INDEX

GF4EAT

AUTOMATIC TRANSMISSION SERVICE GROUP
9200 S. DADELAND BLVD. STE 720
MIAMI, FLORIDA 33156
(305) 670-4161

Updated
June, 2003

INTRODUCTION
MAZDA GF4A-EL AND FORD GF4EAT

The Ford GF4EAT is currently found in the 1993 Probe equipped with the 2.5L engine. The Mazda version designated GF4A-EL is found in the "626" equipped with 2.0L and 2.5L engines. It is a fully computer controlled, four speed transaxle, and contains seven solenoids on the valve body. The seven solenoids provide up and downshift cycles, lock-up control and apply feel, and line pressure control.
This manual contains the information necessary for electrical and mechanical diagnosis, as well as complete disassembly and assembly procedures for repair and/or overhaul. This manual also provides the transaxle specifications and a special service tool section showing the specialized tools required to service this unit.

**We thank Ford Motor Company and 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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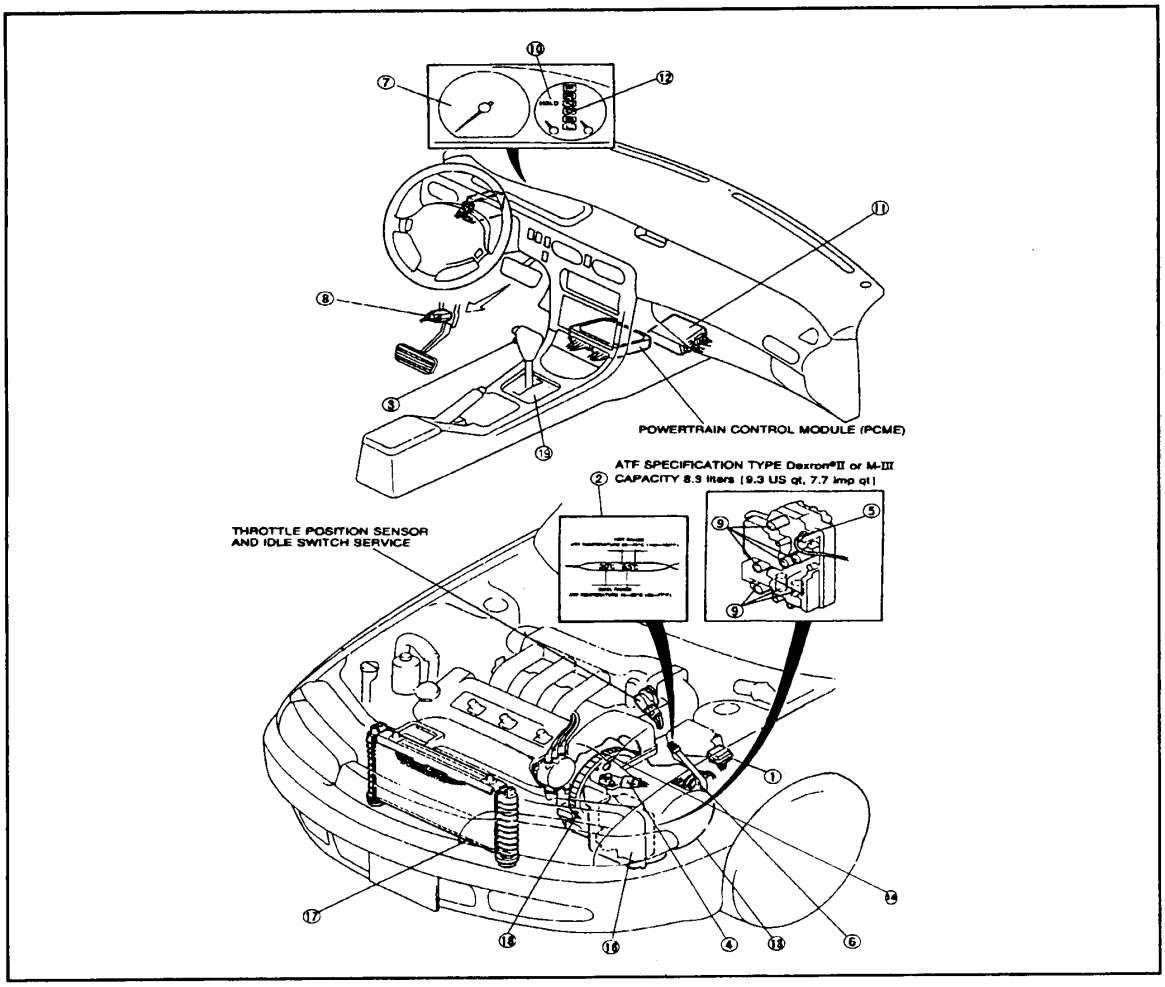


1. DATA LINK CONNECTOR
2. ATF LEVEL
3. HOLD SWITCH
4. INHIBITOR SWITCH
5. ATF THERMO SENSOR
6. PULSE GENERATOR
7. SPEEDOMETER
8. STOP LIGHT SWITCH
9. SOLENOIDS
10. HOLD INDICATOR
11. POWERTRAIN CONTROL MODULE
12. SELECTOR INDICATOR LAMP
13. TRANSAXLE
14. VEHICLE SPEED SENSOR
15. THROTTLE POSITION SENSOR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

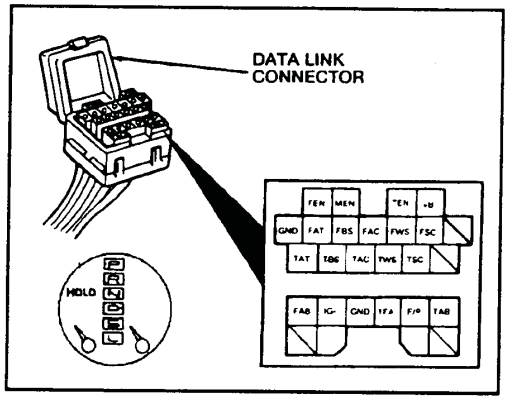
CODE RETRIEVAL WITHOUT A SCANNER

1.FORD PROBE WITH 2.5 LITER ENGINE...CONNECT TAT AND GRD TERMINALS

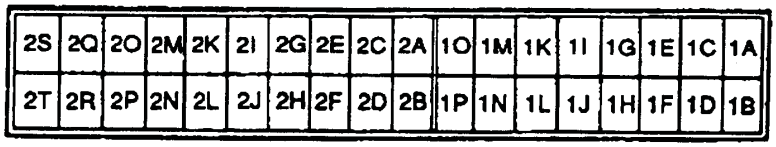
2.MAZDA WITH 2.5 LITER ENGINE...CONNECT TAT AND GRD TERMINALS

3.MAZDA WITH 2.0 LITER ENGINE...CONNECT TEN AND GRD TERMINALS

NOTE...THE HOLD LIGHT WILL FLASH THE CODES



The transaxle controller is located under center of dash. It is mounted on the floor in front of the engine controller and is the smaller of the two.



CONNECTOR VIEWED FROM WIRE SIDE

B+: Battery positive voltage

Terminal	Color	Component	Connected to	Voltmeter + terminal	Voltmeter – terminal	Correct voltage	Condition	Possible cause
1A								
1B (Output)	R	Hold indicator	Instrument cluster (hold indicator	1B	Ground	Below 1.0V	Hold mode	• Instrument cluster (hold indicator)
						B+	Other modes	
1C (Output)	BR/Y	FAT terminal (data link connector)	FAT terminal (data link connector)	1C		Below 2.5V	Hold mode	• Wiring and/or connector from 1C terminal to data link connector FAT terminal
						B+	Other modes	
1D (Output)	G/Y	Inhibitor signal	Powertrain control module (PCME)	1D		Below 1.0V	P and N ranges	• Wiring and/or connector from 1D terminal to powertrain control module (PCME) 1R terminal
						B+	Other ranges	
1E (Input)	R/B	TAT terminal (data link connector) and O/D inhibit signal (auto speed control signal)	TAT terminal (data link connector) and cruise control unit	1E		B+	Ignition switch ON (vehicle stopped)	• Wiring and/or connector from 1E terminal to data link connector TAT terminal
						0V	TAT terminal grounded (vehicle stopped)	• Wiring and/or connector from 1E terminal to cruise control unit 1G terminal
1F (Input)	W/G	Stoplight switch	Stoplight switch	1F		B+	Brake pedal depressed	• Stoplight switch
						0V	Brake pedal released	

CONTINUED...

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 80°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	

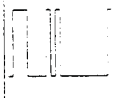
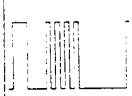
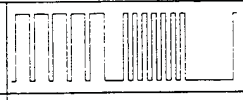
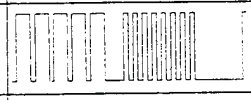
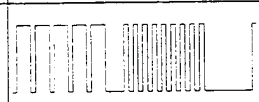
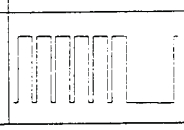
B+: Battery positive voltage

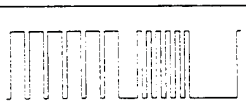
Terminal	Color	Component	Connected to	Voltmeter + terminal	Voltmeter − terminal	Correct voltage	Condition	Possible cause
2E (Output)	P	Solenoid valve (1-2 shift)	Solenoid valve (1-2 shift)	2E	Ground	B+	Solenoid valve ON	• Solenoid valve (1-2 shift) • Wiring and/or connector from 2E terminal to solenoid 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. 1.8V	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) (PCM/T))	—	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)	LG	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

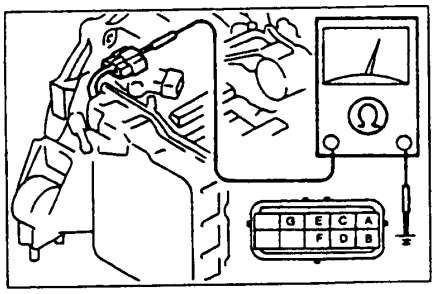
● Available for lockup but may not necessarily be activated.

[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.

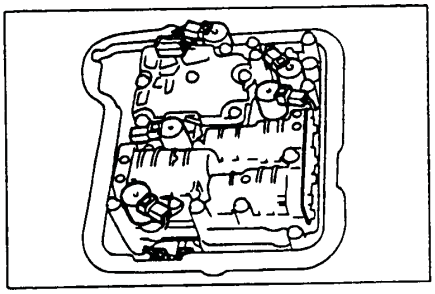
NOTE: The power mode and the normal mode are automatically selected by **BOTH** the **PCME** (Powertrain Control Module Engine), and the **PCMT** (Powertrain Control Module Transmission).
There is **NO O/D** when the ATF temperature is below 50 degrees F.(10 C)
There is **NO O/D** when the cruise control 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)

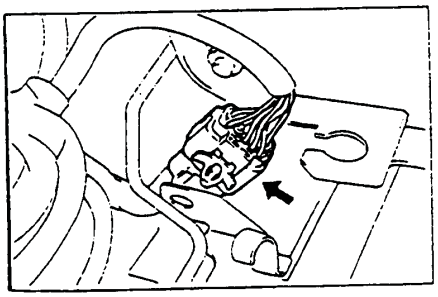
Terminal	Solenoid valve	Resistance (Ω)
A	1-2 shift	11—27
B	2-3 shift	11—27
C	3-4 shift	11—27
D	Lockup control	11—27
E	3-2 timing	11—27
F	Lockup	9—18
G	Line pressure	9—18



MANUAL OPERATION TEST
Inspection

1. Disconnect the solenoid connector.

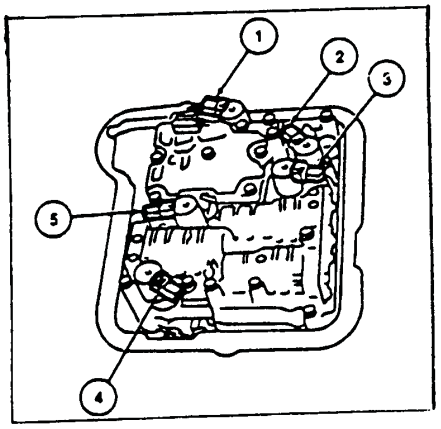
Note
- **Determine the gear position by noting the conditions upon accelerating from a stop and the engine speed (drum rpm) while cruising.**
- **Engine rpm at 40 km/h (25 mph)**
  1st gear: Approx. 4,250 rpm...2.5 engine
  Approx. 3,900 rpm...2.0 engine
  3rd gear: Approx. 1,500 rpm...2.5 engine
  Approx.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



2. Verify the gear position of each range.

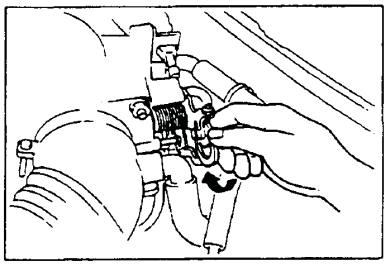
Range	Gear Position
D range	3rd, fixed
S range	3rd, fixed
L range	1st, fixed
R range	Reverse

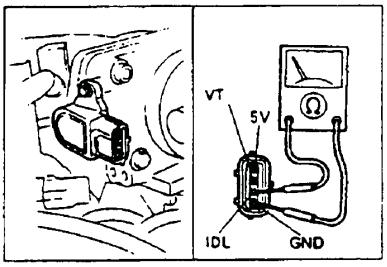
3. If not within the specification, check the oil pressure or transaxle.

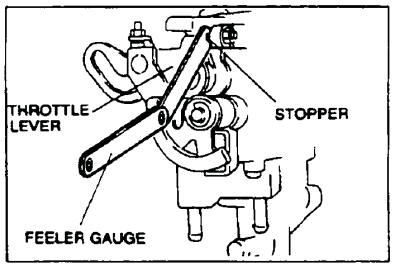


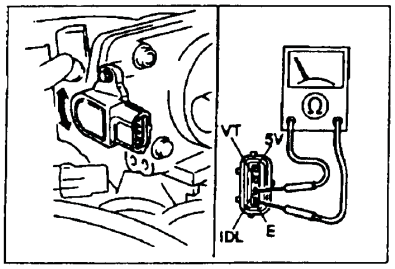
Item	Part Number	Description
1	—	Torque Converter Clutch (TCC) Solenoid
2	—	Line Pressure Solenoid (LPS)
3	—	Downshift Solenoid
4	—	Torque Converter Clutch Control
5	—	1-2 Shift Solenoid

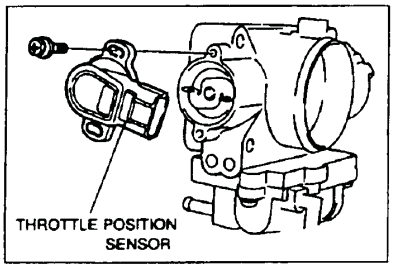
Solenoids 6 (2-3 shift solenoid) and 7 (3-4 shift solenoid) are located on the back side of the valve body.











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

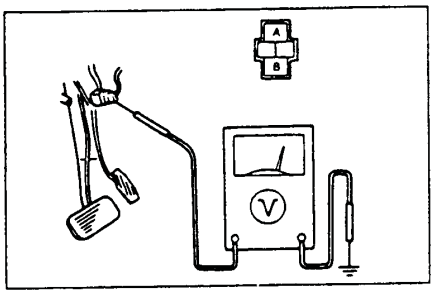
Clearance	Continuity
0.15mm {0.006 in}	Yes
0.50mm {0.020 in}	No

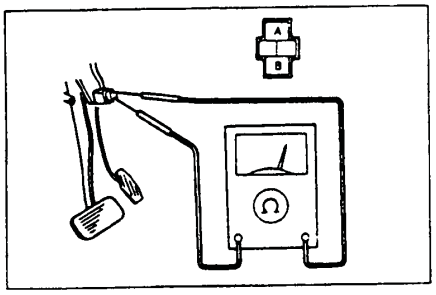
4. If not as specified, loosen the throttle position sensor screws.
5. Insert a **0.15mm {0.006 in}** feeler gauge between the throttle stop screw and stopper lever.
6. Rotate the throttle position sensor clockwise approximately 30 degrees, then rotate it back counterclockwise until there is continuity.
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.

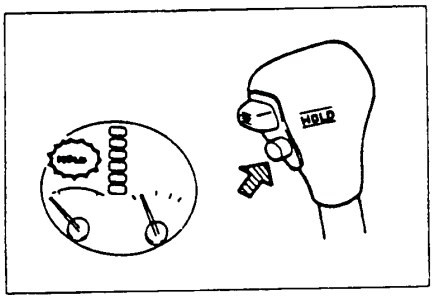
Inspection of continuity

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

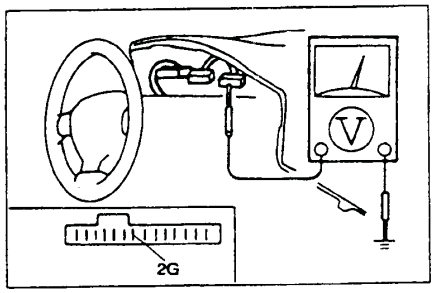
Inspection of operation

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.

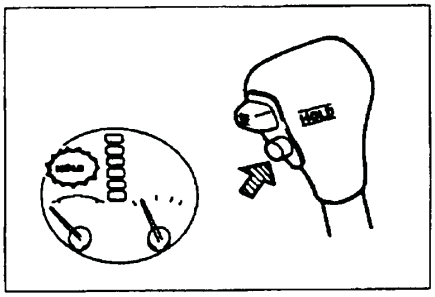


Inspection of voltage

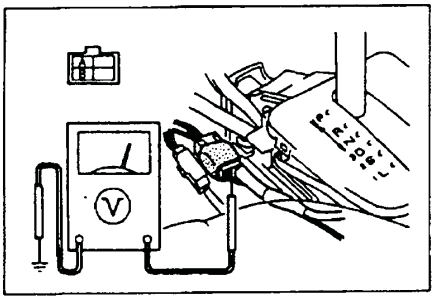
1. Remove the instrument cluster.
2. Turn the ignition switch ON.
3. Measure voltage between terminal 2G and a ground.

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.

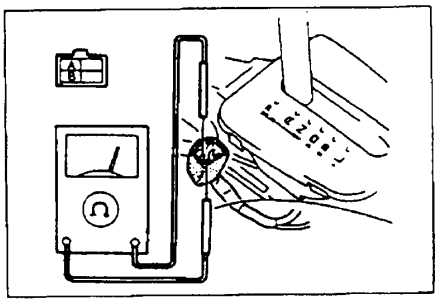


Inspection of voltage
1. Remove the front console.
2. Turn the ignition switch ON.
3. Measure voltage at the hold switch connector.

B+: Battery positive voltage

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

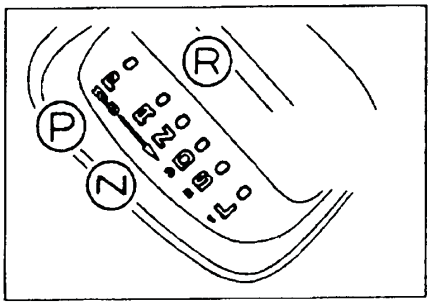
4. If not as specified, check the continuity of the hold switch.



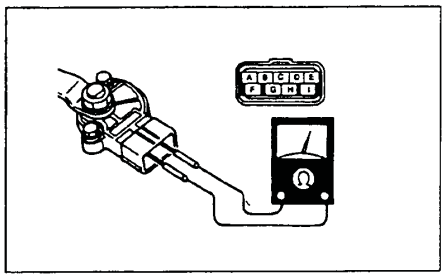
Inspection of continuity
1. Disconnect the negative battery cable.
2. Disconnect the hold switch connector.
3. Check continuity of the switch.

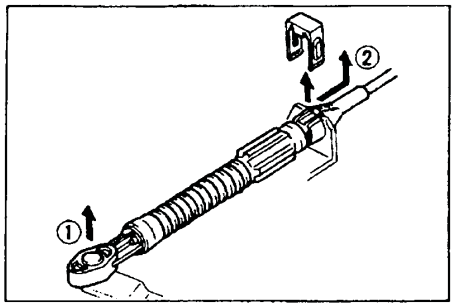
Position	Terminal	
	A	B
Normal		
Depressed	O	O

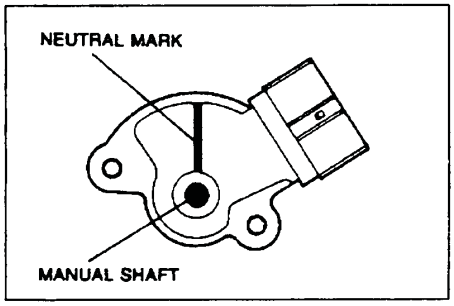
O—O: Continuity

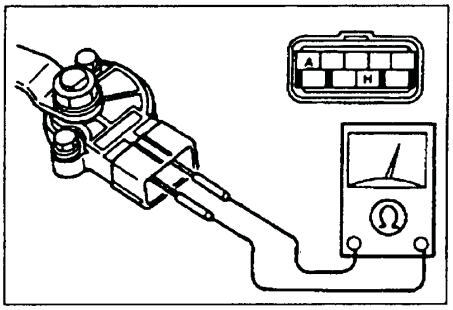


INHIBITOR SWITCH
Inspection
Inspection of operation
1. Verify that the starter operates only with the ignition switch at the START position and the selector lever in P and N ranges.
2. Verify that the back-up lights illuminate when shifted to R range with the ignition switch in the ON position.
3. Verify 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.
   ①Disconnect the selector cable from the manual shaft lever.
   ②Pull 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.

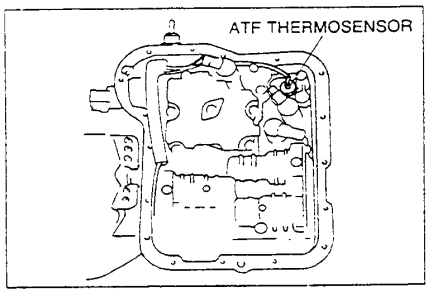
    Tightening torque:
    7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}

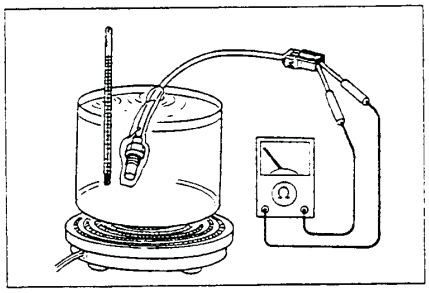
14. Install the lever and spring washer.

    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}



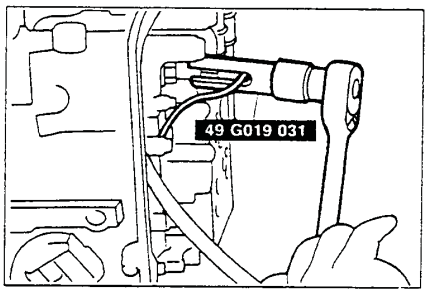


ATF THERMOSENSOR
Inspection

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

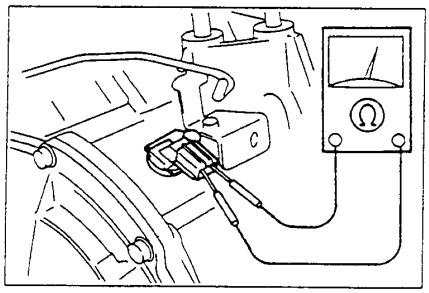
4. If not correct, replace the ATF thermosensor.



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

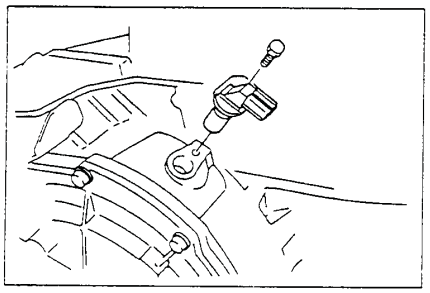


VEHICLE SPEED PULSE GENERATOR
Inspection

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.

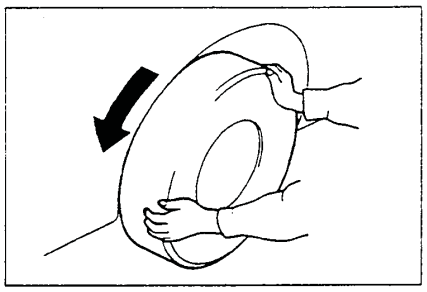
   Resistance: 253—604 Ω
   (ATF temperature: −40—160°C {−40—320°F})

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



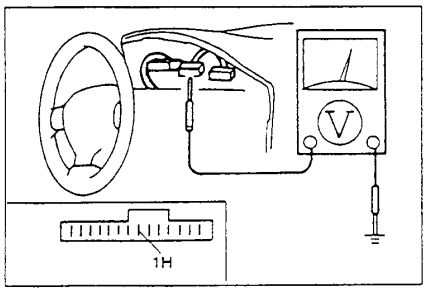
Replacement

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.



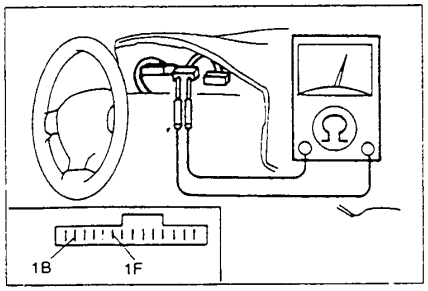
SPEEDOMETER
Inspection

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.

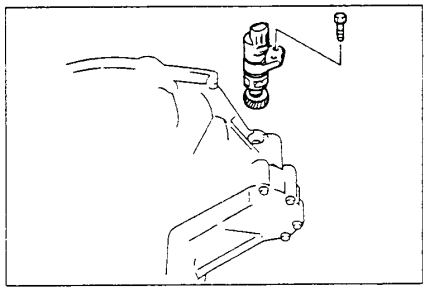
Meter needle	Action
Moves slightly under 5V	Repair wiring harness (Instrument cluster—powertrain control module (PCME, PCMT))
Does not move	Go to next step



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

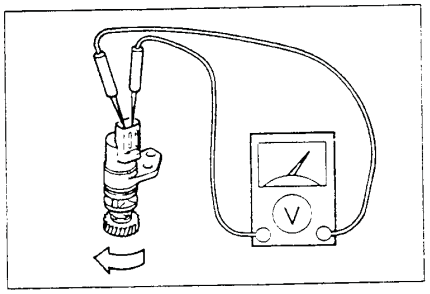
Note
- **The vehicle speed sensor is an alternating current generator. If the DC range is used, the voltage rise will not follow the increase of the wheel speed. If the AC range is used, the voltage will rise when increasing the rotation speed.**

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



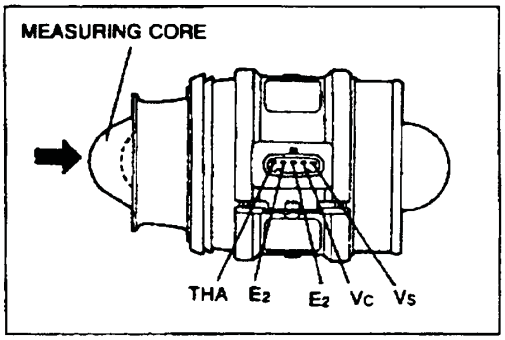
Inspection of speedometer sensor
1. Remove the vehicle speed sensor.

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

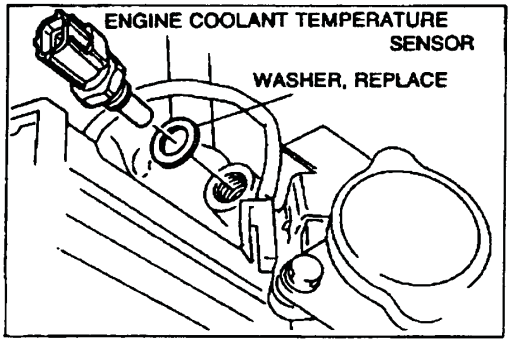


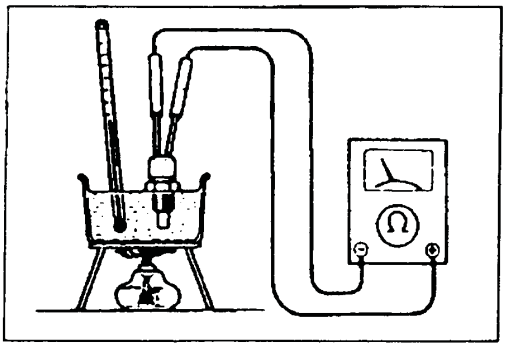
AIR FLOW SENSOR

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.

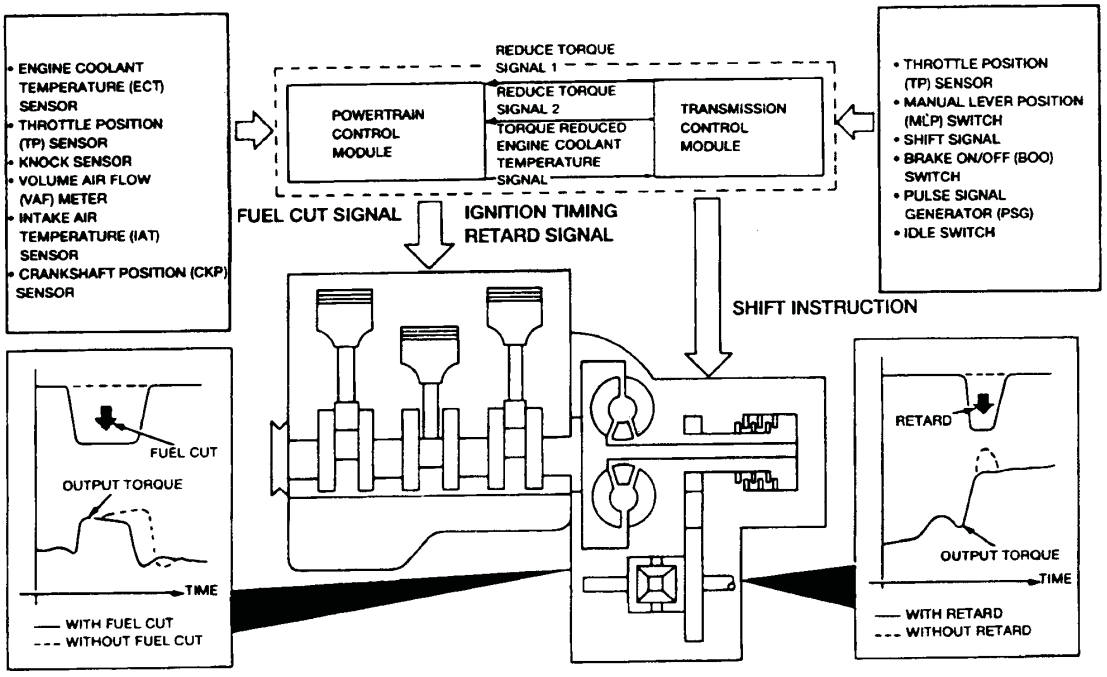
Coolant	Resistance (kΩ)
20°C {68°F}	2.2—2.7
40°C {104°F}	1.0—1.3
60°C {140°F}	0.50—0.65
80°C {176°F}	0.29—0.35

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)

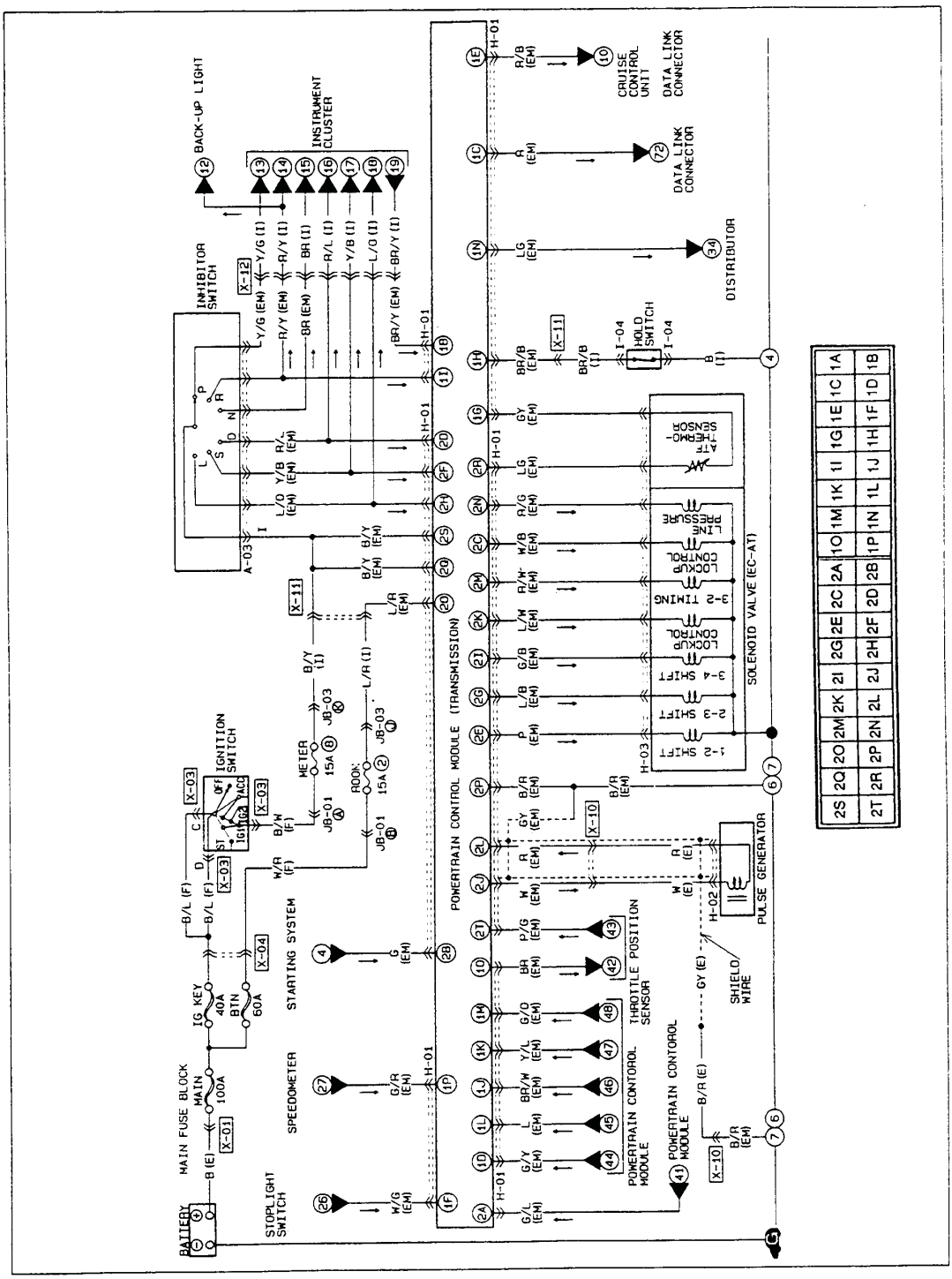
Note
- **If the wiring between the FAT terminal and 1C terminal is open or shorted, diagnostic trouble codes are not displayed on the SST (Self-Diagnosis Checker)**
- **If the wiring between the FAT terminal and 1B terminal is open or shorted, the hold indicator lamp does not display the service code(s).**

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.

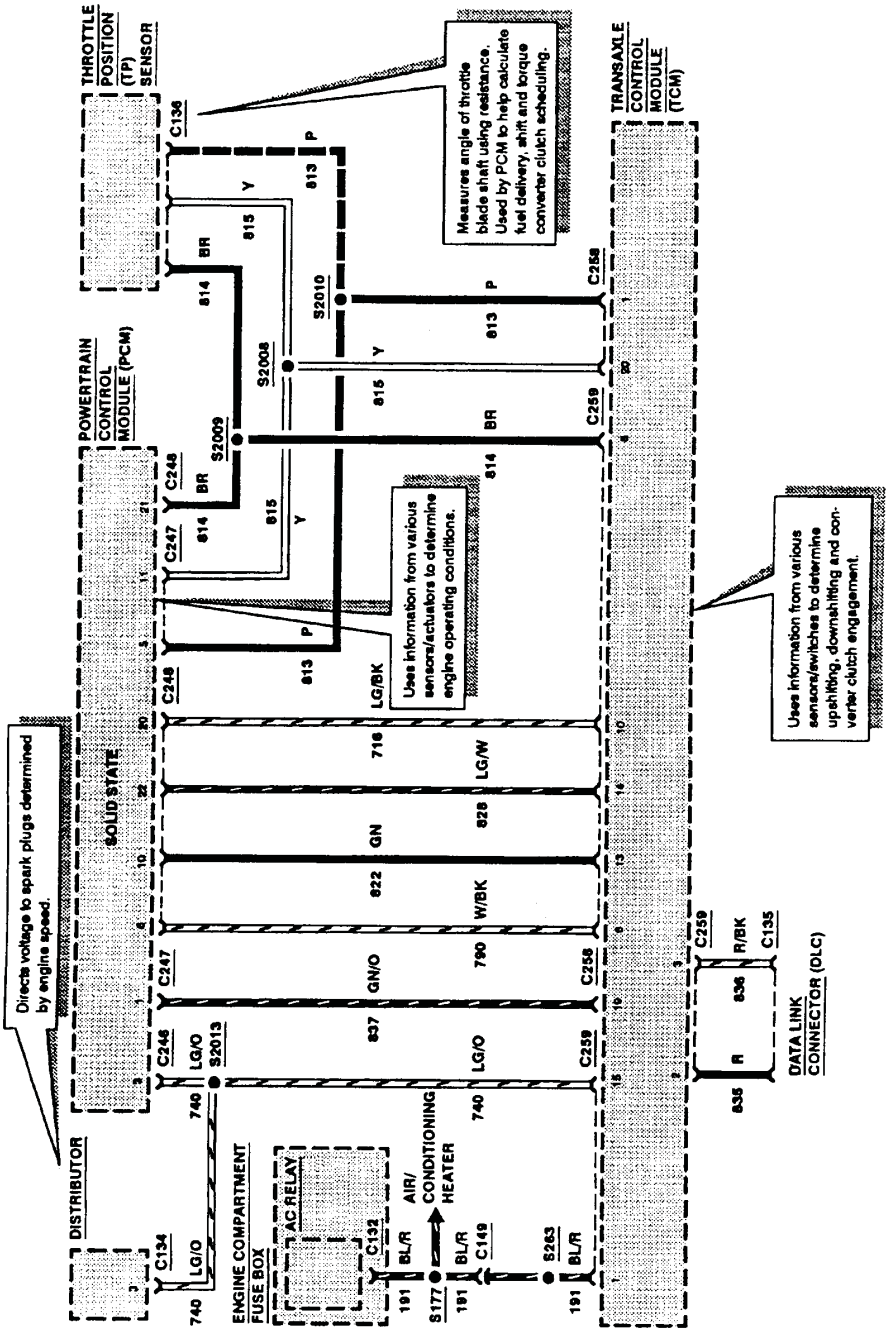
Reduce Torque Signal 2 (2.5 engine)
- If there is an open or short circuit in the reduce torque signal 2 circuit, diagnostic trouble code No.58 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the reduce torque signal 2, the torque reduction control 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

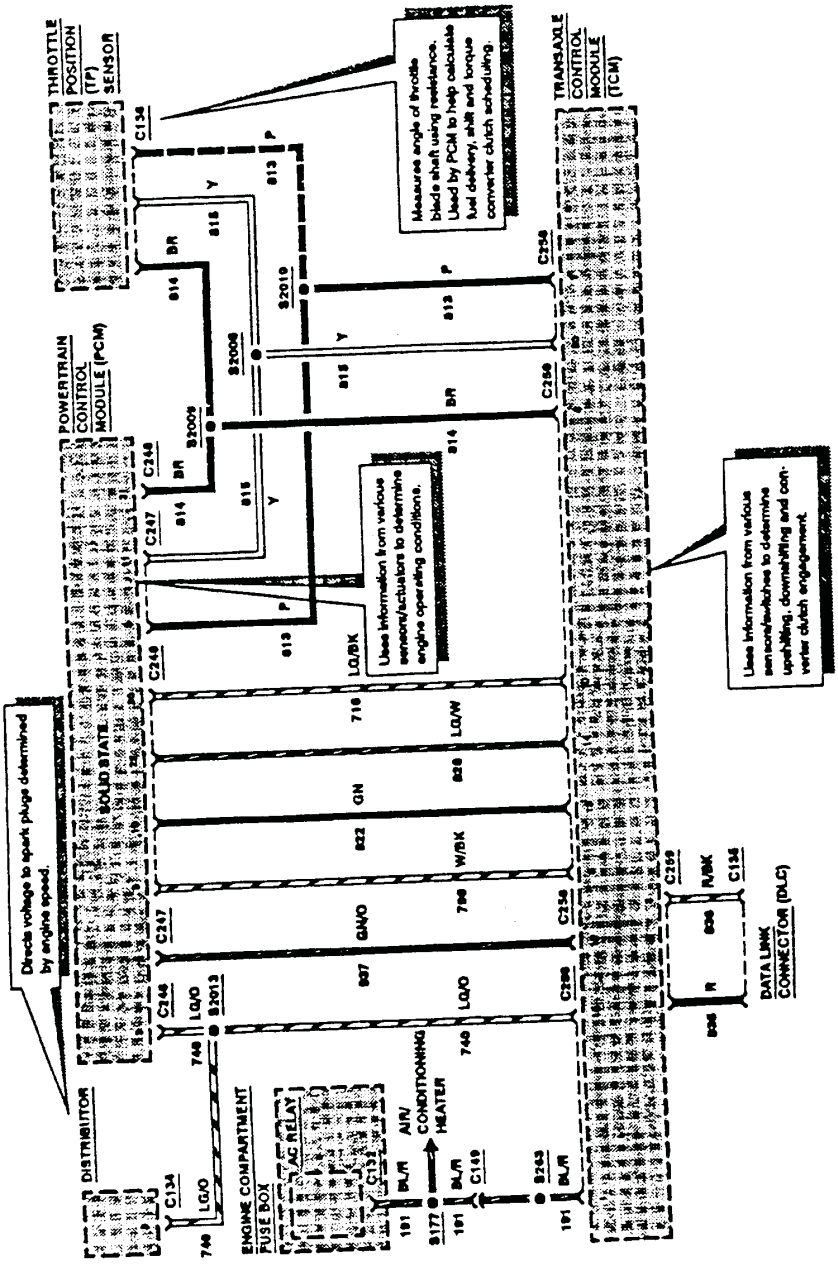


WIRING DIAGRAM.....FORD PROBE.....2.5 LITER ENGINE



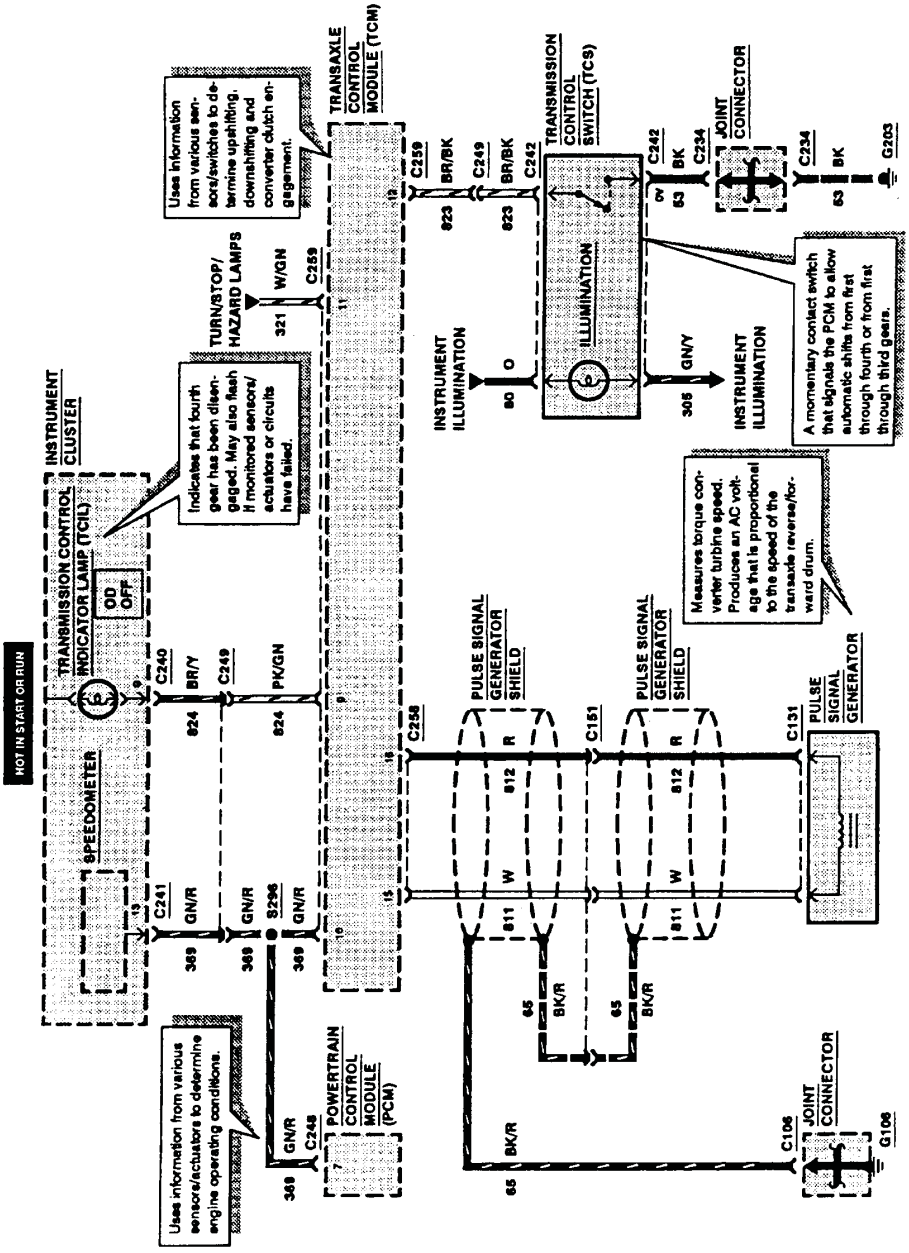
Part 1 of 3...

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



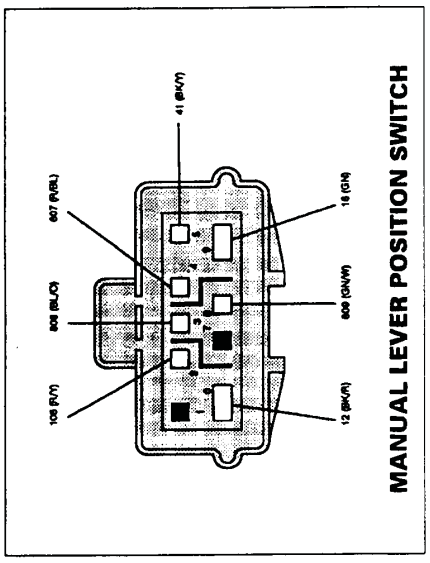
Part 2 of 2...

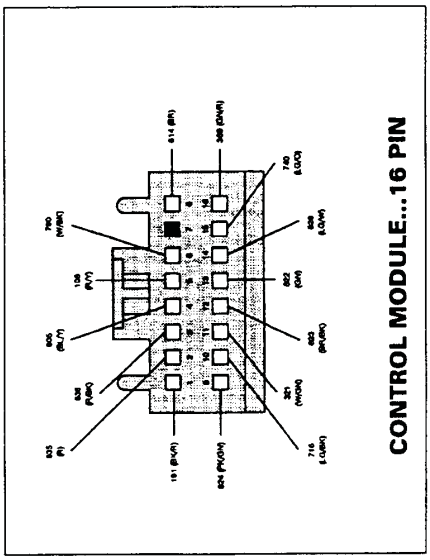
WIRING DIAGRAM.....FORD PROBE CONTINUED.....

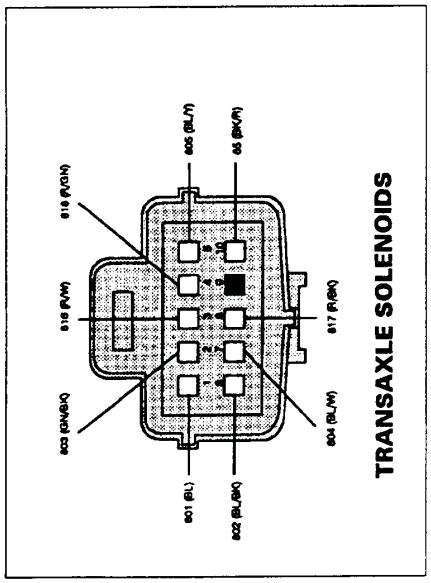


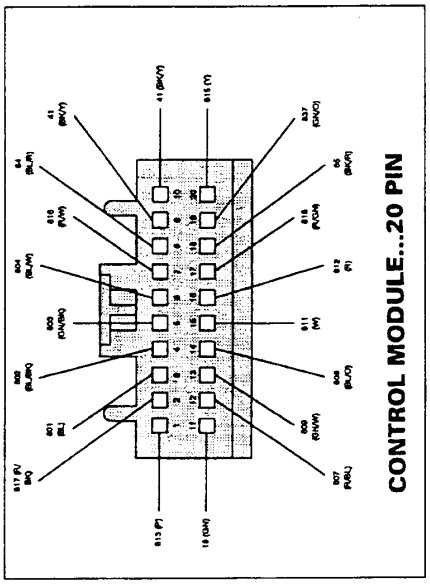
Part 3 of 3

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 (PNP)
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 Convertor 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)
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...

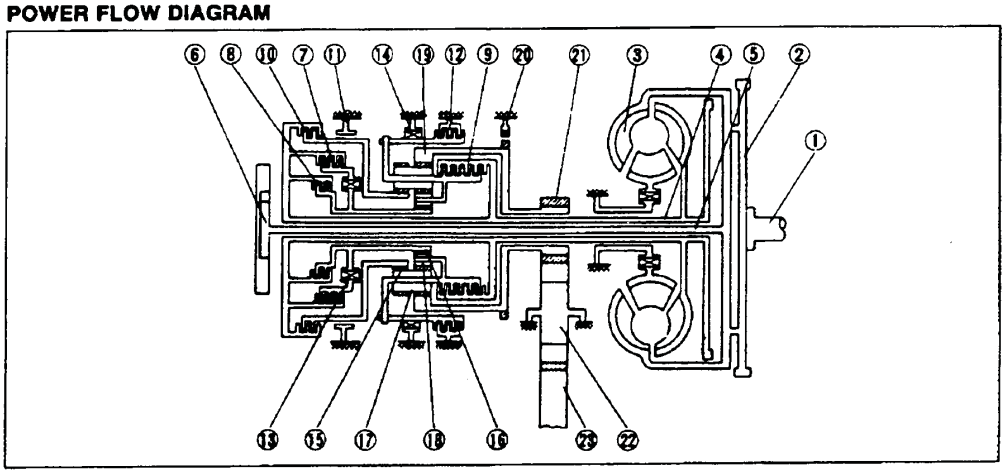
CONDITION	POSSIBLE SOURCE	ACTION
• Erratic Shifting, Incorrect Shift Points, Incorrect Shift Sequence	• Line pressure solenoid sticking. • Control valves. • 2-4 band adjustment. • Clutches slipping. • Fluid level and quality. • Pulse signal generator wire. • Oil pump. • Clutches. • Transmission oil temperature 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

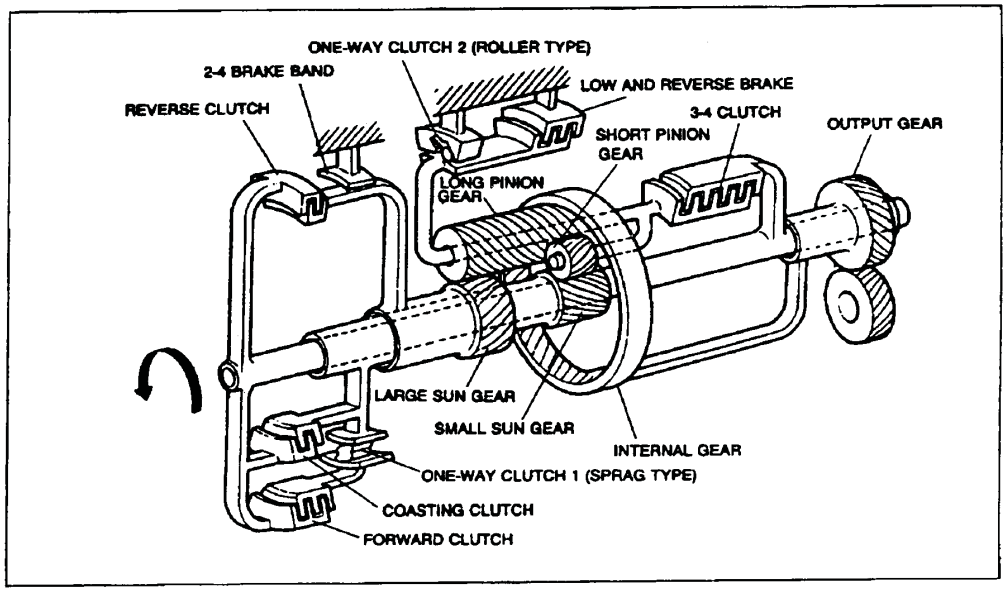
Range	Mode	Gear		Engine braking effect	Forward clutch	Coasting clutch	3-4 clutch	Reverse clutch	2-4 brake		Low and reverse brake	One-way clutch 1 (Sprag type)	One-way clutch 2 (Roller type)
									Applied	Released			
P	—	—		—									
R	—	Reverse	Below approx. 4 km/h (2.5 mph)	Yes				O			O		
			Above 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.

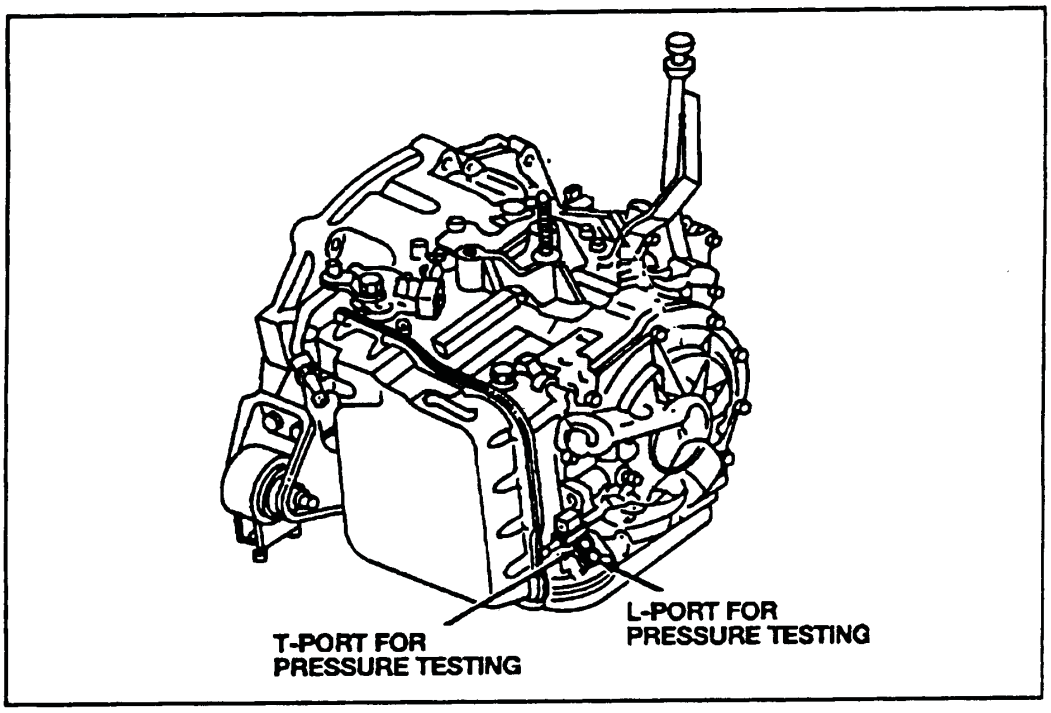
POWER FLOW DIAGRAM



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}

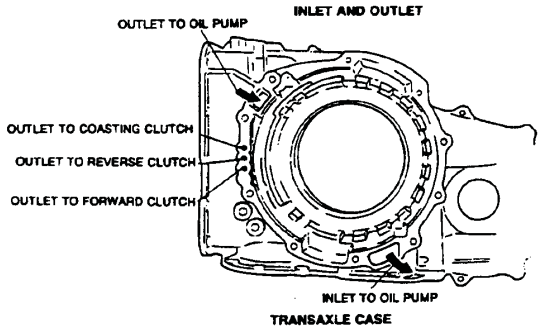
Evaluation of Line Pressure Test

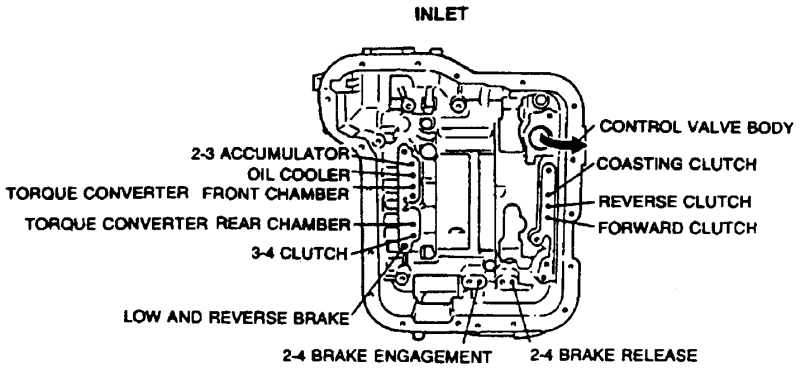
Line pressure	Possible cause
Low pressure in every position	Worn oil pump Oil leaking from oil pump, control valve body, and/or transaxle case Pressure regulator valve sticking Solenoid valve (line pressure) malfunction Pressure modulator valve sticking
Low pressure in D and S only	Oil leaking from hydraulic 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

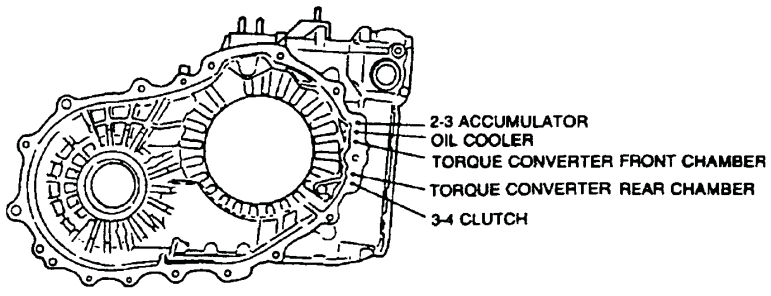
Evaluation of Solenoid Reducing Pressure Test Reducing Pressure is Checked at Port Marked "T"

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

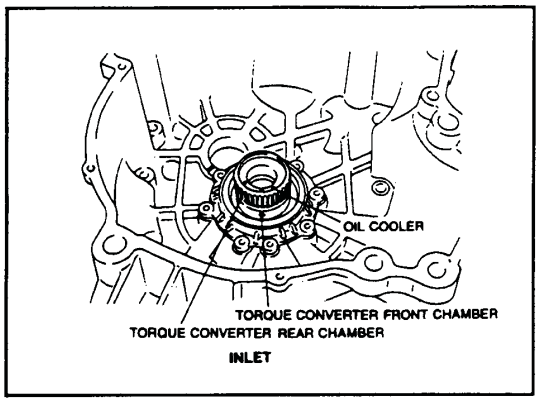
FLUID PASSAGE LOCATIONS

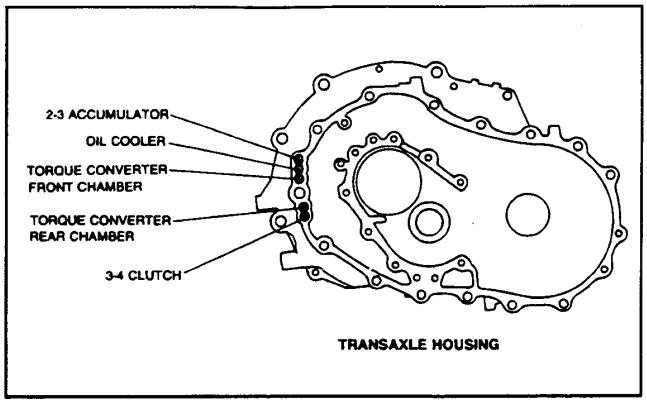


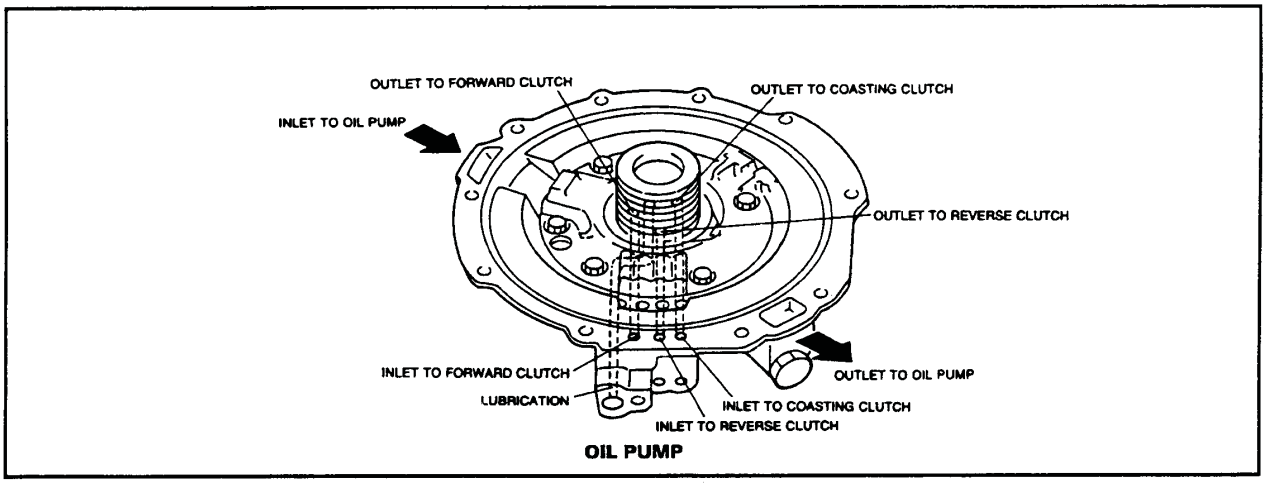


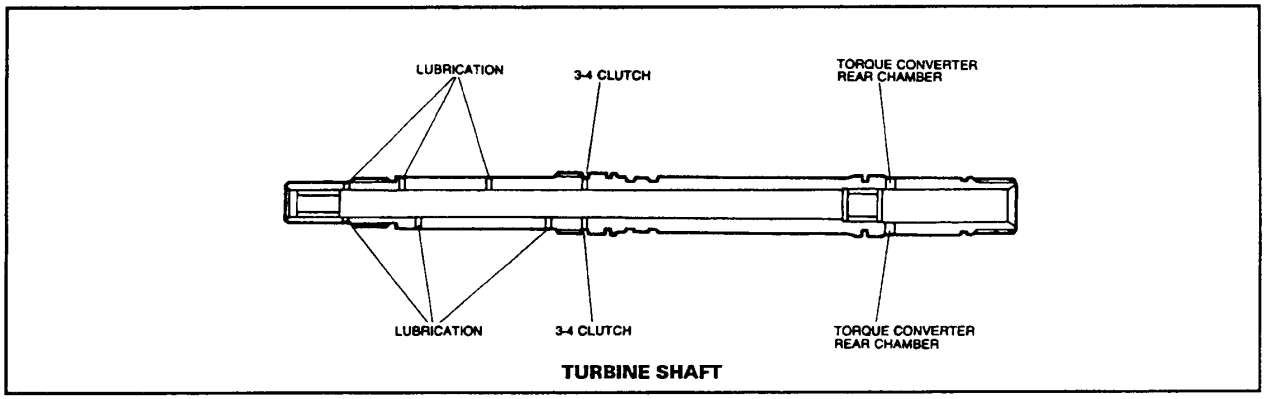


FLUID PASSAGE LOCATIONS





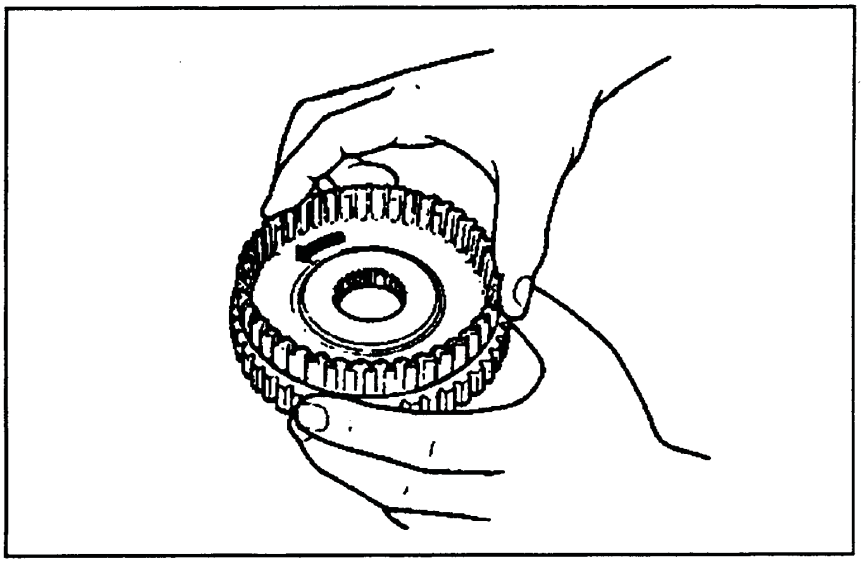




ONE-WAY CLUTCH ROTATION

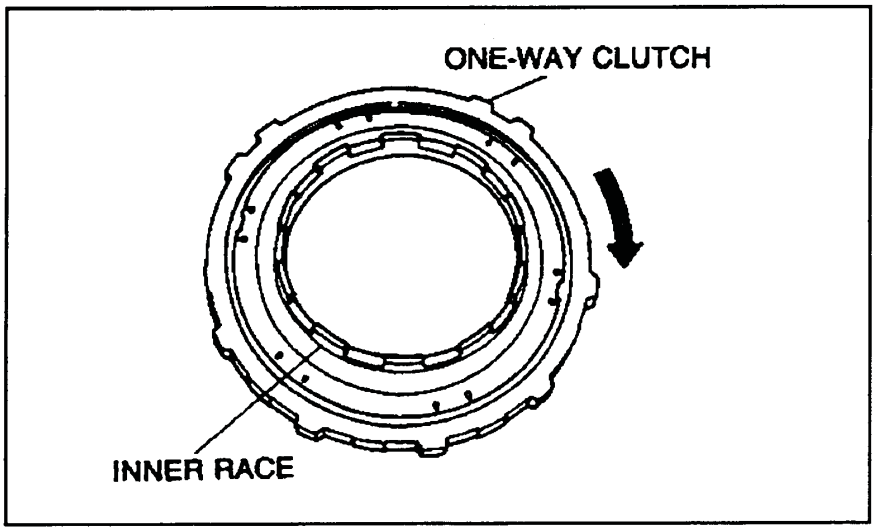
ONE-WAY CLUTCH 1

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

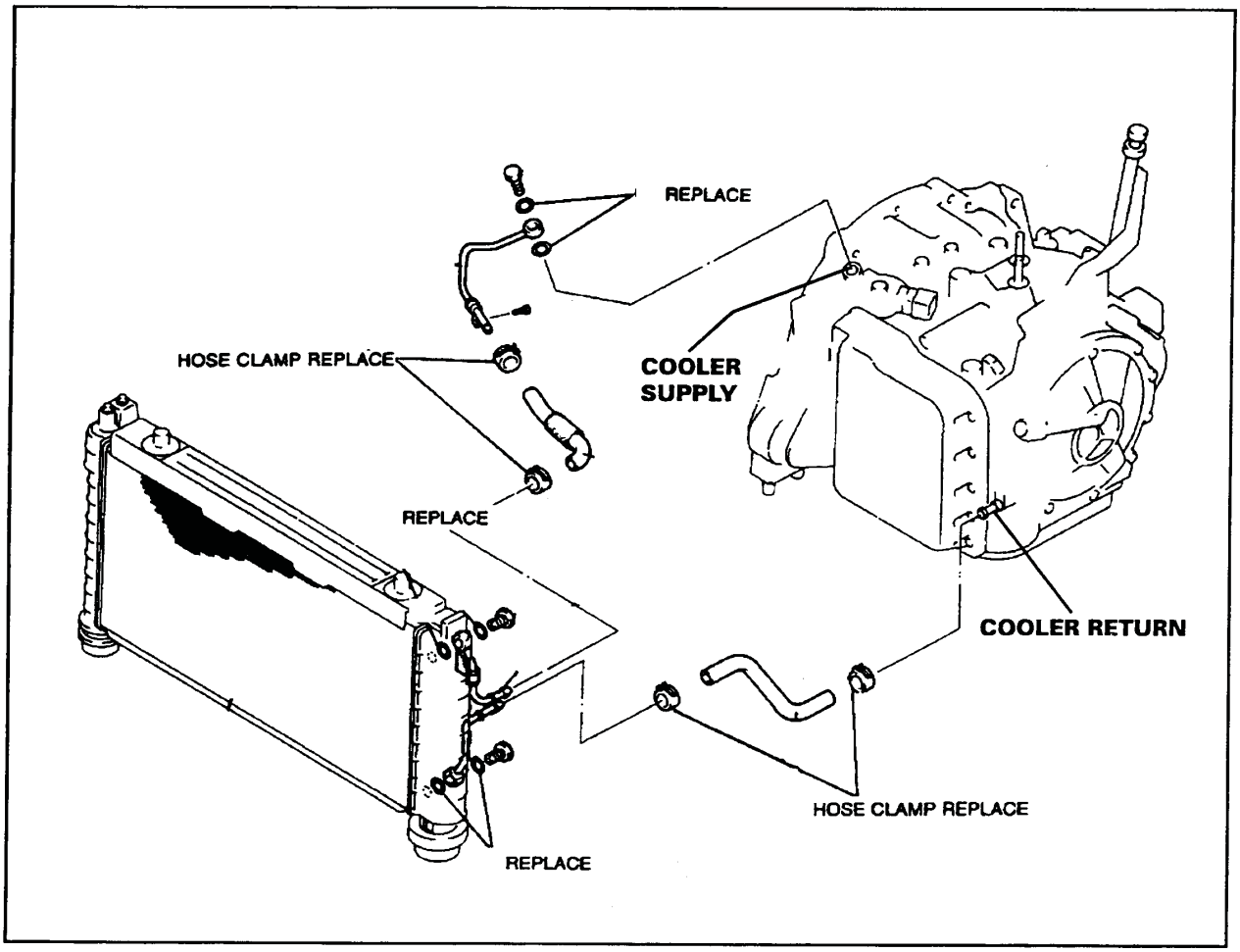


ONE-WAY CLUTCH 2

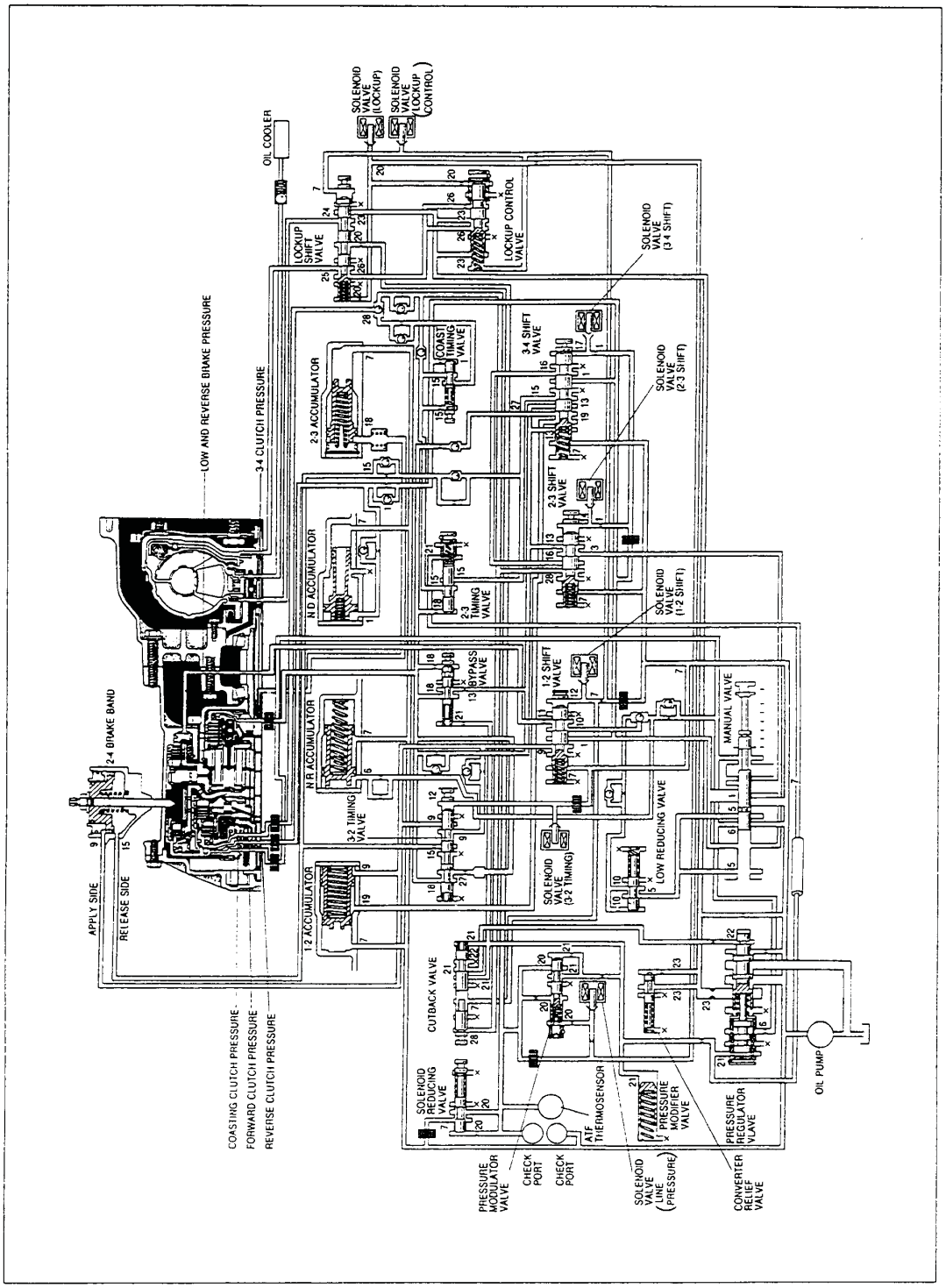
Hold the inner race. The outer race must rotate when turned clockwise



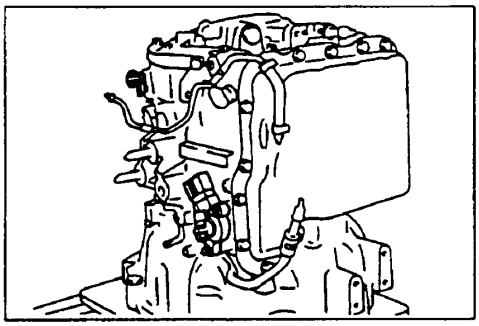
COOLER FLOW


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

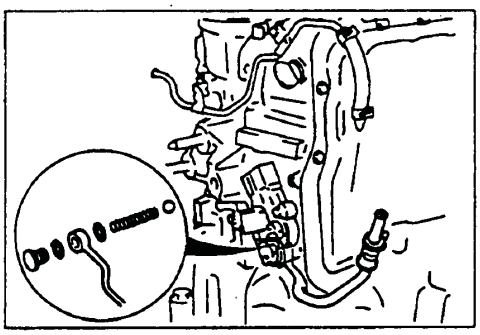
HYDRAULIC CIRCUIT



DISASSEMBLY

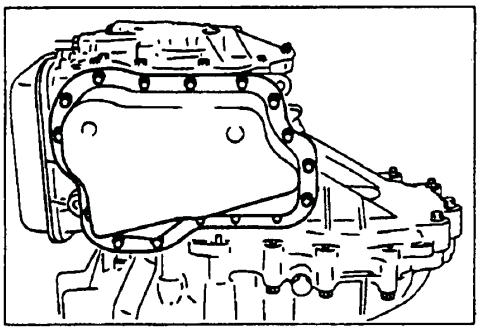


Remove the vehicle speed pulse generator, and inhibitor switch.



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

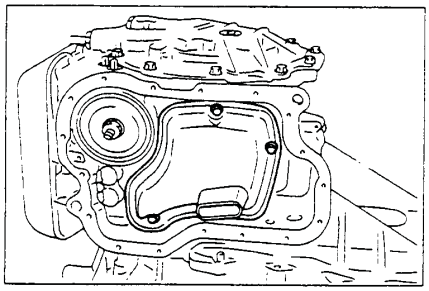
Remove the connector bolt.
Remove the packings, oil pipe, spring, and steel ball.



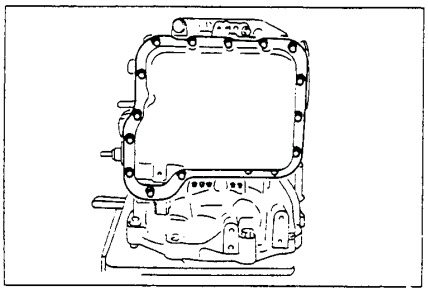
Remove the oil pan and gasket.
Examine any material found in the pan or on the magnet to determine the condition of the transaxle.

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

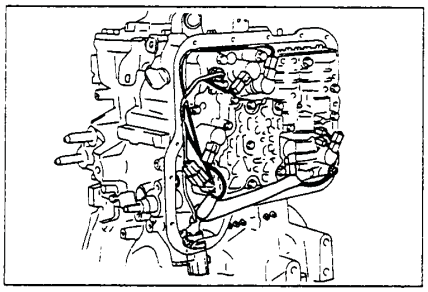
If large amounts of material are found, replace the torque converter and carefully check the transaxle for the cause.



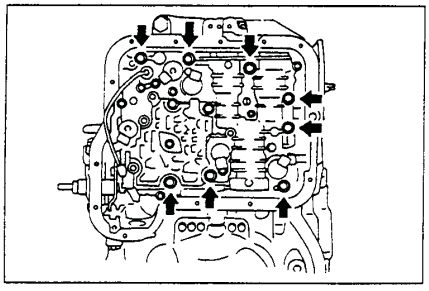
Remove the oil strainer and O-ring.



Remove the control valve body cover and gasket.

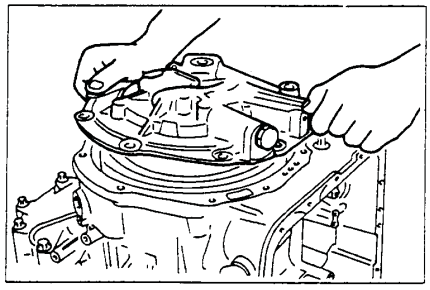


Disconnect the solenoid connectors and ATF thermosensor connector.
Remove the coupler assembly.

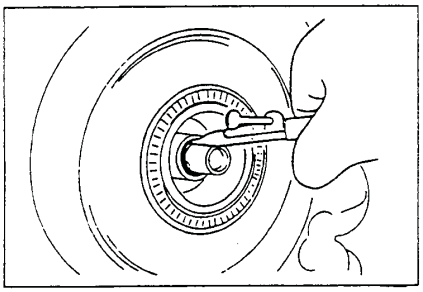


Note
- **Loosen the bolts evenly and gradually.**

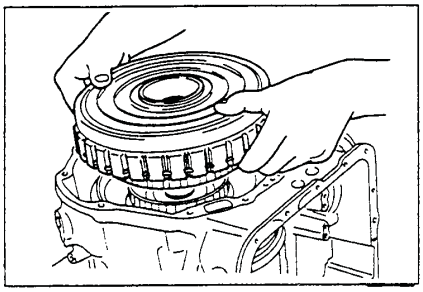
Remove the control valve body as an assembly.



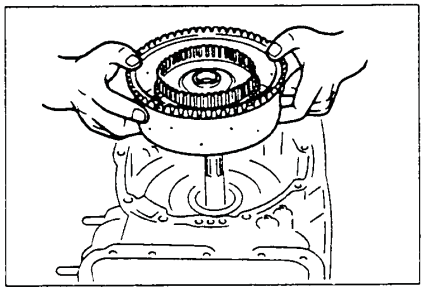
Remove the oil pump and gasket.



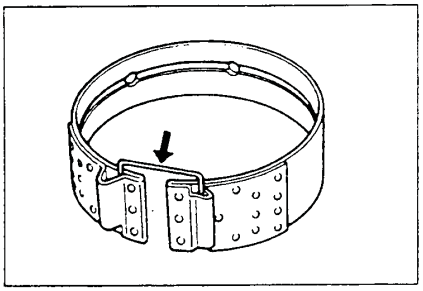
Remove the clutch assembly.
(1) Remove the turbine shaft snap ring.



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

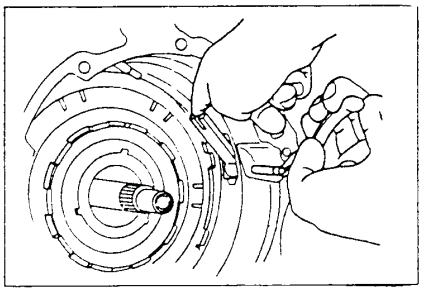


Remove the small sun gear and one-way clutch 1.

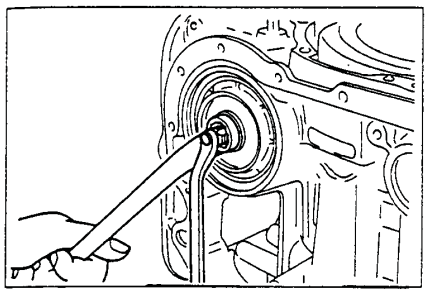


Note
- **Use a piece of wire to secure the brake band so that it is not damaged by being stretched.**

Remove the 2-4 brake band.

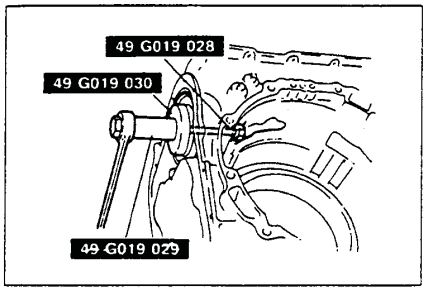


Pull the anchor shaft while holding the strut, then remove the strut.

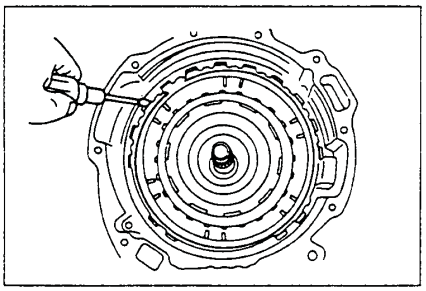


Remove the piston stem from the band servo.

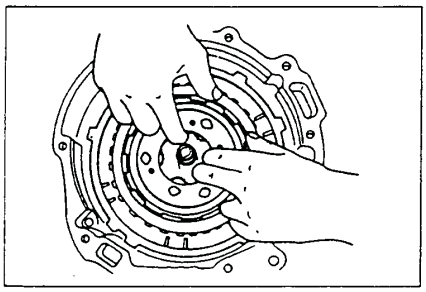
NOTE...The servo cover (not illustrated) is a pressed in dust cover.



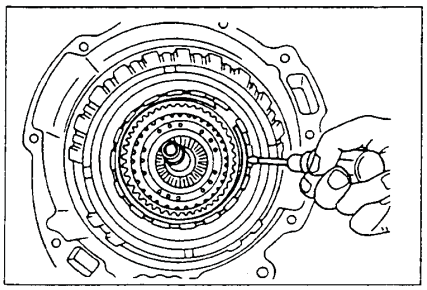
Remove the band servo.
(1) Remove the snap ring by using the **SST**.
(2) Remove the band servo and spring.



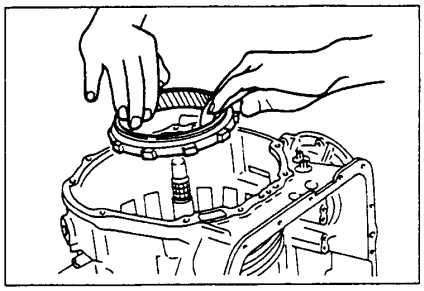
Remove the one-way clutch 2 and carrier hub assembly.
(1) Remove the snap ring.



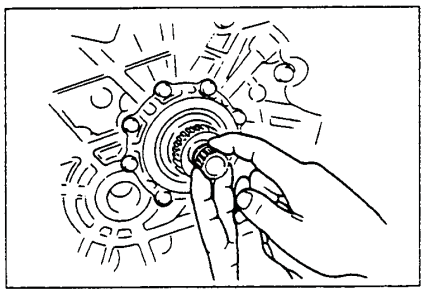
(2) Remove the one-way clutch 2 together with the carrier hub assembly.
(3) Remove the friction plate.



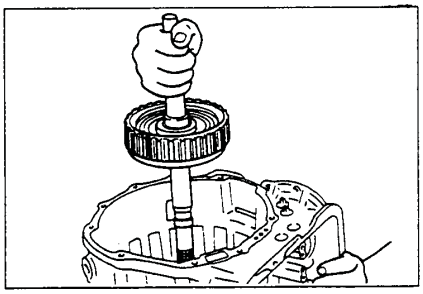
Remove the internal gear.
(1) Remove the snap ring.



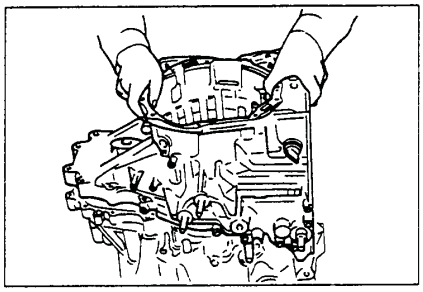
(2) Remove the internal gear from the output shell.



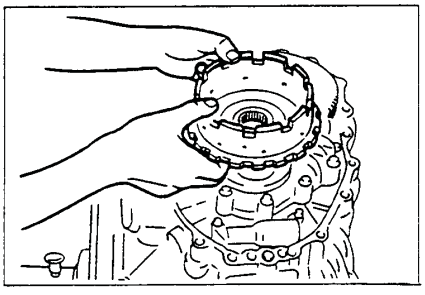
Remove the 3-4 clutch assembly.
(1) Remove the O-ring from the turbine shaft at the converter housing side.



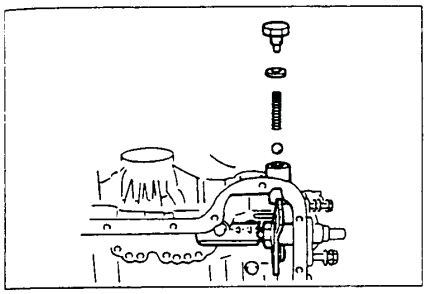
(2) Pull out the turbine shaft to remove the 3-4 clutch assembly.
(3) Remove the 3-4 clutch assembly.



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



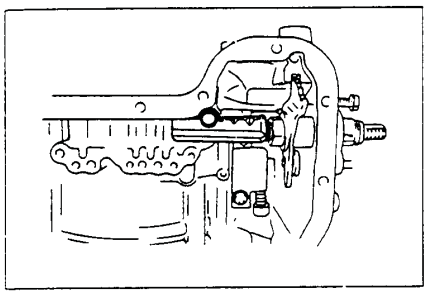
Remove the output shell from the output gear.



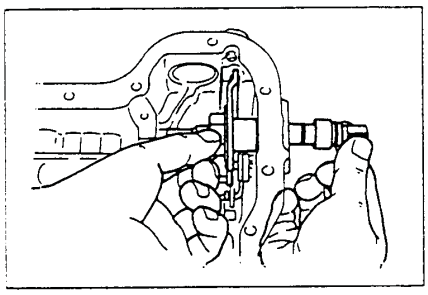
Remove the manual shaft and manual plate.

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

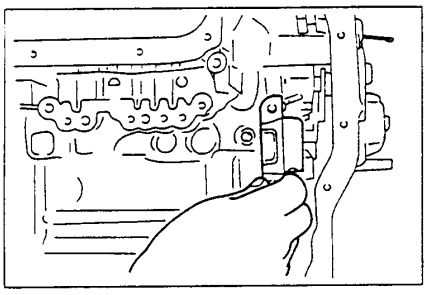
(1) Remove the plug, packing, spring, and detent ball.



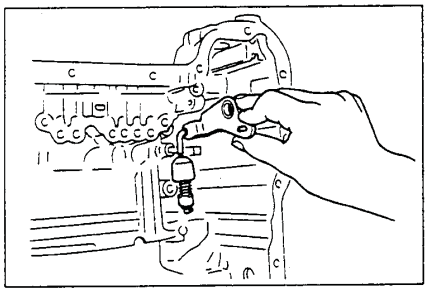
(2) Remove the bracket.



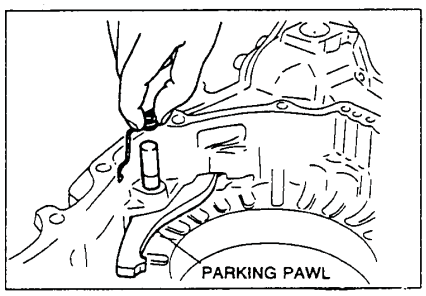
(3) Loosen the nut and puli out the manual shaft.
(4) Remove the nut, washer, spacer, and manual plate.



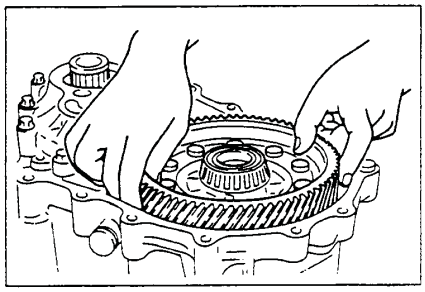
Remove the actuator support.



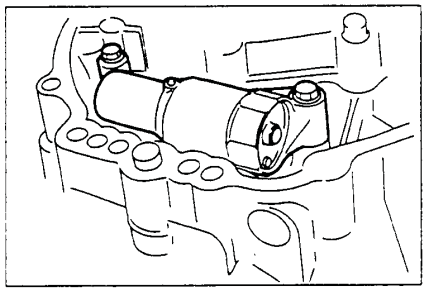
Remove the snap ring and remove the parking assist lever.



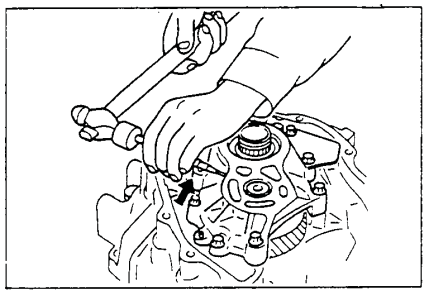
Remove the parking pawl.
(1) Remove the snap ring.
(2) Pull the parking shaft, and remove the spring and parking pawl.



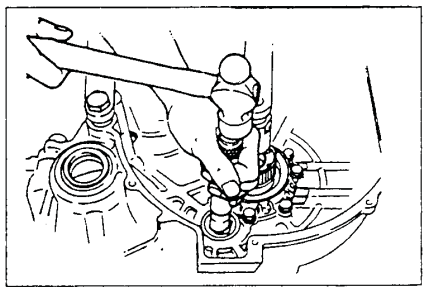
Remove the differential assembly.



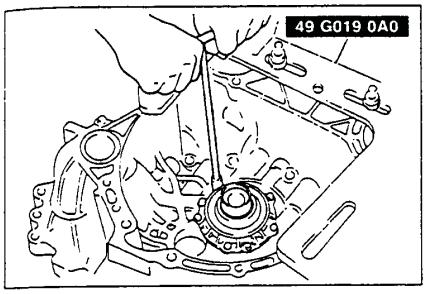
Remove the 2-3 accumulator.
Remove the orifice check valve spring and orifice check valve.



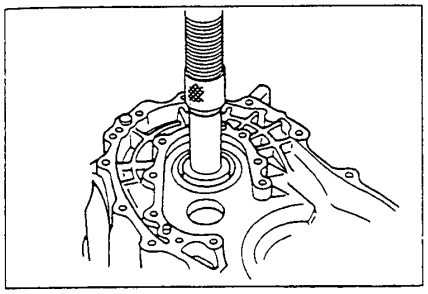
Remove the bearing housing.
(1) Remove the bolt indicated in the figure for access to the roll pin.
(2) Remove the roll pin by using a pin punch.
(3) Remove the baffle plate.
(4) Remove the bearing housing by tapping lightly with a plastic hammer.



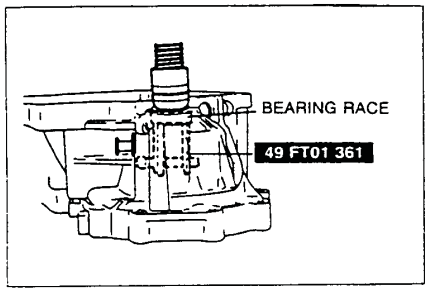
Remove the idler gear and output gear by tapping out from the torque converter side.



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

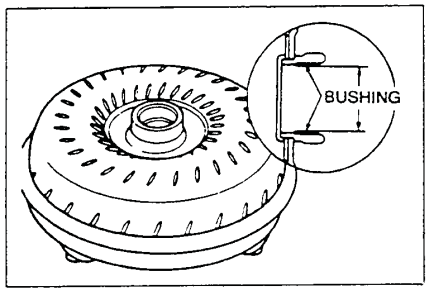


(3) Press the bearing cover assembly out of the converter housing by using a suitable pipe [approx. 80mm {3.1 in} dia].



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

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

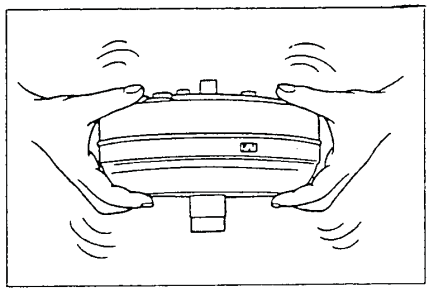


TORQUE CONVERTER

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.

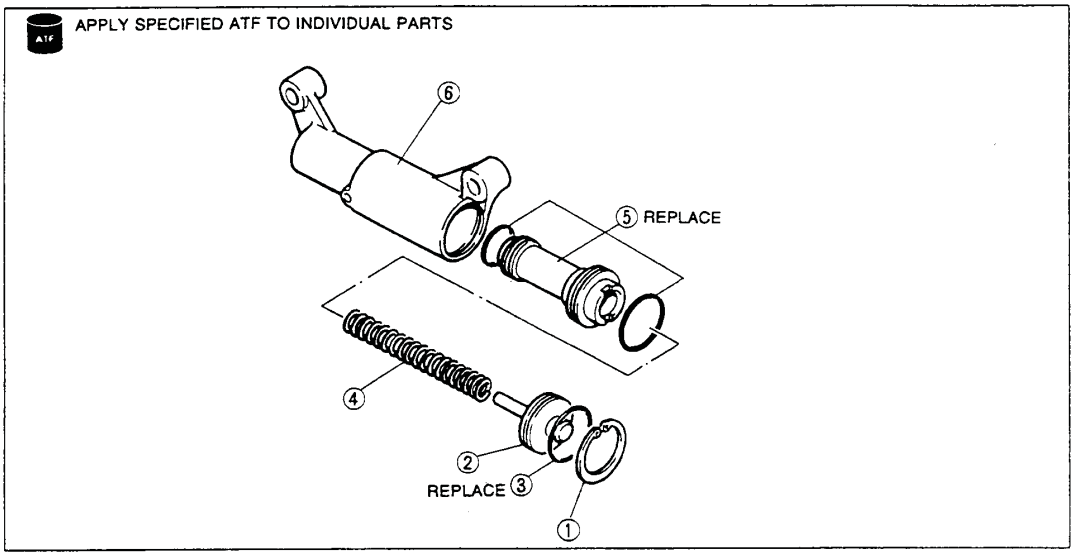
Bushing inner diameter
Standard: 53.030mm {2.0878 in}
Maximum: 53.075mm {2.0896 in}



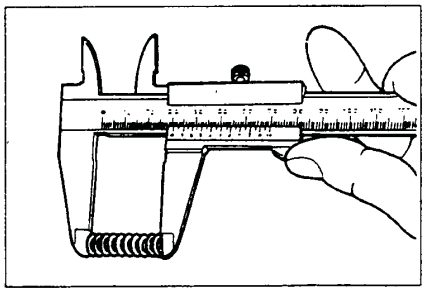
Wash Inside of Converter
1. Drain any ATF remaining in the converter.
2. Pour in ATF **[approx. 0.5 liters {0.5 US qt, 0.4 Imp qt}]**.
3. Shake the converter to clean the inside. Pour out the ATF.
4. Pour in ATF again.
5. Shake the converter to clean the inside. Pour out the ATF.

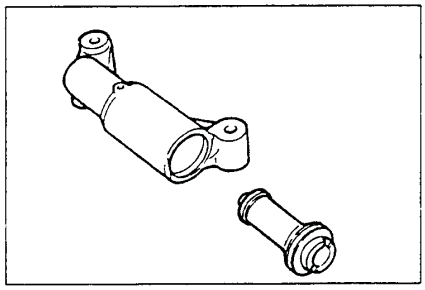
COMPONENT DISASSEMBLY AND ASSEMBLY

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

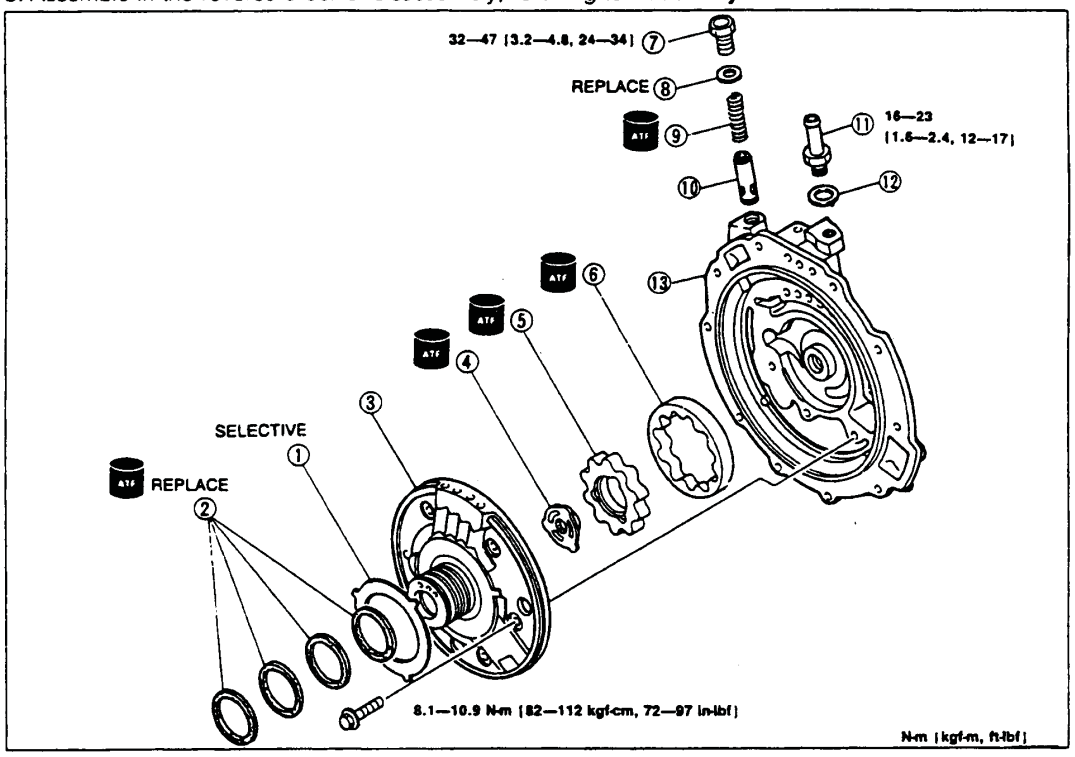
Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
11.5 {0.453}	77.7 {3.06}	23.3	1.4 {0.055}

2. If not as specified, replace the spring.

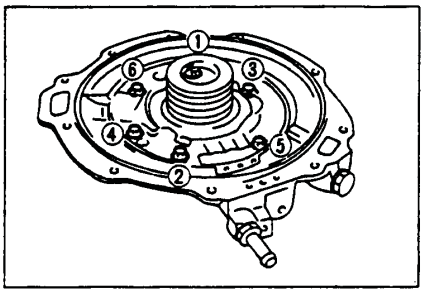
Assembly procedure
1. Apply ATF to the large and small seal rings and install them on to the accumulator piston.

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

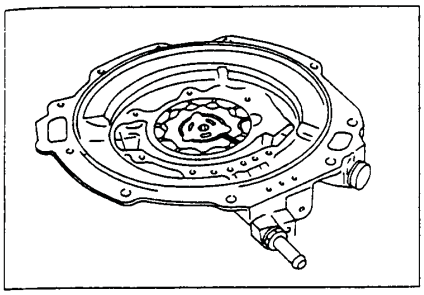
OIL PUMP
Disassembly / Inspection / Assembly
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



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



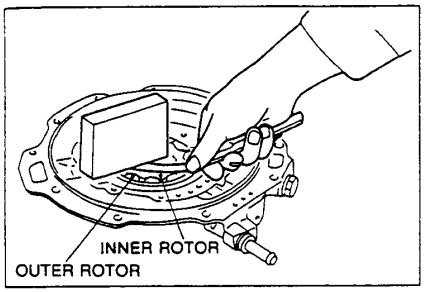
Disassembly note
Oil pump cover
1. Loosen the mounting bolts evenly in the order shown.
2. Remove the oil pump cover from the oil pump housing.



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.

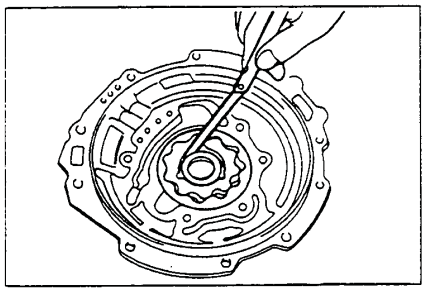


Inspection
Oil pump housing, outer rotor, inner rotor

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}

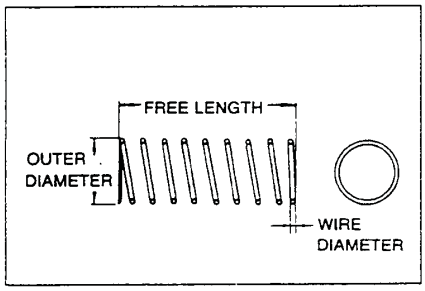
2. If not as specified, replace the pump assembly.



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

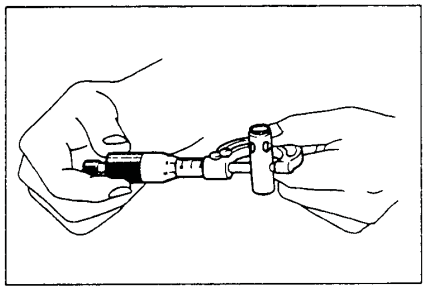
Note
- **Do not compress the spring when measuring with vernier calipers.**

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}

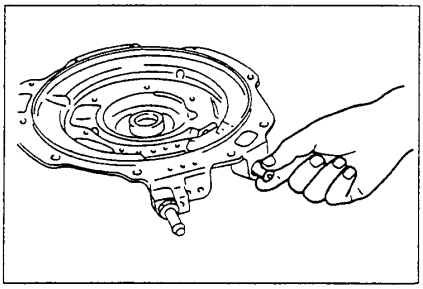
2. If not as specified, replace the spring.



Spool
1. Measure the spool diameter.

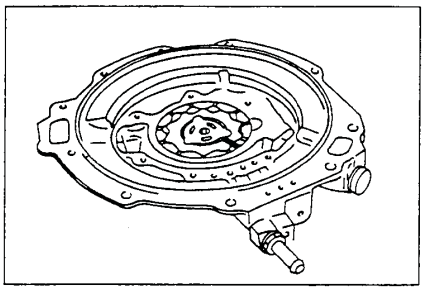
Outer diameter
Standard:
13.970—13.980mm {0.5500—0.5503 in}
Minimum: 13.970mm {0.5500 in}

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

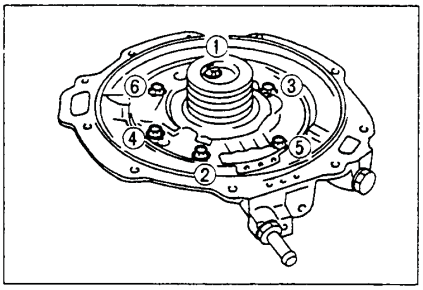


2. Install the spool and spring into the oil pump housing.
3. Verify that the spool moves smoothly.
4. Install a new packing and the plug.

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

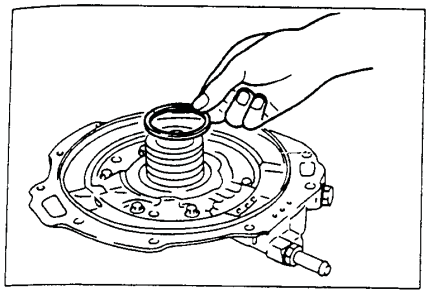


5. Align the marks and install the outer and inner rotors.
6. Install the oil pump flange.



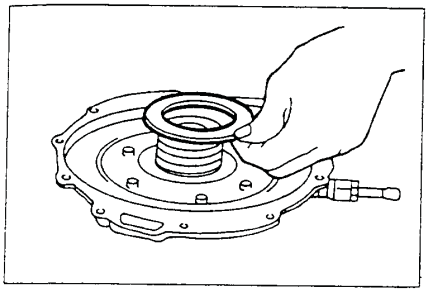
7. Mount the oil pump cover onto the oil pump housing.
8. Tighten the bolts evenly and gradually in the order shown.

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}

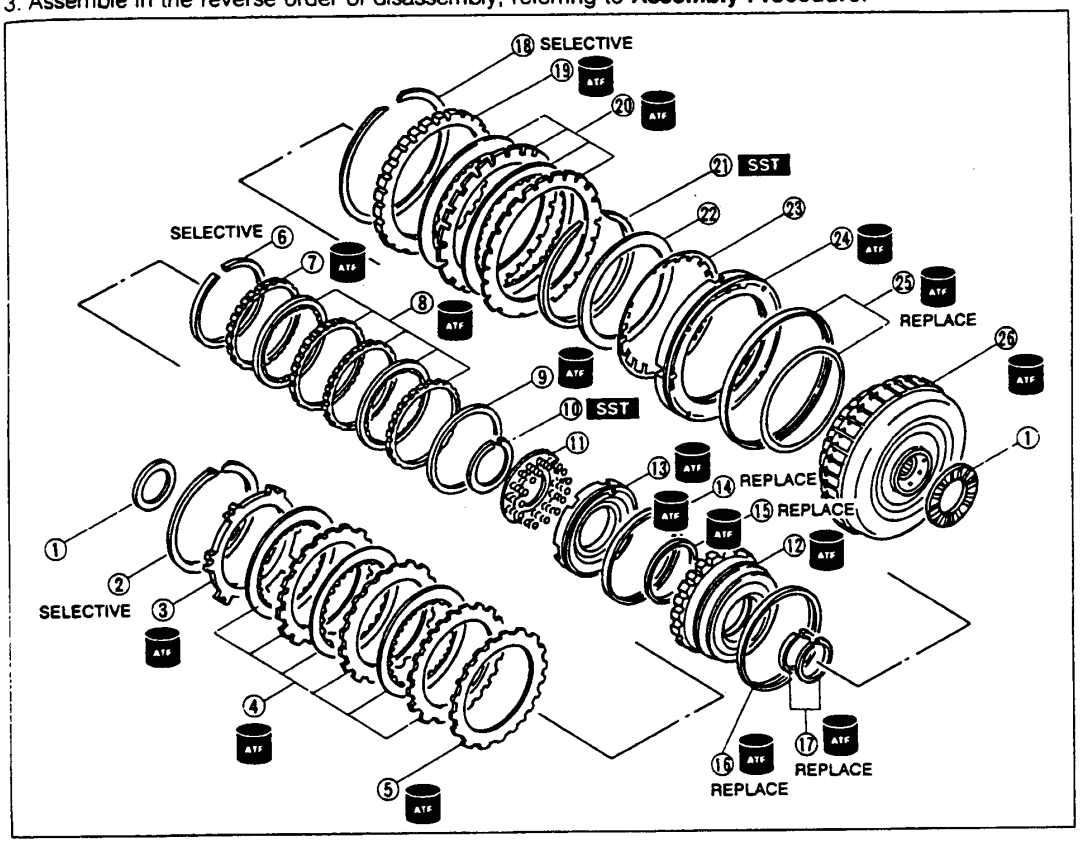


11. Apply petroleum jelly to the bearing race and secure it onto the oil pump cover.

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-

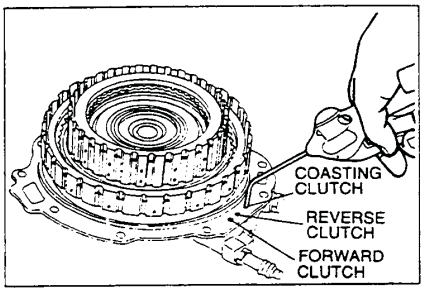
2. Snap Ring
3. Retaing Plate
4. Drive and Driven Plates
5. Dished Plate

-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

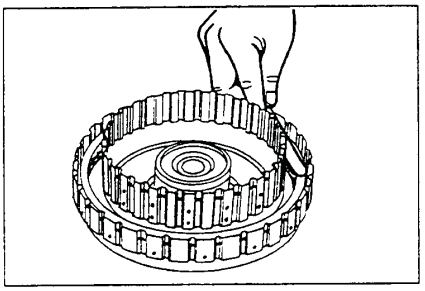
-Reverse Clutch-

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.



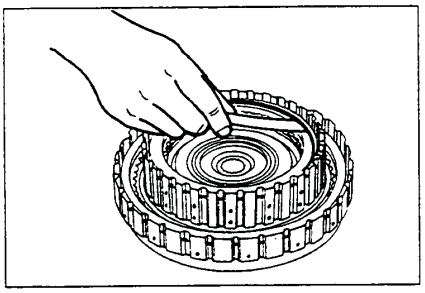
Clutch clearance
Reverse clutch

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.



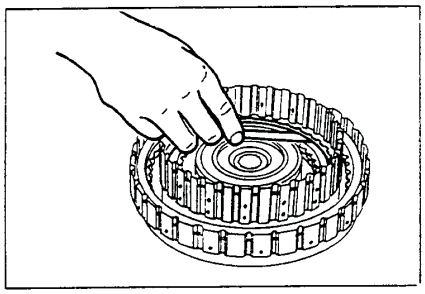
Forward clutch

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.



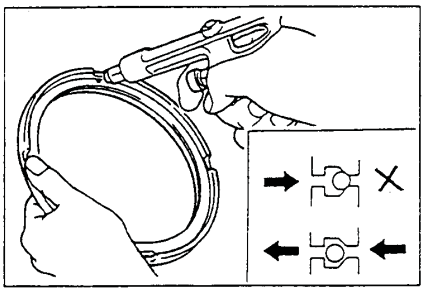
Coasting clutch

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}

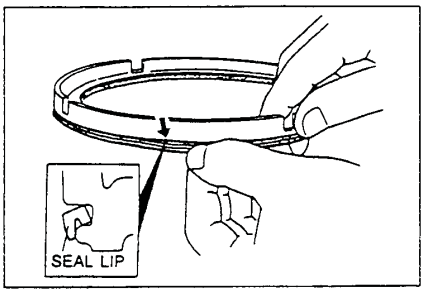
3. If not as specified, replace parts as necessary.
4. Select and install the correct snap ring when assembling.



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/cm², 57 psi} max.

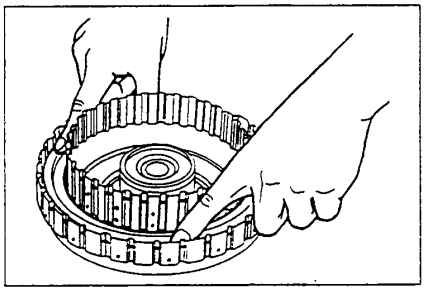


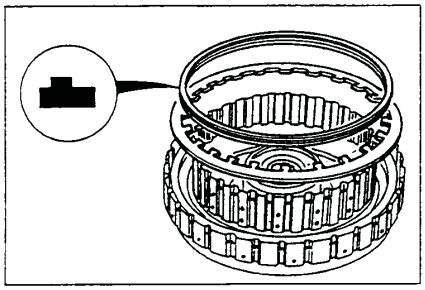
Assembly procedure
Reverse clutch

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

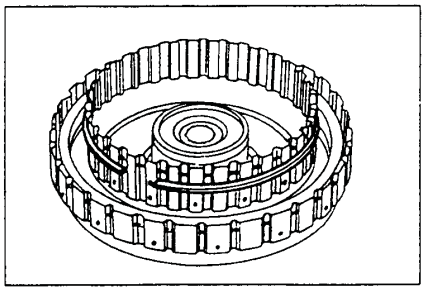
Seal ring inner diameter
Inner seal: 160.5mm {6.319 in}
Outer seal: 188.0mm {7.402 in}

   (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.

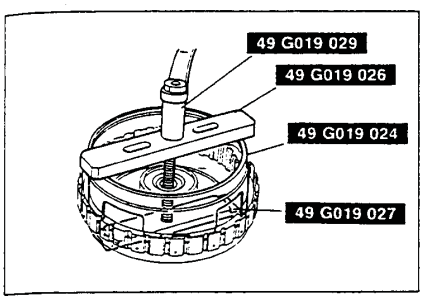


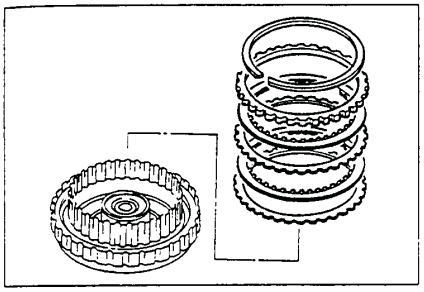


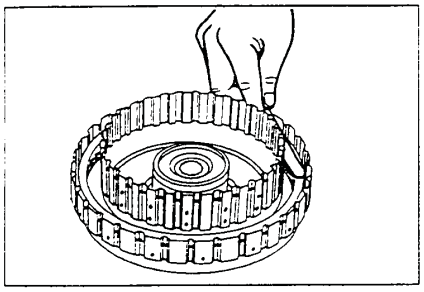
2. Install the piston return spring with the tabs facing up ward away from the reverse piston.
3. Install the return spring stopper with the step facing upward.

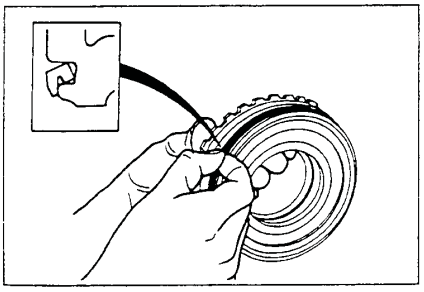


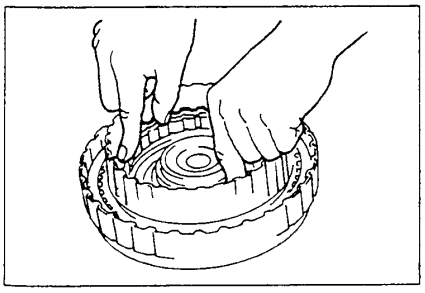
4. Install the snap ring half-way down the reverse forward drum as shown.











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

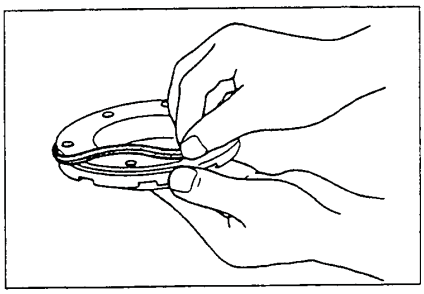
mm {in}

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.

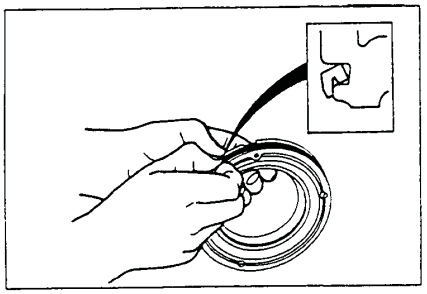
Seal ring inner diameter
Inner seal: 71.02mm {2.796 in}
Outer seal: 137.0mm {5.394 in}

   (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.

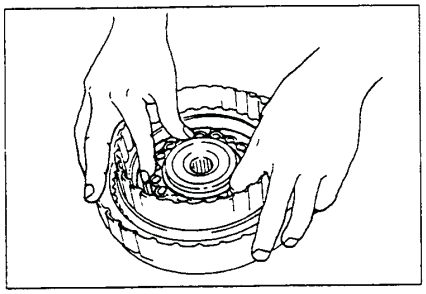


2. Install the coasting piston.
   (1) Apply ATF to the inner and outer faces of the seals and install them onto the coasting piston.

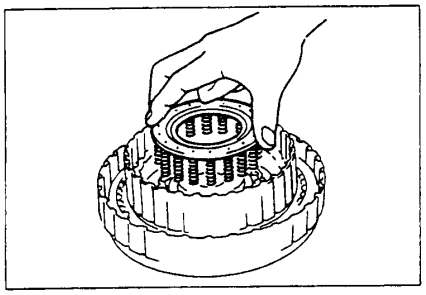
Seal ring inner diameter
Outer seal: 122.0mm {4.803 in}



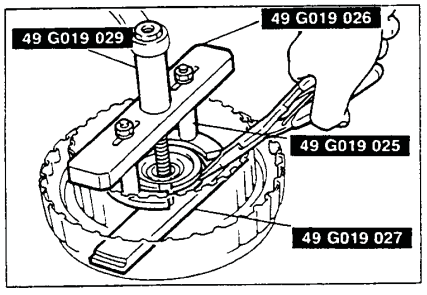
(2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the coasting clutch drum.



(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.



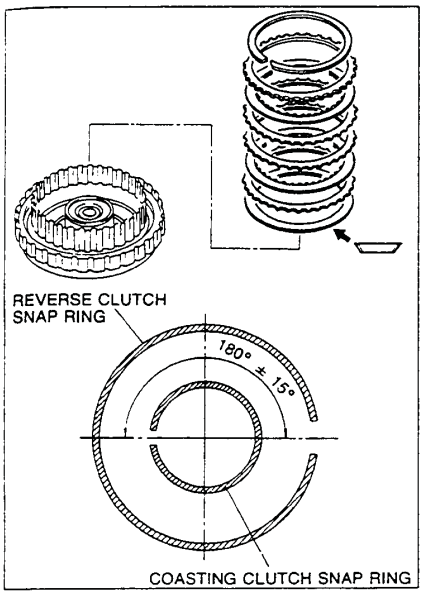
4. Install the **SST** in the coasting clutch.

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.**

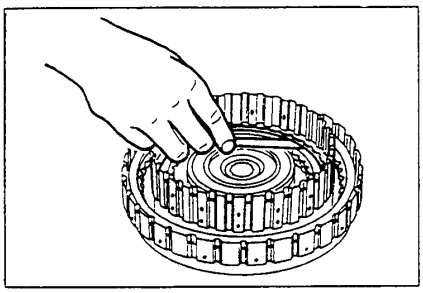
(1) Measure the clearance between the snap ring and the retaining plate.
(2) If the clearance is not within the specification, adjust it by selecting a proper snap ring from below.

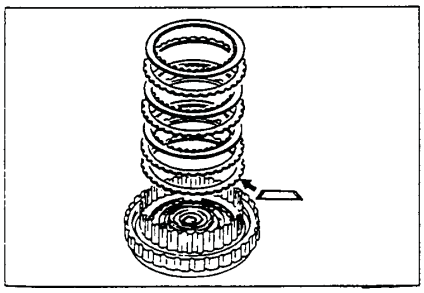
Coasting clutch clearance:
1.0—1.2mm {0.039—0.047 in}

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}

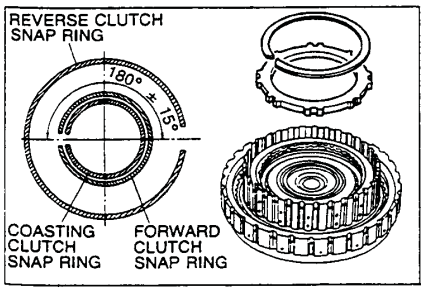




Forward clutch
1. Install the dished plate with the dished side downward.

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

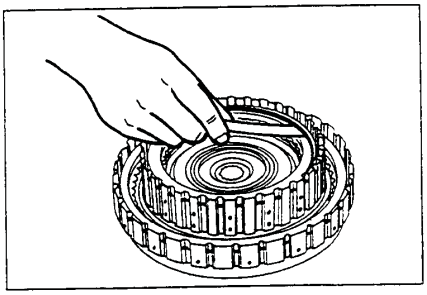
2. Install the drive and driven plates.

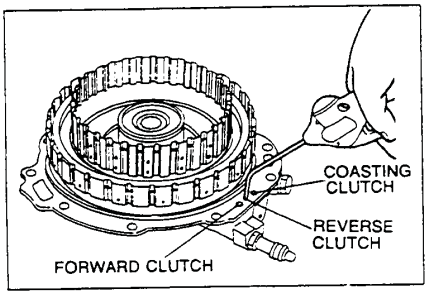


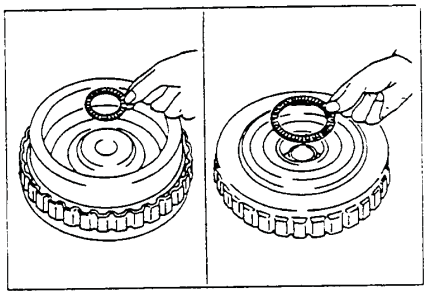
3. Install the retaining plate.

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}

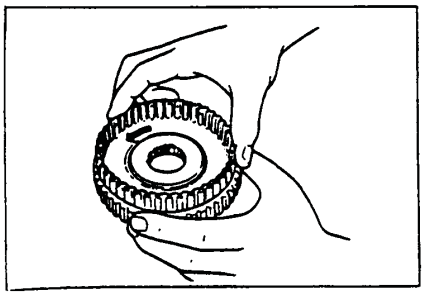
2.00 {0.079}	2.15 {0.085}	2.30 {0.091}
2.45 {0.097}	2.60 {0.102}	2.75 {0.108}

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.

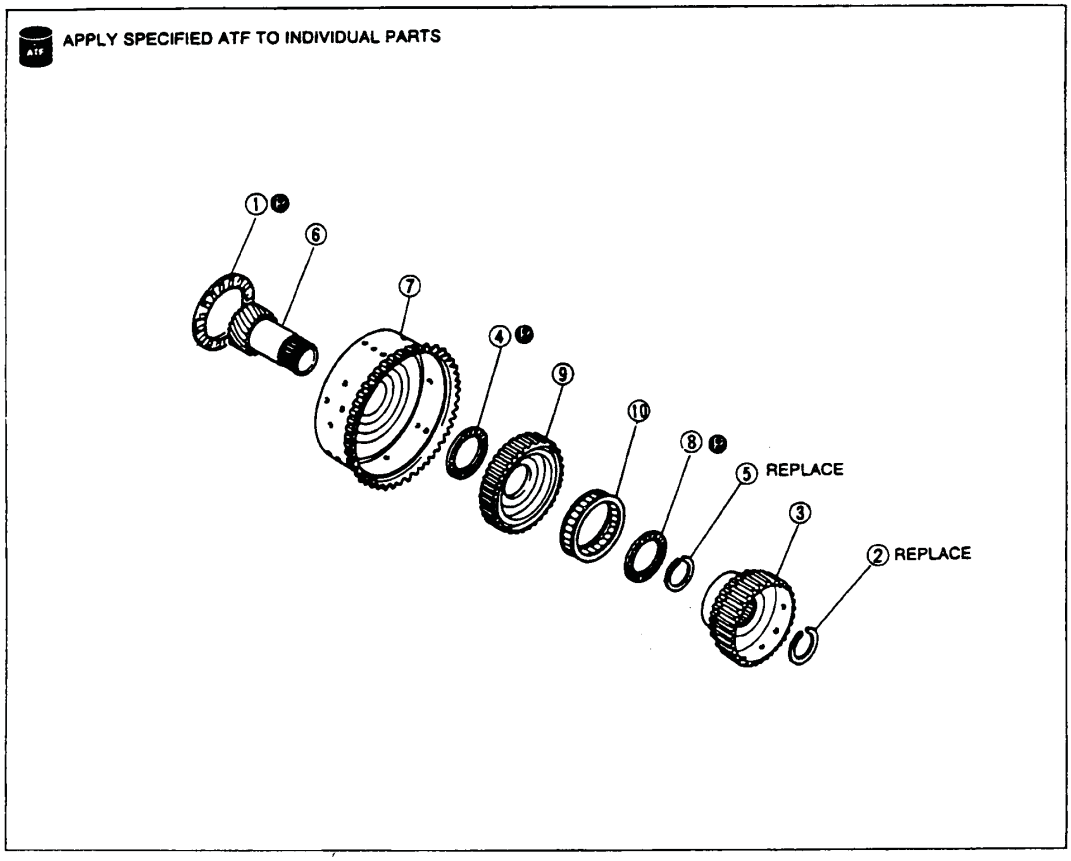
7. Apply petroleum jelly to the thrust bearings, and secure them on the reverse forward drum.

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}

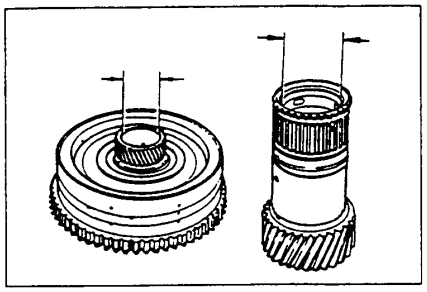


SMALL SUN GEAR AND ONE-WAY CLUTCH 1
Preinspection
One-way clutch 1 operation

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.



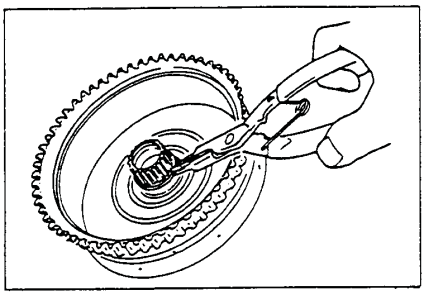
1. Thrust Bearing
2. Snap Ring
3. One-way Clutch Inner Race
4. Thrust Bearing
5. Snap Ring
6. Small Sun Gear
7. Sun Gear Drum
8. Thrust Bearing
9. One-way Clutch Outer Race
10. One-way Clutch 1



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.

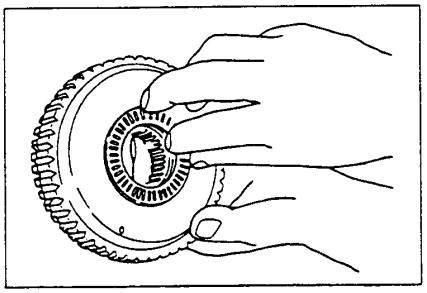
2. If not within the specification, replace the small sun gear or sun gear drum.



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 tc the one-way clutch inner race.

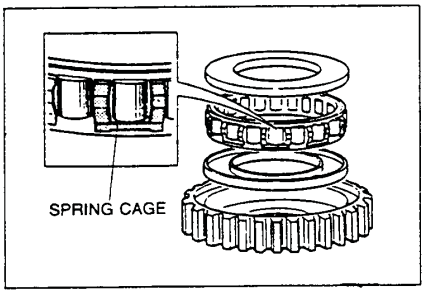
   Thrust bearing outer diameter: 62.5mm {2.46 in}

   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.

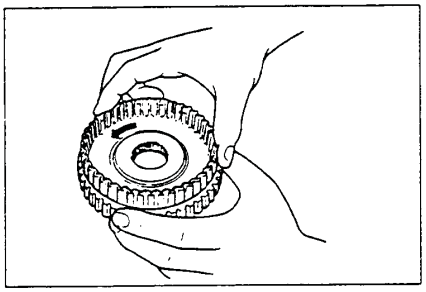
   Thrust bearing outer diameter: 62.5mm {2.46 in}

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

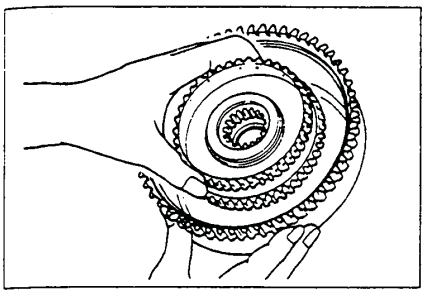


6. Install the one-way clutch inner race into the one-way clutch outer race by turning the inner race counterclockwise.

   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.**

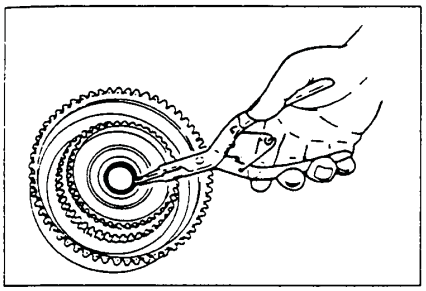


7. Hold the one-way clutch outer race. Verify that the inner race rotates smoothly when turned counterclockwise only.



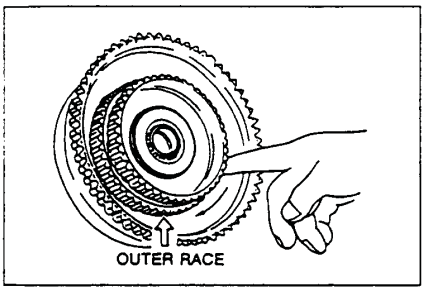
Note
- **Align the splines of the one-way clutch inner race and small sun gear clutch hub.**

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

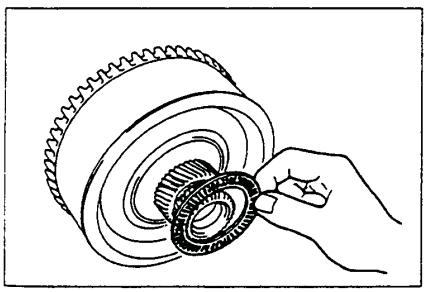


Caution
- **Do not deform the snap ring when installing it.**

9. Install a new snap ring.

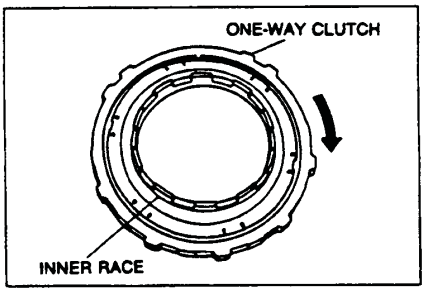


10. Verify that when the small sun gear is held, the one-way clutch outer race turns smoothly and only clockwise.



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

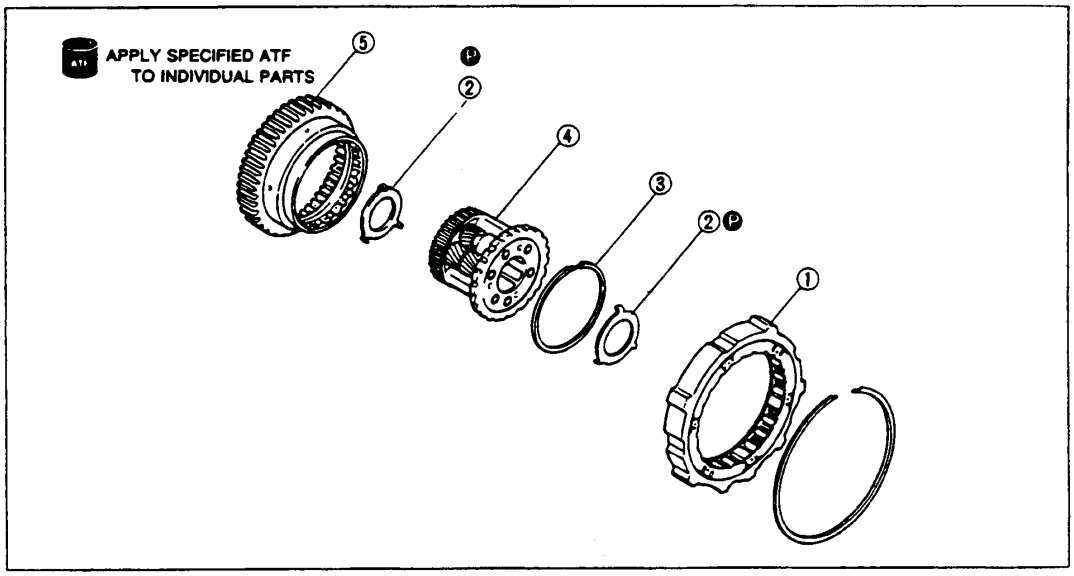
Thrust bearing outer diameter: 72.0mm {2.83 in}



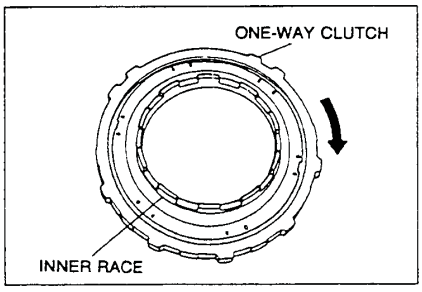
ONE-WAY CLUTCH 2 AND CARRIER HUB ASSEMBLY

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

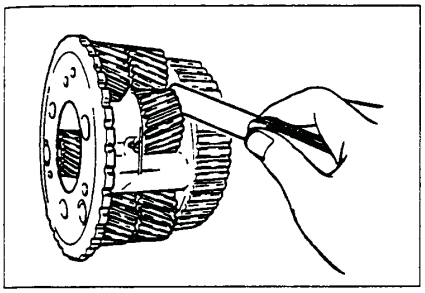
Check the one-way clutch 2 operation.

(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

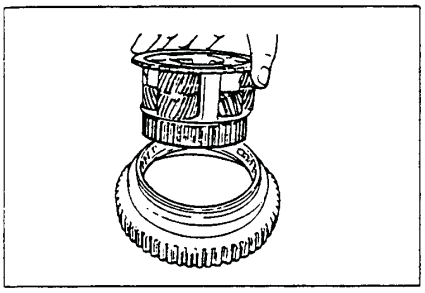
Check for the following and repair or replace as necessary.

(1) Damaged or worn gear and operation.

(2) Clearance between pinion washers and planetary carrier.

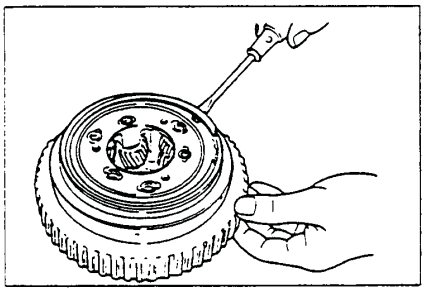
Clearance: 0.2—0.7mm {0.008—0.028 in}

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

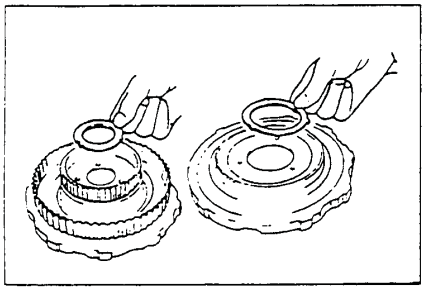


Assembly procedure

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.**

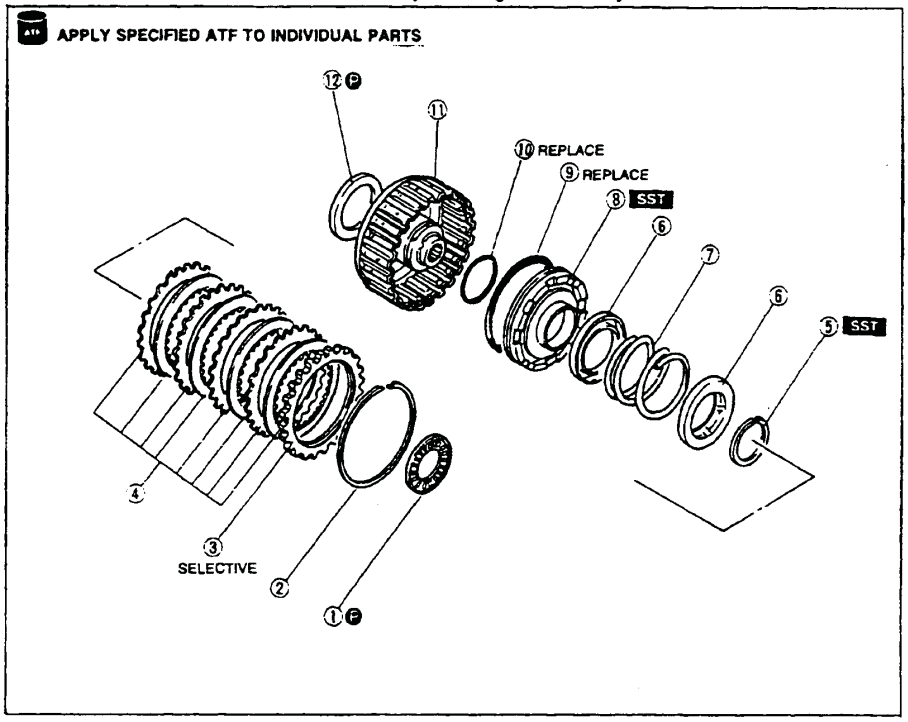
3. Apply petroleum jelly to the bearing race and thrust bearing, install them to the one-way clutch and carrier hub assembly.

Bearing race outer diameter

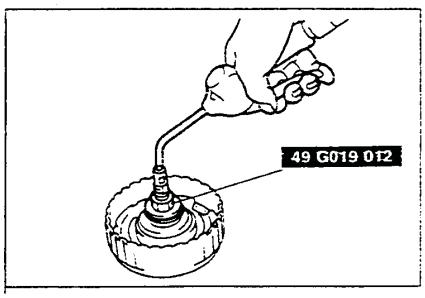
Sun gear drum side: 72.0mm {2.83 in}

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**.



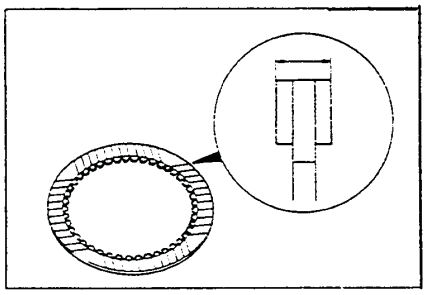
1. Thrust Bearing
2. Snap Ring
3. Retaining Plate
4. Dive and Driven Plates
5. Snap Ring
6. Spring Retainer
7. Return Spring
8. 3-4 Clutch Piston
9. Outer Seal
10. Inner Seal
11. 3-4 Clutch Drum
12. Bearing Race



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.

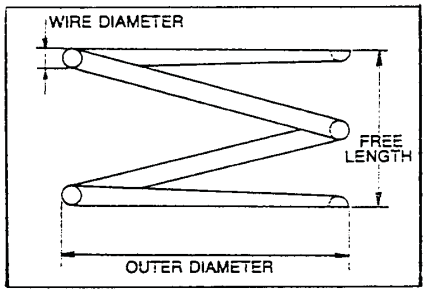
Standard: 1.6mm {0.063 in}
Minimum: 1.4mm {0.055 in}

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

Return spring

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

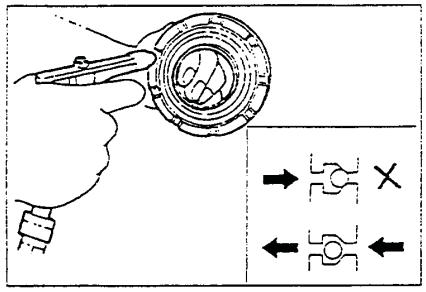
1. Measure the spring free length.



Specifications

Outer diameter mm {in}	Free length mm {in}	No. of coils	Wire diameter mm {in}
33.3 {3.28}	38.7 {1.52}	1.0	5.5 {0.22}

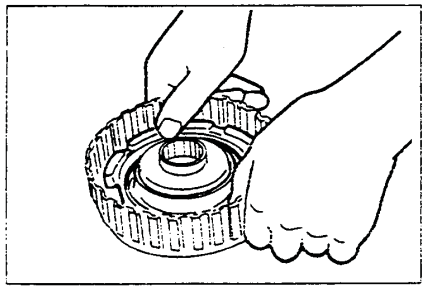
2. If not within the specifications, replace the spring.



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.

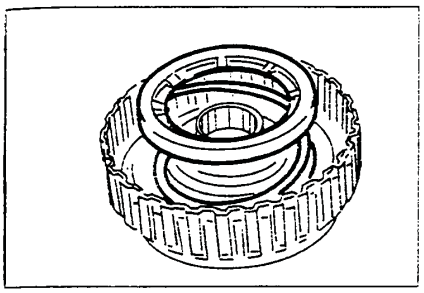
Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.

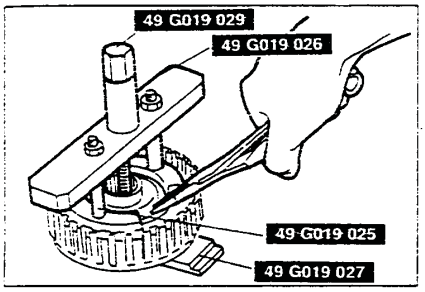


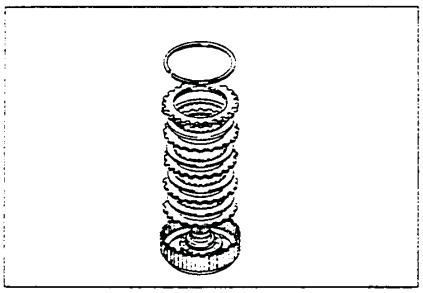
Assembly Procedure

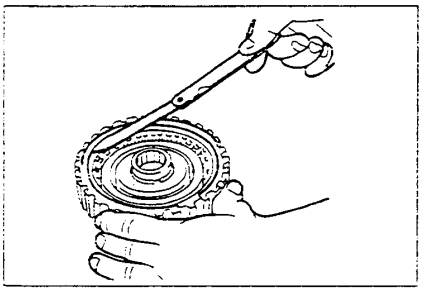
1. Install the 3-4 clutch piston.
   (1) Apply ATF to the inner and outer seals, and install them onto the 3-4 clutch piston.
   (2) Install the piston by pushing evenly around the circumference, being careful not to damage the seal rings.

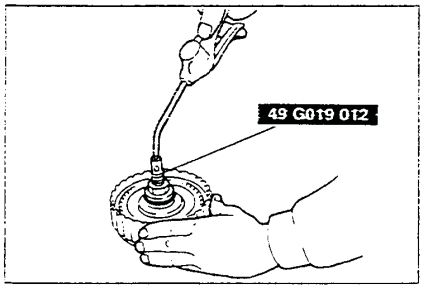
Seal ring inner diameter
Inner seal: 59.0mm {2.32 in}
Outer seal: 105.5mm {4.154 in}











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}

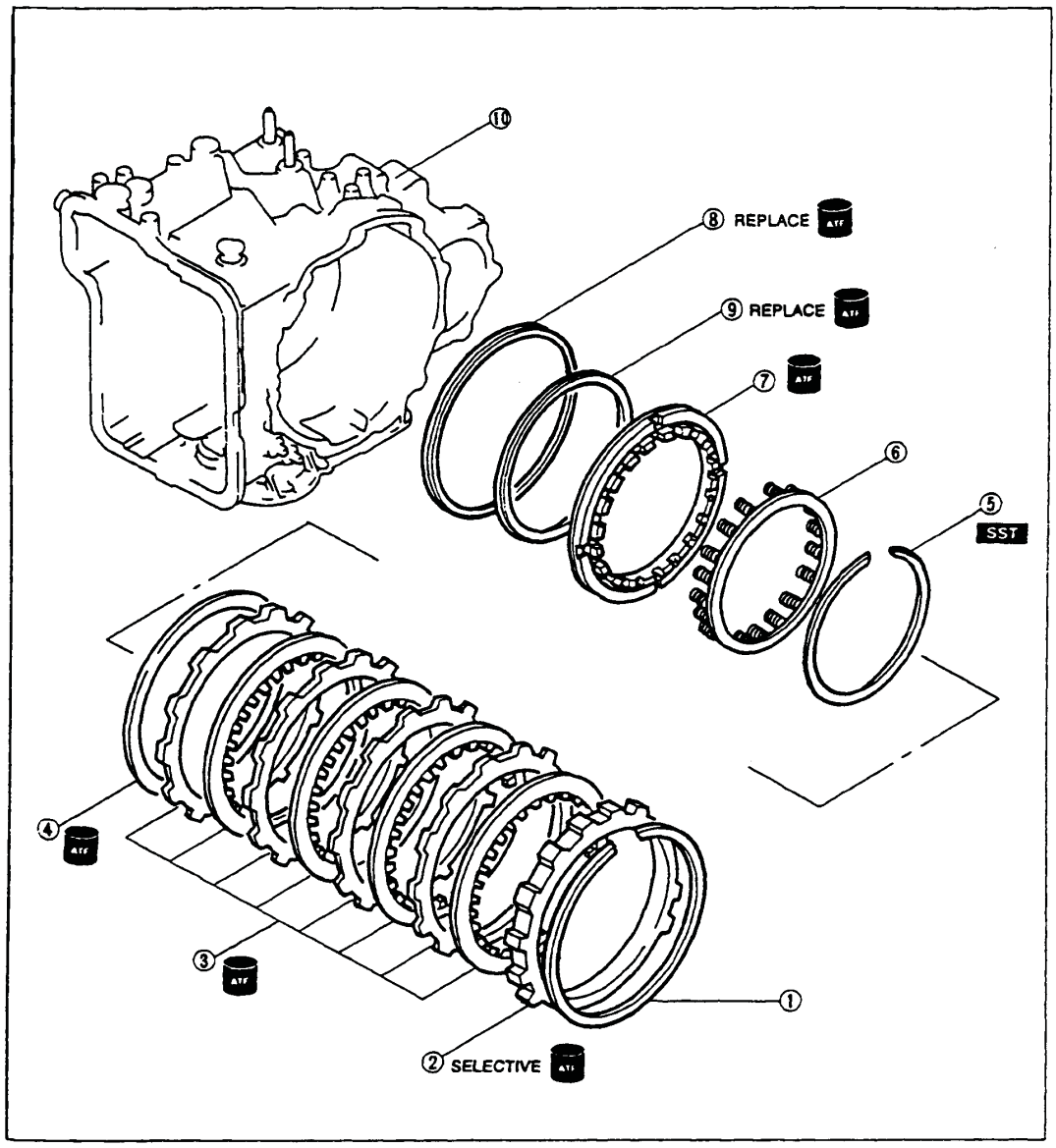
Retaining plate

mm {in}

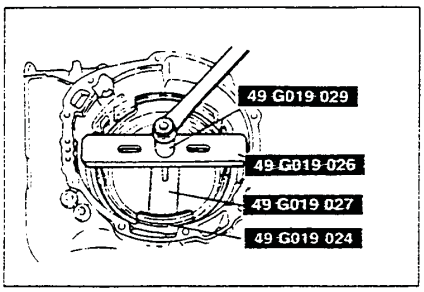
3.8 {0.15}	4.0 {0.16}	4.2 {0.17}
4.4 {0.17}	4.6 {0.18}	4.8 {0.19}

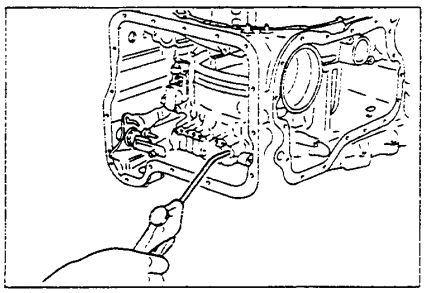
1. Install the **SST** as shown, and check clutch operation by applying compressed air.

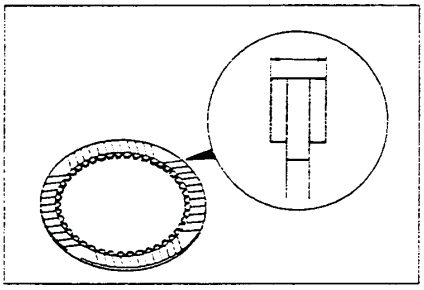
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

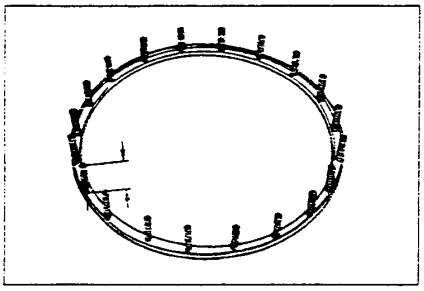


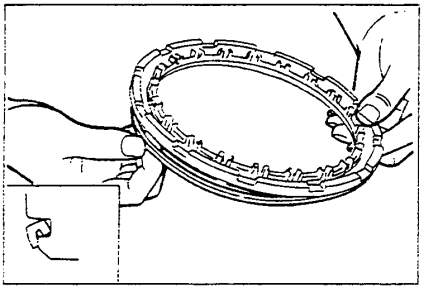
1. Snap Ring
2. Retaining Plate
3. Drive and Driven Plates
4. Dished Plate
5. Snap Ring
6. Spring and Retainer Assembly
7. Low and Reverse Brake Piston
8. Outer Seal
9. Inner Seal
10. Transaxle Case











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.

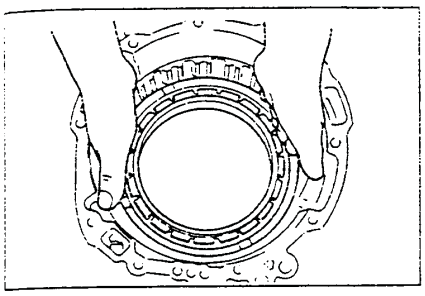
Free length: 18.07mm {0.7114 in}

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

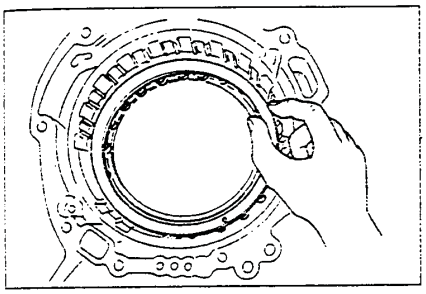
Assembly Procedure
1. Install the low and reverse brake piston.
   (1) Apply ATF to the new inner and outer seals, and install them onto the low and reverse brake piston.

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

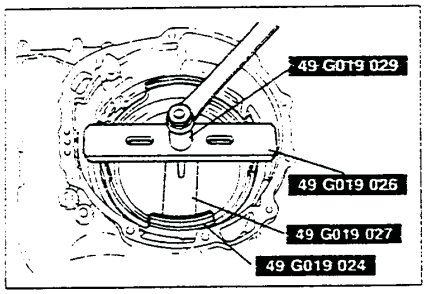
   (2) Face the outer seal lip toward the inside by gently rolling it down around the circumference for easier installation into the case.



(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.



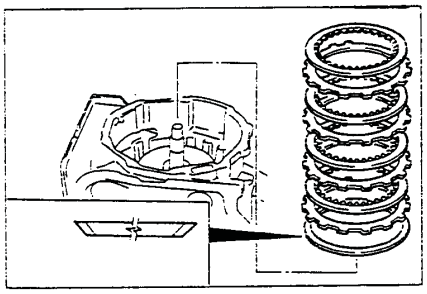
3. Install the **SST** in the transaxle case as shown.

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.**

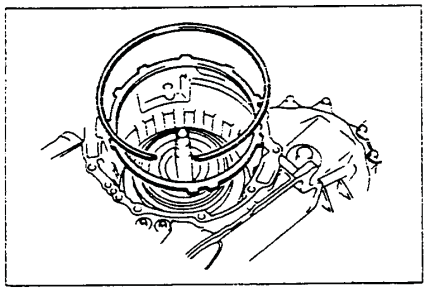
5. Install the snap ring.
6. Remove the **SST**.



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.



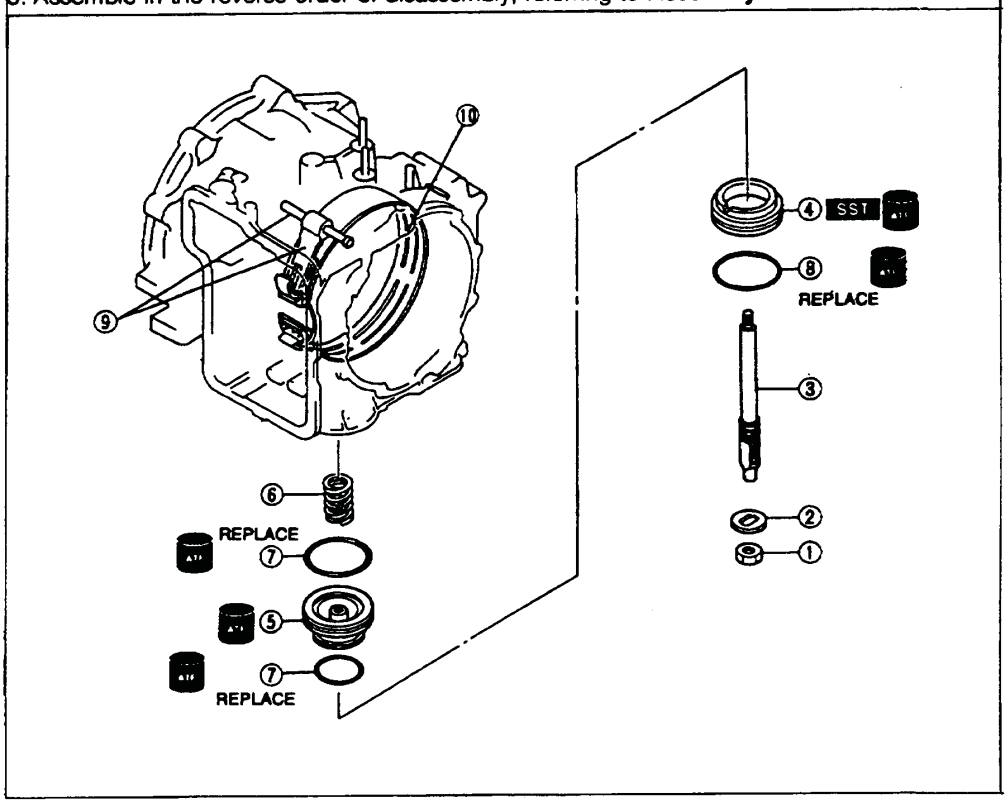
9. Install the retaining plate.

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

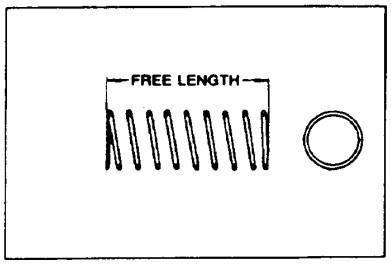
10. Install the snap ring.

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

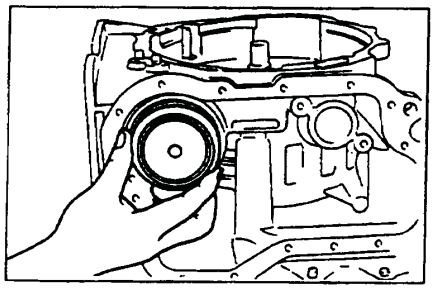
Note
- **Do not compress the spring when measuring with vernier calipers.**

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.

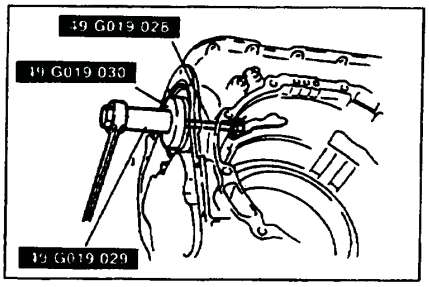


Assembly note
Servo retainer, Band servo piston
Install the servo into the transaxle case.
(1) Apply ATF to a new D-ring and install it onto the band servo piston.

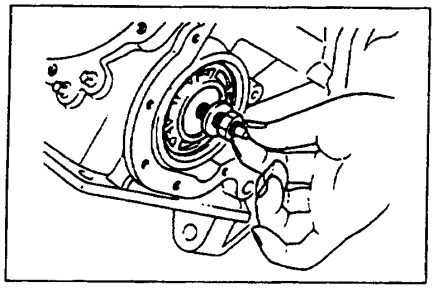
D-ring inner diameter
Small D-ring: 2.0 Engine...47.7mm {1.88in.}
2.5 Engine...29.4mm {1.16in.}
Large D-ring: 65.9mm {2.59 in}

(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}

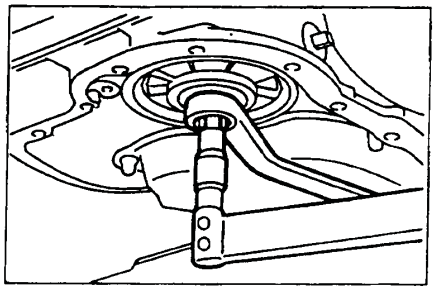


(4) Install the servo return spring and servo retainer assembly into the transaxle case.
(5) Press the servo retainer assembly by using the **SST**.
(6) Install the snap ring.



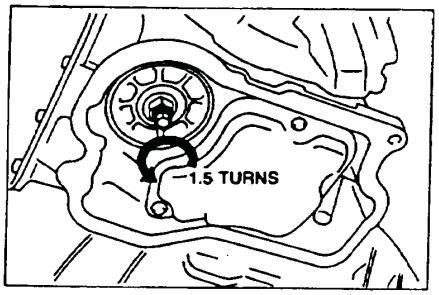
(7) Install the piston stem, washer, and nut to the band servo piston.

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}

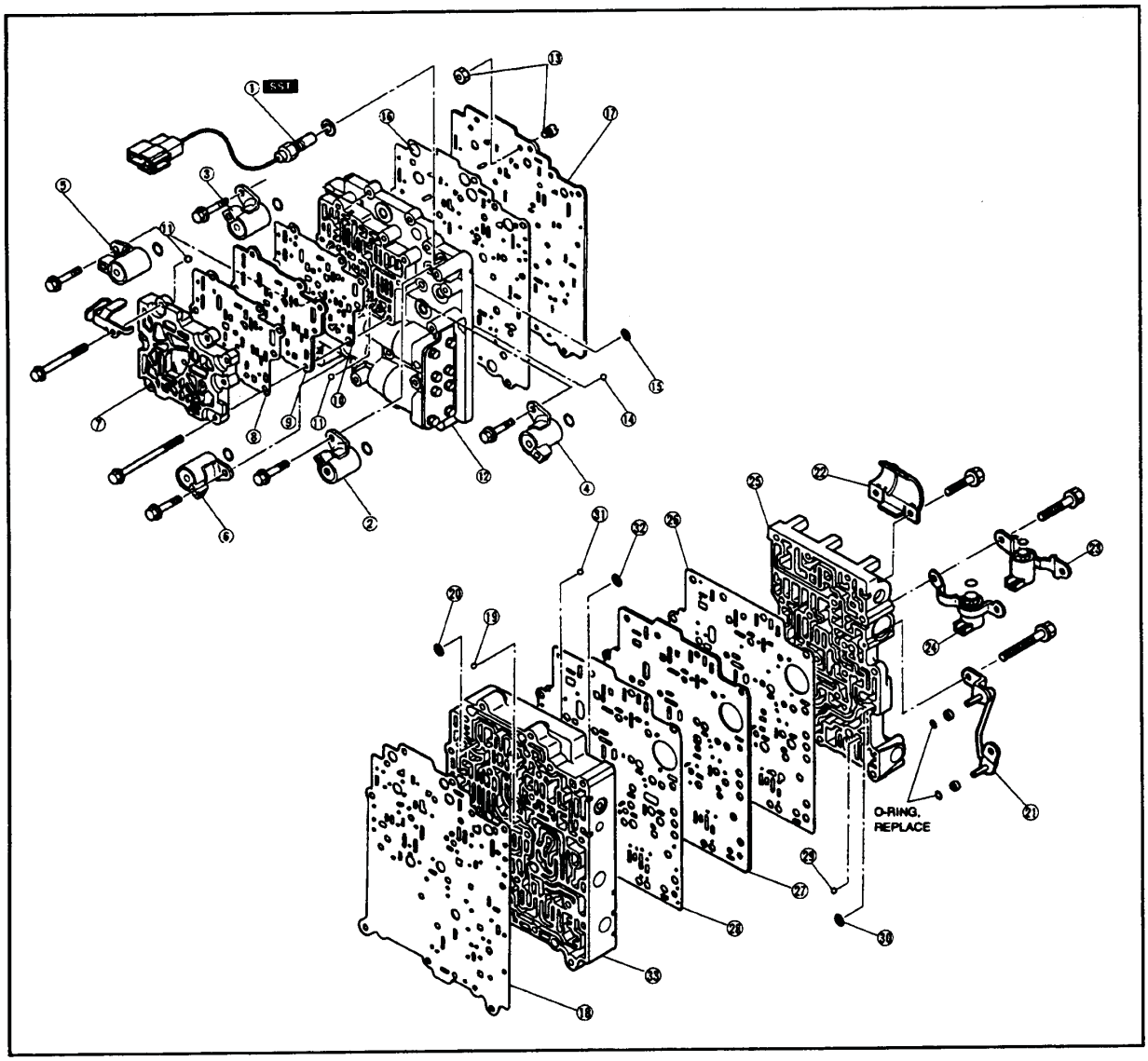


9. Loosen the piston stem 1.5 turns.
10. Hold the piston stem and tighten the locknut to the specified torque.

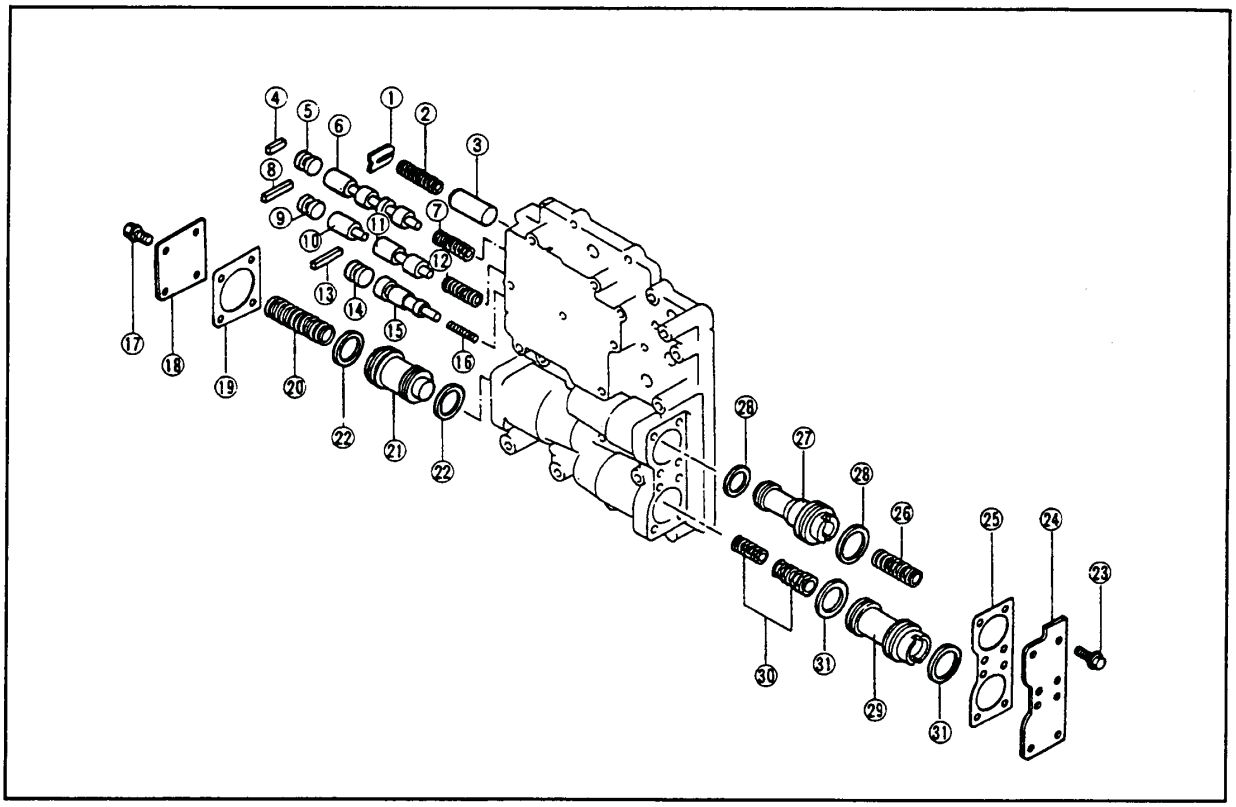
Tightening torque:
25—39 N·m {2.5—4.0 kgf·m, 19—28 ft·lbf}

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

VALVE BODY...DISASSEMBLY/ASSEMBLY

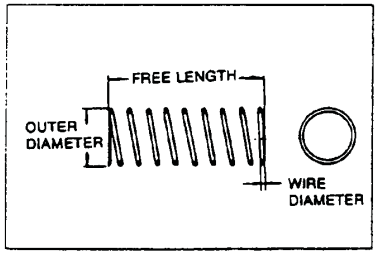


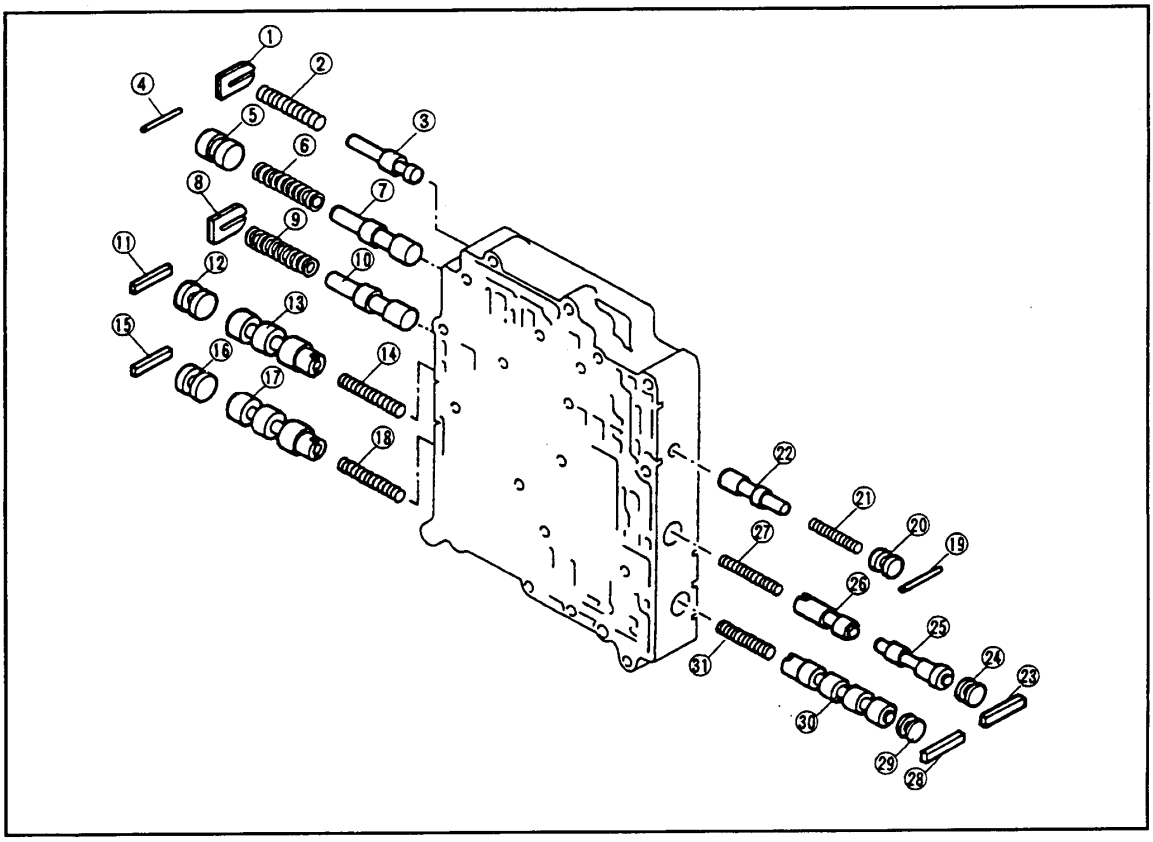
1. ATF Sensor
2. Line Pressure Solenoid
3. Lockup Solenoid
4. 3-2 Timing Solenoid
5. 1-2 Shift Solenoid
6. Lockup Control Solenoid
7. Front Control Valve Body
8. Front Premain Front Gasket
9. Premain Separator Plate
10. Front Premain Rear Gasket
11. Rubber Checkballs
12. Premain Separator Plate
13. Jet 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

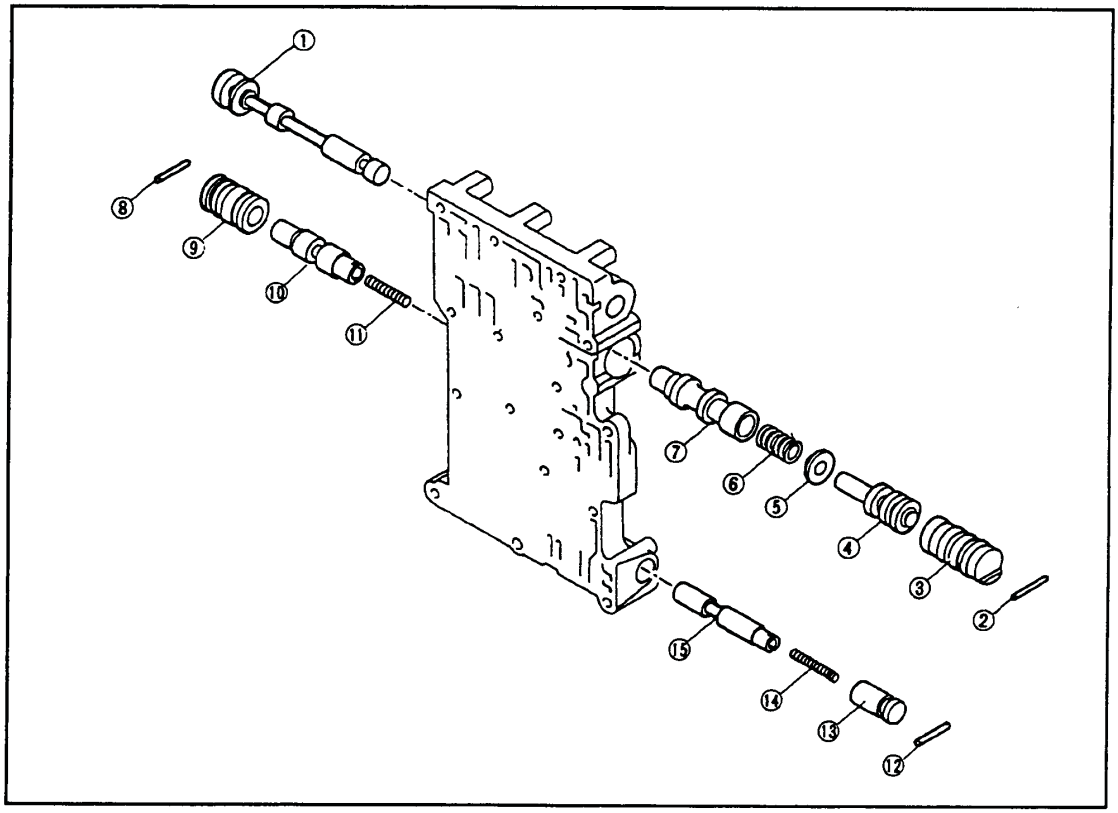
Spring \ Item			Outer diameter mm (in)	Free length mm (in)	No. of coils	Wire diameter mm (in)	Identification color
Pressure modifier accumulator spring			8.2 (0.32)	38.2 (1.50)	16.5	1.2 (0.047)	Light green
3-2 timing spring			8.25 (0.325)	35.4 (1.394)	12.5	0.85 (0.033)	Light blue
Cut back spring			8.2 (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



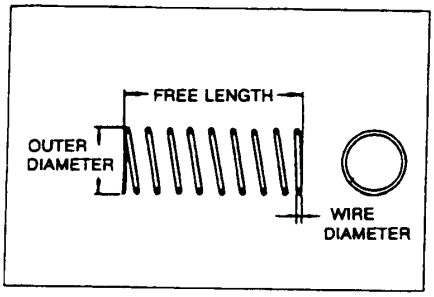


1. Spring Retainer
2. Converter Relief Spring
3. Converter Relief
4. Stop Pin
5. Stop Plug
6. Solenoid Reducing Spring
7. Solenoid Reducing Valve
8. Spring Retainer
9. Low Reducing Spring
10. low Reducing Valve
11. Stop Pin
12. Stop Plug
13. 1-2 Shift Valve
14. 1-2 Shift Spring
15. Stop Pin
16. Stop 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

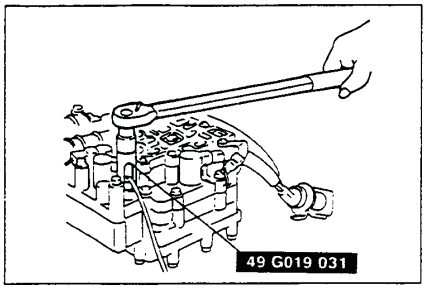


Inspection

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

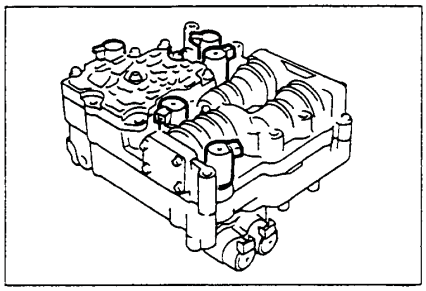
Measure the spring free length.
If not within the specifications, replace the spring.

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

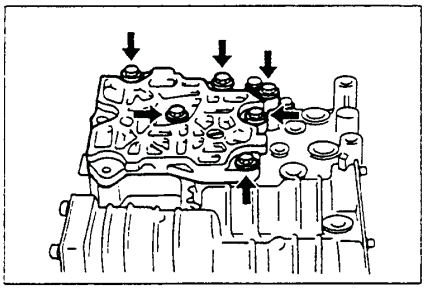


Disassembly Procedure

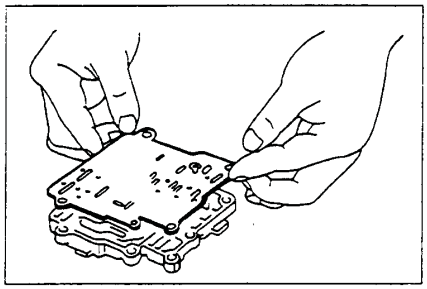
1. Remove the ATF thermosensor by using the **SST**.



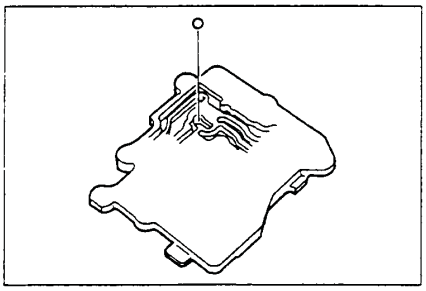
2. Remove the solenoid valves (line pressure. lockup, 3-2 timing, 1-2 shift, lockup control).
3. Remove the O-rings from the solenoid valves.



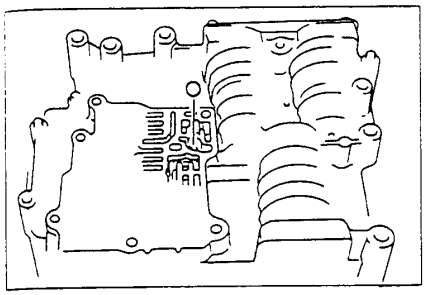
4. Remove the bolts indicated and remove the front control valve body and premain separator plate and gaskets.



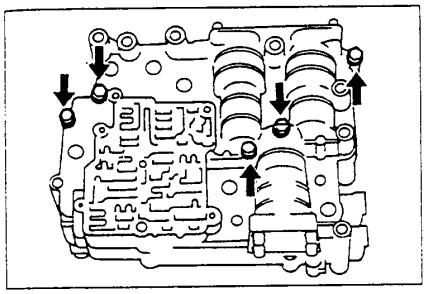
5. Remove the front/premain gaskets and separator plate from the front control body.



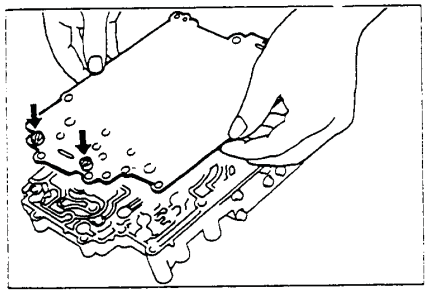
6. Remove the rubber ball from the front control valve body.



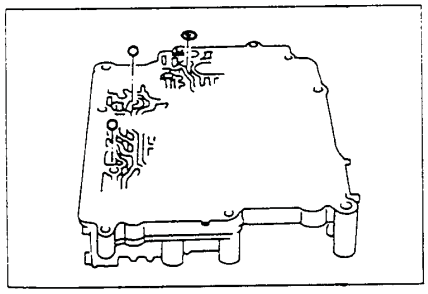
7. Remove the rubber ball from the premain control valve body.



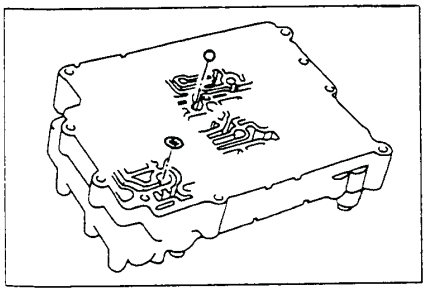
8. Remove the bolts and remove the premain control body and the main separator plate and gaskets.



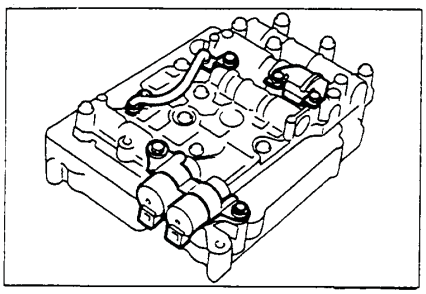
9. Remove the premain/main gaskets and separator from the premain control body.
10. Remove the jet orifices and nuts from the main separator plate.



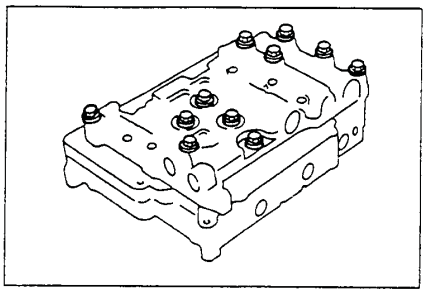
11. Remove the rubber balls and oil strainer from the premain control body.



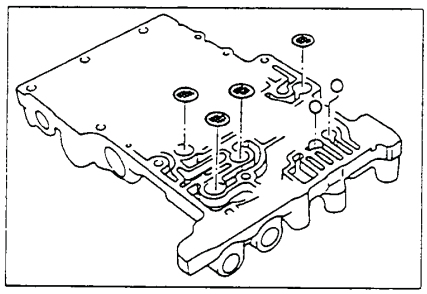
12. Remove the rubber balls and oil strainer from the main control valve body.



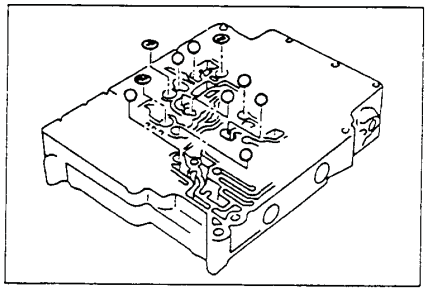
13. Turn the assembly over and remove the oil pipe, oil baffle and solenoid valves (2-3 shift, 3-4 shift).



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

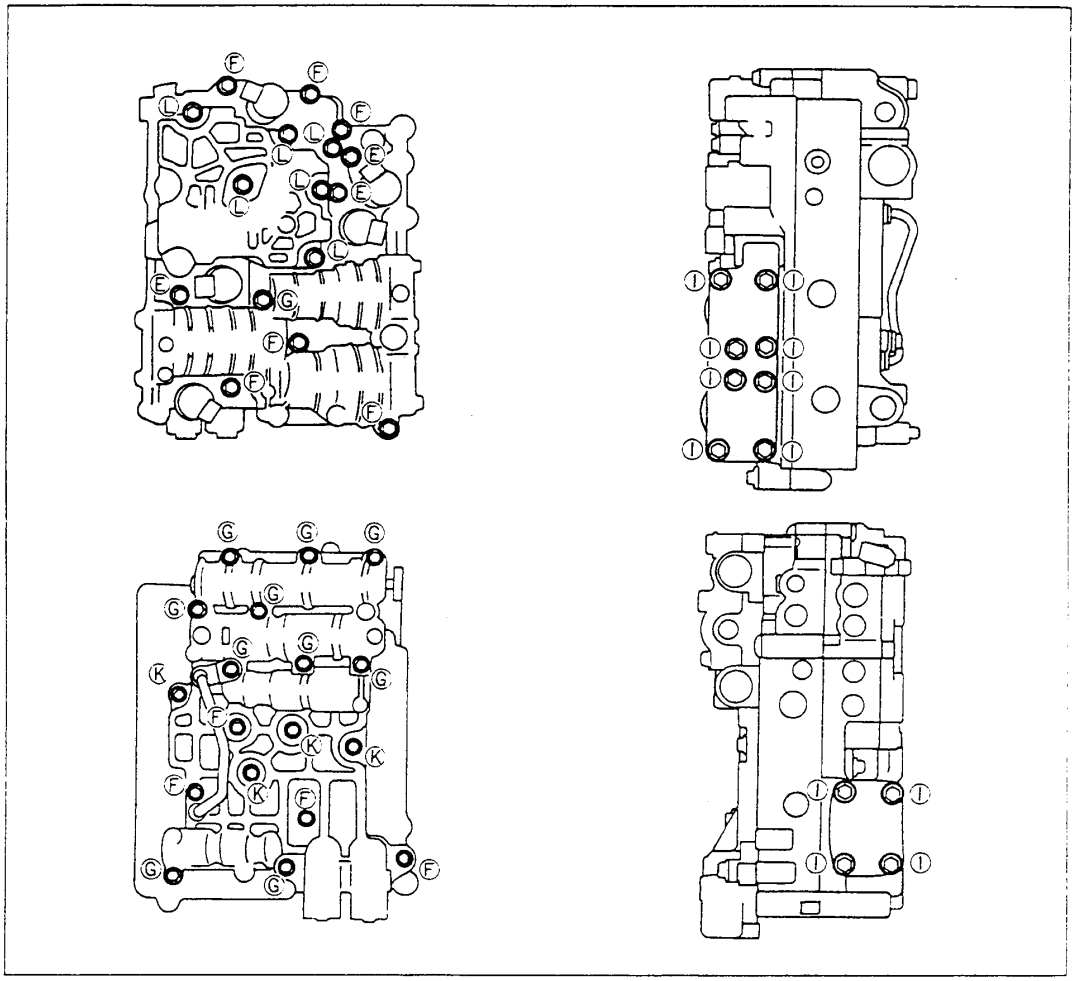


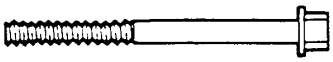
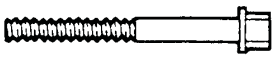
15. Remove the main/rear gaskets and separator from the rear control valve body.
16. Remove the rubber balls and oil strainers from the rear control valve body.

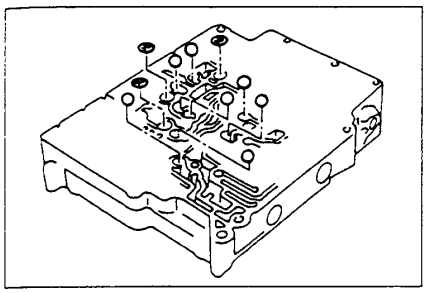


17. Remove the rubber balls and oil strainers from the main control body.

Bolt installation positions and external parts locations

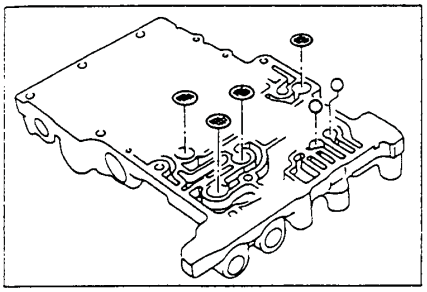


Identification mark	Bolt	Length mm {in}	Tightening torque N·m {kgf-cm, in-lbf}
L		50 {2.0}	6.5—7.8 {66—80, 58—69}
G		40 {1.6}	
F		30 {1.2}	
K		20 {0.79}	
E		12 {0.47}	
I		16 {0.63}	

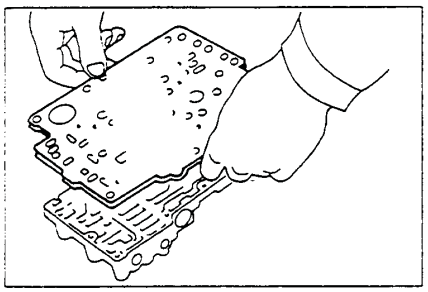


Assembly procedure

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

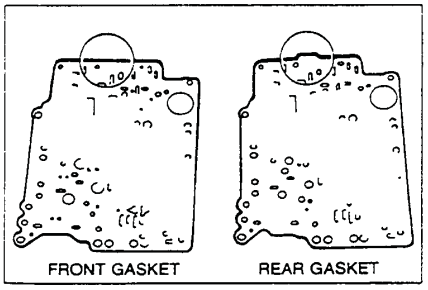


2. Install the oil strainers and rubber balls into the rear control valve body.

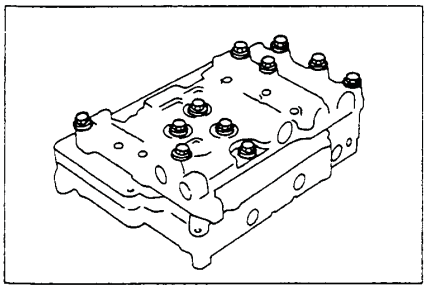


Caution

- **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.

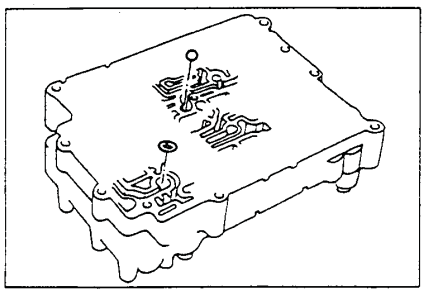


4. Set the rear control valve body onto the main control valve body.

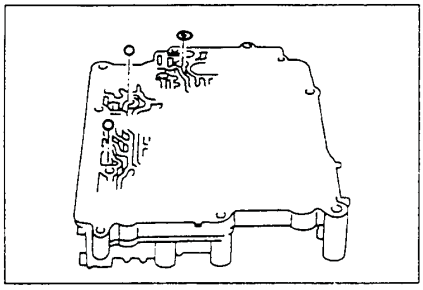
Note

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

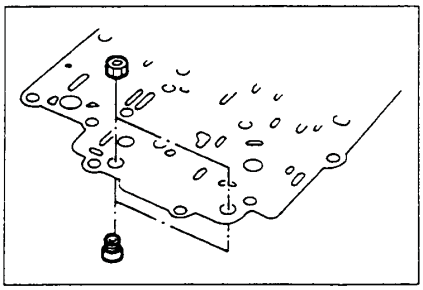
5. Install and loosely tighten the bolts.



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

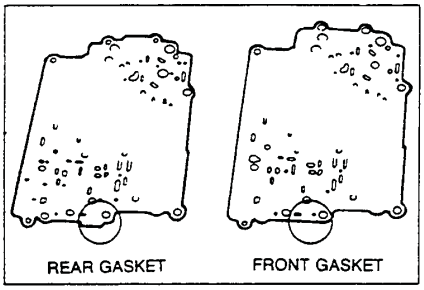


7. Install the oil strainer and rubber balls into the premain control valve body.

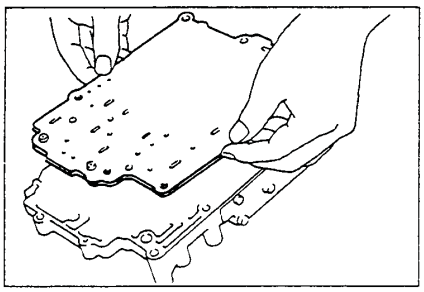


8. Install the jet orifices and nuts to the main separator plate.

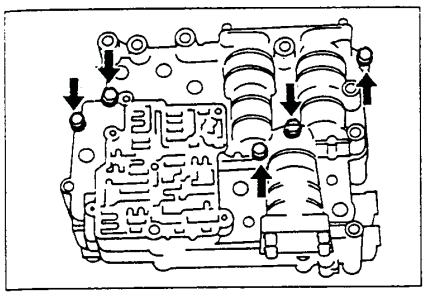
Tightening torque:
1.7—2.2 N·m {17—23 kgf·cm, 15—19 in·lbf}



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



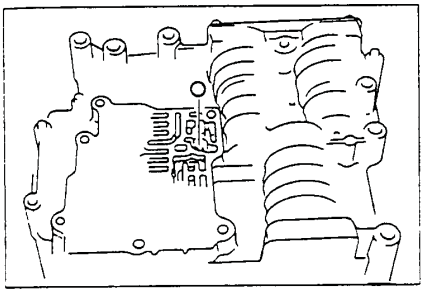
9. Set a new premain/main rear gasket, main separator plate, and new premain/main front gasket on the premain control valve body.



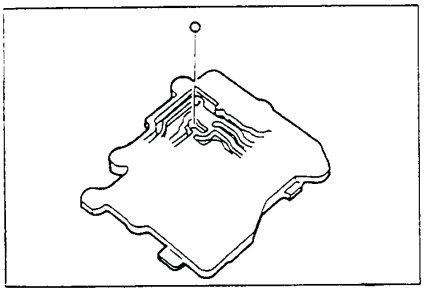
10. Set the premain control valve body onto the main control valve body.

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

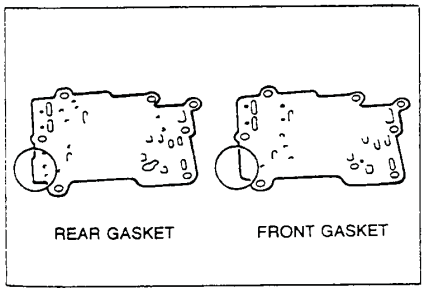
11. Install and loosely tighten the bolts.



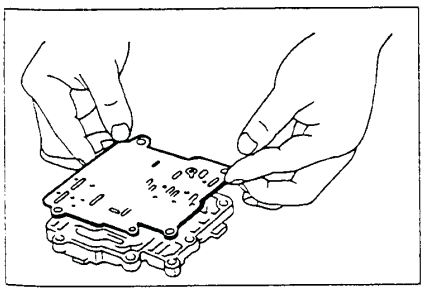
12. Install the rubber ball into the premain control valve body.



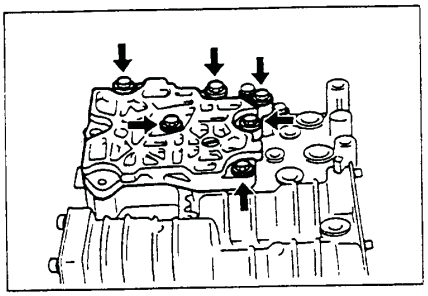
13. Install the rubber ball into the front control valve body.



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



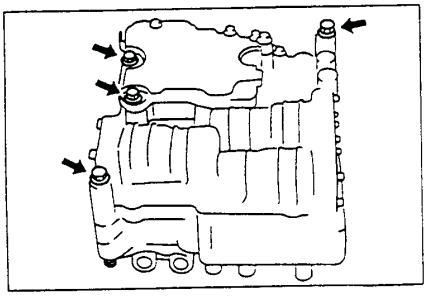
14. Set a new front/premain rear gasket, premain separator plate, and new front/premain front gasket on the front control valve body.



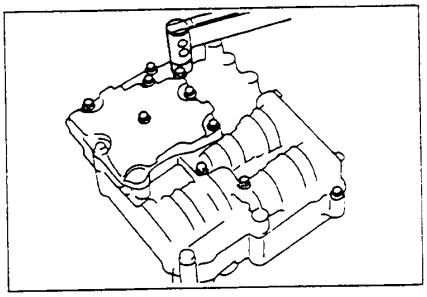
15. Set the front control valve body onto the premain control valve body.

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

16. Install and loosely tighten the bolts.

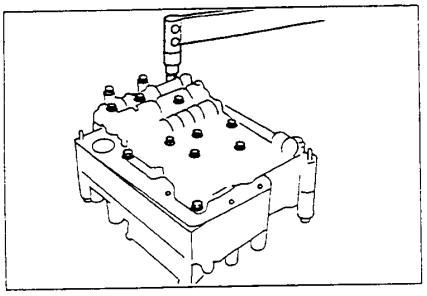


17. Install four control valve body bolts as shown for alignment.



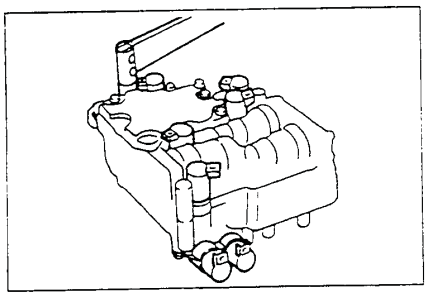
18. Tighten the mounting bolts.
(1) Tighten the front control body.

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



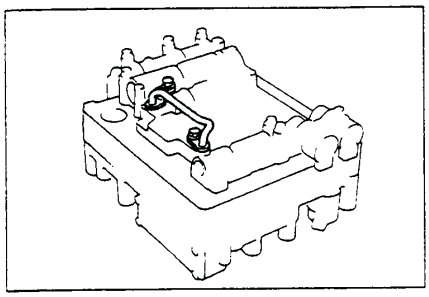
(2) Tighten the rear control valve body.

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



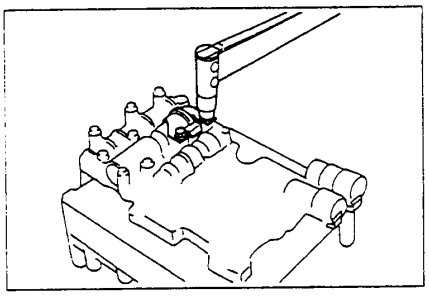
19. Apply ATF to new O-rings and install them onto the solenoid valves.
20. Install the solenoid valves.

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



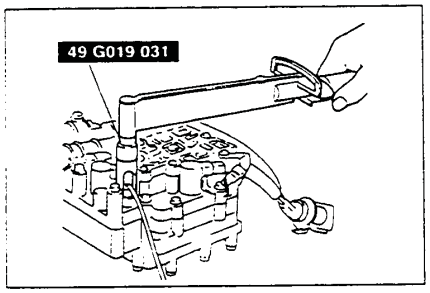
21. Apply ATF to new O-rings and install them onto the oil pipe assembly.
22. Install the oil pipe assembly.

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}

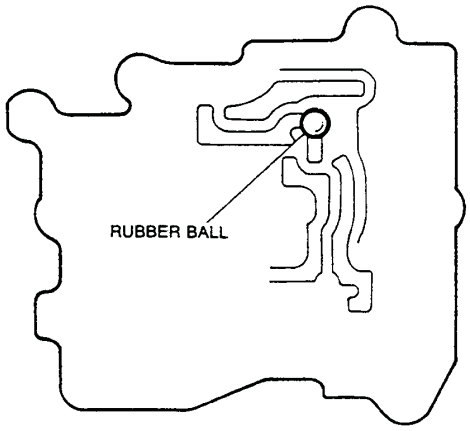


24. Install the ATF thermosensor by using the **SST**.

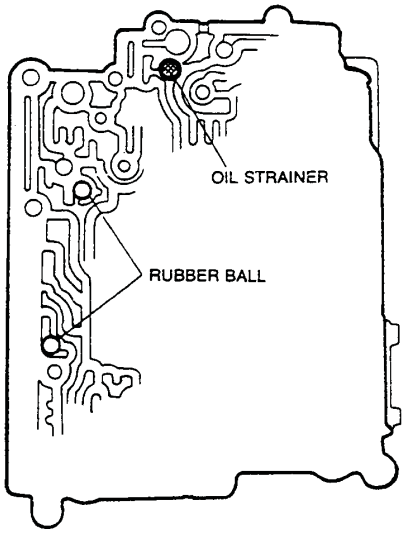
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}

Rubber ball, oil strainer installation positions

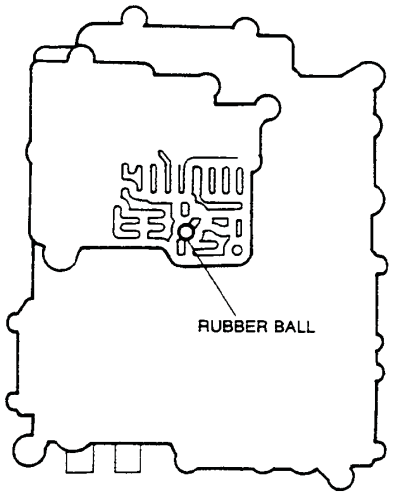
FRONT CONTROL VALVE BODY



PREMAIN CONTROL VALVE BODY
(MAIN CONTROL VALVE BODY SIDE)

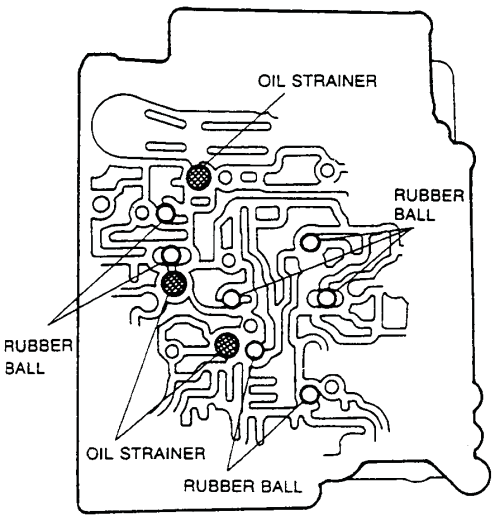


(FRONT CONTROL VALVE BODY SIDE)

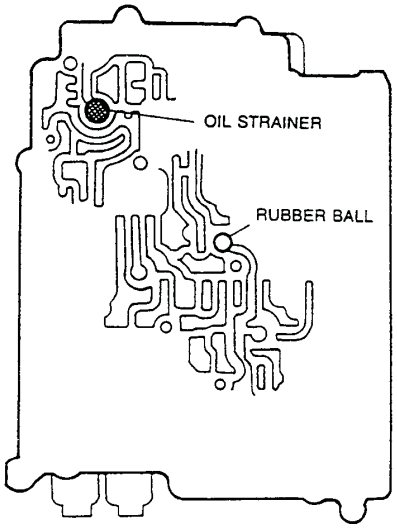


MAIN CONTROL VALVE BODY

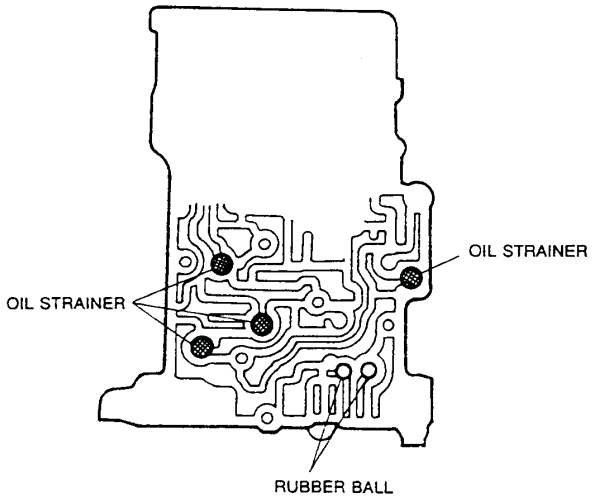
(REAR CONTROL VALVE BODY SIDE)



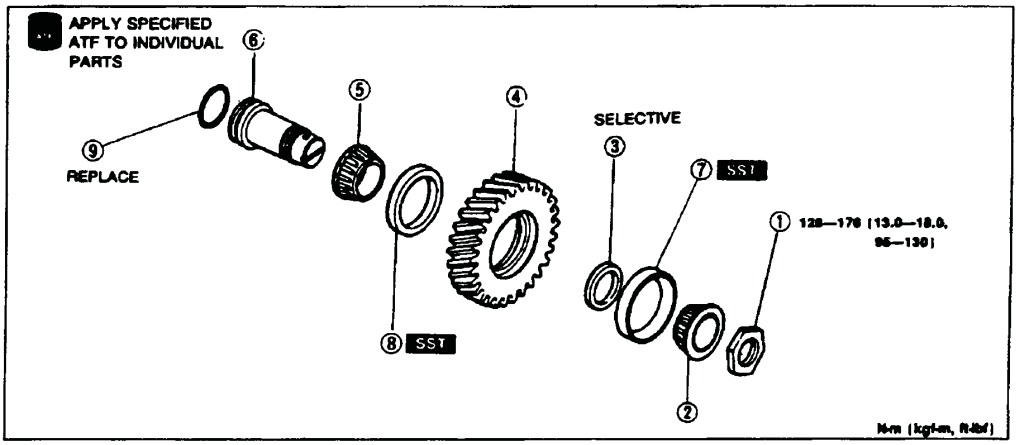
(PREMAIN CONTROL VALVE BODY SIDE)



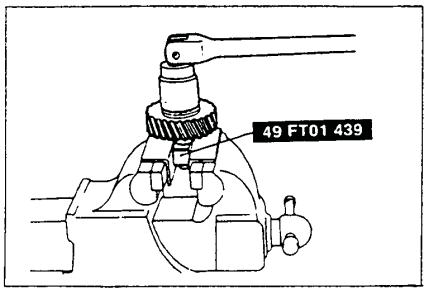
REAR CONTROL VALVE BODY



IDLER GEAR ASSEMBLY



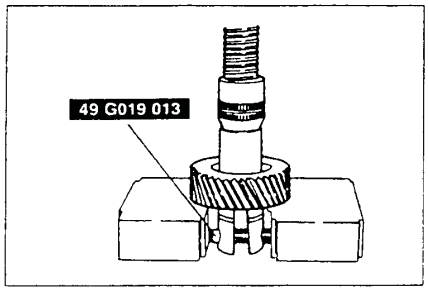
1. Locknut
2. Bearing
3. Spacer
4. Idler Gear
5. Bearing
6. Idler Gear Shaft
7. Bearing Race
8. Bearing Race
9. o-Ring



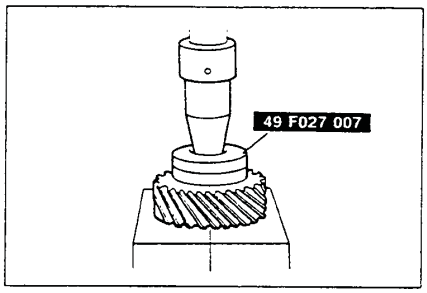
Disassembly Note
Locknut

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.

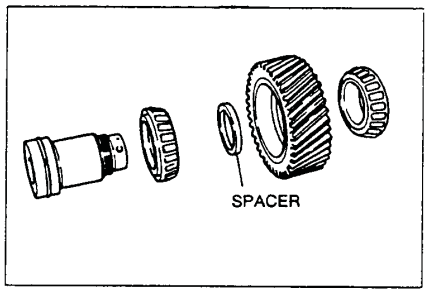


Bearing race
Remove the bearing race from the idler gear by using the **SST**.

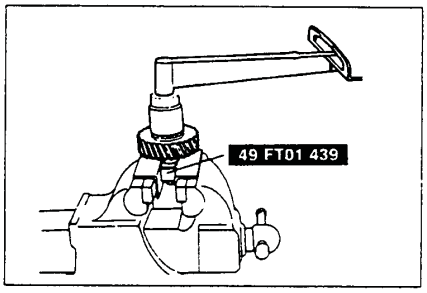


Assembly Procedure

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

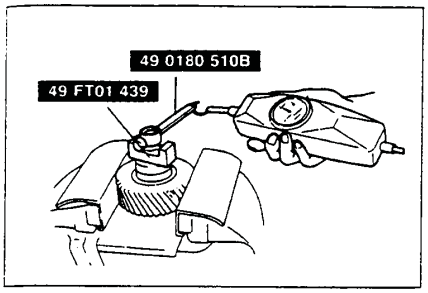
- **Use protective plates in the vise to prevent damage to the SST.**

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.

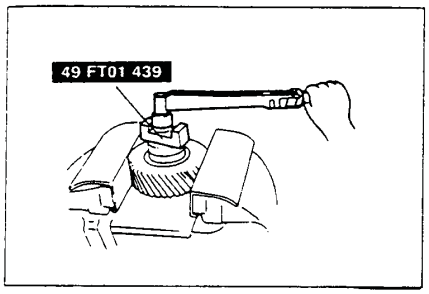
O-ring inner diameter: 33.0mm {1.30 in}



Note

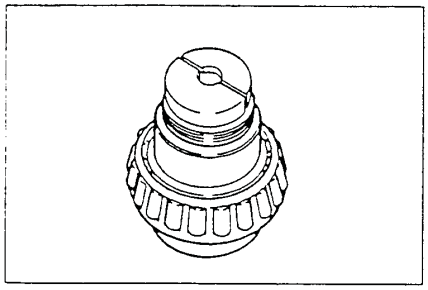
- **Use protective plates in the vise to prevent damage to the idler gear.**
- **Read the preload when the idler shaft starts to turn.**

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}

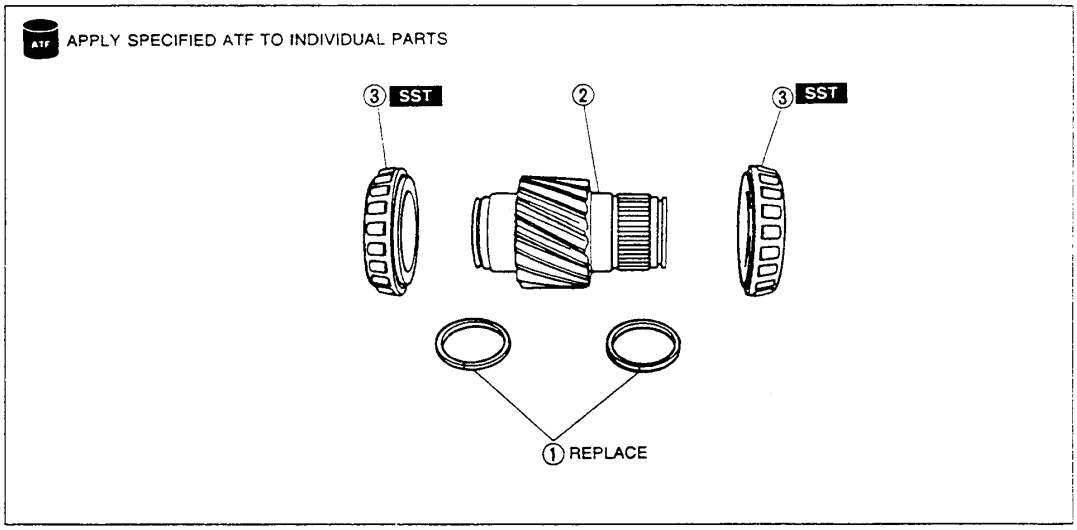


Note
- **Preload is reduced by increasing the thickness of the adjustment spacers or increased by reducing the thickness.**

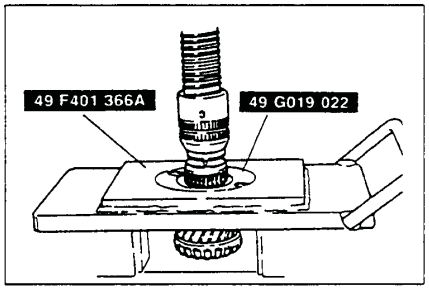
8. If the specified preload cannot be obtained within the specified tightening torque, adjust by selecting the proper adjustment spacers from below.

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}	

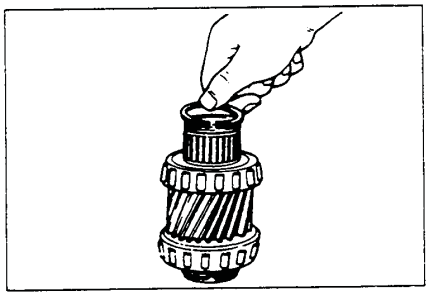
OUTPUT GEAR ASSEMBLY



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



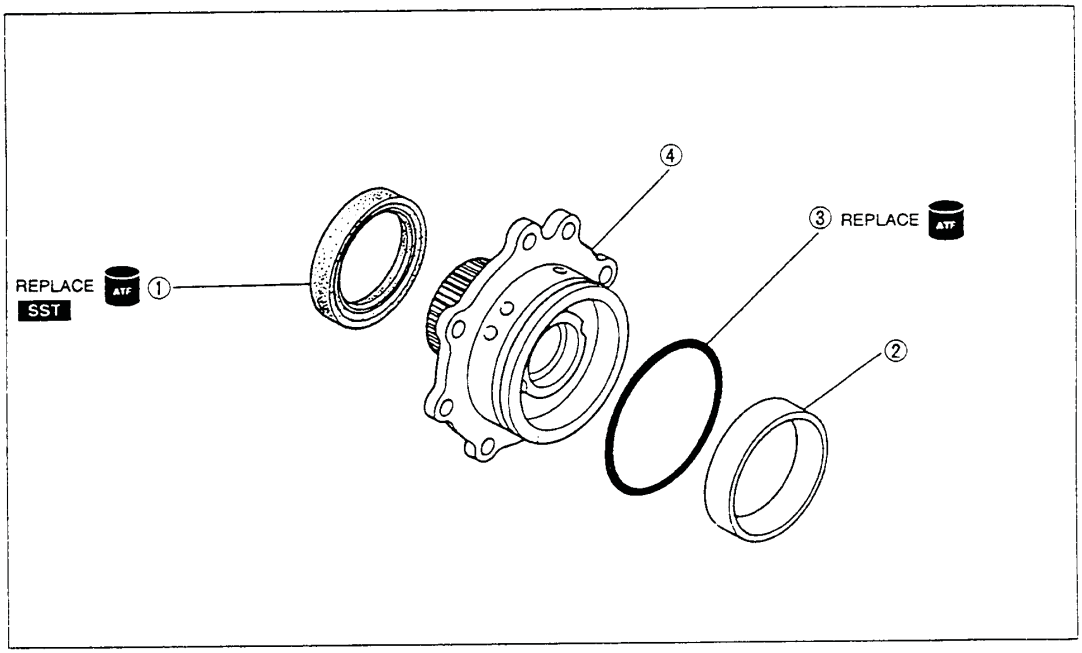
Disassembly note
Bearing
Remove the bearings from the output gear by using the **SST**.



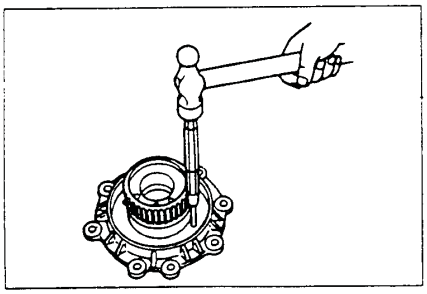
Note
- **Do not damage the seal ring when installing it.**

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}



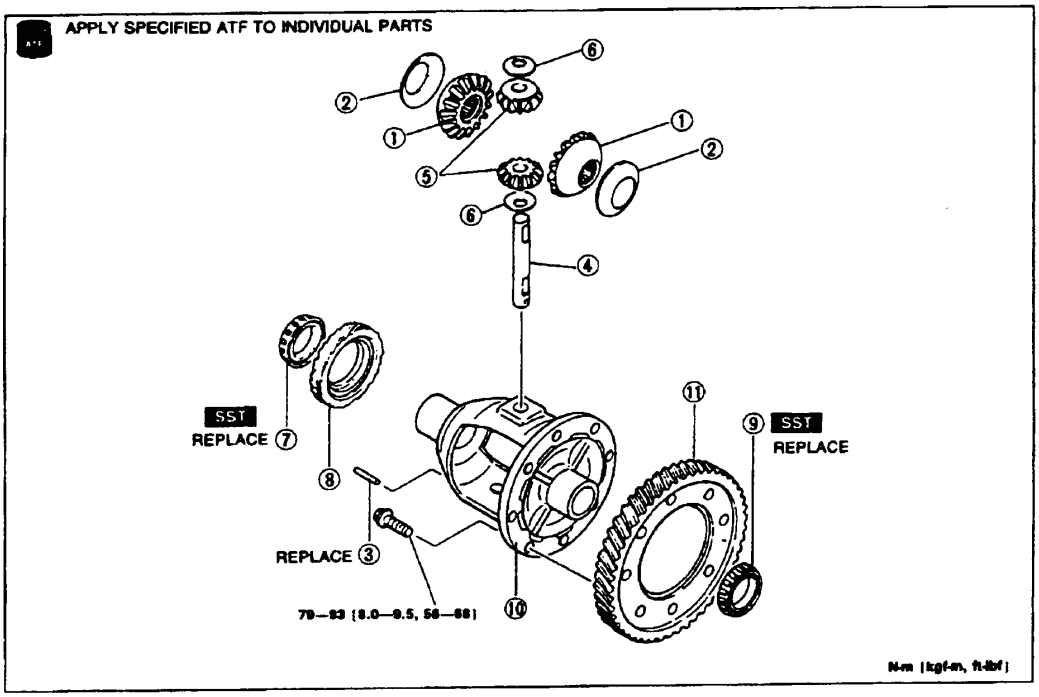
1. Oil seal
2. Bearing race
   Disassembly Note..... below
   Inspect bearing surface for scoring and scratches
3. O-ring
4. Bearing cover



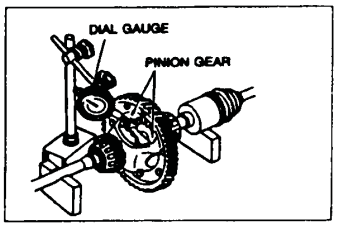
Disassembly note
Bearing race
Remove the bearing race by using a pin punch and a hammer.

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

DIFFERENTIAL...DISASSEMBLY / ASSEMBLY



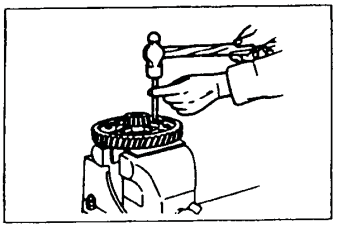
1. Side Gear
2. Thrust Washer
3. Roll Pin
4. Pinion Shaft
5. Pinion Gear
6. Thrust Washer
7. Bearing
8. Speedometer Drive Gear
9. Bearing
10. Gear Case
11. Ring Gear



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}

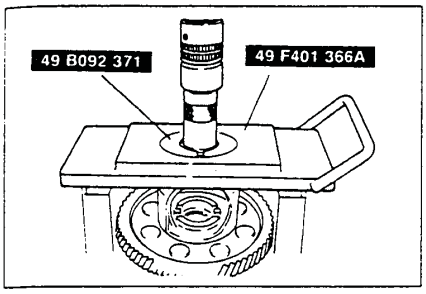
If not within the specification, replace worn and damage parts.



Disassembly Note
Roll pin

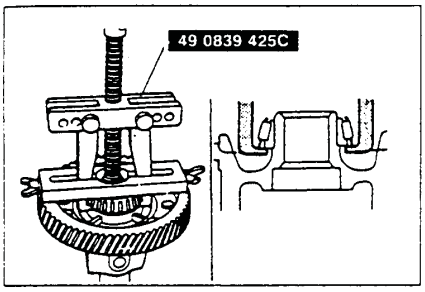
Note
- **Use protective plates in the vise to prevent damage to the differential.**
- **Insert the punch into the roll pin hole from the ring gear side.**

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

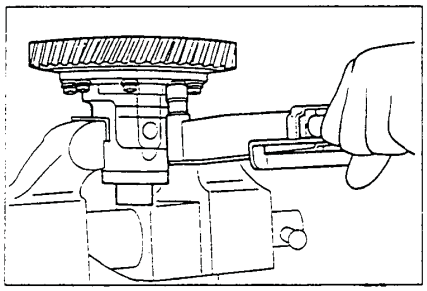


Bearing

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**.

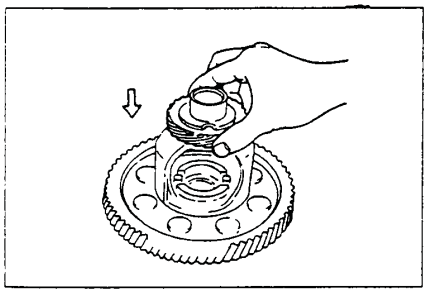


Assembly procedure

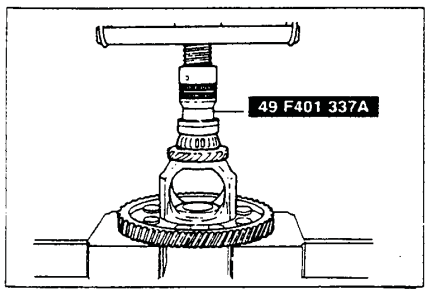
Caution
- **Use pads in the vise to prevent damaging the part.**

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}

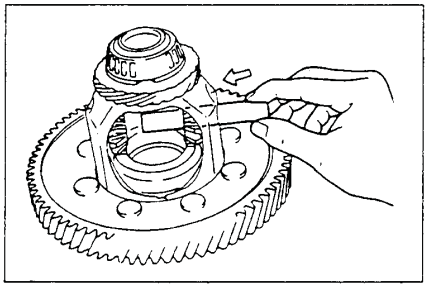


2. Set the speedometer drive gear onto the gear case assembly.

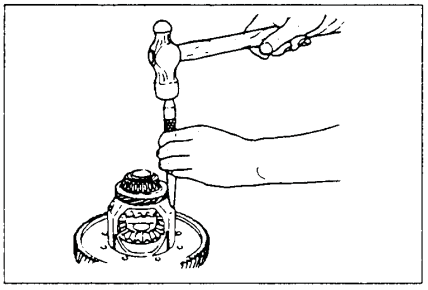


Caution
- **Do not reuse bearings that have been removed.**

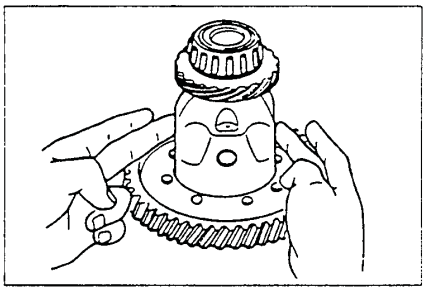
3. Install the new bearing.
   (1) Press the new bearing (speedometer drive gear side) onto the gear case by using the **SST**.
   (2) Press on the other new bearing (ring gear side) in the same manner.



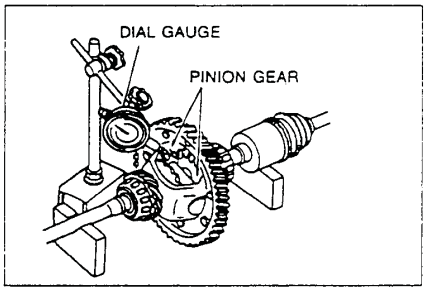
4. Apply ATF to the thrust washers and pinion shaft.
5. Install the pinion gears and thrust washers into the gear case.
6. Install the pinion shaft.



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



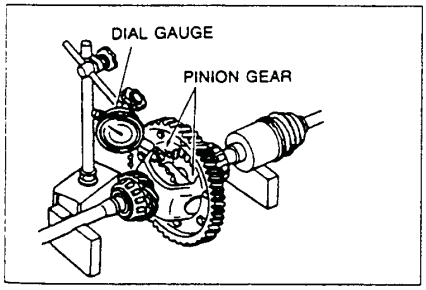
8. Apply ATF to the thrust washers.
9. Install the thrust washers and side gears into the gear case, then turn the side gears and align them with the drive shaft holes.



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.

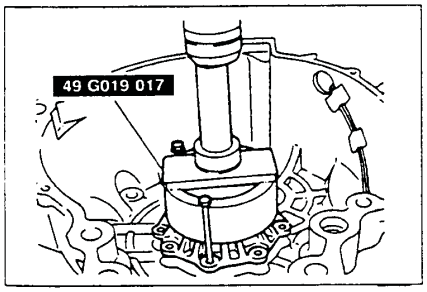


Preinspection
Backlash of side gear and pinion gear

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}

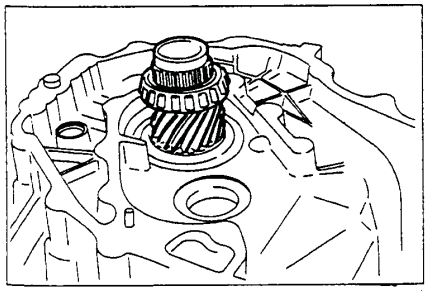
2. If not within the specification, replace worn and damage parts.



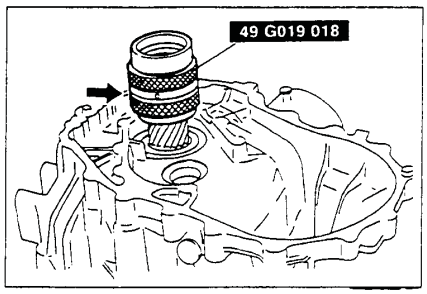
(1) Align the bearing cover with guide bolts as shown.
(2) Press in the bearing cover by using the **SST**.
(3) Remove the guide bolts and install the bearing cover installation bolts.

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.

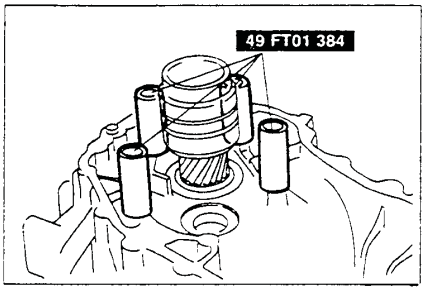


(6) Set the output gear into the converter housing.

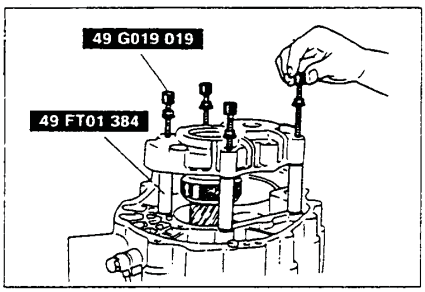


Caution
- **Eliminate the gap (arrow) by turning A or B of the selector.**

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

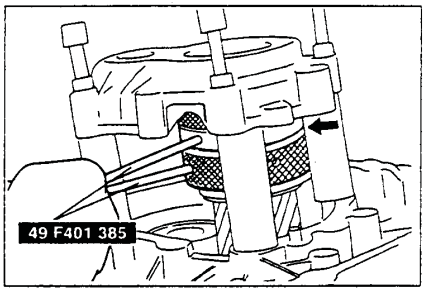


(8) Set the four **SST**s on the converter housing in the positions shown.



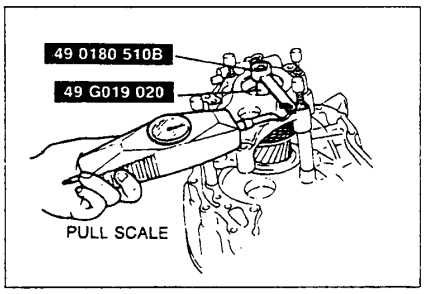
(9) Set the bearing housing on the **SST**s (selector) and install the four **SST**s (bolts). Tighten the bolts to the specified torque.

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



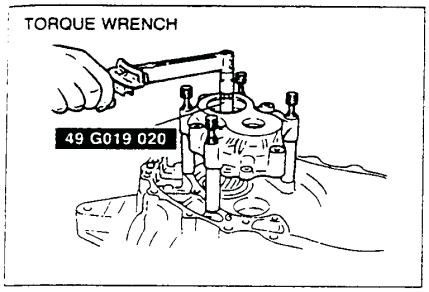
Note
• This is to seat the bearing.

(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).

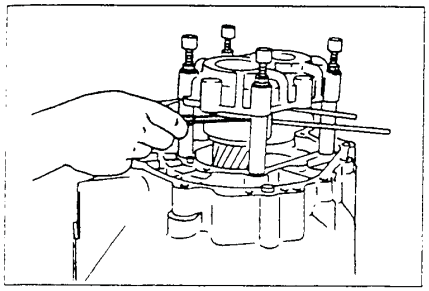


(12) Mount the **SST** and a pull scale or a torque wrench on the output gear.
(13) Adjust the clearance of the **SST** (selector) to obtain the specified preload/pull scale reading.

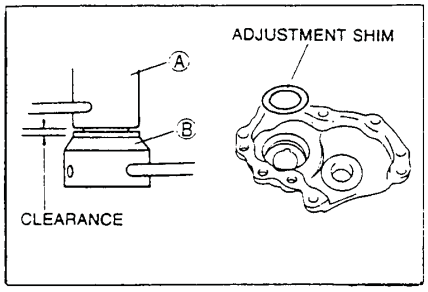
Preload:
1.1—1.9 N·m {11—20 kgf·cm, 10—17 in·lbf}
Reading on pull scale:
11—19 N {1.1—2.0 kgf, 2.5—4.4 lbf}



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

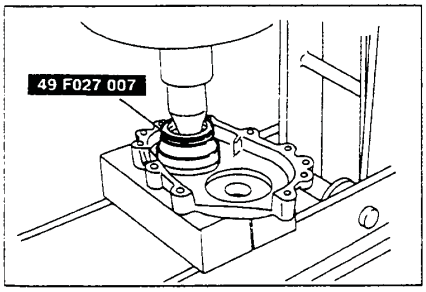


Caution
• Measure the clearance around the entire circumference, and select shims equivalent to the maximum clearance.
• The maximum allowable number of shims is one.



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

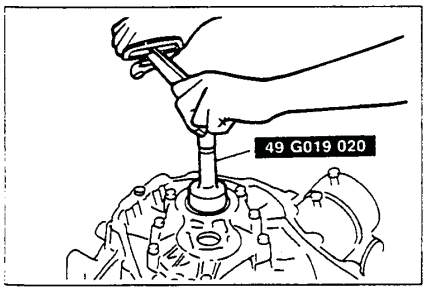
Thickness of shim mm {in}		
0.350 {0.0138}	0.375 {0.0148}	0.400 {0.0157}
0.425 {0.0167}	0.450 {0.0177}	0.475 {0.0187}
0.500 {0.0197}	0.525 {0.0207}	0.550 {0.0217}
0.575 {0.0226}	0.600 {0.0236}	0.625 {0.0246}
0.650 {0.0256}	0.675 {0.0266}	0.700 {0.0276}
0.725 {0.0285}	0.750 {0.0295}	0.775 {0.0305}
0.800 {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.

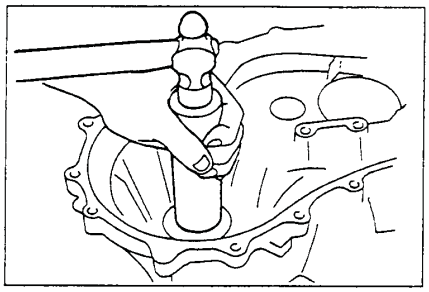
Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



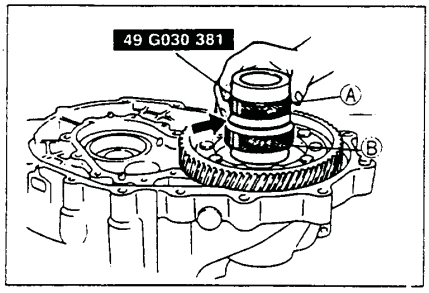
(18) Check that the preload/pull scale reading is within the specification. If not, return to Step (5).

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.



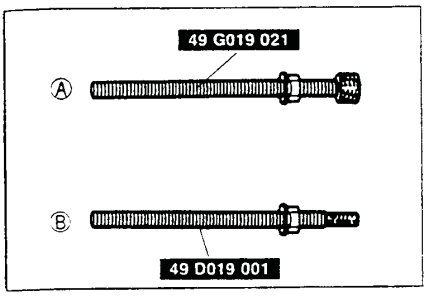
(1) Remove the bearing race and adjustment shims from the transaxie case.
(2) Install the bearing race into the converter housing by using a suitable pipe.

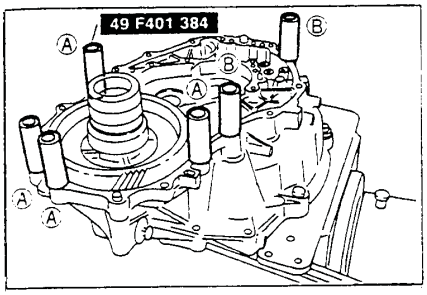


(3) Set the differential assembly into the converter housing.

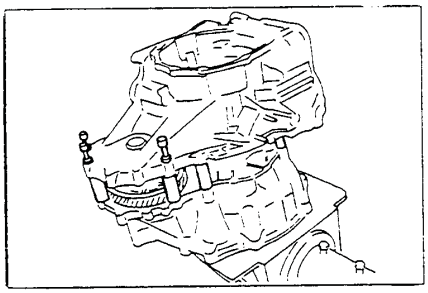
Caution
- **Eliminate the gap (arrow) by turning either A or B of the selector.**

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



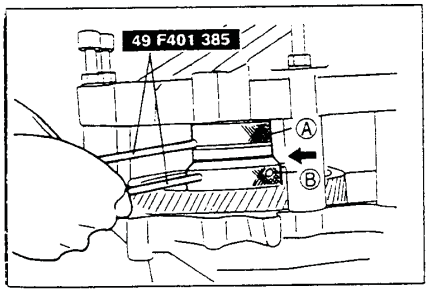


(5) Set the six **SST**s in the positions shown.



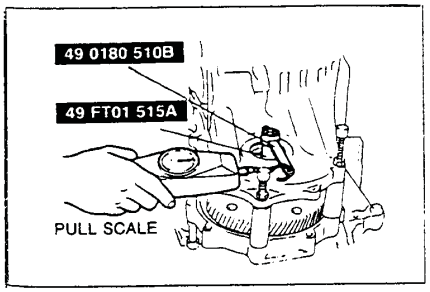
(6) Set the transaxle case on the **SST**s (selectors).
(7) Tighten the **SST**s (bolts) to the specified torque.

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).

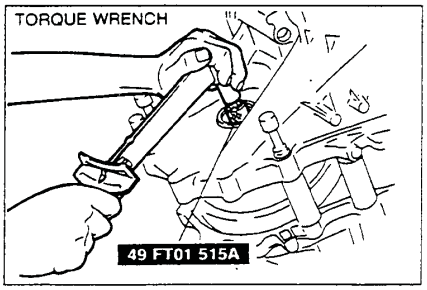


(10) Insert the **SST** through the oil seal hole of the transaxle case and attach it to the pinion shaft.
(11) Mount the **SST** and a pull scale or a torque wrench to the **SST**.

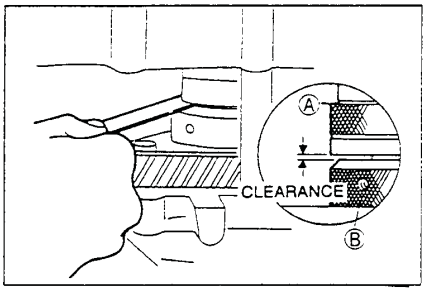
Note
- **Read the preload when the differential starts to turn.**

(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}

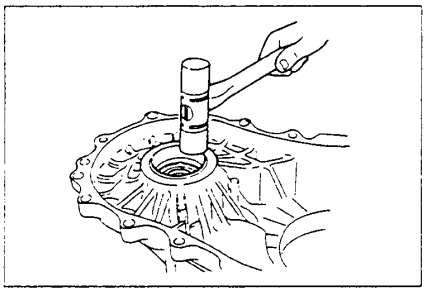


(13) Measure the clearance between A and B of the selector.
(14) Add **0.3mm {0.012 in}** to the measured clearance, and select the shim(s) closest in value to that measurement.

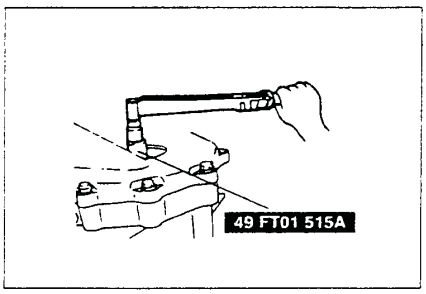


Caution
- **Measure the clearance around the entire circumference.**
- **The maximum allowable number of shims is three.**

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.



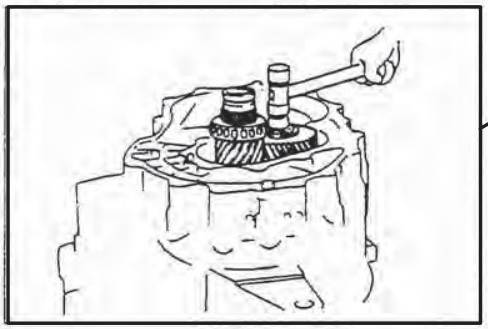
(17) Install the transaxle case.

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

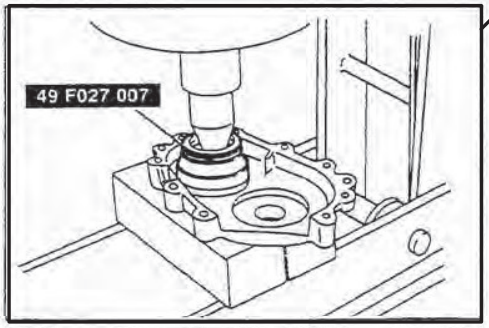
(18) Check that the preload is within the specification. If not, return to Step (1).

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}

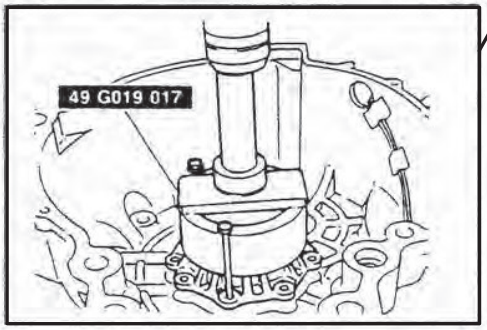
(19) Remove the transaxle case.



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



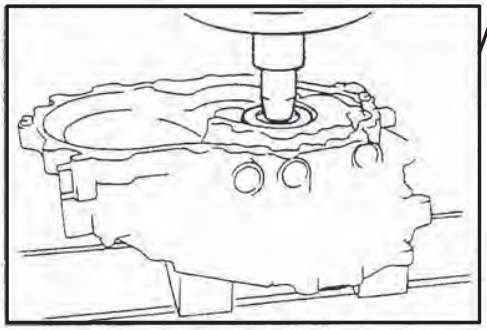
Install the selected shim(s) and bearing race into the bearing housing using the **SST.**



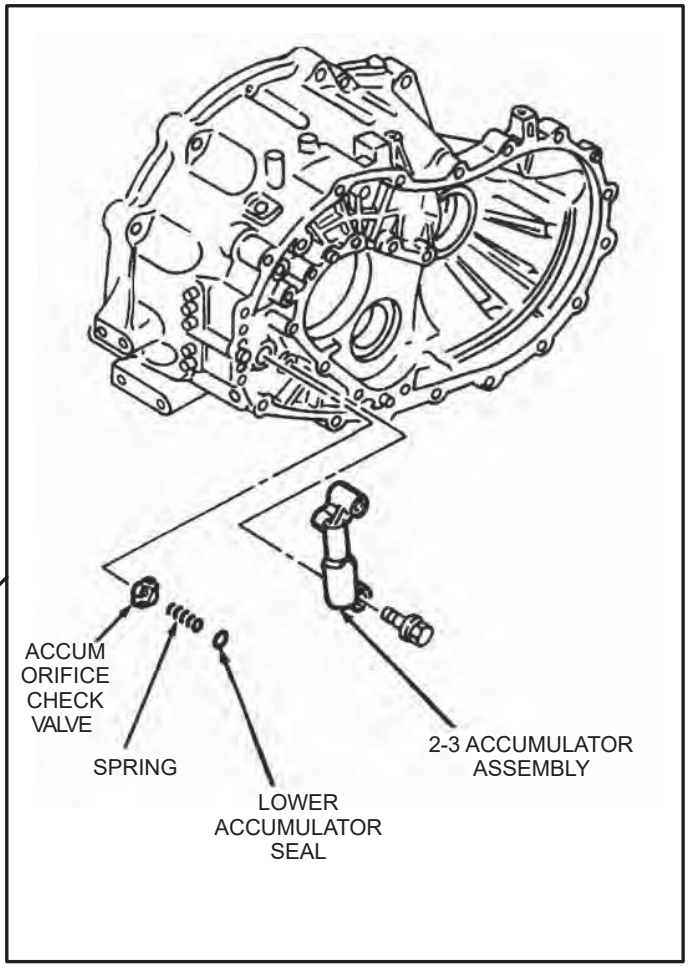
Assembly Procedure

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

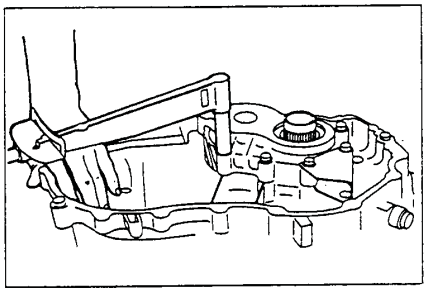
Tightening Torque
10.8-13.7 N·m (96-121 in.lb.)



Press the bearing race into the converter housing.



Install the accumulator orifice check valve, spring and lower accumulator seal as shown.

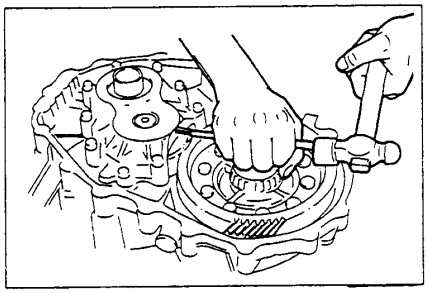


Install the bearing housing.

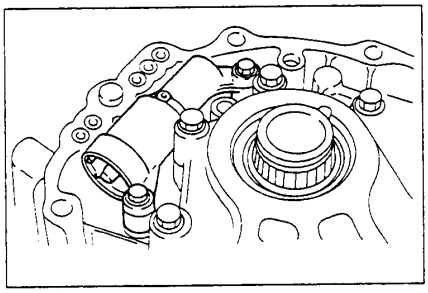
Note
- **Tighten the bolts evenly and gradually.**

(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}

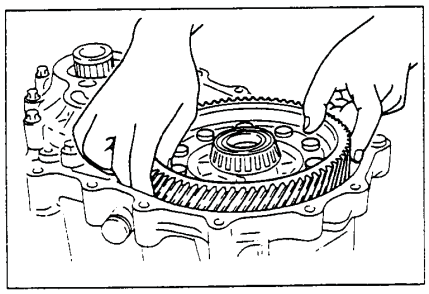


(2) Align the slot of the idler shaft with the mark on the bearing housing.
(3) Tap a new roll pin in by using a pin punch and a hammer.

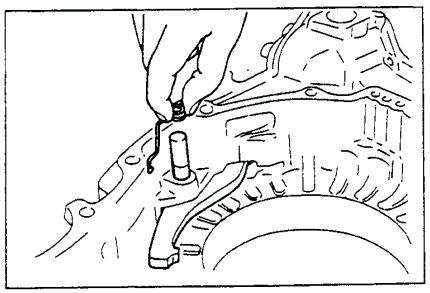


Install the 2-3 accumulator piston.
(1) Install the orifice check valve spring and orifice check valve.
(2) Apply ATF to new O-rings and install them into the 2-3 accumulator.
(3) Install the 2-3 accumulator piston.

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



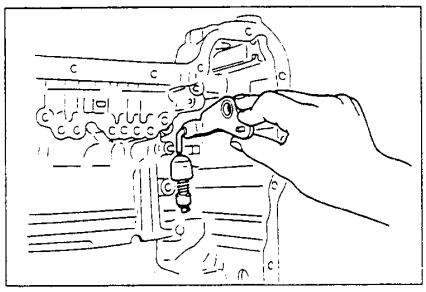
Install the bearing race into the bearing housing.
Install the differential.
Install the selected shim(s) and bearing race into the transaxle case.



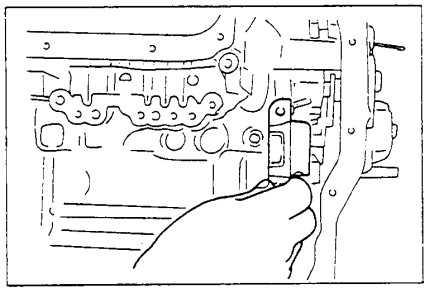
Install the parking pawl.
(1) Install the parking pawl and shaft.

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

(2) Install the spring and snap ring.

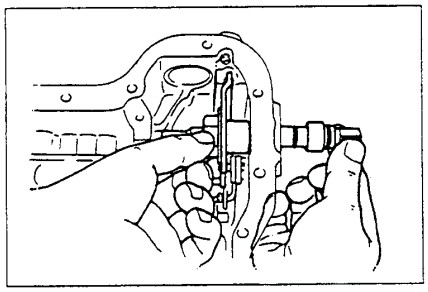


Install the parking assist lever and snap ring.



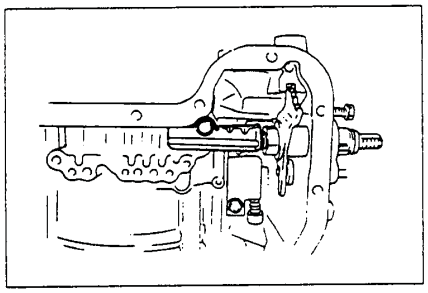
Install the actuator support.

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



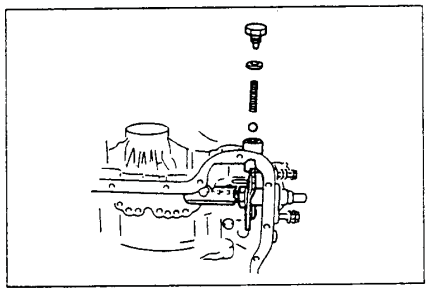
Install the manual shaft and manual plate.
(1) Install the manual plate, spacer, washer, and nut.
(2) Tighten the nut to the specified torque.

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



(3) Install the bracket.

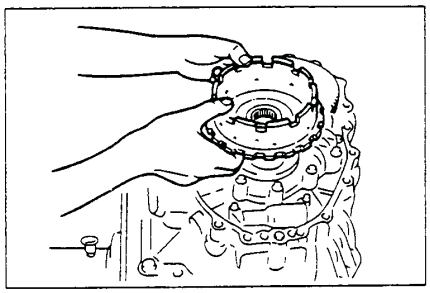
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}



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

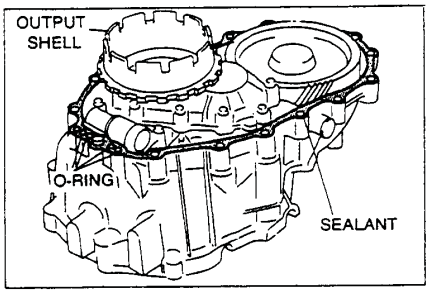
Tightening torque:
11.8—17.6 N·m {120—180 kgf·cm, 105—156 in·lbf}

(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.

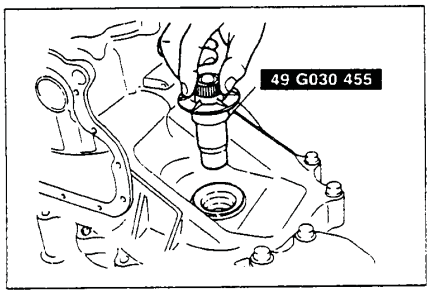
Note
- **Do not damage the O-ring when installing it.**

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}

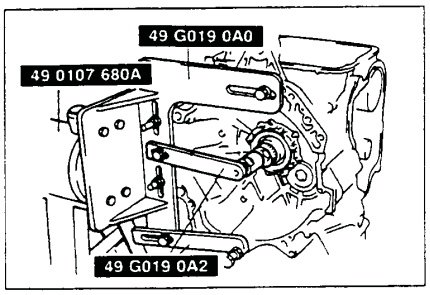


Install the engine mount No.1.

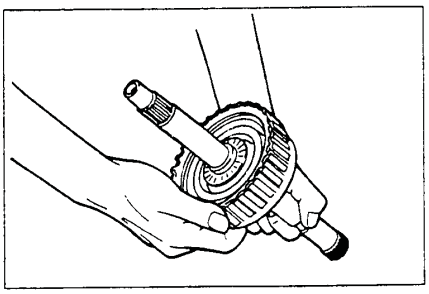
Tightening torque:
68—77 N·m {6.9—7.9 kgf·m, 50—57 ft·lbf}

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

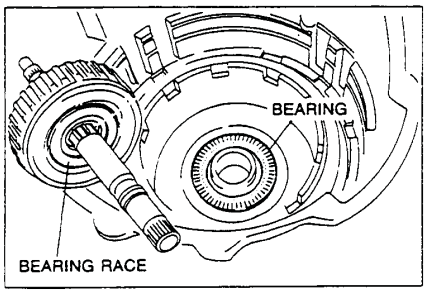
Install the **SST** into the differential side gears.



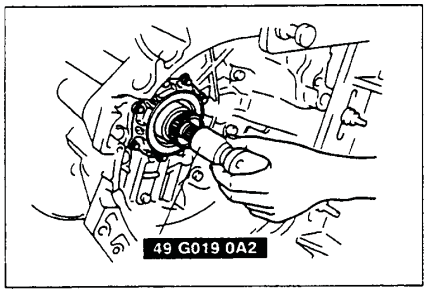
Install the **SST** to hold the turbine shaft.



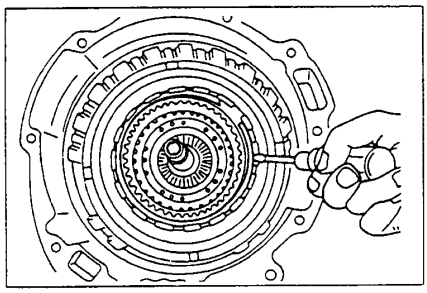
Install the turbine shaft and 3-4 clutch assembly.
(1) Assemble the turbine shaft and 3-4 clutch assembly.



(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.



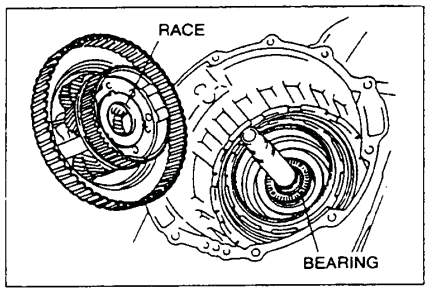
Adjust the **SST** position so that it contacts and holds the turbine shaft.



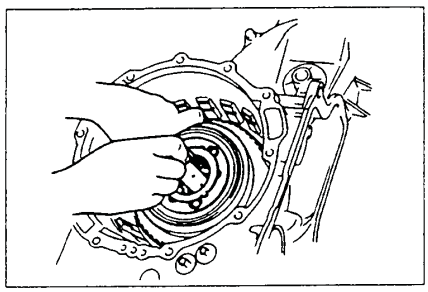
Install the internal gear.
(1) Install the internal gear to the output shell.

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

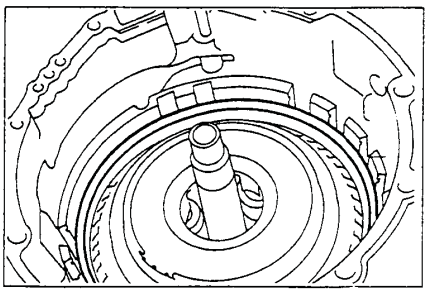
(2) Install the snap ring.



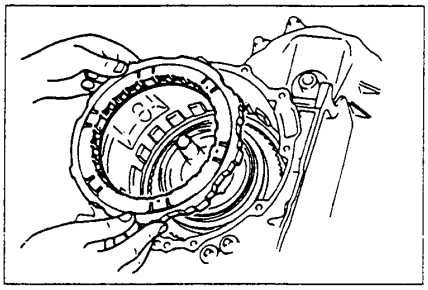
Install the carrier hub assembly.
(1) Verify that the thrust bearing and bearing race are installed in the correct position.



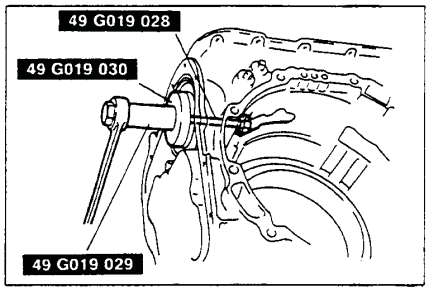
(2) Hold the turbine shaft with one hand to prevent it from rotating.
(3) Install the carrier hub assembly into the 3-4 clutch drum by rotating it.



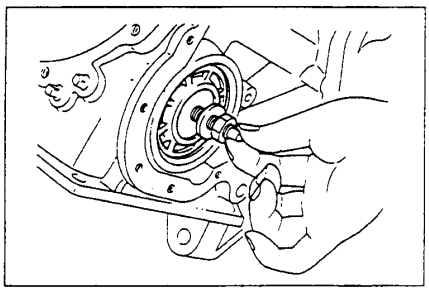
Install the friction plate.



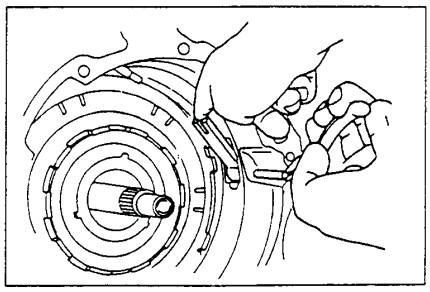
Install the one-way clutch 2.
(1) Hold the one-way clutch 2 horizontally.
(2) Install it by turning the carrier hub assembly counter-clockwise.
(3) Install the snap ring.



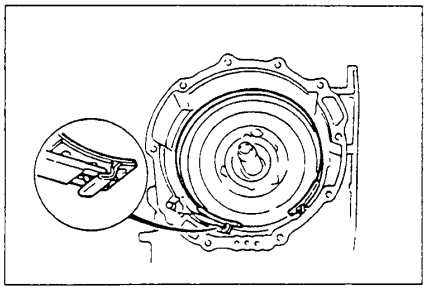
Install the band servo to the transaxle case.
(1) Install the servo return spring and band servo.
(2) Compress the servo by using the **SST**.
(3) Install the snap ring.
(4) Remove the **SST**.



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

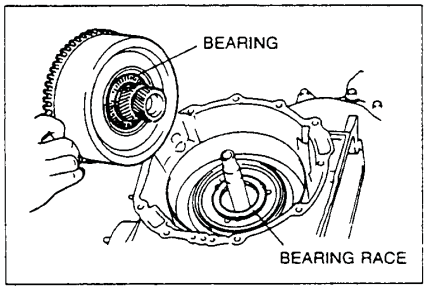


Install the anchor strut.

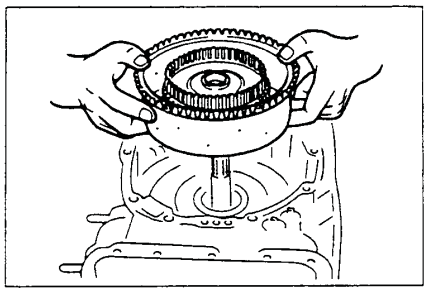


Note
- **Interlock the 2-4 brake band and anchor strut as shown.**

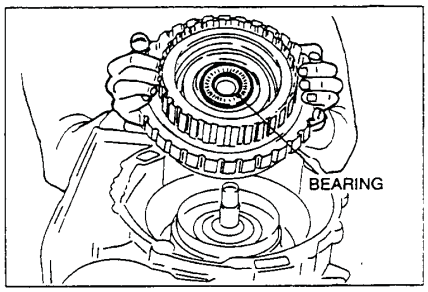
Install the 2-4 brake band in the transaxle case so that it is fully expanded.



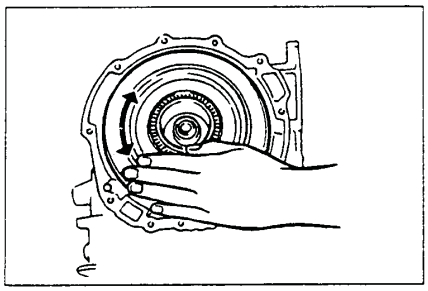
Install the small sun gear and one-way clutch 1.
(1) Verify that the thrust bearing and bearing race are installed in the correct position.



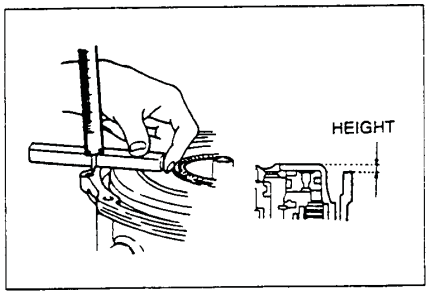
(2) Install the small sun gear and one-way clutch 1 assembly by rotating it.



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

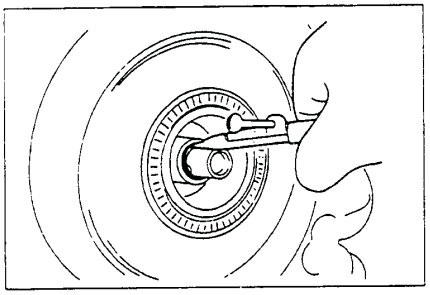


(2) Install the clutch assembly by rotating it.



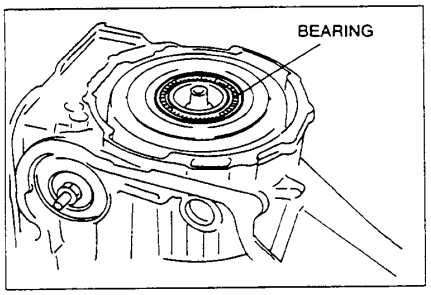
Note
- **Measure the height difference between the reverse and forward drum and the transaxle case.**
- **If not within specification, reassemble begining with Step 22.**

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

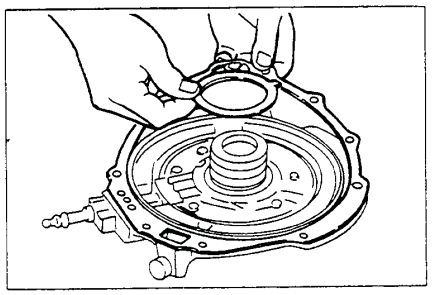


Caution
- **Do not deform the snap ring when installing it.**

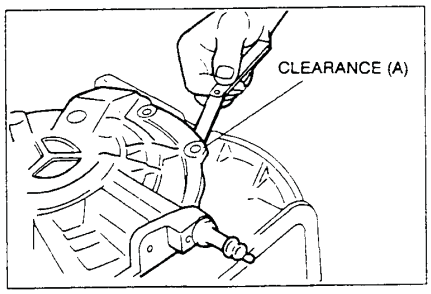
Install the new snap ring into the bottom ring groove of the turbine shaft.



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.



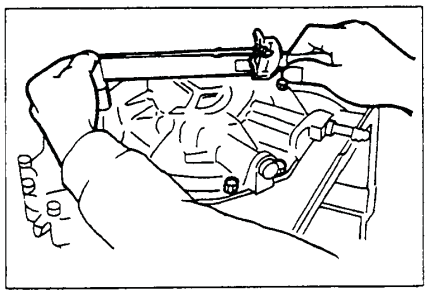
(2) Remove the bearing race and the oil pump gasket.
(3) Set the thickest bearing race **(2.2mm {0.087 in})** onto the oil pump.
(4) Set the oil pump onto the clutch assembly.



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}

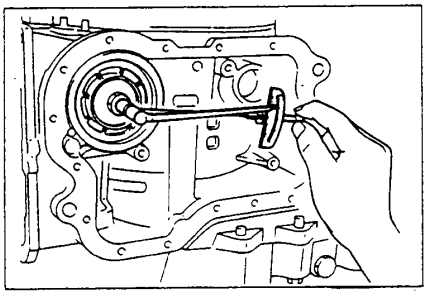


(7) Remove the oil pump.
(8) Place the selected bearing race and a new gasket onto the oil pump.

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.**

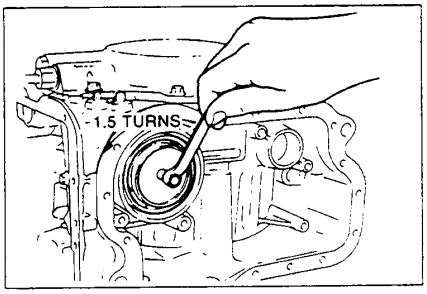
(9) Install the oil pump onto the clutch assembly.

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



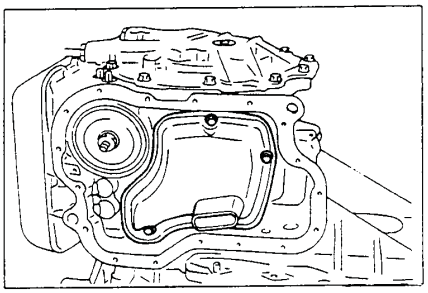
(10) Install the oil pipe.
Adjust the 2-4 brake band.
(1) Loosen the locknut and tighten the piston stem to the specified torque.

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



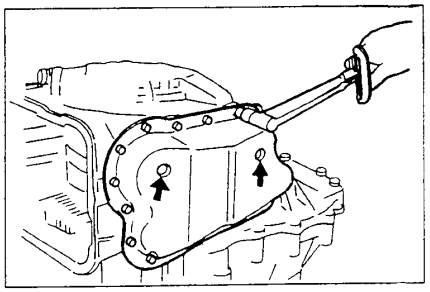
(2) Loosen the piston stem 1.5 turns.
(3) Hold the piston stem and tighten the locknut to the specified torque.

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.

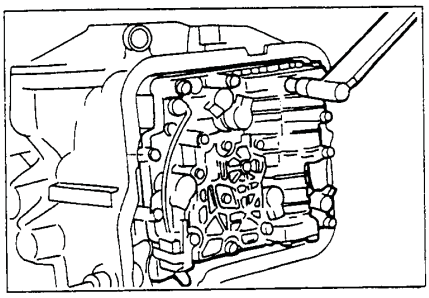
Tightening torque:
7.9—10.7 N·m {80—110 kgf·cm, 70—95 in·lbf}



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

Install a new gasket and the oil pan.

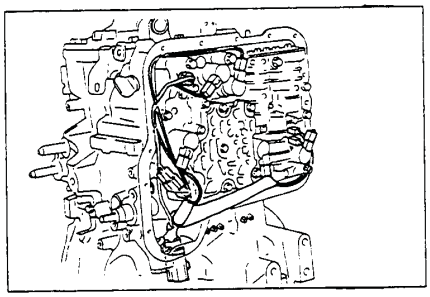
Tightening torque:
8.4—10.7 N·m {85—110 kgf·cm, 74—95 in·lbf}



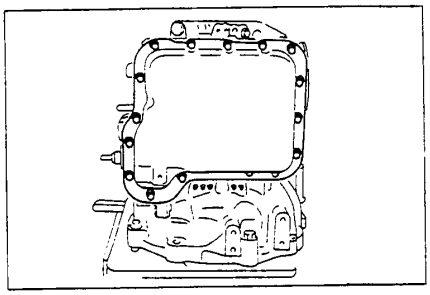
Note
- **Tighten the bolts evenly and gradually.**

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}



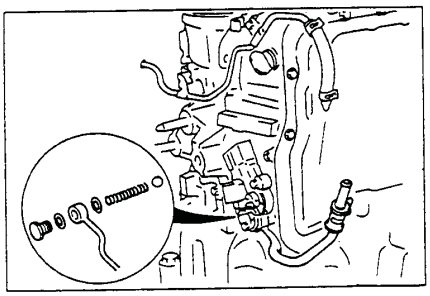
41. Install a new O-ring to the coupler assembly.
42. Install the coupler assembly.
43. Match the harness colors, and connect the solenoid connectors and ATF thermosensor connector.



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.**

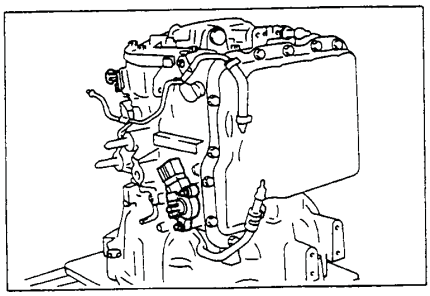
Install a new gasket and control valve body cover.

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



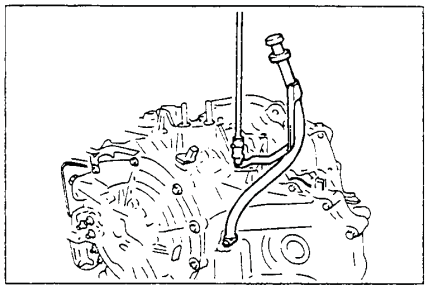
Install the steel ball, spring, oil pipe, and packing.
Install the connecting bolt.

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



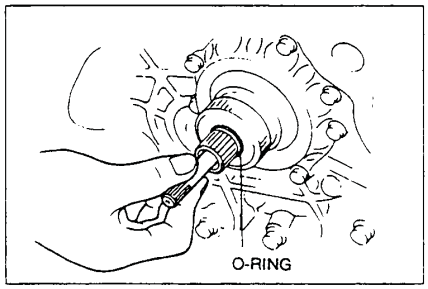
Install the vehicle speed pulse generator.

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

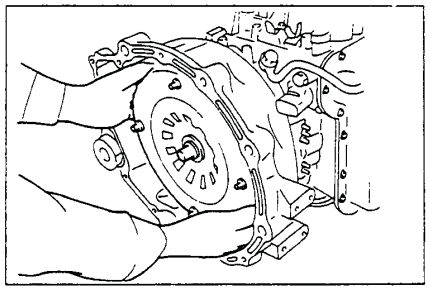


Install the ATF dipstick and oil filler tube along with a new O-ring to the transaxle case.

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.

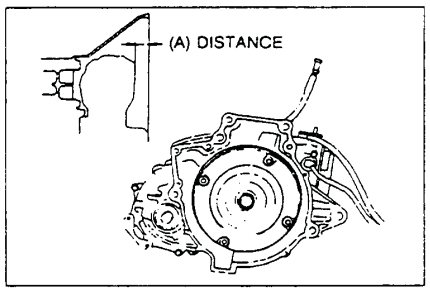


Fill the torque converter with ATF if it has been drained and washed.

ATF type: Dexron®II or M-III

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

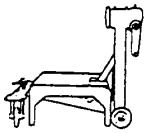
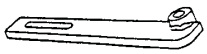
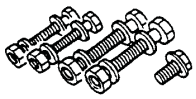
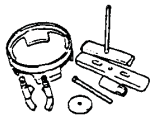
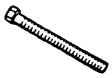
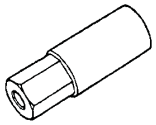
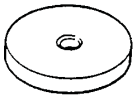
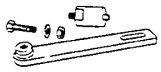
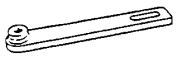
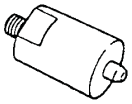
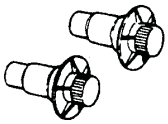
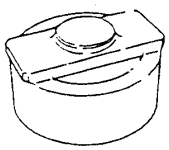
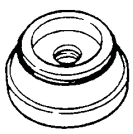
Caution
- **Hold the torque converter in an erect position when filling it with ATF, do not allow the fluid to overflow.**
- **If the converter does not fit in easily, do not try to force it; install carefully.**

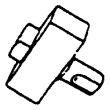
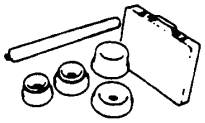
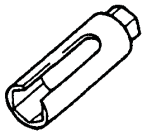
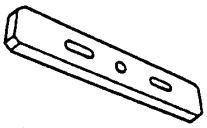
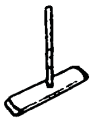
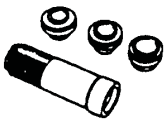


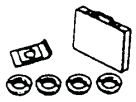
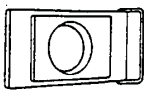
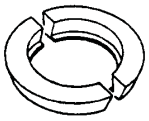
To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the face of the converter housing.

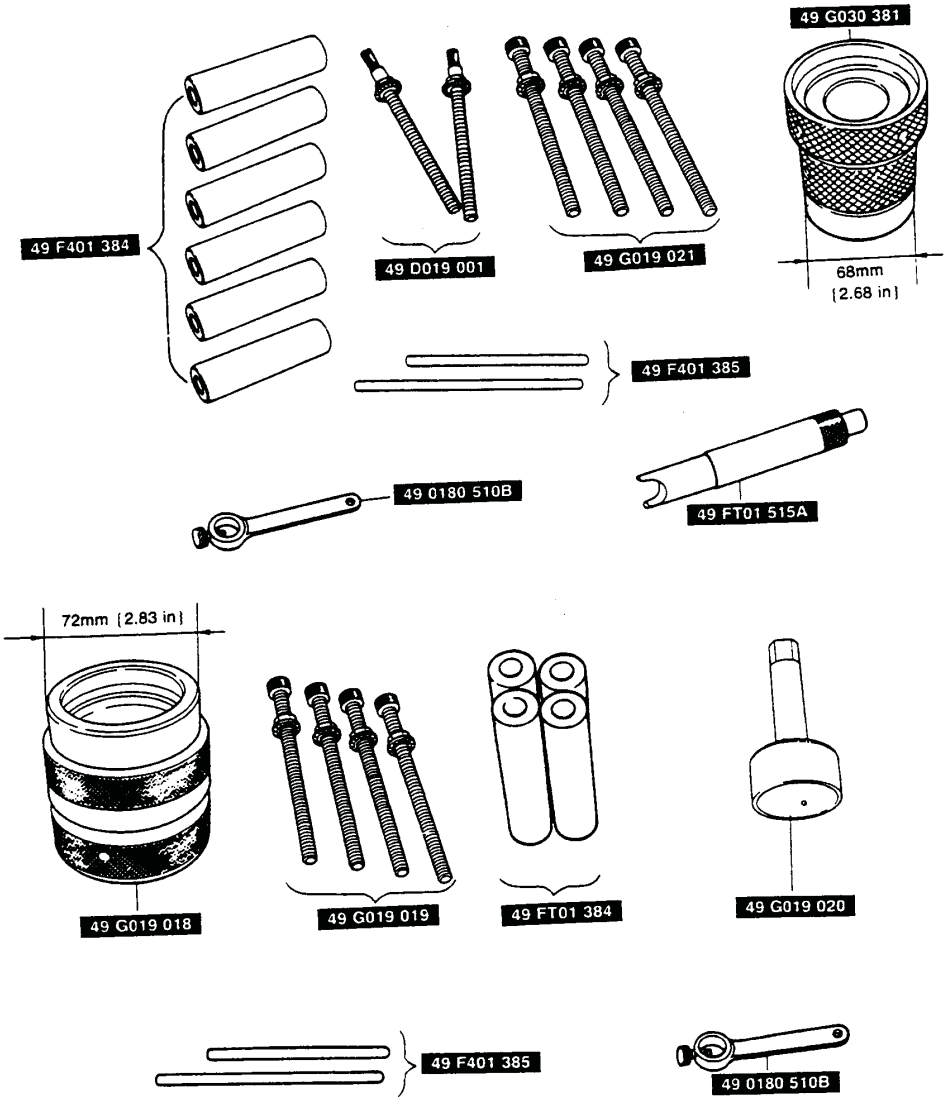
Distance A
2.0 15.3mm {0.602 in}
2.5 14.0mm {0.551 in}

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 (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch	49 G019 026 Plate (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch and reverse clutch
49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For disassembly / assembly of coasting clutch and reverse clutch	49 G030 796 Body (Part of 49 G030 795) 	For installation of oil seal
49 G030 795 Installer, oil seal 	For installation of oil seal	49 0839 425C Puller set, bearing 	For removal of bearing
49 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal	49 B092 371 Attachment E 	For removal of bearing
49 F401 337A Attachment C (Part of 49 F401 330B) 	For installation of bearing	49 F401 330B Installer set, bearing 	For installation of bearing

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 - 78) 730 - 1,010 (110-148) 1,100 - 1,170 (160 - 170) 1,910 - 2,020 (278 - 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	40-50	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
Lockout	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	26-39	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

MAZDA/FORD GF4A-EL
SOLENOID AND TERMINAL I.D.

COMPLAINT: After overhaul, vehicles equipped with GF4A-EL may exhibit a pulsating sensation on forward application, wrong gear starts, downshift's to 1st at higher speeds or no Reverse. The

CAUSE: The cause may be that the wire harness conduit, or protective coating, was removed and solenoid harness connectors may now be attached to the wrong solenoid.

CORRECTION: Refer to Figure 1 for solenoid identification and location on the valve body, and the Mazda part numbers. Refer to Figure 2 for wire color, harness and solenoid connector color and terminal identification.

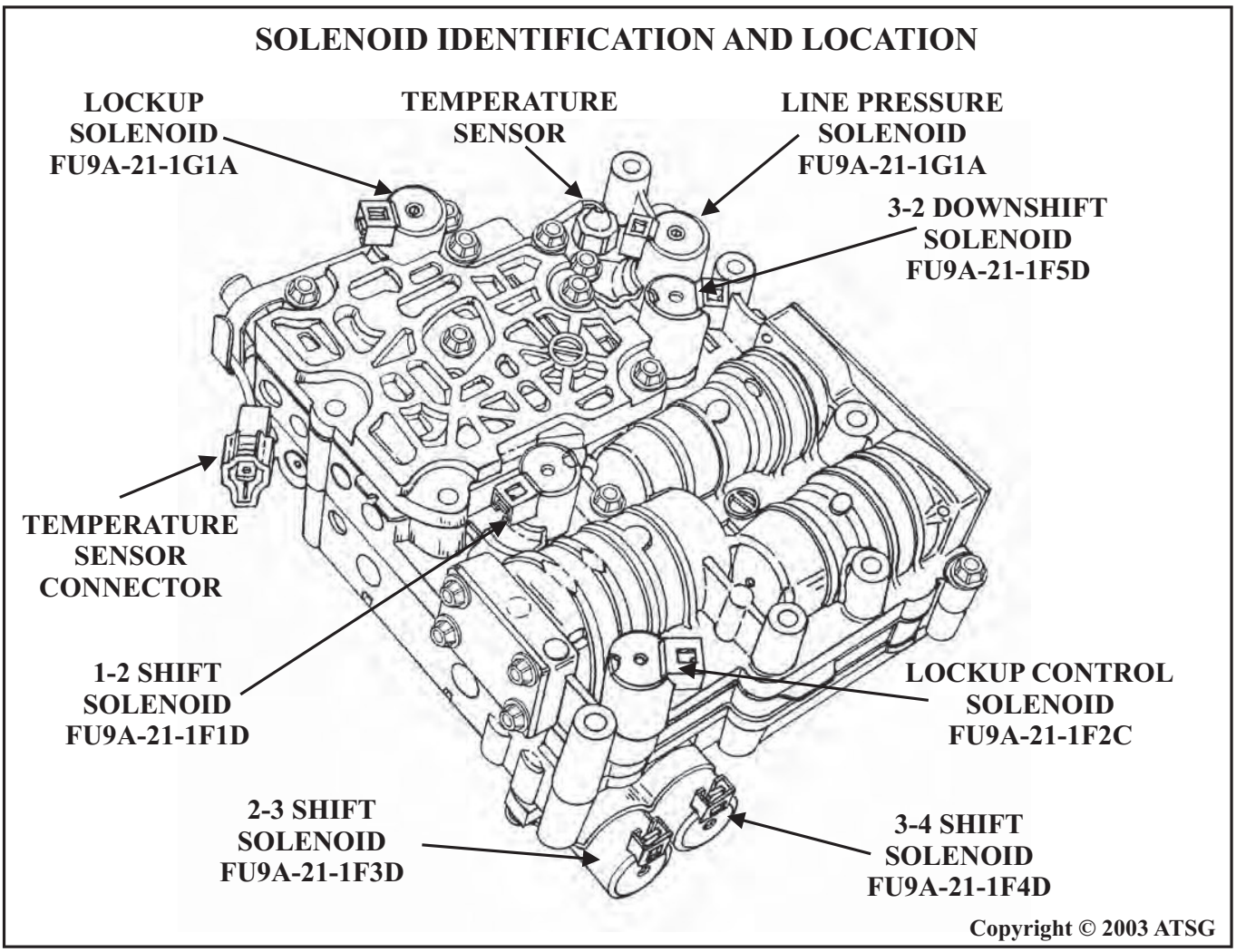
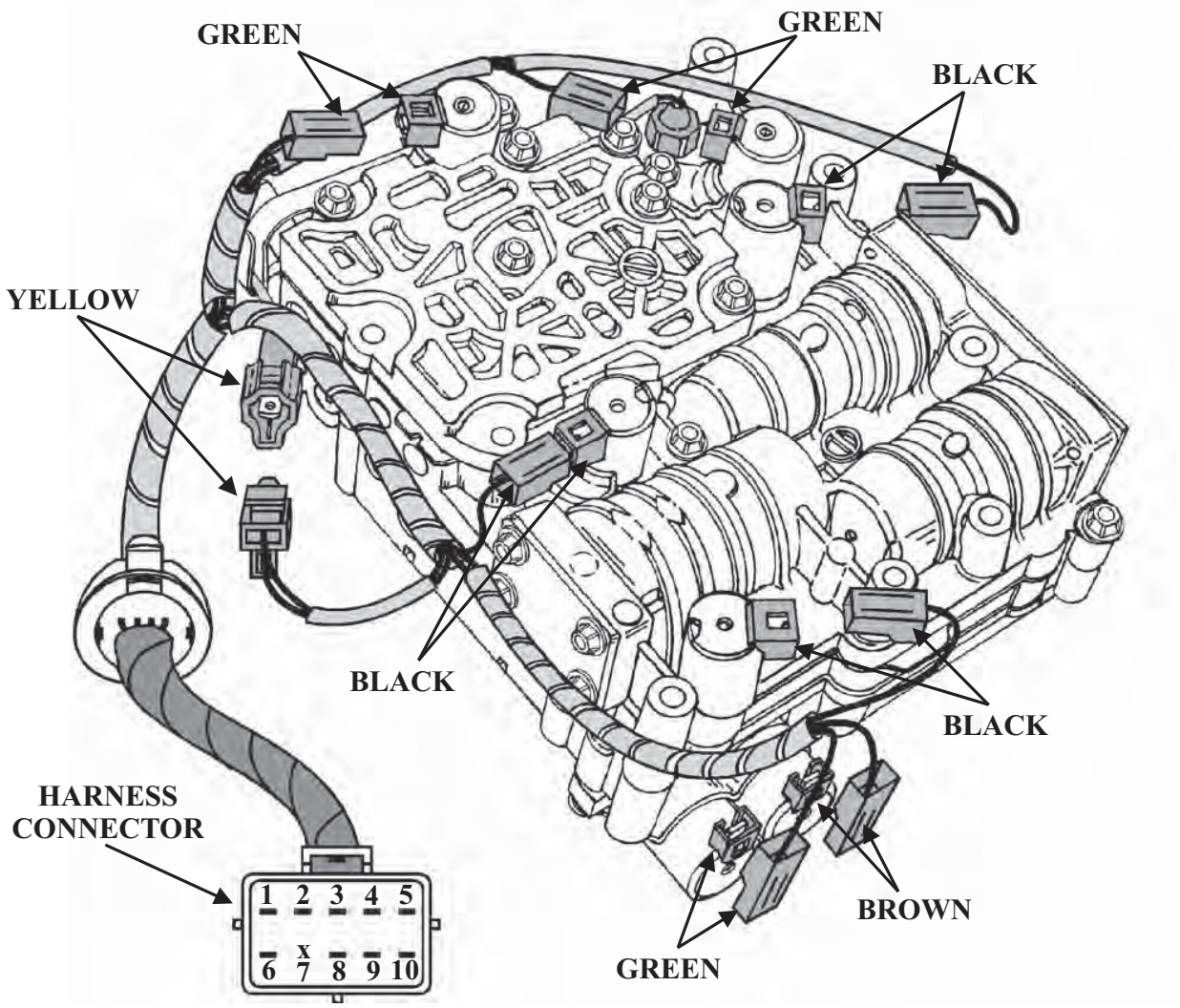


Figure 1

HARNESS COLOR AND TERMINAL I.D.



TERMINAL	IDENTIFICATION	WIRE COLOR	CONNECTOR COLOR
1	TEMP.SENSOR	WHITE	YELLOW
2	LINE PRESSURE	BLUE	GREEN
3	3-2 DOWNSHIFT	BLACK	BLACK
4	3-4 SHIFT	BROWN	BROWN
5	1-2 SHIFT	BLACK	BLACK
6	TEMP.SENSOR	WHITE	YELLOW
7	N / A	N / A	N / A
8	LOCKUP	YELLOW	GREEN
9	LOCKUP CONTROL	WHITE	BLACK
10	2-3 SHIFT	GREEN	GREEN

Figure 2