NO.13 KNOCKING/PINGING-ACCELERATION/CRUISE [SKYACTIV-G 2.0, SKYACTIV-G 2.5]

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13	KNOCKING/PINGING-ACCELERATION/CRUISE
DESCRIPTION	• Abnormal combustion occurs under the condition such as the temperature in the combustion chamber is too high resulting in abnormal noise. • Knocking sound occurs from the engine compartment during acceleration.
POSSIBLE CAUSE	• Poor fuel quality — Fuel RON is not specified — Excessive cleaning agents added in fuel • Poor connection of KS, wiring harness • The following information for calculating ignition timing is incorrect: — KS signal — ECT sensor signal — IAT sensor No.2 (integrated in MAP sensor) signal — MAF sensor signal • Air suction in intake-air system — MAP sensor signal • Combustion temperature is high — Cooling system malfunction — Carbon accumulation — Use of non-genuine spark plug **Warning** **The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:** **• Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.** **• Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injury or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete "BEFORE SERVICE PRECAUTION" and "AFTER SERVICE PRECAUTION" described in this manual. (See BEFORE SERVICE PRECAUTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) (See AFTER SERVICE PRECAUTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)** **Caution** **• Disconnecting/connecting the quick release connector without cleaning it may possibly cause damage to the fuel pipe and quick release connector. Always clean the quick release connector joint area before disconnecting/connecting, and make sure that it is free of foreign matter.**

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	**VERIFY PCM DTC** • Retrieve any DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
2	**REPLACE FUEL** • Drain the remaining fuel in the fuel tank and add the specified fuel. • Leave idling **for approx. 15 min** to refill the hose with fuel. • Does the symptom disappear?	Yes	Symptom troubleshooting completed. (If customer has used fuel additive, give them advice not to use it)
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
3	**VERIFY IF MALFUNCTION CAUSE IS OVERHEATING** **Caution** **• While performing this step, always operate the vehicle in a safe and lawful manner.** **• When the M-MDS is used to observe monitor system status while driving, be sure to have another technician with you, or record the data in the M-MDS using the PID/DATA MONITOR AND RECORD capturing function and inspect later.** • Access the ECT PID using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is the ECT PID value **less than 116 °C {241 ° F}** during driving?	Yes	Go to the next step.
		No	The cause of this concern could be from the cooling system overheating. • Perform the symptom troubleshooting “NO.17 COOLING SYSTEM CONCERNS-OVERHEATING”. (See NO.17 COOLING SYSTEM CONCERNS-OVERHEATING [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
4	**VERIFY SPARK PLUG CONDITION** • Remove all spark plugs. (See SPARK PLUG REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Inspect the spark plug. (See SPARK PLUG INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	Yes	Replace the spark plug. (See SPARK PLUG REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
5	**INSPECT INTAKE AIR SYSTEM FOR AIR SUCTION** • Verify if there is air suction into the intake air system (such as between MAF sensor and intake valve, vacuum hose). • Is there any malfunction?	Yes	Repair or replace the malfunctioning part according to the inspection results.
		No	Go to the next step.
6	**INSPECT MAP SENSOR** • Access the following PIDs using the M-MDS: (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) — MAP — BARO • Measure the intake manifold vacuum when idling (no load). (See INTAKE MANIFOLD VACUUM INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Does the difference between PIDs BARO and MAP nearly match the intake manifold vacuum value?	Yes	Go to the next step.
		No	Replace the MAP sensor/IAT sensor No.2. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.2 REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
7	**INSPECT MAF SENSOR** • Inspect the MAF sensor. (See MASS AIR FLOW (MAF) SENSOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	Yes	Replace the MAF sensor/IAT sensor No.1. (See MASS AIR FLOW (MAF) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.1 REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
8	**INSPECT IAT SENSOR NO.2** • Inspect the IAT sensor No.2 resistance. (See INTAKE AIR TEMPERATURE (IAT) SENSOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	Yes	Replace the MAP sensor/IAT sensor No.2. (See MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR/INTAKE AIR TEMPERATURE (IAT) SENSOR NO.2 REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
9	**INSPECT ECT SENSOR** • Inspect the ECT sensor resistance. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	Yes	Replace the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Go to the next step.
10	**INSPECT KS** • Inspect the KS. (See KNOCK SENSOR (KS) INSPECTION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • Is there any malfunction?	Yes	Replace the KS, then go to the next step. (See KNOCK SENSOR (KS) REMOVAL/ INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)
		No	Remove the accumulated matter in the cylinder head using the following procedure: • Carbon remover • Overhauling Go to the next step.
11	Verify the test results. • If normal, return to the diagnostic index to service any additional symptoms. (See SYMPTOM DIAGNOSTIC INDEX [SKYACTIV-G 2.0, SKYACTIV-G 2.5].) • If a malfunction remains, inspect the related Service Information and perform the repair or diagnosis. — If the vehicle is repaired, troubleshooting is completed. — If the vehicle is not repaired or additional diagnostic information is not available, replace the PCM. (See PCM REMOVAL/INSTALLATION [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)		