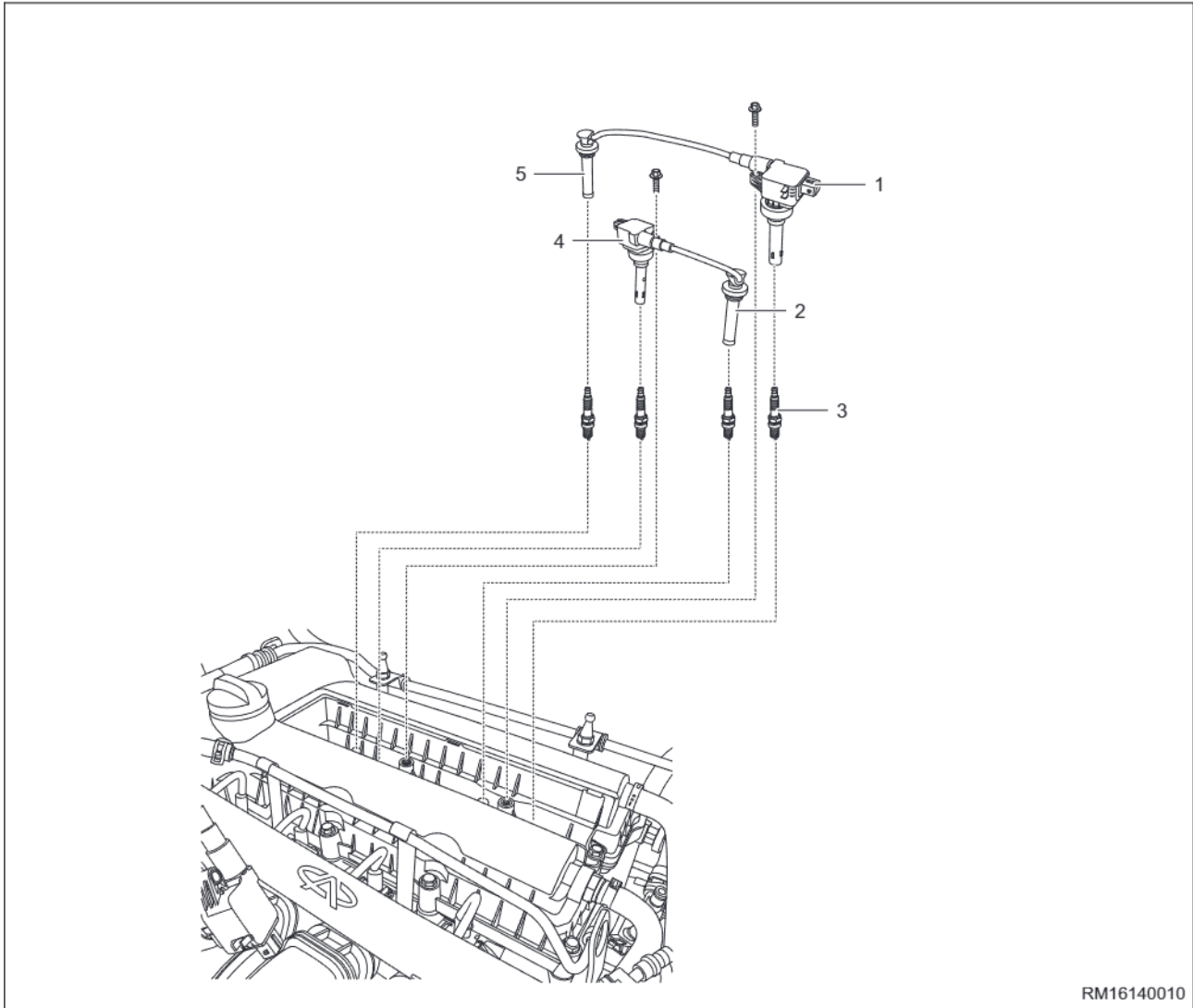

SQRE4G16 IGNITION SYSTEM

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GENERAL INFORMATION

Description



RM16140010

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1 - Cylinder 1 and 4 Ignition Coil Assembly	2 - Cylinder 3 High-voltage Cable
3 - Spark Plug	4 - Cylinder 2 and 3 Ignition Coil Assembly
5 - Cylinder 1 High-voltage Cable	

Operation

Ignition system mainly consists of sensors, Engine Control Module (ECM), ignition coils, high-voltage cables, spark plugs, etc. Ignition advance angle is controlled by Engine Control Module (ECM) directly.

As an integrated module, the ignition coil cannot be disassembled. SQRE4G16 ignition system has 2 ignition coils, and the 2 secondary high-voltage terminals of each ignition coil are connected to spark plugs in 2 engine cylinders respectively via high-voltage posts and high-voltage cables, which makes cylinder 1 and 4 ignite simultaneously, cylinder 2 and 3 ignite simultaneously. Ignition coil primary low-voltage terminal connects to Engine Control Module (ECM) via wire harness.

Engine Control Module (ECM) uses the phase sensor input to decide the Top Dead Center (TDC) position of cylinder 1 piston, and uses the speed sensor to decide which ignition coil is to be energized.



Specifications

Torque Specifications

Description	Torque (N·m)
Spark Plug	20 ± 3
Ignition Coil Fixing Bolt	$8 + 2$

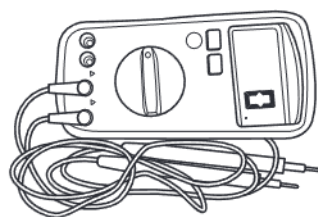
Spark Plug Specifications

Engine Type	SQRE4G16
Spark Plug Type	3707AAG
Spark Plug Gap (mm)	0.8 - 0.9

Tool

General Tool

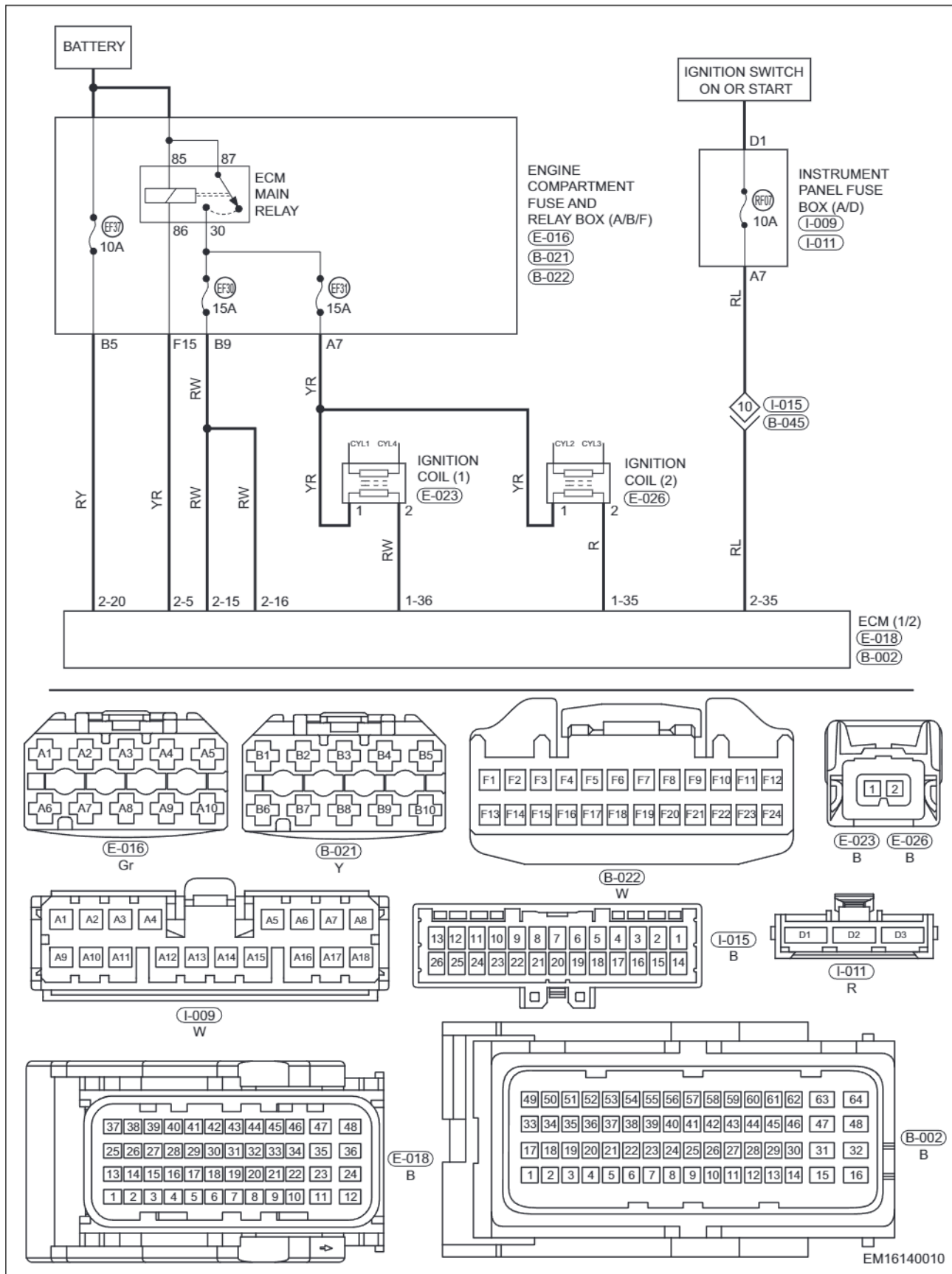
Digital Multimeter



RCH0000002

Circuit Diagram

Ignition System



DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair or adjust faulty components, or replace as necessary.

Symptom	Suspected Area	See page
Stall	Ignition coil and high-voltage cable	14-8
	Camshaft position sensor	06-271
	Spark plug	14-11
	Intake VVT control valve	06-267
	Exhaust VVT control valve	06-267
	Wire harness	-
	ECM	06-281
Knock	Ignition coil and ignition high-voltage cable	14-8
	Knock sensor	06-269
	ECM	06-281
Difficult to start	Battery	16-7
	Ignition coil and high-voltage cable	14-8
	Spark plug	14-11
Engine hesitation, power drop, unstable performance	Ignition coil and high-voltage cable	14-8
	Crankshaft position sensor	06-271
	Intake VVT control valve	06-267
	Exhaust VVT control valve	06-267
	Spark plug	14-11
	Camshaft position sensor	06-271
	ECM	06-281
Rough, unstable idling or stall	Ignition coil and high-voltage cable	14-8
	Camshaft position sensor	06-271
	Spark plug	14-11
	ECM	06-281

Service Precautions

Visual inspection can reduce the unnecessary test and diagnostic time, so pay attention to the following inspection items:

1. Check the line and hose for obvious looseness, and if they are disconnected or routed improperly.
2. Make sure that the battery connections are clean and fixed firmly.
3. Check if the generator wire and belt are installed correctly and securely.
4. Confirm that the ignition coils and high-voltage cables are installed securely.
5. Check if the engine wire harness connectors are inserted fully.
6. Check if all electrical connectors are installed correctly and securely.
7. Check the following electrical connections:
 - a. Engine speed sensor;
 - b. Oxygen sensor;
 - c. Intake pressure/temperature sensor;
 - d. Oil pressure switch;
 - e. Ignition coil;
 - f. Canister solenoid valve;
 - g. Camshaft position sensor;
 - h. Electronic throttle;
 - i. Intake Variable Valve Timing (VVT) control valve;
 - j. Exhaust Variable Valve Timing (VVT) control valve;
 - k. Fuel injector.
8. Check the routing of all vacuum hoses.
9. Confirm that the following vacuum hoses are connected securely without any leakage:
 - a. Canister solenoid valve;
 - b. Charcoal canister;
 - c. PCV valve;
 - d. Warm damper vacuum system;
 - e. Brake booster.
10. Check the fuel pump hose and wire connection to make sure that they are connected securely.

ON-VEHICLE SERVICE

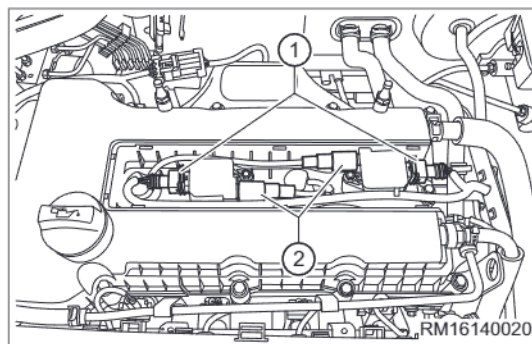
Ignition Coil & High-voltage Cable

Removal

CAUTION

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.
- It is prohibited to use high-voltage cable to perform ignition spark test during repair; otherwise it may cause personal injury and damage the module.

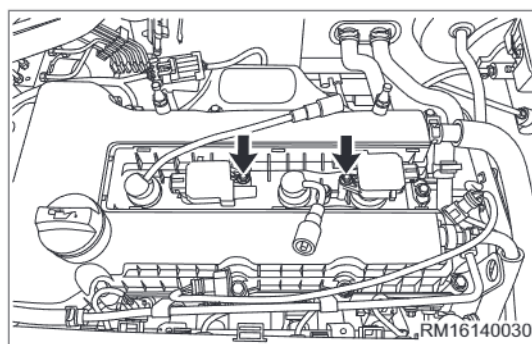
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover.
4. Remove the ignition coil.
 - a. Disconnect the ignition coil connectors (1), and move away the wire harness from ignition coil.
 - b. Disconnect the connectors (2) between high-voltage cable and ignition coil.



CAUTION

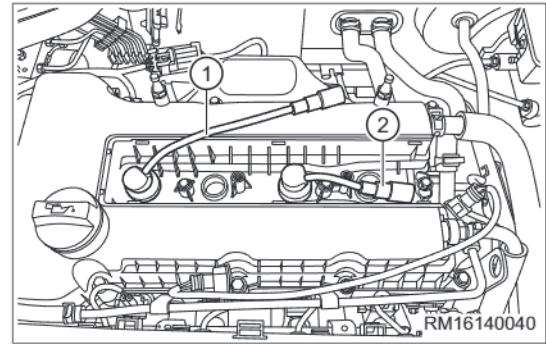
- Be careful not to damage or disconnect the high-voltage cables, when disconnecting the high-voltage cable connectors from ignition coil.

- c. Loosen and remove 2 fixing bolts (arrow) from the ignition coil.
(Tightening torque: 8 + 2 N·m)



- d. Remove the ignition coil.

5. Remove the high-voltage cable.
 - a. Pull the cylinder 1 high-voltage cable (1) and cylinder 3 high-voltage cable (2) upward to remove them from spark plug holes.



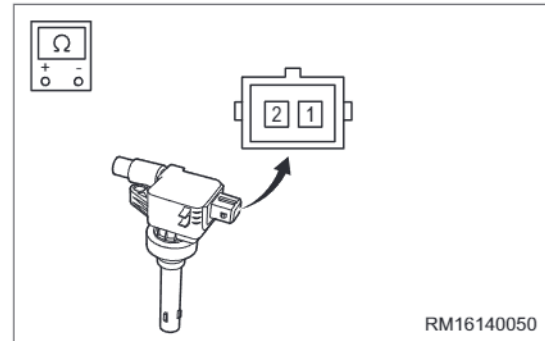
CAUTION

- Be careful not to damage the high-voltage cables when pulling them upward.

Inspection

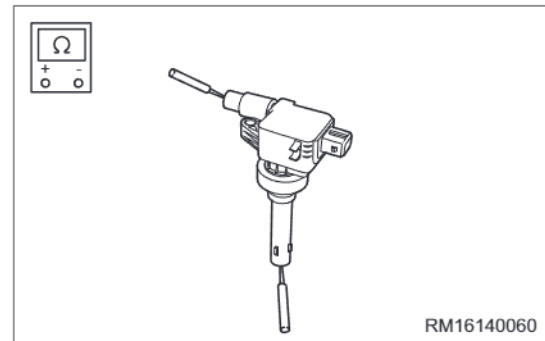
1. Inspect the resistance of ignition coil primary winding.
Turn digital multimeter to ohm band, and check the resistance between terminals 1 and 2.
If result is not as specified, replace the ignition coil.

Multimeter Connection	Condition	Specification (Ω)
Terminal 1 - Terminal 2	Normal temperature	0.7 - 0.9



2. Inspect the resistance of ignition coil secondary winding.
Turn digital multimeter to ohm band, and check the resistance between 2 high-voltage terminals of ignition coil secondary winding.
If result is not as specified, replace the ignition coil.

Measurement Item	Condition	Specification ($k\Omega$)
Resistance of ignition coil secondary winding	Normal temperature	9.68 - 12.32

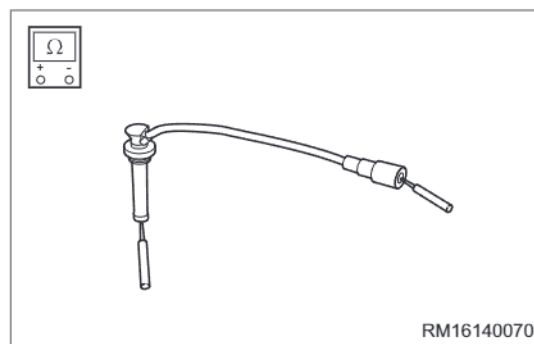


3. Inspect the resistance of high-voltage cable.

Turn digital multimeter to ohm band, and measure the resistance of high-voltage cables in the method as shown in illustration.

If result is not as specified, replace the high-voltage cables.

Measurement Item	Condition	Specification (kΩ)
Resistance of cylinder 1 high-voltage cable	Normal temperature	3.67 - 7.24
Resistance of cylinder 3 high-voltage cable	Normal temperature	2.25 - 4.98



Installation

Installation is in the reverse order of removal.

CAUTION

- Install cylinder 1 and 3 high-voltage cables to spark plug holes according to the marks on high-voltage cables.
- Make sure that the connection between high-voltage cable and ignition coil high-voltage output terminal, spark plug is reliable, or it may cause high-voltage leakage, resulting in poor ignition.

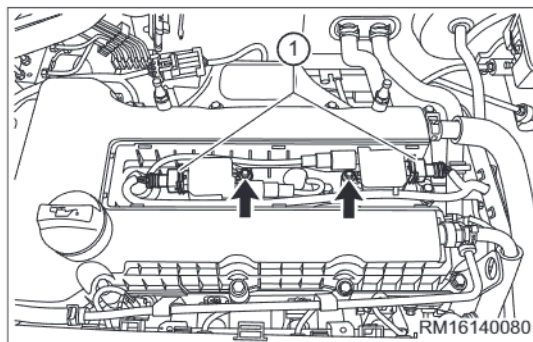
Spark Plug

Removal

CAUTION

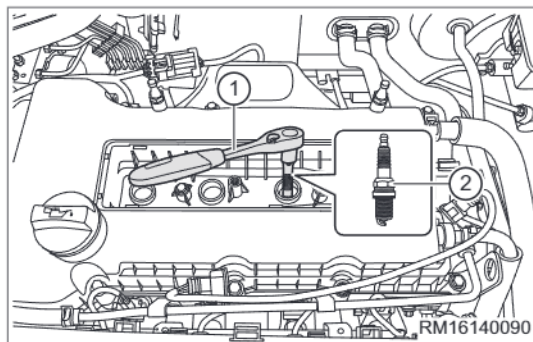
- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- Try to prevent body paint surface from being scratched during removal and installation.
- It is prohibited to use high-voltage cable to perform ignition spark test during repair; otherwise it may cause personal injury and damage the module.
- DO NOT remove the spark plugs when engine is hot; failure to do this may cause damage to the spark plug thread holes on cylinder head.
- Before removal, remove the dirt and foreign matter around spark plug holes to prevent them from dropping into cylinders.

1. Turn off all electrical equipment and the ignition switch. Wait until engine cools down.
2. Disconnect the negative battery cable.
3. Remove the engine trim cover assembly.
4. Remove the ignition coil with high-voltage cable assembly.
 - a. Disconnect the ignition coil connectors (1), and move away the wire harness from ignition coil.
 - b. Loosen and remove 2 fixing bolts (arrow) from the ignition coil.
(Tightening torque: $8 + 2 \text{ N}\cdot\text{m}$)



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- c. Remove the ignition coil with high-voltage cable assembly.
5. Remove the spark plug.
 - a. Using a special spark plug socket wrench (1), loosen the spark plug.
 - b. Remove the spark plug (2).

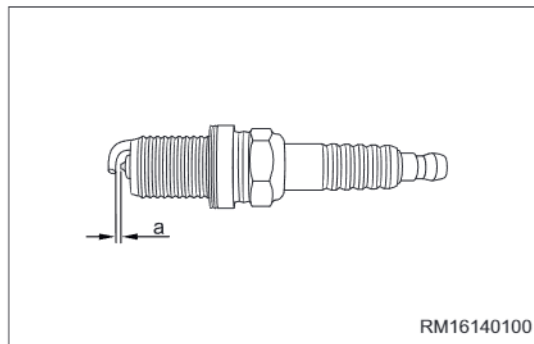


CAUTION

- Be careful not to damage the high-voltage cables when pulling them upward.

Inspection

Check the spark plug gap "a": 0.8 - 0.9 mm.



Installation

CAUTION

- Check the spark plug type to confirm if it is suitable.
- Please install spark plug with a special spark plug socket wrench, and never touch the spark plug socket. DO NOT damage the normal spark plug gap.

1. Install 4 spark plugs respectively into the cylinder head mounting holes for pre-tightening, and then retighten the spark plugs with a torque wrench.
(Tightening torque: 20 ± 3 N·m)
2. Other procedures are in the reverse order of removal.

