2.5 Engine Anti-theft System JL4G18-D

2.5.1 Specifications

2.5.1.1 Fastener Tightening Specifications

Applications	Model	Specifications	
		Metric (Nm)	US English (lb-ft)
Engine Anti-theft System Control Module Bracket Bolts	M6	8-10	6-7.4

2.5.2 Description and Operation

2.5.2.1 Description and Operation

Engine Anti-theft system feature is realized by the engine control module (IMMO) and the engine control module (ECM). Engine anti-theft system components are listed below:

- Anti-theft system Engine Control Module (IMMO)
- Engine Control Module (ECM)
- Body Control Module (BCM)
- Electronic Anti-theft Coil (Motor Anti-theft System, Antennas)
- Ignition Key (Transponder)
- Engine Trouble Indicator Light (MIL)

1. Ignition Key (Transponder)

Inside the plastic key cover of the ignition key there is a transponder. The information contained in the transponder is fixed and can not be changed. Vehicle anti-theft system uses the engine ignition key transponder information to determine whether the key used to start the vehicle ignition is valid. In addition to the ignition key, it can open the door lock system and also has a launch vehicle feature.

2. Electronic Anti-theft Coil (Engines Antenna Anti-theft System)

The electronic Anti-theft ignition coil is installed in the cylinder. When the ignition key is inserted into the ignition cylinder ON position, the electronic Anti-theft ignition coil will generate electromagnetic fields to stimulate the transponder keys to send out a signal. Electronic anti-theft transponder coil detects this signal and sends it to the engine control module anti-theft system.

Integrated on the electronic anti-theft coil there is a light-emitting diode lighting circuit controlled by the interior light circuit in order to facilitate the driver to locate the ignition cylinder.

3. Engine Anti-theft System Control Module

The engine control module anti-theft system is installed in the driver's side below the instrument platform, when it receives a signal from the electronic anti-theft transponder coil. The engine control module anti-theft system compares this signal with key information in the memory to send the fuel engine control module enable / disable instruction.

Note

If the anti-theft system can not get the ignition key transponder information, it will not send any signal to the engine control module.

4. Engine Control Module

Engine control module is installed under the passenger side of instrument panel, near the air-conditioning blower. Based on the signal received from the engine control module anti-theft system, it sends instruction to enable / disable fuel injection.

Based on the instruction received from the engine control module anti-theft system, engine control module will decide whether to send the engine control module to the body lock / unlock status information.

Based on the instruction received from the engine control module anti-theft system, engine control module will decide whether to send to the instrument cluster the "Light the engine anti-theft system warning lamp" request.

5. Body Control Module

Body control module is installed in the driver's side instrument panel left side bottom. it receives engine lock / unlock status information from the engine control module.

If it receives the engine unlocked information, the starter will get power and the vehicle will start.

If it receives the engine unlocked information, it will disconnect the starter power supply, thus prohibiting the engine running. At the same time body control module will activate the remote control alarm system.

6. Engine Failure Warning Light (MIL)

When the instrument cluster receives a "Light the engine anti-theft system warning lamp" request from the engine control module, it will enable engine malfunction indicator light flashing, until the ignition is off.

2.5.3 System Working Principle

2.5.3.1 System Working Principle

When the ignition key is inserted into the ignition cylinder and ignition switch is at ON position, the transponder will be excited by electronic Anti-theft ignition cylinder coil. the transponder will send a signal containing its own information. the signal is received by the engine anti-theft system antenna and sent to the engine control module Anti-theft system. Engine control module Anti-theft system compares this value with the value stored in memory. If the ignition key is recognized as valid, the engine anti-theft system control module will send the enable fuel instruction to the engine control module through the serial data line; if the transponder information is not correct, the engine anti-theft system control module will send the disable fuel instruction to the engine control module.

Note

When the engine control module receives the instruction to disable fuel, ECM will also send to the BCM disable starter instruction through the CAN bus. So the starter will also be locked to prevent the engine running; At the same time, BCM will also activate alarm (if the remote control anti-theft system is not in silent mode) and trigger turning indicators start flashing.

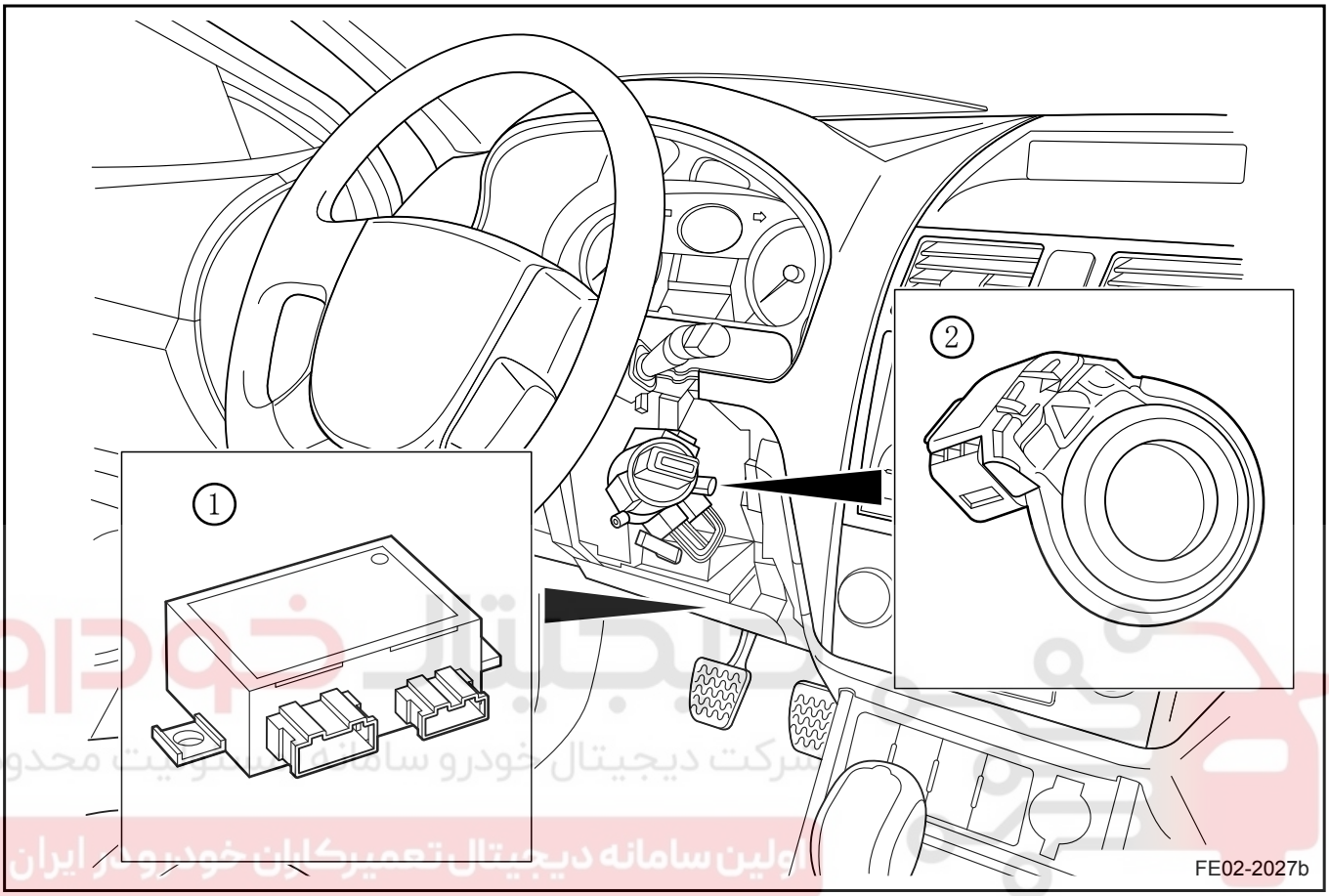
Warning!

If use the invalid ignition key and if the ignition switch is turned too fast, before the anti-theft engine control module sends instruction to disable the fuel, the starter is still possible to run even start. At this point, it is likely to cause injury to engine repair personnel.

2.5.4 Component Locator

2.5.4.1 Component Locator

Electronic Anti-theft Coil, Engine Anti-theft System Control Module



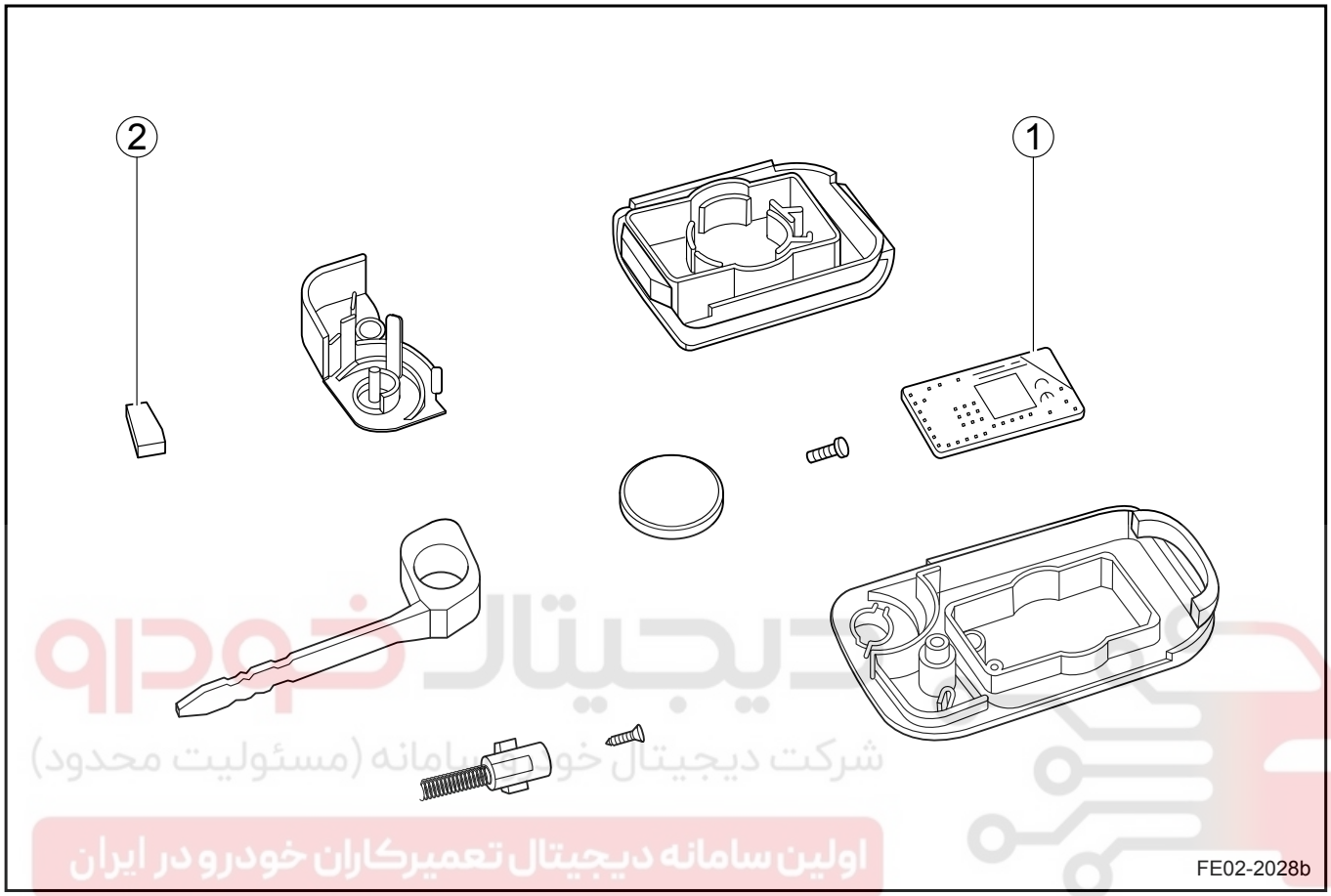
Legend

1. Engine Anti-theft System Control Module
2. Electronic Anti-theft Coil

2.5.5 Disassemble View

2.5.5.1 Disassemble View

Repeater

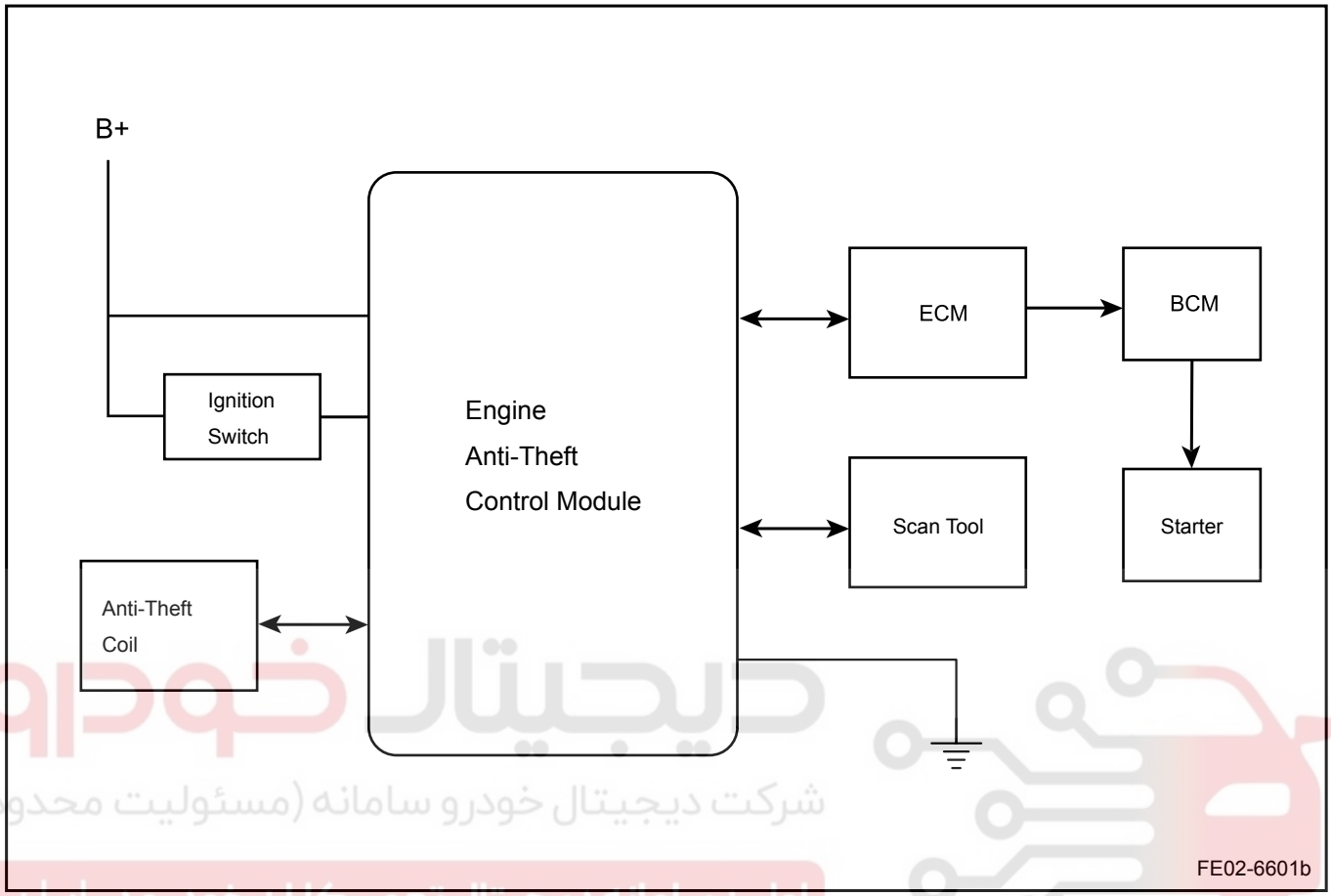


Legend

1. Remote Keyless Entry Transmitter
2. Transponder

2.5.6 Schematic

2.5.6.1 Schematic



2.5.7 Diagnostic Information and Procedures

2.5.7.1 Diagnosis Description

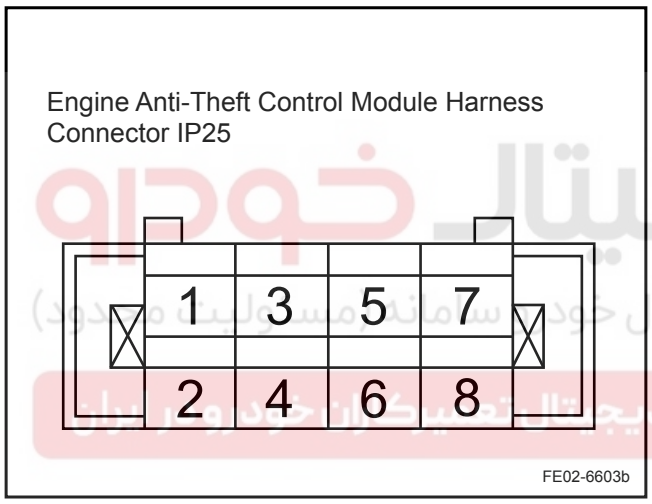
Refer to 2.5.2.1 Description and Operationget familiar with the system functions and operations then start system diagnostics, so that it will help with the correct diagnostic steps, more importantly, it will also help to determine whether the customer described the situation is normal.

2.5.7.2 Visual Inspection

- Check installed after market equipment that may affect the engine anti-theft system operation.
- Check the easy to access system components to identify whether there is a significant damage that may lead to the fault.
- If the system shows the engine is locked, prior to the fault diagnostic check and confirm whether the ignition key completed self learn, otherwise carry out the ignition key learn process. Refer to the2.5.7.7 Replaced Key Programming.

2.5.7.3 Anti-theft Engine Control Module Connector List

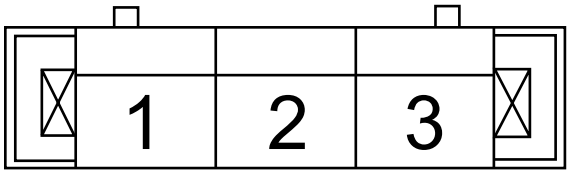
Anti-theft Engine Control Module Connector 1



Terminal ID	Terminal Definition	Wire	Rated Working Voltage	Working Current	Terminal Descriptions
1	to B +	R/O	12 V	Less than 200 mA	Less than 50 mA
2	Ground	B	0 V	Less than 200 mA	Ground
3	-	-	-	-	-
4	to IG1	G/R	12 V	Less than 50 mA	Ignition Switch Signal
5	To R-Line	Gr/W	12 V	Less than 50 mA	Engine Control Module Request Signal
6	Ground	B	0 V	Less than 200 mA	Ground
7	To K-Line	Gr/P	12 V	Less than 100 mA	Diagnostic Information
8	W-Line	Gr/P	12 V	Less than 100 mA	Communication With The Engine Control Module

Anti-theft Engine Control Module Wiring Harness Connector 2

Engine Anti-Theft Control Module Harness Connector IP26



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Terminal ID	Terminal Definition	Wire	Rated Working Voltage	Working Current	Terminal Instructions
1	Coil Connector 1	W/G	125 KHz Modulation Waveform	-	Antenna Signal
2	Coil Connector 2	Gr/O	125 KHz Modulation Waveform	-	Antenna Signal
3	-	-	-	-	-

2.5.7.4 DTC code (DTC) list

DTC	Descriptions	Recorded Before		Output Sequence
		Yes	NO	
B1000	Antenna Failure (Only When Read Anti-theft Transponder, Not Received During Continuous Test).		X	1
B3040	Encryption and Decryption Validation Errors In The W Line (Set When Ending Communication Without "Responding To End Communication").	X		7
B3042	W wire short to ground (If the EMS communication was set to the low bit).	X		5
B3043	W line short to power supply (when the anti-theft device sends wake-up low voltage signal and detected set to continuous high-bit).	X		6
B3045	LED line is short to ground or open, or LED-line damage.	X		11
B3048	LED short to power supply.	X		12
B3055	No anti-theft transponder modulation signal or no anti-theft transponders.	X		8
B3056	no programmed anti-theft transponder idE		X	2
B3057	no programmed security code.		X	3
B3059	No engine EFI request (set when the last time the ignition signal was received but R-line signal was not received.).		X	4

B3060	Anti-theft transponder verification failed.	X		9
B3061	EFI controller verification failed.	X		10

Note

DTC (DTC code) is set based on the above-mentioned output sequence. But at the same time it only shows a maximum of 7 DTC.

Note

DTC code history is code recorded before shown by the scan tool. If a DTC code has no historical features, it only shows the current status. If there are historical features it can display the status up to 20 ignition cycles.

2.5.7.5 Data Flow Table

Serial Number	Name	Data
1	Ignition Switch Position	At ON Position
2	Anti-theft Controller Hardware Malfunction	No Fault
3	Coil Malfunction	No Fault
4	Anti-theft Transponder	Yes
5	The Current Key Match	Have matched
6	The Current Key Position	Position 3
7	Key Storage Position 1	Not Stored
8	Key Storage Position 2	Not Stored
9	Key Storage Position 3	Stored
10	Key Storage Position 4	Stored
11	Key Storage Position 5	Stored
12	Security Certification	Passed
13	Anti-theft Verification	Yes
14	Password Settings	Yes
15	Password Lock	No
16	Remaining Numbers Of Times Entering The Password	10

2.5.7.6 Fault Symptom Table

Symptoms	Suspect Part	Refer to Page
Engine Anti-theft Indicator Always On	Instrument Panel	Refer to 11.7.7.1 Instrument Cluster Replacement.
Engine Anti-theft warning lamp flashes frequently, the engine can not start.	1. the key	Refer to 2.5.7.12 Engine Anti-theft Warning Lamp Flashing, Vehicle Can Not Start.
	2. Anti-theft Coil	

Symptoms	Suspect Part	Refer to Page
	3. Anti-theft Module	
	4. ECM	
	5. Instrument Cluster	
	6. Wiring Harness Connector	
Anti-theft system can not detect the valid key.	1. Anti-theft Coil	-
	2. Anti-theft Module	-
Keys do not match	1. Anti-theft Coil	-
	2. Anti-theft Module	-
	3. Key	-
ECM always detects Anti-theft malfunction	1. Wiring Harness and Connector	Refer to 2.5.7.12 Engine Anti-theft Warning Lamp Flashing, Vehicle Can Not Start.
	2. Anti-theft Module	
	3. ECM	

2.5.7.7 Replaced Key Programming

Note

Refer to 2.5.7.12 Engine Anti-theft Warning Lamp Flashing, Vehicle Can Not Start.

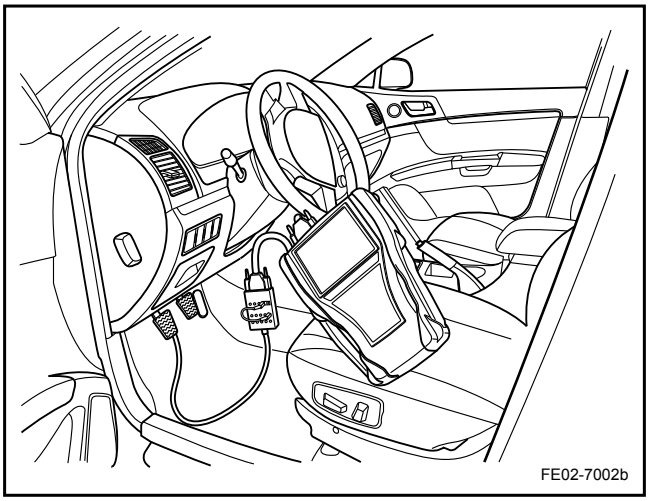
Step 1	Insert a new key.

Next

Step 2	Turn the ignition switch to "ON" position.

Next

Step 3	Enter into the anti-theft system.



Next

Note

Before enter the security code please contact the manufacturers technical department, as the Anti-theft computer will be locked after the wrong security code entered seven consecutive times.

Step 4	Enter the security code.

Next

Step 5	Learn the key.

Next

Step 6	Key programming.

Next

Step 7	Place the ignition switch at "OFF" position and wait about 5 min or so.

Next

Step 8	New key learn successful.

2.5.7.8 Ignition Key Erase

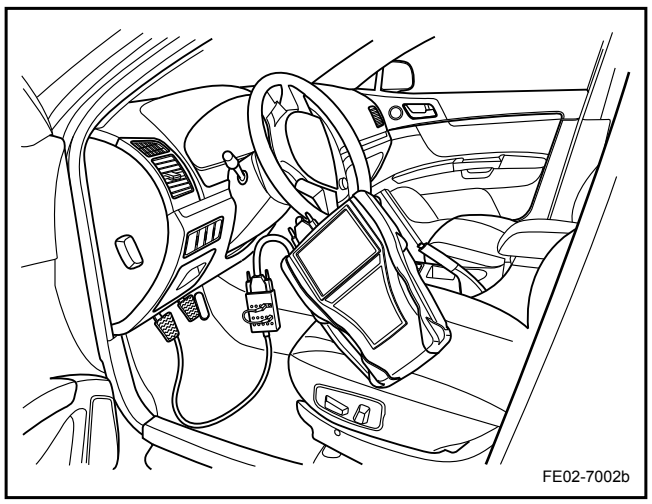
Step 1	Insert a new key.

Next

Step 2	Turn the ignition switch to "ON" position.

Next

Step 3	Enter into the anti-theft system.



Next

Step 4	Enter the security code.

Next

Step 5	Erase the key: select the recorded key location and erase. If you select all, all the keys will be removed.

Next

Step 6	Place the ignition switch at "OFF" position and wait about 5min or so.

Next

Step 7	Key erase successful .

2.5.7.9 Replaced Security Module Programming

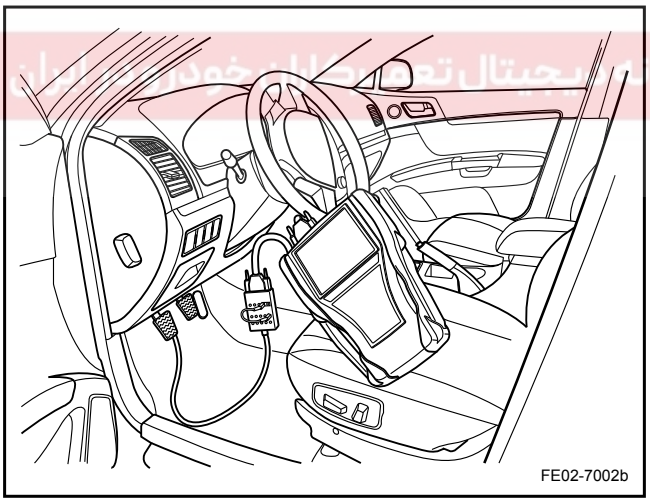
Step 1	Insert a new key.

Next

Step 2	Turn the ignition switch to "ON" position.

Next

Step 3	Enter into the anti-theft system.



Next

Step 4	Set security code.

Next

Step 5	Enter the security code (preset the four-digit security code).

Next

Step 6	Read the security module from ECM.

Next

Step 7	Reprogram the keys. Refer to 2.5.7.7 Replaced Key Programming.

2.5.7.10 Replaced ECM Programming

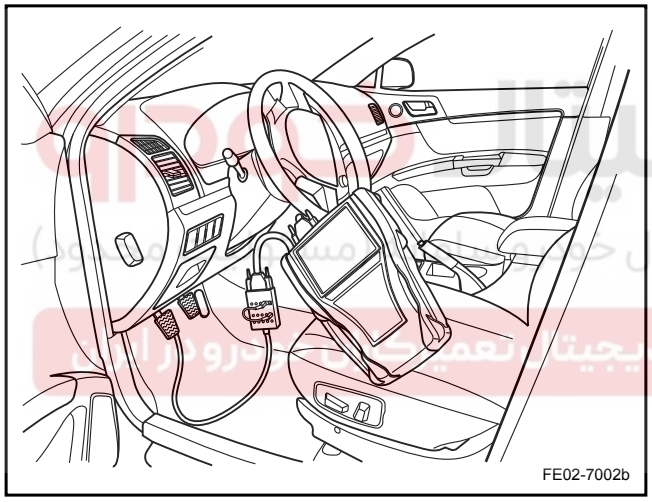
Step 1	Insert a new key.

Next

Step 2	Turn the ignition switch to "ON" position.

Next

Step 3	Enter into the anti-theft system.



Next

Step 4	Enter the security code.

Next

Step 5	Read the anti-theft module to ECM.

2.5.7.11 Replaced Anti-theft Module and ECM Programming

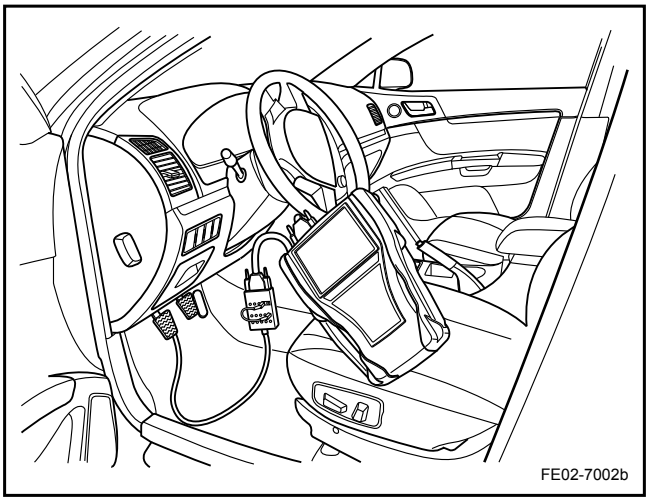
Step 1	Insert a new key.

Next

Step 2	Turn the ignition switch to "ON" position.

Next

Step 3	Enter into the anti-theft system.



Next

Step 4	Set security code (Provided that the anti-theft module is new and without preset security code).

Next

Step 5	Enter the security code (preset the four-digit security code).

Next

Step 6	Read anti-theft module to ECM.

Next

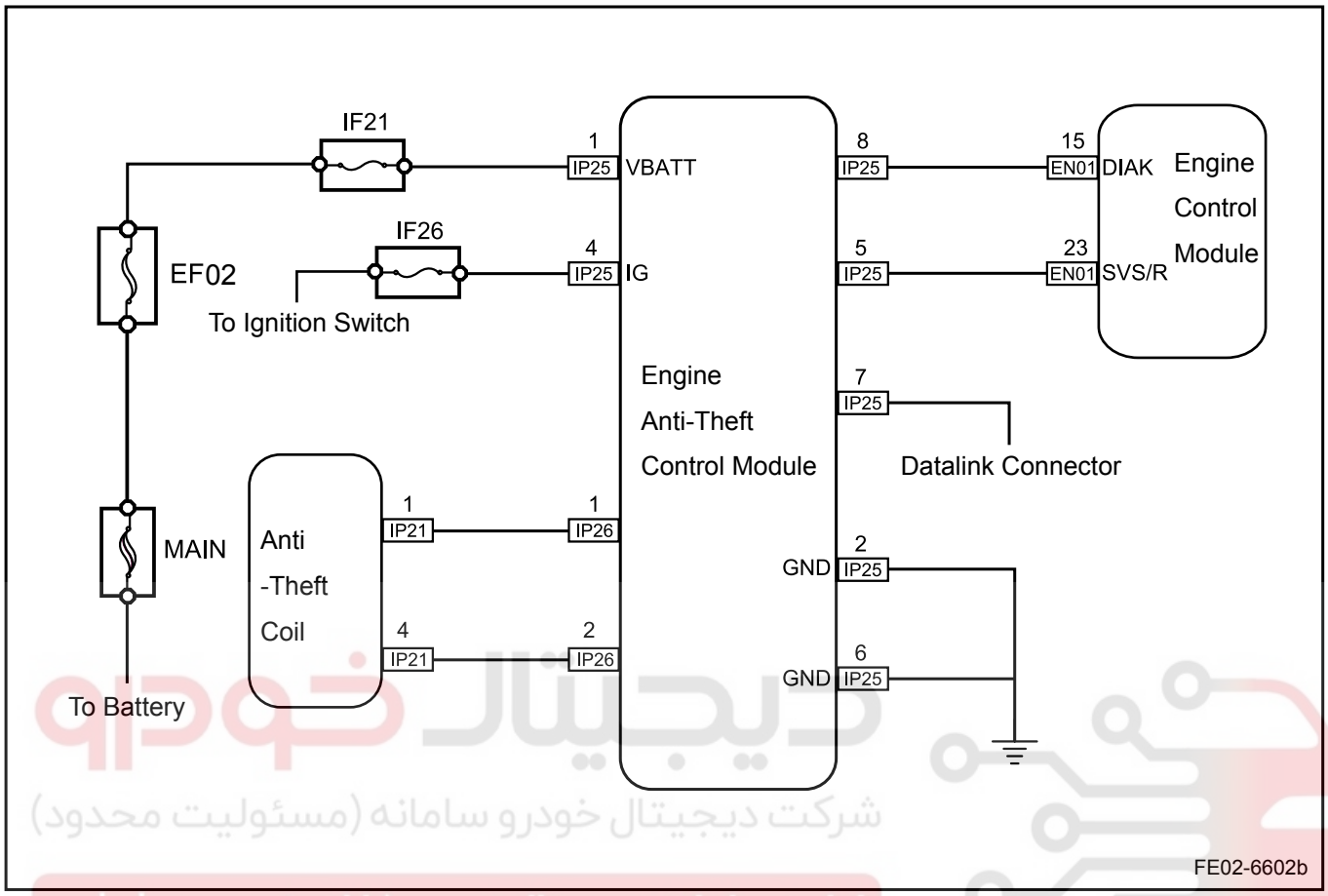
Step 7	Read ECM to the security module.

Next

Step 8	Reprogram the key. Refer to 2.5.7.7 Replaced Key Programming.

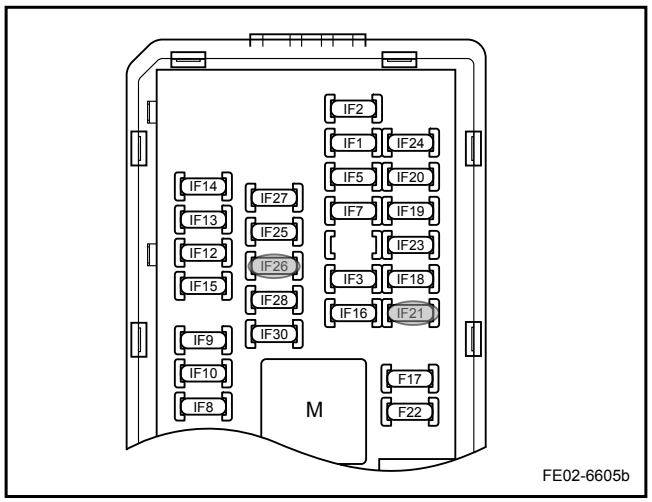
2.5.7.12 Engine Anti-theft Warning Lamp Flashing, Vehicle Can Not Start

Schematic:



Diagnostic Steps:

Step 1	Check the fuses IF26 and IF21.



(a) Check whether the fuses IF26 and IF21 are blown.
Fuse Rating: IF26 rating is 10 A and IF21 rating is 10 A.

No	Go to step 3

Yes

Step 2	Repair fuse IF26 and IF21 circuits.

(a) Check the fuse IF26 circuit and repair the short circuit fault.
(b) Check the fuse IF21 circuit and repair the short circuit fault.
(c) Replace the fuse.

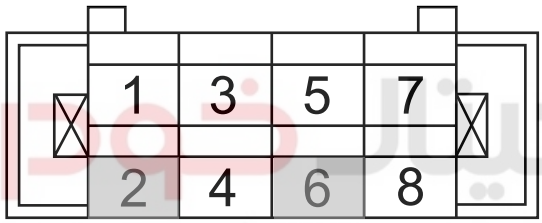
Can the vehicle start as per normal?

Yes → System normal

No

Step 3	Check engine anti-theft system control module ground status.

Engine Anti-theft Control Unit 1 Harness Connector IP25



FE02-6606b

(a) Measure resistance between engine anti-theft system control module IP25 terminal No.2 or terminal No.6 and the body ground with a multimeter and determine the circuit continuity.

Standard Resistance Value: Less than 1 Ω.

Is the resistance standard?

Yes → Go to step 5

No

Step 4	Repair the engine anti-theft system control module ground circuit.

(a) Repair the open circuit between engine anti-theft system control module IP25 terminals No.2 and No.6 and the body ground.

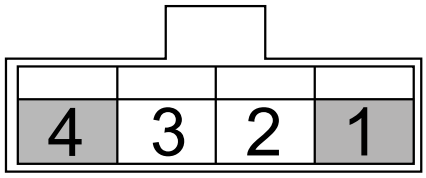
Can the vehicle start as per normal?

Yes → System normal

No

Step 5	Check EAS coil.

Engine Anti-Theft Coil



FE02-6609b

(a) Disconnect the electronic anti-theft coil harness connector.
(b) Measure coil resistance with a multimeter.

Standard Resistance Value: 5 Ω at room temperature 20°C(68 °F)

Is EAS coil resistance the standard value?

Yes → Go to step 7

No

Step 6	Replace the electronic anti-theft coil.

(a) Replace the electronic anti-theft coil. Refer to "2.5.8.1 EAS Coil Replacement."

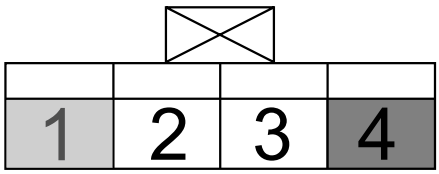
Can the vehicle start as per normal?

Yes → System normal

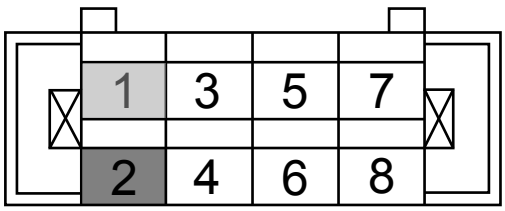
No

Step 7	Check the circuit between EAS coil harness connector terminal and engine anti-theft system control module harness connector terminal.

Engine Anti-Theft Coil Harness Connector IP21



Engine Anti-Theft Control Unit 1 Harness Connector IP25



FE02-6607b

(a) Measure the resistance between the anti-theft coil harness connector IP21 terminal No.1 and engine anti-theft system control module wiring harness connector IP25 terminal No.1 with a multimeter to determine circuit continuity.

Standard Resistance Value: Less than 1 Ω

(b) Measure the resistance between the anti-theft coil harness connector IP21 terminal No.4 and engine anti-theft system control module wiring harness connector IP25 terminal No.2 with a multimeter to determine circuit continuity.

Standard Resistance Value: Less than 1 Ω

Is resistance the standard value?

Yes → Go to step 9

No

Step 8	Repair the circuit fault between electronic anti-theft wiring harness connector coil and engine anti-theft system control module wiring harness connector.

(a) Repair the open circuit between the anti-theft coil harness connector IP21 terminal No.1 and engine anti-theft system control module wiring harness connector IP26 terminal No.1.

(b) Repair the open circuit between the anti-theft coil harness connector IP21 terminal No.4 and engine anti-theft system control module wiring harness connector IP26 terminal No.2.

Can the vehicle start as per normal?

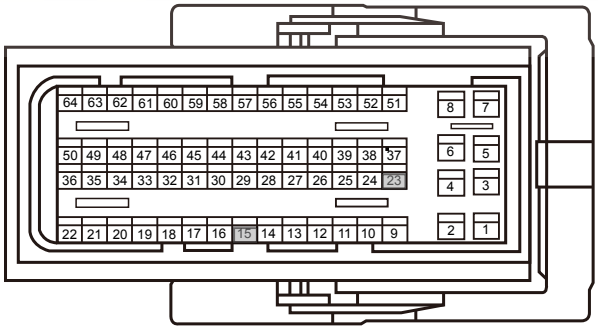
Yes → System normal

No

Step 9	Check the serial communication circuit between the engine anti-theft system control module and engine control module.

Engine Anti-Theft Control Unit 1 Harness Connector IP25

ECM Harness Connector EN01



FE02-6608b

(a) Check the serial communication circuit resistance between engine anti-theft system control module connector IP25 terminal No.5 and the engine control module connector EN01 terminal No.23 to determine the circuit continuity.

Standard Resistance Value: Less than 1 Ω

(b) Check the serial communication circuit resistance between engine anti-theft system control module connector IP25 terminal No.8 and the engine control module connector EN01 terminal No.15 to determine the circuit continuity.

Standard Resistance Value: Less than 1 Ω

Is the resistance standard?

Yes → Intermittent Fault. Refer to 2.2.7.3 Intermittent Fault Check

No

Step 10	Repair the serial communication circuit between engine control module anti-theft system and engine control module.

(a) Repair the serial communication open circuit between engine anti-theft system control module connector IP25 terminal No.

5 and the engine control module connector EN01 terminal No.23.

(b) Repair the serial communication open circuit between engine anti-theft system control module connector IP25 terminal No. 8 and the engine control module connector EN01 terminal No.15.

Can the vehicle start as per normal?

Yes → System normal

No

Step 11	Replace the anti-theft system control module.

(a) Replace the anti-theft system control module. Refer to 2.5.8.2 Anti-theft System Control Module Replacement.

(b) Carry out the engine anti-theft system programming. Refer to 2.5.7.9 Replaced Security Module Programming.

Yes → System normal

No

Step 12	Replace the engine control module.

(a) Replace the engine control module. Refer to 2.2.8.8 Engine Control Module Replacement.

(b) Carry out the engine anti-theft system programming. Refer to 2.5.7.10 Replaced ECM Programming.

Confirm the repair completed.

Next

Step 13	System normal.

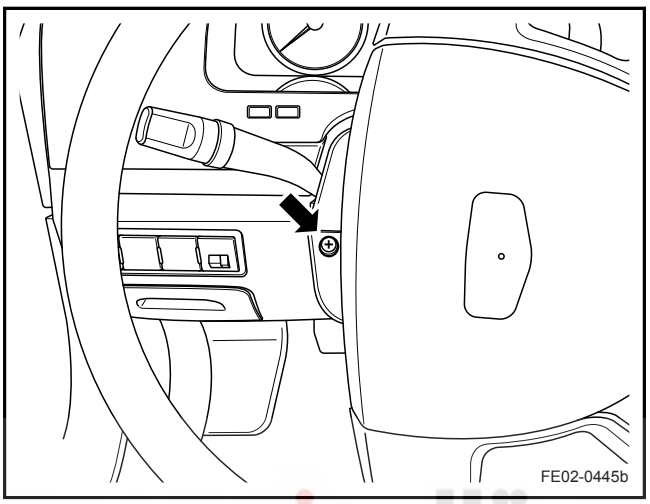
2.5.8 Removal and Installation

2.5.8.1 EAS Coil Replacement

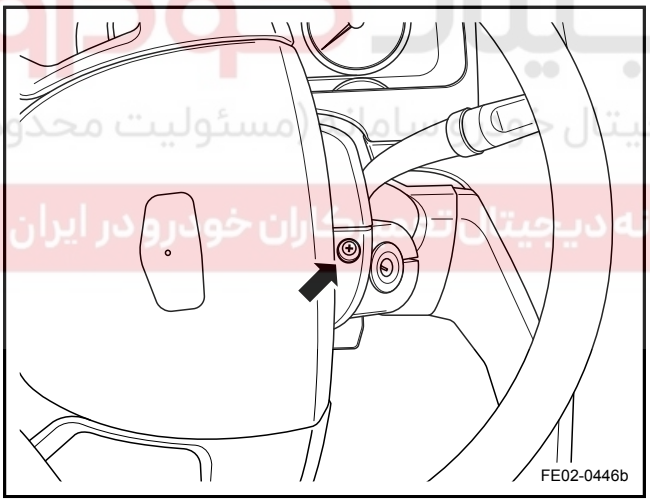
Removal Procedure:

Warning!

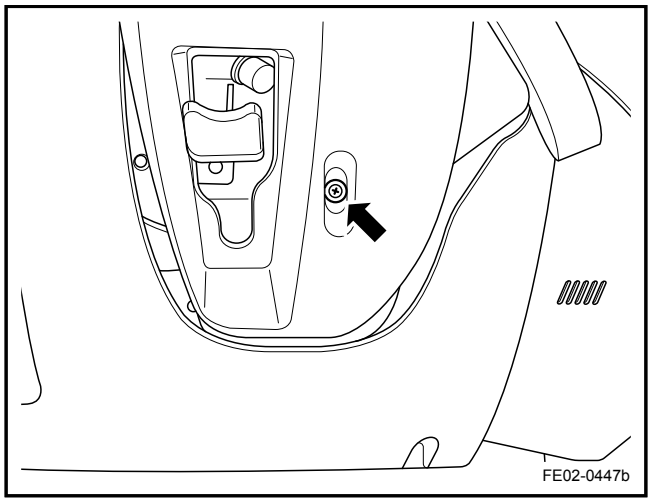
Refer to "Battery Disconnection Warning" in "Warnings and Notices".



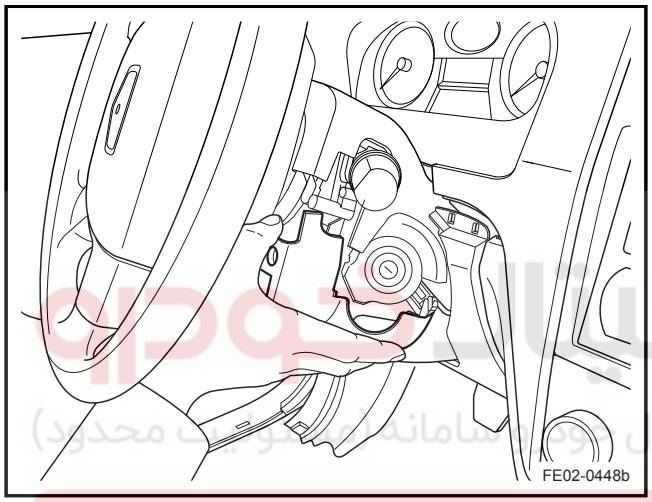
1. Disconnect the battery negative cable. Refer to 2.11.8.1 Battery Disconnection.
2. Turn the steering wheel to the left 90 ° and remove the left upper steering column shield retaining screw.



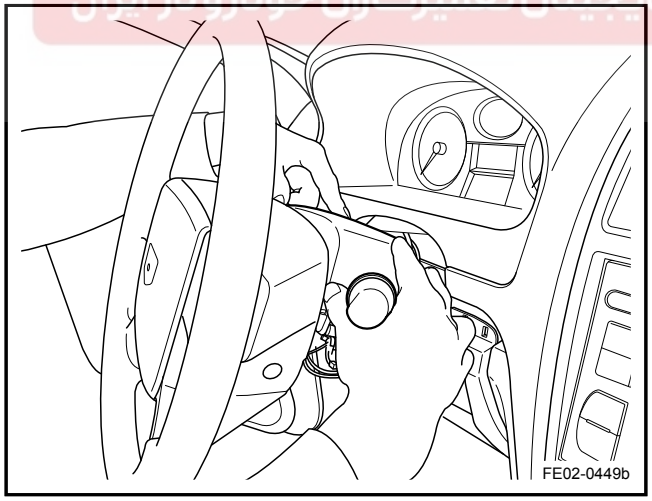
3. Turn the steering wheel to the right 90 ° and remove the right upper steering column shield retaining screw.



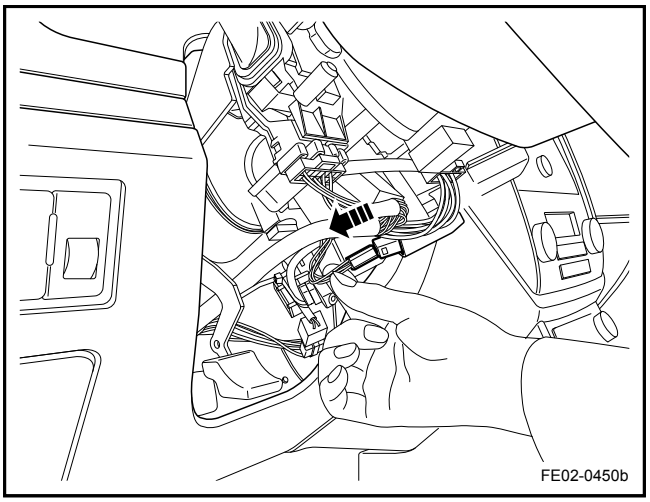
4. Remove the lower steering column shield screw.



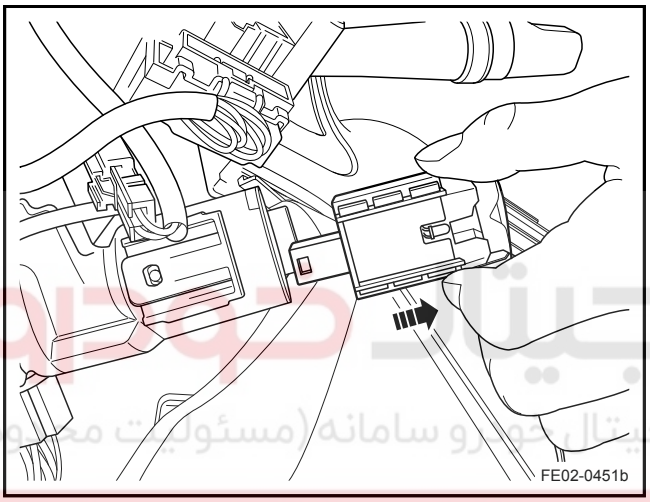
5. Remove the lower steering column shield.



6. Remove the upper steering column shield.

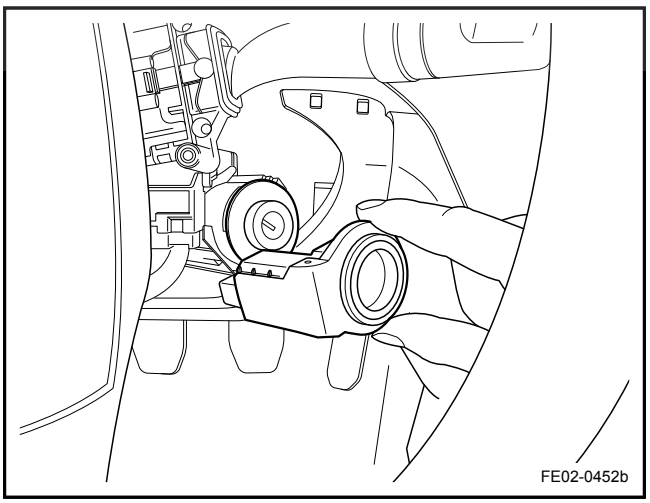


7. Disconnect the electronic anti-theft wiring harness coil connector.

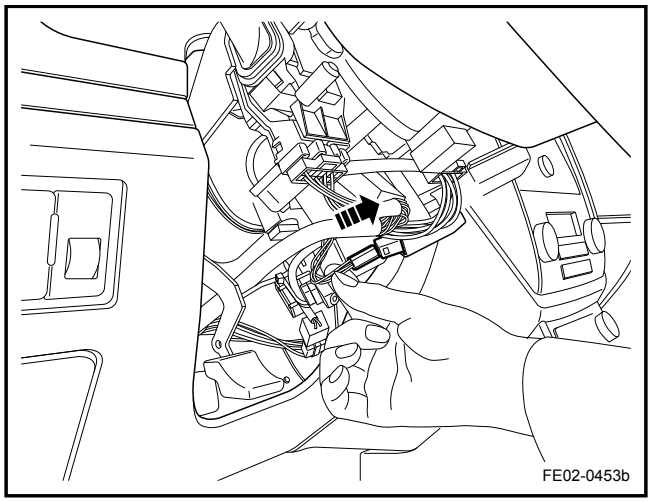


8. Remove the electronic anti-theft engine coil.

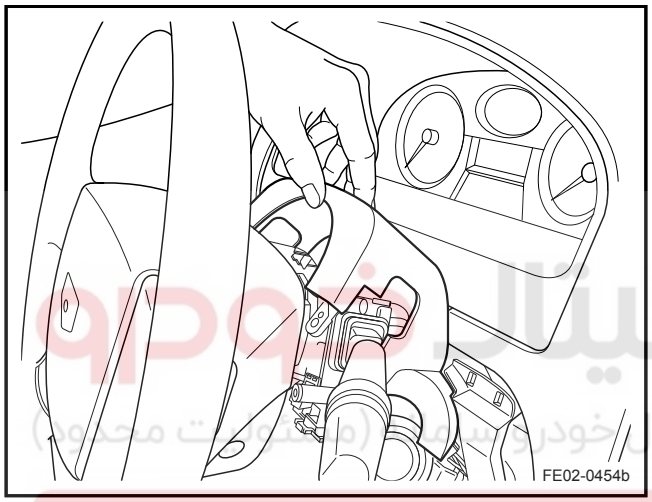
Installation Procedure:



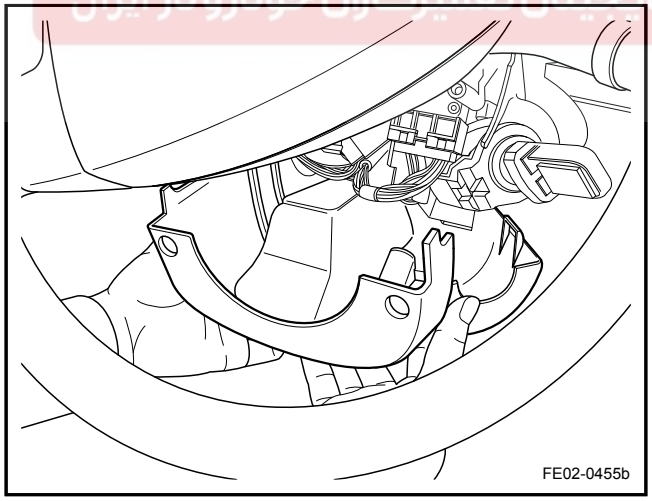
1. Install the electronic anti-theft engine coil.



2. Connect the electronic anti-theft wiring harness coil connector.



3. Install the upper steering column shield.



4. Install the lower steering column shield.
5. Install and tighten the left upper steering column shield retaining screw.

   Torque: 2 Nm (Metric) 1.5 lb-ft (US English)
6. Install and tighten the right upper steering column shield retaining screw.

   Torque: 2 Nm (Metric) 1.5 lb-ft (US English)
7. Install and tighten the lower steering column shield retaining screw.

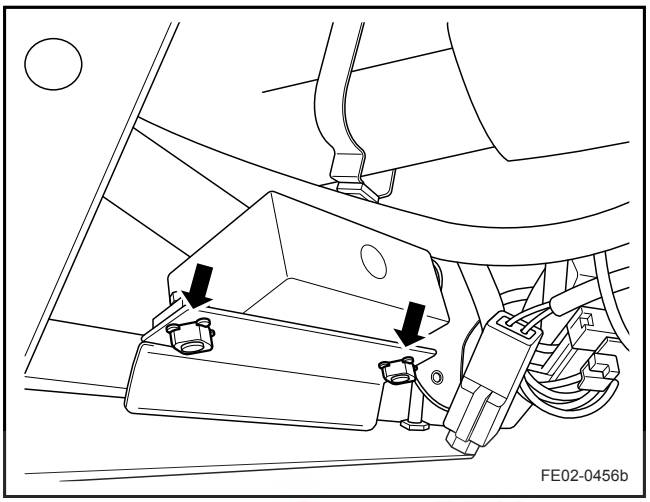
   Torque: 2 Nm (Metric) 1.5 lb-ft (US English)
8. Connect the battery negative cable.

2.5.8.2 Anti-theft System Control Module Replacement

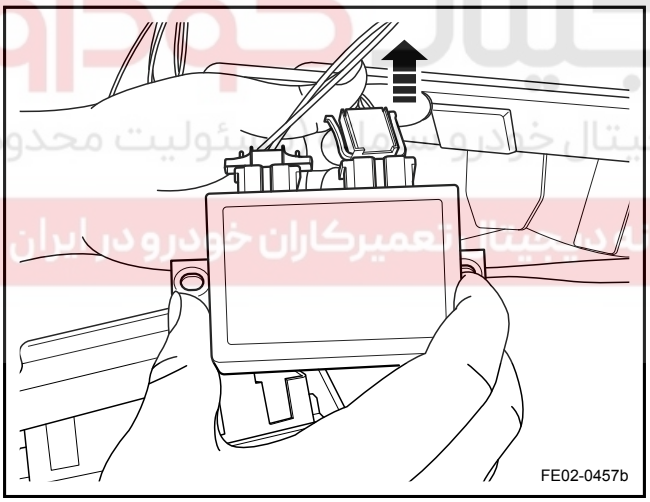
Removal Procedure:

Warning!

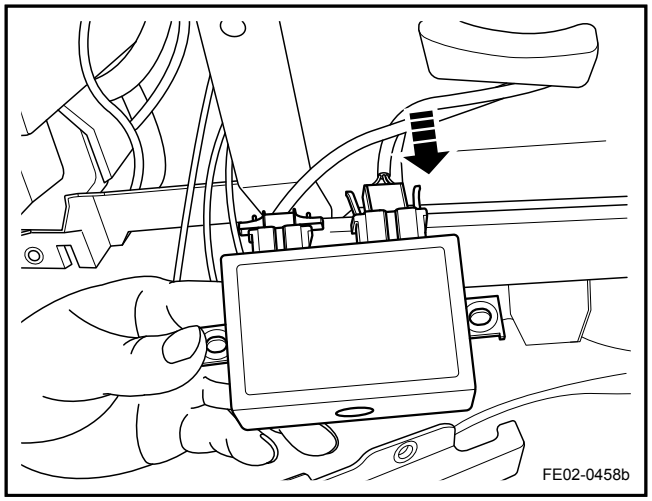
Refer to "Battery Disconnection Warning" in "Warnings and Notices".



1. Disconnect the battery negative cable. Refer to 2.11.8.1 Battery Disconnection.
2. Remove instrument panel trim under the driver's side. Refer to 11.10.8.1 BCM Replacement.
3. Remove the anti-theft system control module retaining bolts.



4. Disconnect anti-theft system control module wiring harness connector.



Installation Procedure:

1. Install the anti-theft system control module.

   Torque: 10 Nm (Metric) 7.4 lb-ft (US English)

2. Connect anti-theft system control module wiring harness connector.
3. Install instrument panel trim under the driver's side.
4. Connect the battery negative cable.

2.6 Engine Mechanical System JL4G18-D

2.6.1 Specifications

2.6.1.1 Fastener Tightening Specifications

Applications	Model	Specifications	
		Metric (Nm)	US English (lb-ft)
Spark Plug Bolt	M14 × 1.25	20-30	14.8-22.2
Cylinder Head Cover (Short Bolt)	M6	7-11	5.2-8.2
Cylinder Head Cover (Long Bolts, Nuts, Special Bolts)	M6	9-13	6.7-9.6
Knock Sensor Bolt	M8 × 30	14.4-21.6	10.7-16
Cylinder Head Bolts	M10 × 1.25	First Pass 46-52	First Pass 34-38.5
		Second Pass 76-84	Second Pass 56-62.2
VVT Actuator Mounting Bolt	M12 × 1.25	59-81	43.7-60
Intake Manifold Mounting Bolt	M8	24-36	17.8-26.7
Crankcase Mounting Bolt	M8	14.4-21.6	10.7-16
Exhaust Pipe Mounting Bolt	M8	20-30	14.8-22.2
Main Bearing Cap Installation Bolt	M10 × 1.25	First Pass 42-46	First Pass 31-34
		Second Pass 54-66	Second Pass 40-48.9
Flywheel Mounting Bolt	M10 × 1.25	83-93	61.4-68.8
Engine Water Pump Short Mounting Bolt	M6 × 25	8-10	6-7.4
Engine Water Pump Long Mounting Bolt	M6 × 35	9-13	6.7-9.6
Fuel Rail Bolt	M6 × 20	7.2-10.8	5.3-8
Connecting Rod Cap Bolt	M8 × 1	First Pass 19-21	First Pass 14-15.5
		Second Pass 50-52	Second Pass 37-38.5
Camshaft Bearing Cap Bolt	M8 M6	21.6-24.5 12.2-13.8	16-18.2 9-10.2
Oil Pan Bolt	M6	7.2-10.8	5.3-8
Oil Filter Mounting Bolt	M6	7.2-10.8	5.3-8
Engine Oil Pressure Alarm Bolt	R1 / 8	10.5-19.5	7.8-14.4
Oil Filter Pipe Joint Bolt	M28 × 1.5	16-24	11.8-17.8
Oil Filter - Pipe Fittings Bolt	UNF3 / 4 "-16	33-37	24.4-27.4
Crankshaft Pulley Mounting Bolt	M12 × 1.25	129.7-146.3	96-108.3