

# The foreword

Firstly, this manual introduces you how the E-controlled EFI system works and makes up, then let you know the diagnosis procedure for system malfunctions in details.

Generally speaking, during the repair or maintenance of E-controlled EFI system, the diagnosis instrument for malfunctions is necessary. The diagnosis instrument for malfunctions can take out the records of failure information storing in ECU. To help the reader know what does malfunction code mean, this manual shows you every condition of malfunction information set up by ECU. However, some malfunctions need analysis rather than known from their records directly, in this case, this manual spent a lot to let you know to find out the root cause according to malfunction information.

Because there are some electrical controlled parts, so there will be some new content in engine malfunctions. In another word, a same engine malfunction may be of mechanical or electrical causes. As for the actual malfunctions of engine, the diagnosis instrument is far not enough, so this manual together with ECU to find out the real malfunction according to engine symptom.

Note: 1. This service manual is for LX350T-5.

2. The fuel supplying pressure for LX350T-5 is 350kPa.

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## 1. The basic principle for ECU system

### 1.1 The basic components make up the ECU of gasoline engine

Any ECU system including that of gasoline engine are made up of three components below:

(1) The 3 in 1 sensor—Transfer all the non-electric signal to the electric ones, then

pass all the information to ECU. The sensors applied to ECU are:

3 in 1 sensor (Integrated air pressure sensor (Loading information), throttle valve position sensor (Information for loading, loading range, acceleration and deceleration), air inlet temperature sensor (Information of air density)

Crankshaft phase sensor (Information for rotation speed and crankshaft position)

Coolant temperature sensor (Engine temperature)

Oxygen sensor (Overdose air  $\lambda$  is more than 1 or less than 1)

(2) The ECU—Who is the brain for the whole ECU system, we usually call it ECU directly. It analyzes or deals with the data and information from sensors, then send them to actuator in terms of conclusion, and makes engine run under the optimized status.

(3) The actuator—Execute the orders from ECU. The actuator is the hand or foot of ECU. The actuators applied on ECU are: Electrical fuel pump, fuel injector, ignition coil and idling control valve,

### 1.2 The fuel system of engine under E-controlled gasoline injection

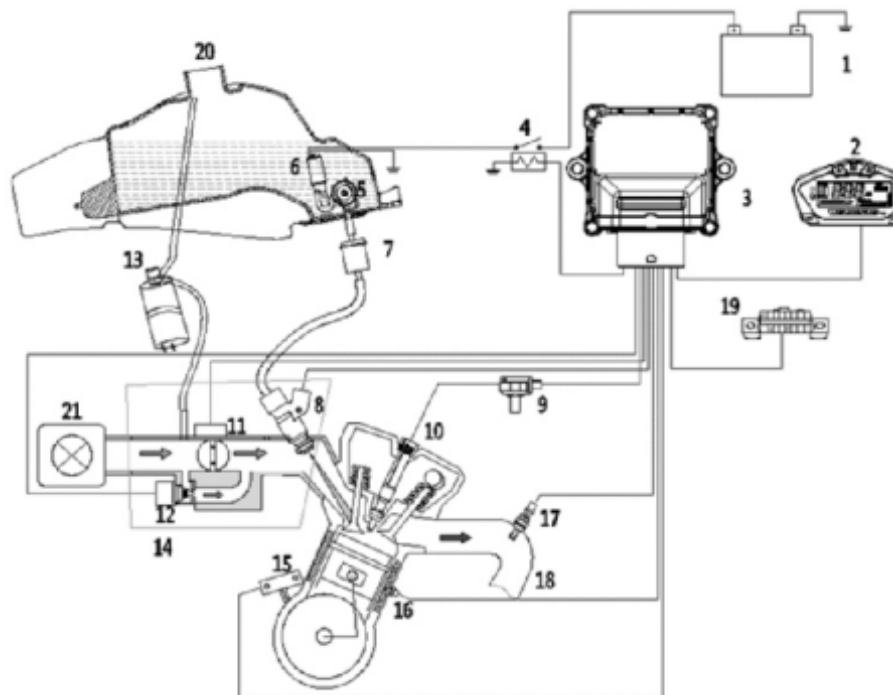
The fuel system of E-controlled gasoline injection is made up of fuel tank, bracket

of electrical fuel pump, fast change joint, fuel filter (In the fuel tank), fuel tube, fuel injector cap and the injector itself.

### 1.3 The way of fuel injection

Every circulation with 1 injection

### 1.4 The components make up ECU



- |                                   |                               |
|-----------------------------------|-------------------------------|
| 1. Battery                        | 12. Idling control valve      |
| 2. Instrument                     | 13. Carbon canister           |
| 3. Electric controlled unit (ECU) | 14. Throttle valve set        |
| 4. Fuel pump relay                | 15. Rotation phase sensor     |
| 5. Fuel pressure adjustor         | 16. Engine temperature sensor |
| 6. Electric fuel pump             | 17. Oxygen sensor             |
| 7. Fuel filter (In the fuel tank) | 18. Muffler (With catalysis)  |
| 8. Fuel injector                  | 19. Diagnosis interface       |
| 9. Ignition coil                  | 20. Fuel tank                 |
| 10. Spark plug                    | 21. Air filter                |
| 11. Sensor                        |                               |

### 1.5 The basic function of ECU

(1) Electric control for fixed fuel amount

This is the most important function of ECU for gasoline engine, which is very

crucial to power, economic, emission, driving even comfort performances, who also involves the controls for closed loop of  $\lambda$ , starting, engine warming, idling speed (Idling rotational speed), partial loading, complete loading, acceleration, deceleration, overtaking fuel cutting off, fuel cutting of for backward dragging and so on.

(2) Electric control for ignition timing and closed angle.

This function is the second most important to fixed fuel amount of ECU, which is also important to performances such as power, economy, emission, driving and comfort.

(3) The self-diagnosis

Under what kind of situation, it works?

When checking the normal work of EFI system

The malfunction light is permanently on, or the malfunction is in judging.

This function means it can make self-diagnosis and self-correction. During the self-inspection, the system may solve the problems automatically who found by itself, in case it failed, the malfunction light may get on and indicate you the problems who shall be fixed by men. The system usually makes self-inspection automatically without men involved.

(4) The self-study of system

Under what kind of situation, it works?

The self-studying works during driving by vehicle automatically without men involved.

The self-learning works according to the feedback of oxygen sensor to make correction on original parameters recorded by ECU. Get the more accurate parameters through the working way and surroundings of vehicle to paly its extremely good performance.

(5) The self-correction of altitude

Under what kind of situation, it works?

When the altitude of vehicle gets changed.

The air inlet pressure sensor can inspect the surrounding air pressure, then pass this signal to ECU, then the ECU makes correction on engine working parameters according to the signal, to meet the demand of power change at corresponding altitude. Automatically set up the best fuel injection according to surrounding terrain and altitude.

## **2. Daily use and maintenance**

### **2.1 Daily use under normal situation**

The first use of a new vehicle, we suggest get on and off of the key for 3 times continuously and then make ignition, whose interval we suggest about 5 seconds each, which aimed for exhaust the residual air in fuel supplying system to establish the sufficient fuel pressure.

In the following daily use, we suggest the ignition shall begin when fuel pump finished running (Or 5 seconds latter when the key turned on), which establish a sufficient fuel pressure for a easy starting.

For the water-cooled model, in case too hot the engine (Hotter than the ECU set

data), when the key turned off, the electric fan may run for 10 seconds latter more, which is normal and a self-protection of system.

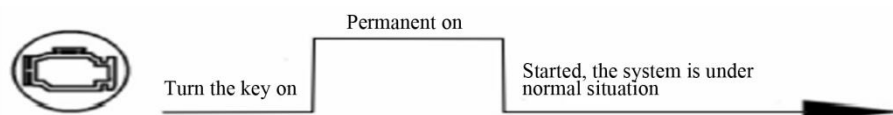
## 2.2 The self-inspection of system

The self-inspection means the process for self-diagnosis and self-correction of system. During this process, the system may solve the problems found out by itself, in case failed to solve them, the indicator light may show you the malfunction information and then solved by men.

The self-inspection of system usually works automatically, who occurs during driving or after vehicle stopped, which needn't men's involvement.

The malfunction light locates on instrument panel, whose function is to show the current status and malfunction for EFI and engine.

The malfunction light may keep on when ignition switch was on, then goes off when the vehicle started, under this case, the system is in normal situation.



In case when the engine started but the malfunction light is permanently on, repeat for 3 times it still keeps on, which means there is component with malfunction in EFI, then inspection is necessary.

Before the engine started, the malfunction light keeps on when the ignition lock and ignition switch started, and permanently on when engine started, but goes off when repeated for 3 times, which means the component of EFI has historic

malfunction, but not now, just because the historic code hasn't erased.

### 2.3 Wash up the throttle valve set

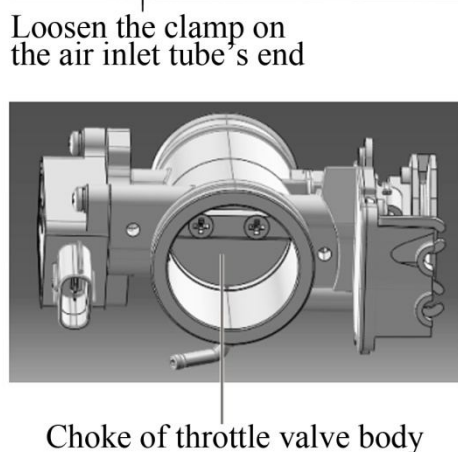
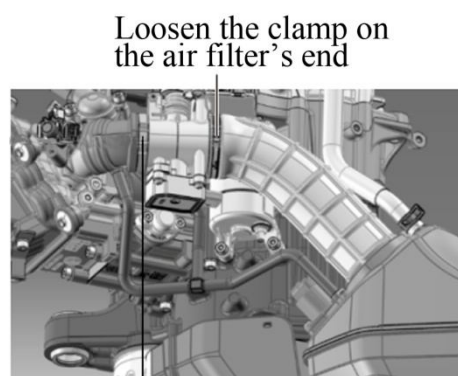
The steps for disassembling the throttle valve set.

1. Turn off the ignition lock.
2. Open the seat, remove the pneumatic support and luggage case.
3. Remove the dust proof cover of throttle valve, then remove the throttle cable.
4. Remove the sensor connector of 3 in 1.
5. Loosen the clamp on the 2 ends of throttle valve set, then remove the throttle valve set.

Note: Wash up the throttle valve set each 6000km.

The steps for washing up the throttle valve set:

1. Wash the inner wall set and choke set of throttle valve by gasoline or the cleanser for it only.
2. Turn the wheel set of throttle valve, to make sure the smooth turning of the wheel without jamming or returning failure.
3. When the cleanser volatilized, re-assemble the throttle valve set.
4. The re-assembly of throttle valve set is precisely opposite to disassembly.





### **3. Issues need pay attention to for United EFI system**

#### **3.1 Issues need pay attention to in daily maintenance**

Please adopt the parts or components from our factory only, otherwise the normal work could not be ensured.

Please adopt the unleaded gasoline only, and please follow the standard and formal procedure for diagnosis and maintenance.

Break down the components or parts in EFI system is not allowed during maintenance.

During the maintenance, please carefully hold the electrical parts such as the ones in ECU or the sensors, drop them on the ground is not allowed.

Please take care for the surrounding environment, dispose the replaced material in environment friendly way,

#### **3.2 Issues need pay attention to during maintenance**

(1) Please don't remove any components, parts or other connectors in EFI system from their original position at will, to prevent impurity, water, or oil get into the connectors, which is bad for the normal works of EFI system.

(2) When cutting off or getting on the connectors, please turn the ignition switch to the position OFF, otherwise it may damage the electrical parts.

(3) In case the maintenance is in hot working conditions or other status may lead to components get hot, the temperature of parts in ECU shall not be higher than 80°C.

(4) The pressure for fuel supplying of EFI is high (About 350kPa), so all the pipelines of

fuel can bear a high pressure. Even when the engine is not working, the pressure in fuel pipeline is also high. Under this case, please don't remove the fuel pipes unless it is necessary, in case their removals are needed, please release the pressure for fuel system in advance, whose method is as below: Remove the fuel pump relay first, then start the engine to idly run, until the engine gets stop automatically. The removal or replacement of fuel pipes shall be done by specialized workers and in place with good air ventilation.

(5) Please make sure the fuel pump is power off when removing its bracket, otherwise the spark it produced may lead to catch fire.

(6) The fuel pump could not be tested and worked in dry condition or in water, otherwise it may reduce its working life, in addition, the positive and negative terminals of fuel pump could not be oppositely connected.

(7) When checking the ignition system, the jump spark test shall be done only when it is necessary, whose testing time shall be as short as possible, and open the throttle valve is not allowed, otherwise a lot of gasoline without combustion may get into air exhaust pipe and make three-way catalysis damage.

(8) Because the adjustment of idling speed is completely done by EFI system without men help, so the limit screw on throttle valve body is well adjusted by supplier when it delivered, so change its original position is not allowed.

(9) The opposite connection between the positive and negative terminals of battery is not allowed, otherwise it may damage the electrical parts, on this model, we adopt the iron wire in negative,

(10) Remove the wire of battery from working engine is not allowed.

(11) In case the welding work is necessary, before that, remove the positive and negative terminals of battery, also the ECU

(12) Don't test the input and output of electric signal for parts or components by cutting through their rubber skin of electric wires.

### 3.3 Necessary tools in maintenance



Tool name: Digital multimeter

Function:

Check the parameters such as voltage, current, electric resistance, on or off of wires in EFI system.



Tool name: Fuel pressure gauge

Function:

Check the pressure in fuel system, judge the working status for fuel pump and fuel pressure adjuster in the system.

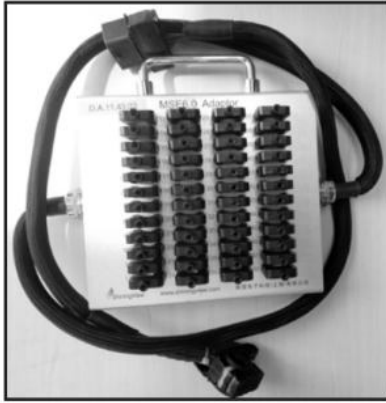


Tool name:

Cylinder pressure gauge

Function:

Check the pressure in cylinder

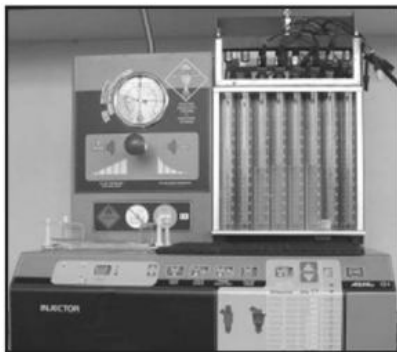


Tool name:

EFI adapter

Function:

Check the electric signal on each needle foot of ECU, also check the working status of electric circuit.



Tool name:

Analyzer for washing fuel injector

Function:

Make analysis for washing work of fuel injector

#### 4. Introduction for malfunction diagnosis

The On-Board Diagnostics, we usually call it OBD system for short, who means a diagnosis system for monitoring the failed parts affect gas emission and engine performance in integrated system of engine control system, which is capable in identification, storage and show the malfunction through its indicator light (MIL) by self-diagnosis.

When repairing the vehicle with OBD system, the worker can find out the malfunction fast and exact by the malfunction diagnosis instrument, who makes higher efficiency and quality for repair or maintenance work.

The OBD technology involves many completely new concepts, firstly, we make some

basic introduction for OBD technology and its related information for an easier understanding on content later.

#### 4.1 Malfunction record

The ECU keeps monitoring the sensors, actuators, their related circuits, malfunction indicator light and voltage of battery, even the ECU itself, also makes reliability inspection for output signal from sensors, driving and internal signals for actuators (For example the closed loop control of  $\lambda$ , engine temperature, idling rotational speed and voltage of battery). Once any malfunction on some part was found or a signal is unreliable, the ECU may immediately make a record in malfunction storage of RAM. The record of malfunction is storing in a form of malfunction code, then show the malfunctions by turns.

The malfunctions can be divided to Stable malfunction or Malfunction by chance according to its frequency of occurrence (For example the temporary wire cutting off or poor contact of connectors)

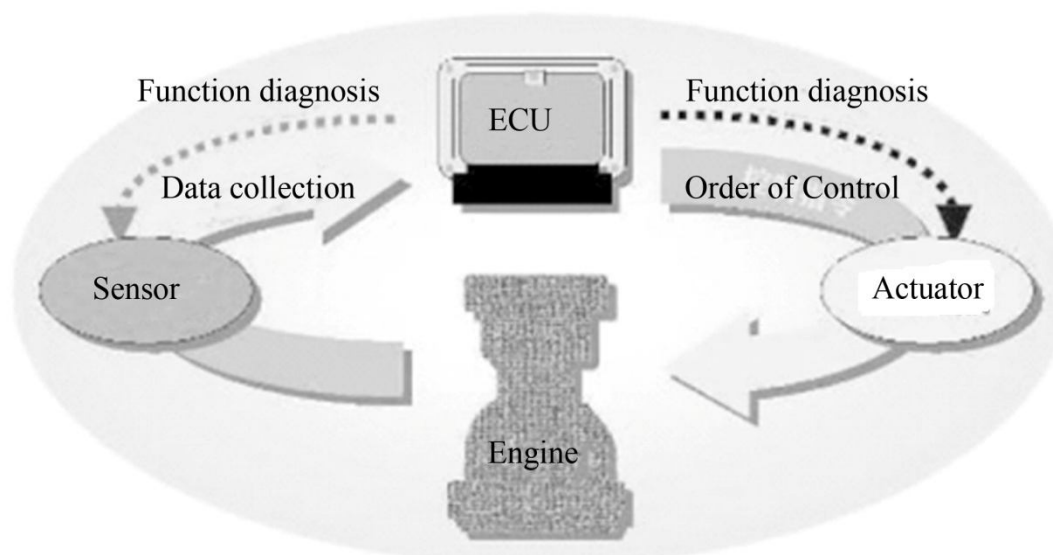


Figure 4.1 The principle diagram for EFI malfunction diagnosis

## 4.2 Malfunction indicator light and its control

The Malfunction Indicator Light (MI or MIL), who indicates you the parts or system failure for parts of or related to gas emission. The MI is a indicating light on instrument panel with a shape meets demand of law.

The MIL usually activates by principles below:

(1) Under normal mode without system malfunction.

Turn on the ignition switch, the ECU starts its initialization immediately. From the beginning of initialization, the MIL keeps on. When the engine started, when ECU found the engine begin working, the MIL gets off immediately.

(2) Under normal model, there is malfunction in the system.

Turn on the ignition switch, the ECU starts its initialization immediately, then the MIL keeps on. When the engine started, when ECU found the engine begin working, the MIL still keeps on.

In case the malfunction got erased, after the vehicle kept running for 3 circulations (Definition: Start the engine and run for 5 seconds or above, meet the demands of activation on corresponding parts as a circulation), then the malfunction indicator light gets off immediately.

Manually erase the historic malfunctions: Keep the key off without starting, then get the throttle fully open, then turn on the key for 5 seconds or above, and turn off the key once again, finally start the engine, the MIL gets off. In case the MIL keeps on, that means the malfunction exists right now.

#### 4.3 4 kinds of malfunctions

B\_mxdfp Max. malfunction, the signal got passed the upper limit of normal range.

B\_mndfp Min. malfunction, the signal got passed the lower limit of normal range.

B\_sidfp signal of malfunction, there is no signal.

B\_npdp unreasonable signal, there is a signal, but it is unreasonable.

#### 4.4 The steps for malfunction inspection and repair

For the vehicle with OBD system, the steps are usually as below:

1. Connect the diagnosis instrument to its corresponding interface, then get it power on as

Figure 1 shows.

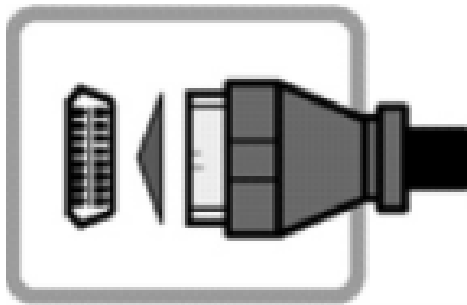


Figure 1

2. Get the ignition switch on as Figure 2 shows.

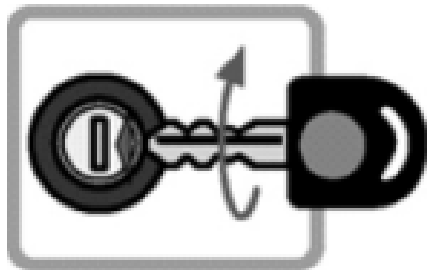


Figure 2

3. Read the malfunction and related information such as Malfunction code or freeze frame;  
Check the Maintenance manual for confirming the malfunction; Work out plan for repair  
according to related malfunction information and experience as Figure 3 shows.



Figure 3

4. Make troubleshooting as Figure 4 shows.

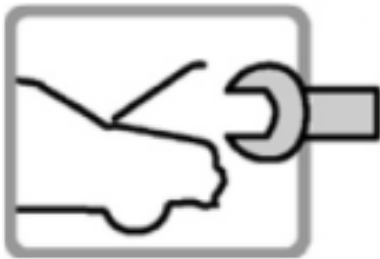


Figure 4

5. Erase the malfunction storage memory; Suitably run the vehicle, who must meet the  
related condition for corresponding malfunction diagnosis; Read the malfunction  
information and confirm the troubleshooting already finished as Figure 5 shows.

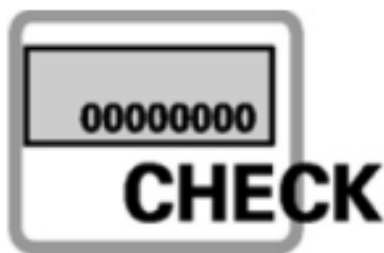


Figure 5



#### 4.5 The connection for diagnosis instrument

This system adopts the communication agreement for CAN wire, and the diagnosis joint of OBD-II standard, as Figure 4.2 shows below. The 6<sup>th</sup> needle foot of standard diagnosis joint is CAN-H while the 14<sup>th</sup> one is CAN-L.

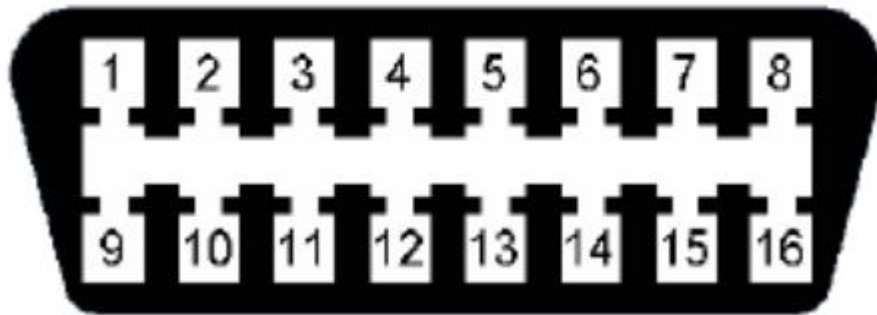


Figure 4.2 Standard diagnosis joint of OBD-II

The ECU can connect to a external diagnosis instrument through wire CAN, and the operation below could be done:

(The functions and operation for diagnosis instrument refer to their corresponding chapters)

(1) Show you the version information

The engine information, ECU's hardware code, and its software code.

(2) Malfunction display

Air inlet pressure sensor, air inlet temperature sensor, engine temperature sensor, throttle valve position sensor, oxygen sensor, heating wire for oxygen sensor, fuel injector, fuel pump relay, crankshaft phase sensor, idling speed, idling speed control valve, voltage in system and the ECU.

### (3) Engine parameters display

Battery voltage, engine rotation speed, target idling speed, engine temperature, signal voltage for engine temperature sensor, air inlet temperature, signal voltage for air inlet sensor, air inlet pressure, air inlet volume, target position for step motor, signal voltage for throttle valve position sensor, width of throttle valve opening, relative position for throttle valve, power charging time, pulse width for fuel injection, advance angle for ignition, short term correction for oxygen sensor, voltage for oxygen sensor, long term correction for oxygen sensor, loading on engine phase, opening width for idling control valve, surrounding pressure, altitude correction index, fuel injection phase and running time;

### (4) Display the EFI situation

Ignition wire end gets on, main relay works, fuel pump relay works, reached idling rotation, reached engine working temperature, vehicle running, idling working status, full loading working status, activate deceleration and fuel reduction, activate acceleration and enrichment, activate closed loop control for fuel injection, activate deceleration and cut off fuel supplying, activate control for lambda, activate the self-learning for gas mixture, and status for malfunction indicator light.

### (5) Function for actuators

Electric fuel pump, step motor, ignition and fuel injection.

## **4.6 Introduction to question related to items**

Features of system:

Fuel injection system in sequence;

New software and hardware structures of modularization, with strong performance of

inserting in;

Adopt the idling control by side air passage (Step motor);

Achieved closed loop control for idling speed;

It can heat up the oxygen sensor;

It can get back by limping.

## **5. The procedure of diagnosis and repair according to malfunction code**

Introduction:

1. Repair only for the current and stable malfunction already confirmed, otherwise it may make mistake in diagnosis.
2. The multimeter we mention latter is the digital one, inspection the circuit for EFI by needle multimeter is not allowed.
3. In case the vehicle is with anti-theft function, if replace the ECU is necessary, don't forget the programming for the new ECU.
4. In case the malfunction show you too low the voltage in some electric circuit, which may indicate this circuit short circuit or disconnect against the ground; In case it show too high the voltage, which may indicate there is short circuit against power source; In case the code show you the malfunction in circuit, which may indicate wire disconnection or some other malfunctions.

Diagnosis assistance

1. The malfunction code could not be erased, which means it is the stable one; In case the malfunction is the one by chance, put your focus on the drop off the wire joints.

2. Already checked according to the steps above, and nothing abnormal is found;
3. Please don't ignore the influence of maintenance, pressure in cylinder and mechanical timing to system;
4. Replace the ECU and then test it.

At this moment, in case the malfunction code could be erased, which means the malfunction is in the ECU, in case the code could not be erased, replace back the ECU for the original one and repeat the procedure, inspect and repair once again.

The content below is the meaning, corresponding diagnosis method, possible malfunction and troubleshooting for the EFI system on current model, which could be the reference in actual maintenance and repair.

The needles of ECU we mention latter all set the actual wire picture as standard, if you need, please contact our workers for after-sales

The malfunction code: P0030 the cut off of control circuit for heating oxygen sensor of 1<sup>st</sup> upstream cylinder

<p>Maintenance reminder</p> <p>The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"> <li>1) The circuit connects the foot of ECU and 2<sup>nd</sup> foot of oxygen sensor on 1<sup>st</sup> upstream cylinder gets cut off.</li> <li>2) The circuit connects the 1<sup>st</sup> foot of 1<sup>st</sup> upstream cylinder's oxygen sensor and main relay gets cut off.</li> <li>3) The circuit connects 1<sup>st</sup> and 2<sup>nd</sup> foot on oxygen sensor of 1<sup>st</sup> upstream cylinder gets cut off.</li> </ol>	<p>Maintenance reminder</p> <p>Check the items below</p> <ol style="list-style-type: none"> <li>1) Check and judge the normal work for the circuit electric resistance between foot of ECU connector and 2<sup>nd</sup> foot on oxygen sensor of 1<sup>st</sup> upstream cylinder.</li> <li>2) Check and judge the normal work for the electric resistance between 1<sup>st</sup> foot of oxygen sensor on 1<sup>st</sup> upstream cylinder and main relay.</li> <li>3) Check the cutting off between the 1<sup>st</sup> and 2<sup>nd</sup> foot on oxygen sensor of 1<sup>st</sup> upstream cylinder.</li> </ol>
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Malfunction code: P0031 Too low the voltage in heating control circuit of 1<sup>st</sup> upstream cylinder's oxygen sensor

Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) The circuit connects the foot of ECU short circuit to the ground.	Maintenance reminder: Check the items below: 1) Check the electric resistance between the foot of ECU and ground.
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Malfunction: P0032 Too high the voltage in heating control circuit of 1<sup>st</sup> upstream cylinder's oxygen sensor

Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) There is short circuit between the circuits connect the foot of ECU and the 1 <sup>st</sup> foot of oxygen sensor on 1 <sup>st</sup> upstream cylinder, 2) There is short circuit between the circuits connect the foot of ECU and other circuits of power source.	Maintenance reminder: Check the items below: 1) Check the voltage of ECU. 2) Check the electric resistance between the foot of ECU and the 1 <sup>st</sup> foot of oxygen sensor on 1 <sup>st</sup> upstream cylinder.
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Malfunction: P0107 Too low the voltage in circuit of air inlet pressure sensor

Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) There is short circuit between the circuit connects the foot of ECU to the ground.	Maintenance reminder: Check the items below: 1) Check the voltage in signal circuit of sensor on ECU's foot.
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Malfunction code: P0108 Too high the voltage in circuit of air inlet pressure sensor

Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) The ECU found the short circuit in the signal circuit of sensor to the ground.	Maintenance reminder: Check the items below: 1) The electric resistance between ECU's foot to the ground.
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Malfunction code: P0112 Too low the voltage of signal from air inlet temperature sensor

Maintenance reminder: The malfunction has been confirmed and it might be as below:	Maintenance reminder: Check the items below: 1) Check the resistance in the signal
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1) There is short circuit in signal circuit of sensor of ECU's foot connects to the ground.	circuit of sensor on ECU's foot to the ground.
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Malfunction code: P0113 Too high the voltage of signal from air inlet temperature sensor

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) There is short circuit in signal circuit of sensor of ECU's foot connects to the power source.</p>	<p>Maintenance reminder: Check the items below: 1) Check the voltage in signal circuit of sensor on ECU's foot.</p>
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Malfunction code: P0117 Too low the voltage in sensor's circuit for engine temperature

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) There is short circuit in circuit connects the ECU's foot to the ground.</p>	<p>Maintenance reminder: Check the items below: 1) Check the electric resistance between ECU's foot and ground.</p>
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Malfunction code: P0118 Too high the voltage in sensor's circuit for engine temperature

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) There is short circuit in circuit connects the ECU's foot to other power sources.</p>	<p>Maintenance reminder: Check the items below: 1) Check the voltage in circuits connect to ECU's foot.</p>
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Malfunction code: P0122 The voltage in sensor's circuit for throttle valve position passed

the lower limit

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) The ECU's foot short circuit to the ground.</p>	<p>Maintenance reminder: Check the items below: 1) Check the electric resistance in circuit connects the ECU's foot to ground.</p>
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Malfunction code: P0123 The voltage in sensor's circuit for throttle valve position passed the upper limit

Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) There is short circuit in signal circuit connecting ECU's foot to ground.	Maintenance reminder: Check the items below: 1) Check the voltage in circuit connects the ECU's foot.
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Malfunction code: P0131 Too low the voltage of oxygen sensor's signal from 1<sup>st</sup> upstream cylinder

Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) There is short circuit in signal circuit connecting the ECU's foot to ground.	Maintenance reminder: Check the items below: 1) Check the electric resistance in signal circuit connecting ECU's foot to ground.
---	--

Malfunction code: P0132 Too high the voltage of oxygen sensor's signal from 1<sup>st</sup> upstream cylinder

Introduction for the root cause: When the engine started, the ECU began its test to the voltage of circuit of oxygen sensor, when the signal voltage was higher than 1.5V for a long time, we should get to know there is short circuit in signal circuit connecting the oxygen sensor to power source.

Maintenance reminder: The malfunction has been confirmed and it might be as below: 1) There is short circuit in signal circuit of ECU's foot connecting the 1 <sup>st</sup> foot of oxygen sensor on 1 <sup>st</sup> upstream cylinder. 2) There is short circuit in signal circuit of ECU's foot connecting to other power sources.	Maintenance reminder: Check the items below: 1) Check the electric resistance in circuit between ECU's foot connecting the 1 <sup>st</sup> foot of oxygen sensor on 1 <sup>st</sup> upstream cylinder. 2) Check the voltage in signal circuit connects the ECU's foot.
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Malfunction code: P0134 Signal malfunction in oxygen sensor's circuit of 1<sup>st</sup> upstream cylinder

The introduction for root cause: When the engine started, the ECU began its test to the voltage of circuit of oxygen sensor, when the signal voltage was always changing between 0.4-0.6V, we get to know there is open circuit in signal circuit of oxygen sensor.

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"> <li>1) There is open circuit between oxygen sensor on 1<sup>st</sup> upstream cylinder and ECU's foot.</li> <li>2) There is poor connection of connectors for oxygen sensor of 1<sup>st</sup> upstream cylinder (The needle foot get oxidized)</li> </ol>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"> <li>1) Check the electric resistance in the 4<sup>th</sup> foot of oxygen sensor on 1<sup>st</sup> upstream cylinder connects the connectors of ECU.</li> </ol>
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Malfunction code: P0201 The open circuit in fuel injection control circuit of 1<sup>st</sup> cylinder

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"> <li>1) There is open circuit in coil of fuel injector on the 1<sup>st</sup> cylinder.</li> <li>2) The poor connection between needle foot of connectors of fuel injector on the 1<sup>st</sup> cylinder and ECU's foot.</li> <li>3) The poor connection between needle foot of connectors of fuel injector on the 1<sup>st</sup> cylinder and main relay.</li> </ol>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"> <li>1) The connection between needle foot of connectors of fuel injector on the 1<sup>st</sup> cylinder and ECU's foot.</li> <li>2) The connection between needle foot of connectors of fuel injector on the 1<sup>st</sup> cylinder and main relay.</li> </ol>
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Malfunction code: P0261 The short circuit to ground in fuel injector control circuit of 1<sup>st</sup> cylinder

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"> <li>1) There is short circuit in each driving circuit connect to ECU's foot.</li> </ol>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"> <li>1) Check the electric resistance connect the ECU's foot to ground.</li> </ol>
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Malfunction code: P0262 The short circuit to power source in fuel injector control circuit of 1<sup>st</sup> cylinder

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"> <li>1) Check the voltage in circuit connect to</li> </ol>
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1) There is short circuit in circuit connects the ECU's foot to other power source.	ECU's foot.
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Malfunction code: P0511 The open circuit of driving foot on step motor

Introduction for root cause: When engine started, the circuit control modular in ECU began the continuous monitoring for voltage in driving circuit of idling step motor, any one circuit in the four is in short circuit to ground/power source/open circuit, we get to know there is malfunction in circuit of step motor.

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"> <li>1) Any circuit of driving circuits from step motor connects to ECU gets short circuit/open circuit to power source of only short circuit to ground.</li> </ol>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"> <li>1) Check the electric resistance or voltage in each driving circuit of step motor connect to ECU.</li> </ol>
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Malfunction code:P0563 Too high the voltage of battery

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"> <li>1) The power generator already damaged or battery gets electric leakage.</li> <li>2) There is open circuit in electro-magnetic motor of power generator.</li> <li>3) The adjustor of power generator damaged or the power generation was out of control and lead to high voltage.</li> </ol>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"> <li>1) Check the performance of power generation of the power generator (Check the voltage of generator when engine started)</li> </ol>
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Malfunction code: P0627 The open circuit on control circuit of fuel pump relay

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"> <li>1) The control circuit of fuel pump gets open circuit to the pump itself or short circuit to ground/short circuit to power source.</li> <li>2) There is open circuit between the relay connecting to main relay.</li> <li>3) There is open circuit in magnetic coil of relay.</li> </ol>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"> <li>1) Check the electric resistance in control circuit of fuel pump relay connects to ECU.</li> <li>2) Check the electric resistance between the fuel pump relay and main relay.</li> <li>3) Check the electric resistance between the 2 feet of relay.</li> </ol>
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Malfunction code: P0629 The short circuit to power source in control circuit of fuel pump

relay

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"><li>1) The control circuit of fuel pump gets open circuit to the pump itself or short circuit to ground/short circuit to power source.</li><li>2) There is open circuit between the relay connecting to main relay.</li><li>3) There is open circuit in magnetic coil of relay.</li></ol>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"><li>1) Check the electric resistance in control circuit of fuel pump relay connects to ECU.</li><li>2) Check the electric resistance between the fuel pump relay and main relay.</li><li>3) Check the electric resistance between the 2 feet of relay.</li></ol>
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Malfunction code: P0650 Malfunction in driving or circuit of MIL light

<p>Maintenance reminder: The malfunction has been confirmed and it might be as below:</p> <ol style="list-style-type: none"><li>1) The driving circuit of MIL light connects to ECU gets open circuit/short circuit to ground/short circuit to power source.</li><li>2) There is open circuit from MIL light connects to main relay.</li><li>3) The MIL light gets burn-out.</li></ol>	<p>Maintenance reminder: Check the items below:</p> <ol style="list-style-type: none"><li>1) Check the voltage or electric resistance in driving circuit connects from MIL light to ECU.</li></ol>
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## 6.The diagnosis and repair procedure according to the malfunction symptom:

Before the diagnosis for engine according to its symptom, make initial inspection as below:

1. Confirm the normal work of engine malfunction indicator light (MIL).
2. Make diagnosis by its corresponding instrument and confirm there is not malfunction record.
3. Conform the symptom of malfunction according to user's complain, then confirm under what kind of conditions it may occur. Check the appearance of vehicle:  
  
(1) Check the fuel leakage from pipelines.

- (2) Check the crack, twist, or wrong connection on vacuum pipeline.
- (3) Check the block, leakage, squeezing or damage on air inlet pipeline.
- (4) Check the crack, aging, or wrong timing sequence for high voltage wire of ignition system.
- (5) Check the cleanliness and firm connection for the joint of wires.
- (6) Check the flexibility or poor contact for connectors' joint of each sensor and actuator.

Important reminder: In case the malfunctions above exist, make troubleshooting for them first, otherwise they may be bad for following up diagnosis and repair.

Assistance for diagnosis:

- 1. Confirm there is not any malfunction record for engine.
- 2. Confirm the malfunction symptom from user's complaint is a real existing.
- 3. Already inspected according to steps above and no abnormal situation was found.
- 4. Please pay attention to the influence of maintenance, cylinder pressure, mechanical timing and fuel status on process of inspection and repair.
- 5. Replace the ECU and make test for the new one (The new ECU needs binding-up with ignition lock in electric way).

Under this case, if the malfunction could be erased, which means the malfunction is in the ECU, in case the malfunction remains, please replace back to the old one, then repeat the procedure, start the diagnosis and repair once again.

- (1) When started, the engine doesn't work or slowly run.
- (2) When starting, the engine could be started by dragging but fail to be started in normal way.

- (3) Difficult starting in hot way.
- (4) Difficult starting in cold way.
- (5) Difficult starting at any time under normal rotation.
- (6) Normally start but idling is unstable at any time.
- (7) Normally start, but idling is unstable during the engine getting warm.
- (8) Normally start, but idling is unstable when the engine already got hot.
- (9) Normally start, but the idling is unstable even gets off when it is partly loaded (The headlight is on).
- (10) Normally start but too high the idling speed.
- (11) The rotation failed to get high even off when it was in acceleration.
- (12) Low response when it was in acceleration.
- (13) Weak response or poor performance when it was in acceleration.
- (1) When starting, the engine doesn't work or start slowly.

The malfunctions are usually at position: 1. Battery 2. Starting motor 3. Wires or ignition switch 4. Mechanical parts in engine

The general procedure is:

Ref.No.	Steps	Result	Following-up steps
1	Check and confirm the starting voltage is within 8-12V between 2 terminals of battery by multimeter.	Yes	Next step
		No	Replace battery
2	Keep the ignition switch at starting position, check if the voltage on positive terminal of starting motor is higher than 8V by multimeter.	Yes	Next step
		No	Repair or replace wire
3	Remove the starting motor and check its working status, specially pay attention to lock-up by open circuit or poor lubrication.	Yes	Repair or replace the starting motor
		No	Next step
4	In case the malfunction only happens in	Yes	Replace the

	winter, check the high resistance on starting motor cause by adopting wrong lubricant.		lubricant with correct specification
		No	Next step
5	Check the internal mechanical resistance in engine which lead to failure or low running speed of starting motor.	Yes	Check or correct the internal resistance in engine
		No	Next step

(2) When starting, then engine could rotate by dragging, but failed in normal way.

The malfunctions are usually at: 1. No fuel in fuel tank 2. Fuel pump 3. Crankshaft phase sensor 4. Ignition coil 5. Mechanical part in the engine.

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Connect to the fuel pressure gauge (Connect to the front end of fuel inlet tube on fuel injector), turn on the ignition switch, repeat if it is necessary, or start the engine to check the fuel pressure is around 350kPa.	Yes	Next step
		No	Check the fuel supplying system
2	Connect to the diagnosis instrument for EFI, check the item of Engine rotation, start the engine to check if there is signal output of rotation	Yes	Next step
		No	Check the wire for crankshaft phase sensor
3	Pull off the ignition wire, connect to the spark plug, makes the spark plug 5mm distance to engine body, then start engine to check if there is blue/white high pressure spark.	Yes	Next step
		No	Check the ignition system
4	Check pressure in cylinder, confirm if the pressure in cylinder is not enough.	Yes	Make troubleshooting for engine mechanical parts
		No	Next step
5	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuit

(3) Difficult starting under hot condition

The malfunctions are usually at: 1. The fuel with water in. 2. Fuel pump 3. Temperature sensor of engine 4. Ignition coil

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Connect to the fuel pressure gauge (Connect to the front end of fuel inlet tube on fuel injector), turn on the ignition switch, repeat if it is necessary, or start the engine to check the fuel pressure is around 350kPa.	Yes	Next step
		No	Check the fuel supplying system
2	Pull off the joint of engine temperature sensor, start the engine to check if smoothly started. (Or make a series connection to an electric resistance with 300Ω to the joint of temperature sensor on engine end instead of the sensor itself, then check if the engine could be smoothly started.	Yes	Next step
		No	Check the circuit or replace the sensor
3	Pull off the ignition wire, connect to the spark plug, makes the spark plug 5mm distance to engine body, then start engine to check if there is blue/white high pressure spark.	Yes	Next step
		No	Check the ignition system
4	Check the fuel status, then confirm if the malfunction occurred right after fuel filled up.	Yes	Replace the fuel
		No	Next step
5	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuit

(4) Difficult starting under cold condition

The malfunctions are usually at: 1. The fuel with water in. 2. Fuel pump 3. Temperature sensor of engine 4. Fuel injector 5. Ignition coil 6. Throttle valve body or the air passage beside for idling speed 7. Mechanical part of engine

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Connect to the fuel pressure gauge (Connect to the front end of fuel inlet tube on fuel injector), turn on the ignition switch, repeat if it is necessary, or start the engine to check the fuel pressure is around 350kPa.	Yes	Next step
		No	Check the fuel supplying system
2	Pull off the joint of engine temperature sensor, start the engine to check if smoothly started. (Or make a series connection to an electric resistance with 300Ω to the joint of temperature sensor on engine end instead of the sensor itself, then check if the engine could be smoothly started.	Yes	Next step
		No	Check the circuit or replace the sensor
3	Pull off the ignition wire, connect to the spark plug, makes the spark plug 5mm distance to	Yes	Next step
		No	Check the ignition

	engine body, then start engine to check if there is blue/white high pressure spark.		system
4	Check the fuel status, then confirm if the malfunction occurred right after fuel filled up.	Yes	Replace the fuel
		No	Next step
5	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step

Difficult starting under cold condition (Continue)

Ref. No.	Steps	Result	Following-up steps
6	Check the pressure in cylinder, check and confirm if the pressure is not enough.	Yes	Make troubleshooting for engine mechanical parts
		No	Next step
7	Slightly turn on the throttle grip to check if it is easy to be started.	Yes	Wash the throttle valve body and idling speed air passage
		No	Next step
8	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits

(5) Rotation is normal, but hard to be started at any time.

The malfunctions are usually at: 1. The fuel with water in. 2. Fuel pump 3. Temperature sensor of engine 4. Fuel injector 5. Ignition coil 6. Throttle valve body or the air passage beside for idling speed 7. Air inlet passage 8. Ignition timing 9. Spark plug 10. Mechanical parts in engine

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Connect to the fuel pressure gauge (Connect to the front end of fuel inlet tube on fuel injector), turn on the ignition switch, repeat if it is necessary, or start the engine to check the fuel pressure is around 350kPa.	Yes	Next step
		No	Check the fuel supplying system

Rotation is normal, but hard to be started at any time. (Continue)

Ref. No.	Steps	Result	Following-up steps
2	Pull off the joint of engine temperature sensor, start the engine to check if smoothly started. (Or make a series connection to an electric resistance with 300Ω to the joint of temperature sensor on engine end instead of the sensor itself, then check if the engine could be smoothly started.	Yes	Next step
		No	Check the circuit or replace the sensor
3	Pull off the ignition wire, connect to the spark plug, makes the spark plug 5mm distance to engine body, then start engine to check if there is blue/white high pressure spark.	Yes	Next step
		No	Check the ignition system
4	Check the fuel status, then confirm if the malfunction occurs right after fuel filled up.	Yes	Replace the fuel
		No	Next step
5	Check if the mechanical ignition timing system of engine met the standard and specification.	Yes	Next step
		No	Check and repair the ignition timing system
6	Check the pressure in cylinder, check and confirm if the pressure is not enough.	Yes	Make troubleshooting for engine mechanical parts
		No	Next step

Rotation is normal, but hard to be started at any time. (Continue)

Ref. No.	Steps	Result	Following-up steps
7	Slightly turn on the throttle grip to check if it is easy to be started.	Yes	Wash the throttle valve body and idling speed air passage
		No	Next step
8	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step
9	Check if the air filter is blocked while if there is leakage on air inlet passage.	Yes	Check and repair the air inlet system
		No	Next step
10	Check the spark plug on cylinder and confirm if its specification and clearance met standard.	Yes	Next step
		No	Adjust or replace
11	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits



(6) Starting is normal, but the idling speed is unstable at any time.

The malfunctions are usually at: 1. Fuel with water in 2. Fuel injector 3. Spark plug 4.

Throttle valve body and air passage for idling speed beside 5. Air inlet passage 6. Idling speed adjustor

7. Ignition timing 8. Spark plug 9. Mechanical parts in engine

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Check if there is a jamming in idling speed adjustor.	Yes	Wash or replace
		No	Next step
2	Check if there is carbon buildup beside air passage for idling or throttle valve body.	Yes	Wash
		No	Next step
3	Check the fuel status, then confirm if the malfunction occurred right after fuel filled up.	Yes	Replace the fuel
		No	Next step
4	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits

Starting is normal, but the idling speed is unstable at any time. (Continue)

Ref. No.	Steps	Result	Following-up steps
5	Check the pressure in cylinder, check and confirm if the pressure is not enough.	Yes	Make troubleshooting for engine mechanical parts
		No	Next step
6	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step
7	Check if the air filter is blocked while if there is leakage on air inlet passage.	Yes	Check and repair the air inlet system
		No	Next step
8	Check the spark plug on cylinder and confirm if its specification and clearance met standard.	Yes	Next step
		No	Adjust or replace
9	Check if the mechanical ignition timing system of engine met the standard and specification.	Yes	Next step
		No	Check and repair the ignition timing system

(7) Starting is normal, but idling speed is unstable during engine getting warm.

The malfunctions are usually at: 1. Fuel with water in 2. Temperature sensor of engine 3.

Spark plug 4. Throttle valve body and air passage for idling beside 5. Air inlet passage 6.

Idling adjustor 7. Mechanical parts in engine

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Check if the air filter is blocked while if there is leakage on air inlet passage.	Yes	Check and repair the air inlet system
		No	Next step
2	Check the spark plug on cylinder and confirm if its specification and clearance met standard.	Yes	Next step
		No	Adjust or replace
3	Check if there is carbon buildup beside air passage for idling or throttle valve body.	Yes	Wash
		No	Next step
4	Pull off the connector of temperature sensor on engine, then start the engine to check if its idling speed was stable.	Yes	Next step
		No	Next step
5	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step

Starting is normal, but idling speed is unstable during engine getting warm. (Continue)

Ref. No.	Steps	Result	Following-up steps
6	Check the fuel status, then confirm if the malfunction occurred right after fuel filled up.	Yes	Replace the fuel
		No	Next step
7	Check the pressure in cylinder, check and confirm if the pressure is not enough.	Yes	Make troubleshooting for engine mechanical parts
		No	Next step
8	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits

(8) Starting is normal, but the idling speed is unstable after the engine warmed up.

The malfunctions are usually at: 1. Fuel with water in 2. Temperature sensor of engine 3. Spark plug 4. Throttle valve body and air passage for idling beside 5. Air inlet passage 6. Idling adjuster 7. Mechanical parts in engine

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Check if the air filter is blocked while if there is leakage on air inlet passage.	Yes	Check and repair the air inlet system
		No	Next step

Starting is normal, but the idling speed is unstable after the engine warmed up. (Continue)

2	Check the spark plug on cylinder and confirm if its specification and clearance met standard.	Yes	Next step
		No	Adjust or replace
3	Check if there is carbon buildup beside air passage for idling or throttle valve body.	Yes	Wash
		No	Next step
4	Pull off the connector of temperature sensor on engine, then start the engine to check if its idling speed was stable.	Yes	Next step
		No	Next step
5	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step
6	Check the fuel status, then confirm if the malfunction occurred right after fuel filled up.	Yes	Replace the fuel
		No	Next step

Starting is normal, but the idling speed is unstable after the engine warmed up. (Continue)

7	Check the pressure in cylinder, check and confirm if the pressure is not enough.	Yes	Make troubleshooting for engine mechanical parts
		No	Next step
8	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits

(9) Starting is normal, but its idling speed is unstable even off when there is partly loaded

(Headlight is on).

The malfunctions are usually at: 1. Idling speed adjustor 2. Fuel injector

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Check if there is carbon buildup beside air passage for idling or throttle valve body.	Yes	Wash
		No	Next step
2	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step

Starting is normal, but its idling speed is unstable even off when there is partly loaded

(Headlight is on).

Ref. No.	Steps	Result	Following-up steps
3	Check if the engine power output got rising when there is loading, which means check the advanced angle of ignition, pulse width for fuel injection and air inlet volume by diagnosis instrument for EFI.	Yes	Go back to step 4th
		No	Next step
4	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits

(10) The starting is normal, but too high the idling speed.

Malfunctions are usually at: 1. Throttle valve body and air passage beside for idling 2.

Vacuum tube 3. Idling speed adjustor 4. Temperature sensor for engine 5. Ignition timing

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Check if there is carbon buildup beside air passage for idling or throttle valve body.	Yes	Wash
		No	Next step
2	Check if it is too tight or locking-up the throttle cable.	Yes	Adjust
		No	Next step

The starting is normal, but too high the idling speed. (Continue)

3	Check the connection of air inlet system and leakage on vacuum tube.	Yes	Check the air inlet system
		No	Next step
4	Pull off the connector of engine temperature sensor, start the engine to check if it is too high the idling speed.	Yes	Check and repair the circuit or replace the sensor
		No	Next step
5	Check if the mechanical ignition timing system of engine met the standard and specification.	Yes	Next step
		No	Check and repair the ignition timing system
6	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits

(11) The rotation failed to speed up even off when it is in acceleration

The malfunctions are usually at: 1. Fuel with water in 2. Pressure sensor for air inlet and position sensor for throttle valve 3. Spark plug 4. Throttle valve body and air passage beside for idling 5. Air inlet passage 6. Idling speed adjustor 7. Fuel injector 8. Ignition timing 9. Air exhaust pipe

The general procedure is:

The rotation failed to speed up even off when it is in acceleration (Continue)

Ref. No.	Steps	Result	Following-up steps
1	Check if the air filter is blocked while if there is leakage on air inlet passage.	Yes	Check and repair the air inlet system
		No	Next step
2	Connect to the fuel pressure gauge (Connect to the front end of fuel inlet tube on fuel injector), turn on the ignition switch, repeat if it is necessary, or start the engine to check the fuel pressure is around 350kPa.	Yes	Next step
		No	Check the fuel supplying system
3	Check the spark plug on cylinder and confirm if its specification and clearance met standard.	Yes	Next step
		No	Adjust or replace
4	Check if there is carbon buildup beside air	Yes	Wash

	passage for idling or throttle valve body.	No	Next step
5	Check the pressure sensor of air inlet, throttle valve position and other circuits to confirm if they were normal.	Yes	Next step
		No	Check and repair the circuits or replace the sensor

The rotation failed to speed up even off when it is in acceleration (Continue)

Ref. No.	Steps	Result	Following-up steps
6	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step
7	Check the fuel status, then confirm if the malfunction occurred right after fuel filled up.	Yes	Replace the fuel
		No	Next step
8	Check the spark plug on cylinder and confirm if its specification and clearance met standard.	Yes	Next step
		No	Check and repair the ignition timing
9	Check if the air exhaust pipe works normally.	Yes	Next step
		No	Repair or replace the air exhaust pipe
10	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits

(12) Slow response when it is in acceleration.

The malfunctions are usually at: 1. Fuel with water in 2. Pressure sensor for air inlet and position sensor for throttle valve 3. Spark plug 4. Throttle valve body and air passage beside for idling 5. Air inlet passage 6. Idling speed adjustor 7. Fuel injector 8. Ignition timing 9. Air exhaust pipe

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Check if the air filter is blocked while if there is leakage on air inlet passage.	Yes	Check and repair the air inlet system
		No	Next step
2	Connect to the fuel pressure gauge (Connect to the front end of fuel inlet tube on	Yes	Next step
		No	Check the fuel

	fuel injector), turn on the ignition switch, repeat if it is necessary, or start the engine to check the fuel pressure is around 350kPa.		supplying system
3	Check the spark plug on cylinder and confirm if its specification and clearance met standard.	Yes	Next step
		No	Adjust or replace
4	Check if there is carbon buildup beside air passage for idling or throttle valve body.	Yes	Wash
		No	Next step
5	Check the pressure sensor of air inlet, throttle valve position and other circuits to confirm if they were normal.	Yes	Next step
		No	Check and repair the circuits or replace the sensor

Slow response when it is in acceleration. (Continue)

Ref. No.	Steps	Result	Following-up steps
6	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step
7	Check the fuel status, then confirm if the malfunction occurred right after fuel filled up.	Yes	Replace the fuel
		No	Next step
8	Check if the ignition timing of engine met the standard and specification.	Yes	Next step
		No	Check and repair the ignition timing
9	Check if the air exhaust pipe works normally.	Yes	Next step
		No	Repair or replace the air exhaust pipe
10	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#; Then check the normal connection or work for iron needle foot of 5# and 10#.	Yes	Diagnosis assistance
		No	Check the corresponding circuits

(13) Weak power in acceleration while with poor performance.

The malfunctions are usually at: 1. Fuel with water in 2. Pressure sensor for air inlet and position sensor for throttle valve 3. Spark plug 4. Ignition coil 5. Throttle valve body and air passage beside for idling 6. Air inlet passage 7. Idling speed adjustor 8. Fuel injector 9. Ignition timing 10. Air exhaust pipe

The general procedure is:

Ref. No.	Steps	Result	Following-up steps
1	Check if there is clutch skidding, low air pressure in tire, jamming in braking, or wrong tire size.	Yes	Repair
		No	Next step
2	Check if the air filter is blocked while if there is leakage on air inlet passage.	Yes	Check and repair the air inlet system
		No	Next step
3	Connect to the fuel pressure gauge (Connect to the front end of fuel inlet tube on fuel injector), turn on the ignition switch, repeat if it is necessary, or start the engine to check the fuel pressure is around 350kPa.	Yes	Next step
		No	Next step
4	Pull off the ignition wire, connect to the spark plug, makes the spark plug 5mm distance to engine body, then start engine to check if the strength of high voltage spark is normal.	Yes	Next step
		No	Check the ignition system
5	Check the spark plug on cylinder and confirm if its specification and clearance met standard.	Yes	Next step
		No	Adjust or replace

Weak power in acceleration while with poor performance. (Continue)

Ref. No.	Steps	Result	Following-up steps
6	Check if there is carbon buildup beside air passage for idling or throttle valve body.	Yes	Wash
		No	Next step
7	Check the pressure sensor of air inlet, throttle valve position and other circuits to confirm if they were normal.	Yes	Next step
		No	Check and repair the circuits or replace the sensor
8	Remove the fuel injector, check the block or leakage on the injector by the washing and analyzer for it only.	Yes	Replace the fuel injector
		No	Next step
9	Check the fuel status, then confirm if the malfunction occurred right after fuel filled up.	Yes	Replace the fuel
		No	Next step
10	Check if the ignition timing of engine met the standard and specification.	Yes	Next step
		No	Check and repair the ignition timing

Weak power in acceleration while with poor performance. (Continue)

Ref. No.	Steps	Result	Following-up steps
11	Check if the air exhaust pipe works normally.	Yes	Next step
		No	Repair or replace the air exhaust pipe
12	Connect the adapter of EFI, turn on the ignition switch, check the normal power supply for the needle foot of 8# and 33#;	Yes	Diagnosis assistance
		No	Check the



	Then check the normal connection or work for iron needle foot of 5# and 10#.		corresponding circuits
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## 7. Malfunction code list (PCODE)

Ref. No.	Code	Description (UAES)
1	P0030	Open circuit for heating control circuit of oxygen sensor on 1 <sup>st</sup> upstream cylinder
2	P0031	Too low the voltage in heating control circuit of oxygen sensor on 1 <sup>st</sup> upstream cylinder
3	P0032	Too high the voltage in heating control circuit of oxygen sensor on 1 <sup>st</sup> upstream cylinder
4	P0107	Too low the voltage from pressure sensor of air inlet
5	P0108	Too high the off voltage from pressure sensor of air inlet
6	P0112	Too low the signal voltage from temperature sensor of air inlet
7	P0113	Too high the signal voltage from temperature sensor of air inlet
8	P0117	Too low the voltage in sensor circuit for engine coolant temperature

### Malfunction code list (PCODE) (Continue)

Ref. No.	Code	Description (UAES)
9	P0118	Too high the voltage in sensor circuit for engine coolant temperature
10	P0122	The voltage in sensor circuit for throttle valve position passed lower limit
11	P0123	The voltage in sensor circuit for throttle valve position passed higher limit
12	P0131	Too low the voltage in signal circuit of oxygen sensor on 1 <sup>st</sup> upstream cylinder
13	P0132	Too high the voltage in signal circuit of oxygen sensor on 1 <sup>st</sup> upstream cylinder
14	P0134	Malfunction in circuit signal of oxygen sensor on 1 <sup>st</sup> upstream cylinder
15	P0201	Open circuit in controlling circuit of fuel injector on 1 <sup>st</sup> upstream cylinder
16	P0261	Short circuit to ground in controlling circuit of fuel injector on 1 <sup>st</sup> upstream cylinder
17	P0262	Short circuit to power source in controlling circuit of fuel injector on 1 <sup>st</sup> upstream cylinder
18	P0511	Malfunction in driving circuit of step motor
19	P0563	Too high the voltage of battery
20	P0627	Open circuit in controlling circuit of fuel pump relay
21	P0629	Short circuit to power source in controlling circuit of fuel pump relay
22	P0650	Malfunction in driving circuit of MIL light

Note: The contents above are the all PCODE for controllers.