DTC	P1271/78	FUEL PRESSURE REGULATOR CIRCUIT MALFUNCTION (OPEN/SHORT)

DTC	P1272/78	FUEL PRESSURE REGULATOR SYSTEM MALFUNCTION

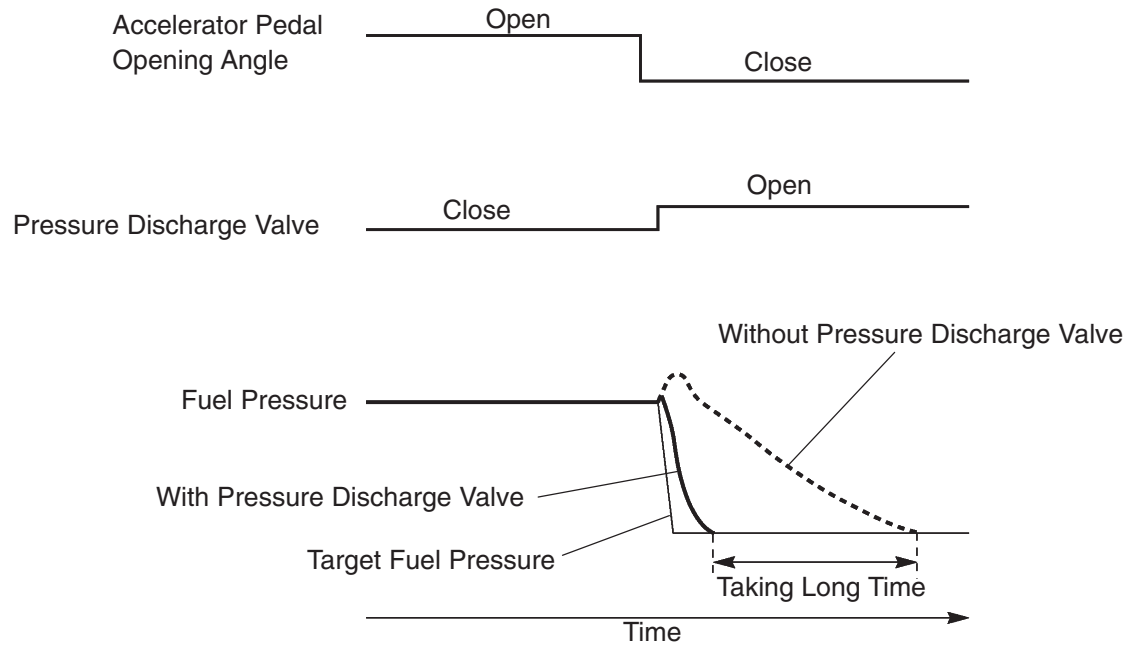
HINT:

- For more information on the pressure discharge valve and the common rail system, see page 05–546.
- For more information on the EDU, see page 05–547.
- If DTC P1271/78 and/or P1272/78 is present, refer to the Diagnostic Trouble Codes (DTCs) Table for Common Rail System on page 05–546.

CIRCUIT DESCRIPTION

The ECM controls the internal fuel pressure of the common rail by opening and closing the pressure discharge valve. When sudden deceleration occurs, the internal fuel pressure temporarily becomes higher than usual, and combustion noises may result. As a result, the ECM opens the valve temporarily to discharge the pressure inside the common rail. Also, the pressure discharge valve opens when the ignition switch is turned to OFF, and the internal pressure is then promptly discharged.

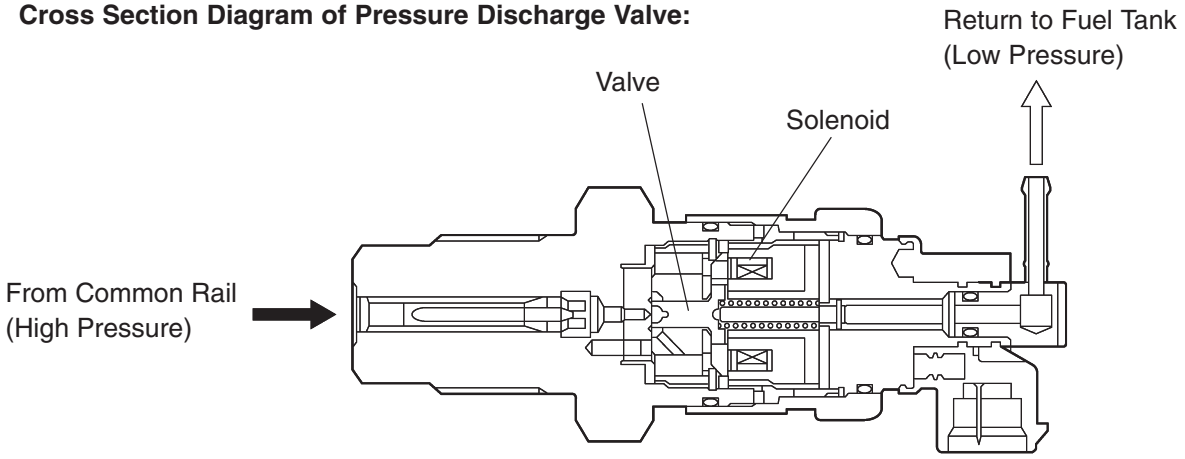
Pressure Discharge Valve Operation by Sudden Deceleration:



HINT:

The solenoid valve of the pressure discharge valve is the same type as that of the injector solenoid valve.

Cross Section Diagram of Pressure Discharge Valve:



DTC No.	DTC Detection Condition	Trouble Area
P1271/78	• Open or short in pressure discharge valve circuit No valve opening confirmation (IJF) signal from EDU to ECM after engine started, despite ECM sending valve opening command (PRD) signal (1 trip detection)	• Open or short in pressure discharge valve circuit • Open or short in pressure discharge valve itself • EDU • ECM
P1272/78	• Pressure discharge valve closed malfunction Actual pressure decreasing rate deviates from simulated pressure decreasing rate after ignition switch turned to OFF (2 trip detection)	• Open or short in pressure discharge valve circuit (P1271 set simultaneously) • Pressure discharge valve • Supply pump • ECM

HINT:

When DTC P1271/78 and/or P1272/78 is set, check the internal fuel pressure of the common rail by selecting the following menu items on the intelligent tester II: Powertrain / Engine and ECT / Data List / Common Rail Pressure.

Reference:

Engine Speed	Fuel Pressure (MPa)
Idling	Approximately 20 to 40
2,500 rpm (No engine load)	Approximately 40 to 80

MONITOR DESCRIPTION

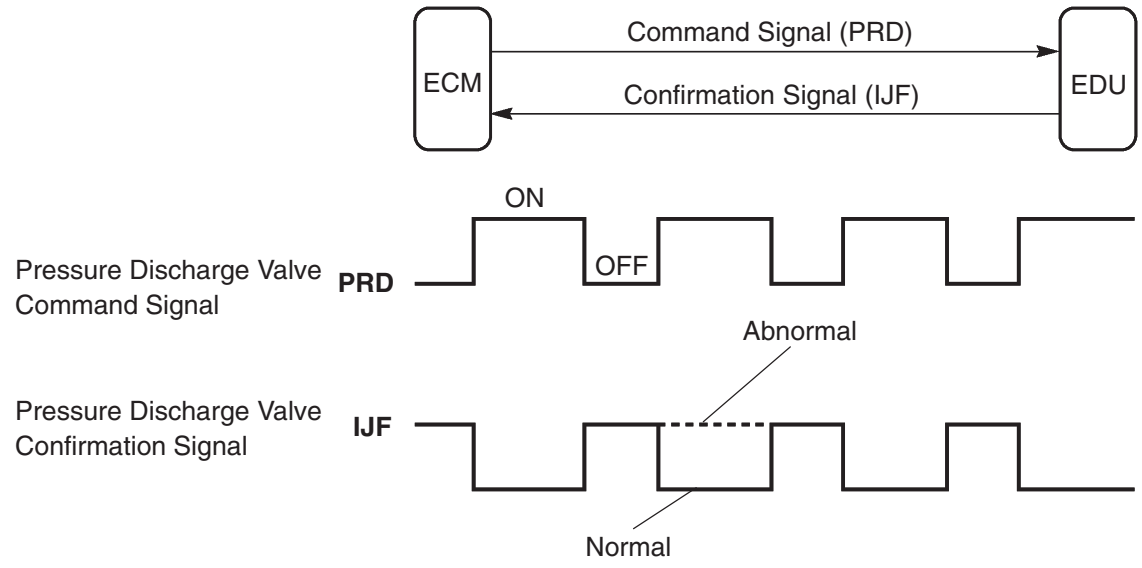
P1271/78 (Open or short in the pressure discharge valve circuit):

This DTC is set if there is no valve opening confirmation (IJF) signal from the EDU to the ECM, despite the ECM commanding the pressure discharge valve to open with the EDU. This DTC refers to an open or short malfunction in the pressure discharge valve circuit, therefore the malfunctions that the valve is stuck open or closed can be excluded.

The EDU monitors the current supplied to the pressure discharge valve and indicates that the current flows into the valve. If the current exceeds the specified level, the EDU interprets this as the IJF signal is low.

If this DTC is set, the ECM enters fail–safe mode and limits the engine power. Fail–safe mode continues until the ignition switch is turned to OFF.

P1271 Malfunction:



P1272/78 (Closed malfunction of the pressure discharge valve):

The pressure discharge valve opens and discharges the internal fuel pressure from the common rail to the fuel tank when the ignition switch is turned to OFF. In this event, the ECM compares the actual dropping rate of the internal fuel pressure and the simulated dropping rate. If the ECM determines the actual dropping rate to be smaller than its simulated rate, the ECM then interprets the valve as being stuck closed, and sets this DTC. This DTC is set if the internal fuel pressure does not decrease to below the specified level after the ignition switch is turned to OFF.

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

MONITOR STRATEGY

P1271/78:

Required sensors	EDU
Frequency of operation	Continuous
Duration	3 seconds
MIL operation	1 driving cycle

P1272/78:

Required sensors	Fuel pressure sensor
Frequency of operation	Once per driving cycle
Duration	1 second
MIL operation	2 driving cycles

TYPICAL ENABLING CONDITIONS

P1271/78:

Specification
Drive vehicle at 50 km/h (31 mph) with 3rd gear and then decelerate it by completely releasing accelerator pedal

P1272/78:

Item	Specification	
	Minimum	Maximum
Fuel pressure	30 MPa (306 kgf/cm^2, 4,351 psi)	–
Fuel temperature	0°C (32°F)	–
Battery voltage	11 V	–
Monitor does not run if fuel pressure sensor, pressure discharge valve circuit, or fuel temperature sensor malfunctioning		

TYPICAL MALFUNCTION THRESHOLDS

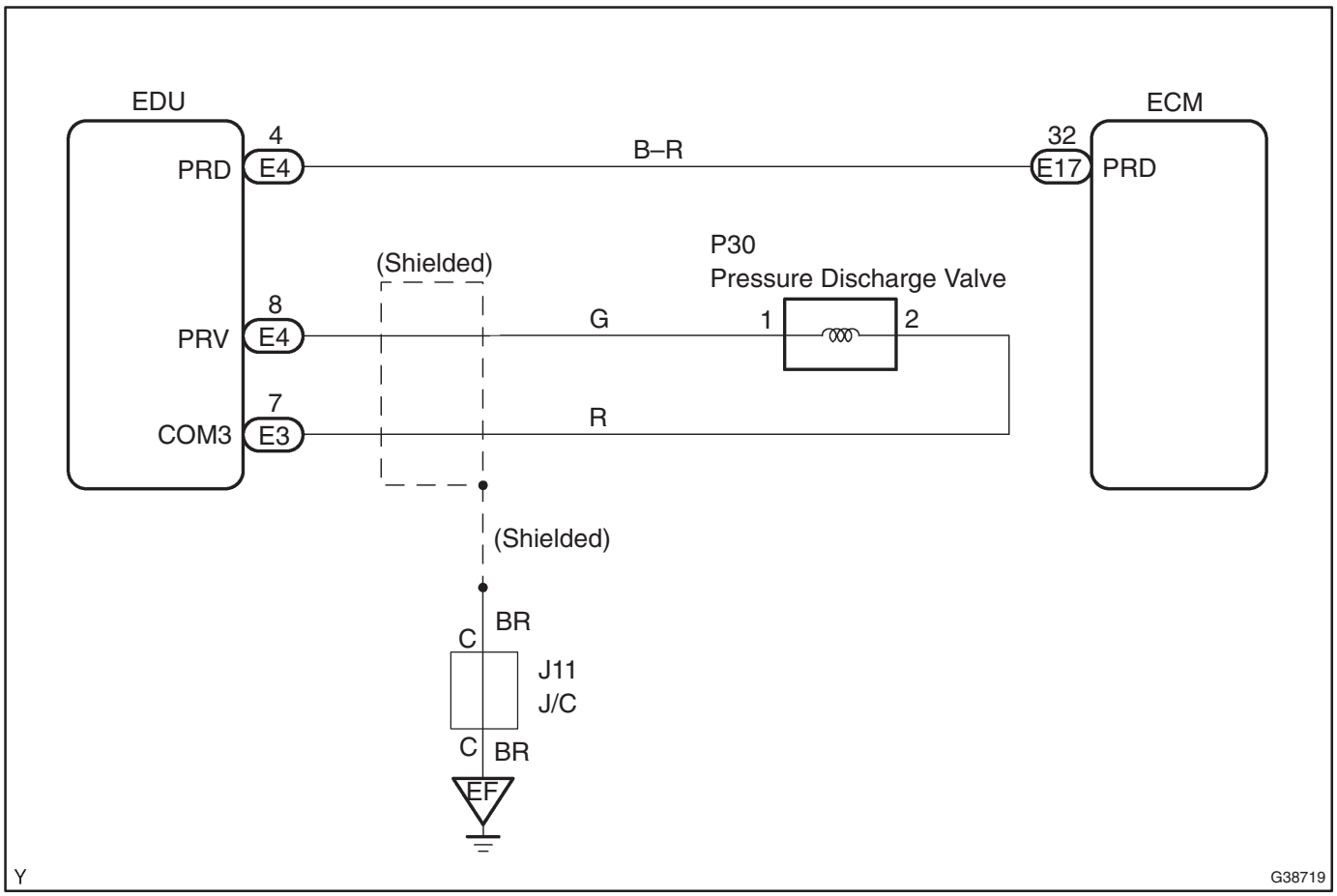
P1271/78:

Threshold
If confirmation signals from EDU not present, despite ECM sending command signals regularly while decelerating

P1272/78:

Threshold
If internal pressure continues exceeding specified level after ignition switch turned to OFF

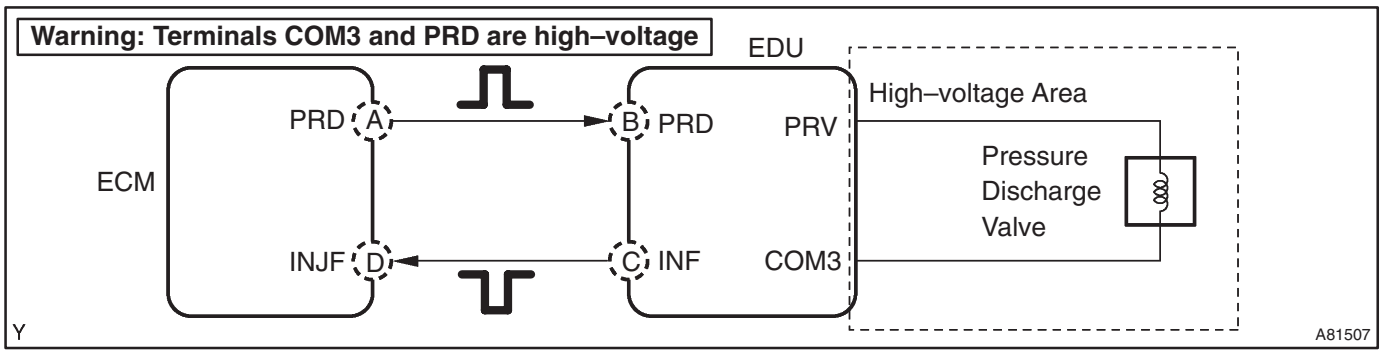
WIRING DIAGRAM



PULSE GENERATION INSPECTION

HINT:

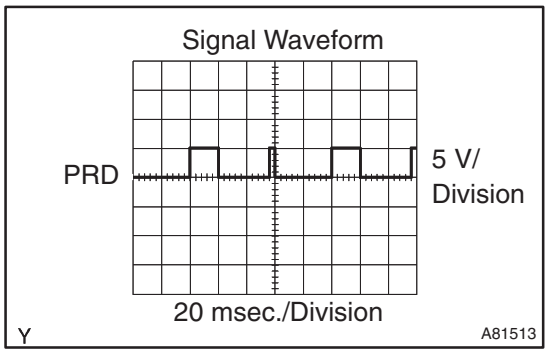
A problem area can be located by checking the waveform at the following terminals.



HINT:

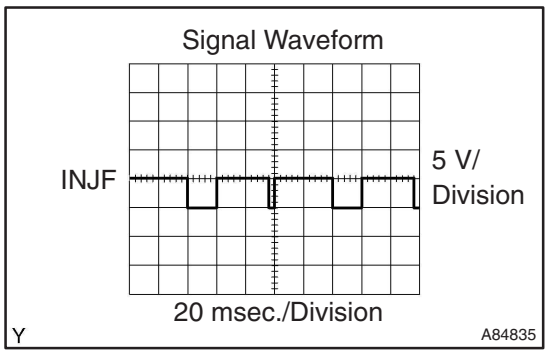
If you check the ECM side first, inspect the following A to D in sequence. If you check the EDU side first, inspect the following B and C in sequence. This shortens the inspecting time.

Inspection Point	Trouble Area
A	• ECM
B (If A is normal)	• Open or short in PRD (ECM) – PRD (EDU) circuit
C (If A and B are normal)	• Open or short in PRV (EDU) – COM3 (EDU) circuit • Pressure discharge valve • EDU
D (If A, B and C are normal)	• Open or short in INF (EDU) – INJF (ECM) circuit (DTC P0200 set simultaneously)



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

Inspection Point	Specified Condition
A and B	Correct waveform shown



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

Inspection Point	Specified Condition
C and D	Correct waveform shown

INSPECTION PROCEDURE

HINT:

- After completing repairs, confirm that DTC P1271/78 and/or P1272/78 is not set again.
- If DTCs P0200/97 and P1271/78 are set simultaneously, there is an open in the INJF wire harness between the EDU and ECM, or there is an open in the wire harness for both injector and pressure discharge valve.
- Read freeze frame data using an 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	READ OUTPUT DTC(DTC P1271/78 AND/OR P1272/78)

(a) Connect an intelligent tester II to the DLC3.
(b) Turn the ignition switch to ON and turn the intelligent tester II ON.
(c) Select the following menu items: Powertrain / Engine and ECT / DTC.
(d) Read DTCs.
Result:

Display (DTC Output)	Proceed To
P1271/78 and P1272/78	A
P1272/78	B

B → **Go to step 8**

A

2 INSPECT COMMON RAIL ASSY(PRESSURE DISCHAGE VALVE)

Component Side:



Pressure Discharge Valve

Y A82883

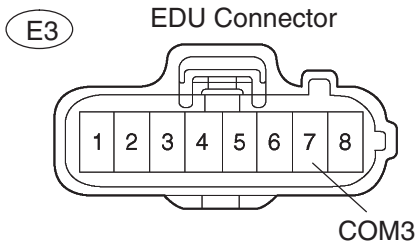
(a) Disconnect the P30 pressure discharge valve connector.
(b) Measure the resistance between the terminals of the pressure discharge valve.
Standard: 0.85 to 1.05 Ω at 20°C (68°F)
(c) Reconnect the pressure discharge valve connector.

NG → **REPLACE COMMON RAIL ASSY (SEE PAGE 11–67)**

OK

3 CHECK HARNESS AND CONNECTOR(PRESSURE DISCHARGE VALVE – EDU)

Wire Harness Side:



Y A81461

(a) Disconnect the E3 and E4 EDU connectors.
(b) Disconnect the P30 pressure discharge valve connector.
(c) Check the resistance.
Standard (Check for open):

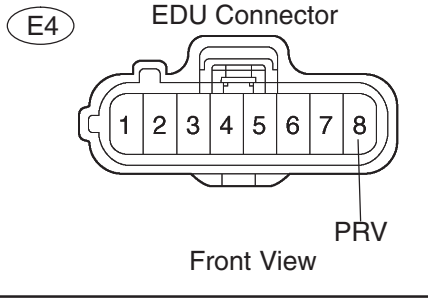
Tester Connection	Specified Condition
COM3 (E3–7) – (P19–2)	Below 1 Ω
PRV (E4–8) – (P19–1)	

Standard (Check for short):

Tester Connection	Specified Condition
COM3 (E3–7) or (P19–2) – Body ground	10 kΩ or higher
PRV (E4–8) or (P19–1) – Body ground	

(d) Reconnect the EDU connectors.
(e) Reconnect the pressure discharge valve connector.

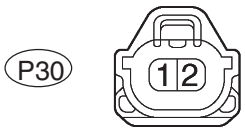
Wire Harness Side:



Y A81462

Wire Harness Side:

Pressure Discharge Valve Connector



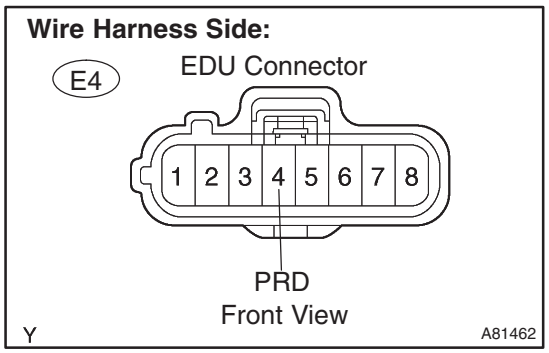
Front View

Y A81694

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR(EDU – ECM)



(a) Disconnect the E4 EDU connector.
(b) Disconnect the E17 ECM connector.
(c) Check the resistance.

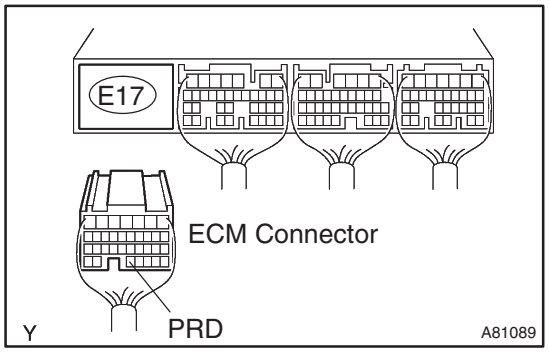
Standard (Check for open):

Tester Connection	Specified Condition
PRD (E4–4) – PRD (E17–32)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
PRD (E4–4) or PRD (E17–32) – Body ground	10 kΩ or higher

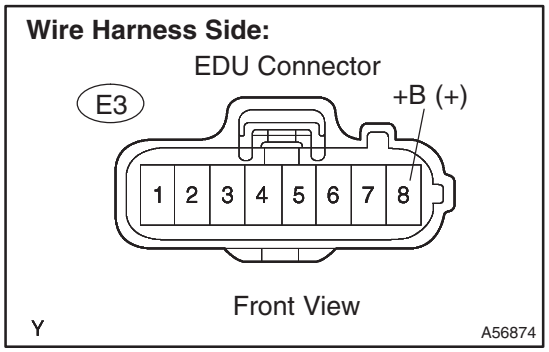
(d) Reconnect the EDU connector.
(e) Reconnect the ECM connector.



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT INJECTOR DRIVER(BATTERY VOLTAGE)

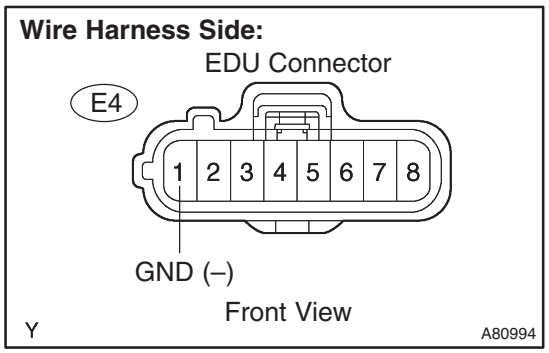


(a) Disconnect the E3 and E4 EDU connectors.
(b) Turn the ignition switch to ON.
(c) Measure the voltage between the terminals of each EDU connector.

Standard:

Tester Connection	Specified Condition
+B (E3–8) – GND (E4–1)	9 to 14 V

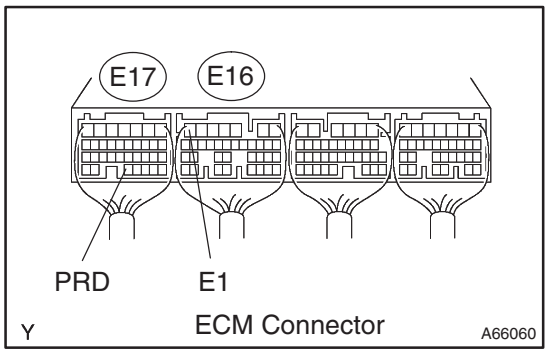
(d) Reconnect the EDU connectors.

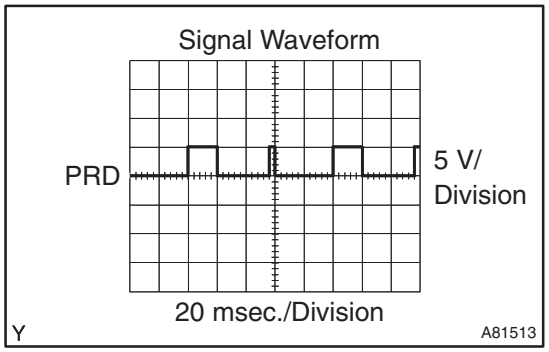


NG → **CHECK INJECTOR DRIVER POWER SOURCE CIRCUIT**

OK

6 INSPECT ECM(PRD VOLTAGE)





(a) Inspect the ECM using an oscilloscope.
(b) Drive the vehicle at 50 km/h (31 mph) with the third gear, and then decelerate by releasing the accelerator pedal.
(c) Check the waveform between the terminal of the E17 and E16 ECM connectors.

Standard:

Tester Connection	Specified Condition
PRD (E17–32) – E1 (E16–7)	Correct waveform shown

HINT:
Alternative inspection:
Run the engine at 2,500 rpm for 10 seconds and then decrease the engine speed to idling by completely releasing the accelerator pedal.

NG → **REPLACE ECM (See Pub. No. RM990E, page 10–34)**

OK

7 REPLACE INJECTOR DRIVER

NEXT

CHECK IF DTCS OUTPUT RECUR

HINT:
P1271/78:
After clearing the DTC, drive the vehicle at 50 km/h (31 mph) with the third gear and then decelerate by releasing the accelerator pedal. Confirm that DTC P1271/78 is not present again.
P1272/78:
After clearing the DTC, start and stop the engine twice, and then confirm that DTC P1272/78 is not present again.

8	REPLACE COMMON RAIL ASSY (SEE PAGE 11–67)

NEXT

CHECK IF DTCS OUTPUT RECUR

HINT:
P1271/78:
After clearing the DTC, drive the vehicle at 50 km/h (31 mph) with the third gear and then decelerate by releasing the accelerator pedal. Confirm that DTC P1271/78 is not present again.
P1272/78:
After clearing the DTC, start and stop the engine twice, and then confirm that DTC P1272/78 is not present again.