

Fuel Pump Control Circuit

CIRCUIT DESCRIPTION

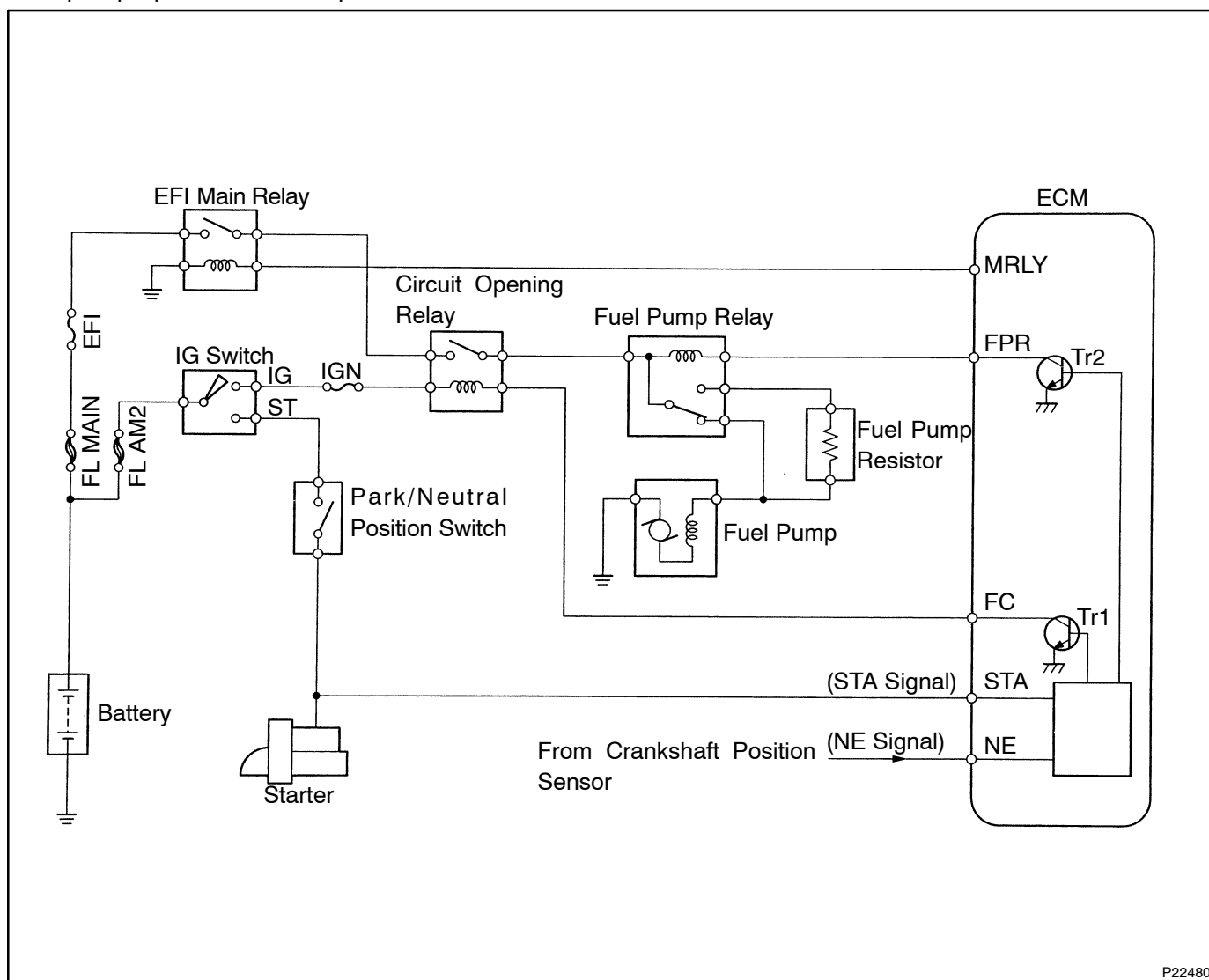
In the diagram below, when the engine is cranked, current flows from terminal ST of the ignition switch to terminal STA of ECM (STA signal).

When the STA signal and NE signal are input to the ECM, Tr1 is turned ON, current flows to coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates.

While the NE signal is generated (engine running), the ECM keeps Tr1 ON (circuit opening relay ON) and the fuel pump also keeps operating.

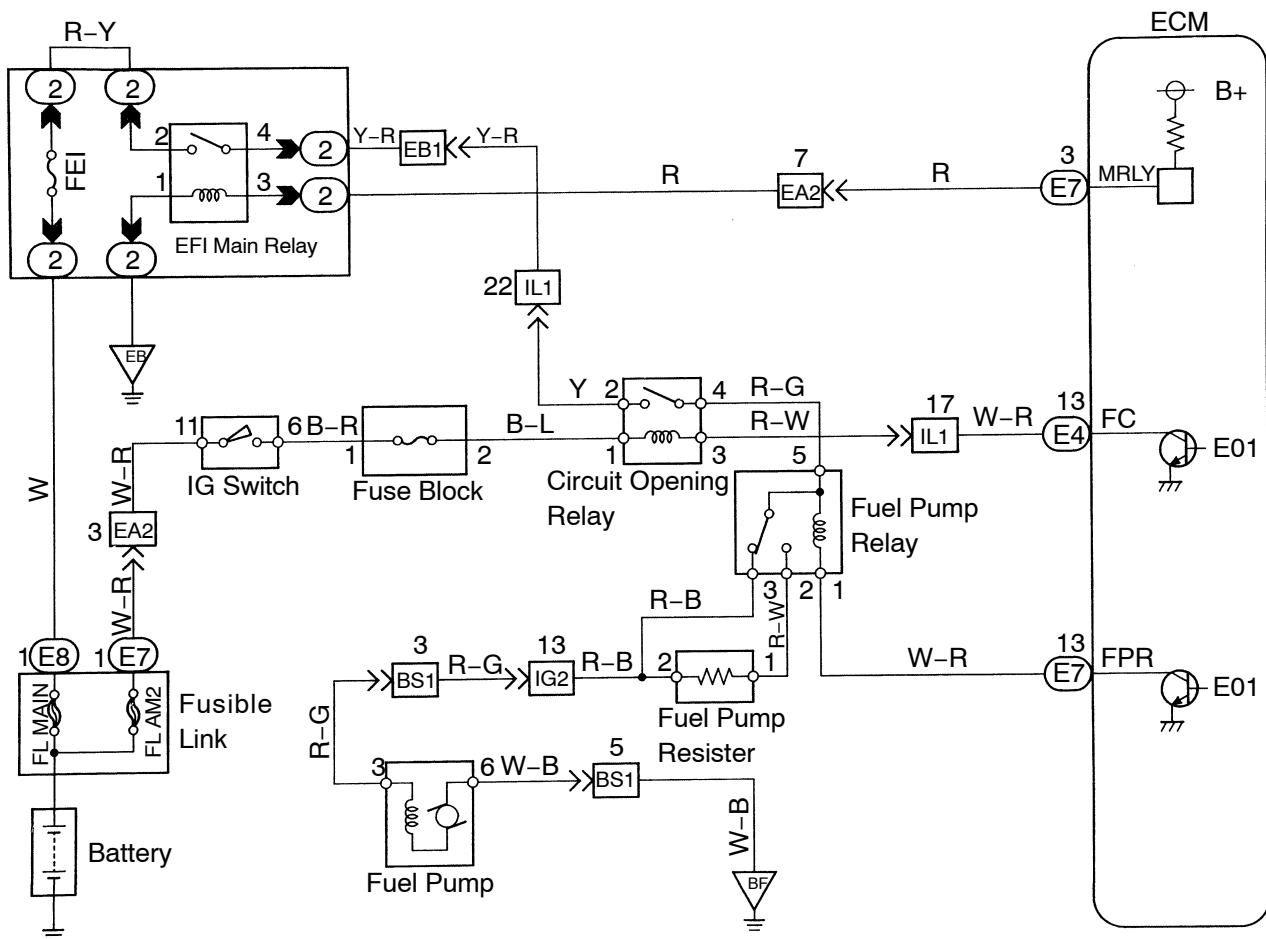
The fuel pump speed is controlled at 2 levels (high speed or low speed) by the condition of the engine (starting, light load, heavy load). When the engine starts (STA ON), Tr2 in the ECM is OFF, so battery voltage is applied directly to the fuel pump. Fuel pump operates at high speed.

After the engine starts, during idling or light loads, since Tr2 goes ON, power is supplied to the fuel pump via the fuel pump resistor. Fuel pump operates at low speed.



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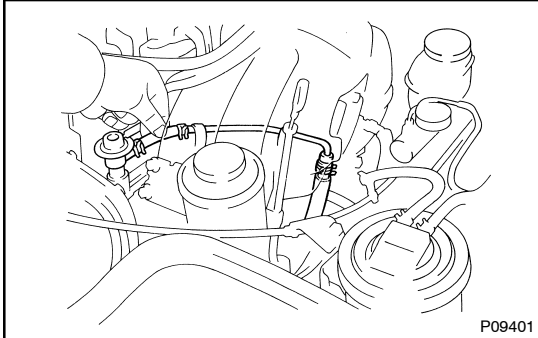
WIRING DIAGRAM



INSPECTION PROCEDURE

LEXUS hand-held tester

- | | |
|---|--|
| 1 | Connect the LEXUS hand-held tester and check operation of the fuel pump. |
|---|--|

**PREPARATION:**

- (a) Remove the fuse cover on the instrument panel.
- (b) Connect the LEXUS hand-held tester to the DLC3.
- (c) Turn the ignition switch ON and push the LEXUS hand-held tester main switch ON.
- (d) Use the ACTIVE TEST mode to operate the fuel pump.

CHECK:

Check for fuel pressure in the fuel return hose when it is pinched off.

OK:

There is pressure in the fuel return hose.

HINT:

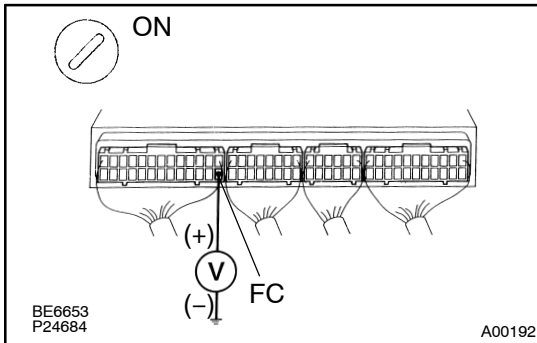
At this time, you will hear a fuel flowing noise.

OK**Go to step 4.****NG**

- | | |
|---|--|
| 2 | Check circuit opening relay (See page SF-51). |
|---|--|

NG**Replace circuit opening relay.****OK**

3 Check voltage between terminal FC of ECM connector and body ground.



PREPARATION:

- (a) Remove instrument panel speaker No.1 panel (See page [SF-63](#)).
- (b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal FC of ECM and body ground.

OK:

Voltage: 9 – 14 V

OK

Go to step 5.

NG

Check for open and short in harness and connector between terminal FC of ECM and circuit opening relay and fuse block (See page [IN-27](#)).

4 Connect the LEXUS hand-held tester and check operation of fuel pump relay.

PREPARATION:

- (a) Connect the LEXUS hand-held tester to the DLC3.
- (b) Start the engine.
- (c) Turn the LEXUS hand-held tester main switch ON.
- (d) Select the ACTIVE TEST mode on the LEXUS hand-held tester.

CHECK:

Check operation of the fuel pump relay when it is switched ON and OFF by the LEXUS hand-held tester.

OK:

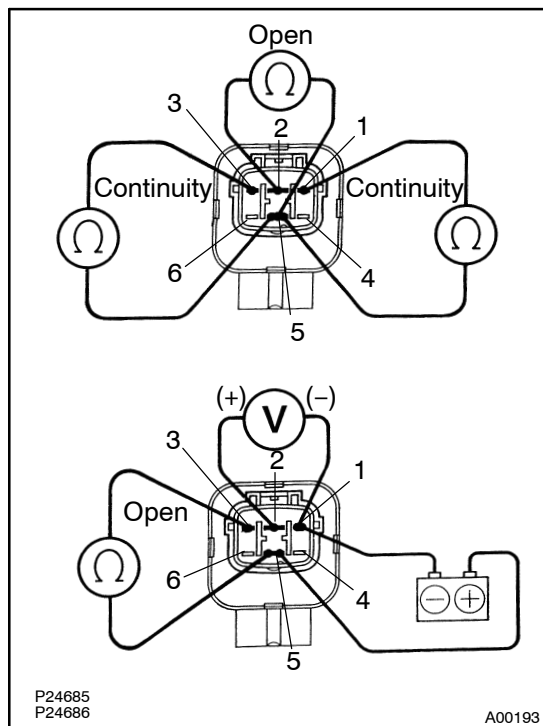
Operating noise can be heard from the relay.

OK

Go to step 8.

NG

5 Check operation of fuel pump relay.



PREPARATION:

- Disconnect the fuel pump relay connector.
- Remove the fuel pump relay (See page [SF-53](#)).

CHECK:

Check the continuity between terminals of fuel pump relay.

OK:

Terminals 3 and 5	Continuity
Terminals 2 and 5	Open
Terminals 1 and 5	Continuity (Reference value 80 Ω)

CHECK:

- Apply battery voltage between terminals 1 and 5.
- Measure the voltage between terminals 1 and 2.

OK:

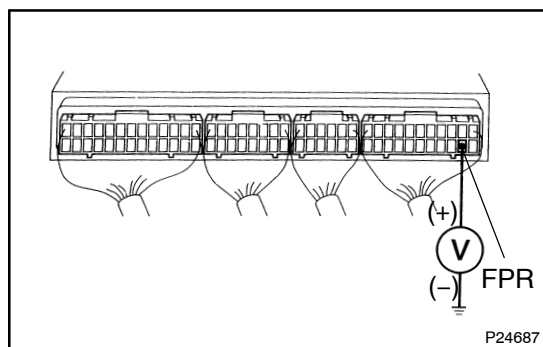
Terminals 1 and 2	Battery voltage
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NG

Replace fuel pump relay.

OK

6 Check voltage between terminal FPR of ECM connector and body ground.



PREPARATION:

- Remove instrument panel speaker No.1 panel (See page [SF-63](#)).
- Start the engine.

CHECK:

Measure the voltage between terminal FPR of ECM and body ground while racing the engine.

OK:

Time after engine started	Voltage
60 seconds or more	0 - 3 V
Less than 60 seconds	9 - 14 V

OK

Check and replace ECM (See page [IN-27](#)).

NG

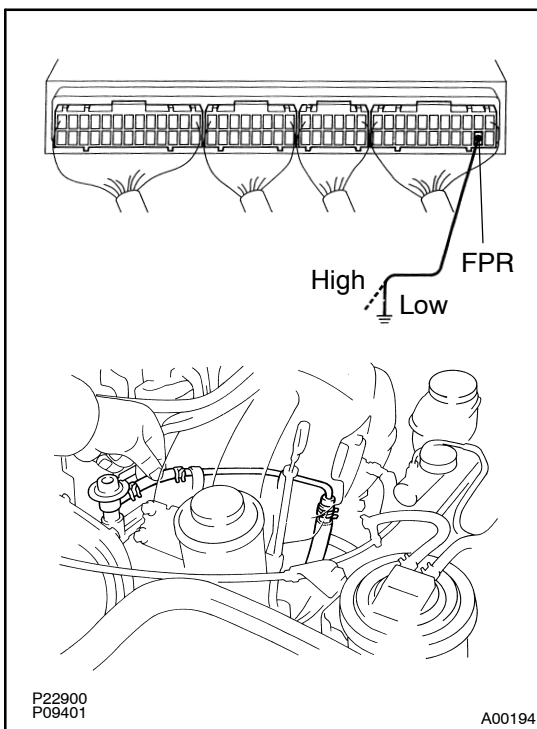
- 7** Check for open and short in harness and connector between terminal FPR of ECM connector and fuel pump relay (See page [IN-27](#)).

NG

Repair or replace harness or connector.

OK

- 8** Check operation of fuel pump.



PREPARATION:

- Remove instrument panel speaker No.1 panel (See page [DI-47](#)).
- Connect the LEXUS hand – held tester to the DLC3.
- Turn ignition switch ON.
- LEXUS hand – held tester main switch ON.
- Use the ACTIVE TEST mode to operate the fuel pump.

CHECK:

Check the operation of fuel pump, when it is operated by the LEXUS hand-held tester and terminal FPR of ECM is grounded and is not grounded.

OK:

There is pressure in the inlet hose.

HINT:

At this time, you will hear a fuel flowing noise.

FPR is grounded (Low speed)	FPR is not grounded	
NG	NG	Go to step 9
NG	OK	Go to step 10
OK	NG	Repair or replace harness or connector between fuel pump relay and fuel pump.

9 Check fuel pump (See page [SF-6](#)).

NG

Repair or replace fuel pump.

OK

Check for open or short in harness and connector between EFI main relay (Marking: EFI) and circuit opening relay and fuel pump relay and fuel pump, fuel pump and body ground (See page [IN-27](#)).

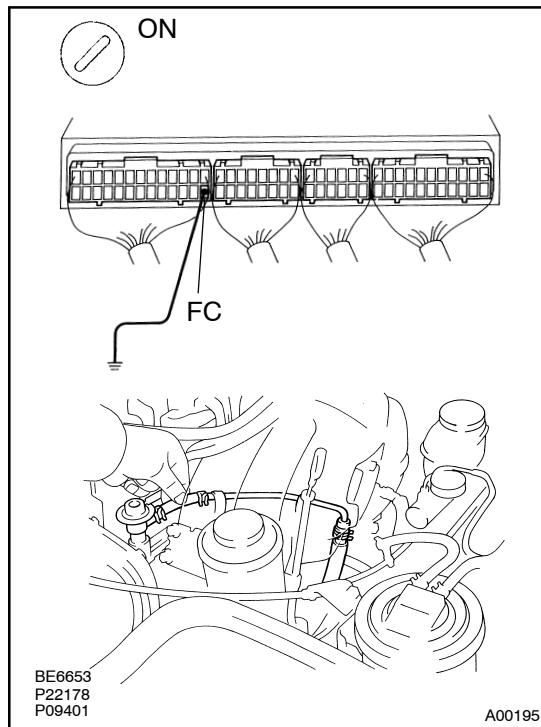
10 Check fuel pump resistor. (See page [SF-54](#)).

NG

Replace fuel pump resistor.

OK

Check for open and short in harness and connector between fuel pump relay and fuel pump resistor and fuel pump (See page [IN-27](#)).

OBD II scan tool (excluding LEXUS hand-held tester)**1 Check operation of fuel pump.****PREPARATION:**

- (a) Remove instrument panel speaker No.1 panel (See page [SF-63](#)).
- (b) Turn ignition switch ON.

CHECK:

- (a) Connect between terminal FC of ECM and body ground.
- (b) Check for fuel pressure in the fuel inlet hose when it is pinched off.

OK:

There is pressure in the fuel inlet hose.

HINT:

At this time, you will hear a fuel flowing noise.

OK

Go to step 4.

OK

2 Check circuit opening relay (See page [DI-35](#)).

NG

Repair or replace.

OK

3	Check voltage between terminal FC of ECM connector and body ground (See page DI-108 , step 3).
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NG

Check for open and short in harness and connector between terminal FC of ECM and circuit opening relay and fuse block

OK

4	Check operation of fuel pump relay (See page DI-108 , step 5).
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NG

Replace fuel pump relay.

OK

5	Check voltage between terminal FPR of ECM connector and body ground (See page DI-108 , step 6).
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NG

Check and replace ECM (See page [IN-27](#)).

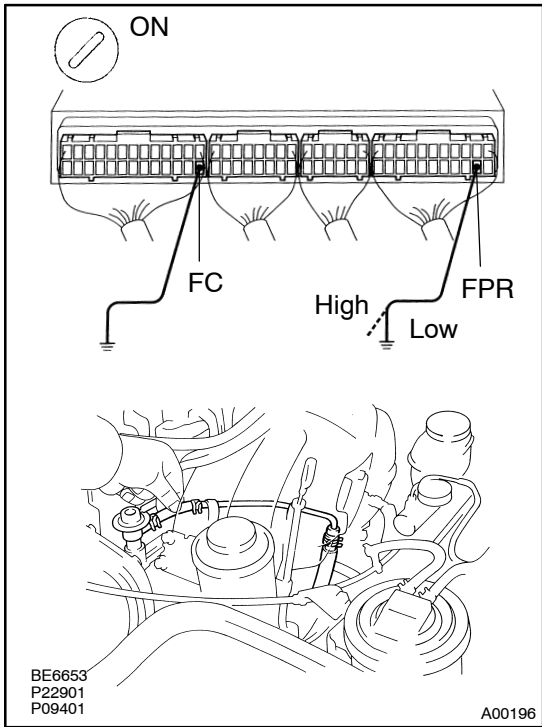
6	Check for open and short in harness and connector between terminal FC of ECM Connector and fuel pump relay (See page IN-27).
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NG

Check and replace harness or connector.

OK

7 Check operation of fuel pump.



PREPARATION:

- (a) Remove instrument panel speaker No.1 panel (See page [SF-63](#)).
- (b) Turn the ignition switch ON.

CHECK:

- (a) Connect terminal FC of ECM and body ground.
- (b) Check the operation of fuel pump when terminal FPR of ECM is grounded and is not grounded.

OK:

There is pressure in the fuel inlet return hose.

HINT:

At this time, you will hear a fuel flowing noise.

FPR is grounded (Low speed)	FPR is not grounded (High speed)	
NG	NG	Go to step 8
NG	OK	Go to step 9
OK	NG	Repair or replace harness or connector between fuel pump relay and fuel pump.

8 Check fuel pump (See page [SF-6](#)).

NG

Repair or replace fuel pump.

OK

Check for open or short in harness and connector between EFI main relay (Marking: EFI) and circuit opening relay and fuel pump relay and fuel pump and body ground (See page [IN-27](#)).

9	Check fuel pump resistor (See page SF-54).
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NG**Replace fuel pump resistor.****OK**

Check for open and short in harness and connector between fuel pump relay and fuel pump resistor and fuel pump (See page [IN-27](#)).