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Table of contents

Safety Precautions

Precautions on Operation

- Please read the instruction before operation.
- Do not collide in operation.
- Be careful when it is connected with the main cable and the diagnosis socket. Tighten the screw fastener and avoid disconnecting or destroying the interface.
- Handle with care. Avoid collision. Unplug the power after operation.
- Hold the connector when plugging or unplugging it. Do not pull the cable for unplugging.

Safety Precautions

- Automotive batteries contain sulfuric acid that is harmful to skin. In operation, direct contact with the automotive batteries should be avoided. Pay attention not to splash the sulfuric acid into eyes. Keep ignition sources away from the battery at all times.
- Engines produce various poisonous compounds (hydrocarbon, carbon monoxide, azote oxid, etc,) which should be avoided.
- Avoid contacting high temperature assembly such as water tank and vent-pipe as the temperature of the running engine is very high.
- Before starting engine, put the speed lever in the neutral position or in the P position to avoid injury.
- Wear an ANSI-approved eye shield when testing or repairing vehicles.
- If you are using the battery as a power source, connect the RED (+) battery clip to the positive of the vehicle battery and the BLACK (-) battery clip to the negative.

Precautions on Operating Vehicle ECU

- Do not disconnect the vehicle inner consumer when the ignition switch is on position. Because at the moment of disconnecting, a very high voltage will be induced, which may damage sensors and ECU.
- Do not put the magnetic object (such as wireless speaker)near to the computer.
- Do cut off the power supply of ECU system before welding on the vehicle.
- Pay more attention to ECU and sensors when operation is next to them.
- Do earth yourself when you disassemble PROM, otherwise ECU and sensors will be damaged by static.
- Do not use the pointer ohm meter instead of DMM for testing ECU and sensor without special requirement.
- Do not test electric devices in relation with ECU with a test lamp unless otherwise expressly provided.
- Do wear a metal ground strip that one end around your wrist and the other to the vehicle body when you get in and out the vehicle.
- Do connect ECU harness connector firmly, otherwise electro elements, such as IC inside ECU, will be damaged.

Introduction

X-431TOP automobile work station (X-431TOP for short) is a newly developed automobile diagnostic computer by LAUNCH. It succeeds to the fruits of many years' hard work and successful experience achieved by LAUNCH in the auto aftermarket field, which enhance the function of diagnosis with available more than 100 models. Besides its functions in reading trouble code and data stream, activating test, reading control module information, adaptation, resetting service oil indicator and coding control unit, X-431TOP also has the functions of vehicle oscilloscope, ignition analysis, vehicle sensor and vehicle information query, and these functions required several instruments once, now only one X-431TOP.

X-431TOP is designed with separatable type: the main unit is separate from the terminal. The terminal is actually a test box, connecting to the correct port or component by cables (diagnostic cable, signal cable, etc.), which is used to collect signals or cache. The main unit, with large LCD multicolor touch screen, mainly deals, displays and controls the signals. X-431TOP main unit communicates the terminal by Bluetooth, so users can diagnose and check the vehicle by touching screen in anywhere.

Multilanguage display makes operation convenient in different countries and areas.

The function of software update via Internet makes it easy for customer to get the latest diagnostic program and keep pace with the development of automotive technology. As new auto series released continuously in the market, LAUNCH will develop the corresponding diagnostic software of new models new systems and new functions in time, and will release the software at www.X431.com.

Outline of X-431TOP

As shown in Figure 1-01 and Figure 1-02, X-431TOP is composed of two parts: the terminal and the main unit（Samsung Q1）. Terminal is mainly used to collect signals. The main unit is used to operate X-431TOP terminal by instruction, and analyses and processes signals collected by X-431TOP terminal.

Figure 1-01 X-431TOP terminal

Figure 1-02 X-431TOP main unit

Ports and Indicators

See Figure 1-03 for X-431TOP terminal connection ports and indicators.

Figure 1-03

Note: table for ports and indicators.

1	CH1 (channel 1/primary signal/secondary signal)	2	CH2 (channel 2)
3	CH3 (channel 3/synchronous)	4	CH4 (channel 4)
5	GND (GND channel)	6	Power switch
7	DC power jack	8	25PIN port
9	Power indicator(red)	10	Diagnosis indicator
11	Communicate state indicator		

Connectors and Diagnostic Cables

Figure 1-04 DAEWOO-12

Figure 1-05 FIAT-3

Figure 1-06 UNIVERSAL-16

Figure 1-07 TOYOTA-17

Figure 1-08 TOYOTA-22

Figure 1-09 FORD-6+1

Figure 1-10 CHRYSLER-6

Figure 1-11 FORD-20

Figure 1-12 JINLONG-16

Figure 1-13 MAZDA-17

Figure 1-14 HAFEI-12+16

Figure 1-15 KIA-20

Figure 1-16 AUDI-4

Figure 1-17 BMW-20

Figure 1-18 BENZ-38

Figure 1-19 HONDA-3

Figure 1-20 DAIHATSU-4

Figure 1-21 NISSAN-14+16

Figure 1-22 MITSUBISHI/HYUNDAI-12+16

Figure 1-23 GM/VAZ-12

Figure 1-24 UNIVERSAL-3

Figure 1-25 GAZ

Figure 1-26 AUDI-16

Figure 1-27 SSANGYONG-14

Figure 1-28 SUBARU-9

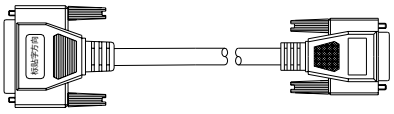


Figure 1-29 Diagnostic cable

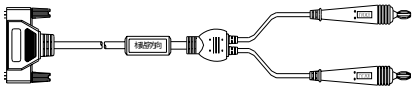


Figure 1-30 Sensor diagnostic cable

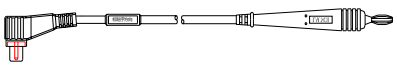


Figure 1-31 Oscilloscope cable

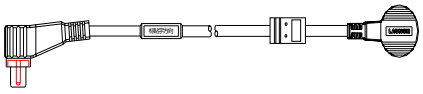


Figure 1-32 Secondary signal induction cable

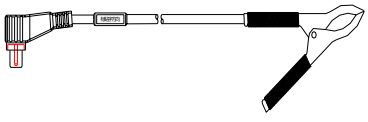


Figure 1-33 Oscillscope GND cable

Figure 1-34 Secondary signal cable

Figure 1-35 Electricity control patch cord 1

Figure 1-36 Electricity control patch cord 2

Figure 1-37 Electricity control patch cord 3

Figure 1-38 Electricity control patch cord 4

Figure 1-39 20MM crocodile clip (red)

Figure 1-40 Cigar ligter power supply

Figure 1-41 Primary signal patch cord

Figure 1-42 KES-200-cylinder signal clamp

Figure 1-43 Battery cable w/two clips

Note:
The hardware is different as the different configuration for each model.

Hardware Configuration

NO.	NAME	QUA	DESCRIPTION	NOTE
1	X-431TOP MAIN UNIT	1		
2	X-431TOP TERMINAL	1		
3	[TOYOTA-17]DIAGNOSTIC CONNECTOR	1	Diagnose TOYOTA17PIN semicircle diagnostic socket model	See Figure 1-07
4	[TOYOTA-22]DIAGNOSTIC CONNECTOR	1	Diagnose TOYOTA 22PIN square diagnostic socket model	See Figure 1-08
5	[MITSUBISHI/HYUNDAI-12+16] DIAGNOSITC CONNECTOR	1	Diagnose MITSUBISH12PIN、16PIN and 12+16PIN diagnostic socket model	See Figure 1-22
6	[NISSAN-14+16]DIAGNOSTIC CONNECTOR	1	Diagnose NISSAN14PIN and 16PIN diagnostic socket model	See Figure 1-21
7	[HONDA-3]DIAGNOSTIC CONNECTOR	1	Diagnose HONDA3PIN diagnostic socket model	See Figure 1-19
8	[MAZDA-17]DIAGNOSTIC CONNECTOR	1	Diagnose MAZDA17PIN diagnostic socket model	See Figure 1-13
9	[KIA-20]DIAGNOSTIC CONNECTOR	1	Diagnose KIA20PIN diagnostic socket model	See Figure 1-15
10	[AUDI-4]DIAGNOSTIC CONNECTOR	1	Diagnose AUDI4PIN diagnostic socket model	See Figure 1-16
11	[BENZ-38]DIAGNOSTIC CONNECTOR	1	Diagnose BENZ38PIN diagnostic socket model	See Figure 1-18
12	[UNIVERSAL-3]DIAGNOSTIC CONNECTOR	1	Read the flash code of the old model	See Figure 1-24
13	[BMW-20]DIAGNOSTIC CONNECTOR	1	Diagnose BMW20PIN diagnostic socket model	See Figure 1-17
14	[FIAT-3]DIAGNOSTIC CONNECTOR	1	Diagnose FIAT3PIN diagnostic	See

			socket model	Figure 1-05
15	[GM/VAZ-12]DIAGNOSTIC CONNECTOR	1	Diagnose GM/VAZ12PIN diagnostic socket model	See Figure 1-23
16	[FORD-6+1]DIAGNOSTIC CONNECTOR	1	Diagnose FORD6+1PIN diagnostic socket model	See Figure 1-09
17	[UNIVERSAL-16]DIAGNOSTIC CONNECTOR	1	All OBDII16PIN diagnostic socket, e.g.BMW-16PIN and TOYOTA-16PIN, etc. except JINLONG-16PIN and AUDI 16PIN.	See Figure 1-06
18	[CHRYSLER-6]DIAGNOSTIC CONNECTOR	1	Diagnose CHRYSLER6PIN diagnostic socket model	See Figure 1-10
19	[FORD-20]DIAGNOSTIC CONNECTOR	1	Diagnose FORD20PIN diagnostic socket model	See Figure 1-11
20	[HAFEI-12+16]DIAGNOSTIC CONNECTOR	1	Diagnose HAFEI12+16PIN diagnostic socket model	See Figure 1-14
21	[DAIHATSU -4]DIAGNOSTIC CONNECTOR	1	Diagnose DAIHATSU4PIN diagnostic socket model	See Figure 1-20
22	[GAZ]DIAGNOSTIC CONNECTOR	1	Diagnose GAZ diagnostic socket model	See Figure 1-25
23	[JINLONG-16]DIAGNOSTIC CONNECTOR	1	Diagnose JINLONG16 PIN diagnostic socket model	See Figure 1-12
24	[DAEWOO-12]DIAGNOSTIC CONNECTOR	1	Diagnose DAEWOO12PIN diagnostic socket model	See Figure 1-4
25	[SUBARU-9]DIAGNOSTIC CONNECTOR	1	Diagnose SUBARU-9PIN diagnostic socket model	See Figure 1-28
26	[AUDI-16]DIAGNOSTIC CONNECTOR	1	Diagnose AUDI16PIN diagnostic socket model	See Figure

				1-26
27	[SSANG YONG-14]DIAGNOSTIC CONNECTOR	1	Diagnose SSANG YONG14PIN diagnostic socket model.	See Figure 1-27
28	KES secondary signal cable	1	Acquire secondary signal	See Figure 1-34
29	Secondary signal induction cable	1	Acquire variety of secondary signal of vehicle without high tension cable	See Figure 1-32
30	KES-200 — cylinder signal clamp	1	Acquire cylinder signal	See Figure 1-42
31	20MM crocodile clip (red)	4		See Figure 1-39
32	Electricity control patch cord 1	5	Convenient to input signal for test.	See Figure 1-35
33	Electricity control patch cord 2	5	Convenient to input signal for test.	See Figure 1-36
34	Electricity control patch cord 3	5	Convenient to input signal for test.	See Figure 1-37
35	Electricity control patch cord 4	5	Convenient to input signal for test.	See Figure 1-38
36	Oscilloscope cable	4	Signal acquisition	See Figure 1-31
37	Oscilloscope GND cable	1		See Figure 1-33
38	Sensor diagnostic cable	1	Diagnose sensor	See Figure 1-30
39	Diagnostic cable	1	Connect DIAGNOSTIC	See

			CONNECTOR to X-431TOP Terminal	Figure 1-29
40	Cigar lighter power supply	1	Acquire power supply from vehicle cigar lighter	See Figure 1-40
41	Battery cable w/two clips	1	Acquire power supply from vehicle battery	See Figure 1-43
42	Primary signal patch cord	4	Transfer signals when checking primary signal and electricity control sensor, which is convenient to input signals for test.	See Figure 1-41

X-431TOP Operation

Starting

After X-431TOP terminal (power, diagnostic cable, etc. For more details, please refer to explanations of connection below) is correctly connected, press the button to Power ON X-431TOP Terminal (refer Figure 1-03), then press power button to power ON the main unit (For more details about other operation of main unit, please refer to the accessory main unit manual). Double click X-431TOP icon on desktop, and then the main unit will enter the main menu (Figure 2-01). X-431TOP main unit will automatically communicates with X-431TOP terminal by Bluetooth.

Menu Descriptions

Figure 2-01

X-431TOP automobile diagnostic workstation provides 5 functions: vehicle diagnosis, vehicle osilloscope, ignition analysis, vehicle sensor and vehicle autobase..With help supplied by X-431TOP, it is easy to operate by pressing buttons.

Vehicle diagnosis: The following functions are applicable for all vehicles: read trouble code , clear trouble code, read datastream and actuation test function. It will be different because of different vehicle models and different systems. For more details, please refer to the newly-developped vehicle diagnosis program.

Vehicle oscilloscope: This function is uesd to test the vehicle circuit output waveform with a built-in storage capacity of 100 pages of waveforms. It has perfect display control and trigger mode. It can also test and display waveforms of 4 channels at one time.

Ignition analysis: Provide ignition waveform analysis including distributor system anglysis ,independent ignition system analysis and simultenous ignition system analysis.

Vehicle sensor: For testing the output DC, resistance , frequency signal of the sensor and simulating the output voltage signal, square wave signal, standard output wave form signal of sensor and arbitrary wave form signal drawn by users.

Vehicle autobase: Provide inquiry function for circuit diagram and sensor information for curent normal vehicle model.

Buttons Descriptions

parameter setting. Use this button to alter the current parameter.

to save the current result.

to check the saved test records.

to use this button for help when you meet trouble.

to confirm and execute.

to execute the currernt operation.

to return to the previous window.

to display the previous page. Use this button when displaying all the content

with several pages.

PAGE DOWN to display the next page. Use this button to display all the content having several pages.

DELETE to delete the chosen content.

RES. to reset.

PRINT to print the current content.

Note: The button will be highlighted when choosed.When the button font is grey, the button is disabled.

Function Introduction

Vehicle Fault Diagnosis

Connection Description

Choose the correct port, and then connect the vehicle socket to main cable and the main cable to X-431TOP Terminal (See Figure 3-01).

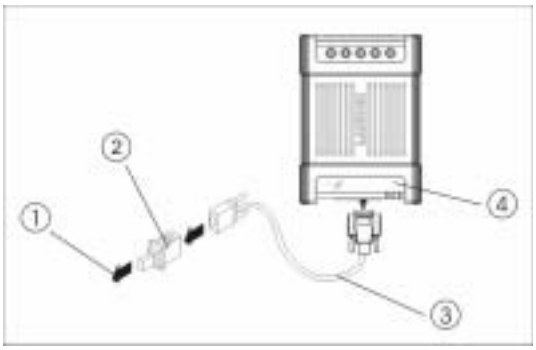


Figure 3-01 Connection illustration
1-to connect the vehicle diagnostic socket
2-diagnostic connector(choose the corresponding connector according to the vehicle model)
3-main cable
4-X-431TOP Terminal

Interface Operation

1. The main menu of the vehicle fault diagnosis is shown as in Figure 3-01.Press [vehicle diagnosis] on X-431 TOP main menu as shown in Figure 2-01,then enter).
2. After conneting according to Figure 3-01,choose the tested vehicle then press [OK]and enter the corresponding vehicle [GAG]as shown in Figure 3-03
3. Choose the diagnosis version(after the upgrading of the diagnosis programm,the old and new version coexist so there are many versions can be selected),then press [download].After downloading(start to run it after loading it into memory),then enter the system choose menu as shown in Figure 3-04

NOTE:
There will be some differences during the process of entering systems because of different vehicle models and vehicle series, therefore the main operation is similar. Please do according to the prompt during operation.

4. After entering the system choose menu, the screen will display the diagnosis function choose menu as shown in Figure 3-05

NOTE:
Double click equals "choose→ OK".

Figure 3-02

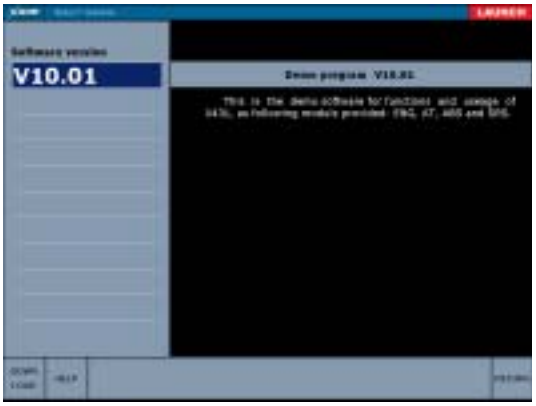


Figure 3-03

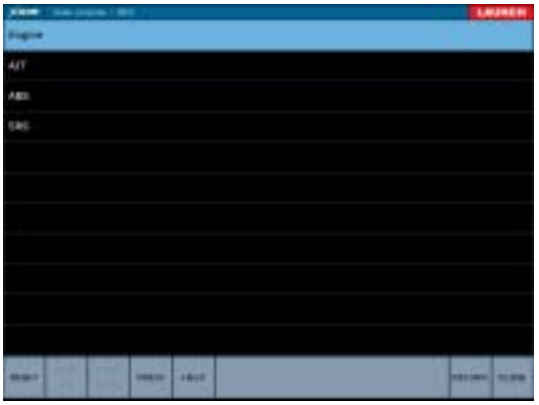


Figure 3-04

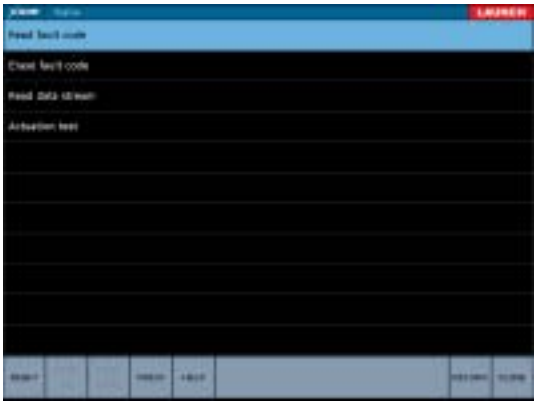


Figure 3-05

Note:
You can save datastream when testing datastream, which is convenient to check, consult and analyse fault. The explanations below are for each key:

"HISTORY": to view the diagnostic records saved before. See Figure 3-06. Select the record according to the model and test time, and then click "OK" to view the datastream.

"SAVE": to save the datastream with serial number+model+time mode when reading. See Figure 3-06.

"DELETE": to deletet datastream.

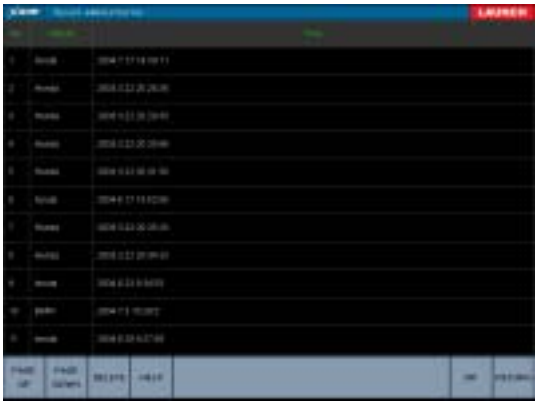


Figure 3-06

Vehicle Oscilloscope

Vehicle oscilloscope does not only grasp the signals, but also can display the signals through waveforms with slow speed. Vehicle oscilloscope can record the signal waveform by storage and can replay the fast signal. In thus, it is very convenient to analyse the faults, including the fast signals (e.g. injector signal and intermittence fault signal) and slow signals (e.g. throttle position variation signal and oxygen sensor signal).

Connection Description

Connect one end of the battery cable w/two clips to the battery for electricity, and connect the other end to X-431TOP terminal DC port (refer to X-431TOP terminal button and port description). Connect the oscilloscope GND cable to X-431TOP terminal GND channel. If the oscilloscope cable is not long enough to connect the signal port, the electronically controlled patch cord can be used to connect the oscilloscope

cable, and then connect the signal port.

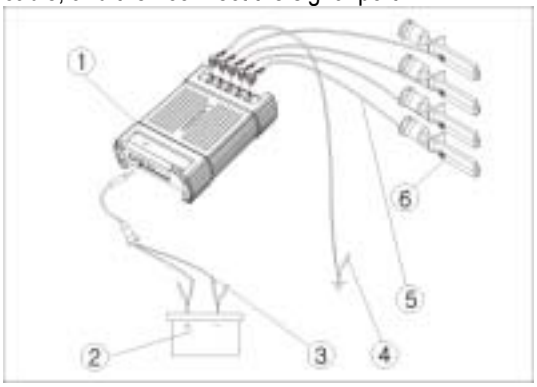


Figure 3-07 Connection illustration for vehicle osciloscope

1-X-431TOP Terminal 2-battery
3-battery cable with w/two clips
4-oscilloscope GND cable
5-oscilloscope cable
6-electronically controlled patch cord

Attention: Please use the special capacitance probe when diagnosing the ignition high tension line. Do not directly connect the oscilloscope to the ignition secondary circuit. You can also get power in the following way:

From cigar lighter: insert one end of the cigar lighter cable into the lighter socket in vehicle and connect the other end to the DC power connector of X-431TOP Terminal.

Oscilloscope Menu

Figure 3-08 shows the entering vehicle oscilloscope menu. (Default "trigger" menu).

Figure 3-08

Parameter setting is at right.
Trigger source: the trigger channel of oscilloscope[channel(CH1), channel(CH2), channel(CH3), channel(CH4)]. The chosen channel is light.

Trigger mode: (auto ~ normal) and (single ~ continuous). When in auto mode, trigger as receive signals. When in normal mode, trigger as satisfied the trigger requirements (leading edge or trailing edge, trigger level, trigger point). When in single mode, triggering once can display one waveform. When in continuous mode, the variation of continuous waveform can be displayed.
Trigger edge: the leading edge or trailing edge of waveform. Clicking [leading] or [trailing] can switch mutually.
Trigger level: the original voltage value of waveform with regulation by [up] and [down].
Trigger point: to regulate the horizontal position of signal trigger with [leftward] and [rightward].

Note: When the numerical value and cursor don't occur, please choose the relevant channel display in the "display setting" menu.

Other functions(refer to the previous explanation with history, save, print, help functions; gridding: turn on/off gridding). Figure 3-09 shows "other"interface. Click the column in the right to operate.

Figure 3-09

TB UP
TB DOWN Regulate the time base value;
time base: the time value of each case level length.

CHANNEL SETTING Channel parameter setting. Figure 3-10 shows the " channel " setting interface.
Channel: the current setting channel is light.
Voltage: the voltage value represented by vertical length of each case, with regulation by [add] and [decrease]. The regulation value is displayed in right-down corner.
Ground:the 0V voltage position of oscilloscope display with regulation by [up]and [down].
Coupling mode: (AC ~ DC)and (positive ~ inverse). DC coupling: for measuring AC and DC signal; AC coupling: only let the signal of AC transit .

Note: When the numerical value and cursor don't occur, please choose the relevant channel display on the "display setting".

Figure 3-10

DISPLAY Display mode setting with 7 display modes to be chosen. See Figure 3-11.

Figure 3-11

MEASURE Calculate voltage and period of waveform. Click "measure" in Figure 3-12 to enter.

Figure 3-12

CHANNEL Select the needed channel. The currrent channel is light.
Item: to select the needed item. Time base and voltage can be measured. Switch "time base", "voltage" and "closed" by clicking. See Figure 3-13.

Corase tuning: to move 4 scales by a click.
Fine tuning: to move 1/5 scale by a click.

Figure 3-13

Figure 3-14 shows the interface of measuring " voltage".

Figure 3-14

System sets parameter of itself and displays signal waveform clearly.

Click the key, select the needed waveform of sensor, and then click "OK"-"display"-"Std waveform". The waveform will be displayed at right.

After connecting oscilloscope diagnostic cable, power calbe and GND cable correctly, turn main unit on. And then set correct parameters, click " RUN", it will display waveforms.

Click "RETURN" to go back to main menu. (See Figure 1-02.)

Ignition Analysis

Generally speaking, diagnosis engine starts with ignition system. Nowadays ignition system includes distributor and distributorless. Distributorless includes independent ignition and simultaneous ignition. (See Figure 3-15)

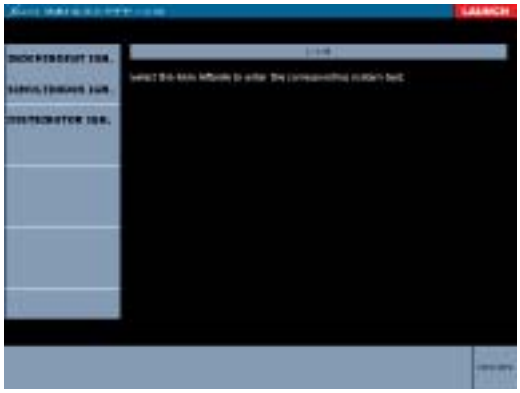


Figure 3-15

Distributor Ignition Analysis

Connection description:

1. Connect one end of the battery double-clip to the battery for electricity, and the other end to X-431TOP terminal DC port (refers to X-431TOP terminal button and port description).
2. Connect one end of the oscilloscope GND cable to X-431TOP terminal GND channel and the other end to the ground.
3. Connect one end of cylinder signal clamp to the CH3 of X-431TOP terminal and the other end to one cylinder high-tension cable.
4. Connect one end of secondary signal cable to CH1 of X-431TOP and the other end to central high-tension cable when testing secondary signals.
5. Connect one end of the primary signal patch cord to the CH1 of X-431TOP terminal and the other end to the primary positive of the ignition coil when testing primary signals.

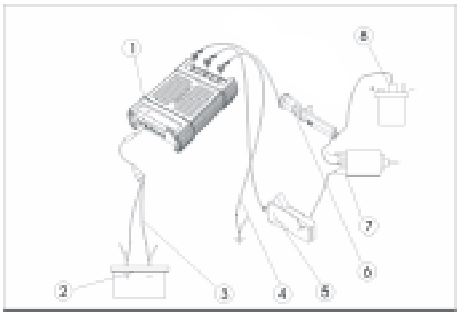


Figure 3-16 Connection illustration for distributor ignition

1-X-431TOP terminal 2-battery
3-battery cable w/two clips
4-oscilloscope GND cable (connecting GND)
5-cylinder signal clip (connecting CH3)
6-secondary signal cable (connecting CH1)
7-distributor 8-ignition coil

NOTE:

1. *From cigar lighter: insert one end of the cigar lighter cable into the lighter socket in vehicle and connect the other end to the DC power connector of X-431TOP Terminal.*
2. *From double-clip power cable: connect one end of the double-clip power cable to the positive & negative battery and the other end to the DC power connector of X-431TOP terminal. (Make sure to connect correct ends.)*
3. *From power patch cord: connect one end of the power patch cord to the 100-240V AC socket and the other end to the jack of the on-off power. And connect the power jack to the DC power connector.*

Figure 3-17 shows the distributor interface.

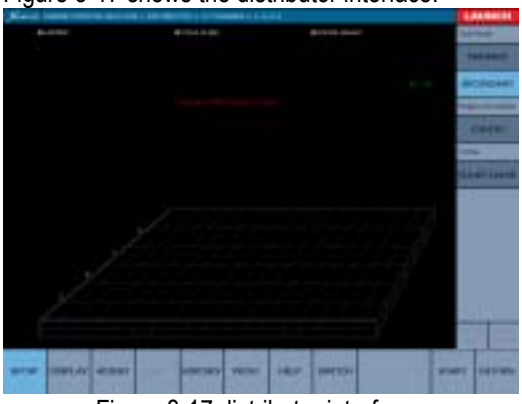


Figure 3-17 distributor interface

[Primary]: for primary signal test.
[Secondary]: for secondary signal test.
[Configure]: to configure the cylinder quantity and ignition sequence of engine. Click "Configure" in Figure 3-18 to enter.
[Clear cache]: to clear the cache waveform data.

Figure 3-18

On the pop-down menu of "cylinders", select the quantity of the cylinder, and then select the order sequence on the pop-down menu of "Ign. Order", or click the number to select the order. If you click wrong number, please click "new order" to correct the order. Then click "start", the system will execute the test.

Independent Ignition

Independent ignition analysis has two connection modes: one is with high-tension and the other is without high-tension

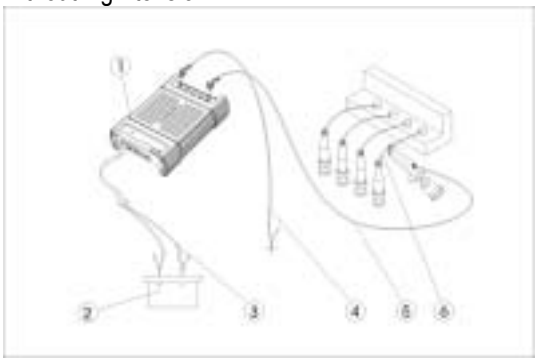


Figure 3-19 Connection illustration for independent ignition with outer High-tension

cable
1-X-431TOP terminal 2-battery
3-battery cable w/two clips
4-oscilloscope GND cable (connecting GND)
5-secondary signal cable (connecting CH1)
6-secondary high-tension cable

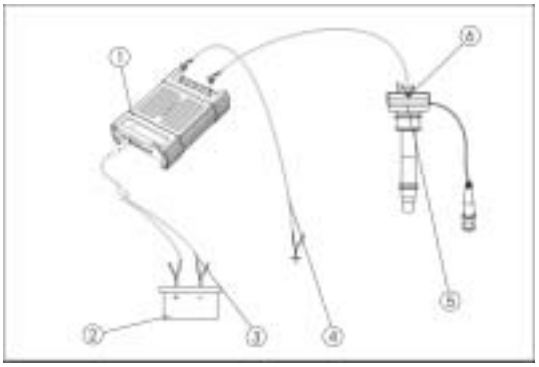


Figure 3-20 Connection illustration for independent ignition with inner High-tension cable

1-X-431TOP terminal 2-battery
3-battery cable w/two clips
4-GND cable (connecting GND) 5-ignition coil
6-secondary signal induction cable (connecting CH1)

NOTE:

1. *From cigar lighter: insert one end of the cigar lighter cable into the lighter socket in vehicle and connect the other end to the DC power connector of X-431TOP Terminal.*
2. *From double-clip power cable: connect one end of the double-clip power cable to the positive battery and the other end to the negative. See Figure 3-20.*
3. *From power patch cord: connect one end of the power patch cord to the 100-240V AC socket and the other end to the jack of the on-off power. And connect the power jack to the DC power connector.*

Figure 3-21 shows the independent ignition interface.

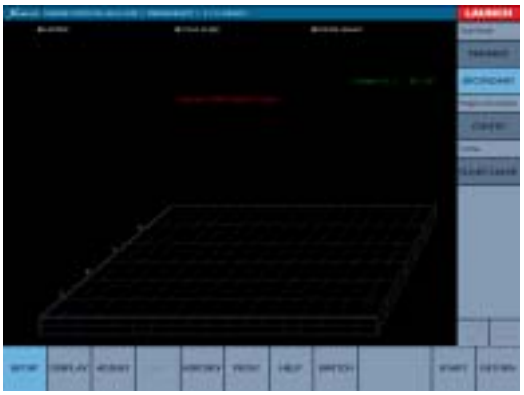


Figure 3-21 independent ignition

Simultaneous Ignition

The diagram of Simultaneous Ignition analysis is as same as the independent ignition's. Refer to the independent ignition diagram.
Figure 3-22 shows the Simultaneous Ignition interface.

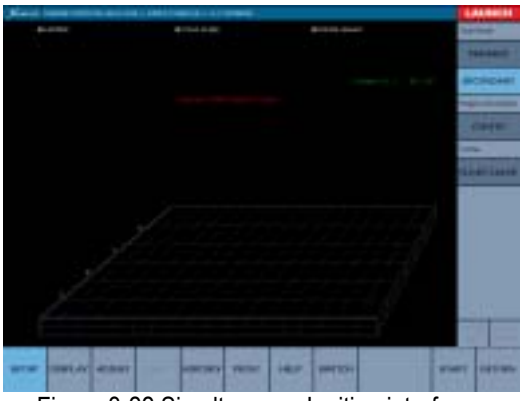


Figure 3-22 Simultaneous Ignition interface

Display and Analysis Mode of Waveform

X-431TOP provides 7 display modes: single-cylinder wave, parade pattern, raster pattern, bar graph, overlap pattern, ladder pattern and data table.These display modes are very convenient for uesrs to watch waveforms. Click [display] in the underside, and then the buttons of 7 display modes will occur. The default

waveform is ladder pattern. See Figure 3-23.

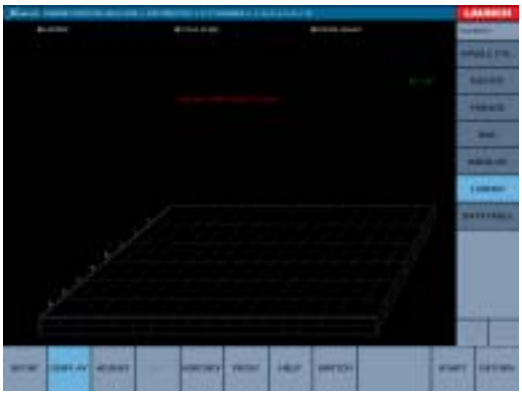


Figure 3-23

Figure 3-24 shows the "display" interface of independent ignition and simultaneous ignition.

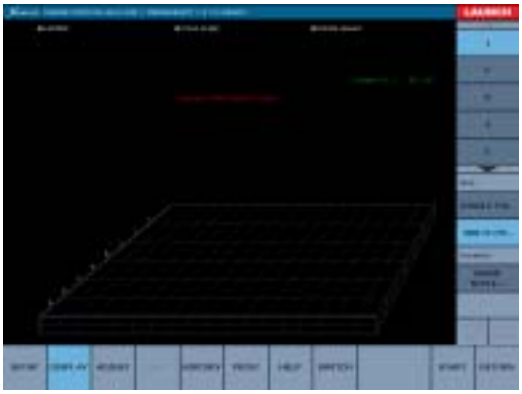


Figure 3-24

The number-1, 2, 3, 4, 5…--represents the corresponding cylinder number.
Style: the "SINGLY CYL." only displays waveforms of single cylinder. The "MULTI CYL." displays waveforms of the current cylinder and other cylinder.
Waveform: click "DRAW STYLE" to enter the interfaces below.

Ladder Pattern

Ladder pattern is the default display mode of system. See Figure 3-25.

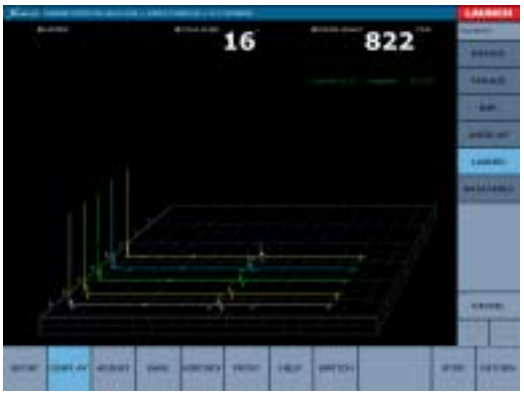


Figure 3-25

Single-cylinder Pattern

Figure 3-26 shows the single-cylinder pattern.
The ignition primary single-cylinder pattern test is mainly used to:

a. Analyze the ignition dwell angle of single cylinder.
b. Analyze the capability of ignition coil and primary high tension circuit.
c. Find the improper mixture A/F ratio of single cylinder.
d. Analyze the capability of capacitance.
e. Find the spark plug that causes the misfire of cylinder.

Figure 3-26

Raster Pattern

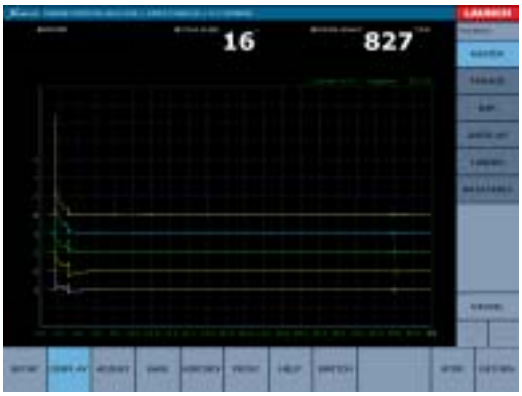


Figure 3-27

Figure 3-27 shows the raster pattern. With the raster pattern, it is very convenient to analyze the dwell angle and opening angle of each cylinder and the working state of each cylinder spark plug.

Parade Pattern

Figure 3-28 shows the parade pattern. This test can provide the valuable information about combustion quality state of each casing.

Figure 3-28

Bar Graph

Figure 3-29 shows the bar graph.

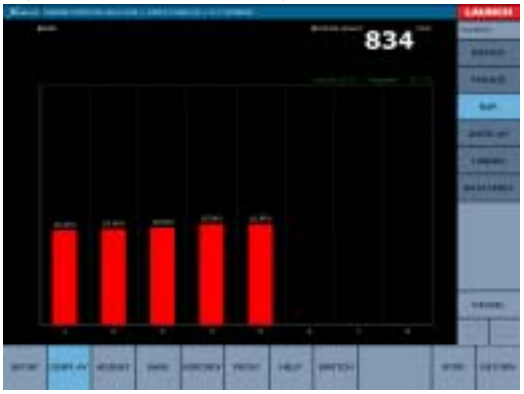


Figure 3-29

Overlap Pattern

Figure 3-30 shows the overlap pattern.

Figure 3-30

Data Table

Figure 3-31 shows the data table. It displays the data of ignition breakdown voltage, spark voltage, spark time, dwell angle and overlapping angle in data table.

Figure 3-31

Display Waveform Adjustment

Click "adjust" in "ignition analysis" menu (distributor, independent or simultaneous menu) to enter the "adjust" interface. (See Figure 3-32).

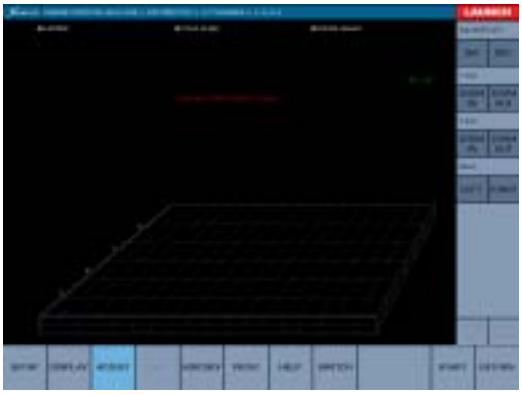


Figure 3-32

[signal]: Click "INC" or "DEC" to increase or decrease the signal.

[X axial]: Click "IN" or "OUT" to zoom in or zoom out the proportion of X axial.

[Y axial]: Click "IN" or "OUT" to zoom in or zoom out the proportion of Y axial.

[MOVE]: Click "UP", "DOWN", "RIGHT" or "LEFT" to move the waveform.

Vehicle sensor

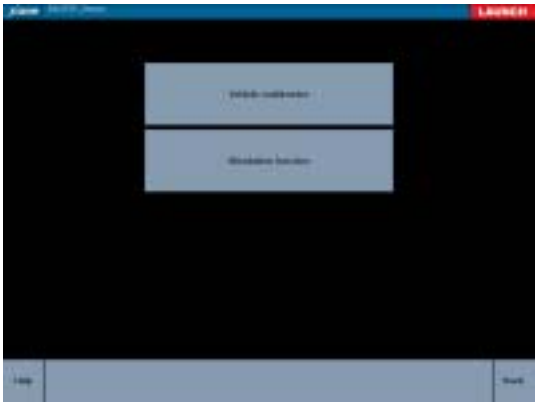


Figure 3-33

The function of vehicle sensor includes vehicle multimeter and simulation function.

Connection Description

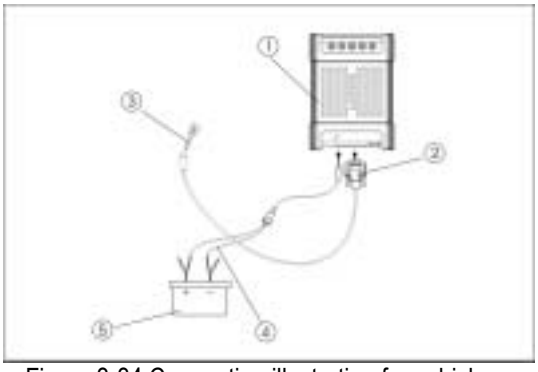


Figure 3-34 Connection illustration for vehicle sensor

1-X-431TOP terminal
2-sensor test cable
3-test probe
4-battery cable w/two clips

- Connect the sensor test cable to the 25PIN port of X-431TOP terminal.
- Connect the power supply to the DC port of X-431TOP terminal.

NOTE:

1. *From cigar lighter: insert one end of the cigar lighter cable into the lighter socket*

in vehicle and connect the other end to the DC power connector of X-431TOP Terminal.

2. *From double-clip power cable: connect one end of the double-clip power cable to the positive & negative battery and the other end to the DC power connector of X-431TOP terminal. (Make sure to connect correct ends).*
3. *From power patch cord: connect one end of the power patch cord to the 100-240V AC socket and the other end to the jack of the on-off power. And connect the power jack to the DC power connector.*

Vehicle Multimeter

In the interface as shown in Figure 3-35, voltage, resistance and frequency can be tested.

Figure 3-35

Simulation Function

With simulation function users can exactly judge if the sensor is good or not, which can decrease replacing components blindly. For example, the trouble code indicates the fault is in water temperature sensor. But we need also make sure the fault is in water temperature sensor or in the connection between ECU and sensors or in ECU itself. So at this time, the signal of simulating water temperature sensor, instead of water temperature sensor, import signal to the microcomputer by simulation function. If the engine work better and the fault symptom disappears, so the fault is in the water temperature sensor. If the fault symptom still occurs, import the signal by ECU port. Now, if the fault symptom disappears, the fault is in the connection between water temperature sensor and ECU; if the fault symptom still occurs, the fault is in ECU.

The Figure 3-36 shows default interface of simulation function (DC interface). Sliding the red slide bar in the right or display voltage value button in the underside can adjust the magnitude of the simulation out-put DC current. After fixing the voltage value, click [start] in the underside, and then X-431 TOP starts to import simulation voltage.

Figure 3-36

Frequency Simulation

Frequency simulation can simulate square signal with pulse frequency 0.1~15kHz, range -12V~+5V, duty ratio 10%~90%.

Click "stable frequency" in Figure 3-36 to enter the "stable frequency emulate" interface as shown in Figure 3-37.

[Frequency(Hz)]: to display the current square signal frequency with adjusting by the [decrease] and [add] in the underside.

[Duty ratio(%)]: to display the current duty ratio with adjusting by the [decrease] and [add] in the underside.

[High battery value (V)]: to display the current high battery value of square signal with adjusting by the [decrease] and [add] in the underside.

[Low battery value (V)]: to display the current low battery value of square signal with adjusting by the [decrease] and [add] in the underside.

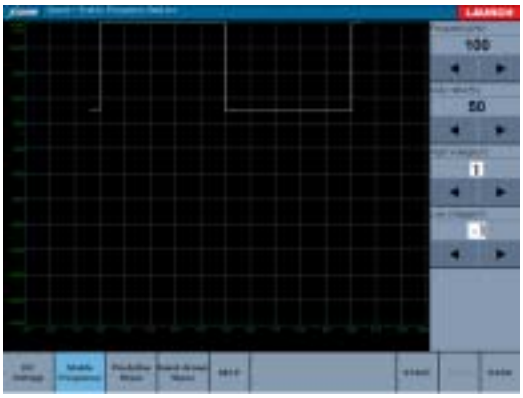


Figure 3-37

Predefined Waveform

X-431 TOP provides predefined normal sensor waveform, which is very convenient to simulate the sensor signal for users. After exporting the predefined waveform (choose the simulation waveform to be displayed after [sensor type], [waveform type]), click [start], and then the relevant sensor waveform out-put can be simulated.

Figure 3-38 shows the "predefined waveform" interface.

[Sensor type]: click triangle symbol and choose sensor type to be simulated on the drop-down menu. X-431TOP provides the predefined waveform for ECT, EVP, HO2S, IAT, MAF, MAP, TP, VAF and VSS.

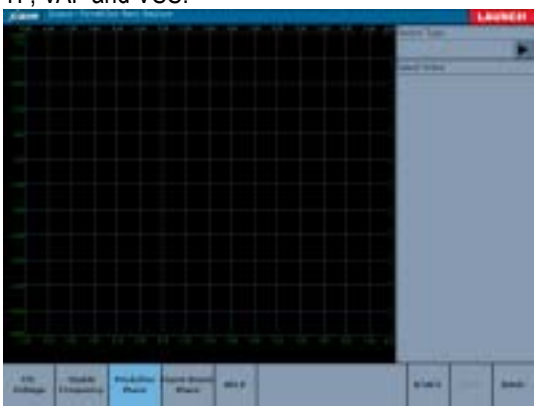


Figure 3-38

Hand-draw Waveform

It is very convenient for users to simulate special waveform or fault wave with hand-draw waveform function. After drawing a waveform in the left and setting the crest voltage and bottom voltage of the waveform in the right parameter setting section, then click [start]. X-431 TOP can output the waveform.

Attention:
It is ok to draw a periodic integrated waveform (when it is outputted, the system will consider the waveform in the draw section as a periodic one). Users don't need to consider the crest &bottom battery and period in the draw section. Only need to set the crest & bottom battery and period in the right parameter setting section.

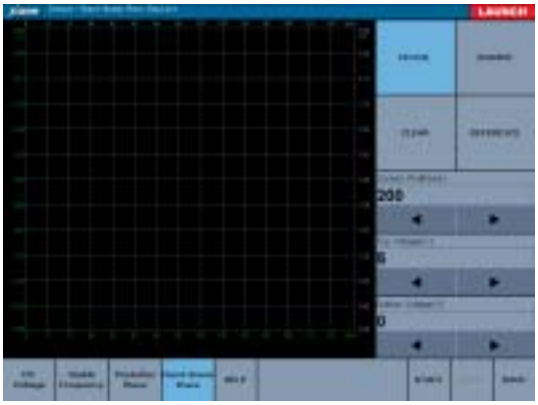


Figure 3-39

to change the mouse to be a pencil with which users can draw waveforms.

to change the mouse to be circle which can be used as an eraser.

to clear the draw section.

to output the predefined waveform. Users can refer to the predefined waveforms.

Precautions on Checking Vehicle Sensor

- Hold the connector when plugging or unplugging it. Do not pull the cable for unplugging.
- At first check the fuse, fusible line and connection port. Then check others after eliminating these faults.
- When measuring voltage, the ignition switch should be turn on and the battery voltage should not be less than 11V.
- When measuring voltage, please shake the lead lightly in the vertical and level direction for much precision.
- When checking if there is a fault of the line open-circuit or not, at first disconnect the CEU and the relevant sensor, then measure the resistance among the ports of sensor in order to make sure there is open-circuit/ contact fault or not.
- When checking if there is a short circuit fault or not, please disconnect the CEU and the relevant sensor, then measure the resistance value of the ports between the connected port and the vehicle body. If the resistance value is more than 1MΩ , there is no fault.
- Before disassembling the engine electrical control system cable, cut off the power supply, that is, the ignition switch is turned off.
- Pay attention to choose the correct GND ports of connectors.
- Contact the test probe and the two ports/ the two leads to be measured when measuring the voltage between the two ports or the two leads.
- Contact the test probe to the ports/ the cable to be measured, and the negative connector to the ground when measuring voltage of one port/ one cable.
- Checking the continuity of the ports, contact and lead is checking the ports, contact and lead electrify or not. The measure way for voltage value can be used here.
- Check the faults in the ports of the CEU to sensors, relays, etc.
- There are two test probes in the testing line. The black one is the signal public port(signal GND); the red one is the input port for voltage, resistance, frequency test and output port for simulation voltage, simulation frequency and λ oxygen sensor. Please choose the correct probes to match the different ports.

Vehicle Autobase

There is no need for Samsung Q1 to register for autobase. If you want to install the main unit program (attached disc) on your own PC or notebook for test or diagnosis, you need register before viewing vehicle autobase (No need for other functions). The register procedures are listed as below:

1. Enter Vehicle Autobase menu. If you have not registered, it will display "Not register".
2. Click "HELP" button, and then click "Get machine ID" in the right bottom of "HELP" window.
3. It will display machine ID in the pop-up menu. Click "Copy machine ID", and set up a new file on hard disk to save the ID.
4. Send the ID file to Launch (yibin.zhong@cnlaunch.com) by e-mail. And then Launch will send you a register program.
5. After receiving register program, double click it to run, and register procedure is completed.

This function provides the system circuit diagram of normal model. Click "Vehicle autobase" on the main menu (See Figure 2-01) to enter Figure 3-40.

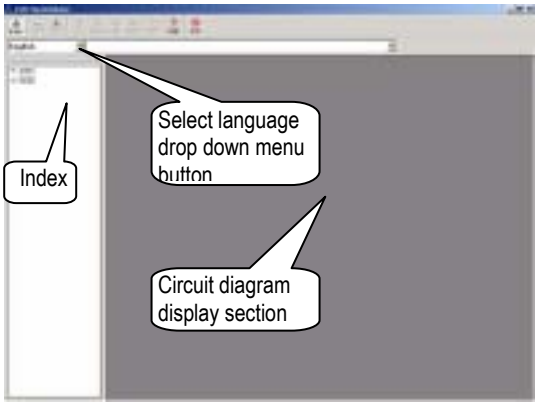


Figure 3-40

Click "+" on the left index to expand it. Select the circuit diagram to view. The circuit diagram of the system will be displayed at right. (See Figure 3-41)

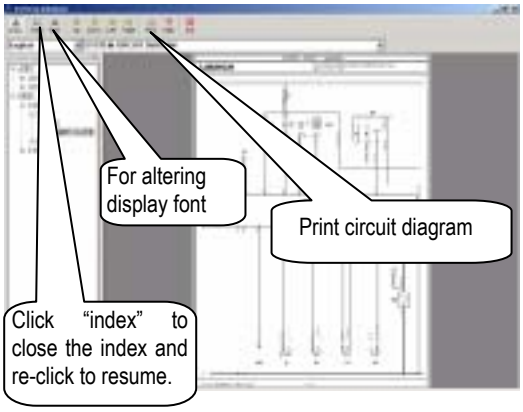


Figure 3-41

Move the mouse to one module (See Figure 3-42) or select one module on the drop-down menu (See Figure 3-43), and then click to expand the circuit diagram. The red part is the selected module. See Figure 3-44.

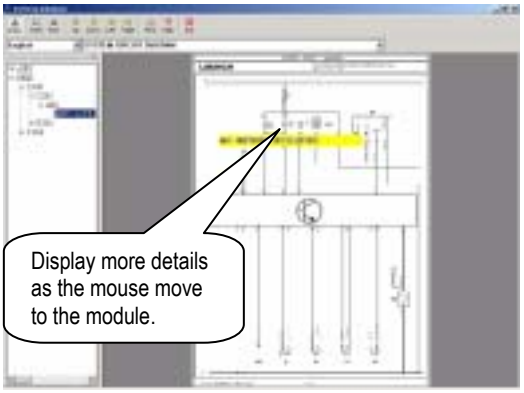


Figure 3-42

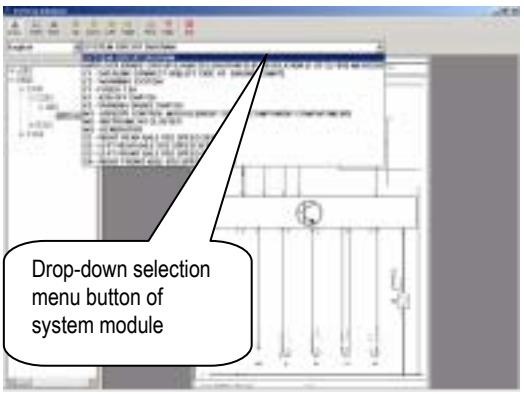


Figure 3-43

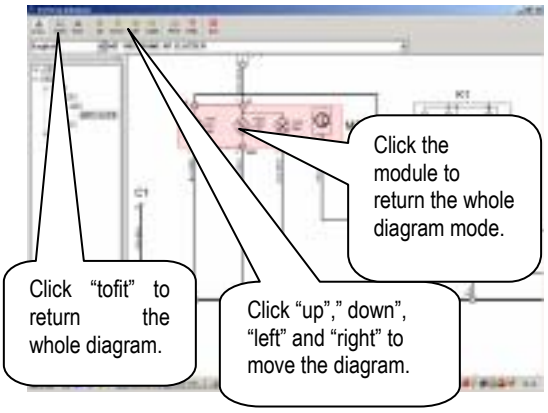


Figure 3-44

Click "help" to acquire the help about the circuit diagram. See Figure 3-45. Click "exit" to leave the interface.

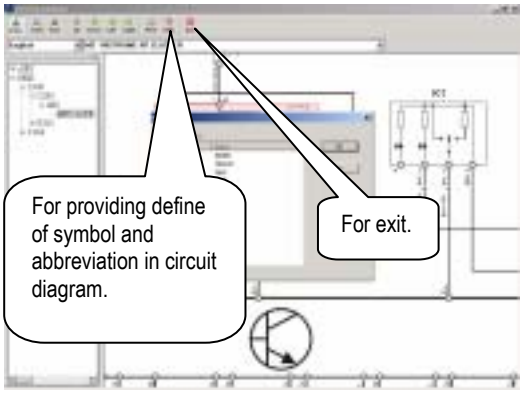


Figure 3-45

Update of diagnostic Software

User Registration

Login to www.X431.com. Select the favorite language on the pull-down menu at the upper left of the interface to enter homepage. See Figure 4-01.

Figure 4-01

Click "Register" in the interface as shown in Figure 4-01 to open the window as shown in Figure 4-02.

Figure 4-02

Note:
When the member purchases one or more products after registration, he should login to the member area, and then click "product control" to register the newly purchased product. Refer to the section "Member login".

The terms of service is shown in the screen. After reading and fully understand it, click "I accept" button to enter the interface as shown in Figure 4-03.

Fill in Product Information

Fill in the serial No. of X-431TOP terminal, registration No. and dealer code in the interface as shown in Figure 4-03.

Figure 4-03

The serial No. is marked on the back of terminal. The registration No. is in an envelope delivered with the product (the number must be kept confidential). The dealer code is attached on the last page of the user's manual.

After the information is filled, click "Next step" to enter the next interface as shown in Figure

4-04.

Note:

1. *When a product is sold, the dealer will login to www. X431. com and enter the dealer code in the "Dealer administration" area so that the user can do effective registration later. User should contact the dealer if registration can not be done effectively.*
2. *If the filled serial No. or registration No. is invalid, the screen will display the message as shown in the figure below. Click "OK" button to return to the previous interface to re-fill the correct numbers.*

Fill User Information

Figure 4-04

After information is filled in the interface as shown in Figure 4-04(The red textbox must be filled. After registration, we will send the confidential information to your registered e-mail, so please make sure that your e-mail is valid.), click "Next step", and then the screen will display the interface as shown in Figure 4-05. Click "OK" then the registration is completed.

Figure 4-05

Note:

Only the registered user can download and update the software.

Software Update

Member Login

The user becomes the registered member after registration. Member can login to the website by filling username, password and user type in the interface as shown in Figure 4-01.

Note: the common users may choose CUSTOMER as user type. If the dealer and the branch want to login to the website, please use the user information given by LAUNCH head office.

After login successfully, the screen will display the interface as shown in Figure 4-06(The default interface is download center interface).

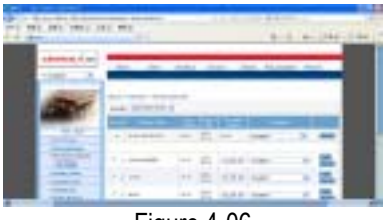


Figure 4-06

[Download Center]: refer to "software download".

[Purchase Center]& [Update center]: refer to "software purchase and update".

[Member Information]: to display and renew the current member information.

[Product Registration]: to register newly purchased product.

[Order Information]: to check or cancel the unpaid order.

[Renew Password]: to renew password after entering the right old password.

[Awarded for complaint]: if user meet some trouble during the operation, he can provide feedback to LAUNCH. Effective complaint will be awarded by LAUNCH

[Logout]: to exit the registration.

Software Download

After login successfully, the screen will enter the [download center] interface. (See Figure 4-07) Registered user can download the software that installed in the download center.

Before download, users had better set up a new folder named [X-431TOP update] on the computer desktop and put the download files to the [X-431TOP update] according next steps.

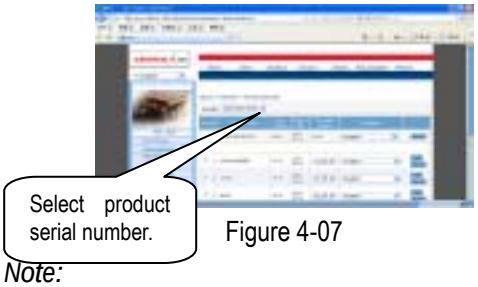


Figure 4-07

Note:

1. *Software update of free charge will be provided by LAUNCH for one year. The free period is from the registration date on the website, not the purchase date. That is, during one year after the registration, users can free download the corresponding software.*
2. *If there is not the latest version in the download center, users can buy the version in the purchase center or in the update center. In the purchase center, users can buy the software that isn't put in the download center. In the update center, users can update the software that is beyond the free download period. After purchase successfully, the purchased software will be automatically added to the download center list.*

Update Tool Download

Before update, users must download the X-431TOP SETUP. On the drop-down menu, users select the language then click [download]. The screen will display the interface as shown in Figure 4-08.

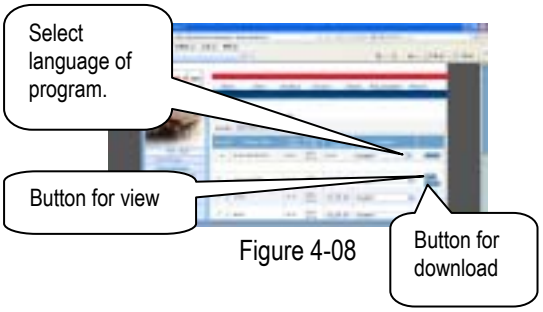


Figure 4-08

Click [save] to put it into the[X-431TOP update] folder.

Diagnostic Program Download

On the drop-down menu, select the language and the version (The default version is the latest version). Click [down] icon, and then click [save] on the pop-up menu to save the file.
Click [view] to learn the detailed information of the version. See Figure 4-09.
Users can down the diagnostic program into the [X-431TOP update]. Up to now, the update software is downloaded completely.

Figure 4-09

Software Update

Open the "X-431TOP update" folder, and double click the icon  . The program will automatically check the downloaded update files, including the download tool and the display program. See Figure 4-10.

Figure 4-10

Note: If you want to install the program on your PC, Bluetooth serial number must be required (Refer to Chapter FAQ). See Figure 4-11.

Figure 4-11

After installation, run "X431TOP icon" in [X-431TOP update] folder, click [Set] and then select [Update]. See Figure 4-12.

Figure 4-12

The screen will pop up a menu. See Figure 4-13.

Figure 4-13

Select the program version for update, and click [Update] icon. It will start to update. When the update is completed, prompts will appear to notify successful update. If the program version for update is not in the left on the above menu, or if you want to add other model version, you can click  . See Figure 4-14.

Figure 4-14

Software Purchase and Update

If users can't find the software that he needs, users should buy the software in the purchase center. Login to www.X431.com then enter the interface as shown in Figure 4-15.

Figure 4-15

Click [purchase center] to choose serial number, and then tick in front of software number.

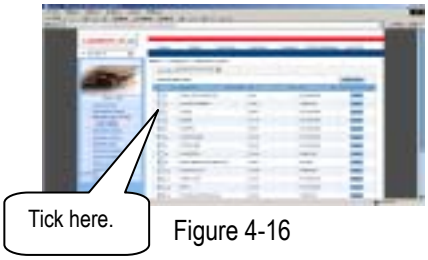


Figure 4-16

Take AUDI as an example, click [view] behind AUDI, and the screen will display the detailed information about the AUDI diagnostic software.

Figure 4-17

Click [order] to add the selected software to shopping cart. See Figure 4-17.

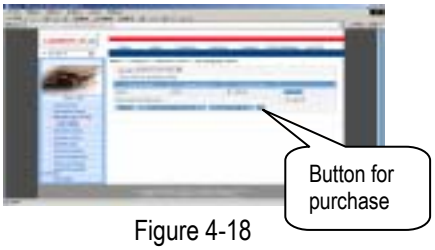


Figure 4-18

Click [pay] to buy the software. The bought software will be automatically added to the user's download center.

Click [clear] to clear all the software in the shopping cart.

Click [purchase other] to buy other software. See Figure 4-18

.

Note:

The operation for update center is the same as that for the purchase center.

FAQ

X-431TOP is a hi-tech product. With the development of modern automotive industry, more and more new technology will be adopted and there may be questions during operation. Read the user's manual to get the answer whenever you have any question, or contact our Customer Service Center for help.

Top Ten Questions

Here we list ten frequently asked questions and answers relating to X-431 TOP.

Question: I can't use "Vehicle Autobase" after installing X431 TOP software on my PC. What can I do?

Answer: There is no need for Samsung Q1 to register for autobase. If you want to install the main unit program (attached disc) on your own PC or notebook for test or diagnosis, you need register before viewing vehicle autobase (No need for other functions). The register procedures are listed as below:

A. Enter Vehicle Autobase menu. If you have not registered, it will display "Not registered".
B. Click "HELP" button, and then click "Get machine ID" in the right bottom of "HELP" window.
C. It will display machine ID in the pop-up menu. Click "Copy machine ID", and set up a new file on hard disk to save the ID.
D. Send the ID file to Launch (yibin.zhong@cnlaunch.com) by e-mail. And then Launch will send you a register program.
E. After receiving register program, double click it to run, and register procedure is completed.

Question: Main unit can't communicate with TOP terminal via Bluetooth after reinstalling X431TOP software. What can I do?

Answer: You must program the Bluetooth of main unit with the Bluetooth of terminal after reinstallation. Please input the Bluetooth serial number through TOP software -> SETTING -> SERVER.

Question: How to get the Bluetooth serial number of X431TOP?

Answer: There are two ways to get:

A. On the top of X431 TOP terminal;
B. In X431TOP software V10.42 or higher version, click Bluetooth communication status icon in program to get Bluetooth serial number.

Question: How to get version information of X431TOP software?

Answer: Click [Vehicle fault diagnosis], and you can view the version information.

Question: Can X431TOP software be updated? Is it the same as the X431TOP diagnostic program?

Answer: X431TOP software is not the same as the X431 diagnostic program. X431 TOP software is the operation software run on PC. X431 TOP diagnostic program is the automobile diagnostic program in "Automobile Faults Diagnostic Program". Both of them can be updated via internet.

Question: How to connect Bluetooth of X431TOP correctly?

Answer: After powering X431TOP terminal, press [Power] button, and now Bluetooth needs initialization with red flashed. After about 30 seconds, the indicator becomes red steady on. Then communicate main unit program with terminal. It won't display "Bluetooth initialization failure".

Question: How many disks for X431 TOP software installation? How about their functions?
Answer: There are sixteen disks for X431TOP software installation. Thereinto twelve disks are for vehicle autobase installation, one for X431TOP software installation, one for Samsung main unit explanation and two for Samsung main unit system.

Question: Why is there no "vehicle autobase" after installing the X431 TOP software downloaded from the website?
Answer: The downloaded X431TOP software doesn't include the diagnostic software and vehicle autobase. The diagnostic software can be downloaded and updated from the website separately and the vehicle autobase should be installed from the installation disk.

Question: How to update X431 TOP diagnostic software:
Answer: X431TOP diagnostic software is inbuilt in the operation software. If there is a need to update, please operate as following:

A. Login to www.x431.com with username and password;
B. Click Download Center, and download the desired diagnostic software in one folder of your PC;
C. Run X431TOP software, click "Set"---"Software Update", select the desired diagnostic software in "Source Directory",
D. Click "Update". After the screen display "Update successful", exit the program.

Question: Why is there no CANBUSII connector in X431TOP package box?
Answer: CANBUSII connector is inbuilt in X431TOP terminal. Universal OBDII-16, BMW-16，Toyoya-16,OBD-16C and Zhonghua-16 are integrated into universal obdII-16. Please select Universal OBDII-16 connector for 16 pin.

Maintenance

- Store the X-431 on a flat and dry place with suitable temperature.
- Never put the X-431 in direct sunlight or near the heating source.
- Prevent smoke, water and oil from entering the X-431.
- Avoid shock, dust, moisture and extremely high temperature.
- Do not disassemble the main unit. Clean the outside surface and screen with soft cloth that is dipped with a little water if the main unit is dirty. This should be done after the machine is turned off and the power cable is removed.
- Periodically turn on the X-431 main unit if it is not operated for long time to avoid moisture.

X-431TOP Technical Parameter

Usage Parameter

Working ambient temperature：0℃～50℃

Transporting storage temperature：-10℃～70℃

Working ambient relevant humidity：20%～90%(40℃)

Transporting storage relevant humidity：20%～90%(40℃)

Pressure: 86kpa～106kpa

Oscilloscope Technical Parameter

Collection:

1.time resolution range: 2.5μs,5.0μs,10.0μs,25.0μs,50.0μs,100μs,250μs,500μs,1.0ms,2.5ms,5.0ms,10.0ms,25.0ms,50.0ms, 100ms,250ms,500ms,1.0s,2.5s,5.0s,10.0s.

2. signal mode: DC/ AC

Channels:

1.Coupling mode: DC, AC.

2.Measuring range: 5.0mv/div，10.0mv/div，20.0mv/div，50.0mv/div，100.0mv/div，200.0mv/div，500.0mv/div，1.0v/div，2.0v/div，5.0v/div，10.0v/div，20.0v/div.

Trigger:

1.Trigger channel: one of the CH1, CH2, CH3 and CH4.

2.Default trigger channel: CH1.

3.Default trigger level: 0mv.

4.Default level range: 6X(the measuring range of trigger channel).

Measuring：

1. Voltage Differential between cursor: (the measuring range of the channel)/ 50.

2. Time differential between cursor: (the time resolution range of any channels)/50.

Precision:

1. Time resolution: 2.5μs;

2. Voltage resolution: 5mv;

3. Time precision: ±5%.

4. Voltage precision: ±5%.

Ignition Analysis Parameter

1.Engine speed: measuring range 500-7200 r/min.

2. Real VCY_ICCANG (Platinum Dwell angle (%): measuring range 0-90°(cam bearer).

Precision:

1.Engine speed: indication error is less than 1%.

2.Real VCY_ICCANG (Platinum Dwell angle (%):indication error is less than ±1(cam bearer).

Sensor Test Technical Parameter

Sensor test function:

Voltage test:

1.Measuring range: DC -400V～+400 V

2.Input impedance: 10 MΩ.

Resistance test:

Measuring range: 0 MΩ～1 MΩ

Frequency test:

1.Measuring range: 1 Hz～15 kHz

2..Input impedance: 300 kΩ

3.Input range: 1 V～12 V

Precision:

Check precision: ±1 %

Sensor simulation function:

DC voltage signal:

1.Output range: -5 V～+5 V

2.The maximal output current: 40 mA

Square-wave signal:

1. Impulse frequency: 0.1 Hz～15 kHz

2. Range: -5 V～+5 V

3. Duty cycle: 10%～90 %

Sensor standard signal:

1. Frequency range: 0.1 Hz～100 Hz

2. Range: -5 V～+5V

Hand-draw waveform Signal:

1. Frequency range: 0.1 Hz ~ 100 Hz

2. Range: -5 V ~ +5 V

Precision:

Test precision: ±5 %

Bluetooth Technical Parameter

Module:

1. Condition temperature: -20°C ~ +70°C ;

2.The farthest transmission distance: 50 meters(open territory);

3.The propositional transmission distance: within 15 meters(open territory).

Safety Requirement

Evidence for export to USA:

FCC Part15 Section 15.107

Evidence for export to Europe:

IEC61000-4-2 : 2001

IEC61000-4-3 : 2002

IEC61000-4-4/A2 : 2001

IEC61000-4-5 : 2001

IEC61000-4-6 : 200

Warranty

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

LAUNCH 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 LAUNCH shall not be liable for any consequential or incidental damages.

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

Disclaimer

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Order Information

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

1. Quantity
2. Part number
3. Item description

Customer Service

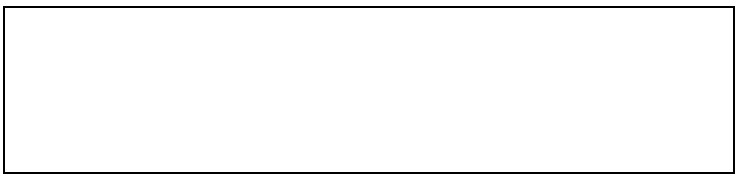
If you have any questions on the operation of the unit, please contact us:

Tel: 86-755-84528431/84528822
E-mail: X431@cnlaunch.com

If your unit requires repair service, return it to the manufacturer with a copy of the sales receipt and a note describing the problem. If the unit is determined to be in warranty, it will be repaired or replaced at no charge. If the unit is determined to be out of warranty, it will be repaired for a nominal service charge plus return freight. Send the unit pre-paid to:

Attn: Customer Service Department
LAUNCH TECH. CO., LTD.
Launch Industrial Park,
North of Wuhe Avenue,
Banxuegang, Bantian,
Longgang, Shenzhen,
Guangdong
P.R.China, 518112

X-431TOP Terminal Serial Number



Dealer Code Number

Note:

1. "Terminal serial No." label is attached by manufacturer before shipping.
2. Dealer should fill in the Dealer Code when selling the machine to customer, and stamp on the code.
3. The "Terminal serial No." and "Dealer code" is useful when updating the software. Refer to the section "Update of Diagnostic Software". Keep the user's manual carefully.
4. Dealer should login to http://www.X431.com to fill in the Dealer Code and other information in "Dealer administration" area when a product is sold so that customer can do software updating.