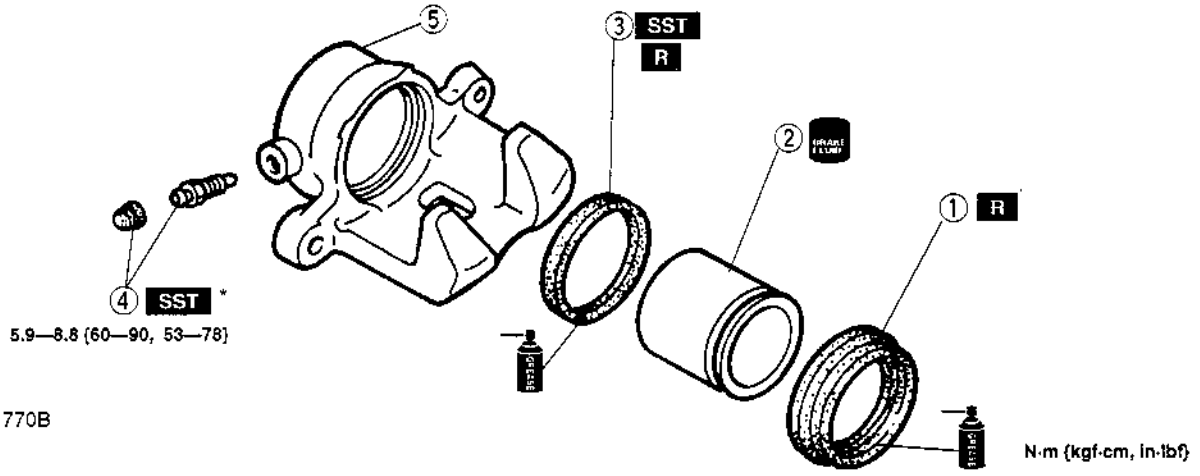
CALIPER (FRONT) DISASSEMBLY/ASSEMBLY

X5U411W14

1. Disassemble in the order indicated in the table.
2. Install in the reverse order of removal.

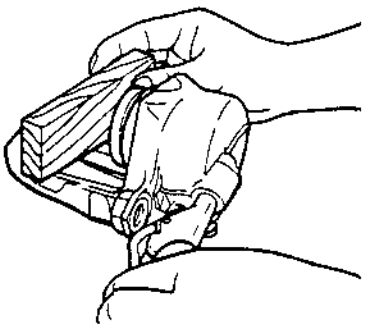


X5U411WC2

1	Dust seal
2	Piston ☞ Disassembly Note
3	Piston seal ☞ Disassembly Note
4	Bleeder screw and bleeder cap
5	Caliper body

Piston Disassembly Note

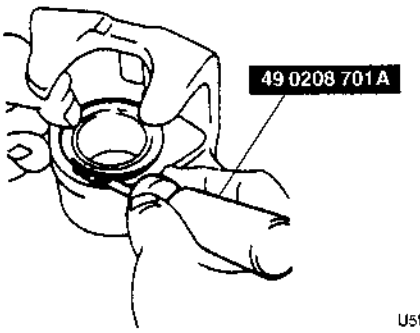
1. Place a piece of wood in the caliper.
2. Gently blow compressed air through the hole to force the piston out of the caliper.



U5U41135

Piston Seal Disassembly Note

- Remove the piston seal by using the **SST.**



U5U41136

REAR BRAKE (DISC) INSPECTION

X5U411W15

Disc Pad Thickness Inspection

1. On level ground, jack up the rear of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Look through the caliper inspection hole and verify the remaining thickness of the pad.

Thickness
1.0 mm {0.04 in} min.

Disc Plate Thickness Inspection

1. Measure the thickness of the disc plate.

Caution
- **When it is necessary to machine the disc plate, if the disc plate is removed from the vehicle then machined, excessive runout may result. Machine the disc plate with it installed on the vehicle.**

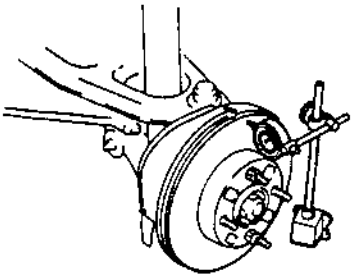
Minimum thickness:
8.0 mm {0.31 in}
Minimum thickness after machining by using a brake lathe on-vehicle:
8.4 mm {0.33 in}

2. If the thickness is not within the specification, replace the disc plate.

Disc Plate Runout Inspection

- Tighten the disc plate to the wheel hub by using two wheel nuts. When measuring runout, measure at the outer edge of the disc plate surface.

Runout limit
0.05 mm {0.002 in} max.

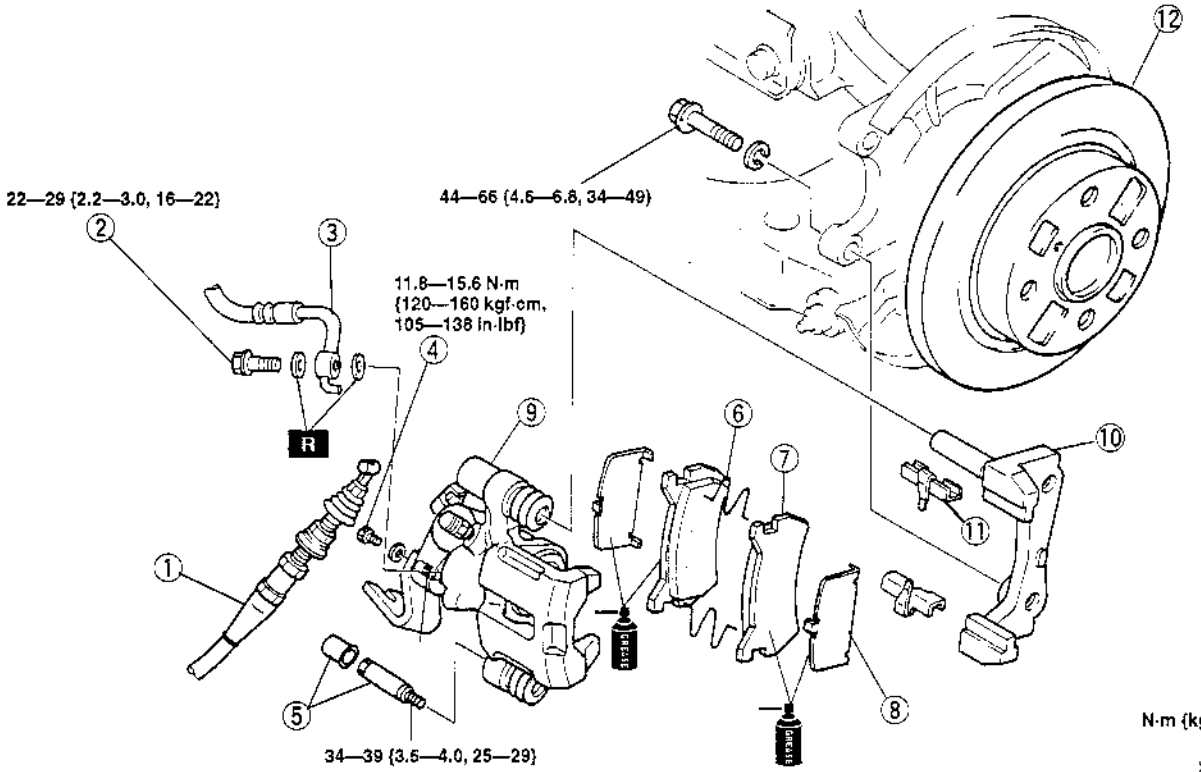


U5U41137

REAR BRAKE (DISC) REMOVAL/INSTALLATION

X5U411W16

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



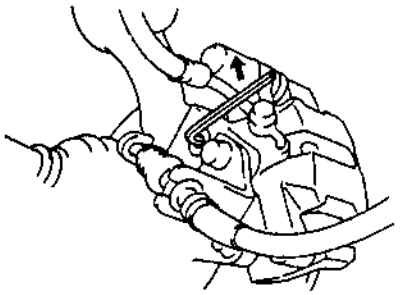
X5U411WA6

1	Parking brake cable
2	Connecting bolt
3	Brake hose
4	Plug
5	Cap and lock bolt
6	Spring
7	Disc pad ☞ Installation Note
8	Shim
9	Caliper
10	Mounting support
11	Guide plate
12	Disc plate ☞ 04–11 FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Plate Removal Note ☞ 04–11 FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Plate Installation Note

Disc Pad Installation Note

1. Turn the manual adjustment gear counterclockwise by using an Allen wrench to pull the brake caliper piston back.

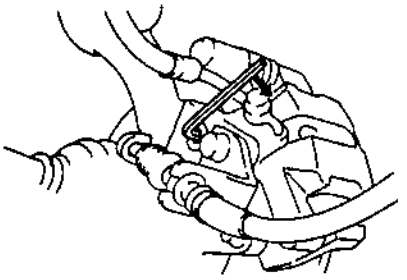
RETRACTING PISTON



U5U41139

2. Install the disc pads.
3. Turn the manual adjustment gear clockwise until the brake pads just touch the disc plate.
4. Return the manual adjustment gear counterclockwise 1/3 turn.

ADJUSTING BRAKE PADS

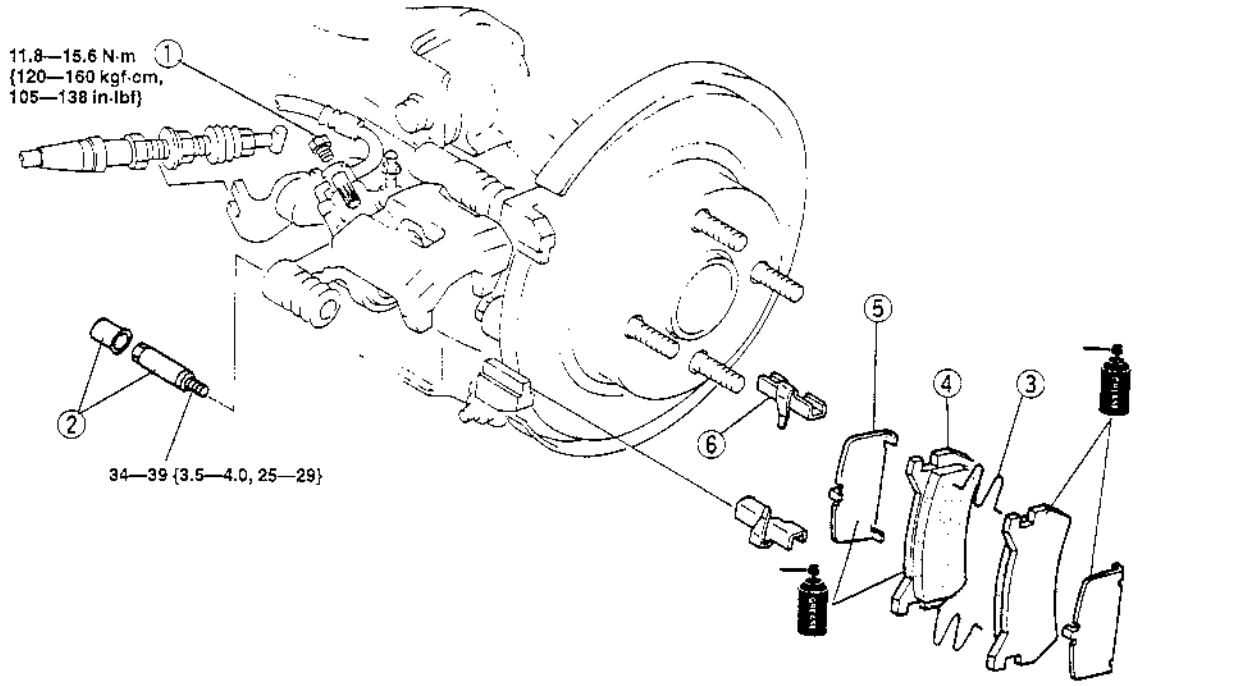


U5U41140

DISC PAD (REAR) REPLACEMENT

X5U411W:7

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



X5U411WC3

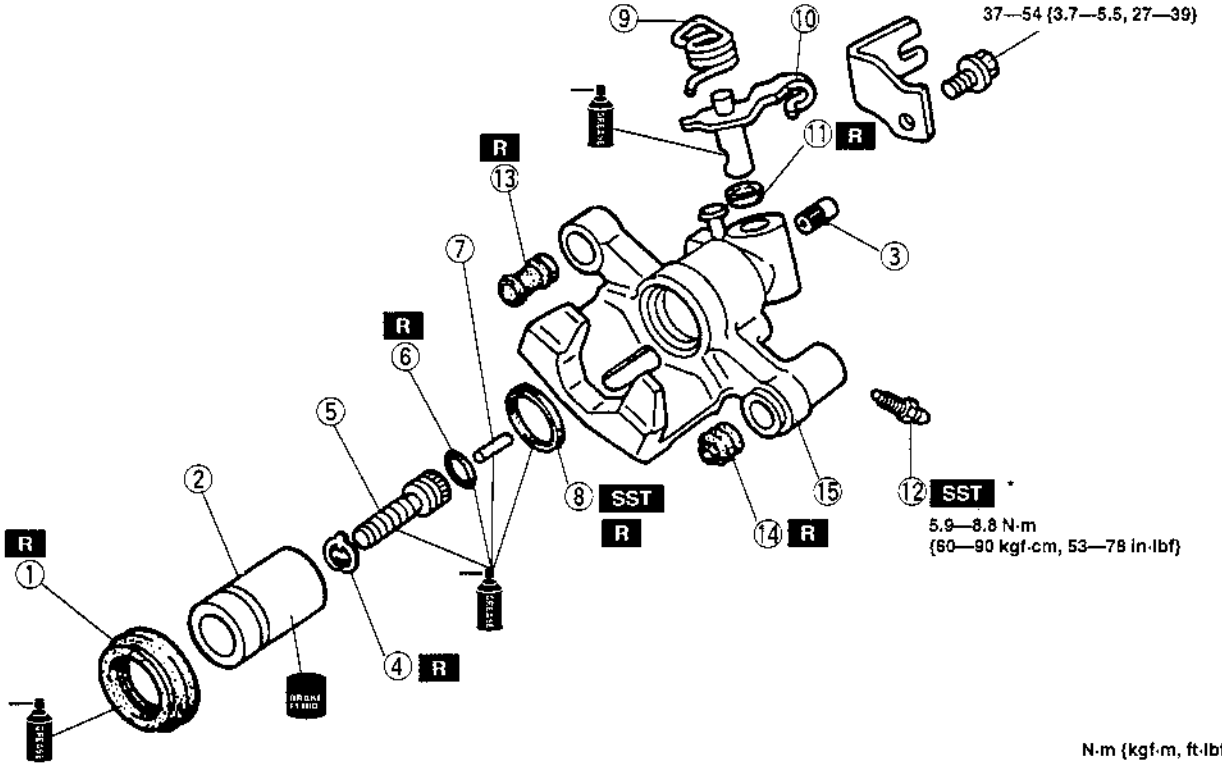
1	Plug
2	Cap and lock bolt
3	Spring
4	Disc pad ☞ 04–11 REAR BRAKE (DISC) REMOVAL/INSTALLATION, Disc Pad Installation Note

5	Shim
6	Guide plate

CALIPER (REAR) DISASSEMBLY/ASSEMBLY

X5U411W18

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



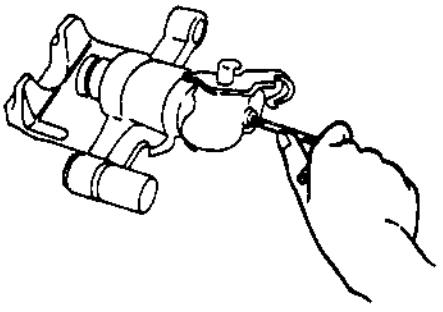
U5U41142

1	Dust seal
2	Piston ☞ Disassembly Note ☞ Assembly Note
3	Manual adjustment gear
4	Snap ring
5	Adjusting bolt
6	O-ring
7	Connecting link
8	Piston seal ☞ 04–11 CALIPER (FRONT) DISASSEMBLY/ASSEMBLY, Piston Seal Disassembly Note

9	Spring
10	Operating lever
11	Boot
12	Bleeder screw
13	Boot
14	Boot
15	Caliper body

Piston Disassembly Note

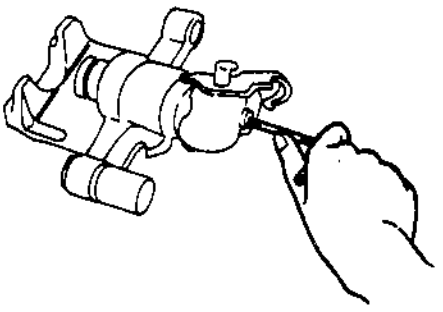
1. Turn the manual adjustment gear clockwise by using an Allen wrench. (Turn the manual adjustment gear until it turns easily.)
2. Remove the piston.



U5U41143

Piston Assembly Note

- Insert the piston into the caliper and turn the adjustment gear counterclockwise by using an Allen wrench to pull the piston in fully. (Turn the adjustment gear until it stops.)



U5U41144

04–12 PARKING BRAKE SYSTEM

PARKING BRAKE INSPECTION

X5U412W01

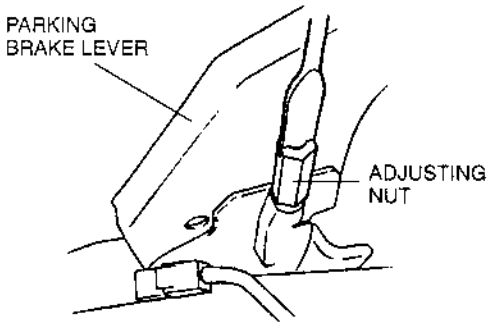
1. Depress the brake pedal several times.
2. Verify that the stroke is as specified when the parking brake lever is pulled with a force of **98 N {10 kgf, 22 lbf}**.

Stroke
5—7 notches

PARKING BRAKE ADJUSTMENT

X5U412W02

1. Depress the brake pedal several times.
2. Remove the cover.
3. Turn the adjusting nut to adjust the lever stroke.
4. Pull the parking brake lever one notch, and verify that the parking brake warning light comes on. Release the parking brake.
5. Turn the wheels by hand, and verify that the brakes do not drag.

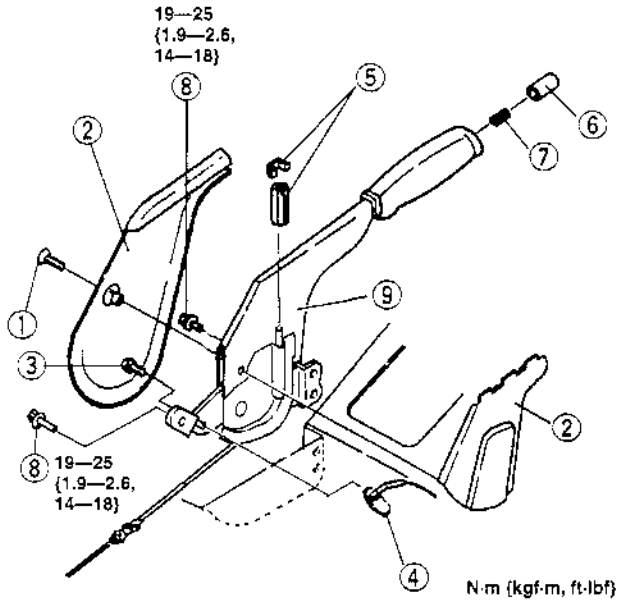


U5U41201

PARKING BRAKE LEVER REMOVAL/INSTALLATION

X5U412W03

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. After installation, adjust the parking lever stroke.



X5U412WA0

1	Screw
2	Cover
3	Bolt
4	Parking brake switch ☞ Installation Note
5	Adjusting nut and clip
6	Release button
7	Spring
8	Bolt
9	Parking brake lever

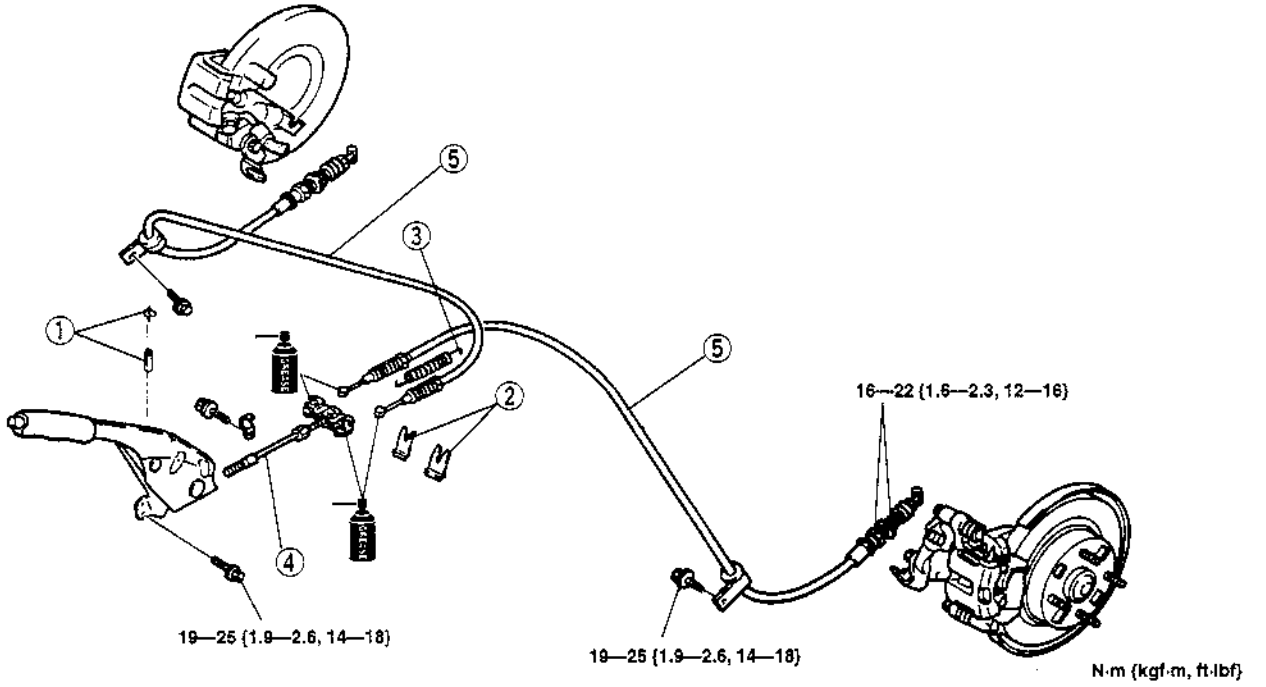
Parking Brake Switch Installation Note

1. Install the parking brake switch so that it contacts the parking brake lever when the lever is fully released.
2. Turn the ignition switch to ON, and verify that the parking brake warning light illuminates with the lever pulled up one notch.

PARKING BRAKE CABLE REMOVAL/INSTALLATION

X5U412W04

1. Remove the exhaust pipe heat insulator.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. After installation:
   (1) Adjust the parking brake lever stroke.
   (2) Depress the brake pedal a few times.
   (3) Verify that the rear brakes do not drag while the wheels are rotated by hand.



X5U412WA1

1	Adjusting nut and clip
2	Clip
3	Spring

4	Front cable
5	Rear cable

04–13 ANTILOCK BRAKE SYSTEM

ABS HYDRAULIC UNIT INSPECTION

System Inspection

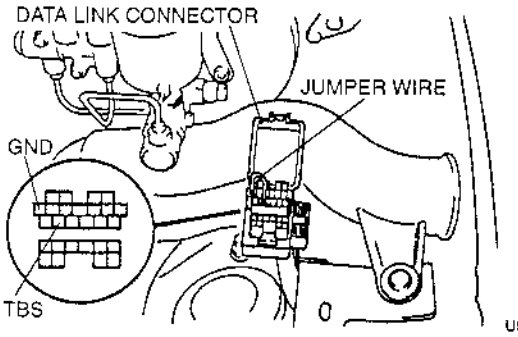
Note
- If any past diagnostic trouble code is memorized, the system inspection mode will not work. Make sure that there is no codes in the ABS memory before performing this inspection.

1. Verify that the battery is fully charged. With the ignition switch at ON, verify that the ABS warning light goes out after **2—4 seconds**.
2. If the light stays ON after **2—4 seconds** the ABS control module detects a failure and will not activate the ABS hydraulic unit. Follow the troubleshooting procedures.
3. Turn the ignition switch off.
4. On level ground, jack up the vehicle and support it evenly on safety stands. Shift the transmission to neutral or N position.
5. Release the parking brake.
6. Rotate the wheels by hand, and inspect for brake drag.

Caution
- **Connecting the wrong data link connector terminals may possibly cause a malfunction. Carefully connect the specified terminals only.**

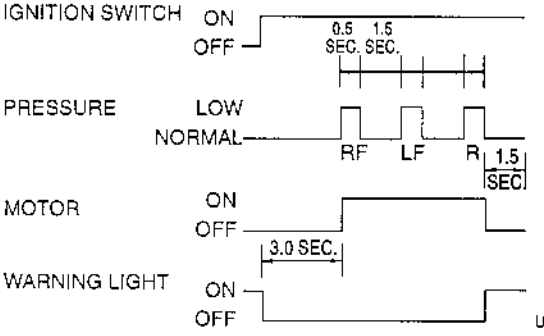
7. Using a jumper wire, connect the TBS and GND terminals of the data link connector.

X5U413W01



U5U41301

8. Depress the brake pedal, and have an assistant verify that the right front wheel will not turn.
9. With the brake pedal still depressed, turn the ignition switch to ON and verify that the brake is released momentarily (approx. **0.5 sec.**) and that the wheel turns when pressure-reduction operates.
10. Verify operation of the remaining wheels in order: left front, right rear, left rear.



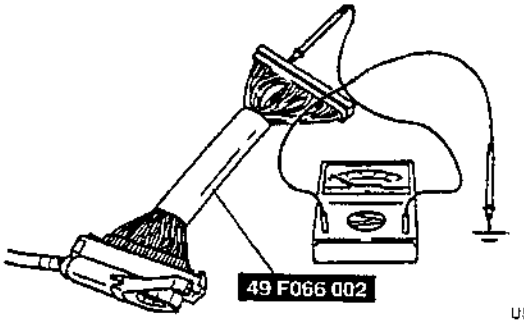
U5U41302

11. When steps 9 and 10 show correct operation, the following systems are okay.
    - Brake piping to ABS hydraulic unit
    - Braking system, including ABS hydraulic unit
    - Electrical system in ABS hydraulic unit (solenoid, ABS motor, etc.)
    - ABS control module, its output system (solenoid, relay, etc.) and harness

    The following are not inspected with the steps 9 and 10.
    - Input system and harness of ABS control module
    - Intermittent failure
    - Fluid leakage
12. Replace the ABS hydraulic unit if wheels do not rotate. Inspect brake piping to ABS hydraulic unit if wheels rotate but their rotation order is not correct. Remove the jumper wire.

ABS Motor Inspection (Including Harness To ABS Control Module)

1. Turn the ignition switch off, and disconnect the ABS control module connector.
2. Connect the **SST** to the ABS control module connector.



U5U41303

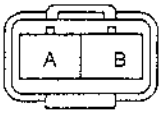
3. Measure the resistance between terminal X of the control module connector and a ground.

   Resistance
   1 Ω max.

4. If not as specified, inspect the wiring harness between the ABS motor and the control module, and inspect the ABS motor. (Refer to ABS Motor Inspection.)

ABS Motor Inspection

1. Turn the ignition switch off.
2. Disconnect the ABS hydraulic unit connector (2 pin).
3. Measure the resistance between terminal A of the ABS hydraulic unit connector and body ground.



VIEW FROM TERMINAL SIDE

U5U41304

   Resistance
   1 Ω max.

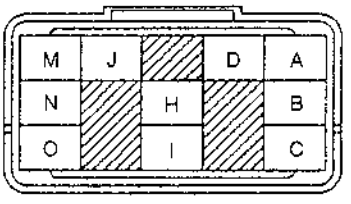
4. Verify that the motor operates when applying 12 V to the terminal A.
5. If not as specified, repair the harness or replace the ABS hydraulic unit as necessary.

Solenoid Valve Inspection Including the Valve Relay

1. Turn the ignition switch off.
2. Disconnect the ABS hydraulic unit connector (10 pin).
3. Apply 12 V between terminal A and D. Measure the resistance between terminal B and the following terminals at the ABS hydraulic unit connector (10 pin).

Specification

Terminal	H	I	J	M	N	O
Resistance (Ω)	4.04—4.54			8.04—9.04		



VIEW FROM TERMINAL SIDE

U5U41305

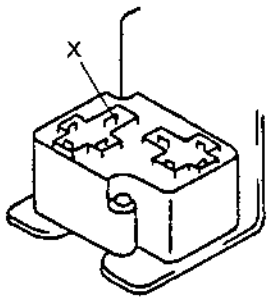
4. If not as specified, inspect the valve relay and solenoid valves.

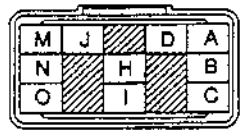
Solenoid Valve Inspection

1. Remove the ABS hydraulic unit.
2. Remove the valve relay. Measure the resistance between terminal X at the valve relay terminal and the following terminals at the ABS hydraulic unit connector.

Specification

Terminal	H	I	J	M	N	O
Resistance (Ω)	4.04—4.54			8.04—9.04		





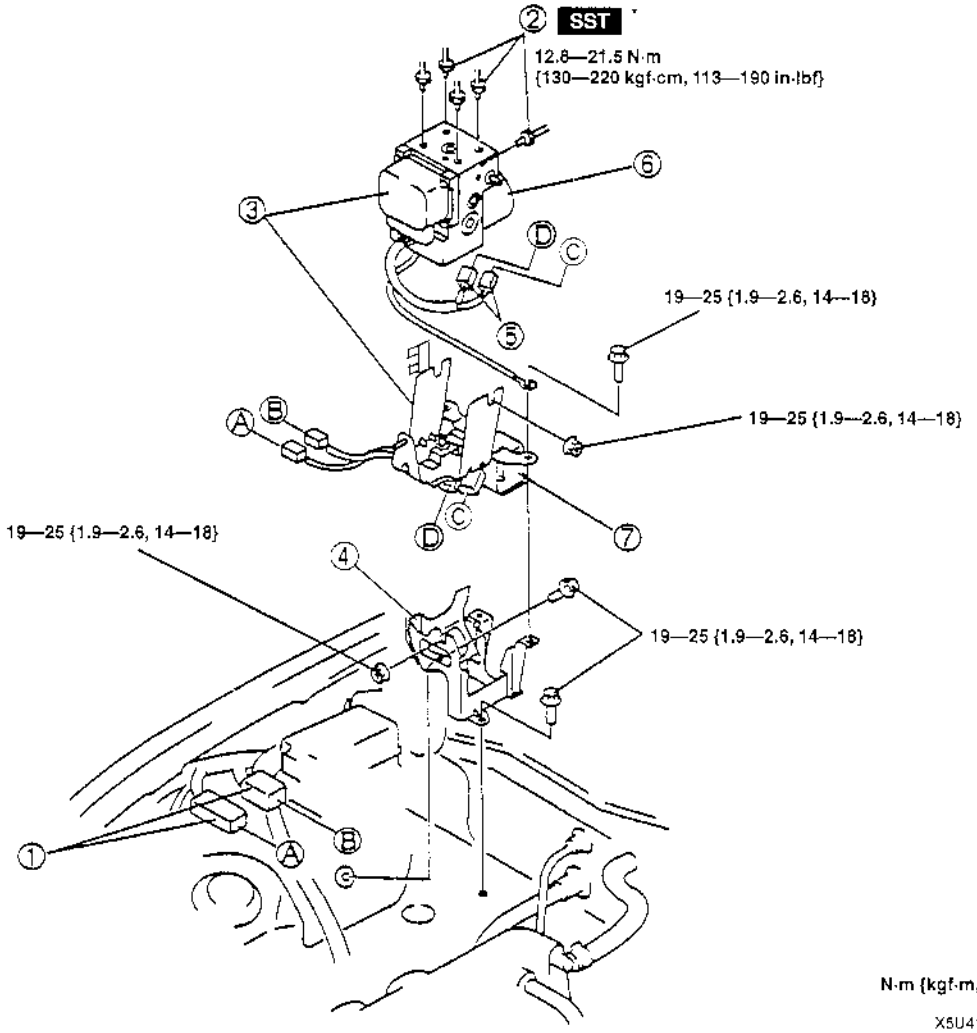
X5U413WA0

3. If not as specified, repair the harness or replace the ABS hydraulic unit as necessary.

ABS HYDRAULIC UNIT REMOVAL/INSTALLATION

X5U413W02

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



* 49 0259 770B

N·m {kgf·m, ft·lbf}

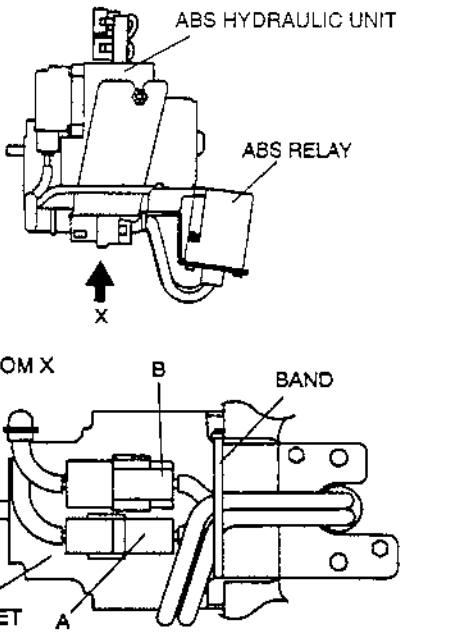
X5U413WA1

1	Connector
2	Brake pipe
3	ABS hydraulic unit and bracket
4	Bracket

5	Connector
6	ABS hydraulic unit ☞ Installation Note
7	Bracket

ABS Hydraulic Unit Installation Note

1. Pass the connector from the ABS HU under the bracket, then connect it with connectors A and B from the ABS relay.
2. Insert the clip for connector A into the bracket hole.
3. Gather the slack in the harness from the ABS relay and tie it with a band to the bracket.



X5U413WA2

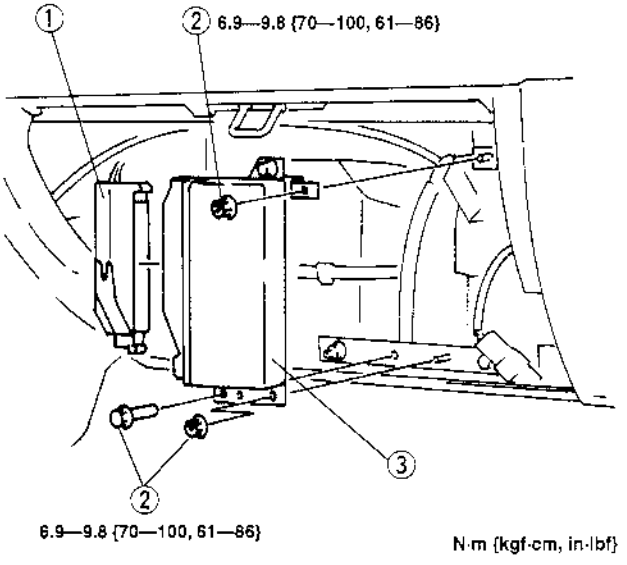
ABS CONTROL MODULE REMOVAL/INSTALLATION

X5U413W03

1. Remove the glove compartment. (Refer to 09–17 GLOVE COMPARTMENT REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

Caution

- **Connect the connector securely. If a poor contact occurs, the ABS system may malfunction.**



X5U413WA3

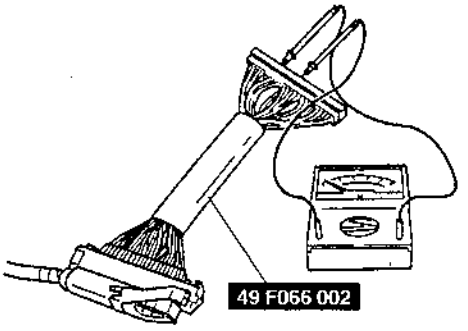
1	Connector
2	Nuts and bolt
3	ABS control module

ABS HARNESS AND INPUT SIGNAL INSPECTION

X5U413W04

Caution
- **Disconnecting and connecting the ABS CM connector must be done with the ignition switch off.**
- **When checking the harness connector, the SST must be used.**

1. Disconnect the ABS CM connector and connect the **SST** to the harness connector with the ignition switch OFF.
2. Attach the tester leads to the **SST** to inspect for voltage, continuity, or resistance, referring to the table below.



U5U41309

Note
- Voltage is measured between applicable terminal and GND terminal of ABS CM harness connector.

U5U41321

Terminal	Signal name	Connected to	Item	Condition	Specification	Possible cause
A	Voltage supply (System)	IG SW	Voltage	IG SW is at ON	B+	Harness (IG SW — ABS CM connector)
				IG SW is off	0 V	
B	Voltage supply (Relay drive)	HU (motor relay, valve relay coil)	Continuity	B—GND	No	Harness (B — motor relay — valve relay, G — motor relay, B — valve relay) Motor relay Valve relay
				B—A	No	
			Resistance	B—G	72—88 Ω	
				B—AK	93—113 Ω	
G	Motor relay drive	HU (motor relay coil)	Continuity	G—GND	No	Harness (B — motor relay — valve relay, G — motor relay, B — valve relay) Motor relay Valve relay
				G—A	No	
			Resistance	B—G	72—88 Ω	
AK	Valve relay drive	HU (valve relay coil)	Continuity	AK—GND	No	Harness (B — motor relay — valve relay, G — motor relay, B — valve relay) Motor relay Valve relay
				AK—A	No	
			Resistance	B—AK	93—113 Ω	
P	On-board diagnosis TBS	Data link connector TBS	Continuity	P—GND	No	Harness (P — TBS at DLC)
				P—A	No	
				P—TBS at DLC	Yes	
AT	On-board diagnosis FBS	Data link connector FBS	Continuity	AT—GND	No	Harness (AT — FBS at DLC)
				AT—A	No	
				AT—FBS at DLC	Yes	
X	Motor monitor	HU (ABS motor)	Voltage	When B+ applied between B and G	B+	Harness (B — motor relay — G, motor relay — battery, X — motor relay — motor, motor — motor GND) Motor Motor relay
				When open between B and G	0 V	
			Continuity	X—GND	Yes	

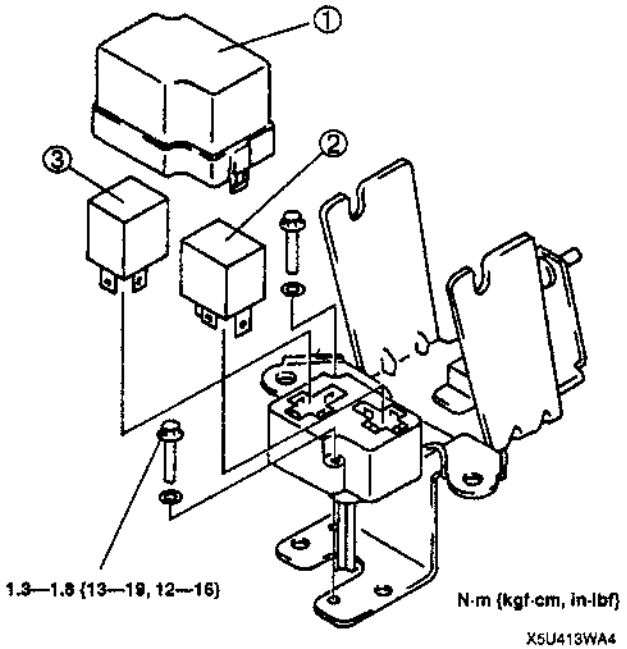
Terminal	Signal name	Connected to	Item	Condition	Specification	Possible cause
AB, AC, AM	System GND	Ground point	Continuity	AB—ground point	Yes	Harness (Each terminal — ground point)
				AC—ground point	Yes	
				AM—ground point	Yes	
				AB—AD, AC—AD	Yes	Short plate of harness connector
				AM—AD	Yes	
AD	Warning light	ABS warning light	Continuity	AD—GND (IG is off)	Yes	Harness (AD — meter, meter — IG SW) Meter
				AD—A (IG is off)	Yes	
			Voltage	When IG SW is at ON	B+	
AV	Brake switch	Brake switch	Voltage	When brake pedal depressed	B+	Harness (AV — brake SW) (When brake light normal)
				When brake pedal released	0 V	
AJ, J	LF wheel-speed	LF wheel-speed sensor	Voltage	Vehicle stopped	0 V (AC)	Harness (sensor — ABS CM harness connector) Sensor, Installation condition
				When turned 1 revolution per second	0.25—1.2 V (AC)	
			Resistance	AJ—J	1.4—1.8 kΩ	
O, N	RF wheel-speed	RF wheel-speed sensor	Voltage	Vehicle stopped	0 V (AC)	Harness (sensor — ABS CM harness connector) Sensor, Installation condition
				When turned 1 revolution per second	0.25—1.2 V (AC)	
			Resistance	O—N	1.4—1.8 kΩ	
K, AL	RR wheel-speed	RR wheel-speed sensor	Voltage	Vehicle stopped	0 V (AC)	Harness (sensor — ABS CM harness connector) Sensor, Installation condition
				When turned 1 revolution per second	0.25—1.2 V (AC)	
			Resistance	K—AL	1.4—1.8 kΩ	
AN, L	LR wheel-speed	LR wheel-speed sensor	Voltage	Vehicle stopped	0 V (AC)	Harness (sensor — ABS CM harness connector) Sensor, Installation condition
				When turned 1 revolution per second	0.25—1.2 V (AC)	
			Resistance	AN—L	1.4—1.8 kΩ	
E	Left front solenoid valve (EV) drive	HU (LF solenoid valve)	Voltage	When B+ applied between B and AK	B+	Harness (B — motor relay — AK, valve relay — battery, valve relay — solenoid Each terminal — solenoid valve) Valve relay Solenoid valve
			Continuity	E—GND	No	
				E—A	No	
AG	Left front solenoid valve (AV) drive	HU (LF solenoid valve)	Voltage	When B+ applied between B and AK	B+	
			Continuity	AG—GND	No	
				AG—A	No	
BB	Right front solenoid valve (EV) drive	HU (RF solenoid valve)	Voltage	When B+ applied between B and AK	B+	
			Continuity	BB—GND	No	
				BB—A	No	
Z	Right front solenoid valve (AV) drive	HU (RF solenoid valve)	Voltage	When B+ applied between B and AK	B+	
			Continuity	Z—GND	No	
				Z—A	No	
BA	Rear solenoid valve (EV) drive	HU (Rear solenoid valve)	Voltage	When B+ applied between B and AK	B+	
			Continuity	BA—GND	No	
				BA—A	No	
Y	Rear solenoid valve (AV) drive	HU (Rear solenoid valve)	Voltage	When B+ applied between B and AK	B+	
			Continuity	Y—GND	No	
				Y—A	No	

ABS RELAY REMOVAL/INSTALLATION

X5U413W05

1. Remove the ABS hydraulic unit.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

1	Cover
2	Motor relay
3	Valve relay



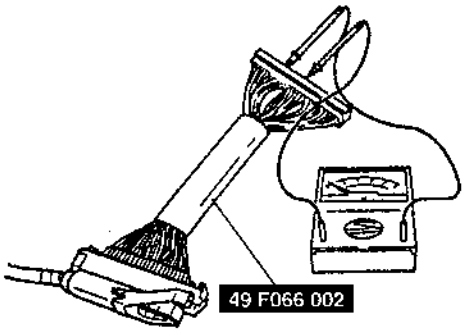
X5U413WA4

ABS RELAY INSPECTION

X5U413W06

Valve Relay Inspection (Including Harness To ABS Control Module)

1. Turn the ignition switch off and disconnect the ABS control module connector.
2. Connect the **SST** to the ABS control module connector.



U5U41311

3. Turn the ignition switch to ON.
4. Measure the voltage between the ground terminal AB and the following terminals of the ABS control module connector.

Terminal: E, Z, Y, AG, BA, BB Voltage
0 V

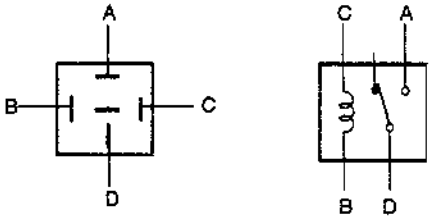
5. Apply 12 V to terminal B and ground terminal AK. Measure the voltage between the ground terminal AB and the following terminals of the ABS control module connector.

Terminal: E, Z, Y, AG, BA, BB Voltage
B+

6. If not as specified, inspect the wiring harness and the valve relay.

Valve Relay Inspection

1. Using an ohmmeter, inspect for continuity of the relay terminals.



U5U41315

○—○ : Continuity

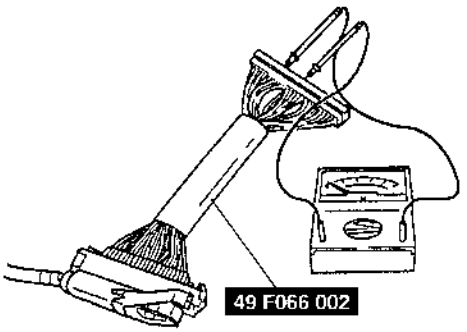
Connect to		A	B	C	D
B+	Ground				
—	—		○	○	
B	C	○			○

U5U41313

2. If not as specified, replace the valve relay.

Motor Relay Inspection (Including Harness To ABS Control Module)

1. Turn the ignition switch off and disconnect the ABS control module connector.
2. Connect the **SST** to the ABS control module connector.



U5U41314

3. Turn the ignition switch to ON.
4. Measure the voltage between terminal X and AB of the ABS control module connector.

Voltage
0 V

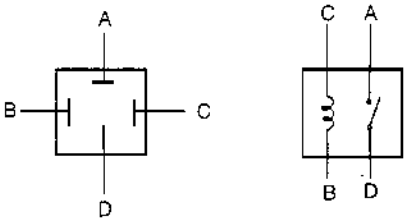
5. Apply B+ to terminal B and ground terminal G. Measure the voltage between terminal X and AB of the ABS control module connector.

Voltage
B+

6. If not as specified, inspect the wiring harness and the motor relay.

Motor Relay Inspection

1. Using an ohmmeter, inspect for continuity of the relay terminals.



U5U41312

○—○ : Continuity

Connect to		A	B	C	D
B+	Ground				
—	—		○	○	
C	B	○			○

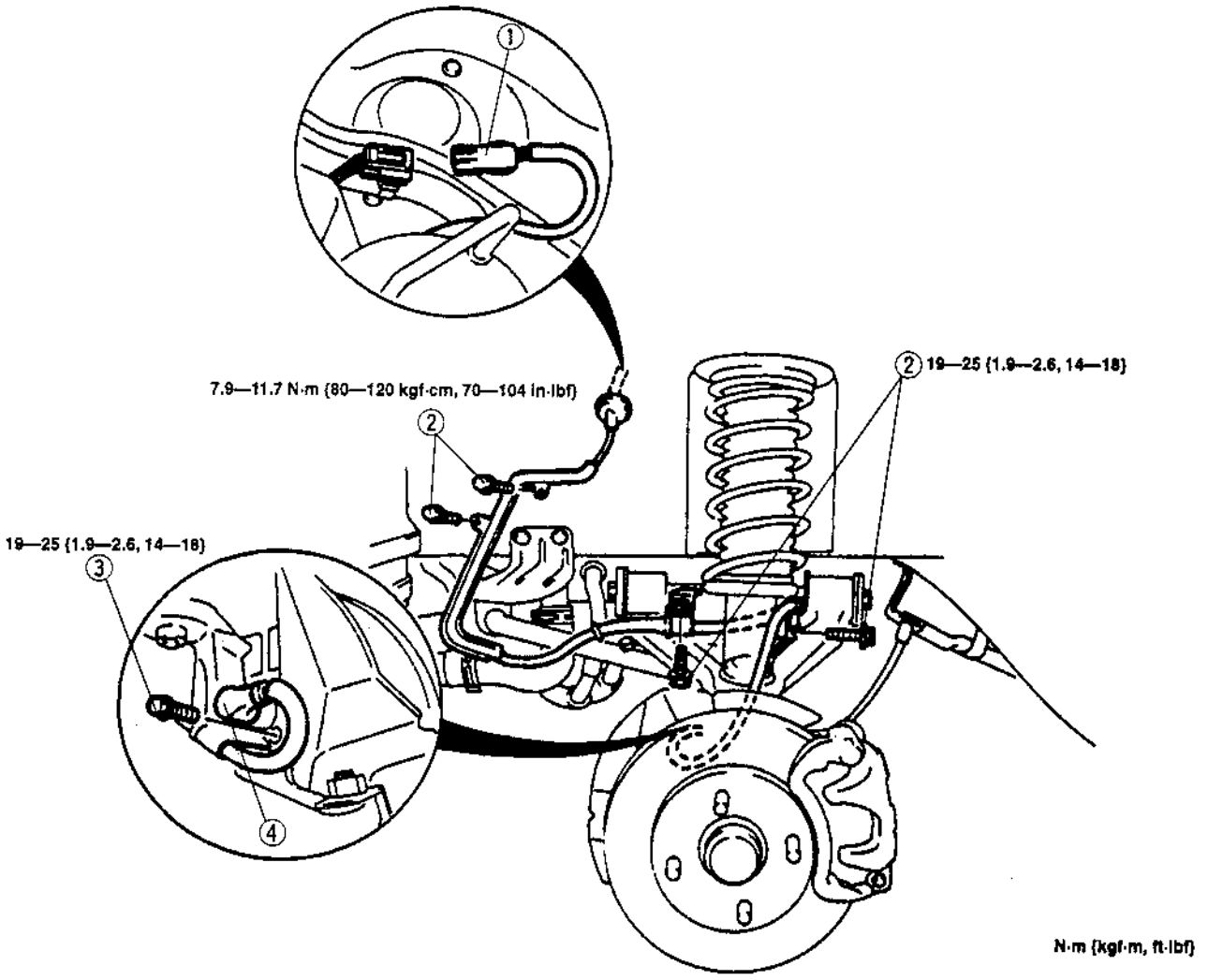
U5U41316

2. If not as specified, replace the motor relay.

FRONT ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION

X5U413W07

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



1	Connector
2	Bolts

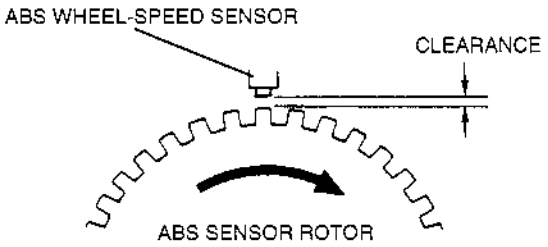
3	Bolt
4	ABS wheel-speed sensor

FRONT ABS WHEEL-SPEED SENSOR INSPECTION

X5U413W08

Clearance Inspection

1. Remove the wheel and tire, and inspect the sensor for looseness and damage. Replace the sensor as necessary.
2. Verify the clearance between the ABS wheel-speed sensor and the sensor rotor.



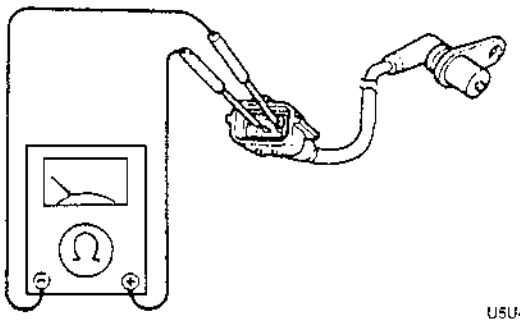
U5U413*8

Clearance
0.3—1.1 mm {0.012—0.043 in}

3. If not as specified, replace the ABS wheel-speed sensor or sensor rotor as necessary.

Resistance Inspection

1. Disconnect the ABS wheel-speed sensor connector.
2. Inspect for resistance at the ABS wheel-speed sensor.



U5U41319

Resistance
1.4—1.8 kΩ

Voltage Inspection

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Disconnect the ABS wheel-speed sensor connector.
3. Inspect each wheel by rotating it at one revolution per second.

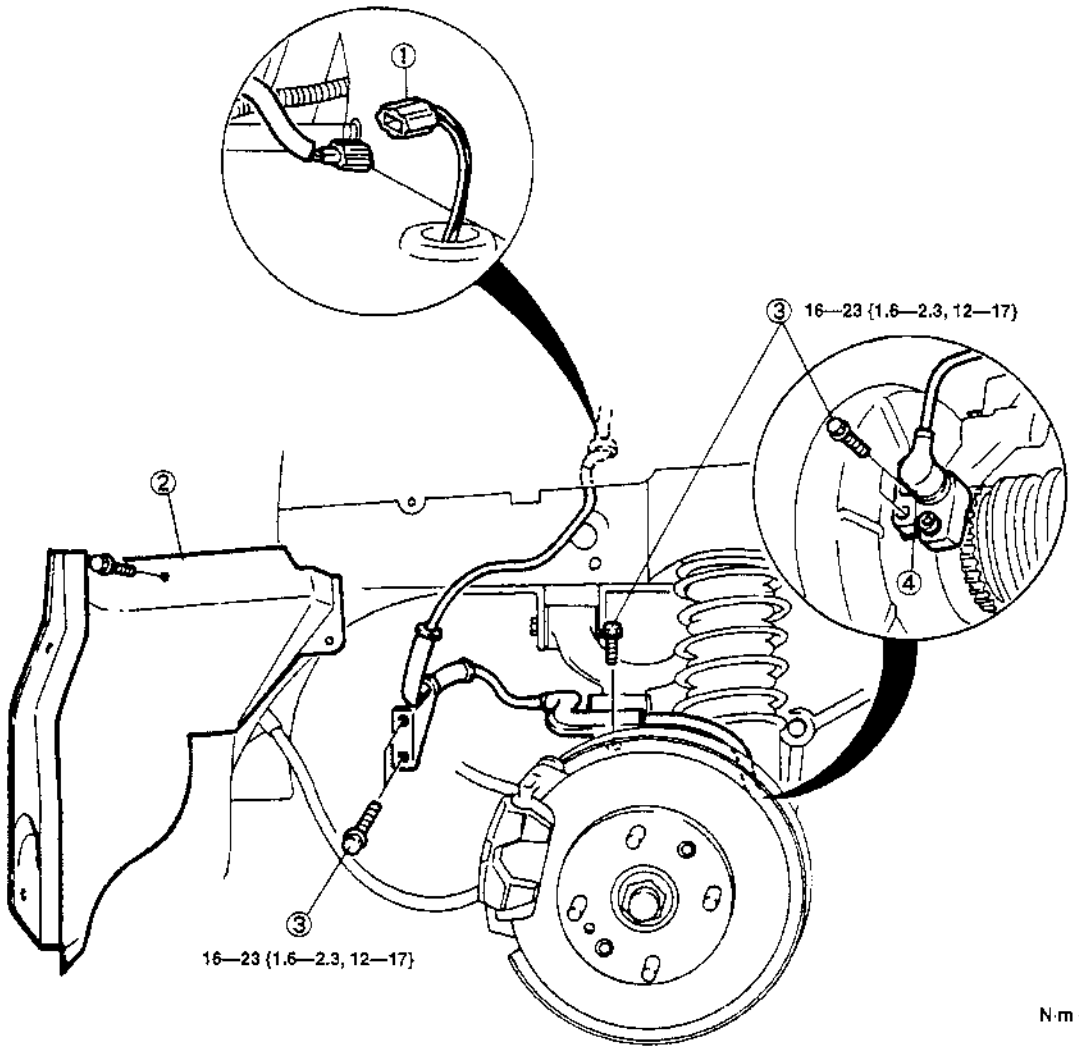
Voltage
0.25—1.2 V (AC)

4. If not as specified, replace the ABS wheel-speed sensor or sensor rotor as necessary.

REAR ABS WHEEL-SPEED SENSOR REMOVAL/INSTALLATION

X5U413W09

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



N·m {kgf·m, ft·lbf}

X5U413WA5

1	Connector
2	Mud guard

3	Bolt
4	ABS wheel-speed sensor

REAR ABS WHEEL-SPEED SENSOR INSPECTION

X5U413W10

- Inspect the rear ABS wheel-speed sensor in the same procedure as the front ABS wheel-speed sensor. (Refer to 04–13 FRONT ABS WHEEL-SPEED SENSOR INSPECTION.)

04–50 TECHNICAL DATA

04 BRAKES

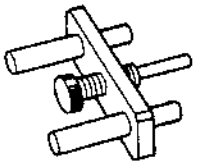
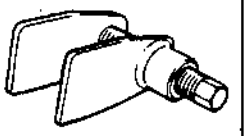
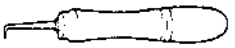
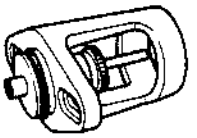
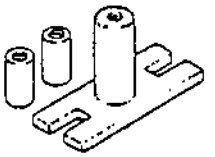
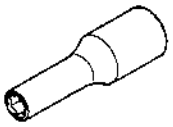
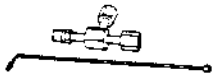
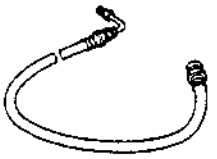
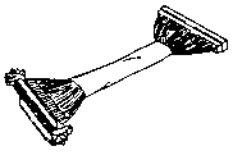
X5U450W01

Item			Specification
CONVENTIONAL BRAKE SYSTEM			
Brake pedal	Brake pedal height (mm {in})		171—181 {6.73—7.13}
	Brake pedal play (mm {in})		4.0—8.4 {0.16—0.33}
	Pedal-to-floor clearance (mm {in})		95 {3.74} min.
Power brake unit	Fluid pressure (kPa {kgf/cm^2, psi})	At 0 kPa {0 mmHg, 0 inHg}	1,079—1,177 {11—12, 156—171}
		At 66.7 kPa {500 mmHg, 19.7 inHg}	5,199—5,494 {53—56, 754—796}
Dual proportioning valve	Bend portion (kPa {kgf/cm^2, psi})		3,923 {40, 569}
	Rear wheel pressure when master cylinder pressure is 5,880 kPa {60 kgf/cm^2, 850 psi} (kPa {kgf/cm^2, psi})		4,846 {49.4, 683} ± 392 {4, 57}
Front disc brake	Minimum disc pad thickness (mm {in})		1.0 {0.04}
	Minimum disc plate thickness (mm {in})		18.0 {0.71}
	Disc plate runout limit (mm {in})		0.05 {0.002}
Rear disc brake	Minimum disc pad thickness (mm {in})		1.0 {0.04}
	Minimum disc plate thickness (mm {in})		8.0 {0.31}
	Disc plate runout limit (mm {in})		0.05 {0.002}
Brake fluid	Type		SAE J1703 or FMVSS 116 DOT3
PARKING BRAKE SYSTEM			
Parking brake lever	Lever stroke when pulled at 98 N {10 kgf, 22 lbf} (notches)		5—7
ANTILOCK BRAKE SYSTEM			
ABS wheel-speed sensor	Clearance between sensor and rotor (mm {in})		0.3—1.1 {0.012—0.043}

04–60 SERVICE TOOLS

04 BRAKES SST

X5U460W01

49 0259 770B Flare nut wrench  T0259770B	49 F043 001 Adjust gauge  TF043001X	49 0221 600C Disc brake expand tool  T0221600C
49 0208 701A Boot air out tool  T0208701A	49 B043 001 Adjust gauge  TB043001X	49 E043 003A Turning lock tool  TE043003A
49 B043 004 Socket wrench  TB043004X	49 U043 0A0 Oil pressure gauge set  TU043A0X	49 U043 004 Oil pressure gauge (Part of 49 U043 0A0)  TU043004X
49 U043 005 Joint (Part of 49 U043 0A0)  TU043005X	49 U043 006 Hose (Part of 49 U043 0A0)  TU043006X	49 F066 002 Harness adapter  TF066002X
49 T088 0A0 NGS set  TT088A0X	49 T088 010F Program Card  TT088010F	—

TRANSMISSION/TRANSAXLE

05
SECTION

05–01 TROUBLESHOOTING

FOREWORD

XSU501WC1

Before proceeding with the following troubleshooting,
- Refer to section 00–00 to understand the basic troubleshooting procedure.
- Perform the diagnostic trouble code inspection.
- If a diagnostic trouble code is displayed, proceed with inspection steps for the code.
- When the engine can be started, perform "ENGINE TUNE-UP". (Refer to 01–10 ENGINE TUNE-UP.)

AUTOMATIC TRANSMISSION ON-BOARD DIAGNOSTIC

X5U501W02

Diagnostic Trouble Code Inspection
(Refer to 01–01A ENGINE ON-BOARD DIAGNOSTIC.)

After Repair Procedure
(Refer to 01–01A ENGINE ON-BOARD DIAGNOSTIC.)

Diagnostic Trouble Code Table

DTC No.	Condition	MIL	DC	Monitor Item	O/D OFF indicator light
P0102	Mass air flow circuit low input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0103	Mass air flow circuit high input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0106	Barometric pressure circuit performance problem	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0107	Barometric pressure circuit low input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0108	Barometric pressure circuit high input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0111	Intake air temperature circuit performance problem	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0112	Intake air temperature circuit low input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0113	Intake air temperature circuit high input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0117	Engine coolant temperature circuit input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0118	Engine coolant temperature circuit high input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0122	Throttle position circuit low input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0123	Throttle position circuit high input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0125	Excessive time to enter closed fuel control	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0130	Front oxygen sensor circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0134	Front oxygen sensor circuit no activity detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0138	Rear heated oxygen sensor circuit high input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0140	Rear oxygen sensor circuit no activity detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0171	Fuel trim system too lean	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0172	Fuel trim system too rich	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0300	Random misfire detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0301	Cylinder 1 misfire detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0302	Cylinder 2 misfire detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0303	Cylinder 3 misfire detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0304	Cylinder 4 misfire detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0325	Knock sensor 1 circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0335	Crankshaft position sensor circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0339	Crankshaft position sensor circuit intermittent	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0401	Exhaust gas recalculation flow insufficient detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0402	Exhaust gas recalculation flow excessive detected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0420	Warm up catalyst system efficiency below threshold (Except California emission regulations applicable model)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0421	Warm up catalyst system efficiency below threshold (California emission regulations applicable model)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0442	Evaporative emission control system malfunction (Leak inspect)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0443	Evaporative emission control system purge control valve circuit malfunction (Equip leak inspect)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			

DTC No.	Condition	MIL	DC	Monitor Item	O/D OFF indicator light
P0446	Evaporative emission control system malfunction (Vent control malfunction)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0452	Evaporative emission control system pressure sensor low input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0453	Evaporative emission control system pressure sensor high input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0455	Evaporative emission control system malfunction (con. leak detected)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0461	Fuel level sensor circuit range/performance	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0462	Fuel level sensor circuit low input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0463	Fuel level sensor circuit high input	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0500	Vehicle speed sensor malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0506	Idle control system RPM lower than expected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0507	Idle control system RPM higher than expected	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0550	P/S pressure switch circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0703	Brake switch input malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0704	Clutch switch input circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0705	Transmission range switch circuit malfunction (AT)	ON	1	CCM	OFF
	Neutral switch circuit malfunction (MT)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P0706	Transmission range switch circuit malfunction (Open circuit)	ON	2	CCM	OFF
P0715	Input/turbine speed sensor circuit malfunction	ON	2	CCM	FLASH
P0720	Output speed sensor circuit malfunction	ON	1	CCM	FLASH
P0725	Engine speed input circuit malfunction	ON	2	CCM	OFF
P0741	Torque converter clutch solenoid valve stuck off	ON	2	CCM	OFF
P0742	Torque converter clutch solenoid valve stuck on	ON	2	CCM	OFF
P0751	Shift solenoid A stuck off	ON	2	CCM	OFF
P0752	Shift solenoid A stuck on	ON	2	CCM	OFF
P0756	Shift solenoid B stuck off	ON	2	CCM	OFF
P0757	Shift solenoid B stuck on	ON	2	CCM	OFF
P1102	Mass air flow inconsistent with TVO sensor (Lower than expected)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1103	Mass air flow inconsistent with RPM (Grater than expected)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1122	Throttle position CLOSE stuck	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1123	Throttle position OPEN stuck	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1135	Front oxygen sensor heater circuit low	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1136	Front oxygen sensor heater circuit high	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1141	Rear oxygen sensor heater circuit low	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1142	Rear oxygen sensor heater circuit high	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1170	Heated oxygen sensor (Front) (Inversion)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1345	No SGC signal	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1449	Canister drain cut valve (CDCV) open or short	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1450	Evaporative emission control system malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1487	EGR boost sensor solenoid valve open or short	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1496	EGR valve motor coil 1 open or short	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1497	EGR valve motor coil 2 open or short	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1498	EGR valve motor coil 3 open or short	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			

DTC No.	Condition	MIL	DC	Monitor Item	O/D OFF indicator light
P1499	EGR valve motor coil 4 open or short	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1504	Idle air control circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1523	VICS circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1562	PCM +BB voltage low	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1601	Communication line error (ECM-TCM)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1608	PCM internal circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1609	PCM internal circuit malfunction (knock sensor circuit)	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1631	Generator output voltage signal no electricity	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1632	Battery voltage monitor signal circuit malfunction	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1633	Battery overcharge	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1634	Generator terminal B circuit open	☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC			
P1740	Torque converter clutch solenoid valve open	ON	1	CCM	FLASH
P1742	Torque converter clutch solenoid valve short	ON	1	CCM	FLASH
P1751	Shift solenoid A circuit open	ON	1	CCM	FLASH
P1752	Shift solenoid A circuit short	ON	1	CCM	FLASH
P1756	Shift solenoid B circuit open	ON	1	CCM	FLASH
P1757	Shift solenoid B circuit short	ON	1	CCM	FLASH
P1771	Throttle position sensor open	ON	1	CCM	FLASH
P1772	Throttle position sensor short	ON	1	CCM	FLASH

Diagnostic Trouble Code Troubleshooting

DTC P0705 DTC P0706	Transmission range switch circuit malfunction Transmission range switch circuit malfunction (Open circuit)
DETECTION CONDITION	No input signal or input of two or more signals from transmission range switch.
POSSIBLE CAUSE	• Transmission range switch • Damaged wiring or connectors between transmission range switch and TCM • TCM malfunction

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are TCM and transmission range switch connections at the connectors for and connector pins okay?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 8.
3	Measure terminal voltage at terminals A, B, C, D, and F of TCM as follows. Is terminal voltage as specified? ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION	Yes	Go to step 8.
		No	Adjust the transmission range switch. ☞ 05–13 TRANSMISSION RANGE SWITCH ADJUSTMENT. If terminal voltage are okay? Go to next step.
4	Inspect for continuity between terminals of transmission range switch and TCM. • Disconnect negative battery cable. • Disconnect transmission range switch and TCM connectors. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 8.
5	Inspect for continuity between terminals of transmission range switch as follows. • Disconnect negative battery cable. • Disconnect transmission range switch connector. Is there continuity between the terminals? ☞ 05–13 TRANSMISSION RANGE SWITCH INSPECTION, Inspection of Continuity.	Yes	Go to next step.
		No	Replace transmission range switch, then go to step 8. ☞ 05–13 TRANSMISSION RANGE SWITCH REMOVAL/INSTALLATION
6	Inspect for continuity between terminals of transmission range switch and METER FUSE. • Disconnect negative battery cable. • Disconnect transmission range switch and METER FUSE. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 8.
7	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 2.
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step.
8	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P0715	Input/turbine speed sensor circuit malfunction
DETECTION CONDITION	Signal from input/turbine speed sensor is not input to TCM when vehicle is moving.
POSSIBLE CAUSE	• Input/turbine speed sensor malfunction • Damaged harness or connectors between input/turbine speed sensor and TCM • TCM malfunction

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are TCM and input/turbine speed sensor connections at the connectors and connector pins okay?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 7.
3	Measure terminal voltage at terminal W and Z of TCM as follows. Is terminal voltage as specified? ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION.	Yes	Go to step 7.
		No	Go to next step.
4	Inspect for continuity between terminals of input/turbine speed sensor and TCM. • Disconnect negative battery cable. • Disconnect input/turbine speed sensor and TCM connectors. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 7.
5	Measure resistance between input/turbine speed sensor terminals. • Disconnect negative battery cable. • Disconnect input/turbine speed sensor connector. Is resistance between terminals correct? ☞ 05–13 INPUT/TURBINE SPEED SENSOR INSPECTION.	Yes	Go to next step.
		No	Replace input/turbine speed sensor, then go to step 7. ☞ 05–13 INPUT/TURBINE SPEED SENSOR REMOVAL/INSTALLATION.
6	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 2.
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step.
7	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P0720	Output speed sensor circuit malfunction
DETECTION CONDITION	Signal from output speed sensor is not input to TCM when vehicle is moving.
POSSIBLE CAUSE	• Output speed sensor malfunction • Damaged harness or connector between output speed sensor and TCM • TCM malfunction

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are TCM and output speed sensor connections at the connectors and connector pins okay?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 7.
3	Measure terminal voltage at terminals AF and AE of TCM as follows. Is terminal voltage as specified? ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION.	Yes	Go to step 7.
		No	Go to next step.
4	Inspect for continuity between terminals of output speed sensor and TCM. • Disconnect negative battery cable. • Disconnect TCM and output speed sensor connectors. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 7.
5	Measure resistance between output speed sensor terminals. • Disconnect negative battery cable. • Disconnect output speed sensor connector. Is resistance between terminal correct? ☞ 05–13 OUTPUT SPEED SENSOR INSPECTION.	Yes	Go to next step.
		No	Replace output speed sensor, then go to step 7. ☞ 05–13 OUTPUT SPEED SENSOR REMOVAL/INSTALLATION.
6	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 2.
		No	Problem is a temporary slip of clutch and should be investigated further. Go to next step.
7	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P0725	Engine speed input circuit signal
DETECTION CONDITION	Signal from engine speed input signal is not input to TCM from PCM.
POSSIBLE CAUSE	• Damaged harness or connectors between TCM and PCM • PCM malfunction • TCM malfunction

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Is diagnostic trouble code P0335 indicated? ☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC.	Yes	Refer to flowchart for diagnostic trouble code P0335 and perform troubleshooting. ☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC.
		No	Go to next step.
3	Are TCM and PCM connections at the connectors and connector pins okay?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 8.
4	Measure terminal voltage at terminal AG of TCM as follows. Is terminal voltage as specified? ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION.	Yes	Go to step 8.
		No	Go to next step.
5	Inspect for continuity between terminals of PCM and TCM. • Disconnect negative battery cable. • Disconnect TCM and PCM connectors. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 8.
6	Inspect the value of the following PIDs using the NGS tester. ☞ 01–40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION. Is PID value okay?	Yes	Go to next step.
		No	Inspect PCM. ☞ 01–40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION.
7	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 2.
		No	Problem is a temporary slip of clutch and should be investigated further, then go to next step.
8	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P0741 DTC P0742	Torque converter clutch solenoid valve stuck off Torque converter clutch solenoid valve stuck on
DETECTION CONDITION	• TCM outputs torque converter clutch signal, but no torque converter clutch is obtained. • TCM does not output torque converter clutch signal, but torque converter clutch is obtained.
POSSIBLE CAUSE	• TCM malfunction • Torque converter clutch solenoid valve malfunction • Control valve body malfunction • Torque converter clutch malfunction • ATF level is low. • Line pressure is low.

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are amount and condition (color) of ATF okay? Inspect ATF leakage at transmission connection and gasket. Color ① Transparent red: Normal ② Black: Defective part in powertrain ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF	Yes	Go to next step.
		No	Adjust ATF amount or replace ATF if necessary. • If ATF color is black, measure line pressure at idle when pressure is less than specification, then repair or replace any defective parts. • If ATF color is light red or reddish brown, replace ATF.
3	Inspect operation of solenoid valve. • Disconnect negative battery cable. • Disconnect solenoid connector. Is it operating okay? ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection.	Yes	Go to step 6.
		No	Replace torque converter clutch solenoid valve, then go to step 6. ☞ 05–13 SOLENOID VALVES REMOVAL/INSTALLATION.
4	Inspect operation of each valve and inspect return spring. Is each valve operating okay and is return spring okay?	Yes	Go to next step.
		No	Repair or replace control valve and replace return spring, then go to step 6.
5	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 3.
		No	Problem is a temporary slip of clutch and should be investigated further, then go to next step.
6	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P0751 DTC P0752	Shift solenoid A stuck off Shift solenoid A stuck on
DETECTION CONDITION	The gear ratio programmed into the memory of the TCM differs from the gear ratio calculated from input/turbine speed sensor input revolution speed and output speed sensor input revolution speed.
POSSIBLE CAUSE	• ATF level is low. • Solenoid valve malfunction • Line pressure is low. • Control valve is stuck. • TCM malfunction

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are amount and condition (color) of ATF okay? Inspect ATF leakage at transmission connection and gasket. Color ① Transparent red: Normal ② Black: Defective part in powertrain ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF	Yes	Go to next step.
		No	Adjust ATF amount or replace ATF if necessary. • If ATF color is black, measure line pressure at idle when pressure is less than specification, then repair or replace any defective parts. • If ATF color is light red or reddish brown, replace ATF.
3	Inspect operation of shift solenoid A. • Disconnect negative battery cable. • Disconnect solenoid connector. Is it operating okay? ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection.	Yes	Go to next step.
		No	Replace shift solenoid A, then go to step 6. ☞ 05–13 SOLENOID VALVES REMOVAL/INSTALLATION
4	Inspect operation of each valve and inspect return spring. Is each valve operating okay and is return spring okay?	Yes	Go to next step.
		No	Repair or replace control valve and replace return spring, then go to step 6.
5	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 3.
		No	Problem is a temporary slip of clutch and should be investigated further, then go to next step.
6	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P0756 DTC P0757	Shift solenoid B stuck off Shift solenoid B stuck on
DETECTION CONDITION	The gear ratio programmed into memory of the TCM differs from the gear ratio calculated from input/turbine speed sensor input revolution speed and output speed sensor input revolution speed.
POSSIBLE CAUSE	• ATF level is low. • Solenoid valve malfunction • Line pressure is low. • Control valve is stuck. • TCM malfunction

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are amount and condition (color) of ATF okay? Inspect ATF leakage at transmission connection and gasket. Color ① Transparent red: Normal ② Black: Defective part in powertrain ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF	Yes	Go to next step.
		No	Adjust ATF amount or replace ATF if necessary. • If ATF color is black, measure line pressure at idle when pressure is less than specification, then repair or replace any defective parts. • If ATF color is light red or reddish brown, replace ATF.
3	Inspect operation of solenoid valve. • Disconnect negative battery cable. • Disconnect solenoid connector. Is it operating okay? ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection.	Yes	Go to next step.
		No	Replace torque converter clutch control solenoid valve, then go to step 6. ☞ 05–13 SOLENOID VALVES REMOVAL/INSTALLATION.
4	Inspect operation of each valve and inspect return spring. Is each valve operating okay and is return spring okay?	Yes	Go to next step.
		No	Repair or replace control valve and replace return spring, then go to step 6.
5	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 3.
		No	Problem is a temporary slip of clutch and should be investigated further, go to next step.
6	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P1740 DTC P1742	Torque converter clutch control solenoid valve open Torque converter clutch control solenoid valve short
DETECTION CONDITION	• Damaged wiring or connectors between torque converter clutch solenoid valve and TCM • Short or open circuit in torque converter clutch solenoid valve • Short or open circuit in TCM internal transistor
POSSIBLE CAUSE	• Damaged wiring or connector between torque converter clutch solenoid valve and TCM • Short or open circuit in torque converter clutch solenoid valve • Short or open circuit in TCM internal transistor

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are TCM and torque converter clutch solenoid valve connections at connector and connector pins okay.?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 7.
3	Measure terminal voltage at terminal AO of TCM as follows. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION	Yes	Go to step 9.
		No	Go to next step.
4	Measure resistance at TCM terminal and body ground. • Disconnect negative battery cable. • Disconnect the TCM connector. Is resistance correct?	Yes	Go to step 9.
		No	Go to next step.
5	Inspect continuity between terminals of solenoid connector and TCM. • Disconnect negative battery cable. • Disconnect solenoid connector and TCM connector. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 9.
6	Inspect continuity between terminals of torque converter clutch solenoid valve and wiring. • Disconnect the negative battery cable. • Disconnect the torque converter clutch solenoid valve connector. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connector and wiring, then go to step 9.
7	Measure resistance at torque converter clutch solenoid valve terminal. • Disconnect negative battery cable. • Disconnect solenoid connector. Is resistance correct? ☞ 05–13 SOLENOID VALVES INSPECTION, Inspection of Resistance.	Yes	Go to next step.
		No	Replace torque converter clutch solenoid valve, then go to step 9. ☞ 05–13 SOLENOID VALVES REMOVAL/INSTALLATION
8	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 2.
		No	Problem is a temporary poor connection of wiring or connectors and should be investigated further, then go to next step.
9	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P1751 DTC P1752	Shift solenoid A circuit open Shift solenoid A circuit short
DETECTION CONDITION	• Damaged wiring or connectors between shift solenoid A and TCM. • Short or open circuit in shift solenoid A • Short or open circuit in TCM internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between shift solenoid A and TCM • Short or open circuit in shift solenoid A • Short or open circuit in TCM internal transistors

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are TCM and shift solenoid A connections at connector and connector pins okay?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 9.
3	Measure terminal voltage at terminal AQ of TCM as follows. Is terminal voltage as specified? ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION.	Yes	Go to step 9.
		No	Go to next step.
4	Measure resistance at TCM terminal and body ground. • Disconnect negative battery cable. • Disconnect the TCM connector. Is resistance correct?	Yes	Go to step 9.
		No	Go to next step.
5	Inspect continuity between terminals of solenoid connector and TCM. • Disconnect negative battery cable. • Disconnect solenoid connector and TCM connector. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 9.
6	Inspect for continuity between terminals of shift solenoid A and TCM. • Disconnect negative battery cable. • Disconnect solenoid connector and TCM connector. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 9.
7	Measure resistance at shift solenoid A terminal. • Disconnect negative battery cable. • Disconnect solenoid connector. Is resistance correct? ☞ 05–13 SOLENOID VALVES INSPECTION, Inspection of Resistance.	Yes	Go to next step.
		No	Replace shift solenoid A, then go to step 9. ☞ 05–13 SOLENOID VALVES REMOVAL/INSTALLATION.
8	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 2.
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step.
9	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P1756 DTC P1757	Shift solenoid B circuit open Shift solenoid B circuit short
DETECTION CONDITION	• Damaged wiring or connectors between shift solenoid B and TCM • Short or open circuit in shift solenoid B • Short or open circuit in TCM internal transistor
POSSIBLE CAUSE	• Damaged wiring or connectors between shift solenoid B and TCM • Short or open circuit in shift solenoid B • Short or open circuit in TCM internal transistor

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Are TCM and shift solenoid B connection at connectors and connector pins okay?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 9.
3	Measure terminal voltage at terminal AN of TCM as follows. Is terminal voltage as specified? ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION.	Yes	Go to step 9.
		No	Go to next step.
4	Measure resistance at TCM terminal and body ground. • Disconnect negative battery cable. • Disconnect the TCM connector. Is resistance correct?	Yes	Go to step 9.
		No	Go to next step.
5	Inspect continuity between terminals of solenoid connector and TCM. • Disconnect negative battery cable. • Disconnect solenoid connector and TCM connector. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 9.
6	Inspect for continuity between terminals of shift solenoid B and TCM. • Disconnect negative battery cable • Disconnect solenoid connector and TCM connector. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 9.
7	Measure resistance at shift solenoid B terminal. • Disconnect negative battery cable. • Disconnect solenoid connector. Is resistance correct? ☞ 05–13 SOLENOID VALVES INSPECTION, Inspection of Resistance.	Yes	Go to next step.
		No	Replace shift solenoid B, then go to step 9. ☞ 05–13 SOLENOID VALVES REMOVAL/INSTALLATION.
8	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 2.
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step.
9	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

DTC P1771	Throttle position sensor open
DTC P1772	Throttle position sensor short
DETECTION CONDITION	The throttle position sensor voltage is less than 0.14 V or more than 4.78 V.
POSSIBLE CAUSE	• Throttle position sensor malfunction • PCM malfunction • Damaged wiring or connector between PCM and throttle position sensor • Damaged wiring or connector between TCM and throttle position sensor

STEP	INSPECTION		ACTION
1	Have FREEZE FRAME PID DATA been recorded?	Yes	Go to next step.
		No	Record FREEZE FRAME PID DATA on repair order, then go to next step.
2	Is diagnostic trouble code P0122 indicated? ☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC	Yes	Refer to flowchart for diagnostic trouble code P0122, and perform troubleshooting. ☞ 01–01A ENGINE ON-BOARD DIAGNOSTIC
		No	Go to next step.
3	Are TCM and throttle position sensor connections at connectors and connector pins okay?	Yes	Go to next step.
		No	Repair or replace connector, then go to step 7.
4	Measure the terminal voltage at terminal R and U of TCM as follows. Is terminal voltage as specified? ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION.	Yes	Go to step 7.
		No	Go to next step.
5	Inspect for continuity between terminals of throttle position sensor and TCM. • Disconnect negative battery cable. • Disconnect solenoid connector and TCM connector. Is there continuity between terminals?	Yes	Go to next step.
		No	Repair or replace connectors and wiring, then go to step 7.
6	Erase diagnostic trouble code from memory. Is same code No. present after performing "After Repair Procedure"?	Yes	Return to step 2.
		No	Intermittent poor connection of harness or connector. Repair connector and/or harness, then go to next step.
7	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure. **Note** • If the malfunction remains even though all inspections have been performed, get assistance from Technical Hotline.
		No	Troubleshooting completed.

AUTOMATIC TRANSMISSION BASIC INSPECTION

XSU501WC3

STEP	INSPECTION		ACTION
1	Connect NGS tester to data link connector-2. Turn ignition switch to ON. Retrieve any diagnostic trouble code. Is "NO CODES RECEIVED/SYSTEM PASSED" displayed?	Yes	**No diagnostic trouble code is displayed:** Go to next step.
		No	**Diagnostic trouble code is displayed:** Go to appropriate diagnostic trouble code test. **If communication error message is displayed on NGS tester, inspect following:** • Open circuit between main relay and PCM terminal B • Open main relay ground circuit. • Main relay stuck open. • Open or poor ground circuit (PCM terminal 3A, 3B or 3C). • Poor connection of vehicle body ground.
2	Turn ignition switch to ON. Does O/D OFF indicator light (illuminate/go out) correspond to O/D OFF switch position (ON/OFF)?	Yes	Go to next step.
		No	Go to symptom troubleshooting No.25 "O/D OFF INDICATOR LIGHT DOES NOT ILLUMINATE WHEN O/D OFF SWITCH IS TURNED ON" or No.26 "O/D OFF INDICATOR LIGHT ILLUMINATES WHEN O/D OFF SWITCH IS NOT TURNED ON".
3	Inspect ATF color and condition. ☞ 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF Condition Inspection. Are ATF color, odor and level okay?	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection result. Flush automatic transmission and cooler line as necessary.
4	Perform line pressure test. ☞ 05–13 MECHANICAL SYSTEM TEST, Line Pressure Test. Is line pressure okay?	Yes	Go to next step.
		No	Adjust throttle cable as necessary. ☞ 05–13 THROTTLE CABLE ADJUSTMENT. Repair or replace any defective parts according to inspection result.
5	Perform stall test. ☞ 05–13 MECHANICAL SYSTEM TEST, Stall Test. Is stall speed okay?	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection result.
6	Turn ignition switch off. Disconnect TCM connector. Inspect continuity between TCM connector terminal AP and ground. Is there continuity?	Yes	Reconnect TCM connector. Go to next step.
		No	Inspect ground condition. Repair or replace ground circuit as necessary.
7	Access TCM. Inspect voltage at following TCM connector terminals: ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION. • Throttle position sensor signal (terminal U) • Output speed sensor signal (terminal AF and AE) • Input/turbine speed sensor signal (terminal W and Z) • R position signal (terminal D) • N position signal (terminal F) • D range signal (terminal C) • 2 range signal (terminal B) • 1 range signal (terminal A) Are all terminal voltages okay?	Yes	Go to appropriate symptom troubleshooting and follow procedures.
		No	Inspect following, then go to appropriate symptom troubleshooting and follow procedures: **Throttle position sensor:** • Inspect for open or short circuit between throttle position sensor and TCM terminals U and R. • Inspect throttle position sensor adjustment. **Output speed sensor:** • Inspect for open or short circuit between output speed sensor and TCM terminal AF or AE. • Inspect for damages of sensor rotor and sensor. • Inspect output speed sensor. **Input/turbine speed sensor:** • Inspect open or short circuit between input/turbine speed sensor and TCM terminal W or Z. • Inspect for damage of teeth on outer shell. • Inspect input/turbine speed sensor. • Inspect automatic transmission internal damage. **Transmission range switch signals (R, N, D, 2, and/or 1 range):** • Inspect transmission range switch adjustment. • Inspect shift linkage adjustment (include automatic transmission internal related part). • Inspect for open or short circuit between transmission range switch and TCM terminals.

AUTOMATIC TRANSMISSION SYMPTOM TROUBLESHOOTING

X5U501W04

Diagnosis Index

- Use the chart below to verify the symptoms of the trouble in order to diagnose the appropriate area.

No.	TROUBLESHOOTING ITEM	DESCRIPTION
1	Vehicle does not move in D, 2, 1 ranges, or in R position.	Vehicle does not move when accelerator pedal is depressed.
2	Vehicle moves in N position.	Vehicle creeps in N position. Vehicle creeps if brake pedal is not depressed in N position.
3	Vehicle moves in P position, or parking gear does not disengage when P is disengaged.	Vehicle rolls when on a downward slope and tires do not lock in P position. Tires are locked when P is disengaged, vehicle does not move in D, 2, 1 ranges, and R position when accelerator pedal is depressed, and engine remains in stall condition.
4	Excessive creep	Vehicle accelerates in D, 2, 1 ranges, and R position without depressing accelerator pedal.
5	No creep at all	Vehicle does not move in D, 2, 1 ranges, or R position when idling on flat paved road.
6	Low maximum speed and poor acceleration	Vehicle acceleration is poor at start. Delayed acceleration when accelerator is depressed while driving.
7	No shift	Single shift range only. Sometimes shift correctly.
8	No TCC function	TCC does not operate even though vehicle speed is increased.
9	Abnormal shift	Shifts incorrectly (incorrect shift pattern).
10	Frequent shifting	Downshifting occurs immediately even when accelerator pedal is depressed slightly in D, 2, 1 ranges (O/D OFF switch is off).
11	Shift point is high or low	Shift point is considerably different from automatic shift diagram. Shift is delayed when accelerating. Shift occurs quickly when accelerating and engine speed does not increase.
12	No kickdown	Does not downshift when accelerator pedal is fully depressed within kickdown range.
13	Engine flares up or slips when upshifting or downshifting	When accelerator pedal is depressed for driveway, engine speed increases but vehicle speed increase slowly. When accelerator pedal is depressed while driving, engine speed increases but vehicle speed does not increase.
14	Engine flares up or slips when accelerating vehicle	Engine flares up when accelerator pedal is depressed for upshifting. Engine flares up suddenly when accelerator pedal is depressed for downshifting.
15	Judder upon during TCC operation	Vehicle jolts when TCC is engaged.
16	Excessive N to D or N to R position/range shift shock	Strong shock is felt when shifting from N to D or N to R position/range at idle.
17	Excessive shift shock when upshifting and downshifting	Excessive shift shock is felt when depressing accelerator pedal to accelerate at upshifting. During cruising, excessive shift shock is felt when depressing accelerator pedal at downshifting.
18	Excessive TCC shift shock	Strong shock is felt when torque converter clutch is engaged.
19	Noise at idle when vehicle is stopped in all position/ranges	Transmission is noisy in all positions and ranges when vehicle is idling.
20	Noise at idle when vehicle is stopped in D, 2, 1 ranges, or in R position	Transmission is noisy in driving ranges when vehicle is idling.

No.	TROUBLESHOOTING ITEM	DESCRIPTION
21	No engine braking in 1, 2, or 3 gear	Engine speed drops to idle but vehicle coasts when accelerator pedal is released during cruising at medium to high speeds. Engine speed drops to idle but vehicle coasts when accelerator pedal is released when in 1 range at low vehicle speed.
22	Transmission overheats	Burnt smell is emitted from transmission. Smoke is emitted from transmission.
23	Engine stalls when shifted to D, 2, 1 ranges, and/or in R position	Engine stalls when shifting from N or P position to D, 2, 1 ranges or R position at idle.
24	Engine stalls when driving at slow speeds or stopping.	Engine stalls when brake pedal is depressed white driving at low speeds or stopping.
25	O/D OFF indicator light does not illuminate when O/D OFF switch is turned on	O/D OFF indicator light in dashboard does not illuminate when O/D OFF switch is turned on and ignition switch is at ON.
26	O/D OFF indicator light illuminates when O/D OFF switch is not turned on	O/D OFF indicator light in dashboard illuminates even though O/D OFF switch is turned off and ignition switch is at ON.

Quick Diagnosis Chart

No.	Item	Selector lever misadjusted	Ignition system malfunction	Not within line pressure specification	Idle speed misadjusted	Ignition timing misadjusted	Transmission range switch misadjusted	Throttle position sensor: Signal is not output	Throttle position sensor: Malfunction signal is output	Input/turbine speed sensor: Signal is not output	Input/turbine speed sensor: Malfunction signal is output	O/D OFF switch: Signal is not output	O/D OFF switch: Malfunction signal is output	Output speed sensor: Signal is no input	Output speed sensor: Malfunction signal is output	Poor ground
	Symptom / Cause of trouble / Inspection method / Item						Electrical system components									
							ATX outer parts									
1	Vehicle does not move in D, 2, 1 ranges, or in R position	○		○				○	○	○	○					○
2	Vehicle moves in N position	○		○				○	○	○	○					○
3	Vehicle moves in P position, or parking gear does not disengage when P is disengaged	○														
4	Excessive creep			○	○	○										
5	No creep at all	○		○				○	○	○	○					○
6	Low maximum speed and poor acceleration			○		○	○	○	○	○	○	○	○			○
7	No shift			○				○	○	○	○	○	○			○
8	No TCC function			○			○	○	○	○	○	○	○	○	○	○
9	Abnormal shift	○		○			○	○	○	○	○					○
10	Frequent shifting			○				○	○	○	○					○
11	Shift point is high or low				○	○		○	○	○	○					○
12	No kickdown							○	○							○
13	Engine flares up or slips when upshifting or downshifting	○		○				○	○	○	○					○
14	Engine flares up or slips when accelerating vehicle	○		○				○	○	○	○					○
15	Judder during torque converter clutch (TCC) operation			○		○		○	○	○	○					
16	Excessive N to D or N to R position/range shift shock			○	○			○	○	○	○					
17	Excessive shift shock when upshifting and downshifting			○				○	○	○	○					
18	Excessive torque converter clutch (TCC) shift shock			○				○	○	○	○					
19	Noise at idle when vehicle is stopped in all positions/ranges							○	○							
20	Noise at idle when vehicle is stopped in D, 2, 1, ranges, and/or in R position	○					○	○	○							
21	No engine braking in 1, 2, or 3 gear	○		○			○	○	○	○	○	○	○			
22	Transmission overheats			○												
23	Engine stalls when shifted to D, 2, 1 ranges, and/or in R position				○		○									
24	Engine stalls when driving at slow speeds or stopping				○		○									
25	O/D OFF indicator light does not illuminate when O/D OFF switch is turned ON											○	○			
26	O/D OFF indicator light illuminates when O/D OFF switch is not turned ON											○	○			
	Line pressure test															
	Stall test															
	Time lag test															
	Diagnostic trouble code							○		○				○		

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1	Vehicle does not move in D, 2, 1 ranges, or in R position	○	○		○					○	○	○	
2	Vehicle moves in N position	○	○		○						○		
3	Vehicle moves in P position, or parking gear does not disengage when P is disengaged										○		
4	Excessive creep												
5	No creep at all	○	○		○					○	○	○	
6	Low maximum speed and poor acceleration	○	○		○					○	○	○	
7	No shift	○	○		○					○	○		
8	No TCC function			○	○					○		○	
9	Abnormal shift	○	○		○					○	○		
10	Frequent shifting				○					○			
11	Shift point is high or low												
12	No kickdown	○	○		○					○	○		
13	Engine flares up or slips when upshifting or downshifting	○	○		○					○			
14	Engine flares up or slips when accelerating vehicle	○	○		○					○			
15	Judder during torque converter clutch (TCC) operation			○	○							○	○
16	Excessive N to D or N to R position/range shift shock				○			○		○	○		
17	Excessive shift shock when upshifting and downshifting	○	○		○	○	○			○	○		
18	Excessive torque converter clutch (TCC) shift shock			○	○								
19	Noise at idle when vehicle is stopped in all positions/ranges	○	○									○	
20	Noise at idle when vehicle is stopped in D, 2, 1, ranges, and/or in R position											○	
21	No engine braking in 1, 2, or 3 gear				○					○			
22	Transmission overheats			○					○		○		○
23	Engine stalls when shifted to D, 2, 1 ranges, and/or in R position			○	○								○
24	Engine stalls when driving at slow speeds or stopping			○	○								○
25	O/D OFF indicator light does not illuminate when O/D OFF switch is turned ON												
26	O/D OFF indicator light illuminates when O/D OFF switch is not turned ON												

No.	Item	Electrical system components			Hydraulic system components					Powertrain system			
		ATX inner parts											
	Symptom / Cause of trouble / Inspection method / Item	Shift solenoid A malfunction	Shift solenoid B malfunction	TCC solenoid valve malfunction	Control valve not operating properly	Brake No.2 accumulator not operating properly	Direct accumulator not operating properly	Forward accumulator not operating properly	Oil cooler not operating properly	Slipping (Brake, clutch)	Burnt (Brake, clutch)	Torque converter not operating properly	TCC piston burnt
	Line pressure test				○					○	○		
	Stall test				○					○	○	○	
	Time lag test							○		○	○		
	Diagnostic trouble code	○	○	○									

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Symptom Troubleshooting

1	VEHICLE DOES NOT MOVE IN D, 2, 1 RANGES, OR IN R POSITION

TROUBLESHOOTING HINTS

If the vehicle does not move in D, 2, 1 ranges or R position, basically, the malfunction is in the automatic transmission. (Vehicle will move even with a malfunction in the PCM.) Since a malfunction in the sensor circuit or output circuit is the cause of the malfunction in the automatic transmission, inspect the sensors, output circuit, and the related harnesses.

① Clutch slippage, worn (D, 2, 1 ranges—Forward clutch, 4GR clutch, one-way clutch No.0, One-way clutch No.2, R position—Reverse brake, 4GR clutch, direct clutch, one-way clutch No.0)
- Line pressure is low
- Malfunction of sensor ground
- Malfunction of shift solenoid A
- Malfunction of shift solenoid B
- Malfunction of body ground
- Malfunction of control valve body

② Malfunction of selector lever
③ Parking mechanism not operating properly.
④ Malfunction of torque converter

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	With vehicle stopped on a flat, road and engine off, does vehicle move when pushed? (in D, 2 range or N, R position and brake released)	Yes	Go to next step.
		No	Inspect parking mechanism.
2	Does vehicle move when selector lever is in between N position and D range?	Yes	Go to next step.
		No	Inspect or adjust the selector lever. ☞ 05–14 SELECTOR LEVER ADJUSTMENT.
3	Turn ignition switch to ON. Inspect voltages between following TCM connector terminals and ground in D, 2 and 1 ranges. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION. **Specification** **TCM terminal AQ: B+** **TCM terminal AN: 0 V** Are voltages okay?	Yes	Go to next step.
		No	Inspect following: • Body ground condition • TCM connector terminals AS and AR voltage **Specifications: B+**
4	Disconnect shift solenoid connector. Turn ignition switch to ON. Inspect voltages between each shift solenoid connector terminal and ground in D, 2 and 1 ranges. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION. **Specification** **Terminal B: B+** **Terminal A: 0 V** Are voltages okay?	Yes	Inspect for bent, damaged, corroded or loose connection of shift solenoid terminal on automatic transmission. Inspect for mechanically stuck shift solenoids. ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection. If shift solenoids are okay, overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.
		No	Inspect for open or short circuit between TCM connector terminal and shift solenoid connector terminal.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

2	VEHICLE MOVES IN N POSITION

TROUBLESHOOTING HINTS

If the vehicle moves in N position, basically, the malfunction is in the automatic transmission. Since a malfunction in the sensor circuit or output circuit is the cause of the malfunction in the automatic transmission, inspect the sensor, output circuit, and the related harnesses.

① Clutch is burned. (Move forward: Forward clutch, one-way clutch No.0, one-way clutch No.2, Move backward: Direct clutch, reverse brake, one-way clutch No.0)
- Line pressure is low
- Malfunction of control valve body

② Selector lever position disparity

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Does vehicle creep when selector lever is moved slightly in N position?	Yes	Overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.
		No	Inspect and adjust selector lever. ☞ 05–14 SELECTOR LEVER ADJUSTMENT.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

3	VEHICLE MOVES IN P POSITION, OR PARKING GEAR DOES NOT DISENGAGE WHEN P IS DISENGAGED

TROUBLESHOOTING HINTS

① Malfunction of parking mechanism (May have effect on noise or shock from transmission)
② Improper adjustment of selector lever
③ If vehicle moves in N position, perform No.2 "VEHICLE MOVES IN N POSITION".

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

4	EXCESSIVE CREEP

TROUBLESHOOTING HINTS

① Engine idle speed is high (transmission system is not cause of problem)
② Go to No.8 "FAST IDLE/RUNS ON"
☞ 01–01A ENGINE SYMPTOM TROUBLESHOOTING

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

5	NO CREEP AT ALL

TROUBLESHOOTING HINTS

Either the transmission is stuck in 3GR or 4GR position, or there is clutch circuit slippage because the direct clutch is stuck.

① Clutch is burned
- Line pressure is low.
- Malfunction of shift solenoid A
- Malfunction of shift solenoid B
- Malfunction of body ground
- Malfunction of control valve body

② Transmission is fixed in 3GR or 4GR (Operation of fail-safe function)
- Short or open circuit in wiring
- Poor connection of connector
- Malfunction of the electronic parts of output and input system

③ Insufficient starting torque
- Malfunction of torque converter

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Does vehicle creep in any range/position except for P and N positions?	Yes	Go to next step.
		No	Inspect or adjust the selector lever. ☞ 05–14 SELECTOR LEVER ADJUSTMENT.
2	Turn ignition switch to ON. Inspect voltages between following TCM connector terminals and ground in D range. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION. **Specification** **TCM terminal AQ: B+** **TCM terminal AN: 0 V** Are voltages okay?	Yes	Go to next step.
		No	Inspect following: • Body ground condition • TCM terminals AS and AR voltages: **Specifications: B+**
3	Disconnect shift solenoid connector. Turn ignition switch to ON. Inspect voltages between each shift solenoid connector terminal and ground in D range: **Specification** **Terminal B: B+** **Terminal A: 0 V** Are voltages okay?	Yes	Inspect for bent, damaged, corroded or loose connection of shift solenoid terminal. Inspect for mechanically stuck shift solenoids. ☞ 05–13 SOLENOID VALVE INSPECTION, Operating Inspection. If shift solenoids are okay, go to next step.
		No	Inspect for open or short circuit between TCM connector terminal and shift solenoid connector terminal.
4	Overhaul control valve body and repair or replace any defective parts. Does problem eliminate?	Yes	AT is now normal.
		No	Replace torque converter. If problem remains, replace or overhaul transmission and repair or replace any defective parts.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

6	LOW MAXIMUM SPEED AND POOR ACCELERATION

TROUBLESHOOTING HINTS

If the clutch is stuck or does not stay in 3GR or 4GR, the malfunction is in the engine circuit.

① Clutch slippage, burned
- Line pressure is low
- Malfunction of throttle position sensor
- Malfunction of output speed sensor
- Malfunction of input/turbine speed sensor
- Malfunction of sensor ground
- Malfunction of shift solenoid A and/or B
- Malfunction of body ground
- Malfunction of control valve body

② Transmission is fixed in 3GR or 4GR (Operation of fail-safe function)
- Short or open circuit in wiring
- Poor connection of connector
- Malfunction of the electronic parts of output and input system

③ Insufficient starting torque (Suspected when in gear condition, shift control and engine circuit are normal)
- Malfunction of torque converter (Poor operation, sticking)

④ Engagement of TCC operation range (Operation of fail-safe function)

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Go to symptom troubleshooting No.11 "LACK/LOSS OF POWER" ☞ 01–01A ENGINE SYMPTOM TROUBLESHOOTING Does engine control system okay?	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
2	Disconnect shift solenoid connector Does vehicle operate as follows? **D range—4GR (fixed)** **2 range—3GR (fixed)** **1 range—1GR (fixed)** **R position—Reverse**	Yes	Go to next step.
		No	Overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.
3	Connect shift solenoid connector. Drive vehicle in D, 2, and 1 ranges (O/D OFF switch is off). Does vehicle start from stop in first gear?	Yes	Go to next step.
		No	Inspect voltage at TCM connector terminals AQ and AN in D, 2, and 1 ranges. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION. **Specification** **TCM terminal AQ: B+** **TCM terminal AN: 0 V** If not, inspect body ground condition and TCM terminal AS and AR voltage (B+). If okay, inspect for bent, damage, corrosion or loose connection of shift solenoids terminals. Inspect also continuity between following wiring harness: • Shift solenoid ground circuit • TCM terminal AQ—Shift solenoid terminal B • TCM terminal AN—Shift solenoid terminal A

STEP	INSPECTION		ACTION
4	Connect NGS tester to data link connector-2. Access TP V and VS PIDs. Drive vehicle. Inspect following TCM connector terminal voltages at each shift point monitored by TP V and VS PIDs. ☞ 05–13 ROAD TEST, Shift Diagram. 1GR • TCM terminal AQ: B+ • TCM terminal AN: 0 V 2GR • TCM terminal AQ: B+ • TCM terminal AN: B+ 3GR • TCM terminal AQ: 0 V • TCM terminal AN: B+ 4GR • TCM terminal AQ: 0 V • TCM terminal AN: 0 V Are terminal voltages okay?	Yes	Replace torque converter. If problem remains, replace or overhaul automatic transmission and repair or replace any defective parts.
		No	**If no shift up from 1GR in D range:** Inspect output speed sensor and related wiring harness. **If shift up from 1GR to 4GR in D range:** Inspect shift solenoid B and related wiring harnesses. **For other results:** Inspect following TCM connector terminal voltages while driving in suspect condition: • Throttle position sensor signal (TCM terminal U) • Input/turbine speed sensor (TCM terminal W and Z) • Output speed sensor (TCM terminal AE and AF) If okay, inspect for shift solenoids

Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

7	NO SHIFT

TROUBLESHOOTING HINTS

When the gear position is fixed in 3GR (in 2 range) or 4GR (in D range) due to the fail-safe operation, the malfunction is in the automatic transmission.

Perform malfunction diagnosis according to No.6 "LOW MAXIMUM SPEED AND POOR ACCELERATION".

① Clutch is burned.
- Line pressure is low
- Malfunction of output speed sensor

Note

- Fix 1GR in D and 2 ranges if there is malfunction in output speed sensor

- Malfunction of input/turbine speed sensor
- Malfunction of sensor ground (TCM AP—ground)
- Malfunction of shift solenoid A
- Malfunction of shift solenoid B
- Malfunction of body ground
- Malfunction of control valve body

② 3GR (in 2 range) or 4GR (in D range) is fixed (operation in fail-safe function).
- Short or open circuit in wiring
- Poor connection of connector
- Disconnected shift solenoid connector
- Poor ground of shift solenoid

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Fail-safe function

Range	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
Both shift solenoids A and B malfunction	4GR	4GR	4GR	4GR	3GR	1GR
Output speed sensor malfunction	1GR	1GR	1GR	1GR	1GR	2GR

Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

8	NO TCC FUNCTION

TROUBLESHOOTING HINTS
Basically, the TCC does not operate when the fail-safe is operating. Verify the diagnostic trouble code at first. If the TCC operates when driving at high speeds only, the malfunction (improper adjustment) is in the O/D OFF switch circuit or transmission range switch circuit.

Caution
- **If the torque converter clutch or piston is stuck, inspect them. In addition, Inspect the oil cooler for foreign particles which may have mixed in with the ATF.**

① TCC piston slippage, burned
- Line pressure is low
- Malfunction of throttle position sensor
- Malfunction of engine coolant temperature sensor
- Malfunction of output speed sensor
- Malfunction of input/turbine speed sensor
- Malfunction of sensor ground

② Malfunction of transmission range switch
- Short or open circuit in wiring
- Poor connection of connector
- Malfunction of sensor
- Selector lever adjustment is incorrect
- Transmission range switch adjustment is incorrect

③ Malfunction of TCC control solenoid valve
- Short or open circuit in wiring
- Poor connection of connector
- Solenoid valve is stuck

④ Malfunction of O/D OFF switch
⑤ Malfunction of torque converter
⑥ Malfunction of control valve body

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Drive vehicle in D range and inspect following: • 1–2 shift up and down • 2–3 shift up and down • 3–4 shift up and down Are all shifts up and shifts down possible?	Yes	Go to next step.
		No	**No shift at all** Go to symptom troubleshooting No.7 "NO SHIFT". **No shift from 1GR in D rage** Inspect output speed sensor. **3GR and 4GR are only available in D range.** Inspect shift solenoid A and related harness. **4GR is only available in D range.** Inspect both shift solenoid A and B. Inspect shift solenoid related wiring harness including shift solenoid ground. **Abnormal shift** Go to symptom troubleshooting No.9 "ABNORMAL SHIFT".
2	Connect NGS tester to data link connector-2. Access VS PID and TP V PID. Connect voltmeter to TCM connector terminal AO. Inspect if TCM connector terminal AO voltage is B+ in torque converter clutch operating condition monitored by VS and TP V PIDs. ☞ 05–13 ROAD TEST, Shift Diagram. Is voltage okay?	Yes	Inspect for open or short circuit between TCM connector terminal AO and shift solenoid connector terminal C. Repair or replace as necessary. Inspect for torque converter clutch solenoid valve stuck. ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection. then, go to next step.
		No	Inspect for bent, damaged, corroded or loose connection of TCM connector terminals. Inspect following TCM connector terminal voltages while driving in suspect condition. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION • D range signal (TCM terminal C) • Input/turbine speed sensor signal (TCM terminals W and Z) • Ground (TCM terminal AP) • Output speed sensor signal (TCM terminal AE and AF) • Throttle position sensor signal (TCM terminal U) Repair or replace any defective parts.

STEP	INSPECTION		ACTION
3	Overhaul control valve body and repair or replace any defective parts. Is problem eliminated?	Yes	AT is now normal.
		No	Replace torque converter. If problem remains, replace or overhaul transmission and repair or replace any defective parts

Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

9	ABNORMAL SHIFT

TROUBLESHOOTING HINTS

There is a malfunction in the signal circuit which controls shifting (throttle position sensor, input/turbine speed sensor, and output speed sensor), the control valve is stuck, or the clutch circuit is stuck.

① Clutch slippage, burned

- Line pressure is low
- Malfunction or misadjustment of throttle position sensor
- Malfunction of output speed sensor
- Malfunction of input/turbine speed sensor
- Malfunction of sensor ground
- Malfunction of shift solenoid A
- Malfunction of shift solenoid B
- Malfunction of torque converter clutch solenoid valve
- Malfunction of body ground
- Misadjustment of throttle cable
- Malfunction of control valve body

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Inspect for continuity between TCM connector terminal AP and ground. Is there continuity?	Yes	Go to next step.
		No	Repair or replace ground circuit.
2	Make sure abnormal shift driving condition Inspect for any abnormal signal change at the following TCM terminals when abnormal shift is occurred: • D, 2, or 1 range signal (TCM C, B, or A) • Throttle position sensor signal (TCM terminal U) • Output speed sensor signal (TCM terminal AE and AF) • Input/turbine speed sensor signal (TCM terminal W and Z) Are all signals okay?	Yes	Go to next step.
		No	Inspect for intermittent open or short of the related wiring harness and sensor.
3	Connect NGS tester to data link connector-2. Access TP V and VS PIDs. Drive vehicle. Inspect following TCM connector terminal voltage at each shift point monitored by TP V and VS PIDs: ☞ 05–13 ROAD TEST, Shift Diagram. 1GR • TCM terminal AQ: B+ • TCM terminal AN: 0 V 2GR • TCM terminal AQ: B+ • TCM terminal AN: B+ 3GR • TCM terminal AQ: 0 V • TCM terminal AN: B+ 4GR • TCM terminal AQ: 0 V • TCM terminal AN: 0 V Are terminal voltages okay?	Yes	Inspect for continuity between TCM connector terminal and shift solenoid connector terminal. Inspect also for shift solenoid stuck. ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection. If okay, overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.
		No	Inspect for bent, damaged, corroded or poor contact of TCM terminal.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

10	FREQUENT SHIFTING

TROUBLESHOOTING HINTS
The circuit which is the cause is basically the same as for No.9 "ABNORMAL SHIFT". However, a malfunction of the input signal to the throttle position sensor, input/turbine speed sensor, output speed sensor (including the sensor ground, sensor harness and connector), or clutch slippage (clutch stuck, low pressure in line) may also be the cause.
Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

11	SHIFT POINT IS HIGH OR LOW

TROUBLESHOOTING HINTS
- If the transmission does not shift normally, there is a malfunction of the input signal to the throttle position sensor, input/turbine speed sensor, or output speed sensor.
- If the engine speed is high or low regardless that shifting is normal, inspect the tachometer.
- Verify that the output signal of the throttle position sensor changes linearly.

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

12	NO KICKDOWN

TROUBLESHOOTING HINTS
If the transmission does not downshift though shifting is normal, the malfunction is in the throttle position sensor circuit(including the sensor ground, sensor harness and connector).
Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

13	ENGINE FLARES UP OR SLIPS WHEN UPSHIFTING OR DOWNSHIFTING

TROUBLESHOOTING HINTS

There is clutch slippage because the clutch is stuck or the line pressure is low.

① Clutch stuck, slippage (Forward clutch, direct clutch, 4GR brake, brake No.2, one-way clutch No.0, one-way clutch No.1, one-way clutch No.2)
- Line pressure is low
- Malfunction or misadjustment of throttle position sensor
- Malfunction of output speed sensor
- Malfunction of input/turbine speed sensor
- Malfunction of sensor ground
- Malfunction of shift solenoid A
- Malfunction of shift solenoid B
- Malfunction of TCC solenoid valve
- Malfunction of body ground
- Misadjustment of throttle cable
- Malfunction of control valve body

② Poor operation of mechanical pressure
- Selector lever position disparity
- Transmission range switch position disparity

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Is line pressure okay? ☞ 05–13 MECHANICAL SYSTEM TEST, Line Pressure Test.	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
2	Is shift point okay? ☞ 05–13 ROAD TEST, Shift point table	Yes	Go to next step.
		No	Go to No.9 "ABNORMAL SHIFT".
3	Inspect whether shift solenoids A and B are mechanically stuck. ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection. Are both shift solenoids okay?	Yes	Inspect for bent, damaged, corroded or loose contact of TCM connector terminal and shift solenoid connector terminals. Inspect also shift solenoid ground condition. If all items are okay, overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.
		No	Replace shift solenoid. ☞ 05–13 SOLENOID VALVES REMOVAL/INSTALLATION

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

14	ENGINE FLARES UP OR SLIPS WHEN ACCELERATING VEHICLE

TROUBLESHOOTING HINTS

The malfunction is basically the same as for No.13 "ENGINE FLARES UP OR SLIPS WHEN UPSHIFTING OR DOWNSHIFTING".

If condition for No.13 worsens, the malfunction will develop into No.14.

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

15	JUDDER UPON DURING TCC OPERATION

TROUBLESHOOTING HINTS
Poor torque converter clutch engagement due to either slippage because the TCC piston is stuck or the line pressure is low.

Note
- If the TCC or piston are stuck, inspect them. In addition, inspect the oil cooler for foreign particles which may have mixed in with the ATF.

① TCC piston slippage, burned
- Line pressure is low
- Malfunction or misadjustment of throttle position sensor
- Malfunction of output speed sensor
- Malfunction of input/turbine speed sensor
- Malfunction of sensor ground
- Malfunction of TCC solenoid valve
- Malfunction of control valve body

② Malfunction of torque converter

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Inspect for abnormal signal change at following TCM connector terminal when judder occurrs: • Throttle position sensor signal (TCM terminal U) • Output speed sensor signal (TCM terminals AE and AF) • Input/turbine speed sensor signal (TCM terminal W and Z) Are all signals okay?	Yes	Go to next step.
		No	Inspect for intermittent open or short of related wiring harness and sensor.
2	Connect NGS tester to data link connector-2. Access VS and TP V PIDs. Inspect TCM connector terminal AO voltage in TCC operating condition monitored by VS and TP V PIDs. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION **Specification: B+ in TCC condition** Does voltage change from 0 to B+ with correct TCC timing?	Yes	Inspect for continuity between TCM connector terminal AO and TCC solenoid valve terminal C. Inspect for TCC solenoid valve stuck. ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection. If okay, go to next step.
		No	Inspect for bent, damaged, corroded and poor contact of TCM connector terminal. Inspect for short to ground between TCC solenoid valve connector terminal C and TCM connector terminal AO.
3	Overhaul control valve body and repair or replace any defective parts. Is problem eliminated?	Yes	AT is now normal.
		No	Replace torque converter.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

16	EXCESSIVE N TO D OR N TO R POSITION/RANGE SHIFT SHOCK		
TROUBLESHOOTING HINTS Shift shock may worsen when the fail-safe is operating. If no diagnostic trouble code is output, the shift shock may worsen due to poor operation of the control valve body or sticking of the clutch. ① Clutch is burned (N→D: Forward clutch, N→R: Reverse brake or direct clutch) • Line pressure is low • Malfunction of throttle position sensor • Malfunction of sensor ground • Misadjustment of throttle cable • Malfunction of control valve body ② Poor hydraulic operation (Malfunction in range change) ③ Idle speed is high ④ Poor tightening torque of engine mount or exhaust mount **Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.**			
STEP	**INSPECTION**		**ACTION**
1	Does shift shock occur only when engine is cold?	Yes	Inspect following TCM connector terminal voltage: ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION • Throttle position sensor signal (TCM terminal U) • Ground (TCM terminal AP)
		No	Go to next step.
2	Is line pressure okay? ☞ 05–13 MECHANICAL SYSTEM TEST, Line Pressure Test.	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
3	Is stall speed okay? ☞ 05–13 MECHANICAL SYSTEM TEST, Stall Test	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
4	Turn ignition switch to ON Inspect TCM connector terminal AP voltage: ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION Is voltage okay?	Yes	Inspect ground condition. Overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.
		No	Adjust throttle position sensor if necessary. Replace throttle position sensor if necessary.

Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

17	EXCESSIVE SHIFT SHOCK WHEN UPSHIFTING AND DOWNSHIFTING

TROUBLESHOOTING HINTS

Shift shock may worsen when the fail-safe is operating. The shift shock has worsened if the throttle position sensor, input/turbine speed sensor, or output speed sensor signal malfunctions.

① Clutch slippage, burned
- Line pressure is low or high
- Malfunction of throttle position sensor
- Malfunction of output speed sensor
- Malfunction of input/turbine speed sensor
- Malfunction of shift solenoid A
- Malfunction of shift solenoid B
- Malfunction of TCC solenoid valve
- Misadjustment of throttle cable
- Malfunction of body ground and sensor ground
- Malfunction of control valve body

② Poor hydraulic operation (Malfunction in range change)

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Is line pressure okay? ☞ 05–13 MECHANICAL SYSTEM TEST, Line Pressure Test.	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
2	Is stall speed okay? ☞ 05–13 MECHANICAL SYSTEM TEST, Stall Test	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
3	Inspect for abnormal signal change at following TCM connector terminal while upshifting or downshifting: • Throttle position sensor signal (TCM terminal U) • Output speed sensor (TCM terminal AE and AF) • Input/turbine speed sensor signal (TCM terminal W and Z) Are all signals okay?	Yes	Go to next step.
		No	Inspect for intermittent open or short of related wiring harness and sensor.
4	Inspect whether shift solenoids are mechanically stuck. ☞ 05–13 SOLENOID VALVES INSPECTION, Operating Inspection. Are shift solenoids okay?	Yes	Inspect for continuity between appropriate shift solenoid connector terminal and appropriate TCM connector terminal. If okay, overhaul control valve body and repair or replace any defective parts If problem remains, replace or overhaul transmission and repair or replace any defective parts.
		No	Replace shift solenoid

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

18	EXCESSIVE TCC SHIFT SHOCK

TROUBLESHOOTING HINTS

① The troubleshooting flow is the same as for No.15 "JUDDER UPON TCC OPERATION".

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

19	NOISE AT IDLE WHEN VEHICLE IS STOPPED IN ALL POSITIONS/RANGES

TROUBLESHOOTING HINTS
The malfunction is in the oil pump which causes a high-pitched noise to be emitted from the transmission at idle.

Note
- If a noise is emitted during shifting only, the malfunction is in shift solenoid A, B, or TCC solenoid valve. If a noise is emitted during shifting at certain gears only or during deceleration only, it is gear noise.

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Inspect engine condition. Is there anything wrong with the engine?	Yes	Go to appropriate symptom troubleshooting. ☞ 01–01A ENGINE SYMPTOM TROUBLESHOOTING.
		No	Inspect engine and transmission mounts installation condition. Inspect also for AT cooler pipe vibration. If okay, overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

20	NOISE AT IDLE WHEN VEHICLE IS STOPPED IN D, 2, 1 RANGE OR IN R POSITION

TROUBLESHOOTING HINTS
① Although the malfunction is basically the same as No.19 "NOISE AT IDLE WHEN VEHICLE STOPPED IN ALL POSITIONS/RANGES", other causes may be selector lever position disparity or transmission range switch position disparity.

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

21	NO ENGINE BRAKING IN 1, 2, or 3 GEAR

TROUBLESHOOTING HINTS
① Clutch slippage, burned (brake No.1, reverse brake)
- Line pressure is low
- Malfunction of output speed sensor
- Malfunction of input/turbine speed sensor
- Malfunction of sensor ground
- Malfunction of control valve body

② O/D OFF switch is on is not judged by TCM (short, or open circuit, poor operation)
- Malfunction of O/D OFF switch signal

Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Connect NGS tester to data link connector-2. Turn ignition switch to ON. Select TR SW PID. Is TR SW PID reading okay when selecting range? ☞ 01–40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION.	Yes	Go to next step.
		No	Inspect for transmission range switch adjustment. ☞ 05–13 TRANSMISSION RANGE SWITCH ADJUSTMENT Adjust transmission range switch as necessary. Inspect transmission range switch. Repair or replace any defective parts.

STEP	INSPECTION		ACTION
2	Do following symptoms concurrently occur? • Engine flares up or slips during acceleration. • Engine flares up or slips when shifting.	Yes	Go to symptom troubleshooting No.13 "ENGINE FLARES UP OR SLIPS WHEN UPSHIFTING OR DOWNSHIFTING" or No.14 "ENGINE FLARES UP OR SLIPS WHEN ACCELERATING VEHICLE".
		No	Go to next step.
3	Inspect voltages at following TCM connector terminals: ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION • TCC solenoid valve signal (TCM terminal AO) • Input/turbine speed sensor signal (TCM terminal W and Z) • Output speed sensor signal (TCM terminals AE and AF) Are voltages okay?	Yes	Overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.
		No	Inspect for intermittent open or short circuit on related wiring harness and/or sensor.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

22	TRANSMISSION OVERHEATS

TROUBLESHOOTING HINTS
The malfunction is restricted to hindrance of coolant at the oil cooler.
① Line pressure is low
- ATF level is low
- Malfunction of throttle position sensor
- Misadjustment of throttle cable

② Oil cooler malfunction (Foreign material mixed in with ATF)
③ Excessive amount of ATF
Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.

STEP	INSPECTION		ACTION
1	Is line pressure okay? ☞ 05–13 MECHANICAL SYSTEM TEST, Line Pressure Test.	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
2	Perform stall test. ☞ 05–13 MECHANICAL SYSTEM TEST, Stall Test Is stall speed okay?	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
3	Inspect for bent, damage, corrosion or kinks of oil cooler pipes. Are oil cooler pipes okay?	Yes	Overhaul control valve body and repair or replace any defective parts. If problem remains, replace or overhaul transmission and repair or replace any defective parts.
		No	Replace any defective parts.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

23	ENGINE STALLS WHEN SHIFTED TO D, 2, 1 RANGES, AND/OR IN R POSITION		
TROUBLESHOOTING HINTS ① The malfunction is on engine control side (i.e. IAC control). Otherwise, the malfunction is TCC circuit (engine always stalls). **Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.**			
STEP	**INSPECTION**		**ACTION**
1	Go to symptom troubleshooting No.4 "ENGINE STALLS" ☞ 01–01A ENGINE SYMPTOM TROUBLESHOOTING. Is engine control system okay?	Yes	Go to next step.
		No	Repair or replace any defective parts according to inspection results.
2	Inspect TCM connector terminal AO voltage. ☞ TRANSMISSION CONTROL MODULE INSPECTION Is terminal voltage okay?	Yes	Inspect TCC solenoid valve mechanical stuck. ☞ SOLENOID VALVE INSPECTION, Operating Inspection. If okay, go to next step.
		No	Inspect for intermittent short to power circuit between TCC connector terminal AO and TCC solenoid valve connector terminal.
3	Inspect for bent, damage or kinks of oil cooler line pipes. If okay, overhaul control valve body and repair or replace any defective parts Does problem eliminate?	Yes	AT is now normal.
		No	Replace torque converter. If problem remains, replace or overhaul transmission and repair or replace any defective parts.

Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

24	ENGINE STALLS WHEN DRIVING AT SLOW SPEEDS OR STOPPING		
TROUBLESHOOTING HINTS The malfunction is on the engine control side (fuel injection control, IAC control). **Before following the troubleshooting steps, make sure that the on-board diagnosis and basic inspection are conducted.**			
STEP	**INSPECTION**		**ACTION**
1	Go to symptom troubleshooting No.9 "LOW IDLES/STALLS DURING DECELERATION". ☞ 01–01A ENGINE SYMPTOM TROUBLESHOOTING Is engine control system okay?	Yes	Go to symptom troubleshooting No.23 "ENGINE STALLS WHEN SHIFTED TO D, 2, 1 RANGE, AND/OR IN R POSITION".
		No	Repair or replace any defective parts according to inspection results.

Note

- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

25	O/D OFF INDICATOR LIGHT DOES NOT ILLUMINATE WHEN O/D OFF SWITCH IS TURNED ON		
TROUBLESHOOTING HINTS O/D OFF switch or related wiring harness malfunction			
STEP	**INSPECTION**		**ACTION**
1	Are other indicator lights illuminated with ignition switch at ON?	Yes	Inspect meter fuse.
		No	Go to next step.
2	Inspect O/D OFF switch. ☞ 05–13 O/D OFF SWITCH INSPECTION Is O/D OFF switch okay?	Yes	Go to next step.
		No	Replace O/D OFF switch. ☞ 05–13 O/D OFF SWITCH REMOVAL/INSTALLATION
3	Inspect TCM connector terminal L voltage. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION Is terminal voltage okay?	Yes	Go to next step.
		No	Inspect continuity between O/D OFF switch and TCM terminal K.
4	Remove O/D OFF indicator light. Is O/D OFF indicator light bulb burned out?	Yes	Replace O/D OFF indicator light.
		No	Inspect for open circuit or disconnected connector in following harness: • Ignition switch and O/D OFF indicator light • O/D OFF indicator light and TCM terminal L including instrument cluster circuit board

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

26	O/D OFF INDICATOR LIGHT ILLUMINATES WHEN O/D OFF SWITCH IS NOT TURNED ON		
TROUBLESHOOTING HINTS O/D OFF switch or related wiring harness malfunction			
STEP	**INSPECTION**		**ACTION**
1	Inspect O/D OFF switch. ☞ 05–13 O/D OFF SWITCH INSPECTION. Is O/D OFF switch okay?	Yes	Go to next step.
		No	Replace O/D OFF switch. ☞ 05–13 O/D OFF SWITCH REMOVAL/INSTALLATION.
2	Inspect TCM connector terminal L voltage. ☞ 05–13 TRANSMISSION CONTROL MODULE INSPECTION. Is terminal voltage okay?	Yes	Inspect for short to ground circuit between O/D OFF switch terminal and TCM terminal K.
		No	Inspect for short to ground circuit between O/D OFF indicator light on instrument cluster and TCM connector terminal L including instrument cluster circuit board.

Note
- If the malfunction remains even though all inspections have been performed, get assistance from technical hotline/your distributors.

05–10 CLUTCH

GENERAL PROCEDURES (CLUTCH)

X5U510W01

Precaution

Clutch pipe

- If any clutch pipe has been disconnected anytime during the procedure, add brake fluid, bleed the air, and inspect for leakage after the procedure has been completed.
- If removing the clutch pipe, remove it by using the **SST** (49 0259 770B). If installing the clutch pipe, change the clutch pipe tightening torque to allow for use of a torque wrench-**SST** (49 0259 770B) combination, and then tighten the clutch pipe by using the **SST** (49 0259 770B). (Refer to 00–00 FUNDAMENTAL PROCEDURES, Torque Formulas.)

CLUTCH FLUID INSPECTION

X5U510W02

Note

- The fluid reservoir must be maintained between the MIN/MAX level during replacement.

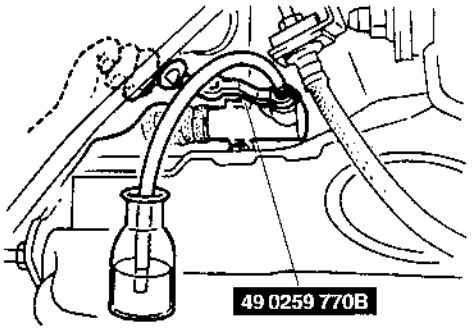
CLUTCH FLUID REPLACEMENT

X5U510W03

Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

Note
- Do not mix different brands of fluid.
- Do not reuse the clutch fluid that was drained.

1. Drain the fluid from the reservoir by using a suction pump. (Refer to 04–10 PRECAUTION (BRAKES).)
2. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder screw.
3. Insert the other end of the vinyl hose into a clear container.
4. Loosen the bleeder screw by using the **SST**.



X5U510WA1

5. With another person slowly pumping the clutch pedal, drain the fluid from the clutch system.
6. Repeat step 5 until all the fluid is drained.
7. Change the bleeder screw tightening torque to allow for a torque wrench-**SST** combination. (Refer to 00–00 FUNDAMENTAL PROCEDURES, Torque Formulas.)
8. Tighten the bleeder screw by using the **SST**.

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

9. Fill the reservoir to MAX with new fluid of the specified type.
10. Bleed the air from the clutch. (Refer to 05–10 CLUTCH FLUID AIR BLEEDING.)
11. Verify correct clutch operation.
12. Verify that there is no fluid leakage.

CLUTCH FLUID AIR BLEEDING

X5U510W04

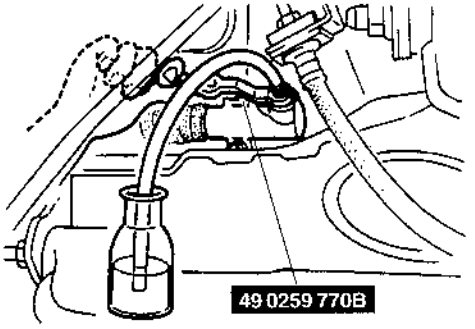
Caution
- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

Note
- Do not mix different brands of fluid.
- Do not reuse the clutch fluid that was drained.

1. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
2. Place the other end of the vinyl hose in a clear container.
3. Slowly pump the clutch pedal several times.
4. With the clutch pedal depressed, loosen the bleeder screw by using the **SST** to let the fluid escape. Close the bleeder screw by using the **SST**.
5. Repeat Steps 3 and 4 until only clean fluid is seen.
6. Tighten the bleeder screw.

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

7. Add fluid to the MAX mark.



X5U510WA2

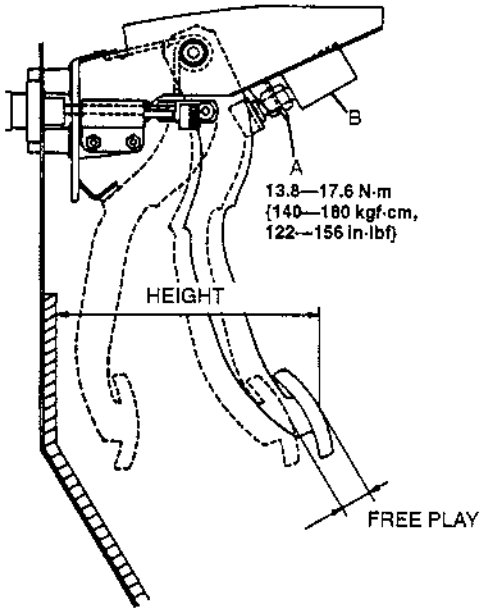
CLUTCH PEDAL INSPECTION

X5U510W05

Clutch Pedal Height Inspection

1. Measure the distance from the upper surface of the pedal pad to the cabin carpet.

Pedal height
175—180 mm {6.89—7.09 in} (With carpet)



X5U510WA3

2. As necessary, adjust the height.

Clutch Pedal Free Play Inspection

1. Depress the clutch pedal by hand until clutch resistance is felt.

Free play
0.6—3.1 mm {0.02—0.12 in}
Total free play
5—13 mm {0.20—0.51 in}

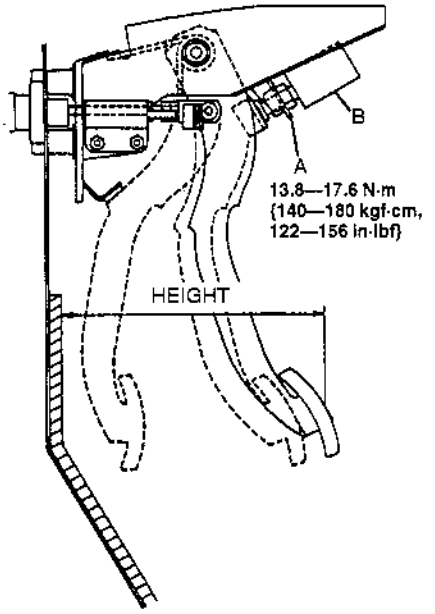
2. Adjust the free play as necessary. (Refer to 05–10 CLUTCH PEDAL ADJUSTMENT, Clutch Pedal Free Play Adjustment.)

CLUTCH PEDAL ADJUSTMENT

X5U510W06

Clutch Pedal Height Adjustment

1. Disconnect the clutch switch connector.
2. Loosen locknut A and turn clutch switch B until the height is correct.
3. Tighten locknut A.



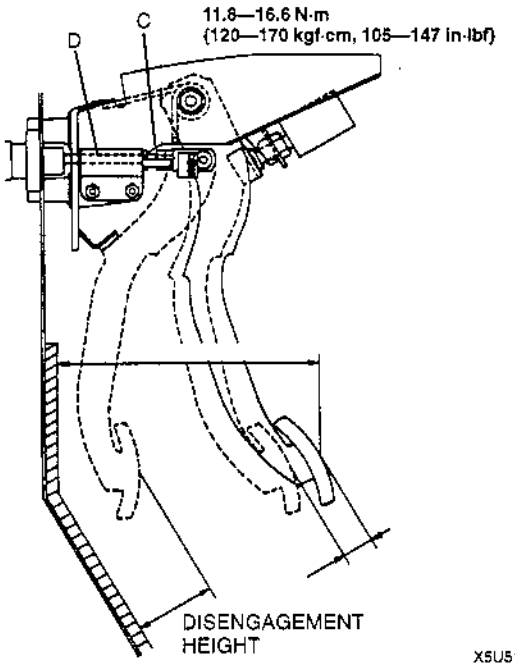
X5U510WA4

Tightening torque
13.8—17.6 N·m
{140—180 kgf·cm, 122—156 in·lbf}

4. After adjustment, inspect the free play.

Clutch Pedal Free Play Adjustment

1. Loosen locknut C and turn push rod D until the free play is correct.
2. Verify that the disengagement height as measured from the upper surface of the pedal pad to the carpet is correct when the pedal is fully depressed.



X5U510WA5

Minimum disengagement height
68 mm {2.68 in} (With carpet)

3. Tighten locknut C.

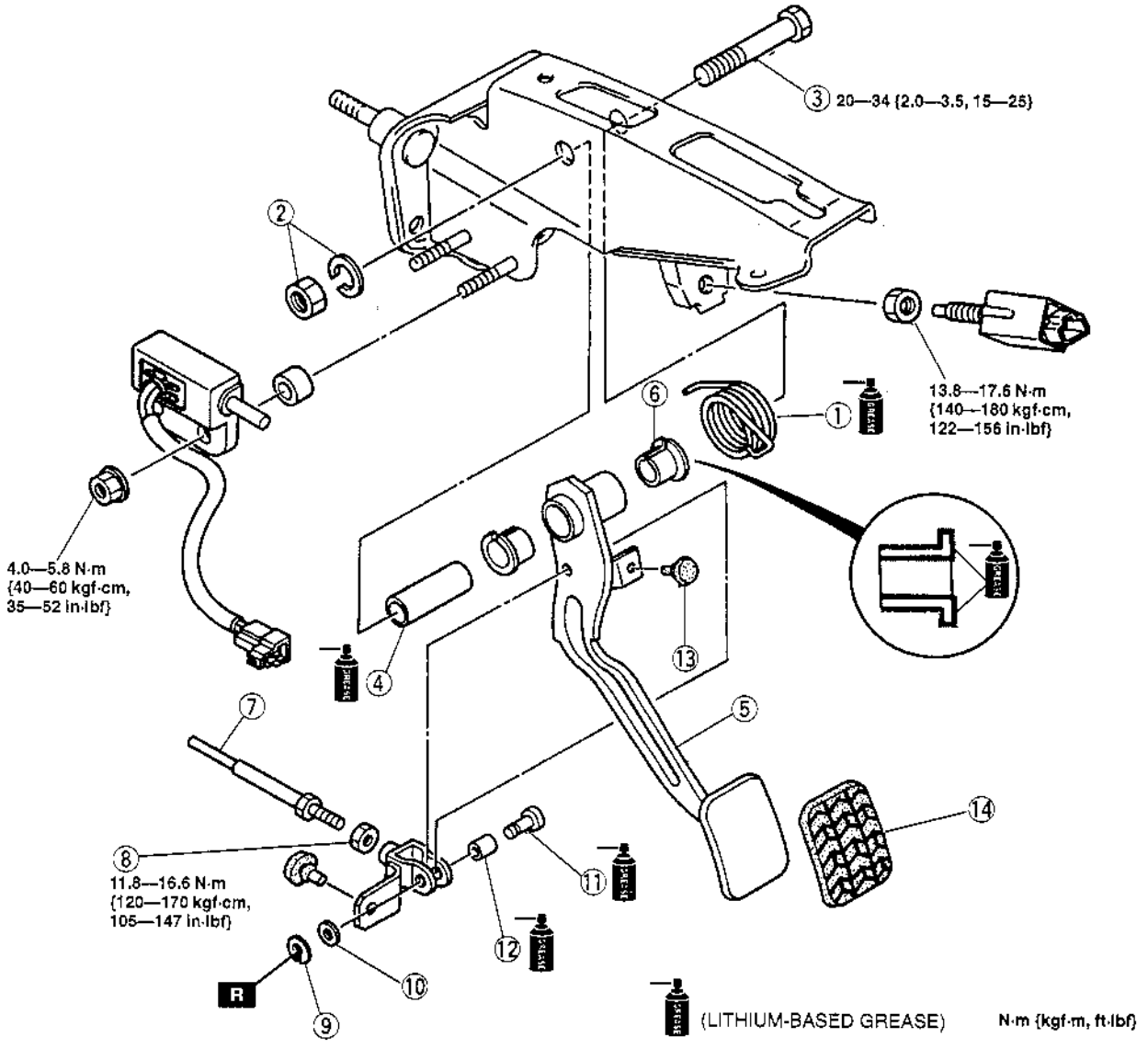
Tightening torque
11.8—16.6 N·m
{120—170 kgf·cm, 105—147 in·lbf}

4. After adjustment, inspect the height.

CLUTCH PEDAL REMOVAL/INSTALLATION

X5U510W07

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



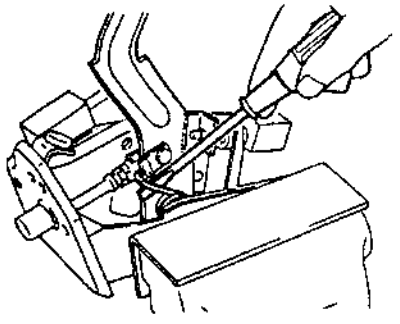
X5U510WA6

1	Spring ☞ Removal Note ☞ Installation Note
2	Nut and lock washer
3	Bolt
4	Spacer
5	Clutch pedal
6	Bushing
7	Push rod

8	Nut
9	Clip
10	Wave washer
11	Pin
12	Spacer
13	Stop
14	Pedal pad

Spring Removal Note

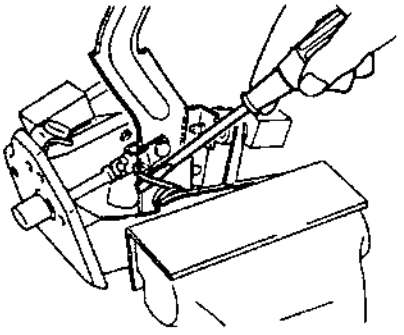
1. Place the clutch pedal component in a vise.
2. Pry the spring off the clutch pedal as shown in the figure.



X5U510WA7

Spring Installation Note

1. Place the clutch pedal component in a vise.
2. Install the spring onto the clutch pedal as shown in the figure.
3. Adjust the clutch pedal height and free play after installation.



X5U510WA8

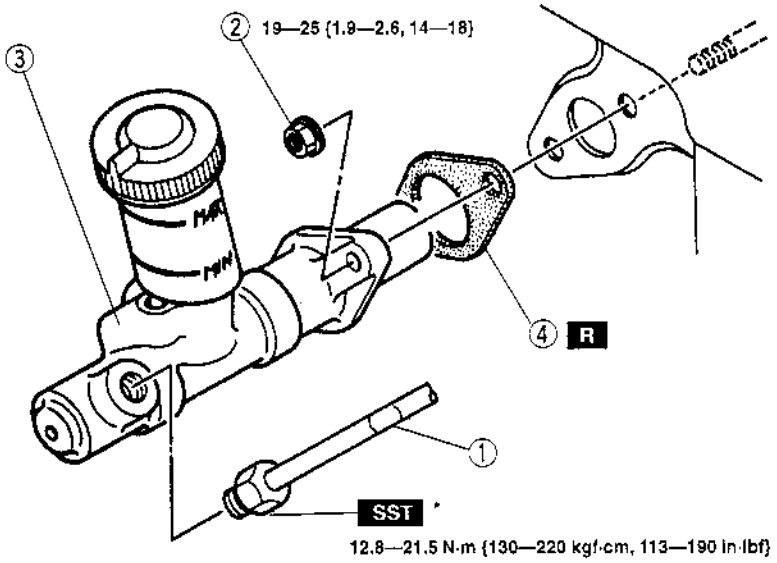
CLUTCH MASTER CYLINDER REMOVAL/INSTALLATION

X5U510W08

Caution

- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Inspect and adjust the clutch pedal height and free play. (Refer to 05–10 CLUTCH PEDAL ADJUSTMENT.)



* 49 0259 770B

N·m {kgf·m, ft·lbf}

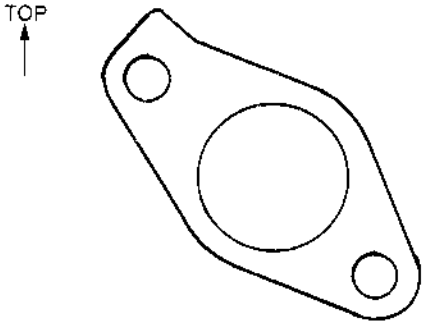
12.8—21.5 N·m {130—220 kgf·cm, 113—190 in·lbf}

X5U510WA9

1	Clutch pipe
2	Nut

3	Clutch master cylinder ☞ 05–10 CLUTCH FLUID AIR BLEEDING
4	Gasket ☞ Installation Note

Gasket Installation Note
- Install the gasket as shown.



X5U510WAA

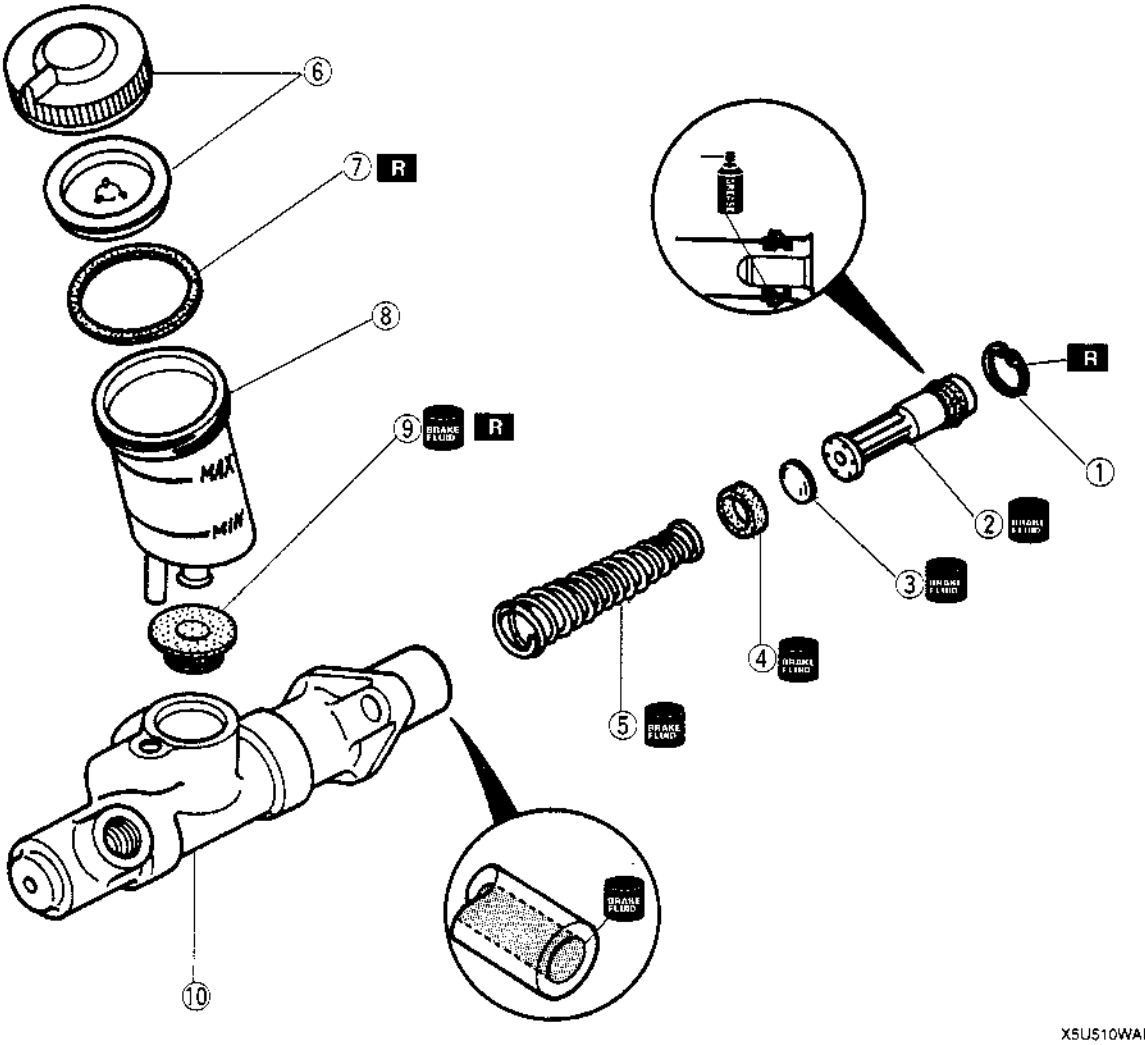
CLUTCH MASTER CYLINDER DISASSEMBLY/ASSEMBLY

X5U510W09

1. Disassemble in the order indicated in the table.

Warning
- **Applying compressed air to the cylinder component can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.**

2. Wipe all parts, and use compressed air to clean all ports, passages, and inner parts.
3. Assemble in the reverse order of disassembly.

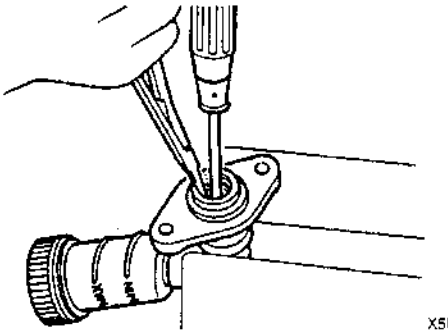


X5U510WAB

1	Snap ring ☞ Disassembly/Assembly Note
2	Piston and secondary cup component
3	Spacer
4	Primary cup
5	Return spring
6	Cap
7	Packing
8	Reservoir
9	Bushing
10	Master cylinder body

Snap Ring Disassembly/Assembly Note

- While holding the piston down with a cloth-wrapped Phillips screwdriver, remove the snap ring.



X5U510WAC

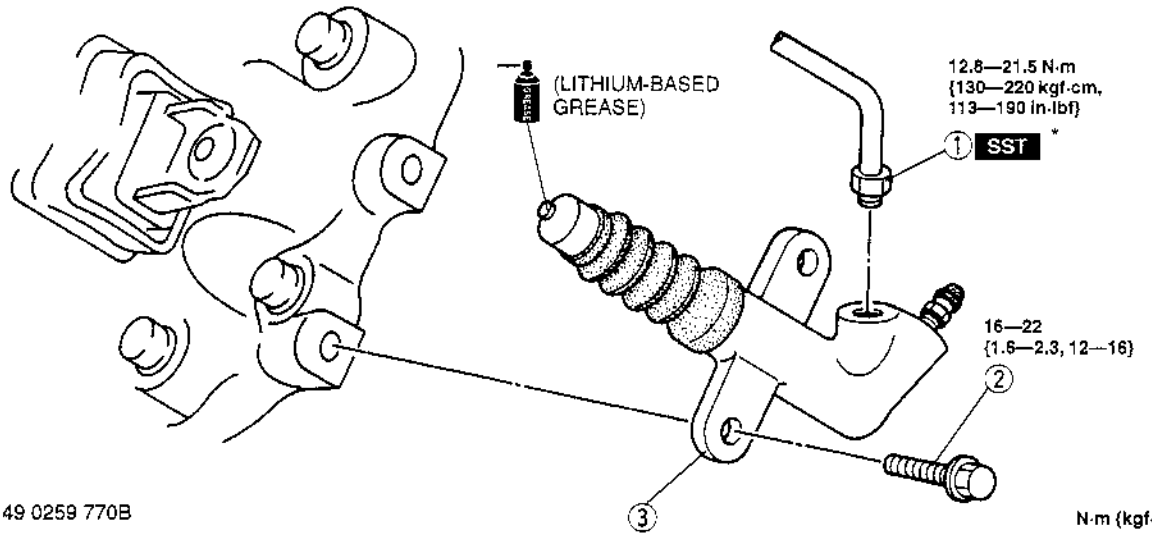
CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION

X5U510W10

Caution

- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



X5U510WAD

1	Clutch pipe
2	Bolt

3	Clutch release cylinder ☞ 05–10 CLUTCH FLUID AIR BLEEDING

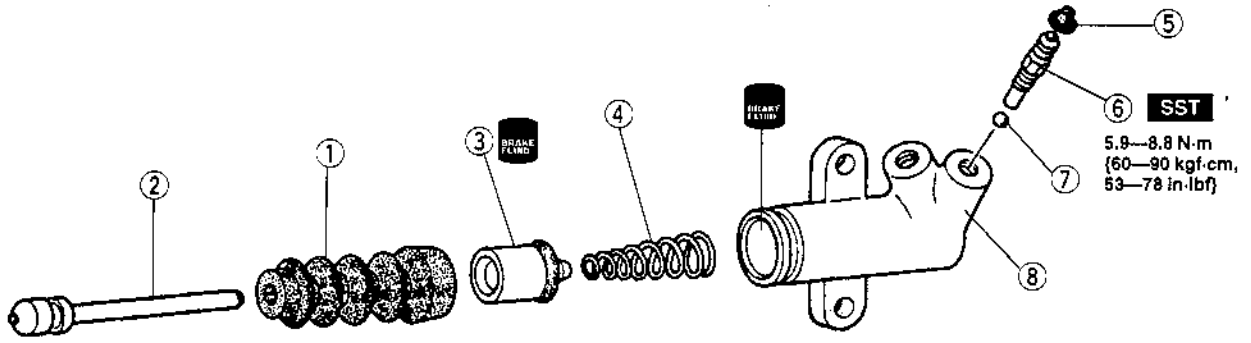
CLUTCH RELEASE CYLINDER DISASSEMBLY/ASSEMBLY

X5U510W11

1. Disassemble in the order indicated in the table.

Warning
- **Applying compressed air to the cylinder component can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.**

2. Wipe all parts, and use compressed air to clean all ports, passages, and inner parts.
3. Assemble in the reverse order of disassembly.



* 49 0259 770B

X5U510WAE

1	Boot
2	Push rod
3	Piston and cup component
4	Spring

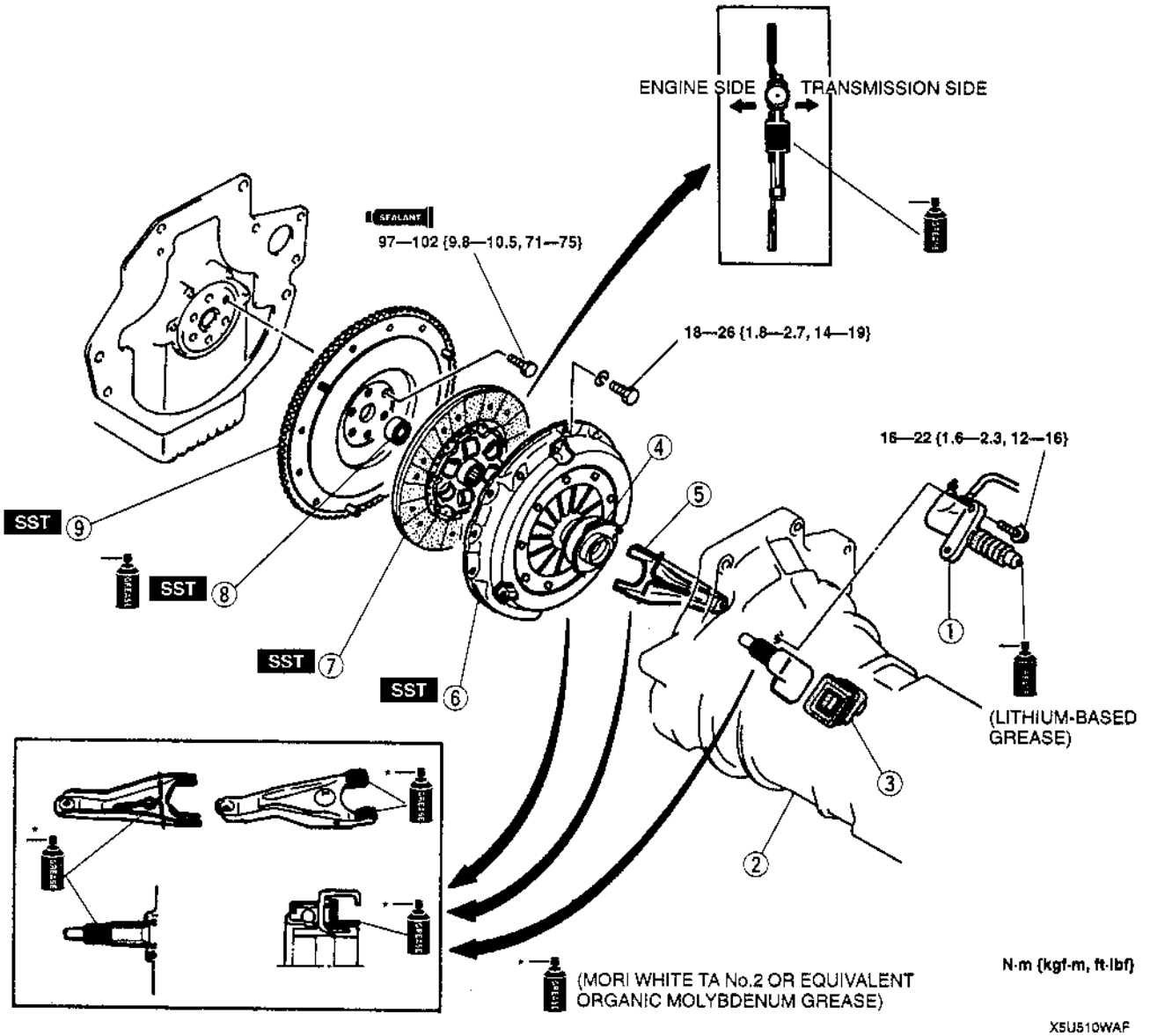
5	Bleeder cap
6	Bleeder screw
7	Steel ball
8	Release cylinder body

CLUTCH UNIT REMOVAL/INSTALLATION

X5U510W12

Note
- The clutch release cylinder can be removed from the transmission with the clutch pipe connected.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



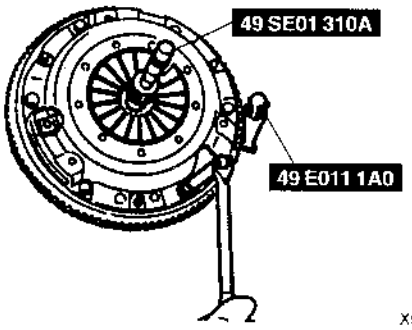
X5U510WAF

1	Clutch release cylinder
2	Transmission ☞ 05–11 MANUAL TRANSMISSION REMOVAL/INSTALLATION
3	Boot
4	Clutch release collar ☞ 05–10 CLUTCH RELEASE COLLAR INSPECTION
5	Clutch release fork
6	Clutch cover ☞ Removal Note ☞ Installation Note

7	Clutch disc ☞ Removal Note ☞ Installation Note
8	Pilot bearing ☞ Removal Note ☞ Installation Note
9	Flywheel ☞ Removal Note ☞ Installation Note

Clutch Cover and Clutch Disc Removal Note

1. Install the **SST**.



X5U510WAG

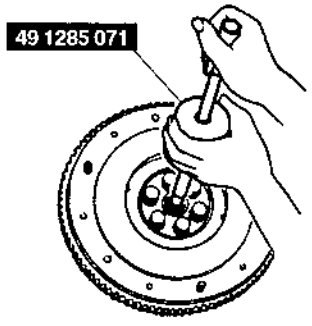
2. Hold the flywheel by using the **SST**.
3. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released. Then remove the clutch cover and disc.

Pilot Bearing Removal Note

Note

- The pilot bearing does not need to be removed unless you are replacing it.

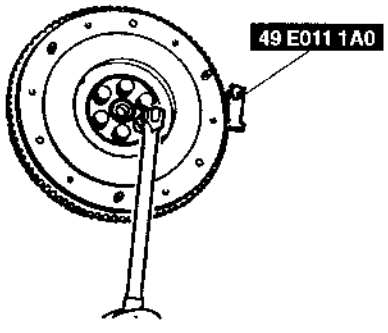
- Remove the pilot bearing by using the **SST**.



X5U510WAH

Flywheel Removal Note

1. Hold the flywheel by using the **SST**.

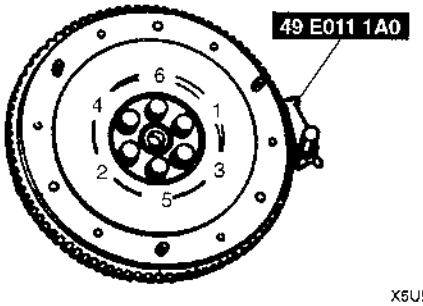


X5U510WAJ

2. Remove the flywheel.
3. Inspect for oil leakage from the crankshaft rear oil seal. If there is any such leakage or if the oil seal is damaged, replace the crankshaft oil seal. (Refer to 01–10 REAR OIL SEAL REPLACEMENT.)

Flywheel Installation Note

1. Wipe the bolts clean, then apply sealant to the bolt threads.
2. Install the flywheel, and secure it by using the **SST**.



X5U510WAK

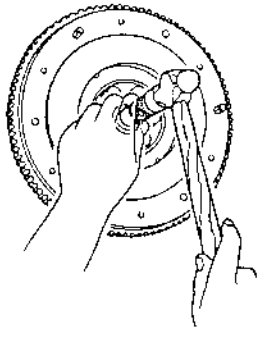
3. Tighten the bolts in the pattern shown.

Tightening torque
97—102 N·m {9.8—10.5 kgf·m, 71—75 ft·lbf}

Pilot Bearing Installation Note

- Install a new pilot bearing by using a suitable pipe.

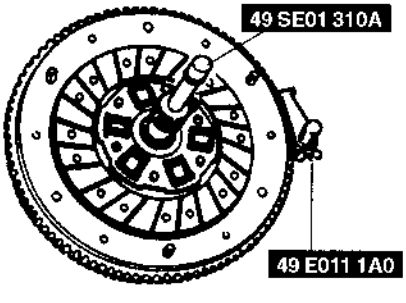
Depth
0—0.4 mm {0—0.016 in}



X5U510WAL

Clutch Disc Installation Note

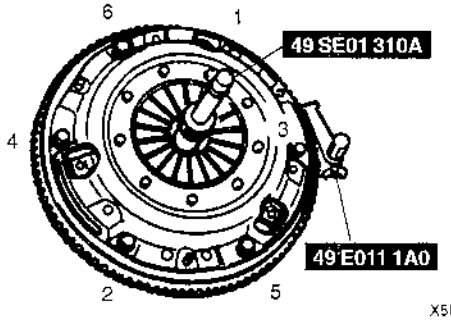
1. Clean the clutch disc splines and main drive gear splines, and apply Mori White TA No.2 or equivalent organic molybdenum grease.
2. Hold the clutch disc in position by using the **SST**.



X5U510WAM

Clutch Cover Installation Note

1. Hold the flywheel by using the **SST**.
2. Align the dowel holes with the flywheel dowels.
3. Tighten the bolts evenly and gradually in the pattern shown.



X5U510WAN

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

CLUTCH COVER INSPECTION

X5U510W13

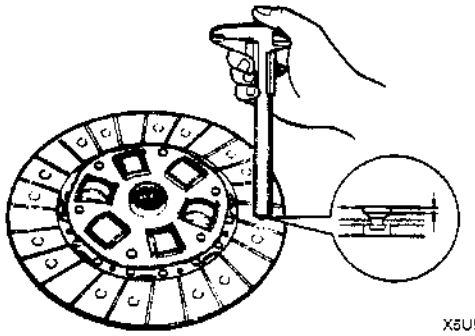
1. Inspect the contact surface for scoring, cracks, and burning. Repair or replace as necessary.
2. Remove minor scoring or burning by using emery paper. Repair if scoring or burning is major. Replace if cracked.
3. Inspect the tips of the diaphragm spring for wear and cracks.
4. If there is wear or cracks, replace the clutch cover.

CLUTCH DISC INSPECTION

X5U510W14

1. Inspect the lining surface for burning and oil contamination. Repair by using sandpaper if the trouble is minor. Replace the clutch disc if it is badly burned or oil soaked.
2. Inspect for loose facing rivets or torsion dampers. Replace the clutch disc if any are loose.
3. Measure the thickness of the lining at a rivet head on both sides by using vernier calipers. Replace the clutch disc if less than minimum.

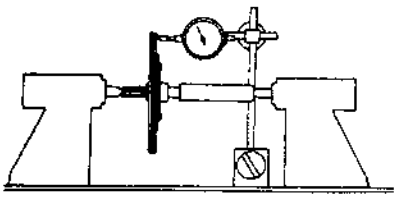
Minimum thickness
0.3 mm {0.012 in}



X5U510WAP

4. Measure the clutch disc runout by using a dial indicator. Replace the clutch disc if runout is excessive.

Maximum runout
0.7 mm {0.028 in}



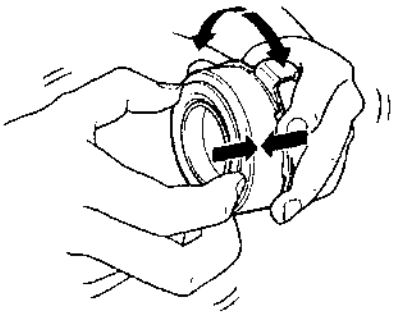
X5U510WAQ

CLUTCH RELEASE COLLAR INSPECTION

X5U510W15

Caution
- **Cleaning the clutch release collar with cleaning fluids or a steam cleaner can wash the grease out of the sealed bearing.**

- Turn the collar while applying force in the axial direction. If the collar sticks or has excessive resistance, replace it.

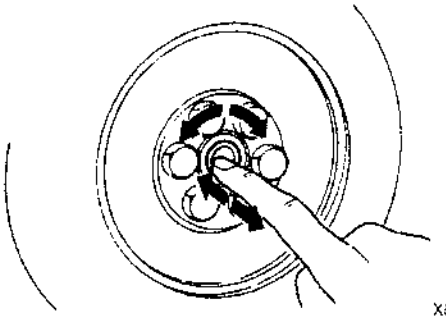


X5U510WAR

PILOT BEARING INSPECTION

X5U510W16

1. Turn the bearing while applying force in the axial direction.
2. If the bearing sticks or has excessive resistance, replace it.



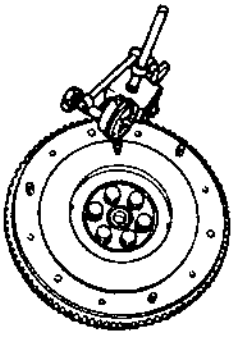
X5U510WAS

FLYWHEEL INSPECTION

X5U510W17

1. Inspect the contact surface for scoring, cracks, and burning.
2. Remove minor scoring or burning by using emery paper. Repair if scoring or burning is major. Replace if cracked.
3. Inspect the ring gear teeth for wear or damage.
4. Measure the flywheel runout by using a dial indicator. Replace the flywheel if runout is excessive.

Maximum runout
0.2 mm {0.008 in}



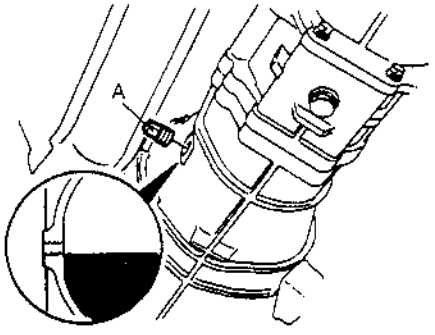
X5U510WAT

05–11 MANUAL TRANSMISSION

TRANSMISSION OIL INSPECTION

X5U511W01

1. Remove the check plug A.



X5U511WA0

2. Verify that the oil is at the brim of the check plug hole as shown. If it is low, add the specified oil from the check plug hole.

Specified oil
Grade:
API service GL-4 or GL-5
Viscosity:
SAE 75W–90 (All season) or
SAE 80W–90 (Above 10 °C {50 °F})
Capacity:
2.0 L {2.1 US qt, 1.8 Imp qt}

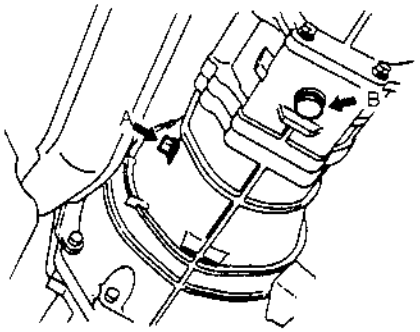
3. Wipe the plug clean and apply sealant to the plug threads before installing.

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

TRANSMISSION OIL REPLACEMENT

X5U511W02

1. Remove the drain plug B (with washer) and the check plug A.

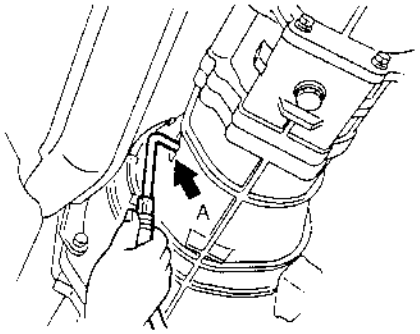


X5U511WA1

2. Drain the oil into a container.
3. Wipe all plugs clean.
4. Install the drain plug B (with new washer).

Tightening torque
B: 40—58 N·m {4.0—6.0 kgf·m, 29—43 ft·lbf}

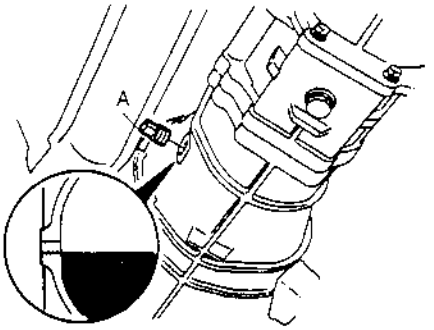
5. Add the specified oil from check plug A port until the level reaches the brim of check plug hole.



X5U511WA2

Specified oil
Grade:
API service GL-4 or GL-5
Viscosity:
SAE 75W–90 (All season) or
SAE 80W–90 (Above 10 °C {50 °F})
Capacity:
2.0 L {2.1 US qt, 1.8 Imp qt}

6. Apply sealant to the threads of check plug A.
7. Install the check plug A.



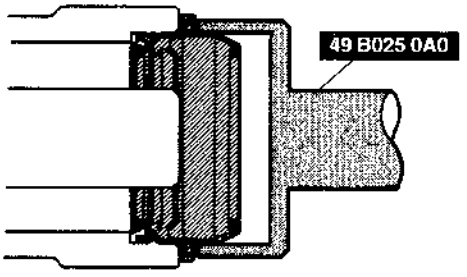
X5U511WA3

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

OIL SEAL (REAR) REPLACEMENT

X5U511W03

1. Raise the vehicle and support it with safety stands.
2. Remove the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL/INSTALLATION.)
3. Remove the oil seal from the extension housing.
4. Apply the specified oil to a new oil seal.
5. Install the new oil seal by using the **SST**.



X5U511WA4

6. Install the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL/INSTALLATION.)
7. Inspect the oil level. (Refer to 05–11 TRANSMISSION OIL INSPECTION.)

VEHICLE SPEEDOMETER SENSOR REMOVAL/INSTALLATION

X5U511W04

1. Disconnect the negative battery cable.
2. Drain the transmission oil. (Refer to 05–11 TRANSMISSION OIL REPLACEMENT.)
3. Disconnect the vehicle speedometer sensor connector.
4. Remove the vehicle speedometer sensor.
5. Apply transmission oil to a new O-ring and install it on a new vehicle speedometer sensor.
6. Install the vehicle speedometer sensor.

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

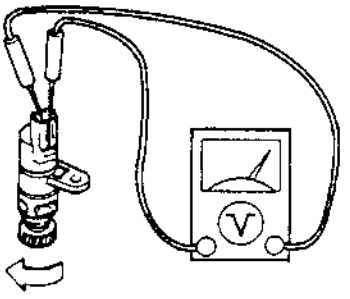
7. Connect the vehicle speedometer sensor connector.
8. Add the specified amount and type of transmission oil. (Refer to 05–11 TRANSMISSION OIL REPLACEMENT.)
9. Connect the negative battery cable.

VEHICLE SPEEDOMETER SENSOR INSPECTION

X5U511W05

1. Remove the vehicle speedometer sensor. (Refer to 05–11 VEHICLE SPEEDOMETER SENSOR REMOVAL/INSTALLATION.)
2. Measure voltage between terminals of the vehicle speedometer sensor while the gear is turning.

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



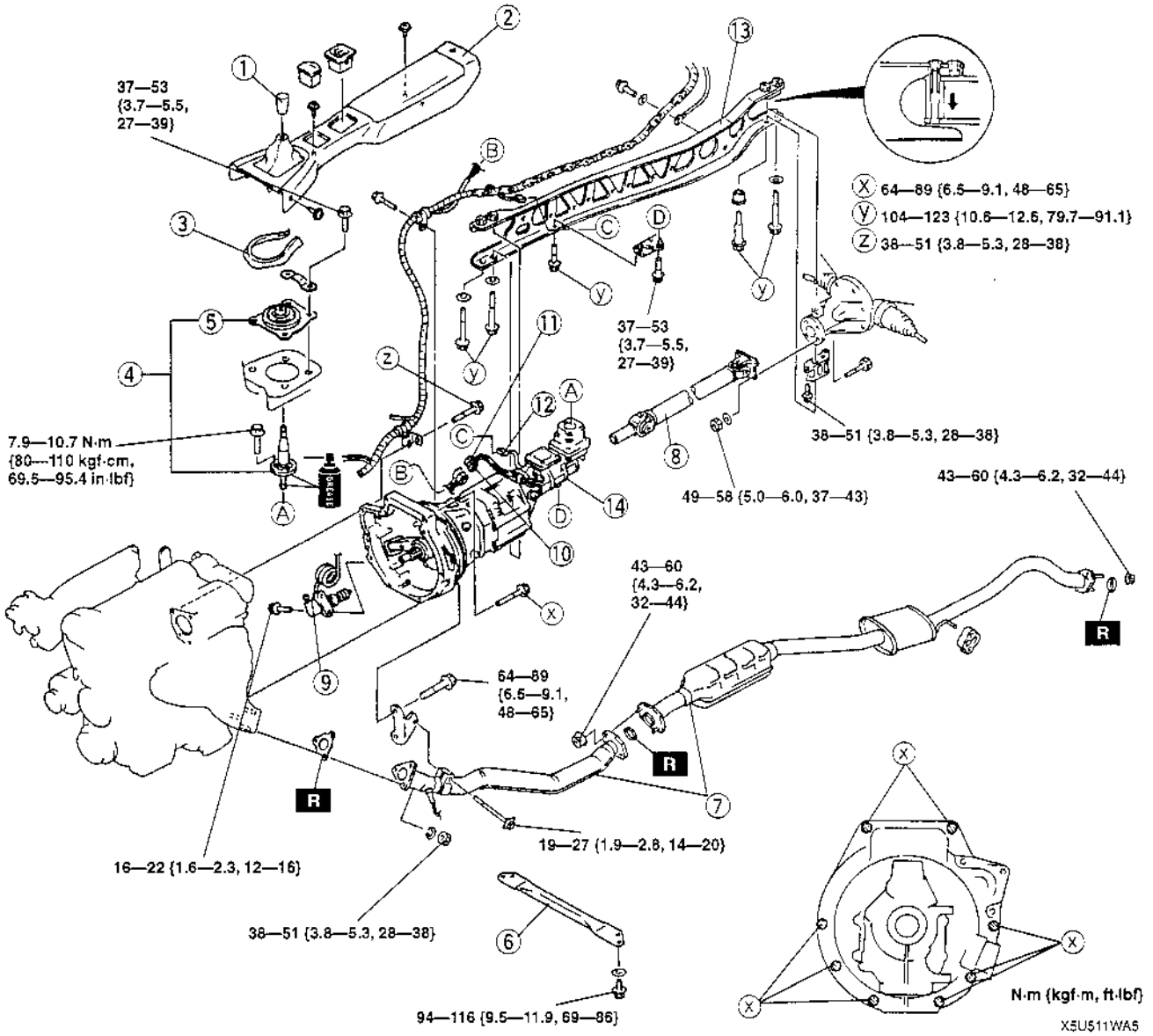
X5U111WAK

3. Install the vehicle speedometer sensor. (Refer to 05–11 VEHICLE SPEEDOMETER SENSOR REMOVAL/INSTALLATION.)

MANUAL TRANSMISSION REMOVAL/INSTALLATION

X5U511W06

1. Drain the transmission oil. (Refer to 05–11 TRANSMISSION OIL REPLACEMENT.)
2. Remove the undercover.
3. Remove the starter. (Refer to 01–19 STARTER REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Add the specified amount and type of transmission oil. (Refer to 05–11 TRANSMISSION OIL REPLACEMENT.)
7. Warm up the engine and transmission, inspect for oil leakage, and verify the transmission operation.

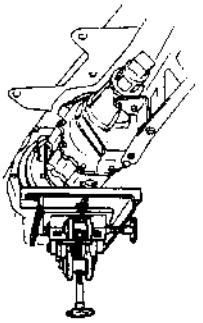


1	Shift lever knob
2	Rear console
3	Insulation
4	Shift lever component ☞ Installation Note
5	Dust boot
6	Front crossbar
7	Front pipe and middle pipe ☞ 01–13 EXHAUST SYSTEM REMOVAL/INSTALLATION
8	Propeller shaft ☞ 03–15 PROPELLER SHAFT REMOVAL/INSTALLATION
9	Clutch release cylinder
10	Back-up light switch connector
11	Neutral switch connector
12	Speedometer sensor connector

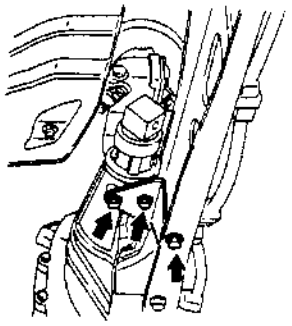
13	Power plant frame (PPF) ☞ Removal Note ☞ Installation Note
14	Transmission ☞ Removal Note ☞ Installation Note

Power Plant Frame (PPF) Removal Note

1. Disconnect the wire harness from the PPF.
2. Support the transmission with a jack.

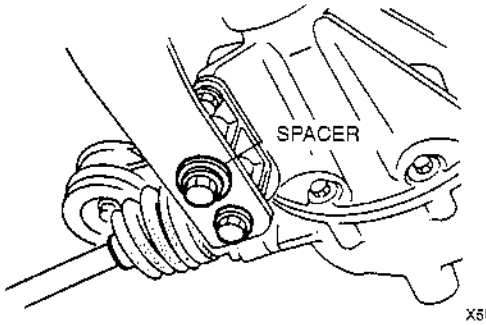


3. Remove the PPF bracket.



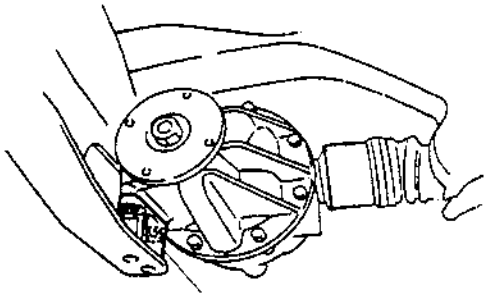
X5U511WA7

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



X5U511WA8

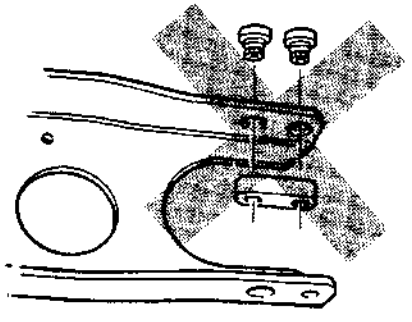
5. Remove the differential mounting spacer.



DIFFERENTIAL MOUNTING SPACER X5U511WA9

Caution

- **Removing the PPF spacers will reduce the performance of the PPF. If the spacers are removed, replace the PPF as an component.**



X5U511WAA

6. Remove the transmission-side bolts, and remove the PPF.

Note

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

7. Remove the sleeve.

Transmission Removal Note

1. Support the transmission with a transmission jack.
2. Loosen the transmission installation bolts.

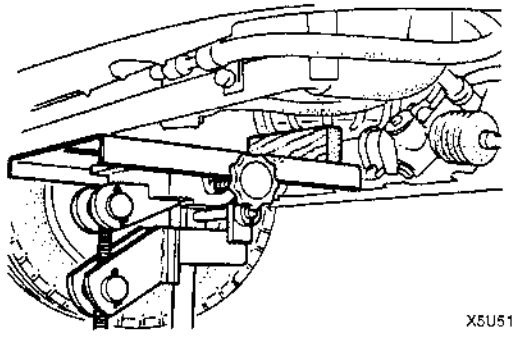
Caution

- **Shaking the transmission could damage the crankshaft position sensor on the engine. When removing the transmission, do not shake it up and down or side to side.**

3. Remove the transmission.

Transmission Installation Note

1. Tilt the engine by pushing up on the front of the oil pan with a wooden block and a transmission jack.
2. Support the transmission with a transmission jack.



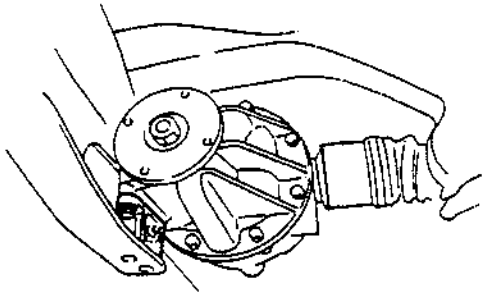
X5U511WAB

3. Raise the transmission into place and install and tighten the installation bolts.

Tightening torque
64—89 N·m {6.5—9.1 kgf·m, 48—65 ft·lbf}

Power Plant Frame (PPF) Installation Note

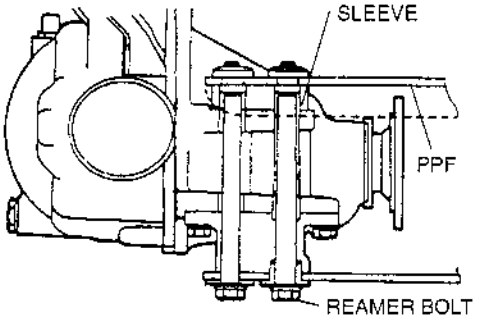
1. Install the differential mounting spacer.



DIFFERENTIAL MOUNTING SPACER X5U511WAC

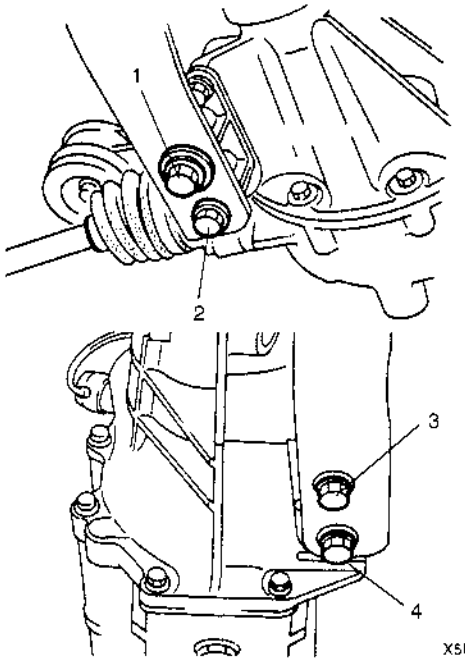
Tightening torque
38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}

2. Support the transmission with a jack so that it is level.
3. Position the PPF and install the sleeve.



X5U511WAD

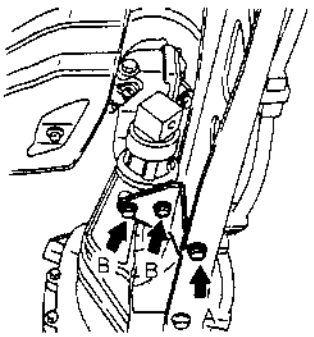
4. Install the spacer and bolts and tighten the reamer bolt making sure the threading is aligned properly. The reamer bolt should be installed in the forward hole.
5. Tighten the outer bolts making sure the threading is aligned properly.
6. Tighten the bolts to the specified torque in the order shown.



X5U511WAE

Tightening torque
104—123 N·m
{10.6—12.6 kgf·m, 76.7—91.1 ft·lbf}

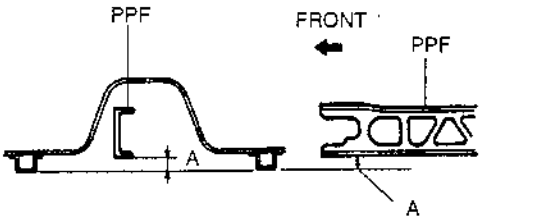
7. Install the PPF bracket.



X5U511WAF

Tightening torque
A: 104—123 N·m
{10.6—12.6 kgf·m, 76.7—91.1 ft·lbf}
B: 37—53 N·m {3.7—5.5 kgf·m, 27—39 ft·lbf}

8. Remove the jack, and connect the wire harness.
9. Measure distance A with a straightedge and vernier calipers.



X5U511WAG

Distance
A: 60.0—72.0 mm {2.37—2.83 in}

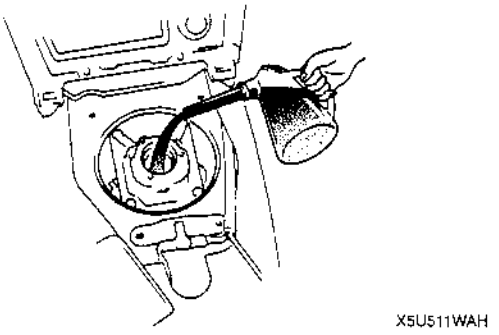
10. If the distance is not as specified, reposition the PPF to the transmission.

Shift Lever Component Installation Note

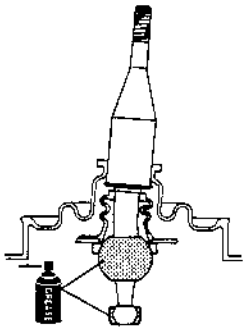
Note
- The change control case must also be filled with the specified amount of oil whenever the extension housing has been removed or the transmission has been overhauled.

1. Pour the specified amount of oil into the change control case.

Specified oil
Grade:
API service GL-4 or GL-5
Viscosity:
SAE 75W–90
Capacity:
80—95 cc {4.9—5.8 cu in}


X5U511WAH

2. Apply grease to the shift lever component as shown in the figure.



X5U511WAJ

3. Apply sealant to the contact surfaces of the shift lever component and the change control case.
4. Install the shift lever component.

05–13 AUTOMATIC TRANSMISSION

MECHANICAL SYSTEM TEST

X5U513W01

Mechanical System Test Preparation

1. Engage the parking brake and use wheel chocks at the front and rear of the wheels.
2. Inspect the engine coolant. (Refer to 01–12 ENGINE COOLANT LEVEL INSPECTION.)
3. Inspect the engine oil. (Refer to 01–10 ENGINE OIL INSPECTION.)
4. Inspect the ATF levels. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF Level Inspection.)
5. Inspect the ignition timing. (Refer to 01–10 ENGINE TUNE-UP.)
6. Inspect the idle speed. (Refer to 01–10 ENGINE TUNE-UP.)

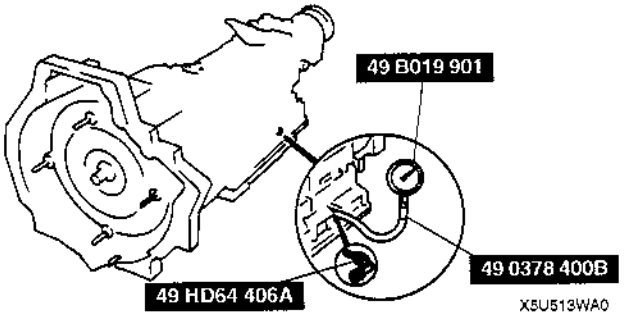
Line Pressure Test

1. Perform mechanical system test preparation. (Refer to 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 badly burn you. 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 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.**

5. Firmly depress the brake pedal with the left foot, and then gradually depress the accelerator pedal with the right.
6. When the engine no longer increases, quickly read the line pressure and release the accelerator pedal.
7. Shift the selector to 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/cm^2, psi}	
	Idle	Stall
D, 2, 1	370—400 {3.7—4.1, 53—58}	980—1110 {9.9—11.4, 141—162}
R	510—550 {5.1—5.7, 73—81}	1250—1490 {12.7—15.2, 181—216}

Warning

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

9. Remove the **SSTs**.
10. Apply ATF to the 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, 5.3—7.8 in·lbf}

Evaluation of line pressure test

Line pressure	Possible cause
Low pressure in every position	• Primary regulator valve is sticking. • Throttle valve is 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.
Higher than specification	• Primary regulator valve is sticking. • Throttle valve is sticking. • Throttle cable misadjustment

Stall Test

1. Perform mechanical system test preparation. (Refer to Mechanical System Test Preparation.)
2. Shift the selector lever to 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 with the right.
4. When the engine speed no longer increases, quickly read the speed and release the accelerator pedal.
5. Shift the selector to 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
Above specification	In D range	Insufficient line pressure • Forward clutch is slipping • One-way clutch No.2 is slipping.
	In R position	Insufficient line pressure • Direct clutch is slipping. • Reverse brake is slipping.
	In all range and R position	Insufficient line pressure • 4GR clutch or one-way clutch No.0 is slipping.
Below specification		• Engine is out of turn.
		• One-way clutch is slipping within torque converter.

Time Lag Test

1. Perform mechanical system test preparation. (Refer to Mechanical System Test Preparation.)
2. Shift the selector from N position to D range. (O/D OFF switch OFF)
3. Use a stopwatch to measure the time it takes from shifting until shock 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.
   (1) N position → D range (O/D OFF SW ON)
   (2) 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 is slipping. • One-way clutch No. 2 is slipping.
N → R select	• Insufficient line pressure • Direct clutch is slipping. • Reverse brake is slipping.

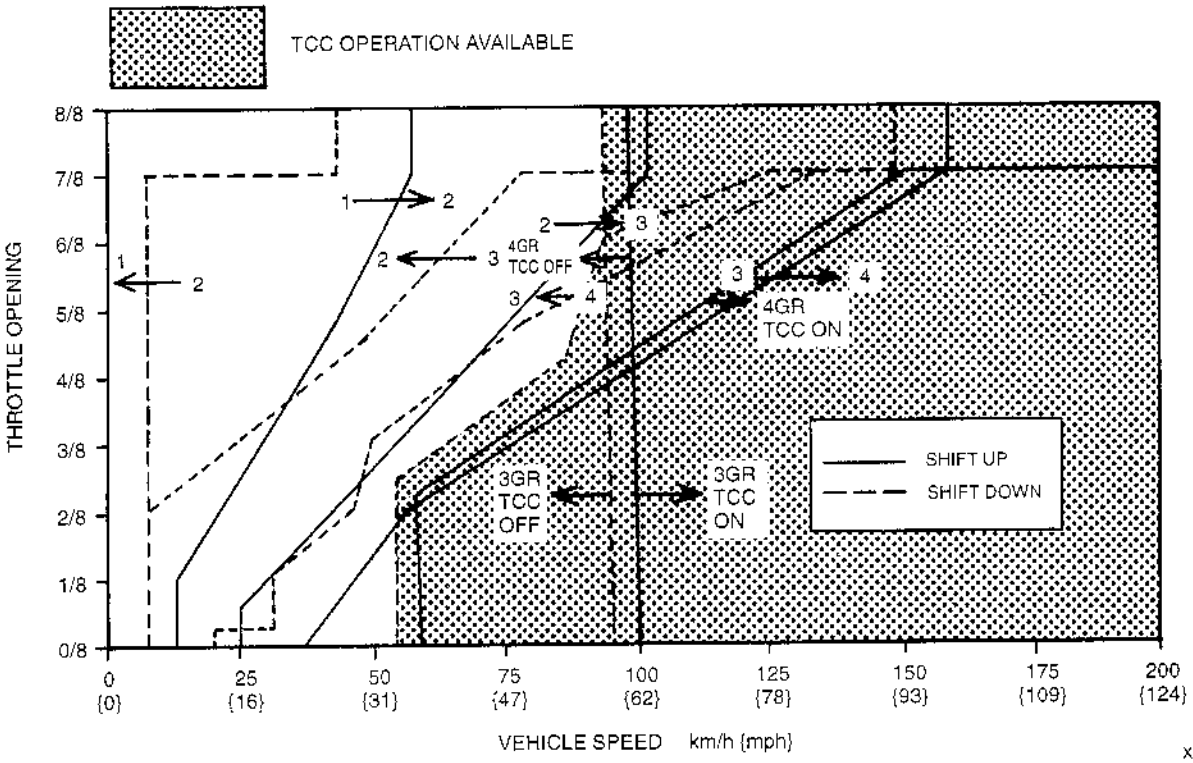
ROAD TEST

X5U513W02

Road Test Preparation

1. Inspect the engine coolant. (Refer to 01–12 ENGINE COOLANT LEVEL INSPECTION.)
2. Inspect the engine oil. (Refer to 01–10 ENGINE OIL INSPECTION.)
3. Inspect the ATF levels. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF Level Inspection.)
4. Inspect the ignition timing. (Refer to 01–10 ENGINE TUNE-UP.)
5. Inspect the idle speed. (Refer to 01–10 ENGINE TUNE-UP.)

Shift Diagram



X5U513WA1

D Range Test

1. Perform road test preparation. (Refer to Road Test Preparation.)
2. Shift the selector lever to D range.
3. Accelerate the vehicle with the half, and the wide open throttle.
4. Verify that 1→2, 2→3, and 3→4 upshifts and downshifts are obtained. The shift points must be as shown in the vehicle speed at shift point table.
5. Drive the vehicle in fourth, third, and second gears and verify that kickdown occurs for 4→3, 3→2, 2→1 downshifts, and that the shift points are as shown in the vehicle speed at shift point table.
6. Decelerate the vehicle and verify that engine braking effect is felt in fourth gear.
7. Drive the vehicle and verify that torque converter clutch operation is obtained. The operation points must be as shown in the vehicle speed at shift point table.
8. Select O/D OFF SW ON.
9. Accelerate the vehicle with the half, and the wide open throttle, and verify that 1→2, 2→3 upshift and downshift are obtained. The shift points must be as shown in the vehicle speed at shift point table.

Vehicle speed at shift point table

Range	Mode	Throttle opening angle	Shift	Vehicle speed (km/h {mph})	Shift solenoid A	Shift solenoid B
D	Except O/D OFF	Wide open throttle	$D_1 \rightarrow D_2$	58—64 {36—40}	ON	OFF→ON
			$D_2 \rightarrow D_3$	102—110 {63—68}	ON→OFF	ON
			D_3 TCC operation	98—106 {61—65}	OFF	ON
			$D_3 \rightarrow D_4$	157—167 {97—103}	OFF	ON→OFF
		Half throttle	$D_1 \rightarrow D_2$	33—42 {20—26}	ON	OFF→ON
			$D_2 \rightarrow D_3$	59—76 {37—47}	ON→OFF	ON
			D_3 TCC operation	94—106 {58—65}	OFF	ON
			$D_3 \rightarrow D_4$	65—88 {40—54}	OFF	ON→OFF
			D_4 TCC operation	81—109 {50—67}	OFF	OFF
		Closed throttle position	$D_4 \rightarrow D_3$	17—23 {11—14}	OFF	OFF→ON
			$D_3 \rightarrow D_1$	5—11 {3—7}	OFF→ON	ON→OFF
		Kickdown (Wide open throttle)	$D_4 \rightarrow D_3$	145—155 {90—96}	OFF	OFF→ON
			$D_3 \rightarrow D_2$	95—103 {59—63}	OFF→ON	ON
			$D_2 \rightarrow D_1$	42—48 {26—30}	ON	ON→OFF
	O/D OFF	Wide open throttle	$D_1 \rightarrow D_2$	58—64 {36—40}	ON	OFF→ON
			$D_2 \rightarrow D_3$	102—110 {63—68}	ON→OFF	ON
			D_3 TCC operation	98—106 {61—65}	OFF	ON
		Half throttle	$D_1 \rightarrow D_2$	33—42 {20—26}	ON	OFF→ON
			$D_2 \rightarrow D_3$	59—76 {37—47}	ON→OFF	ON
			D_3 TCC operation	94—106 {58—65}	OFF	ON
		Closed throttle position	$D_4 \rightarrow D_3$	17—23 {11—14}	OFF	OFF→ON
			$D_3 \rightarrow D_1$	5—11 {3—7}	OFF→ON	ON→OFF
		Kickdown (Wide open throttle)	$D_4 \rightarrow D_3$	145—155 {90—96}	OFF	OFF→ON
			$D_3 \rightarrow D_2$	95—103 {59—63}	OFF→ON	ON
			$D_2 \rightarrow D_1$	42—48 {26—30}	ON	ON→OFF

Note

- The shift solenoid electrical ON–OFF pattern in 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.

2 Range Test

1. Perform road test preparation. (Refer to Road Test Preparation.)
2. Shift the selector lever to 2 range.
3. Accelerate the vehicle with the half, and the wide open throttle.
4. Verify that downshifts are obtained. The shift points must be as shown in the vehicle speed at shift point table.

Vehicle speed at shift point table

Range	Mode	Throttle opening angle	Shift	Vehicle speed (km/h {mph})	Shift solenoid A	Shift solenoid B
2	—	All position	$2_3 \rightarrow 2_2$	101—107 {63—66}	OFF→ON	ON

Note

- The shift solenoid electrical ON–OFF pattern in 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.

1 Range Test

1. Perform road test preparation. (Refer to Road Test Preparation.)
2. Shift the selector lever to 1 range.
3. Accelerate the vehicle with the half, and the wide open throttle.
4. Verify that downshifts are obtained. The shift points must be as shown in the vehicle speed at shift point table.

Vehicle speed at shift point table

Range	Mode	Throttle opening angle	Shift	Vehicle speed (km/h {mph})	Shift solenoid A	Shift solenoid B
1	—	All position	$1_2 \rightarrow 1_1$	35—41 {22—25}	ON	ON→OFF

Note

- The shift solenoid electrical ON–OFF pattern in 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.

P Position Test

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

AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION

X5U513WC3

ATF Condition Inspection

- One way of determining whether the transmission should be disassembled is by noting:

1. If the ATF is muddy or varnished.
2. If the ATF smells strange or unusual.

ATF condition

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: Metal pieces cause wide range of problems by plugging up in oil pipe, control valve body, and oil cooler in radiator. • When large amount of metal pieces are found, overhaul transmission and detect defective parts. If necessary, repair or replace transmission. • Implement flushing operation as there is a possibility of having metal pieces plugged in oil pipe and/or oil cooler inside of radiator.
	Has no burnt smell	Normal	• Discoloration by oxidation.

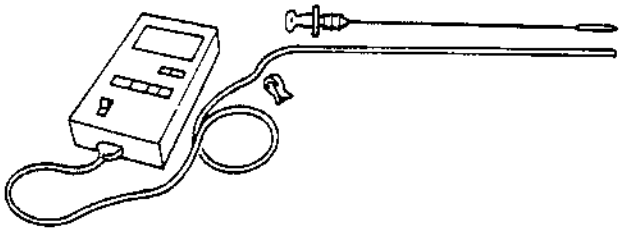
3. If ATF condition is poor, repair as follows.
   (1) Dark color condition
   - Overhaul transmission and repair or replace parts as necessary.

   (2) Light pink and/or reddish-brown condition.
   - Replace ATF.

ATF Level Inspection

Caution
- **The ATF amount varies according to ATF's 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.**

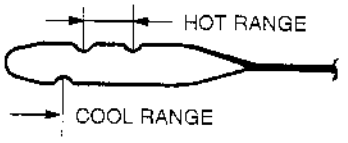
1. Park the vehicle on level ground.
2. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.
3. Adjust the length or thermistor probe measure the same as the dipstick and hold the probe with a paper holder. Insert into the filler tube and measure the temperature.



X5U513WA2

4. Inspect the ATF level before warming up the engine. In this case, use the cool range (**15—25 °C {59—77 °F}**).
5. Warm up the engine until the ATF reaches **60—70 °C {140—158 °F}**.
6. While depressing the brake pedal, shift the selector lever to each range (P—1), pausing momentarily in each range.
7. Shift back to P position.
8. 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®II)



X5U513WA3

AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT

X5U513W04

Warning
- **When the transmission and ATF are hot, they can badly burn you. Turn off the engine and wait until they are cool before changing 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®II)
Fill amount
6.7 L {7.1 US qt, 5.9 Imp qt}

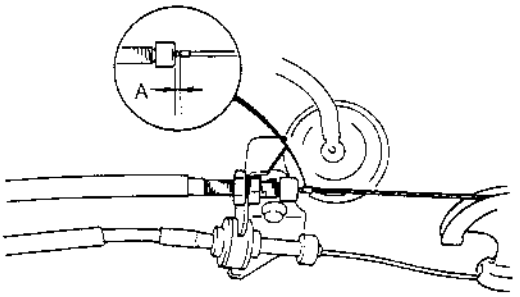
6. Install the dipstick.
7. Ensure that the ATF level is in the HOT **65 °C {149 °F}** range.
8. Add ATF to the specified level if necessary.

THROTTLE CABLE INSPECTION

X5U513W05

1. Verify that the throttle cable is adjusted within dimension A as shown in the figure below when the throttle cable is in closed throttle position.

Dimension A
0.8—1.5 mm {0.03—0.05 in}



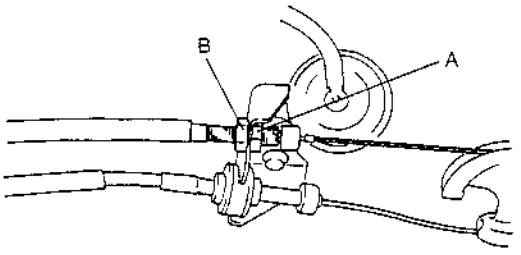
X5U513WA4

2. If it is not within specification, adjust the throttle cable. (Refer to 03–13 THROTTLE CABLE ADJUSTMENT.)

THROTTLE CABLE ADJUSTMENT

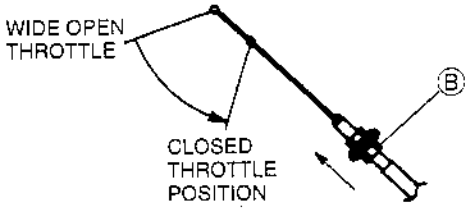
X5U513W06

1. Loosen nut A and B.



X5U513WA5

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.



X5U513WA6

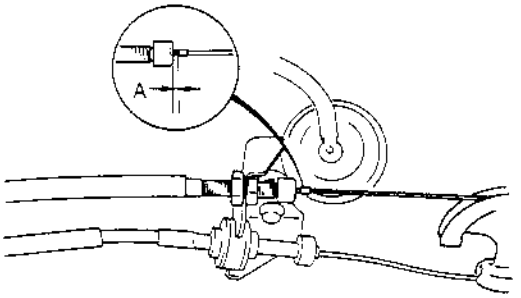
Note
- Tighten nut A by pushing it down so that the throttle cable will not come off from the bracket.

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}

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 the figure below when the throttle cable is in closed throttle position.

Dimension A
0.8—1.5 mm {0.03—0.05 in}



X5U513WA7

THROTTLE CABLE REMOVAL/INSTALLATION

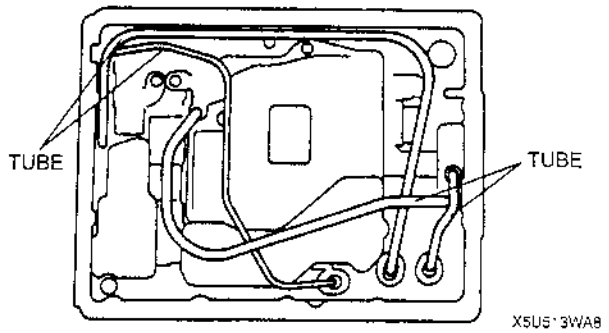
On-Vehicle Removal

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. (Refer to AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
4. Remove the throttle cable from the throttle lever.
5. Remove the oil pan and gasket.

Caution

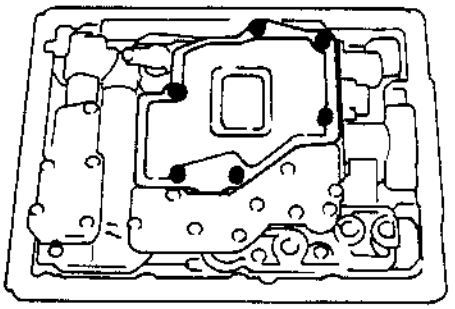
- **To prevent deformation of the tube, remove the tube by pulling both ends up.**

6. Remove the tube.



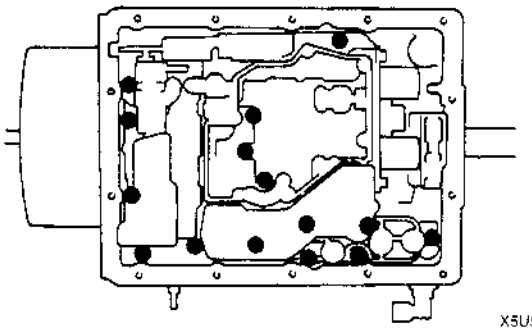
X5U513WA8

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



X5U513WC2

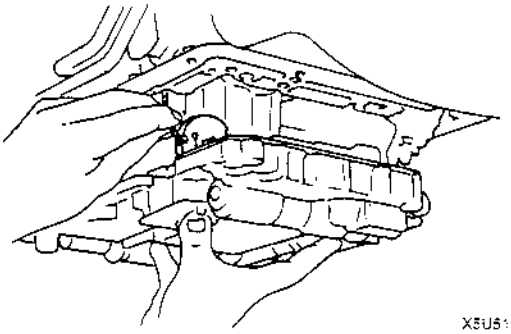
9. Remove the control valve body installation bolts.



X5U513WA9

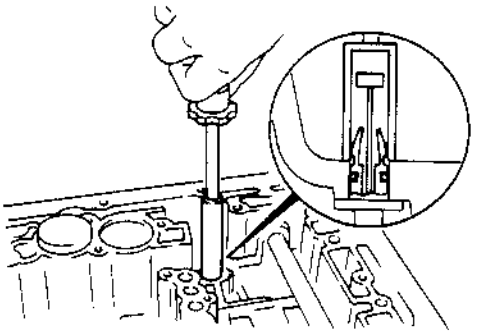
X5U513W07

10. Remove the nipple of the throttle cable from the throttle cam.



X5U513WAA

11. Remove the control valve body.
12. Remove the accumulator spring.
13. Remove the throttle cable from the transmission case by using a 10 mm {0.4 in} socket wrench.

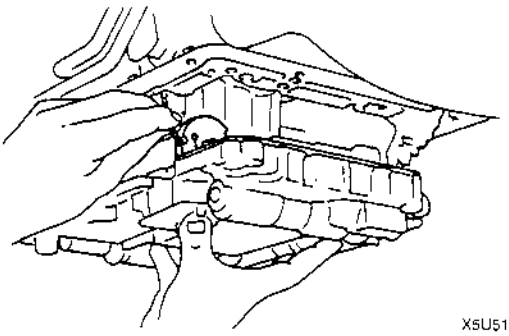


X5U513WAB

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

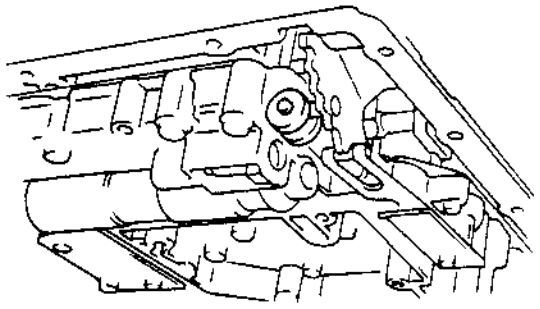
On-Vehicle Installation

1. Apply ATF to the new O-ring.
2. Install the O-ring to the throttle cable.
3. Install the throttle cable.
4. Install the nipple of the throttle cable to the throttle cam.



X5U513WAD

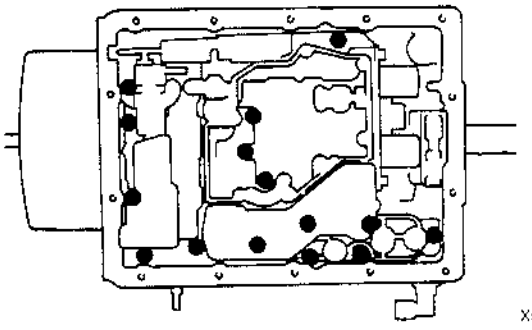
5. Verify that the manual valve and manual shaft are assembled correctly.



X5U513WAE

6. Install the control valve body.

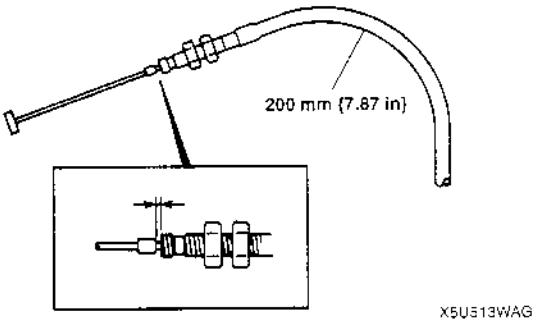
Tightening torque
7.9—11.7 N·m
{80—120 kgf·cm, 70—104 in·lbf}



X5U513WA9

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

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.

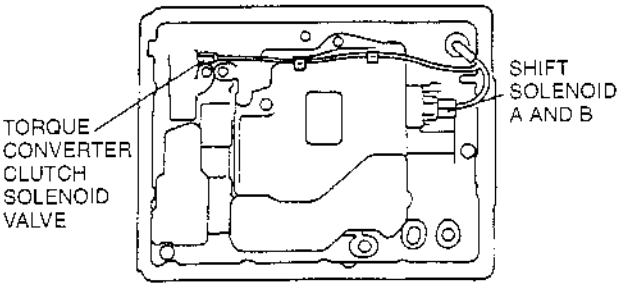


X5U513WAG

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 solenoid A, B, and torque converter clutch solenoid valve connector.



X5U513WAH

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. (Refer to 05–13 THROTTLE CABLE ADJUSTMENT.)
14. Add ATF to the specified level. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
15. Carry out mechanical test. (Refer to 05–13 MECHANICAL SYSTEM TEST.)
16. Carry out road test. (Refer to 05–13 ROAD TEST.)

O/D OFF SWITCH INSPECTION

X5U513W27

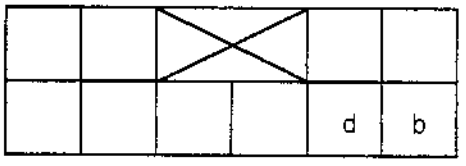
Inspection of Operation

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.
3. 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 ON.
3. Measure the voltage at the O/D OFF switch connector.

Position	Connector terminal (V)	
	b	d
Normal	B+	0
Depressed	0	0



X5U513WC3

4. If not as specified, inspect for continuity at the O/D OFF switch.
5. Install the rear console.

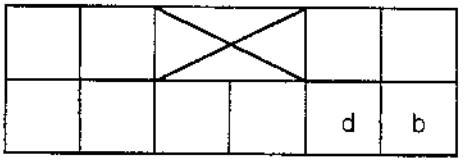
Inspection of Continuity

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.

○—○ : Continuity

Position	Connector terminal	
	b	d
Normal		
Depressed	○	○

X5U513WAJ



X5U513WAK

5. If not as specified, replace the selector lever knob component.
6. If the switch is okay, inspect the wiring harness. (O/D OFF switch — transmission control module, O/D OFF switch — Body ground.)
7. Install the rear console.
8. Connect the negative battery cable.

O/D OFF SWITCH REMOVAL/INSTALLATION

X5U513W08

1. Disconnect the negative battery cable.
2. Remove the rear console.
3. Disconnect the connector and remove the O/D OFF switch terminals. (Refer to 05–14, SELECTOR LEVER DISASSEMBLY/ASSEMBLY, Connector Disassembly Note.)
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. (Refer to 05–14 SELECTOR LEVER DISASSEMBLY/ASSEMBLY.)
7. Install the rear console.
8. Connect the negative battery cable.

TRANSMISSION RANGE SWITCH INSPECTION

X5U513W09

Inspection of Operation

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

Inspection of Continuity

1. Inspect the on-board diagnostic trouble code. (Refer to 05–01 AUTOMATIC TRANSMISSION ON-BOARD DIAGNOSTIC.)
2. Remove the transmission range switch. (Refer to 05–13 TRANSMISSION RANGE SWITCH REMOVAL/INSTALLATION.)
3. Inspect for continuity at the transmission range switch.

Range/position	Terminals	Continuity
P	D—C	Yes
	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

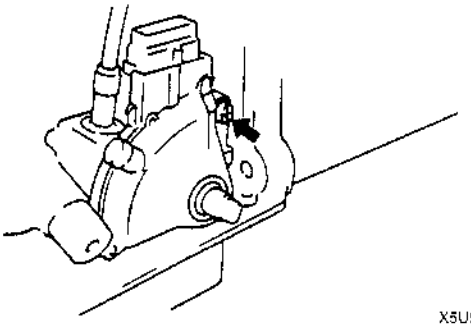
X5U513WAL

4. If not as specified, replace the transmission range switch.
5. Install the transmission range switch. (Refer to 05–13 TRANSMISSION RANGE SWITCH REMOVAL/INSTALLATION.)

TRANSMISSION RANGE SWITCH REMOVAL/INSTALLATION

X5U513W10

1. Disconnect the negative battery cable.
2. Disconnect the transmission range 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 by using a screwdriver.
6. Remove the nut, lock washer, and packing.
7. Remove the transmission range switch.
8. Rotate the manual shaft to the N position.
9. Hand-tighten the transmission range switch bolt.

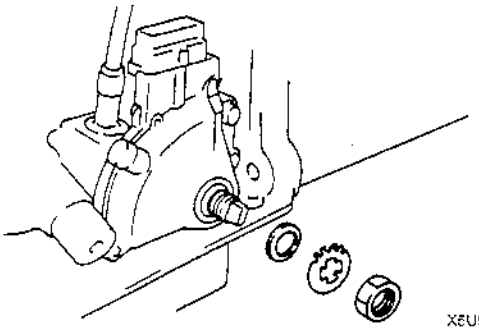


X5U513WAM

10. Install the new packing.
11. Install the new lock washer.
12. Tighten the nut.

Tightening torque
3.0—4.9 N·m {30—50 kgf·cm, 27—43 in·lbf}

13. Bend claws of lock washer.



X5U513WAN

14. Adjust the transmission range switch. (Refer to 05–13 TRANSMISSION RANGE SWITCH ADJUSTMENT.)
15. Tighten the transmission range switch mounting bolt.

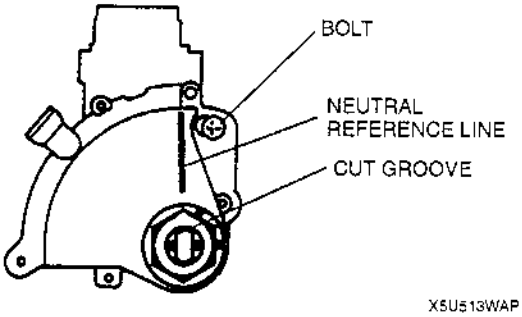
Tightening torque
4.0—6.8 N·m {40—70 kgf·cm, 35—60 in·lbf}

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 SWITCH ADJUSTMENT

X5U513W11

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



X5U513WAP

6. Tighten the transmission range switch mounting bolt.

Tightening torque
4.0—6.8 N·m {40—70 kgf·cm, 35—60 in·lbf}

7. Install selector rod to the manual shaft lever.
8. Connect the negative battery cable.
9. Inspect the operation of the transmission range switch. (Refer to 05–13 TRANSMISSION RANGE SWITCH INSPECTION.)

INPUT/TURBINE SPEED SENSOR INSPECTION

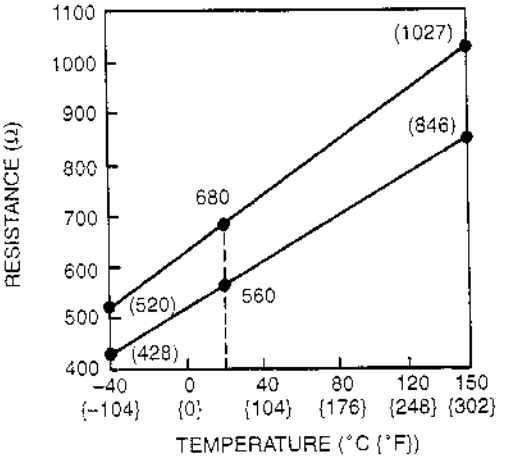
X5U513W12

1. Disconnect the negative battery cable.
2. Removal the bracket and front pipe. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
3. Disconnect the input/turbine speed sensor connector.

Note
- Resistance value 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}.

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

Resistance
560—680 Ω (20 °C {68 °F})



( ): REFERENCE DATA

X5U513WAQ

5. If not correct, replace the input/turbine speed sensor.
6. Connect the input/turbine speed sensor connector.
7. Install the front pipe and bracket. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
8. Connect the negative battery cable.

INPUT/TURBINE SPEED SENSOR REMOVAL/INSTALLATION

X5U513W13

1. Disconnect the negative battery cable.
2. Remove the bracket and front pipe. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
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 the 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. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
11. Connect the negative battery cable.

OUTPUT SPEED SENSOR INSPECTION

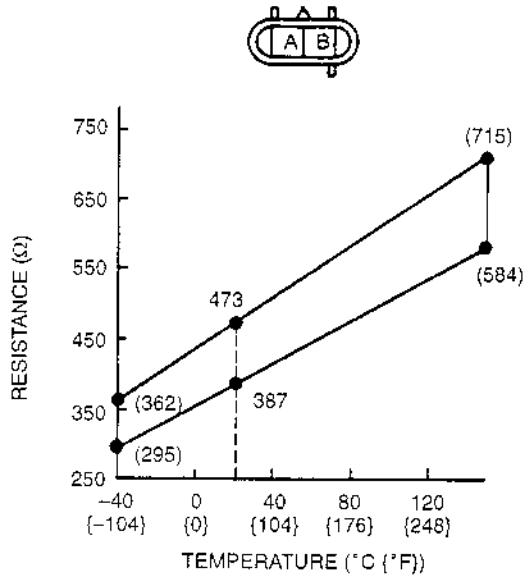
X5U513W14

1. Disconnect the negative battery cable.
2. Disconnect the output speed sensor connector.
3. Remove the output speed sensor.

Note
- Resistance value 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}.

4. Measure the resistance between the terminals of the output speed sensor.

Resistance
387—473 Ω (20 °C {68 °F})



( ): REFERENCE DATA

X5U513WAR

5. If not correct, replace the output speed sensor.
6. Install the output speed sensor.

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.

OUTPUT SPEED SENSOR REMOVAL/INSTALLATION

X5U513W15

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 the 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

X5J5*3W16

Inspection of Solenoid Valves

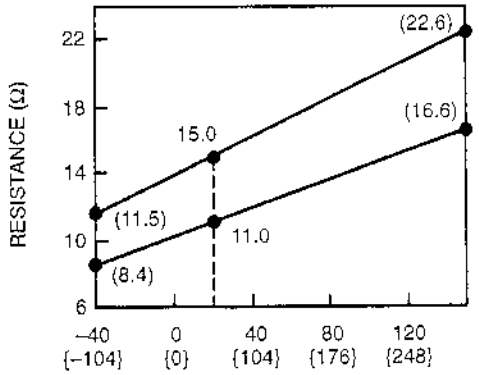
1. Inspect the on-board diagnostic trouble code. (Refer to 05–01 AUTOMATIC TRANSMISSION ON–BOARD DIAGNOSTIC.)
2. Disconnect the negative battery cable.
3. Remove the solenoid valves. (Refer to 05–13 SOLENOID VALVES REMOVAL/INSTALLATION.)

Note

- Resistance value 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}.

4. Measure the resistance between terminal of the solenoid valve.

Solenoid	Resistance (Ω)
Shift solenoid B	11—15
Shift solenoid A	11—15
Torque converter clutch solenoid valve	11—15



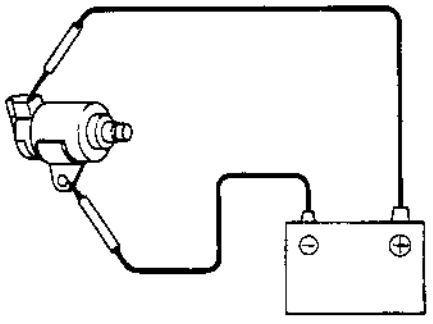
( ): REFERENCE DATA

X5U513WAS

5. If not correct, replace the solenoid valves.
6. Install the solenoid valves. (Refer to 05–13 SOLENOID VALVE REMOVAL/INSTALLATION.)
7. Connect the solenoid valve connector.
8. Connect the negative battery cable.

Operating Inspection

1. Disconnect the negative battery cable.
2. Remove the solenoid valves. (Refer to 05–13 SOLENOID VALVES REMOVAL/INSTALLATION.)
3. Inspect the voltage at terminals A to C and listen for a "click" sound at all solenoid valves.
4. If the "click" is not heard, replace the solenoid valve.



XEU513WAT

5. Install the solenoid valves. (Refer to 05–13 SOLENOID VALVES REMOVAL/INSTALLATION.)
6. Connect the solenoid valve connector.
7. Connect the negative battery cable.

Fail Safe Function

Range	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
Both shift solenoid A and B malfunction	4GR	4GR	4GR	4GR	3GR	1GR

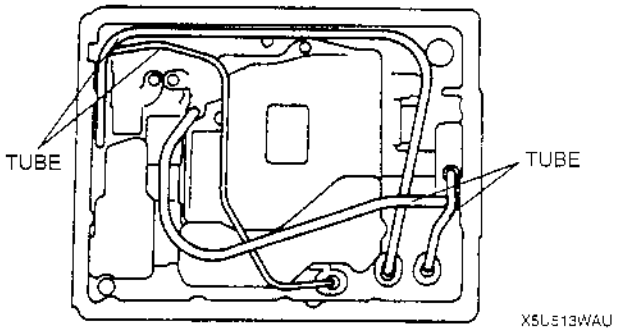
SOLENOID VALVES REMOVAL/INSTALLATION

X5U513W17

1. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents.
2. Disconnect the negative battery cable.
3. Drain the ATF. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
4. Remove the oil pan and gasket.

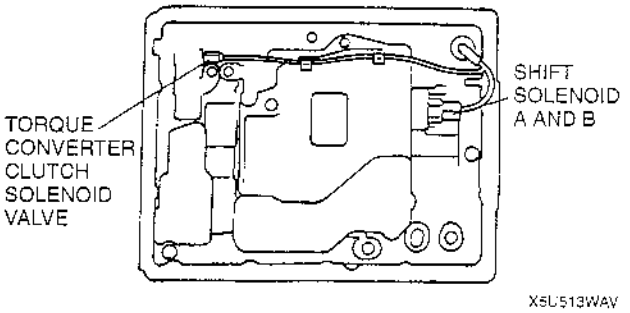
Caution
- **To prevent deformation of the tube, remove the tube by pulling both ends up.**

5. Remove the tubes.



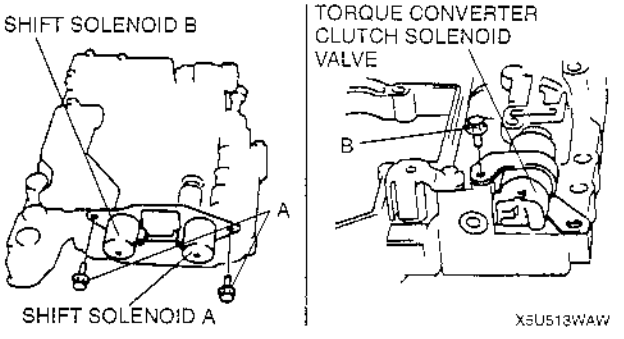
X5U513WAU

6. Disconnect the shift solenoid A and B and torque converter clutch solenoid valve connector.



X5U513WAV

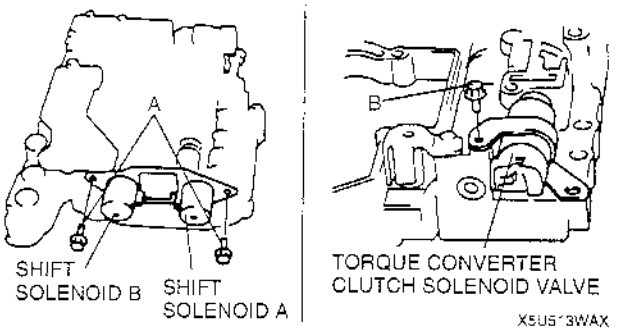
7. Remove the solenoid valve.



X5U513WAW

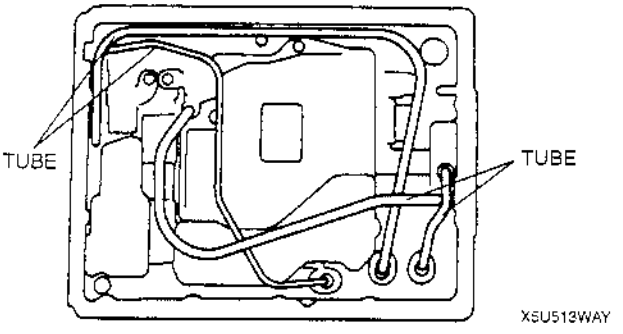
8. Apply ATF to the new O-ring.
9. Install the O-ring to the torque converter clutch solenoid valve.
10. Install the new gasket and solenoid valve to the control valve body.

Tightening torque
A: 7.9—11.5 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}



X5U513WAX

11. Connect shift solenoid A, B and torque converter clutch solenoid valve connector.
12. Install the tubes.



X5U513WAY

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. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
15. Carry out mechanical test. (Refer to 05–13 MECHANICAL SYSTEM TEST.)
16. Carry out road test. (Refer to 05–13 ROAD TEST.)

TRANSMISSION CONTROL MODULE INSPECTION

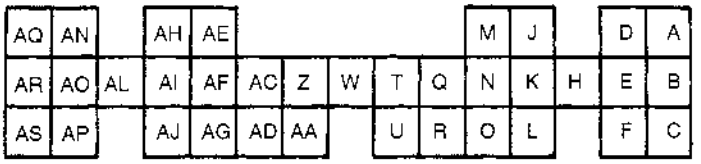
X5U513W1B

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

Note

- Use the ground of terminal AP of the transmission control module when measuring terminal voltage as an error may occur when the negative (–) lead of the circuit tester is connected to ground.

Terminal Voltage Chart (Reference Data)



X5U513WAZ

Terminal	Signal	Connected to	Test condition	Voltage (V)	Possible malfunction
A	Transmission range switch (1 range)	Transmission range switch	1 range	B+	• Transmission range switch • Related harness
			All position Other range	0	
B	Transmission range switch (2 range)	Transmission range switch	2 range	B+	• Transmission range switch • Related harness
			All position Other range	0	
C	Transmission range switch (D range)	Transmission range switch	D range	B+	• Transmission range switch • Related harness
			All position Other range	0	
D	Transmission range switch (R position)	Transmission range switch	R position	B+	• Transmission range switch • Related harness
			Other position All range	0	
E	—	—	—	—	—
F	Transmission range switch (P or N position)	Transmission range switch	P or N position	B+	• Transmission range switch • Related harness
			Other position All range	0	
H	—	—	—	—	—
J	—	—	—	—	—
K	O/D OFF switch	O/D OFF switch	O/D OFF switch is released.	B+	• O/D OFF switch • Related harness
			O/D OFF switch is depressed.	0	
L	O/D OFF indicator light	O/D OFF indicator light	O/D OFF indicator light illuminates.	0	• O/D OFF indicator light • Related harness
			O/D OFF indicator light does not illuminate.	B+	
M	—	—	—	—	—
N	—	—	—	—	—
O	PCM/TCM communication	Powertrain control module	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 diagnostic trouble codes as well.	—	• Powertrain control module • Related harness
Q	—	—	—	—	—
R	Throttle position sensor (Vref)	Throttle position sensor	Ignition switch is off.	0	• Throttle position sensor • Related harness
			Ignition switch is on.	4.5—5.5	

Terminal	Signal	Connected to	Test condition	Voltage (V)	Possible malfunction
T	4GR inhibit signal (Auto speed control signal)	Cruise control module	Ignition switch is on.	B+	• Cruise control module • Related harness
			When 4GR inhibit signal is not input	4.5—8.0	
			When 4GR inhibit signal is input	0	
U	Throttle position sensor (TVO)	Throttle position sensor	Closed throttle position	0.3—1.0	• Throttle position sensor • Related harness
			Wide open throttle	3.7—4.4	
W	Input/turbine speed sensor	Input/turbine speed sensor	Ignition switch is on.	2.5	• Input/turbine speed sensor • Related harness
			Engine is running. (P position)	2.5	
Z	Ground (Input/turbine speed sensor)	Input/turbine speed sensor	Constant	2.5	• Input/turbine speed sensor • Related harness
AA	—	—	—	—	—
AC	Vehicle speed signal	Vehicle speed sensor	Ignition switch is on.	0	• Vehicle speed sensor • Related harness
			Driving	2.5	
AD	—	—	—	—	—
AE	Ground (Output speed sensor)	Output speed sensor	Constant	2.5	• Output speed sensor • Related harness
AF	Output speed sensor	Output speed sensor	Ignition switch is on.	2.5	• Output speed sensor • Related harness
			Driving	2.5	
AG	Engine speed signal	Powertrain control module	Ignition switch is on.	4—6.4	• Powertrain control module • Related harness
			Idle	4—6.4	
AH	—	—	—	—	—
AI	—	—	—	—	—
AJ	—	—	—	—	—
AL	PCM/TCM communication	Powertrain control module	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 diagnostic trouble codes as well.	—	• Powertrain control module • Related harness
AN	Shift solenoid B	Shift solenoid B	Solenoid is on.	B+	• Shift solenoid B • Related harness
			Solenoid is off.	0	
AO	Torque converter clutch solenoid valve	Torque converter clutch solenoid valve	Solenoid is on.	B+	• Torque converter clutch solenoid valve • Related harness
			Solenoid is off.	0	
AP	TCM ground		Constant	0	• Related harness
AQ	Shift solenoid A	Shift solenoid A	Solenoid is on.	B+	• Shift solenoid A • Related harness
			Solenoid is off.	0	
AR	Power supply		Constant	B+	• Battery • Related harness
AS	Power supply	Main relay	Ignition switch is off.	0	• Main relay • Related harness
			Ignition switch is on.	B+	

TRANSMISSION CONTROL MODULE REMOVAL/INSTALLATION

X5U513W19

1. Disconnect the negative battery cable.
2. Disconnect the transmission control module connector.
3. Remove the transmission control module.
4. Install the transmission control module.

Tightening torque
36 N·m {3.7 kgf·m, 27 ft·lbf}

5. Connect the transmission control module connector.
6. Connect the negative battery cable.

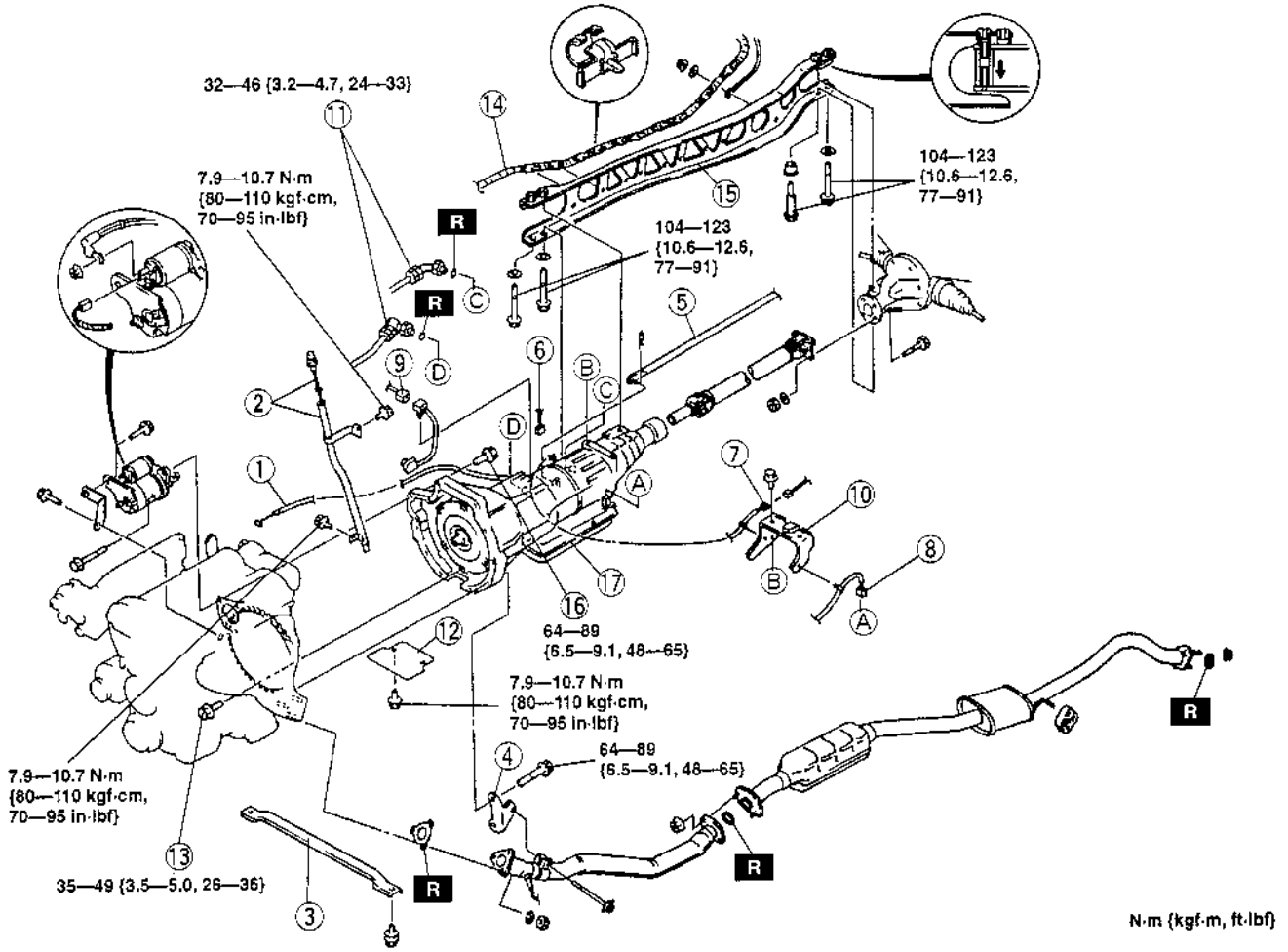
AUTOMATIC TRANSMISSION REMOVAL/INSTALLATION

X5U513W20

1. Disconnect the negative battery cable.
2. Drain the ATF. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
3. Remove the exhaust system. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
4. Remove the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL/INSTALLATION.)

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

5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Add ATF to the specified level. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
8. Connect the negative battery cable.
9. Inspect the operation of the transmission range switch. (Refer to 05–13 TRANSMISSION RANGE SWITCH INSPECTION, Inspection of Operation.)
10. Inspect the operation of the selector lever. (Refer to 03–14 SELECTOR LEVER INSPECTION.)
11. Carry out the mechanical system test. (Refer to 05–13 MECHANICAL SYSTEM TEST.)
12. Carry out the road test. (Refer to 05–13 ROAD TEST.)

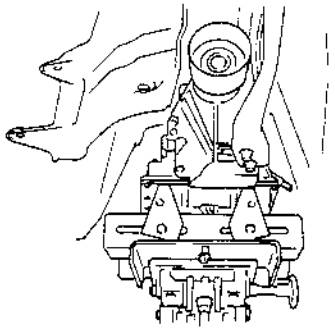


X5U513WB0

1	Throttle cable ☞ THROTTLE CABLE ADJUSTMENT
2	Filler tube, dipstick
3	Performance rod
4	Exhaust bracket
5	Shift rod ☞ Installation Note
6	Transmission range switch connector
7	Output speed sensor connector
8	Solenoid connector
9	Input/turbine speed sensor
10	Harness bracket
11	Oil pipe ☞ OIL COOLER REMOVAL/INSTALLATION
12	Undercover
13	Torque converter bolts ☞ Removal Note ☞ Installation Note
14	Harness
15	Power plant frame ☞ Removal Note ☞ Installation Note
16	Transmission mount bolts
17	Transmission ☞ Installation Note

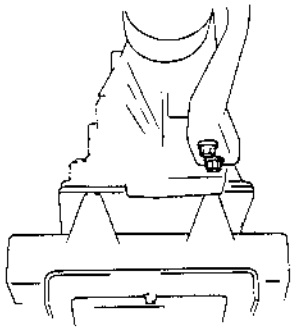
Power Plant Frame (PPF) Removal Note

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



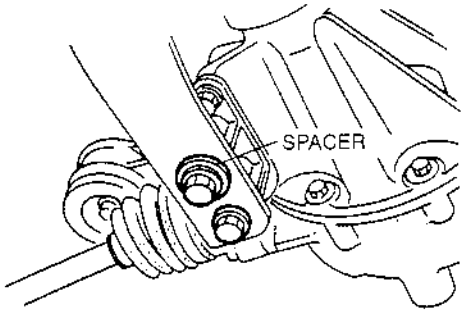
X5U513WB1

3. Remove the front bolts.



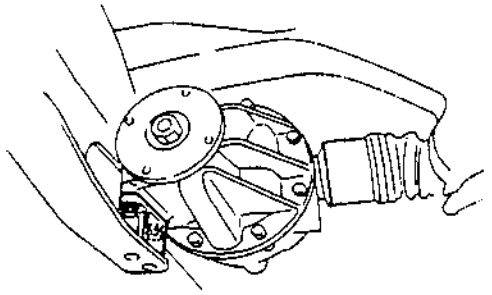
X5U513WB2

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



X5U513WB3

5. Remove the differential mounting spacer.

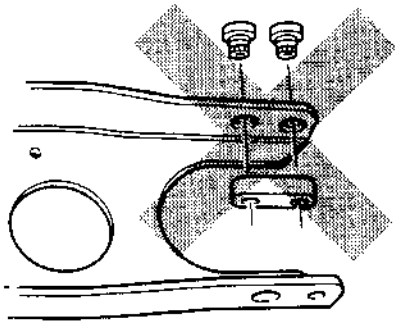


DIFFERENTIAL MOUNTING SPACER X5U513WB4

6. Remove the transmission side bolts, and remove the PPF. Do not remove the spacers from the PPF. If they are removed, replace the PPF as an assembly.

Note

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

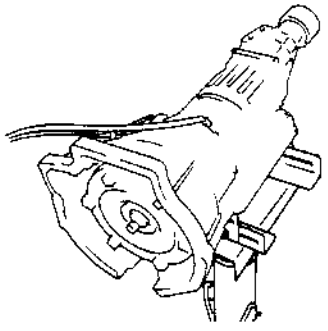


X5U513WB5

7. Remove the sleeve.

Transmission Removal Note

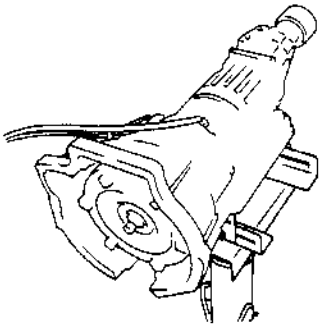
- Set the transmission onto the transmission jack, paying special attention not to damage the oil pipes. Make sure that the torque converter side of the transmission is tilted slightly upward during removal. Carefully lower the transmission from the vehicle.



X5U513WB6

Transmission Installation Note

- 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.

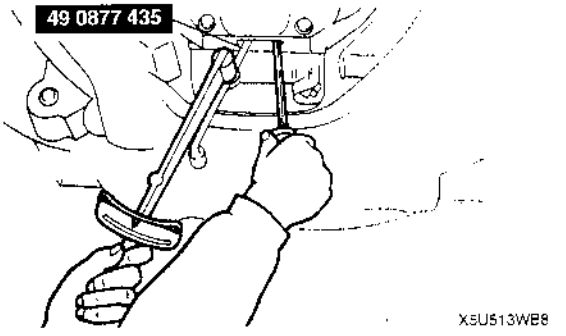


X5U513WB6

Torque Converter Bolts Installation Note

1. Align the holes by turning the torque converter.
2. Lock the drive plate by 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. (00–00 FUNDAMENTAL PROCEDURES, Torque Formulas.)
5. Tighten the torque converter mounting bolts by using the **SST**.

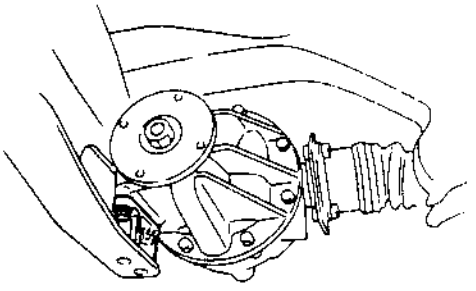
Tightening torque
35—49 N·m {3.5—5.0 kgf·m, 26—36 ft·lbf}



X5U513WB8

Power Plant Frame (PPF) Installation Note

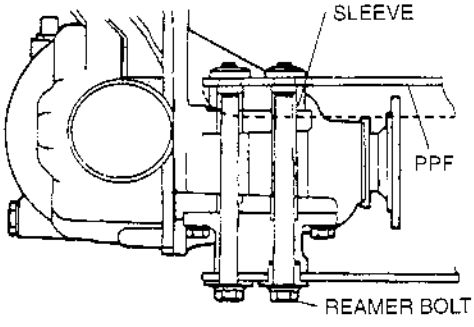
1. Install the differential mounting spacer.



X5U513WB9

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 snugly tighten the reamer bolt. The reamer bolt should be installed in the forward hole.
5. Tighten the outer bolts snugly.

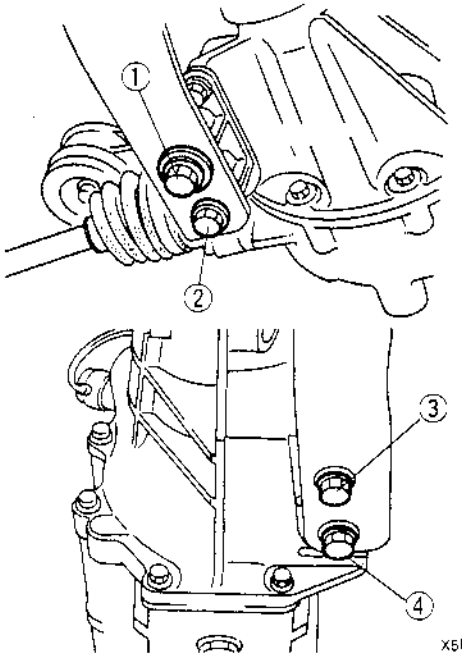
Tightening torque
104—123 N·m
{10.6—12.6 kgf·m, 77—91 ft·lbf}



X5U513WBA

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

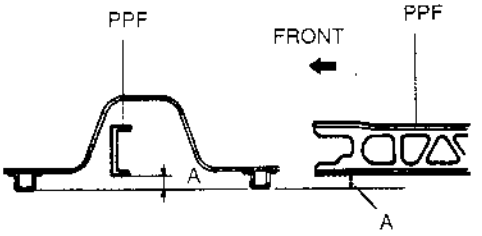
Tightening torque
104—123 N·m
{10.6—12.6 kgf·m, 77—91 ft·lbf}



X5U513WBB

7. Remove the jack.
8. Measure distance A by using a straightedge and vernier calipers.

Distance A
50.5—62.5 mm {1.99—2.46 in}

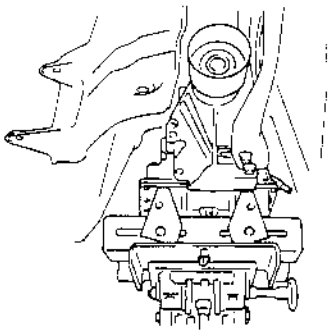


X5U513WBC

9. If the distance is not within the specification, reposition the power plant frame at the transmission.

EXTENSION HOUSING REMOVAL/INSTALLATION

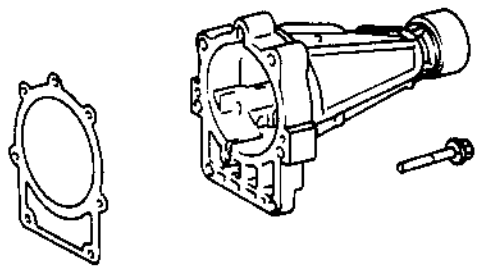
1. Clean the transmission exterior thoroughly by using a steam cleaner or cleaning solvent.
2. Disconnect the negative battery cable.
3. Drain the ATF. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
4. Disconnect the speed sensor connector.
5. Remove the exhaust system. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
6. Remove the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL/INSTALLATION.)
7. Support the transmission on a jack.



X5U513WAC

8. Remove the power plant frame.
9. Remove the extension housing and gasket.

X5U513W21



X5U513WBD

10. Install a new gasket and extension housing on the transmission case.

Tightening torque
24—41 N·m {2.4—4.2 kgf·m, 24—41 ft·lbf}

11. Install the power plant frame.
12. Install the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL/INSTALLATION.)
13. Install the exhaust system. (Refer to 01–15 EXHAUST SYSTEM REMOVAL/INSTALLATION.)
14. Connect the speed sensor connector.
15. Add ATF to the specified level. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT, ATF Level Inspection.)
16. Carry out the line pressure test. (Refer to 05–13 MECHANICAL SYSTEM TEST, Line Pressure Test.)
17. Carry out the road test. (Refer to 05–13 ROAD TEST.)