
MULTIPOINT FUEL INJECTION (MPI)

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GENERAL

OUTLINE OF CHANGE

Due to the following changes of the 6G75-MPI engine, the service procedures have been established. The other service procedures are the same as before.

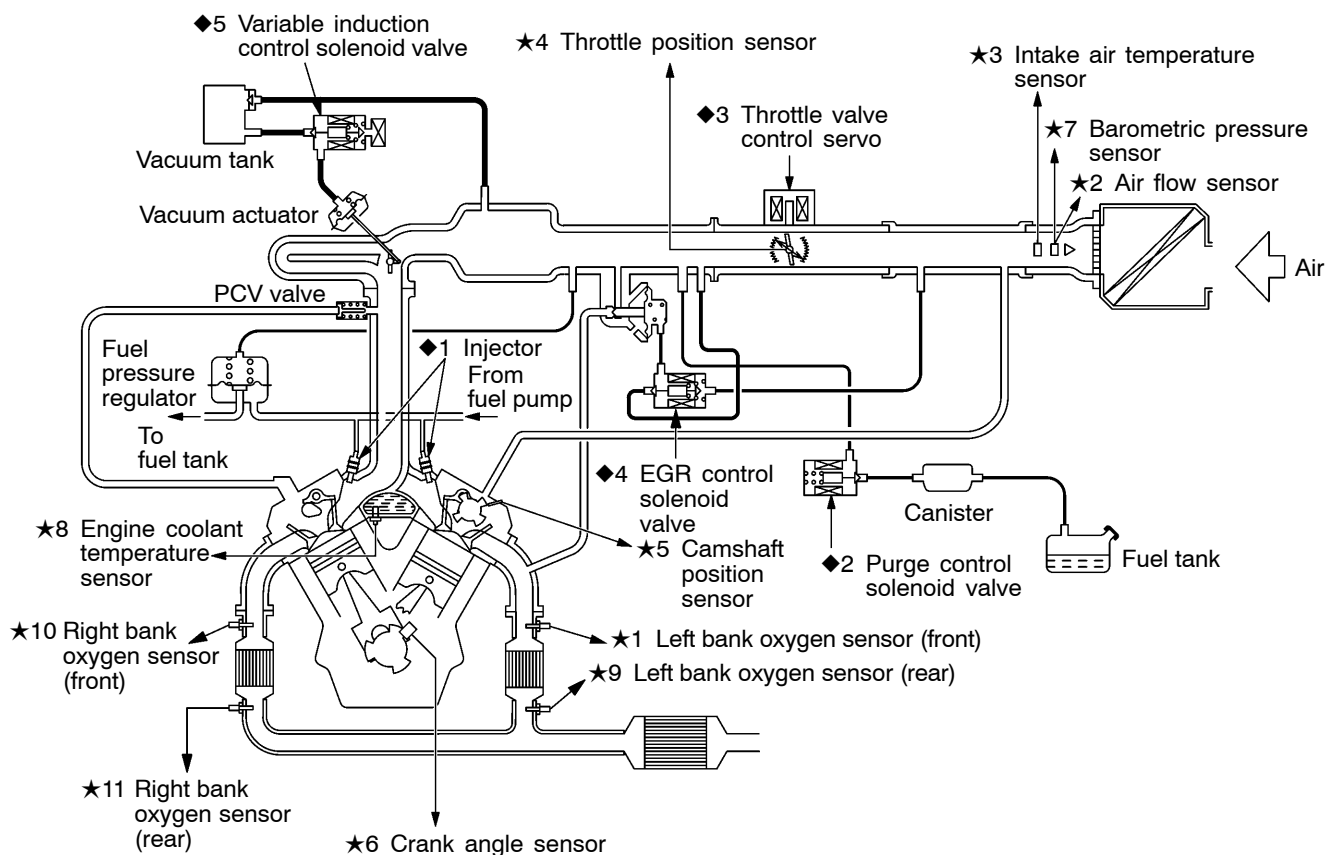
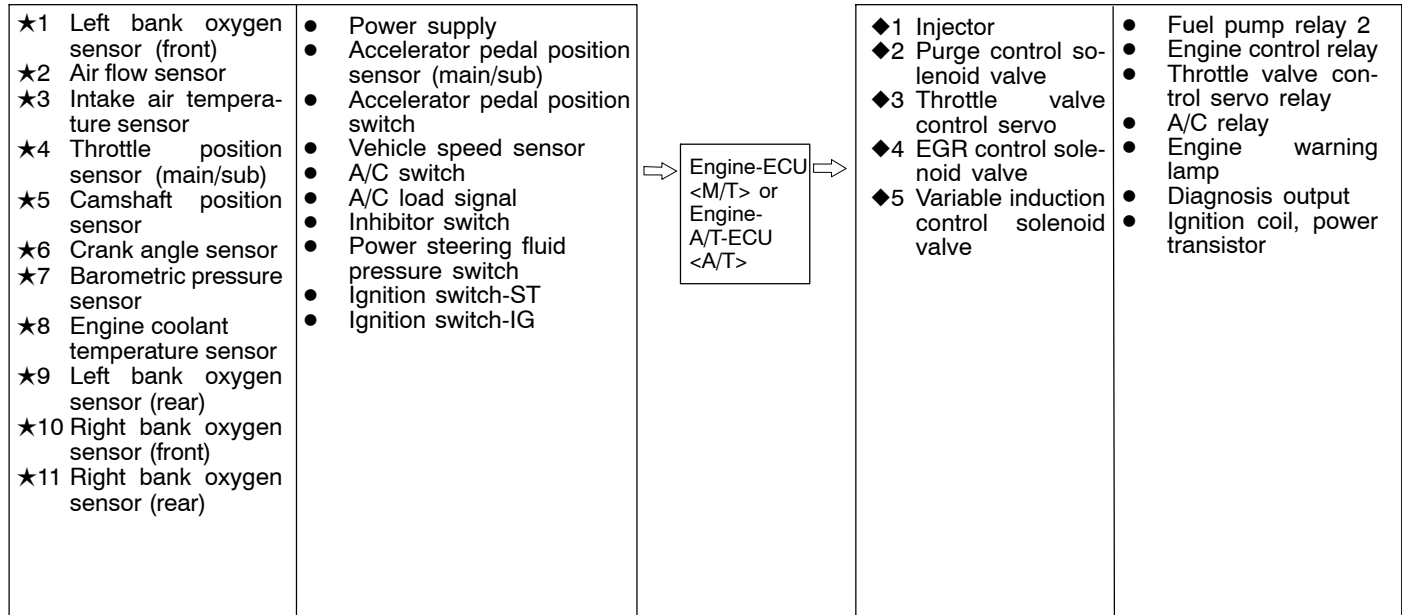
- Due to the changes on the On-board diagnostics system, diagnostic items have been added.
- The engine-A/T-ECU has been changed.

GENERAL INFORMATION

GENERAL SPECIFICATIONS

Item		Specifications
Engine-ECU <M/T > or Engine-A/T-ECU <A/T>	Identification model No.	E6T46274



SYSTEM DIAGRAM



SERVICE SPECIFICATIONS

Item		Standard value
Oxygen sensor heater resistance (at 20 °C) Ω	Left bank oxygen sensor (front)	4.5 – 8.0
	Right bank oxygen sensor (front)	
	Left bank oxygen sensor (rear)	11 – 18
	Right bank oxygen sensor (rear)	

SPECIAL TOOLS

Tools	Number	Name	Use
	MB991316	Test harness (4-pin, square)	Oxygen sensor check
	MD998464	Test harness (4-pin, square)	Oxygen sensor check

TROUBLESHOOTING**DIAGNOSIS FUNCTION****ENGINE WARNING LAMP (CHECK ENGINE LAMP)****Engine warning lamp inspection items**

Code No.	Diagnosis item
–	Engine-ECU <M/T> or engine-A/T-ECU <A/T>
P0100	Air flow sensor system
P0105	Barometric pressure sensor system
P0110	Intake air temperature sensor system
P0115	Engine coolant temperature sensor system
P0122	Throttle position sensor (main) circuit low input
P0123	Throttle position sensor (main) circuit high input
P0125	Feedback system
P0130	Right bank oxygen sensor (front) system
P0135	Right bank oxygen sensor heater (front) system
P0136	Right bank oxygen sensor (rear) system
P0141	Right bank oxygen sensor heater (rear) system
P0150	Left bank oxygen sensor (front) system
P0155	Left bank oxygen sensor heater (front) system
P0156	Left bank oxygen sensor (rear) system
P0161	Left bank oxygen sensor heater (rear) system
P0170	Abnormal fuel system (Right bank)
P0173	Abnormal fuel system (Left bank)
P0201	No.1 Injector system
P0202	No.2 Injector system
P0203	No.3 Injector system
P0204	No.4 Injector system
P0205	No.5 Injector system
P0206	No.6 Injector system
P0222	Throttle position sensor (sub) circuit low input
P0223	Throttle position sensor (sub) circuit high input
P0300	Random cylinder misfire detected
P0301	No.1 cylinder misfire detected
P0302	No.2 cylinder misfire detected
P0303	No.3 cylinder misfire detected
P0304	No.4 cylinder misfire detected
P0305	No.5 cylinder misfire detected
P0306	No.6 cylinder misfire detected

Code No.	Diagnosis item
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	EGR control solenoid valve system
P0421	Catalyst malfunction (Right bank)
P0431	Catalyst malfunction (Left bank)
P0443	Purge control solenoid valve system
P0500	Vehicle speed sensor system
P0505	Idle speed control (ISC) system
P0551	Power steering fluid pressure switch system
P0606	Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction
P0638	Throttle valve control servo circuit range/performance problem
P0642	Throttle position sensor power supply
P0657	Throttle valve control servo relay circuit malfunction
P1602	Communication malfunction (between engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor and system LSI)
P1603	Battery backup line system
P1610	Immobilizer system
P2100	Throttle valve control servo circuit (open)
P2101	Throttle valve control servo magneto malfunction
P2121	Accelerator pedal position sensor (main) circuit range/performance problem
P2122	Accelerator pedal position sensor (main) circuit low input
P2123	Accelerator pedal position sensor (main) circuit high input
P2126	Accelerator pedal position sensor (sub) circuit range/performance problem
P2127	Accelerator pedal position sensor (sub) circuit low input
P2128	Accelerator pedal position sensor (sub) circuit high input
P2135	Throttle position sensor (main and sub) range/performance problem
P2138	Accelerator pedal position sensor (main and sub) range/performance problem

FREEZE FRAME DATA

When the engine-ECU <M/T> or engine-A/T-ECU <A/T> detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called “Freeze frame data”. By analyzing this “Freeze frame” data with the MUT-II/III, an effective troubleshooting can be performed. The display items of freeze frame data are shown below.

DISPLAY ITEM LIST

Item No.	Data	Unit
21	Engine coolant temperature sensor	°C
22	Crank angle sensor	r/min
24	Vehicle speed	km/h
81	Long-term fuel compensation (Right bank)	%
82	Short-term fuel compensation (Right bank)	%
83	Long-term fuel compensation (Left bank)	%
84	Short-term fuel compensation (Left bank)	%
87	Calculation load value	%
88	Fuel control condition (Right bank)	Open loop
		Closed loop
		Open loop owing to drive condition
		Open loop owing to system malfunction
		Closed loop based on one oxygen sensor
89	Fuel control condition (Left bank)	Open loop
		Closed loop
		Open loop owing to drive condition
		Open loop owing to system malfunction
		Closed loop based on one oxygen sensor
–	Diagnosis code during data recording	–

NOTE

If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.

INSPECTION CHART FOR DIAGNOSIS CODE

NOTE

*1 Refer to the 2004 PAJERO Workshop Manual (Pub. No. PWJE0005-3). As for MUT-II/III data list and actuator test, refer to the chart on this manual

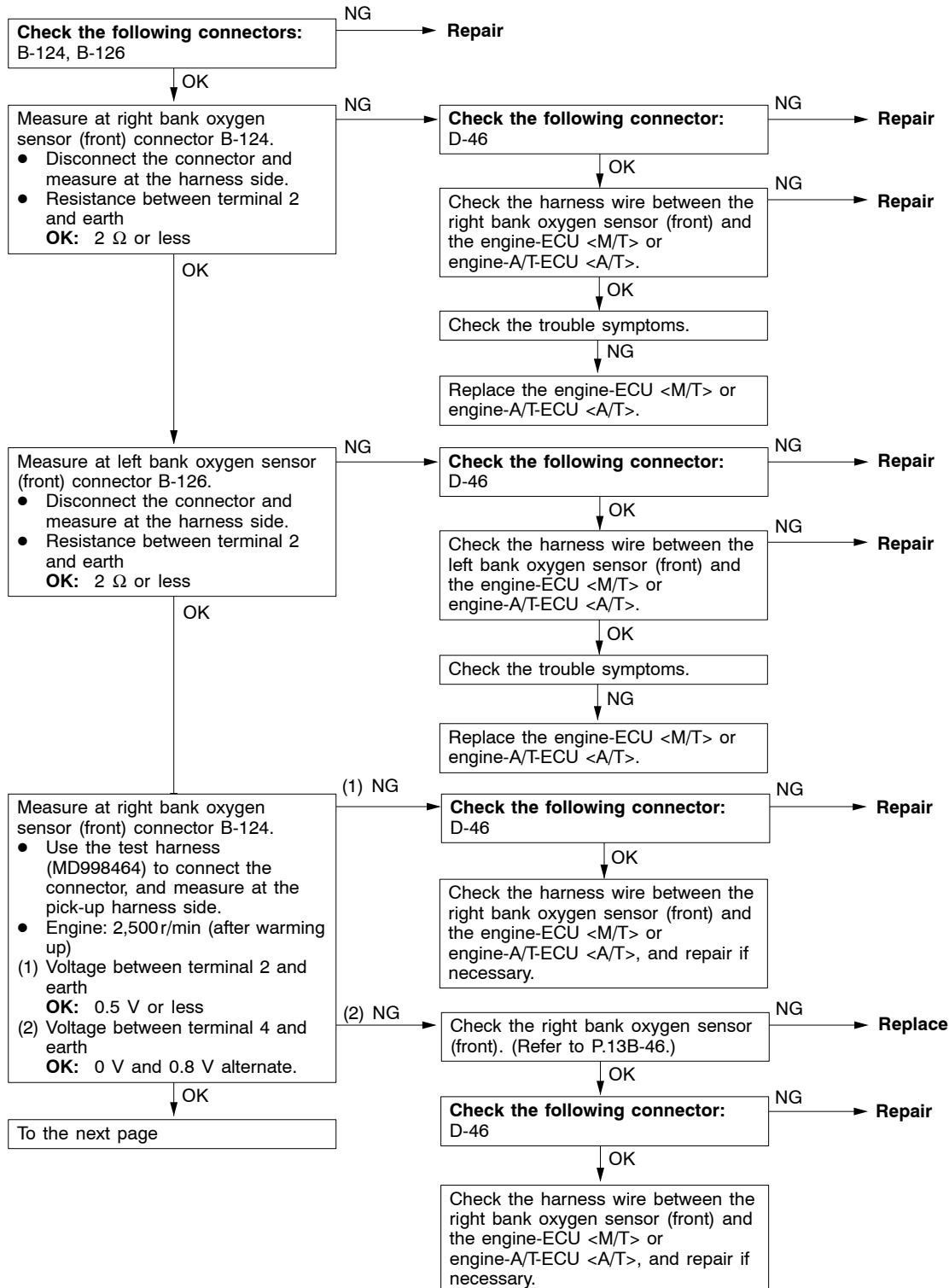
*2 Refer to the 2005 PAJERO Workshop Manual (Pub. No. PWJE0005-4). As for MUT-II/III data list and actuator test, refer to the chart on this manual

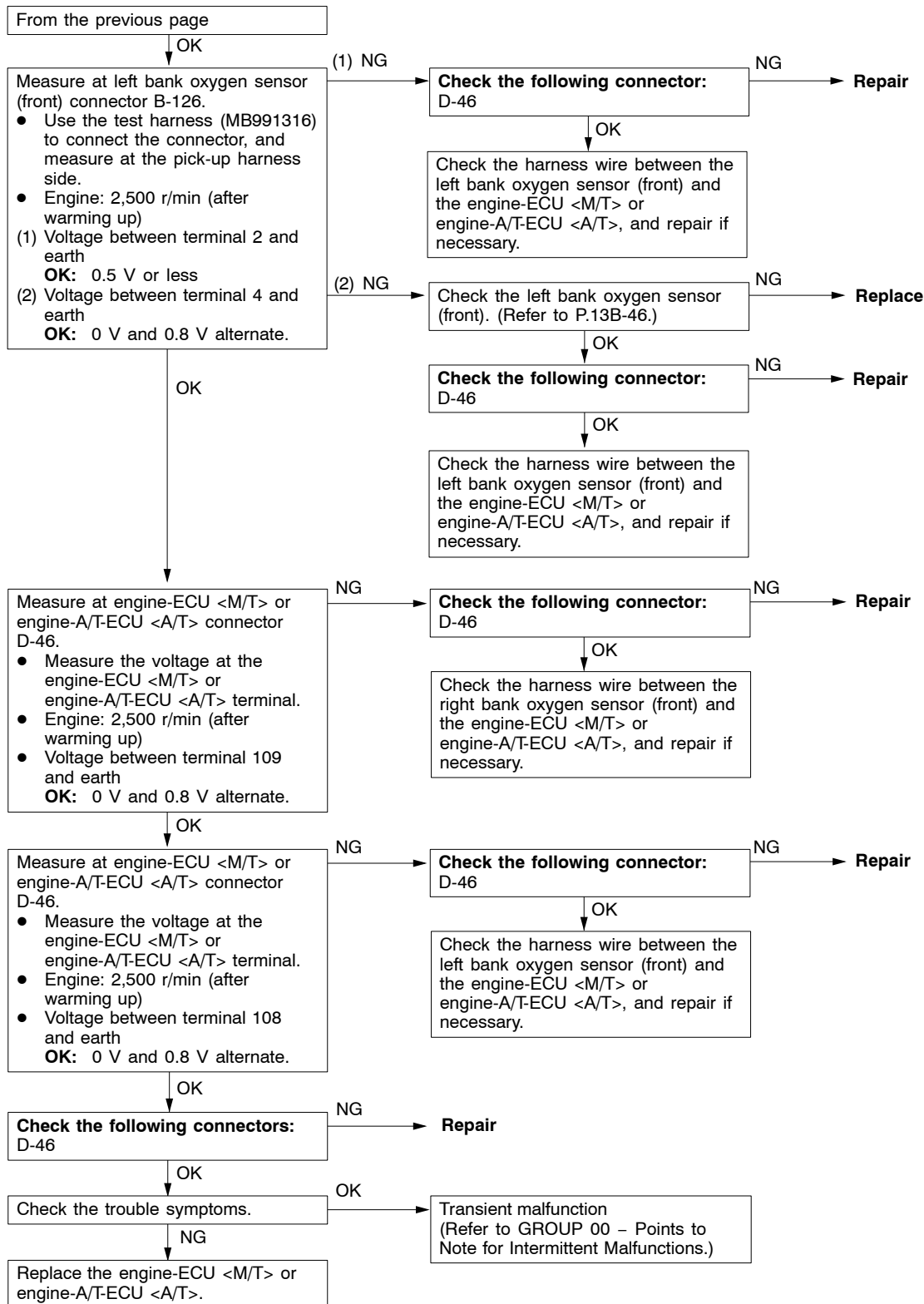
Code No.	Diagnosis item	Reference page
P0100	Air flow sensor system	13B-8*1
P0105	Barometric pressure sensor system	13B-37*1
P0110	Intake air temperature sensor system	13B-10*1
P0115	Engine coolant temperature sensor system	13B-11*1
P0122	Throttle position sensor (main) circuit low input	13B-14*1
P0123	Throttle position sensor (main) circuit high input	13B-15*1
P0125	Feedback system	13B-10
P0130	Right bank oxygen sensor (front) system	13B-12
P0135	Right bank oxygen sensor heater (front) system	13B-13
P0136	Right bank oxygen sensor (rear) system	13B-15
P0141	Right bank oxygen sensor heater (rear) system	13B-16
P0150	Left bank oxygen sensor (front) system	13B-18
P0155	Left bank oxygen sensor heater (front) system	13B-19
P0156	Left bank oxygen sensor (rear) system	13B-21
P0161	Left bank oxygen sensor heater (rear) system	13B-22
P0170	Abnormal fuel system (Right bank)	13B-24
P0173	Abnormal fuel system (Left bank)	13B-26
P0201	No.1 Injector system	13B-16*1
P0202	No.2 Injector system	
P0203	No.3 Injector system	
P0204	No.4 Injector system	
P0205	No.5 Injector system	
P0206	No.6 Injector system	
P0222	Throttle position sensor (sub) circuit low input	13B-7*2
P0223	Throttle position sensor (sub) circuit high input	13B-18*1
P0300	Random cylinder misfire detected	13B-28
P0301	No.1 cylinder misfire detected	13B-29
P0302	No.2 cylinder misfire detected	
P0303	No.3 cylinder misfire detected	
P0304	No.4 cylinder misfire detected	
P0305	No.5 cylinder misfire detected	
P0306	No.6 cylinder misfire detected	

Code No.	Diagnosis item	Reference page
P0335	Crank angle sensor system	13B-19*1
P0340	Camshaft position sensor system	13B-21*1
P0403	EGR control solenoid valve system	13B-30
P0421	Catalyst malfunction (Right bank)	13B-31
P0431	Catalyst malfunction (Left bank)	13B-32
P0443	Purge control solenoid valve system	13B-33
P0500	Vehicle speed sensor system	13B-10*2
P0505	Idle speed control (ISC) system	13B-34
P0551	Power steering fluid pressure switch system	13B-35
P0606	Engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor malfunction	13B-10*2
P0638	Throttle valve control servo circuit range/performance problem	13B-11*2
P0642	Throttle position sensor power supply	13B-23*1
P0657	Throttle valve control servo relay circuit malfunction	13B-13*2
P1602	Communication malfunction (between engine-ECU <M/T> or engine-A/T-ECU <A/T> main processor and system LSI)	13B-14*2
P1603	Battery backup line system	13B-35
P1610	Immobilizer system	13B-25*1
P2100	Throttle valve control servo circuit (open)	13B-15*2
P2101	Throttle valve control servo magneto malfunction	13B-16*2
P2121	Accelerator pedal position sensor (main) circuit range/performance problem	13B-17*2
P2122	Accelerator pedal position sensor (main) circuit low input	13B-30*1
P2123	Accelerator pedal position sensor (main) circuit high input	13B-31*1
P2126	Accelerator pedal position sensor (sub) circuit range/performance problem	13B-32*1
P2127	Accelerator pedal position sensor (sub) circuit low input	13B-33*1
P2128	Accelerator pedal position sensor (sub) circuit high input	13B-34*1
P2135	Throttle position sensor (main and sub) range/performance problem	13B-18*2
P2138	Accelerator pedal position sensor (main and sub) range/performance problem	13B-19*2

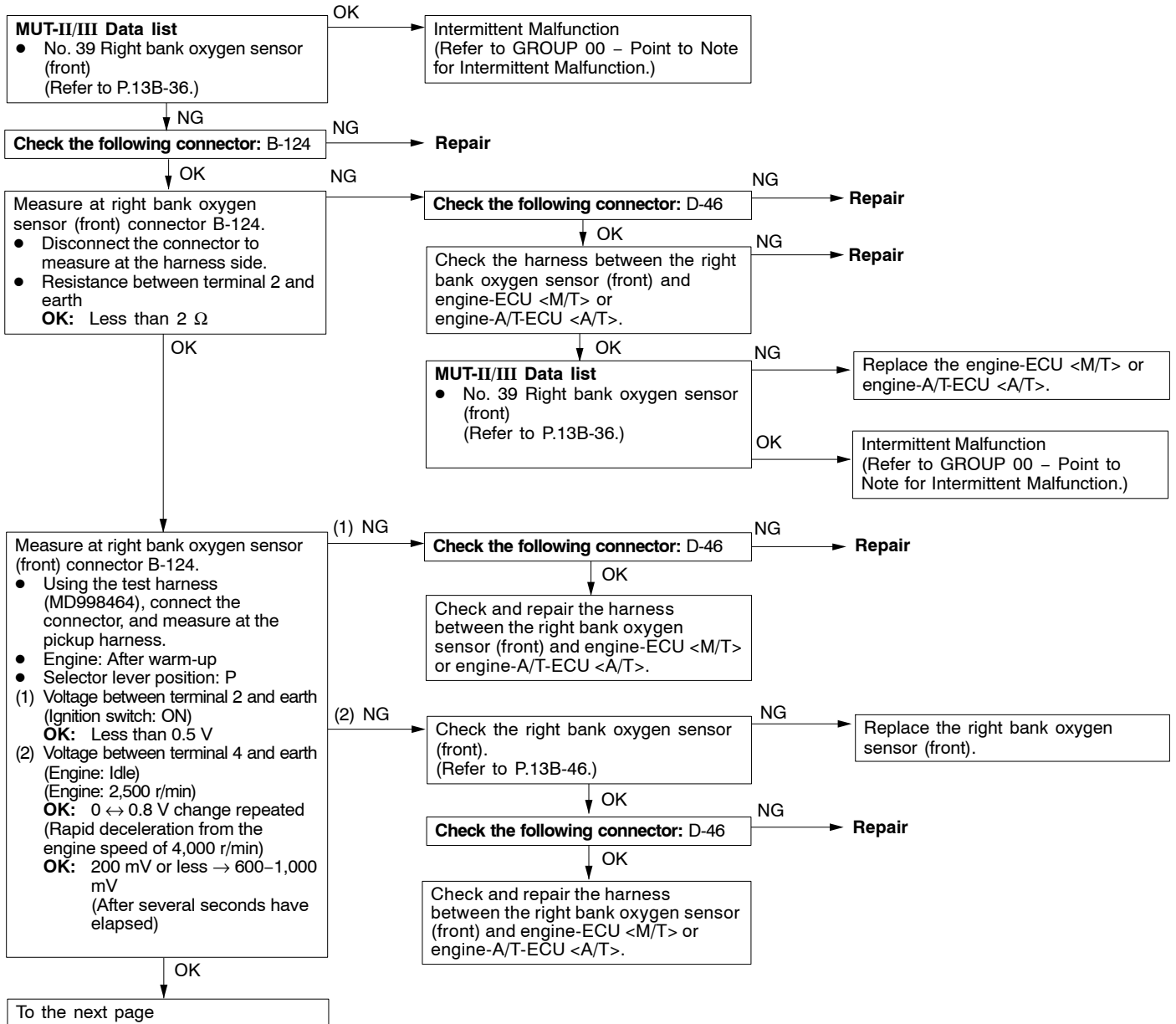
INSPECTION PROCEDURE FOR DIAGNOSIS CODE

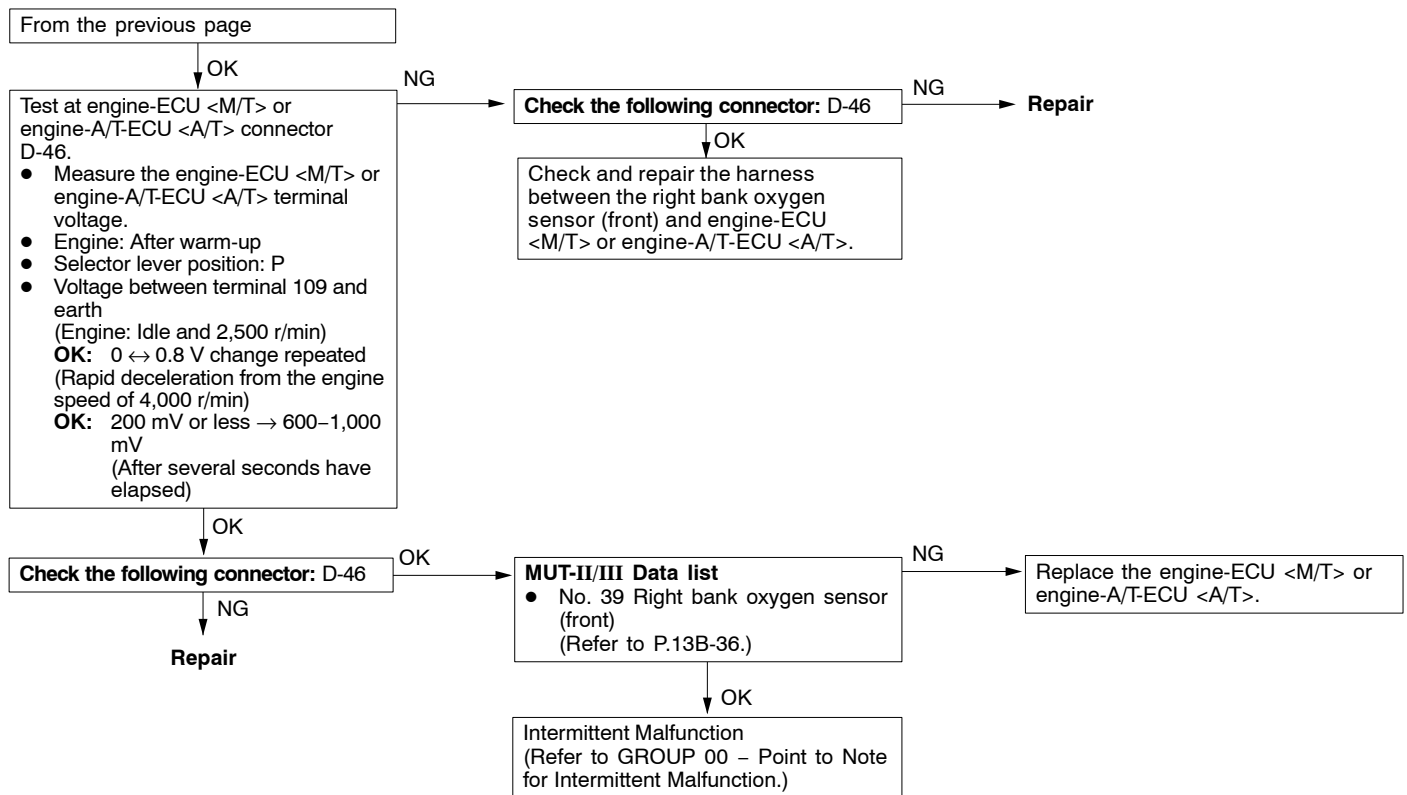
Code No. P0125 Feedback system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> The engine coolant temperature is approximately 80°C or more. During stoichiometric feedback control The vehicle is not being decelerated. <p>Set Conditions</p> <ul style="list-style-type: none"> Right bank oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds. Left bank oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds. 	<ul style="list-style-type: none"> Malfunction of right bank oxygen sensor (front) Malfunction of left bank oxygen sensor (front) Open or short circuit in the right bank oxygen sensor (front) circuit or loose connector contact Open or short circuit in the left bank oxygen sensor (front) circuit or loose connector contact Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



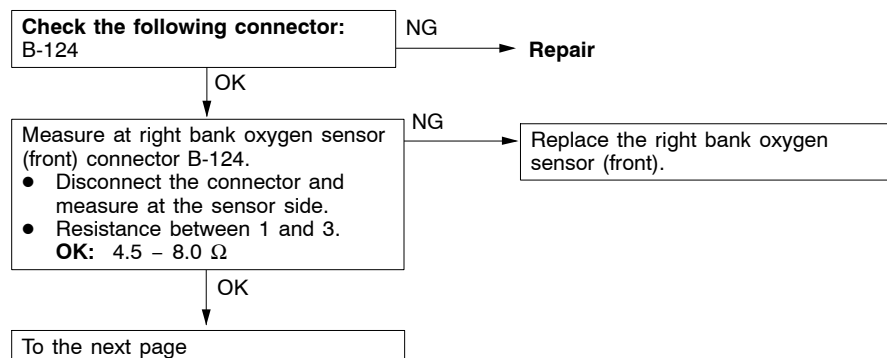


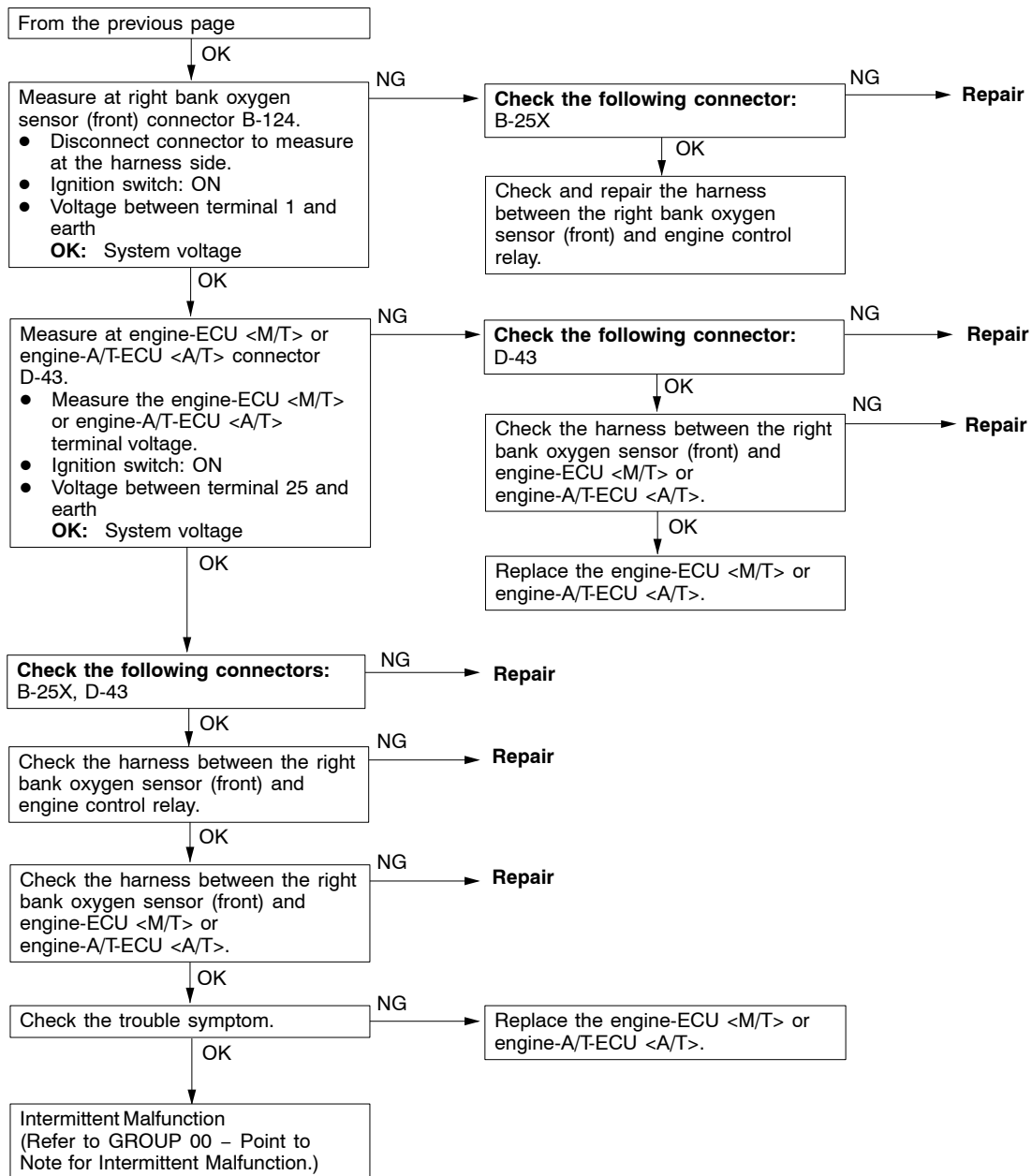
Code No. P0130 Right bank oxygen sensor (front) system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> More than 3 minutes passed after completion of start of engine The engine coolant water temperature is approximately more than 80°C. The engine speed is more than 1,200 r/min. Currently running on flat road at constant speed. Volumetric efficiency 25% or more. <p>Set Condition</p> <ul style="list-style-type: none"> The right bank oxygen sensor (front) 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 right bank oxygen sensor (front) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>. 	<ul style="list-style-type: none"> Malfunction of right bank oxygen sensor (front) Right bank oxygen sensor (front) circuit disconnection, short-circuit, or connector contact defect. Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>.



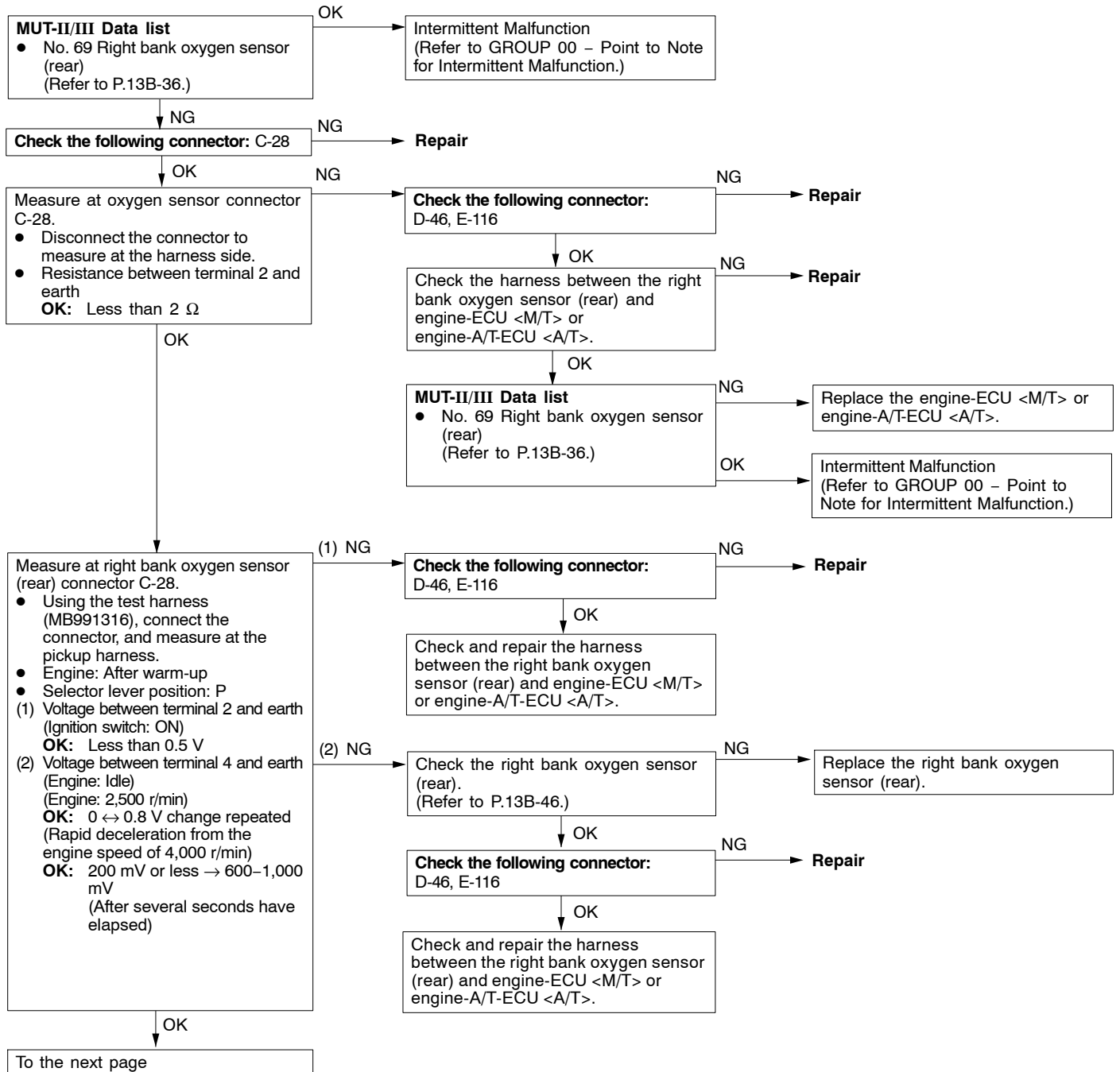


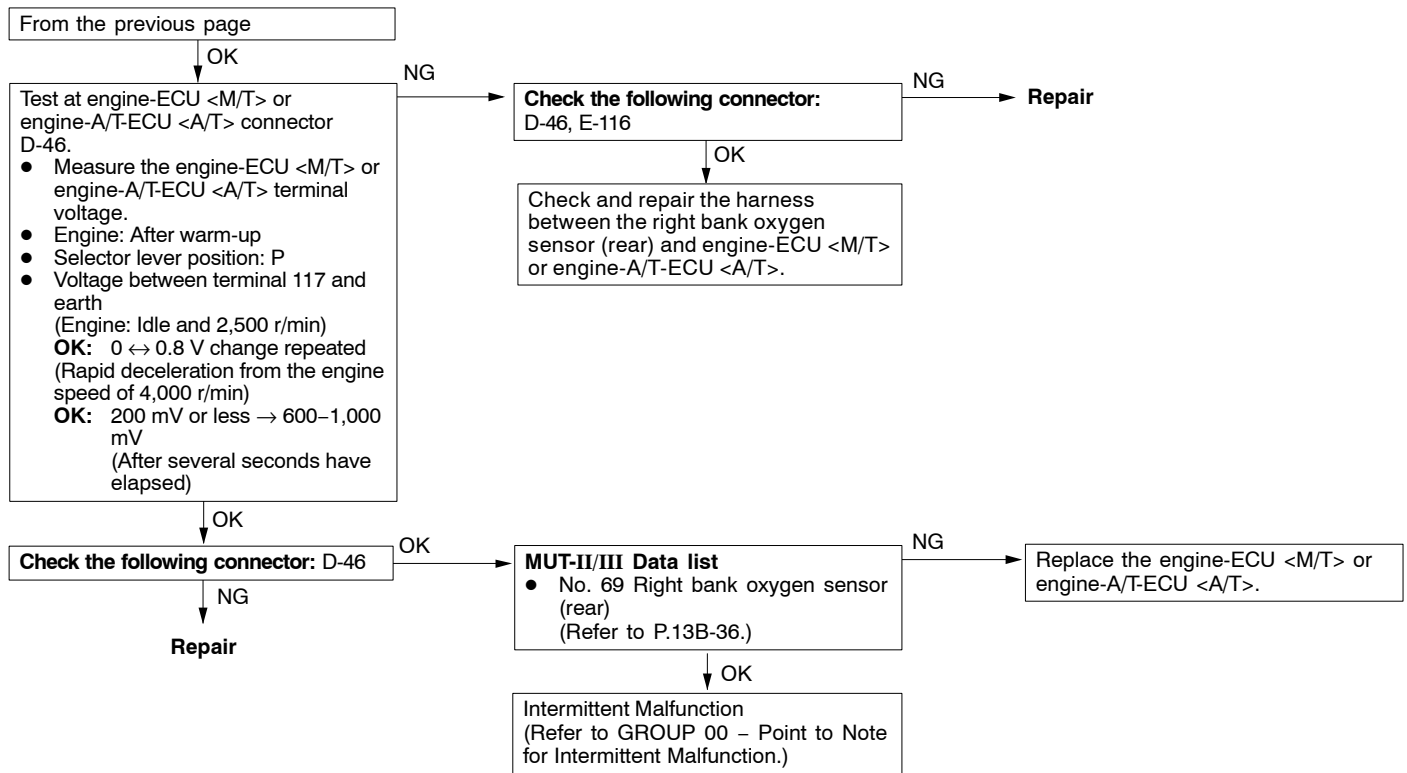
Code No. P0135 Right bank oxygen sensor heater (front) system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approximately more than 20°C. • Right bank oxygen sensor heater (front) is ON. • The engine speed is more than 50 r/min. • The battery voltage is 11 – 16 V. <p>Set Condition</p> <ul style="list-style-type: none"> • For 4 seconds, right bank oxygen sensor heater (front) current is 0.2 A or less, or 7.5 A or more. 	<ul style="list-style-type: none"> • Malfunction of right bank oxygen sensor heater (front) • Right bank oxygen sensor heater (front) circuit disconnection, short-circuit, or connector contact defect • Malfunction of right bank engine-ECU <M/T> or engine-A/T-ECU <A/T>



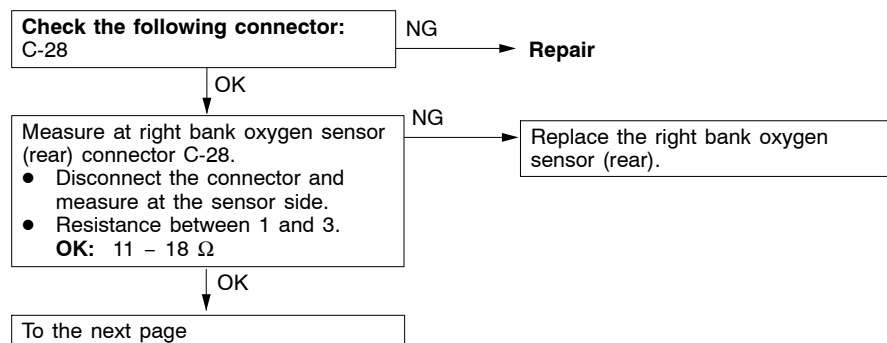


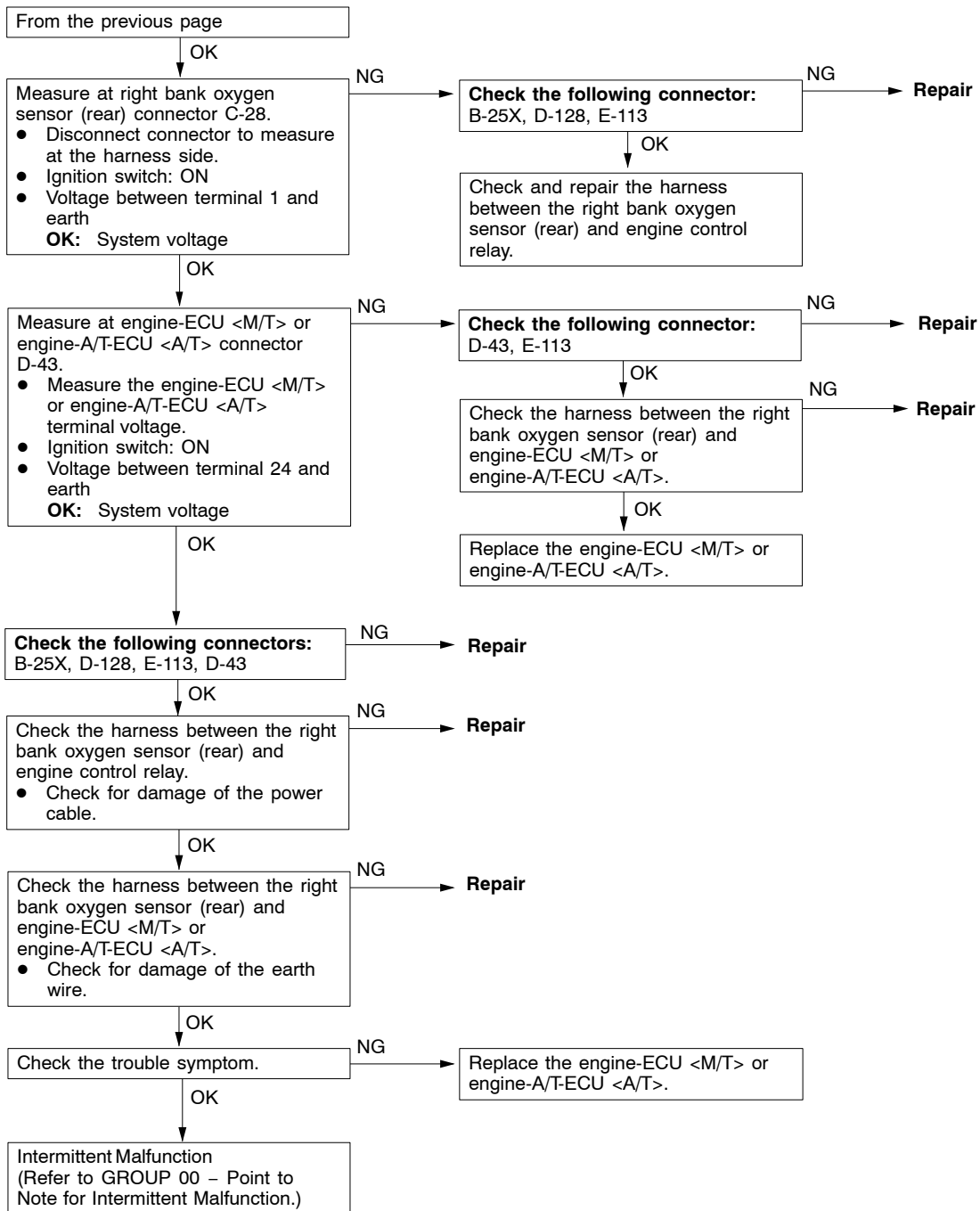
Code No. P0136 Right bank oxygen sensor (rear) system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> More than 3 minutes passed after completion of start of engine The engine coolant water temperature is approximately more than 80°C. The engine speed is more than 1,200 r/min. Currently running on flat road at constant speed. Volumetric efficiency 25% or more. <p>Set Condition</p> <ul style="list-style-type: none"> The right bank oxygen sensor (rear) output voltage is 4.5 V or more when the sensor output voltage is 0.15 V or less and a voltage of 5 V is applied to the right bank oxygen sensor (rear) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>. 	<ul style="list-style-type: none"> Malfunction of right bank oxygen sensor (rear) Right bank oxygen sensor (rear) circuit disconnection, short-circuit, or connector contact defect. Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



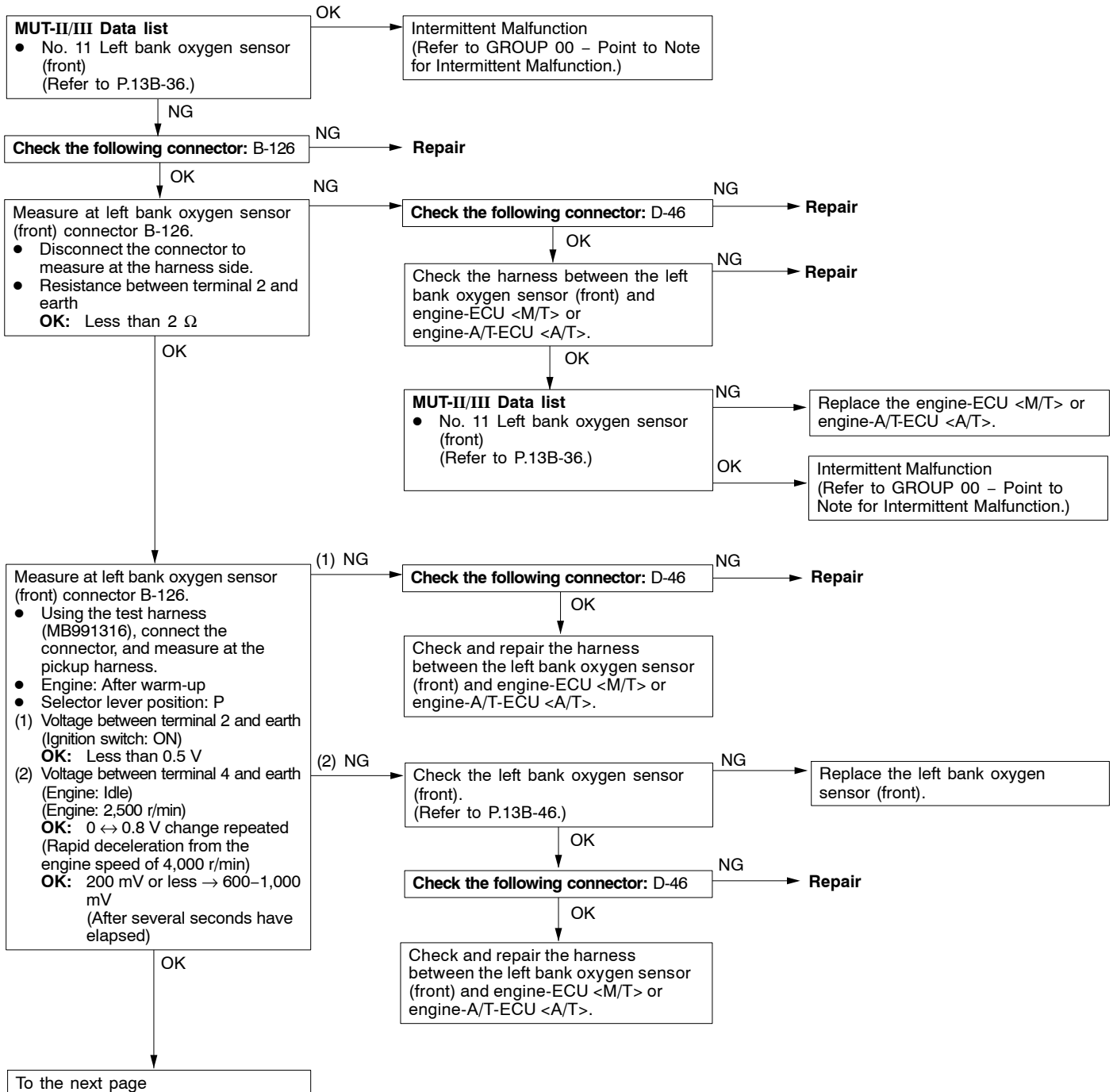


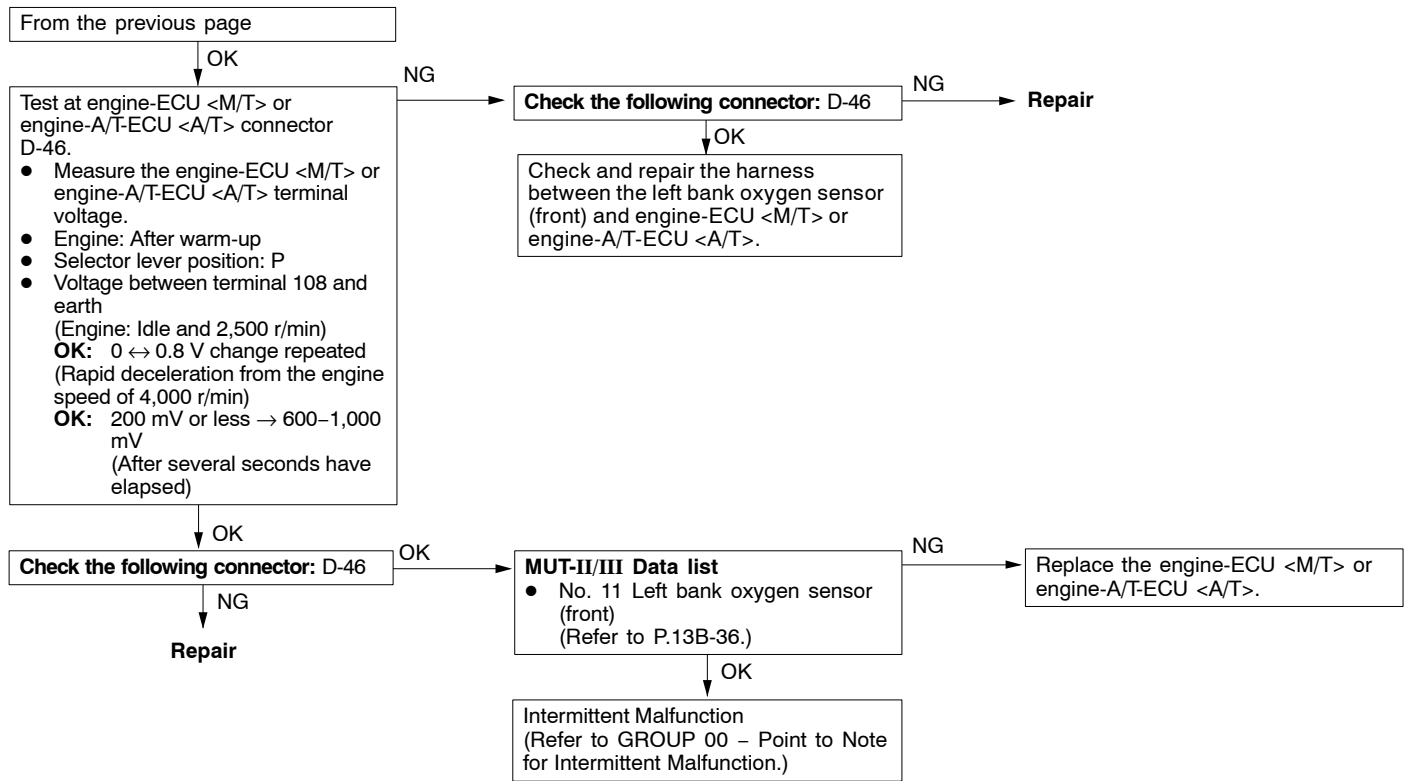
Code No. P0141 Right bank oxygen sensor heater (rear) system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approximately more than 20°C. • Right bank oxygen sensor heater (rear) is ON. • The engine speed is more than 50 r/min. • The battery voltage is 11 – 16 V. <p>Set Condition</p> <ul style="list-style-type: none"> • For 4.5 seconds, right bank oxygen sensor heater (rear) current is 0.2 A or less, or 5 A or more. 	<ul style="list-style-type: none"> • Malfunction of right bank oxygen sensor heater (rear) • Right bank oxygen sensor heater (rear) circuit disconnection, short-circuit, or connector contact defect • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



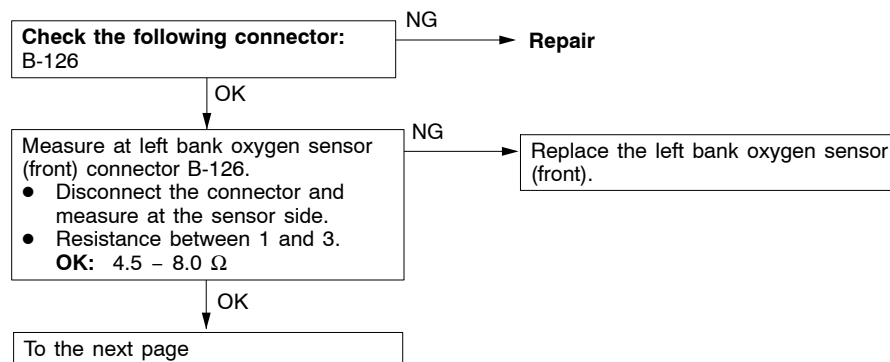


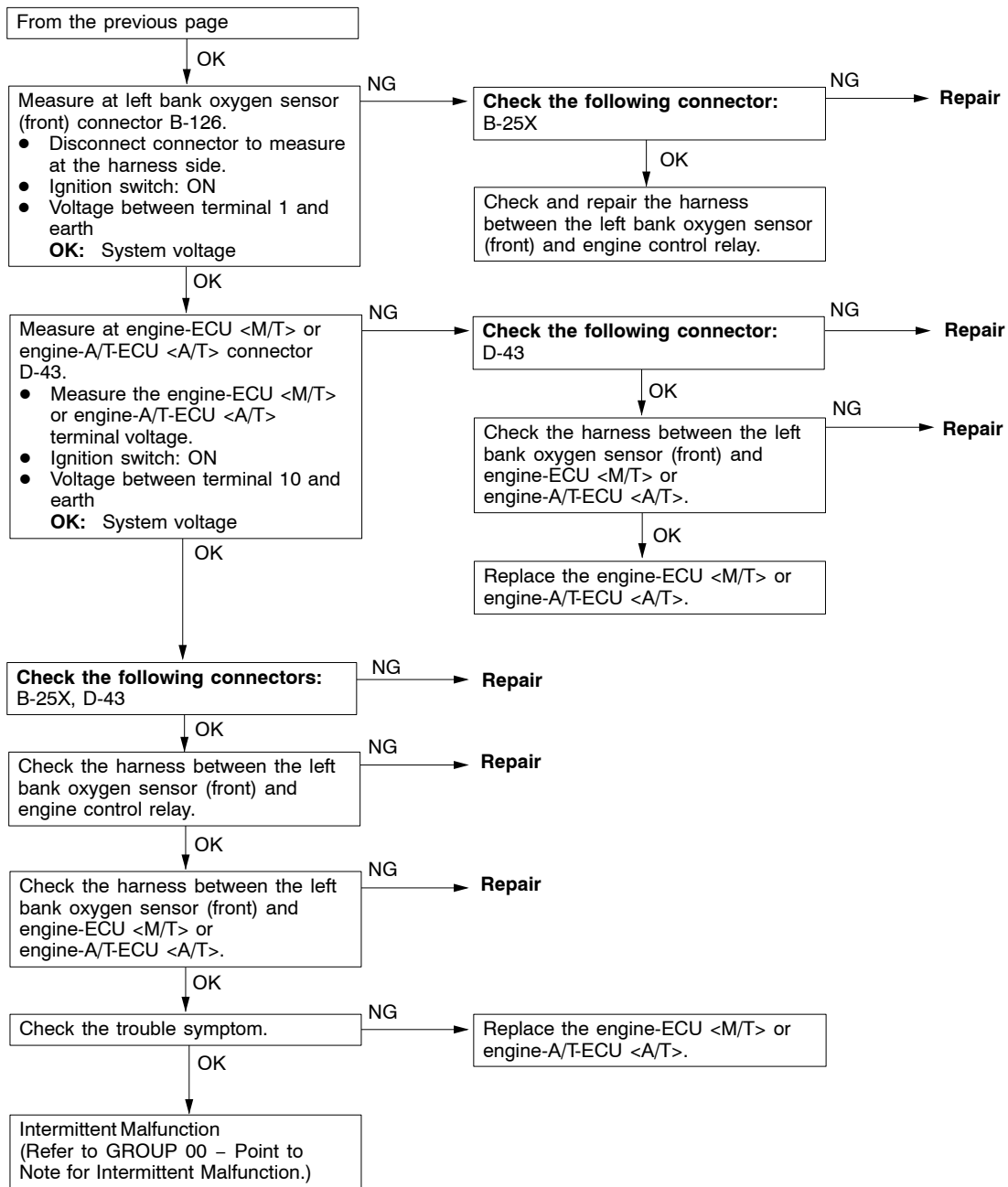
Code No. P0150 Left bank oxygen sensor (front) system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> More than 3 minutes passed after completion of start of engine The engine coolant water temperature is approximately more than 80°C. The engine speed is more than 1,200 r/min. Currently running on flat road at constant speed. Volumetric efficiency 25% or more. <p>Set Condition</p> <ul style="list-style-type: none"> The left bank oxygen sensor (front) 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 left bank oxygen sensor (front) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>. 	<ul style="list-style-type: none"> Malfunction of left bank oxygen sensor (front) Left bank oxygen sensor (front) circuit disconnection, short-circuit, or connector contact defect. Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



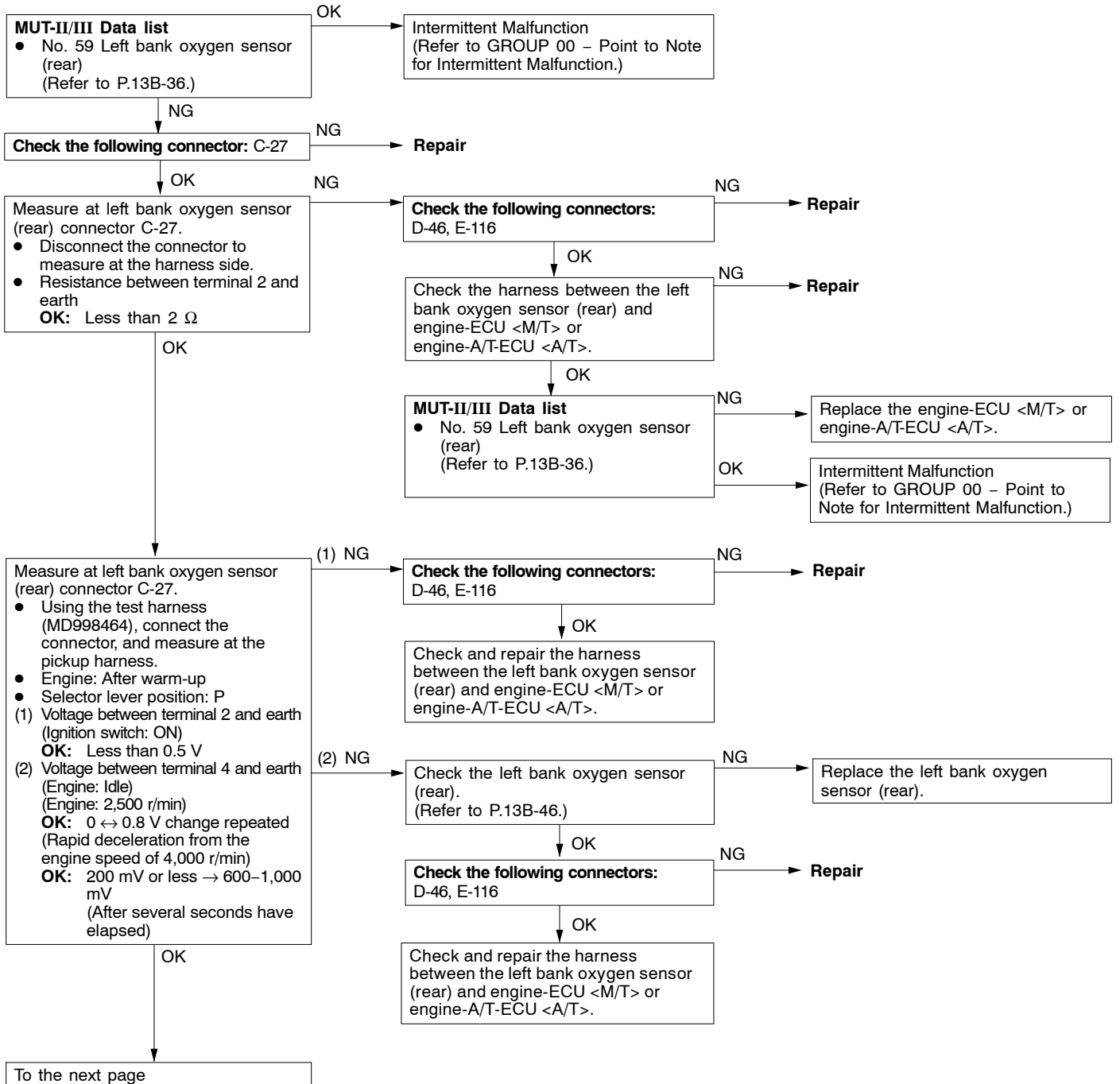


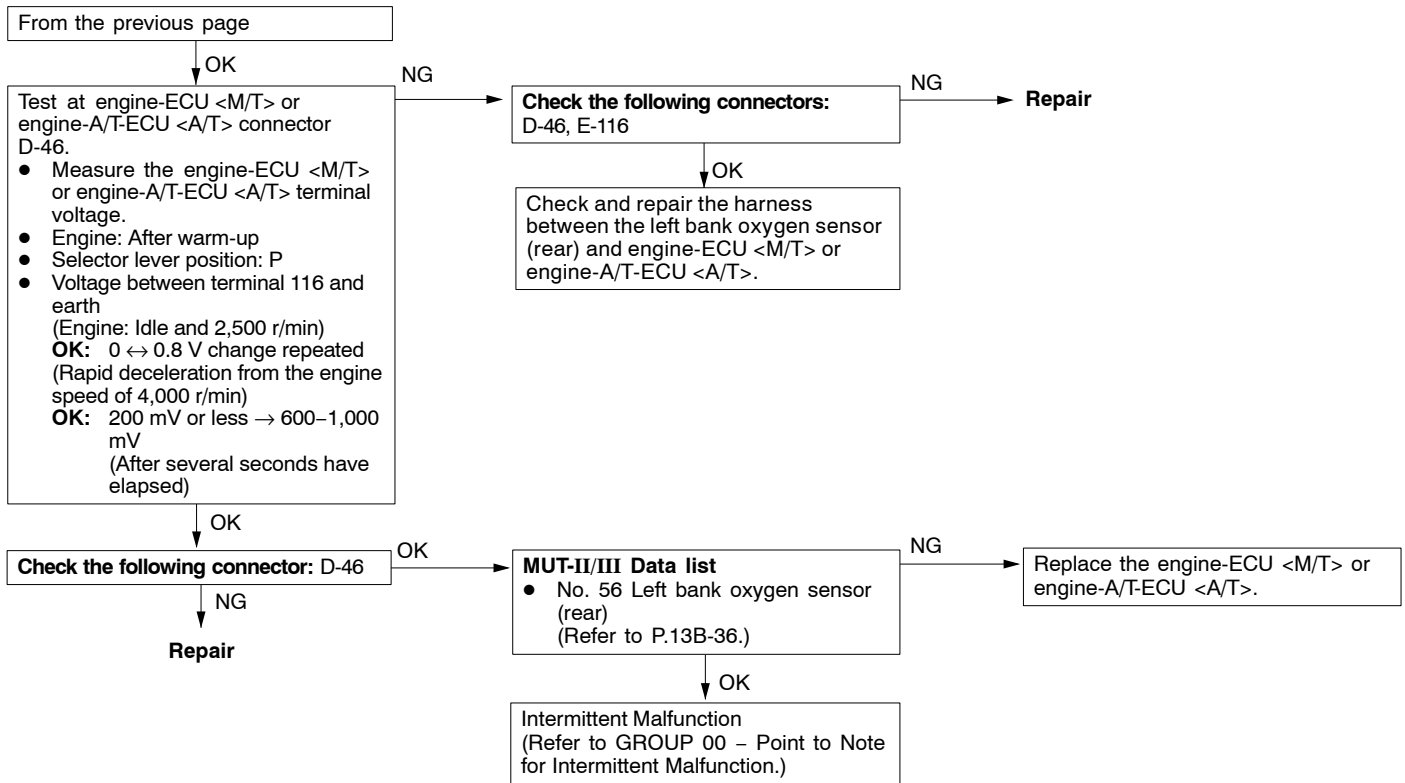
Code No. P0155 Left bank oxygen sensor heater (front) system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approximately more than 20°C. • Left bank oxygen sensor heater (front) is ON. • The engine speed is more than 50 r/min. • The battery voltage is 11 – 16 V. <p>Set Condition</p> <ul style="list-style-type: none"> • For 4 seconds, left bank oxygen sensor heater (front) current is 0.2 A or less, or 7.5 A or more. 	<ul style="list-style-type: none"> • Malfunction of left bank oxygen sensor heater (front) • Left bank oxygen sensor heater (front) circuit disconnection, short-circuit, or connector contact defect • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



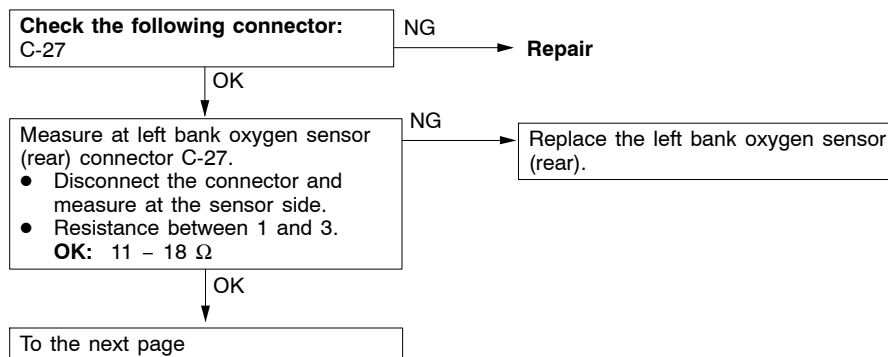


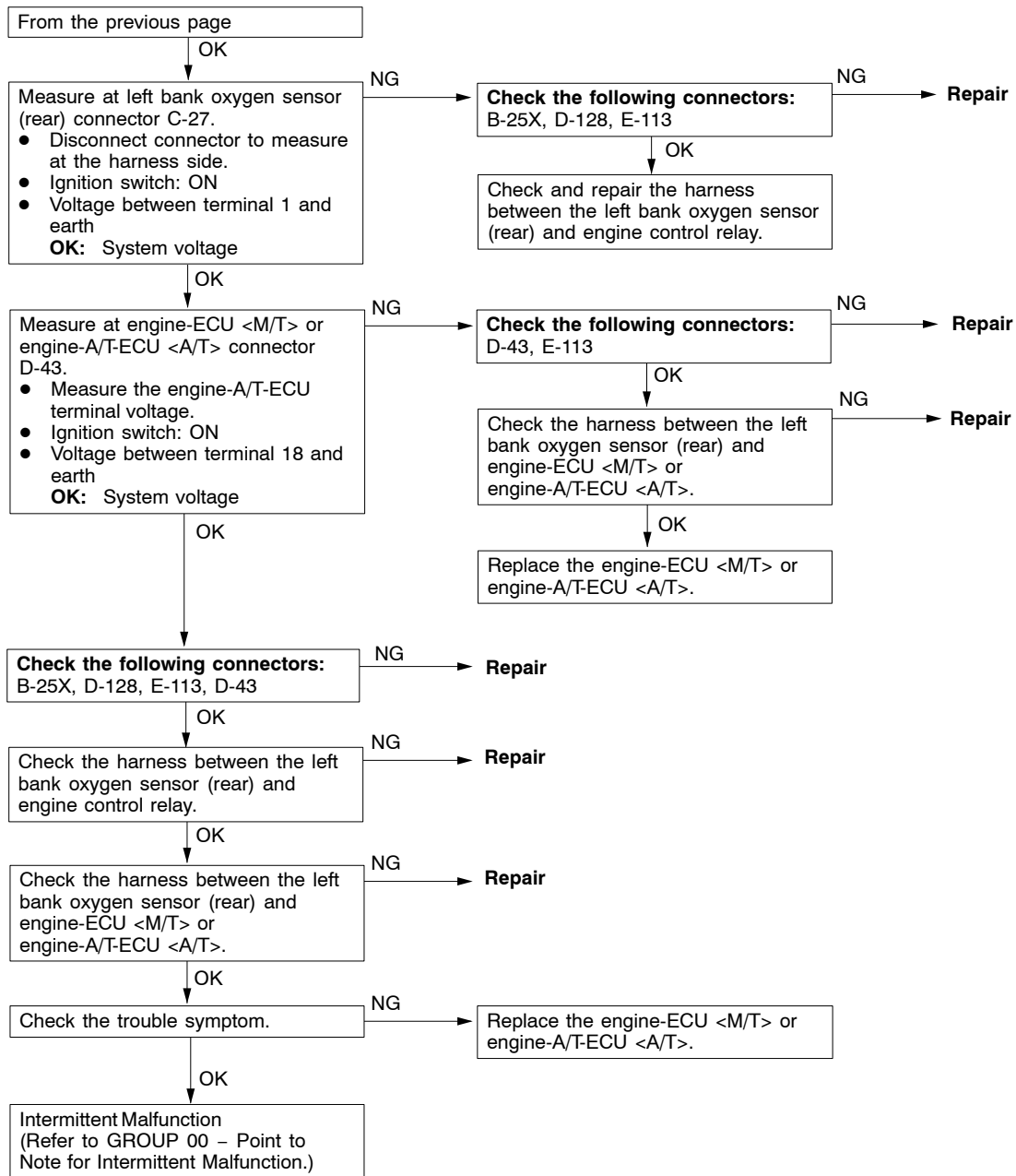
Code No. P0156 Left bank oxygen sensor (rear) system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> More than 3 minutes passed after completion of start of engine The engine coolant water temperature is approximately more than 80°C. The engine speed is more than 1,200 r/min. Currently running on flat road at constant speed. Volumetric efficiency 25% or more. <p>Set Condition</p> <ul style="list-style-type: none"> The left bank oxygen sensor (rear) output voltage is 4.5 V or more when the sensor output voltage is 0.15 V or less and a voltage of 5 V is applied to the left bank oxygen sensor (rear) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>. 	<ul style="list-style-type: none"> Malfunction of left bank oxygen sensor (rear) Left bank oxygen sensor (rear) circuit disconnection, short-circuit, or connector contact defect. Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



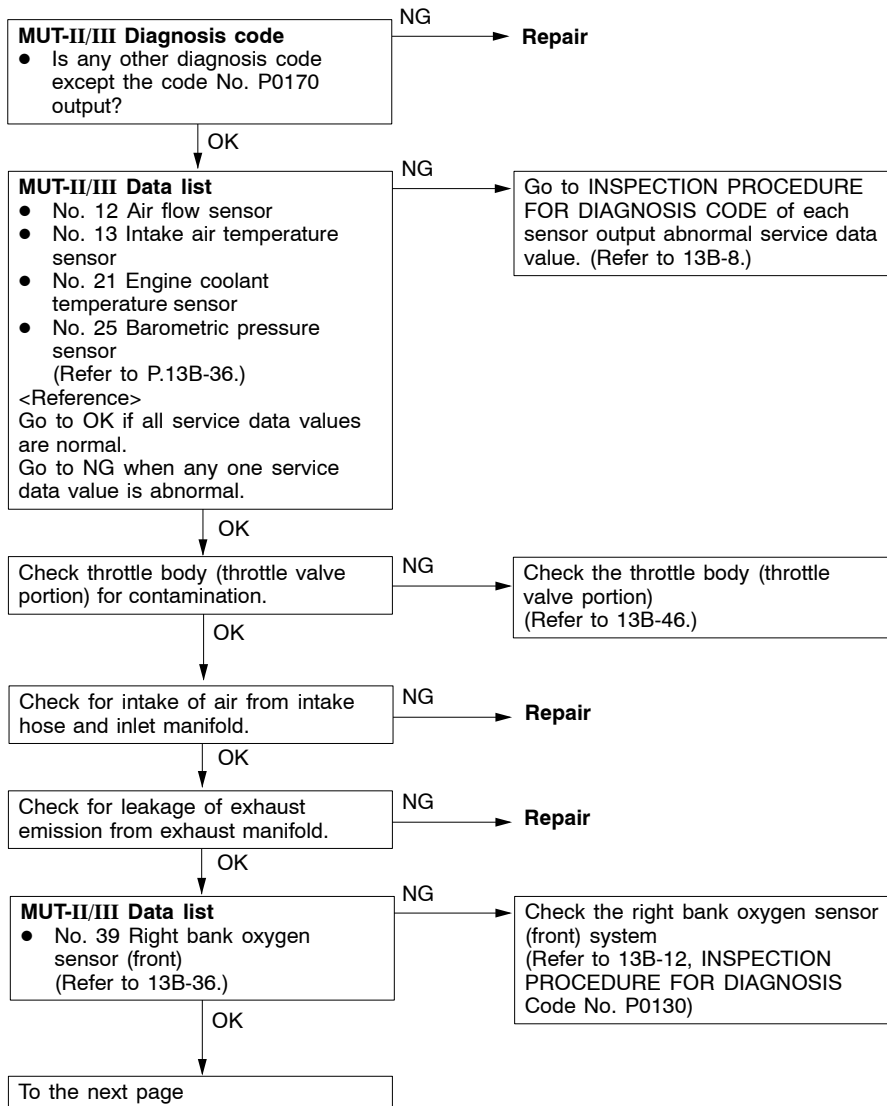


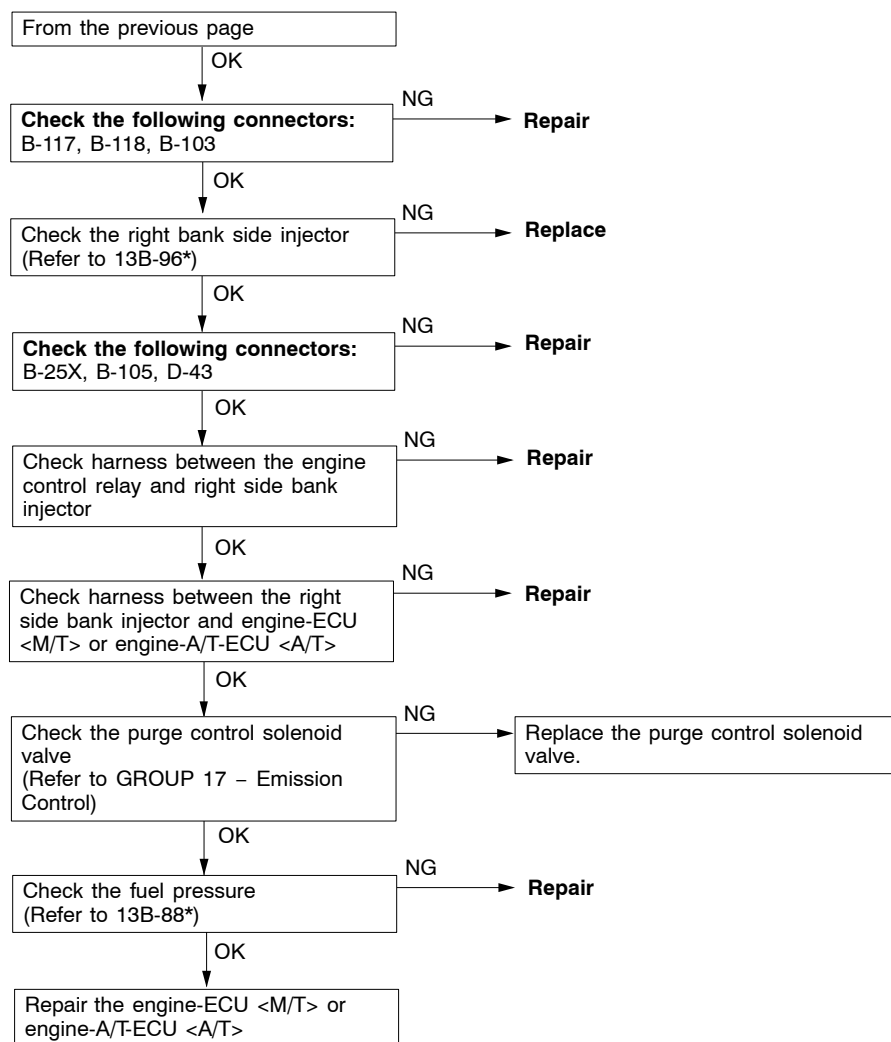
Code No. P0161 Left bank oxygen sensor heater (rear) system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approximately more than 20°C. • Left bank oxygen sensor heater (rear) is ON. • The engine speed is more than 50 r/min. • The battery voltage is 11 – 16 V. <p>Set Condition</p> <ul style="list-style-type: none"> • For 4.5 seconds, left bank oxygen sensor heater (rear) current is 0.2 A or less, or 5 A or more. 	<ul style="list-style-type: none"> • Malfunction of left bank oxygen sensor heater (rear) • Left bank oxygen sensor heater (rear) circuit disconnection, short-circuit, or connector contact defect • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>





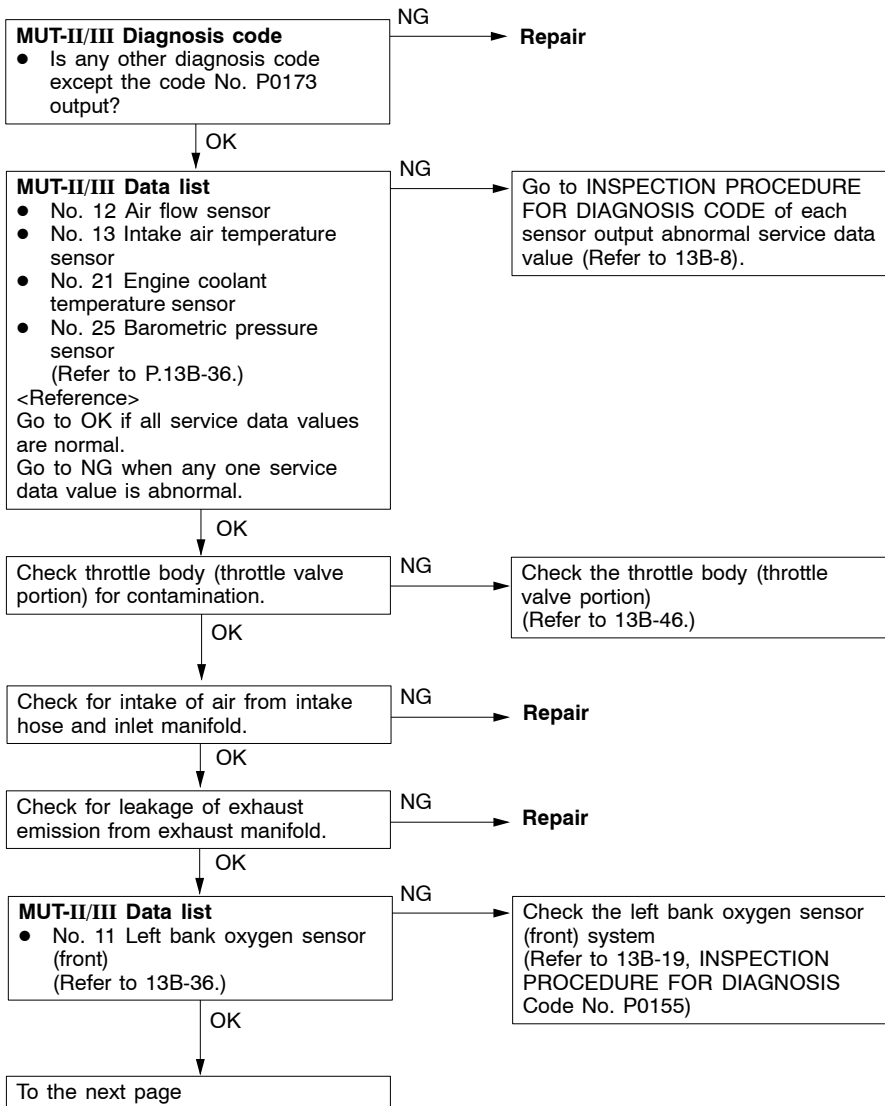
Code No. P0170 Abnormal fuel system (Right bank)	Probable cause
Range of Check <ul style="list-style-type: none"> • In learning the air/fuel ratio Set Conditions <ul style="list-style-type: none"> • 5 seconds or more have been passed while the fuel injection amount compensation value is too low. or <ul style="list-style-type: none"> • 5 seconds or more have been passed while the fuel injection amount compensation value is too high. 	<ul style="list-style-type: none"> • Malfunction of intake air temperature sensor • Malfunction of air flow sensor • Malfunction of purge control solenoid valve • Malfunction of injector • Air drawn in from gaps in gasket, seals, etc. • Malfunction of engine coolant temperature sensor • Malfunction of barometric pressure sensor • Exhaust leak • Incorrect fuel pressure • Malfunction of right bank oxygen sensor (front) • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>

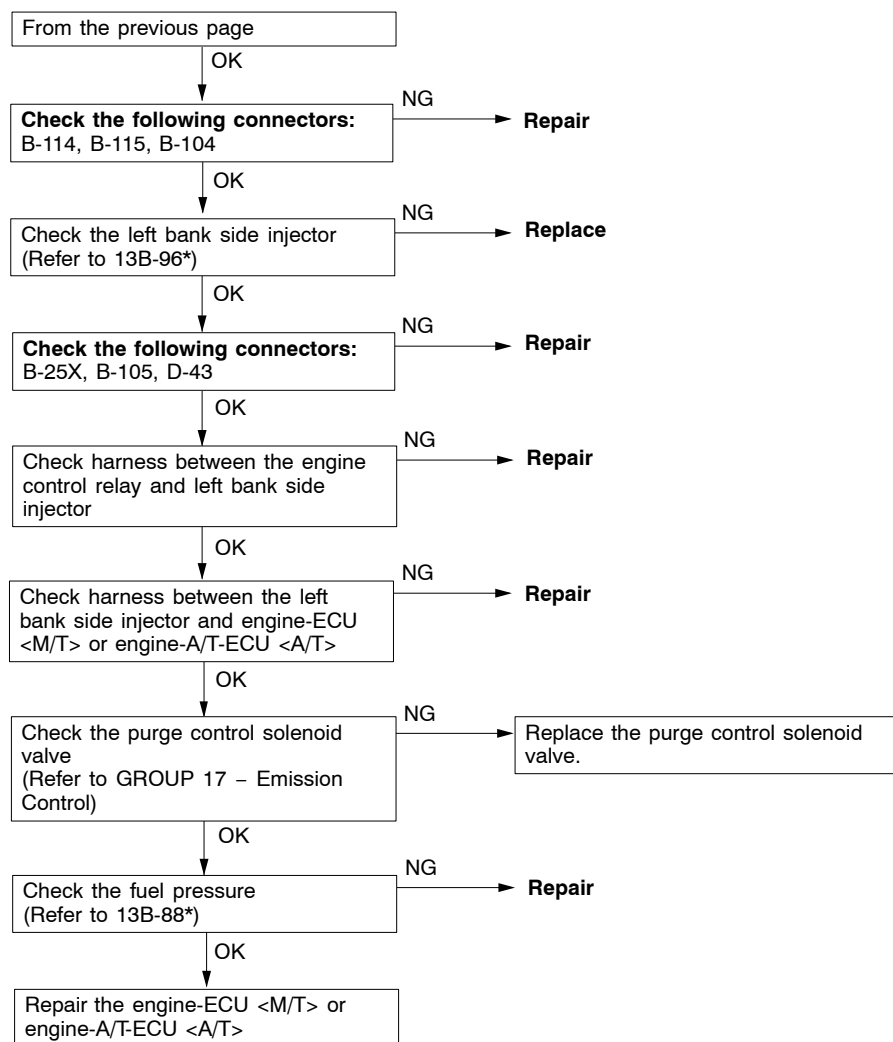


**NOTE**

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

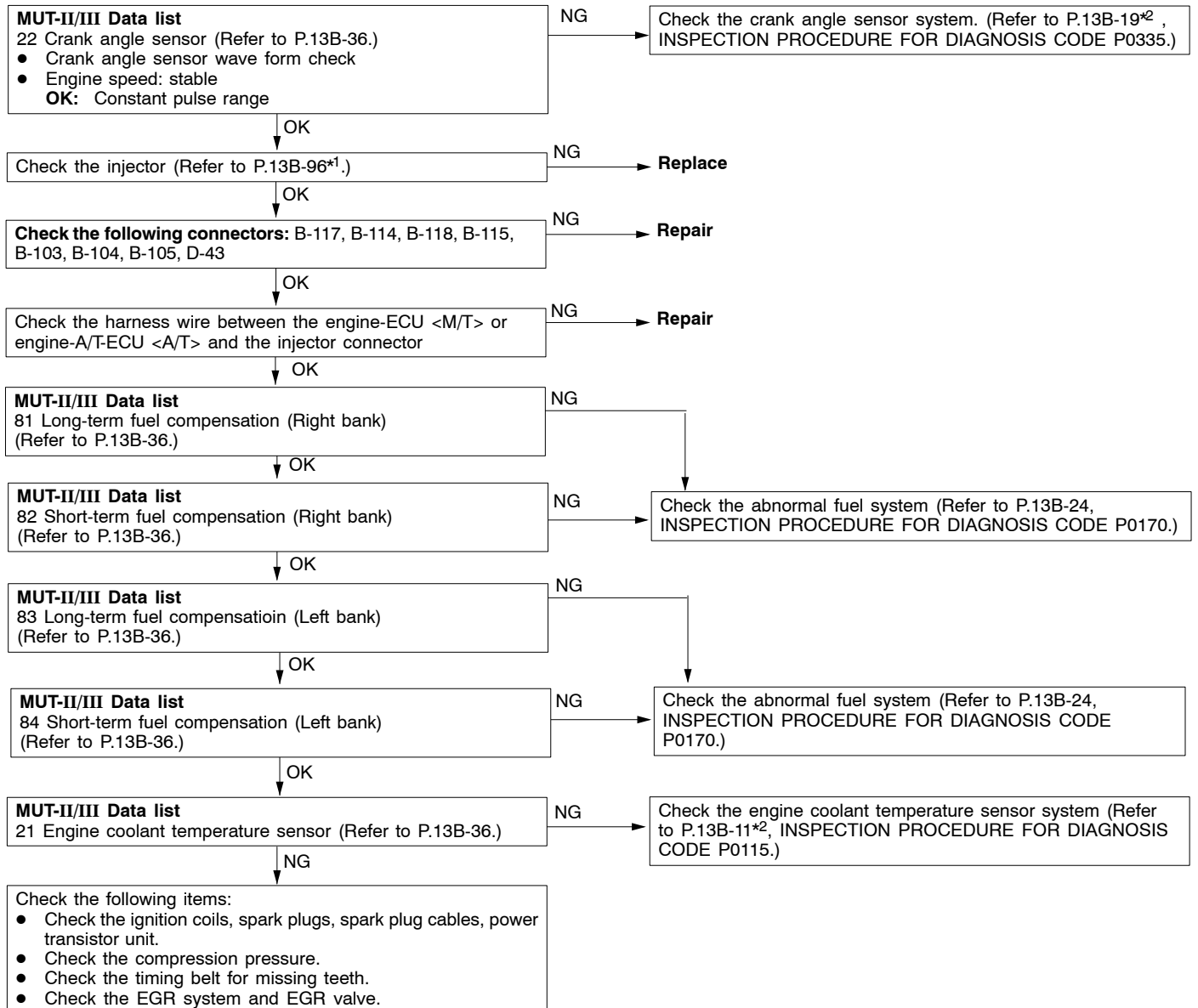
Code No. P0173 Abnormal fuel system (Left bank)	Probable cause
Range of Check <ul style="list-style-type: none"> • In learning the air/fuel ratio Set Conditions <ul style="list-style-type: none"> • 5 seconds or more have been passed while the fuel injection amount compensation value is too low. or <ul style="list-style-type: none"> • 5 seconds or more have been passed while the fuel injection amount compensation value is too high. 	<ul style="list-style-type: none"> • Malfunction of intake air temperature sensor • Malfunction of air flow sensor • Malfunction of purge control solenoid valve • Malfunction of injector • Air drawn in from gaps in gasket, seals, etc. • Malfunction of engine coolant temperature sensor • Malfunction of barometric pressure sensor • Exhaust leak • Incorrect fuel pressure • Malfunction of left bank oxygen sensor (front) • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



**NOTE**

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

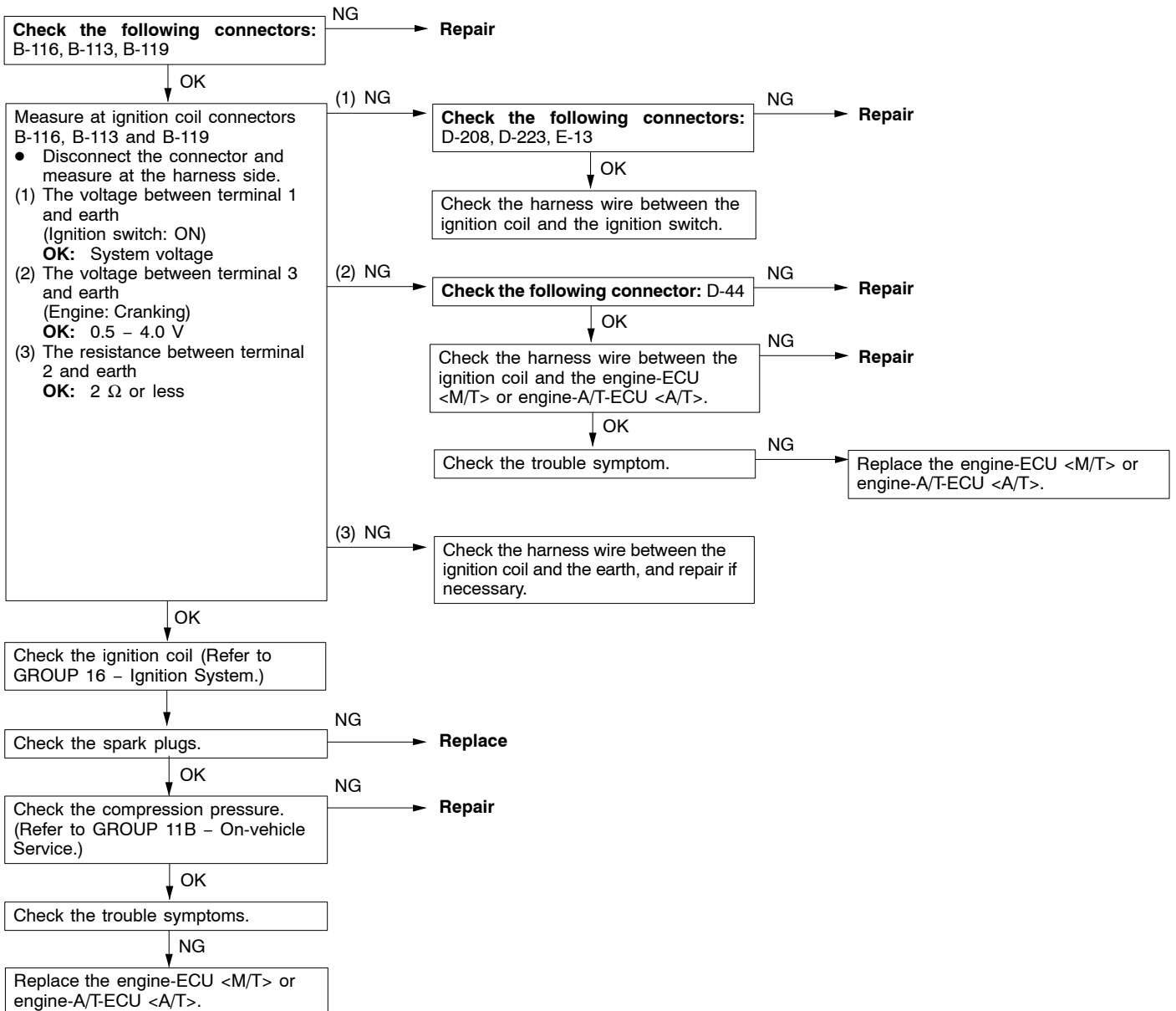
Code No. P0300 Random cylinder misfire detected	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • 5 seconds or more have passed after completion of start of engine. • Engine speed is 500 – 4500 r/min. • Intake manifold pressure is 32 kPa or more. • Engine coolant temperature is –10°C or higher. • The intake air temperature is –10°C or higher. • The barometric pressure is 72 kPa or more. • The volumetric efficiency is 27.5 – 60%. • Adaptive learning is complete for the vane which generates a crankshaft position signal. • While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching (A/C: within three seconds after switching from ON to Off and vice versa). • Throttle deviation is between –0.059 V/10 ms and +0.059 V/10 ms <p>Set Condition</p> <ul style="list-style-type: none"> • Misfire has occurred more frequently than allowed (2%) during 200 revolutions (when the catalyst temperature is higher than 950°C). (Misfire is detected in 2 cylinders or more) 	<ul style="list-style-type: none"> • Malfunction of the ignition system • Abnormal compression • Malfunction of injector • Abnormal signal from the crank angle sensor • Malfunction of the air/fuel mixture ratio control system • Malfunction of the engine coolant temperature sensor • Missing timing belt teeth • Malfunction of the EGR valve • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>

**NOTE:**

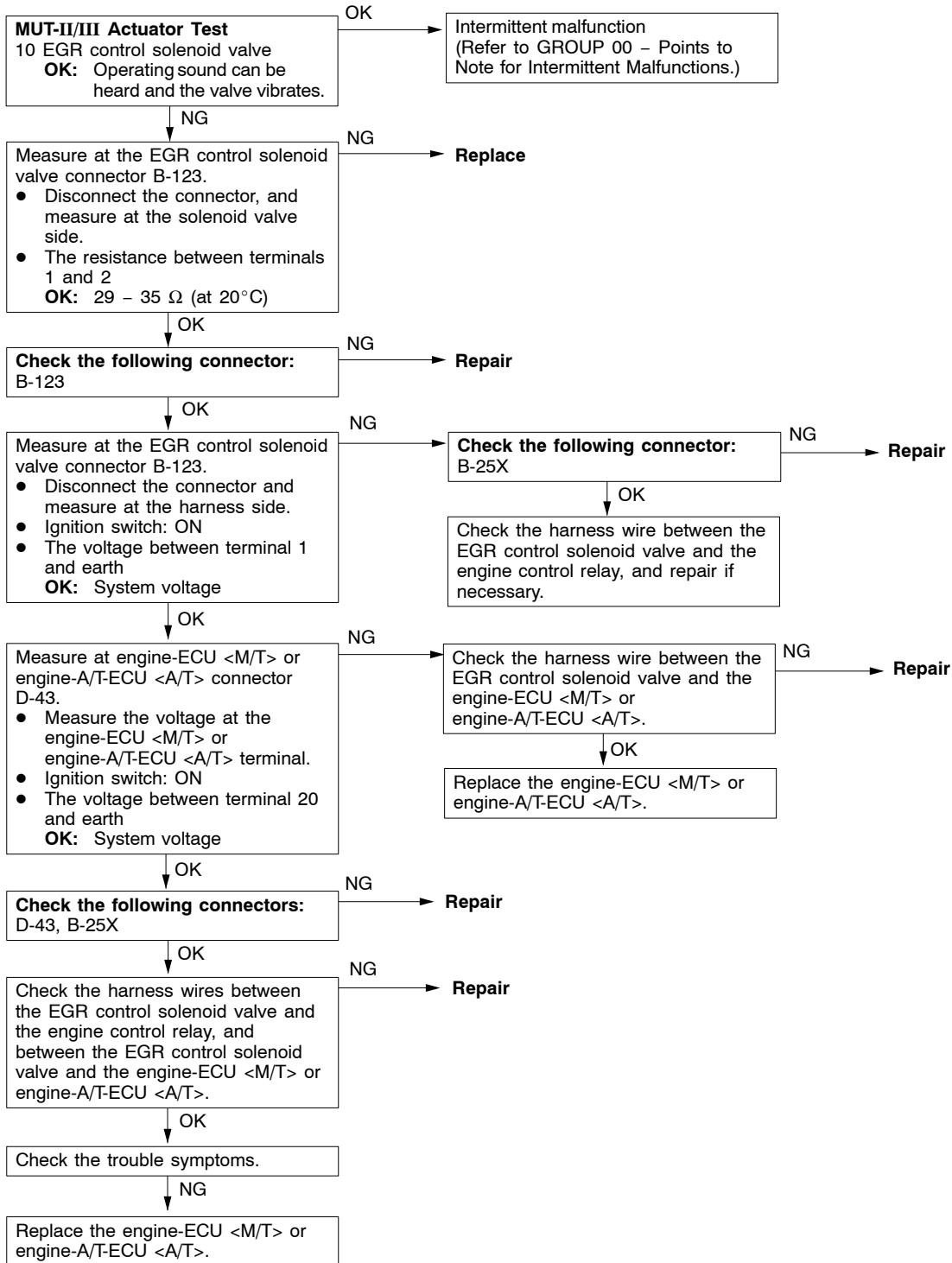
*1: Refer to the 2001 PAJERO Workshop Manual (Pub. No. PWJE0005)

*2: Refer to the 2004 PAJERO Workshop Manual (Pub. No. PWJE0005-3)

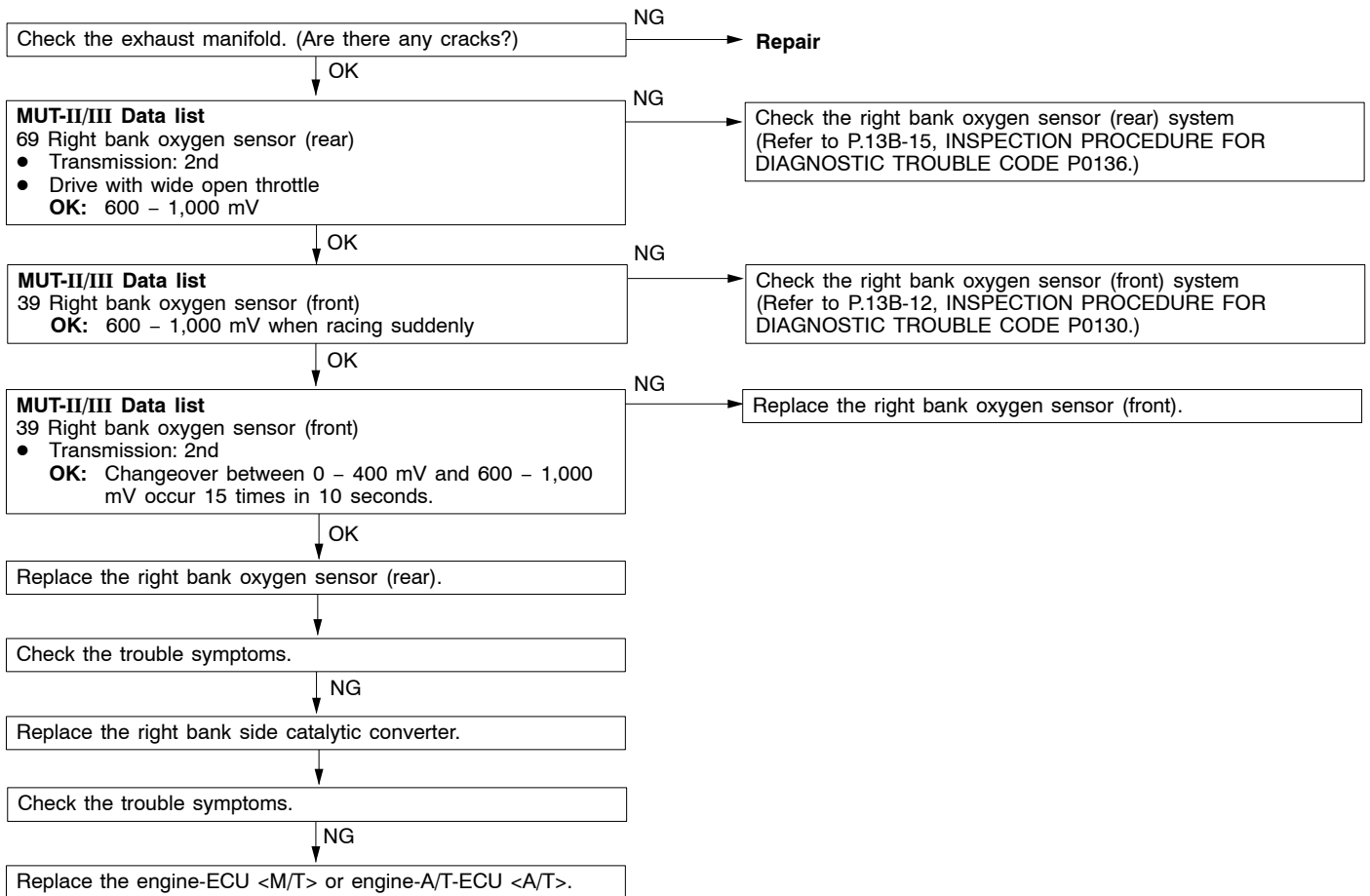
Code No. P0301 No. 1 cylinder misfire detected Code No. P0302 No. 2 cylinder misfire detected Code No. P0303 No. 3 cylinder misfire detected Code No. P0304 No. 4 cylinder misfire detected Code No. P0305 No. 5 cylinder misfire detected Code No. P0306 No. 6 cylinder misfire detected	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> 5 seconds or more have passed after completion of start of engine. The engine speed is 500 – 4500 r/min. The intake manifold pressure is 32 kPa or more. The engine coolant temperature is –10°C or higher. The intake air temperature is –10°C or higher. The barometric pressure is 72 kPa or more. The volumetric efficiency is 27.5 – 60%. Adaptive learning for the vane that sends the crankshaft position signal is complete. While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching (A/C: within three seconds after switching from ON to Off and vice versa). Throttle deviation is between –0.059 V/10 ms and +0.059 V/10 ms <p>Set Condition</p> <ul style="list-style-type: none"> Misfire has occurred more frequently than allowed (2%) during 200 revolutions (when the catalyst temperature is higher than 950°C). (Misfire is detected in one cylinder only) 	<ul style="list-style-type: none"> Malfunction of the ignition system Abnormal compression Malfunction of injector Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



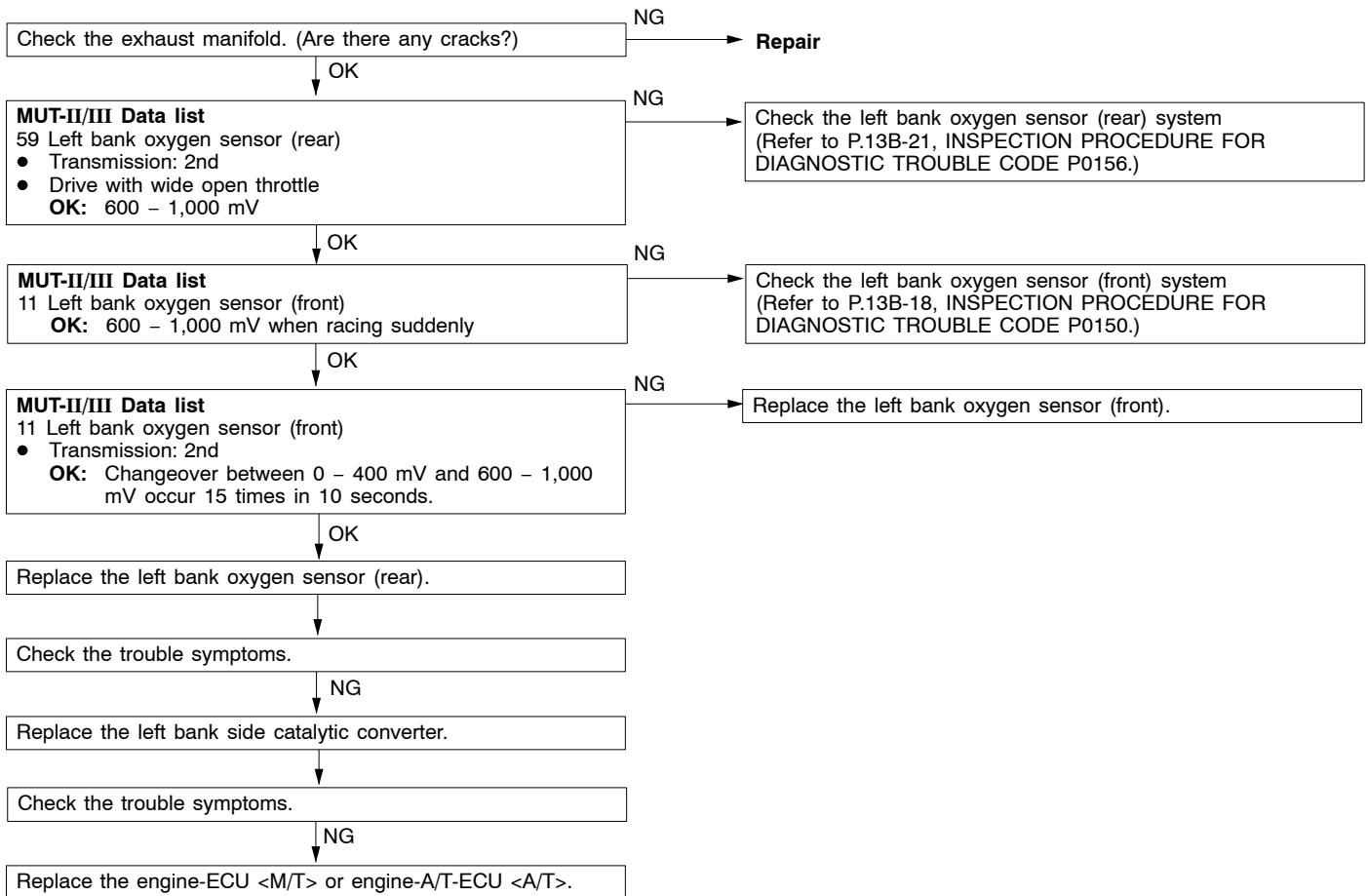
Code No. P0403 EGR control solenoid valve system	Probable cause
Range of Check <ul style="list-style-type: none"> Ignition switch: ON Battery voltage is 10 V or more. Set Condition <ul style="list-style-type: none"> The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the EGR control solenoid valve is turned from on to off. 	<ul style="list-style-type: none"> Malfunction of the EGR control solenoid valve Open or short circuit in the EGR control solenoid valve circuit or loose connector contact Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



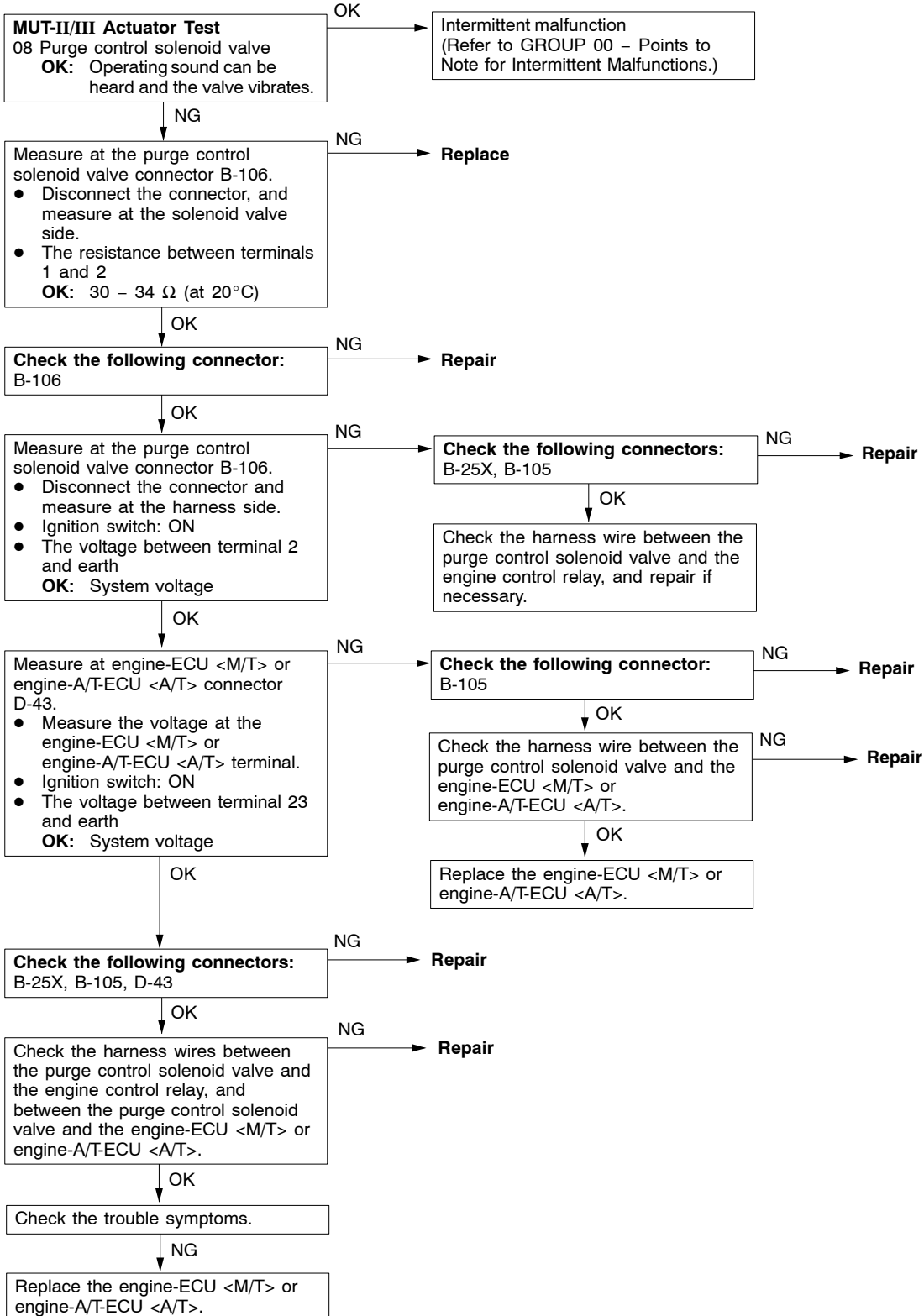
Code No. P0421 Catalyst malfunction (Right bank)	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • The engine speed is 3,000 r/min or less. • The throttle valve is open. • The air flow sensor output is 8 g/s or more. • 3 seconds or more have passed after the conditions above were satisfied. • Under the closed loop control • Vehicle speed is 1.5 km/h or more. • Short-term fuel trim is -12.5% or higher or +12.5 % or lower. • The cumulative air flow sensor output is 708g or more. <p>Set Condition</p> <ul style="list-style-type: none"> • The right bank oxygen sensor (rear) signal frequency divided by right bank oxygen sensor (front) signal frequency = 0.75 or more. 	<ul style="list-style-type: none"> • Malfunction of right bank side catalyst • Malfunction of the right bank oxygen sensor (front) • Malfunction of the right bank oxygen sensor (rear) • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



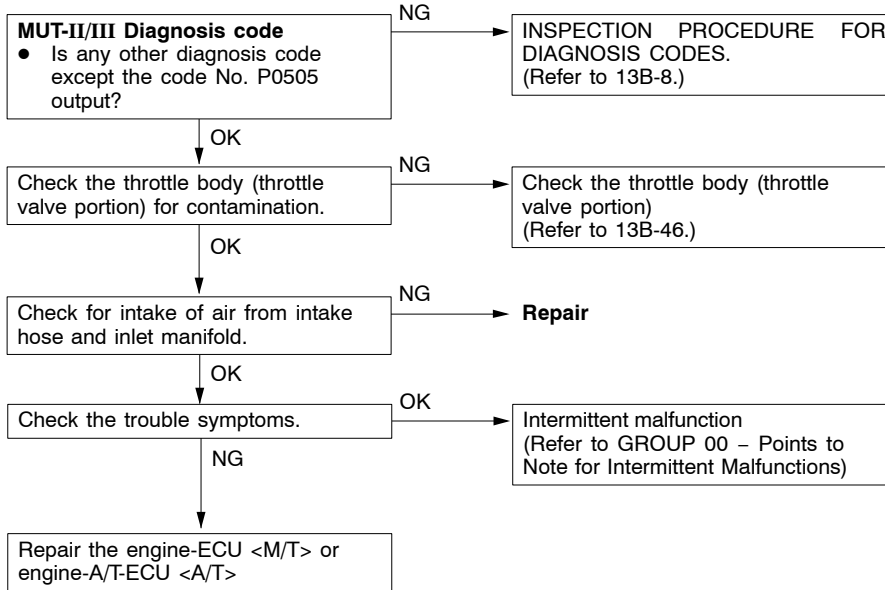
Code No. P0431 Catalyst malfunction (Left bank)	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • The engine speed is 3,000 r/min or less. • The throttle valve is open. • The air flow sensor output is 8 g/s or more. • 3 seconds or more have passed after the conditions above were satisfied. • Under the closed loop control • The vehicle speed is 1.5 km/h or more. • Short-term fuel trim is -12.5% or higher or +12.5 % or lower. • The cumulative air flow sensor output is 708g or more. <p>Set Condition</p> <ul style="list-style-type: none"> • The left bank oxygen sensor (rear) signal frequency divided by left bank oxygen sensor (front) signal frequency = 0.75 or more. 	<ul style="list-style-type: none"> • Malfunction of left bank side catalyst • Malfunction of the left bank oxygen sensor (front) • Malfunction of the left bank oxygen sensor (rear) • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



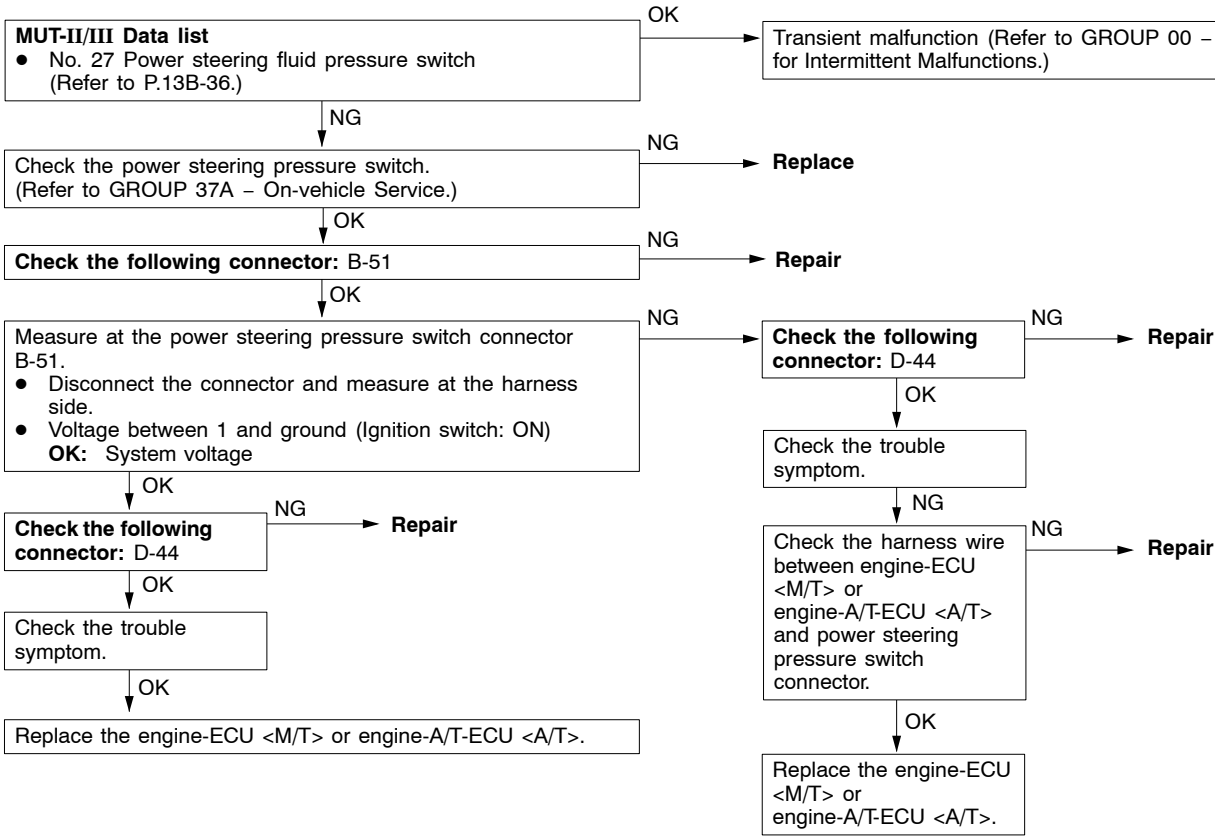
Code No. P0443 Purge control solenoid valve system	Probable cause
Range of Check <ul style="list-style-type: none"> Ignition switch: ON Battery voltage is 10 V or more. Set Condition <ul style="list-style-type: none"> The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off. 	<ul style="list-style-type: none"> Malfunction of the purge control solenoid valve Open or short circuit in the purge control solenoid valve circuit or loose connector contact Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



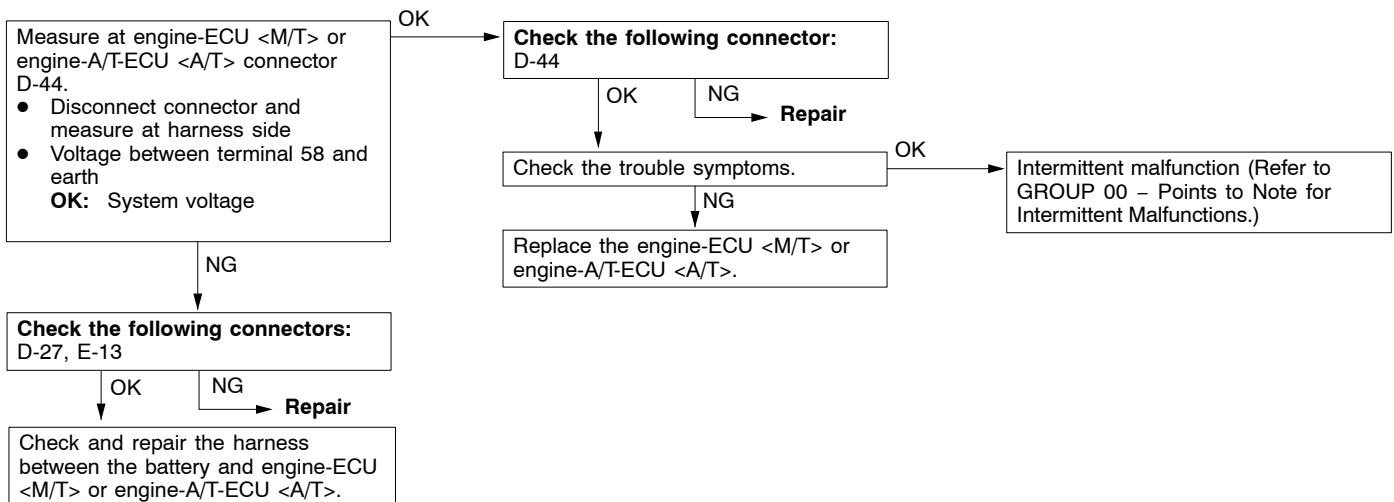
Code No. P0505 Idle speed control (ISC) system	Probable cause
Range of Check <ul style="list-style-type: none"> Engine coolant temperature is approximately 80°C or higher. Battery voltage is 10 V or more. Set Condition <ul style="list-style-type: none"> The actual idle speed is higher than target idle speed by 200 r/min or more for 10 seconds. 	<ul style="list-style-type: none"> Intake system vacuum leak Throttle valve area is dirty Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



Code No. P0551 Power steering fluid pressure switch system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Engine coolant temperature is 10°C or more. Repeat the *1 drive and *2 stop ten times or more. <p>*1: Engine speed is 50 r/min or higher. *2: Vehicle speed is 1.5 km/h or lower.</p> <p>Set Condition</p> <ul style="list-style-type: none"> Power steering pressure switch remains on. 	<ul style="list-style-type: none"> Power steering fluid pressure switch failed. Open or shorted power steering fluid pressure switch circuit or loose connector Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>



Code No. P1603 Battery backup line system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON <p>Set Condition</p> <ul style="list-style-type: none"> Battery backup line voltage 6 V or less. 	<ul style="list-style-type: none"> Battery backup line circuit disconnection, short-circuit, or connector contact defect Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T>



DATA LIST REFERENCE TABLE

Caution

When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.

NOTE

- Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second close to the engine.
- Bank 1 indicates the right bank cylinder, and bank 2 indicates the left bank cylinder.
- *1. In a new vehicle [driven approximately 500 km or less], the air flow sensor output frequency is sometimes 10% higher than the standard frequency.
- *2. The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 V.
- *3. In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.
- *4. Disconnect the throttle valve control servo connector, and then delete the diagnosis code that was recorded during the inspection with the use of the MUT-II/III after the inspection has been completed.
- *5. When service data in check mode is selected, the data is not displayed.
- *6. Refer to the 2004 PAJERO Workshop Manual (Pub. No. PWJE0005-3).
- *7. Refer to the 2005 PAJERO Workshop Manual (Pub. No. PWJE0005-4).

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
11	Left bank oxygen sensor (front)	Engine:Warming up (Air/fuel mixture is made leaner when decelerating, and is made richer when racing.)	When the engine is running at 4,000 r/min, decelerate suddenly.	200 mV or less	Code No. P0150	13B-18
			When engine is suddenly raced.	600 – 1,000 mV		
		Engine:Warming up (The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the engine-ECU<M/T> or engine-A/T-ECU<A/T>.)	Engine is idling	Voltage changes repeatedly between 400 mv or less and 600 – 1,000 mV		
			2,500 r/min	Voltage changes repeatedly between 400 mv or less and 600 – 1,000 mV		
12	Air flow sensor*1	<ul style="list-style-type: none"> ● Engine coolant temperature: 80 – 95°C ● Lamps, electric cooling fan and all accessories: OFF ● Neutral (A/T: P range) 	Engine is idling	17 – 60 Hz	–	–
			2,500 r/min	90 – 200 Hz		
			Engine is raced	Frequency increases in response to racing		

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
13	Intake air temperature sensor	Ignition switch: ON or with engine running	When intake air temperature is -20°C	-20°C	Code No. P0110	13B-10* ⁶
			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		
14	Throttle position sensor (sub)	<ul style="list-style-type: none"> Ignition switch: ON (Engine is stopped) Remove the intake air hose at the throttle body side. Disconnect the throttle position sensor connector, and then connect terminal No.1, No.2, No.3 and No. 4 with the use of the special tool: MB991348 	Close the throttle valve with a finger fully.	2,200 – 2,800 mV	Code No. P0222, P0223	13B-7* ⁷ , 13B-18* ⁶
			Open the throttle valve with a finger fully.	4,000 mV or more		
16	Power supply voltage	Ignition switch: ON		System voltage	Procedure No. 25	13B-57* ⁶
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 27	13B-23* ⁷
			Engine: Cranking	ON		
21	Engine coolant temperature sensor	Ignition switch: ON or with engine running	When engine coolant temperature is -20°C	-20°C	Code No. P0115	13B-11* ⁶
			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		

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
22	Crank angle sensor	<ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected 	Compare the engine speed readings on the tachometer and the MUT-II/III.	Matched	Code No. P0335	13B-19*6
		Engine: Idling	When engine coolant temperature is -20°C	1,300 – 1,500 r/min		
			When engine coolant temperature is 0°C	1,300 – 1,500 r/min		
			When engine coolant temperature is 20°C	1,300 – 1,500 r/min		
			When engine coolant temperature is 40°C	1,040 – 1,240 r/min		
			When engine coolant temperature is 80°C	600 – 800 r/min		
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. P0105	13B-37*6
			At altitude of 600 m	95 kPa		
			At altitude of 1,200 m	88 kPa		
			At altitude of 1,800 m	81 kPa		
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Code No. P0551	13B-35
			Steering wheel turning	ON		
28	A/C switch	Engine: Warming up, idling		OFF	Procedure No. 29	13B-59*6
		<ul style="list-style-type: none"> Engine: After having warming up/Engine idling A/C switch: ON 	A/C compressor clutch is not operating	OFF		
			A/C compressor clutch is operating	ON		
34	Air flow sensor reset signal	Engine: After having warming up	Engine is idling	ON	Code No. P0100	13B-8*6
			2,500 r/min	OFF		

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
37	Volumetric efficiency	<ul style="list-style-type: none">Engine coolant temperature: 80 – 95 °CLamps, electric cooling fan and all accessories: OFFTransmission: Neutral (A/T: P range)	Engine is idling	15 – 35 %	—	—
			2,500 r/min	15 – 35 %		
			Racing	Volumetric efficiency in-creases according to amount of racing.		
38	Crank angle sensor	<ul style="list-style-type: none">Engine: Cranking (at less than 2,000 r/min)Tachometer: Connected		The speeds indicated by the MUT-II/III and tachometer match.	—	—
39	Right bank oxygen sensor (front)	Engine: Warming up (Air/fuel mixture is made leaner when decelerating, and is made richer when racing.)	When the engine is running at 4,000 r/min decelerate suddenly.	200 mV or less	Code No. P0130	13B-12
			When engine is sud- denly raced.	600 – 1,000 mV		
		Engine: Warming up (The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the engine-ECU <M/T> or engine-A/T-ECU <A/T>.)	Engine is idling	Voltage changes repeatedly be- tween 400 mV or less and 600 – 1,000 mV		
			2,500 r/min			
41	Injectors*2	Engine: Cranking	When engine coolant temperature is 0°C	100 – 160 ms	—	—
			When engine coolant temperature is 20°C	37 – 67 ms		
			When engine coolant temperature is 80°C	9.5 – 11.5 ms		
	Injectors*3	<ul style="list-style-type: none">Engine coolant temperature: 80 – 95°CLamps, electric cooling fan and all accessories: OFFTransmission: Neutral (A/T: P range)	Engine is idling	2.2 – 4.8 ms		
			2,500 r/min	2.2 – 4.8 ms		
			Racing	Increases		

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
44	Ignition coils and power transistor	<ul style="list-style-type: none"> Engine: After having warming up Timing lamp is set. (to check actual ignition timing) 	Engine is idling	2 – 47° BTDC	–	–
			2,500 r/min	27 – 47° BTDC		
49	A/C relay	Engine: Warming up, idling		OFF	Procedure No.29	13B-59*6
		<ul style="list-style-type: none"> Engine: After having warming up/Engine idling A/C switch: ON 	A/C compressor clutch is not operating	OFF		
			A/C compressor clutch is operating	ON		
59	Left bank oxygen sensor (rear)	<ul style="list-style-type: none"> Engine: After having warming up 	Racing	0 and 600 – 1,000 mV alternate.	Code No. P0156	13B-21
69	Right bank oxygen sensor (rear)	<ul style="list-style-type: none"> Engine: After having warming up 	Racing	0 and 600 – 1,000 mV alternate.	Code No. P0136	13B-15
77	Accelerator pedal position sensor (sub)	Ignition switch: ON	Release the accelerator pedal	885 – 1,185 mV	Code No. P2126 P2127 P2128	13B-32*6, 13B-33*6, 13B-34*6
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4,035 mV or more		
78	Accelerator pedal position sensor (main)	Ignition switch: ON	Release the accelerator pedal	885 – 1,185 mV	Code No. P2121 P2122 P2123	13B-17*7, 13B-30*6, 13B-31*6
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4,035 mV or more		

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
79	Throttle position sensor (main)*4	<ul style="list-style-type: none">Ignition switch: ON (Engine is stopped)Remove the intake air hose at the throttle body side.Disconnect the throttle position sensor connector, and then connect terminal No.1, No.2, No.3 and No.4 with the use of the special tool: MB991348	Close the throttle valve with a finger fully.	300 – 700 mV	Code No. P0122, P0123	13B-14*6, 13B-15*6
			Open the throttle valve with a finger fully.	4,000 mV or more		
		No load		500 – 700 mV		
		A/C switch: “OFF” to “ON”		Voltage rises		
		<ul style="list-style-type: none">A/C switch: “OFF”Shift lever: “N” to “D” <A/T>				
A1*5	Right bank oxygen sensor (front)	Engine: Warming up (Air/fuel mixture is made leaner when decelerating, and is made richer when racing.)	When the engine is running at 4,000 r/min, decelerate suddenly.	200 mV or less	Code No. P0130	13B-12
			When engine is suddenly raced.	600 – 1,000 mV		
		Engine: Warming up (The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the engine-ECU <M/T> or engine-A/T-ECU <A/T>.)	Engine is idling	Voltage changes repeatedly between 400 mV or less and 600 – 1,000 mV.		
			2,500 r/min			
		A2*5	Right bank oxygen sensor (rear)	<ul style="list-style-type: none">Engine: After having warming up		

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
A3*5	Left bank oxygen sensor (front)	Engine: Warming up (Air/fuel mixture is made leaner when decelerating, and is made richer when racing.)	When the engine is running at 4,000 r/min, decelerate suddenly.	200 mV or less	Code No. P0150	13B-18
			When engine is suddenly raced.	600 – 1,000 mV		
		Engine: Warming up (The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the engine-ECU<M/T> or engine-A/T-ECU<A/T>.)	Engine is idling	Voltage changes repeatedly between 400 mV or less and 600 – 1,000 mV.		
			2,500 r/min			
A4*5	Left bank oxygen sensor (rear)	● Engine: After having warming up	Racing	0 and 600 – 1,000 mV alternate.	Code No. P0156	13B-21
12*5	Air flow sensor *1	● Engine coolant temperature: 80 – 95°C ● Lights, electric cooling fan and all accessories: “OFF” ● Transmission: Neutral (A/T: P range)	Engine is idling	2.3 – 8.8 gm/s	–	–
			2,500 r/min	13.0 – 32.0 gm/s		
			Engine is raced	Frequency increases in response to racing		
13*5	Intake air temperature sensor	Ignition switch: “ON” or with engine running	When intake air temperature is –20°C	–20°C	Code No. P0110	13B-10*6
			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		

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
21*5	Engine coolant temperature sensor	Ignition switch: "ON" or with engine running	When engine coolant temperature is -20°C	-20°C	Code No. P0115	13B-11*6
			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		
22*5	Crank angle sensor	<ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected 		Compare the engine speed readings on the tachometer and the MUT-II/III	Code No. P0335	13B-19*6
		Engine: Idling	When engine coolant temperature is -20°C	1,300 – 1,500 r/min		
			When engine coolant temperature is 0°C	1,300 – 1,500 r/min		
			When engine coolant temperature is 20°C	1,300 – 1,500 r/min		
			When engine coolant temperature is 40°C	1,040 – 1,240 r/min		
			When engine coolant temperature is 80°C	600 – 800 r/min		
44*5	Ignition coil and power transistor	<ul style="list-style-type: none"> Engine: After having warming up Timing lamp is set (to check actual ignition timing) 	Engine is idling	2 – 18 deg	–	–
			2,500 r/min	27 – 47 deg		
81*5	Long-term fuel compensation (Right bank)	Engine: Warm, 2,500 r/min without any load (during closed loop)		-12.5 – 12.5%	Code No. P0170	13B-24
82*5	Short-term fuel compensation (Right bank)	Engine: Warm, 2,500 r/min without any load (during closed loop)		-12.5 – 12.5%	Code No. P0170	13B-24

Item No.	Inspection item	Inspection condition		Normal condition	Code No./ Inspection procedure No.	Reference page
83*5	Long-term fuel compensation (Left bank)	Engine: Warm, 2,500 r/min without any load (during closed loop)		-12.5 – 12.5%	Code No. P0173	13B-26
84*5	Short-term fuel compensation (Left bank)	Engine: Warm, 2,500 r/min without any load (during closed loop)		-12.5 – 12.5%	Code No. P0173	13B-26
87*5	Engine load	Engine: After having warming up	Engine is idling	15 – 35%	–	–
			2,500 r/min	15 – 35%		
88*5	Fuel control condition (Right bank)	Engine: Warm	2,500 r/min	Closed loop	Code No. P0125	13B-10
			When engine is suddenly raced	Open loop – drive condition		
89*5	Fuel control condition (Left bank)	Engine: Warm	2,500 r/min	Closed loop	Code No. P0125	13B-10
			When engine is suddenly raced	Open loop – drive condition		

ACTUATOR TEST REFERENCE TABLE

Item No.	Inspection item	Drive content	Inspection conditions		Normal condition	Code No./ Inspection procedure No.	Reference page
01	Injectors	Cut off No. 1 injector	Engine: After having warmed up/ Engine is idle (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)		Idling condition becomes different (becomes unstable).	Code No. P0201	13B-16*
02		Cut off No. 2 injector				Code No. P0202	
03		Cut off No. 3 injector				Code No. P0203	
04		Cut off No. 4 injector				Code No. P0204	
05		Cut off No. 5 injector				Code No. P0205	
06		Cut off No. 6 injector				Code No. P0206	
07	Fuel pump	Fuel pump operates and fuel is recirculated.	Ignition switch: ON	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Pulse is felt.	Procedure No. 26	13B-57*
				Listen near the fuel tank for the sound of fuel pump operation.	Sound of operation is heard.		
08	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Clicks when solenoid valve is driven.	Code No. P0443	13B-33
10	EGR control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Clicks when solenoid valve is driven.	Code No. P0403	13B-30
11	Variable induction control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Clicks when solenoid valve is driven.	–	–
17	Basic ignition timing	Set to ignition timing adjustment mode	Engine: Idling Timing light is set		5° BTDC	–	–
21	Condenser fan	Drive the fan motor	Ignition switch: ON		Fan motor runs	Procedure No.24	13B-56*

NOTE

* : Refer to the 2004 PAJERO Workshop Manual (Pub. No. PWJE0005-3).

TERMINAL VOLTAGE CHECK CHART

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
10	Left bank oxygen sensor heater (front)	Engine: Warming up, idling (15 seconds after starting engine)	9 – 11 V
		Engine: Racing	9 – 11 V → System voltage (momentarily)
18	Left bank oxygen sensor heater (rear)	Engine: Warming up, idling	1 V or less
		Engine: Racing	System voltage
24	Right bank oxygen sensor heater (rear)	Engine: Warming up, idling	1 V or less
		Engine: Racing	System voltage
25	Right bank oxygen sensor heater (front)	Engine: Warming up, idling (15 seconds after starting engine)	9 – 11 V
		Engine: Racing	9 – 11 V → System voltage (momentarily)
108	Left bank oxygen sensor (front)	Engine: Warming up, 2,500 r/min (Check using a digital voltmeter)	0 and 0.8 V alternates (changes repeatedly)
109	Right bank oxygen sensor (front)	Engine: Warming up, 2,500 r/min (Check using a digital voltmeter)	0 and 0.8 V alternates (changes repeatedly)
116	Left bank oxygen sensor (rear)	<ul style="list-style-type: none"> Engine: Warming up Engine: Racing 	0 and 0.6 – 1.0 V alternates
117	Right bank oxygen sensor (rear)	<ul style="list-style-type: none"> Engine: Warming up Engine: Racing 	0 and 0.6 – 1.0 V alternates

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

Terminal No.	Inspection item	Normal condition (Check condition)
10 – 34	Left bank oxygen sensor heater (front)	4.5 – 8.0 Ω (at 20°C)
25 – 34	Right bank oxygen sensor heater (front)	4.5 – 8.0 Ω (at 20°C)
18 – 34	Left bank oxygen sensor heater (rear)	11 – 18 Ω (at 20°C)
24 – 34	Right bank oxygen sensor heater (rear)	11 – 18 Ω (at 20°C)

ON-VEHICLE SERVICE

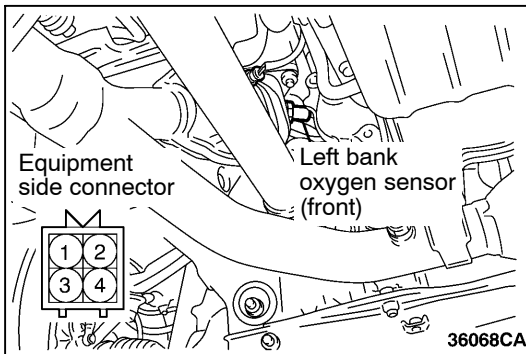
THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

1. Remove the air intake hose from the throttle body.
2. Remove the throttle body assembly.

Caution

- Do not spray the cleaning fluid directly to the throttle valve.
- Make sure the cleaning fluid does not enter the motor from the bypass line. Also make sure it does not enter the sensor through the shaft.

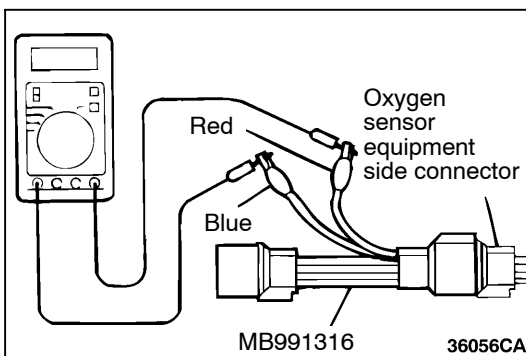
3. Spray cleaning fluid on a clean cloth.
4. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning fluid.
5. Install the throttle body assembly.
6. Attach the air intake hose.

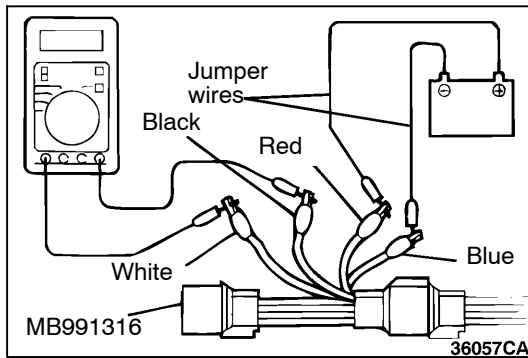


OXYGEN SENSOR CHECK

<Left bank oxygen sensor (front)>

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 ($4.5 - 8.0 \Omega$ at 20°C) between terminal 1 (red clip of the special tool) and terminal 3 (blue clip of the special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until the engine coolant is 80°C or higher.





5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.
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.

Caution

- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 8 V is applied to the oxygen sensor heater.

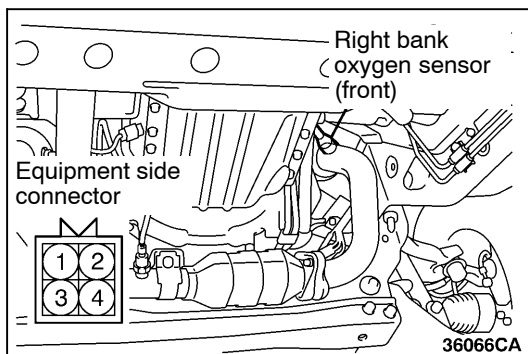
NOTE

If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.1 (red clip of special tool) and the terminal No.3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (–) terminal of 8 V power supply respectively, then check again.

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

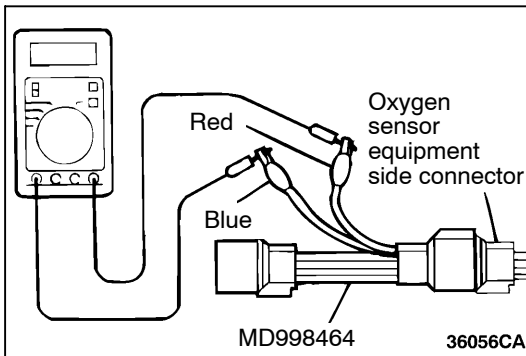
NOTE

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

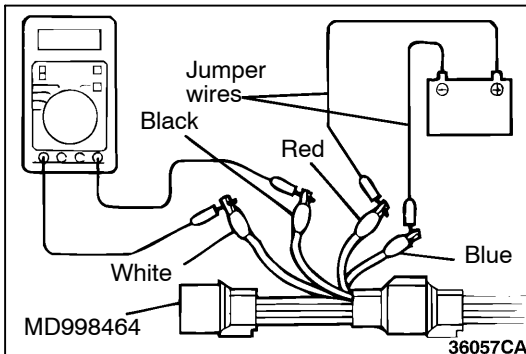


<Right bank oxygen sensor (front)>

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 ($4.5 - 8.0 \Omega$ at 20°C) between terminal 1 (red clip of the special tool) and terminal 3 (blue clip of the special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until the engine coolant 80°C or higher.



5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.
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.

Caution

- **Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.**
- **Be careful the heater is broken when voltage of beyond 8 V is applied to the oxygen sensor heater.**

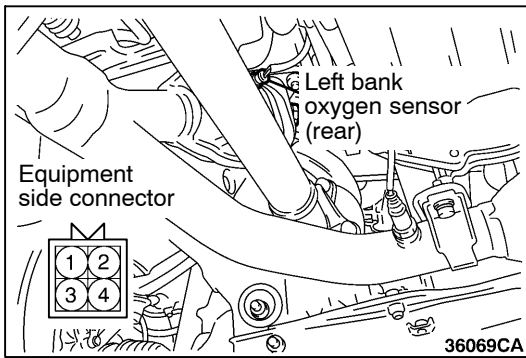
NOTE

If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.1 (red clip of special tool) and the terminal No.3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (-) terminal of 8 V power supply respectively, then check again.

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

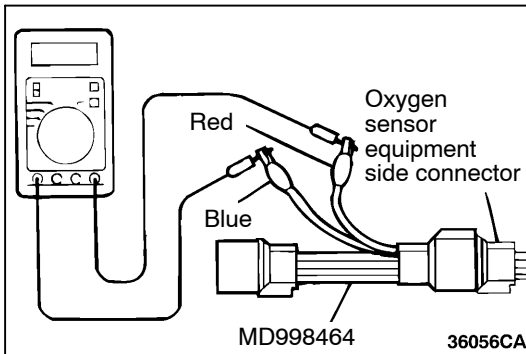
NOTE

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

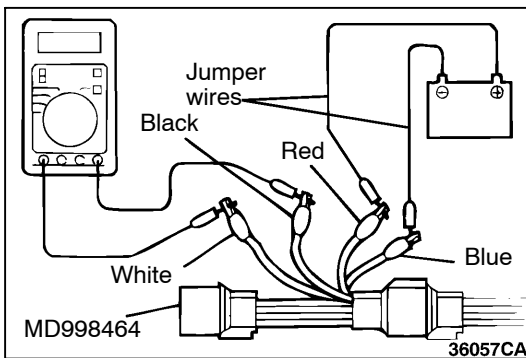


<Left bank oxygen sensor (rear)>

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



5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.
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.

Caution

- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 12 V is applied to the oxygen sensor heater.

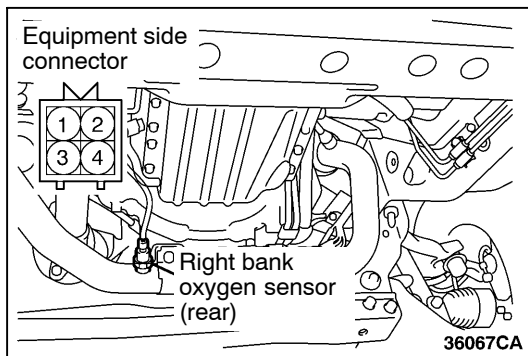
NOTE

If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.1 (red clip of special tool) and the terminal No.3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (-) terminal of 12 V power supply respectively, then check again.

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

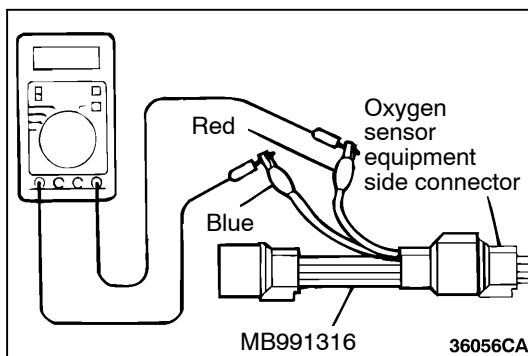
NOTE

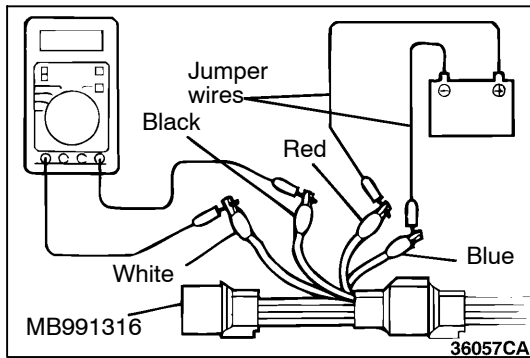
For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler.



<Right bank oxygen sensor (rear)>

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 the special tool) and terminal 3 (blue clip of the special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until the engine coolant 80°C or higher.





5. Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.
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.

Caution

- **Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.**
- **Be careful the heater is broken when voltage of beyond 12 V is applied to the oxygen sensor heater.**

NOTE

If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.1 (red clip of special tool) and the terminal No.3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (-) terminal of 12 V power supply respectively, then check again.

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.