User Manual

Portable Colour Digital Storage Oscilloscope

36025D

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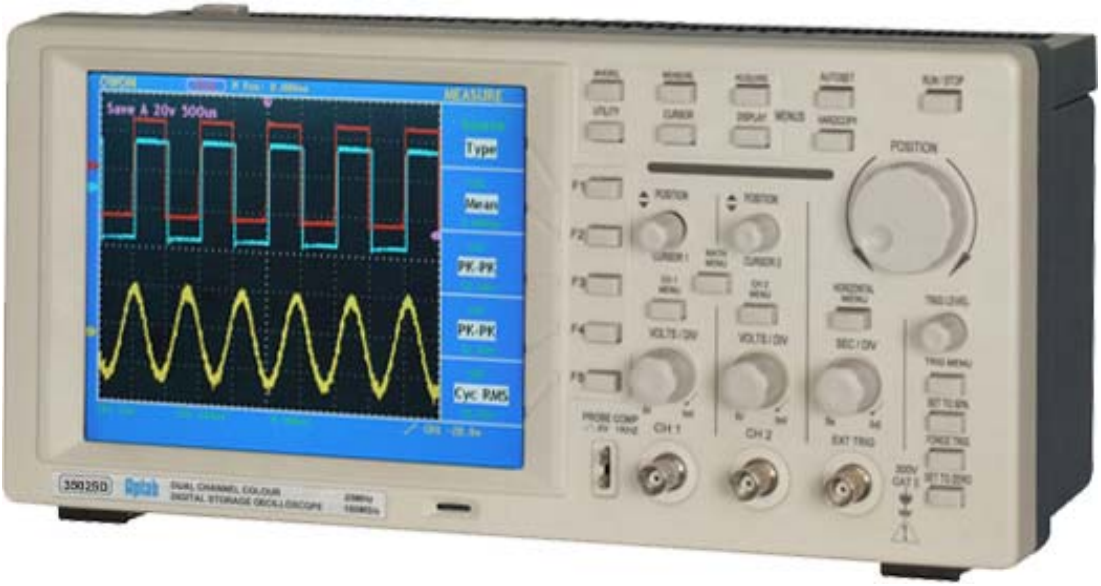

Portable Colour Digital Storage Oscilloscope

Model 36025D

WARRANTY

Aplab warrants that all products manufactured by Aplab conform to published Aplab specifications and are free from defects in materials and workmanship for a period of one year from the date of despatch when used under normal operating conditions and within the service conditions for which they were furnished.

The obligation of Aplab arising from a Warranty claim shall be limited to repairing, or at its option, replacing without charge, any product which in Aplab's sole opinion proves to be defective within the scope of the Warranty.

Aplab must be notified in writing of the defect or nonconformity within the Warranty period and the affected product returned to Aplab's factory or to an authorized service center within (30) days after discovery of such defect or nonconformity.

For products warranties requiring return to Aplab, products must be returned to a service facility designated by Aplab.

Aplab shall have no responsibility hereunder for any defect or damage caused by improper storage, improper installation, unauthorized modification, neglect, inadequate maintenance, accident or for any product which has been repaired or altered by anyone other than Aplab or its authorized representative and not in accordance with instructions furnished by Aplab.

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The Warranty described above is Buyer's sole and exclusive remedy and no other warranty, whether written or oral, is expressed or implied. Aplab specifically desclaims the implied warranties of merchantability and fitness for a particular purpose. No statement, representation, agreement, or understanding, oral or written, made by an agent, distributor, representative, or employee of Aplab, which is not contained in the foregoing Warranty will be binding upon Aplab, unless made in writing and executed by an authorized Aplab employee. Under no circumstances shall Aplab be liable for any direct, indirect, special, incidental, or consequential damages, expenses, losses, or delays (including loss of profits) based on contract, tort, or any legal theory.

Table of Contents

1. General Safety Requirements & precautions

Before Connecting to the Power Mains, please read following safety precautions to avoid any possible body injury and to prevent this product or any other products connected from damage. In order to avoid any contingent danger, this product is only used within the range specified.

Only the qualified technicians can carry out the servicing and the maintenance.

Prevent the Fire or Body Injury.

Use the proper power line. Only use the power cord specially provided for this product or that has been approved to be used.

Connect or Disconnect Correctly. When the probe or testing wire is connected to the power lead, please do not connect and disconnect the probe or testing wire freely.

Product Grounding. This product is grounded through the power lead grounding conductor. In order to prevent any electric shocking, the grounding conductor must be connected to the ground. Please ensure that this product has been already grounded correctly before any connection with its input or output terminal.

Connect the probe correctly. The grounding end of the probe corresponds to the grounding phase. **Please don't connect the grounding end to the positive phase. Pay attention to the limiting values of all terminals.** In order to prevent any fire or electric shock risks, please pay attention to all the limiting values and marks of this product. Before any connections for this product, please read the user's manual of this product to understand the information about the rated values .

Do not make any operations without the instrument cover installed. If the cover or panel has already been removed, please don't operate this product.

Use the proper fuse. Only the fuse complying with the specified type and nominal value for this product can be used.

Avoid touching any exposed circuit. When the product is on power, please don't touch the uncovered contacts and parts.

Please don't make any operations when you have observed an uncertain fault. In case of any damage to this product observed, please contact the qualified maintenance personnel for check up.

Operate in a good ventilated atmospheric condition. Please read carefully the detailed installation instructions in the user's manual so that this product can be used correctly. Always operate it in a good ventilated atmosphere.

Please do not make any operations in a moist environment.

Please do not make any operations in an explosive environment .

Keep the products surface clean and dry.

2. Safety Terms and Symbols

Terms in this manual. The following terms may appear in this manual:

⚠ **Warning.** A warning statement indicates the conditions and actions which may endanger the life safety.

⚠ **Note.** A note statement indicates the conditions and actions which may cause damage to this product or other property.

Terms on the product. The following terms may appear on this product:

Danger: It indicates that there may be an immediate injury to you when you encounter this mark.

Warning: It indicates that there may not be an immediate injury to you when you encounter this mark.

Note: It indicates that there may be damage to this product or other property.

Symbols on the products. The following symbol may appear on the products:

High Voltage Please refer the Manual. Protective Ground End Grounding End for Measurement Earth End on the Shell

3. General Features of the 36025D Color Digital Storage Oscilloscope

- The bandwidth of 25MHz for each Channel
- Record length of 6,000 points for each channel
- Sampling rates of 100MS/s for each channel
- Read-out with the cursors
- Five automatic measurement functions
- Color liquid crystal display (LCD) of high resolution and high contrast with adjustable back light
- Storage and Recall of waveforms
- Automatic setting function, capable of fast setting
- MATH function for multiple-waveform calculation
- Detection of the average and peak values of the waveform
- Digital real-time Sampling oscilloscope;
- Edge and video triggering function;
- Built-in RS232 and USB communication ports;
- User friendly with English language.
- Built-in Li-ion rechargeable battery charger.
- Battery Operation.

4. Technical Specifications

Only if the oscilloscope fulfill the following two conditions at first, can these specification standards be reached.

- This instrument should run for more than 30 minutes continuously under the specified operating temperature.
- If the change range of the operating temperature is up to or exceeds 5□, open the system function menu and execute the "Auto-calibration" procedure.

All specification standards can be fulfilled, except one(s) marked with the word "Typical".

Sampling

ACQU Mode	Sample Peak Detection Average
Sampling Rate	100 MS/s

Input

Input Coupling	DC, AC
Input Impedance	1MΩ± 2%, connected with 20pF± 3pF in parallel
Probe attenuation coefficient	1X, 10X, 100X, 1000X
Max. Input Voltage	300V, Peak Value

Level

Sampling Rate Range	10S/s ～ 100MS/s
Waveform interpolation	(sinx) /x
Record Length	5000 sampling points per channel
Scanning Speed Range (S/div)	5ns/div～5s/div, according to the stepping mode of 1- 2.5- 5.
Accuracy of Sampling Rate and Delay Time	± 100ppm (for any time interval equal to or greater than 1ms)
Measuring Accuracy of Time Interval (□T) (Full Bandwidth)	Single: ± (One Sampling Interval Time +100ppm × Reading +0.6ns) >Averages of 16: ± (One Sampling Interval Time +100ppm× Reading +0.4ns)

Vertical

A/D Converter	Resolution of 8 bits, with the sampling carried out in two channels at the same time.
Sensitivity (Volt/division) Range (V/div)	5mV/div- 5V/div (at the input BNC)
Displacement Range	± 10div (5mV- 5V)
Simulative Bandwidth	25M
Single Bandwidth	Full Bandwidth
Low frequency respond (AC Coupling, - 3dB)	≥5Hz (at BNC)
Rising Time (Typical, at BNC)	≤17.5ns
DC Gain Accuracy	± 5%
DC Measuring Accuracy (Average for ACQU MODE)	The voltage difference (□V) between any two points on the wave form after averaging the captured wave forms of more than 16: ± (5% Reading + 0.05 divisions).

Trigger

Trigger Sensitivity (Edge Trigger)	DC Coupling	Channel 1 and Channel 2: 1div (DC ～ Full Bandwidth)
	EXT	100mV(DC ～ Full Bandwidth)
	EXT/5	500mV(DC ～ Full Bandwidth)
	AC Coupling	It is the same as the DC coupling in case of 50Hz or more.
Trigger Level Range	Internal	± 6 divisions from the screen center.
	EXT	± 600mV
	EXT/5	± 3V
Trigger Level Accuracy (Typical): It is applicable to the signal with the rising and falling time ≥ 20ns	Inside	± 0.3 div
	EXT	± (40mV + 6% of Set Value)
	EXT/5	± (200mV +6% of Set Value)
Trigger Displacement	Preliminary Trigger: 655 divisions Late Trigger: 4 divisions.	
Set Level to 50% (Typical)	Operation under the condition of input signal frequency ≥ 50Hz.	
Trigger Sensitivity (Video trigger, typical)	Internal	Peak-to-peak value of 2 divisions
	EXT	400mV
	EXT/5	2V
Signal System and Line/Field Frequency (Video Trigger Type)	Supporting the NTSC, PAL and SECAM broadcast system of any field frequency of line frequency.	

Measurement

Cursor Measurement	Voltage difference (□V) and time difference (□T) between cursors.
Automatic Measurement	Peak-to-Peak Value, Average , RMS , Frequency and Cycle

Probe

	1X Position	10X Position
Bandwidth	DC: up to 4 MHz	DC: up to full bandwidth
Attenuation Ratio	1: 1	10: 1
Compensation Range	10pf ～ 35pf	
Input Resistance	1MΩ± 2%	10MΩ± 2%
Input Electric Capacity	85pf- 115pf	14.5pf- 17.5pf
Input Voltage	150 V DC	300 V DC

General Technical Specifications

Display

Display Type	7.8 " Color LCD (Liquid Crystal Display)
Display Resolution	640 (Horizontal) × 480 (Vertical) Pixels
Display Colors	256 Colors

Output for Probe Compensation

Output Voltage (Typical)	About 5V, with the Peak-to-Peak value equal to or greater than 1MΩ of load.
Frequency (Typical)	Square wave of 1KHz

Power

Mains Voltage	100～240 VAC RMS, 50Hz, CAT II
Power Consumption	< 15W
Fuse	1A, T grade, 250V

Environment

Temperature	Working temperature: 0 □～ 40 □ Storage temperature: -20 □～ +60 □
Relative Humidity	≤ 90%
Height	Operating: 3,000 m Non-operating: 15,000 m
Cooling Method	Natural convection

Mechanical Specifications

Dimension	350mm× 157mm×120mm
Weight	1.4 kilogram

Standard Accessories:

- Passive probe: 2, 1.2 m, 1:1 (10:1)
- CD: 1, for Iinstruction. Manual and S/W for PC communication,
- Power line: one, up to the standards of the country in which it is used.
- User's Manual: One

Options:

- RS232 data line or USB data line cabels (Optional)
- Battery

5. Getting Started

This chapter deals with the following topics mainly:

- Introduction to the front panel user interface controls of the Oscilloscope
- The general inspection
- The functional inspection
- Probe Compensation
- Setting the probe attenuation coefficient
- The probe safety
- Auto-calibration
- The vertical system
- The horizontal system
- The trigger system

5.1 Use-Interface Front Panel Controls and Functions :

Whenever you get a new-type oscilloscope, you should first get acquainted with its front panel and the 36000D series digital storage oscilloscope is no exception. This chapter describes the operations and functions of the front panel controls of the Oscilloscope, enabling you to be familiar with the use of the Oscilloscope in the shortest time. The Oscilloscope offers a simple front panel controls with distinct functions to users for their completing some basic operations, in which the knobs and function pushbuttons are included. The knobs have the functions similar to other Oscilloscopes. The 5 buttons in the column on the right side of the display screen are menu selection buttons (defined as F1 to F5 from top to bottom respectively), through which, you can set the different options for the current menu. The other pushbuttons are function buttons, through which, you can enter different function menus or obtain a specific function application directly.

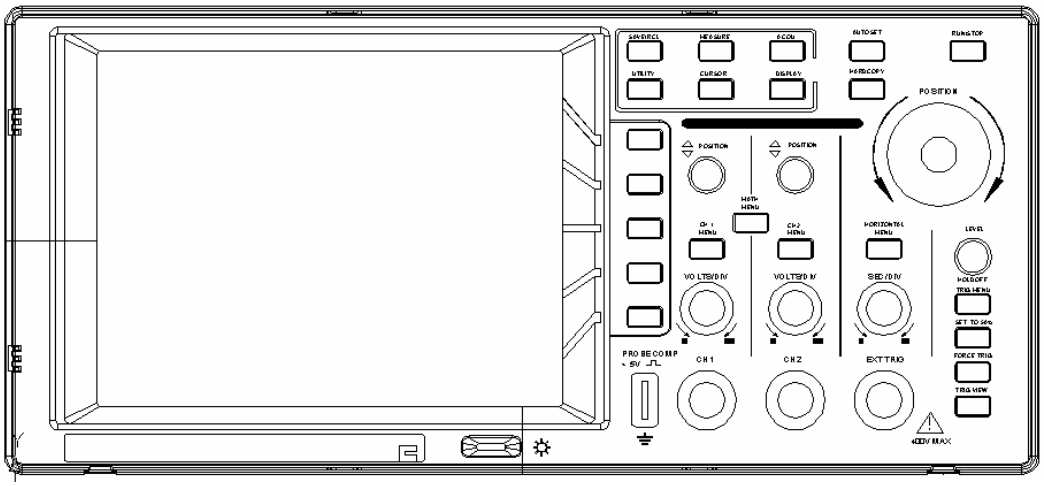


Fig. 1 The Front Panel of a Digital Storage Oscilloscope

Function Buttons

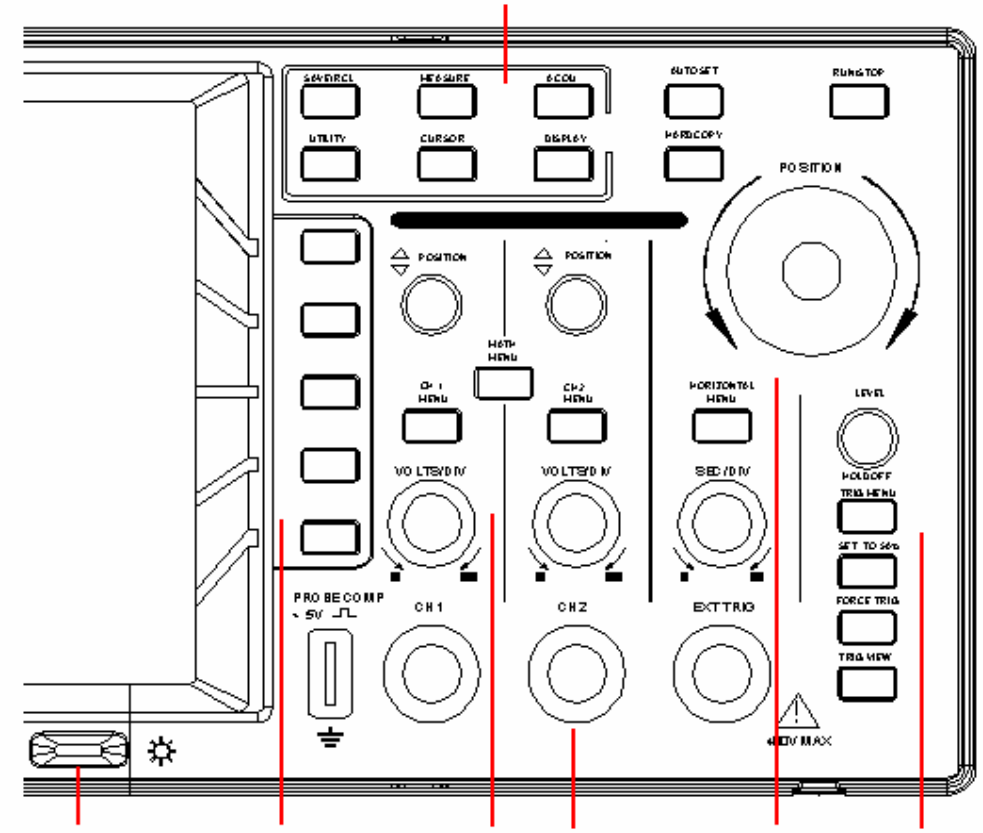


Fig. 2 Explanatory Drawing for Operations of the Digital Storage Oscilloscope

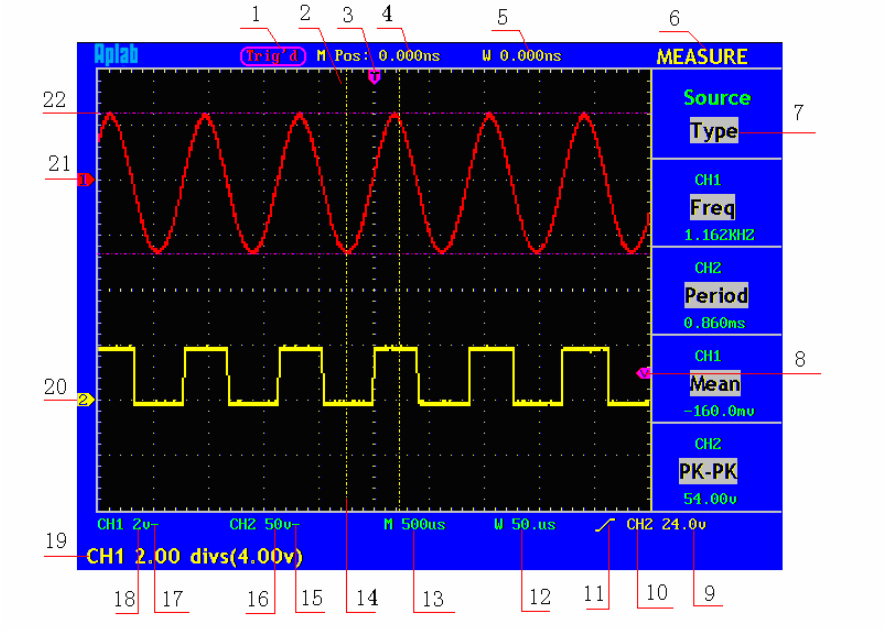


Fig. 3 Illustrative Drawing of Display Interfaces

1. The Trigger State indicates the following information:

   Auto: The oscilloscope is under the Automatic mode and is collecting the waveform under the non-trigger state.

   Trig' d: The oscilloscope has already detected a trigger signal and is collecting the after-triggering information.

   Ready: All pre-triggered data have been captured and the oscilloscope has been already ready for accepting a trigger.

   Scan: The oscilloscope captures and displays the waveform data continuously in the scan mode.

   Stop: The oscilloscope has already stopped the waveform data acquisition.

2. Waveform Viewing Area.
3. The purple pointer indicates the horizontal trigger position, which can be adjusted by the horizontal position control knob.
4. The reading shows the time deviation between the horizontal trigger position and the screen centre line, which equals 0 in the screen center.
5. This reading shows the time deviation between the horizontal trigger position and the window centre line, which is regarded as 0 in the window center.
6. It indicates the current function menu.
7. It indicates the operation options for the current function menu, which changes with the function menus.
8. The purple pointer shows the trigger level position.
9. The reading shows the trigger level value.
10. The reading shows the trigger source.
11. It shows the selected trigger type:

     Rising edge triggering

     Falling edge triggering

     Video line synchronous triggering

     Video field synchronous triggering

12. The reading shows the window time base set value.
13. The reading shows the main time base set value.
14. The two yellow dotted lines indicate the size of the viewing expanded window.
15. The icon shows the coupling mode of the CH2 channel.

16. “—“ indicates the direct current coupling

    “ ～” indicates the AC coupling

17. The reading shows the vertical scale factor (the Voltage Division) of the CH2 channel.

18. The icon indicates the coupling mode of the CH1 channel:

    The icon "–" indicates the direct current coupling

    The icon "～" indicates the AC coupling

19. The reading indicates the vertical scale factor (the Voltage Division) of the CH1 channel.

20. The information shows the zero point positions of CH1 or CH2 channel.

21. The yellow pointer shows the grounding datum point (zero point position) of the waveform of the CH2 channel. If the pointer is not displayed, it shows that this channel is not opened.

22. The red pointer indicates the grounding datum point (zero point position) of the waveform of the CH1 channel. If the pointer is not displayed, it shows that the channel is not opened.

23. The positions of two purple dotted line cursors measurements.

5.2 General Inspection

After you get a new Oscilloscope, it is recommended that you should make a check on the instrument according to the following steps:

1. **Check whether there is any damage caused by transportation.**

   If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away. First complete tests on the unit for the electrical and mechanical properties and its accessories.

2. **Check the Accessories**

   The supplied accessories have been already described in the **Appendix B** "Accessories" of this Manual. You can check whether there is any loss of accessories with reference to this description. If it is found that there is any accessory lost or damaged, please get in touch with the distributor of APLAB responsible for this service or the APLAB's local offices.

3. **Check the Complete Instrument**

   If it is found that there is damage to the appearance of the instrument, or the instrument can not work normally, or fails in the performance test, please get in touch with the APLAB's distributor responsible for this business or the APLAB's local offices. If there is damage to the instrument caused by the transportation, please keep the package intact for retransport. Please inform to the Service/logistics department or the APLAB's distributor/region responsible for this business. A repairing or replacement of the instrument will be arranged by the APLAB.

5.3 Function Inspection

Make a fast function check to verify the normal operation of the instrument, as per following steps:

1. **Connect the Instrument to the Power and Push down the Power Switch Button.**

   The instrument carries out all self-check items and shows the prompt "Press any Key to Enter the Operating Mode". Press the "**UTILITY**" button to get access to the "FUNCTION" menu and push down F2 the menu selection button to call out the function "Recall Factory". The default attenuation coefficient set value of the probe in the menu is 10X, shown as Fig. 4.

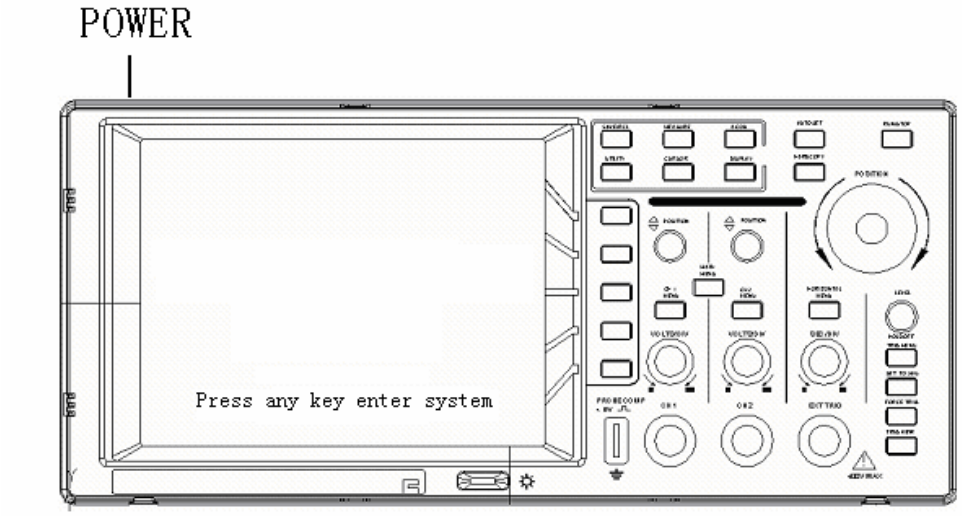


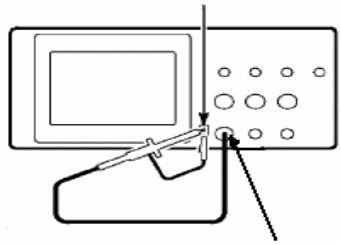
Fig. 4 Power on the Instrument

2. **Set the Switch in the Oscilloscope Probe as 10X and Connect the Oscilloscope with CH1 Channel.**

Align the slot in the probe with the plug in the CH1 connector BNC, and then tighten the probe with rotating it to the right side.

Connect the probe tip and the ground clamp to the connector of the probe compensator, shown as Fig. 5.

Probe comp



CH1

Fig. 5 Connection of the Probe

3. Press the AUTOSET Button.

The square wave of 1 KHz frequency and 5V peak-peak value will be displayed in several seconds (see Fig. 6).

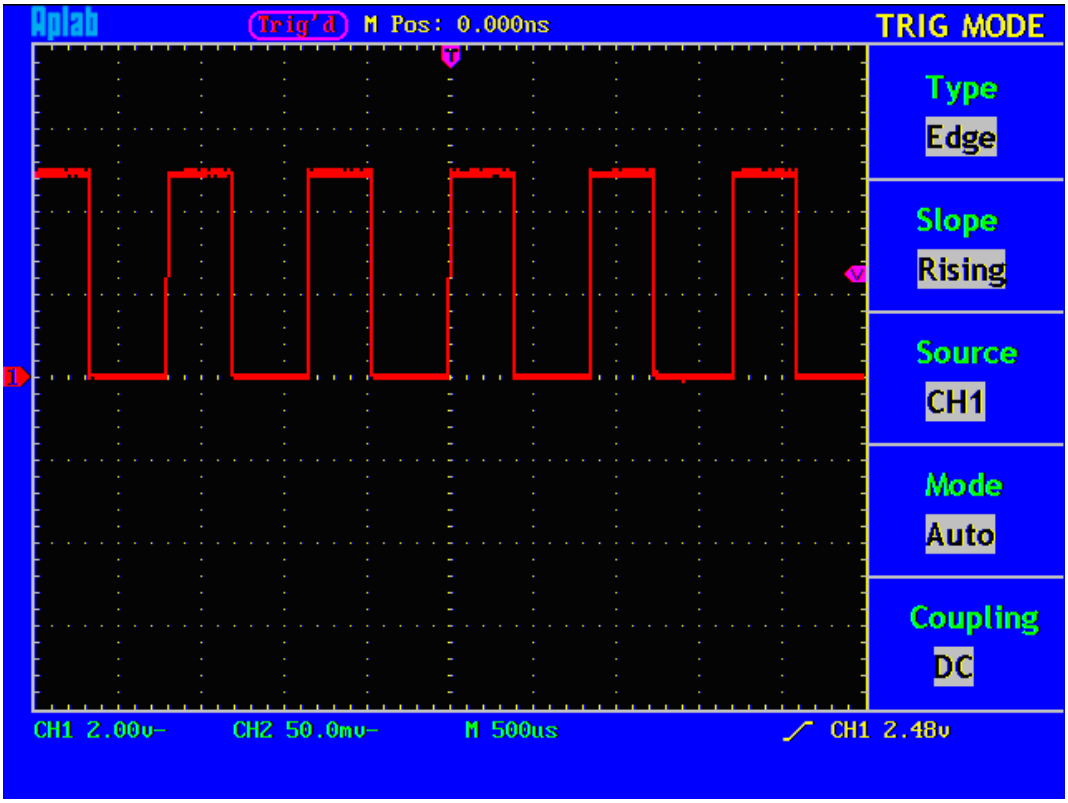


Fig. 6 Autoset

Check CH2 by repeating Step 2 and Step 3.

5.4 Probe Compensation

Whenever you connect the probe with any input channel for the first time, make this adjustment to match the probe with the input channel. The probe which is not compensated /adjusted will result in the measuring error or mistake. For adjusting the probe compensation, please carry out the following steps:

1. Set the attenuation coefficient of the probe in the menu as 10X and that of the switch in the probe as 10X, and connect the oscilloscope probe with the CH1 channel. If a probe hook tip is used, ensure that it keeps in close touch with the probe. Connect the probe tip with the signal connector of the probe compensator and connect the reference wire clamp with the ground wire connector of the probe connector, and then press the button AUTOSET (see Fig. 5).
2. Check the displayed wave forms and adjust by plastic screw driver provided with the probe till a correct compensation is achieved (see Fig. 7 and Fig. 8).

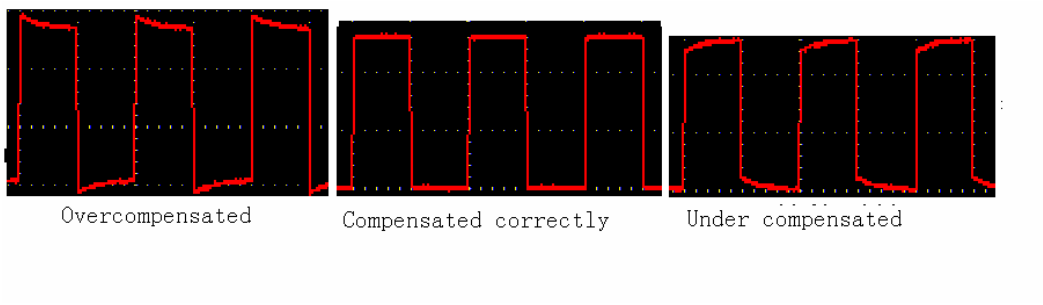


Fig. 7 Displayed Wave Forms of the Probe Compensation

3. Repeat the steps mentioned if necessary.

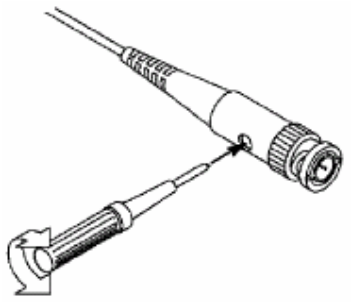


Fig. 8 Adjust Probe

5.5 Setting the Probe Attenuation Coefficient

The probe has several attenuation coefficients, which will influence the vertical scale factor of the oscilloscope.

If it is required to change (check) the set value of the probe attenuation coefficient, press the function menu button of the channels used, then push down the selection button corresponding to the probe till the correct set value is shown.

This setting will be valid all the time before it is changed again.

Note: The attenuation coefficient of the probe in the menu is preset to 10X when the oscilloscope is delivered from the factory.

Make sure that the set value of the attenuation switch in the T5100 probe is the same as the menu selection of the probe in the oscilloscope.

The set values of the probe switch are 1X and 10X (see Fig. 9).

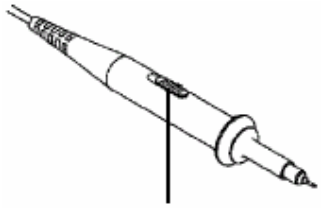


Fig. 9 Attenuation Switch

Note: When the attenuation switch is set to 1X, the T5100 probe will limit the bandwidth of the oscilloscope up to 5MHz. If it is needed to use the whole bandwidth of the oscilloscope, the switch must be set to 10X.

5.6 Probe Safety

The safety guard ring around the probe body protects your finger against the electric shock, shown as Fig. 10.

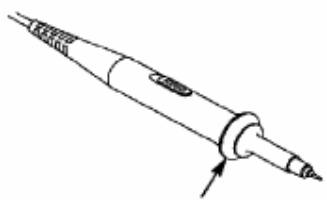


Fig. 10 Finger Guard

Warning: In order to avoid suffering from the electric shock, please keep your finger behind the safety guard ring of the probe body during the operation.

In order to protect you from suffering from the electric shock during your using the probe, do not touch the metal part of the probe tip when the probe is connected to the power supply.

Before making any measurements, please connect the probe to the instrument and connect the ground terminal to the earth.

5.7 Auto-calibration

The auto-calibration application can make the oscilloscope reach the optimum condition rapidly to obtain the most accurate measurement value. You can carry out this application program at any time, but when the range of variation of the ambient temperature is up to or over 5 degree C , this program must be executed.

For the performing of the self-calibration, all probes or wires should be disconnected with the input connector first. Then, press the "**UTILITY"** button to call out the **FUNCTION** menu; push down the F3 menu selection button to choose the option " Do Self Cal"; finally, run the program after confirming that everything is ready now.

5.8 Vertical System

Please refer to Fig.11, there are a series of buttons and knobs in **VERTICAL CONTROLS**. The following practices will gradually direct you to get familiar with the using of the vertical setting.

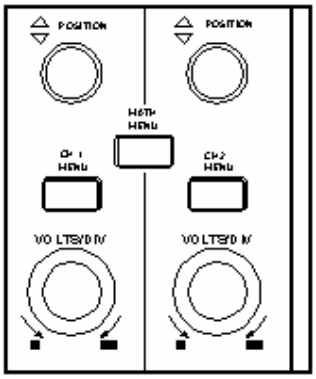


Fig. 11 Vertical Control Zone

1. Use the button **"VERTICAL POSITION"** knob to show the signal in the center of the waveform window. The **"VERTICAL POSITION"** knob function is to adjust the vertical display position of the signal. Thus, when the "**VERTICAL POSITION**" knob is rotated, the pointer of the earth datum point of the channel is directed to move up and down following the wave form.

Measurement

If the channel is under the DC coupling mode, you can rapidly measure the DC component of the signal through the observation of the difference between the wave form and the signal ground.

If the channel is under the AC mode, the DC component will be removed by filtration. This mode helps you display the AC component of the signal with a higher sensitivity.

2. Change the vertical setting and observe the consequent state information change.

With the information displayed in the status bar at the bottom of the waveform window, you can determine any changes in the channel vertical scale factor.

- Rotate the vertical "VOLTS/DIV" knob and change the "Vertical Scale Factor (Voltage Division)", it can be found that the scale factor of the channel corresponding to the status bar has been changed accordingly.
- Press buttons of "**CH1 MENU**", "**CH2 MENU**" and "**MATH MENU**", the operation menu, symbols, wave forms and scale factor status information of the corresponding channel will be displayed in the screen.

5.9 Horizontal System

Please refer to Fig.12, there are a button and two knobs in the "**HORIZONTAL CONTROLS**". The following practices will gradually direct you to get familiar with the setting of horizontal time base.

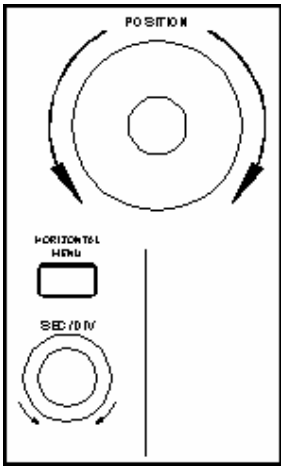


Fig. 12 Horizontal Control Zone

1. Use the horizontal **"SEC/DIV"** knob to change the horizontal time base setting and observe the consequent status information change. Rotate the horizontal "**SEC/DIV**" knob to change the horizontal time base, and it can be found that the "**Horizontal Time Base**" display in the status bar changes accordingly. The horizontal scanning speed steps from 5ns up to 5s in the sequence of 1=2.5=5.
2. Use the "**HORIZONTAL POSITION**" knob to adjust the horizontal position of the signal in the waveform window. The "**HORIZONTAL POSITION**" knob is used to control the triggering displacement of the signal or for other special applications. If it is applied to triggering the displacement, it can be observed that the wave form moves horizontally with the knob when you rotate the "**Horizontal Position**" knob.
3. With the "**HORIZONTAL MENU**" button pushed down, you can set and initiate the Window Expansion.

5.10 Trigger System

Please refer to Fig.13, there are a knob and four buttons in the "**TRIGGER CONTROLS**". The following practices will direct you to get familiar with the setting of the trigger system gradually.

Fig. 13 Trigger Control Zone

1. Press the "**TRIG MENU**" button and call out the trigger menu. With the operations of the 5 menu selection buttons, the trigger setting can be changed.
2. Use the "**LEVEL"** knob to change the trigger level setting.
   With the rotation of the "**LEVEL**" knob, it can found that the trigger indicator in the screen will move up and down with the rotation of the knob. With the movement of the trigger indicator, it can be observed that the trigger level value displayed in the screen changes.
3. Press the button "**SET TO% 50**" to set the trigger level as the vertical mid point values of the amplitude of the trigger signal.
4. Press the "**FORCE TRIG**" button to force a trigger signal, which is mainly applied to the "Normal" and "Single" trigger modes.
5. The "**TRIG VIEW /SET TO ZERO**" button is used to reset the trigger horizontal position.

6. Operation

Now that you have already become familiar with the initial operations of **“VERTICAL CONTROLS”, “HORIZONTAL CONTROLS”** and **“TRIGGER CONTROLS”**, and the functions of the function areas, buttons and knobs in the front panel of the Oscilloscope. Based on familiarisation of the previous Chapter, the user should have now intimate knowledge of the determination of the change of the oscilloscope setting through observing the status bar. If you have not been familiar with the above-mentioned operations and methods yet, we advise you to read the section of “ First time operation” again.

This chapter will deal with the following topics mainly:

- **How to Set the Vertical System**
- **How to Set the Horizontal System**
- **How to Set the Trigger System**
- **How to Carry on the Sampling Setup**
- **How to Set the Display System**
- **How to carry out the Store and Recall Operations**
- **How to Carry on the Auxiliary Function Setting**
- **How to Carry on the Automatic Measurement**
- **How to Carry on the Cursor Measurement**
- **How to Use Executive Buttons**

It is recommended that you read this chapter carefully to get acquainted the various measurement functions and other operation methods of the Oscilloscope.

6.1 Vertical System :

The **VERTICAL CONTROLS** includes three menu buttons such as **CH1 MENU**, **CH2 MENU** and **MATH MENU,** and four knobs such as **VERTICAL POSITION** , **VOLTS/DIV** (one control group for each of the two channels).

Setting of CH1 and CH2

Every channel has an independent vertical menu and each item is set respectively based on the channel.

With the "**CH1 MENU**" or **"CH2 MENU"** menu button pushed down, the system shows the operation menu of the corresponding channel (see Fig. 14).

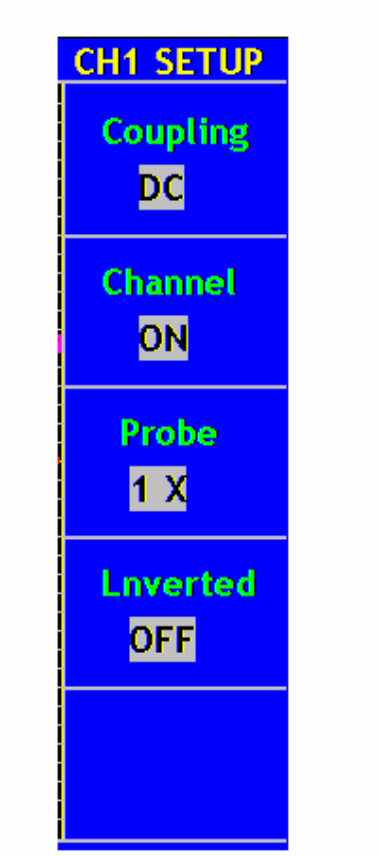


Fig. 14 Channel Setting Menu

The description of the Channel Menu is shown as the following list: following form:

Function Menu	Setting	Description
Coupling	AC DC	Blocks the DC and allows AC components in the input signal. Allows the AC/DC component in the input signal.
Channel	OFF ON	Closes the perticular measurement channel. Opens the particular measuring channel.
Probe	1X 10X 100X 1000X	Chooses one according to the probe attenuation factor to make the vertical scale reading accurate.
Inverted	OFF ON	The wave form is displayed normally. Initiate the wave form inverted function.

1. Setting Channel Coupling

Taking the Channel 1 for example, the measured signal is a square wave signal containing the direct current bias. The operation steps are shown as below:

(1). Press the **CH1 MENU** button and call out the **CH1 SETUP** menu.

(2). Press the **F1** menu selection button and select the Coupling item as "AC" to set the channel coupling in AC mode, under which the direct current component in the signal will be blocked.

Then, press the **F1** menu selection button again and select the Coupling item as "DC", setting the channel coupling in dc mode, under which both dc and ac components in the signal will be unblocked.

The wave forms are shown as Fig. 15 and Fig. 16.

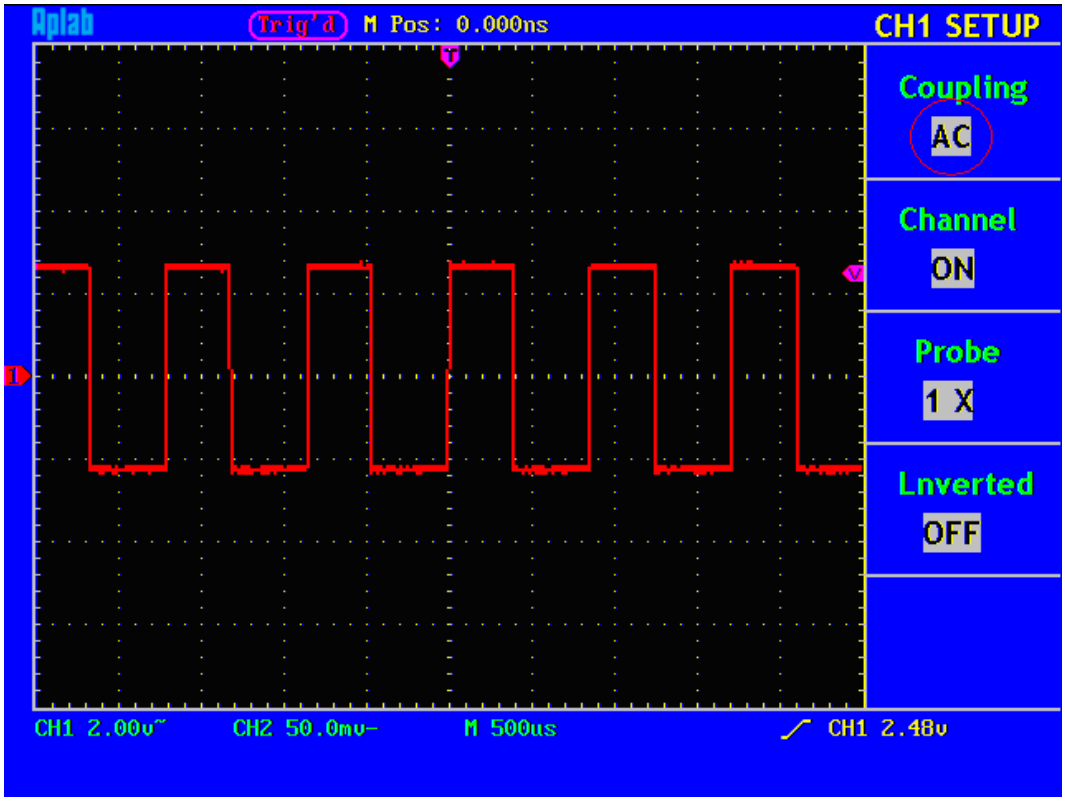


Fig. 15 An "AC Coupled" Oscillogram

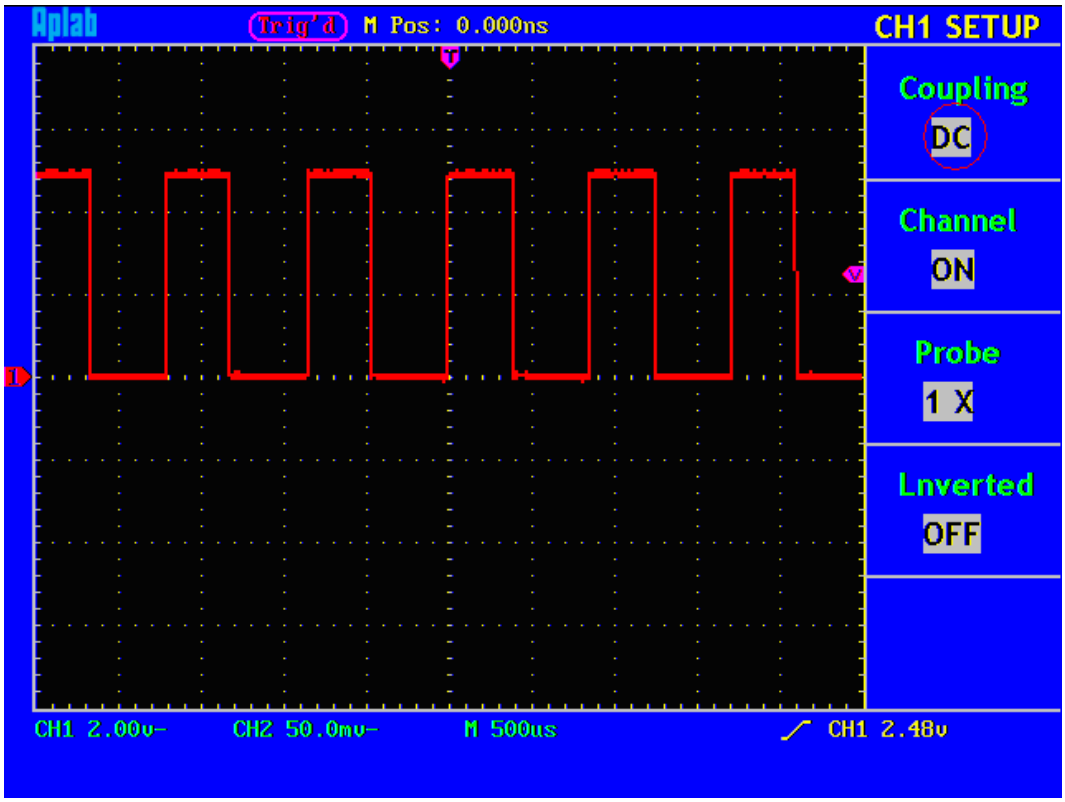


Fig. 16 "DC Coupled" Oscillogram

2. Setting the Channel "ON/OFF"

Taking the Channel 1 for example, the operation steps are shown as below:

(1). Press the **CH1 MENU** button and call out the **CH1 SETUP** menu.

(2). Press the **F2** menu selection button and select the Channel as **OFF,** with Channel 1 switched off.

(3). Press **F2** menu selection button again, select the channel as **ON**, with Channel 1 is switched on.

3. Adjusting the Attenuation Ratio of the Probe

In order to match the attenuation coefficient of the probe, it is required to adjust the attenuation ratio coefficient of the probe through the operating menu of the Channel accordingly. If the attenuation coefficient of the probe is 1:1, that of the oscilloscope input channel should also be set to 1X to avoid any errors presented in the displayed scale factor information and the measured data.

Take the Channel 1 as an example, the attenuation coefficient of the probe is 1:1, the operation steps is shown as follows:

(1). Press the **CH1 MENU** button, access CH1 SETUP menu.

(2). Press the **F3** menu selection button and select 1X for the probe.

The Figure 17 illustrates the setting and the vertical scale factor when the probe of the attenuation coefficient of 1:1.is used.

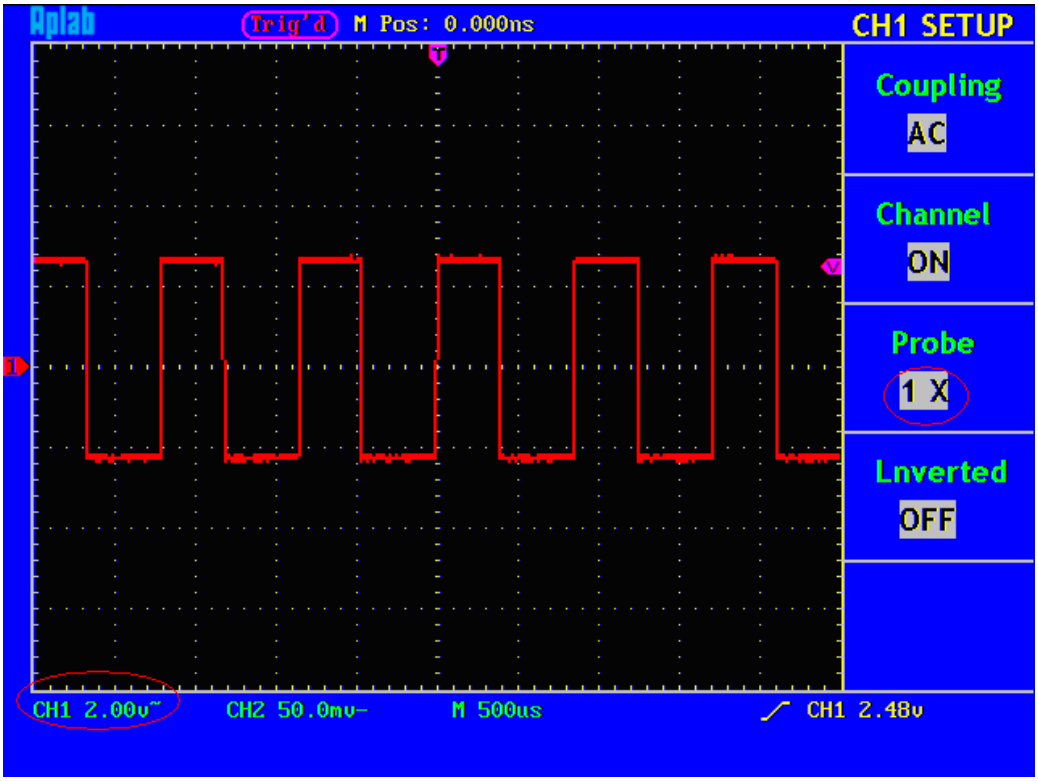


Fig. 17 Adjusting the Attenuation Ratio of the Probe

A List of the Attenuation Coefficients of Probes and the Corresponding Menu Settings.

Attenuation Coefficient of the Probe	Corresponding Menu Setting
1:1	1X
10:1	10X
100:1	100X
1000:1	1000X

5. Setting of Inverted Wave Form

In the wave form inverted, the displayed signal is turned 180 degrees against the phase of the earth potential.

Taking the Channel 1 for example, the operation steps are shown as follows:

(1). Press the **CH1 MENU** button and get access to the **CH1 SETUP** menu.

(2). Press the **F4** menu selection button and select **ON** in the **Lnverted.** The wave form inverted function is initiated.

(3). Press the **F4** menu selection button again and select OFF for **Lnverted** item. The function of wave form inverted is closed off.

For the screen display, see Fig. 18 and Fig. 19.

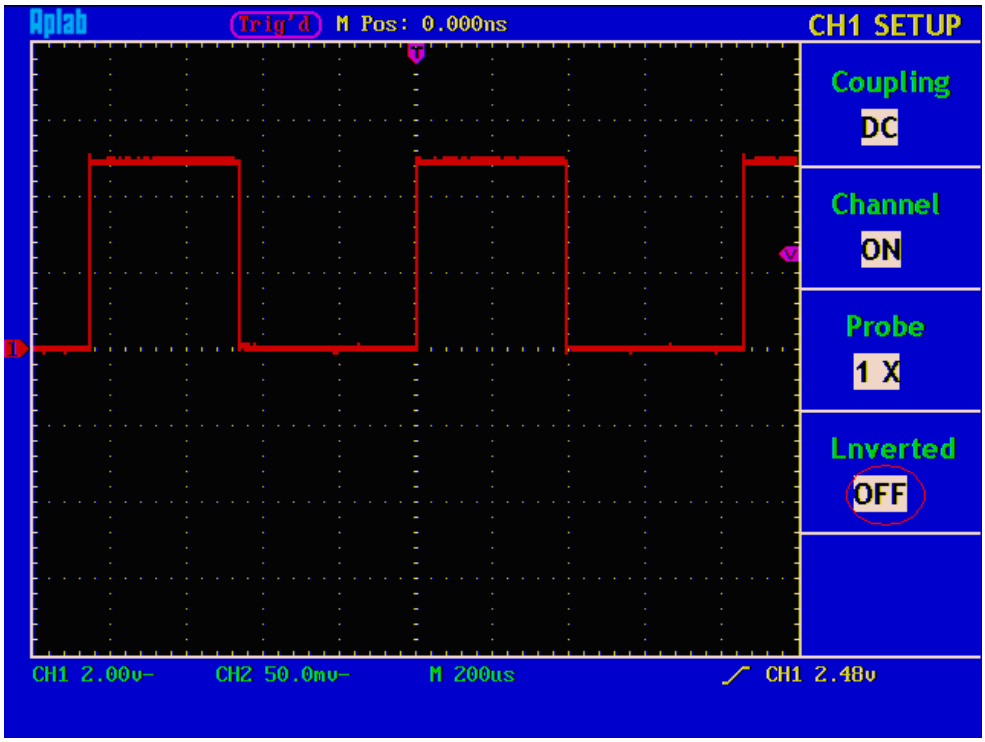


Fig. 18 Wave Form not Inverted

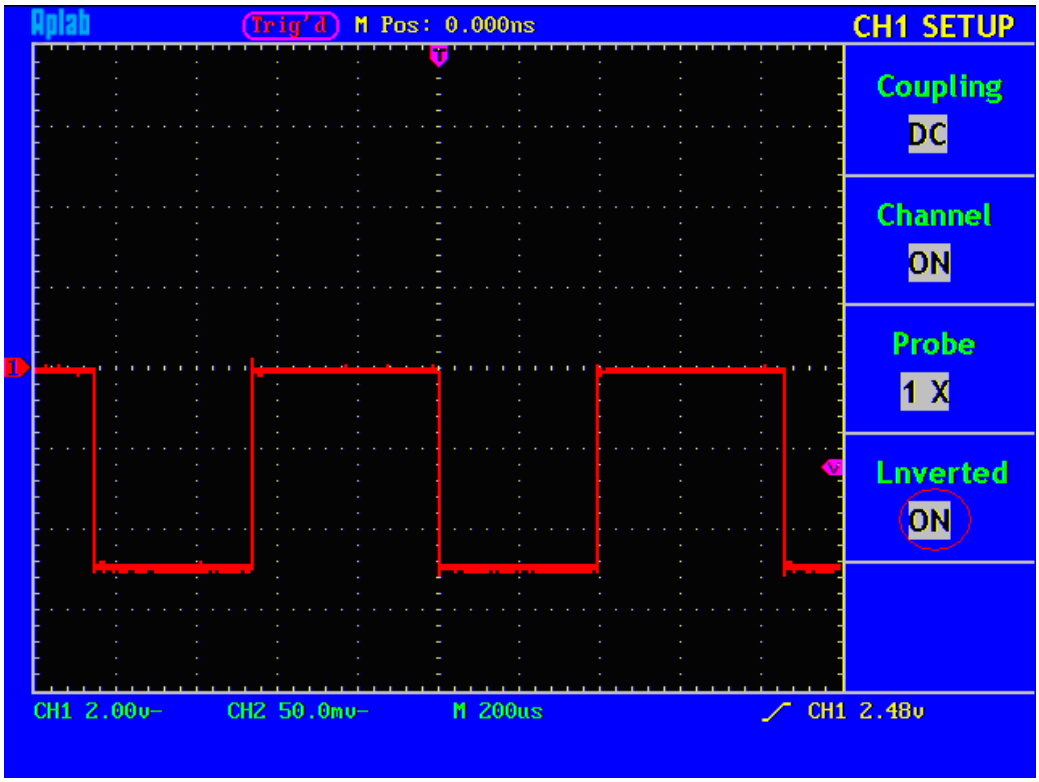


Fig. 19 Wave Form Inverted

6.2 MATH Function

The **Math:** function is used to show the results of the addition and subtraction operations between Channel 1 and Channel 2.

Taking the additive operation between Channel 1 and Channels 2 for example, the operation steps are as follows:

1. Press the **MATH MENU** button and call out the **WAVE MATH** menu.
2. Press the **F3** menu selection button and choose **CH1+CH2**. The green calculated wave form M is displayed in the screen; press the **F3** menu selection button again, the wave form M is closed off (see Fig. 20).

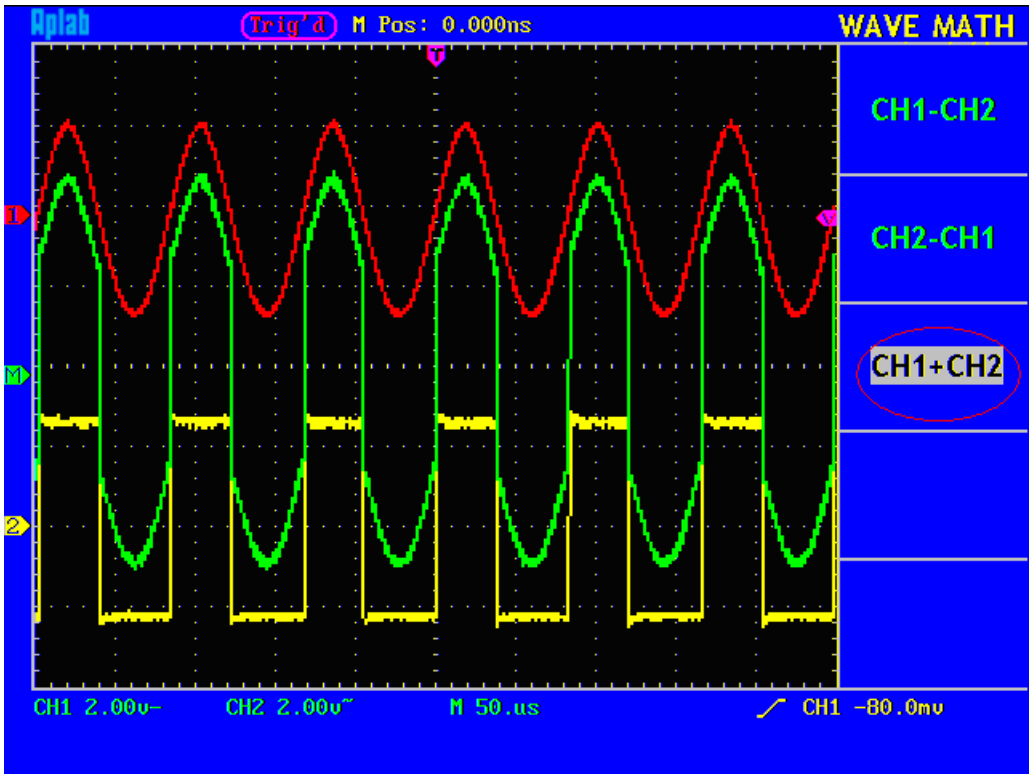


Fig. 20 Wave Form resulted from CH1 +CH2 Mathematical Manipulation

The corresponding FCL (Functional Capabilities List) of the **Wave Form Calculation**

Setting	**Description**
CH1-CH2	Subtract the Channel 2 wave form from the Channel 1 wave form.
CH2-CH1	Subtract the Channel 1 wave form from the Channel 2 wave form.
CH1+CH2	Add the Channel 1 wave form to the Channel 2.

6.3 Application of VERTICAL POSITION and VOLTS/DIV Controls

1. The .**VERTICAL POSITION** knob is used to adjust the vertical positions of the wave forms of all Channels (including those resulted from the mathematical operation).
   The analytic resolution of this control knob changes with the vertical division.
2. The **VOLTS/DIV** knob is used to regulate the vertical resolution of the wave forms of all channels (including those obtained from the mathematical manipulation), which can determine the sensitivity of the vertical division with the sequence of 1-2-5. The vertical sensitivity goes up when the knob is rotated clockwise and goes down when the knob is rotated anticlockwise.
3. When the vertical position of the channel wave form is adjusted, the screen shows the information concerning the vertical position at the lower left corner (see Fig.21).

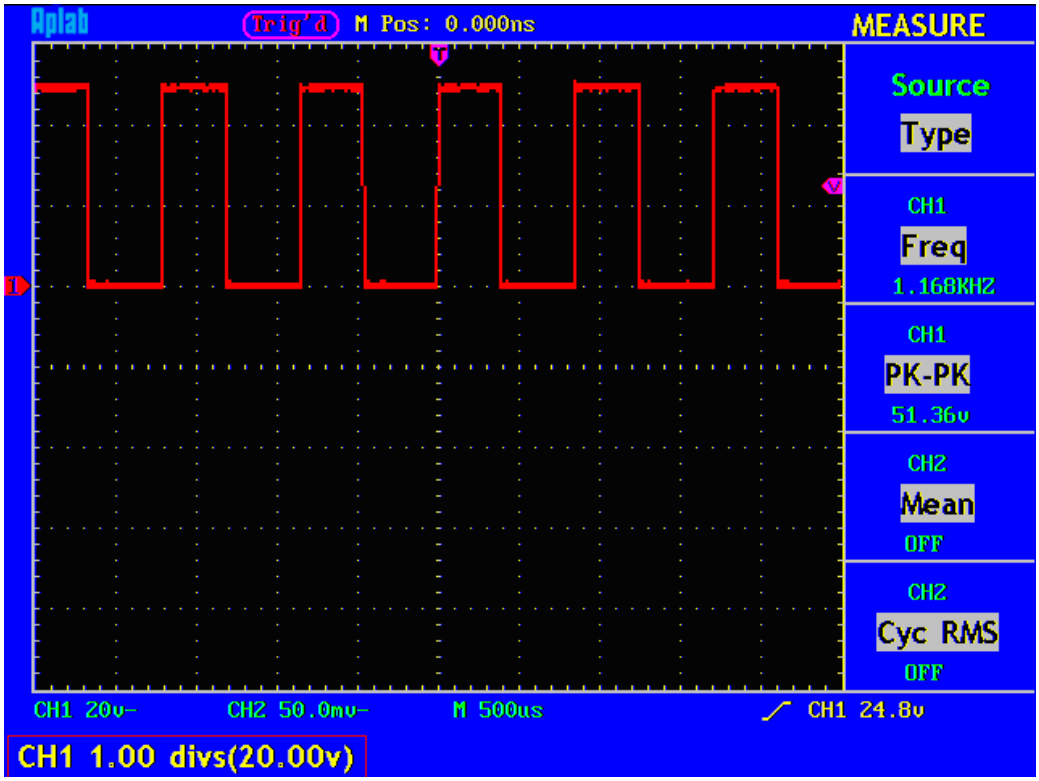


Fig. 21 Information about Vertical Position

6.4 Horizontal System

The **HORIZONTAL CONTROLS** includes the **HORIZONTAL NENU** button and such knobs as **HORIZONTAL POSITION** and **SEC/DIV**.

1. HORIZONTAL POSITION knob: this knob is used to adjust the horizontal positions of all channels (include those obtained from the mathematical manipulation), the analytic resolution of which changes with the time base.
2. SEC/DIV knob: it is used to set the horizontal scale factor for setting the main time base or the window.
3. HORIZONTAL NENU button: with this button pushed down, the screen shows the operating menu (see Fig. 22).

Fig. 22 Time Base Mode Menu

The description of the **Horizontal Menu** is as follows:

Function Menu	Setting	Description
Main Time Base		The setting of the horizontal main time base is used to display the wave form.
Window Setup		A window area is defined by two cursors.
Window Expansion		The defined window area for display is expanded to the full screen.

6.5 Main Time Base

Press the **F1** menu selection button and choose the **Main Time Base.** In this case, the **HORIZONTAL POSITION** and **SEC/DIV** knobs are used to adjust the main window. The display in the screen is shown as Fig. 23.

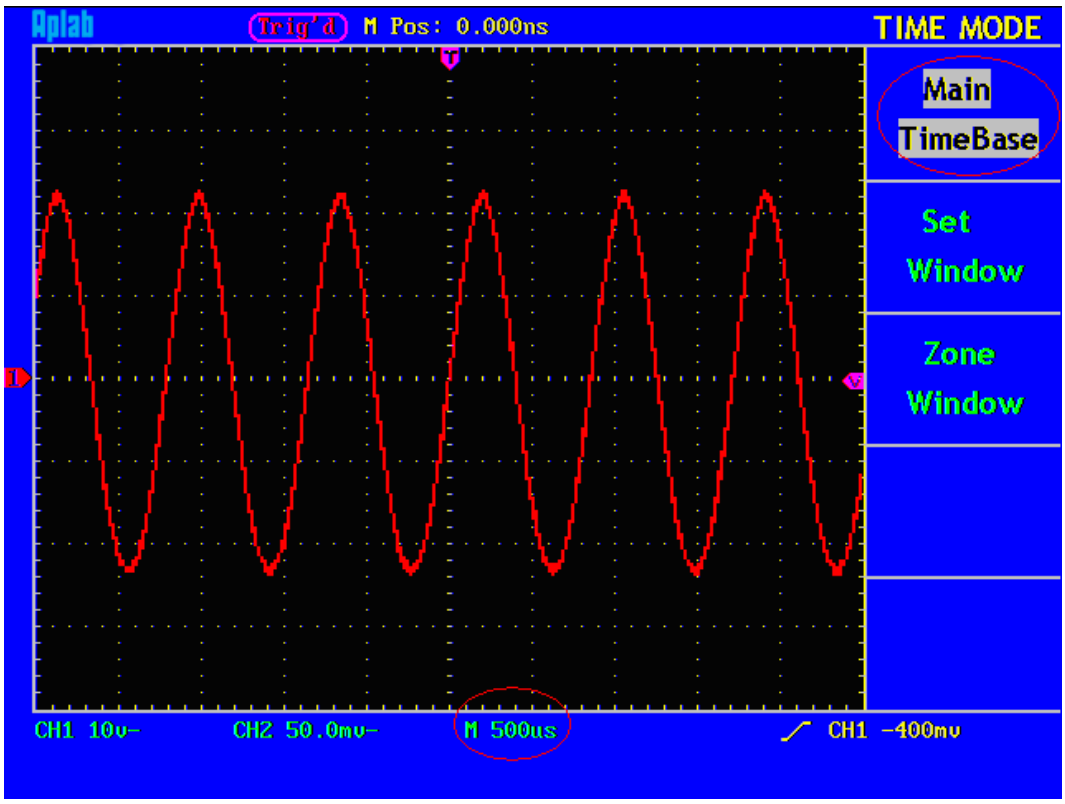


Fig. 23 Main Time Base

6.6 Window Setting

Press the F2 menu selection button and choose **Set Window**. The screen will show a window area defined by two cursors. In this case, the **HORIZONTAL POSITION** and **SEC/DIV** knobs can be used to adjust the horizontal position and size of this window area (see Fig. 24).

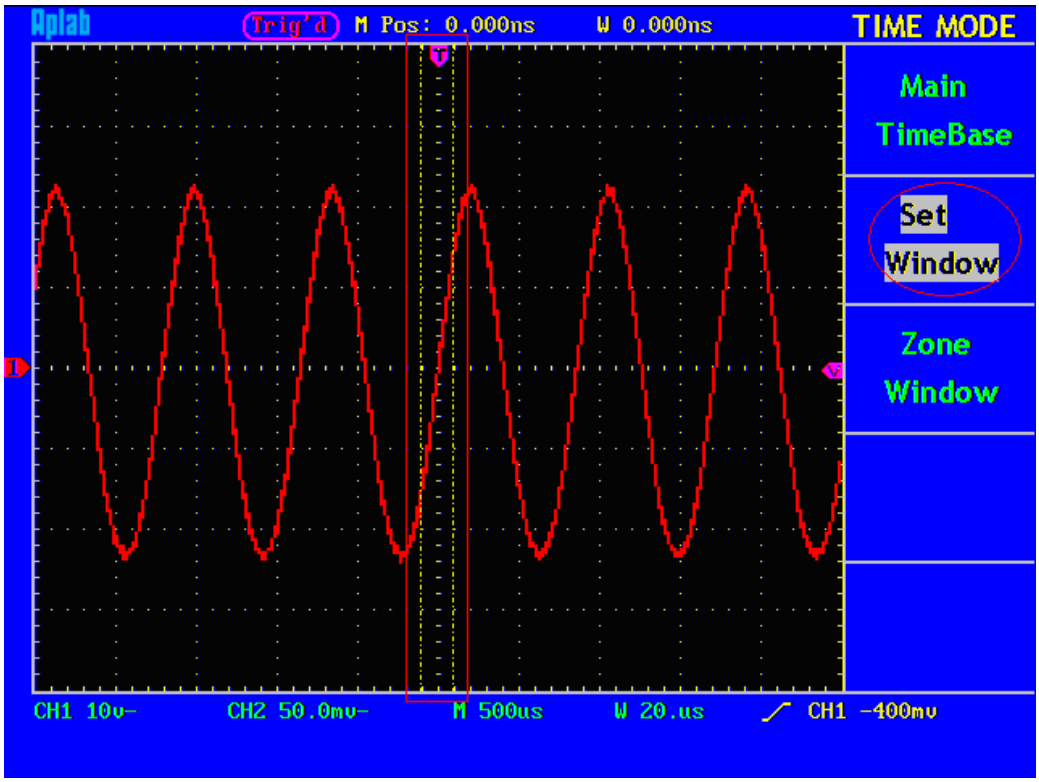


Fig. 24 Window Setting

6.7 Window Expansion

Press the **F3** menu selection button and choose **Zone Window**. As a result, the window area defined by two cursors will be expanded to the full screen size (see Fig. 25).

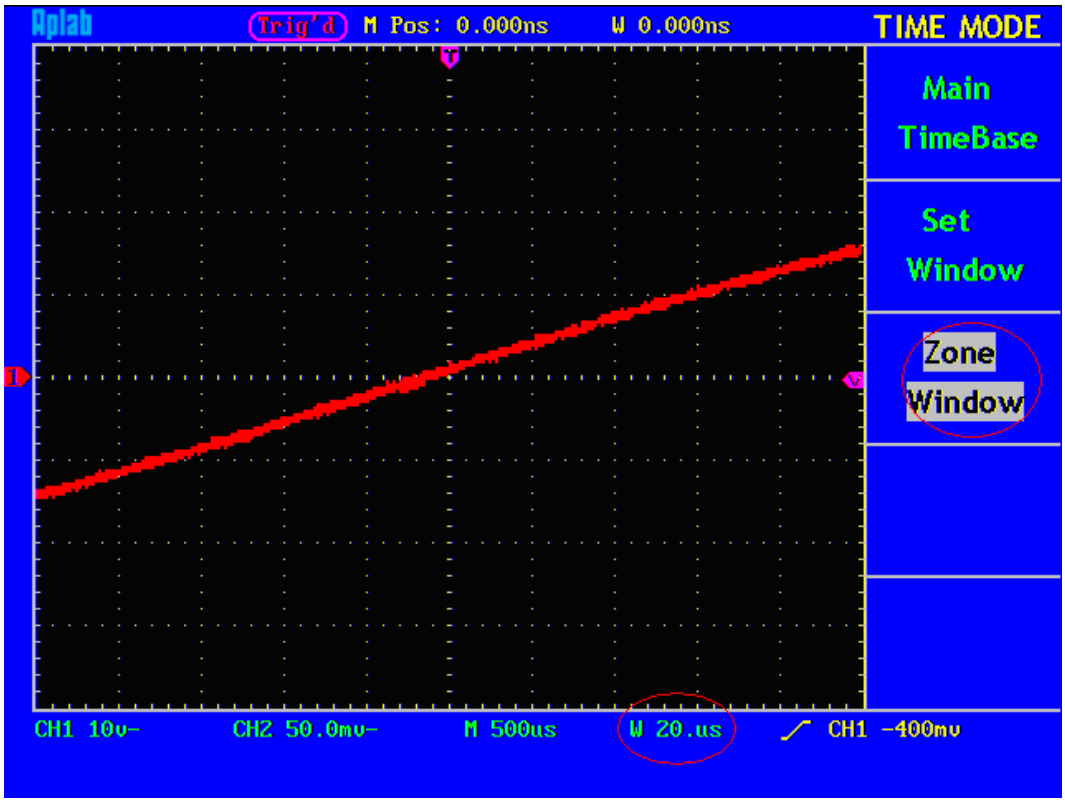


Fig. 25 Zone Window

6.8 Trigger System

When the oscilloscope begins to collect the data and display the wave form depends on a trigger. Once it is set correctly, the trigger can transfer the unstable display into a meaningful wave form.

When beginning to collect data, the oscilloscope will collect adequate data to draw the wave form at the left side of the trigger point at first. It will continuously perform the data acquisition while waiting for the trigger condition. After a trigger is detected, the oscilloscope will continuously collect data enough to draw the wave form at the right side of the trigger point.

One knob and four function menu buttons are included in the trigger control zone.

LEVEL: Trigger the level control knob and set the signal voltage corresponding to the trigger point.

SET TO %50: Set the trigger level as the vertical mid point value of the amplitude of the trigger signal.

FORCE TRIG: It is a force trigger button for the generation of a trigger signal, which is mainly used in the “Normal” and "Single” triggering modes.

TRIG VIEW: Trigger the resetting of the horizontal position.

TRIG MENU: It is a trigger menu button. When it is pressed, an operation menu will be presented in the screen, shown as Fig. 26.

Fig. 26 Trigger Mode Menu

6.9 Trigger Control

There are two trigger modes: Edge Trigger and Video Trigger. Each trigger mode uses different function menu. The switching between two modes can be implemented by pressing the **F1** menu selection button.

Edge Trigger: It happens when the trigger input passes through a given level along the set direction.

Video Trigger: Carry out the field or line video trigger of the standard video signal.

The Edge and Video Trigger menus are described respectively as below:

6.10 Edge Trigger

Under the Edge Trigger mode, a trigger happens in the trigger threshold value of the input signal edge. When the **Edge Trigger** is selected, a trigger will occur in the rising or falling edge of the input signal.

The **Edge Trigger Menu** is shown as Fig. 27.

Fig. 27 Edge Trigger Menu

The **Edge Trigger Menu** is described as below:

Function Menu	Setting	Description
Slope	Rising	Set a trigger on the rising edge of the signal.
	Falling	Set a trigger on the falling edge of the signal.
Source	CH1	Set Channel 1 as the trigger signal of the source.
	CH2	Set Channel 2 as the trigger signal of the source.
	EXT	Set the external trigger channel as the trigger signal of the source.
	EXT/5	Divide the External Trigger Source by 5 to expand the external trigger level range.
Mode	Auto	Collect the wave form even if there is not trigger condition is detected.
	Normal	Collect the wave form only when the trigger condition is fulfilled.
	Single	Collect a wave form when a trigger is detected then stop sampling.
Coupling	DC	Block the direct current component.
	AC	Unblock all components.
	HF Rjc	Block the high-frequency signal and only unblock the high-frequency component.
	LF Rjc	Block the low-frequency signal and only unblock the low frequency component.

Make such settings in Channel 1 as Rising for Slop, Auto for Mode and DC for Coupling. The operation steps are as follows:

1. Press the TRIG MENU button and call out the trigger menu.
2. Press the **F1** menu selection button and select Edge for Type.
3. Press the **F2** menu selection button and select Rising for Slope.
4. Press the **F3** menu selection button and choose CH1 for Source.
5. Press the **F4** menu selection button and choose Auto for Mode.
6. Press the **F5** menu selection button and choose AC for Coupling. The display in the screen is as Fig. 28.
7. Press the **F2** menu selection button again and choose Falling for Slope. For the screen display, see Fig. 29.

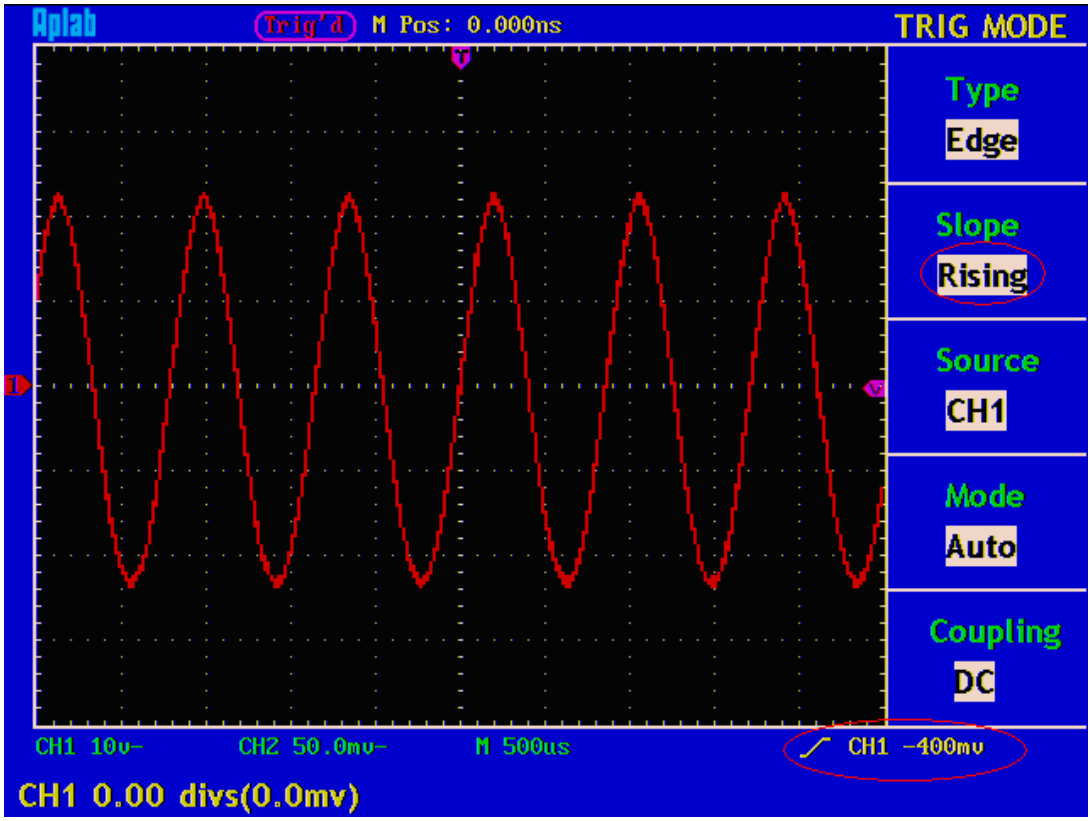


Fig. 28 Wave Form Triggered on the Rising Edge

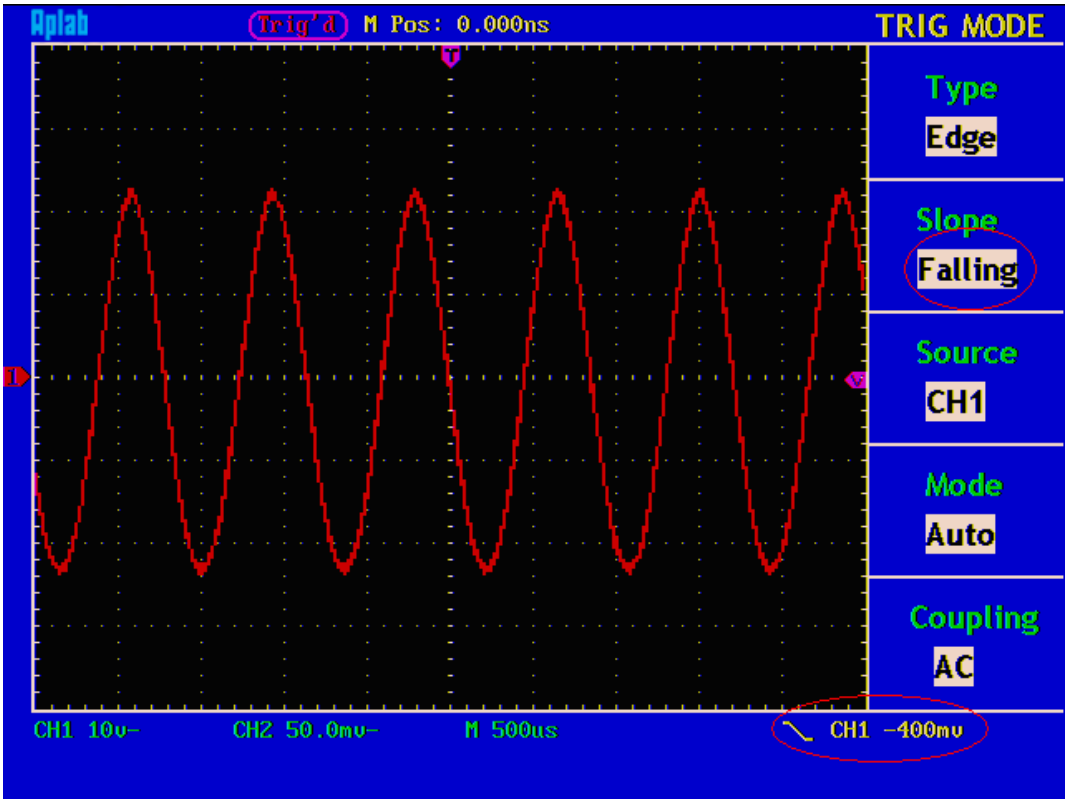


Fig. 29 Wave Form Triggered on the Falling Edge

6.11 Video Trigger

After choosing "**Video Trigger**", a trigger is possible in field or line of NTSC, PAL or SECAM standard video signal.

The operation menu of **Video Trigger** is shown as Fig. 30.

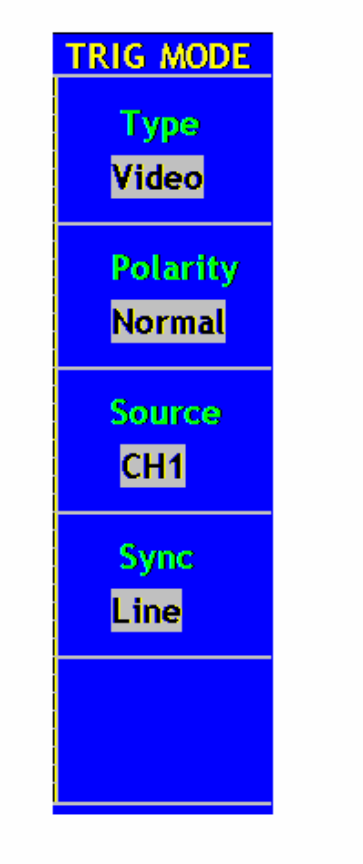


Fig. 30 Video Trigger Menu

The description of the **Video Trigger menu** is shown the following table:

Function Menu	Setting	Description
Polarity	Normal Inverted	Applicable to the video signal of low black level. Applicable to the video signal of high black level.
Source	CH1 CH2 EXT EXT/5	Set Channel 1 as the trigger signal of the source. Set Channel 2 as the trigger signal of the source. Set the external input channel as the trigger signal of the source. Divide the external trigger source by 5 and expand the external trigger level range.
Sync	Line Field	Set a trigger synchronization in the vide line. Set a trigger synchronization in the video field.

The operation steps for setting Channel 1 in Video Trigger Mode are as below:

1. Press the **TRIG MENU** button and get access to the trigger menu.
2. Press the **F1** menu selection button and choose **Video** for Type.
3. Press the **F2** menu selection button and choose **Normal** for Polarity.
4. Press the **F3** menu selection button and choose **CHI1** for Source.
5. Press the **F4** menu selection button and choose **Field** for Sync. The screen display is shown as Fig. 31.
6. Press the **F4** menu selection button again and choose **Line** for Slope. The screen display is shown as Fig. 32.

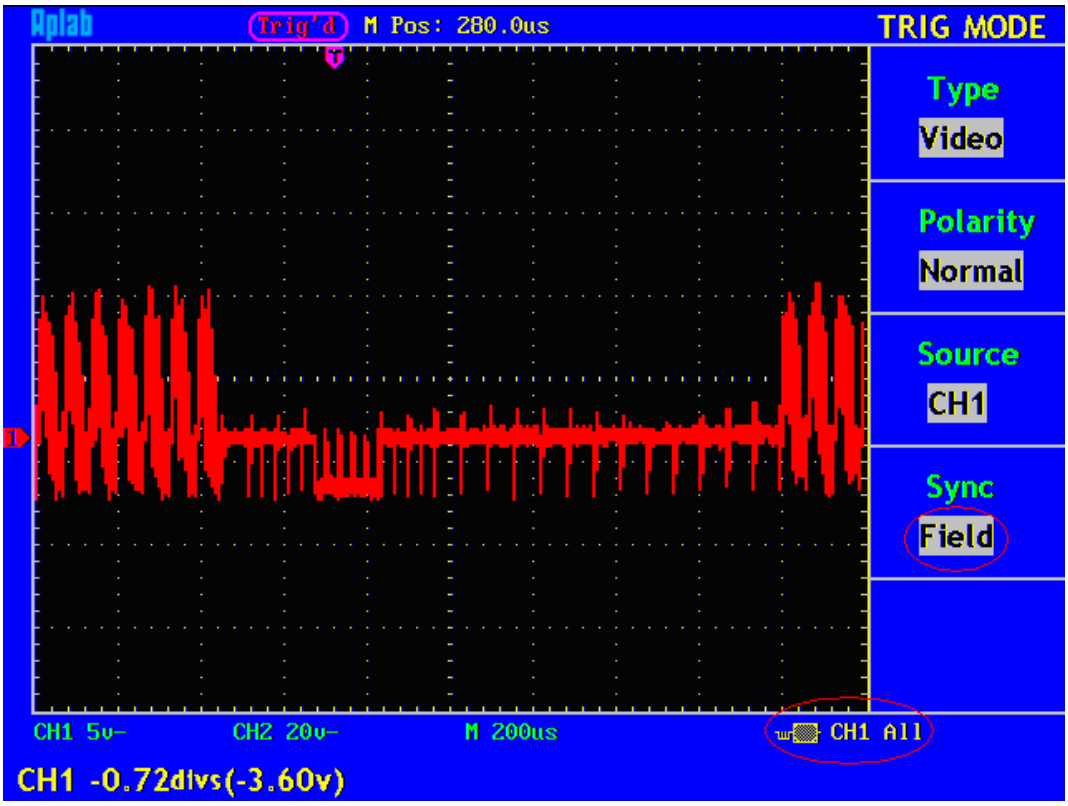


Fig. 31 Wave Form Triggered in the Video Field

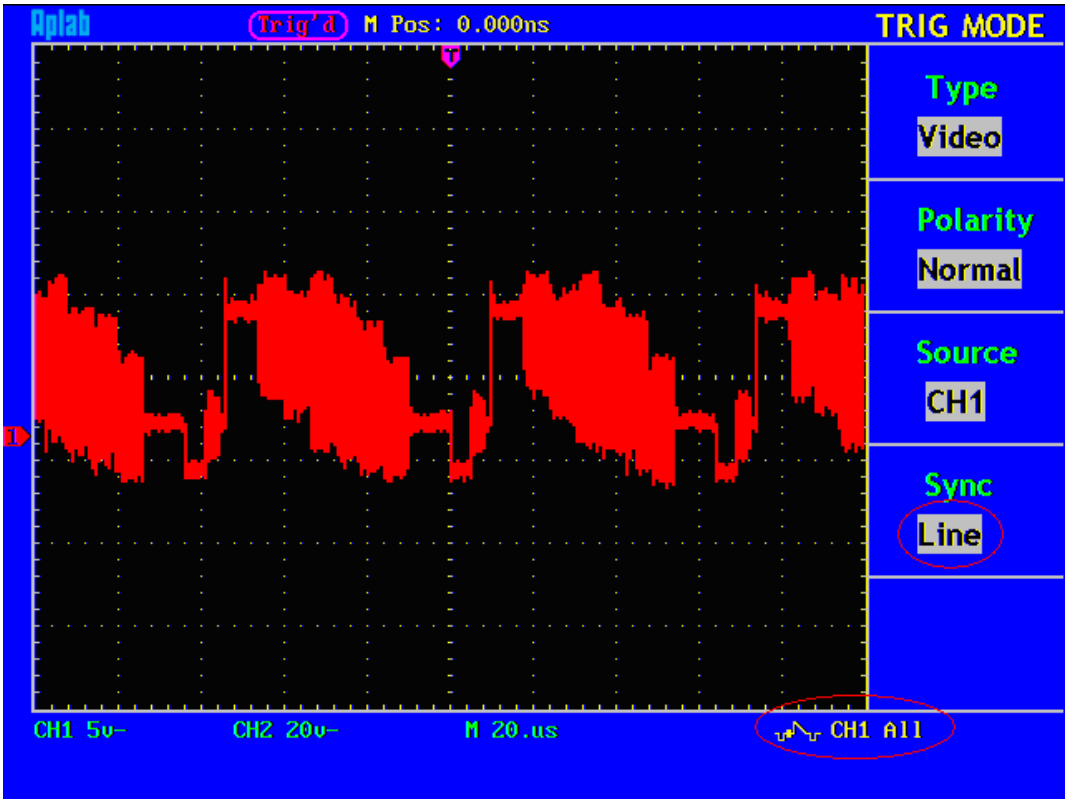


Fig. 32 Wave Form Triggered in the Video Line

6.12 Function Menu

The function menu control zone includes 6 function menu buttons and 3 immediate-execution buttons: **SAVE/REL, MEASURE, ACQUIRE, UTILITY, CURSOR, DISPLAY, AUTOSET, RUN/STOP and HARDCOPY.**

6.13 Sampling Setup

Press the **ACQUIRE** button and the menu is displayed in the screen, shown as Fig. 33.

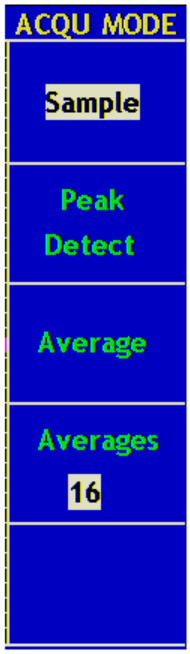


Fig. 33 ACQU MODE Menu

The description of the **Sampling Setup Menu** is shown as follows:

Function Menu	Setting	Description
Sampling		General sampling mode.
Peak Detection		It is used for the detection of the jamming burr and the possibility of reducing the confusion.
Average value		It is used to reduce the random and don't-care noises, with the optional number of averages.
Averages	4, 16, 64, 128	Choose the number of averages.

Change the **ACQU Mode** settings and observe the consequent variation of the wave form displayed.

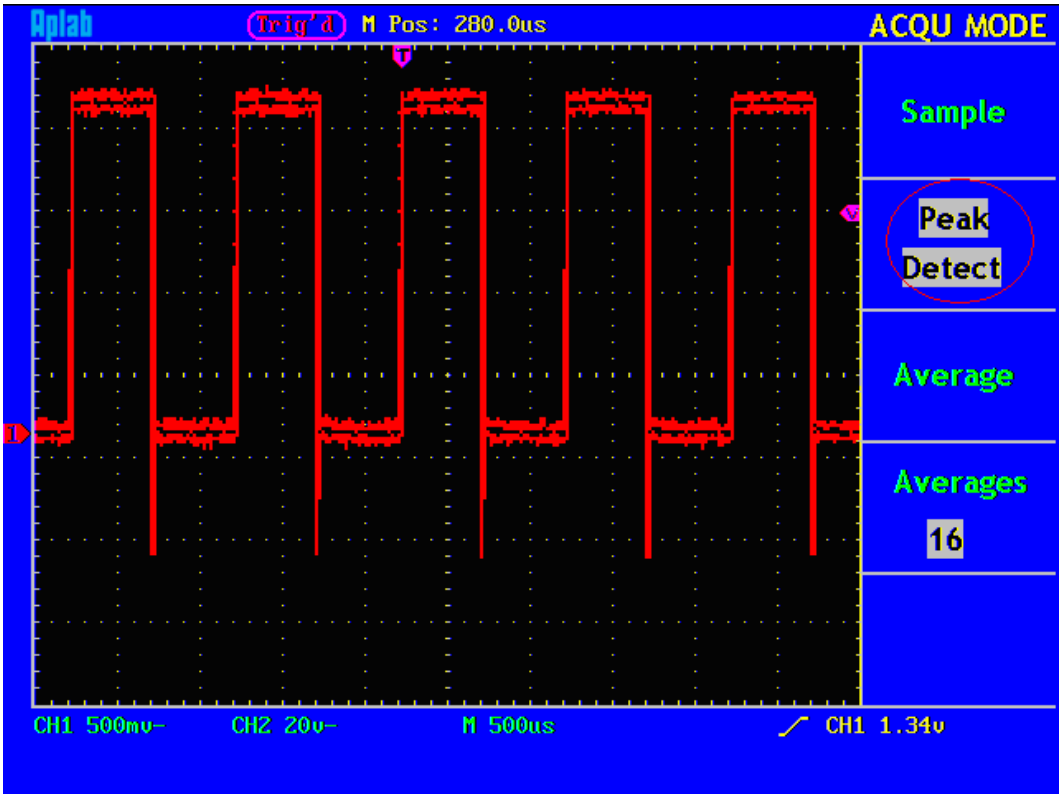


Fig. 34 Peak Detect mode, under which the burrs on the falling edge of the square wave can be detected and the noise is heavy.

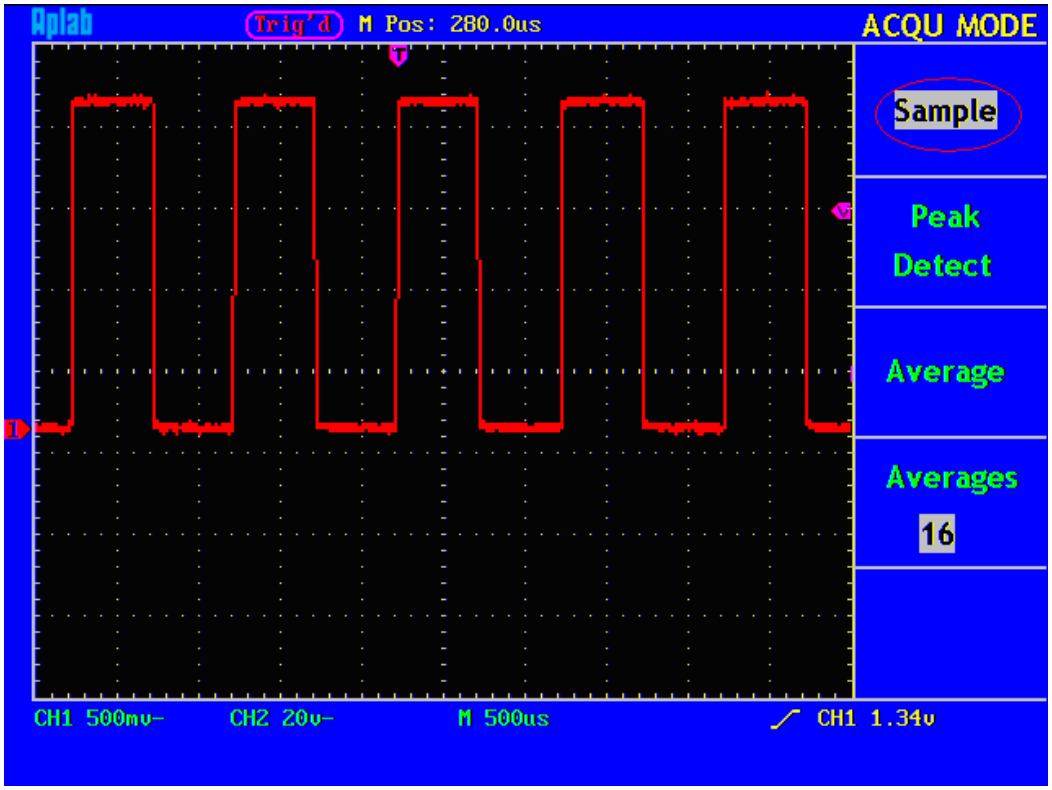


Fig. 35 Common **ACQU Mode** display, in which no burr can be detected.

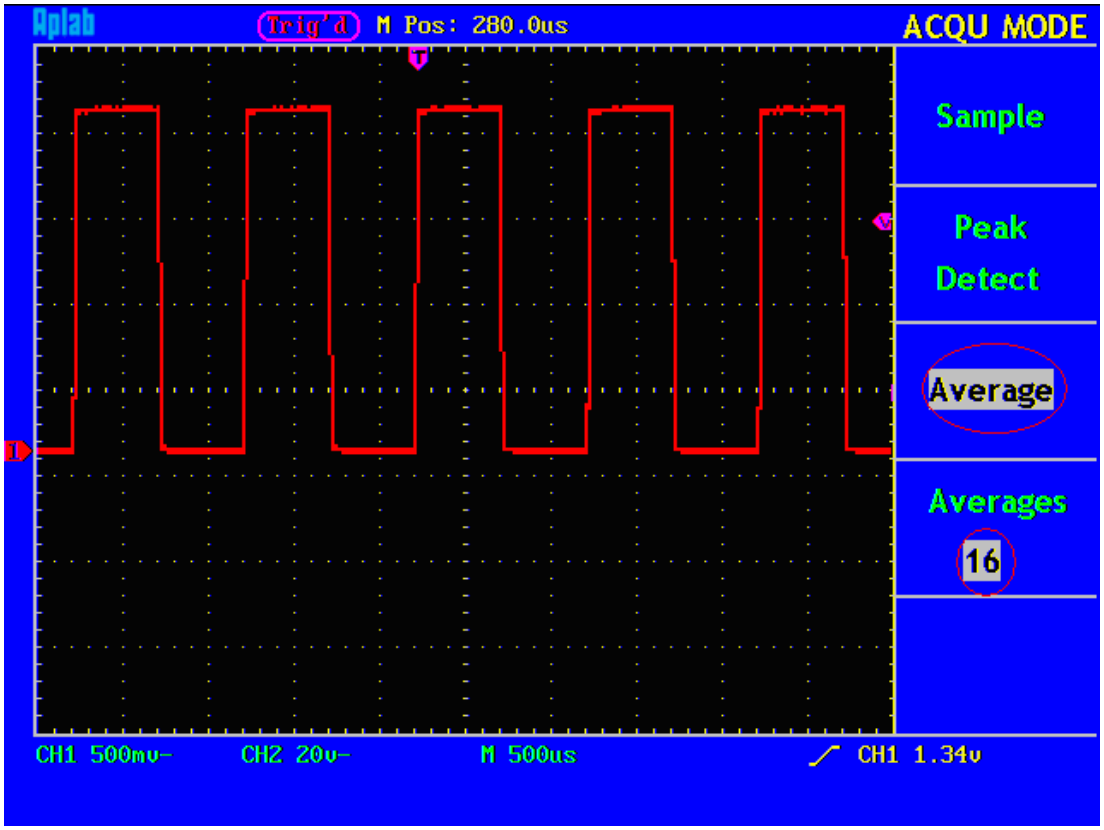


Fig. 36 The displayed wave form after the noise is removed under the Average Mode, in which the average number of 64 is set.

6.14 Display System

Push down the **DISPLAY** button and the menu displayed in the screen is shown as Fig. 37.

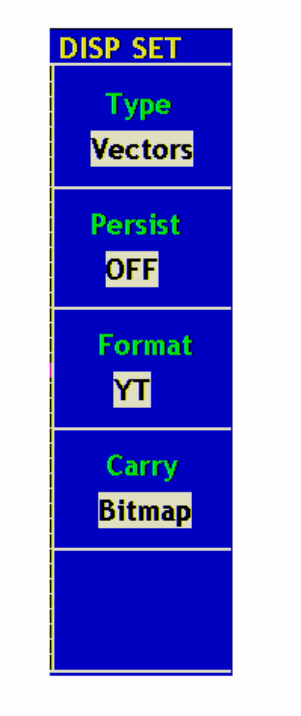


Fig. 37 Display Set Menu

The description of the **Display Set Menu** is shown as follows:

Function Menu	Setting	Description
Type	Vectors	The space between the adjacent sampling points in the display is filled with the vector form.
	Dots	Only the sampling points are displayed.
Persist	OFF 1sec 2sec 5sec Infinite	Set the persistence time for each sampling point.
Format	YT	Show the relative relation between the vertical voltage and the horizontal time.
	XY	Channel 1 is displayed on the horizontal axis and Channel 2 on the vertical axis.
Carry	Bitmap	The data transmitted in communication are in the bitmap form.
	Vectors	The data transmitted in communication are in the vector form.

Display Type: With the **F1** menu selection button pushed down, you can shift between **Vectors** and **Dots** types**.** The differences between the two display types can be observed through the comparison between Fig. 38 and Fig.39.

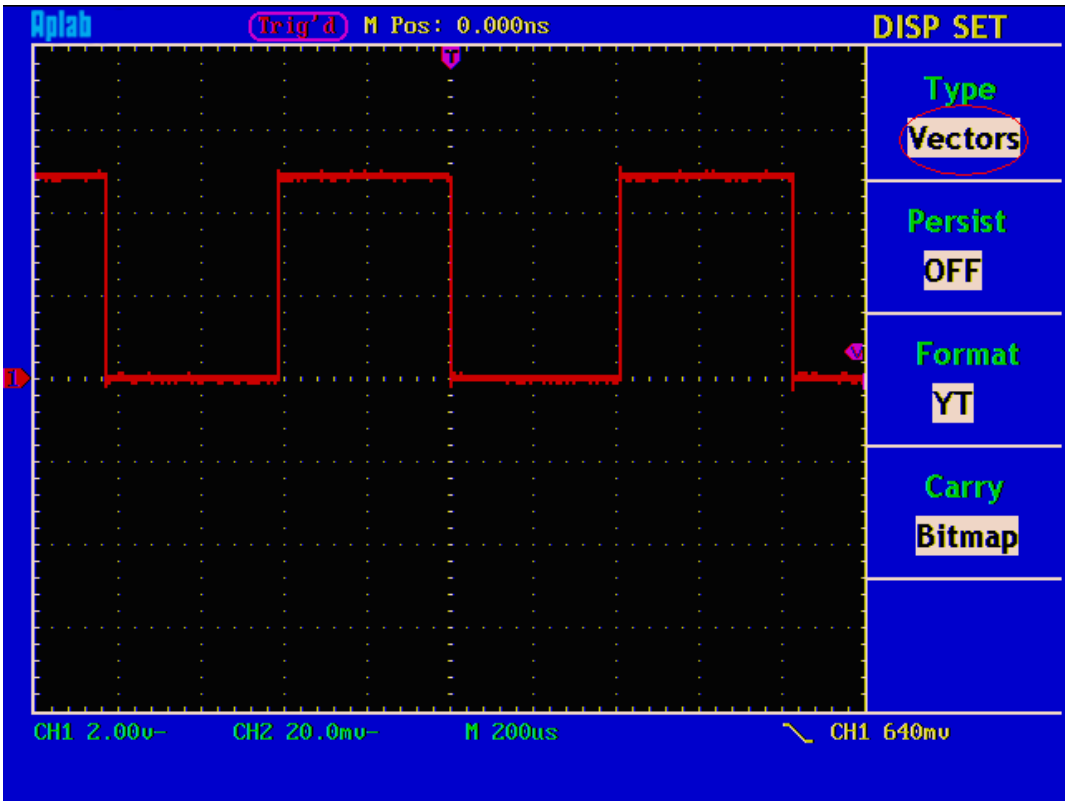


Fig. 38 Display in the Vector Form

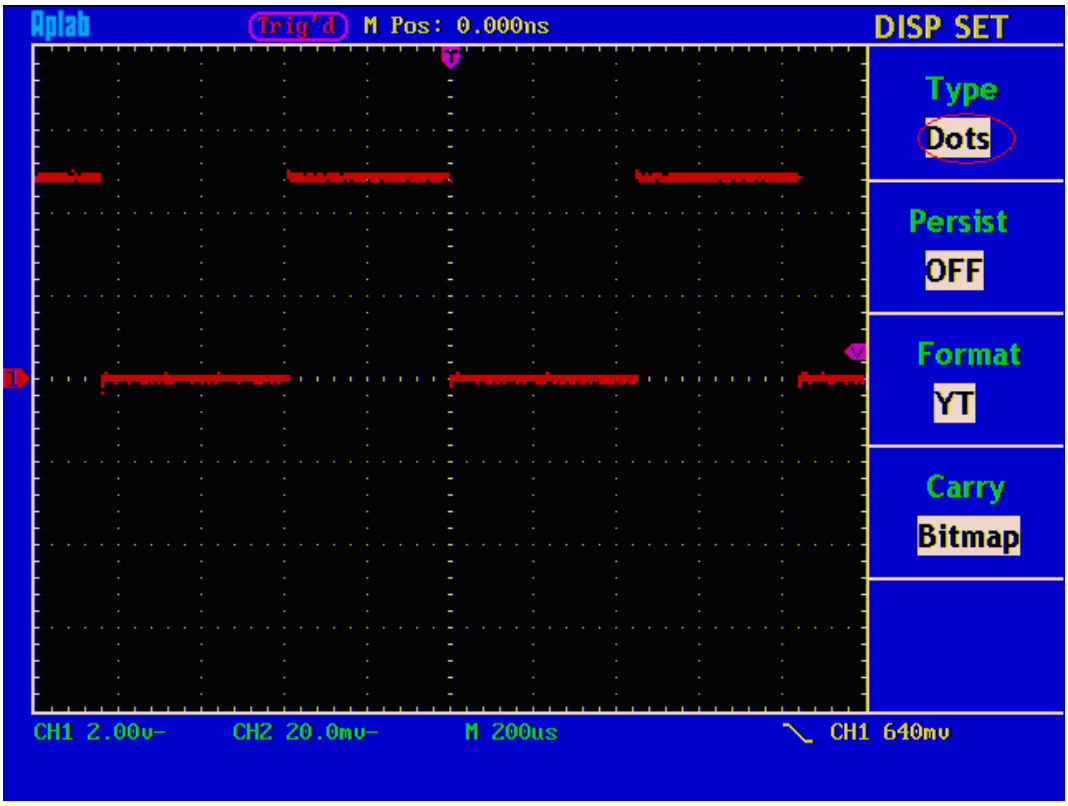


Fig. 39 Display in Dots form

6.15 Persistence

When the **Persist** function is used, the persistence display effect of the picture tube oscilloscope can be simulated: the reserved original data is displayed in fade color and the new data is in bright color. With the **F2** menu selection button, different persistence time can be chosen: **1sec**, **2sec, 5sec, Infinite** and **Closed.** When the "**Infinite**" option is set for **Persist** time**,** the measuring points will be stored till the controlling value is changed (see Fig. 40).

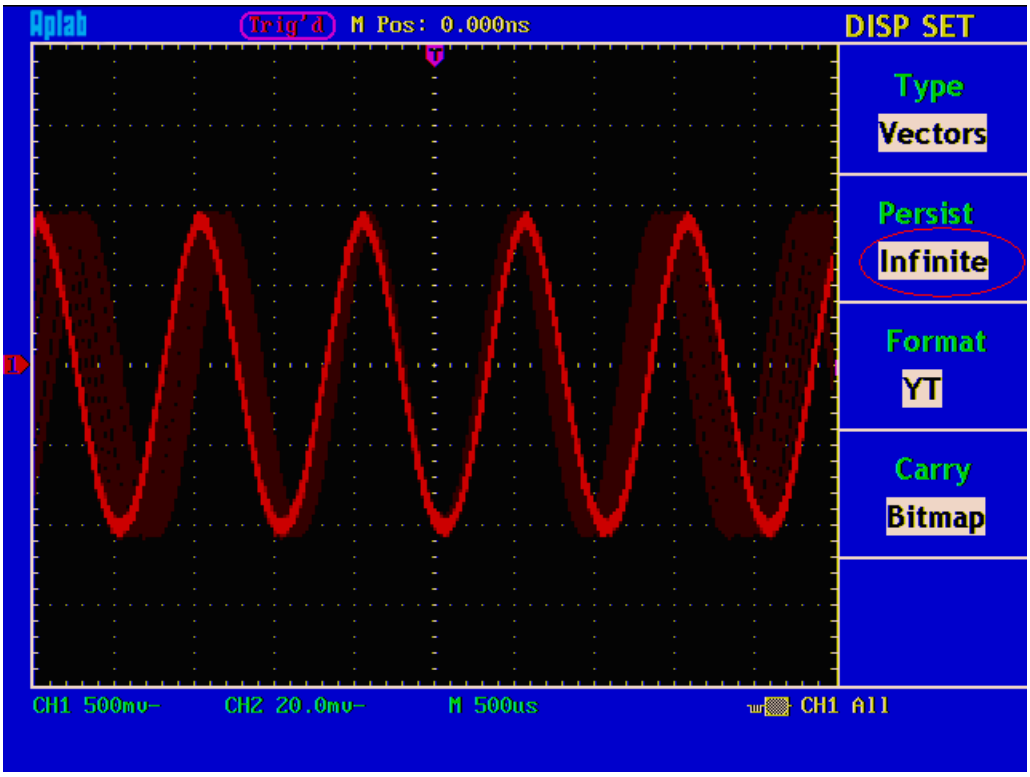


Fig. 40 Infinite Persistence Display

6.16 XY Format

This format is only applicable to Channel 1 and Channel 2. After the XY display format is selected, Channel 1 is displayed in the horizontal axis and Channel 2 in the vertical axis; the oscilloscope is set in the untriggered sample mode: the data are displayed as bright spots and the sampling rate is 1MS/s and can not be changed.

The operations of all control knobs are as follows:

- The **Vertical VOLTS/DIV** and the **Vertical POSITION** knobs of Channel 1are used to set the horizontal scale and position.
- The **Vertical VOLTS/DIV** and the **Vertical POSITION** knobs of Channel 2 are used to set the vertical scale and position continuously.

The following functions can not work in the XY Format:

- Reference or digital wave form
- Cursor
- Auto Set
- Time base control
- Trigger control

Operation steps:

1. Press the **DISPLAY** button and call out the **Display Set** Menu.
2. Press the **F3** menu selection button and choose the form as XY. The display format is changed to be XY mode (see Fig. 41).

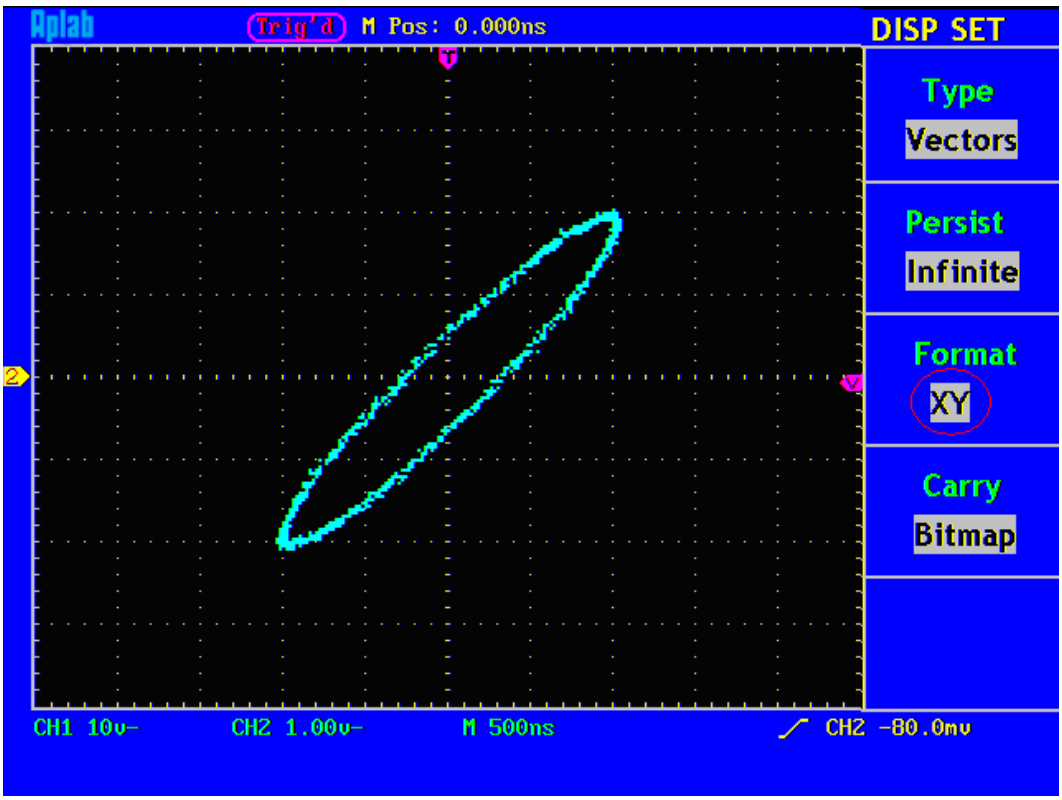


Fig. 41 XY Display Mode

6.17 How to Save and Recall a Wave Form

Press the **SAVE/REL** button, you can save and call out the wave forms in the instrument. The menu displayed in the screen is shown as Fig. 42.

Fig. 42 Wave Form Save Menu

The description of the **Wave Form Save Menu** is shown as the following table:

Function Menu	**Setting**	**Description**
Source	CH1 CH2 MATH	Choose the wave form to be saved.
WAVE	A , B C , D	Choose the address in or from which the waveform is saved or can be get access to..
Save		Save the wave form of the source in the selected address.
CHA	OFF ON	Switch on or off the display of the stored wave form .

6.18 Save and Recall the Wave Form

The Oscilloscope can store four wave forms, which can be displayed with the current wave form at the same time. The stored wave form called out can not be adjusted.

In order to save the wave form of the channel CH1 into the address A, the operation steps should be followed:

1. Press the **F1** menu selection button and choose CH1 for Source.
2. Press the **F2** menu selection button and choose A for Wave.
3. Press the **F3** menu selection button and save the wave form.
4. Press the **F4** menu selection button and choose **ON** for CHA. The stored wave form A will be displayed in the screen. The voltage level and time base level will also be shown at the upper left corner of the display area at the same time (see Fig. 43).

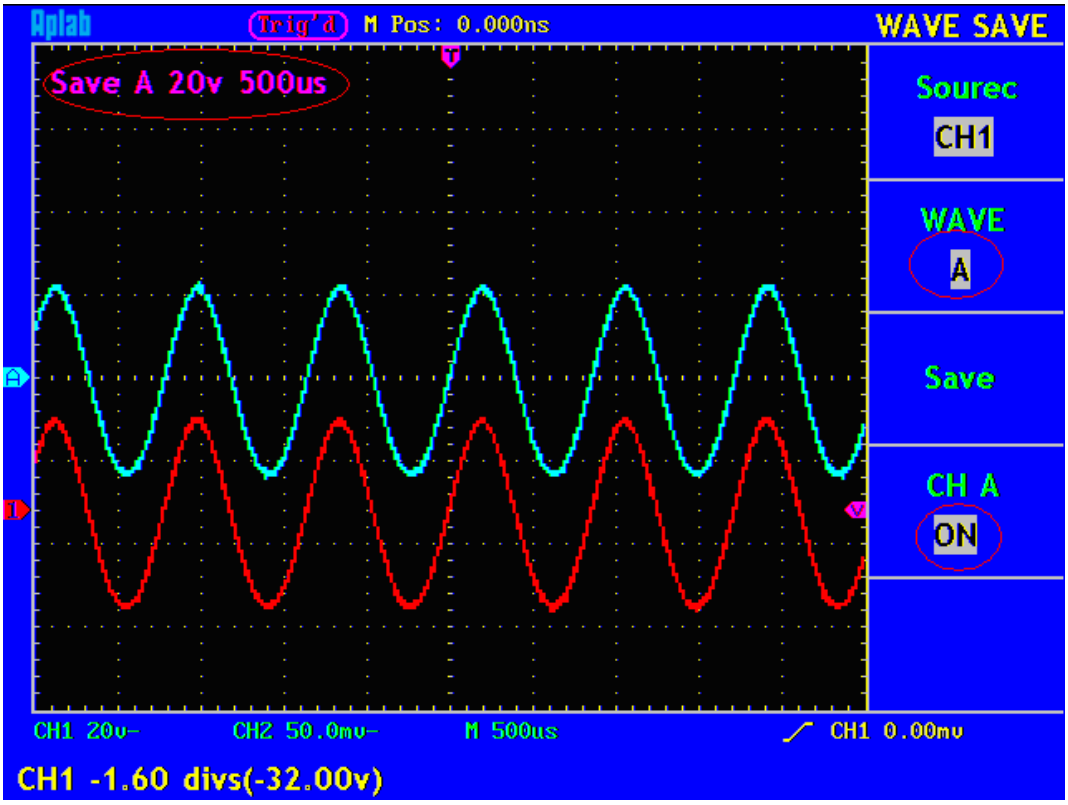


Fig. 43 Wave Saving

6.19 How to Carry on the Auxiliary System Function Setting

Press the **UNTILITY** button and the menu is displayed in the screen as Fig. 45.

Fig. 45 Function Menu

The description of the **Auxiliary Function Menu** is shown as the following table.

Function Menu	**Setting**	**Description**
System Status		Display the system function menu.
Recall Factory		Call out the factory settings.
Do Self Cal		Carry out the self-calibration procedure.
Language	Chinese ENGLISH	Choose the display language of the operating system.

6.20 Do Self Cal (Self-Calibration)

The self-calibration procedure can improve the accuracy of the oscilloscope under the ambient temperature to the greatest extent. If the change of the ambient temperature is up to or exceeds 5□, the self-calibration procedure should be executed to obtain the highest level of accuracy.

Before executing the self-calibration procedure, disconnect the probe or wire and the input connector. Then，press the **F3** menu selection button and choose "**Do Self Cal**". After confirming it is all set, push down **F3** button and choose "**Do Self Cal**", entering the self-calibration procedure of the instrument.

6.21 SYS STAT (System State)

Press the **F1** menu selection button and choose "**SYS STAT**" item. The menu pops up in the screen as Fig. 46.

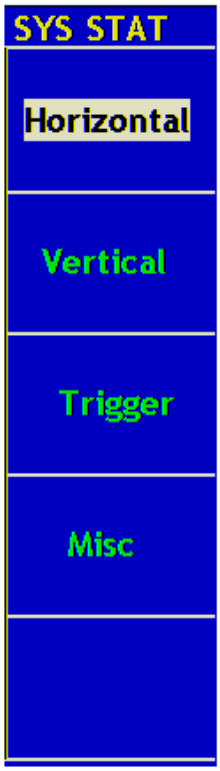


Fig. 46 SYS STAT Menu

The "**SYS STAT**" menu is described as the following table:

Function Menu	Setting	Description
Horizontal		Show the horizontal parameter of the channel.
Vertical		Show the vertical parameter of the channel.
Trigger		Show the parameters of the trigger system.
Misc		Adjust the Date and Time.

After entering into the SYS STAT menu, choose the corresponding function, with the corresponding parameters shown in the screen. If press the **F1** menu selection button and choose the function item **"Horizontal",** the Horizontal System State will be displayed in the screen. Press any other function button and exit from the SYS STAT menu (see Fig. 47).

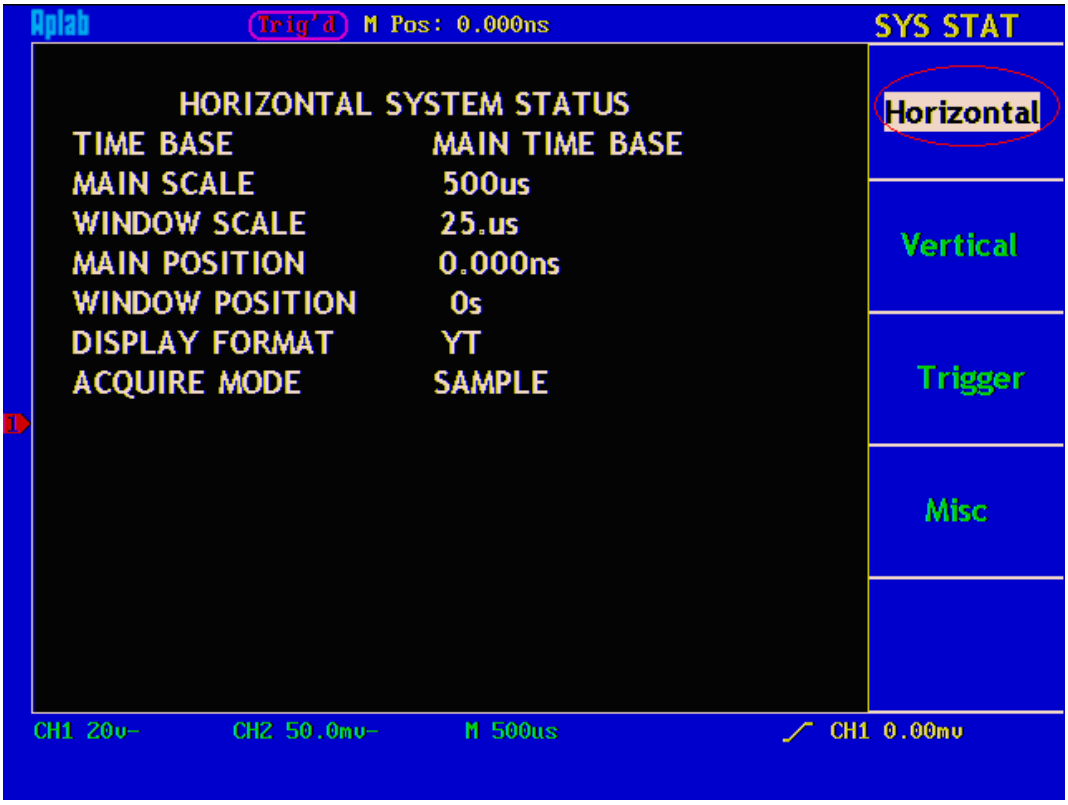


Fig. 47 Horizontal System State

6.22 How to Conduct the Automatic Measurement :

With the **Measure** button pressed down, an automatic measurement can be implemented. There are 5 types of measurements and 4 measurement results can be displayed simultaneously.

Press the **F1** menu selection button to choose **Source** or **Type** menu. You can choose the channel to be measured from the **Source** menu and choose the measurement **Type** (Freq, Cycle, Mean, PK–PK, RMS and None). The menu is displayed as Fig. 48.

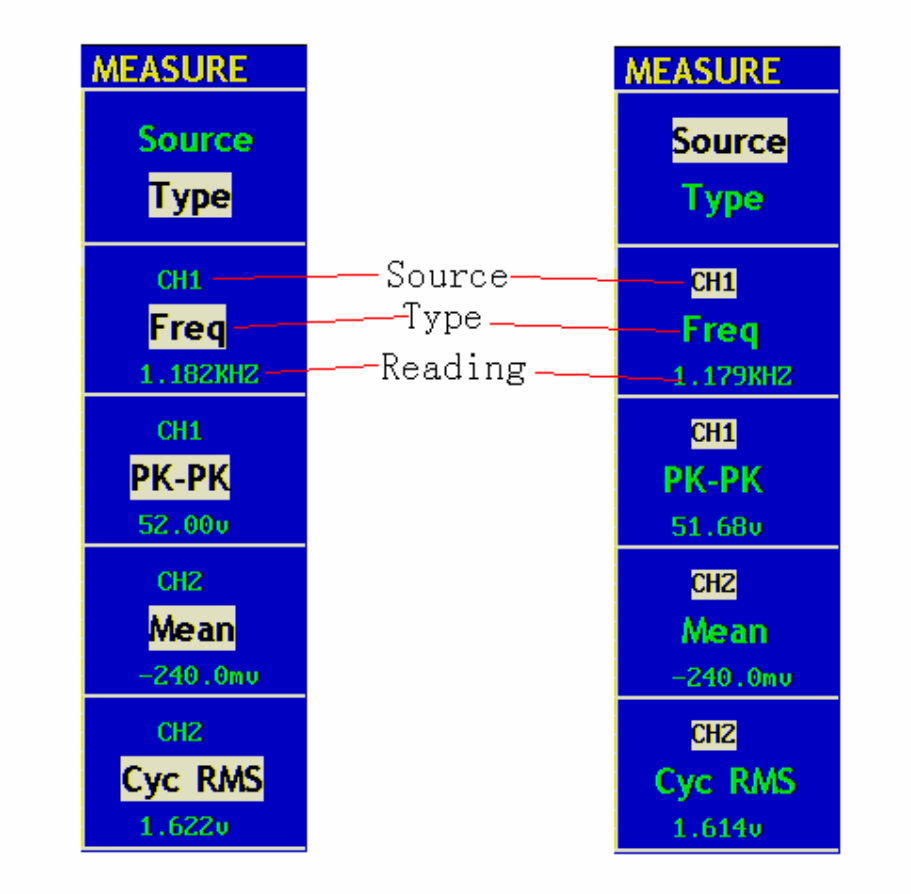


Fig. 48 Measure Menu

6.23 Measure

Four automatic measured values can be shown one time at maximum for the wave form of each channel. Only if the wave form channel is in the ON state can the measurement be carried out. No automatic measurement can be made for the saved or the mathematically manipulated wave form, or in the XY or Scan format.

Measure the frequency, the peak-to-peak value of the Channel CH1 and the mean, the RMS of the Channel CH2, according the following steps:

1. Press the F1 menu selection button and choose Source.
2. Press the **F2** menu selection button and choose **CH1**.
3. Press the **F3** menu selection button and choose **CH1**.
4. Press the **F4** menu selection button and choose **CH2**.
5. Press the **F5** menu selection button and choose **CH2**.
6. Press the **F1** menu selection button and choose **Type**.
7. Press the **F2** menu selection button and choose **Freq**.
8. Press the **F3** menu selection button and choose **Pk-Pk**.
9. Press the **F4** menu selection button and choose **Mean**.
10. Press the **F5** menu selection button and choose **Cyc RMS**.

The measured value will be displayed in the reading window automatically (see Fig. 49).

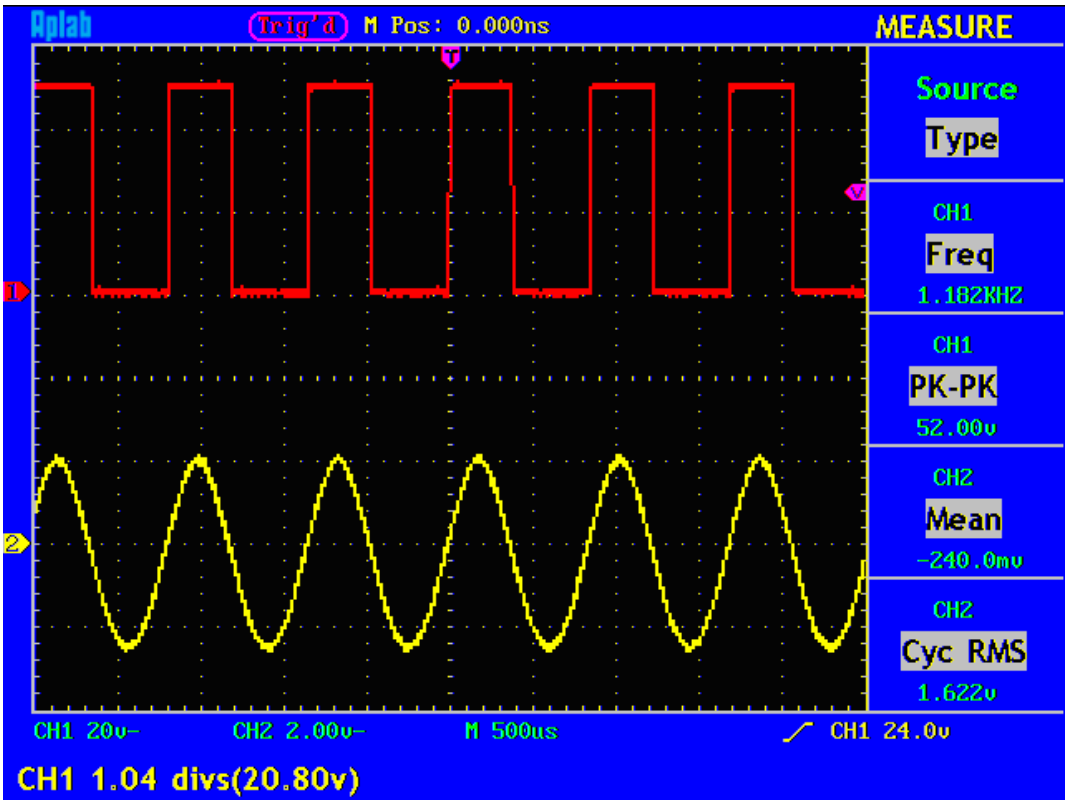


Fig. 49 Automatic Measurement

6.24 How to Carry on the Cursor Measurement :

Press the **CURSOR** button to display the cursor measurement function menu (**CURS MEAS**) in the screen, which includes **Voltage Measurement** and **Time Measurement,** shown as Fig. 50.

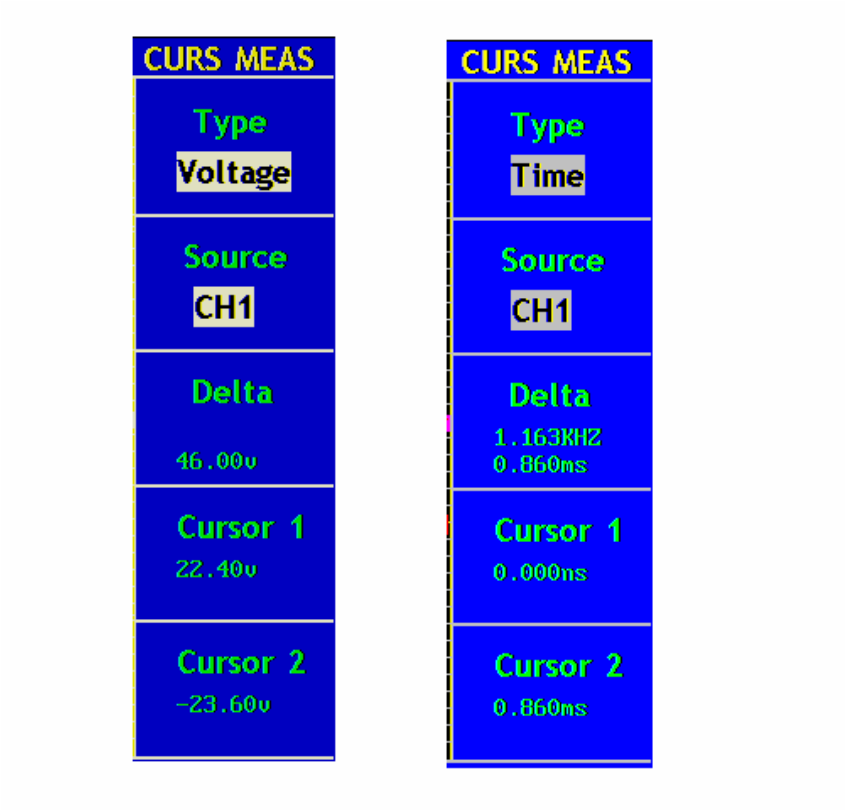


Fig. 50 CURS MEAS Menu

The description of the **cursor measurement menu** is shown as the following table:

Function Menu	Setting	Description
Type	OFF Voltage Time	Switch off the cursor measurement. Display the voltage measurement cursor and menu. Show time measures the cursor and menu.
Source	CH1, CH2	Choose the channel generating the wave form to which the cursor measurement will be applied.
Delta		Read the difference between cursors.
Cursor 1		Read the position of Cursor 1 (the Time is read with reference to the horizontal trigger position and the Voltage is to the ground point).
Cursor 2		Read the position of Cursor 1 (the Time is read with reference to the horizontal trigger position and the Voltage is to the ground point).

6.25 Cursor Measurement

When carrying out the cursor measurement, the position of Cursor 1 can be adjusted with the **CURSOR1 (VERTICAL POSITION)** knob of Channel 1, and that of Cursor 2 can be adjusted with the **CURSOR2 (VERTICAL POSITION)** knob of Channel 2.

Perform the following operation steps for the voltage cursor measurement of the channel CH1:

1. Press **CURSOR** and recall the **Curs Meas** menu.
2. Press the **F1** menu selection button to choose **Voltage** for Type, with two purple dotted lines displayed along the horizontal direction of the screen, which indicating **CURSOR1** and **CURSOR2**.
3. Press the **F2** menu selection button and choose **CH1** for **Source**.
4. Adjust the positions of **CURSOR1** and **CURSOR2** according to the measured wave form, with the absolute value of the voltage amplitude difference between Cursor 1 and Cursor 2 displayed in the increment window. The current position of Cursor1 is displayed in the Cursor1 window and that of Cursor2 is displayed in the Cursor2 window (see Fig. 51).

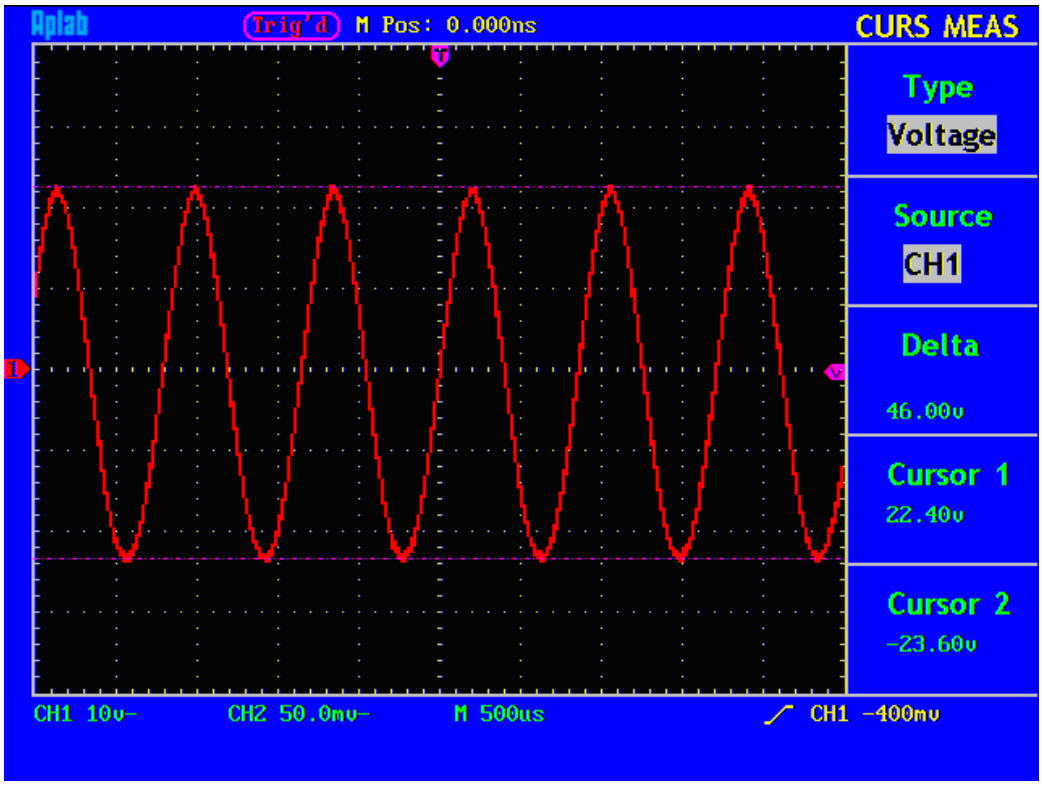


Fig. 51 Wave Form of Voltage Cursor Measurement

Carry out the following operation steps for the time cursor measurement of the channel CH1:

1. Press "**CURSOR**" and recall the CURS MEAS menu.
2. Press the **F1** menu selection button and choose **Time** for **Type**, with two purple dotted lines displayed along the vertical direction of the screen, which indicating Cursor 1 and Cursor 2.
3. Press the **F2** menu selection button and choose **CH1** for **Source**.
4. Adjust the positions of **CURSOR1** and **CURSOR2** according to the measured wave form, with the cycle and frequency of Cursor1 and Cursor 2 displayed in the increment window. The current position of Cursor1 is displayed in the Cursor1 window and that of Cursor2 is displayed in the Cursor2 window (see Fig. 52).

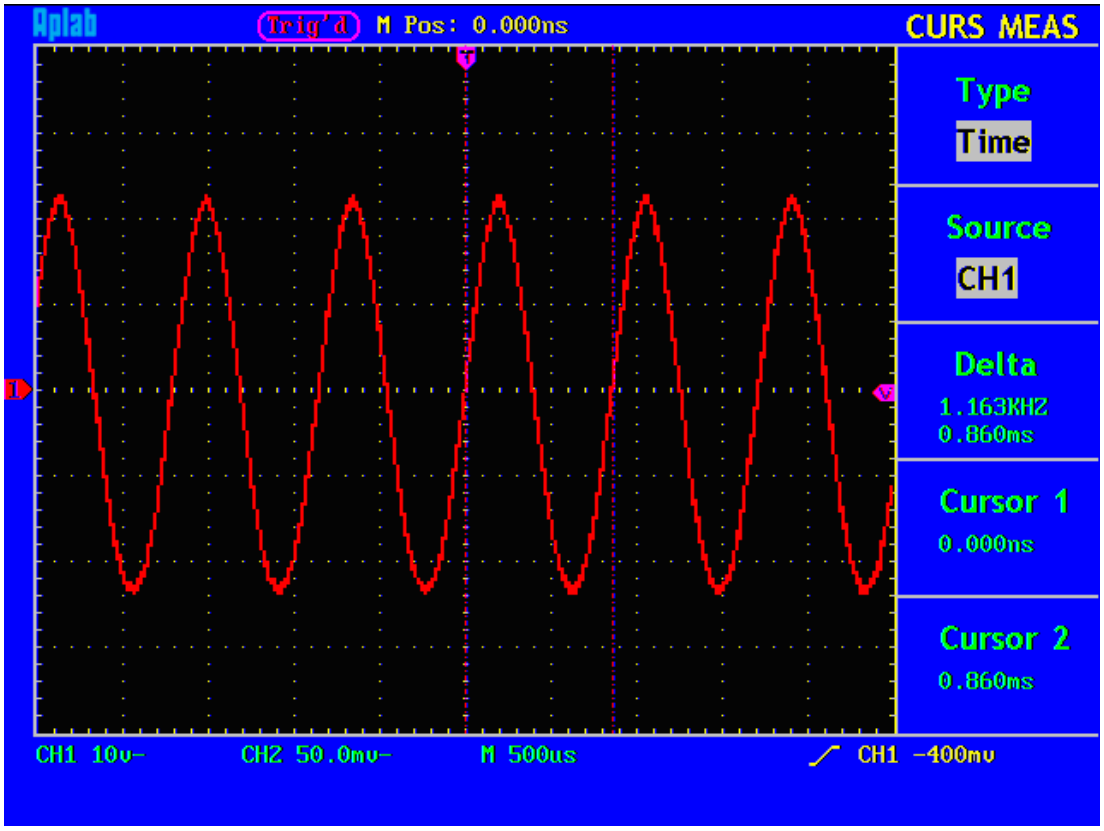


Fig. 52 Wave Form of Cursor Measurement

6.26 Execution Controls

The execution buttons include **AUTOSET**, **RUN/STOP** and **HARDCOPY**.

6.27 AUTOSET

This button is used for the automatic setting of all control values of the instrument to generate the wave form suitable for observation. Press the **AUTOSET** button and the oscilloscope will perform the fast automatic measurement of the signal.

The function items of **AUTOSET** are shown as the following table:

Function Items	**Setting**
Acquisition Mode	Current
Vertical Coupling	DC
Vertical Scale	Adjust to the proper division.
Bandwidth	Full
Horizontal Level	Middle
Horizontal Sale	Adjust to the proper division
Trigger Type	Current
Trigger Source	Show the minimum number of channels.
Trigger Coupling	Current
Trigger Slope	Current
Trigger Level	Mid-point Setting
Trigger Mode	Auto
Display Format	YT

RUN/STOP: Enable or disable the waveform sampling.

Notice: Under the **Stop** state, the vertical division and the horizontal time base of the wave form can be adjusted within a certain range, in other words, the signal can be expanded in the horizontal or vertical direction.
When the horizontal time base equal to or is less than 50ms, the horizontal time base can be expanded for 4 divisions downwards.

7. Maintenance, Cleaning and Repairing

General Maintenance

Please don't store or put the instrument in the place where the liquid crystal display will be directly exposed to the sunlight for a long time.

Caution: The instrument or probe should not be stained with the spraying agent, liquid and solvent to avoid any damage to it.

Cleaning

Check the probe and instrument regularly according to their operating state. Clean the external surface of the instrument following the steps shown as below:

1. Please wipe the dust from the instrument and probe surface with a soft cloth. Do not make any scuffing on the transparent LCD protection screen when clean the LCD screen.
2. Clean the instrument with a wet soft cloth not dripping water, during the period of which please pay attention to the disconnection of power. It is recommended to scrub with soft detergent or fresh water. Please don't apply any corrosive chemical cleaning agent to prevent the instrument or probe from damage.

 **Warning:** Before power on again for operation, it is required to confirm that the instrument has already been dried completely, avoiding any electrical short circuit or bodily injury resulting form the moisture.

8. Fault Diagnosis

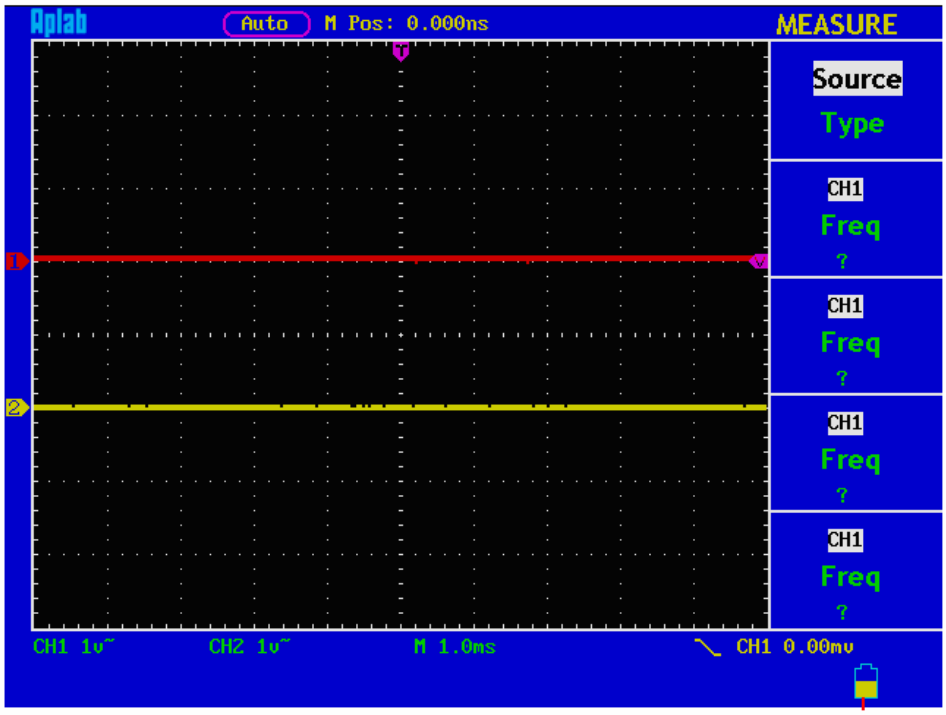
1. **In the case of that the oscilloscope is still in the black-screen state without any display after the power is switch on, implement the following fault treatment procedure.**
   - Check whether the power connection is connected properly.
   - Check whether the power switch is pushed down to the designated position.
   - Restart the instrument after complete the checks above.
   - If this product still can not work normally, please get in touch with Aplab and we will be under your service.
2. **After acquiring the signal, carry out the following operations if the wave form of the signal is not displayed in the screen.**
   - Check whether the probe is properly connected to the signal connecting wire.
   - Check whether the signal connecting wire is correctly connected to the BNC (namely, the channel connector).
   - Check whether the probe is properly connected with the object to be measured.
   - Check whether there is any signal generated from the object to be measured (the trouble can be shot by the connection of the channel from which there is a signal generated with the channel in fault).
   - Make the signal acquisition operation again.
3. **The measured voltage amplitude value is 10 times greater or smaller than the actual value.**

   Check whether the channel attenuation coefficient conforms with the attenuation ration of the probe used in practical application.
4. **There is wave form displayed, but it is not stable.**
   - Check whether the **Source** item in the **TRIG MODE** menu is in conformity with the signal channel used in the practical application.
   - Check on the trigger **Type** item: The common signal chooses the **Edge** trigger mode for **Type** and the video signal the **Video**. Only if a proper trigger mode is applied, the wave form can be displayed steadily.
   - Try to change the trigger coupling into the high frequency suppress and the low frequency suppress to smooth the high frequency or low frequency noise triggered by the interference.
5. **No Display Responses to the Push-down of RUN/STOP.**

   Check whether Normal or Signal is chosen for Polarity in the TRIG MODE menu and the trigger level exceeds the wave form range.
   If it is, make the trigger level is centered in the screen or set the trigger mode as Auto. In addition, with the **AUTOSET** button pressed, the setting above can be completed automatically.
6. **After the AVERAGE value sampling is set in the ACQU MODE or the a longer duration is set in the DISP MODE, the display rate is slowed down.**

   It is a normal phenomenon.

9. Battery Using Guide:



Battery electric quantity indicating symbols including: , , and

Charging the oscilloscope Batteries

The lithium battery maybe not be charged when delivery. Please charge the battery for 12 hours to make sure to connect the power to supply (the oscilloscope should be turned on during charging) to oscilloscope. The battery can supply power for 4 hours after being charged completely.

There will have battery power indication show on the top of panel when oscilloscope power supplied by the battery. , , and imply for different power consumption and when shows it means the power can only supply for 5 minutes maximum.

Note:

To avoid overheat of battery during charging, the environment temperature is not allowed to exceed the permissible value given in technical specification.

Replacing the Lithium Battery Unit

It is usually not required to replace the battery unit. But when it is required to replace it, only qualified personnel can carry out this operation, and only use the same specification lithium battery.

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