

ENGINE CONTROL SYSTEM OPERATION INSPECTION [LF]

B3E010318881W31

Main Relay Operation Inspection

1. Verify that the main relay clicks when the ignition switch is turned to ON position and off.
 - If there is no operation sound, inspect the following.
 - Main relay (See [RELAY INSPECTION](#).)
 - Wiring harness and connector between ignition switch and main relay terminal A
 - Wiring harness and connector between PCM terminal 1AT and main relay terminal B

Intake Manifold Vacuum Inspection

1. Verify air intake hoses are installed properly.
2. Start the engine and run it at idle.
3. Disconnect the vacuum hose between the intake manifold and purge solenoid valve from the intake manifold side.
4. Connect a vacuum gauge to the intake manifold and measure the intake manifold vacuum. (See [INTAKE-AIR SYSTEM MANIFOLD VACUUM INSPECTION \[LF\]](#).)
 - If not as specified, inspect the following.

Note

- Air suction can be located by engine speed change when lubricant is sprayed on the area where suction is occurring.
 - Air suction at throttle body, intake manifold and PCV valve installation points
 - Accelerator cable free play
 - Fuel injector insulator
 - Engine compression (See [COMPRESSION INSPECTION \[LF\]](#).)

Idle Air Control System Inspection

Engine coolant temperature compensation inspection

1. Connect the WDS or equivalent to the DLC-2.
2. Access the following PIDs.
 - ECT
 - IAT
 - RPM
3. Verify that the engine is in cold condition, then start the engine.
4. Verify that the engine speed decreases as the engine warms up.
 - If the engine speed does not decrease or decreases slowly, inspect the following.
 - ECT sensor and related wiring harness (See [ENGINE COOLANT TEMPERATURE \(ECT\)](#))

[SENSOR INSPECTION \[LF\].\)](#)

- IAC valve and related wiring harness (See [IDLE AIR CONTROL \(IAC\) VALVE INSPECTION \[LF\].\)](#)

Load compensation inspection

1. Start the engine and idle it.
2. Connect WDS or equivalent to the DLC-2.
3. Verify that P0506, P0507 or P0511 not displayed.
 - If P0506, P0507 or P0511 shown, perform the DTC inspection. (See [DTC TABLE \[LF\].\)](#)
4. Change the duty value of the IAC valve to **100%** using the IAC PID.
5. Verify that the idle speed increases.
 - If the idle speed does not change, inspect the following.
 - IAC valve air passage
 - Open or short circuit in wiring harness between IAC valve terminals and PCM terminals 2E and 2F
6. Access the following PIDs.
 - AC_REQ
 - IAC
 - PSP
 - RPM

Note

- Excludes temporary idle speed drop just after the loads are turned on.

7. Verify that the engine speed is within the specification under each load condition. (See [ENGINE TUNE-UP \[LF\].\)](#)

- If not as specified under each load condition, inspect the following.
 - A/C switch and related wiring harness.
 - Fan switch and related wiring harness (See [FAN SWITCH INSPECTION.](#))
 - PSP switch and related wiring harness.

Variable Intake-air Control Operation Inspection

1. Start the engine.
2. Inspect the rod operation under the following condition.

Rod operation

Engine speed	4,750 rpm	
	Less than	More than
Shutter valve actuator	Operate	Not operate

- If the rod operation is not as specified, inspect as follows.
 - (1) Stop the engine.
 - (2) Connect WDS or equivalent to the DLC-2.
 - (3) Verify that DTC P0661 or P0662 is not displayed.

- If DTC P0661 or P0662 is shown, perform the DTC inspection. (See [DTC TABLE \[LF\]](#).)
- (4) Turn the ignition switch to the ON position.
- (5) Turn the variable intake-air control solenoid valve from on to off using the IMTV PID and verify that operation sound of the solenoid valve is heard.
 - If the operation sound is heard, inspect the following.
 - Vacuum hose and vacuum chamber for looseness or damage
 - Shutter valve actuator (See [VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION \[LF\]](#).)
 - Shutter valve stuck open or close
 - If the operation sound is not heard, inspect the following.
 - Variable intake-air solenoid valve (See [VARIABLE INTAKE-AIR SOLENOID VALVE INSPECTION \[LF\]](#).)

Variable Tumble Control Operation Inspection

1. Connect the WDS or equivalent to the DLC-2.
2. Access ECT PID.
3. Verify that ECT PID is **below 63 °C {145 °F}**.
4. Start the engine.
5. Inspect rod operation under the following condition.

Rod operation

Engine speed	3,750 rpm	
	Less than	More than
Shutter valve actuator	Operate	Not operate

- If the rod operation is not specified, inspect as follows.
 - (1) Verify that DTC No. P2009 or P2010 is not displayed.
 - If DTC No. P2009 or P2010 are shown, perform the DTC inspection. (See [DTC TABLE \[LF\]](#).)
 - (2) Turn the ignition switch to the ON position.
 - (3) Turn the variable tumble solenoid valve from on to off using the IMRC PID and verify that operation sound of the solenoid valve is heard.
 - If the operation sound is heard, inspect the following.
 - Vacuum hose and vacuum chamber for looseness or damage
 - Shutter valve actuator (See [VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION \[LF\]](#).)
 - Shutter valve stuck open or close
 - If the operation sound is not heard, inspect the following.
 - Variable tumble solenoid valve (See [VARIABLE TUMBLE SOLENOID VALVE INSPECTION \[LF\]](#).)

Fuel Injector Operation Inspection

STEP	INSPECTION	RESULTS	ACTION
1	While cranking the engine, inspect for fuel injector operation sound at each cylinder using a soundscope. Is operation sound heard?	Yes	Fuel injector operation is normal.
		No	All cylinders no heard: Go to the next step. Some cylinders no heard: Go to Step 3.
			Inspect following:

2	Perform the main relay operation inspection. Is main relay operation normal?	Yes	<ul style="list-style-type: none"> • Fuel injector power system related wiring harness and connectors • PCM connectors • Fuel injector GND and related wiring harness and connectors
		No	Repair or replace the malfunctioning part.
3	Change fuel injector connector of not operating fuel injector and operating fuel injector. Is operation sound heard?	Yes	Go to the next step.
		No	Replace fuel injector. (See FUEL INJECTOR INSPECTION [ZJ, Z6, LF])
4	Are wiring harness and connectors of not operation fuel injector normal? (Open or short circuit)	Yes	Inspect PCM terminal voltage of fuel injector signal.
		No	Repair or replace the malfunctioning part.

Fuel Cut Control System Inspection

1. Warm up the engine and idle it.
2. Turn off the electrical loads and A/C switch.
3. Connect the WDS or equivalent to the DLC-2.
4. Access RPM and FUELPW1 PIDs.
5. Monitor both PIDs while performing the following steps.

(1) Depress the accelerator pedal and increase the engine speed to **4,000 rpm**.

(2) Release the accelerator pedal (brake pedal is not depressed) and verify that the fuel injector duration time is **0 ms.**, and **2-5 ms.** when the engine speed drops below **1,300 rpm**.

- If not as specified, inspect the following.
 - ECT sensor and related wiring harness (See [ENGINE COOLANT TEMPERATURE \(ECT\) SENSOR INSPECTION \[LF\]](#).)
 - Neutral/clutch pedal position switch and related wiring harness (See [CLUTCH PEDAL POSITION \(CPP\) SWITCH INSPECTION \[LF\]](#).)

Fuel Pump Operation Inspection

1. Connect the WDS or equivalent to the DLC-2.
2. Remove the fuel-filler cap.
3. Turn the ignition switch to the ON position.
4. Turn the fuel pump relay from off to on using the FP PID and inspect if the operation sound is heard.
 - If no operation sounds is heard, proceed to next step.
5. Measure the voltage at wiring harness-side fuel pump terminal A.

Specification

B+ (Ignition switch is ON position)

- If the voltage is as specified, inspect the following.
 - Fuel pump continuity
 - Fuel pump GND
 - Wiring harness between fuel pump relay and PCM terminal 1AQ (without immobilizer system),

- 1AR (with immobilizer system)
- If not as specified, inspect the following.
 - Fuel pump relay (See [RELAY INSPECTION](#).)
 - Wiring harness and connector (Main relay-fuel pump relay-fuel pump)

Fuel Pump Control System Inspection

1. Connect the WDS or equivalent to the DLC-2.
2. Turn the ignition switch to the ON position.
3. Access FP PID.
4. Turn the fuel pump relay from off to on and inspect if the operation sound of the fuel pump relay is heard.
 - If no operation sound is heard, inspect the fuel pump relay.
 - If the fuel pump relay is normal, inspect the following.
 - Wiring harnesses and connectors (Main relay-fuel pump relay-PCM)

Spark Test

1. Remove the fuel pump relay.
2. Verify that each ignition coil and connector is connected properly.
3. Inspect the ignition system in the following procedure.

Warning

- High voltage in the ignition system can cause strong electrical shock which can result in serious injury. Avoid direct contact to the vehicle body during the following spark test.

STEP	INSPECTION	ACTION
1	<ul style="list-style-type: none"> • Disconnect ignition coil from spark plugs. • Remove spark plugs. • Reconnect spark plugs to ignition coil. • Ground spark plugs to engine. • Is strong blue spark visible at each cylinder while cranking? 	Yes Ignition system is normal.
		No Some cylinders do not spark: <ul style="list-style-type: none"> • Go to the next step. All cylinders do not spark: <ul style="list-style-type: none"> • Go to Step 4.
2	<ul style="list-style-type: none"> • Inspect spark plugs for damage, wear, carbon deposits and proper plug gap. • Are spark plugs normal? 	Yes Go to the next step.
		No Replace spark plugs, then return to Step.1.
3	<ul style="list-style-type: none"> • Inspect following wiring harnesses for open or short circuit: <ul style="list-style-type: none"> - Ignition coil No.1 terminal B-PCM terminal 2BE - Ignition coil No.2 terminal B-PCM terminal 2BF - Ignition coil No.3 terminal B-PCM terminal 2BG - Ignition coil No.4 terminal B-PCM terminal 2BH • Are wiring harnesses normal? 	Yes Inspect and replace ignition coil. (See IGNITION COIL INSPECTION [LF] .)
		No Repair or replace the malfunctioning part, then return to Step.1.
4	<ul style="list-style-type: none"> • Measure the voltage at terminal A in each ignition coils. • Is voltage reading B+ ? 	Yes Go to the next step.
		No Inspect power supply circuit of ignition coils.

5	• Does PCM connector or ignition coil connectors have poor connection?	Yes	Repair or replace connector, then return to Step.1.
		No	Go to the next step.
6	• Are following parts normal? - CKP sensor and crankshaft pulley	Yes	Inspect for open or short circuit in wiring harness and connector of CKP sensor.
		No	Repair or replace the malfunctioning part, then return to Step.1.

EGR Control System Inspection

1. Crank the engine and verify that EGR valve operation (initial operation) sound is heard.

- If the operation sound is not heard, connect WDS or equivalent to the DLC-2 and verify that the DTC P0403 is shown. Perform the DTC inspection. (See [DTC TABLE \[LF\]](#).)

2. Start the engine and run it at idle.

3. Increase the step value of EGR valve from **0** to **40** using SEGRP PID.

4. Operate the EGR valve and inspect if the engine speed becomes unstable or the engine stalls.

- If the engine speed will not change, proceed to following.
 - (1) Stop the engine.
 - (2) Remove the EGR valve.
 - (3) Connect the EGR valve connector.
 - (4) Turn the ignition switch to the ON position.
 - (5) Increase the step value of EGR valve from **0** to **40** using SEGRP PID.
 - (6) Inspect the EGR operation.
 - If the EGR valve is operated, clean the EGR valve and reinspect from Step 2.
 - If the EGR valve will not operate, replace the EGR valve and reinspect from Step 2.

5. Start the engine and warm it up completely.

6. Access the following PIDs.

- ECT
- RPM
- SEGRP
- TP
- VSS

7. Idle the vehicle and verify that the SEGRP value is **0**.

8. Put the vehicle in drive.

9. Depress the accelerator pedal and verify that the SEGRP value is increased.

- If the SEGRP value will not increase, inspect the VSS, TP and ECT PIDs. (See [PCM INSPECTION \[LF\]](#).)

10. Stop the vehicle and verify that the SEGRP value is returned **0**.

Purge Control System Inspection

1. Start the engine.

2. Disconnect the vacuum hose between the purge valve and the charcoal canister.

3. Put a finger to the purge valve and verify that there is no vacuum applied when the engine is cold.
 - If there is a vacuum, inspect the following.
 - Wiring harness and connectors (Purge valve-PCM terminal 2AN)
 - Purge valve
4. Start the engine and warm it up completely.
5. Stop the engine.
6. Connect the WDS or equivalent to the DLC-2 and verify that the DTC P0443 is shown. Perform the DTC inspection. (See [DTC TABLE \[LF\]](#).)
7. Turn the ignition switch to the ON position.
8. Access ECT PID.
9. Verify that the engine coolant temperature is **above 78 °C {173 °F}**.
 - If WDS or equivalent indicates **below 78 °C {173 °F}**, perform the ECT sensor inspection.
10. Access EVAPCP PID.
11. Increase the duty value of the purge valve to **50%** and inspect if the operation sound of the valve is heard.
 - If the operation sound is heard, inspect for the loose or damaged vacuum hose. (Intake manifold-purge valve-charcoal canister)
 - If the operation sound is not heard, perform the purge valve inspection.

A/C Cut-off Control System Inspection

1. Start the engine.
2. Turn the A/C switch and fan switch on.
3. Verify that the A/C compressor magnetic clutch actuates.
 - If it does not actuate, go to symptom troubleshooting "No.23 A/C does not work sufficiently".
4. Fully open the throttle valve and verify that the A/C compressor magnetic clutch does not actuate for **2-5 s**.
 - If it actuates, inspect as follows.
 - (1) Connect the WDS or equivalent to the DLC-2.
 - (2) Turn the A/C switch off.
 - (3) Turn the ignition switch to the ON position.
 - (4) Access ACCS PID.
 - (5) Turn the A/C relay from off to on and inspect if the operation sound of the relay is heard.
 - If the operation sound is heard, inspect TP PID.
 - If the operation sound is not heard, inspect following.
 - A/C relay
 - Open circuit or short to GND in wiring harness and connectors (Ignition switch-A/C relay-PCM terminal 1AN)
 - A/C related parts

Cooling Fan Motor Operation Inspection

1. Verify that the battery voltage is **above 12.4 V**.
 - If the battery voltage is **below 12.4 V**, charge the battery or connect the external power supply.

2. Connect the WDS or equivalent to the DLC-2.

3. Access the following PIDs.

- ECT
- AC_REQ
- COLP

4. Turn the A/C switch to off.

5. Verify that ECT PID is **below 98 °C {209 °F}** and the AC_REQ is off.

- If the ECT PID is **below 98 °C {209 °F}**, inspect the ECT sensor.
- If the AC_REQ PID is on, inspect the A/C switch and A/C refrigerant pressure switch (high/low pressure).

6. Turn the ignition switch to the ON position while the temperature is **below 98 °C {209 °F}** with the ignition switch in the ON position.

7. Verify that the cooling fan is not operating.

- If the cooling fan is operating inspect the following:
 - (1) Verify that the FAN DUTY PID is **0 %**.
 - If the FAN DUTY PID is not **0 %**, inspect the following PID and related parts.
 - ECT (ECT sensor)
 - AC_REQ (A/C switch and A/C refrigerant pressure switch (high/low) pressure)
 - COLP (A/C refrigerant pressure switch (medium pressure))
 - VSS (Vehicle speed sensor)
 - ACCS (A/C magnetic clutch)
 - If the FAN DUTY PID is **0 %**, replace cooling fan component.

8. Turn the A/C switch to on.

9. Verify that the cooling fan is operating while the ECT PID is **below 98 °C {209 °F}**.

- If the cooling fan does not operate, inspect for the following:
 - A/C switch
 - A/C refrigerant pressure switch
 - Fan control module power supply circuit (open or short circuit)
 - Fan control module GND circuit (open or short circuit)
 - Fan control module control signal circuit (open or short circuit between fan control module terminal B and PCM terminal 1W)
 - Fan control module(See [COOLING FAN MOTOR COMPONENT INSPECTION.](#))

10. Verify that the cooling fan operates at medium speed while the COLP PID is off and high speed while the COLP PID is on.

- If the cooling fan does not operate middle and/or high speed, inspect for the following:
 - A/C refrigerant pressure switch (medium switch)
 - Fan control module(See [COOLING FAN MOTOR COMPONENT INSPECTION.](#))

11. Turn the A/C switch to the off position.

12. Start the engine and idle it.

13. Verify that the cooling fan operating speed increases relative to the ECT PID increase.

- If the cooling fan speed does not increase inspect the following:
 - ECT sensor (characteristic).

- Fan control signal circuit (between fan control module terminal B and PCM terminal 1W)
- If the all items are normal, replace the cooling fan component.