UAES EFI SYSTEM USE AND MAINTENANCE MANUAL

Foreword

This manual firstly introduces components and basic principle for Electric Fuel Injection (EFI) system of Electric Control Unit (ECU), then, the diagnosis procedure for fault in system.

Generally, during the maintenance for EFI of ECU, the diagnosis kit is necessary. The diagnosis kit could pull up fault record from ECU storage. For easy understanding to user of what codes stand for, this manual shows users the form list of record condition against every fault. However, some faults could not be directly fixed up by fault record, which needs to base upon analysis, so, this manual spent a lot to find out faults according to their record.

The ECU is a new part for troubleshooting of engine. In another word, the fault of an engine could be mechanical or electric, whose real cause could not be fixed up by diagnosis kit only, under this case, this manual bases upon the faults, under ECU, to find out root causes.

Note: The fuel supplying pressure for engine of 900cc is 500kPa.

Material code: 362360019-0001

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1. Basic principle for ECU system

1.1 The components for ECU of gasoline engine.

Any ECU kit, including that for gasoline engine, has 3 major components as below:

(1) Sensor – Transform mechanical message to electric one, then provide them to ECU. The sensors for ECU are:

Sensor (For air intake pressure (Loading), throttle valve sensor (Loading message, loading range, and acceleration message), intake temperature sensor (For air density)

Crankshaft phase sensor (Information for rotation and crankshaft position)

Coolant sensor (For engine temperature)

Oxygen sensor (When air index λ is ＞1 or ＜1)

(2) Electric Control Unit – This is the brain of Electric Control Kit, we usually call it ECU for simple, which analyses and manages with messages from sensors, then get conclusions and send orders to actuation to get engine working under best conditions.

Actuator – Execute order from ECU. The actuator is hand and foot for ECU. The actuators for ECU are: Electric fuel pump, fuel injector, ignition coil, and idling control valve.

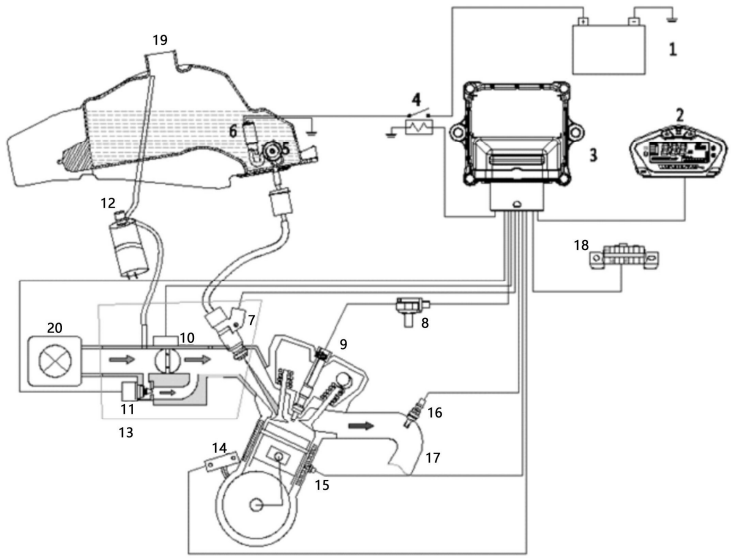
1.2 Fuel kit under gasoline injection engine of electric control

This kit has components of fuel tank, bracket of electric fuel pump, fast change joint, fuel hose, fuel trail and injector.

1.3 Fuel injection

Every circulation once

1.4 Components for ECU kit



1. Battery
2. Meters
3. ECU unit
4. Fuel pump relay
5. Fuel pressure adjustor
6. Electric fuel pump
7. Fuel injector
8. Ignition coil
9. Spark plug
10. Sensor
11. Accelerator
12. Electric throttle valve body
13. Carbon canister
14. Rotation phase sensor
15. Engine temperature sensor
16. Oxygen sensor
17. Muffler (With catalyst)
18. Diagnosis joint
19. Fuel tank
20. Air filter

1.5 Basic function for ECU kit

(1) Electric control for fuel quantification

This function is the most important for ECU kit, which is a key factor for power, economic, emission and comfort performance, which has relation to controls for λ closing loop, starting, started, engine heating id ling (Idling rotation), partly loading, full loading, acceleration, deceleration, over-speeding fuel cut and reverse dragging fuel cut.

(2) Electric control for ignition timing or closing

This is important next only to fuel quantification, also is a key factor for power, economic, emission, driving and comfort performance of vehicle.

(3) System self diagnosis

Under what kind of conditions, this function starts?

* Check normal working of EFI.

* Faults indicator light keeps on and judging faults

This function means self-diagnosis and correction. In self-diagnosis, the system finds out faults by itself, if failed, the indicator light shows faults message, which shall be fixed up by men,. The self-diagnosis usually executes by system itself without human-operation.

Diagnosis reminder is done by faults indicator light, whose details refer to Chapter 2.2 Self-diagnosis.

(4) Self-learning

Under what kind of conditions, the self-learning starts?

*This function is done within vehicle running by itself without human-operation.

Self-learning is according to messages from oxygen sensor to make correction records in ECU. Get parameters with higher precision from driving and surroundings to play best vehicle performance.

(5) Altitude corrections

Under what kind of conditions, the self-correction for altitude starts?

*When altitude of vehicle changed

The air intake pressure sensor can test air pressure surrounds it, then sends this signal to ECU, the ECU makes correction for engine according to this signal to meet changes for altitude and power. Adjust fuel injection to the best according to actual place and altitude by itself.

2. Use and maintenance

2.1 Regular use

When driving new vehicle at the first time, turn the key on and off by 3 times then starts ignition with each internal of 5 seconds, this operation is to exhaust residual air in system and set up enough fuel pressure.

In the following use, we suggest ignition start when fuel pump running finished (or 5 seconds after key turned on), this operation is to set up enough fuel pressure for an easy starting.

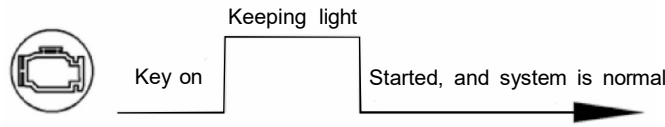
2.2 System self-checking

Self-checking means diagnosis and correction by system itself. The system finds out faults by itself through self-checking, if failed, the faults indicator light reminds you the message needs be done by men.

The self-checking usually be done by itself without human-operation at some time in driving or after stopped.

The faults indicator light is on dashboard, whose function is showing faults message in EFI or engine at the moment.

If indicator light is “Keeping light” when ignition started, and gets off when vehicle started, which means the system is normal.



When engine started, the faults indicator light is keeping light, repeatedly start for 3 times and it is still on, which means there have faults in EFI, the troubleshooting is necessary.

Before engine starting, when ignition lock and switch got on by faults indicator is keeping light, even when engine started, it still keeps light, after repeated starting by 3 times, it goes off, it means EFI used to have faults but now is normal only the faults code without erasing up.

2.3 Wash electric throttle valve body

Disassembly for electric throttle valve body

1.Turn off ignition lock;

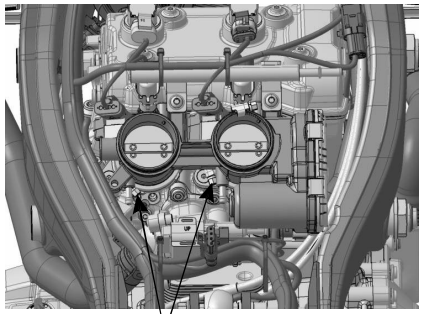
2. Remove seat, fuel tank, covering plastic parts and air filter;

3. Remove accessories of desorption and fuel inlet tube;

4.Separate sensors, socket plug for electric throttle valve body, socket plug for air intake sensor and that for fuel injector;

5.Loosen clamp for throttle valve kit, then remove the kit;

Caution: Wash valve body once each 10000km.



Remove clamp on throttle valve body

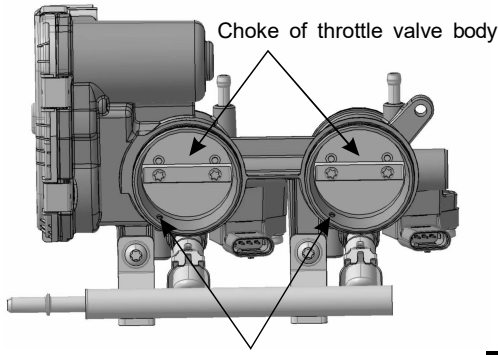
Washing for valve body:

1. Wash valve kit by cleanser and wash its inside wall by gasoline, also wash choke of valve and side idling passage;

2. Turn the wheel of valve kit, make sure the wheel return smoothly without jamming or failure;

3. When cleanser completely dried off, assemble valve kit;

4.The re-assembly for valve is opposite to disassembly.



3. Issues need pay attention for joint EFI

3.1 General issues need to know

The inspection could be done by digital universal meter only.

Only genuine parts allowed for maintenance, otherwise normal performance of EFI could not be ensured.

Only unleaded gasoline allowed for maintenance, please strictly follow standard procedures for diagnosis and troubleshooting.

Break down parts of EFI is not allowed.

Be careful when taking electrical parts (Control unit or sensors), don't let them drop on ground.

Pay attention to environment protection, dispose waste material in correct way.

3.2 Issues need pay attention during maintenance

(1) Please don't remove any parts of EFI from its installation place to avoid damage or touching water and grease, don't let them get into connectors, it is bad for EFI working.

(2) When cutting off or connecting the connectors, please turn ignition switch off before that, otherwise it may damage electrical parts.

(3) When heating up is needed for hot simulation conditions, the temperature for ECU could not be higher than 80℃.

(4) Fuel supplying pressure for EFI is high (Around 500kPa), all fuel hoses are pressure resistant. Even engine is not working, there still high pressure in fuel hoses, so please don't remove the hoses during maintenance, when the repair for fuel hoses is needed, please make pressure relief for fuel system before removing the hoses, whose steps are below: Remove fuel pump relay first, then start engine and let it idly run. Removal for oil hose shall be at place with smooth air ventilation and done by special service workers.

(5) When removing bracket of fuel pump from tank, please don't get pump power on to avoid producing spark and catch fire.

(6) Please don't test fuel pump in air or water, otherwise its working life may get shorter, in addition, opposite connection for positive and negative terminal for fuel pump is not allowed.

(7) When testing ignition system, make spark jumping test when it is necessary, whose testing time shall be as short as possible, please don't open throttle valve when testing it, otherwise, a lot of gasoline without combustion may get into air exhaust pipe and damage three-way catalyst.

(8) The idling adjustment is completely done by EFI without human operation, the air intake screw of side passage of valve body already adjusted in place by supplier before delivery, please don't change its initial position.

(9) Opposite connection between positive and negative terminals of batter is not allowed, to avoid damaging electrical parts, this system adopts iron wire for negative terminal.

(10) Please don't remove wire of battery when engine is running.

(11) Before welding on vehicle, please remove ECU, positive and negative wire for battery terminals.

(12) Please don't test signal input and output by penetrating rubber skin of wire.

3.3 Tool list

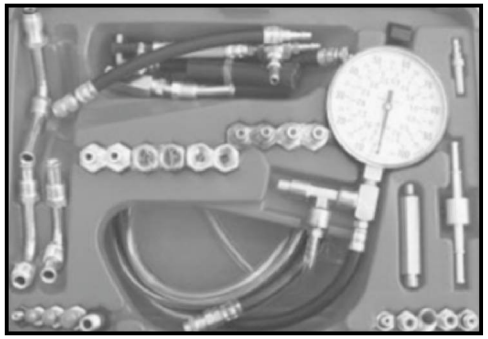


Tool name:

Digital universal meter

Function:

Check parameters such as voltage, current, resistance, power on and off in EFI.



Tool name:

Fuel pressure gauge

Function:

Check pressure in fuel system, judge working condition for fuel pump and pressure adjustor in fuel system.

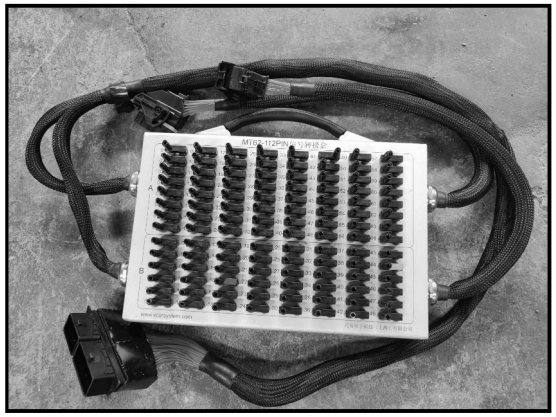


Tool name:

Cylinder pressure gauge

Function:

Check pressure in cylinder

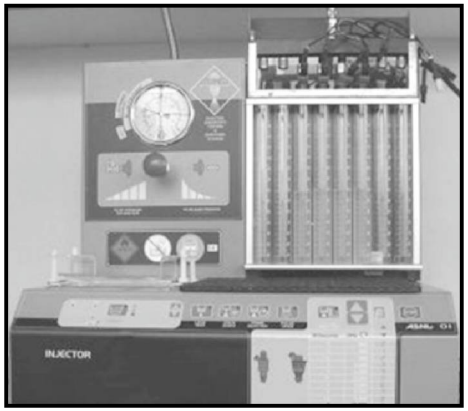


Tool name:

EFI adapter

Function:

Check electric signal for each stitch of ECU, also check working of circuit.



Tool name:
Cleaning analyzer for fuel injector
Function:
Clean and analyze for fuel injector

4. Introduction for faults diagnosis

On Board Diagnosis (OBD for short), means the diagnosis system integrated in control system of vehicle, which monitors parts have effects on gas emission and engine working. It has function for identifying or storage for faults information, then shows the messages by malfunction indicator light (MIL).

When repairing the vehicle with OBD system, the service worker can know the parts with fault easily through OBD, which greatly promotes quality and effect for maintenance.

The technology on OBD has many new ideas, the following chapter introduces you related technology for OBD for an easy understanding for content next.

4.1 Faults record

The ECU unit keeps monitoring on sensors, actuator, related circuit, malfunction indicator light and battery voltage even the ECU itself, then test reliability for signal output of sensors, actuator and internal signals (Such as close loop, engine temperature, idling rotation and battery voltage), once fault on one part was found, or someone signal is unreliable, the ECU sets up fault record in memory storage of RAM. The fault message in memory storage is in terms of code according to order of occurrence for display.

The faults can be divided to “Stable” or “Accidental” according to their frequency (Such as wire cut off for a short while or poor contact of connectors).

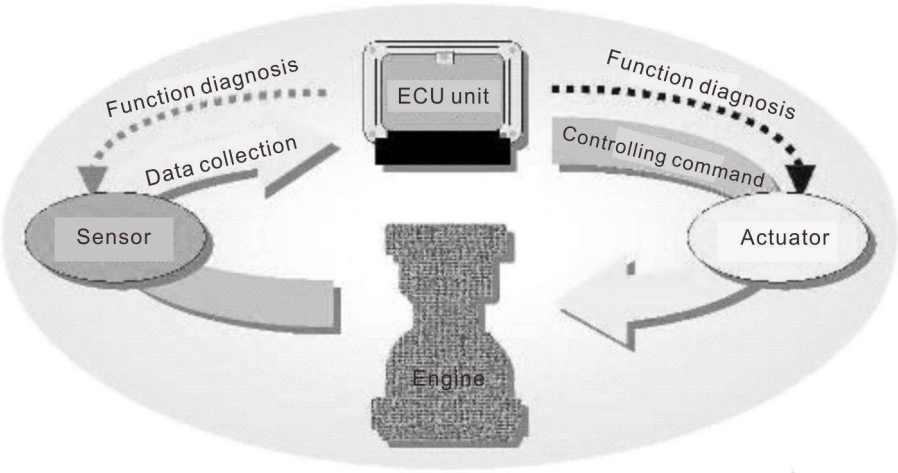


Figure 4.1 Principle diagram for EFI diagnosis system

4.2 Malfunction indicator light and control

Malfunction Indicator (MI): For indication when parts or system failure relates to emission, MI usually is a indicator light on dashboard with lawful shape.

The activation for MIL light shall be as below:

(1) Under normal mode, system without faults

Turn on ignition switch, the ECU starts initialization at once, from that, the MIL light keeps on. When engine started (Start vehicle), when ECU felt engine rotation, the MIL light goes off immediately.

(2) Under normal mode, system has faults in it

(3) Turn on ignition switch, the ECU starts initialization at once, from that, the MIL light keeps on. When engine started (Start vehicle), when ECU felt engine rotation, the MIL light still keeps on.

If troubleshooting already made, when vehicle has run for 3 circulations (Definition: Start vehicle, run by 5 seconds or meet demands of activation on corresponding parts, that is a circulation), then the MIL light goes off.

4.3 Steps for troubleshooting

For the models with OBD, their troubleshooting generally as below:

1. Connect diagnosis kit to its joint, then get it power on as Figure 1 shows.

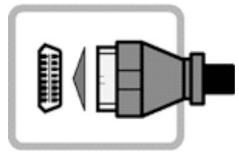


Figure 1

2. Connect ignition switch and get power on as Figure 2 shows.

Figure 2

3. Read fault message (Fault code, frozen-frame); Check maintenance manual for confirming failure parts or faults type; Make maintenance plan according to related message or experience as Figure 3 shows.



Figure 3

4. Make troubleshooting as Figure 4 shows.

Figure 4

5. Clean up memory storage; Suitably run the vehicle, the running must meet demands for fault diagnosis; Read faults message, confirm faults has already been cleared as Figure 5 shows.



Figure 5

4.4 Diagnosis kit connection

This system adopts communication agreement of wire “CAN” with standard diagnosis joint of ISO9141-2, which is fixing on wire of engine. Use stitch 16, 14, 6 and 4 on standard diagnosis joint on engine management system (EMS). The stitch 4 on diagnosis joint connects to stitch 111, 112, 63 and 64 on ECU, also connects to ground wire of vehicle, the stitch 14 and 6connecto stitch 17 and 1 on ECU, which is the wire CAN for engine, the stitch 16 connects to stitch 20 on ECU and connect to positive terminal of batter.

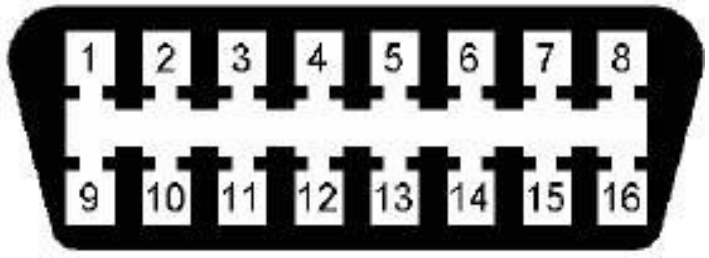


Figure 4.2 ISO9141-2 standard diagnosis joint

The ECU connect to out-sourced diagnosis kit through wire “CAN”, whose connection is as below:
(Functions and operations please refer to corresponding Chapters for diagnosis kit)
(1) Version message display
Engine message, hardware code for ECU and its software code.

(2) Faults display

Air intake pressure sensor, intake temperature sensor, engine temperature sensor, throttle valve sensor, oxygen sensor, heating wire for oxygen sensor, fuel injector, fuel pump relay, idling rotation, system voltage, ECU and MIL.

(3) Engine parameter display

Battery voltage, engine rotation, target idling, engine temperature, signal voltage for engine temperature sensor, air intake temperature, signal voltage for air intake temperature sensor, intake pressure, intake capacity, signal voltage for throttle valve sensor, valve opening width, relative valve position, power charging time, fuel injection pulse width, ignition advance angle, oxygen sensor short term correction, oxygen sensor voltage, oxygen sensor long term correction, engine relative loading, surrounding pressure, altitude corrective index, fuel injection phase and running time.

(4) EFI status display

Ignition wire end power on, main relay working, fuel pump relay working, reach idling rotation, reach engine working temperature, vehicle running, idling work condition, full loading condition, activate deceleration and slow down, activate acceleration and enrichment, activate fuel injection close loop, activate lambda control, activate gas mixture self-learning and MIL status.

(5) Test function for actuator

MIL, electric fuel pump, ignition and fuel injection.

4.5 Issues relate to project

System feature:

Positive sequential injection system;

Software and hardware structure of new modularization, with high portability;

Identify rotation signal by signal plate of 36-2 teeth;

Idling control through side air passage;

Achieve close loop control for idling rotation;

With heating-up for oxygen sensor;

With function of going back by limping.

5. System diagnosis and troubleshooting according to fault code

Explanation:

1. The fault already confirmed to be stable one, otherwise the diagnosis would be wrong.

2. The universal meter in following content means the digital one, please don't check circuit of EFI by the meter of pointer needle type.

3. Check and repair the vehicle with anti-theft function, if replace ECU is necessary in following steps, please make programming for the new ECU.

4. If fault code indicates a circuit with low voltage, which means there may have cutting off or short circuit against ground; If the code indicates too high the voltage, which means there may have short circuit to power supply; If the code indicates circuit fault, which means there may have cut off in circuit or several kinds of malfunctions in wires.

Diagnosis assistance:

1. Fault code fails to be erased, while the fault is stable; If it is accidental, please put focus on checking for dropping off of wire joint.

2. Already checked by steps above but no fault was found;

3. During checking and repairing, please pay attention to daily maintenance, cylinder pressure and mechanical timing, all above have effect on system;

4. Replace ECU for a new one, then test it.

If at this moment, the fault code can be erased, which means the malfunction is in ECU, but if at this moment the code still can't be erased, please replace the ECU back, repeat the procedure above once again, make checking and repair once again.

The form list below is what the codes stand for in EFI of current model, corresponding diagnosis and possible malfunctions, also includes how to deal with malfunctions, which could be reference in maintenance.

All stitches of ECU in following content are all setting actual wire diagram as standard, if actual diagram is needed, please contact service station.

Fault code: P0030 Heating control circuit cut off for oxygen sensor on upstream cylinder 1

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit from stitch of ECU to stitch 2 on oxygen sensor on upstream cylinder 1 cut off 2) Connective circuit from stitch 1 on oxygen sensor on upstream cylinder1 to main relay cut off. 3) Stitch 1 and 2 on oxygen sensor of upstream cylinder 1 cut off.	Maintenance reminder: Check items below: 1) Measure resistance between stitch on ECU connector and stitch 2 on oxygen sensor of upstream cylinder 1, judge its normal working. 2) Measure resistance between stitch 1 on oxygen sensor of upstream cylinder 1 and main relay, check their normal work. 3) Measure cutting off between stitch 1 and 2 on oxygen sensor and upstream cylinder 1.

Fault code: P 0050 Heating control circuit cut off for oxygen sensor on upstream cylinder 2

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit from stitch of ECU to stitch 2 on oxygen sensor on upstream cylinder 2 cut off 2) Connective circuit from stitch 1 on oxygen sensor on upstream cylinder2 to main relay cut off. 3) Stitch 1 and 2 on oxygen sensor of upstream cylinder 2 cut off.	Maintenance reminder: Check items below: 1) Measure resistance between stitch on ECU connector and stitch 2 on oxygen sensor of upstream cylinder 2, judge its normal working. 2) Measure resistance between stitch 1 on oxygen sensor of upstream cylinder 2 and main relay, check their normal work. 3) Measure cutting off between stitch 1 and 2 on oxygen sensor and upstream cylinder 2.

Fault code: P 0036 Heating control circuit cut off for downstream oxygen sensor

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit from stitch of ECU to stitch 2 on downstream oxygen sensor cut off 2) Connective circuit from stitch 1 on downstream oxygen sensor to main relay cut off. 3) Stitch 1 and 2 on downstream oxygen sensor 2 cut off.	Maintenance reminder: Check items below: 1) Measure resistance between stitch on ECU connector and stitch 2 on downstream oxygen sensor, judge its normal working. 2) Measure resistance between stitch 1 on downstream oxygen sensor and main relay, check their normal work. 3) Measure cutting off between stitch 1 and 2 on downstream oxygen sensor.

Fault code: P0031 Low voltage in heating control circuit for oxygen sensor on upstream cylinder 1

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit to stitch of ECU short against ground.	Maintenance reminder: Check items below: 1) Measure and check normal work for resistance from stitch of ECU to ground.

Fault code: P 0051 Low voltage in heating control circuit for oxygen sensor on upstream cylinder 2

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit to stitch of ECU short against ground.	Maintenance reminder: Check items below: 1) Measure and check normal work for resistance from stitch of ECU to ground.

Fault code: P 0137 Too low the voltage in oxygen sensor signal of downstream

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit to stitch of ECU short against ground.	Maintenance reminder: Check items below: 1) Measure and check normal work for resistance from stitch of ECU to ground.

Fault code: P0032 High voltage of heating control circuit for upstream cylinder 1 oxygen sensor

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit to stitch of ECU short circuit against stitch 1 of upstream oxygen sensor. 2) Connective circuit to stitch of ECU short circuit against other circuits of power supply	Maintenance reminder: Check items below: 1) Measure the normal voltage of ECU. 2) Measure resistance between ECU stitch and stitch 1 of oxygen sensor of upstream cylinder 1.

Fault code: P0032 High voltage of heating control circuit for upstream cylinder 2 oxygen sensor

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit to stitch of ECU short circuit against stitch 1 of upstream oxygen sensor. 2) Connective circuit to stitch of ECU short circuit against other circuits of power supply	Maintenance reminder: Check items below: 1) Measure the normal voltage of ECU. 2) Measure resistance between ECU stitch and stitch 1 of oxygen sensor of upstream cylinder 2.

Fault code: P0138 Too high voltage in oxygen sensor circuit of downstream

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Connective circuit to stitch of ECU short circuit against stitch 1 of downstream oxygen sensor. 2) Connective circuit to stitch of ECU short circuit against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure the normal voltage of ECU. 2) Measure resistance between ECU stitch and stitch 1 of downstream oxygen sensor.

Fault code: P0107 Low voltage in sensor circuit of air intake pressure

Maintenance reminder: Fault already confirmed, there may have problems below: 1) The ECU detected short circuit of sensor signal circuit against ground.	Maintenance reminder: Check items below: 1) Resistance between stitch of ECU and ground.

Fault code: P0108 High voltage in sensor circuit of air intake pressure

Maintenance reminder: Fault already confirmed, there may have problems below: 1) The ECU detected short circuit of sensor signal circuit against power supply.	Maintenance reminder: Check items below: 1) Voltage for ECU stitch.

Fault code: P0112 Low voltage for sensor signal of air intake temperature

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short between sensor signal circuit of ECU stitch and ground.	Maintenance reminder: Check items below: 1) Measure resistance between sensor signal circuit of ECU and ground.

Fault code: P0113 High voltage for sensor signal of air intake temperature

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short between sensor signal circuit of ECU stitch and power supply.	Maintenance reminder: Check items below: 1) Measure and confirm the normal voltage for sensor signal circuit of ECU stitch.

Fault code: P0117 Low voltage in engine temperature sensor

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short between ECU stitch and ground.	Maintenance reminder: Check items below: 1) Measure resistance between ECU stitch and ground.

Fault code: P0118 High voltage in sensor circuit for engine temperature

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short between ECU stitch and other circuits of power supply	Maintenance reminder: Check items below: 1) Measure and confirm normal voltage in circuit connects to ECU stitch.

Fault code: P0122 Low voltage of signal from position sensor 1 for electric throttle valve

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short of ECU stitch against ground.	Maintenance reminder: Check items below: 1) Measure resistance between ECU stitch and ground.

Fault code: P0123 High voltage of signal from position sensor 1 for electric throttle valve

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short of ECU stitch against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure and confirm normal voltage in circuit connects to ECU stitch.

Fault code: P0131 Low voltage of sensor signal on upstream cylinder 1

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short in signal circuit connects to ECU stitch.	Maintenance reminder: Check items below: 1) Measure resistance in signal circuit connects from ECU stitch to ground.

Fault code: P0151 Too low the voltage in oxygen sensor signal of upstream cylinder 2

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short in signal circuit connects to ECU stitch against ground.	Maintenance reminder: Check items below: 1) Measure resistance in signal circuit connects from ECU stitch to ground.

Fault code: P0137 Too low the voltage in oxygen sensor signal of downstream

Maintenance reminder: Fault already confirmed, there may have problems below: Circuit short in signal circuit connects to ECU stitch against ground.	Maintenance reminder: Check items below: Measure resistance in signal circuit connects from ECU stitch to ground.

Fault code: P0132 Too high voltage in oxygen sensor circuit of upstream cylinder 1

Fault introduction: When engine started, the ECU measures voltage in oxygen sensor circuit, when the signal voltage is higher than 1.5V for a long while, there is short circuit of oxygen sensor signal against power supply.

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short in signal circuit connects to ECU stitch against stitch 1 of oxygen sensor on upstream cylinder 1. 2) Circuit short in signal circuit connects to ECU stitch against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure resistance in signal circuit of ECU stitch connects to stitch 1 of oxygen sensor on upstream cylinder 1. 2) Measure voltage in signal circuit connects to ECU stitch.

Fault code: P0152 Too high the voltage in signal circuit of oxygen sensor on upstream cylinder 2.

Fault introduction: When engine started, the ECU measures voltage in oxygen sensor circuit, when the signal voltage is higher than 1.5V for a long while, there is short circuit of oxygen sensor signal against power supply.

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short in signal circuit connects to ECU stitch against stitch 1 of oxygen sensor on upstream cylinder 2. 2) Circuit short in signal circuit connects to ECU stitch against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure resistance in signal circuit of ECU stitch connects to stitch 1 of oxygen sensor on upstream cylinder 2. 2) Measure voltage in signal circuit connects to ECU stitch.

Fault code: P0138: Too high voltage in oxygen sensor circuit of downstream

Fault introduction: When engine started, the ECU measures voltage in oxygen sensor circuit, when the signal voltage is higher than 1.5V for a long while, there is short circuit of oxygen sensor signal against power supply.

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit short in signal circuit connects to ECU stitch against stitch 1 of oxygen sensor of downstream. 2) Circuit short in signal circuit connects to ECU stitch against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure resistance in signal circuit of ECU stitch connects to stitch 1 of oxygen sensor of downstream. 2) Measure voltage in signal circuit connects to ECU stitch.

Fault code: P0134 Faults in circuit signal of oxygen sensor on upstream cylinder 1

Fault introduction: When engine started, the ECU measures voltage in oxygen sensor circuit, when the signal voltage is changing between 0.4-0.6V for a long while, the system judges there is fault of circuit cut off in oxygen sensor signal

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit cut off between ECU stitch and oxygen sensor on upstream cylinder 1. 2) Poor contact on connectors of oxygen sensor on upstream cylinder 1. (Stitch oxidized).	Maintenance reminder: Check items below: 1) Measure resistance between ECU connectors and stitch 4 of oxygen sensor on upstream cylinder 1.

Fault code: P0154 Faults in circuit signal of oxygen sensor on upstream cylinder 2

Fault introduction: When engine started, the ECU measures voltage in oxygen sensor circuit, when the signal voltage is changing between 0.4-0.6V for a long while, the system judges there is fault of circuit cut off in oxygen sensor signal.

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit cut off between ECU stitch and oxygen sensor on upstream cylinder 2. 2) Poor contact on connectors of oxygen sensor on upstream cylinder 2. (Stitch oxidized).	Maintenance reminder: Check items below: 1) Measure resistance between ECU connectors and stitch 4 of oxygen sensor on upstream cylinder 2.

Fault code: P0138 Too high voltage in oxygen sensor circuit of downstream

Fault introduction: When engine started, the ECU measures voltage in oxygen sensor circuit, when the signal voltage is changing between 0.4-0.6V for a long while, the system judges there is fault of circuit cut off in oxygen sensor signal.

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit cut off between ECU stitch and oxygen sensor of downstream. 2) Poor contact on connectors of oxygen sensor of downstream. (Stitch oxidized).	Maintenance reminder: Check items below: 1) Measure resistance between ECU connectors and stitch 4 of oxygen sensor of downstream.

Fault code: P0201 Circuit cut off in fuel injector control of cylinder 1

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Cutting off in coil of fuel injector of cylinder 1. 2) Poor contact between connector stitch of fuel injector of cylinder 1 and stitch of ECU. 3) Poor connection between connector stitch of fuel injector of cylinder 1 and main relay.	Maintenance reminder: Check items below: 1) Poor connection from connector stitch of fuel injector of cylinder 1 to ECU stitch. 2) Poor connection from connector stitch of fuel injector of cylinder 1 to main relay.

Fault code: P0202 Circuit cut off in fuel injector control of cylinder 2

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Cutting off in coil of fuel injector of cylinder 2. 2) Poor contact between connector stitch of fuel injector of cylinder 2 and stitch of ECU. 3) Poor connection between connector stitch of fuel injector of cylinder 2 and main relay.	Maintenance reminder: Check items below: 1) Poor connection from connector stitch of fuel injector of cylinder 2 to ECU stitch. 2) Poor connection from connector stitch of fuel injector of cylinder 2 to main relay.

Fault code: P0261 Short circuit on controlling circuit of fuel injector of cylinder 1 against ground

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Each driving circuit connects to ECU stitch short circuit against ground.	Maintenance reminder: Check items below: 1) Measure resistance in circuit connects from ECU stitch to ground.

Fault code: P0264 Short circuit on controlling circuit of fuel injector of cylinder 2 against ground

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Each driving circuit connects to ECU stitch short circuit against ground.	Maintenance reminder: Check items below: 1) Measure resistance in circuit connects from ECU stitch to ground.

Fault code: P0262 Short circuit on controlling circuit of fuel injector of cylinder 1 against to other circuits of power supply

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit connects to ECU stitch short circuit against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure voltage of circuits connect to ECU stitch.

Fault code: P0265 Short circuit on controlling circuit of fuel injector of cylinder 2 against to other circuits of power supply

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuit connects to ECU stitch short circuit against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure voltage of circuits connect to ECU stitch.

Fault code: P0563 Too high the battery voltage

Maintenance reminder: Fault already confirmed, there may have problems below: 1) The power generator damaged or battery power leaks. 2) Excitation circuit of generator cuts off. 3) Adjustor of generator damaged and failed to control power generation which lead to high power output.	Maintenance reminder: Check items below: 1) Check power generation ability for generator (Measure its voltage when it started).

Fault code: P 0627 Control circuit of fuel pump relay cuts off

Fault code: P 0629 Control circuit of fuel pump relay shorts circuit against power supply

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Cut off/short against ground/power supply in control circuit of fuel pump relay connects to ECU. 2) Circuit cuts off between relay and the main one. 3) Circuits cuts off between relay and solenoid coil.	Maintenance reminder: Check items below: 1) Resistance of voltage in control circuit of fuel pump relay connects to ECU. 2) Resistance between relay and main relay. 3) Resistance between both stitches of relay.

Fault code: P 1098 Lower effective trigging of side rolling switch

Maintenance reminder: Fault already confirmed, there may have problems below: The side rolling angle is bigger than 60, the switch may work.	Maintenance reminder: Check items below: When the vehicle fell off, then get it upright, turn the key on to start engine, when vehicle worked for three circulations, the malfunction indicator light goes off; Also can erase fault code manually; Turn off the key without starting vehicle, fully open the throttle, turn on the key and keep over 5 seconds, then turn the key off, then the malfunction indicator light goes off; *Definition for working circulation: Start vehicle and keep for 5 seconds or above, or meet activation demands of corresponding parts, this means a working circulation.

Fault code: P1116 Coolant overheat alarm

Maintenance reminder: Fault already confirmed, there may have problems below: When engine coolant overheated, its alarming light on meter goes on.	Maintenance reminder: Check items below: Cool down engine until coolant alarm light went off, turn the key on to start engine, when vehicle worked for three circulations, the malfunction indicator light goes off; Also can erase fault code manually; Turn off the key without starting vehicle, fully open the throttle, turn on the key and keep over 5 seconds, then turn the key off, then the malfunction indicator light goes off; *Definition for working circulation: Start vehicle and keep for 5 seconds or above, or meet activation demands of corresponding parts, this means a working circulation.

Fault code: P2122 Low voltage of signal from position sensor 1 for electric throttle pedal

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Each driving circuit connects to ECU stitch shorts circuit against ground.	Maintenance reminder: Check items below: 1) Measure resistance in circuits connect to ECU stitch against ground.

Fault code: P2123 High voltage of signal from position sensor 1 for electric throttle pedal

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuits connect to ECU stitch short circuit against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure and confirm voltage in circuits connect to ECU stitch.

Fault code: P2127 Low voltage of signal from position sensor 2 for electric throttle pedal

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Each driving circuit connects to ECU stitch shorts circuit against ground.	Maintenance reminder: Check items below: 1) Measure resistance in circuits connect to ECU stitch against ground.

Fault code: P2128 High voltage of signal from position sensor 2 for electric throttle pedal

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuits connect to ECU stitch short circuit against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure and confirm voltage in circuits connect to ECU stitch.

Fault code: P0122 Low voltage of signal from position sensor 1 for electric throttle valve

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Each driving circuit connects to ECU stitch shorts circuit against ground. 2) Poor connection between connector stitch and harness wire.	Maintenance reminder: Check items below: 1) Measure resistance in circuits connect to ECU stitch against ground. 2) Poor connection between connector stitch and wire harness

Fault code: P0123 High voltage of signal from position sensor 1 for electric throttle valve

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuits connect to ECU stitch short circuit against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure and confirm voltage in circuits connect to ECU stitch.

Fault code: P0222 Low voltage of signal from position sensor 2 for electric throttle valve

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Each driving circuit connects to ECU stitch shorts circuit against ground.	Maintenance reminder: Check items below: 1) Measure resistance in circuits connect to ECU stitch against ground.

Fault code: P0223 High voltage of signal from position sensor 2 for electric throttle valve

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Circuits connect to ECU stitch short circuit against other circuits of power supply.	Maintenance reminder: Check items below: 1) Measure and confirm voltage in circuits connect to ECU stitch.

Fault code: P0568 Incorrect voltage for cruising control signal

Fault cause introduction: Key for cruising control circuit and cruising control itself locked up or pressed down and kept for a long while, it shows you fault P0568

Maintenance reminder: Fault already confirmed, there may have problems below: 1) Poor contact for cruising control key, short circuit from ECU to other circuits.	Maintenance reminder: Check items below: 1) Normal work of cruising control key, normal voltage output of pressing key.

6. Diagnosis procedure for checking and repair according to faults

Before diagnosis for engine faults, make primary inspection first:

1. Confirm normal working for engine malfunction indicator light;
2. Make inspection by diagnosis kit, make sure there is not any fault record;
3. Confirm the fault from user complaint, also confirm the root cause for fault.

Then check is appearance:

(1) Check if there is fuel leaking from hose;

(2) Check crack, twist or connection for vacuum hose.

(3) Check Locking-up, leaks or squeeze on air intake hose.

(4) Check crack, aging and ignition order for high voltage wire of ignition system.

(5) Check if the connecting place of wires to ground clean and firm.

(6) Confirm poor contact of flexibility for joints of sensors and actuators.

Important reminder: If conditions above exist, make maintenance against the faults, otherwise they are bad for following diagnosis and maintenance.

Diagnosis assistance:

1. Confirm there is not any fault record for engine.
2. Confirm the fault from complaint is real.
3. Already checked according to conditions above and without problems.
4. Pay attention to maintenance, cylinder pressure, mechanical timing and fuel during diagnosis and repair.
5. Replace ECU for a new one and make test.

If at the moment, then troubleshooting could be done, the faults are in ECU, if faults remain, replace the ECU for the original one, repeat the procedure once again, then start the diagnosis and repair once again.

(1) Engine doesn't work or slowly run when it started.

(2) When starting, the engine could be dragged but failed to start.

(3) Hard starting under hot condition.

(4) Hard starting under cold condition.

(5) Rotation is normal, but start hard at any time.

(6) Start normally, but idling is unstable at any time.

(7) Start normally, but idling is unstable during engine warming up.

(8) Start normally, but idling is unstable when engine warmed up.

(9) Start normally, but idling is unstable when it is partly loaded (Open headlight) or goes off at once.

(10) Start normally but with high idling.

(11) Rotation speeding-up failed when accelerating or ignition off.

(12) Slow response when accelerating.

(13) Powerless acceleration with poor performance.

(14) Turn the accelerator but it doesn't work or engine power output without changes.

(15) Cruising under stable speed failed.

(1) Engine doesn't work or slowly run when it started.

Fault positions usually are: 1. Battery 2. Starting motor 3. Wire or ignition switch 4. Mechanical part of engine.

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check voltage between terminals of batter by universal meter, the voltage shall be within 8-12V when engine is starting.	Yes	Next step
		No	Replace battery
2	Keep ignition switch at working place, check and confirm the voltage at positive terminal of starting motor is above 8V by universal meter.	Yes	Next step
		No	Repair or replace wire
3	Remove starting motor and check its work. Put focus on locking up due to circuit cut off or poor lubrication.	Yes	Repair or replace starting motor
		No	Next step
4	If faults are all in winter, check if there is strong resistance on starting motor due to wrong lubricant.	Yes	Replace lubricant for suitable specification
		No	Next step
5	Confirm if the internal mechanical resistance of engine is too strong, which leads to motor failure or bad work.	Yes	Check and repair internal resistance of engine
		No	Next step

(2) When starting, the engine could be dragged but failed to start.

Fault positions usually are: 1. No fuel in tank 2. Fuel pump 3. Crankshaft phase sensor 4. Ignition coil 5. Mechanical part of engine.

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Connect to fuel pressure gauge (Joint point is at front end of fuel inlet hose of injector), turn on ignition switch, repeat several or start engine for times if it is needed, check and confirm fuel pressure is around 500kPa.	Yes	Next step
		No	Check fuel supply system
2	Connect diagnosis kit of EFI, check data of “Engine rotation”, start engine and check signal output for rotation.	Yes	Next step
		No	Check circuit for crankshaft phase sensor
3	Pull off ignition coil, connect to spark plug, get its terminal apart from vehicle body by 5mm, start engine and check if there is white or blue spark.	Yes	Next step
		No	Check ignition system
4	Check pressure in cylinder, check confirm enough pressure.	Yes	Make troubleshooting for engine mechanical failures
		No	Next step
5	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(3) Hard starting under hot condition

Fault positions usually are: 1. Fuel with moisture 2. Fuel pump 3. Engine temperature sensor 4. Ignition coil

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Connect to fuel pressure gauge (Joint point is at front end of fuel inlet hose of injector), turn on ignition switch, repeat several or start engine for times if it is needed, check and confirm fuel pressure is around 500kPa.	Yes	Next step
		No	Check fuel supply system
2	Pull off connector for engine temperature sensor, start engine and check its work. (Or connect a series resistance of 300Ω for substitution for temperature sensor, then check if starting success.	Yes	Next step
		No	Check circuit or replace sensor
3	Pull off ignition coil, connect to spark plug, get its terminal apart from vehicle body by 5mm, start engine and check if there is white or blue spark.	Yes	Next step
		No	Check ignition system
4	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step
5	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(4) Hard starting under cold condition

Fault positions usually are: 1. Fuel with moisture 2. Fuel pump 3. Engine temperature sensor 4. Fuel injector 5. Ignition coil 6. Throttle valve body and air passage beside 7. Engine mechanical part

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Connect to fuel pressure gauge (Joint point is at front end of fuel inlet hose of injector), turn on ignition switch, repeat several or start engine for times if it is needed, check and confirm fuel pressure is around 500kPa.	Yes	Next step
		No	Check fuel supply system
2	Pull off connector for engine temperature sensor, start engine and check its work. (Or connect a series resistance of 300Ω for substitution for temperature sensor, then check if starting success.	Yes	Next step
		No	Check circuit or replace sensor
3	Pull off ignition coil, connect to spark plug, get its terminal apart from vehicle body by 5mm, start engine and check if there is white or blue spark.	Yes	Next step
		No	Check ignition system
4	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step
5	Remove fuel injector, check leakage and blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step

Hard starting under cold condition (Next to page above)

Ref. No.	Operation steps	Result	Following steps
6	Check pressure in cylinder, check confirm enough pressure.	Yes	Make troubleshooting for engine mechanical failures
		No	Next step
7	Slightly turn the accelerator to confirm easy staring.	Yes	Wash throttle valve body and idling air passage beside it
		No	Next step
8	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(5) Rotation is normal, but start hard at any time.

Fault positions usually are: 1. Fuel with moisture 2. Fuel pump 3. Engine temperature sensor 4. Fuel injector 5. Ignition coil 6. Throttle valve body and idling air passage beside it 7. Air intake passage 8. Spark timing 9. Spark plug 10. Engine mechanical part

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Connect to fuel pressure gauge (Joint point is at front end of fuel inlet hose of injector), turn on ignition switch, repeat several or start engine for times if it is needed, check and confirm fuel pressure is around 500kPa.	Yes	Next step
		No	Check fuel supply system

Rotation is normal, but start hard at any time. (Next to page above)

Ref. No.	Operation steps	Result	Following steps
2	Pull off connector for engine temperature sensor, start engine and check its work. (Or connect a series resistance of 300Ω for substitution for temperature sensor, then check if starting success.	Yes	Next step
		No	Check circuit or replace sensor
3	Pull off ignition coil, connect to spark plug, get its terminal apart from vehicle body by 5mm, start engine and check if there is white or blue spark.	Yes	Next step
		No	Check ignition system
4	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step
5	Check and confirm the mechanical ignition timing meets specification.	Yes	Next step
		No	Check timing ignition kit
6	Check pressure in cylinder, check confirm enough pressure.	Yes	Make troubleshooting for engine mechanical failures
		No	Next step

Rotation is normal, but start hard at any time. (Next to page above)

Ref. No.	Operation steps	Result	Following steps
7	Slightly turn the accelerator to confirm easy staring.	Yes	Wash throttle valve body and idling air passage beside it
		No	Next step
8	Remove fuel injector, check leakage or blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step
9	Check blocking-up in air filter, confirm if there is air leaks in air intake passage.	Yes	Check air intake system
		No	Next step
10	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Next step
		No	Adjust or replace
11	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(6) Start normally, but idling is unstable at any time.

Fault positions usually are: 1. Fuel with moisture 2. Fuel injector 3. Spark plug 4. Throttle valve body and idling air passage beside 5. Air intake passage 6. Idling adjustor 7. Ignition timing 8. Spark plug 9. Engine mechanical part

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check if the idling adjustor is jamming.	Yes	Wash or replace
		No	Next step
2	Check if there is carbon buildup in throttle valve body or idling air passage beside.	Yes	Wash
		No	Next step
3	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step
4	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

Start normally, but idling is unstable at any time. (Next to page above)

Ref. No.	Operation steps	Result	Following steps
5	Check pressure in cylinder, check confirm enough pressure.	Yes	Make troubleshooting for engine mechanical failures
		No	Next step
6	Remove fuel injector, check leakage or blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step
7	Check blocking-up in air filter, confirm if there is air leaks in air intake passage.	Yes	Check air intake system
		No	Next step
8	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Next step
		No	Adjust or replace
9	Check if mechanical ignition timing kit of engine meets standard.	Yes	Next step
		No	Check and repair ignition timing kit

(7) Start normally, but idling is unstable during engine warming up

Fault positions usually are: 1. Fuel with moisture 2. Engine temperature sensor 3. Spark plug 4. Throttle valve body and idling air passage beside 5. Air intake passage 6. Idling adjustor 7. Engine mechanical part

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check blocking-up in air filter, confirm if there is air leaks in air intake passage.	Yes	Check air intake system
		No	Next step
2	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Next step
		No	Adjust or replace
3	Check if there is carbon buildup in throttle valve body or idling air passage beside.	Yes	Wash
		No	Next step
4	Remove joint of engine temperature sensor, start engine and check if idling is unstable.	Yes	Next step
		No	Check circuit or replace sensor
5	Remove fuel injector, check leakage or blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step

Start normally, but idling is unstable during engine warming up (Next to page above)

Ref. No.	Operation steps	Result	Following steps
6	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step
7	Check pressure in cylinder, check confirm enough pressure.	Yes	Make troubleshooting for engine mechanical failures
		No	Next step
8	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(8) Start normally, but idling is unstable when engine warmed up.

Fault positions usually are: 1. Fuel with moisture 2. Engine temperature sensor 3. Spark plug 4. Throttle valve body and idling air passage beside it 5. Air intake passage 6. Idling adjustor 7. Engine mechanical part

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check blocking-up in air filter, confirm if there is air leaks in air intake passage.	Yes	Check air intake system
		No	Next step

Start normally, but idling is unstable when engine warmed up (Next to page above)

Ref. No.	Operation steps	Result	Following steps
2	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Next step
		No	Adjust or replace
3	Check if there is carbon buildup in throttle valve body or idling air passage beside.	Yes	Wash
		No	Next step
4	Remove joint of engine temperature sensor, start engine and check if idling is unstable.	Yes	Next step
		No	Check circuit or replace sensor
5	Remove fuel injector, check leakage or blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step
6	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step

Start normally, but idling is unstable when engine warmed up (Next to page above)

Ref. No.	Operation steps	Result	Following steps
7	Check pressure in cylinder, check confirm enough pressure.	Yes	Make troubleshooting for engine mechanical failures
		No	Next step
8	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(9) Start normally, but idling is unstable when it is partly loaded (Open headlight) or goes off at once
Fault positions usually are: 1. Idling adjustor 2. Fuel injector
Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check if there is carbon buildup in throttle valve body or idling air passage beside.	Yes	Wash
		No	Next step
2	Remove fuel injector, check leakage or blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step

Start normally, but idling is unstable when it is partly loaded (Open headlight) or goes off at once (Next to page above)

Ref. No.	Operation steps	Result	Following steps
3	Check if engine power output raises up when there is loading, which means check advance angle for ignition by EFI diagnosis kit, also check the changes for pulse width for fuel injection and air intake capacity.	Yes	To step 4
		No	Next step
4	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(10) Start normally but with high idling.

Fault positions usually are: 1. Throttle valve body and idling air passage beside 2. Vacuum tube 3. Idling adjustor 4. Engine temperature sensor 5. Ignition timing

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check if there is carbon buildup in throttle valve body or idling air passage beside.	Yes	Wash
		No	Next step
2	Check if accelerator was blocked-up.	Yes	Adjust or replace
		No	Next step

Start normally but with high idling (Next to page above)

Ref. No.	Operation steps	Result	Following steps
3	Check connection for air intake kit and air leaks on vacuum hose.	Yes	Check and repair air intake kit
		No	Next step
4	Remove joint of engine temperature sensor, start engine and check if idling is too high.	Yes	Check circuit or replace sensor
		No	Next step
5	Check if mechanical ignition timing kit of engine meets standard.	Yes	Next step
		No	Check and repair ignition timing kit
6	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(11) Rotation speeding-up failed when accelerating or ignition off.

Fault positions usually are: 1. Fuel with moisture 2. Air intake pressure sensor and throttle valve position sensor 3. Spark plug 4. Throttle valve body and idling air passage beside 5. Air intake passage 6. Idling adjustor 7. Fuel injector 8. Ignition timing 9. Air exhaust pipe

Diagnosis procedure usually is:

Rotation speeding-up failed when accelerating or ignition off. (Next to page above)

Ref. No.	Operation steps	Result	Following steps
1	Check blocking-up in air filter, confirm if there is air leaks in air intake passage.	Yes	Check air intake system
		No	Next step
2	Connect to fuel pressure gauge (Joint point is at front end of fuel inlet hose of injector), turn on ignition switch, repeat several or start engine for times if it is needed, check and confirm fuel pressure is around 500kPa.	Yes	Next step
		No	Check fuel supply system
3	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Next step
		No	Adjust or replace
4	Check if there is carbon buildup in throttle valve body or idling air passage beside.	Yes	Wash
		No	Next step
5	Check air intake pressure sensor, throttle valve position sensor and their circuit.	Yes	Next step
		No	Check circuit or replace sensor

Rotation speeding-up failed when accelerating or ignition off. (Next to page above)

Ref. No.	Operation steps	Result	Following steps
6	Remove fuel injector, check leakage or blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step
7	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step
8	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Next step
		No	Adjust or replace
9	Check smooth work of air exhaust pipe.	Yes	Next step
		No	Repair or replace air exhaust pipe
10	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(12) Slow response when accelerating.

Fault positions usually are: 1. Fuel with moisture 2. Air intake pressure sensor and throttle valve position sensor 3. Spark plug 4. Throttle valve body and idling air passage beside 5. Air intake passage 6. Idling adjustor 7. Fuel injector 8. Ignition timing 9. Air exhaust pipe

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check blocking-up in air filter, confirm if there is air leaks in air intake passage.	Yes	Check air intake system
		No	Next step
2	Connect to fuel pressure gauge (Joint point is at front end of fuel inlet hose of injector), turn on ignition switch, repeat several or start engine for times if it is needed, check and confirm fuel pressure is around 500kPa.	Yes	Next step
		No	Check fuel supply system
3	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Next step
		No	Adjust or replace
4	Check if there is carbon buildup in throttle valve body or idling air passage beside.	Yes	Wash
		No	Next step
5	Check air intake pressure sensor, throttle valve position sensor and their circuit.	Yes	Next step
		No	Check circuit or replace sensor

Slow response when accelerating (Next to page above)

Ref. No.	Operation steps	Result	Following steps
6	Remove fuel injector, check leakage or blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step
7	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step
8	Check if ignition timing of engine meets standard.	Yes	Next step
		No	Check and repair ignition timing
9	Check smooth work of air exhaust pipe.	Yes	Next step
		No	Repair or replace air exhaust pipe
10	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(13) Powerless acceleration with poor performance.

Fault positions usually are: 1. Fuel with moisture 2. Air intake pressure sensor and throttle valve position sensor 3. Spark plug 4. Ignition coil 5. Throttle valve body and idling air passage beside 6. Air intake passage 7. Idling adjustor 8. Fuel injector 9. Ignition timing 10. Air exhaust pipe

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check if there is clutch skidding, low pressure in tire, dragging brake and wrong tire size.	Yes	Repair
		No	Next step
2	Check blocking-up in air filter, confirm if there is air leaks in air intake passage.	Yes	Check air intake system
		No	Next step
3	Connect to fuel pressure gauge (Joint point is at front end of fuel inlet hose of injector), turn on ignition switch, repeat several or start engine for times if it is needed, check and confirm fuel pressure is around 500kPa.	Yes	Next step
		No	Check fuel supply system
4	Pull off ignition coil connect it to spark plug, keep spark plug 5mm to engine body, start engine to check strength of ignition.	Yes	Next step
		No	Check ignition kit
5	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Next step
		No	Adjust or replace

Powerless acceleration with poor performance. (Next to page above)

Ref. No.	Operation steps	Result	Following steps
6	Check spark plug, check and confirm its specification and gap meet standard.	Yes	Wash
		No	Next step
7	Check air intake pressure sensor, throttle valve position sensor and their circuit.	Yes	Next step
		No	Check circuit or replace sensor
8	Remove fuel injector, check leakage or blocking-up by its washing analyzer.	Yes	Replace fuel injector
		No	Next step
9	Check fuel, confirm if fault occurs right after accelerated.	Yes	Replace fuel
		No	Next step
10	Check if ignition timing of engine meets standard.	Yes	Next step
		No	Check and repair ignition timing

Powerless acceleration with poor performance. (Next to page above)

Ref. No.	Operation steps	Result	Following steps
11	Check smooth work of air exhaust pipe.	Yes	Next step
		No	Repair or replace air exhaust pipe
12	Connect to adapter of EFI, turn on ignition switch, check power supply on stitch 15#, 16# and 20#; Check iron wire for stitch 63#, 64#, 83#, 84#, 111# and 112#.	Yes	Diagnosis assistance
		No	Check and repair corresponding wires

(14) Turn the accelerator but it doesn't work or engine power output without changes.

Fault positions usually are: 1. Accelerator connectors 2. Accelerator voltage output 3. Electric throttle valve connectors

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check connector of accelerator and circuit of wires on vehicle.	Yes	Next step
		No	Circuit checking and repair
2	Check voltage output of accelerator.	Yes	Next step
		No	Circuit checking and repair or replace sensors

Turn the accelerator but it doesn't work or engine power output without changes. (Next to page above)

Ref. No.	Operation steps	Result	Following steps
3	Check circuit for connector of accelerator.	Yes	Next step
		No	Circuit checking and repair or replace sensor

(15) Cruising under stable speed failed

Fault positions usually are: 1. Cruising control button 2. Cruising control connectors 3. Braking signal 4. Clutch signal 5. Speed signal

Diagnosis procedure usually is:

Ref. No.	Operation steps	Result	Following steps
1	Check if sometimes the cruising control button doesn't work.	Yes	Next step
		No	Circuit checking and repair or replace sensor
2	Check circuit for connectors of cruising control.	Yes	Next step
		No	Circuit checking and repair or replace sensor
3	Check braking signal.	Yes	Next step
		No	Circuit checking and repair or replace sensor

Cruising under stable speed failed (Next to page above)

Ref. No.	Operation steps	Result	Following steps
4	Check clutch signal.	Yes	Next step
		No	Circuit checking and repair or replace sensor
5	Check speed signal.	Yes	Next step
		No	Circuit checking and repair or replace sensor

7. Fault code (PCODE) list

Ref. No.	PCODE	Introduction (UAES)
1	P0030	Heating control circuit cut off for oxygen sensor on upstream cylinder 1
2	P0031	Low voltage in heating control circuit for oxygen sensor on upstream cylinder 1
3	P0032	High voltage of heating control circuit for upstream cylinder 1 oxygen sensor
4	P0036	Heating control circuit cut off for downstream oxygen sensor
5	P0037	Low voltage in heating control circuit for downstream oxygen sensor
6	P0038	High voltage in heating control circuit for downstream oxygen sensor
7	P0050	Heating control circuit cut off for oxygen sensor on upstream cylinder 2
8	P0051	Low voltage in heating control circuit for oxygen sensor on upstream cylinder 2

Fault code (PCODE) list (Next to page above)

Ref. No.	PCODE	Introduction (UAES)
9	P0052	High voltage of heating control circuit for upstream cylinder 2 oxygen sensor
10	P0107	Low voltage in sensor circuit of air intake pressure
11	P0108	High voltage in sensor circuit of air intake pressure
12	P0112	Low voltage for sensor signal of air intake temperature
13	P0113	High voltage for sensor signal of air intake temperature
14	P0117	Low voltage in engine temperature sensor
15	P0118	High voltage in sensor circuit for engine temperature
16	P0121	Wrong signal for position sensor 1 of electric throttle valve
17	P0122	Too low the voltage in sensor circuit of throttle valve position
18	P0123	High voltage of signal from position sensor 1 for electric throttle valve
19	P0130	Wrong signal for upstream cylinder 1 oxygen sensor
20	P0131	Too low the voltage of oxygen sensor signal on upstream cylinder 1
21	P0132	Too high voltage in oxygen sensor circuit of upstream cylinder 1
22	P0134	Faults in circuit signal of oxygen sensor on upstream cylinder 1
23	P0136	Faults in circuit signal of downstream oxygen sensor
24	P0137	Too low the voltage in oxygen sensor signal of downstream
25	P0138	Too high voltage in oxygen sensor circuit of downstream

Fault code (PCODE) list (Next to page above)

Ref. No.	PCODE	Introduction (UAES)
26	P0150	Wrong signal for oxygen sensor of upstream cylinder 2
27	P0151	Too low the voltage in oxygen sensor signal of upstream cylinder 2
28	P0152	Too high the voltage in signal circuit of oxygen sensor on upstream cylinder 2
29	P0154	Faults in circuit signal of oxygen sensor on upstream cylinder 2
30	P0201	Circuit cut off in fuel injector control of cylinder 1
31	P0202	Circuit cut off in fuel injector control of cylinder 2
32	P0221	Wong signal for position sensor 2 of electric throttle valve
33	P0222	Low voltage of signal from position sensor 2 for electric throttle valve
34	P0223	High voltage of signal from position sensor 2 for electric throttle valve
35	P0261	Short circuit on controlling circuit of fuel injector of cylinder 1 against ground
36	P0262	Short circuit on controlling circuit of fuel injector of cylinder 1 against to other circuits of power supply
37	P0264	Short circuit on controlling circuit of fuel injector of cylinder 2 against ground
38	P0265	Short circuit on controlling circuit of fuel injector of cylinder 2 against to other circuits of power supply
39	P0300	Catch fire
40	P0301	Cylinder 1 catch fire
41	P0302	Cylinder 2 catch fire
42	P0322	Sensor pulse signal without rotation (Short circuit or cut off)

Fault code (PCODE) list (Next to page above)

Ref. No.	PCODE	Introduction (UAES)
43	P0480	Fan control circuit cut
44	P0563	Too high the battery voltage
45	P0627	Control circuit of fuel pump relay cuts off
46	P0629	Control circuit of fuel pump relay shorts circuit against power supply
47	P0691	Fan control circuit short against ground
48	P0692	Fan control circuit short against power supply
49	P1098	Lower effective trigging of side rolling switch
50	P1099	Too high voltage of rolling sensor signal
51	P2106	Driving kit fault for electric throttle valve
52	P2122	ow voltage of signal from position sensor 1 for electric throttle pedal
53	P2123	High voltage of signal from position sensor 1 for electric throttle pedal
54	P2127	Low voltage of signal from position sensor 2 for electric throttle pedal
55	P2128	High voltage of signal from position sensor 2 for electric throttle pedal
56	P2138	Wrong signal for sensor signal of electric throttle pedal position
57	P2232	Wrong signal for downstream oxygen sensor
58	P2300	Low voltage for control circuit of cylinder 1 ignition coil
59	P2301	High voltage for control circuit of cylinder 1 ignition coil

Fault code (PCODE) list (Next to page above)

Ref. No.	PCODE	Introduction (UAES)
60	P2303	Low voltage for control circuit of cylinder 2 ignition coil
61	P2304	High voltage for control circuit of cylinder 2 ignition coil
62	P2A0C	Low voltage in sensor 2 circuit for air intake pressure
63	P2A0D	High voltage in sensor 2 circuit for air intake pressure

Note: Above is all PCODE for controller.

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