V1.00.000

2014-08-25

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Precaution on Operation

- The appliance is a sophisticated electronic device, handle it with care.
- It is normal that the main unit screen may flash at the moment of engine ignition.
- You may unplug the main unit if the program can not be actuated or confused screen occurs. Plug again to continue the operation.
- Be careful when plugging and unplugging the test cable. Tighten the screw before operation to avoid unexpected disconnection and/or damage to the port.
- Disconnect the power after operation. Unplug the power cord by holding the connector, not the cable itself.

Table of Contents

1 Foreword

1.1 Introductions

The scopebox is an optional add-on module for Launch's Android-based diagnostic tool, including automotive oscilloscope and automotive ignition waveform.

Automotive oscilloscope can make the auto repair technician quickly judge the faults on automotive electronic equipment and wiring, and the oscilloscope sweep speed is far greater than the signal frequency of such vehicles, usually 5-10 times of the measured signal. The automotive oscilloscope not only can quickly acquire the circuit signal, but also can slowly display the waveform to observe and analyze. It can also record and store the tested signal waveform which can be recalled to observe for the fast signal, having great convenience to failure analysis. Either high-speed signal (e.g.: Injection nozzle, intermittent fault signal) or the slow-speed signal (e.g. the throttle position change and the oxygen sensor signal) can be observed through automotive oscilloscope in an appropriate waveform.

The electronic signal can be compared and judged via measuring five parameters indexes. The five parameters are the amplitude (the maximum voltage of signal), the frequency (the cycle time of signal), the shape (the appearance of signal), the pulse width (the duty cycle or the time range of signal), and the array (the repetition characteristic of signal), which can be tested, displayed, saved by the automotive oscilloscope. Via the waveform analysis can further detect the circuit fault on sensors, actuators, circuits, and electronic control units, etc.

1.2 Product features

- Rapidly capture the circuit signal.
- Display waveform slowly for observation and analysis.
- Record and store the tested signal waveform for playback and failure analysis.
- Detect, display and store all the electrical signal of five parameters, namely

amplitude, frequency, shape, pulse width, and array.

1.3 Product function

Provides specialized automotive oscilloscope function and supports ignition waveform analysis.

1.4 Technical parameters

Scopebox: 4 channels, highest sampling frequency 200MHZ, max. storage depth 64MSa, 8-bit resolution.

2 Structure and Accessories

2.1 Scopebox structure

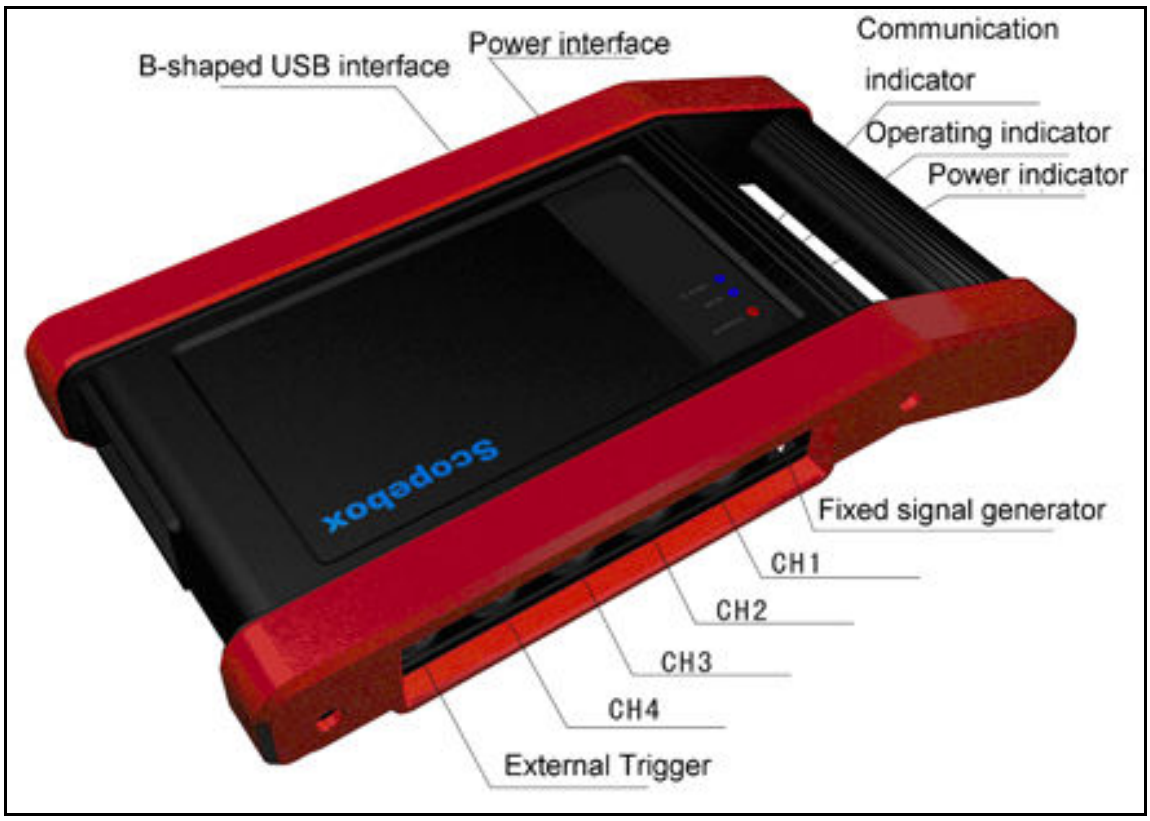


Fig 2-1 Scopebox Structure Diagram

Table 2-1 shows the ports and indicators for the scopebox.

No.	Name	Description
1	CH1	Channel 1
2	CH2	Channel 2
3	CH3	Channel 3
4	CH4	Channel 4
5	External trigger	External trigger signal
6	Fixed signal generator	Generate a square signal with fixed 1K frequency.

7	Power indicator	It keeps steady red after the scopebox is powered on.
8	Running indicator	It remains steady green after the scopebox is running.
9	Communication indicator	It blinks in process of data communication.
10	Power interface	Connect to power supply via the power adapter.
11	B-shaped USB interface	Connect main unit via USB cable as separated individual USB devices.

2.2 Scopebox accessories

The scopebox includes the secondary pickup cable for 4-channel oscilloscope, crocodile clips for 4-channel oscilloscope, etc. See Table 2-2.

As the product configuration can be different, the accessories included with the product may differ from the accessories listed on this manual. Please see the packing list attached to the product for the detailed accessories.

Table 2-2 Accessory checklist

No.	Name	Picture
1	Secondary ignition pickup for 4-channel oscilloscope	
2	Crocodile clips for 4-channel oscilloscope	
3	Direct ignition extension cord	

4	6-way universal guide line for 4-channel oscilloscope	
5	BNC to 4mm connector test cable	
6	Pin connector suite for 4-channel oscilloscope	

3 Automotive Oscilloscope

3.1 Connection

The scopebox should work with the Launch's Android-based diagnostic tool.

1. Firstly, power on the diagnostic tool.
2. Then plug one end of ground cable of the scopebox into external trigger channel (GND), the other end should be grounded.
3. Connect one end of probe cable to the CH1, CH2, CH3, or CH4 on the scopebox, and then connect the other end to related signal terminal.

Warning: Please use the specific capacitance probe when diagnosing the ignition high voltage line. Never connect the scopebox to the ignition secondary circuit directly.

3.2 Initial interface introduction

Fig. 3-1 displays the initial interface of the scopebox.

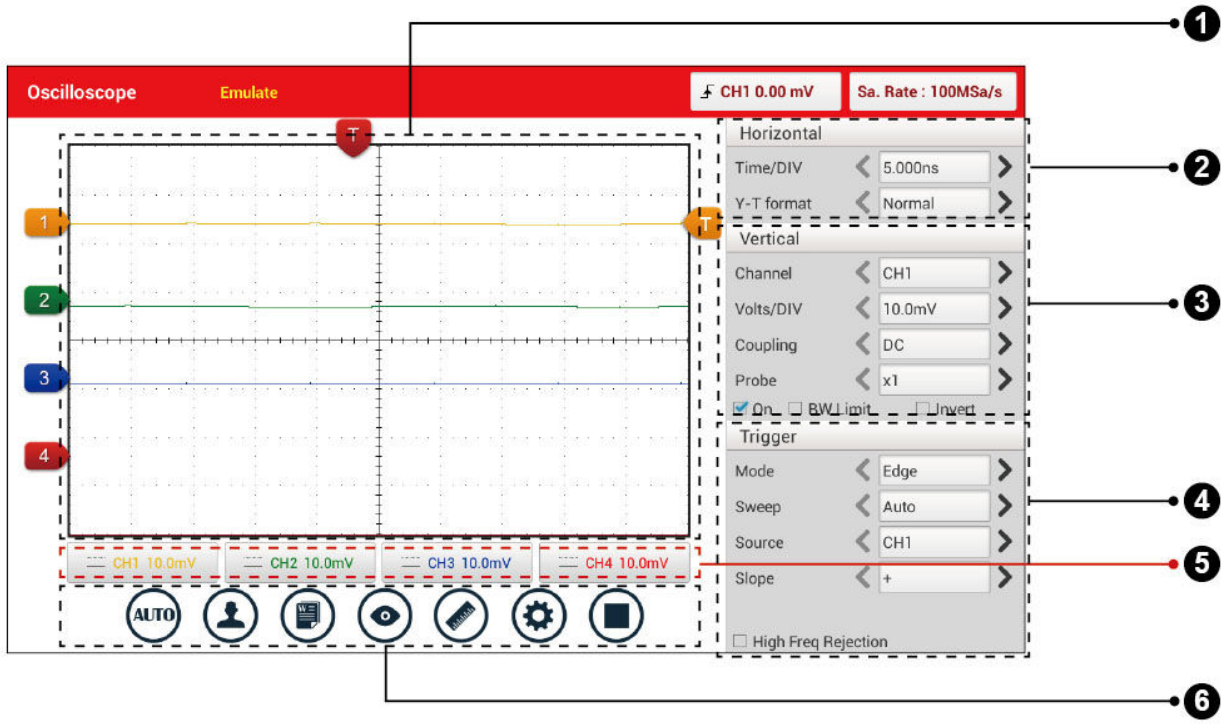


Fig. 3-1

No.	Descriptions
1	Signal display area
2	Horizontal Settings: Controls the time base.
3	Vertical Settings: Controls the amplitude of the displayed signal.
4	Trigger Settings: Controls the start event of the sweep.
5	Channel Selection Button
6	Function Menu  **[Auto]:** It indicates auto trigger setting. See **Chapter 3.3.2**.  **[Ref]:** There are expert reference and base reference available. Expert reference enables you to recall your customized expert database, whereas base reference provides automatic pre-setting function of specialized sensors. See **Chapter 3.3.6**.  **[File]:** Provides save snapshot, snapshot manager, waveform record and waveform replay. See **Chapter 3.3.5**.  **[View]:** Calibration and display settings are available. See **Chapter 3.3.3**.  **[Measure]:** Includes signal source measurement, horizontal measurement, vertical measurement and clear measurement. See **Chapter 3.3.4**.  **[Settings]:** Shows/hides the parameter settings area including horizontal settings, vertical settings and trigger settings.  **[Start/Stop]:** Starts/stops collecting waveforms.

3.3 Operations

3.3.1 Channel selection and attributes setting

<1> Channel selection

There are two ways available for channel selection: (See Fig. 3-2)
A. Select from the channel tab shown at the bottom of the waveform display area;

B. Select from Vertical settings.

Note: For better comparison and identification, each channel and waveform are marked in different colors.

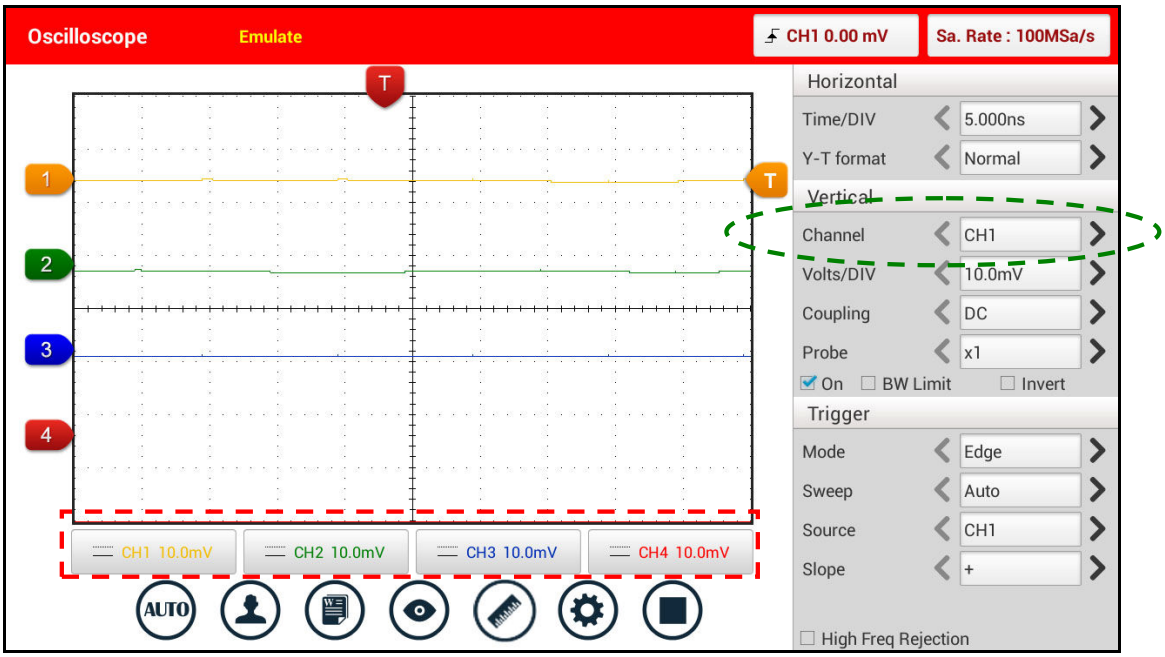


Fig.3-2

<2> Channel attributes & trigger setting

Channel attributes can be set via horizontal settings and vertical settings.

Horizontal Settings

User can make some settings directly by tapping < or > next to options. See Fig. 3-3.

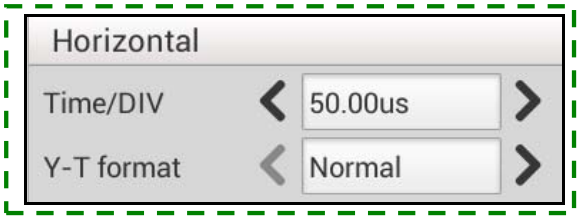


Fig. 3-3

Options descriptions:

Menu	Comments/Settings
Time/DIV	Horizontal scale. If the waveform acquisition is stopped (using the ▶/■ button), the Time/DIV selector expands or compresses the waveform.
Y-T format	The conventional oscilloscope display format. It shows the voltage of a waveform record (on the vertical axis) as it varies over time (on the horizontal axis).

Vertical Settings

The trigger determines when the scopebox starts to acquire data and display a waveform. When a trigger is set up properly, it can convert unstable displays or blank screens into meaningful waveforms.

When the scopebox starts to acquire a waveform, it collects enough data so that it can draw the waveform to the left of the trigger point. The scopebox continues to acquire data while waiting for the trigger condition to occur. After it detects a trigger, the scopebox continues to acquire enough data so that it can draw the waveform to the right of the trigger point.

User can make some settings directly by tapping < or > next to options. See Fig. 3-4.

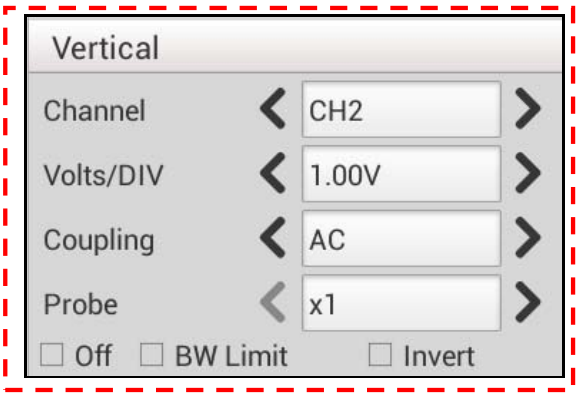


Fig. 3-4

Options descriptions:

Menu	Comments/Settings
Channel	To select the channel source.
Volts/DIV	It is defined as "Volts/Division" and mainly used to change the resolution.
Coupling	Trigger coupling determines what part of the signal passes to the trigger circuit. AC, DC and Ground are included: **AC:** Blocks the DC component of the input signal; **DC:** Passes both AC and DC components of the input signal; **Ground:** Disconnects the input signal.
Probe	When using a probe, the scopebox allows you to select the attenuation factor for the probe. The attenuation factor changes the vertical scaling of the scopebox so that the measurement results reflect the actual voltage levels at the probe tip.
BW Limit	ON: Limits the channel bandwidth to 20MHz to reduce display noise. OFF: Get full bandwidth.
Invert	ON: Turn on the invert function.

	OFF: Restore to the original display of the waveform.

Trigger setting

Trigger indicates that when certain waveform meets the conditions that are predefined according to the requirements, the scopebox acquires the waveform and its adjacent section, and then presents it on the screen.

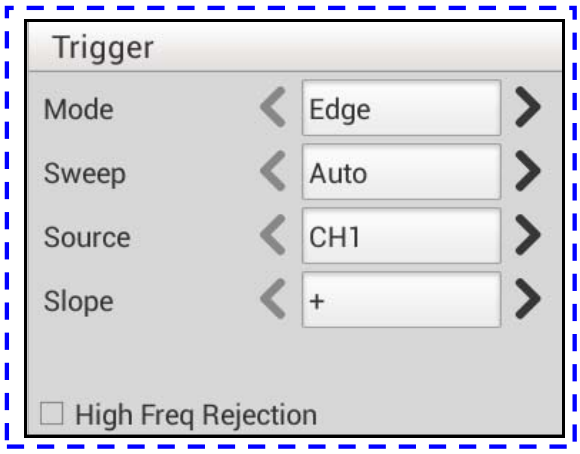


Fig. 3-5

1) If **Edge** trigger is selected (An edge trigger determines whether the scopebox finds the trigger point on the rising or the falling edge of a signal.):

Menu	Comments/Settings
Sweep	The sweep mode determines how the scopebox behaves in the absence of a trigger event. The scopebox provides three trigger modes: Auto, Normal, and Single. **Auto:** It allows the scopebox to acquire waveforms even when it does not detect a trigger condition. If no trigger condition occurs while the scopebox is waiting for a specific period, it will force itself to trigger. When forcing invalid triggers, the scopebox can not synchronize the waveform, and then waveform seems to roll across the display. If valid triggers occur, the

	display becomes stable on the screen. **Normal:** This mode allows the scopebox to acquire a waveform only when it is triggered. If no trigger occurs, the scopebox keeps waiting, and the previous waveform, if any, will remain on the display. **Single:** In this mode, it only acquires the waveform that generates for the first time the trigger conditions are met, and then stops after finishing capture.
Source	Select which channel as trigger signal.
Slope	+ : Trigger on rising edge - : Trigger on falling edge
High Freq Rejection	Reject high frequency signals when selected.

2) If **Pulse Width** trigger is selected (Pulse trigger occurs according to the width of pulse. The abnormal signals can be detected through setting up the pulse width condition):

Menu	Comments/Settings
Sweep	The sweep mode determines how the scopebox behaves in the absence of a trigger event. The scopebox provides three trigger modes: Auto, Normal, and Single. **Auto:** It allows the scopebox to acquire waveforms even when it does not detect a trigger condition. If no trigger condition occurs while the scopebox is waiting for a specific period, it will force itself to trigger. When forcing invalid triggers, the scopebox can not synchronize the waveform, and then waveform seems to roll across the display. If valid triggers occur, the display becomes stable on the screen. **Normal:** This mode allows the scopebox to acquire a

	waveform only when it is triggered. If no trigger occurs, the scopebox keeps waiting, and the previous waveform, if any, will remain on the display. **Single:** In this mode, it only acquires the waveform that generates for the first time the trigger conditions are met, and then stops after finishing capture.
Source	Select which channel as trigger signal.
Condition	To select pulse condition.
Pulse Width	Set required pulse width.
High Freq Rejection	Reject high frequency signals when selected.

3.3.2 Auto

The scopebox has an Auto feature that sets up the scopebox automatically to display the input signal in a best fit.

Tap AUTO, the scopebox may change the current settings to display the signal. It automatically adjusts the vertical and horizontal scaling, as well as the trigger coupling, position, slope, level and mode settings.

3.3.3 View Settings

<1> Calibration

This option adjusts the scopebox's internal circuitry to get the best accuracy. Use this function to calibrate the Scopebox's vertical and horizontal systems.

Tap and then tap [Calibration], a dialog box similar to Fig. 3-6 will appear.

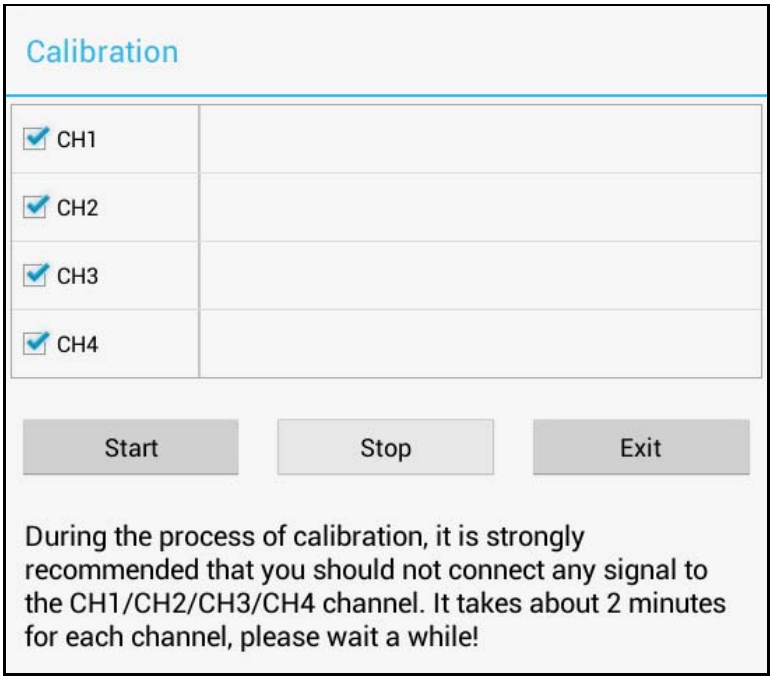


Fig. 3-6

Check the box before the channel to select it. To deselect it, just uncheck it. After choosing the desired channel(s), tap [Start] to start calibration and [Start] button will be temporarily invalid during calibrating. Tap [Stop] to stop calibrating. Once it becomes active, it indicates calibration has completed.

Notes: In process of calibration, make sure CH1/CH2/CH3/CH4 has no signal input. Moreover, calibration may take several minutes and please be patient to wait.

<2> REF settings

Reference waveforms are saved waveforms to be selected for display. The reference function will be available after saving the selected waveform to non-volatile memory.

Tap  and then [REF] to enter the REF setting screen. See Fig. 3-7.

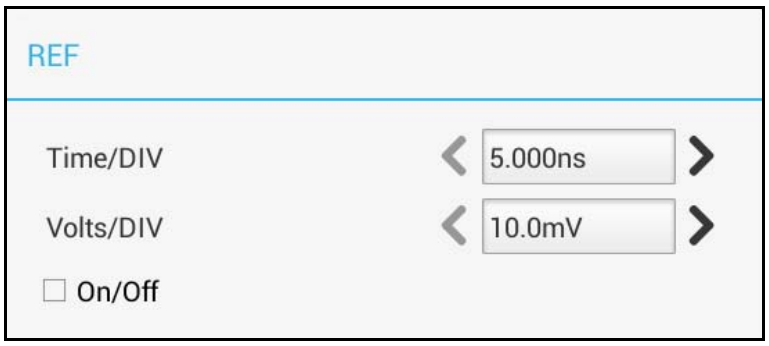


Fig. 3-7

Tap < or > to select the desired reference value for time/DIV and volts/DIV. To show or hide the REF, just check/uncheck the box before On/Off.

<3> Display settings

Tap and then [Display settings] to enter the setting screen. See Fig. 3-8.

Fig. 3-8

Select "Vectors" or "Dots" to display waveforms as vectors or dots. Check/uncheck the box before Grid to turn on/off grid display.

3.3.4 Measure

<1> Channel source

Tap and then [Source], a screen similar to Fig. 3-9 will appear.

Fig. 3-9

<2> Horizontal / Vertical measure

Horizontal Measure / Vertical Measure are used to measure voltage parameter and time parameter respectively. Drag A line upwards or downwards to control voltage. Move A line left or right to fine-tune timebase. A line is a solid line and B line is a dotted line.

Tap  and then [Horizontal Measure], a screen similar to Fig. 3-10 will appear.

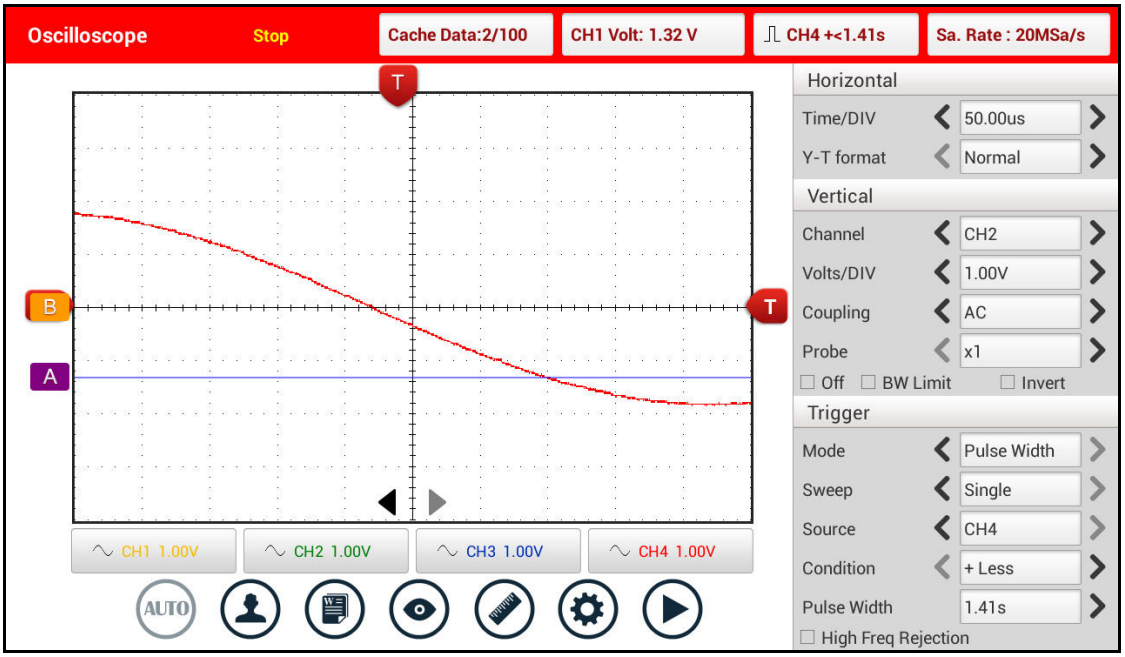


Fig. 3-10

Note: If no desired channel is selected, the system will take the current source as the default channel.

<3> Clear measure

Tap  and then [Clear Measure], the system will clear the measurement result on screen.

3.3.5 File management

<1> Save snapshot

While viewing sampling data, tap  and then [Save Snapshot] to store the current screen.

<2> Snapshot manager

While viewing sampling data, tap  and then [Snapshot Manager] to enter. View, delete and edit operations are supported.

<3> Record waveform

This function is used to record input waveforms that are acquired by the scopebox at a specific period, and save it as waveform file which can be recalled in future.

It can be performed only when the scopebox is collecting data in Normal mode.

Tap  , then select [Record] from the pop-up menu to start recording. See Fig. 3-11.

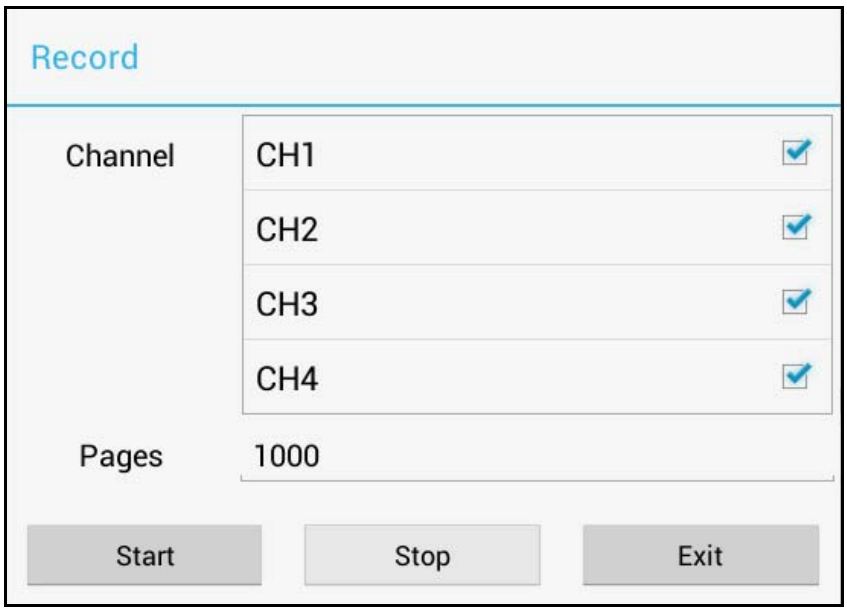


Fig.3-11

Tap [Start] to start recording with a minimum record length of 10 frames, and [Stop] to stop recording. While recording, the recorded pages will be shown on the screen.

<4> Load waveform for playback

The Import function enables you to import the stored waveform file for playback and review. During replaying, the scopebox stops collecting data automatically.

Tap , then select [Waveform replay] from the pop-up menu to enter a screen similar to Fig. 3-12.

Fig.3-12

Select the file first, and then tap to open the waveform file. Tap to starting the playback and tap to stop it.

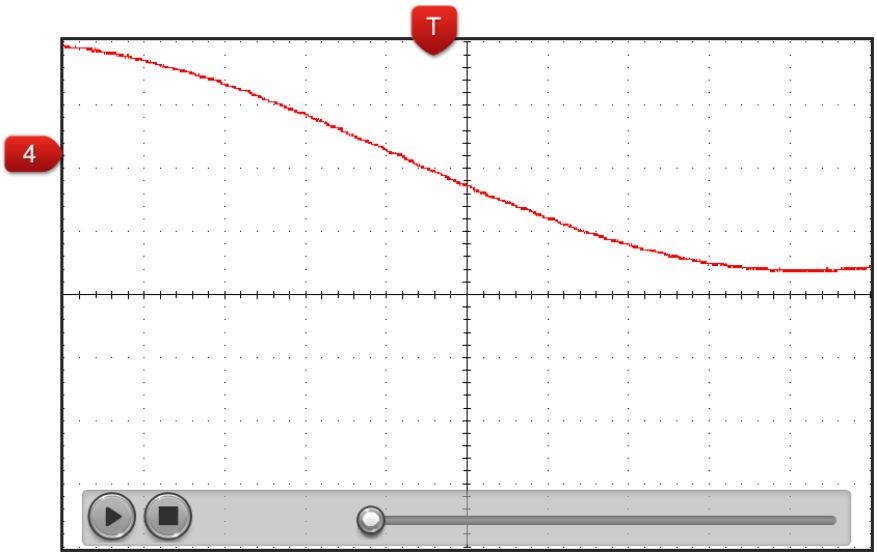


Fig.3-13

To delete the waveform file, tap .

Tap to return to the previous screen.

3.3.6 Expert Reference

<1> Expert Reference

By default, it appears blank. As a matter of fact, Expert reference database is generated by doing the following:

1. Open and edit a snapshot;
2. Select "Joint the expert database" (refer to the following illustration), and then tap to save the waveform being displayed on the screen as REF.

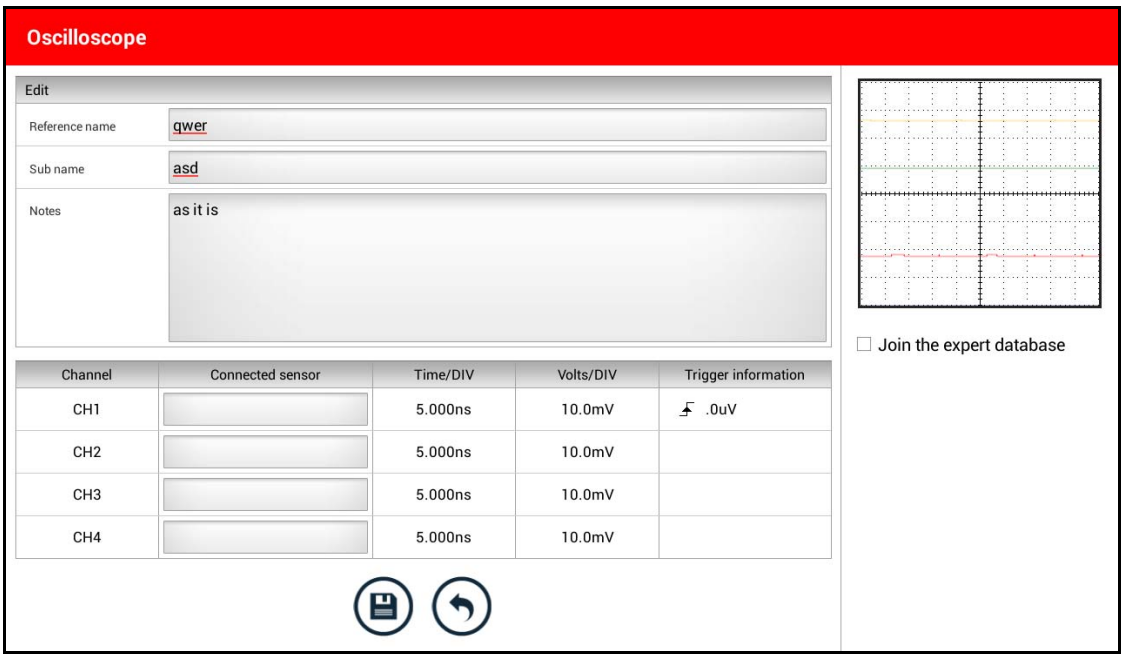


Fig. 3-14

Tap and then [Expert Reference] to enter, the following operation can be done:

: To load and recall the selected file.

: To delete the selected file.

: To edit the selected file.

<2> Base Reference

Preset waveforms of some sensors are available for your reference.

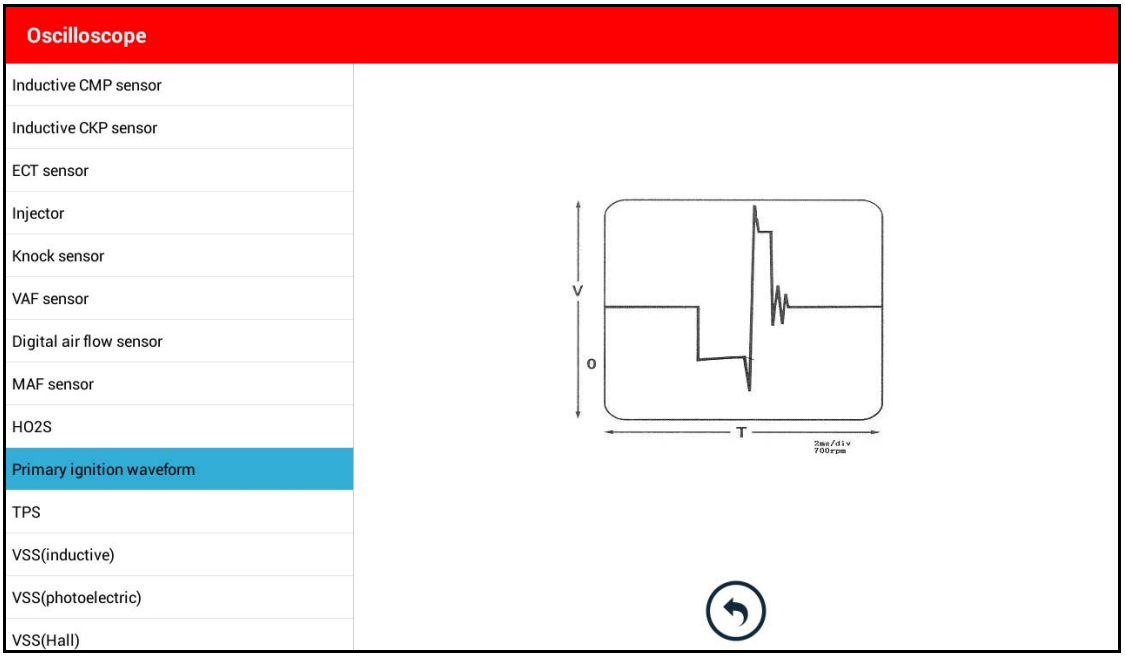


Fig. 3-15

3.3.7 Exit the application

Tap  to exit the current application.

4 Automotive Ignition waveform

The ignition system is the system which has greatest impact on the performances of gasoline engine, as the statistical data shows that nearly half of the failures are caused by poor work of electrical system. And the performance tests of engine often start from the ignition system. Nowadays ignition system includes distributor and distributorless. Distributorless includes independent ignition and simultaneous ignition.

1. Distributor ignition system i.e. contact breaker with contact-controlled ignition system (commonly known as the platinum) and contact breaker with noncontact-controlled ignition system combined with magnet, hall components or infrared.
2. Independent ignition system: Each spark plug has its own individual coil that sits right on top of it, also called coil on plug system. Crankshaft sensor send out the ignition timing signal and cylinder identification signal so that the ignition system can send out ignition signal to specified cylinder in specified time, each cylinder has its independent ignition coil.
3. Simultaneous ignition system: Two spark plugs share the same coil, also called waste spark system. When two cylinder pistons reach top dead center at the same time (one is compression, another is the exhaust), two spark plugs will be ignited at the same time, at this time, the ignition for the former cylinder is in high-pressure low temperature gas mixture, the ignition is valid, while for the latter one is in low-pressure high temperature exhaust gas, the ignition is invalid.

The scopebox can test and analyze the secondary signal for various engine ignition systems.

4.1 Secondary-distributor ignition analysis

Connections: Plug the BNC end of secondary ignition pickup into CH1/CH2/CH3/CH4 channel of the scopebox, and then connect the high-voltage clip to high-voltage line, and crocodile clips to ground.

Tips: Common ignition sequence (the specific sequence is subject to the

actual engine ignition sequence)
Four-stroke in-line four-cylinder: 1-2-4-3, or 1-3-4-2
Four-stroke in-line six-cylinder: 1-5-3-6-2-4, or 1-4-2-6-3-5
Four-stroke in-line eight-cylinder: 1-8-4-3-6-5-7-2
Five-cylinder: 1-2-4-5-3

V 6 engine: Generally speaking, based on the person sitting on the driver cab, if the right side cylinder numbers on the right side, from the front to the back are as follows: 1, 3, 5; and the cylinder numbers on the left side, from the front to the back are as follows: 2, 4, 6; then the ignition sequence is: 1 − 4 − 5 − 2 − 3 − 6. If the cylinder numbers on the right side, from the front to the back are as follows: 2, 4, 6; and cylinder numbers on the left side, from the front to the back are as follows:1, 3, 5; then the ignition sequence is: 1 − 6 − 5 − 4 − 3 − 2.

The Figure 4-1 below shows the normal ignition waveform of distributor ignition system, the upper one is the secondary waveform, and the lower one is the primary waveform.

The secondary waveform
A section is contact open period; B section is make contact period, which is the magnetizing field of ignition coil.

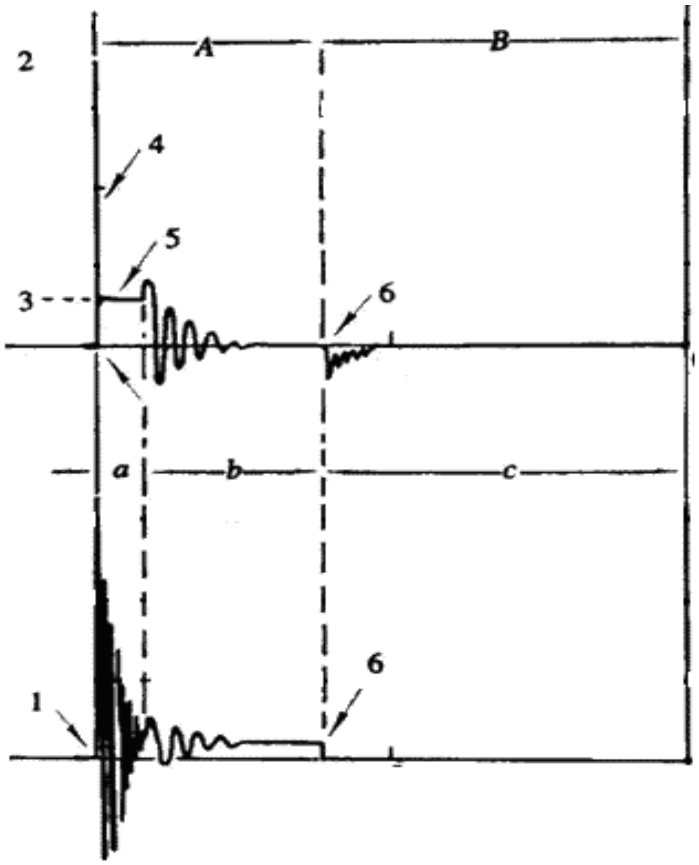


Fig. 4-1

1) Contact break point: The primary circuit of ignition coil cut off, the secondary voltage was sensed and increased sharply
2) Ignition voltage: Secondary coil voltage overcome the damper of high voltage line, the contact breaker gap and the spark plug gap to release magnetizing energy, 1-2 section is the breakdown voltage
3) Spark voltage: For the capacitor discharge voltage
4) Ignition voltage pulse: For the charge and discharge sections
5) Spark line: The inductance discharge process, i.e. the mutual inductance voltage of ignition coil maintains the conduction of secondary circuit
6) Contact point close the current flow into primary coil, the primary coil oscillates due to the mutual inductance.

Primary ignition waveform

Section **a** shows the voltage oscillation on the primary circuit due to the magnetic induction of spark in the duration;

Section **b** shows the damped oscillation generated by remaining magnetic field

energy after the spark;

Section **c** shows the make contact magnetic period of primary coil.

Seen from the waveform, the amplitudes of breaker contact closed angle, break angle and breakdown voltage and spark voltage are very clear, besides, the spark delay period and two oscillations can also be tested. For the ignition system without faults, compared with the whole cycle, the contact closed angle just 45%-50% (four-cylinder), 63%-70% (six-cylinder), or 64%-71% (eight-cyliner); the breakdown voltage is over 15kv; the spark voltage is about 9kV, the spark period is greater than 0.8ms. If these values or waveform are abnormal, it means there is fault or the system needs to be adjusted.

4.2 Secondary-simultaneous ignition analysis

Connections: Plug the BNC end of secondary ignition pickup into CH1/CH2/CH3/CH4 channel of Scopebox, then connect the high-voltage clip to high-voltage line, and crocodile clips to ground.

Connection as shown in figure 4-2:

Fig. 4-2

Fig. 4-3 below shows the valid and invalid ignition waveforms. Under the working status of valid ignition, the breakdown voltage and spark voltage are higher because the cylinder is filled with fresh combustible mixture gas, which has a lower ionization level and vice versa.

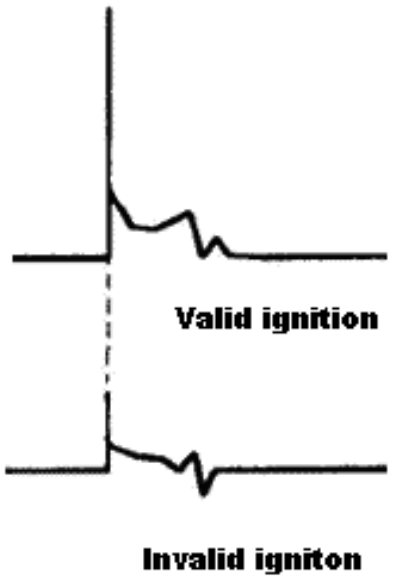


Fig. 4-3

4.3 Secondary-direct ignition analysis

Connection：

1) When the high-voltage wire is exposed, plug the BNC end of secondary ignition pickup into CH1/CH2/CH3/CH4 channel of Scopebox, then connect the high-voltage clip to high-voltage line, and crocodile clips to ground.
2) If no high-voltage wire exposes, dismantle ignition coil of tested cylinder and use direct ignition extension cord. Connect one end to ignition coil which should be grounded via direct ignition grounding wire, and insert the other end into cylinder to joint with spark plug. Then plug the BNC end of secondary ignition pickup into CH1/CH2/CH3/CH4 channel of Scopebox, then connect the high-voltage clip to high-voltage line, and crocodile clips to ground.

Connections are shown in Fig. 4-4:

Fig. 4-4

Fig. 4-5 shows the normal secondary (the upper one) and (the lower one) primary ignition waveform of direct ignition system. Because the on/off of primary circuit is not opening/closing of mechanical contact, but the conduction of transistor. The primary voltage has no obvious oscillations within the duration, but the voltage increases during the magnetization process due to current limiting, and this change can cause corresponding fluctuations of secondary voltage line as a result of induction of ignition coil.

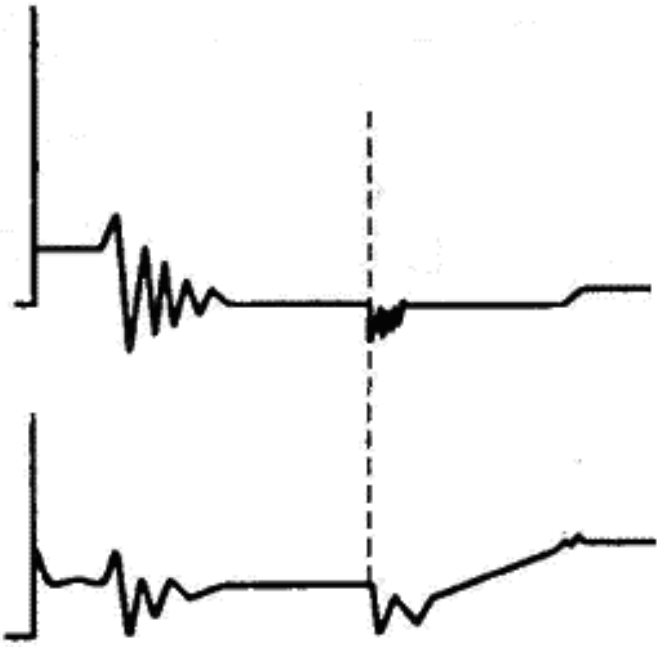


Fig. 4-5

4.4 Waveform analysis mode

The ignition secondary single-cylinder waveform test is mainly used to:

a. Analyze the ignition dwell angle of single cylinder.(ignition coil charging time)

b. Analyze the capability of ignition coil and secondary high tension circuit (from ignition line to ignition voltage line).

c. Find the improper mixture A/F ratio of single cylinder (from combustion line).

d. Analyze the capability of capacitance (platinum or ignition system).

e. Find the spark plug that causes misfire of the cylinder (from combustion line).

This test can provide very meaningful information about the combustion quality for each cylinder. If necessary, this test can also be performed during driving. Since the secondary ignition waveform is significantly affected by different engines, fuel systems and ignition conditions, it is useful for detecting the faults

of engine mechanical parts, fuel system components, and ignition system components. Different parts of the waveform can specify that some components and systems on the specific cylinder have faults. Refer to the instructions for various parts of waveform for the related component working status of specific waveform section.

Test methods and conditions:

Start the engine or drive the vehicle accroding to the driving performance fault or poor ignition, etc. Confirm the consistence of judgement standard (the amplitude, frequency, shape and pulse width, etc., for each cylinder), check the fault of the waveform for corresponding components.

Waveform results: Observe the ignition coil at the beginning of charging, the relative consistent falling edge represents the dwell angle and ignition timing of each cylinder are precise.

Ignition line:

Observe the height consistence of flashover voltage. Too high flashover voltage (even out of the scopebox screen) represents a high resistance existed in the ignition secondary circuit (for example, open circuit, or damaged spark plug or high voltage line, or too large time gap on spark plug), while the too short sparking voltage represents the resistance of ignition secondary circuit is lower than normal value (due to pollutant and broken spark plug or the high voltage line of spark plug has electrical leakage, etc.).

Spark or combustion voltage:

Observe the consistence of spark or combustion voltage, as it represents the consistence of spark plug and the air-fuel ratio of each cylinder. In case that the mixing ratio is too lean, the combustion voltage will be lower than normal value.

Combustion line:

Observe the spark or the combustion line which shall be clean with few clutter, as lots of clutter indicates the cylinder has poor ignition due to ignite too early, damaged nozzle, pollutant spark plug, or other reasons. The duration of combustion line indicates the mixing ratio of the cylinder is abnormal lean or

rich. Too long combustion line (usually greater than 2ms) represents the mixing ratio is rich, whereas too short of combustion line (usually less than 0.75ms) represents the mixing ratio is lean.

Ignition coil oscillation:

Observe at least two oscillation waveforms after the combustion line, which will be better if more than three oscillation waveforms, as it represents the ignition coil and capacitor (on Platinum or ignition system) are normal.

Primary voltage analysis

According to the faulty primary voltage waveform collected by the ignition analysis, the related components and mechanical equipment status of ignition system electrical circuit can be analyzed, which provides a reliable basis for the adjustment and maintenance of power circuit to avoid the blind demolition. The waveform shown on Fig. 4-6, appears a lot of clutter on the contact break point, which is obviously caused by the serious erosion on contact break point. It can be verified via burnishing the contact or changing the circuit breaker.

Fig. 4-6

For the primary voltage waveform shown on Fig. 4-7, the damped attenuation cycles obviously reduced on the spark period, the amplitude became lower, which is evidently caused by capacitor leakage.

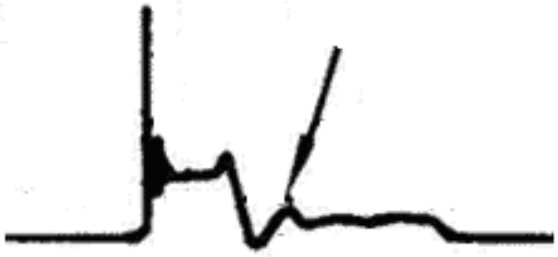


Fig. 4-7

The waveform on Fig. 4-8, shows the accidental pumping during contact closing period. The irregular beating is caused by insufficient spring force.

Fig. 4-8

The curve on Fig. 4-9 shows the contact angle is too small during the magnetizing period, which is caused by too large contact gap.

Fig. 4-9

A lot of clutter will be displayed on the horizontal section of primary waveform if contact has poor grounding, as shown below figure 4-10.

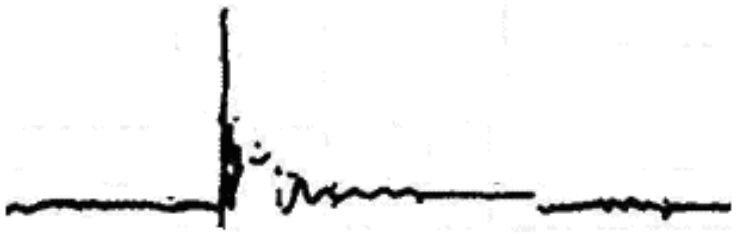


Fig.4-10

Fig. 4-11 shows the fault of low-voltage waveform in electronic ignition system. The voltage does not rise during magnetizing, which indicates that the effect of limitation of the circuit failed and no components on distributorless ignition system can be adjusted. When this waveform is abnormal, you can only replace the ignition coils, igniter, ignition signal generator and cam position sensor, etc., one by one, to find out the faulty component or module.

Fig. 4-11

The secondary waveform is also affected by the spark plug, the combustion process, mixture gas composition, the engine thermal state of the ignition coil, etc., which is more complicated. The following lists a large number of measured secondary faulty waveform for reference. Since various factors lead to the failures, Fig. 4-12 just shows the major possible factors for the failures.

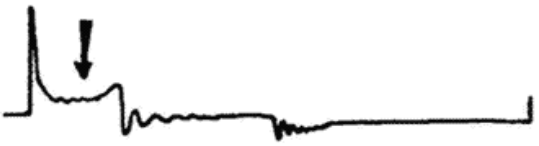
Secondary circuit resistance is too large

Oil or coke was attached in spark plug

Spark plug gap is too large or mixture gas is too lean

Injector of electronic fuel injection poor work

Spark plug overheated or value guide leakage



Mixture ratio is too rich or spark plug leak electricity

Mixture ration is too lean or cylinder pressure is too low

Distributor cover or distributor lead is matched un-tightly

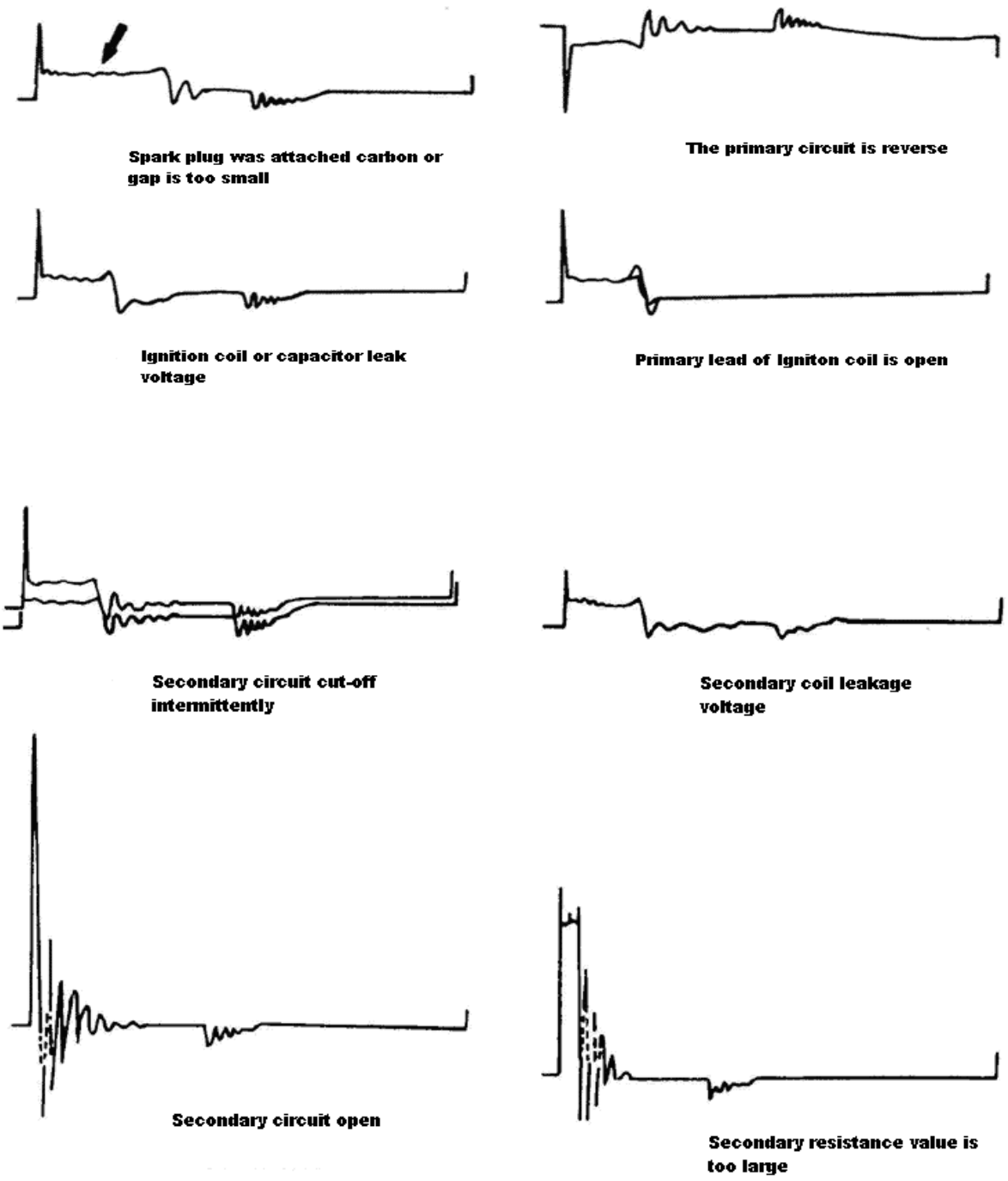

Spark plug was attached carbon or gap is too small
The primary circuit is reverse
Ignition coil or capacitor leak voltage
Primary lead of Igniton coil is open
Secondary circuit cut-off intermittently
Secondary coil leakage voltage
Secondary circuit open
Secondary resistance value is too large

Fig 4-12

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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 Department

If you have any questions on the operation of the unit, please call:
+86-755-84528767

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 prepaid to:

Attn: Customer Service Department
LAUNCH TECH. CO., LTD.
Launch Industrial Park,
North of Wuhe Avenue,
Banxuegang, Bantian,
Longgang, Shenzhen, Guangdong
P.R.China, 518129

Launch website: http: //www. cnlaunch.com

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