DI9UV–01

DTC	P0130/21	Oxygen Sensor Circuit Malfunction

DTC	P0131/21	Oxygen Sensor Circuit Low Voltage

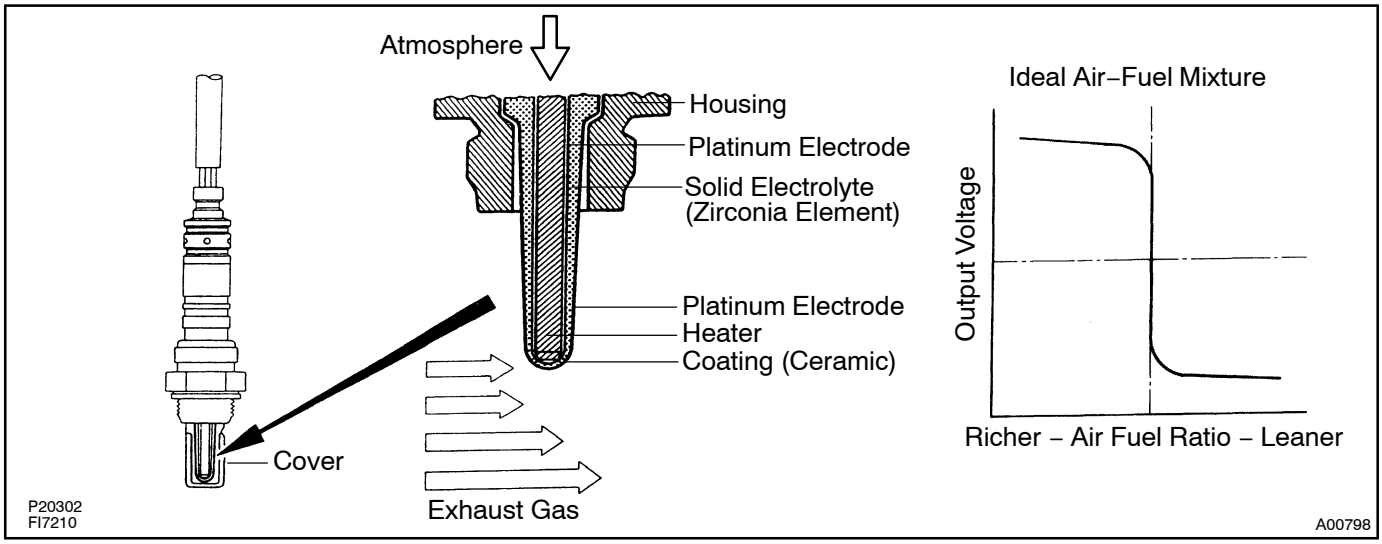
CIRCUIT DESCRIPTION

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 which 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 the engine ECU with feedback to 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: < 0.45 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: > 0.45 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.

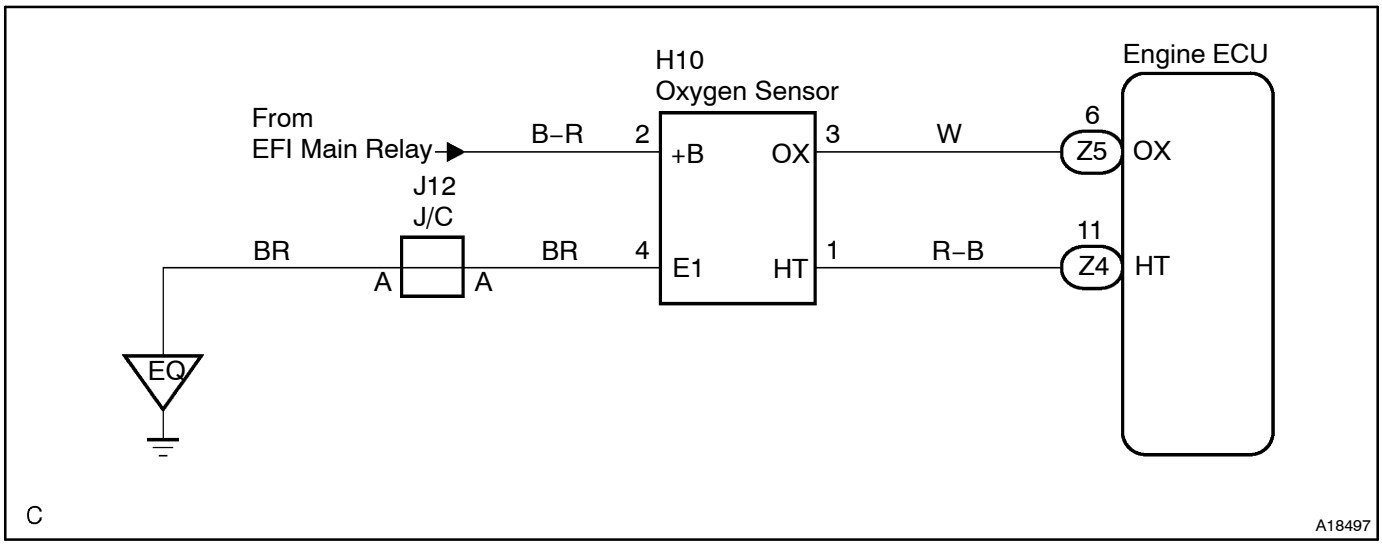


DTC No.	DTC Detection Condition	Trouble Area
P0130/21	• Voltage output of oxygen sensor remains at 0.4 V or more, or 0.55 V or less, during idling after engine is warmed up • Open or short in oxygen sensor circuit (2 trip detection logic)	• Open or short in oxygen sensor circuit • Oxygen sensor • Air induction system • Fuel pressure • Injector • Engine ECU
P0131/21	• Voltage output of oxygen sensor remains at 0.4 V or more, or 0.55 V or less, during idling after engine is warmed up • Open or short in oxygen sensor circuit (2 trip detection logic)	

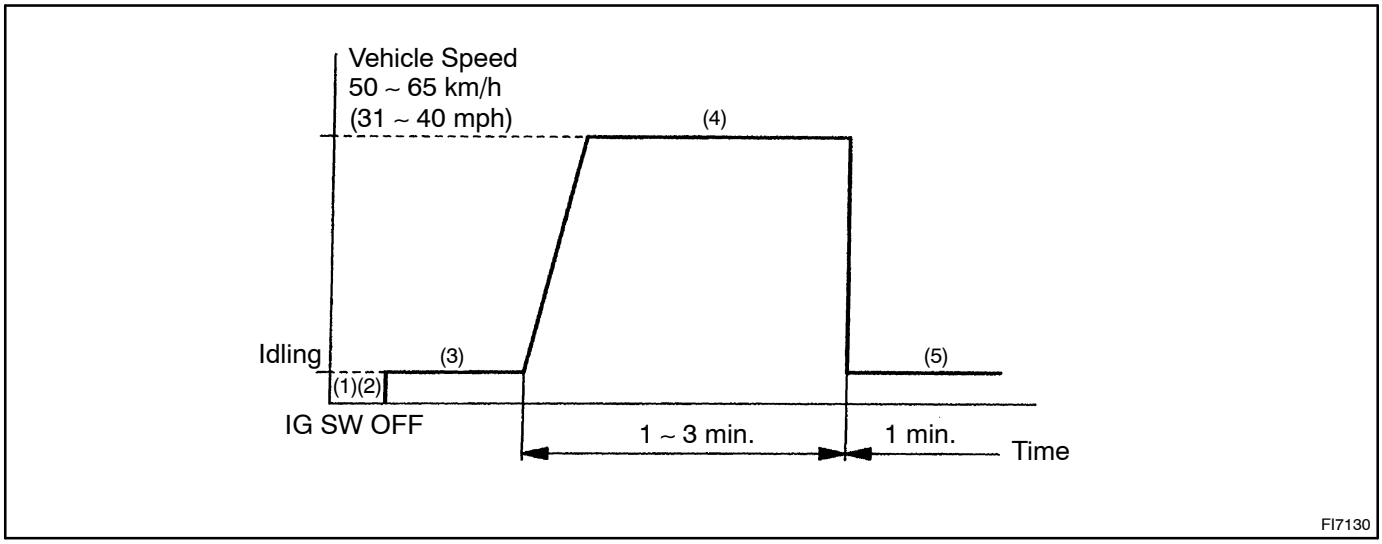
HINT:

- The oxygen sensor output voltage and the short–term fuel trim value can be read by using the hand–held tester.
- If the voltage output of the oxygen sensor is 0 V, the oxygen sensor circuit may be open or short.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN



(1) Connect the hand–held tester to the DLC3.
(2) Switch the hand–held tester from normal mode to check (test) 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 oxygen sensor.
(5) Let the engine idle for 1 min.
HINT:
- If you have no hand–held tester, do step (1) to (5) again.
- If a malfunction exists, the check engine warning (CHK ENG) will light up during step (5).

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 (5), them perform steps (3) to (5) again.

INSPECTION PROCEDURE

HINT:
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 was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0130/21, DTC P0131/21) being output?**

YES → **Go to relevant DTC chart (See page DI–13).**

NO

2	Check oxygen sensor.

OK → Go to step 7.

NG

3	Check for open and short in harness and connector between engien ECU and oxygen sensor (See page IN–20).

NG → Repair or replace harness or connector.

OK

4	Check air induction system.

NG → Repair or replace induction system.

OK

5	Check LPG regurator primary prissure.

NG → Check and repair LPG regurator, fuel pipe line and LPG solenoid.

OK

6	Check LPG carburetor (See page FU–27).

NG → Repair or replace LPG carburetor.

OK →

Replace oxygen sensor.

7	Perform confirmation driving pattern.

Go →

8	Are there DTC P0130/21 or P0131/21 being output again?

YES → Check for intermittent problems (See page DI–18).

No →

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