

Description

The ignition coil is a kind of small transformer that transforms the battery voltage to 30 kV or more to create a spark in the spark plug gap in the cylinder.

The igniter embedded in the ignition coil includes the power transistor and it is an electronic switch whose electric current is controlled by the Engine Control Module (ECM) signal.

The ignition timing is controlled by the ECM and the standard ignition timing data depending on the engine operating condition is stored in the ECM memory.

The engine operating conditions (speed, load, warm-up state, etc.) are detected by the various sensors.

Based on these sensor signals and the ignition timing data, when the ECM applies the ignition signal to the ignition coil for a certain period of time, igniter is energized and current flows and rises gradually to the primary coil and the magnetic field is produced.

When the current in the primary coil is cut off by the ignition signal of the ECM, the rapid change of the magnetic flux by the mutual induction action is induced to the secondary coil and high voltage is generated depending on the coil winding ratio.

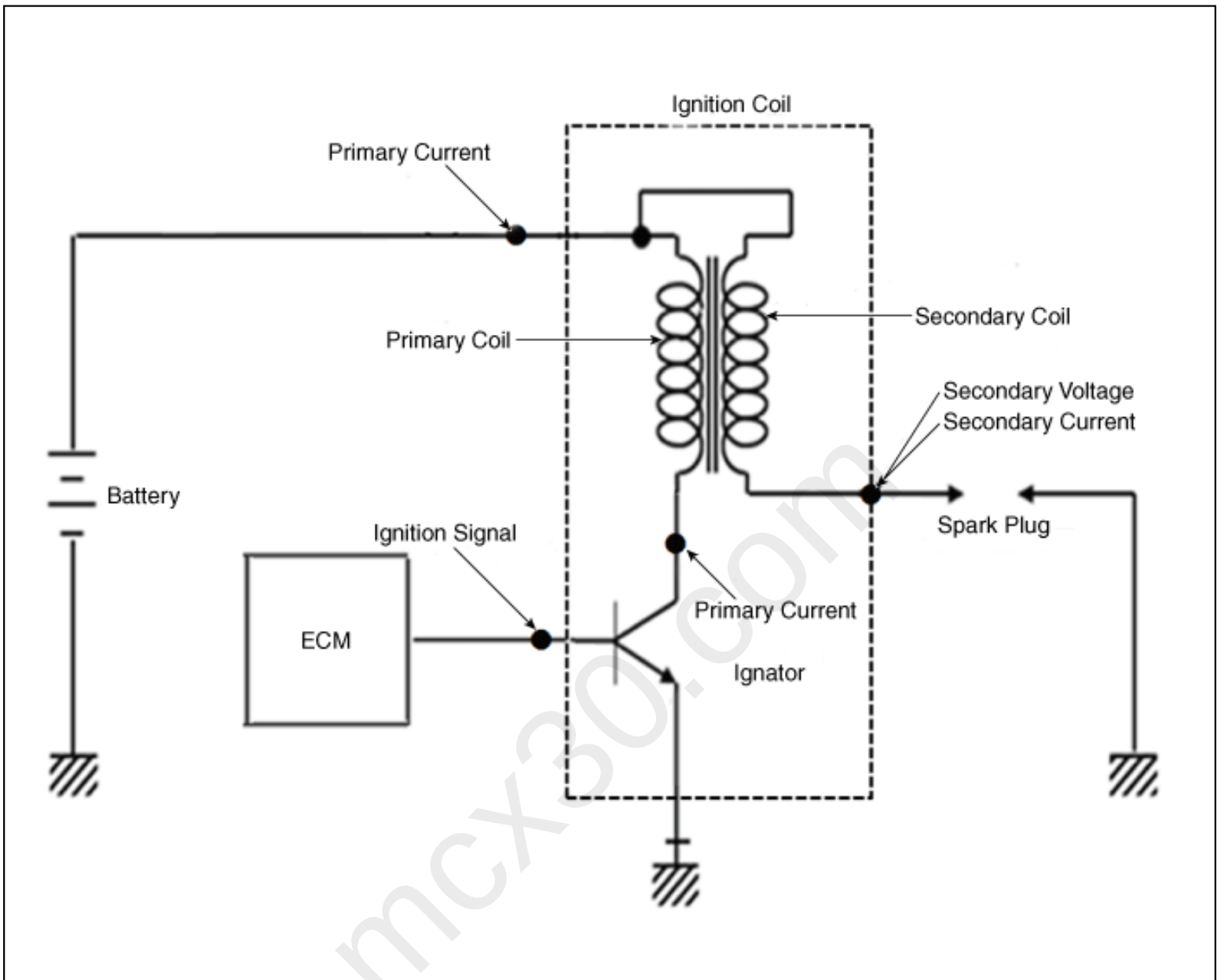
This high voltage generated from the secondary coil is caught in the spark plug gap and discharges as the electric field is destroyed to generate a spark.

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Troubleshooting

Trouble symptom	Probable cause	Remedy
Engine will not start or is hard to start (Crank OK)	Ignition lock switch	Inspect ignition lock switch, or replace as required
	Ignition coil	Inspect ignition coil, or replace as required
	Spark plugs	Inspect spark plugs, or replace as required
	Ignition wiring disconnected or broken	Repair wiring, or replace as required
Rough idle or stalls	Ignition wiring	Repair wiring, or replace as required
	Ignition coil	Inspect ignition coil, or replace as required
Engine hesitates/poor acceleration	Spark plugs	Inspect spark plugs or replace as required
	Ignition wiring	Repair wiring, or replace as required
Poor mileage	Spark plugs	Inspect spark plugs or replace as required

Schematic
Diagrams



Inspect ignition coil assembly and Perform spark test

1. Check for DTCs.

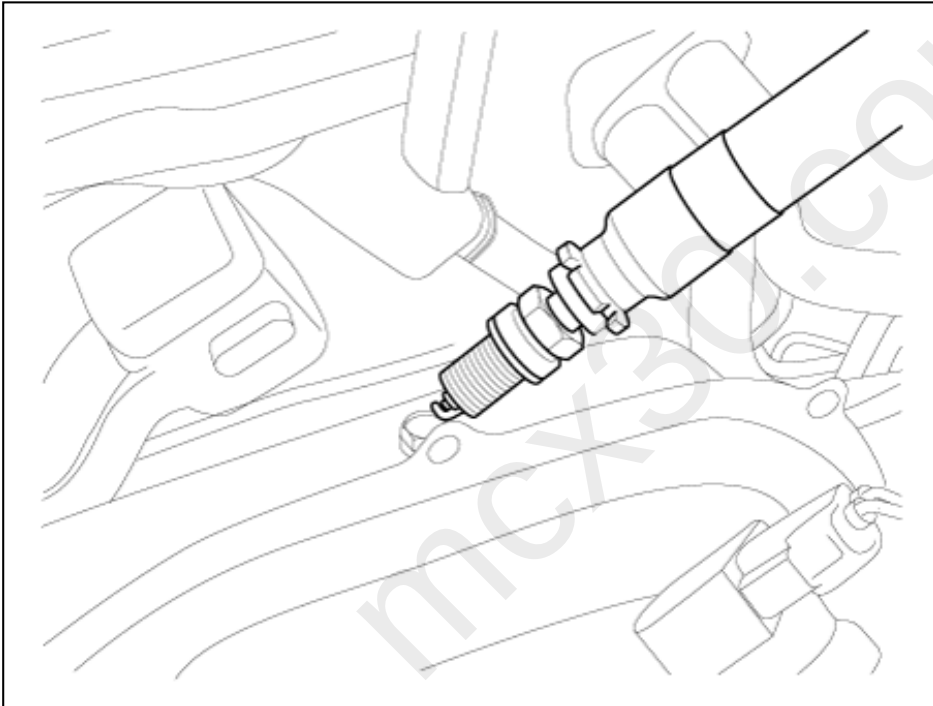


- If a DTC is present, perform troubleshooting in accordance with the procedure for that DTC.
(Refer to DTC guide)

2. Check if sparks occur.

■ Without diagnostic tool

- (1) Remove the engine cover.
(Refer to Engine Mechanical System - "Engine Cover")
- (2) Remove the ignition coils.
(Refer to Ignition System - "Ignition Coil")
- (3) Using a spark plug wrench, remove the spark plugs.
(Refer to Ignition System - "Spark Plug")
- (4) Connect the connector after install the spark plug to ignition coil.
- (5) Ground the spark plug to the engine.



- (6) Check if sparks occur at each spark plug while engine is being cranked.



- Do not crank the engine for more than 5 seconds.

■ With diagnostic tool

- (7) Remove the engine cover.
(Refer to Engine Mechanical System - "Engine Cover")
- (8) Remove the ignition coils.
(Refer to Ignition System - "Ignition Coil")
- (9) Using a spark plug wrench, remove the spark plugs.
(Refer to Ignition System - "Spark Plug")
- (10) Connect the diagnostic tool to data link connector (DLC).
- (11) Turn the ignition switch ON.
- (12) Select "Vehicle, Model year, Engine, System".
- (13) Select "Actuation Test".

(14) Select "Ignition Coil Enable/Disable-#1, #2, #3, #4".

Actuation Test

● Test Item(26)

Canister Shut Off Valve Clocked(UBD-2 Only)

Fan Motor Control-High Speed

Fan Motor Control-Low Speed

Main Relay

Canister Purge Valve

Oil Control Valve - Intake Bank1

Oil Control Valve - Exhaust Bank 1(Optional)

Ignition Coil Enable/Disable-#1

Ignition Coil Enable/Disable-#2

Ignition Coil Enable/Disable-#3

Ignition Coil Enable/Disable-#4

Injector Disable-Cylinder 1

Injector Disable-Cylinder 2

Injector Disable-Cylinder 3

Injector Disable-Cylinder 4

ETC Motor

O2 Heater Front (B1/S1)

O2 Heater Rear (B1/S2)

Variable Intake Solenoid(Optional)

Cruise Control Main Lamp(Optional)

Cruise Control SET Lamp(Optional)

Data Analysis

Actuation Test

● Test Item(26)

Ignition Coil Enable/Disable-#1

● Duration

Until Stop Button

● Condition

IG. ON/ENG.OFF

● Result

Start

Ignition Coil Enable/Disable-#2

Ignition Coil Enable/Disable-#3

Ignition Coil Enable/Disable-#4

Injector Disable-Cylinder 1

Injector Disable-Cylinder 2

Injector Disable-Cylinder 3

Injector Disable-Cylinder 4

ETC Motor

O2 Heater Front (B1/S1)

O2 Heater Rear (B1/S2)

Variable Intake Solenoid(Optional)

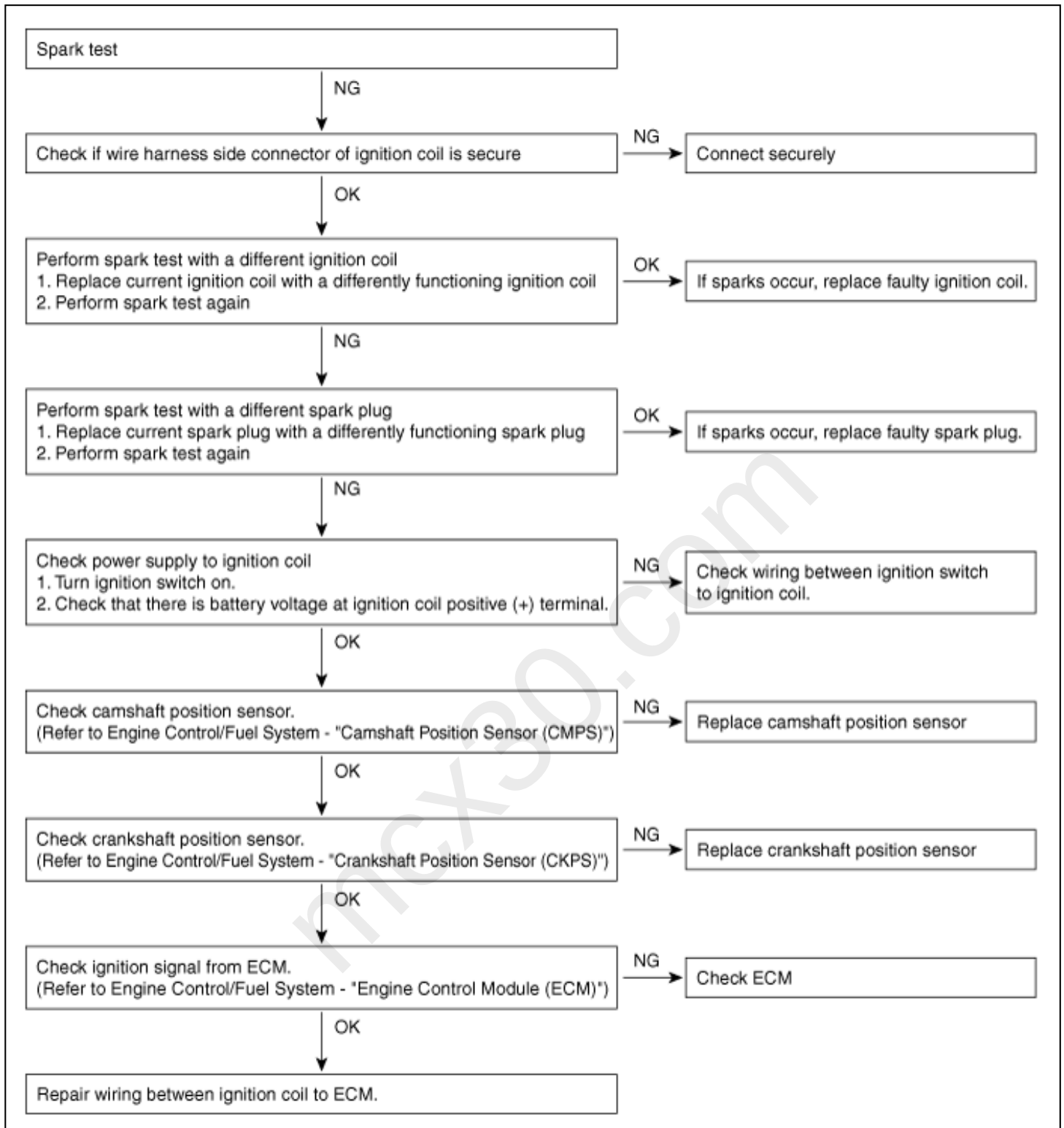
Cruise Control Main Lamp(Optional)

Data Analysis



- Do not crank the engine for more then 5 seconds.

3. If sparks do not occur, perform the following test.



4. Using a spark plug wrench, install spark plugs.

(Refer to Ignition System - "Spark Plug")

5. Install the ignition coils.

(Refer to Ignition System - "Ignition Coil")

6. Install the engine cover.

(Refer to Engine Mechanical System - "Engine Cover")

Description

The ignition coil is mounted on the top side of the cylinder head cover end. The ignition coil consists of the primary coil that receives battery power and the secondary coil that generates high voltage.

When the current in the primary coil is cut off by the ignition signal of the ECM, the rapid change of the magnetic flux by the mutual induction action is induced to the secondary coil and high voltage is generated depending on the coil winding ratio.

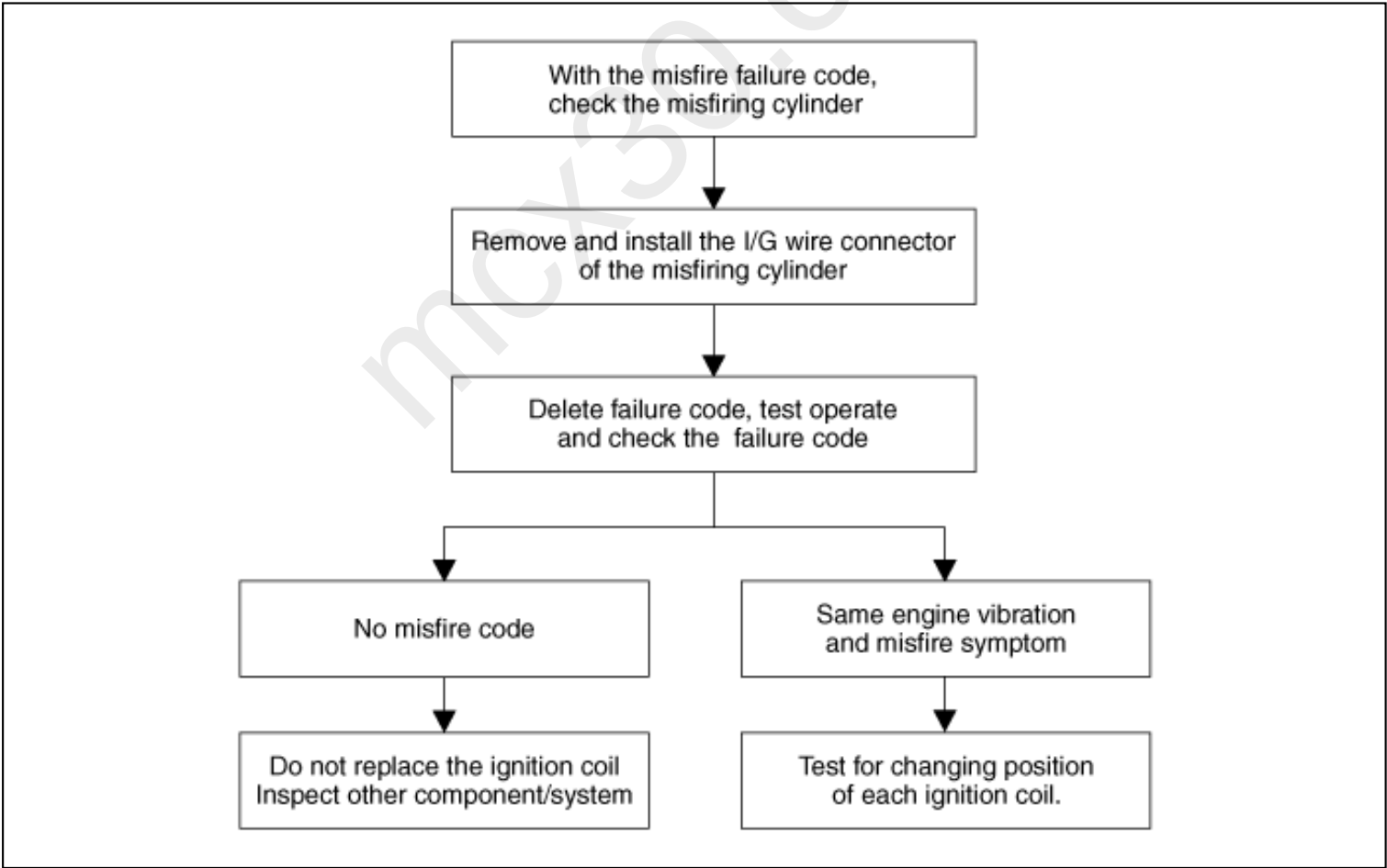
This high voltage generated from the secondary coil is caught in the spark plug gap and discharges as the electric field is destroyed to generate a spark.

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Troubleshooting

Connector assembly status test

1. Disconnect the ignition coil connectors (A) and reinstall it.



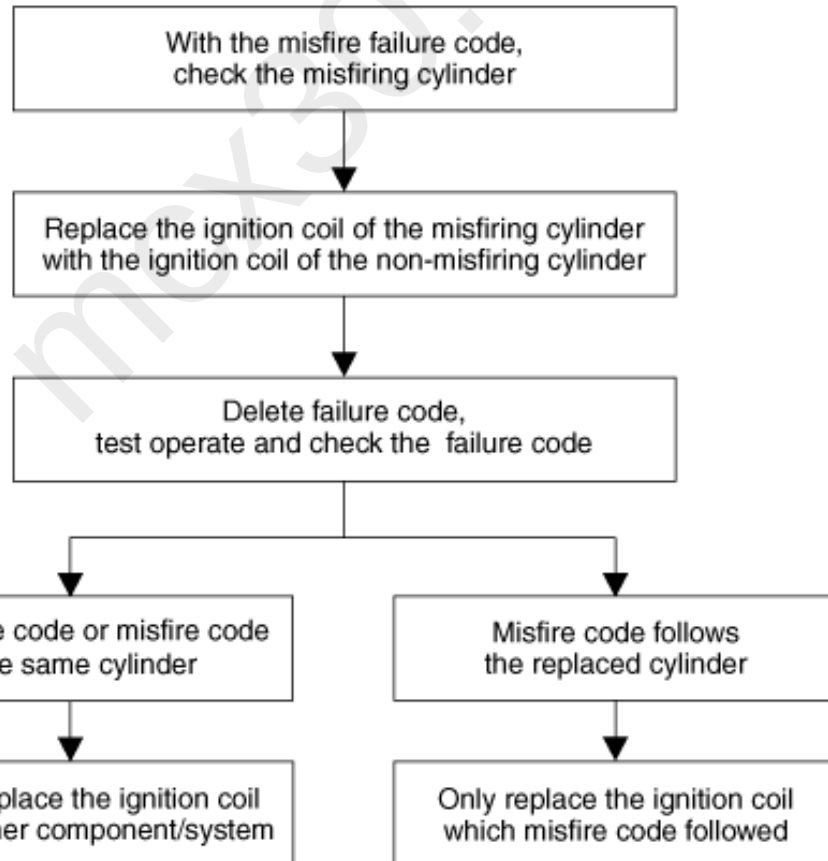
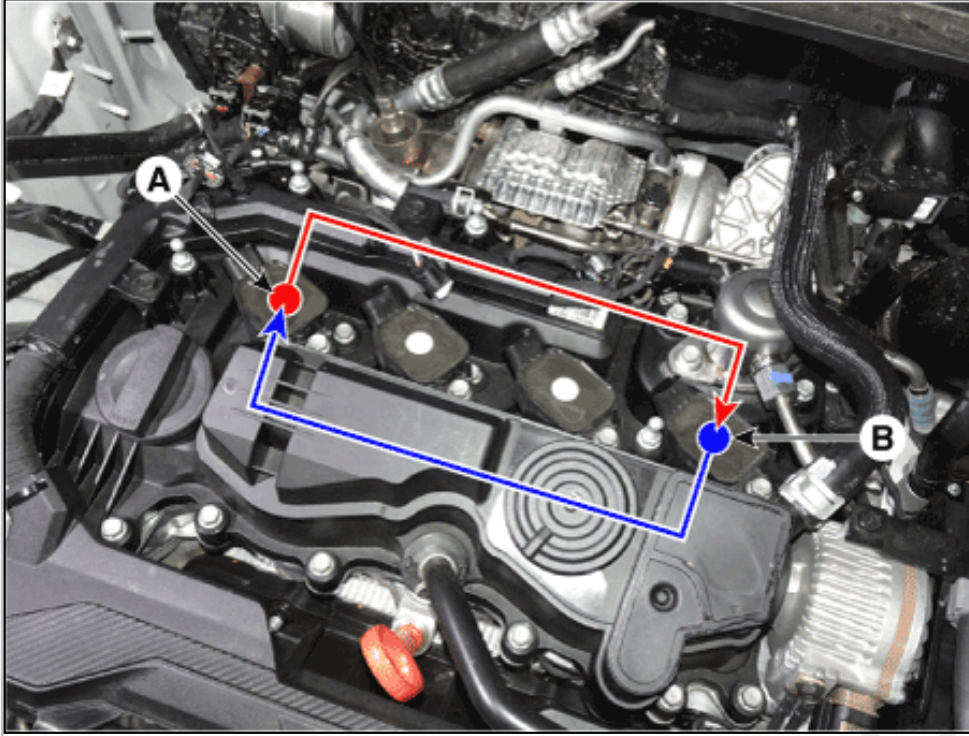
Test for changing position of each ignition coil

A : Ignition coil w/ misfire code

B : Ignition coil w/o misfire code



- Do not move with spark plug at the same time (move the ignition coil only)

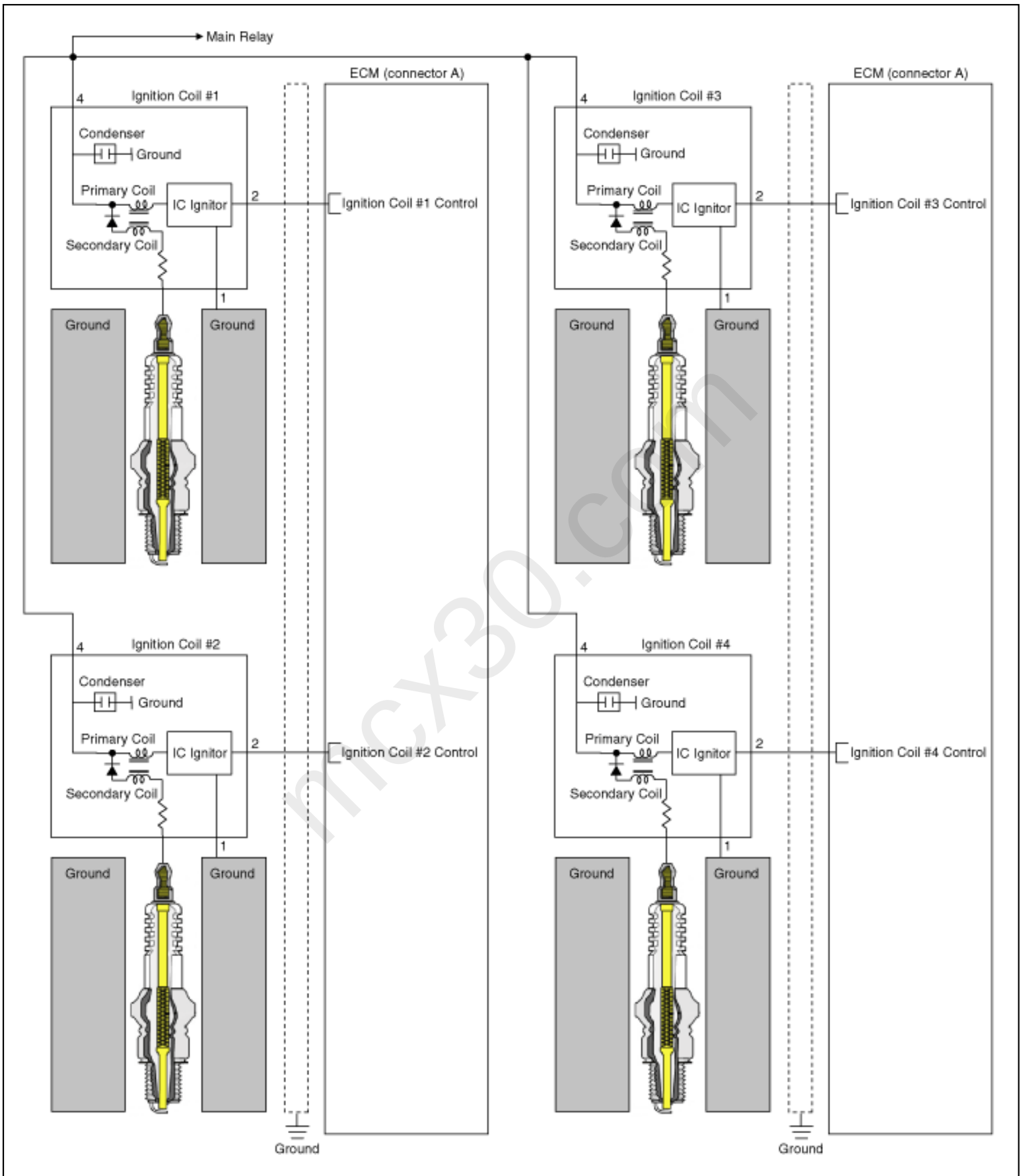


Specification

Item	Specification	
Rated Voltage (V)	14V	
Secondary Coil [Engine 1000RPM standard]	Input voltage (V)	14V
	Dwell Time (ms)	5.9
	Spark current (mA)	More than 124
	Spark duration time (ms)	More than 2.0
Igniter voltage (V)		480 - 550
Pin		4

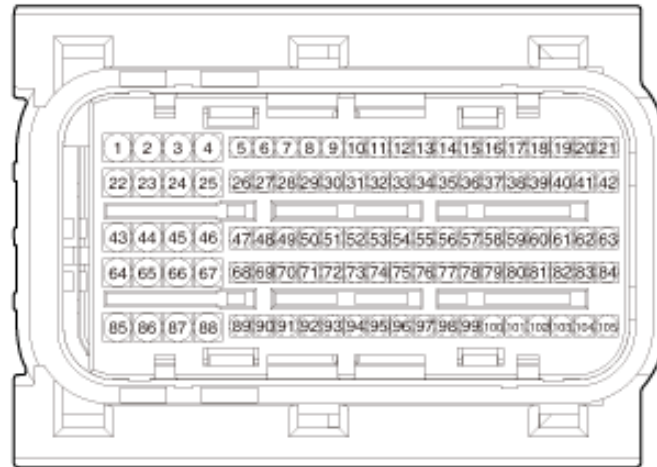
Item	Specification						
Engine Speed (RPM)	1000	2000	3000	4000	5000	6000	7000
Dwell Time (ms)	5.9	5.2	4.2	3.8	3.5	3.2	2.3
Secondary Coil Voltage (kV)	40	40	40	40	39	38	31

Circuit Diagram

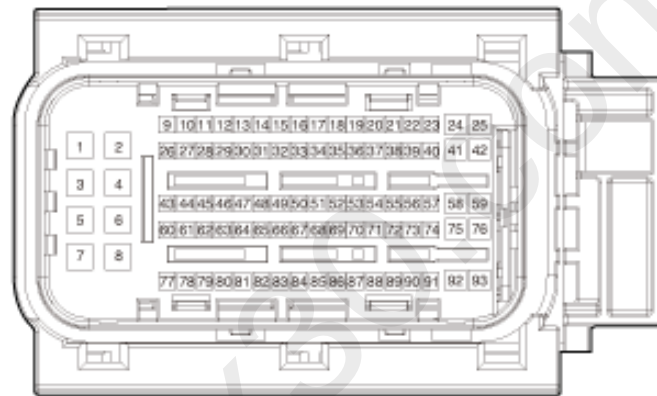


Ignition Coil Connector Terminal Function

[ECM Harness Connector]



Connector [A]



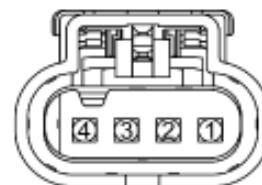
Connector [B]

Ignition Coil Terminal



IG Coil #1,2,3,4

Ignition Coil Harness Connector



IG Coil #1,2,3,4

Ignition Coil Terminal Function

*Connected to number

Ignition Coil #1 (Cylinder #1)

Pin No	Description	Connected to
1	Ground	Chassis
2	Ignition Coil #1 Control	ECM Connector [A] (48)
3	-	-

4	Battery Power (B+)	Main Relay
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Ignition Coil #2 (Cylinder #2)

Pin No	Description	Connected to
1	Ground	Chassic
2	Ignition Coil #2 Control	ECM Connector [A] (68)
3	-	-
4	Battery Power (B+)	Main Relay

Ignition Coil #3 (Cylinder #3)

Pin No	Description	Connected to
1	Ground	Chassic
2	Ignition Coil #3 Control	ECM Connector [A] (26)
3	-	-
4	Battery Power (B+)	Main Relay

Ignition Coil #4 (Cylinder #4)

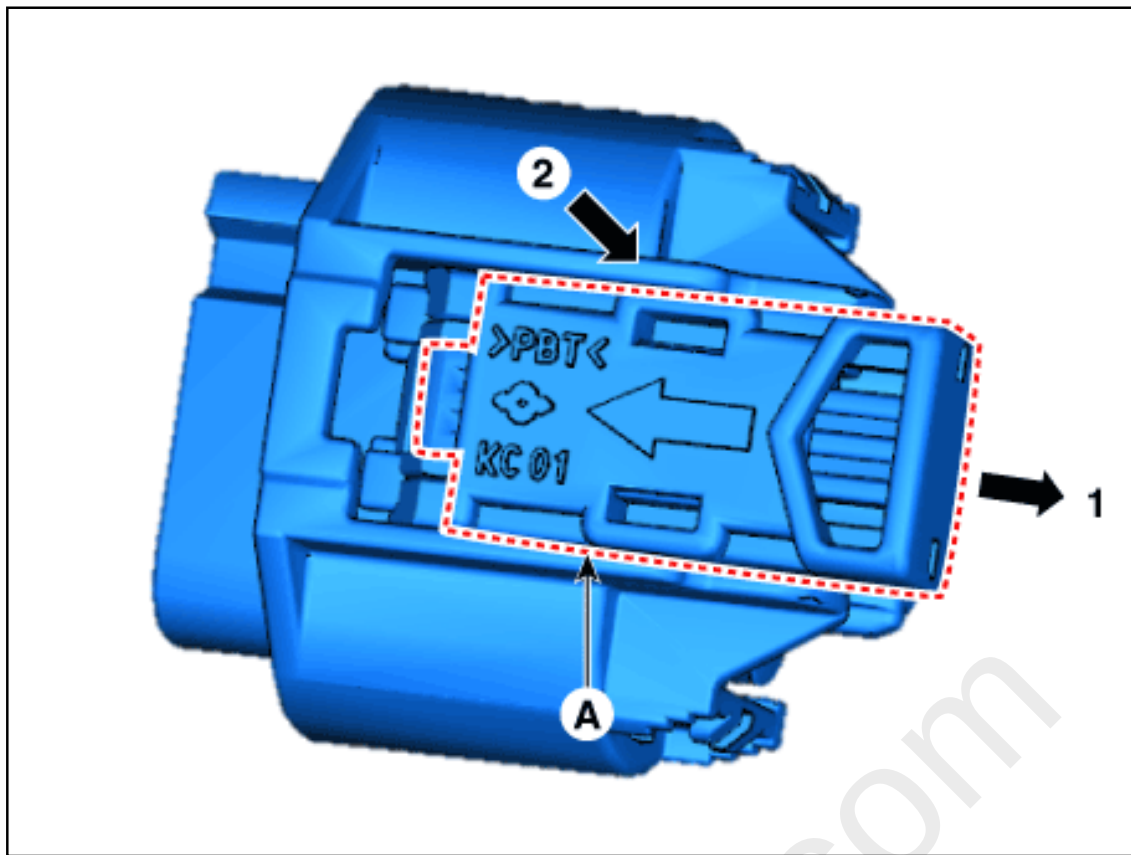
Pin No	Description	Connected to
1	Ground	Chassic
2	Ignition Coil #4 Control	ECM Connector [A] (90)
3	-	-
4	Battery Power (B+)	Main Relay

Removal

1. Turn the ignition switch OFF and disconnect the battery (-) terminal.
2. Remove the engine cover.
(Refer to Engine Mechanical System - "Engine Cover")
3. Disconnect the ignition coil connectors (A).



- When removing the ignition coil connector, pull the lock pin (A) and push the clip.



4. Remove the ignition coils (A).

Tightening torque :

9.8 - 11.8 N.m (1.0 - 1.2 kgf.m, 7.2 - 8.7 lb-ft)



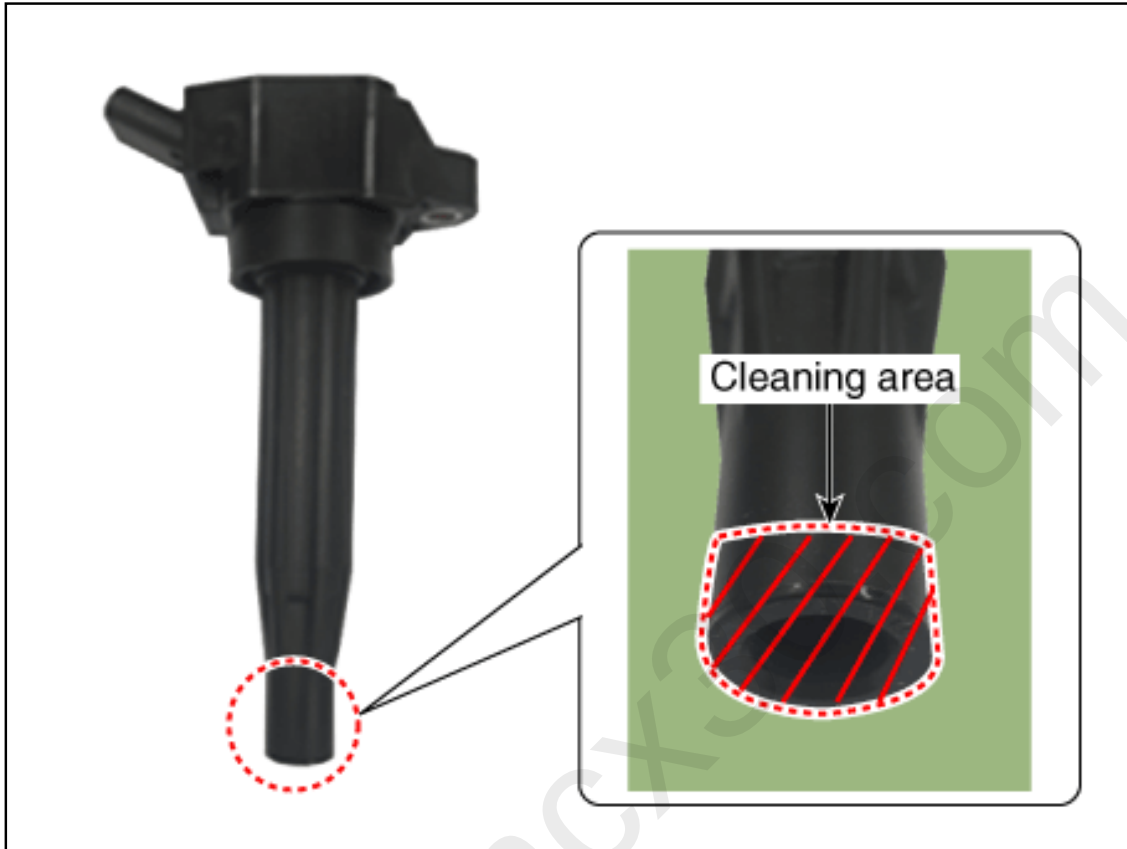
Installation

1. Install in the reverse order of removal.

Cleaning

Cleaning work is required to prevent the problem of contamination of the spark plug insulator by foreign substances attached to the bottom of the ignition coil boot.

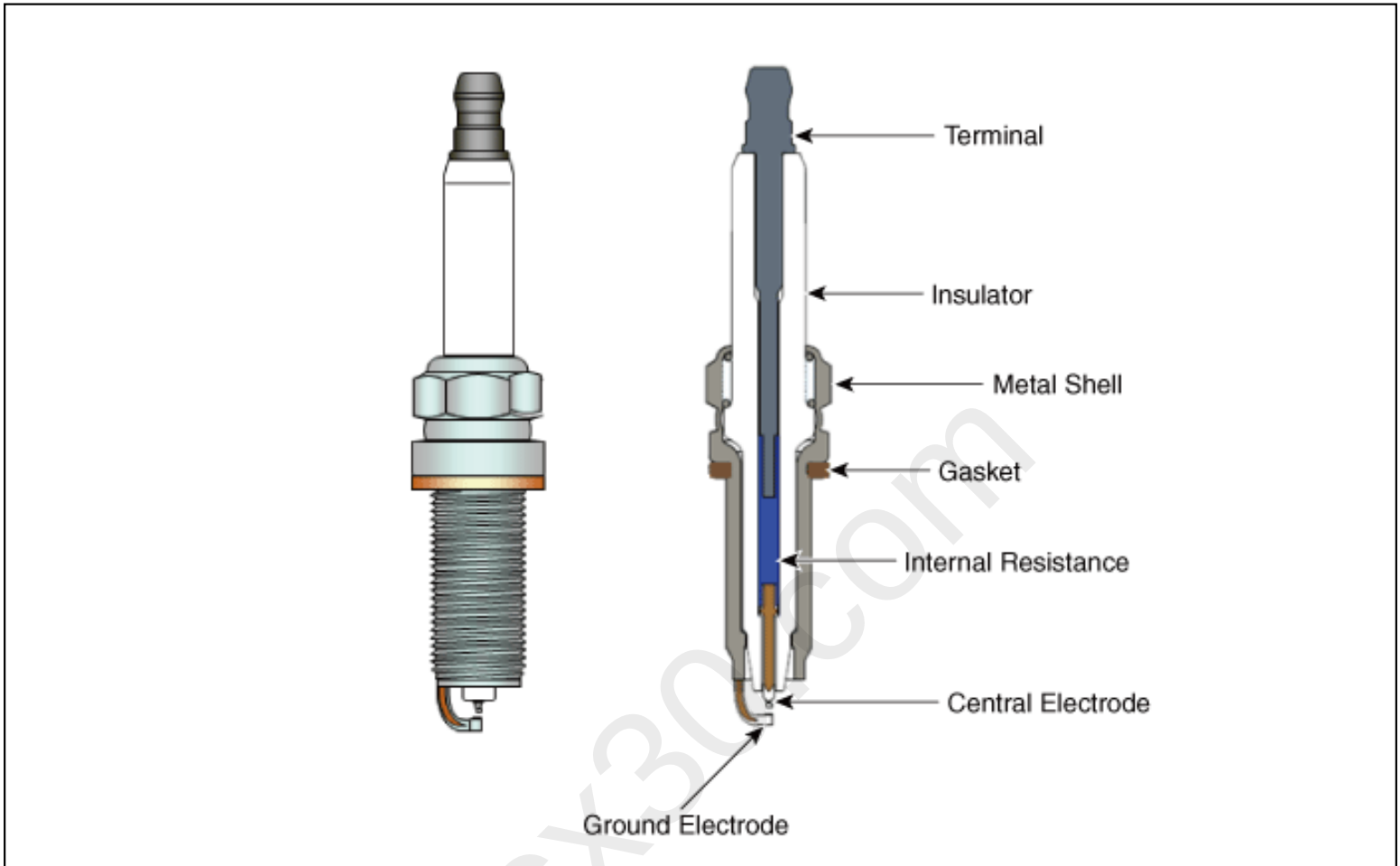
1. Prepare the soft cloth.
2. Wipe the contaminants inside and outside the bottom of the ignition coil boot with the soft cloth as shown in the following figure.



- The cloth should be clean, free of contaminants, and soft enough to not damage the parts.

Description

A spark plug is a device for delivering electric current from an ignition system to the combustion chamber of a spark-ignition engine to ignite the compressed fuel/air mixture therein by means of an electric spark, while containing combustion pressure within the engine. A spark plug has a metal threaded shell, electrically isolated from a central electrode by a porcelain insulator.



Specification

Item	Specification
Type	SILZKR8J8GS
Gap	0.7 - 0.8 mm (0.0276 - 0.0315 in.)
Electrode Material	IRIDIUM

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Inspection

[On vehicle inspection]

1. Accelerate the engine to about 3,000 rpm 3 times or more.
2. Remove the spark plug.

(Refer to Spark Plug - "Removal")

3. Check the spark plug visually.

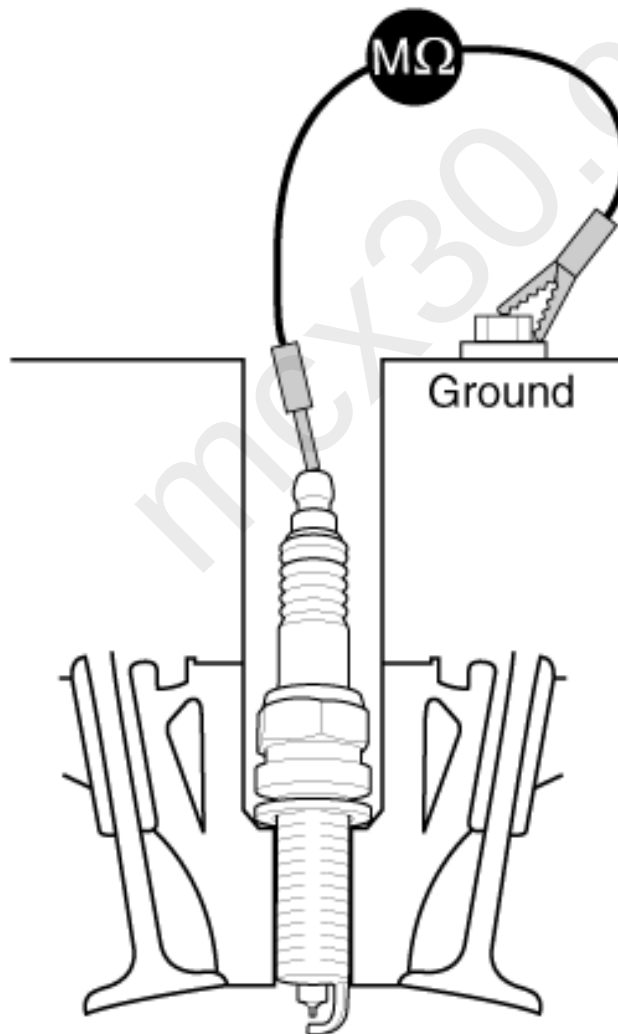
If the electrode is dry, the spark plug is normal.

If the electrode is wet, check for damage and inspect the electrode gap as follows.

[Component Inspection]

1. Check the spark plug for any damage on its thread and insulator.
If there is damage, replace the spark plug.
2. Check the electrode. Measure the insulation resistance with an ohmmeter.
If the resistance is less than the specified value, adjust the electrode gap.

Specification : 10 M Ω or more



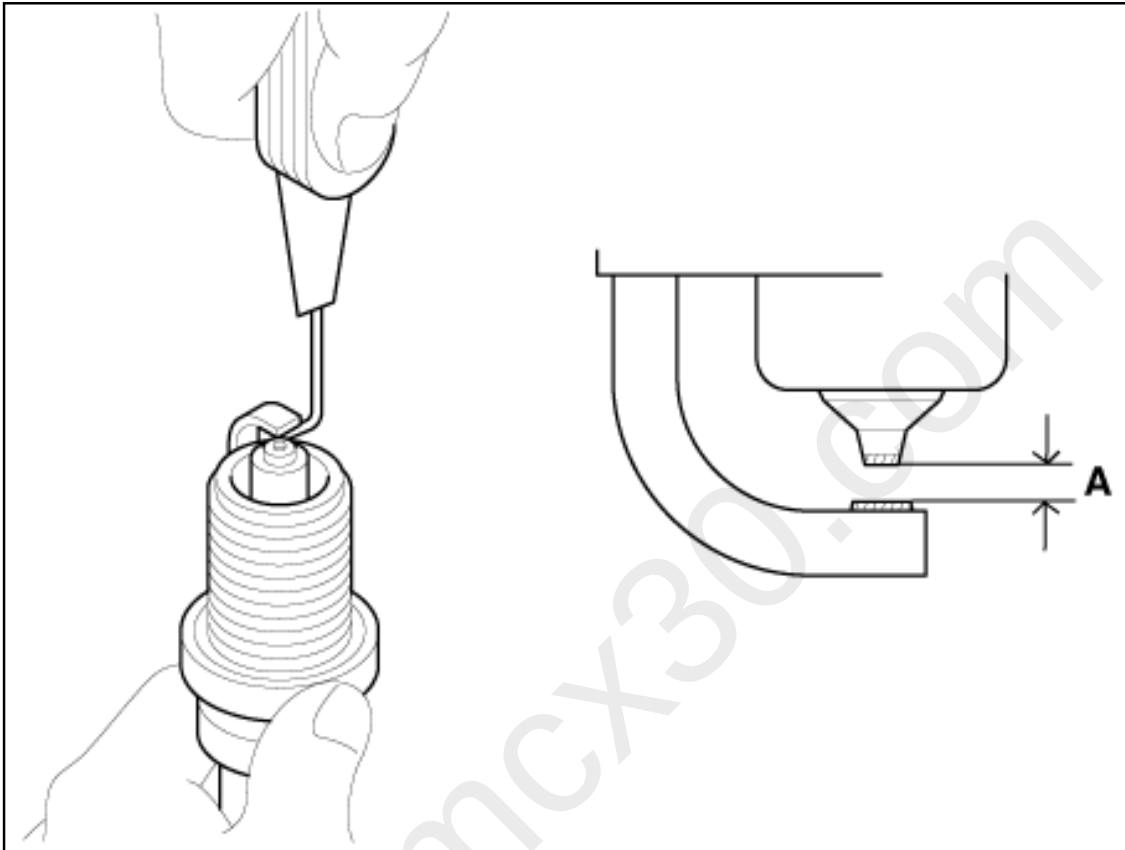
3. Check the spark plug electrode gap.

If the gap is greater than the maximum, replace the spark plug.

Specification : 0.7 - 0.8 mm (0.0276 - 0.0315 in.)



- When adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip.
Never attempt to adjust the gap on a used plug.

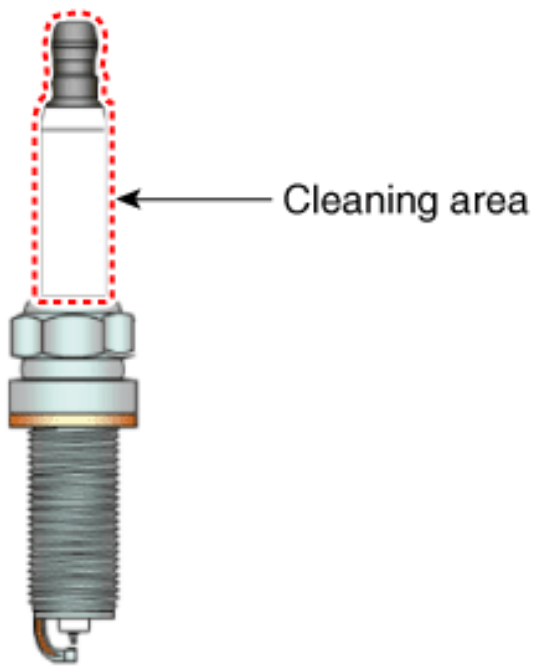


Cleaning

(1)

Cleaning work is required to prevent the problem of contamination of the spark plug insulator by foreign substances attached to the bottom of the ignition coil boot.

1. Prepare the soft cloth.
2. Wipe the contaminants of the spark plug insulator with the soft cloth as shown in the following figure.



- The cloth should be clean, free of contaminants, and soft enough to not damage the parts.

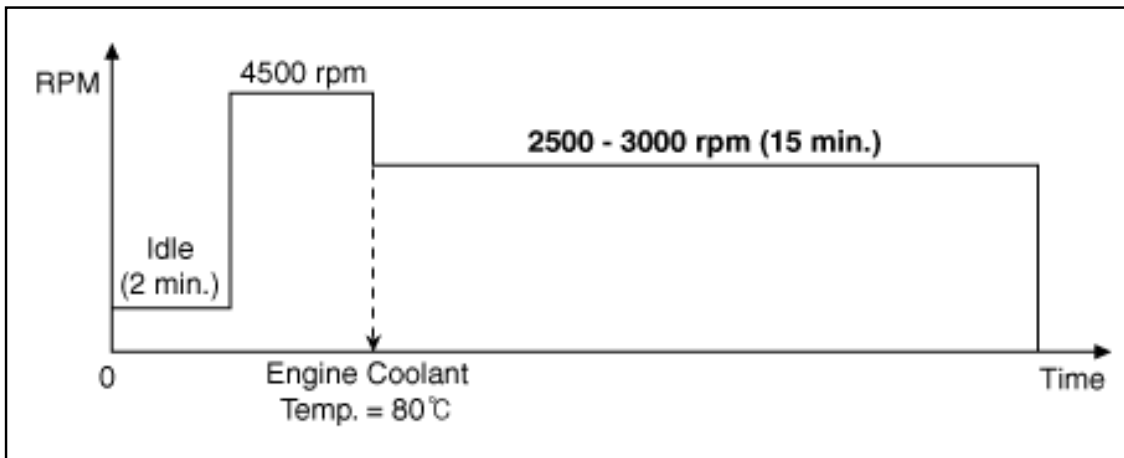
Cleaning

(2)

The combustion temporarily becomes unstable, due to the aged fuel and the carbon deposits accumulated on the spark plug(s) after long-term storage.

[1st Method]

1. Start the engine and keep the engine running at idle for 2 minutes.
2. Step on the accelerator pedal and hold it steady at 4500 rpm with the shift lever in N position to warm up the engine until the temperature of the engine coolant reaches 80°C.
3. Keep the engine running at 2500 - 3000 rpm in the N position for 15 minutes.



[2nd Method]

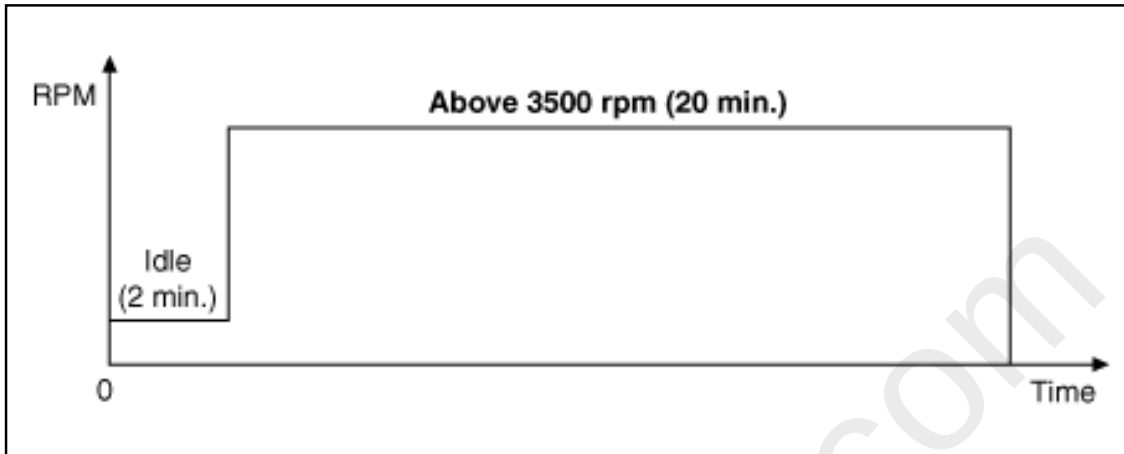


•The 2nd method should be performed only if the 1st method fails (the misfire-related codes recur).

1. Start the engine and keep the engine running at idle for 2 minutes.
2. Drive the vehicle for over 20 minutes, keeping the engine speed above 3500 rpm.



•If equipped with manual transaxle, shift the gear properly for keeping the engine speed above 3500 rpm.



Removal

1. Remove the ignition coil.
(Refer to Engine Electrical System - "Ignition Coil")
2. Using a spark plug wrench, remove the spark plugs (A).

Tightening torque :

14.7 - 24.5 N.m (1.5 - 2.5 kgf.m, 10.8 - 18.1 lb-ft)



- Be careful that no contaminates enter into spark plug holes.

Installation

1. Install in the reverse order of removal.