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GENERAL

OUTLINE OF CHANGES

Since the vehicles for Singapore have been newly added and the vehicles for Hong Kong have been changed partially, the following service procedures have been established. The other procedures are the same as before.

GENERAL INFORMATION

GENERAL SPECIFICATION <VEHICLES FOR SINGAPORE>

Item		Specification
Engine-A/T-ECU	Identification model No.	E6T39675

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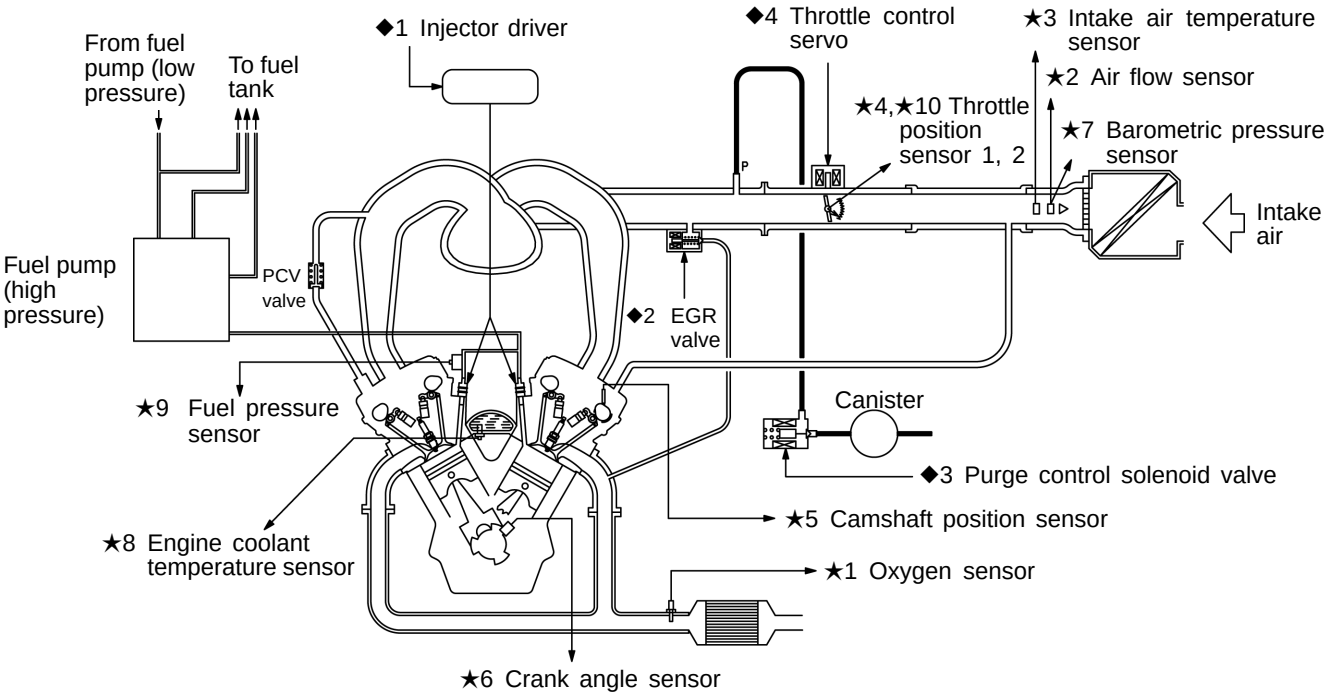
GASOLINE DIRECT INJECTION SYSTEM DIAGRAM <Vehicles for Singapore>

★1 Oxygen sensor ★2 Air flow sensor ★3 Intake air temperature sensor ★4 Throttle position sensor 2 ★5 Camshaft position sensor ★6 Crank angle sensor ★7 Barometric pressure sensor ★8 Engine coolant temperature sensor ★9 Fuel pressure sensor	● Power supply ● Ignition switch-IG ● Ignition switch-ST ● Accelerator pedal position sensor 1 ● Accelerator pedal position switch ● Detonation sensor ● Vehicle speed sensor ● A/C switch1, 2 ● Inhibitor switch ● Power steering fluid pressure switch ● Alternator FR signal ● Stop lamp switch ● Small lamp switch ● Injector open circuit check signal ● Throttle valve controller	⇨ Engine-A/T-ECU ⇨	◆1 Injector driver (injector) ◆2 EGR valve ◆3 Purge control solenoid valve	● Engine control relay ● Fuel pump relay ● Injector driver relay ● Throttle control servo relay ● A/C relay ● Condenser fan relay ● Ignition coil ● Engine warning lamp ● GDI ECO indicator lamp ● Diagnosis output ● Alternator G terminal ● Throttle valve controller ● Oxygen sensor heater (right and left)
★10 Throttle position sensor 1	● Power supply ● Ignition switch-IG ● Accelerator pedal position sensor 2 ● Engine-A/T-ECU	⇨ Throttle valve controller ⇨	◆4 Throttle control servo	● Engine-A/T-ECU



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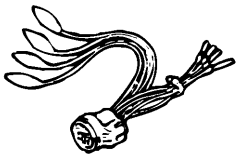
SERVICE SPECIFICATIONS

<Vehicles for Singapore>

Item	Standard value
Oxygen sensor output voltage V (during revving)	0.6 – 1.0
Oxygen sensor heater resistance (at 20 °C) Ω	11 – 18

SPECIAL TOOL

<Vehicles for Singapore>

Tools	Number	Name	Use
	MB991316	Test harness (4-pin, square)	Oxygen sensor check

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TROUBLESHOOTING

INSPECTION CHART FOR DIAGNOSIS CODES <VEHICLES FOR SINGAPORE>

Code No.	Diagnosis item	Reference page
P0100	Air flow sensor (AFS) system	13A-14*
P0105	Barometric pressure sensor system	13A-16*
P0110	Intake air temperature sensor system	13A-18*
P0115	Engine coolant temperature sensor system	13A-19*
P0120	Throttle position sensor 1 (TPS1) system	13A-22*
P0130	Oxygen sensor system	13A-7
P0135	Oxygen sensor heater system	13A-8
P0170	Abnormal fuel system system	13A-9
P0190	Abnormal fuel system	13A-32*
P0201	No.1 injector system	13A-34*
P0202	No.2 injector system	13A-36*
P0203	No.3 injector system	13A-38*
P0204	No.4 injector system	13A-40*
P0205	No.5 injector system	13A-42*
P0206	No.6 injector system	13A-44*
P0220	Accelerator pedal position sensor 1 (APS1) system	13A-46*
P0225	Throttle position sensor 2 (TPS2) system	13A-48*
P0300	Ignition coil (power transistor) system	13A-49*
P0325	Detonation sensor system	13A-51*
P0335	Crank angle sensor system	13A-51*
P0340	Camshaft position sensor system	13A-53*
P0403	EGR valve system	13A-55*
P0443	Purge control solenoid valve system	13A-57*
P0500	Vehicle speed sensor system	13A-58*
P1200	Injector driver system	13A-58*
P1220	electronic-controlled throttle valve system	13A-59*
P1221	Throttle valve position feedback system	13A-60*
P1222	Throttle control servo system	13A-61*
P1223	Communication line with throttle valve controller	13A-62*
P1225	Accelerator pedal position sensor 2 (APS2) system	13A-63*
P1226	Throttle valve controller system	13A-64*
P1500	Alternator FR terminal system	13A-65*

NOTE
*: Refer to the 2001 PAJERO Workshop Manual (Pub. No. PWJE0005).

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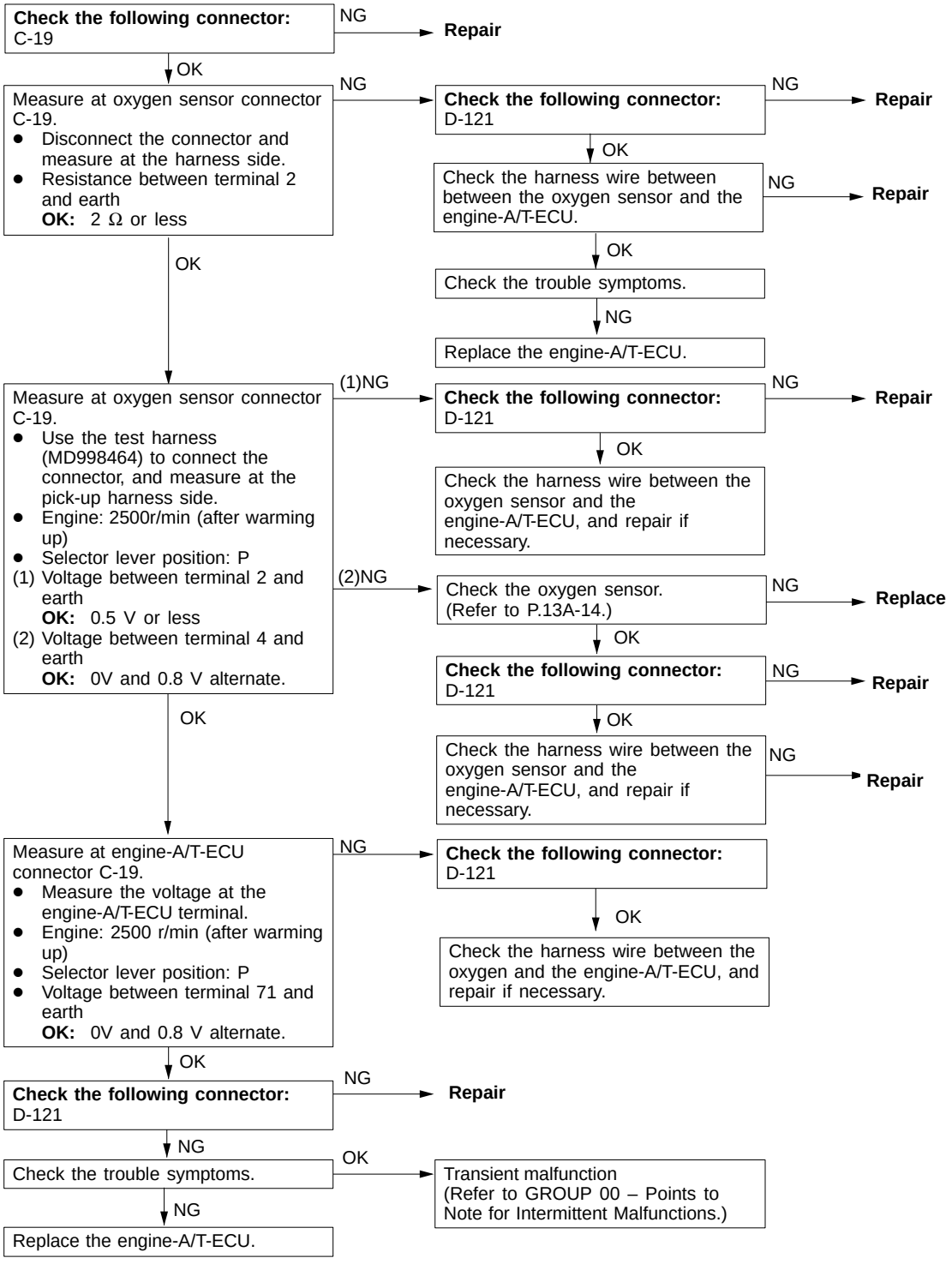
INSPECTION PROCEDURE FOR DIAGNOSIS CODE

Code No. P0130 Oxygen sensor system	Probable cause
Range of Check ● Three minutes have been passed since the engine has been started. ● The engine coolant temperature is approx. 80°C or more. ● Intake air temperature is 20 – 30°C ● Engine speed is 1200 r/min or more ● Driving on a level surface at constant speed. Set Conditions ● The oxygen sensor output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor inside the engine-A/T-ECU.	● Malfunction of of right bank oxygen sensor ● Open or short circuit in the right bank oxygen sensor circuit or loose connector contact ● Malfunction of engine-A/T-ECU



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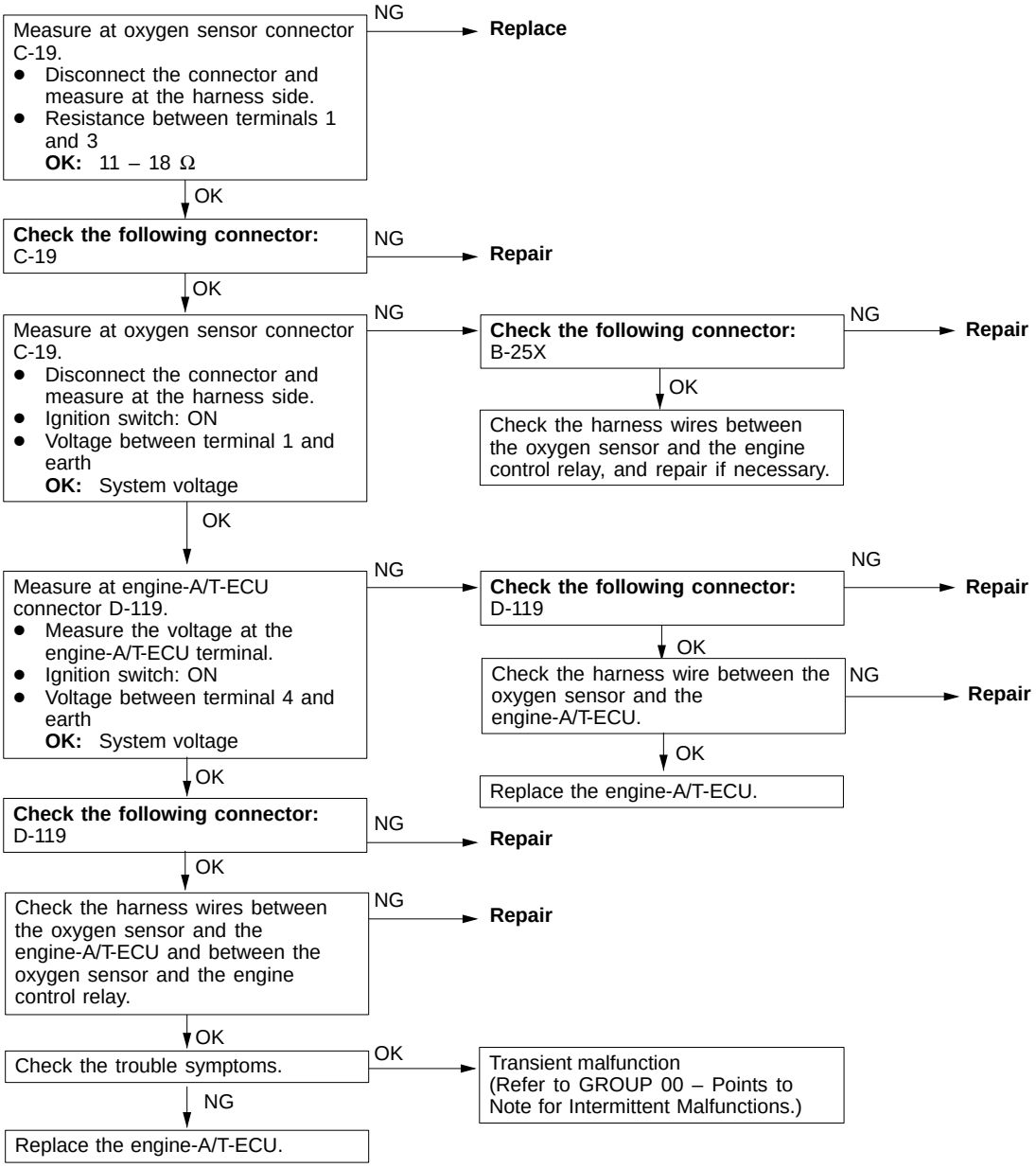
Code No. P0135 Oxygen sensor heater system	Probable cause
Range of Check ● The engine coolant temperature is approx. 20°C or more. ● The right bank oxygen sensor heater remains on. ● The engine speed is 50 r/min or more. ● Battery voltage is 11 – 16 V. Set Conditions ● The current, which flows through the right bank oxygen sensor heater, is 0.2 A or less or 3.5 A or more for four seconds.	● Malfunction of right bank oxygen sensor heater ● Open or short circuit in the right bank oxygen sensor circuit or loose connector contact ● Malfunction of engine-A/T-ECU



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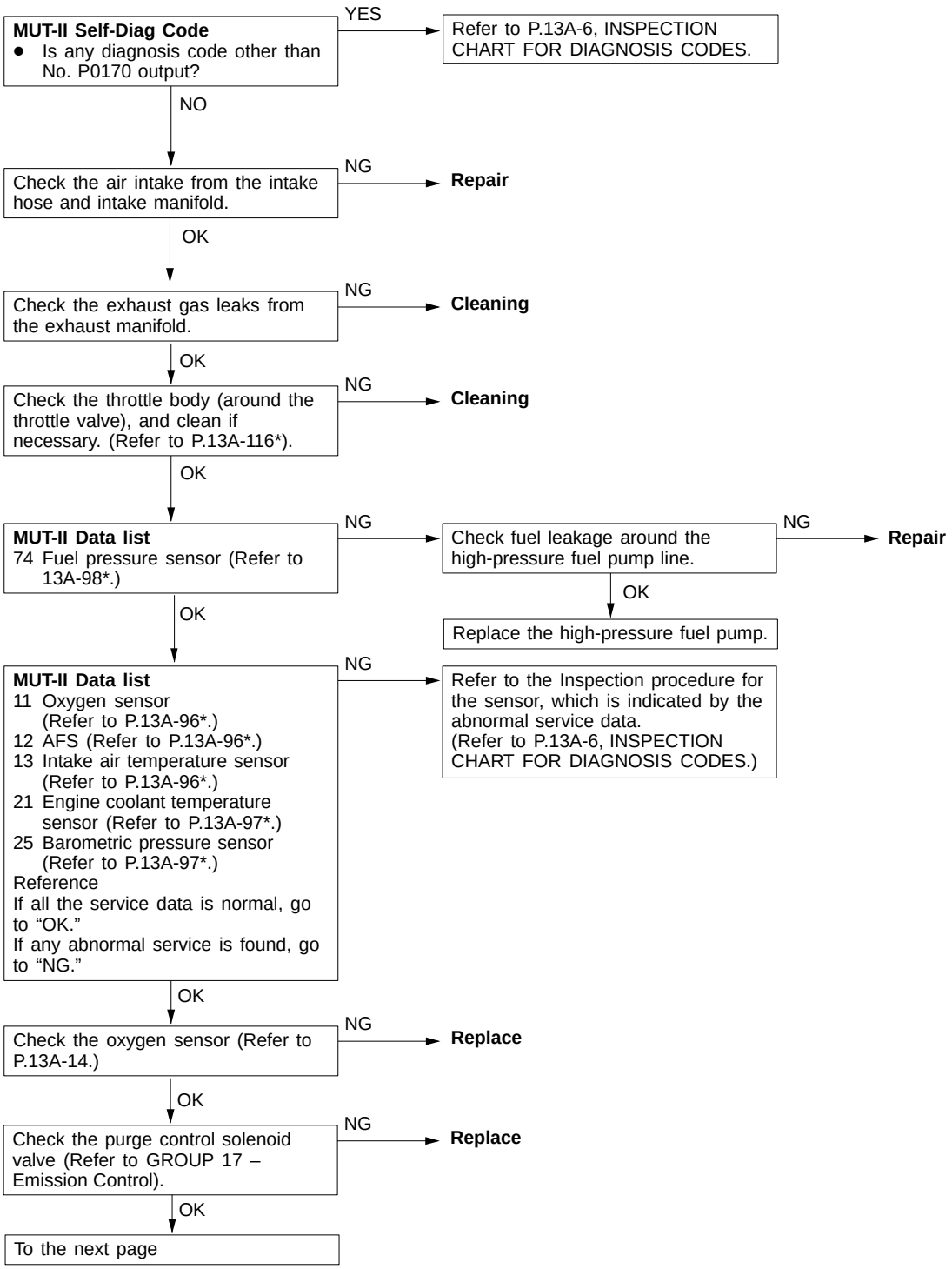
Code No. P0170 Abnormal fuel system system	Probable cause
Range of Check ● Engine: Being learning the air-fuel ratio Set Conditions ● Ten seconds or more have been passed while the fuel injection amount compensation value is too low. or ● Ten seconds or more have been passed while the fuel injection amount compensation value is too high.	● Malfunction of fuel supply system ● Malfunction of oxygen sensor ● Malfunction of intake air temperature sensor ● Malfunction of barometric pressure sensor ● Malfunction of air flow sensor ● Malfunction of engine-A/T-ECU



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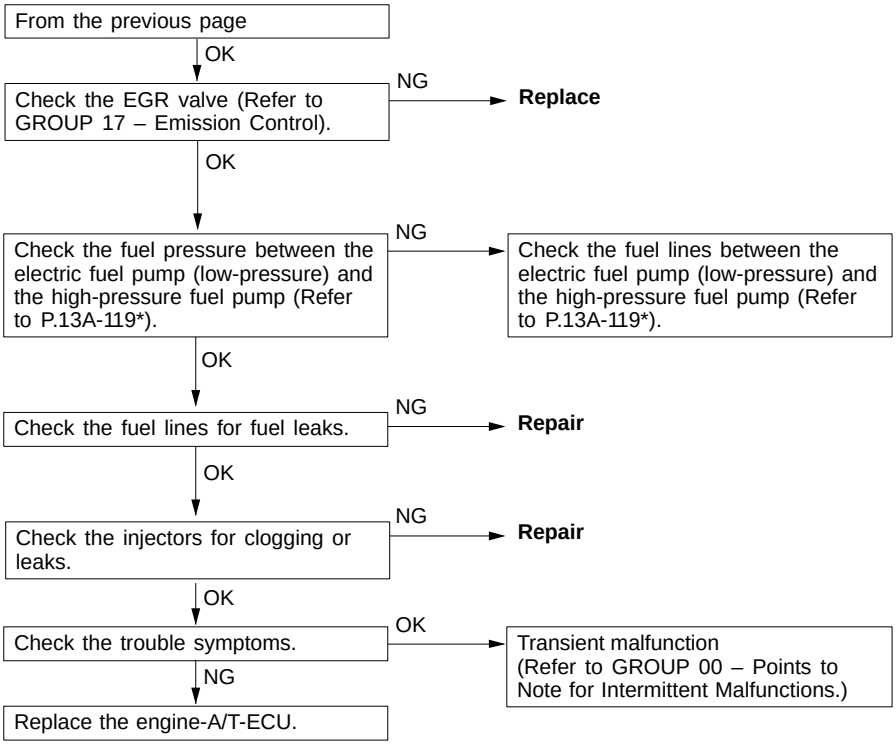

NOTE

*: Refer to the 2001 PAJERO Workshop Manual (Pub. No. PWJE0005).

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DATA LIST REFERENCE TABLE

Item No.	Check item	Requirement		Normal condition	Inspection procedure No.	Reference page
22	Crank angle sensor	● Engine: Cranking ● Tachometer: Connected	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. P0335	13A-51*
		● Engine: Idling ● Idle position switch: ON	When engine coolant temperature is –20°C	1,300 – 1,500 r/min <Vehicles for Singapore> 1,250 – 1,450 r/min <Vehicles for Hong Kong>		
			When engine coolant temperature is 0°C	1,300 – 1,500 r/min <Vehicles for Singapore> 1,100 – 1,300 r/min <Vehicles for Hong Kong>		
			When engine coolant temperature is 20°C	1,250 – 1,450 r/min <Vehicles for Singapore> 1,000 – 1,200 r/min <Vehicles for Hong Kong>		
			When engine coolant temperature is 40°C	1,100 – 1,300 r/min <Vehicles for Singapore> 900 – 1,100 r/min <Vehicles for Hong Kong>		
			When engine coolant temperature is 80°C (Within four minutes after engine has started) <Vehicles for Singapore> (Within six minutes after engine has started) <Vehicles for Hong Kong>	500 – 700 r/min		

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Item No.	Check item	Requirement		Normal condition	Inspection procedure No.	Reference page
44	Ignition advance value	● Engine: After having warmed up ● Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.)	Engine: Idling (Within four minutes after engine has started) <Vehicles for Singapore> (Within six minutes after engine has started) <Vehicles for Hong Kong>	12 – 28 deg <Vehicles for Singapore> 7 – 23 deg <Vehicles for Hong Kong>	Code No. P0300	13A-49*
			2,500 r/min	15 – 35 deg		
74	Fuel pressure sensor	● Engine coolant temperature: 80 – 95°C ● Lamps, electric cooling fan and all accessories: OFF ● Transmission: P range	Engine: Cranking	2 kPa or more	Code No. P0190	13A-32*
			Engine: Idling	4 – 6.9 MPa		
12 ★	Air flow sensor	● Engine coolant temperature: 80 – 95°C ● Lamps and all accessories: OFF ● Transmission: P range	Engine: Idling (Within four minutes after engine has started)	3.0 – 6.9 gm/s	Code No. P0100	13A-14*
			2,500 r/min	8.8 – 15.2 gm/s		
			Racing	Frequency increases in response to racing		
13 ★	Intake air temperature sensor	Ignition switch: ON or with engine running	When intake air temperature is –20°C	–20°C	Code No. P0225	13A-48*
			When intake air temperature is 0°C	0°C		
			When intake air temperature is 20°C	20°C		
			When intake air temperature is 40°C	40°C		
			When intake air temperature is 80°C	80°C		
21 ★	Engine coolant temperature sensor	Ignition switch: ON or with engine running	When engine coolant temperature is –20°C	–20°C	Code No. P0115	13A-19*
			When engine coolant temperature is 0°C	0°C		
			When engine coolant temperature is 20°C	20°C		
			When engine coolant temperature is 40°C	40°C		
			When engine coolant temperature is 80°C	80°C		

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Item No.	Check item	Requirement		Normal condition	Inspection procedure No.	Reference page
22 ★	Crank angle sensor	● Engine: Cranking ● Tachometer: Connected	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. P0335	13A-51*
		● Engine: Idling ● Idle position switch: ON	When engine coolant temperature is –20°C	1,300 – 1,500 r/min <Vehicles for Singapore> 1,250 – 1,450 r/min <Vehicles for Hong Kong>		
			When engine coolant temperature is 0°C	1,300 – 1,500 r/min <Vehicles for Singapore> 1,100 – 1,300 r/min <Vehicles for Hong Kong>		
			When engine coolant temperature is 20°C	1,250 – 1,450 r/min <Vehicles for Singapore> 1,000 – 1200 r/min <Vehicles for Hong Kong>		
			When engine coolant temperature is 40°C	1,100 – 1,300 r/min <Vehicles for Singapore> 900 – 1,100 r/min <Vehicles for Hong Kong>		
			When engine coolant temperature is 80°C (Within four minutes after engine has started) <Vehicles for Singapore> (Within six minutes after engine has started) <Vehicles for Hong Kong>	500 – 700 r/min		
44 ★	Ignition advance value	● Engine: After having warmed up ● Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.)	Engine: Idling (Within four minutes after engine has started) <Vehicles for Singapore> (Within six minutes after engine has started) <Vehicles for Hong Kong>	12 – 28 deg <Vehicles for Singapore> 7 – 23 deg <Vehicles for Hong Kong>	Code No. P0300	13A-49*
			2,500 r/min	15 – 35 deg		

NOTE
*: Refer to the 2001 PAJERO Workshop Manual (Pub. No. PWJE0005)
Items marked by ★ will not be displayed if service data is selected on the check mode.

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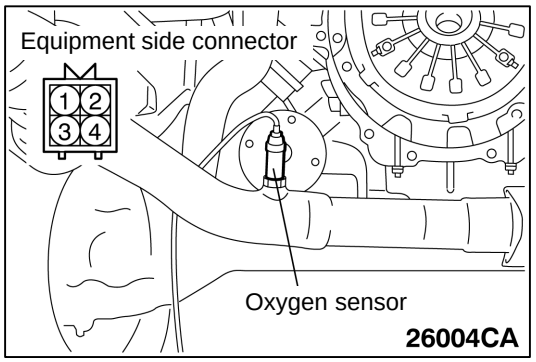
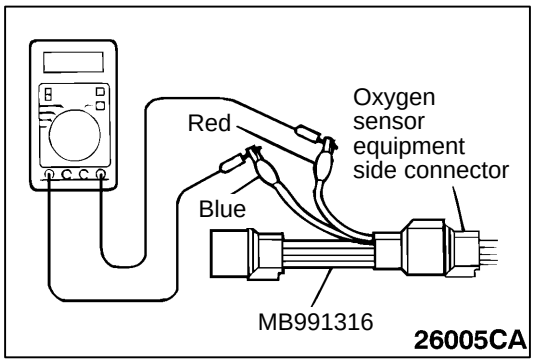


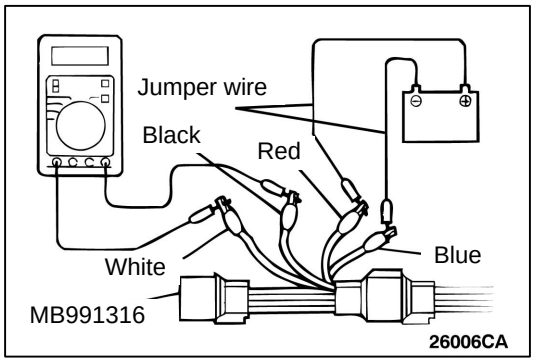
ON-VEHICLE SERVICE

OXYGEN SENSOR CHECK <Vehicles for Singapore>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness) to the connector on the oxygen sensor side.



2. Make sure that there is continuity (11 – 18 Ω at 20 °C) between terminal 1 (red clip of special tool) and terminal 3 (blue clip of special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80 °C or higher.



5. Use the jumper wire to connect terminal 1 (red clip) of the oxygen sensor connector to the battery (+) terminal and terminal 3 (blue clip) to the battery (–) terminal.

Caution
Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.

6. Connect a digital voltage meter between terminal 2 (black clip) and terminal 4 (white clip).
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

Engine	Oxygen sensor output voltage	Remarks
When racing the engine	0.6 – 1.0 V	If you make the air/fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 – 1.0 V

8. If the sensor is defective, replace the oxygen sensor.

NOTE
For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler.