
RX-7
Twin - Turbo
1993 Factory Service Manual
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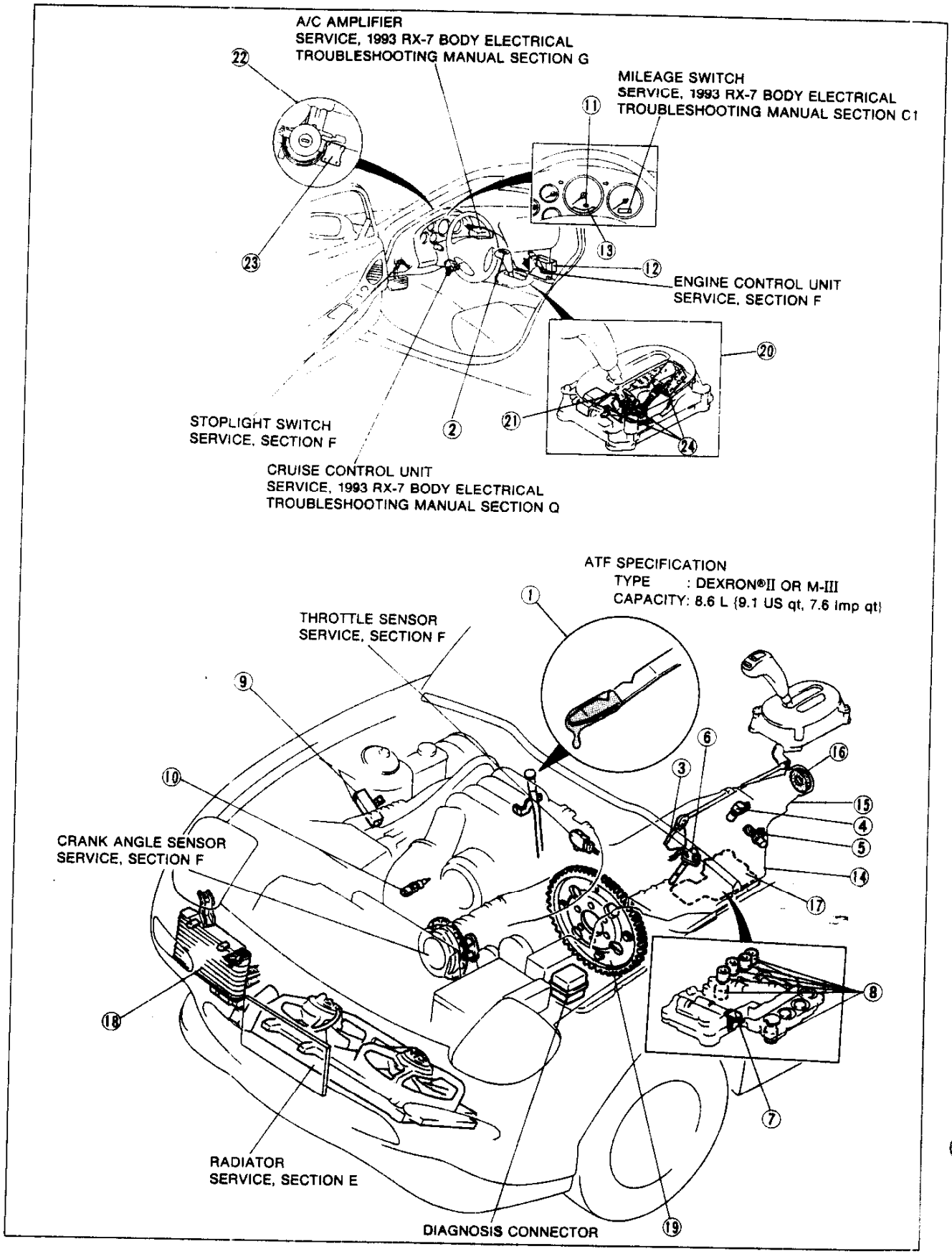
Before beginning any service procedure, refer to the 1993 RX-7 Body Electrical Troubleshooting Manual; see section S for air bag system precautions and J1 for audio anti-theft system precautions.

AUTOMATIC TRANSMISSION (Electronically Controlled)

37U0KX-001

INDEX



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37U0KX 002

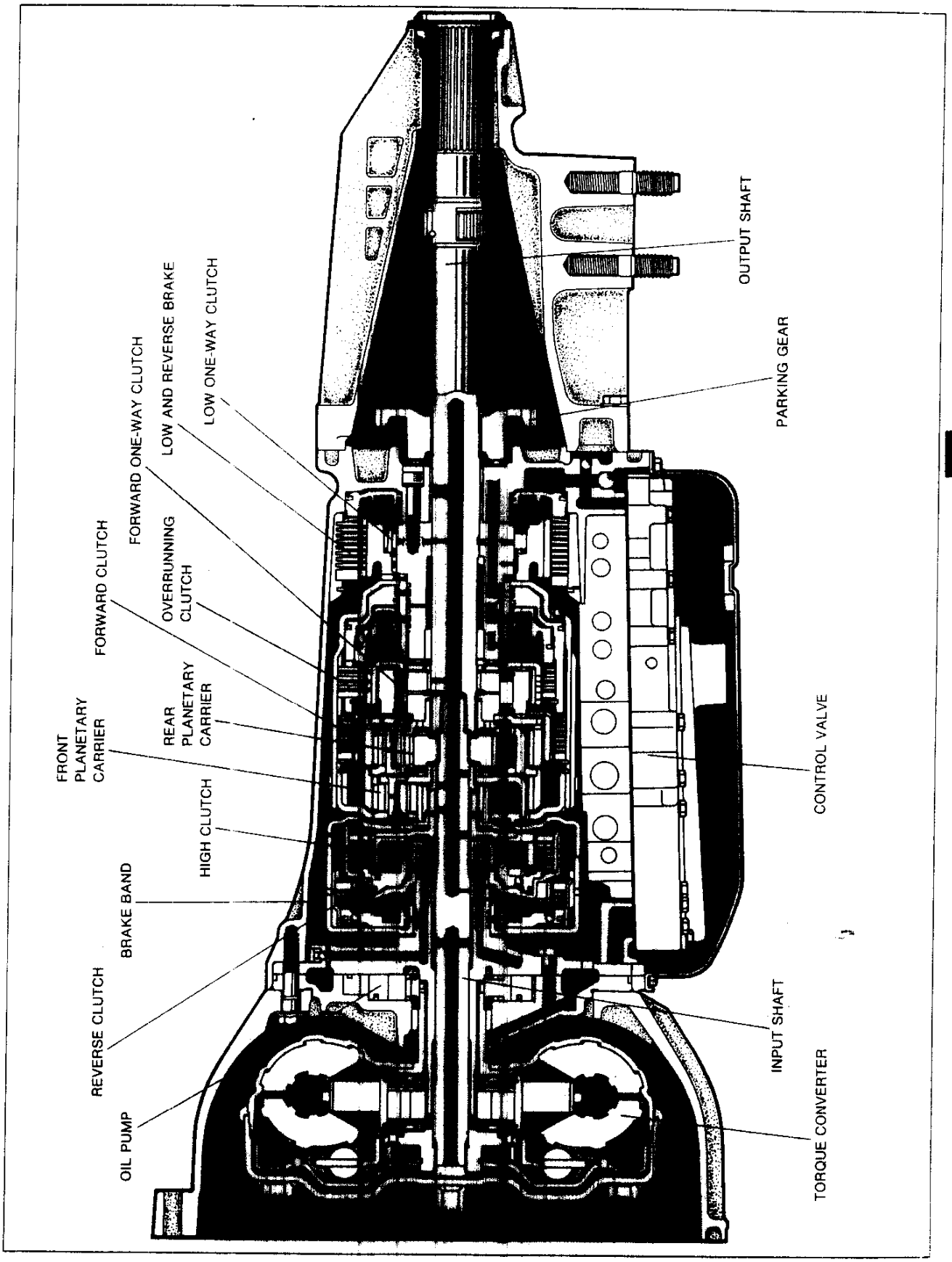
OUTLINE

SPECIFICATIONS

Item \ Model			RB4A-EL
Gear ratio	1st		3.027
	2nd		1.619
	3rd		1.000
	O/D		0.694
	Reverse		2.272
Final gear ratio			3.909
Automatic transmission fluid (ATF)	Type		Dexron®II or M-III
	Capacity L {US qt, Imp qt}	Total	8.6 {9.1, 7.6}
		Oil pan	4.0 {4.2, 3.5}
Torque converter stall torque ratio			2.200
Number of drive/driven plates	Reverse clutch		2/2
	High clutch		4/7
	Forward clutch		6/6
	Overrunning clutch		3/5
	Low and reverse brake		7/7
Band servo mm {in}	Servo piston outer / inner diameter		80.0/50.0 {3.15/1.97}
	O/D servo piston outer diameter		72.0 {2.83}
Front planetary gear unit number of teeth	Sun gear		33
	Pinion gear		21
	Internal gear		75
Rear planetary gear unit number of teeth	Sun gear		37
	Pinion gear		19
	Internal gear		75

37U0KX 003

CROSS-SECTIONAL VIEW



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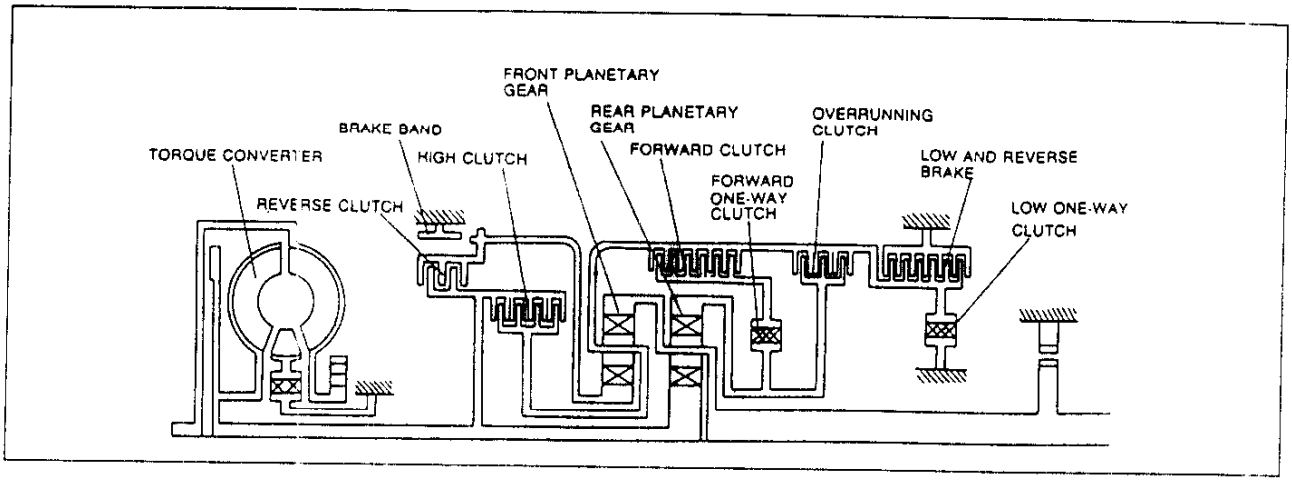
POWERFLOW DIAGRAM



29U0KX-006

OPERATION OF COMPONENTS

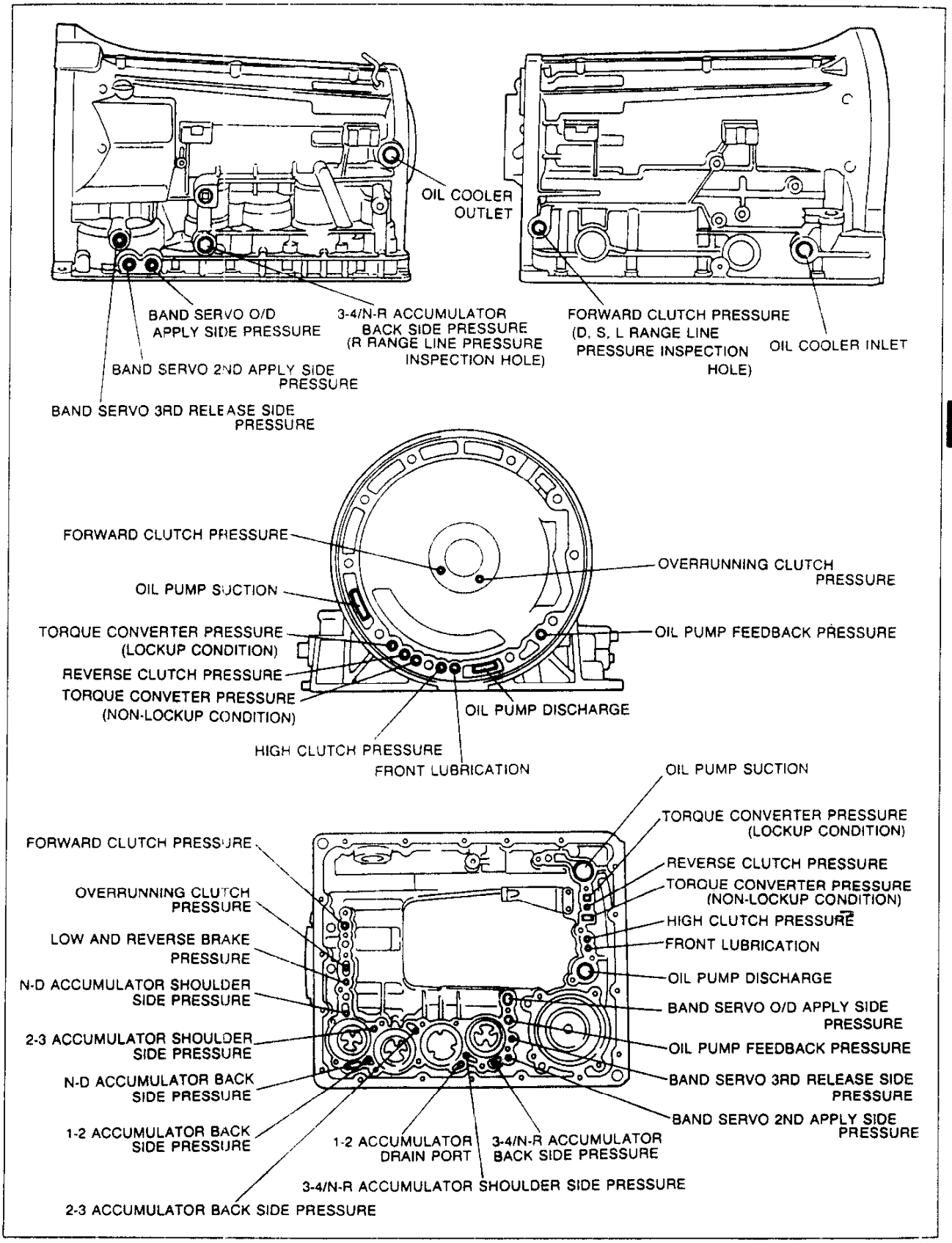
Range	Mode	Gear	Shift	Reverse clutch	High clutch	Forward clutch	Overrunning clutch	Band servo piston			Forward OWC	Low OWC	Low and reverse brake
								2nd applied	3rd released	O/D applied			
P	–	–	–										
R	–	Reverse	–	○									○
N	–	–	–										
D	Except hold	1st	↕			○	■				●	●	
		2nd	↕			○	*3 ■	○			●		
		3rd	↕		○	○	*3 ■	*1 ⊗	⊗		●		
		O/D	↕		○	⊗		*2 ⊗	⊗	○			
	hold	2nd	↑			○	*3 ◎	○			●		
		3rd	↑		○	○	*3 ◎	*1 ⊗	⊗		●		
		*4 O/D	↑		○	⊗		*2 ⊗	⊗	○			
S	Except hold	1st	↕			○	△				●	●	
		2nd	↕			○	*3 △	○			●		
		3rd	↕		○	○	*3 △	*1 ⊗	⊗		●		
	hold	2nd	↑			○	*3 △	○			●		
		*4 3rd	↑		○	○	*3 △	*1 ⊗	⊗		●		
L	Except hold	1st	↕			○	*3 ○				●	●	○
		2nd	↕			○	*3 ○	○			●		
	hold	1st	↑			○	*3 ○				●	●	○
		*4 2nd	↑			○	*3 ○	○			●		

37U0KX-004

OWC: one-way clutch
*1: Hydraulic pressure is applied to both 2nd applied side and 3rd released side of band servo piston. However, because area of 3rd released side is larger than 2nd applied side, the brake band does not engage
*2: Hydraulic pressure is applied to O/D applied side in the above conditions (*1) and brake band engages.
*3: Indicates that engine braking is available as a result of operation of overrunning clutch.
*4: Prevents engine overspeed.
○: Constantly engaged.
●: Operates when accelerated
△: Engaged when throttle opening is below approximately 1.3/8.
◎: Engaged when vehicle speed is above approximately 10 km/h {6.2 MPH} and throttle opening is below approximately 1.3/8.
■: Engaged when vehicle speed is above approximately 10 km/h {6.2 MPH} and throttle opening is below approximately 1.3/8 (NORMAL A/C OFF mode)
⊗: Engaged, however does not transmit power

FLUID PASSAGE LOCATION

Transmission Case



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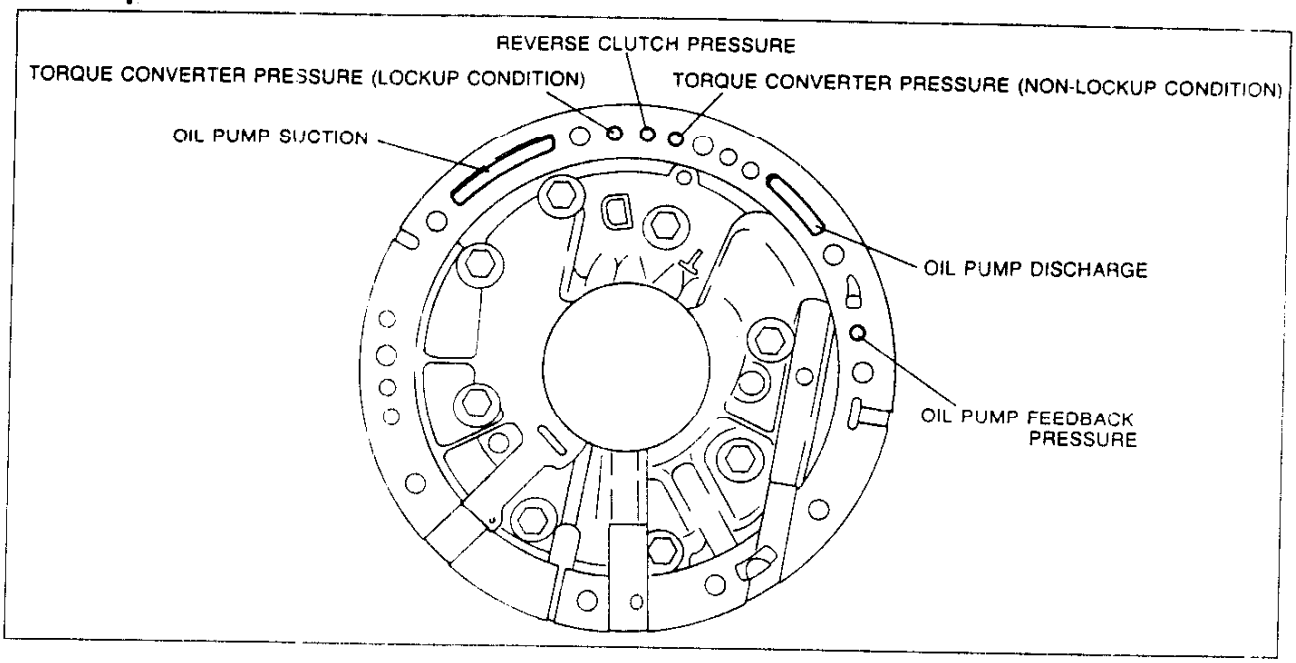
Oil Pump



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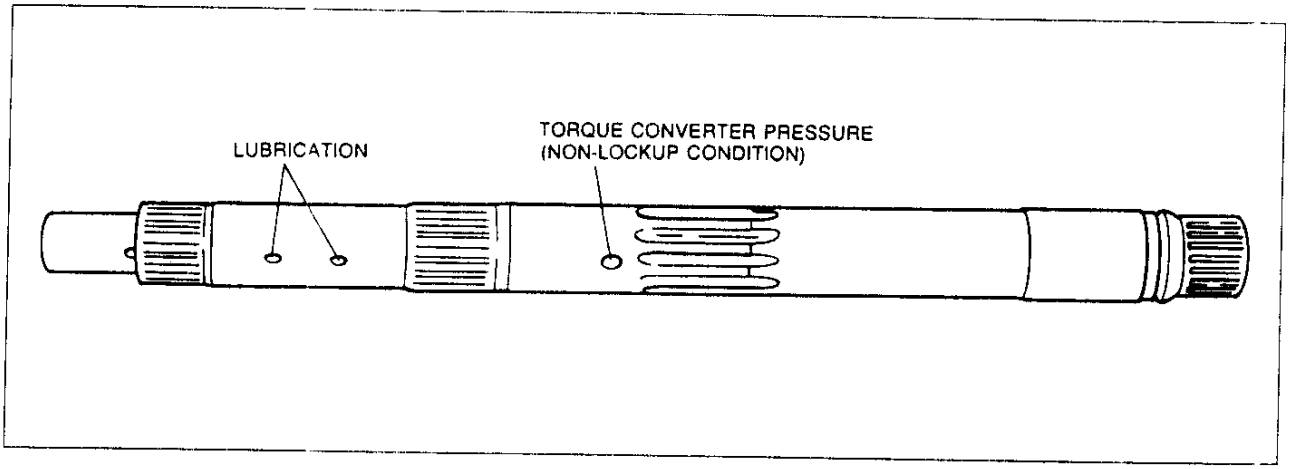
Input Shaft



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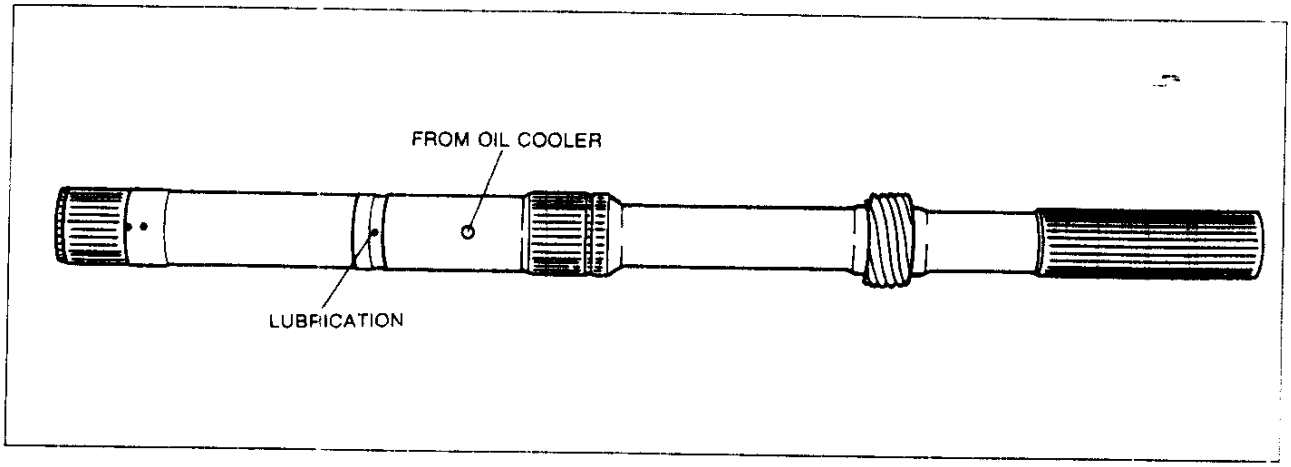
Output Shaft



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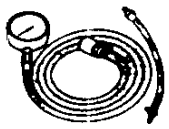
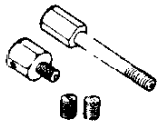
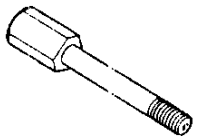
MECHANICAL SYSTEM TEST

PREPARATION

SST

49 0378 400A Gauge set, oil pressure		For oil pressure test	49 B019 901 Gauge, oil pressure		For oil pressure test
49 F019 0A0 Adapter set		For oil pressure test	49 F019 002 Adapter A (Part of 49 F019 0A0)		For oil pressure test
49 F019 003 Adapter B (Part of 49 F019 0A0)		For oil pressure test	49 F019 004 Screw (Part of 49 F019 0A0)		For oil pressure test

37U0KX-005

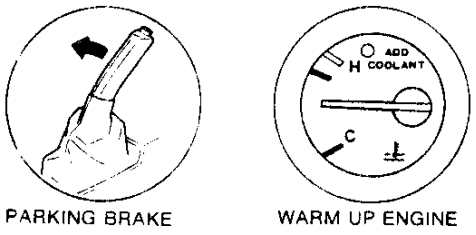
K

STALL TEST

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

Preparation

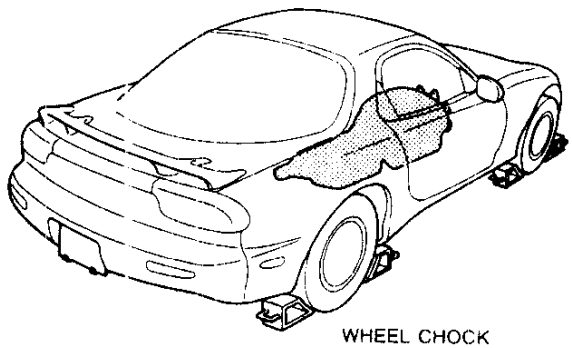
1. Engage the parking brake and use wheel chocks at the front and rear of the wheels.
2. Warm the engine thoroughly to raise the ATF temperature to operating level **60–70°C {140–158°F}**
3. Check, and correct as necessary, the engine coolant, engine oil, and ATF levels before testing.



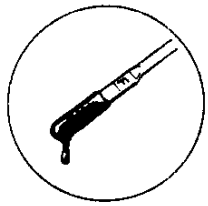
PARKING BRAKE

WARM UP ENGINE

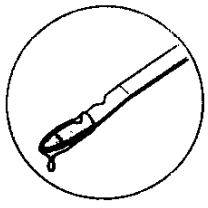
COOLANT LEVEL



WHEEL CHOCK



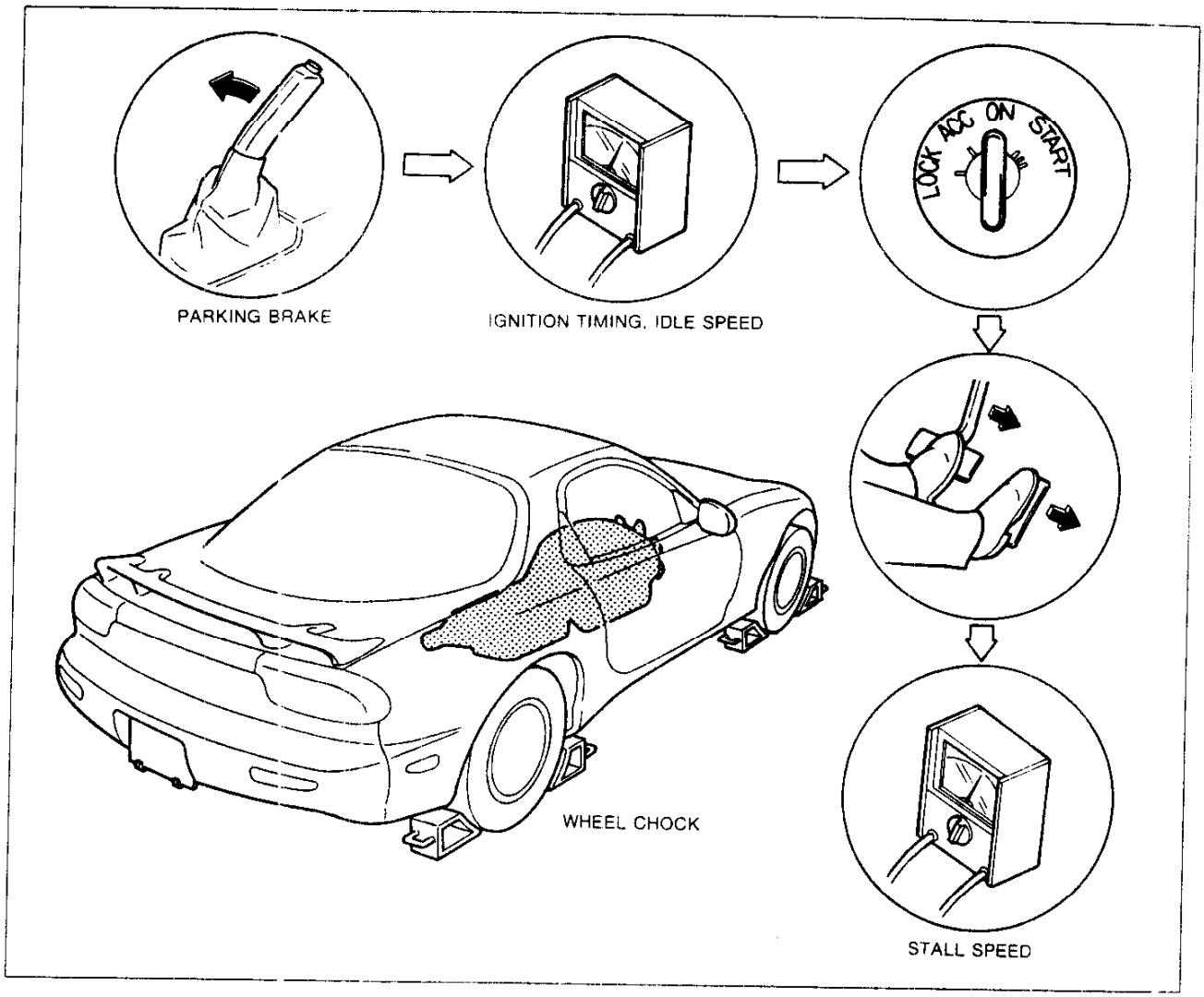
ENGINE OIL LEVEL



ATF LEVEL

37U0KX-006

Procedure



37U0KX-007

1. Check the idle speed and ignition timing in P range. (Refer to Section F.)

Idle speed: 700–750 rpm
Ignition timing: Leading 5° ATDC
Trailing 20° ATDC
(TEN terminal of diagnosis connector grounded)

Caution
- **Steps 2 and 3 must be performed within five (5) seconds.**
- **After measuring the engine stall speed, idle for at least one (1) minute in N range to cool the ATF and to prevent its deterioration.**

2. Firmly depress the brake pedal with the left foot, shift the selector lever to D range (except hold mode) and gradually depress the accelerator pedal with the right until the throttle valve is fully opened.
3. When the engine speed no longer increases, quickly read the speed and release the accelerator.

Caution
- **Be sure to allow sufficient cooling time between each stall test.**

4. Perform a stall test for the following ranges in the same manner.
   (1) D range (hold mode)
   (2) S range (except hold mode)
   (3) S range (hold mode)
   (4) L range (except hold mode)
   (5) L range (hold mode)
   (6) R range

Engine stall speed: 3,000–3,300 rpm

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Caution
- **Check the following even if the engine speed is within specification.**
  High clutch slipping
  Brake band slipping

Evaluation of Stall Test

Condition		Possible Cause	
Above specification	In all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve and/or transmission case
			Stuck pressure regulator valve
	In D and S ranges (except hold mode)	Forward clutch slipping Forward one-way clutch slipping Low one-way clutch slipping	
	In R range	Low and reverse brake slipping Reverse clutch slipping Perform road test to determine whether problem is low and reverse brake or reverse clutch a) Engine braking applied in L range 1st ...Reverse clutch slipping b) Engine braking not applied in L range 1st ...Low and reverse brake slipping	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

37U0KX 009

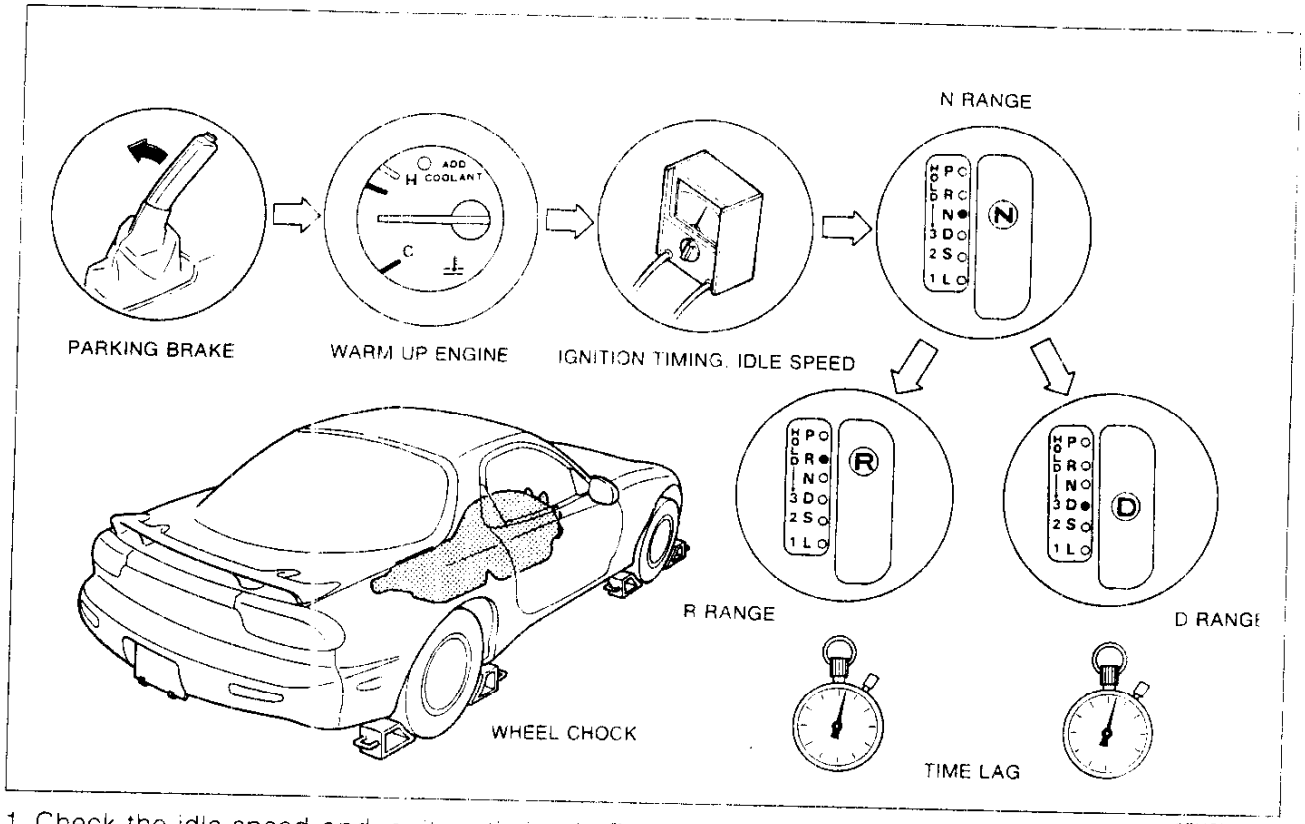
TIME LAG TEST

If the selector lever is shifted while the engine is idling, there will be a certain time lapse, or time lag, before shock is felt. This step measures this time lag in order to check conditions of the N-D, 1-2, and 3-4/N-R accumulators; forward, reverse, and one-way clutches; brake band; and low and reverse brake.

Preparation

Perform the preparation procedure outlined in STALL TEST. (Refer to page K–9.)

Procedure



1. Check the idle speed and ignition timing in P range. (Refer to Section F.)

   Idle speed: 700–750 rpm
   Ignition timing: Leading 5° ATDC
   Trailing 20° ATDC
   (TEN terminal of diagnosis connector grounded)

2. Shift from N range to D range (except hold mode).
3. Use a stopwatch to measure the time taken from shifting until shock is felt.

Note

- **Make three measurements for each test and average the results.**

4. Perform the test for the following shifts in the same manner.
   (1) N → D range (hold mode)
   (2) N → R range

Time lag: N → D range ..... Below 1.0 sec.
N → R range ..... Below 1.2 sec.

If the result of time lag test is above specification, check for the following possible causes.

Evaluation of Time Lag Test

Condition		Possible Cause
Above specification	N → D shift (except hold mode)	Insufficient line pressure
		Forward clutch slipping
		Low one-way clutch slipping
		N-D accumulator not operating properly
	N → D shift (hold mode)	Insufficient line pressure
		Brake band slipping
		1-2 accumulator not operating properly
	N → R shift	Insufficient line pressure
		Reverse clutch slipping
		Low and reverse brake slipping
		3-4/N-R accumulator not operating properly

37U0K-11

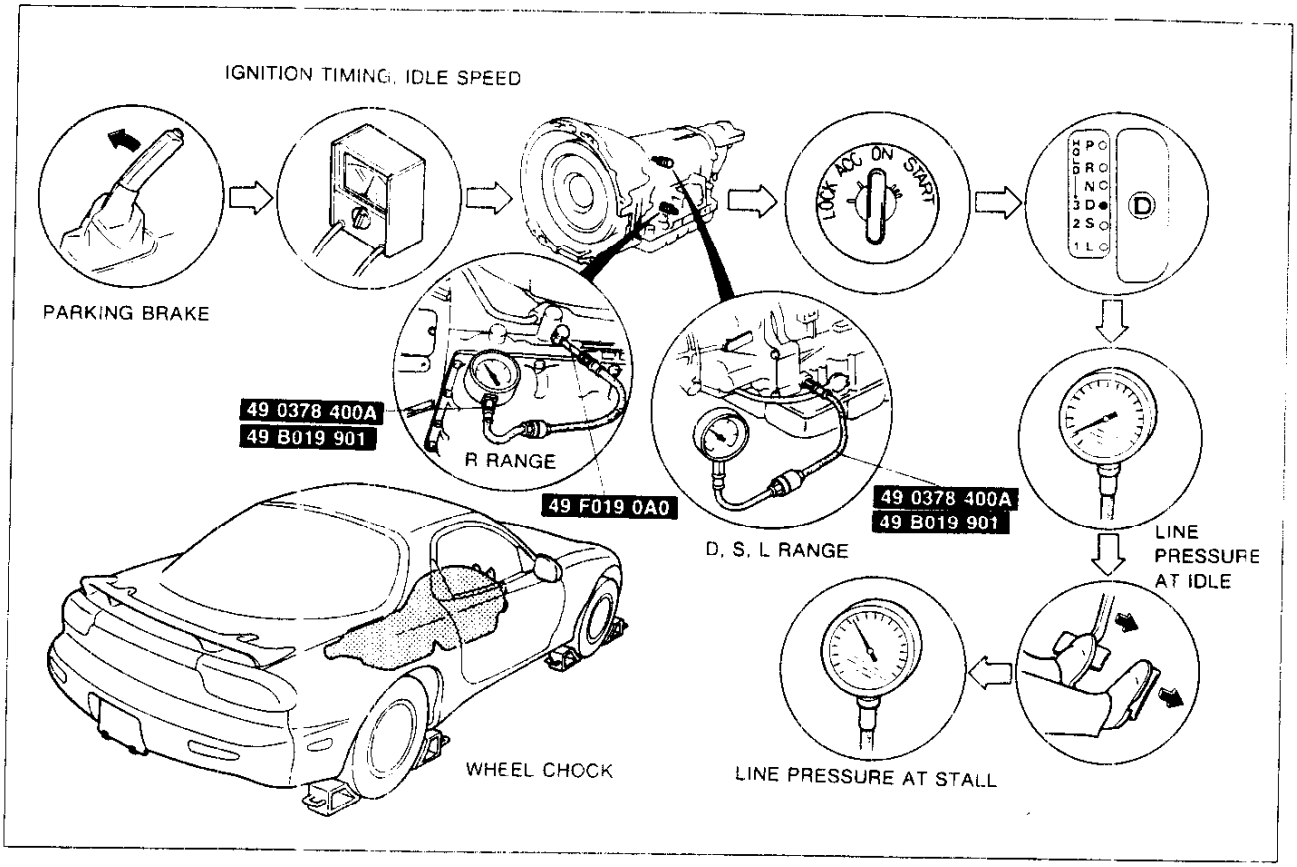
LINE PRESSURE TEST

This test measures line pressures as a means of checking the hydraulic components and inspecting for oil leakage.

Preparation

Perform the preparation procedure outlined in STALL TEST. (Refer to page K–9.)

Procedure



1. Check the idle speed and ignition timing in P range. (Refer to Section F.)

   Idle speed: 700–750 rpm
   Ignition timing: Leading 5° ATDC
   Trailing 20° ATDC
   (TEN terminal of diagnosis connector grounded)
2. Remove the tunnel member (front) and the exhaust pipe bracket.
3. Remove the line pressure inspection bolt and connect the **SST** (49 F019 0A0).
4. Replace the gauge of **SST** (49 0378 400A) with **SST's** (49 B019 901).

   Caution
   - **After performing step 5, remove the SST (49 B019 901) and replace the gauge of it with the SST (49 0378 400A).**
5. Shift the selector lever to D range and read the line pressure at idle.
6. Connect the **SST** (49 0378 400A) to the line pressure inspection port.

   Caution
   - **After reading the line pressure at stall, idle for at least one (1) minute in N range.**
   - **Steps 7 and 8 must be performed within five (5) seconds to prevent possible transmission damage.**
7. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot until the throttle valve is fully opened.
8. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.

9. Read the line pressure at idle and at the engine stall speed for each range in the same manner.

Specified line pressure:

Range	Line pressure kPa {kgf/cm², psi}	
	Idle	Stall
D, S, L	500–520 {5.0–5.4, 72–76}	1,200–1,270 {12.2–13.0, 174–184}
R	620–650 {6.3–6.7, 90–95}	1,510–1,570 {15.3–16.1, 218–228}

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Caution

- **Do not reuse the bolt because it is coated.**

10. Remove the **SST** and install a new square head plug in the inspection port.

Tightening torque: 5.0–9.8 N·m {50–100 kgf·cm, 44–86 in·lbf}

11. Install the exhaust pipe bracket.

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

12. Install the tunnel member (front).

Tightening torque: 18–26 N·m {1.8–2.7 kgf·m, 14–19 ft·lbf}

If the result of line pressure test is out of the specification, check for the following possible causes.

Evaluation of Line Pressure Test

Condition		Possible Cause
At idle	Low pressure in every range	Worn oil pump Damaged control piston (in oil pump) Pressure regulator valve or plug sticking Damaged pressure regulator valve spring Fluid leaking between oil strainer, oil pump, and pressure regulator valve
	Low pressure in forward ranges	Fluid leaking from hydraulic circuit of forward clutch
	Low pressure in D and S ranges (hold mode)	Fluid leaking from hydraulic circuit of band servo 2nd apply side
	Low pressure in R range	Fluid leaking from hydraulic circuit of reverse clutch
	Low pressure in R and L ranges	Fluid leaking from hydraulic circuit of low and reverse brake
	Higher than specification	Throttle sensor out of adjustment Damaged ATF thermosensor Solenoid valve (line pressure) sticking Short circuit of solenoid valve (line pressure) circuit Pressure modifier valve sticking Pressure regulator valve or plug sticking
At stall speed	Low pressure	Throttle sensor out of adjustment Solenoid valve (line pressure) sticking Short circuit of solenoid valve (line pressure) circuit Pressure regulator valve or plug sticking Pressure modifier valve sticking Pilot valve sticking Damaged control piston (in oil pump)

37U0K2-[illegible]14

ROAD TEST

Caution

- **Perform the test at normal ATF operating temperature 60–70°C {140–158°F}.**

Note

- **The vehicle's indicated speed as shown by its speedometer may not be accurate when the vehicle is on a chassis roller. Therefore, verify the shift points by using only the vehicle speed as shown by the DT-S1000.**
- **The throttle sensor voltage of the DT-S1000 represents the throttle valve opening.**

This step is performed to inspect for problems in the various gear ranges. If these tests show any problems, refer to the electronic system component or mechanical section of this manual to adjust or replace as necessary.

D RANGE TEST

Shift Point, Shift Pattern, and Shift Shock

Note

- **The power mode and the normal mode are automatically selected by the EC-AT control unit.**
- **Once the power mode is selected, the EC-AT control unit does not switch to normal mode until the ignition switch is turned OFF.**
- **When the ATF temperature is less than 40°C {104°F} in the period shortly after the engine is started, the EC-AT control unit selects the low ATF temperature mode.**
- **The shift points during the low ATF temperature mode are higher than in the power mode and lockup is inhibited.**

1. Shift the selector lever to D range.

Note

- **There is no O/D when the ATF temperature is below 10°C {50°F}.**
- **There is no O/D when the ATF temperature is below 38°C {100°F} and vehicle speed is less than 63 Km/h {39 MPH}.**
- **There is no O/D when the cruise control is operating and there is an 8 km/h {5 MPH} difference between the preset cruise speed and the vehicle speed, or the RESUME/ACCEL switch is ON.**

2. Accelerate the vehicle with half- and full-throttle opening.
3. Verify that 1-2, 2-3, and 3-O/D upshifts are obtained. The shift points must be as shown in the D range shift diagram.
4. Drive the vehicle in O/D, 3rd and 2nd gears and verify that kickdown occurs for O/D → 3, O/D → 2, O/D → 1, 3 → 2, 3 → 1, 2 → 1, and that the shift points are as shown in the D range shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in 3rd and 2nd gears when normal A/C OFF mode is selected, vehicle speed is more than 10 km/h {6.2 MPH}, and the throttle opening is less than 1/8.

Note

- **When the engine coolant temperature is above 115°C {239°F}, the lockup points are lowered.**
- **There is no lockup when the transmission is in O/D gear position and the ATF temperature is below 20°C {68°F}.**
- **There is no lockup when the transmission is in 3rd gear position and ATF temperature is below 38°C {100°F}.**
- **There is no slip lockup when the ATF temperature is below 50°C {122°F}.**
- **There is no slip lockup when the ATF temperature is above 100°C {212°F}.**
- **There is no slip lockup when the slip lockup OFF signal is ON.**
- **There is no slip lockup when the transmission is in O/D gear position and the idle signal is ON.**
- **There is no slip lockup when the transmission is in 3rd gear position, the idle signal is ON, and vehicle speed is less than 140 km/h {87 MPH}.**
- **There is no slip lockup when the accelerator pedal is depressed rapidly.**

6. Drive the vehicle and verify that lockup is obtained.
7. Select hold mode.
8. Accelerate the vehicle with half- and full-throttle opening, and verify that 3rd gear is held after 2-3 upshift is obtained. The shift points must be as shown in the D range (hold mode) shift diagram.
9. Drive the vehicle in 3rd and 2nd gears and verify that kickdown does not occur.
10. Decelerate the vehicle and verify that engine braking effect is felt in 3rd and 2nd gears when vehicle speed is more than 10 km/h {6.2 MPH} and the throttle opening less than 1.3/8.

Note

- **When the engine coolant temperature is above 115°C {239°F}, the lockup points are lowered.**
- **There is no lockup when the transmission is in 3rd gear position and the ATF temperature is below 38°C {100°F}.**

11. Drive the vehicle and verify that lockup is obtained.

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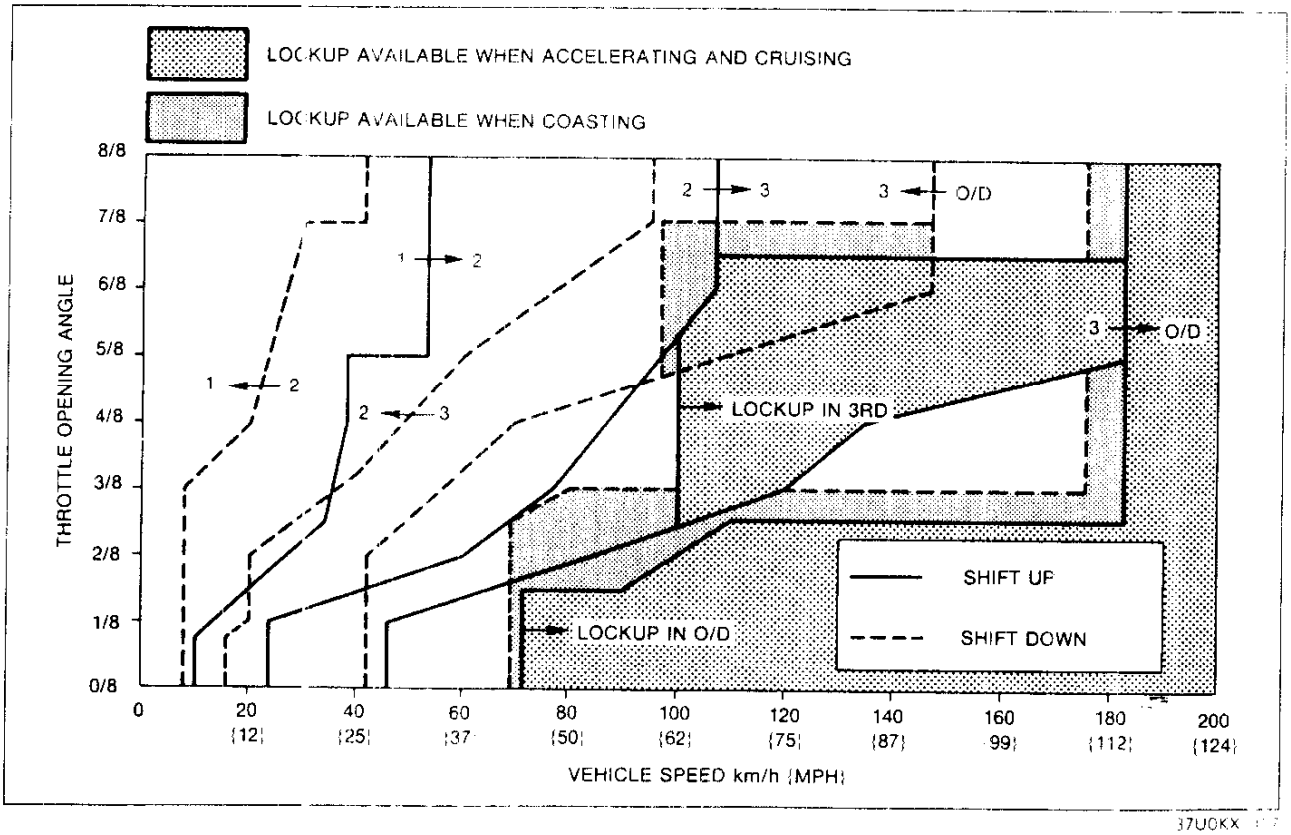
D range (power mode) shift diagram



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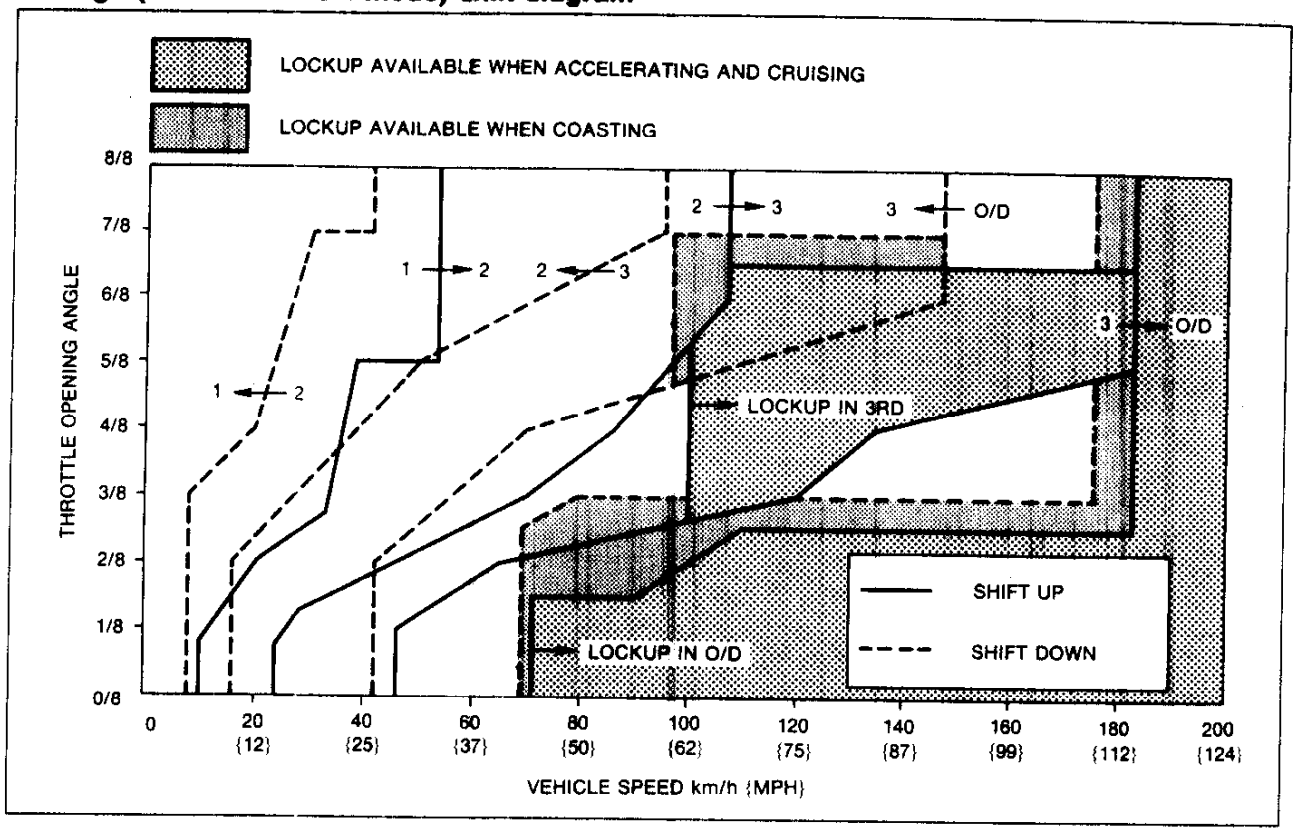
D range (normal A/C ON mode) shift diagram



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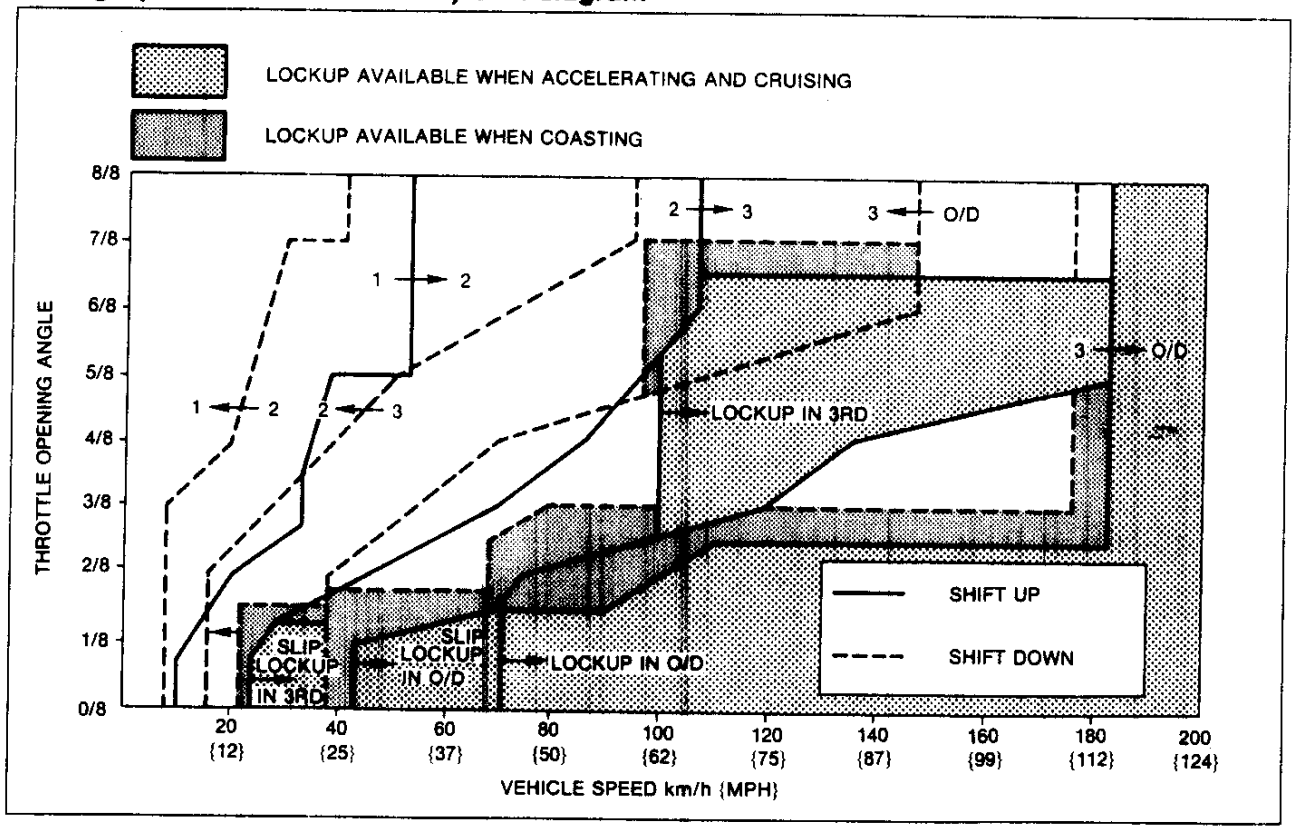
D range (normal A/C OFF mode) shift diagram



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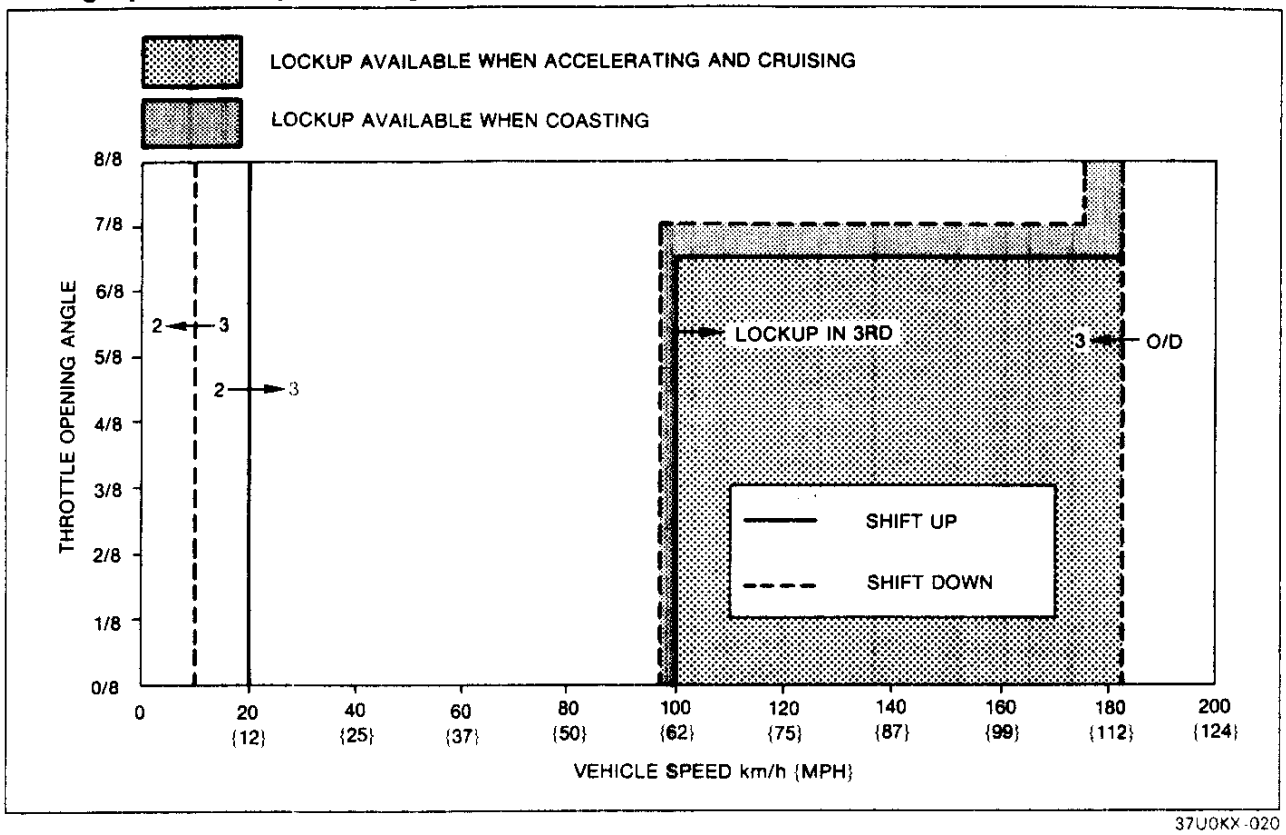
D range (hold mode) shift diagram



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Noise and Vibration

Note

- **Abnormal noise and vibration can also be caused by the torque converter, propeller shaft, or differential. Therefore, check with extreme care.**

Drive the vehicle in O/D (lockup), O/D (no lockup), and 3rd (hold) and check for abnormal noise and vibration.

29U0KX-121

S RANGE TEST

Shift Point, Shift Pattern, and Shift Shock

1. Shift the selector lever to S range.
2. Accelerate the vehicle with half- and full-throttle opening.
3. Verify that 1-2 and 2-3 upshifts are obtained. The shift points must be as shown in the S range shift diagram.
4. Drive the vehicle in 3rd and 2rd gears and verify that kickdown occurs for 3 → 2, 3 → 1, 2 → 1, and that the shift points are as shown in the S range shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in 3rd and 2nd gears when the throttle opening is less than 1.3/8.

Note

- **When the engine coolant temperature is above 115°C {239°F}, the lockup points are lowered.**
- **There is no lockup when the transmission is in 3rd gear position and the ATF temperature is below 38°C {100°F}.**

6. Drive the vehicle and verify that lockup is obtained.
7. Select hold mode.
8. Accelerate the vehicle with half- and full-throttle opening, and verify that 2nd gear is held.
9. Decelerate the vehicle and verify that engine braking effect is felt when the throttle opening is less than 1.3/8.

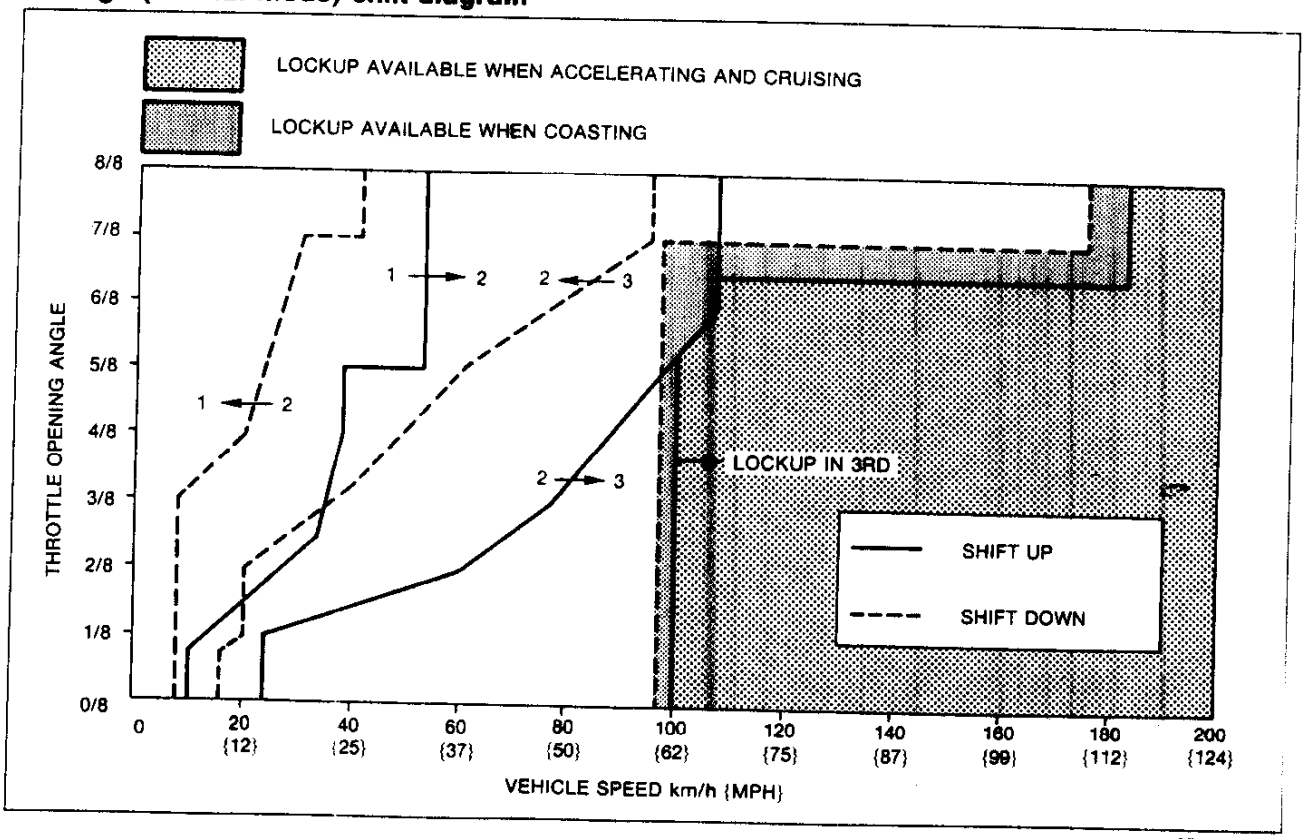
Note

- **When the engine coolant temperature is above 115°C {239°F}, the lockup points are lowered.**

10. Drive the vehicle and verify that lockup is obtained.

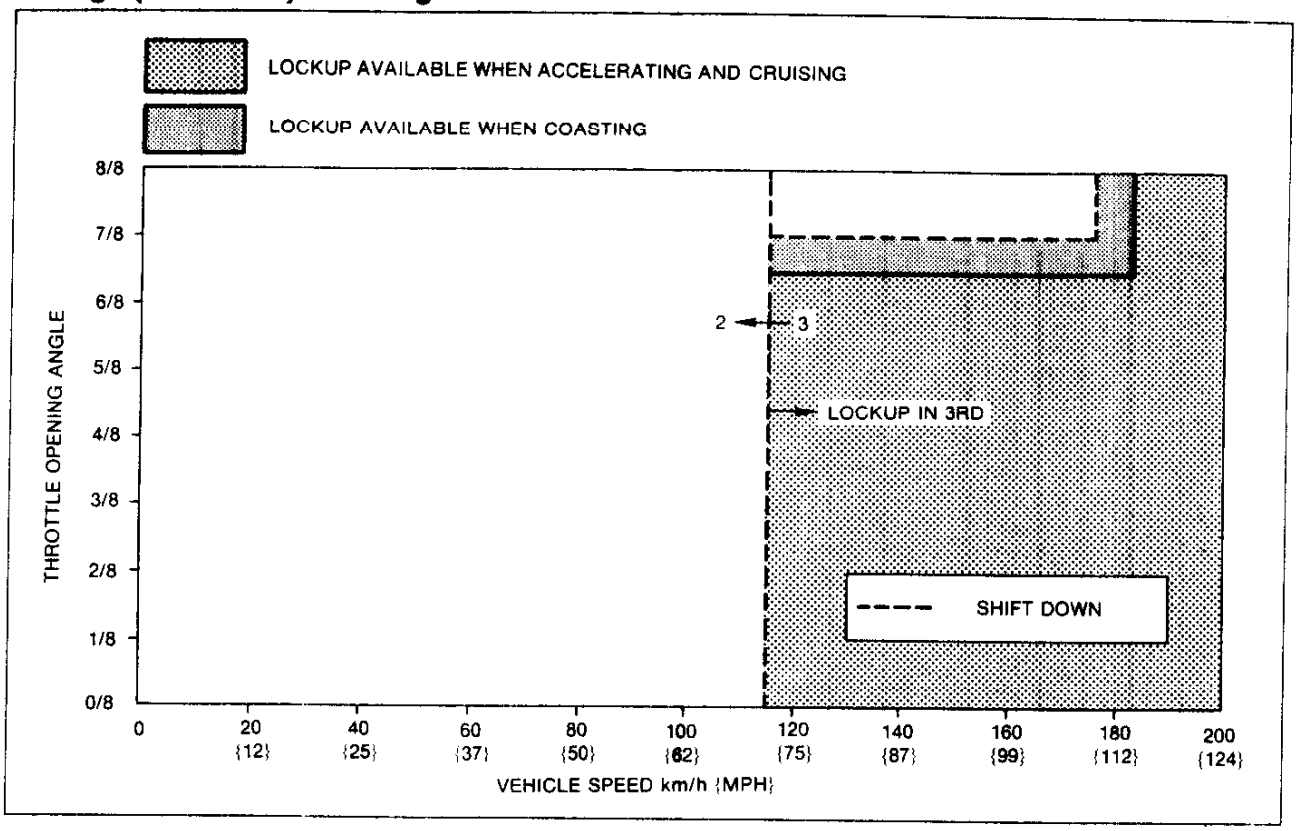
37U0KX-021

S range (normal mode) shift diagram



37U0KX-022

S range (hold mode) shift diagram



37U0KX-023

Noise and Vibration

Note

- **Abnormal noise and vibration can also be caused by torque converter, propeller shaft, or differential. Therefore, check with extreme care.**

Drive the vehicle in 2nd (hold) and check for abnormal noise and vibration.

29U9KX-125

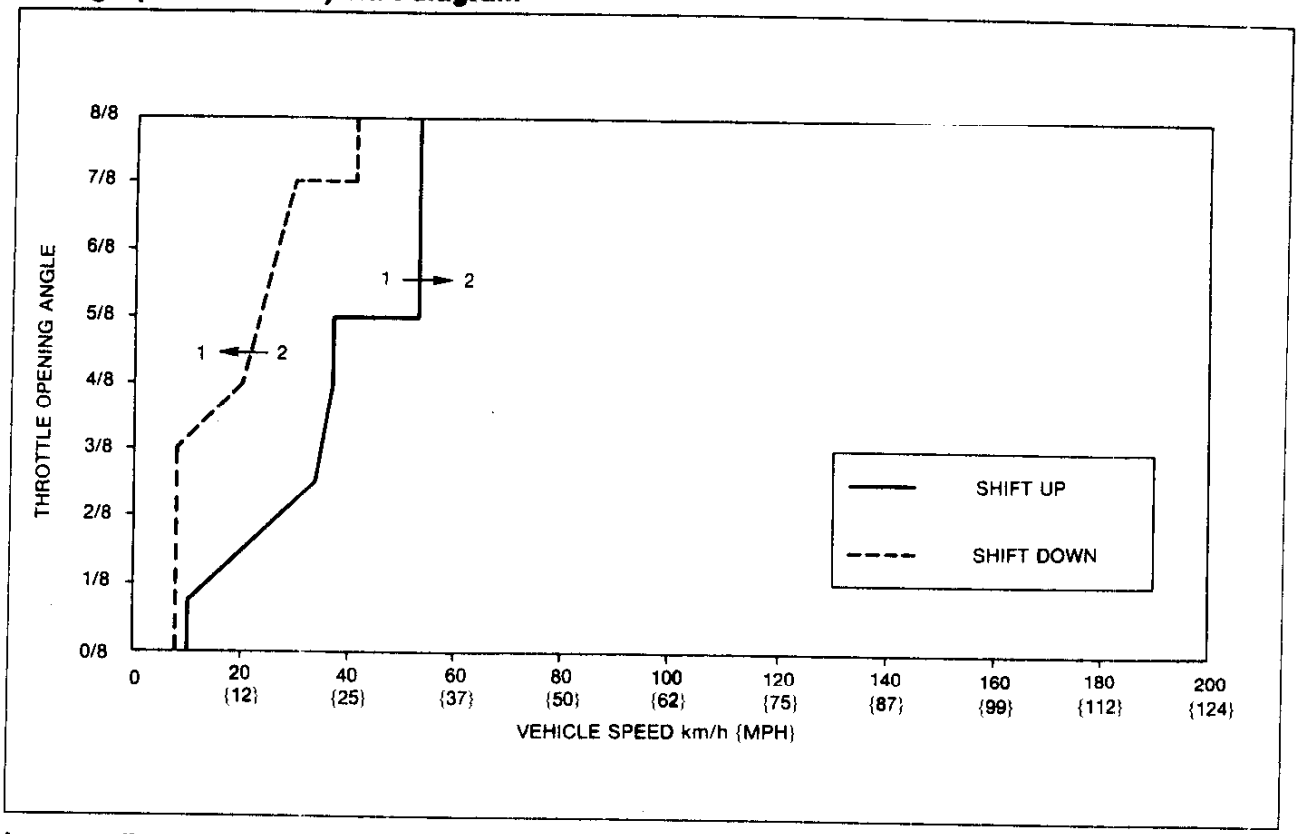
L RANGE TEST

Shift Point, Shift Pattern, and Shift Shock

1. Shift the selector lever to L range.
2. Accelerate the vehicle with half- and full-throttle opening.
3. Verify that 1-2 upshift is obtained. The shift points must be as shown in the L range shift diagram.
4. Drive the vehicle in 2nd gear and verify that kickdown occurs for 2 → 1, and that the shift point is as shown in the L range shift diagram.
5. Decelerate the vehicle and verify that engine braking effect is felt in 2nd and 1st gears.
6. Select hold mode.
7. Accelerate the vehicle with half- and full-throttle opening, and verify that 1st gear is held.
8. Decelerate the vehicle and verify that engine braking effect is felt.

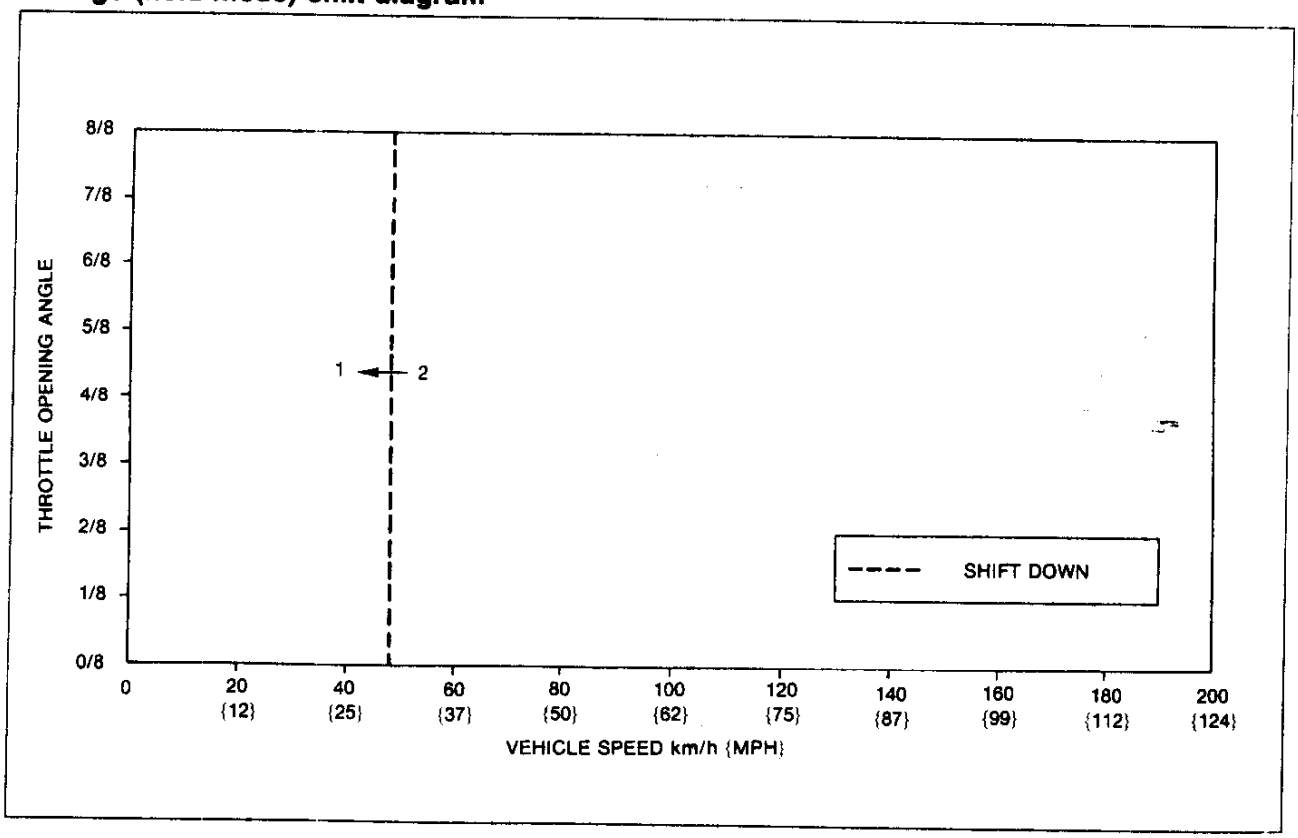
37U0KX-9024

L range (normal mode) shift diagram



37U0KX 025

L range (hold mode) shift diagram



37U0KX-026

Noise and Vibration

Note

- **Abnormal noise and vibration can also be caused by the torque converter, propeller shaft, or differential. Therefore, check with extreme care.**

Drive the vehicle in 1st (hold) and check for abnormal noise and vibration.

29U0K0-129

P RANGE TEST

Shift into P range on a gentle slope. Release the brake and verify that the vehicle does not roll.

29U0K0-130

Vehicle Speed at Shift Point Table

Range	Mode	Throttle condition (throttle sensor voltage)	Shift	Vehicle speed km/h {MPH}
D	POWER	Fully open (4.0–4.5V)	$D_1 \rightarrow D_2$	50–56 {31–35}
			$D_2 \rightarrow D_3$	103–111 {64–69}
			$D_3 \rightarrow$ O/D	178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$	35–41 {22–25}
			$D_2 \rightarrow D_3$	81–93 {50–58}
			$D_3 \rightarrow$ O/D	126–144 {78–89}
			Lockup ON (D_3)	94–106 {58–66} (81–93 {50–58})
			Lockup ON (O/D)	174–192 {108–119} (126–144 {78–89})
		Fully closed (0.1–1.1V)	O/D $\rightarrow D_3$	39–45 {24–28}
			$D_3 \rightarrow D_2$	13–19 {8–12}
			$D_2 \rightarrow D_1$	5–11 {3–7}
		Kickdown	O/D $\rightarrow D_3$	142–152 {88–94}
			$D_3 \rightarrow D_2$	91–99 {57–62}
			$D_2 \rightarrow D_1$	38–44 {24–27}
	NORMAL A/C ON	Fully open (4.0–4.5V)	$D_1 \rightarrow D_2$	50–56 {31–35}
			$D_2 \rightarrow D_3$	103–111 {64–69}
			$D_3 \rightarrow$ O/D	178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$	32–38 {20–24}
			$D_2 \rightarrow D_3$	80–92 {50–57}
			$D_3 \rightarrow$ O/D	126–144 {78–89}
			Lockup ON (D_3)	94–106 {58–66} (80–92 {50–57})
			Lockup ON (O/D)	174–192 {108–119} (126–144 {78–89})
		Fully closed (0.1–1.1V)	O/D $\rightarrow D_3$	39–45 {24–28}
			$D_3 \rightarrow D_2$	13–19 {8–12}
			$D_2 \rightarrow D_1$	5–11 {3–7}
		Kickdown	O/D $\rightarrow D_3$	142–152 {88–94}
			$D_3 \rightarrow D_2$	91–99 {57–62}
			$D_2 \rightarrow D_1$	38–44 {24–27}
	NORMAL A/C OFF	Fully open (4.0–4.5V)	$D_1 \rightarrow D_2$	50–56 {31–35}
			$D_2 \rightarrow D_3$	103–111 {64–69}
			$D_3 \rightarrow$ O/D	178–188 {111–117}
		Half throttle	$D_1 \rightarrow D_2$	32–38 {20–24}
			$D_2 \rightarrow D_3$	80–92 {50–57}
			$D_3 \rightarrow$ O/D	126–144 {78–89}
			Lockup ON (D_3)	94–106 {58–66} (80–92 {50–57})
			Lockup ON (O/D)	174–192 {108–119} (126–144 {78–89})
		Fully closed (0.1–1.1V)	O/D $\rightarrow D_3$	32–38 {20–24}
			$D_3 \rightarrow D_2$	13–19 {8–12}
			$D_2 \rightarrow D_1$	5–11 {3–7}
		Kickdown	O/D $\rightarrow D_3$	142–152 {88–94}
			$D_3 \rightarrow D_2$	91–99 {57–62}
			$D_2 \rightarrow D_1$	38–44 {24–27}

Note

- **Lockup indicates complete lockup.**
- **( ) indicates lockup points when the engine coolant temperature is above 115°C {239°F}.**

Range	Mode	Throttle condition (throttle sensor voltage)	Shift	Vehicle speed km/h {MPH}
D	HOLD	–	O/D → D_3	180–186 {112–116}
			D_3 → D_2	7–13 {4–8}
			D_2 → D_1	15–25 {9–16}
			Lockup ON (D_3)	94–106 {58–66} {39–51 {24–32}}
S	EXCEPT HOLD	Fully open (4.0–4.5V)	S_1 → S_2	50–56 {31–35}
			S_2 → S_3	103–111 {64–69}
		Half throttle	S_1 → S_2	35–41 {22–25}
			S_2 → S_3	81–93 {50–58}
			Lockup ON (S_3)	94–106 {58–66} {81–93 {50–58}}
		Fully closed (0.1–1.1V)	S_3 → S_2	13–19 {8–12}
			S_2 → S_1	5–11 {3–7}
		Kickdown	S_3 → S_2	91–99 {57–62}
			S_2 → S_1	38–44 {24–27}
	HOLD	–	S_3 → S_2	112–118 {70–73}
L	EXCEPT HOLD	Fully open (4.0–4.5V)	L_1 → L_2	50–56 {31–35}
		Half throttle	L_1 → L_2	35–41 {22–25}
		Fully closed (0.1–1.1V)	L_2 → L_1	5–11 {3–7}
		Kickdown	L_2 → L_1	38–44 {24–27}
	HOLD	–	L_2 → L_1	45–51 {28–32}

37U0KX-027

Note

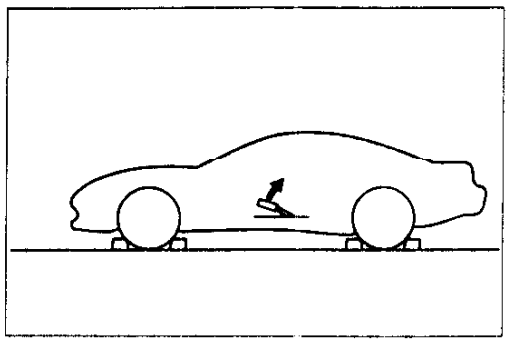
- **Lockup indicates complete lockup.**
- **( ) indicates lockup points when the engine coolant temperature is above 115° {239°F}.**
- **Throttle sensor voltage as a throttle condition should be calculated as shown:**

Throttle condition	Calculation	Example
Fully closed voltage	DT-S1000 indicated voltage at fully closed	0.3V
Fully open voltage	DT-S1000 indicated voltage at fully open	3.5V
Half throttle voltage	DT-S1000 indicated voltage difference between fully open and fully closed, divided by 2	(3.5V – 0.3V) ÷ 2 = 1.6V

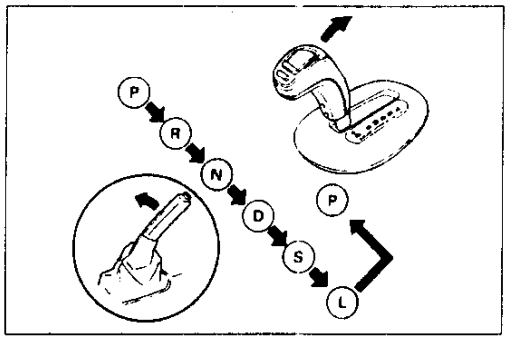
37U0KX-028

Condition		Possible Cause
Shifting	Starts in 2nd or shifts directly from 1st to O/D	Stuck solenoid valve (shift A) Stuck shift valve A
	Starts in O/D	Stuck solenoid valve (shift B) Stuck shift valve B
	No shift	Stuck solenoid valve (shift A and B) Stuck shift valve A and/or B
	Incorrect shift points	Throttle sensor out of adjustment Speed sensor 1 (revolution sensor) not operating properly
Shift shock felt or slipping		Stuck solenoid valve (line pressure) Accumulators not operating properly Throttle sensor out of adjustment Speed sensor 1 (revolution sensor) not operating properly ATF thermosensor not operating properly Worn clutches, one-way clutches, and/or brakes
No engine braking		Stuck solenoid valve (overrunning clutch) Worn clutches and/or brakes
No lockup shift		Stuck solenoid valve (lockup) Stuck lockup control valve

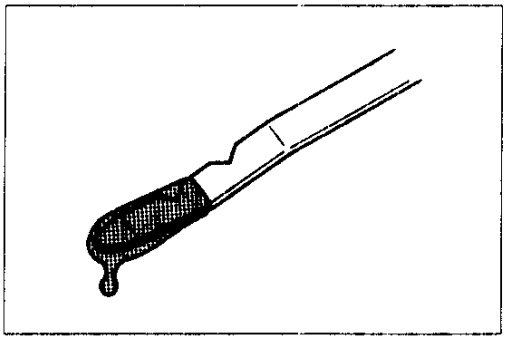
29U0KX-103



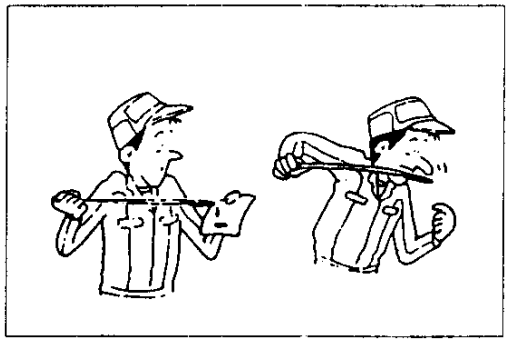
37J0KX-029



29U0KX-135



37U0KX-030



29U0KX-137

AUTOMATIC TRANSMISSION FLUID (ATF)

ATF

Inspection

Level

Caution

- **Place the vehicle on a flat, level surface.**

1. Apply the parking brake and securely position wheel chocks to prevent the vehicle from rolling.
2. Warm up the engine until the ATF temperature reaches **60–70°C {140–158°F}**.
3. While depressing the brake pedal, shift the selector lever to each range (P-L). Leave it a few seconds in each range.
4. Shift back to P range.
5. Ensure that the ATF level is between the notches of the ATF dipstick. Add ATF to specification, if necessary.

ATF Type: Dexron®II or M-III
Capacity: 8.6 L {9.1 US qt, 7.6 Imp qt}

Condition

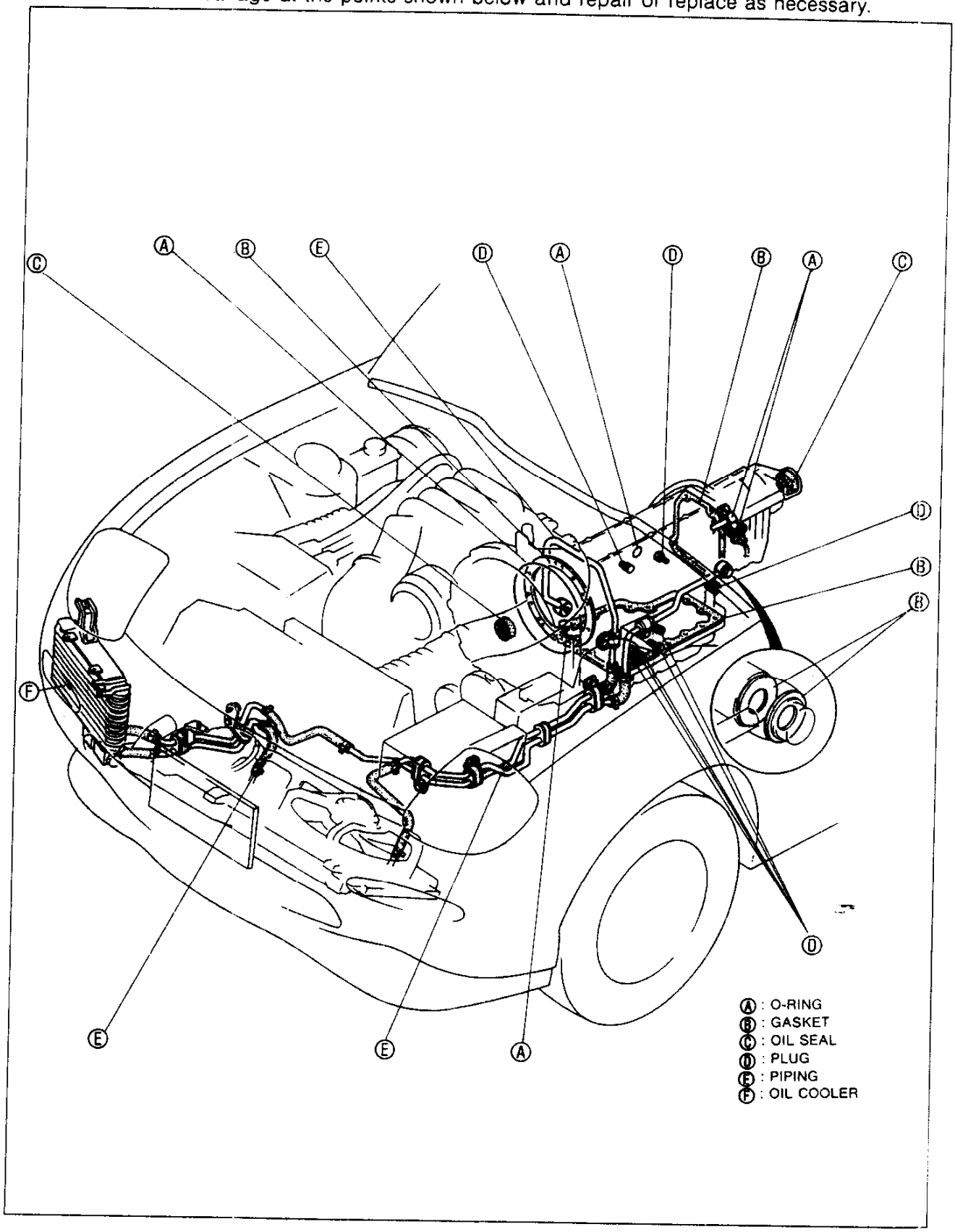
Note

- **Observe the condition of the ATF carefully, and determine whether or not the automatic transmission should be disassembled.**
- **If the ATF is muddy and varnished, it indicates burned drive plates and/or brake band.**

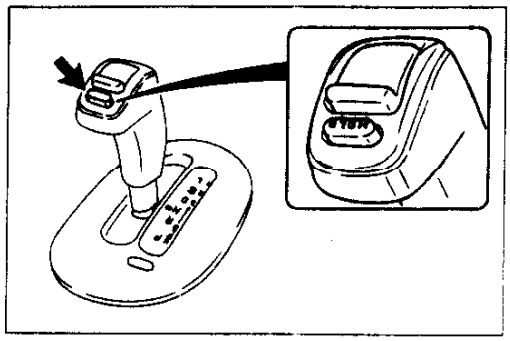
1. Check the ATF for discoloration.
2. Check the ATF for any unusual smell.

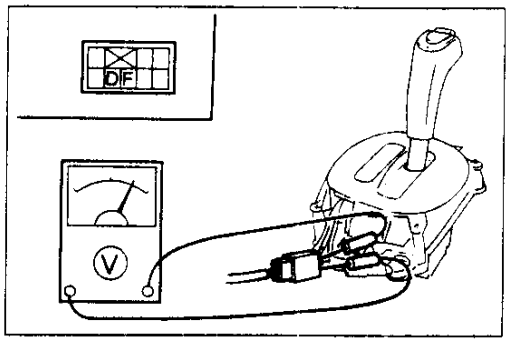
Fluid leakage

Check for ATF leakage at the points shown below and repair or replace as necessary.

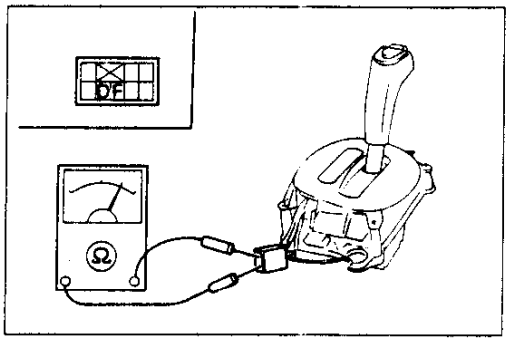


29U0KX-138-

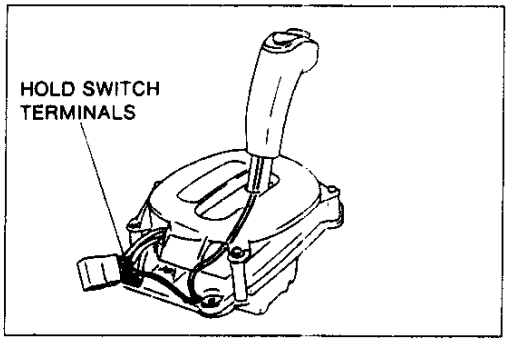

29U0KX-139



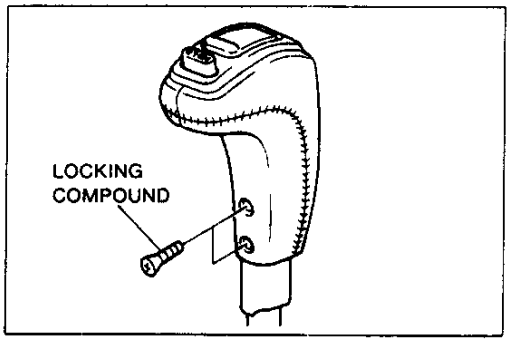
37U0KX-031



37U0KX-032



37U0KX-033



37U0KX-034

ELECTRONIC SYSTEM COMPONENTS

HOLD SWITCH

Inspection

Operation

1. Turn the ignition switch ON.
2. Press the hold switch ON/OFF and verify that the hold indicator illuminates when the hold mode is selected.
3. If not as specified, measure the hold switch terminal voltage.

Terminal voltage

1. Remove the console panel.
2. Turn the ignition switch ON.
3. Press the hold switch ON/OFF, and measure the voltage between terminals D and F.

V_B: Battery voltage

Terminal / Switch condition	Terminal voltage (V)	
	D	F
Released	0	0
Depressed	V_B	0

4. If not correct, check the hold switch continuity.

Continuity

1. Disconnect the negative battery cable and the shift-lock control unit connector.
2. Press the hold switch ON/OFF, and check continuity between terminals D and F.

Switch condition	Continuity
Released	Yes
Depressed	No

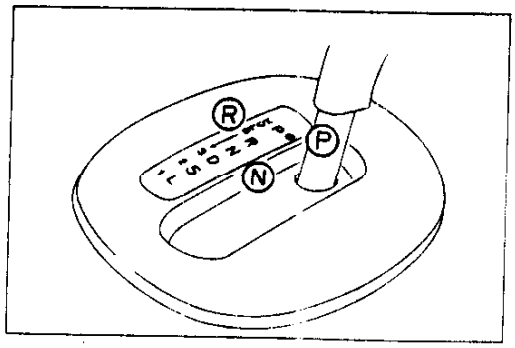
3. If not correct, replace the selector lever knob.
4. Connect the shift-lock control unit connector.
5. Install the console panel.
6. Connect the negative battery cable.

Replacement

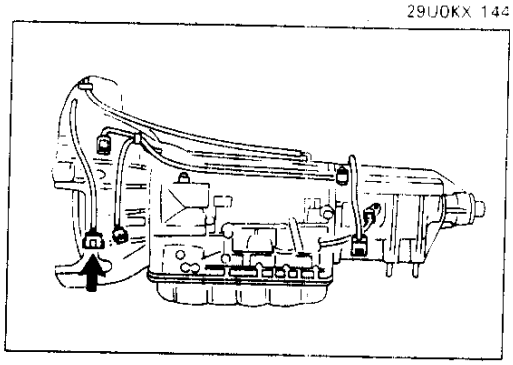
1. Remove the console panel.
2. Remove the indicator panel screws.
3. Disconnect the shift-lock control unit connector and pull the hold switch terminals out of the connector.
4. Remove the selector lever knob.
5. Install the new selector lever knob.
6. Insert the hold switch terminals into the connector and connect the shift-lock control unit connector.
7. Apply a small amount of locking compound to the screws, and tighten.

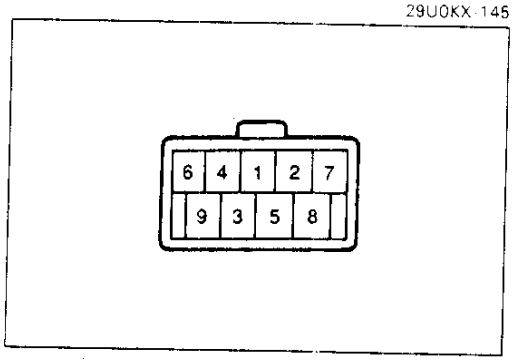
Tightening torque:
1.5–2.9 N·m {15–30 kgf·cm, 14–26 in·lbf}

8. Install and adjust the indicator panel. (Refer to page K–165.)
9. Install the console panel.

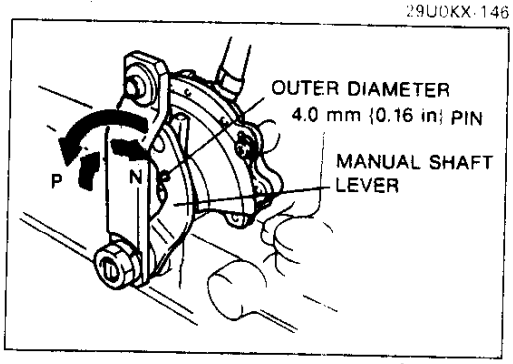


29U0KX-144

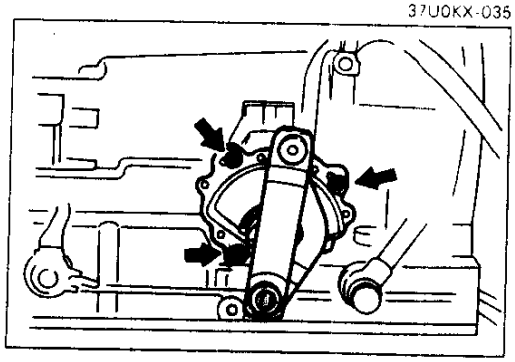

29U0KX-145



29U0KX-146



37U0KX-035


37U0KX-036

INHIBITOR SWITCH

Inspection

Operation

1. Turn the ignition switch ON.
2. Shift the selector lever and verify that the selected range and selector indicator lamp (built into combination meter) positions are aligned.
3. Apply the parking brake and securely position wheel chocks to prevent the vehicle from rolling.
4. Verify that the starter operates with the ignition switch at START position and the selector lever in P and N ranges only.
5. Verify that the back-up lights illuminate when the selector lever is shifted to R range with the ignition switch at ON position.
6. If not as specified, check the inhibitor switch continuity.

Continuity

1. Disconnect the negative battery cable and the inhibitor switch connector.
2. Remove the inhibitor switch connector from the bracket.
3. Check continuity of the inhibitor switch terminals.

Position	1	2	3	4	5	6	7	8	9
P	○						○	○	○
R		○					○		
N			○				○	○	○
D				○			○		
S					○		○		
L						○	○		

○—○ : Indicates continuity

4. If not correct, adjust or replace the inhibitor switch.
5. Install the inhibitor switch connector to the bracket.
6. Connect the inhibitor switch connector and the negative battery cable.

Adjustment

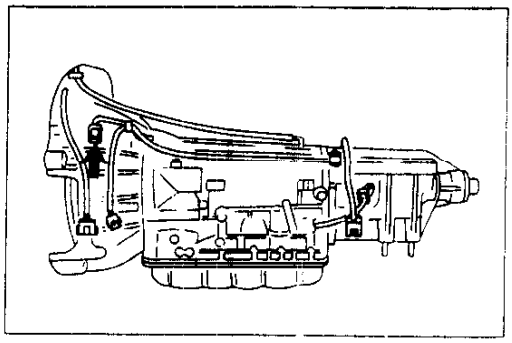
1. Remove the selector rod from the manual shaft lever.
2. Move the manual shaft to N range position.
3. Loosen the inhibitor switch mounting bolts.
4. Align the holes of the inhibitor switch and the manual shaft by inserting an **approx. 4.0 mm {0.16 in}** outer diameter pin.
5. Tighten the inhibitor switch mounting bolts and remove the pin.

Tightening torque:
2.5–3.9 N·m {25–40 kgf·cm, 22–34 in·lbf}

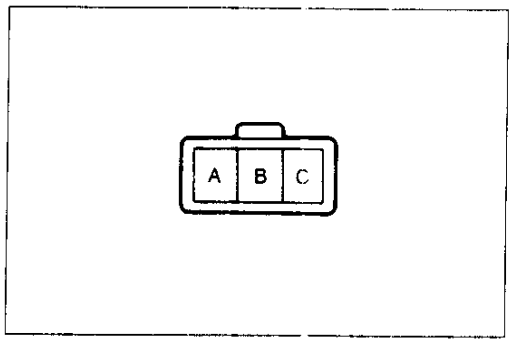
6. Recheck the continuity of the inhibitor switch.
7. If not correct, readjust or replace the inhibitor switch.
8. Install the selector rod to the manual shaft lever.

Replacement

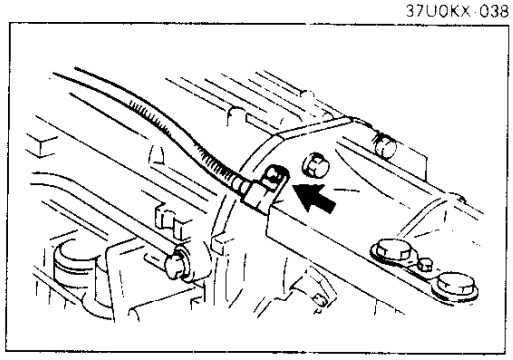
Refer to "Adjustment" above for replacement of the inhibitor switch.



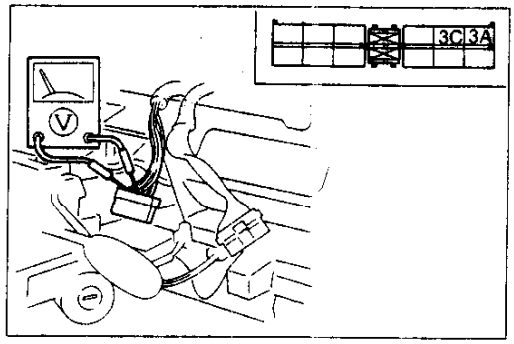
37U0KX-037



37U0KX-038



37U0KX-039



37U0KX-040

SPEED SENSOR 1 (REVOLUTION SENSOR)

Inspection

1. Disconnect the negative battery cable.
2. Disconnect speed sensor 1 connector.
3. Measure the resistance between the terminals of speed sensor 1.

ATF temperature: 20–80°C {68–176°F}

Terminal	Resistance (Ω)
A and B	500–1,000
B and C	∞
A and C	∞

4. If not correct, replace speed sensor 1.
5. Connect speed sensor 1 connector.
6. Connect the negative battery cable.

Replacement

1. Disconnect the negative battery cable.
2. Disconnect speed sensor 1 connector.
3. Remove the speed sensor 1 from the extension housing.
4. Apply ATF to a new O-ring and install it on the speed sensor 1.
5. Install new speed sensor 1.

Tightening torque:
5.0–6.8 N·m {50–70 kgf·cm, 44–60 in·lbf}

6. Connect the speed sensor 1 connector.
7. Connect the negative battery cable.

SPEED SENSOR 2 (SPEEDOMETER SENSOR)

Speedometer

Inspection

Note

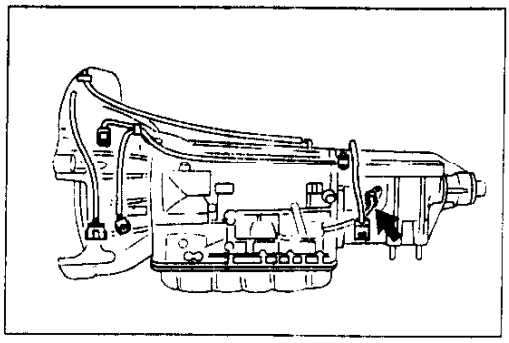
- **Speed sensor 2 is an alternating current generator which produces an alternating current to generate vehicle speed signals. Therefore, a direct current circuit tester cannot be used to measure the speed signal output because it cannot register signal charges quickly enough. (If using an alternating current circuit tester, the voltage increases as the vehicle speed increases.)**

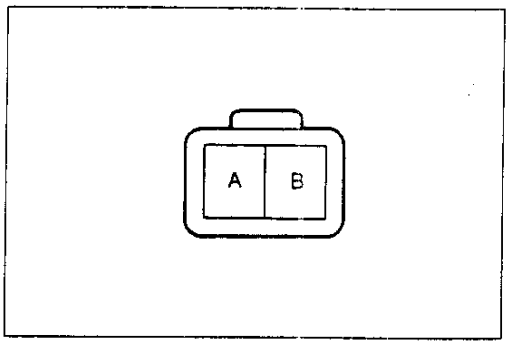
1. Remove the combination meter. (Refer to 1993 RX-7 Body Electrical Troubleshooting Manual Section C1.)
2. Disconnect the speedometer connector.

Note

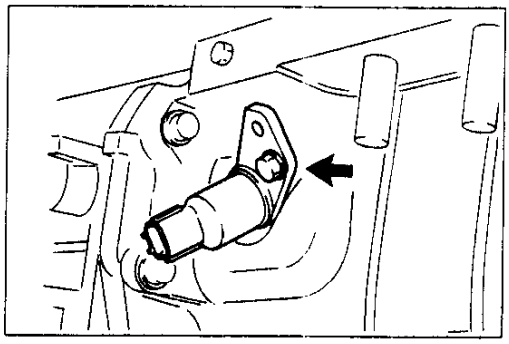
- **Set the voltmeter to the 5V range.**

3. Turn the ignition switch to LOCK position.
4. Measure the voltage between terminals 3A and 3C of the speedometer connector (harness side) with the rear wheels turning slowly.
5. When the voltmeter pointer moves slightly, replace the speedometer. If the pointer does not move, check the speed sensor 2 and/or wiring.
6. Connect the speedometer connector.
7. Install the combination meter. (Refer to 1993 RX-7 Body Electrical Troubleshooting Manual Section C1.)


37U0KX-041



37U0KX-042


37U0KX-043

Speed Sensor 2
Inspection

1. Disconnect the negative battery cable.
2. Remove the speed sensor 2.
3. Verify that magnetic resistance is felt when turning the speed sensor 2 driven gear by hand.
4. Disconnect the speed sensor 2 connector.

Note
- **Set the voltmeter to the 5V range.**

5. Measure the voltage between terminals A and B with the rear wheels turning slowly.
6. If the pointer does not move, check the speed sensor 2 continuity.
7. Measure the resistance between terminals A and B.

Resistance:
Approx. 290 Ω (at 20–80°C {68–176°F})

8. If not correct, replace the speed sensor 2.
9. Apply ATF to a new O-ring and install it on the speed sensor 2.
10. Install the speed sensor 2.

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

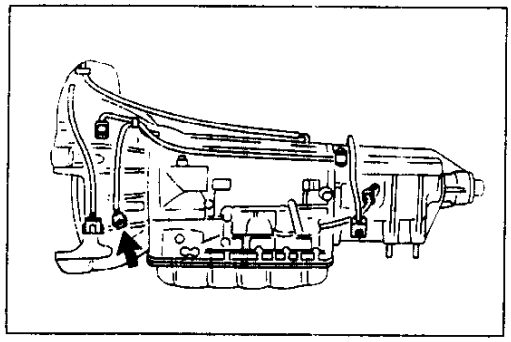
11. Connect the speed sensor 2 connector.
12. Connect the negative battery cable.

Replacement

1. Disconnect the negative battery cable.
2. Disconnect the speed sensor 2 connector.
3. Remove the speed sensor 2 from the extension housing.
4. Apply ATF to a new O-ring and install it on the speed sensor 2.
5. Install the new speed sensor 2.

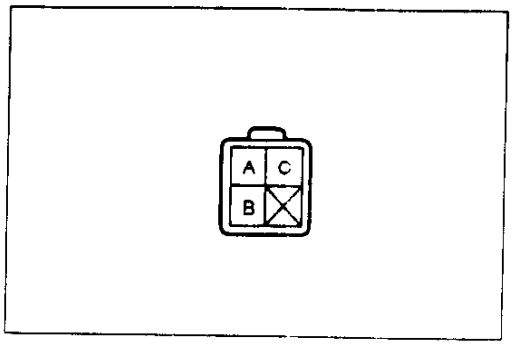
Tightening torque:
7.9–10.7 N·m {80–110 kgf·cm, 70–95 in·lbf}

6. Connect the speed sensor 2 connector.
7. Connect the negative battery cable.

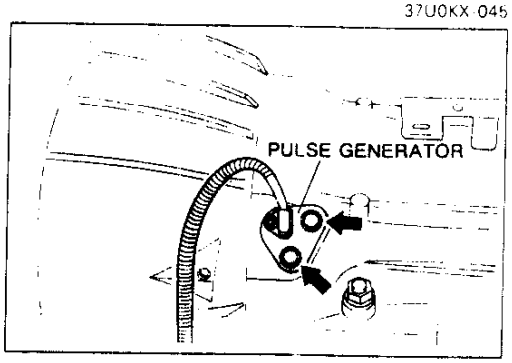

37U0KX-044

PULSE GENERATOR
Inspection

1. Disconnect the negative battery cable.
2. Disconnect the pulse generator connector.



37U0KX-045



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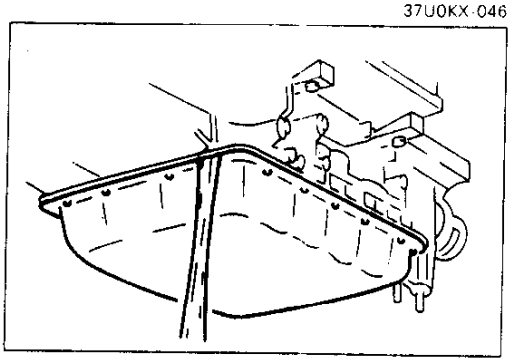
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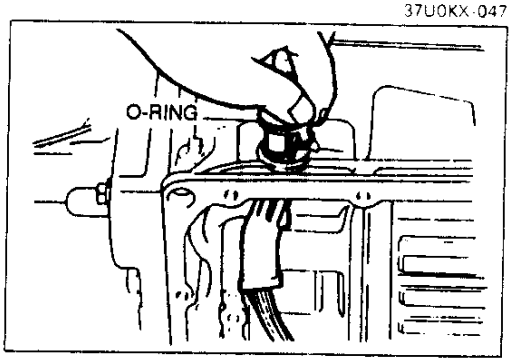

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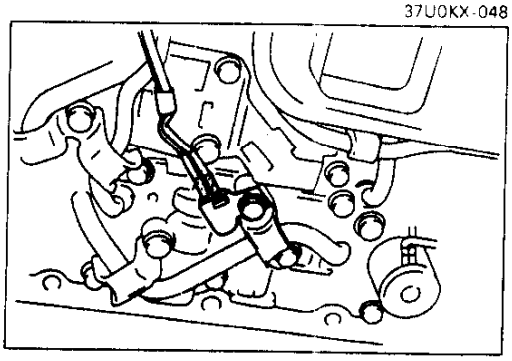

37U0KX-049

3. Measure the resistance between the terminals of the pulse generator.

ATF temperature: 20–80°C {68–176°F}

Terminal	Resistance (kΩ)
A and B	2.2–3.5
B and C	∞
A and C	∞

4. If not correct, replace the pulse generator.
5. Connect the pulse generator connector.
6. Connect the negative battery cable.

Replacement

1. Remove the transmission assembly. (Refer to page K–42.)
2. Remove the pulse generator from the transmission case.
3. Apply ATF to a new O-ring and install it on the new pulse generator.
4. Install the new gasket and new pulse generator.
5. Install new bolts and tighten.

Tightening torque:
5.0–6.8 N·m {50–70 kgf·cm, 44–60 in·lbf}

6. Install the transmission assembly. (Refer to page K–149.)

ATF THERMOSENSOR

Replacement

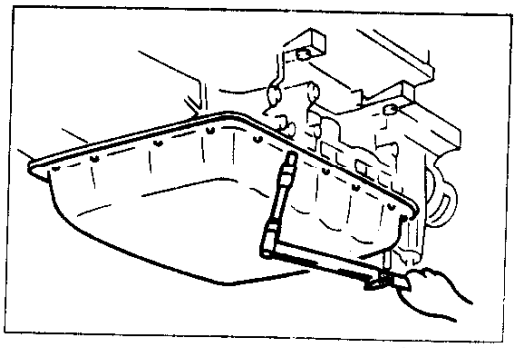
Warning
- **Be careful when draining; the ATF is hot.**

1. Disconnect the negative battery cable.
2. Disconnect the solenoid valve connector.
3. Loosen the oil pan mounting bolts and drain the ATF into a suitable container.
4. Remove the oil pan.
5. Remove the ATF thermosensor from the control valve body.
6. Remove the control valve body. (Refer to page K–128.)

Note
- **The ATF thermosensor is part of the solenoid valve harness.**

7. Remove the solenoid valve harness from the transmission case.
8. Apply ATF to a new O-ring and install it on the solenoid valve harness.
9. Install the new solenoid valve harness into the transmission case.
10. Install the control valve body. (Refer to page K–130.)
11. Install the ATF thermosensor onto the control valve body.

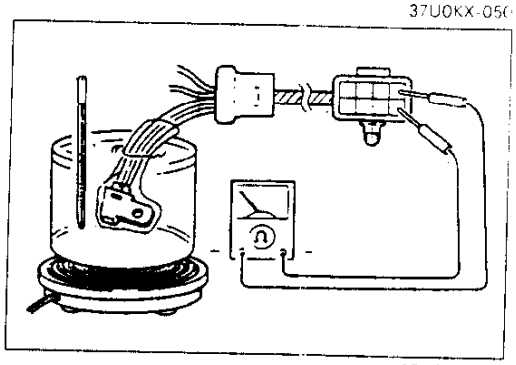
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}


37U0KX-050

12. Clean the oil pan and the magnet, and set the magnet into the oil pan.
13. Install a new gasket and the oil pan.

Tightening torque:
5.0–7.8 N·m {50–80 kgf·cm, 44–69 in·lbf}

14. Connect the solenoid valve connector.
15. Fill the transmission with the specified amount and type of ATF. (Refer to page K–25.)
16. Connect the negative battery cable.

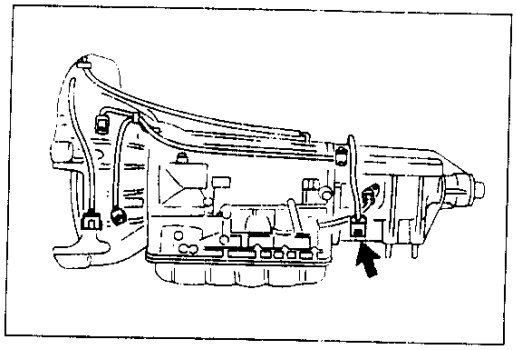

37U0KX 051

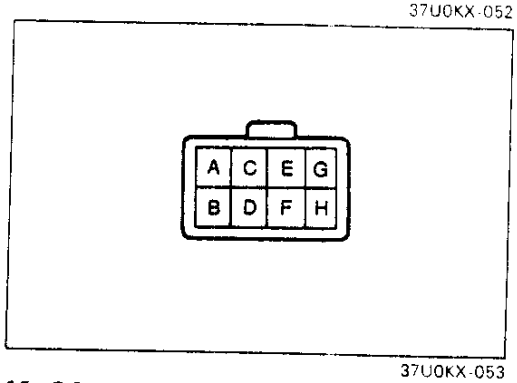
Inspection

1. Refer to "Replacement" on the previous page for removal of the ATF thermosensor.
2. Wrap the ATF thermosensor and place it in water with a thermometer as shown and heat the water gradually.
3. Measure the resistance between the terminals of the thermosensor.

Water temperature	Resistance (kΩ)
10°C {50°F}	2.5
40°C {104°F}	0.6
80°C {176°F}	0.3

4. If not correct, replace the ATF thermosensor.
5. Refer to "Replacement" for installation of the ATF thermosensor.


37U0KX-052



37U0KX-053

SOLENOID VALVES

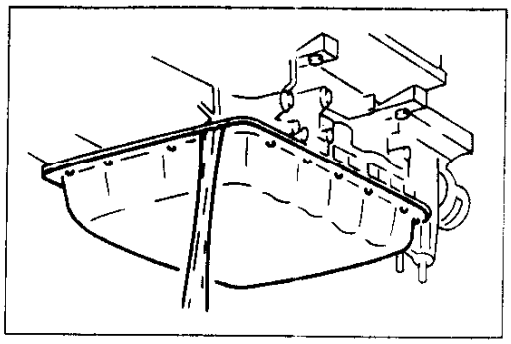
Inspection

1. Disconnect the negative battery cable.
2. Disconnect the solenoid valve connector.
3. Measure the resistance between terminals A through F and a ground.

ATF temperature: 20–80°C {68–176°F}

Terminal	Solenoid valve	Resistance (Ω)
A	Lockup control	20–40
B	Shift A	20–40
C	Shift B	20–40
D	Overrunning clutch	20–40
E	Line pressure	2.5–5.0
F	Lockup	10–20

4. If not correct, replace the solenoid valves.
5. Connect the solenoid valve connector.
6. Connect the negative battery cable.



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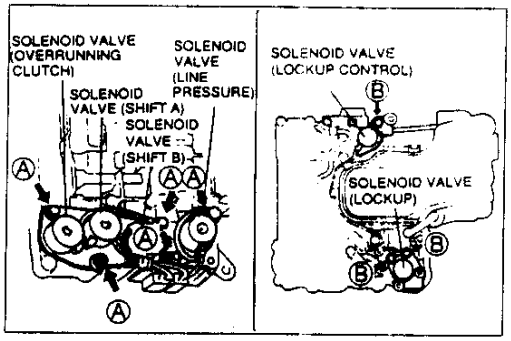

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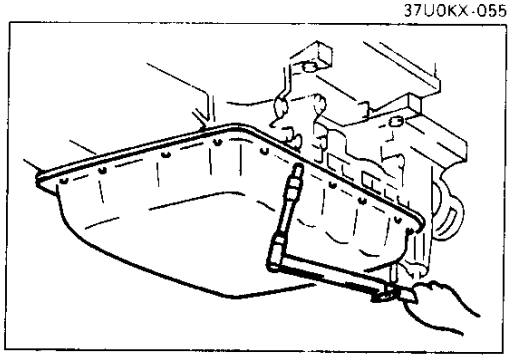

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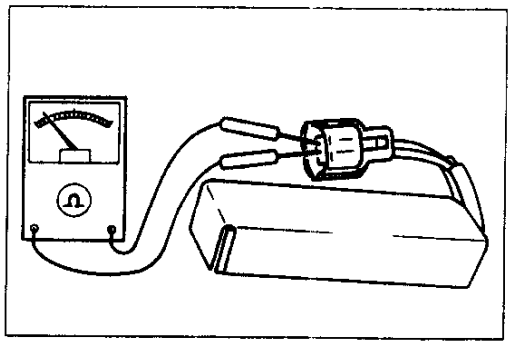
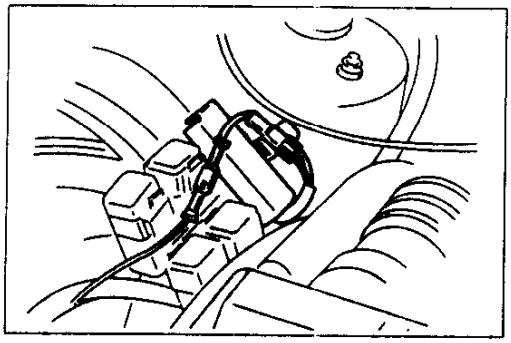


29U0KX-169



37U0KX-057

Replacement

Warning

- **Be careful when draining; the ATF is hot.**

Note

- **If the solenoid valves (shift A, shift B, overrunning clutch, and line pressure) are not correct, replace the solenoids as an assembly.**

1. Disconnect the negative battery cable.
2. Loosen the oil pan mounting bolts and drain the ATF into a suitable container.
3. Remove the oil pan.
4. Remove the control valve body. (Refer to page K–128.)
5. Remove the solenoid valve(s).
6. Apply ATF to a new O-ring(s) and install it on the new solenoid valve(s).
7. Install the new solenoid valve(s) to the control valve body.

Tightening torque

A: 6.9–9.8 N·m {70–100 kgf·cm, 61–86 in·lbf}

B: 9.9–12.7 N·m {100–130 kgf·cm, 86.9–112 in·lbf}

8. Install the control valve body. (Refer to page K–130.)
9. Clean the oil pan and the magnet, and set the magnet into the oil pan.
10. Install a new gasket and the oil pan.

Tightening torque:

5.0–7.8 N·m {50–80 kgf·cm, 44–69 in·lbf}

11. Fill the transmission with the specified amount and type of the ATF. (Refer to page K–25.)
12. Connect the negative battery cable.

DROPPING RESISTOR

Inspection

1. Disconnect the negative battery cable.
2. Disconnect the dropping resistor connector.
3. Measure the resistance between the terminals of the resistor.

Resistance: 10–14 Ω

4. If not correct, replace the dropping resistor.
5. Connect the dropping resistor connector.
6. Connect the negative battery cable.

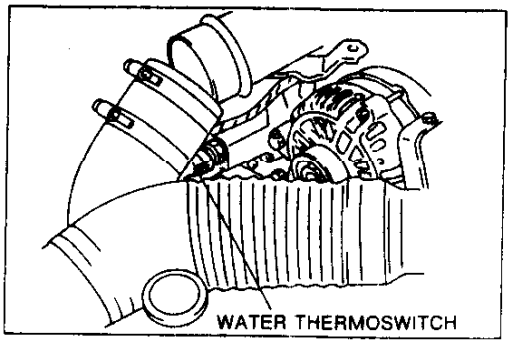
Replacement

1. Disconnect the negative battery cable.
2. Disconnect the dropping resistor connector.
3. Remove the dropping resistor.
4. Install the new dropping resistor.

Tightening torque:

7.9–11.7 N·m {80–120 kgf·cm, 70–104 in·lbf}

5. Connect the dropping resistor connector.
6. Connect the negative battery cable.



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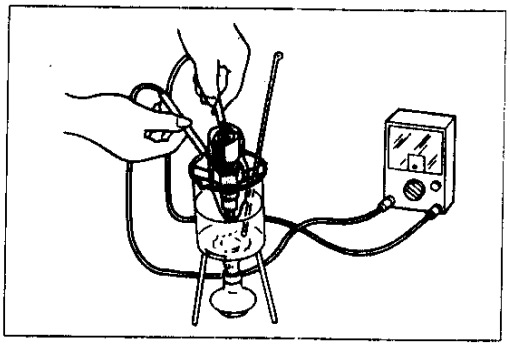

37U0KX-059

WATER THERMOSWITCH

Replacement

1. Disconnect the negative battery cable.
2. Disconnect the water thermoswitch connector.
3. Drain the engine coolant.
4. Remove the water thermoswitch.
5. Install the new water thermoswitch.

Tightening torque:
5.9–8.8 N·m {60–90 kgf·cm, 53–78 in·lbf}

6. Connect the water thermoswitch connector.
7. Fill the engine with the specified amount and type of engine coolant.
8. Connect the negative battery cable.

Inspection

1. Refer to "Replacement" above for removal of water thermoswitch.
2. Wrap the water thermoswitch in wrapping vinyl, place it in the ATF with a thermometer as shown, and heat the ATF gradually.
3. Measure the resistance between the terminals of the water thermoswitch.

ATF temperature	Continuity
Above 115°C {239°F}	Yes
Below 110°C {230°F}	No

4. If not correct, replace the water thermoswitch.
5. Refer to "Replacement" above for installation of the water thermoswitch.

HOLD INDICATOR

Inspection

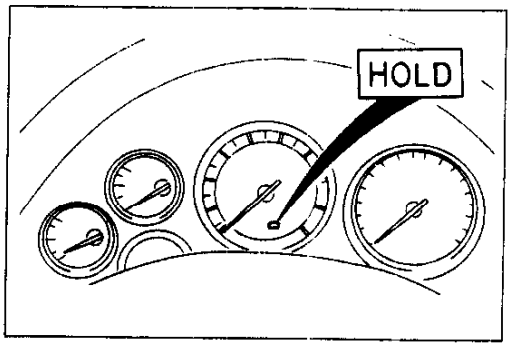
Operation

1. Turn the ignition switch ON.

Note

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

2. Press the hold switch ON/OFF and verify that the hold indicator illuminates when the hold mode is selected.
3. If not as specified, inspect the combination meter and/or hold switch.



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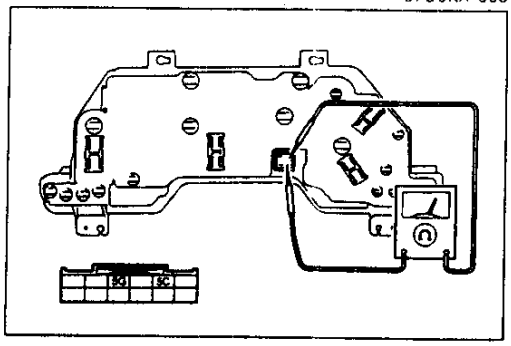

37U0KX-061

Continuity

1. Disconnect the negative battery cable.
2. Remove the combination meter. (Refer to 1993 RX-7 Body Electrical Troubleshooting Manual Section C1.)
3. Check for continuity between terminals 5C and 5G of the combination meter.

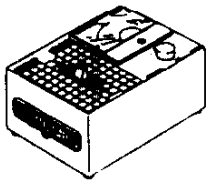
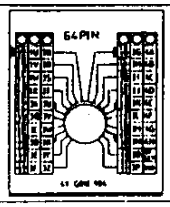
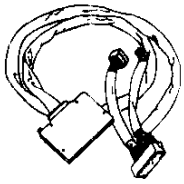
Terminal	5C	5G
Continuity	○	○

○ ○: Indicates continuity

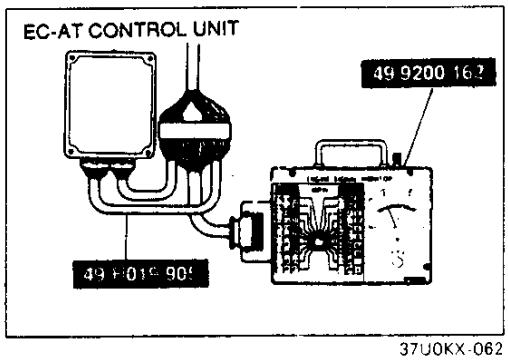
4. If not correct, replace the bulb or the combination meter.
5. Install the combination meter. (Refer to 1993 RX-7 Body Electrical Troubleshooting Manual Section C1.)
6. Connect the negative battery cable.

EC-AT CONTROL UNIT

Preparation
SST

49 9200 162 Monitor, Engine Signal		For inspection of EC-AT control unit terminal voltage	49 G018 904 Sheet		For inspection of EC-AT control unit terminal voltage
49 H019 905 Adapter Harness		For inspection of EC-AT control unit terminal voltage			

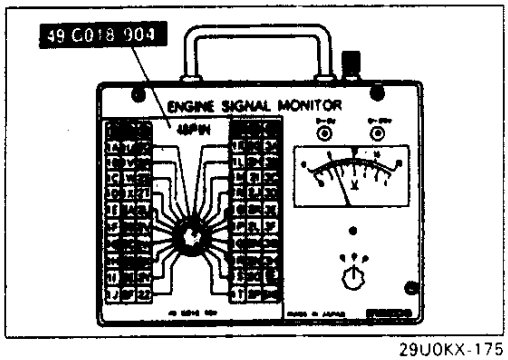
29U0KX-173



37U0KX-062

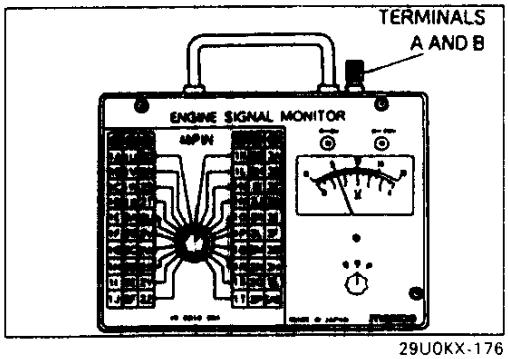
Inspection

1. Lift out the EC-AT control unit by referring to the EC-AT control unit replacement procedure.
   (Refer to page K–41.)
2. Disconnect the EC-AT control unit connectors.
3. Connect the **SSTs (Engine Signal Monitor** and **Adapter Harness)** to the EC-AT control unit as shown.



29U0KX-175

4. Place the **SST (Sheet)** on the **Engine Signal Monitor**.
5. Turn the ignition switch ON.
6. Measure the terminal voltage at each terminal.
7. If any EC-AT control unit terminal voltage is incorrect, check the related input or output devices and wiring. If no problem is found, replace the EC-AT control unit.

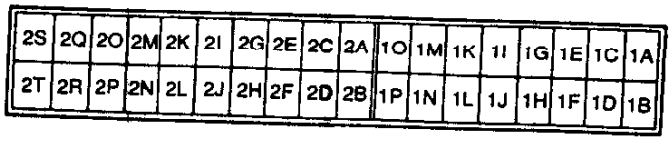


29U0KX-176

Caution

- **Never apply voltage to SST terminals A and B.**

Terminal Voltage Chart (Reference Data)

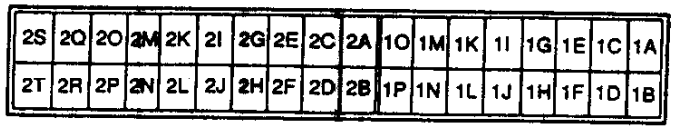


V_B: Battery voltage

Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (−) terminal	Correct voltage	Condition	Check area
1A	L/R	Battery (backup)	Battery	1A	Ground	V_B	Constant	• Wiring and/or connector from 1A terminal to battery
1B (Output)	W/G	Solenoid valve (shift B)	Solenoid valve	1B		V_B	P, R, and N ranges or 1st and 2nd gear positions	• Solenoid valve (shift B) • Wiring and/or connector from 1B terminal to solenoic valve (shift B)
						Below 1.0V	3rd and O/D gear positions	
1C (Output)	Y	Inhibitor signal	Engine control unit	1C		Below 1.0V	P and N ranges	• Inhibitor switch, pulse generator, and/or engine control unit • Wiring and/or connector from 1C terminal to engine control unit 1R terminal
						V_B	Except P and N ranges	
1D (Output)	W/R	Solenoid valve (shift A)	Solenoid valve	1D		V_B	P, R, and N ranges or 1 st and O/D gear positions	• Solenoid valve (shift A) • Wiring and/or connector from 1D terminal to solenoid valve (shift A)
						Below 1.0V	2nd and 3rd gear positions	
1E (Input)	R	Inhibitor switch (R range)	Inhibitor switch	1E		V_B	R range	• Inhibitor switch • Wiring and/or connector from 1E terminal to inhibitor switch
						0V	Excect R range	
1F (Output)	W/L	Solenoid valve (line pressure)	Solenoid valve	1F		Above 1.5V	Throttle valve fully closed	• Solenoid valve (line pressure) • Wiring and/or connector from 1F terminal to solenoid valve (line pressure)
						Below 1.0V	Throttle valve fully opened	
1G (Input)	Y/L	Engine rpm signal	Engine control unit	1G		0.3–0.8V	Engine running at idle	• Wiring and/or connector from 1G terminal to engine control unit 2B terminal • Engine control unit
						0V	Engine stopped	
						1.8–2.2V	Engine running at 3,000 rpm (no load)	
1H (Output)	B/LG	Dropping resistor	Dropping resistor	1H		V_B	Throttle valve fully closed	• Dropping resistor and/or solenoid valve (line pressure) • Wiring and/or connector between 1H terminal, dropping resistor, and solenoid valve.
						Below 1.0V	Throttle valve fully opened	

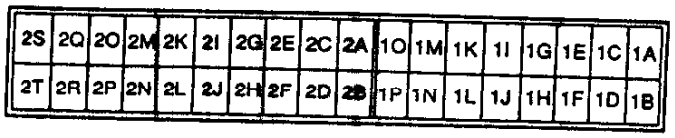
Caution

- **The 1D terminal voltage [solenoid valve (shift A)] is below 1.0V when in HOLD mode in P, R, and N ranges.**



V_B: Battery voltage

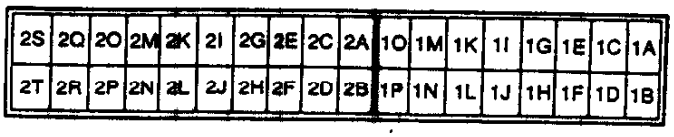
Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (−) terminal	Correct voltage	Condition	Check area
1I (Input)	G/R	Speed sensor 2 (speedometer sensor)	Speedometer	1I	Ground	2–3V	Vehicle moving	● Speed sensor 2 and/or speedometer ● Wiring and/or connector between 1I terminal, speedometer, and speed sensor 2.
						0V or 4.5–5.5V	Vehicle stopped	
1J (Ground)	B/L	Ground (EC-AT control unit)	–	1J		0V	Constant	● Wiring condition.
1K (Output)	O/L	Hold indicator / FAT terminal (diagnosis connector)	Combination meter (hold indicator lamp) and FAT terminal (diagnosis connector)	1K		Below 1.0V	Hold mode	● Wiring and/or connector from 1K terminal to hold indicator lamp (combination meter) ● Hold indicator lamp
						V_B	Except hold mode	
1L (Input)	V/P	A/C signal	A/C relay	1L		Below 3.0V	A/C ON	● Engine control unit and/or A/C switch ● Wiring and/or connector from 1L terminal to A/C switch
						V_B	A/C OFF	
1M (Output)	W	Solenoid valve (lockup)	Solenoid valve	1M		V_B	Lockup	● Solenoid valve (lockup) ● Wiring and/or connector from 1M terminal to solenoid valve (lockup)
						Below 1.0V	No lockup	
1N	B/Y	Battery (main)	Ignition switch	1N		V_B	Ignition switch ON	● Meter fuse and/or ignition switch ● Wiring and/or connector from 1N terminal to ignition switch (IG1)
						0V	Ignition switch OFF	
1O (Output)	W/Y	Solenoid valve (overrunning clutch)	Solenoid valve	1O		Below 1.0V	Throttle valve fully opened (D range)	● Solenoid valve (overrunning clutch) ● Wiring and/or connector from 1O terminal to solenoid valve (overrunning clutch)
						V_B	Throttle valve closed (D range)	
1P	B/Y	Battery (main)	Ignition switch	1P		V_B	Ignition switch ON	● Meter fuse and/or ignition switch ● Wiring and/or connector from 1P terminal to ignition switch (IG1)
						0V	Ignition switch OFF	
2A (Input)	BR/W	Throttle sensor (V_{REF})	Throttle sensor	2A		4.5–5.5V	Ignition switch ON	● Wiring and/or connector from 2A terminal to engine control unit 3I terminal ● Throttle sensor
						0V	Ignition switch OFF	



V_B: Battery voltage

Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (−) terminal	Correct voltage	Condition	Check area
2B (Input)	Y/G	Inhibitor switch (D range)	Inhibitor switch	2B	Ground	V_B	D range	• Inhibitor switch • Wiring and/or connector from 2B terminal to inhibitor switch
						0V	Except D range	
2C (Input)	G/Y	Atmospheric pressure sensor	Engine control unit	2C		2.0–4.5V	Ignition switch ON	• Wiring and/or connector from 2C terminal to engine control unit 2D terminal
						0V	Ignition switch OFF	
2D (Input)	L/Y	Inhibitor switch (P and N ranges)	Inhibitor switch	2D	Ground	0V	P and N ranges	• Inhibitor switch and/or ignition switch • Wiring and/or connector between 2D terminal, inhibitor switch, and ignition switch (STA)
						V_B	Except P and N ranges	
2E (Input)	O	Pulse generator	Pulse generator	2E*	2L	Approx. above 0.5V (AC)	Vehicle speed above 25 km/h {16 MPH}	• Pulse generator • Wiring and/or connector from 2E terminal to pulse generator
						Approx. 0V (AC)	Vehicle stopped (Ignition switch ON)	
2F (Output)	G/W	Solenoid valve (lockup control)	Solenoid valve	2F	Ground	V_B	lockup	• Solenoid valve (lockup control) • Wiring and/or connector from 2F terminal to solenoid valve (lockup control)
						Below 1.0V	No lockup	
2G (Input)	G/R	Slip lockup OFF signal	Engine control unit	2G		Below 1.0V	Engine running at 3,000 rpm	• Wiring and/or connector from 2G terminal to engine control unit 2C terminal • Engine control unit
						V_B	Engine running at idle	
2H (Input)	L/G	Torque reduced signal	Engine control unit	2H		V_B	Engine running at idle	• Wiring and/or connector from 2H terminal to engine control unit 2G terminal • Throttle sensor, speed sensor 1 pulse generator, and/or engine control unit
						Below 1.0V	Throttle opening above 1/8 (Engine coolant temp. below 40°C {104°F})	
2I (Input)	W/Y	Hold switch	Hold switch	2I		V_B	Switch depressed	• Hold switch • Wiring and/or connector from 2I terminal to hold switch
						0V	Switch released	

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

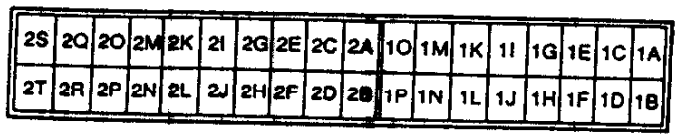


V_B: Battery voltage

Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (–) terminal	Correct voltage	Condition	Check area
2J (Input)	Y/G	Speed sensor 1 (revolution sensor)	Speed sensor 1 (revolution sensor)	2J*	2L	Approx. above 1.0V (AC)	Vehicle speed above 25 km/h {16 MPH}	● Speed sensor 1 (revolution sensor) ● Wiring and/or connector from 2J terminal to speed sensor 1
						Approx. 0V (AC)	Vehicle stopped	
2K	L/W	TAT terminal (diagnosis connector) / O/D inhibit signal (auto speed control signal)	TAT terminal (diagnosis connector) and cruise control unit	2K	Ground	4.5–5.5	Ignition switch ON	● 1N and 1P terminal voltage ● Wiring and/or connector from 2K terminal to diagnosis connector TAT terminal ● Wiring and/or connector from 2K terminal to cruise control unit G terminal
						0V	TAT terminal grounded	
2L (Ground)	W	Ground (input signals)	–	2L		0V	Constant	● Wiring condition
2M (Input)	R/W	Idle signal	Engine control unit	2M	Ground	4.5–5.5V	Throttle valve opened	● Throttle sensor and/or engine control unit ● Wiring and/or connector from 2M terminal to engine control unit 2E terminal
						Below 1.0V	Throttle valve fully closed	
2N (Input)	B	Water thermoswitch / mileage switch	Water thermoswitch and mileage switch	2N		0V	Engine coolant temp. above 115°C {239°F} or vehicle total mileage above 625 km {388 miles} and vehicle stopped	● Water thermoswitch and/or mileage switch ● Wiring and/or connector from 2N terminal to water thermoswitch
						V_B	Engine coolant temp. below 110°C {230°F} or vehicle total mileage below 625 km {388 miles} and vehicle stopped	
2O (Input)	LG/R	Stoplight switch	Stoplight switch	2O		V_B	Brake pedal depressed	● Stoplight switch ● Wiring and/or connector from 2O terminal to stoplight switch
						0V	Brake pedal released	

* Check the 2J (speed sensor 1) terminal voltage by using the AC range.

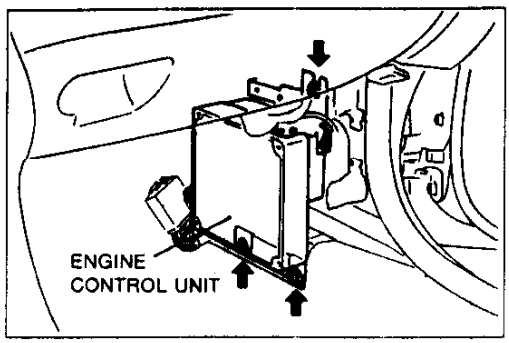
ELECTRONIC SYSTEM COMPONENTS



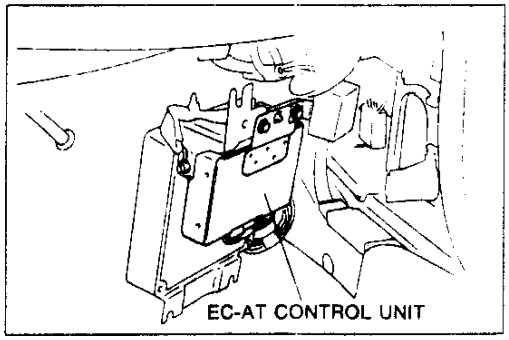
V_B: Battery voltage

Terminal	Color	Component	Connected to	Voltmeter (+) terminal	Voltmeter (−) terminal	Correct voltage	Condition	Check area
2P (Output)	G/W	Reduce torque signal / slip lockup signal	Engine control unit	2P	Ground	Below 1.0V	When shifting from 1st to 2nd or from 2nd to 3rd with the throttle opening above 1.5/8 When slip lockup with the throttle opening below 0.5/8.	● Wiring and/or connector from 2P terminal to engine control unit 1Q terminal ● Throttle sensor, speed sensor 1, pulse generator, solenoid valve (lockup, lockup control), and/or engine control unit
						V_B	Engine running at idle	
2Q (Input)	BR/W	Inhibitor switch (L range)	Inhibitor switch	2Q		V_B	L range	● Inhibitor switch ● Wiring and/or connector from 2Q terminal to inhibitor switch
						0V	Except L range	
2R (Input)	R	ATF thermosensor	ATF thermo-sensor	2R	2L	Approx. 2.4–0.4V	While warming up ATF Note ● Approx. 1.8V: ATF temperature 10°C {50°F} ● Approx. 1.1V: ATF temperature 40°C {104°F}	● ATF thermosensor ● Wiring and/or connector from 2R terminal to ATF thermosensor
2S (Input)	L/R	Inhibitor switch (S range)	Inhibitor switch	2S	Ground	V_B	S range	● Inhibitor switch ● Wiring and/or connector from 2S terminal to inhibitor switch
						0V	Except S range	
2T (Input)	B/G	Throttle sensor (TVO)	Throttle sensor	2T		0.1–1.1V	Throttle valve fully closed	● Throttle sensor ● Wiring and/or connector from 2T terminal to throttle sensor
						4.0–4.5V	Throttle valve fully opened	

37U0KX-063



37U0KX-064



Replacement

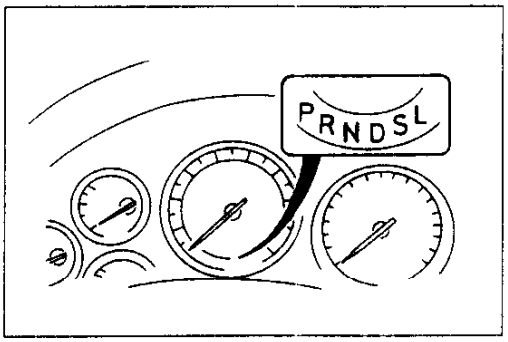
1. Disconnect the negative battery cable.
2. Remove the front side trim (passenger side).
3. Remove the engine control unit. (Refer to Section F.)
4. Remove the nuts shown in the figure and disconnect the EC-AT control unit connectors.
5. Install the new EC-AT control unit.

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

6. Connect the EC-AT control unit connectors.
7. Install the engine control unit. (Refer to Section F.)

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

8. Install the front side trim (passenger side).
9. Connect the negative battery cable.

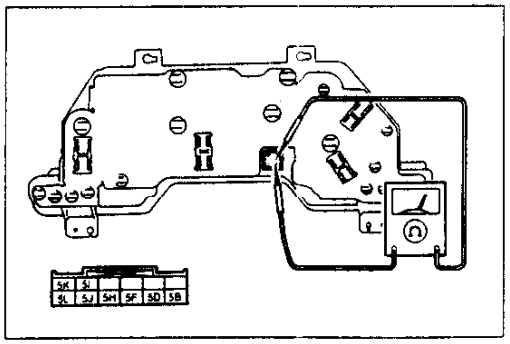


SELECTOR INDICATOR LAMP

Inspection

Operation

1. Verify that the selected range and selector indicator lamp (built into combination meter) positions are aligned.
2. If not as specified, check the inhibitor switch and/or selector indicator lamp.



Continuity

1. Disconnect the negative battery cable.
2. Remove the combination meter. (Refer to 1993 RX-7 Body Electrical Troubleshooting Manual Section C1.)
3. Check for continuity between the terminals.

Terminal / Position	5K	5I	5L	5J	5H	5F	5D	5B
P	○		○					
R	○			○				
N		○			○			
D		○				○		
S		○					○	
L		○						○

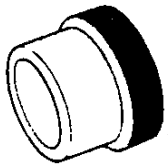
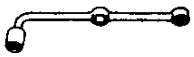
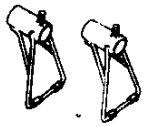
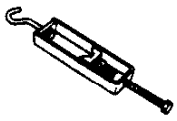
○—○ : Indicates continuity

4. If not correct, replace the bulb or combination meter.
5. Install the combination meter. (Refer to 1993 RX-7 Body Electrical Troubleshooting Manual Section C1.)
6. Connect the negative battery cable.

TRANSMISSION

TRANSMISSION UNIT (REMOVAL)

Preparation
SST

49 J019 002 Cap 	For prevention of ATF leakage	49 0877 435 Special wrench 	For loosening of torque converter installation bolts
49 G017 5A0 Support, engine 	For support of engine	49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine

37U0KX-065

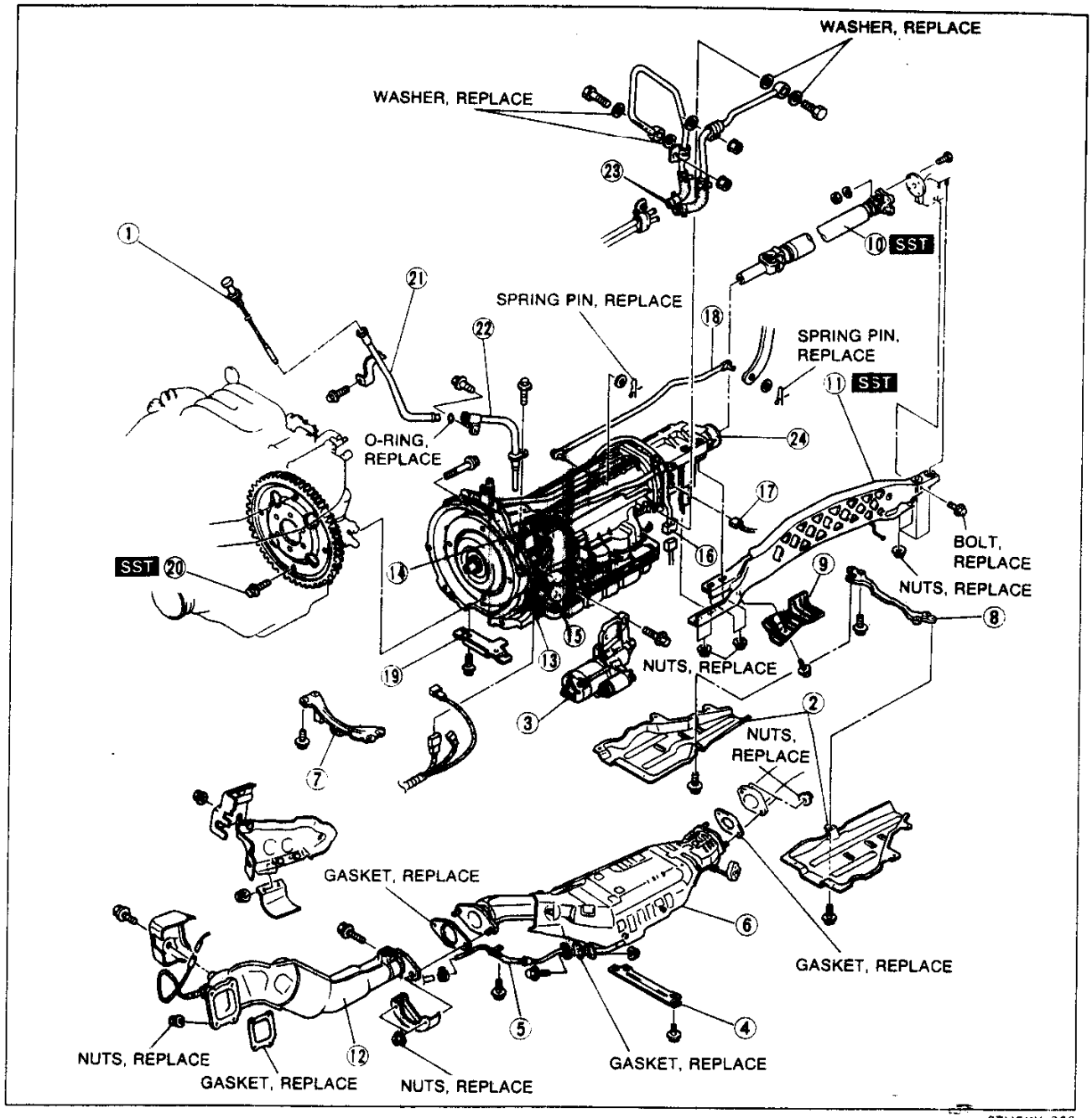
Removal

1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Remove in the order shown in the figure, referring to **Removal Note**.

Caution

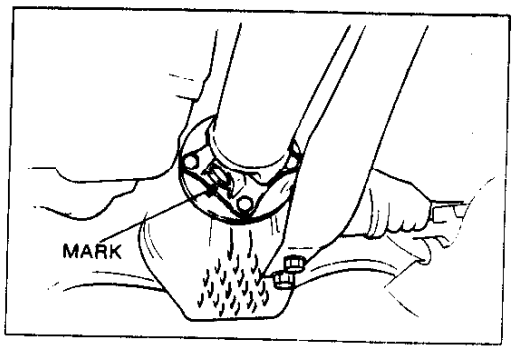
- **Keep the transmission upright so that any foreign material will remain in the oil pan.**

29U0KX-180



37U0KX-066

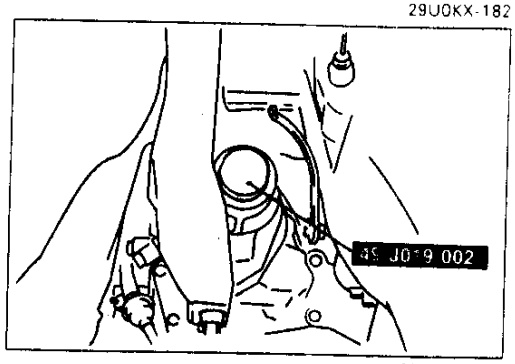
1. ATF dipstick
2. Undercover (right and left)
3. Starter
4. Tunnel member (center)
5. Secondary air injection pipe
6. Catalytic converter assembly
7. Tunnel member (front)
8. Tunnel member (rear)
9. Cover
10. Propeller shaft
    Removal Note ..... page K–44
11. Power plant frame (PPF)
    Removal Note ..... page K–44
12. Front exhaust pipe
13. Inhibitor switch connector
14. Speed sensor 1 connector
15. Pulse generator connector
16. Solenoid valve connector
17. Speed sensor 2 connector
18. Selector rod (selector lever side)
19. Service hole cover
20. Torque converter bolts
    Removal Note ..... page K–44
21. Oil filler tube (upper)
22. Oil filler tube (lower)
23. Oil cooler hose
24. Transmission
    Removal Note ..... page K–45



29U0KX-182

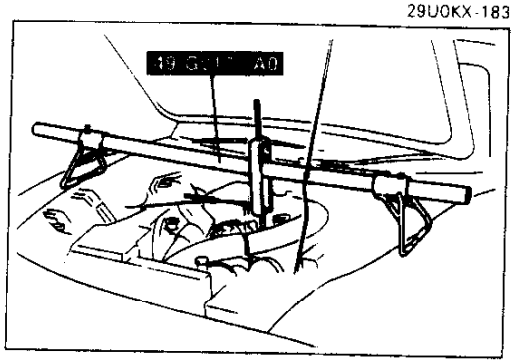
Removal note
Propeller shaft

1. Mark the flange for proper reassembly.
2. Remove the propeller shaft.



29U0KX-183

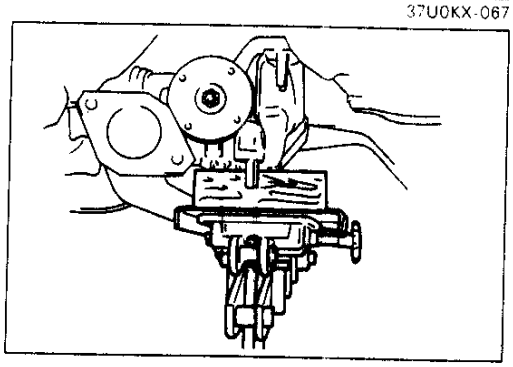
3. Install the **SST** into the extension housing.



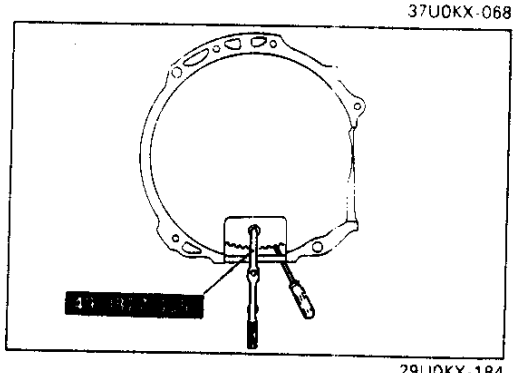
37U0KX-067

Power plant frame (PPF)

1. Hold the engine with the **SST**.

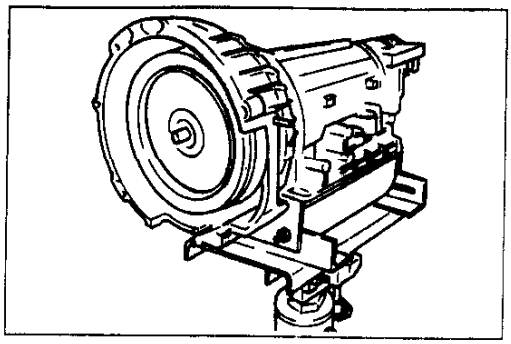

37U0KX-068

2. Hold the differential with a transmission jack.
3. Remove the PPF.


29U0KX-184

Torque converter bolts

1. Lock the drive plate by using a screwdriver.
2. Remove the torque converter bolts by using the **SST**.



37U0KX-069

Transmission

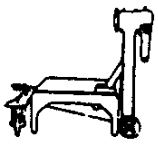
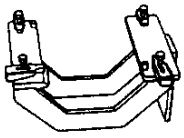
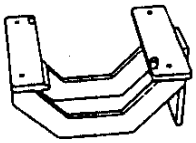
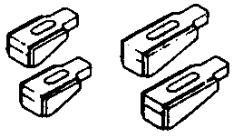
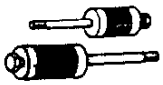
1. Support the transmission with a transmission jack.

Caution
- **Do not drop the torque converter.**
- **Do not allow the transmission to lean toward the torque converter side.**
- **Do not damage the oil pipes.**

2. Carefully lower and remove the transmission.

TRANSMISSION UNIT (DISASSEMBLY)

Preparation
SST

49 0107 680A Engine stand 	For disassembly of transmission	49 U019 0A0A Hanger set, transmission 	For disassembly of transmission
49 H075 495B Body (Part of 49 U019 0A0A) 	For disassembly of transmission	49 U019 003 Holder (Part of 49 U019 0A0A) 	For disassembly of transmission
49 0378 390 Puller, oil pump 	For disassembly of transmission		

29U0KX-188

Precaution
General Notes:

1. Disassemble the transmission in a clean area (clean work space) to prevent contaminants from entering into the mechanisms.
2. Inspect the individual transmission components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
3. Use only plastic hammers when applying force to separate the light alloy case joints.
4. Never use rags during disassembly; they may leave particles that can clog fluid passages.
5. Several parts resemble one another; organize them so that they do not get mixed up.
6. Disassemble the control valve assembly and thoroughly clean it when the clutch or brake band has burned out or when the ATF has degenerated.

Cleaning Notes:

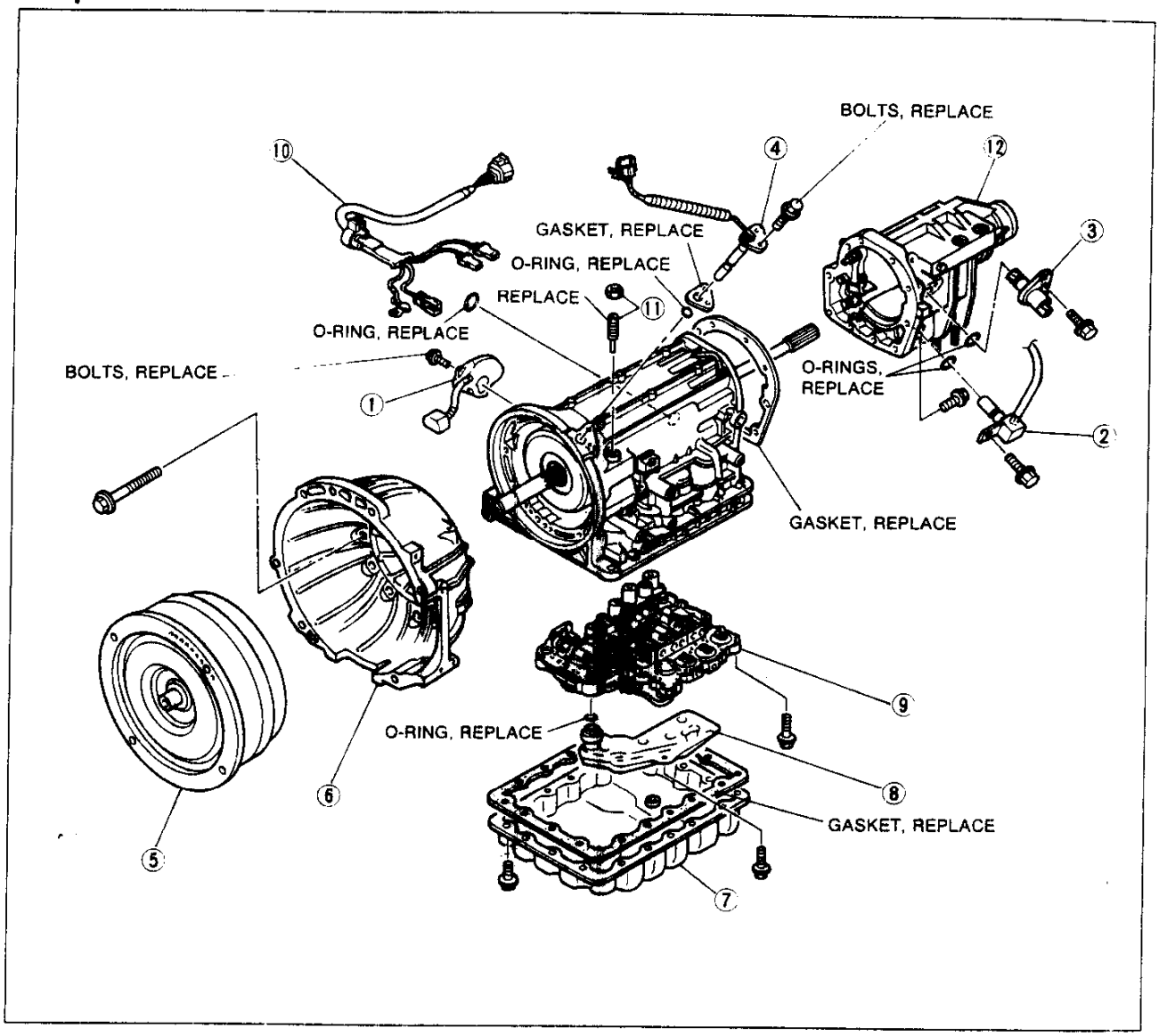
1. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents, or both, before disassembly.
2. Clean the removed parts with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and check that there are no obstructions.
3. Wear eye protection when using compressed air to clean components.

29U0KX-139

Disassembly

Disassemble in the order shown in the figure, referring to **Disassembly Procedure**.

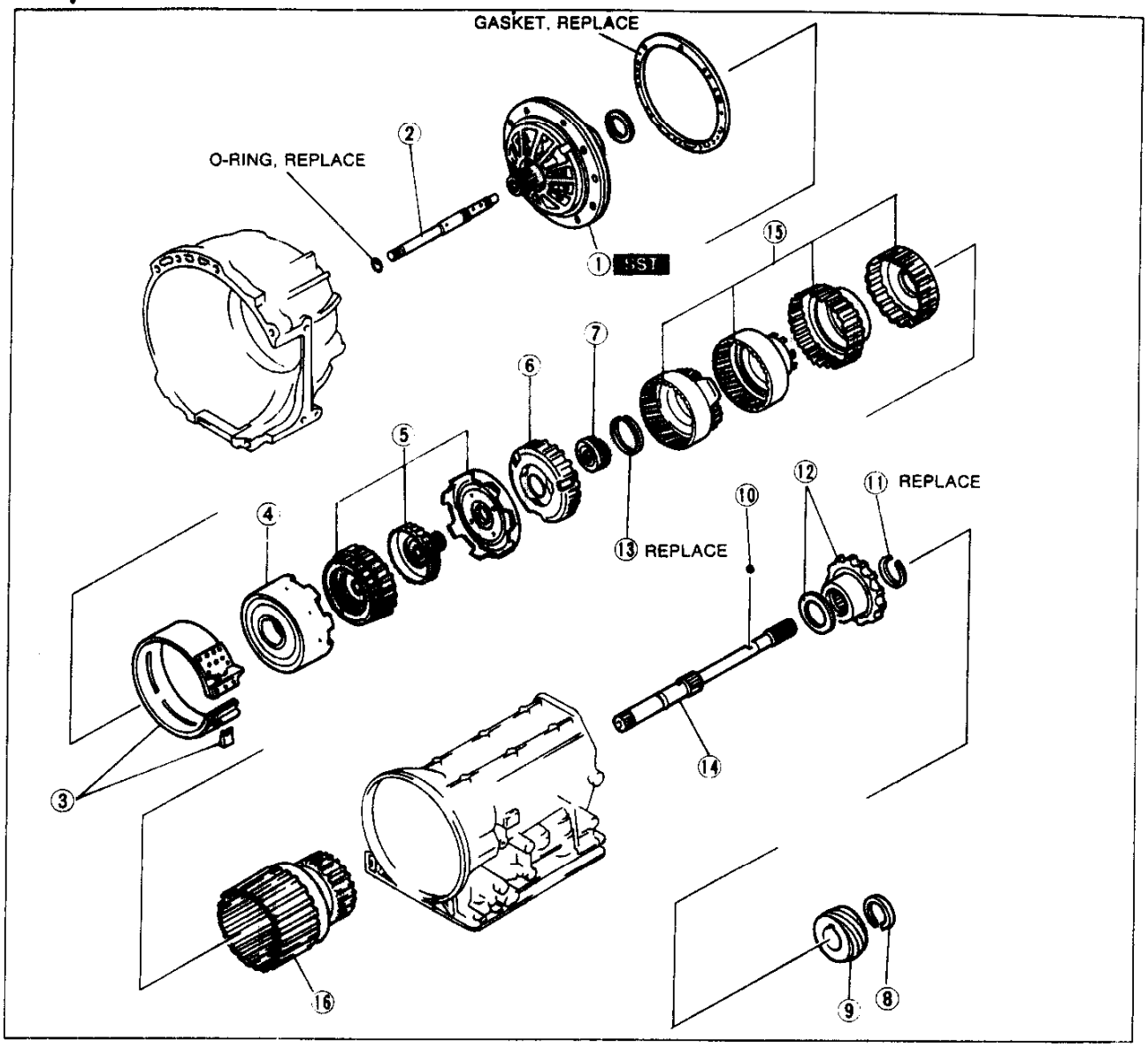
Components 1



3700KX 070

1. Inhibitor switch
   - Inspection ..... page K–28
   - Adjustment ..... page K–28
   - Replacement ..... page K–28
2. Speed sensor 1
   - Inspection ..... page K–29
   - Replacement ..... page K–29
3. Speed sensor 2
   - Inspection ..... page K–30
   - Replacement ..... page K–30
4. Pulse generator
   - Inspection ..... page K–30
   - Replacement ..... page K–31
5. Torque converter
   - Inspection ..... page K–57
6. Converter housing
7. Oil pan
8. Oil strainer
9. Control valve body
   - Disassembly / Inspection ..... page K–108
   - Assembly ..... page K–125
   - On-Vehicle Removal ..... page K–128
   - On-Vehicle Installation ..... page K–130
10. Solenoid valve harness
11. Anchor end bolt and nut
12. Extension housing / Parking mechanism
    - Disassembly / Inspection / Assembly ..... page K– 97
    - On-Vehicle Removal / Installation ..... page K–101

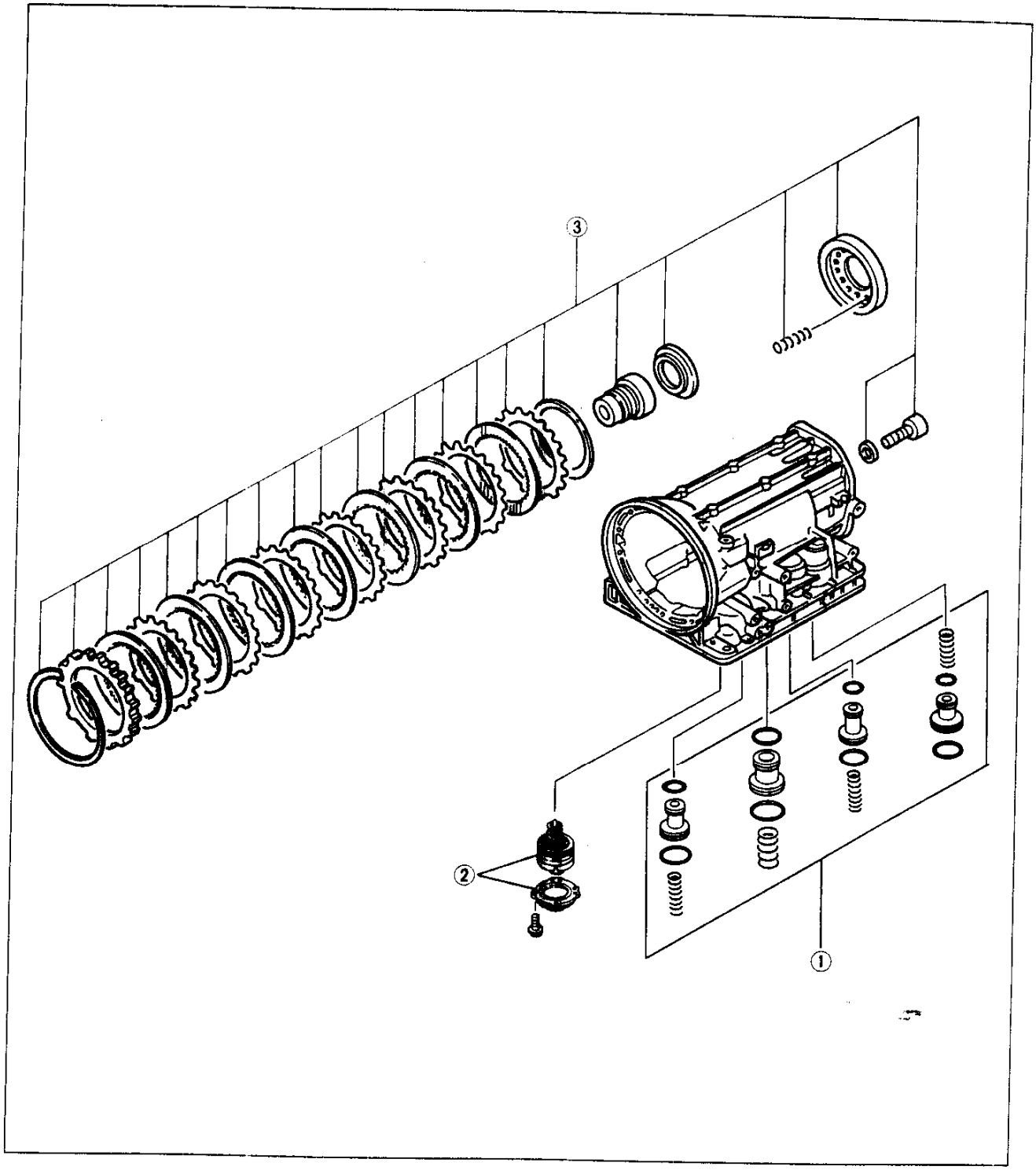
Components 2



37U0KX-071

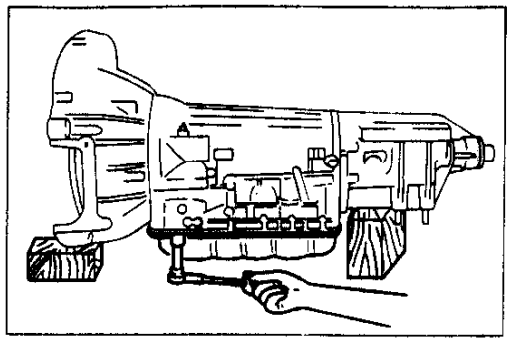
1. Oil pump
   Disassembly / Inspection / Assembly ..... page K–60
2. Input shaft
3. Brake band and strut
4. Reverse clutch
   Preinspection ..... page K–64
   Disassembly / Inspection / Assembly ..... page K–65
5. High clutch and front sun gear
   Preinspection ..... page K–70
   Disassembly / Inspection / Assembly ..... page K–71
6. Front planetary carrier
7. Rear sun gear
8. Snap ring
9. Speedometer drive gear
10. Steel ball
11. Snap ring
12. Parking gear and bearing
13. Snap ring
14. Output shaft
15. Front internal gear, rear internal gear, forward clutch hub, overrunning clutch hub
    Preinspection ..... page K–80
    Disassembly / Inspection / Assembly ..... page K–80
16. Forward clutch drum (forward clutch, overrunning clutch, low one-way clutch)
    Preinspection ..... page K–83
    Disassembly / Inspection / Assembly ..... page K–84

Components 3

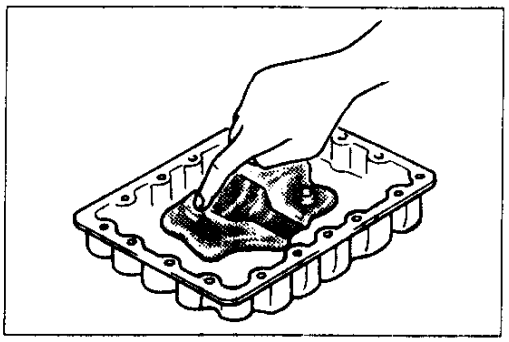


37U0KX-072

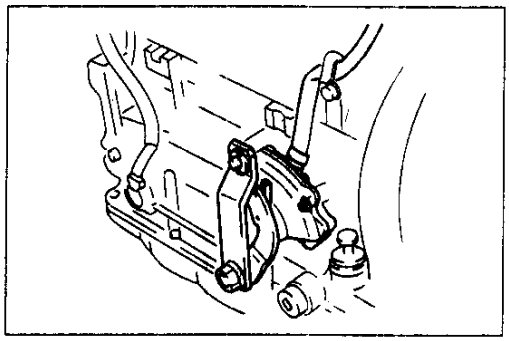
1. Accumulators
   Disassembly / Inspection / Assembly ..... page K–58
2. Band servo
   Preinspection ..... page K–76
   Disassembly / Inspection / Assembly ..... page K–76
3. Low and reverse brake
   Preinspection ..... page K–91
   Disassembly / Inspection / Assembly ..... page K–92



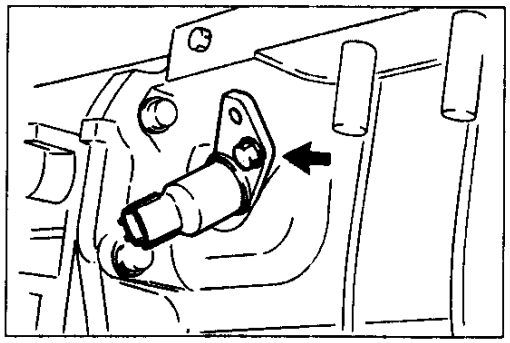
29U0KX-193



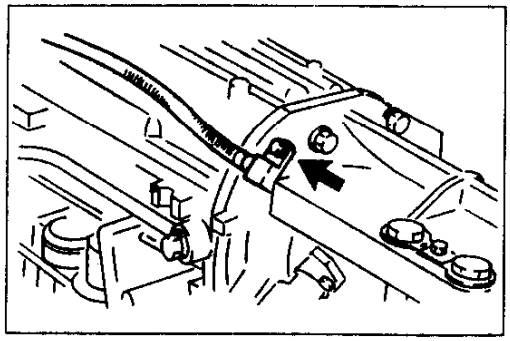
29U0KX-194



37U0KX-073



37U0KX-074



29U0KX-197

Disassembly procedure

Caution
- **Keep the transmission upright so that any foreign material will remain in the oil pan.**

1. Place the transmission on wooden blocks under the converter housing and the extension housing.

Caution
- **If large amounts of material are found, replace the torque converter and carefully check the transmission for the cause.**

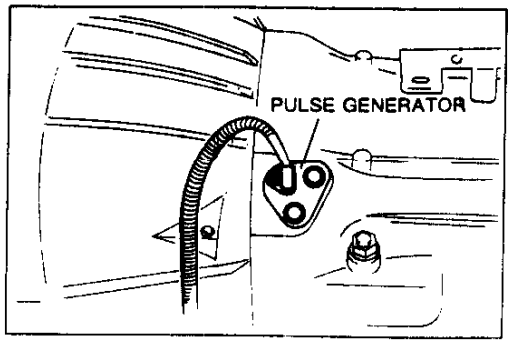
2. Remove the oil pan and gasket.
3. Examine any material found in the pan or on the magnet to determine the condition of the transmission.
   Clutch facing material ..... Drive plate and brake band wear
   Steel (magnetic) ..... Bearing gear, and driven plate wear
   Aluminum (nonmagnetic) ..... Bushings or cast aluminum parts wear
4. Install the oil pan with a few bolts to protect the control valve body.
5. Remove the harness from the connector bracket.
6. Remove the inhibitor switch.
7. Remove the harness from the connector bracket.
8. Remove the connector bracket from the converter housing.

Caution
- **Do not damage the speed sensor 2.**

9. Remove speed sensor 2.
10. Remove the O-ring from speed sensor 2.

Caution
- **Do not damage the speed sensor 1.**

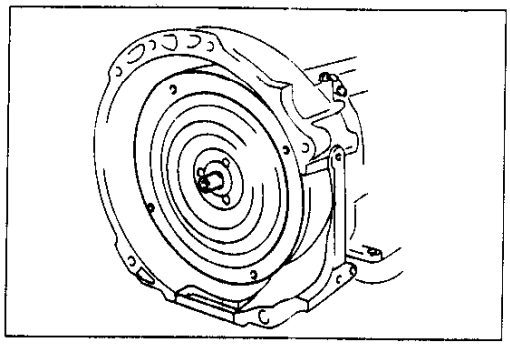
11. Remove speed sensor 1.
12. Remove the O-ring from speed sensor 1.



29U0KX-198

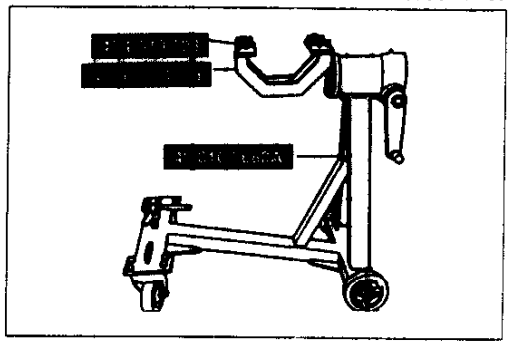
Caution
- **Do not damage the pulse generator.**

13. Remove the pulse generator and gasket from the transmission case.
14. Remove the O-ring from the pulse generator.

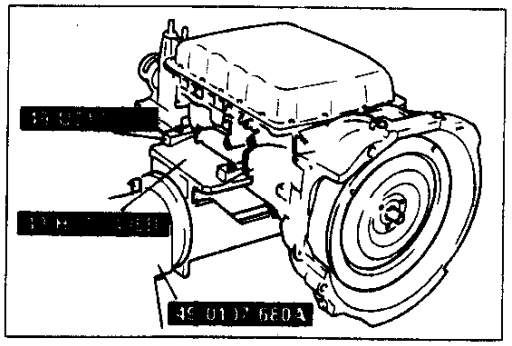

29U0KX-199

Note
- **Be careful not to spill the ATF when removing the torque converter.**

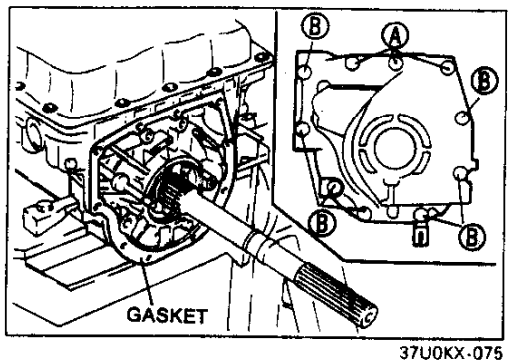
15. Remove the torque converter.


29U0KX-200

16. Assemble the **SST** as shown.


29U0KX-201

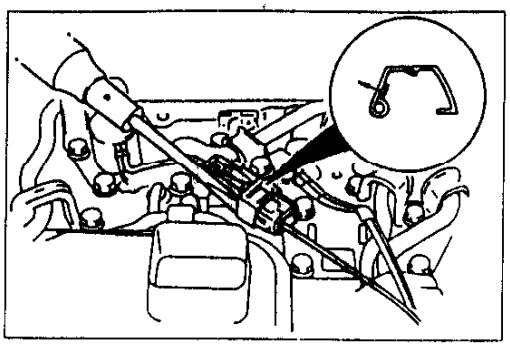
17. Mount the transmission to the **SST**.
18. Remove the oil pan, gasket, and magnet.



37U0KX-075

19. Remove the extension housing and gasket.

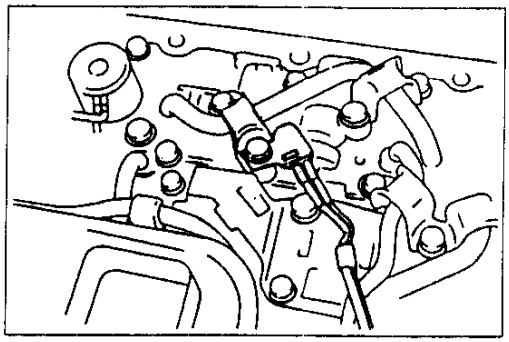
Bolt length (measured from below bolt head)
A: 30 mm {1.181 in}
B: 45 mm {1.772 in}



29U0KX-203

Caution
- **Do not damage the harness or connector.**

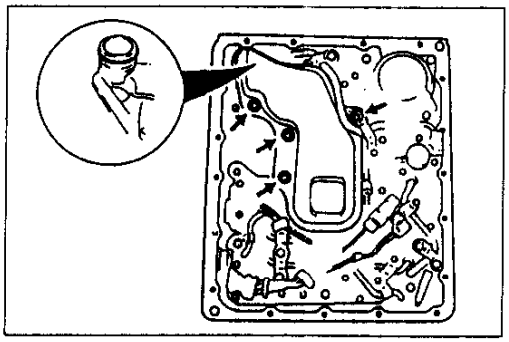
20. Remove the clip.
21. Remove the solenoid valve (lockup) connector.



37U0KX-076

22. Remove the ATF thermosensor.

Bolt length (measured from below bolt head):
45 mm {1.772 in}

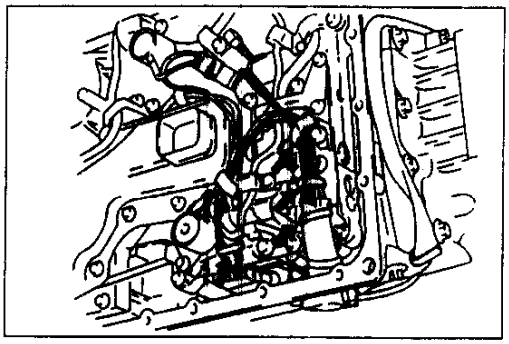


37U0KX-077

23. Remove the oil strainer.

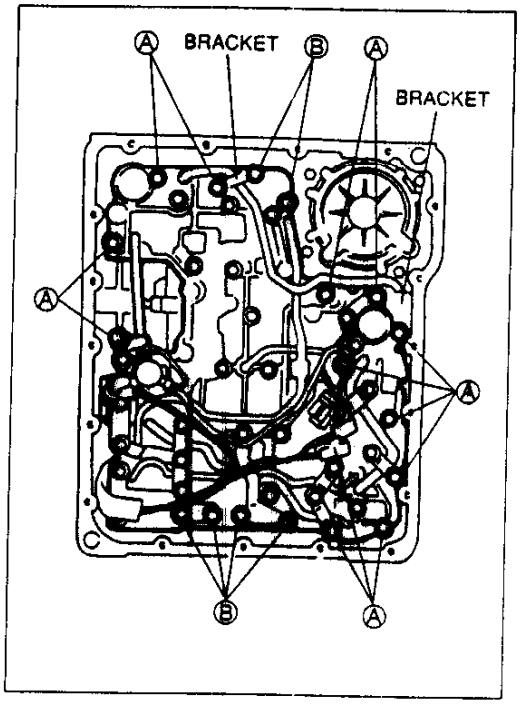
Bolt length (measured from below bolt head):
50 mm {1.969 in}

24. Remove the O-ring from the oil strainer.



29U0KX-206

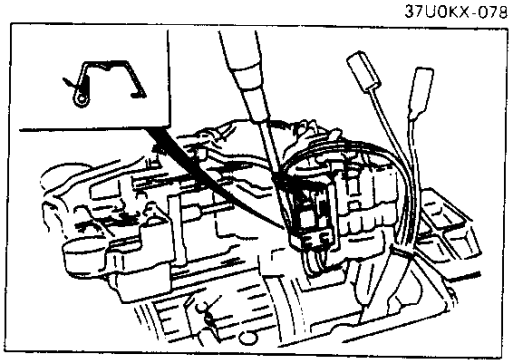
25. Separate the solenoid valve harness from the harness clip.



37U0KX-078

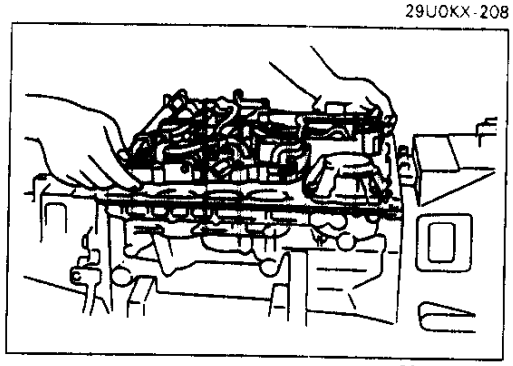
26. Remove bolts A, B, and the brackets shown in the figure.

Bolt length (measured from below bolt head)
A: 33 mm {1.299 in}
B: 45 mm {1.772 in}

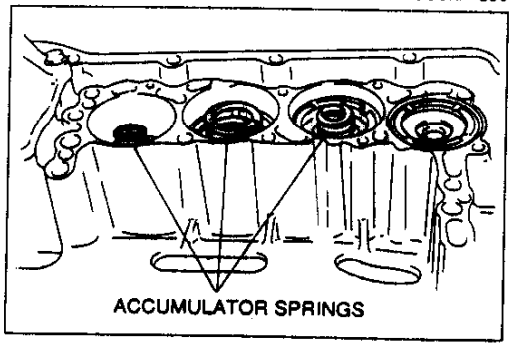

29U0KX-208

Caution
- **Do not damage the harness or connector.**

27. Remove the clip.
28. Disconnect the solenoid valve connectors.

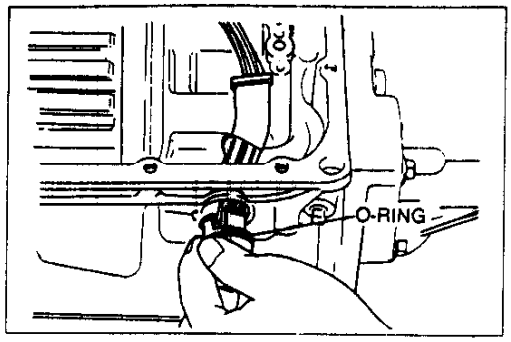

29U0KX-209

29. Remove the control valve body.



29U0KX-210

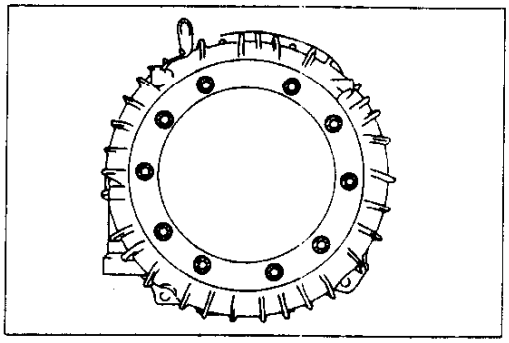
30. Remove the accumulator springs.



29U0KX-211

Caution
- **Do not damage the solenoid connector.**

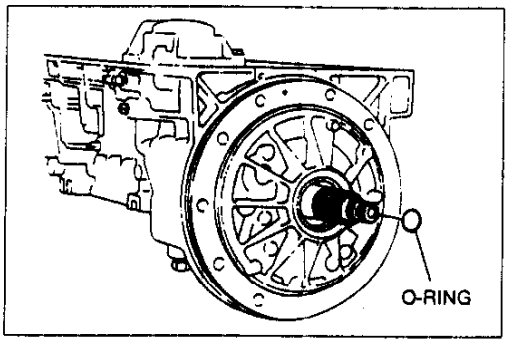
31. Remove the solenoid connector from the transmission case.
32. Remove the O-ring from the solenoid valve harness.


29U0KX-212

33. Remove the converter housing from the transmission case.

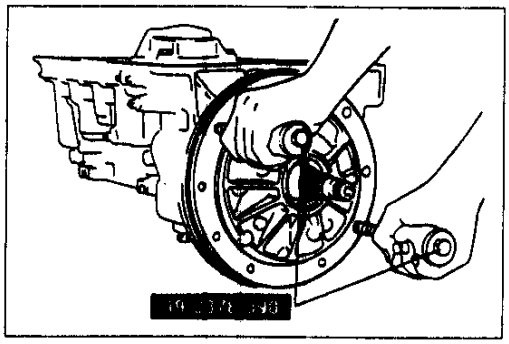
Caution
- **Do not damage the sealing surface.**

34. Clean the sealant from the converter housing.



29U0KX-213

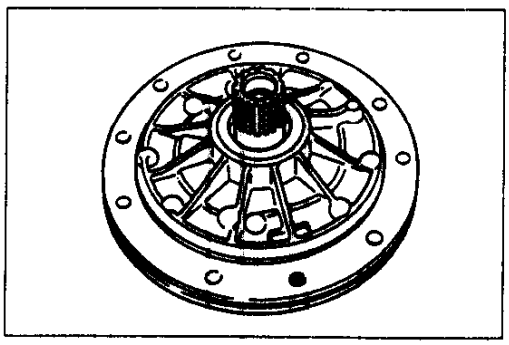
35. Remove the O-ring from the input shaft.


29U0KX-214

36. Install the **SST** to the oil pump.

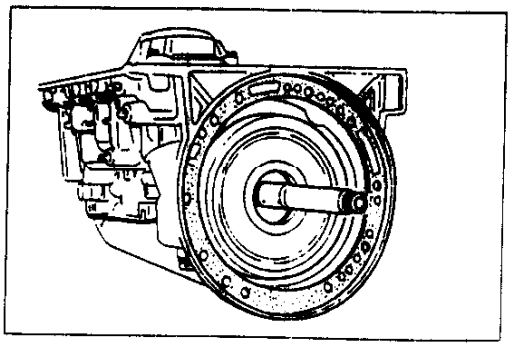
Caution
- **Do not damage the sealing surface; remove slowly.**

37. Remove the oil pump from the transmission case by evenly sliding the weights of the **SST**. Remove the **SST** from the oil pump.


29U0KX-215

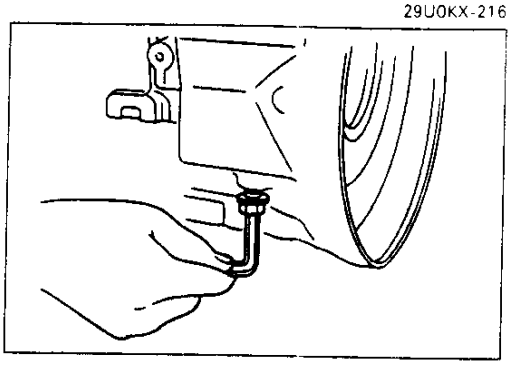
Caution
- **Do not scratch the oil pump housing.**

38. Clean the sealant from the oil pump housing.



29U0KX-216

39. Remove the oil pump gasket.
40. Pull out the input shaft while holding the reverse clutch drum.

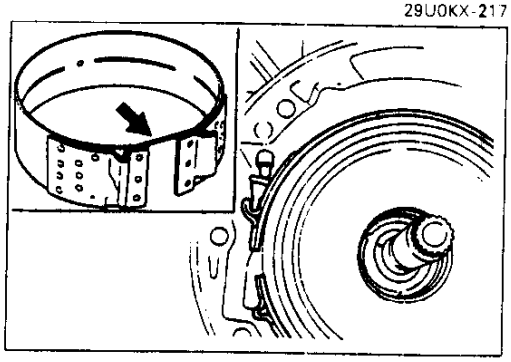


29U0KX-217

41. While holding the anchor end bolt, loosen the locknut.

Caution
- **Do not reuse the anchor end bolt.**

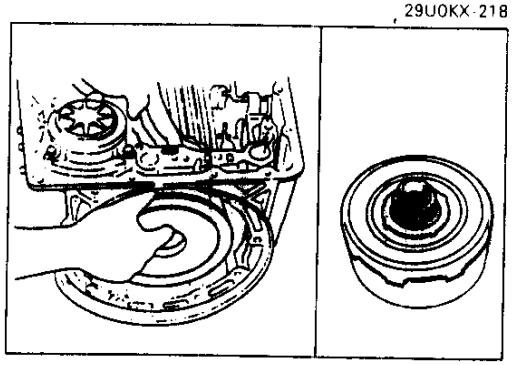
42. Remove the anchor end bolt.
43. Clean the sealant from the case threads.



29U0KX-218

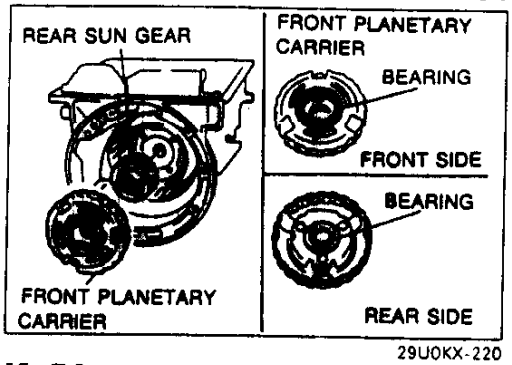
Caution
- **To prevent the brake facing from cracking or peeling, do not stretch the brake band. Secure it with a wire clip.**

44. Remove the brake band and the band strut.



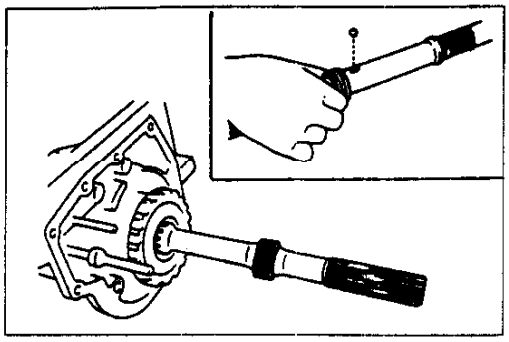
29U0KX-219

45. Remove the reverse clutch, high clutch, and front sun gear assembly from the transmission case.



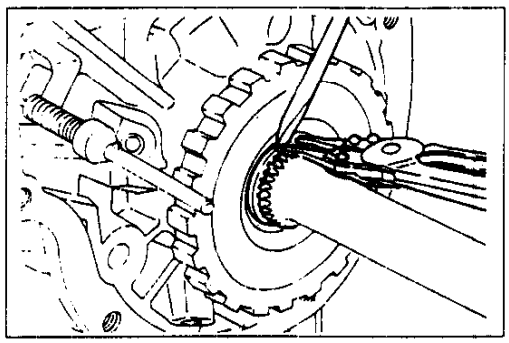
29U0KX-220

46. Remove the front planetary carrier, bearings, and rear sun gear.
    Inspect the following and replace as necessary.
    1) Front planetary carrier
       Inspect gear teeth for damage, wear, and cracks.
       Check for rough rotation of pinion gears.
    2) Rear sun gear
       Inspect gear teeth for damage, wear, and cracks.
    3) Bearing
       Inspect for damage and rough rotation.



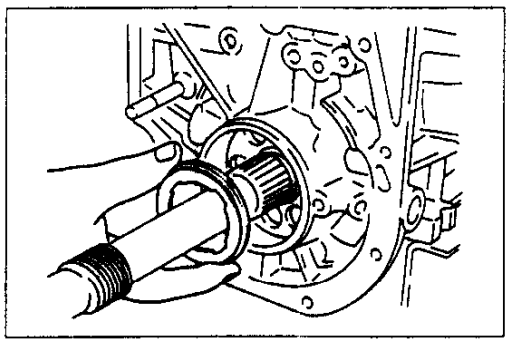
37U0KX-079

47. Remove the snap ring and the speedometer drivegear.
48. Remove the steel ball.



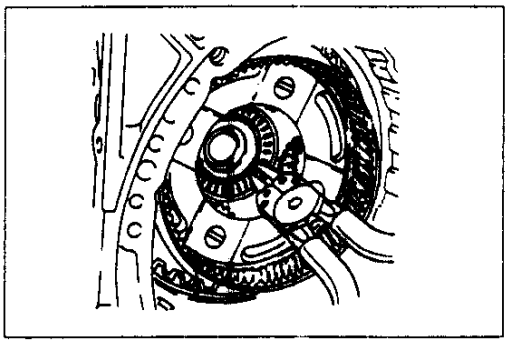
29U0KX-222

49. Remove the snap ring from the output shaft.
50. Remove the parking gear.



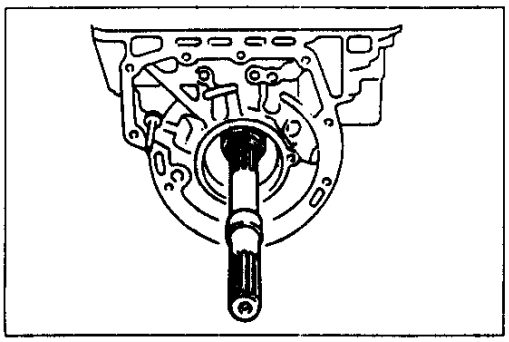
29U0KX-223

51. Remove the bearing from the rear of the transmission case.
    Inspect for damage and rough rotation.
    Replace as necessary.



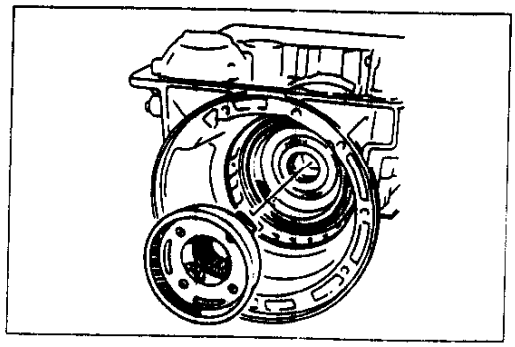
29U0KX-224

52. Push the output shaft slightly forward and remove the snap ring from the output shaft.



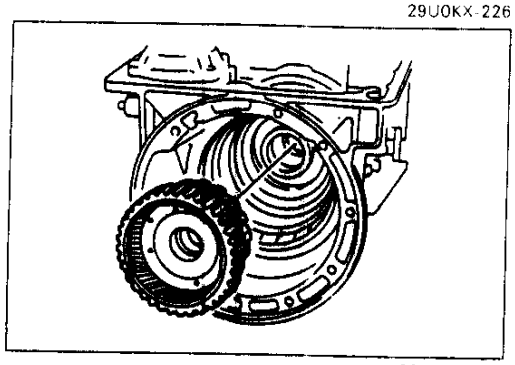
29U0KX-225

53. Slide the output shaft from the rear of the transmission case.



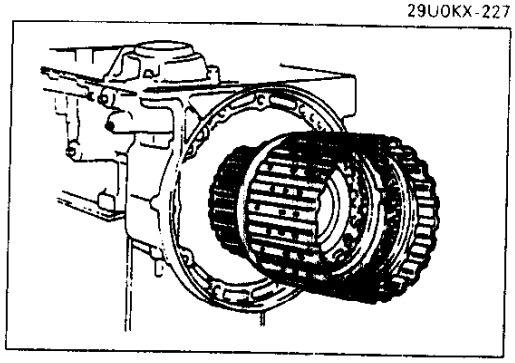
29U0KX-226

54. Remove the front internal gear (integrated with rear planetary carrier).



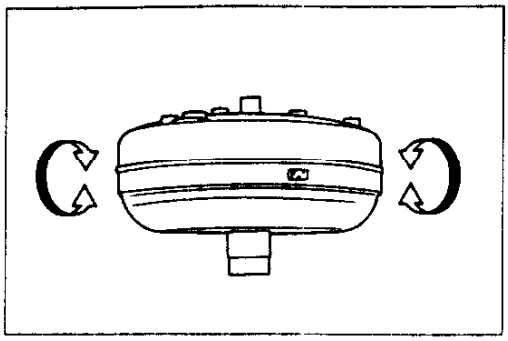
29U0KX-227

55. Remove the rear internal gear, forward clutch hub, and overrunning clutch hub assembly.

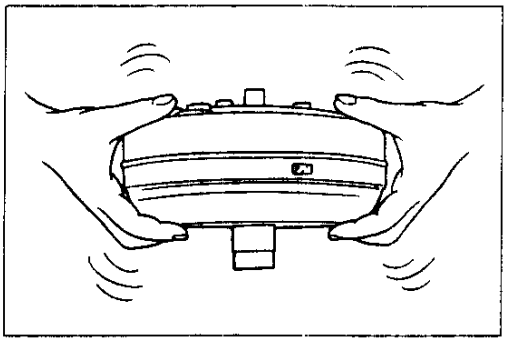


29U0KX-228

56. Remove the forward clutch drum (forward clutch, overrunning clutch, and low one-way clutch) assembly.



29U0KX-229



37U0KX-080

TORQUE CONVERTER

Note
- **The torque converter is welded together and cannot be disassembled.**

Inspection

1. Check the outside of the converter for damage and cracks. Replace the torque converter if there are any problems.
2. Check for rust on the pilot hub or the boss. Remove any rust completely.

Cleaning the inside of the converter

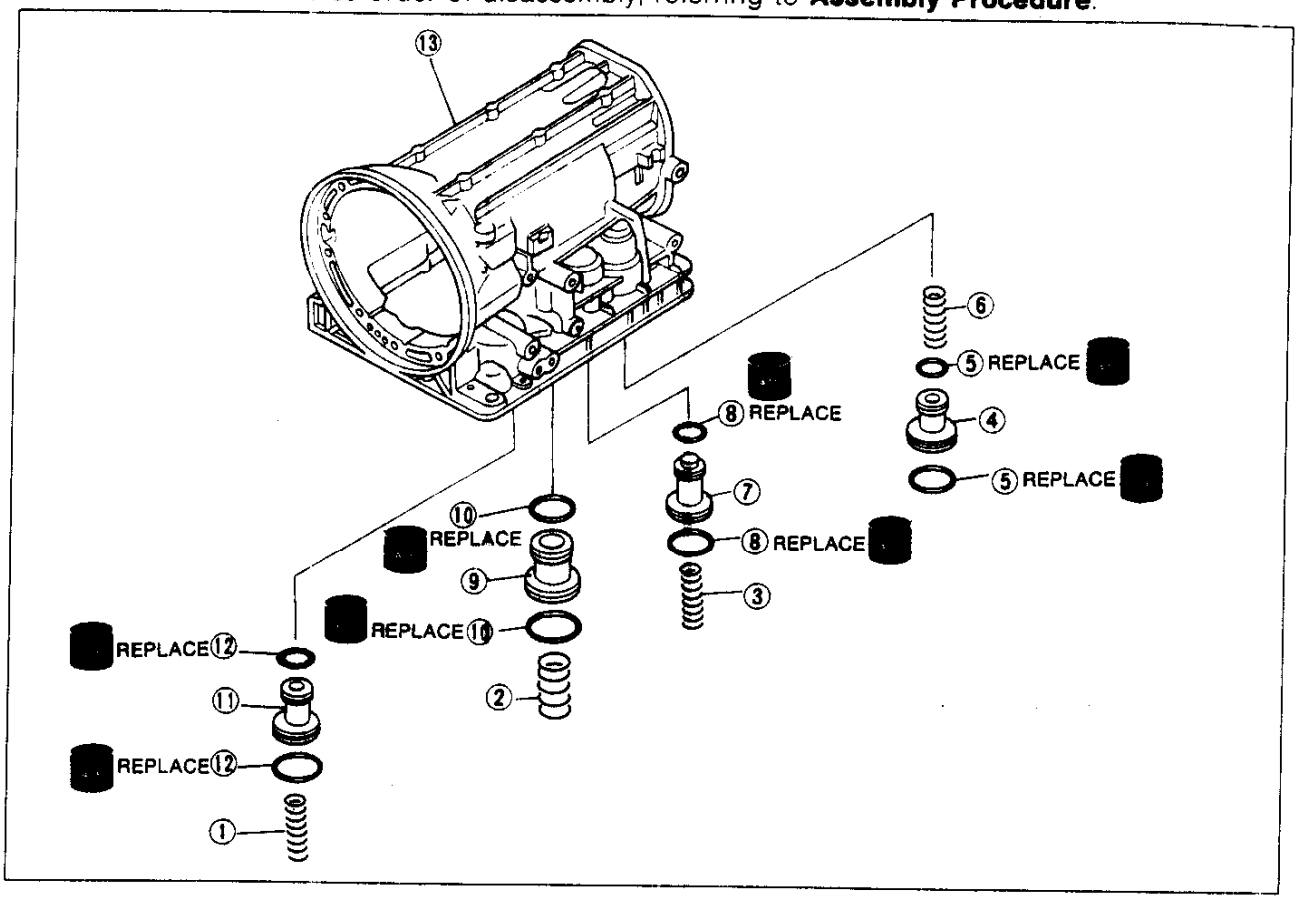
Caution
- **Do not reuse the ATF.**

1. Drain all ATF remaining in the converter.
2. Pour in new ATF **(2.0 L {2.1 US qt, 1.8 Imp qt})**.
3. Shake the converter to clean the inside. Drain the ATF.
4. Pour in new ATF again.

ACCUMULATORS

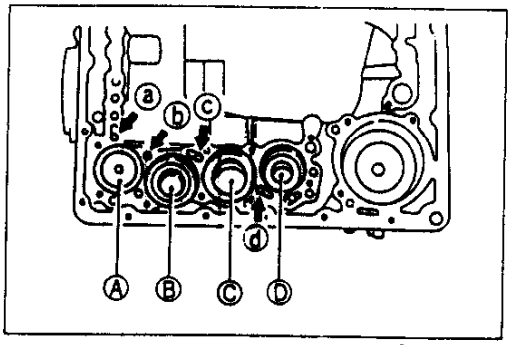
Disassembly / Inspection / Assembly

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



37U0KX-031

1. 3-4/N-R accumulator spring
   Inspection ..... page K–59
2. 1-2 accumulator spring
   Inspection ..... page K–59
3. 2-3 accumulator spring
   Inspection ..... page K–59
4. N-D accumulator piston
   Disassembly Note ..... below
5. O-rings
6. N-D accumulator spring
   Inspection ..... page K–59
7. 2-3 accumulator piston
   Disassembly Note ..... below
8. O-rings
9. 1-2 accumulator piston
   Disassembly Note ..... below
10. O-rings
11. 3-4/N-R accumulator piston
    Disassembly Note ..... below
12. O-rings
13. Transmission case

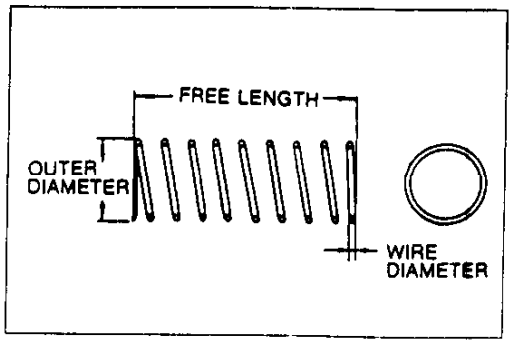


29U0KX-232

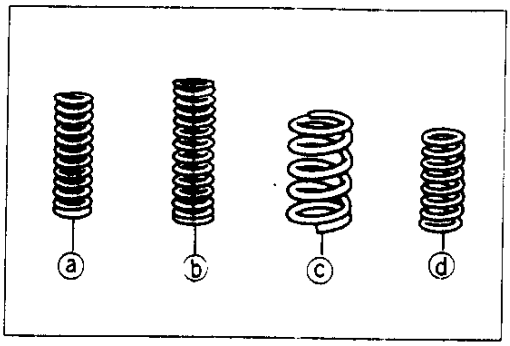
Disassembly note
Accumulator piston

Remove the accumulator pistons from transmission case by applying compressed air through the oil passage as shown in the figure.

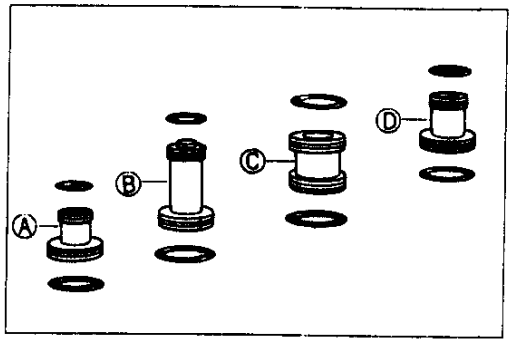
Item / Accumulator	Location	Oil passage
N-D accumulator	A	a
2-3 accumulator	B	b
1-2 accumulator	C	c
3-4/N-R accumulator	D	d

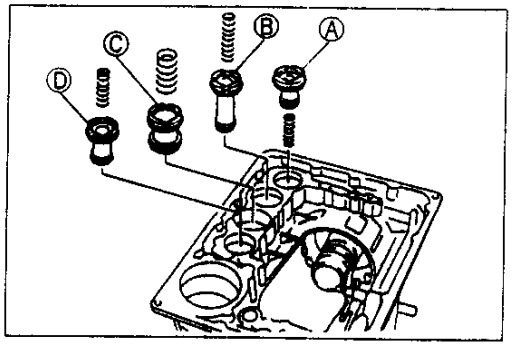


37U0KX-082

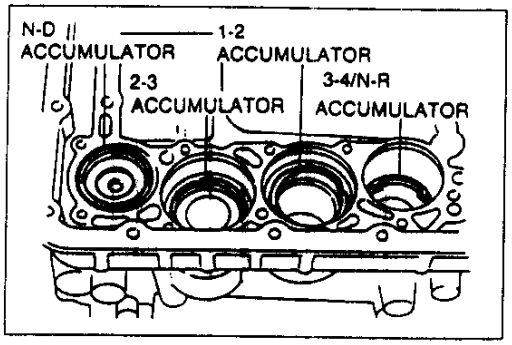


37U0KX-083





37U0KX-084



29U0KX-236

Inspection

Accumulator spring

1. Measure the spring free length

Item / Spring	Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
N-D accumulator spring	18.0 {0.71}	43.0 {1.69}	7.9	2.3 {0.091}
1-2 accumulator spring	29.3 {1.15}	45.0 {1.77}	3.8	3.7 {0.15}
2-3 accumulator spring	19.5 {0.77}	66.0 {2.60}	8.6	3.0 {0.12}
3-4/N-R accumulator spring	18.0 {0.71}	43.0 {1.69}	7.9	2.3 {0.091}

2. If not within specification, replace the spring.

Assembly procedure

Note

- **Installation order**
  N-D accumulator: Spring – Piston
  2-3 accumulator: Piston – Spring
  1-2 accumulator: Piston – Spring
  3-4/N-R accumulator: Piston – Spring
- **Outer diameter of spring**

	Spring	Outer dia. mm {in}
a	N-D accumulator	18.0 {0.71}
b	2-3 accumulator	19.5 {0.77}
c	1-2 accumulator	29.3 {1.15}
d	3-4/N-R accumulator	18.0 {0.71}

1. Apply ATF to the new O-rings and install them onto the accumulator pistons.

Piston / O-ring		Large mm {in}	Small mm {in}
A	N-D accumulator	45.0 {1.77}	29.0 {1.14}
B	2-3 accumulator	50.0 {1.97}	32.0 {1.26}
C	1-2 accumulator	50.0 {1.97}	45.0 {1.77}
D	3-4/N-R accumulator	45.0 {1.77}	29.0 {1.14}

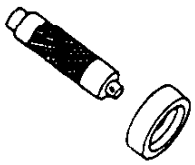
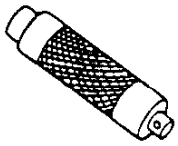
Note

- **Apply even pressure to the perimeter of the accumulator pistons during installation to avoid damaging the O-rings.**

2. Install the accumulator pistons and springs.

OIL PUMP

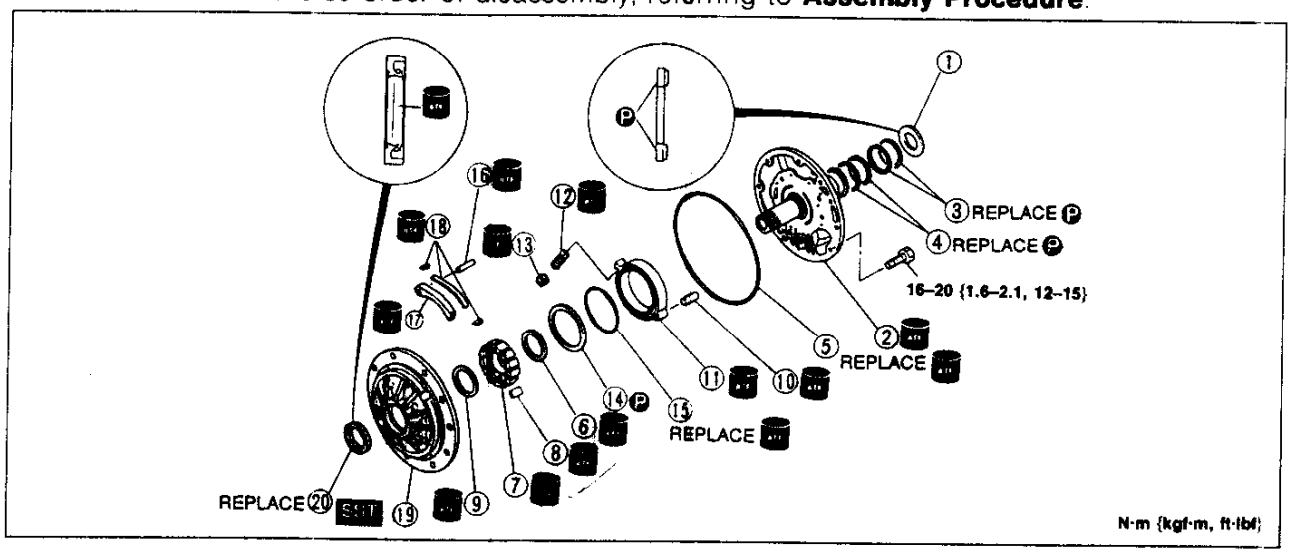
Preparation
SST

49 G030 795 Installer, oil seal 	For installation of oil seal	49 G030 796 Body (Part of 49 G030 795) 	For installation of oil seal
49 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal		

27U0KX-237

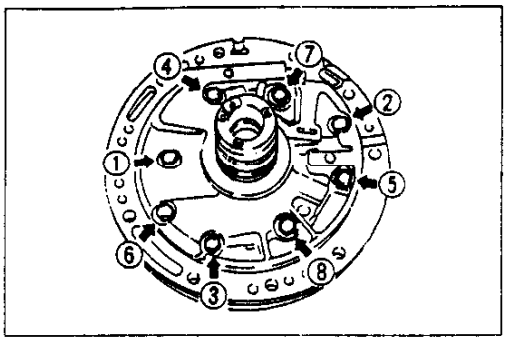
Disassembly / Inspection / Assembly

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



37U0KX-035

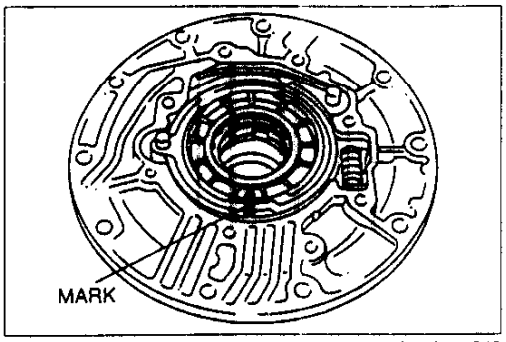
1. Bearing
   Inspect for damage and rough rotation
2. Oil pump cover
   Disassembly Note ..... page K–61
   Inspection ..... page K–61
3. Seal ring (small diameter)
4. Seal ring (large diameter)
5. O-ring
6. Vane ring
7. Rotor
   Disassembly Note ..... page K–61
   Inspection ..... page K–62
8. Vane
   Inspection ..... page K–62
9. Vane ring
10. Pivot pin
    Disassembly Note ..... page K–61
11. Cam ring
    Disassembly Note ..... page K–61
    Inspection ..... page K–62
12. Cam ring spring
    Inspection ..... page K–62
13. Spring seat
14. Friction ring
15. O-ring
16. Pivot pin
17. Control piston
    Inspection ..... page K–62
18. Side seal
19. Oil pump housing
    Inspection ..... page K–62
20. Oil seal



29U0KX-239

Disassembly note
Oil pump cover

1. Gradually loosen the mounting bolts in the order shown.
2. Remove the oil pump cover from the oil pump housing.

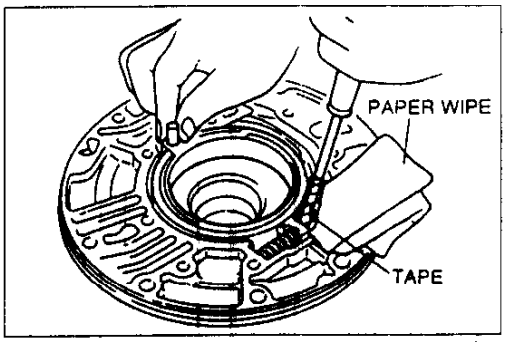


29U0KX-240

Rotor

Caution
- **Do not use a punch to mark the rotor and cam ring.**

1. Mark the rotor and cam ring.
2. Remove the rotor and vanes from the cam ring.

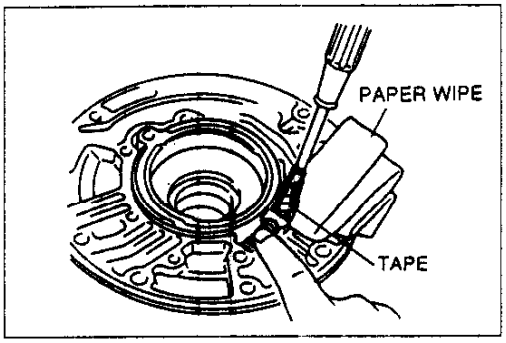


29U0KX-241

Pivot pin

Caution
- **Do not scratch the oil pump housing.**

1. Wrap a screwdriver with tape.
2. Hold the cam ring and remove the pivot pin.

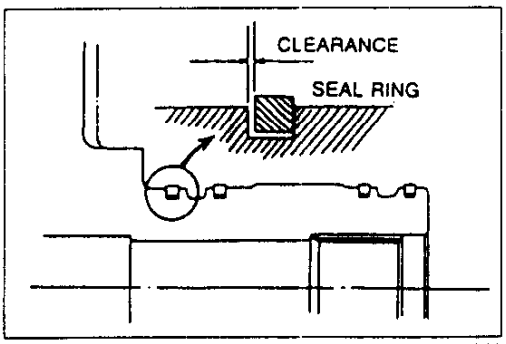


29U0KX-242

Cam ring

Caution
- **Do not scratch the oil pump housing.**
- **Hold the cam ring spring to prevent it from popping out.**

Remove the cam ring and spring.



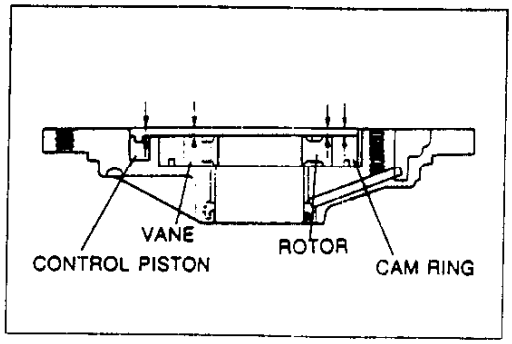
37U0KX-086

Inspection
Oil pump cover

1. Fit new seal rings into the oil pump cover.
2. Measure the clearance between the seal ring and the ring groove.

Standard clearance:
0.10–0.25 mm {0.004–0.010 in}
Maximum clearance: 0.25 mm {0.010 in}

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



37U0KX-087

Oil pump housing, cam ring, rotor, vane, and control piston

Note

- **Do not install the friction ring, O-ring, control piston, side seals, and cam ring spring.**

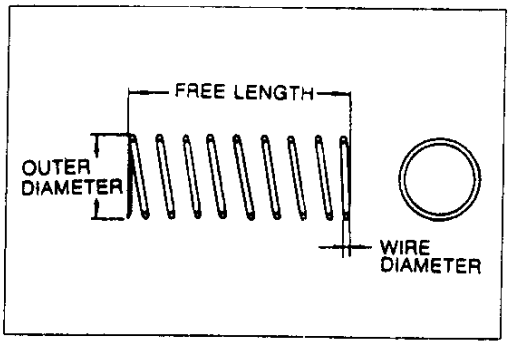
1. Install the cam ring, vanes, rotor, and control piston.
2. Measure the distance from the edge of the oil pump housing to the cam ring, rotor, vanes, and control piston at least four points along their circumferences.

Clearance

mm {in}

Part \ Distance	Standard	Maximum
Cam ring	0.010–0.024 {0.0004–0.0009}	0.030 {0.0012}
Rotor, vane, control piston	0.030–0.044 {0.0012–0.0017}	0.050 {0.0020}

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



37U0KX-088

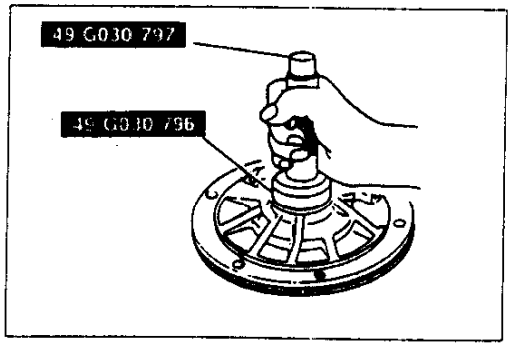
Cam ring spring

1. Measure the spring free length.

Specification

Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
13.7 {0.539}	39.8 {1.567}	7.8	2.3 {0.091}

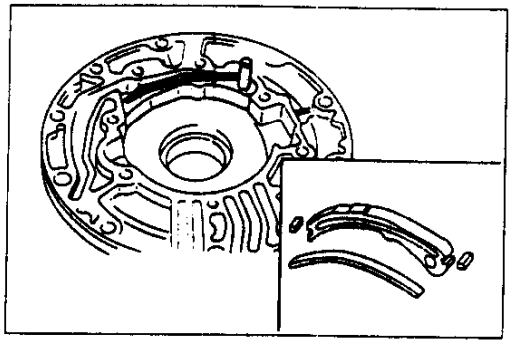
2. If not correct, replace the cam ring spring.



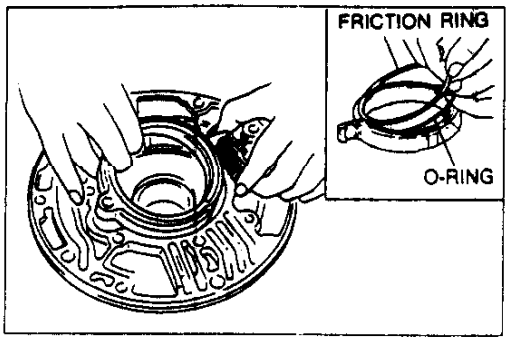
29U0KX-246

Assembly procedure

1. Apply ATF to the lip of a new oil seal, and install it by using the **SST**.

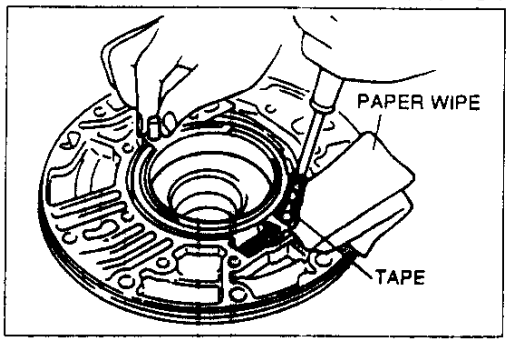

29U0KX-247

2. Apply ATF to side seals, and install them on the control piston with the black surface facing the control piston.
3. Install the control piston and pivot pin.



29U0KX-248

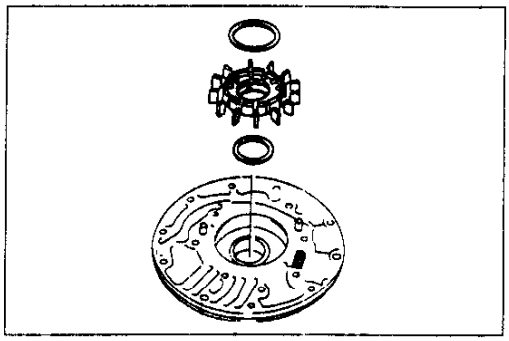
4. Apply petroleum jelly to the cam ring groove and install a new O-ring and friction ring into the cam ring.
5. Install the cam ring and spring while compressing the spring against the oil pump housing.



29U0KX-249

Caution
- **Do not scratch the oil pump housing.**

6. Wrap a screwdriver with tape.
7. Hold the cam ring and install the pivot pin.



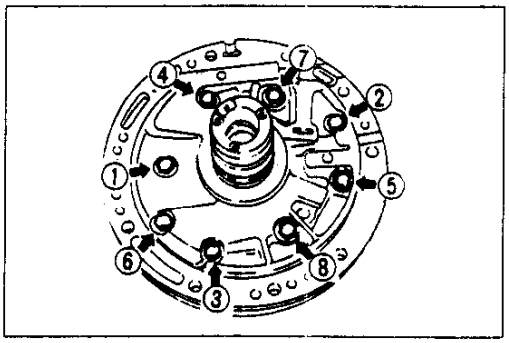
29U0KX-250

8. Confirm that the mark on the rotor is facing upward, and install the rotor, vanes, and vane rings.

Caution
- **Do not damage the oil seal by the splines of the oil pump cover.**

9. Install the oil pump cover onto the oil pump housing.
10. Tighten the bolts evenly and gradually in the order shown.

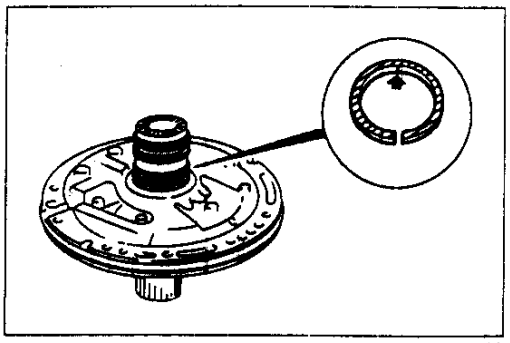
Tightening torque:
16–20 N·m {1.6–2.1 kgf·m, 12–15 ft·lbf}



37U0KX-089

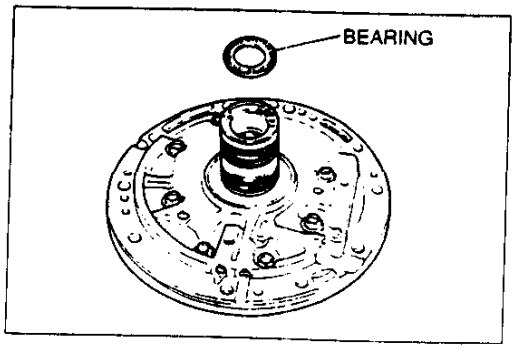
Caution
- **Do not overexpand the seal rings when installing them.**

Note
- **Press the seal rings down into the petroleum jelly to hold them.**
- **Seal rings come in two different diameters.**
  Small dia.: No mark
  Large dia.: Yellow mark in area shown by arrow



29U0KX-252

11. Apply petroleum jelly into the ring grooves, and install new seal rings.
12. Apply ATF to a new O-ring and install it onto the oil pump.



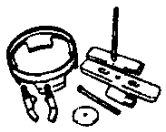
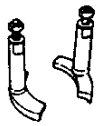
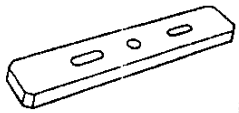
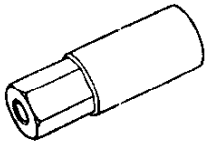
37U0KX-090

13. Apply petroleum jelly to the bearing and set it on the oil pump.

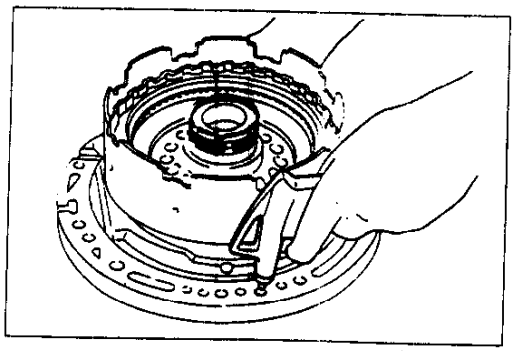
Bearing outer diameter: 47.0 mm {1.85 in}

REVERSE CLUTCH

Preparation
SST

49 G019 0A7A Compressor set, return spring 	For disassembly / assembly of snap ring	49 G019 025 Body B (Part of 49 G019 0A7A) 	For disassembly / assembly of snap ring
49 G019 026 Plate (Part of 49 G019 0A7A) 	For disassembly / assembly of snap ring	49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For disassembly / assembly of snap ring
49 G019 029 Nut (Part of 49 G019 0A7A) 	For disassembly / assembly of snap ring		

29U0KX-254

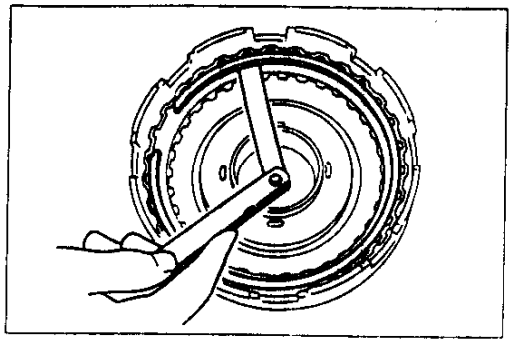

37U0KX-091

Preinspection
Reverse clutch operation

1. Install the reverse clutch onto the oil pump along with the seal rings. Apply compressed air to the oil passage as shown.
2. Verify that the retaining plate moves toward the snap ring.

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

3. If not, the D-ring or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect and replace as necessary when assembling



37U0KX-092

Clearance between retaining plate and snap ring

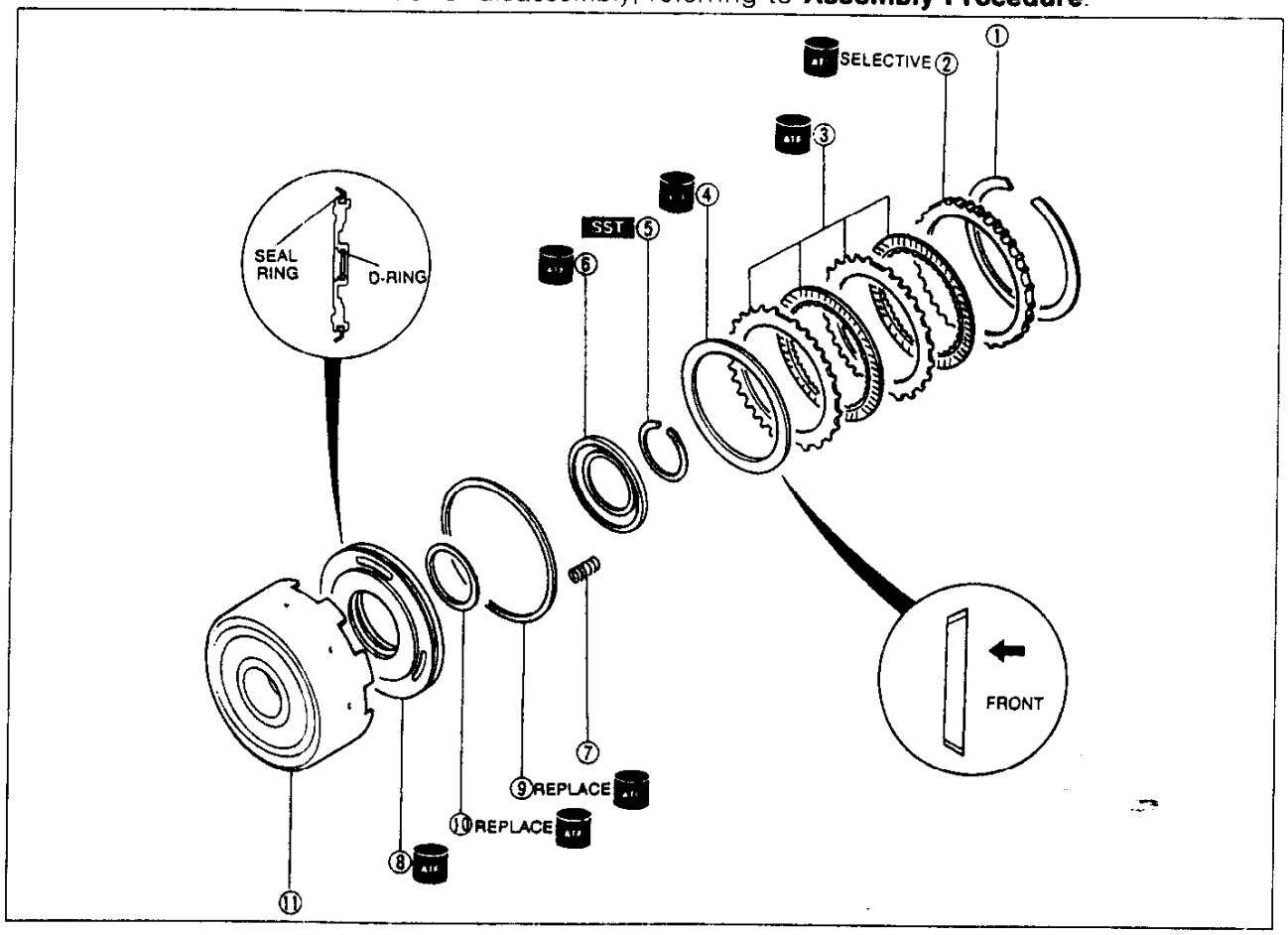
1. Measure the clearance between the retaining plate and the snap ring.

   Clearance: 0.50–1.20 mm {0.020–0.047 in}

2. Select the correct retaining plate when assembling. (Refer to page K–68)

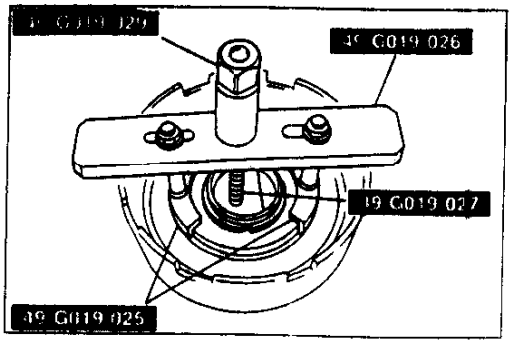
Disassembly / Inspection / Assembly

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

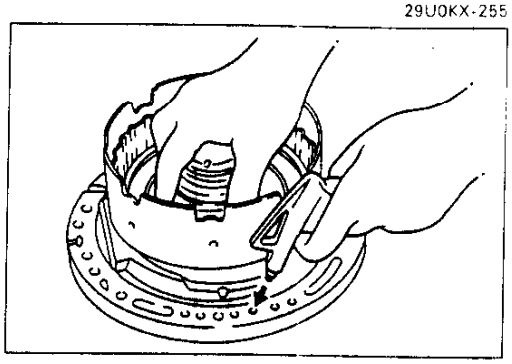


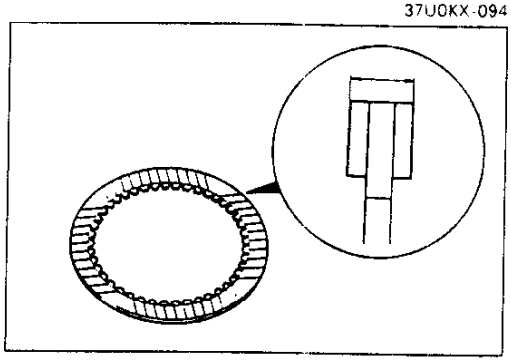
37U0KX-093

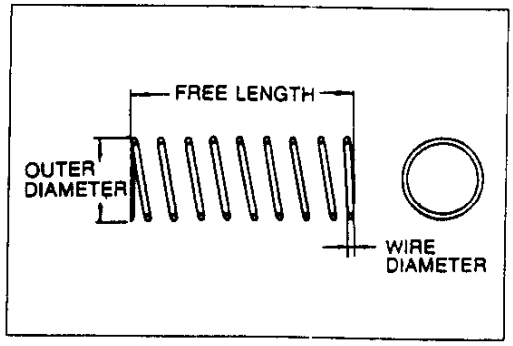
1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
   Inspect for wear and burning
   Inspection ..... page K–66
4. Dished plate
5. Snap ring
   Disassembly Note ..... page K–66
6. Spring retainer
7. Return springs
   Inspection ..... page K–66
8. Clutch piston
   Inspect balls for sticking by shaking the piston
   Disassembly Note ..... page K–66
   Inspection ..... page K–66
9. Seal ring
10. D-ring
11. Reverse clutch drum



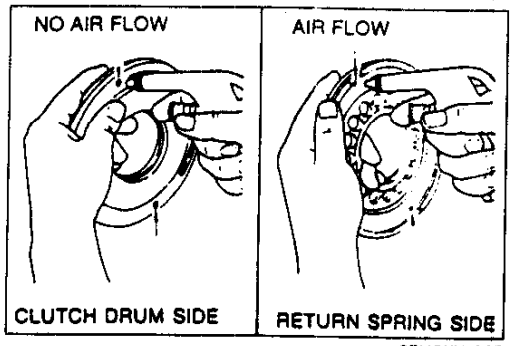
29U0KX-255


37U0KX-094


37U0KX-095



37U0KX-096



37U0KX-097

Disassembly Note
Snap ring

Caution
- **Depress the spring retainer only enough to remove the snap ring.**
- **Do not damage the snap ring.**

1. Compress the springs by using the **SST**, and remove the snap ring with snap ring pliers.
2. Remove the spring retainer and return springs.

Clutch piston

1. Install the reverse clutch with seal rings onto the oil pump.
2. Remove the piston by applying compressed air through the oil passage.

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.

Thickness
Standard: 2.0 mm {0.079 in}
Minimum: 1.8 mm {0.071 in}

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

Return springs

1. Measure the spring free length.

Specification

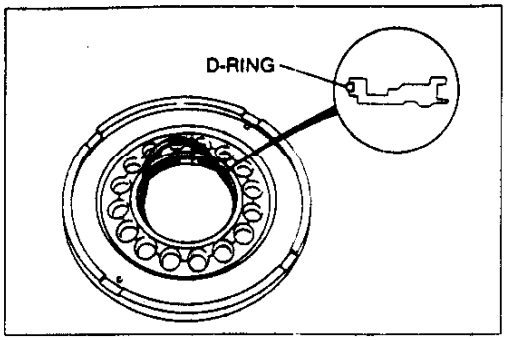
Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
11.6 {0.457}	19.69 {0.775}	4.0	1.3 {0.051}

2. If not within specification, replace the return spring.

Clutch piston

1. Shake the clutch piston and verify that the check ball is free.
2. Verify that there is no air flow when applying compressed air through the oil hole on the clutch drum side.
3. Verify that there is air flow when applying compressed air through the oil hole on the return spring side.

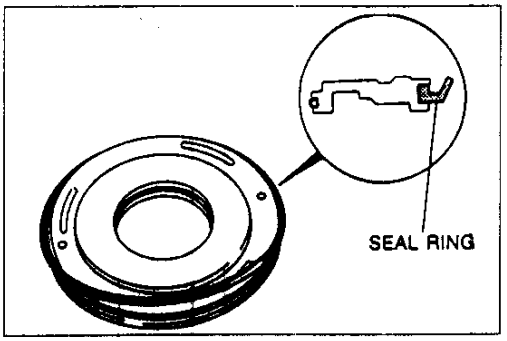
Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.



29U0KX-263

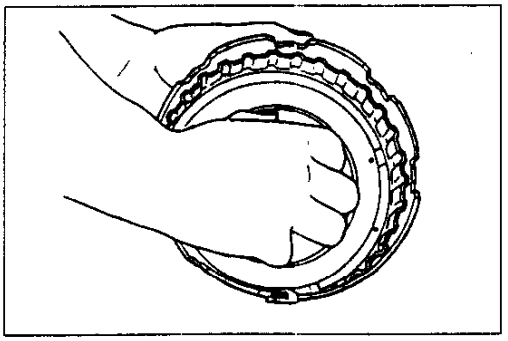
Assembly procedure

1. Apply ATF to a new D-ring and install it into the clutch piston.



29U0KX-264

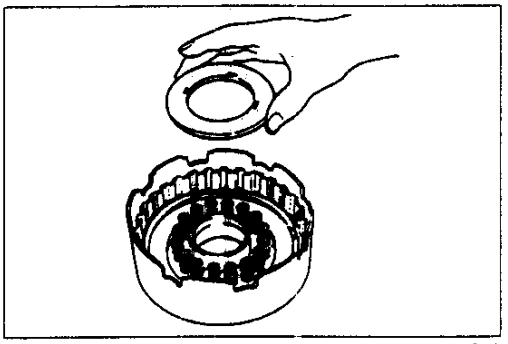
2. Apply ATF to a new seal ring and install it into the clutch piston.


29U0KX-265

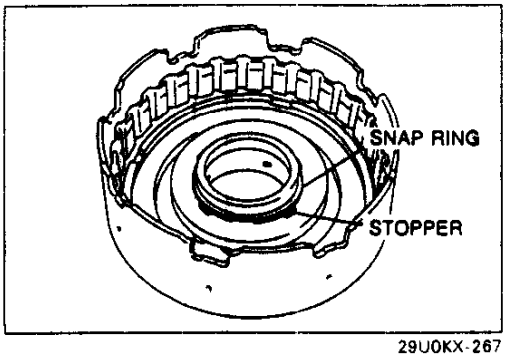
3. Apply ATF to the inner face of the reverse clutch drum.

Caution
- **Apply even pressure to the perimeter of the clutch piston when installing it to avoid damaging the seal ring and D-ring.**
- **If the piston cannot be turned by hand, remove it and check for damage to the seal ring.**

4. Install the clutch piston into the reverse clutch drum by turning it evenly and gradually.

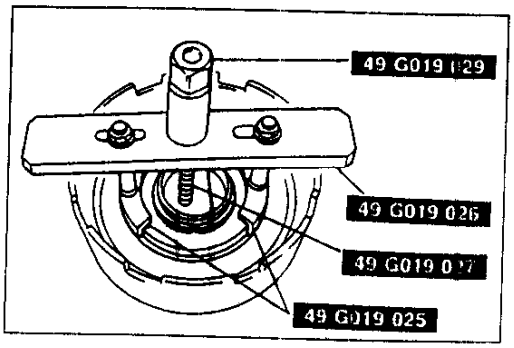

29U0KX-266

5. Install the return springs and spring retainer.



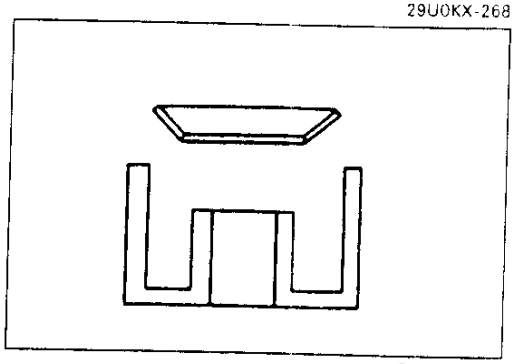
29U0KX-267

Caution
- **Depress the spring retainer only enough to install the snap ring.**
- **Do not overexpand the snap ring when installing it.**
- **Install the snap ring inside the stopper of the spring retainer.**
- **Do not align the ring endgap with the spring retainer stopper.**

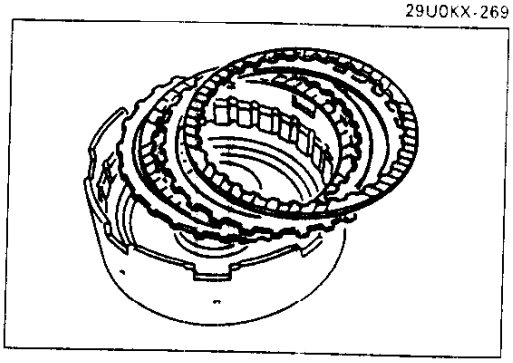


29U0KX-268

6. Install the snap ring while compressing the springs by using the **SST**.

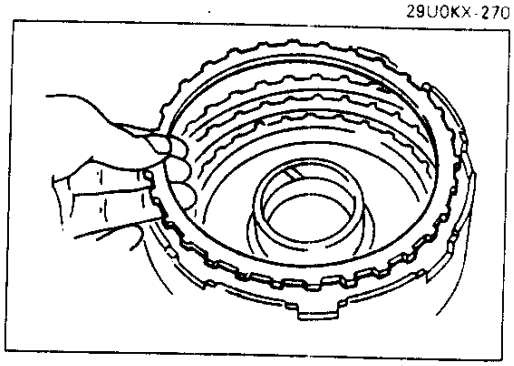

29U0KX-269

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


29U0KX-270

Note
- **Installation order: Driven-Drive-Driven-Drive**
- **Soak new drive plates in ATF for at least two hours before installation.**

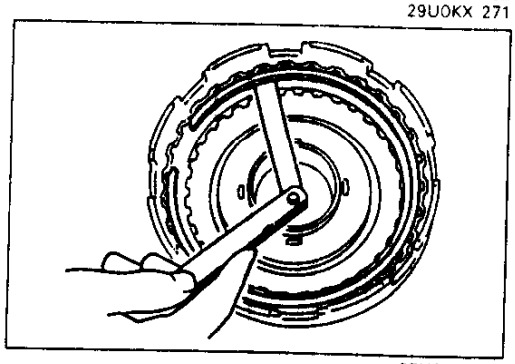
8. Apply ATF to the drive plates and driven plates, and install them into the reverse clutch drum.


29U0KX 271

9. Install the retaining plate.

Caution
- **Do not deform the snap ring.**

10. Install the snap ring.


37U0KX-098

11. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge.

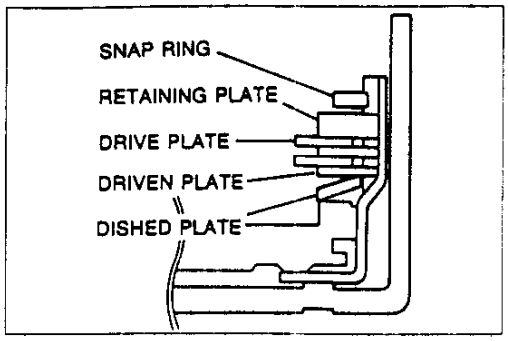
Clearance: 0.50–1.20 mm {0.020–0.047 in}

12. If not within specification, adjust the clearance by selecting the correct retaining plate.

Retaining plate size

mm {in}

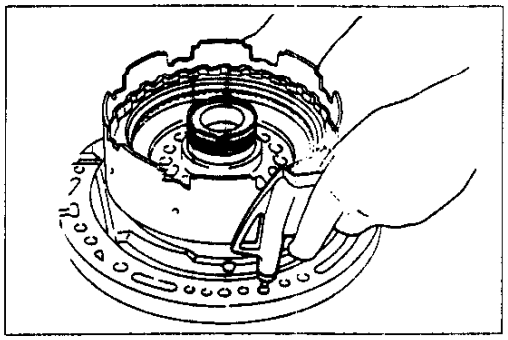
4.6 {0.181}	4.8 {0.189}	5.0 {0.197}	5.2 {0.205}
5.4 {0.213}	5.6 {0.220}	5.8 {0.228}	—



37U0KX-099

13. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates, and drive plates. Adjust the clearance by selecting the correct retaining plate.

Clearance: 0.50–0.80 mm {0.020–0.031 in}



37U0KX-100

Caution

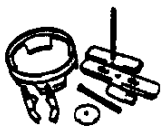
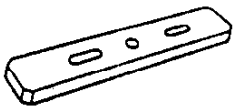
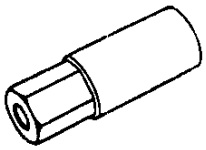
- **Apply air for no more than 3 seconds.**

14. Install the reverse clutch with seal rings onto the oil pump. Apply compressed air through the oil passage and verify clutch operation.

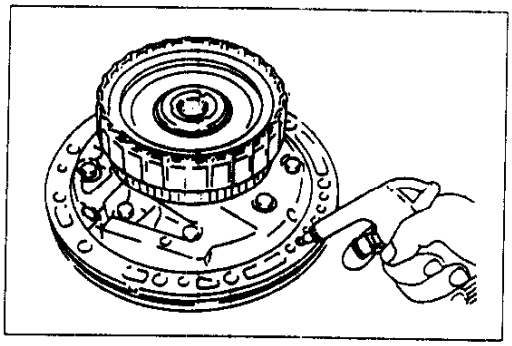
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

HIGH CLUTCH AND FRONT SUN GEAR

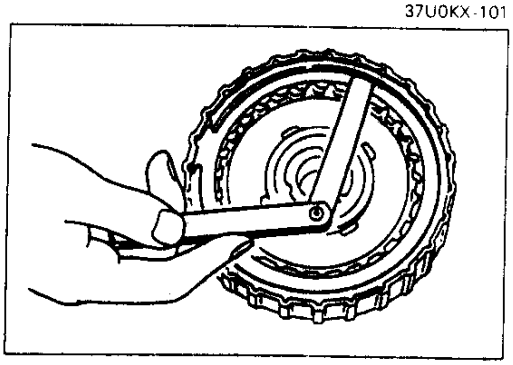
Preparation
SST

49 G019 0A7A Compressor set, return spring 	For removal / installation of snap ring	49 G019 025 Body B (Part of 49 G019 0A7A) 	For removal / installation of snap ring
49 G019 026 Plate (Part of 49 G019 0A7A) 	For removal / installation of snap ring	49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For removal / installation of snap ring
49 G019 029 Nut (Part of 49 G019 0A7A) 	For removal / installation of snap ring		

29U0KX-27



37U0KX-101



37U0KX-102

Preinspection
High clutch operation

1. Install the high clutch with seal rings onto the oil pump. Apply compressed air through the oil passage as shown.
2. Verify that the retaining plate moves toward the snap ring.

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

3. If not, the D-rings may be damaged or fluid may be leaking at the piston check ball. Inspect and replace as necessary when assembly.

Clearance between retaining plate and snap ring

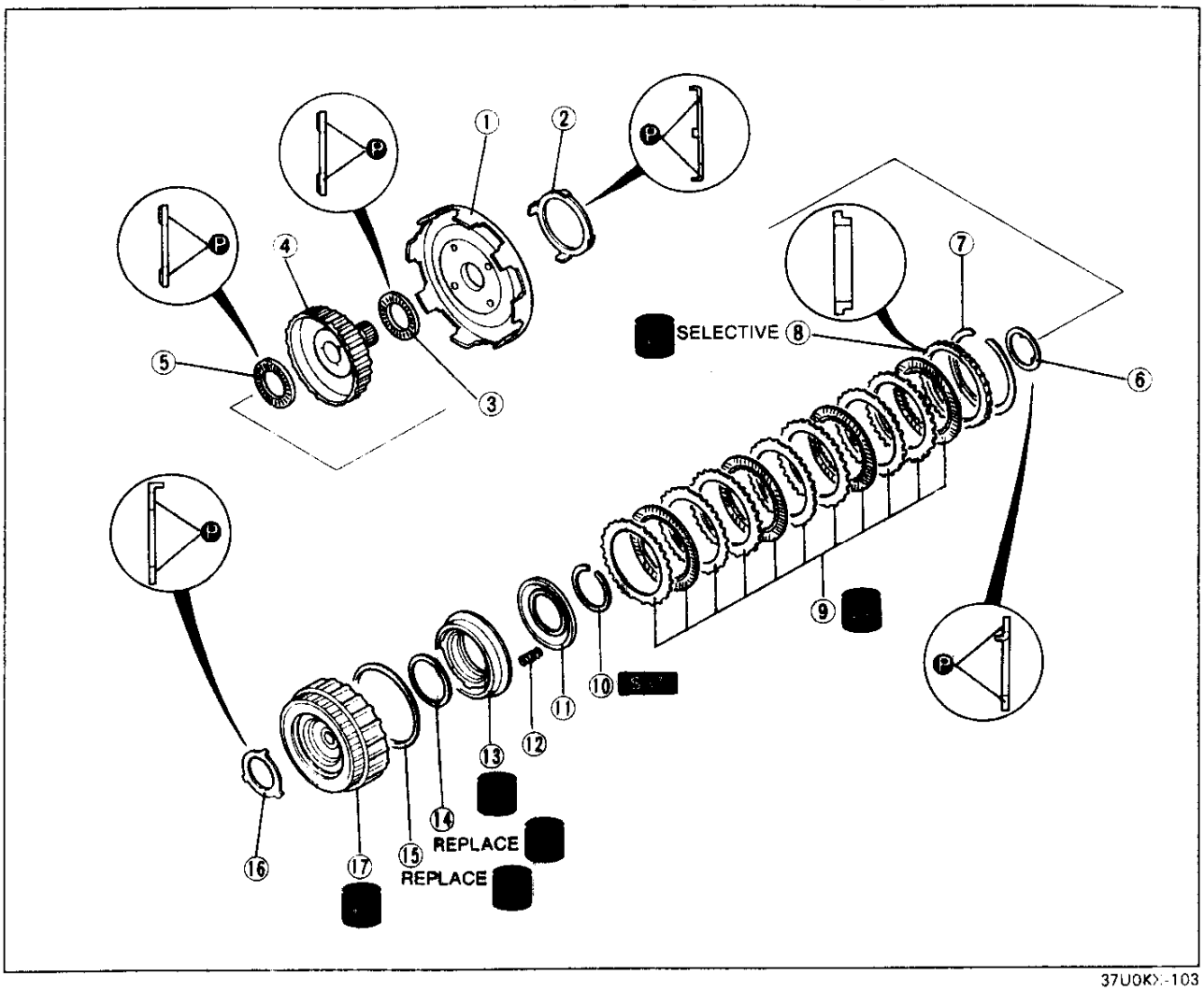
1. Measure the clearance between the retaining plate and the snap ring.

Clearance: 1.8–3.0 mm {0.071–0.118 in}

2. Select the correct retaining plate when assembling. (Refer to page K–74.)

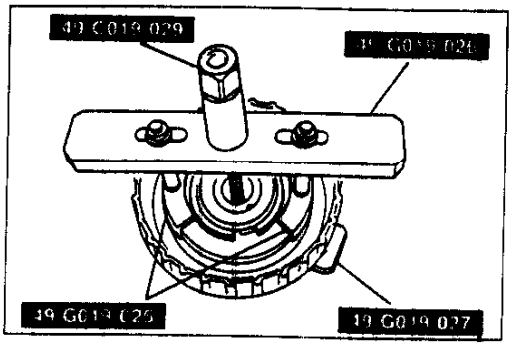
Disassembly / Inspection / Assembly

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

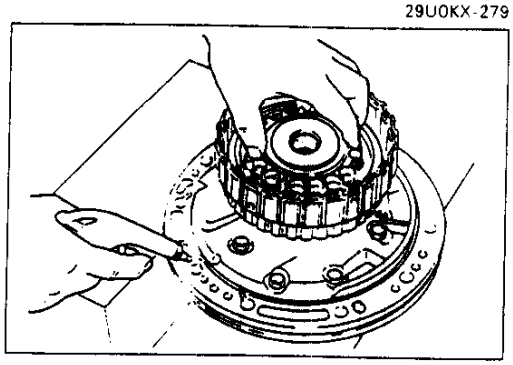


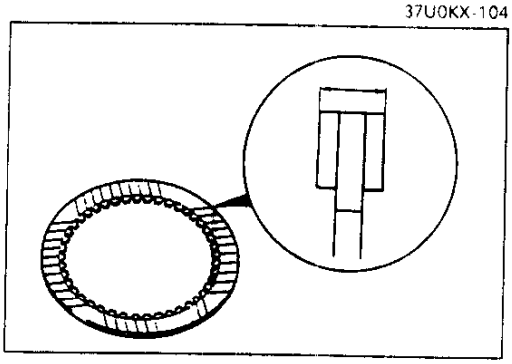
37U0K)-103

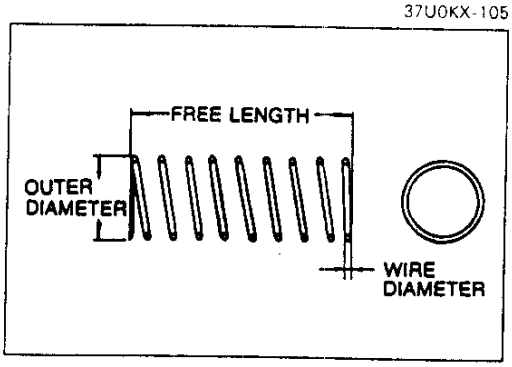
1. Front sun gear
   Inspect gear teeth for damage, wear, and cracks
2. Bearing race
   Inspect bearing surface for scoring and scratches
3. Bearing
   Inspect for damage and rough rotation
4. High clutch hub
5. Bearing
   Inspect for damage and rough rotation
6. Bearing race
   Inspect bearing surface and scoring or scratches
7. Snap ring
8. Retaining plate
9. Drive plates and driven plates
   Inspect for wear and burning
   Inspection ..... page K–72
10. Snap ring
    Disassembly Note ..... page K–72
11. Spring retainer
12. Return springs
    Inspection ..... page K–72
13. Clutch piston
    Inspect balls for sticking by shaking the piston
    Disassembly Note ..... page K–72
    Inspection ..... page K–72
14. D-ring
15. D-ring
16. Bearing race
    Inspect bearing surface for scoring and scratches
17. High clutch drum



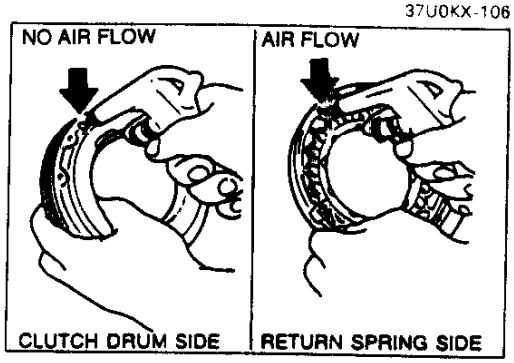
29U0KX-279


37U0KX-104


37U0KX-105



37U0KX-106



37U0KX-107

Disassembly note
Snap ring

Caution
- **Depress the spring retainer only enough to remove the snap ring.**
- **Do not damage the snap ring.**

1. Compress the springs by using the **SST**, and remove the snap ring with snap ring pliers.
2. Remove the piston retainer and return springs.

Clutch piston

1. Install the high clutch with seal rings onto the oil pump.
2. Remove the piston by applying compressed air through the oil passage.

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.

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

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

Return springs

1. Measure the spring free length.

Specification

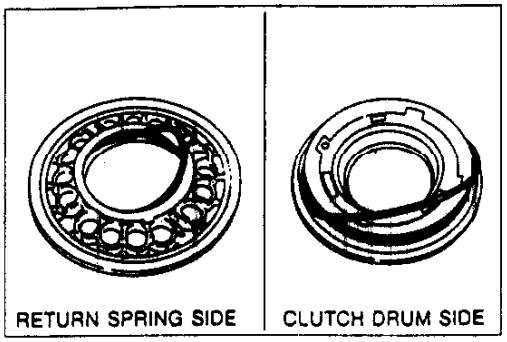
Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
11.6 {0.457}	22.3 {0.878}	5.2	1.2 {0.047}

2. If not within specification, replace the return spring.

Clutch piston

1. Shake the clutch piston and verify that the check ball is free.
2. Verify that there is no air flow when applying compressed air through the oil hole on the clutch drum side
3. Verify that there is air flow when applying compressed air through the oil hold on the return spring side.

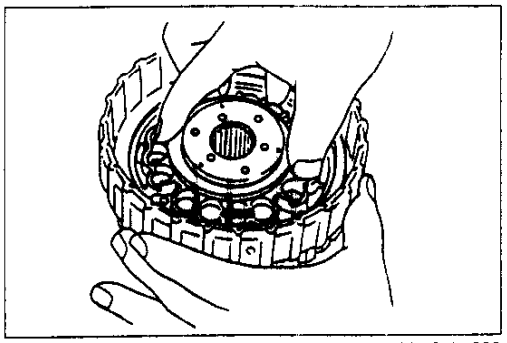
Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.



29U0KX-284

Assembly procedure

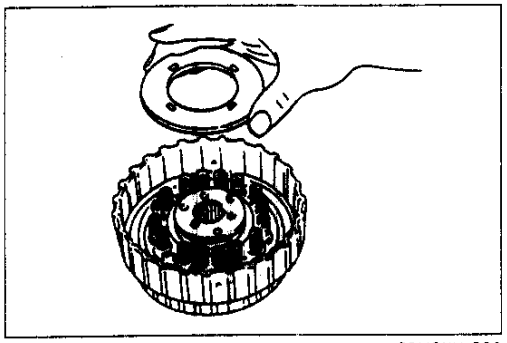
1. Apply ATF to new D-rings and install them into the clutch piston.


29U0KX-285

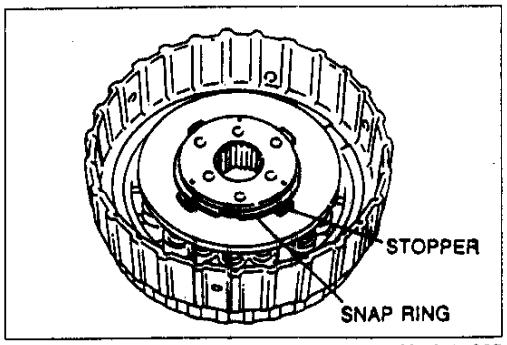
2. Apply ATF to the inner face of the high clutch drum.

Caution
- **Apply even pressure to the perimeter of the clutch piston when installing it to avoid damaging the D-rings.**

3. Install the clutch piston into the high clutch drum by turning it evenly and gradually.

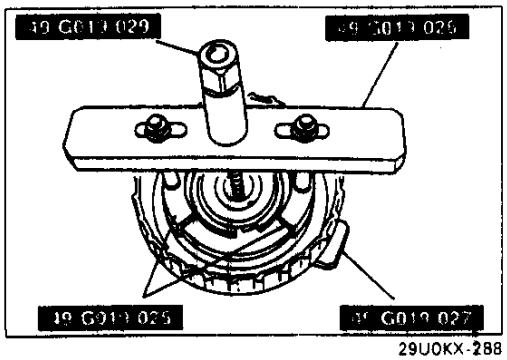

29U0KX-286

4. Install the return springs and spring retainer.

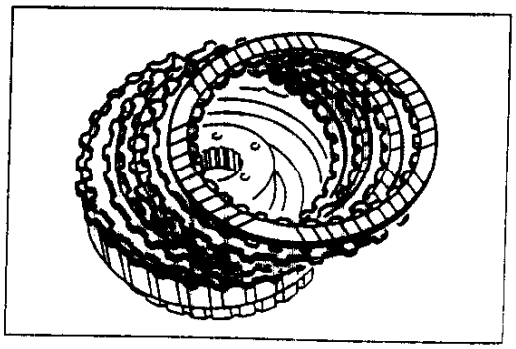


29U0KX-287

Caution
- **Depress the spring retainer only enough to install the snap ring.**
- **Do not overexpand the snap ring when installing.**
- **Install the snap ring inside the stopper of the spring retainer.**
- **Do not align the snap ring endgap with the spring retainer stopper.**

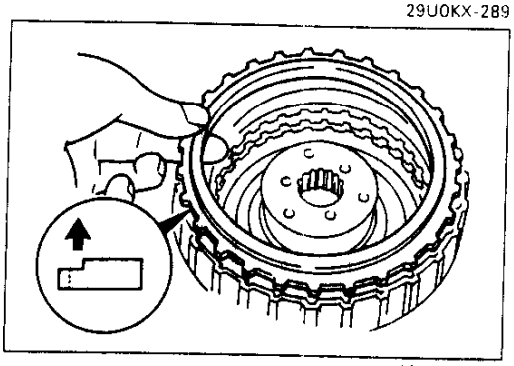

29U0KX-288

5. Install the snap ring while compressing the springs by using the **SST**.


29U0KX-289

Note
- **Installation order:**
  Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive
- **Soak new drive plates in ATF for at least two hours before installation.**

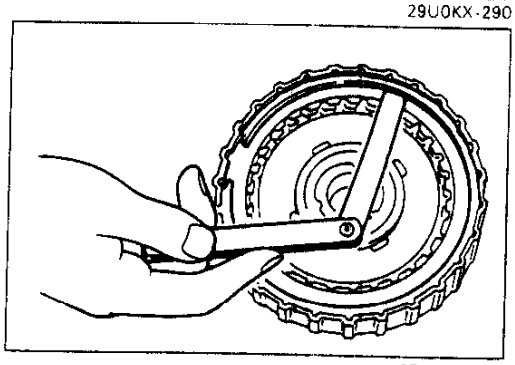
6. Apply ATF to the drive plates and driven plates, and install them into the high clutch drum.


29U0KX-290

7. Install the retaining plate.

Caution
- **Do not deform the snap ring.**

8. Install the snap ring.


37U0KX-108

9. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge.

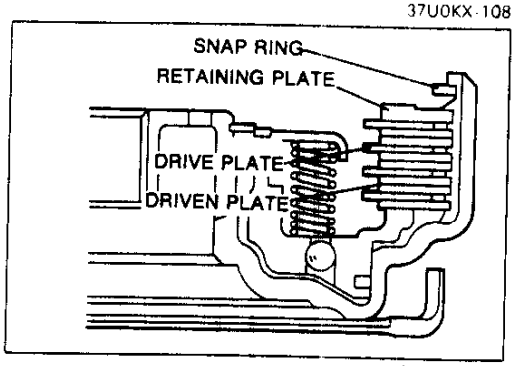
Clearance: 1.8–3.0 mm {0.071–0.118 in}

10. If not within specification, adjust the clearance by selecting the correct retaining plate.

Retaining plate size

mm {in}

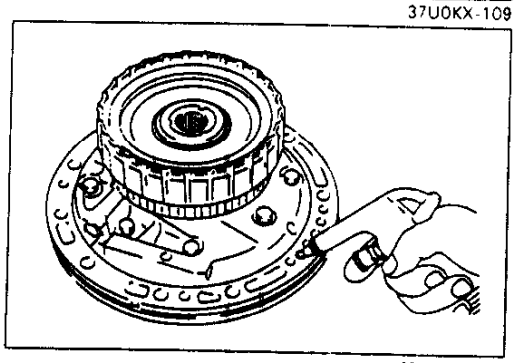
3.4 {0.134}	3.6 {0.142}	3.8 {0.150}
4.0 {0.157}	4.2 {0.165}	-



37U0KX-109

11. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the driven plates and drive plates. Adjust the clearance by selecting the correct retaining plate.

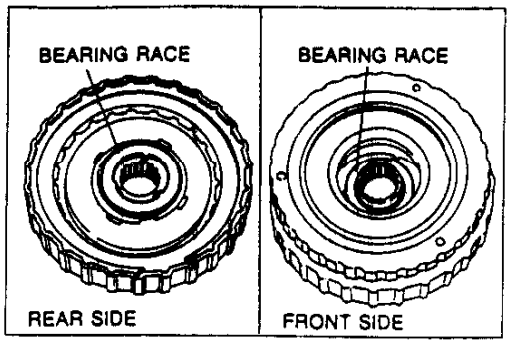
Clearance: 1.8–2.2 mm {0.071–0.087 in}


37U0KX-110

Caution
- **Apply air for no more than 3 seconds.**

12. Install the high clutch with the seal rings onto the oil pump. Apply compressed air through the oil passage and verify clutch operation.

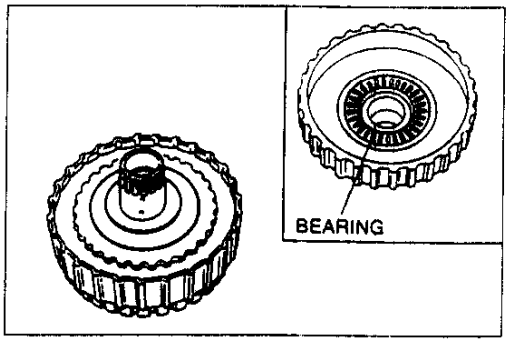
Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.



37U0KX-111

13. Apply petroleum jelly to the bearing races and install them in the high clutch drum as shown.

Bearing race outer diameter
Front: 43.5 mm {1.71 in}
Rear: 51.5 mm {2.03 in}

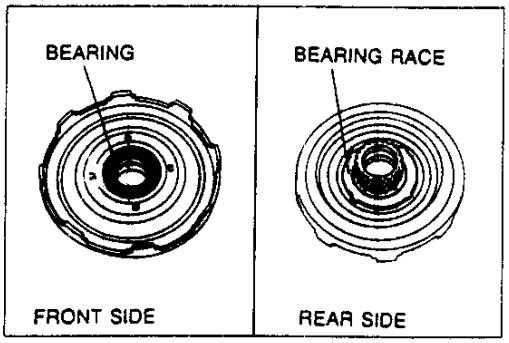


37U0KX-112

14. Apply petroleum jelly to the bearing and install it in the high clutch hub as shown.

Bearing outer diameter: 53.0 mm {2.09 in}

15. Apply ATF to the high clutch hub, and install it in the high clutch drum by turning it evenly and gradually.

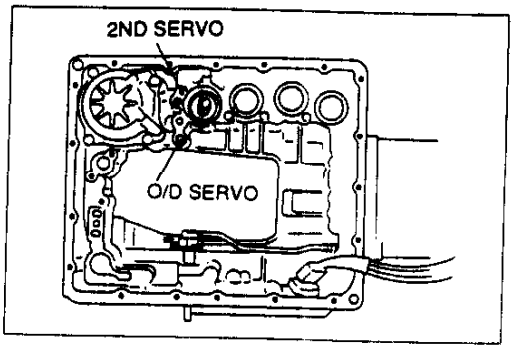


37U0KX-113

16. Apply petroleum jelly to the bearing and bearing race, and install them to the front sun gear.

Bearing outer diameter: 53.0 mm {2.09 in}
Bearing race outer diameter: 75.0 mm {2.95 in}

17. Assemble the front sun gear, reverse clutch, high clutch, and high clutch hub.



37U0KX-114

BAND SERVO

Preinspection

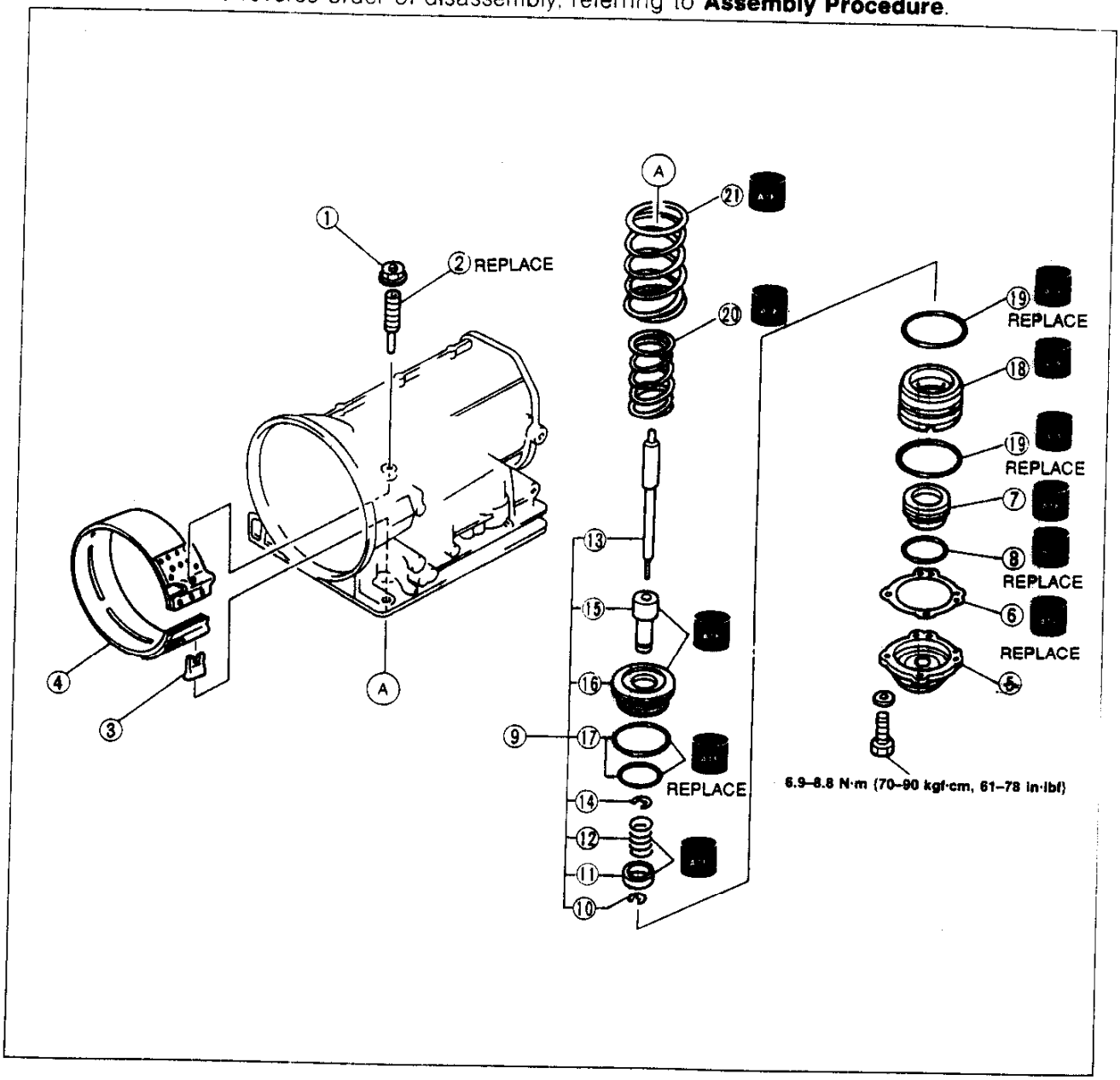
Band servo operation

1. Apply compressed air through the oil passage as shown.
2. Verify that the piston stem moves toward the brake band.

   Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.
3. If not, the D-rings or the O-rings may be damaged or the piston assembly may be sticking. Inspect and replace as necessary when assembling.

Disassembly / Inspection / Assembly

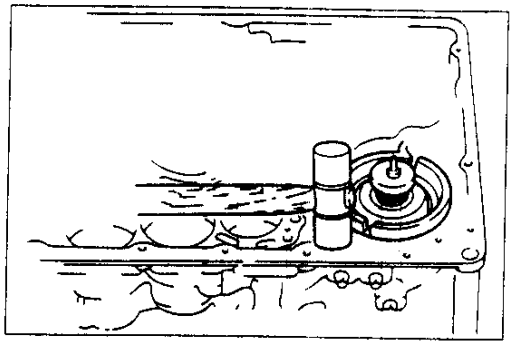
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



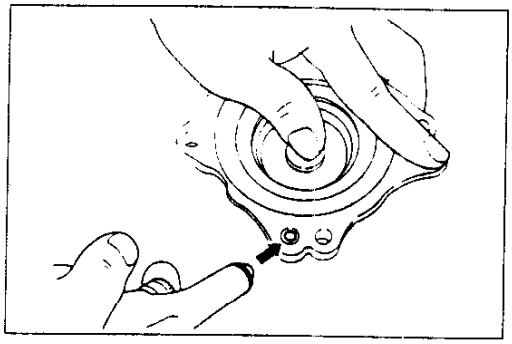
29U0KX-298

1. Locknut
2. Anchor end bolt
3. Band strut
4. Brake band
5. Band servo retainer
6. Gasket
7. O/D band servo piston
   Disassembly Note ..... below
8. D-ring
9. Piston and servo piston retainer
   Disassembly Note ..... below
10. Retaining ring (small)
11. Spring retainer
12. Return spring C
    Inspection ..... below
13. Piston stem
14. Retaining ring (large)
15. Servo spring retainer
16. Band servo piston
17. D-rings
18. Servo piston retainer
19. O-rings
20. Return spring B
    Inspection ..... below
21. Return spring A
    Inspection ..... below

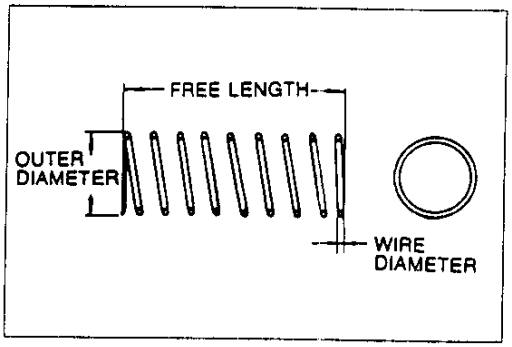
29U0KX-299



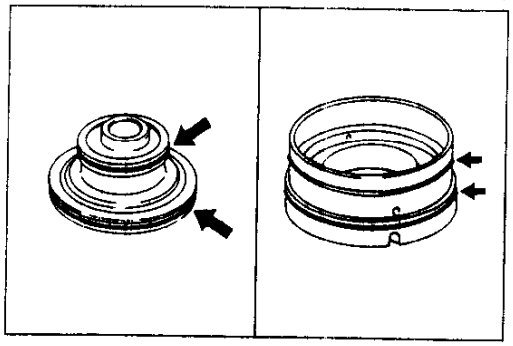
29U0KX-300



37U0KX-115



37U0KX-116



29U0KX-303

Disassembly note
Piston and servo piston retainer

Remove the piston and servo piston retainer from the transmission case by using a plastic hammer.

O/D band servo piston

1. Block one oil hole of the O/D servo piston retainer and the center hole in the O/D band servo piston.
2. Apply compressed air through the other oil hole in the O/D servo piston retainer to remove O/D band servo piston.

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

3. Remove the D-ring from the O/D band servo piston.

Inspection
Return spring

1. Measure the spring free length.

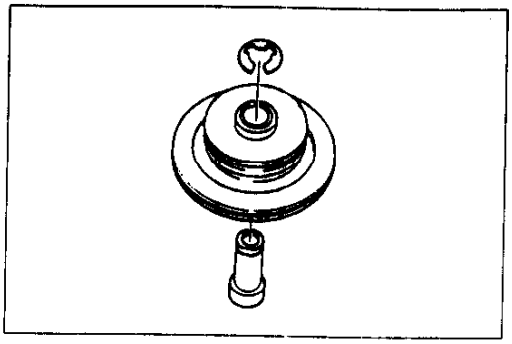
Specification

Item / Spring	Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
Spring A	40.3 {1.59}	53.8 {2.12}	3.0	2.3 {0.091}
Spring B	34.3 {1.35}	45.6 {1.80}	3.0	2.3 {0.091}
Spring C	27.6 {1.09}	29.7 {1.17}	3.2	2.6 {0.102}

2. If not within specification, replace the return spring.

Assembly procedure

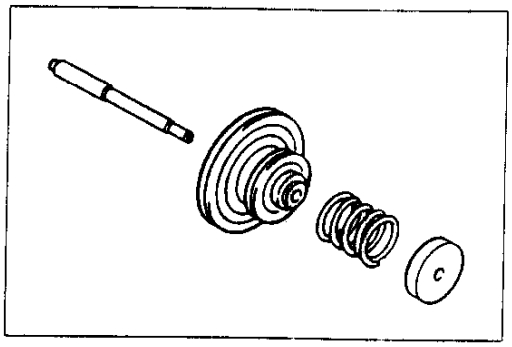
1. Apply ATF to new O-rings and install them onto the servo piston retainer.
2. Apply ATF to new D-rings and install them onto the band servo piston.



29U0KX-304

Caution
- **Do not deform the retaining ring.**

3. Apply ATF to the servo spring retainer and retaining ring (large). Assemble them in the band servo piston.

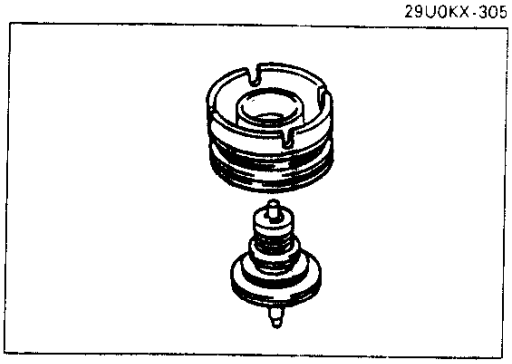


29U0KX-305

4. Assemble the band servo piston, piston stem, return spring, and spring retainer.

Caution
- **Do not deform the retaining ring.**

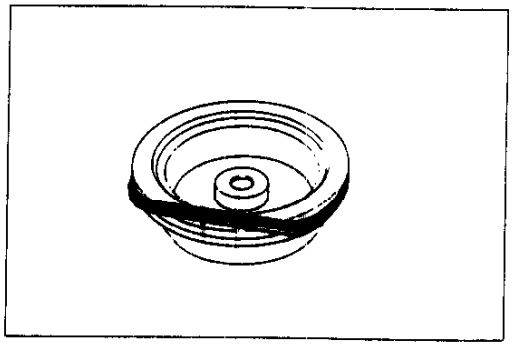
5. Install the retaining ring (small).



29U0KX-306

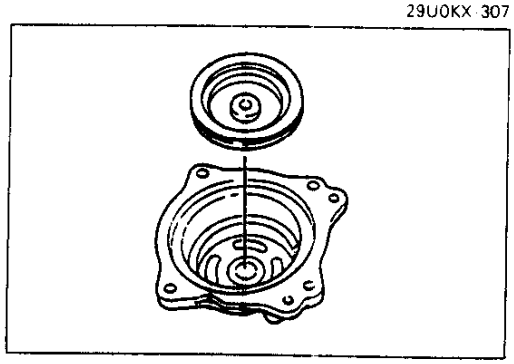
Caution
- **Apply even pressure to the perimeter of the piston when installing it to avoid damaging the O-rings and D-rings.**

6. Apply ATF to the band servo piston assembly and install it onto the servo piston retainer.



29U0KX-307

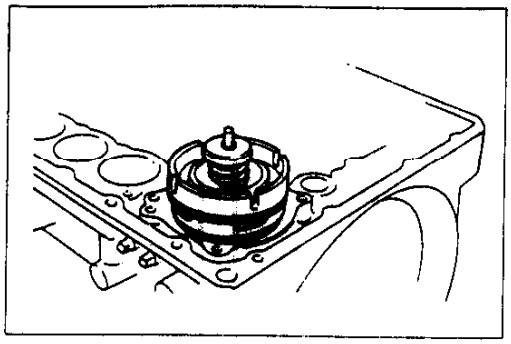
7. Apply ATF to a new D-ring and install it onto the O/D band servo piston.



29U0KX-308

Caution
- **Apply even pressure to the perimeter of the piston when installing it to avoid damaging the D-ring.**

8. Apply ATF to the O/D band servo piston, and install it into the band servo retainer.

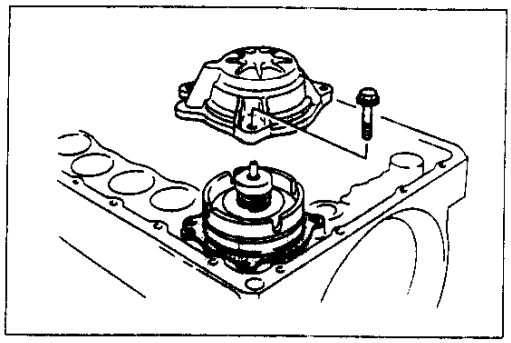


29U0KX-309

9. Install return springs A and B.

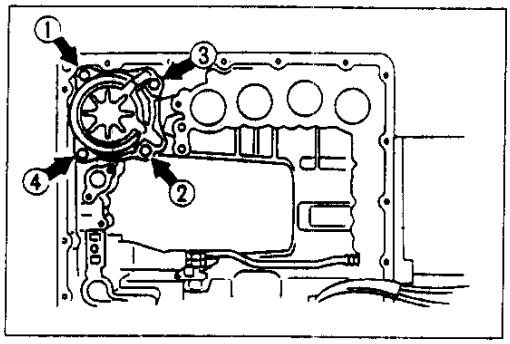
Caution
- **Apply even pressure to the perimeter of the body when installing it to avoid damaging the O-rings and D-rings.**

10. Apply ATF to the piston assembly and install it into the transmission case.



29U0KX-310

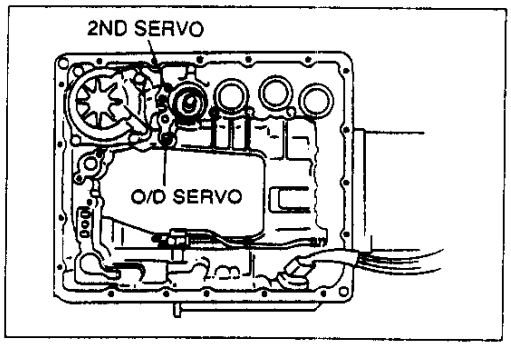
11. Apply ATF to the band servo retainer and a new gasket, and install them on the transmission case.



37U0KX-117

12. Tighten the bolts evenly and gradually in the order shown.

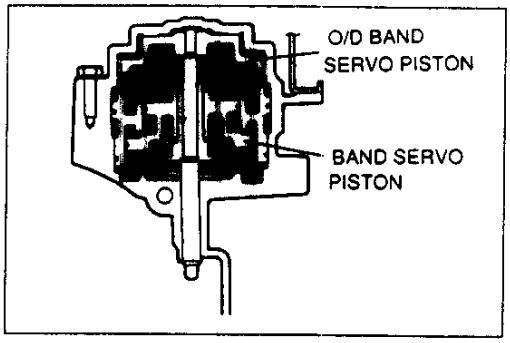
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}

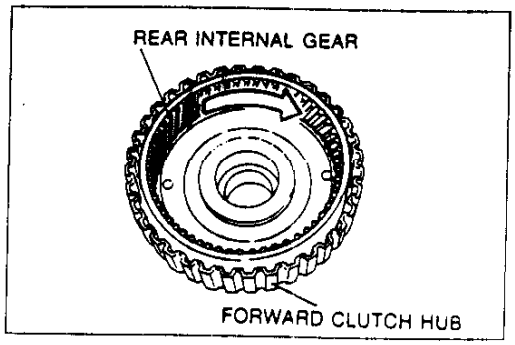


37U0KX-118

13. Verify servo piston operation by applying compressed air through the oil holes as shown.

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





29U0KX-313

FRONT INTERNAL GEAR, REAR INTERNAL GEAR, FORWARD CLUTCH HUB, OVERRUNNING CLUTCH HUB

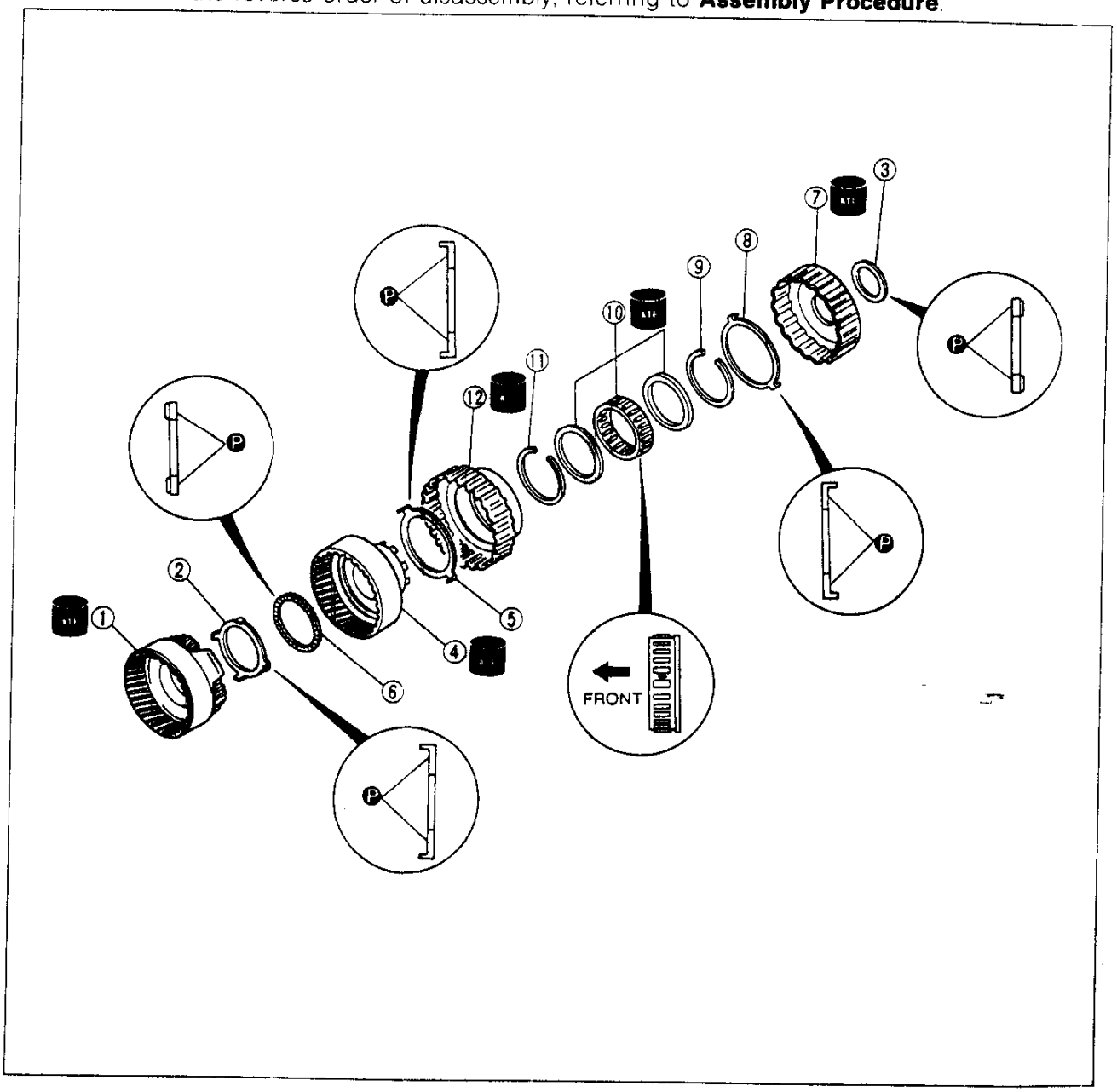
Preinspection

Forward one-way clutch operation

1. While holding the forward clutch hub, verify that the rear internal gear rotates smoothly when turned clockwise and locks when turned counterclockwise.
2. If not as specified, replace the one-way clutch.

Disassembly / Inspection / Assembly

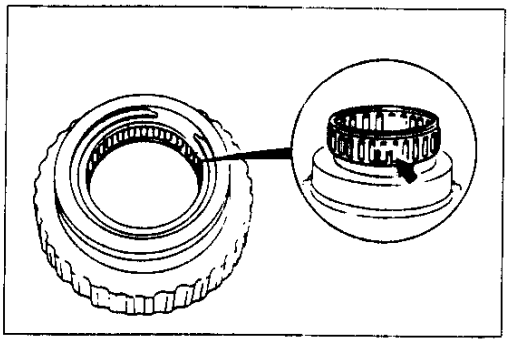
1. Disassemble in the order shown in the figure.
2. Inspect all parts and replace if necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



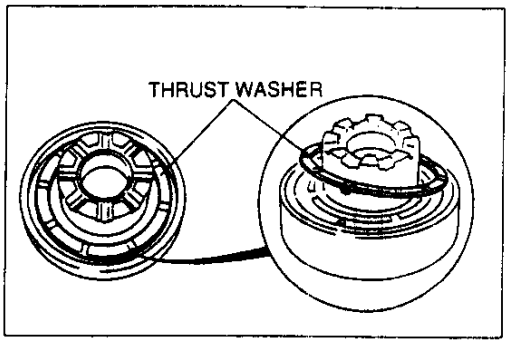
29U0KX-314

1. Front internal gear (with rear planetary carrier)
   Inspect gear teeth for damage, wear, and cracks
   Check rotation of pinion gears
2. Bearing race
   Inspect bearing surface for scoring and scratches
3. Bearing
   Inspect for damage and rough rotation
4. Rear internal gear
   Inspect gear teeth for damage, wear, and cracks
5. Thrust washer
6. Bearing
   Inspect for damage and rough rotation
7. Overrunning clutch hub
8. Thrust washer
9. Snap ring
10. Forward one-way clutch
    Inspection ..... page K–80
11. Snap ring
12. Forward clutch hub

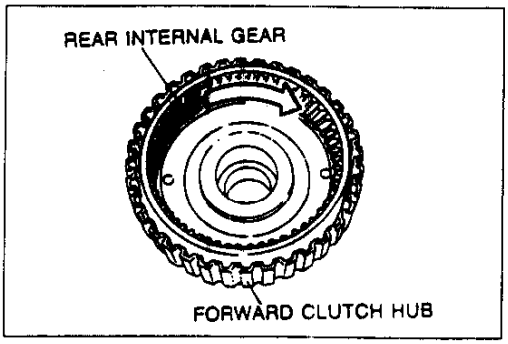
37U0KX-119



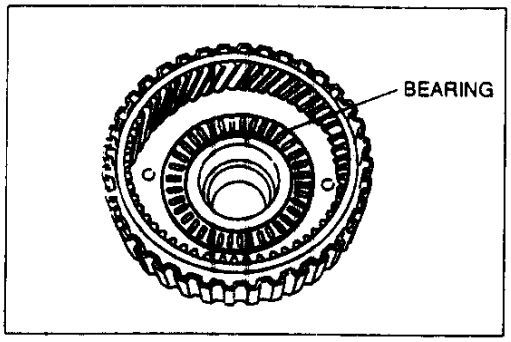
29U0KX-316



29U0KX-317



29U0KX-318



37U0KX-120

Assembly procedure

Caution
- **Do not deform the snap ring.**
- **Install the side indicated by the arrow in the figure toward the front when inserting the one-way clutch into the forward clutch hub.**

1. Install the snap ring into the forward clutch hub.
2. Apply ATF to the forward one-way clutch. Install it in the forward clutch hub and install the snap ring.

Note
- **Be sure the locating tabs of the thrust washer are set into the holes in the rear internal gear.**

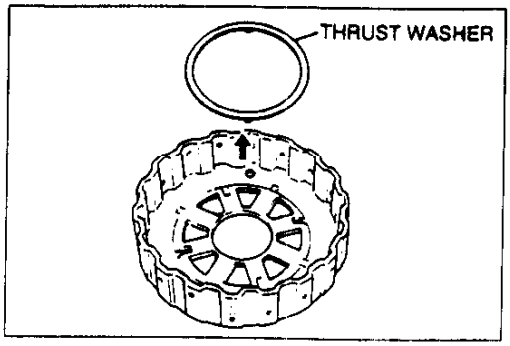
3. Apply petroleum jelly to the thrust washer and set it on the rear internal gear.

Note
- **If the rear internal gear turns counterclockwise, the one-way clutch is installed upside down.**

4. Apply ATF to the rear internal gear, and install it in the forward clutch hub by turning it evenly and gradually.
5. While holding the forward clutch hub, verify that the rear internal gear turns clockwise only.

6. Apply petroleum jelly to the bearing, and install it on the rear internal gear.

Bearing outer diameter: 78.0 mm {3.07 in}

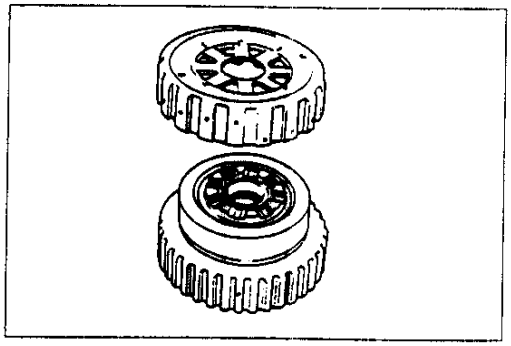


29U0KX-320

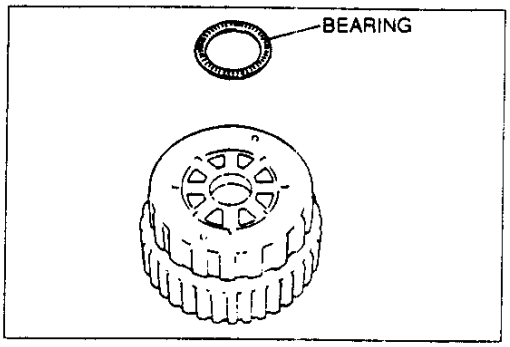
Note

- **Be sure the locating tabs of the thrust washer are set into the holes in the overrunning clutch hub.**

7. Apply petroleum jelly to the thrust washer, and set it in the overrunning clutch hub.


29U0KX-321

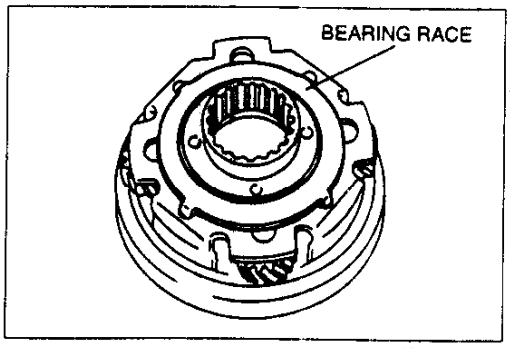
8. Set the overrunning clutch hub on the rear internal gear.



37U0KX-121

9. Apply petroleum jelly to the bearing, and set it on the overrunning clutch hub.

Bearing outer diameter: 59.0 mm {2.32 in}



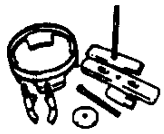
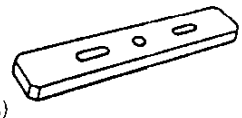
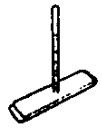
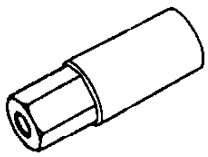
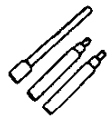
37U0KX-122

10. Apply petroleum jelly to the bearing race, and set it on the front internal gear.

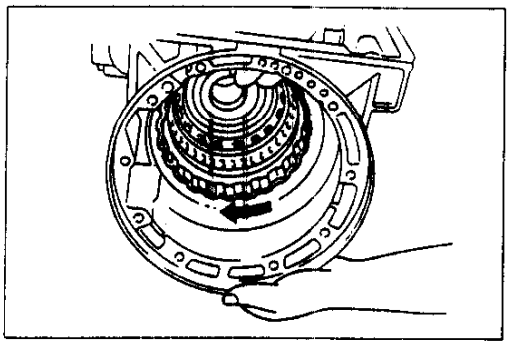
Bearing race outer diameter: 75.0 mm {2.95 in}

FORWARD CLUTCH DRUM (FORWARD CLUTCH, OVERRUNNING CLUTCH, LOW ONE-WAY CLUTCH)

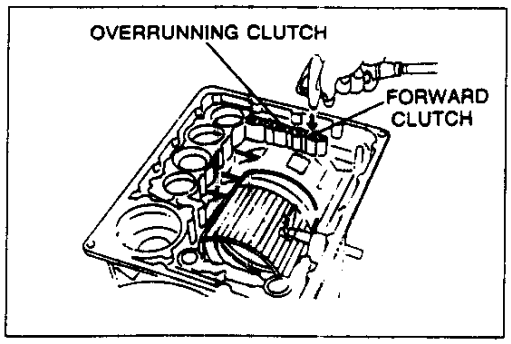
Preparation
SST

49 G019 0A7A Compressor set, return spring 	For removal / installation of snap ring	49 G019 025 Body B (Part of 49 G019 0A7A) 	For removal / installation of snap ring
49 G019 026 Plate (Part of 49 G019 0A7A) 	For removal / installation of snap ring	49 G019 027 Attachment A (Part of 49 G019 0A7A) 	For removal / installation of snap ring
49 G019 029 Nut (Part of 49 G019 0A7A) 	For removal / installation of snap ring	49 L019 001 Bolt 	For removal / installation of snap ring

29U0KX-324



29U0KX-325



37U0KX-123

Preinspection
Low one-way clutch operation

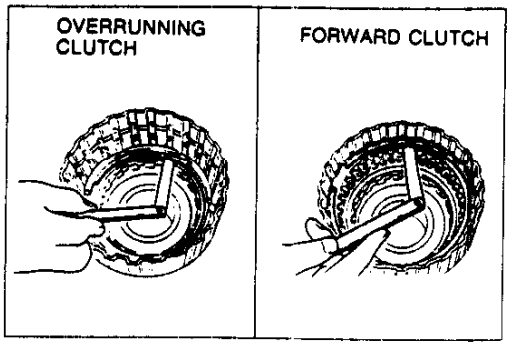
1. Install the forward clutch drum into the transmission case.
2. Verify that the forward clutch drum rotates smoothly when turned clockwise, and locks when turned counterclockwise.
3. If not, replace the one-way clutch.

Forward clutch and overrunning clutch operation

1. Install the forward clutch drum and low one-way clutch inner race into the transmission case. Apply compressed air through the oil passage as shown.
2. Verify that the retaining plates move toward the snap rings.

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

3. If not, the D-rings or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect and replace as necessary when assembling.



37U0KX-124

Clearance between retaining plate and snap ring

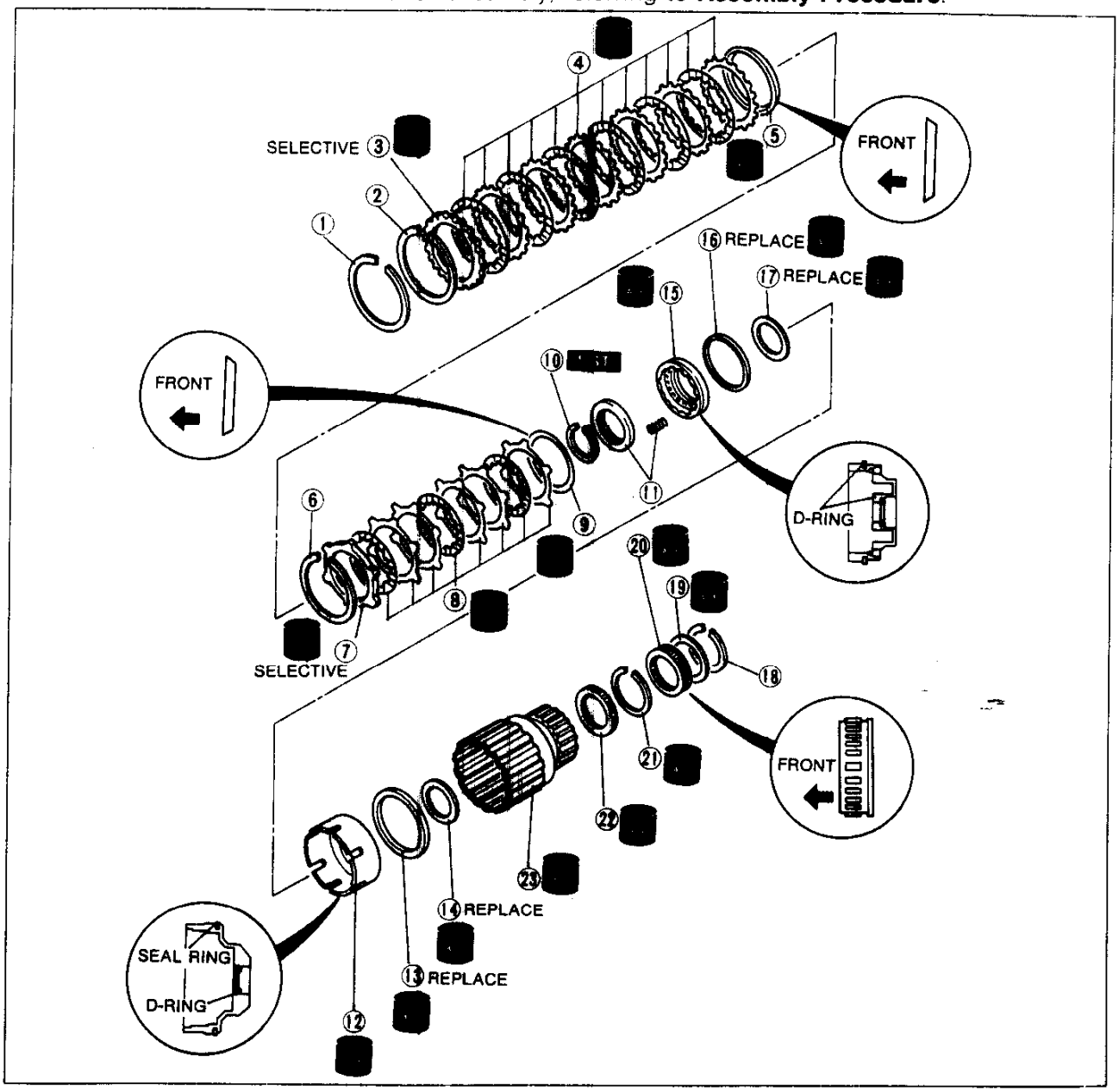
1. Measure the clearance between the retaining plate and the snap ring of the forward clutch and the overrunning clutch.

Clearance
Forward clutch: 0.45–1.85 mm {0.018–0.073 in}
Overrunning clutch: 1.0–2.0 mm {0.039–0.079 in}

2. Select the correct retaining plate when assembling. (Refer to pages K–89, 90.)

Disassembly / Inspection / Assembly

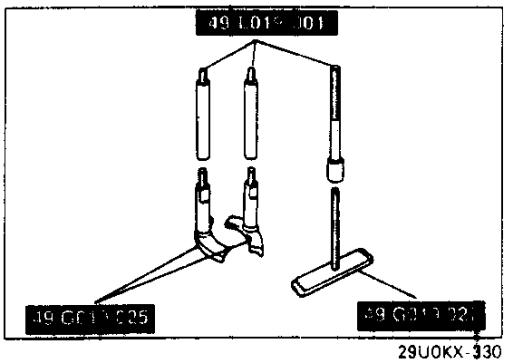
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



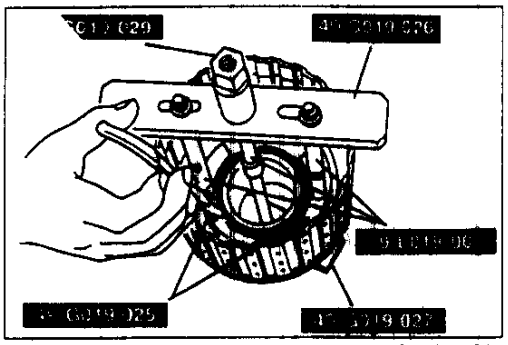
29U0KX-328

1. Snap ring
2. Snap ring
3. Retaining plate
4. Drive plates and driven plates
   Inspect for wear and burning
   Inspection ..... page K–86
5. Dished plate
6. Snap ring
7. Retaining plate
8. Drive plates and driven plates
   Inspect for wear and burning
   Inspection ..... page K–86
9. Dished plate
10. Snap ring
    Disassembly Note ..... below
11. Spring retainer and return springs
    Inspection ..... page K–86
12. Forward clutch piston
    Disassembly Note ..... below
13. Seal ring
14. D-ring
15. Overrunning clutch piston
    Inspect balls for sticking by shaking piston
    Disassembly Note ..... below
    Inspection ..... page K–86
16. D-ring
17. D-ring
18. Snap ring
19. Side plate
20. Low one-way clutch
    Inspection ..... page K–83
21. Snap ring
22. Bearing (radial bearing)
    Inspect for damage and rough rotation
23. Forward clutch drum
    Inspection ..... page K–86

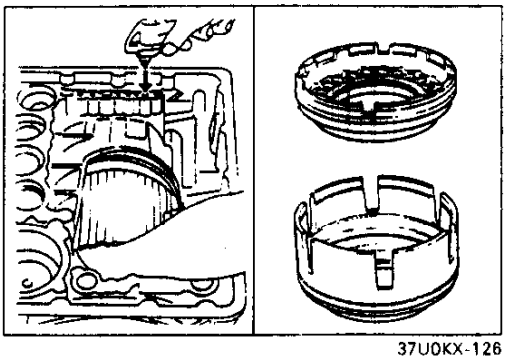
37U0KX-125



29U0KX-330



29U0KX-331



37U0KX-126

Disassembly note
Snap ring

1. Assemble the **SST**.

Caution
- **Depress the spring retainer only enough to remove the snap ring.**
- **Do not damage the snap ring.**

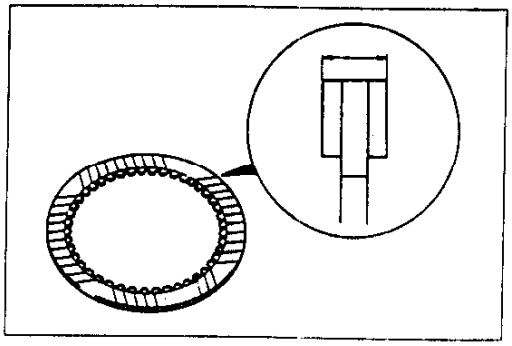
2. Compress the springs by using the **SST**, and remove the snap ring with snap ring pliers.
3. Remove the spring retainer and return springs.

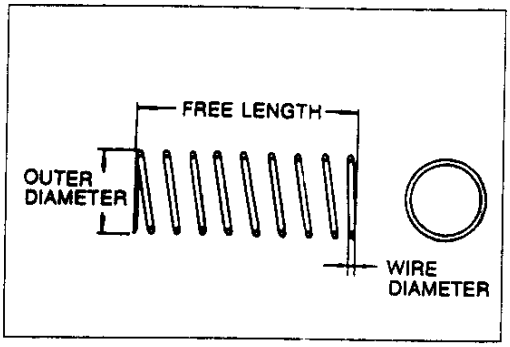
Forward clutch piston, Overrunning clutch piston

1. Set the forward clutch drum in the transmission case.
2. Remove the piston by applying compressed air through the oil passage.

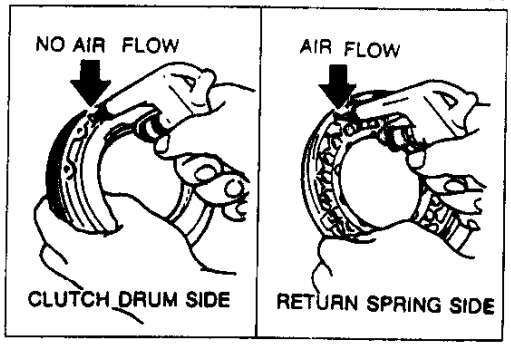
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

3. Remove the overrunning clutch piston from the forward clutch piston.

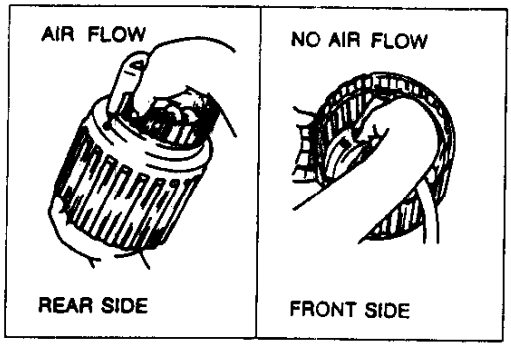

37U0KX-127



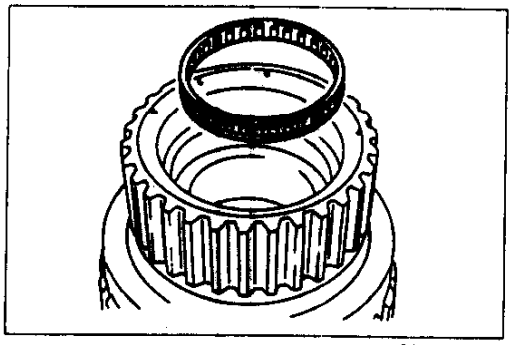
37U0KX-128



37U0KX-128



37U0KX-130


29U0KX-337

Inspection
Drive plates

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

Forward clutch
Standard: 2.0 mm {0.079 in}
Minimum: 1.8 mm {0.071 in}

Overrunning clutch
Standard: 2.0 mm {0.079 in}
Minimum: 1.8 mm {0.071 in}

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

Return springs

1. Measure the spring free length.

Specification

Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
9.7 {0.38}	35.8 {1.41}	10.3	1.3 {0.051}

2. If not within specification, replace the return spring.

Overrunning clutch piston

1. Shake the clutch piston and verify that the check ball is free.
2. Verify that there is no air flow when applying compressed air through the oil hole on the clutch drum side.
3. Verify that there is air flow when applying compressed air through the oil hole on return spring side.

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

Forward clutch drum

1. Verify that there is no air flow when applying compressed air through the oil hole on the front side.
2. Verify that there is air flow when applying compressed air through the oil hole on the rear side.

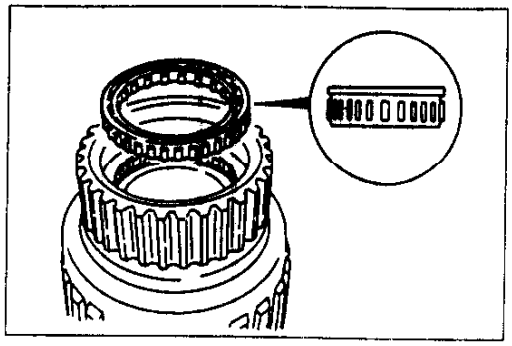
Air pressure: 390 kPa {4.0 kgf/cm^2, 57 psi} max.

Assembly procedure

1. Apply ATF to the bearing and install it into the forward clutch drum.

Caution
- **Do not deform the snap ring.**

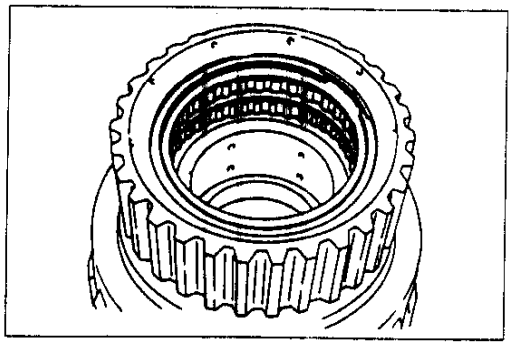
2. Install the snap ring.



29U0KX 338

Caution
- **Install the low one-way clutch with the flange facing upward.**
- **Do not damage the forward clutch drum inner face when installing the low one-way clutch.**

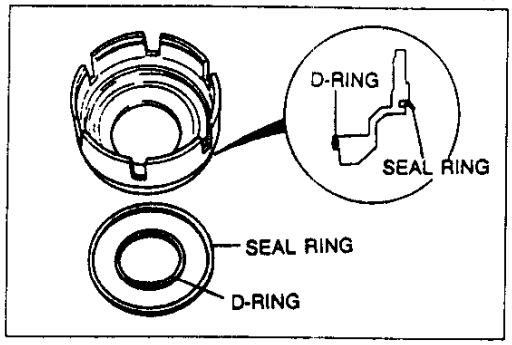
3. Apply ATF to the low one-way clutch, and install it into the forward clutch drum.



29U0KX-339

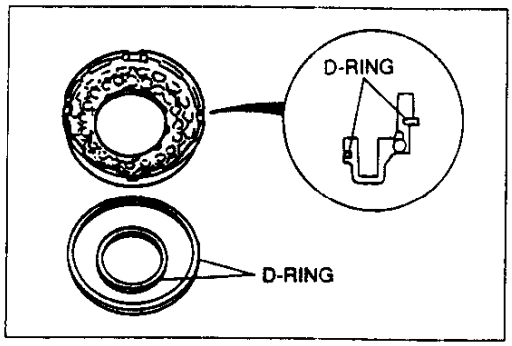
Caution
- **Do not deform the snap ring.**

4. Apply ATF to the side plate and snap ring, and install them into the forward clutch drum.



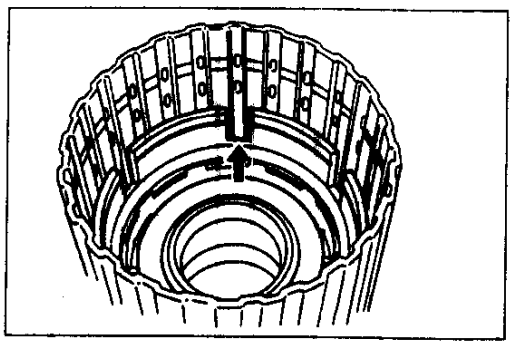
29U0KX-340

5. Apply ATF to a new D-ring and seal ring, and install them into the forward clutch piston as shown.



29U0KX-341

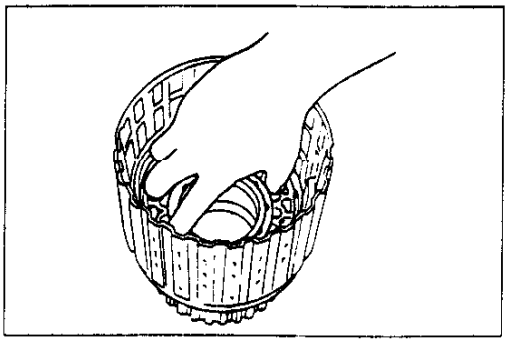
6. Apply ATF to the new D-rings, and install them to the overrunning clutch piston as shown.



29U0KX-342

Caution
- **Apply even pressure to the perimeter of the piston when installing it to avoid damaging the seal ring and D-ring.**
- **If the piston cannot be turned by hand, remove the piston and check for damage to the seal ring.**

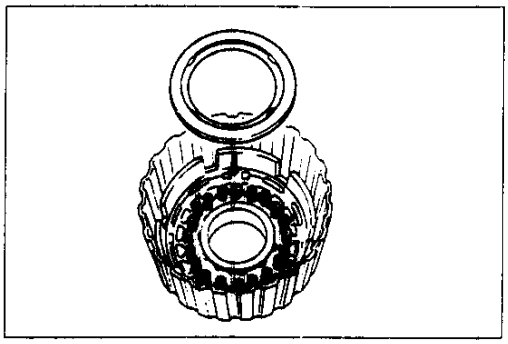
7. Apply ATF to the inner face of the forward clutch drum and to the forward clutch piston.
8. Install the forward clutch piston in the forward clutch drum by turning it evenly and gradually. Align the notches in the forward clutch piston with the grooves in forward clutch drum.



29U0KX-343

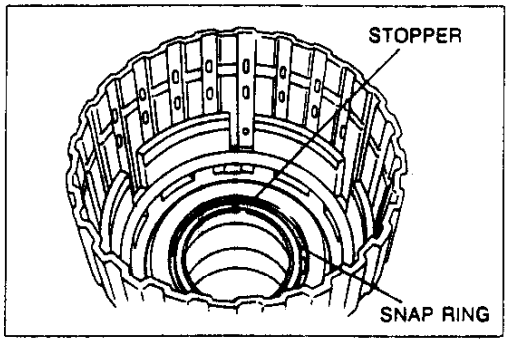
Caution
- **Apply even pressure to the perimeter of the piston when installing it to avoid damaging the D-rings.**

9. Apply ATF to the inner face of the forward clutch piston and to the overrunning clutch piston.
10. Install the overrunning clutch piston in the forward clutch piston by turning it evenly and gradually.



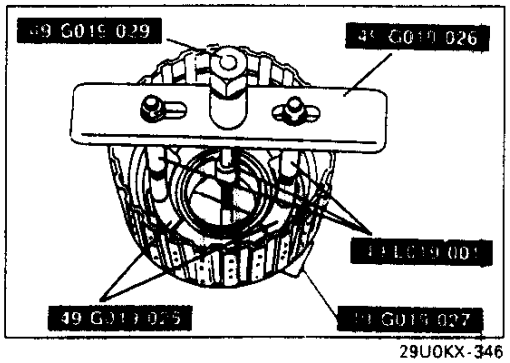
29U0KX-344

11. Install the return springs and spring retainer.



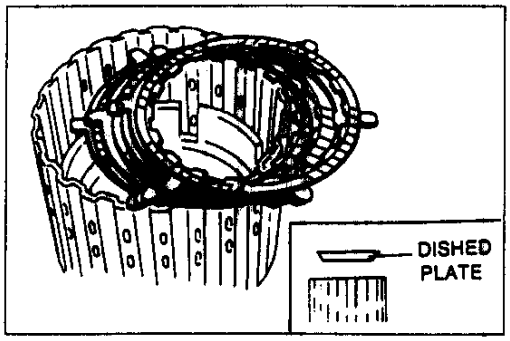
29U0KX-345

Caution
- **Depress the spring retainer only enough to install the snap ring.**
- **Do not overexpand the snap ring.**
- **Install the snap ring inside the stopper of the spring retainer.**
- **Do not align the snap ring endgap with the spring retainer stopper.**



29U0KX-346

12. Install the snap ring while compressing the springs by using the **SST**.

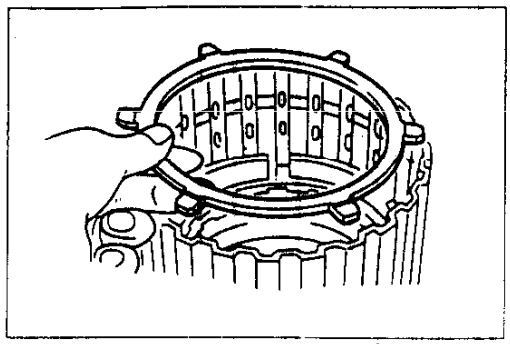


29U0KX-347

13. Install the dished plate as shown.

Note
- **Installation order: Driven-Drive-Driven-Driven-Drive-Driven-Driven-Drive**
- **Soak new drive plates in ATF for at least two hours before installation.**

14. Apply ATF to the drive plates and driven plates, and install them into the forward clutch piston.

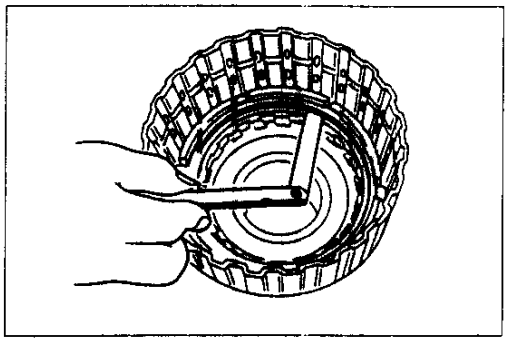


29U0KX-348

15. Install the retaining plate.

Caution
- **Do not deform the snap ring.**

16. Install the snap ring.



37U0KX-131

17. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge

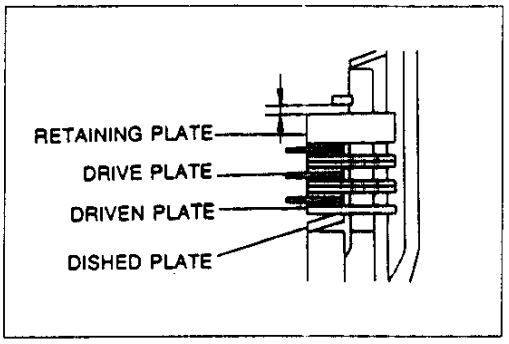
Clearance: 1.0–2.0 mm {0.039–0.079 in}

18. If not within specification, adjust the clearance by selecting the correct retaining plate.

Retaining plate size

mm {in}

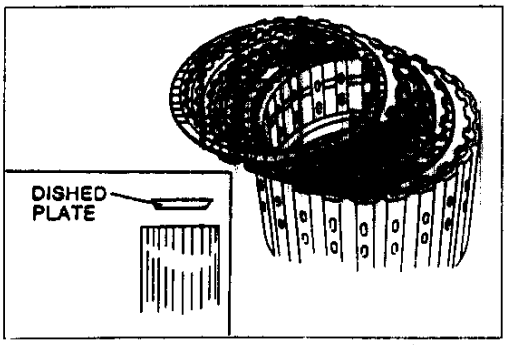
4.0 {0.157}	4.2 {0.165}	4.4 {0.173}	4.6 {0.181}
4.8 {0.189}	5.0 {0.197}	5.2 {0.205}	–



37U0KX-132

19. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates, and drive plates.
Adjust the clearance by selecting the correct retaining plate.

Clearance: 1.0–1.4 mm {0.039–0.055 in}

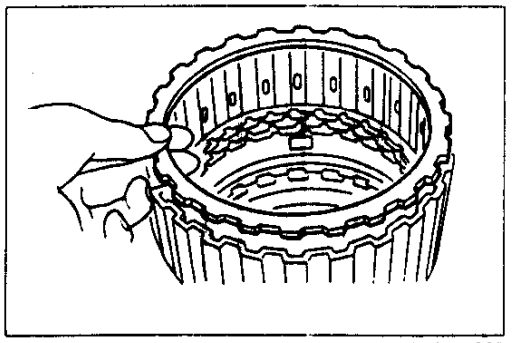


37U0KX-133

20. Install the dished plate as shown.

Note
- **Installation order:**
  Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive
- **Soak new drive plates in ATF for at least two hours before installation.**

21. Apply ATF to the drive plates and driven plates, and install them into the forward clutch drum.

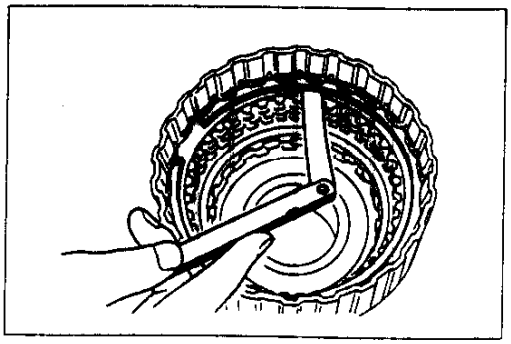


29U0KX-352

22. Install the retaining plate.

Caution
- **Do not deform the snap ring.**

23. Install the snap ring.



37U0KX-134

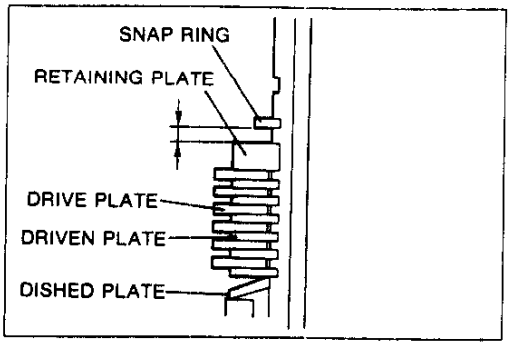
24. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge. If not within specification, adjust the clearance by selecting the correct retaining plate.

Clearance: 0.45–1.85 mm {0.018–0.073 in}

Retaining plate size

mm {in}

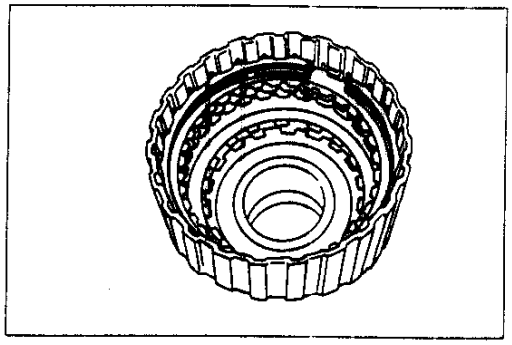
8.0 {0.315}	8.2 {0.323}	8.4 {0.331}	8.6 {0.339}
8.8 {0.346}	9.0 {0.354}	9.2 {0.362}	–



37U0KX-135

25. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates, and drive plates.
Adjust the clearance by selecting the correct retaining plate.

Clearance: 0.45–0.85 mm {0.018–0.033 in}

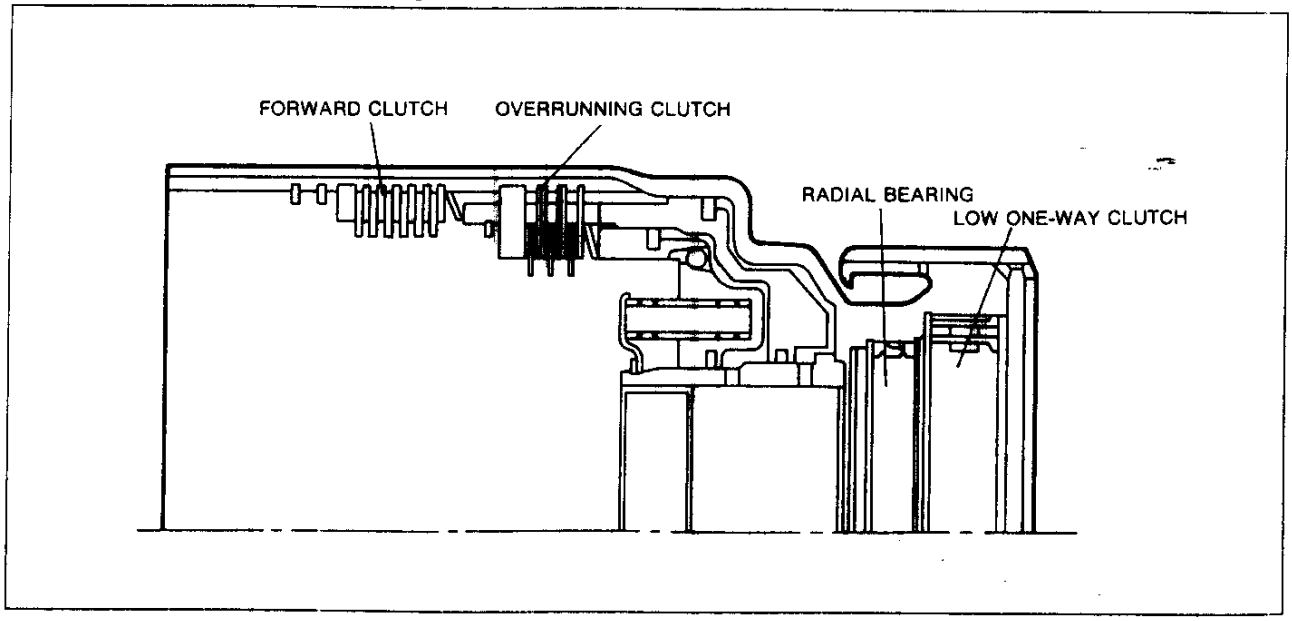


29U0KX-355

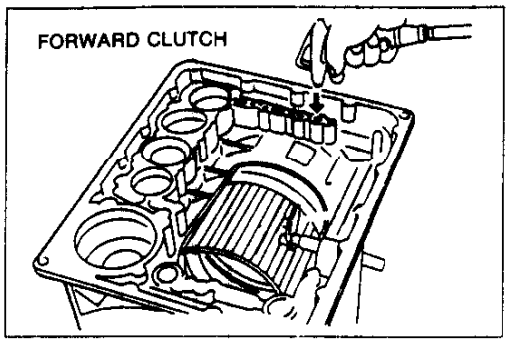
Caution
- **Do not deform the snap ring.**

26. Install the snap ring.

Illustration of proper assembly



29U0KX-356

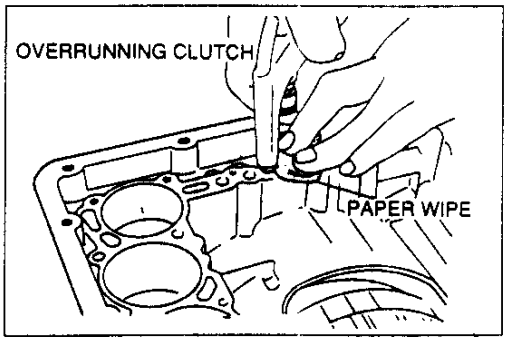


37U0KX-136

Caution
- **Apply air for no more than 3 seconds.**

27. Set the forward clutch drum in the transmission.
28. Apply compressed air through the oil passage as shown, and verify the forward clutch operation.

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

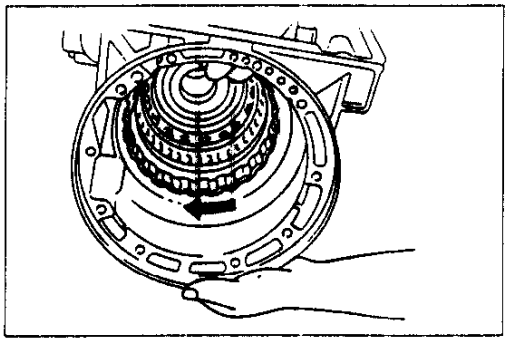


37U0KX-137

Note
- **Use a paper wipe to block the oil passage.**

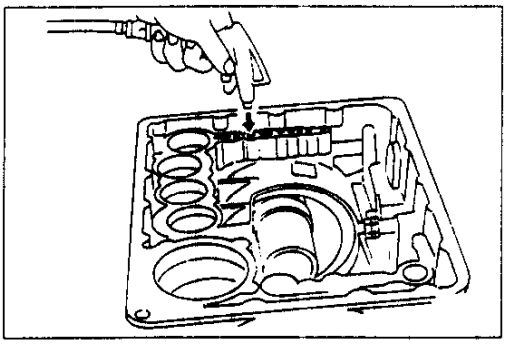
29. Apply compressed air through the oil passage as shown, and check the overrunning clutch operation.

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


29U0KX-359

30. Verify that the forward clutch drum turns clockwise only.

Note
- **If it turns counterclockwise, the one-way clutch has been installed upside down.**


37U0KX-138

LOW AND REVERSE BRAKE

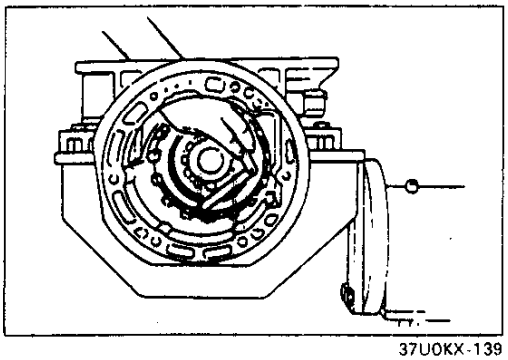
Preinspection

Low and reverse brake operation

1. Apply compressed air through the oil passage as shown.
2. Verify that the retaining plate moves toward the snap ring.

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

3. If not, the D-ring or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect and replace as necessary when assembling.


37U0KX-139

Clearance between retaining plate and snap ring

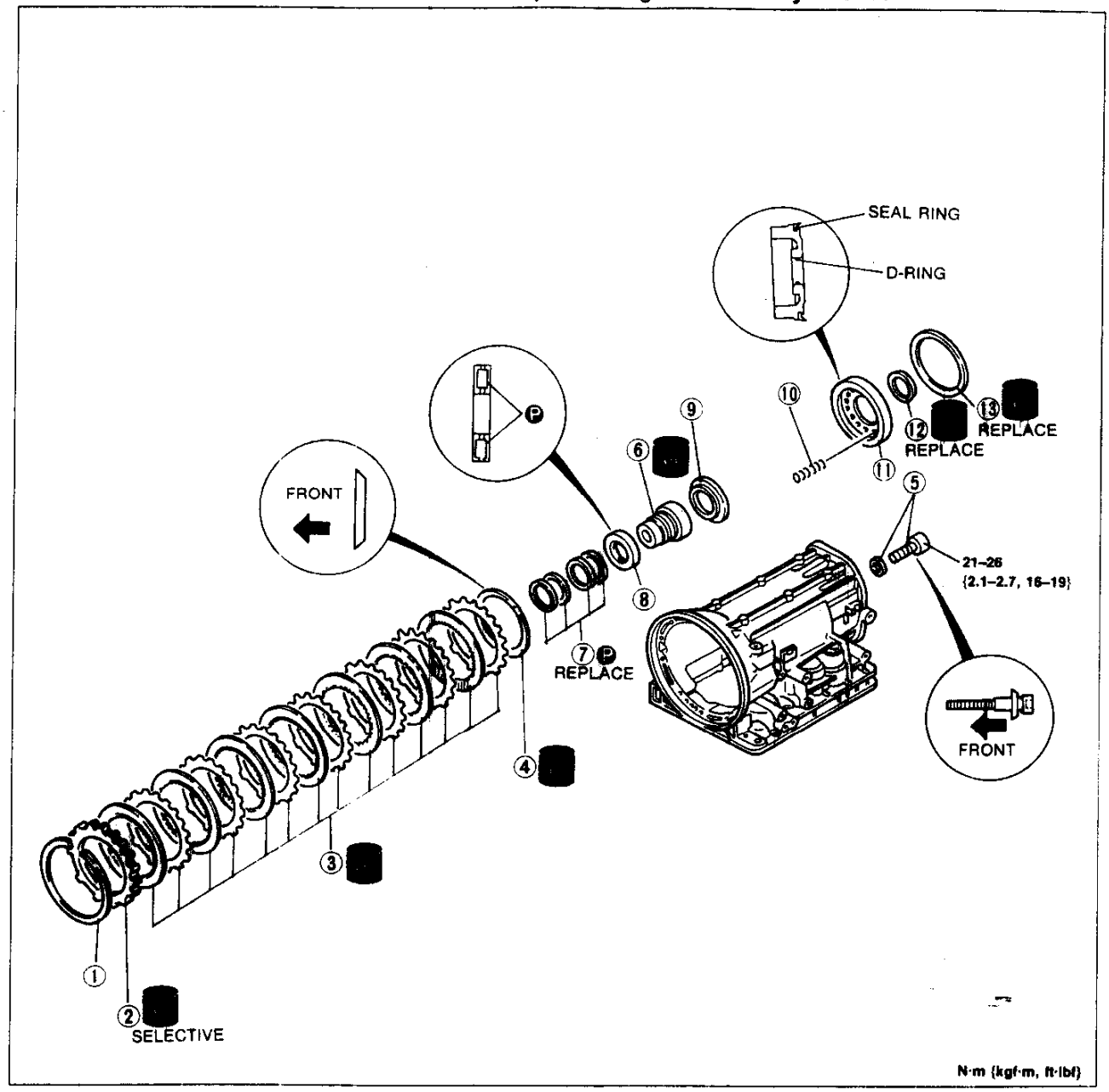
1. Measure the clearance between the retaining plate and the snap ring.

Clearance: 0.8–2.6 mm {0.031–0.102 in}

2. Select the correct retaining plate when assembling. (Refer to page K–95.)

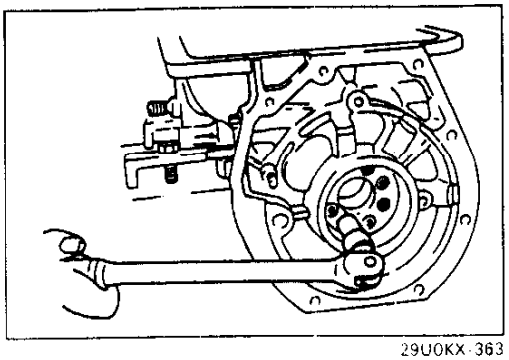
Disassembly / Inspection / Assembly

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



37U0KX-140

1. Snap ring
2. Retaining plate
3. Drive plates and driven plates
   Inspect for damage and burning
   Inspection ..... page K–93
4. Dished plate
5. Allen-head bolts and washers
6. Low one-way clutch inner race
   Disassembly Note ..... page K–93
   Inspection ..... page K–93
7. Seal rings
8. Bearing
   Inspect for damage and rough rotation
9. Spring retainer
10. Return springs
    Inspection ..... page K–93
11. Low and reverse brake piston
    Inspect balls for sticking by shaking piston
    Disassembly Note ..... page K–93
12. D-ring
13. Seal ring

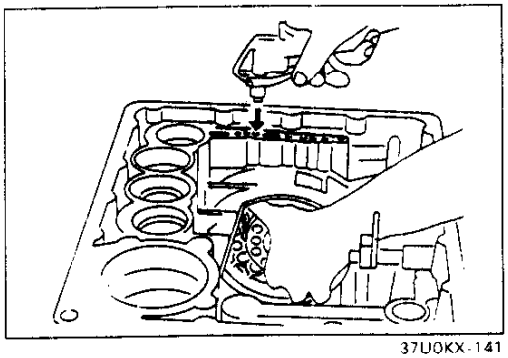


29U0KX-363

Disassembly note
Low one-way clutch inner race

Caution
- **Do not allow the spring retainer to jump out when removing the low one-way clutch inner race.**

Remove the Allen-head bolts, washers, and low one-way clutch inner race.

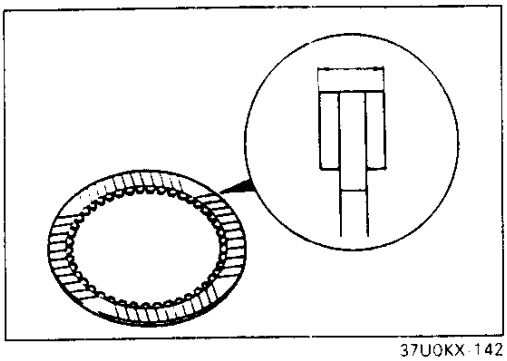


37U0KX-141

Low and reverse brake piston

Remove the low and reverse brake piston by applying compressed air through the oil passage as shown.

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



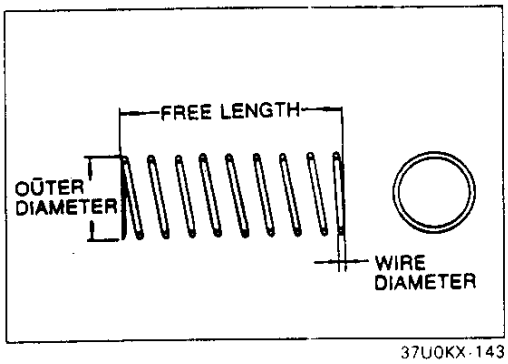
37U0KX-142

Inspection
Drive plates

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

Thickness
Standard: 2.0 mm {0.079 in}
Minimum: 1.8 mm {0.071 in}

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



37U0KX-143

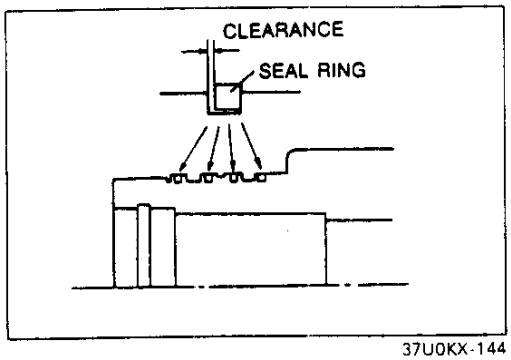
Return springs

1. Measure the spring free length.

Specification

Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
11.6 {0.457}	22.3 {0.878}	5.2	1.2 {0.047}

2. If not within specification, replace the return spring.



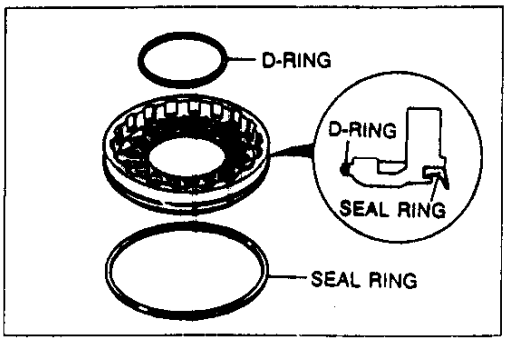
37U0KX-144

Low one-way clutch inner race

1. Apply petroleum jelly to new seal rings and install them to the one-way clutch inner race.
2. Measure the clearance between each seal ring and ring groove.

Standard clearance:
0.10–0.25 mm {0.004–0.010 in}
Maximum clearance: 0.25 mm {0.010 in}

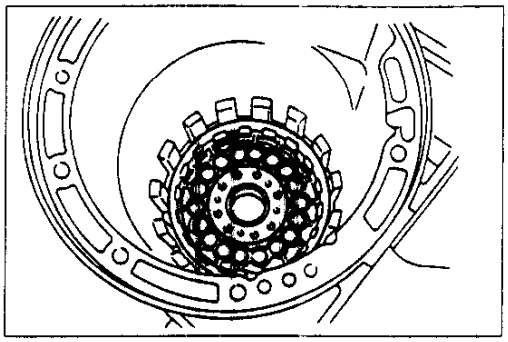
3. If not within specification, replace the low one-way clutch inner race.



29U0KX-368

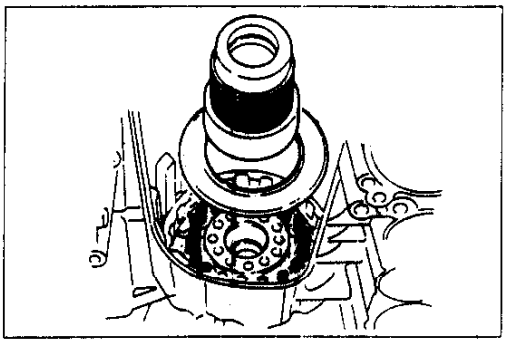
Assembly procedure

1. Apply ATF to a new D-ring and seal ring and install them to the low and reverse brake piston.

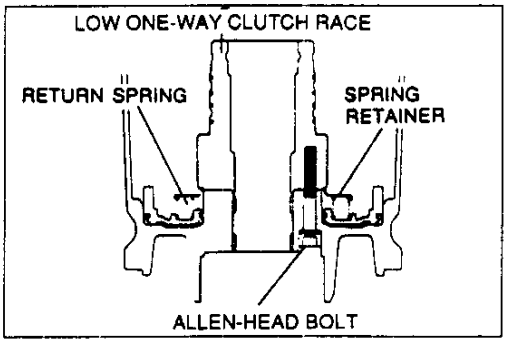

29U0KX-369

Caution
- **Apply even pressure to the perimeter of the brake piston when installing it to avoid damaging the D-ring and seal ring.**
- **If the piston cannot be turned by hand, remove it and check for damage to the seal ring.**

2. Apply ATF to the inner face of the transmission case.
3. Install the low and reverse brake piston in the transmission case by turning it evenly and gradually.

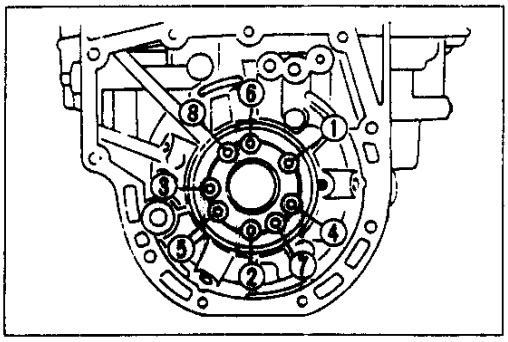

29U0KX-370

4. Set the return springs, spring retainer, and low one-way clutch inner race into the transmission case.



29U0KX-371

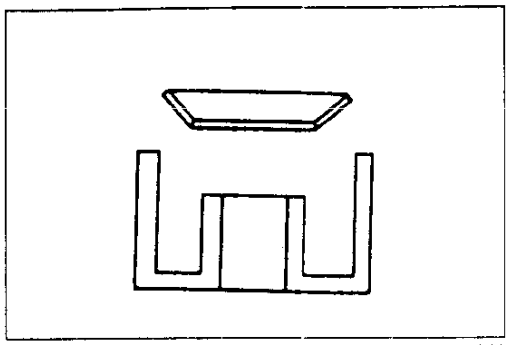
5. Verify that the return springs, spring retainer, and low one-way clutch inner race are properly positioned.



29U0KX-145

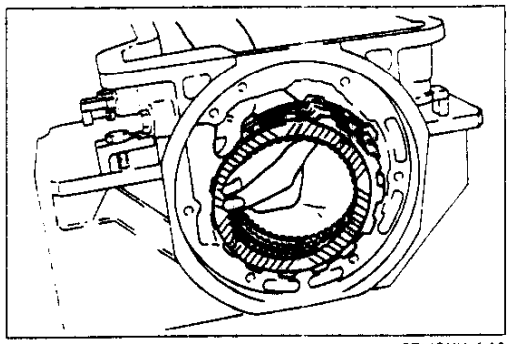
6. Tighten the Allen-head bolts evenly and gradually in the order shown.

Tightening torque:
21–26 N·m {2.1–2.7 kgf·m, 16–19 ft·lbf}



29U0KX-373

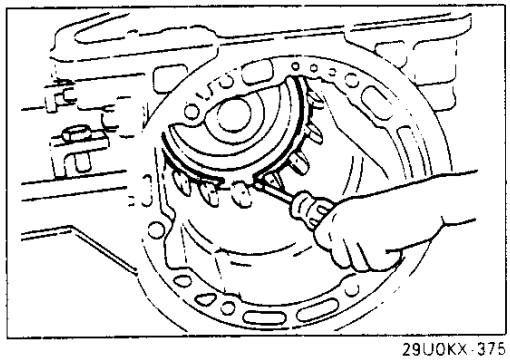
7. Install the dished plate as shown.



37U0KX-146

Note
- **Installation order:**
  Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive
- **Soak new drive plates in ATF for at least two hours before installation.**

8. Apply ATF to the drive plates and driven plates, and install them into the transmission case.

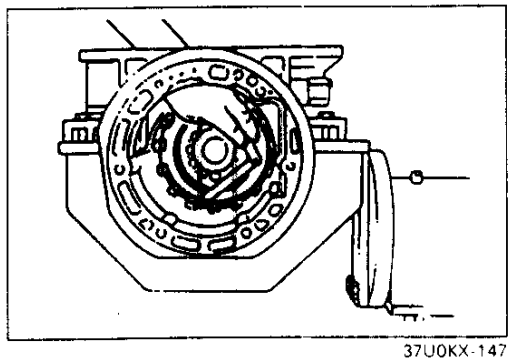


29U0KX-375

9. Install the retaining plate.

Caution
- **Do not deform the snap ring.**

10. Install the snap ring.



37U0KX-147

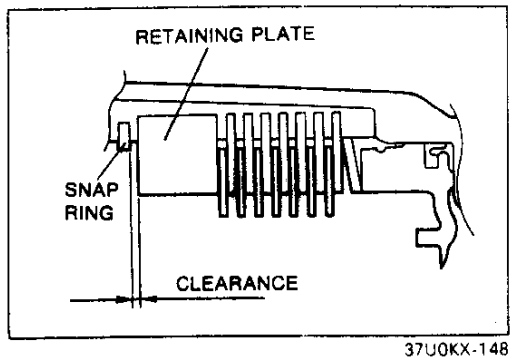
11. Measure the clearance between the retaining plate and the snap ring by using a feeler gauge. If not within specification, adjust the clearance by selecting the correct retaining plate.

Clearance: 0.8–2.6 mm {0.031–0.102 in}

Retaining plate size

mm {in}

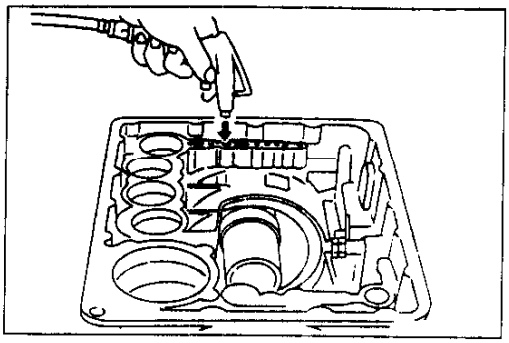
6.2 {0.244}	6.4 {0.252}	6.6 {0.260}	6.8 {0.268}
7.0 {0.276}	7.2 {0.283}	7.4 {0.291}	7.6 {0.299}
7.8 {0.307}	8.0 {0.315}	–	–



37U0KX-148

12. If the clearance cannot be brought to within specification after installation of the thickest retaining plate, replace the dished plate, driven plates and drive plates.
Adjust the clearance by selecting the correct retaining plate.

Clearance: 0.8–1.2 mm {0.031–0.047 in}

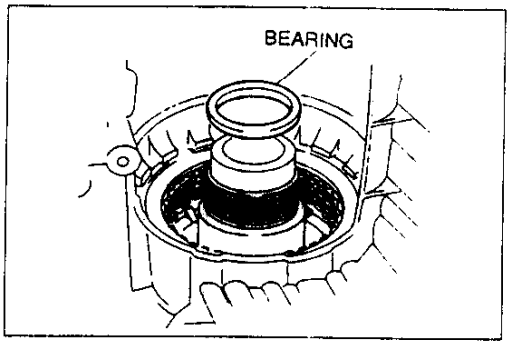


37U0KX-149

Caution
- **Apply air for no more than 3 seconds.**

13. Verify operation of the piston by applying compressed air through the oil passage of the low and reverse brake as shown.

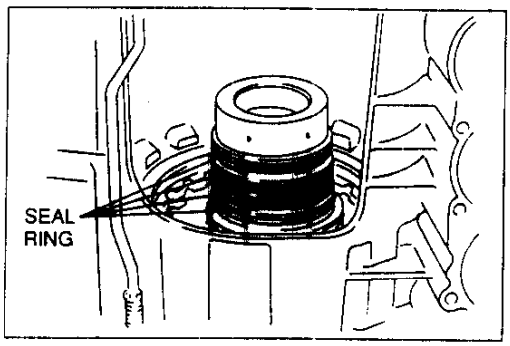
Air pressure: 390 kPa {4.0 kgf/cm², 57 psi} max.



37U0KX-150

14. Apply petroleum jelly to the bearing, and install it on the low one-way clutch inner race with the black surface facing downward.

Bearing outer diameter: 78.1 mm {3.07 in}



29U0KX-380

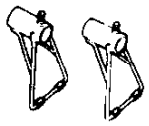
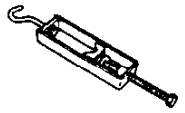
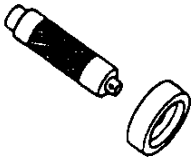
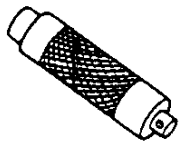
Caution
- **Do not overexpand the seal rings when installing them.**

Note
- **Press the seal rings down into the petroleum jelly to hold them.**

15. Apply petroleum jelly to the seal rings and install them onto the low one-way clutch inner race.

EXTENSION HOUSING / PARKING MECHANISM

Preparation
SST

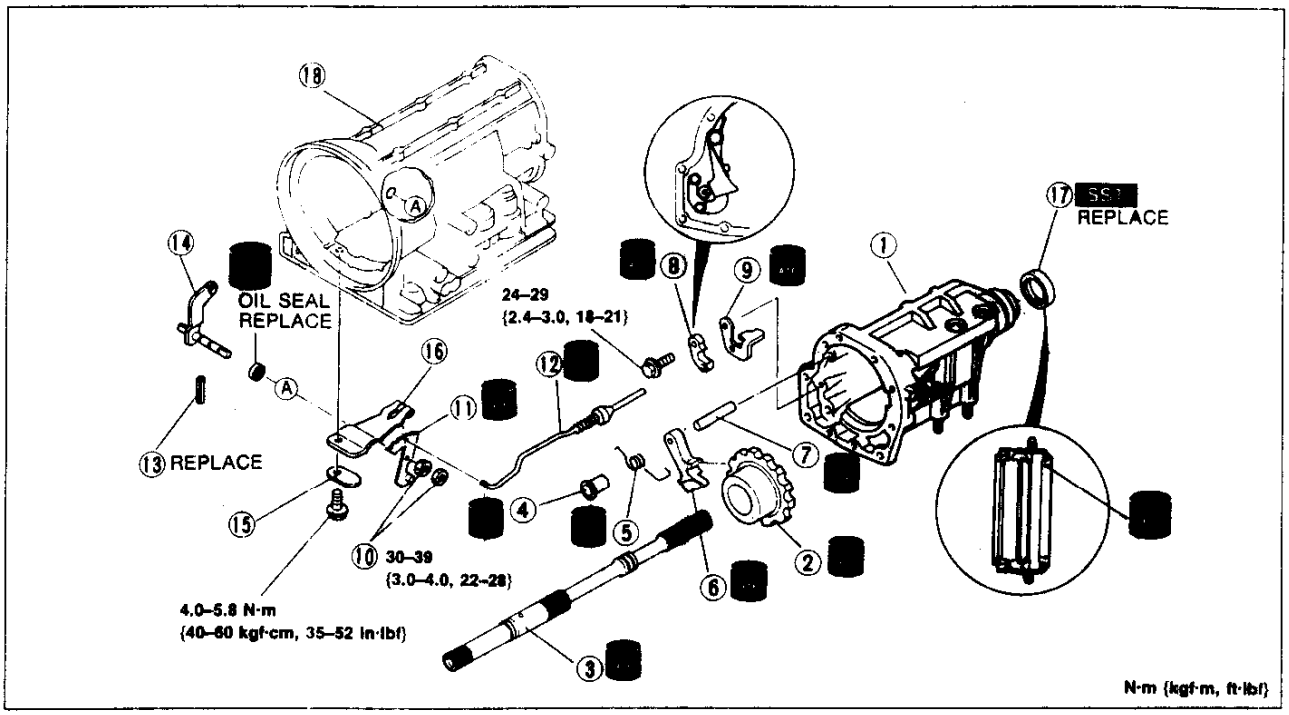
49 G017 5A0 Support, engine 	For support of engine	49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine
49 G030 795 Installer, oil seal 	For installation of oil seal	49 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal
49 F019 001 Installer, oil seal 	For installation of oil seal		

37U0KX-151

Disassembly / Inspection / Assembly

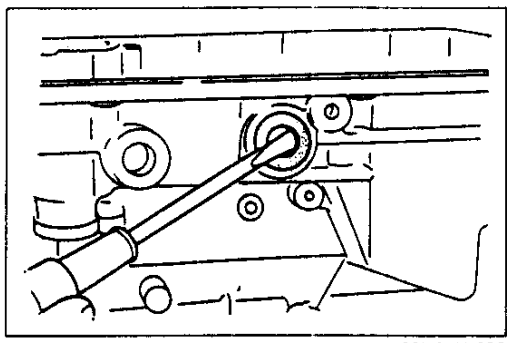
Caution
- **Do not remove the oil seals unless necessary to do so for repairs.**

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



29U0KX-382

1. Extension housing
2. Parking gear
   Inspect gear teeth for damage and wear
   Inspect bearing for rough rotation
3. Output shaft
   Inspect splines for damage and wear
4. Parking pawl spacer
5. Return spring
6. Parking pawl
7. Parking pawl shaft
8. Parking actuator
9. Parking rod guide
10. Locknuts
11. Manual plate
12. Parking rod
13. Roll pin
14. Manual shaft
15. Spacer
16. Detent spring
    Inspect for fracture and wear
17. Oil seal (extension housing)
18. Transmission case
    Inspection
    a) Damage and wear of oil seal
       Disassembly Note ..... below
    b) Damage and rough rotation of inner bearing

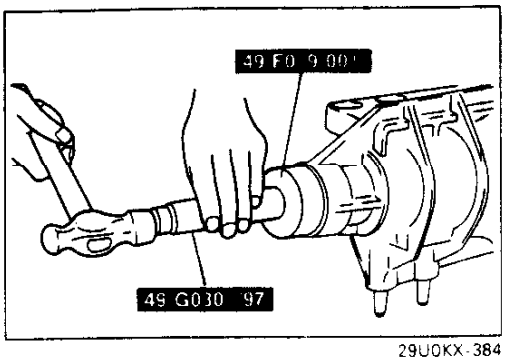


29U0KX-383

Disassembly note
Oil seal (transmission side)

Caution
- **Do not remove the oil seal unless necessary.**
- **Do not scratch the inside of the transmission case.**

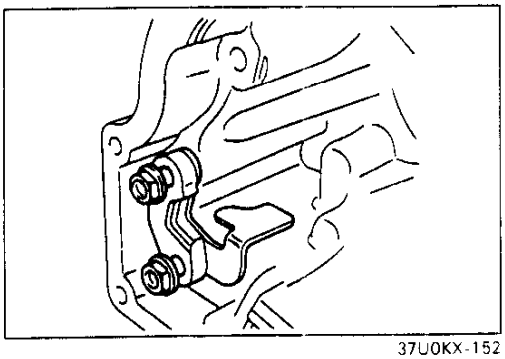
Remove the oil seal by using a screwdriver.



29U0KX-384

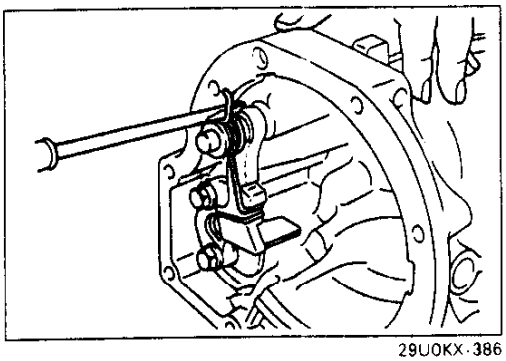
Assembly procedure

1. Apply ATF to the lip of the new oil seal.
2. Install the oil seal by using the **SST**.

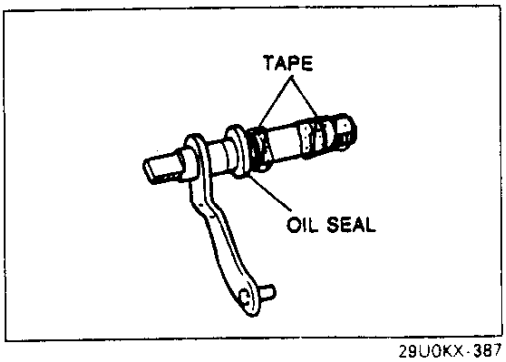

37U0KX-152

3. Apply ATF to the parking rod guide and parking actuator and install them in the extension housing.

Tightening torque:
24–29 N·m {2.4–3.0 kgf·m, 18–21 ft·lbf}

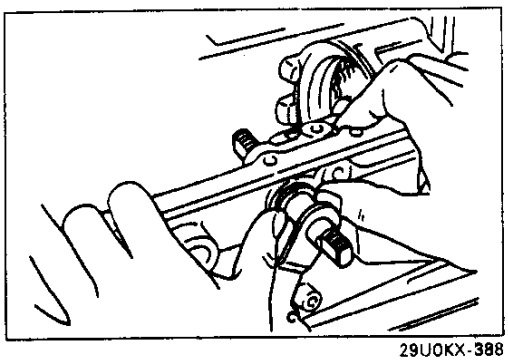

29U0KX-386

4. Apply ATF to the parking pawl shaft and install it in the extension housing.
5. Apply ATF to the parking pawl, return spring, and spacer. Install them in the extension housing.

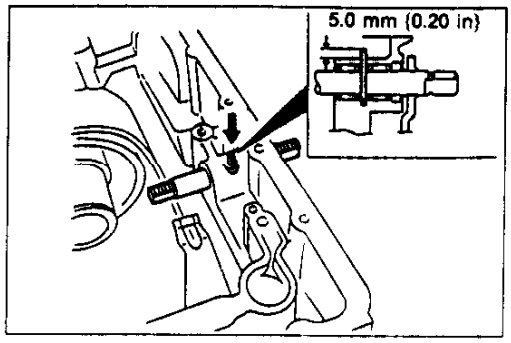


29U0KX-387

6. Wrap the threads of the manual shaft with tape.
7. Apply ATF to the lip of a new oil seal and install it onto the manual shaft.

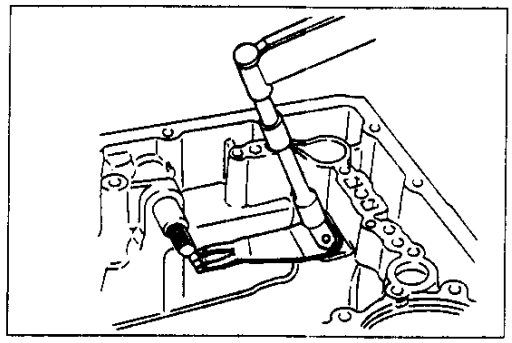

29U0KX-388

8. Apply ATF to the bearing in the transmission case.
9. Install the manual shaft into the transmission case.
10. Push the oil seal squarely into the transmission case.
11. Remove the tape.



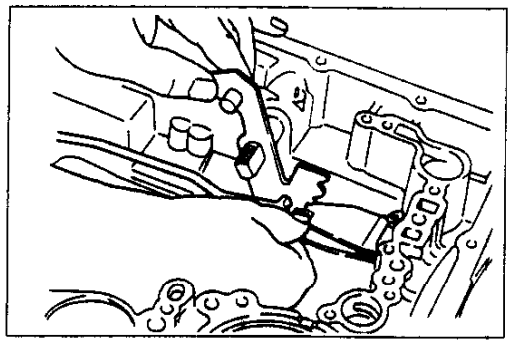
29U0KX-389

12. Align the groove in manual shaft with the roll pin hole. Tap the roll pin into the case as shown in the figure.

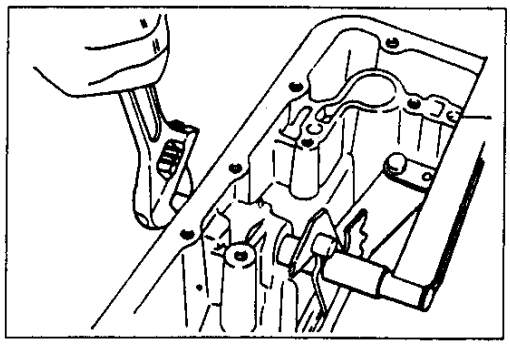

37U0KX-153

13. Install the detent spring and spacer.

Tightening torque:
4.0–5.8 N·m {40–60 kgf·cm, 35–52 in·lbf}


29U0KX-391

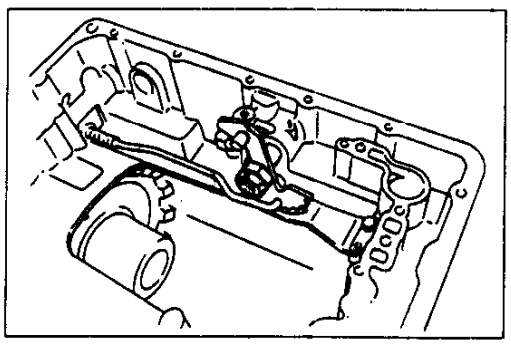
14. Install the manual plate and parking rod.


37U0KX-154

Caution
- **When tightening the locknuts, hold the manual shaft as shown.**

15. Tighten the locknuts.

Tightening torque:
30–39 N·m {3.0–4.0 kgf·m, 22–28 ft·lbf}


29U0KX-393

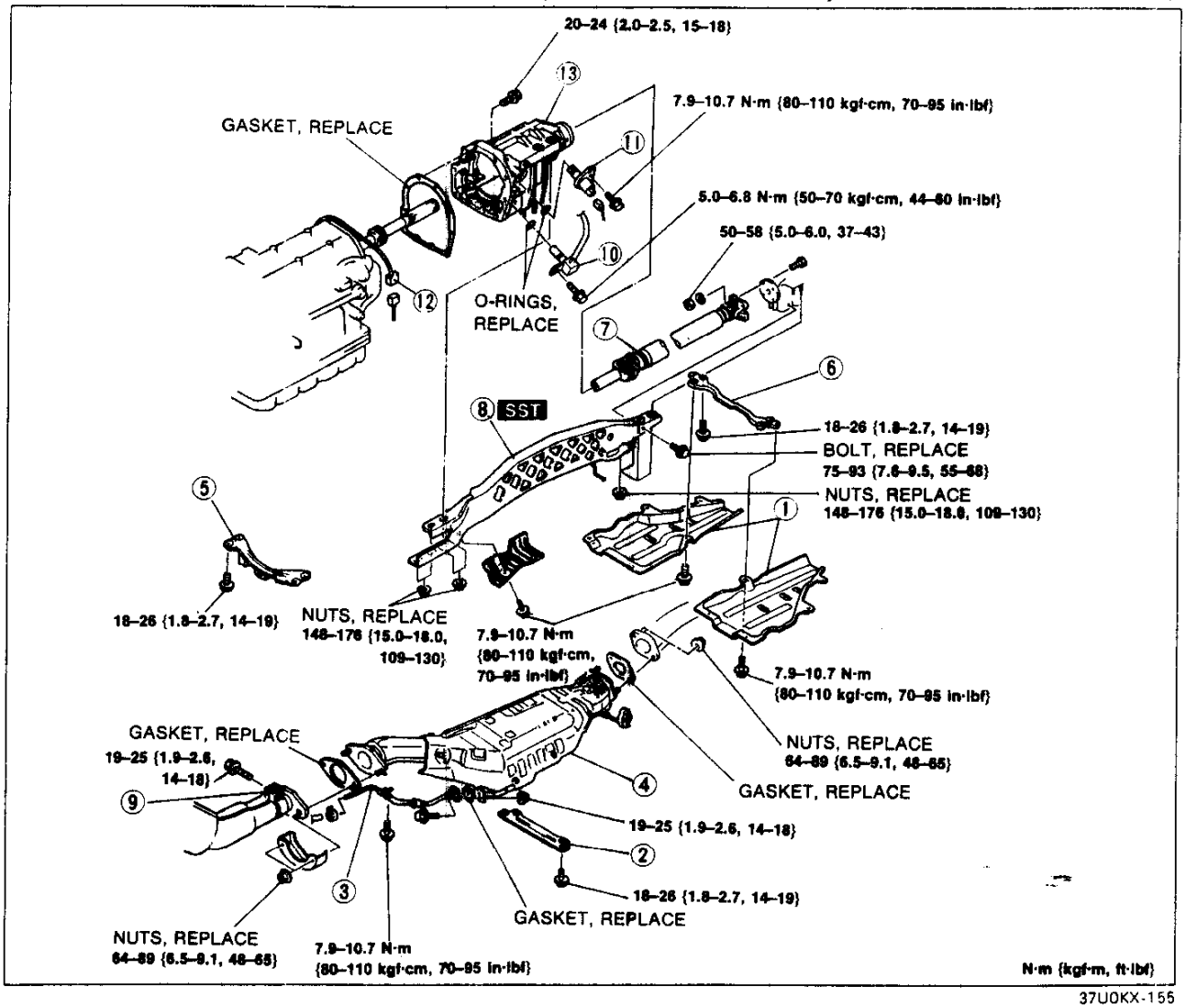
16. Verify operation of the parking mechanism.

On-Vehicle Removal / Installation

Caution

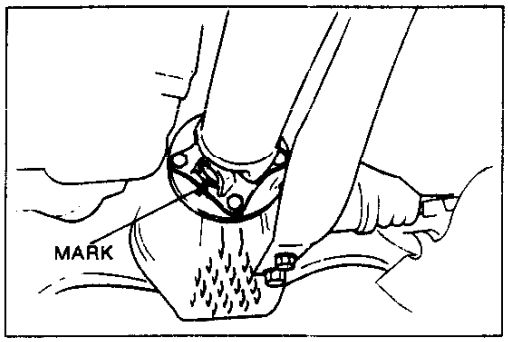
- **Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvent before removal.**

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install the reverse order of removal, referring to **Installation Note**.
4. Perform the following after installation of the extension housing.
   (1) Connect the negative battery cable.
   (2) Check the ATF level and add ATF to specification, if necessary.



37U0KX-155

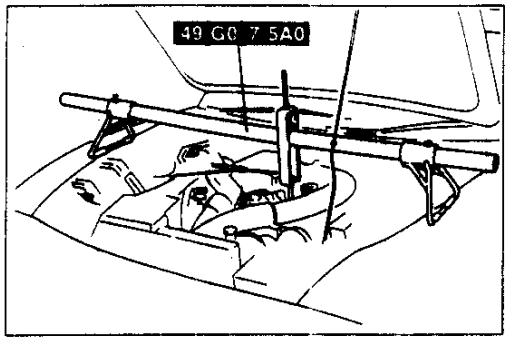
1. Undercover (right and left)
2. Tunnel member (center)
3. Secondary air injection pipe
4. Catalytic converter assembly
5. Tunnel member (front)
6. Tunnel member (rear)
7. Propeller shaft
   Removal Note ..... page K–102
   Installation Note ..... page K–103
8. Power plant frame (PPF)
   Removal Note ..... page K–102
   Installation Note ..... page K–102
9. Front exhaust pipe bracket
10. Speed sensor 1
11. Speed sensor 2
12. Solenoid valve connector
13. Extension housing
    Installation Note ..... page K–102



37U0KX-156

Removal note
Propeller shaft

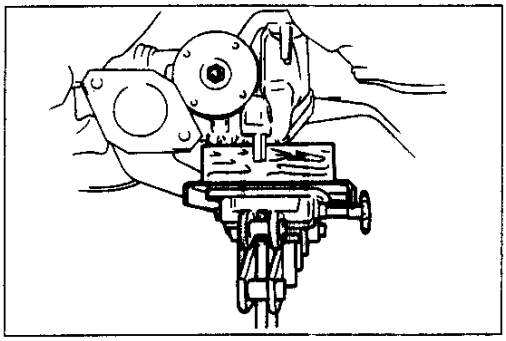
1. Mark the flange for proper reassembly.
2. Remove the propeller shaft.



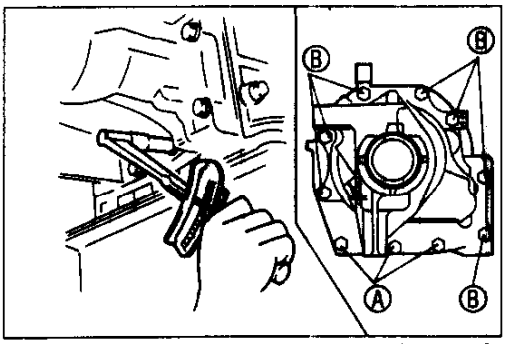
37U0KX-157

Power plant frame (PPF)

1. Hold the engine with the **SST**.


37U0KX-158

2. Hold the differential with the transmission jack.
3. Remove the PPF.



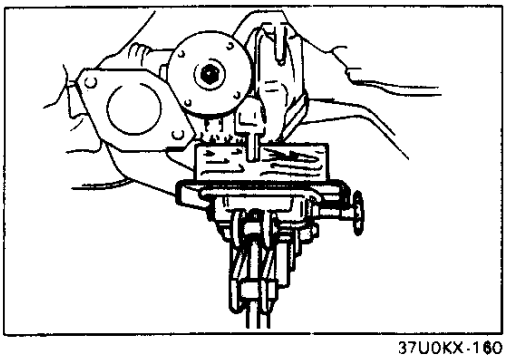
37U0KX-159

Installation note
Extension housing

1. Install a new gasket on the transmission case.
2. Install the extension housing.

Bolt length (measured from below the head):
A: 30 mm {1.18 in}
B: 45 mm {1.77 in}

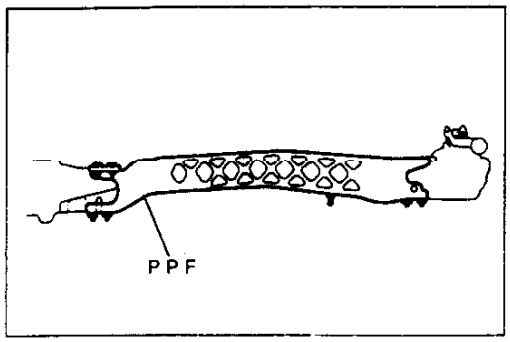
Tightening torque:
20–24 N·m {2.0–2.5 kgf·m, 15–18 ft·lbf}


37U0KX-160

Power plant frame (PPF)

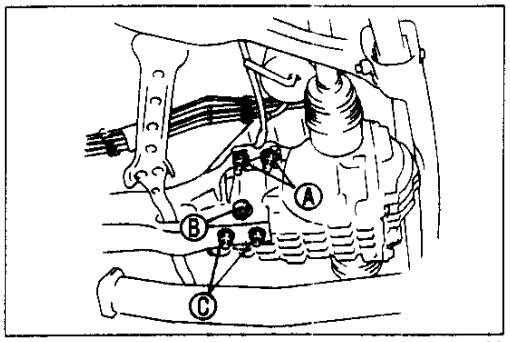
Caution
- **Do not reuse PPF installation bolt and nuts.**

1. Hold the differential at a 0° angle by using the transmission jack.



37U0KX-161

2. Hold the PPF in place with a new bolt and nuts.

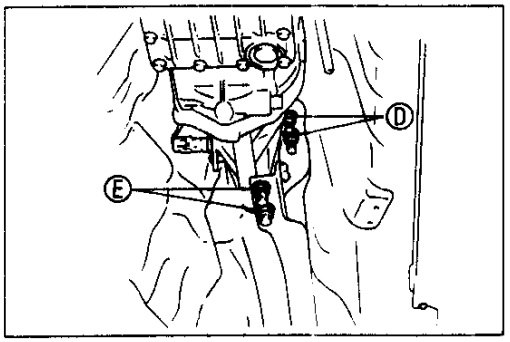


37U0KX-162

Caution
- **Tighten the differential-side PPF installation bolt and nuts first.**

3. Tighten the differential-side PPF installation bolt and nuts in the order A, B, C.

Tightening torque:
A, C: 148–176 N·m {15.0–18.0 kgf·m, 109–130 ft·lbf}
B: 75–93 N·m {7.6–9.5 kgf·m, 55–68 ft·lbf}

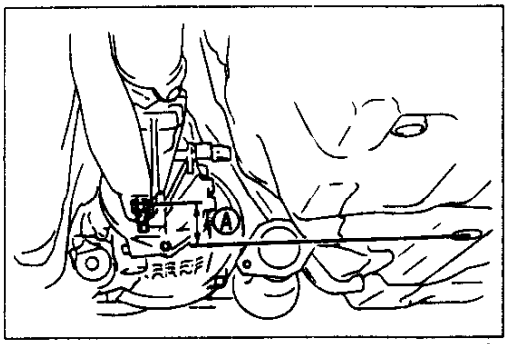


37U0KX-163

4. Tighten the transmission-side PPF installation nuts in the order D, E.

Tightening torque:
148–176 N·m {15.0–18.0 kgf·m, 109–130 ft·lbf}

5. Remove the transmission jack.



37U0KX-164

6. Measure A as shown in the figure.

Specification
Right side: 73.0 mm {2.87 in} min.
Left side : 75.0 mm {2.95 in} min.

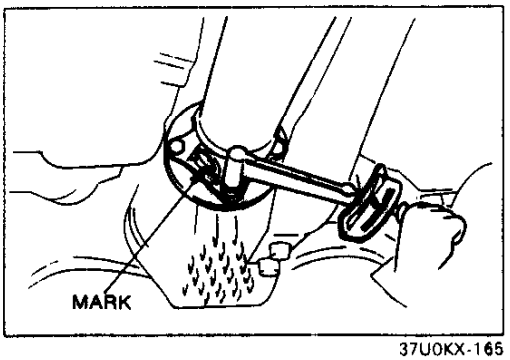
Note
- **When measuring with a straight edge placed on both the right and left sides, the clearance should be 74.0 mm {2.91 in} minimum.**

7. If not within specification, readjust the PPF.

Propeller shaft

Caution
- **Align the mark.**

Install the propeller shaft.



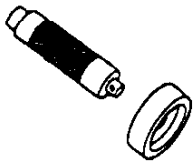
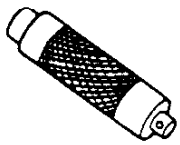
37U0KX-165

Tightening torque:
50–58 N·m {5.0–6.0 kgf·m, 37–43 ft·lbf}

OIL SEAL (EXTENSION HOUSING)

Preparation

SST

40 G030 795 Installer, oil seal 	For installation of oil seal	40 G030 797 Handle (Part of 49 G030 795) 	For installation of oil seal
40 F019 001 Installer, oil seal 	For installation of oil seal		

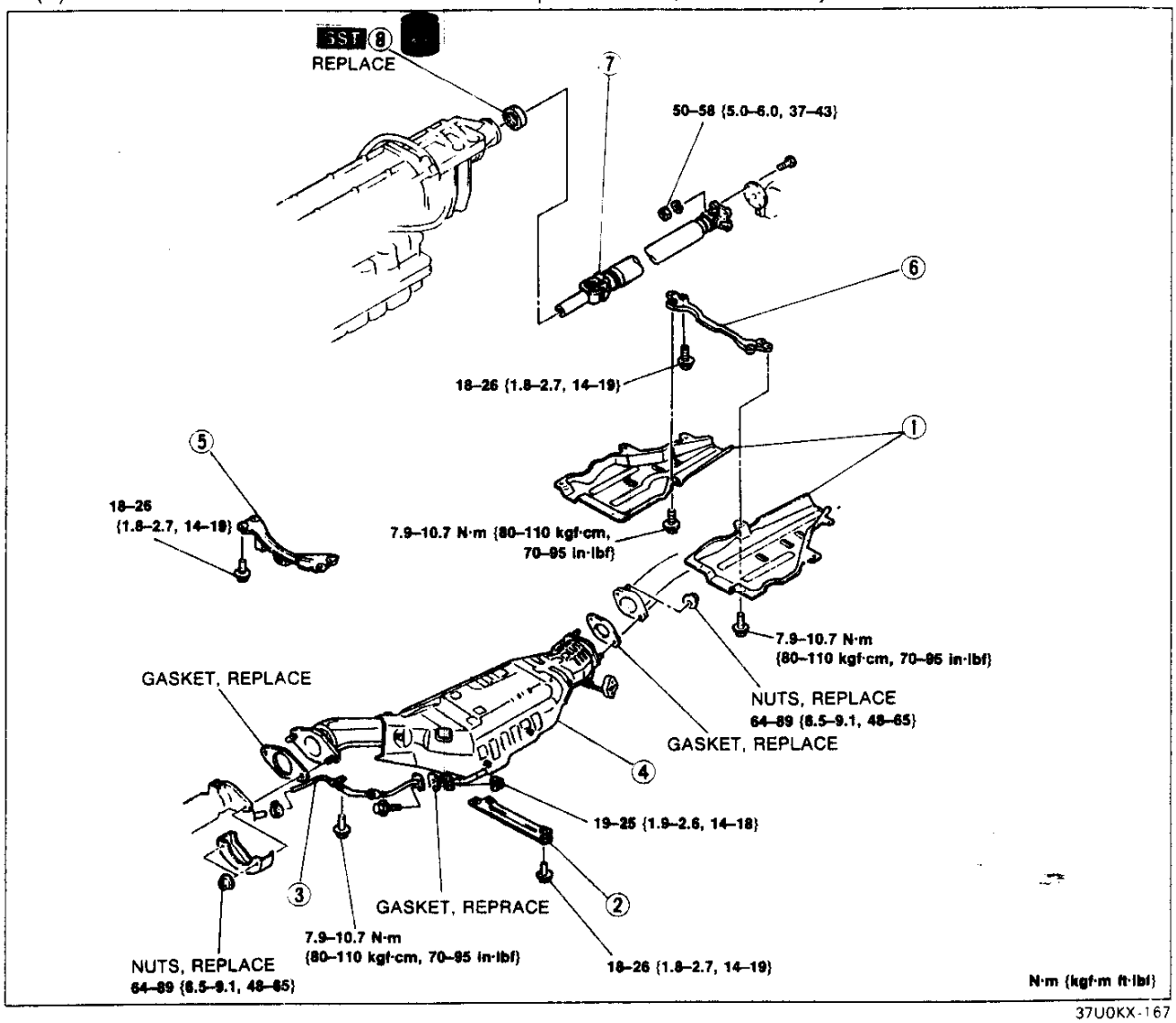
370U0KX-166

On-Vehicle Removal / Installation

Caution

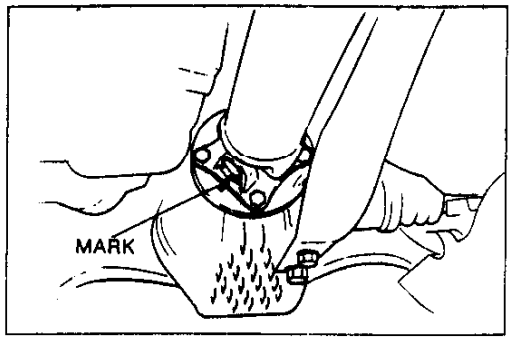
- **Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvent before removal.**

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Perform the following after installation of the oil seal.
   (1) Connect the negative battery cable.
   (2) Check the ATF level and add ATF to specification, if necessary.



37U0KX-167

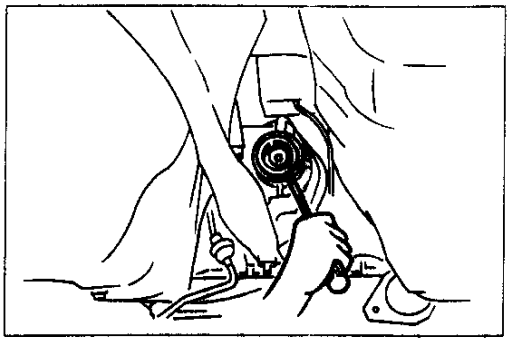
1. Undercover (right and left)
2. Tunnel member (center)
3. Secondary air injection pipe
4. Catalytic converter assembly
5. Tunnel member (front)
6. Tunnel member (rear)
7. Propeller shaft
   Removal Note ..... page K–106
   Installation Note ..... page K–106
8. Oil seal
   Removal Note ..... page K–106
   Installation Note ..... page K–106



29U0KX-404

Removal Note
Propeller shaft

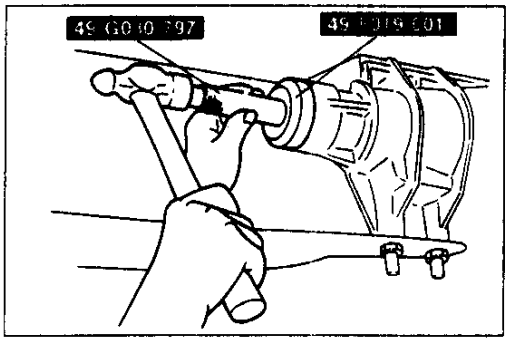
1. Mark the flange for proper reassembly.
2. Remove the propeller shaft


29U0KX-405

Oil seal

Caution
- **Do not damage the extension housing or output shaft.**

Remove the oil seal by using a screwdriver.

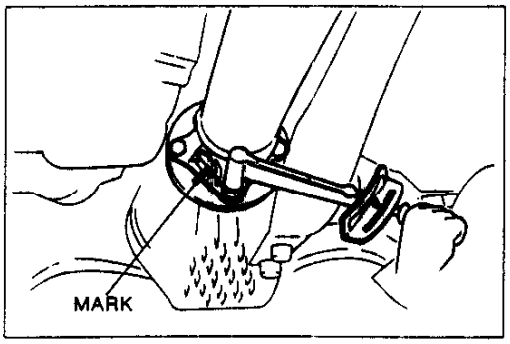

29U0KX-406

Installation note
Oil seal

1. Apply ATF to the lip of the new oil seal.

Caution
- **Install the oil seal until the stopper contacts the extension housing.**

2. Install the new oil seal by using the **SST**.



37U0KX-168

Propeller shaft

Caution
- **Align the mark.**

Install the propeller shaft.

Tightening torque:
50–58 N·m {5.0–6.0 kgf·m, 37–43 ft·lbf}

MEMO

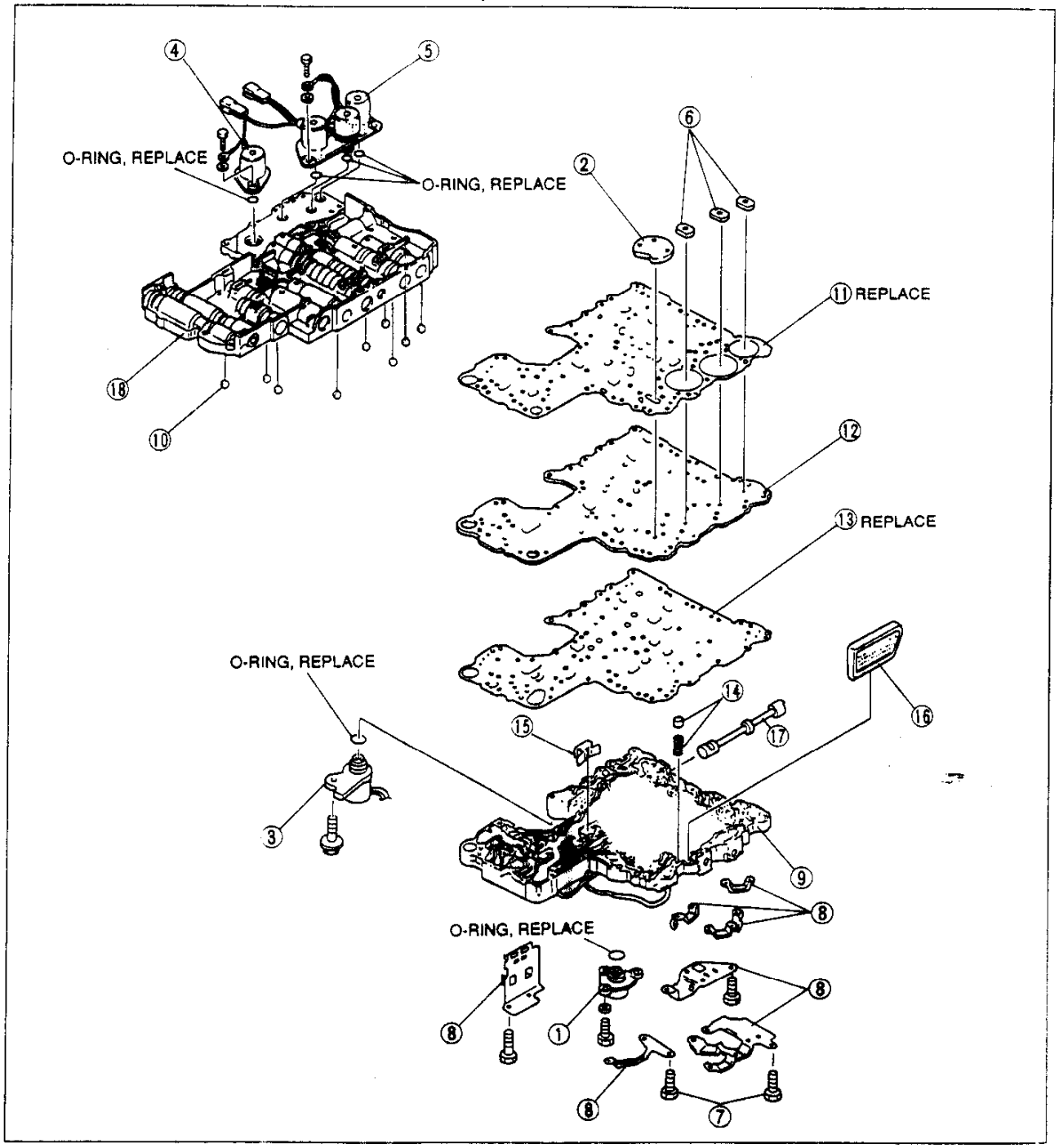
CONTROL VALVE BODY (DISASSEMBLY / INSPECTION)

Disassembly / Inspection

Caution

- **Be especially careful when handling the control valve; it consists of the most precise and delicate parts of the transmission.**
- **Neatly arrange the removed parts to avoid confusing them with similar parts.**
- **Clean the removed parts with cleaning solvent, and dry them with compressed air. Clean out all holes and passages with compressed air.**

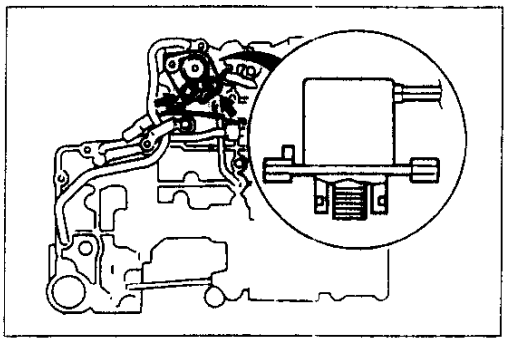
1. Disassemble in the order shown in the figure, referring to **Disassembly Procedure**.
2. Inspect all parts and replace as necessary.



29U0KX-4C9

1. Solenoid valve (lockup)
   Inspect filter for clogging and damage
   Inspection ..... page K– 32
2. Side plate
3. Solenoid valve (lockup control)
   Inspect filter for clogging and damage
   Inspection ..... page K– 32
4. Solenoid valve (line pressure)
   Inspect filter for clogging and damage
   Inspection ..... page K– 32
5. Solenoid valves (overrunning clutch, shift A, and shift B)
   Inspect filter for clogging and damage
   Inspection ..... page K– 32
6. Support plate
7. Retaining bolts and nuts
   Installation position ..... page K–124
8. Brackets
   Installation position ..... page K–123
9. Lower control valve body
   Disassembly / Inspection / Assembly ..... page K–120
10. Steel balls
    Installation position ..... page K–123
11. Upper gasket
12. Separator plate
    Inspect fluid passages for clogging and damage
13. Lower gasket
14. Orifice check valve and spring
15. Pilot filter
    Inspect for clogging and damage
16. Accumulator filter
    Inspect for clogging and damage
17. Manual valve
    Inspect for sticking, scoring, and scratches
18. Upper control valve body
    Disassembly / Inspection / Assembly ..... page K–112

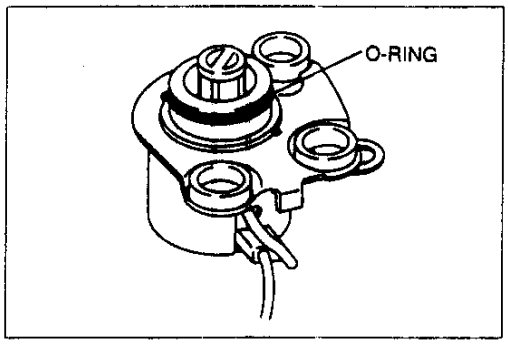
370U0KX-69



29U0KX-411

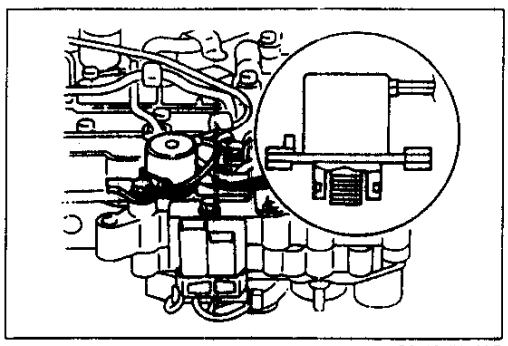
Disassembly procedure

1. Remove the solenoid valve (lockup) and side plate from the lower control valve body.



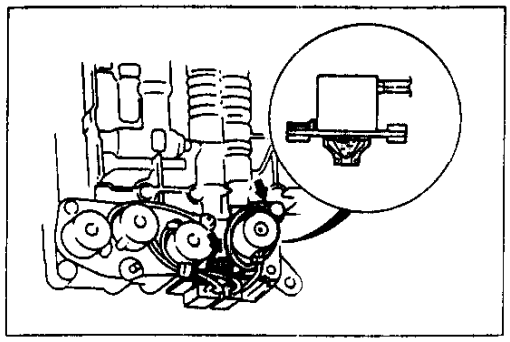
29U0KX-412

2. Remove the O-ring from the solenoid valve (lockup).



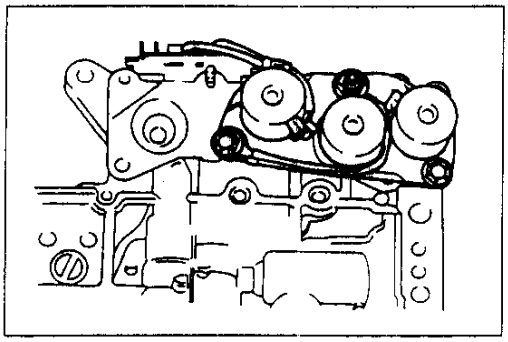
29U0KX-413

3. Remove the solenoid valve (lockup control) from the lower control valve body.
4. Remove the O-ring from the solenoid valve (lockup control).



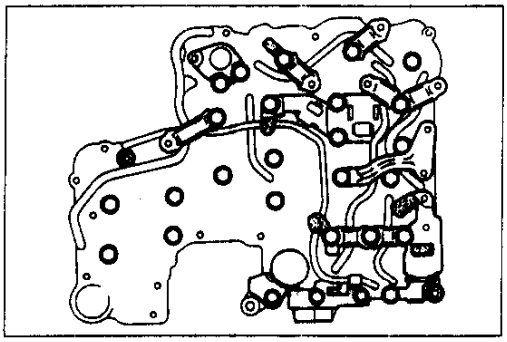
29U0KX-414

5. Remove the solenoid valve (line pressure) from the upper control valve body.
6. Remove the O-ring from the solenoid valve (line pressure).



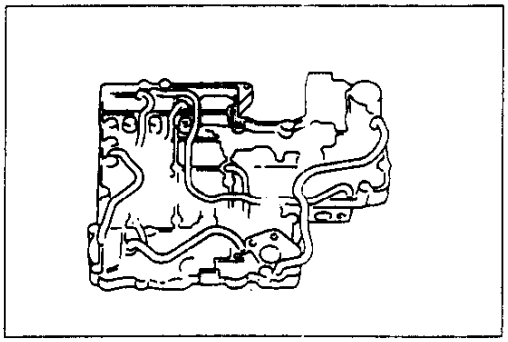
29U0KX-415

7. Remove the solenoids from the upper control valve body.
8. Remove the O-rings from the solenoids.



29U0KX-416

9. Remove the support plates.
10. Remove the bolts, nuts, and brackets.

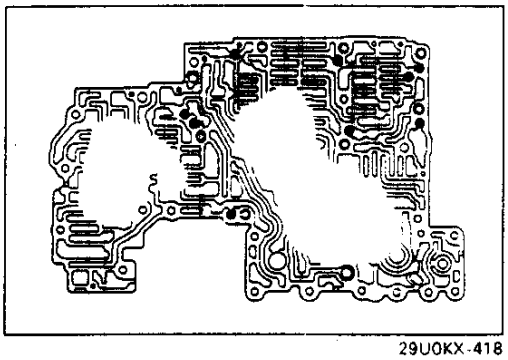


29U0KX-417

Caution

- **Do not scratch the valve body.**
- **Be careful not to drop the pilot filter, orifice check valve, spring, or accumulator filter.**

11. Separate the lower control valve body, lower and upper gaskets, and separator plate assembly from the upper control valve body.

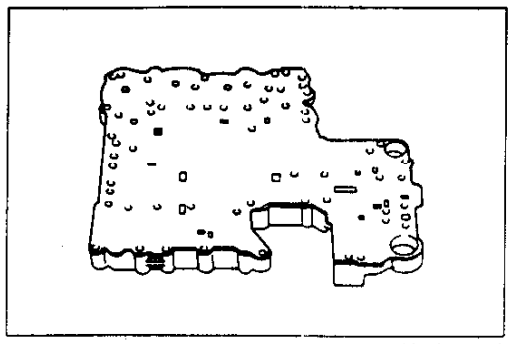


29U0KX-418

Caution

- **Do not drop or lose the steel balls.**

12. Remove the steel balls from the upper control valve body.

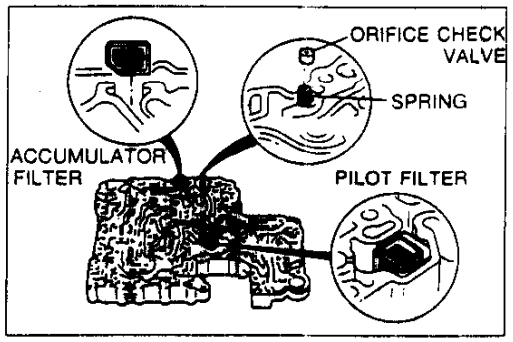


29U0KX-419

13. Face the lower control valve body downward.

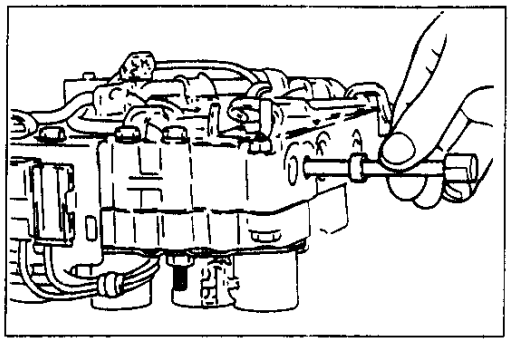
Caution
- **Do not lose the pilot filter, orifice check valve, spring, or accumulator filter.**

14. Remove the separator plate and gaskets.



29U0KX-420

15. Remove the orifice check valve, spring, pilot filter, and accumulator filter.



29U0KX-421

16. Remove the manual valve from the lower control valve body.

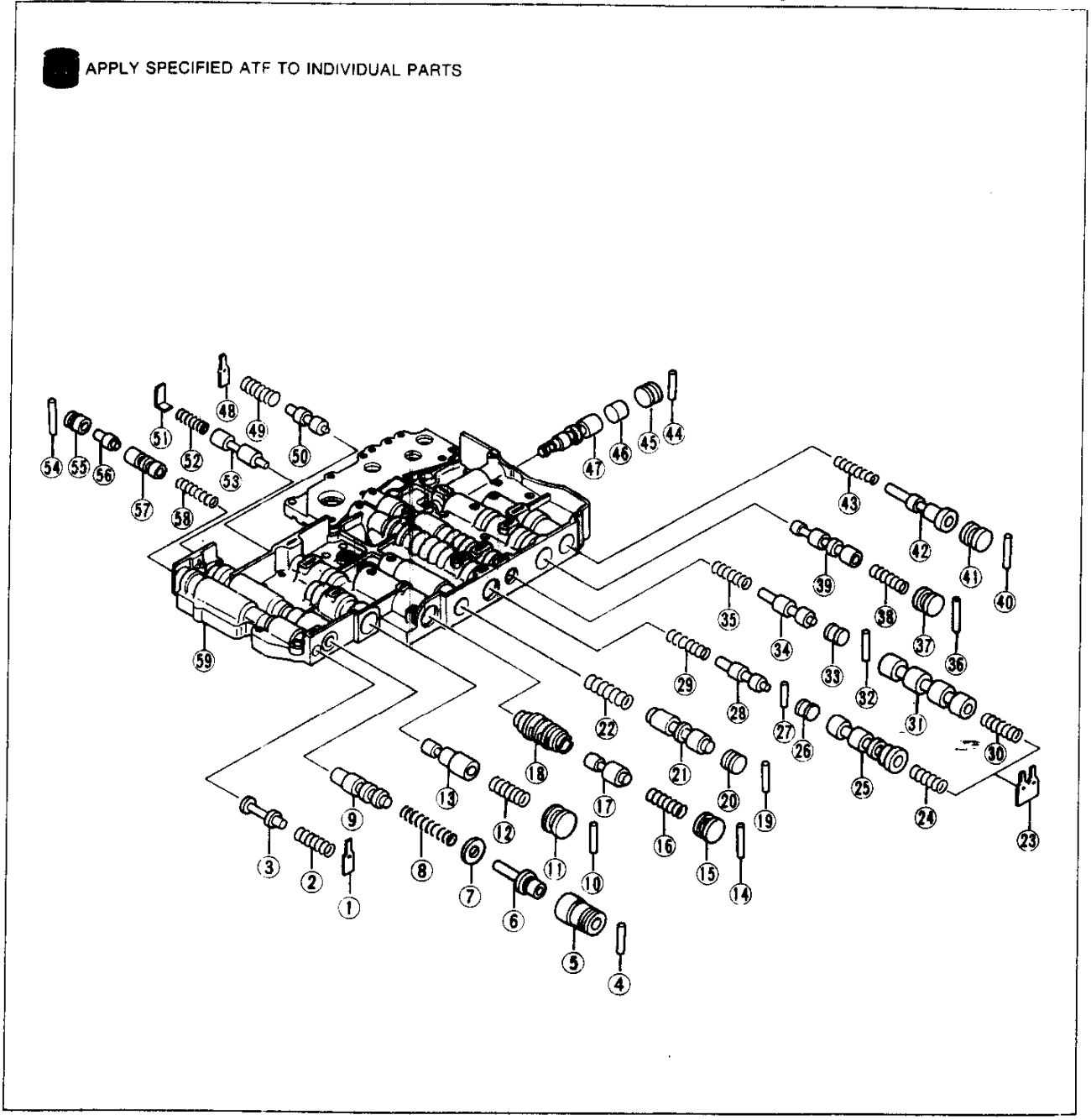
UPPER CONTROL VALVE BODY

Disassembly / Inspection / Assembly

Caution

- **Each valve should slide out by its own weight.**
- **When a valve will not slide out by its own weight, depending on the valve, push it out with a wire or place the valve body open-side down and lightly tap it with a plastic hammer. Never scratch or otherwise damage the valve surface or bore.**
- **Do not use a magnet to remove or install parts.**
- **Do not drop or lose the valves or internal parts.**

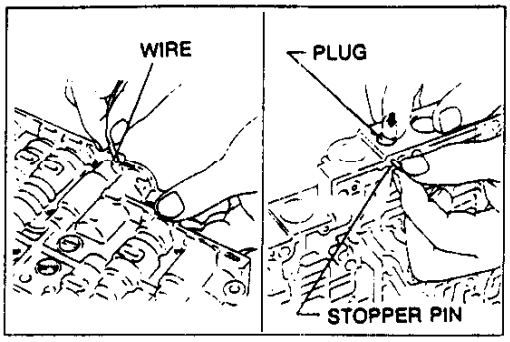
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



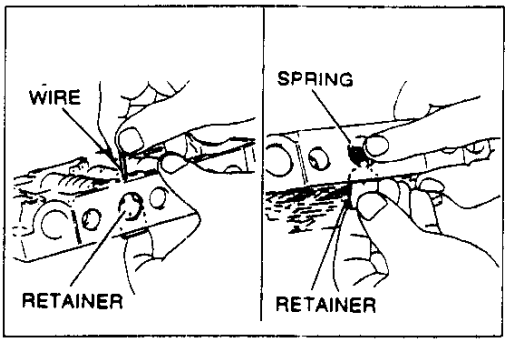
37U0KX-170

1. Retainer
   Disassembly Note ..... page K–114
2. Torque converter relief spring
   Inspection ..... page K–115
3. Torque converter relief valve
   Inspect for sticking, scoring, and scratches
4. Stopper pin
   Disassembly Note ..... page K–114
5. Pressure regulator sleeve
6. Pressure regulator plug
   Inspect for sticking, scoring, and scratches
7. Spring seat
8. Pressure regulator spring
   Inspection ..... page K–115
9. Pressure regulator valve
   Inspect for sticking, scoring, and scratches
10. Stopper pin
    Disassembly Note ..... page K–114
11. Pressure modifier plug
12. Pressure modifier spring
    Inspection ..... page K–115
13. Pressure modifier valve
    Inspect for sticking, scoring, and scratches
14. Stopper pin
    Disassembly Note ..... page K–114
15. Accumulator control plug
16. Accumulator control valve spring
    Inspection ..... page K–115
17. Accumulator control valve
    Inspect for sticking, scoring, and scratches
18. Accumulator control sleeve
    Inspect for sticking, scoring, and scratches
19. Stopper pin
    Disassembly Note ..... page K–114
20. Shuttle shift valve D plug
21. Shuttle shift valve D
    Inspect for sticking, scoring, and scratches
22. Shuttle shift valve D spring
    Inspection ..... page K–115
23. Retainer
    Disassembly Note ..... page K–114
24. Shift valve B spring
    Inspection ..... page K–115
25. Shift valve B
    Inspect for sticking, scoring, and scratches
26. Stopper pin
    Disassembly Note ..... page K–114
27. 4-2 sequence plug
28. 4-2 sequence valve
    Inspect for sticking, scoring, and scratches
29. 4-2 sequence spring
    Inspection ..... page K–115
30. Shift valve A spring
    Inspection ..... page K–115
31. Shift valve A
    Inspect for sticking, scoring, and scratches
32. Stopper pin
    Disassembly Note ..... page K–114
33. 4-2 relay plug
34. 4-2 relay valve
    Inspect for sticking, scoring and scratches
35. 4-2 relay spring
    Inspection ..... page K–115
36. Stopper pin
    Disassembly Note ..... page K–114
37. Overrunning clutch control plug
38. Overrunning clutch control spring
    Inspection ..... page K–115
39. Overrunning clutch control valve
    Inspect for sticking, scoring and scratches
40. Stopper pin
    Disassembly Note ..... page K–114
41. Overrunning clutch reducing plug
42. Overrunning clutch reducing valve
    Inspect for sticking, scoring and scratches
43. Overrunning clutch reducing spring
    Inspection ..... page K–115
44. Stopper pin
    Disassembly Note ..... page K–114
45. Shuttle shift valve S plug 1
46. Shuttle shift valve S plug 2
47. Shuttle shift valve S
    Inspect for sticking, scoring and scratches
48. Retainer
    Disassembly Note ..... page K–114
49. Pilot spring
    Inspection ..... page K–115
50. Pilot valve
    Inspect for sticking, scoring and scratches
51. Retainer
    Disassembly Note ..... page K–114
52. Lockup modifier spring
    Inspection ..... page K–115
53. Lockup modifier valve
    Inspect for sticking, scoring and scratches
54. Stopper pin
    Disassembly Note ..... page K–114
55. Lockup control sleeve
56. Lockup control plug
    Inspect for sticking, scoring and scratches
57. Lockup control valve
    Inspect for sticking, scoring and scratches
58. Lockup control spring
    Inspection ..... page K–115
59. Upper control valve body
    Inspect for damage and scoring

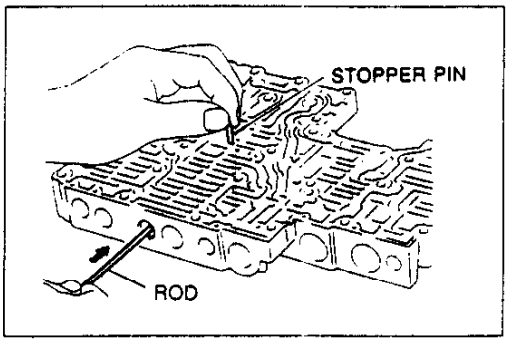
370U0KX-171



29U0KX-424



29U0KX-425



37U0KX-172

Disassembly note
Stopper pin

Caution
- **Do not use a magnet to hold the stopper pin.**

1. Push the stopper pin out with a wire.
2. Depress and hold the plug or sleeve with a finger to prevent the valve from popping out.
3. Remove the stopper pin, and remove the valve and internal parts.

Retainer

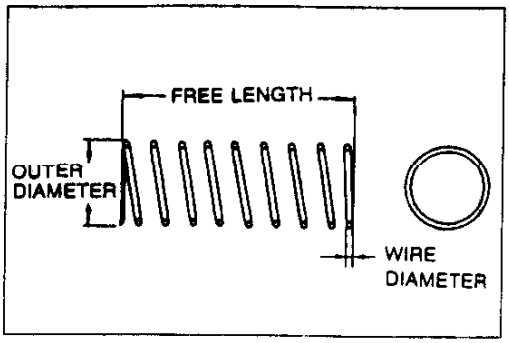
Caution
- **Do not use a magnet to hold the retainer.**

1. Push the retainer out with a wire.
2. Hold the inside parts with a finger to prevent the valve from popping out.
3. Remove the retainer, the valve, and the internal parts.

Stopper pin
(4-2 sequence valve and 4-2 relay valve)

Caution
- **Removal may be difficult.**
- **Do not use a magnet to hold the stopper pin.**

1. Push the stopper pin out with a wire.
2. Depress the plug with a vinyl-tape-wrapped **1.5 mm {0.059 in}** diameter rod.
3. Remove the stopper pin, the valve, and the internal parts.



29U0KX-427

Inspection
Springs

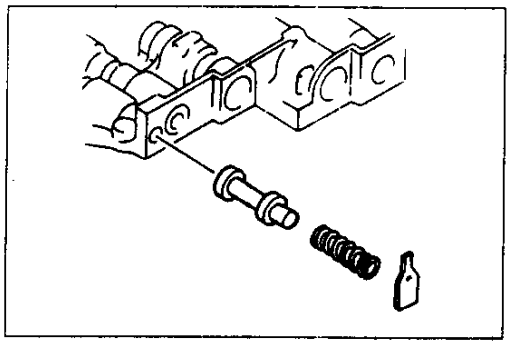
1. Measure the spring free length.
2. If not within specification, replace the spring.

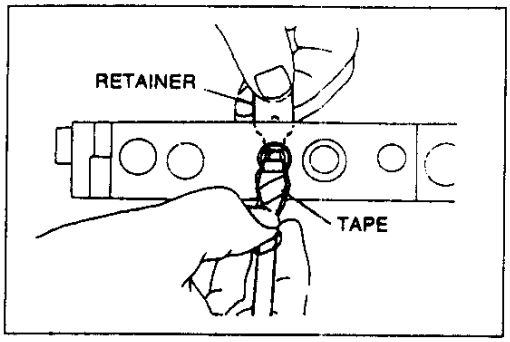
Specification

Spring \ Item		Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
Torque converter relief valve		9.2 {0.362}	38.3 {1.508}	14.2	1.5 {0.059}
Pressure regulator valve		14.0 {0.551}	29.0 {1.142}	5.6	1.6 {0.063}
Pressure modifier valve*	A	6.8 {0.268}	31.95 {1.258}	15.5	0.8 {0.031}
	B	6.9 {0.272}	32.6 {1.283}	22.2	0.9 {0.035}
	C	6.9 {0.272}	32.8 {1.291}	15.6	0.9 {0.035}
Accumulator control valve spring		10.5 {0.413}	17.0 {0.669}	4.3	0.5 {0.012}
Shuttle shift valve D		6.0 {0.236}	26.5 {1.043}	12.0	0.7 {0.028}
4-2 sequence valve		6.95 {0.274}	29.1 {1.146}	11.0	0.55 {0.022}
Shift valve B		7.0 {0.276}	25.0 {0.984}	9.5	0.65 {0.026}
4-2 relay valve		6.95 {0.274}	29.1 {1.146}	11.0	0.55 {0.022}
Shift valve A		7.0 {0.276}	25.0 {0.984}	9.5	0.65 {0.026}
Overrunning clutch control valve		7.0 {0.276}	23.6 {0.929}	7.9	0.6 {0.024}
Overrunning clutch reducing valve		7.0 {0.276}	32.5 {1.280}	12.6	0.85 {0.033}
Pilot valve		9.1 {0.358}	25.7 {1.012}	8.3	1.1 {0.043}
Lockup modifier valve		4.2 {0.165}	21.5 {0.846}	13.6	0.4 {0.016}
Lockup control valve		4.7 {0.185}	23.4 {0.921}	15.6	0.45 {0.018}

* Either A, B, or C type spring is installed at shipment. Only A type spring is available for replacement.

37U0KX-173


29U0KX-429



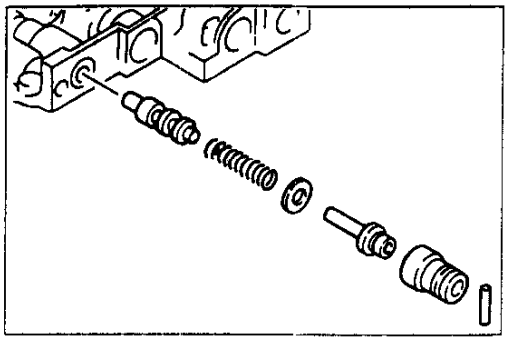
29U0KX-430

Assemble procedure

Caution

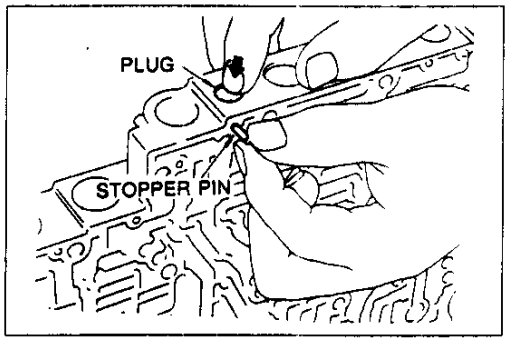
- **Before assembly, make sure all parts are thoroughly cleaned.**
- **Apply ATF to all parts and bores.**
- **Note the proper direction of the valve and internal parts.**
- **Do not reuse any parts that have been dropped.**
- **Do not scratch the valve or valve body.**
- **Wrap a screwdriver or rod with tape before using to insert a valve.**

1. Insert the torque converter relief valve and spring.
2. Install the retainer while compressing the spring.



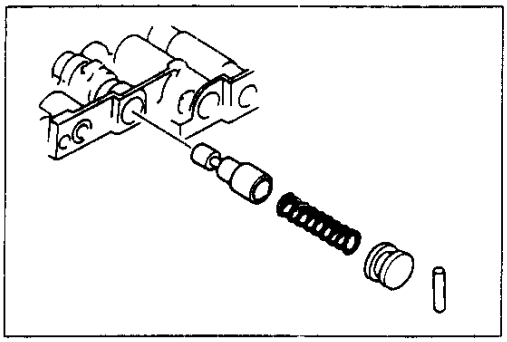
29U0KX-431

3. Insert the pressure regulator valve, spring, spring seat, plug, and sleeve.



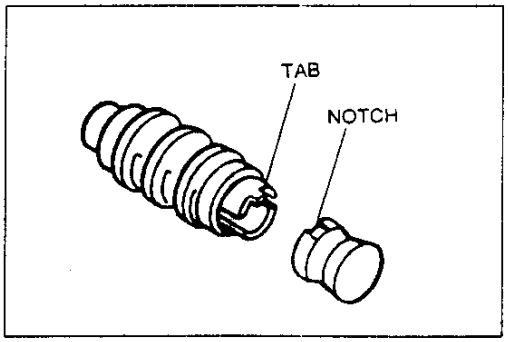
29U0KX-432

4. Insert the stopper pin while pushing the sleeve.



29U0KX-433

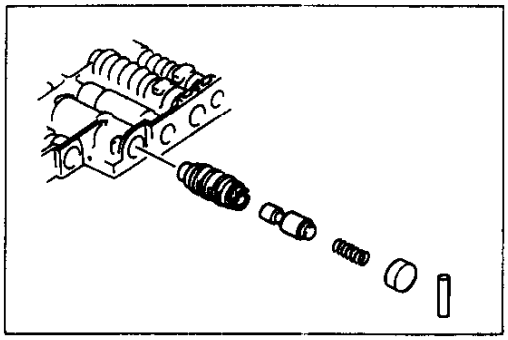
5. Insert the pressure modifier valve, spring, and plug.
6. Insert the stopper pin while pushing the plug.



29U0KX-434

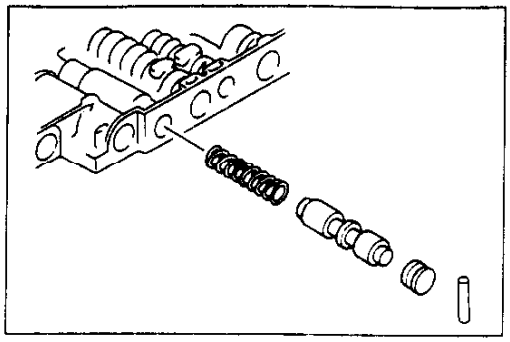
Note

- **Align the tab of the sleeve with the plug notch.**



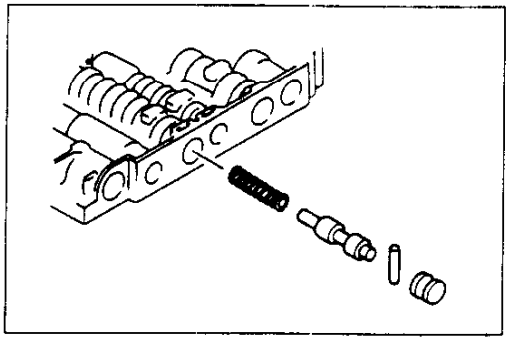
37U0KX-174

7. Insert the accumulator control sleeve, valve, and spring.
8. Insert the plug.
9. Insert the stopper pin.



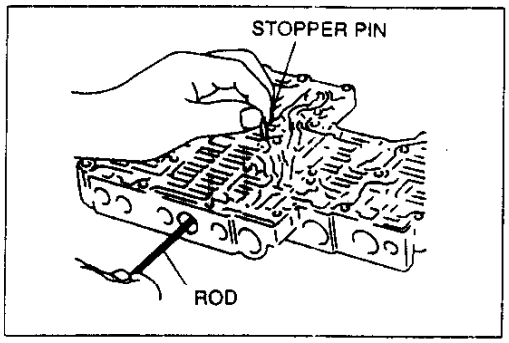
29U0KX-436

10. Insert the shuttle shift valve D spring, valve, and plug.
11. Insert the stopper pin while pushing the plug.



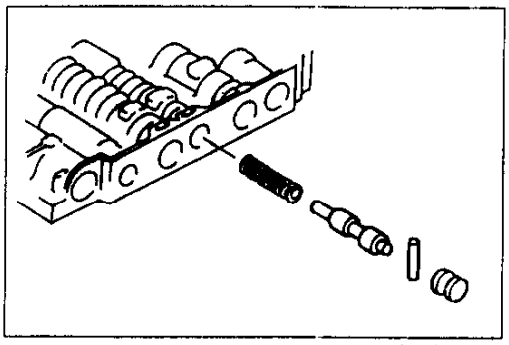
29U0KX-437

12. Insert the 4-2 sequence spring, valve, and plug.



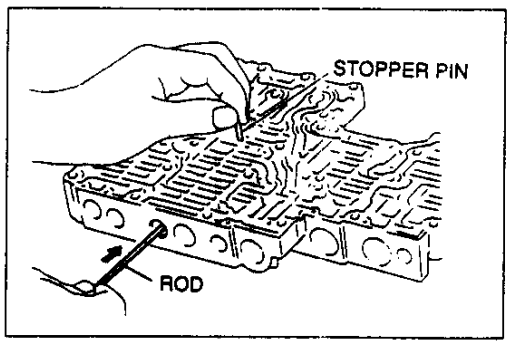
37U0KX-175

13. Push in the plug with a vinyl-tape-wrapped **1.5 mm {0.059 in}** diameter rod.
14. Insert the stopper pin.



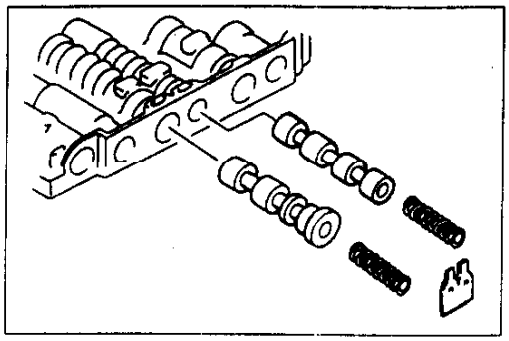
29U0KX-439

15. Insert the 4-2 relay spring, valve, and plug.



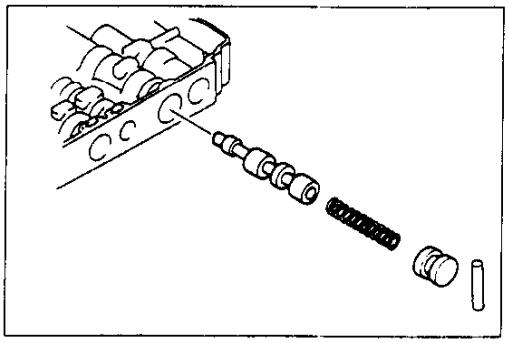
37U0KX-176

16. Push in the plug with a vinyl-tape-wrapped **1.5 mm {0.059 in}** diameter rod and insert the stopper pin.



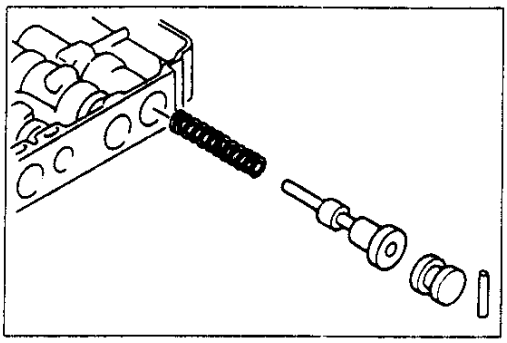
29U0KX-441

17. Insert shift valve A and spring.
18. Insert shift valve B and spring.
19. Install the retainer while compressing the springs.



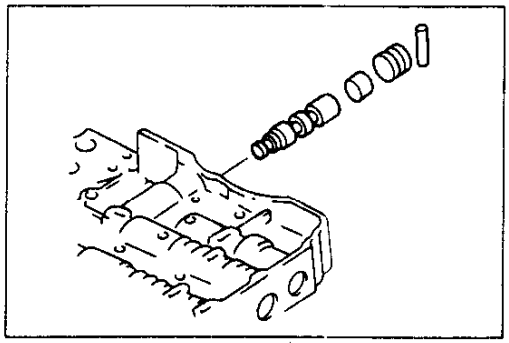
29U0KX-442

20. Insert the overrunning clutch control valve, spring, and plug.
21. Insert the stopper pin while pushing the plug.



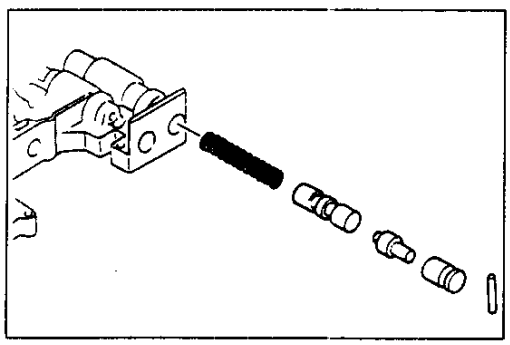
29U0KX-443

22. Insert the overrunning clutch reducing spring, valve, and plug.
23. Insert the stopper pin while pushing the plug.



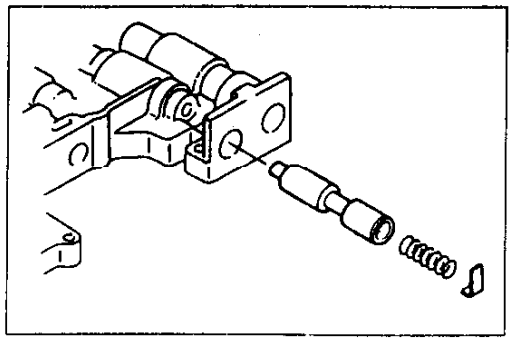
29U0KX-444

24. Insert the shuttle shift valve S, plug 2, and plug 1.
25. Insert the stopper pin.



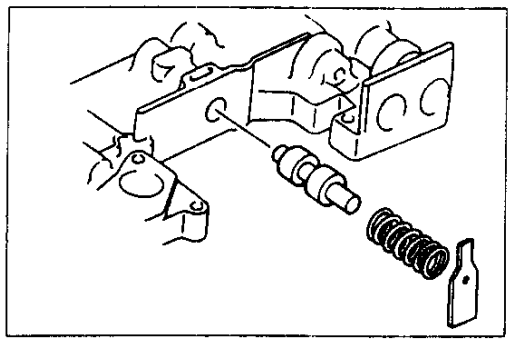
29U0KX-445

26. Insert the lockup control spring, valve, plug, and sleeve.
27. Insert the stopper pin while pushing the sleeve.



29U0KX-446

28. Insert the lockup modifier valve and spring.
29. Insert the retainer while pushing the spring.



29U0KX-447

30. Insert the pilot valve and spring.
31. Insert the retainer while pushing the spring.

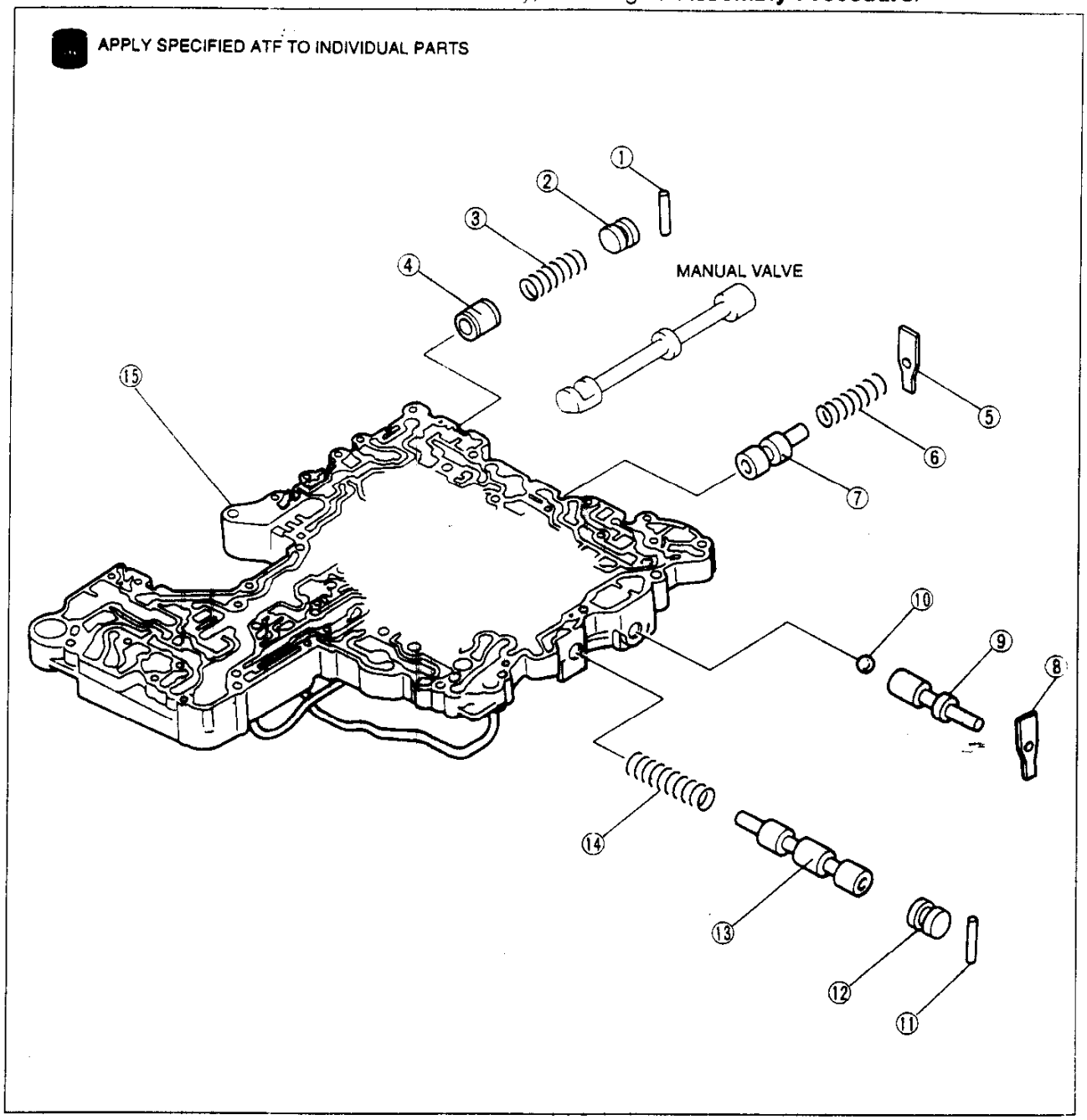
LOWER CONTROL VALVE BODY

Disassembly / Inspection / Assembly

Caution

- **Each valve should slide out by its own weight.**
- **When a valve will not slide out by its own weight, depending on the valve, push it out with a wire or place the valve body open-side down and lightly tap it with a plastic hammer. Never scratch or otherwise damage the valve surface or bore.**
- **Do not drop or lose the valves or internal parts.**
- **Do not use a magnet to remove or install parts.**

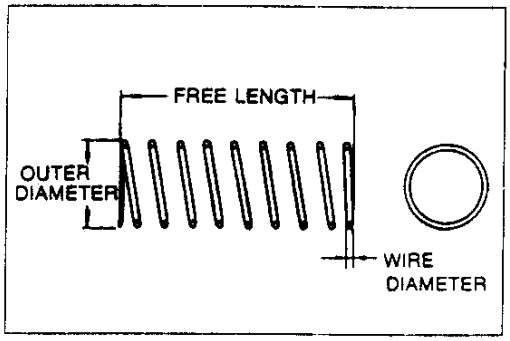
1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Inspect all parts and replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Procedure**.



37U0KX-177

1. Stopper pin
   Disassembly Note ..... page K–114
2. Modifier accumulator plug
3. Modifier accumulator spring
   Inspection ..... below
4. Modifier accumulator valve
   Inspect for sticking, scoring and scratches
5. Retainer
   Disassembly Note ..... page K–114
6. 1st reducing spring
   Inspection ..... below
7. 1st reducing valve
   Inspect for sticking, scoring and scratches
8. Retainer
   Disassembly Note ..... page K–114
9. 3-2 timing valve
   Inspect for sticking, scoring and scratches
10. Steel ball
11. Stopper pin
    Disassembly Note ..... page K–114
12. Servo charger plug
13. Servo charger valve
    Inspect for sticking, scoring and scratches
14. Servo charger spring
    Inspection ..... below
15. Lower control valve body
    Inspect for damage and scoring

370U0KX-78



29U0KX-450

Inspection
Springs

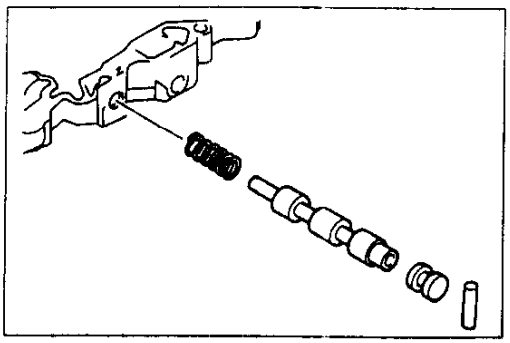
1. Measure the spring free length.
2. If not within specification, replace the spring.

Specification

Spring \ Item	Outer dia. mm {in}	Free length mm {in}	No. of coils	Wire dia. mm {in}
Modifier accumulator valve	9.8 {0.39}	30.5 {1.20}	8.75	1.3 {0.05}
1st reducing valve	6.8 {0.27}	25.4 {1.00}	12.5	0.8 {0.03}
Servo charger valve	6.5 {0.26}	33.2 {1.31}	12.0	0.5 {0.02}

37U0KX-179

Assembly procedure

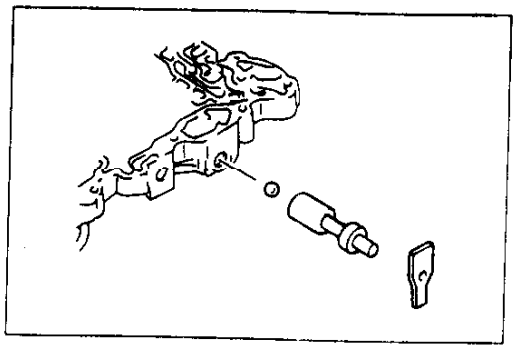


29U0KX-452

Caution

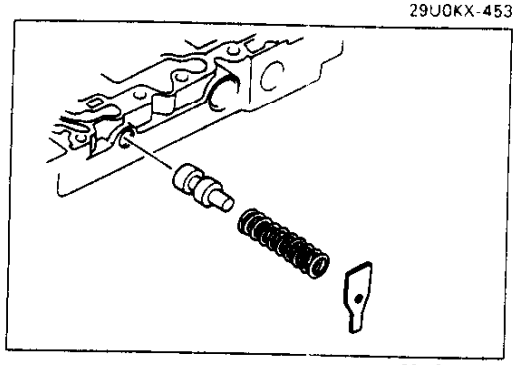
- **Before assembly, make sure all parts are thoroughly cleaned.**
- **Apply ATF to all parts and bores.**
- **Note the proper direction of the valve and internal parts.**
- **Do not reuse any parts that have been dropped.**
- **Do not scratch the valve or valve body.**
- **Wrap a screwdriver or rod with tape before using it to insert a valve.**

1. Insert the servo charger spring, valve, and plug.
2. Insert the stopper pin while pushing the plug.



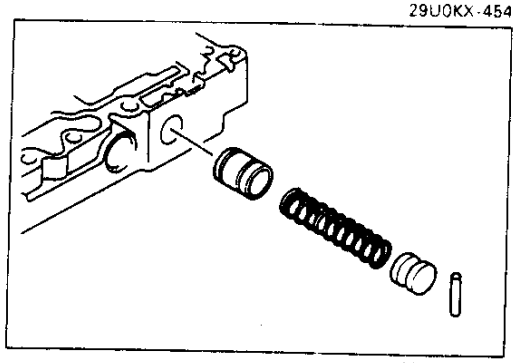
29U0KX-453

3. Insert the steel ball and 3-2 timing valve.
4. Insert the retainer.



29U0KX-454

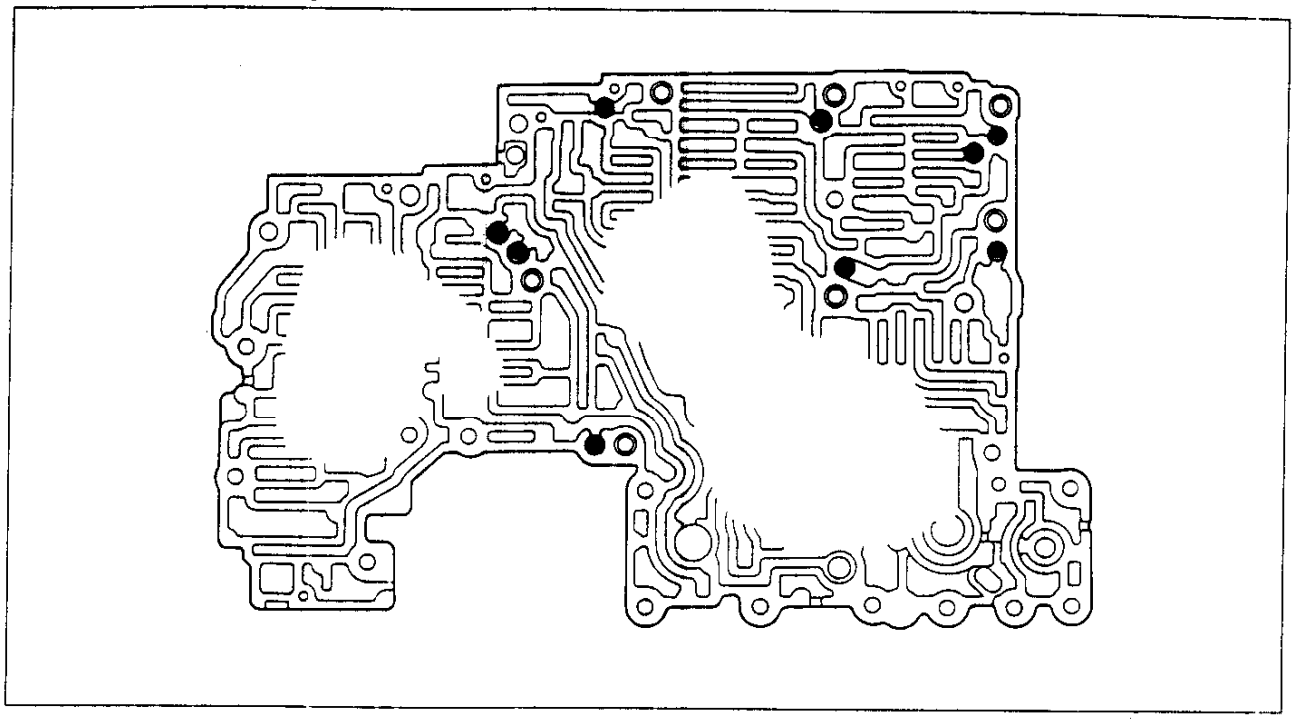
5. Insert the 1st reducing valve and spring.
6. Insert the retainer while compressing the spring.



29U0KX-455

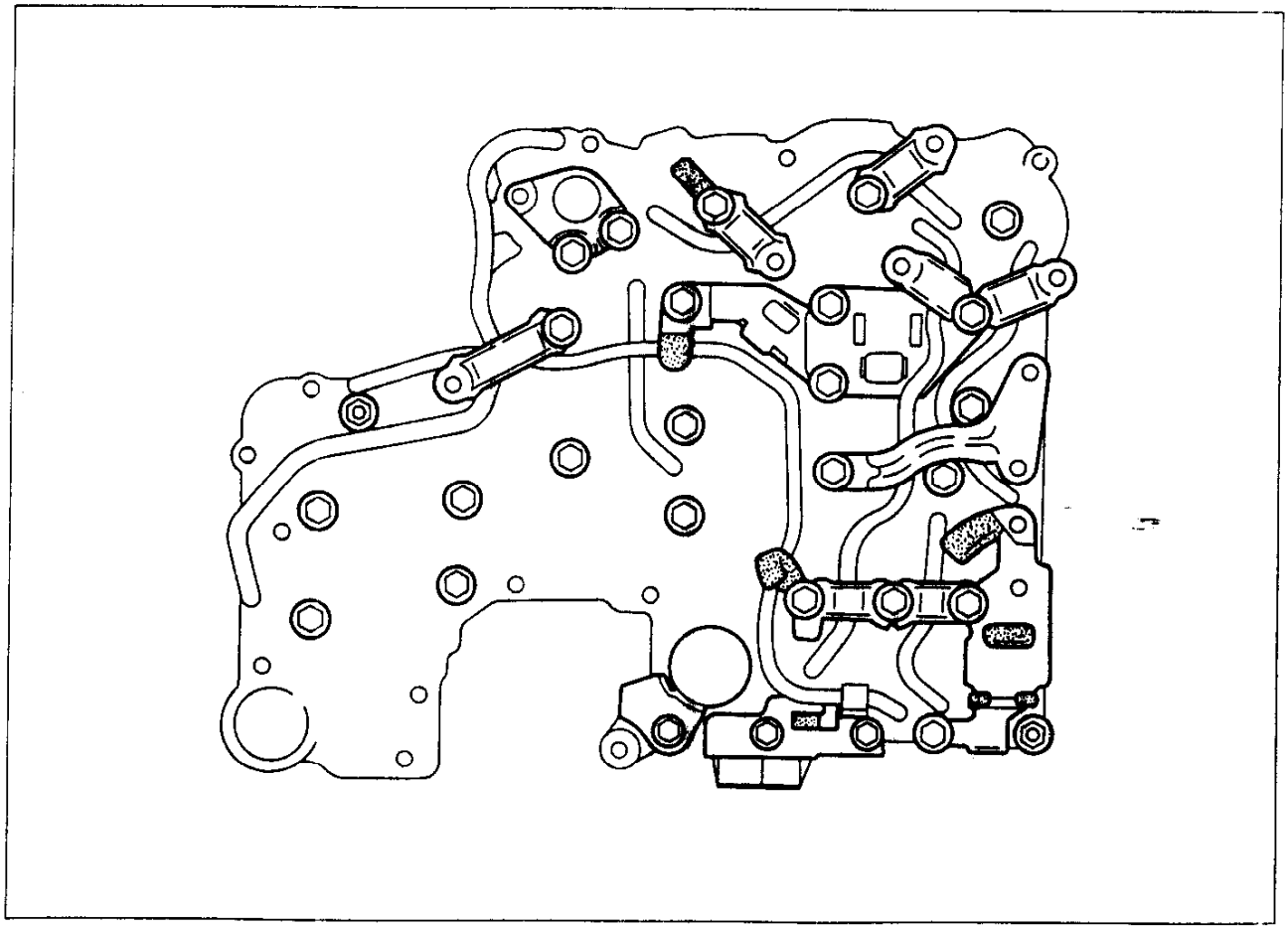
7. Insert the modifier accumulator valve, spring, and plug.
8. Insert the stopper pin while pushing the plug.

Steel ball installation positions



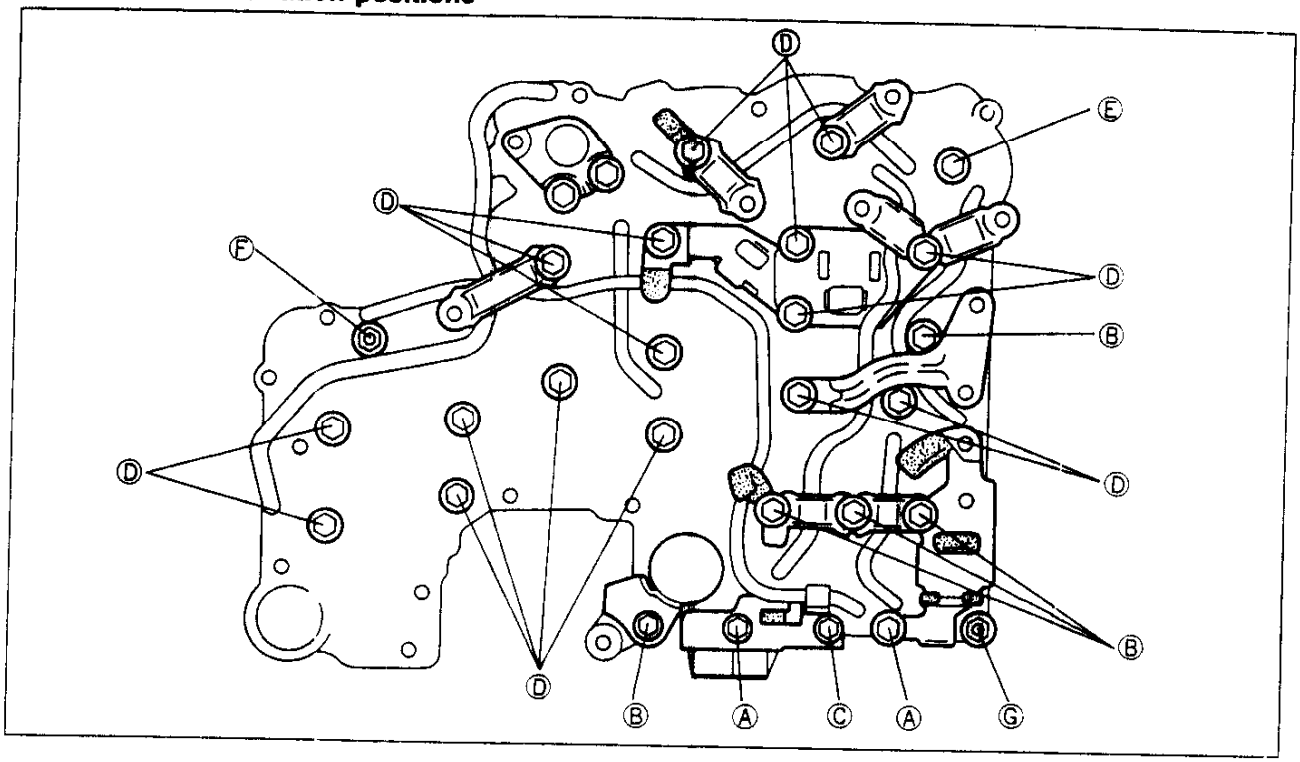
29U0KX-456

Bracket installation positions

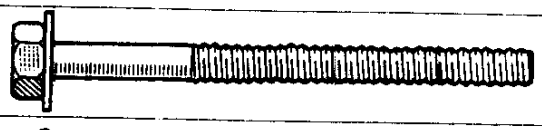
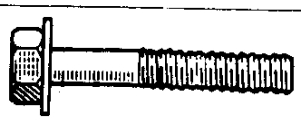
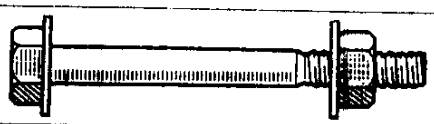
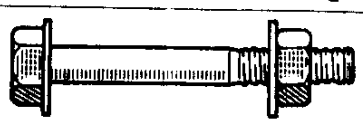


29U0KX-457

Bolt and nut installation positions



29U0KX-458

Identification letter	Bolt and nut	Length mm {in}	Torque specification N·m {kgf·cm, in·lbf}
A		65 {2.6}	6.9–8.8 {70–90, 61–78}
B		50 {2.0}	
C		40 {1.6}	
D		33 {1.3}	
E		27 {1.1}	
F		55 {2.2}	
G		45 {1.8}	

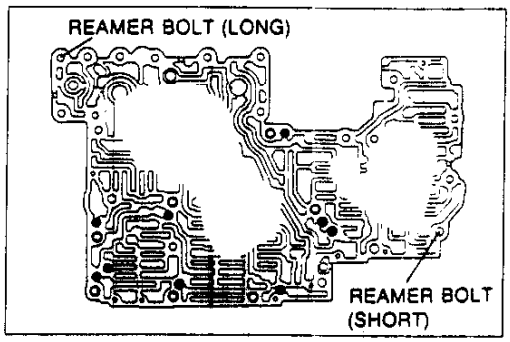
37U0KX-180

CONTROL VALVE BODY (ASSEMBLY)

Assembly

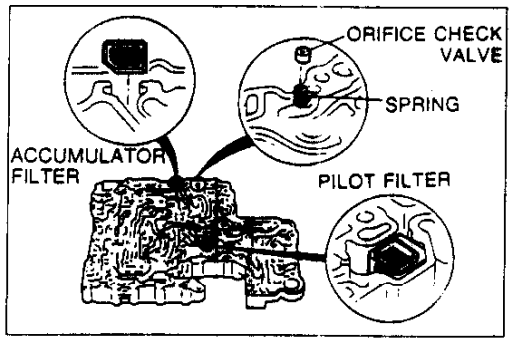
Caution
- **Before assembly, make sure all parts are thoroughly cleaned.**
- **Apply ATF to all parts.**
- **Do not reuse the gasket or O-ring.**

29U0KX-160



29U0KX 461

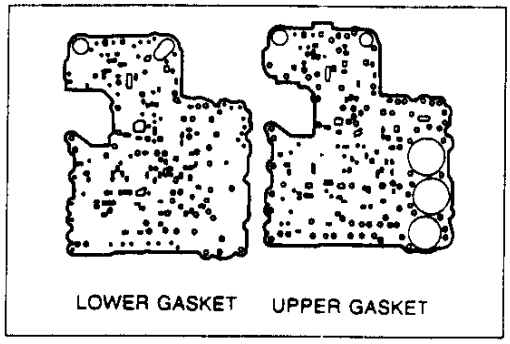
1. Install the steel balls and reamer bolts into their proper positions in the upper control valve body. (Refer to page K–123 for installation positions.)



29U0KX-462

Caution
- **Note the proper direction of the accumulator filter.**

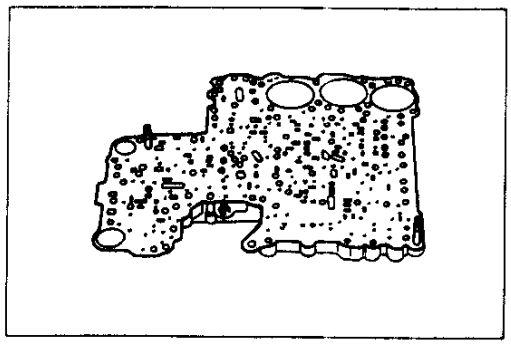
2. Install the pilot filter, accumulator filter, orifice check valve, and spring into their proper positions in the lower control valve body.

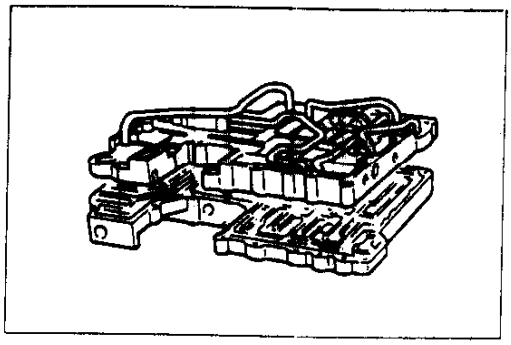


29U0KX-463

Caution
- **Do not mixup the upper and lower gaskets.**
- **Do not scratch the lower control valve body.**

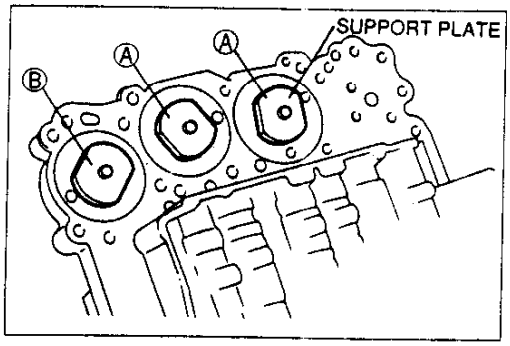
3. Install new gaskets and the separator plate onto the lower control valve body.





29U0KX-464

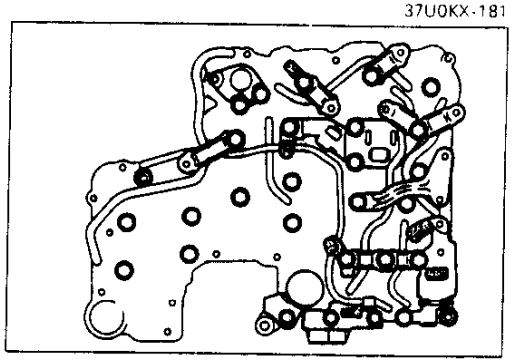
4. Set the lower control valve body onto the upper control valve body.



37U0KX-181

5. Install the support plates as shown.

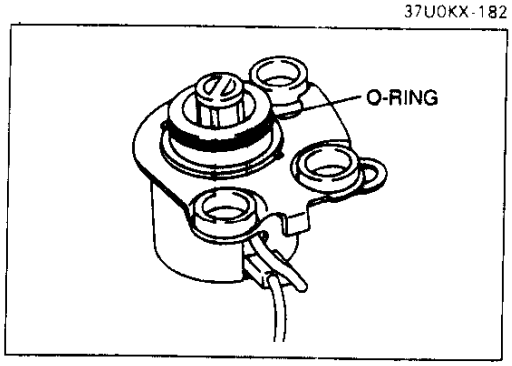
Bolt length (measured from below bolt head):
A: 33 mm {1.3 in}
B: 27 mm {1.1 in}



37U0KX-182

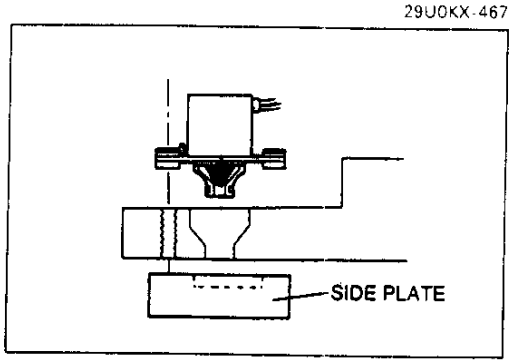
6. Install the brackets in their proper positions. (Refer to page K–123 for installation positions.)
7. Install the bolts and nuts in their proper positions, and tighten the fasteners evenly and gradually. (Refer to page K–124 for installation positions.)

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}



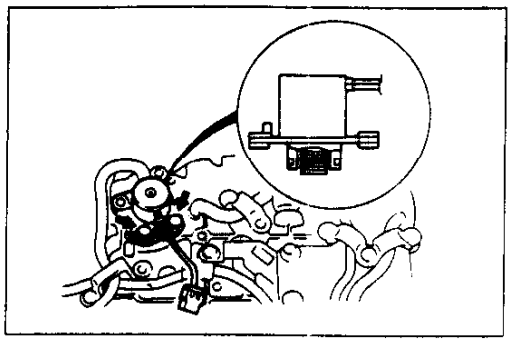
29U0KX-467

8. Install a new O-ring onto the solenoid valve (lockup).



29U0KX-468

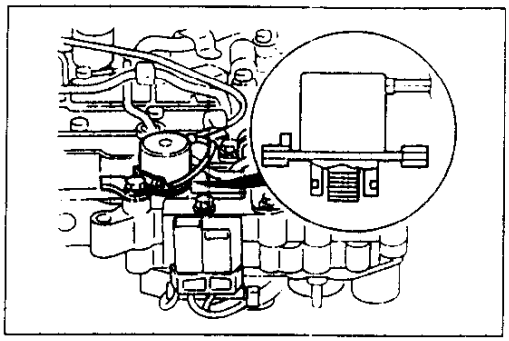
Note
- **Install the side plate as shown.**



37U0KX-183

9. Install the solenoid valve (lockup) and side plate to the lower control valve body.

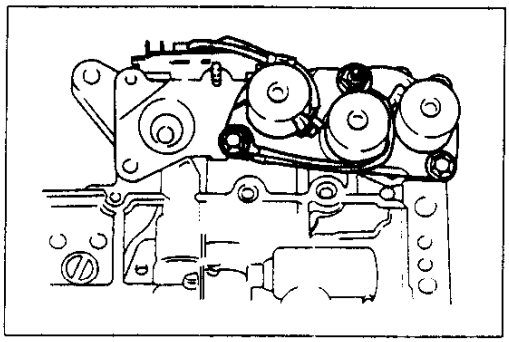
Tightening torque:
9.9–12.7 N·m {100–130 kgf·cm, 87–112 in·lbf}



37U0KX-184

10. Install a new O-ring onto the solenoid valve (lockup control).
11. Install the solenoid valve (lockup control) into the lower control valve body.

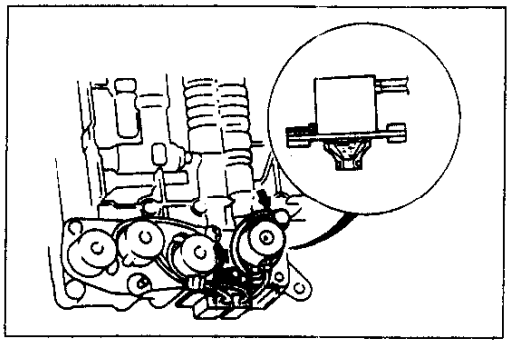
Tightening torque:
9.9–12.7 N·m {100–130 kgf·cm, 87–112 in·lbf}



37U0KX-185

12. Install the new O-rings onto the solenoids.
13. Install the solenoids into the upper control valve body.

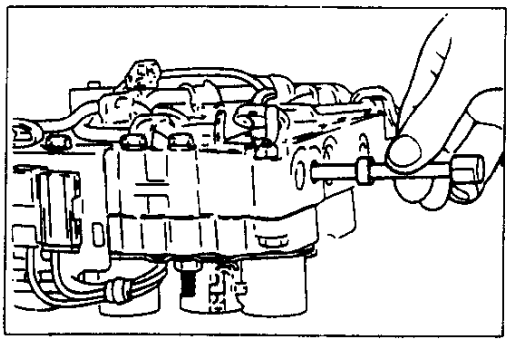
Tightening torque:
6.9–9.8 N·m {70–100 kgf·cm, 61–86 in·lbf}



37U0KX-186

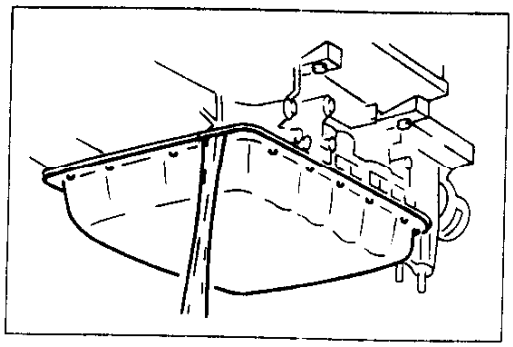
14. Install a new O-ring onto the solenoid valve (line pressure).
15. Install the solenoid valve (line pressure) into the upper control valve body.

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



29U0KX-473

16. Insert the manual valve.



37U0KX-187

CONTROL VALVE BODY (ON-VEHICLE REMOVAL / INSTALLATION)

On-vehicle Removal

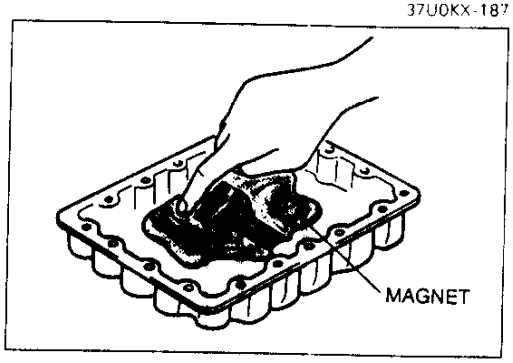
Warning

- **Be careful when draining; the ATF is hot.**

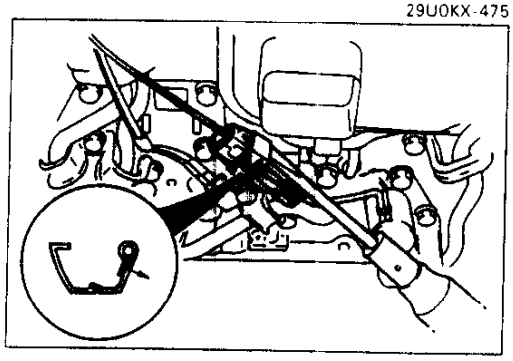
Caution

- **Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvent before removal.**

1. Disconnect the negative battery cable.
2. Jack up the vehicle and support it with safety stands.
3. Loosen the oil pan bolts and drain the ATF into a suitable container.
4. Remove the oil pan and gasket.
5. Remove the magnet from the oil pan and examine any material found in the pan or on the magnet to determine the condition of the transmission.



29U0KX-475

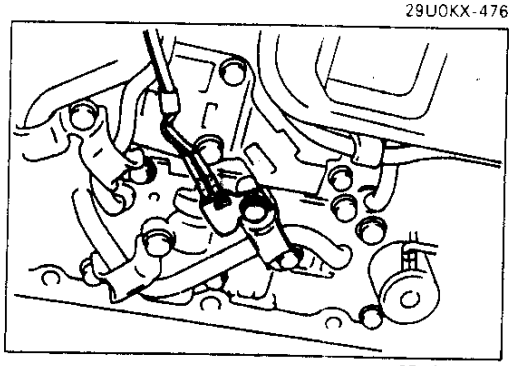


29U0KX-476

Caution

- **Do not damage the harness or connector.**

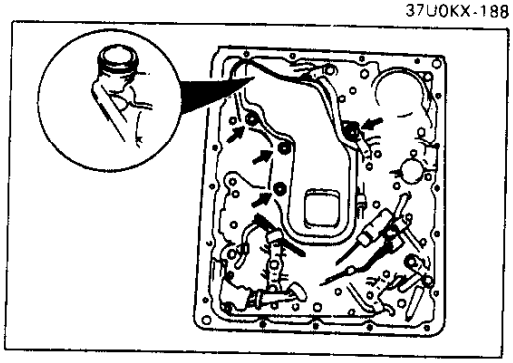
6. Remove the clip.
7. Disconnect the solenoid valve (lockup) connector.



37U0KX-188

8. Remove the ATF thermosensor.

Bolt length (measured from below bolt head):
45 mm {1.8 in}

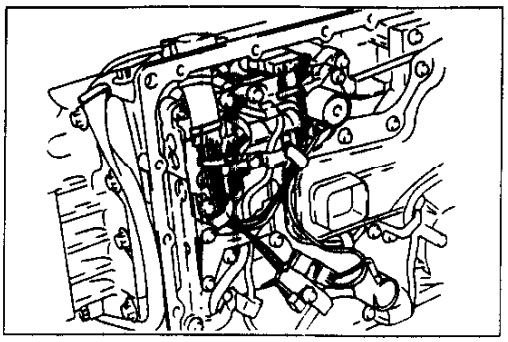


37U0KX-189

9. Remove the oil strainer.

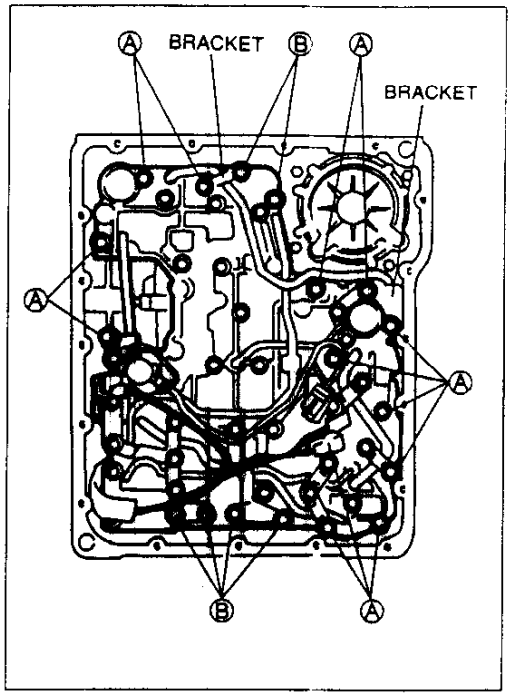
Bolt length (measured from below bolt head):
50 mm {2.0 in}

10. Remove the O-ring from the oil strainer.



29U0KX-479

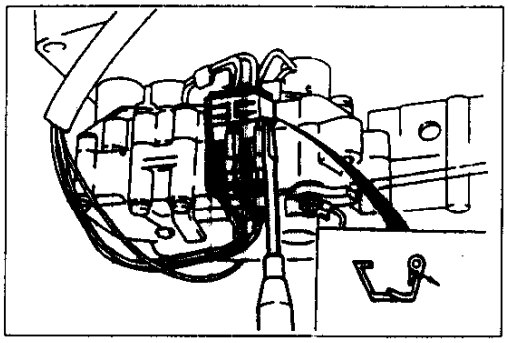
11. Separate the solenoid valve harness from the harness clip.



37U0KX-190

12. Remove bolts A and B and the brackets shown in the figure.

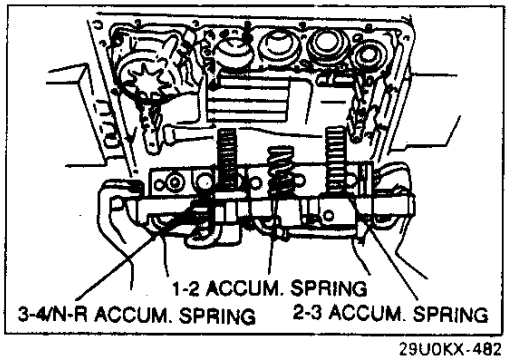
Bolt length (measured from below bolt head):
A: 33 mm {1.3 in}
B: 45 mm {1.8 in}



29U0KX-481

Caution
- **Do not damage the harness or connector.**

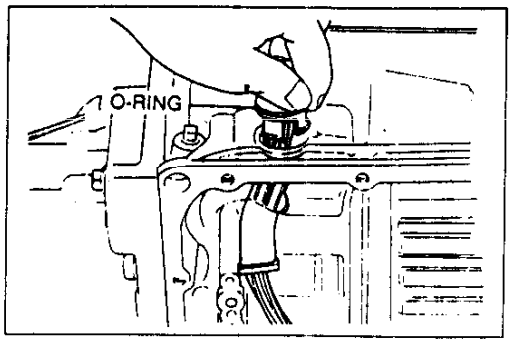
13. Remove the clip.
14. Disconnect the solenoid valve connectors.



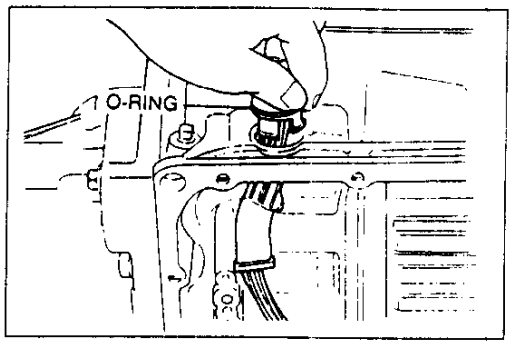
29U0KX-482

Caution
- **Do not drop the accumulator springs.**

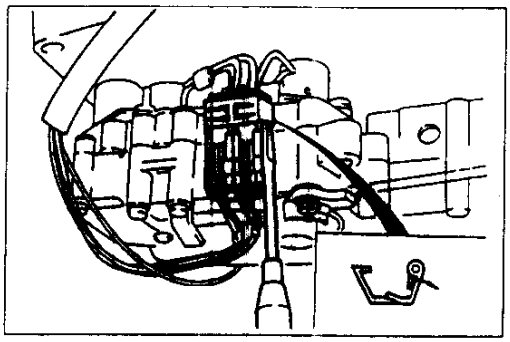
15. Remove the control valve body and accumulator springs.

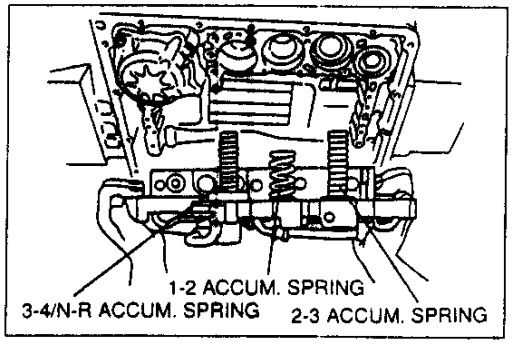


29U0KX-483

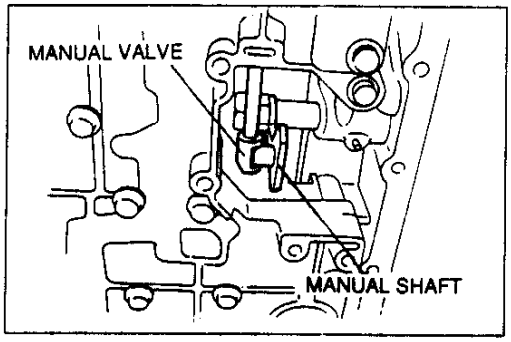


29U0KX-484


29U0KX-485



37U0KX-191



29U0KX-487

Caution
- **Do not damage the harness.**

16. If necessary, remove the solenoid valve harness from the transmission case.
17. Remove the O-ring from the solenoid valve harness.

On-Vehicle Installation

1. Apply ATF to the new O-ring and install it onto the solenoid valve harness.

Caution
- **Do not damage the harness.**

2. Install the solenoid valve harness into the transmission case.

3. Connect the solenoid valve connectors.
4. Install the clip.

5. Set the accumulator springs into the control valve body as shown.

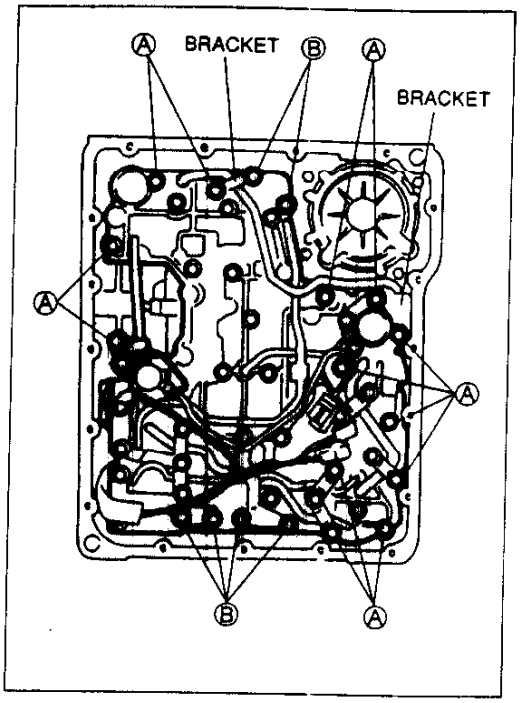
Spring specifications

mm {in}

Item / Spring	Outer dia.	Free length	No. of coils	Wire dia.
3-4 / N-R accumulator piston	18.0 {0.71}	43.0 {1.69}	7.9	2.3 {0.091}
1-2 accumulator piston	29.3 {1.15}	45.0 {1.77}	3.8	3.7 {0.15}
2-3 accumulator piston	19.5 {0.77}	66.0 {2.60}	8.6	3.0 {0.12}

Note
- **Verify that the manual valve and manual shaft are assembled correctly.**
- **Verify that the accumulator springs are installed correctly.**

6. Set the control valve into the transmission case and secure it.

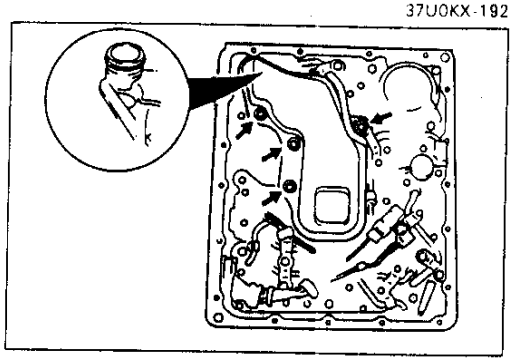


37U0KX-192

7. Install the A and B bolts and bracket shown in the figure.

Bolt length (measured from below bolt head):
A: 33 mm {1.3 in}
B: 45 mm {1.8 in}

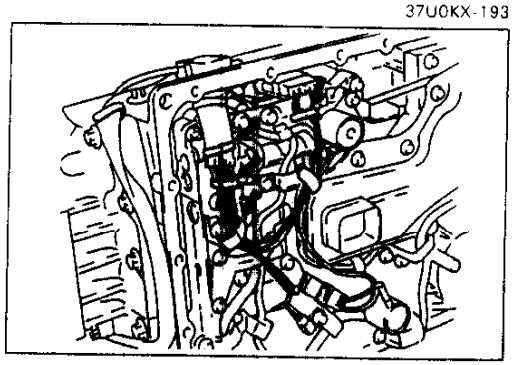
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}


37U0KX-193

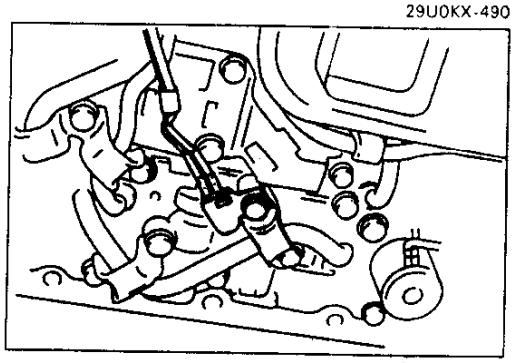
8. Apply ATF to a new O-ring and install it onto the oil strainer.
9. Install the oil strainer.

Bolt length (measured from below bolt head):
50 mm {2.0 in}

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}


29U0KX-490

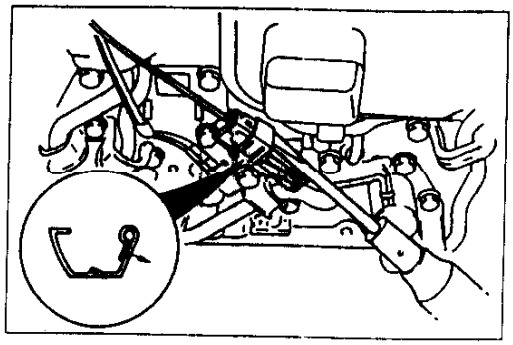
10. Secure the solenoid valve harness with the harness clip.


37U0KX-194

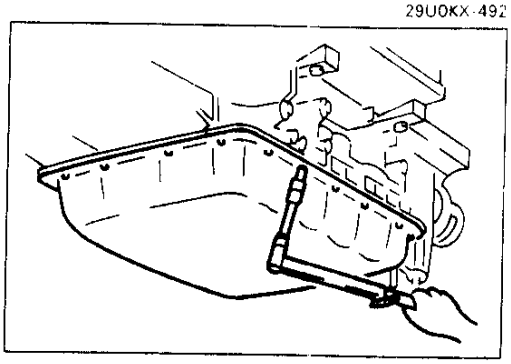
11. Install the ATF thermosensor.

Bolt length (measured from below bolt head):
45 mm {1.8 in}

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}

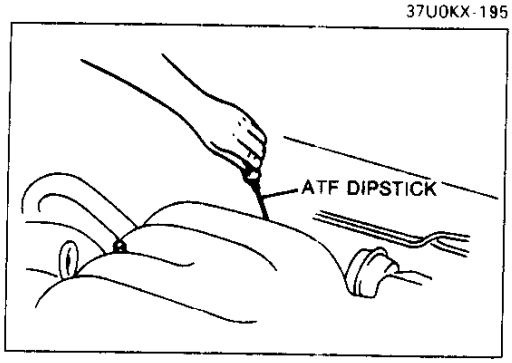

29U0KX-492

12. Connect the solenoid valve (lockup) connector.
13. Install the clip.


37U0KX-195

14. Clean the oil pan and the magnet, and set the magnet into the oil pan.
15. Install a new gasket and the oil pan.

Tightening torque:
5.0–7.8 N·m {50–80 kgf·cm, 44–69 in·lbf}



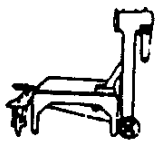
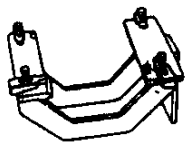
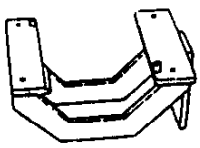
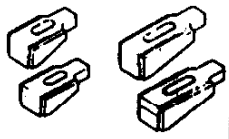
37U0KX-196

16. Connect the negative battery cable.
17. Pour in ATF and check the ATF level as specified. (Refer to page K–25.)

TRANSMISSION UNIT (ASSEMBLY)

Preparation

SST

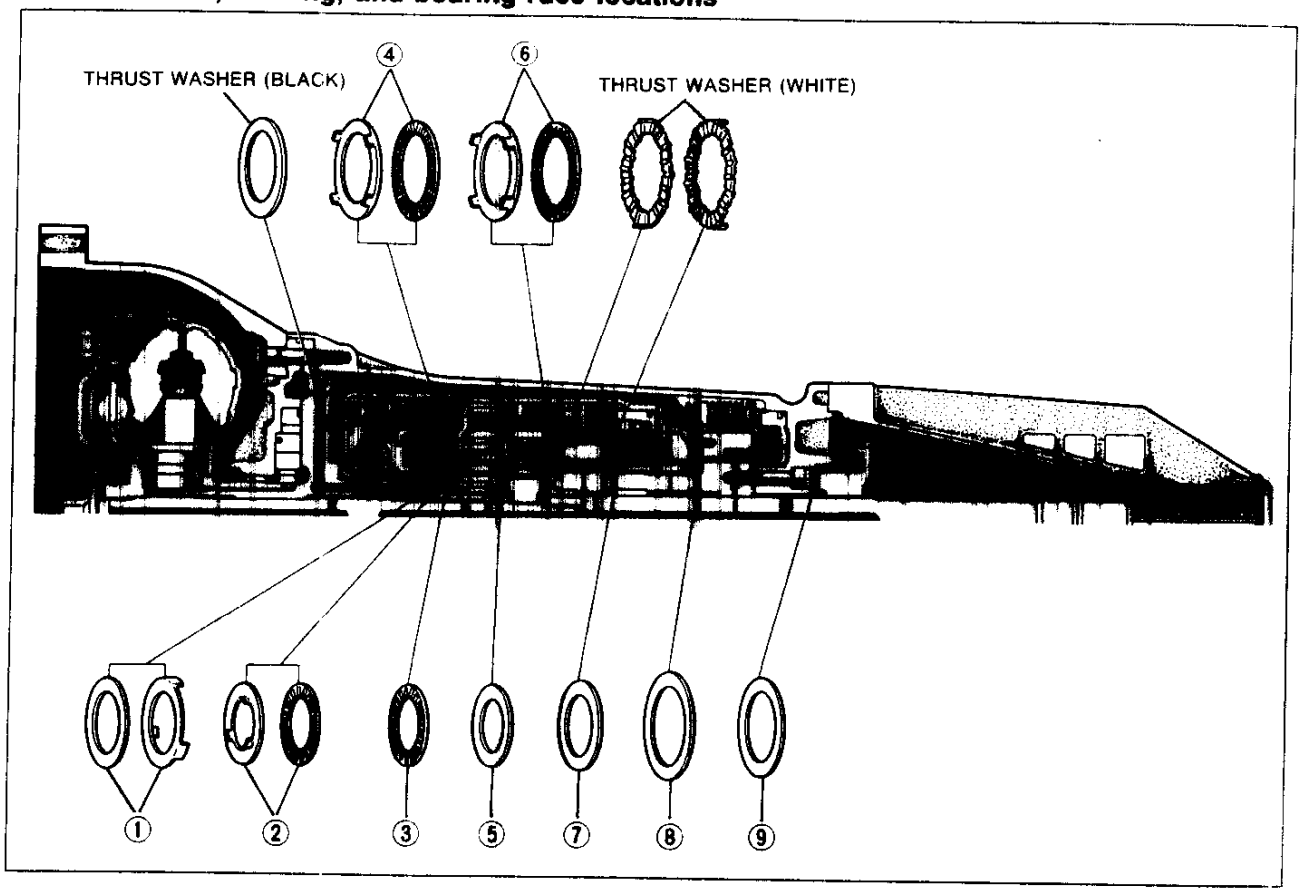
49 0107 680A Engine stand 	For assembly of transmission	49 U019 0A0A Hanger set, transmission 	For assembly of transmission
49 H075 495B Body (Part of 49 U019 0A0A) 	For assembly of transmission	49 U019 003 Holder (Part of 49 U019 0A0A) 	For assembly of transmission

29U0KX-495

Precaution

1. If the drive plates or brake band is replaced with new one(s), soak in ATF for at least 2 hours before installation.
2. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, D-rings and sliding parts.
3. All O-rings, D-rings, seals, and gaskets must be replaced with new ones included in the overhaul kit.
4. Use petroleum jelly, not grease, during reassembly.
5. When it is necessary to replace a bushing, replace the subassembly that includes that bushing.
6. Assemble the housing within 10 minutes after applying sealant, and allow it to cure at least 30 minutes after assembly before filling the transmission with ATF.

Thrust washer, bearing, and bearing race locations



29U0KX-496

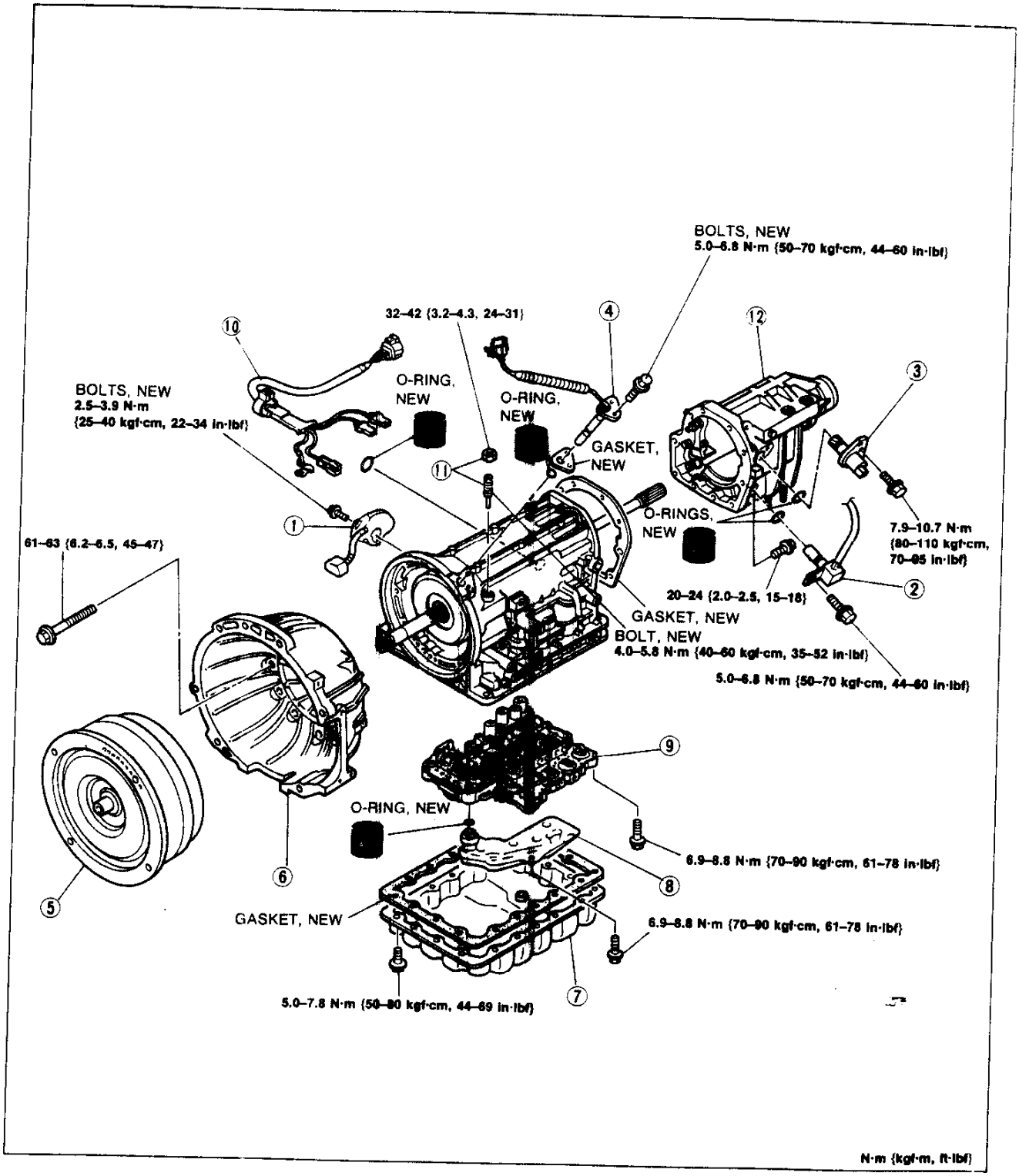
Outer diameter of bearing and race

		1	2	3	4	5	6
Bearing	mm {in}	47.0 {1.85}	53.0 {2.09}	53.0 {2.09}	78.0 {3.07}	53.0 {2.09}	78.0 {3.07}
Race	mm {in}	43.5 {1.71}	51.5 {2.03}	–	75.0 {2.95}	–	75.0 {2.95}

		7	8	9
Bearing	mm {in}	59.0 {2.32}	78.1 {3.08}	64.0 {2.52}
Race	mm {in}	–	–	–

37U0KX-197

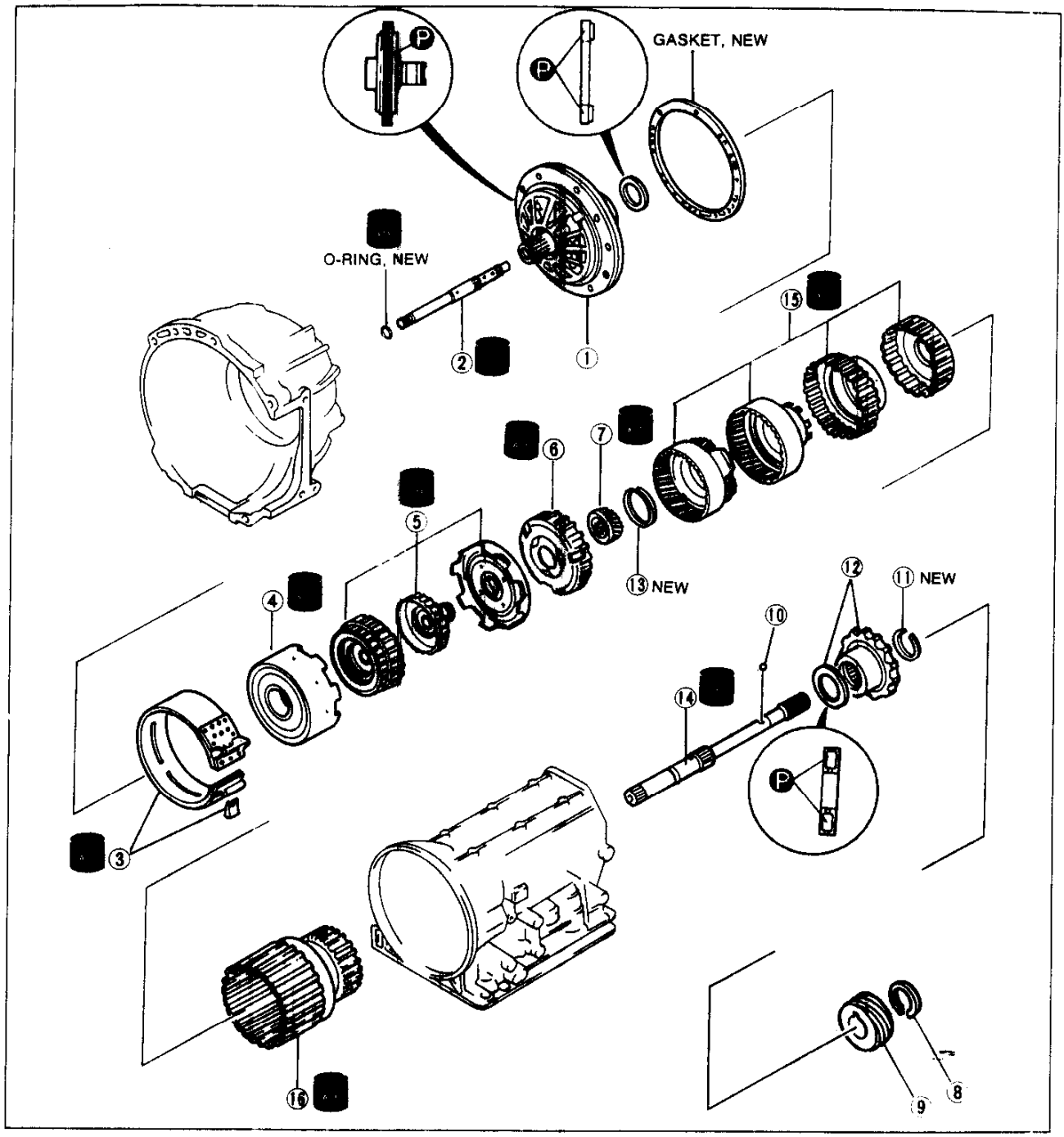
Components 1



29U0KX-438

1. Inhibitor switch
2. Speed sensor 1
3. Speed sensor 2
4. Pulse generator
5. Torque converter
6. Converter housing
7. Oil pan
8. Oil strainer
9. Control valve body
10. Solenoid valve harness
11. Anchor end bolt and nut
12. Extension housing / Parking mechanism

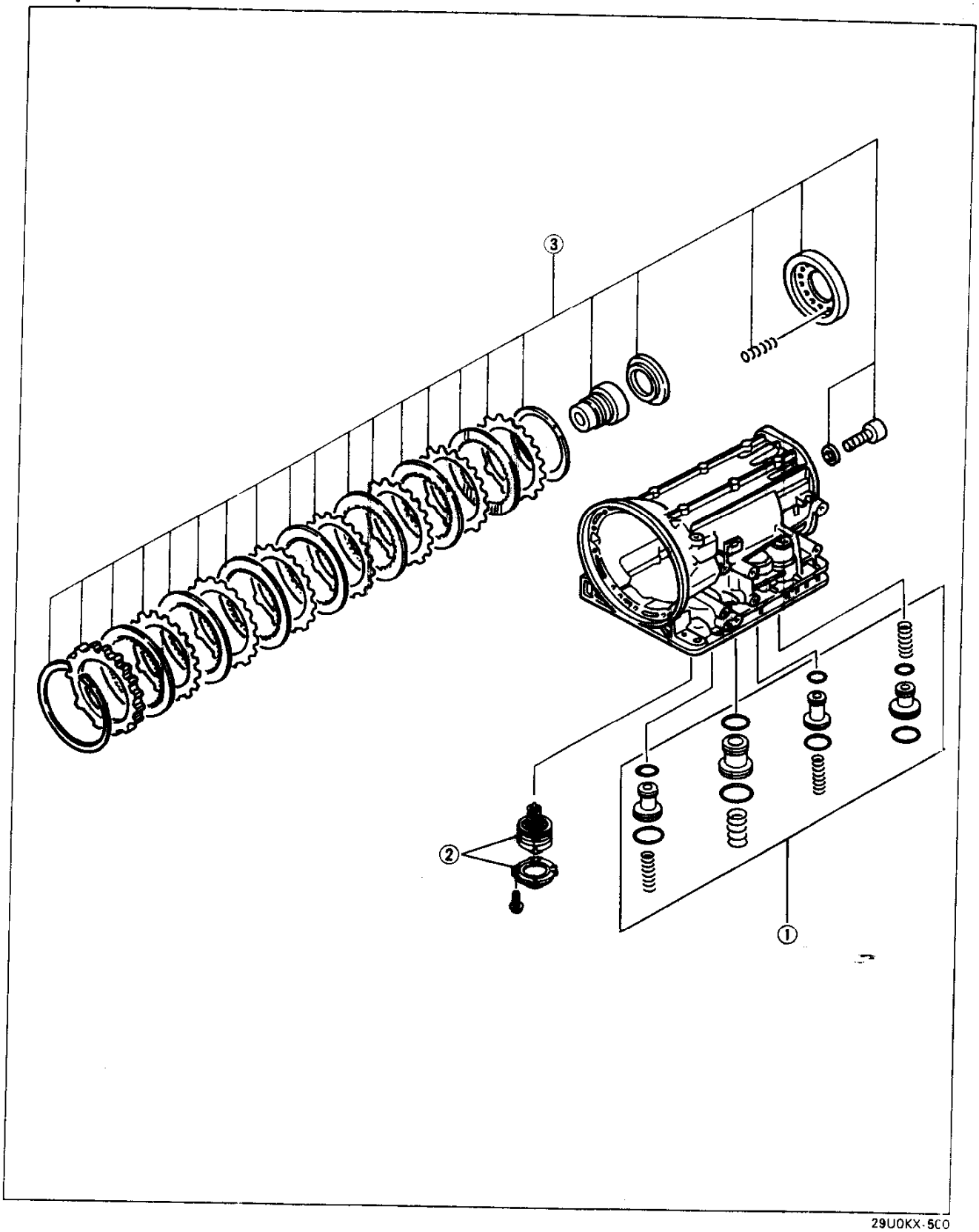
Components 2



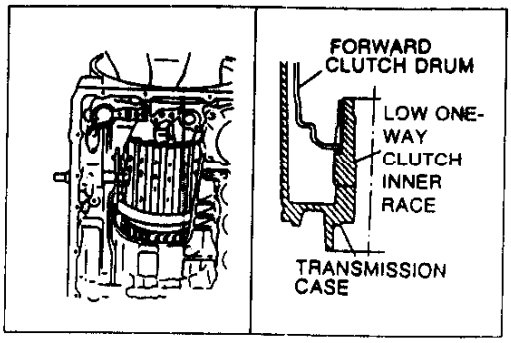
37U0KX-198

1. Oil pump
2. Input shaft
3. Brake band and strut
4. Reverse clutch
5. High clutch and front sun gear
6. Front planetary carrier
7. Rear sun gear
8. Snap ring
9. Speedometer drive gear
10. Steel ball
11. Snap ring
12. Parking gear and bearing
13. Snap ring
14. Output shaft
15. Front internal gear, rear internal gear, forward clutch hub, overrunning clutch hub
16. Forward clutch drum (forward clutch, overrunning clutch, low one-way clutch)

Components 3



1. Accumulator
2. Band servo
3. Low and reverse brake

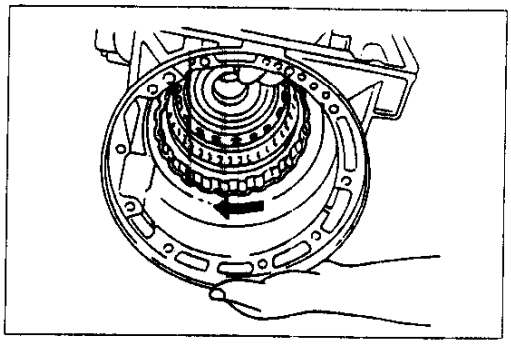


29U0KX-501

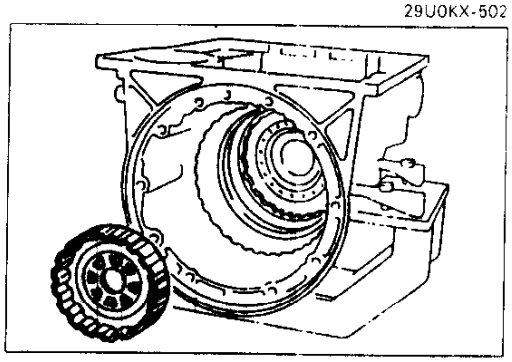
Assembly procedure

Caution
- **Do not damage the seal rings on the low one-way clutch inner race.**

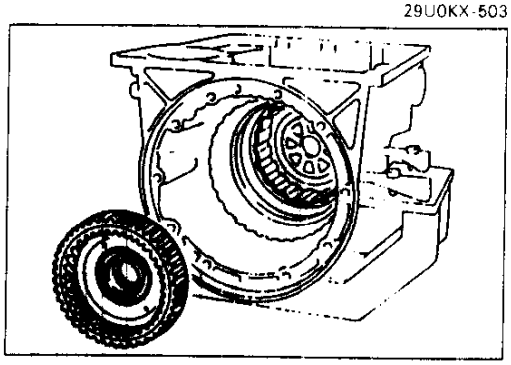
1. Install the forward clutch drum while slowly turning it clockwise until its hub passes fully over the low one-way clutch inner race.


29U0KX-502

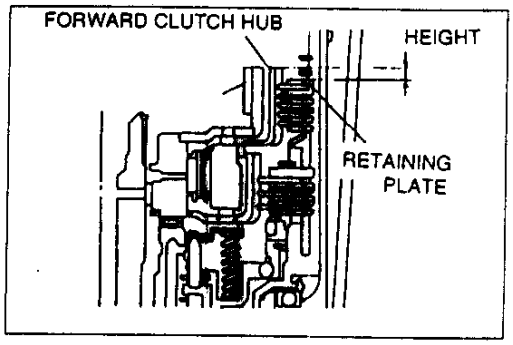
2. Verify that the forward clutch drum will turn only clockwise.


29U0KX-503

3. Verify that the bearing is installed on the rear of the overrunning clutch hub.
4. Install the overrunning clutch hub into the forward clutch drum.
5. Verify that the thrust washer is installed on the front of the overrunning clutch hub.


29U0KX-504

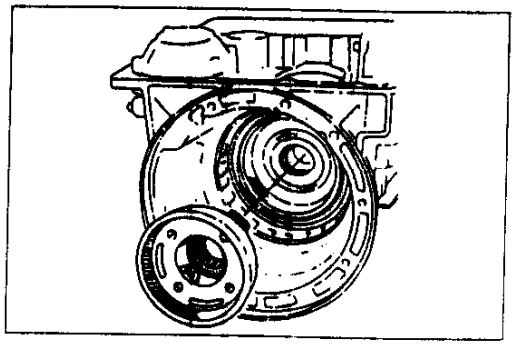
6. Install the rear internal gear and forward clutch hub assembly into the forward clutch drum.
7. Verify that the bearing is installed on the rear internal gear.



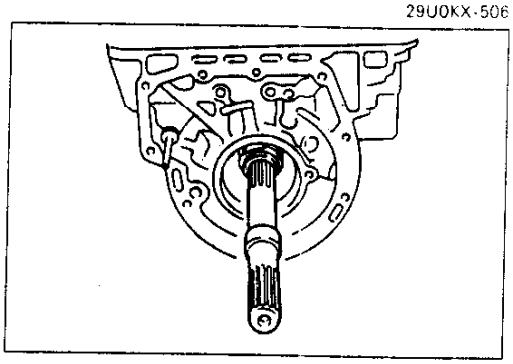
37U0KX-199

8. Measure the height difference between the forward clutch retaining plate and the top of the forward clutch hub.

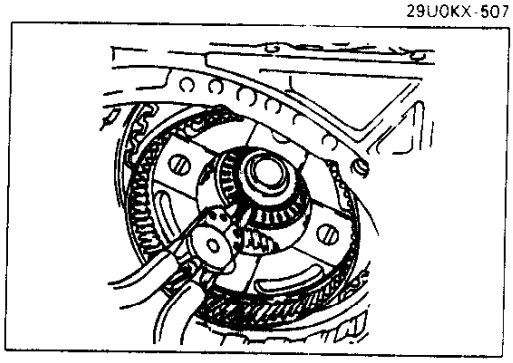
Height: 2.0–3.0 mm {0.079–0.118 in} approx.


29U0KX-506

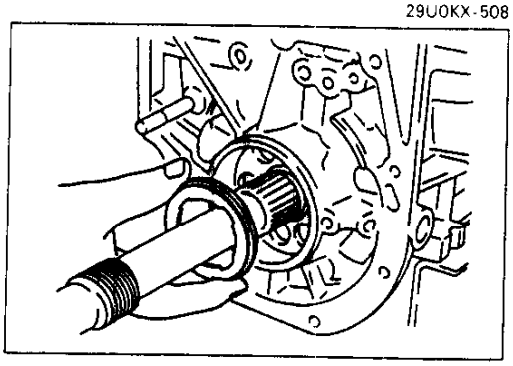
9. Verify that the bearing race is installed on the front internal gear (rear planetary carrier).
10. Install the front internal gear (rear planetary carrier) into the forward clutch assembly.


29U0KX-507

11. Insert the output shaft from the rear of the transmission case.

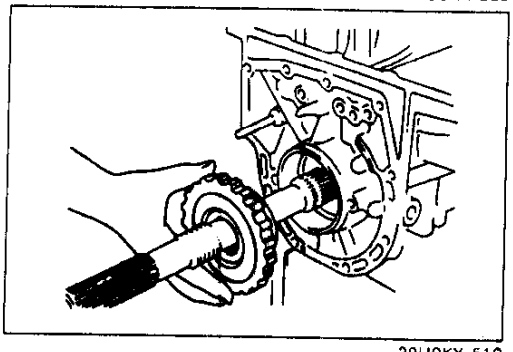

29U0KX-508

12. Push the output shaft slightly forward, and install a new snap ring on the shaft. Verify that the output shaft cannot be pulled from the rear of the transmission case.

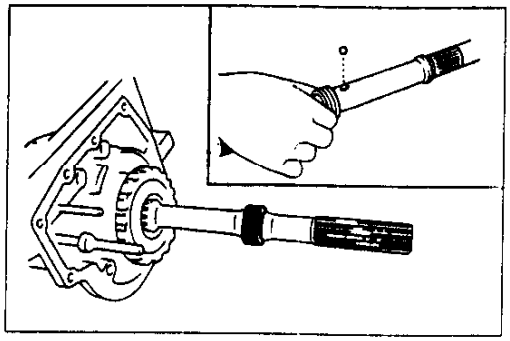

37U0KX-200

13. Apply petroleum jelly to the bearing and install it to the transmission case with the black surface facing outward.

Bearing outer diameter: 64.0 mm {2.52 in}

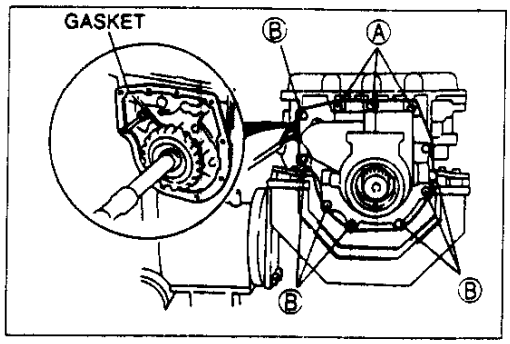

29U0KX-510

14. Install the parking gear.
15. Pull the output shaft slightly back, and install a new snap ring on the shaft. Verify that the output shaft cannot be pulled from the front of the transmission case.



37U0KX-201

16. Install the steel ball and speedometer drive gear onto the output shaft.
17. Secure the speedometer drive gear with the snap ring.

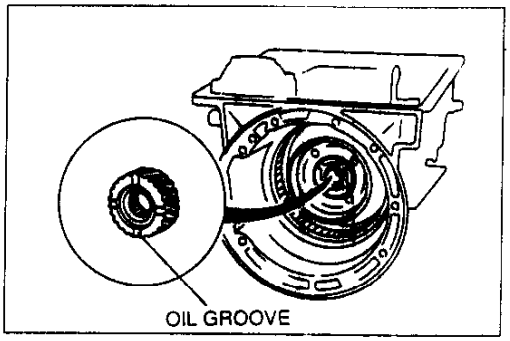


37U0KX-202

18. Install a new gasket and the extension housing.

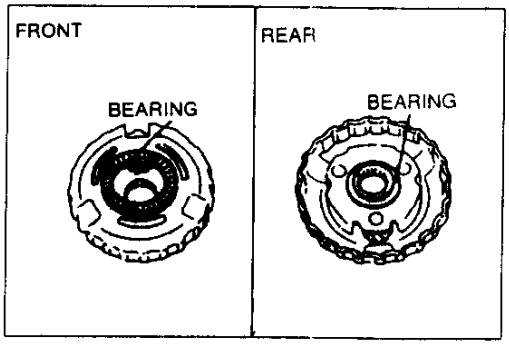
Bolt length (measured from below bolt head):
A: 30 mm {1.2 in}
B: 45 mm {1.8 in}

Tightening torque:
20–24 N·m {2.0–2.5 kgf·m, 15–18 ft·lbf}



29U0KX-513

19. Install the rear sun gear into the rear planetary carrier with the oil grooves of the gear facing outward.

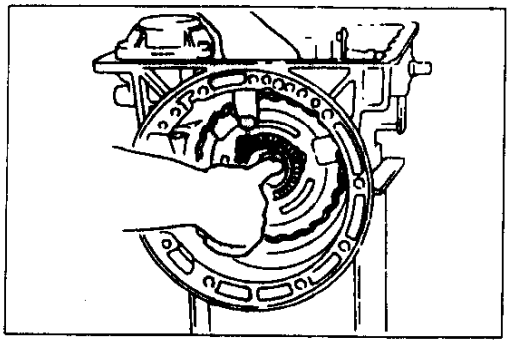


37U0KX-203

Caution
- **Install the rear bearing with the black surface facing outward.**

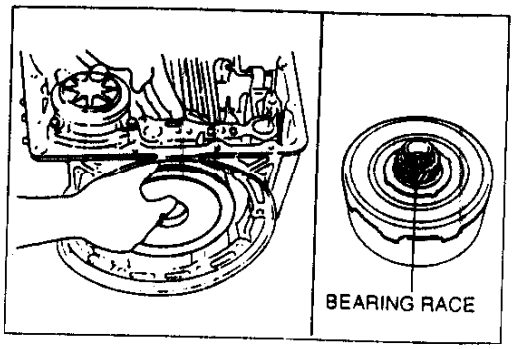
20. Apply petroleum jelly to the bearings and install them to the front planetary carrier.

Bearing outer diameter
Front: 78.0 mm {3.07 in}
Rear: 53.0 mm {2.09 in}



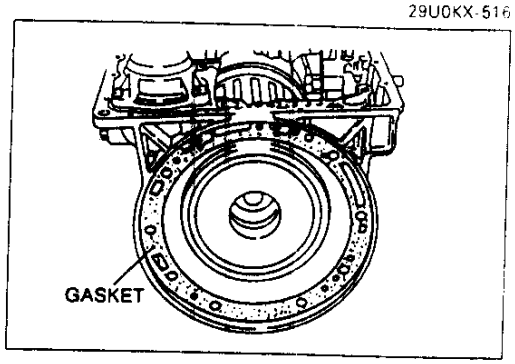
29U0KX-515

21. While rotating the forward clutch drum clockwise, install the front planetary carrier into the forward clutch drum.



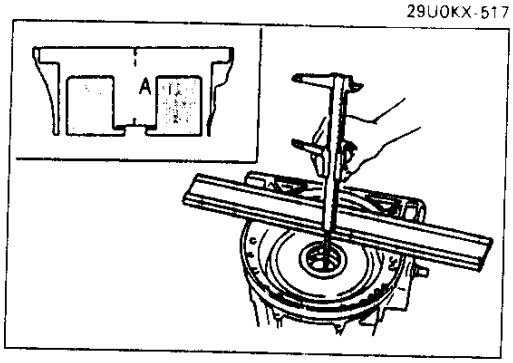
29U0KX-516

22. Verify that the bearing race is installed on the front sun gear.
23. Install the reverse clutch, high clutch, and front sun gear assembly into the transmission case.
24. Verify that the bearing race is installed on the high clutch drum.



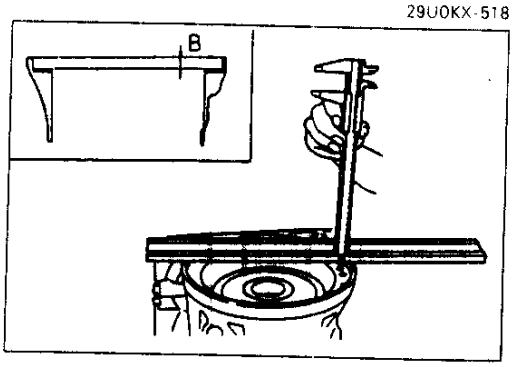
29U0KX-517

25. Adjust the total end play.
(1) Install a new oil pump gasket.



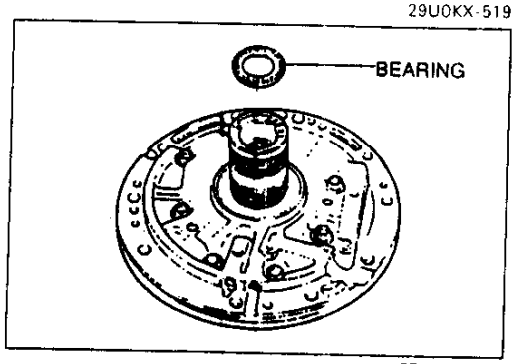
29U0KX-518

(2) Measure height A by using vernier calipers and a straightedge.



29U0KX-519

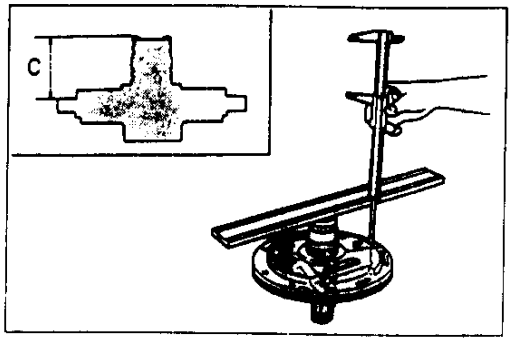
(3) Measure height B.



37U0KX-204

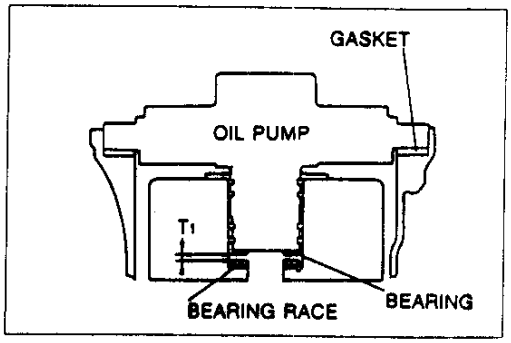
(4) Apply petroleum jelly to the bearing and install it on the oil pump.

Bearing outer diameter: 47.0 mm {1.85 in}



29U0KX-521

(5) Measure height C.



37U0KX-205

(6) Calculate the total end play by using the formula below.

Formula: T1 = A – B – C – 0.1 mm {0.004 in}

T1: Total end play
A: Distance between front of transmission case and bearing race on the high clutch drum
B: Distance between front of transmission case and oil pump gasket
C: Distance between upper surface of oil pump bearing and oil pump gasket contact surface.
0.1 mm {0.0039 in}: Amount of compression of new oil pump gasket

Total end play:
0.25–0.55 mm {0.010–0.022 in}

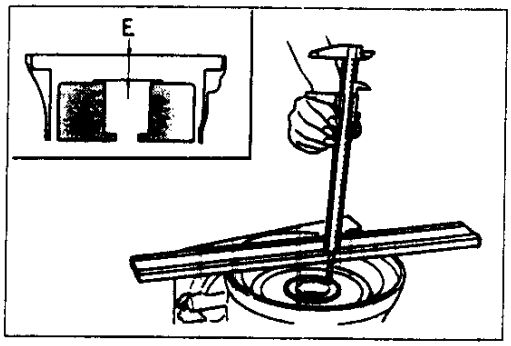
(7) If the total end play is not within specification, adjust it by selecting and installing the proper bearing race.

Bearing race size

mm {in}

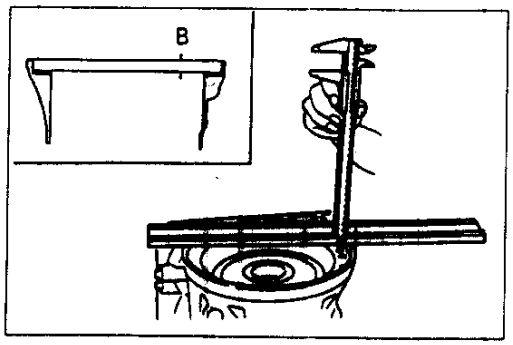
0.8 {0.031}	1.0 {0.039}	1.2 {0.047}	1.4 {0.055}
1.6 {0.063}	1.8 {0.071}	2.0 {0.079}	–

37U0KX-206



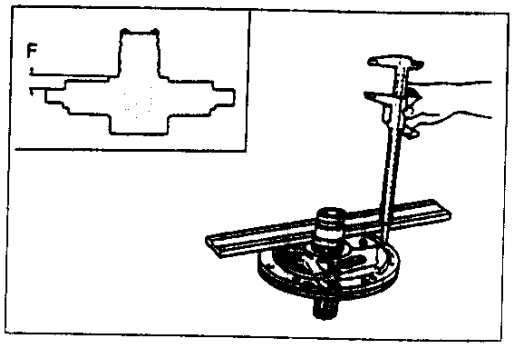
29U0KX-524

26. Adjust the reverse clutch end play.
(1) Install the thrust washer on the reverse clutch.
(2) Measure height E by using vernier calipers and a straightedge.



29U0KX-525

(3) Measure height B.



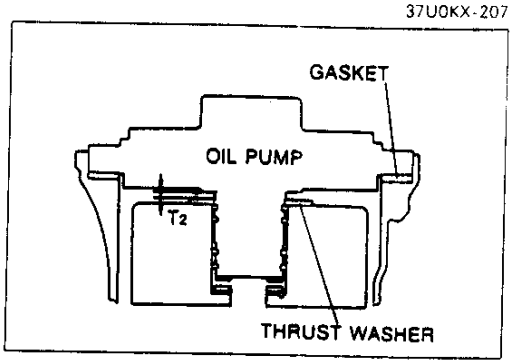
37U0KX-207

(4) Measure height F.

(5) Calculate the reverse clutch end play by using the formula below.

Formula: T2 = E – B – F – 0.1 mm {0.004 in}

T2: Reverse clutch end play
B: Distance between front of transmission case and oil pump gasket.
E: Distance between front of transmission case and thrust washer on the reverse clutch drum
F: Distance between reverse clutch thrust washer contact surface of oil pump and oil pump gasket contact surface
0.1 mm {0.0039 in}: Amount of compression of new oil pump gasket



37U0KX-208

Reverse clutch end play:
0.55–0.90 mm {0.022–0.035 in}

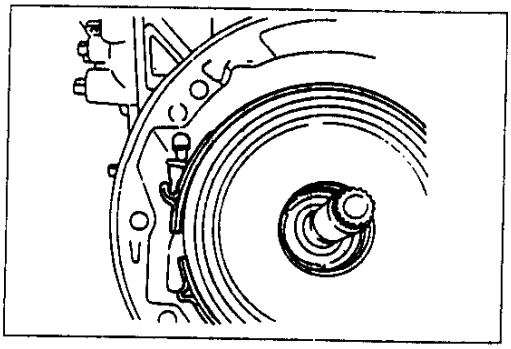
(6) If the reverse clutch end play is not within specification, adjust it by selecting and installing the proper thrust washer.

Thrust washer size

mm {in}

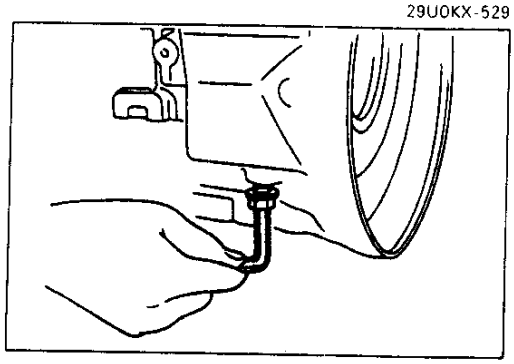
0.7 {0.028}	0.9 {0.035}	1.1 {0.043}	1.3 {0.051}
1.5 {0.059}	1.7 {0.067}	1.9 {0.075}	–

37U0KX-209

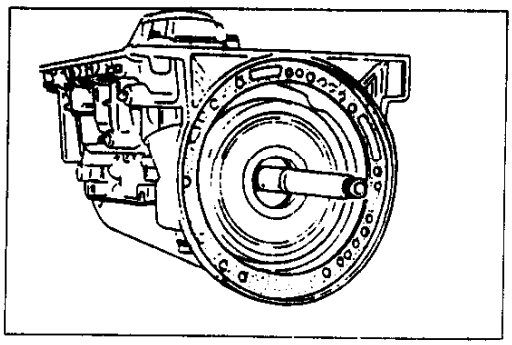

29U0KX-529

Caution
- **Adjust the brake band after installation of the converter housing.**

27. Apply ATF to the brake band and band strut, and install them into the transmission.

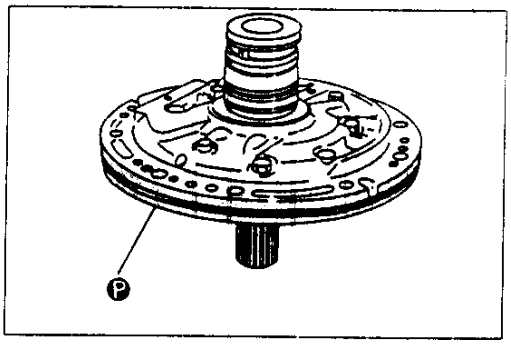

29U0KX-530

28. Temporarily install a new anchor end bolt.



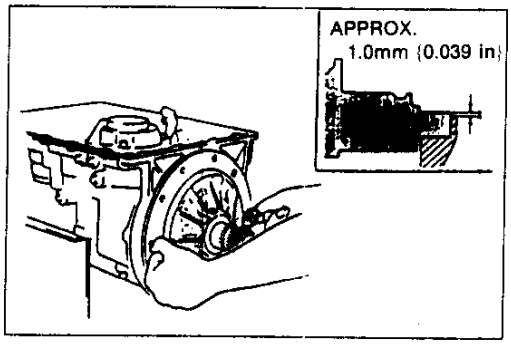
29U0KX-531

29. Apply ATF to the input shaft and install it into the transmission case.



29U0KX-532

30. Apply petroleum jelly to the oil pump assembly as shown.



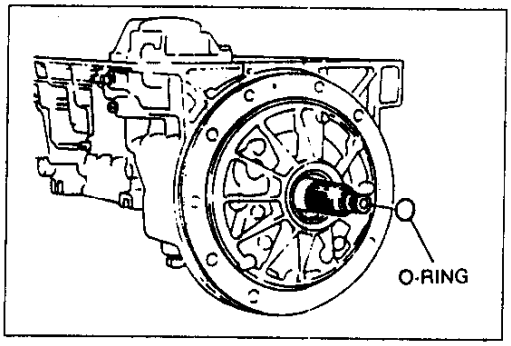
37U0KX-210

Caution

- **Do not damage the seal rings or O-ring.**
- **Do not use a hammer, plastic or any other kind, to install the oil pump.**

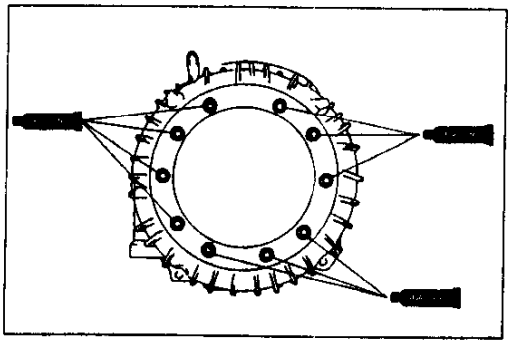
31. Install the oil pump assembly into the transmission case by using two converter housing bolts as guides. Measure the height difference between the edge of the transmission case and the oil pump as shown.

Height: 1.0 mm {0.039 in} approx.



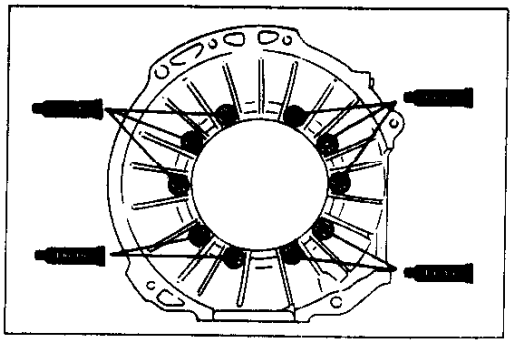
29U0KX-534

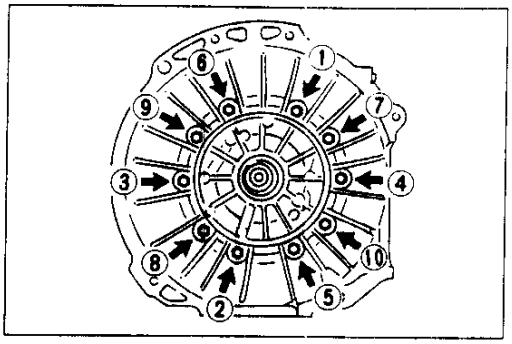
32. Apply ATF to a new O-ring, and install it onto the input shaft.



29U0KX-535

33. Apply sealant lightly around the bolt holes as shown.

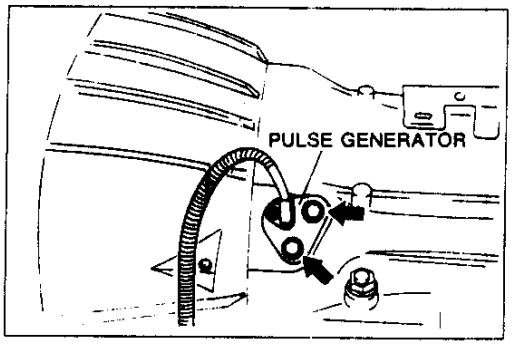




37U0KX-211

34. Remove the conventer housing guide bolts.
35. Install the converter housing onto the transmission case, and tighten the bolts evenly in the order shown.

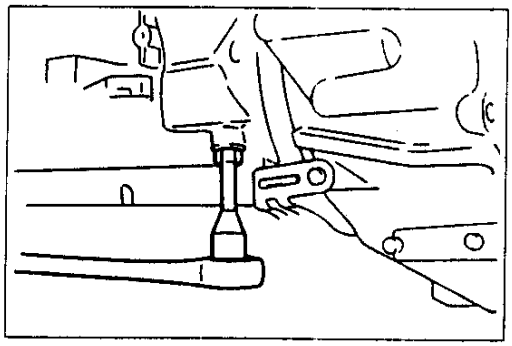
Tightening torque:
61–63 N·m {6.2–6.5 kgf·m, 45–47 ft·lbf}



37U0KX-212

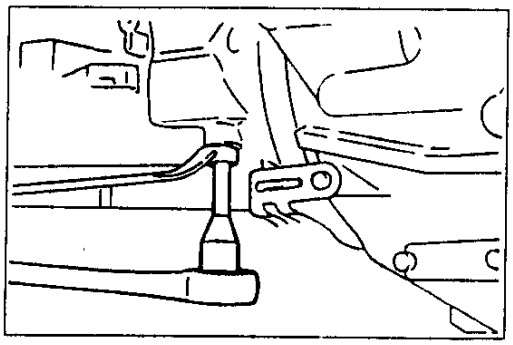
36. Apply ATF to a new O-ring and install it onto the pulse generator.
37. Install a new gasket and the pulse generator.
38. Install new bolts and tighten them.

Tightening torque:
5.0–6.8 N·m {50–70 kgf·cm, 44–60 in·lbf}


37U0KX-213

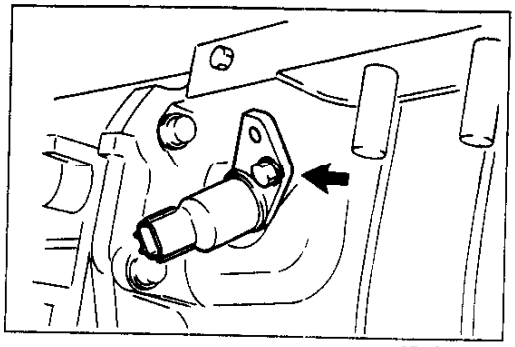
39. Adjust the brake band.
    (1) Tighten the anchor end bolt.

Tightening torque:
4.0–5.8 N·m {40–60 kgf·cm, 35–52 in·lbf}


37U0KX-214

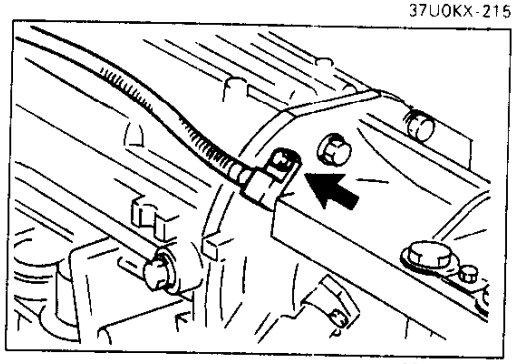
(2) Loosen the anchor end bolt 2.5 turns.
(3) Install the locknut.
(4) Hold the anchor end bolt and tighten the locknut

Tightening torque:
32–42 N·m {3.2–4.3 kgf·m, 24–31 ft·lbf}


37U0KX-215

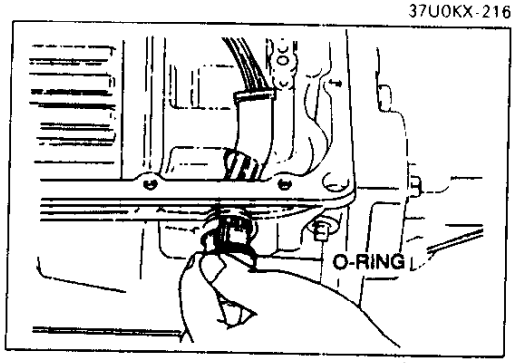
40. Apply ATF to a new O-ring and install it onto speed sensor 2.
41. Install speed sensor 2 into the extension housing.

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


37U0KX-216

42. Apply ATF to a new O-ring and install it onto speed sensor 1.
43. Install speed sensor 1 into the extension housing.

Tightening torque:
5.0–6.8 N·m {50–70 kgf·cm, 44–60 in·lbf}

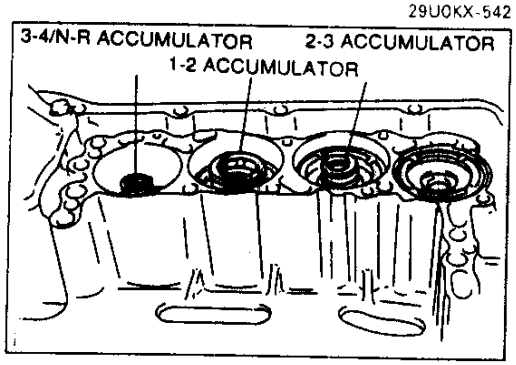


29U0KX-542

44. Apply ATF to a new O-ring and install it onto the solenoid valve harness.

Caution
- **Do not damage the solenoid valve harness.**

45. Install the solenoid valve harness into the transmission case.



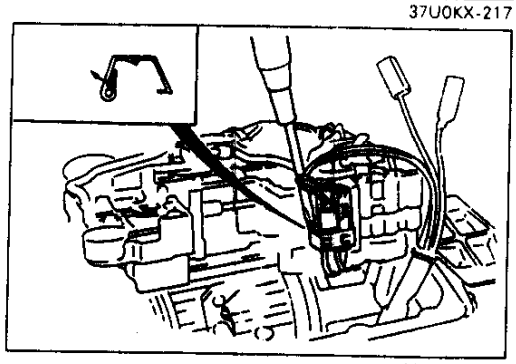
37U0KX-217

46. Install the accumulator spring into the accumulator piston.

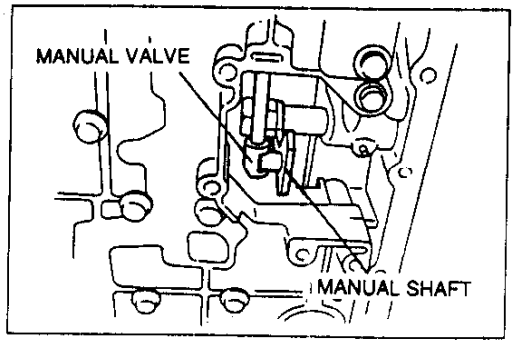
Spring specifications

mm {in}

Item / Spring	Outer dia.	Free length	No. of coils	Wire dia.
3-4/N-R accumulator piston	18.0 {0.71}	43.0 {1.69}	7.9	2.3 {0.091}
1-2 accumulator piston	29.3 {1.15}	45.0 {1.77}	3.8	3.7 {0.15}
2-3 accumulator piston	19.5 {0.77}	66.0 {2.60}	8.6	3.0 {0.12}


29U0KX-544

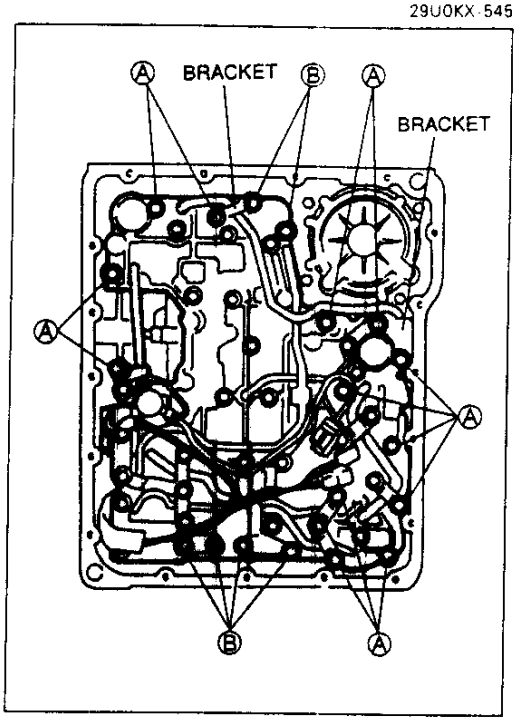
47. Connect the solenoid valve connectors.
48. Install the clip.



29U0KX-545

Caution
- **Do not damage the harness.**

49. Verify that the manual valve and manual shaft are assembled correctly.

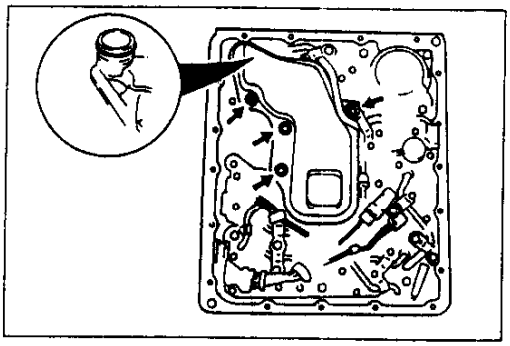


37U0KX-218

50. Install the valve body assembly, and tighten the bolts evenly.

Bolt length (measured from below bolt head):
A: 33 mm {1.3 in}
B: 45 mm {1.8 in}

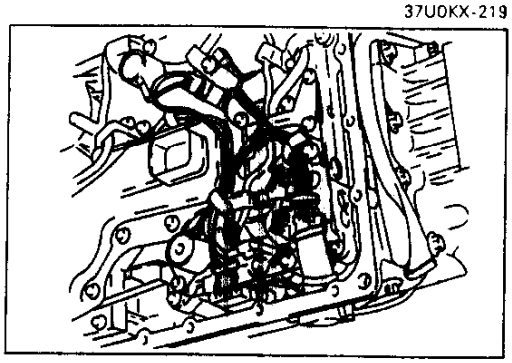
Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}


37U0KX-219

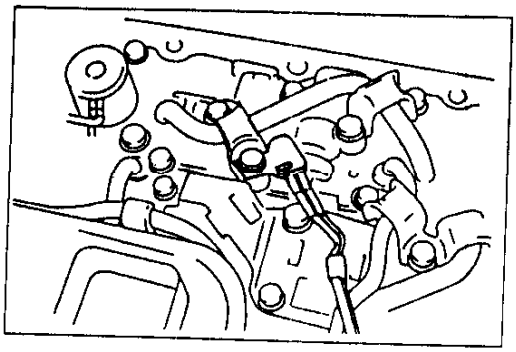
51. Apply ATF to a new O-ring and install it onto the oil strainer.
52. Install the oil strainer into the control valve body.

Bolt length (measured from below bolt head):
50 mm {2.0 in}

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}


29U0KX-548

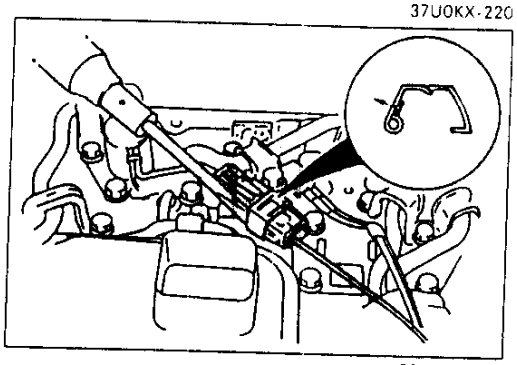
53. Secure the solenoid valve harness with the clips.


37U0KX-220

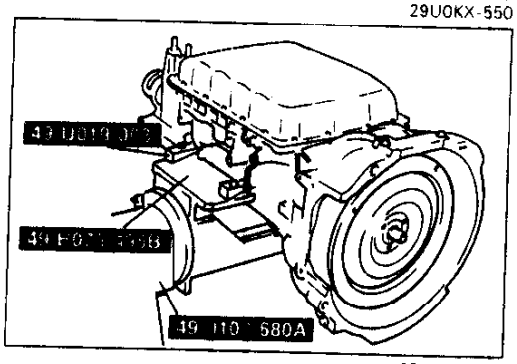
54. Install the ATF thermosensor as shown in the figure.

Bolt length (measured from below bolt head):
45 mm {1.8 in}

Tightening torque:
6.9–8.8 N·m {70–90 kgf·cm, 61–78 in·lbf}


29U0KX-550

55. Connect the solenoid valve (lockup) connector.
56. Install the clip.



37U0KX-221

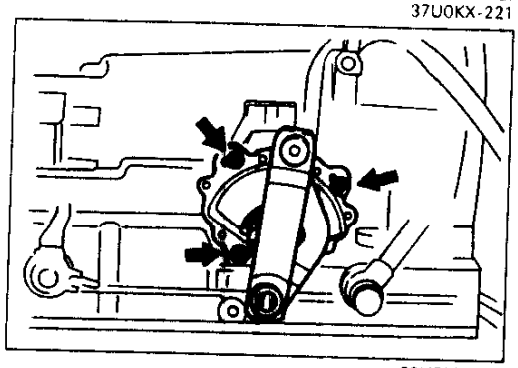
57. Set the magnet into the oil pan.
58. Install a new gasket and the oil pan.

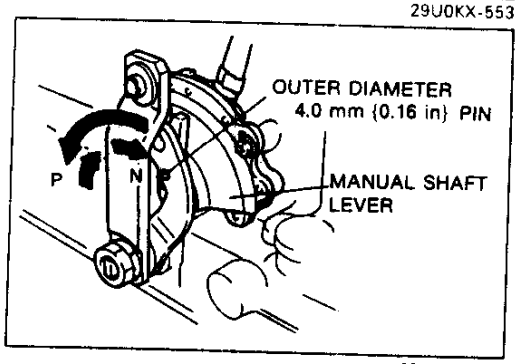
Tightening torque:
5.0–7.8 N·m {50–80 kgf·cm, 44–69 in·lbf}

59. Remove the transmission from the **$ST (transmission hanger)**.
60. Install the connector brackets onto the extension housing.

Tightening torque:
7.9–11.7 N·m {80–120 kgf·cm, 70–104 in·lbf}

61. Install the harness onto the connector bracket.
62. Install and adjust the inhibitor switch.
    (1) Verify that the manual shaft is positioned at the L position (fully forward).
    (2) Install the inhibitor switch over the manual shaft and install new bolts.


29U0KX-553

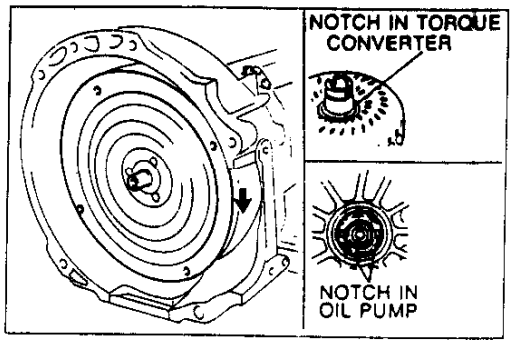


37U0KX-223

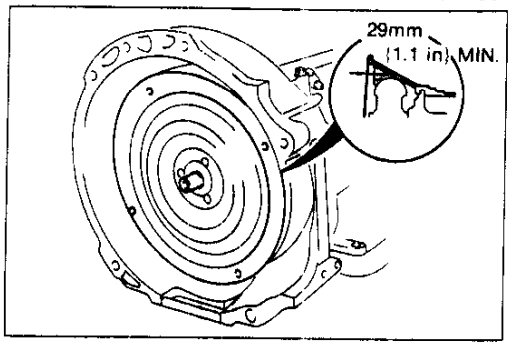
(3) Turn the manual shaft fully rearward, then return it **2 notches** (N range position).
(4) Insert **a 4.0 mm {0.16 in}** outer diameter pin through the holes of the inhibitor switch and the manual shaft lever.
(5) Tighten the inhibitor switch retaining bolts.

Tightening torque:
2.5–3.9 N·m {25–40 kgf·cm, 22–34 in·lbf}

(6) Remove the pin.



37U0KX-224



37U0KX-225

63. Remove the transmission from the **SST**. Stand the torque converter upright, and fill with ATF.

Note

- **Approximately 2.0 L {2.1 US qt, 1.8 Imp qt} of ATF are required for a new torque converter.**

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

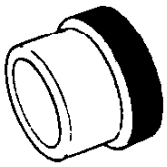
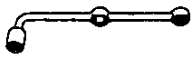
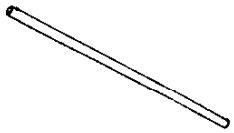
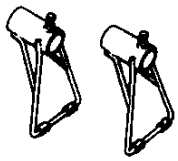
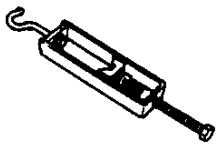
65. Measure the installation depth of the torque converter by using vernier calipers and a straightedge.

Specification: 29 mm {1.1 in} min.

TRANSMISSION UNIT (INSTALLATION)

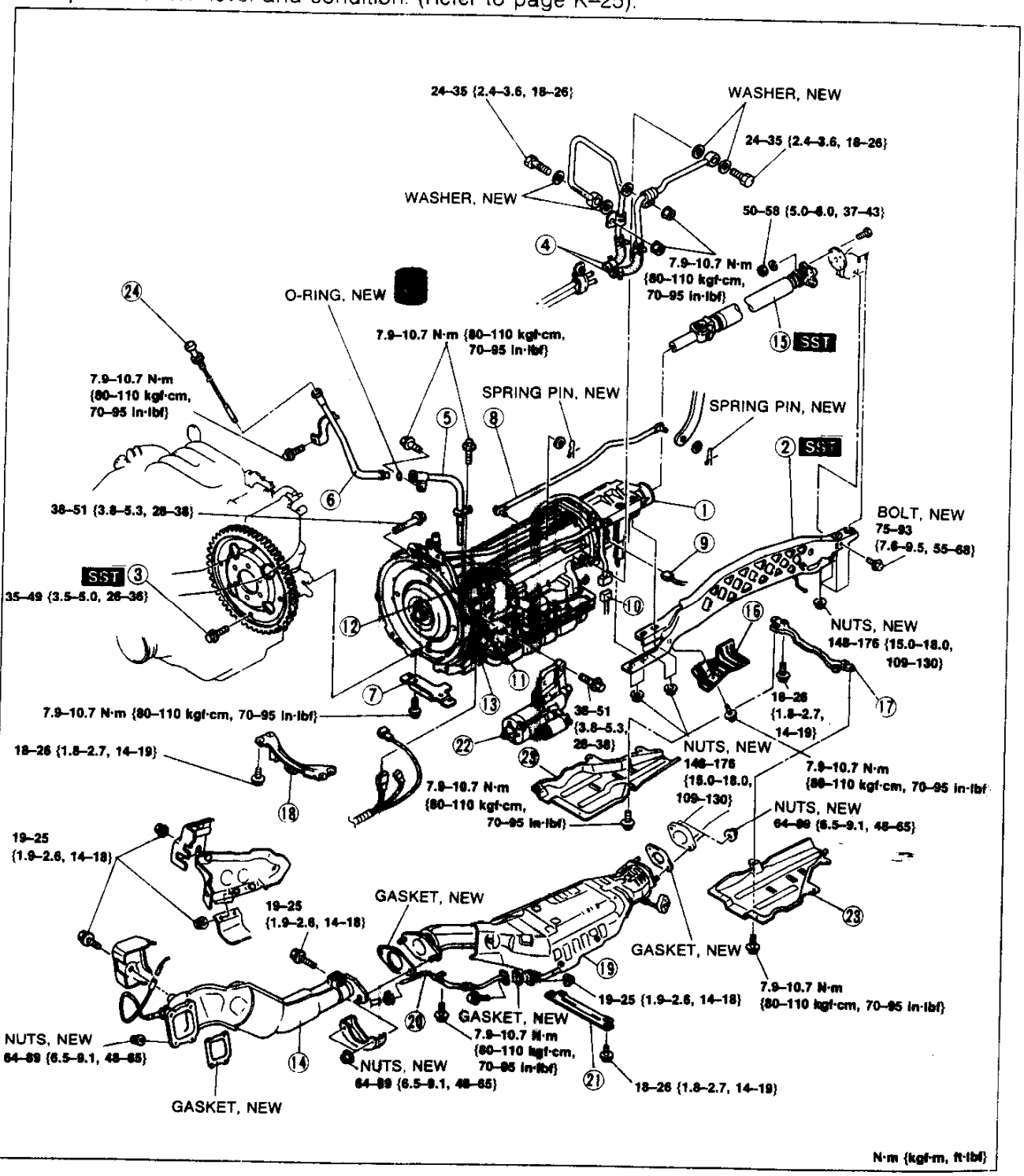
Preparation

SST

49 J019 002 Cap 	For prevention of ATF leakage	49 0877 435 Special wrench 	For loosening of torque converter installation bolts
49 G017 5A0 Support, engine 	For support of engine	49 G017 501 Bar (Part of 49 G017 5A0) 	For support of engine
49 G017 502 Support (Part of 49 G017 5A0) 	For support of engine	49 G017 503 Hook (Part of 49 G017 5A0) 	For support of engine

37U0KX-216

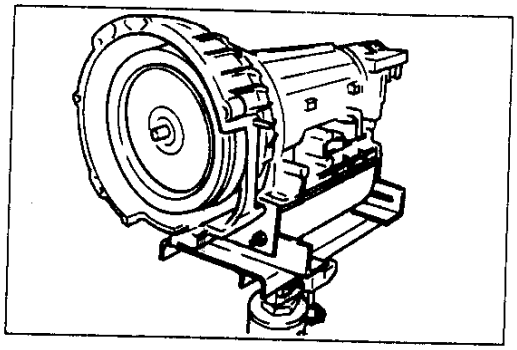
1. Install in the order shown in the figure, referring to **Installation Note**.
2. Fill the transmission with the specified ATF after installation.
3. Connect the negative battery cable.
4. Inspect the inhibitor switch operation. (Refer to page K–28).
5. Inspect the selector lever operation. (Refer to page K–164).
6. Inspect for oil leakage from the transmission.
7. Perform a road test. (Refer to page K–16).
8. Inspect the ATF level and condition. (Refer to page K–25).



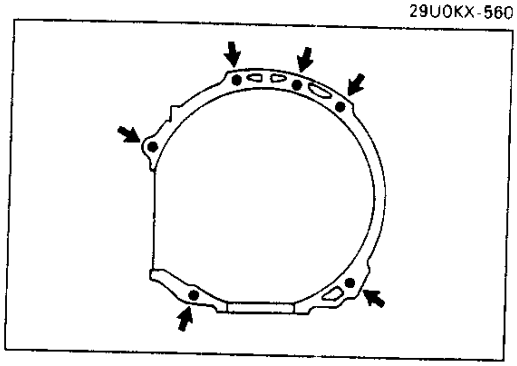
37U0KX-227

1. Transmission
   Installation Note ..... below
2. Power plant frame (PPF)
   Installation Note ..... below
3. Torque converter bolts
   Installation Note ..... page K–153
4. Oil cooler hose
5. Oil filler tube (lower)
6. Oil filler tube (upper)
7. Service hole cover
8. Selector rod (selector lever side)
   Installation Note ..... page K–153
9. Speed sensor 2 connector
10. Solenoid valve connector
11. Pulse generator connector
12. Speed sensor 1 connector
13. Inhibitor switch connector
14. Front exhaust pipe
15. Propeller shaft
    Installation Note ..... page K–153
16. Cover
17. Tunnel member (rear)
18. Tunnel member (front)
19. Catalytic converter assembly
20. Secondary air injection pipe
21. Tunnel member (center)
22. Starter
23. Under cover (right and left)
24. ATF dipstick

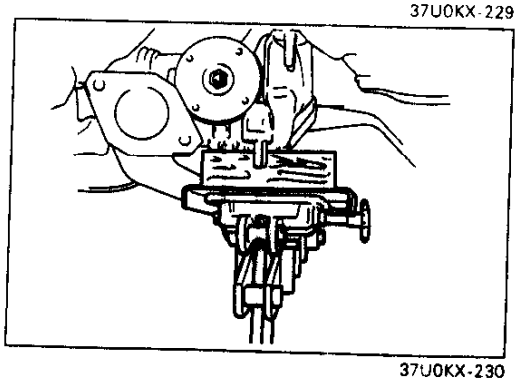
37U0• X-228



29U0KX-560



37U0KX-229



37U0KX-230

Installation note
Transmission

Caution
- **Do not allow the transmission to lean toward the torque converter side.**

1. Set the transmission on a transmission jack.
2. Mount the transmission to the engine.

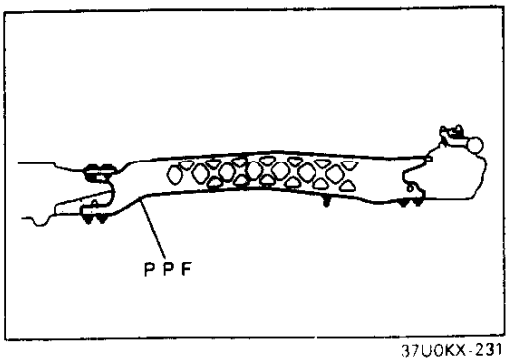
3. Gradually tighten the mounting bolts.

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

Power plant frame (PPF)

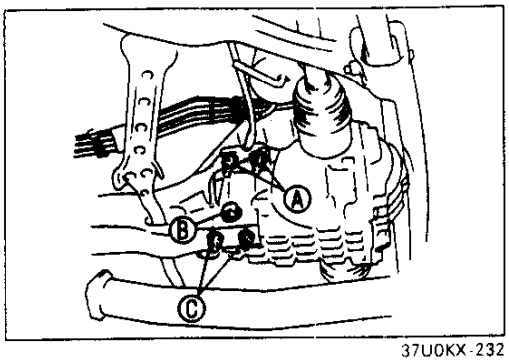
Caution
- **Do not rense PPF installation bolt and nuts.**

1. Hold the differential at a 0° angle by using the transmission jack.



37U0KX-231

2. Hold the PPF in place with a new bolt and nuts.

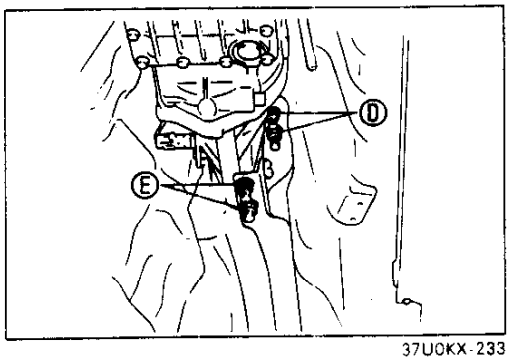


37U0KX-232

Caution
- **Tighten the differential-side PPF installation bolt and nuts first.**

3. Tighten the differential-side PPF installation bolt and nuts in the order A, B, C.

Tightening torque:
A, C: 148–176 N·m {15.0–18.0 kgf·m, 109–130 ft·lbf}
B: 75–93 N·m {7.6–9.5 kgf·m, 55–68 ft·lbf}

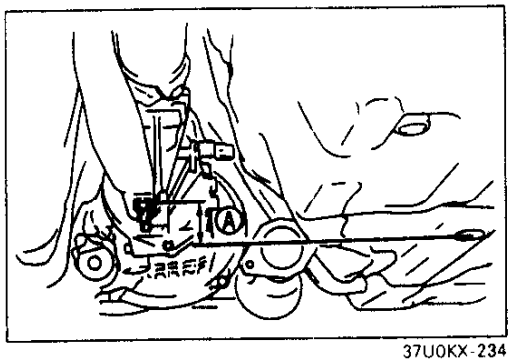


37U0KX-233

4. Tighten the transmission-side PPF installation nuts n the order D, E.

Tightening torque:
148–176 N·m {15.0–18.0 kgf·m, 109–130 ft·lbf}

5. Remove the transmission jack.



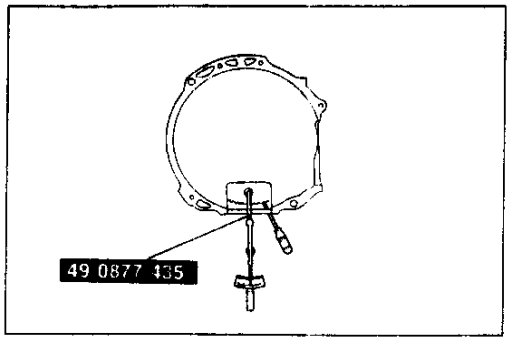
37U0KX-234

6. Measure A as shown in the figure.

Specification
Right side: Below 73.0 mm {2.87 in}
Left side : Below 75.0 mm {2.95 in}

Note
- **When measuring with a straight edge placed on both the right and left sides, the clearance should be 74.0 mm {2.91 in} minimum.**

7. If not within specification, readjust the PPF.



37U0KX-235

Torque converter bolts

1. Align the holes by turning torque converter.
2. Lock the drive plate by using a screwdriver.

Caution

- **Loosely and equally tighten the torque converter bolts, then further tighten them to the specified tightening torque.**

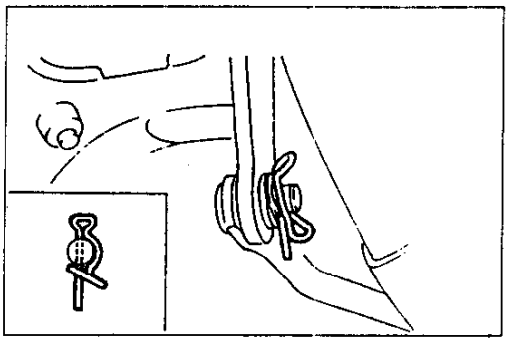
3. Tighten the torque converter mounting bolts by using **SST** .

Caution

- **When tightening the bolts with the SST, adjust the below-written tightening torque by using the following formulas.**
  Choose the formula that applies to you.

N·m	N·m × L (m) ÷ (L (m) + 0.1)
kgf·m	kgf·m × L (m) ÷ (L (m) + 0.1)
ft·lbf	ft·lbf × L (ft) ÷ (L (ft) + 0.3)

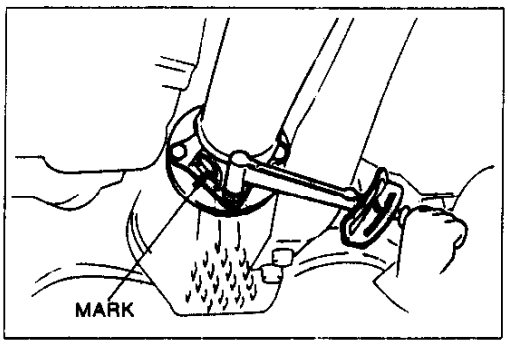
Tightening torque:
35–49 N·m {3.5–5.0 kgf·m, 26–36 ft·lbf}



37U0KX-236

Selector rod

1. Install the selector rod.
2. Install the washer and a new spring pin as shown.



37U0KX-237

Propeller shaft

1. Remove the **SST (cap)** from the extension housing.

Caution

- **Align the mark.**

2. Install the propeller shaft.

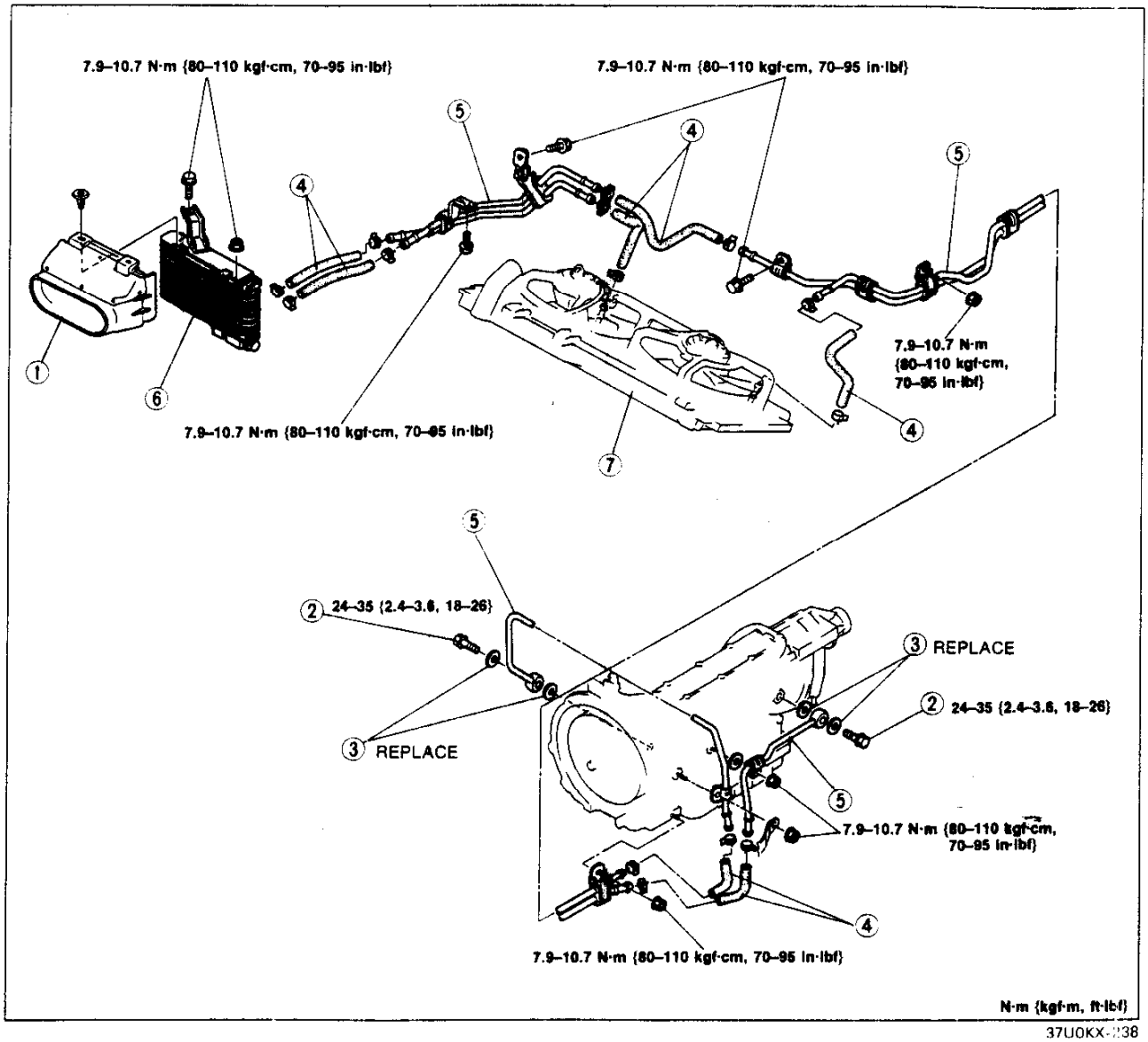
Tightening torque:
50–58 N·m {5.0–6.0 kgf·m, 37–43 ft·lbf}

OIL COOLER

OIL COOLER

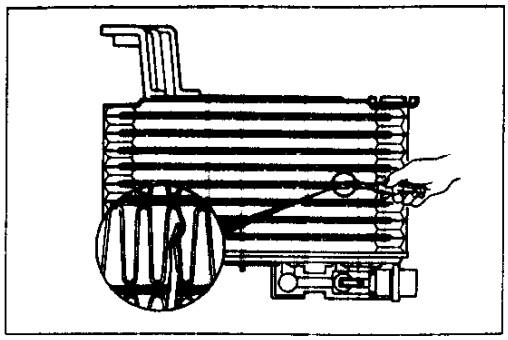
Removal / Inspection / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Inspect all parts and repair or replace as necessary.
4. Install in the reverse order of removal, referring to **Installation Note**.
5. Add ATF to the specified level.
6. Connect the negative battery cable.
7. Inspect the oil leakage from the oil pipes and oil hoses.
8. Inspect the ATF level and condition. (Refer to page K–25.)



37U0KX-238

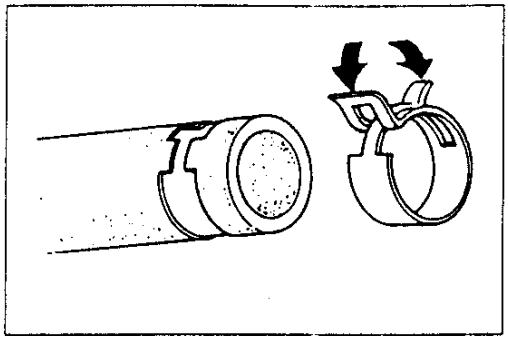
1. Air duct
2. Connector bolts
   Inspect for or clogging
3. Washers
4. Oil hoses
   Inspect for damage and cracks
   Installation Note ..... page K–155
5. Oil pipes
   Inspect for damage and cracks
6. Oil cooler
   Inspection ..... page K–155
7. Radiator
   Service ..... Section E



37U0JX-239

Inspection
Oil cooler

1. Inspect for cracks, damage, and water leakage, and replace as necessary.
2. Inspect for bent fins and repair with a screwdriver as necessary.

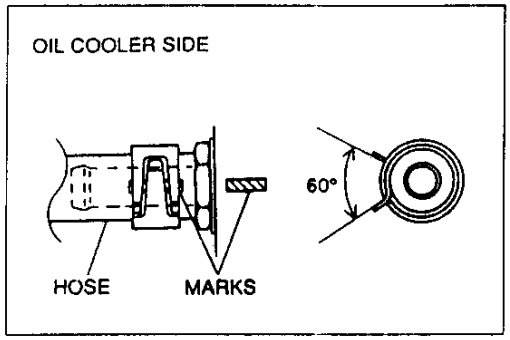


29U0KX-568

Installation note
Oil hoses

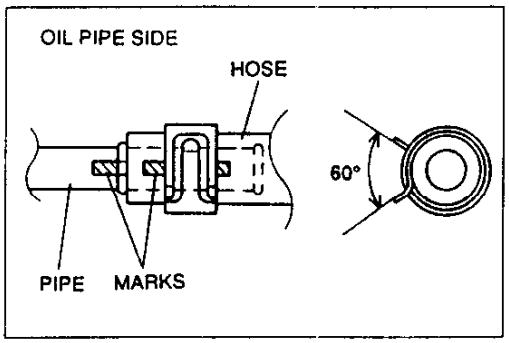
Caution

- **If reusing the hose clamp and/or oil hose, position the hose clamp in the original location on the hose.**
- **Squeeze the clamp lightly with large pilers to ensure a good tie.**



29U0KX-569

1. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated as shown.
2. Install the hose clamp onto the hose at the center of the mark and at the angle shown.
3. Verify that the hose clamp does not interfere with any other parts.



DRIVE PLATE

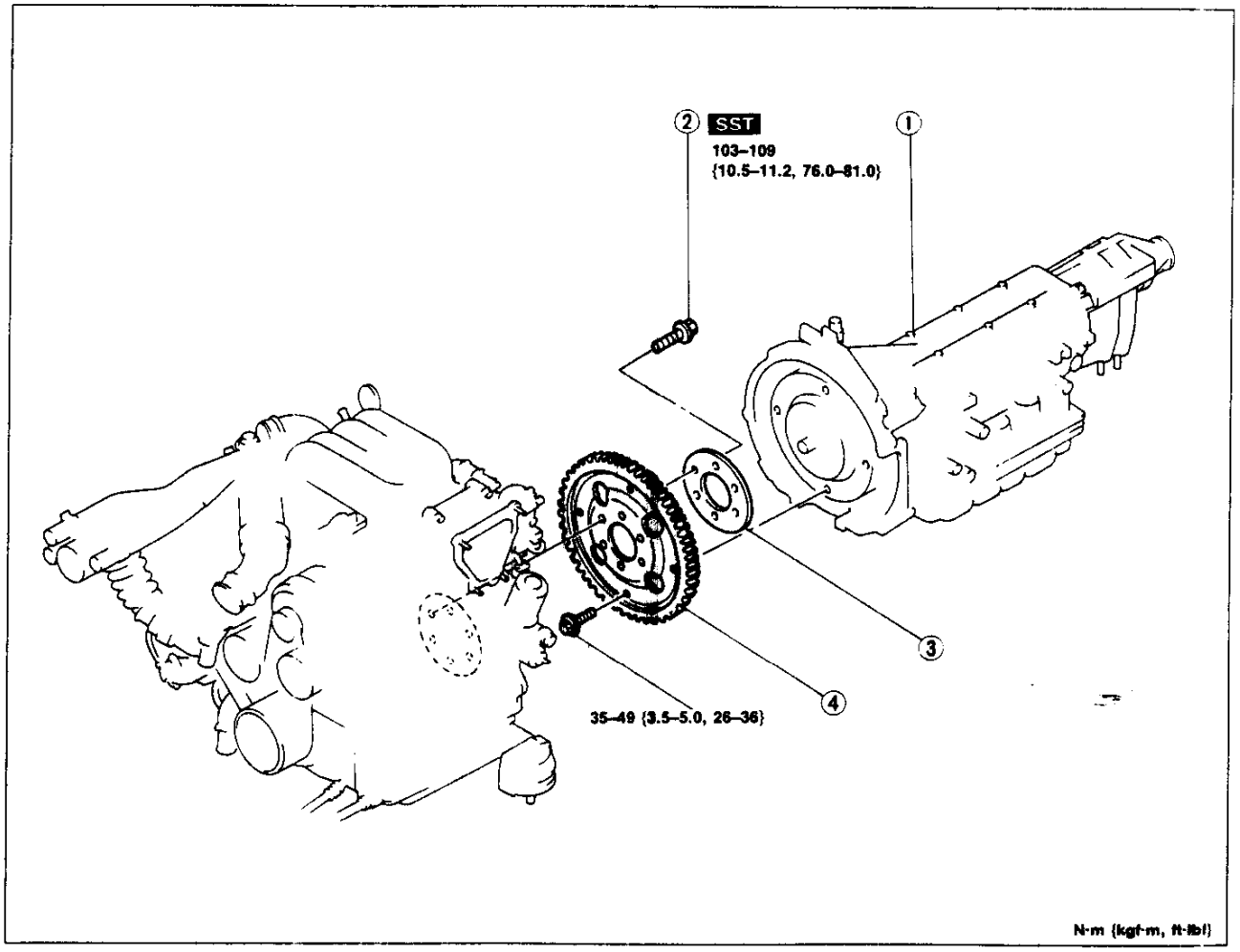
PREPARATION
SST

49 1881 055A Stopper, counter weight		For prevention of engine rotation

37U0KX-240

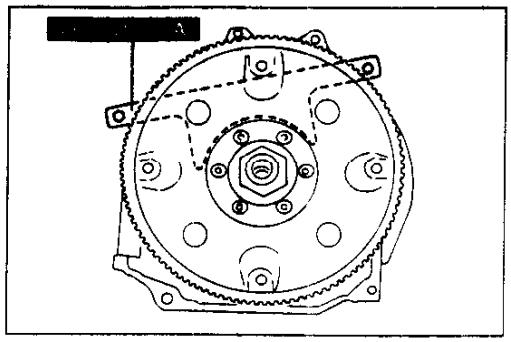
DRIVE PLATE
Removal / Inspection / Installation

1. Remove in the order shown in the figure, referring to **Removal Note**.
2. Inspect all parts and replace as necessary.
3. Install in the reverse order of removal, referring to **Installation Note**.



37U0KX-241

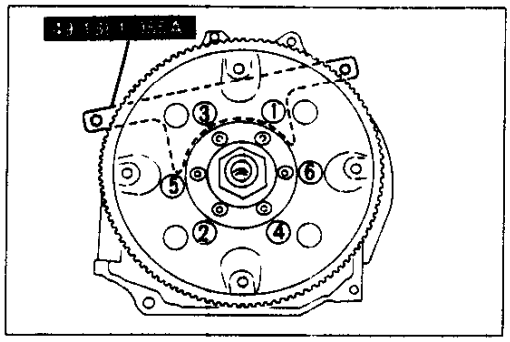
1. Transmission
   - Removal ..... page K– 42
   - Installation ..... page K–149
2. Drive plate mounting bolts
   - Removal Note ..... page K–157
   - Installation Note ..... page K–157
3. Adapter
4. Drive plate
   - Inspect for cracks and for ring gear wear and damage



29U0KX-572

Removal note
Drive plate mounting bolts

1. Set the **SST** or equivalent against the drive plate.
2. Remove the drive plate.



37U0KX-242

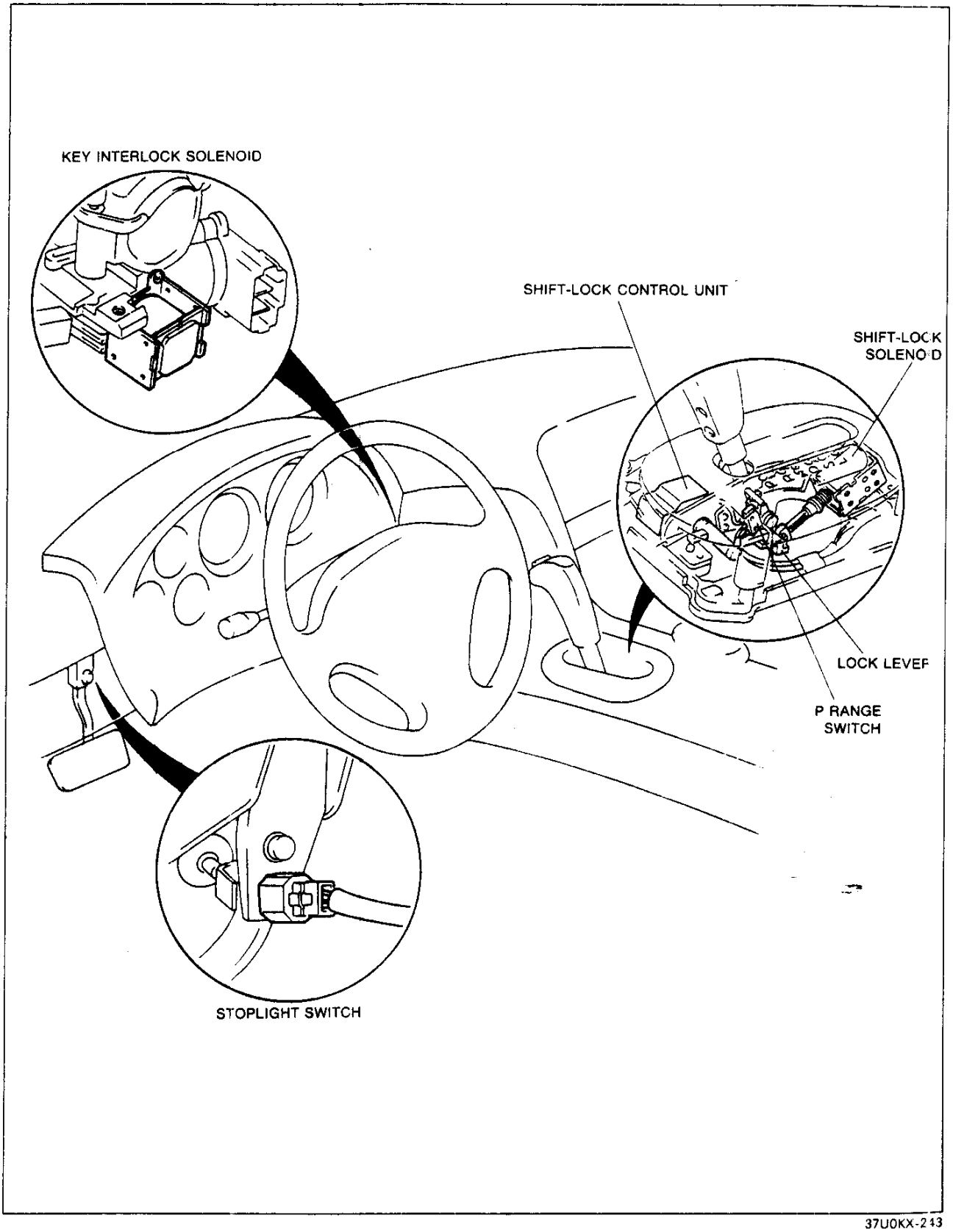
Installation note
Drive plate mounting bolts

1. Set the **SST** or equivalent against the drive plate.
2. Tighten the drive plate installation bolts in two or three steps as shown.

Tightening torque:
103–109 N·m {10.5–11.2 kgf·m, 76.0–81.0 ft·lbf}

SHIFT MECHANISM

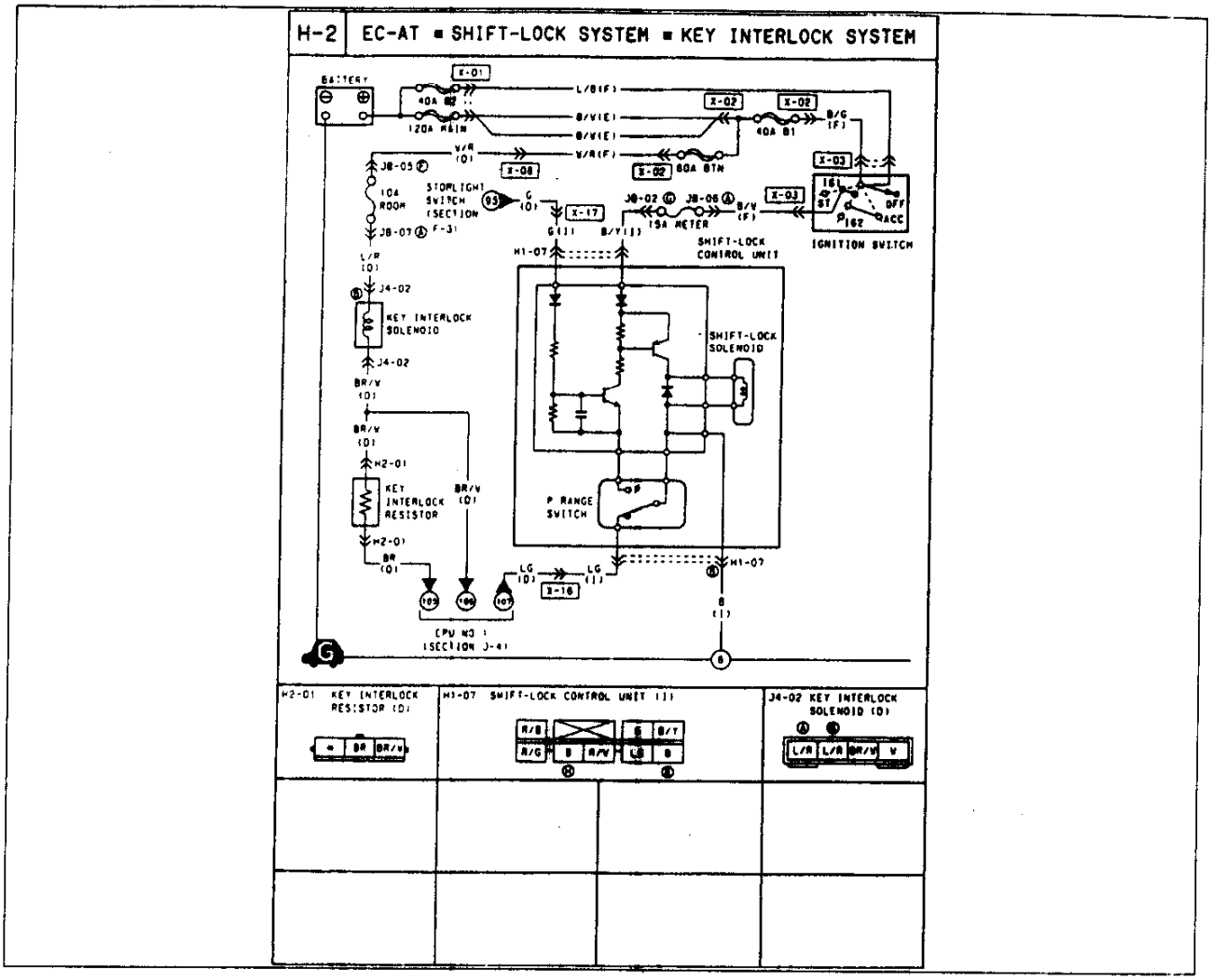
SHIFT-LOCK SYSTEM COMPONENTS



37U0KX-243

TROUBLESHOOTING

Circuit Diagram



37U0KX-244

Diagnosis chart

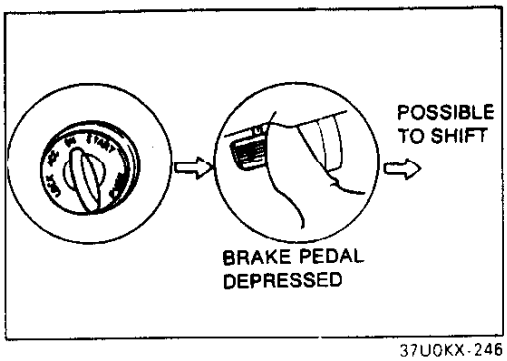
Problem	Possible cause	Action	Page
Selector lever cannot be moved from P range with brake pedal depressed and ignition switch ON	MAIN 120A fuse burned	Replace	K-159
	BTN 60A fuse burned	Replace	K-159
	STOP 20A fuse burned	Replace	K-159
	METER 15A fuse burned	Replace	K-159
	Ignition switch system malfunction ● Wire harness broken ● Poor connection	Repair or replace Connect firmly	K-159 K-159
	Ignition switch malfunction	Inspect and replace	Section T*
	Stoplight switch system malfunction ● Wire harness broken ● Poor connection	Repair or replace Connect firmly	K-159 K-159
	Stoplight switch remains OFF	Adjust or replace	Section T*
	Shift-lock control system malfunction ● Wire harness broken ● Poor connection ● P range switch remains OFF ● Shift-lock control unit malfunction ● Shift-lock solenoid malfunction	Repair or replace Connect firmly Inspect and replace Inspect and replace Inspect and replace	K-159 K-159 K-162 K-162 K-162
	Misadjustment of selector lever or improper assembly of shift-look solenoid	Adjust or repair	K-164

* Refer to 1993 RX-7 Body Electrical Troubleshooting Manual.

Problem	Possible cause	Action	Page
Selector lever can be moved from P range with ignition switch ON, but without brake pedal depressed	Stoplight switch remains ON	Adjust or replace	Section T*
	Shift-lock control system malfunction • Shift-lock control unit malfunction	Inspect and replace	K-162
	Misadjustment of selector lever or improper assembly of shift-lock solenoid	Adjust or repair	K-164
Selector lever can be moved from P range with ignition switch OFF and brake pedal depressed	Ignition switch malfunction	Inspect and replace	Section T*
	Shift-lock control system malfunction • Shift-lock control unit malfunction	Inspect and replace	K-162
	Misadjustment of selector lever or improper assembly of shift-lock solenoid	Adjust or repair	K-164
Shift-lock solenoid operation heard when brake pedal depressed with ignition switch ON in other than P range	P range switch remains ON	Inspect and replace	K-162
	Misadjustment of selector lever or improper assembly of shift-lock solenoid	Adjust or repair	K-164
Selector lever remains locked when emergency override button operated	Emergency override button not pushed fully down	Push down fully and hold emergency override button, move selector lever	–
	Broken emergency override button	Replace	K-168
	Misadjustment of indicator panel	Adjust	K-165
Ignition key can be turned to lock position with selector lever in other than P range	MAIN 120A fuse burned	Replace	K-159
	BTN 60A fuse burned	Replace	K-159
	ROOM 10A fuse burned or not installed	Replace or install	K-159
	P range switch system malfunction • Wire harness broken • Poor connection	 Repair or replace Connect firmly	 K-159 K-159
	P range switch remains ON	Inspect and replace	K-162
	Key interlock solenoid malfunction • Wire harness broken • Poor connection • Key interlock solenoid malfunction	 Repair or replace Connect firmly Inspect and replace	 K-159 K-159 K-162
	Key interlock resistor malfunction • Wire harness broken • Poor connection	 Repair or replace Connect firmly	 – –
	Key cylinder (push switch) malfunction • Wire harness broken • Poor connection	Inspect and replace Repair or replace Connect firmly	Section T* K-159 K-159
	Central processing unit (CPU) malfunction	Inspect and replace	Section T*
Ignition key cannot be turned to lock position with selector lever in P range	P range switch remains OFF	Inspect and replace	K-162
	Key interlock solenoid malfunction	Inspect and replace	K-162
	Key cylinder (push switch) malfunction	Inspect and replace	Section T*
	Misadjustment of selector lever	Adjust	K-164

* Refer to 1993 RX-7 Body Electrical Troubleshooting Manual.

37U0KX-245

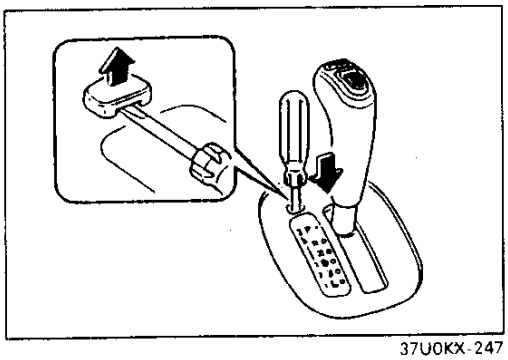


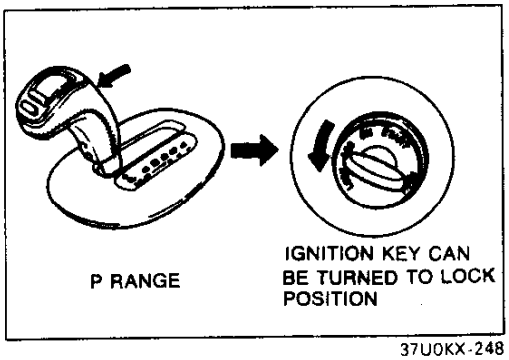
37U0KX-246

SHIFT-LOCK
Inspection

Caution
- **Service with the engine OFF.**

1. Turn the ignition switch to ON.
2. Verify that the selector lever is in P range.
3. Without the brake pedal depressed, verify that the selector lever cannot be shifted from P range.
4. Depress the brake pedal and verify that the selector lever can be shifted from P range.
5. If not as specified, check the shift-lock control system connector terminal voltage and continuity. (Refer to page K–162)


37U0KX-247



37U0KX-248

EMERGENCY OVERRIDE BUTTON
Inspection

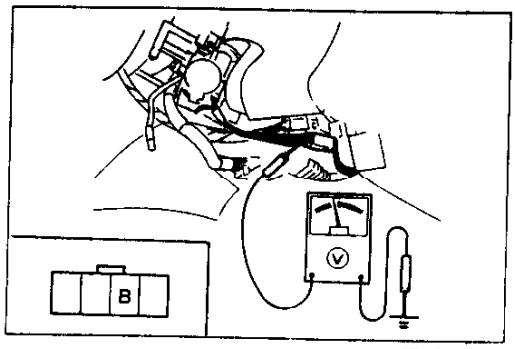
Caution
- **Service with the ignition switch OFF.**

1. Verify that the selector lever is in P range.
2. Without the brake pedal depressed, verify that the selector lever cannot be shifted from P range.
3. Insert the screwdriver provided in the tool kit into the emergency override hole and push down. Verify that the selector lever can be shifted from P range.
4. If not as specified, inspect and repair as necessary, referring to Troubleshooting. (Refer to page K–159.)

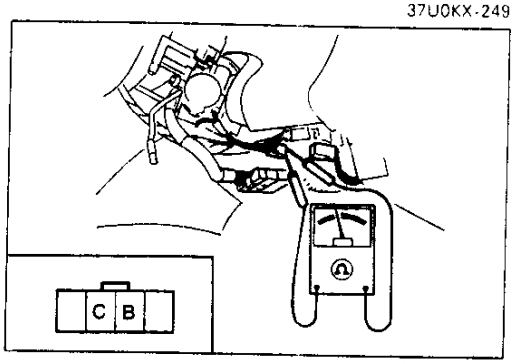
KEY INTERLOCK
Inspection

Caution
- **Service with the engine OFF.**

1. Turn the ignition switch ON.
2. Shift the selector lever to R range.
3. Verify that the ignition key cannot be turned to LOCK position.
4. Shift the selector lever to P range.
5. Verify that the ignition key can be turned to LOCK position.
6. If not as specified, inspect and repair as necessary, referring to Troubleshooting. (Refer to page K–159.)



37U0KX-249



37U0KX-250

KEY INTERLOCK SOLENOID

Inspection

Terminal voltage

1. Remove the column cover.
2. Turn the ignition switch ON.
3. Measure the voltage between terminals B and a ground.

V_B: Battery voltage

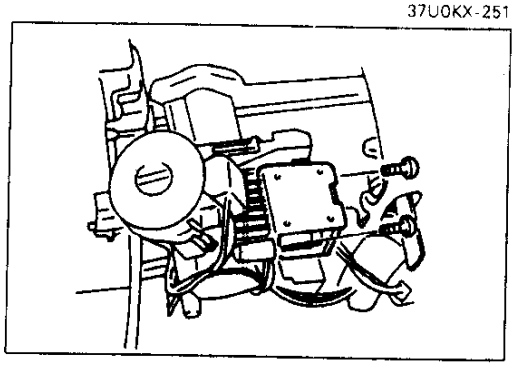
Selector lever position	Voltage
P range	V_B
Except P range	0V

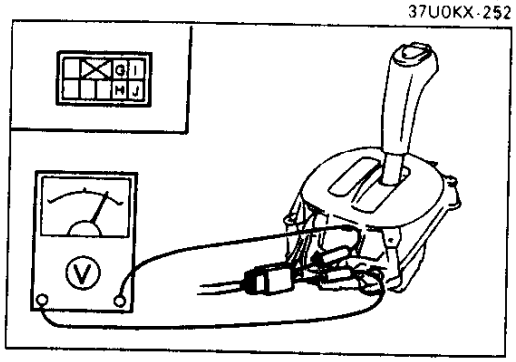
4. If not correct, check the key interlock solenoid continuity.

Continuity

1. Disconnect the negative battery cable and the key interlock solenoid connector.
2. Check continuity between terminals B and C.
3. If not correct, replace the key interlock solenoid.
4. Connect the key interlock solenoid connector.
5. Connect the negative battery cable.

37U0KX-251


37U0KX-252


37U0KX-253

Replacement

1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Disconnect the key interlock solenoid connector.
4. Remove the screws and the key interlock solenoid.
5. Install the new key interlock solenoid and tighten the screws.

Tightening torque:
6.9–12.7 N·m {70–130 kgf·cm, 61–112 in·lbf}

6. Connect the key interlock solenoid connector.
7. Install the column cover.
8. Connect the negative battery cable.

SHIFT-LOCK CONTROL SYSTEM

Inspection

1. Remove the console panel.
2. Shift the selector lever to P range.
3. Turn the ignition switch ON, and check terminal voltages and continuity, referring to the chart on next page.

Caution

- **Disconnect the connector when checking continuity between terminal J (harness side) and a ground.**

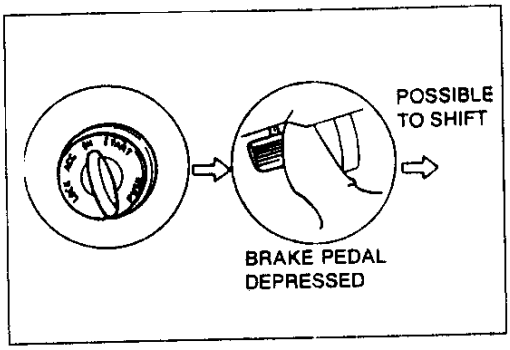
4. Turn the ignition switch OFF, and check continuity between terminal J and a ground, referring to the chart below.
5. If not as specified, repair the wire harness and/or replace the P range switch, shift-lock solenoid, and shift-lock control unit as an assembly.

37U0KX-254

V_B: Battery voltage

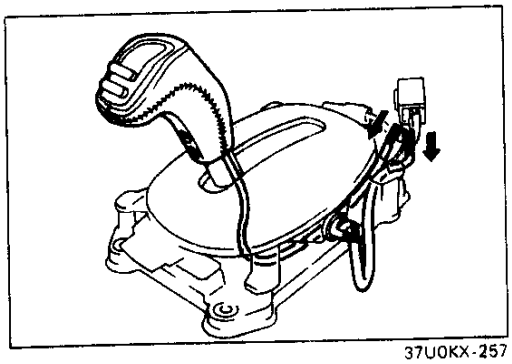
Terminal	(-) terminal connected to	Measured value	Condition		Specification
G	Ground	Voltage	Brake pedal released → depressed		0V → V_B
H	J	Continuity	P range	Selector lever push button released	No
				Selector lever push button depressed	Yes
			Except P range		Yes
I	Ground	Voltage	Ignition switch OFF → ON		0V → V_B
J	Ground	Continuity	Constant		Yes

37U0KX-255

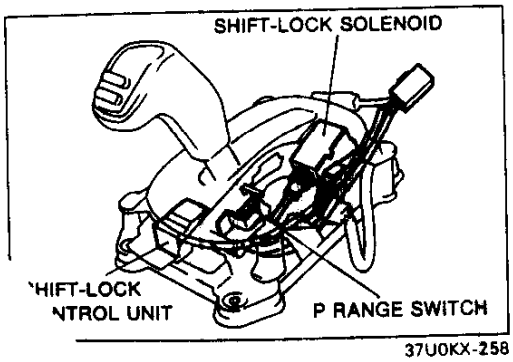


5. Install the console panel.
6. Verify correct operation of the shift-lock system. (Refer to page K–161.)

370U0KX-256



37U0KX-257



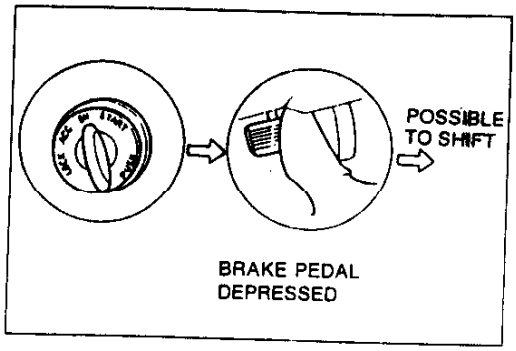
37U0KX-258

Replacement

Note

- **Replace the P range switch, shift-lock solenoid, and shift-lock control unit as an assembly if one of them is not correct.**

1. Disconnect the negative battery cable.
2. Remove the console panel and rear console.
3. Remove the indicator screws and lift up the indicator panel.
4. Disconnect the shift-lock control unit connector.
5. Pull the hold switch terminals and the position indicator lamp terminals out of the connector.
6. Remove the P range switch, shift-lock solenoid, and shift-lock control unit as an assembly.
7. Install the new P range switch, shift-lock solenoid, and shift-lock control unit as an assembly.
8. Insert the hold switch terminals and the position indicator lamp terminals into the connector.
9. Connect the shift-lock control unit connector.
10. Install and adjust the indicator panel. (Refer to page K–165.)
11. Install the console panel and rear console.
12. Connect the negative battery cable.
13. Verify correct operation of the shift-lock system. (Refer to page K–161.)



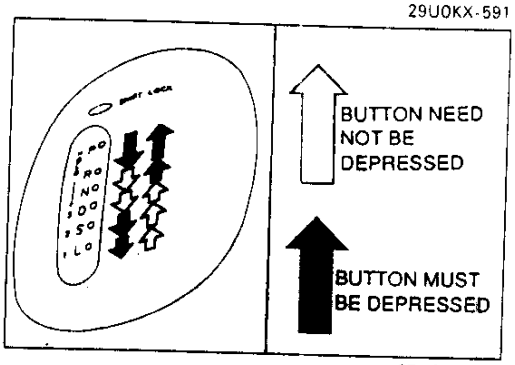
29U0KX-591

SELECTOR LEVER

Inspection

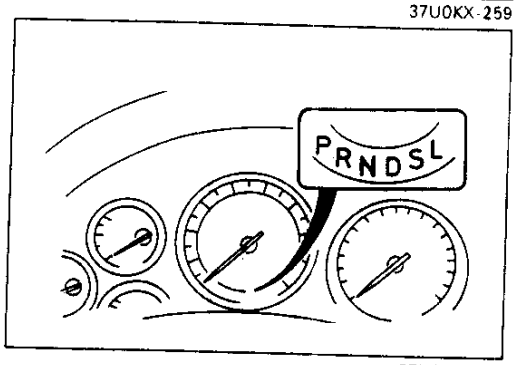
Caution

- **Shift the selector lever from P range to other ranges with the ignition switch ON and the brake pedal depressed.**



37U0KX-259

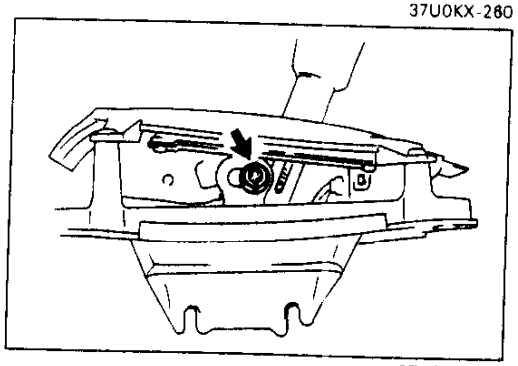
1. Verify that the selector lever can only be shifted as shown.
2. Verify that there is a "click" at each range when shifted from P → L range.
3. Verify that the positions of the selector lever and the indicator are aligned.
4. If not as specified, adjust the indicator panel. (Refer to page K–165.)



37U0KX-260

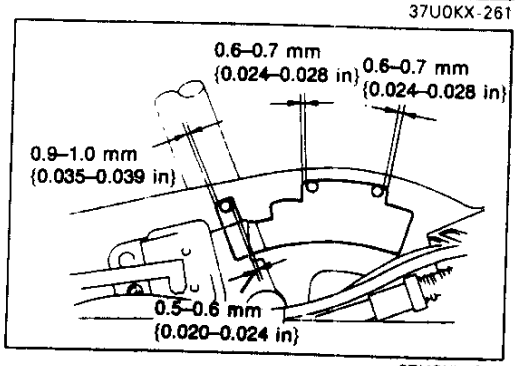
5. Verify that the positions of the selector lever and the selector indicator lamp in the instrument cluster are aligned.
6. If not as specified, adjust the inhibitor switch. (Refer to page K–28.)
7. Verify that the vehicle operates in selected range.

Adjustment


37U0KX-261

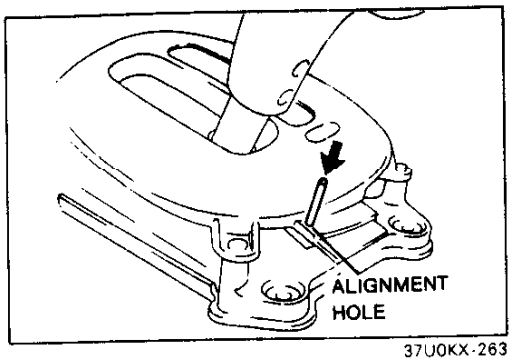
1. Remove the console panel.
2. Remove the indicator screws and lift up the indicator panel.
3. Shift the selector lever to P range.
4. Loosen the locknut as shown.
5. Adjust the lever so that the clearance between the guide plate and the guide pin in P range is as shown.
6. Tighten the locknut.

Tightening torque:
20–28 N·m {2.0–2.9 kgf·m, 15–20 ft·lbf}



37U0KX-262

7. Move the selector lever to N and D ranges and verify that the clearance between the guide plate and the guide pin is the same at both positions.
8. If not as specified, readjust the lever.
9. Install and adjust the indicator panel. (Refer to page K–165.)
10. Install the console panel.
11. Connect the negative battery cable.



37U0KX-263

Indicator panel adjustment

1. Shift the selector lever to P range.
2. Align the alignment holes in the slider with the holes in the indicator panel.
3. Install a suitable heavy-gauge wire to hold the slider.
4. Tighten the indicator screws.

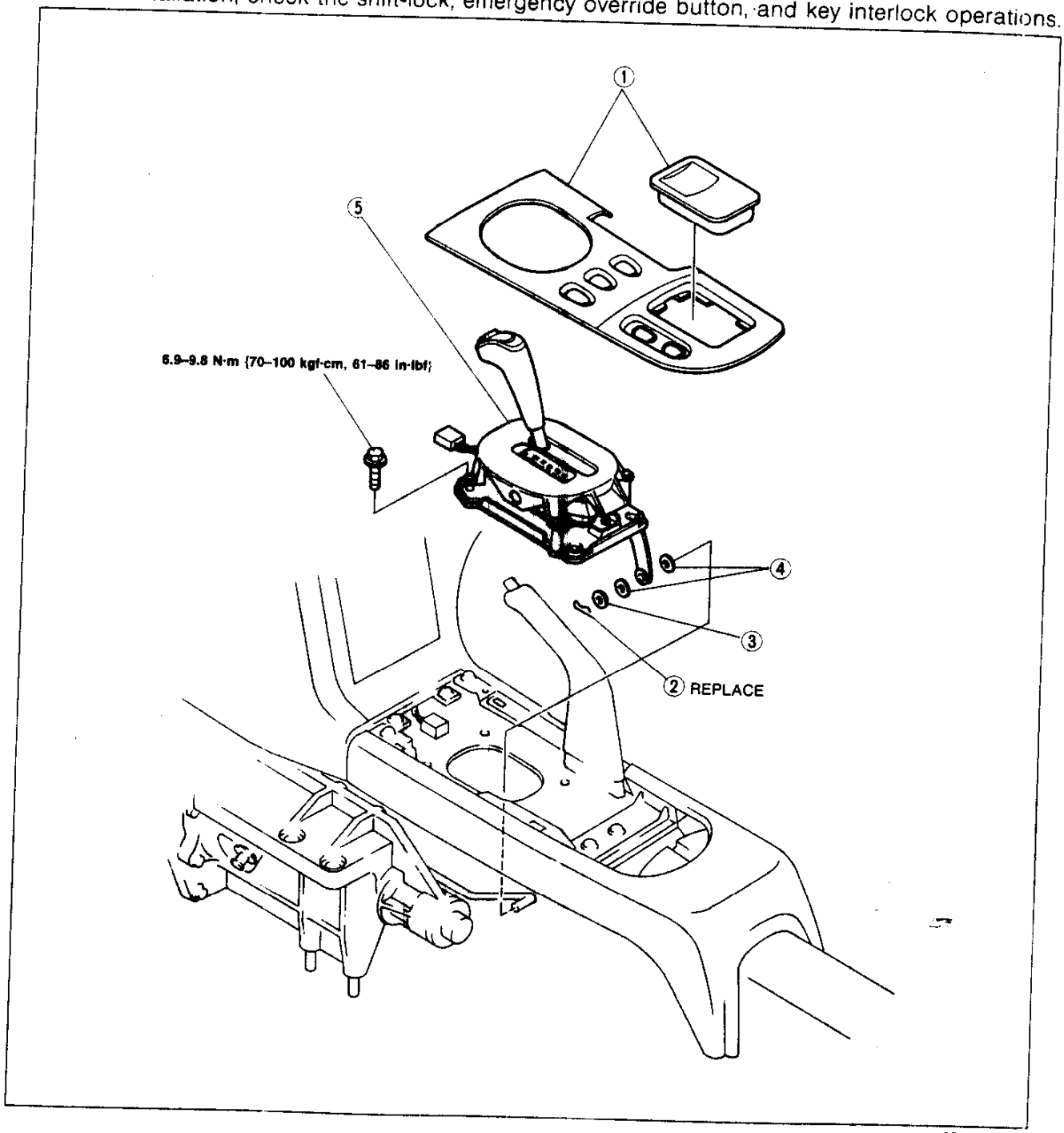
Tightening torque:
2.0–2.9 N·m {20–30 kgf·cm, 18–26 in·lbf}

5. Remove the wire.
6. Verify that the selector lever properly aligns with the indicator in each range.

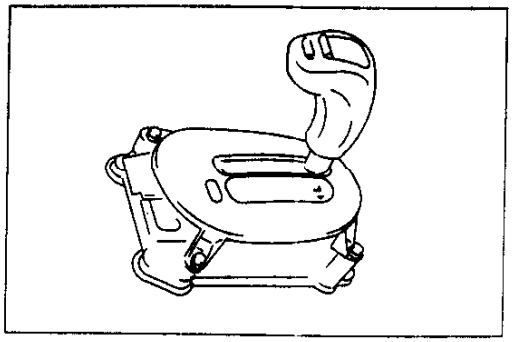
37U0KX-264

Removal / Installation

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Connect the negative battery cable.
5. After installation, check the shift-lock, emergency override button, and key interlock operations.



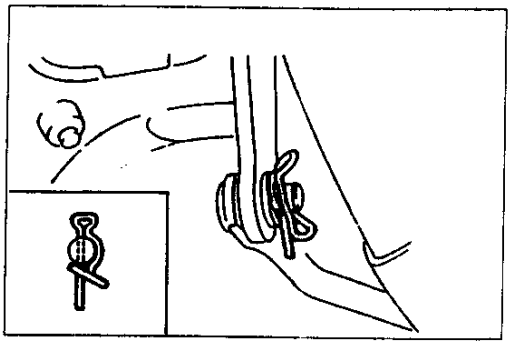
1. Console panel
2. Spring pin
   - Removal Note ..... page K–167
   - Installation Note ..... page K–167
3. Wave washer
4. Washer
5. Selector lever
   - Inspection ..... page K–164
   - Adjustment ..... page K–164
   - Disassembly / Inspection / Assembly ..... page K–168



37U0KX-266

Removal Note
Spring pin

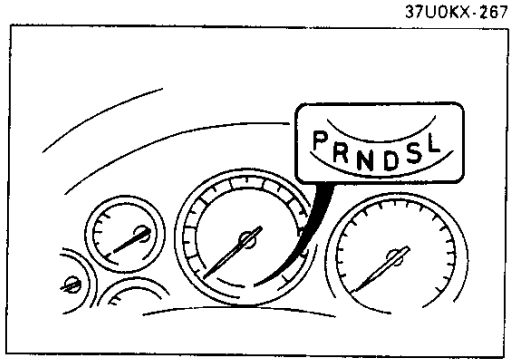
1. Shift the selector lever to L range.
2. Remove the spring pin and washer.
3. Remove the selector rod from the adjustment lever.



37U0KX-267

Installation Note
Spring pin

1. Shift the selector lever to L range.
2. Install the selector rod to adjustment lever.
3. Install the washer and new spring pin as shown.



37U0KX-268

4. Tighten the selector lever bolt.

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

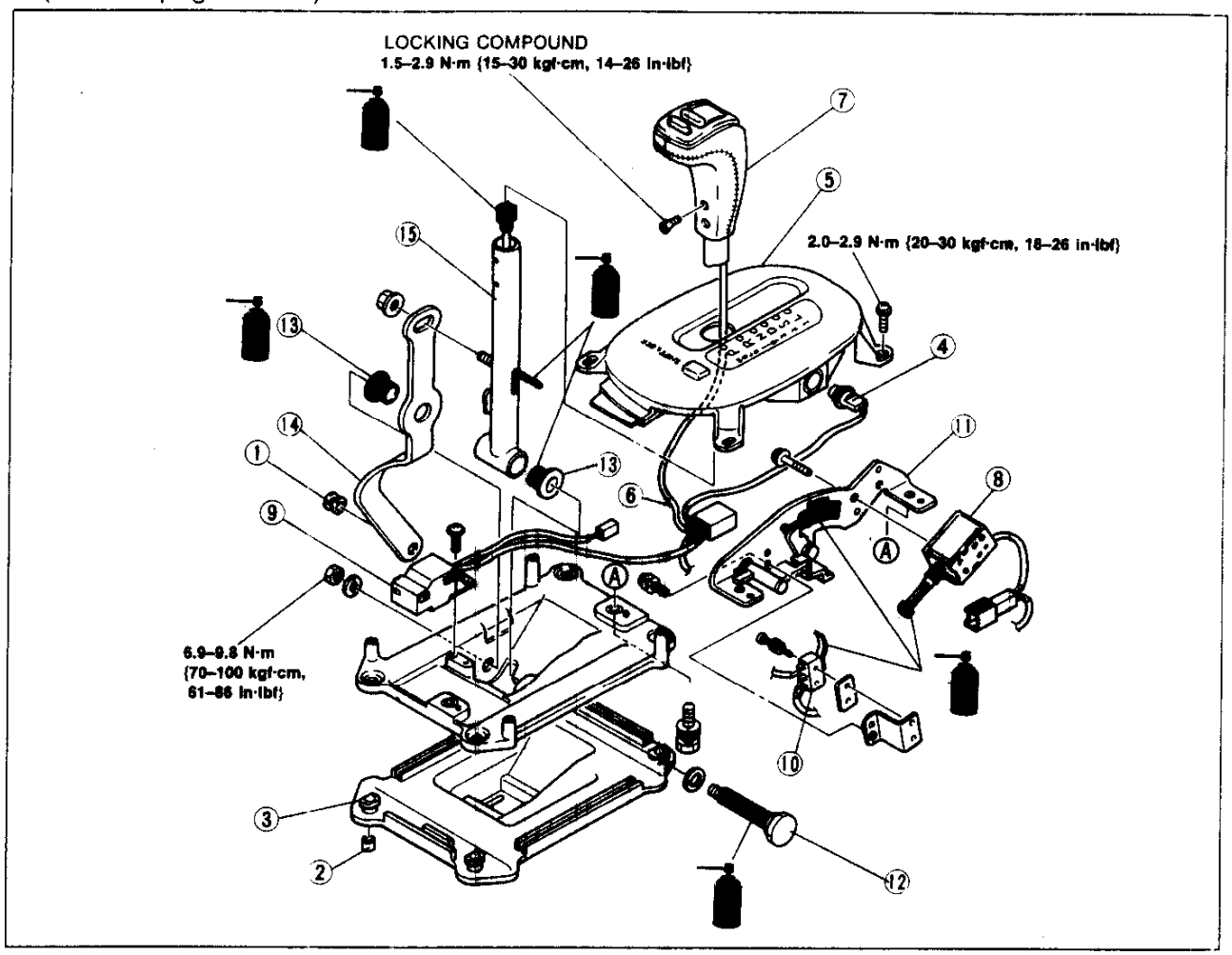
5. Verify that the positions of the selector lever and the selector indicator lamp are aligned.

Disassembly / Inspection / Assembly

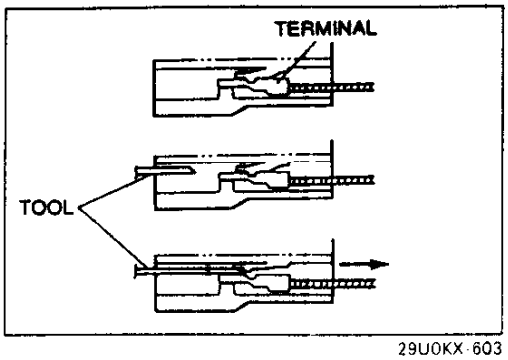
Note

- **Do not remove the P range switch or adjustment lever unless necessary.**

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 Note**.
4. If the adjustment lever locknut is loosened, adjust the selector lever after installation. (Refer to page K–164.)



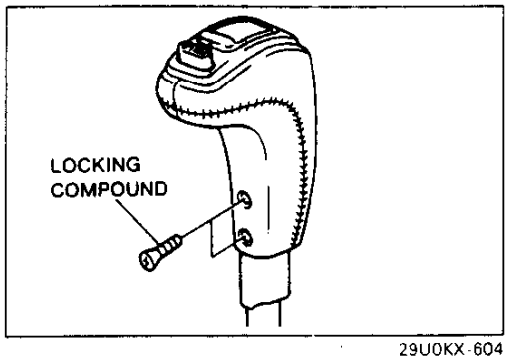
1. Bushing
2. Spacer
3. Boot
4. Position indicator lamp
5. Indicator panel
   Assembly Note ..... page K–170
6. Connector pin
   Disassembly Note ..... page K–169
7. Selector lever knob
   Disassembly Note ..... page K–169
   Assembly Note ..... page K–170
8. Shift-lock solenoid
   Inspection ..... page K–162
9. Shift-lock control unit
   Inspection ..... page K–162
10. P range switch
    Inspection ..... page K–162
11. Guide plate
12. Spindle
    Disassembly Note ..... page K–169
    Assembly Note ..... page K–169
13. Bushing
14. Adjustment lever
15. Selector lever
    Inspection for smooth operation
    Inspection guide pin for damage and wear
16. Selector lever bracket.



29U0KX-603

Disassembly Note
Connector pin

1. Insert a thin piece of metal from the terminal side of the connector, and press down the terminal locking top.
2. Pull the terminal out of the connector.

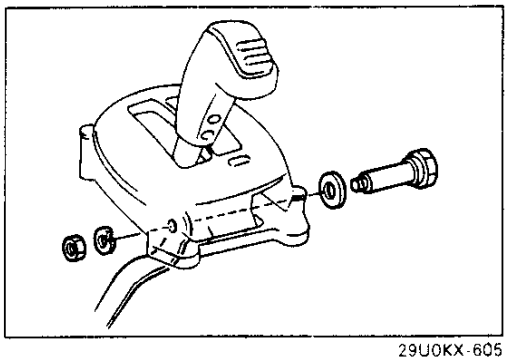


29U0KX-604

Selector lever knob

Caution
- **Do not damage the hold switch harness.**

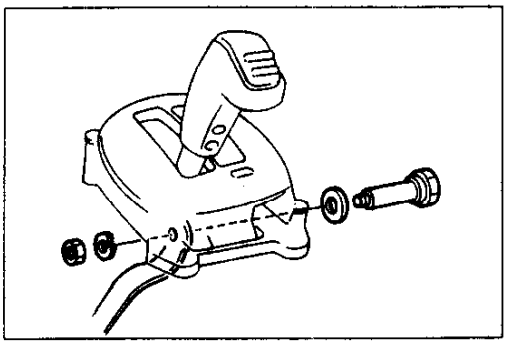
1. Remove the screws from selector lever knob.
2. Remove the selector lever knob and sleeve.


29U0KX-605

Spindle

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

1. Shift the selector lever to P range.
2. Secure the adjustment lever in a vise.
3. Remove the spindle nut.

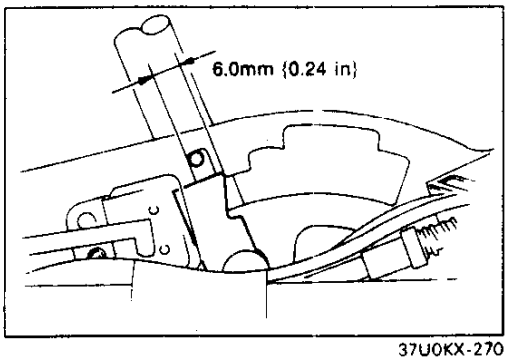

29U0KX-606

Assembly Note
Spindle

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

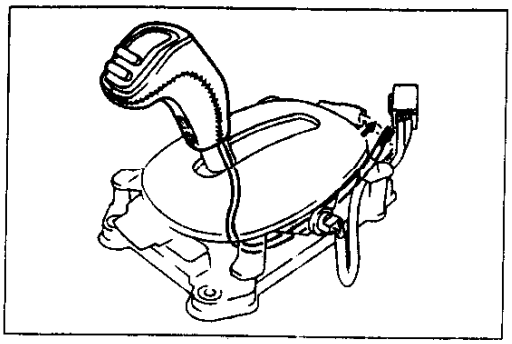
1. Install the selector lever and spindle to the selector lever bracket.
2. Shift the selector lever to P range.
3. Place the adjustment lever in a vise and tighten the spindle nut.

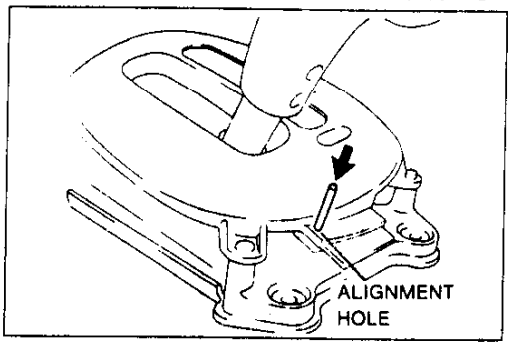
Tightening torque:
6.9–9.8 N·m {70–100 kgf·cm, 61–86 in·lbf}



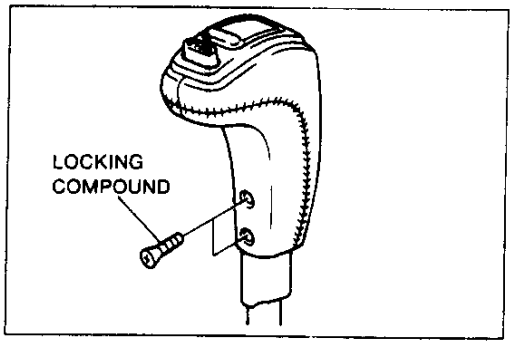
37U0KX-270

4. Verify that the overlap of the guide pin and the lock lever is within specification with the selector lever pushed forward.


37U0KX-271



37U0KX-272



37U0KX-273

Indicator panel

1. Install the selector sleeve and the selector lever knob to the selector lever.

Caution
- **Do not damage the hold switch harness.**

2. Position the hold switch harness as shown.
3. Insert the connect pin to the connector.
4. Shift the selector lever to P range.
5. Align the alignment holes in the slider with the holes in the indicator panel.
6. Install a suitable heavy-gauge wire to hold the slider.
7. Tighten the indicator screws.

Tightening torque:
2.0–2.9 N·m {20–30 kgf·cm, 18–26 in·lbf}

8. Remove the wire.
9. Verify that the selector lever properly aligns with the indicator in each range.

Selector lever knob

1. Apply locking compound to the screws.
2. Tighten the screws.

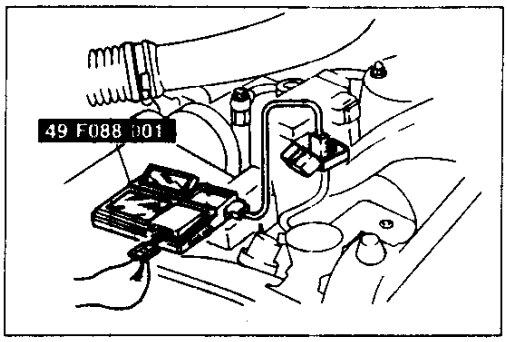
Tightening torque:
1.5–2.9 N·m {15–30 kgf·cm, 14–26 in·lbf}

TROUBLESHOOTING GUIDE

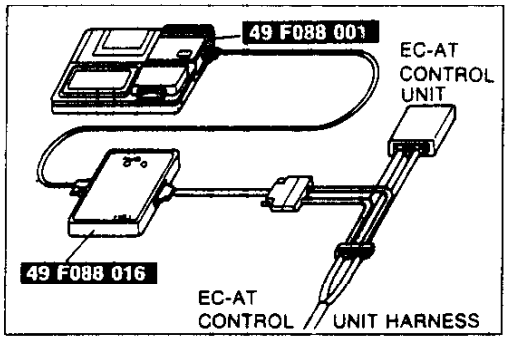
GENERAL NOTES

A problem with the EC-AT may be caused by the engine, the EC-AT powertrain, the hydraulic control system, or the electronic control system; therefore, when troubleshooting begin with those points which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.

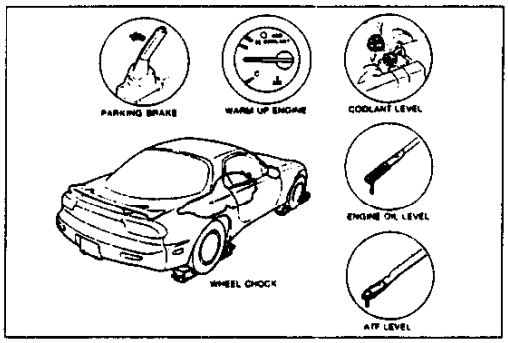
29U0KX-012



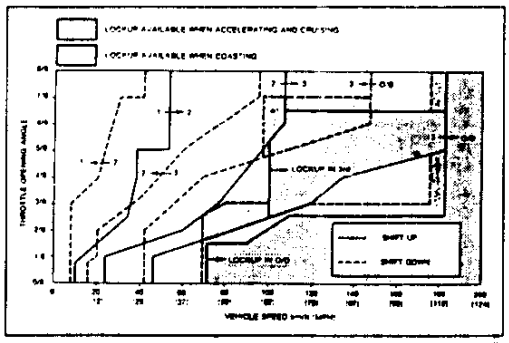
37U0KX-274



37U0KX-275



37U0KX-276



37U0KX-277

Step 1: Self-diagnostic System Inspection

Check for service code(s) memorized in the EC-AT control unit by using the **DT-S1000** or **Self-Diagnosis Checker**. (Refer to page K–214.)

Note

- **Service code(s) can also be checked by observing the flashing sequence of the hold indicator lamp. (Refer to page K–214.)**

Step 2: Electric Signal Inspection

Check the signals to/from the EC-AT control unit with the **DT-S1000**. (Refer to page K–248.)

Note

- **Signals can also be checked by checking the EC-AT control unit terminal voltages with the Engine Signal Monitor or a voltmeter. (Refer to page K–35.)**

Step 3: Mechanical System Test

Check the engine stall speed, time lag, and line pressure. (Refer to page K–9.)

Step 4: Road Test

Note

- **For correct testing, the vehicle speed, engine speed, throttle opening (throttle sensor voltage), and gear position should be checked with the DT-S1000.**

Check the shift point, shift schedule, and shift shock. (Refer to page K–16.)

QUICK DIAGNOSIS CHART

OUTLINE

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

1. Components indicated in the "Self-diagnosis" line of the QUICK DIAGNOSIS CHART (I) are diagnosed by the EC-AT control unit self-diagnosis function. **DT-S1000** or **Self-Diagnosis Checker** can be used for easy retrieval of the service code numbers.
2. Components indicated in the "Adjustment" line of the QUICK DIAGNOSIS CHART (I) indicate that there is a possibility that the problem may be the result of an incorrect adjustment. Check the adjustment of each component, and readjust if necessary.
3. Input and output signals of the EC-AT control unit for the components indicated in the **DT-S1000** line of the QUICK DIAGNOSIS CHART (I) can be easily checked by using the **DT-S1000**.
4. Components indicated in the "Stall Test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the stall test.
5. Components indicated in the "Time Lag Test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the time lag test.
6. Components indicated in the "Line Pressure Test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the line pressure test.
7. Components indicated in the "Road Test" line of the QUICK DIAGNOSIS CHART (I) can be checked for malfunction by observing the results of the road test.
8. QUICK DIAGNOSIS CHART (II) shows the relationship between the troubleshooting item and inspection point.

37U0KX-278

QUICK DIAGNOSIS CHART (I)

Item \ Possible parts and reference page			Preliminary								Electronic system																			
			K-25	K-164	Section F	Section G	K-9	K-12	K-14	K-16	K-28	Section F	K-29	K-29	Section G	K-31	K-32	K-32	K-32	K-33	K-32	K-32	K-32	K-30	K-35	Section F	K-35	K-27	K-35
			ATF level and condition	Selector lever	Idle speed and ignition timing	Ignition system and starter	Stall test	Time lag test	Line pressure test	Road test	Inhibitor switch	Throttle sensor	Speed sensor 1 (revolution sensor)	Speed sensor 2 (speedometer sensor)	Engine rpm signal	ATF thermosensor	Solenoid valve (shift A)	Solenoid valve (shift B)	Solenoid valve (line pressure)	Dropping resistor	Solenoid valve (lockup)	Solenoid valve (lockup control)	Solenoid valve (overrunning clutch)	Pulse generator	Inhibitor signal	Idle signal	O/D inhibit signal (ASC signal)	Hold switch	A/C signal
Self-diagnosis												○	○	○	○	○	○	○	○		○	○	○	○						
Adjustment			○	○	○						○	○																		
Testers	Self-Diagnosis Checker											○	○	○	○	○	○	○	○		○	○	○	○						
	DT-S1000	Service code check										○	○	○	○	○	○	○	○		○	○	○	○						
		Input / output signal monitor									○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
		Shifting check monitor										○	○				○	○	○		○									
	Engine Signal Monitor										○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Stall test																														
Time lag test																														
Line pressure test																														
Road test																														

QUICK DIAGNOSIS CHART (I)

Item	Possible parts and reference page	Electronic system								Hydraulic control system								Powertrain									
		Slip lockup signal	Torque reduced signal	Reduce torque signal	Stoplight switch	Slip lockup OFF signal	Water thermoswitch	Atmospheric pressure sensor	Mileage switch	Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Band servo	Oil pump	Hydraulic circuit	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band (and servo)	Parking mechanism
		K-35	K-35	K-35	K-35	K-35	K-34	K-35	K-35	K-108	K-58	K-58	K-58	K-58	K-76	K-60	K-253	K-57	K-64	K-70	K-83	K-80	K-83	K-83	K-91	K-76	K-97
Testers	Self-diagnosis		○		○			○																			
	Adjustment			○																							
	Self-Diagnosis Checker		○	○				○																			
	Service code check		○	○				○																			
DT-S1000	Input / output signal monitor	○	○	○	○	○	○	○	○																		
	Shifting check monitor																										
	Engine Signal Monitor	○	○	○	○	○	○	○	○																		
	Stall test									○						○		○	○	○	○	○	○	○	○	○	
	Time lag test										○	○		○					○		○			○	○	○	
	Line pressure test									○						○	○		○		○				○		
	Road test									○	○	○	○	○							○	○	○	○	○	○	○

37U0KX-279

QUICK DIAGNOSIS CHART (II–1)

	Troubleshooting item / Possible parts and reference page		Preliminary									Electronic system																				
			K–25	K–164	Section F	Section G	K–9	K–12	K–14	K–16	K–28	Section F	K–29	K–29	Section G	K–31	K–32	K–32	K–32	K–33	K–32	K–32	K–32	K–30	K–35	Section F	K–35	K–27	K–35	
			ATF level and condition	Selector lever	Idle speed and ignition timing	Ignition system and starter	Stall test	Time lag test	Line pressure test	Road test	Inhibitor switch	Throttle sensor	Speed sensor 1 (revolution sensor)	Speed sensor 2 (speedometer sensor)	Engine rpm signal	ATF thermosensor	Solenoid valve (shift A)	Solenoid valve (shift B)	Solenoid valve (line pressure)	Dropping resistor	Solenoid valve (lockup)	Solenoid valve (lockup control)	Solenoid valve (overrunning clutch)	Pulse generator	Inhibitor signal	Idle signal	O/D inhibit signal (ASC signal)	Hold switch	A/C signal		
6	Engine starts in other than P and N ranges			3		2					1																				
14	Engine stalls	Idle when shifted from N or P to other ranges			1						3		5											4	2						
18		On deceleration	1		2						4		6											5	3						
24	Engine rough	On deceleration	1	3					2			6							4	5											
25	Poor acceleration	Drive away	1				3		2	7	10	6	12				8	9	4	5							11				
26		On acceleration																													
30	Surges while cruising											1	3								4				2					
31	Lack of power		1				3		2	7	10	6	12				8	9	4	5							11				
32	Poor fuel economy										10	7	11		9	6	3	4			1	2	5			8	13	14			
40	Vehicle does not move in D, S, L, and/or R ranges		1	4					2	3		7							5	6											
	①	Vehicle does not move in D, S, and/or L ranges		1.																											
	②	Vehicle does not move in D, and/or S ranges		1					2										3	4											
	③	Vehicle does not move in R range	1						2										3	4											
41	Vehicle moves in N range		1	3					2			6							4	5											
42	Vehicle moves in P range			1						2																					
43	Excessive creep				1		3		2		9	6							4	5				8	7						
44	No shift									1			5				2	3									4				
	①	Does not shift 1st to 2nd											4				2	3									1				
	②	Does not shift 2nd to 3rd											2					1													
	③	Does not shift to O/D															1														
	④	Does not shift O/D to 3rd									5		6			1	2	3					4				7	8			
	⑤	Does not shift O/D to 2nd, or 3rd to 2nd	1						6			2					3	4										5			
	⑥	Does not shift 3rd to 1st, or 2nd to 1st	1						6			2					3	4										5			
45	Abnormal shift		1									2	3																		
	①	Shifts directly from 1st to 3rd	1																												
	②	Does not kickdown when accelerator is depressed in O/D with in kickdown range										1	2				3	4													
	③	Excessive engine speed when accelerated in O/D due to delayed kickdown										2	1				3	4													
46	Frequent shifting											1																			
47	Shift point high or low											1	3		2																4
48	No lockup										7	4	8		6	3					1	2				5					
49	No kickdown											1	5				2	3										4			

* The numbers indicate the inspection sequence.

QUICK DIAGNOSIS CHART (II-1)

Electronic system									Hydraulic control system								Powertrain										Possible parts and reference page / Troubleshooting item		
K-35	K-35	K-35	K-35	K-35	K-34	K-35	K-35	K-108	K-58	K-58	K-58	K-58	K-76	K-60	K-253	K-57	K-64	K-70	K-83	K-80	K-83	K-83	K-91	K-76	K-97			
Slip lockup signal	Torque reduced signal	Reduce torque signal	Stoplight switch	Slip lockup OFF signal	Water thermoswitch	Atmospheric pressure sensor	Mileage switch	Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Band servo	Oil pump	Hydraulic circuit	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band (and servo)	Parking mechanism				
																										Engine starts in other than P and N ranges		5
									6						8	7										Idle when shifted from N or P to other ranges	Engine stalls	14
									7						9	8										On deceleration		18
								7										10	9		8		12	11		On deceleration	Engine rough	24
								13					14	19	21	20	15	16					18	17		Drive away	Poor accelera-tion	25
																										On deceleration		26
5								6							7	8										Surges while cruising		30
								13					14	19	21	20	15	16					18	17		Lack of power		31
					12			15					18		17	16								19		Poor fuel economy		32
								8					9	10	18	14	17	11	16				13	12	15	Vehicle does not move in D, S, L, and/or R ranges		
															3							2				Vehicle does not move in D, S, and/or L ranges	①	40
								5							11		6	7	8		9		10			Vehicle does not move in D, and/or S ranges	②	
								5	6						12		7	8	9	10		11				Vehicle does not move in R range	③	
								7							11		10		8		9					Vehicle move in N range		41
																									3	Vehicle move in P range		42
								10																		Excessive creep		43
								6					7		10			9						8		No shift		
								5					6		9			8						7		Does not shift 1st to 2nd	①	
								3					4		7			6						5		Does not shift 2nd to 3rd	②	
								2					3		7						5		6	4		Does not shift to O/D	③	44
								9					10		12									11		Does not shift O/D to 3rd	④	
								7					9		11			8						10		Does not shift O/D to 2nd, or 3rd to 2nd	⑤	
								7					10		12			8				9		11		Does not shift 3rd to 1st, or 2nd to 1st	⑥	
								4					5		7									6		Abnormal shift		
										2			3		5									4		Shifts directly from 1st to 3rd	①	
																										Does not kickdown when accelerator is depressed in O/D with in kickdown range	②	45
																										Excessive engine speed when accelerated in O/D due to delayed kickdown	③	
								2							3											Frequent shifting		46
								5																		Shift point high or low		47
								9							11	10										No lockup		48
								6																		No kickdown		49

37U0KX-230

QUICK DIAGNOSIS CHART (II-2)

Troubleshooting item			Possible parts and reference page	Preliminary								Electronic system																	
				K-25	K-164	Section F	Section G	K-9	K-12	K-14	K-16	K-28	Section F	K-29	K-29	Section G	K-31	K-32	K-32	K-32	K-33	K-32	K-32	K-32	K-30	K-35	Section F	K-35	K-27	K-35
				ATF level and condition	Selector lever	Idle speed and ignition timing	Ignition system and starter	Stall test	Time lag test	Line pressure test	Road test	Inhibitor switch	Throttle sensor	Speed sensor 1 (revolution sensor)	Speed sensor 2 (speedometer sensor)	Engine rpm signal	ATF thermosensor	Solenoid valve (shift A)	Solenoid valve (shift B)	Solenoid valve (line pressure)	Dropping resistor	Solenoid valve (lockup)	Solenoid valve (lockup control)	Solenoid valve (overrunning clutch)	Pulse generator	Inhibitor signal	Idle signal	O/D inhibit signal (ASC signal)	Hold switch	A/C signal
50			When accelerating	1	3					2			6							4	5									
51		Engine speed flares up	When upshifting and/or downshifting	1	3			9		2			6	8						4	5				7					
	①		When 1st to 2nd shifting	1	2			9		3			6	8						4	5					7				
	②		When 2nd to 3rd shifting	1	2			9		3			6	8						4	5					7				
	③		When 3rd to O/D shifting	1	2			9		3			6	8						4	5				7					
	④		When O/D, or 3rd to 2nd shifting	1	2			8		3			6							4	5				7					
	⑤		When 3rd, or 2nd to 1st shifting	1	2			9		3			6					8		4	5				7					
52			P, N to R and/or N to D	1		2		4		3		10	7							5	6				9	8				
53		Excessive shift shock	When upshifting and/or downshifting	1				3		2			6	10			8			4	5				9		7			
	①		When 1st to 2nd shifting					12		1			4	7			5			2	3				6					
	②		When 2nd to 3rd shifting					12		1			4	7			5			2	3				6					
	③		When 3rd to O/D shifting					8		1			4	7			5			2	3				6					
	④		When 2nd to 1st shifting in L range					10		1			4	7			5			2	3				6					
	⑤		When coasting							2			5	8			6			3	4			1	7		9			
	⑥		When lockup	1									3	7		6						2			5		4			
54	No engine braking			1								5	3										2					4		
55	No mode changes																												1	
56	Transmission noise		N and/or P ranges	1									4	5		6				2	3									
57			All ranges	1																										
58	Transmission overheat			1				3		2			6							4	5	7	8							
				2		1				4			7	10		9				5	6	3					8			
					3		2					1																		
												3														2	1			

* The numbers indicate the inspection sequence.

QUICK DIAGNOSIS CHART (II-2)

Electronic system									Hydraulic control system								Powertrain										Possible parts and reference page / Troubleshooting item		
K-35	K-35	K-35	K-35	K-35	K-34	K-35	K-35	K-108	K-58	K-58	K-58	K-58	K-76	K-60	K-253	K-57	K-64	K-70	K-83	K-80	K-83	K-83	K-91	K-76	K-97			
Slip lockup signal	Torque reduced signal	Reduce torque signal	Stoplight switch	Slip lockup OFF signal	Water thermoswitch	Atmospheric pressure sensor	Mileage switch	Control valve body	N-D accumulator	1-2 accumulator	2-3 accumulator	3-4/N-R accumulator	Band servo	Oil pump	Hydraulic circuit	Torque converter	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrunning clutch	Low one-way clutch	Low and reverse brake	Brake band (and servo)	Parking mechanism			
								7						13	15	14	11		8	9		10	12			When accelerating		50
						10		11		12	13	14			20			16	17	18		19		15		When upshifting and/or downshifting		
							10	11		12					14									13		When 1st to 2nd shifting	①	
							10	11			12				15			14						13		When 2nd to 3rd shifting	②	
								10				11			14			13						12		When 3rd to O/D shifting		51
								9							12			11						10		When O/D, or 3rd to 2nd shifting	③	
								10							12									11		When 3rd, or 2nd to 1st shifting	④	
								11	12			13			17		15		14			16				P, N to R and/or N to D		52
	11	12				13		14		15	16	17			21			20			19			18		When upshifting and/or downshifting		
	8	9				11	10	12		13					15									14		When 1st to 2nd shifting	①	
	8	9				11	10	12			13				16			15						14		When 2nd to 3rd shifting	②	
						9		10				11			14					13				12		When 3rd to O/D shifting	③	53
	8	9				11		12							14							13				When 2nd to 1st shifting in L range	④	
								10																		When coasting	⑤	
								8							10	9										When lockup	⑥	
								6							9						7		8			No engine braking		54
																										No mode changes		55
													7		8											N and/or P ranges		56
															2											All ranges		57
								9					10	18	17	11	12	14		15		16	13			Transmission overheat		58
								11						13	12													

Engine speed flares up

Excessive shift shock

Transmission noise

37U0KX-231

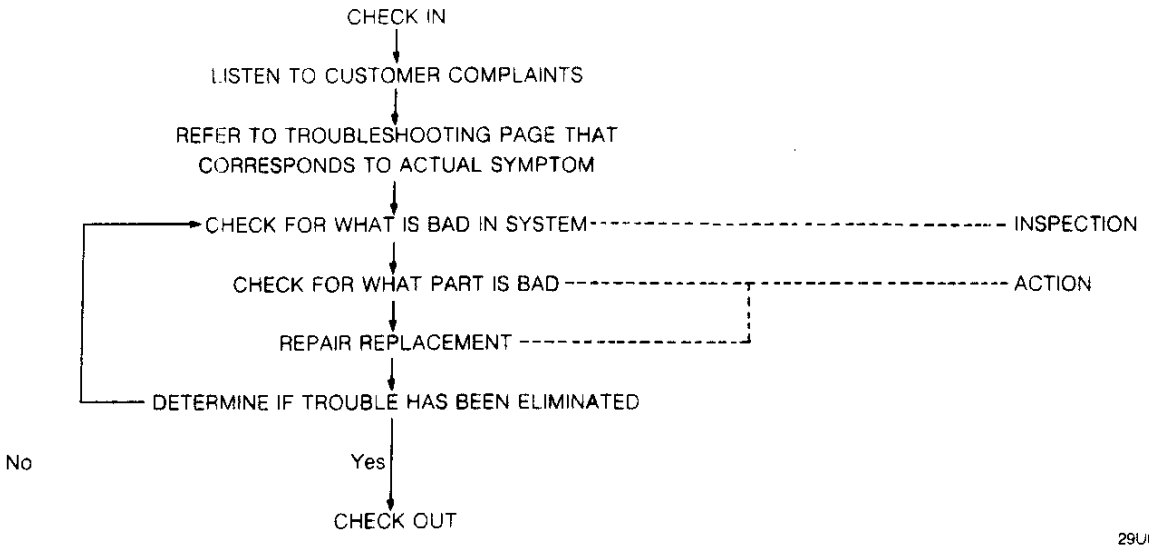
SYMPTOM TROUBLESHOOTING

USING THIS SECTION

Introduction

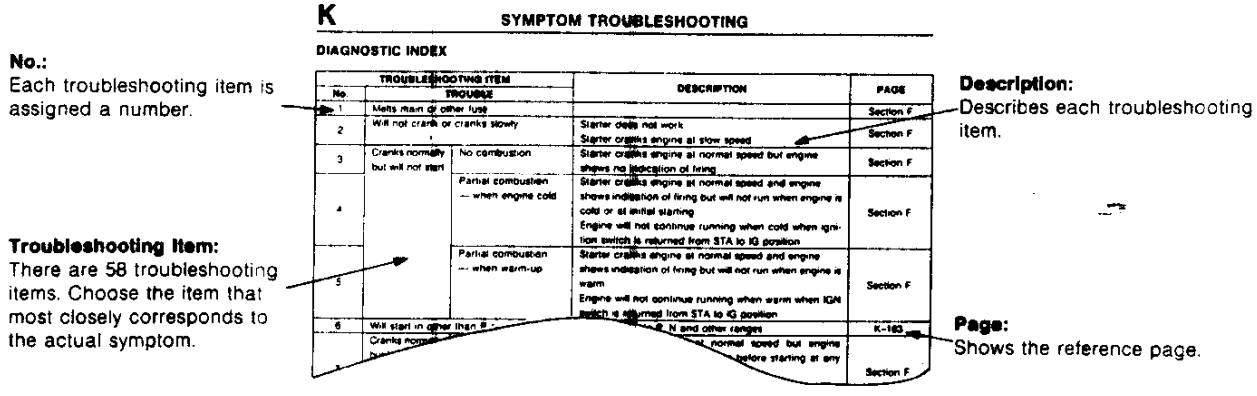
Most of the automatic transmission control system is electronically controlled, often making it difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a drivability complaint. The customer is often a good source of information on such problems, especially intermittent ones. Through talks with the customer, one can find out what the symptoms are and under what conditions they occur.

Work Flow



29U0K x-021

Diagnostic Index

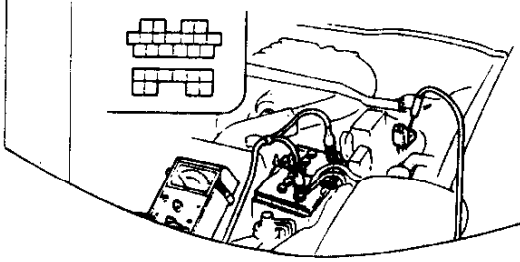


29U0K x-022

Troubleshooting Chart

K

SYMPTOM TROUBLESHOOTING

14	ENGINE STALLS IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES		
DESCRIPTION	• Engine stops unexpectedly when shifted from N or P to other ranges at idle		
[TROUBLESHOOTING HINTS] ① Engine idle speed low ② Control valve stuck (lockup control valve, shuttle shift valve D, lockup modifier valve, or pilot valve) ③ Inhibitor signal malfunction ④ Inhibitor switch worn or misadjusted ⑤ Pulse generator malfunction ⑥ Speed sensor 1 (revolution sensor) malfunction			
STEP	INSPECTION		ACTION
1	Are ignition timing and idle speed OK? ☞ Section F **Ignition timing: Leading 5° ATDC, Trailing 20° ATDC** **Idle speed: 700–750 rpm (P range)** 	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞ Section F

29U0KX 023

DESCRIPTION:

Further describes the symptom. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:

Describes the possible point of malfunction.

STEP:

Shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:

Describes an inspection method to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page shown by the "☞" mark.

ACTION:

Recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the action is described on the reference page shown by the "☞" mark.

29U0KX-024

DIAGNOSTIC INDEX

TROUBLESHOOTING ITEM			DESCRIPTION	PAGE
No.	TROUBLE			
1	Melts main or other fuse			Section F
2	Will not crank or cranks slowly		Starter does not work Starter cranks engine at slow speed	Section F
3	Cranks normally but will not start	No combustion	Starter cranks engine at normal speed but engine shows no indication of firing	Section F
4		Partial combustion — when engine cold	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is cold or at initial starting Engine will not continue running when cold when ignition switch is returned from STA to IG position	Section F
5		Partial combustion — when warm-up	Starter cranks engine at normal speed and engine shows indication of firing but will not run when engine is warm. Engine will not continue running when warm when IGN switch is returned from STA to IG position	Section F
6	Will start in other than P and N ranges		Engine starts in P, N and other ranges	K–183
7	Cranks normally but hard to start	Any engine temp.	Starter cranks engine at normal speed but engine requires excessive cranking time before starting at any engine temperature Engine starts after stalling a few times at any engine temperature	Section F
8		When engine cold	Starter cranks engine at normal speed but engine requires excessive cranking time before starting when engine is cold Engine starts after stalling a few times when engine is cold	Section F
9		After warm-up	Starter cranks engine at normal speed but engine requires excessive cranking time before starting after warm-up	Section F
10	Engine stalls	Idle at any engine temp.	Engine stops unexpectedly at any engine temp.	Section F
11		During fast idle	Engine stops unexpectedly during fast-idle operation	Section F
12		Idle after warm-up	Engine stops unexpectedly at idle after warm-up	Section F
13		Idle with A/C, P/S, and/or E/L ON	Engine stops unexpectedly when A/C, P/S, and/or E/L turned ON at idle	Section F
* 14		Idle when shifted from N or P to other ranges	Engine stops unexpectedly when shifted from N or P to other ranges at idle	Section F K–184
15		Driveway	Engine stops unexpectedly upon driveaway	Section F
16		On acceleration	Engine stops unexpectedly at beginning of acceleration or during acceleration	Section F
17		While cruising	Engine stops unexpectedly while cruising	Section F
* 18		On deceleration	Engine stops unexpectedly at beginning of deceleration or recovery from deceleration exhaust afterburn	Section F K–186
19	Engine rough	Idle at any engine temp.	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at any engine temp. Idle speed too slow and excessive engine shake at any engine temp.	Section F
20		During fast idle	Fast idle speed too slow and excessive engine shake during fast idle, but returns to normal after warm-up	Section F
21		Idle after warm-up	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle after warm-up	Section F

* Refer to Section F before referring to K sections.

TROUBLESHOOTING ITEM No.	TROUBLE		DESCRIPTION	PAGE
22	Engine rough	Idle with A/C, P/S, and/or E/L ON	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when A/C, P/S, and/or E/L ON	Section F
23		Idle when shifted from N or P to other range	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake at idle when shifted from P or N to other range	Section F
* 24		On deceleration	Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration Exhaust afterburn	Section F K–187
* 25	Poor acceleration	Driveaway	Engine speed increases normally but vehicle speed slowly increases during driveaway	Section F K–189
* 26		On acceleration	Engine speed increases normally but vehicle speed slowly increases during acceleration	
27	High idle speed after warm-up		Idle speed continues at fast idle after warm-up Engine returns slowly to idle after acceleration is released	Section F
28	Idle fluctuates / Idle hants		Engine speed changes back and forth between specified idle speed and higher speed	Section F
29	Hesitates / Stumbles on acceleration		Momentary pause at beginning of acceleration or during acceleration	Section F
* 30	Surges while cruising		Momentary minor irregularity in engine output at steady vehicle speed	Section F K–192
* 31	Lack of power		Performance poor under load (i.e., power down when climbing hills)	Section F K–194
* 32	Poor fuel economy		Fuel economy unsatisfactory	Section F K–194
33	A/C does not work		A/C compressor magnetic clutch does not engage when A/C switch ON	Section F
34	Knocking / Pinging		Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)	Section F
35	Fuel odor		Gasoline fuel smell or visible leaks	Section F
36	Exhaust sulfur smell		Rotten egg smell from exhaust	Section F
37	High oil consumption		Oil consumption excessive	Section F
38	Self-Diagnosis Checker flashes 88 / DT-S1000 indicates "SYSTEM ERROR"		MIL always ON/Self-Diagnosis Checker flashes 88 with test connector ground / DT-S1000 indicates "SYSTEM ERROR"	Section F
39	MIL never ON		Self-Diagnosis Checker or DT-S1000 indicates service code No. of input device but MIL never ON	Section F
40	Vehicle does not move in D, S, L and/or R ranges		No creep at all Vehicle does not move when accelerator pedal depressed after shifted to D, S, L and/or R range	K–194
41	Vehicle moves in N range		Vehicle creeps in N range Vehicle moves when accelerator pedal not depressed	K–195
42	Vehicle moves in P range		Vehicle rolls in P range, and drivetrain not lockup	K–195
43	Excessive creep		Vehicle moves quickly in D, S, L and R ranges (accelerator pedal not depressed) **Note** **• Excessive N to R range and N to D range shift shock felt**	K–195

* Refer to section F before referring to K section.

TROUBLESHOOTING ITEM No.	TROUBLESHOOTING ITEM TROUBLE		DESCRIPTION	PAGE
44	No shift		Single range shift (1st → 2nd, 2nd → 3rd, or 3rd → O/D) only Sometimes shifts correctly **Note** **• Gear position is held in hold mode**	K–196
45	Abnormal shift		Shifts incorrectly (incorrect shift pattern) (ex) Vehicle shifts 1st → O/D directly when accelerating with accelerator pedal depressed slightly	K–198
46	Frequent shifting		Downshift occurs when accelerator depressed slightly in D, S and L ranges (except hold mode)	K–200
47	Shift point high or low		Shift points do not match shift diagram Shift delayed when accelerating Shifts occur too fast when accelerating and engine speed does not increase	K–201
48	No lockup		No lockup when vehicle speed reaches lockup range	K–202
49	No kickdown		Does not downshift when accelerator pedal depressed more than 7/8 within kickdown range	K–202
50	Engine speed flares up	When accelerating	Engine speed flares up on acceleration	K–202
51		When upshifting and/or downshifting	Engine flares up when accelerator pedal depressed for upshifting Engine flares up suddenly when accelerator pedal depressed for downshifting	K–203
52	Excessive shift shock	P, N to R and/or N to D	Strong shift shock felt at idle when shifting from N to D or R range	K–205
53		When upshifting and/or downshifting	Excessive shift shock felt when accelerating at upshifting During cruising, excessive shift shock felt when accelerator pedal depressed at downshifting	K–208
54	No engine braking		Engine speed drops to idle but vehicle does not slow when accelerator pedal released during cruising at medium to high speed Engine speed drops to idle but vehicle does not slow when accelerator pedal released when in L range at low vehicle speed	K–211
55	No mode change		Mode does not change to/from normal mode in D range Hole mode not selected or not cancelled	K–213
56	Transmission noise	All ranges	Transmission noisy in all ranges when vehicle is idling	K–213
57		D, S, L, R ranges	Abnormal noise from transmission in D, S, L, R	K–213
58	Transmission overheats		ATF smells burnt and/or is discolored	K–213

37U0KX-082

SYMPTOM TROUBLESHOOTING CHART

6	WILL START IN OTHER THAN P AND N RANGES
DESCRIPTION	• Engine starts in P, N and other ranges

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

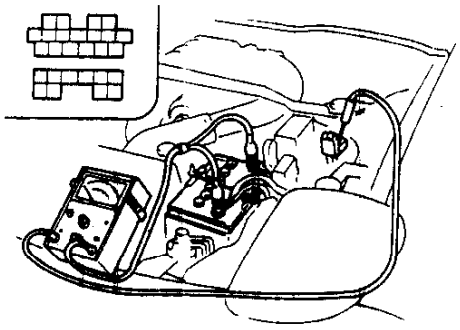
① Inhibitor switch worn or misadjusted ☞ page K-28
② Ignition system malfunction ☞ Section G
③ Selector lever installation or adjustment incorrect ☞ page K-164

37U0KX-:83

14	ENGINE STALLS IDLE WHEN SHIFTED FROM N OR P TO OTHER RANGES
DESCRIPTION	• Engine stops unexpectedly when shifted from N or P to other ranges at idle

[TROUBLESHOOTING HINTS]

① Engine idle speed low
② Control valve stuck (lockup control valve, shuttle shift valve D, lockup modifier valve, or pilot valve)
③ Inhibitor signal malfunction
④ Inhibitor switch worn or misadjusted
⑤ Pulse generator malfunction
⑥ Speed sensor 1 (revolution sensor) malfunction

STEP	INSPECTION		ACTION
1	Are ignition timing and idle speed OK? ☞ **Section F** **Ignition timing: Leading 5° ATDC, Trailing 20° ATDC** **Idle speed: 700–750 rpm (P range)** 	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞ **Section F**
2	Is problem correctec when 20-pin and 16-pin connectors of EC-AT control unit are disconnected?	Yes	Go to next step
		No	Overhaul control valve body and repair or replace parts as necessary If large amounts of material are found, overhaul transmission and repair or replace parts as necessary
3	Is output voltage of inhibitor signal at EC-AT control unit terminal OK? V_B: Battery voltage	Yes	Check wiring and connector from 1C terminal of EC-AT control unit to 1R terminal of engine control unit
		No	Go to next step

Term.	Unit	Spec.	Condition	Page
1C	V	V_B	D range	K–35
		Below 1.0	P and N ranges	

Unit: V → Voltage

STEP	INSPECTION		ACTION
4	Are measurements at EC-AT control unit terminals OK? V_B: Battery voltage	Yes	Replace EC-AT control unit ☞ page K-41
		No	Check for malfunctioning parts and wiring • Inhibitor switch ☞ page K-28 • Pulse generator ☞ page K-30 • Speed sensor 1 (revolution sensor) ☞ page K-29

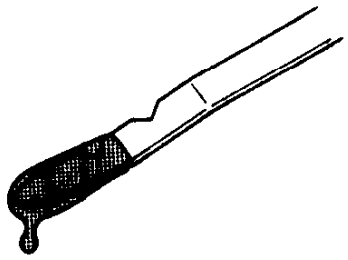
Term.	Unit	Spec.	Condition	Page
2D	V	0	P and N ranges	K-35
		V_B	Except P and N ranges	
1E	V	V_B	R range	
		0	Except R range	
2B	V	V_B	D range	
		0	Except D range	
2S	V	V_B	S range	
		0	Except S range	
2Q	V	V_B	L range	
		0	Except L range	
2E↔2L	kΩ	2.2–3.5	Constant (Ign: OFF)	
2J↔2L	Ω	500–1,000	Constant (Ign: OFF)	

Unit: V → Voltage
Ω → Resistance

Note

- **2D, 1E, 2B, 2S, 2Q terminals: Inhibitor switch**
- **2E terminal: Pulse generator**
- **2J terminal: Speed sensor 1 (revolution sensor)**
- **2L terminal: Ground (input)**

37U0KX-184

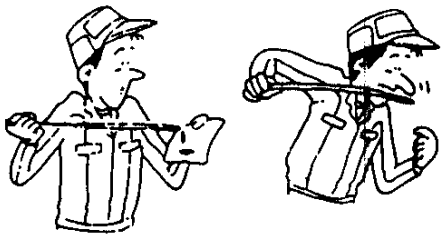
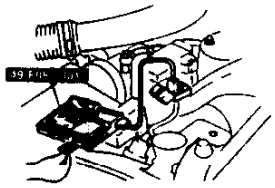
18	ENGINE STALLS ON DECELERATION		
DESCRIPTION	• Engine stops unexpectedly at beginning of deceleration or recovery from deceleration exhaust afterburn		
[TROUBLESHOOTING HINTS] ① ATF level low			
STEP	INSPECTION		ACTION
1	Is ATF level OK? ☞ page K-25 **Level: Between notches on dipstick** 	Yes	Go to No.14 "ENGINE STALLS WHEN SHIFTED FROM N TO D AND/OR FROM N TO R RANGE" in section K of this manual ☞ page K-184
		No	Adjust ATF level ☞ page K-25

37U0KX-785

24	ENGINE ROUGH ON DECELERATION
DESCRIPTION	• Engine shakes at beginning of deceleration, during deceleration, or recovery from deceleration • Exhaust afterburn

[TROUBLESHOOTING HINTS]

① ATF level low
② Selector lever installation or adjustment incorrect
③ Throttle sensor malfunction or misadjusted
④ Line pressure low
⑤ Powertrain slippage (forward clutch, forward one-way clutch, low one-way clutch, reverse clutch, or low and reverse brake)
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, or pilot valve)
⑦ Solenoid valve (line pressure) worn
⑧ Dropping resistor malfunction

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ page K-25 	Yes	Go to next step
		No	**Note** • **After pinpointing problem, overhaul transmission and repair or replace parts as necessary** Problem within transmission Go to next step, and check for cause
2	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ page K-214 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ page K-214 If problem remains, overhaul transmission and repair or replace parts as necessary
		No	Go to next step
3	Is line pressure OK? ☞ page K-14 **Specified line pressure** **kPa (kgf/cm², psi)** 13B: D, S, L: Idle 500–520 {5.0–5.4, 72–76}; Stall 1,200–1,270 {12.2–13.0, 174–184} 13B: R: Idle 620–650 {6.3–6.7, 90–95}; Stall 1,510–1,570 {15.3–16.1, 218–228}	Yes	Overhaul transmission and repair or replace parts as necessary
		No	Check selector lever operation ☞ page K-164 If OK, go to next step If not OK, adjust, repair or replace selector lever ☞ page K-164, 166

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Are measurements at EC-AT control unit terminals OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K–35</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K–246</td></tr>
<tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr>
<tr><td rowspan="3">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign: OFF)</td><td>K–35</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K–246</td></tr>
<tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr>
</table>
Unit: Ω → Resistance
% → ON duty
Note
•1F terminal: Solenoid valve (line pressure)
• 1H terminal: Dropping resistor</td><td>Yes</td><td>Replace control valve body assembly
☞ page K–128
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Solenoid valve (line pressure) ☞ page K–32
• Dropping resistor ☞ page K–33

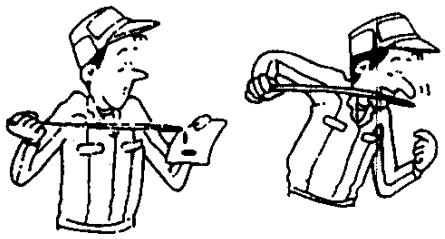
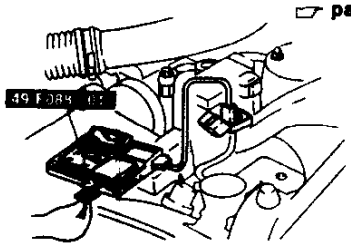
If resistance OK but duty not, go to next step</td></tr>
<tr><td>5</td><td>Is input voltage of throttle sensor at EC-AT control unit OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve fully closed</td><td rowspan="2">K–35</td></tr>
<tr><td>4.0–4.5</td><td>Throttle valve fully opened</td></tr>
</table>
Unit: V → Voltage</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K–41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle sensor and wiring
☞ Section F</td></tr>
</table>

37U0KX-28

25, 26	POOR ACCELERATION WHEN DRIVE AWAY OR ON ACCELERATION
DESCRIPTION	• Engine speed increases normally but vehicle speed slowly increases during driveaway. • Engine speed increases normally but vehicle speed slowly increases during acceleration.

[TROUBLESHOOTING HINTS]

① ATF level low
② Selector lever installation or adjustment incorrect
③ Throttle sensor malfunction or misadjusted
④ Line pressure low
⑤ Powertrain slippage
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, pilot valve, shift valve A, or shift valve B)
⑦ Solenoid valve (line pressure) worn
⑧ Dropping resistor malfunction
⑨ Solenoid valve (shift A, B) worn
⑩ Inhibitor switch worn
⑪ Hold switch worn
⑫ Speed sensor 1 (revolution sensor) malfunction
⑬ Torque converter worn
⑭ Engine power low

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ page K-25 	Yes	Go to next step
		No	**Note** • **After pin pointing problem, overhaul transmission and repair or replace parts as necessary** Problem within transmission Go to next step, and check for cause
2	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ page K-214 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ page K-214
		No	Go to next step
3	Is line pressure OK? ☞ page K-14 **Specified line pressure** **kPa {kgf/cm², psi}** Engine / Range / Idle / Stall 13B / D, S, L / 500–520 {5.0–5.4, 72–76} / 1,200–1,270 {12.2–13.0, 174–184} 13B / R / 620–650 {6.3–6.7, 90–95} / 1,510–1,570 {15.3–16.1, 218–228}	Yes	Go to next step
		No	Check selector lever operation ☞ page K-164 If OK, go to next step If not OK, adjust, repair or replace selector lever ☞ page K-164, 166

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Is engine stall speed OK?
☞ page K-9
rpm
<table><tr><th>Engine</th><th>Engine stall speed</th></tr><tr><td>13B</td><td>3,000–3,300</td></tr></table></td><td>Yes</td><td>Go to Step 7</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>5</td><td>Are measurements at EC-AT control unit terminals OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr><tr><td rowspan="2">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr></table>Unit: Ω → Resistance
% → ON duty

Note
• 1F terminal: Solenoid valve (line pressure)
• 1H terminal: Dropping resistor</td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Solenoid valve (line pressure) ☞ page K-32
• Dropping resistor ☞ page K-33

If resistance OK but duty not, go to next step</td></tr>
<tr><td>6</td><td>Is input voltage of throttle sensor at EC-AT control unit OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve fully closed</td><td rowspan="2">K-35</td></tr><tr><td>4.0–4.5</td><td>Throttle valve fully opened</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K-41
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle sensor and wiring
☞ Section F
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>7</td><td>Disconnect solenoid 8-pin connector; is vehicle driven as follows?
☞ page K-247
<table><tr><th>Range</th><th>Gear position</th></tr><tr><td>D range</td><td>3rd (fixed)</td></tr><tr><td>S range</td><td>3rd (fixed)</td></tr><tr><td>L range</td><td>2nd (fixed)</td></tr><tr><td>R range</td><td>Reverse (fixed)</td></tr></table></td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace control valve body assembly
☞ page K-128
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>8</td><td>Drive vehicle in D, S, and L ranges (except hold mode); does vehicle start from stop in 1st gear?

Are engine rpm at 20 km/h (12 mph) and throttle opening OK?
RPM: Approx. 2,100
Throttle opening: 4/8</td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Go to next step</td></tr>
</table>

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>9</td><td>Are measurements at EC-AT control unit terminals OK?
V_B: Battery voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">1D</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td><td rowspan="6">K-35</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>2nd and 3rd gear</td></tr>
<tr><td>V_B</td><td>1st and O/D gear</td></tr>
<tr><td rowspan="3">1B</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>3rd and O/D gear</td></tr>
<tr><td>V_B</td><td>1st and 2nd gear</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage
Note
• 1D terminal: Solenoid valve (shift A)
• 1B terminal: Solenoid valve (shift B)</td><td>Yes</td><td>Replace control valve body assembly
☞ page K-128
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Solenoid valve (shift A) ☞ page K-32
• Solenoid valve (shift B) ☞ page K-32

If resistance OK but voltage not, go to next step</td></tr>
<tr><td>10</td><td>Are measurements at EC-AT control unit terminals OK?
V_B: Battery voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2D</td><td rowspan="2">V</td><td>0</td><td>P and N ranges</td><td rowspan="12">K-35</td></tr>
<tr><td>V_B</td><td>Except P and N ranges</td></tr>
<tr><td rowspan="2">1E</td><td rowspan="2">V</td><td>V_B</td><td>R range</td></tr>
<tr><td>0</td><td>Except R range</td></tr>
<tr><td rowspan="2">2B</td><td rowspan="2">V</td><td>V_B</td><td>D range</td></tr>
<tr><td>0</td><td>Except D range</td></tr>
<tr><td rowspan="2">2S</td><td rowspan="2">V</td><td>V_B</td><td>S range</td></tr>
<tr><td>0</td><td>Except S range</td></tr>
<tr><td rowspan="2">2Q</td><td rowspan="2">V</td><td>V_B</td><td>L range</td></tr>
<tr><td>0</td><td>Except L range</td></tr>
<tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>V_B</td><td>Switch depressed</td></tr>
<tr><td>0</td><td>Switch released</td></tr>
<tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance
Note
• 2D, 1E, 2B, 2S, 2Q terminals: Inhibitor switch
• 2I terminal: Hold switch
• 2J terminal: Speed sensor 1 (revolution sensor)
• 2L terminal: Ground (Input)</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Inhibitor switch ☞ page K-28
• Hold switch ☞ page K-27
• Speed sensor 1 (revolution sensor) ☞ page K-29

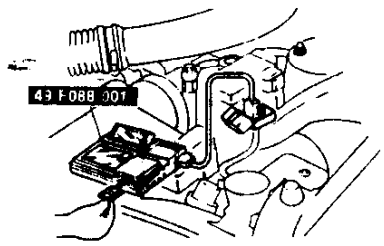
If problem remains, return to Step 7</td></tr>
<tr><td>11</td><td>Replace with known good EC-AT control unit; is problem corrected?
☞ page K-41</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace torque converter</td></tr>
</table>

37U0KX-287

30	SURGES WHILE CRUISING
DESCRIPTION	• Momentary minor irregularity in engine output at steady vehicle speed

[TROBLESHOOTING HINTS]

① ATF level low
② Throttle sensor malfunction or misadjusted
③ Solenoid valve (lockup) worn
④ Idle signal malfunction
⑤ Slip lockup OFF signal malfunction

STEP	INSPECTION		ACTION
1	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ page K-214 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ page K-214
		No	Go to next step
2	Is input voltage of throttle sensor at EC-AT control unit OK?	Yes	Go to next step
		No	Check throttle sensor and wiring ☞ Section F
3	Are resistance and output duty of solenoid valve (lockup) at EC-AT control unit terminal OK?	Yes	Replace control valve body assembly ☞ page K-128 If problem remains, overhaul transmission and repair or replace parts as necessary
		No	If resistance not OK, check for solenoid valve (lockup) and wiring ☞ page K-32 If resistance OK but duty not, go to next step

Term.	Unit	Spec.	Condition	Page
2T	V	0.1–1.1	Throttle valve fully closed	K-35
		4.0–4.5	Throttle valve fully opened	

Unit: V → Voltage

Term.	Unit	Spec.	Condition	Page
1M	Ω	10–20	Constant (Ign: OFF)	K-35
	%	Approx. 5	No lockup (Ign: ON)	K-247
		Approx. 95	Lockup (Ign: ON)	

Unit: Ω → Resistance
% → ON duty

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Are measurements at EC-AT control unit terminals OK?

V_B: Battery voltage

<table>
<tr><th>Term</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2M</td><td rowspan="2">V</td><td>Below 1.0</td><td>Throttle valve fully closed</td><td rowspan="4">K-35</td></tr>
<tr><td>4.5–5.5</td><td>Throttle valve opened</td></tr>
<tr><td rowspan="2">2G</td><td rowspan="2">V</td><td>Below 1.0</td><td>Engine running at 3,000 rpm</td></tr>
<tr><td>V_B</td><td>Engine running at idle</td></tr>
</table>
Unit: V → Voltage

Note
• 2M terminal: Idle signal
• 2G terminal: Slip lockup OFF signal</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K-41
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Idle signal ☞ page K-35
• Slip lockup OFF signal ☞ page K-35</td></tr>
</table>

37U0KX-288

31	LACK OF POWER
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low — ☞ page K-25
② Selector lever installation or adjustment incorrect — ☞ page K-164
③ Throttle sensor malfunction or misadjusted — ☞ Section F
④ Line pressure low — ☞ page K-14
⑤ Powertrain slippage
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, shift valve A or shift valve B)
⑦ Solenoid valve (line pressure) worn — ☞ page K-32
⑧ Dropping resistor malfunction — ☞ page K-33
⑨ Solenoid valve (shift A and/or B) worn — ☞ page K-32
⑩ Inhibitor switch worn or misadjusted — ☞ page K-28
⑪ Hold switch circuit malfunction — ☞ page K-27
⑫ Speed sensor 1 (revolution sensor) malfunction — ☞ page K-29
⑬ Torque converter worn — ☞ page K-57
⑭ Engine power low

37U0KX-289

32	POOR FUEL ECONOMY
DESCRIPTION	• Fuel economy unsatisfactory

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Solenoid valve (lockup) worn — ☞ page K-32
② Solenoid valve (lockup control) worn — ☞ page K-32
③ Control valve stuck (lockup control valve, lockup modifier valve, pilot valve, or shuttle shift valve D)
④ ATF thermosensor malfunction — ☞ page K-31
⑤ Throttle sensor malfunction or misadjusted — ☞ Section F
⑥ Engine rpm signal malfunction — ☞ page K-35
⑦ Speed sensor 1 (revolution sensor) malfunction — ☞ page K-29
⑧ Inhibitor switch worn or misadjusted — ☞ page K-28

37U0KX-290

40	VEHICLE DOES NOT MOVE IN D, S, L AND/OR R RANGES
DESCRIPTION	• No creep at all • Vehicle does not move when accelerator pedal depressed after shifted to D, S, L and/or R range

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low — ☞ page K-25
② Selector lever installation or adjustment incorrect — ☞ page K-164
③ Throttle sensor malfunction or misadjusted — ☞ Section F
④ Line pressure low — ☞ page K-14
⑤ Powertrain slippage (high clutch, brake band, forward clutch, or reverse clutch)
⑥ Control valve stuck (manual valve pressure regulator valve, pressure modifier valve or pilot valve)
⑦ Solenoid valve (line pressure) worn — ☞ page K-32
⑧ Dropping resistor malfunction — ☞ page K-33
⑨ Parking mechanism worn — ☞ page K-97

37U0KX-291

41	VEHICLE MOVES IN N RANGE
DESCRIPTION	• Vehicle creeps in N range • Vehicle moves when accelerator pedal not depressed

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Selector lever installation or adjustment incorrect ☞ **page K-164**
② Powertrain burned (forward clutch, or overrunning clutch)
③ Throttle sensor malfunction or misadjusted ☞ **Section F**
④ Control valve stuck (manual valve)
⑤ Solenoid valve (line pressure) worn ☞ **page K-32**
⑥ Dropping resistor malfunction ☞ **page K-33**

37U0KX-292

42	VEHICLE MOVES IN P RANGE
DESCRIPTION	• Vehicle rolls in P range, and drivetrain not lookup

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Selector lever installation or adjustment incorrect ☞ **page K-164**
② Parking mechanism worn ☞ **page K-97**

37U0KX-293

43	EXCESSIVE CREEP
DESCRIPTION	• Vehicle moves quickly in D, S, L, and R ranges (accelerator pedal not depressed) **Note** **• Excessive N to R range and N to D range shift shock felt**

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

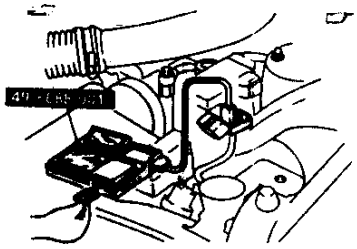
① Engine idle speed misadjusted ☞ **Section F**
② Line pressure at idle high ☞ **page K-14**

37U0KX-294

44	NO SHIFT
DESCRIPTION	• Single range shift (1st → 2nd, 2nd → 3rd, or 3rd → O/D) only • Sometimes shifts correctly **Note** **• Gear position is held in hold mode**

[TROUBLESHOOTING HINTS]

① Solenoid valve (shift A and B) worn
② Control valve stuck
③ Hold switch malfunction
④ Speed sensor 1 (revolution sensor) malfunction
⑤ Poor ground
⑥ EC-AT control unit malfunction

STEP	INSPECTION		ACTION
1	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ **page K–214** 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ **page K–214**
		No	Go to next step
2	Disconnect solenoid 8-pin connector; is vehicle driven as follows? ☞ **page K–247** **Range** / **Gear position**: D range – 3rd (fixed); S range – 3rd (fixed); L range – 2nd (fixed); R range – Reverse (fixed)	Yes	Go to next step
		No	Replace control valve body assembly ☞ **page K–128** If problem remains, overhaul transmission and repair or replace parts as necessary
3	Drive vehicle in D, S, and L ranges (except hold mode); does vehicle start from stop in 1st gear? Are engine rpm at 20 km/h (12 mph) and throttle opening OK? **RPM: Approx. 2,100** **Throttle opening: 4/8**	Yes	Go to Step 5
		No	Go to next Step

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Are measurements at EC-AT control unit terminals OK?
V_B: Battery voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="4">1D
1B</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td><td rowspan="8">K–35</td></tr>
<tr><td rowspan="3">V</td><td>Below 1.0</td><td>2nd and 3rd gear</td></tr>
<tr><td>V_B</td><td>1st and O/D gear</td></tr>
<tr><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>3rd and O/D gear</td></tr>
<tr><td>V_B</td><td>1st and 2nd gear</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage
Note
• 1D terminal: Solenoid valve (shift A)
• 1B terminal: Solenoid valve (shift B)</td><td>Yes</td><td>Replace control valve body assembly
☞ page K–128
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Solenoid valve (shift A) ☞ page K–32
• Solenoid valve (shift B) ☞ page K–32

If resistance OK, but voltage not, go to next step</td></tr>
<tr><td>5</td><td>Are measurements at EC-AT control unit terminals OK?
V_B: Battery voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2I</td><td rowspan="2">V</td><td>V_B</td><td>Switch depressed</td><td rowspan="3">K–35</td></tr>
<tr><td>0</td><td>Switch released</td></tr>
<tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance

Note
• 2I terminal: Hold switch
• 2J terminal: Speed sensor 1 (revolution sensor)
• 2L terminal: Ground (input)</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Hold switch ☞ page K–27
• Speed sensor 1 (revolution sensor) ☞ page K–29

If problem remains, return to Step 3</td></tr>
<tr><td>6</td><td>Is voltage between 1L terminal of EC-AT control unit and transmission case OK?

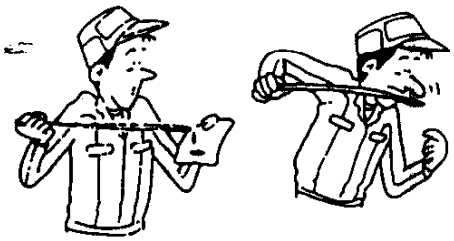
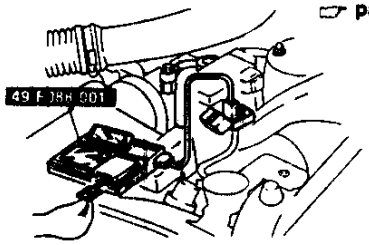
Specified voltage: 0V (Normal condition)</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Problem in ground circuit
Repair wiring or replace connector</td></tr>
<tr><td>7</td><td>Replace with known good EC-AT control unit; is problem corrected?
☞ page K–41</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K–41</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
</table>

37U0KX-295

45	ABNORMAL SHIFT
DESCRIPTION	• Shifts incorrectly (incorrect shift pattern) Ex) Vehicle shifts 1st → O/D directly when accelerating with accelerator pedal depressed slightly

[TROUBLESHOOTING HINTS]

① ATF level low
② Poor ground
③ Throttle sensor malfunction or misadjusted
④ Speed sensor 1 (revolution sensor) malfunction
⑤ EC-AT control unit malfunction
⑥ Stuck control valve (shift valve A, shift valve B, or pilot valve)

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ page K-25 	Yes	Go to next step
		No	**Note** **• After pinpointing problem, overhaul transmission and repair or replace parts as necessary** Problem within transmission Go to next step and check for cause
2	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ page K-214 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ page K-214
		No	Go to next step
3	Is voltage between 1L terminal of EC-AT control unit and transmission case OK? **Specified voltage: 0V (Normal condition)**	Yes	Go to next step
		No	Problem in ground circuit Repair wiring or replace connector

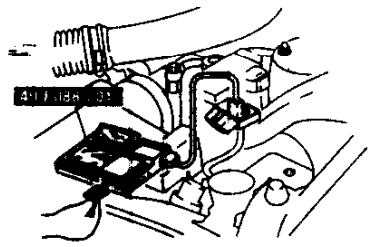
<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Are measurements at EC-AT control unit terminals OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve fully closed</td><td rowspan="3">K–35</td></tr><tr><td>4.0–4.5</td><td>Throttle valve fully opened</td></tr><tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant</td></tr></table>Unit: V → Voltage
Ω → Resistance

Note
• 2T terminal: Throttle sensor
• 2J terminal: Speed sensor 1 (revolution sensor)
• 2L terminal: Ground (input)</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Throttle sensor ☞ Section F
• Speed sensor 1 (revolution sensor) ☞ page K–29</td></tr>
<tr><td>5</td><td>Replace with known good EC-AT control unit; is problem corrected?
☞ page K–41</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K–41</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace control valve body assembly
☞ page K–128
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
</table>

37U0KX-296

46	FREQUENT SHIFTING
DESCRIPTION	• Downshift occurs when accelerator depressed slightly in D, S, and L ranges (except hold mode)

[TROUBLESHOOTING HINTS]
① Poor ground
② Throttle sensor malfunction or misadjusted
③ EC-AT control unit misadjusted

STEP	INSPECTION		ACTION
1	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ page K-214 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ page K-214 If problem remains, overhaul transmission and repair or replace parts as necessary
		No	Go to next step
2	Is voltage between 1L terminal of EC-AT control unit and transmission case OK? **Specified voltage: 0V (Normal condition)**	Yes	Go to next step
		No	Problem in ground circuit Repair wiring or replace connector
3	Is input voltage of throttle sensor at EC-AT control unit OK?	Yes	Go to next step
		No	Check for throttle sensor and wiring ☞ Section F
4	Replace with known good EC-AT control unit; is problem corrected? ☞ page K-41	Yes	Replace EC-AT control unit ☞ page K-41
		No	Replace control valve body assembly ☞ page K-128 If problem remains, overhaul transmission and repair or replace parts as necessary

Term.	Unit	Spec.	Condition	Page
2T	V	0.1–1.1	Throttle valve fully closed	K-35
		4.0–4.5	Throttle valve fully opened	

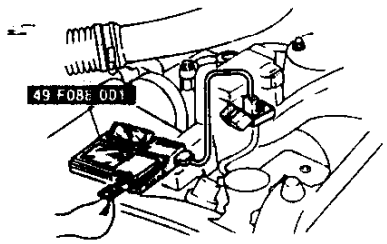
Unit: V → Voltage

37U0KX-297

47	SHIFT POINT HIGH OR LOW
DESCRIPTION	• Shift points do not match shift diagram • Shifts delayed when accelerating • Shifts occur too fast when accelerating and engine speed does not increase

[TROUBLESHOOTING HINTS]

① Throttle sensor malfunction or misadjusted
② Engine rpm signal malfunction
③ Speed sensor 1 (revolution sensor) malfunction
④ A/C signal malfunction

STEP	INSPECTION		ACTION
1	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ **page K-214** 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ **page K-214**
		No	Go to next step
2	Is input voltage of throttle sensor at EC-AT control unit OK?	Yes	Go to next step
		No	Check throttle sensor and wiring ☞ **Section F**

Term.	Unit	Spec.	Condition	Page
2T	V	0.1–1.1	Throttle valve fully closed	K-35
		4.0–4.5	Throttle valve fully opened	

Unit: V → Voltage

3	Are measurements at EC-AT control unit terminals OK? V_B: Battery voltage	Yes	Replace EC-AT control unit ☞ **page K-41** If problem remains, overhaul transmission and repair or replace parts as necessary
		No	Check for malfunctioning parts and wiring • Engine rpm signal ☞ **Section G** • Speed sensor 1 (revolution sensor) ☞ **page K-29** • A/C signal ☞ **Section F**

Term.	Unit	Spec.	Condition	Page
1G	V	0.3–0.8	Engine running at idle	K-35
		0	Engine stopped	
		1.8–2.2	Engine running at 3,000 rpm (no load)	
2J ↔ 2L	Ω	500–1,000	Constant (Ign: OFF)	
1L	V	Below 3.0	A/C ON	
		V_B	A/C OFF	

Unit: V → Voltage
Ω → Resistance

Note
- **1G terminal: Engine rpm signal**
- **2J terminal: Speed sensor 1 (revolution sensor)**
- **1L terminal: A/C signal**
- **2L terminal: Ground (Input)**

37U0KX-298

48	NO LOCKUP
DESCRIPTION	• No lockup when vehicle speed reaches lockup range

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Solenoid valve (lockup) worn ☞ **page K-32**
② Solenoid valve (lockup control) worn ☞ **page K-32**
③ Control valve stuck (lockup control valve, lockup modifier valve, pilot valve, or shuttle shift valve D)
④ ATF thermosensor malfunction ☞ **page K-31**
⑤ Throttle sensor malfunction or misadjusted ☞ **Section F**
⑥ Idle signal malfunction ☞ **page K-35**
⑦ Engine rpm signal malfunction ☞ **page K-35**
⑧ Speed sensor 1 (revolution sensor) ☞ **page K-29**
⑨ Inhibitor switch worn or misadjusted ☞ **page K-28**

37U0KX-299

49	NO KICKDOWN
DESCRIPTION	• Does not downshift when accelerator pedal depressed more than 7/8 within kickdown range

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Throttle sensor malfunction or misadjusted ☞ **Section F**
② Solenoid valve (shift A and/or B) worn ☞ **page K-32**
③ Control valve stuck (shift valve A, shift valve B, or pilot valve)
④ Hold switch malfunction ☞ **page K-27**
⑤ Speed sensor 1 (revolution sensor) malfunction ☞ **page K-29**

37U0KX-300

50	ENGINE SPEED FLARES UP WHEN ACCELERATING
DESCRIPTION	• Engine speed flares up on acceleration

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

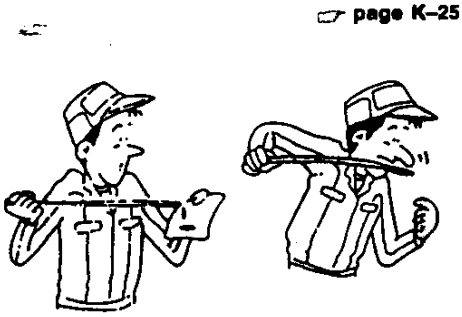
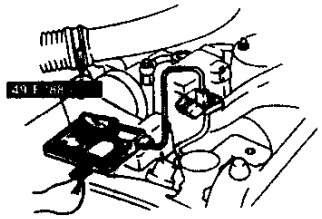
① ATF level low ☞ **page K-25**
② Selector lever installation or adjustment incorrect ☞ **page K-164**
③ Throttle sensor malfunction or misadjusted ☞ **Section F**
④ Line pressure low ☞ **page K-14**
⑤ Powertrain slippage (forward clutch, forward one-way clutch, low one-way clutch, reverse clutch, or low and reverse brake)
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve or pilot valve)
⑦ Solenoid valve (line pressure) worn ☞ **page K-32**
⑧ Dropping resister malfunction ☞ **page K-33**

37U0KX-301

51	ENGINE SPEED FLARES UP WHEN UPSHIFTING AND/OR DOWNSHIFTING
DESCRIPTION	• Engine flares up when accelerator pedal depressed for upshifting • Engine flares up suddenly when accelerator pedal depressed for downshifting

[TROUBLESHOOTING HINTS]

① ATF level low
② Selector lever installation or adjustment incorrect
③ Throttle sensor malfunction or misadjusted
④ Line pressure low
⑤ Powertrain slippage (brake band, high clutch, forward clutch, forward one-way clutch, or low one-way clutch)
⑥ Control valve stuck (pressure regulator valve, pressure modifier valve, pilot valve, shift valve A, or shift valve B)
⑦ Solenoid valve (line pressure) worn
⑧ Dropping resistor malfunction
⑨ Pulse generator malfunction
⑩ Speed sensor 1 (revolution sensor) malfunction
⑪ Atmospheric pressure sensor malfunction

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ **page K-25** 	Yes	Go to next step
		No	**Note** • **After pinpointing problem, overhaul transmission and repair or replace parts as necessary** Problem within transmission Go to next step, and check for cause
2	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ **page K-214** 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ **page K-214**
		No	Go to next step
3	Is line pressure OK? ☞ **page K-14** **Specified line pressure kPa (kgf/cm², psi)** Engine 13B: Range D, S, L: Idle 500–520 {5.0–5.4, 72–76}; Stall 1,200–1,270 {12.2–13.0, 174–184} Engine 13B: Range R: Idle 620–650 {6.3–6.7, 90–95}; Stall 1,510–1,570 {15.3–16.1, 218–228}	Yes	Overhaul transmission and repair or replace parts as necessary
		No	Check selector lever operation ☞ **page K-164** If OK, go to next step If not OK, adjust, repair, or replace selector lever ☞ **page K-164, 166**

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Are measurements at EC-AT control unit terminals OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr>
<tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr>
<tr><td rowspan="3">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr>
<tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr>
<tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr>
</table>
Unit: Ω → Resistance
% → ON duty
Note
• 1F terminal: Solenoid valve (line pressure)
• 1H terminal: Dropping resistor</td><td>Yes</td><td>Replace control valve body assembly
☞ page K-128
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Solenoid valve (line pressure) ☞ page K-32
• Dropping resistor ☞ page K-33

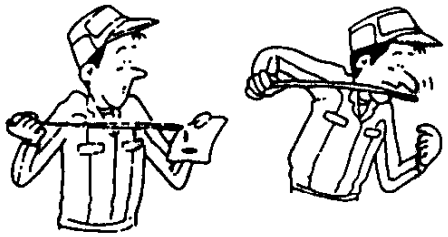
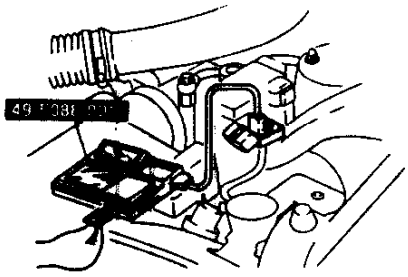
If resistance OK but duty not, go to next step</td></tr>
<tr><td>5</td><td>Is input voltage of throttle sensor at EC-AT control unit OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve fully closed</td><td rowspan="2">K-35</td></tr>
<tr><td>4.0–4.5</td><td>Throttle valve fully opened</td></tr>
</table>
Unit: V → Voltage</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle sensor and wiring
☞ Section F</td></tr>
<tr><td>6</td><td>Are measurements at EC-AT control unit terminals OK?
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td>2E ↔ 2L</td><td>kΩ</td><td>2.2–3.5</td><td>Constant (Ign: OFF)</td><td rowspan="4">K-35</td></tr>
<tr><td>2J ↔ 2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">2C</td><td rowspan="2">V</td><td>2.0–4.5V</td><td>Ignition switch ON</td></tr>
<tr><td>0V</td><td>Ignition switch OFF</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage
Note
• 2E terminal: Pulse generator
• 2J terminal: Speed sensor 1 (revolution sensor)
• 2C terminal: Atmospheric pressure sensor
• 2L terminal: Ground (Input)</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Pulse generator ☞ page K-30
• Speed sensor 1 (revolution sensor) ☞ page K-29
• Atmospheric pressure sensor ☞ page K-35</td></tr>
</table>

37U0KX-302

52	EXCESSIVE SHIFT SHOCK P, N TO R AND/OR N TO D
DESCRIPTION	• Strong shift shock felt at idle when shifting from N to D or R range

[TROUBLESHOOTING HINTS]

① ATF level low
② Idle speed high
③ Throttle sensor malfunction or misadjusted
④ Line pressure high
⑤ Control valve stuck (pressure regulator valve, pressure modifier valve, or pilot valve)
⑥ Powertrain slippage
⑦ Solenoid valve (line pressure) worn
⑧ Dropping resistor malfunction
⑨ N–D, or 3–4/N–R accumulator worn
⑩ Inhibitor signal malfunction
⑪ Pulse generator malfunction
⑫ Inhibitor switch worn or misadjusted

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ page K–25 	Yes	Go to next step
		No	**Note** **• After pinpointing problem, overhaul transmission and repair or replace parts as necessary** Problem within transmission Go to next step, and check for cause
2	Are ignition timing and idle speed OK? ☞ Section F **Ignition timing: Leading 5° ATDC, Trailing 20° ATDC** **Idle speed: 700–750 rpm (P range)**	Yes	Go to next step
		No	Adjust ignition timing and/or idle speed ☞ Section F
3	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ page K–214 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ page K–214
		No	Go to next step
4	Is line pressure OK? ☞ page K–14 **Specified line pressure kPa (kgf/cm², psi)** Engine 13B: Range D, S, L: Idle 500–520 {5.0–5.4, 72–76}; Stall 1,200–1,270 {12.2–13.0, 174–184} Engine 13B: Range R: Idle 620–650 {6.3–6.7, 90–95}; Stall 1,510–1,570 {15.3–16.1, 218–228}	Yes	Go to next step
		No	Go to Step 6

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>5</td><td>Is engine stall speed OK?
☞ page K-8
rpm
<table><tr><th>Engine</th><th>Engine stall speed</th></tr><tr><td>13B</td><td>3,000–3,300</td></tr></table></td><td>Yes</td><td>Go to Step 8</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>6</td><td>Are measurements at EC-AT control unit terminals OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr><tr><td rowspan="3">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr></table>Unit: Ω → Resistance
% → ON duty

Note
• 1F terminal: Solenoid valve (line pressure)
• 1H terminal: Dropping resistor</td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Solenoid valve (line pressure) ☞ page K-32
• Dropping resistor ☞ page K-33

If resistance OK but duty not, go to next step</td></tr>
<tr><td>7</td><td>Is input voltage of throttle sensor at EC-AT control unit OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve fully closed</td><td rowspan="2">K-35</td></tr><tr><td>4.0–4.5</td><td>Throttle valve fully opened</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle sensor and wiring
☞ Section F</td></tr>
</table>

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>8</td><td>Are measurements at EC-AT control unit terminals OK?
V_B: Battery voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">1C</td><td rowspan="2">V</td><td>V_B</td><td>D range</td><td rowspan="12"></td></tr>
<tr><td>Below 1.0</td><td>P and N ranges</td></tr>
<tr><td>2E↔2L</td><td>kΩ</td><td>2.2–3.5</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">2D</td><td rowspan="2">V</td><td>0</td><td>P and N ranges</td></tr>
<tr><td>V_B</td><td>Except P and N ranges</td></tr>
<tr><td rowspan="2">1E</td><td rowspan="2">V</td><td>V_B</td><td>R range</td></tr>
<tr><td>0</td><td>Except R range</td><td>K–35</td></tr>
<tr><td rowspan="2">2B</td><td rowspan="2">V</td><td>V_B</td><td>D range</td></tr>
<tr><td>0</td><td>Except D range</td></tr>
<tr><td rowspan="2">2S</td><td rowspan="2">V</td><td>V_B</td><td>S range</td></tr>
<tr><td>0</td><td>Except S range</td></tr>
<tr><td rowspan="2">2Q</td><td rowspan="2">V</td><td>V_B</td><td>L range</td></tr>
<tr><td>0</td><td>Except L range</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance

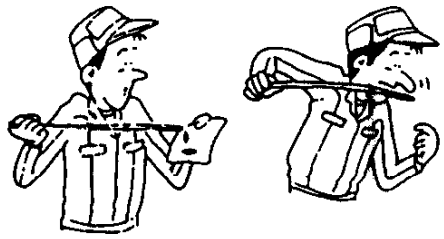
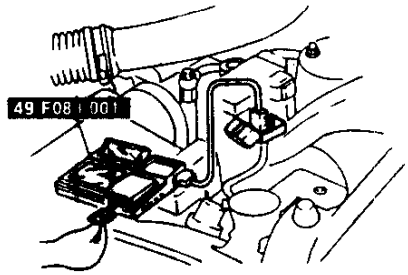
Note
• 1C terminal: Inhibitor signal
• 2E terminal: Pulse generator
• 2D, 1E, 2B, 2S, 2Q terminals: Inhibitor switch
• 2L terminal: Ground (input)</td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Inhibitor signal ☞ page K–35
• Pulse generator ☞ page K–30
• Inhibitor switch ☞ page K–28</td></tr>
</table>

37U0KX-303

53	EXCESSIVE SHIFT SHOCK WHEN UPSHIFTING AND/OR DOWNSHIFTING
DESCRIPTION	• Excessive shift shock felt when accelerating at upshifting • During cruising, excessive shift shock felt when accelerator pedal depressed at downshifting

[TROUBLESHOOTING HINTS]

① ATF level low
② Throttle sensor malfunction or misadjusted
③ Line pressure high
④ Powertrain slippage
⑤ Control valve stuck (pressure regulator valve, pressure modifier valve, pilot valve, servo charger valve, or accumulator control valve)
⑥ Solenoid valve (line pressure) worn
⑦ Dropping resistor malfunction
⑧ Idle signal malfunction
⑨ ATF thermosensor malfunction
⑩ Pulse generator malfunction
⑪ Speed sensor 1 (revolution sensor) malfunction
⑫ Atmospheric pressure sensor malfunction
⑬ Torque reduced signal and/or reduce torque signal malfunction?

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ **page K–25** 	Yes	Go to next step
		No	**Note** • **After pinpointing problem, overhaul transmission and repair or replace parts as necessary** Problem within transmission Go to next step, and check for cause
2	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ **page K–214** 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ **page K–214**
		No	Go to next step
3	Is line pressure OK? ☞ **page K–14** **Specified line pressure kPa (kgf/cm², psi)** Engine / Range / Idle / Stall 13B / D, S, L / 500–520 {5.0–5.4, 72–76} / 1,200–1,270 {12.2–13.0, 174–184} 13B / R / 620–650 {6.3–6.7, 90–95} / 1,510–1,570 {15.3–16.1, 218–228}	Yes	Go to next step
		No	Go to Step 5

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Is engine stall speed OK?
☞ page K-9
rpm
<table><tr><th>Engine</th><th>Engine stall speed</th></tr><tr><td>13B</td><td>3,000–3,300</td></tr></table></td><td>Yes</td><td>Go to Step 8</td></tr>
<tr><td></td><td></td><td>No</td><td>Overhaul transmission and repair or replace part as necessary</td></tr>
<tr><td>5</td><td>Are measurements at EC-AT control unit terminal OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="3">1F</td><td>Ω</td><td>2.5–5.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr><tr><td rowspan="3">1H</td><td>Ω</td><td>12.5–19.0</td><td>Constant (Ign: OFF)</td><td>K-35</td></tr><tr><td rowspan="2">%</td><td>Approx. 100</td><td>Throttle valve fully closed (Ign: ON)</td><td rowspan="2">K-246</td></tr><tr><td>Approx. 5</td><td>Throttle valve fully opened (Ign: ON)</td></tr></table>Unit: Ω → Resistance
% → ON duty

Note
• 1F terminal: Solenoid valve (line pressure)
• 1H terminal: Dropping resistor</td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for malfunctioning parts and wiring
• Solenoid valve (line pressure) ☞ page K-32
• Dropping resistor ☞ page K-33

If resistance OK and duty not, go to next step</td></tr>
<tr><td>6</td><td>Is input voltage of throttle sensor at EC-AT control unit OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve fully closed</td><td rowspan="2">K-35</td></tr><tr><td>4.0–4.5</td><td>Throttle valve fully opened</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Check throttle sensor and wiring
☞ Section F</td></tr>
<tr><td>7</td><td>Is input voltage of idle signal at EC-AT control unit OK?
<table><tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr><tr><td rowspan="2">2M</td><td rowspan="2">V</td><td>Below 1.0</td><td>Throttle valve fully closed</td><td rowspan="2">K-35</td></tr><tr><td>4.5–5.5</td><td>Throttle valve opened</td></tr></table>Unit: V → Voltage</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check idle signal and wiring
☞ Section F

→</td></tr>
</table>

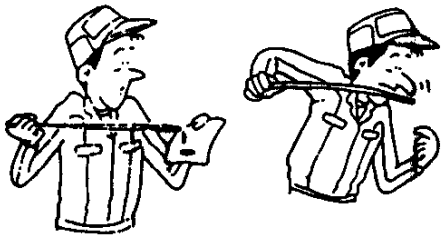
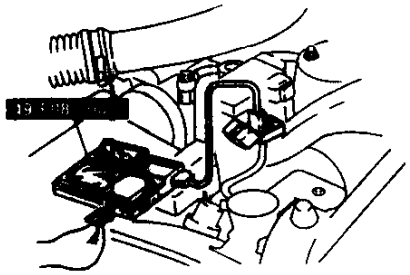
<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>8</td><td>Are measurement at EC-AT control unit terminals OK?
V_B: Battery voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">2R↔2L</td><td rowspan="3">V</td><td>Approx. 1.8</td><td>ATF temp. 10°C {50°F}</td><td rowspan="9">K–35</td></tr>
<tr><td>Approx. 1.1</td><td>ATF temp. 40°C {104°F}</td></tr>
<tr><td>Approx. 0.4</td><td>ATF temp. 80°C {176°F}</td></tr>
<tr><td>2E↔2L</td><td>kΩ</td><td>2.2–3.5</td><td>Constant (Ign: OFF)</td></tr>
<tr><td>2J↔2L</td><td>Ω</td><td>500–1,000</td><td>Constant (Ign: OFF)</td></tr>
<tr><td rowspan="2">2C</td><td rowspan="2">V</td><td>2.0–4.5V</td><td>Ignition switch ON</td></tr>
<tr><td>0V</td><td>Ignition switch OFF</td></tr>
<tr><td rowspan="2">2H</td><td rowspan="2">V</td><td>V_B</td><td>Engine running at idle</td></tr>
<tr><td>Below 1.0</td><td>Throttle opening above 1/8 (Engine coolant temp. below 40°C {104°F})</td></tr>
<tr><td rowspan="2">2P</td><td rowspan="2">V</td><td>Below 1.0</td><td>Shifting</td></tr>
<tr><td>V_B</td><td>Engine running at idle</td></tr>
</table>
Unit: V → Voltage
Ω → Resistance
Note
• 2R terminal: ATF thermosensor
• 2E terminal: Pulse generator
• 2J terminal: Speed sensor 1 (revolution sensor)
• 2C terminal: Atmospheric pressure sensor
• 2H terminal: Reduce torque signal
• 2P terminal: Torque reduced signal
• 2L terminal: Ground (input)</td><td>Yes</td><td>Overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• ATF thermosensor ☞ page K–31
• Pulse generator ☞ page K–30
• Speed sensor 1 (revolution sensor) ☞ page K–29
• Atmospheric pressure sensor ☞ page K–35
• Reduce torque signal ☞ page K–35
• Torque reduced signal ☞ page K–35</td></tr>
</table>

37 J0KX-304

54	NO ENGINE BRAKING
DESCRIPTION	• Engine speed drops to idle but vehicle does not slow when accelerator pedal released during cruising at medium to high speed • Engine speed drops to idle but vehicle does not slow when accelerator pedal released when in L range at low vehicle speed

[TROUBLESHOOTING HINTS]

① ATF level low
② Powertrain slippage
③ Control valve stuck (overrunning clutch control valve, overrunning clutch reducing valve, 1st reducing valve, or pilot valve)
④ Solenoid valve (overrunning clutch) worn
⑤ Throttle sensor malfunction or misadjusted
⑥ O/D inhibit signal (ASC signal) malfunction
⑦ Inhibitor switch worn or misadjusted

STEP	INSPECTION		ACTION
1	Are ATF level and condition OK? ☞ **page K–25** 	Yes	Go to next step
		No	**Note** **• After pinpointing problem, overhaul transmission and repair or replace parts as necessary** Problem within transmission Go to next step, and check for cause
2	Are there any service code(s) displayed on the DT-S1000 or Self-Diagnosis Checker when the ignition switch is ON? ☞ **page K–214** 	Yes	Service code(s) displayed • Check for cause of code(s) ☞ **page K–214**
		No	Go to next step
3	Is there slippage when accelerating or shifting, or flare up when shifting?	Yes	Powertrain slipped Go to No.50 "ENGINE SPEED FLARES UP WHEN ACCELERATING" or No.51 "ENGINE SPEED FLARES UP WHEN UPSHIFTING AND/OR DOWNSHIFTING" in section K of this manual ☞ **page K–202, 203**
		No	Go to next step

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td>4</td><td>Is engine braking felt in L range?
☞ page K-21</td><td>Yes</td><td>Go to next step</td></tr>
<tr><td></td><td></td><td>No</td><td>Replace control valve body assembly
☞ page K-128
If problem remains, overhaul transmission and repair or replace parts as necessary</td></tr>
<tr><td>5</td><td>Are resistance and output voltage of solenoid valve (overrunning clutch) at EC-AT control unit terminal OK?
V_B: Battery voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="3">1O</td><td>Ω</td><td>20–40</td><td>Constant (Ign: OFF)</td><td rowspan="3">K-35</td></tr>
<tr><td rowspan="2">V</td><td>Below 1.0</td><td>2nd gear and throttle opening less than 1.3/8 in S range hold mode</td></tr>
<tr><td>V_B</td><td>O/D</td></tr>
</table>
Unit: Ω → Resistance
V → Voltage</td><td>Yes</td><td>Go to next or replace step</td></tr>
<tr><td></td><td></td><td>No</td><td>If resistance not OK, check for solenoid valve (overrunning clutch) and wiring
☞ page K-32
If resistance OK and voltage not, go to next step</td></tr>
<tr><td>6</td><td>Are measurements at EC-AT control unit terminals OK?
V_B: Battery voltage
<table>
<tr><th>Term.</th><th>Unit</th><th>Spec.</th><th>Condition</th><th>Page</th></tr>
<tr><td rowspan="2">2T</td><td rowspan="2">V</td><td>0.1–1.1</td><td>Throttle valve fully closed</td><td rowspan="12">K-35</td></tr>
<tr><td>4.0–4.5</td><td>Throttle valve fully opened</td></tr>
<tr><td rowspan="2">2K</td><td rowspan="2">V</td><td>4.5–5.5</td><td>Ignition switch ON</td></tr>
<tr><td>0</td><td>TAT terminal grounded</td></tr>
<tr><td rowspan="2">2D</td><td rowspan="2">V</td><td>0</td><td>P and N ranges</td></tr>
<tr><td>V_B</td><td>Except P and N ranges</td></tr>
<tr><td rowspan="2">1E</td><td rowspan="2">V</td><td>V_B</td><td>R range</td></tr>
<tr><td>0</td><td>Except R range</td></tr>
<tr><td rowspan="2">2B</td><td rowspan="2">V</td><td>V_B</td><td>D range</td></tr>
<tr><td>0</td><td>Except D range</td></tr>
<tr><td rowspan="2">2S</td><td rowspan="2">V</td><td>V_B</td><td>S range</td></tr>
<tr><td>0</td><td>Except S range</td></tr>
<tr><td rowspan="2">2Q</td><td rowspan="2">V</td><td>V_B</td><td>L range</td></tr>
<tr><td>0</td><td>Except L range</td></tr>
</table>
Unit: V → Voltage
Note
• 2T terminal: Throttle sensor
• 2K terminal: O/D inhibit signal (ASC signal), TAT terminal
• 2D, 1E, 2B, 2S, 2Q terminals: Inhibitor switch</td><td>Yes</td><td>Replace EC-AT control unit
☞ page K-41</td></tr>
<tr><td></td><td></td><td>No</td><td>Check for malfunctioning parts and wiring
• Throttle sensor ☞ Section F
• O/D inhibit signal (ASC signal), TAT terminal ☞ page K-35
• Inhibitor switch ☞ page K-28</td></tr>
</table>

37U0KX-305

55	NO MODE CHANGE
DESCRIPTION	• Mode does not change to/from normal mode in D range • Hold mode not selected or not cancelled

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① Hold switch malfunction ☞ **page K-27**
② Throttle sensor malfunction or misadjusted ☞ **Section F**
③ EC-AT control unit malfunction ☞ **page K-35**

37U0KX-306

56	TRANSMISSION NOISE ALL RANGES
DESCRIPTION	• Transmission noisy in all ranges when vehicle is idling

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low ☞ **page K-25**
② Throttle sensor malfunction or misadjusted ☞ **Section F**
③ Speed sensor 1 (revolution sensor) malfunction ☞ **page K-29**
④ Engine rpm signal malfunction ☞ **page K-35**

37U0KX-307

57	TRANSMISSION NOISE D, S, L, R RANGES
DESCRIPTION	• Abnormal noise from transmission in D, S, L, R

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low ☞ **page K-25**
② Torque converter malfunction ☞ **page K-57**

37U0KX-308

58	TRANSMISSION OVERHEATS
DESCRIPTION	• ATF smells burnt and/or is discolored

[TROUBLESHOOTING HINTS]

Inspect parts and wiring; repair, adjust, or replace malfunctioning parts as necessary

① ATF level low ☞ **page K-25**
② Line pressure low ☞ **page K-14**
③ Powertrain burned
④ Solenoid valve (line pressure) stuck ☞ **page K-246**
⑤ Dropping resistor malfunction ☞ **page K-33**
⑥ Throttle sensor malfunction or misadjusted ☞ **Section F**
⑦ Solenoid valve (lockup) worn ☞ **page K-32**
⑧ Solenoid valve (lockup control) worn ☞ **page K-32**
⑨ Oil cooler circuit malfunction ☞ **page K-154**

37U0KX-309

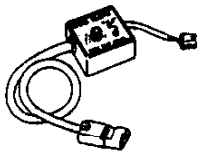
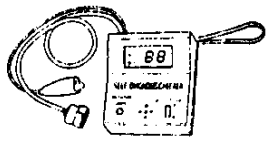
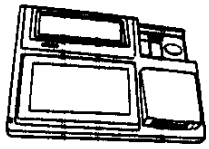
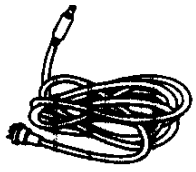
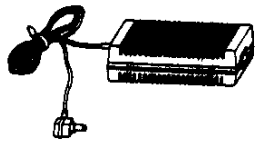
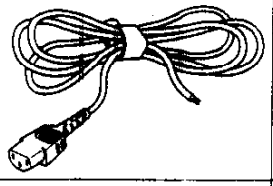
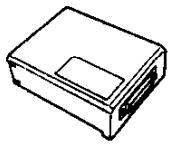
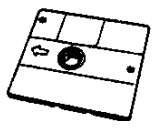
SELF-DIAGNOSIS FUNCTION

DESCRIPTION

The self-diagnosis system integrated in the EC-AT control unit diagnoses malfunction of the main sensors (input) and solenoid valves (output) and the EC-AT control unit itself.
Malfunctions or intermittent malfunctions are memorized in the EC-AT control unit to later be output as service codes.
The **Self-Diagnosis Checker** or **DT-S1000** can be used to retrieve these service codes. The **Self-Diagnosis Checker** indicates a malfunction by display a code number and sounding a buzzer. The **DT-S1000** displays a code number and shows the cause of malfunction.
When the TAT and GND terminals of the diagnosis connector are jumped with the ignition switch ON, the EC-AT control unit outputs any memorized service codes by flashing the hold indicator.

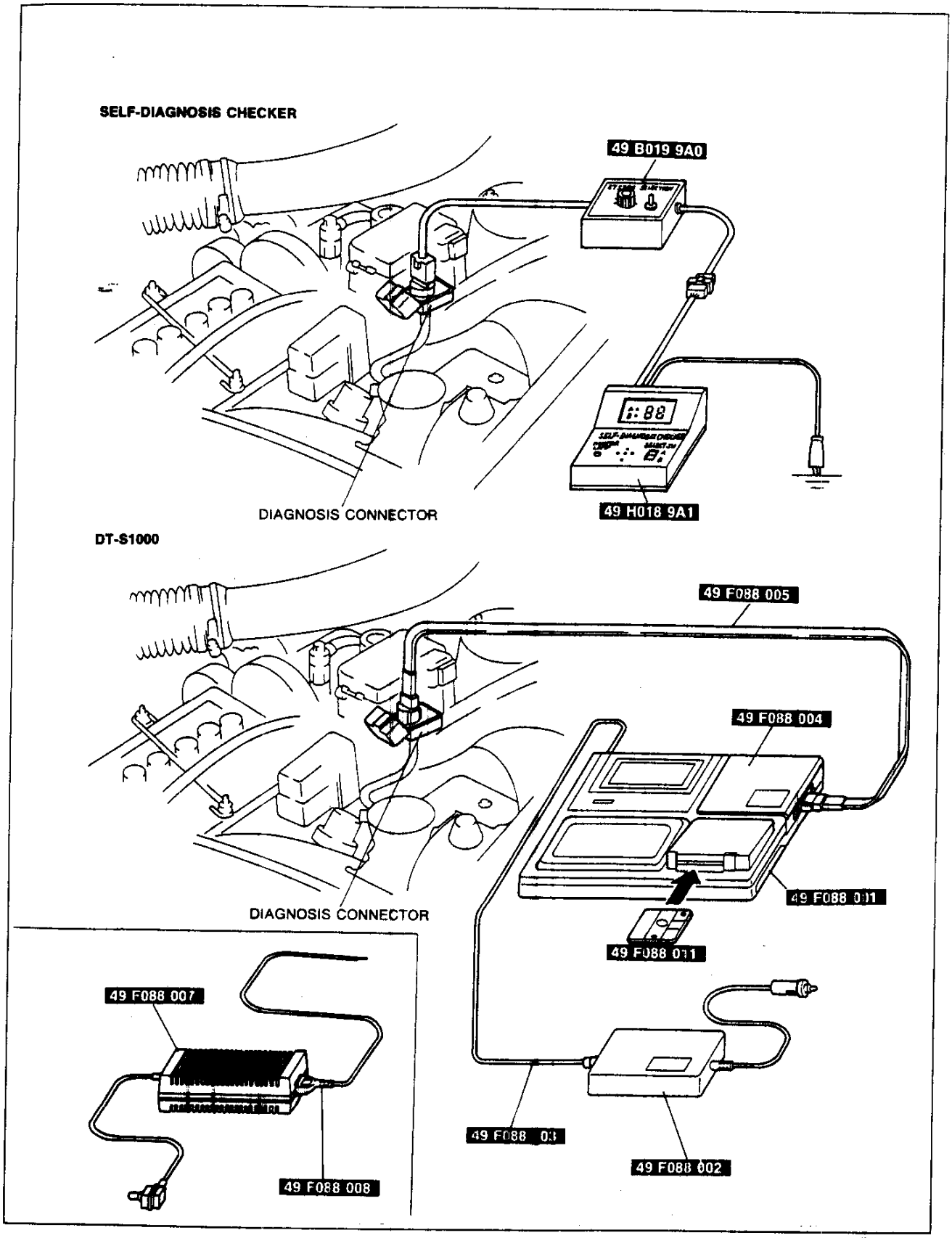
37U0KX-310

PREPARATION
SST

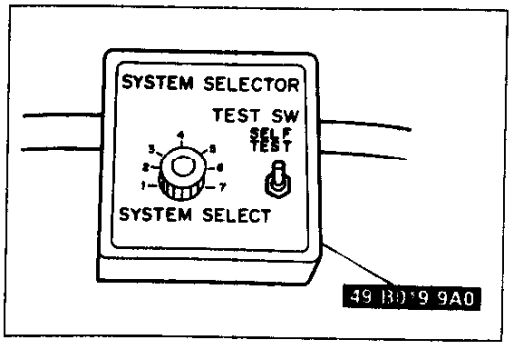
49 B019 9A0 System Selector		For diagnosis of EC-AT	49 H018 9A1 Self-Diagnosis Checker		For diagnosis of EC-AT
49 F088 001 DT-S1000 Base Unit		For diagnosis of EC-AT	49 F088 002 Power Unit DC-12V		For diagnosis of EC-AT
49 F088 003 Harness Power Unit DC		For diagnosis of EC-AT	49 F088 007 Power Unit AC		For diagnosis of EC-AT
49 F088 008 Harness Power Unit AC		For diagnosis of EC-AT	49 F088 004 IF-Adapter Type-I		For diagnosis of EC-AT
49 F088 005 Harness Type-I		For diagnosis of EC-AT	49 F088 011 System Disk Type-I (V 1.00)		For diagnosis of EC-AT

37U0KX-311

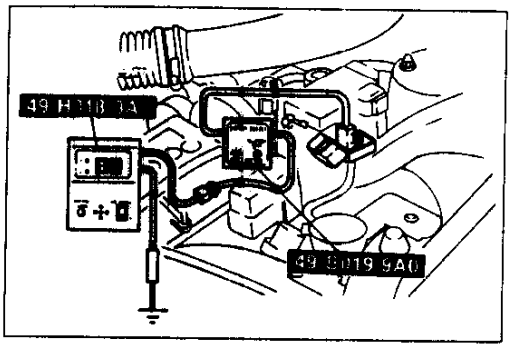
Assembly of SST

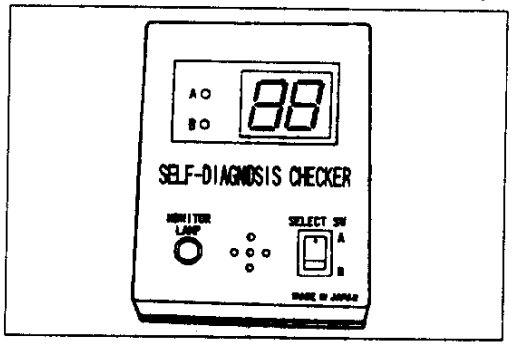


37U0KX-312

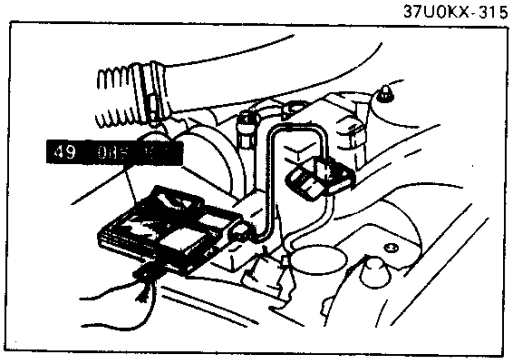


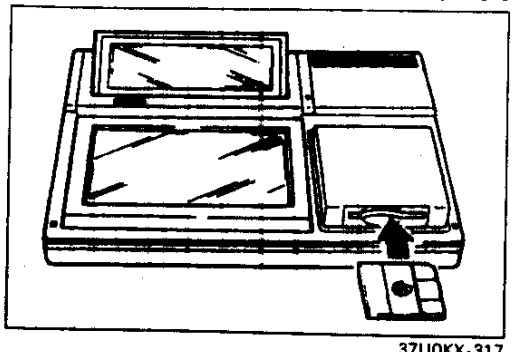
37U0KX-313


37U0KX-314



37U0KX-315


37U0KX-316


37U0KX-317

SERVICE CODE NUMBER

Inspection Procedure

Self-Diagnosis Checker

1. Connect the **SST (System Selector)** to the diagnosis connector.
2. Set the SYSTEM SELECT switch A to position 2.
3. Set the TEST SW to SELF TEST position.
4. Connect the **SST (Self-Diagnosis Checker)** to the **SST (System Selector)** and a ground.
5. Set the SELECT SW to position A.
6. Turn the ignition switch ON.
7. Verify that **"88"** flashes on the digital display and that the buzzer sounds for 3 seconds.
8. If **"88"** does not flash, check the main relay and 1N and/or 1P terminals of the EC-AT control unit for an open or short circuit.
9. If **"88"** flashes and the buzzer sounds continuously for more than 20 seconds, check the wiring to terminal 2N of the EC-AT control unit for an open or short circuit. If necessary, replace the EC-AT control unit and repeat from step 2.
10. Note any code number(s) and check for the cause(s). Repair as necessary.

Note

- **After repairs are made, recheck for code number(s) by performing the "After-Repair Procedure". (Refer to page K–234.)**

DT-S1000

1. Connect the **SST (DT-S1000)** to the diagnosis connector. (Refer to page K–215.)
2. Turn the ignition switch ON.
3. Check the service code and its cause on the DT-S1000 display.

Note

- **If the DT-S1000 displays "No service codes", the problem will be in a system or area not covered by the self-diagnosis function.**
- **If the DT-S1000 displays "System error", verify the DT-S1000 connecting and check for the cause(s) referring to the DT-S1000 instruction manual.**

4. Note any code number(s) and check for the cause(s). Repair as necessary.

Note

- **After repairs are made, recheck for code number(s) by performing the "After-Repair Procedure". (Refer to page K–234.)**

Service code number

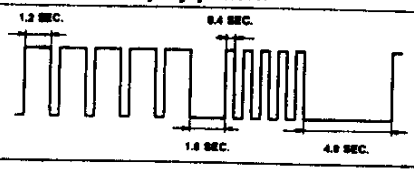
Code No.	Indicator flashing pattern	Diagnosed circuit	Condition	Point	Memorized	Page
01		Engine rpm signal	No input signal from ECU	• Wiring from engine control unit to EC-AT control unit • Engine control unit	Yes	K-219
06		Speed sensor 1 (Revolution sensor)	No input signal from speed sensor 1 (Revolution sensor)	• Speed sensor 1 connector • Wiring from speed sensor 1 to EC-AT control unit • Speed sensor 2 resistance	Yes	K-220
07		Speed sensor 2 (Speedometer sensor)	No input signal from speed sensor 2 (Speedometer sensor)	• Speed sensor 2 connector • Wiring from speed sensor 2 to combination meter • Wiring from combination meter to EC-AT control unit • Speedometer resistance	Yes	K-221
12		Throttle sensor	Open or short circuit of throttle sensor or wiring	• Throttle sensor connector • Wiring from throttle sensor to EC-AT control unit • Throttle sensor resistance	Yes	K-222
55		Pulse generator	No input signal from pulse generator	• Pulse generator connector • Wiring from pulse generator to EC-AT control unit • Pulse generator resistance	Yes	K-223
56		ATF thermosensor	Open or short circuit of ATF thermosensor or wiring	• ATF thermosensor connector • Wiring from ATF thermosensor to EC-AT control unit • ATF thermosensor resistance	Yes	K-224
57		Reduce torque signal/Slip lockup signal, torque reduced signal	Open or short circuit of reduce torque signal/slip lockup signal wiring, and/or torque reduced signal wiring	• Wiring from engine control unit to EC-AT control unit • EC-AT control unit • Engine control unit	Yes	K-225
58		Atmospheric pressure sensor	Open or short circuit of atmospheric pressure sensor wiring	• Wiring from engine control unit to EC-AT control unit • Engine control unit	Yes	K-226
60		Solenoid valve (shift A)	Open or short circuit of solenoid valve wiring	• Solenoid valve connector • Wiring from solenoid valve to EC-AT control unit • Solenoid valve resistance • Wiring from dropping resistor to EC-AT control unit (Only No.64) • Dropping resistor resistance (Only No.64)	Yes	K-227
61		Solenoid valve (shift B)			Yes	K-228
62		Solenoid valve (overrunning clutch)			Yes	K-229
63		Solenoid valve (loukup)			Yes	K-230
64		Solenoid valve (line pressure)			Yes	K-231
65		Solenoid valve (lockup control)			Yes	K-233

37U0KX-318

Caution

- **If there is more than one malfunction, the code number will be indicated in memorical order, lowereat number.**

Service code number display pattern example

Service code number	Display pattern
55	

37U0KX-319

SERVICE CODE NO.01 ENGINE RPM SIGNAL

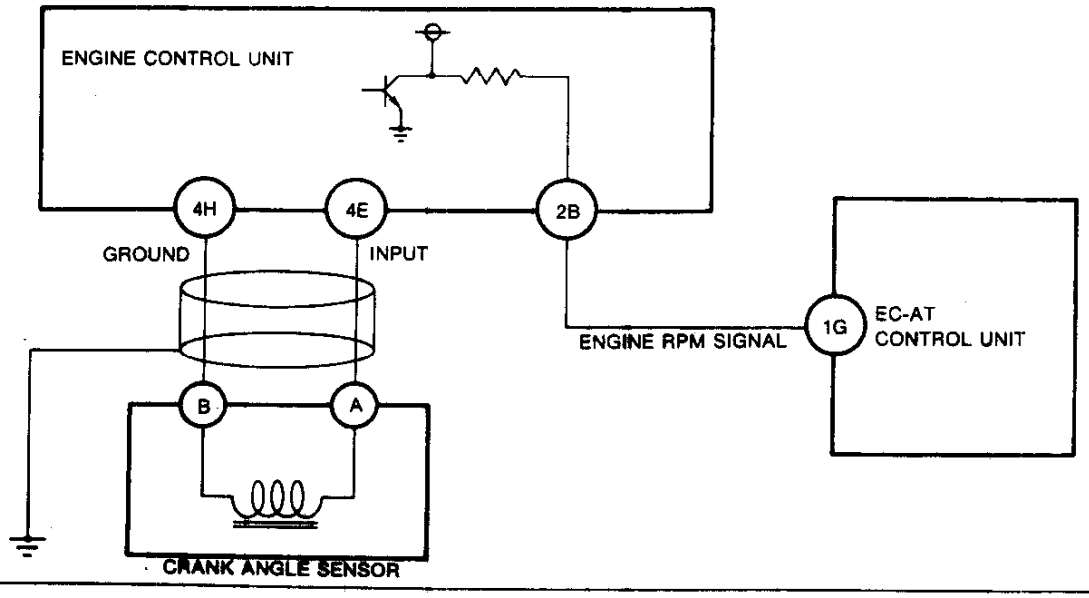
STEP	INSPECTION		ACTION
1	Are there any poor connections at distributor, engine control unit and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is input voltage of engine rpm signal at EC-AT control unit OK? ☞ page K-35	Yes	Go to Step 5
		No	Go to next step
3	Disconnect 16-pin EC-AT control unit connector Is there continuity between 1G terminal of EC-AT control unit and 2B terminal of engine control unit	Yes	Go to next step
		No	Repair wiring
4	Connect a circuit tester to terminals as shown Is input voltage of engine rpm signal at engine control unit OK? ☞ Section F	Yes	Go to next step
		No	Check crank angle sensor and/or wiring ☞ Section F If OK, replace engine control unit If not OK, repair or replace malfunction parts and/or wiring
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed. Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Voltage (V)	Condition
1G ☞	Ground	0	Engine stopped
		0.3–0.8	Engine idling
		1.8–2.2	Engine running at 3,000 rpm (no load)

(+) term.	(–) term.	Voltage (V)	Condition
2B	Ground	0	Engine stopped
		0.3–0.8	Engine idling
		1.8–2.2	Engine running at 3,000 rpm (no load)

37U0KX-320

CIRCUIT DIAGRAM



SERVICE CODE NO.06 SPEED SENSOR 1 (REVOLUTION SENSOR)

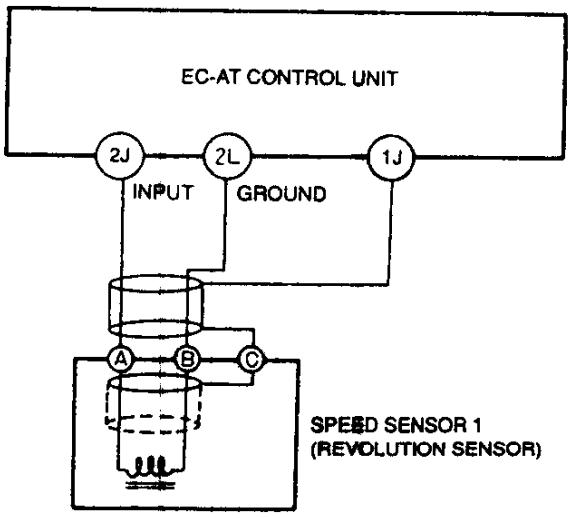
STEP	INSPECTION		ACTION
1	Are there any poor connections at speed sensor 1 and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is input voltage of speed sensor 1 at EC-AT control unit OK? ☞ page K-35	Yes	Go to Step 5
		No	Go to next step
3	Disconnect 20-pin EC-AT control unit connector Is resistance between 2J terminal and 2L terminal OK? **Resistance: 500–1,000 Ω**	Yes	Go to Step 5
		No	Go to next step
4	Disconnect speed sensor 1 connector Is resistance of sensor OK? ☞ page K-29	Yes	Check wiring and connectors from EC-AT control unit to speed sensor 1 If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace speed sensor 1 ☞ page K-29
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Voltage (V)	Condition
2J	2L	Approx. above 1.0 (AC range)	While driving (above 25km/h {16MPH})
		Approx. 0 (AC range)	Vehicle stopped

Terminal	Resistance (Ω)
A ↔ B	500–1,000
B ↔ C	∞
A ↔ C	∞

37U0KX-321

CIRCUIT DIAGRAM



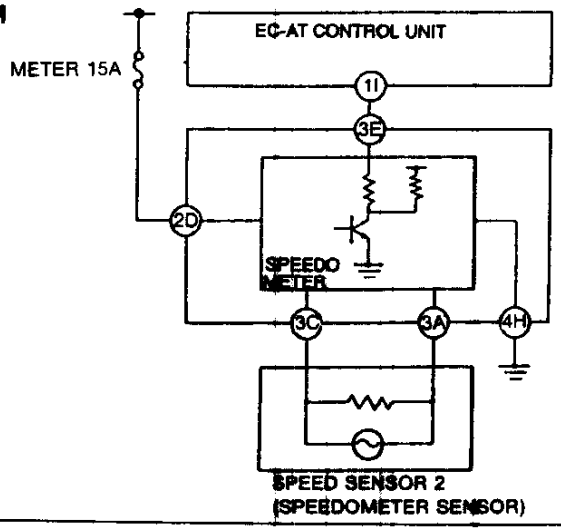
SERVICE CODE NO.07 SPEED SENSOR 2 (SPEEDOMETER SENSOR)

STEP	INSPECTION		ACTION
1	Are there any poor connections at speed sensor 2 and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is input voltage of speed sensor 2 at EC-AT control unit OK? ☞ page K-35	Yes	Go to Step 8
		No	Go to next step
3	Remove combination meter Is there continuity between 3E terminal of meter connector and 1I terminal of EC-AT control unit?	Yes	Go to next step
		No	Repair or replace wiring and/or connector
4	Connect circuit tester to 3C and 3A terminals of meter connector Does pointer of circuit tester move slightly when rear wheels are slowly turned? ☞ page K-29	Yes	Replace speedometer
		No	Go to next step
5	Remove speed sensor 2 Is resistance felt when turning speedometerdriven gear by hand? ☞ page K-30	Yes	Go to next step
		No	Replace speed sensor 2 ☞ page K-30
6	Disconnect speed sensor 2 connector and connect circuit tester Does pointer of circuit tester move slightly when driven gear is slowly turned? ☞ page K-30	Yes	Go to next step
		No	Replace speed sensor 2 ☞ page K-30
7	Disconnect speed sensor 2 connector Is continuity of sensor OK? ☞ page K-30 **Resistance: Approx. 290 Ω (20°C [68°F]); reference**	Yes	Check wiring and connectors from speed sensor 2 to speedometor If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace speed sensor 2 ☞ page K-30
8	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Voltage (V)	Condition
1I	Ground	2–3	Vehicle moving
		0 or 4.5–5.5	Vehicle stopped

37U0KX-322

CIRCUIT DIAGRAM

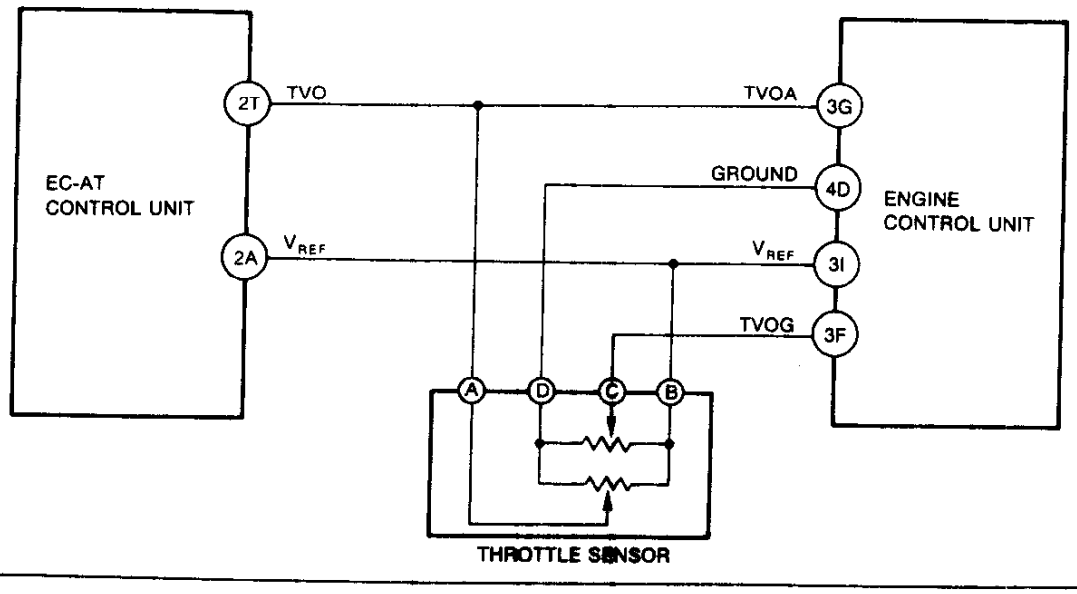


SERVICE CODE NO.12 THROTTLE SENSOR

STEP	INSPECTION		ACTION
1	Are there any poor connections at throttle sensor and EC-AT control unit connector or terminal?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is input voltage of throttle sensor (TVO) at EC-AT control unit OK? ☞ page K-35 (+) term. 2T; (–) term. Ground; Voltage (V): 0.1–1.1, Condition: Throttle valve fully closed (+) term. 2T; (–) term. Ground; Voltage (V): 4.0–4.5, Condition: Throttle valve fully opened	Yes	Go to step 5
		No	Go to next step
3	Connect a circuit tester to terminals as shown Is input voltage of throttle sensor (VREF) at EC-AT control unit OK? ☞ page K-35 (+) term. 2A; (–) term. Ground; Voltage (V): 4.5–5.5, Condition: Ignition switch ON (+) term. 2A; (–) term. Ground; Voltage (V): 0, Condition: Ignition switch OFF	Yes	Go to next step
		No	Check voltage at 3I terminal of engine control unit **Voltage: 4.5–5.5V (ignition switch ON)** If OK, go to next step If not OK, repair wiring and/or connector, or replace engine control unit
4	Is throttle sensor OK? ☞ Section F	Yes	Check wiring and connectors from EC-AT control unit to throttle sensor If OK, go to next step If not OK, repair wiring and/or connector
		No	Adjust or replace throttle sensor ☞ Section F
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

37U0KX-323

CIRCUIT DIAGRAM



SERVICE CODE NO.55 PULSE GENERATOR

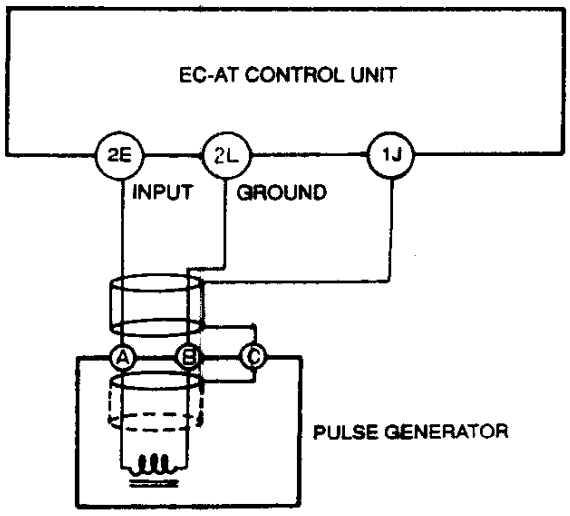
STEP	INSPECTION		ACTION
1	Are there any poor connections at pulse generator and EC-AT control unit connector or terminal?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is input voltage of pulse generator at EC-AT control unit OK? ☞ page K-35	Yes	Go to Step 5
		No	Go to next step
3	Disconnect 20-pin EC-AT control unit connector Is resistance between 2E terminal and 2L terminal OK? **Resistance: 2.2–3.5 kΩ**	Yes	Go to next step
		No	Go to next step
4	Disconnect pulse generator connector Is resistance of pulse generator OK? ☞ page K-30	Yes	Check wiring and connectors from EC-AT control unit to pulse generator If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace pulse generator ☞ page K-31
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Voltage (V)	Condition
2E	2L	Approx. 0 above 0.5 (AC range)	While driving (above 25km/h {16mph})
		Approx. 0 (AC range)	Vehicle stopped

Terminal	Resistance (KΩ)
A ↔ B	2.2–3.5
B ↔ C	∞
A ↔ C	∞

37U0KX-324

CIRCUIT DIAGRAM



SERVICE CODE NO.56 ATF THERMOSENSOR

STEP	INSPECTION		ACTION
1	Are there any poor connections at ATF thermosensor and EC-AT control unit connector or terminal?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is input voltage of ATF thermosensor at EC-AT control unit OK? ☞ page K-35	Yes	Go to Step 5
		No	Go to next step
3	Disconnect 20-pin EC-AT control unit connector Is resistance between 2R terminal and 2L terminal OK?	Yes	Go to Step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between G terminal and H terminal of ATF thermosensor OK? ☞ page K-32	Yes	Check wiring and connectors from EC-AT control unit to ATF thermosensor If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace ATF thermosensor ☞ page K-31
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

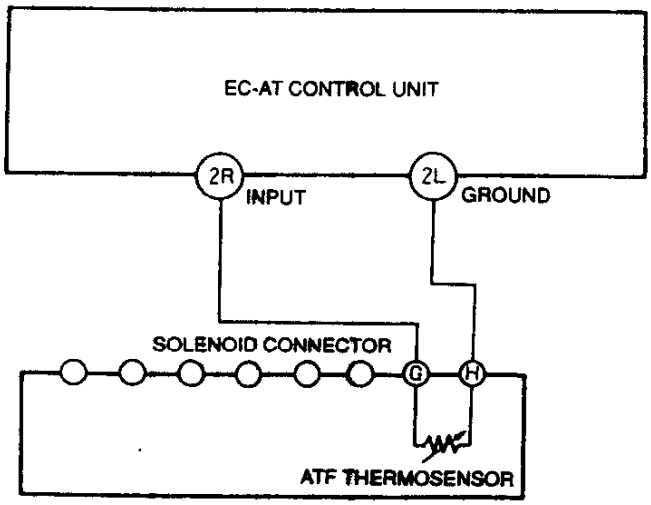
(+) term.	(–) term.	Voltage (V)	Condition
2R	2L	Approx. 1.8	ATF temp. 10°C {50°F}
		Approx. 1.1	ATF temp. 40°C {104°F}
		Approx. 0.4	ATF temp. 80°C {176°F}

Terminal	Resistance (kΩ)
2R ↔ 2L	Approx. 3.8 ATF temp. 10°C {50°F}
	Approx. 1.2 ATF temp. 40°C {104°F}
	Approx. 0.3 ATF temp. 80°C {176°F}

Terminal	Resistance (kΩ)
G ↔ H	Approx. 3.8 ATF temp. 10°C {50°F}
	Approx. 1.2 ATF temp. 40°C {104°F}
	Approx. 0.3 ATF temp. 80°C {176°F}

37U0KX-325

CIRCUIT DIAGRAM



SERVICE CODE NO.57 REDUCE TORQUE SIGNAL / SLIP LOCKUP SIGNAL, TORQUE REDUCED SIGNAL

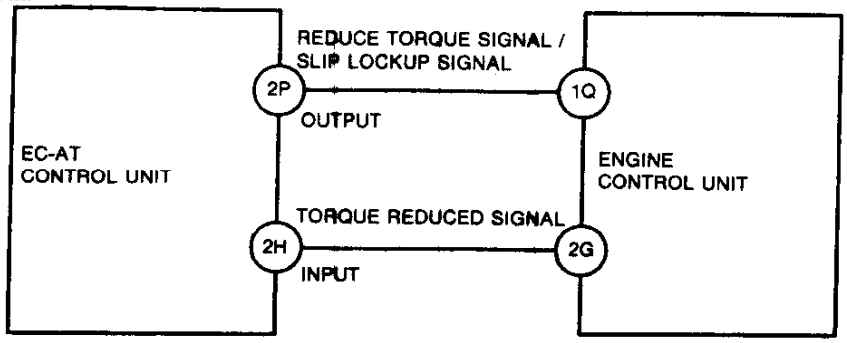
STEP	INSPECTION		ACTION
1	Are there any poor connections at engine control unit and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is input voltage of torque reduced signal at EC-AT control unit OK? ☞ page K-35 V_B: Battery voltage	Yes	Go to Step 4
		No	Go to next step
3	Disconnect 20-pin EC-AT control unit connector Is there continuity between 2H terminal of EC-AT control unit and 2G terminal of engine control unit?	Yes	Go to next step
		No	Repair wiring
4	Connect a circuit tester to terminals as shown Is output voltage of reduce torque signal at EC-AT control unit OK? ☞ page K-35 V_B: Battery voltage	Yes	Go to Step 6
		No	Go to next step
5	Disconnect 20-pin EC-AT control unit connector Is there continuity between 2P terminal of EC-AT control unit and 1Q terminal of engine control unit?	Yes	Go to next step
		No	Repair wiring
6	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit or engine control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(-) term.	Voltage (V)	Condition
2H	Ground	V_B	Engine idling
		Below 1.0	Throttle opening above 1/8 (Engine coolant temp. below 40°C (104°F))

(+) term.	(-) term.	Voltage (V)	Condition
2P	Ground	Below 1.0	When shifting from 1st to 2nd or from 2nd to 3rd with the throttle opening above 1.5/8 When slip lockup with the throttle opening below 0.5/8
		V_B	Engine idling

37U0KX-326

CIRCUIT DIAGRAM



SERVICE CODE NO.58 ATMOSPHERIC PRESSURE SENSOR

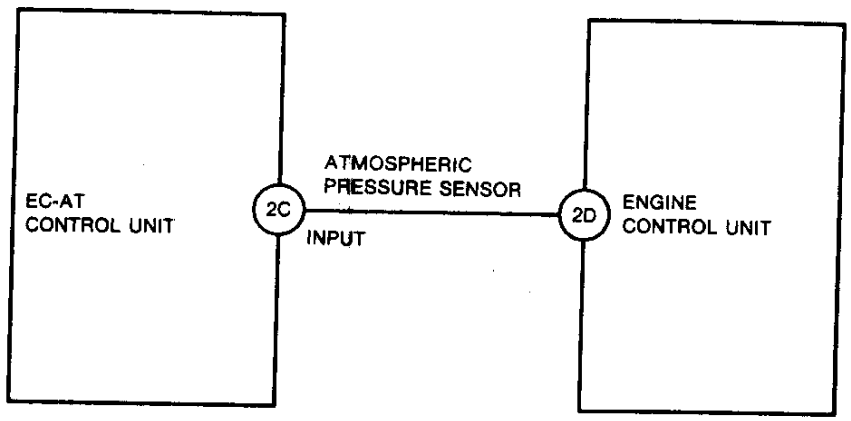
STEP	INSPECTION		ACTION
1	Are there any poor connections at engine control unit and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is input voltage of atmospheric pressure sensor at EC-AT control unit OK? ☞ page K-35	Yes	Go to Step 5
		No	Go to next step
3	Disconnect 20-pin EC-AT control unit connector Is there continuity between 2C terminal of EC-AT control unit and 2D terminal of engine control unit?	Yes	Go to next step
		No	Repair wiring
4	Connect a circuit tester to terminals as shown Is output voltage of atmospheric pressure sensor at engine control unit OK? ☞ Section F	Yes	Go to next step
		No	Replace engine control unit ☞ Section F
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Voltage (V)	Condition
2C	Ground	2.0–4.5V	Ignition switch ON
		0V	Ignition switch OFF

(+) term.	(–) term.	Voltage (V)	Condition
2D	Ground	2.0–4.5V	Ignition switch ON
		0V	Ignition switch OFF

37U0KX-327

CIRCUIT DIAGRAM



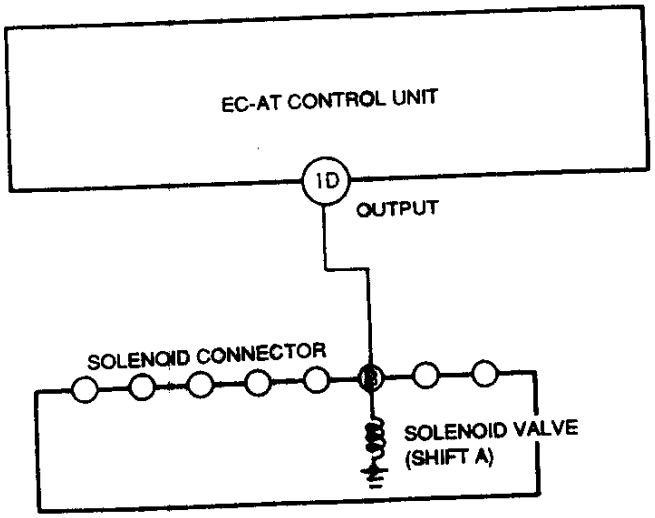
SERVICE CODE NO.60 SOLENOID VALVE (SHIFT A)

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is output voltage of solenoid valve (shift A) at EC-AT control unit OK? ☞ page K-35 V_B: Battery voltage	Yes	Check wiring and go to Step 5
		No	Go to next step
3	Disconnect 16-pin EC-AT control unit connector Is resistance between 1D terminal and a ground **Resistance: 20–40 Ω**	Yes	Go to Step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between ground and terminal B of solenoid valve (shift A) OK? ☞ page K-32 **Resistance: 20–40 Ω**	Yes	Check wiring and connectors from EC-AT control unit to solenoid valve (shift A) If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace solenoid valve (shift A) ☞ page K-33
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Voltage (V)	Condition
1D	Ground	V_B	1st, O/D gear
		Below 1.0	2nd, 3rd gear

37U0KX-328

CIRCUIT DIAGRAM

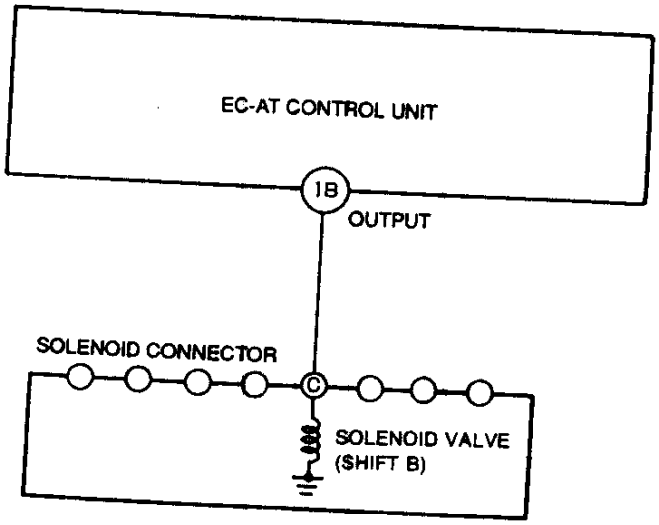


SERVICE CODE NO.61 SOLENOID VALVE (SHIFT B)

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is output voltage of solenoid valve (shift B) at EC-AT control unit OK? ☞ page K-35 V_B: Battery voltage (+) term. 1B; (–) term. Ground; Voltage (V): V_B; Condition: 1st, 2nd gear (+) term. 1B; (–) term. Ground; Voltage (V): Below 1.0; Condition: 3rd, O/D gear	Yes	Check wiring and go to Step 5
		No	Go to next step
3	Disconnect 16-pin EC-AT control unit connector Is resistance between 1B terminal and a ground OK? **Resistance: 20–40 Ω**	Yes	Go to Step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between ground and terminal C of solenoid valve (shift B) OK? **Resistance: 20–40 Ω** ☞ page K-32	Yes	Check wiring and connectors from EC-AT control unit to solenoid valve (shift B) If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace solenoid valve (shift B) ☞ page K-33
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

CIRCUIT DIAGRAM

37U0KX-329



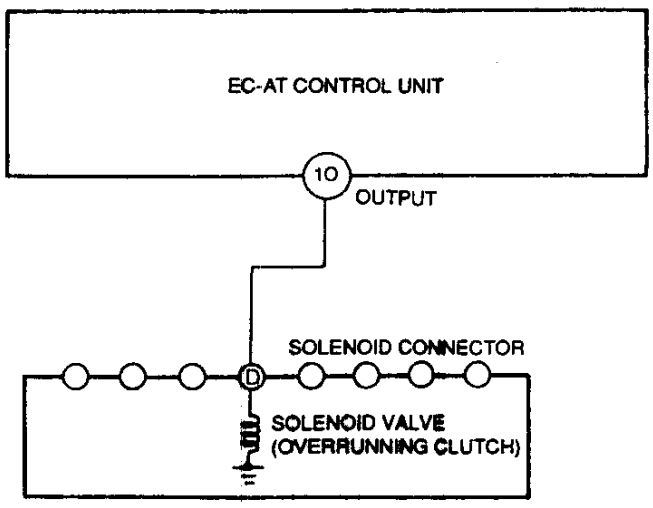
SERVICE CODE NO.62 SOLENOID VALVE (OVERRUNNING CLUTCH)

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is output voltage of solenoid valve (overrunning clutch) at EC-AT control unit OK? ☞ page K-35 V_B: Battery voltage	Yes	Check wiring and go to Step 5
		No	Go to next step
3	Disconnect 16-pin EC-AT control unit connector Is resistance between 10 terminal and a ground OK? **Resistance: 20–40 Ω**	Yes	Go to Step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between ground and terminal D of solenoid valve (overrunning clutch) OK? ☞ page K-32 **Resistance: 20–40 Ω**	Yes	Check wiring and connectors from EC-AT control unit to solenoid valve (overrunning clutch) If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace solenoid valve (overrunning clutch) ☞ page K-33
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Voltage (V)	Condition
10	Ground	V_B	D range (throttle valve closed)
		Below 1.0	D range (throttle valve fully opened)

37U0KX-330

CIRCUIT DIAGRAM



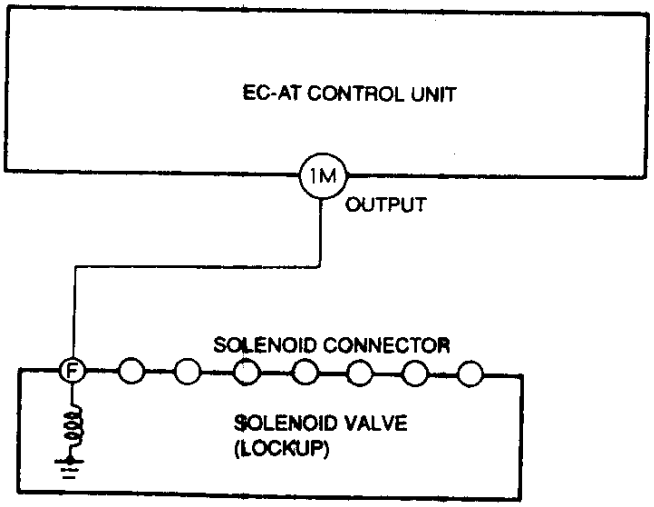
SERVICE CODE NO.63 SOLENOID VALVE (LOCKUP)

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Disconnect 16-pin EC-AT control unit connector Is resistance between 1M terminal and a ground OK? **Resistance: 10–20 Ω**	Yes	Go to Step 4
		No	Go to next step
3	Disconnect solenoid connector Is resistance between ground and terminal F of solenoid valve (lockup) OK? ☞ **page K–32** **Resistance: 10–20 Ω**	Yes	Check wiring and connectors from EC-AT control unit to solenoid valve (lockup) If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace solenoid valve (lockup) ☞ **page K–33**
4	Connect a dwell meter to terminals as shown Is output duty of solenoid valve (lockup) at EC-AT control unit OK? ☞ **page K–247**	Yes	Go to next step
		No	Replace EC-AT control unit ☞ **page K–41**
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ **page K–234**	Yes	Replace EC-AT control unit ☞ **page K–41**
		No	Intermittent poor connection Check for cause

(+) term.	(–) term.	Duty (ON %)	Condition
1M	Ground	Approx. 5	No lockup
		Approx. 100	Lockup

37U0KX-331

CIRCUIT DIAGRAM



SERVICE CODE NO.64 SOLENOID VALVE (LINE PRESSURE)

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Disconnect 16-pin EC-AT control unit connector Is resistance between 1F terminal (solenoid valve (line pressure)) and a ground OK? **Resistance: 2.5–5.0 Ω**	Yes	Go to next step
		No	Go to Step 4
3	Disconnect 16-pin EC-AT control unit connector Is resistance between 1H terminal (dropping resitor) and a ground OK? **Resistance: 12.5–19.0 Ω**	Yes	Go to Step 5
		No	Go to Step 7
4	Disconnect solenoid connector Is resistance between ground and terminal E of solenoid valve (line pressure) OK? ☞ **page K–32** **Resistance: 2.5–5.0 Ω**	Yes	Check wiring and connectors from EC-AT control unit to solenoid valve (line pressure) If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace solenoid valve (line pressure) ☞ **page K–33**
5	Connect a dwell meter to terminals as shown Is output duty of dropping resistor at EC-AT control unit OK? ☞ **page K–246**	Yes	Go to next step
		No	Replace EC-AT control unit, perform road test, and go to Step 8 ☞ **page K–41, 16**

(+) term.	(–) term.	Duty (ON %)	Condition
1H	Ground	Approx. 100	Throttle valve fully closed
		Approx. 5	Throttle valve fully opened

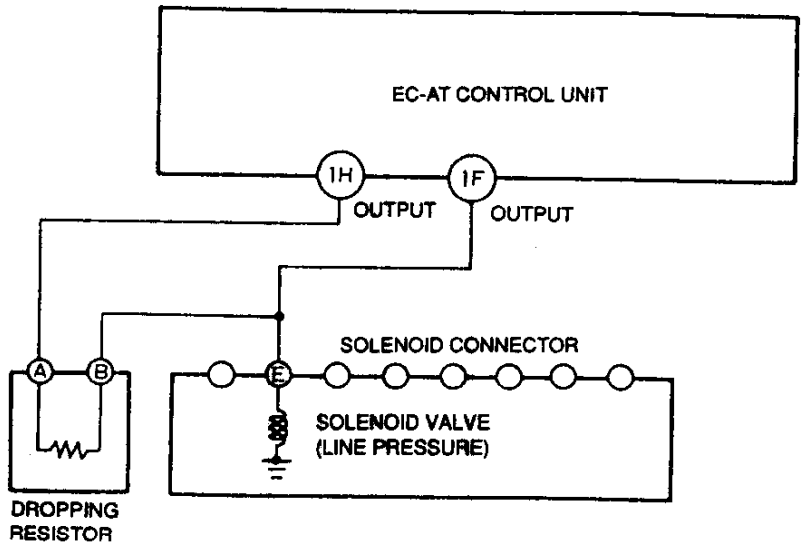
6	Connect a dwell meter to terminals as shown Is output duty of solenoid valve (line pressure) at EC-AT control unit OK? ☞ **page K–246**	Yes	Go to next step
		No	Replace EC-AT control unit, perform road test, and go to Step 8 ☞ **page K–41, 16**

(+) term.	(–) term.	Duty (ON %)	Condition
1F	Ground	Approx. 100	Throttle valve fully closed
		Approx. 5	Throttle valve fully opened

7	Disconnect dropping resistor connector Is resistance of resistor OK? ☞ **page K–33** **Resistance: 10–14 Ω**	Yes	Check wiring and connectors from EC-AT control unit to dropping resistor If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace dropping resistor ☞ **page K–33**
8	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ **page K–234**	Yes	Replace EC-AT control unit ☞ **page K–41**
		No	Intermittent poor connection Check for cause

37U0KX-332

CIRCUIT DIAGRAM

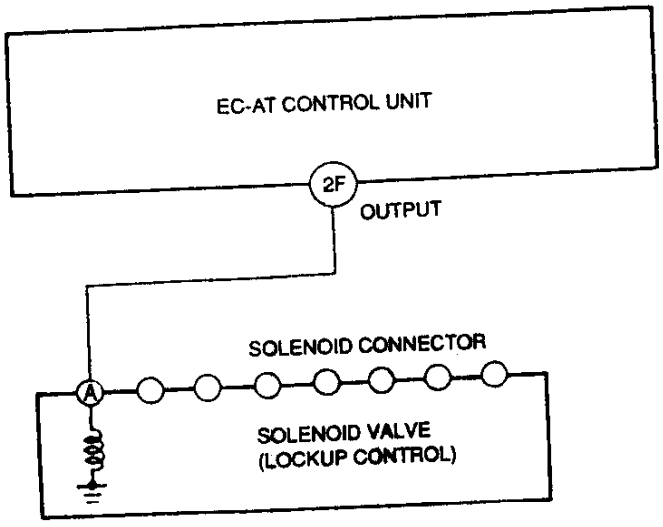


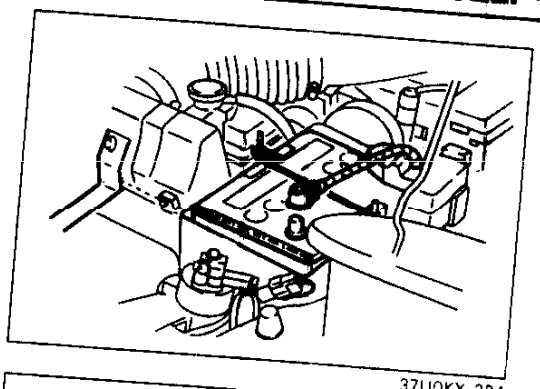
SERVICE CODE NO.65 SOLENOID VALVE (LOCKUP CONTROL)

STEP	INSPECTION		ACTION
1	Are there any poor connections at solenoid valve and EC-AT control unit connectors?	Yes	Go to next step
		No	Repair or replace connector
2	Connect a circuit tester to terminals as shown Is output voltage of solenoid valve (lockup control) at EC-AT control unit OK? ☞ page K-35 V_B: Battery voltage (+) term. 2F; (–) term. Ground; Voltage (V): V_B / Below 1.0; Condition: Lockup / No lockup	Yes	Check wiring and go to Step 5
		No	Go to next step
3	Disconnect 20-pin EC-AT control unit connector Is resistance between 2F terminal and a ground OK? **Resistance: 20–40 Ω**	Yes	Go to Step 5
		No	Go to next step
4	Disconnect solenoid connector Is resistance between ground and terminal A of solenoid valve (lockup control) OK? ☞ page K-32 **Resistance: 20–40 Ω**	Yes	Check wiring and connectors from EC-AT control unit to lockup control solenoid If OK, go to next step If not OK, repair wiring and/or connector
		No	Replace solenoid valve (lockup control) ☞ page K-33
5	Disconnect negative battery cable for at least 20 seconds and the brake pedal is depressed Connect battery cable and recheck for service code Is service code displayed? ☞ page K-234	Yes	Replace EC-AT control unit ☞ page K-41
		No	Intermittent poor connection Check for cause

37U0KX-333

CIRCUIT DIAGRAM

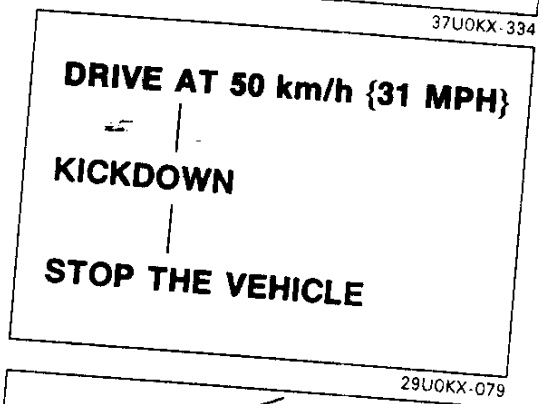




37U0KX-334

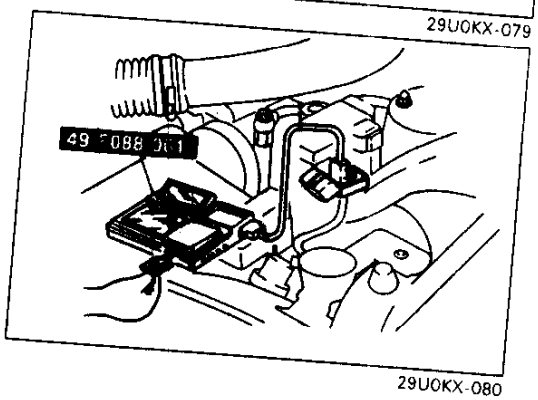
After-Repair Procedure

1. Cancel the memory of service codes by disconnecting the negative battery cable for at least **20 seconds** and the brake pedal is depressed.
   Reconnect the battery cable.
2. Remove the **SST (Self-Diagnosis Checker** or **DT-S1000)** if connected.



29U0KX-079

3. Drive the vehicle at 50 km/h {31 MPH}, and depress the accelerator pedal fully to activate kickdown. Stop the vehicle gradually.



29U0KX-080

4. Connect the **SST (Self-Diagnosis Checker** or **DT-S1000)** to the diagnosis connector.
5. Turn the ignition switch ON.
6. Verify that no code numbers are displayed.

SERVICE POINTS

OUTLINE

Hold Switch

- If the wiring of the hold switch is open or shorted, selection to/from hold mode is not possible.

Inhibitor Switch

- If a malfunction occurs in the wiring of the inhibitor switch, the EC-AT control unit 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 Sensor

- If the wiring of the throttle sensor is open or shorted, service code No.12 is displayed by the self-diagnosis function, and hold mode is canceled.
- If a malfunction occurs in the throttle sensor, the EC-AT control unit judges the throttle opening signals from the idle signal, and sets the line pressure as follows:

Idle signal	Throttle opening angle	Line pressure
OFF (throttle valve opened)	4/8 stroke	Maximum
ON (throttle valve fully closed)	0/8 stroke	Minimum

Idle Signal

- If the wiring is open, the EC-AT control unit does not correct the throttle characteristics. In this case, lockup is not canceled when cruising (throttle fully closed) and vehicle jolts when accelerator pedal is depressed or released.
- If the wiring is shorted, the line pressure will be low (does not match throttle characteristics) and the transmission may slip when shifting.

Speed Sensor 1 (Revolution Sensor)

- If there is no input signal from speed sensor 1, service code No.06 is displayed by the self-diagnosis function and hold mode is canceled.
- Shifting is made based on signals from speed sensor 2 (speedometer sensor).
- If a malfunction occurs in speed sensor 1 and speed sensor 2 at the same time, solenoid valve (shift A and B) go OFF and D and S ranges become in 3rd gear position, L range becomes in 2nd gear position, andlockup is inhibited.

Speed Sensor 2 (Speedometer Sensor)

- If there is no input signal from speed sensor 2, service code No.07 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in speed sensor 2, shifting is made normal based on signals from speed sensor 1 (revolution sensor).
- If a malfunction occurs in speed sensor 1 and speed sensor 2 at the same time, solenoid valve (shift A and B) go OFF and D and S ranges become in 3rd gear position, L range becomes in 2nd gear position, and lockup is inhibited.

Pulse Generator

- If no input signal from the pulse generator, service code No.55 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the pulse generator, the torque reduction control function is inhibited The gear position at shifting cannot be determined and timing control at shifting is made based on signals from speed sensor 1 (revolution sensor). Shift shock may be slightly strong.

Stoplight Switch

- If the wiring of the stoplight switch is open or shorted, EC-AT control is made normal.
- If the wiring is shorted to the battery power, there may be a shift from O/D to 3rd when the throttle valve is fully closed.

Torque Reduced Signal
- If the wiring is open or shorted, service code No.57 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the torque reduced signal, the torque reduction control function is inhibited and the line pressure characteristics will be high when shifting. Shift shock may be slightly strong.
- If a malfunction occurs in the reduce torque signal or slip lockup signal, service code No.57 is displayed by the self-diagnosis function.

Mileage Switch
- If the wiring is open, the line pressure characteristics will be slightly high. Shift shock may be slightly strong when shifting from 1st to 2nd or from 2nd to 3rd.
- If the wiring is shorted, the transmission may slip when shifting from 1st to 2nd or from 2nd to 3rd until the total mileage of the vehicle exceeds approximately 600 km {372 miles}.

Water-Thermoswitch
- If the wiring of the water thermoswitch is open or shorted, EC-AT control is made normal.
- If the wiring is shorted, the engine coolant temperature may increase.

A/C Signal
- If the wiring is open, normal mode, A/C ON is selected bacause an ON A/C signal is judged.
- If the wiring is shorted, normal mode, A/C OFF is selected bacause an OFF A/C signal is judged.

Slip Lockup OFF Signal
- If the wiring of the slip lockup OFF signal is open or shorted, EC-AT control is made normal.

Engine RPM Signal
- If there is no input signal from the engine rpm signal, service code No.01 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the engine rpm signal, lockup shock may be slightly strong.

ATF Thermosensor
- If the wiring is open, service code No.56 is memorized by the self-diagnosis function. Line pressure is set at maximum and O/D and lockup are inhibited.
- If the wiring is shorted, service code No.56 is memorized by the self-diagnosis function. Shift shock at low ATF temperature may be strong.

Atmospheric Pressure Sensor
- If the wiring is open or shorted, service code No.58 is displayed by the self-diagnosis function. Line pressure is not controlled correctly at high altitude and shift shock will be strong.

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

TAT Terminal (Diagnosis Connector)
- If the wiring is open, service code(s) are not displayed by the self-diagnosis function.
- If the wiring is shorted, service code(s) memorized in the EC-AT control unit are displayed by hold indicator.

Solenoid Valve (Shift A and B)
- If the wiring is open or shorted, service code No.60 for solenoid valve (shift A) or service code No.61 for solenoid valve (shift B) is displayed and hold mode is canceled.
- If either solenoid valve malfunctions, both solenoid valves go OFFand D and S ranges become in 3rd gear position, L range becomes in 2nd gear position, and lockup is inhibited.

Solenoid Valve (Line Pressure)
- If the wiring is open or shorted, service code No.64 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 the dropping resistor, service code No.64 is displayed by the self-diagnosis function.

Solenoid Valve (Lockup)
- If the wiring is open or shorted, service code No.63 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 (Lockup Control)
- If the wiring is open or shorted, service code No.65 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 (Overrunning Clutch)
- If the wiring is open or shorted, service code No.62 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the solenoid valve (overrunning clutch), the solenoid valve goes OFF and the overrunning clutch engages. Engine braking is available when coasting. There is no shift to O/D.

Dropping Resistor
- If the wiring is open or shorted, service code No.64 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the dropping resistor, the line pressure is set at maximum to make driving possible.
- If a malfunction occurs in the solenoid valve (line pressure), service code No.64 is displayed by the self-diagnosis function.

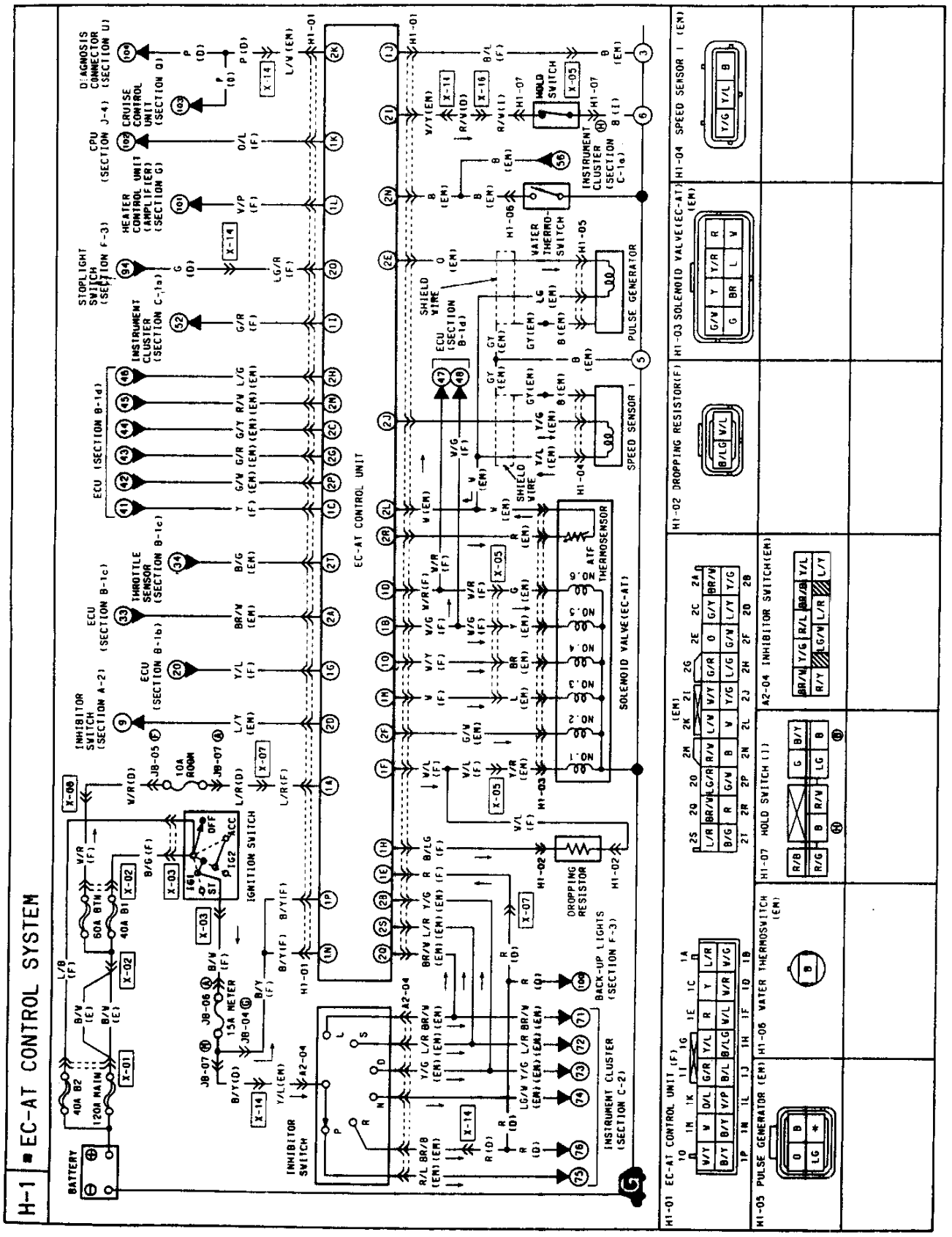
Reduce Torque Signal
- If the wiring is open or shorted, service code No.57 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the reduce torque signal, the torque reduction control function is inhibited and line pressure will be high at shifting. Shift shock may be slightly strong.
- If a malfunction occurs in the torque reduced signal or slip lockup signal, service code No.57 is displayed by the self-diagnosis function.

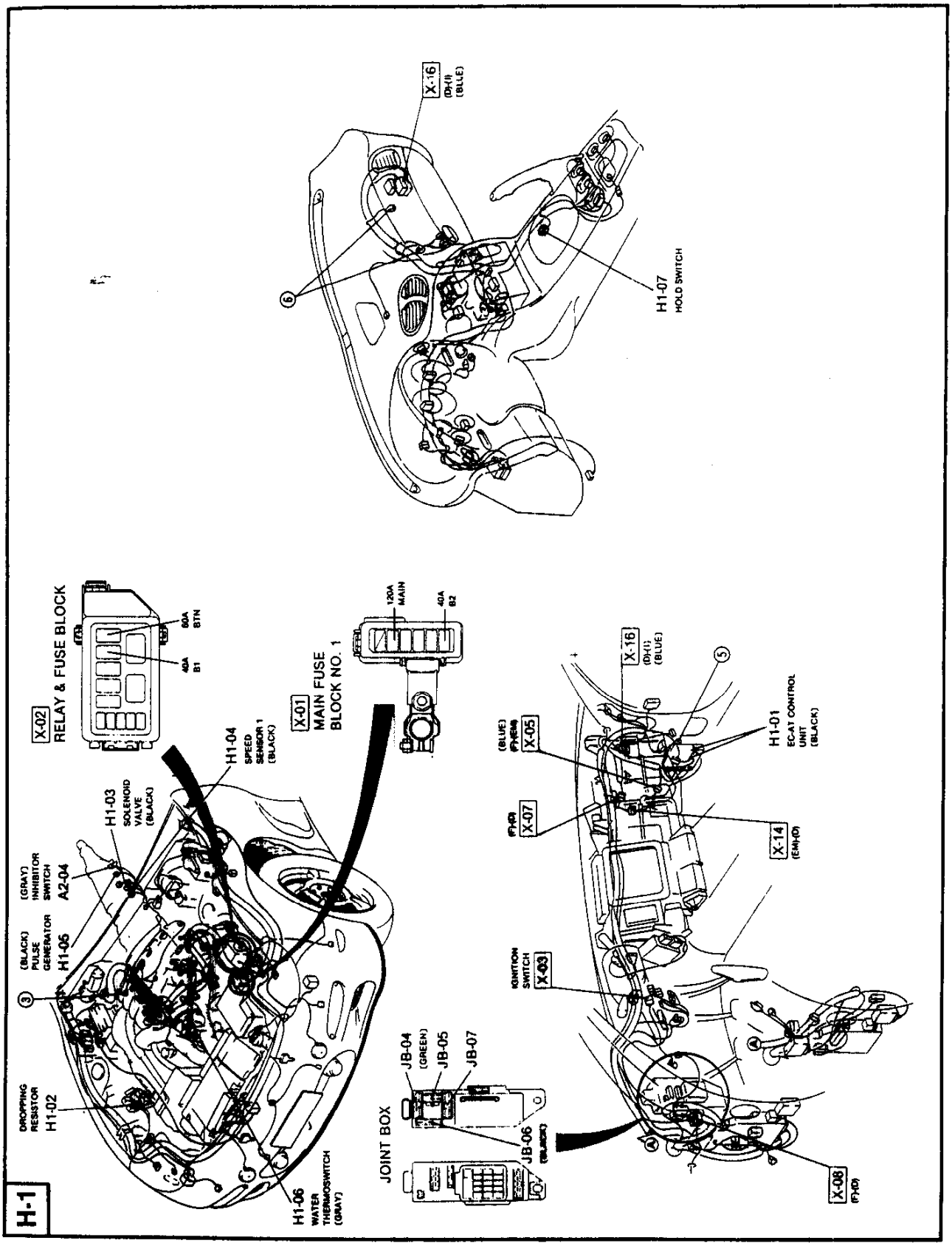
Slip Lockup Signal
- If the wiring is open or shorted, service code No.57 is displayed by the self-diagnosis function and hold mode is canceled.
- If a malfunction occurs in the slip lockup signal, the torque reduction control function is inhibited and line pressure will be high at shifting. Shift shock may be slightly strong.
- If a malfunction occurs in the torque reduced signal or reduce torque signal, service code No.57 is displayed by the self-diagnosis function.

Inhibitor Signal
- If the wiring is open, the engine speed will be slightly low in P and N ranges.
- If the wiring is shorted, the engine speed will be slightly high in R, D, S, and L ranges.

Hold Indicator Lamp
- If the wiring is open, the hold indicator lamp will not illuminate.
- If the wiring is shorted, the hold indicator lamp will remain illuminated.
- If the wiring between the FAT terminal and 2N terminal is open or shorted, service code(s) will not be displayed by the self-diagnosis function.

WIRING DIAGRAM




H-1
X-16 (D+I) (BLUE)
H1-07 HOLD SWITCH
X-02 RELAY & FUSE BLOCK
60A B1N
40A B1
X-01 MAIN FUSE BLOCK NO. 1
120A MAIN
40A B2
H1-04 SPEED SENSOR 1 (BLACK)
H1-03 SOLENOID VALVE (BLACK)
(GRAY) INHIBITOR SWITCH A2-04
(BLACK) PULSE GENERATOR H1-05
DROPPING RESISTOR H1-02
H1-06 WATER THERMOSWITCH (GRAY)
JOINT BOX
JB-04 (GREEN)
JB-05
JB-07
JB-06 (BLACK)
IGNITION SWITCH X-03
X-07
(BLUE) X-05
X-16 (D+I) (BLUE)
H1-01 EC-AT CONTROL UNIT (BLACK)
X-14
X-08

MEMO

ELECTRICAL DIAGNOSIS SUPPORT

Hold Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2I terminal — hold switch	Mode does not change when hold switch is not operated	Mode does not change when hold switch is operated	Shifting may be abnormal Mode may change when hold switch not operated
Hold switch-ground		No symptom	

Inhibitor Switch

Note

- **If fuse burns out while driving, EC-AT control unit judges current range.**
- **When ignition switch is turned from OFF to ON after fuse burns out, EC-AT control unit judges N range. EC-AT control unit inhibits lockup at this time.**

R Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1E terminal — R range switch	No symptom	METER 15A fuse burns out when R range is selected	May not shift to O/D in D range S, L range shift pattern may be same as D range
R range switch — battery		Fuse burns out	
R range switch — range indicator lamp	Range indicator lamp does not illuminate	METER 15A fuse burns out when R range is selected	

L Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2Q terminal — L range switch	L range shift pattern may be same as D or S range	METER 15A fuse burns out when L range is selected	May not shift to O/D in D range S, L range shift pattern may be same as D range
L range switch — battery		Fuse burns out	
L range switch — range indicator lamp	Range indicator lamp does not illuminate	METER 15A fuse burns out when L range is selected	

S Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2S terminal — S range switch	S range shift pattern may be same as D or L range	METER 15A fuse burns out when S range is selected	May not shift to O/D in D range S, R range shift pattern may be same as D range
S range switch — battery		Fuse burns out	
S range switch — range indicator lamp	Range indicator lamp does not illuminate	METER 15A fuse burns out when S range is selected	

D Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2B terminal — D range switch	D range shift pattern may be same as S or L range	METER 15A fuse burns out when D range is selected	May not shift to O/D in D range S, R range shift pattern may be same as D range
D range switch — battery		Fuse burns out	
D range switch — range indicator lamp	Range indicator lamp does not illuminate	METER 15A fuse burns out when D range is selected	

P, N Range Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2D terminal — P, N range switch	No symptom	IG KEY 40A fuse burns out when ignition switch turned START	May not shift to O/D in D range S, L range shift pattern may be same as D range
P, N range switch — starter cuicuit	Starter does not operate		

Throttle Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2A terminal — throttle sensor	Code No.12 output Shift point incorrect and shift shock strong	Code No.12 output Shift point incorrect and shift shock strong	Line pressure will be abnormal and clutch may slip if EC-AT control unit does not judge malfunction Vehicle may jolt
EC-AT control unit 2T terminal — throttle sensor			

NA: Not applicable

Idle Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2M terminal – engine control unit 2E terminal	Vehicle jolts when accelator pedal depressed or released	Clutches may slip when shifting	Line pressure will be abnormal and clutches may slip if EC-AT control unit does not judge malfunction Vehicle may jolt

Speed Sensor 1 (Revolution Sensor)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2J terminal – speed sensor 1	Code No.06 output	Code No.06 output	NA
Speed sensor 1 – ground (EC-AT control unit 2L terminal)		NA	

Speed Sensor 2 (Speedometer Sensor)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1I terminal – speed sensor 2	Code No.07 output	Code No.07 output	NA

Pulse Generator

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2E terminal – pulse generator	Code No.55 output Shift shock may be slightly strong	Code No.55 output Shift shock may be slightly strong	NA
Pulse generator – ground (EC-AT control unit 2L terminal)		NA	

Stoplight Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2Q terminal – stoplight switch	No symptom	Stop 15A fuse burns out when brake pedal is depressed	NA
Stoplight switch – battery		NA	

Torque Reduced Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2H terminal – engine control unit 2G terminal	Code No.57 output Shift shock may be slightly strong	Code No.57 output Shift shock may be slightly strong	NA

Mileage Switch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2N terminal – speedometer	Shift shock may be strong when shifting from 1st to 2nd or from 2nd to 3rd	Transmission may slip when shifting from 1st to 2nd or from 2nd to 3rd until the total mileage of the vehicle exceeds approximately 600 km {372 mile}	NA

NA: Not applicable

Water Thermoswitch

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2N terminal – water thermoswitch	Acceleration feeling (driving performance) will be deteriorated	Engine coolant temperature may increase	Acceleration feeling (driving performance) will be deteriorated

A/C Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1L terminal – engine control unit 1K terminal	Will always be normal, A/C ON mode	Will always be normal, A/C OFF mode	NA

Slip Lockup OFF Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2G terminal – engine control unit 2C terminal	No symptom	No symptom	NA

Engine RPM Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1G terminal – engine control unit 2B terminal	Code No. 01 output Lockup shock will be strong	Code No.01 output Lockup shock will be strong	NA

ATF Thermosensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2R terminal – ATF thermosensor	Code No.56 output O/D and lockup will be inhibited	No code No.56 output Shift shock will be strong at low ATF temperature	NA
ATF thermosensor – ground (EC-AT control unit 2L terminal)		NA	

Atmospheric Pressure Sensor

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2C terminal – engine control unit 2D terminal	Code No.58 output Shift shock will be strong at high altitude	Code No.58 output Shift shock will be strong at high altitude	NA

O/D Inhibit Signal (ASC Signal)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2K terminal – cruise control unit 1G terminal	O/D not inhibited when O/D inhibit signal ON	Does not shift to O/D Always diagnose EC-AT system	NA

TAT Terminal (Diagnosis Connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2K terminal – TAT terminal	Does not diagnose EC-AT system	Always diagnose EC-AT system Does not shift to O/D	NA

NA: Not applicable

Solenoid Valve (Shift A)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1D terminal – solenoid valve (shift A)	Code No. 60 output D, S range: 3rd gear fixed L range: 2nd gear fixed	Code No. 60 output D, S range: 3rd gear fixed L range: 2nd gear fixed	Shifting may be abnormal if EC-AT control unit does not judge malfunction
Solenoid valve (shift A) – ground		No symptom	

Solenoid Valve (Shift B)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1B terminal – solenoid valve (shift B)	Code No.61 output D, S range: 3rd gear fixed L range: 2nd gear fixed	Code No.61 output D, S range: 3rd gear fixed L range: 2nd gear fixed	Shifting may be abnormal if EC-AT control unit does not judge malfunction
Solenoid valve (shift B) – ground		No symptom	

Solenoid Valve (Line Pressure)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1F terminal – solenoid valve (line pressure)	Code No.64 output Shift shock and select shock will be strong	Code No.64 output Shift shock and select shock will be strong	Shifting may be abnormal if EC-AT control unit does not judge malfunction
Solenoid valve (line pressure) – ground		No symptom	

Solenoid Valve (Lockup)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1M terminal – solenoid valve (lockup)	Code No.63 output Lockup will not operate	Code No.63 output Lockup will not operate	Lockup may not be operated in lockup zone
Solenoid valve (lockup) – ground		No symptom	

Solenoid Valve (Lockup Control)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2F terminal – solenoid valve (lockup control)	Code No.65 output Lockup will not operate	Code No.65 output Lockup will not operate	Lockup may not be operated in lockup zone
Solenoid valve (lockup control) – ground		No symptom	

Solenid Valve (Overrunning Clutch)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1O terminal – solenoid valve (overrunning clutch)	Code No.62 output Engine breaking always operated during coasting Does not shift to O/D	Code No.62 output Engine breaking always operated during coasting Does not shift to O/D	May not shift to O/D
Solenoid valve (overrunning clutch) – ground		No symptom	

Dropping Resister

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1H terminal – dropping resister	Code No.64 output Shift shock and select shock will be strong	Code No.64 output Shift shock and select shock will be strong	NA
Dropping resister – solenoid valve (line pressure)			

NA: Not applicable

Reduce Torque Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2P terminal – engine control unit 1Q terminal	Code No.57 output Shift shock may be slightly strong	Code No.57 output Shift shock may be slightly strong	NA

Slip Lockup Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 2P terminal – engine control unit 1Q terminal	Code No.57 output Shift shock may be slightly strong	Code No.57 output Shift shock may be slightly strong	NA

Inhibitor Signal

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1C terminal – engine control unit 1R terminal	Engine speed will be slightly low in P and N ranges	Engine speed will be slightly high in R, D, S, and L ranges	NA

Hold Indicator Lamp

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1K terminal – Hold indicator lamp	Hold indicator lamp not illuminated	Hold indicator lamp always illuminated	NA

FAT Terminal (Diagnosis Connector)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1K terminal – FAT terminal (diagnosis connector)	Service code(s) not displayed by self-diagnosis function When using Self-Diagnosis Checker, "88" flashes after 20 seconds or DT-S1000 displays "System error"	Service code(s) not displayed by self-diagnosis function When using Self-Diagnosis Checker, "88" flashes after 20 seconds or DT-S1000 displays "System error"	NA

Battery Power (Backup)

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1A terminal – battery	Memory functions that rely on Self-Diagnosis, such as service code memory, do not operate	ROOM 10A fuse burns out	NA

Battery Power

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1N terminal – battery	No symptom	METER 15A fuse burns out when ignition switch is ON	NA
EC-AT control unit 1P terminal – battery	No symptom	METER 15A fuse burns out when ignition switch is ON	NA
EC-AT control unit 1N and 1P terminals – battery	EC-AT control unit does not function D, S range: 3rd gear fixed L range: 2nd gear fixed	METER 15A fuse burns out when ignition switch is ON	NA

NA: Not applicable

Ground

Circuit	Condition		
	Open circuit	Short circuit	Poor ground
EC-AT control unit 1J terminal – ground	EC-AT control unit does not function D, S range: 3rd gear fixed L range: 2nd gear fixed	No symptom	Shifting may be abnormal

37U0KX-336

Note

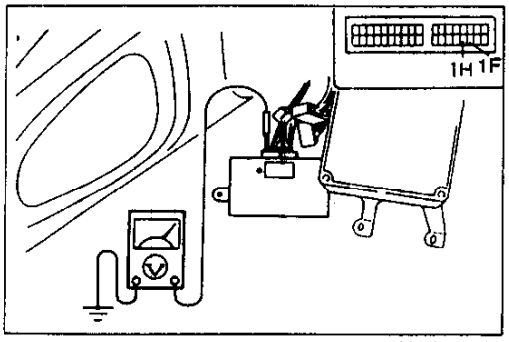
- **If a solenoid circuit or sensor circuit has poor grounding, the following malfunctions may exist:**
  1. **Abnormal shifting**
     - **Shift points abnormal**
     - **Transmission hunts (repeated upshifting/downshifting)**
     - **Drives away except in 1st gear**
     - **Does not shift to O/D**
     - **Fail-safe function may be operated by self-diagnosis system according to extent of malfunction**
  2. **Deterioration of shift feeling**
     - **Oil pressure high and shift shock strong**
     - **Shift timing incorrect and engine flares up**
     - **Shift timing incorrect and vehicle brakes on shifting**
     - **Fail-safe function may be operated by self-diagnosis system according to extent of malfunction**

SYSTEM INSPECTION

SOLENOID VALVE (LINE PRESSURE) OUTPUT DUTY Inspection

Note

- **When checking the duty ratio, check at terminal 1F (solenoid valve(line pressure)) and terminal 1H (dropping resistor) of EC-AT control unit.**
- **Output duty ratio can be checked by using the DT-S1600.**



29U0KX-085

1. Connect the (+) terminal of a dwell meter to terminal 1F and/or terminal 1H at the EC-AT control unit and the (–) terminal to a ground. Set the dwell meter selector to the 4 cylinder position.
2. Turn the ignition switch to ON.

Note 29U0KX-084

- **The dwell meter indicates the OFF duty ratio.**

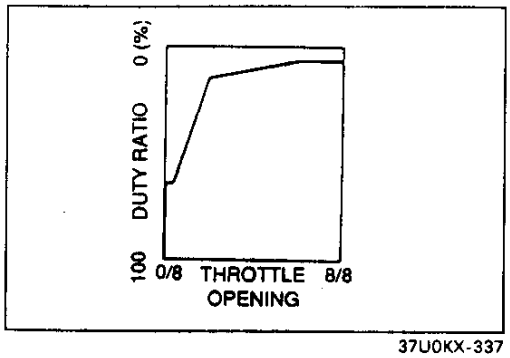
3. Verify the duty ratio by depressing and releasing the accelerator pedal.

Throttle opening	Duty ratio (ON %)
Fully closed (0/8)	Approx. 100
Fully open (8/8)	Approx. 5

Note

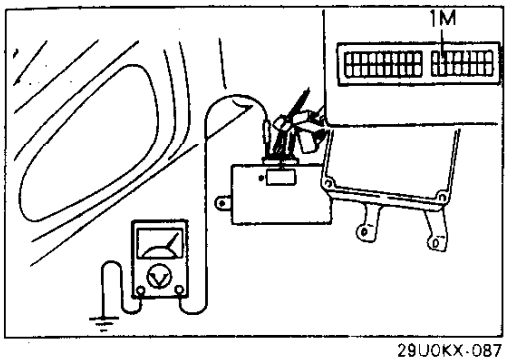
- **The relationship between the dwell angle (°) and duty ratio (%) is as follows:**

Dwell angle (°)	0	18	36	54	72	90
Duty ratio (%)	0	20	40	60	80	100



37U0KX-337

4. Depress the accelerator pedal slowly and verify the duty ratio charges as shown in the graph.
5. If not as specified, check the EC-AT control unit (refer to page K–35), dropping resistor (refer to page K–33), and line pressure solenoid (refer to page K–32).



29U0KX-087

SOLENOID VALVE (LOCKUP) OUTPUT DUTY

Inspection

Note

- **Output duty ratio can be checked by using the DT-S1000.**

1. Connect the (+) terminal of a dwell meter to terminal 1M of the EC-AT control unit and the (–) terminal to a ground.
2. Drive the vehicle.

Note

- **The dwell meter indicates the OFF duty ratio.**

3. Verify the duty ratio in the lockup condition.

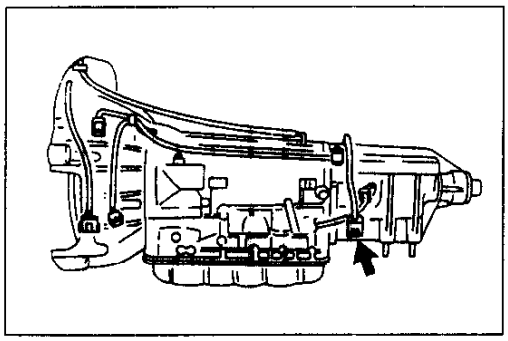
Condition	Duty ratio (ON %)
No lockup	Approx. 5
Lockup	Approx. 95

Note

- **See above note for dwell and duty relationship.**

4. If not as specified, check the EC-AT control unit (refer to page K–35), and solenoid valve (lockup) (refer to page K–32).

37U0KX-338


29U0KX-089

MANUAL OPERATION TEST

Inspection

1. Disconnect solenoid connector.

Note

- **Determine the gear position by noting the conditions upon accelerating from a stop and the engine speed while cruising.**
- **Engine rpm at 40 km/h (25 mph):**
  2nd gear: Approx. 2,300 rpm
  3rd gear: Approx. 1,500 rpm

2. Verify the gear position of each range.

Range	Gear Position
D range	3rd, fixed
S range	3rd, fixed
L range	2nd, fixed
R range	Reverse

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

29U0KX-090

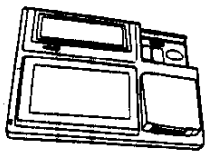
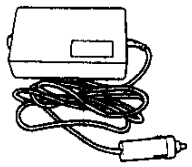
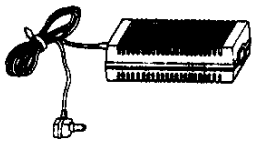
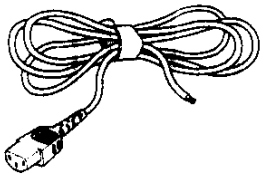
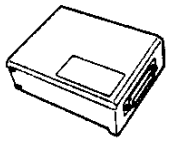
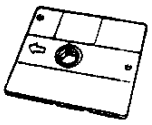
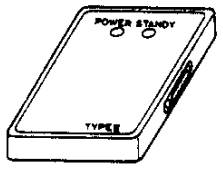
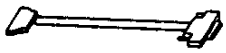
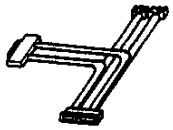
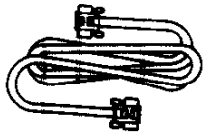
ELECTRICAL SIGNAL INSPECTION

DESCRIPTION

In this step, the input and output signals are checked by using the **DT-S1000**.
The **DT-S1000** checks for proper operation of various switches and sensors in the EC-AT system. It also checks the EC-AT control unit for output the various control signals.

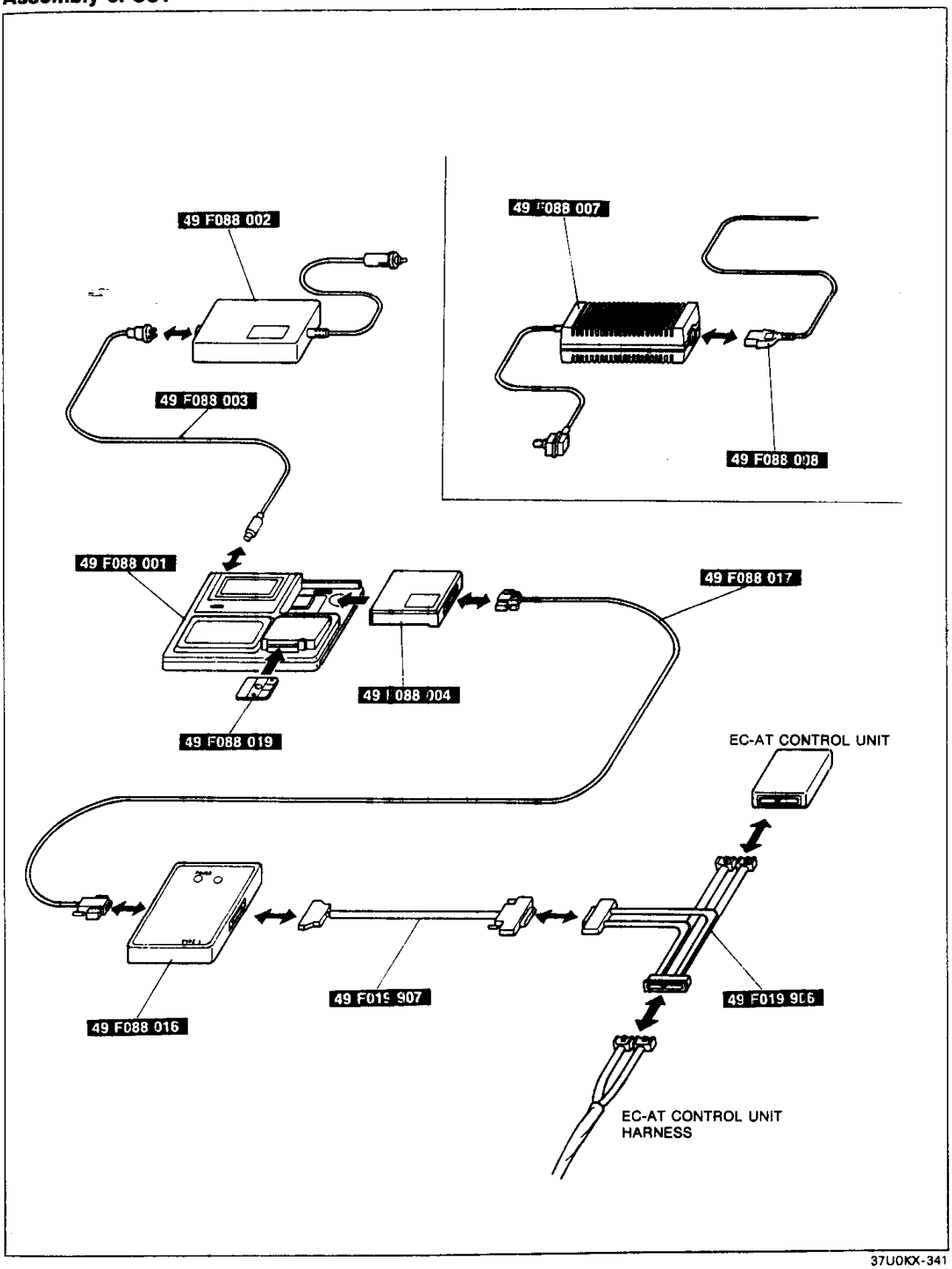
37U0KX-339

PREPARATION
SST

49 F088 001 DT-S1000 Base Unit 	For inspection of electrical signal	49 F088 002 Power Unit DC-12V 	For inspection of electrical signal
49 F088 003 Harness Power Unit DC 	For inspection of electrical signal	49 F088 007 Power Unit AC 	For inspection of electrical signal
49 F088 008 Harness Power Unit AC 	For inspection of electrical signal	49 F088 004 IF-Adapter Type-I 	For inspection of electrical signal
49 F088 019 System Disk Type-III (V1.00) 	For inspection of electrical signal	49 F088 016 System Unit Type-III 	For inspection of electrical signal
49 F019 907 Adapter Harness 	For inspection of electrical signal	49 F019 906 Adapter Harness 36P 	For inspection of electrical signal
49 F088 017 Harness Type-III 	For inspection of electrical signal		

37U0KX-340

Assembly of SST



37U0KX-341

DT-S1000 MONITOR ITEM CHART

By using the DT-S1000, following input/output signals to/from the EC-AT control unit signal can be checked.

Terminal	Input or output	Component	DT-S1000 function		
			Input/output signal monitor	Shifting check monitor	Remark
1A	–	Battery power (backup)	○ (Voltage)		
1B	Output	Solenoid valve (shift B)	○ (Voltage)	○ (Gear position)	Solenoid valve pattern can be checked DT-S1000 displayed gear position is calculated by signals received from solenoid valves (shift A, shift B)
1C	Output	Inhibitor signal	○ (Voltage)		
1D	Output	Solenoid valve (shift A)	○ (Voltage)	○ (Gear position)	Solenoid valve pattern can be checked DT-S1000 displayed gear position is calculated by signals received from solenoid valves (shift A, shift B)
1E	Input	Inhibitor switch (R range)	○ (Voltage)		
1F	Output	Solenoid valve (line pressure)	○ (Duty; %)	○ (Duty; %)	Output duty ratio can be checked
1G	Input	Engine rpm signal	○ (rpm)		Engine rpm signal can be checked
1H	Output	Dropping resistor	○ (Duty; %)		Output duty ratio can be checked
1I	Input	Speed sensor 2 (Speedometer sensor)	○ (km/h)		Vehicle speed signal (backup signal) can be checked
1J	–	Ground (EC-AT control unit)	○ (Voltage)		
1K	Output	Hold indicator	○ (Voltage)		
1L	Input	A/C signal	○ (Voltage)		
1M	Output	Solenoid valve (lockup)	○ (Duty; %)	○ (Duty; %)	Output duty ratio can be checked
1N	–	Battery power (main)	○ (Voltage)		
1O	Output	Solenoid valve (overrunnig clutch)	○ (Voltage)		Solenoid valve pattern can be checked
1P	–	Battery power (main)	○ (Voltage)		
2A	Input	Throttle sensor (V_{REF})	○ (Voltage)		
2B	Input	Inhibitor switch (D range)	○ (Voltage)		
2C	Input	Atmospheric pressure sensor	○ (Voltage)		
2D	Input	Inhibitor switch (P, N range)	○ (Voltage)		
2E	Input	Pulse generator	○ (rpm)		Input shaft rpm signal can be checked
2F	Output	Solenoid valve (lockup control)	○ (Voltage)		Solenoid valve pattern can be checked
2G	Input	Slip lockup OFF signal	○ (Voltage)		
2H	Input	Torque reduced signal	○ (Voltage)		
2I	Input	Hold switch	○ (Voltage)		
2J	Input	Speed sensor 1 (revolution sensor)	○ (Vehicle speed; km/h)	○ (Vehicle speed; km/h)	Vehicle speed signal (main signal) can be checked
2K	Input	TAT terminal/O/D inhibit signal (ASC signal)	○ (Voltage)		
2L	–	Ground (input signal)	○ (Voltage)		
2M	Input	Idle signal	○ (Voltage)		

( ) indicates DT-S1000 display unit

Terminal	Input or output	Component	DT-S1000 function		
			Input/output signal monitor	Shifting check monitor	Remark
2N	Input	Water thermoswitch/Mileage switch	○ (Voltage)		
2O	Input	Stoplight switch	○ (Voltage)		
2P	Output	Reduce torque signal/slip lockup signal	○ (Voltage)		
2Q	Input	Inhibitor switch (L range)	○ (Voltage)		
2R	Input	ATF thermosensor	○ (Voltage)		
2S	Input	Inhibitor switch (S range)	○ (Voltage)		
2T	Input	Throttle sensor (TVO)	○ (Voltage)	○ (Voltage)	Throttle opening angle can be checked

37U0KX-342

( ) indicates DT-S1000 display unit

Solenoid valve operation table

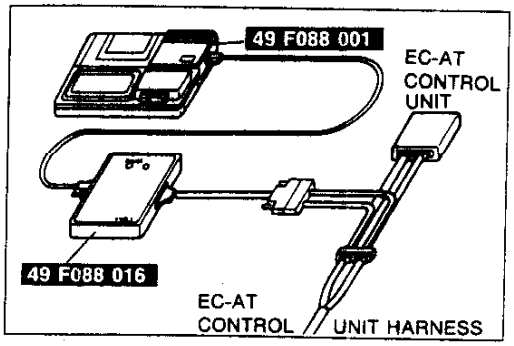
Range	Mode	Gear	Shift A	Shift B
P	–	–	ON	ON
R	–	Reverse	ON	ON
N	–	–	ON	ON
D	Except HOLD	1st	ON	ON
		2nd	OFF	ON
		3rd	OFF	OFF
		O/D	ON	OFF
	HOLD	2nd	OFF	ON
		3rd	OFF	OFF
		* O/D	ON	OFF
S	Except HOLD	1st	ON	ON
		2nd	OFF	ON
		3rd	OFF	OFF
	HOLD	2nd	OFF	ON
		3rd	OFF	OFF
L	Except HOLD	1st	ON	ON
		2nd	OFF	ON
	HOLD	1st	ON	ON
		2nd	OFF	ON

37U0KX-343

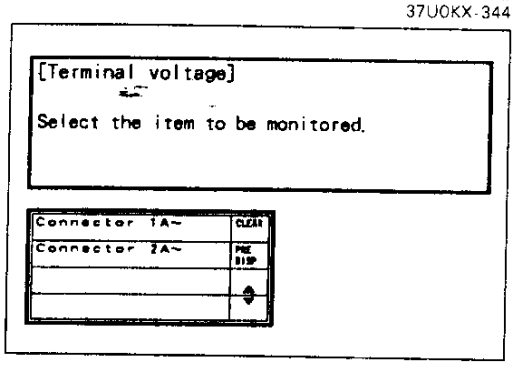
* Marked gears prevent engine overspeed.

Note

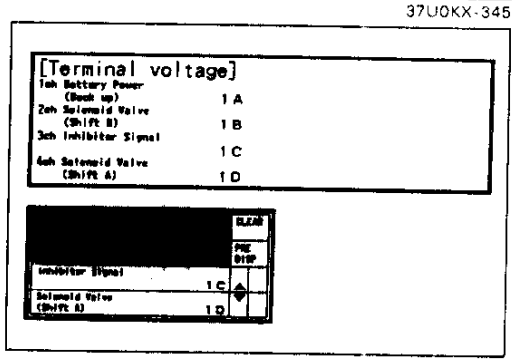
- **Solenoid valve (shift A) is OFF when P, R, or N range in HOLD mode.**



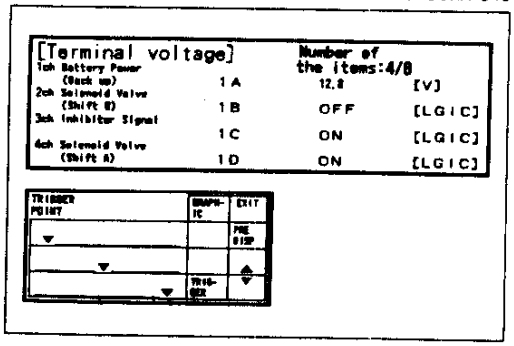
37U0KX-344



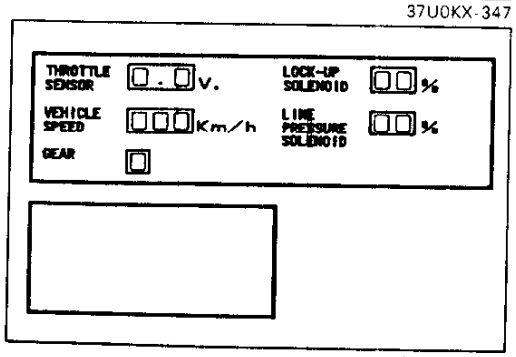
37U0KX-345



37U0KX-346



37U0KX-347



37U0KX-348

ELECTRICAL SIGNAL INSPECTION

Inspection Procedure

Input/Output signal monitor function

1. Assemble the **DT-S1000** . (Refer to page K–249.)
2. Disconnect the negative battery cable and connect the **DT-S1000** to the EC-AT control unit.
3. Reconnect the negative battery cable.
4. Select the input/output signal monitor function from the **DT-S1000** display.

Note

- **The maximum selection item is 8.**

5. Select the inspection item (terminal No.).
6. Verify indication of the respective data item in each condition, referring to the EC-AT control unit terminal voltage chart. (Refer to page K–36.)

< Example >

When checking the solenoid valve pattern at each gear position, and the overrunning clutch (engine braking) control, the following steps are available.

Step 1

Select the solenoid valve (shift A), solenoid valve (shift B), and solenoid valve (overrunning clutch).

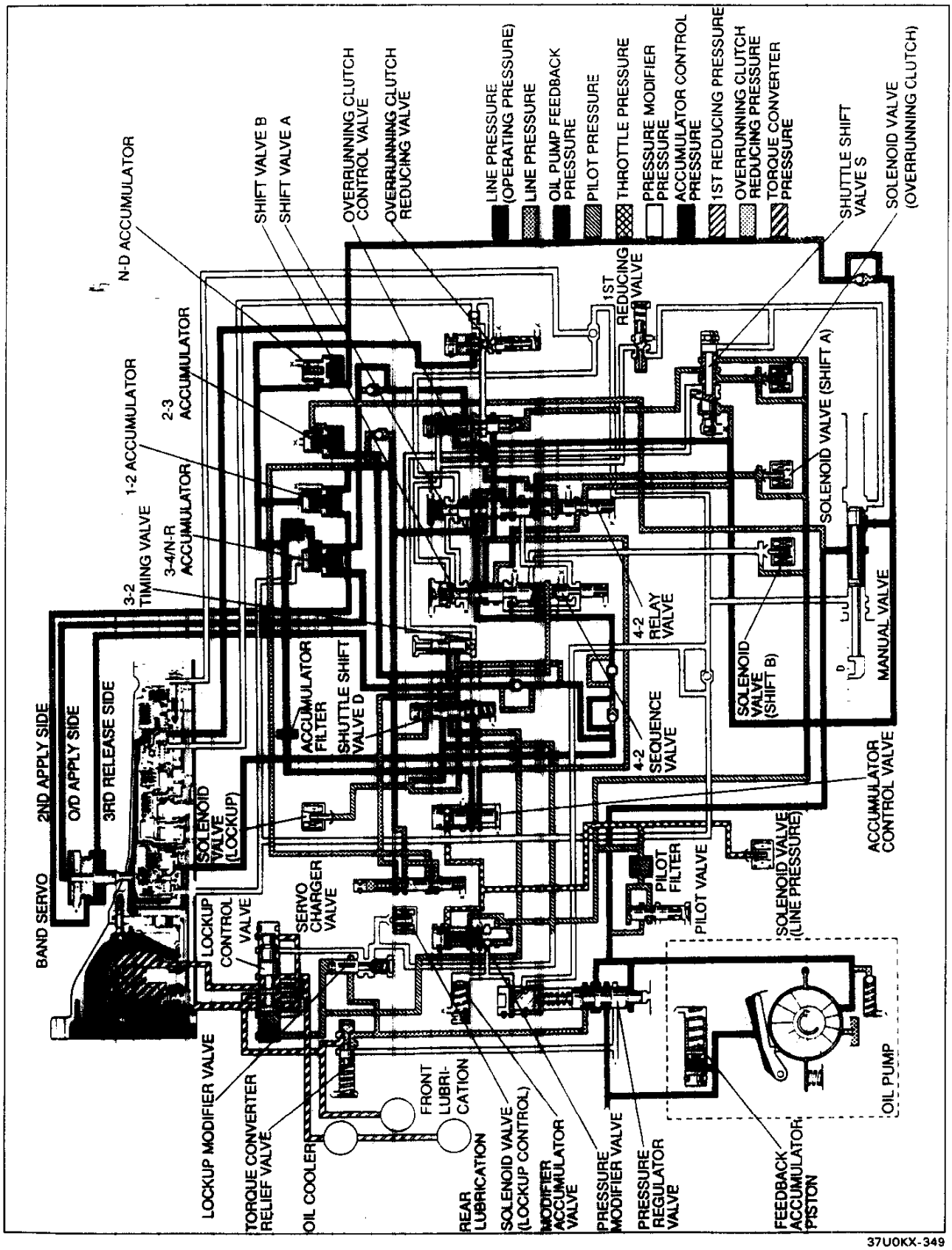
Step 2

Drive the vehicle and verify that the ON/OFF (battery voltage/0V) pattern of the solenoid valve (shift A, and B) are same as the solenoid valve operation table (refer to page K–251), and engine braking is operated when solenoid valve (overrunning clutch) is ON (battery voltage).

Shifting check monitor function

1. Assemble the DT-S1000. (Refer to page K-249.)
2. Disconnect the negative battery cable and connect the **DT-S1000** to the EC-AT control unit.
3. Reconnect the negative battery cable.
4. Select the shifting check monitor function from the **DT-S1000** display.
5. Drive the vehicle and verify the shift point, lockup point, and shift schedule.

HYDRAURIC CIRCUIT



37U0KX-349