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- There is a possibility that this unit is inapplicable to some of the vehicle models or systems listed in the diagnosis section due to different countries, areas, and/or years. Do not hesitate to contact ANCEL if you come across such questions. We are to help you solve the problem as soon as possible.

## **Disclaimer**

- To take full advantage of the unit, you should be familiar with the engine.
- All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make change at any time without notice.
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## **Safety Precautions and Warnings**

To prevent personal injury or damage to vehicles and/or this tool, please read this user's manual first carefully and observe the following safety precautions at a minimum whenever working on a vehicle:

- Always perform automotive testing in a safe environment.
- Do not attempt to operate or observe the tool while driving a vehicle. Operating or observing the tool will cause driver distraction and could cause a fatal accident.
- Wear safety eye protection that meets ANSI standards.
- Keep clothing, hair, hands, tools, test equipment, etc. away from all moving or hot engine parts.
- Operate the vehicle in a well-ventilated work area: Exhaust gases are poisonous.
- Put blocks in front of the drive wheels and never leave the vehicle unattended while running tests.
- Use extreme caution when working around the ignition coil, distributor cap, ignition wires and spark plugs. These components create hazardous voltages when the engine is running.
- Put the transmission in P (for A/T) or N (for M/T) and make sure the parking brake is engaged.
- Keep a fire extinguisher suitable for gasoline/chemical/ electrical fires nearby.
- Don't connect or disconnect any test equipment while the ignition is on or the engine is running.

- Keep this tool dry, clean, free from oil/water or grease. Use a mild detergent on a clean cloth to clean the outside of the tool, when necessary.
- Please use the 5 V DC power adaptor to charge this tool. No responsibility can be assumed for any damage or loss caused as a result of using power adaptors other than the right one.

### **FCC Statement:**

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FX9000 (FCC ID: 2ASC7FX9000) has been evaluated to meet general RF exposure requirement. The highest reported SAR value is 0.58W/kg. This device was tested for typical body-worn operations with the back of the handset kept 0mm from the body. The use of accessories that do not satisfy these requirements may not comply with FCC RF exposure requirements, and should be avoided.

Hereby, OBDSpace TECHNOLOGY CO., LTD. declares that this Professional Diagnostic Tool (Model FX9000) is in compliance with the essential Requirements and other relevant provisions of Radio Equipment Directive 2014/53/EU.

Operation frequency and Max. RF output power:

WiFi 802.11b/g/n(2.4G): 2412-2472MHz, 18.92dBm;

The RF frequencies can be used in Europe without restriction.

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# 1. Introduction

FX9000 Professional Diagnostic Tool is an evolutionary smart solution for passenger car diagnosis. It inherits from ANCEL's advanced diagnosing technology and is characterized by covering a wide range of vehicles, featuring powerful functions, and providing precise test result.

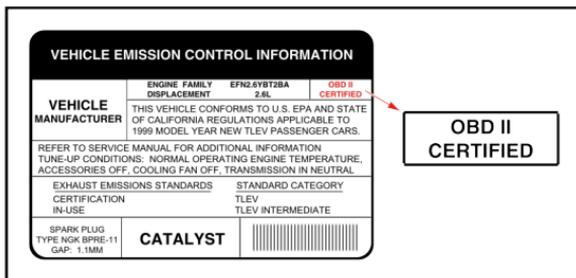
It has the following functions and advantages:

- **Smart(Auto-Detect) Diagnosis:** Once the tool and the vehicle are properly connected, the system starts auto-detect process. Once the whole process is successfully finished, a diagnostic report will be automatically generated and sent to your email box (if bound).
- **Manual Diagnosis:** If Auto-Detect failure occurs, manual diagnosis is also available. Diagnosis functions include: Version Information, Read DTCs, Clear DTCs and Read Data Stream (supports 3 display modes: Value, Graph and Merged).
- **OBDII Diagnosis:** 10 modes of OBD II test are supported, including EVAP, O<sub>2</sub> Sensor, I/M Readiness, MIL Status, VIN Info, and On-board monitors testing etc.
- **Reset:** Frequently used maintenance and reset items can be done. It includes Oil Reset Service, Electronic Parking Brake Reset, Steering Angle Calibration, ABS Bleeding, TPMS (Tire Pressure Monitor System) Reset, Gear Learning, IMMO Service, Injector Coding, Battery Maintenance System, Diesel Particulate Filter (DPF) Regeneration, Electronic Throttle Position Reset, Gearbox Matching, AFS (Adaptive Front-lighting System) Reset, Sunroof Initialization and Suspension Calibration.
- **One-click Update:** Let you update your diagnostic software and APK online.
- **Diagnostic History:** This function provides a quick access to the tested vehicles and users can choose to view the test report or resume from the last operation, without the necessity of starting from scratch.
- **Diagnostic Feedback:** Use this option to submit the vehicle issue to us for analysis and troubleshooting.
- **DTC Library:** Allows you to retrieve the definition of the diagnostic trouble code from the abundant DTC database.
- Displays battery real-time voltage once properly connected to the vehicle.
- Touch & Keypad input are supported.

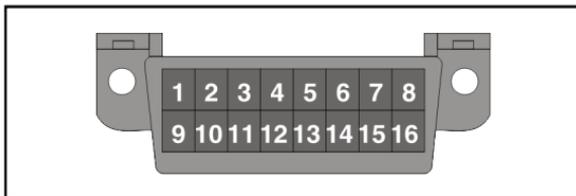
This tool is specially designed to work with most OBD II compliant vehicles, including Controller Area Network (CAN). It is required by EPA that all 1996 and newer vehicles (cars and light trucks) sold in the United States must be OBD II compliant and this includes all American, Asian and European vehicles.

A small number of 1994 and 1995 model year gasoline vehicles are OBD II compliant. To verify if a 1994 or 1995 vehicle is OBD II compliant, check the following:

1. **Vehicle Emissions Control Information (VECI) Label.** It is located under the hood or by the radiator of most vehicles. If the vehicle is OBD II compliant, the label will designate “OBD II Certified”.



2. Government regulations mandate that all OBD II compliant vehicles **must** have a “common” 16-pin **Data Link Connector (DLC)**.




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 **Note:** Some 1994 and 1995 vehicles have 16-pin connectors but are not OBD II compliant. Only those vehicles with a Vehicle Emissions Control Label stating “OBD II Certified” are OBD II compliant.

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## 2. General Information

### 2.1 On-Board Diagnostics (OBD) I

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 Note: With the exception of some 1994 and 1995 vehicles, most vehicles from 1982 to 1995 are equipped with some type of first generation On-Board Diagnostics.

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Beginning in 1988, California's Air Resources Board (CARB), and later the Environmental Protection Agency (EPA) required vehicle manufacturers to include a self-diagnostic program in their on-board computers. The program would be capable of identifying emissions-related faults in a system. The first generation of Onboard Diagnostics came to be known as OBD I.

OBD I is a set of self-testing and diagnostic instructions programmed into the vehicle's onboard computer. The programs are specifically designed to detect failures in the sensors, actuators, switches and wiring of the various vehicle emissions-related systems. If the computer detects a failure in any of these components or systems, it lights an indicator on the dashboard to alert the driver. The indicator lights only when an emissions-related problem is detected.

The computer also assigns a numeric code for each specific problem that it detects, and stores these codes in its memory for later retrieval. These codes can be retrieved from the computer's memory with the use of a "Code Reader" or a "Diagnostic Tool."

### 2.2 On-Board Diagnostics (OBD) II

As technology evolved and the desire to improve the On-Board Diagnostic system increased, a new generation of On-Board Diagnostic system was developed. This second generation of On-Board Diagnostic regulations is called "OBD II".

In addition to performing all the functions of the OBD I System, the OBD II System has been enhanced with new Diagnostic Programs. These programs closely monitor the functions of various emissions-related components and systems (as well as other systems) and make this information readily available (with the proper equipment) to the technician for evaluation.

The California Air Resources Board (CARB) conducted studies on OBD I equipped vehicles. The information that was gathered from these studies showed the following:

- A large number of vehicles had deteriorating or degraded emissions-related components. These components were causing an increase in emissions.
- Because OBD I systems only detect failed components, the degraded components were not setting codes.
- Some emissions problems related to degraded components only occur when the vehicle is being driven under a load. The emission checks being conducted at the time were not performed under simulated driving conditions. As a result, a significant number of vehicles with degraded components were passing Emissions Tests.
- Codes, code definitions, diagnostic connectors, communication protocols and emissions terminology were different for each manufacturer. This caused confusion for the technicians working on different make and model vehicles.

To address the problems made evident by this study, CARB and the EPA passed new laws and standardization requirements. These laws required that vehicle manufacturers to equip their new vehicles with devices capable of meeting all of the new emissions standards and regulations. It was also decided that an enhanced on-board diagnostic system, capable of addressing all of these problems, was needed. This new system is known as “On-Board Diagnostics Generation Two (OBD II).” The primary objective of the OBD II system is to comply with the latest regulations and emissions standards established by CARB and the EPA.

The Main Objectives of the OBD II System are:

- To detect degraded and/or failed emissions-related components or systems that could cause tailpipe emissions to exceed by 1.5 times the Federal Test Procedure (FTP) standard.
- To expand emissions-related system monitoring. This includes a set of computer run diagnostics called Monitors. Monitors perform diagnostics and testing to verify that all emissions-related components and/or systems are operating correctly and within the manufacturer’s specifications.
- To use a standardized Diagnostic Link Connector (DLC) in all vehicles. (Before OBD II, DLCs were of different shapes and sizes.)
- To standardize the code numbers, code definitions and language used to describe faults. (Before OBD II, each vehicle manufacturer used their own code numbers, code definitions and language to describe the same faults.)
- To expand the operation of the Malfunction Indicator Lamp (MIL).
- To standardize communication procedures and protocols between the diagnostic equipment (Diagnostic Tools, Code Readers, etc.) and the vehicle’s on-board computer.

## 2.3 Diagnostic Trouble Codes (DTCs)

OBD II Diagnostic Trouble Codes are codes that are stored by the on-board computer diagnostic system in response to a problem found in the vehicle. These codes identify a particular problem area and are intended to provide you with a guide as to where a fault might be occurring within a vehicle. **DO NOT** replace parts based only on DTCs without first consulting the vehicle's service manual for proper testing procedures for that particular system, circuit or component.

OBD II Diagnostic Trouble Codes consist of a five-digit alphanumeric code.

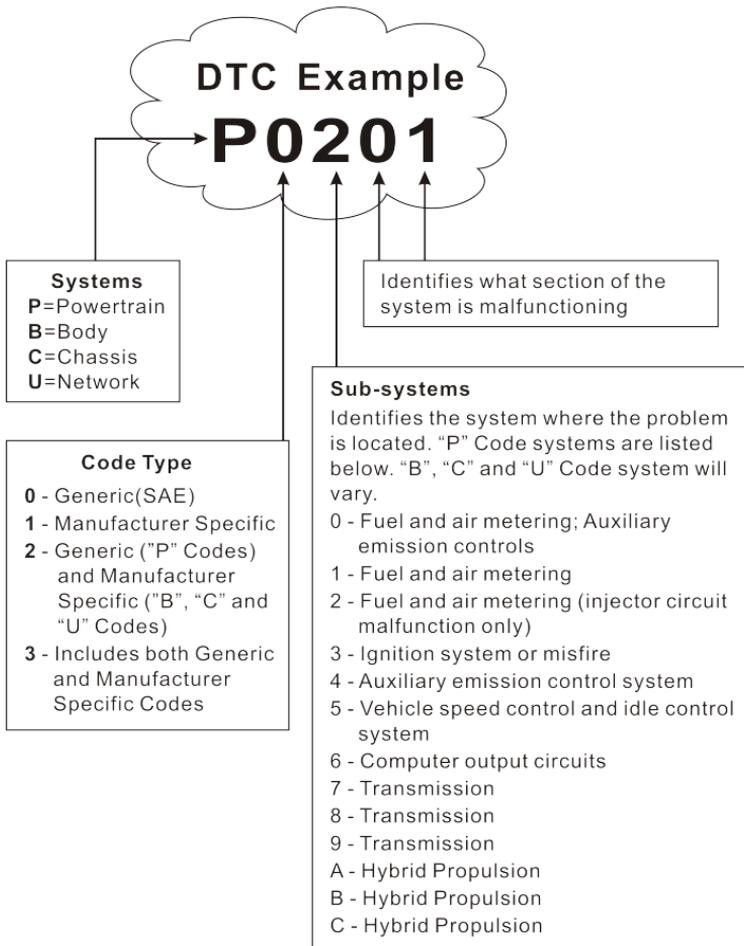
- The 1st character is a **letter** (B, C, P or U). It identifies the "main system" where the fault occurred (Body, Chassis, Powertrain, or Network).
- The 2nd character is a **numeric digit** (0 thru 3). It identifies the "type" of code (Generic or Manufacturer-Specific).

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 **Note:** Generic DTCs are codes that are used by all vehicle manufacturers. The standards for generic DTCs, as well as their definitions, are set by the Society of Automotive Engineers (SAE).

Manufacturer-Specific DTCs are codes that are controlled by the vehicle manufacturers. The Federal Government does not require vehicle manufacturers to go beyond the standardized generic DTCs in order to comply with the new OBD II emissions standards. However, manufacturers are free to expand beyond the standardized codes to make their systems easier to diagnose.

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- The 3rd character is a letter or a **numeric digit** (0 thru 9, A thru F). It identifies the specific system or sub-system where the problem is located.
  - The 4th and 5th characters are **letters** or **numeric digits** (0 thru 9, A thru F). They identify the section of the system that is malfunctioning.

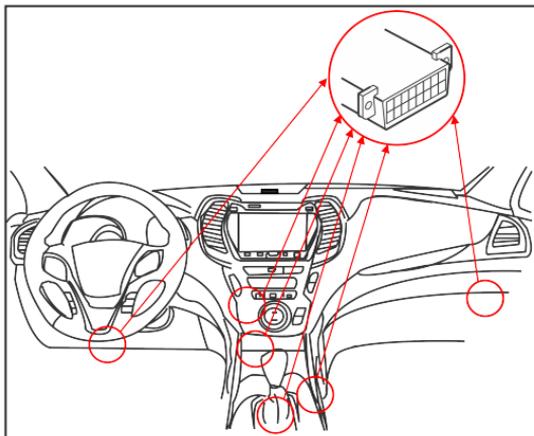


P0201 - Injector circuit malfunction, Cylinder 1

## 2.4 Location of the Data Link Connector (DLC)

The DLC (Data Link Connector or Diagnostic Link Connector) is typically a 16-pin connector where diagnostic code readers interface with the vehicle's on-board computer. The DLC is usually located 12 inches from the center of the instrument panel (dash), under or around the driver's side for most vehicles. If

Data Link Connector is not located under dashboard, a label should be there telling location. For some Asian and European vehicles, the DLC is located behind the ashtray and the ashtray must be removed to access the connector. If the DLC cannot be found, refer to the vehicle's service manual for the location.



Potential DLC Location

## 2.5 OBD II Terminology

The following terms and their definitions are related to OBD II systems. Read and reference this list as needed to aid in the understanding of OBD II systems.

**Powertrain Control Module (PCM)** -- The PCM is the OBD II accepted term for the vehicle's "on-board computer." In addition to controlling the engine management and emissions systems, the PCM also participates in controlling the powertrain (transmission) operation. Most PCMs also have the ability to communicate with other computers on the vehicle (ABS, ride control, body, etc.).

**Monitors** -- Monitors are "diagnostic routines" programmed into the PCM. The PCM utilizes these programs to run diagnostic tests, and to monitor operation of the vehicle's emissions-related components or systems to ensure they are operating correctly and within the vehicle's manufacturer specifications. Currently, up to fifteen Monitors are used in OBD II systems. Additional Monitors will be added as the OBD II system is further developed.

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 Note: Not all vehicles support all fifteen Monitors.

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**Enabling Criteria** -- Also termed Enabling Conditions. They are the vehicle-specific events or conditions that must occur within the engine before the various

monitors will set, or run. Some monitors require the vehicle to follow a prescribed “drive cycle” routine as part of the enabling criteria. Drive cycles vary among vehicles and for each monitor in any particular vehicle. Please refer to the vehicle’s factory service manual for specific enabling procedures.

**Trip** - A Trip for a particular Monitor requires that the vehicle is being driven in such a way that all the required “Enabling Criteria” for the Monitor to run and complete its diagnostic testing are met. The “Trip Drive Cycle” for a particular Monitor begins when the ignition key is turned “On.” It is successfully completed when all the “Enabling Criteria” for the Monitor to run and complete its diagnostic testing are met by the time the ignition key is turned “Off.” Since each of the fifteen monitors is designed to run diagnostics and testing on a different part of the engine or emissions system, the “Trip Drive Cycle” needed for each individual Monitor to run and complete varies.

**OBD II Drive Cycle** -- A specific mode of vehicle operation that provides conditions required to set all the readiness monitors applicable to the vehicle to the “ready” condition. The purpose of completing an OBD II drive cycle is to force the vehicle to run its onboard diagnostics. Some form of a drive cycle needs to be performed after DTCs have been erased from the PCM’s memory or after the battery has been disconnected. Running through a vehicle’s complete drive cycle will “set” the readiness monitors so that future faults can be detected. Drive cycles vary depending on the vehicle and the monitor that needs to be reset. For vehicle specific drive cycle, consult the service manual.



Note: Do not confuse a “Trip” Drive Cycle with an OBD II Drive Cycle. A “Trip” Drive Cycle provides the “Enabling Criteria” for one specific Monitor to run and complete its diagnostic testing. An OBD II Drive Cycle must meet the “Enabling Criteria” for all Monitors on a particular vehicle to run and complete their diagnostic testing.

**Warm-up Cycle** - Vehicle operation after an engine off period where engine temperature rises at least 40°F (22°C) from its temperature before starting, and reaches at least 160°F (70°C). The PCM uses warm-up cycles as a counter to automatically erase a specific code and related data from its memory. When no faults related to the original problem are detected within a specified number of warm-up cycles, the code is erased automatically.

**Fuel Trim (FT)** - Feedback adjustments to the base fuel schedule. Short-term fuel trim refers to dynamic or instantaneous adjustments. Long-term fuel trim refers to much more gradual adjustments to the fuel calibration schedule than short-term trim adjustments. These long-term adjustments compensate for

vehicle differences and gradual changes that occur over time.

## 2.6 OBD II Monitors

An important part of a vehicle's OBD II system is the Readiness Monitors, which are indicators used to find out if all of the emissions components have been evaluated by the OBD II system. They are running periodic tests on specific systems and components to ensure that they are performing within allowable limits.

Monitor operation is either "Continuous" or "Non-Continuous," depending on the specific monitor.

### 2.6.1 Continuous Monitors

Some of the vehicle components or systems are continuously tested by the vehicle's OBD II system, while others are tested only under specific vehicle operating conditions. The continuously monitored components listed below are always ready:

#### 1. Misfire Monitor

This Monitor continuously checks for engine misfires. A misfire occurs when the air-fuel mixture in the cylinder does not ignite. The misfire Monitor uses changes in crankshaft speed to sense an engine misfire. When a cylinder misfires, it no longer contributes to the speed of the engine, and engine speed decreases each time the affected cylinder(s) misfire. The misfire Monitor is designed to sense engine speed fluctuations and determine from which cylinder(s) the misfire is coming, as well as how bad the misfire is.

There are three types of engine misfires, Types 1, 2, and 3.

- Type 1 and Type 3 misfires are two-trip monitor faults. If a fault is sensed on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The MIL is not commanded on at this time. If the fault is found again on the second trip, under similar conditions of engine speed, load and temperature, the computer commands the MIL "On," and the code is saved in its long term memory.
- Type 2 misfires are the most severe type of misfire. When a Type 2 misfire is sensed on the first trip, the computer commands the MIL to light when the misfire is sensed. If the computer determines that a Type 2 misfire is severe, and may cause catalytic converter damage, it commands the MIL to "flash" once per second as soon as the misfire is sensed. When the misfire is no longer present, the MIL reverts to steady "On" condition.

The Misfire Monitor is supported by both "spark ignition" vehicles and

“compression ignition” vehicles.

## 2. Fuel System Monitor

This Monitor uses a Fuel System Correction program, called Fuel Trim, inside the on-board computer. Fuel Trim is a set of positive and negative values that represent adding or subtracting fuel from the engine. This program is used to correct for a lean (too much air/not enough fuel) or rich (too much fuel/not enough air) air-fuel mixture. The program is designed to add or subtract fuel, as needed, up to a certain percent. If the correction needed is too large and exceeds the time and percent allowed by the program, a fault is indicated by the computer.

The Fuel System Monitor is supported by both “spark ignition” vehicles and “compression ignition” vehicles. The Fuel System Monitor may be a “One-Trip” or “Two-Trip” Monitor, depending on the severity of the problem.

## 3. Comprehensive Components Monitor (CCM)

This Monitor continuously checks all inputs and outputs from sensors, actuators, switches and other devices that provide a signal to the computer. The Monitor checks for shorts, opens, out of range value, functionality and “rationality\* (See Note).”



**Rationality:** Each input signal is compared against all other inputs and against information in the computer’s memory to see if it makes sense under the current operating conditions.

Example: The signal from the throttle position sensor indicates the vehicle is in a wide-open throttle condition, but the vehicle is really at idle, and the idle condition is confirmed by the signals from all other sensors. Based on the input data, the computer determines that the signal from the throttle position sensor is not rational (does not make sense when compared to the other inputs). In this case, the signal would fail the rationality test.

The CCM is supported by both “spark ignition” vehicles and “compression ignition” vehicles. The CCM may be either a “One-Trip” or a “Two-Trip” Monitor, depending on the component.

### 2.6.2 Non-Continuous Monitors

“Non-continuous” Monitors perform and complete their testing once per trip. The “non-continuous” Monitors are:

#### 1. O<sub>2</sub> Sensor Monitor

The Oxygen Sensor monitors how much oxygen is in the vehicle's exhaust. It generates a varying voltage of up to one volt, based on how much oxygen is in the exhaust gas, and sends the signal to the computer. The computer uses this signal to make corrections to the air/fuel mixture. If the exhaust gas has a large amount of oxygen (a lean air/fuel mixture), the oxygen sensor generates a "low" voltage signal. If the exhaust gas has very little oxygen (a rich mixture condition), the oxygen sensor generates a "high" voltage signal. A 450mV signal indicates the most efficient, and least polluting, air/fuel ratio of 14.7 parts of air to one part of fuel.

The oxygen sensor must reach a temperature of at least 600-650°F, and the engine must reach normal operating temperature, for the computer to enter into closed-loop operation.

The oxygen sensor only functions when the computer is in closed-loop. A properly operating oxygen sensor reacts quickly to any change in oxygen content in the exhaust stream. A faulty oxygen sensor reacts slowly, or its voltage signal is weak or missing.

The Oxygen Sensor Monitor is supported by "spark ignition" vehicles only. The Oxygen Sensor Monitor is a "Two-Trip" monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL "On," and saves the code in its long-term memory.

## 2. O<sub>2</sub> Sensor Heater Monitor

The Oxygen Sensor Heater Monitor tests the operation of the oxygen sensor's heater. There are two modes of operation on a computer-controlled vehicle: "open-loop" and "closed-loop." The vehicle operates in open-loop when the engine is cold, before it reaches normal operating temperature. The vehicle also goes to open-loop mode at other times, such as heavy load and full throttle conditions. When the vehicle is running in open-loop, the oxygen sensor signal is ignored by the computer for air/fuel mixture corrections. Engine efficiency during open-loop operation is very low, and results in the production of more vehicle emissions.

Closed-loop operation is the best condition for both vehicle emissions and vehicle operation. When the vehicle is operating in closed-loop, the computer uses the oxygen sensor signal for air/fuel mixture corrections.

In order for the computer to enter closed-loop operation, the oxygen sensor must reach a temperature of at least 600°F. The oxygen sensor heater helps the oxygen sensor reach and maintain its minimum operating temperature (600°F) more quickly, to bring the vehicle into closed-loop operation as soon as possible.

The Oxygen Sensor Heater Monitor is supported by “spark ignition” vehicles only. The Oxygen Sensor Heater Monitor is a “Two-Trip” Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL “On,” and saves the code in its long-term memory.

### 3. Catalyst Monitor

The catalytic converter is a device that is installed downstream of the exhaust manifold. It helps to oxidize (burn) the unburned fuel (hydrocarbons) and partially burned fuel (carbon monoxide) left over from the combustion process. To accomplish this, heat and catalyst materials inside the converter react with the exhaust gases to burn the remaining fuel. Some materials inside the catalytic converter also have the ability to store oxygen, and release it as needed to oxidize hydrocarbons and carbon monoxide. In the process, it reduces vehicle emissions by converting the polluting gases into carbon dioxide and water.

The computer checks the efficiency of the catalytic converter by monitoring the oxygen sensors used by the system. One sensor is located before (upstream of) the converter; the other is located after (downstream of) the converter. If the catalytic converter loses its ability to store oxygen, the downstream sensor signal voltage becomes almost the same as the upstream sensor signal. In this case, the monitor fails the test.

The Catalyst Monitor is supported by “spark ignition” vehicles only. The Catalyst Monitor is a “Two-Trip” Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL “On” and saves the code in its long-term memory.

### 4. Heated Catalyst Monitor

Operation of the “heated” catalytic converter is similar to the catalytic converter. The main difference is that a heater is added to bring the catalytic converter to its operating temperature more quickly. This helps reduce emissions by reducing the converter’s down time when the engine is cold. The Heated Catalyst Monitor performs the same diagnostic tests as the catalyst Monitor, and also tests the catalytic converter’s heater for proper operation.

The Heated Catalyst Monitor is supported by “spark ignition” vehicles only. This Monitor is also a “Two-Trip” Monitor.

### 5. EGR (Exhaust Gas Recirculation) System Monitor

The Exhaust Gas Recirculation (EGR) system helps reduce the formation

of Oxides of Nitrogen during combustion. Temperatures above 2500°F cause nitrogen and oxygen to combine and form Oxides of Nitrogen in the combustion chamber. To reduce the formation of Oxides of Nitrogen, combustion temperatures must be kept below 2500°F. The EGR system recirculates small amounts of exhaust gas back into the intake manifold, where it is mixed with the incoming air/fuel mixture. This reduces combustion temperatures by up to 500°F. The computer determines when, for how long, and how much exhaust gas is recirculated back to the intake manifold. The EGR Monitor performs EGR system function tests at preset times during vehicle operation.

The EGR Monitor is supported by both “spark ignition” vehicles and “compression ignition” vehicles. The EGR Monitor is a “Two-Trip” Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL “On,” and saves the code in its long-term memory.

## 6. EVAP System Monitor

OBD II vehicles are equipped with a fuel Evaporative system (EVAP) that helps prevent fuel vapors from evaporating into the air. The EVAP system carries fumes from the fuel tank to the engine where they are burned during combustion. The EVAP system may consist of a charcoal canister, fuel tank cap, purge solenoid, vent solenoid, flow monitor, leak detector and connecting tubes, lines and hoses.

Fumes are carried from the fuel tank to the charcoal canister by hoses or tubes. The fumes are stored in the charcoal canister. The computer controls the flow of fuel vapors from the charcoal canister to the engine via a purge solenoid. The computer energizes or deenergizes the purge solenoid (depending on solenoid design). The purge solenoid opens a valve to allow engine vacuum to draw the fuel vapors from the canister into the engine where the vapors are burned. The EVAP Monitor checks for proper fuel vapor flow to the engine, and pressurizes the system to test for leaks. The computer runs this Monitor once per trip.

The EVAP Monitor is supported by “spark ignition” vehicles only. The EVAP Monitor is a “Two-Trip” Monitor. If a fault is found on the first trip, the computer temporarily saves the fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the PCM commands the MIL “On,” and saves the code in its long-term memory.

## 7. Secondary Air System Monitor

When a cold engine is first started, it runs in open-loop mode. During open-loop operation, the engine usually runs rich. A vehicle running rich wastes

fuel and creates increased emissions, such as carbon monoxide and some hydrocarbons. A Secondary Air System injects air into the exhaust stream to aid catalytic converter operation:

- It supplies the catalytic converter with the oxygen it needs to oxidize the carbon monoxide and hydrocarbons left over from the combustion process during engine warmup.
- The extra oxygen injected into the exhaust stream also helps the catalytic converter reach operating temperature more quickly during warm-up periods. The catalytic converter must heat to operating temperature to work properly.

The Secondary Air System Monitor checks for component integrity and system operation, and tests for faults in the system. The computer runs this Monitor once per trip.

The Secondary Air System Monitor is a “Two-Trip” monitor. If a fault is found on the first trip, the computer temporarily saves this fault in its memory as a Pending Code. The computer does not command the MIL on at this time. If the fault is sensed again on the second trip, the computer commands the MIL “On,” and saves the code in its long-term memory.



**Note:** The following Monitors became standard beginning in 2010. The majority of vehicles produced before this time will not support these Monitors.

### 2.6.3 OBD II Reference Table

The table below lists current OBD II Monitors, and indicates the following for each Monitor:

- A. Monitor Type (how often does the Monitor run; Continuous or Once per trip).
- B. Number of trips needed, with a fault present, to set a pending DTC.
- C. Number of consecutive trips needed, with a fault present, to command the MIL “On” and store a DTC.
- D. Number of trips needed, with no faults present, to erase a Pending DTC.
- E. Number and type of trips or drive cycles needed, with no faults present, to turn off the MIL.
- F. Number of warm-up periods needed to erase the DTC from the computer’s memory after the MIL is turned off.

Name of Monitor	A	B	C	D	E	F
CCM	Continuous	1	2	1	3	40
Misfire Monitor (Type 1 and 3)	Continuous	1	2	1	3 - similar conditions	80
Misfire Monitor (Type 2)	Continuous	1	1	1	3 - similar conditions	80
Fuel System Monitor	Continuous	1	1 or 2	1	3 - similar conditions	80
Catalytic Converter Monitor	Once per trip	1	2	1	3 trips	40
O <sub>2</sub> Sensor Monitor	Once per trip	1	2	1	3 trips	40
O <sub>2</sub> Sensor Heater Monitor	Once per trip	1	2	1	3 trips	40
EGR Monitor	Once per trip	1	2	1	3 trips	40
EVAP system Monitor	Once per trip	1	2	1	3 trips	40
Secondary Air System Monitor	Once per trip	1	2	1	3 trips	40

## 2.7 DTCs and MIL Status

When the vehicle's on-board computer detects a failure in an emissions-related component or system, the computer's internal diagnostic program assigns a diagnostic trouble code (DTC) that points to the system (and subsystem) where the fault was found. The diagnostic program saves the code in the computer's memory. It records a "Freeze Frame" of conditions present when the fault was found, and lights the Malfunction Indicator Lamp (MIL). Some faults require detection for two trips in a row before the MIL is turned on.

---

 **Note:** The “Malfunction Indicator Lamp” (MIL) is the accepted term used to describe the lamp on the dashboard that lights to warn the driver that an emissions-related fault has been found. Some manufacturers may still call this lamp a “Check Engine” or “Service Engine Soon” light.

---

There are two types of DTCs used for emissions-related faults: Type “A” and Type “B.” Type “A” codes are “One-Trip” codes; Type “B” DTCs are usually Two-Trip DTCs.

When a **Type “A”** DTC is found on the First Trip, the following events take place:

- The computer commands the MIL “On” when the failure is first found.
- If the failure causes a severe misfire that may cause damage to the catalytic converter, the MIL “flashes” **once per second**. The MIL continues to flash as long as the condition exists. If the condition that caused the MIL to flash is no longer present, the MIL will light “steady” On.
- A DTC is saved in the computer’s memory for later retrieval.
- A “Freeze Frame” of the conditions present in the engine or emissions system when the MIL was ordered “On” is saved in the computer’s memory for later retrieval. This information shows fuel system status (closed loop or open loop), engine load, coolant temperature, fuel trim value, MAP vacuum, engine RPM and DTC priority.

When a **Type “B”** DTC is found on the First Trip, the following events take place:

- The computer sets a Pending DTC, but the MIL is not ordered “On.” “Freeze Frame” data may or may not be saved at this time depending on manufacturer. The Pending DTC is saved in the computer’s memory for later retrieval.
- If the failure is found on the second consecutive trip, the MIL is ordered “On.” “Freeze Frame” data is saved in the computer’s memory.
- If the failure is not found on the second Trip, the Pending DTC is erased from the computer’s memory.

The MIL will stay lit for both Type “A” and Type “B” codes until one of the following conditions occurs:

- If the conditions that caused the MIL to light are no longer present for the next three trips in a row, the computer automatically turns the MIL “Off” if no other emissions-related faults are present. However, the DTCs remain in the computer’s memory as a history code for 40 warm-up cycles (80 warm-up cycles for fuel and misfire faults). The DTCs are automatically erased if the fault that caused them to be set is not detected again during that period.

- Misfire and fuel system faults require three trips with “similar conditions” before the MIL is turned “Off.” These are trips where the engine load, RPM and temperature are similar to the conditions present when the fault was first found.



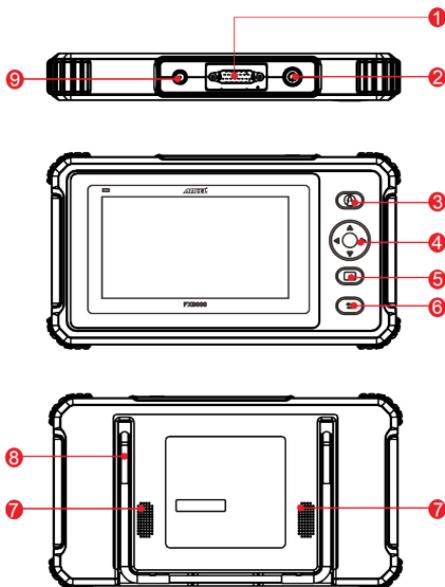
Note: After turning off MIL, DTCs and Freeze Frame data will stay in the computer's memory.

---

- Erasing the DTCs from the computer's memory can also turn off the MIL. If a Diagnostic Tool or Scan Tool is used to erase the codes, Freeze Frame data will also be erased.

### 3. Components and Controls

#### 3.1 Controls



NO.	Name	Descriptions
1	DB-15 Diagnostic Connector	Connect to vehicle's DLC (Data Link Connector) via diagnostic cable.

2	Power	<ul style="list-style-type: none"> <li>• In Off mode, press  button for about 5 seconds to turn on.</li> <li>• In On mode:                             <ul style="list-style-type: none"> <li>• Press  button to activate the LCD if the LCD is off.</li> <li>• Press  button to turn off the LCD if the LCD lights up.</li> <li>• Press  button for 3 seconds to turn off.</li> </ul> </li> </ul>
3	Home	Press  button to return to the home (Job menu) screen.
4	Select	Move  button for up and down selection. Move  button for left and right selection; Or turn page up and down when more than one page is displayed.
5	OK	Press  button to confirm a selection (or action) from a menu list.
6	Return	Press  button to exit the current program or return to the previous screen.
7	Speakers	Support sound play.
8	Foldable Stand	Flip out the Foldable Stand to any angle and work comfortable at your desk, or hang it on the steering wheel.
9	5 V DC Charging Port	Connect to external DC power for charging the tool.

### 3.2 Technical Specifications

- Screen: 7" touch screen
- RAM: 2 GB
- ROM: 16 GB

- OBDII input voltage range: 9 to 18 V DC
- Touch & Keypad input
- Charging via:
  - 5 V DC charging cable
  - Diagnostic cable through connection to vehicle's DLC
- Dimension: 246 x 139.5 x 34 mm
- Working temperature: 0 to 50 °C (32 to 122 F°)
- Storage temperature: -20 to 70 °C (-4 to 158 F°)

### 3.3 Accessories Checklist

For detailed accessory items, please consult from the local agency.

1. FX9000 handset
2. OBD II diagnostic cable
3. 5 V DC charging cable
4. Power adaptor
5. Quick start guide
6. User manual

## 4. Initial Use

### 4.1 Charging the Tool

There are two charging methods available:

Via Charging Cable: Plug one end of the included charging cable into the DC-IN port of the tool, and the other end to the external DC power.

Via Diagnostic Cable: Insert one end of the diagnostic cable into the DB-15 connector of the tool, and the other end to the vehicle's DLC.

Once the charging LED illuminates solid green, it indicates that the battery is fully charged.

### 4.2 Getting Started

If it is the first time you have used this tool, you need to make some system settings.

1. Press the [Power] button to power it on.
2. The screen displays a welcome page. Tap "Start" to go to next step.
3. Choose the desired system language, and tap "OK" to confirm.

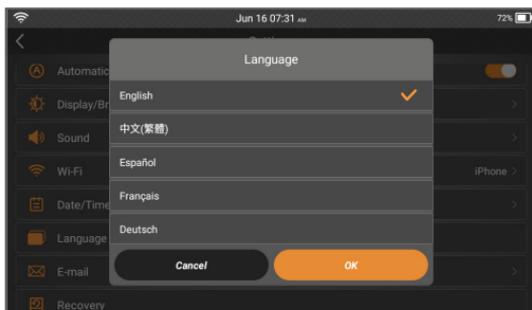


Figure 4-1

4. Choose the desired time zone, and tap "Next" to enter the WLAN setup page.
5. Slide the switch to ON, the system starts searching for all available wireless LANs. Choose the desired WLAN access point / network.



Figure 4-2

- If the network you chose is open, you can connect directly;
- If the selected network is encrypted, you have to enter the right security key (network password).

---

**Note:** If you choose “Ignore” in WLAN setup, it will go into the date setting page. If the tool has been properly connected to the Internet, the system will automatically obtain the correct network date and time and navigate to step 6.

---

6. After the network connection is done, tap “Next Step” to configure email address. Input the email address, and tap “Next Step” to go to next step.

---

**Note:** You are strongly recommended to fill in the valid email address. Once you configured this option, the system will automatically send the diagnostic report to your email box every time a complete Auto-Detect process is successfully finished.

---

7. Carefully read all terms and conditions of the user agreement, check the box before the “Agree to all the above terms”, and tap “OK” finish the sign-up process and navigate to Job Menu.

### 4.3 Job Menu

It mainly includes the following function modules.

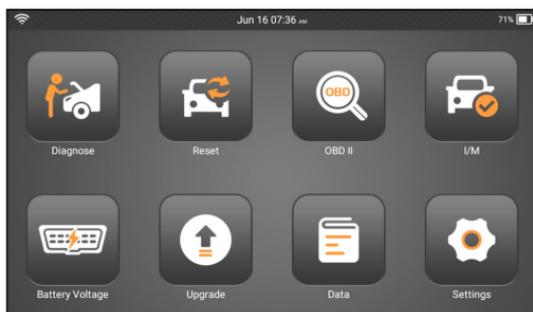


Figure 4-3

<b>Diagnose</b>	To configure the tool to operate as a professional diagnostic tool.
<b>I/M</b>	<p>A quick access to the I/M Readiness function of OBD II Diagnosis. I/M refers to Inspection and Maintenance that is legislated by the Government to meet federal clean-air standards. I/M Readiness indicates whether or not the various emissions-related systems on the vehicle are operating properly and are ready for Inspection and Maintenance testing.</p> <p> Note: This function also can be done by performing "OBD II" -&gt; "I/M Readiness". For detailed operation, please refer to Chapter 5.3.</p>
<b>OBD II</b>	This option presents a quick way to check for DTCs, isolate the cause of the illuminated Malfunction Indicator Lamp (MIL), check monitor status prior to emissions certification testing, verify repairs, and perform a number of other services that are emission-related.
<b>Reset</b>	To perform all kinds of common repair & maintenance items, including Oil Reset Service, Electronic Parking Brake Reset, Steering Angle Calibration, ABS Bleeding, TPMS Reset, Gear Learning, IMMO Service, Injector Coding, Battery Maintenance System, Diesel Particulate Filter (DPF) Regeneration, Electronic Throttle Position Reset, Gearbox Matching, AFS (Adaptive Front-lighting System) Reset, Sunroof Initialization and Suspension Calibration.

<b>Battery Voltage</b>	Performs a check of the vehicle's battery to ensure the system is operating within acceptable limits.
<b>Upgrade</b>	To update vehicle diagnostic software and APK.  Note: This function requires a stable network connection.
<b>Data</b>	Includes Diagnostic report, Diagnostic record, Feedback and DTC library etc.
<b>Settings</b>	To make some system settings, including Network setup, Email and Brightness etc.

## 5. Diagnose

### 5.1 Connection

1. Turn the ignition off.
2. Locate vehicle's DLC socket: Refer to Chapter 2.4 for DLC location.
3. Plug one end of the diagnostic cable into the DB-15 connector of the tool, and tighten the captive screws. Connect the other end to the vehicle's DLC.

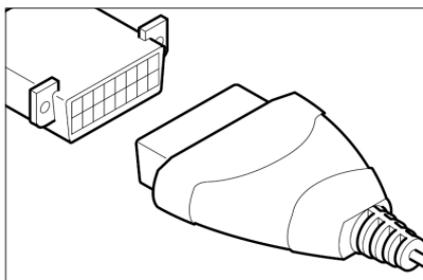


Figure 5-1

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#### Note:

- A plastic DLC cover may be found for some vehicles and you need to remove it before plugging the diagnostic cable.
- The cable connector is keyed and will only fit one way. If you have problems connecting the cable connector to the DLC, rotate the connector 180° and try again.

- 
4. Turn the ignition on. Engine can be off or running.

### 5.2 System Diagnosing

This function is specially designed to diagnose electronic control systems of single vehicle model.

#### 5.2.1 Smart Diagnosis (Auto-Detect)

After connection, turn the ignition key on and the system enters auto-detect mode ( Note: Please make sure the “Automatic detection on connect” in “Settings” is set as ON).

**Note:** To detect more and accurate VINs, a stable network connection is highly recommended for this function.

**Caution:** Don't connect or disconnect any test equipment with ignition on or engine running.

- A. Once the system successfully obtains the VIN (Vehicle Identification Number) information of the currently identified vehicle, it will continue scanning the vehicle systems. After the scanning is complete, a diagnostic report will be automatically generated and sent to your email box (if bound).
- B. If the tool failed to access the VIN information, the screen will display a interface for VIN input.



Fig. 5-2

Input the VIN, and tap “OK”, the system will automatically identify the vehicle model. If the vehicle VIN is successfully decoded, it will perform auto-diagnosis until a diagnostic report is automatically output. Otherwise it will enter manual diagnosis mode. For details on manual diagnosis, see Chapter 5.2.2.

**Note:**

- The most recognizable location for this number is in the top left corner on the vehicle’s dashboard. Other locations include the driver’s door or post, and the firewall under the hood.
- In general, vehicle identification numbers are standardized - all contain 17 characters. VIN characters may be capital letters A through Z and numbers 1 through 0; however, the letters I, O and Q are never used in order to avoid mistakes of misreading. No signs or spaces are allowed in the VIN.

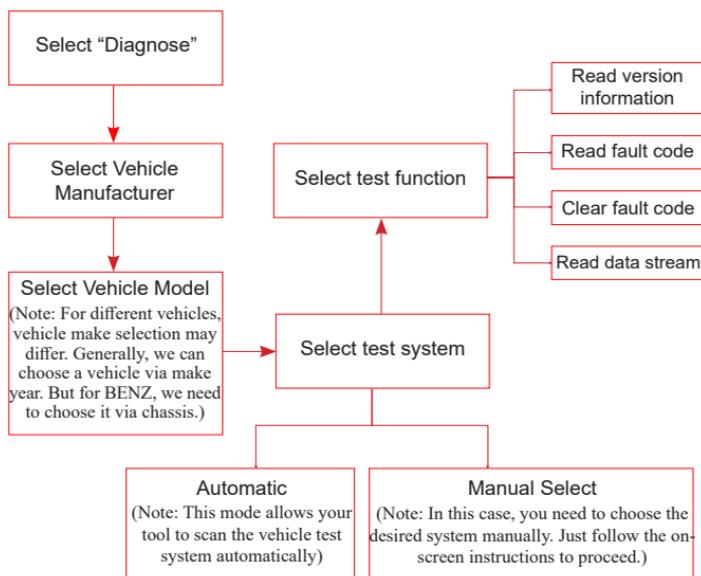
## 5.2.2 Manual Diagnosis

If the tool can not obtain the VIN information, you can also perform vehicle diagnosis manually. In this mode, you need to execute the menu-driven command and then follow the on-screen instruction to proceed.

### Note:

- Before diagnosing, please make sure the diagnostic program corresponding to certain vehicle model has been installed on your tool.
- For vehicles manufactured by different vendors, it is possible that it has different diagnostic menus. For details, please follow the instructions on the screen to proceed.

Refer to the flowchart illustrated as below to diagnose a vehicle manually:



Take Demo as an example to demonstrate how to diagnose a vehicle.

- 1). Select diagnostic software version: Tap the "DEMO" to go to Step 2.



Fig. 5-3

2). Select test item: Select the desired test item to proceed.

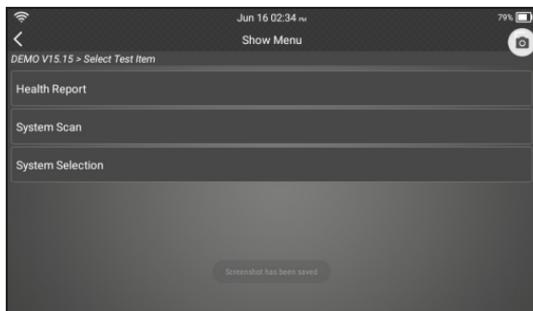


Fig. 5-4

### 5.2.2.1 Health Report (Quick Test)

This function varies from vehicle to vehicle. It enables you to quickly access all the electronic control units of the vehicle and generate a detailed report about vehicle health.

Tap “Health Report”, the system starts scanning the ECUs. Once the scanning is complete, a screen similar to the following appears:

In above figure, the tested system with fault code appears in red (✘) and the system with OK displays in black (✔).

#### On-screen Buttons:

▼: Tap to display the details of DTCs existing in the current system. Tap ▲ to hide it.

⋮: Tap to select other test functions. For detailed operations, refer to Chapter

### 5.2.2.3.

**Report:** Tap to save the diagnostic result as a report. All reports are saved under the “Diagnostic Report” module in “Data”.

**Clear Code:** Tap to clear the existing diagnostic trouble codes.

 **Note:** If you plan to take the vehicle to a Service Center for repair, DO NOT erase the codes from the vehicle’s computer. If data is erased, valuable information that might help the technician troubleshoot the problem will also be erased.

### 5.2.2.2 System Scan

Use this option to quickly scan and identify which systems are installed on the vehicle.

In Fig. 5-4, tap “System Scan” to scan the vehicle control modules. When scanning is complete, tap the desired system to navigate to the test function selection screen. For detailed operations on test function, please refer to Chapter 5.2.2.3.

### 5.2.2.3 System Selection

This option allows you manually select the test system and function step by step. On the “Show Menu” interface, tap “System Selection”, and tap the desired system (take “PCM” as an example) to jump to the test function page.

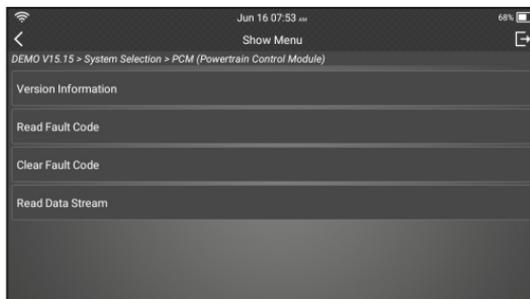


Fig. 5-5

 **Note:** Different vehicle has different diagnostic menus.

### A. Version Information

This function is used to read the version information of system mode, vehicle VIN, software and ECU.

## B. Read Fault Code

This function displays the detailed information of DTC records retrieved from the vehicle's control system.

 **Note:** Retrieving and using DTCs for troubleshooting vehicle operation is only one part of an overall diagnostic strategy. Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. This information can be found in the vehicle's service manual.

In Fig. 5-6, tap "Read DTC", the screen will display the diagnostic result.



Fig. 5-6

### On-screen Buttons:

**Help:** Tap to view the help information.

**Code Search:** Tap it to search for more information about the current DTC online.

**Report:** To save the current data in text format. All diagnostic reports can be accessed from "Data" -> "Diagnostic Report".

## C. Clear Fault Code

After reading the retrieved codes from the vehicle and certain repairs have been carried out, you can use this function to erase the codes from the vehicle. Before performing this function, please be sure the vehicle's ignition key is in the ON position with the engine off.

## Note:

1. If you plan to take the vehicle to a Service Center for repair, DO NOT erase the codes from the vehicle's computer. If data is erased, valuable information that might help the technician troubleshoot the problem will also be erased.
2. Clearing DTCs does not fix the problem(s) that caused the code(s) to be set. If proper repairs to correct the problem that caused the code(s) to be set are not made, the code(s) will appear again and the check engine light will illuminate as soon as the problem that cause the DTC to set manifests itself.

## D. Read Data Stream

This option retrieves and displays live data and parameters from the vehicle's ECU.

In Fig. 5-7, tap "Read Data Stream", the system will display data stream items.

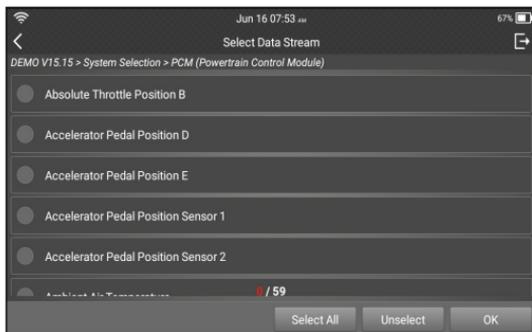


Fig. 5-7

### On-screen Buttons:

**Select All:** Tap it to select all items of the current page. To select certain data stream item, just check the box before the item name.

**Unselect:** Tap it to deselect all data stream items.

**OK:** Tap it to confirm and jump to the next step.

After selecting the desired items, tap "OK" to enter the data stream reading page.



Fig. 5-8

### Note:

1. If the value of the data stream item is out of the range of the standard (reference) value, the whole line will display in red. If it complies with the reference value, it displays in blue (normal mode).
2. The indicator 1/X shown on the bottom of the screen stands for the current page/total page number. Swipe the screen from the right/left to advance/return to the next/previous page.

There are 3 types of display modes available for data viewing, allowing you to view various types of parameters in the most suitable way.

- Value – this is the default mode which displays the parameters in texts and shows in list format.
- Graph – displays the parameters in waveform graphs.
- Combine – this option is mostly used in graph merge status for data comparison. In this case, different items are marked in different colors.

### On-screen Buttons:

Tap it to view the waveform graph of the current data stream item.

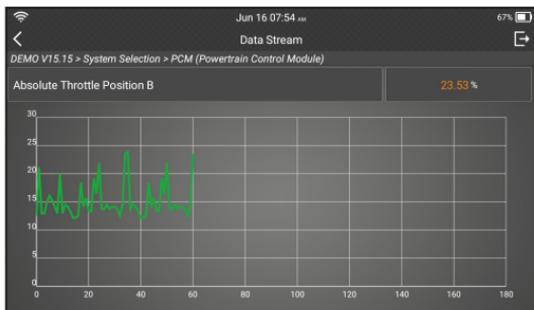


Fig. 5-9

**Combine:** Tap it, a list of the data stream items will appear on the screen. Select the necessary items (Max. 4 items can be selected at the same time) and the screen will display the waveforms corresponding to these items immediately.



Fig. 5-10

**Report:** Tap to save the current data as a diagnostic report. All diagnostic reports can be accessed from “Data” -> “Diagnostic Report”. The tool logs the Date of Report (the date and time at which the report was created) and assigns a unique Report #.

**Record:** Tap to record and save Live Data. Recorded Live Data can serve as valuable information to help you in troubleshooting and diagnosing vehicle problems. The saved file follows the naming rule: It begins with vehicle type, and then the record starting time and ends with .x431 (To differentiate between files, please configure the accurate system time). All diagnostic records can be viewed by tapping “Data” -> “Diagnostic Record”.

### 5.3 OBDII Diagnosis

This option presents a quick way to check for DTCs, isolate the cause of the

illuminated Malfunction Indicator Lamp (MIL), check monitor status prior to emissions certification testing, verify repairs, and perform a number of other services that are emission-related.

After the tool is properly connected to the vehicle's DLC, tap "OBID II" on the Job menu. The tool will automatically start a check of the vehicle's computer to determine which type of communication protocol it is using. When the tool identifies the computer's communication protocol, a communication link is established and then the screen will display the Monitor Status.

Item	Value
VIN	N/A
MIL Status	OFF
DTCs In This ECU	108
Readiness Completed	5
Readiness Not Completed	2

Fig. 5-11

**Note:** A PROTOCOL is a set of rules and procedures for regulating data transmission between computers, and between testing equipment and computers. Now five different types of protocols (ISO 9141, Keyword 2000, J1850 PWM, J1850 VPW and CAN) are in use by vehicle manufacturers.

Tap "OK", the following function list appears.

### **1. Read Codes**

This option is used to identify which section of the emission control system has malfunctioned.

**Note:** Diagnostic Trouble Codes or Fault Codes can be used to identify which engine systems or components that are malfunctioning. Never replace a part based only on the DTC definition. Retrieving and using DTCs for troubleshooting vehicle operation is only one part of an overall diagnostic strategy. Follow testing procedures (in vehicle's service manual), instructions and flowcharts to confirm the locations of the problem.

### **2. Erase Codes**

After reading the retrieved codes from the vehicle and certain repairs have been

carried out, you can use this function to erase the codes from the vehicle. Before performing this function, please be sure the vehicle's ignition key is in the ON position with the engine off.

---

 Note:

- When this function is used to erase DTCs from the vehicle's on-board computer, "Freeze Frame" data is erased and "Permanent" DTCs ARE NOT erased.
  - When data is erased from the vehicle's computer memory, the I/M Readiness Monitor Status program resets the status of all Monitors to a "Not Completed" status. To set all of the Monitors to a "Completed" status, an OBD II Drive Cycle must be performed. Refer to your vehicle's service manual for information on how to perform an OBD II Drive Cycle for the vehicle under test.
- 

After clearing, you should retrieve trouble codes once more or turn ignition on and retrieve codes again. If there are still some trouble codes in the system, please troubleshoot the code using a factory diagnosis guide, then clear the code and recheck.

### **3. I/M Readiness**

I/M refers to Inspection and Maintenance that is legislated by the Government to meet federal clean-air standards. I/M Readiness indicates whether or not the various emissions-related systems on the vehicle are operating properly and are ready for Inspection and Maintenance testing.

The purpose of the I/M Readiness Monitor Status is to indicate which of the vehicle's Monitors have run and completed their diagnosis and testing, and which ones have not yet run and completed testing and diagnosis of their designated sections of the vehicle's emissions system.

The I/M Readiness Monitor Status function also can be used (after repair of a fault has been performed) to confirm that the repair has been performed correctly, and/or to check for Monitor Run Status.

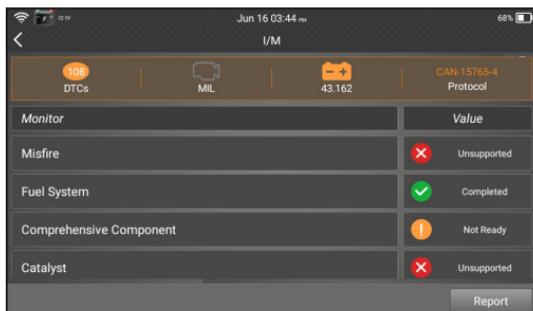


Fig. 5-12

This function can also be done by tapping [I/M Readiness] directly on the Job Menu.

#### **4. Data Stream**

This option retrieves and displays live data and parameters from the vehicle's ECU.

#### **5. View Freeze Frame**

When an emission-related fault occurs, certain vehicle conditions are recorded by the on-board computer. This information is referred to as freeze frame data. Freeze Data is a snapshot of the operating conditions at the time of an emission-related fault.

---

 Note: If DTCs were erased, Freeze Data may not be stored in vehicle memory depending on vehicle.

---

#### **6. O<sub>2</sub> Sensor Test**

OBD II regulations require that applicable vehicles monitor and test operation of the oxygen (O<sub>2</sub>) sensors to identify problems that can affect fuel efficiency and vehicle emissions. These tests are performed automatically when engine operating conditions are within predefined limits. Results of these tests are stored in the on-board computer's memory.

The O<sub>2</sub> Sensor Test function lets you retrieve and view O<sub>2</sub> sensor monitor test results for the most recently completed tests from your vehicle's on-board computer.

#### **7. On-Board Monitor Test**

The OBD Monitor Test function retrieves and displays test results for emission-

related powertrain components and systems that are not continuously monitored. The tests available are determined by the vehicle manufacturer.

## 8. EVAP System Test

The EVAP test function lets you initiate a leak test for the vehicle's EVAP system. The tool does not perform the leak test, but signals to vehicle's on-board computer to initiate the test. Before using the system test function, refer to the vehicle's service repair manual to determine the procedures necessary to stop the test.

## 9. Vehicle Info

This option displays the vehicle information. This information may include:

- **VIN** (Vehicle identification Number). It is applicable to model year 2000 and newer OBD II-compliant vehicles.
- **CID** (Calibration ID). These IDs uniquely identify the software version(s) for the vehicle's control module(s).
- **CVN** (Calibration Verification Number). CVNs are used to determine if emission-related calibrations for the vehicle under test have been changed. One or more CVNs may be returned by the vehicle's computer.

## 5.4 History

Generally once a vehicle diagnosis is performed, the tool will record the every details of diagnostic session. The History function provides direct access to the previously tested vehicles and users can resume from the last operation, without the necessity of starting from scratch.

Tap "History" on the Manual Diagnosis main menu screen, all diagnostic records will be listed on the screen in date sequence.

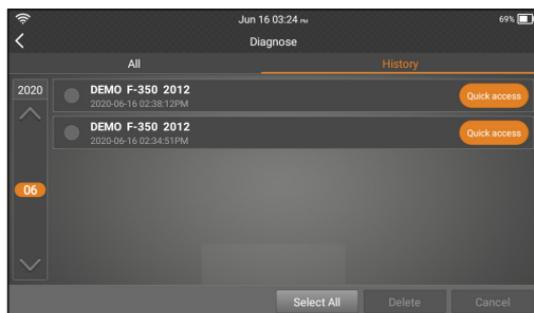
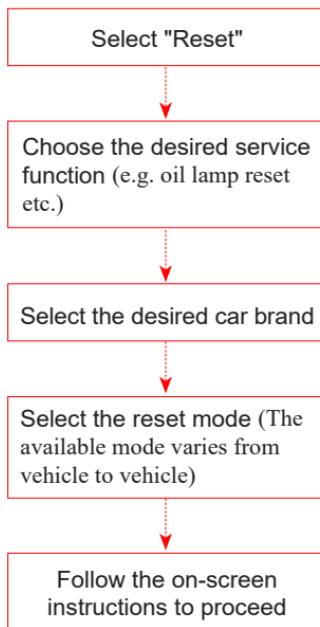


Fig. 5-13

- Tap certain vehicle model to view the details of the last diagnostic report.
- To delete certain diagnostic history, select it and then tap “Delete”. To delete all historical records, tap “Select All” and then tap “Delete”.
- Tap “Quick access” to directly navigate to the function selection page of last diagnostic operation. Choose the desired option to proceed.

## 5.5 Resetting

In addition to amazing & powerful diagnostic function, it also features Oil Reset Service, Electronic Parking Brake Reset, Steering Angle Calibration, ABS Bleeding, TPMS (Tire Pressure Monitor System) Reset, Gear Learning, IMMO Service, Injector Coding, Battery Maintenance System, Diesel Particulate Filter (DPF) Regeneration, Electronic Throttle Position Reset, Gearbox Matching, AFS (Adaptive Front-lighting System) Reset, Sunroof Initialization and Suspension Calibration. There are two methods to reset service lamp: Manual reset or Auto reset. Auto reset follows the principle of sending command from the tool to vehicle's ECU to do resetting. While using manual reset, users just follow the on-screen instructions to select appropriate execution options, enter correct data or values, and perform necessary actions, the system will guide you through the complete performance for various service operations. Follow the flowchart shown as below to perform resetting.



### 5.5.1 Oil Reset Service

This function allows you to perform reset for the engine oil life system, which calculates an optimal oil life change interval depending on the vehicle driving

conditions and climate.

This function can be performed in the following cases:

1. If the service lamp is on, you must provide service for the car. After service, you need to reset the driving mileage or driving time so that the service lamp turns off and the system enables the new service cycle.
2. After changing engine oil or electric appliances that monitor oil life, you need to reset the service lamp.

### 5.5.2 Electronic Parking Brake Reset

1. If the brake pad wears the brake pad sense line, the brake pad sense line sends a signal sense line to the on-board computer to replace the brake pad. After replacing the brake pad, you must reset the brake pad. Otherwise, the car alarms.
2. Reset must be performed in the following cases:
  - a) The brake pad and brake pad wear sensor are replaced.
  - b) The brake pad indicator lamp is on.
  - c) The brake pad sensor circuit is short, which is recovered.
  - d) The servo motor is replaced.

### 5.5.3 Steering Angle Calibration

To reset the steering angle, first find the relative zero point position for the car to drive in straight line. Taking this position as reference, the ECU can calculate the accurate angle for left and right steering.

After replacing the steering angle position sensor, replacing steering mechanical parts (such as steering gearbox, steering column, end tie rod, steering knuckle), performing four-wheel alignment, or recovering car body, you must reset the steering angle.

### 5.5.4 ABS Bleeding

This function allows you to perform various bi-directional tests to check the operating conditions of Anti-lock Braking System (ABS).

1. When the ABS contains air, the ABS bleeding function must be performed to bleed the brake system to restore ABS brake sensitivity.
2. If the ABS computer, ABS pump, brake master cylinder, brake cylinder, brake line, or brake fluid is replaced, the ABS bleeding function must be performed to bleed the ABS.

### 5.5.5 Tire Pressure Monitor System Reset

This function allows you to quickly look up the tire sensor IDs from the vehicle's ECU, as well as to perform TPMS replacement and sensor test.

1. After the tire pressure MIL turns on and maintenance is performed, the tire pressure resetting function must be performed to reset tire pressure and turn off the tire pressure MIL.
2. Tire pressure resetting must be performed after maintenance is performed in the following cases: tire pressure is too low, tire leaks, tire pressure monitoring device is replaced or installed, tire is replaced, tire pressure sensor is damaged, and tire is replaced for the car with tire pressure monitoring function.

### 5.5.6 Gear Learning

The crankshaft position sensor learns crankshaft tooth machining tolerance and saves to the computer to more accurately diagnose engine misfires. If tooth learning is not performed for a car equipped with Delphi engine, the MIL turns on after the engine is started. The diagnostic device detects the DTC P1336 'tooth not learned'. In this case, you must use the diagnostic device to perform tooth learning for the car. After tooth learning is successful, the MIL turns off.

After the engine ECU, crankshaft position sensor, or crankshaft flywheel is replaced, or the DTC 'tooth not learned' is present, tooth learning must be performed.

### 5.5.7 IMMO Service

An immobilizer is an anti-theft mechanism that prevents a vehicle's engine from starting unless the correct ignition key or other device is present. Most new vehicles have an immobilizer as standard equipment. An important advantage of this system is that it doesn't require the car owner to activate it since it operates automatically. An immobilizer is considered as providing much more effective anti-theft protection than an audible alarm alone.

As an anti-theft device, an immobilizer disables one of the systems needed to start a car's engine, usually the ignition or the fuel supply. This is accomplished by radio frequency identification between a transponder in the ignition key and a device called a radio frequency reader in the steering column. When the key is placed in the ignition, the transponder sends a signal with a unique identification code to the reader, which relays it to a receiver in the vehicle's computer control module. If the code is correct, the computer allows the fuel supply and ignition systems to operate and start the car. If the code is incorrect or absent, the computer disables the system, and the car will be unable to start until the correct key is placed in the ignition.

To prevent the car being used by unauthorized keys, the anti-theft key matching function must be performed so that the immobilizer control system on the car identifies and authorizes remote control keys to normally use the car.

When the ignition switch key, ignition switch, combined instrument panel, ECU, BCM, or remote control battery is replaced, anti-theft key matching must be performed.

### 5.5.8 Injector Coding

Write injector actual code or rewrite code in the ECU to the injector code of the corresponding cylinder so as to more accurately control or correct cylinder injection quantity.

After the ECU or injector is replaced, injector code of each cylinder must be confirmed or re-coded so that the cylinder can better identify injectors to accurately control fuel injection.

### 5.5.9 Battery Maintenance System Reset

This function enables you to perform a resetting operation on the monitoring unit of vehicle battery, in which the original low battery fault information will be cleared and battery matching will be done.

Battery matching must be performed in the following cases:

- a) Main battery is replaced. Battery matching must be performed to clear original low battery information and prevent the related control module from detecting false information. If the related control module detects false information, it will invalidate some electric auxiliary functions, such as automatic start & stop function, sunroof without one-key trigger function, power window without automatic function.
- b) Battery monitoring sensor. Battery matching is performed to re-match the control module and motoring sensor to detect battery power usage more accurately, which can avoid an error message displaying on the instrument panel.

### 5.5.10 Diesel Particulate Filter (DPF) Regeneration

DPF regeneration is used to clear PM (Particulate Matter) from the DPF filter through continuous combustion oxidation mode (such as high temperature heating combustion, fuel additive or catalyst reduce PM ignition combustion) to stabilize the filter performance.

DPF regeneration may be performed in the following cases:

- a) The exhaust back pressure sensor is replaced.
- b) The PM trap is removed or replaced.

- c) The fuel additive nozzle is removed or replaced.
- d) The catalytic oxidizer is removed or replaced.
- e) The DPF regeneration MIL is on and maintenance is performed.
- f) The DPF regeneration control module is replaced.

### 5.5.11 Electronic Throttle Position Reset

This function enables you to make initial settings to throttle actuators and returns the “learned” values stored on ECU to the default state. Doing so can accurately control the actions of regulating throttle (or idle engine) to adjust the amount of air intake.

### 5.5.12 Gearbox Matching

1. This function can complete the gearbox self-learning to improve gear shifting quality.
2. When the gearbox is disassembled or repaired (after some of the car battery is powered off), it will lead to shift delay or impact problem. In this case, this function needs to be done so that the gearbox can automatically compensate according to the driving conditions so as to achieve more comfortable and better shift quality.

### 5.5.13 AFS (Adaptive Front-lighting System) Reset

This feature is used to initialize the adaptive headlamp system. According to the ambient light intensity, the adaptive headlamp system may decide whether to automatically turn on the headlamps, and timely adjust the headlamp lighting angle while monitoring the vehicle speed and body posture.

### 5.5.14 Sunroof Initialization

This function can set the sunroof lock off, closed when it rains, sliding / tilting sunroof memory function, temperature threshold outside the car etc.

### 5.5.15 Suspension Calibration

1. This function can adjust the height of the body.
2. When replacing the body height sensor in the air suspension system, or control module or when the vehicle level is incorrect, you need to perform this function to adjust the body height sensor for level calibration.

## 6. Update

If some new software or APK can be updated, a numeric indicator will display on the “Upgrade” module on the Job menu. In this case, you may use this option to keep it synchronized with the latest version.

---

### Note:

- To enjoy more functions and better service, you are strongly suggested to update it on regular basis.
  - This function requires a stable network connection.
- 

Tap “Upgrade” on the Job menu to enter the update center.

By default, all diagnostic software is selected.

To deselect certain software, tap “Unselect”, and then check the box next to vehicle model.

Tap “Update” to start downloading. It may take several minutes to finish it, please be patient to wait. To pause downloading, tap “Stop”. To resume it, tap “Continue”. If network connection failure occurs, tap “Retry” to try again.

Once download is finished, the software packages will be installed automatically.

## 7. Data

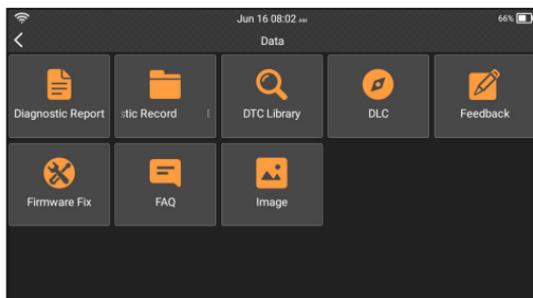


Fig. 7-1

### 7.1 Diagnostic Report

This module stores all diagnostic reports saved on the Read Trouble Code screen.

All the diagnostic reports are sorted by Date and Make. If there are too many reports stored, tap (Search) to filter and quickly locate it.

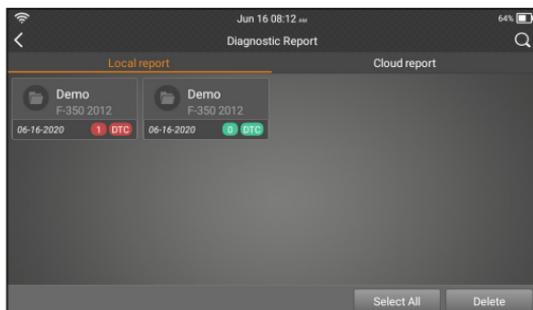


Fig. 7-2

- To select all reports, tap “Select All”. To deselect all, tap “Unselect”.
- Tap it to view its details.
- Select the desired report and then tap “Delete” to delete it.

### 7.2 Diagnostic Record

If user records the running parameters or waveform graphs while reading data stream, it will be saved as diagnostic records and appear under this module.

Tap “Diagnostic Record” to enter and select the desired data stream items and tap “OK” to jump to the playback page.

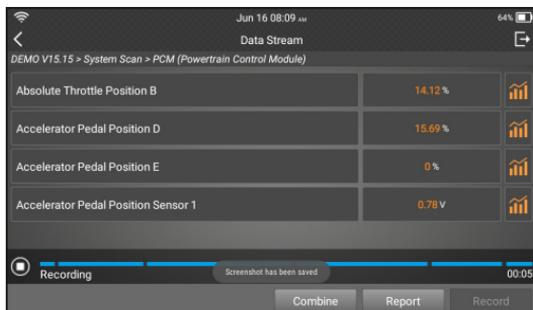


Fig. 7-3

### On-screen Buttons:

**Graph** – Displays parameters in waveform graphs.

**Combine** – Use to merge graphs for data comparison. Different items are coded in different colors.

**Value** – The default mode displays the parameters as text in a list format.

**Frame Playback** – Use for frame-by-frame playback of the selected data stream items. When in Frame Playback mode, this button changes to “Auto Playback”.

**Auto Playback** – Use for automatic playback of the selected data stream items. When in Auto Playback mode, this button changes to “Frame Playback”.

## 7.3 DTC Library

This option helps you to find the location of the vehicle’s DLC.

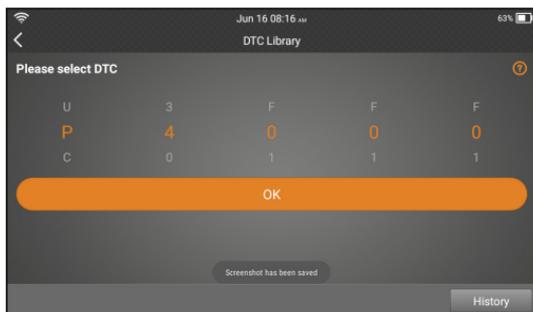


Fig. 7-4

Swipe the screen upwards/downwards to alter the value, then press [OK] button, the screen will display definition of the DTC.

## 7.4 DLC(Data Link Connector) Location

This option helps you to find the location of the vehicle's DLC.

## 7.5 Feedback

This item allows you to feedback your diagnostic problems to us for analysis and troubleshooting.

Tap "Feedback", the following 3 options will be displayed on the left column of the screen.

### A. Diag. Feedback

Tap a tested vehicle model to enter the feedback screen.

- 1) Tap "Choose File" to open the target folder and choose the desired diagnostic logs.
- 2) Choose the failure type and fill in the detailed failure description in the blank text box and telephone or email address. After inputting, tap "Submit Result" to send it to us.

### B. History Feedback

Tap it to view all diagnostic feedback records. Different process states are marked with different colors.

### C. Offline Feedback

Tap it to display all diagnostic feedback logs which have not been submitted successfully due to network failure. Once the handset gets a stable network signal, it will be uploaded to the remote server automatically.

## 7.6 Firmware Fix

Use this item to upgrade and fix diagnostic firmware. During fixing, please do not cut power or switch to other interfaces.

## 7.7 FAQ

Provides some frequently asked questions of the tool.

## 7.8 Image

All screenshots created during vehicle diagnosis are saved in this module. To enable the screenshot function, go to Settings and slide the Screen capture

switch to ON. A screenshot icon will float on upper right corner of the screen.

## 8. Settings

### 8.1 Units of Measurement

It is designed to set the measurement unit. Metric System and English System are available.

### 8.2 Screen Capture

This option allows you to capture the current screen. All screenshots created during vehicle diagnosis are saved in "Data" -> "Image" module.

To enable the screenshot function, slide the Screen capture switch to ON. A screenshot icon will float on upper right corner of the screen. Tap it to capture the screen.

### 8.3 Automatic Detection on Connect

This option enables you to determine whether to start an automatic VIN detection once the tool is properly connected to the vehicle's DLC.

### 8.4 Display & Brightness

This item allows you to set the standby time and screen brightness.

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 Tips: Reducing the brightness of the screen is helpful to conserve the power of the handset.

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### 8.5 Sound

This option lets you adjust the volume and other sound settings.

### 8.6 Network

---

 Note: Once WLAN is set as ON, the tool will consume more power. While it keeps unused, please set it off to save power. While WLAN keeps unused, please turn it off to conserve battery power.

---

The tool has built-in WLAN module that can be used to get online. Once you're online, you can register your tool, update diagnostic software & APK, send email on your network.

Slide the switch to ON, the system starts searching for all available wireless

LANs. Choose the desired WLAN access point / network to connect.

## 8.7 Date/Time

This option allows you to set the system date & time.

---

 Note: Since all diagnostic reports are sorted by Make and Date. To differentiate between files, please configure the accurate system time.

---

## 8.8 Language

The tool supports multiple languages. You can use this option to change the target language.

## 8.9 Email Setup

This option is used to set up the default email address for automatically receiving the diagnostic reports.

## 8.10 Recovery

Use this item to reset this tool to the default factory setting.

---

 Warning: Resetting may cause data loss. Before doing so, please be careful to perform this operation.

---

## 8.11 Clean up

This option allows user to clear some cache files and free up some storage space.

## 8.12 About

This option displays the hardware configuration information of the tool and license agreement.



## 9. FAQ

Here we list some frequently asked questions and answers related to this tool.

✓ System halts when reading data stream. What is the reason?

It may be caused by a slackened connector. Please turn this tool off, firmly connect the connector, and switch it on again.

✓ Screen of main unit flashes at engine ignition start.

Caused by electromagnetic disturbing, and this is normal phenomenon.

✓ There is no response when communicating with on-board computer.

Please confirm the proper voltage of power supply and check if the throttle has been closed, the transmission is in the neutral position, and the water is in proper temperature.

✓ What to do if the system fails to start auto VIN detection?

Please check the following possible reasons:

- Whether the tool is properly connected to the vehicle's DLC.
- Whether the "Automatic detection on Connect" switch is OFF. If yes, slide it to ON.

✓ Why are there so many fault codes?

Usually, it's caused by poor connection or fault circuit grounding.

✓ How to upgrade the system software?

1. Switch the tool on and ensure a stable internet connection.
2. Tap "Setting" on the Job Menu, select "About" -> "Version", and tap "Detect the System Version" to enter the system upgrading page.
3. Follow the on-screen instructions step by step to finish the process. It may take several minutes depending on the internet speed, please be patient. After upgrade is successfully finished, the tool will automatically restart and enters the Job menu.

✓ What if the tool cannot be switched on even after a period of recharging?

Please recharge it for at least 3 hours until the power LED lights up, then it can be switched on.

## **Warranty**

THIS WARRANTY IS EXPRESSLY LIMITED TO PERSONS WHO PURCHASE ANCEL PRODUCTS FOR PURPOSES OF RESALE OR USE IN THE ORDINARY COURSE OF THE BUYER'S BUSINESS.

ANCEL electronic product is warranted against defects in materials and workmanship for one year (12 months) from date of delivery to the user.

This warranty does not cover any part that has been abused, altered, used for a purpose other than for which it was intended, or used in a manner inconsistent with instructions regarding use. The exclusive remedy for any automotive meter found to be defective is repair or replacement, and ANCEL shall not be liable for any consequential or incidental damages.

Final determination of defects shall be made by ANCEL in accordance with procedures established by ANCEL. No agent, employee, or representative of ANCEL has any authority to bind ANCEL to any affirmation, representation, or warranty concerning ANCEL automotive meters, except as stated herein.

## **Order Information**

Replaceable and optional parts can be ordered directly from your ANCEL authorized tool supplier. Your order should include the following information:

1. Quantity
2. Part number
3. Item description

## **Customer Service**

If you have any questions on the operation of the unit, please contact local dealer, or contact OBDSpace Technology Co., Ltd.:

Website: [www.anceltech.com](http://www.anceltech.com)

[www.anceltech.com](http://www.anceltech.com)

Phone: +86 755 8175 1202

Email: [support@anceltech.com](mailto:support@anceltech.com)

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