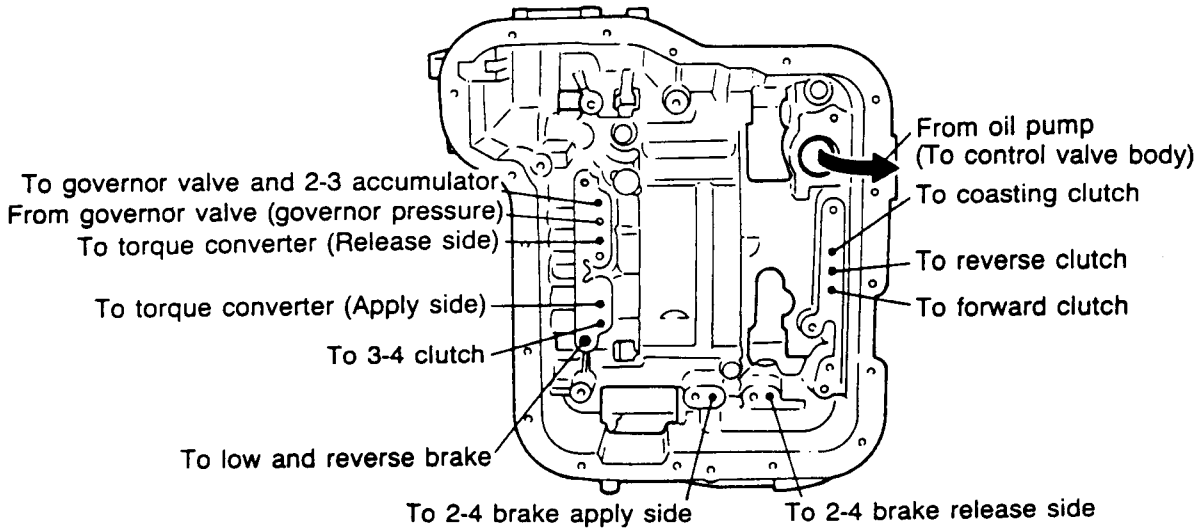
76G07B-010

Oil Pump



Transaxle Case





OTSG

Technical Service Information

Quick Diagnosis Chart

The Quick Diagnosis Chart shows various problems and the relationship of various components that might be the cause of the problem.

The following is an explanation of the symbols used in this chart.

1. Components indicated in the "Adjustment" column indicate that there is a possibility that the problem may be the result of an incorrect adjustment.
   Check the adjustment of each component, and readjust if necessary.
2. The components indicated in the "Electrical System Inspection" column can be checked for malfunction by the results of the checking procedure.
3. Components indicated in the "Stall Test" column can be checked for malfunction by the results of the stall test.
4. Components indicated in the "Time Lag Test" column can be checked for malfunction by the results of the time lag test.
5. Components indicated in the "Road Test" column can be checked for malfunction by the results of the road test.
6. Components indicated in the "Oil Pressure Test" column can be checked for malfunction by the results of the oil pressure test.
7. The checking, adjusting, repair or replacement procedures for each component

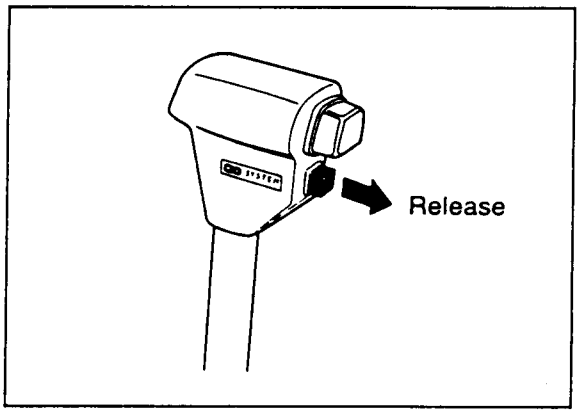
Inspection point / Item	Electrical control system						Preliminary				Hydraulic control system					Power train												
	Inhibitor switch	OD OFF switch	Cruise control switch	Water temperature switch	Kick-down switch	OD release solenoid valve	ATF level and condition	Selector lever	Throttle cable	Idle speed and ignition timing	Control valves	Accumulators	Oil pump	Governor valve	Hydraulic circuit	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3-4 clutch	2-4 brake and servo	Low and reverse brake	One-way clutch 1	One-way clutch 2	Parking gear	Planetary gear	Differential assembly
Adjustment	○						○	○	○	○																		
Electrical System Inspection		○	○		○	○																						
Stall Test											○		○		○	○	○		○		○	○	○	○				
Time Lag Test											○	○			○		○		○			○	○	○				
Oil Pressure Test									○		○	○	○	○	○		○	○	○		○	○						
Road Test						○					○			○	○													

ATSG Technical Service Information

Condition	Inspection point and reference page	ON VEHICLE: Electrical control system: Inhibitor switch	OD OFF switch	Cruise control switch	Water temperature switch	Kick-down switch	OD release solenoid valve	Preliminary: ATF level and condition	Selector lever	Throttle cable	Idle speed and ignition timing	Hydraulic control system: Control valves	Accumulators	OFF VEHICLE: Power train: Oil pump	Governor valve	Hydraulic circuit	Torque converter	Forward clutch	Coasting clutch	Reverse clutch	3-4 clutch	2-4 brake and servo	Low and reverse brake	One-way clutch 1	One-way clutch 2	Parking gear	Planetary gear	Differential assembly
Accele-rating	Vehicle does not move in D, 2, 1, or R range							○	○			○		○		○	○	○		○			○	○	○	○		
	Vehicle moves in N range								○			○				○												
	Excessive creep									○	○	○					○											
	No creep at all							○	○	○	○	○		○		○	○	○		○			○	○	○			
Shifting	No shift							○				○		○	○	○												
	Abnormal shift sequence		○	○	○		○	○	○	○		○			○	○		○	○		○	○		○	○			
	Frequent shifting		○	○	○	○	○					○			○													
	Excessive high or low shift point					○	○	○	○	○		○		○	○	○	○											
	No lock-up		○	○	○	○	○		○			○			○	○	○											
	No kick-down					○			○			○			○	○												
Slipping	Engine run away or slip when starting vehicle							○		○		○		○		○		○		○			○	○	○			
	Engine run away or slip when up- or down-shifting							○		○		○		○		○		○	○		○	○		○	○			
Shift shock	Excessive N to D or N to R shift shock							○			○	○	○															
	Excessive shift shock when upshifting or downshifting							○		○		○	○					○	○		○	○		○				
	Excessive shift shock when changing range							○	○	○		○	○					○	○		○	○	○	○				
Noise	Transaxle noisy in N or P range							○				○		○	○		○											
	Transaxle noisy in D, 2, 1, or R range							○				○		○	○		○										○	○
Others	No engine braking							○			○	○				○	○		○			○	○					
	Transaxle overheats							○				○		○		○	○											
	Engine will not start	○							○																			

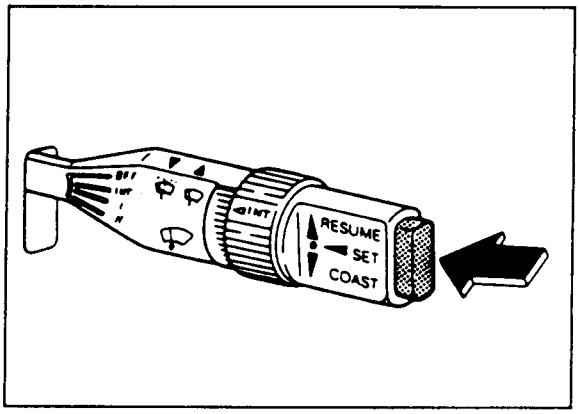
(ELECTRICAL SYSTEM INSPECTION)

In this step, the function of the electrical control system (Inhibition of OD and lock-up) is checked. The electrical control system components should be checked to determine if it functions correctly.



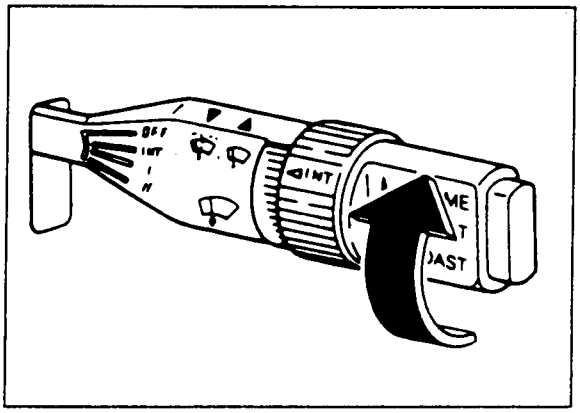
O/D OFF Switch Inhibition Function

1. Warm up the engine and ATF.
2. Check that the D range, OD, and lock-up is provided.
3. When driving the vehicle with D range, OD, and lock-up selected, depress the O/D OFF switch and check that OD and lock-up is cancelled.
4. If not cancelled, check the O/D OFF switch.
5. Release the O/D OFF switch after completion.

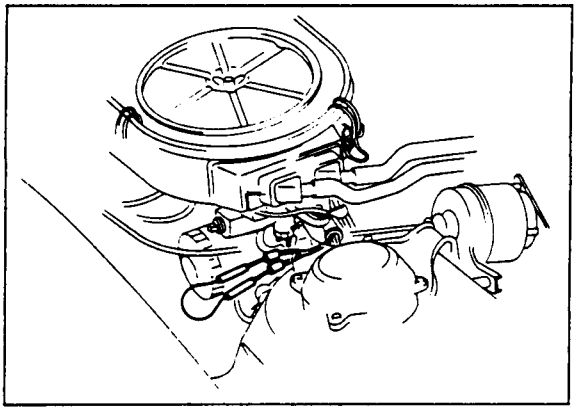


Cruise Control Switch Inhibition Function

1. Drive the vehicle in D range, OD, and lock-up selected again.
2. Depress the Set switch of the cruise control and check that OD and lock-up is cancelled.
3. If not cancelled, check the cruise control system.

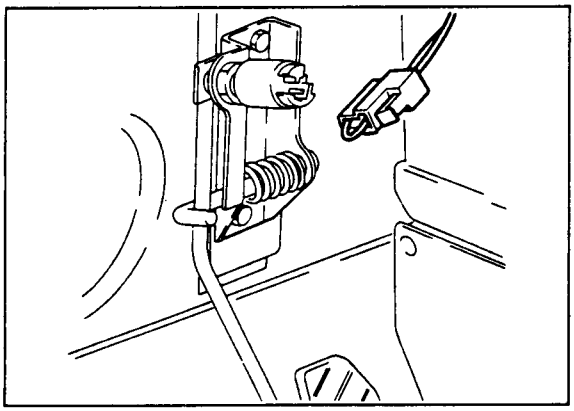


4. Again drive the vehicle in D range, OD, and lock-up.
5. Turn the Resume switch of the cruise control and check that OD and lock-up is cancelled.
6. If not cancelled, check the cruise control system.



Water Temperature Switch Inhibition Function

1. Stop the vehicle.
2. Disconnect the water temperature switch connector.
3. Drive the vehicle in D range selected.
4. Check that OD and lock-up does not operate.
5. If not cancelled, check the wiring harness of the water temperature switch.
6. Stop the vehicle and reconnect the water temperature switch connector.



Kick-down Switch Inhibition Function

1. Connect the terminals of the kick-down switch connector with a jumper wire.
2. Drive the vehicle in D range selected.
3. Check that the OD and lock-up do not achieve.
4. If not correct, check wiring harness of kick-down switch.
5. Stop the vehicle and reconnect the connector to the switch.

(STALL TEST)

This step is performed to determine if there is slippage of the friction elements or malfunction of the hydraulic components.

Preparation

Check the following items prior to testing:

1. Engine coolant, engine oil and ATF levels.
2. Warm the engine thoroughly to raise the ATF temperature to operating level (50—80°C, 122—176°F).
3. Engage the parking brake and use wheel chocks at the front and rear wheels.

1. Connect a tachometer to the engine.
2. Shift the selector lever to D range.
3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read and note the engine speed as soon as it becomes constant, then release the accelerator pedal.

Caution
Steps 3 to 4 must be performed within 5 seconds.

5. Shift the selector to N range and run the engine at idle speed for at least one minutes.

Note
This one minute idle period is performed to cool the ATF and prevent oil degradation.

6. Perform stall tests for the following ranges in the same manner.
   (1) 2 range
   (2) 1 range
   (3) R range

Standard stall speed:

FE engine
D.S.L range 2430—2530 rpm
R range 2390—2490 rpm

F8 engine
D.S.L range 2180—2280 rpm
R range 2140—2240 rpm

Caution
Always provide adequate cooling time between individual range stall tests.

Evaluation	Condition	Possible cause	
Above specification	In all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve, and/or transaxle case
			Stuck pressure regulator valve
	In D 2, and 1	One-way clutch 1 slipping	
	In D range only	One-way clutch 2 slipping	
	In 2 range only	2-4 brake slipping	
	In R range only	Low and reverse brake slipping	
		Reverse clutch slipping	
		Perform a road test, to determine if this is caused by the low and reverse brake or the reverse clutch, as follows: a) Effective engine braking in 1 range.....Front clutch b) No engine braking in 1 range.....Low and reverse brake	
Within specification		All shift control elements within transaxle are functioning normally.	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

(TIME LAG TEST)

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step checks this time lag for checking the condition of the N-D and N-R accumulators, forward, reverse and one-way clutches, and low and reverse brake.

1. Start the engine and check that the idle speed is **900** $\pm^{50}_{0}$ rpm.
2. Shift from N range to D range
3. Measure the time it takes from shifting until shock is felt using a stop watch.
4. Shift the selector to N range and run the engine at idle speed for at least one minute.
5. Perform the test for the shift from N range to R range in the same manner.

Note
Make three measurements for each test and take the average value.

Specified time lag: N → D range ..... 0.4—1.2 second
N → R range ..... 0.4—1.5 second

Evaluation

Condition		Possible Cause
N → D shift	More than specification	Insufficient line pressure
		Forward clutch slipping
		One-way clutch 1 slipping
		One-way clutch 2 slipping
	Less than specification	N-D accumulator not operating properly
		Excessive line pressure
N → R shift	More than specification	Insufficient line pressure
		Low & reverse brake slipping
		Reverse clutch slipping
	Less than specification	N-R accumulator not operating properly
		Excessive line pressure

(ROAD TEST)

This step is performed to inspect for problems at the various ranges. If these tests show any problems, adjust or replace by referring to the mechanical sections.

Caution
Perform the test at normal ATF operating temperature (50—80°C, 122—176°F).

D Range Test
Shift point, shift pattern, and shift shock

1. Shift the selector lever to D range and depress the OD OFF switch.
2. Accelerate the vehicle with half (4/8) and full (8/8) throttle valve opening.
3. Check that 1-2, 2-3 and 3-OD up-shifts and downshifts and lock-up are obtained. The shift points must be as shown in the D range shift diagram.

Note
Abnormal noise and vibration can also be caused by the torque converter, drive shaft, or differential. Therefore, checking of cause must be made with extreme care.

b) There is no lock-up or OD when the coolant temperature is below 72°C (162°F), when the cruise control is operating and when there is a 3 km/h (1.9 mph) difference between the pre-set cruise speed and vehicle speed, when set or resume switch is ON, and when the OD OFF switch is depressed.

4. Check the up and down shifts for shift shock or slippage.
5. While driving in 3rd **(50—60 km/h, 31—37 mph)** shift the selector lever to 2 range and check that 3-2 downshift immediately occurs, then decelerate and check that engine braking effect is felt in 2nd gear.

P Range Test

1. Shift into P range on a gentle slope, release the brake and check that the vehicle does not roll.
2. Shift into P range while driving the vehicle at maximum of **4 km/h (2.5 mph)** on a level surface, and check that the vehicle stops.

Vehicle Speed at Gearshift Table

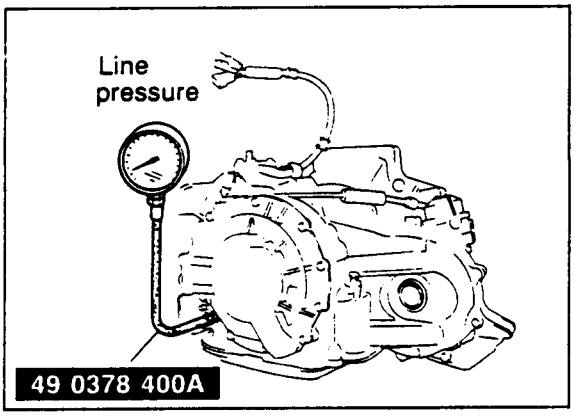
Range	Throttle condition	Shifting	Vehicle speed km/h (mph)	
			FE engine	F8 engine
D	Fully opened	1st → 2nd	50—65 (31—40)	47—62 (29—38)
		2nd → 3rd	100—115 (62—71)	94—109 (58—68)
	Half throttle (1/2)	1st → 2nd	17—32 (11—20)	16—31 (10—19)
		2nd → 3rd	42—57 (26—35)	
		3rd → OD	79—94 (49—58)	74—89 (46—55)
		Lock-up	74—89 (46—55)	
	Kick-down	OD → 3rd	More than 88 (55)	More than 82 (51)
		OD → 2nd	34—103 (21—64)	33—97 (20—60)
		OD → 1st	27—49 (17—30)	26—48 (16—30)
		3rd → 2nd	34—103 (21—64)	33—97 (20—60)
		3rd → 1st	11—49 (7—30)	10—48 (6—30)
		2nd → 1st	4—49 (2—30)	3—48 (2—30)
1	Fully opened	1st → 2nd	56—71 (35—44)	52—67 (32—42)
	Half throttle (1/2)	1st → 2nd	56—71 (35—44)	52—67 (32—42)
	Kick-down	2nd → 1st	46—61 (29—38)	43—58 (27—36)

Evaluation

Condition		Possible Cause
No 1-2 shift		Insufficient governor pressure
		Stuck 1 range control valve
		Stuck 1-2 shift control valve
		Stuck 1-2 shift valve
		No check ball (rubber ball)
No 2-3 shift		Insufficient governor pressure
		Stuck 2 range control valve
		Stuck servo control valve
		Stuck 2-3 shift valve
		No check ball (rubber ball)
No 3-OD shift		Insufficient governor pressure
		Excessive throttle pressure
		Stuck OD release valve
		Stuck needle valve of the OD release solenoid valve
		Stuck 3-4 shift valve
		No check ball (rubber ball)
No. Lock-up (Electric circuit is OK)		Insufficient governor pressure
		Stuck OD release valve
		Stuck needle valve of the OD release solenoid valve
		Stuck OD lock-up valve
		Stuck lock-up control valve
Shift occurred in 2 range		Stuck 1-2 control valve
		Stuck 2 range control valve
No kick-down		Stuck throttle valve
		Stuck kick-down valve
Incorrect shift point	In D and 1 range	Excessive or insufficient governor pressure
		Excessive or insufficient throttle pressure
		Excessive or insufficient line pressure
	In 1 range	Stuck 1 range control valve
No engine braking effect		Stuck coasting bypass valve
		Fluid leakage from 2-3 accumulator seal rings
		No check ball (rubber ball)
Shift shock or slippage	In 1-2 and/or 3-OD shift	Fluid leakage from 1-2 accumulator seal rings
		No check ball (rubber ball) or leakage
		No one-way check orifice or leakage
	In 2-3 shift	Fluid leakage from 2-3 accumulator seal ring
		Stuck bypass valve
		Stuck 2-3 timing valve
		Stuck coast bypass valve
		Stuck servo control valve
		No one-way check orifice or leakage
		No check ball (rubber ball) or leakage
	In 3-2 shift	Fluid leakage from 1-2 accumulator seal ring
		No check ball (rubber ball) or leakage
		Stuck 3-2 timing valve
		Stuck 3-2 capacity valve

(OIL PRESSURE TEST)

This step checks line, throttle, and governor pressures to check the operation of hydraulic components and for oil leakage.



Line Pressure Test
Preparation

1. Connect the **SST** to the line pressure output point (square head plug L).
2. Connect a tachometer to the engine.
3. Perform the preparation procedure shown in STEP 3 (STALL TEST).

1. Start the engine and check that the idle speed is **900** $\pm^{50}_{0}$ rpm.
2. Shift the selector lever to D range.
3. Read the line pressure at idle.
4. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
5. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

Caution
Steps 4 to 5 must be performed within 5 seconds.

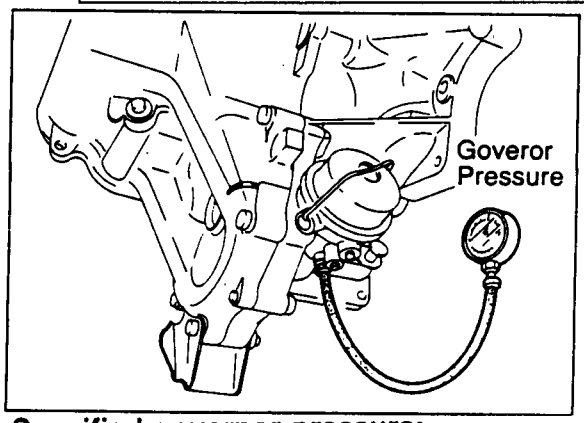
5. Shift the selector lever to N range and run the engine at idle for at least one minute.
6. Read the line pressure at idle and engine stall speeds for each range in the same manner.

Specified Line pressure:

Condition	Line pressure kPa (kg/cm², psi)	
Range	D S L	R
When idling	350—490 (3.6—5.0, 51—71)	600—830 (6.1—8.5, 87—121)
At stall speed	980—1230 (10.0—12.5, 142—178)	1470—1960 (15.0—20.0, 213—284)

Evaluation

Condition		Possible Cause
Below specification	In all ranges	Worn oil pump
		Fluid leakage from the oil pump, control valve body and/or transaxle case
		Stuck pressure regulator valve
		Stuck throttle valve
		Stuck pressure modulator valve
	In D, 2 and 1 range	Fluid leakage from the forward clutch hydraulic circuit
		Fluid leakage from the governor valve hydraulic circuit
		Fluid leakage from the N-R accumulator seal rings
	In D and 1 range	Fluid leakage from the 2-3 accumulator seal rings
		Fluid leakage from the 1-2 accumulator seal rings
	In D and R range	Fluid leakage from the N-D accumulator seal rings
	In 2 and 1 range	Fluid leakage from the coasting clutch hydraulic circuit
		Stuck throttle backup valve
	In R and 1 range	Fluid leakage from the low and reverse brake hydraulic circuit
	In 2 range only	Fluid leakage from 2-4 brake servo hydraulic circuit
	In 1 range only	Stuck low reducing valve
	In R range only	Fluid leakage from reverse clutch hydraulic circuit
Excessive line pressure		Stuck throttle valve
		Stuck throttle modulator valve
		Stuck pressure regulator valve
		Stuck throttle backup valve



Governor Pressure Test

Preparation

1. Connect the **SST** to the governor pressure output point.
2. Place the pressure gauge inside the vehicle.
3. Warm up ATF and check ATF level.

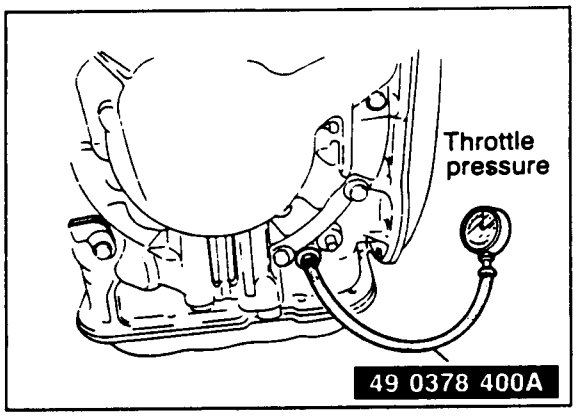
Drive the vehicle in D range.
Read the governor pressure at the speeds listed in the table below.

Specified governor pressure:

Vehicle Speed km/h (mph)	Governor Pressure kPa (kg/cm², psi)	
	FE engine	F8 engine
30 (19)	79—114 (0.81—1.16, 12—16)	82—117 (0.84—1.19, 12—17)
55 (34)	146—190 (1.49—1.94, 21—28)	157—201 (1.60—2.05, 23—29)
85 (53)	276—339 (2.81—3.46, 40—49)	302—366 (3.08—3.73, 44—53)

Evaluation

Condition	Possible Cause
Not within specification	Fluid leakage from the line pressure hydraulic circuit
	Fluid leakage from the governor pressure hydraulic circuit
	Defective or stuck governor valve



Throttle Pressure Test
Preparation
1. Connect the **SST** to the throttle pressure output point (Square head plug T).
2. Connect a tachometer to the engine.
3. Perform the preparation procedure shown in STEP 3 (STALL TEST).

1. Start the engine and check that the idle speed is **900** $\pm^{50}_{0}$ rpm.
2. Shift the selector to D range.
3. Read the throttle pressure at idle.
4. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
5. Read the throttle pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

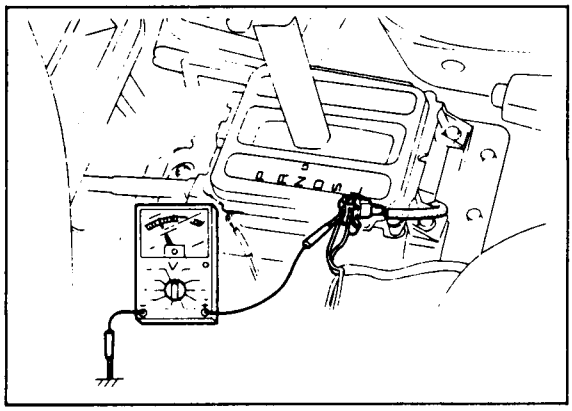
Caution
Steps 4 to 5 must be performed within 5 seconds.

Specified throttle pressure:

Condition	Throttle pressure kPa (kg/cm², psi)
When idling	83—113 (0.85—1.15, 12—16)
At stall speed	540—610 (5.5—6.2, 78—88)

Evaluation

Condition	Possible Cause
Not within specification	Stuck throttle valve
	Stuck pressure regulator valve
	Improper adjustment of throttle cable

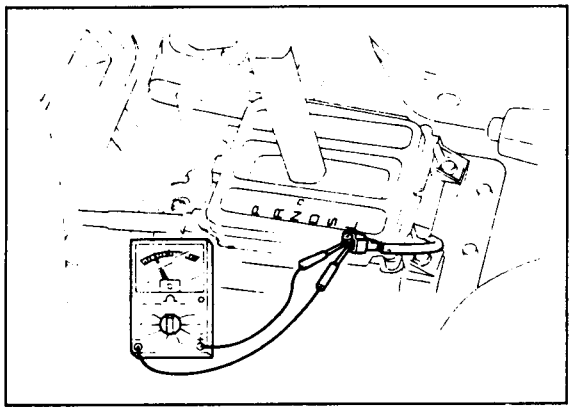


Inspection of Terminal Voltage

1. Remove the consol box.
2. Turn the ignition switch ON.
3. Check the voltage between the terminal (B) and ground while depressing the switch.

Terminal voltage	Switch
Approx. 12V	Depressed
Below 1.5V	Released

4. If correct, check continuty between the terminal.

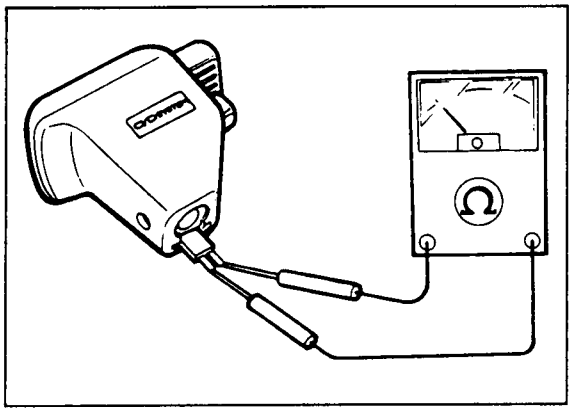


Inspection of Continuity

1. Disconnect the hold switch connector.
2. Check for continuity between the terminals while depressing the switch.

Continuity	Switch
YES	Released
NO	Depressed

3. If not correct, replace the hold switch.



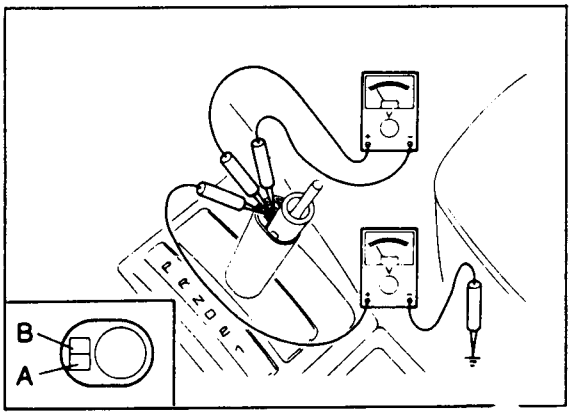
OD OFF SWITCH (G4A-HL)

Inspection of Continuity

1. Remove the selector lever knob.
2. Check the continuity of the terminals.

Switch	Continuity
Depressed	No
Released	Yes

3. If not correct, replace the selector lever knob.

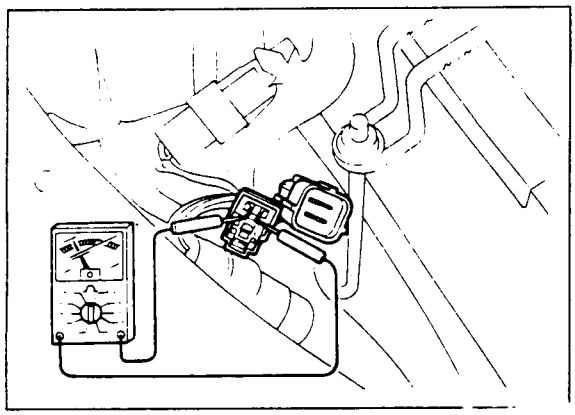


Inspection of Terminal Voltage

1. Check that continuity of the switch is OK.
2. Turn the ignition switch ON.
3. Check the voltage between terminal A and B, and between terminal A and ground.

Terminal	Voltage
A and B	Approx. 12V
A and ground	Approx. 12V

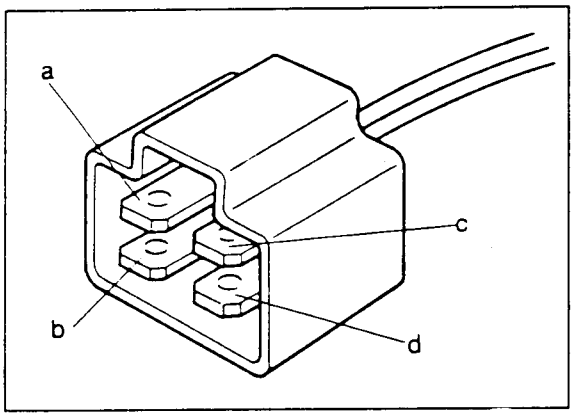
4. If not correct, check the wiring harness.



INHIBITOR SWITCH

Inspection

1. Check that the starter turns with the ignition switch at START position and the selector in the P and N ranges, and dose not operate in other positions.
2. Check that the back-up (reverse) light illuminates when shifted to the R range with the ignition switch in the ON position.
3. Check the inhibitor switch if it is not working properly.

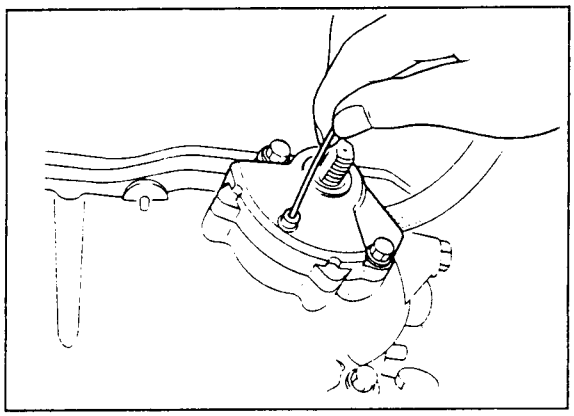


G4A-HL

Position	Connector terminal			
	a	b	c	d
P			○—○	
R	○—○			
N			○—○	
D, 1, 2				

○—○: indicates continuity

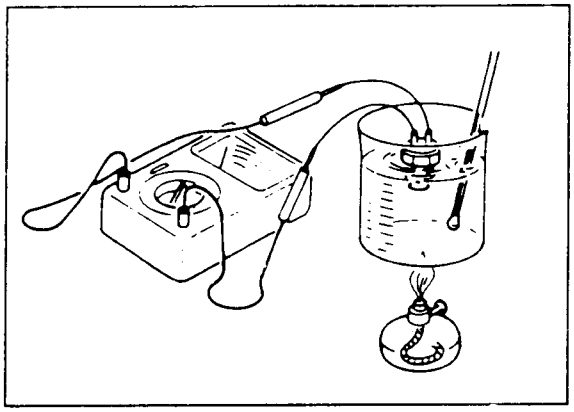
3. If not correct, replace switch and perform adjustment of inhibitor switch.



3. Remove the screw and move the inhibitor switch so that the small hole is aligned with the screw hole.
4. Set the alignment by inserting a **2.0 mm (0.079 in)** diameter pin through the holes.
5. Loosely tighten the switch mounting bolts, remove the pin, and reinstall the screw.
6. Tighten the switch mounting bolts to specification.

Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)

7. Recheck the continuity of the individual terminals.



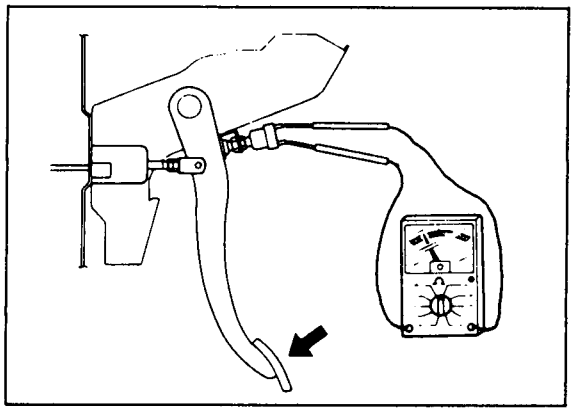
WATER TEMPERATURE SWITCH

Inspection

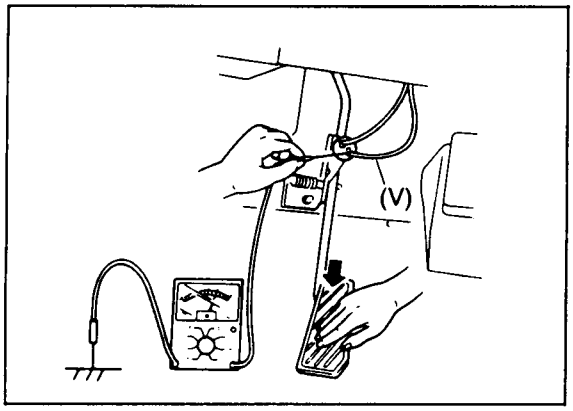
1. Remove the water temperature switch.
2. Place the switch in water with a thermometer and heat up the water gradually.
3. Check the continuity of the terminals. If necessary replace the switch.

Connection guide

Water temperature	Continuity
Below 65°C (149°F)	Yes
Above 72°C (162°F)	No



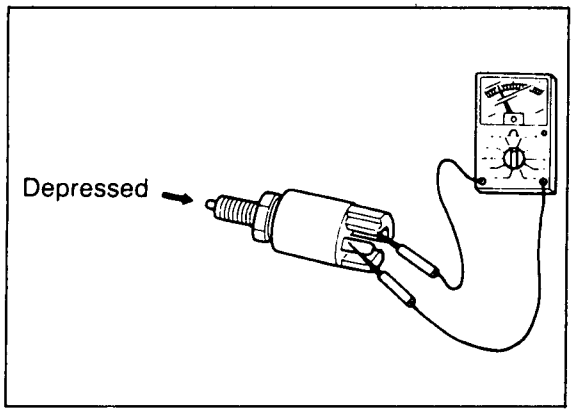
Inspection of Continuity
1. Disconnect the brake light switch connector.
2. Check for continuity between the terminals while depressing the brake pedal.



KICK-DOWN SWITCH (G4A-HL)
Inspection of Terminal Voltage
1. Turn the ignition switch ON.
2. Check the voltage at terminal (V) with a voltmeter.

Depressing stroke	Terminal voltage
7/8—8/8 (Full)	Approx. 12V
0—7/8	Below 1.5V

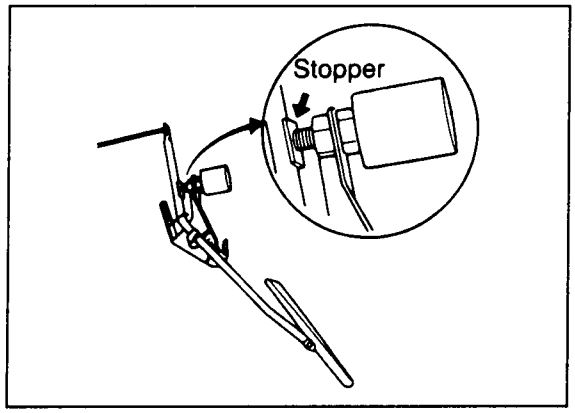
3. If not correct, check the wiring harness, switch, or adjust the switch position.



Inspection of Continuty
1. Disconnect the kick-down switch connector.
2. Check for continuity of the switch with an ohmmeter.

Switch	Continuity
Pushed	Yes
Released	No

3. If not correct, replace the kick-down switch.



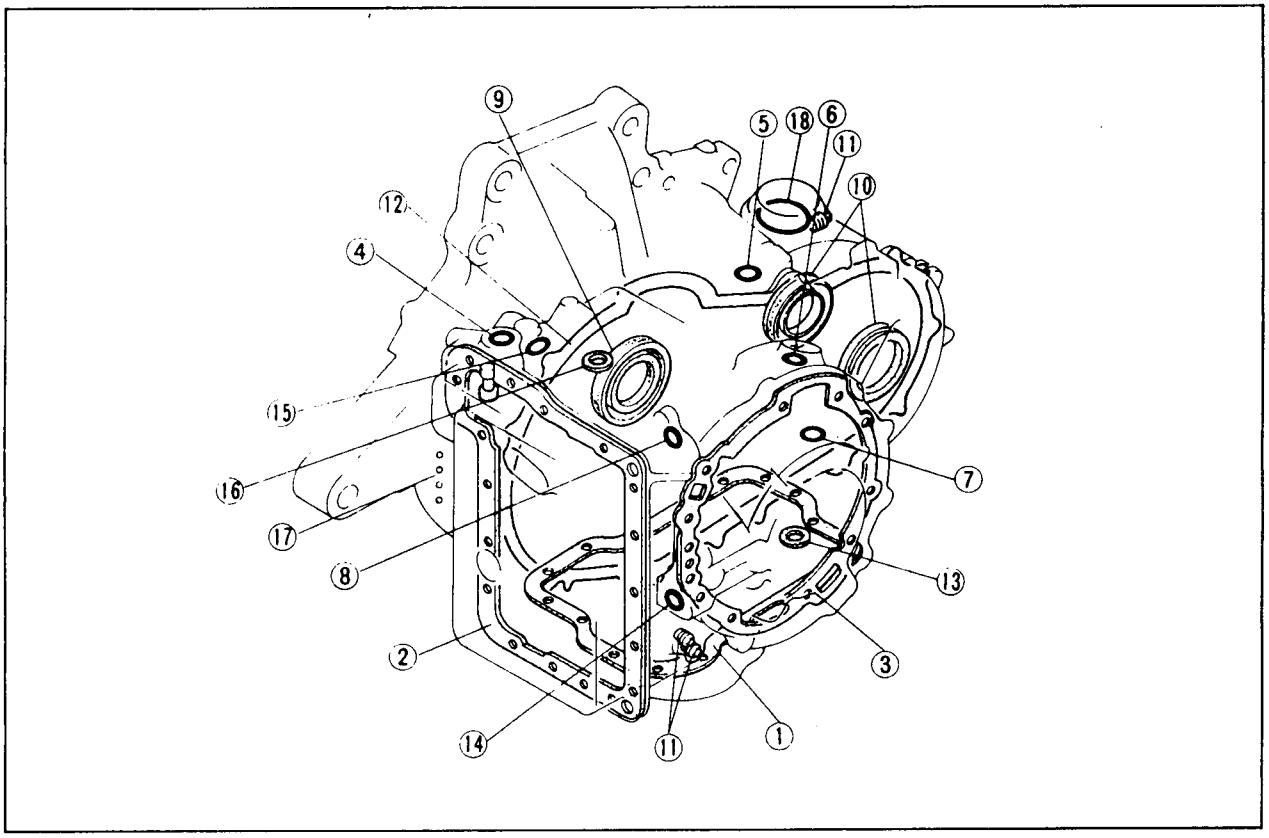
Adjustment
1. Loosen the kick-down switch locknuts.
2. Depress the accelerator pedal fully.
3. Turn the switch until the threaded case touches the stopper.
4. Turn the switch counterclockwise by one half revolution.
5. Secure the switch with the locknut.

ON-VEHICLE MAINTENANCE

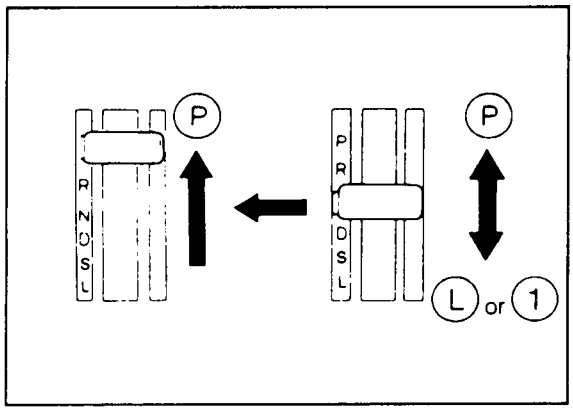
AUTOMATIC TRANSAXLE FLUID (ATF)

Inspection for Fluid Leaks

Check for fluid leaks; the following figure shows the locations where fluid leakage may possibly occur.



1. Oil pan
2. Control valve body cover
3. Oil pump
4. Inhibitor switch
5. Speedometer driven gear
6. Pulse generator (G4A-EL)
7. Oil filler tube
8. Throttle cable
9. Bearing cover
10. Driveshaft
11. Square head plug
12. Transaxle case
13. Drain plug
14. Oil cooler return pipe
15. Oil cooler outlet pipe
16. Fluid temperature switch (G4A-EL)
17. Blind plugs
18. Governor cover (G4A-HL)

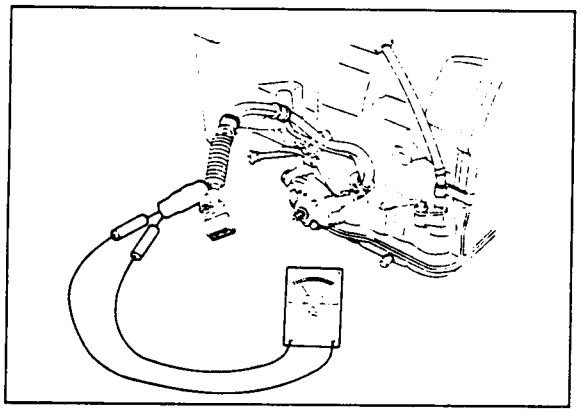


Inspection of Level

1. Apply the parking brake and position wheel chocks to prevent the car from rolling forward.

   Note
   Place the car on a flat, level surface.

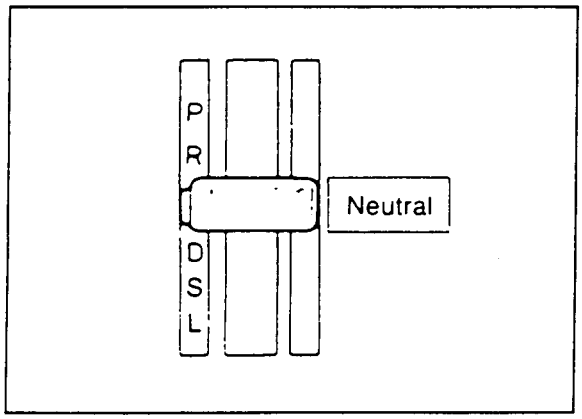
2. Run the engine so that the automatic transaxle fluid reaches specified temperature.
3. While the engine is idling, shift the select lever from P to L or P to 1 and back again.
4. Let the engine idle.
5. Shift the select lever to P.



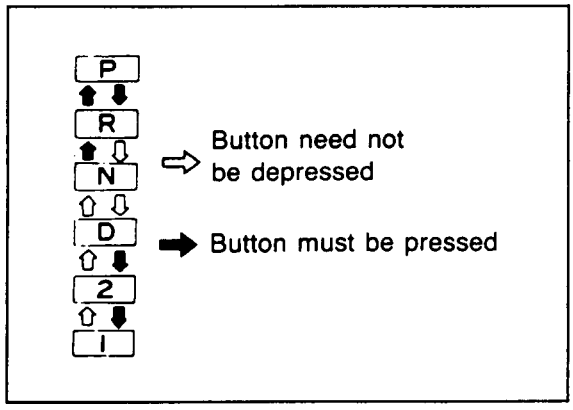
OD RELEASE SOLENOID VALVE (G4A-HL)
Inspection of Resistance
1. Disconnect the solenoid valve connector.
2. Check resistance between the terminals.

Resistance: 13—27 Ω

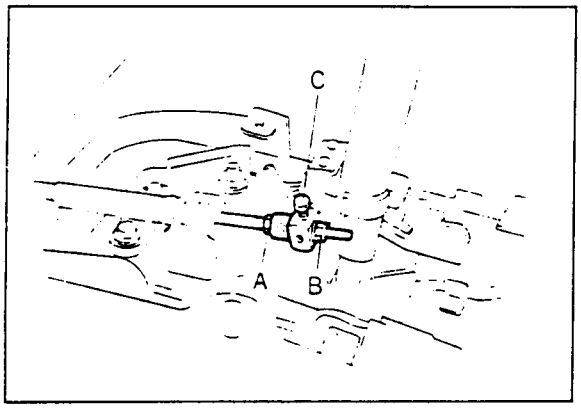
3. If not correct, replace the solenoid valve.



Adjustment
1. Shift the selector lever to N range.
2. Loosen the inhibitor switch mounting bolts.

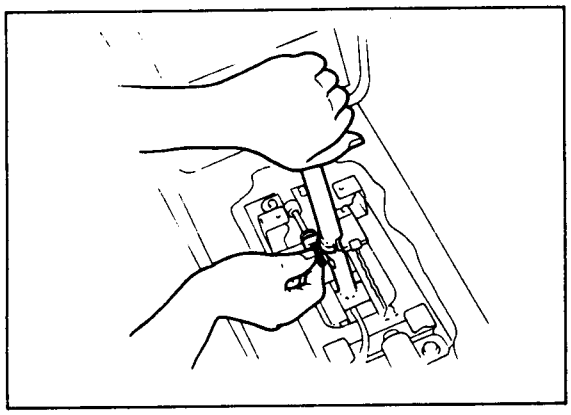


SELECTOR LEVER
Inspection
1. Check that the selector lever can only be shifted as shown in the figure.
2. Make sure there is a click at each range when shifted from the P ↔ L or P ↔ 1 range.
3. Check that the position of the selector lever and the indicator are exact.
4. Check that the button returns smoothly when used to shift the selector.



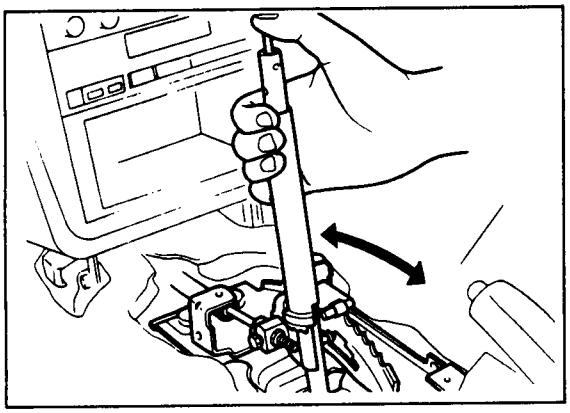
Adjustment
1. Loosen locknuts A, B, and C.
2. Shift the selector lever to the P range.
3. Shift the transmission to the P range by moving the manual shaft of the transmission.
4. Tighten locknut C to the specified torque.

Tightening torque:
8—11 N·m (80—110 cm-kg, 67—96 in-lb)

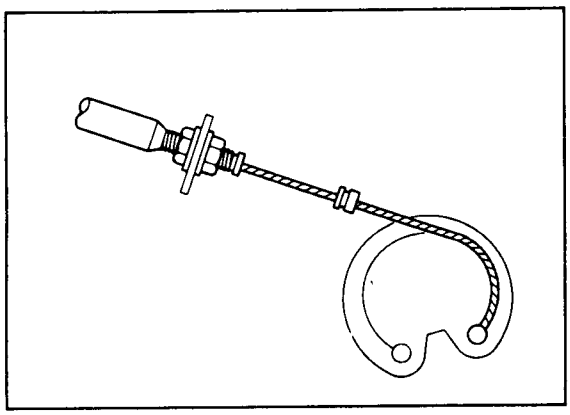


5. Turn the nut by hand until locknut A touches the spacer lightly.
6. Tighten locknut B to the specified torque.

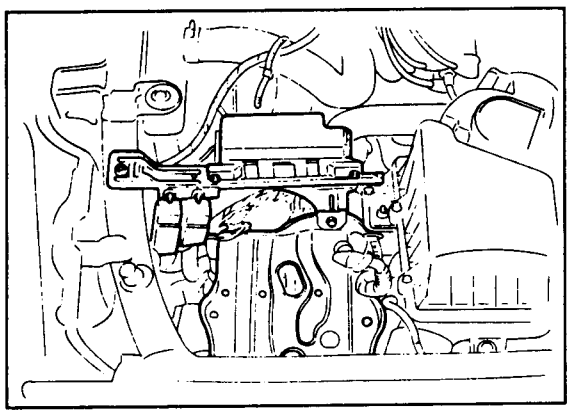
Tightening torque:
8—11 N·(80—110 cm-kg, 67—96 in-lb)



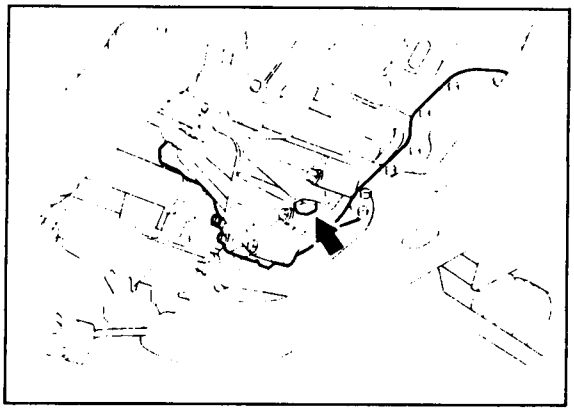
7. Verify that there is a click at each range when shifted from the P ↔ L range.
8. Check that the position of the selector lever and the indicator are exact.
9. Check that the button returns smoothly when used to shift the selector.
10. If necessary, check the spring condition.



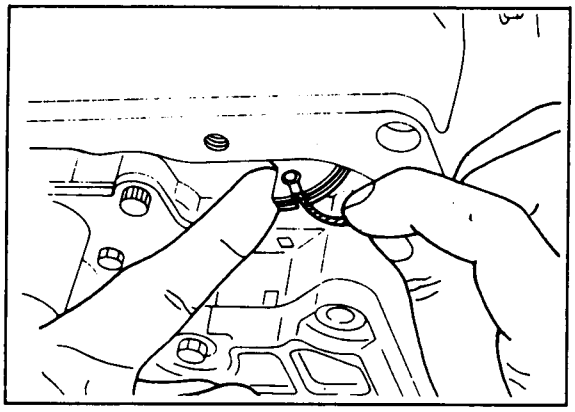
THROTTLE CABLE
Inspection
1. Check the inner and outer cable for damage.
2. Make sure that the accelerator operates smoothly.



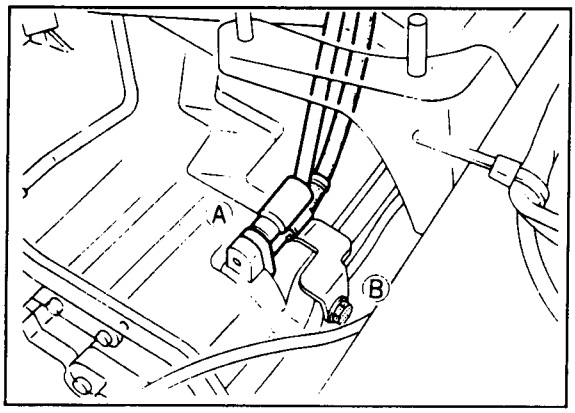
Removal
Remove the battery and battery carrier.



Separate the harness from the clip.
Jack up the vehicle and support it with safety stands, then drain the ATF.



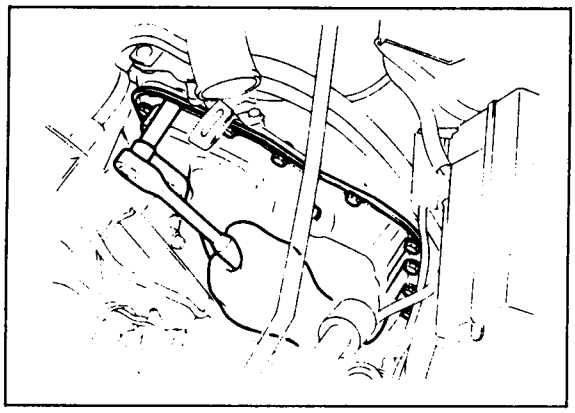
Remove the throttle cable from the throttle cam (throttle chamber).
Remove the control valve body cover and gasket.
Remove the throttle cable from the throttle cam (control valve body).
Remove the mounting bolt and throttle cable from the transaxle.
Remove the O-ring.



Installation
Install in the reverse order of removal referring to installation note.

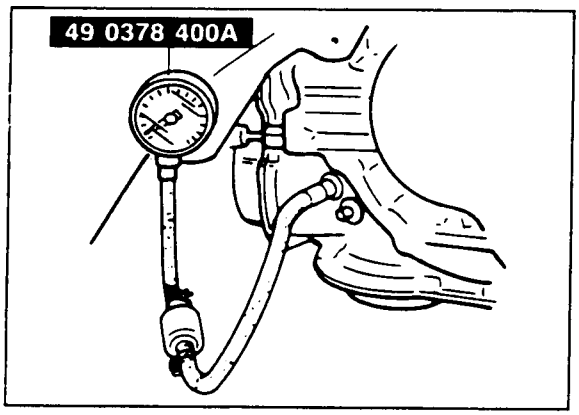
Installation note
Throttle cable
Install the throttle cable and a new O-ring into the transaxle case.

Tightening torque:
Ⓐ 8—11 N·m
(80—110 cm-kg, 69—95 in-lb)
Ⓑ 19—26 N·m
(1.9—2.6 m-kg, 14—19 ft-lb)



Control valve body cover
Install the control valve body cover and a new gasket.

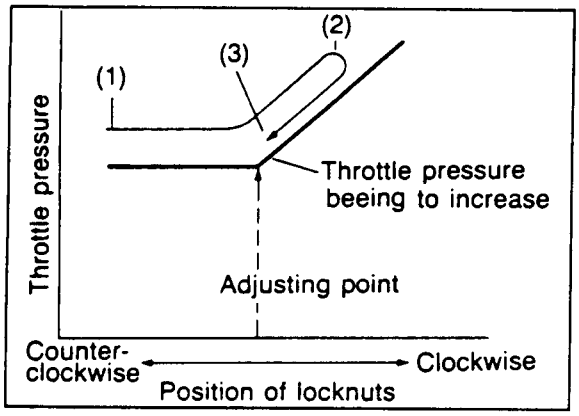
Tightening torque:
8—11 N·m (85—110 cm-kg, 74—95 in-lb)



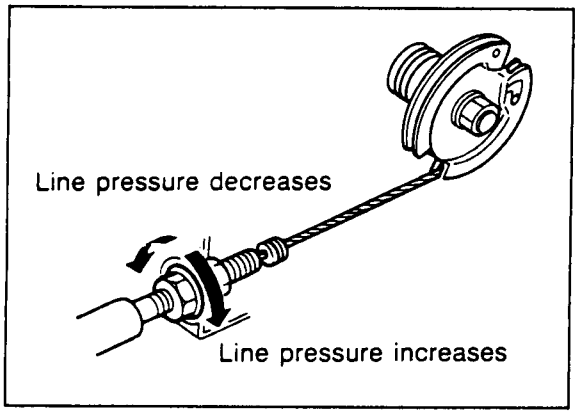
Adjustment (G4A-HL)

1. Remove the splash shield next to the left front tire.
2. Remove the square head plug T and install the **SST**.
3. Shift into P range and start the engine. Warm up the engine to normal operating temperature, and adjust the idle speed.

Idle speed: 900 $\pm^{50}_{0}$ rpm



4. Adjust locknuts as follows:
   When the locknuts are moved, throttle pressure is increased or decreased as shown. Adjust the locknuts to the correct position using the following procedure.
   (1) Initially install the locknuts fully away from the throttle cam. (Loosen the cable all the way)
   (2) Adjust the locknuts in a clockwise direction as viewed from the front of the vehicle until the throttle pressure begins to increase above the specification shown below.

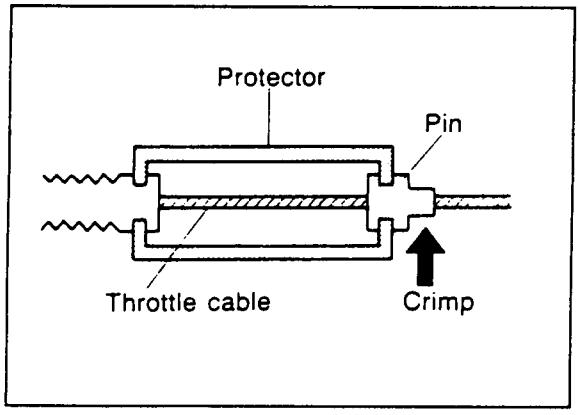


   (3) Adjust the locknuts in a counterclockwise direction until the throttle pressure decreases to the specification. Tighten the locknuts.

Specified pressure: 88—108 kPa (0.9—1.1 kg/cm^2, 13—16 psi)

Note
Transmission in P range

5. Turn off the engine.



6. Reinstall the square head plug.

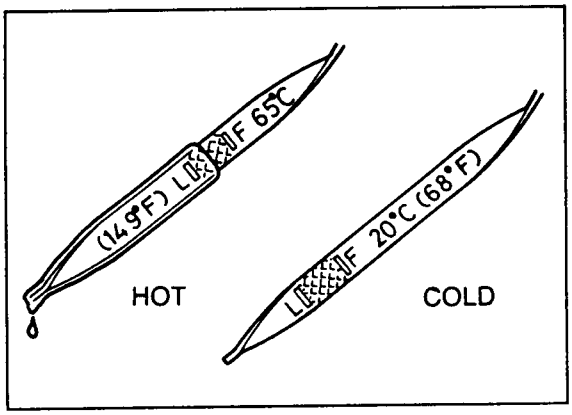
Tightening torque:
5—10 N·m (50—100 cm-kg, 43—87 in-lb)

7. Fully open the throttle valve; then crimp the pin with the protector installed as shown.
8. Remove the protector.

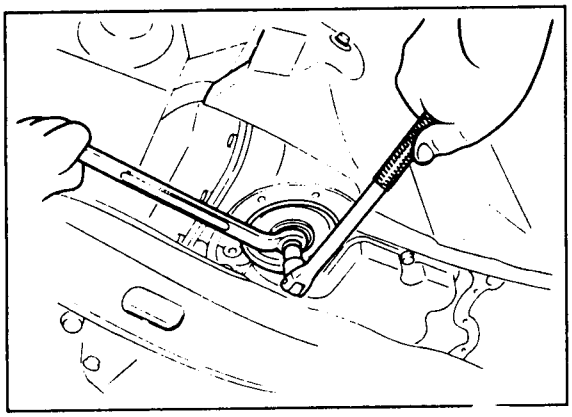


Install the magnets on the oil pan as shown and install the oil pan along with a new gasket.

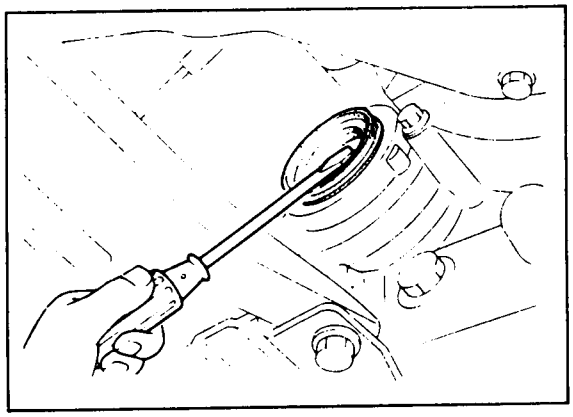
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)



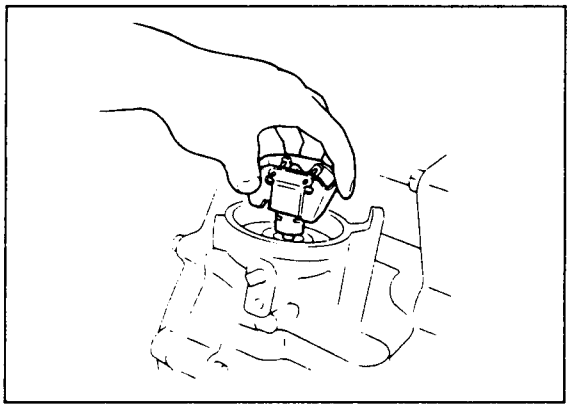
Add ATF, and with the engine idling, check the fluid level and for leaks.



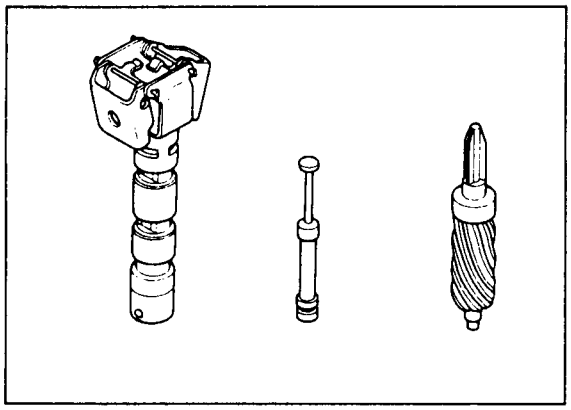
ADJUSTMENT OF 2-4 BRAKE BAND
Remove the oil pan.
Adjust the 2-4 brake band.



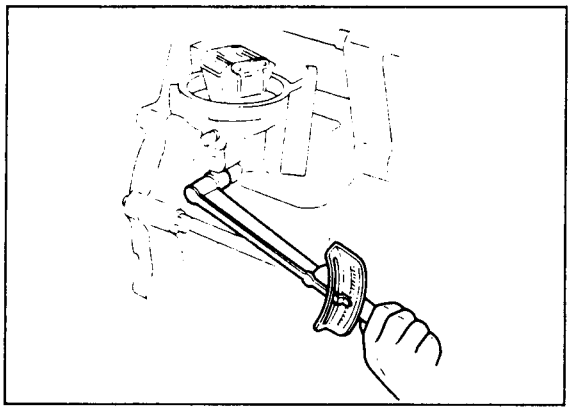
REPLACEMENT OF DRIVESHAFT OIL SEAL
Replace the oil seal in the same manner as for the manual transaxle.



GOVERNOR (G4A-HL)
Removal
Remove the clip from the governor cover.
Remove the stopper bolt; then remove the governor assembly.



Disassembly, Inspection and Assembly
Refer to Governor section of INSPECTION AND REPAIR.



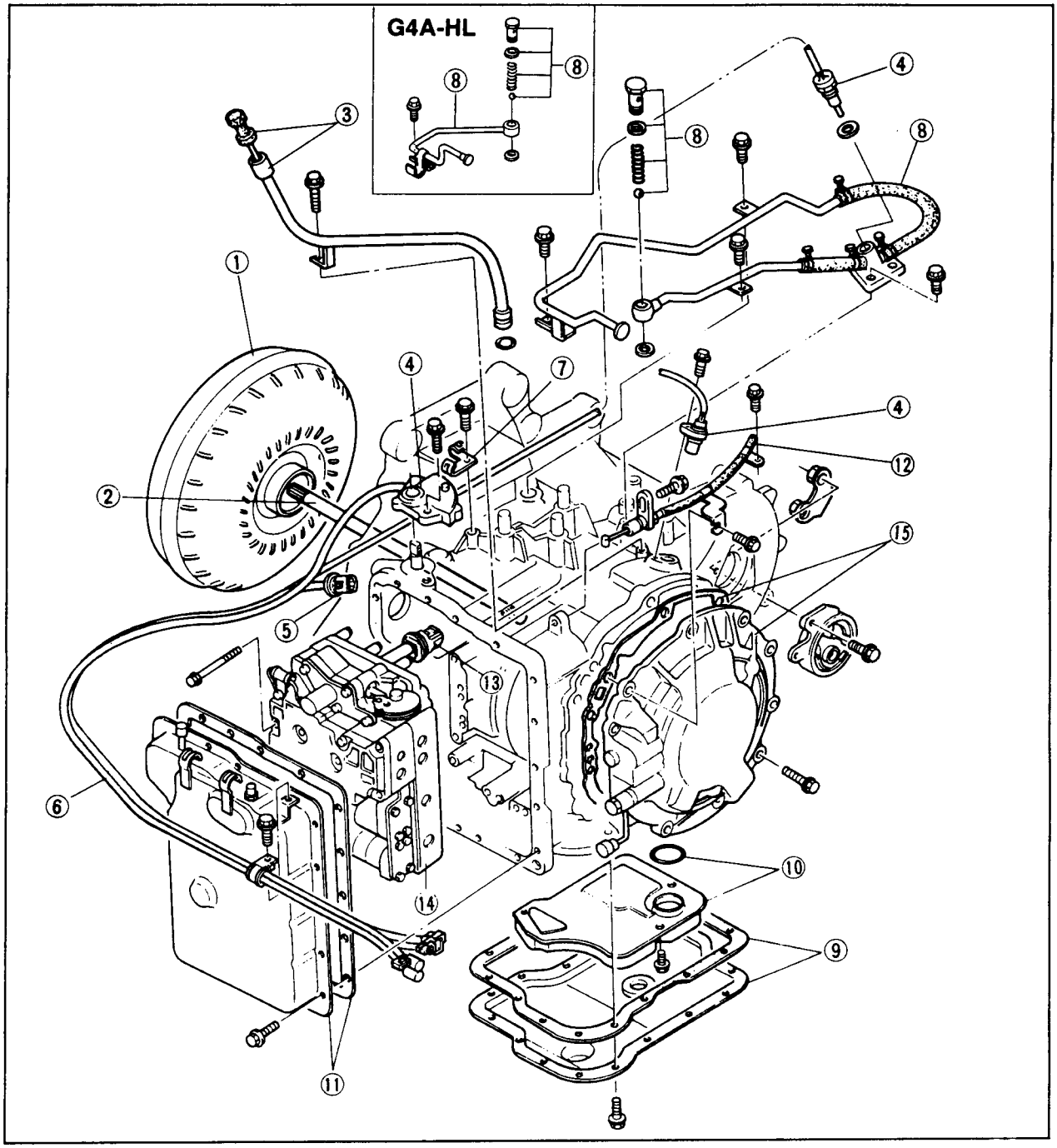
Installation
Install in the reverse order of removal referring to installation note.

Installation note
Stopper bolt
Tighten the stopper bolt.

Tightening torque:
6—9 N·m (60—90 cm-kg, 52—78 in-lb)

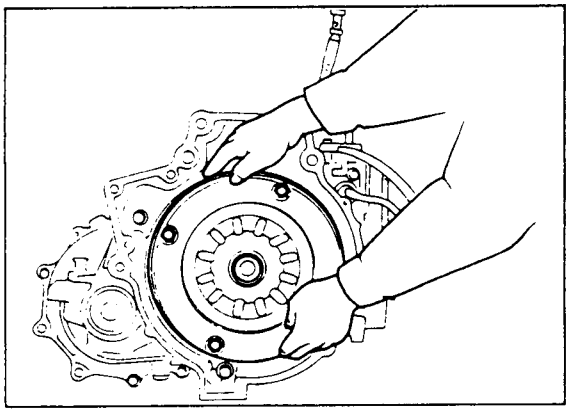
DISASSEMBLY

DISASSEMBLY
Components



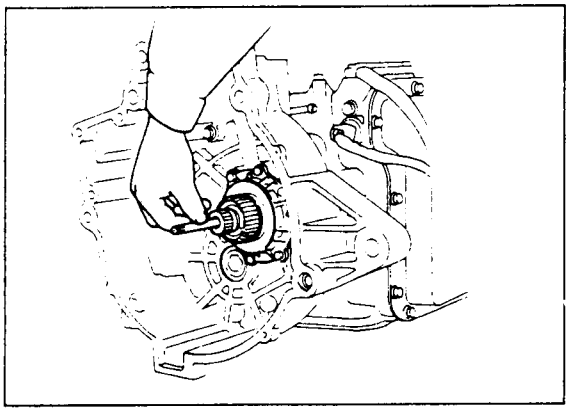
1. Torque converter
2. Oil pump shaft
3. Oil level gauge and oil filler tube
4. Pulse generator, fluid temperature switch, and inhibitor switch
5. Solenoid connector
6. Wire harnesses
7. Harness clip
8. Oil pipes, oil hoses, and switch box
9. Oil pan and gasket
10. Oil strainer and O-ring
11. Control valve body cover and gasket
12. Throttle cable
13. Solenoid connector (Valve body side)
14. Control valve body
15. Oil pump and gasket

Procedure
Precaution
(1) Drain the ATF before removing the transaxle from the vehicle.
(2) Disassemble the transaxle in a clean area (dustproof workspace) to prevent dust entry into the mechanisms.
(3) Clean the transaxle exterior thoroughly with steam and/or cleaning solvents prior to disassembly.
(4) Inspect the individual transaxle components in accordance with the Troubleshooting during disassembly.
(5) Use plastic hammers when applying force to separate the light alloy case joints.
(6) Do not use rags during disassembly.
(7) Neatly arrange the removed parts in order during disassembly.

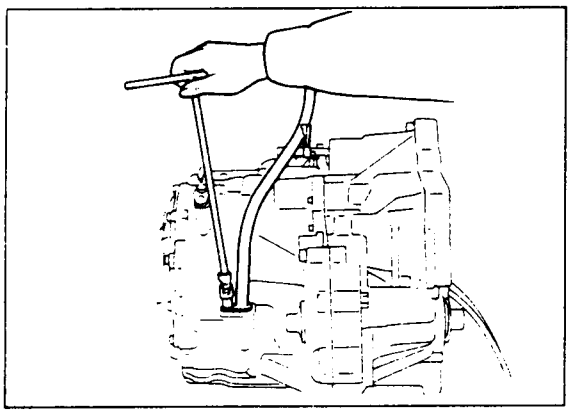


1. Remove the torque converter from the converter housing.

Note
Do not allow the ATF to spill when removing the torque converter.

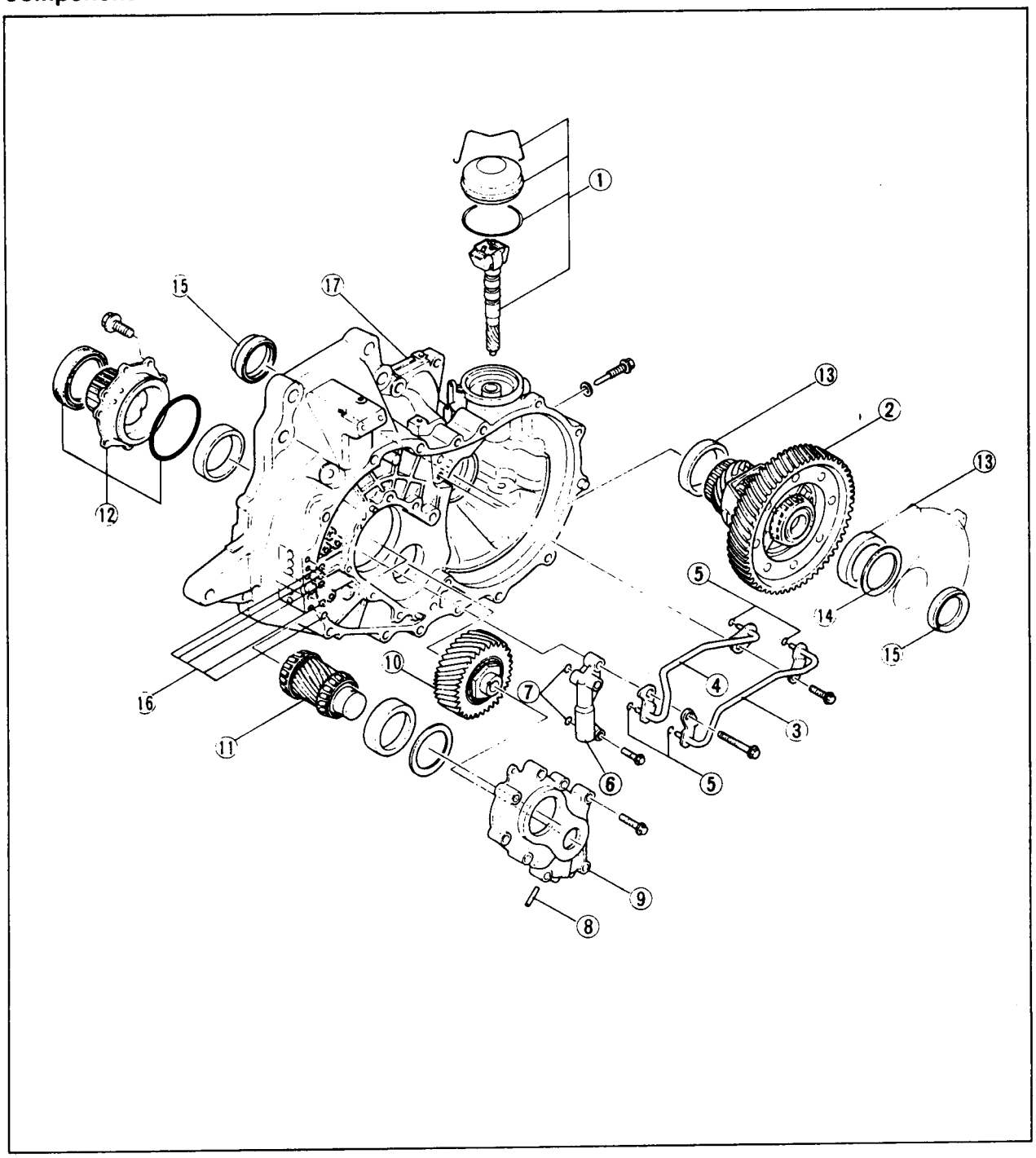


2. Pull out the oil pump shaft by hand.

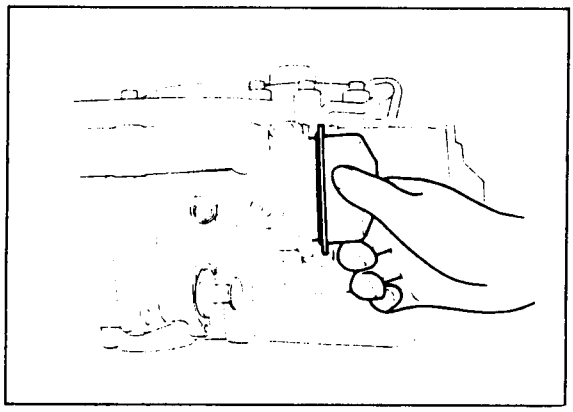


3. Remove the oil level gauge and oil filler tube.

DISASSEMBLY-
Component



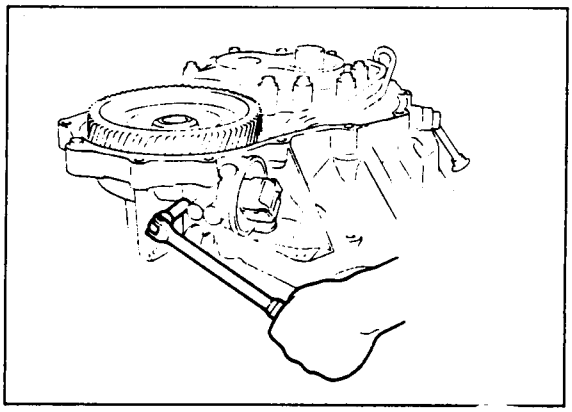
1. Governor assembly (G4A-HL)
2. Differential assembly
3. Governor outlet pipe (G4A-HL)
4. Governor inlet pipe (G4A-HL)
5. O-rings (G4A-HL)
6. 2-3 accumulator piston assembly
7. O-rings
8. Roll pin
9. Bearing housing
10. Idle gear assembly
11. Output gear assembly
12. Bearing cover assembly
13. Bearing outer races
14. Adjust shim
15. Oil seals
16. O-rings
17. Converter housing



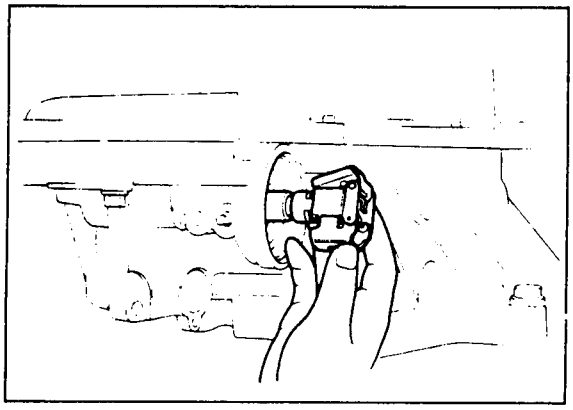
Procedure

Remove the governor assembly.

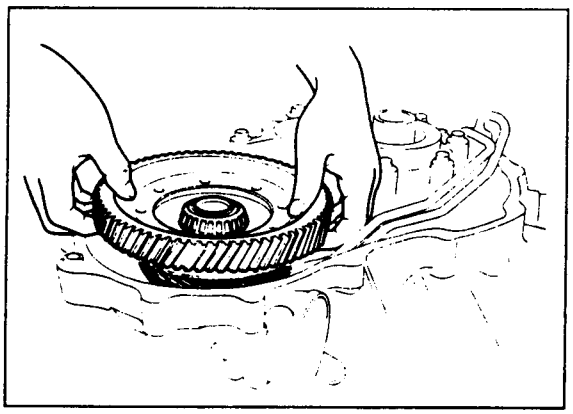
(1) Remove the clip, governor cover and O-ring.



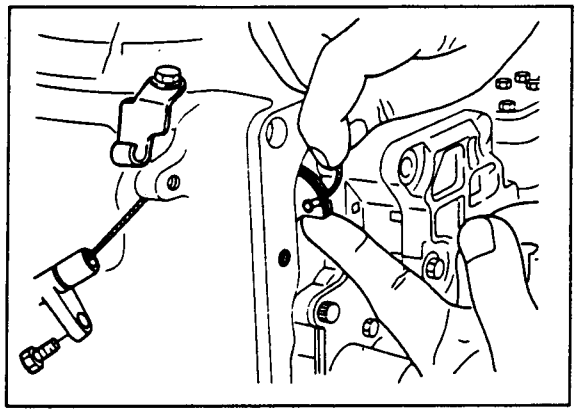
(2) Remove the stopper bolt.



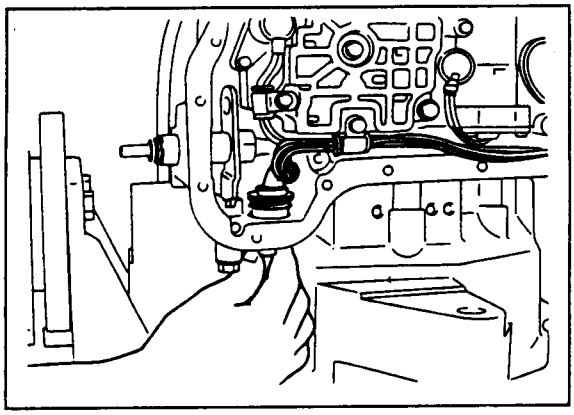
(3) Remove the governor assembly.



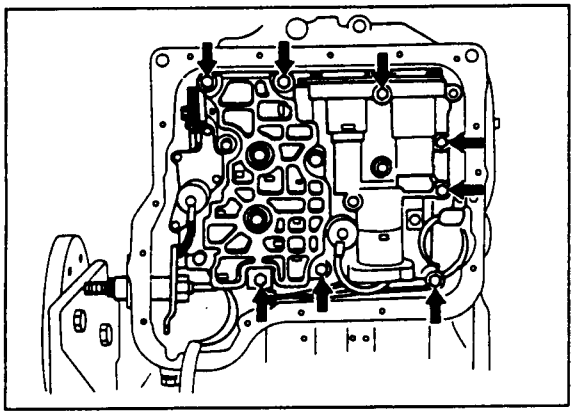
Remove the differential assembly.



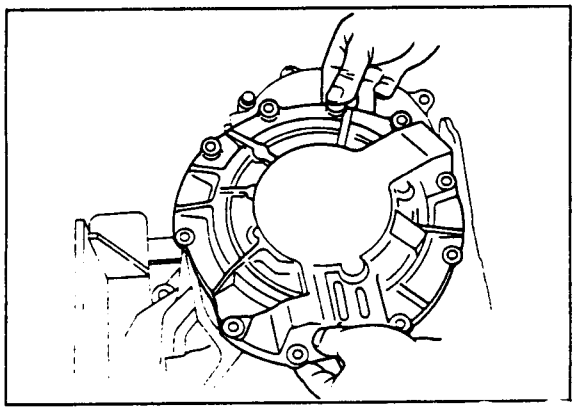
. Remove the throttle cable.
(1) Remove the throttle cable attaching bolt and bracket.
(2) Remove the cable from the throttle cam of the valve body.



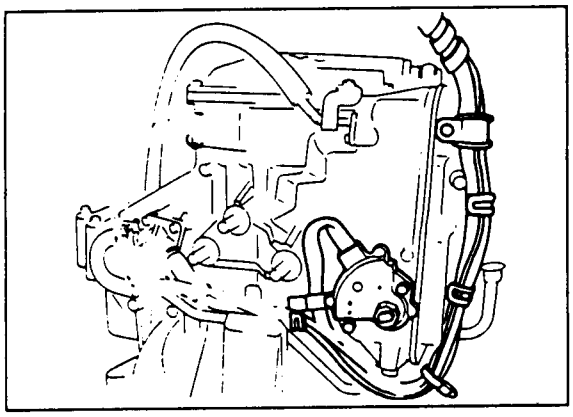
Pinch the teeth of the solenoid connector and remove it by pushing inward.



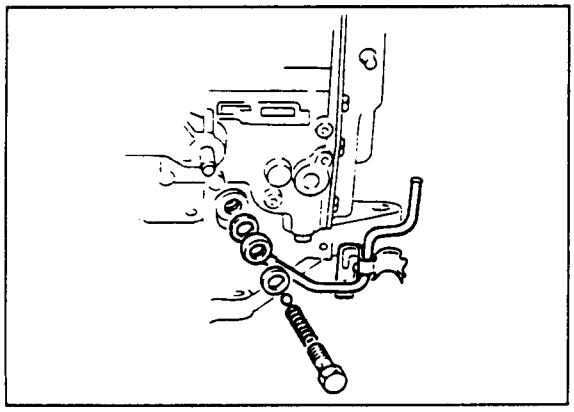
Remove the control valve body as an assembly.



Remove the oil pump as an assembly.

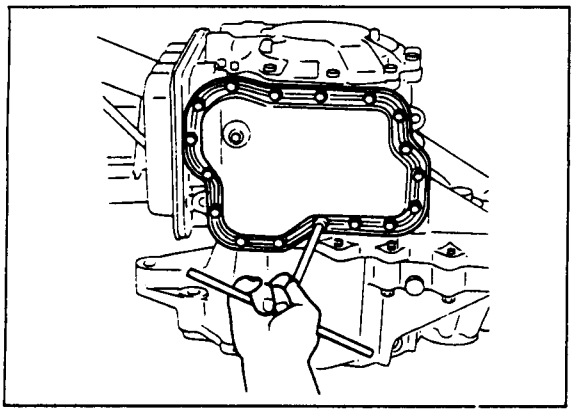


G4A-HL
Remove the inhibitor switch.

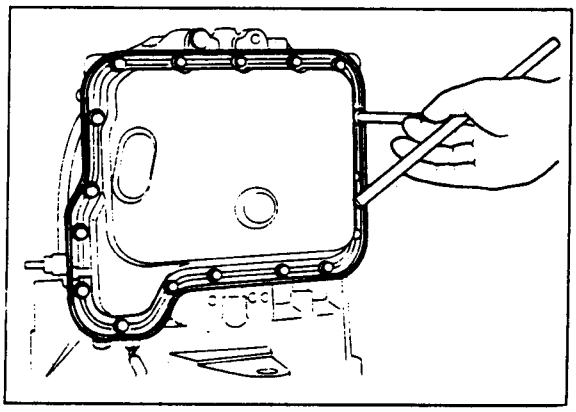


G4A-HL
Remove the oil pipe.

Note
Remove the ball from the case.

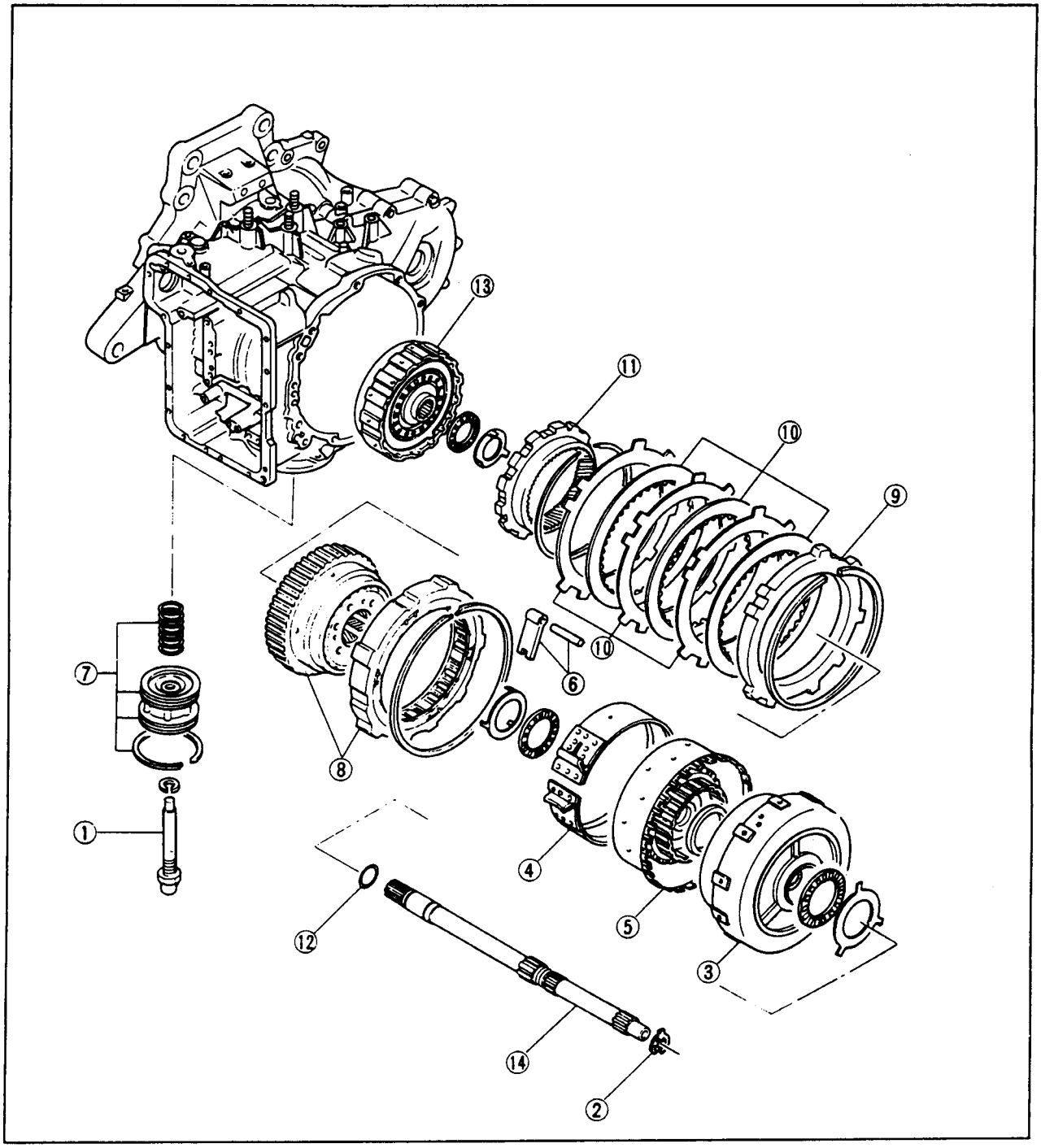


Remove the oil pan and gasket.



Remove the control valve body cover and gasket.

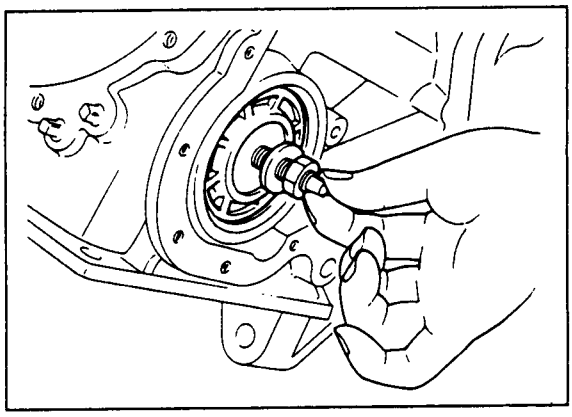
DISASSEMBLY
Components



1. Piston stem
2. Snap ring
3. Clutch assembly
4. 2-4 brake band
5. Small sun gear and one-way clutch
6. Anchor strut and shaft
7. Servo
8. One-way clutch and carrier hub assembly

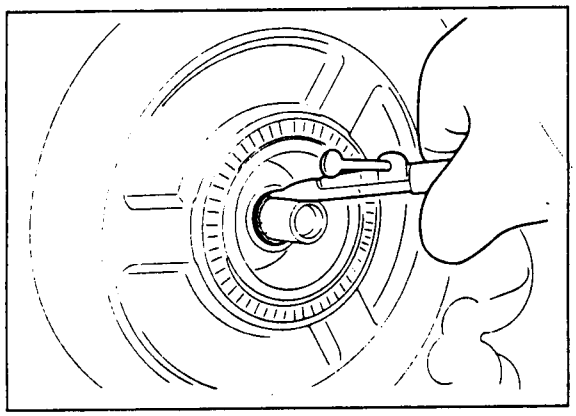
—Low and reverse brake—

9. Retaining plate
10. Drive and driven plates
11. Internal gear
12. O-ring
13. 3-4 clutch assembly
14. Turbine shaft



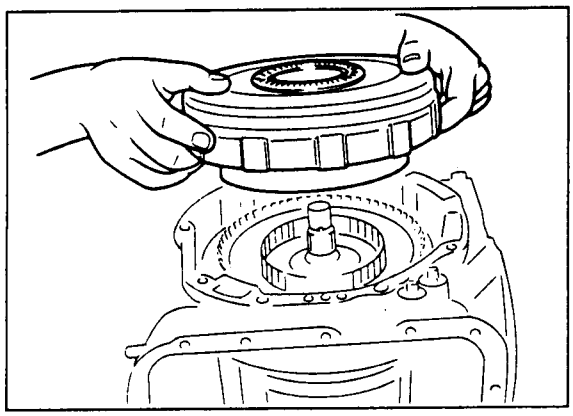
Procedure

Remove the piston stem from the servo.

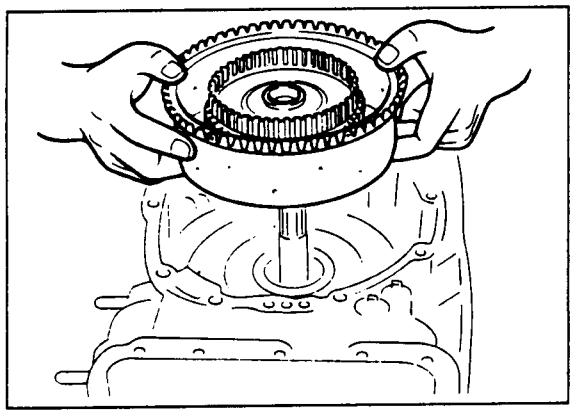


Remove the clutch assembly.

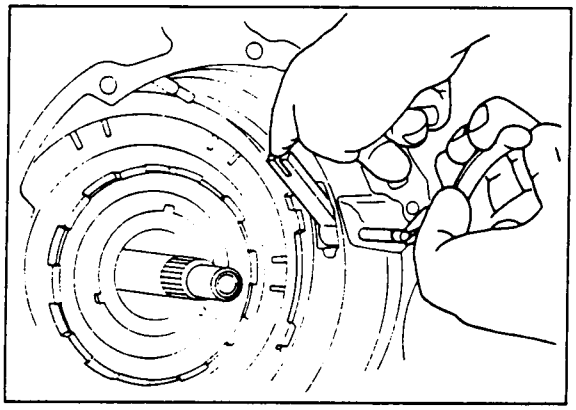
(1) Remove the turbine shaft snap ring.



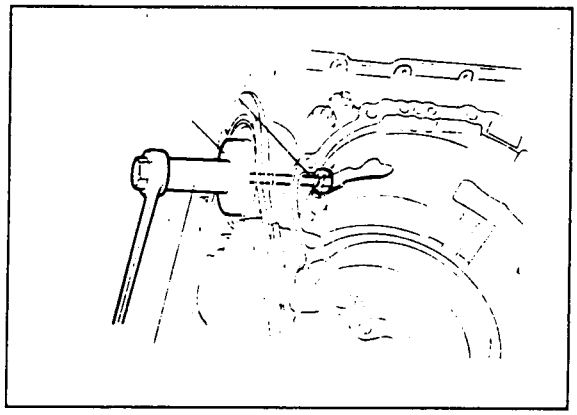
(2) Pull the reverse and forward drum and remove the clutch assembly.



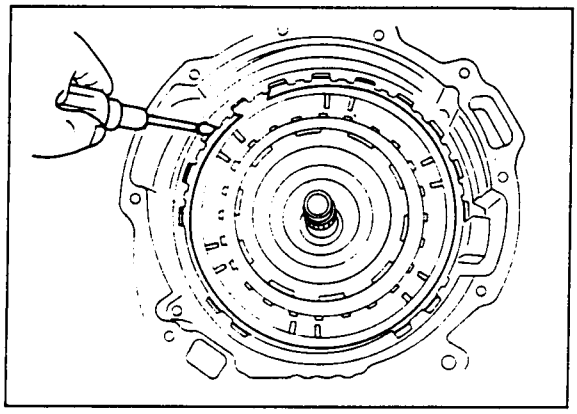
Remove the small sun gear and one-way clutch.



Pull the anchor shaft while holding the strut, then remove the strut.

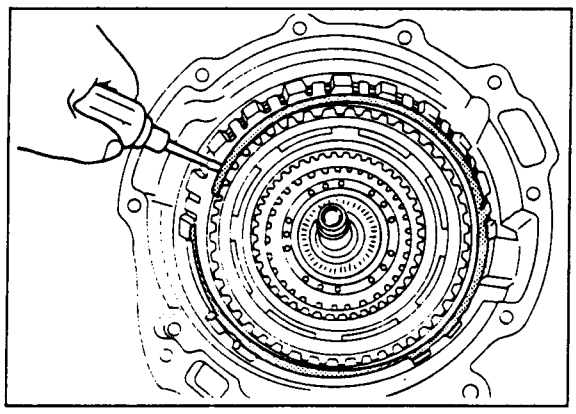


Remove the servo.
(1) Remove the snap ring with the **SST**.
(2) Remove the servo and spring.

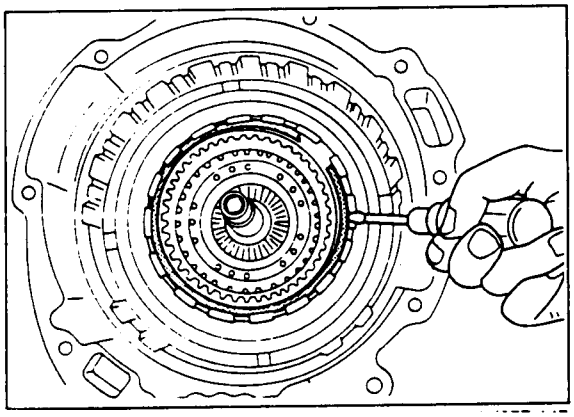


Remove the one-way clutch and carrier hub assembly.
Remove the snap ring.

Remove the internal gear from the 3-4 clutch drum.

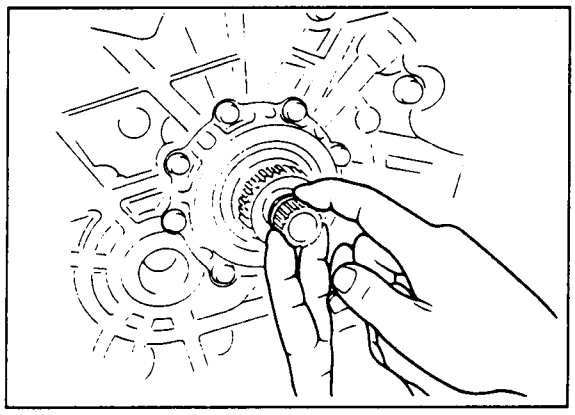


Remove the low and reverse brake assembly.
Remove the snap ring.

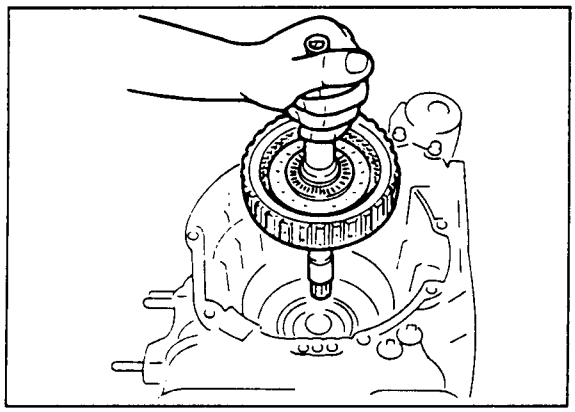


Remove the internal gear.
Remove the snap ring.

Remove the retaining plate and the drive and driven plates.



Remove the 3-4 clutch assembly.
Remove the O-ring from the turbine shaft at the converter housing side.

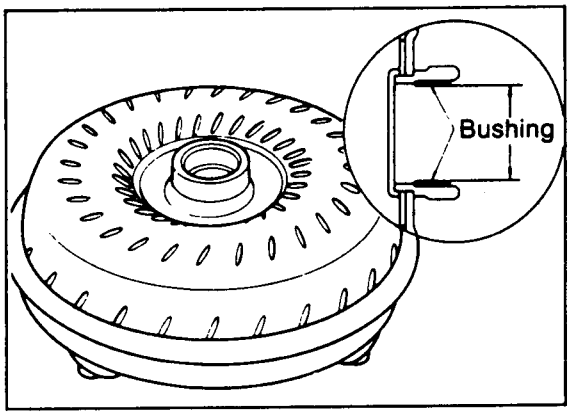


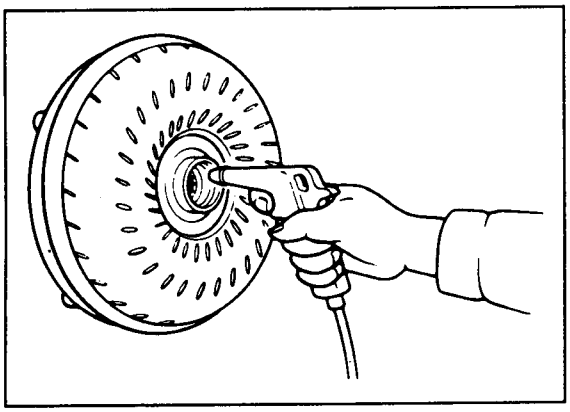
Pull out the turbine shaft to remove the 3-4 clutch assembly.
Remove the 3-4 clutch assembly.

INSPECTION AND REPAIR

PRECAUTION

(1) Several of the parts resemble each other; organize them so that they do not get mixed up.
(2) Clean each part with cleaning oil, clean out the oil holes and oil passages with compressed air, and check that there are no obstructions.
(3) When using cleaning oil and compressed air, wear protective eyewear.
(4) If a clutch plate or brake band is replaced with a new one, soak it in ATF for 2 hours or more before installing.
(5) Before assembly, apply ATF to all seal rings, rotating parts, and sliding parts.
(6) All seals, gaskets and roll pins must be replaced with new ones during assembly.
(7) Use petroleum jelly, not grease where required.
(8) When it is necessary to replace a bushing, replace the assembly which includes that bushing.





TORQUE CONVERTER

The torque converter is welded together and cannot be disassembled.

Inspection

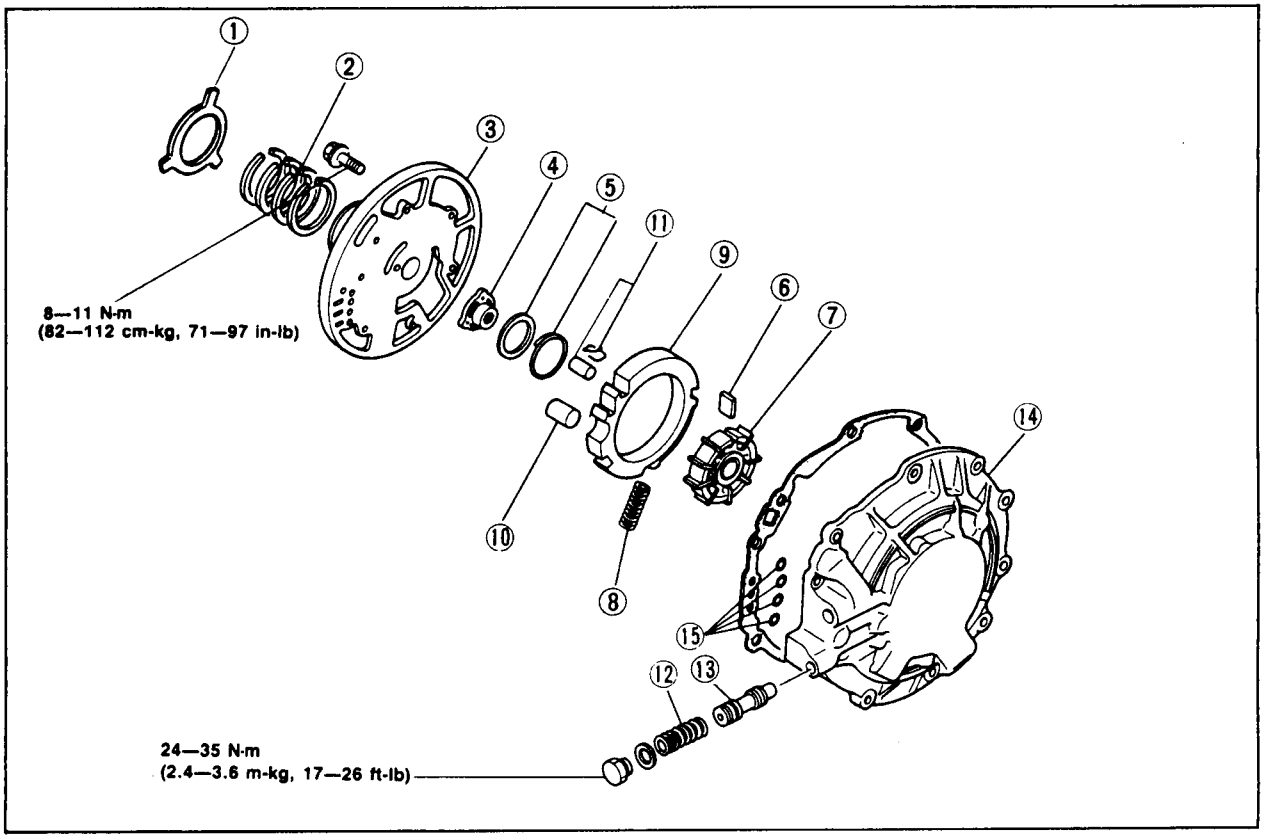
1. Check the outer part of the converter for damage or cracks, and replace it if necessary.
2. Check whether there is any rust on the pilot hub of the converter or on the boss. If there is any, remove it completely.
3. Measure the bushing of the converter boss. Replace the converter assembly if the bushing is worn.

Bushing inner diameter
Standard: 53.030 mm (2.088 in)
Maximum: 53.076 mm (2.090 in)

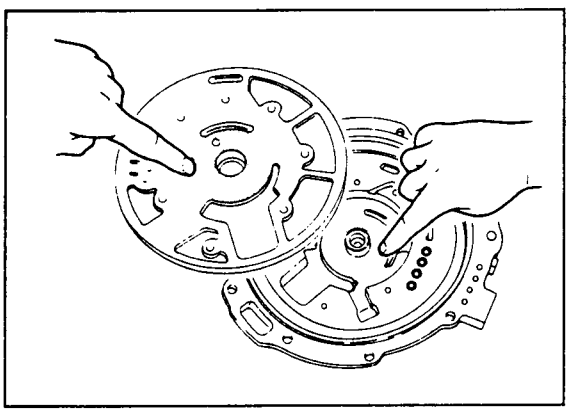
Washing Inside of Converter

1. Drain any ATF remaining in the converter.
2. Pour in solvent [approximately **0.5 liter (0.53 US qt, 0.44 Imp qt)**].
3. Shake the converter to clean the inside. Pour out the solvent.
4. Clean the inside of the converter with compressed air so that the inside is perfectly empty.
5. Pour in ATF.
6. Shake the converter to clean the inside. Pour out the ATF.

OIL PUMP
Disassembly
Disassemble in the sequence shown in the figure.



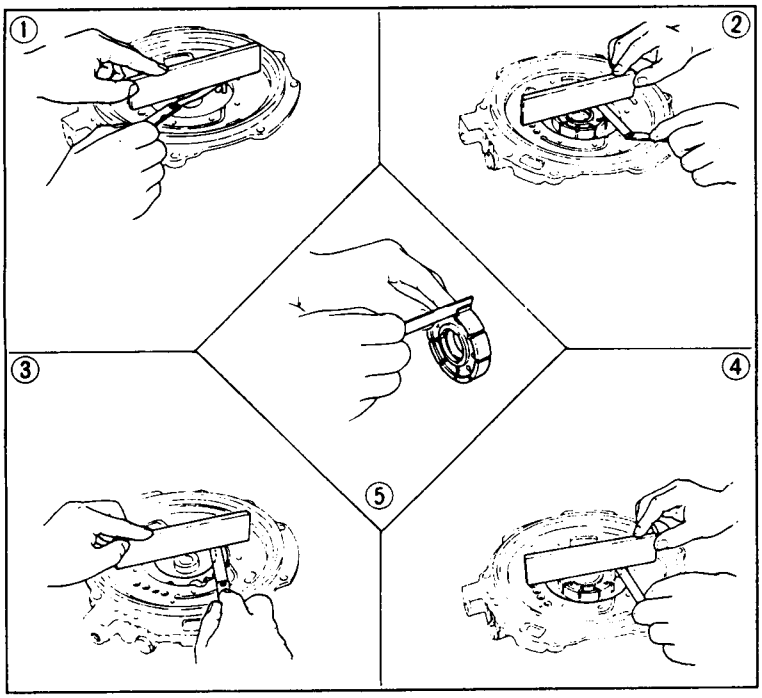
1. Bearing race
2. Seal rings
3. Oil pump cover
4. Pump flange
5. Guide ring and guide spring
6. Vane
7. Rotor
8. Spring
9. Cam ring
10. Pivot roller
11. Seal pin and spring
12. Spring
13. Valve
14. Oil pump body
15. O-ring



Inspection
Check the following and replace any faulty parts.
1. Sliding surfaces of the oil pump cover and oil pump body for damage or wear
2. Broken or worn seal ring
3. Weakened spring

Free length of springs:
(1) For the cam ring (No. 8)
41.6 mm (1.64 in)
(2) For the valve (No. 12)
35.0 mm (1.38 in)

4. Clearance
Measure the clearances below; if not within specification, replace the oil pump.



1. Seal pin—Oil pump cover
Standard:
0.005—0.020 mm
(0.0002—0.0008 in)
Maximum: 0.060 mm (0.002 in)

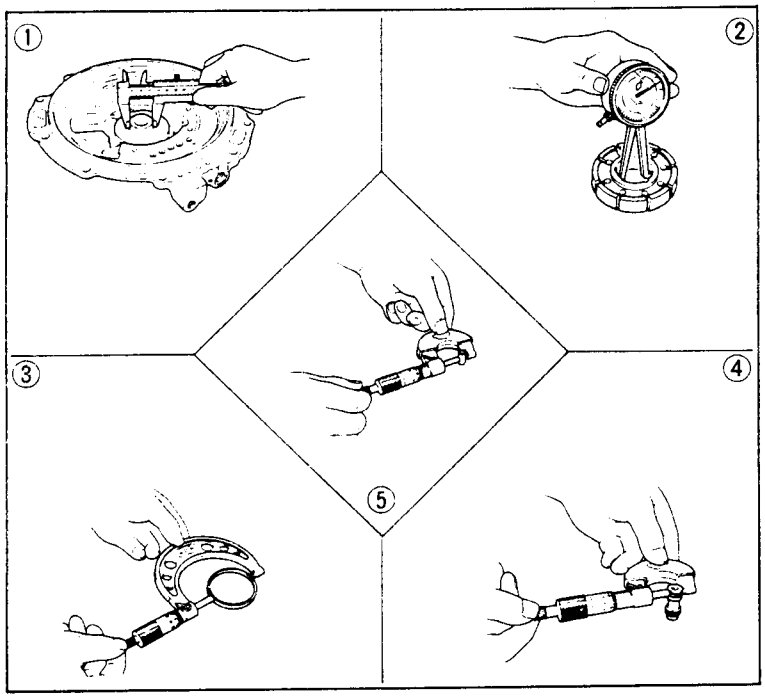
2. Rotor—Oil pump cover
Standard:
0.005—0.020 mm
(0.0002—0.0008 in)
Maximum: 0.030 mm (0.0012 in)

3. Cam ring—Oil pump cover
Standard:
0.005—0.020 mm
(0.0002—0.0008 in)
Maximum: 0.080 mm (0.003 in)

4. Vane—Oil pump cover
Standard:
0.015—0.050 mm
(0.0006—0.0020 in)
Maximum: 0.080 mm (0.003 in)

5. Vane—Rotor groove
Standard:
0.010—0.045 mm
(0.0004—0.0018 in)
Maximum: 0.065 mm (0.0026 in)

5. Wear limit
Check each part for wear; if not within specification, replace the oil pump.



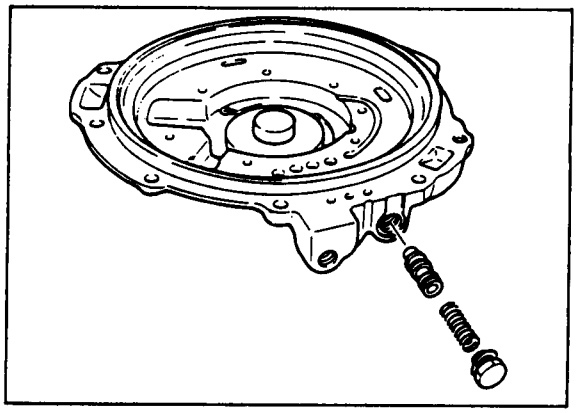
1. Oil pump body sleeve.. outer diameter
Standard: 28.00 mm (1.102 in)

2. Rotor bushing.... inner diameter
Standard: 28.00 mm (1.102 in)
Maximum: 28.05 mm (1.104 in)

3. Guide ring ..... outer diameter
Standard: 57.85 mm (2.278 in)
Minimum: 57.70 mm (2.272 in)

4. Valve..... outer diameter
Standard: 12.00 mm (0.472 in)
Minimum: 11.86 mm (0.467 in)

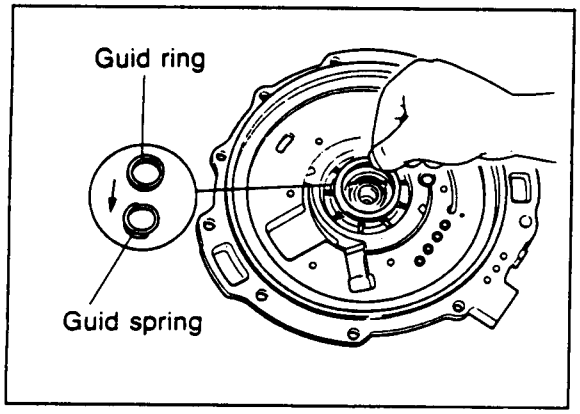
5. Seal pin..... outer diameter
Standard: 5.00 mm (0.197 in)
Minimum: 4.90 mm (0.193 in)



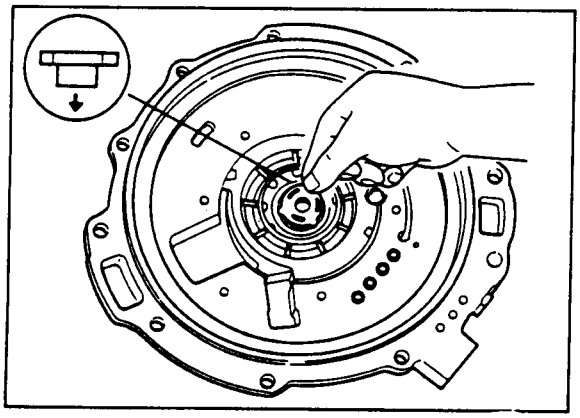
Assembly

Install the valve and spring into the oil pump body, and check that the valve moves smoothly. Install the plug.

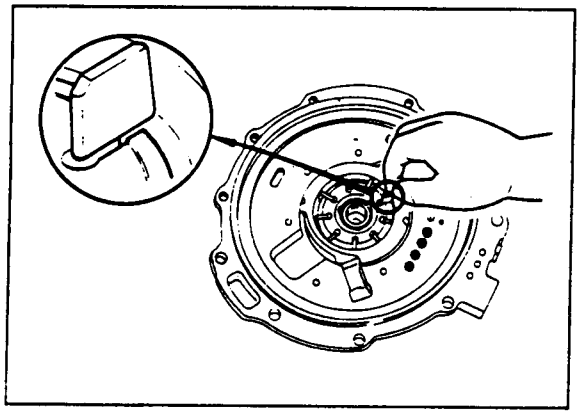
Tightening torque:
24—35 N·m (2.4—3.6 m-kg, 17—26 ft-lb)



Install the guide spring and guide ring while expanding the vanes toward the cam ring.



Install the pump flange onto the rotor.

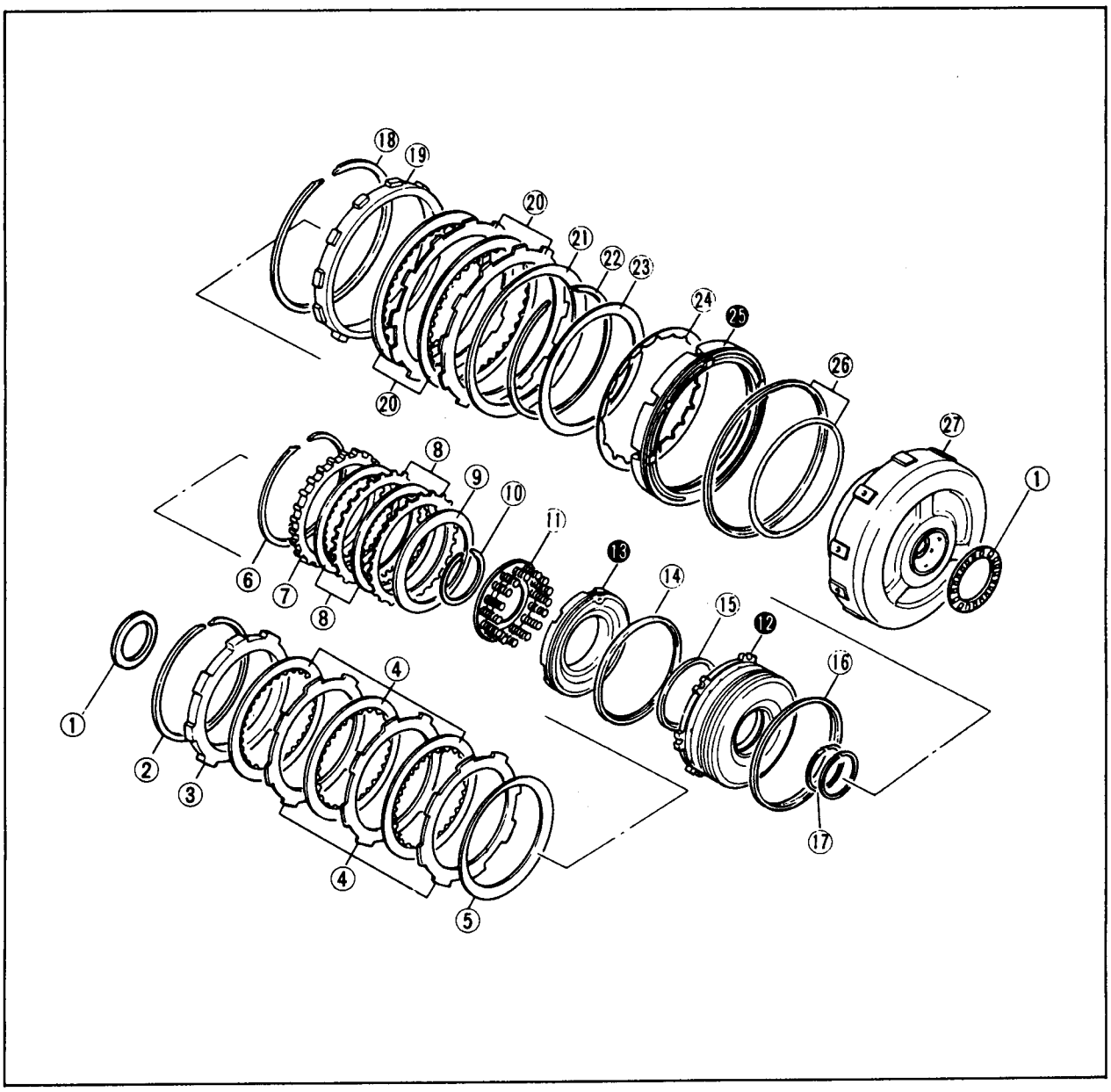


Install the vanes into the rotor as shown.

CLUTCH ASSEMBLY

Disassembly

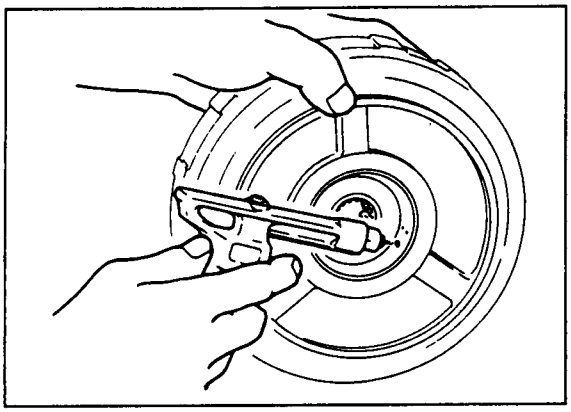
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



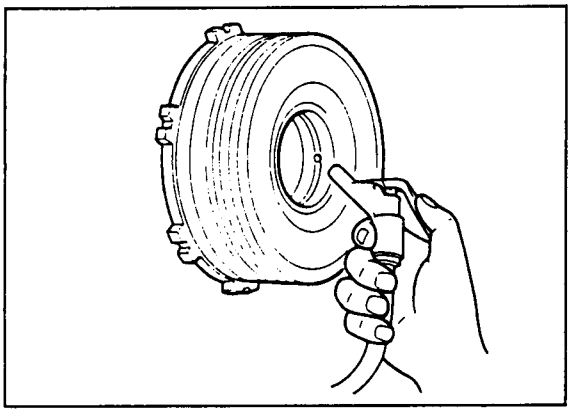
—Forward clutch—
1. Thrust bearings
2. Snap ring
3. Retaining plate
4. Drive and driven plates
5. Dished plate

—Coasting clutch—
6. Snap ring
7. Retaining plate
8. Drive and driven plates
9. Dished plate
10. Snap ring
11. Spring and retainer assembly
12. Coasting clutch drum
13. Coasting piston
14. Outer seal
15. Inner seal
16. Outer seal
17. Seal rings

—Reverse clutch—
18. Snap ring
19. Retaining plate
20. Drive and driven plates
21. Dished plate
22. Snap ring
23. Return spring stopper
24. Piston return spring
25. Reverse piston
26. Seal rings (inner and outer)
27. Reverse and forward drum

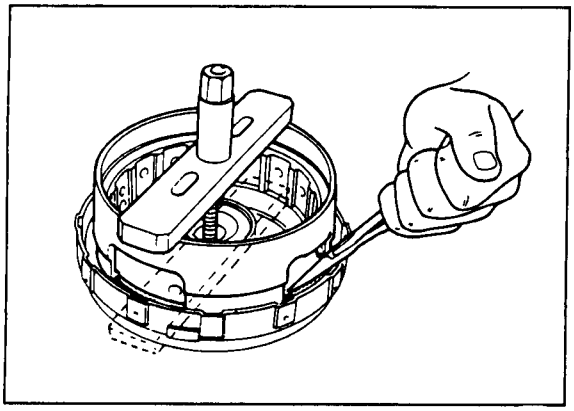


Remove the coasting clutch drum from the reverse and forward drum by applying compressed air through the fluid passage.

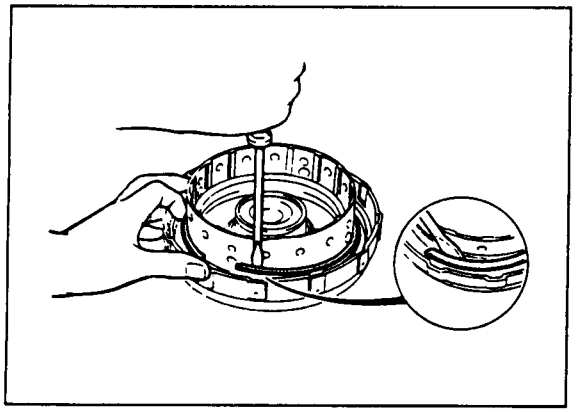


Coasting piston

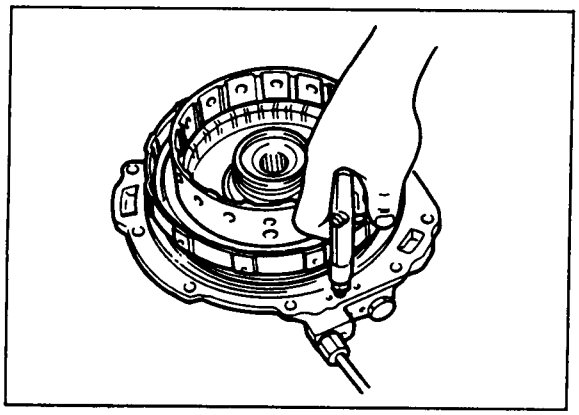
Remove the coasting clutch piston from the coasting clutch drum by applying compressed air through the fluid passage.



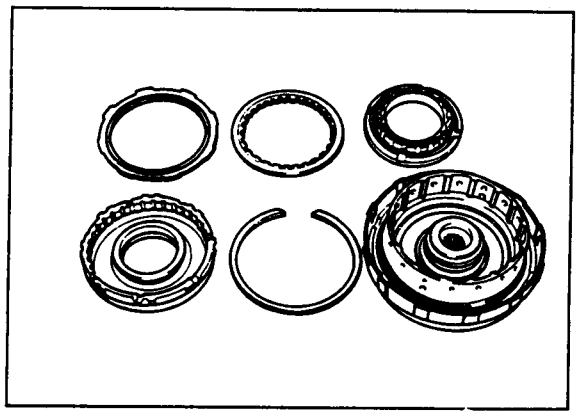
Remove one end of the snap ring from the groove with snap ring pliers.



Remove the **SST** from the reverse and forward drum.
Remove the snap ring with a screw driver.



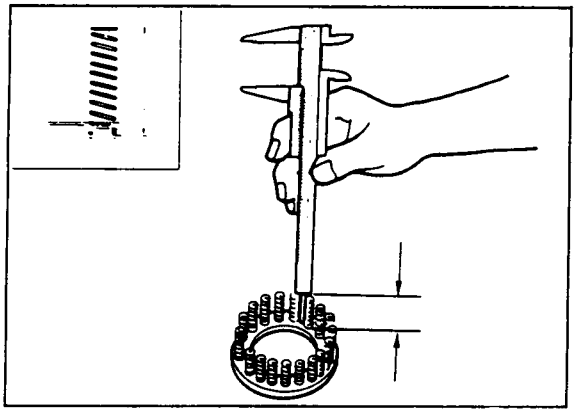
Place the reverse and forward drum on the oil pump.
Remove the reverse piston by applying compressed air through the fluid passage.



Inspection
Check the following and repair or replace any faulty parts.
Drive and driven plates for damage or wear

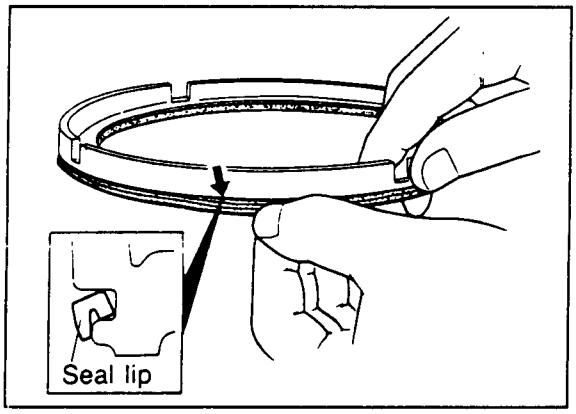
Drive plate thickness
Standard: 1.6 mm (0.063 in)
Minimum: 1.4 mm (0.055 in)

Clutch piston for damage or cracks
Clutch drum for damage or deformation
Seal contact area for damage
Check ball for leaking sticking
Broken or worn snap ring
Broken or weakened spring

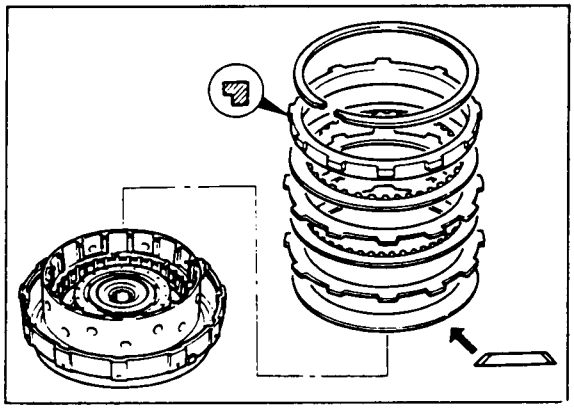


Spring and retainer assembly for separation or deformation

Free length of spring:
29.8 mm (1.173 in)



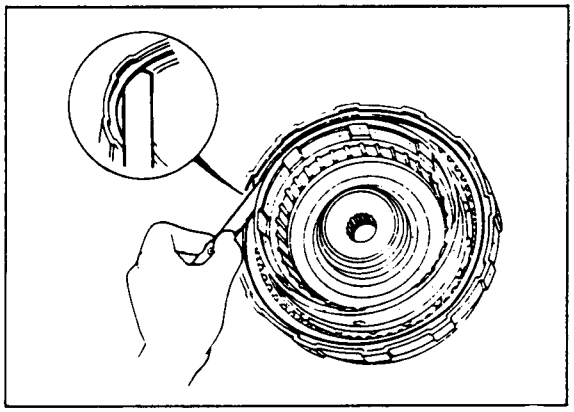
Assembly
Reverse clutch
Install the reverse piston.
Apply ATF to inner and outer faces of the seals, and install them to the reverse piston.
Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the reverse clutch drum.



Install the dished plate with the dished side facing the piston as shown.
Install the drive and driven plates.

Note
Installation order:
Driven-Drive-Driven-Drive

Install the retaining plate with the step facing downward.
Install the snap ring.

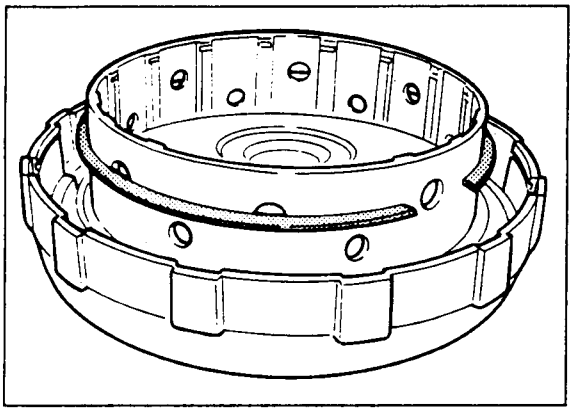


Check the reverse clutch clearance.
Measure the clearance between the snap ring and the retaining plate of the reverse clutch. If the clearance is not within specification, adjust it by selecting a proper retaining plate.

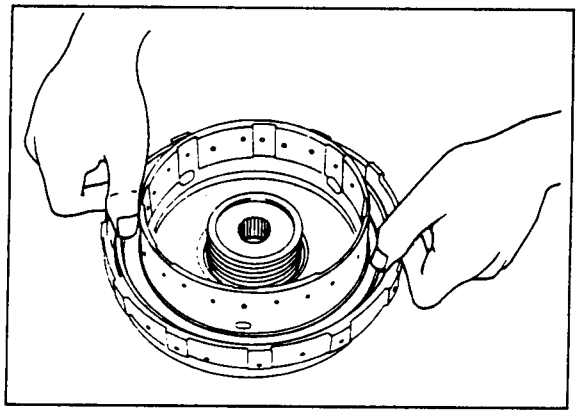
Reverse clutch clearance:
2.1—2.4 mm (0.083—0.094 in)

Retaining plate sizes mm (in)

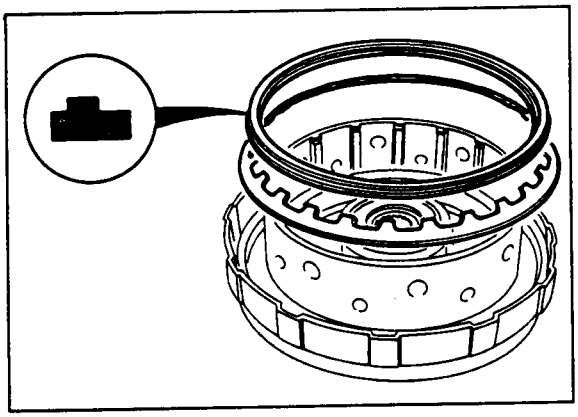
6.6 (0.260)	6.8 (0.268)	7.0 (0.276)
7.2 (0.283)	7.4 (0.291)	7.6 (0.299)



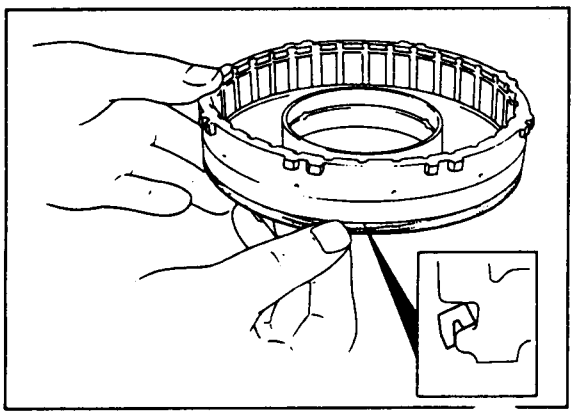
Install the snap ring half-way down the reverse forward drum as shown.



Install the reverse piston by pushing evenly around the circumference, being careful not to damage the seal rings.



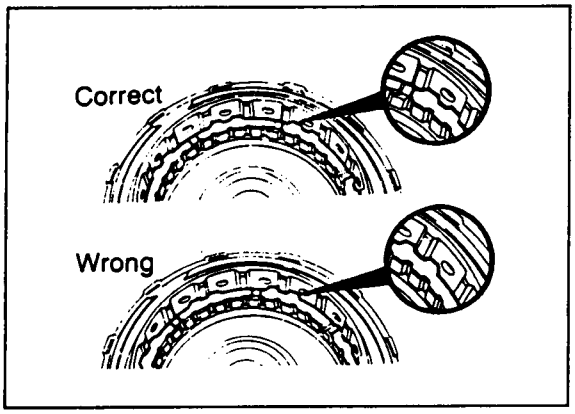
Install the piston return spring with the tabs facing away from the reverse piston.
Install the return spring stopper with the step facing upwards.



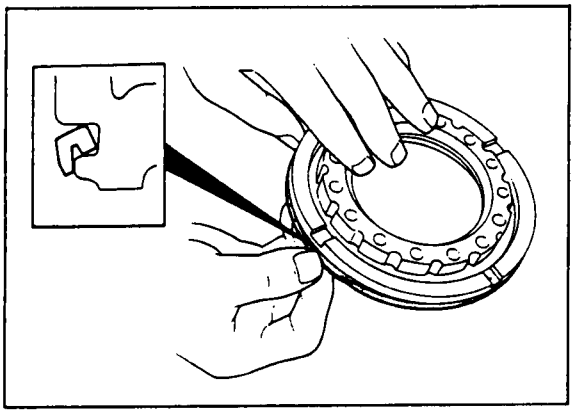
Coasting clutch

Install the coasting clutch drum.

Apply ATF to inner and outer faces of the seal, and install it onto the coasting clutch drum. Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the drum.

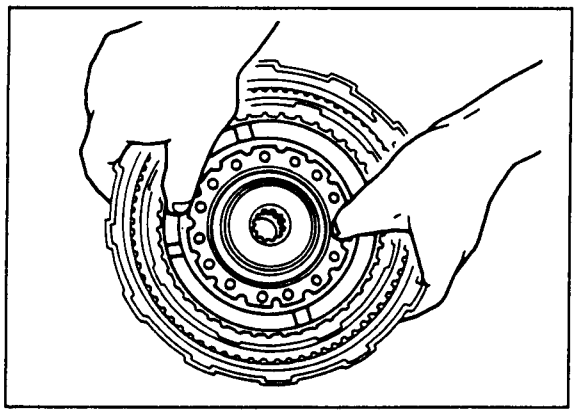


Install the coasting clutch drum the correct position in the reverse and forward drum.
Push evenly around the circumference, being careful not to damage the outer seal.

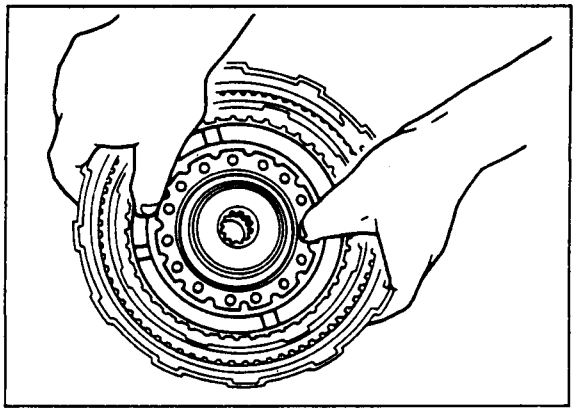


Install the coasting piston

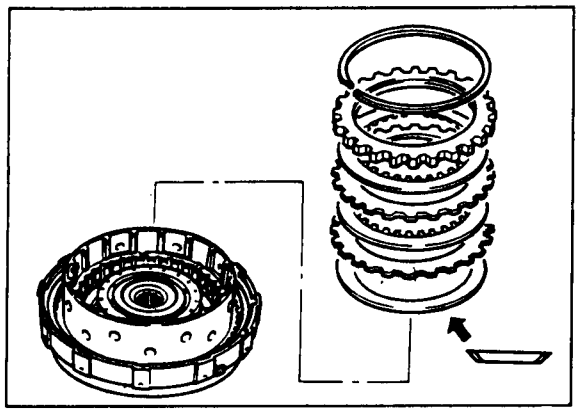
Apply ATF to inner and outer faces of the seals and install them onto the coasting piston. Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the drum.



Install the coasting piston by pushing evenly around the circumference, being careful not to damage the outer seal.



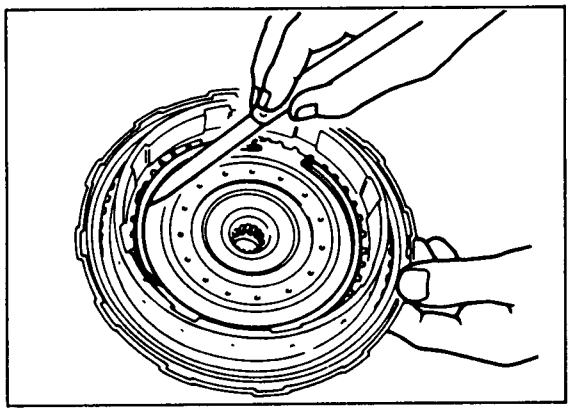
Install the spring and retainer assembly.



Install the dished plate with the dished side upward.
Install the drive and driven plates.

Note
Installation order:
Driven-Drive-Driven-Drive

Install the retaining plate.
Install the snap ring.

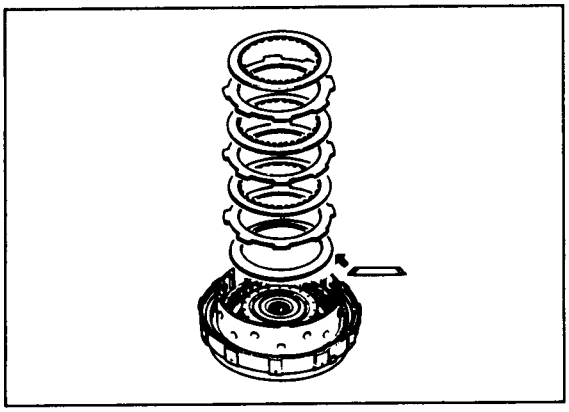


Check the coasting clutch clearance.
Measure the clearance between the snap ring and the retaining plate of the coasting clutch. If the clearance is not within specification, adjust it by selecting a proper retaining plate.

Coasting clutch clearance:
1.0—1.2 mm (0.040—0.047 in)

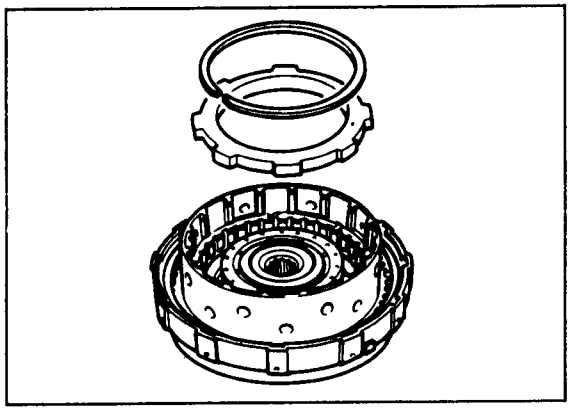
Retaining plate sizes mm (in)

4.6 (0.181)	4.8 (0.189)	5.0 (0.197)
5.2 (0.205)	5.4 (0.213)	5.6 (0.220)

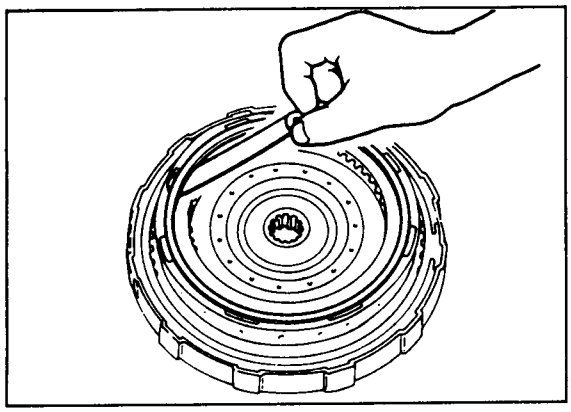


Forward clutch
Install the dished plate with the dished side downward.
Install the drive and driven plates.

Note
Installation order:
Driven-Drive-Driven-Drive-Driven-Drive



Install the retaining plate.
Install the snap ring.

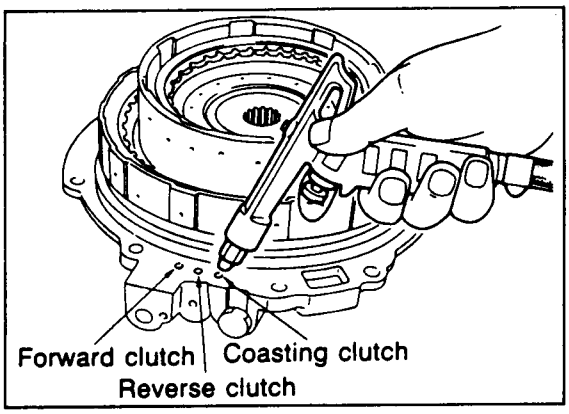


Check the forward clutch clearance.
Measure the clearance between the snap ring and the retaining plate of the forward clutch. If the clearance is not within specification, adjust it by selecting a proper retaining plate.

Forward clutch clearance:
1.0—1.2 mm (0.040—0.047 in)

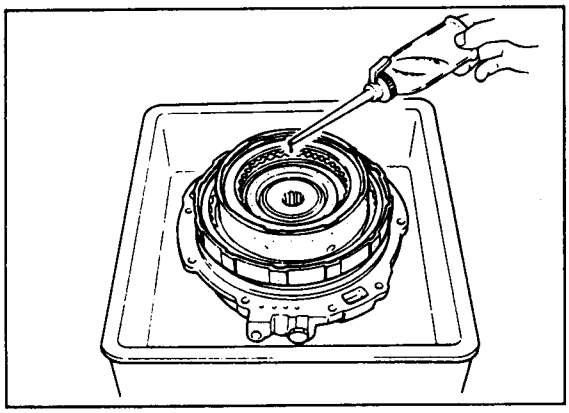
Retaining plate sizes mm (in)

5.9 (0.232)	6.1 (0.240)	6.3 (0.248)
6.5 (0.256)	6.7 (0.264)	8.9 (0.350)

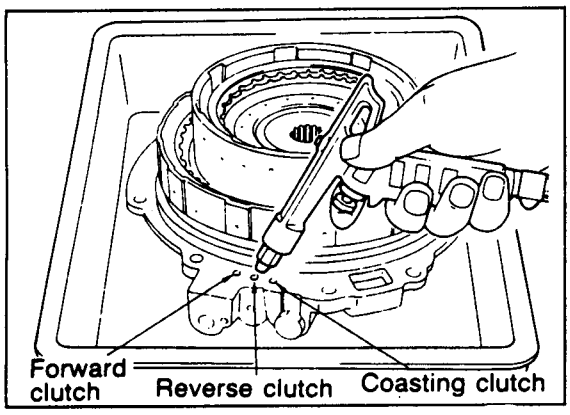


Check for the clutch operation as follows.
Set the clutch assembly onto the oil pump. Check the clutch operation by applying compressed air through the fluid passages as shown.

Applied air pressure:
392 kPa (4.0 kg/cm^2, 57 psi)

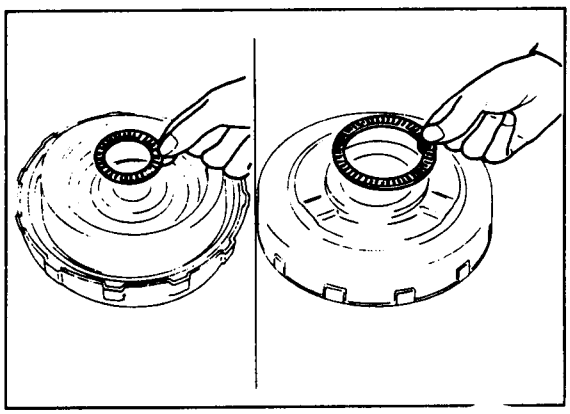


Pour in ATF so that the reverse piston, coasting clutch drum, and coasting clutch piston are fully submerged.



Check that no bubbles come from between the piston and drum seal when applying compressed air through the fluid passages as shown.

Caution
The compressed air must be under 392 kPa (4.0 kg/cm^2, 57 psi), and should not applied for over 3 seconds.



Apply petroleum jelly to the thrust bearings to secure them; then install them on both sides of the reverse and forward drum.

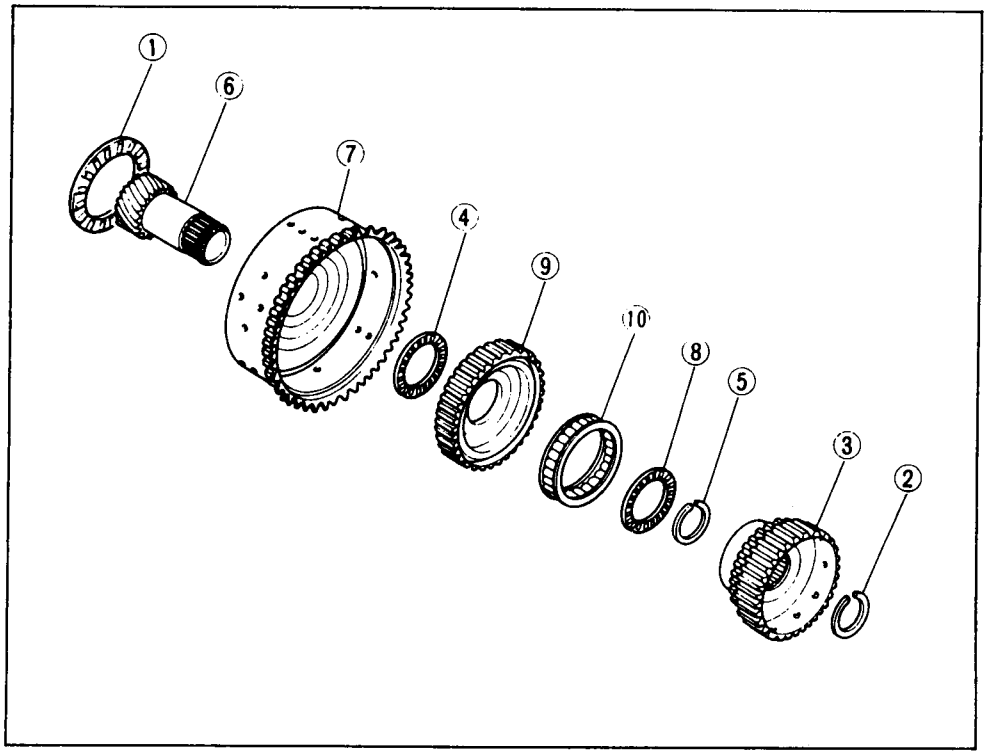
Thrust bearing outer diameter
Oil pump side: 86.0 mm (3.39 in)

Small sun gear and one-way clutch side:
56.1 mm (2.21 in)

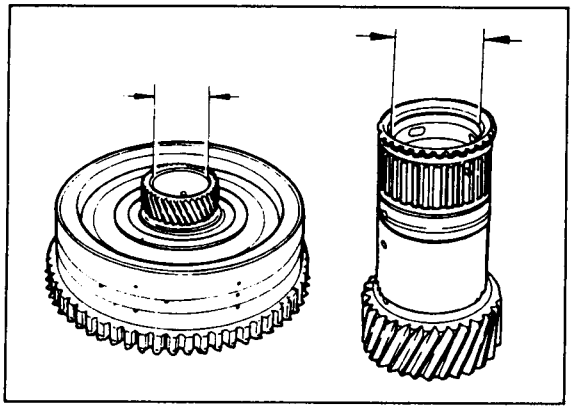
SMALL SUN GEAR AND ONE-WAY CLUTCH

Disassembly

Disassemble in the sequence shown in the figure.



1. Thrust bearing
2. Snap ring
3. One-way clutch inner race
4. Thrust bearing
5. Snap ring
6. Small sun gear
7. Sun gear drum
8. Thrust bearing
9. One-way clutch outer race
10. One-way clutch



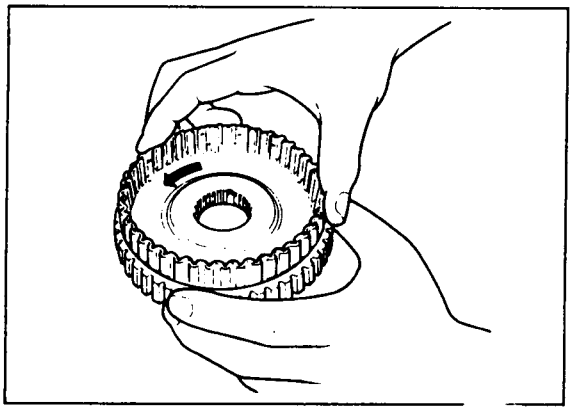
Inspection

Check the following and replace any faulty parts.

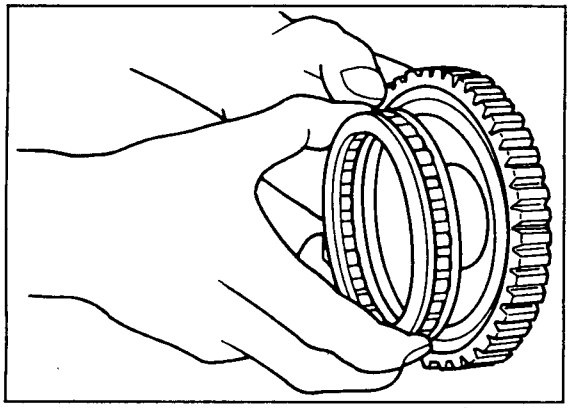
1. Sun gear drum and small sun gear for damage or wear
2. Bushing for damage or wear

Specification:

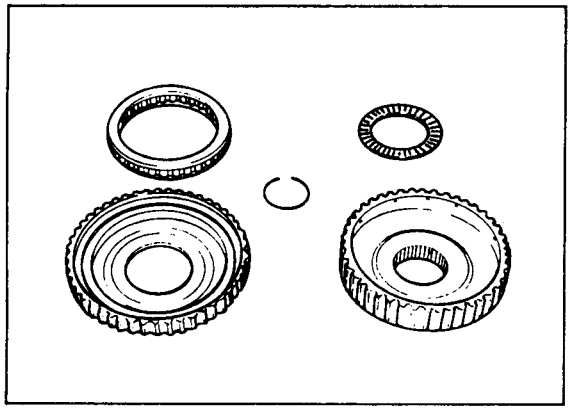
Sun gear drum: 33.425 mm (1.316 in) max.
Small sun gear: 24.021 mm (0.946 in) max.



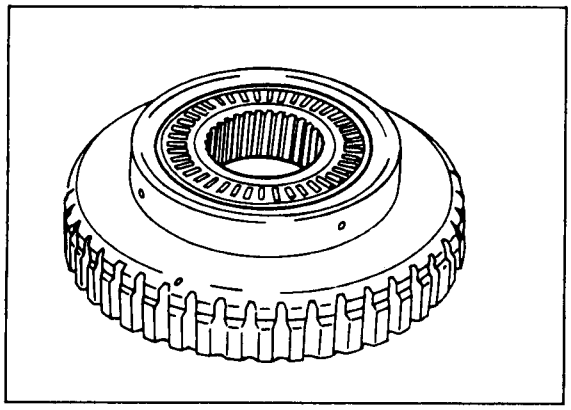
3. Inner and outer race for damage or wear
4. Damaged or worn clutch hub
5. Damaged or worn gear
6. Damaged or worn thrust bearing
7. Broken or worn snap ring
8. One-way clutch operation
   Hold the one-way clutch outer race. Check that the inner race turns only counterclockwise.



Replacement of one-way clutch
Remove the one-way clutch inner race.
Remove the one-way clutch.
Remove the thrust bearing.

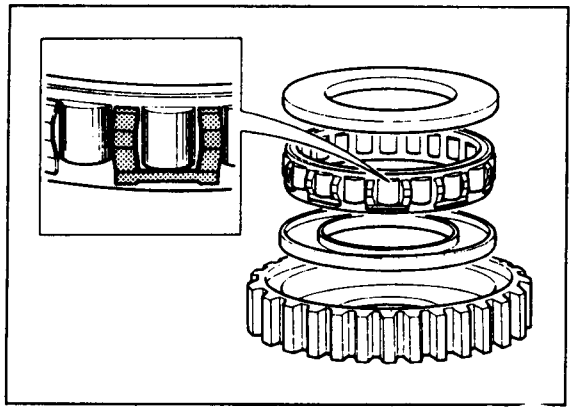


Inspect the one-way clutch inner and outer race, and replace if necessary.



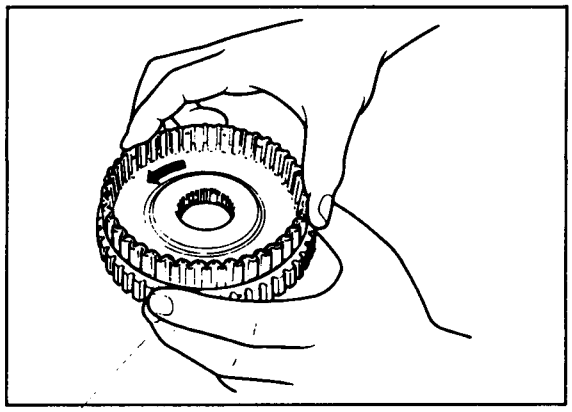
Apply petroleum jelly to the thrust bearing to secure it; then install it to the one-way clutch inner race.

Thrust bearing outer diameter:
62.1 mm (2.44 in)

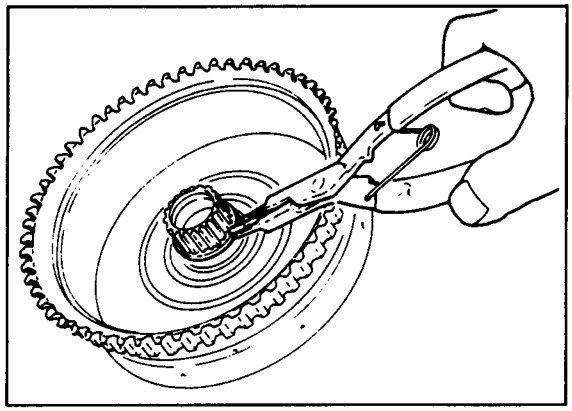


Install the one-way clutch into the one-way clutch outer race.

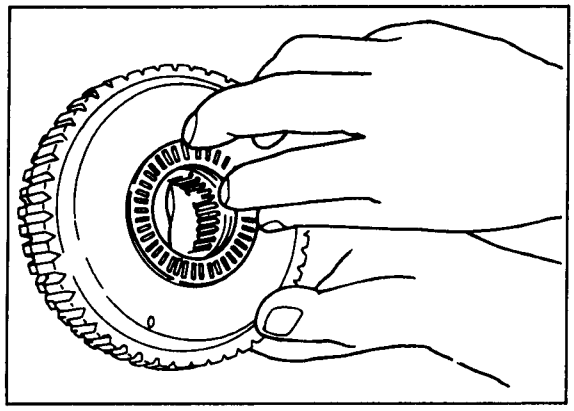
Caution
Check that the spring cage of the one-way clutch faces toward the outer race.



Install the one-way clutch inner race into the one-way clutch outer race by turning inner race counterclockwise.
Hold the one-way clutch outer race. Check that the inner race turns only counterclockwise.

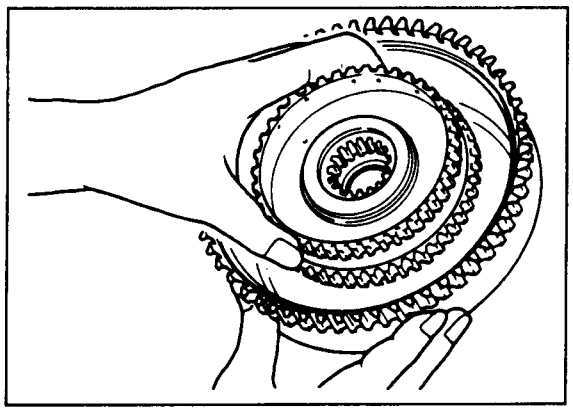


Assembly
Install the small sun gear into the sun gear drum.
Install the snap ring.



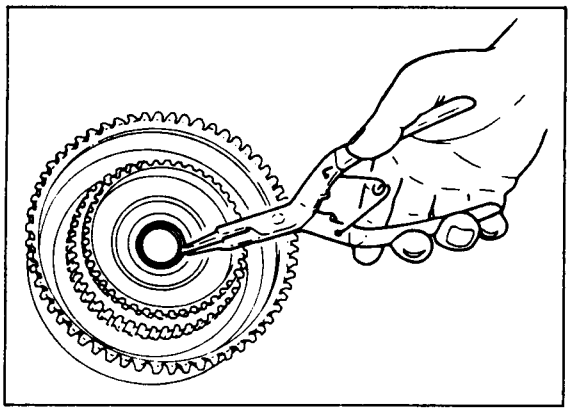
Apply petroleum jelly to the thrust bearing to secure it; then install it to the one-way clutch inner race.

Thrust bearing outer diameter:
62.1 mm (2.44 in)

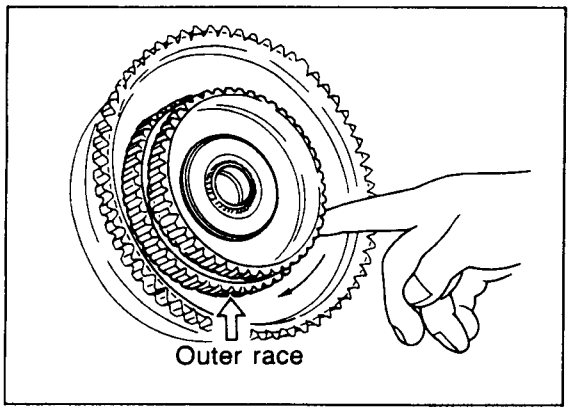


Install the one-way clutch inner and outer race to the sun gear drum.

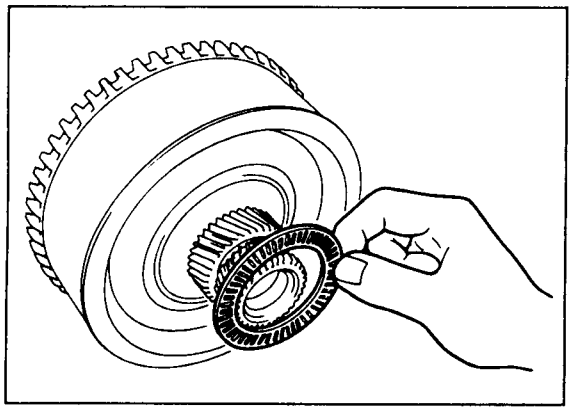
Note
Align the splines of the one-way clutch inner race and small sun gear clutch hub.



Install the snap ring.



Check that when the small sun gear is held, the one-way clutch outer race turns smoothly and only clockwise.



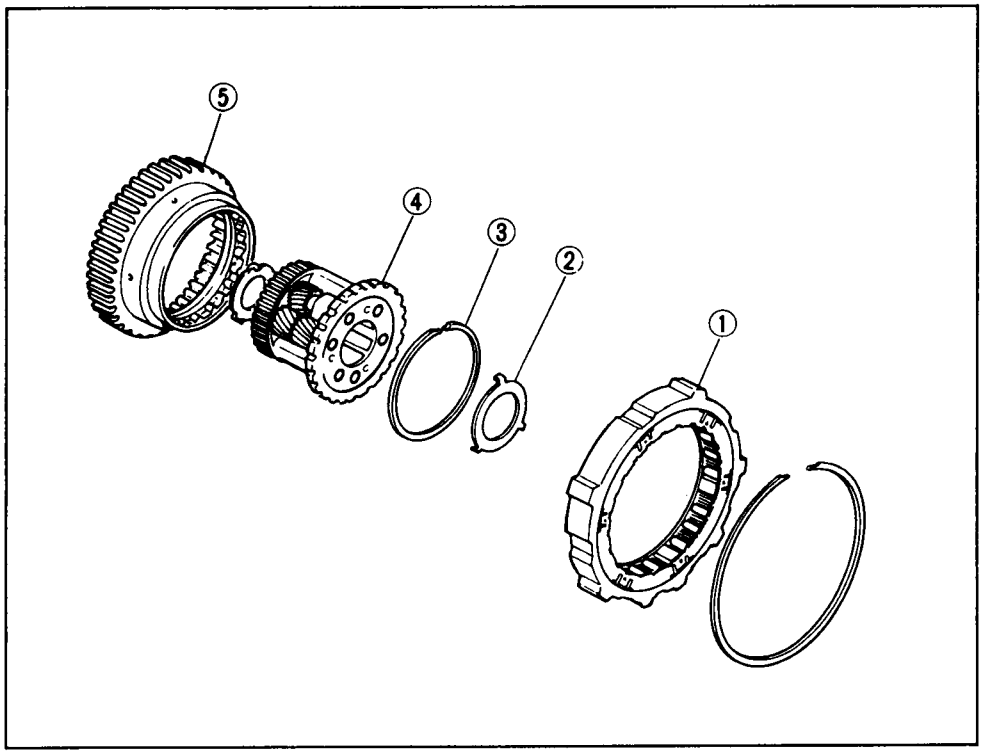
Apply petroleum jelly to the thrust bearing to secure it; then install it to the sun gear drum.

Thrust bearing outer diameter:
72.0 mm (2.83 in)

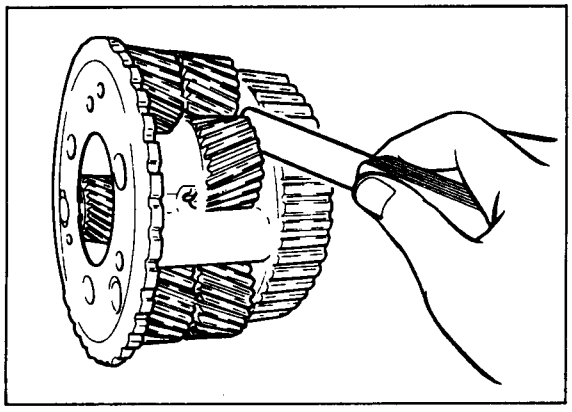
ONE-WAY CLUTCH AND CARRIER HUB ASSEMBLY

Disassembly

Disassemble in the sequence shown in the figure.



1. One-way clutch
2. Bearing races
3. Snap ring
4. Carrier hub assembly
5. Inner race (Low and reverse hub)



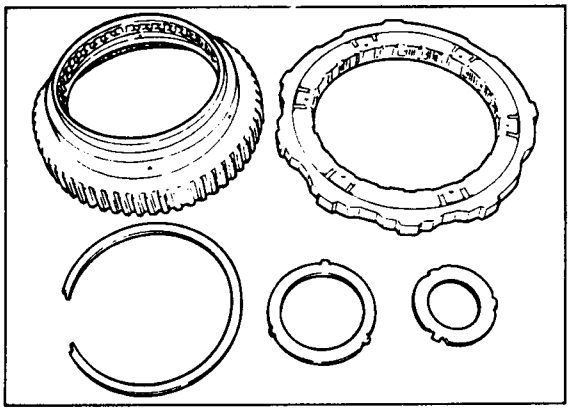
Inspection

Check the following and replace any faulty parts.

Damaged or worn gear and operation

Clearance between pinion washer and planetary carrier

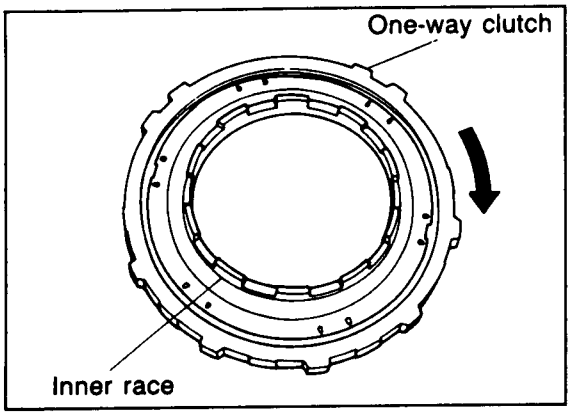
Clearance:
0.2—0.7 mm (0.008—0.028 in)



Damaged or worn inner race

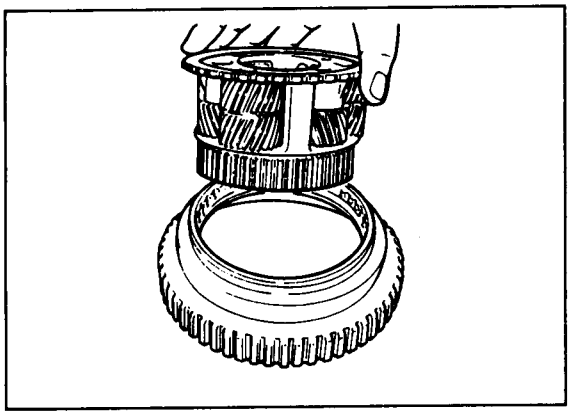
Broken or worn snap ring

Damaged or worn bearing race

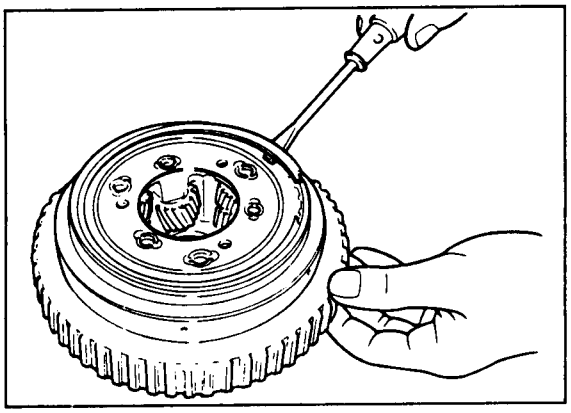


Damaged or worn one-way clutch and operation
Detached roller

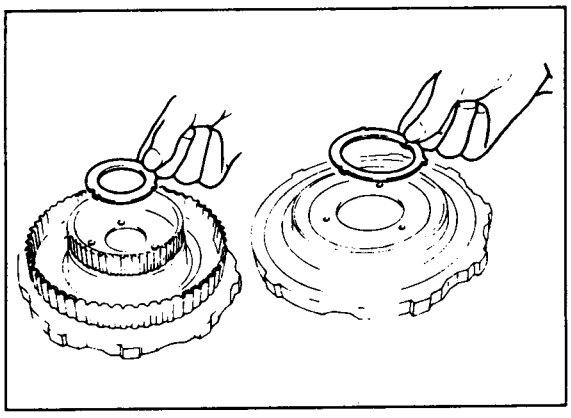
Note
Assemble the one-way clutch and the inner race, then confirm that the one-way clutch rotates only clockwise and smoothly.



Assembly
Assemble the carrier hub assembly to the inner race.



Install th snap ring.

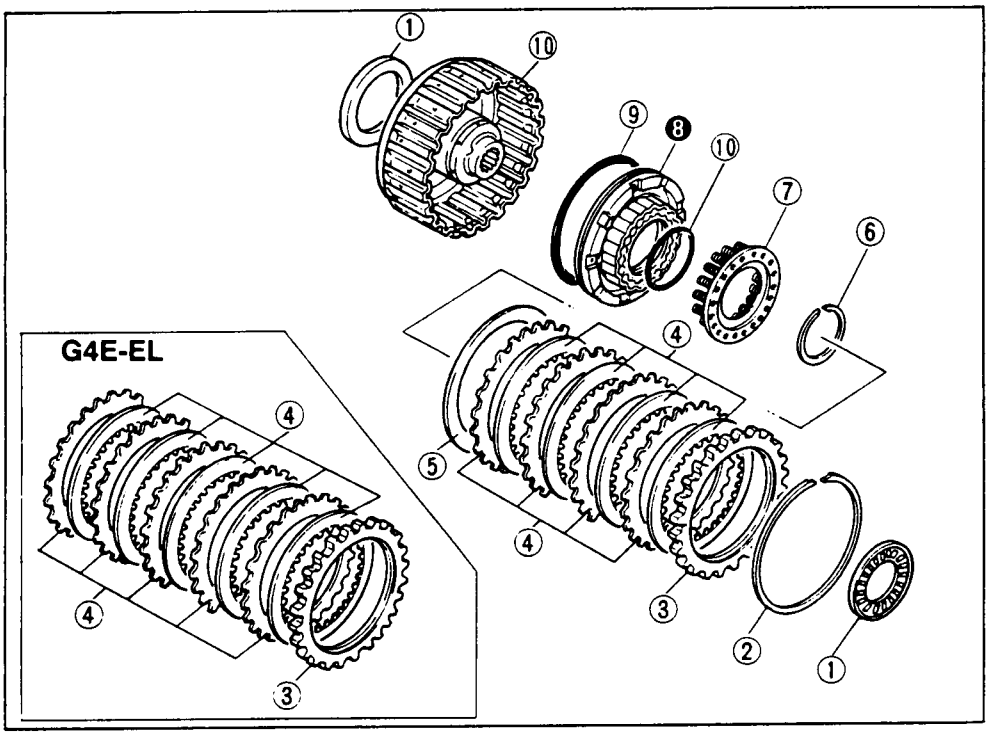


Apply petroleum jelly to the bearing races to secure them; then install them to both sides of the one-way clutch and carrier hub assembly.

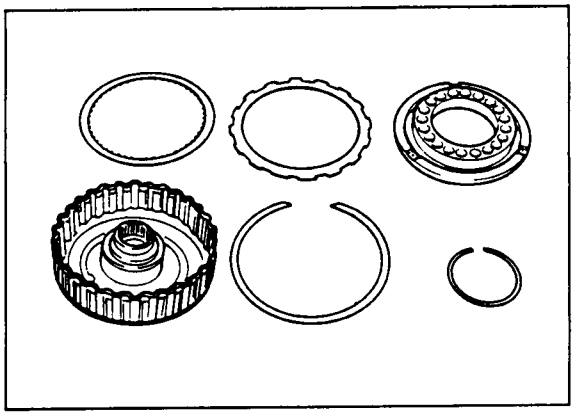
Bearing race outer diameter
Sun gear drum side: 72.0 mm (2.83 in)
3-4 clutch side: 57.0 mm (2.21 in)

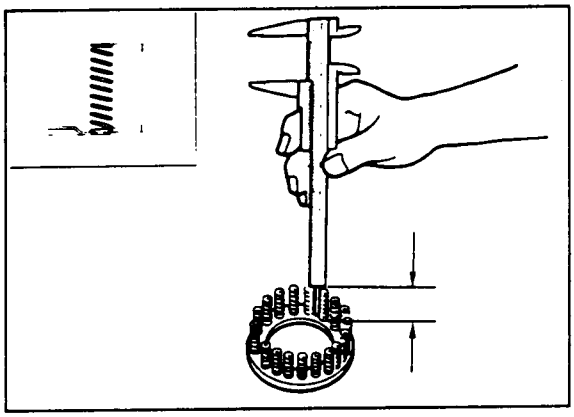
Note
Install the tabs of the bearing race into the alignment holes.

3-4 CLUTCH
Disassembly
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked part.



1. Thrust bearings
2. Snap ring
3. Retaining plate
4. Drive and driven plates
5. Dished plate (G4A-HL)
6. Snap ring
7. Spring and retainer assembly
8. 3-4 clutch piston
9. Outer seal
10. Inner seal
11. 3-4 clutch drum





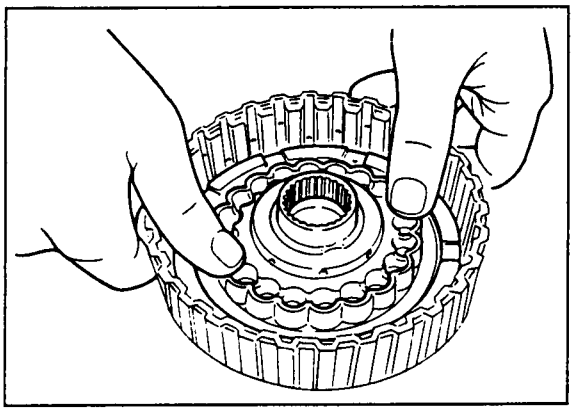
Inspection
Check the following and repair or replace any faulty parts.
Drive and driven plates for damage or wear

Drive plate thickness
Standard: 1.6 mm (0.063 in)
Minimum: 1.4 mm (0.055 in)

Clutch piston for damage or cracks
Clutch drum for damage or deformation
Seal contact areas for damage
Check ball for leaking or sticking
Spring and retainer assembly for separation or deformation
Broken or worn snap ring

Broken or weakened spring

Free length of spring:
33.2 mm (1.307 in)

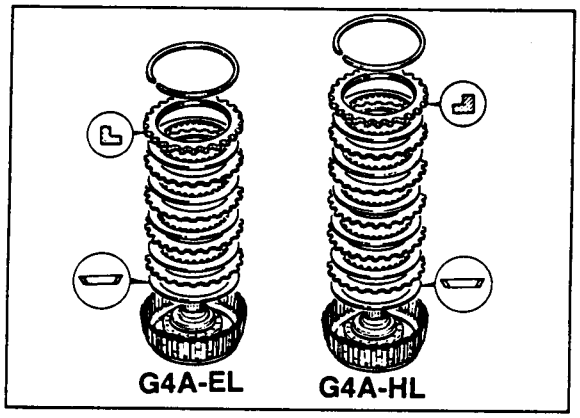


Assembly

Install the 3-4 clutch piston.

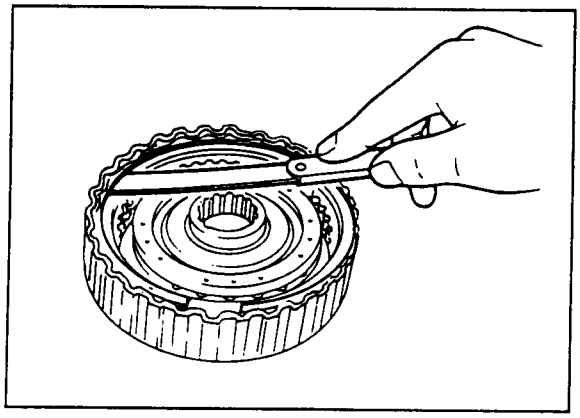
Apply ATF to the inner and outer seals, and install them onto the 3-4 clutch piston.
Install the piston by pushing evenly around the circumference, being careful not to damage the seal rings.

Install the spring and retainer assembly.



Install the dished plate the dished side up ward (G4A-HL).
Install the drive and driven plates.

Note
Installation order:
G4A-EL
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive
G4A-HL
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



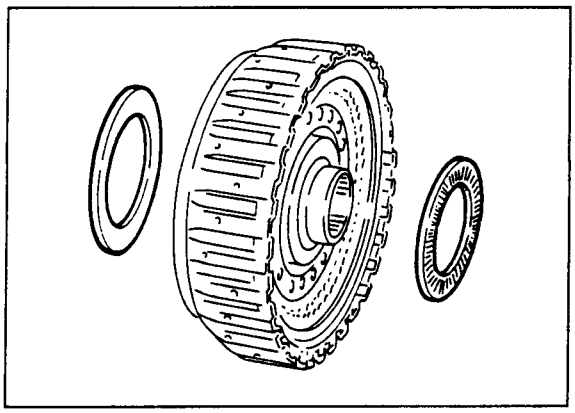
Install the retaining plate with the step facing upward.
Install the snap ring.

Check the 3-4 clutch clearance.
Measure the clearance between the snap ring and the retaining plate of the 3-4 clutch.
If the clearance is not within specification, adjust it by selecting a proper retaining plate.

3-4 clutch clearance:
1.3—1.5 mm (0.051—0.059 in)

G4A-HL

4.8 (0.189)	5.0 (0.197)	5.2 (0.205)
5.4 (0.213)	5.6 (0.220)	



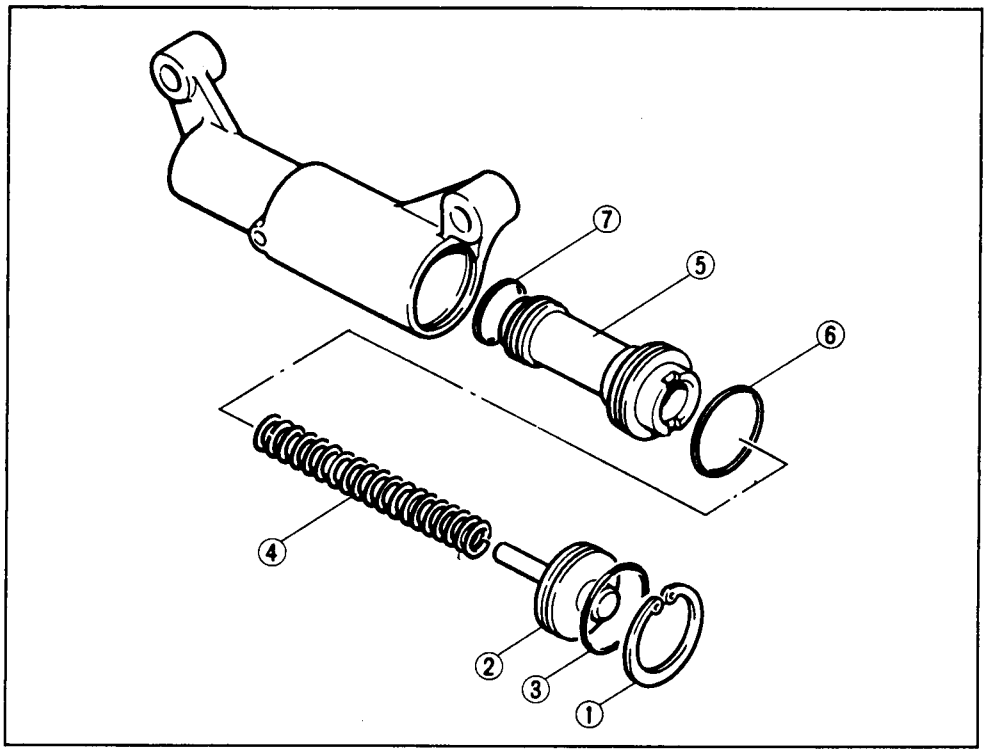
Apply petroleum jelly to the thrust bearings and secure them to both sides of the 3-4 clutch drum.

Thrust bearing outer diameter
Carrier hub side: 56.1 mm (2.21 in)
Output shell side: 72.1 mm (2.84 in)

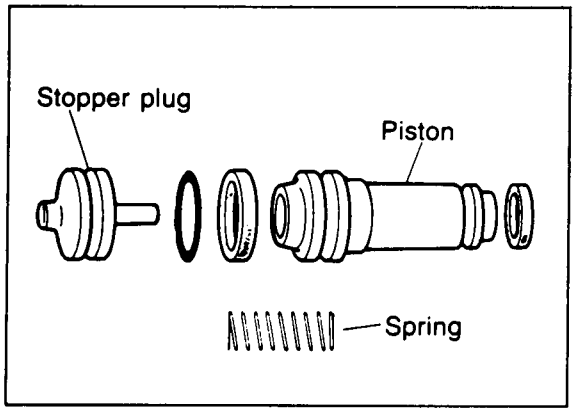
2-3 ACCUMULATOR

Disassembly

Disassemble in the sequence shown in the figure.



1. Snap ring
2. Stopper plug
3. O-ring
4. 2-3 accumulator spring
5. 2-3 accumulator piston
6. Large seal ring
7. Small sea ring

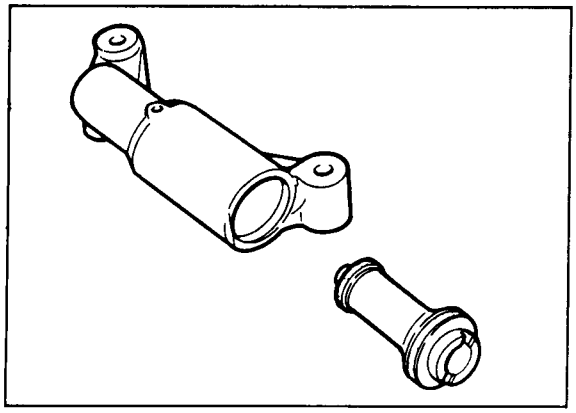


Inspection

Check the following and replace any faulty parts.

Damaged or worn piston
Damaged or worn stopper plug
Broken or weakened spring

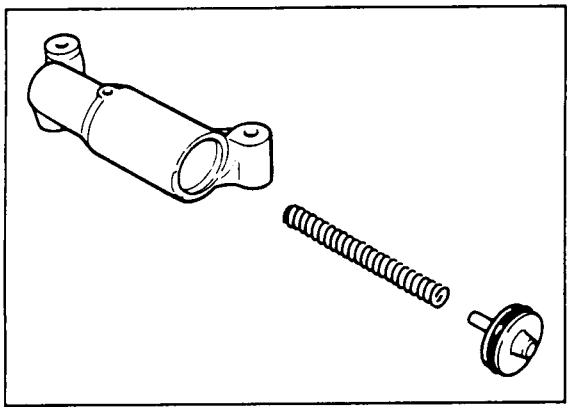
Free length of spring:
G4A-EL 83.3 mm (3.280 in)
G4A-HL 76.0 mm (2.992 in)



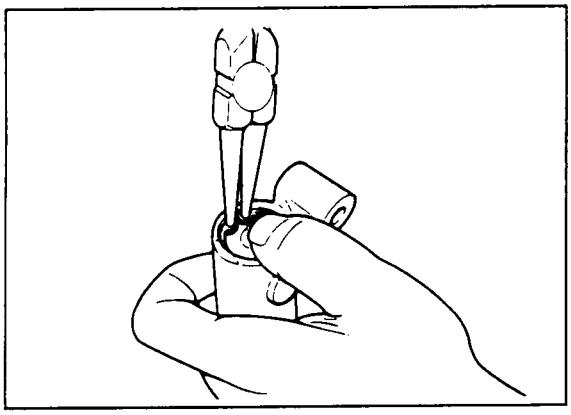
Assembly

Install the 2-3 accumulator.

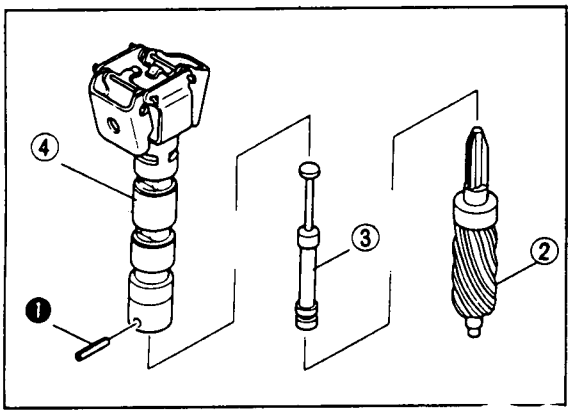
Apply ATF to large and small seal rings; then install them to the accumulator piston.
Insert the 2-3 accumulator.



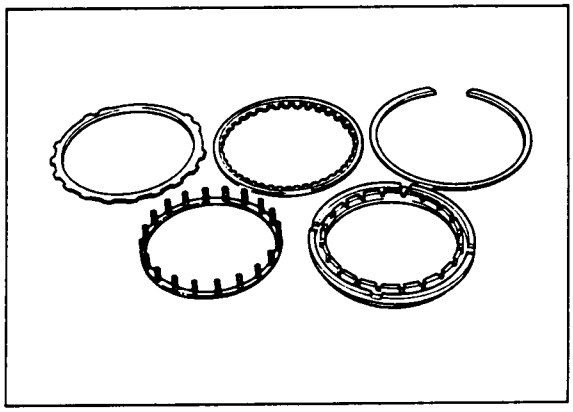
Install the spring to the piston.
Install the stopper plug.
(1) Apply ATF to O-ring, and install it onto the stopper plug.
(2) Install the stopper plug.



4. Install the snap ring while holding in the stopper plug.



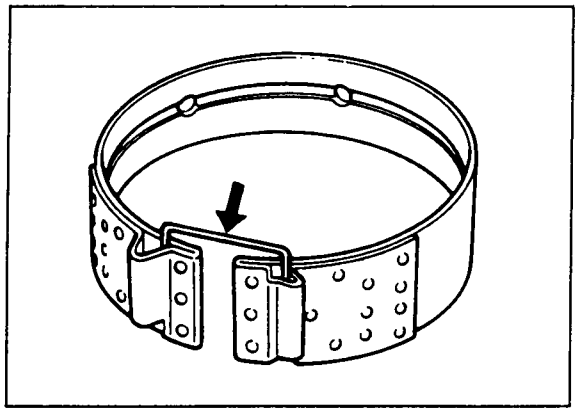
GOVERNOR ASSEMBLY (G4A-HL)
Disassembly
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked part.
1. Roll pin
2. Governor driven gear
3. Governor valve
4. Governor carrier and sleeve



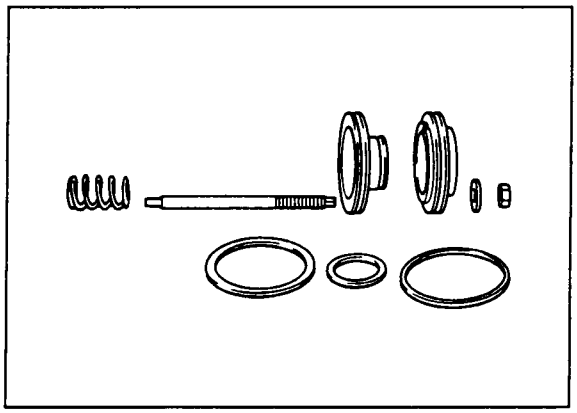
LOW AND REVERSE BRAKE
Inspection
Check the following and replace any faulty parts.
1. Damaged or worn drive and driven plates

Drive plate thickness
Standard: 1.6 mm (0.063 in)
Minimum: 1.4 mm (0.055 in)

Free length of spring:
20.5 mm (0.807 in)

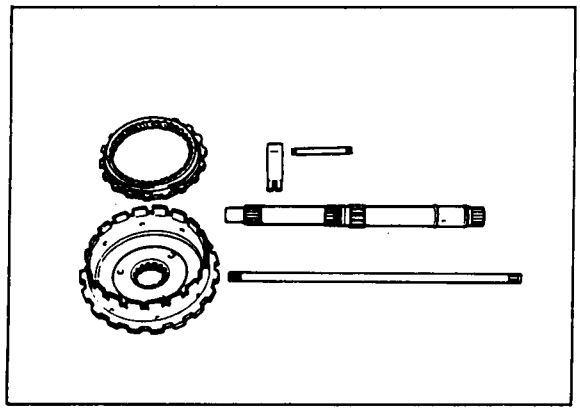


2-4 BRAKE BAND
Inspection
Check the following and replace if necessary.
1. Damaged or worn 2-4 brake band

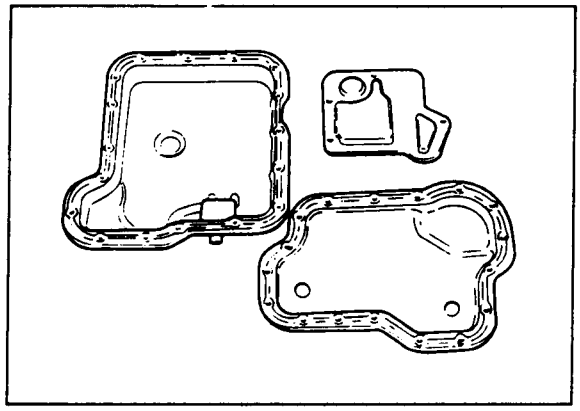


BAND SERVO
Inspection
Check the following and replace any faulty parts.
1. Damaged or worn piston
2. Weakened return spring

Free length of spring:
G4A-EL: 43.25 mm (1.703 in)
G4A-HL: FE engine 42.0 mm (1.654 in)
F8 engine 43.25 mm (1.703 in)

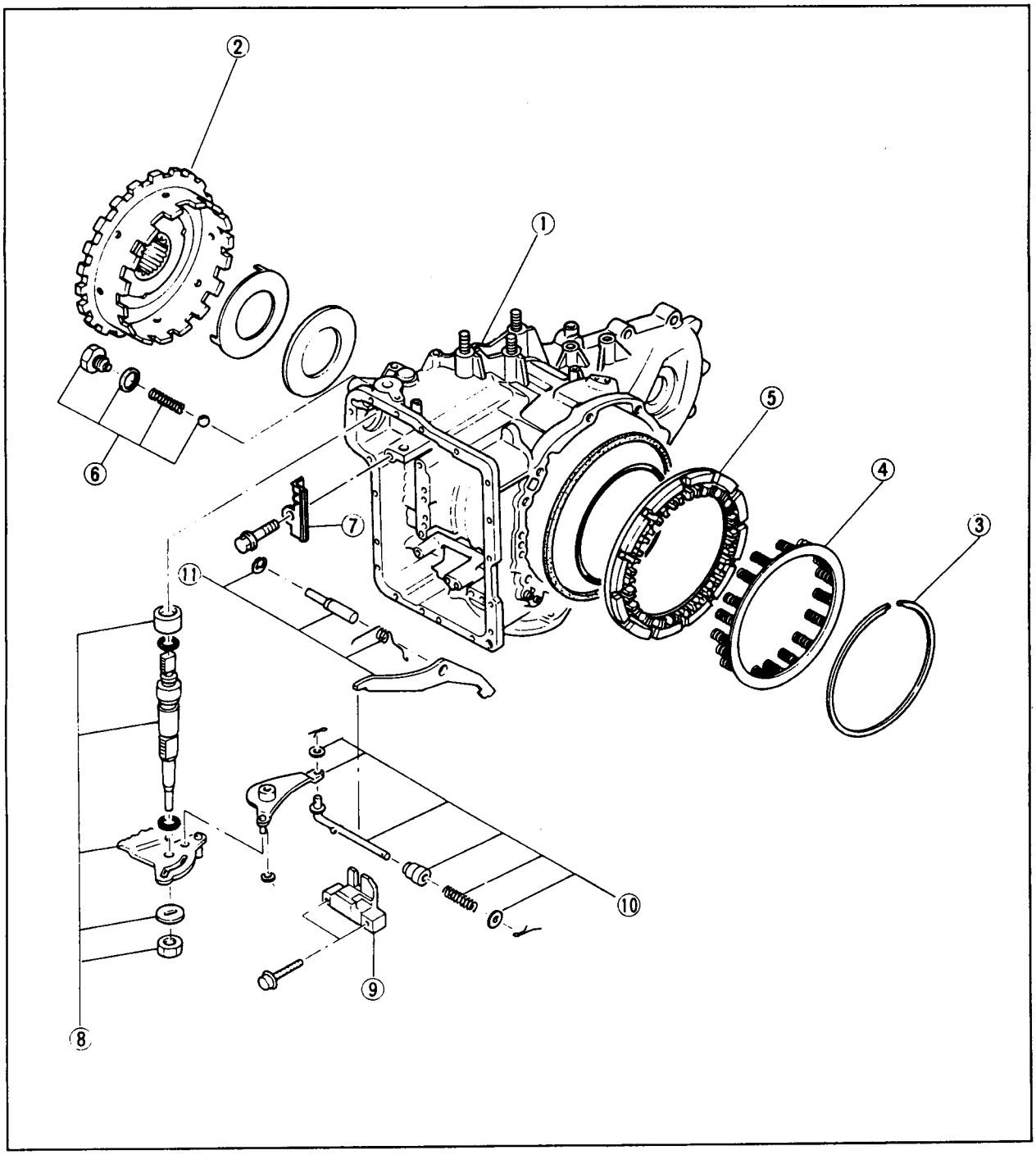


OTHER INSPECTION
Check the following and replace any faulty parts.
1. Damaged or worn output shell
2. Damaged or worn internal gear
3. Damaged or worn turbine shaft
4. Damaged or worn oil pump shaft
5. Damaged or worn anchor strut and shaft

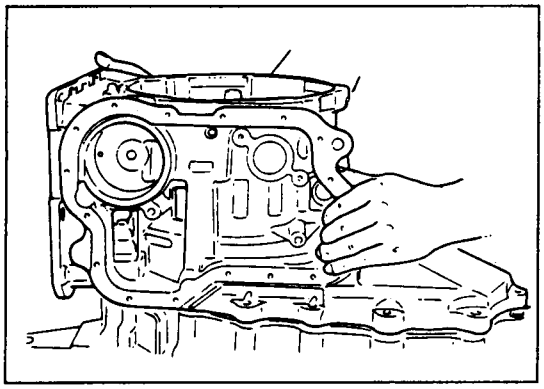


6. Damaged or cracked valve body cover
7. Damaged or cracked oil pan
8. Damaged or clogged oil strainer

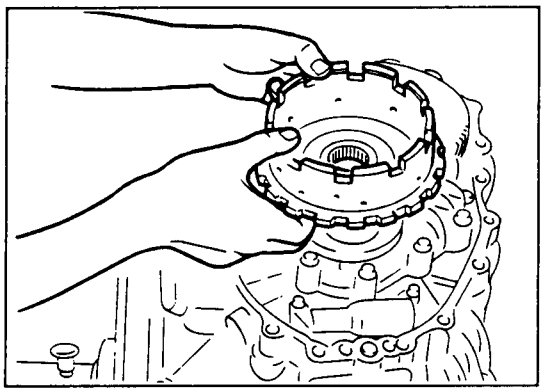
DISASSEMBLY
Component



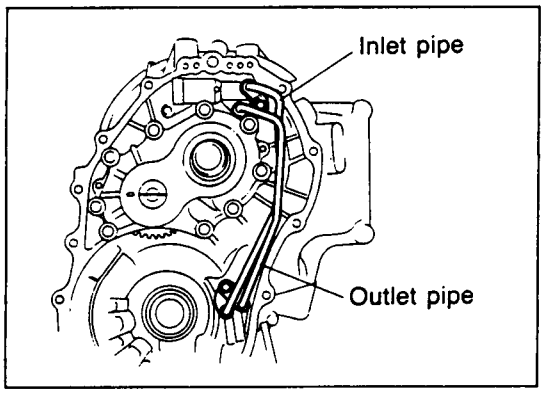
1. Transaxle case
2. Output shell
3. Snap ring
4. Spring and retainer assembly
5. Low and reverse brake piston
6. Plug, washer, spring, and detent ball
7. Bracket
8. Manual shaft and manual plate
9. Actuator support
10. Parking assist lever
11. Parking pawl



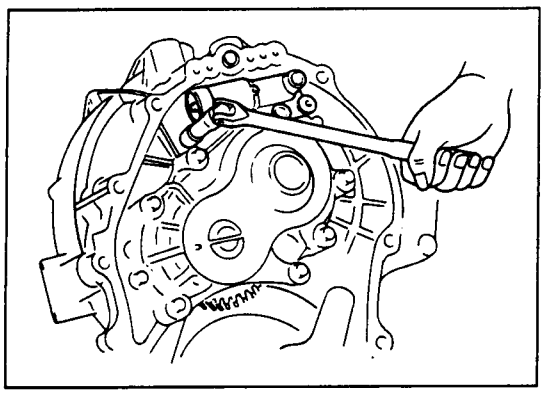
Remove the bolts; then remove the transaxle case by tapping lightly with a plastic hammer.



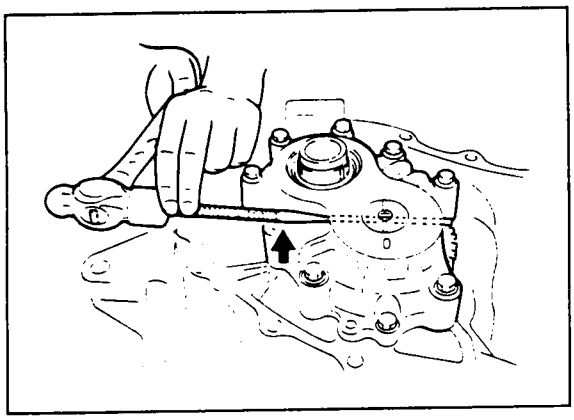
Remove the output shell from the output gear.



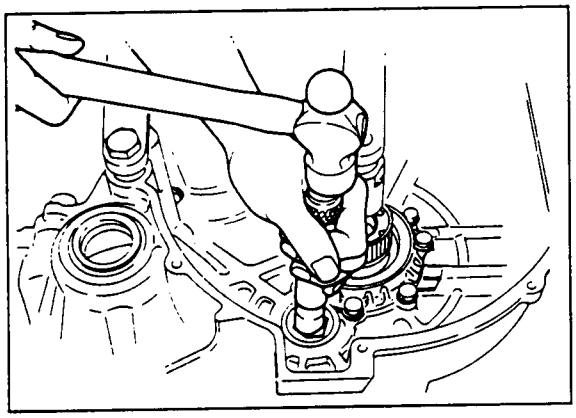
Remove the governor outlet pipe, governor inlet pipe, and O-rings.



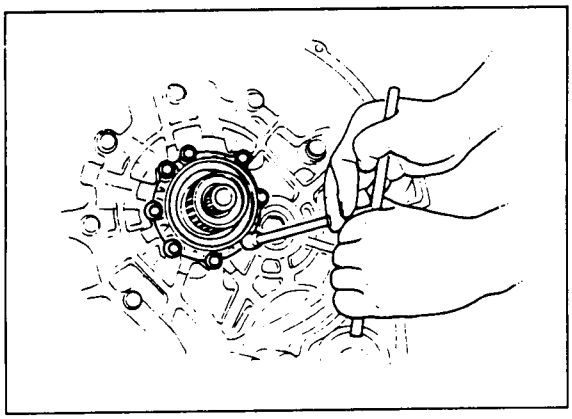
Remove the 2-3 accumulator piston assembly and O-rings.



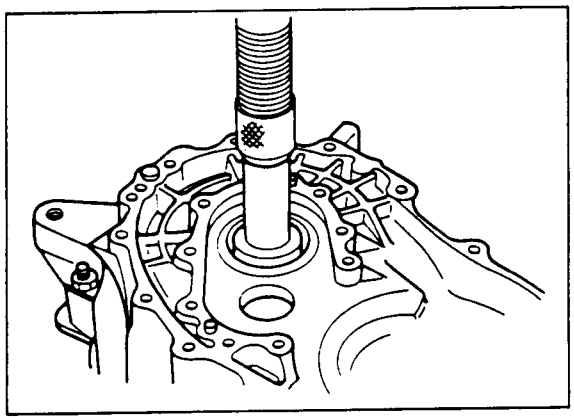
Remove the bearing housing.
(1) Remove the bolt indicated in the figure.
(2) Remove the roll pin with a pin punch.
(3) Remove the bearing housing by tapping lightly with a plastic hammer.



Remove the idle gear assembly and output gear assembly by tapping out from the torque converter side.



Remove the bearing cover.
(1) Remove the converter housing from the transaxle hanger.
(2) Remove the bearing cover bolts.



(3) Press the bearing cover assembly out of the converter housing.

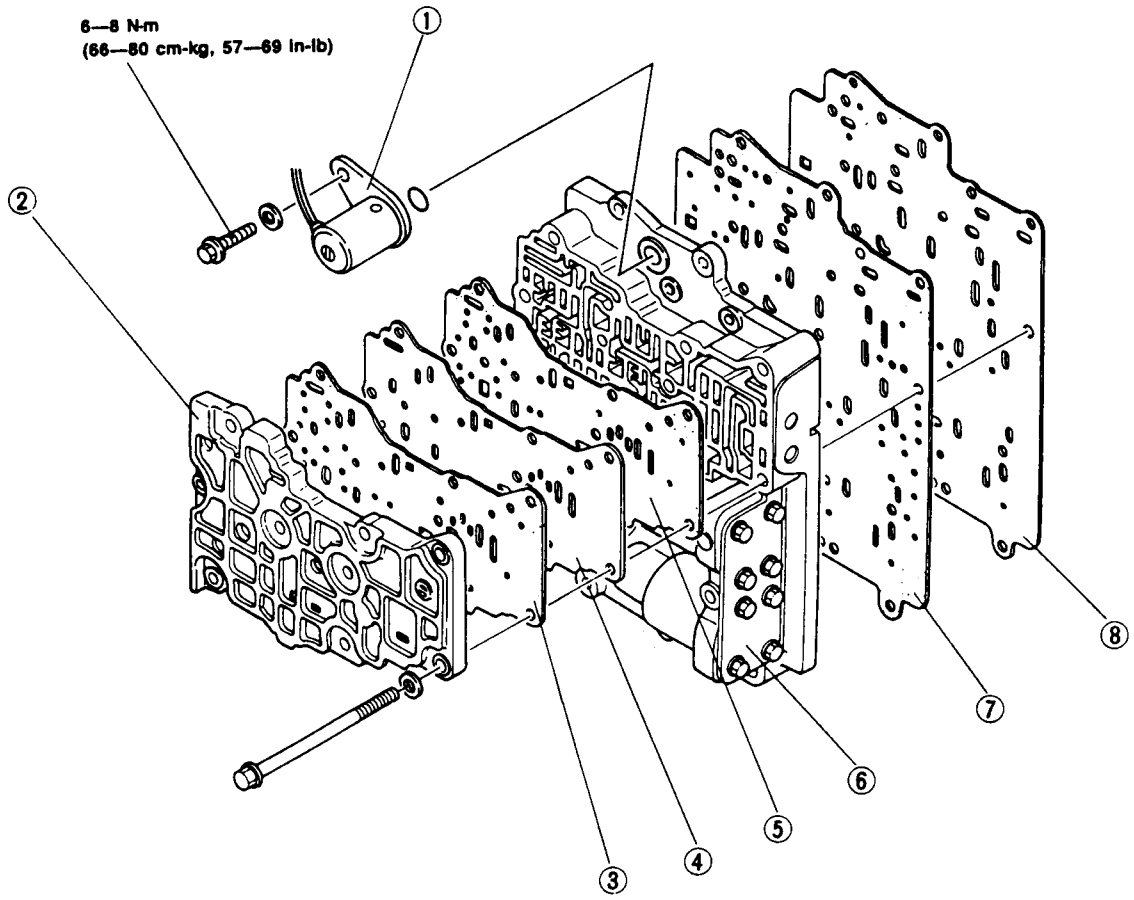
CONTROL VALVE BODY (G4A-HL)

Precaution

(1) Pay close attention when handling the control valve because it consists of the most precise and delicate parts of the transaxle.
(2) Neatly arrange the removed parts in order to avoid mixing up similar parts.
(3) Disassemble the control valve assembly and thoroughly clean it when the clutch and/or brake bands are burned, and/or when the automatic transaxle fluid is degenerated.

Components I

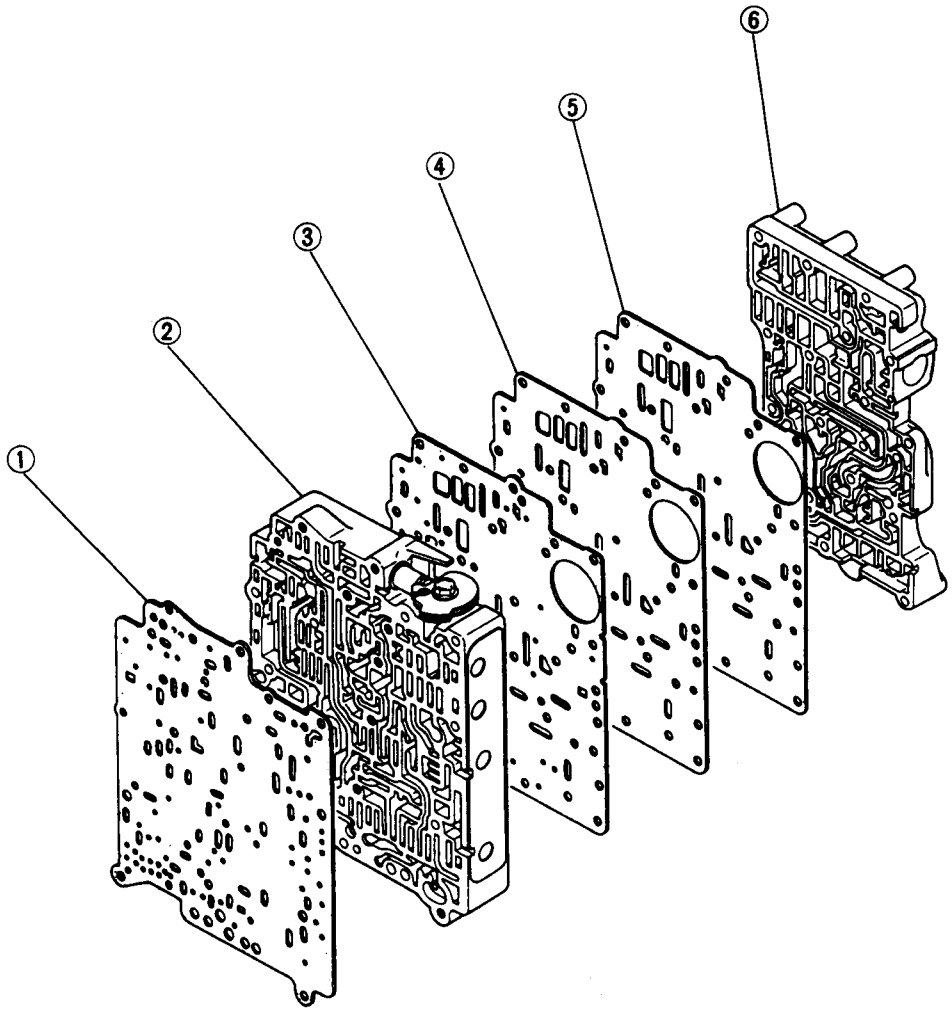
Front and premain control body



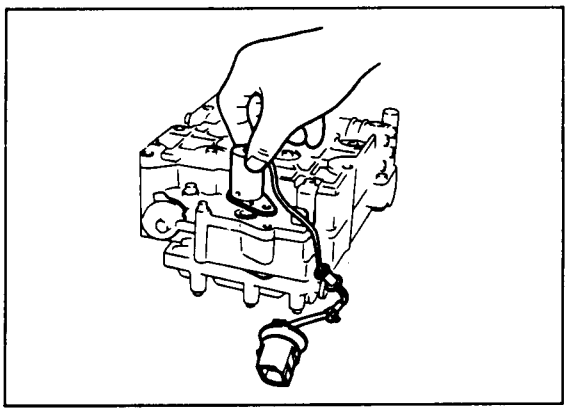
1. Lock-up solenoid valve
2. Front control body
3. Front/premain front gasket
4. Premain separator
5. Front/premain rear gasket
6. Premain control body
7. Premain/main front gasket
8. Main separator

Components II

Main and rear control body



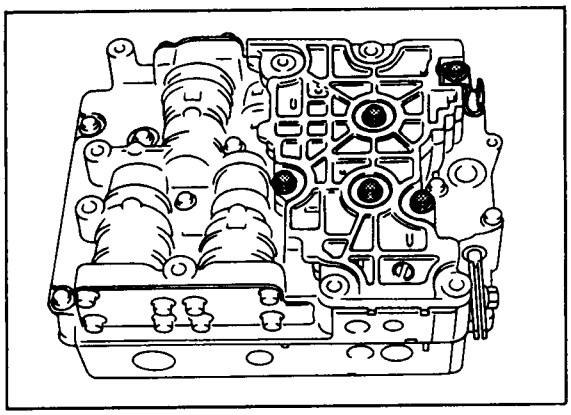
1. Premain/main rear gasket
2. Main control body
3. Main/rear front gasket
4. Rear separator
5. Main/rear rear gasket
6. Rear control body



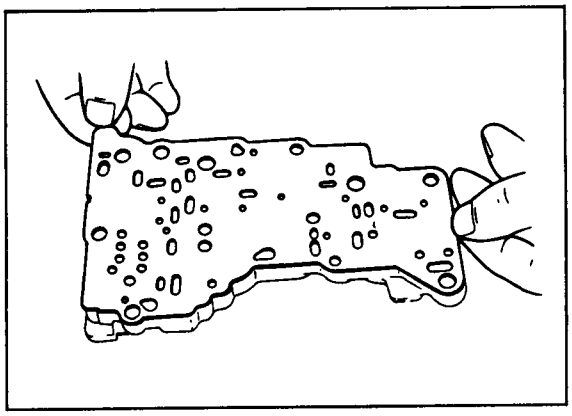
83U07B-275

Disassembly of Control Valve Body

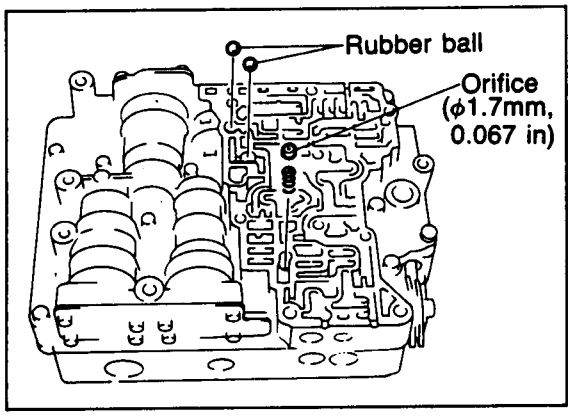
1. Remove the lock-up solenoid valve.
2. Remove the O-ring and oil strainer.



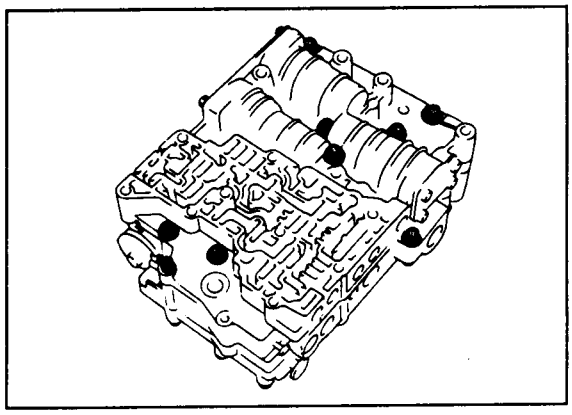
3. Remove the indicated bolts and bracket, and pull out the front control body with the premain separator as a unit.



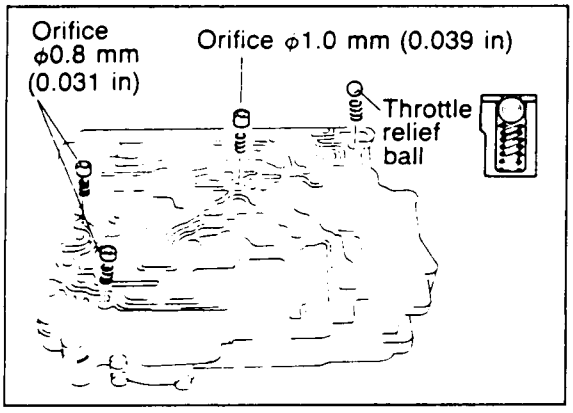
4. Remove the front/premain gaskets and separator from the front control body.



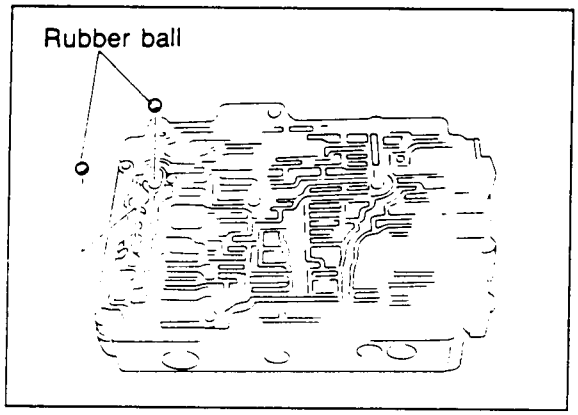
5. Remove the rubber balls, orifice check valve (ϕ1.7 mm, 0.067 in) and spring from the premain control body.



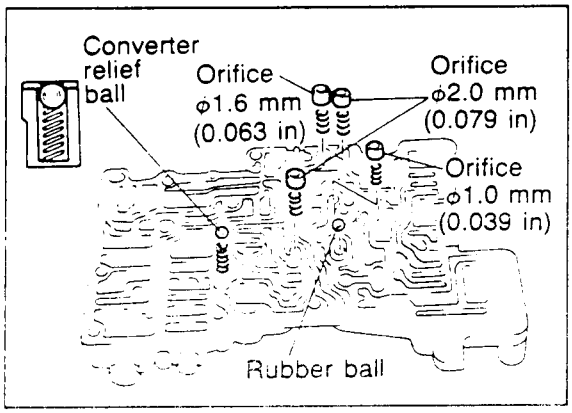
6. Remove the bolts and hexagonal head bolt and remove the premain control body and the main separator as a unit.



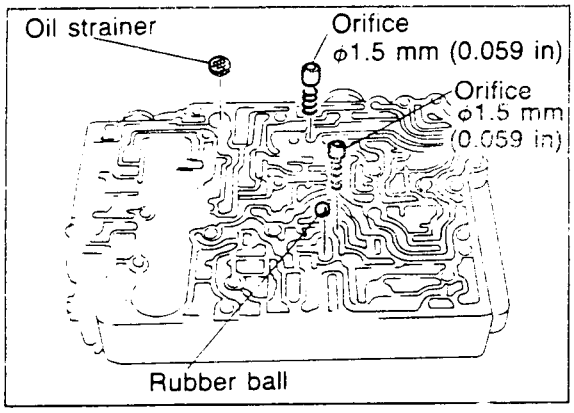
7. Remove the premain/main gaskets and separator from the premain control body.
8. Remove the orifice check valves (φ1.0 mm, 0.039 in; φ0.8 mm, 0.031 in) and springs, and the throttle relief ball and spring from the premain control body.



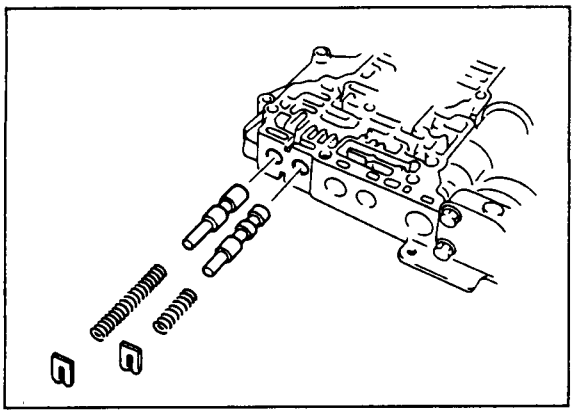
9. Remove the rubber balls from the main control body.



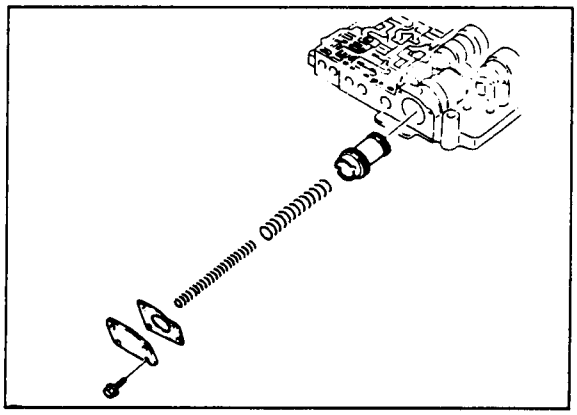
11. Remove the main/rear gaskets and separator from the rear control body.
12. Remove the orifice check valves (φ2.0 mm, 0.079 in; φ1.6 mm, 0.063 in; φ1.0 mm, 0.039 in) and springs, converter relief ball and spring, and the rubber ball from the rear control body.



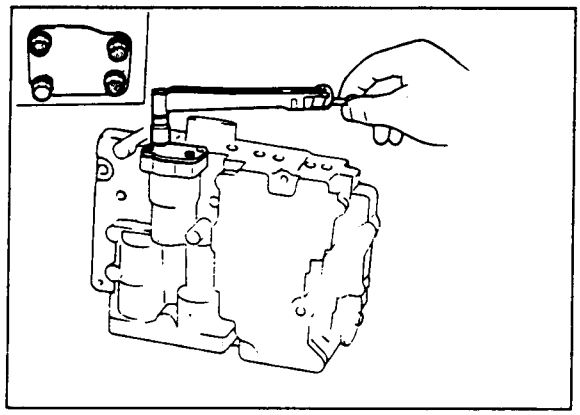
13. Remove the orifice check valves (φ1.5 mm, 0.059 in) and springs, oil strainer, and rubber ball from the main control body.



Install the 2-3 timing valve, 2-3 timing spring, and retainer.
Install the low reducing valve, low reducing spring, and retainer.

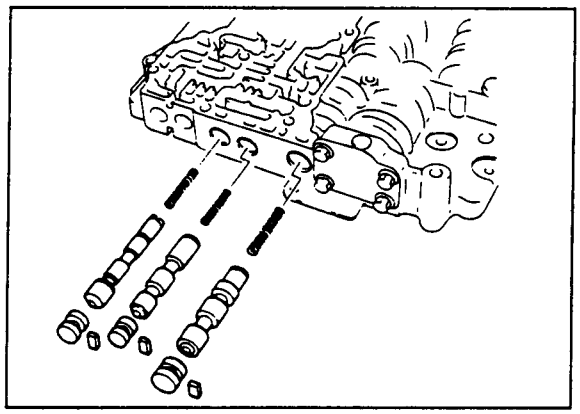


Apply ATF to the O-rings, and install them onto the piston; then install the 1-2 accumulator piston and 1-2 accumulator springs.



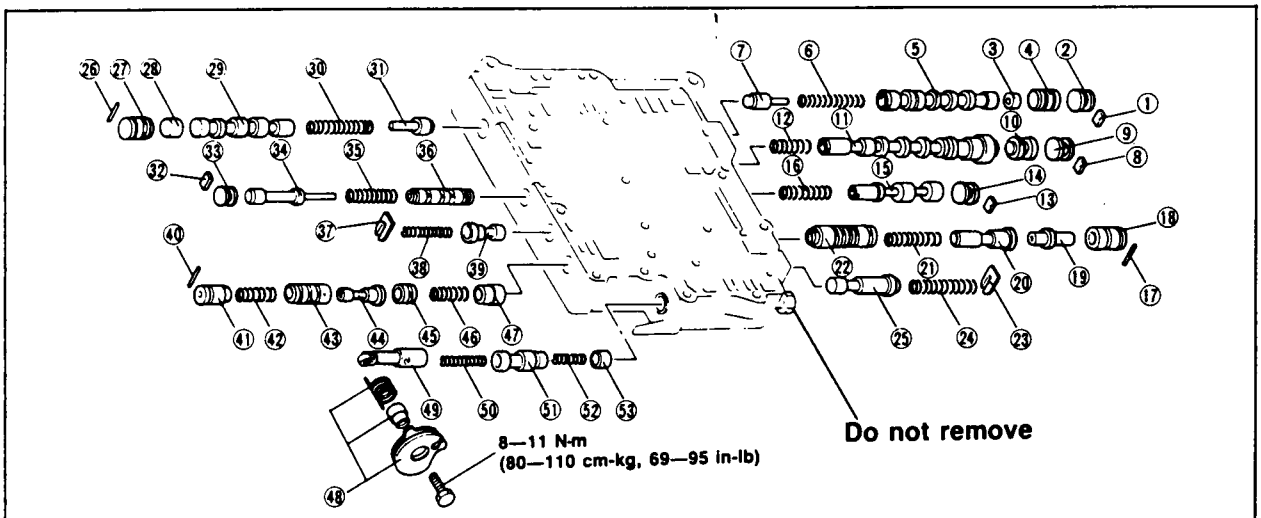
Install the 1-2 accumulator gasket and plate; then tighten the plate.

Tightening torque:
6—8 N·m (66—80 cm-kg, 57—69 in-lb)

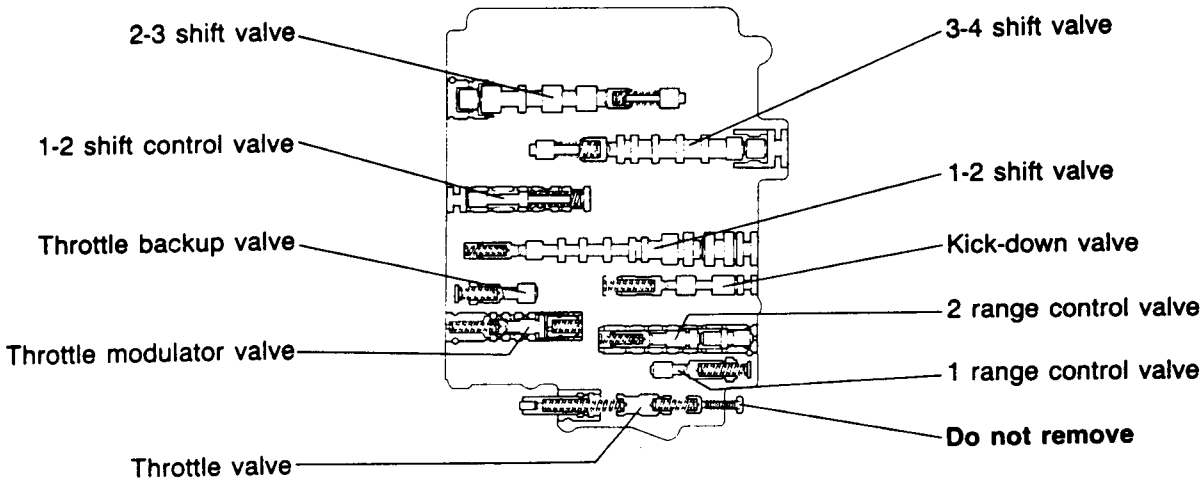


Install the OD release spring, OD release valve, stopper plug, and stopper pin.
Install the bypass spring, bypass valve, stopper plug, and stopper pin.
Install the servo control spring, servo control valve, stopper plug, and stopper pin.

Main Control Body
Disassembly
Disassemble in the sequence shown in the figure.



Valve Location

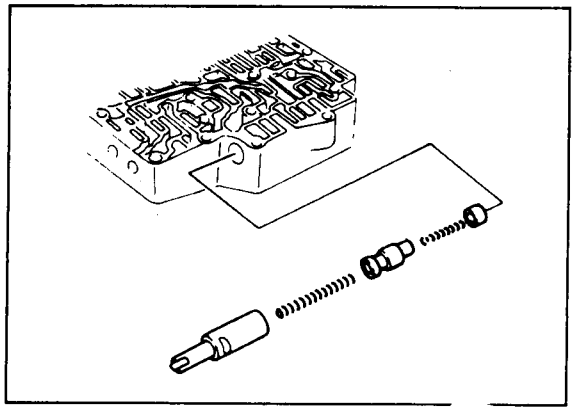


1. Stopper pin
2. Stopper plug
3. 3-4 shift front plug
4. 3-4 shift sleeve
5. 3-4 shift valve
6. 3-4 shift spring
7. 3-4 shift rear plug
8. Stopper pin
9. Stopper plug
10. 1-2 shift plug
11. 1-2 shift valve
12. 1-2 shift spring
13. Stopper pin
14. Stopper plug
15. Kick-down valve
16. Kick-down spring
17. Stopper pin
18. 2 range control front sleeve
19. 2 range control plug
20. 2 range control valve
21. 2 range control spring
22. 2 range control rear sleeve
23. Retainer
24. 1 range control spring
25. 1 range control valve
26. Stopper pin
27. 2-3 shift sleeve
28. 2-3 shift front plug
29. 2-3 shift valve
30. 2-3 shift spring
31. 2-3 shift rear plug
32. Stopper pin
33. Stopper plug
34. 1-2 shift control valve
35. 1-2 shift control spring
36. 1-2 shift control sleeve
37. Retainer
38. Throttle backup spring
39. Throttle backup valve
40. Stopper pin
41. Throttle modulator sleeve A
42. Throttle modulator front spring
43. Throttle modulator sleeve B
44. Throttle modulator valve
45. Throttle modulator sleeve C
46. Throttle modulator rear spring
47. Throttle modulator plug
48. Throttle cam assembly
49. Throttle plug assembly
50. Throttle spring
51. Throttle valve
52. Throttle assist spring
53. Throttle adjust plug

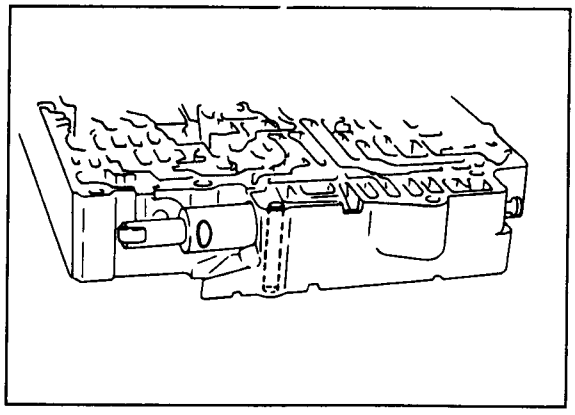
Inspection
Check the following and replace any faulty parts.
1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

Spring

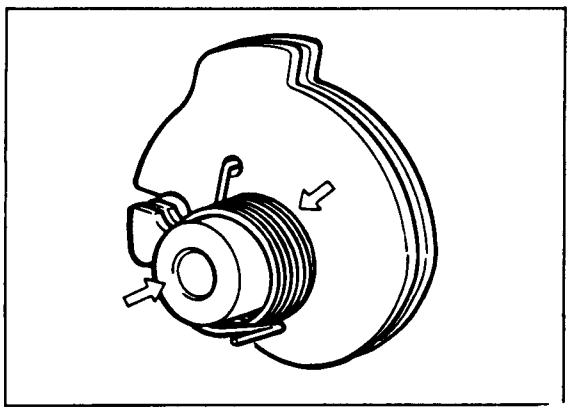
Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
1-2 shift control spring	5.5 (0.217)	46.0 (1.811)	0.5 (0.020)	Light green
1-2 shift spring	5.0 (0.197)	24.9 (0.980)	0.5 (0.020)	Gray
2-3 shift spring	6.1 (0.240)	39.7 (1.563)	0.65 (0.026)	Pink
3-4 shift spring	6.4 (0.252)	37.0 (1.457)	0.6 (0.024)	—
Throttle backup spring	6.4 (0.252)	33.5 (1.319)	0.6 (0.024)	Pink
Throttle modulator front spring	5.0 (0.197)	27.8 (1.094)	0.6 (0.024)	Red
Throttle modulator rear spring	7.15 (0.281)	30.8 (1.213)	0.85 (0.033)	Red
1 rang control spring	6.15 (0.242)	39.2 (1.543)	0.65 (0.026)	White
2 rang control spring	3.95 (0.156)	32.1 (1.264)	0.45 (0.018)	—
Kick-down spring	5.4 (0.213)	38.1 (1.500)	0.8 (0.031)	—
Throttle assist spring	5.15 (0.203)	32.3 (1.272)	0.55 (0.022)	Dark green
Throttle spring	5.4 (0.213)	48.3 (1.902)	0.8 (0.031)	—
Converter relief ball spring	6.9 (0.272)	24.1 (0.949)	0.9 (0.035)	Maroon
Orifice check valve spring	5.0 (0.197)	12.5 (0.492)	0.23 (0.009)	—



Assembly
1. Install the throttle adjust plug, throttle assist spring, throttle valve, throttle spring, and throttle plug assembly.

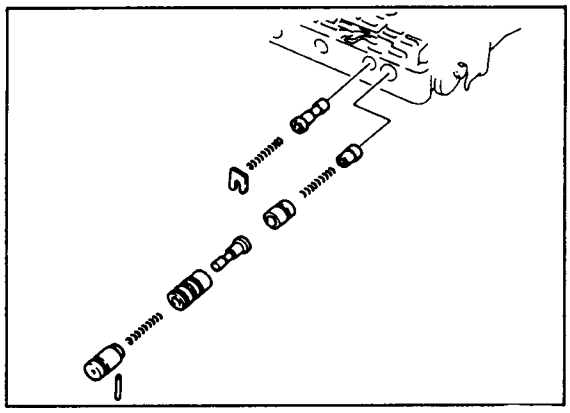


Caution
Install the throttle plug assembly with the groove aligned with the bolt hole.

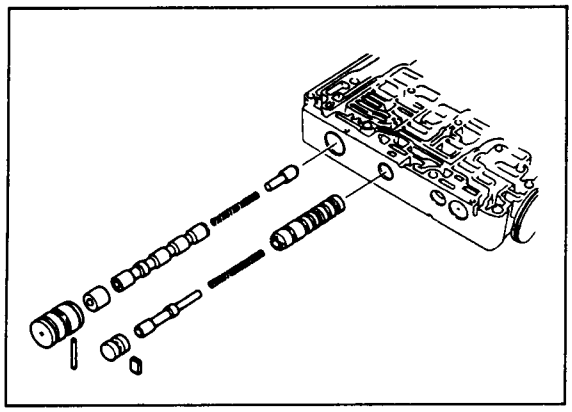


2. Install the throttle return spring as shown.
3. Install the throttle cam assembly to the main control body.

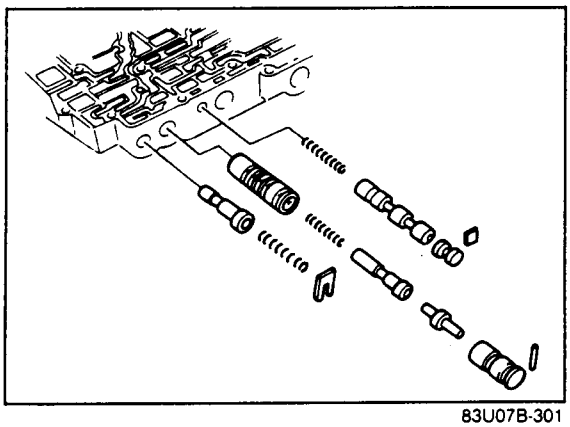
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)



4. Install the throttle modulator plug, throttle modulator rear spring, throttle modulator sleeve C, throttle modulator valve, throttle modulator sleeve B, throttle modulator front spring, throttle modulator sleeve A, and stopper pin.
5. Install the throttle backup valve, throttle backup spring, and retainer.



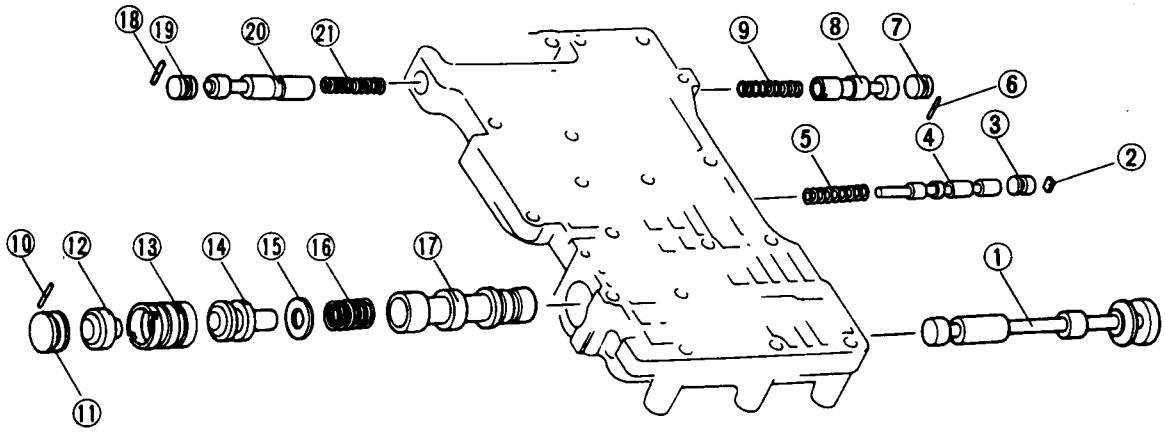
6. Install the 1-2 shift control sleeve, 1-2 shift control spring, 1-2 shift control valve, stopper plug, and stopper pin.
7. Install the 2-3 shift rear plug, 2-3 shift spring, 2-3 shift valve, 2-3 shift front plug, 2-3 shift sleeve, and stopper pin.



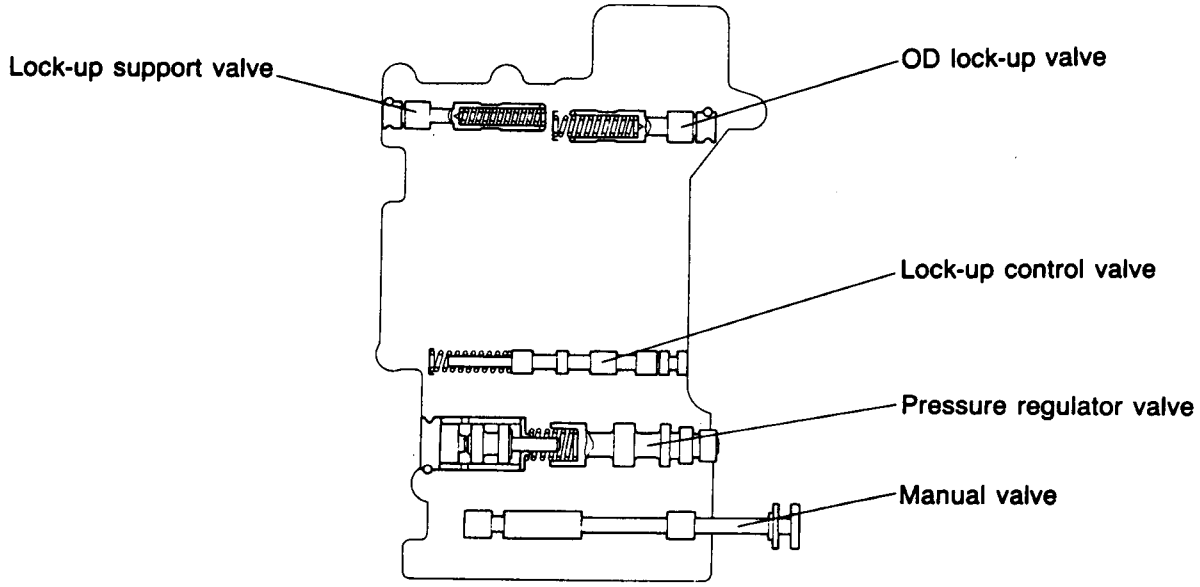
83U07B-301

8. Install the 1 range control valve, 1 range control spring, and retainer.
9. Install the 2 range control rear sleeve, 2 range control spring, 2 range control valve, 2 range control plug, 2 range control front sleeve, and stopper pin.
10. Install the kick-down spring, kick-down valve, stopper plug, and stopper pin.

Rear Control Body
Disassembly
Disassemble in the sequence shown in the figure.



Valve Location

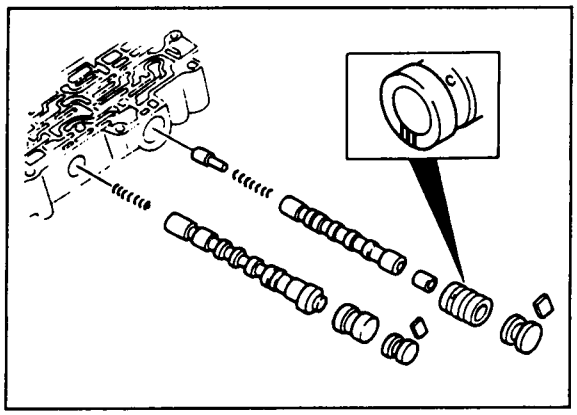


1. Manual valve
2. Stopper pin
3. Stopper plug
4. Lock-up control valve
5. Lock-up control spring
6. Stopper pin
7. Stopper plug
8. OD lock-up valve
9. OD lock-up spring
10. Stopper pin
11. Stopper plug
12. Pressure regulator backup plug
13. Pressure regulator plug sleeve
14. Pressure regulator plug
15. Pressure regulator spring seat
16. Pressure regulator spring
17. Pressure regulator valve
18. Stopper pin
19. Stopper plug
20. Lock-up support valve
21. Lock-up support spring

Inspection
Check the following and replace any faulty parts.
1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

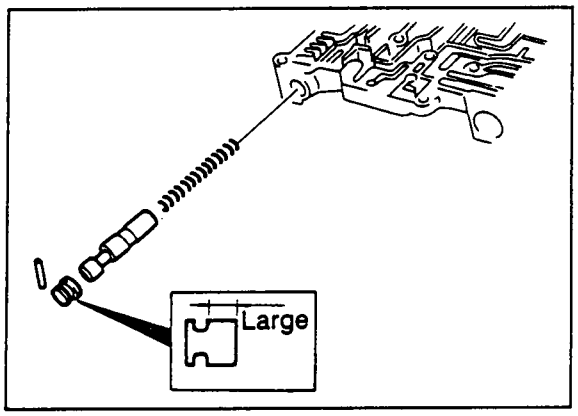
Spring

Spring name	Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
Pressure regulator spring	9.5 (0.374)	30.7 (1.209)	0.7 (0.028)	—
Lock-up control spring	7.3 (0.287)	46.2 (1.819)	0.8 (0.031)	Blue
Lock-up support spring	6.1 (0.240)	43.5 (1.713)	0.65 (0.026)	Blue
OD lock-up spring	7.1 (0.280)	66.5 (2.618)	0.8 (0.031)	Red



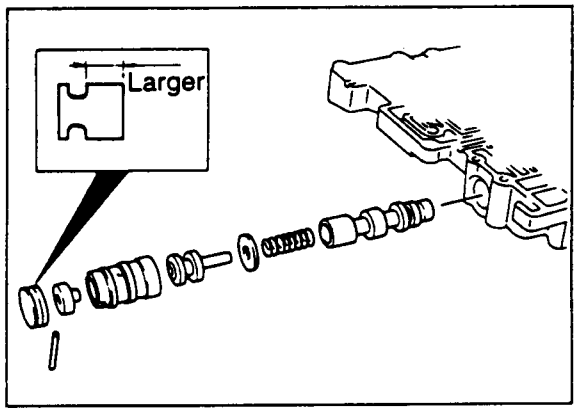
Install the 1-2 shift spring, 1-2 shift valve, 1-2 shift plug, stopper plug, and stopper pin.
Install the 3-4 shift rear plug, 3-4 shift spring, 3-4 shift valve, 3-4 shift sleeve, 3-4 shift front plug, stopper plug, and stopper pin.

Note
Install the 3-4 shift sleeve with the identification notches facing inward.



Assembly
Install the lock-up support spring, lock-up support valve, stopper plug, and stopper pin.

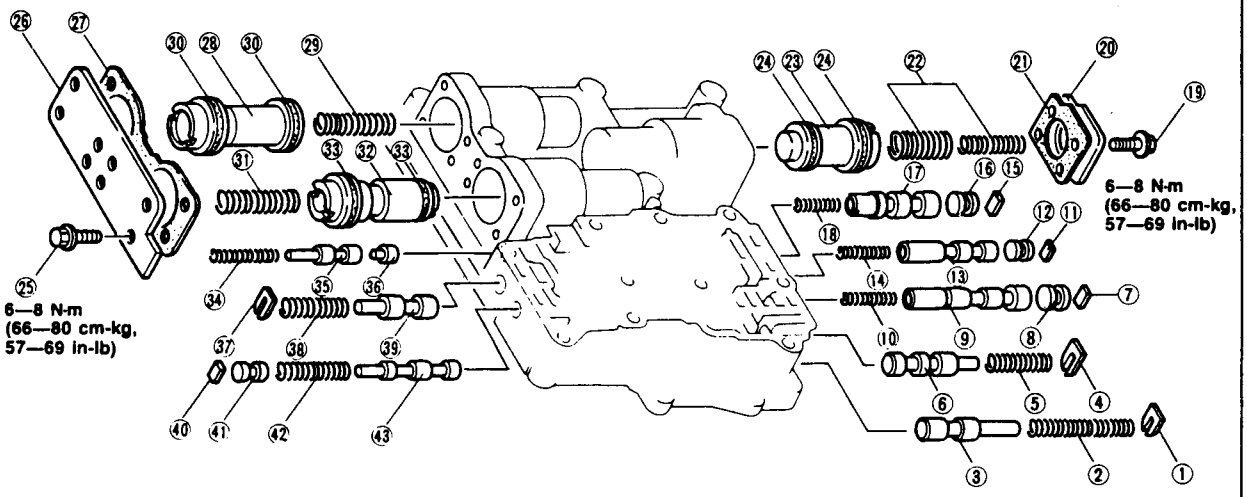
Note
Install the stopper plug large end first.



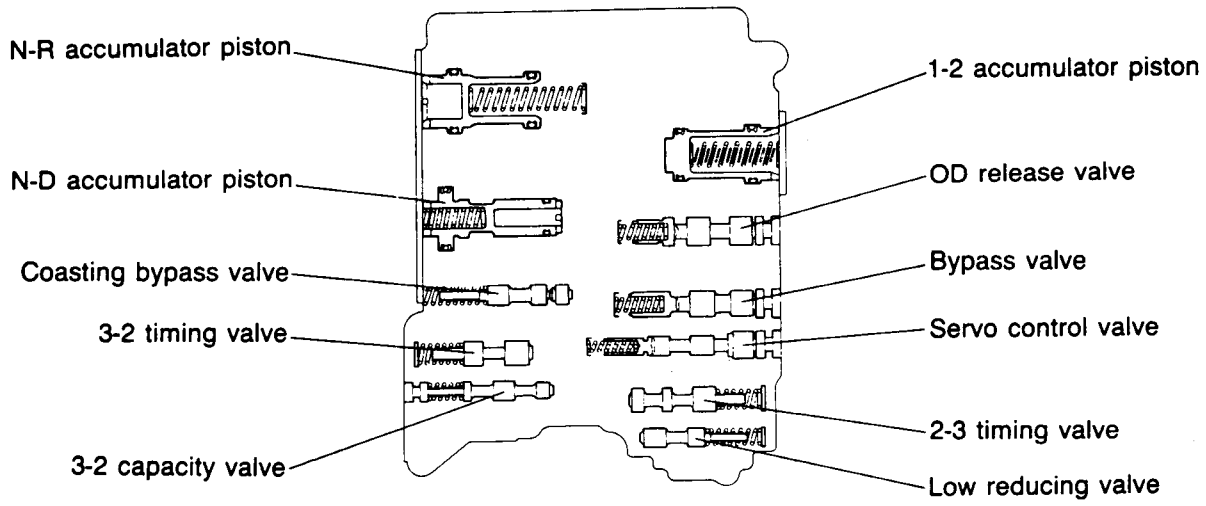
Install the pressure regulator valve, pressure regulator spring, pressure regulator spring seat, pressure regulator plug, pressure regulator plug sleeve, pressure regulator backup plug, stopper plug, and stopper pin.

Note
Install the stopper plug large end first.

Premain Control Body
Disassembly
Disassemble in the sequence shown in the figure.



Valve Location



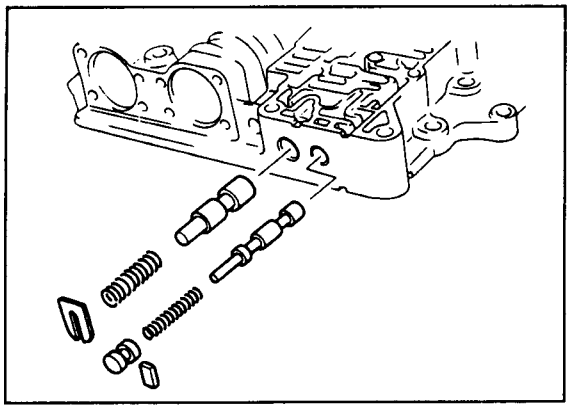
1. Retainer
2. Low reducing spring
3. Low reducing valve
4. Retainer
5. 2-3 timing spring
6. 2-3 timing valve
7. Stopper pin
8. Stopper plug
9. Servo control valve
10. Servo control spring
11. Stopper pin
12. Stopper plug
13. Bypass valve
14. Bypass spring
15. Stopper pin
16. Stopper plug
17. OD release valve
18. OD release spring
19. Bolt
20. 1-2 accumulator plate
21. 1-2 accumulator gasket
22. 1-2 accumulator springs
23. 1-2 accumulator piston
24. 1-2 accumulator seal rings
25. Bolt
26. N-R accumulator plate
27. N-R accumulator gasket
28. N-R accumulator piston
29. N-R accumulator rear spring
30. N-R accumulator seal rings
31. N-D accumulator front spring
32. N-D accumulator piston
33. N-D accumulator seal rings
34. Coasting bypass spring
35. Coasting bypass valve
36. Coasting bypass plug
37. Retainer
38. 3-2 timing spring
39. 3-2 timing valve
40. Stopper pin
41. Stopper plug
42. 3-2 capacity spring
43. 3-2 capacity valve

Inspection

Check the following and replace any faulty parts.
1. Damaged or worn valves
2. Damaged oil passage
3. Cracked or damaged valve body
4. Operation of each valve
5. Weakened spring

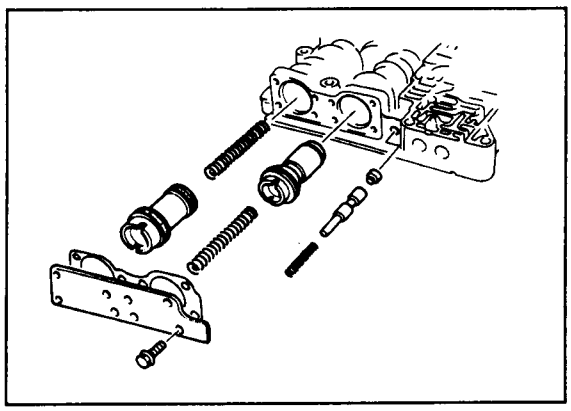
Spring

Spring name		Outer dia. mm (in)	Free length mm (in)	Wire dia. mm (in)	Spring color
1-2 accumulator small spring	F8 engine	9.9 (0.400)	84.7 (3.335)	1.2 (0.047)	Red
1-2 accumulator large spring	FE engine	13.0 (0.512)	73.2 (2.881)	1.8 (0.071)	Pink
	F8 engine	16.0 (0.630)	84.7 (3.335)	2.0 (0.079)	White
Bypass spring		5.0 (0.197)	25.1 (0.988)	0.7 (0.028)	Yellow
Servo control spring		4.9 (0.193)	27.1 (1.067)	0.5 (0.020)	Light blue
2-3 timing spring		8.3 (0.327)	26.5 (1.043)	0.8 (0.031)	—
N-R accumulator rear spring		11.1 (0.437)	68.2 (2.685)	1.0 (0.039)	Blue
N-D accumulator front spring		9.8 (0.386)	60.9 (2.398)	1.1 (0.043)	Yellow
Low reducing spring		8.7 (0.343)	38.3 (1.508)	0.9 (0.035)	Black
OD release spring		6.0 (0.236)	32.6 (1.283)	0.6 (0.024)	Orange
Coasting bypass spring		5.8 (0.228)	31.3 (1.232)	0.6 (0.024)	Yellow
3-2 timing spring		8.2 (0.323)	28.55 (1.124)	0.8 (0.031)	Maroon
3-2 capacity spring		5.55 (0.219)	30.5 (1.201)	0.55 (0.022)	Light green
Throttle relief ball spring		6.6 (0.260)	20.3 (0.799)	0.8 (0.031)	Light green

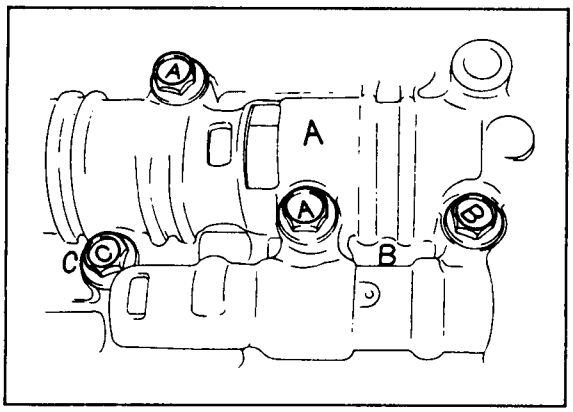


Assembly

Install the 3-2 capacity valve, 3-2 capacity spring, stopper plug, and stopper pin.
Install the 3-2 timing valve, 3-2 timing spring, and retainer.

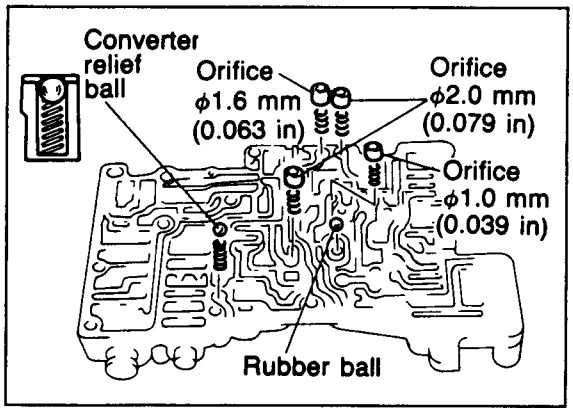


Install the coasting bypass plug, coasting bypass valve, and coasting bypass spring.
Apply ATF to the O-rings, and install them onto the piston; then insert the N-R accumulator rear spring, and N-R accumulator piston.
Apply ATF to the O-rings, and install them onto the piston; then insert the N-D accumulator piston, and N-D accumulator front spring.

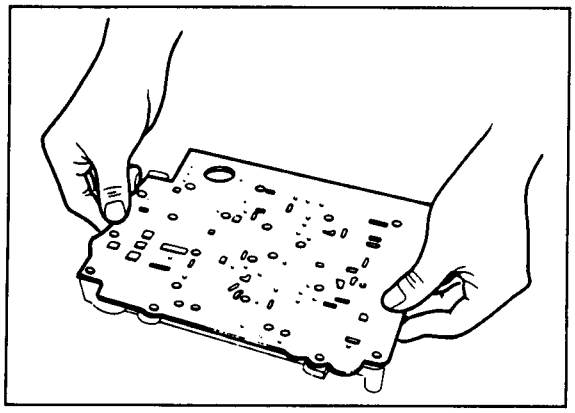


Assembly of Control Valve Body

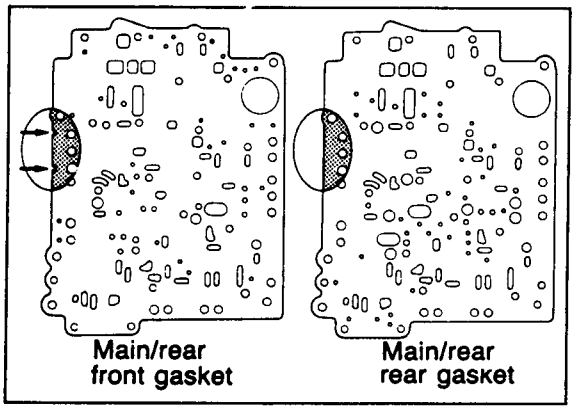
Note
a) Do not mix-up the front and rear gaskets during assembly.
b) Match the bolt head letter and the control valve body letter.



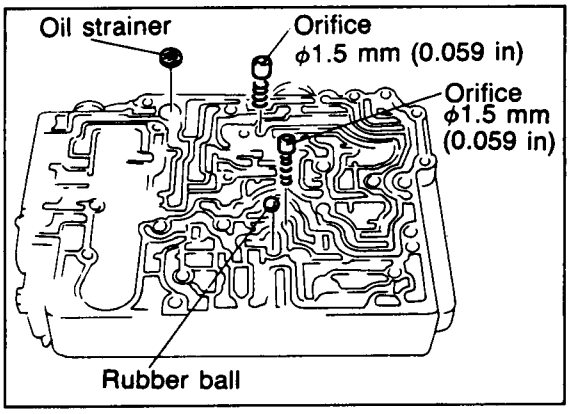
Install the orifice check valves (ϕ2.0 mm, 0.079 in; ϕ1.6 mm, 0.063 in; ϕ1.0 mm, 0.039 in) and springs, converter relief ball and spring, and rubber ball in the rear control body as shown.



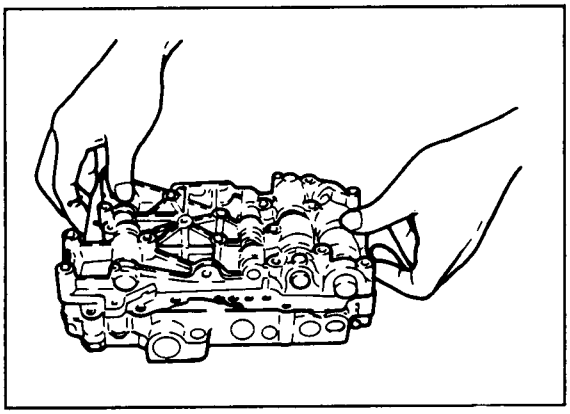
Install the gaskets on both sides of the rear separator; then install it onto the rear control body.



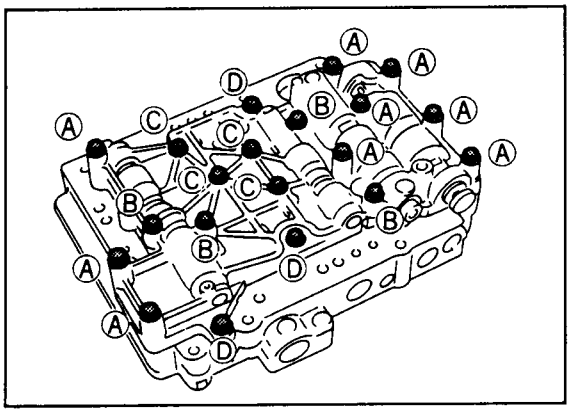
Note
The main/rear rear gasket and main/rear front gasket are not interchangeable.



Install the orifice check valves (ϕ1.5 mm, 0.059 in) and springs, oil strainer, and rubber ball in the main control body as shown.

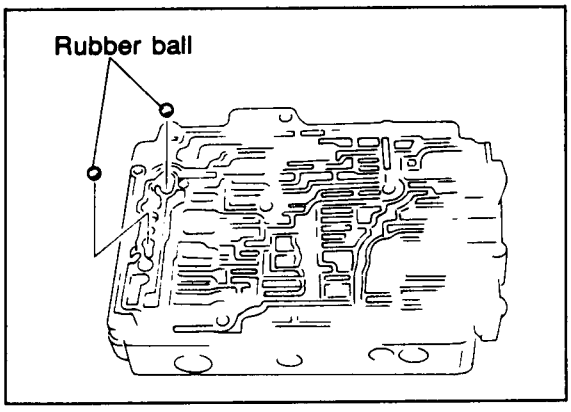


Install the rear control body to the main control body.

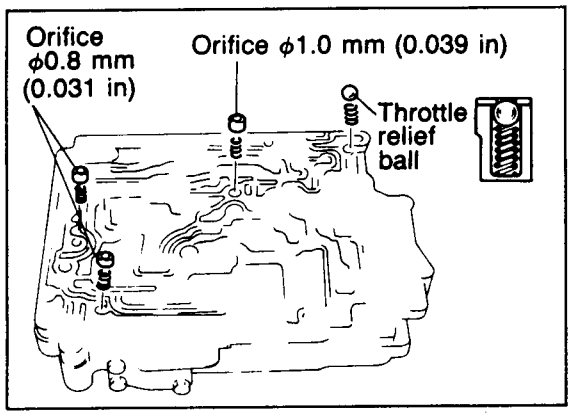


Loosely tighten the bolts.

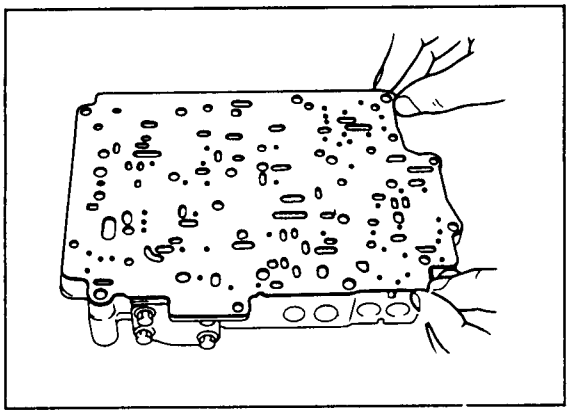
Note
Match the bolt head letter as shown.



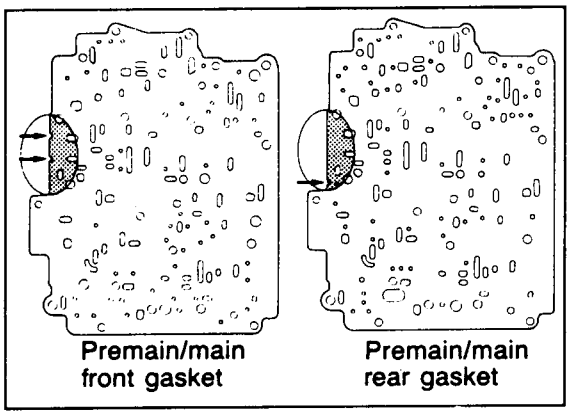
Turn the assembly over and install the rubber balls in the main contrcl body as shown.



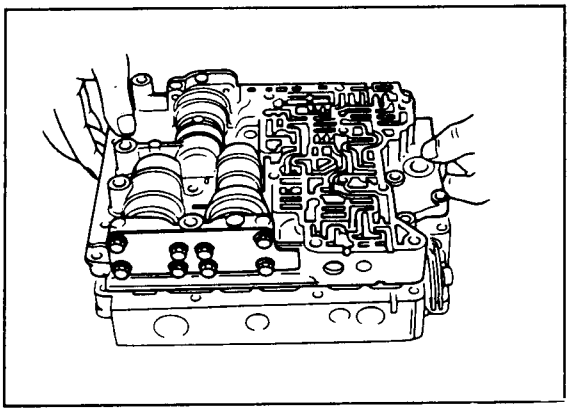
Install the orifice check valves (ϕ1.0 mm, 0.039 in; ϕ0.8 mm; 0.031 in) and springs, and the throttle relief ball and spring in the premain control body as shown.



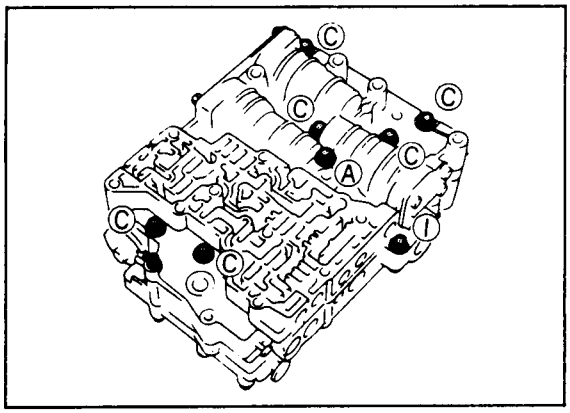
Install the gaskets on both sides of the main separator; then install it onto the premain control body.



Note
The premain/main rear gasket and premain/main front gasket are not interchangeable.

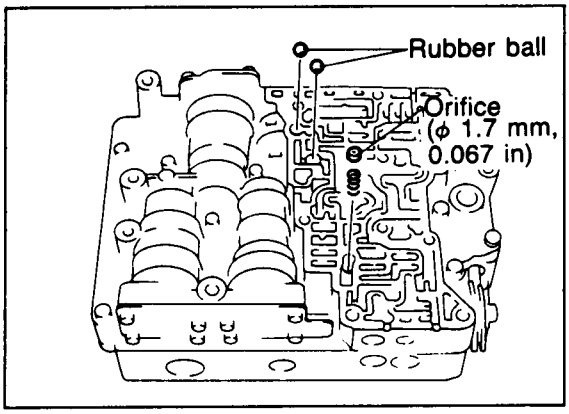


Set the premain control body onto the main control body.

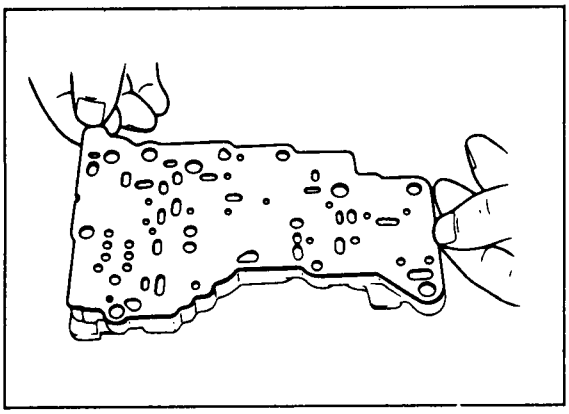


Loosely tighten the bolts.

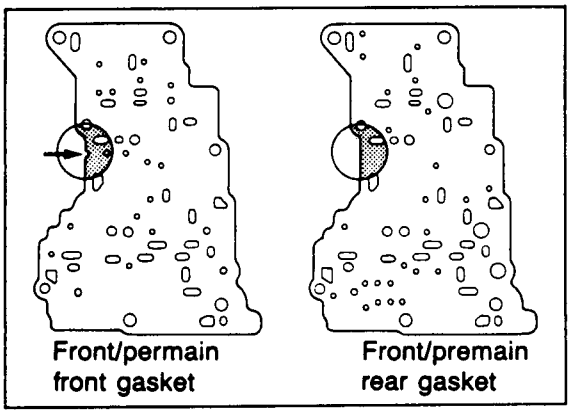
Note
Match the bolt head letter as shown.



Install the rubber balls, orifice check valve (ϕ1.7 mm, 0.067 in) in and spring in the premain control body as shown.



Install the gaskets on both sides of the premain separator; then install it onto the front control body.

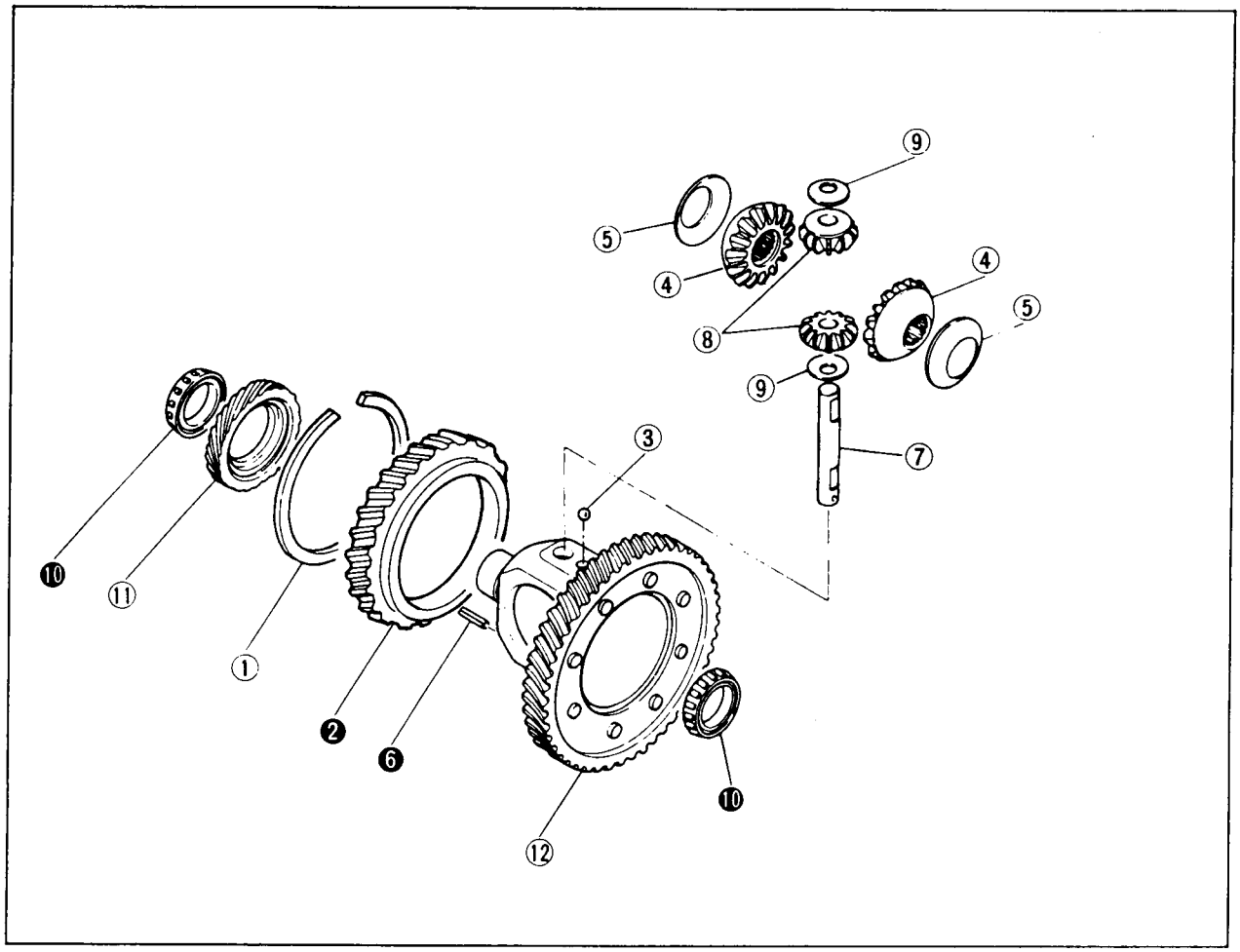


Note
The front/premain front gasket and front/premain rear gasket are not interchangeable.

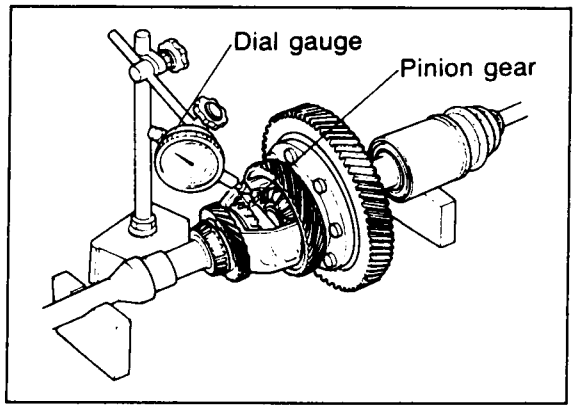
DIFFERENTIAL

Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.



1. Snap ring (G4A-HL)
2. Governor drive gear (G4A-HL)
3. Steel ball (G4A-HL)
4. Side gear
5. Side gear thrust washer
6. Roll pin
7. Pinion shaft
8. Pinion gear
9. Pinion gear thrust washer
10. Side bearing inner race
11. Speedometer drive gear
12. Ring gear and gear case assembly

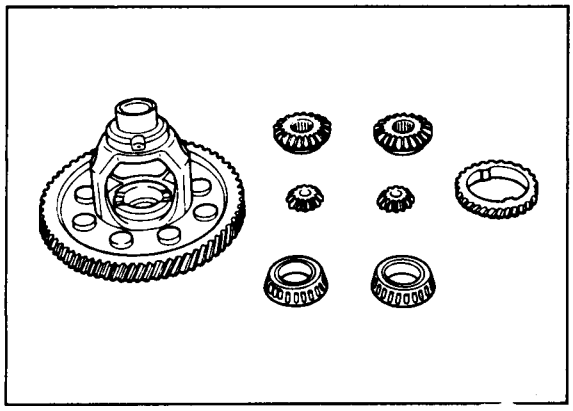


Disassembly note

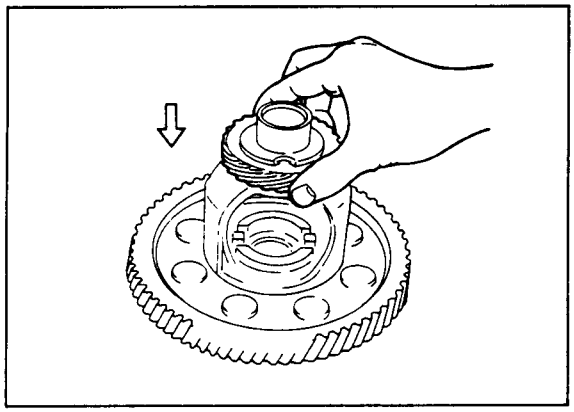
Checking backlash

Before disassembly, measure the backlash of the side gears and pinion gears. If it is not within specification, replace the differential assembly.

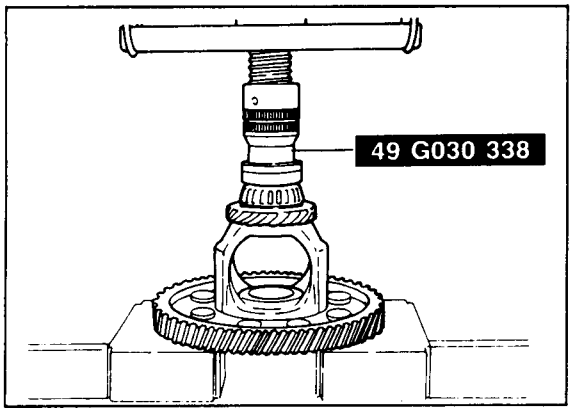
Backlash:
Standard 0.025—0.1 mm (0.001—0.004 in)
Maximum 0.5 mm (0.020 in)



Inspection
Check the following and replace any faulty parts.
1. Damaged or worn gears
2. Cracked or damaged gear case
3. Damaged bearings

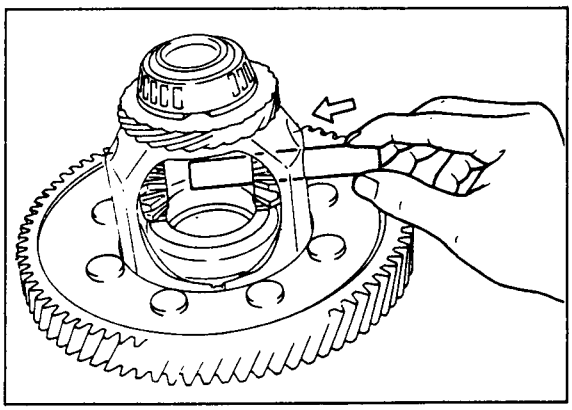


Assembly
Set the speedometer drive gear onto the ring gear and case assembly.



Install the side bearing inner races.
(1) Press the side bearing inner race (side opposite the ring gear) onto the ring gear and case assembly with the **SST**.
(2) Press on the other side bearing inner race (ring gear side) in the same manner.

Caution
Do not reuse the bearings if they were removed.

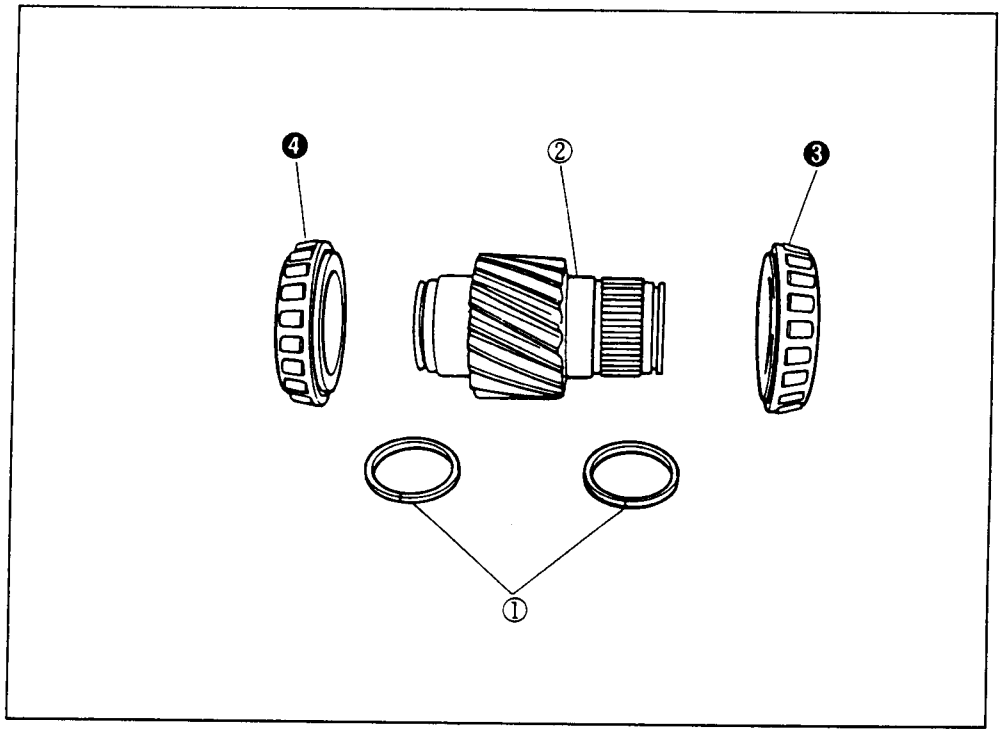


Install the pinion gears and thrust washers into the case.
Install the pinion shaft.

OUTPUT GEAR

Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.

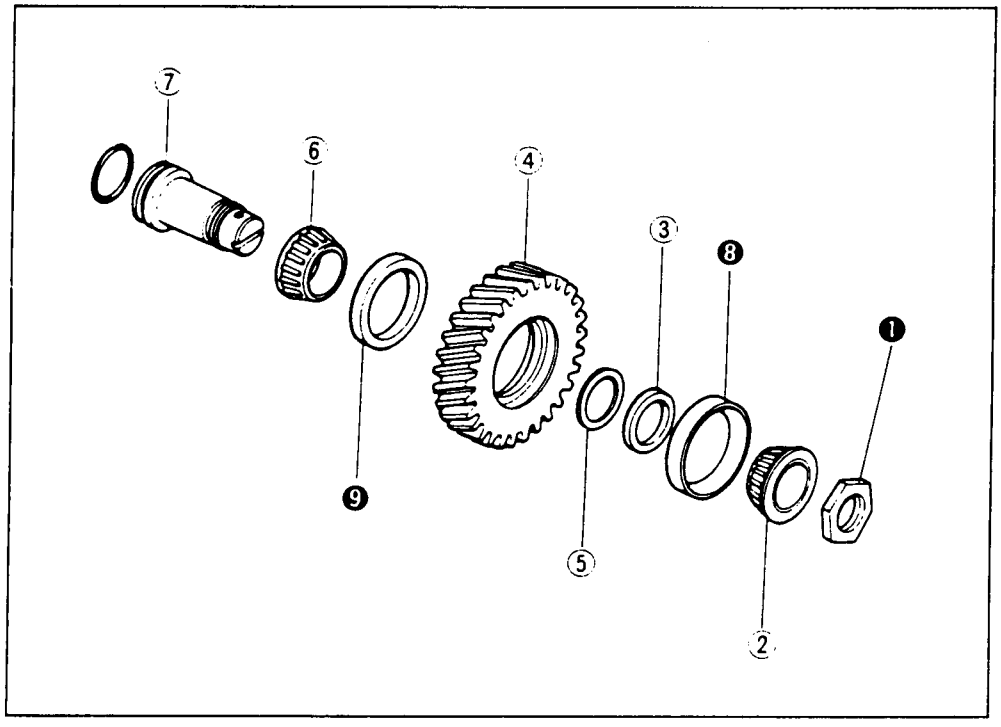


1. Seal ring
2. Output gear
3. Output gear bearing
4. Output gear bearing

IDLE GEAR

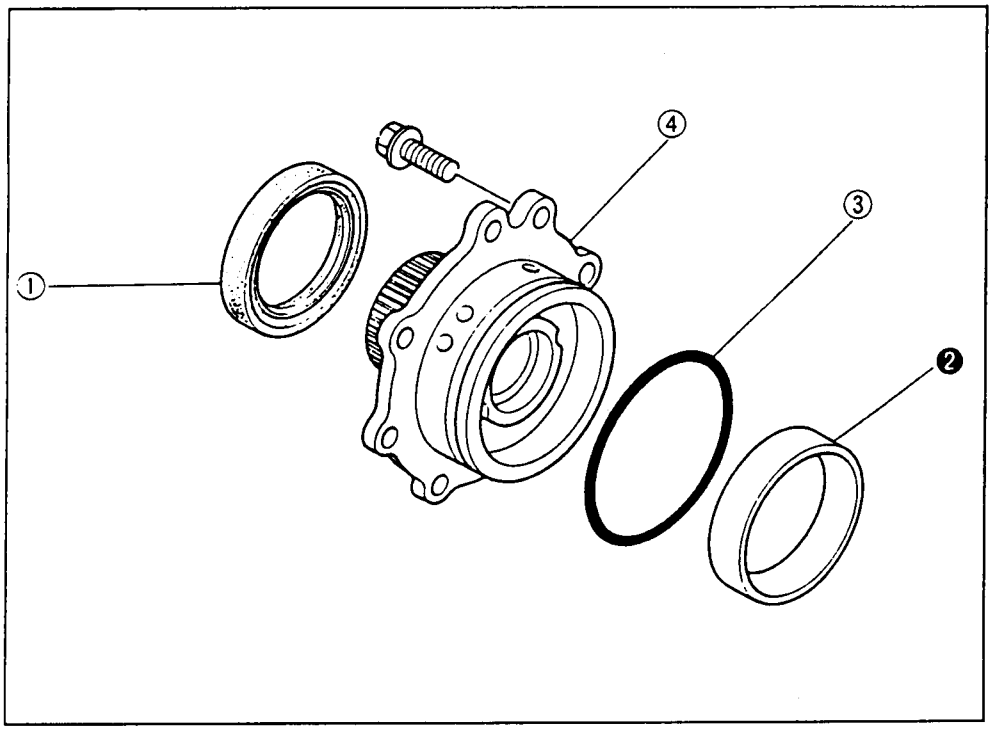
Disassembly

Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.

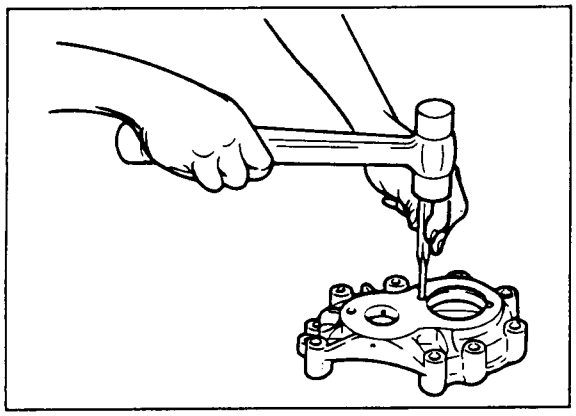


1. Locknut
2. Idle gear bearing
3. Spacer
4. Idle gear
5. Adjust shim
6. Idle gear bearing
7. Idle shaft
8. Bearing outer race
9. Bearing outer race

BEARING COVER ASSEMBLY
Disassembly
Disassemble in the sequence shown in the figure referring to the disassembly note for the specially marked parts.

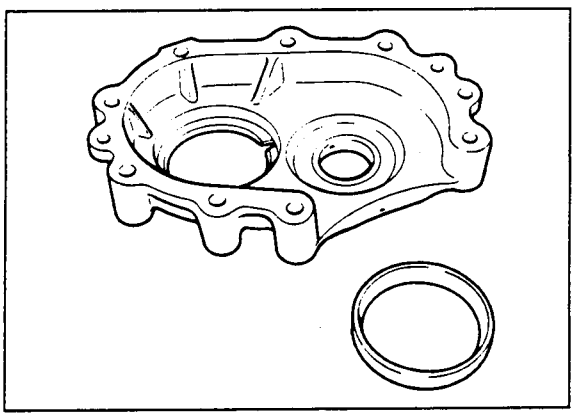


1. Oil seal
2. Bearing outer race
3. O-ring
4. Bearing cover



BEARING HOUSING
Disassembly
Remove the bearing outer race with a pin punch and hammer

Note
Install the bearing outer race during reassembly of transaxle to adjust the preload.



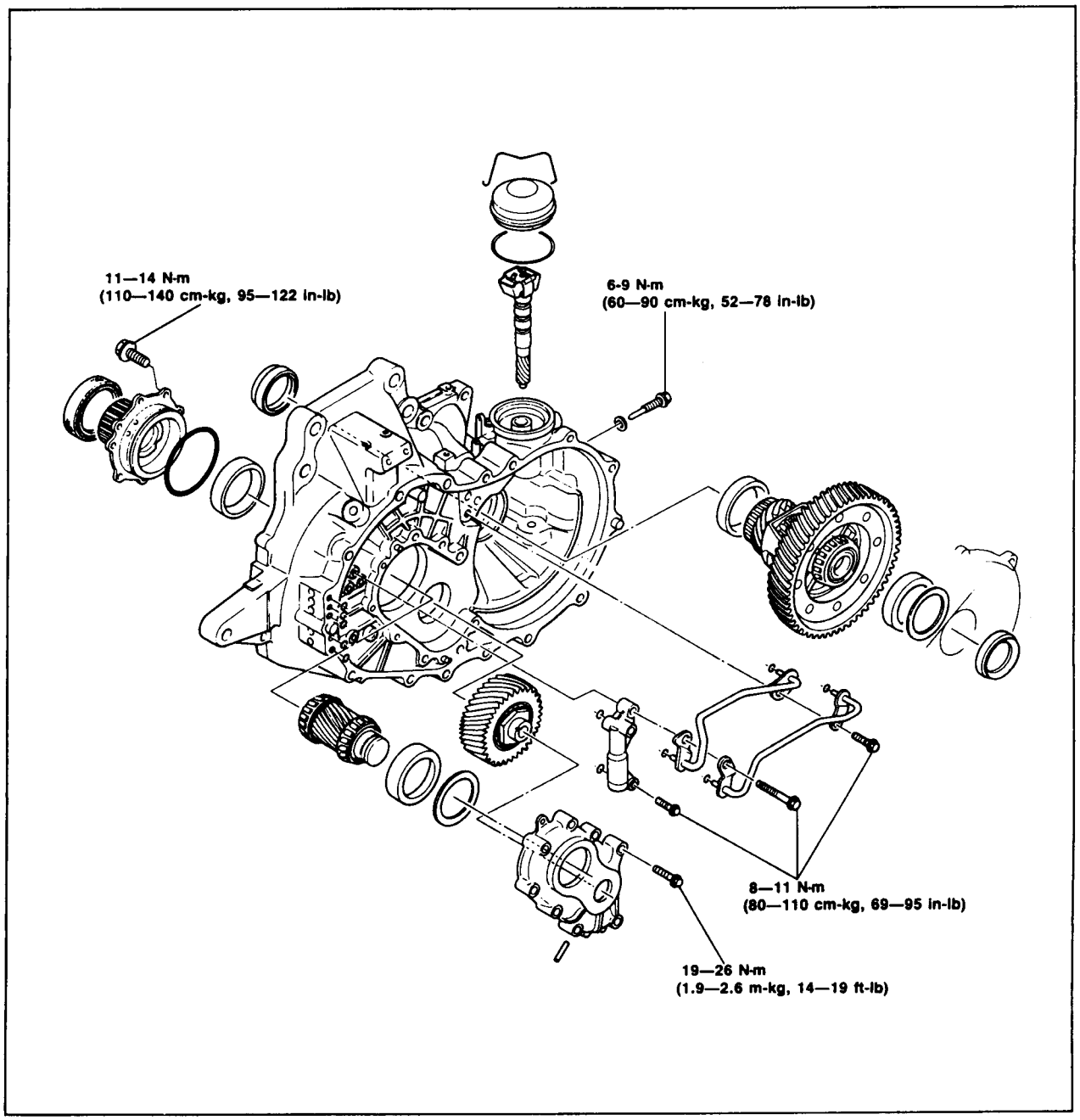
Inspection
Check the following and replace any faulty parts.
1. Damaged bearing housing
2. Damaged bearing outer race

ASSEMBLY

PRECAUTION

(1) The automatic transaxle consists of high-precision-finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage or affect performance.
(2) Clean out oil holes and oil passages with compressed air, and check that there are no obstructions.
(3) Before assembly, apply ATF to each O-ring, seal ring, rotating part, and friction part.
(4) If the brake band or drive plates are replaced with new ones, first soak them in ATF for at least 2 hours before installing.
(5) Each seal gasket and O-ring must be replaced with a new one.
(6) Be sure to install all thrust bearings and races in the correct direction and position.

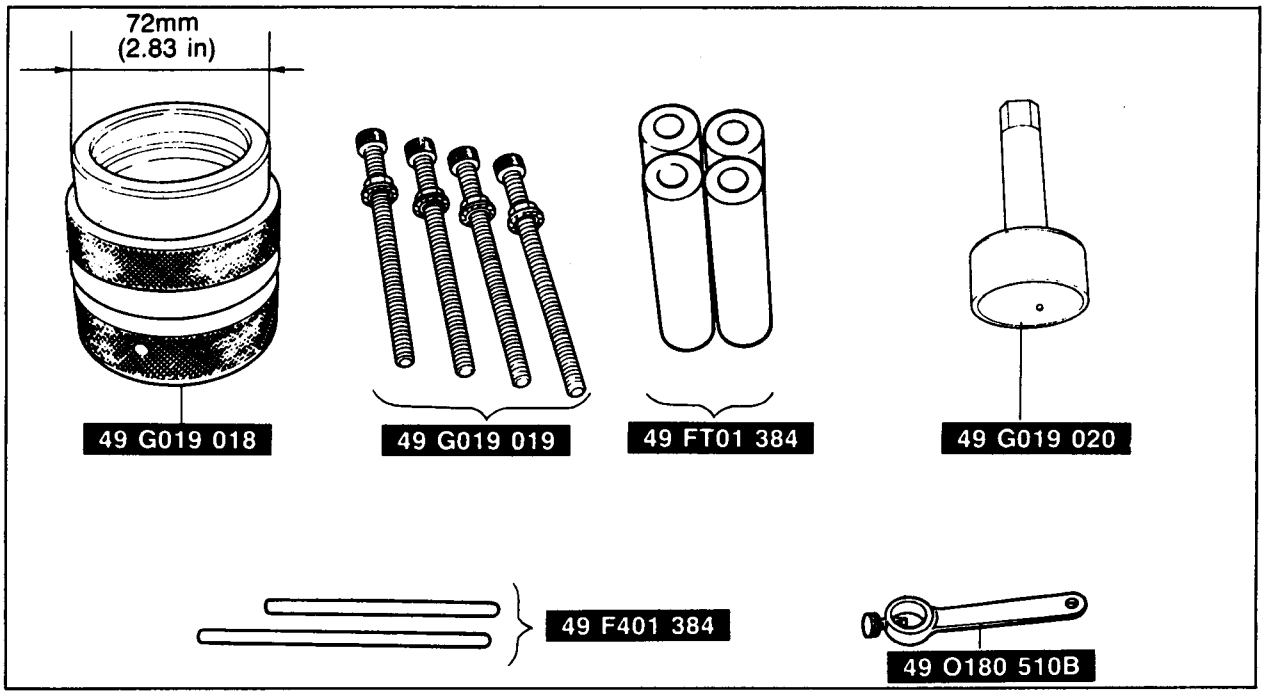
ASSEMBLY-
Torque Specifications

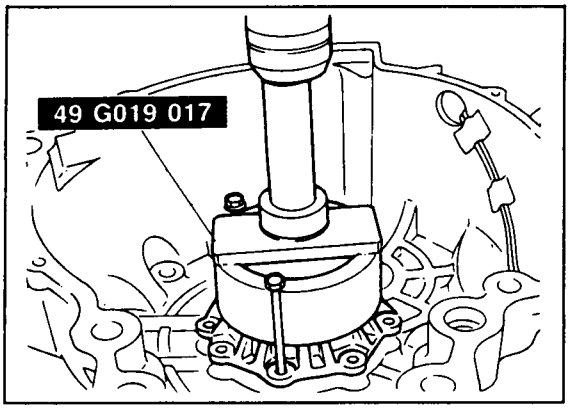


Procedure

1. Adjust the preload of the output gear bearing and select the adjust shim(s) as described below.

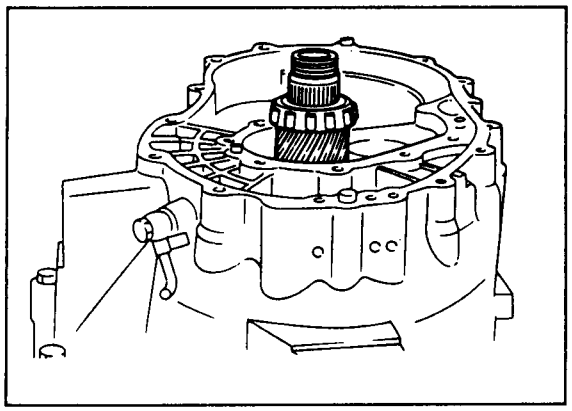
Note
To adjust the preload, use the SST shown below.



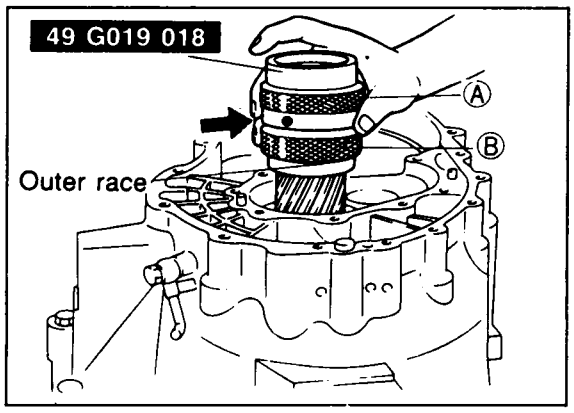


(1) Press the bearing cover in after aligning it with guide bolts as shown.

Tightening torque: 11—14 N·m (110—140 cm-kg, 95—122 in-lb)

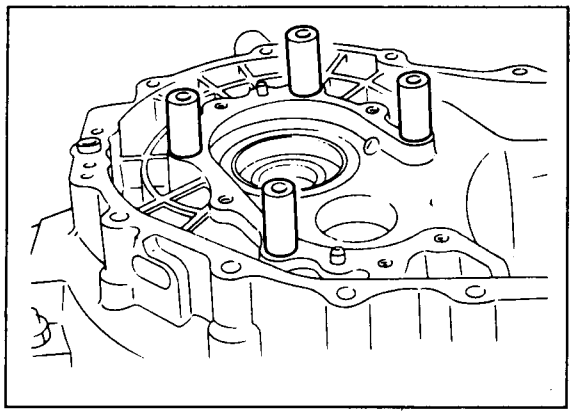


(2) Install the converter housing onto the **SST**.
(3) Remove the bearing outer race and adjust shims from the bearing housing. (Refer to page 7B—185)
(4) Mount the output gear assembly onto the converter housing.

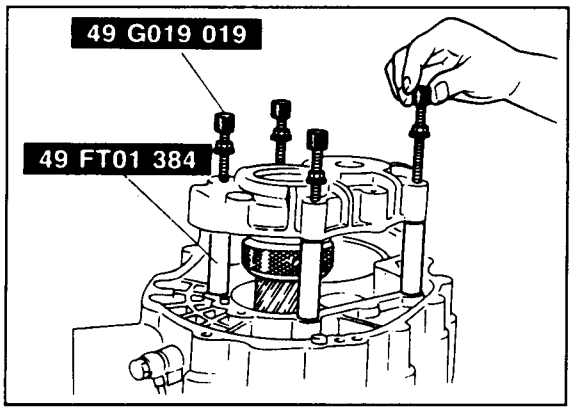


Install the outer race removed in step (2) to the **SST**; then mount them on the output gear assembly.

Caution
Eliminate the gap (arrow) by turning A or B of the selector.

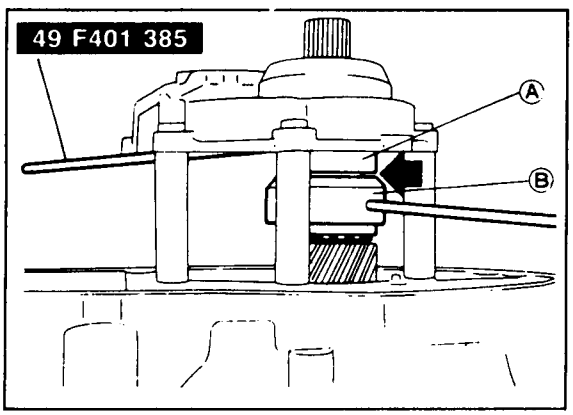


Set the four **SST** on the converter housing in the positions shown.



Set the bearing housing on the **SST** (selector) and install the four **SST** (bolts); then tighten them to the specified torque.

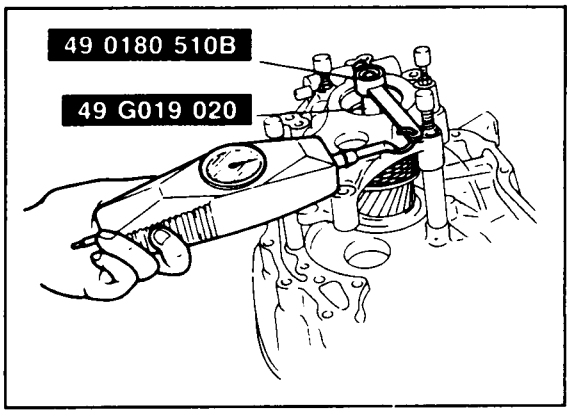
Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



Turn the **SST** (selector) to increase the clearance indicated by the arrow with the **SST** (bars) until it no longer turns.

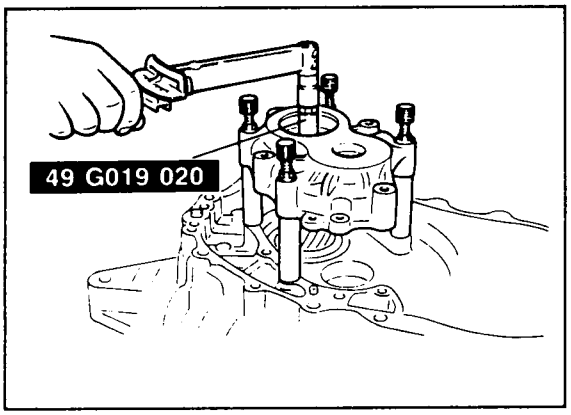
Note
This is to seat the bearing.

Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).

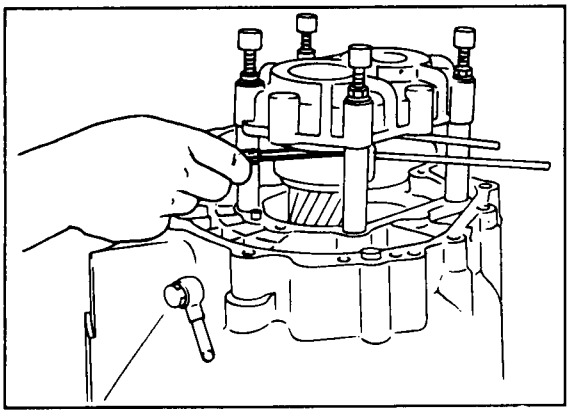


Mount the **SST** and pull scale or torque wrench on the output gear.
Increase the clearance between A and B to obtain the specified preload/pull scale reading.

Preload: 0.5—0.9 N·m
(5.0—9.0 cm-kg, 4.34—7.81 in-lb)
Reading on pull scale: 5—9 N
(0.5—0.9 kg, 1.1—1.98 lb)

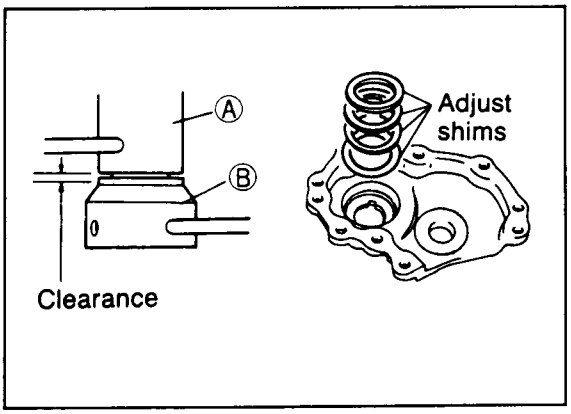


Note
Read the preload when the output gear starts to turn.

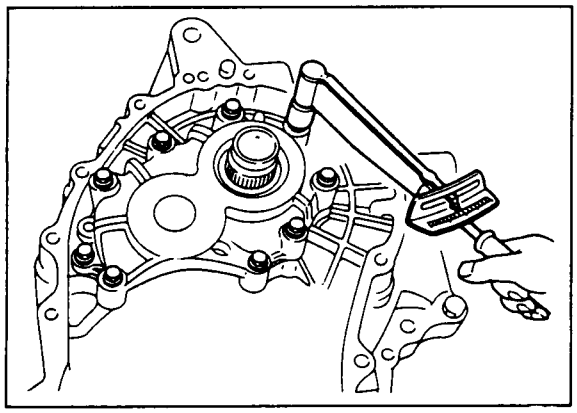


Measure the clearance. Select adjust shim(s) equivalent to the measured clearance.

Thickness of shim	
0.10 mm (0.004 in) 0.12 mm (0.005 in) 0.14 mm (0.006 in) 0.16 mm (0.0063 in)	0.18 mm (0.007 in) 0.20 mm (0.008 in) 0.50 mm (0.020 in)



Caution
a) Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.
b) The maximum allowable number of shims is 7.



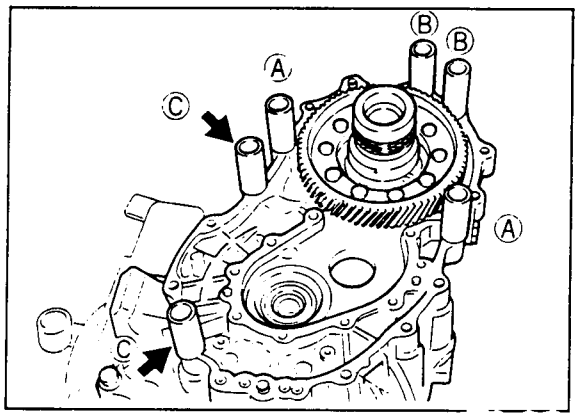
Install the bearing housing.

Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)

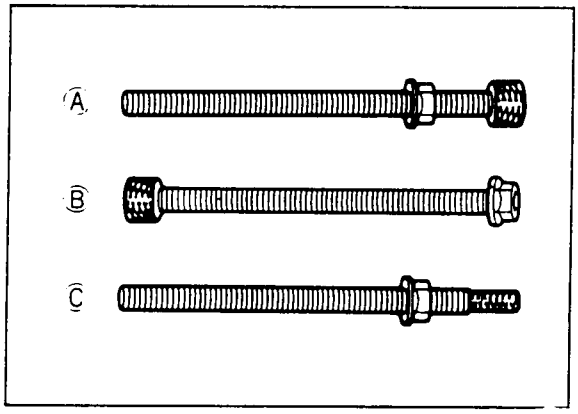
Check that the preload/pull scale reading is within specification. If not within specification return to step (2).

Preload: 0.03—0.9 N·m
(0.3—9.0 cm-kg, 0.26—7.81 in-lb)
Reading on pull scale:
0.3—9 N (0.03—0.9 kg, 0.066—1.98 lb)

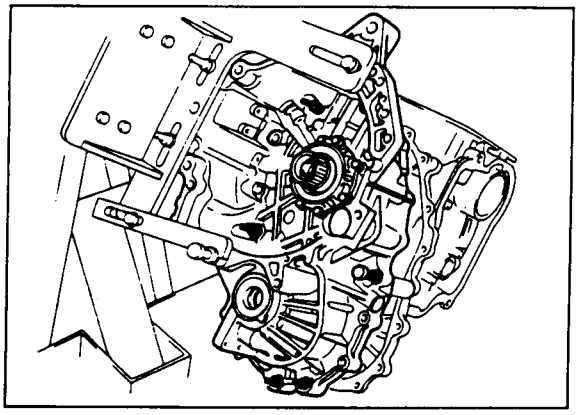
Remove the bearing housing.



Set the six **SST** in the positions shown.

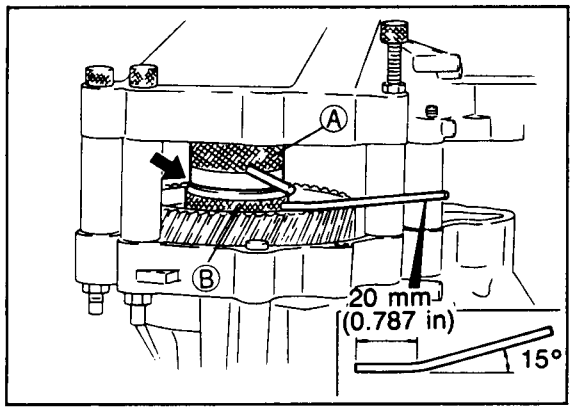


Note
Install the bolts in the positions shown in the illustration above.



Set the transaxle case on the selectors.
Tighten the **SST** (bolts) to the specified torque.

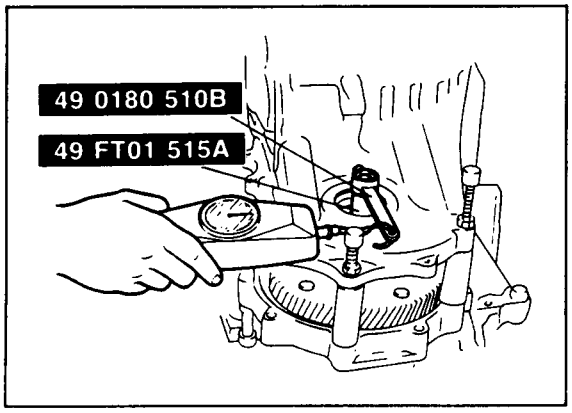
Tightening torque:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)



Turn the **SST** (selector) to increase the clearance indicated by the arrow with the **SST** (bars), until it no longer turns.

Note
a) This is to seat the bearings.
b) To turn the SST (B), bend the bar as shown.

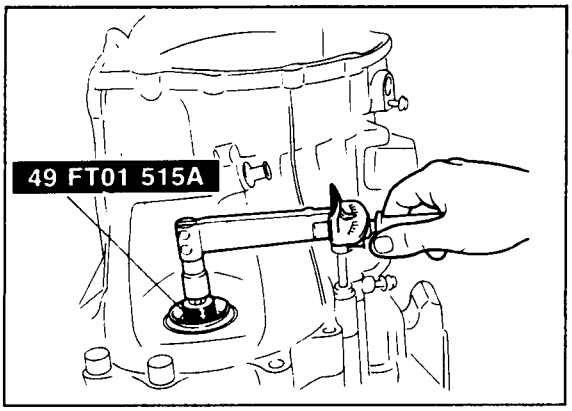
Turn the selector in the opposite direction until the preload is eliminated (gap is reduced).



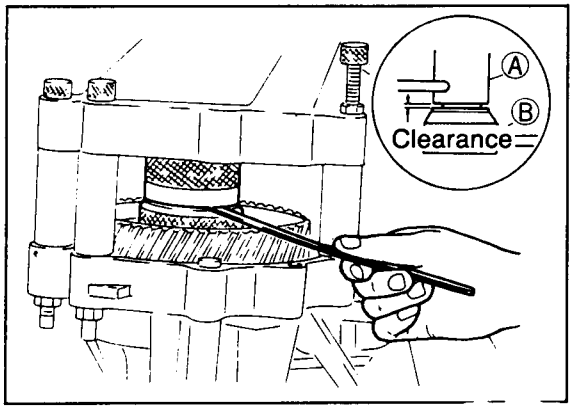
Insert the **SST** through the oil seal hole of the transaxle case and attach it to the pinion shaft. Mount the **SST** and pull scale or torque wrench.
Widen the clearance between A and B to obtain the specified preload/pull scale reading.

Preload:
0.5 N·m (5 cm-kg, 4.3 in-lb)
Reading on pull scale:
5 N (0.5 kg, 1.1 lb)

Note
Read the preload when the differential starts to turn.

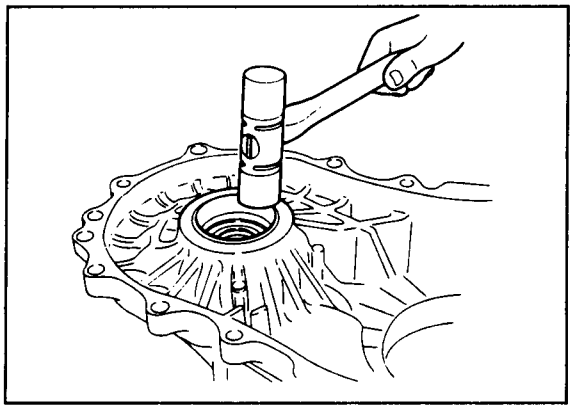


Measure the clearance between A and B.
Add **0.3 mm (0.0118 in)** to the measured clearance, and select the shim(s) closest in valve to that measurement.

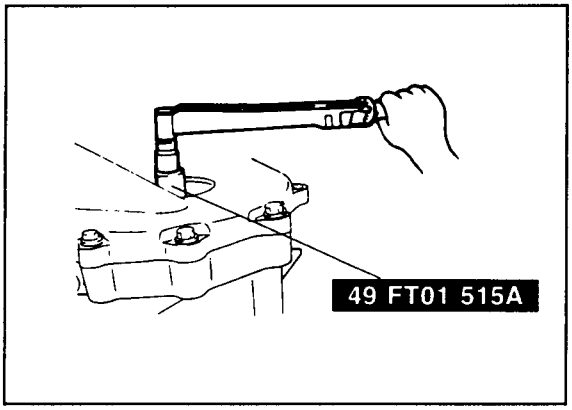


Thickness of shim	
0.10 mm (0.004 in)	0.20 mm (0.008 in)
0.12 mm (0.005 in)	0.50 mm (0.020 in)
0.14 mm (0.006 in)	0.70 mm (0.028 in)
0.16 mm (0.0063 in)	1.00 mm (0.039 in)
0.18 mm (0.007 in)	

Caution
a) Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.
b) The maximum allowable number of shims is 3.



Remove the transaxle case and selector. Install the required shim(s) and tap the bearing race into the transaxle case.



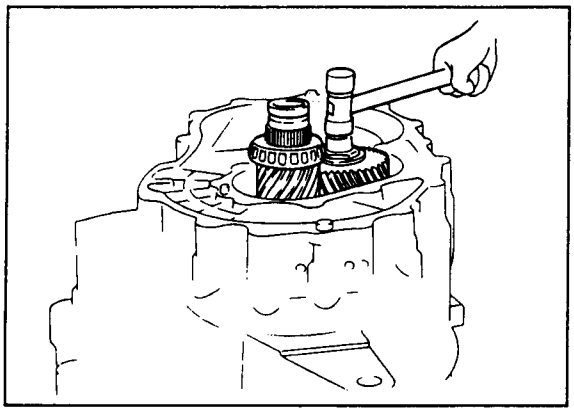
Install the transaxle case.

Tightening torque:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)

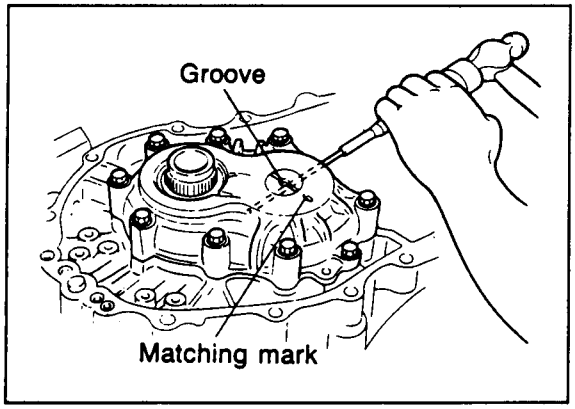
Check that the preload is within specification. If not within specification,

Preload: 2.9—3.9 N·m
(30—40 cm-kg, 26—35 in-lb)
Reading on pull scale: 29—39 N
(3.0—4.0 kg, 6.6—8.8 lb)

Remove the transaxle case and differential assembly.



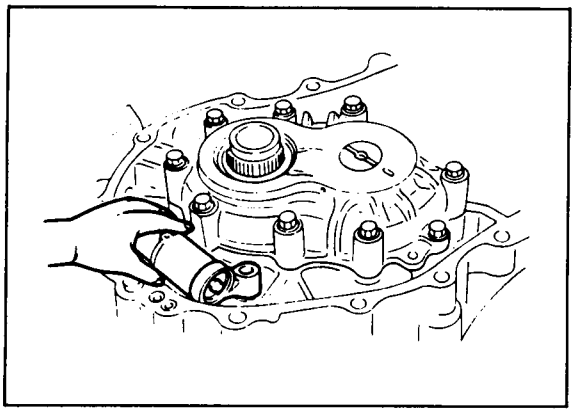
Install the idle gear and output gear as an assembly by tapping in with a plastic hammer.



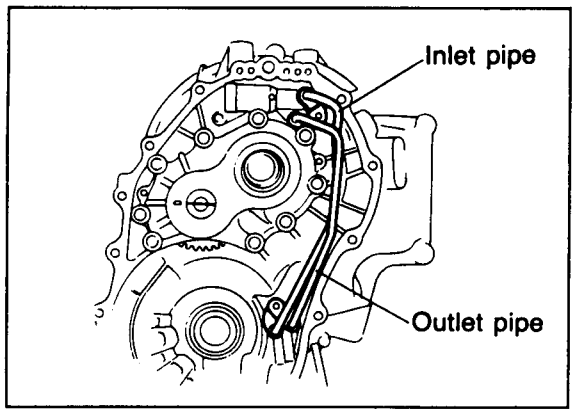
Install the bearing housing.
Install the bearing housing on the converter housing.

Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)

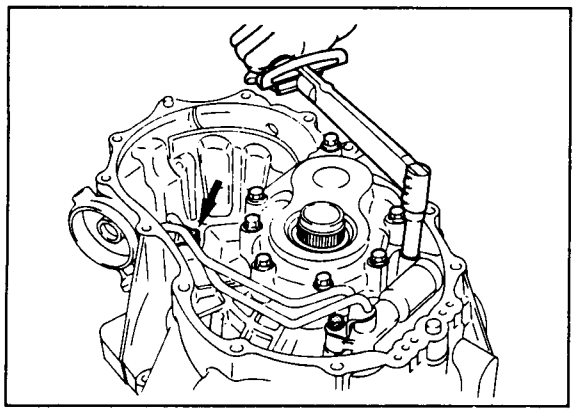
Align the groove on the idle shaft with the matching mark on the bearing housing.
Tap the roll pin in with a pin punch and hammer.



Apply ATF to the O-rings and install them into the 2-3 accumulator; then temporarily install the 2-3 accumulator piston assembly in the converter housing.

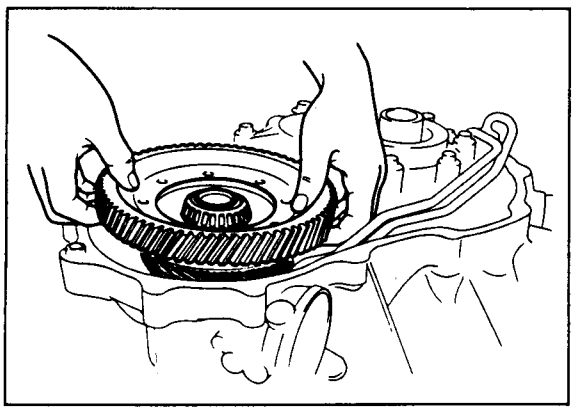


Apply ATF to the O-rings and install them onto the governor inlet pipe and governor outlet pipe; then temporarily install the inlet and outlet pipes.

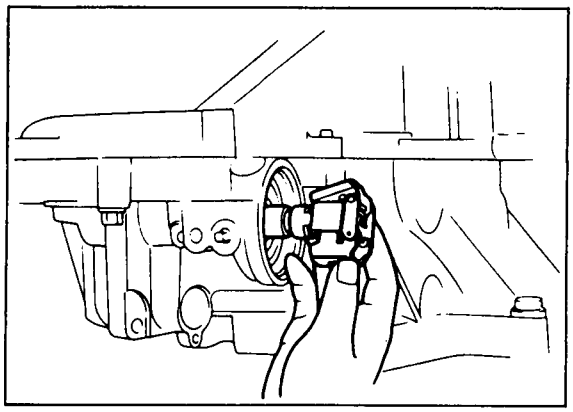


Tighten the bolts.

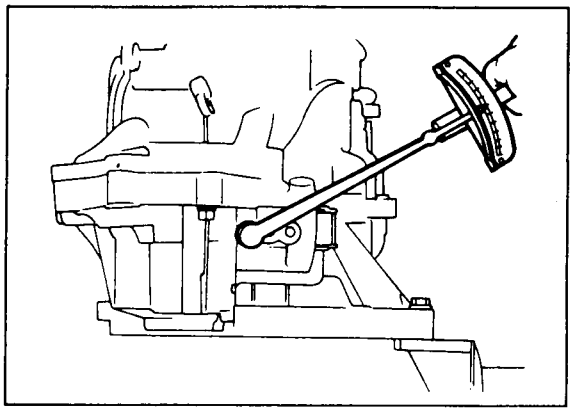
Tightening torque: 8—11 N·m (80—110 cm-kg, 69—95 in-lb)



Set the differential assembly into the converter housing.

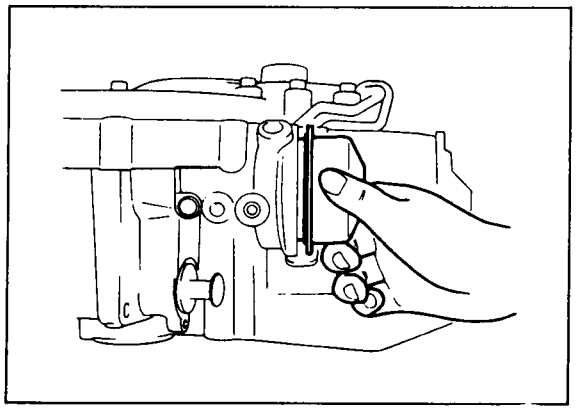


Install the governor assembly.
Install the governor assembly.



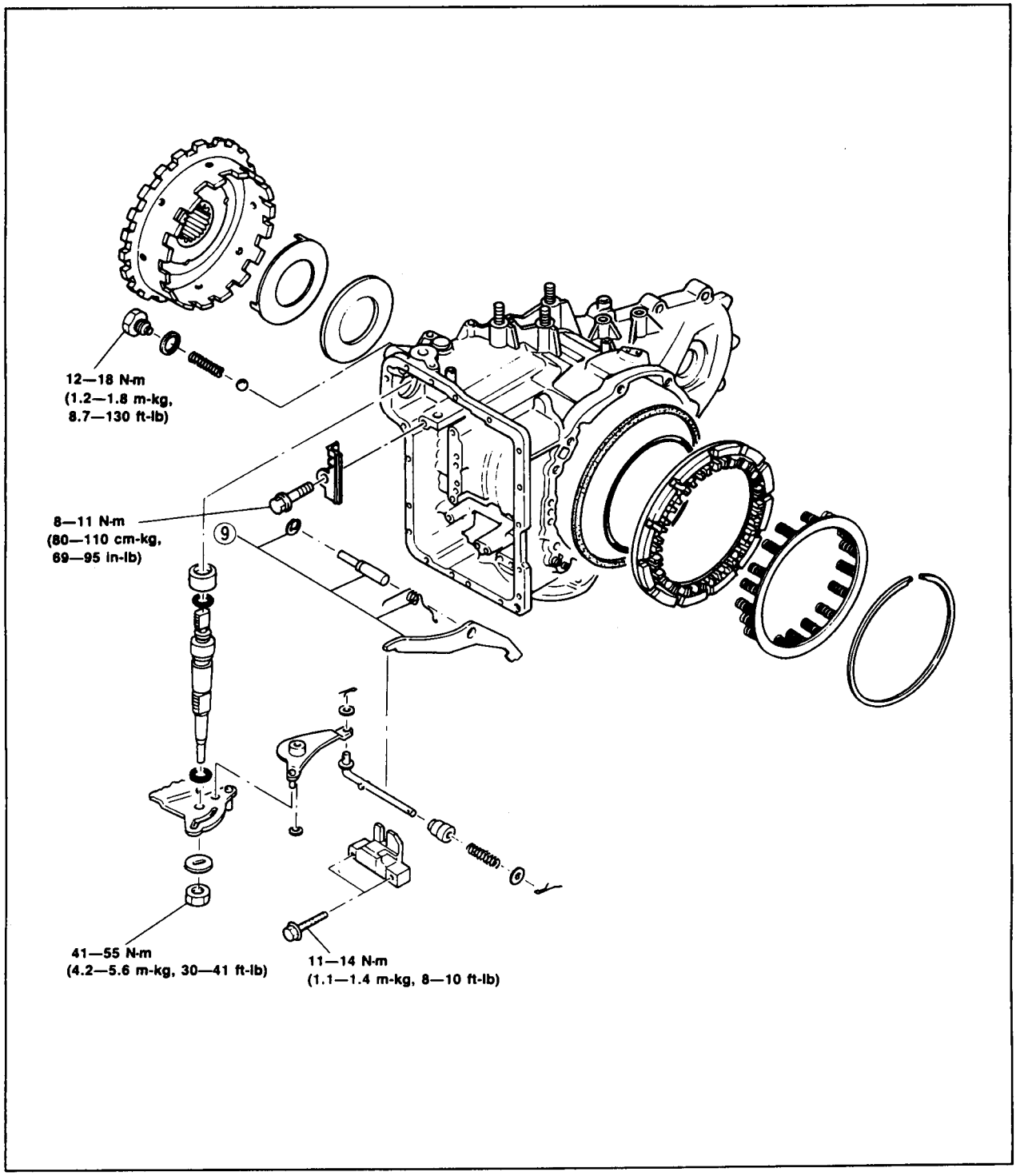
Install the stopper bolt.

Tightening torque: 6—9 N·m (60—90 cm-kg, 52—78 in-lb)

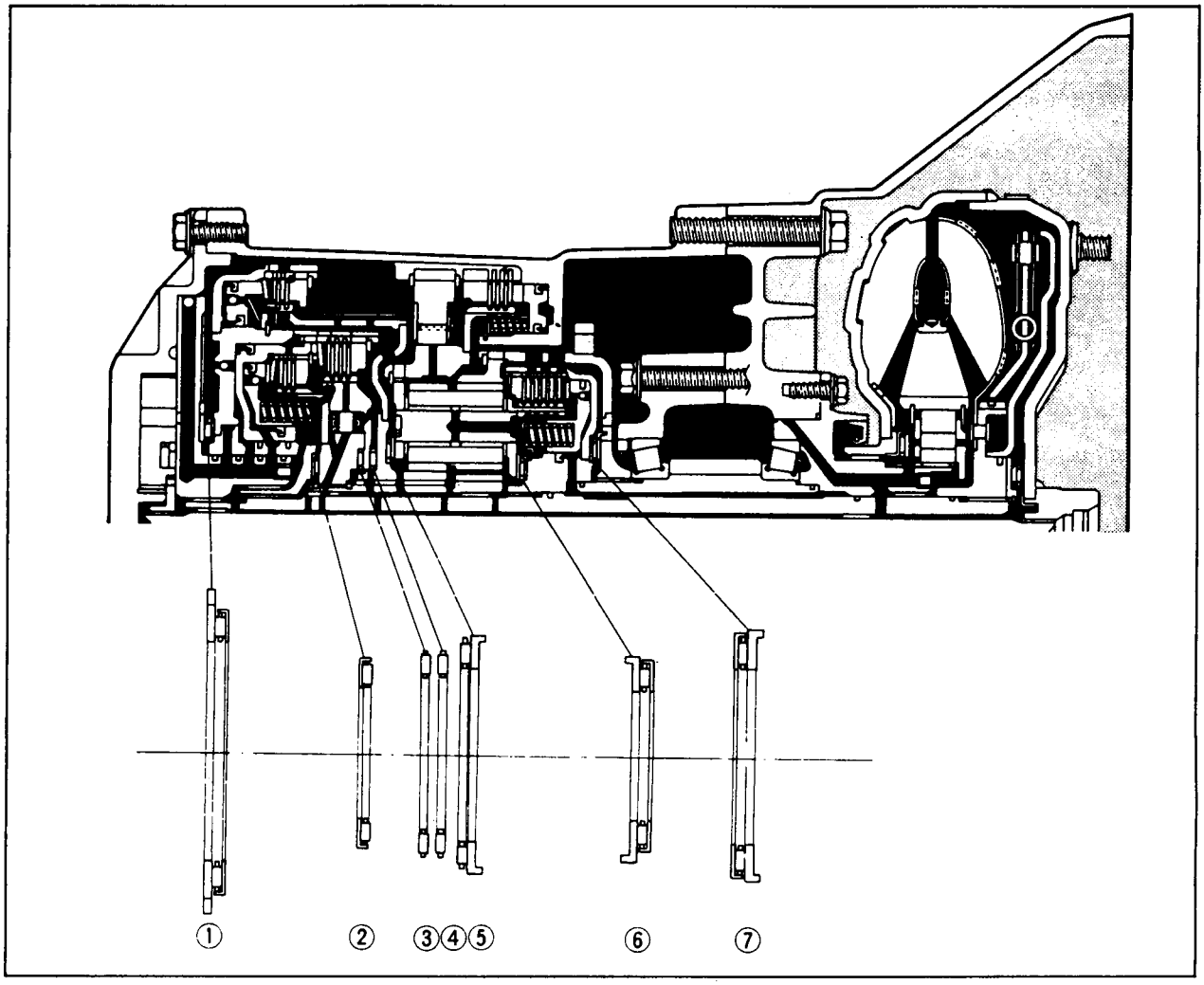


Install the O-ring on the governor cover.
Install the governor cover and clip.

ASSEMBLY-
Torque Specifications



Thrust Washer, Bearing, and Race Locations

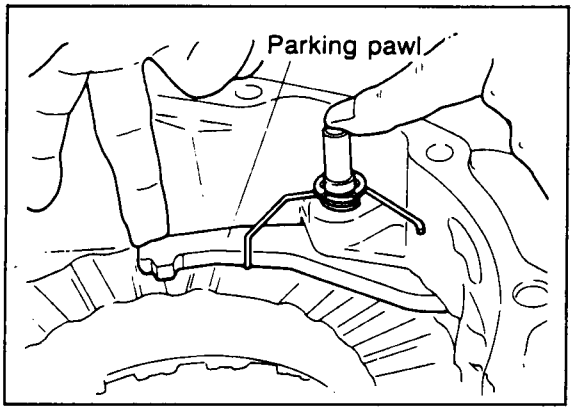


Outer diameter of bearing and race

mm (in)

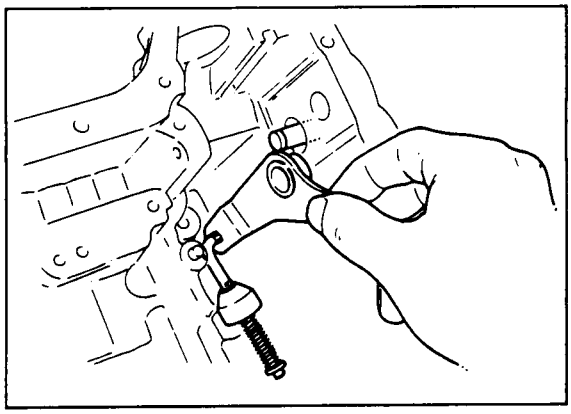
	1	2	3	4	5	6	7
Bearing	86.0 (3.39)	56.1 (2.21)	62.1 (2.44)	62.1 (2.44)	72.0 (2.83)	56.1 (2.21)	72.1 (2.84)
Race	88.0 (3.46)	—	—	—	72.0 (2.83)	57.0 (2.21)	72.0 (2.83)

Note: Install with petroleum jelly to prevent the thrust bearing or bearing race from falling out.

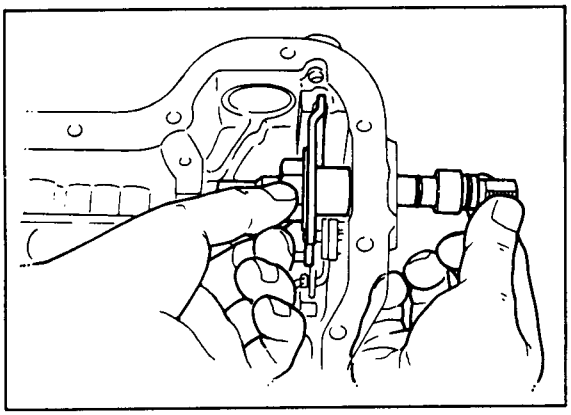


Procedure

1. Install the parking pawl.
   (1) Install the parking pawl and shaft.
   (2) Install the spring and snap ring.
   (3) Move the manual shaft and check that the parking pawl operates.

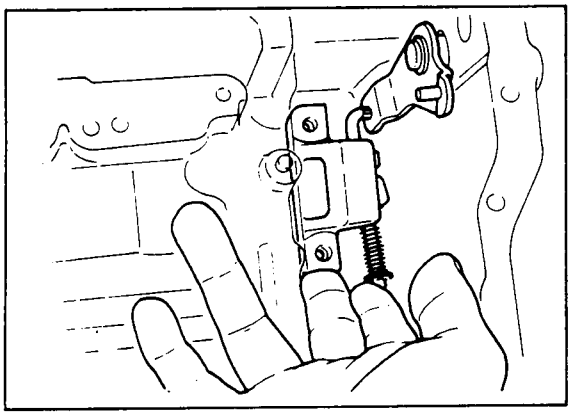


Install the parking assist lever and snap ring.



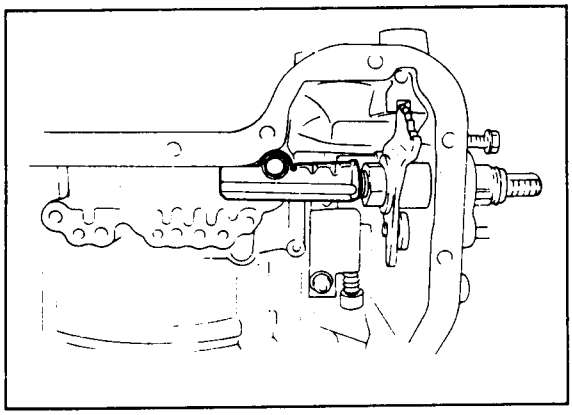
Install the actuator support.

Tightening torque:
11—14 N·m (1.1—1.4 m-kg, 8.0—10 ft-lb)



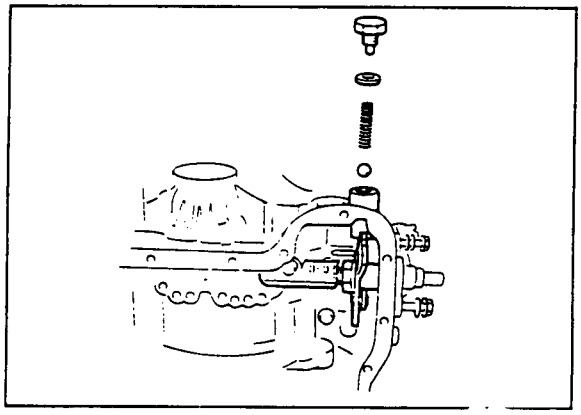
Install the manual shaft and manual plate.
Install the manual plate, spacer, washer, and nut.
Tighten the nut to specified torque.

Tightening torque:
41—55 N·m (4.2—5.6 m-kg, 30—41 ft-lb)



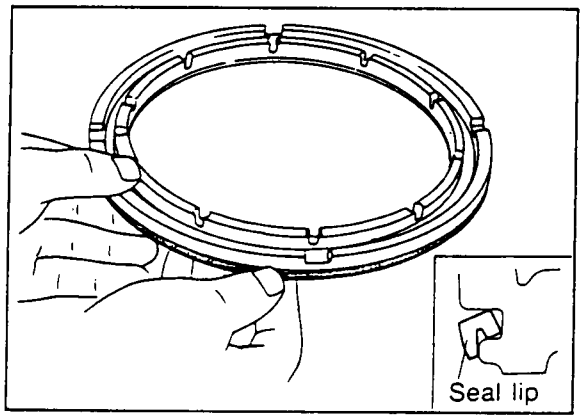
Install the bracket.

Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)

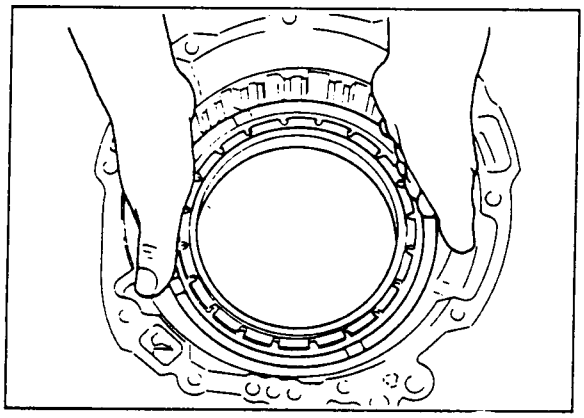


Install the detent ball, spring, washer and plug; then tighten the plug.

Tightening torque:
12—18 N·m (1.2—1.8 m-kg, 8.7—13 ft-lb)

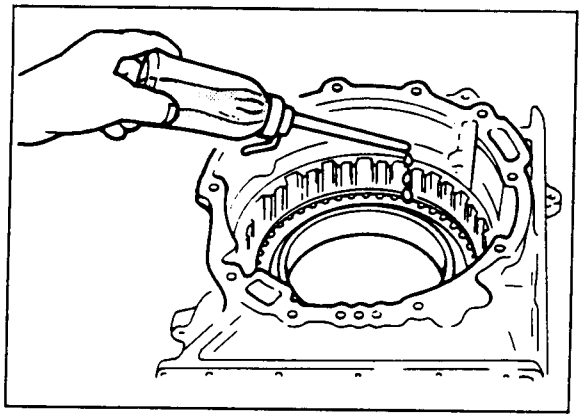


Install the low and reverse brake piston.
Apply ATF to the inner and outer seals, and install them to the low and reverse brake piston. Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the case.



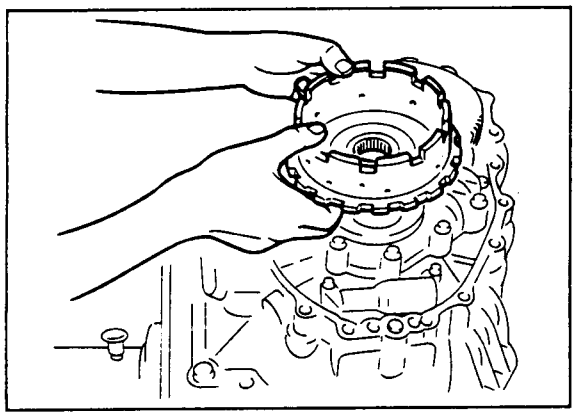
Install the low and reverse brake piston by pushing evenly around the circumference, being careful not to damage the outer seal.

Install the spring and retainer assembly.



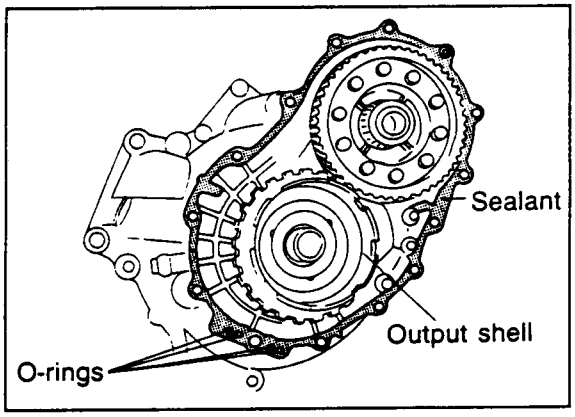
Check the low and reverse brake piston operation.
Pour in ATF so that the low and reverse brake piston is fully submerged.
Check that no bubbles come from between the piston and seals when applying compressed air through the fluid passage. (Refer to page 7B—204)

Caution
The compressed air must be under 392 kPa (4.0 kg/cm^2, 57 psi) and not applied for over 3 seconds.



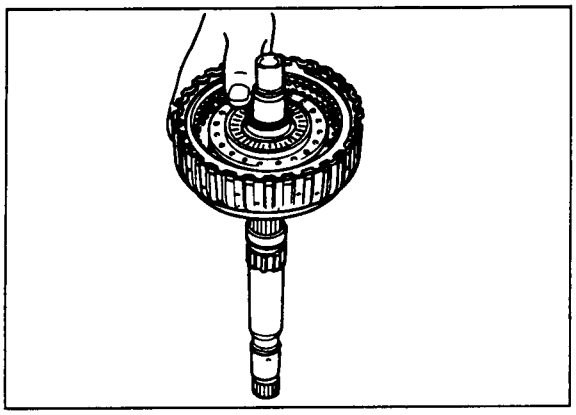
Install the output shell to the output gear, and install the bearing race onto the output shell.

Bearing race outer diameter.
72.0 mm (2.83 in)

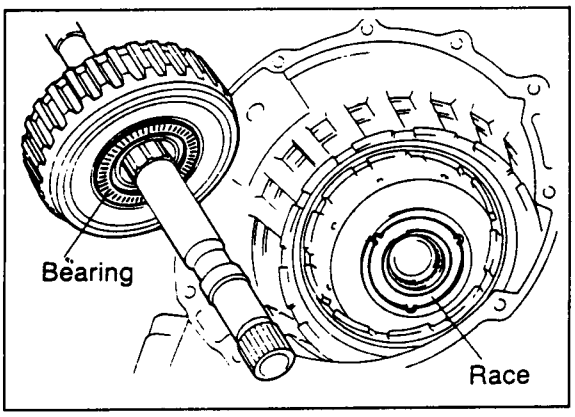


Apply a thin coat of silicon sealant to the contact surfaces of the converter housing and transaxle case.
Install the O-rings.
Install the transaxle case to the converter housing.

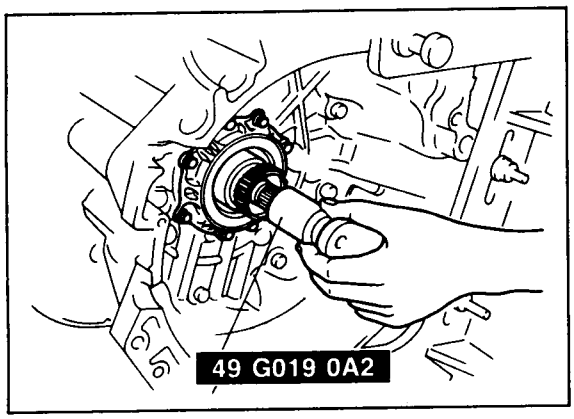
Tightening torque:
37—52 N·m (3.8—5.3 m-kg, 27—38 ft-lb)



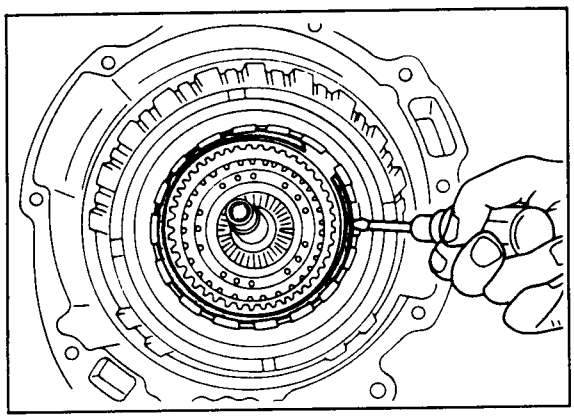
Install the turbine shaft and 3-4 clutch assembly.
Assemble the turbine shaft and 3-4 clutch assembly.



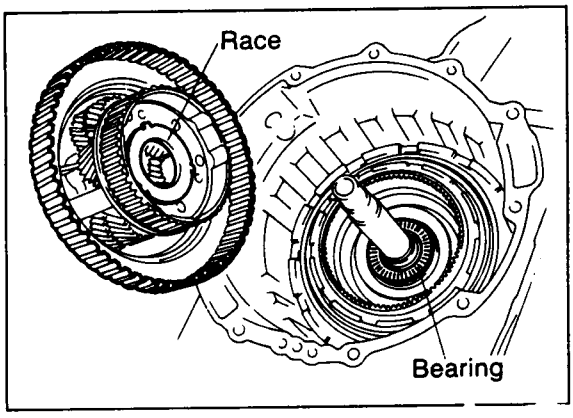
Check that the thrust bearing and bearing race are installed in the correct position.
Install the turbine shaft and 3-4 clutch assembly into the transaxle case.



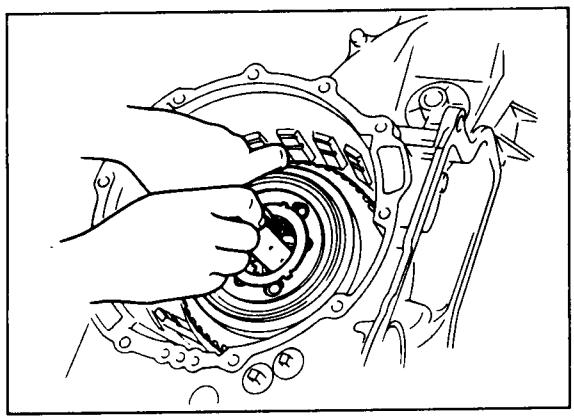
Adjust the **SST** position so that it contacts and holds the turbine shaft.



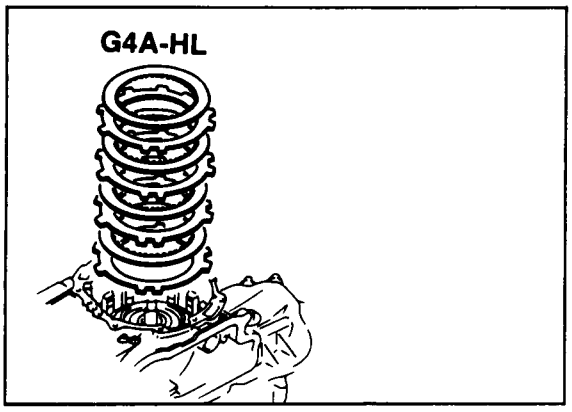
Install the internal gear.
(1) Install the internal gear to the 3-4 clutch drum.
(2) Install the snap ring.



Install the carrier hub assembly.
(1) Check that the thrust bearing and bearing race are installed in the correct position.



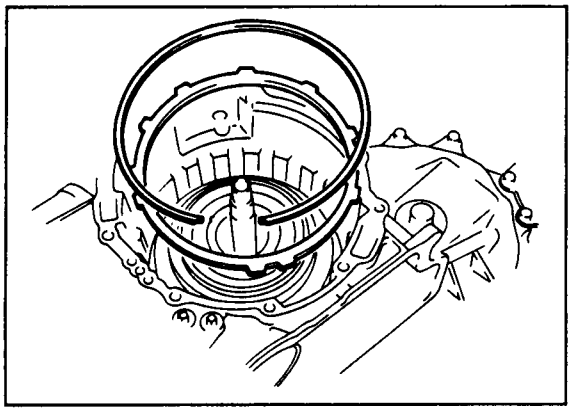
(2) Hold the turbine shaft with one hand to prevent it from rotating.
(3) Install the carrier hub assembly into the 3-4 clutch drum by rotating it.



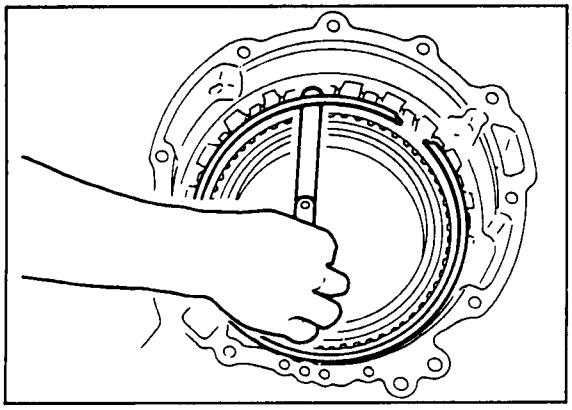
Install the drive and driven plates.

Note
Installation order:

G4A-HL
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



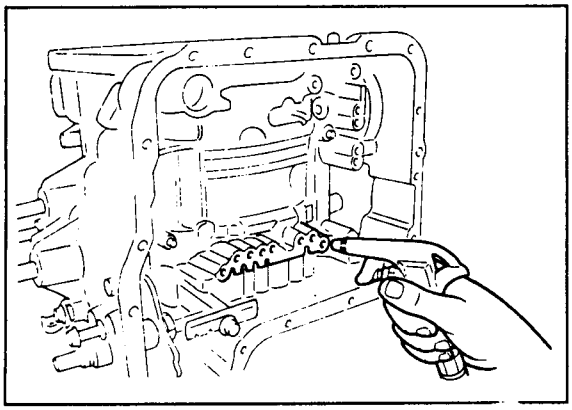
Install the retaining plate.
Install the snap ring.



Check the low and reverse brake clearance.
(1) Measure the clearance between the snap ring and the low and reverse brake retaining plate.
(2) If the clearance is not within specification, adjust it by selecting a proper retaining plate.

Low and reverse brake clearance:
2.1—2.4 mm (0.083—0.094 in)

mm (in)

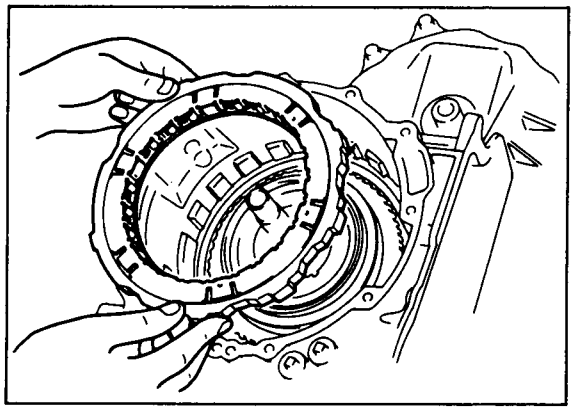


G4A-HL

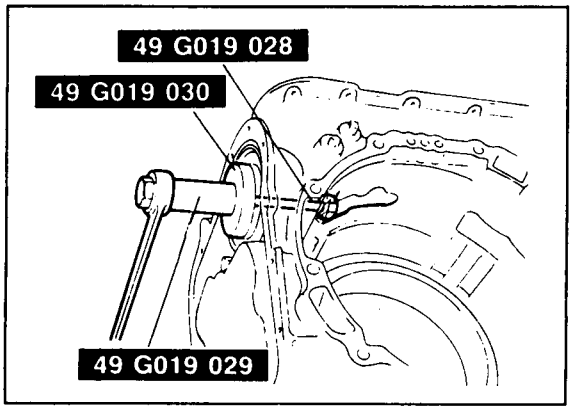
6.8 (0.268)	7.0 (0.276)	7.2 (0.283)
7.4 (0.291)	7.6 (0.299)	7.8 (0.307)

Check the low and reverse brake operation by applying compressed air through the fluid passage as shown in the figure.

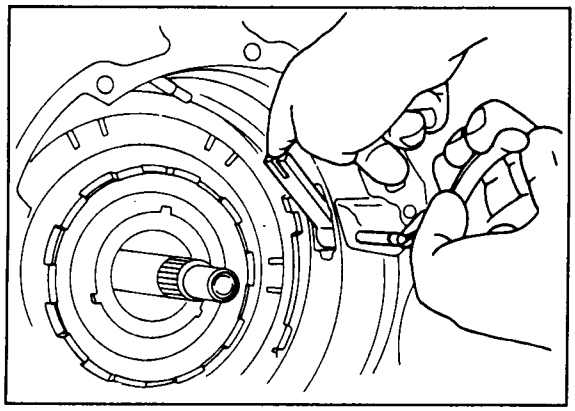
Air pressure:
392 kPa (4.0 kg/cm^2, 57 psi)



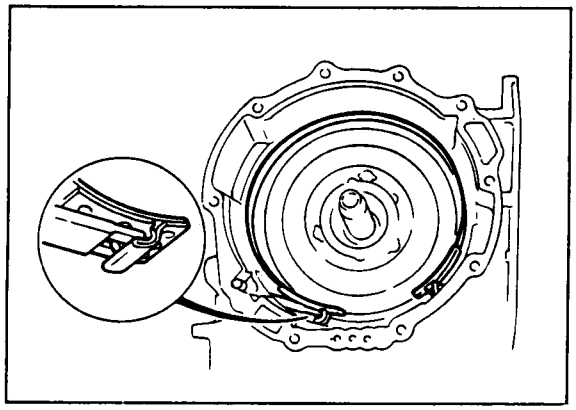
Install the one-way clutch.
(1) Hold the one-way clutch horizontally.
(2) Install it by turning the carrier hub assembly counterclockwise.
(3) Install the snap ring.



Install the servo to the transaxle case.
(1) Install the servo spring and servo.
(2) Compress the servo with the **SST**.
(3) Install the snap ring.
(4) Remove the **SST**.
(5) Install the piston stem.

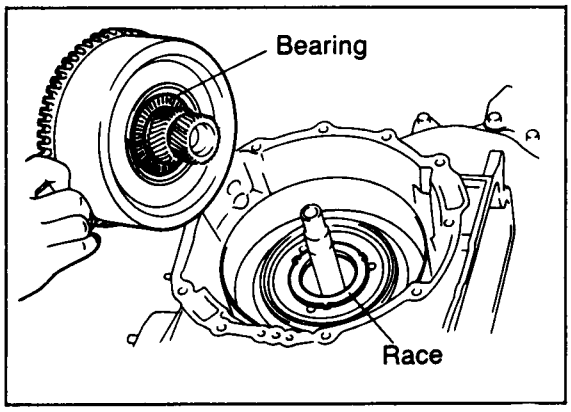


Install the anchor strut.

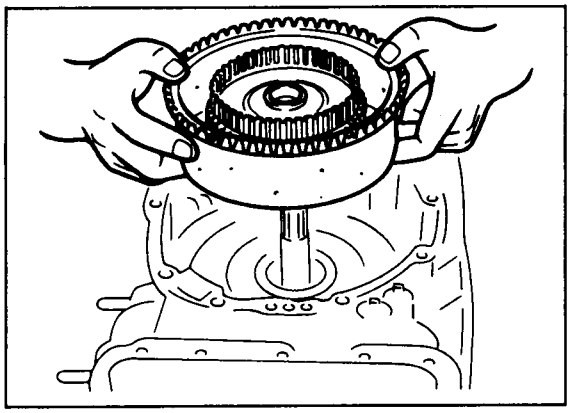


Install the 2-4 brake band in the transaxle case so that it is expanded fully.

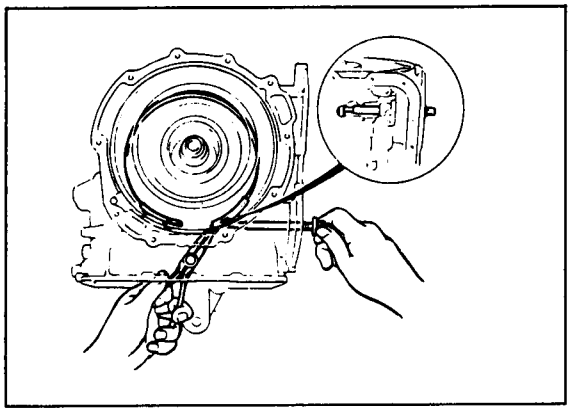
Note
Interlock the 2-4 brake band and anchor strut as shown.



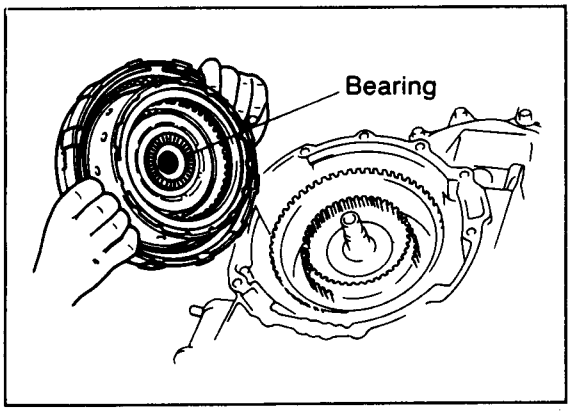
Install the small sun gear and one-way clutch.
Check that the thrust bearing and bearing race are installed in the correct position.



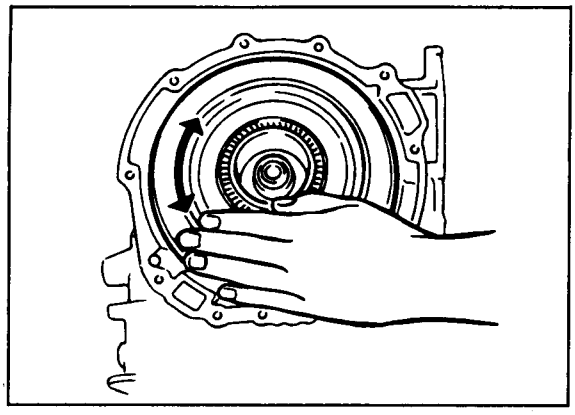
Install the small sun gear and one-way clutch by rotating it.



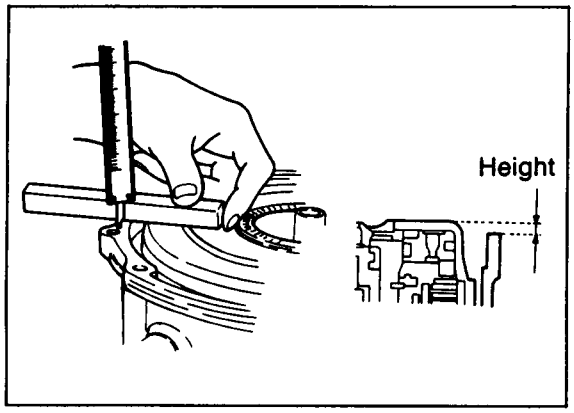
Install the piston stem in the position while pulling out the 2-4 brake band with a pliers; then loosely tighten the piston stem by hand.



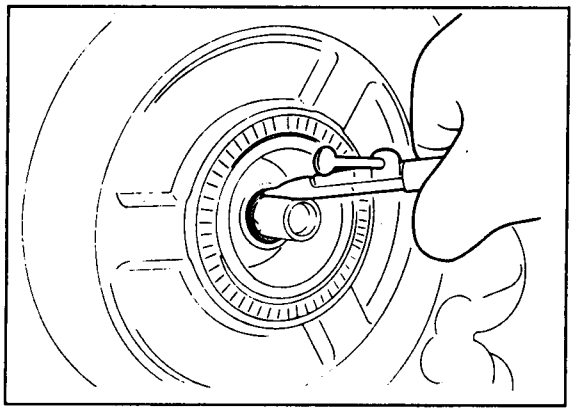
Install the clutch assembly.
Check that the thrust bearing is installed in the correct position.



Install the clutch assembly by rotating it.

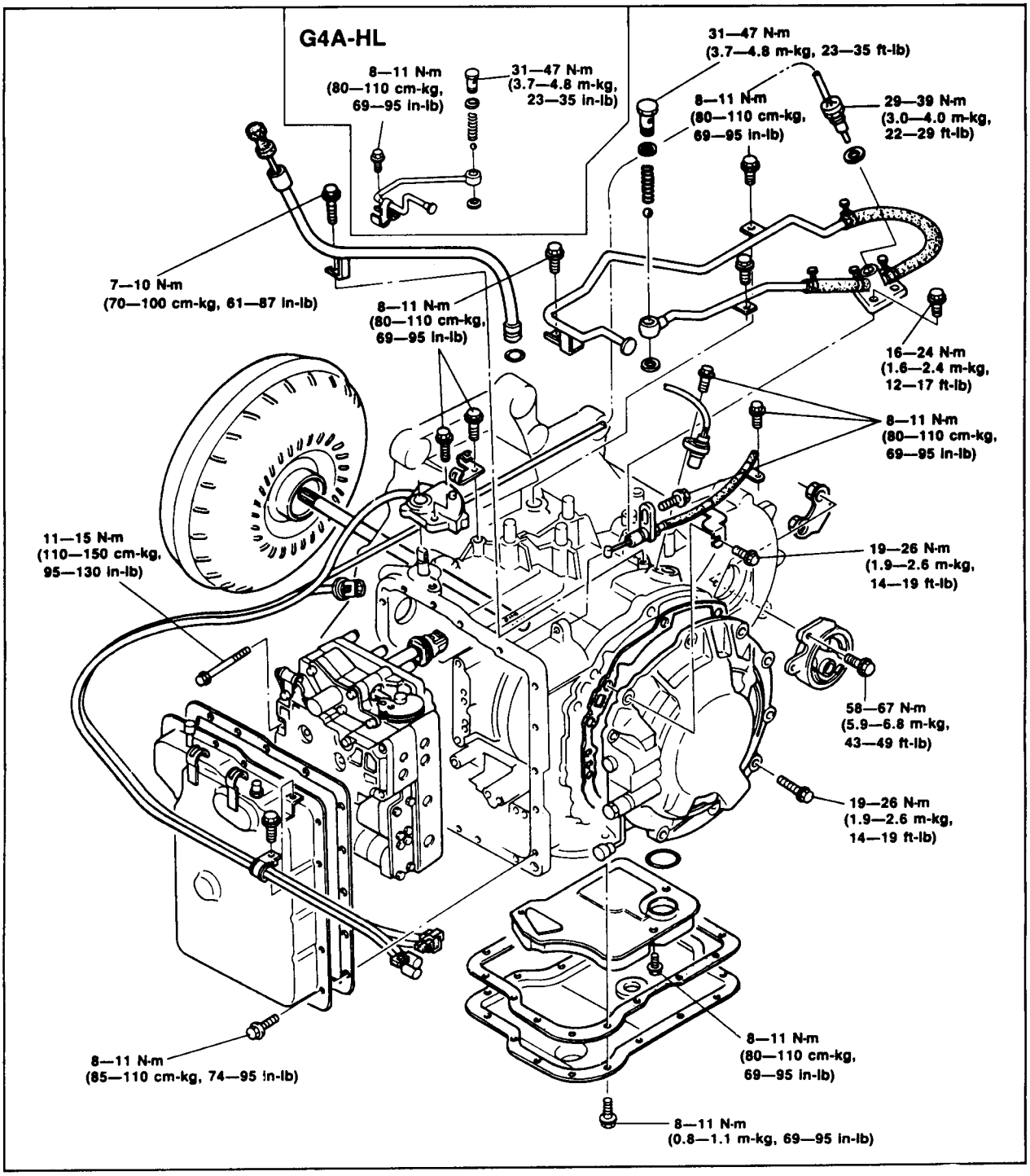


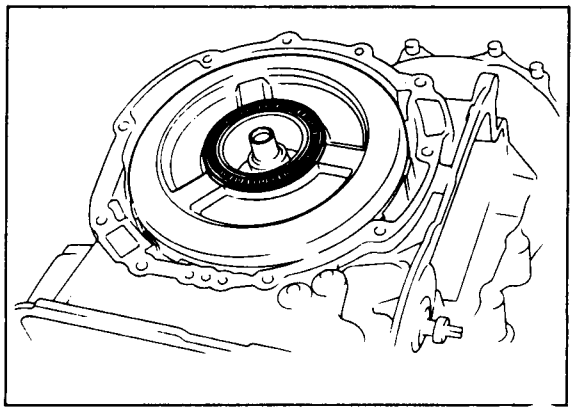
Note
Measure the height difference between the reverse and forward drum and transaxle case.
Standard height: 0.8 mm (0.032 in)



Install the snap ring into the bottom ring groove of the turbine shaft.

ASSEMBLY
Torque Specifications

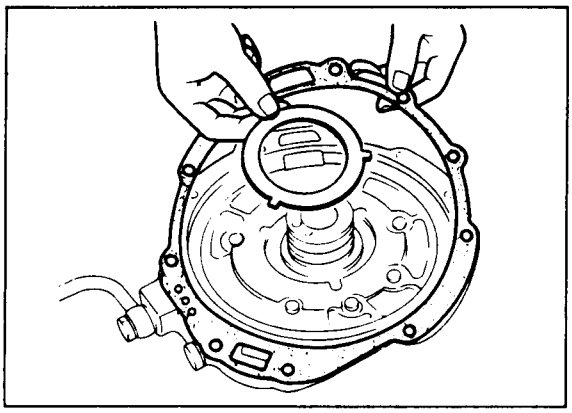




Procedure

Use the following procedure to adjust the total end play and select a suitable bearing race.

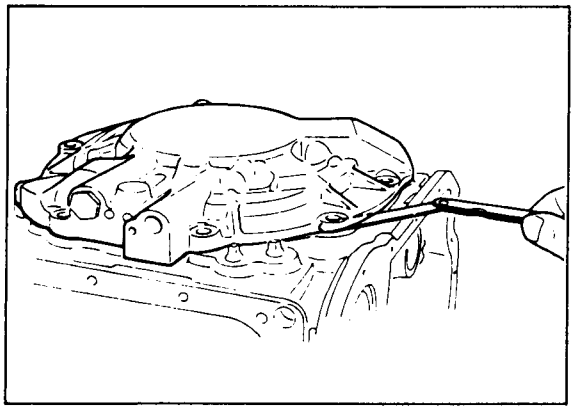
Set the thrust bearing onto the clutch assembly.



Remove the previous race and gasket.

Set the thickest bearing race **2.2 mm (0.087 in)** onto the oil pump.

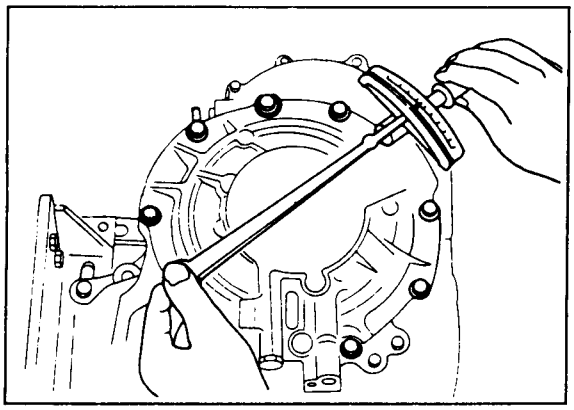
Set the oil pump onto the clutch assembly.



Measure clearance between the transaxle case and oil pump.

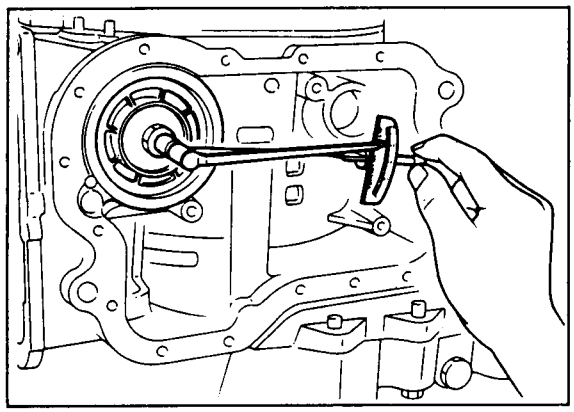
Select a suitable bearing race from the chart below.

Clearance mm (in)	Select this bearing race mm (in)
0.91—1.10 (0.036—0.043)	1.2 (0.047)
0.71—0.90 (0.028—0.035)	1.4 (0.055)
0.51—0.70 (0.020—0.027)	1.6 (0.063)
0.31—0.50 (0.012—0.019)	1.8 (0.071)
0.11—0.30 (0.004—0.011)	2.0 (0.078)
0—0.10 (0—0.003)	2.2 (0.087)



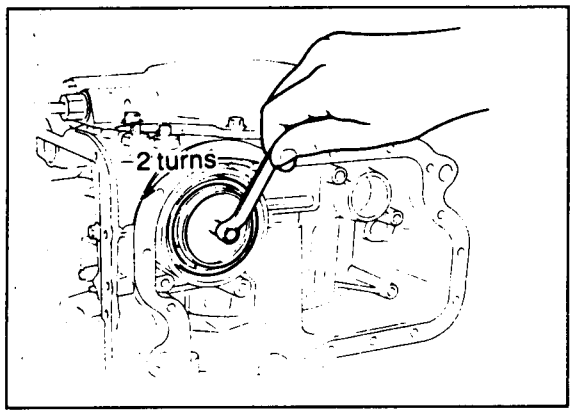
(7) Remove the oil pump.
(8) Place the selected bearing race and a new gasket onto the oil pump.
(9) Install the oil pump onto the clutch assembly.

Tightening torque:
19—26 N·m (1.9—2.6 m-kg, 14—19 ft-lb)



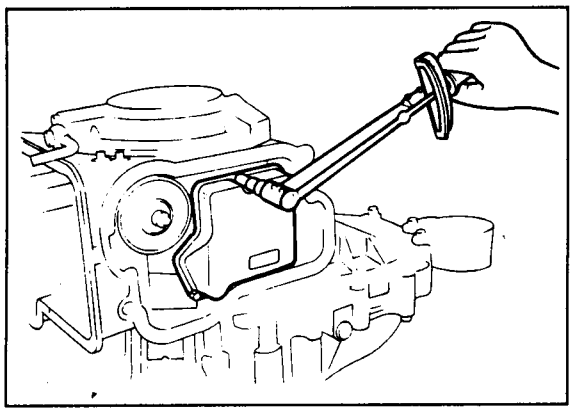
Adjust the 2-4 brake band.
Loosen the locknut and tighten the piston stem to the specified torque.

Tightening torque:
9—11 N·m (90—110 cm-kg, 78—95 in-lb)



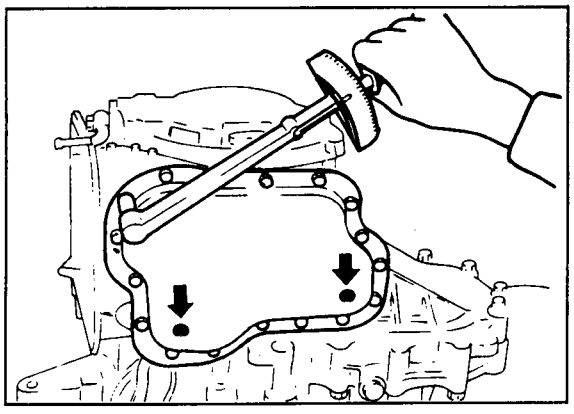
Loosen the piston stem 2 turns.
Tighten the locknut to the specified torque.

Tightening torque:
25—39 N·m (2.5—4.0 m-kg, 18—29 ft-lb)



Install the oil strainer along with a new O-ring to the transaxle.

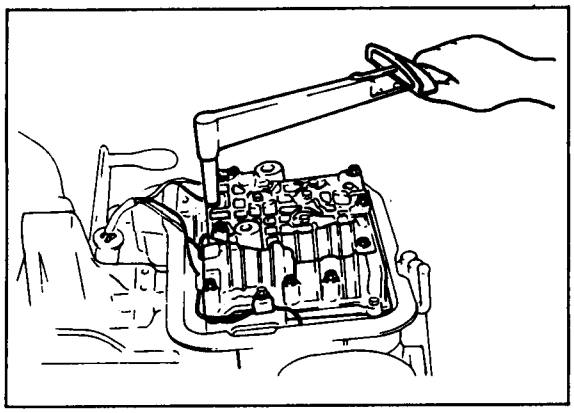
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)



Install the oil pan along with a new gasket.

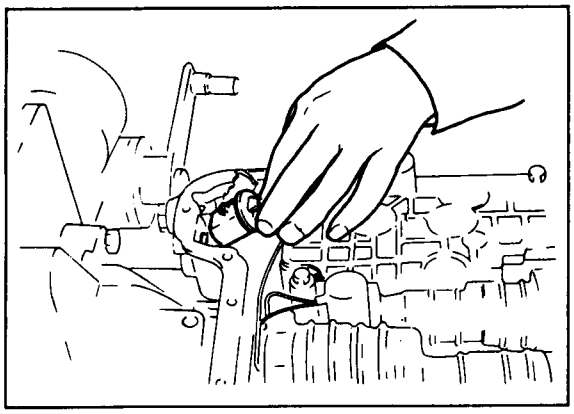
Tightening torque:
8—11 N·m (85—110 cm-kg, 74—95 in-lb)

Note
Install the magnets in the positions shown in the illustration.

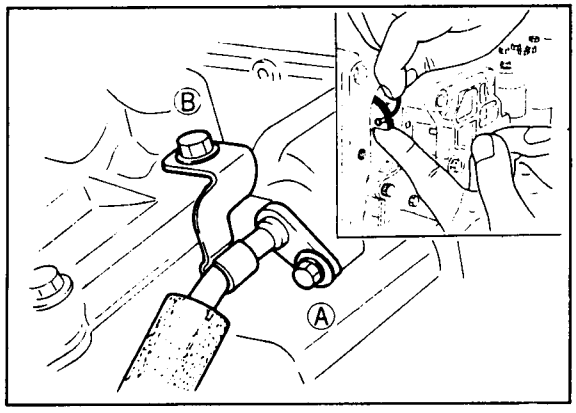


Align the manual valve with the pin on the manual plate, and install the control valve body into the transaxle case.

Tightening torque:
11—15 N·m
(110—150 cm-kg, 95—130 in-lb)

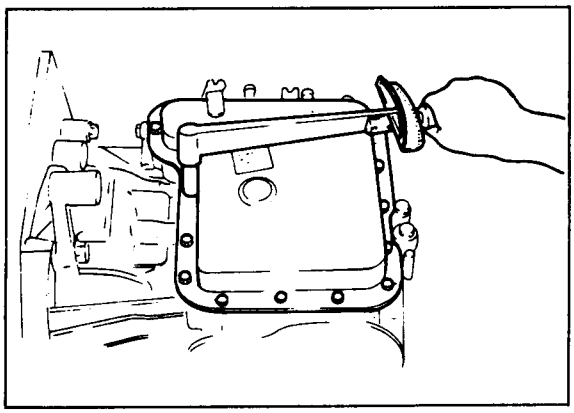


Install the solenoid connector and a new O-ring in the transaxle case.



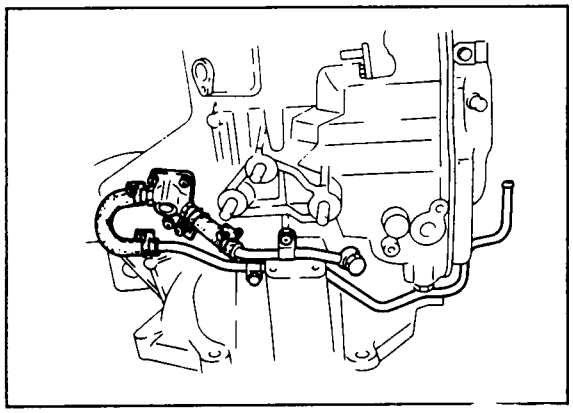
Install a new O-ring on the bracket; then feed the throttle cable through the transaxle case and connect it to the throttle cam.
Install the throttle cable attaching bolts and bracket.

Tightening torque:
Ⓐ 8—11 N·m
(80—110 cm-kg, 69—95 in-lb)
Ⓑ 19—26 N·m
(1.9—2.6 m-kg, 14—19 ft-lb)



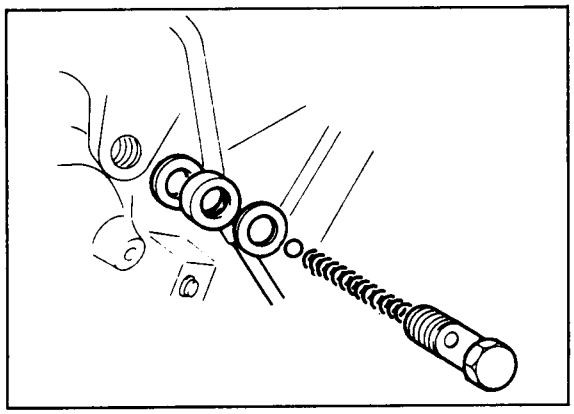
Install the control valve body cover along with a new gasket.

Tightening torque:
8—11 N·m (85—110 cm-kg, 74—95 in-lb)



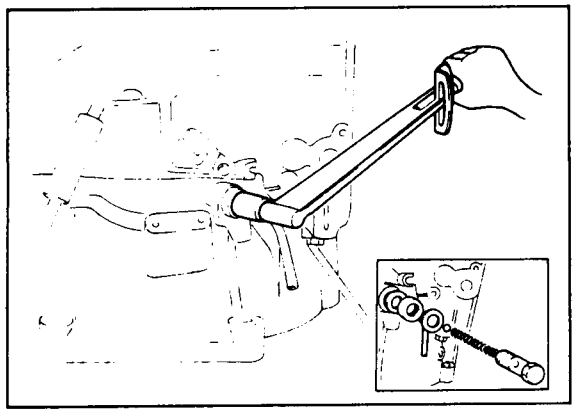
Install the oil pipes, oil hoses, and switch box as an assembly; then install the harness clip.

Tightening torque:
Switch box
16—24 N·m (1.6—2.4 m-kg, 12—17 ft-lb)
Harness clip
8—11 N·m (80—110 cm-kg, 69—95 in-lb)



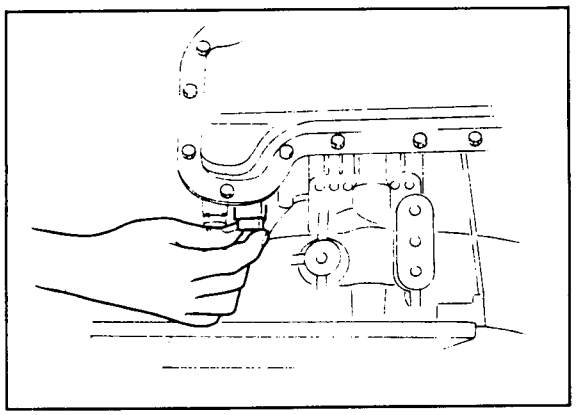
Install the ball, spring, gasket, and a plug.

Tightening torque:
31—47 N·m (3.2—4.8 m-kg, 23—35 ft-lb)

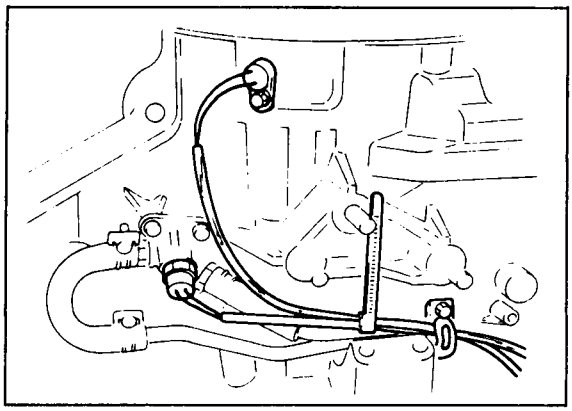


G4A-HL
Install the oil pipe, ball, spring, oil pipe, gasket, and plug.

Tightening torque: 31—47 N·m
(3.2—4.8 m-kg, 23—35 ft-lb)

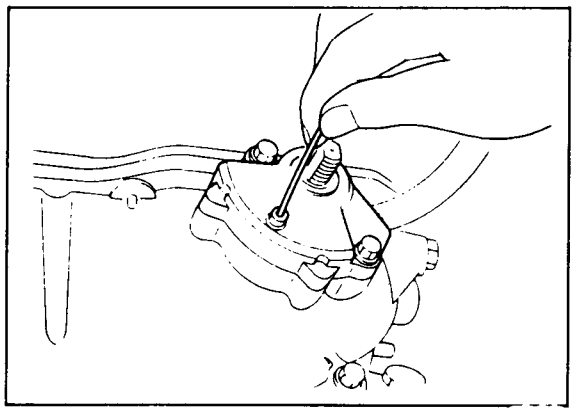


Install the solenoid connector.



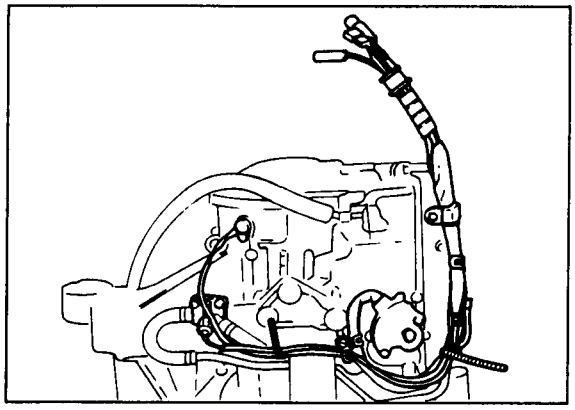
Install the pulse generator and fluid temperature switch.

Tightening torque:
Pulse generator
8—11 N·m (80—110 cm-kg, 69—95 in-lb)
Fluid temperature switch
29—39 N·m (3.0—4.0 m-kg, 22—29 in-lb)



Install the inhibitor switch.
Turn the manual shaft to the "N" position.
Install the inhibitor switch and loosely tighten the bolts.
Remove the screw and move the inhibitor switch so that the alignment hole is aligned with the screw hole.
Insert a **2.0 mm (0.079 in)** diameter pin through the holes.
Install the screw; then tighten the bolts to the specified torque.

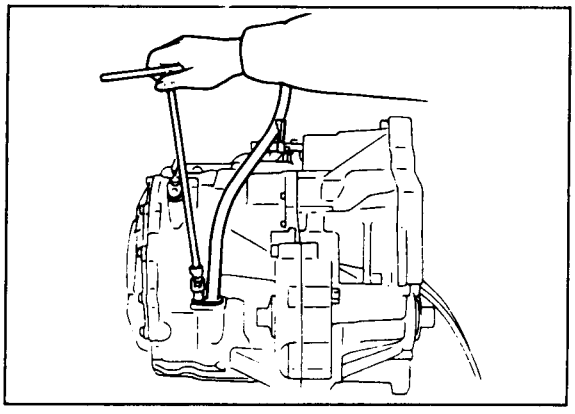
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)



Install the harness with the remaining clip.

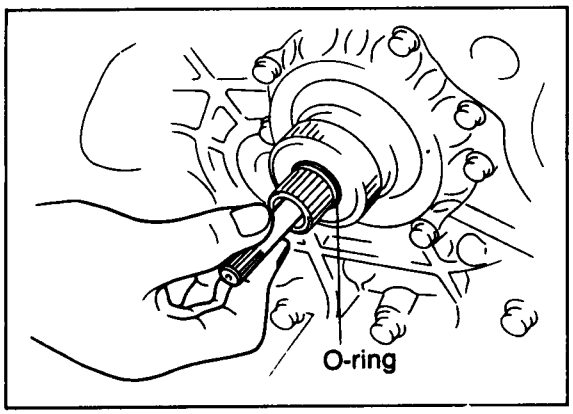
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)

Remove the transaxle from the **SST**.

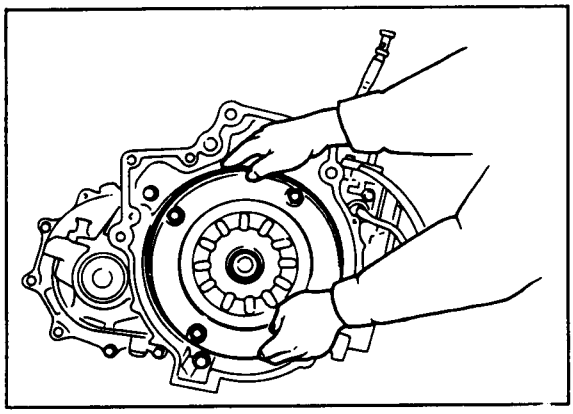


Install the oil level gauge and tube along with a new O-ring to the transaxle case.

Tightening torque:
7—10 N·m (70—100 cm-kg, 61—87 in-lb)



Install the oil pump shaft.
Install a new O-ring onto the turbine shaft.



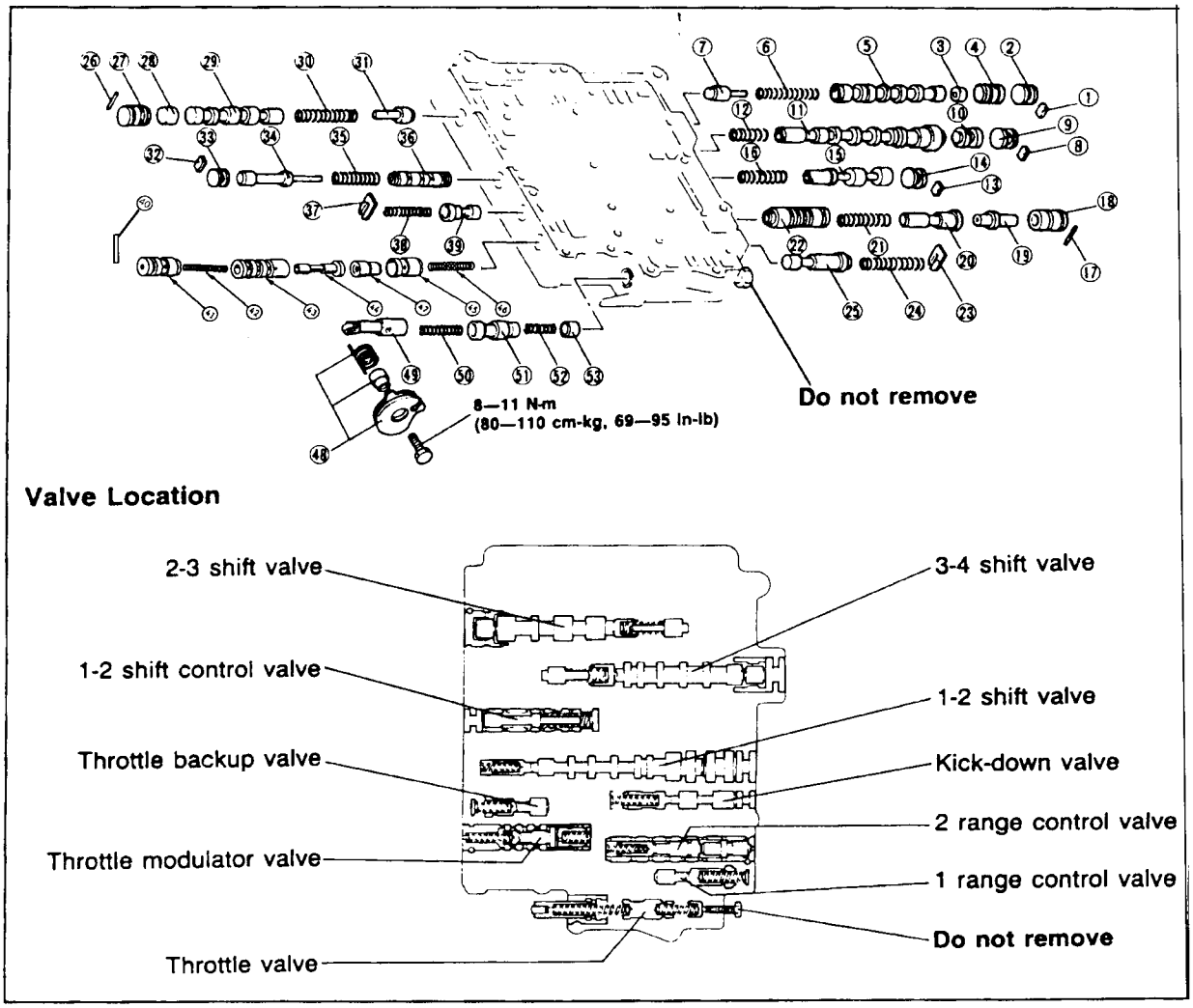
Fill the torque converter with ATF if it has been drained and washed.

ATF type: Dexron II or M III

Install the torque converter in the converter housing while rotating it to align the splines.

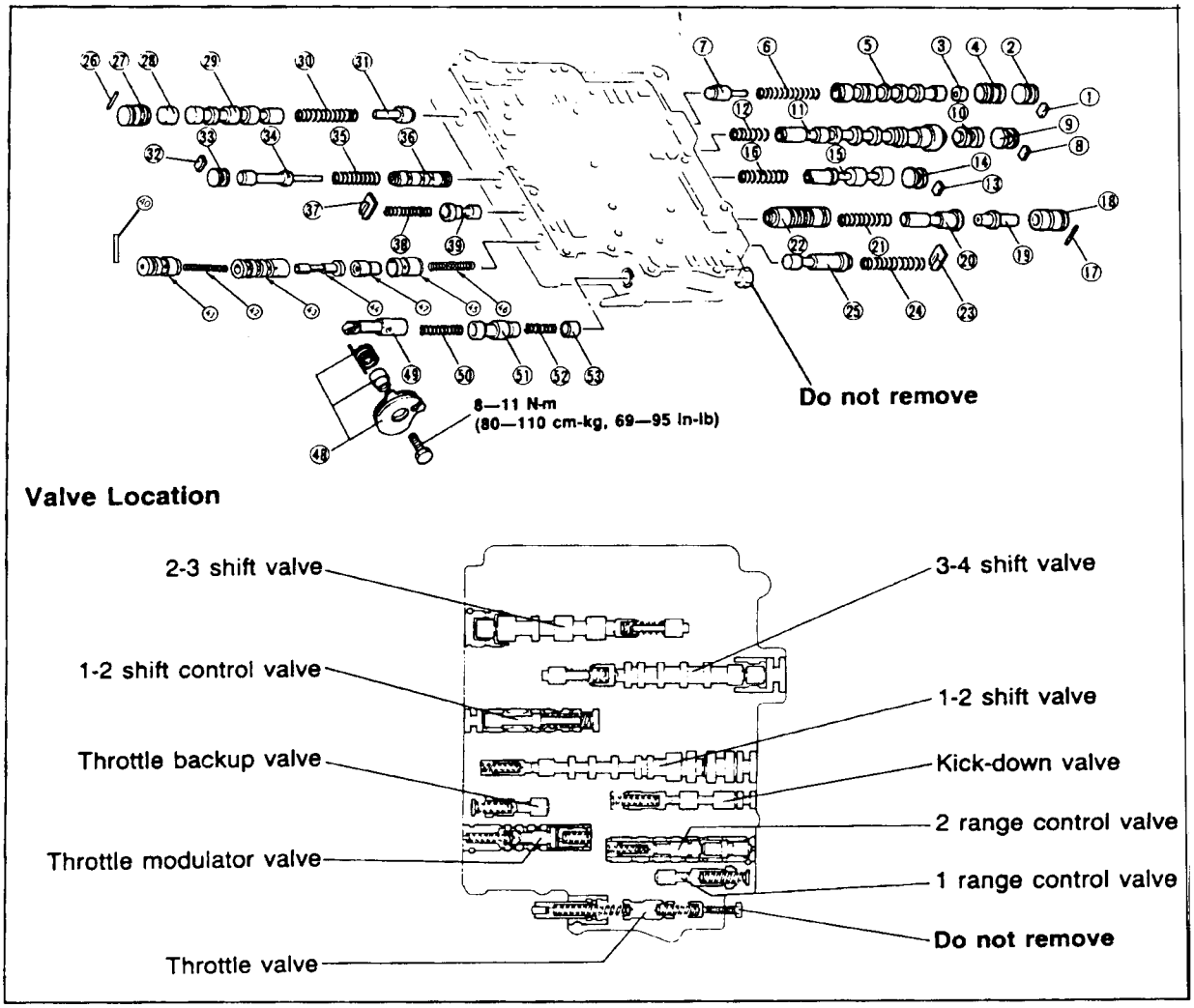
Caution
a) Hold the torque converter in an erect position when filling it with ATF, do not allow the fluid to overflow.
b) If the converter does not fit in easily, do not

Main Control Body
Disassembly
Disassemble in the sequence shown in the figure.

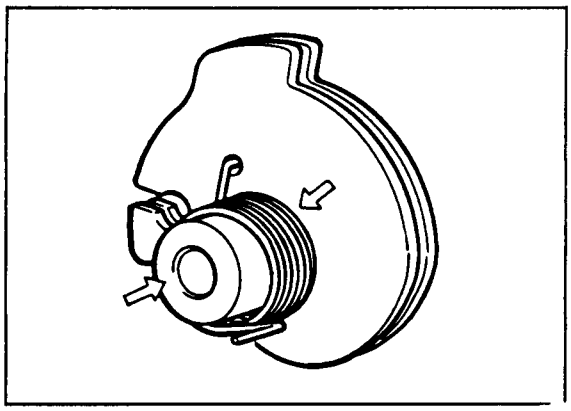


1. Stopper pin
2. Stopper plug
3. 3-4 shift front plug
4. 3-4 shift sleeve
5. 3-4 shift valve
6. 3-4 shift spring
7. 3-4 shift rear plug
8. Stopper pin
9. Stopper plug
10. 1-2 shift plug
11. 1-2 shift valve
12. 1-2 shift spring
13. Stopper pin
14. Stopper plug
15. Kick-down valve
16. Kick-down spring
17. Stopper pin
18. 2 range control front sleeve
19. 2 range control plug
20. 2 range control valve
21. 2 range control spring
22. 2 range control rear sleeve
23. Retainer
24. 1 range control spring
25. 1 range control valve
26. Stopper pin
27. 2-3 shift sleeve
28. 2-3 shift front plug
29. 2-3 shift valve
30. 2-3 shift spring
31. 2-3 shift rear plug
32. Stopper pin
33. Stopper plug
34. 1-2 shift control valve
35. 1-2 shift control spring
36. 1-2 shift control sleeve
37. Retainer
38. Throttle backup spring
39. Throttle backup valve
40. Stopper pin
41. Throttle modulator sleeve A
42. Throttle modulator front spring
43. Throttle modulator sleeve B
44. Throttle modulator valve
45. Throttle modulator sleeve C
46. Throttle modulator rear spring
47. Throttle modulator plug
48. Throttle cam assembly
49. Throttle plug assembly
50. Throttle spring
51. Throttle valve
52. Throttle assist spring
53. Throttle adjust plug

Main Control Body
Disassembly
Disassemble in the sequence shown in the figure.

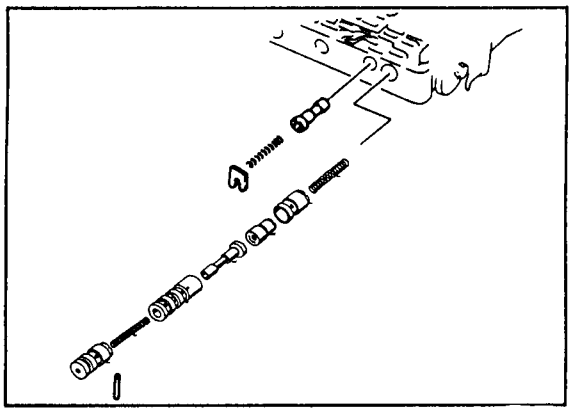


1. Stopper pin
2. Stopper plug
3. 3-4 shift front plug
4. 3-4 shift sleeve
5. 3-4 shift valve
6. 3-4 shift spring
7. 3-4 shift rear plug
8. Stopper pin
9. Stopper plug
10. 1-2 shift plug
11. 1-2 shift valve
12. 1-2 shift spring
13. Stopper pin
14. Stopper plug
15. Kick-down valve
16. Kick-down spring
17. Stopper pin
18. 2 range control front sleeve
19. 2 range control plug
20. 2 range control valve
21. 2 range control spring
22. 2 range control rear sleeve
23. Retainer
24. 1 range control spring
25. 1 range control valve
26. Stopper pin
27. 2-3 shift sleeve
28. 2-3 shift front plug
29. 2-3 shift valve
30. 2-3 shift spring
31. 2-3 shift rear plug
32. Stopper pin
33. Stopper plug
34. 1-2 shift control valve
35. 1-2 shift control spring
36. 1-2 shift control sleeve
37. Retainer
38. Throttle backup spring
39. Throttle backup valve
40. Stopper pin
41. Throttle modulator sleeve A
42. Throttle modulator front spring
43. Throttle modulator sleeve B
44. Throttle modulator valve
45. Throttle modulator sleeve C
46. Throttle modulator rear spring
47. Throttle modulator plug
48. Throttle cam assembly
49. Throttle plug assembly
50. Throttle spring
51. Throttle valve
52. Throttle assist spring
53. Throttle adjust plug

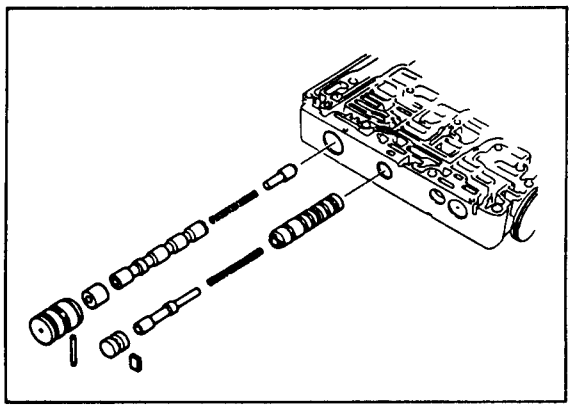


2. Install the throttle return spring as shown.
3. Install the throttle cam assembly to the main control body.

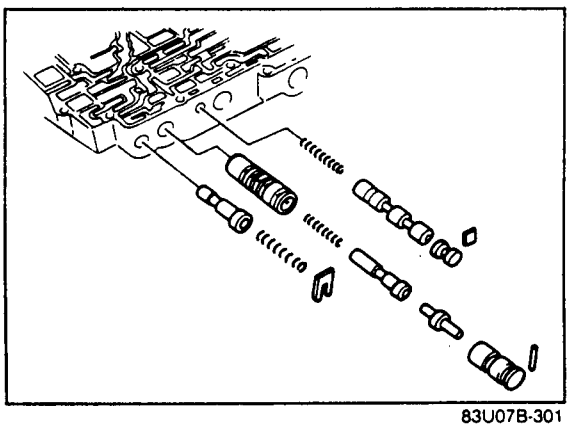
Tightening torque:
8—11 N·m (80—110 cm-kg, 69—95 in-lb)



4. Install the throttle modulator plug, throttle modulator rear spring, throttle modulator sleeve C, throttle modulator valve, throttle modulator sleeve B, throttle modulator front spring, throttle modulator sleeve A, and stopper pin.
5. Install the throttle backup valve, throttle backup spring, and retainer.



6. Install the 1-2 shift control sleeve, 1-2 shift control spring, 1-2 shift control valve, stopper plug, and stopper pin.
7. Install the 2-3 shift rear plug, 2-3 shift spring, 2-3 shift valve, 2-3 shift front plug, 2-3 shift sleeve, and stopper pin.



8. Install the 1 range control valve, 1 range control spring, and retainer.
9. Install the 2 range control rear sleeve, 2 range control spring, 2 range control valve, 2 range control plug, 2 range control front sleeve, and stopper pin.
10. Install the kick-down spring, kick-down valve, stopper plug, and stopper pin.

83U07B-301

TRANSMISSION INPUTS

The **Throttle Position Sensor** is located on the throttle body. See Figure 5. It senses throttle position, or engine load, and sends this information to the TCU in the form of a variable return voltage. There are two connectors at the throttle position sensor. One is for the ECU (Engine Control Unit) and one is for the TCU. It can be checked with either a voltmeter or an ohmmeter, but it seems that the voltmeter check is easiest. With the key on and the throttle position sensor connected, probe into the connector. There should be about 5 volts sent to the TPS. See Figure 6. The signal return wire should show slightly less voltage than that sent to the TPS. This voltage should drop smoothly as throttle is opened. At full throttle there should be less than 1 volt at the signal return wire.

NOTE: ECU connector (figure 6) signal return voltage will be opposite of the TCU signal return voltage.

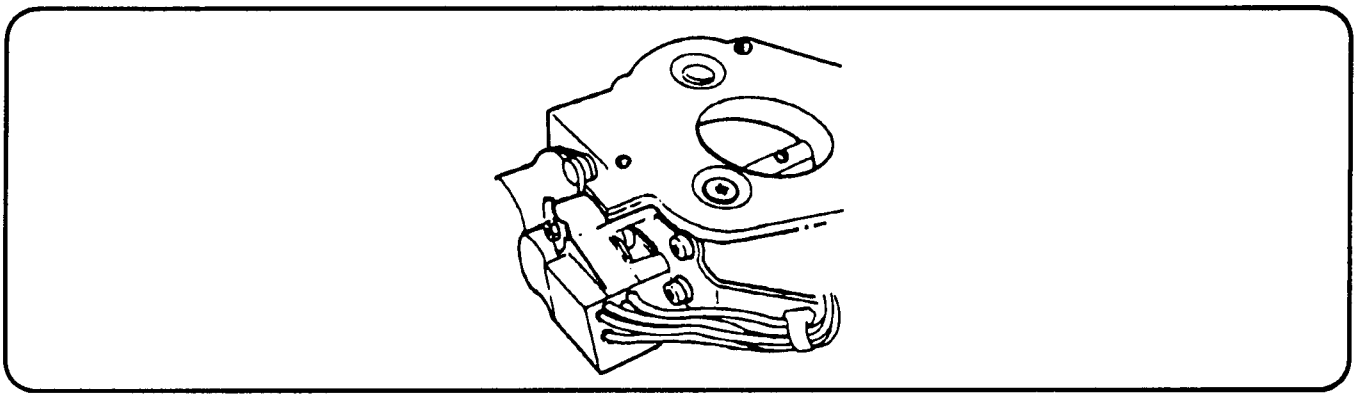


Figure 5

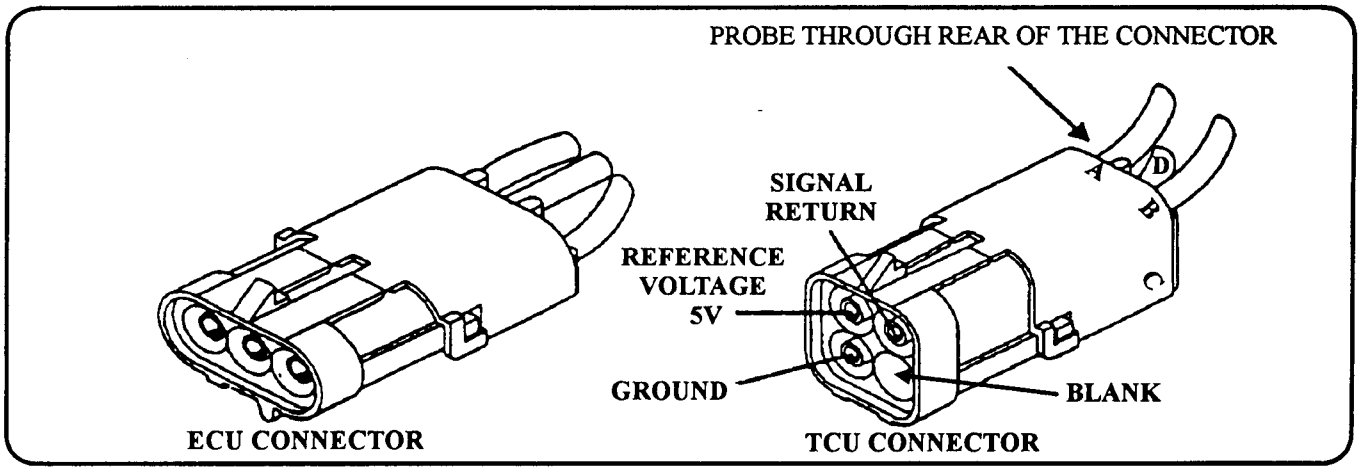


Figure 6

The **Neutral Start Switch** is mounted to the right side of the transmission. Besides allowing the engine to start only in park or neutral and operating the back-up lights, it provides electrical inputs to the TCU. Electrical contacts are provided within the switch for each gear selector range except D which is not used. The shift positions that are used as input to the TCU are 1-2 ND 3. If the drivers selects either of these positions,the contacts inside the switch signal the TCU to prevent upshifts beyond these ranges or to allow the transmission to downshift into 1st, 2nd or 3rd gear. For example if the driver selects 3, the transmission will upshift 1-2-3 and downshift 3-2-1. A safety system within the TCU will not allow the transmission to obtain 1st gear until the vehicle speed drops below approximately 30 mph even though the driver has selected the 1-2 range. This helps prevent engine damage.

INTRODUCTION
MAZDA N4A-EL

The N4A-EL is a four speed overdrive transmission with shifts and shift timing being controlled by the on board EC-AT control unit. The torque converter is equipped with a lock-up mechanism and is also controlled by the EC-AT control unit. This converter has a stall ratio of 1.900:1.

The line pressure used for shift feel is determined by engine vacuum to the modulator, pressure regulator valve, and spring in the transmission. This transmission consists of three planetary gear sets, four clutch packs, two bands and two sprags. It holds 7.7 US quarts of Dextron II or M-III automatic transmission fluid and is currently found in the Mazda 929 and early MPV'S.

We thank MAZDA
for the information and illustrations that have made this booklet possible

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for their reliability, but ATSG does not guarantee its accuracy.

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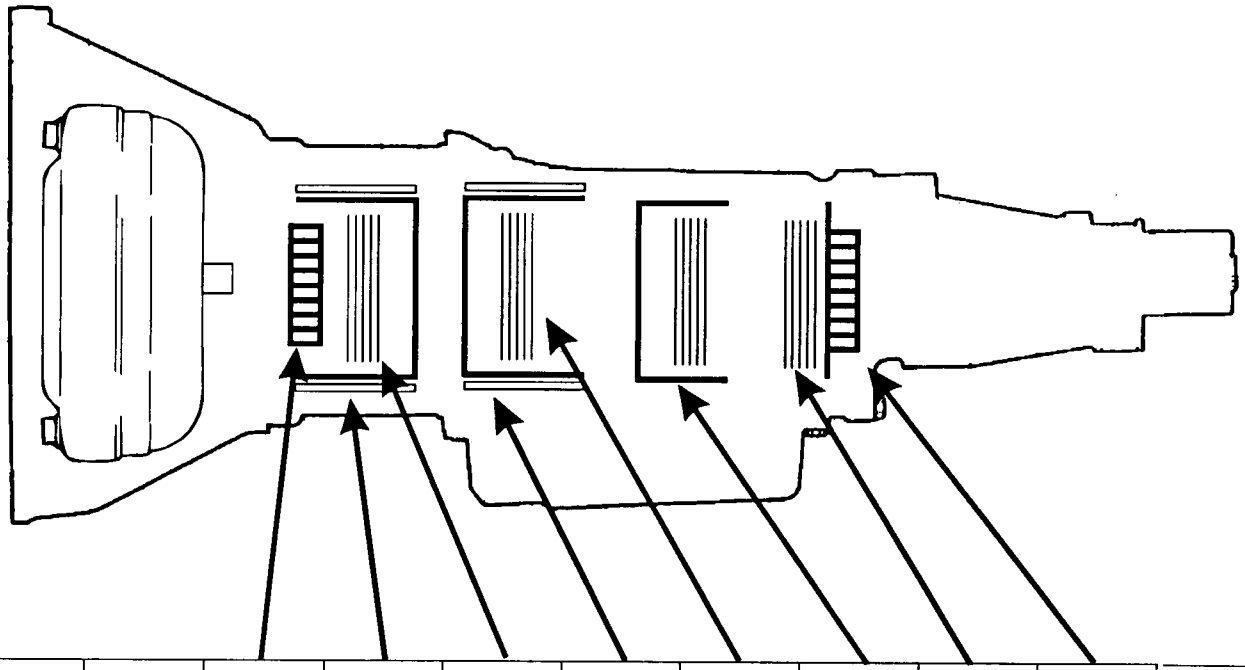
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N4A-EL
CLUTCH AND BAND APPLICATION CHART



SELECTOR POSITION	GEAR	O.D. SPRAG	O.D. BAND	DIRECT CLUTCHES	INTER. BAND	HIGH CLUTCHES	FORWARD CLUTCHES	LOW/REV CLUTCHES	LOW SPRAG	GEAR RATIO
R	REVERSE	ON		ON		ON		ON		2.40:1
D	FIRST	ON		ON			ON		ON	2.84:1
	SECOND	ON		ON	ON		ON			1.54:1
	THIRD	ON		ON		ON	ON			1:1
	O.D.		ON			ON	ON			.72:1
S	FIRST	ON		ON			ON		ON	2.84:1
	SECOND	ON		ON	ON		ON			1.54:1
	THIRD	ON		ON		ON	ON			1:1
L	FIRST	ON		ON			ON	ON		2.84:1
	SECOND	ON		ON	ON		ON			1.54:1

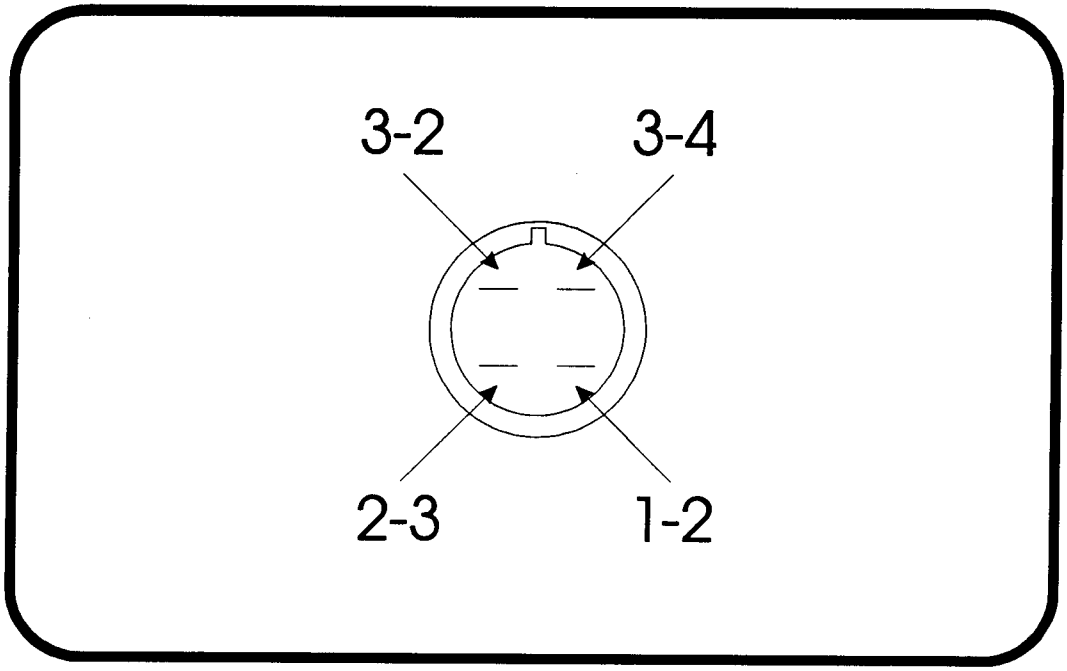
SOLENOID VALVE APPLICATION CHART

SELECTOR POSITION	GEAR	SOLENOID VALVES			
		1-2	2-3	3-4	LOCK-UP
R	REVERSE			ON	
D	FIRST	ON	ON	ON	
	SECOND		ON	ON	
	THIRD			ON	ON*
	O.D.				ON*

* LOCK-UP CONTROL VALVE COMES ON IN THIRD AND O.D. RANGES WITH RESPECT TO THROTTLE POSITION, VEHICLE SPEED AND TEMPERATURE.

THE 3-2 CONTROL SOLENOID IS "ENERGIZED" MOMENTARILY ON A 3-2 DOWNSHIFT

THESE SHIFT SOLENOIDS CAN BE OPERATED WITH A 12 VOLT JUMPER WIRE. ILLUSTRATED BELOW IS THE SOLENOID WIRE HARNESS CONNECTOR WITH EACH TERMINAL IDENTIFICATION FOR TEST PURPOSES.



OIL PRESSURE TEST

This step checks line pressures for checking the hydraulic components and for oil leakage.

Preparation

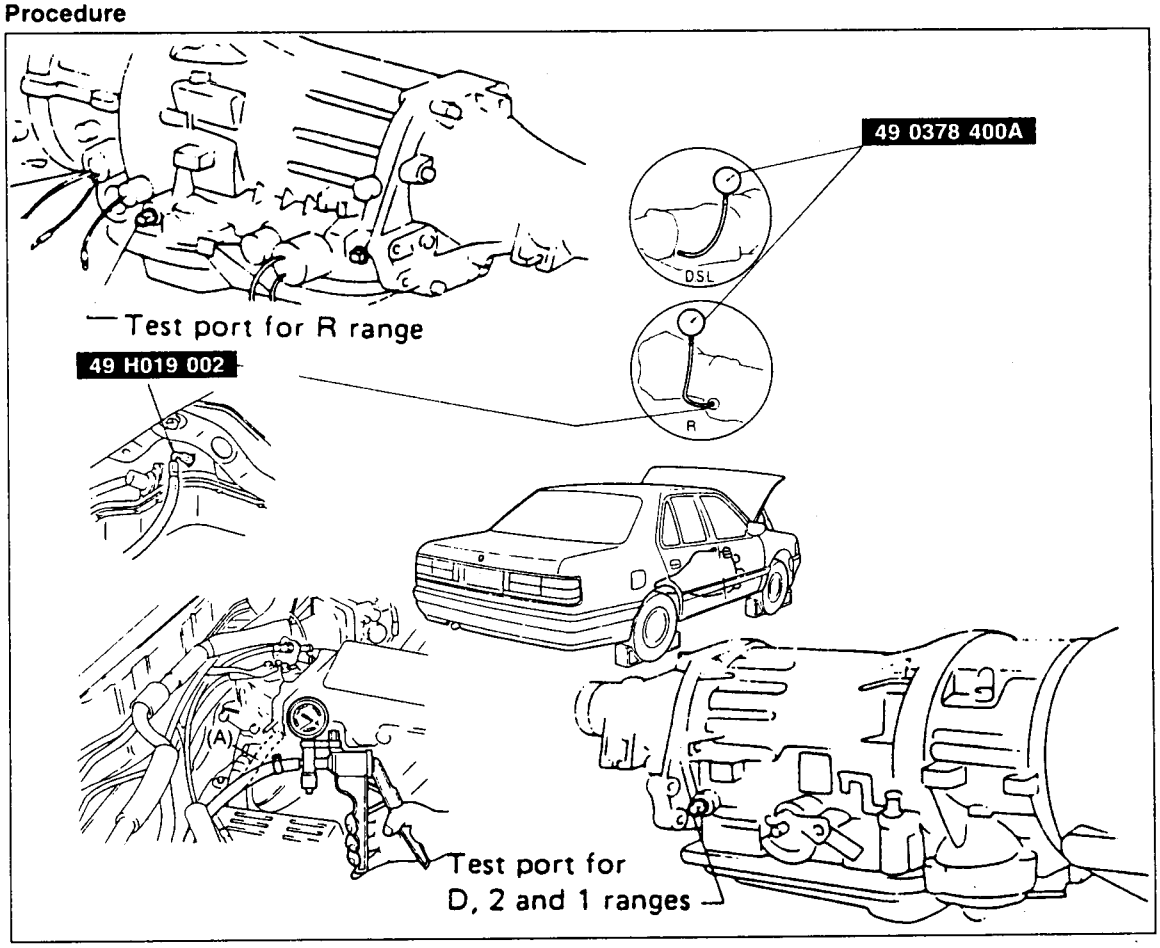
1. Perform the preparation procedure shown in STEP 4 (STALL TEST).
2. Connect a tachometer to the engine.
3. Connect the **SST** to the line pressure inspection holes.

SST = SPECIAL SERVICE TOOL

Note

a) Left side hole is for R range.
b) Right side hole is for D, S, L ranges.
c) R range test should be performed before D,S,L range tests.

Procedure



1. Start the engine and check that the idle speed is **650 ± 20** rpm.
2. Shift the selector lever to R range and read the oil pressure at idle.
3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read the oil pressure as soon as the engine speed becomes constant, then release the accelerator pedal.
5. Shift the selector lever to N range and run the engine at idle for at least one minute.
6. Read the line pressure at idle and engine stall speeds for each range in the same manner.

Specified line pressure:

Range		Pressure kPa (kg/cm², psi)	
		Idle	Stall
D range	Economy mode	290—390 (3—4, 43—57)	880—1080 (9—11, 128—156)
S range	Economy mode	290—390 (3—4, 43—57)	880—1080 (9—11, 128—156)
	Hold mode	290—390 (3—4, 43—57)	880—1080 (9—11, 128—156)
L range		290—390 (3—4, 43—57)	880—1080 (9—11, 128—156)
R range		540—640 (5.5—6.5, 78—92)	1470—1670 (15—17, 213—242)

7. Cool the transmission and reconnect the **SST** to the right side inspection hole.
8. Disconnect the vacuum hose (A) from the surge tank and connect a vacuum pump to the hose.
9. Shift the selector lever to R range.
10. Read the line pressure at idle as described below.

SST = SPECIAL SERVICE TOOL

Specified line pressure:

Vacuum	Line pressure kPa (kg/cm², psi)
Atmospheric pressure	880—1080 (9—11, 128—156)
200 mmHg (7.87 inHg)	690—780 (7—8, 100—114)
400 mmHg (15.7 inHg)	390—490 (4—5, 57—71)

Evaluation of Stall Line Pressure

Condition		Possible Cause
Below specification	In all ranges	Worn oil pump Fluid leakage from the oil pump, control valve body, and/or transmission case Stuck pressure regulator valve Fluid leakage from the direct clutch and/or OD band servo release side hydraulic circuit
	In D (Econ.), S (Econ.), and L ranges	Fluid leakage from the rear clutch hydraulic circuit Stuck pressure modifier valve
	In S (Econ. & Hold) and L ranges	Fluid leakage from the throttle backup valve hydraulic circuit
	In L and R ranges	Fluid leakage from the low-and-reverse hydraulic circuit
	In R range only	Fluid leakage from the front clutch and/or 2nd band servo release side hydraulic circuit
	In S range (Hold)	Stuck throttle backup valve Stuck backup control valve Backup control function (electronic) not operating properly
Excessive line pressure		Stuck pressure modifier valve Stuck backup control valve

Evaluation of Idle Line Pressure

Condition		Possible Cause
Below specification		Same as Stall Line Pressure
Excessive pressure	In all ranges	Leaking or disconnected vacuum hose Leaking vacuum diaphragm Over length diaphragm rod Stuck vacuum throttle valve Stuck pressure regulator valve
	In S range (Hold)	Stuck pressure modifier valve
Incorrect line pressure with specified vacuum at vacuum diaphragm	No variation	Missing diaphragm rod
	Incorrect variation (Above or below specification)	Incorrect diaphragm rod length Stuck vacuum throttle valve Stuck pressure regulator valve Stuck pressure regulator plug

Shift Pattern Determination

The EC-AT has the nine shift patterns described below. The EC-AT control unit selects the proper pattern based on the range and mode conditions.

The range is determined according to signals received from the switches (D, S, L, N & P) within the inhibitor switch.

The mode is determined according to the signals from the economy switch within the mode switch, and those from the hold switch.

	R range	P&N range	L range	S range	D range
Power mode	Reverse (3rd)	Neutral (3rd or 1st)	1 ⇄ 2 (⇄ 3)	1 ⇄ 2 ⇄ 3 (L/U)	1 ⇄ 2 ⇄ 3 ⇄ OD (L/U) (L/U)
Economy mode					1 ⇄ 2 ⇄ 3 ⇄ O (L/U) (L/U)
Hold mode			1 (← 2 ← 3)	2 (← 3)	2 ⇄ 3 (←OD) (L/U)

1. D range

Three shift patterns are provided.

(1) Power and Economy modes
1st, 2nd, 3rd, 3rd (lockup), OD, and OD (lockup) shifts are provided. Shift points in power mode are at higher speeds than those of economy mode.

(2) Hold mode
The 2nd and 3rd shifts are provided. 2nd gear is selected at only 20 km/h (12 mph) or below to assure acceleration. After that, 3rd gear is held. However, to prevent over speeding the engine during OD → 3 downshift, OD is held until OD → 3 downshift speed (162 km/h [100 mph]) is achieved.

2. S range

Two shift programs are provided.

(1) Power and Economy mode
1st, 2nd, 3rd, and 3rd (lockup) shifts are provided. The shift points for both modes are the same and these shift points are the same as those of D range power mode.

(2) Hold mode
2nd gear is provided and held. To prevent over speeding the engine during 3 → 2 downshift, 3rd gear is held until 3 → 2 downshift speed (103 km/h [64 mph]) is achieved.

3. L range

Two shift programs are provided.

(1) Power and Economy mode
1st and 2nd gears are provided. The shift points for both modes are the same and these shift points are the same as those of D range power mode. To prevent over speeding the engine during 3 → 2 downshift, 3rd gear is held until 3 → 2 downshift speed (103 km/h [64 mph]) is achieved.

(2) Hold mode
1st gear is provided and held. To prevent over speeding the engine during 3 → 2 → 1 downshift, 3rd or 2nd gears are held until 3 → 2 or 2 → 1 downshift speed (103 km/h [64 mph] or 48 km/h [30 mph]) is achieved.

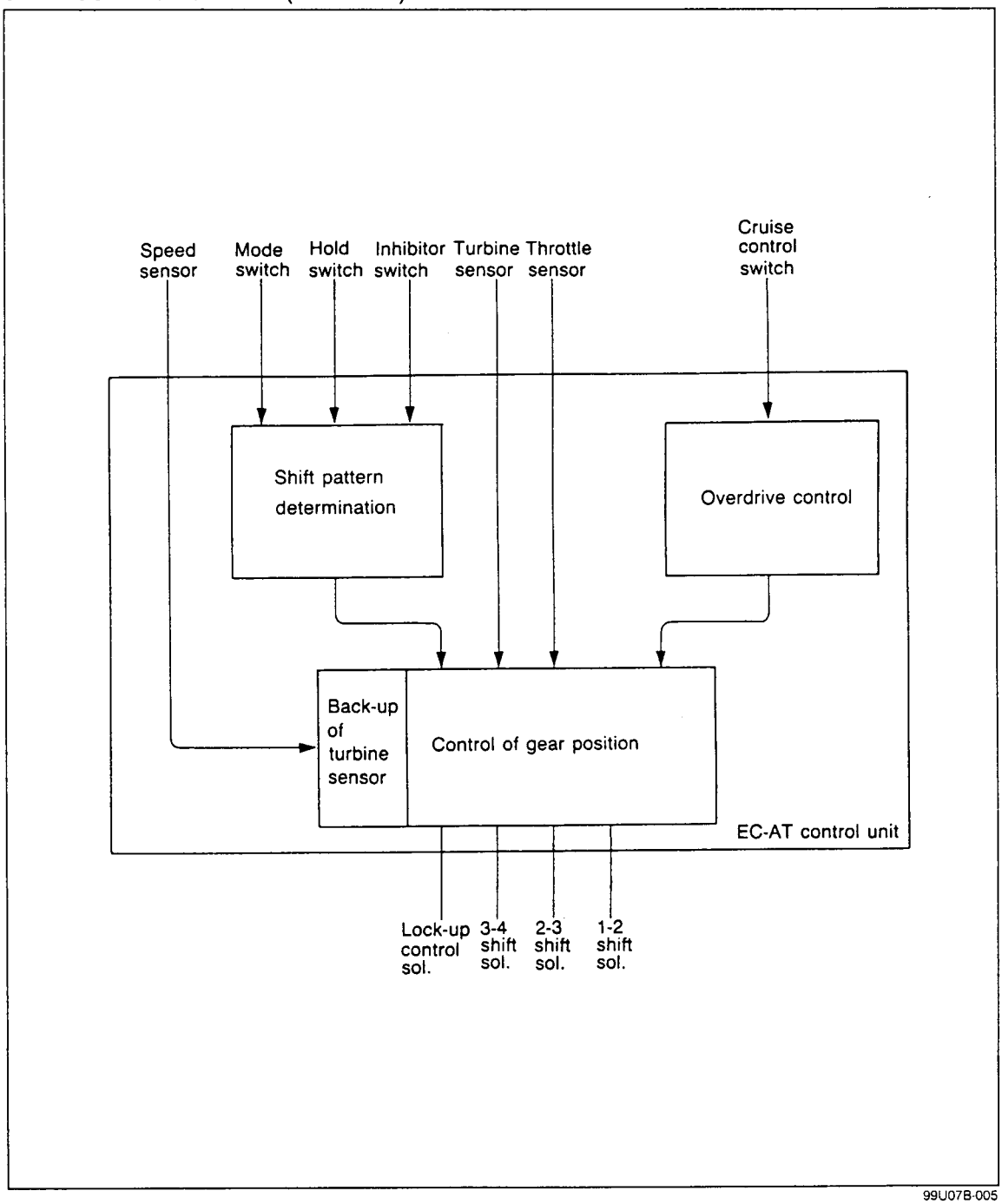
4. P & N range

The transmission is in neutral position hydraulically, however, the shift solenoid valves are in the pattern for 3rd or 1st gear according to vehicle speed.

This is to prepare for shifting to D range.

Solenoid pattern	Vehicle speed
3rd pattern	Above 15—17 km/h (9—11 mph)
1st pattern	Below 15—17 km/h (9—11 mph)

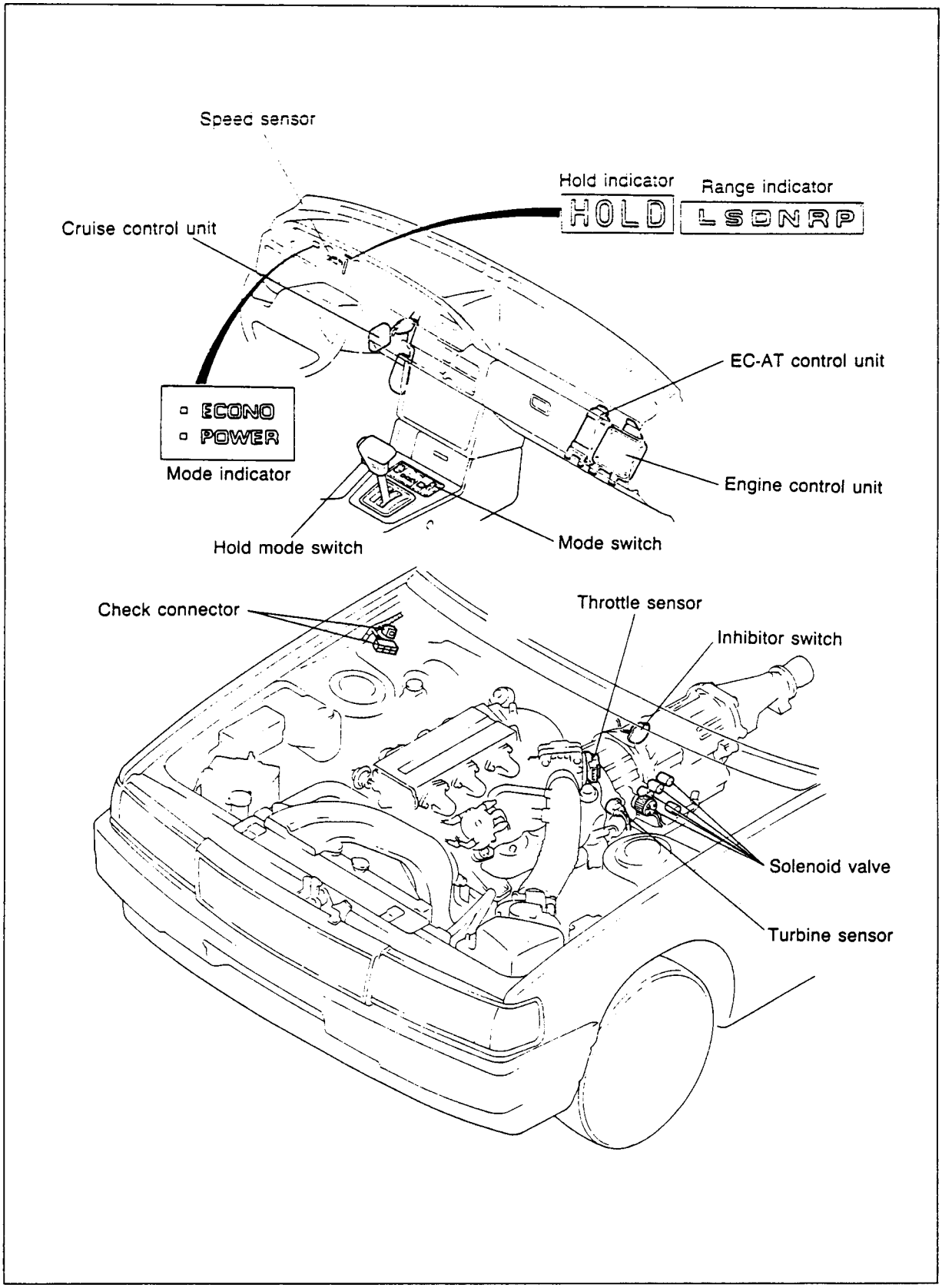
SHIFT CONTROL SYSTEM (ELECTRIC)



99U07B-005

This system is composed of three sensors, seven switches, the EC-AT control unit, and four solenoid valves. The EC-AT control unit selects one of nine shift patterns according to the status of the inhibitor switch, mode switch, and hold switch, then determines a gear position according to signals from the throttle sensor and turbine sensor.
In addition, overdrive is inhibited according to the driving conditions as detected by the signal from the cruise control switch (in the cruise control unit).

COMPONENT LOCATION



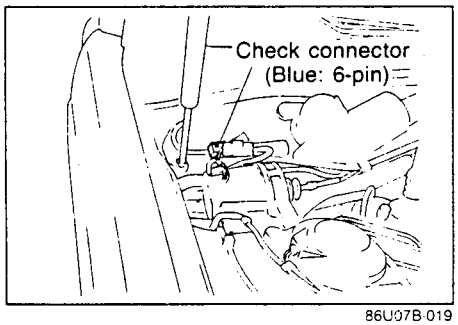
WARNING CODE RETRIEVAL:
It is necessary to use a hand held scanner such as a Monitor 4000-E, Snap-on, or EC-AT Tester set in order to retrieve the warning codes memorized in the EC-AT control unit. There are a total of 8 possible warning codes that the EC-AT control unit could memorize. They are:

06 - THE SPEED SENSOR OR CIRCUIT
12 - THE THROTTLE POSITION SENSOR OR CIRCUIT
55 - THE TURBINE SENSOR OR CIRCUIT
60 - 1-2 SHIFT SOLENOID, VALVE OR CIRCUIT
61 - 2-3 SHIFT SOLENOID, VALVE OR CIRCUIT
62 - 3-4 SHIFT SOLENOID, VALVE OR CIRCUIT
63 - LOCKUP CONTROL VALVE OR CIRCUIT
64 - 3-2 SHIFT SOLENOID, VALVE OR CIRCUIT

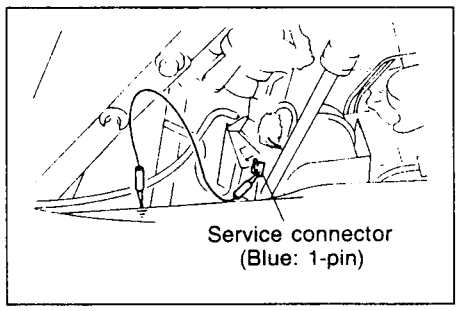
You will need to use the manufactures instructional guide book to hook up the scanner you are using to the vehicle. These testers use the 6 pin blue check connector and the 1 pin blue service connector illustrated below.

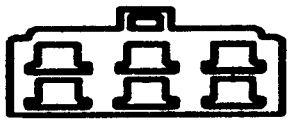
MAZDA
Connector Location

All Models ..... Engine compartment near wiper motor



86U07B-019

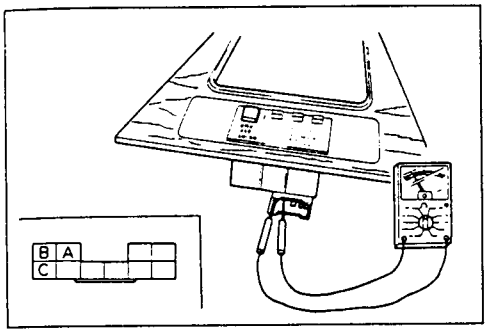


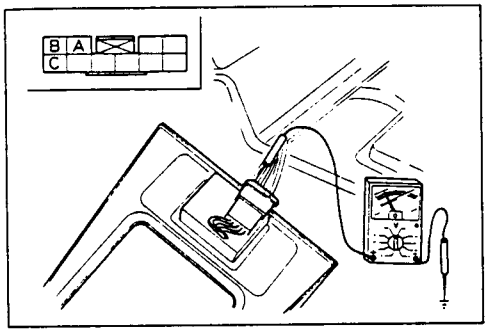


Blue 6-Pin Capacity Connector for Transmission Codes



Blue 1-Pin Capacity Connector for Transmission Codes





ELECTRONIC SYSTEM COMPONENTS

MODE SWITCH

Inspection of Continuity

1. Remove the upper plate.
2. Disconnect the mode switch connector.
3. Check continuity of the terminals.

Mode	Connector terminal		
	A	B	C
Power	○		○
Economy	○	○	

○—○: Indicates continuity

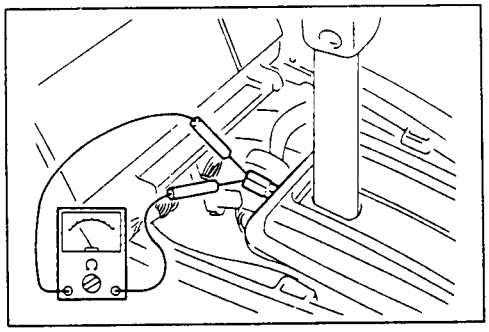
4. If not correct, replace the mode switch.
5. If correct, check terminal voltage

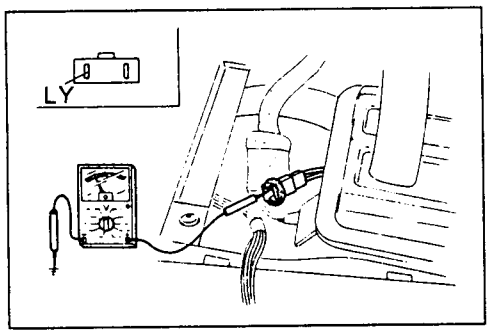
Inspection of Terminal Voltage

1. Check that continuity of switch is O.K.
2. Reconnect the mode switch connector.
3. Turn the ignition switch ON.
4. Check the voltage between each terminal and ground.

Terminal	Voltage		
	Power mode	Economy mode	Hold mode
A	Below 1.5V	Below 1.5V	Approx. 12V
B	Approx. 12V	Below 1.5V	Approx. 12V
C	Below 1.5V	Approx. 12V	Approx. 12V

5. If not correct in the power or economy mode, check wiring harness.
6. If not correct at the hold mode, check the 1A terminal (mode indicator) of the EC-AT control unit and the hold switch.





HOLD SWITCH

Inspection of Continuity

1. Remove the upper plate
2. Disconnect the hold switch connector.
3. Check for continuity between the terminals while depressing the switch.

Continuity	Switch
YES	Released
NO	Depressed

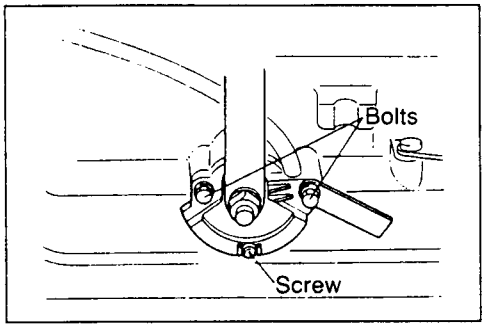
4. If not correct, replace the hold switch.
5. If correct, check terminal voltage.

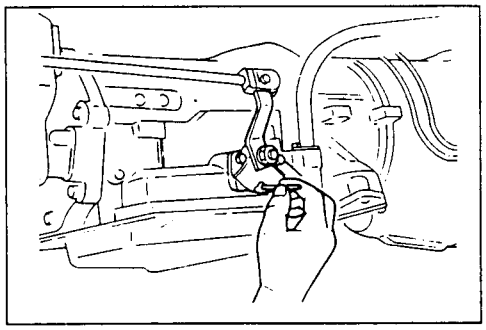
Inspection of Terminal Voltage

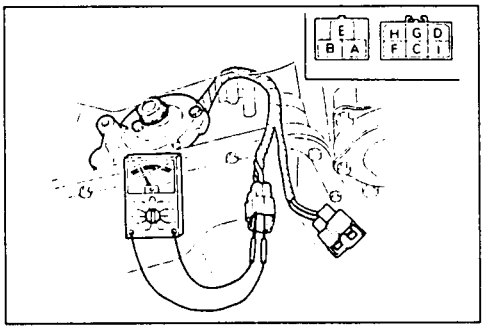
1. Check that continuity of the switch is O.K.
2. Reconnect the hold switch connector.
3. Turn the ignition switch ON.
4. Check the voltage between the terminal (LY) and ground while depressing the switch.

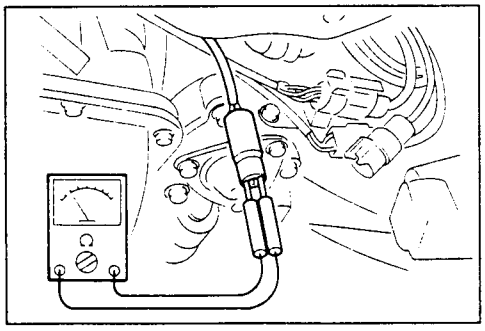
Terminal voltage	Switch
Approx. 12V	Depressed
Below 1.5V	Released

5. If not correct, check wiring harness.









INHIBITOR SWITCH
Adjustment
1. Shift the manual shaft to the "N" position.
2. Loosen the inhibitor switch mounting bolts.
3. Remove the screw and move the inhibitor switch so that the small hole is aligned with the screw hole.
4. Set the alignment by inserting a **2.0 mm (0.079 in)** diameter pin through the holes.
5. Tighten the switch mounting bolts to specification.

   Tightening torque:
   4.9—6.9 N·m (50—70 cm-kg, 43—61 in-lb)

6. Remove the pin, and install and tighten the screw to specification.

   Tightening torque:
   0.4—0.7 N·m (4—7 cm-kg, 3.5—6.0 in-lb)

7. Recheck the continuity of the individual terminals.

Inspection of continuity
1. Disconnect the inhibitor switch connector.
2. Check continuity of the terminals.

Position	Connector terminal								
	A	B	C	D	E	F	G	H	I
P	○—○		○—○						
R			○		——○				
N	○—○		○			——○			
D			○				——○		
S			○					——○	
L			○						——○

○—○: Indicates continuity

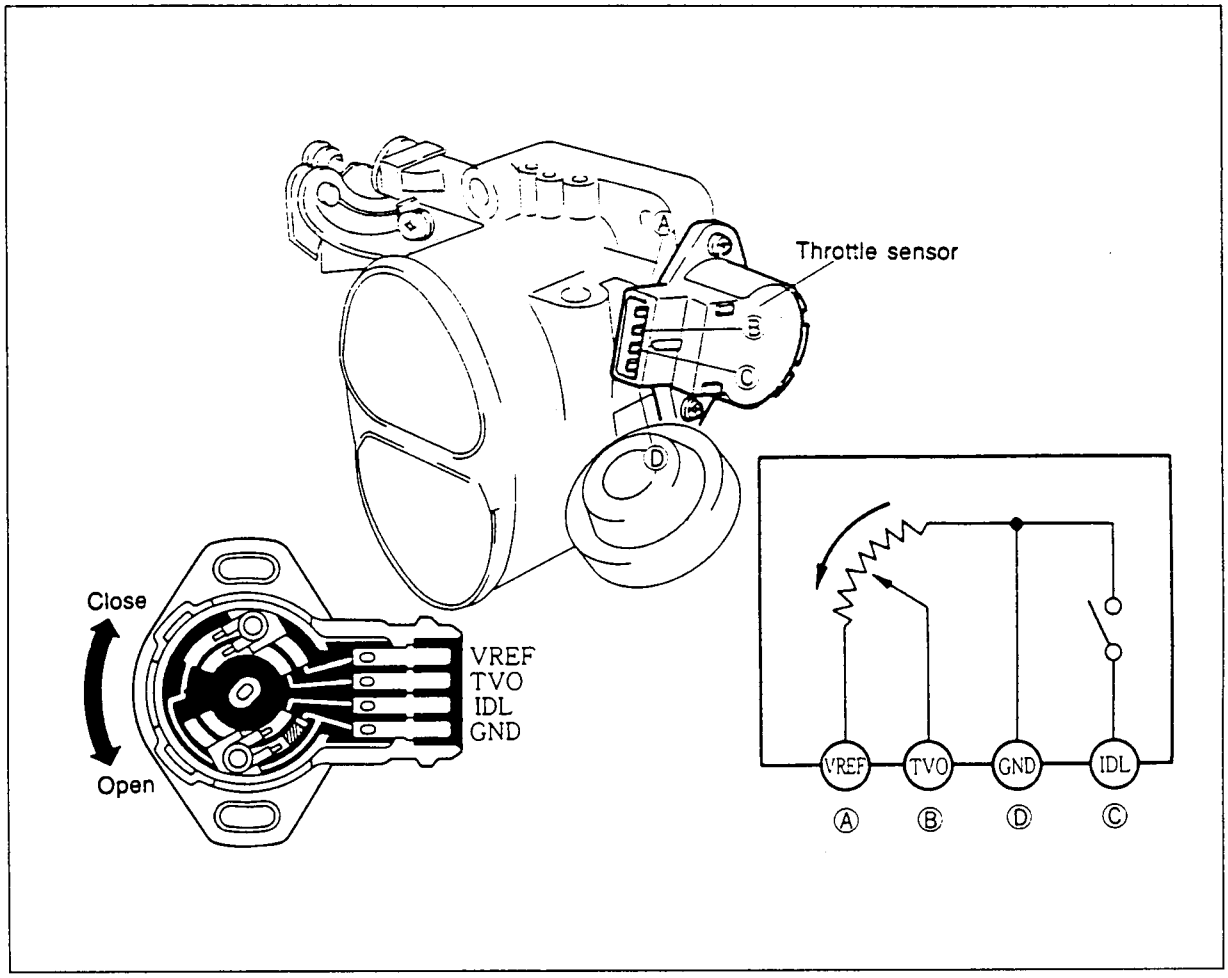
3. If not correct, replace the switch.

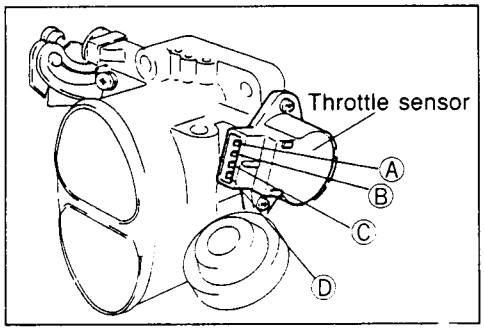
TURBINE SENSOR
Inspection of Resistance
1. Disconnect the turbine sensor connector.
2. Check resistance at the terminals.

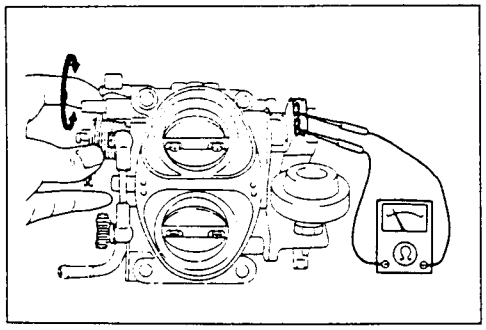
   Resistance: Approx. 245 Ω

3. If not correct, check voltage generation of the sensor.

THROTTLE SENSOR







Inspection
Variable resistor

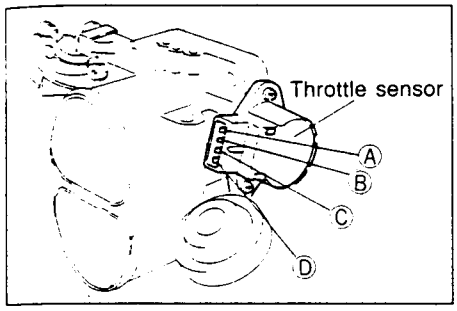
1. Disconnect the throttle sensor connector from the throttle sensor, and connect an ohmmeter between (A) and (D) terminals.
2. Check the resistance.

   Resistance: 3.5—6.5 kΩ

3. Connect an ohmmeter between (B) and (D) terminals.
4. Gradually open the throttle valve, check the resistance.

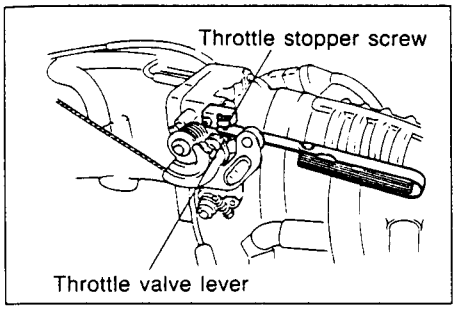
   Resistance:
   Below approx. 1 kΩ.... Throttle valve fully closed
   Approx. 3.5—6.5 kΩ..... Throttle valve fully open

5. If not within specification, check the throttle sensor adjustment.



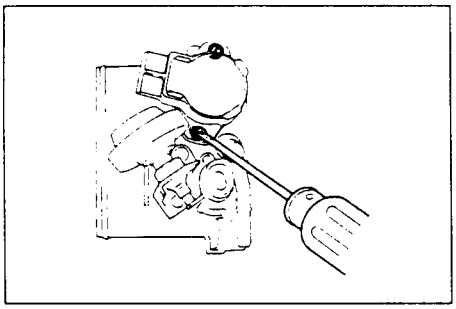
Idle switch

1. Disconnect the throttle sensor connector from the throttle sensor.
2. Connect an ohmmeter between (C) and (D) terminals.

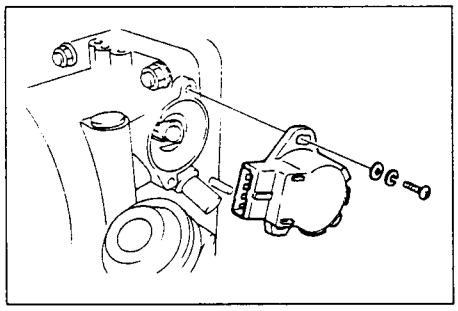


3. Check for continuity between (C) and (D) with a feeler gauge inserted between the throttle stopper screw and throttle valve lever.

Thickness gauge	Continuity between terminals ((C)↔(D))
0.5 mm (0.02 in)	Yes
0.7 mm (0.028 in)	No

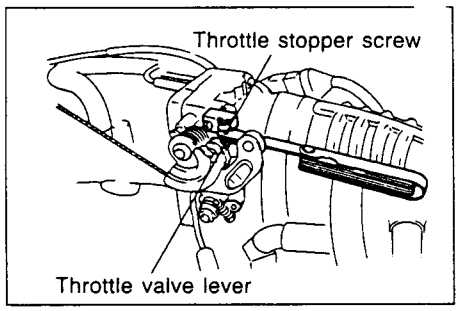


4. If not within specification, loosen the screws and rotate the throttle sensor to adjust.
5. Tighten the screws and seal them with white paint.
6. After checking and adjusting the sensor, connect the throttle sensor connector.

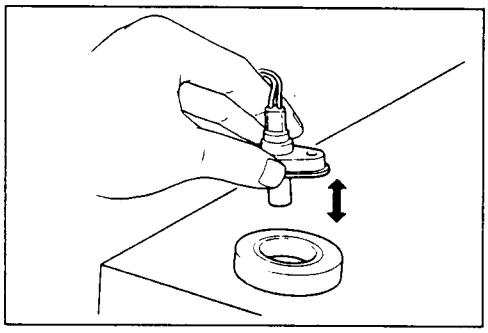


Replacement

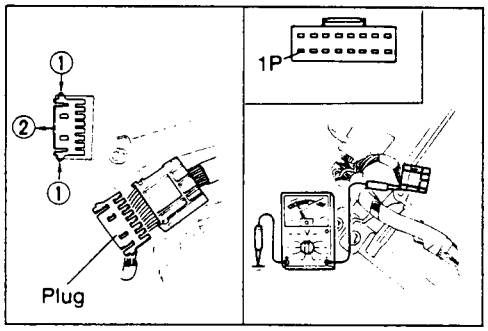
1. Disconnect the throttle sensor connector.
2. Remove the screws.
3. Remove the throttle sensor.



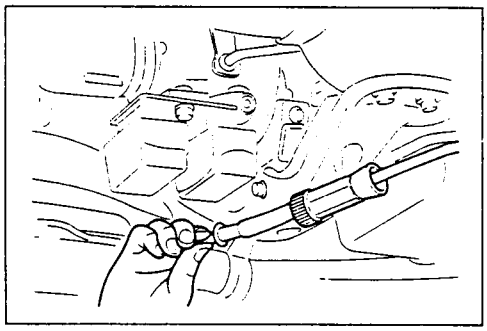
4. Install the throttle sensor.
5. Adjust the idle switch.
6. Tighten the screws and seal them with white paint.



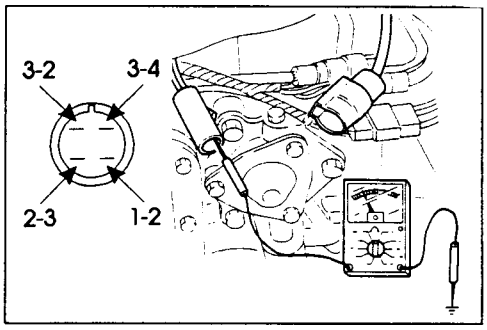
Inspection of Voltage Generation
1. Remove the turbine sensor.
2. Connect a voltmeter (0.1 volt range) to the terminals.
3. Wave the the tip of turbine sensor approx. 5 mm (0.197 in) away from a magnet and check that the sensor generates voltage.
4. If not correct, replace the turbine sensor.



SPEED SENSOR
Inspection of voltage
1. Disconnect the 16-pin connector from the EC-AT control unit.
2. Remove the plug from the connector.
3. Connect a voltmeter between the 1P terminal and ground as shown.
4. Turn the ignition switch ON.



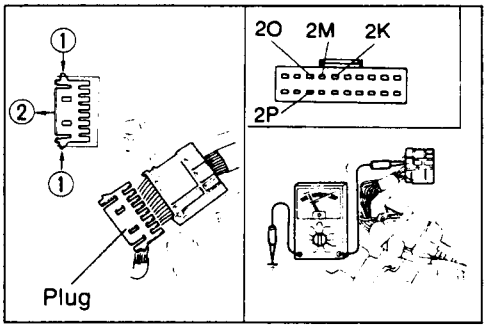
5. Remove the speedometer cable from the transmission.
6. Slowly turn the speedometer cable one turn.
7. Check that approx. 7V is shown 4 times.
8. If not correct, check the speedometer.



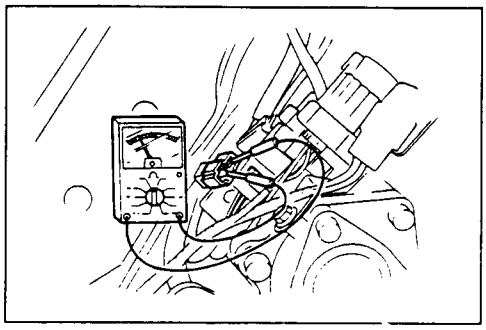
SOLENOID VALVE (1-2 shift, 2-3 shift, 3-4 shift, 3-2 control)
Inspection of Resistance
1. Disconnect the solenoid valve connector.
2. Check resistance between each terminal and ground.

   Resistance: 13—27 Ω

3. If not correct, check the wiring harness for an open or short-circuit. Replace the solenoid valve, if necessary.



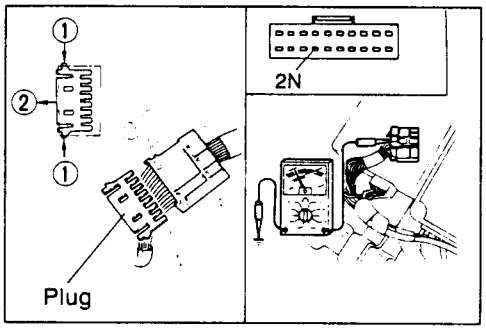
Inspection of Continuity
1. Disconnect the 20-pin connector from the EC-AT control unit.
2. Remove the plug from the connector.
3. Check continuity between terminals 2K, 2M, 2O and 2P and ground.
4. If not correct, check the wiring harness for an open-circuit.



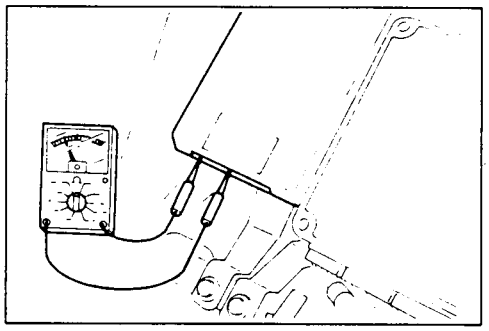
SOLENOID VALVE (Lockup control)
Inspection of Resistance
1. Disconnect the solenoid valve connector.
2. Check resistance between the terminals.

   Resistance: 13—25 Ω

3. If not correct, replace the solenoid valve.



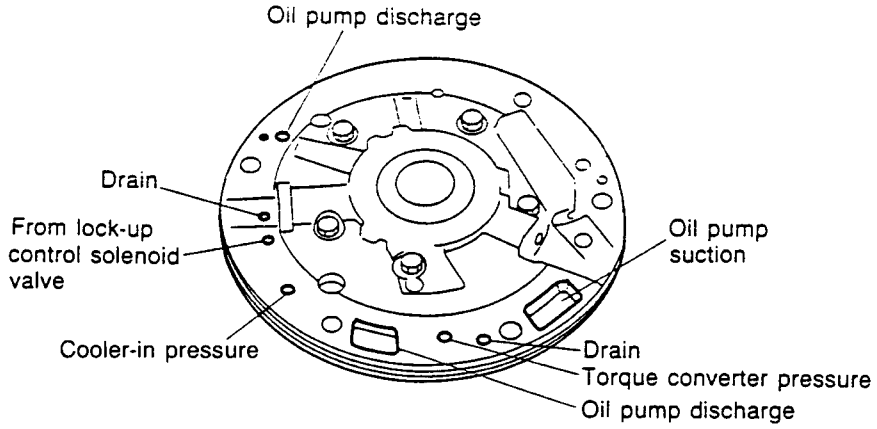
Inspection of Continuity
1. Disconnect the 20-pin connector from the EC-AT control unit.
2. Remove the plug from the connector.
3. Check continuity between the terminal 2N and ground.
4. If not correct, check the wiring harness for an open-circuit.



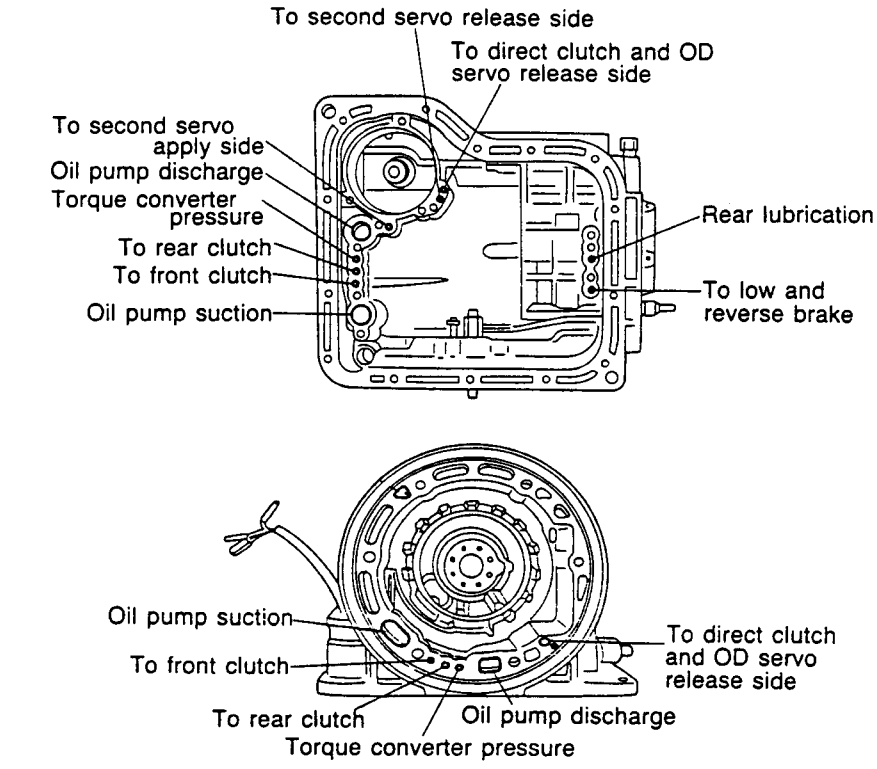
EC-AT CONTROL UNIT
Inspection of Solenoid Transistor
1. Disconnect the connectors from the EC-AT control unit.
2. Check continuity between terminals 2K, 2M, 2N, 2O, 2P, and 2S.
3. If there is no continuity at any one terminal, replace the EC-AT control unit.

Terminal	Connected to	Voltage	Condition
1A (Output)	Mode indicator	Approx. 12V	Hold mode
		Below 1.5V	Power or economy mode
1B (Output)	Hold indicator	Below 1.5V	Hold mode
		Approx. 12V	Other modes
1C (Output)	EC-AT Tester (malfunction code)	Approx. 12V	Normal
		Below 1.5V or Approx. 12V (fluctuating)	If malfunction present
		Code signal	Self-diagnosis check connector grounded
1E (Input)	EC-AT check connector	Approx. 12V	—
1H (Input)	Hold switch	Approx. 12V	Switch depressed
		Below 1.5V	Switch released
1I (Input)	Mode switch (Economy side)	Below 1.5V	Economy switch depressed (Economy mode)
		Approx. 12V	Power switch depressed or hold mode
1J (Ground)	Engine ground	Below 1.5V	—
1M (Input)	Cruise control unit	Below 1.5V	SET or RESUME switch ON, or vehicle speed 3 km/h (2 mph) lower than preset speed (Driving vehicle; cruise control ON)
		Approx. 12V	Other (normal) conditions

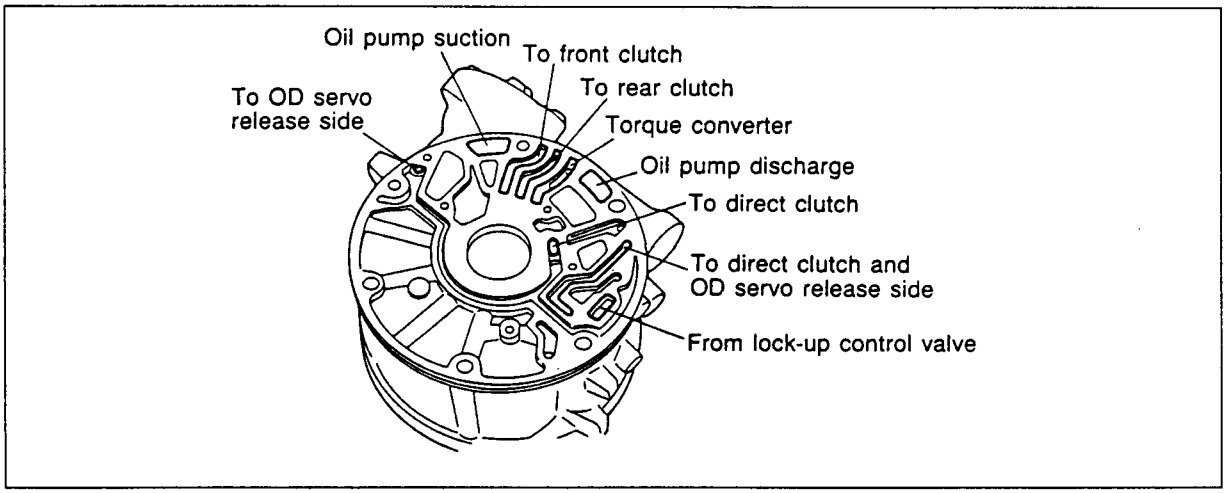
Oil pump



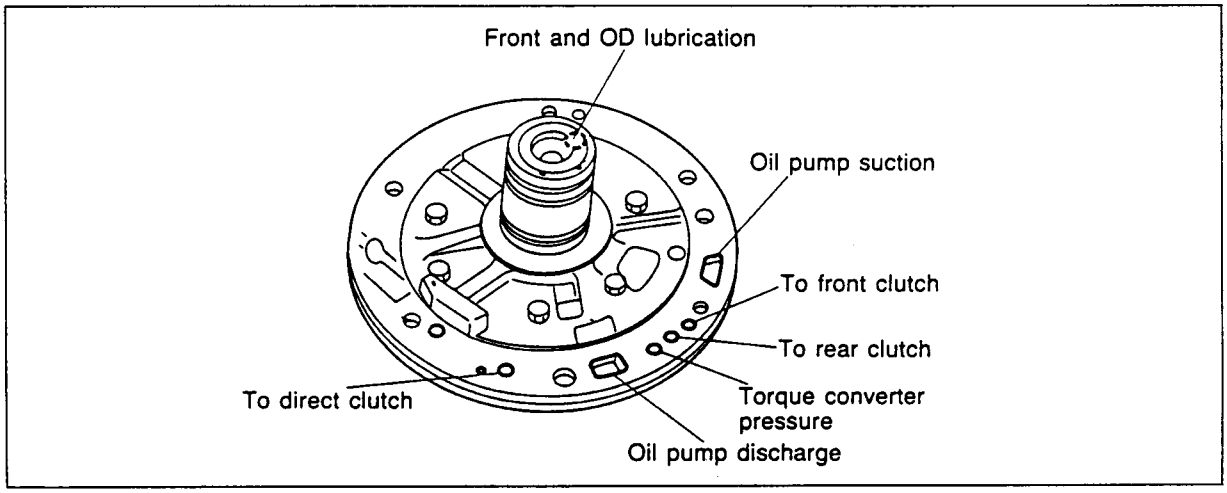
Transmission case



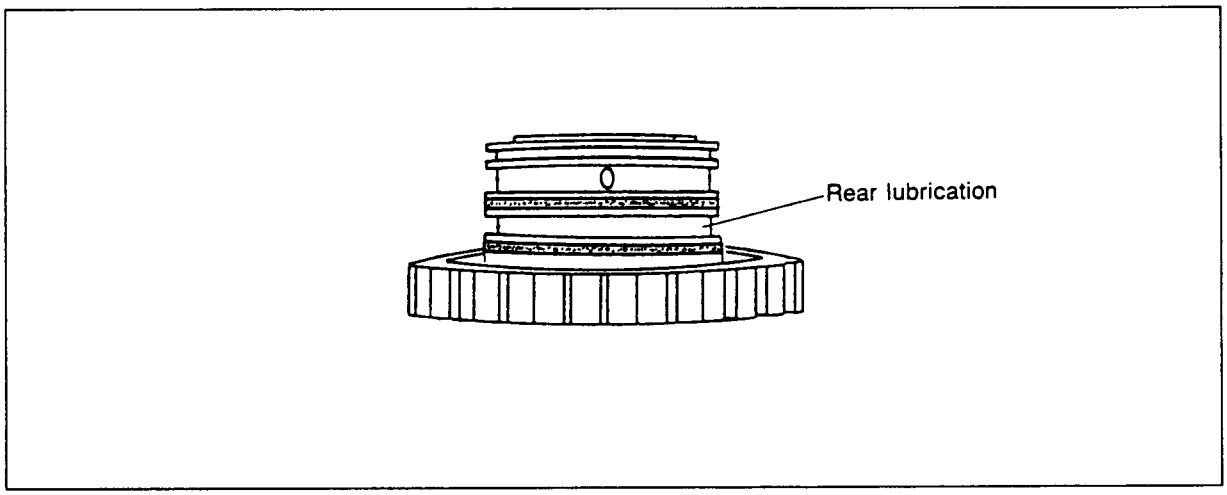
OD case



Drum support



Oil distributor

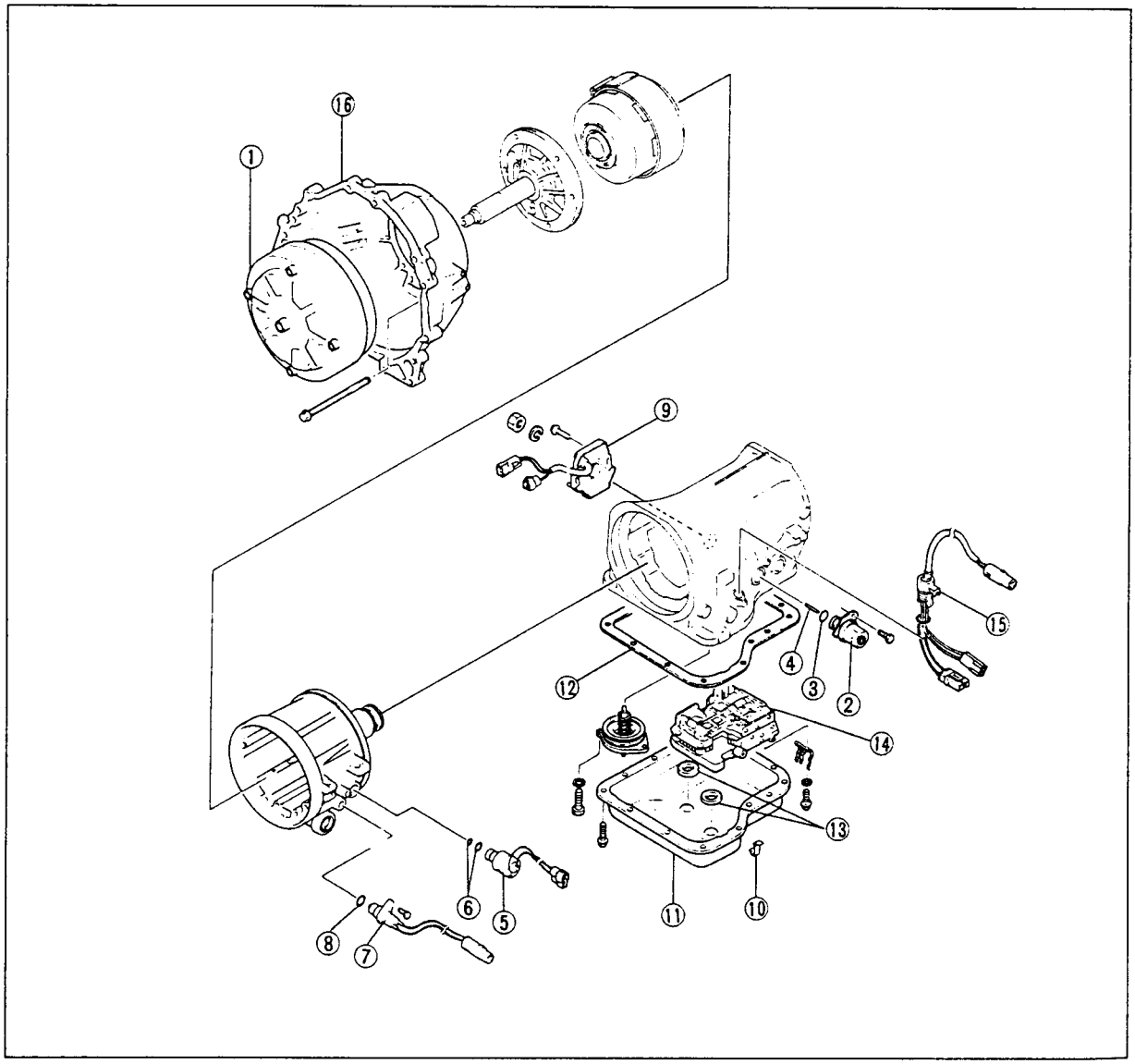


DISASSEMBLY

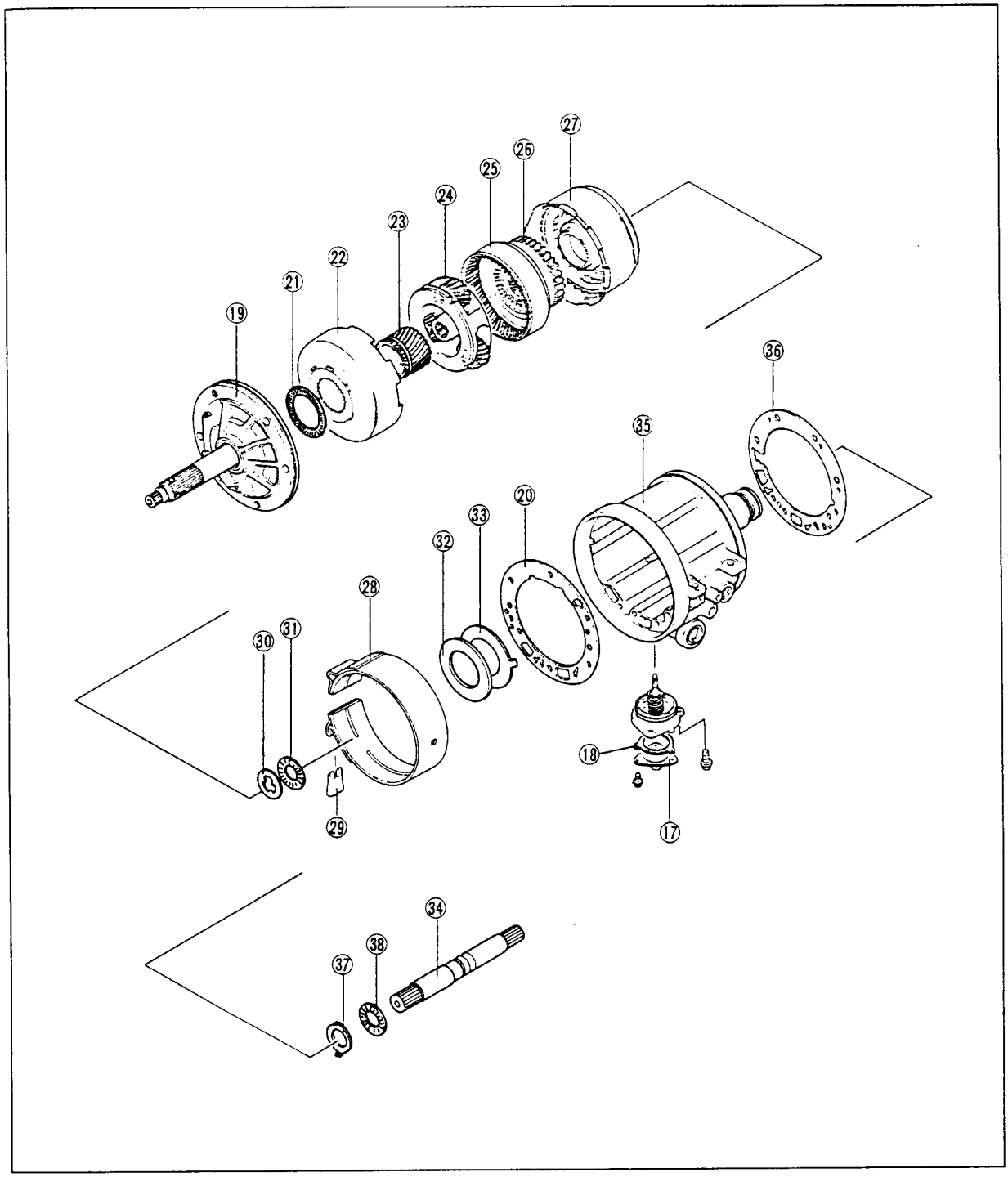
PRECAUTION

1. Disassemble the transmission in a clean area (dustproof workspace) to prevent dust entry into the mechanisms.
2. Clean the transmission exterior thoroughly with steam and/or cleaning solvents prior to disassembly.
3. Inspect the individual transmission components in accordance with the troubleshooting chart during disassembly.
4. Use only plastic hammers when applying force to separate the light alloy case joints.
5. During disassembly, never use rags which may leave particles that can clog fluid passages.

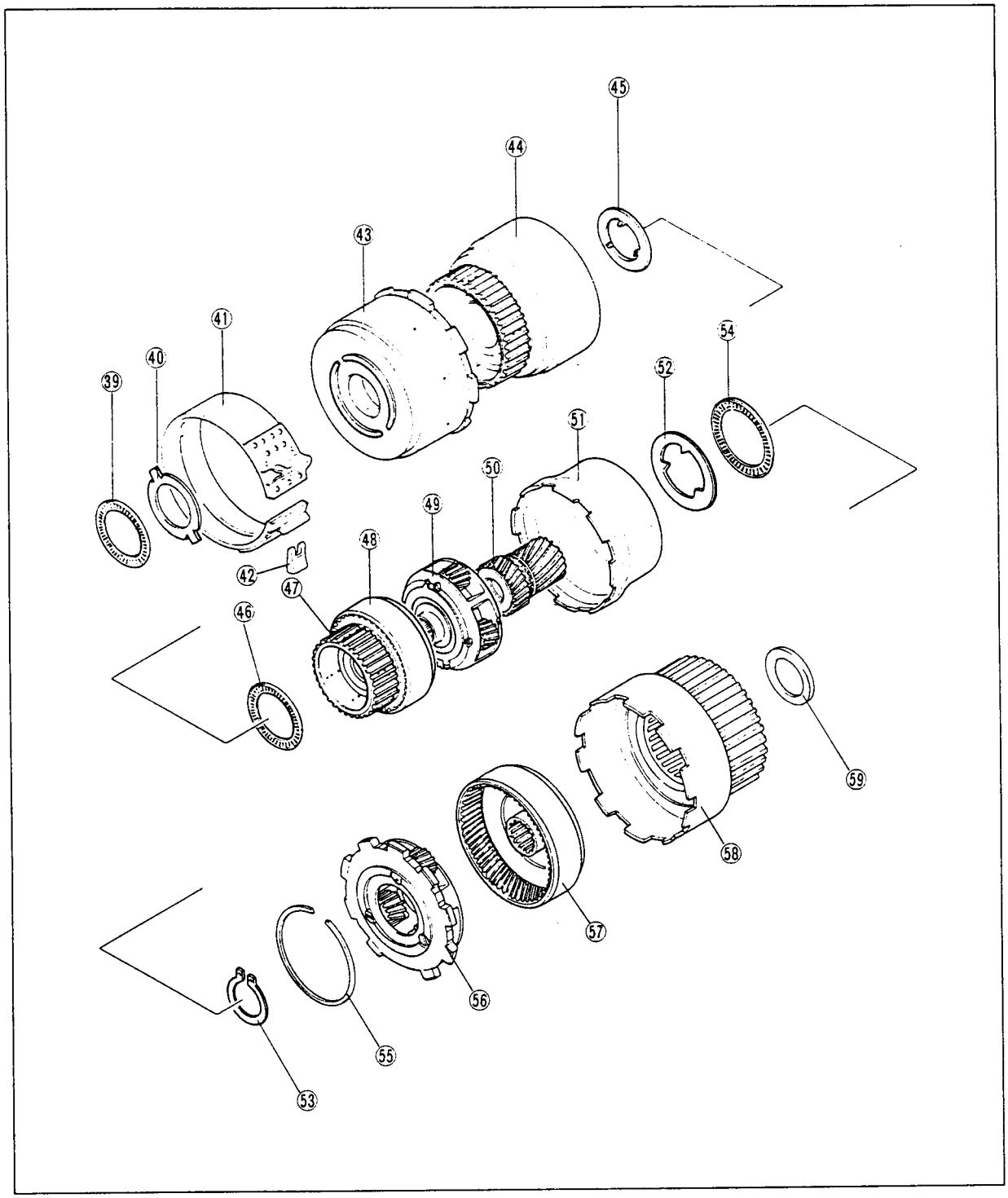
COMPONENTS



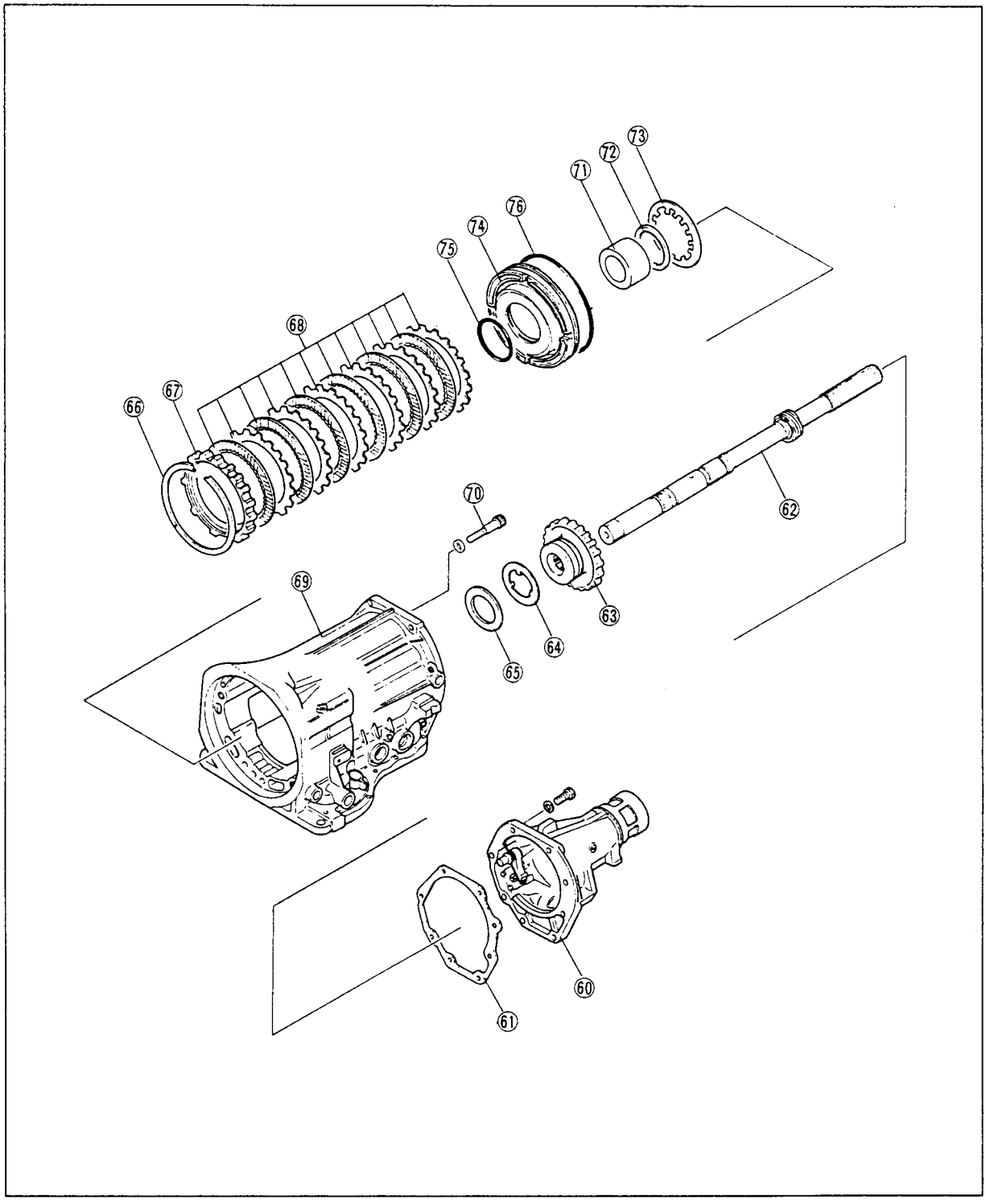
1. Torque converter
2. Vacuum diaphragm
3. O-ring
4. Vacuum diaphragm rod
5. Lockup control solenoid
6. O-ring
7. Turbine sensor
8. O-ring
9. Inhibitor switch
10. Bracket
11. Oil pan
12. Gasket
13. Magnet
14. Valve body assembly
15. Solenoid valve connector
16. Converter housing



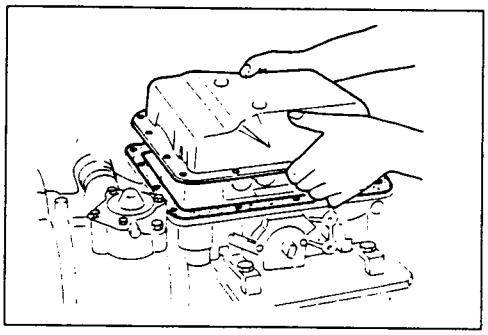
17. OD band servo cover
18. Gasket
19. Oil pump
20. Gasket
21. Bearing
22. Connecting shell
23. Sun gear
24. OD planetary pinion carrier
25. Internal gear
26. OD clutch hub
27. Direct clutch
28. OD brake band
29. Band strut
30. Bearing race
31. Bearing
32. Bearing
33. Bearing race
34. Intermediate shaft
35. OD case
36. Gasket
37. Bearing race
38. Bearing



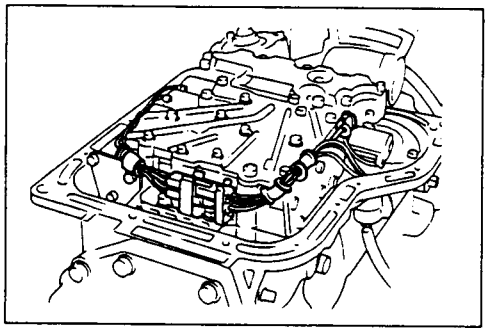
39. Bearing
40. Bearing race
41. 2nd brake band
42. Band strut
43. Front clutch
44. Rear clutch
45. Bearing race
46. Bearing
47. Rear clutch hub
48. Internal gear
49. Front planetary pinion carrier
50. Sun gear
51. Connecting shell
52. Bearing race
53. Snap ring
54. Bearing
55. Snap ring
56. Rear planetary pinion carrier
57. Internal gear
58. Connecting drum
59. Bearing



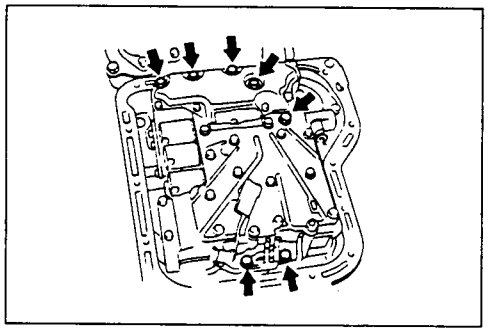
60. Extension housing
61. Gasket
62. Output shaft
63. Oil distributor
64. Bearing race
65. Bearing
66. Snap ring
67. Retaining plate
68. Drive plates and driven plates
69. Transmission case
70. Allen head bolts
71. One-way clutch inner race
72. Thrust washer
73. Return spring
74. Low and reverse brake piston
75. O-ring
76. Piston seal



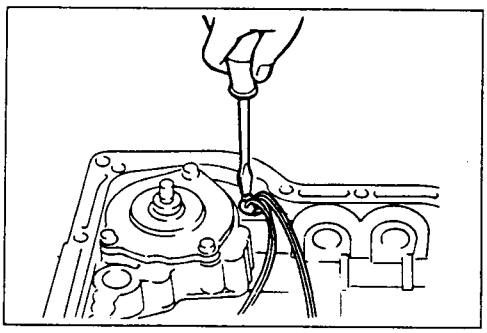
1. Remove the bolts and bracket.
2. Remove the oil pan and gasket.
3. Remove the magnets.



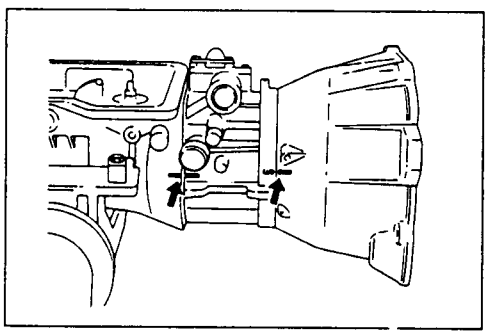
4. Disconnect the solenoid valve connectors.
5. Remove the harnesses from the bracket.



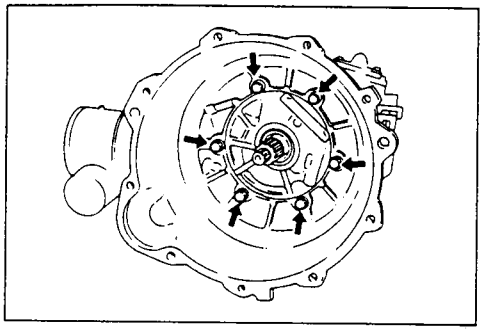
6. Remove the valve body assembly.



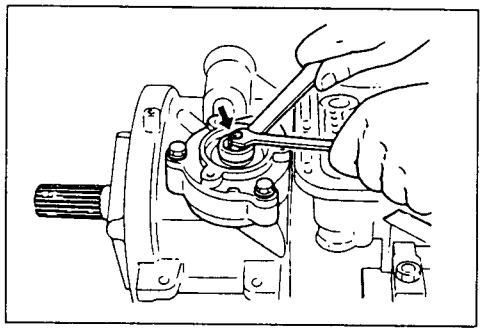
7. Remove the solenoid valve connector from the transmission case.



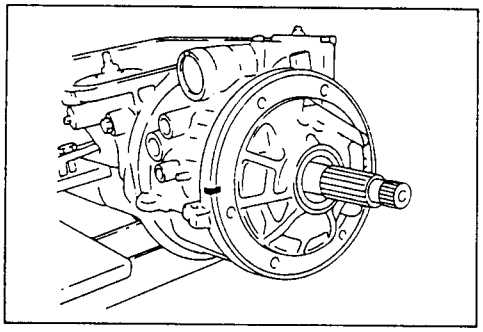
8. Put marks on the converter housing, OD case, and transmission case for proper reassembly.



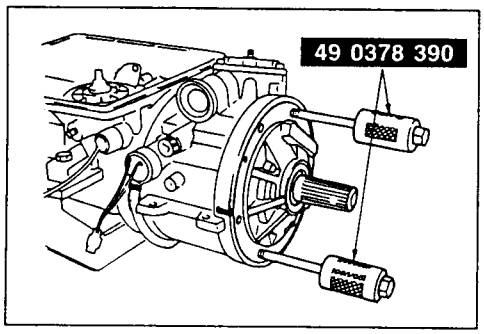
9. Remove the converter housing.



10. Remove the OD band servo cover and gasket.
11. Loosen the OD band servo locknut and tighten the piston stem.

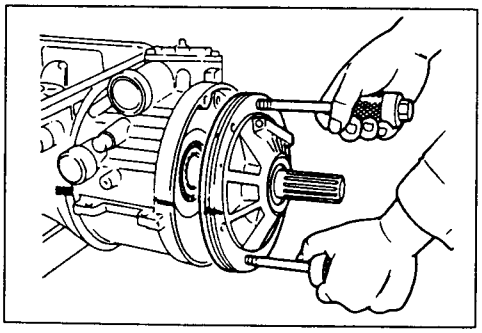


12. Put marks on the OD case and oil pump for proper reassembly.



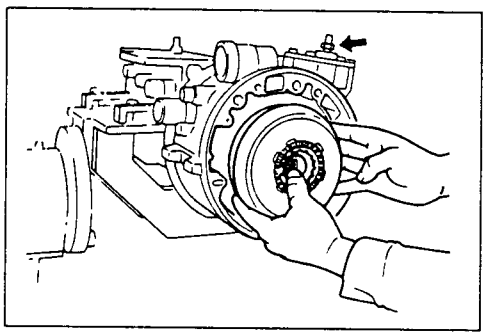
13. Screw the **SST** into the oil pump.

SST = SPECIAL SERVICE TOOL

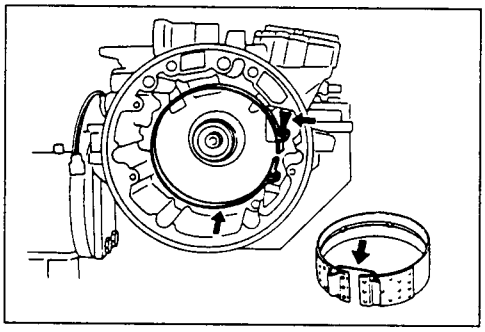


14. Slide the weights of the oil pump pullers to remove the oil pump; then remove the gasket.

Caution
Remove the oil pump gently to prevent the OD connecting shell, sun gear, and planetary pinion carrier from falling out.

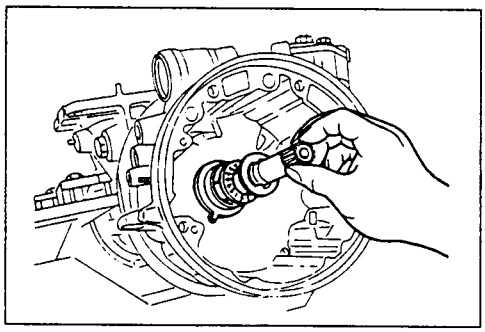


15. Loosen the piston stem of the OD band servo.
16. Remove the bearings and direct clutch assembly (connecting shell, sun gear, OD planetary pinion carrier, internal gear, OD clutch hub, and direct clutch).

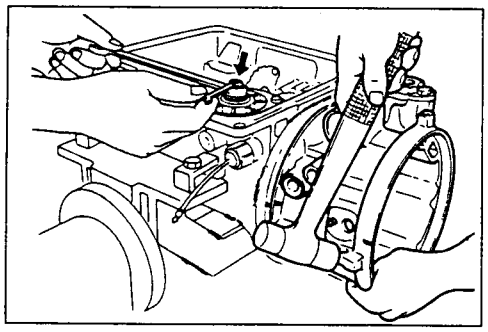


17. Remove the OD brake band and band strut.

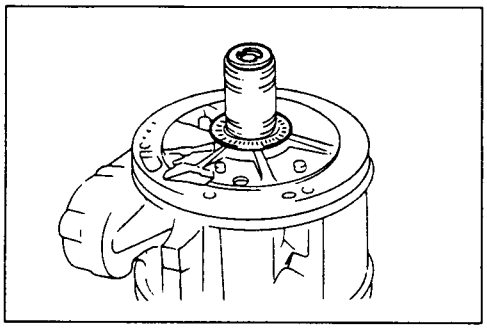
Caution
To prevent the brake lining from cracking or peeling, do not stretch the OD brake band. Secure it with a wire clip.



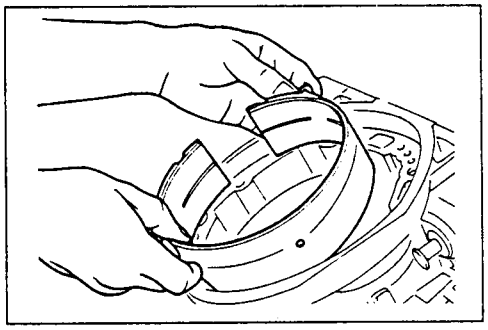
18. Remove the bearing races and bearing.
19. Remove the intermediate shaft.



20. Loosen the 2nd band servo locknut and tighten the piston stem.
21. Separate the OD case from the transmission case by tapping it lightly with a plastic hammer.
22. Remove the gasket.

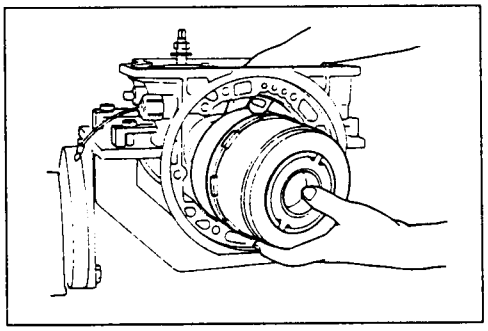


23. Remove the bearing race and bearings.



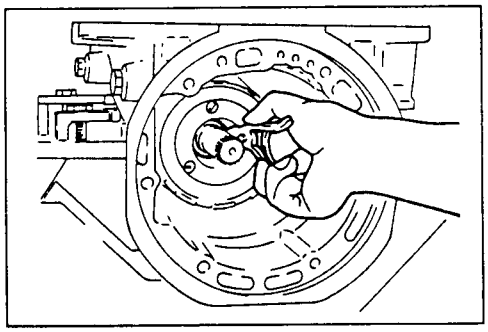
24. Loosen the piston stem of the 2nd band servo.
25. Remove the 2nd brake band and band strut.

Caution
To prevent the brake lining from cracking or peeling, do no stretch the 2nd band brake. Secure it with a wire clip.

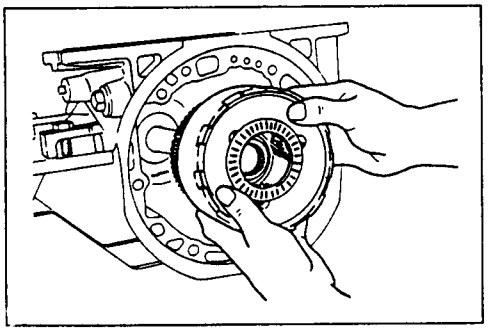


26. Remove the front clutch, rear clutch, rear clutch hub, front planetary pinion carrier, connecting shell, internal gear, bearing races, bearing, and sun gear as a unit.

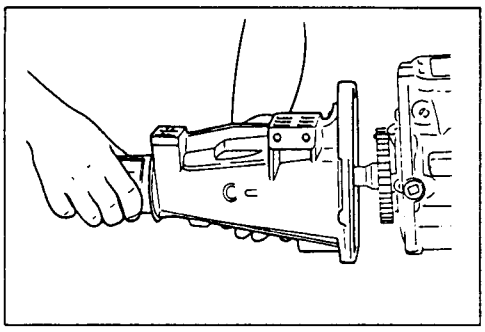
Note
After the unit is removed, it should be disassembled and arranged to prepare for inspection and repair.



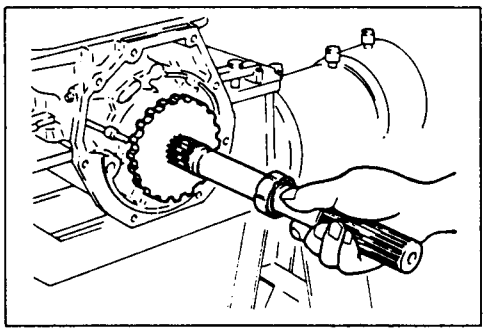
27. Remove the snap ring from the output shaft with snap-ring pliers.



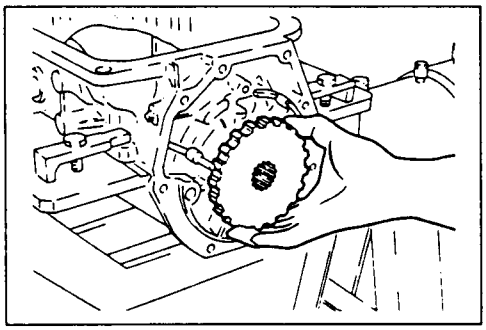
28. Remove the connecting drum, rear planetary pinion carrier, internal gear, and bearings as a unit.



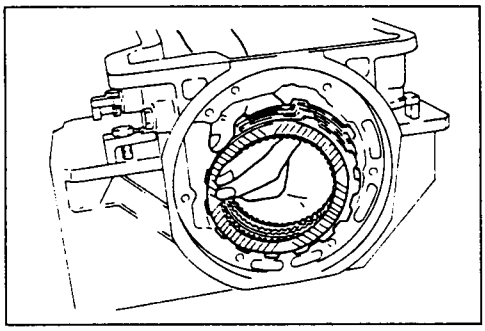
29. Remove the rear extension housing and gasket.



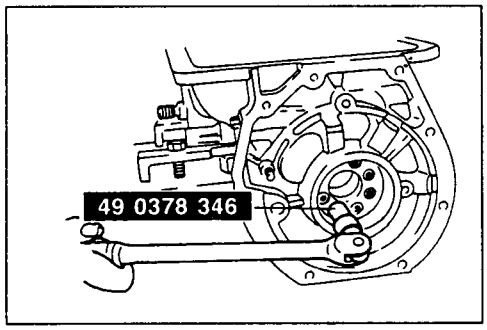
30. Pull out the output shaft.



31. Remove the oil distributor.
32. Remove the bearing race and bearing.

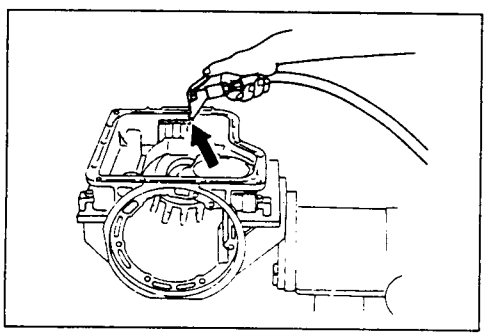


33. Remove the snap ring from the low and reverse brake with a screwdriver.
34. Remove the retaining plate, drive plates, and driven plates.

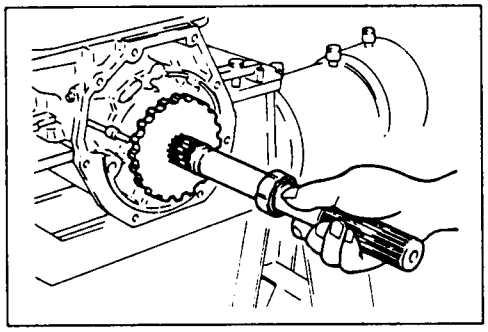


35. Remove the allen head bolts from the rear of the transmission case with the **SST**.
Remove the one-way clutch inner race, thrust washer, and piston return spring.

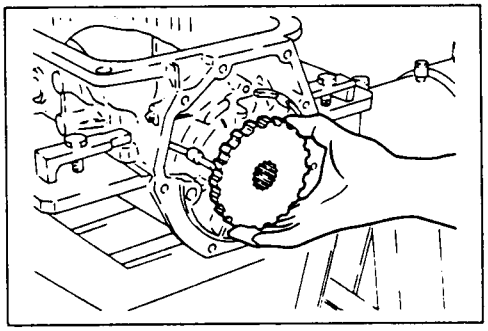
SST = SPECIAL SERVICE TOOL



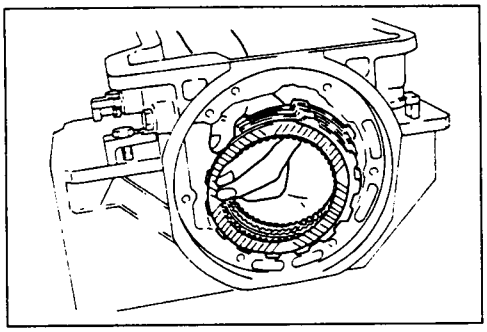
36. Apply compressed air to the oil passage as illustrated in the figure, and remove the low and reverse brake piston. Remove the O-ring and piston seal.



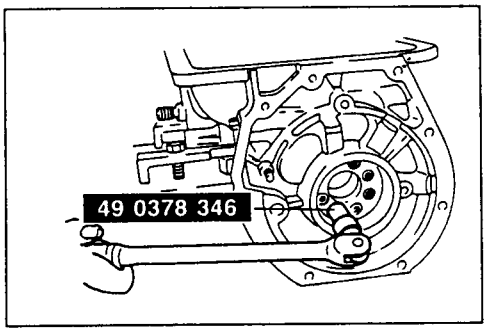
30. Pull out the output shaft.



31. Remove the oil distributor.
32. Remove the bearing race and bearing.

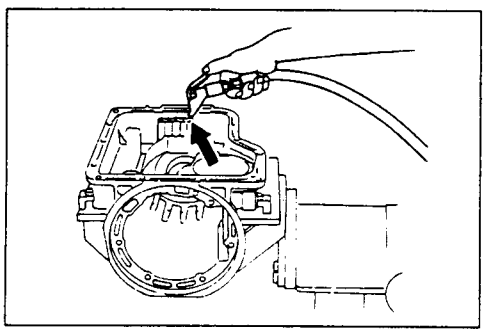


33. Remove the snap ring from the low and reverse brake with a screwdriver.
34. Remove the retaining plate, drive plates, and driven plates.

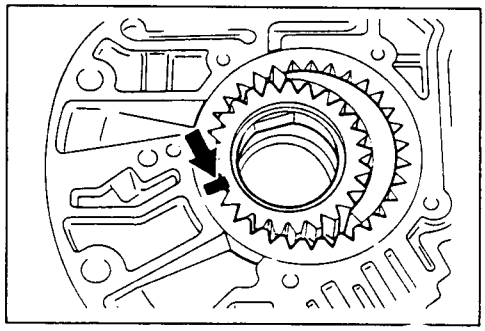


35. Remove the allen head bolts from the rear of the transmission case with the **SST**.
Remove the one-way clutch inner race, thrust washer, and piston return spring.

SST = SPECIAL SERVICE TOOL

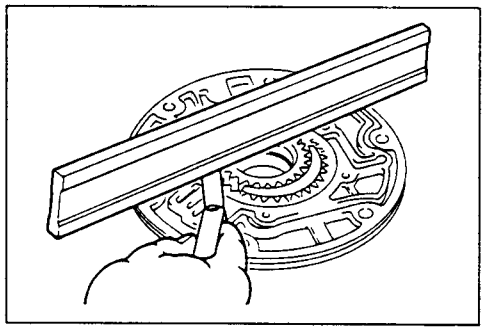


36. Apply compressed air to the oil passage as illustrated in the figure, and remove the low and reverse brake piston. Remove the O-ring and piston seal.



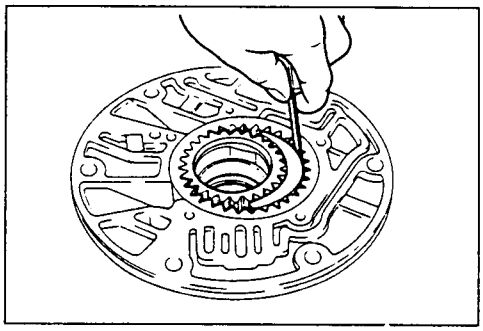
Inner gear and outer gear
Mark the inner and outer gear positions and remove the gears from the housing.

Caution
Do not use a punch to mark the gears.



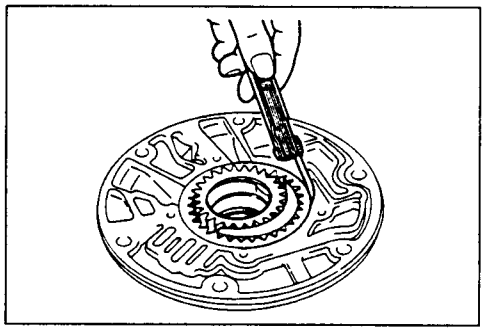
Inspection
Inspect the following parts and replace if necessary.
1. Clearance between gears and pump cover.

Standard clearance:
0.02—0.04 mm (0.0008—0.0016 in)
Maximum: 0.08 mm (0.0031 in)



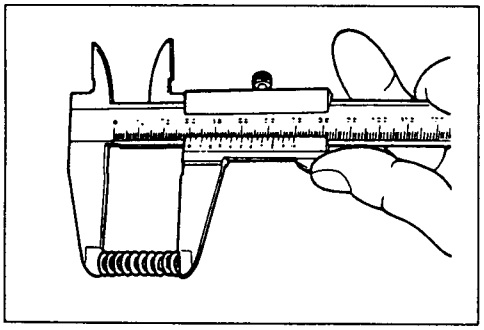
2. Clearance between outer gear teeth tip and crescent.

Standard clearance:
0.14—0.21 mm (0.0055—0.0083 in)
Maximum: 0.25 mm (0.0098 in)



3. Side clearance between outer gear and housing.

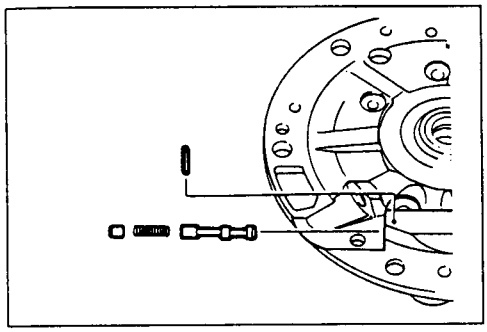
Standard clearance:
0.05—0.20 mm (0.0020—0.0079 in)
Maximum: 0.25 mm (0.0098 in)



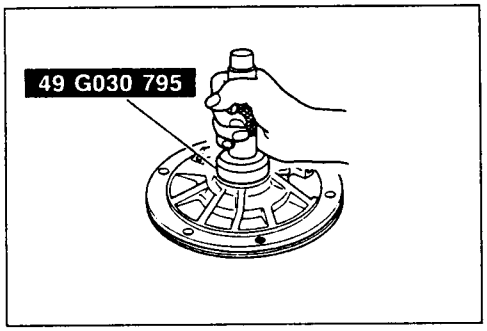
4. Weakening of spring tension.

Free spring length: 25.7 mm (1.01 in)

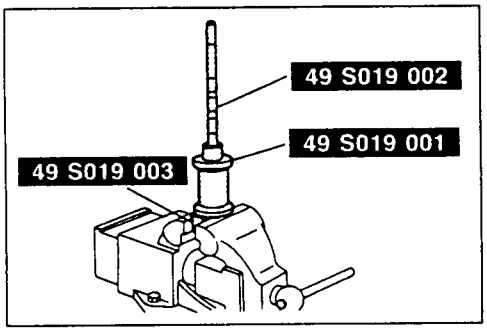
5. Damage of lockup control valve.



Assembly
1. Install the lockup control valve, spring, and plug.
2. Tap in the roll pin.

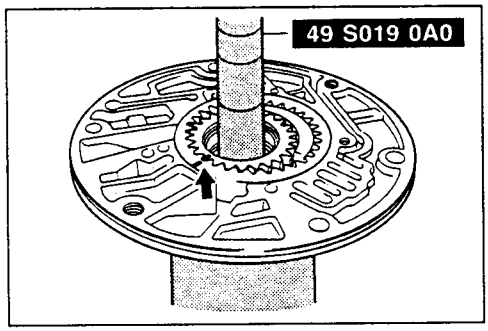


3. Install a new oil seal with the **SST**.

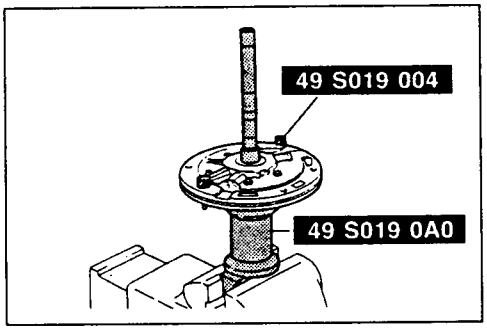


4. Assemble the **SST** and secure it in a vise.

Note
Use protective plates to prevent damage to the SST.

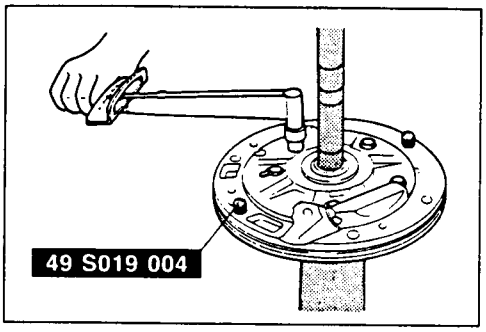


5. Place a new O-ring in the pump cover.
6. Set the pump housing on the **SST**.
7. Install the inner and outer gears in the pump housing with their matching marks toward the pump cover.

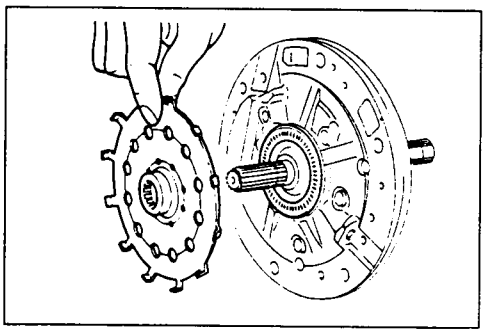


8. Set the pump cover on the **SST**.
9. Install the **SST** (pins).

SST = SPECIAL SERVICE TOOL

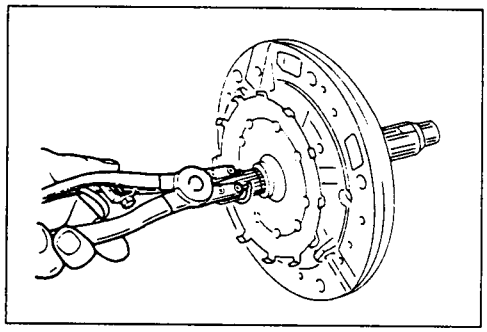


10. Tighten the installation bolts and remove the **SST** (pins).
SST = SPECIAL SERVICE TOOL
Tightening torque:
5.9—7.8 N·m (60—80 cm-kg, 52—69 in-lb)

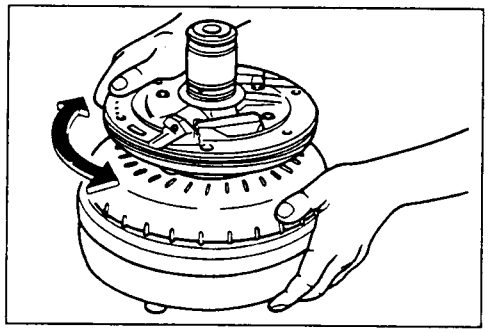


11. Install a new O-ring on the input shaft.
12. Install the bearing and sensing rotor.

Bearing outer diameter: 69.9 mm (2.75 in)

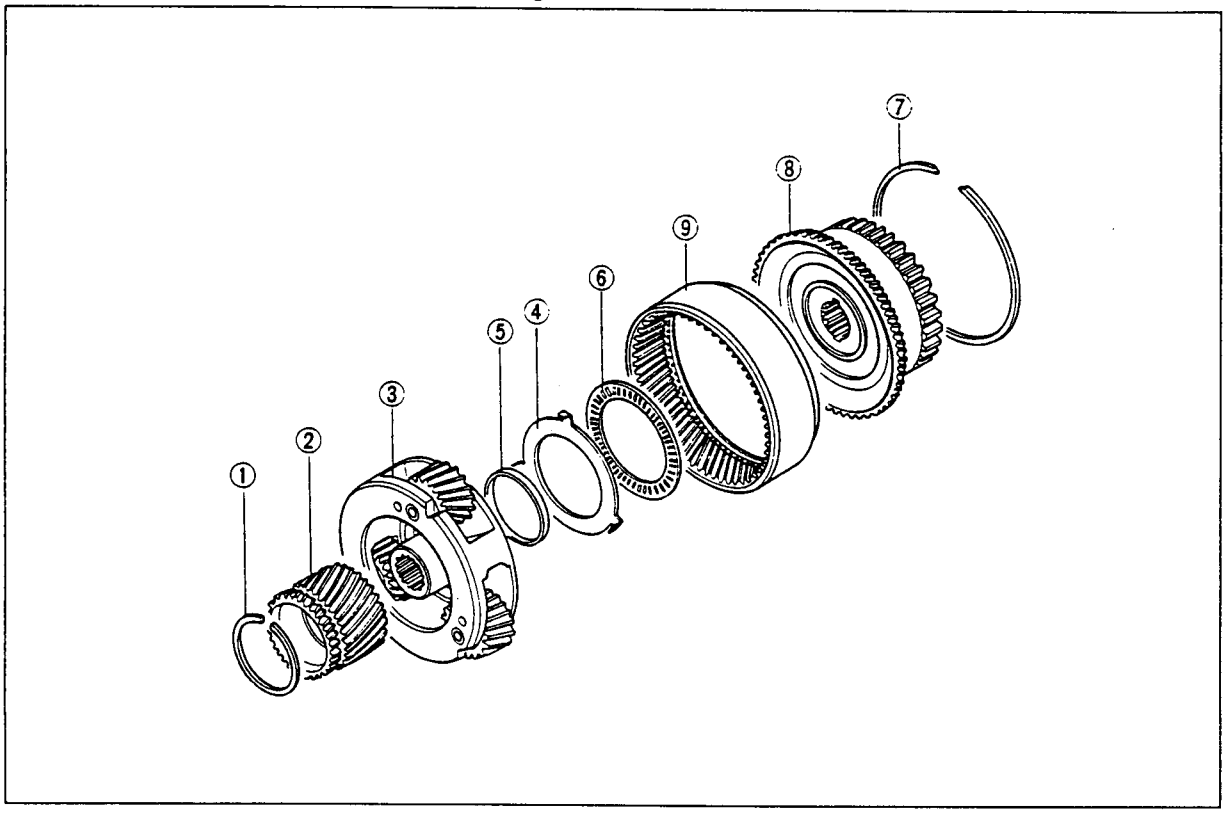


13. Install the snap ring on the input shaft with snap-ring pliers.

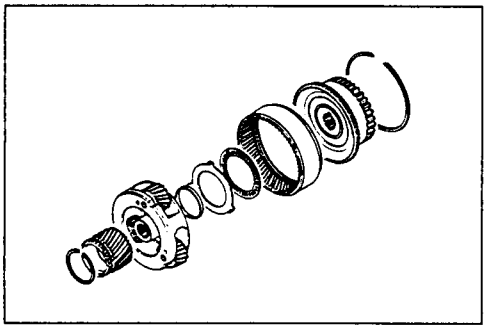


14. Set the oil pump on the torque converter, and check that the gears turn smoothly.

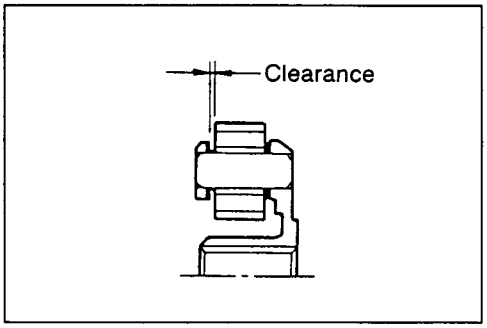
OD PLANETARY GEAR UNIT (OD PLANETARY PINION CARRIER, OD CLUTCH HUB)
Disassembly
Disassemble in the sequence shown in the figure.



1. Snap ring
2. Sun gear
3. OD planetary pinion carrier
4. Bearing race
5. Seal sleeve
6. Bearing
7. Snap ring
8. OD clutch hub
9. Internal gear

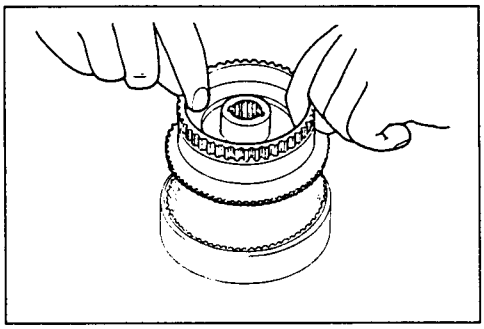


Inspection
Inspect the following parts and replace if necessary.
1. Fracture and wear of snap ring
2. Wear of individual gears
3. Rotation of front carrier pinion gear
4. Rotation and damage or wear of bearing

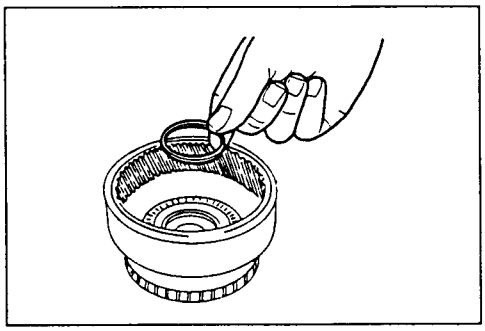


5. Clearance between pinion washer and planetary pinion carrier

Standard clearance:
0.2—0.7 mm (0.008—0.028 in)
Maximum: 0.8 mm (0.031 in)



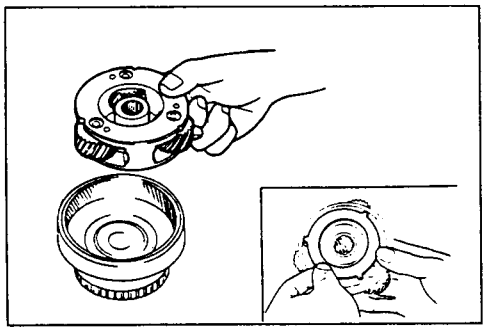
Assembly
1. Install the OD clutch hub in the internal gear.
2. Install the snap ring.



3. Install the bearing.

Bearing outer diameter: 69.9 mm (2.75 in)

4. Install a new seal sleeve in the OD clutch hub.

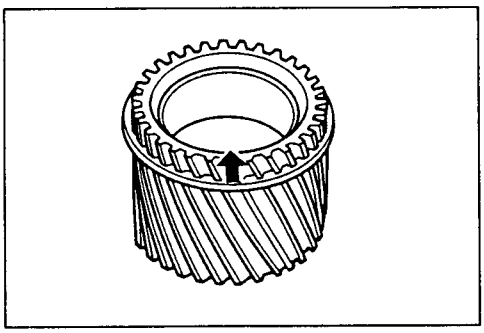


5. Install the bearing race in the OD planetary pinion carrier.

Bearing race outer diameter: 70.0 mm (2.76 in)

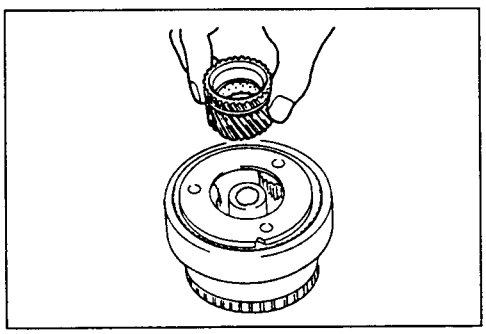
Note
Affix the bearing race with petroleum jelly.

6. Install the OD planetary pinion carrier in the internal gear.



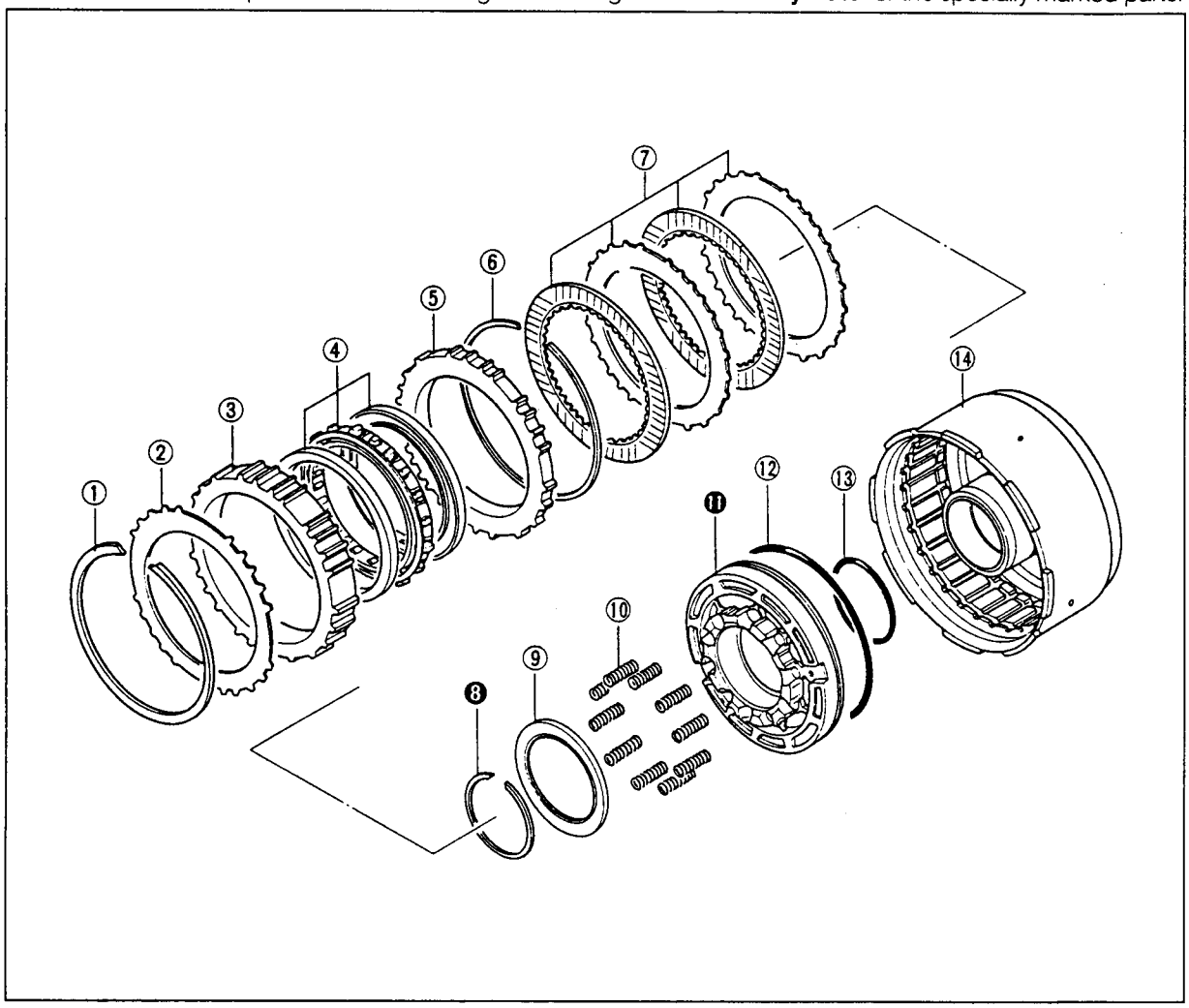
7. Install the snap ring on the sun gear.

Note
Pay close attention to the front and rear direction of the sun gear. The grooved side (arrow) is the front.

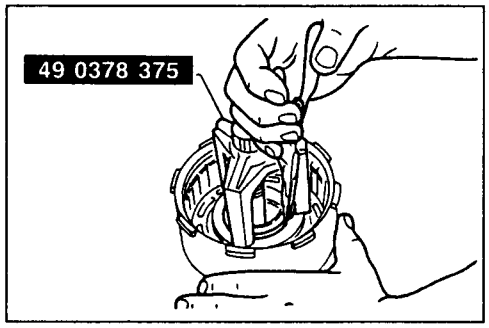


8. Install the sun gear in the OD planetary pinion carrier.

DIRECT CLUTCH
Disassembly
Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked parts.

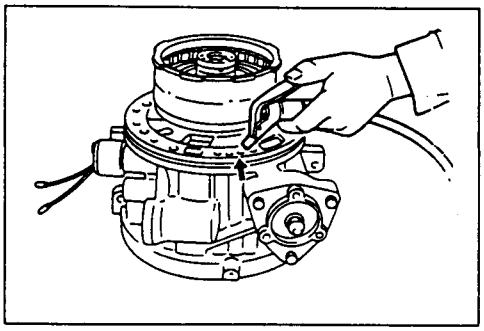


1. Snap ring
2. Side plate
3. Outer race
4. One-way clutch
5. Retaining plate
6. Snap ring
7. Drive plates and driven plates
8. Snap ring
9. Spring retainer
10. Spring
11. Piston
12. Seal ring
13. O-ring
14. Direct clutch drum



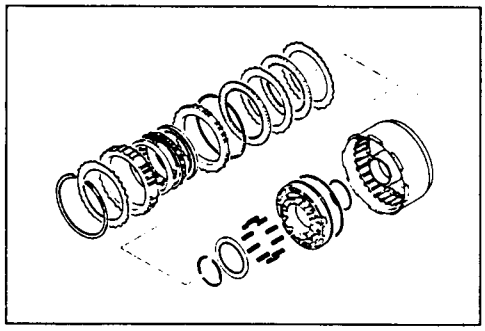
Disassembly note
Snap ring
1. Compress the spring with the **SST**, then remove the snap-ring with snap-ring pliers.
2. Remove the spring retainer and spring.

SST = SPECIAL SERVICE TOOL



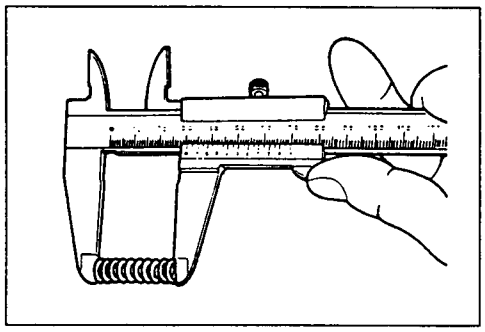
Piston
1. Set the direct clutch drum on the drum support.
2. Remove the piston by applying compressed air to the oil passage.

Air pressure: 392 kPa (4.0 kg/cm^2, 57 psi) max.



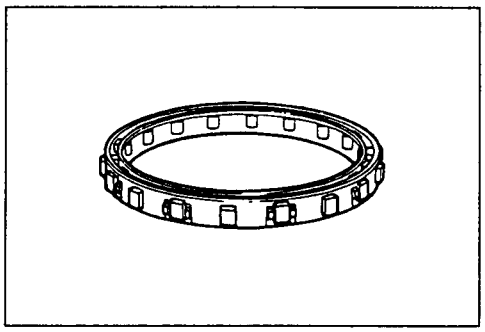
Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of drive plate facing
2. Fracture or wear of snap ring
3. Spring retainer deformation
4. Check ball stuck in piston

Note
Check that the ball is free by shaking the piston.

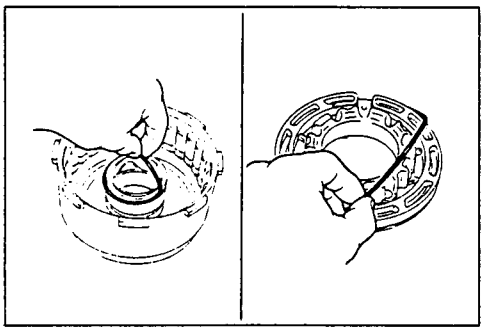


5. Spring fracture
6. Weakening of spring tension

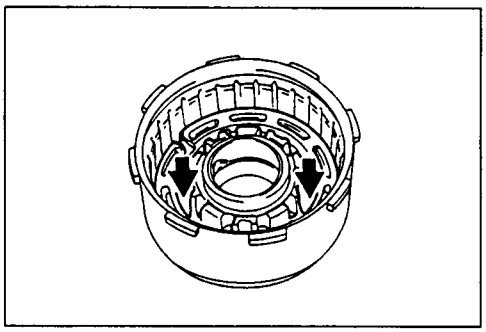
Free spring length: 30.5 mm (1.20 in)



7. Wear of one-way clutch

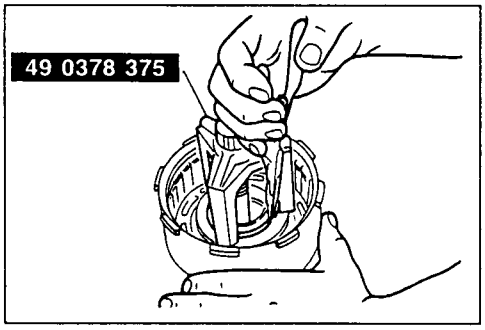


Assembly
1. Appy ATF to the O-ring and install it in the direct clutch drum.
2. Apply ATF to the seal ring and install it onto the piston.

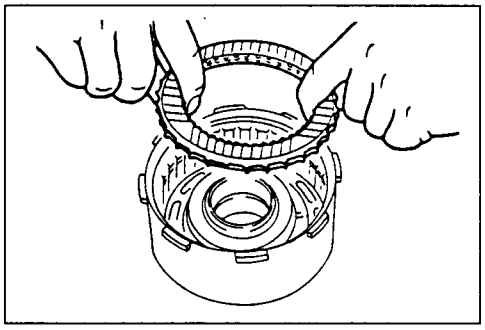


3. Install the piston in the direct clutch drum.

Caution
Apply even pressure to the perimeter of the piston to avoid damaging the seal rings when installing.



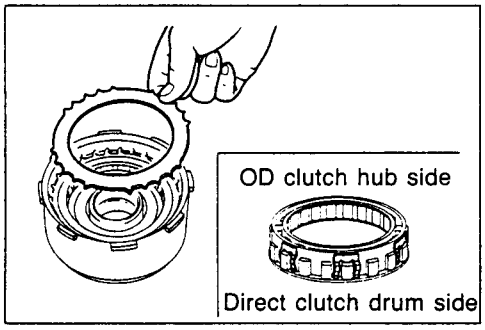
4. Install the springs and spring retainer and compress them with the **SST**. **SST = SPECIAL SERVICE TOOL**
5. Install the snap ring.



6. Install the driven plates and drive plates.

Note
Installation order:
Driven-Drive-Driven-Drive

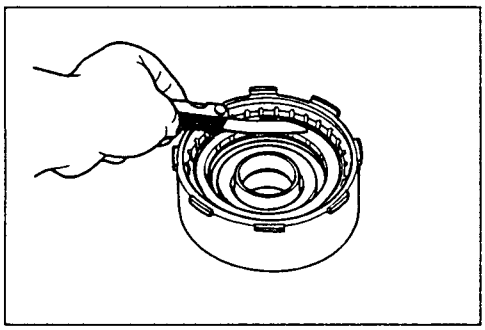
7. Install the snap ring.



8. Install the retaining plate, one-way clutch, outer race, and side plate.

Caution
a) Check that the spring cage of the one-way clutch faces toward the direct clutch drum.
b) Align the flats of the retaining plate and outer race with the lubrication hole of the clutch drum, then set them in the drum.

9. Install the snap ring.



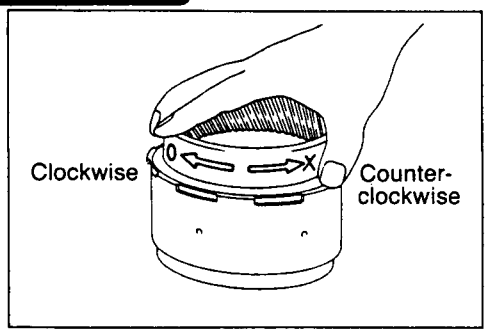
10. Measure the clearance between the side plate and snap ring with a feeler gauge. Adjust the clearance by installing the correct side plate.

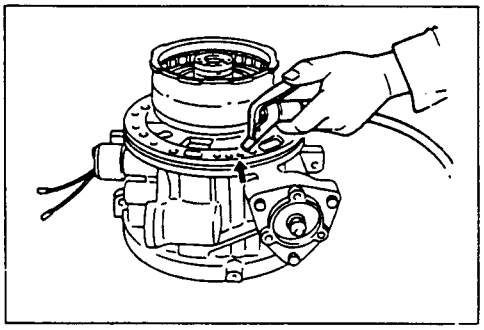
Clearance:
Maximum: 0.2 mm (0.008 in)

Side plate sizes

mm (in)

0.4 (0.016)	0.6 (0.024)	0.8 (0.031)
1.0 (0.039)	1.2 (0.047)	





11. Insert the direct clutch hub on the top of the direct clutch.
12. Check the one-way clutch operation by turning to right and left.

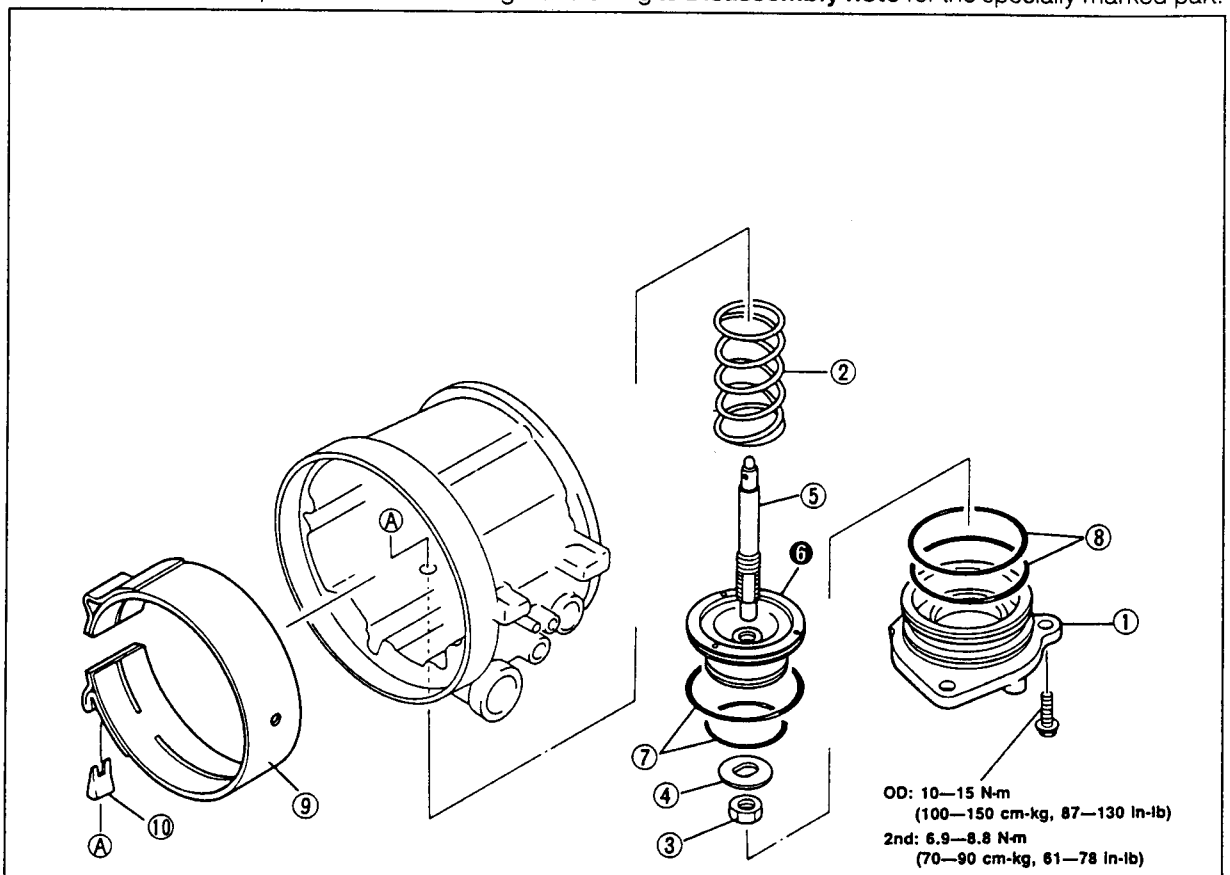
Note
The direct clutch hub should turn clockwise only. If it turns counterclockwise, the one-way clutch is reversely installed.

13. Set the direct clutch on the drum support. Apply compressed air to the oil passage, and check the clutch operation. **Air pressure:**
392 kPa (4.0 kg/cm^2, 57 psi) max.

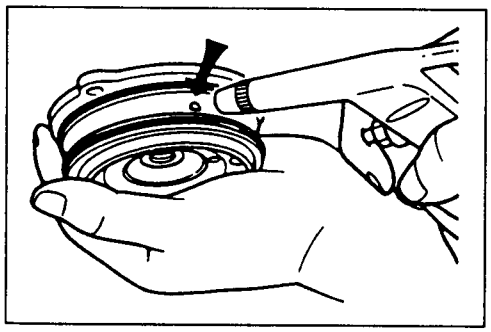
Caution
Apply air for no more than 3 seconds.

OD AND 2ND BAND SERVO

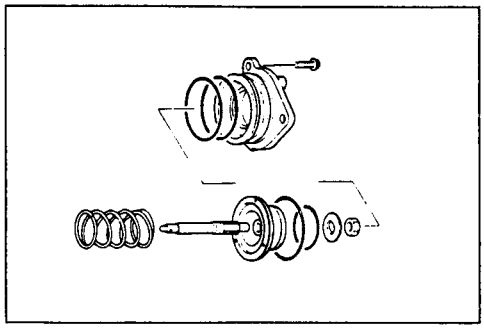
Disassembly
Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked part.



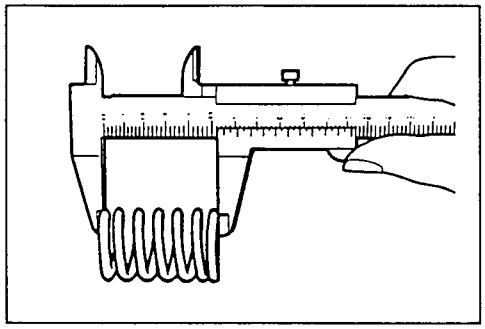
1. Body
2. Return spring
3. Nut
4. Washer
5. Piston stem
6. Piston assembly
7. Piston seal
8. O-ring
9. Brake band
10. Band strut



Disassembly note
Piston assembly
Remove the piston assembly from the body by applying compressed air to the oil passage hole.

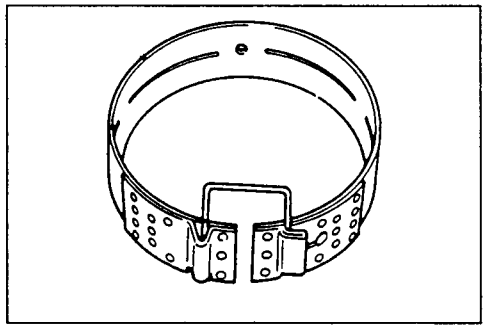


Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of piston stem
2. Damage or wear of piston assembly and body

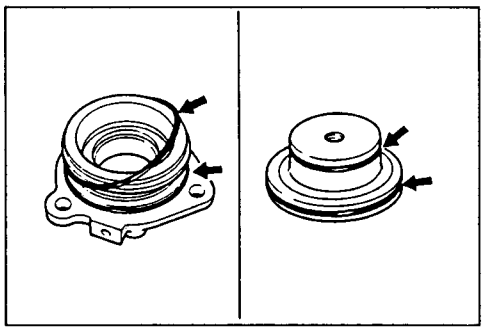


3. Weakening of return spring tension

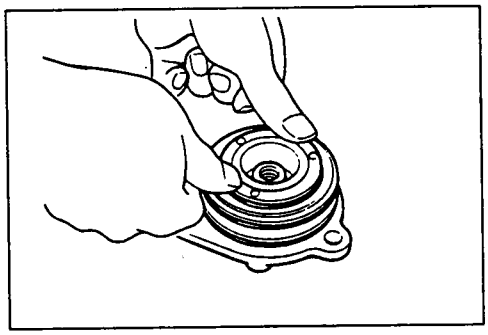
Free spring length:
OD: 48.0 mm (1.89 in)
2nd: 35.0 mm (1.38 in)



4. Cracking or peeling of brake band facing

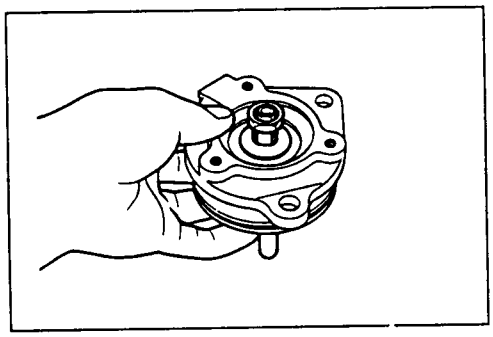


Assembly
1. Apply ATF to the O-ring and install them onto the body.
2. Apply ATF to the piston seals and install them onto the piston assembly.

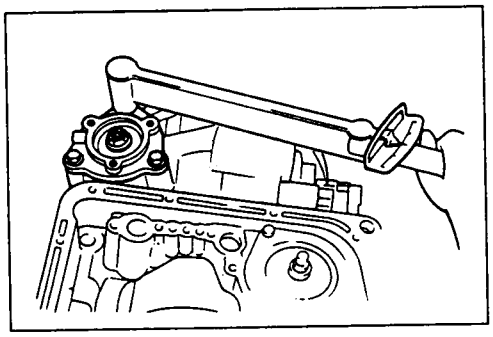


3. Press the piston assembly in the body.

Caution
Apply even pressure to the perimeter of the piston to avoid damaging the seal rings when installing.



4. Install the piston stem and washer.
5. Loosely tighten the nut.



6. Install the return spring.
7. Install the piston assembly and body.

Caution
Apply even pressure to the perimeter of the body to avoid damaging the O-ring when installing.

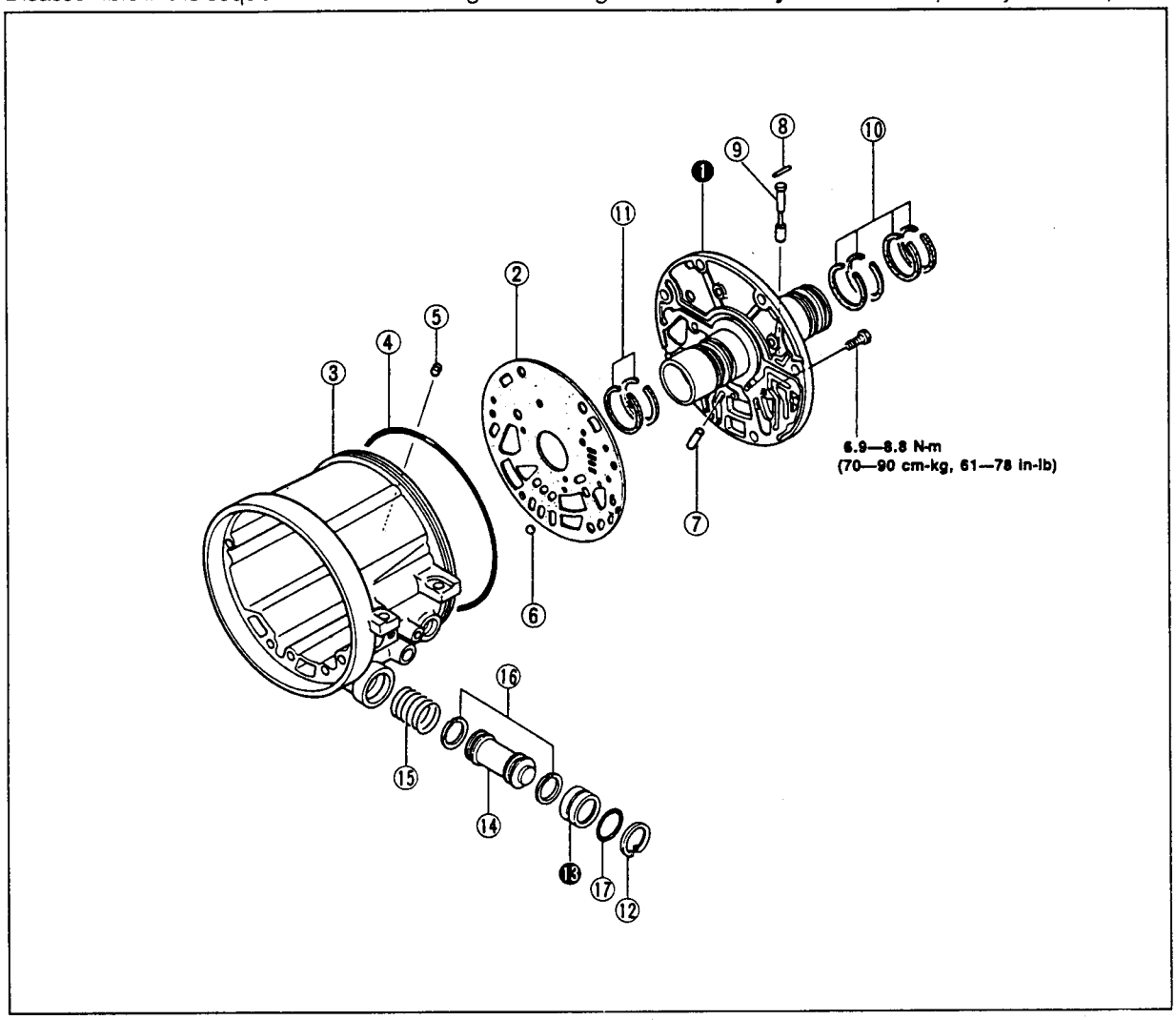
8. Tighten the bolts.

Tightening torque:
OD band servo:
9.8—15 N·m (1.0—1.5 m-kg, 7.2—11 ft-lb)
2nd band servo:
6.9—8.8 N·m (70—90 cm-kg, 61—78 in-lb)

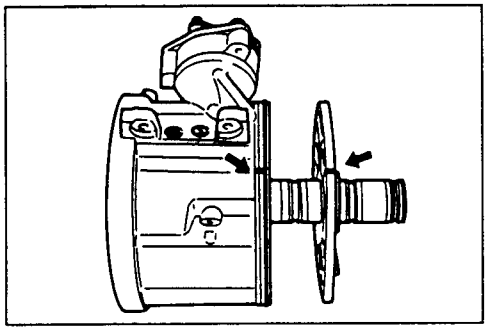
DRUM SUPPORT, ACCUMULATOR, OD CASE

Disassembly

Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked parts.



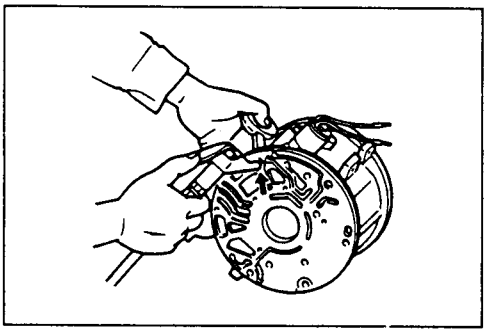
1. Drum support
2. Gasket
3. OD case
4. Seal ring
5. One-way valve
6. Steel ball
7. Plug
8. Roll pin
9. Plug
10. Seal ring
11. Seal ring
12. Snap ring
13. Accumulator plug
14. Accumulator piston
15. Spring
16. Seal ring
17. O-ring



Disassembly note

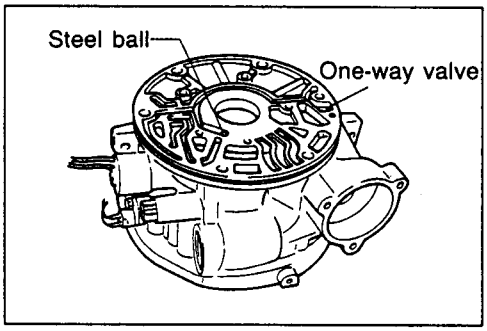
Drum support

Make matching marks on the OD case and drum support for proper reassembly, then remove the drum support.

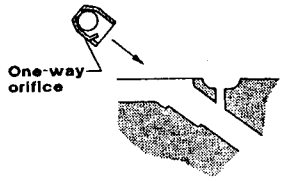


Accumulator plug
1. Clean the oil passage with compressed air.
2. Remove the accumulator piston and spring.

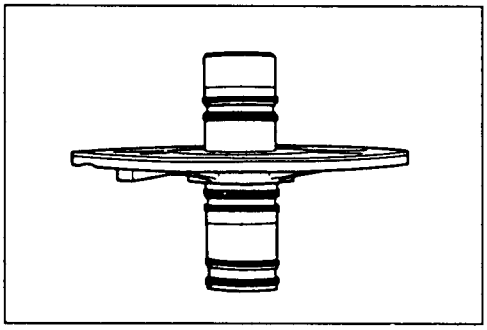
Warning
Apply compressed air gradually to prevent residual oil from flying out with force.



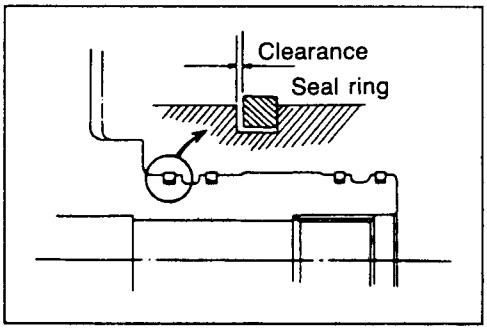
Inspection
Drum support
Inspect the following parts and replace if necessary.
1. Cracks in case
2. Damage to oil passages
3. Damage to gasket
4. Damage to plug
5. Check ball stuck in OD case



Note
Check that the ball is free by shaking the OD case.

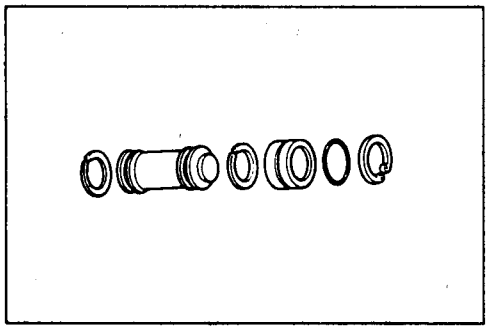


6. Fracture or wear of drum support seal rings

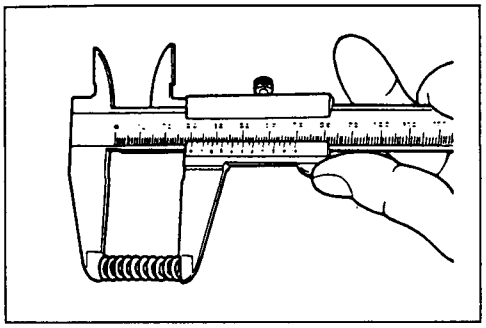


7. Clearance between seal ring and seal ring groove

Standard clearance:
0.04—0.16 mm (0.0016—0.0063 in)
Maximum: 0.40 mm (0.0157 in)

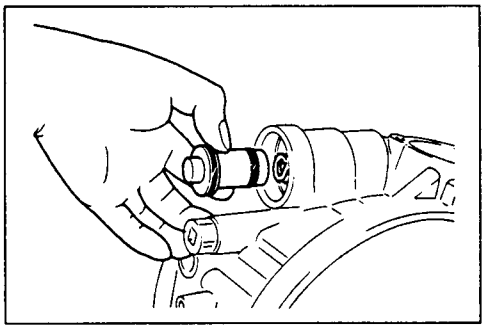


Accumulator
Inspect the following parts and replace if necessary.
1. Damage or wear of piston
2. Fracture or wear of snap ring
3. Damage to seal rings



4. Weakening of return spring tension.

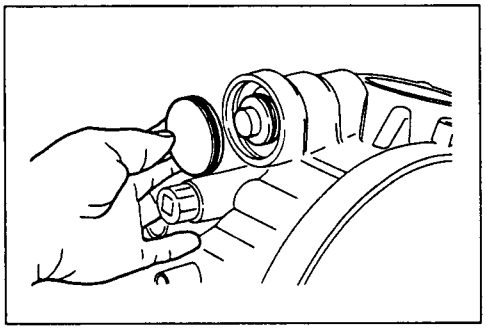
Free spring length: 40.4 mm (1.59 in)



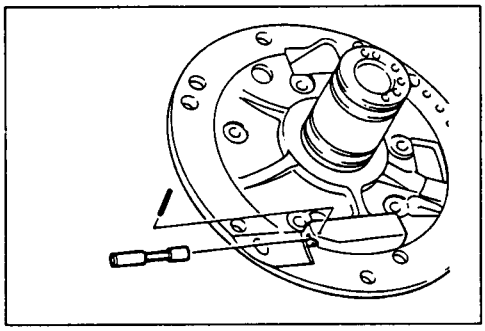
Assembly

1. Apply ATF to the seal rings and install them onto the accumulator piston.
2. Install the spring and accumulator piston.

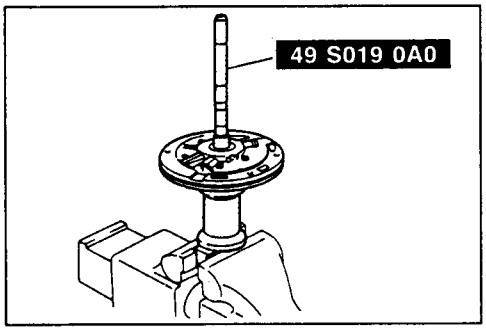
Caution
Apply even pressure to the perimeter of the piston to avoid damaging the seal rings when installing.



3. Apply ATF to the O-ring and install it onto the accumulator plug.
4. Install the accumulator plug and snap ring.
5. Check the accumulator operation by applying compressed air to the oil passage.



6. Install the plug.
7. Tap in the roll pin.

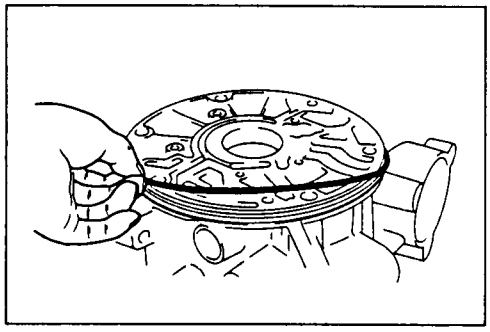


8. Set the oil pump on the **SST**.

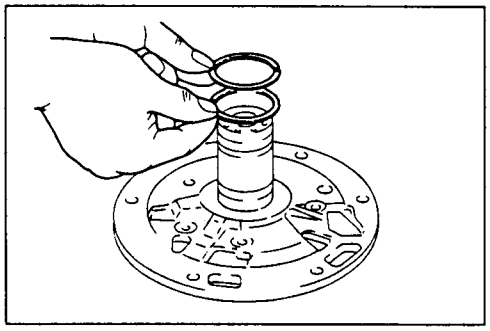
Note
Use protective plates to prevent damage to the SST.

9. Mount the OD case on the oil pump.

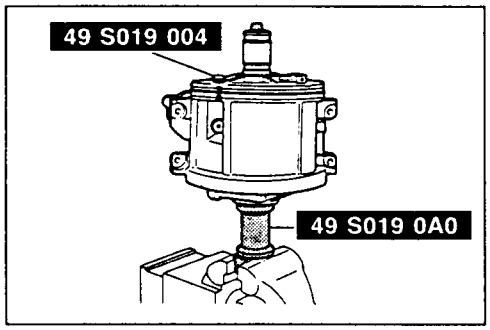
SST = SPECIAL SERVICE TOOL



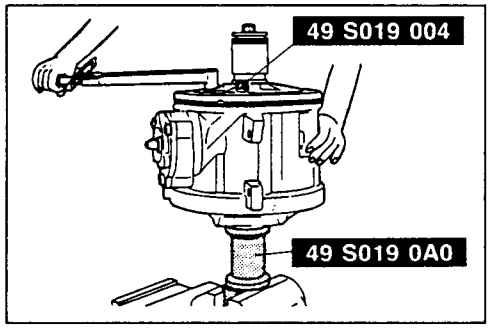
10. Apply ATF to the seal ring and install it onto the OD case.



11. Install the one-way valve and steel ball.
12. Apply ATF to the seal rings and install them onto the drum support.

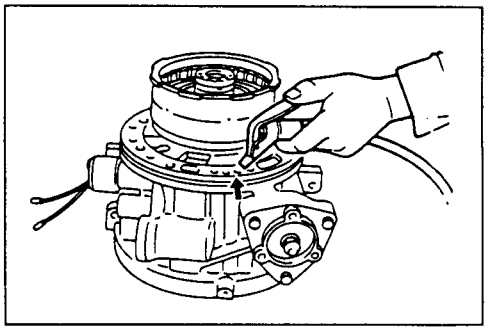


13. Install the drum support on the OD case and align the matching marks.
14. Install the **SST** (pins). **SST = SPECIAL SERVICE TOOL**



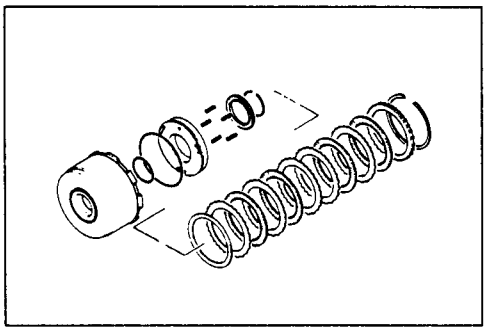
15. Tighten the drum support mounting bolts and remove the pins.

Tightening torque:
6.9—8.8 N·m (70—90 cm-kg, 61—78 in-lb)



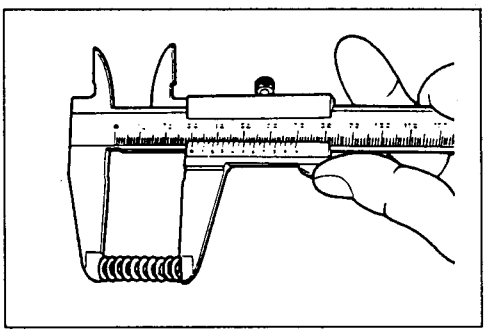
Piston
1. Set the front clutch drum on the drum support.
2. Remove the piston by applying compressed air to the oil passage.

Air pressure:
392 kPa (4.0 kg/cm^2, 57 psi) max.



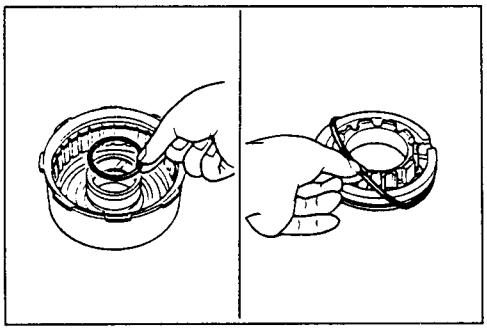
Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of drive plate facing
2. Fracture or wear of snap ring
3. Spring retainer deformation
4. Check ball stuck in piston

Note
Check that the ball is free by shaking the piston.

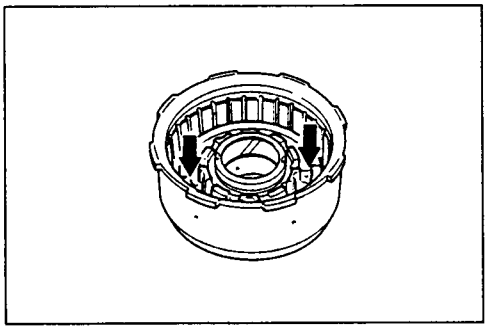


5. Fracture of spring
6. Weakening of return spring tension

Free spring length: 30.5 mm (1.20 in)

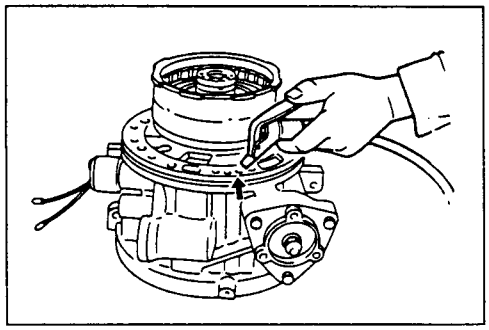


Assembly
1. Apply ATF to the O-ring and install it in the front clutch drum.
2. Apply ATF to the seal ring and install it onto the piston.



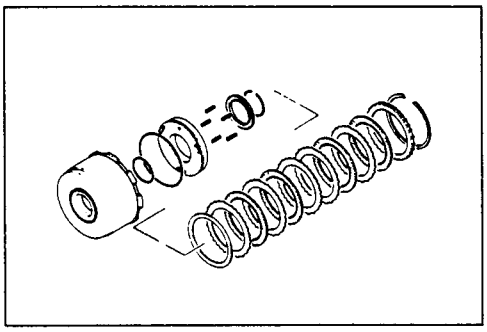
3. Install the piston in the front clutch drum.

Caution
Apply even pressure to the perimeter of the piston to avoid damaging the seal rings when installing.



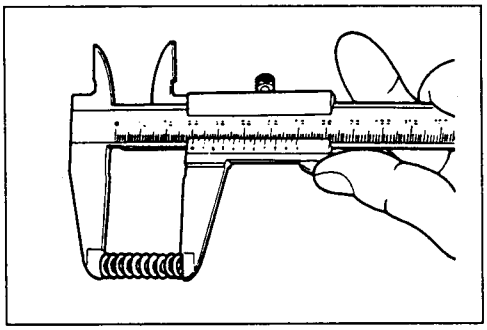
Piston
1. Set the front clutch drum on the drum support.
2. Remove the piston by applying compressed air to the oil passage.

Air pressure:
392 kPa (4.0 kg/cm^2, 57 psi) max.



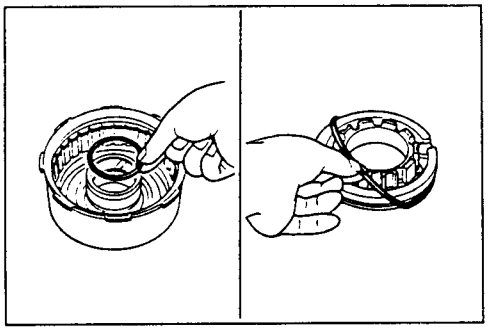
Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of drive plate facing
2. Fracture or wear of snap ring
3. Spring retainer deformation
4. Check ball stuck in piston

Note
Check that the ball is free by shaking the piston.

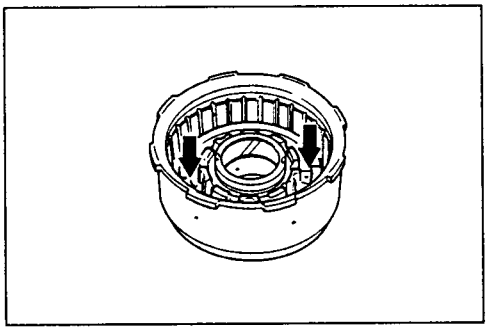


5. Fracture of spring
6. Weakening of return spring tension

Free spring length: 30.5 mm (1.20 in)

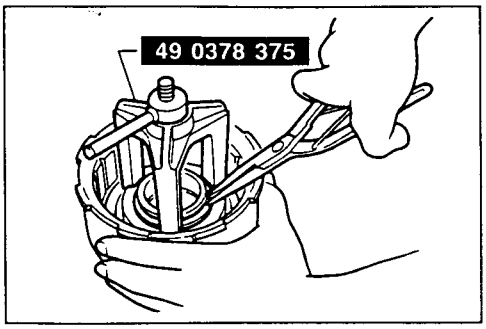


Assembly
1. Apply ATF to the O-ring and install it in the front clutch drum.
2. Apply ATF to the seal ring and install it onto the piston.



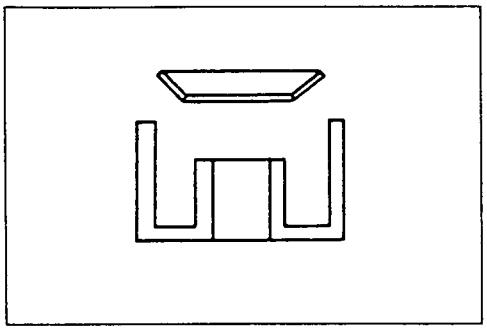
3. Install the piston in the front clutch drum.

Caution
Apply even pressure to the perimeter of the piston to avoid damaging the seal rings when installing.

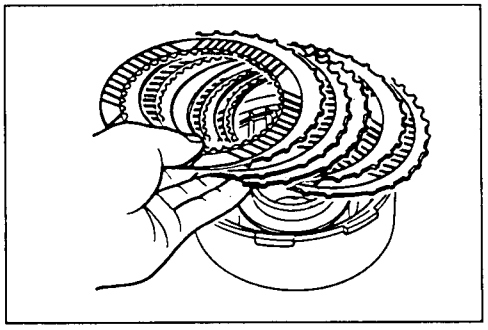


4. Install the springs and spring retainer, then compress them with the **SST**.
5. Install the snap ring.

SST = SPECIAL SERVICE TOOL

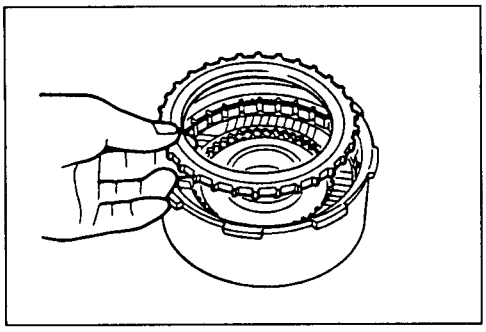


6. Install the dished plate as shown in the figure.

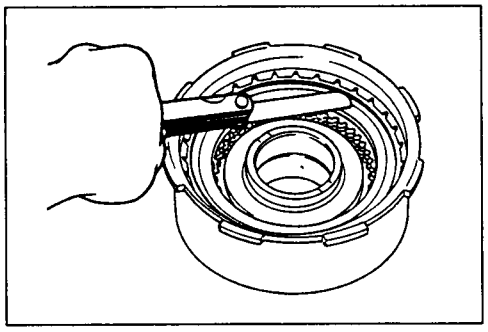


7. Install the driven plates and drive plates.

Note
Installation order:
Driven-Drive-Driven-Drive-Driven-Driven-Drive-Driven-Drive



8. Install the retaining plate with the step facing upward.
9. Install the snap ring.



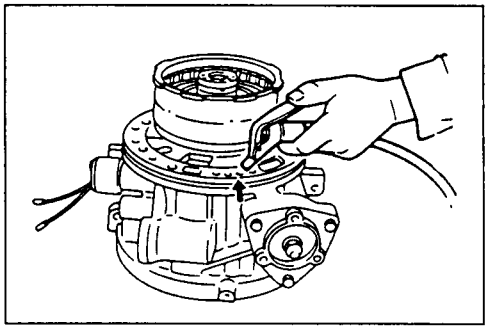
10. Measure the clearance between the retaining plate and snap ring with a feeler gauge. Adjust the clearance by installing the correct retaining plate.

Clearance: 0.9—1.1 mm (0.035—0.043 in)

Retaining plate sizes

mm (in)

5.0 (0.197)	5.2 (0.205)	5.4 (0.213)
5.6 (0.220)	5.8 (0.228)	6.0 (0.236)
6.2 (0.244)		

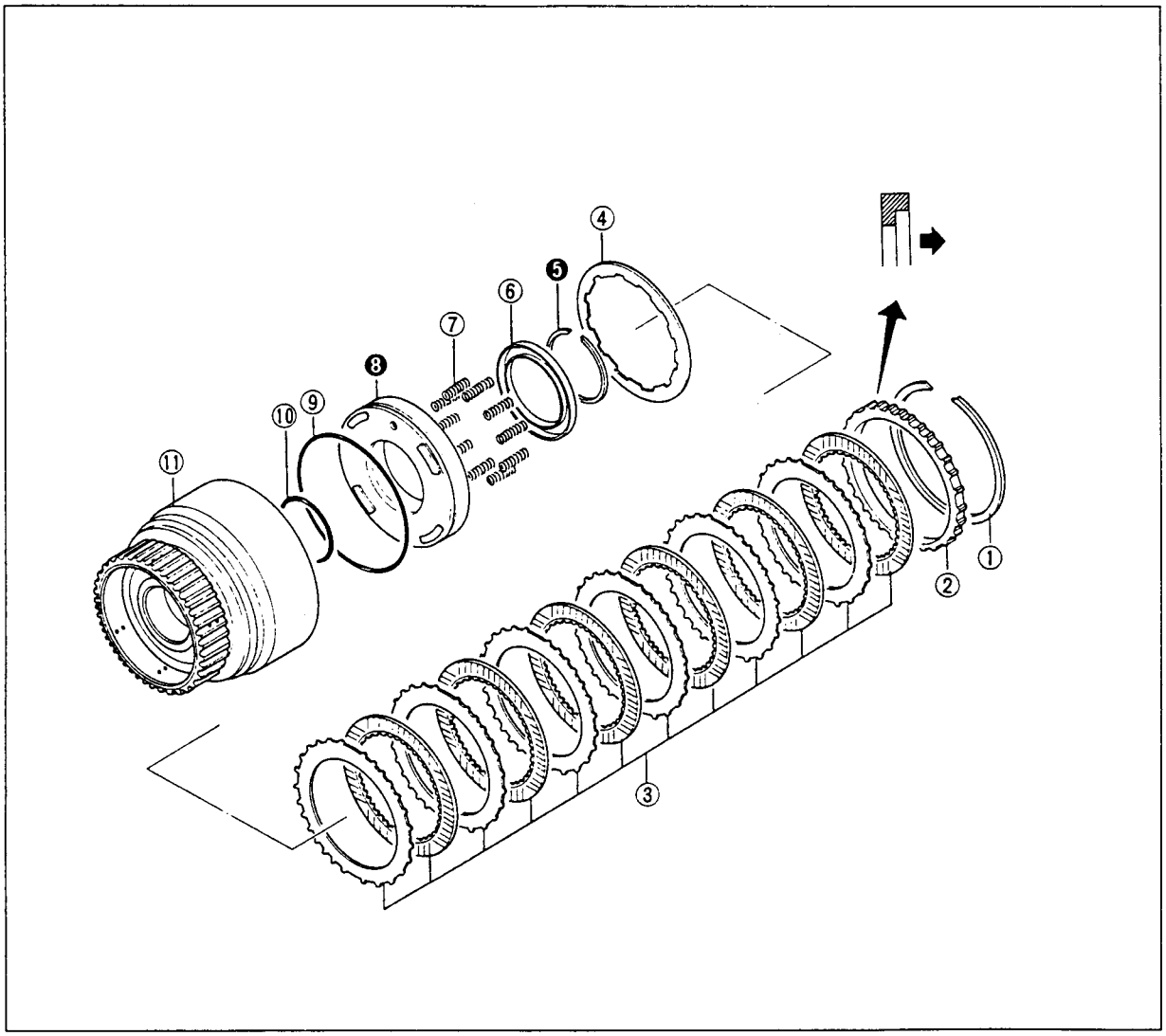


11. Set the front clutch on the drum support. Apply compressed air to the oil passage and check the clutch operation.

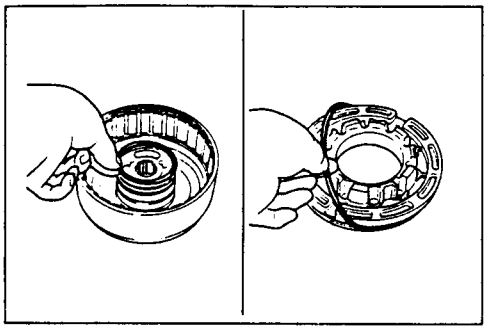
Air pressure: 392 kPa (4.0 kg/cm^2, 57 psi) max.

Caution
Apply air for no more than 3 seconds.

REAR CLUTCH
Disassembly
Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked parts.

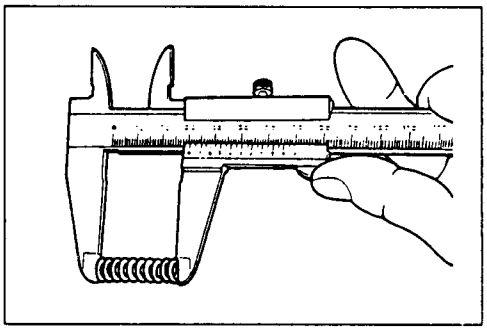


1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
4. Dished plate
5. Snap ring
6. Spring retainer
7. Spring
8. Piston
9. Seal ring
10. O-ring
11. Rear clutch drum



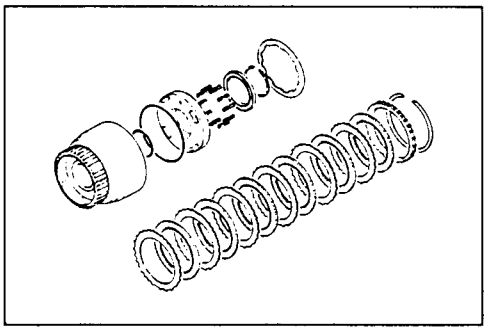
Disassembly note
Snap ring
1. Compress the spring with the **SST**, then remove the snap ring with snap-ring pliers.
2. Remove the snap ring retainer and spring.

SST = SPECIAL SERVICE TOOL



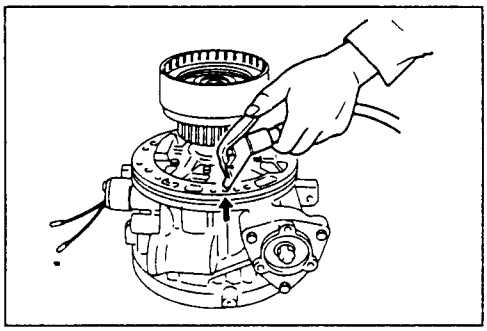
Piston
1. Set the rear clutch drum on the drum support.
2. Remove the piston by applying compressed air to the oil passage.

Air pressure: 392 kPa (4.0 kg/cm^2, 57 psi) max.



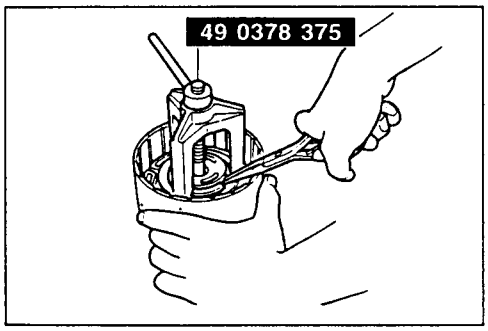
Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of drive plate facing
2. Fracture or wear of snap rings
3. Spring retainer deformation
4. Check ball stuck in piston

Note
Check that the ball is free by shaking the piston.

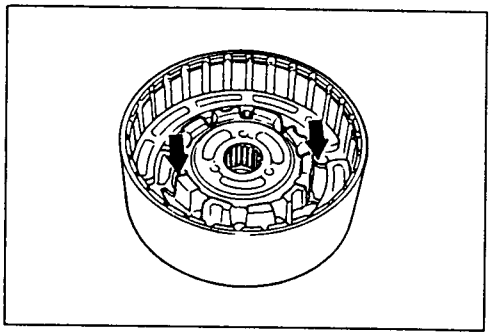


5. Fracture of spring
6. Weakening of return spring tension

Free spring length: 30.5 mm (1.20 in)

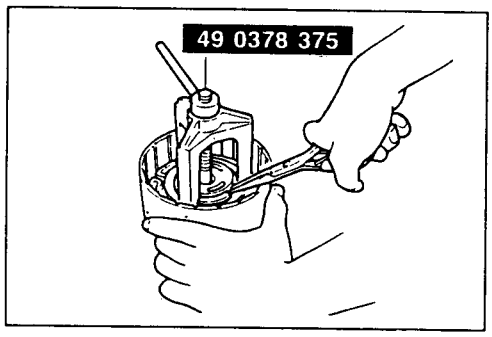


Assembly
1. Apply ATF to the O-ring and install it in the rear clutch drum.
2. Apply ATF to the seal ring and install it onto the piston.

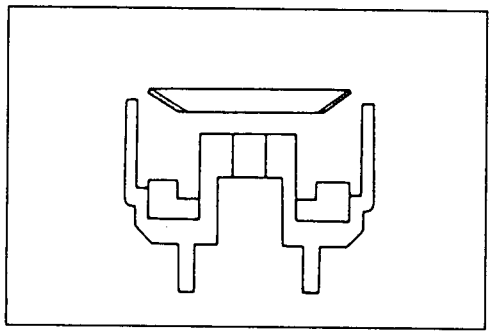


3. Install the piston in the rear clutch drum.

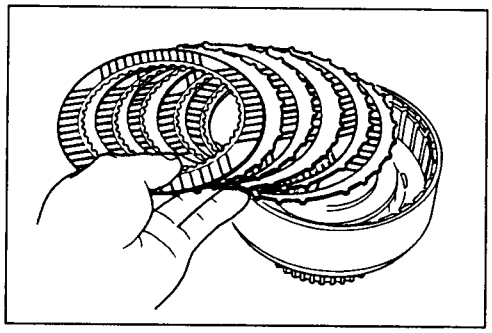
Caution
Apply even pressure to the perimeter of the piston to avoid damaging the seal rings when installing.



4. Install the springs and spring retainer and compress them with the **SST**.
5. Install the snap ring.

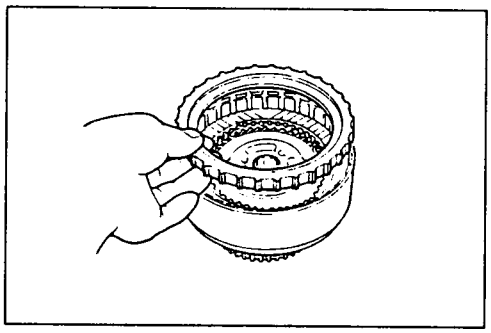


6. Install the dished plate as shown in the figure.

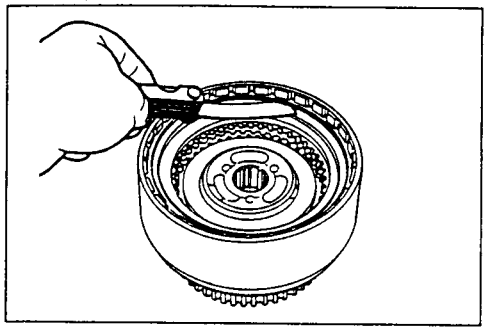


7. Install the driven plates and drive plates.

Note
Installation order:
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

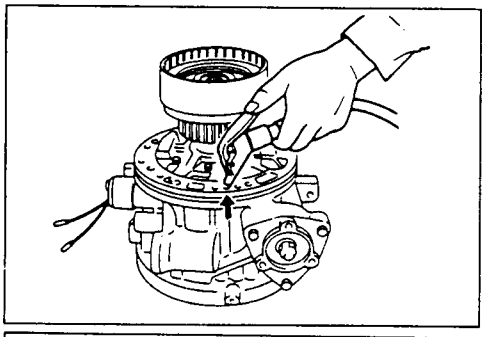


8. Install the retaining plate with the step facing upward.
9. Install the snap ring.



10. Measure and adjust the rear clutch clearance. Replace all drive and driven plates if the clearance exceeds specification.

Clearance:
Maximum: 0.8—1.0 mm (0.031—0.039 in)

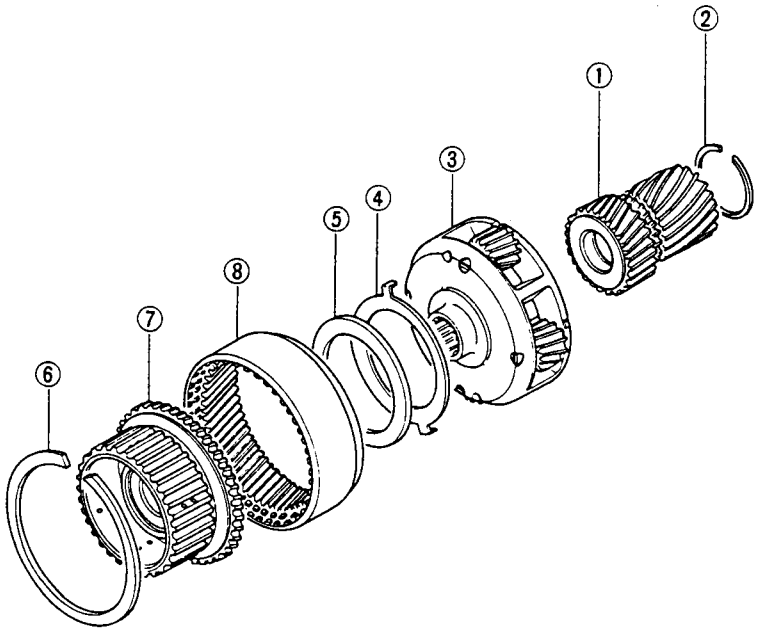


11. Set the rear clutch on the drum support. Apply compressed air to the oil passage and check the clutch operation.

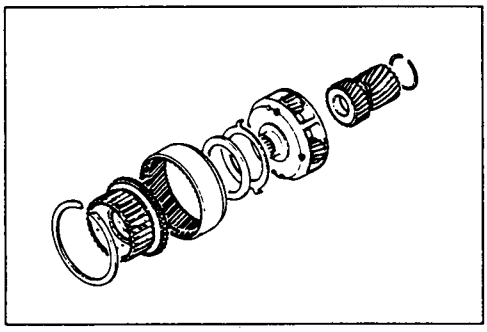
Air pressure: 392 kPa (4.0 kg/cm^2, 57 psi) max.

Caution
Apply air for no more than 3 seconds.

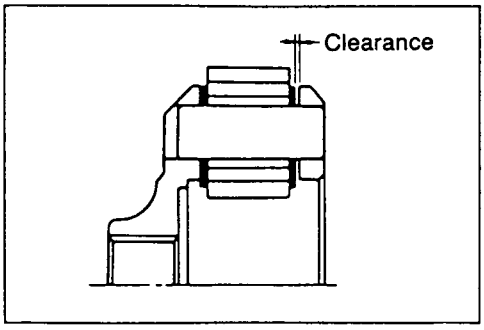
FRONT PLANETARY GEAR UNIT (REAR CLUTCH HUB, FRONT PLANETARY PINION CARRIER)
Disassembly
Disassemble in the sequence shown in the figure.



1. Sun gear
2. Snap ring
3. Front planetary pinion carrier
4. Bearing race
5. Bearing
6. Snap ring
7. Rear clutch hub
8. Internal gear

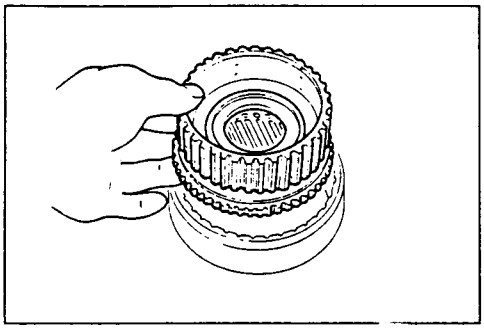


Inspection
Inspect the following parts and replace if necessary.
1. Fracture or wear of snap ring
2. Wear of individual gears
3. Rotation of front carrier pinion gear
4. Rotation and damage or wear of bearing

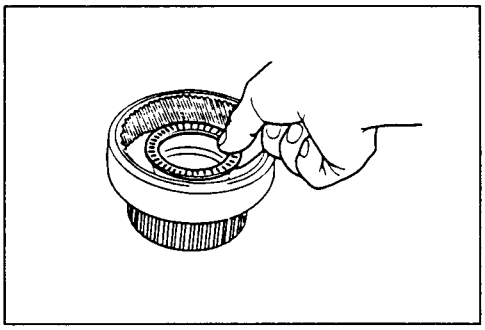


5. Clearance between pinion washer and planetary pinion carrier

Standard clearance: 0.2—0.7 mm (0.008—0.028 in)
Maximum: 0.8 mm (0.031 in)

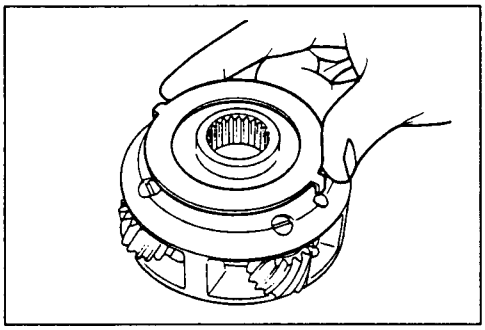


Assembly
1. Install the rear clutch hub in the internal gear.
2. Install the snap ring.



3. Install the bearing.

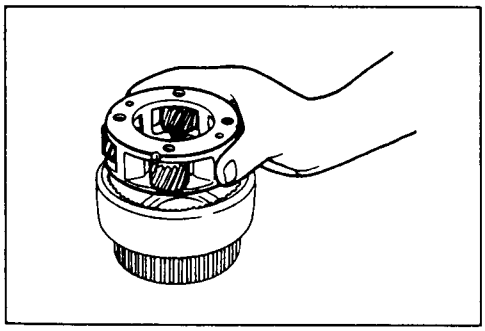
Bearing outer diameter: 69.9 mm (2.75 in)



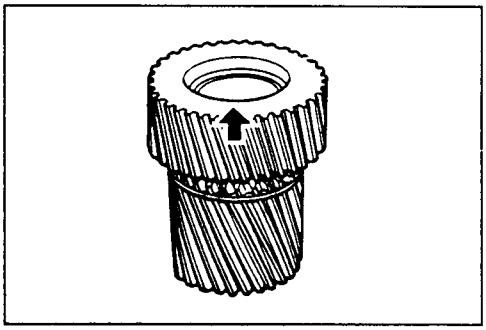
4. Install the bearing race on the front planetary pinion carrier.

Bearing race outer diameter: 70.0 mm (2.76 in)

Note
Affix the bearing race with petroleum jelly.

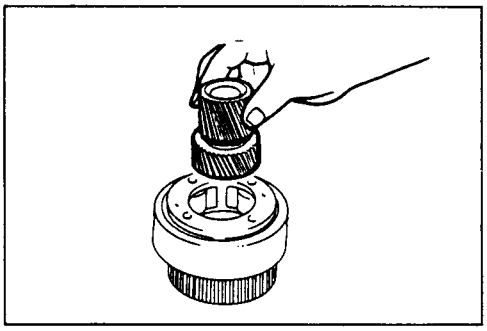


5. Install the front planetary pinion carrier in the internal gear.



6. Install the snap ring on the sun gear.

Note
Pay close attention to the front and rear direction of the sun gear. The grooved side (arrow) is the front.

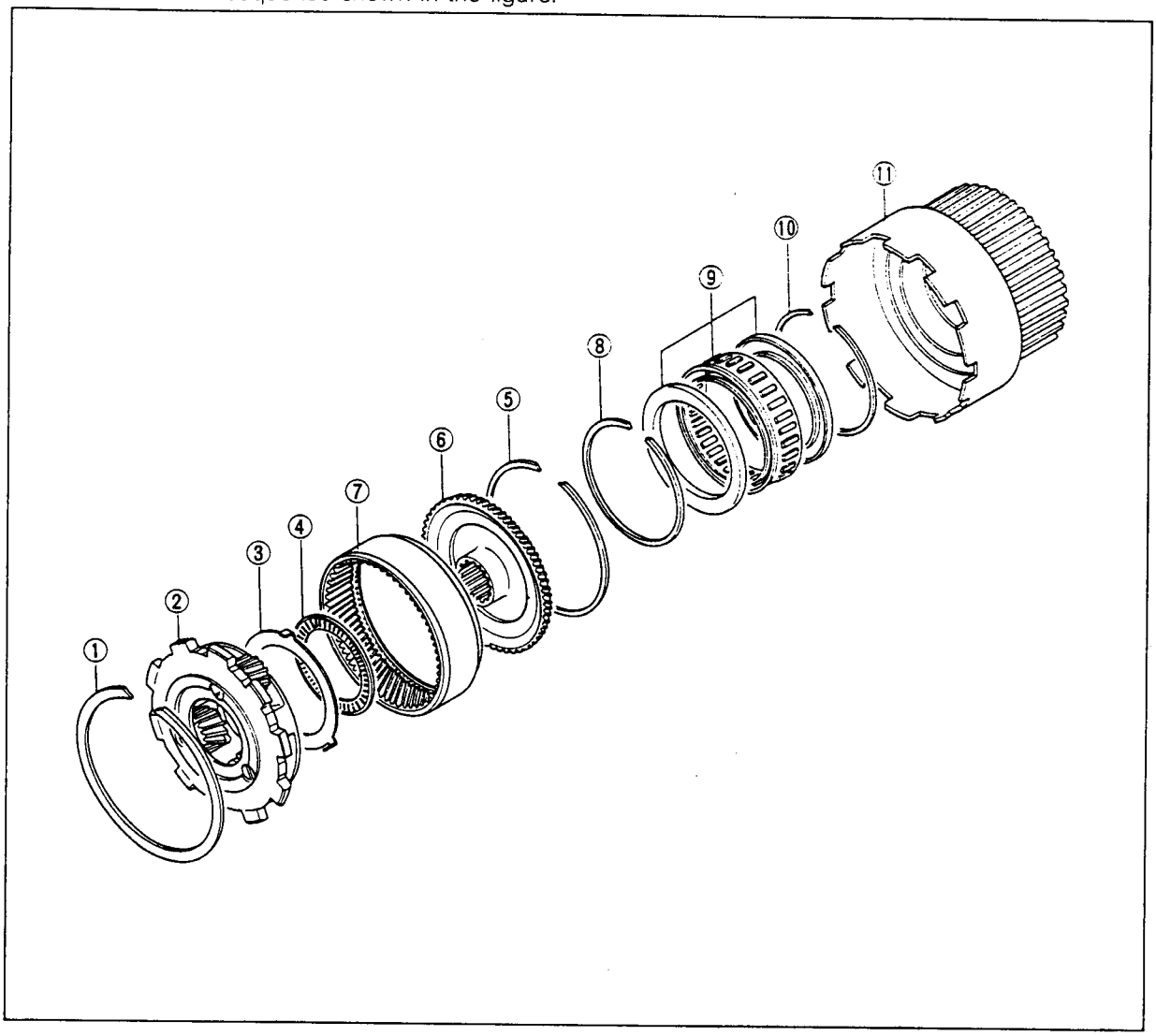


7. Install the sun gear in the front planetary pinion carrier.

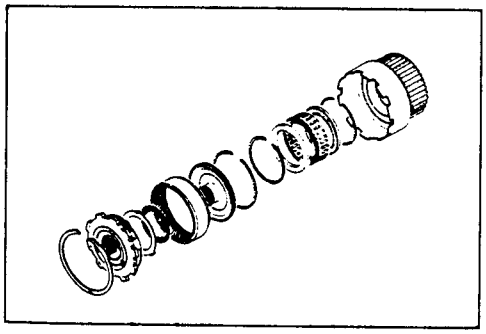
REAR PLANETARY GEAR UNIT (CONNECTING DRUM, REAR PLANETARY PINION CARRIER, ONE-WAY CLUTCH)

Disassembly

Disassemble in the sequence shown in the figure.



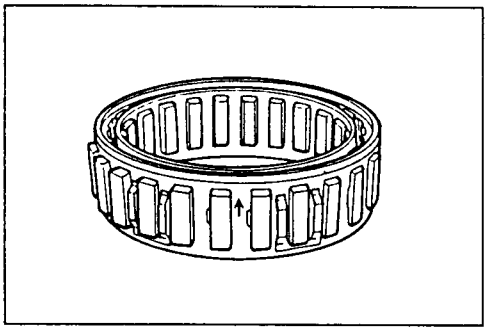
1. Snap ring
2. Rear planetary pinion carrier
3. Bearing race
4. Bearing
5. Snap ring
6. Drive flange
7. Internal gear
8. Snap ring
9. One-way clutch
10. Snap ring
11. Connecting drum



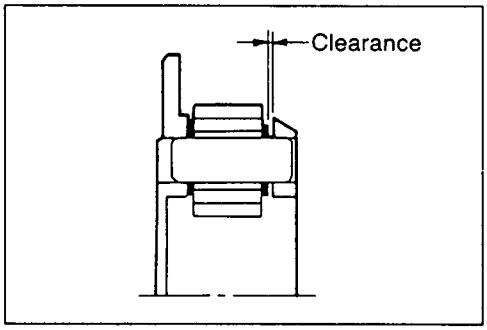
Inspection

Inspect the following parts and replace if necessary.

1. Fracture or wear of snap ring
2. Damage or wear of individual gears
3. Rotation and damage or wear of bearing

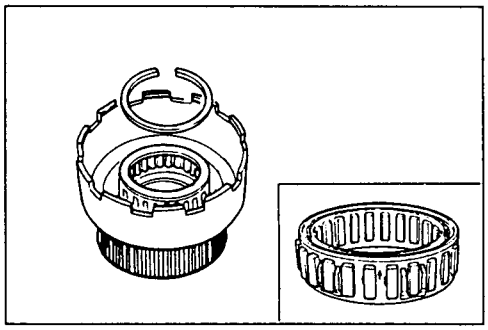


4. Wear of one-way clutch



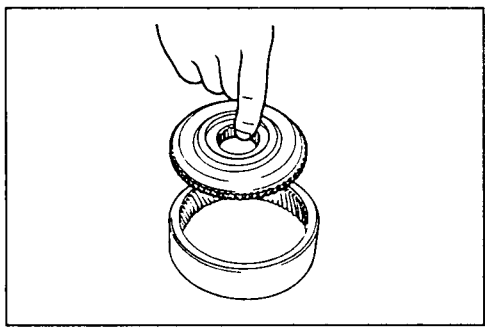
5. Clearance between pinion washer and planetary pinion carrier

Standard clearance: 0.2—0.7 mm (0.008—0.028 in)
Maximum: 0.8 mm (0.031 in)

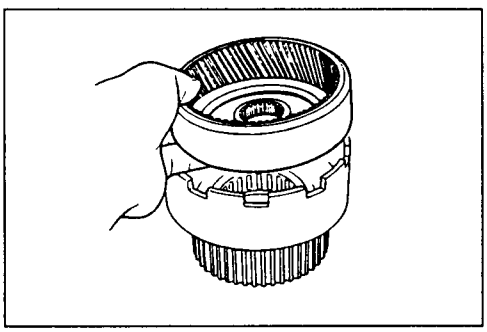


Assembly
1. Install the snap ring in the connecting drum.
2. Install the one-way clutch and snap ring.

Caution
Install the side indicated by an arrow in the figure toward the front when inserting the one-way clutch into the one-way clutch outer race.

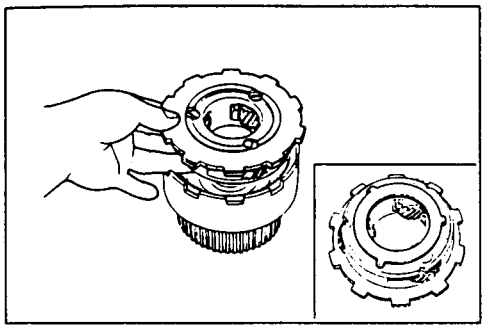


3. Install the drive flange in the internal gear.
4. Install the snap ring.



5. Install the internal gear and drive flange in the connecting drum.
6. Install the bearing.

Bearing outer diameter: 69.9 mm (2.75 in)



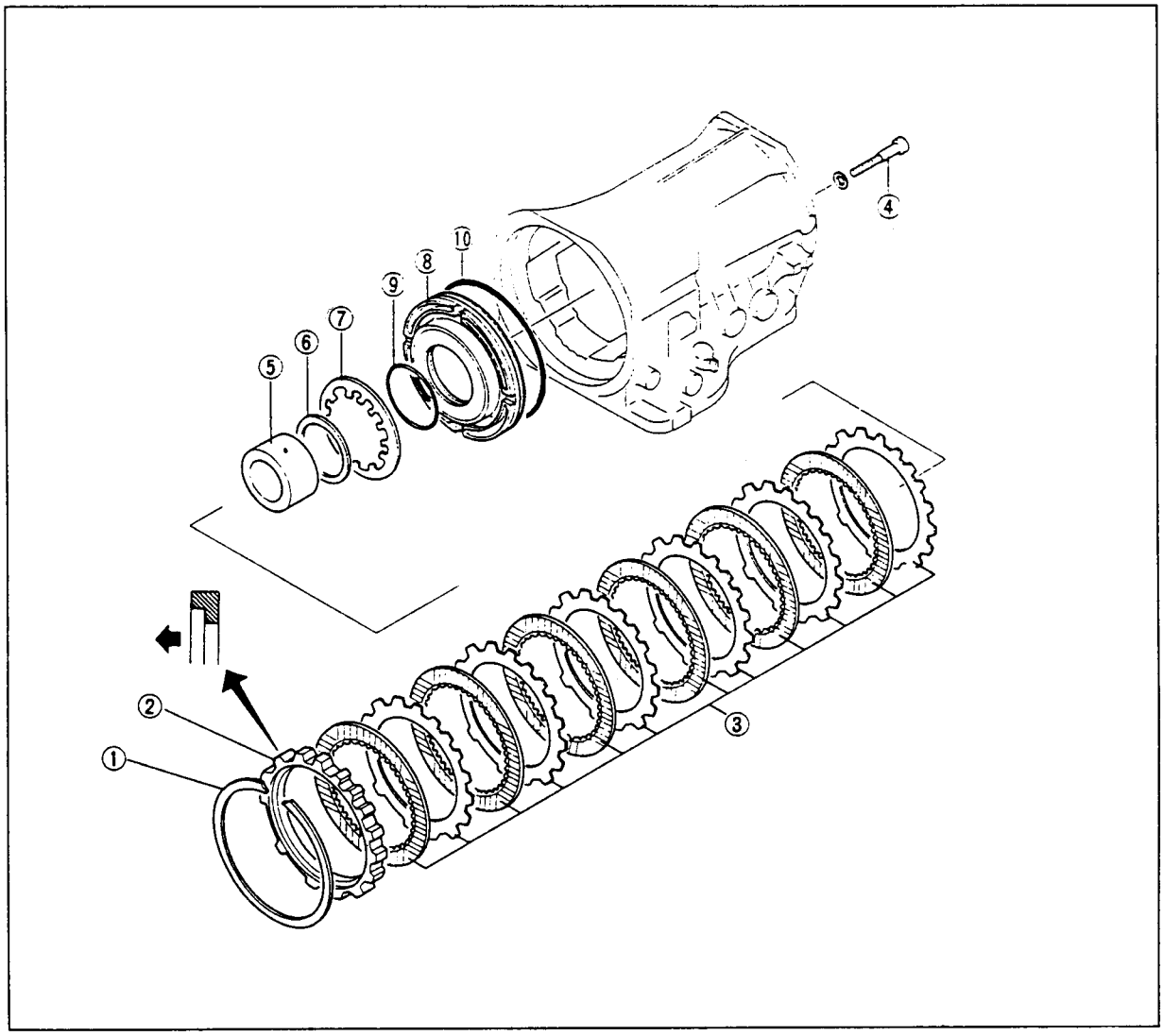
7. Install the bearing race in the rear planetary pinion carrier.

Bearing race outer diameter: 70.0 mm (2.76 in)

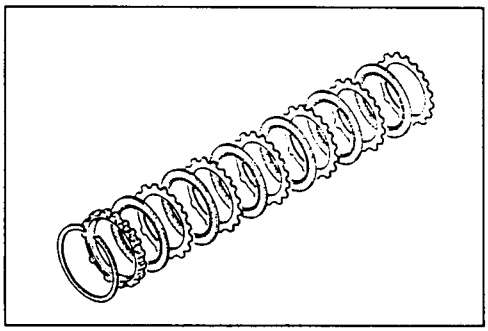
Note
Affix the bearing with petroleum jelly.

8. Install the rear planetary pinion carrier in the connecting drum.
9. Install the snap ring.
10. **WHEN THE CONNECTING DRUM IS INSTALLED IN THE CASE, THE DRUM MUST TURN CLOCKWISE AND LOCK COUNTER CLOCKWISE**

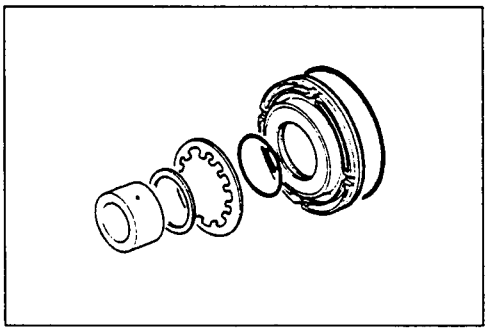
LOW AND REVERSE BRAKE
Components



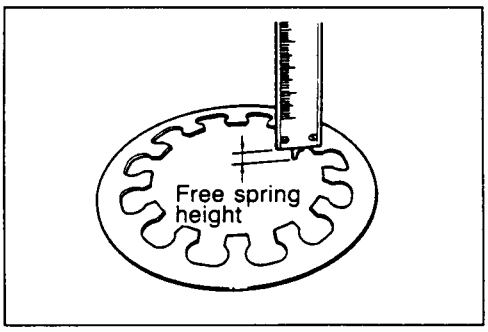
1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
4. Allen head bolt
5. One-way clutch inner race
6. Thrust washer
7. Return spring
8. Low and reverse brake piston
9. O-ring
10. Seal ring



Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of drive plate facing
2. Damage of driven plate
3. Fracture or wear of snap ring



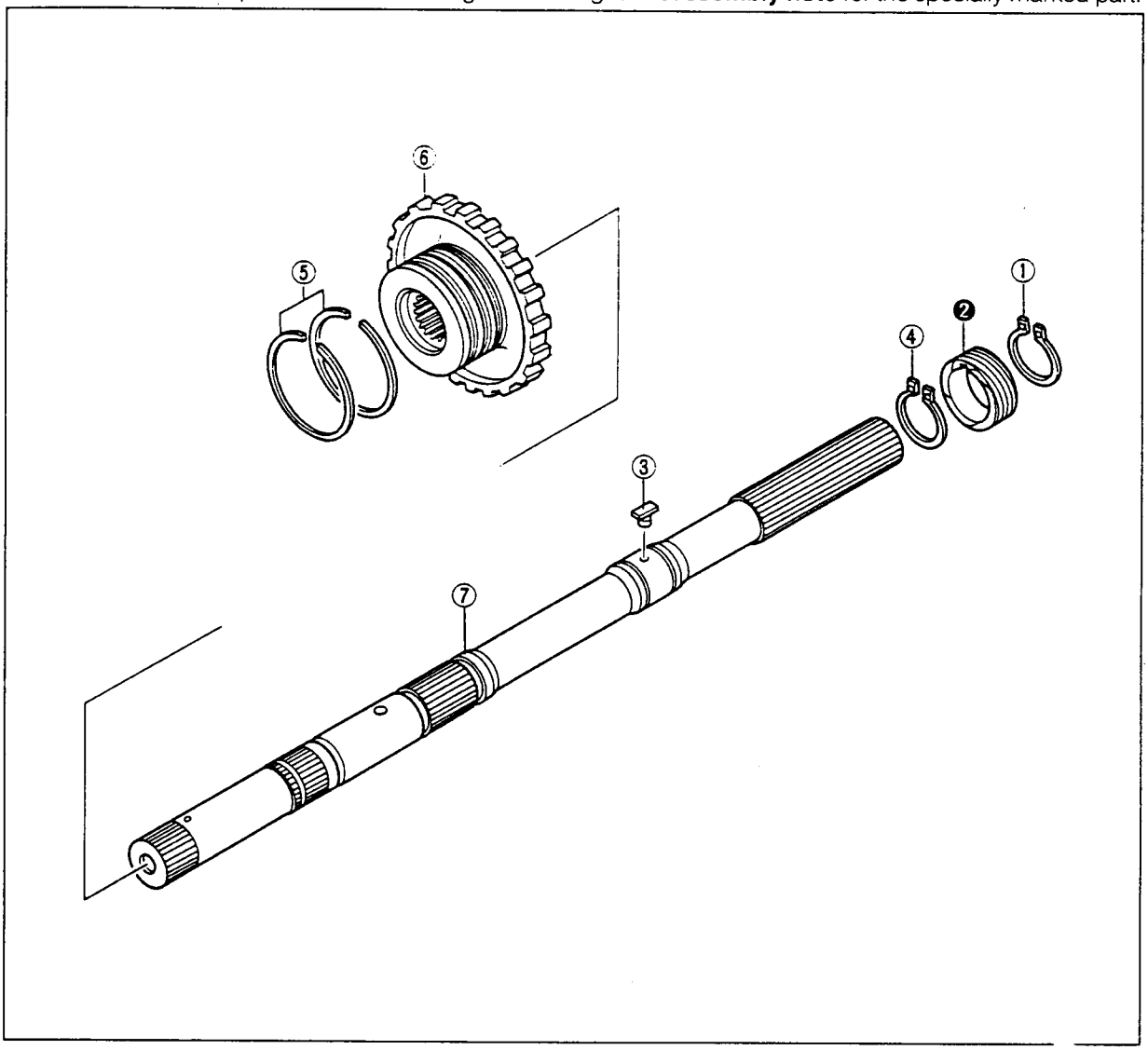
4. Wear of one-way clutch inner race
5. Damage to thrust washer
6. Damage or wear of low and reverse brake piston or seal rings



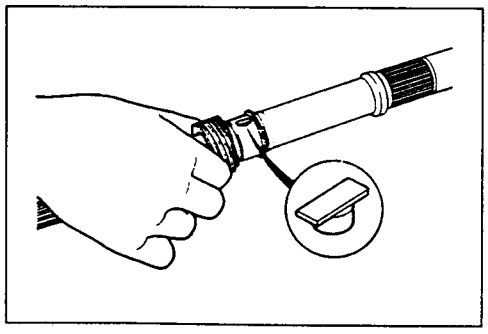
7. Weakening of return spring tension

Free spring height: 5.3—6.2 mm (0.209—0.244 in)

OUTPUT SHAFT, OIL DISTRIBUTOR
Disassembly
Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked part.

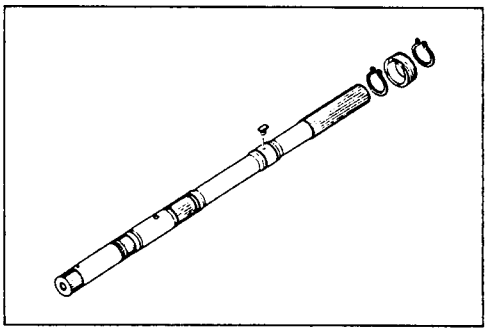


1. Snap ring
2. Speedometer drive gear
3. Key
4. Snap ring
5. Seal ring
6. Oil distributor
7. Output shaft

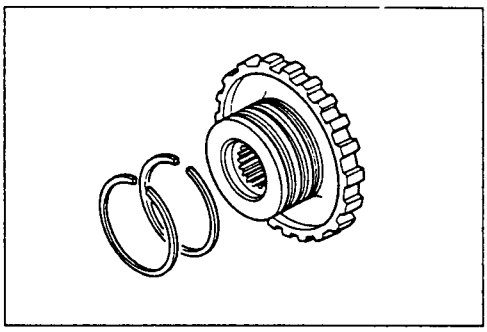


Disassembly note
Speedometer drive gear
Remove the speedometer drive gear.

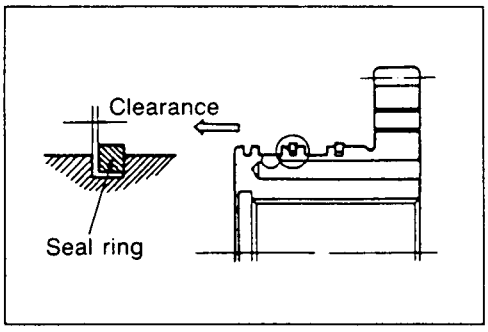
Note
Be careful not to lose the key.



Inspection
Inspect the following parts and replace if necessary.
1. Bend or wear of output shaft
2. Damage or wear of speedometer drive gear
3. Damage or wear of key



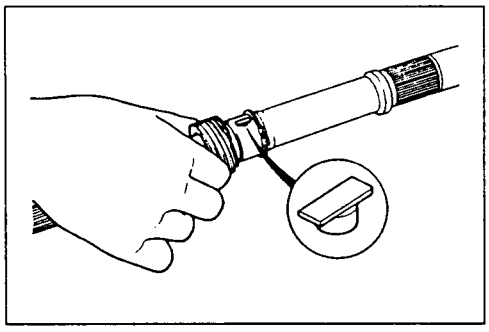
4. Damage or wear of oil distributor
5. Damage to seal rings



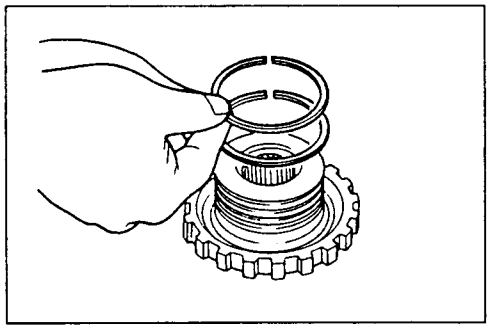
6. Clearance between seal rings and seal ring grooves

   Standard clearance:
   0.04—0.16 mm (0.0016—0.0063 in)
   Maximum: 0.40 mm (0.0157 in)

7. Damage to seal ring

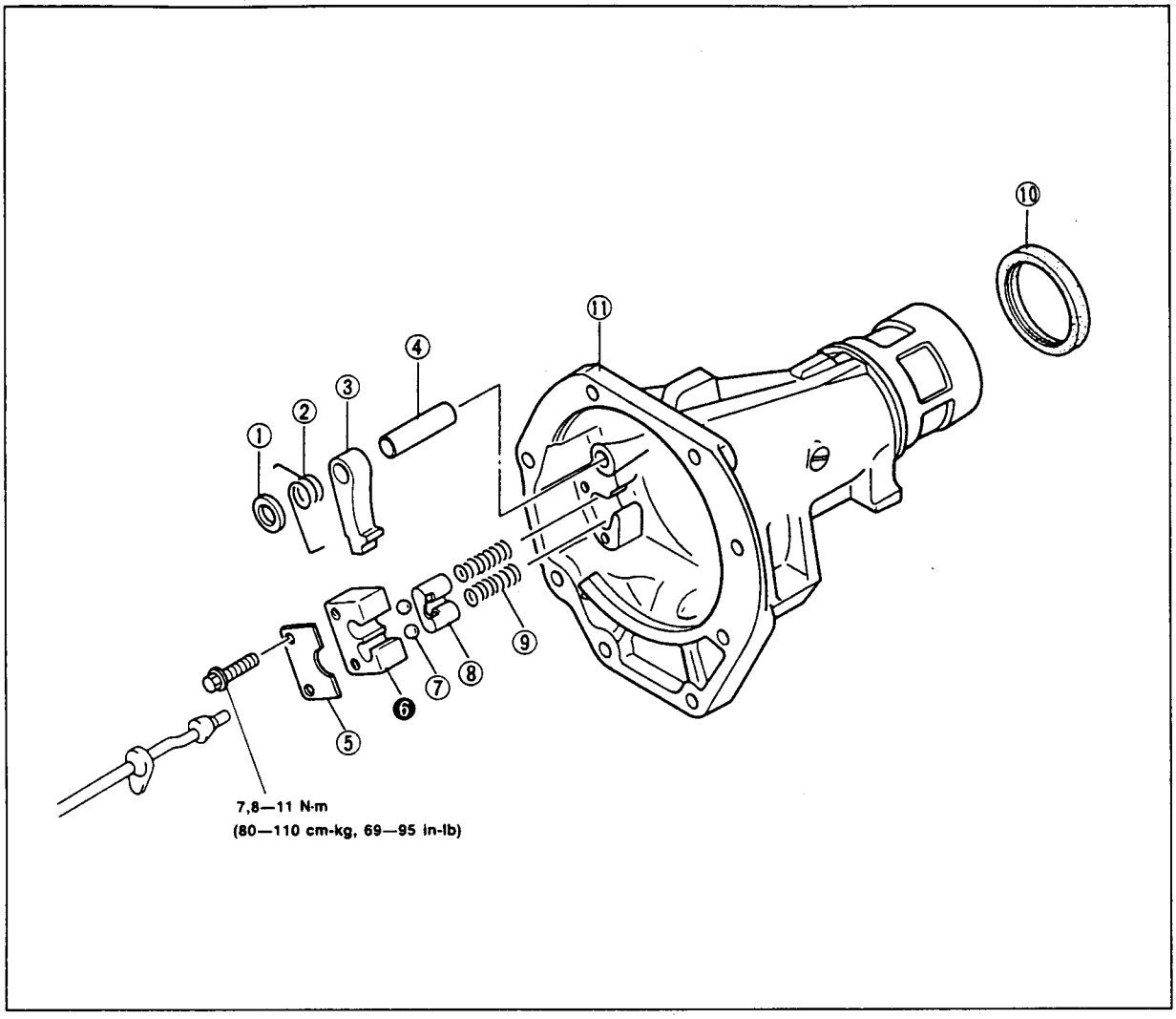


Assembly
1. Install the snap ring.
2. Install the key and speedometer drive gear.
3. Install the snap ring.

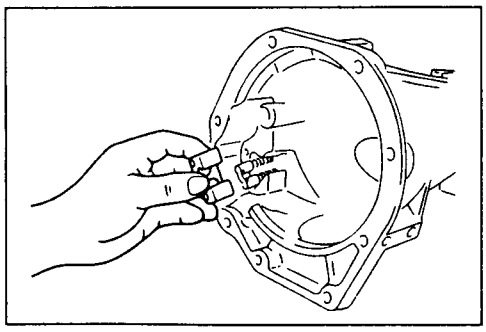


4. Apply ATF to the seal rings and install them onto the oil distributor.

EXTENSION HOUSING
Disassembly
Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked part.

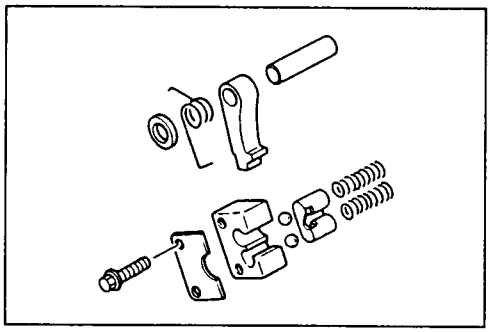


1. Dowel spacer
2. Return spring
3. Parking pawl
4. Pawl shaft
5. Retaining plate
6. Actuator support
7. Steel ball
8. Retainer
9. Spring
10. Oil seal
11. Housing

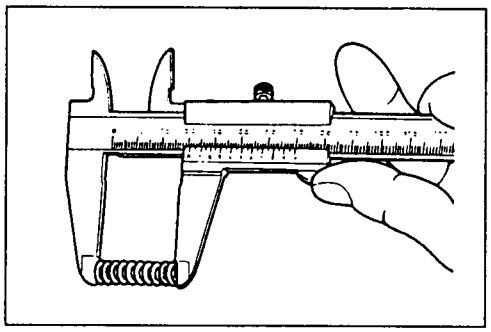


Disassembly note
Actuator support
Remove the actuator support and steel ball.

Note
Remove the actuator support slowly because the steel ball may pop out.

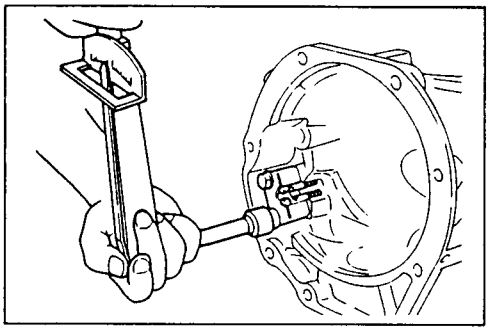


Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of parking pawl
2. Damage or wear of pawl shaft
3. Damage or wear of actuator support
4. Damage to steel ball



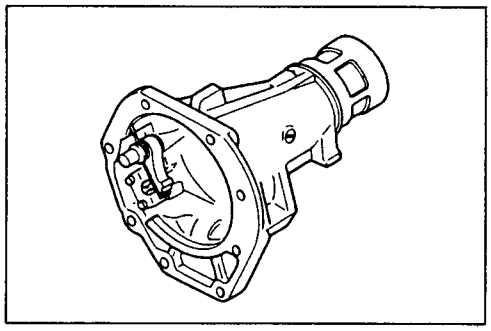
5. Fracture of spring
6. Weakening of spring tension

Free spring length: 32.0 mm (1.26 in)



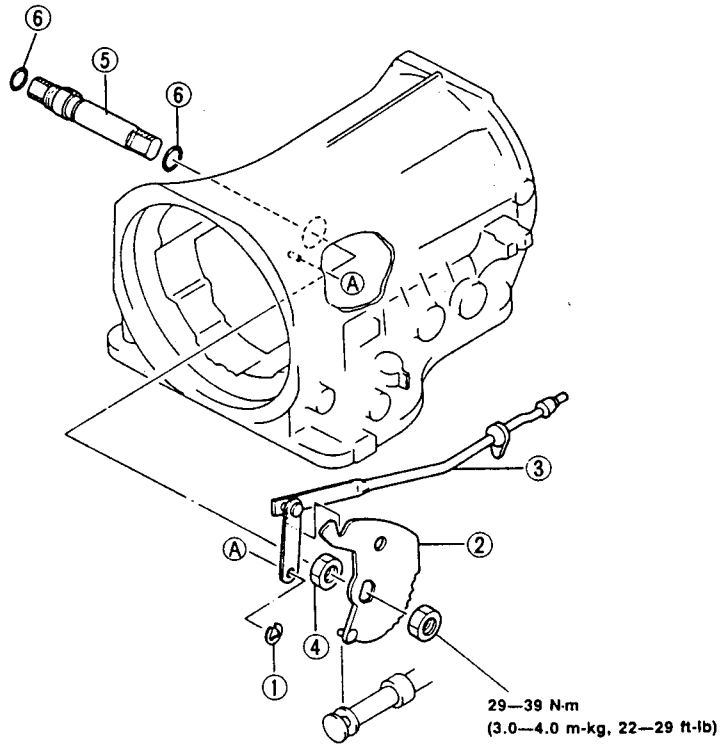
Assembly
1. Install a new oil seal in the housing.
2. Install the spring and retainer.
3. Install the steel ball and actuator support.
4. Tighten the retaining plate mounting bolts.

Tightening torque:
7.8—11 N·m (80—110 cm-kg, 69—95 in-lb)

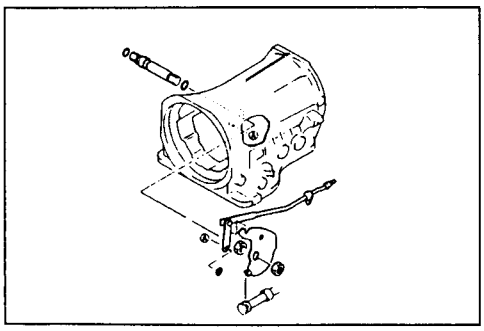


5. Install the pawl shaft.
6. Install the parking pawl and return spring.
7. Install the dowel spacer.

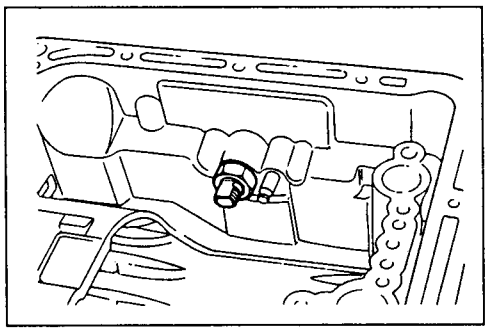
TRANSMISSION CASE
Disassembly
Disassemble in the sequence shown in the figure.



1. Retaining ring
2. Manual plate
3. Parking rod
4. Spacer
5. Manual shaft
6. O-ring

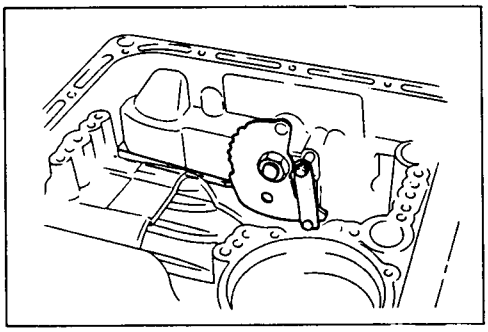


Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of parking rod
2. Damage or wear of manual plate
3. Damage or wear of manual rod

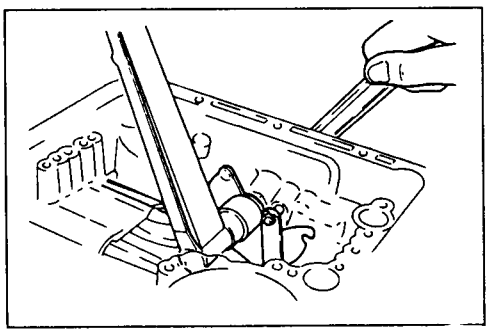


Assembly

1. Apply ATF to the O-rings and install them onto the manual shaft.
2. Install the manual shaft and spacer.

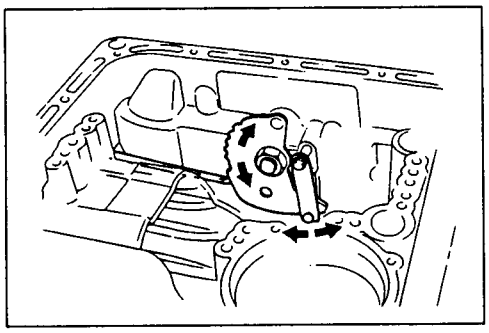


3. Install the parking rod and retaining ring.
4. Install the manual plate on the manual shaft.
5. Loosely tighten the locknut.



6. Tighten the locknut.

Tightening torque:
29—39 N·m (3.0—4.0 m-kg, 22—29 ft-lb)



7. Check the parking mechanism operation.

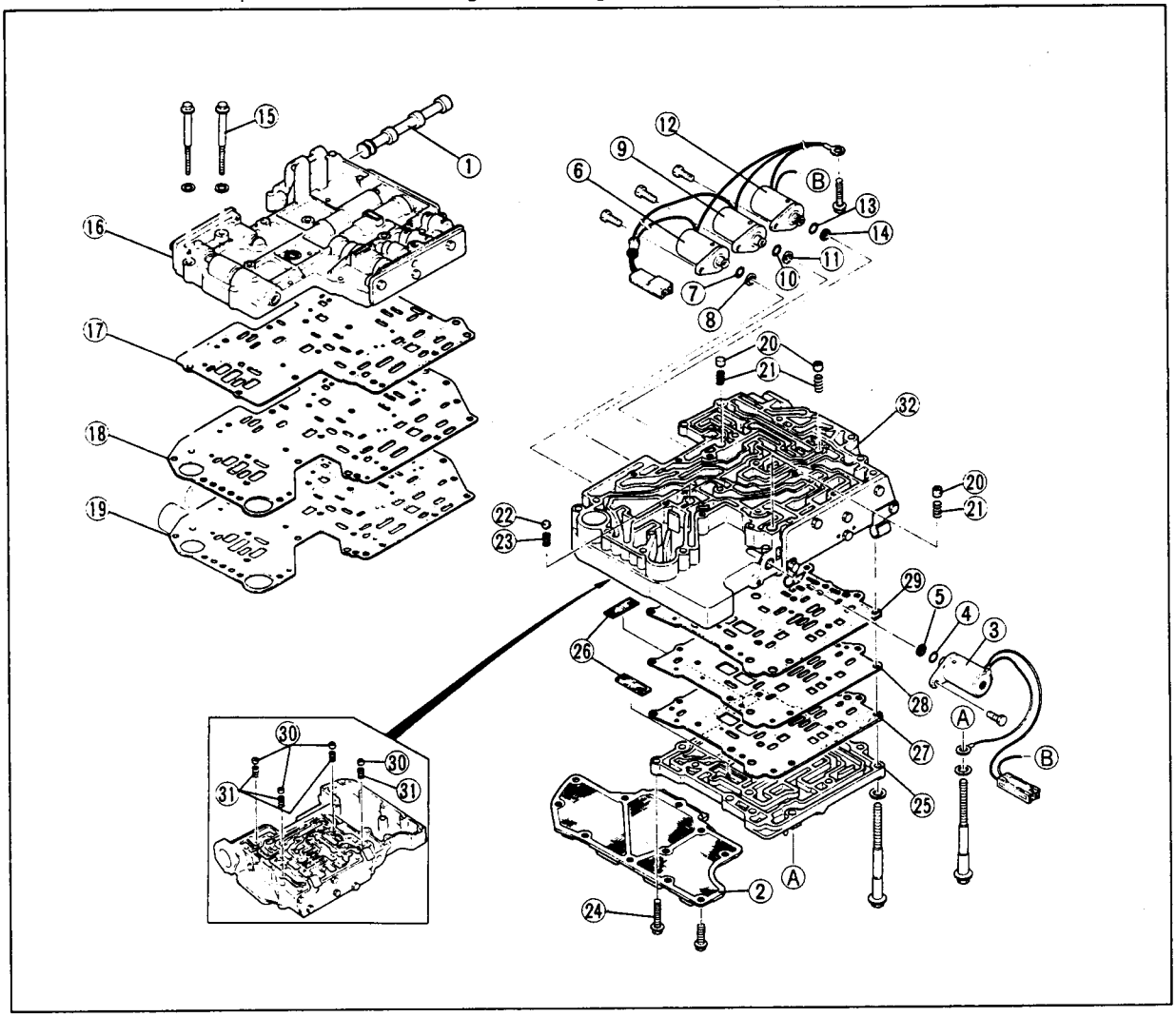
CONTROL VALVE

Precaution

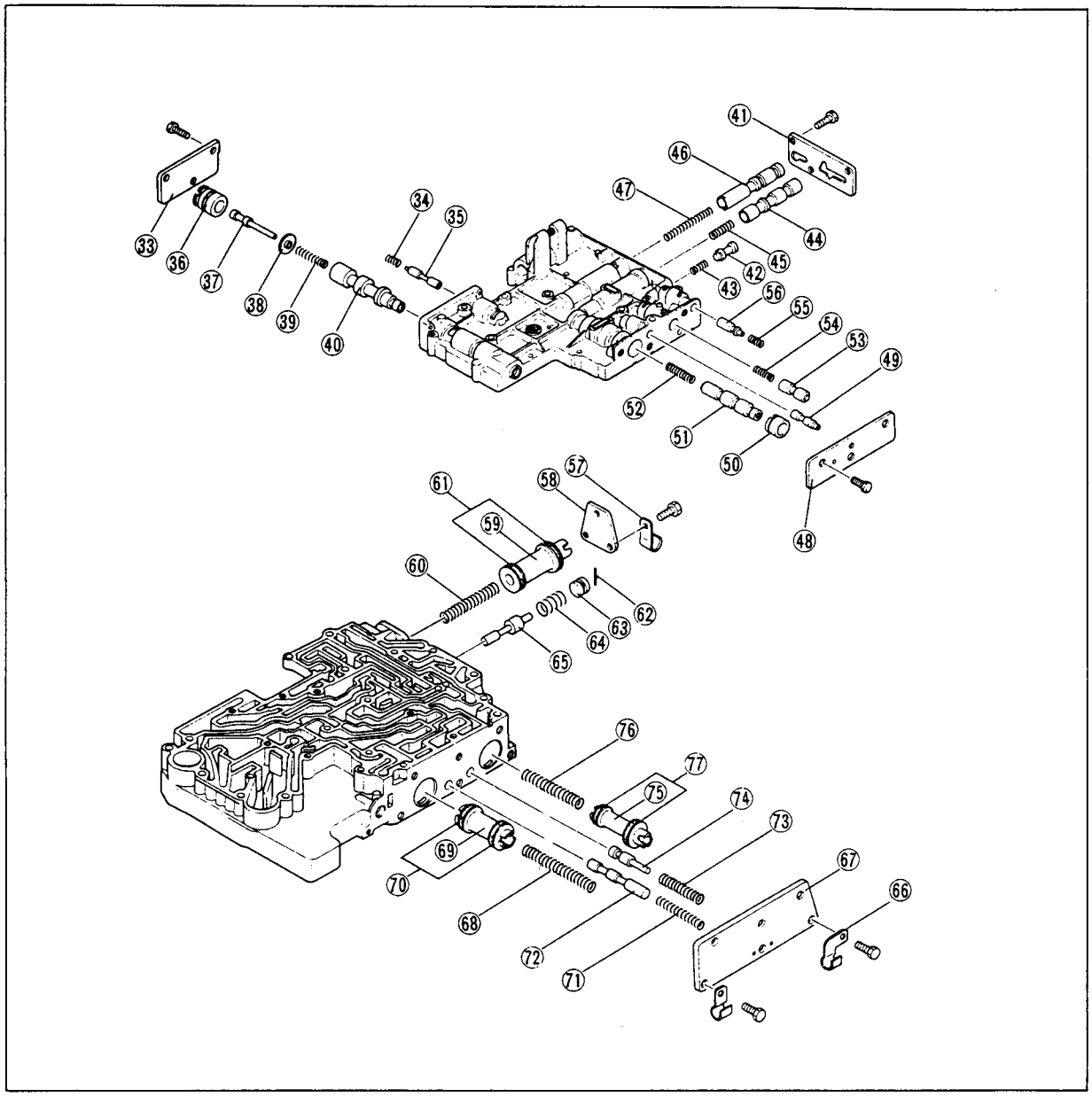
1. Pay close attention when handling the control valve because it consists of the most precise and delicate parts of the transmission.
2. Neatly arrange the removed parts in order to avoid mixing up similar parts.
3. Disassemble the control valve assembly and thoroughly clean it when the clutch and/or brake bands are burned and/or when the ATF is degenerated.

Disassembly

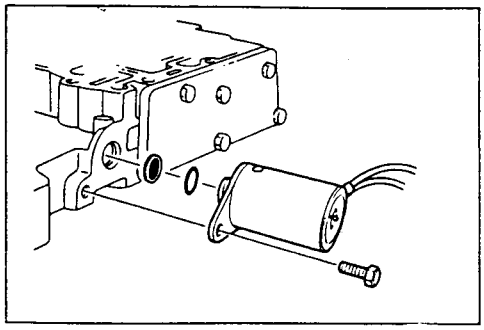
Disassemble in the sequence shown in the figure referring to **Disassembly note** for the specially marked parts.



1. Manual valve
2. Oil strainer
3. 3-2 control solenoid valve
4. O-ring
5. Oil strainer
6. 1-2 shift solenoid valve
7. O-ring
8. Oil strainer
9. 2-3 shift solenoid valve
10. O-ring
11. Oil strainer
12. 3-4 shift solenoid valve
13. O-ring
14. Oil strainer
15. Bolt
16. Upper valve body
17. Upper gasket
18. Separate plate
19. Lower gasket
20. Orifice check valve
21. Spring
22. Throttle relief ball
23. Spring
24. Bolt
25. Valve body cover
26. Inner strainer
27. Cover gasket
28. Separate plate
29. Lower gasket
30. Orifice check valve
31. Spring
32. Lower valve body

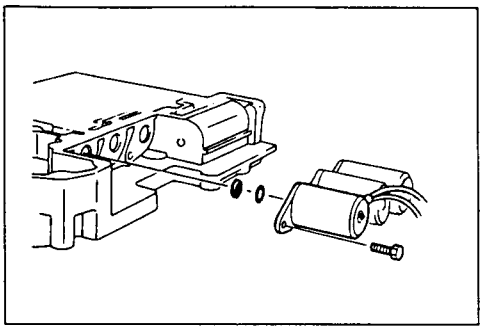


33. Side plate
34. N-R reducing spring
35. N-R reducing valve
36. Pressure regulator sleeve
37. Pressure regulator plug
38. Spring seat
39. Pressure regulator spring
40. Pressure regulator valve
41. Side plate
42. Pressure modifier valve
43. Pressure modifier spring
44. 1-2 shift valve
45. 1-2 shift spring
46. 2-3 shift valve
47. 2-3 shift spring
48. Side plate
49. Vacuum throttle valve
50. 3-4 shift sleeve
51. 3-4 shift valve
52. 3-4 shift spring
53. Backup control valve
54. Backup control spring
55. Throttle backup spring
56. Throttle backup valve
57. Clip
58. Side plate
59. N-D accumulator piston
60. N-D accumulator spring
61. Seal ring
62. Roll pin
63. Stopper plug
64. 1-2 reducing spring
65. 1-2 reducing valve
66. Clip
67. Side plate
68. 1-2 accumulator spring
69. 1-2 accumulator piston
70. Seal ring
71. 3-2 control spring
72. 3-2 control valve
73. Throttle relief spring
74. Throttle relief valve
75. N-R/2-3 accumulator piston
76. N-R/2-3 accumulator spring
77. Seal ring



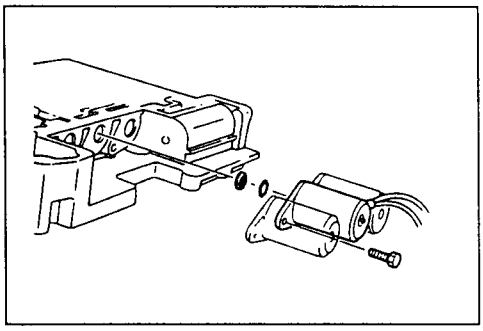
Disassembly note
3-2 control solenoid valve
1. Remove the 3-2 control solenoid valve.
2. Remove the oil strainer and O-ring.

Note
Be careful not to lose the oil strainer.



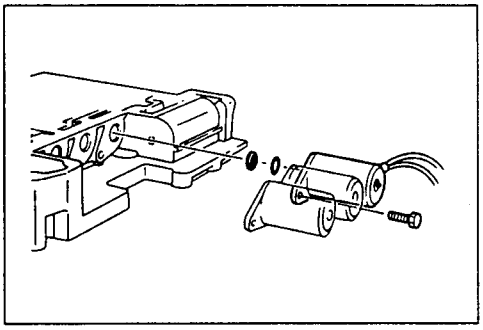
1-2 shift solenoid valve
1. Remove the 1-2 shift solenoid valve.
2. Remove the oil strainer and O-ring.

Note
Be careful not to lose the oil strainer.



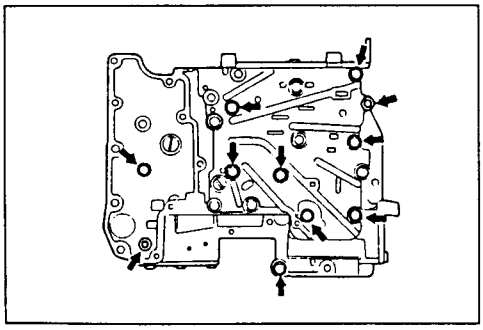
2-3 shift solenoid valve
1. Remove the 2-3 shift solenoid valve.
2. Remove the oil strainer and O-ring.

Note
Be careful not to lose the oil strainer.

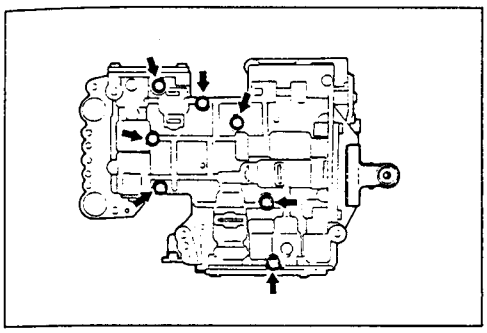


3-4 shift solenoid valve
1. Remove the 3-4 shift solenoid valve.
2. Remove the oil strainer and O-ring.

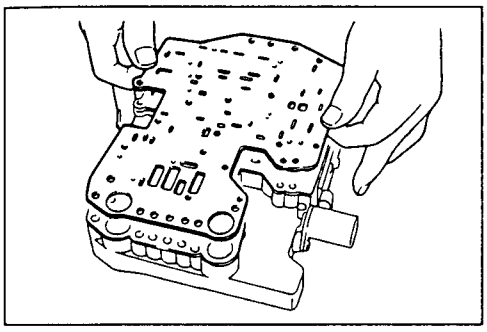
Note
Be careful not to lose the oil strainer.



Upper valve body
1. Remove the bolts and nuts shown in the figure.

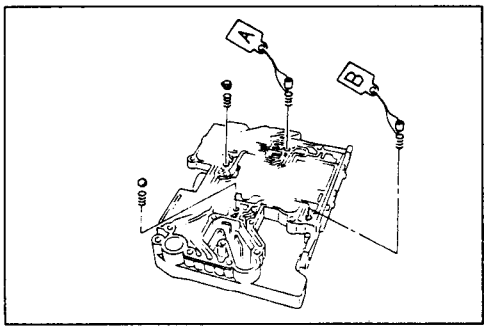


2. Hold the lower valve body and separate plate together with a large clip.
3. Remove the upper valve body.



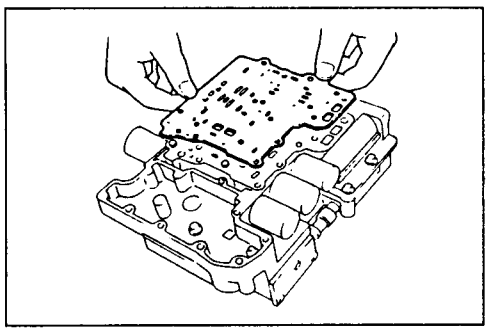
Separate plate
1. Remove the clip.
2. Remove the separate plate and lower gasket.

Caution
Remove the separate plate and lower gasket gently to avoid losing the orifice check valves and springs and the throttle relief ball and spring in the valve body.



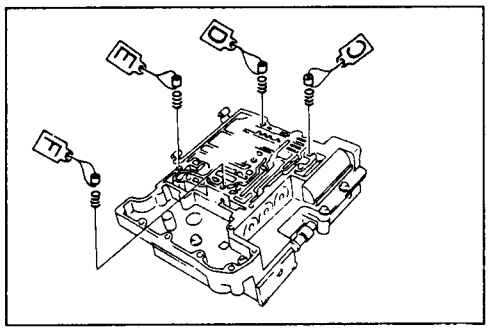
Orifice check valve, Throttle relief ball, Spring
Remove the orifice check valves, throttle relief ball, and springs.

Note
Tag the orifice check valves as shown for proper reassembly.



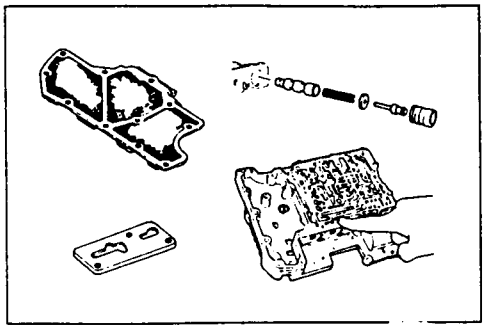
Separate plate
Remove the separate plate and lower gasket.

Caution
Remove the separate plate and lower gasket gently to avoid losing the orifice check valves and springs in the valve body.

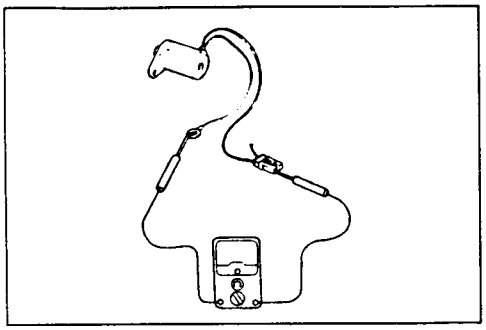


Orifice check valve, Spring
Remove the orifice check valves and springs.

Note
Tag the orifice check valves as shown for proper reassembly.

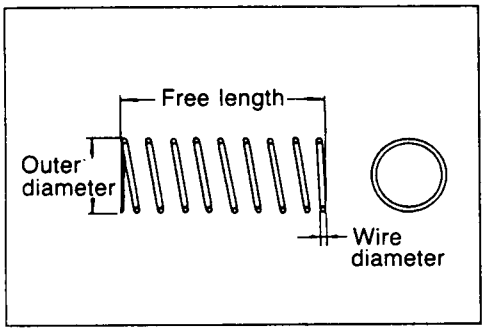


Inspection
Inspect the following parts and replace if necessary.
1. Damage or wear of individual valves
2. Damage to oil passages
3. Cracks or damage of valve body
4. Operation of individual valves
5. Damage or wear of side plate
6. Damage of oil strainer



7. Check resistance of each solenoid valve with an ohmmeter.

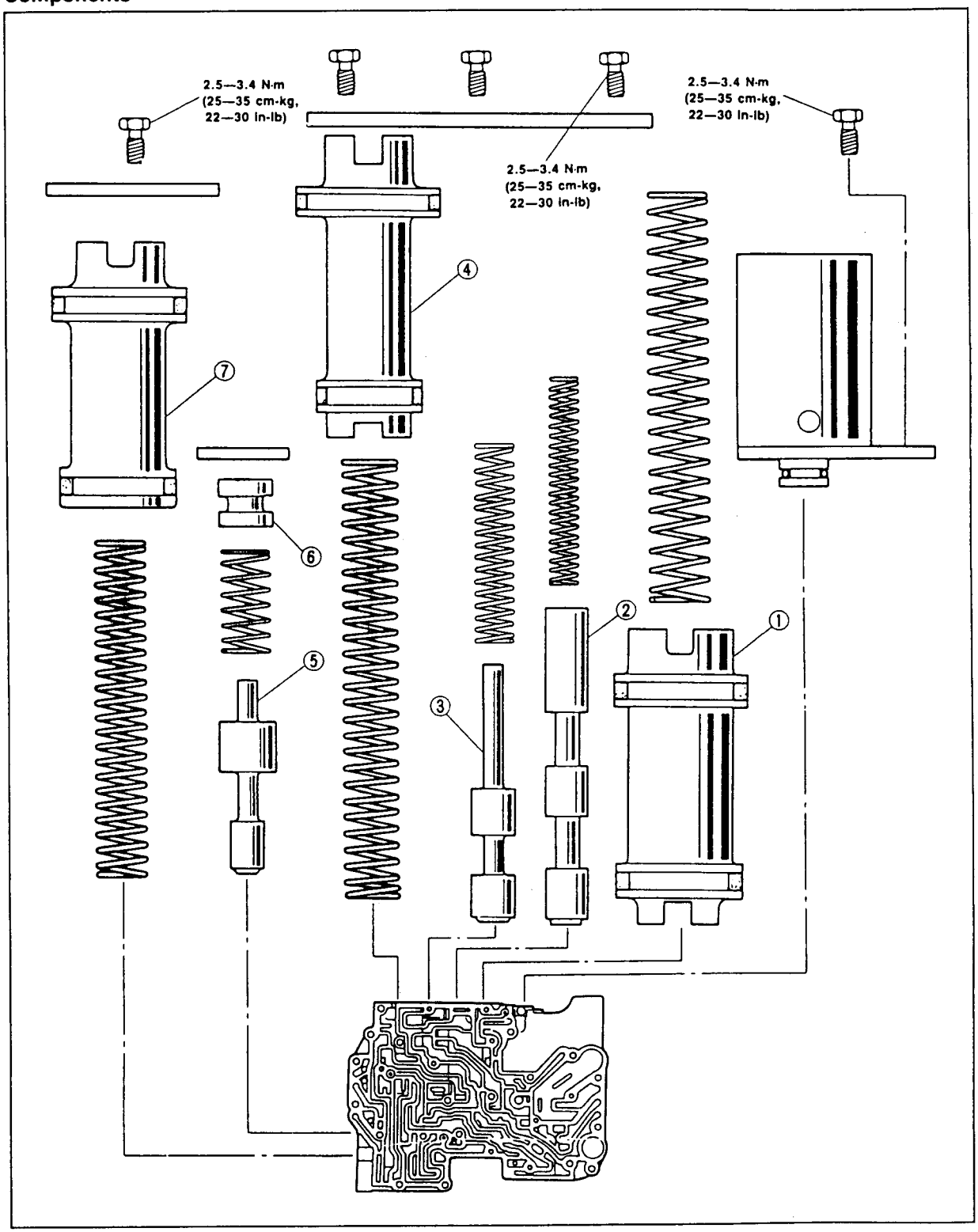
Resistance
Lockup: 13—25Ω
Others : 13—27Ω



8. Check spring specifications.

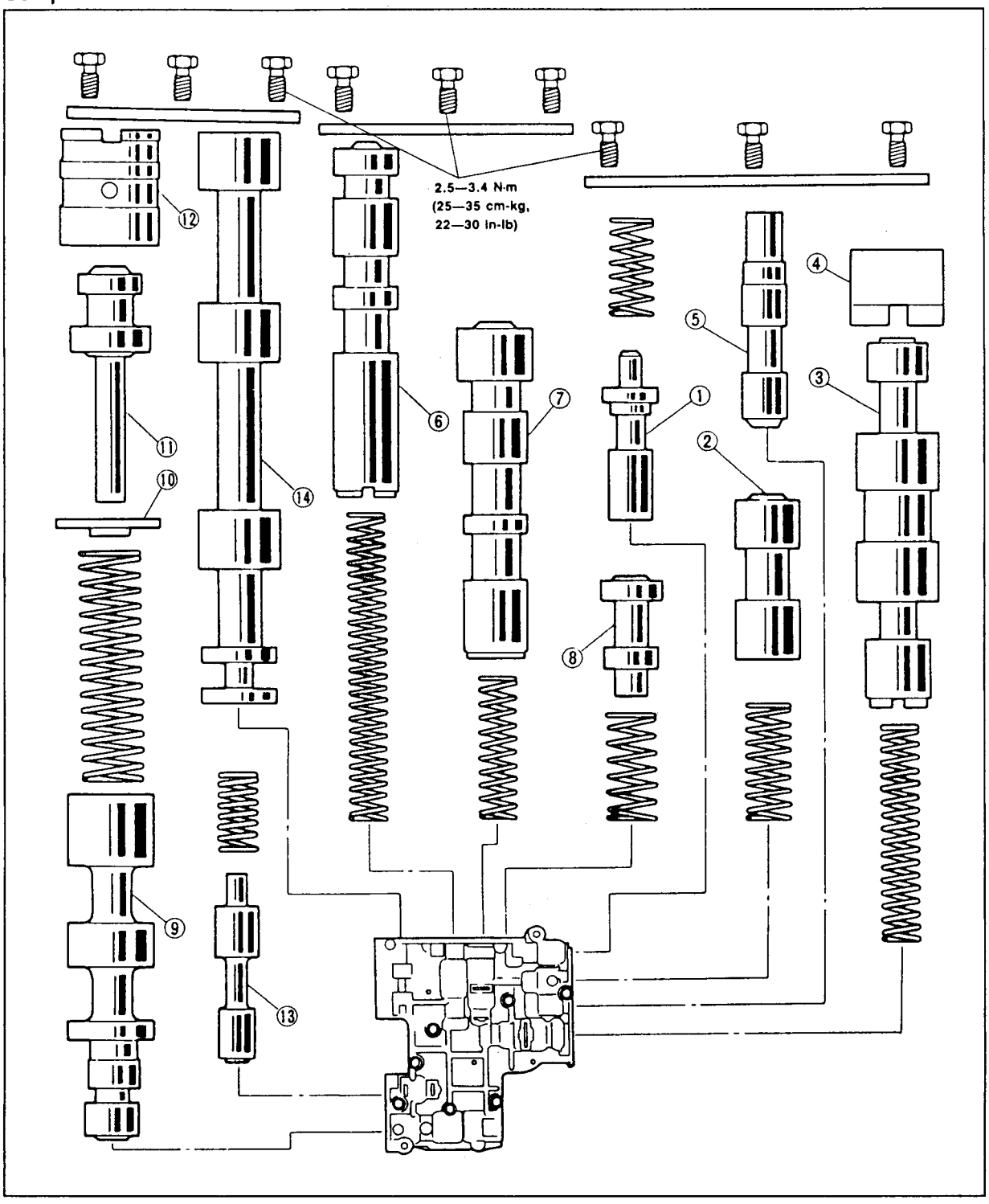
Valve spring	Outer dia. mm (in)	Free length mm (in)	No. of coils	Wire dia. mm (in)
Pressure regulator	11.7 (0.461)	43.0 (1.693)	15.0	1.2 (0.047)
1-2 shift	7.4 (0.291)	26.4 (1.039)	11.6	0.7 (0.028)
2-3 shift	7.4 (0.291)	57.6 (2.268)	26.0	0.9 (0.035)
3-4 shift	7.5 (0.295)	40.2 (1.583)	17.0	0.8 (0.031)
Pressure modifier	9.2 (0.362)	19.8 (0.780)	7.3	0.7 (0.028)
Throttle backup	8.3 (0.327)	18.3 (0.720)	7.5	0.8 (0.031)
N-R reducing	7.4 (0.291)	14.5 (0.571)	7.0	0.6 (0.024)
Backup control	8.5 (0.335)	21.3 (0.839)	9.3	0.9 (0.035)
N-R/2-3 accumulator	8.9 (0.350)	82.5 (3.248)	31.7	1.1 (0.043)
N-D accumulator	9.5 (0.374)	63.8 (2.512)	22.9	1.4 (0.055)
1-2 reducing	9.5 (0.374)	19.5 (0.768)	7.6	0.9 (0.035)
Throttle relief	7.4 (0.291)	38.2 (1.504)	17.0	1.1 (0.043)
3-2 control	5.5 (0.217)	39.5 (1.555)	22.4	0.7 (0.028)
1-2 accumulator	11.8 (0.465)	78.0 (3.071)	21.5	1.4 (0.055)
Orifice check	5.0 (0.197)	15.5 (0.610)	12.0	0.2 (0.008)
Throttle relief (ball)	6.5 (0.256)	26.8 (1.055)	16.0	0.9 (0.035)

Components



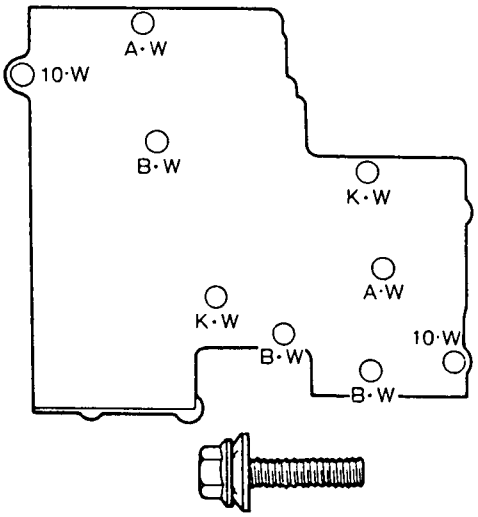
1. 1-2 accumulator piston
2. 3-2 control valve
3. Throttle relief valve
4. N-R/2-3 accumulator piston
5. 1-2 reducing valve
6. Stopper plug
7. N-D accumulator piston

Components

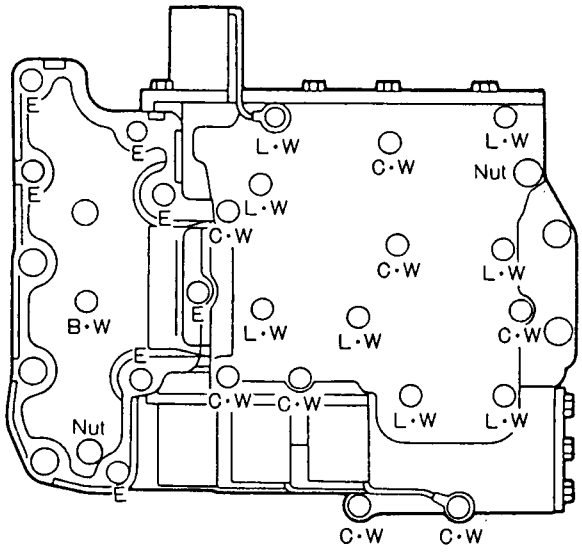


1. Throttle backup valve
2. Backup control valve
3. 3-4 shift valve
4. 3-4 shift sleeve
5. Vacuum throttle valve
6. 2-3 shift valve
7. 1-2 shift valve
8. Pressure modifier valve
9. Pressure regulator valve
10. Spring seat
11. Pressure regulator plug
12. Pressure regulator sleeve
13. N-R reducing valve
14. Manual valve

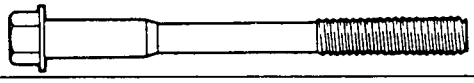
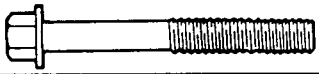
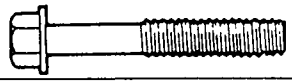
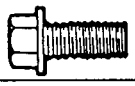
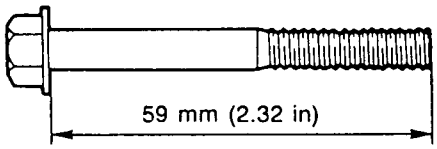
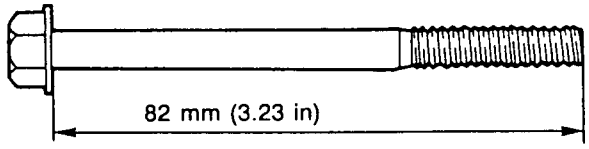
Bolt locations

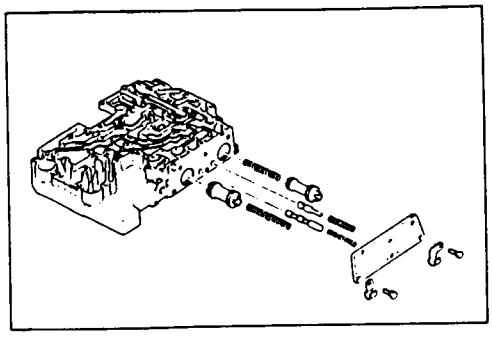


Dished washer direction



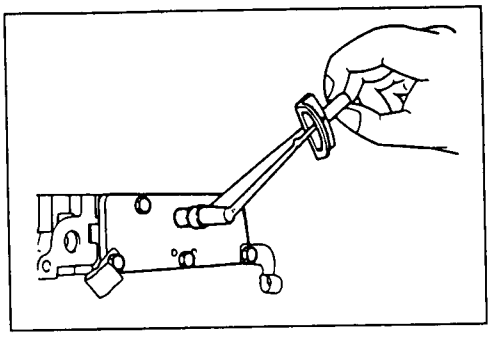
W:Dished washer

Indentification letter	Bolts	Torque specification
L		6.5—7.8 N·m (66—80 cm-kg, 57—69 in-lb)
A		
B		
K		
C		
E		
10		11—15 N·m (1.1—1.5 m-kg, 8.0—11 ft-lb)
10		



Assembly

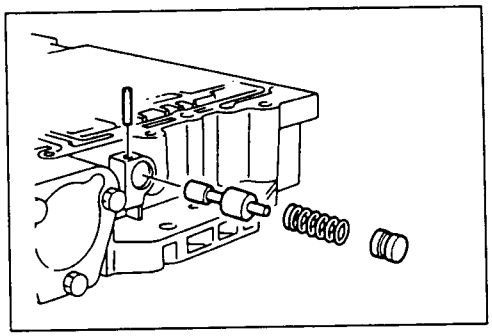
1. Apply ATF to the seal rings and install them onto the 1-2 accumulator piston.
2. Insert the 1-2 accumulator piston and spring.
3. Insert the 3-2 control valve and spring.
4. Insert the throttle relief valve and spring.
5. Apply ATF to the seal rings and install them onto the N-R/2-3 accumulator piston.
6. Insert the N-R/2-3 accumulator spring and valve.
7. Install the side plate.



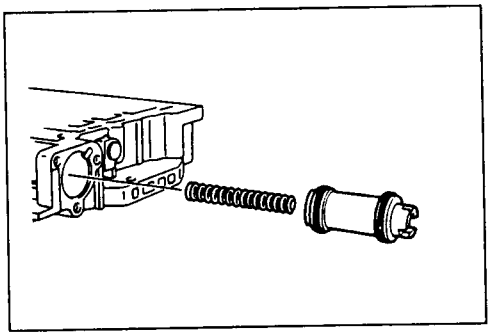
8. Install the clip and bolts.

Tightening torque:
2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)

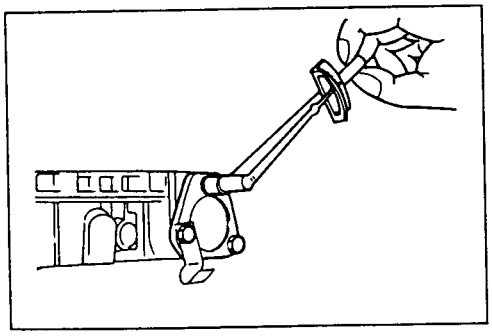
Note
Install the valves by consecutively blocking them with the side plate held with a bolt at the end.



9. Insert the 1-2 reducing valve, spring, and stopper plug.
10. Tap in the roll pin.

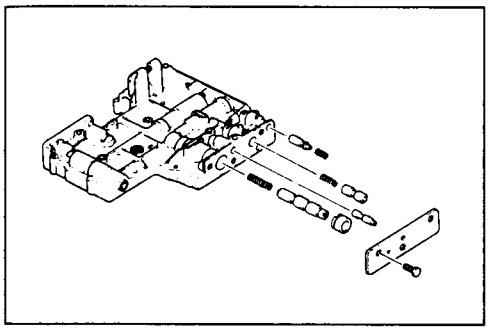


11. Apply ATF to the seal rings and install them onto the N-D accumlator piston.
12. Insert the N-D accumulator spring and piston.

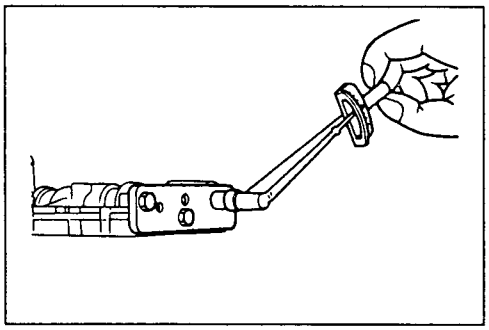


13. Install the clip and bolts.

Tightening torque:
2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)

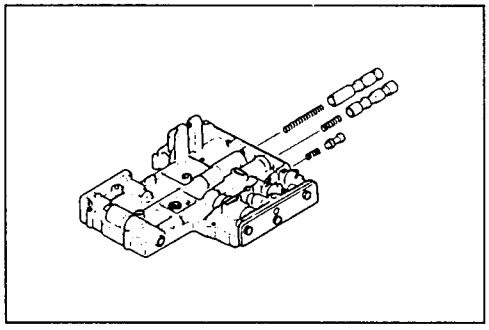


14. Insert the throttle backup valve and spring.
15. Insert the backup control spring and valve.
16. Insert the 3-4 shift spring, valve, and sleeve.
17. Insert the vacuum throttle valve.
18. Install the side plate so that it does not contact the vacuum throttle valve.

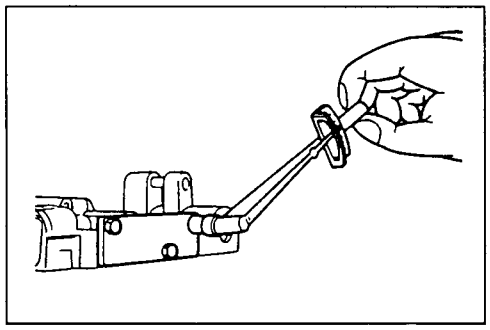


19. Tighten the installation bolts.

    Tightening torque:
    2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)



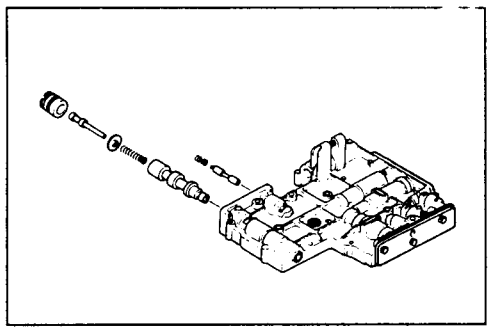
20. Insert the 2-3 shift spring and valve.
21. Insert the 1-2 shift spring and valve.
22. Insert the pressure modifier spring and valve.



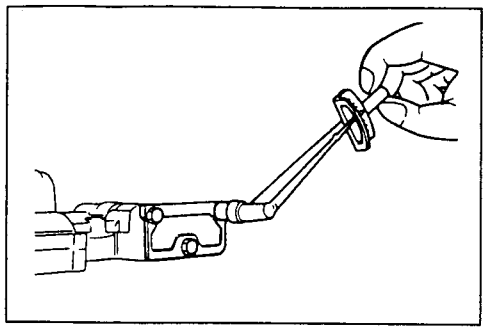
23. Install the side plate.
24. Tighten the installation bolts.

    Tightening torque:
    2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)

    Note
    Install the valves by consecutively blocking them with the side plate held with a bolt at the end.

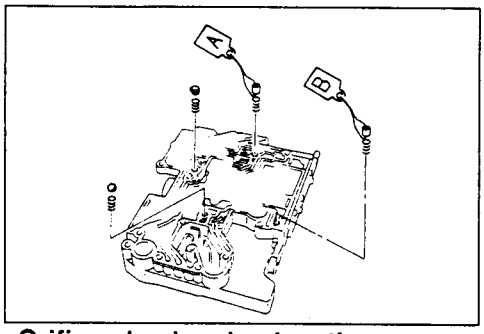


25. Insert the pressure regulator valve, spring, spring seat, plug, and sleeve.
26. Insert the N-R reducing valve and spring.



27. Install the side plate.
28. Tighten the installation bolts.

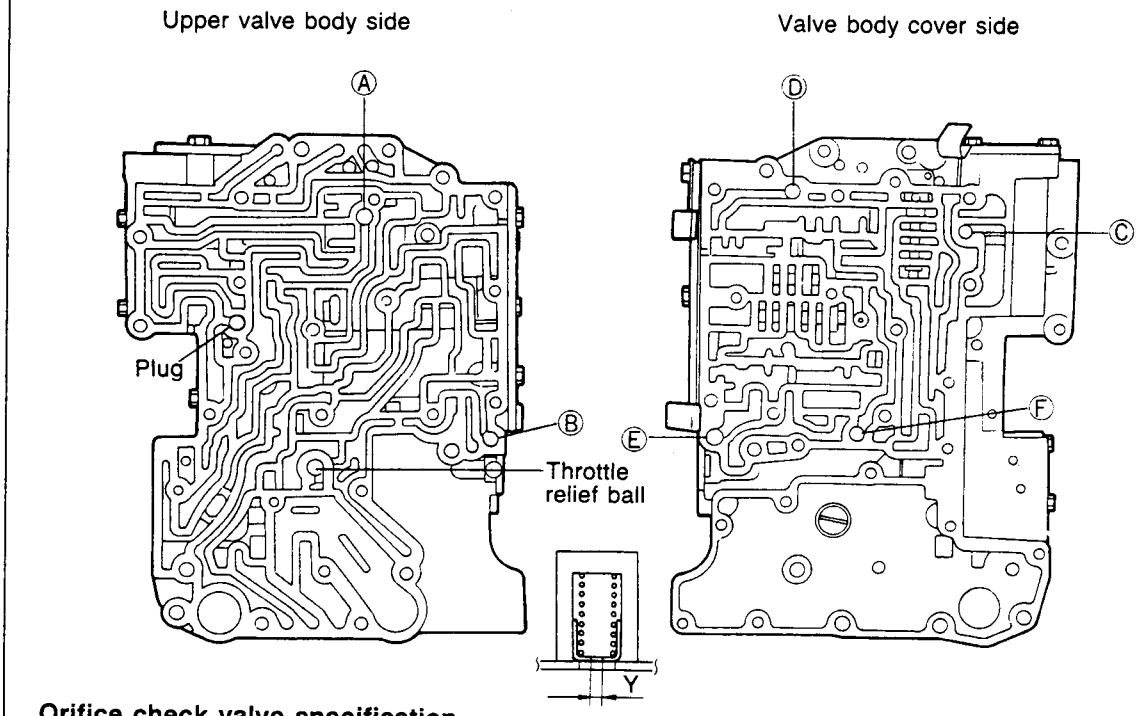
Tightening torque:
2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)



29. Insert the orifice check valve, plug and springs, and the check ball and spring in the lower valve body.

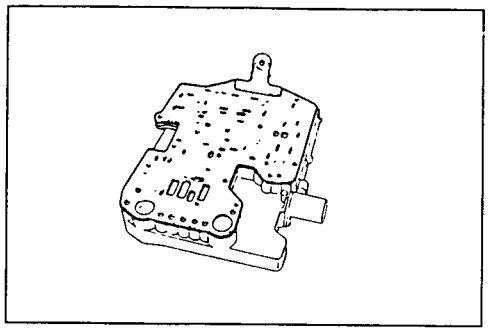
Note
Check that the orifice check valves and check ball are properly inserted. (Refer to page 7B—121.)

Orifice check valve location

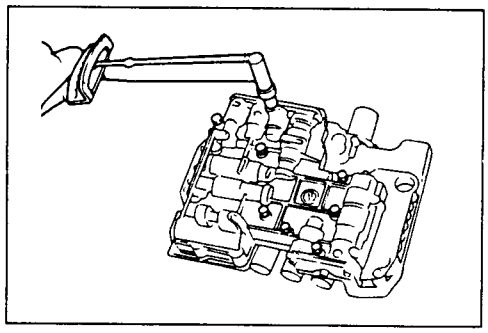


Orifice check valve specification

		Y diameter
Upper valve body side mm (in)	Ⓐ	ϕ1.8 (0.071)
	Ⓑ	ϕ2.2 (0.087)
Valve body cover side mm (in)	Ⓒ	ϕ1.8 (0.071)
	Ⓓ	ϕ1.5 (0.059)
	Ⓔ	ϕ1.1 (0.043)
	Ⓕ	ϕ1.0 (0.039)



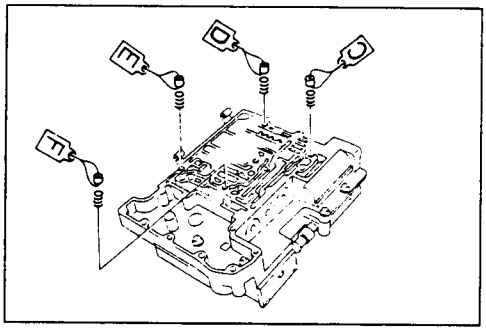
30. Position the separate plate and lower gasket on the lower valve body. Align the plate and valve body and hold them together with large clips.



31. Install the upper gasket and upper valve body on the separate plate.
32. Tighten the installation bolts.

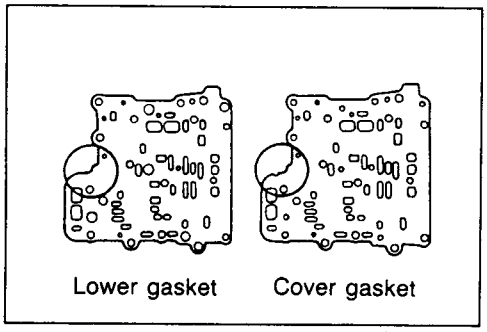
Tightening torque:
6.5—7.8 N·m (66—80 cm-kg, 57—69 in-lb)

Note
Check that the installation bolts are installed in the correct position. (Refer to page 7B—117.)



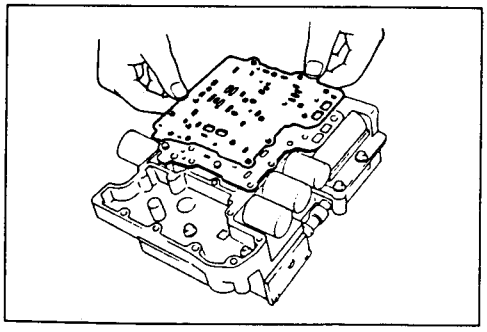
33. Turn over the valve body assembly and insert the orifice check valves and springs in the lower valve body.

Note
Check that the orifice check valves are properly inserted. (Refer to page 7B—121.)

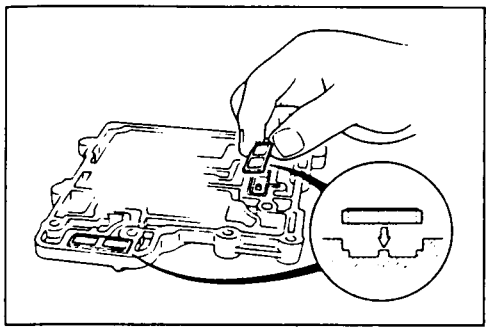


34. Install the lower gasket on the lower valve body.

Note
The lower gasket is identified as shown.

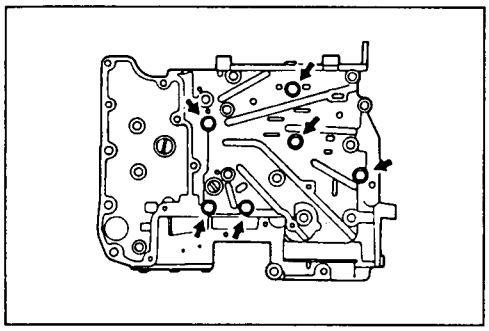


35. Install the lower gasket, separate plate, and cover gasket.



36. Install the inner strainer in the valve body cover.

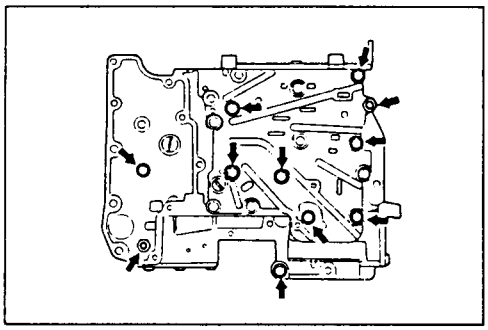
Note
Affix the inner strainer with ATF.



37. Install the valve body cover on the cover gasket.

Tightening torque:
6.5—7.8 N·m (66—80 cm-kg, 57—69 in-lb)

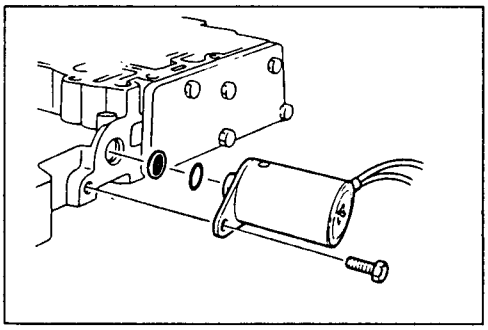
Note
Check that the installation bolts are installed in the correct position. (Refer to page 7B—117.)



38. Tighten the installation bolts and nuts.

Tightening torque:
Bolt: 6.5—7.8 N·m (66—80 cm-kg, 57—69 in-lb)
Nut: 11—15 N·m (1.1—1.5 m-kg, 8.0—15 ft-lb)

Note
Check that the installation bolts are installed in the correct position. (Refer to page 7B—117.)

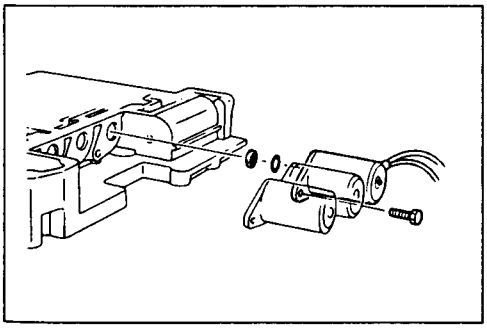


39. Apply ATF to the O-rings and install them onto the each solenoid valve.
40. Install the oil strainer in the lower valve body.

Note
Affix the oil strainer with ATF.

41. Install the 3-2 control solenoid valve.
42. Tighten the installation bolt.

Tightening torque:
2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)

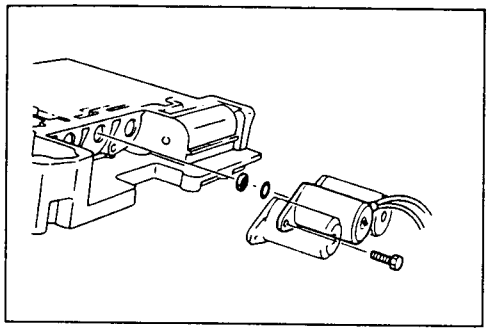


43. Install the oil strainer in the lower valve body.

Note
Affix the oil strainer with ATF.

44. Install the 3-4 shift solenoid valve.
45. Tighten the installation bolt.

Tightening torque:
2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)

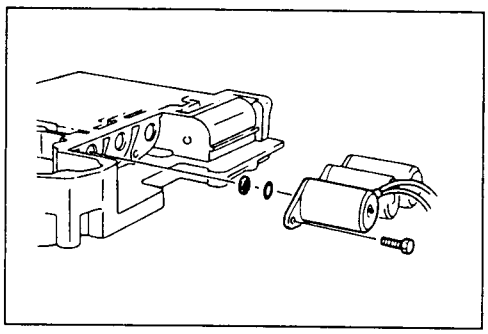


46. Install the oil strainer in the lower valve body.

Note
Affix the oil strainer with ATF.

47. Install the 2-3 shift solenoid valve.
48. Tighten the installation bolt.

Tightening torque:
2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)

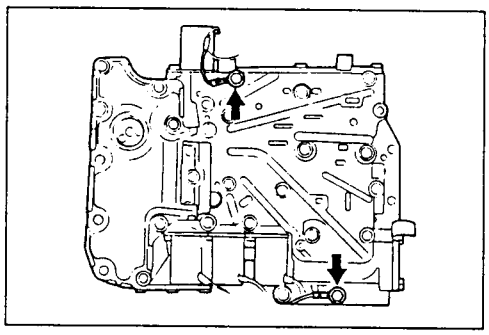


49. Install the oil strainer in the lower valve body.

Note
Affix the oil strainer with ATF.

50. Install the 1-2 shift solenoid valve.
51. Tighten the installation bolt.

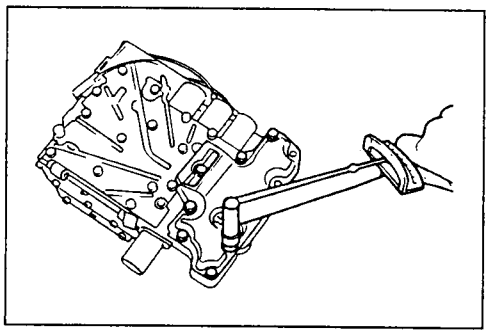
Tightening torque:
2.5—3.4 N·m (25—35 cm-kg, 22—30 in-lb)



52. Connect the ground terminals and tighten the bolts.

Tightening torque:
6.5—7.8 N·m (66—80 cm-kg, 57—69 in-lb)

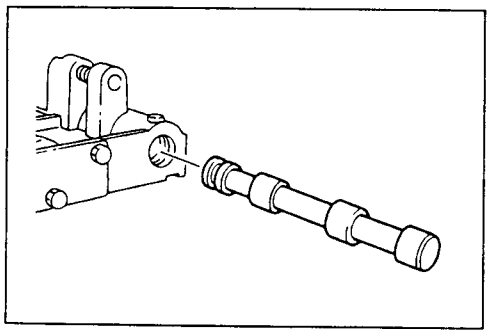
Note
Check that the installation bolts are installed in the correct position. (Refer to page 7B—117.)



53. Mount the oil strainer.
54. Tighten the installation bolts.

Tightening torque:
6.5—7.8 N·m (66—80 cm-kg, 57—69 in-lb)

Note
Check that the installation bolts are installed in the correct position. (Refer to page 7B—117.)



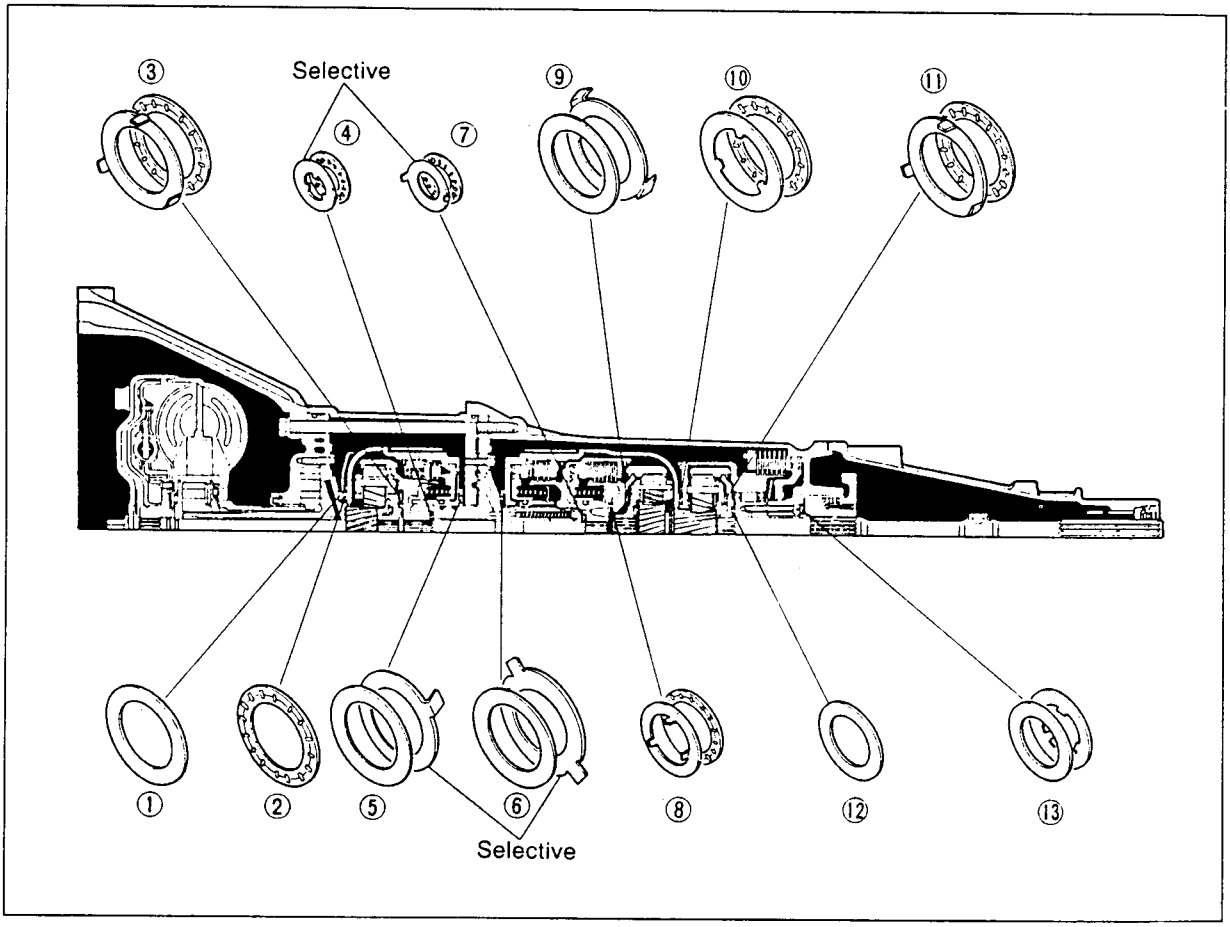
55. Install the manual valve.

ASSEMBLY

PRECAUTION

1. The automatic transmission consists of high-precision finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage or affect performance.
2. Clean out oil holes and oil passages with compressed air, and check that there are no obstructions.
3. Before assembly, apply ATF to each O-ring, seal ring, rotating part, and friction part.
4. If brake bands or drive plates are replaced with new ones, first soak them in ATF for at least 2 hours.
5. Each seal, gasket, and O-ring must be replaced with new ones.
6. Be sure to install thrust bearings and races in the correct direction and position.

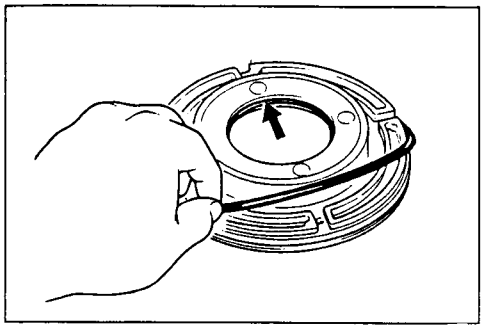
Thrust Washer, Bearing, and Race Location



Outer diameter of bearing and race

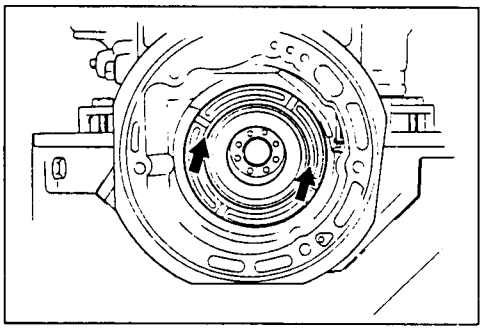
		1	2	3	4	5	6	7
Bearing	mm (in)	69.9 (2.75)	69.9 (2.75)	69.9 (2.75)	34.9 (1.37)	69.9 (2.75)	69.9 (2.75)	34.9 (1.37)
Race	mm (in)	—	—	70.0 (2.76)	33.0 (1.30)	70.0 (2.76)	76.0 (2.99)	33.0 (1.30)

		8	9	10	11	12	13
Bearing	mm (in)	52.9 (2.08)	69.9 (2.75)	69.9 (2.75)	69.9 (2.75)	46.9 (1.85)	52.9 (2.08)
Race	mm (in)	51.5 (2.03)	70.0 (2.76)	70.0 (2.76)	70.0 (2.76)	—	51.5 (2.03)



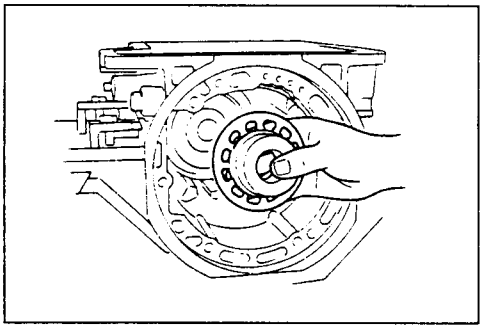
Procedure

1. Mount the transmission case on the engine stand.
2. Apply ATF to the seal ring and install it onto the low and reverse brake piston.
3. Apply ATF to the O-ring and install it in the low and reverse brake piston.

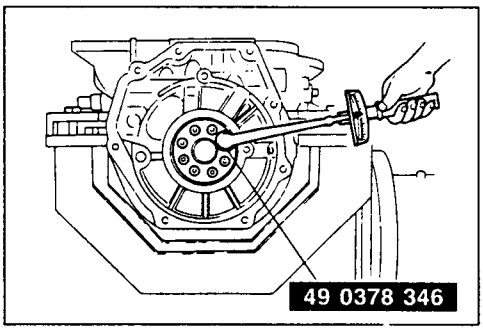


4. Install the low and reverse brake piston.

Caution
Apply ATF to the seal rings, and press the perimeter of the piston evenly when installing.

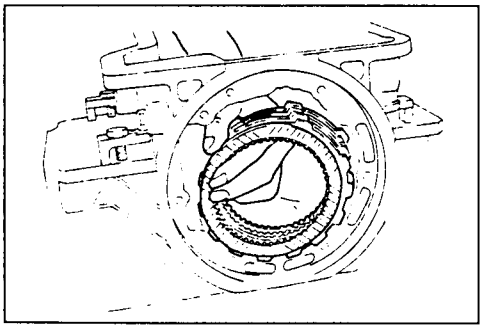


5. Assemble the one-way clutch inner race, thrust washer, and piston return spring, and install them in the transmission case.
6. Check that the return spring, thrust washer, and rings are properly positioned before securing the bolts.



7. Tighten the inner race mounting bolts with the **SST**.

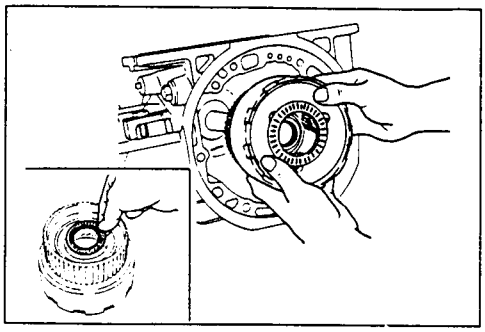
Tightening torque:
13—18 N·m (1.3—1.8 m-kg, 9.4—13 ft-lb)



8. Install the driven plates and drive plates.

Note
Installation order:
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive

9. Install the retaining plate.
10. Install the snap ring.

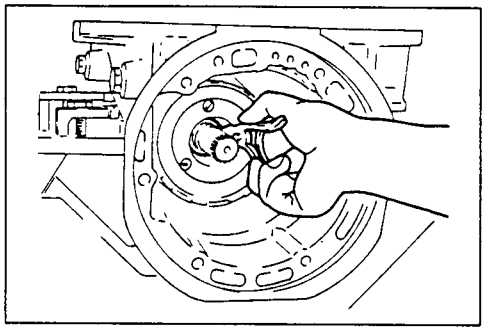


17. Install the bearings on the rear and front side of planetary gear unit.

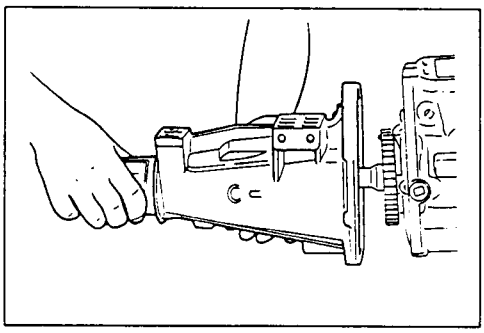
Bearing outer diameter
Connecting shell side: 69.9 mm (2.75 in)
One-way clutch inner race side: 46.9 mm (1.85 in)

Note
Affix the bearings with petroleum jelly.

18. Install the rear planetary gear unit (connecting drum, internal gear, and rear planetary pinion carrier) in the low and reverse brake side.
19. Install the snap ring on the front side of the output shaft.



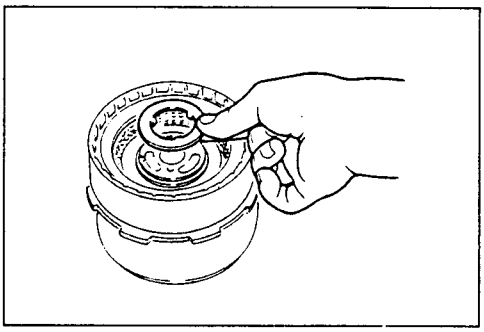
WHEN THE CONNECTING DRUM IS INSTALLED IN THE CASE, THE DRUM MUST TURN **CLOCKWISE** AND LOCK **COUNTER CLOCKWISE**



20. Install a new gasket on the transmission case.
21. Install the rear extension housing.

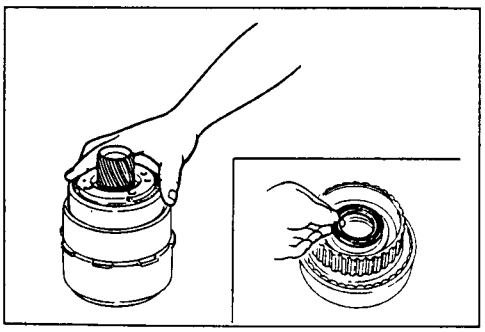
Tightening torque:
20—25 N·m (2.0—2.5 m-kg, 14—18 ft-lb)

22. Check that the output shaft is locked with the manual lever in P range.



23. Set the rear clutch assembly on the top of the front clutch assembly.
24. Install the bearing race on the rear clutch assembly.

Bearing race outer diameter: 51.5 mm (2.03 in)

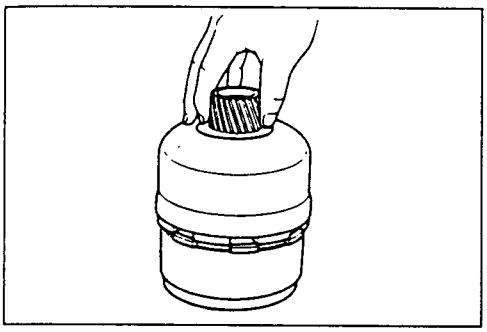


25. Install the bearing on the front planetary gear unit.

Bearing outer diameter: 52.9 mm (2.08 in)

Note
Affix the bearing with petroleum jelly.

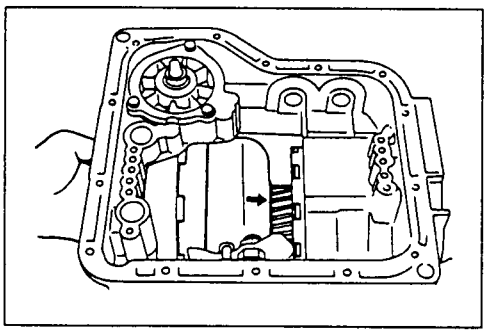
26. Install the front planetary gear unit (rear clutch hub, front planetary pinion carrier, and sun gear) in the rear clutch assembly.



27. Install the connecting shell and bearing race from the top of the front planetary gear unit.

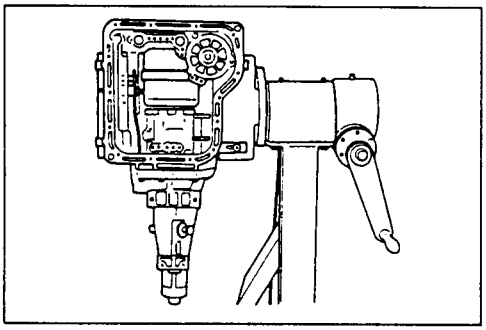
Bearing race outer diameter: 70.0 mm (2.76 in)

Note
Affix the bearing race with petroleum jelly.

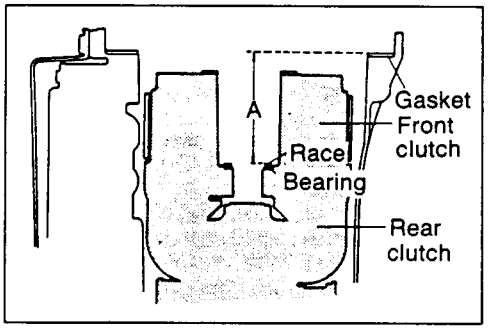


28. Install the front clutch, rear clutch, rear clutch hub, front planetary pinion carrier, connecting shell, internal gear, sun gear, bearing, and bearing races as a unit into the transmission case.

Caution
Pay close attention to prevent incorrect assembly of the many similar bearings and races.



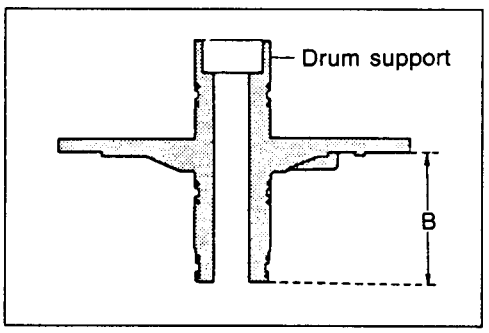
29. Check and adjust the rear clutch total end play.
(1) Position the front of the transmission case upward.
(2) Set the drum support bearing and race on the rear clutch.
(3) Install a new drum support gasket in the transmission case.



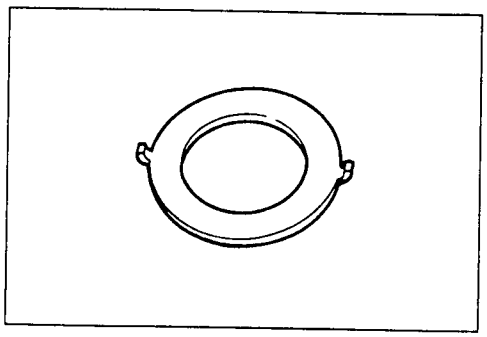
(4) Measure distances A and B with a straightedge and vernier calipers.
(5) Calculate the total end play by using the formula below.

Formula: T = A — B — 0.1 mm (0.0039 in)

T: Total end play
A: The distance between the drum support mounting surface (including the drum support gasket) and the drum support bearing race surface on the rear clutch assembly.
B: The distance between the drum support bearing race contact surface and the drum support gasket contact surface.
0.1:The compression amount of a new gasket.



Total end play: 0.25—0.50 mm (0.0098—0.0197 in)

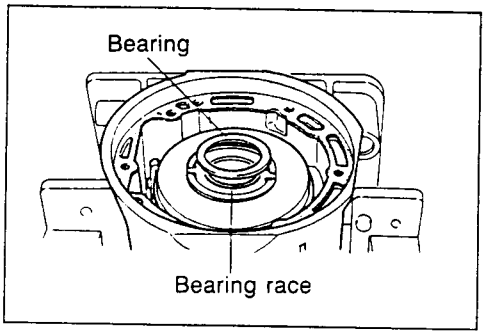


(6) Adjust the total end play by selecting the proper bearing race.

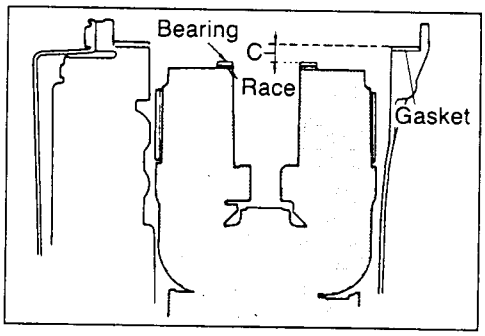
Bearing race sizes

mm (in)

1.2 (0.047)	1.4 (0.055)	1.6 (0.063)
1.8 (0.071)	2.0 (0.079)	2.2 (0.087)



30. Check and adjust the front clutch end play.
(1) Install the bearing race and bearing in position.

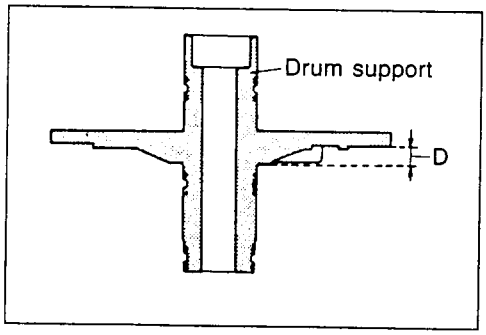


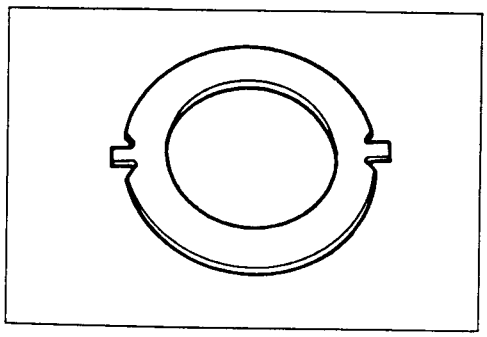
(2) Measure distances C and D with a straightedge and vernier calipers.
(3) Calculate the front clutch end play by using the formula below.

Formula: T = C — D — 0.1 mm (0.0039 in)

T: Front clutch end play
C: The distance between the drum support mounting surface (including the drum support gasket) of the transmission case and the bearing surface on the front clutch assembly.
D: The distance between the sliding surface of the bearing and the drum support gasket contact surface.
0.1: The compression amount of a new gasket.

Front clutch end play: 0.5—0.8 mm (0.020—0.031 in)



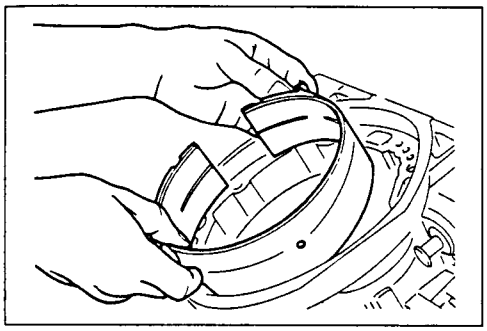


(4) Adjust the front clutch end play by selecting the proper bearing race.

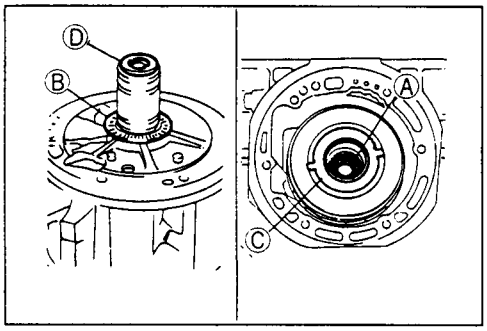
Bearing race sizes

mm (in)

0.8 (0.031)	1.0 (0.039)	1.2 (0.047)
1.4 (0.055)	1.6 (0.063)	1.8 (0.071)
2.0 (0.079)	2.2 (0.087)	



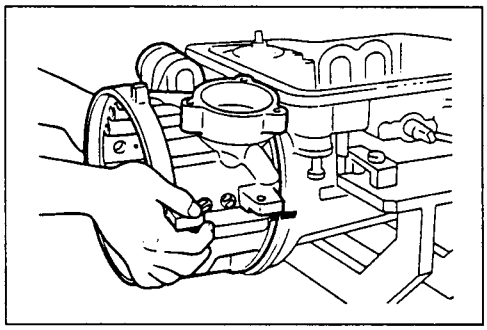
31. Install the 2nd brake band and strut in position.
32. Tighten the piston stem lightly.



33. Install the bearings and bearing races as shown in the figure.

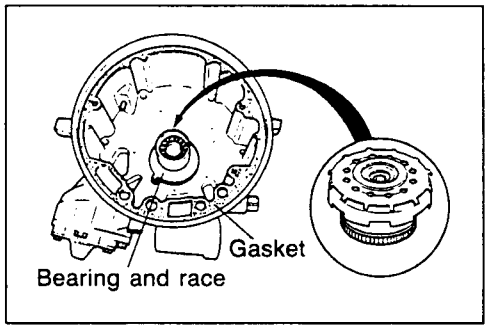
Bearing outer diameter
A: 34.9 mm (1.37 in)
B: 69.9 mm (2.75 in)
Bearing race outer diameter
C: 76.0 mm (2.99 in)
D: 33.0 mm (1.30 in)

Note
Affix the bearings and bearing races with petroleum jelly.



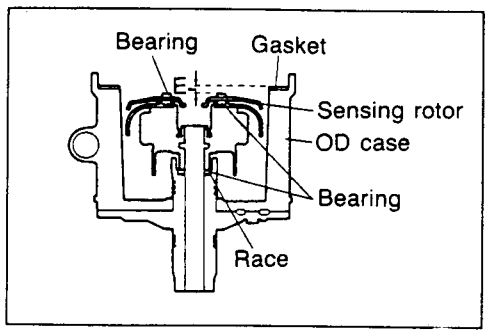
34. Install a new gasket in the transmission case.
35. Check that the bearing race is on top of the front clutch and the bearing is at the bottom of the front clutch, then mount the OD case.

Note
a) Align the matching marks of the transmission case and OD case. Tap lightly with a plastic hammer to avoid damaging the seal rings when installing.
b) Install two bolts for alignment.



36. Check and adjust the OD planetary gear unit total end play.
    (1) Position the OD case upright.
    (2) Install the bearing and race on the OD case.
    (3) Install the planetary carrier, sun gear, connecting shell, and bearing as a unit in the OD case.
    (4) Install the sensing rotor and bearing on the connecting shell.

Note
a) Do not install the direct clutch drum at this time.
b) The sensing rotor and bearing are part of the oil pump assembly.

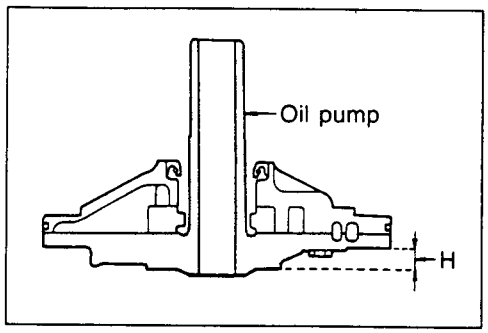


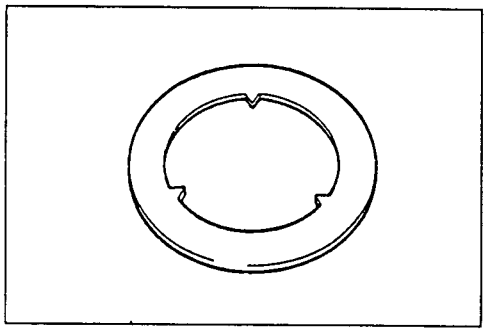
(5) Install a new oil pump gasket in the OD case.
(6) Measure distances E and H with a straightedge and vernier calipers.
(7) Calculate the OD gear train total end play by using the formula below.

Formula: T = E — H — 0.1 mm (0.0039 in)

T: Total end play
E: The distance between the oil pump mounting surface (including the oil pump gasket) and the sensing rotor bearing surface.
H: The distance between the oil pump side sensing rotor bearing contact surface and the oil pump gasket contact surface.
0.1: The compression amount of a new gasket.

Total end play: 0.25—0.50 mm (0.0098—0.0197 in)



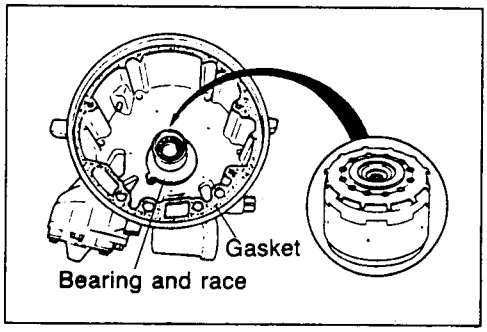


(8) Adjust the total end play by selecting the proper bearing race.

Bearing race sizes

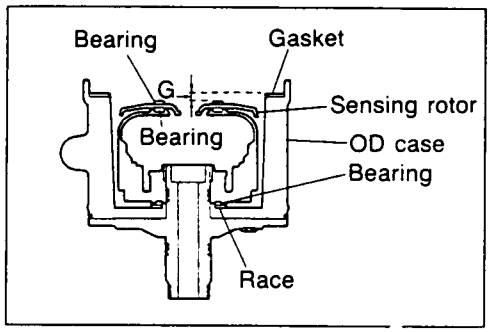
mm (in)

1.2 (0.047)	1.4 (0.055)	1.6 (0.063)
1.8 (0.071)	2.0 (0.079)	2.2 (0.087)



37. Check and adjust the direct clutch end play.
(1) Install the bearing race in the OD case.
(2) Install the direct clutch, sun gear, connecting shell, and bearings in the OD case.
(3) Install the sensing rotor and bearing on the connecting shell.

Note
a) Do not install the planetary pinion carrier at this time.
b) The sensing rotor and bearing are part of the oil pump assembly.

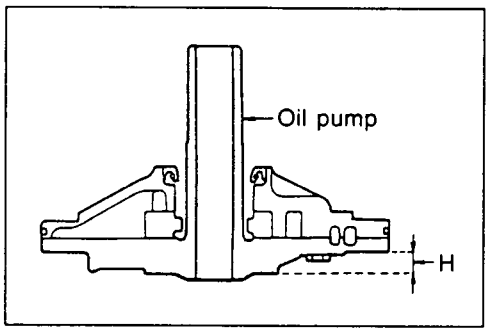


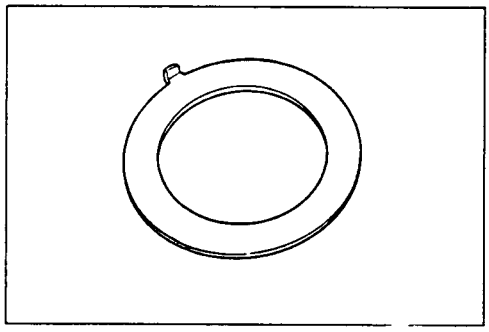
(4) Measure distances G and H with a straightedge and vernier calipers.
(5) Calculate the direct clutch end play by using the formula below.

Formula: T = G — H — 0.1 mm (0.0039 in)

T: Total end play
G: The distance between the oil pump mounting surface (including the oil pump gasket) and the sensing rotor bearing surface.
H: The distance between the oil pump side sensing rotor bearing contact surface and the oil pump gasket contact surface.
0.1: The compression amount of a new gasket.

Total end play: 0.5—0.8 mm (0.020—0.031 in)



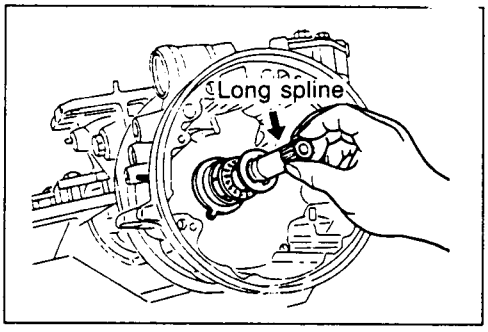


(6) Adjust the direct clutch end play by selecting the proper bearing race.

Bearing race sizes

mm (in)

0.8 (0.031)	1.0 (0.039)	1.2 (0.047)
1.4 (0.055)	1.6 (0.063)	1.8 (0.071)
2.0 (0.079)	2.2 (0.087)	



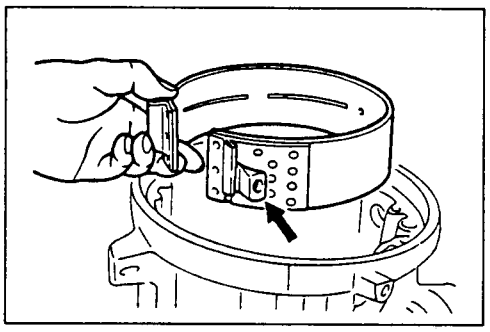
38. Insert the intermediate shaft.

Caution
The end with the long spline is the front.
Long spline: 23.0 mm (0.91 in)
Short spline: 18.6 mm (0.73 in)

39. Install the large bearing race.

Bearing race outer diameter: 70.0 mm (2.76 in)

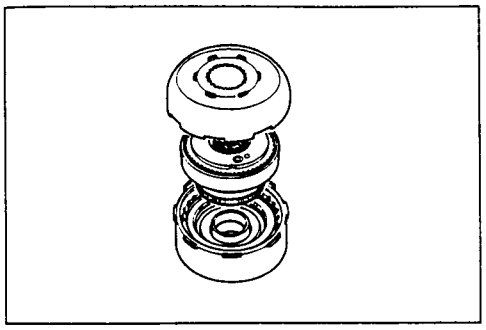
Note
Affix the bearing race with petroleum jelly.



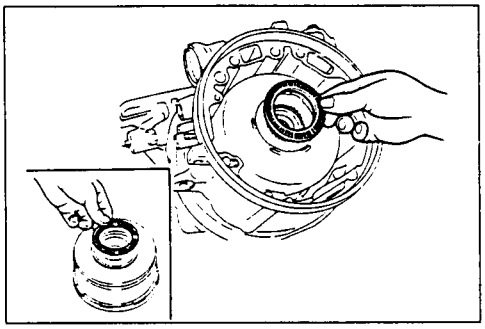
40. Install the small bearing, then the small bearing race.

Bearing outer diameter: 34.9 mm (1.37 in)
Bearing race outer diameter: 33.0 mm (1.30 in)

41. Install the OD brake band and band strut.



42. Install the OD planetary gear unit (OD clutch hub, internal gear, OD planetary carrier, and sun gear) on the direct clutch.
43. Install the OD connecting shell on the OD planetary gear unit.



44. Install the bearing on the direct clutch assembly.

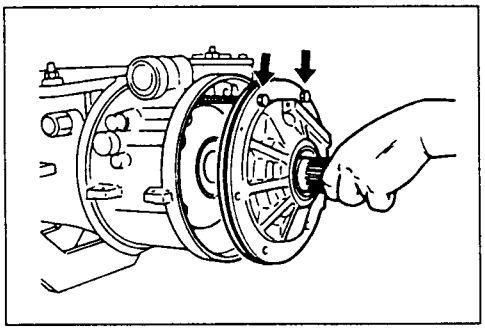
Bearing outer diameter: 69.9 mm (2.75 in)

Note
Affix the bearing with petroleum jelly.

45. Install the direct clutch assembly.
46. Install the bearing on the OD connecting shell.

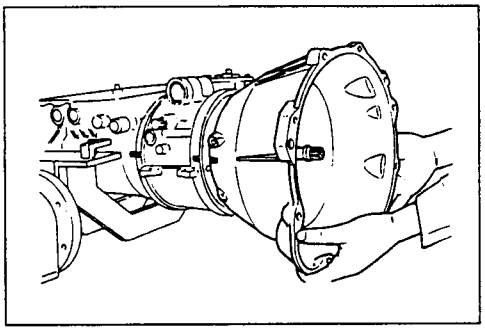
Bearing outer diameter: 69.9 mm (2.75 in)

Note
Affix the bearing with petroleum jelly.



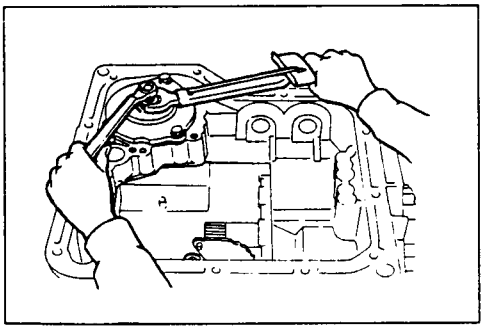
47. Install a new gasket in the OD case.
48. Install the oil pump, input shaft, bearing, and sensing rotor as a unit.

Note
Position the pump with two bolts and install by tapping lightly with a plastic hammer.



49. Apply sealant to the bolt flanges and converter housing contact surface.
50. Install the converter housing.

Tightening torque:
59—69 N·m (6.0—7.0 m-kg, 43—51 ft-lb)



51. Apply ATF to the piston stem.
52. Adjust the 2nd brake band.
(1) Loosen the locknut and tighten the piston stem.

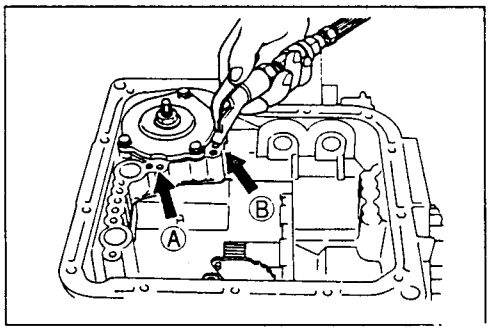
Tightening torque:
12—14 N·m (1.25—1.45 m-kg, 9.0—10.5 ft-lb)

(2) Loosen the stem the number of turns shown below.

Stem: 2 1/2 turns

(3) Hold the piston stem and tighten the locknut.

Tightening torque:
15—39 N·m (1.5—4.0 m-kg, 11—29 ft-lb)

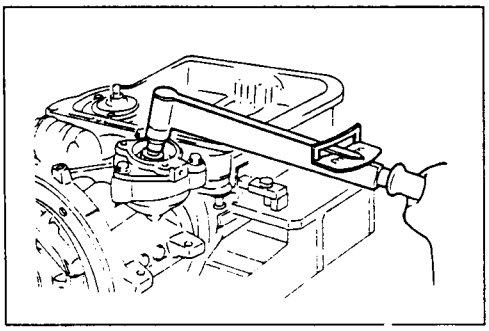


53. Check the servo piston operation by applying compressed air to the oil passage of the 2nd band servo.

A:Engage
B:Release

Air pressure: 392 kPa (4.0 kg/cm^2, 57 psi) max.

Caution
Apply air for no more than 3 seconds.



54. Apply ATF to the piston stem.
55. Adjust the OD brake band.
    (1) Loosen the locknut and tighten the piston stem.

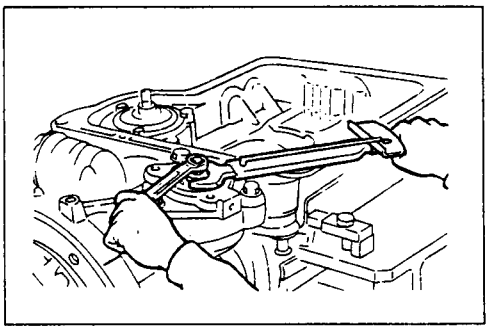
Tightening torque:
12—15 N·m (1.2—1.5 m-kg, 8.7—11 ft-lb)

    (2) Loosen the stem the number of turns shown below.

Stem: 2 turns

    (3) Hold the piston stem and tighten the locknut.

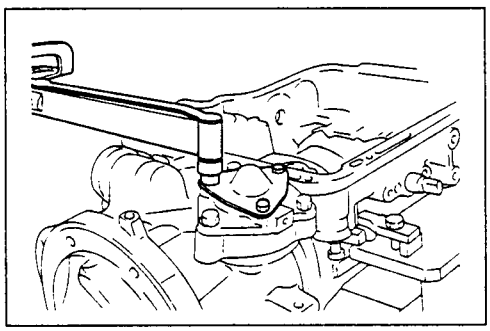
Tightening torque:
15—39 N·m (1.5—4.0 m-kg, 11—29 ft-lb)



56. Check the servo piston operation by applying compressed air to the oil passage of the OD band servo.

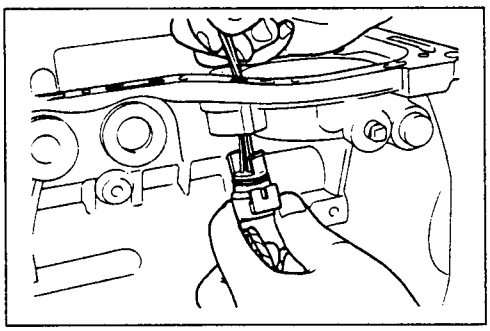
Air pressure: 392 kPa (4.0 kg/cm^2, 57 psi) max.

Caution
Apply air for no more than 3 seconds.

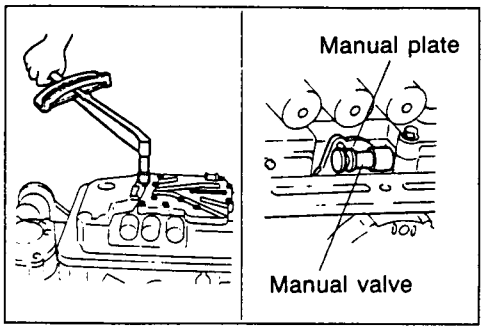


57. Install a new gasket on the OD band servo.
58. Install the OD band servo cover.

Tightening torque:
4.9—6.9 N·m (50—70 cm-kg, 43—61 in-lb)



59. Apply ATF to the O-ring and install it onto the solenoid valve connector.
60. Install the solenoid valve connector in the transmission case

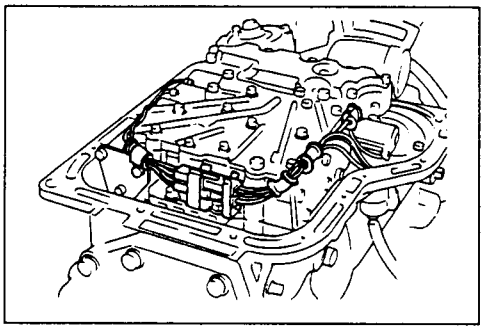


61. Install the valve body assembly.

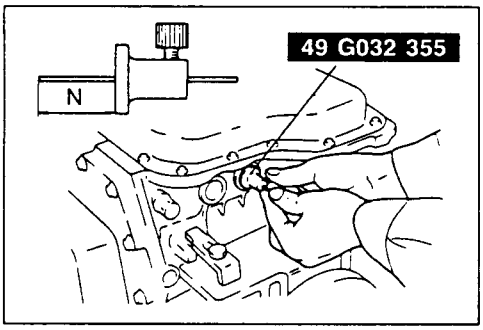
Note
Be sure to align the manual plate and the manual valve.

62. Install the bolts.

Tightening torque:
11—15 N·m (1.1—1.5 m-kg, 8.0—11 ft-lb)



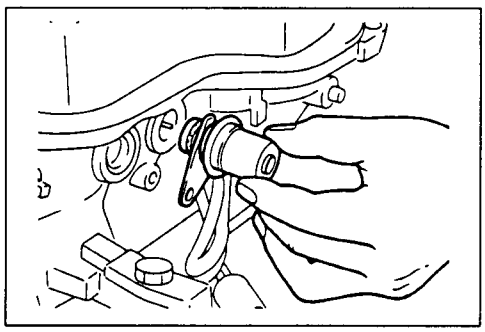
63. Connect the solenoid valve connectors.
64. Install the harnesses.



65. Apply ATF to the O-ring and install it onto the vacuum diaphragm.
66. Select the diaphragm rod.
    (1) Measure the N dimension with the **SST** and a scale.
    (2) Select the diaphragm rod in accordance with the table below.

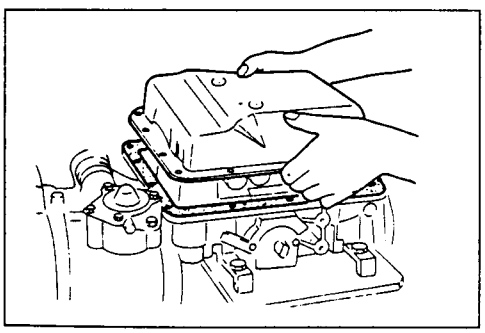
SST = SPECIAL SERVICE TOOL

N dimension	Applicable diaphragm rod length
Below 27.20 mm (1.0709 in)	29.0 mm (1.14 in)
27.30—28.70 mm (1.0748—1.0905 in)	29.5 mm (1.16 in)
27.80—28.20 mm (1.0945—1.1102 in)	30.0 mm (1.18 in)
28.30—28.70 mm (1.1142—1.1300 in)	30.5 mm (1.20 in)
28.80 mm (1.1339 in) or over	31.0 mm (1.22 in)



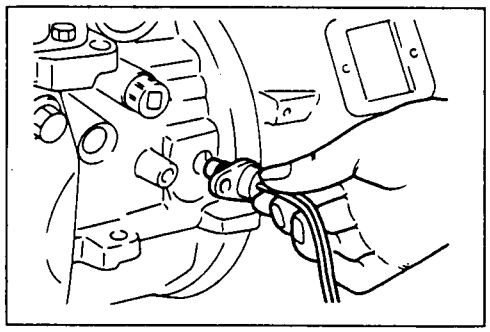
67. Install the vacuum diaphragm.

Tightening torque:
7.8—11 N·m (80—110 cm-kg, 69—95 in-lb)



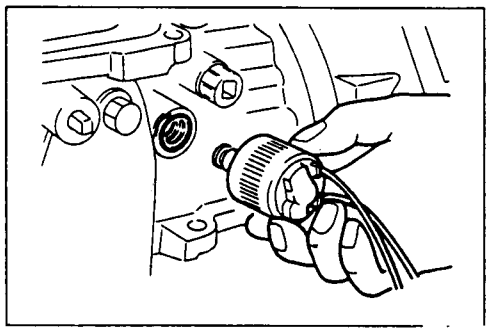
68. Install the magnets in the oil pan.
69. Install the oil pan and a new gasket.
70. Install the bracket and bolts.

Tightening torque:
5.9—7.8 N·m (60—80 cm-kg, 52—69 in-lb)

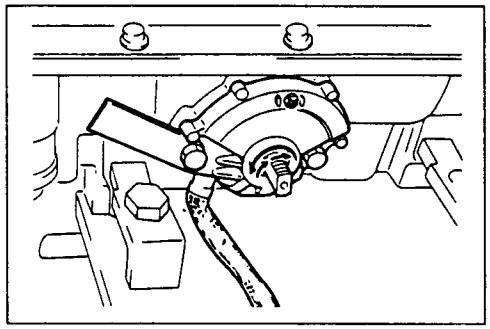


71. Apply ATF to the O-ring and install it onto the turbine sensor.
72. Apply locking compound to the mounting bolt threads, then install the turbine sensor.

Tightening torque:
7.8—11 N·m (80—110 cm-kg, 69—95 in-lb)

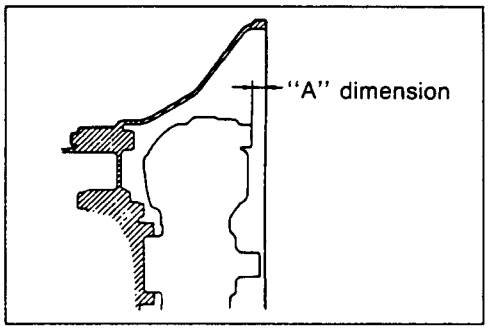


73. Apply ATF to the O-rings and install them into the transmission case.
74. Install the lockup control solenoid.



75. Rotate the manual shaft forward fully, then return it 2 notches to the N position.
76. Loosely tighten the inhibitor switch bolts.
77. Remove the screw on the switch body and slightly move the inhibitor switch so that the screw hole on the switch body is aligned with the small hole inside the switch. Check their alignment by inserting a **2.0 mm (0.0079 in)** diameter pin into the holes.
78. Tighten the switch attaching bolts.
79. Remove the pin and tighten the screw into the hole.

Tightening torque:
4.9—6.9 N·m (50—70 cm-kg, 43—61 in-lb)



80. Before installing, hold the torque converter in an erect position and fill it with ATF. Do not allow the fluid to overflow.
81. Ensure that the torque converter is installed correctly by measuring the clearance ("A") between the end of the torque converter and the end of the converter housing.

"A": 32 mm (1.26 in) min.

MAZDA N4AEL
SOFT OR FLARED SHIFTS WHEN WARM

Complaint: Shifts seem fine when cold, but become increasingly drawn out as the transmission warms up.

Cause: Valve body calibration problems related to fluid temperature.

Correction:
1. Check all accumulator piston teflon rings for fit.
2. Replace the 1-2 accumulator piston teflon rings with suitable "O" rings. Replace the 1-2 accumulator spring with a stronger spring(A 700-R4 throttle plunger spring is sufficient if it is shimmed 1/4 in. on the piston side). **SEE FIGURE 1.**
3. Move orifice **B** (servo release orifice) to the orifice **D** (direct clutch orifice) location and move the orifice **D** to the orifice **B** location. **SEE FIGURE 2.**
4. Replace the intermediate band servo spring with a weaker one. The L4N71B servo spring is weaker or a blue accumulator spring from an AXOD.

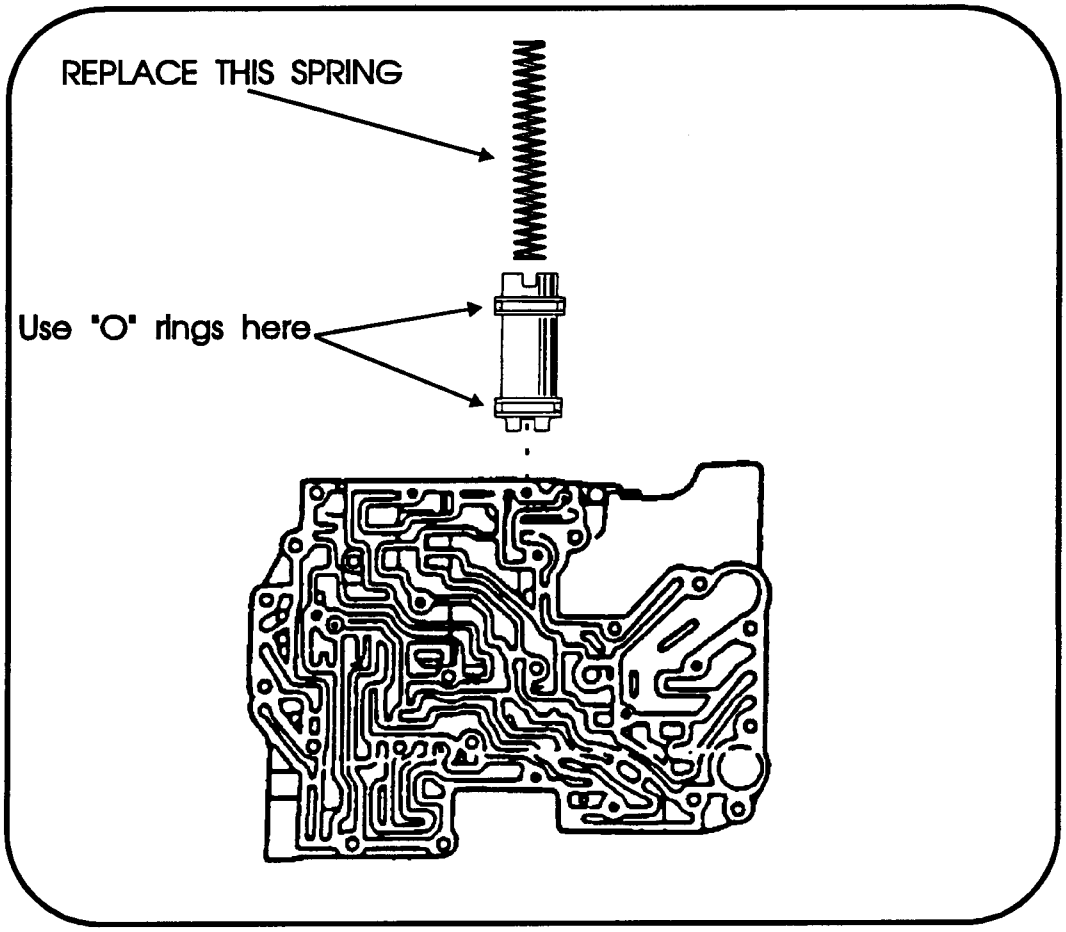
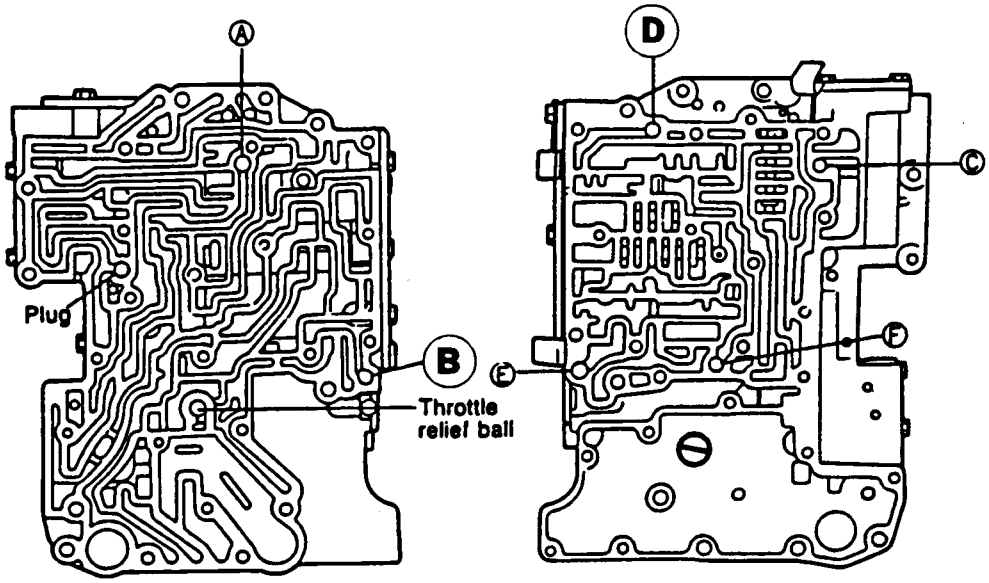


Figure 1.

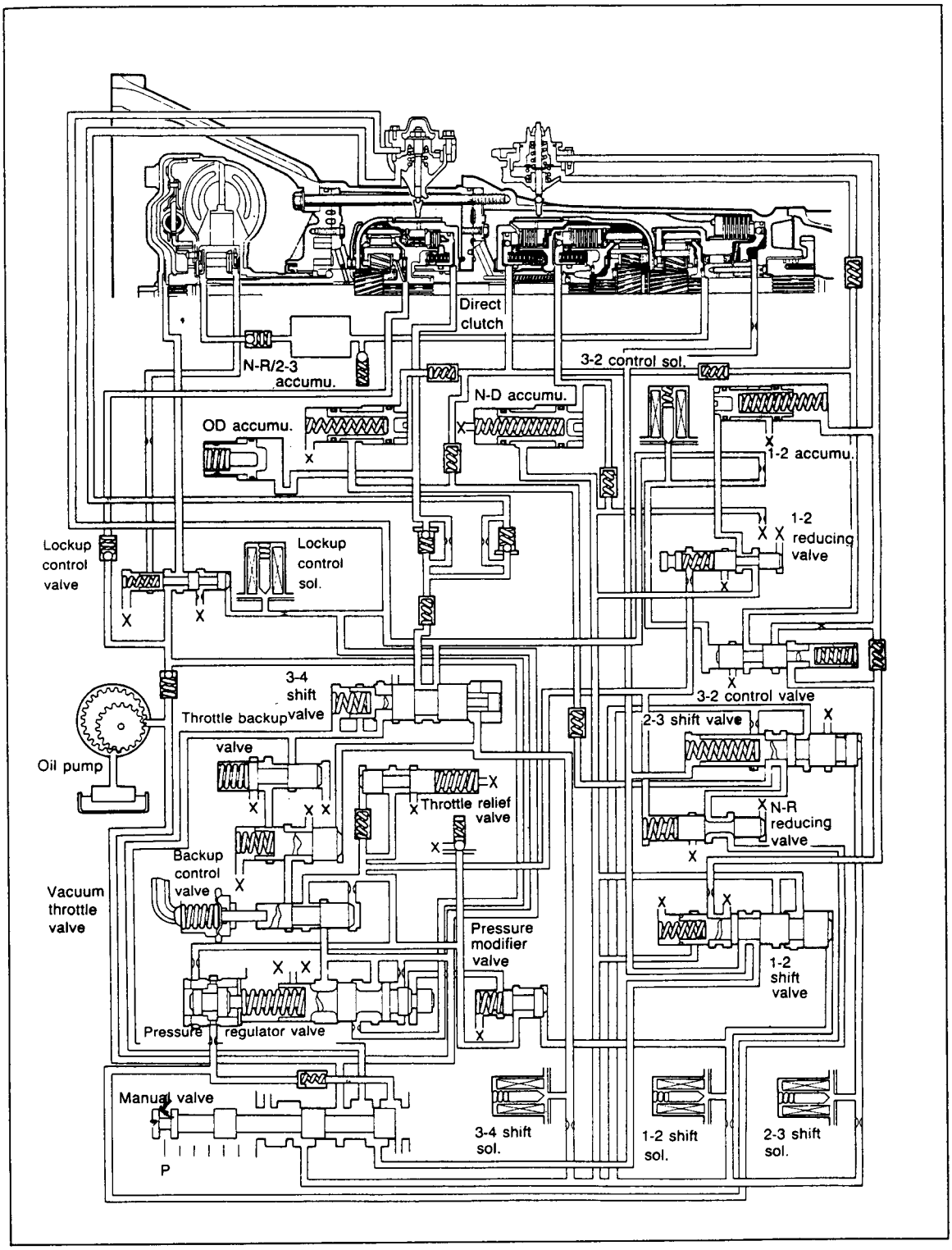


SWITCH B AND D ORIFICES

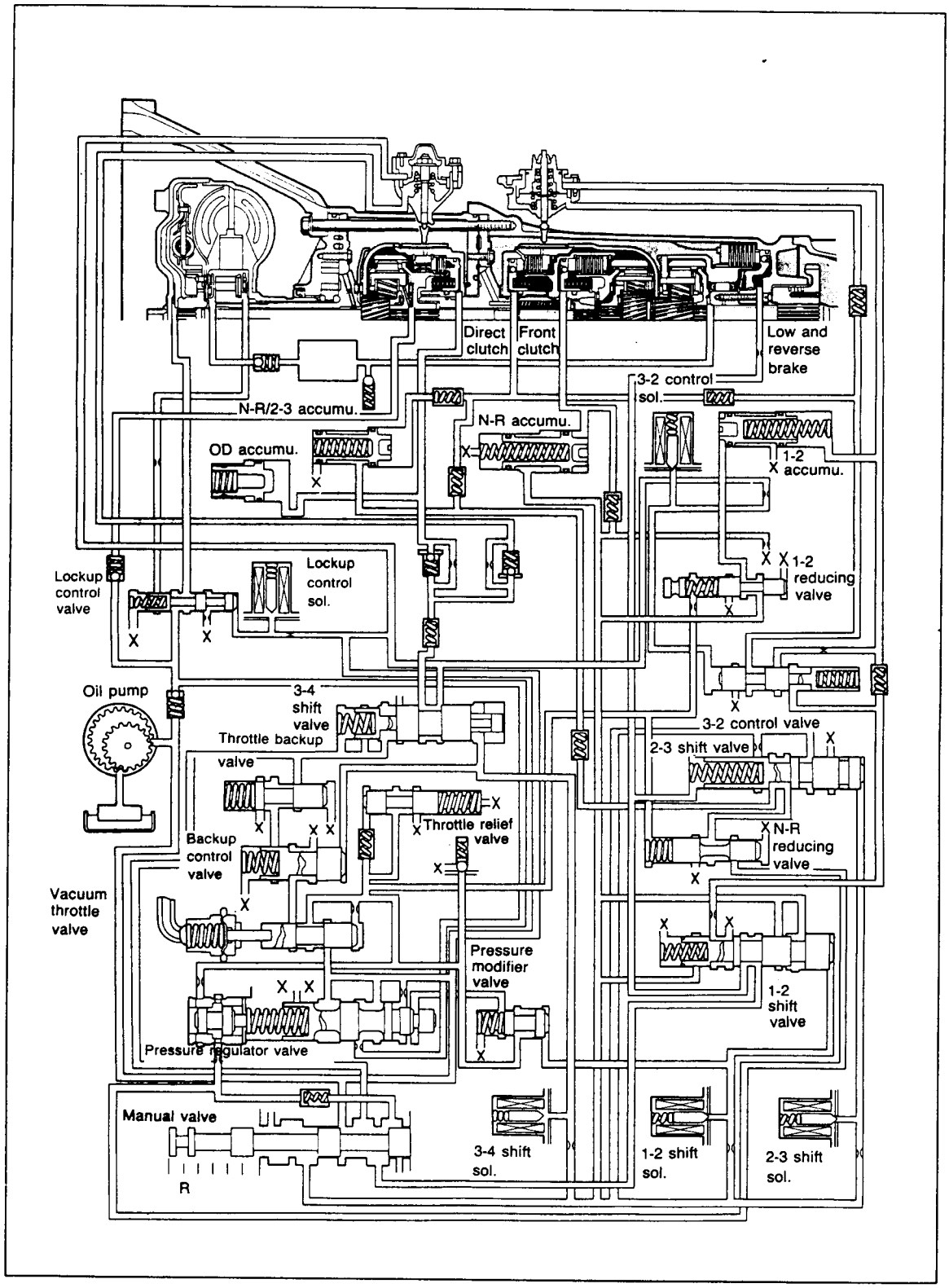
Figure 2.

HYDRAULIC CIRCUIT

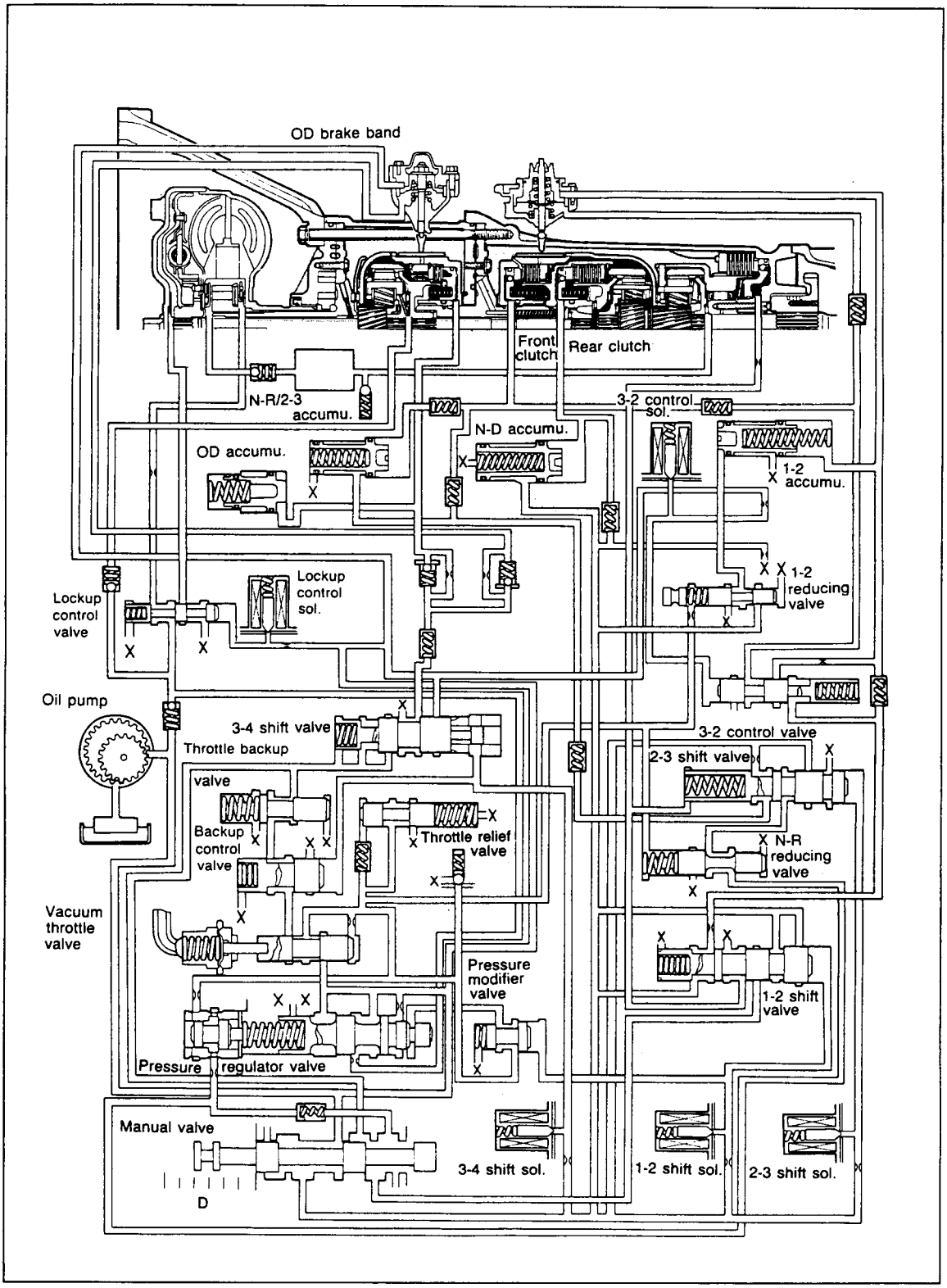
P RANGE

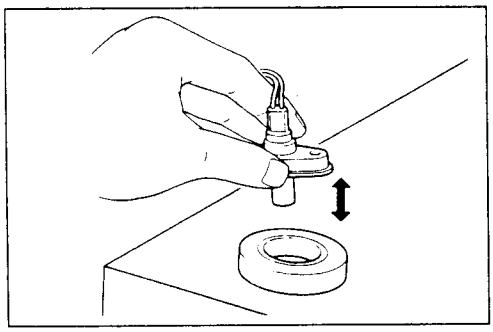


R RANGE

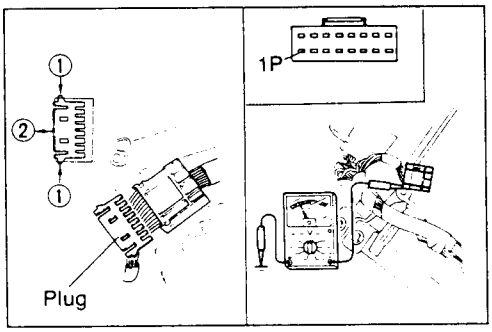

Direct clutch
Front clutch
Low and reverse brake
3-2 control sol.
N-R/2-3 accumu.
N-R accumu.
OD accumu.
1-2 accumu.
Lockup control valve
Lockup control sol.
1-2 reducing valve
Oil pump
3-4 shift valve
Throttle backup valve
3-2 control valve
2-3 shift valve
Throttle relief valve
N-R reducing valve
Backup control valve
Vacuum throttle valve
Pressure modifier valve
1-2 shift valve
Pressure regulator valve
Manual valve
R
3-4 shift sol.
1-2 shift sol.
2-3 shift sol.

D RANGE; OD, LOCKUP ON

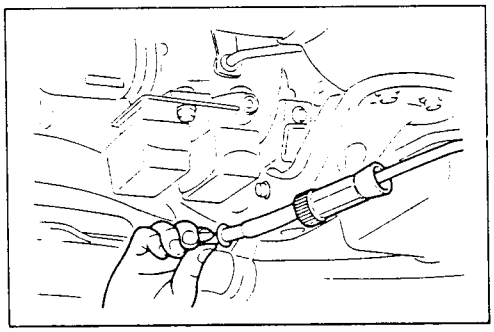




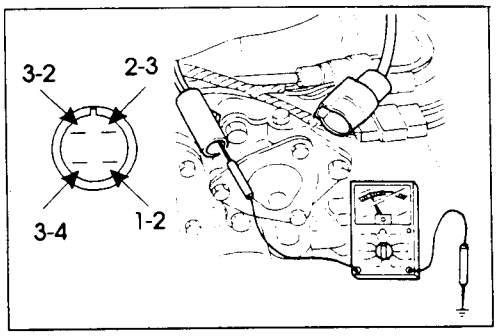
Inspection of Voltage Generation
1. Remove the turbine sensor.
2. Connect a voltmeter (0.1 volt range) to the terminals.
3. Wave the the tip of turbine sensor approx. 5 mm (0.197 in) away from a magnet and check that the sensor generates voltage.
4. If not correct, replace the turbine sensor.



SPEED SENSOR
Inspection of voltage
1. Disconnect the 16-pin connector from the EC-AT control unit.
2. Remove the plug from the connector.
3. Connect a voltmeter between the 1P terminal and ground as shown.
4. Turn the ignition switch ON.



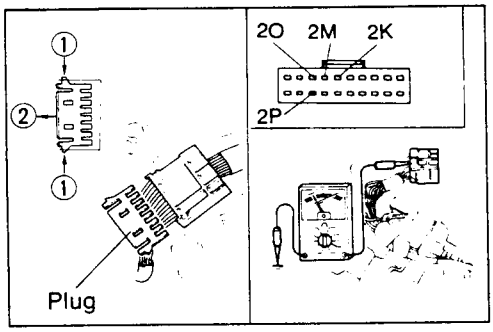
5. Remove the speedometer cable from the transmission.
6. Slowly turn the speedometer cable one turn.
7. Check that approx. 7V is shown 4 times.
8. If not correct, check the speedometer.



SOLENOID VALVE (1-2 shift, 2-3 shift, 3-4 shift, 3-2 control)
Inspection of Resistance
1. Disconnect the solenoid valve connector.
2. Check resistance between each terminal and ground.

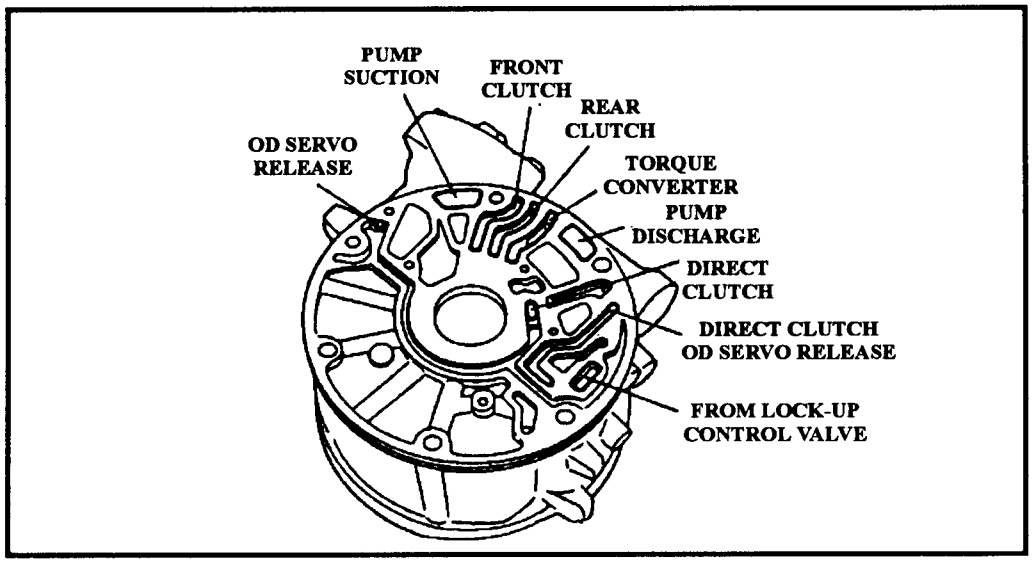
   Resistance: 13—27 Ω

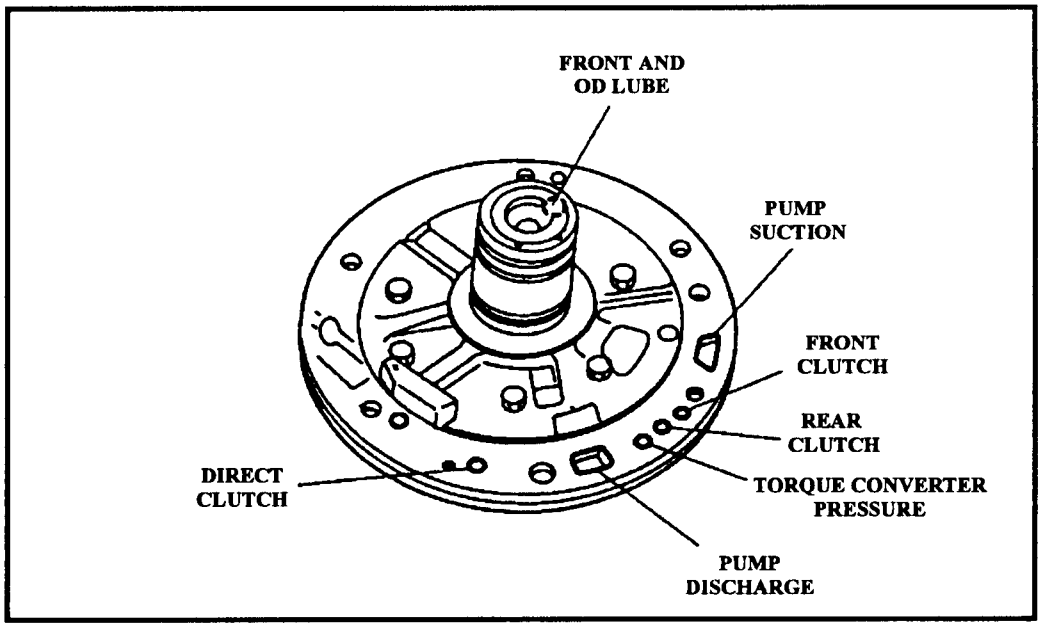
3. If not correct, check the wiring harness for an open or short-circuit. Replace the solenoid valve, if necessary.

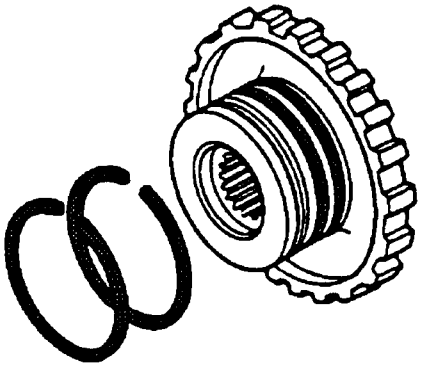


Inspection of Continuity
1. Disconnect the 20-pin connector from the EC-AT control unit.
2. Remove the plug from the connector.
3. Check continuity between terminals 2K, 2M, 2O and 2P and ground.
4. If not correct, check the wiring harness for an open-circuit.

N4AEL
OIL PASSAGES AND OIL DISTRIBUTOR





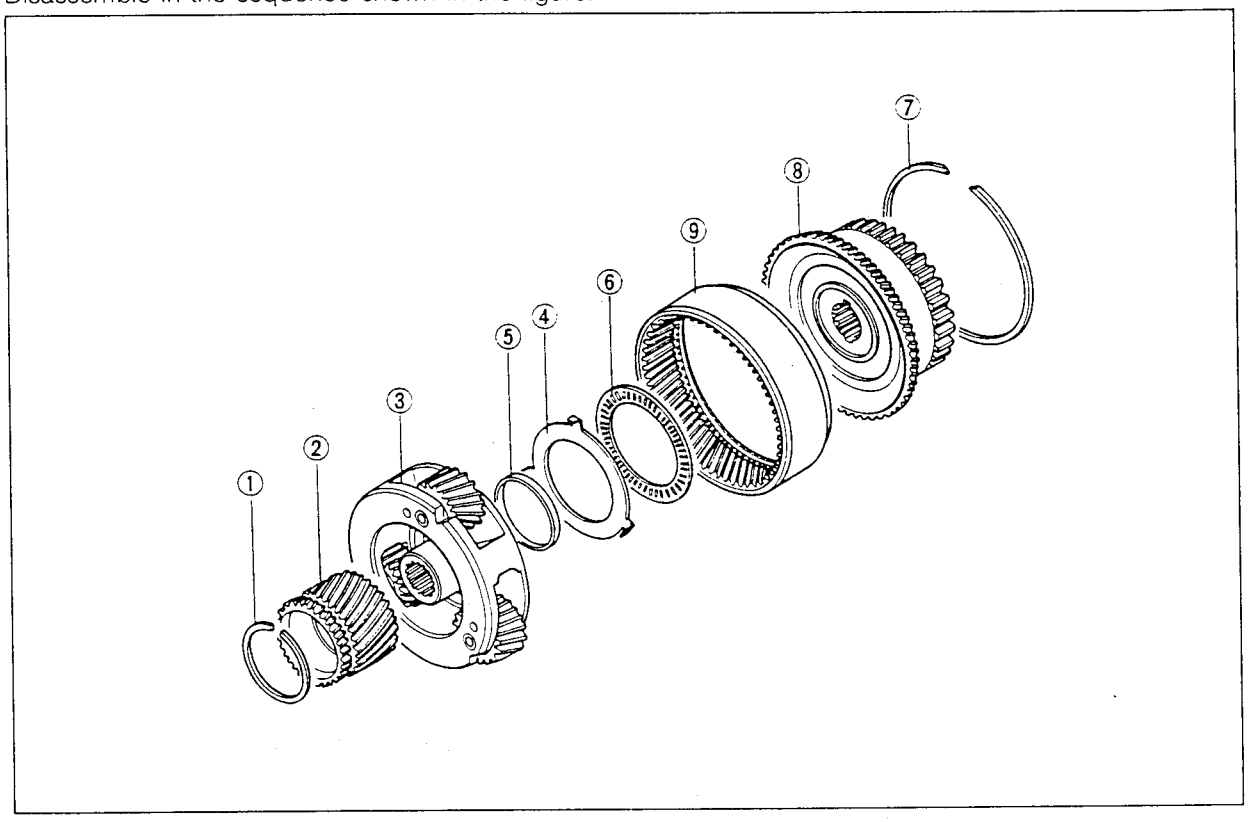


The oil distributor only requires 2 sealing rings on the bottom 2 grooves closest to the parking lugs. These rings seal forward clutch feed oil which is used to lube the speedometer gears and the extension housing bushing. Nicked, cut or worn sealing rings here can cause a loss of forward clutch oil resulting in delayed forward engagement or premature forward clutch failure. It has been found that A4LD Rubber Governor Rings work very well for this application.

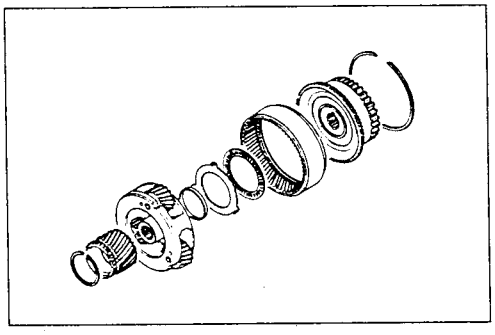
OD PLANETARY GEAR UNIT (OD PLANETARY PINION CARRIER, OD CLUTCH HUB)

Disassembly

Disassemble in the sequence shown in the figure.



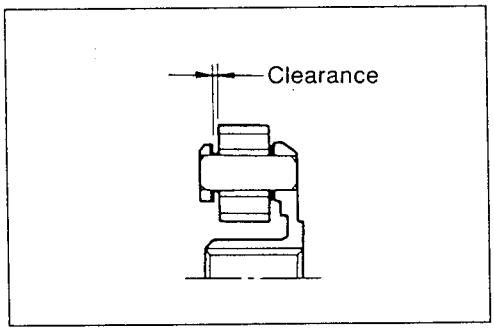
1. Snap ring
2. Sun gear
3. OD planetary pinion carrier
4. Bearing race
5. Seal sleeve
6. Bearing
7. Snap ring
8. OD clutch hub
9. Internal gear



Inspection

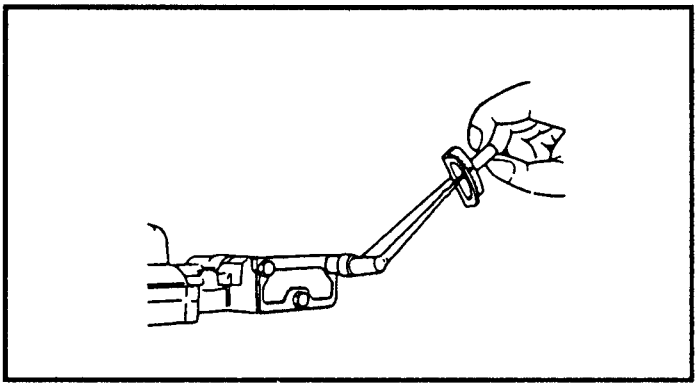
Inspect the following parts and replace if necessary.

1. Fracture and wear of snap ring
2. Wear of individual gears
3. Rotation of front carrier pinion gear
4. Rotation and damage or wear of bearing



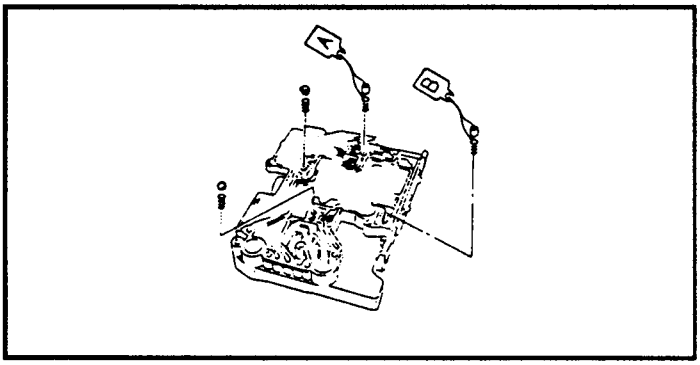
5. Clearance between pinion washer and planetary pinion carrier

Standard clearance:
0.2—0.7 mm (0.008—0.028 in)
Maximum: 0.8 mm (0.031 in)



27. Install the side plate.
28. Tighten the installation bolts.

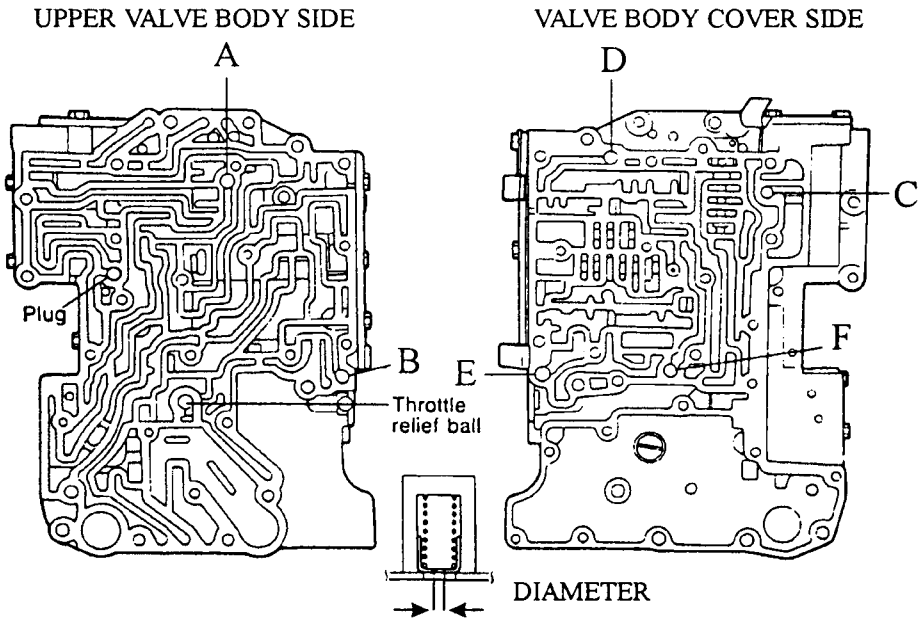
Tightening torque:
2.5-3.4 Nm (25-35 cm-kg, 22-30 in-lb)



29. Insert the orifice check valve, plug and springs, and the check ball and spring in the lower valve body.

Note
Check that the orifice check valves and check ball are properly inserted.

Orifice check valve location



ORIFICE	O.E. DIA.*	ENLARGE TO	FUNCTION
A	.071"	N/A	2-3 SHIFT
B	.087"	N/A	4-3 CONTROL
C	.071"	N/A	FORWARD CLUTCH
D	.059"	N/A	2-3 ACCUMULATOR
E	.043"	.062"	1-2 CONTROL
F	.039"	.071"	1-2 FEED

* - SIZES MAY VARY FROM MODEL TO MODEL

MAZDA N4AEL

SOFT OR FLARED SHIFTS WHEN WARM

COMPLAINT: Shifts seem fine when cold but become increasingly soft or drawn out as fluid temprature increases.

CAUSE: The cause may be: A. Leaks from the "Factory" sealing rings on the accumulator pistons in the valve body.
B. Calibration concerns in the valve body.

CORRECTION:
A. Remove and discard all "Factory" sealing rings on the accumulator pistons and replace them with suitable "O"rings available from aftermarket sources . (see Figure 1)
B. 1. Enlarge the orifice in the small spacer plate to .086" as shown in Figure 2 to prevent a 3-2 slip or flare.
2. Follow the orifice locations and modifications as shown in Figure 3.
3. Adjust intermediate band as follows: Loosen piston stem lock nut. Torque piston stem to 8-10 ft.lbs. Back off piston stem 2-2.5 turns. Torque piston stem lock nut to 11-29 ft.lbs.
4. Ensure overall modulator pin length is at least 1.160". The preferred pin length is 1.180" to 1.220".

ACCUMULATOR PISTON LOCATION

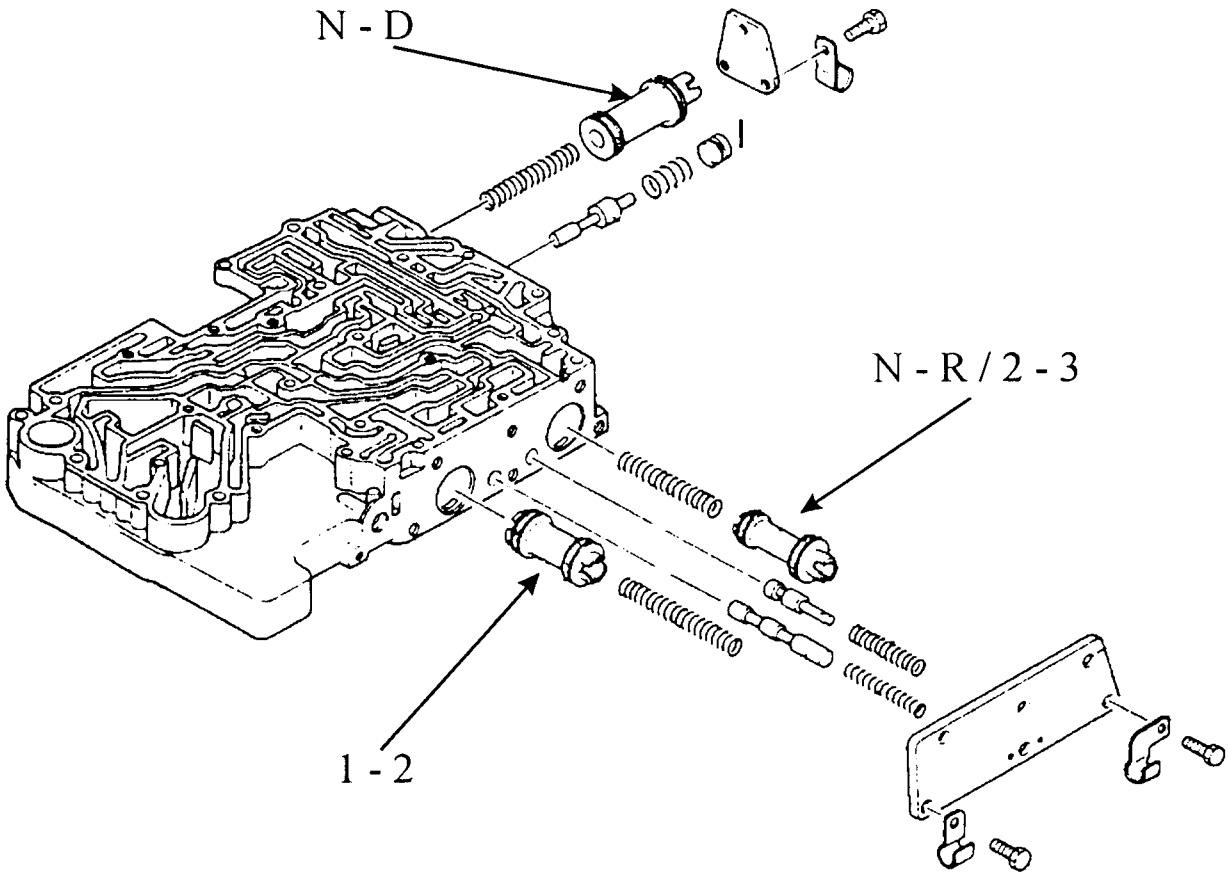


Figure 1

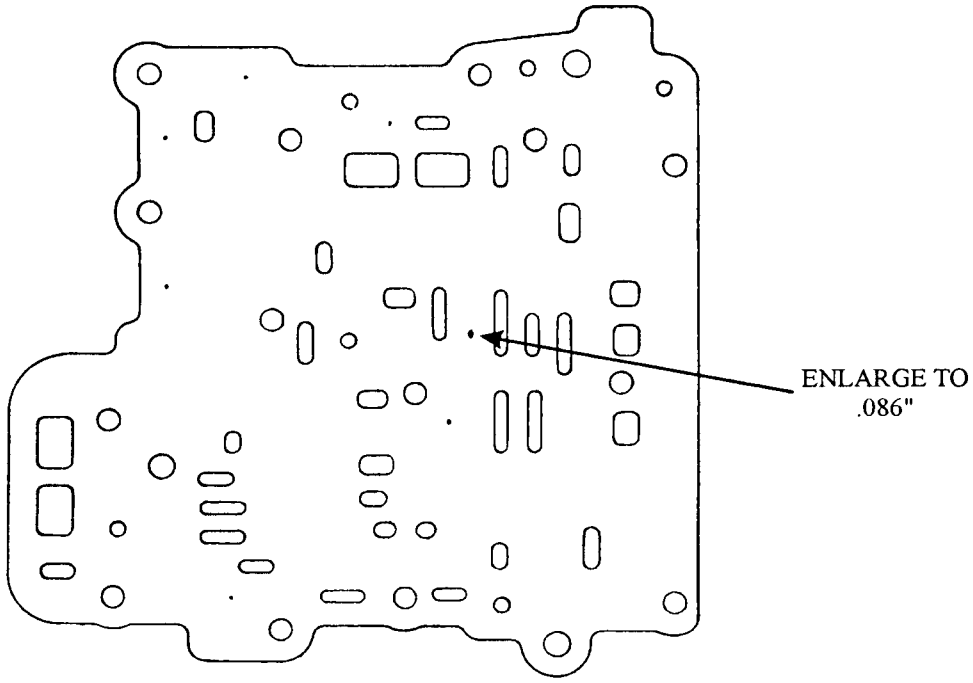
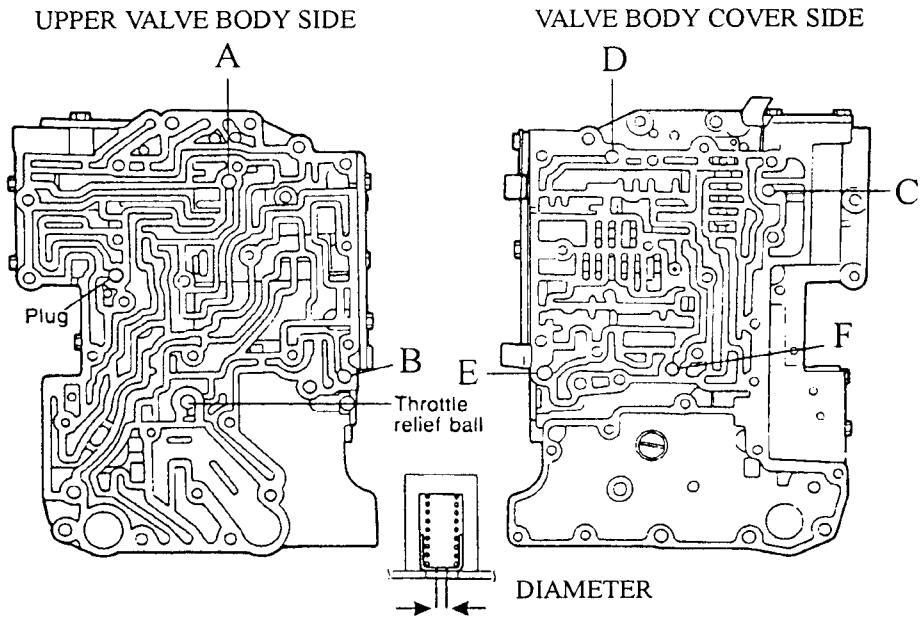


Figure 2



ORIFICE	O.E. DIA.*	ENLARGE TO	FUNCTION
A	.071"	N/A	2-3 SHIFT
B	.087"	N/A	4-3 CONTROL
C	.071"	N/A	FORWARD CLUTCH
D	.059"	N/A	2-3 ACCUMULATOR
E	.043"	.062"	1-2 CONTROL
F	.039"	.071"	1-2 FEED

* - SIZES MAY VARY FROM MODEL TO MODEL

Figure 3

Valve and Fluid Passage Locations
Control valve

