NO.18 KNOCKING/PINGING-ACCELERATION/CRUISE [SKYACTIV-D 2.2]

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18	KNOCKING/PINGING-ACCELERATION/CRUISE
DESCRIPTION	• Knocking sound occurs from the engine.
POSSIBLE CAUSE	• PCM DTC is stored. • Fuel injector injection amount correction procedure has not been completed. • Fuel injection system malfunction — Fuel leakage from fuel system — Common rail malfunction — Supply pump malfunction — Suction control valve malfunction — Fuel injector malfunction — Fuel pressure relief valve malfunction — Fuel check valve or fuel feed valve malfunction • Poor fuel quality • Mechanical (engine) malfunction — Improper engine compression — Large mechanical resistance — Improper valve timing — Engine oil malfunction (oil working up or down)

Diagnostic Procedure

STEP	INSPECTION	RESULTS	ACTION
1	**VERIFY PCM DTC** • Retrieve PCM DTCs using the M-MDS. (See ON-BOARD DIAGNOSTIC TEST [SKYACTIV-D 2.2].) • Are any DTCs present?	Yes	Go to the applicable DTC inspection. (See DTC TABLE [SKYACTIV-D 2.2].)
		No	Go to the next step.
2	**VERIFY THAT FUEL INJECTION AMOUNT CORRECTION IS CORRECTLY COMPLETED** • Perform the FUEL INJECTOR INJECTION AMOUNT CORRECTION. (See FUEL INJECTOR INJECTION AMOUNT CORRECTION [SKYACTIV-D 2.2].) • Start the engine. • Verify the glow indicator light. • Does the glow indicator light illuminate?	Yes	Re-perform the PCM fuel injection amount adjustment. (Perform the FUEL INJECTOR DATA RESET and FUEL INJECTOR CODE PROGRAM using the M-MDS.) (See FUEL INJECTOR DATA RESET [SKYACTIV-D 2.2].) (See FUEL INJECTOR CODE PROGRAM [SKYACTIV-D 2.2].) • If a malfunction occurs, change the learning method (use/do not use M-MDS), and re-implement the FUEL INJECTOR INJECTION AMOUNT CORRECTION. (See FUEL INJECTOR INJECTION AMOUNT CORRECTION [SKYACTIV-D 2.2].) Go to Step 11.
		No	Go to the next step.
3	**INSPECT FOR FUEL LEAKAGE FROM FUEL SYSTEM** • Visually inspect the following: — Fuel leakage from the fuel tank, fuel pump, hose, pipe, fuel injector, supply pump, common rail — Cracking and damage in fuel hose and pipe — Clamp installation condition for each hose and pipe — Fuel pipe securing condition due to deterioration such as rubber of clamp • Are all items normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results, then go to Step 11.

STEP	INSPECTION	RESULTS	ACTION
4	**INSPECT FUEL INJECTION RELATED PARTS** • Inspect the following parts: — Common rail (See COMMON RAIL INSPECTION [SKYACTIV-D 2.2].) — Supply pump (See SUPPLY PUMP INSPECTION [SKYACTIV-D 2.2].) — Suction control valve (See SUCTION CONTROL VALVE INSPECTION [SKYACTIV-D 2.2].) — Fuel injector (See FUEL INJECTOR INSPECTION [SKYACTIV-D 2.2].) — Fuel pressure relief valve (See FUEL PRESSURE RELIEF VALVE INSPECTION [SKYACTIV-D 2.2].) • Are all items normal?	Yes	Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results, then go to Step 11.
5	**INSPECT FOR MALFUNCTION DUE TO POOR FUEL** • Replace the fuel. (See FUEL DRAINING PROCEDURE [SKYACTIV-D 2.2].) • Does the symptom disappear?	Yes	Advise the customer as to the change in the fuel used.
		No	Remove the accumulated matter in the cylinder head using the following procedure, then go to the next step. • Carbon remover • Overhauling
6	**INSPECT ENGINE COMPRESSION** • Inspect the engine compression. (See COMPRESSION INSPECTION [SKYACTIV-D 2.2].) • Are compression pressures within specification? **Specification:** • Compression — Standard: **2255 kPa {22.99 kgf/cm^2, 327.1 psi} (180 rpm)** — Minimum: **1804 kPa {18.40 kgf/cm^2, 261.6 psi} (180 rpm)** — Maximum difference between cylinders: **147 kPa {1.50 kgf/cm^2, 21.3 psi} (180 rpm)**	Yes	Go to the next step.
		No	Go to Step 9.
7	**DETERMINE IF MALFUNCTION IS DUE TO EXCESSIVE ENGINE SPEED RESISTANCE** • Rotate the crankshaft pulley lock bolt clockwise using a wrench. (See FRONT OIL SEAL REPLACEMENT [SKYACTIV-D 2.2].) • Can bolts be rotated?	Yes	Go to Step 9.
		No	Go to the next step.
8	**INSPECT FOR MALFUNCTION DUE TO EXCESSIVE MECHANICAL RESISTANCE OF ENGINE ACCESSORIES** • Remove all drive belts from engine accessories. (See DRIVE BELT REMOVAL/INSTALLATION [SKYACTIV-D 2.2].) **Caution** **• Do not run the engine for long periods with the drive belts of engine accessories removed. Otherwise the engine could be damaged from overheating.** • Start the engine. • Is cranking possible? (Does the engine start?)	Yes	Repair or replace the malfunctioning part according to the inspection results, then go to Step 11. (Large mechanical resistance in engine accessories.)
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
9	**INSPECT FOR MALFUNCTION DUE TO DEVIATED VALVE TIMING** • Inspect the valve timing (timing chain installation condition). (See TIMING CHAIN REMOVAL/ INSTALLATION [SKYACTIV-D 2.2].) • Is the valve timing normal?	Yes	Go to the next step.
		No	Adjust the valve timing to the correct timing, then go to Step 11.
10	**INSPECT FOR MALFUNCTION DUE TO INTERNAL ENGINE WEAR, DAMAGE** • Inspect for the following engine internal parts: — Cylinder — Piston ring — Intake valve — Exhaust valve — Such as cylinder head gasket • Are all items normal?	Yes	Replace the lower case, then go to the next step. (Fuel may not inject normally because there is a malfunction in the fuel check valve and fuel feed valve.) (See LOWER CASE REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
		No	Repair or replace the malfunctioning part according to the inspection results, then 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-D 2.2].) • 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-D 2.2].)		