

DTC	P0130/21	Oxygen Sensor Circuit Malfunction (Bank 1 (2) Sensor 1)
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CIRCUIT DESCRIPTION

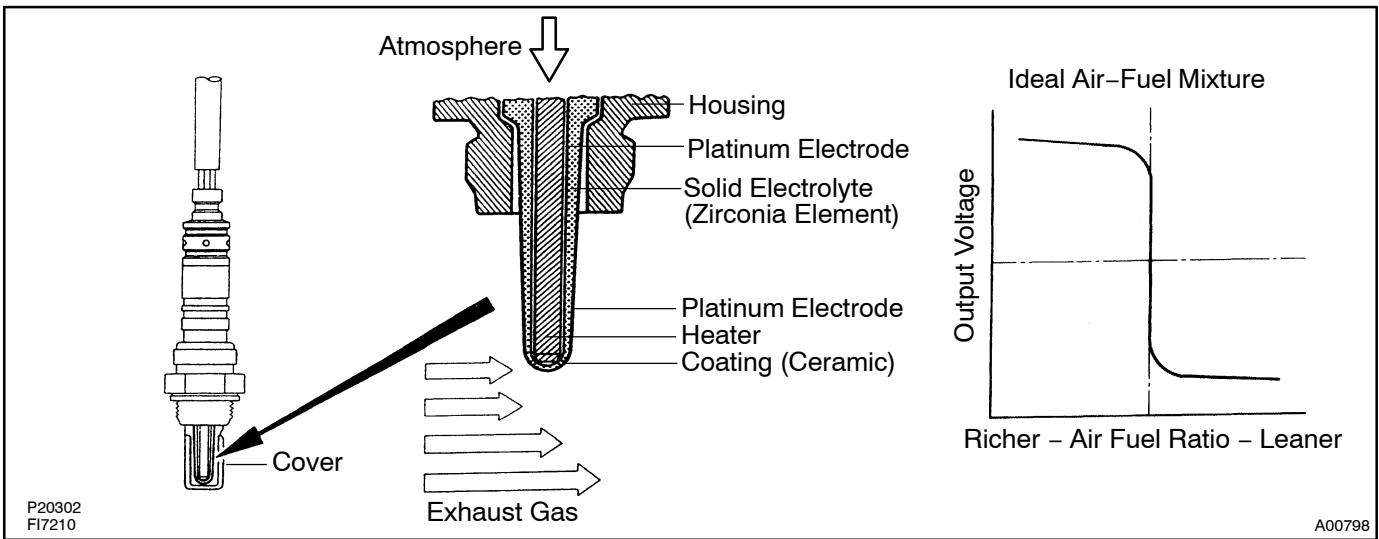
To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used, but for the most efficient use of the three-way catalytic converter, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.

The oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide feedback to the computer for control of the air-fuel ratio.

When the air-fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the oxygen sensor informs the engine ECU of the LEAN condition (small electromotive force: 0 V).

When the air-fuel ratio is RICHER than the stoichiometric air-fuel ratio, the oxygen concentration in the exhaust gas is reduced and the oxygen sensor informs the engine ECU of the RICH condition (large electromotive force: 1 V). The engine ECU judges by the electromotive force from the oxygen sensor whether the air-fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the oxygen sensor causes output of abnormal electromotive force, the engine ECU is unable to perform accurate air-fuel ratio control.

The oxygen sensors include a heater which heats the Zirconia element. The heater is controlled by the engine ECU. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



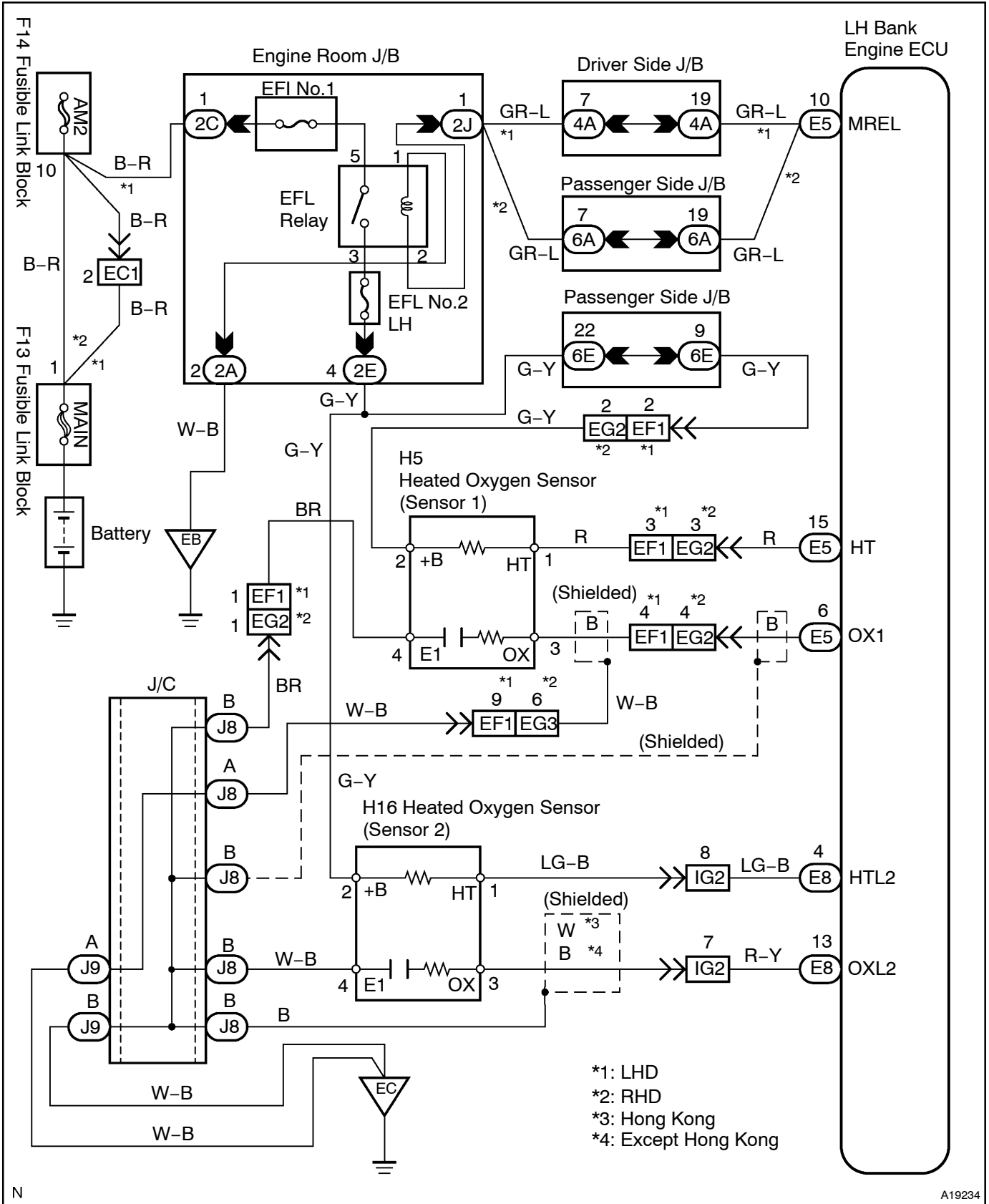
DTC No.	DTC Detecting Condition	Trouble Area
P0130/21	Condition (a) and (b) continues for 60 secs. or more: (a) The engine speed after warming up is 1,500 rpm or more and the vehicle speed is less than 100 km/h (62 mph). (b) Oxygen sensor output voltage amplitude is less than 0.3 V.	<ul style="list-style-type: none"> • Open or short in heated oxygen sensor circuit • Heated oxygen sensor • Fuel trim malfunction • Engine ECU

HINT:

Sensor 1 refers to the sensor closer to the engine body.

The oxygen sensor's output voltage and the short-term fuel trim value can be read using the hand-held tester.

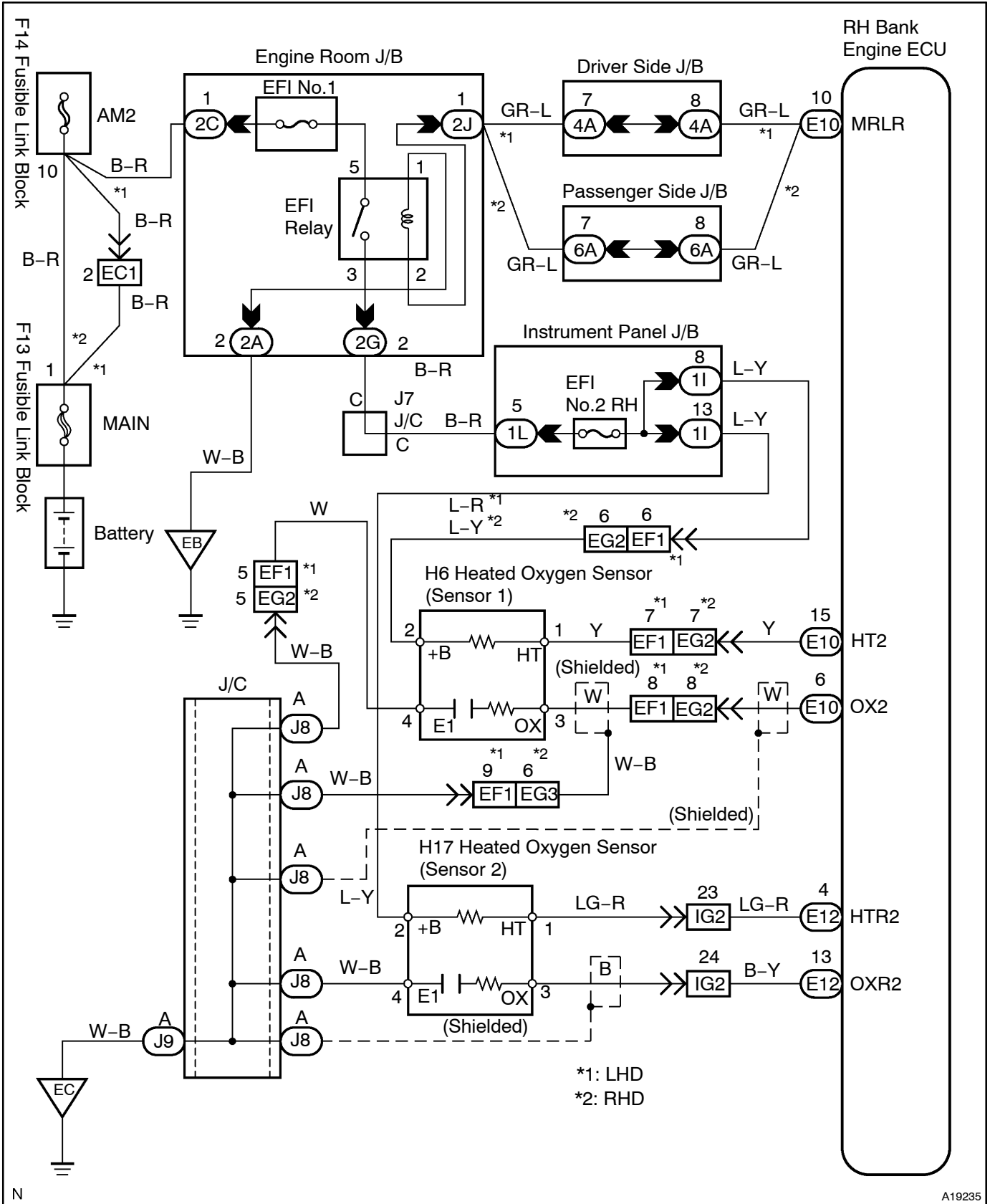
WIRING DIAGRAM



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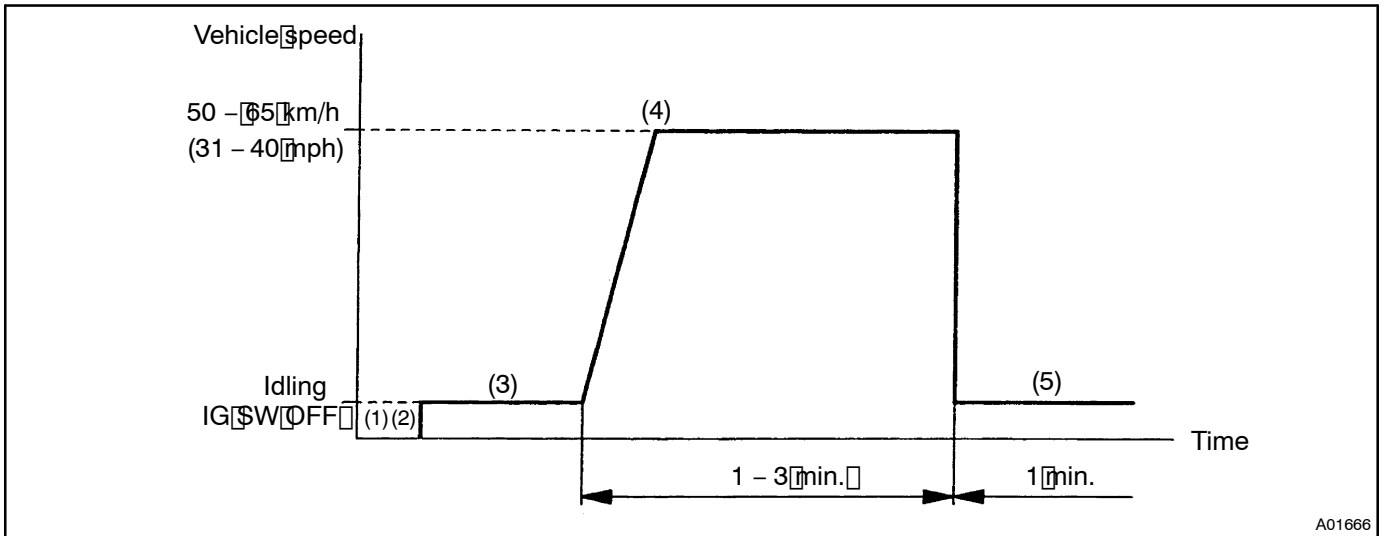
DIAGNOSTICS - ENGINE



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CONFIRMATION DRIVING PATTERN



A01666

- (1) Connect the hand-held tester to the DLC3.
- (2) Switch the hand-held tester from normal mode to check mode (See page DI-4).
- (3) Start the engine and warm it up with all accessory switches OFF.
- (4) Drive the vehicle at 50 - 65 km/h (31 - 40 mph) for 1 - 3 min. to warm up the heated oxygen sensor.
- (5) Let the engine idle for 1 min.
- (6) Perform steps (3) to (5) three times.

HINT:

If a malfunction exists, the EFI will light up during step (6).

NOTICE:

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (3) to (6), then perform steps (3) to (6) again.

INSPECTION PROCEDURE

HINT:

- LH and RH bank engine ECU detect this DTC code respectively. The inspection procedures are same for both LH and RH bank engine ECU and described in this manual. Even though terminal name and part name on the side of RH bank are described in parenthesis, perform the inspection for only ECU that has detected DTC.
- Read freeze frame data using hand-held tester. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides DTC P0130/21) being output?
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YES

Go to relevant DTC chart.

NO

2 Check the output voltage of oxygen sensor during idling.

PREPARATION:

Warm up the oxygen sensor with the engine at 2,500 rpm for approx. 90 sec.

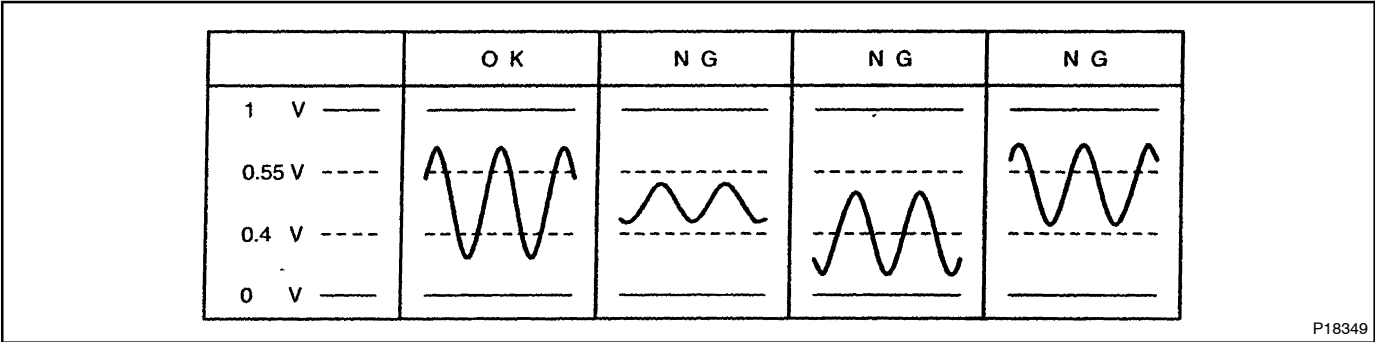
CHECK:

Use the hand-held tester read the output voltage of the oxygen sensor during idling.

OK:

Oxygen sensor output voltage:

Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



OK Perform confirmation driving pattern.

NG

3 Check for open and short in harness and connector between engine ECU and oxygen sensor (bank 1 (2) sensor 1) (See page IN-20).

NG Repair or replace harness or connector.

OK

4 Check air induction system (See Pub. No. RM677E, page FI-1).

NG Repair or replace induction system.

OK

5 Check fuel pressure (See Pub. No. RM677E, page FI-6).

NG

Check and repair fuel pump, fuel pipe line and filter (See Pub. No. RM677E, page FI-6).

OK

6 Check injector injection (See Pub. No. RM677E, page FI-18).

NG

Replace injector.

OK

Replace heated oxygen sensor (bank 1 (2) sensor 1).

7 Perform confirmation driving pattern.

Go

8 Are there DTC P0130/21 being output again?

YES

Check for intermittent problems (See page DI-4).

No

Check and replace engine ECU (See page IN-20).