NO.10 HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK [SKYACTIV-D 2.2]

id0103g1897700

10	HARD TO START/LONG CRANK/ERRATIC START/ERRATIC CRANK
DESCRIPTION	• There is ignition, but the engine does not run under its own power. • Long period of time required before the engine starts.
POSSIBLE CAUSE	**Note** • If the ignition is not switched off (to LOCK or ACC) after the engine stalls, and then an engine restart is attempted, the PCM corrects the difference between CKP sensor and CMP sensor signals caused by engine stalling, which may result in more time needed to restart the engine. • PCM DTC is stored. • A/C relay malfunction • ECT sensor malfunction • 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 • Jet pump malfunction (4WD) • Poor fuel quality • Mechanical (engine) malfunction — Large mechanical resistance — Improper engine compression — Improper valve timing — Engine oil malfunction (oil working up or down) **Warning** **• The following troubleshooting flow chart contains the fuel system diagnosis and repair procedures. Read the following warnings before performing the fuel system services:** **— Always keep sparks and flames away from fuel. Fuel can be easily ignited which could cause serious injury or death, and damage to equipment.** **— Fuel line spills and leakage from the pressurized fuel system are dangerous. Fuel can ignite and cause serious injury or death, and damage to property and facilities. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure", while referring to the "BEFORE SERVICE PRECAUTION". (See BEFORE SERVICE PRECAUTION [SKYACTIV-D 2.2].)** **— Fuel is highly flammable and dangerous. Fuel line spills and leakage can cause serious injury or death, and damage to equipment. When installing the fuel hose, always refer to the "AFTER SERVICE PRECAUTION" and perform the "Fuel Hose Installation Procedure". (See AFTER SERVICE PRECAUTION [SKYACTIV-D 2.2].)**

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	**INSPECT A/C RELAY** • Switch the ignition off. • Remove the A/C relay. • Inspect the A/C relay. (See RELAY INSPECTION.) • Is the A/C relay normal?	Yes	Go to the next step.
		No	Replace the A/C relay, then go to Step 13.

STEP	INSPECTION	RESULTS	ACTION
3	**INSPECT ECT SENSOR** • Inspect the ECT sensor. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR INSPECTION [SKYACTIV-D 2.2].) • Is the ECT sensor normal?	Yes	Go to the next step.
		No	Replace the ECT sensor, then go to Step 13. (See ENGINE COOLANT TEMPERATURE (ECT) SENSOR REMOVAL/INSTALLATION [SKYACTIV-D 2.2].)
4	**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 13.
5	**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	2WD: • Go to Step 7. 4WD: • Go to the next step.
		No	Repair or replace the malfunctioning part according to the inspection results, then go to Step 13.
6	**INSPECT JET PUMP** • Inspect the jet pump. (See JET PUMP INSPECTION [SKYACTIV-D 2.2].) • Is the jet pump normal?	Yes	Go to the next step.
		No	Replace the fuel gauge sender unit (main), then go to Step 13. (See FUEL GAUGE SENDER UNIT REMOVAL/INSTALLATION [4WD].)
7	**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
8	**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 10.
		No	Go to the next step.

STEP	INSPECTION	RESULTS	ACTION
9	**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 13. (Large mechanical resistance in engine accessories.)
		No	Go to the next step.
10	**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 Step 13.
		No	Go to the next step.
11	**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 13.
12	**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.
13	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].)		