P261C

2ZR-FXE ENGINE CONTROL: SFI SYSTEM: P261B-P261D: Engine Coolant Pump "B" Control Malfunction
P261D - Engine Coolant Pump "B" Control Circuit High

DESCRIPTION

The ECM controls the engine water pump assembly by calculating the necessary amount of coolant flow based on engine coolant temperature, engine speed and vehicle speed information. The speed of the engine water pump assembly is controlled steplessly using duty cycle signal sent from the ECM. This optimal control enhances warm-up performance and reduces cooling losses, thus reducing the specific fuel consumption of the engine.

DTC No.	DTC Detection Condition	Trouble Area
P261B	Engine water pump assembly speed is less than 900 rpm while the engine water pump assembly is operating (1 trip detection logic)	● Open or short in engine water pump assembly circuit ● Engine water pump assembly ● ECM
P261C	Engine water pump assembly output voltage is less than specified value while the engine water pump assembly is operating (1 trip detection logic)	● Short in engine water pump assembly circuit ● Engine water pump assembly ● ECM
P261D	Engine water pump assembly output voltage is higher than specified value while the engine water pump assembly is operating (1 trip detection logic)	● Open in engine water pump assembly circuit ● Engine water pump assembly ● ECM

MONITOR DESCRIPTION

The ECM calculates the speed of the engine water pump assembly using a duty cycle signal sent from the engine water pump assembly. When the speed of the engine water pump assembly becomes less than 900 rpm while it is operating, the ECM detects the malfunction and stores DTC P261B.

The engine water pump assembly operates steplessly based on a duty cycle signal sent from the ECM. If actual drive duty cycle ratio does not correspond to the target drive duty cycle of the engine water pump assembly, the ECM detects the malfunction.

MONITOR STRATEGY

Related DTCs	P261B: Engine water pump circuit performance P261C: Engine water pump circuit range check (low voltage) P261D: Engine water pump circuit range check (high voltage)
Required Sensors/Components (Main)	Engine water pump assembly
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	15 seconds: Engine coolant pump circuit performance 3 seconds: Engine coolant pump circuit range check (low voltage, high voltage)
MIL Operation	Immediately
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All

Monitor runs whenever following DTCs are not present	None
Battery voltage	8 V or more
Power switch	On (IG)
Time after power switch off to on (IG)	More than 0.5 seconds

P261B: Engine Water Pump Circuit Performance

Output signal duty ratio	40% or more
Monitor synchronism monitor status	Enable
Engine coolant temperature	-10°C (14°F) or more
Engine coolant temperature sensor circuit fail (P0115, P0117, P0118)	Not detected
Engine water pump circuit low voltage fail (P261C)	Not detected
Engine water pump circuit high voltage fail (P261D)	Not detected

P261C, P261D: Engine Water Pump Circuit Range Check (Low Voltage, High Voltage)

Output signal duty ratio	40 to 60%
Engine water pump circuit performance fail (P261B)	Not detected
Engine water pump output terminal voltage monitor counter	0.08 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P261B: Engine Water Pump Circuit Performance

Motor speed	Less than 900 rpm

P261C: Engine Water Pump Circuit Range Check (Low Voltage)

Current engine water pump output terminal voltage	Low
Engine water pump output monitor error	Judged

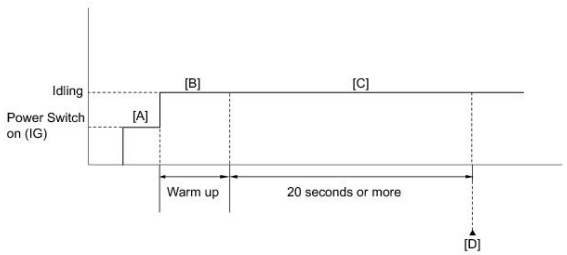
P261D: Engine Coolant Pump Circuit Range Check (High Voltage)

Current engine water pump output terminal voltage	High
Engine water pump output monitor error	Judged

COMPONENT OPERATING RANGE

Motor speed	900 rpm or more
Engine water pump output monitor normal	Judged

CONFIRMATION DRIVING PATTERN



1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode Component Tests and General Diagnostics.
7. Start the engine and warm it up (until the engine coolant temperature is 75°C (167°F) or higher) [B].

8. Idle the engine for 20 seconds or more [C].

9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

10. Read the DTC [D].

HINT
*** If the DTC is output, the system is malfunctioning.**
*** If a DTC is not output, perform the following procedure.**

11. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

12. Input the DTC: P261B, P261C or P261D.

13. Check the DTC judgment result.

Techstream Display	Description
NORMAL	● DTC judgment completed ● System normal
ABNORMAL	● DTC judgment completed ● System abnormal
INCOMPLETE	● DTC judgment not completed ● Perform driving pattern after confirming DTC enabling conditions
UNKNOWN	● Unable to perform DTC judgment ● Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit

HINT
*** If the judgment result shows NORMAL, the system is normal.**
*** If the judgment result shows ABNORMAL, the system has a malfunction.**
*** If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [C] again.**

14. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

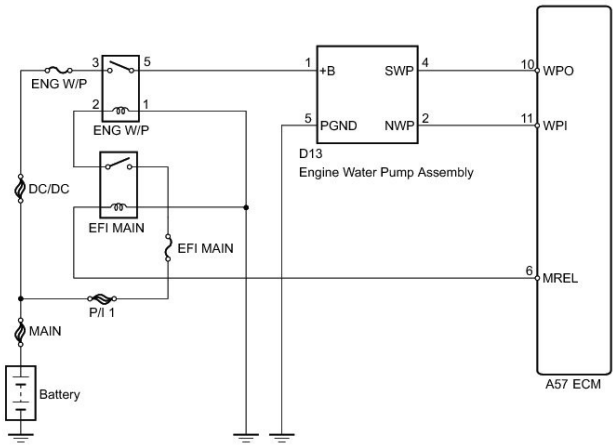
15. Check the judgment result.

HINT
*** If the judgment result shows NORMAL, the system is normal.**
*** If the judgment result shows ABNORMAL, the system has a malfunction.**

16. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs Reading and Clearing Diagnostic Trouble Codes.

HINT
*** If a permanent DTC is output, the system is malfunctioning.**
*** If no permanent DTC is output, the system is normal.**

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:
Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT
Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

PROCEDURE

1. PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVATE THE ELECTRIC WATER PUMP)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Active Test / Activate the Electric Water Pump.

(e) Touch the engine water pump assembly and check that the pump is operating (vibrating).

OK:

The engine water pump assembly is operating (vibrating).

NG -- CHECK ENGINE WATER PUMP ASSEMBLY (POWER SOURCE)
OK -- Continue to next step.

2. CHECK HARNESS AND CONNECTOR (ENGINE WATER PUMP ASSEMBLY - ECM)

HINT
Confirm a good connection at the engine water pump assembly and ECM connectors.

(a) Disconnect the engine water pump assembly connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

Tester Connection	Condition	Specified Condition
D13-2 (NWP) - A57-11 (WPI)	Always	Below 1 Ω
D13-4 (SWP) - A57-10 (WPO)	Always	Below 1 Ω

Standard Resistance (Check for Short):

Tester Connection	Condition	Specified Condition
D13-2 (NWP) or A57-11 (WPI) - Body ground	Always	10 kΩ or higher
D13-4 (SWP) or A57-10 (WPO) - Body ground	Always	10 kΩ or higher

(d) Reconnect the engine water pump assembly connector.

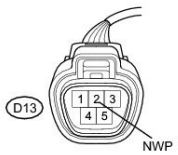
(e) Reconnect the ECM connector.

NG -- REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE WATER PUMP ASSEMBLY - ECM)
OK -- Continue to next step.

3. CHECK ECM (WPI VOLTAGE)

(a) Disconnect the engine water pump assembly connector.

*a



c

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
D13-2 (NWP) - Body ground	Power switch on (IG)	11 to 14 V

Text in Illustration

*a	Front view of wire harness connector (to Engine Water Pump Assembly)

(d) Reconnect the engine water pump assembly connector.

NG -- REPLACE ECM Removal

OK -- REPLACE ENGINE WATER PUMP ASSEMBLY

4. CHECK ENGINE WATER PUMP ASSEMBLY (POWER SOURCE)

HINT
Confirm a good connection at the engine water pump assembly and ECM connectors.

(a) Disconnect the engine water pump assembly connector.

*a

c

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Switch Condition	Specified Condition
D13-1 (+B) - Body ground	Power switch on (IG)	11 to 14 V

Text in Illustration

*a	Front view of wire harness connector (to Engine Water Pump Assembly)

(d) Reconnect the engine water pump assembly connector.

NG -- INSPECT ENG W/P RELAY
OK -- Continue to next step.

5. CHECK HARNESS AND CONNECTOR (ENGINE WATER PUMP ASSEMBLY - BODY GROUND)

(a) Disconnect the engine water pump assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

Tester Connection	Switch Condition	Specified Condition
D13-5 (PGND) - Body ground	Always	Below 1 Ω

(c) Reconnect the engine water pump assembly connector.

NG -- REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE WATER PUMP ASSEMBLY - BODY GROUND)
OK -- Continue to next step.

6. CHECK HARNESS AND CONNECTOR (ENGINE WATER PUMP ASSEMBLY - ECM)

(a) Disconnect the engine water pump assembly connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

Tester Connection	Condition	Specified Condition
D13-2 (NWP) - A57-11 (WPI)	Always	Below 1 Ω
D13-4 (SWP) - A57-10 (WPO)	Always	Below 1 Ω

Standard Resistance (Check for Short):

Tester Connection	Condition	Specified Condition
D13-2 (NWP) or A57-11 (WPI) - Body ground	Always	10 kΩ or higher
D13-4 (SWP) or A57-10 (WPO) - Body ground	Always	10 kΩ or higher

(d) Reconnect the engine water pump assembly connector.

(e) Reconnect the ECM connector.

NG -- REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE WATER PUMP ASSEMBLY - ECM)
OK -- Continue to next step.

7. REPLACE ENGINE WATER PUMP ASSEMBLY

(a) Replace the engine water pump assembly Removal.

NEXT -- Continue to next step.

8. CHECK WHETHER DTC OUTPUT RECURS (DTC P261B, P261C OR P261D)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on.

(c) Turn the Techstream on.

(d) Put the engine in inspection mode Component Tests and General Diagnostics.

(e) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(f) Enter the following menus: Powertrain / Engine and ECT / Trouble codes.

(g) Read the DTCs.

Result:

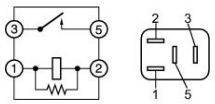
Result	Proceed to
DTC P261B, P261C or P261D is output	A
DTC is not output	B

B -- END

A -- REPLACE ECM Removal

9. INSPECT ENG W/P RELAY

(a) Remove the ENG W/P relay from the engine room relay block.



(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Tester Connection	Condition	Specified Condition
3 - 5	No battery voltage applied between terminals 1 and 2	10 kΩ or higher
3 - 5	Battery voltage applied between terminals 1 and 2	Below 1 Ω

(c) Reinstall the ENG W/P relay to the engine room relay block.

NG -- REPLACE ENG W/P RELAY
OK -- Continue to next step.

10. CHECK HARNESS AND CONNECTOR (ENG W/P RELAY - ENGINE WATER PUMP ASSEMBLY)

(a) Remove the ENG W/P relay from the engine room relay block.

(b) Disconnect the engine water pump assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

Tester Connection	Condition	Specified Condition
ENG W/P relay terminal 5 - D13-1 (+B)	Always	Below 1 Ω

Standard Resistance (Check for Short):

Tester Connection	Condition	Specified Condition
ENG W/P relay terminal 5 or D13-1 (+B) - Body ground	Always	10 kΩ or higher

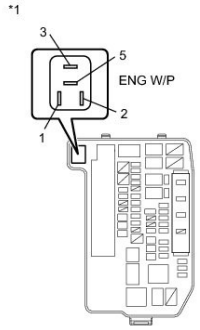
(d) Reinstall the ENG W/P relay to the engine room relay block.

(e) Reconnect the engine water pump assembly connector.

NG -- REPAIR OR REPLACE HARNESS OR CONNECTOR (ENG W/P RELAY - ENGINE WATER PUMP ASSEMBLY)
OK -- Continue to next step.

11. CHECK ENG W/P RELAY (POWER SOURCE)

(a) Remove the ENG W/P relay from the engine room relay block.



(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Tester Connection	Condition	Specified Condition
ENG W/P relay terminal 3 - Body ground	Always	11 to 14 V

Text in Illustration

*1	Engine Room Relay Block

(c) Reinstall the ENG W/P relay to the engine room relay block.

NG -- REPAIR OR REPLACE HARNESS OR CONNECTOR (ENG W/P RELAY - BATTERY)
OK -- Continue to next step.

12. CHECK HARNESS AND CONNECTOR (ENG W/P RELAY - BODY GROUND)

(a) Remove the ENG W/P relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

Tester Connection	Condition	Specified Condition
ENG W/P relay terminal 1 - Body ground	Always	Below 1 Ω

(c) Reinstall the ENG W/P relay to the engine room relay block.

NG -- REPAIR OR REPLACE HARNESS OR CONNECTOR (ENG W/P RELAY - BODY GROUND)

OK -- REPAIR OR REPLACE HARNESS OR CONNECTOR (ENG W/P RELAY - EFI MAIN RELAY)