

ENGINE CONTROL SYSTEM OPERATION INSPECTION

[ZJ, Z6]

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Main Relay Operation Inspection

1. Verify that the main relay clicks when the ignition switch turned to the 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 1AW and main relay terminal B

Intake Manifold Vacuum Inspection

1. Verify the air intake hoses are installed properly.
2. Start the engine and idle it.
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 \[ZJ, Z6\]](#))
 - 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 \[ZJ, Z6\]](#).)

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 \[ZJ, Z6\].\)](#)

- IAC valve and related wiring harness (See [IDLE AIR CONTROL \(IAC\) VALVE INSPECTION \[ZJ, Z6\].\)](#))

Load compensation inspection

1. Start the engine and run is during idle.
2. Connect the WDS or equivalent to the DLC-2.
3. Verify that P0511 not displayed.
 - If P0511 shown, perform the DTC inspection. (See [DTC P0511 \[ZJ, Z6\].\)](#))
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 2X and 2AB
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 \[ZJ, Z6\]](#))
 - If not as specified under each load condition, inspect the following.
 - Refrigerant pressure switch (low, high) and related wiring harness (See [REFRIGERANT PRESSURE SWITCH INSPECTION.](#))
 - Fan switch and related wiring harness (See [FAN SWITCH INSPECTION.](#))
 - PSP switch and related wiring harness (See [POWER STEERING PRESSURE \(PSP\) SWITCH INSPECTION \[ZJ, Z6\].\)](#))

Variable Intake-air Control Operation Inspection

1. Connect the WDS or equivalent to DLC-2.
2. Perform the KOEO self-test using WDS or equivalent.
3. Verify that DTC P0660 is not displayed.
 - If DTC P0660 is shown, perform the DTC inspection. (See [DTC P0660 \[Z6\].\)](#))
4. Turn the ignition switch to the ON position (Engine off).
5. Turn variable intake-air shutter valve actuator from on to off and from off to on using the IMTV PID and verify that operation sound of the actuator is heard.

- If operation sound is not heard, inspect the following.
 - Variable intake-air shutter valve actuator (See [VARIABLE INTAKE-AIR SHUTTER VALVE ACTUATOR INSPECTION \[ZJ, Z6\].](#))
 - Variable intake shutter valve actuator stuck open or close

Variable Tumble Control Operation Inspection

1. Connect the WDS or equivalent to DLC-2.
2. Perform the KOEO self-test using WDS or equivalent.
3. Verify that DTC P2006 and P2008 are not displayed.
 - If DTC P2006 or P2008 is shown, perform the DTC inspection. (See [DTC TABLE \[ZJ, Z6\].](#))
4. Turn the ignition switch to the ON position (Engine off).
5. Monitor ECT, RPM and IMRC PIDs.
6. Verify that ECT PID is **60 °C {140 °F} or less**.
7. Start engine.
8. Verify that IMRC PID is following while ECT PID is **60 °C {140 °F} or less**.
 - If the IMRC PID is not specified, inspect TP sensor (misadjustment).

Engine speed

Engine speed	3,250 rpm	
	Less than	More than
IMRC PID	On	Off

9. Turn variable tumble shutter valve actuator from on to off and from off to on using IMRC PID and verify that operation sound of the actuator is heard.
 - If operation sound is not heard, inspect the following.
 - Variable tumble shutter valve actuator (See [VARIABLE TUMBLE SHUTTER VALVE ACTUATOR INSPECTION \[ZJ, Z6\].](#))
 - Variable tumble shutter valve actuator stuck open or close

Fuel Injector Operation Inspection

STEP	INSPECTION	RESULTS	ACTION
1	While cranking 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.
2	Perform the main relay operation inspection. Is main relay operation normal?	Yes	Inspect the following: <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. Fuel pump relay (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 the PCM terminal voltage of fuel injector signal.
		No	Repair or replace the malfunctioning part.

Fuel Cut Control System Inspection

1. Warm-up engine and idle it.
2. Turn off the electrical loads and A/C switch.
3. Connect WDS or equivalent to the DLC-2.
4. Access RPM and FUELPW 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 **1,200 rpm or less**.

- If not as specified, inspect the following.

- ECT sensor and related wiring harness (See [ENGINE COOLANT TEMPERATURE \(ECT\) SENSOR INSPECTION \[ZJ, Z6\].](#))

- Neutral/clutch pedal position switch and related wiring harness (MTX) (See [CLUTCH PEDAL POSITION \(CPP\) SWITCH INSPECTION \[ZJ, Z6\].](#))

- TR switch and related wiring harness (ATX) (See [TRANSAXLE RANGE \(TR\) SWITCH INSPECTION.](#))

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 1AH (without immobilizer system), 1AC (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 the spark plugs for damage, wear, carbon deposits and proper plug gap. • Are the spark plugs normal? 	Yes	Go to the next step.
		No	Replace the 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 C-PCM terminal 2Y - Ignition coil No.2 terminal C-PCM terminal 2U - Ignition coil No.3 terminal C-PCM terminal 2Q - Ignition coil No.4 terminal C-PCM terminal 2M • Are wiring harnesses normal? 	Yes	Inspect and replace the ignition coil. (See IGNITION COIL INSPECTION [ZJ, Z6] .)
		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 B+? 	Yes	Go to the next step.
		No	Inspect power supply circuit of ignition coils.

5	• Does the PCM connector or ignition coil connectors have poor connection?	Yes	Repair or replace the 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 \[ZJ, Z6\]](#).)

2. Start the engine and idle it.

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. Drive the vehicle.

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 \[ZJ, Z6\]](#).)

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

Purge Control System Inspection

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

2. Start the engine and idle it.

3. Access ECT PID.
4. Verify that the engine coolant temperature is **60 °C {140 °F} or more**.
 - If the WDS or equivalent indicates **60 °C {140 °F} or less**, perform out the ECT sensor inspection.
5. Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
6. Put a finger to the purge solenoid valve and verify that there is vacuum applied when the engine is cold.
 - If there is no vacuum, inspect the following.
 - Wiring harness and connectors (Purge solenoid valve-PCM terminal 2AV)
 - Purge solenoid valve
7. Stop the engine.
8. Verify that the DTC P0443 is shown. Perform out DTC inspection. (See [DTC P0443 \[ZJ, Z6\]](#).)
9. Turn the ignition switch to the ON position.
10. Access EVAPCP PID.
11. Increase the duty value of the purge solenoid 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 solenoid valve-charcoal canister)
 - If the operation sound is not heard, perform the purge solenoid 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". (See [NO.23 A/C DOES NOT WORK SUFFICIENTLY \[ZJ, Z6\]](#).)
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 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 1AL)
 - 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 1AP)
 - 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 medium 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 1AP)
- If the all items are normal, replace the cooling fan component.

Variable Valve Timing Control System Operation Inspection

When idling cannot be continued

1. Remove the OCV and verify that the spool valve is at maximum retard position.
2. If the spool valve is stuck in advance direction, replace the OCV.
3. Connect the OCV.
4. Turn the ignition switch to the ON position.
5. Verify that the spool valve is at maximum retard position.
6. If the spool valve is stuck in advance direction, inspect for the following.
 - Short circuit in wiring harnesses or connectors between the OCV and the PCM.
7. Inspect the variable valve timing actuator.

When idling can be continued

1. Warm-up the engine.
2. Connect the WDS or equivalent to the DLC-2.
3. Idle the engine.
4. Access VT DUTY1 PID.
5. Set the OCV duty valve to **100%** and verify that the engine idles roughly or stalls.
 - If as specified, inspect the timing belt component (valve timing deviation).
 - If not as specified, go to the next step.
6. Remove the OCV and connect the OCV connector to the OCV.
7. Turn the ignition switch to the ON position.
8. Access VT DUTY1 PID.
9. Set the OCV duty value to **100%** and verify that the spool valve operates in the advance direction.
10. If not as specified, inspect the following.
 - OCV operation.
 - Wiring harness and connectors between the OCV and the PCM for open or short circuit.
11. Inspect the following hydraulic passages for clogging and/or leakage.
 - Oil pressure switch-OCV
 - OCV-camshaft
 - Camshaft internal passage

12. If they are normal, replace the intake camshaft pulley (with a built-in variable valve timing actuator).