

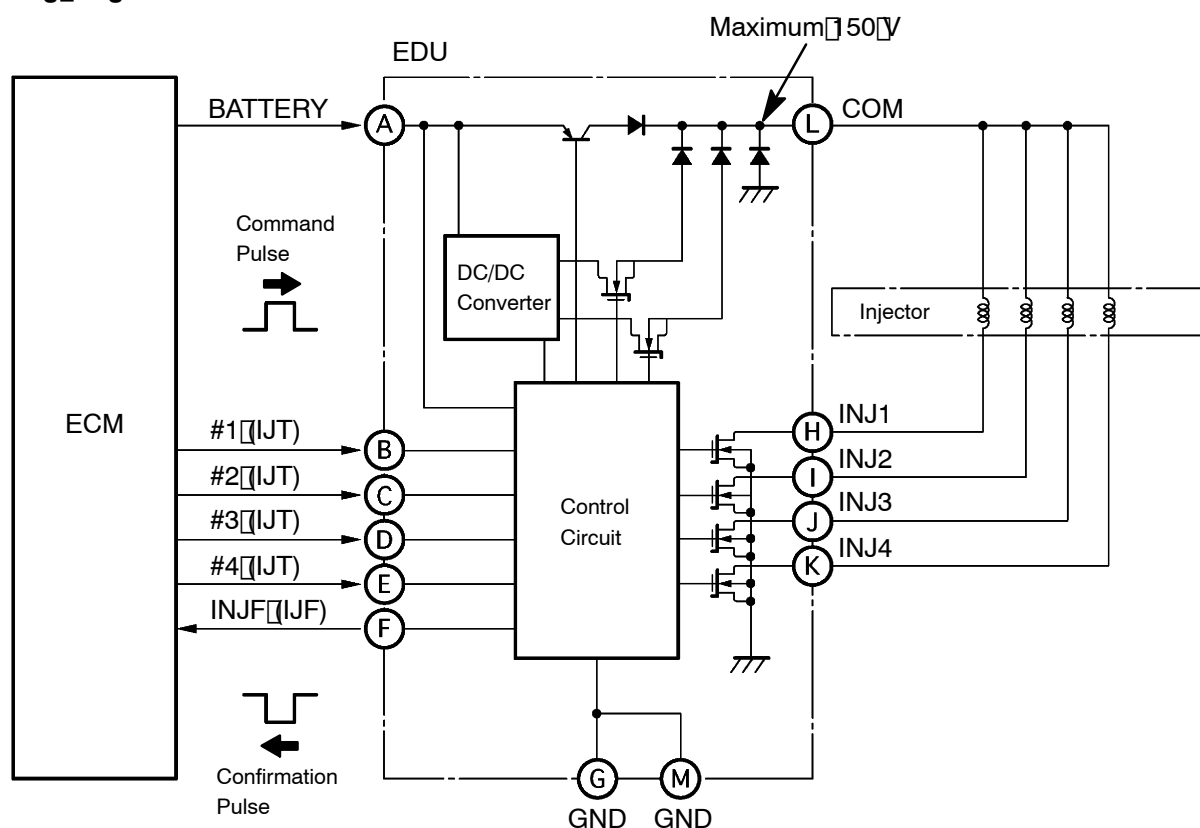
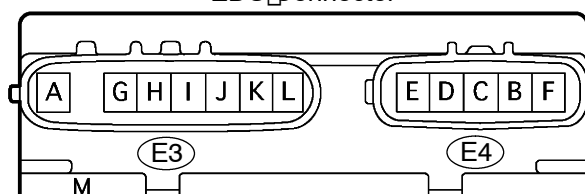
DTC**P0200****INJECTOR CIRCUIT OPEN****HINT:**

- For more information on the EDU, see page 05-432.
- If P0200 is present, refer to the diagnostic trouble codes (DTCs) table for the fuel system on page 05-432.

CIRCUIT DESCRIPTION

The EDU has been adopted to drive the injectors at high speeds. The EDU delivers high-speed driving under high-pressurized fuel conditions using the DC/DC converter that provides a high-voltage, and the quick-charging system.

Soon after the EDU receives an injection command (IJT) signal from the ECM, the EDU responds to the command with an injector injection confirmation (IJF) signal when the current is applied to the injector.

EDU Wiring Diagram:**EDU Connector****Warning: Terminals H, I, J, K and L are high voltage**

DTC No.	DTC Detection Condition	Trouble Area
P0200	<ul style="list-style-type: none"> • Open or short in EDU or injector circuit After engine is started, there is no injection confirmation (IJF) signal from EDU to ECM, despite the ECM sending injection command (IJT) signal to the EDU (1 trip detection logic)	<ul style="list-style-type: none"> • Open or short in EDU circuit • Injector • EDU • ECM

MONITOR DESCRIPTION

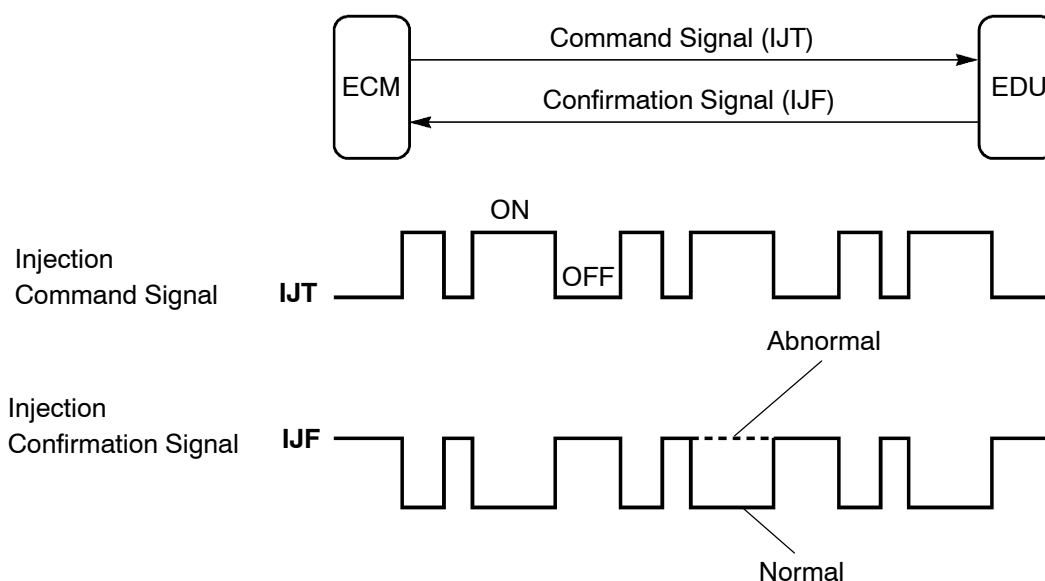
P0200 (Open or short in EDU or injector circuit):

The ECM continuously monitors both injection command (IJT) signal and injection confirmation (IJF) signal. This DTC will be set if the ECM judges that the number of IJT signals and IJF signals are inconsistent. The injectors are grounded over a FET (Field Effect Transistor) and a serial resistor. This resistor creates a voltage drop, which is monitored by the EDU (injector drive circuit), in relation to the current drawn by the injector. When the injector current becomes too high, the voltage drop over the resistor exceeds a specified level and no IJF signal for that cylinder is sent to the ECM.

P0200 refers to a malfunction in the EDU or injector circuit.

If this DTC is present, the ECM enters fail-safe mode and limits the engine power. The fail-safe mode continues until the ignition switch is turned to OFF.

Malfunction Detection:



Y

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MONITOR STRATEGY

Required sensors	IJF signal from EDU
Frequency of operation	Continuous
Duration	10 seconds
MIL operation	1 driving cycle

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
Engine speed	500 rpm	–
Battery voltage	11 V	–
Ignition switch	ON	

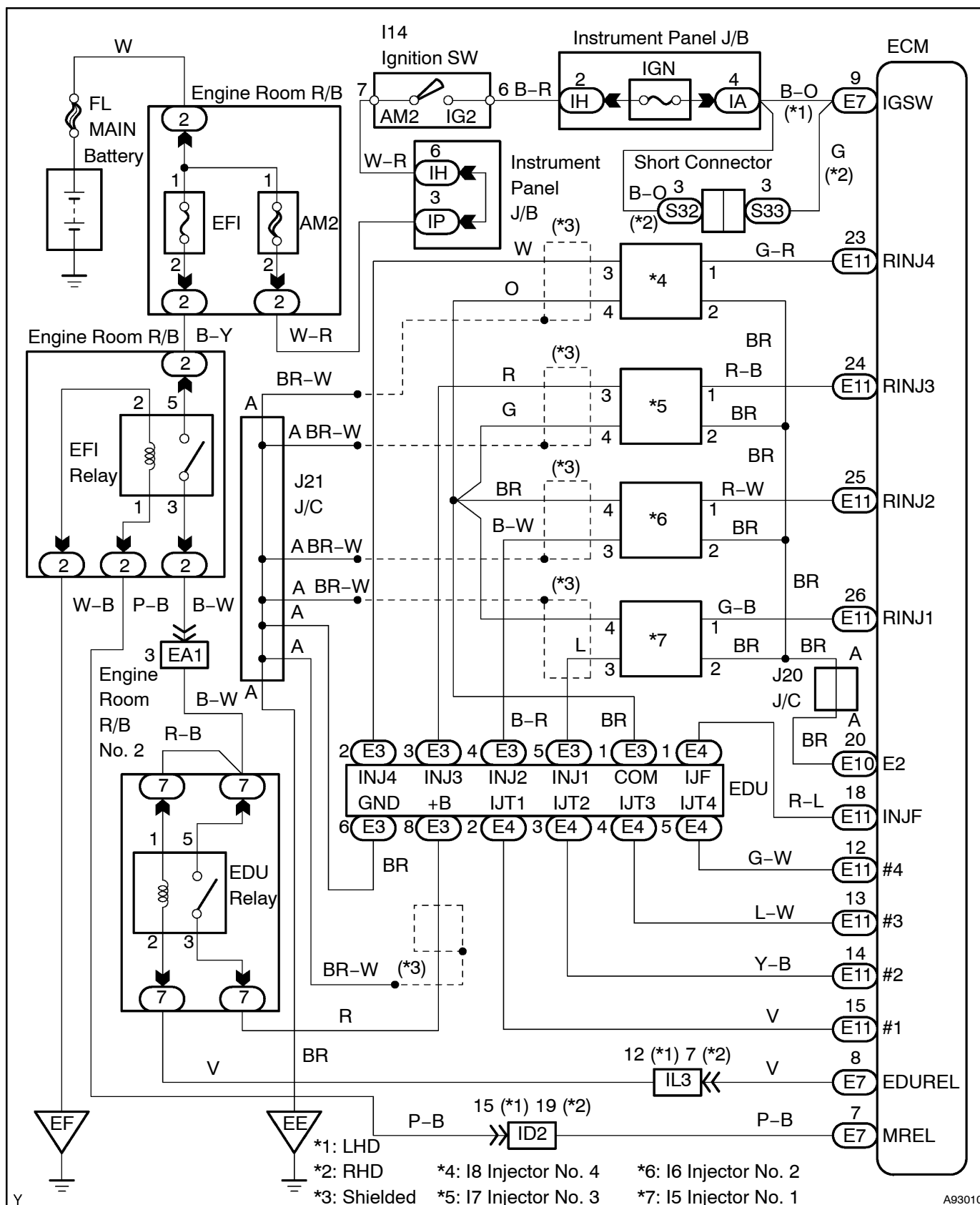
TYPICAL MALFUNCTION THRESHOLDS

Threshold

The injection missing counter* for all the cylinders, or for one individual cylinder, reaches a specified number (taking approximately 1 second from engine ignition)

*: Increments when no IJF signal is received from the EDU despite the ECM sending IJT signals

WIRING DIAGRAM

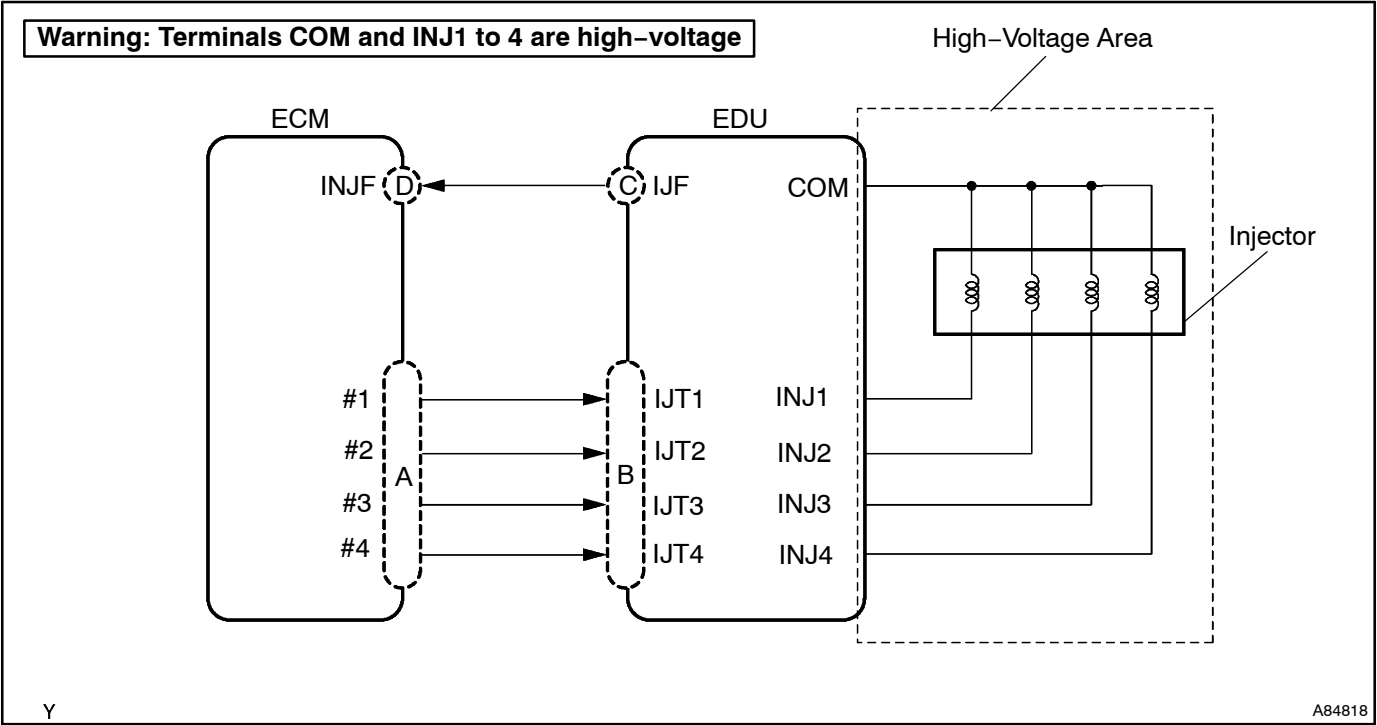


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PULSE GENERATION INSPECTION

HINT:

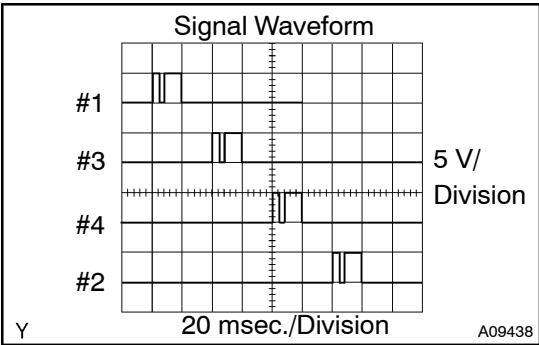
Problem areas can be located by checking the waveform at the following terminals.



HINT:

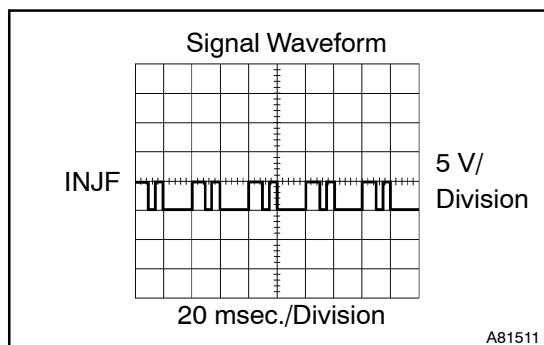
If you check the ECM side first, inspect the following A and D in sequence. If you check the EDU side first, inspect the following B and C in sequence. This shortens the inspection time.

Malfunction Point	Trouble Area
A	• ECM
B (if A is normal)	• Open or short in "#1 to #4 (ECM)" – "IJT1 to IJT4 (EDU)" harness or connector
C (if A and B are normal)	• Open or short in "INJ1 to INJ4 (EDU)" – COM (EDU) circuit • Injector • EDU
D (if A, B and C are normal)	• Open or short in "INJ (EDU)" – "INJF (ECM)" circuit



- (a) Reference: Inspection using the oscilloscope.
During idling, the correct waveform is as shown in the diagram on the left.

Inspection Points	Specified Condition
A and B	Correct waveform is as shown



- (b) Reference: Inspection using the oscilloscope.
During idling, the correct waveform is as shown in the diagram on the left.

Inspection Points	Specified Condition
C and D	Correct waveform is as shown

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester II. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, and other data from the time the malfunction occurred.

1 CHECK OTHER DTC OUTPUT(IN ADDTION TO DTC P0200)

- Connect the intelligent tester II to the DLC3.
- Turn the ignition switch to ON and turn the intelligent tester II ON.
- Select the following menu items: Powertrain / Engine and ECT / DTC.
- Read DTCs.

Result:

Display (DTC Output)	Proceed To
P0200 and P1238	A
P0200	B

B

Go to step 3

A

2 READ VALUE OF INTELLIGENT TESTER II(COMPENSATION OF INJECTION VOLUME BETWEEN CYLINDERS)

- Connect the intelligent tester II to the DLC3.
- Start the engine and turn the intelligent tester II ON.
- On the intelligent tester II, select the following menu items: Powertrain / Engine and ECT / Data List / Revised Injection Volume #1, #2, #3, and #4.
- Read the value.

Result:

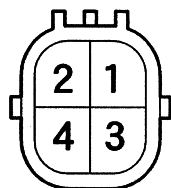
Result	Compensatory Injection Volume (mm ³)
Standard	-3 to 3
Maximum	-4.9 to 4.9

- Inspect and repair the cylinder that has an improper compensation value according to the following steps.

GO

3 INSPECT INJECTOR ASSY

Component Side:



Injector Assy

A

A38631

- (a) Disconnect the I5, I6, I7 or I8 injector connector.
- (b) Measure the resistance between the terminals of the injector assembly.

Standard:

Tester Connection	Specified Condition
3 - 4	2.5 to 3.1 Ω at 20°C (68°F)

- (c) Reconnect the injector connector.

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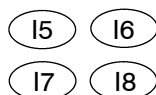
REPLACE INJECTOR ASSY
 (See page 11-22 of Pub. No. RM864E AVENSIS
 VERSO/ PICNIC REPAIR MANUAL)

OK

4 CHECK HARNESS AND CONNECTOR(EDU - INJECTOR ASSY)

Wire Harness Side:

Injector Connector

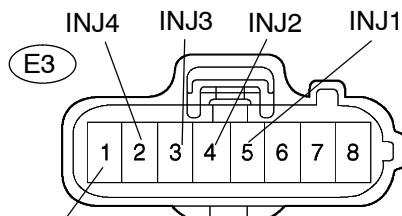


Front View

Y

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Wire Harness Side:



EDU Connector

Front View

Y

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- (a) Check the harness and connectors between the injector and EDU (INJ terminal).
 - (1) Disconnect the I5, I6, I7, or I8 injector connector.
 - (2) Disconnect the E3 EDU connector.
 - (3) Check the resistance.

Standard (Check for open):

Tester Connection	Specified Condition
Injector (I5-3) - INJ1 (E3-5)	Below 1 Ω
Injector (I6-3) - INJ2 (E3-4)	
Injector (I7-3) - INJ3 (E3-3)	
Injector (I8-3) - INJ4 (E3-2)	
Injector (I5-4) - COM (E3-1)	
Injector (I6-4) - COM (E3-1)	
Injector (I7-4) - COM (E3-1)	
Injector (I8-4) - COM (E3-1)	

Standard (Check for short):

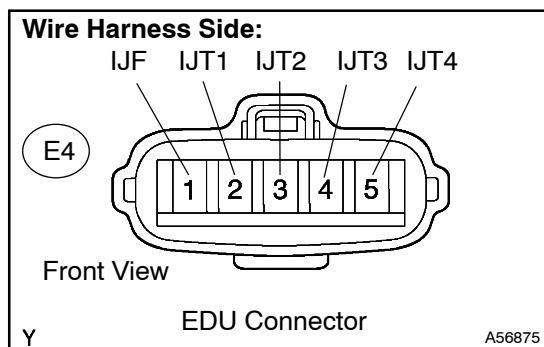
Tester Connection	Specified Condition
Injector (I5-3) or INJ1 (E3-5) - Body ground	10 k Ω or higher
Injector (I6-3) or INJ2 (E3-4) - Body ground	
Injector (I7-3) or INJ3 (E3-3) - Body ground	
Injector (I8-3) or INJ4 (E3-2) - Body ground	
Injector (I5-4) or COM (E3-1) - Body ground	
Injector (I6-4) or COM (E3-1) - Body ground	
Injector (I7-4) or COM (E3-1) - Body ground	
Injector (I8-4) or COM (E3-1) - Body ground	

- (4) Reconnect the injector connector.
- (5) Reconnect the EDU connector.

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**REPAIR OR REPLACE HARNESS OR
CONNECTOR**

OK

5 CHECK HARNESS AND CONNECTOR(EDU - ECM)

- Disconnect the E4 EDU connector.
- Disconnect the E11 ECM connector.
- Check the resistance.

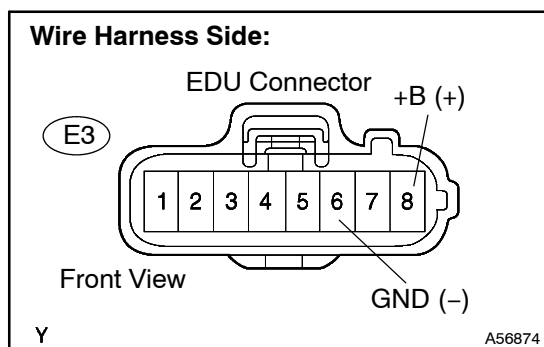
Standard (Check for open):

Tester Connection	Specified Condition
IJT1 (E4-2) - #1 (E11-15)	Below 1 Ω
IJT2 (E4-3) - #2 (E11-14)	
IJT3 (E4-4) - #3 (E11-13)	
IJT4 (E4-5) - #4 (E11-12)	
IJF (E4-1) - INJF (E11-18)	

Standard (Check for short):

Tester Connection	Specified Condition
IJT1 (E4-2) or #1 (E11-15) - Body ground	10 k Ω or higher
IJT2 (E4-3) or #2 (E11-14) - Body ground	
IJT3 (E4-4) or #3 (E11-13) - Body ground	
IJT4 (E4-5) or #4 (E11-12) - Body ground	
IJF (E4-1) or INJF (E11-18) - Body ground	

- Reconnect the EDU connector.
- Reconnect the ECM connector.

NG**REPAIR OR REPLACE HARNESS OR CONNECTOR****OK****6 INSPECT INJECTOR DRIVER(BATTERY VOLTAGE)**

- Disconnect the E3 EDU connector.
- Turn the ignition switch to ON.
- Measure the voltage between the specified terminals of the EDU connector.

Standard:

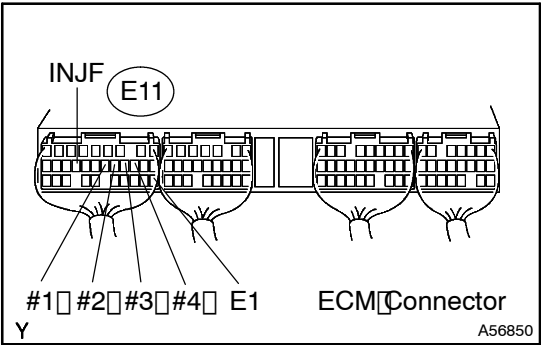
Tester Connection	Specified Condition
+B (E3-8) - GND (E3-6)	9 to 14 V

- Reconnect the EDU connectors.

NG**CHECK INJECTOR DRIVER POWER SOURCE CIRCUIT (BATTERY - EDU)****OK**

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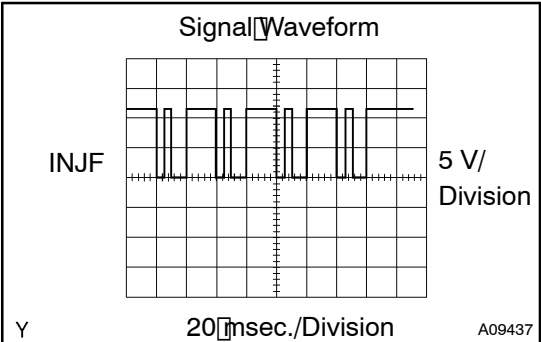
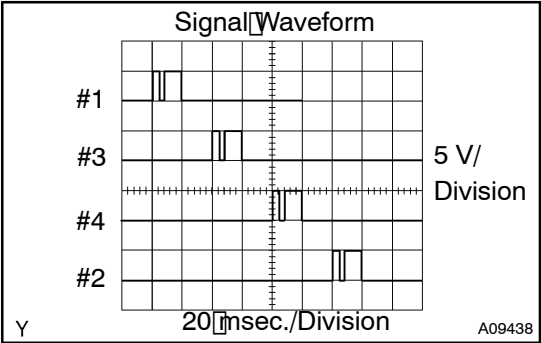
INSPECT ECM(INJECTOR VOLTAGE)



- (a) Inspect using the oscilloscope.
- (b) During idling, check the waveform between the specified terminals of the E11 ECM connector.

Standard:

Tester Connection	Specified Condition
#1(E11-15) - E1(E11-22)	Correct waveform is as shown
#2(E11-14) - E1(E11-22)	
#3(E11-13) - E1(E11-22)	
#4(E11-12) - E1(E11-22)	
INJF(E11-18) - E1(E11-22)	



NG REPLACE ECM (See page 10-30)

OK

8

REPLACE INJECTOR DRIVER

GO

CHECK IF DTC OUTPUT RECURS (DTC P0200)

HINT:

After clearing the DTC, start the engine and let it idle for 30 seconds, and then confirm that P0200 is not set again.