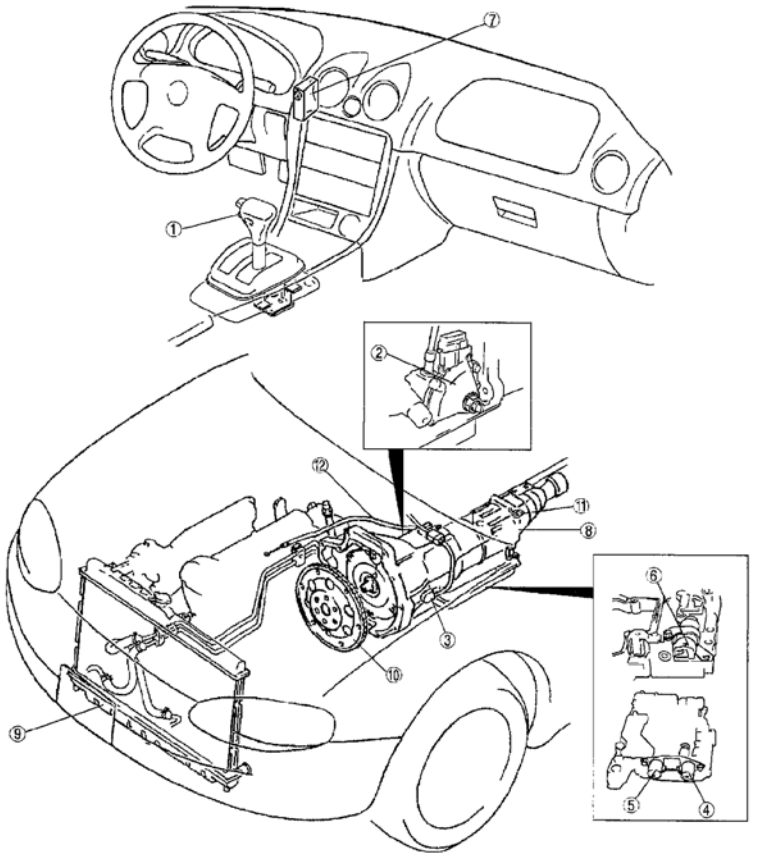
2005 TRANSMISSION

Automatic Transmission - MX-5 Miata

AUTOMATIC TRANSMISSION LOCATION INDEX



1	O/D OFF Switch (See O/D OFF SWITCH INSPECTION) (See O/D OFF SWITCH REMOVAL/INSTALLATION)
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6	Torque Converter Clutch Solenoid Valve (See SOLENOID VALVES INSPECTION) (See SOLENOID VALVES REMOVAL/INSTALLATION)
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12	Throttle Cable (See THROTTLE CABLE INSPECTION) (See THROTTLE CABLE ADJUSTMENT) (See THROTTLE CABLE REMOVAL/INSTALLATION)

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Fig. 1: Identifying Automatic Transmission Components
Courtesy of MAZDA MOTORS CORP.

AUTOMATIC TRANSMISSION CONTROL SYSTEM WIRING DIAGRAM

See **TRANSMISSION** .

MECHANICAL SYSTEM TEST

MECHANICAL SYSTEM TEST PREPARATION

1. Apply the parking brake and use wheel chocks at the front and rear of the wheels.
2. Inspect the engine coolant. (See **ENGINE COOLANT LEVEL INSPECTION** .)
3. Inspect the engine oil. (See **ENGINE OIL LEVEL INSPECTION** .)
4. Inspect the ATF levels. (See **ATF LEVEL INSPECTION**.)
5. Inspect the ignition timing. (See **ENGINE TUNE-UP** .)
6. Inspect the idle speed. (See **ENGINE TUNE-UP** .)

LINE PRESSURE TEST

1. Perform mechanical system test preparation. (See **MECHANICAL SYSTEM TEST PREPARATION**.)

WARNING:

- **Removing the plug when the ATF is hot can be dangerous. Hot ATF can come out of the opening and cause severe burns. Before removing the plug, allow the ATF to cool.**

2. Connect the **SSTs** to the line pressure inspection port.
3. Shift the selector lever to D range and read the line pressure at idle.
4. Connect the **SST** to the line pressure inspection port.

CAUTION:

- **If the accelerator pedal (AP) is pressed for longer than 5 seconds while the brake pedal is pressed, the transmission could be damaged. Therefore, perform both Steps 5 and 6 within 5 seconds.**

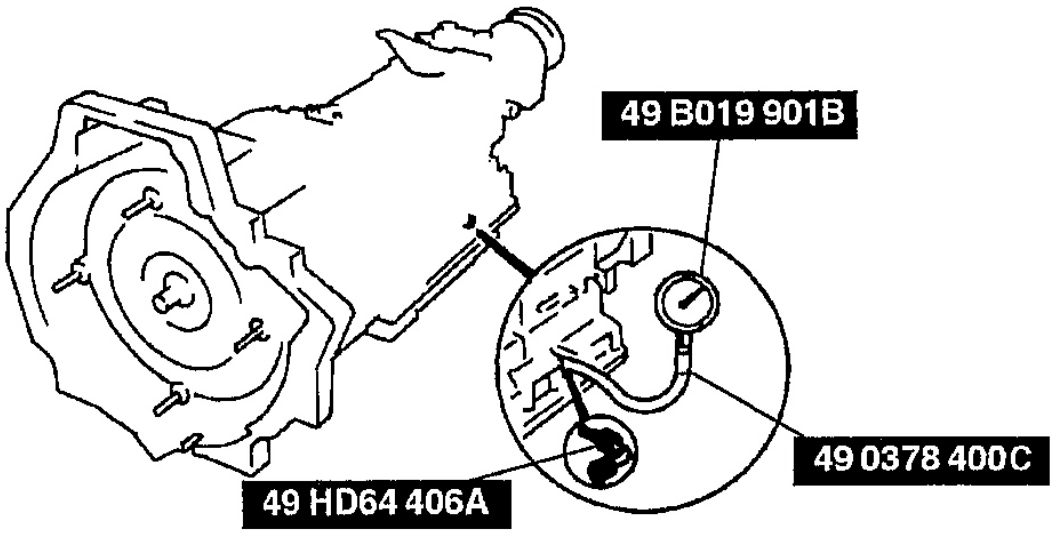

Fig. 2: Connecting SSTs To Line Pressure Inspection Port
Courtesy of MAZDA MOTORS CORP.

5. Firmly depress the brake pedal with the left foot, and gently depress the AP to the floor with the right.
6. When the engine speed no longer increases, quickly read the line pressure and release the AP.
7. Shift the selector lever to the N position and let the engine idle for 1 minute or more to cool the ATF.
8. Read the line pressure at idle and at the engine stall speed for the 2, 1 ranges, and R position in the same manner.

SPECIFIED LINE PRESSURE

Position/Range	Line pressure kPa {kgf/cm2, psi}	
	Idle	Stall
D, 2, 1	370-420 {3.7- 4.2, 53-59}	960-1,110 {9.8- 11.4, 140-162}
R	520-580 {5.3- 5.9, 76-83}	1,270-1,520 {13.0-15.4, 185- 218}

WARNING:

- **Removing the SST when the ATF is hot can be dangerous. Hot ATF can come out of the opening and cause severe burns. Before removing the SST, allow the ATF to cool.**

9. Remove the **SSTs.**
10. Apply ATF to a new O-ring.
11. Install the O-ring to the plug.
12. Install a plug in the inspection port.

Tightening torque

5.9-8.8 N.m {60-90 kgf.cm, 53-78 in.lbf}

EVALUATION OF LINE PRESSURE TEST

Line pressure	Possible cause
Low pressure in all ranges	Primary regulator valve sticking Throttle valve sticking Throttle cable misadjustment Worn oil pump
Low pressure in D range	Oil is leaking from hydraulic circuit of D range
Low pressure in R position	Oil is leaking from hydraulic circuit of R position
High pressure in all ranges	Primary regulator valve sticking Throttle valve sticking Throttle cable misadjustment

STALL TEST

1. Perform mechanical system test preparation. (See **MECHANICAL SYSTEM TEST PREPARATION**.)
2. Shift the selector lever to the R position.

CAUTION:
- **If the accelerator pedal is pressed for longer than 5 seconds while the brake pedal is pressed, the transmission could be damaged. Therefore, perform both Steps 3 and 4 within 5 seconds.**

3. Firmly depress the brake pedal with the left foot, and gently depress the accelerator pedal (AP) to the floor with the right.
4. When the engine speed no longer increases, quickly read the speed and release the AP.
5. Shift the selector lever to the N position and let the engine idle for 1 minute or more to cool the ATF.
6. Perform a stall test of D, 2, and 1 ranges in the same manner.

Engine stall speed

2,370-2,740 rpm

EVALUATION OF STALL TEST

Condition	Possible cause	
	In D range	Insufficient line pressure • Forward clutch slipping • One-way clutch No.2 slipping
		Insufficient line pressure

Above specification	In R position	• Direct clutch slipping • Reverse brake slipping
	In all range and R position	Insufficient line pressure • 4GR clutch or one-way clutch No.O slipping
Below specification		Engine out of tune
		One-way clutch slipping in torque converter

TIME LAG TEST

1. Perform mechanical system test preparation. (See **MECHANICAL SYSTEM TEST PREPARATION**.)
2. Shift the selector lever from the N position to D range. (O/D OFF switch OFF)
3. Use a stopwatch to measure the time it takes from shifting until engagement is felt. Make three measurements for each test and take the average from the results.
4. Perform the test for the following shifts in the same manner.
   a. N position --> D range (O/D OFF SW ON)
   b. N position --> R position

Time lag

N position --> D range: 0.7 sec.
N position --> R position: 1.2 sec.

EVALUATION OF TIME LAG TEST

Condition	Possible cause
N --> D select	Insufficient line pressure Forward clutch slipping One-way clutch NO.2 slipping
N --> R select	Insufficient line pressure Direct clutch slipping Reverse brake slipping

ROAD TEST

ROAD TEST PREPARATION

1. Inspect the engine coolant. (See **ENGINE COOLANT LEVEL INSPECTION** .)
2. Inspect the engine oil. (See **ENGINE OIL LEVEL INSPECTION** .)
3. Inspect the ATF levels. (See **AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION**.)
4. Inspect the idle speed and ignition timing. (See **ENGINE TUNE-UP** .)
5. Bring up the engine and transmission to normal operating temperature.

TYPICAL SHIFT DIAGRAM

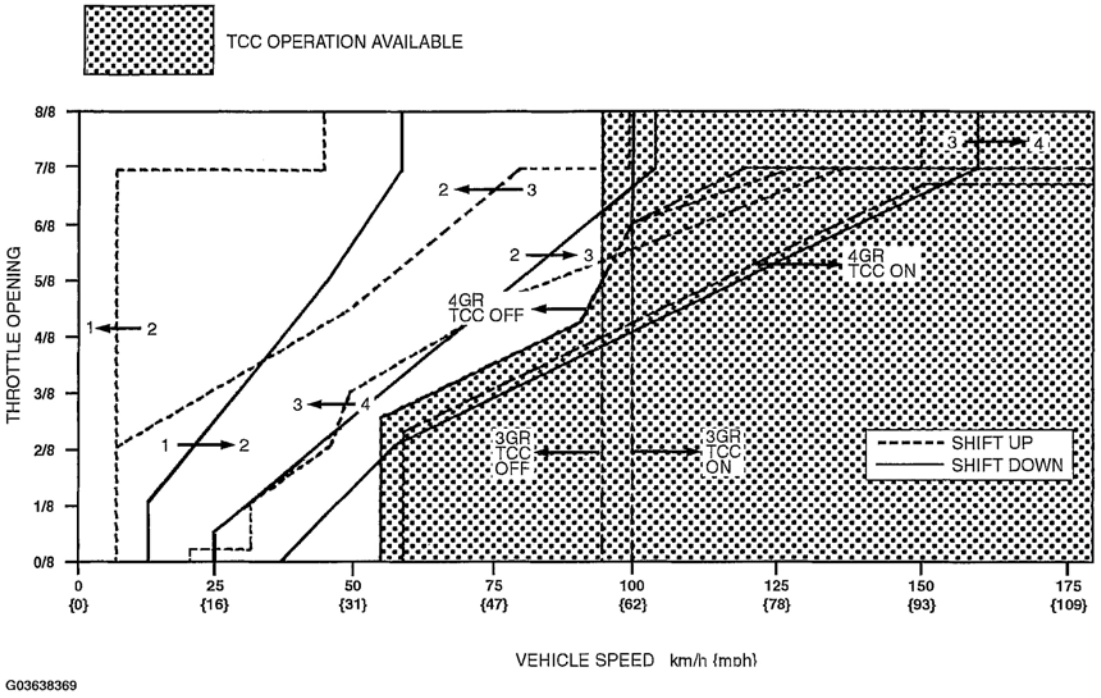

Fig. 3: Typical Shift Diagram
Courtesy of MAZDA MOTORS CORP.

SHIFT SCHEDULE TEST

1. Drive the vehicle with wide open throttle, half throttle, closed throttle position and kickdown, and verify that following shifts are obtained. The shift points must be as shown in the table below.
   - GR-->2GR, 2GRh ->3GR, and 3GR-->4GR upshifts and downshifts are obtained in D range (O/D OFF switch OFF).
   - 1GR-->2GR and 2GR-->3GR upshifts and downshifts are obtained in D range (O/D OFF switch ON).
   - 2GR is held in 2 range.
   - 1GR is held in 1 range.
2. Decelerate the vehicle and verify that engine braking effect is felt in 4GR.
3. Drive the vehicle and verify that TCC operation is obtained in 3GR and 4GR in D range.

NOTE:

- **The shift solenoid electrical ON-OFF pattern is this chart describes the stabilized condition before and after shift control. The pattern may oscillate between ON and OFF momentarily while shifting-up or down. This is normal.**

VEHICLE SPEED AT SHIFT POINT

Range/Mode	Throttle condition	Shift	Vehicle speed (km/h {mph})	Shift solenoid A	Shift solenoid B
D range (O/D OFF switch OFF)	Wide open throttle	1GR-->2GR	58-64 {36-40}	ON	OFF-->ON
		2GR-->3GR	102-110 (63-68}	ON-->OFF	ON
		3GRh-->4GR	157-167 (97-103}	OFF	ON-->OFF
	Half throttle	1GR-->2GR	33-42 {20-26}	ON	OFF-->ON
		2GR-->3GR	59-76 {37-47}	ON-->OFF	ON
		3GR TCC operation	94-106 (58-65}	OFF	ON
		3GR-->4GR	85-112 (52-69}	OFF	ON-->OFF
		4GR TCC operation	81-109 (50-67}	OFF	OFF
	Closed throttle position	4GR-->3GR	17-23 (11-14}	OFF	OFF-->ON
		3GR-->1GR	5-11 {3-6}	OFF-->ON	ON-->OFF
	Kickdown (wide open throttle)	4GR-->3GR	145-155 (90-96}	OFF	OFF-->ON
		3GR-->2GR	95-103 (59-63}	OFF-->ON	ON
		2GR-->1GR	42-48 {26-29}	ON	ON-->OFF
D range (O/D OFF switch ON)	Wide open throttle	1GR-->2GR	58-64 {36-40}	ON	OFF-->ON
		2GR-->3GR	102-110 (63-68}	ON-->OFF	ON
	Half throttle	1GR-->2GR	33-42 {20-26}	ON	OFF-->ON
		2GR-->3GR	59-76 {37-47}	ON-->OFF	ON
		3GR TCC operation	94-106 (58-65}	OFF	ON
	Closed throttle position	3GR-->1GR	5-11 {3-6}	OFF-->ON	ON-->OFF
	Kickdown (wide open throttle)	3GR-->2GR	95-103 (59-63}	OFF-->ON	ON
		2GR-->1GR	42-48 {26-29}	ON	ON-->OFF
2	-	3GR-->2GR	101-107 (63-66}	OFF-->ON	ON
1	-	2GR-->1GR	35-41 {22-25}	ON	ON-->OFF

NOISE AND VIBRATION TEST

1. Drive the vehicle and listen closely for any noise or vibration. The torque converter, drive shaft, and differential can be sources of noise and vibration if they are not functioning properly. Inspect these when searching for sources of noise and vibration.

P POSITION TEST

1. Shift into P position on a gentle slope. Release the brake, and verify that the vehicle does not roll.
   - If the vehicle rolls, inspect the AT. (See **AUTOMATIC TRANSMISSION SYMPTOM TROUBLESHOOTING** .)

AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION

ATF CONDITION INSPECTION

1. One way of determining whether the transmission should be disassembled is by noting:
    - If the ATF is muddy or varnished.
    - If the ATF smells strange or unusual.
    - If ATF condition is poor, repair as follows.
        i. Dark color condition
            - Overhaul transmission and repair or replace parts if necessary.
        ii. Light pink and/or reddish-brown condition.
            - Replace ATF.

ATF condition

ATF CONDITION POSSIBLE CAUSE

Condition			Possible cause
Clear red		Normal	-
Light red (pink)		Contaminated with water	• Broken oil cooler inside of radiator • Poor breather hose installation: By water contamination, problem could be occurring to parts inside of transmission. It is necessary to overhaul transmission and detect defective parts. • If necessary, repair or replace transmission.
Reddish brown	Has burnt smell and metal pieces are found	Deteriorated ATF	Defective powertrain components inside of transmission: Specks cause wide range of problems by plugging up in oil pipe, control valve body, and oil cooler in radiator. • When large amount of specks are found. Overhaul transmission and detect defective parts. • If necessary, repair or replace transmission. • Implement flushing operation as there is a possibility of having specks plugged up oil pipe and/or oil cooler inside of radiator.
	Has no burnt smell	Normal	• Discoloration by oxidation.

ATF LEVEL INSPECTION

CAUTION:
- **The ATF amount varies according to ATF temperature. Therefore,**

when checking the ATF level or replacing the ATF, use a thermometer to measure the temperature then adjust the ATF amount to the specified level according to the specified temperature.

1. Park the vehicle on level ground.
2. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.
3. Adjust the length of thermistor probe measure to the measure same as the dipstick and hold the probe with a paper holder.

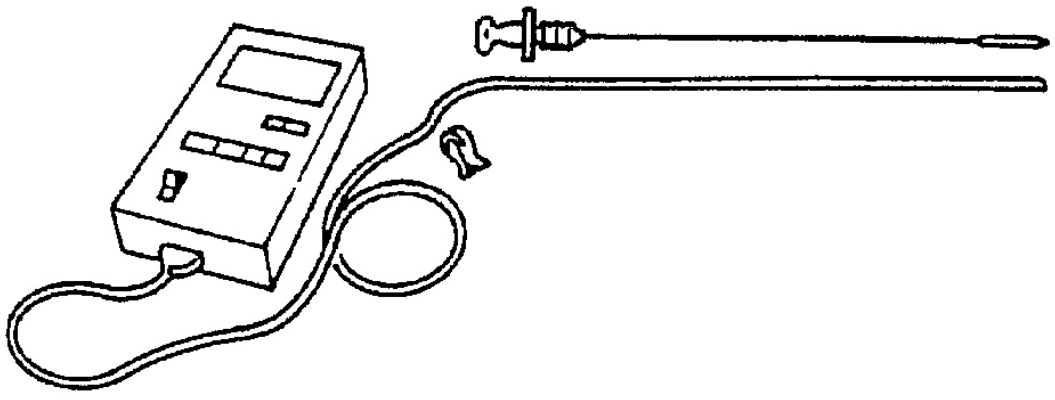

Fig. 4: Adjusting Length Of Thermistor Probe Measure To Measure Same As Dipstick
Courtesy of MAZDA MOTORS CORP.

4. Insert into the filler tube and measure the temperature.
5. Inspect the ATF level before warming up the engine. In this case, use the cool range **(15- 25°C {59-77° F}).**
6. Warm up the engine until the ATF reaches **60- 70°C{140-158°F}.**
7. While depressing the brake pedal, shift the selector lever to each range (P-1), pausing momentarily in each range.
8. Shift back to the P position.
9. While the engine is idling, verify that the ATF level is in the HOT **65°C {149°F}** range.
   - Adjust ATF level to the specification, if necessary.

ATF type

M-III or equivalent (e.g.Dexron(R)III)

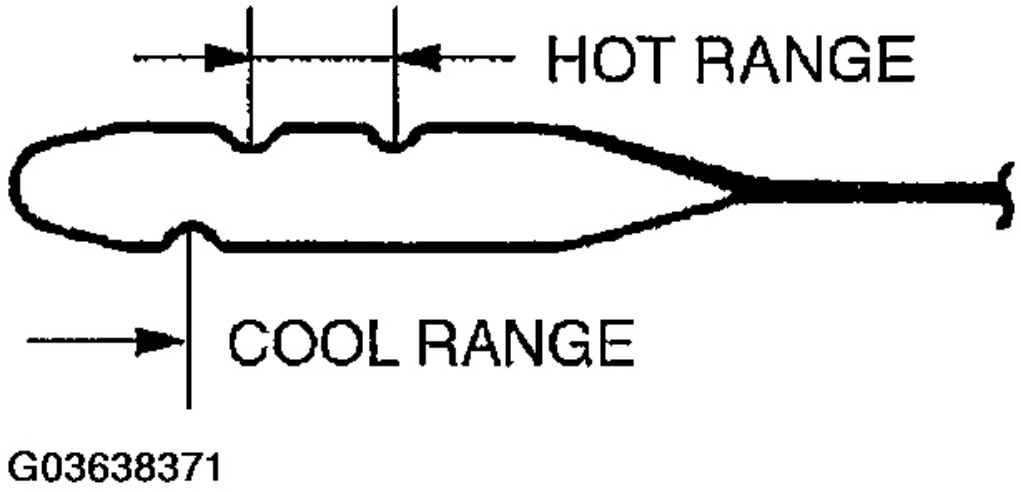

Fig. 5: Identifying Hot And Cool Range
Courtesy of MAZDA MOTORS CORP.

AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT

WARNING:

- **Hot transmissions and ATF can cause severe burns. Turn off the engine and wait until the transmission and ATF are cool before replacing the ATF.**

1. Remove the dipstick.
2. Remove the drain plug and washer.
3. Drain the ATF into a container.
4. Install a new washer and the drain plug.

Tightening torque

18-22 N.m {1.8-2.3 kgf.m, 14-16 in.lbf}

5. Add the specified amount and type of ATF through the oil filler tube.

ATF type

M-III or equivalent (e.g.Dexron°III)

Fill amount (approx.quantity)

6.7 L {7.1 US qt, 5.9 Imp qt}

6. Install the dipstick.
7. Verify that the ATF level is in the HOT **65°C {149°F}** range.
   - Add ATF to the specified level if necessary.

THROTTLE CABLE INSPECTION

1. Verify that the throttle cable is adjusted within dimension A as show in the figure below when the throttle cable is in closed throttle position.
   - If it is not within specification, adjust the throttle cable. (See **THROTTLE CABLE ADJUSTMENT**.)

Dimension A

0.8-1.5 mm {0.03-0.05 in}

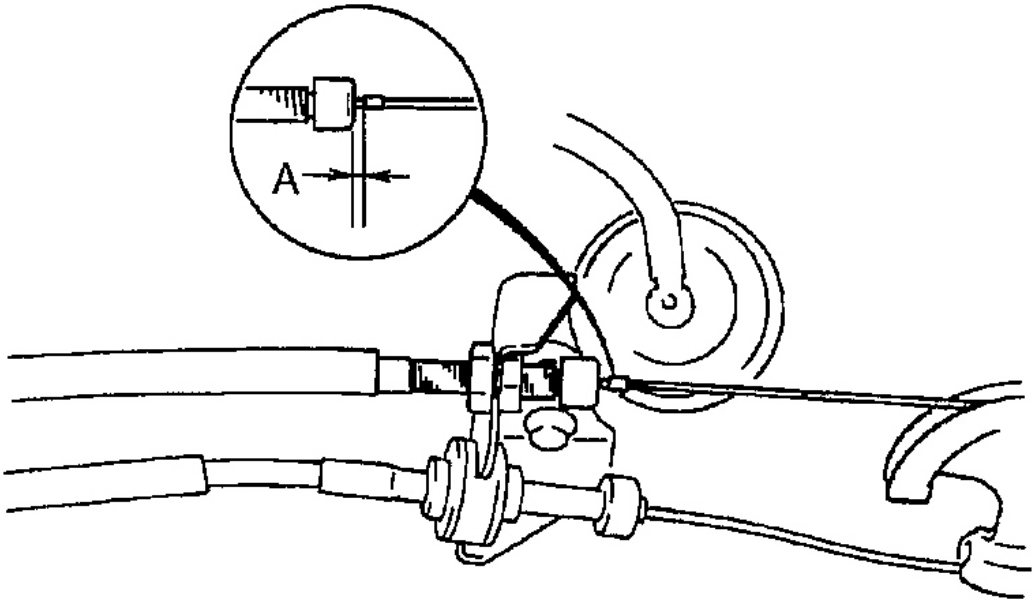

Fig. 6: Adjusting Throttle Cable
Courtesy of MAZDA MOTORS CORP.

THROTTLE CABLE ADJUSTMENT

1. Loosen nuts A and B.

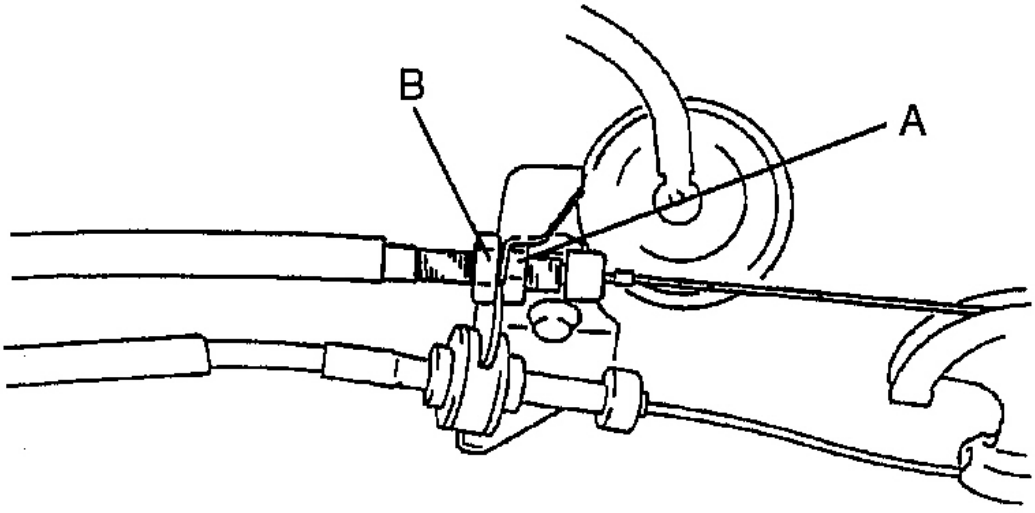

Fig. 7: Tightening Throttle Cable
Courtesy of MAZDA MOTORS CORP.

2. Put nut B in the direction of the arrow as shown in the figure, with the throttle lever in closed throttle position. Then tighten the nut by hand.

NOTE:

- **Tighten nut A by pushing it down so that the throttle cable will not come off from the bracket.**

3. Tighten nut A with the throttle lever totally closed.

Tightening torque

12-16 N.m {1.2-1.7 kgf.m, 8.7-12.2 ft.lbf}

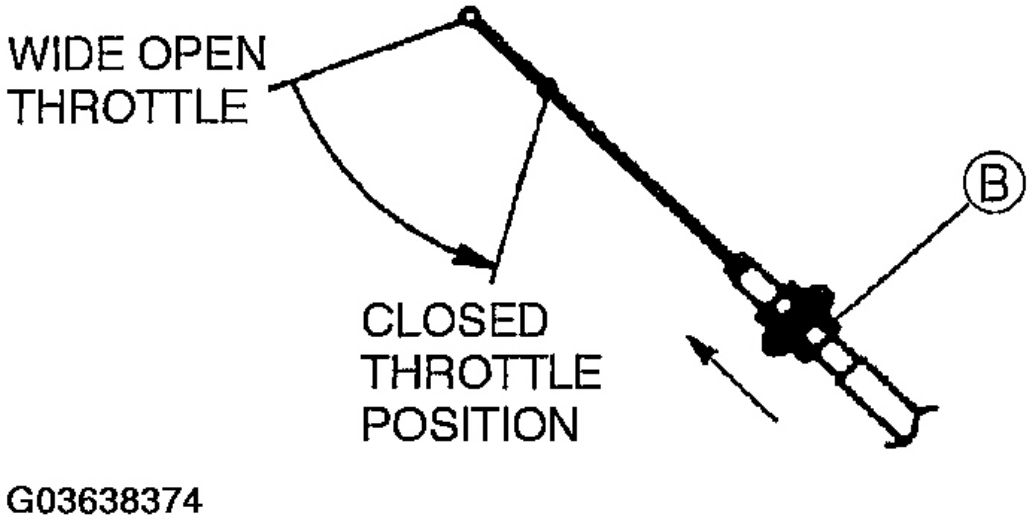

Fig. 8: Identifying Closed Throttle Position
Courtesy of MAZDA MOTORS CORP.

4. Verify that the throttle cable moves smoothly.
5. Verify that there is no deflection, and that the throttle cable is adjusted within dimension A as shown in **Fig. 9** below when the throttle cable is in closed throttle position.

Dimension A

0.8-1.5 mm {0.03-0.05 in}

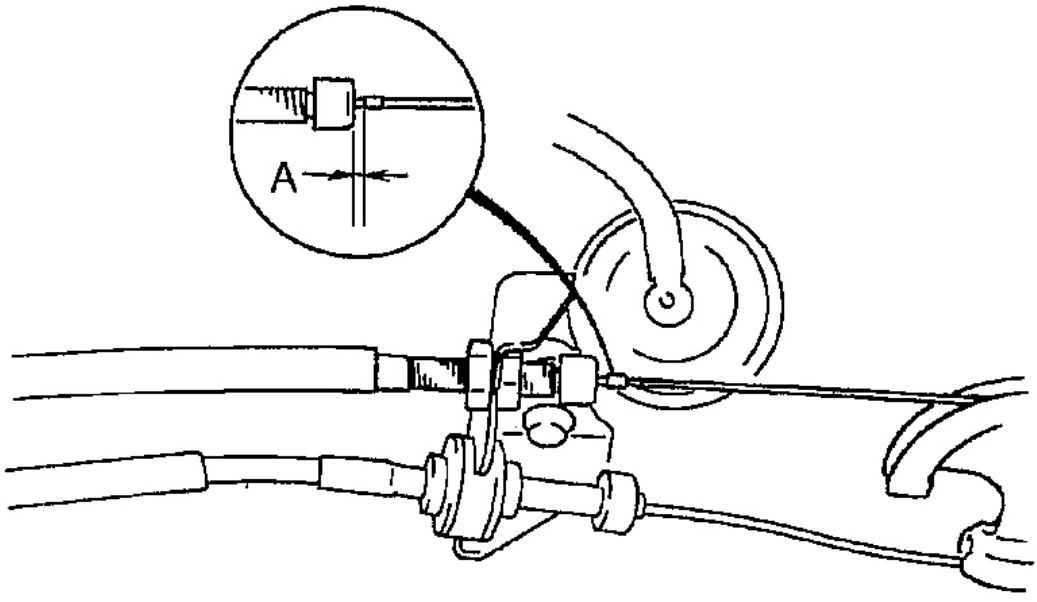

Fig. 9: Adjusting Throttle Cable Within Dimension A
Courtesy of MAZDA MOTORS CORP.

THROTTLE CABLE REMOVAL/INSTALLATION

ON-VEHICLE REMOVAL

1. Disconnect the negative battery cable.
2. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents.
3. Drain the ATF into separate suitable containers. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
4. Remove the throttle cable from the throttle lever.
5. Remove the oil pan and gasket.

CAUTION:
- **To prevent deformation of the tube, remove the tube by pulling both ends up.**

6. Remove the tube.

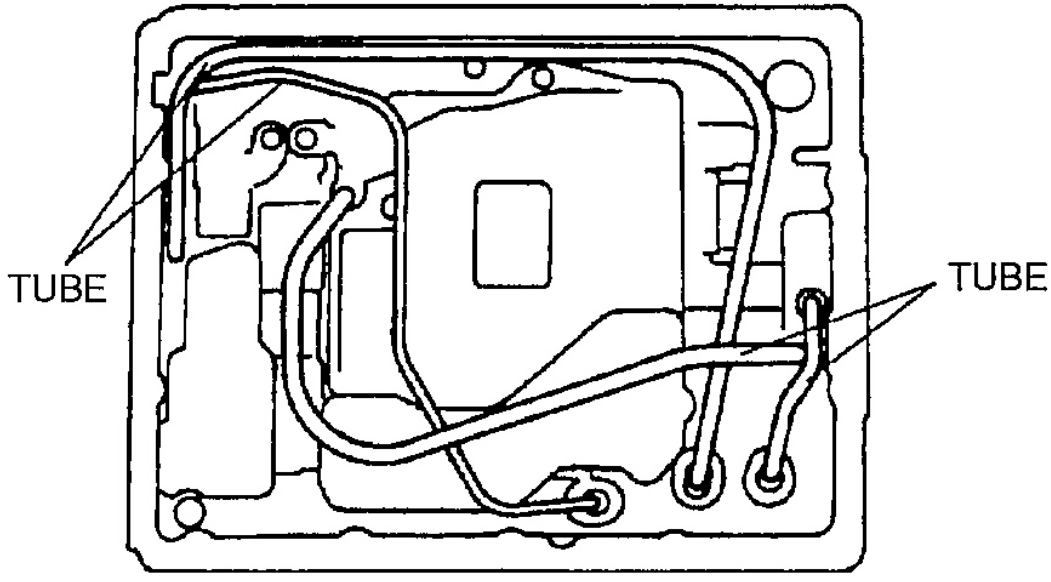

Fig. 10: Removing Tube
Courtesy of MAZDA MOTORS CORP.

7. Disconnect the shift solenoids A, B, and torque converter clutch solenoid valve connectors.
8. Remove the oil strainer.

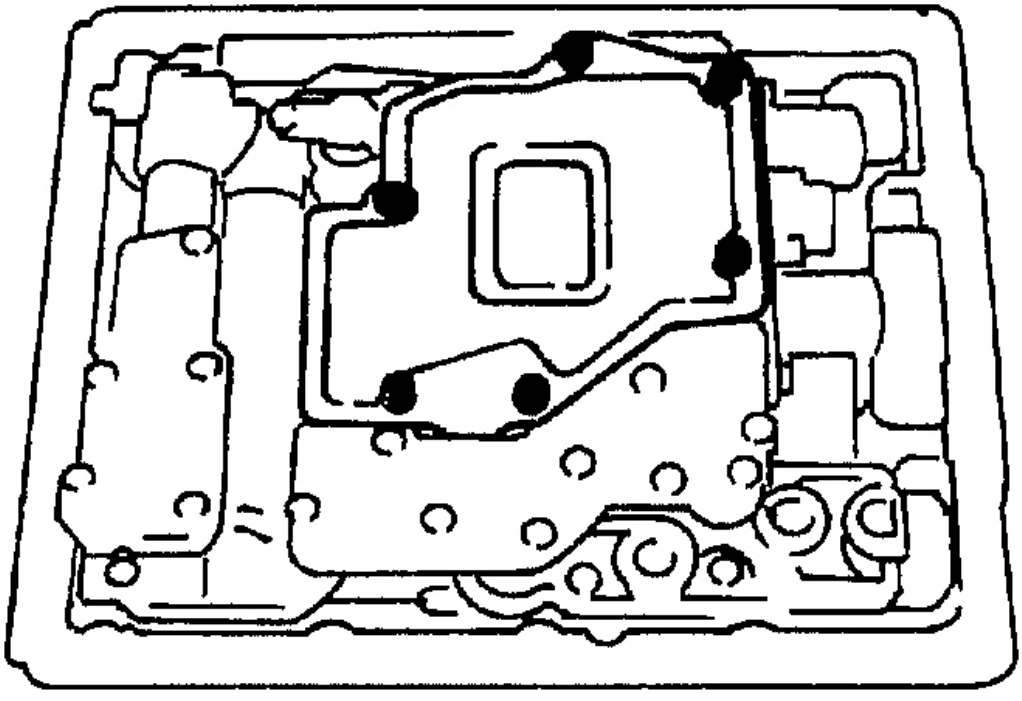

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Fig. 11: Removing Oil Strainer
Courtesy of MAZDA MOTORS CORP.

9. Remove the control valve body installation bolts.

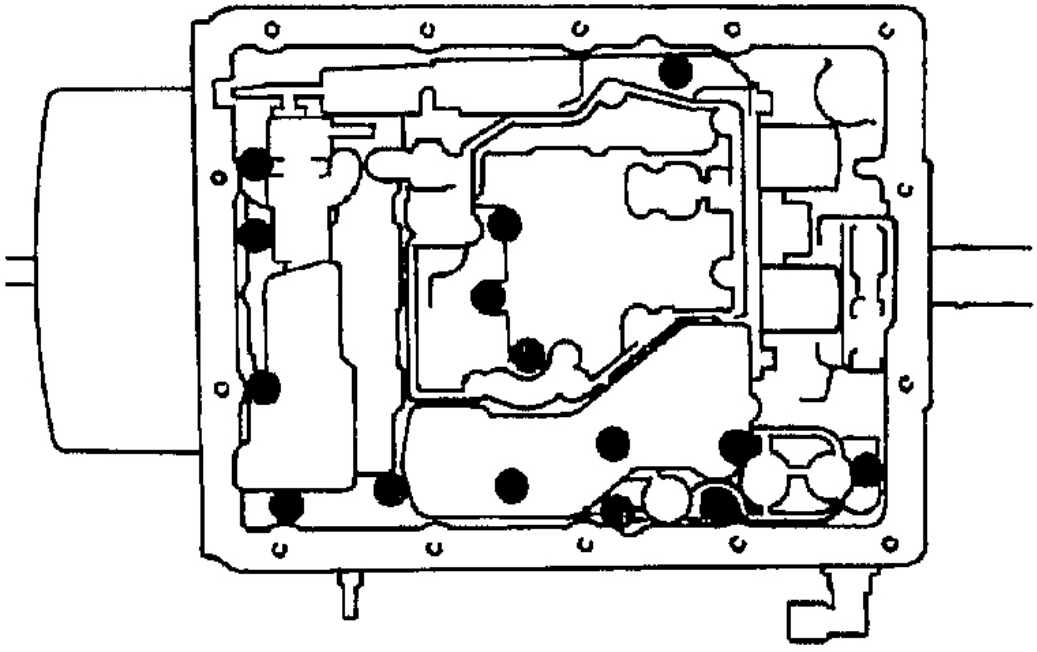

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Fig. 12: Removing Control Valve Body Bolts
Courtesy of MAZDA MOTORS CORP.

10. Remove the nipple of the throttle cable from the throttle cam.
11. Remove the control valve body.

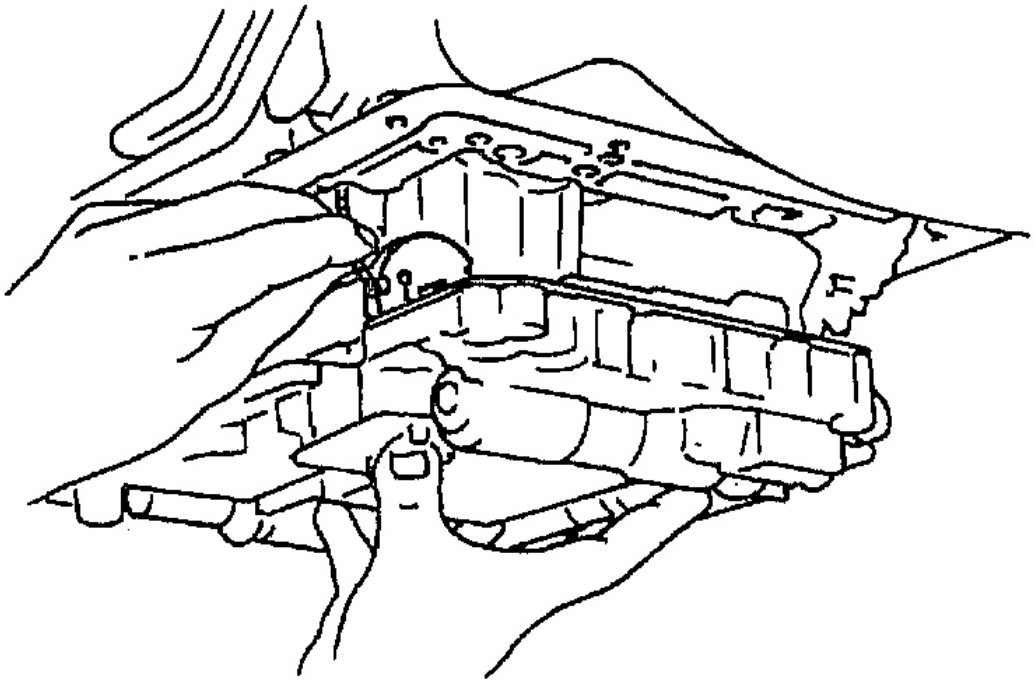

Fig. 13: Removing Control Valve Body
Courtesy of MAZDA MOTORS CORP.

12. Remove the accumulator spring.
13. Remove the throttle cable from the transmission case using a **10 mm {0.4 in}** socket wrench.

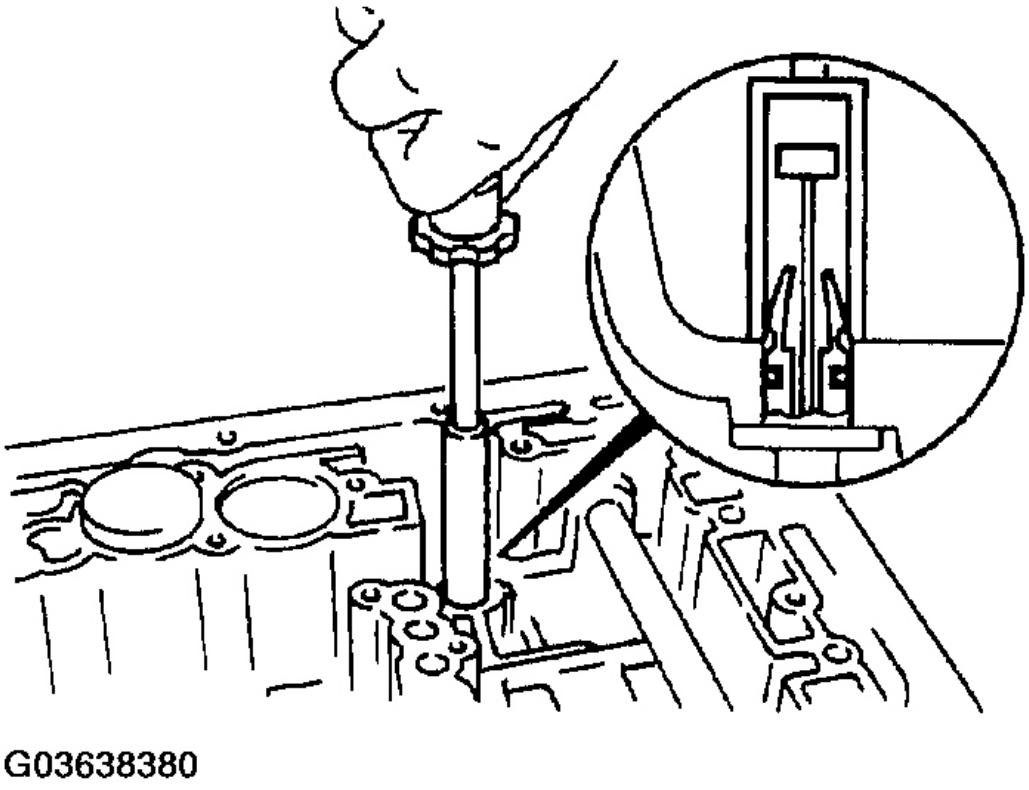

Fig. 14: Removing Throttle Cable From Transmission Case Using Socket Wrench
Courtesy of MAZDA MOTORS CORP.

14. Remove the throttle cable.
15. Remove the O-ring from the throttle cable.

ON-VEHICLE INSTALLATION

1. Apply ATF to a new O-ring.
2. Install the O-ring to the throttle cable.
3. Install the throttle cable.

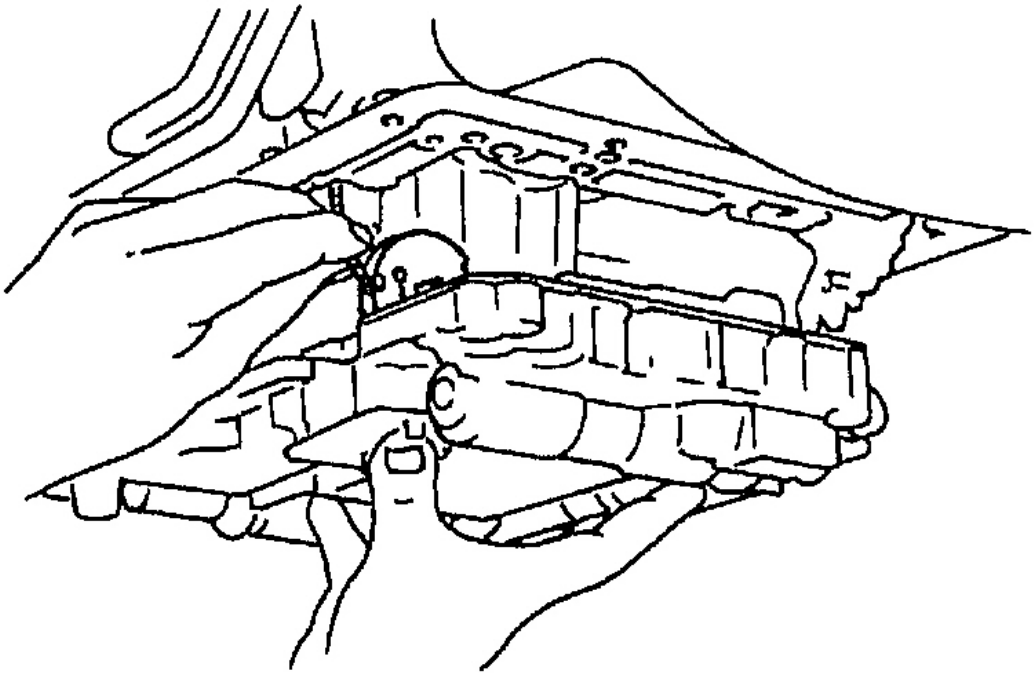

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Fig. 15: Installing Throttle Cable
Courtesy of MAZDA MOTORS CORP.

4. Install the nipple of the throttle cable to the throttle cam.
5. Verify that the manual valve and manual shaft are assembled correctly.

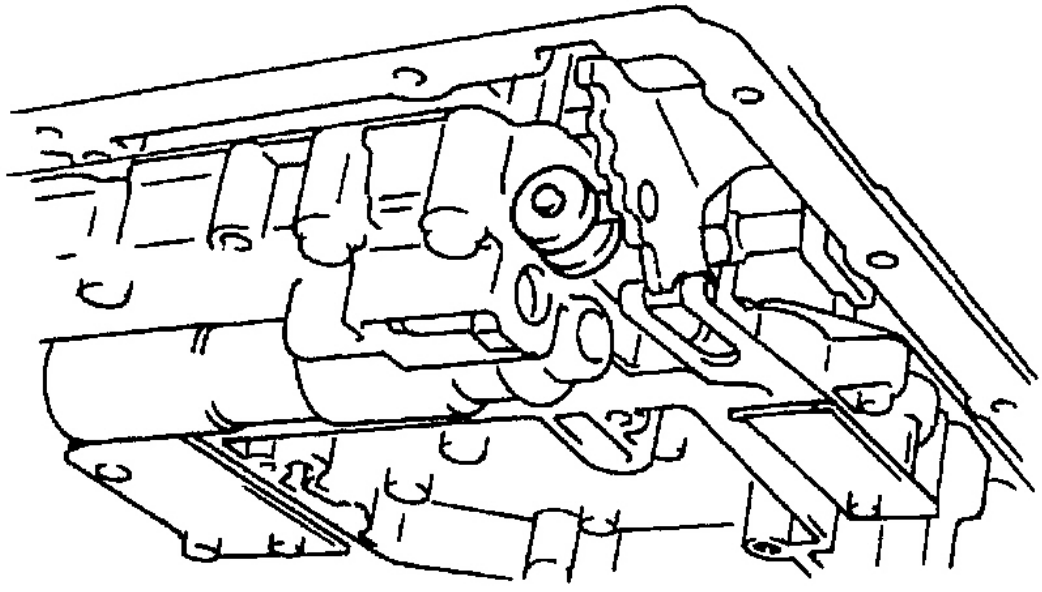

Fig. 16: Identifying Manual Valve And Manual Shaft Assembly
Courtesy of MAZDA MOTORS CORP.

6. Install the control valve body.

Tightening torque

7.9-11.7 N.{80-120 kgf.cm, 70-104 in.lbf}

NOTE:

- **Step 7 is for the throttle cable replacement only.**

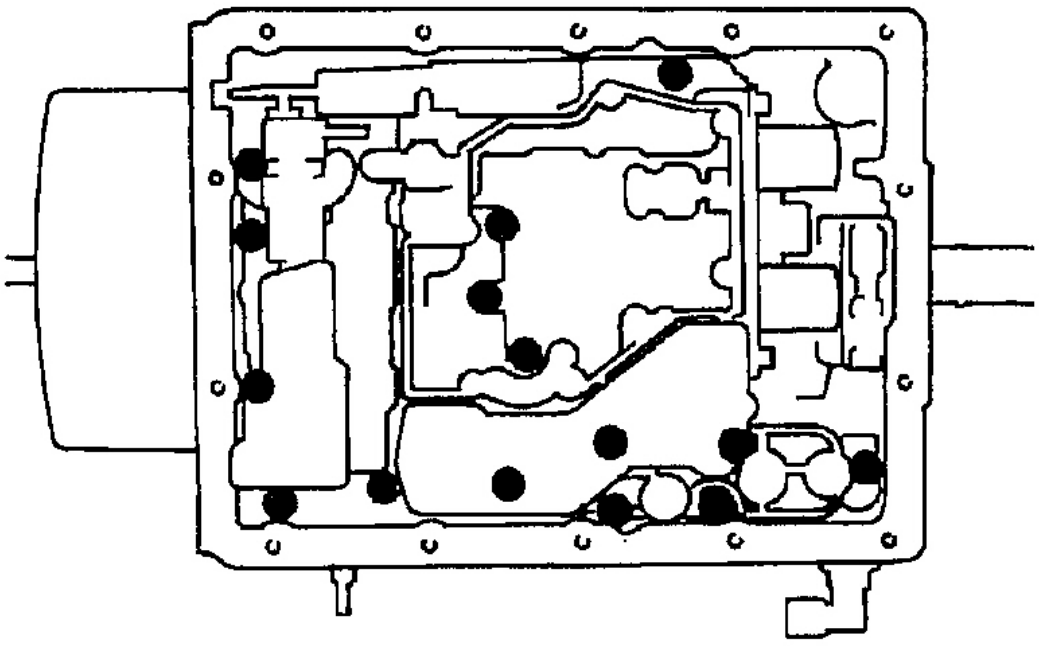

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Fig. 17: Installing Control Valve Body
Courtesy of MAZDA MOTORS CORP.

7. With throttle cable installed to the throttle cam, bend near the center of the throttle cable to a radius of **200 mm {7.87 in}** . Then, pull the throttle cable until there is no play or just before the throttle cam starts to move, and stake the adjustment mark at the position shown in the figure.

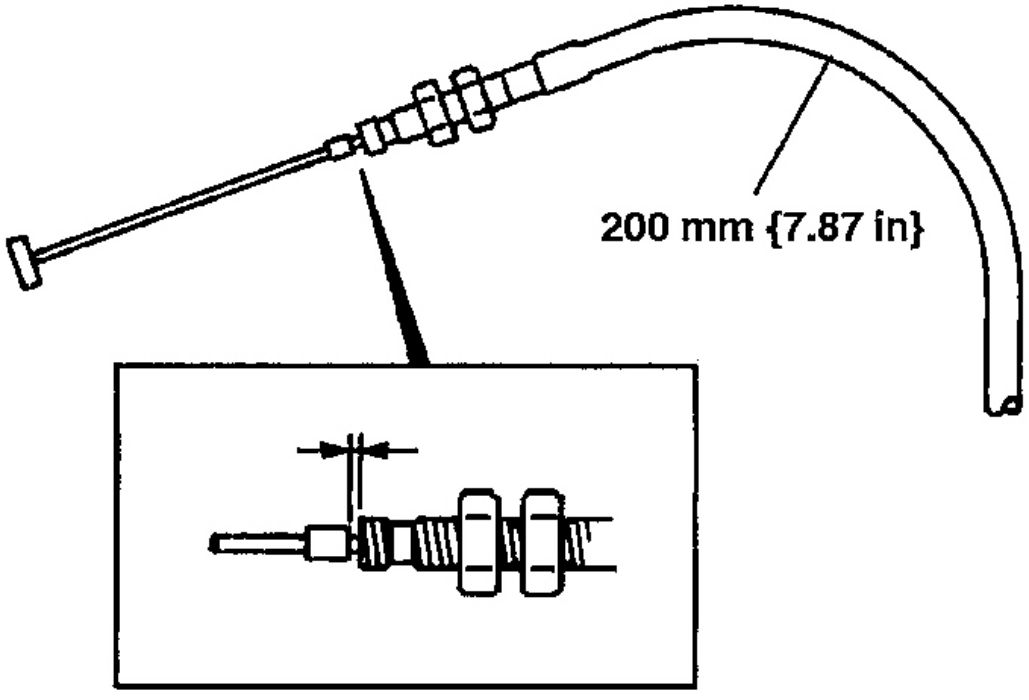

Fig. 18: Bending Throttle Cable
Courtesy of MAZDA MOTORS CORP.

8. Install the oil strainer.

   Tightening torque

   5.0-5.8 N.m {50-60 kgf.cm, 44-52 in.lbf}

9. Connect the shift solenoids A, B, and torque converter clutch solenoid valve connectors.

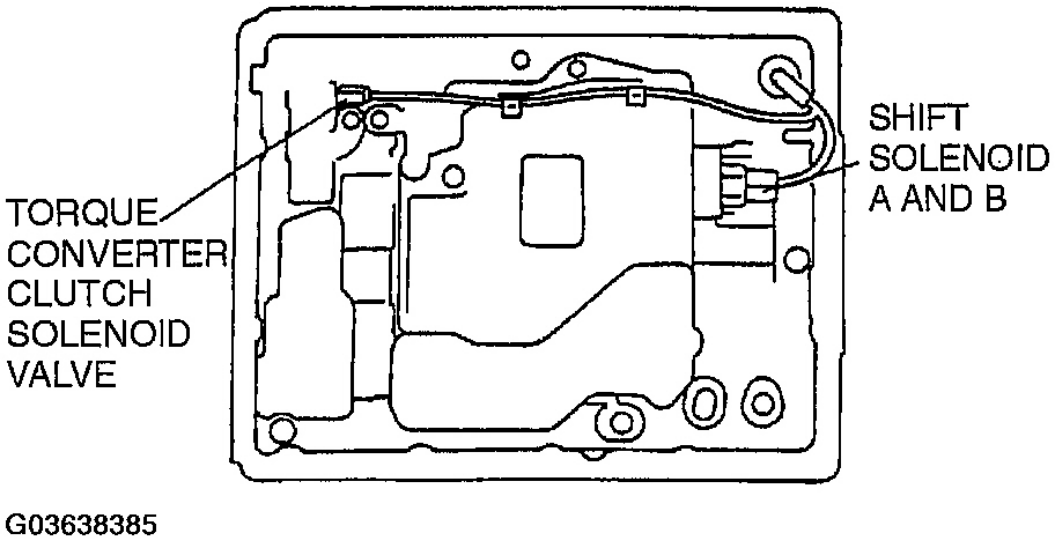

Fig. 19: Connecting Shift Solenoids And Torque Converter Clutch Solenoid Valve Connectors
Courtesy of MAZDA MOTORS CORP.

10. Install the tube.
11. Install the new gasket and oil pan.

Tightening torque

4.0-4.9 N.m {40-50 kgf.cm, 35-43 in.lbf}

12. Install the throttle cable to the throttle lever.
13. Adjust the throttle cable. (See **THROTTLE CABLE ADJUSTMENT**.)
14. Add ATF to the specified level. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
15. Carry out mechanical test. (See **MECHANICAL SYSTEM TEST**.)
16. Carry out road test. (See **ROAD TEST**.)

O/D OFF SWITCH INSPECTION

INSPECTION OF OPERATION

1. Turn the ignition switch from OFF to ON.
2. Verify that the O/D OFF indicator light is not illuminated. Depress the O/D OFF switch and verify that the O/D OFF indicator light illuminates.
    - If not as specified, inspect the terminal voltage of the O/D OFF switch.

INSPECTION OF VOLTAGE

1. Remove the rear console.
2. Turn the ignition switch to the ON position.
3. Measure the voltage at the O/D OFF switch connector.
    - If not as specified, inspect for continuity at the O/D OFF switch.

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

4. Install the rear console.

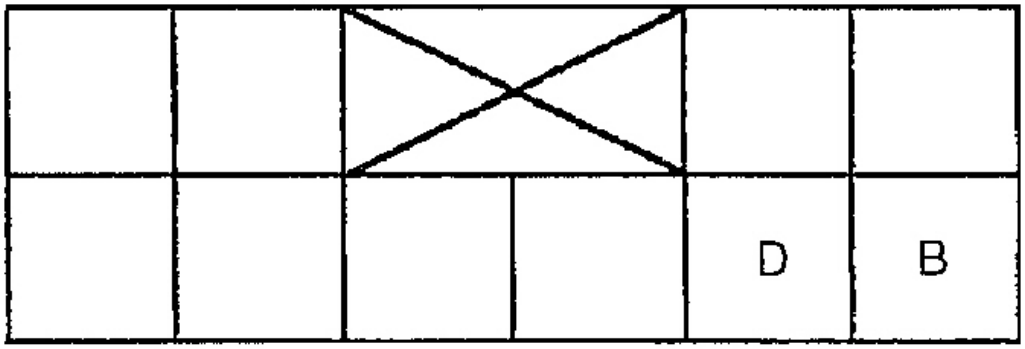

Fig. 20: Identifying O/D Off Switch Connector Terminals
Courtesy of MAZDA MOTORS CORP.

INSPECTION OF CONTINUITY

1. Disconnect the negative battery cable.
2. Remove the rear console.
3. Disconnect the O/D OFF switch connector.

4. Inspect for continuity at the O/D OFF switch.
   - If not as specified, replace the selector lever knob component.
   - If the switch is okay, inspect the wiring harness. (O/D OFF switch - transmission control module, O/D OFF switch - Body ground.)

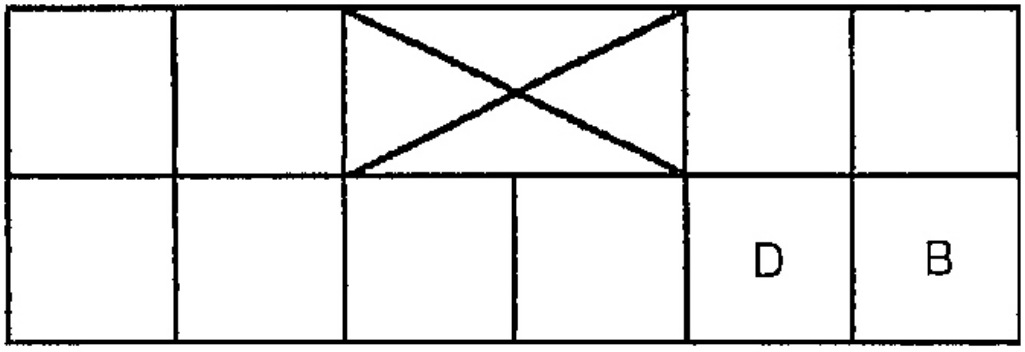

Fig. 21: Identifying Harness Side Connector (View From Terminal Side)
Courtesy of MAZDA MOTORS CORP.

○——○ : Continuity

Position	Connector terminal	
	B	D
Normal		
Depressed	○———	———○

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Fig. 22: Inspecting O/D Off Switch Continuity

Courtesy of MAZDA MOTORS CORP.

5. Install the rear console.
6. Connect the negative battery cable.

O/D OFF SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the rear console.
3. Disconnect the connector and remove the O/D OFF switch terminals. (See **SELECTOR LEVER DISASSEMBLY/ASSEMBLY** .)
4. Remove the selector lever knob component.
5. Install a selector lever knob component.

Tightening torque

2.0-2.9 N.m {20-30 kgf.cm, 18-26 in.lbf}

6. Install the O/D OFF switch terminals and connect the connector. (See **SELECTOR LEVER DISASSEMBLY/ASSEMBLY** .)
7. Install the rear console.
8. Connect the negative battery cable.

TRANSMISSION RANGE (TR) SWITCH INSPECTION

INSPECTION OF OPERATION

1. Verify that the starter operates only with the ignition switch at the START position and selector lever in the P/N position.
2. Verify that the back-up lights illuminate when shifted to the R position with the ignition switch at the ON position.
    - If not as specified, inspect the continuity of the TR switch.

INSPECTION OF CONTINUITY

1. Inspect the OBD trouble code. (See **DTC TABLE** .)
2. Remove the TR switch. (See **TRANSMISSION RANGE (TR) SWITCH REMOVAL/INSTALLATION**.)
3. Inspect for continuity at the TR switch.
    - If not as specified, replace the TR switch.

Range/position	Terminals	Continuity
	D-C	Yes

P	I-B	
	Other	No
R	I-F	Yes
	Other	No
N	D-C	Yes
	I-J	
	Other	No
D	I-H	Yes
	Other	No
2	I-E	Yes
	Other	No
1	I-G	Yes
	Other	No

PART SIDE CONNECTOR
(VIEW FROM TERMINAL SIDE)

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Fig. 23: Identifying TR Switch Connector (View From Terminal Side)
Courtesy of MAZDA MOTORS CORP.

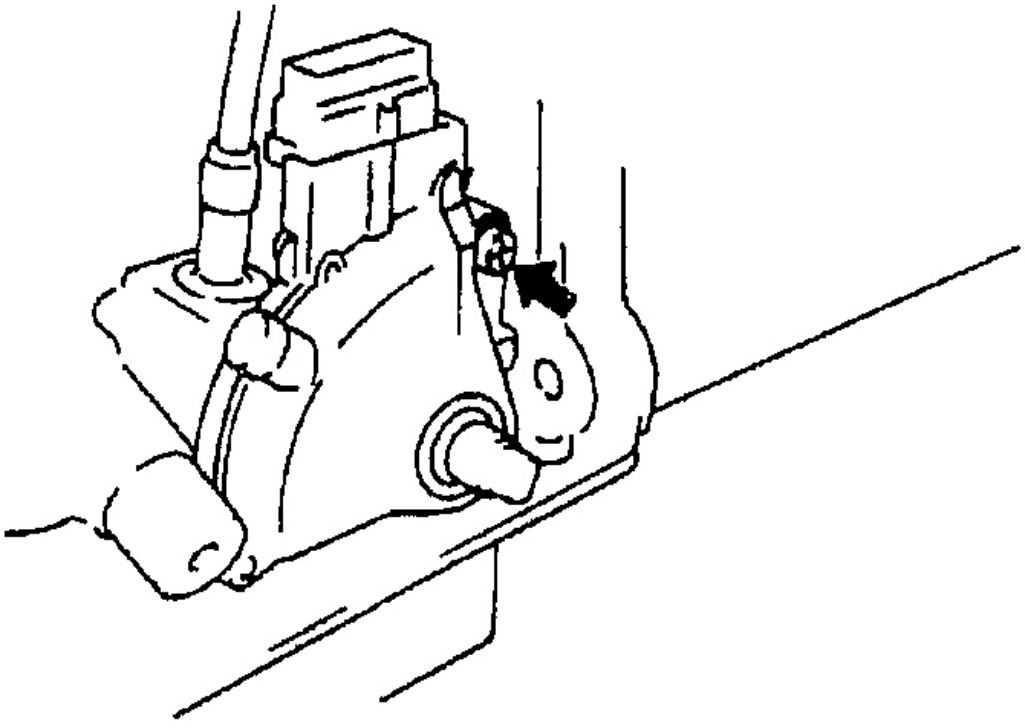
4. Install the TR switch. (See **TRANSMISSION RANGE (TR) SWITCH REMOVAL/INSTALLATION**.)

TRANSMISSION RANGE (TR) SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the TR switch connector.
3. Remove the selector rod from the manual shaft lever.
4. Remove the manual shaft lever.
5. Remove the staking of the lock washer using a screwdriver.
6. Remove the nut, lock washer, and packing.
7. Remove the TR switch.
8. Rotate the manual shaft to the N position.
9. Hand-tighten the TR switch bolt.
10. Install a new packing.
11. Install a new lock washer.
12. Tighten the nut.

Tightening torque

3.0-4.9 N.m {30-50 kgf.cm, 27-43 in.lbf}



G03638390

Fig. 24: Installing Nut
Courtesy of MAZDA MOTORS CORP.

13. Bend claws of the lock washer.
14. Adjust the TR switch. (See **TRANSMISSION RANGE (TR) SWITCH ADJUSTMENT**.)
15. Tighten the TR switch mounting bolt.

Tightening torque

4.0-6.8 N.m {40-70 kgf.cm, 35-60 in.lbf}

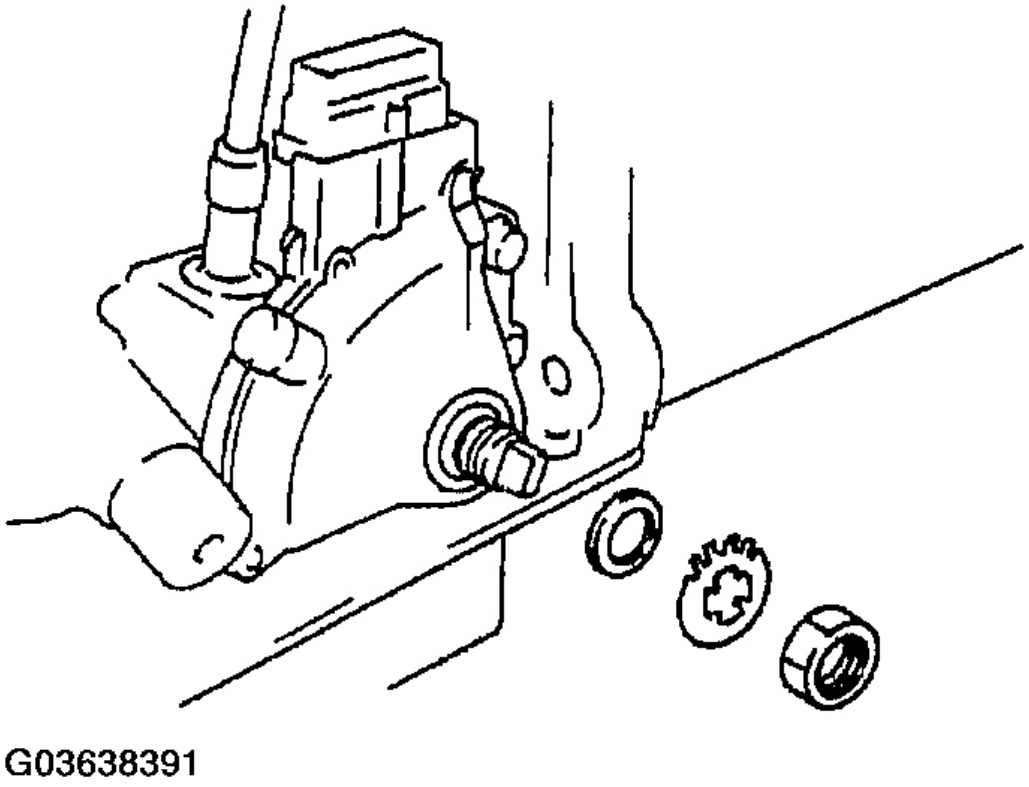


Fig. 25: Tightening TR Switch Mounting Bolt
Courtesy of MAZDA MOTORS CORP.

16. Rotate the manual shaft to the P position.
17. Install the manual shaft lever.
18. Install the selector rod to the manual shaft lever.

TRANSMISSION RANGE (TR) SWITCH ADJUSTMENT

1. Disconnect the negative battery cable.
2. Remove the selector rod from the manual shaft lever.
3. Rotate the manual shaft to the N position.
4. Loosen the TR switch mounting bolt.
5. Align the cut groove in the switch with the neutral reference line.
6. Tighten the TR switch mounting bolt.

Tightening torque

4.0-6.8 N.m {40-70 kgf.cm, 35-60 in.lbf}

7. Install the selector rod to the manual shaft lever.
8. Connect the negative battery cable.
9. Inspect the operation of the TR switch. (See **TRANSMISSION RANGE (TR) SWITCH INSPECTION**.)

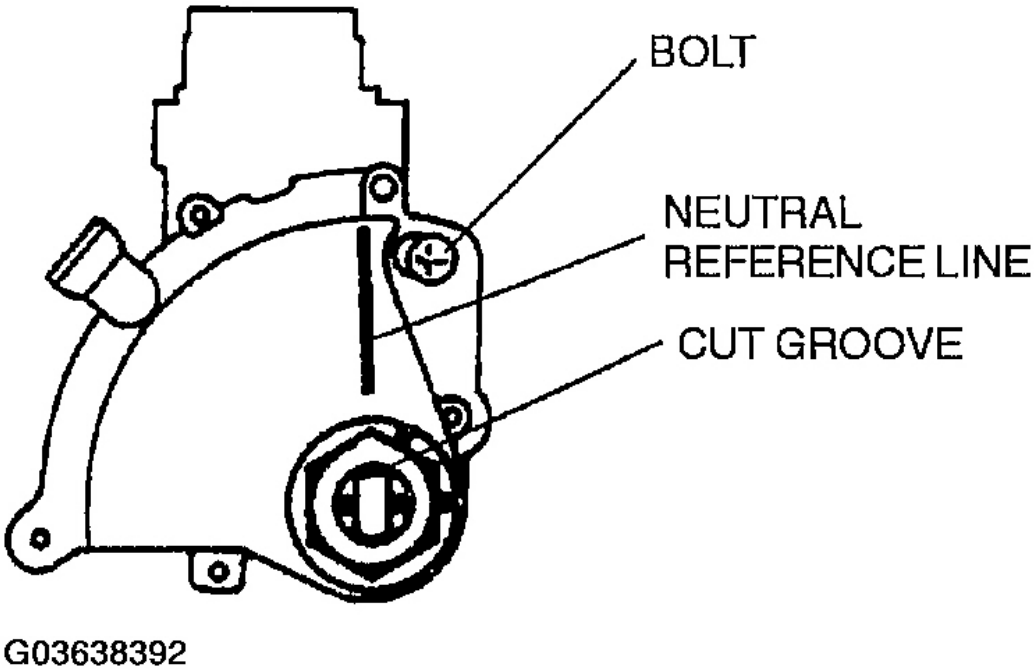


Fig. 26: Adjusting Transmission Range (TR) Switch
Courtesy of MAZDA MOTORS CORP.

INPUT/TURBINE SPEED SENSOR INSPECTION

1. Remove the bracket and front pipe. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
2. Disconnect the input/turbine speed sensor connector.

NOTE:

- **Resistance value of the input/turbine speed sensor varies with temperature. Normal resistance value occurs when the temperature is 20°C {68°F} , but it may be abnormal at high temperatures. Therefore, do not determine the resistance value only at 20°C {68°F}.**

3. Measure the resistance between the terminals of the input/turbine speed sensor.

- If not correct, replace the input/turbine speed sensor.

Resistance

560-680 ohms (20°C {68° F})

4. Connect the input/turbine speed sensor connector.
5. Install the front pipe and bracket. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
6. Connect the negative battery cable.

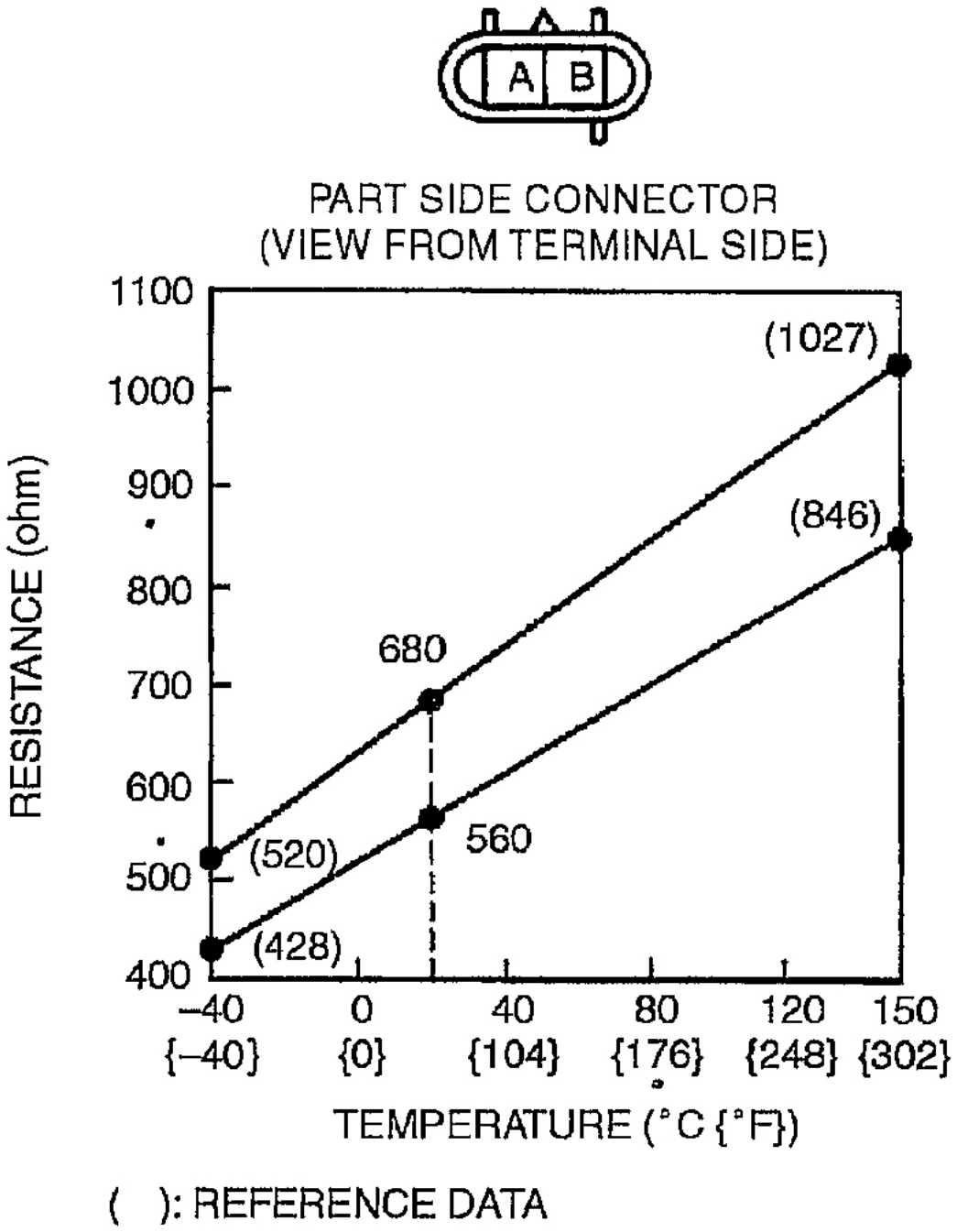


Fig. 27: Input/Turbine Speed Sensor Part Side Connector Graph
Courtesy of MAZDA MOTORS CORP.

INPUT/TURBINE SPEED SENSOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the bracket and front pipe. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
3. Disconnect the input/turbine speed sensor connector.
4. Remove the input/turbine speed sensor.
5. Remove the O-ring from the input/turbine speed sensor.
6. Apply ATF to a new O-ring.
7. Install the O-ring to the input/turbine speed sensor.
8. Install the input/turbine speed sensor.

   Tightening torque

   5.8-8.8 N.m {59-90 kgf.cm, 52-78 in.lbf}
9. Connect the input/turbine speed sensor connector.
10. Install the front pipe and bracket. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
11. Connect the negative battery cable.

OUTPUT SPEED SENSOR INSPECTION

1. Disconnect the output speed sensor connector.
2. Remove the output speed sensor.

   NOTE:
   - **Resistance value of the output speed sensor varies with temperature. Normal resistance value occurs when the temperature is 20°C {68°F} , but it may be abnormal at high temperatures. Therefore, do not determine the resistance value only at 20°C {68°F}.**

3. Measure the resistance between the terminals of the output speed sensor.
   - If not correct, replace the output speed sensor.

   Resistance

   387-473 ohms (20°C {68°F})
4. Install the output speed sensor.

   Tightening torque

   5.0-6.8 N.m {50-70 kgf.cm, 44-60 in.lbf}
5. Connect the output speed sensor connector.
6. Connect the negative battery cable.

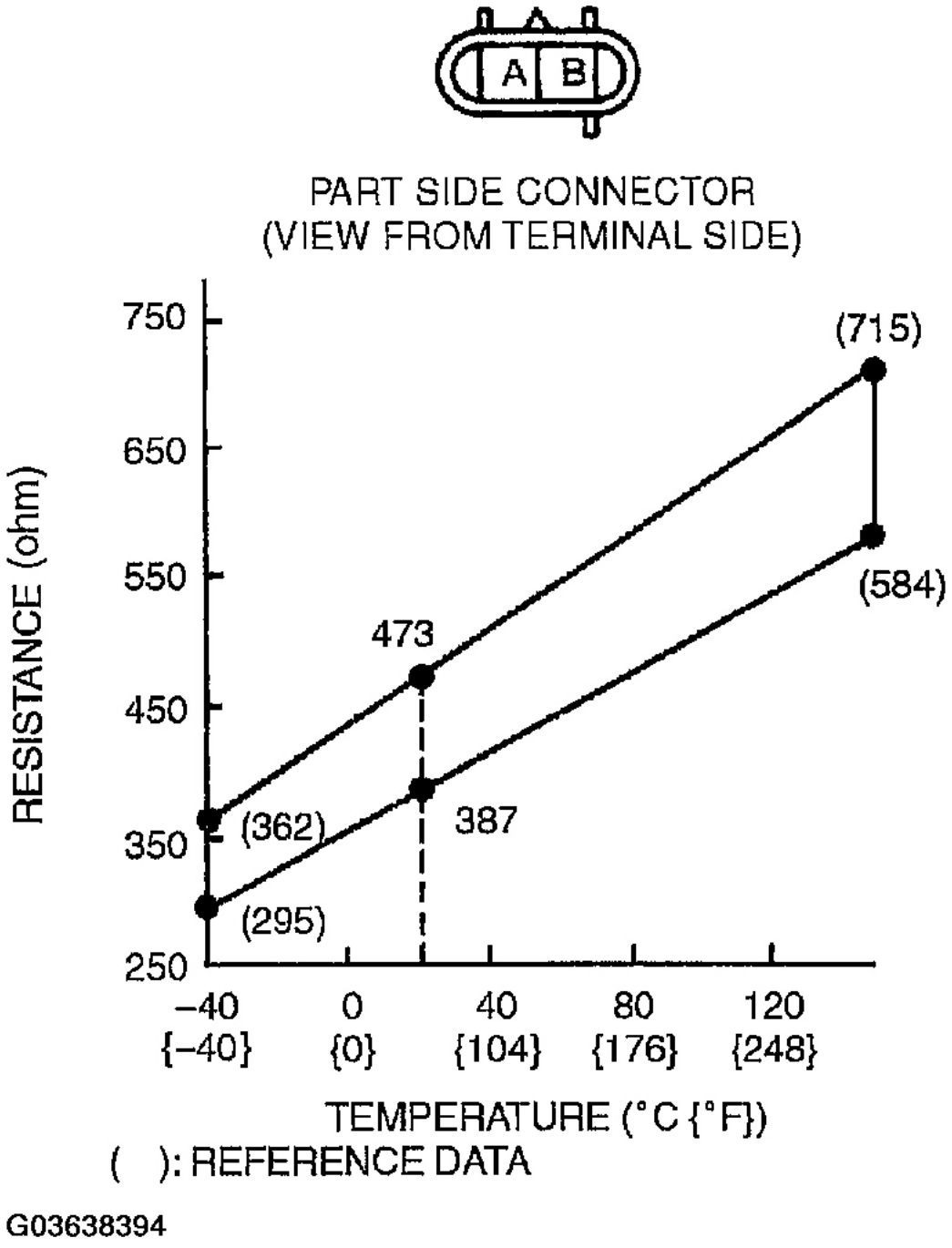


Fig. 28: Output Speed Sensor Part Side Connector Graph
Courtesy of MAZDA MOTORS CORP.

OUTPUT SPEED SENSOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the output speed sensor connector.
3. Remove the output speed sensor from the transmission
4. Apply ATF to a new O-ring.
5. Install the O-ring to the output speed sensor.
6. Install the output speed sensor to the transmission.

   Tightening torque

   5.0-6.8 N.m {50-70 kgf.cm, 44-60 in.lbf}

7. Connect the output speed sensor connector.
8. Connect the negative battery cable.

SOLENOID VALVES INSPECTION

INSPECTION OF SOLENOID VALVES

1. Inspect the OBD trouble code. (See **DTC TABLE** .)
2. Remove the solenoid valves. (See **SOLENOID VALVES REMOVAL/INSTALLATION**.)

   NOTE:

   - **Resistance value of the solenoid valve varies with temperature. Normal resistance value occurs when the temperature is 20°C {68°F} , but it may be abnormal at high temperatures. Therefore, do not determine the resistance value only at 20°C {68°F}.**

3. Measure the resistance between solenoid valve terminals.
   - If not correct, replace the solenoid valves.

Solenoid	Resistance (ohm)
Shift solenoid B	11-15
Shift solenoid A	11-15
Torque converter clutch solenoid valve	11-15

4. Install the solenoid valves. (See **SOLENOID VALVES REMOVAL/INSTALLATION**.)
5. Connect the solenoid valve connector.
6. Connect the negative battery cable.

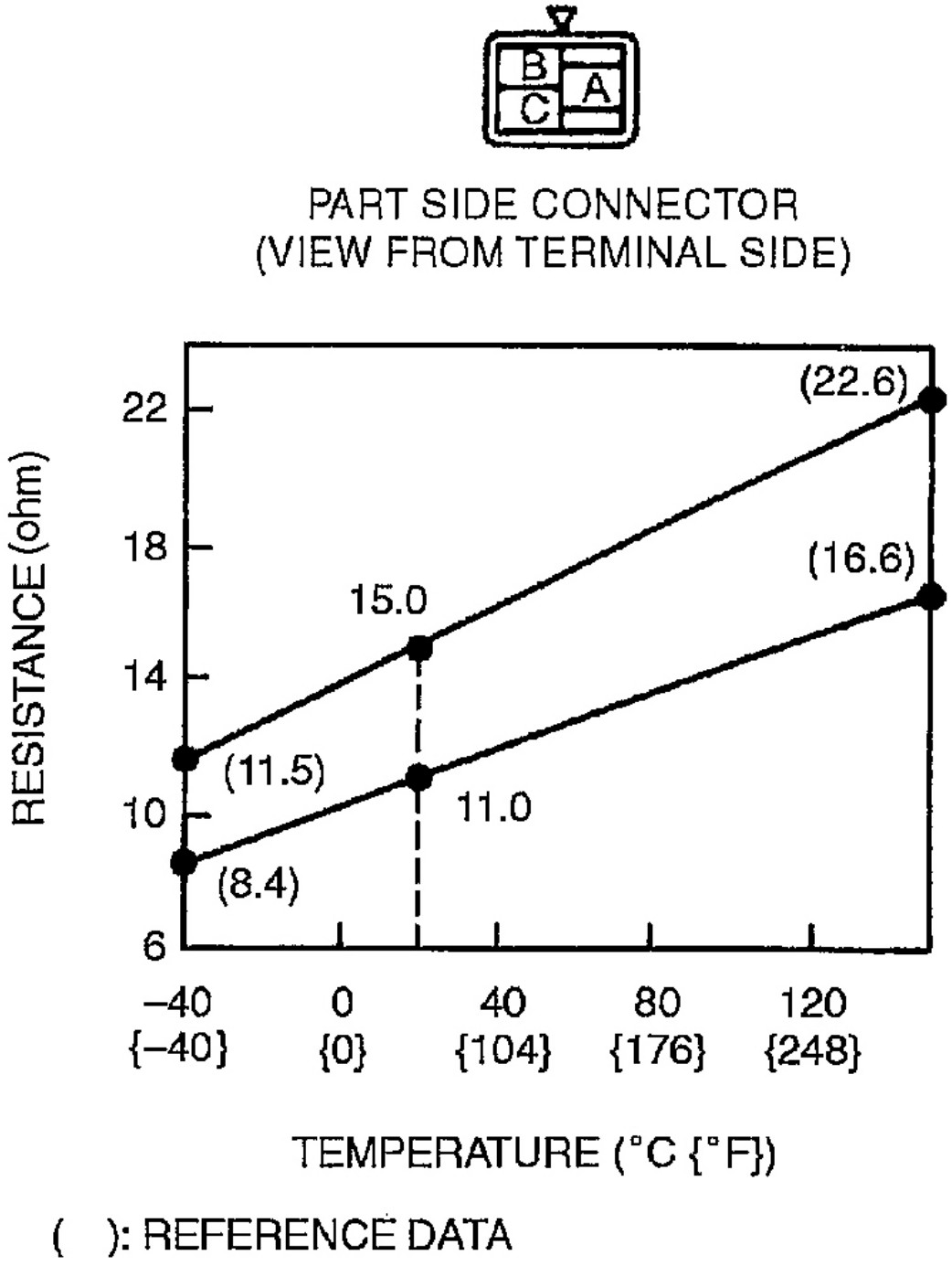


Fig. 29: Solenoid Valve Part Side Connector Graph

Courtesy of MAZDA MOTORS CORP.

OPERATING INSPECTION

1. Disconnect the negative battery cable.
2. Remove the solenoid valves. (See **SOLENOID VALVES REMOVAL/INSTALLATION**.)
3. Apply the voltage at terminal and listen for a ' "click" sound at all solenoid valves.
   - If a "click" is not heard, replace the solenoid valve.
4. Install the solenoid valves. (See **SOLENOID VALVES REMOVAL/INSTALLATION**.)
5. Connect the solenoid valve connector.
6. Connect the negative battery cable.

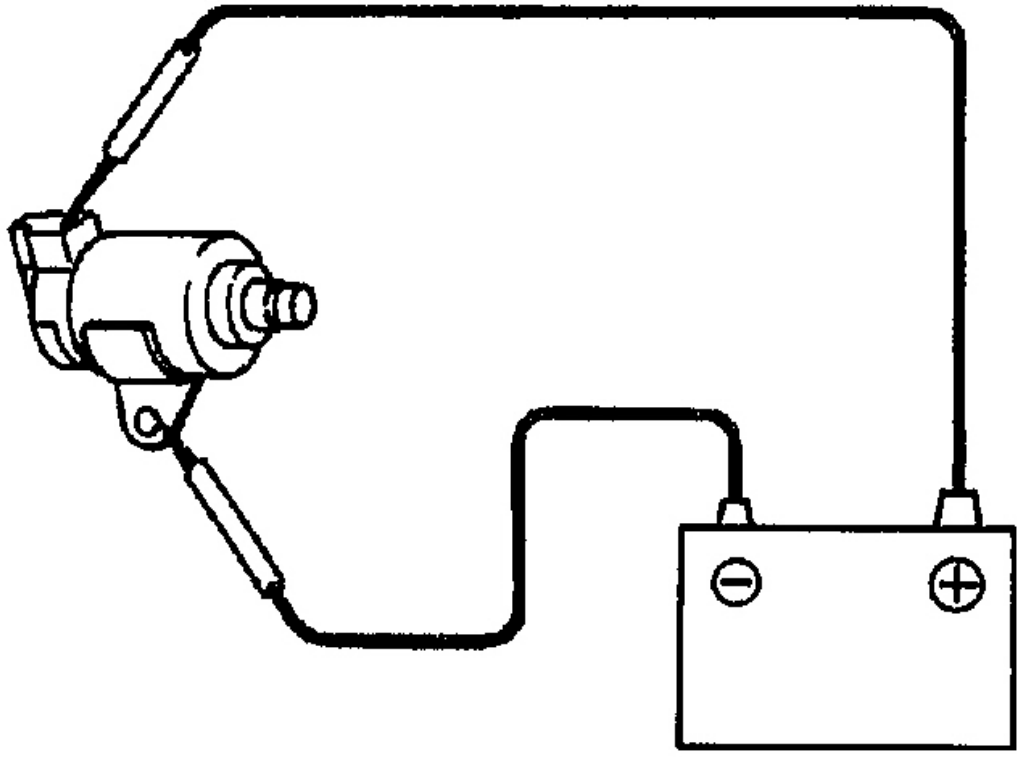


Fig. 30: Inspecting Solenoid Valve Operation
Courtesy of MAZDA MOTORS CORP.

FAIL-SAFE FUNCTION

FAIL-SAFE FUNCTION

Gear/solenoid condition	D range				2 range	1 range
Required gear position	1GR	2GR	3GR	4GR	2GR	1GR
Shift solenoid A malfunction	3GR	3GR	3GR	4GR	3GR	1GR
Shift solenoid B malfunction	1GR	4GR	4GR	4GR	3GR	1GR
Shift solenoids A and B both malfunction	4GR	4GR	4GR	4GR	3GR	1GR

SOLENOID VALVES REMOVAL/INSTALLATION

1. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents.
2. Disconnect the negative battery cable.
3. Drain the ATF. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
4. Remove the oil pan and gasket.

CAUTION:
- **To prevent deformation of the tube, remove the tube by pulling both ends up.**

5. Remove the tubes.

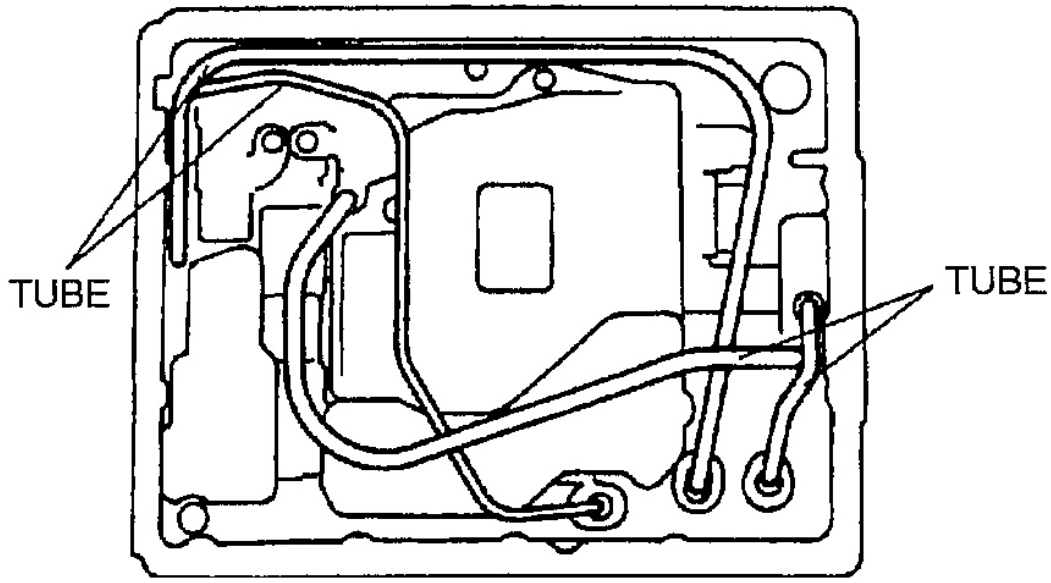


Fig. 31: Removing Tubes
Courtesy of MAZDA MOTORS CORP.

6. Disconnect the shift solenoids A, B and torque converter clutch solenoid valve connectors.

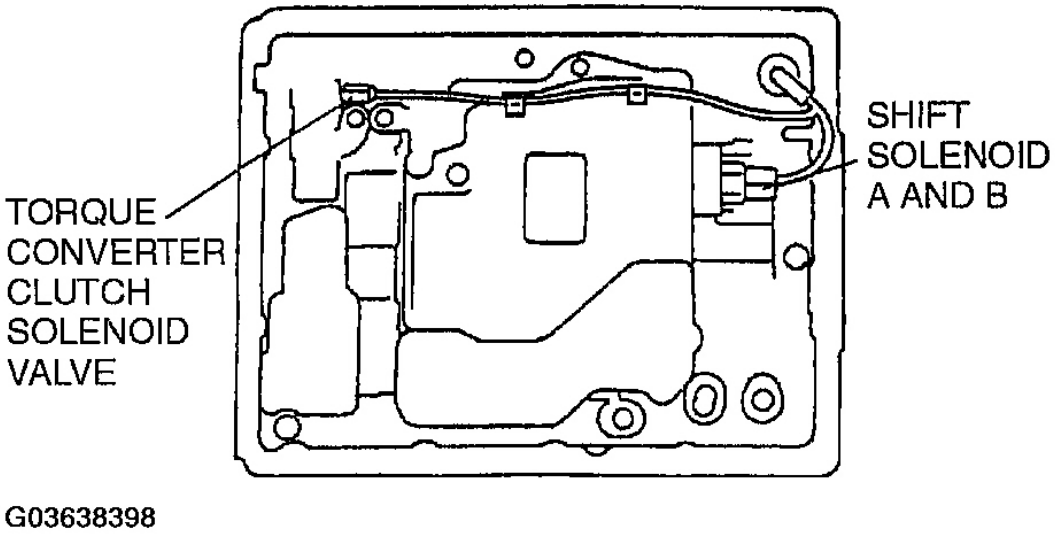


Fig. 32: Disconnecting Shift Solenoids & Torque Converter Clutch Solenoid Valve Connectors
Courtesy of MAZDA MOTORS CORP.

7. Remove the solenoid valve.
8. Apply ATF to a new O-ring.
9. Install the O-ring to the torque converter clutch solenoid valve.

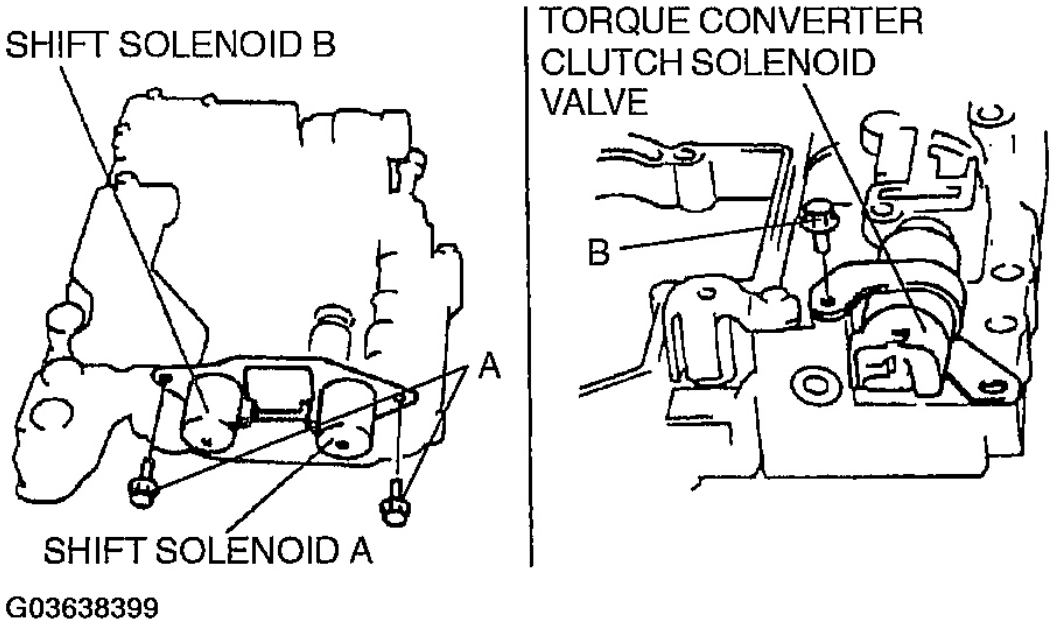


Fig. 33: Identifying Torque Converter Clutch Solenoid Valve
Courtesy of MAZDA MOTORS CORP.

10. Install a new gasket and solenoid valve to the control valve body.

    Tightening torque

    A: 7.9-11.7 N.m {80-120 kgf.cm, 70-104 in.lbf}
    B: 5.0-5.8 N.m {50-60 kgf.cm, 44-52 in.lbf}

11. Connect shift solenoids A, B, and torque converter clutch solenoid valve connectors.

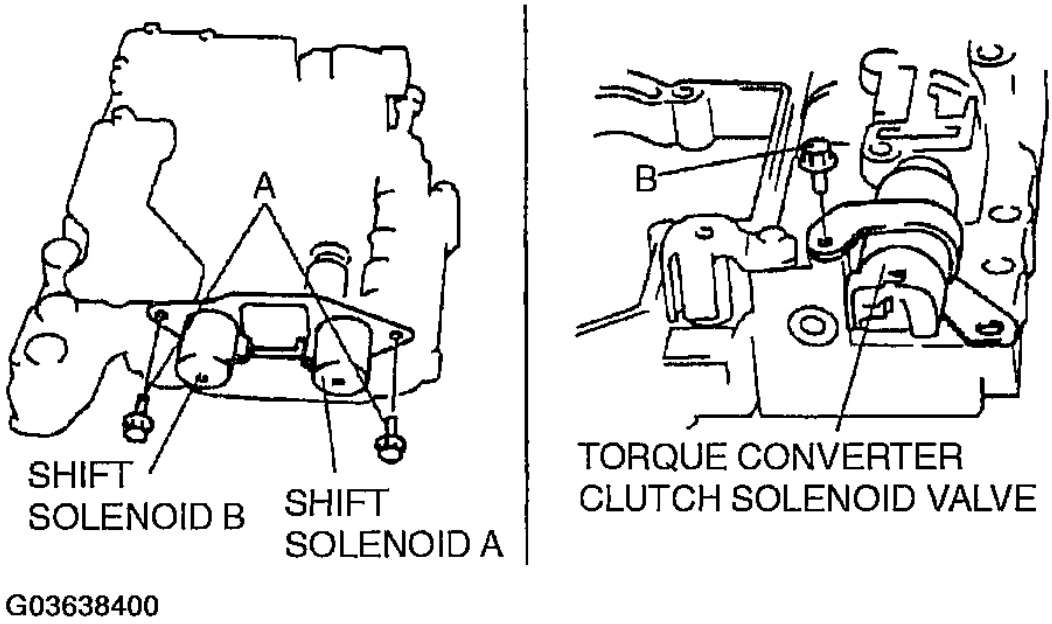


Fig. 34: Connecting Shift Solenoids And Torque Converter Clutch Solenoid Valve Connectors
Courtesy of MAZDA MOTORS CORP.

12. Install the tubes.
13. Install the new gasket and oil pan.

Tightening torque

4.0-4.9 N.m {40-50 kgf.cm, 35-43 in.lbf}

14. Add ATF to the specified level. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
15. Carry out mechanical test. (See **MECHANICAL SYSTEM TEST**.)
16. Carry out road test. (See **ROAD TEST**.)

TRANSMISSION CONTROL MODULE (TCM) INSPECTION

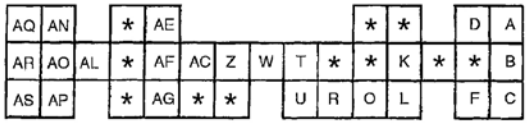
1. Turn the ignition switch to the ON position, and inspect the TCM terminal voltage, referring to the Terminal Voltage Chart.
   - If any TCM terminal voltage is incorrect, inspect the related input of output devices and wiring.
   - If no problem is found, replace the TCM.

NOTE:

- **Use the ground of terminal AP of the TCM when measuring terminal**

voltage as an error may occur when the negative (-) lead of the circuit tester is connected to ground.

TERMINAL VOLTAGE TABLE (REFERENCE DATA)



HARNESS SIDE CONNECTOR
(VIEW FROM HARNESS SIDE)

Terminal	Signal	Connected to	Test condition	Voltage (V)	Action
A	TR switch (1 range)	TR switch	1 range	B+	• Inspect TR switch (See TRANSMISSION RANGE (TR) SWITCH INSPECTION) • Inspect related harness
			All other ranges	below 1	
B	TR switch (2 range)	TR switch	2 range	B+	• Inspect TR switch (See TRANSMISSION RANGE (TR) SWITCH INSPECTION) • Inspect related harness
			All other ranges	below 1	
C	TR switch (D range)	TR switch	D range	B+	• Inspect TR switch (See TRANSMISSION RANGE (TR) SWITCH INSPECTION) • Inspect related harness
			All other ranges	below 1	
D	TR switch (R position)	TR switch	R position	B+	• Inspect TR switch (See TRANSMISSION RANGE (TR) SWITCH INSPECTION) • Inspect related harness
			All other ranges	below 1	
E	—	—	—	—	—

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Fig. 35: Transmission Control Module (TCM) Terminal Voltage Reference Table (1 Of 4)
Courtesy of MAZDA MOTORS CORP.

Terminal	Signal	Connected to	Test condition	Voltage (V)	Action
F	TR switch (P or N position)	TR switch	P or N position	B+	• Inspect TR switch (See 05–13–15 TRANSMISSION RANGE (TR) SWITCH INSPECTION) • Inspect related harness
			All other ranges	below 1	
H	—	—	—	—	—
J	—	—	—	—	—
K	O/D OFF switch	O/D OFF switch	O/D OFF switch is released.	above 10	• Inspect O/D OFF switch (See O/D OFF SWITCH INSPECTION) • Inspect related harness
			O/D OFF switch is depressed.	below 1	
L	O/D OFF indicator light	O/D OFF indicator light	O/D OFF indicator light illuminates.	below 1	• Inspect O/D OFF indicator light (See PANEL LIGHT CONTROL SWITCH INSPECTION) • Inspect related harness
			O/D OFF indicator light does not illuminate.	B+	
M	—	—	—	—	—
N	—	—	—	—	—
O	PCM/TCM communication	PCM	Because PCM/TCM communication is carried out by serial communication, the condition of the PCM/TCM communication cannot be decided by inspection of terrminal voltage only. Perform inspection according to DTC as well.	—	• Inspect PCM (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [BP, BP WITH TC]) • Inspect related harness
Q	—	—	—	—	—
R	TP (V-ref)	TP sensor	Ignition switch is off.	below 1	• Inspect TP sensor (See THROTTLE POSITION (TP) SENSOR INSPECTION [BP, BP WITH TC]) • Inspect related harness
			Ignition switch is on.	4.5—5.5	
T	4GR inhibit signal (Auto speed control signal)	Cruise control module	Idle	above 10	• Inspect cruise control module (See CRUISE CONTROL MODULE INSPECTION) • Inspect related harness
			When 4GR inhibit signal is input	below 1	

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Fig. 36: Transmission Control Module (TCM) Terminal Voltage Reference Table (2 Of 4)
Courtesy of MAZDA MOTORS CORP.

Terminal	Signal	Connected to	Test condition	Voltage (V)	Action
U	TP (TVO)	TP sensor	CTP	0.3—1.0	• Inspect TP sensor (See THROTTLE POSITION (TP) SENSOR INSPECTION [BP, BP WITH TC]) • Inspect related harness
			WOT	3.7—4.4	
W	Input/turbine speed sensor	Input/turbine speed sensor	Idle	Pulse generation*	• Inspect input/ turbine speed sensor (See INPUT/ TURBINE SPEED SENSOR INSPECTION) • Inspect related harness
Z	Ground (Input/ turbine speed sensor)	Input/turbine speed sensor	Ignition switch is ON.	2.5 (DC) 0 (AC)	• Inspect input/ turbine speed sensor (See INPUT/ TURBINE SPEED SENSOR INSPECTION) • Inspect related harness
AA	—	—	—	—	—
AC	Vehicle speed signal	VSS	Vehicle speed at 30km/h {18.6 mph}	Pulse generation*	• Inspect VSS (See VEHICLE SPEEDOMET ER SENSOR INSPECTION [M15M-D]) • Inspect related harness
AD	—	—	—	—	—
AE	Output speed sensor	Output speed sensor	Ignition switch is on.	2.5 (DC) 0 (AC)	• Inspect output speed sensor (See OUTPUT SPEED SENSOR INSPECTION) • Inspect related harness
AF	Output speed sensor	Output speed sensor	Vehicle speed at 30 km/h {18.6 mph}	Pulse generation*	• Inspect output speed sensor (See OUTPUT SPEED SENSOR INSPECTION) • Inspect related harness

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Fig. 37: Transmission Control Module (TCM) Terminal Voltage Reference Table (3 Of 4)
Courtesy of MAZDA MOTORS CORP.

Terminal	Signal	Connected to	Test condition	Voltage (V)	Action
AG	Engine speed signal	PCM	Idle	Pulse generation*	• Inspect PCM (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [BP, BP WITH TC]) • Inspect related harness
AH	—	—	—	—	—
AI	—	—	—	—	—
AJ	—	—	—	—	—
AL	PCM/TCM communication	PCM	Because PCM/TCM communication is carried out by serial communication, the condition of the PCM/TCM communication cannot be decided by inspection of terminal voltage only. Perform inspection according to DTC as well.	—	• Inspect PCM (See ENGINE CONTROL SYSTEM OPERATION INSPECTION [BP, BP WITH TC]) • Inspect related harness
AN	Shift solenoid B	Shift solenoid B	Except 2GR or 3GR	B+	• Inspect shift solenoid B (See SOLENOID VALVES INSPECTION) • Inspect related harness
			1GR or 4GR	below 1	
AO	TCC solenoid valve	TCC solenoid valve	TCC is ON	B+	• Inspect TCC solenoid valve (See SOLENOID VALVES INSPECTION) • Inspect related harness
			TCC released	below 1	
AP	TCM ground	—	Under any condition	below 1	• Inspect related harness
AQ	Shift solenoid A	Shift solenoid A	1GR or 2GR	B+	• Inspect shift solenoid A (See SOLENOID VALVES INSPECTION) • Inspect related harness
			3GR or 4GR	below 1	
AR	Power supply	—	Under any condition	B+	• Inspect battery (See BATTERY INSPECTION) • Inspect related harness
AS	Power supply	Main relay	Ignition switch is off.	below 1	• Inspect main relay • Inspect related harness
			Ignition switch is on.	B+	

* : See 05–13–25 Input/Output Pulse (Reference)

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Fig. 38: Transmission Control Module (TCM) Terminal Voltage Reference Table (4 Of 4)
Courtesy of MAZDA MOTORS CORP.

INPUT/OUTPUT PULSE (REFERENCE)

Input/turbine speed sensor

- Connecting terminal: W (+)-AP (-)
- Measuring device setting: 1V/DIV (Y) 5 ms/DIV (X)
- Measuring condition: Idle

Fig. 39: Turbine Speed Sensor Graph
Courtesy of MAZDA MOTORS CORP.

Vehicle speed signal

- Connecting terminal: AC (+)-AP (-)
- Measuring device setting: 1V/DIV (Y) 5ms/DIV (X)
- Measuring condition: Vehicle speed at 30 km/h {18.6 mph}

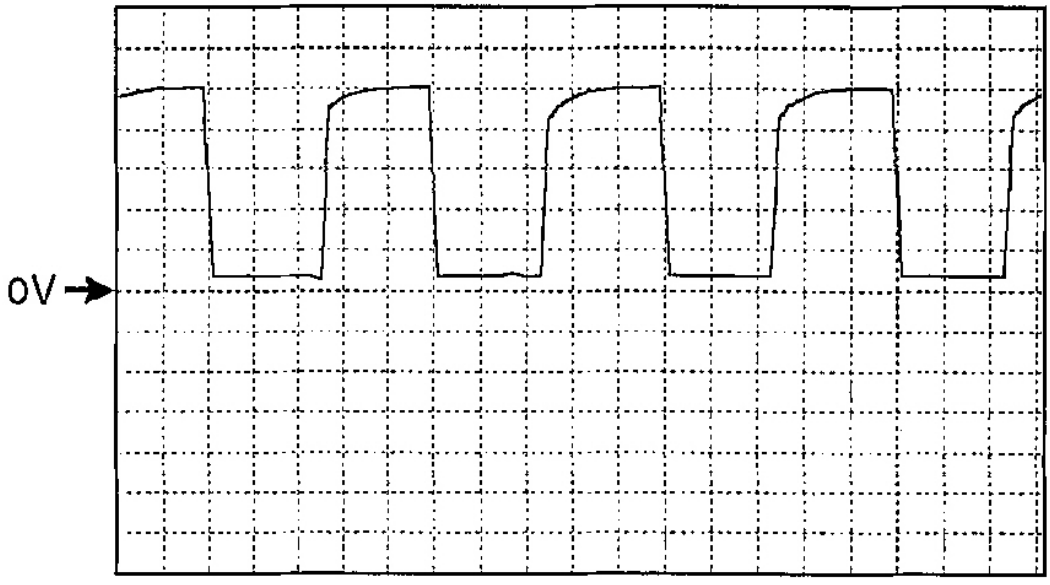


Fig. 40: Vehicle Speed Signal Graph
Courtesy of MAZDA MOTORS CORP.

Output speed sensor

- Connecting terminal: AF (+)-AP (-)
- Measuring device setting: 1V/DIV (Y) 5ms/DIV (X)
- Measuring condition: Vehicle speed at 30 km/h {18.6 mph}

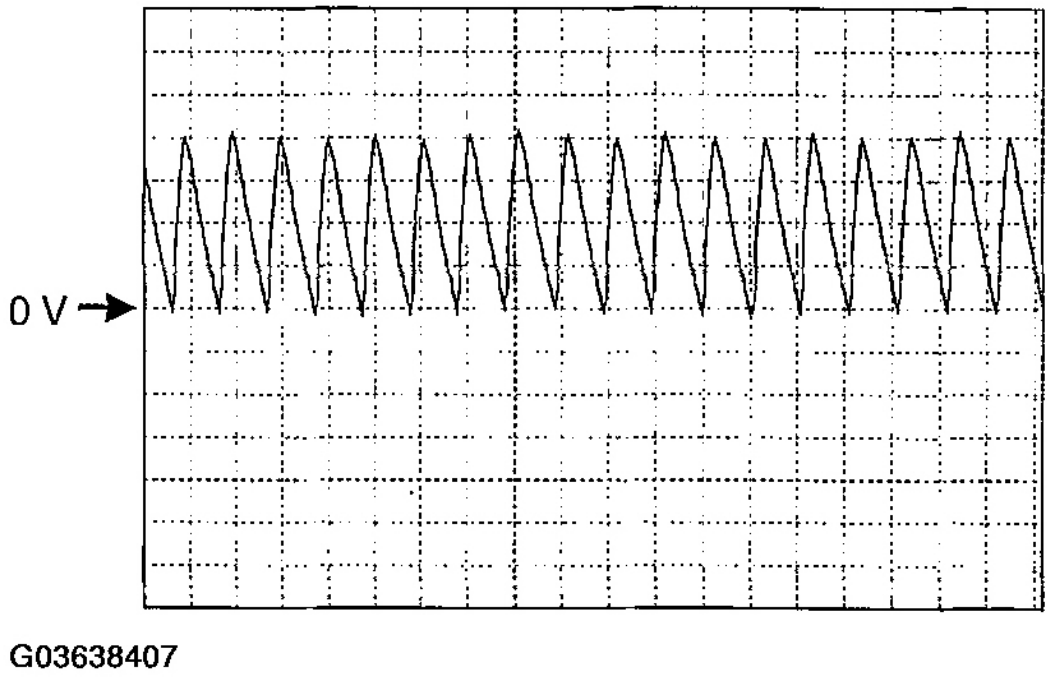


Fig. 41: Output Speed Sensor Graph
Courtesy of MAZDA MOTORS CORP.

Engine speed signal

- Connecting terminal: AG (+)-AP (-)
- Measuring device setting: 2V/DIV (Y) 5 ms/DIV (X)
- Measuring condition: Idle

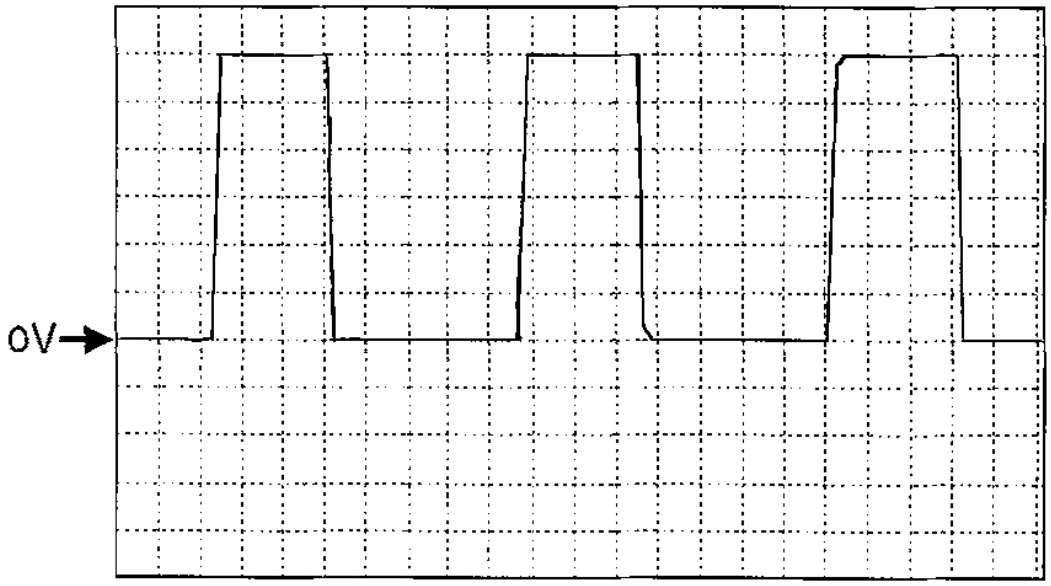


Fig. 42: Engine Speed Signal Graph
Courtesy of MAZDA MOTORS CORP.

TRANSMISSION CONTROL MODULE (TCM) REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Disconnect the TCM connector.
3. Remove the TCM.
4. Install the TCM.

Tightening torque

36 N.m {3.7 kgf.m, 27 ft.lbf}

5. Connect the TCM connector.
6. Connect the negative battery cable.

AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION

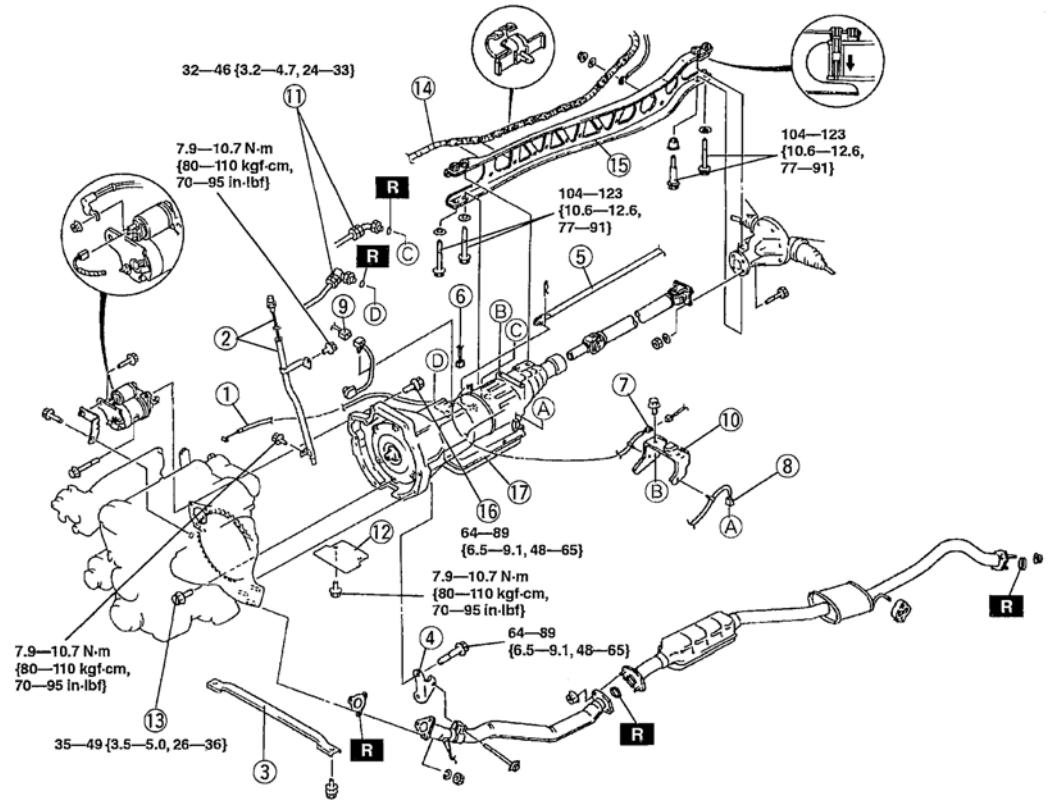
1. Disconnect the negative battery cable.
2. Drain the ATF. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
3. Remove the cross member bracket. (16-inch wheel model) (See **CROSSMEMBER BRACKET REMOVAL/INSTALLATION** .)

4. Remove the rear crossbar. (16-inch wheel model) (See **REAR CROSSMEMBER REMOVAL/INSTALLATION** .)
5. Remove the exhaust system. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
6. Remove the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)

WARNING:

- **Improperly jacking a transmission is dangerous. It can slip off the jack and cause serious injury.**

7. Remove in the order indicated in the table.



1	Throttle cable (See ACCELERATOR CABLE INSPECTION/ADJUSTMENT [BP, BP WITH TC])
2	Filler tube, dipstick
3	Performance rod
4	Exhaust bracket
5	Shift rod
6	TR switch connector
7	Output speed sensor connector
8	Solenoid connector
9	Input/turbine speed sensor
10	Harness bracket
11	Oil pipe (See OIL COOLER REMOVAL/ INSTALLATION)

12	Undercover
13	Torque converter bolts (See Torque Converter Bolts Installation Note)
14	Harness
15	Power plant frame (See Power Plant Frame (PPF) Removal Note) (See Power Plant Frame (PPF) Installation Note)
16	Transmission mount bolts
17	Transmission (See Transmission Installation Note)

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Fig. 43: Removing Automatic Transmission - With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

8. Install in the reverse order of removal.
9. Add ATF to the specified level. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
10. Connect the negative battery cable.
11. Inspect the operation of the transmission range switch. (See **INSPECTION OF OPERATION**.)
12. Inspect the operation of the selector lever. (See **SELECTOR LEVER INSPECTION** .)

13. Carry out the mechanical system test. (See **MECHANICAL SYSTEM TEST**.)
14. Carry out the road test. (See **ROAD TEST**.)

POWER PLANT FRAME (PPF) REMOVAL NOTE

1. Disconnect the wire harness from the power plant frame.
2. Support the transmission on a jack.

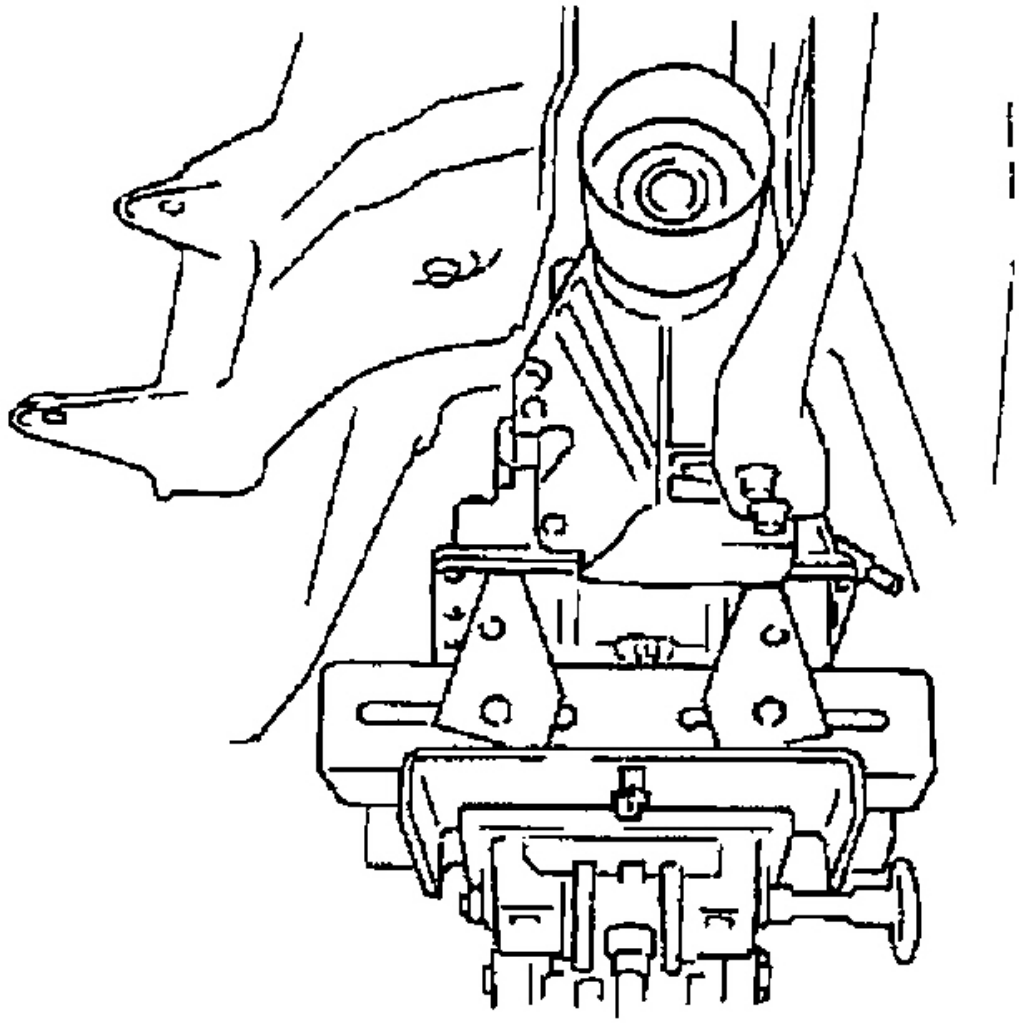

Fig. 44: Supporting Transmission On Jack

Courtesy of MAZDA MOTORS CORP.

3. Remove the front bolts.

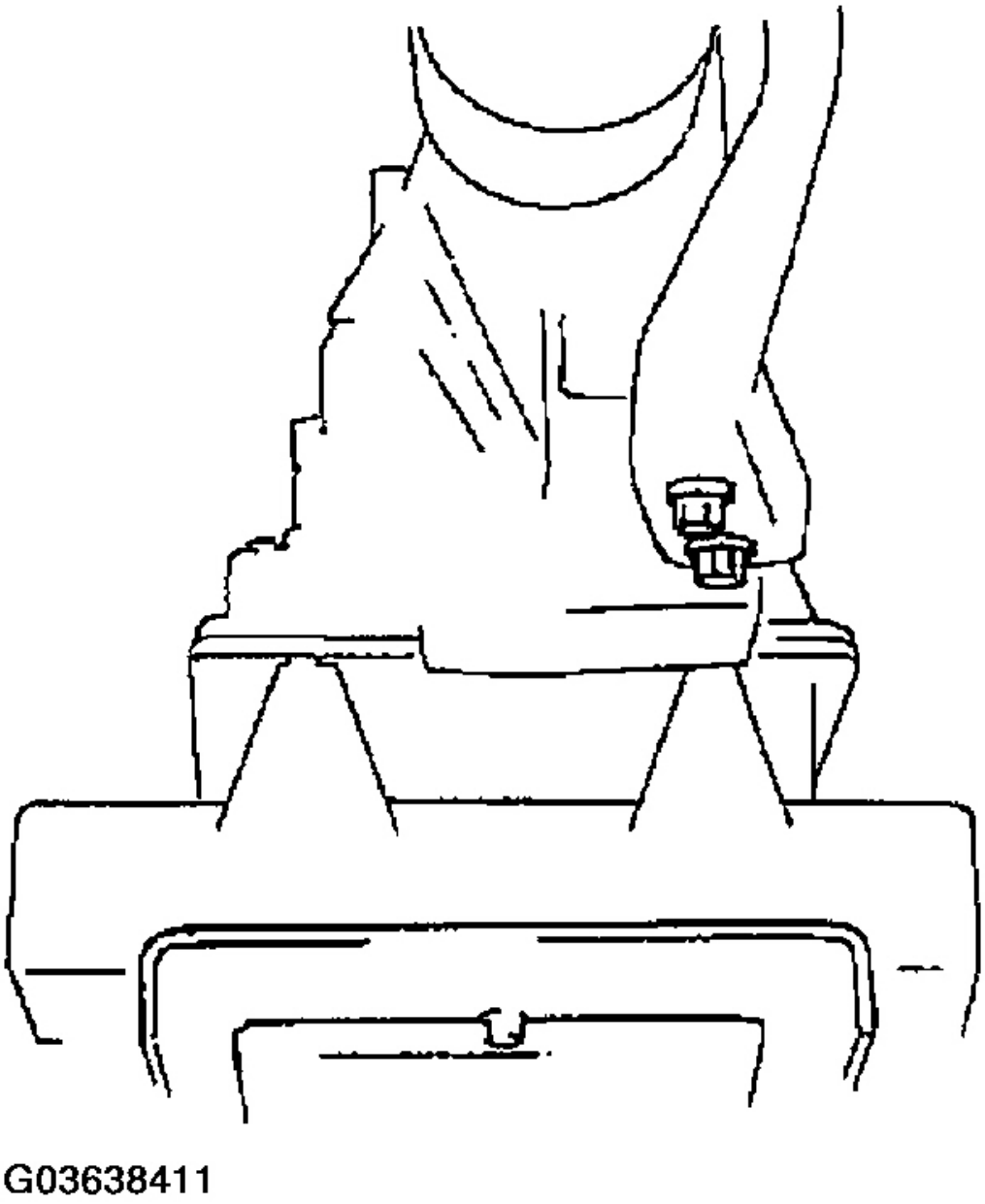

Fig. 45: Removing Font Bolt
Courtesy of MAZDA MOTORS CORP.

4. Remove the differential side bolts, and pry out the bolt spacer.

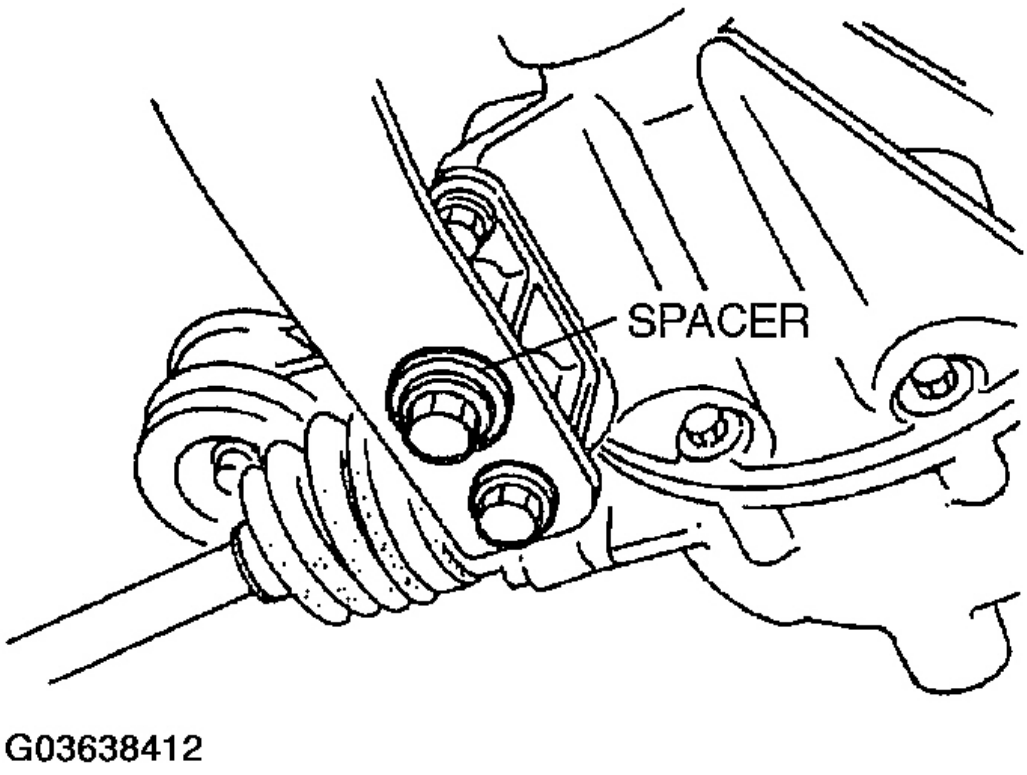

Fig. 46: Removing Bolt Spacer
Courtesy of MAZDA MOTORS CORP.

5. Remove the differential mounting spacer.

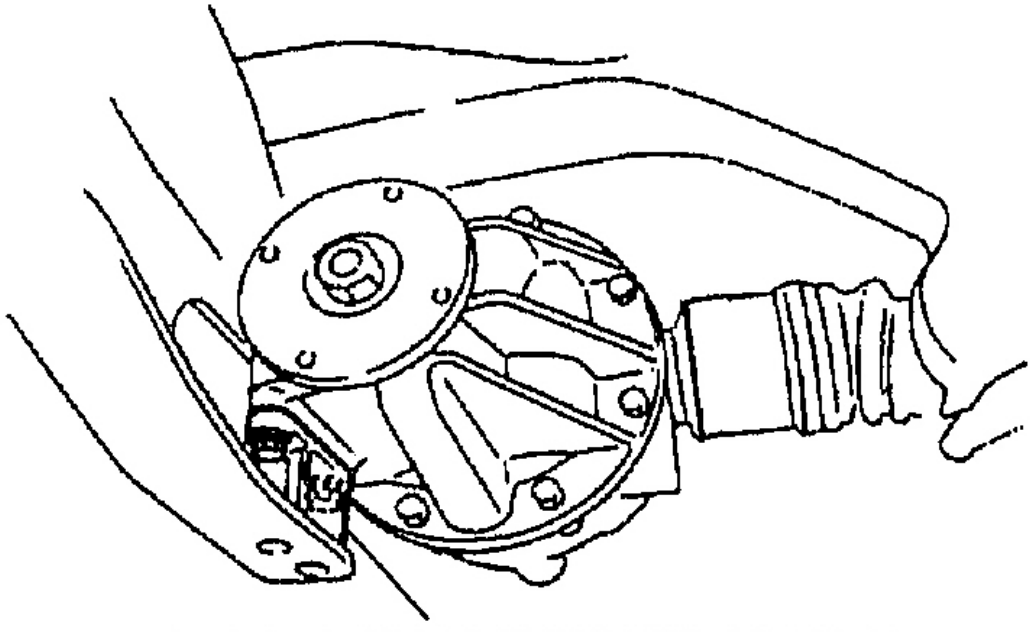

Fig. 47: Removing Differential Mounting Spacer
Courtesy of MAZDA MOTORS CORP.

6. Remove the transmission side bolts, and remove the PPF. Do not remove the spacers from the PPF.
   - If the spacers are removed, replace the PPF as a component.

NOTE:

- **If the sleeve cannot be removed easily, tap the side of the sleeve with a plastic hammer.**

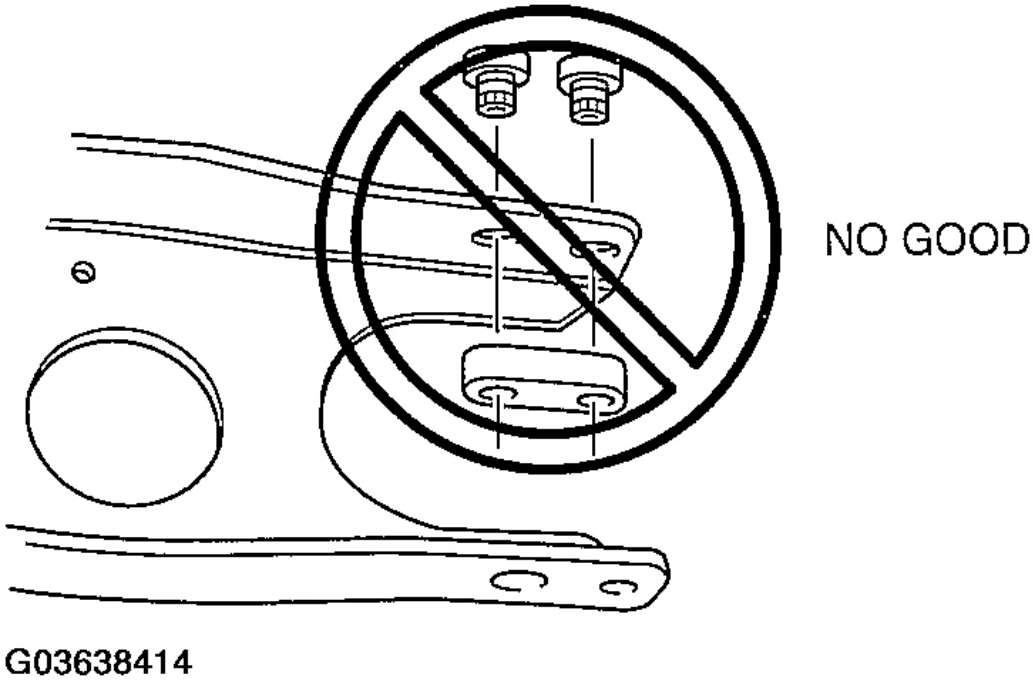

Fig. 48: Warning Against Removing Spacers From PPF
Courtesy of MAZDA MOTORS CORP.

7. Remove the sleeve.

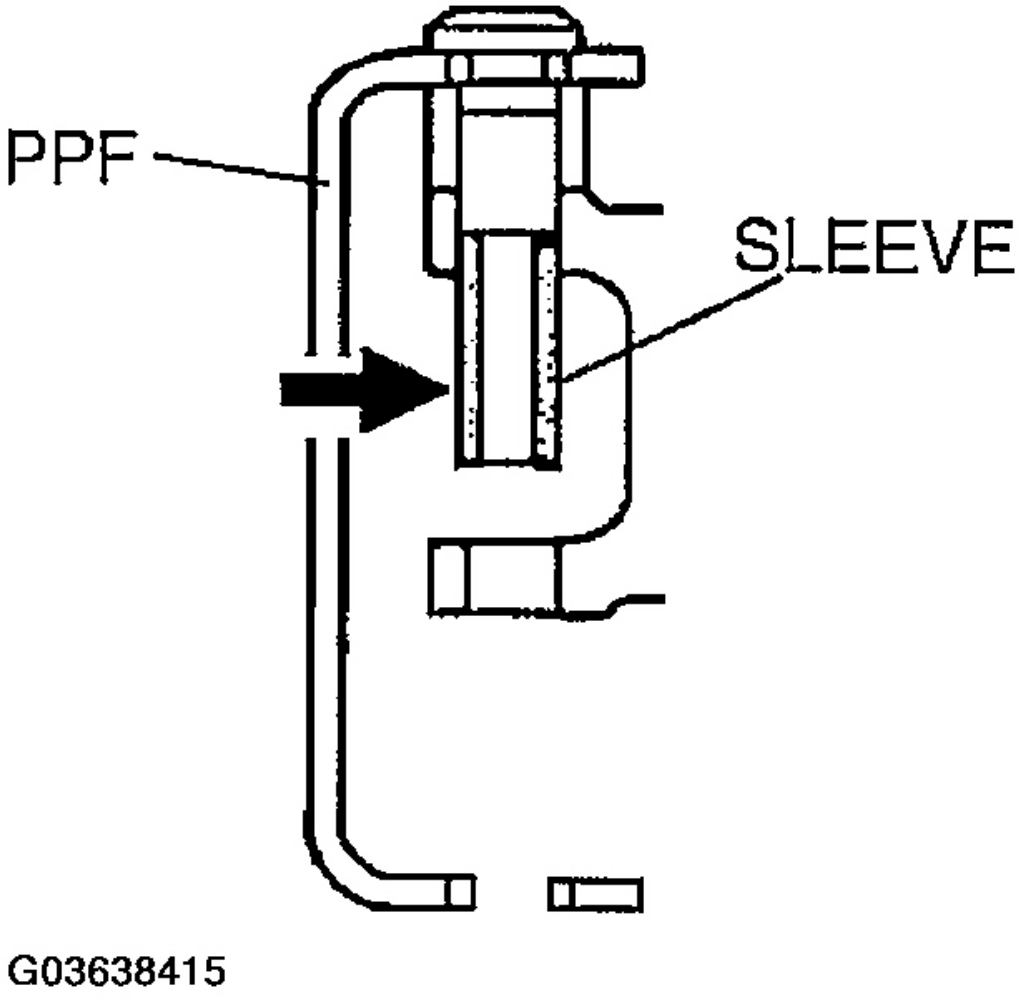

Fig. 49: Removing Sleeve
Courtesy of MAZDA MOTORS CORP.

TRANSMISSION REMOVAL NOTE

1. Set the transmission onto the transmission jack, paying special attention not to damage the oil pipes. Make sure that the torque converter side of the transmission is tilted slightly upward during removal. Carefully lower the transmission from the vehicle.

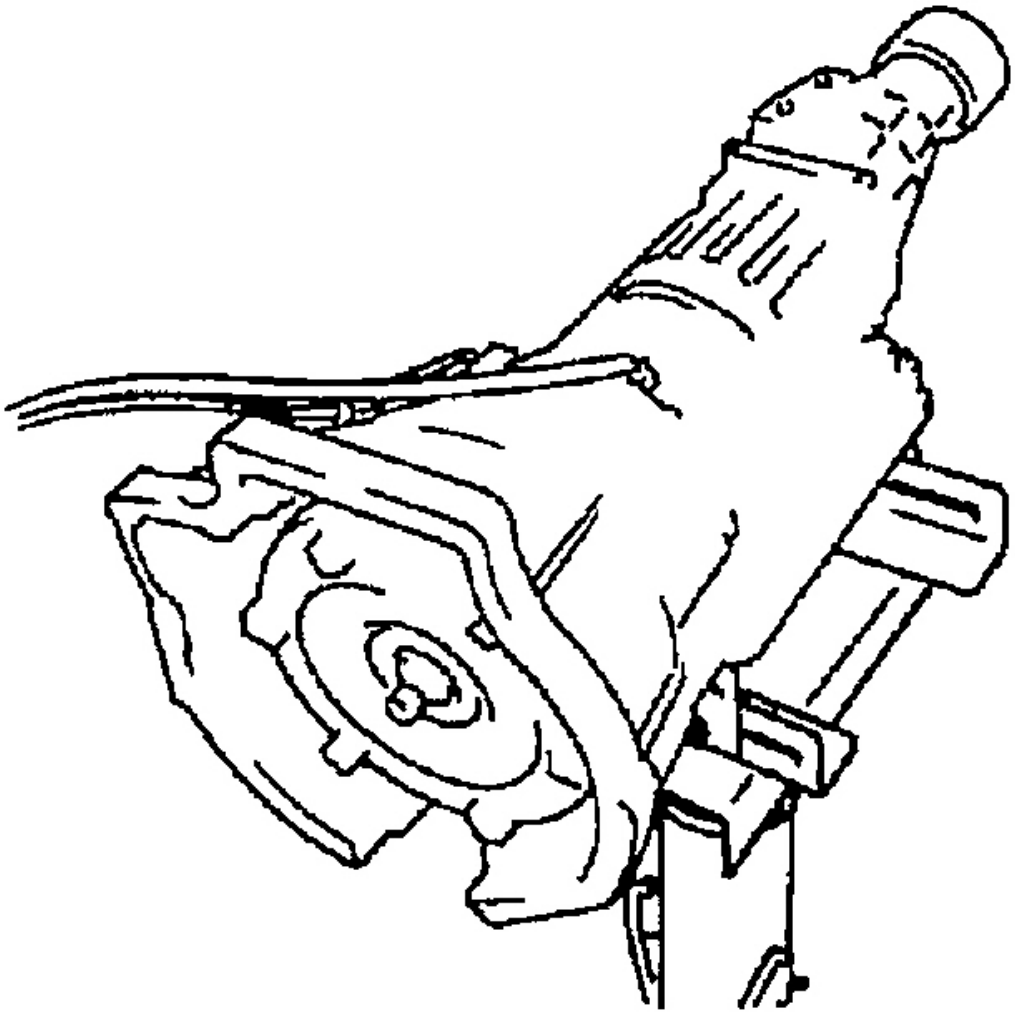

Fig. 50: Removing Transmission
Courtesy of MAZDA MOTORS CORP.

TRANSMISSION INSTALLATION NOTE

1. Set the transmission onto the transmission jack, paying special attention not to damage the oil pipes. Make sure that the torque converter side of the transmission is tilted slightly upward.

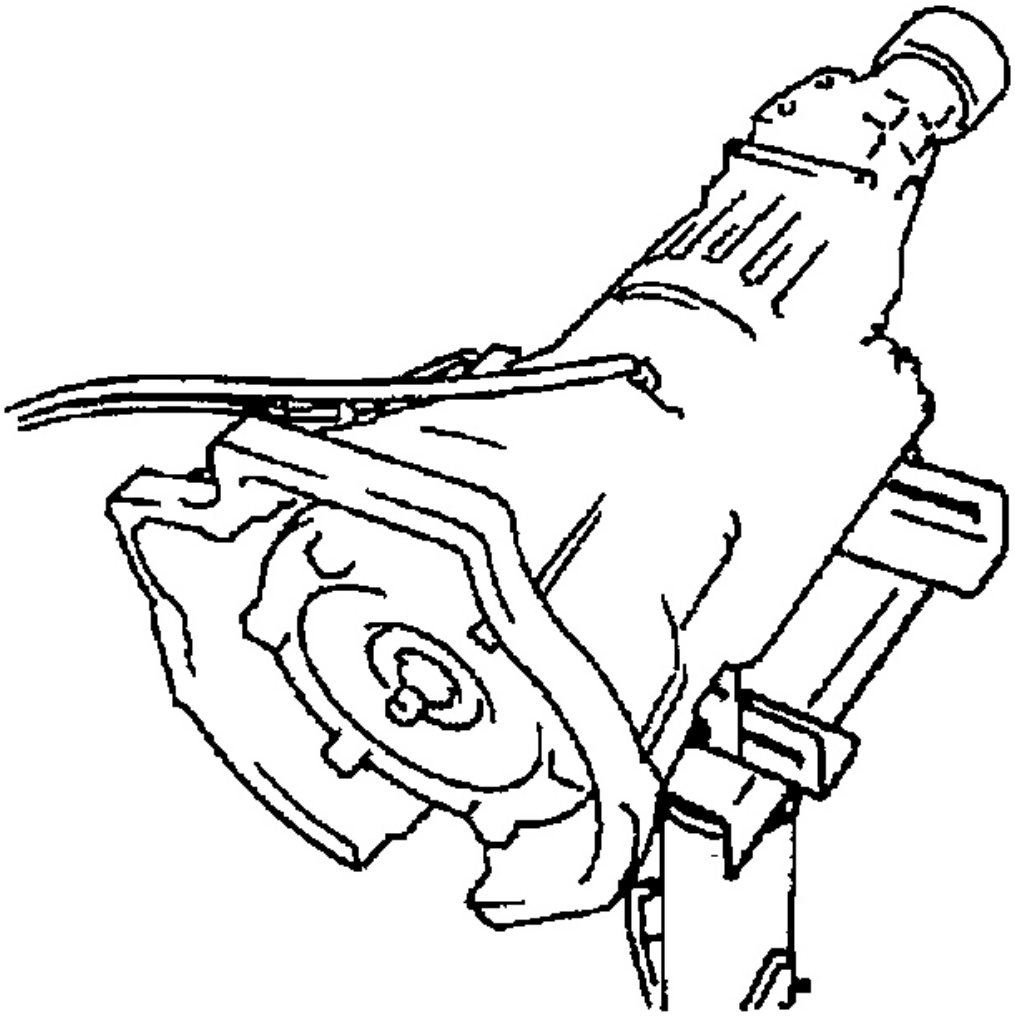

Fig. 51: Installing Transmission
Courtesy of MAZDA MOTORS CORP.

TORQUE CONVERTER BOLTS INSTALLATION NOTE

1. Align the holes while turning the torque converter.
2. Lock the drive plate using a screwdriver.
3. Hand-tighten the torque converter mounting bolts in a crisscross pattern.
4. Modify the torque converter mounting bolts tightening torque to allow for a torque wrench **SST**

combination. (See **TORQUE FORMULAS** .)

5. Tighten the torque converter mounting bolts using the **SST.**

Tightening torque

35-49 N.m {3.5-5.0 kgf.m, 26-36 ft.lbf}

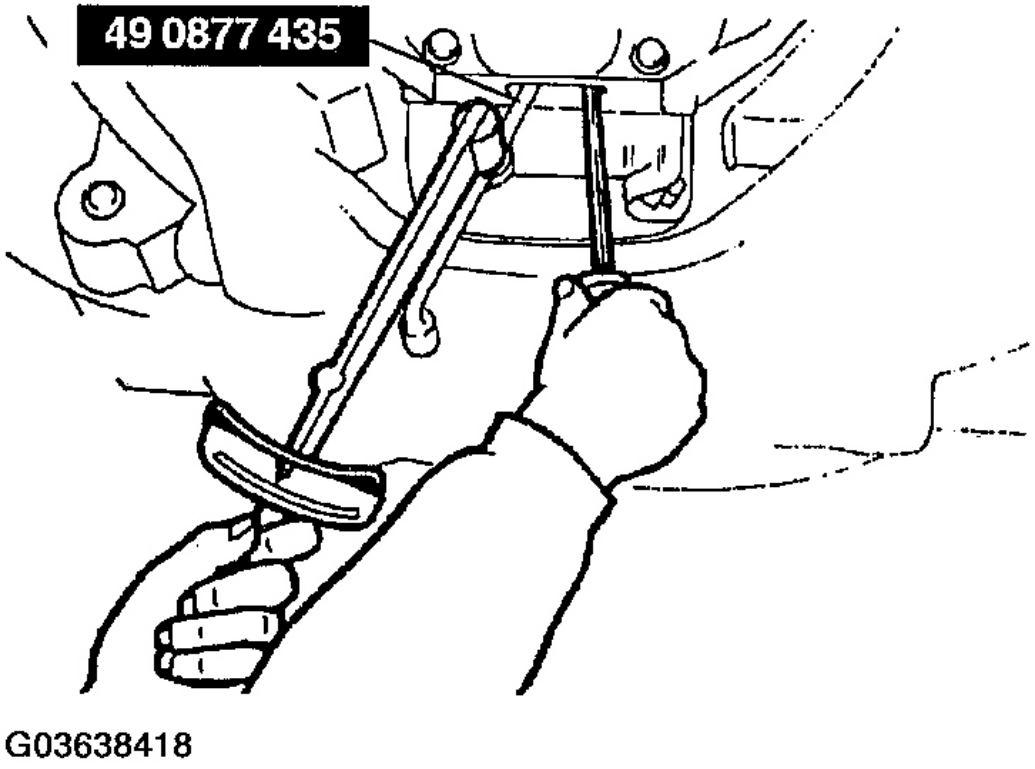

Fig. 52: Tightening Torque Converter Mounting Bolts Using SST
Courtesy of MAZDA MOTORS CORP.

POWER PLANT FRAME (PPF) INSTALLATION NOTE

1. Install the differential mounting spacer.
2. Support the transmission on a jack so that it is level.
3. Position the PPF and install the sleeve.
4. Install the spacer and bolts, and tighten the reamer bolt firmly. The reamer bolt should be installed in the forward hole.

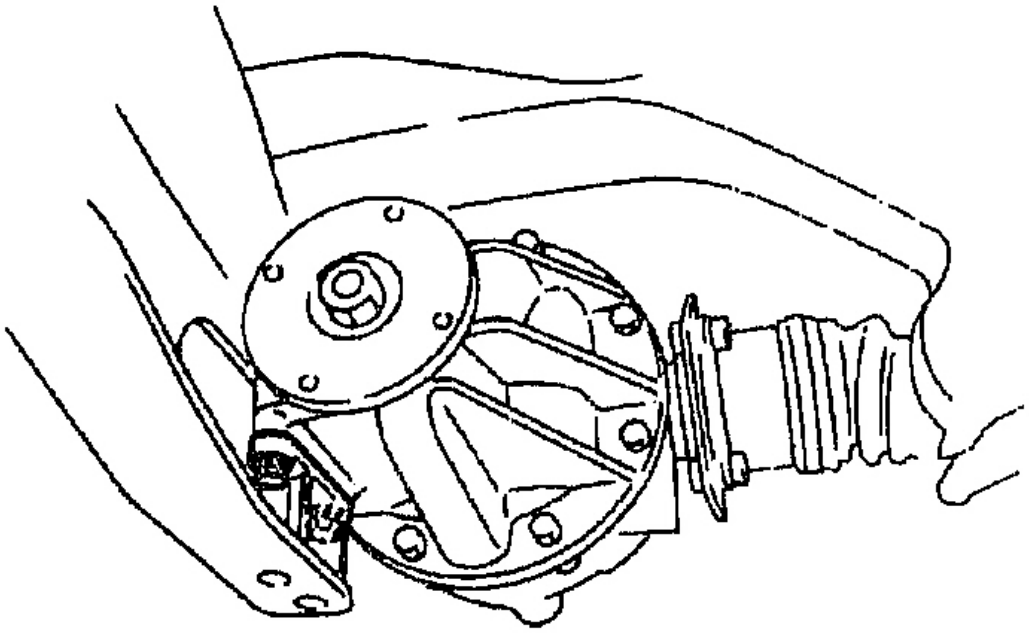

Fig. 53: Installing Differential Mounting Spacer
Courtesy of MAZDA MOTORS CORP.

5. Tighten the outer bolts snugly.

Tightening torque

104-123 N.m {10.6-12.6 kgf.m, 77-91 ft.lbf}

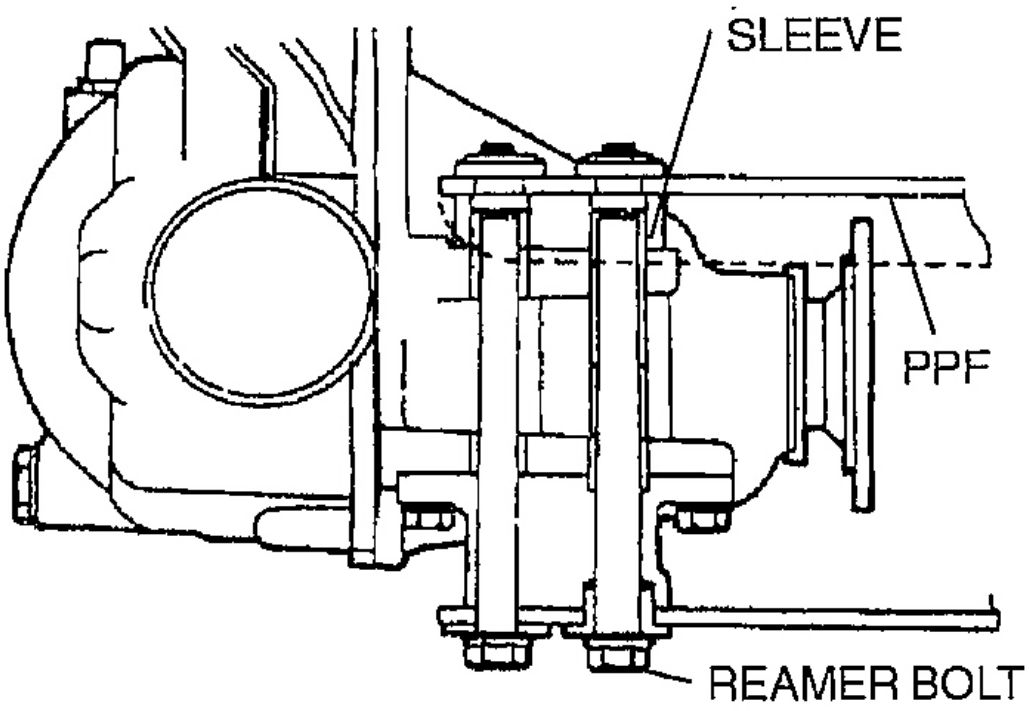

Fig. 54: Tightening Outer Bolts
Courtesy of MAZDA MOTORS CORP.

6. Tighten the bolts to the specified torque in the order shown.

Tightening torque

104-123 N.m {10.6-12.6 kgf.m, 77-91 ft.lbf}

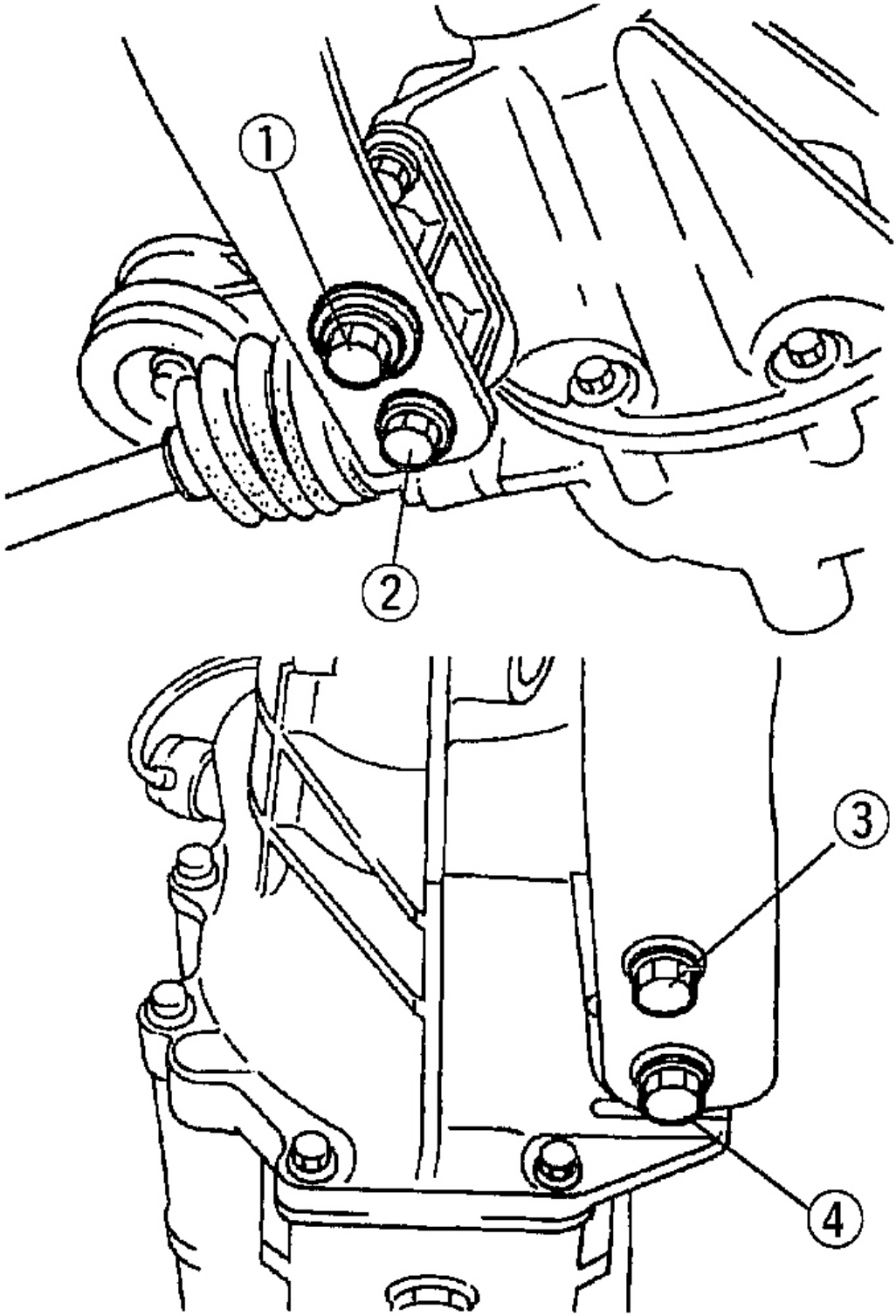

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Fig. 55: Tightening Bolts In Sequence
Courtesy of MAZDA MOTORS CORP.

7. Remove the jack.
8. Measure distance A using a straightedge and vernier calipers.
    - If the distance is not within the specification, reposition the power plant frame at the transmission.

    Distance A

    50.5-62.5 mm {1.99-2.46 in}

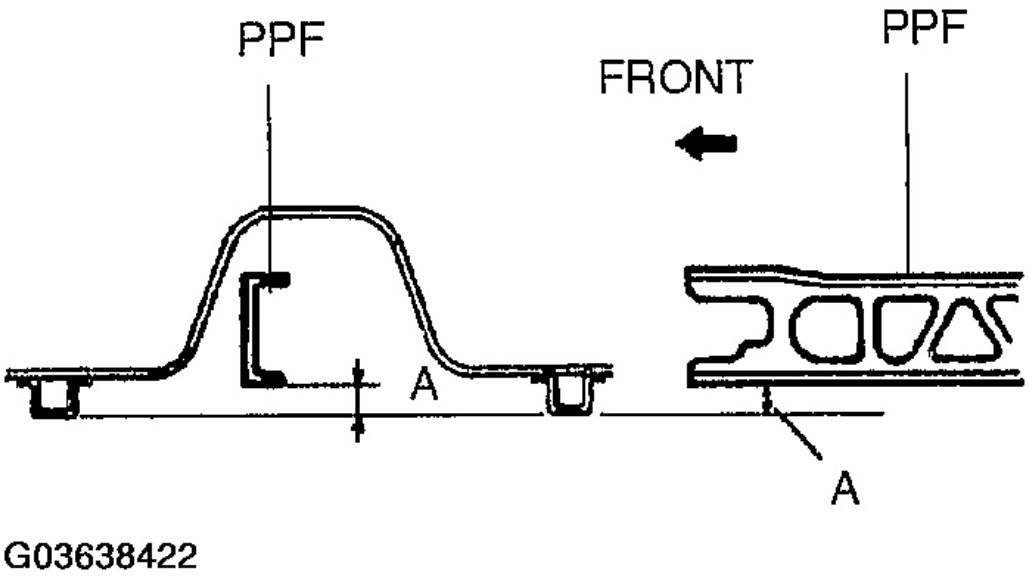

Fig. 56: Measuring Distance A
Courtesy of MAZDA MOTORS CORP.

EXTENSION HOUSING REMOVAL/INSTALLATION

1. Clean the transmission exterior thoroughly using a steam cleaner or cleaning solvent.
2. Disconnect the negative battery cable.
3. Drain the ATF. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
4. Disconnect the output speed sensor connector.
5. Remove the exhaust system. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
6. Remove the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)

7. Support the transmission on a jack.

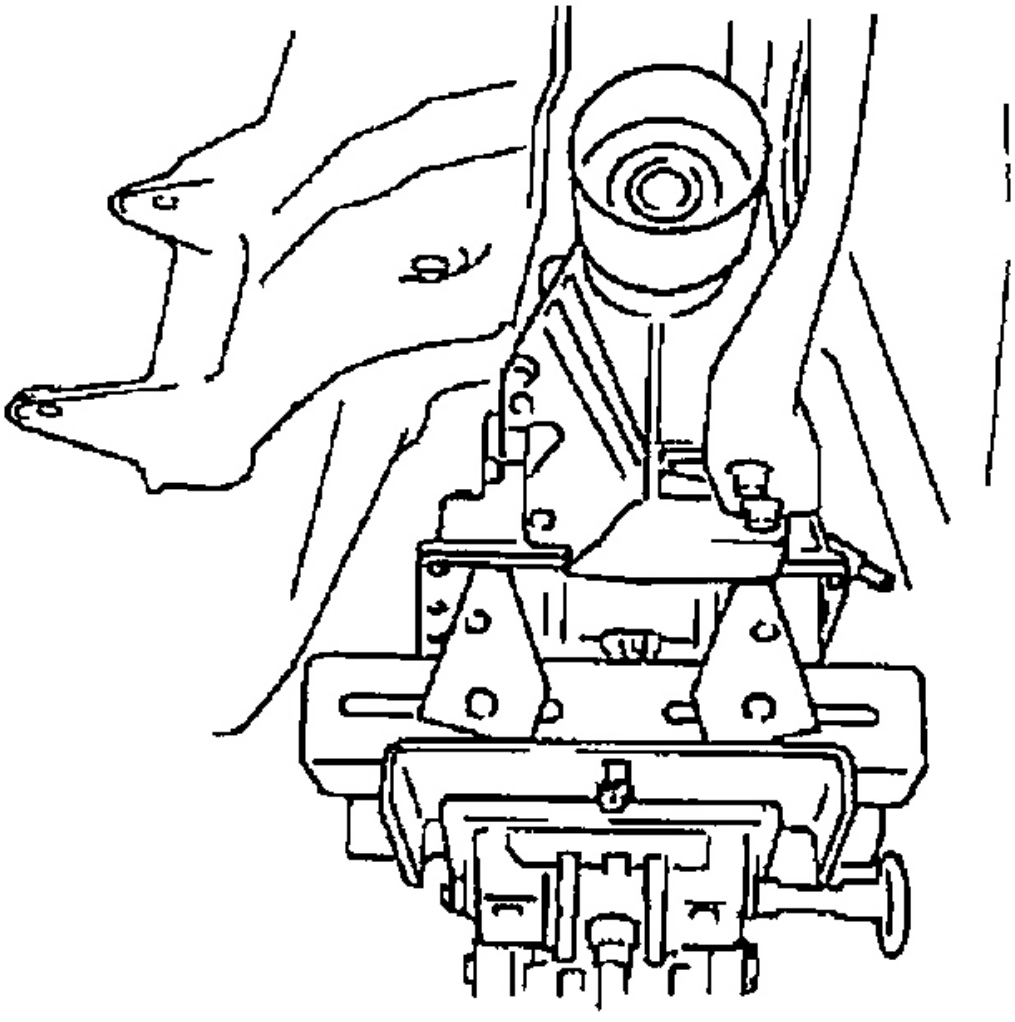

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Fig. 57: Supporting Transmission On Jack
Courtesy of MAZDA MOTORS CORP.

8. Remove the power plant frame.
9. Remove the extension housing and gasket.
10. Install a new gasket and extension housing on the transmission case.

Tightening torque

24-41 N.m {2.4-4.2 kgf.m, 18-30 ft.lbf}

11. Install the power plant frame.
12. Install the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)
13. Install the exhaust system. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
14. Connect the speed sensor connector.
15. Add ATF to the specified level. (See **ATF LEVEL INSPECTION**.)
16. Carry out the line pressure test. (See **LINE PRESSURE TEST**.)
17. Carry out the road test. (See **ROAD TEST**.)

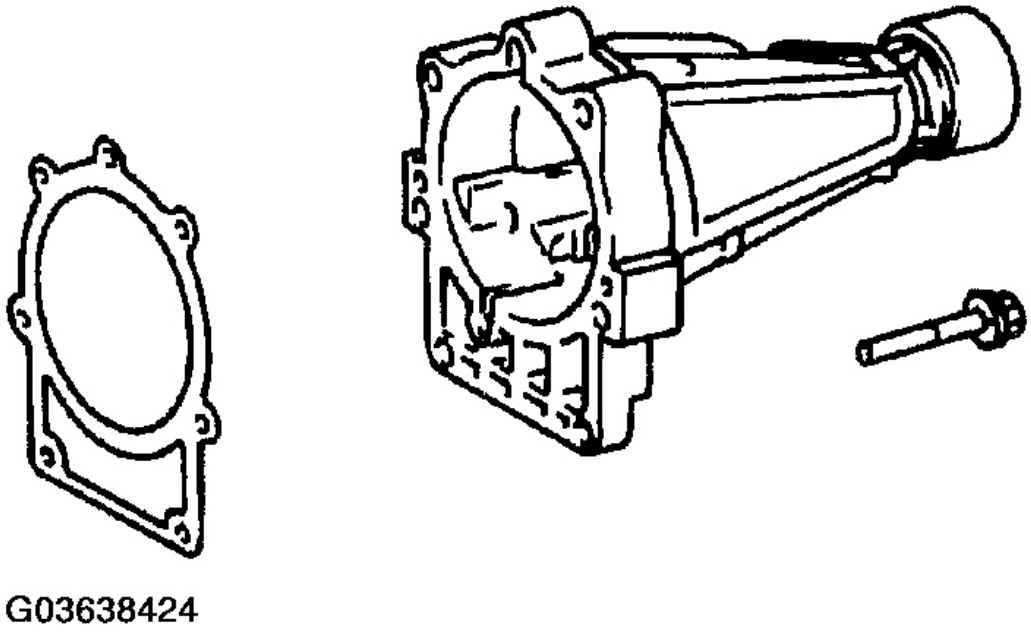


Fig. 58: Removing Extension Housing And Gasket
Courtesy of MAZDA MOTORS CORP.

OIL SEAL (TRANSMISSION) REPLACEMENT

1. Clean the transmission exterior thoroughly using a steam cleaner or cleaning solvent.
2. Drain the ATF. (See **ATF LEVEL INSPECTION**.)
3. Remove the exhaust pipe. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
4. Remove the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)

5. Remove the oil seal using the **SST.**
6. Apply ATF to a new oil seal lip.

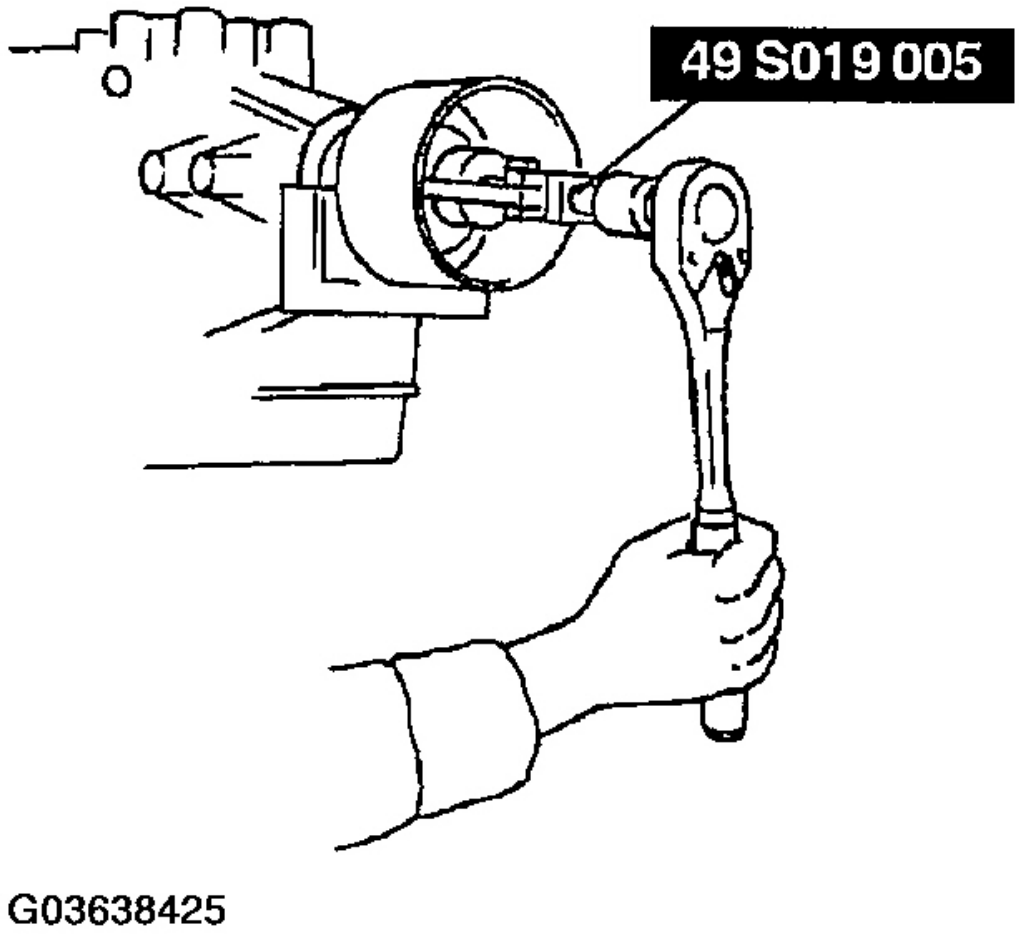


Fig. 59: Removing Oil Seal Using SST
Courtesy of MAZDA MOTORS CORP.

7. Install the oil seal to the position shown in the figure within dimension A as follows using the convex part of the **SST.**

Dimension A

6.2-6.8 mm {0.25-0.26 in}

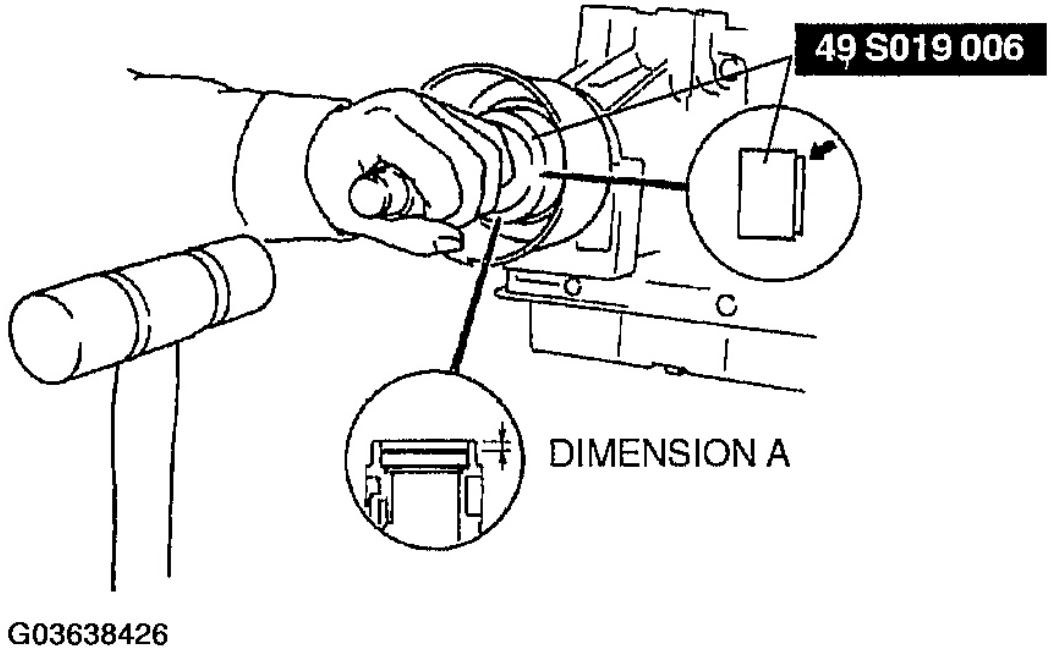


Fig. 60: Installing Oil Seal Using SST
Courtesy of MAZDA MOTORS CORP.

8. Install the retainer to dimension B position using the concave part of the **SST.**

   Dimension B

   0.7-1.3 mm {0.03-0.05 in}
9. Install the propeller shaft. (See **PROPELLER SHAFT REMOVAL/INSTALLATION** .)
10. Install the exhaust pipe. (See **EXHAUST SYSTEM REMOVAL/INSTALLATION [BP]** .)
11. Add ATF to the specified level. (See **ATF LEVEL INSPECTION**.)
12. Carry out the line pressure test. (See **LINE PRESSURE TEST**.)
13. Carry out the road test. (See **ROAD TEST**.)

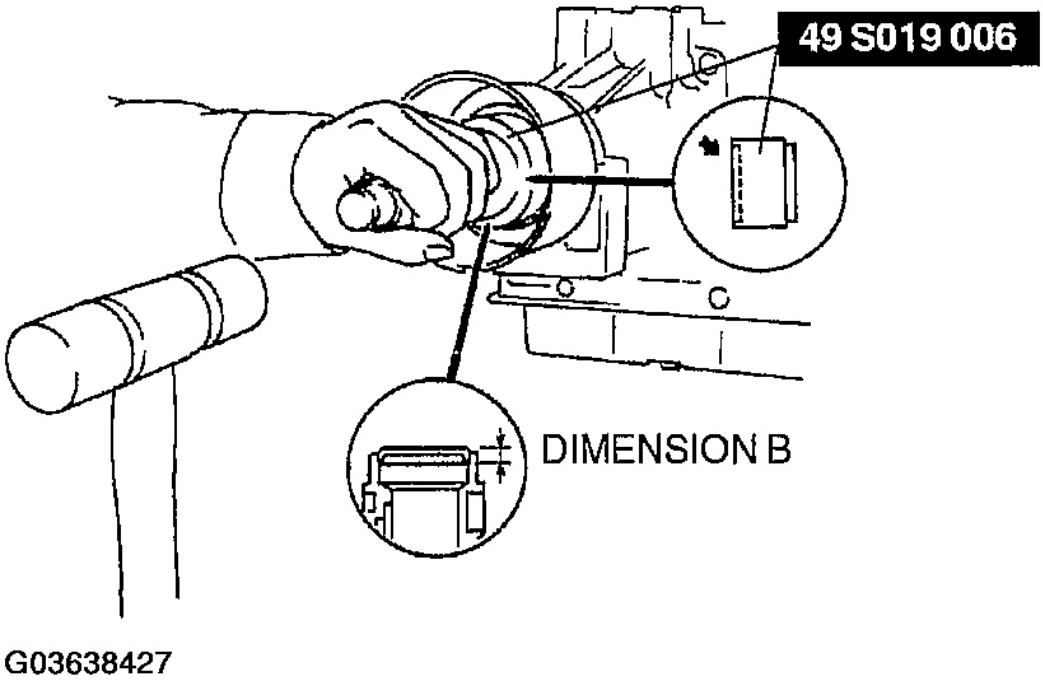


Fig. 61: Installing Retainer Using SST
Courtesy of MAZDA MOTORS CORP.

CONTROL VALVE BODY REMOVAL/INSTALLATION

ON-VEHICLE REMOVAL

1. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents.
2. Disconnect the negative battery cable.
3. Drain the ATF. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
4. Remove the oil pan and gasket.

CAUTION:
- **To prevent deformation of the tube, remove the tube by pulling both ends up.**

5. Remove the tubes.

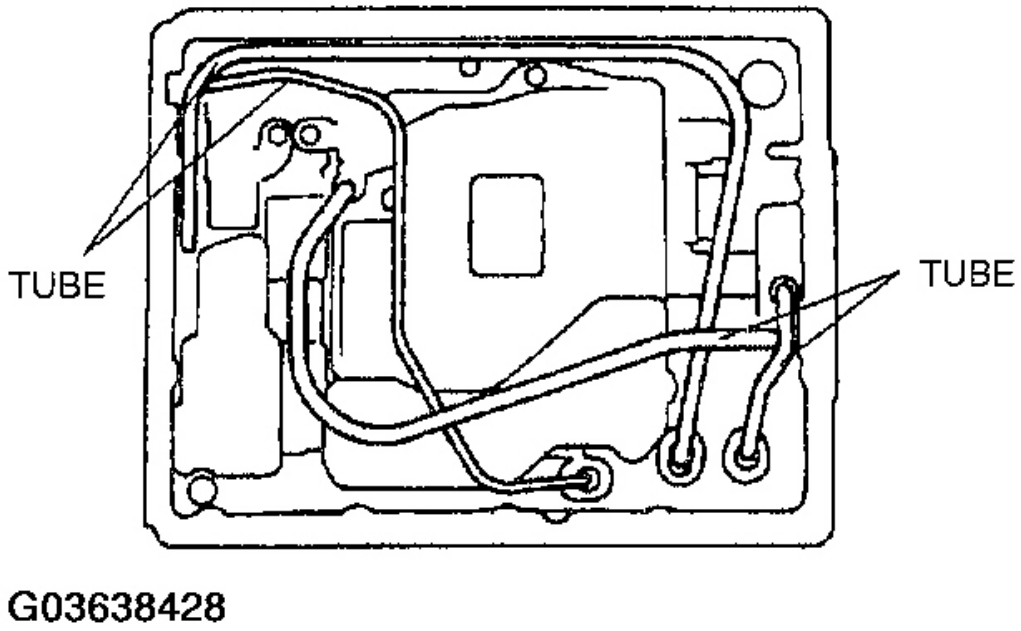


Fig. 62: Removing Tube
Courtesy of MAZDA MOTORS CORP.

6. Disconnect shift solenoids A, B, and torque converter clutch solenoid valve connectors.

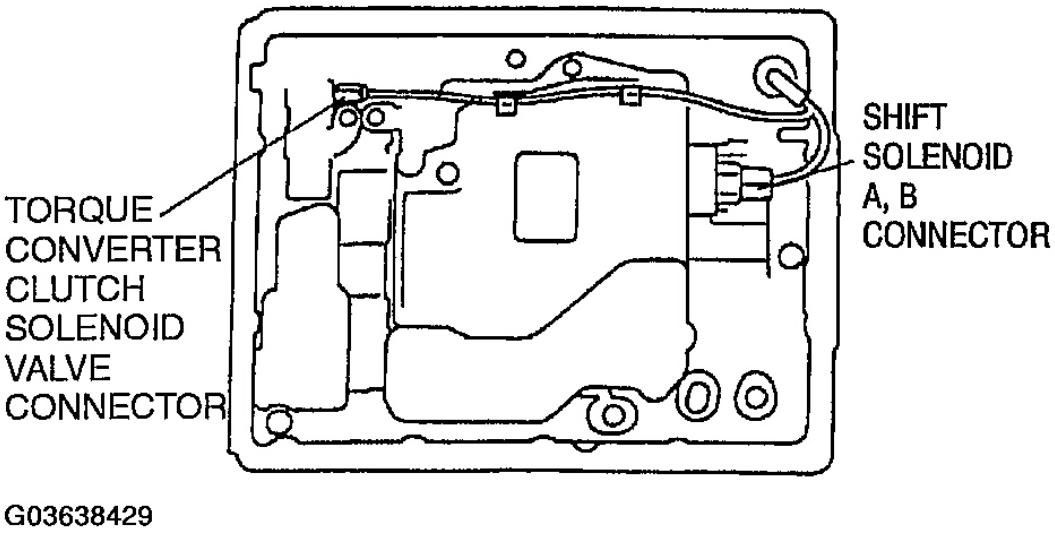
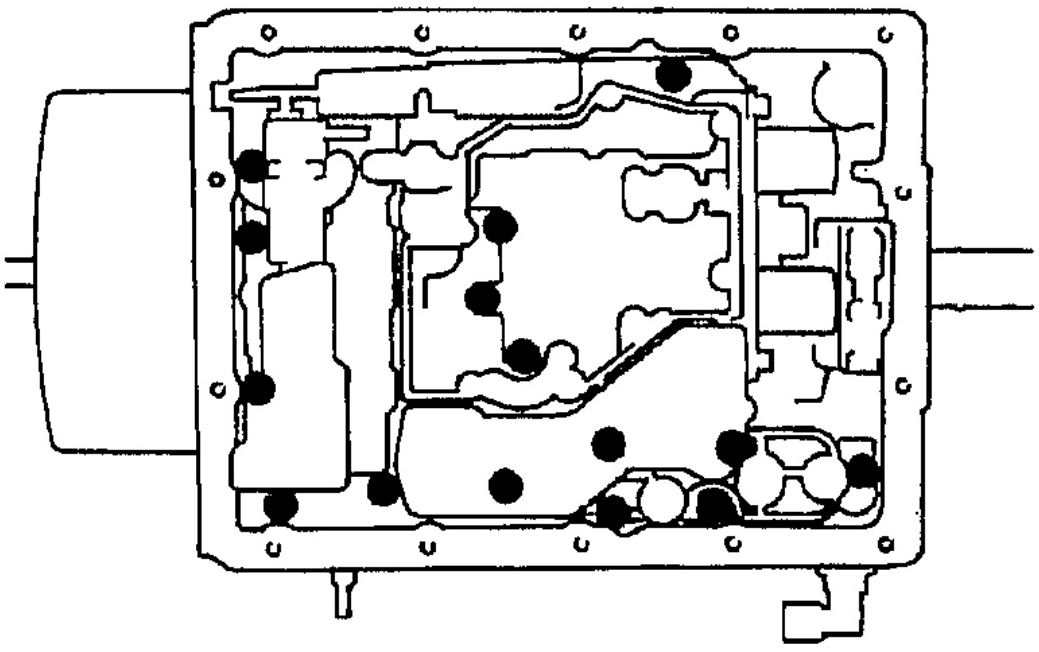


Fig. 63: Disconnecting Shift Solenoids And Torque Converter Clutch Solenoid Valve Connectors
Courtesy of MAZDA MOTORS CORP.

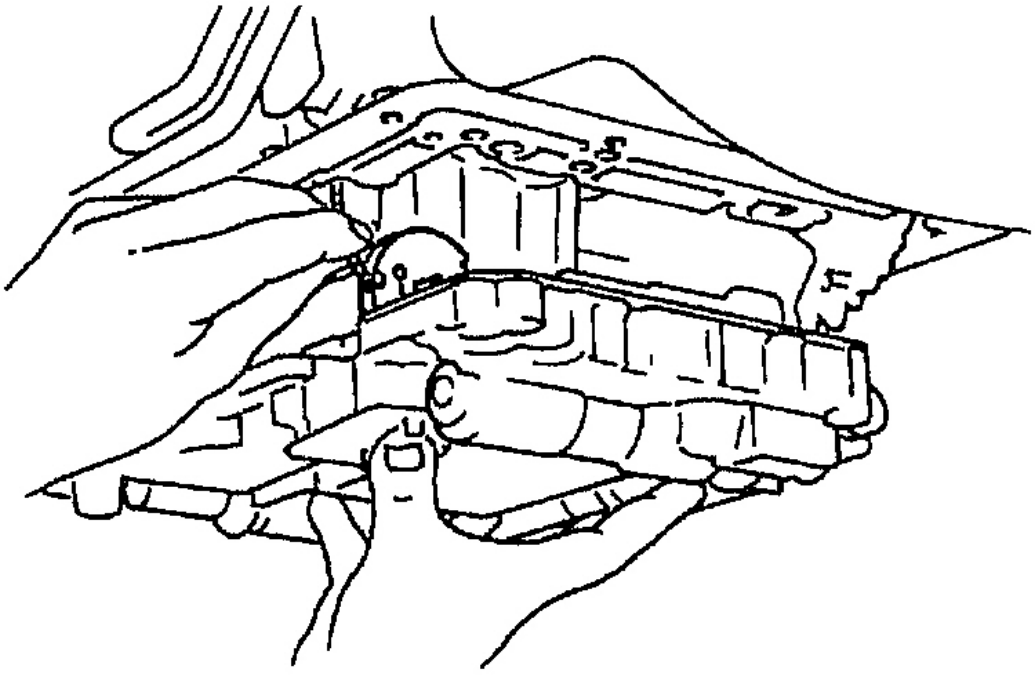
7. Remove the oil strainer.
8. Remove the control valve body installation bolts.



G03638430

Fig. 64: Removing Control Valve Body Bolts
Courtesy of MAZDA MOTORS CORP.

9. Remove the nipple of the throttle cable from the throttle cam.
10. Remove the control valve body.
11. Remove the accumulator spring.

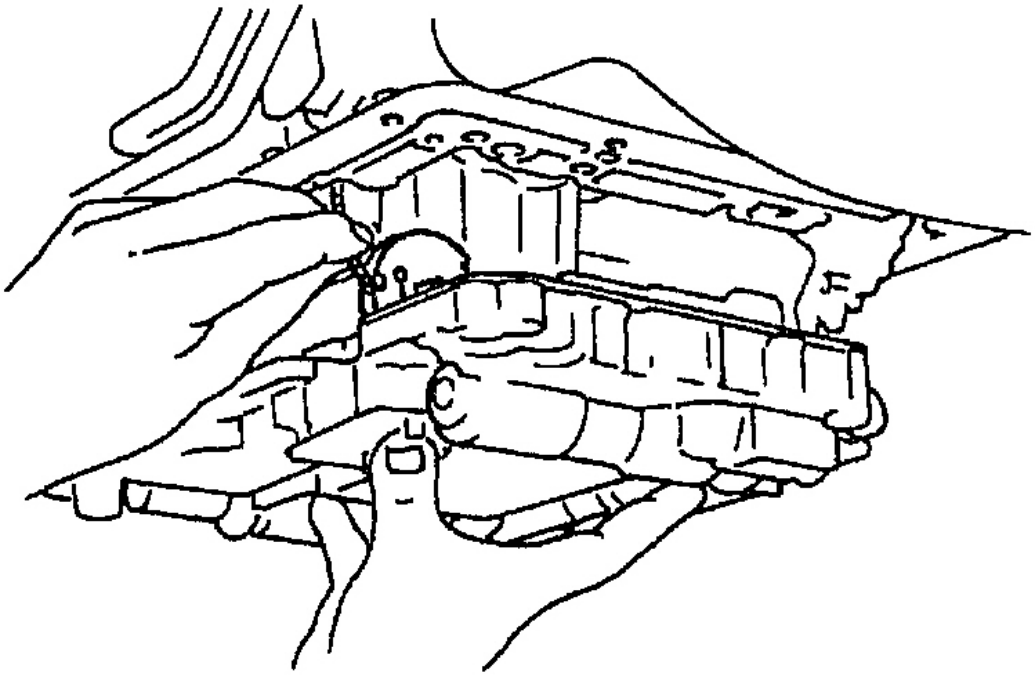


G03638431

Fig. 65: Removing Control Valve Body
Courtesy of MAZDA MOTORS CORP.

ON-VEHICLE INSTALLATION

1. Set the accumulator springs into the control valve body as shown.
2. Install the nipple of the throttle cable to the throttle cam.



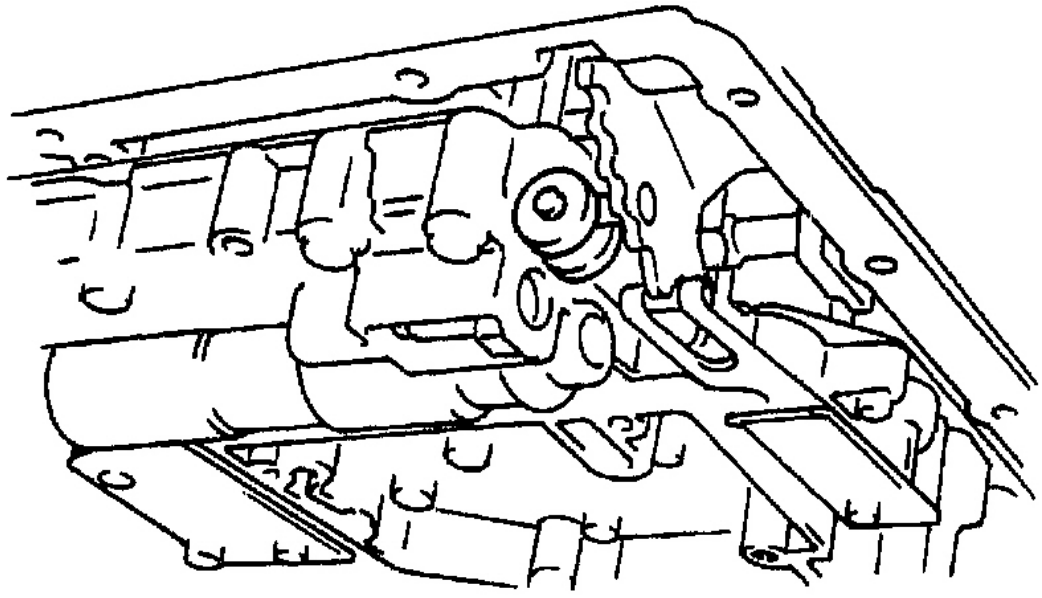
G03638432

Fig. 66: Installing Control Valve Body
Courtesy of MAZDA MOTORS CORP.

3. Verify that the manual valve and manual shaft are assembled correctly.
4. Install the control valve body.

Tightening torque

7.9-11.7 N.m {80-120 kgf.cm, 70-104 in.lbf}



G03638433

Fig. 67: Installing Control Valve Body
Courtesy of MAZDA MOTORS CORP.

5. Install the oil strainer.

Tightening torque

5.0-5.8 N.m {50-60 kgf.cm, 44-52 in.lbf}

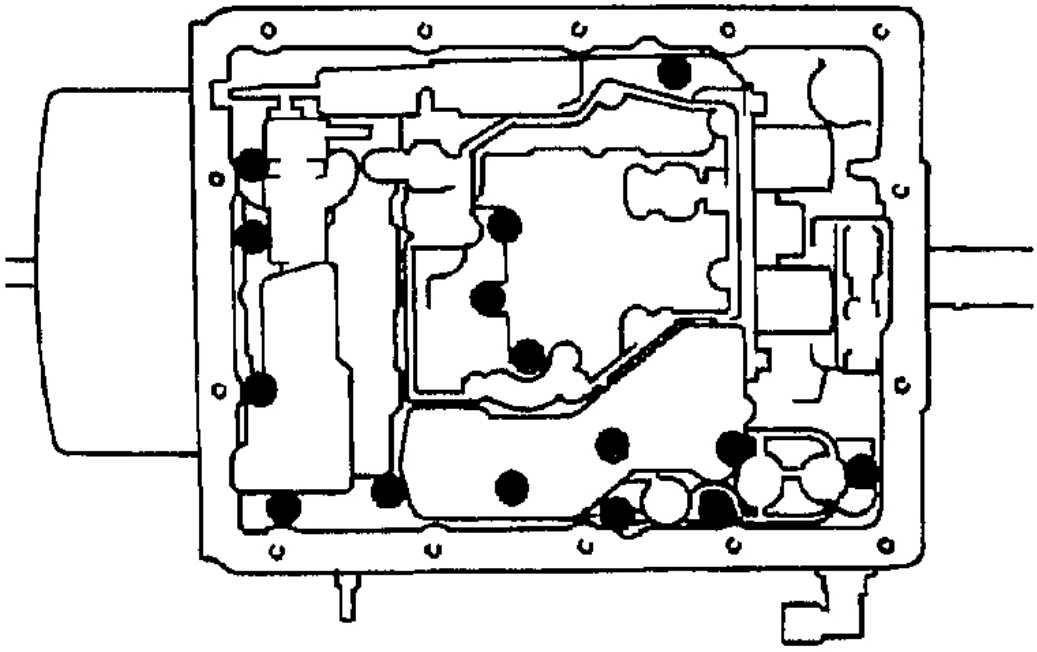


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Fig. 68: Installing Oil Strainer
Courtesy of MAZDA MOTORS CORP.

6. Connect shift solenoids A, B, and torque converter clutch solenoid valve connectors.

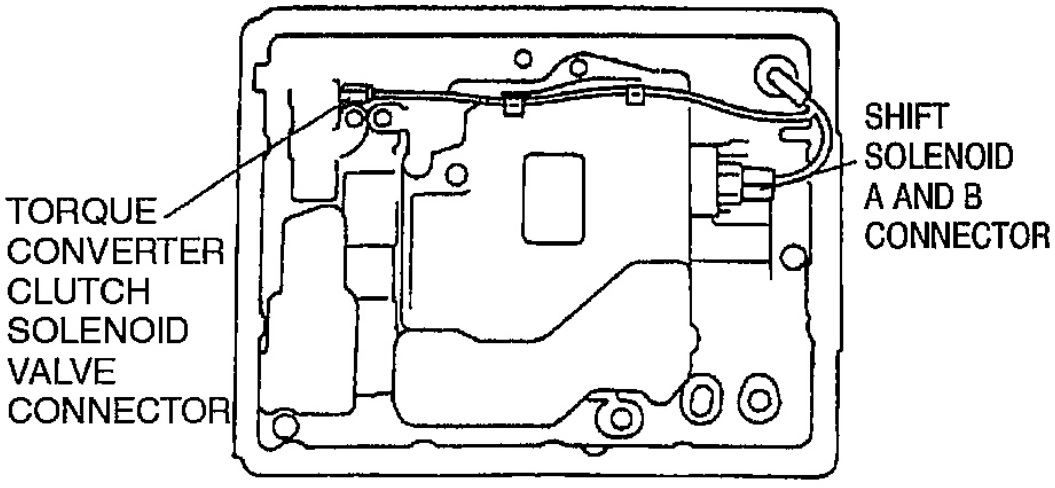


Fig. 69: Connecting Shift Solenoids And Torque Converter Clutch Solenoid Valve Connectors
Courtesy of MAZDA MOTORS CORP.

7. Install the tubes.

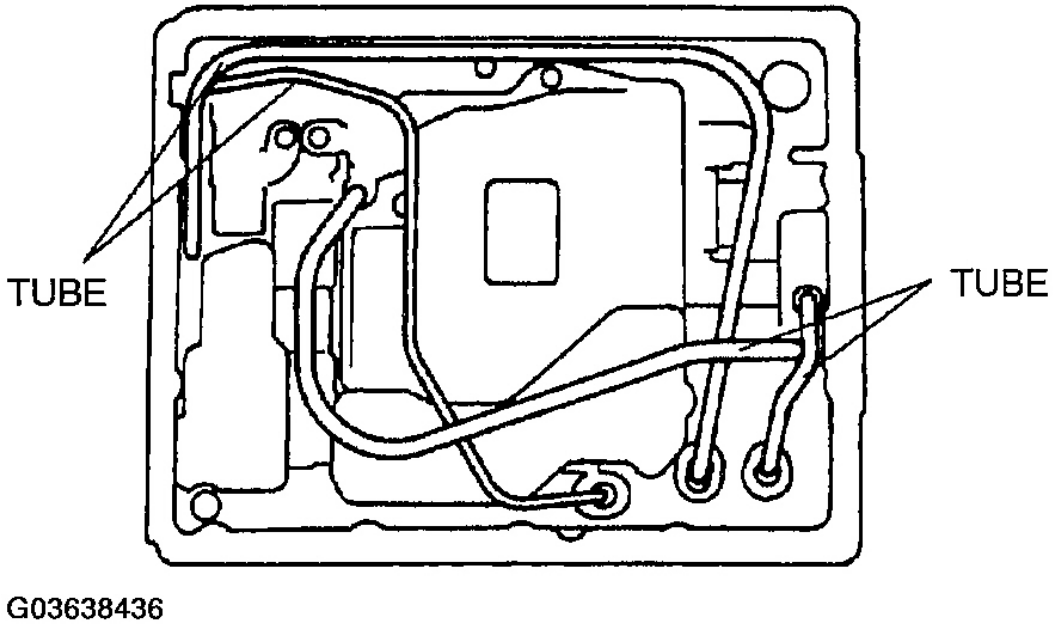


Fig. 70: Installing Tubes
Courtesy of MAZDA MOTORS CORP.

8. Install the new gasket and oil pan.

   Tightening torque

   4.0-4.9 N.m {40-50 kgf.cm, 35-43 in.lbf}
9. Add ATF to the specified level. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
10. Carry out the mechanical test. (See **MECHANICAL SYSTEM TEST**.)
11. Carry out the road test. (See **ROAD TEST**.)

TORQUE CONVERTER REMOVAL/INSTALLATION

1. Remove the transmission. (See **AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION**.)

   CAUTION:
   - **The oil seal is easily damaged by the sharp edges of the torque converter splines. Do not let the splines contact the oil seal.**

2. Remove the torque converter, and immediately turn it so that the hole faces upward. This will help to keep any remaining fluid from spilling.
3. Drain any ATF remaining in the torque converter.
4. Pour in solvent **(approx.0.50 L {0.53 Us qt, 0.44 Imp qt}).**
5. Shake the torque converter to clean the inside. Pour out the solvent.
6. Install the torque converter in the converter housing while rotating it to align the splines.
7. To ensure that the torque converter is installed accurately, measure distance A between the end of the torque converter and the end of the converter housing.

   Distance A

   22.7 mm {0.894 in}
8. Install the transmission. (See **AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION**.)

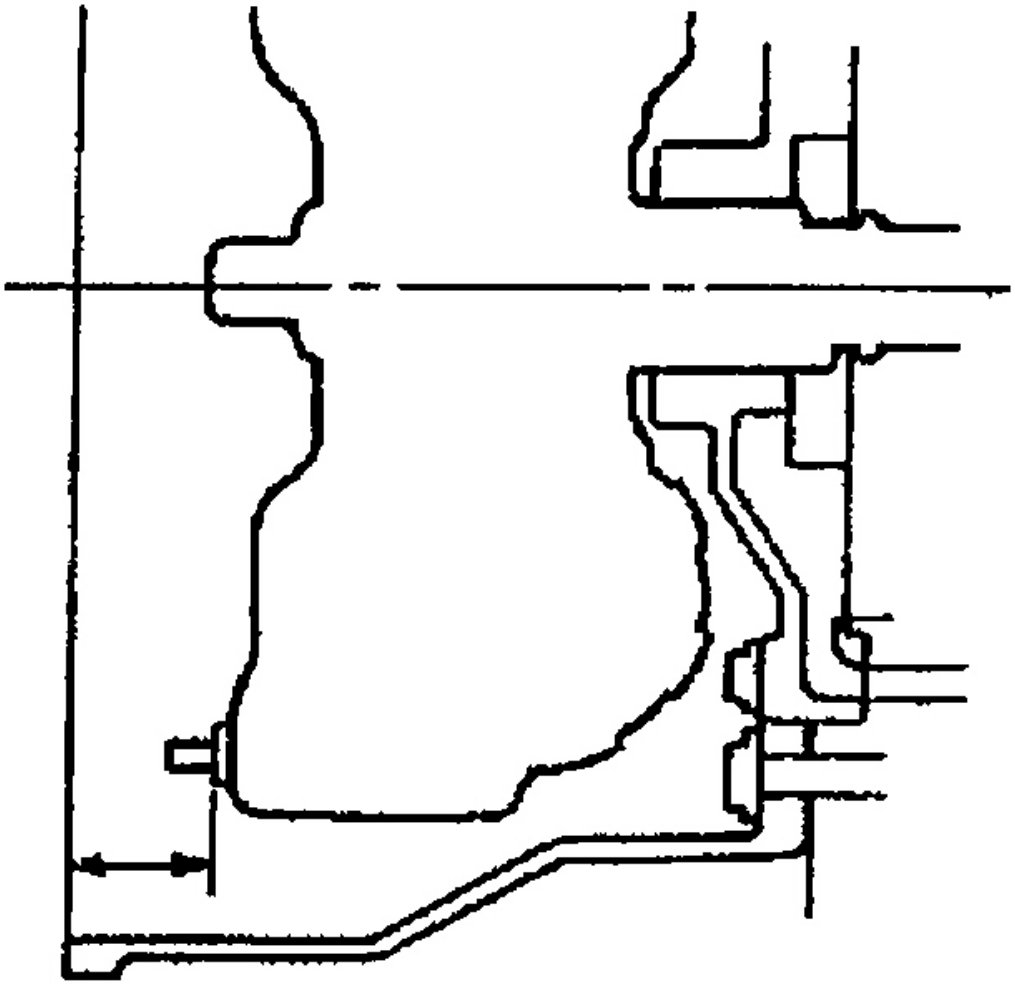
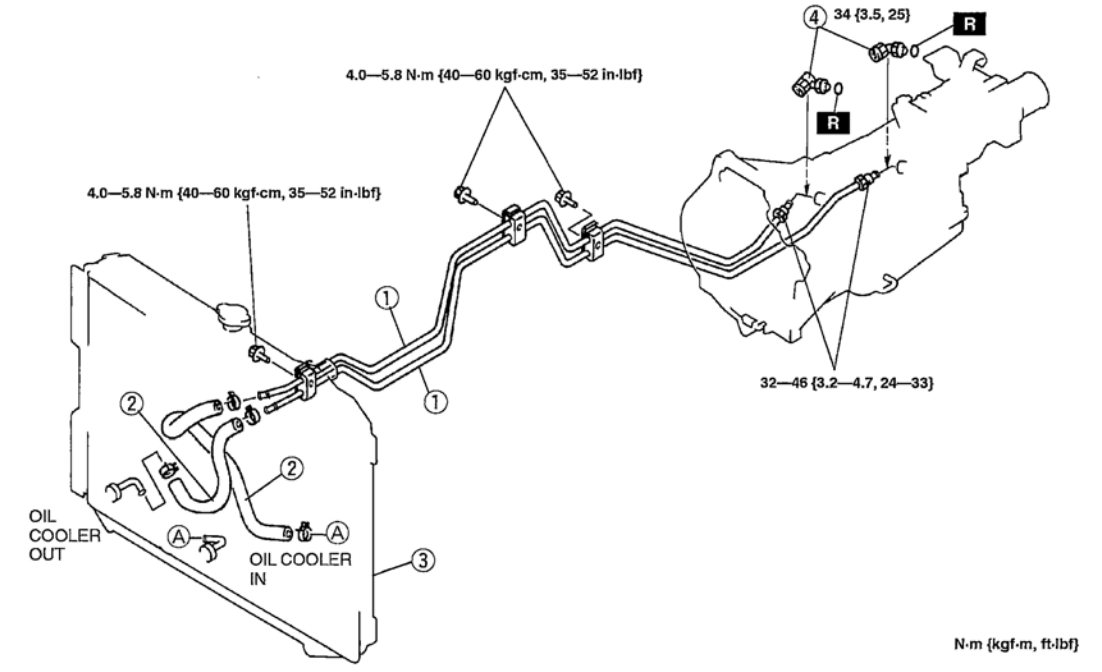


Fig. 71: Installing Torque Converter In Converter Housing
Courtesy of MAZDA MOTORS CORP.

OIL COOLER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the ATF. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
3. Remove in the order indicated in the table.



1	Oil pipe
2	Oil hose

3	Radiator (in tank oil cooler) (See Radiator (In Tank Oil Cooler) Installation Note)
4	Elbow (See Elbow Installation Note)

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Fig. 72: Removing Oil Cooler - With Torque Specifications
Courtesy of MAZDA MOTORS CORP.

4. Install in the reverse order of removal.
5. Add ATF to the specified level. (See **AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT**.)
6. Connect the negative battery cable.
7. Inspect for oil leakage from the oil pipes and oil hoses.
8. Inspect the ATF level and condition. (See **ATF LEVEL INSPECTION**.)
9. Carry out the mechanical system test. (See **MECHANICAL SYSTEM TEST**.)
10. Carry out the road test. (See **ROAD TEST**.)

ELBOW INSTALLATION NOTE

1. Apply ATF to the O-ring, then install it to the elbow.
2. Install the elbows in the angle shown in **Fig. 73**, then tighten the nut.

Tightening torque

34 N.m {3.5 kgf.m, 25 ft.lbf}

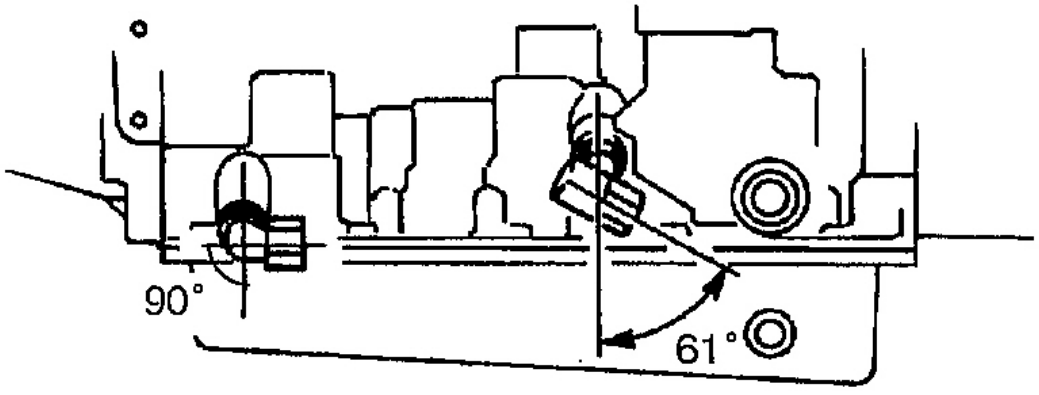

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Fig. 73: Installing Elbow
Courtesy of MAZDA MOTORS CORP.

RADIATOR (IN TANK OIL COOLER) INSTALLATION NOTE

1. The automatic transmission oil cooler flushing must be performed whenever a transmission is removed for service to remove existing fluid which may be contaminated to prevent contamination of new fluid. The flushing must be performed after installation of the overhauled or replaced transmission.
2. Follow the instruction in the manufacturers publication for flushing operation.

OIL HOSE INSTALLATION NOTE

CAUTION:
- **In order to prevent ATF leakage, replace the hose when any damage is found inside or outside of the hose, especially on areas contacting with pipes.**

1. Apply compressed air to cooler-side opening, and blow any remaining dust and foreign material from the cooler pipes. Compressed air should be applied for no less than one minute.

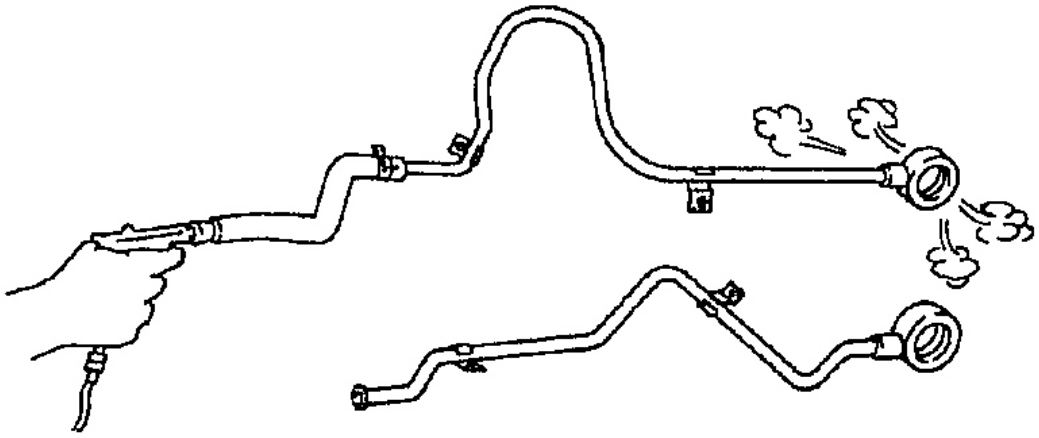

Fig. 74: Applying Compressed Air To Cooler-Side
Courtesy of MAZDA MOTORS CORP.

2. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated as shown.

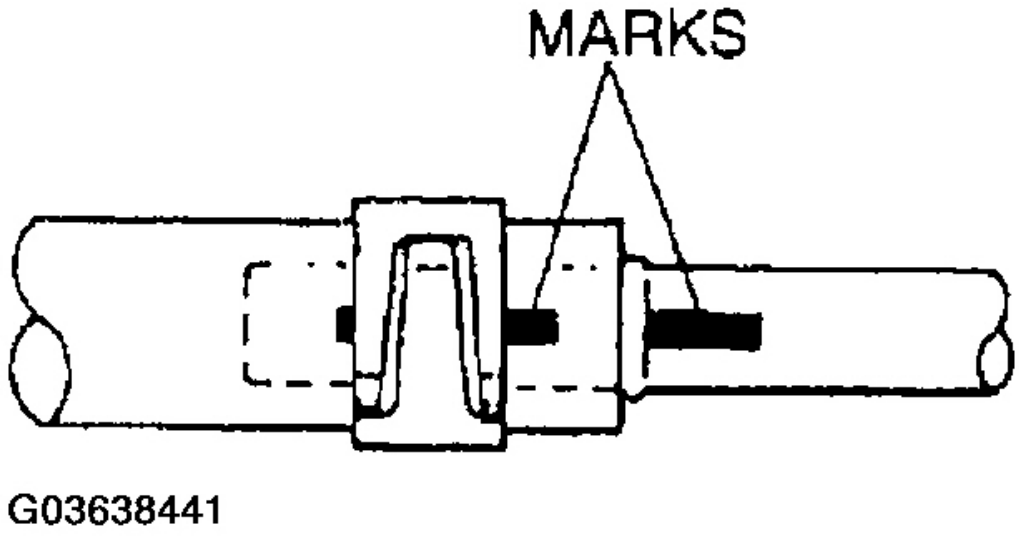

Fig. 75: Aligning Marks

Courtesy of MAZDA MOTORS CORP.

3. Install the hose clamp onto the hose.
   - If reusing the hose, install a new hose clamp exactly onto the mark left by the previous hose clamp.
4. Verify that the hose clamp does not interfere with any other parts.

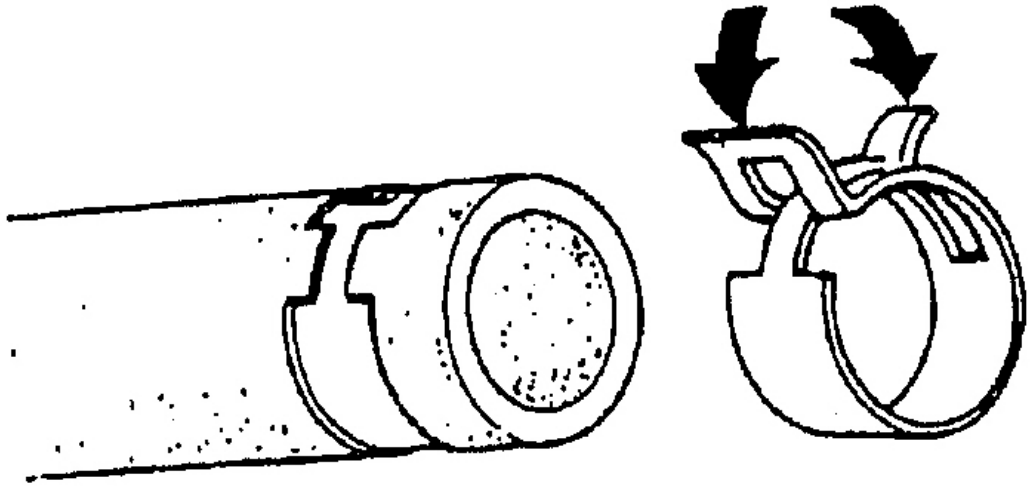

Fig. 76: Installing Hose Clamp
Courtesy of MAZDA MOTORS CORP.

DRIVE PLATE REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.

1	Drive plate mounting bolts (See Drive Plate Mounting Bolts Removal Note) (See Drive Plate Mounting Bolts Installation Note)
2	Drive plate
3	Adapter

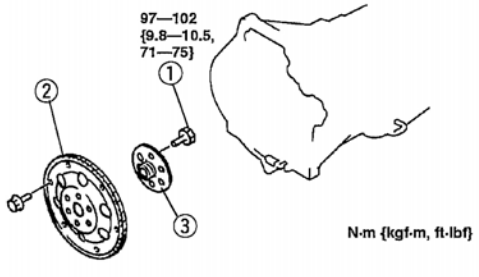

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Fig. 77: Removing Drive Plate - With Torque Specifications

Courtesy of MAZDA MOTORS CORP.

2. Install in the reverse order of removal.

DRIVE PLATE MOUNTING BOLTS REMOVAL NOTE

1. Set the **SST** against the drive plate.
2. Remove the bolts and the drive plate.

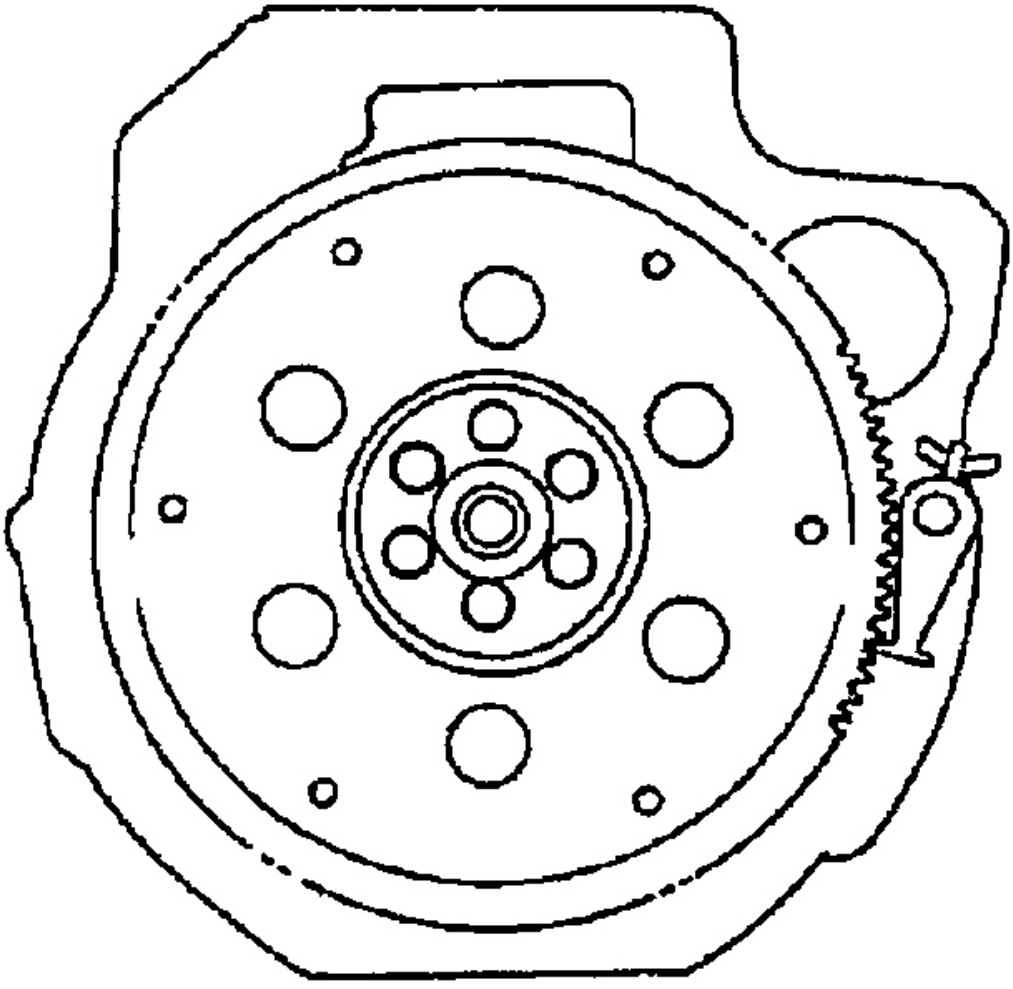

Fig. 78: Identifying Drive Plate

Courtesy of MAZDA MOTORS CORP.

DRIVE PLATE MOUNTING BOLTS INSTALLATION NOTE

1. Set the **SST** against the drive plate.
2. Tighten the drive plate mounting bolts gradually in the order shown.

Tightening torque

97-102 N.m {9.8-10.5 kgf.m, 71-75 ft.lbf}

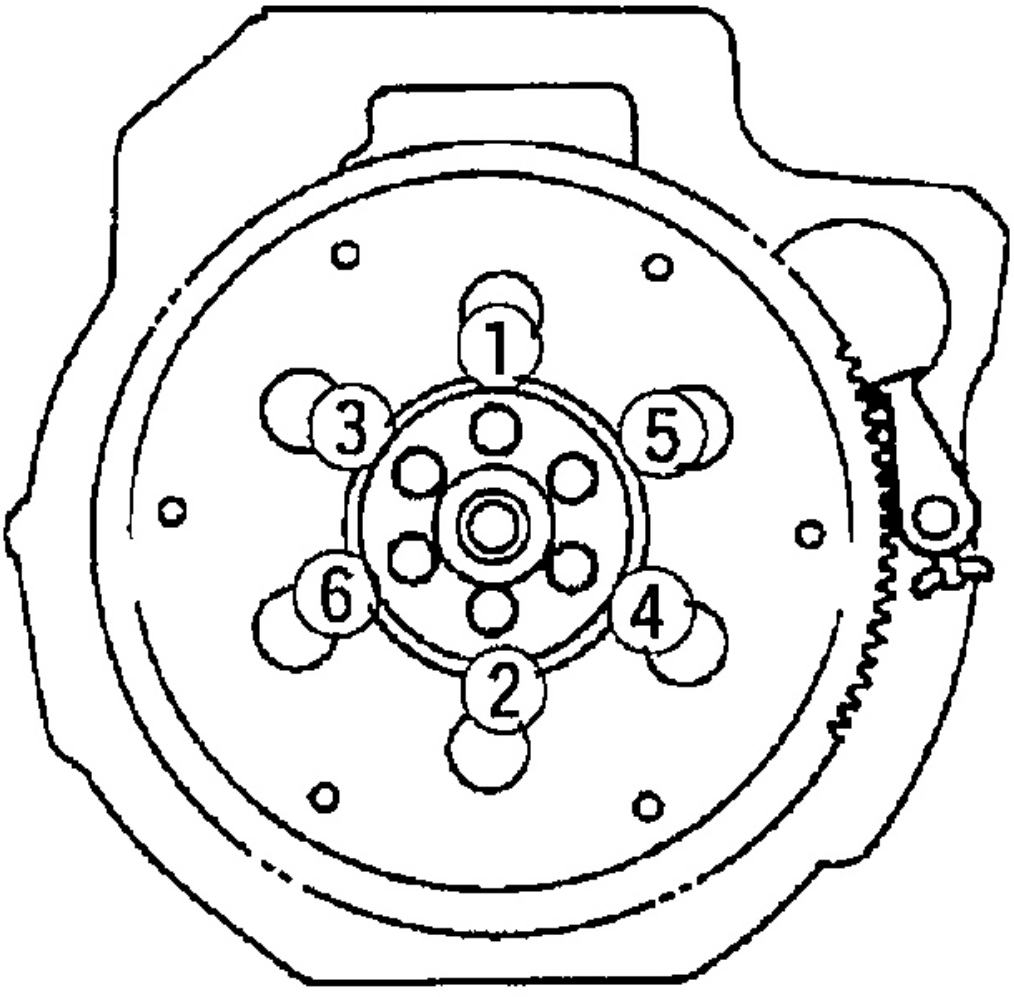

Fig. 79: Tightening Drive Plate Mounting Bolts In Sequence
Courtesy of MAZDA MOTORS CORP.