IGNITION SYSTEM

1430-05/1430-14/1443-01/1443-02/

GENERAL INFORMATION

OVERVIEW AND OPERATING PROCESS

CONFIGURATION

REMOVAL AND INSTALLATION

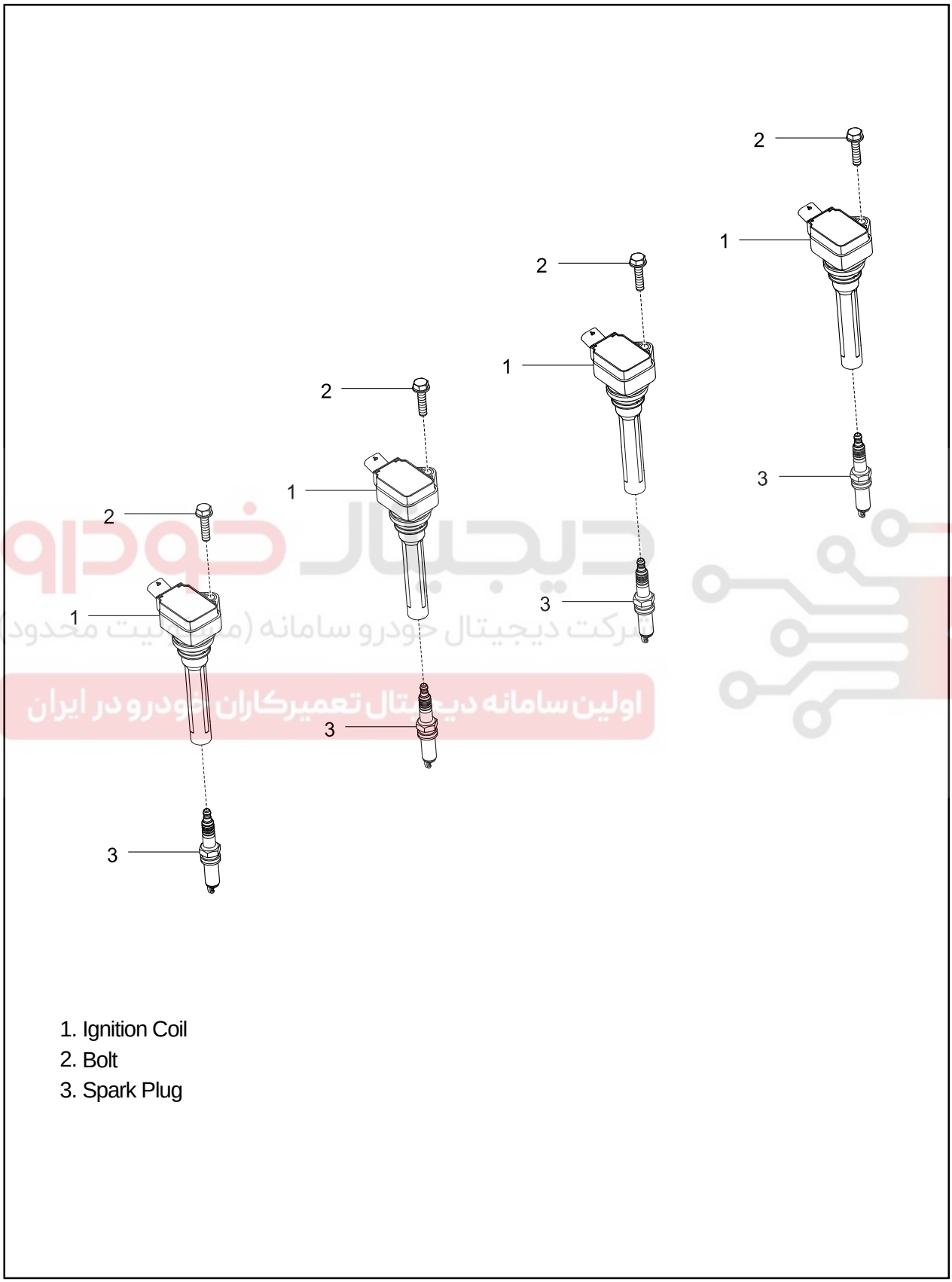
IGNITION SYSTEM 1443-01

GENERAL INFORMATION

1. SPECIFICATION

Description		Specification
Spark plug	Internal resistance	3 ~ 7 kΩ
	Center electrode	Iridium alloy
	Ground electrode	Platinum alloy
	Electrode clearance	1.1 mm
	Change interval	160,000 km
Ignition coil	Primary operating current	7 ± 0.5A
	Generated voltage (primary/secondary)	Max. 400 V / 5~20 kV
	Ignition type	Independent ignition type
	Ignition sequence	1-3-4-2

2. LAYOUT



1. Ignition Coil
2. Bolt
3. Spark Plug

Modification basis	
Application basis	
Affected VIN	

OVERVIEW AND OPERATING PROCESS

1. OVERVIEW

The ignition system is to supply high voltage generated from the ignition coil to the spark plug. The G20DF engine is equipped with the independent type direct ignition system that the ignition coil is installed in each cylinder.
The basic ignition timing in each cylinder is determined by the signals from camshaft position sensor and crankshaft position sensor.
This ignition system controls the electronic ignition timing received from the engine ECU. To control the ignition timing precisely, the ECU use the information below:

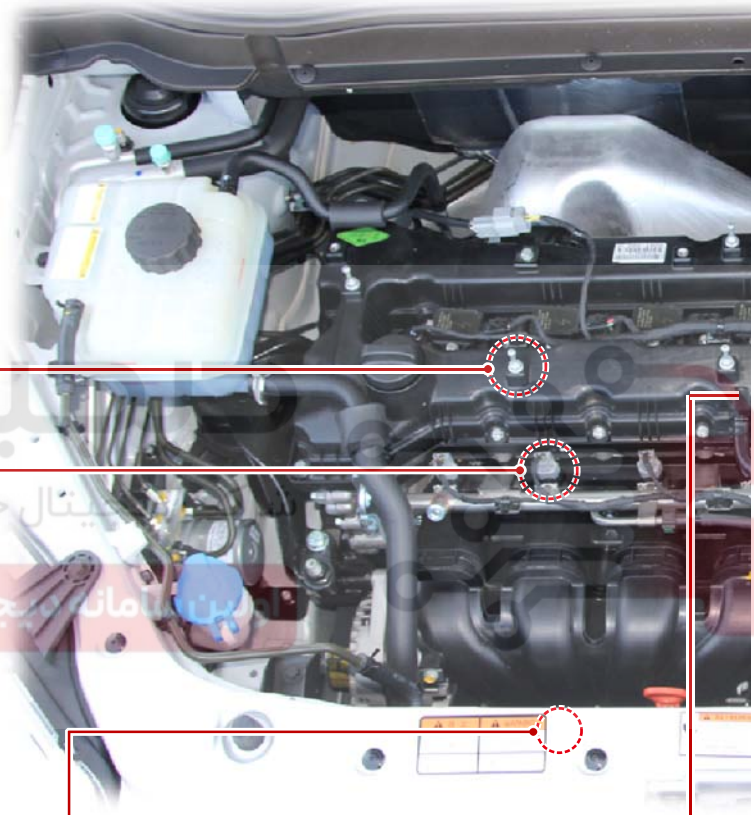
- Engine load
- Coolant temperature
- Intake air temperature
- Engine rpm
- Camshaft position sensor (CPS)
- Crankshaft position sensor (CKS)

If the signal from the camshaft position sensor is not delivered to the engine ECU, the ignition coil and fuel system cannot be operated.

2. COMPONENTS

Ignition coil

Spark plug

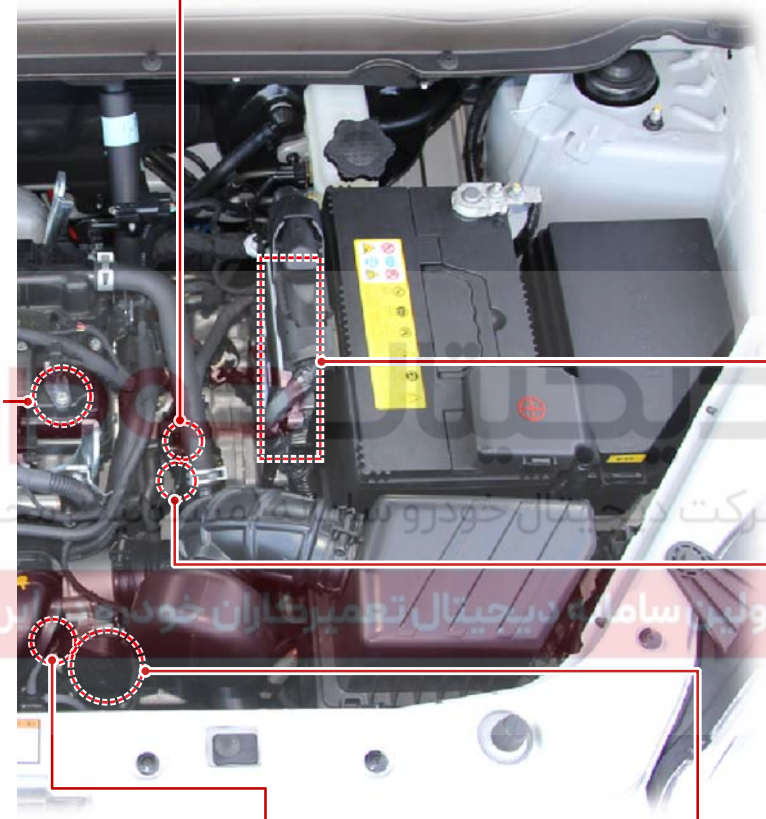


Injector

Knock sensor

Camshaft position sensor

Modification basis	
Application basis	
Affected VIN	



Crankshaft position sensor

Engine ECU

Coolant temperature sensor

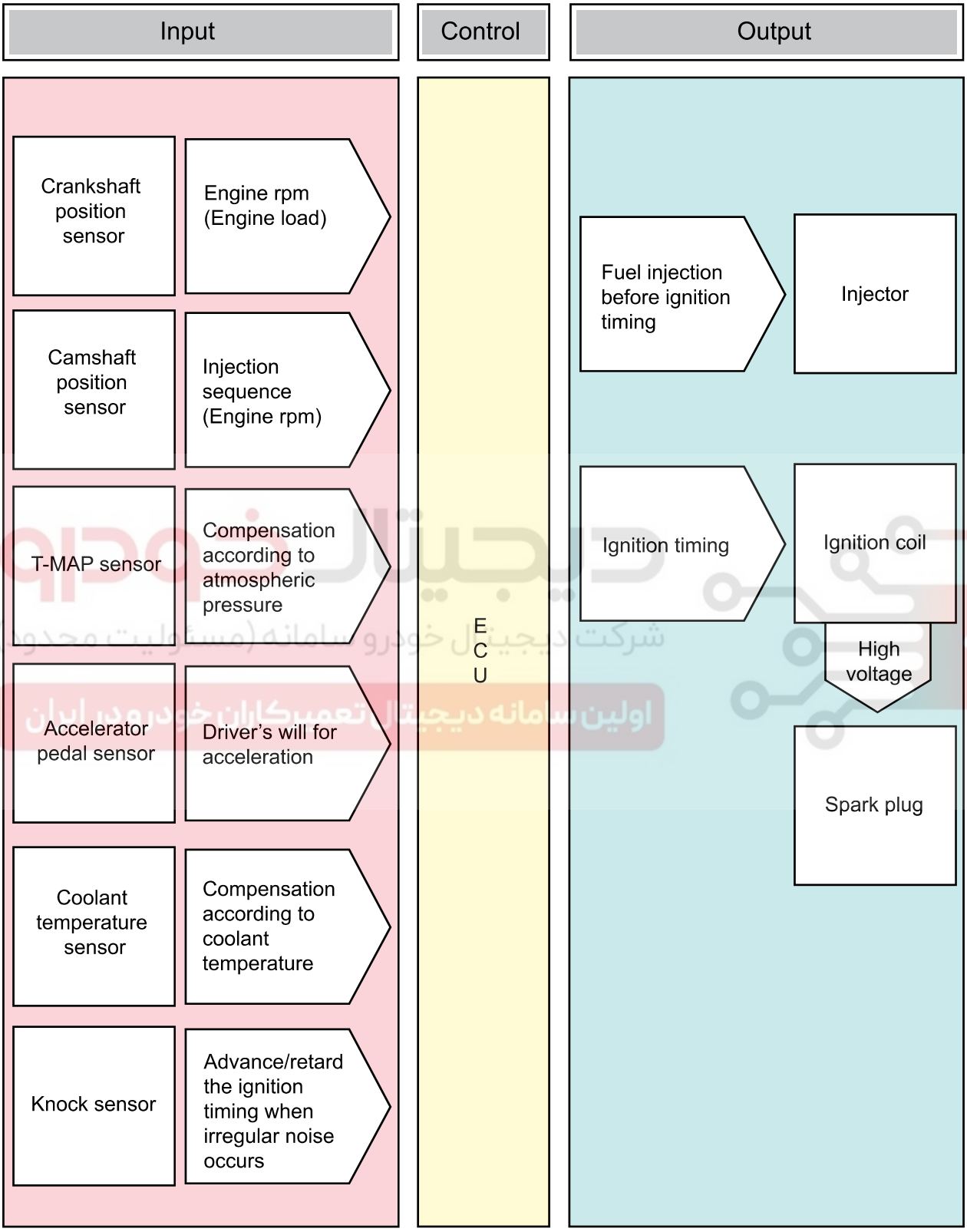
T-MAP sensor

Electric throttle valve

Accelerator pedal position sensor

Modification basis	
Application basis	
Affected VIN	

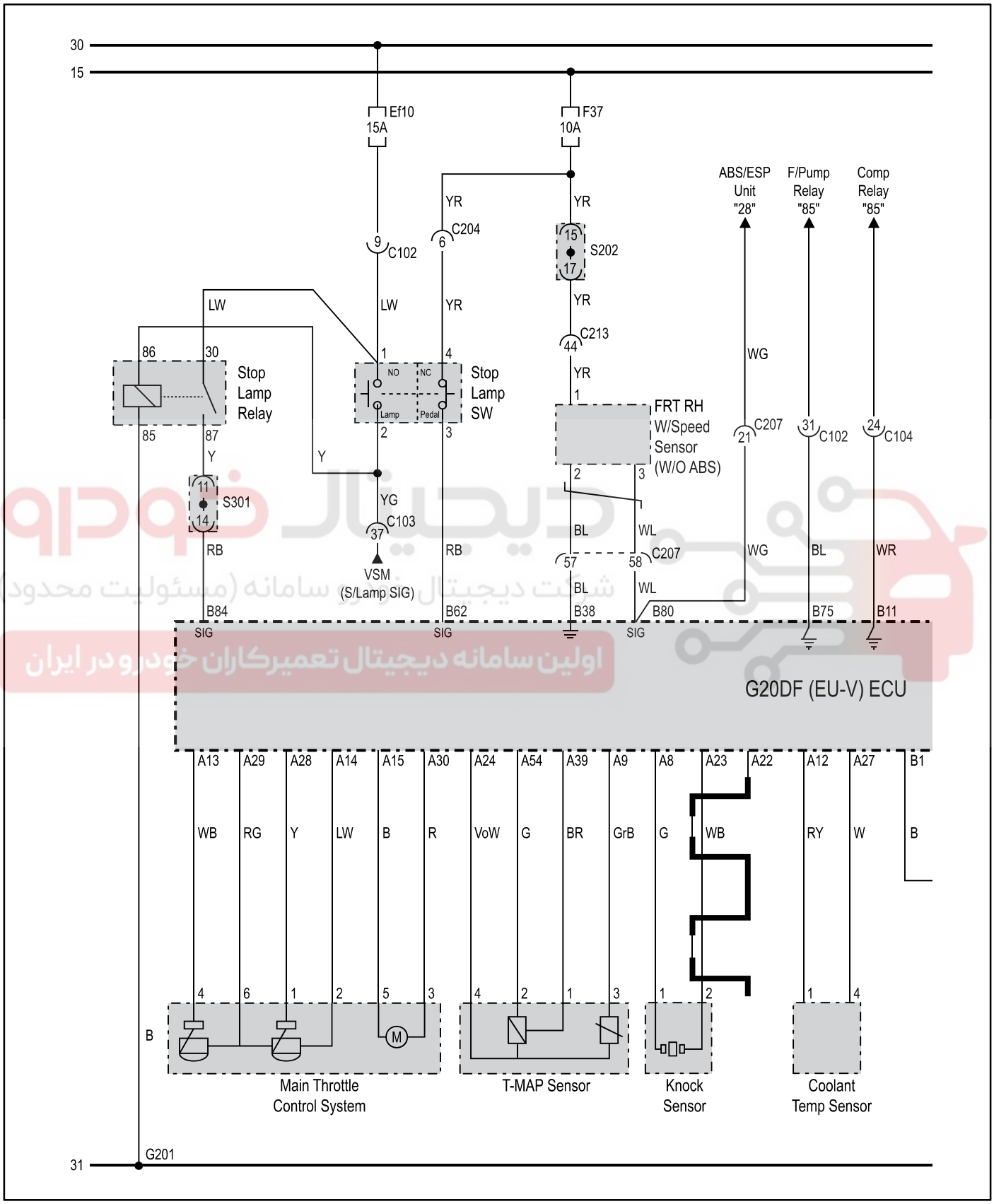
3. INPUT/OUTPUT DEVICES



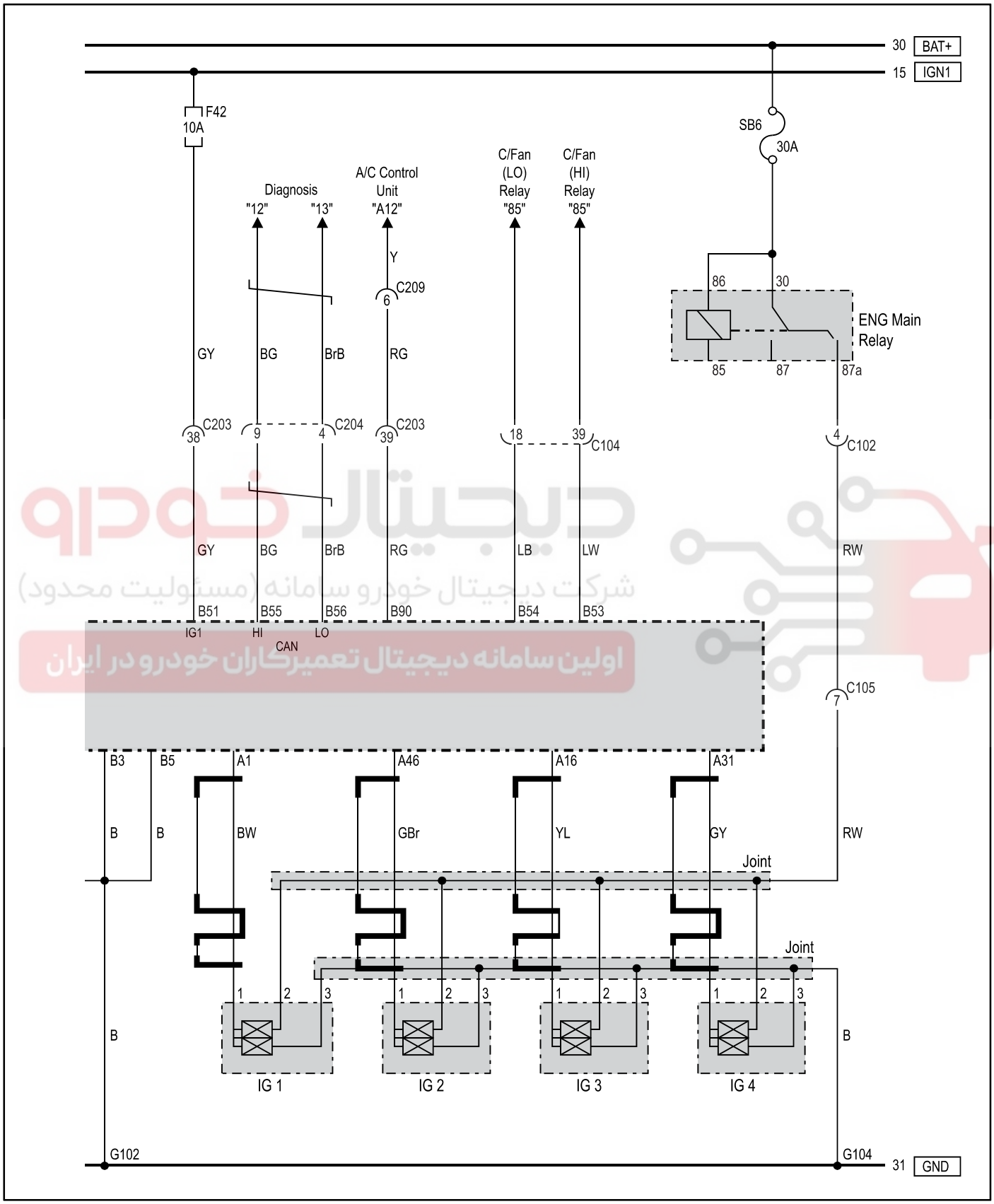
Modification basis	
Application basis	
Affected VIN	

Memo

4. CIRCUIT DIAGRAM



Modification basis	
Application basis	
Affected VIN	



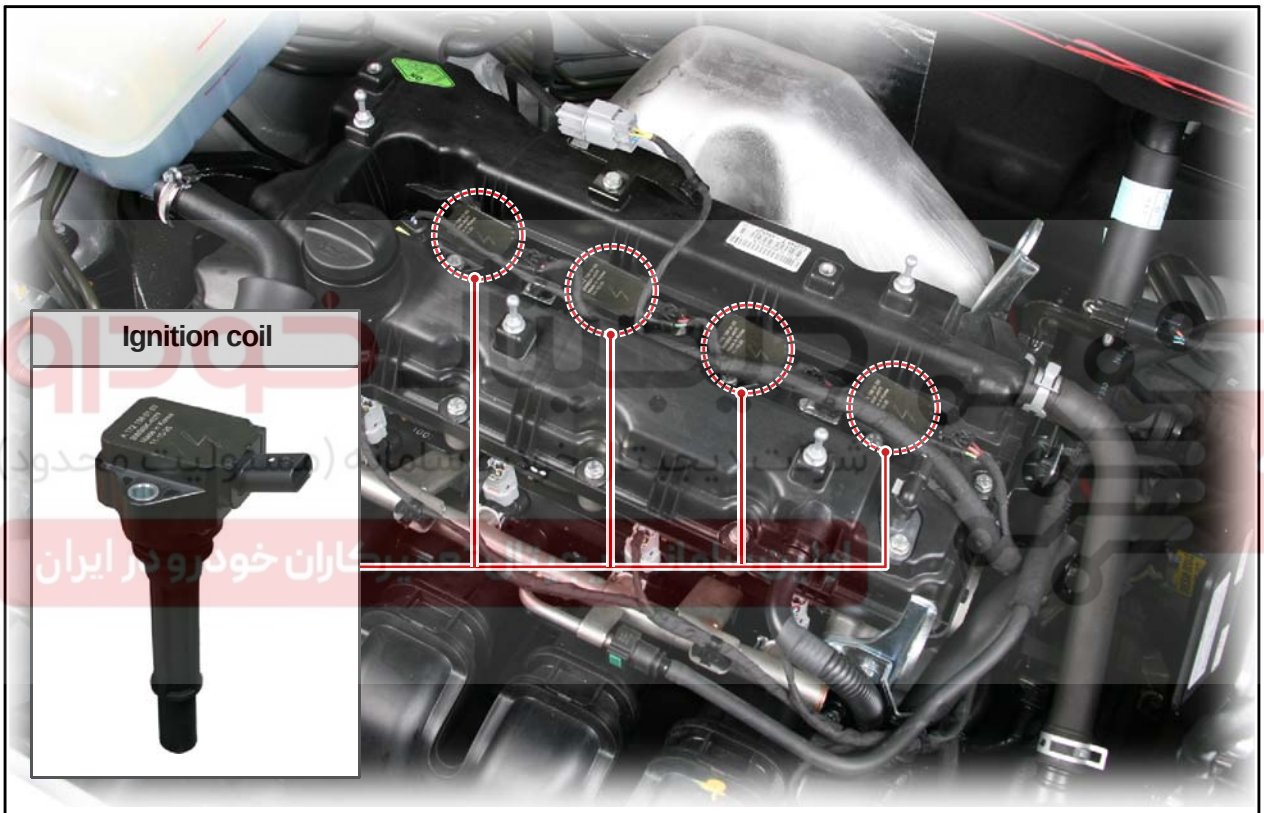
Modification basis	
Application basis	
Affected VIN	

CONFIGURATION

S.G.N. 1443-01 IGNITION COIL

1) Overview

The G20DF engine is equipped with the independent type direct ignition system that the ignition coil is installed in each cylinder.
This independent type direct ignition system provides easy installation and less igntion energy loss. The ignition coil in this system has long cylindrical shape, thus is called stick type or pencil type ignition coil.



Description	Specification	
Component resistence (20℃)	Primary coil	800 mΩ
	Secondary coil	Not measurable (High voltage Diode)
Generated voltage	Primary coil	Max 400 V
	Secondary coil	5~20 kV
Operating temperature	-40℃ ~ 130℃	
Operating current	Primary coil: 7.5 A ± 0.5 A	

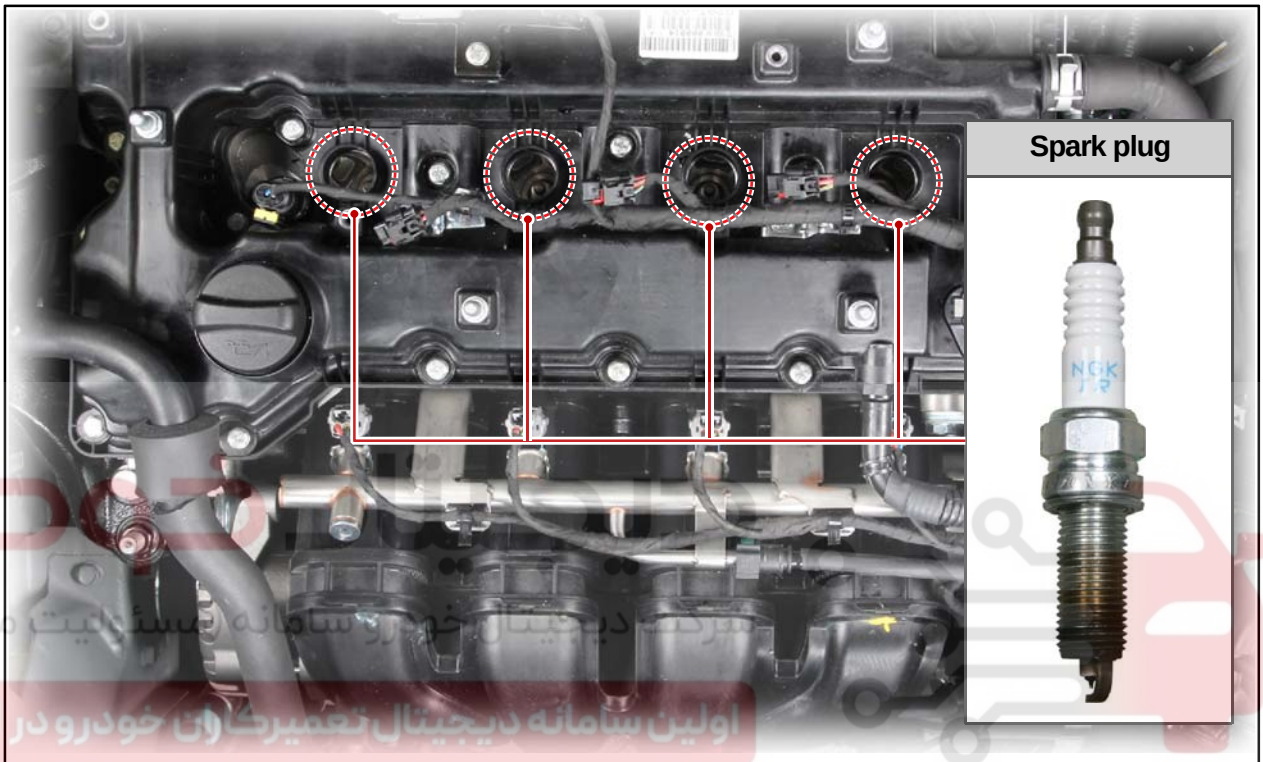
Modification basis	
Application basis	
Affected VIN	

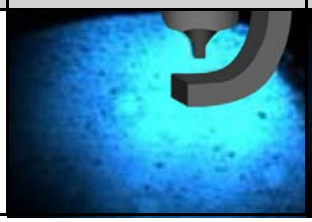
S.G.N. 1443-02

SPARK PLUG

1) Overview

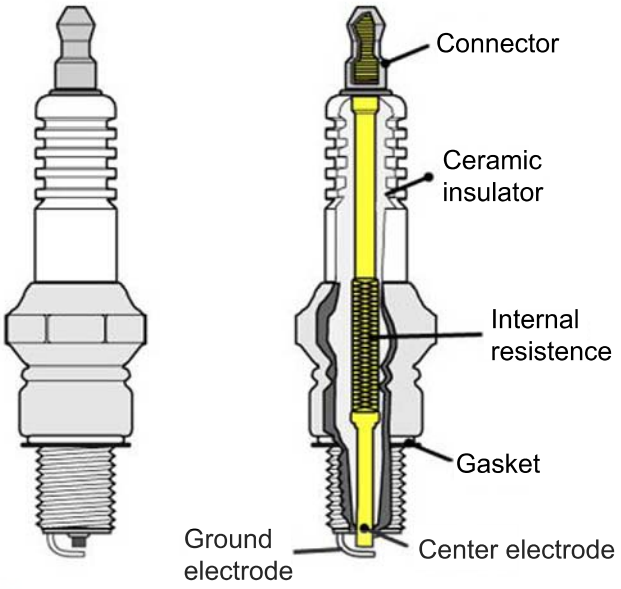
The spark plug in G20DF engine is made of iridium alloy.
The iridium spark plug improves the fuel economy and ignition efficiency with high starting performance, accelerating performance and idling safety.



Type	Appearance	At beginning of ignition	In 3 ms
Iridium spark plug (G20DF)			

Modification basis	
Application basis	
Affected VIN	

Spark plug



▶ Ceramic insulator

This isolates the high voltage at the electrode, ensuring that the spark happens at the tip of the electrode and not anywhere else on the plug.

▶ Connector

This is connected to the ignition coil to get the electric power.

▶ Gasket

Because the spark plug also seals the combustion chamber or the engine when installed, seals are required to ensure there is no leakage from the combustion chamber.

▶ Interal resistance

The sparking noise may cause RF noise in audio system. To reduce this, the internal resistance is installed in the spark plug.

▶ Electrode

The electrode is an electrical conductor used to make a spark ti ginite the fuel in combustion chamber.

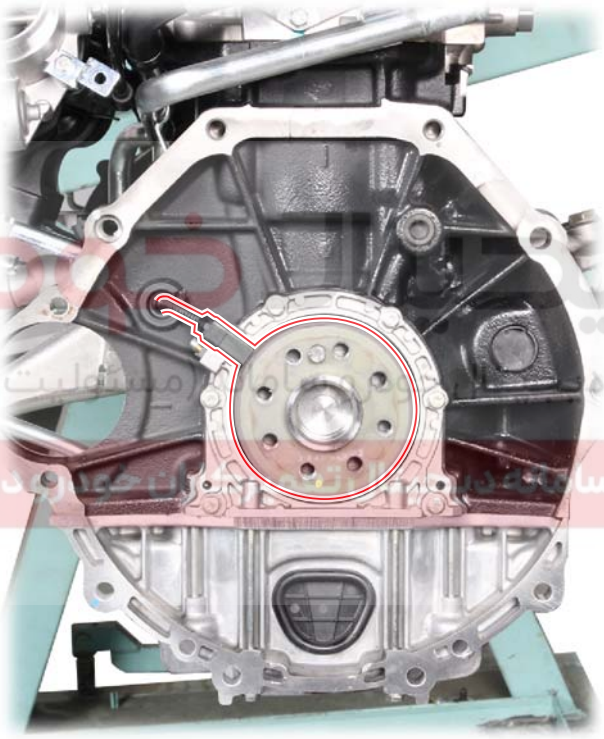
Modification basis	
Application basis	
Affected VIN	

S.G.N. 1127-35

CRANKSHAFT POSITION SENSOR

1) Overview

The crankshaft position sensor uses 5V power and consists of active type MR sensor and magnetic trigger ring. It has 4 resistance (MR element) that determines the crankshaft position and engine rpm by the current through the resistance changes due to the rotation of crankshaft. This could be the main factor to determine the ignition timing.
The crankshaft position sensor is used as a important signal to determine the ignition timing and fuel injection volume by detecting the piston position in each cylinder.



Crankshaft position sensor

Magnetic trigger ring

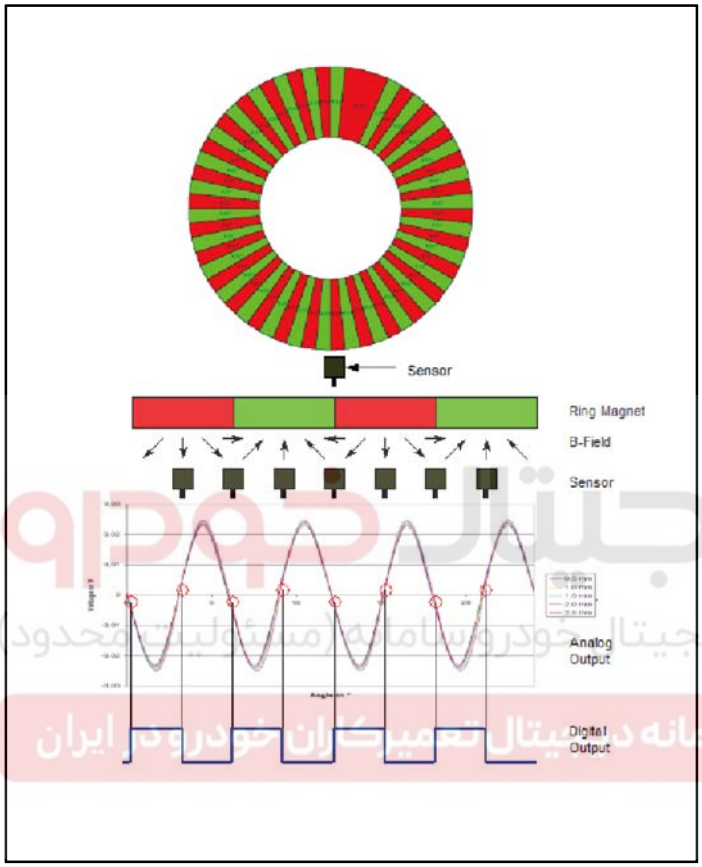
NOTE

Magneto Resistance Sensor Element
Magneto resistance is the property of a material to change the value of its electrical resistance when an external magnetic field is applied to it.

Modification basis	
Application basis	
Affected VIN	

2) Features

(1) MR type sensor outputs the square wave form.
(2) Magnetic trigger ring is magnetized. If an external magnetic field approaches it, the magnetic field in it ring could be lost.
(3) There are 114° of angle deviation in No.1 cylinder with long tooth.



Description	Specification
Supply voltage	12 V
Output voltage	4.48V
Air gap	0.6~1.4mm

CAUTION
Do not approach any tool or device with magnetic field near the magnetic trigger ring.

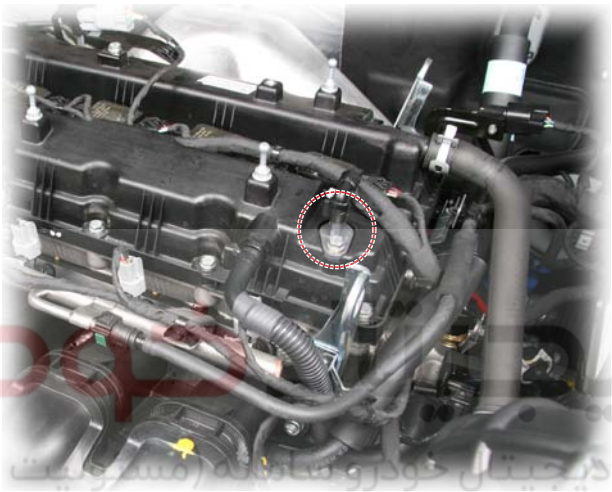
Modification basis	
Application basis	
Affected VIN	

S.G.N.
1430-14 CAMSHAFT POSITION SENSOR

1) Overview

The camshaft position sensor is used to determine the correct cylinder at the beginning of start. However, after the engine has been started, the engine can be running even when the camshaft position sensor is mulfunctioning.

- Determining the basic fuel injection timing
- Determining the ignition signal during idling



Camshaft position sensor installed

Rotor of intake camshaft position sensor

Camshaft position sensor

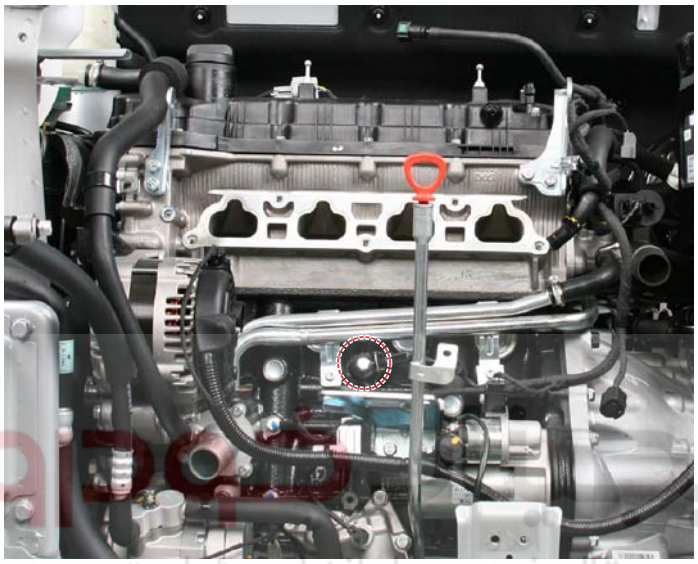
Modification basis	
Application basis	
Affected VIN	

S.G.N. 1430-05

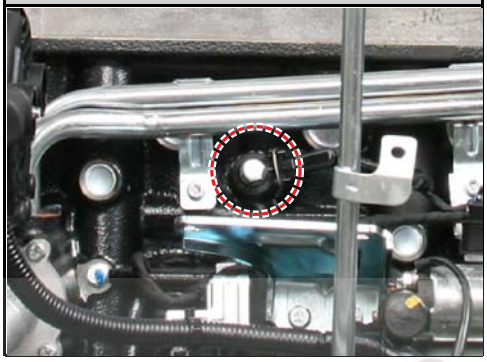
KNOCK SENSOR

1) Overview

The knock sensor is located on the cylinder block in intake manifold side.
The knock sensor is to detect abnormal knocking in the engine. The knock sensor has Piezoelectric elements that generates a voltage when pressure or a vibration is applied to them.



Knock sensor installed



Knock sensor

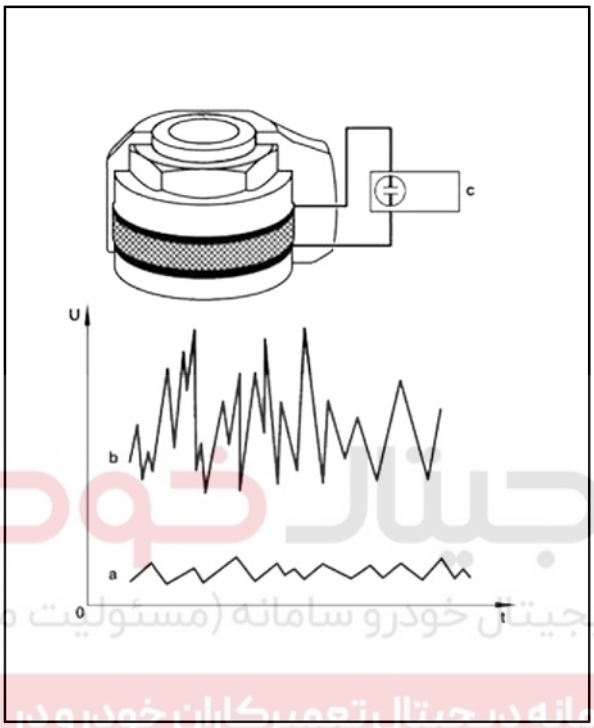
Insulation resistance	>1 MΩ at 900 V
Resonance frequency	> 30 kHz
Operating temperature	−40 ~ 150℃
Output voltage	22 ~ 37 mV/g (3~10kHz)
	22 ~ 57 mV/g (10~20kHz)

Modification basis	
Application basis	
Affected VIN	

2) Features

- Piezoelectric element
- Sele power generation

Piezoelectric element detecs the sound, vibration, and pressure through the element between metal plates.



Frequency	3 kHz < f < 20kHz

CAUTION

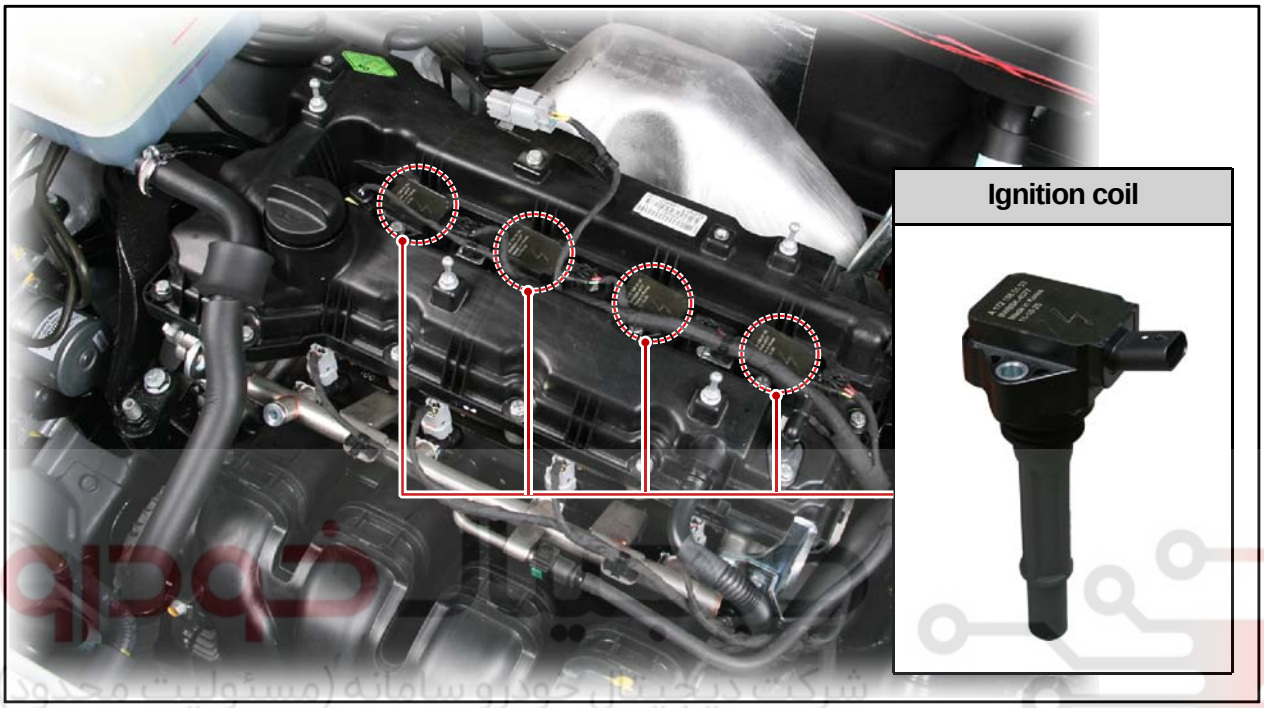
The knock sensor is not supplied with reference power, but generates voltage by its piezoelectric element to supply engine vibration degree to the ECU.

u: Oscilloscope
t: Time
a: Controlled ignition signal pattern
b: Uncontrolled ignition signal pattern

REMOVAL AND INSTALLATION

S.G.N. 1443-01 IGNITION COIL ASSEMBLY

Preceding work - Disconnect the negative cable from the battery.



1. Disconnect the ignition coil connectors (No.1 ~ No.4) in order.

2. Unscrew the bolt from the No.1 ignition coil.

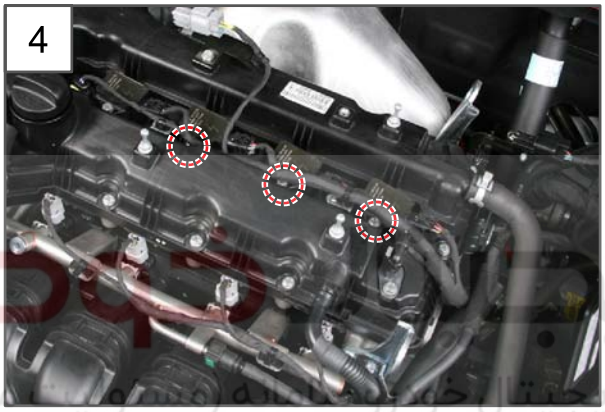
Tightening torque 10.0 ± 1.0Nm

Modification basis	
Application basis	
Affected VIN	

3

3. Remove the No.1 ignition doil.

4



4. With the same manner, remove the remaining ignition coils.

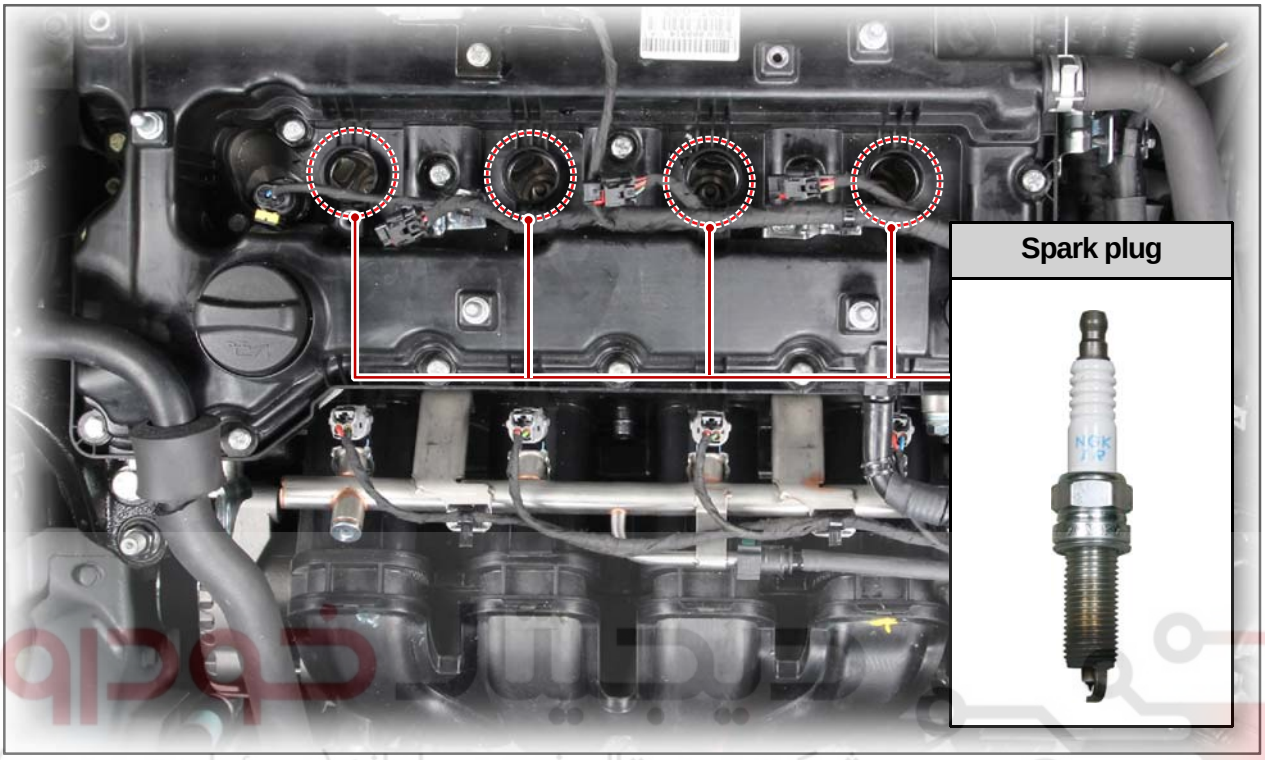
5

5. Install the ignition coils in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

S.G.N. 1443-02 SPARK PLUG

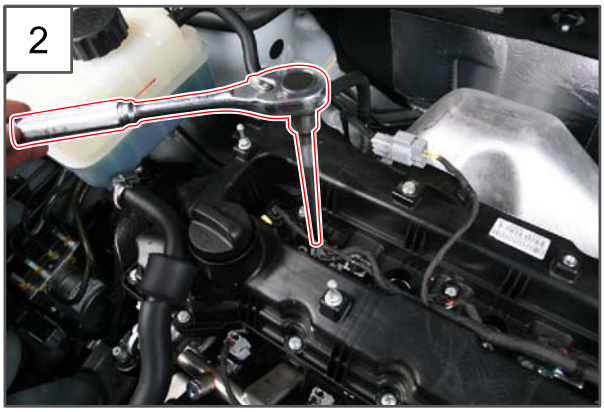
Preceding work - Disconnect the negative cable from the battery.



1. Remove the ignition coils in order.

NOTE

Refer to chapter "Ignition coil assemble".



2. Unscrew the No.1 ignition coil with the specified tool.

Tightening torque 15 ~ 25Nm

Modification basis	
Application basis	
Affected VIN	

3

3. Remove the No.1 spark plug.

NOTE

With the same manner, remove the remaining (No.2 ~ No.4) spark plugs.

CAUTION

Seal the injector mounting holes so that foreign material cannot get into the hole.

4

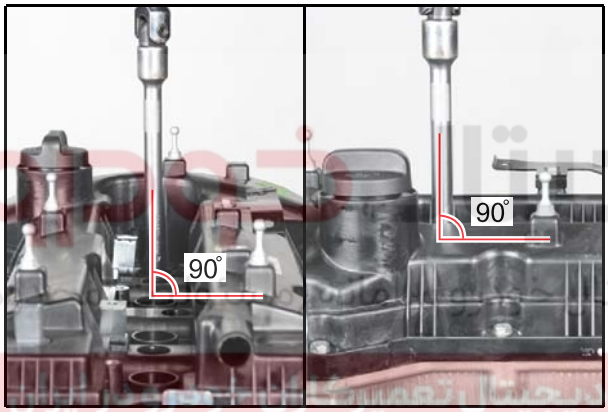
4. Install the spark plugs in the reverse order of removal.

Cautions when installing

- Screw in the spark plug with hands and specified tool before tightening it.

CAUTION
If the thread is incorrectly engaged, the spark plug or thread could be damaged.

CAUTION
Do not apply excessive force to tighten it. Keep the specified tightening torque.



- The tool for spark plug should be perpendicular dueing service work.

- Measure the air gap before installation.

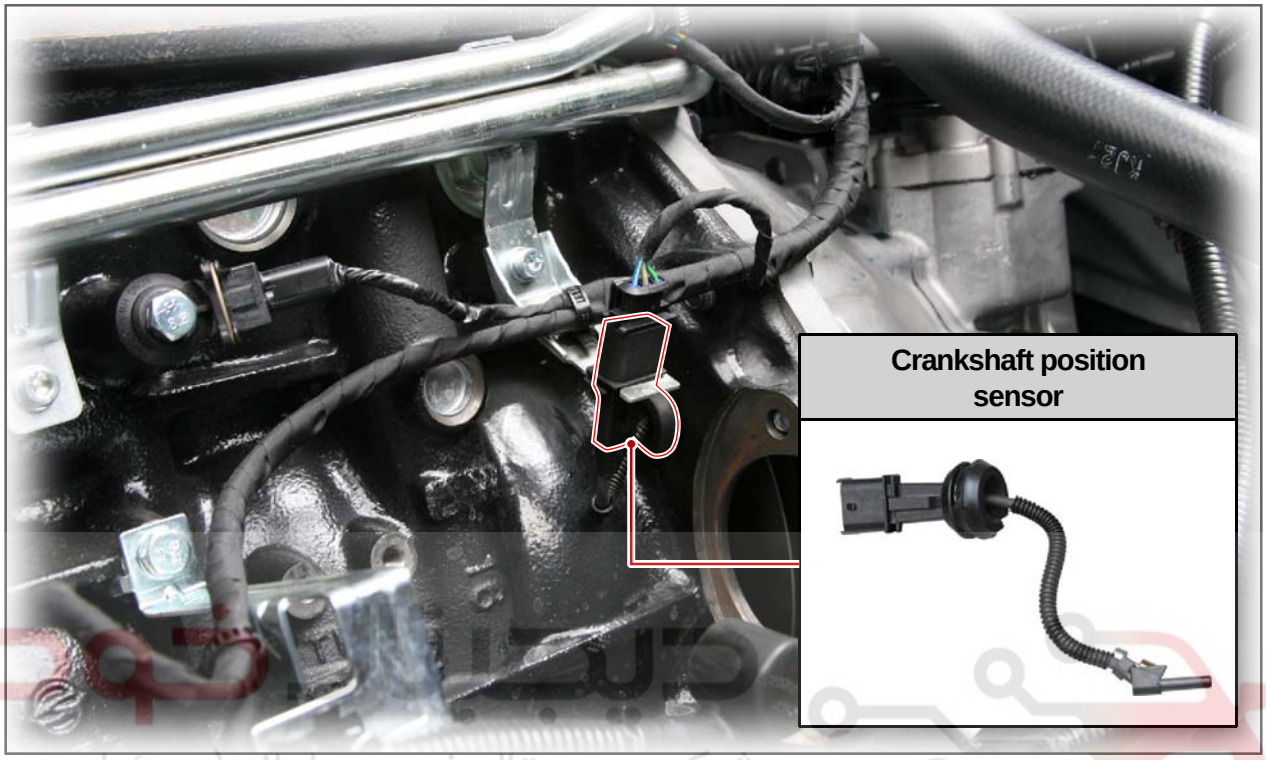
Air gap	1.1 mm

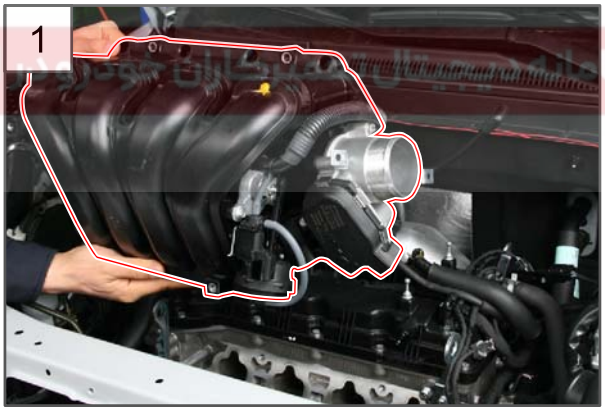
Modification basis	
Application basis	
Affected VIN	

S.G.N. 1127-35

CRANKSHAFT POSITION SENSOR

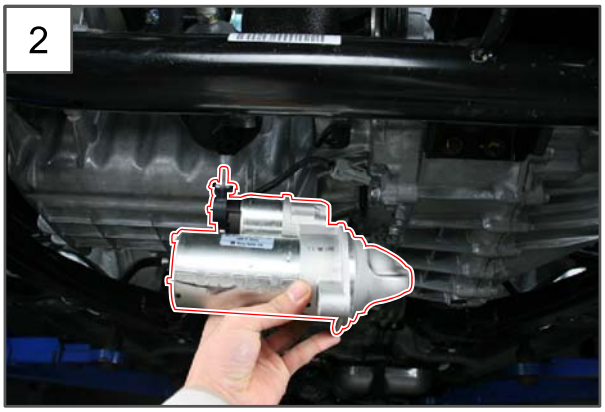
Preceding work - Disconnect the negative cable from the battery.





1. Remove the intake manifold assembly.

NOTE
Refer to Chapter "Intake System".

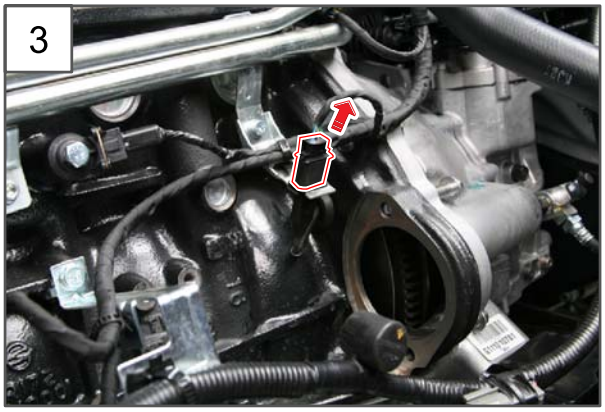


2. Remove the start motor.

NOTE
Refer to Chapter "Starting System".

Modification basis	
Application basis	
Affected VIN	

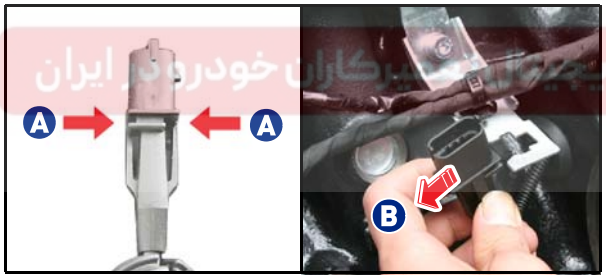
3



3. Disconnect the crankshaft position sensor connector.

4

4. Remove the crankshaft position sensor connector from the bracket.



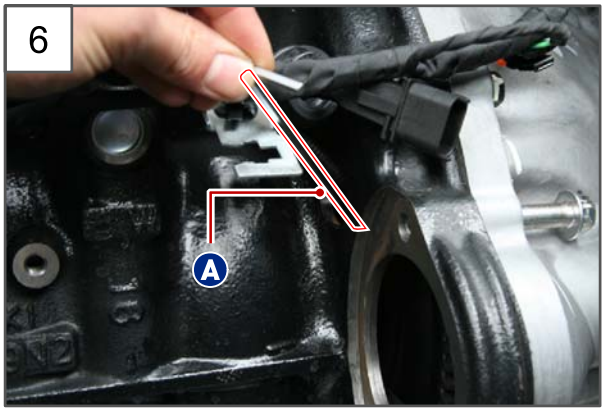
To remove the connector, push both locks (A) on connector and pull it out toward arrow direction (B).

5

5. Remove the crankshaft position sensor dust cover.

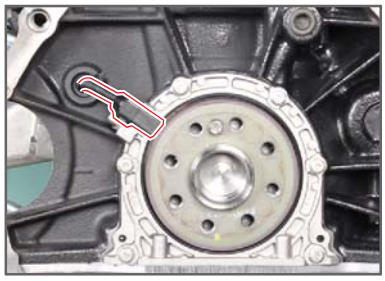
Modification basis	
Application basis	
Affected VIN	

6

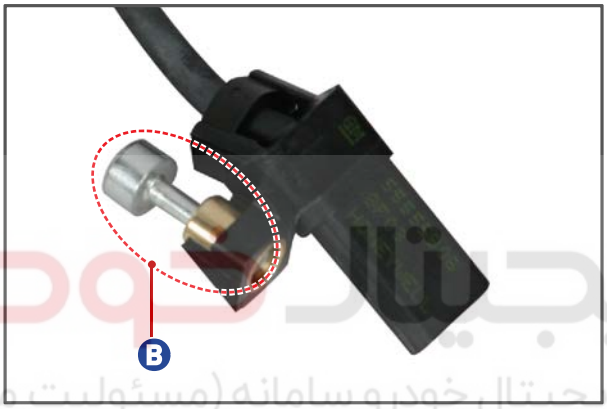


6. Unscrew hexagon mounting bolt (6 mm) with L-wrench from the crankshaft position sensor.

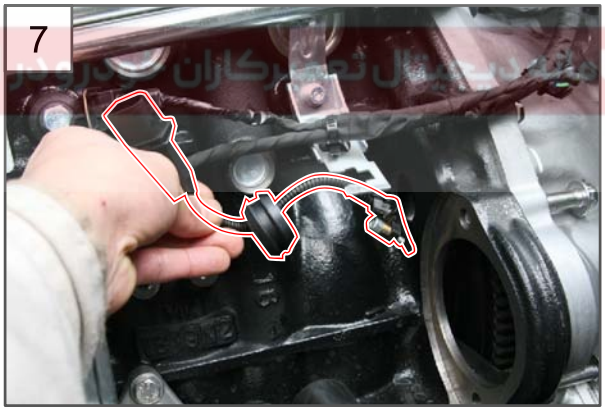
Tightening torque 10.0 ± 1.0Nm



- Crankshaft position sensor mounting bolt (B)



7



7. Remove the crankshaft position sensor.

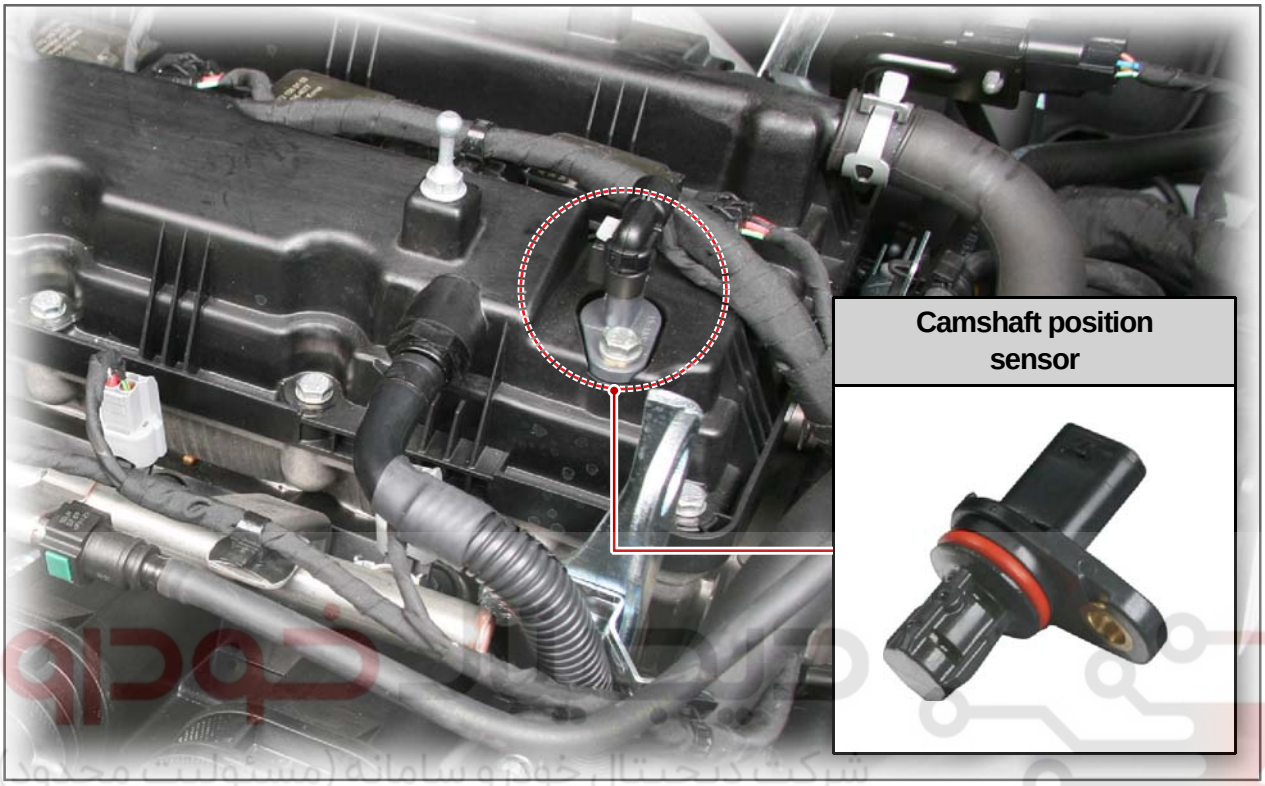
8

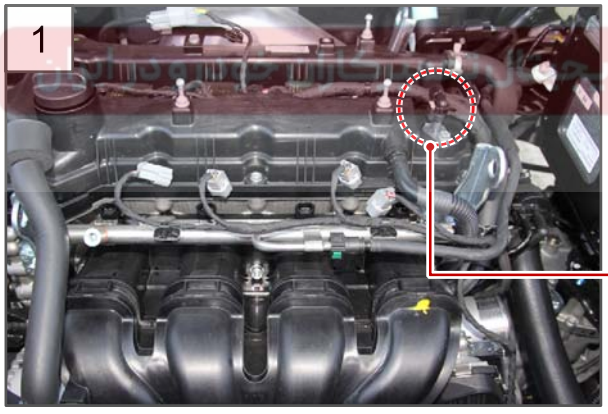
8. Install the crankshaft position sensor in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

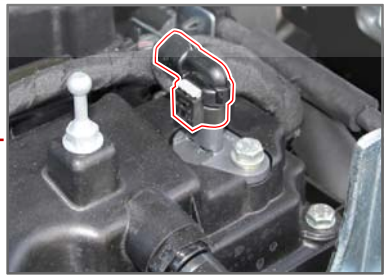
S.G.N.
1430-14 CAMSHAFT POSITION SENSOR

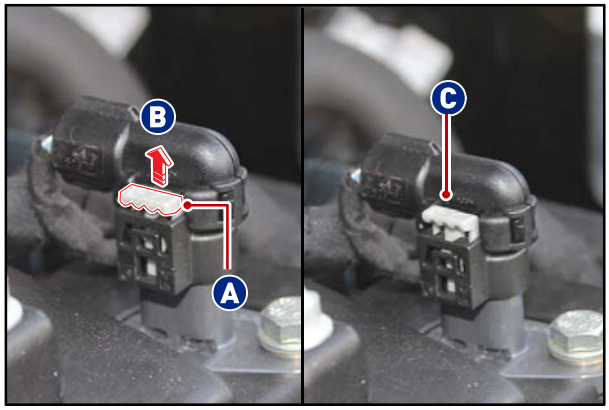
Preceding work - Disconnect the negative cable from the battery.





1. Disconnect the camshaft position sensor connector.





- To disconnect the camshaft position sensor connector, pull the lock (A) toward direction (B) and push the lock (C).

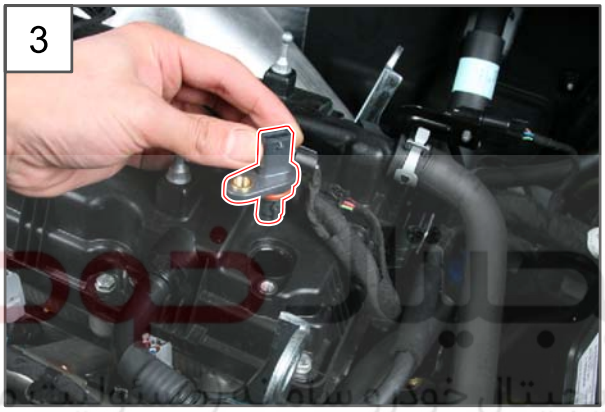
Modification basis	
Application basis	
Affected VIN	

2

2. Unscrew mounting bolt (10 mm) from the camshaft position sensor.

Tightening torque 10.0 ~ 14.0Nm

3



3. Remove the camshaft position sensor.

4

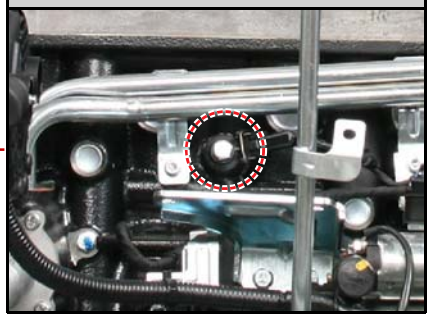
4. Install the camshaft position sensor in the reverse order of removal.

Modification basis	
Application basis	
Affected VIN	

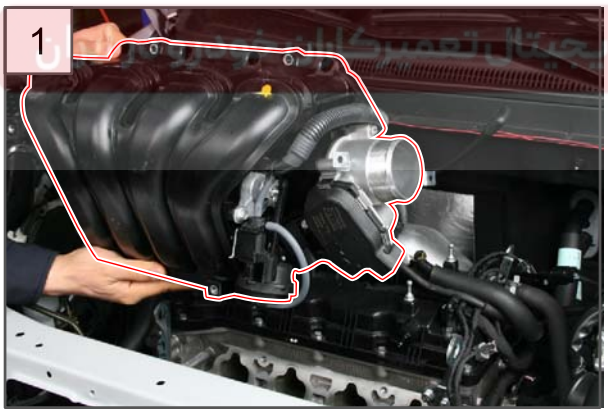
S.G.N. 1430-05 KNOCK SENSOR

Preceding work - Disconnect the negative cable from the battery.

Knock sensor installed



Knock sensor



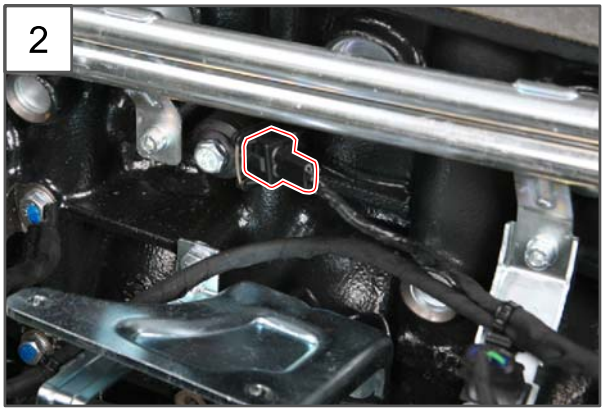
1. Remove the intake manifold assembly.

NOTE

Refer to Chapter "Intake System".

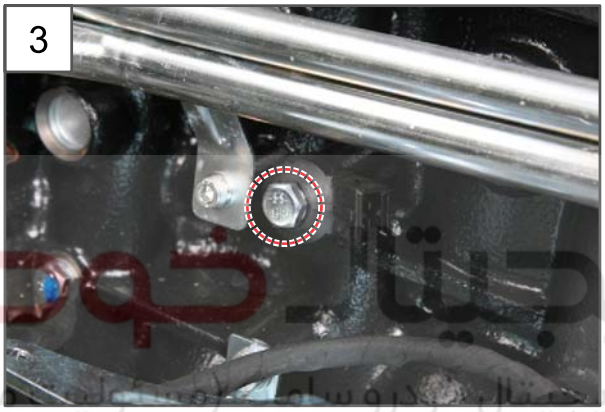
Modification basis	
Application basis	
Affected VIN	

2



2. Disconnect the knock sensor connector.

3



3. Unscrew the bolt (13 mm) from the knock sensor.

CAUTION
The knock sensor connector should face 3 o'clock when installed.

Tightening torque 20.0 ± 5.0Nm

4

4. Remove the knock sensor.

6

6. Install the knock sensor in the reverse order of removal.

Memo