Connected to PC :

The oscilloscope has a RS-232 port and 2 USB ports. Firmware of the oscilloscope can be updated through RS-232 port when connect the instrument to PC. If users need to update or repair the firmware, please contact the sales agency. The storaged data of the instrument could be storaged to PC through the mini USB ports.

Setting the Oscilloscope

About this chapter

This chapter will detail the oscilloscope function of the test tool.

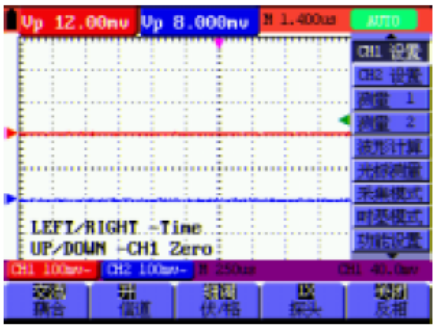
Setting the Vertical CH1 and CH2

Each channel has its own independent vertical menu and each item can be set respectively based on the specific channel.

To make vertical CH1 and CH2 settings, do the following:

1. Press the **MENU** key and the function menu appears at the right of the screen.
2. Press the **MUNU UP** or **MENU DOWN** key to jump to **CH1 Setting** and 5 options appears at the bottom of the screen.
3. Select and press key from **F1 through F5** keys to make different settings.

Now, you can find a screen that looks like the following figure:



The following Table describes the **Vertical Channel** menu:

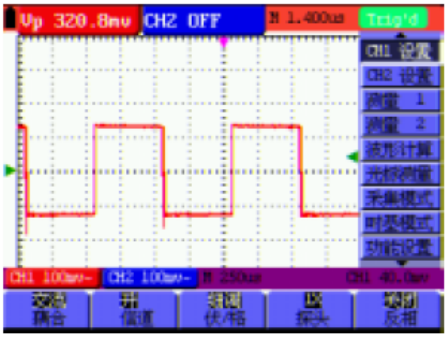
Function menu	Setting	Description
Coupling	AC DC	The dc component in the input signal is blocked.. The ac and dc components of the input signal are allowed.
Channel	Close Open	Close the channel. Open a channel.
V/div.	Coarse Fine	With Coarse selected, the vertical sensitivity is set in the "1-2-5" stepping form; With Fine selected, make a further division within the range of Coarse setting to improve the resolution.
Probe	1X 10X 100X 1000X	Select one according the probe attenuation factor to ensure a correct vertical scale reading.
Invert	Close Open	Waveform is displayed normally. Open the **Invert** function of the waveform setting.

1. **Setting the Channel Coupling**

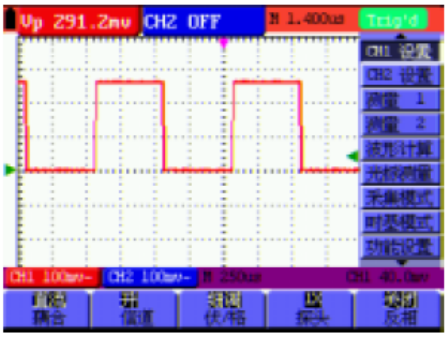
With CH1 taken for example, the measured signal is a sine wave signal containing a dc offset. Press **F1 Coupling** first and then **AC** to make an ac coupling setting. The dc component contained in the tested signal is blocked.

Press **F1 Coupling** first and then **DC** to make a dc coupling setting. Both dc and ac components contained in the tested signal are permitted.

The waveform is displayed as the following figure.



AC coupling



DC coupling

2. **Make Open and Close Settings on Channel**

With CH1 taken for example,

Press **F2 Channel** first, then **Close** to make a Close setting on CH1;

Press **F2 Channel** key first, then **Open** to make an Open setting on CH1.

3. **Make a V/div. Adjustment Setting**

The vertical **V/div** adjustment includes Coarse and Fine modes. The vertical sensitivity ranges from **5mV/div to 5V/div.** The **Coarse** defines the sensitivity of the vertical **V/div** in the **1—2—5** stepping form, that is, it steps in test in the form of **5mV/div, 10mV/div, 20mV/div…5 V/div.**

Fine means a further adjustment within the present vertical **V/div** range. If the input waveform amplitude is slightly larger than the full range in the present **V/div** range while the displayed

waveform amplitude is somehow lower with the next **V/div** stepped, the **Fine** mode can be ap to improve the displayed waveform amplitude and benefit the specific observation of signals.

4. Adjusting the Probe Scale

It is necessary to adjust the probe attenuation scale factor correspondingly in the channel oper menu in order to comply with the probe attenuation scale. If it is a 10:1 probe, the scale of the channel of the oscilloscope should be selected as **10X** to avoid any error occurring in the displ scale factor information and tested data.

Press **F4 Probe** to jump to the relative probe.

Table: Probe attenuation factor and the corresponding menu setting

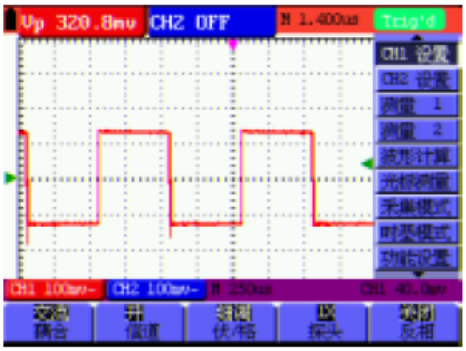
Probe attenuation factor	Corresponding Menu Setting
1:1	1X
10:1	10X
100:1	100X
1000:1	1000X

5. Setting of Inverted Waveform

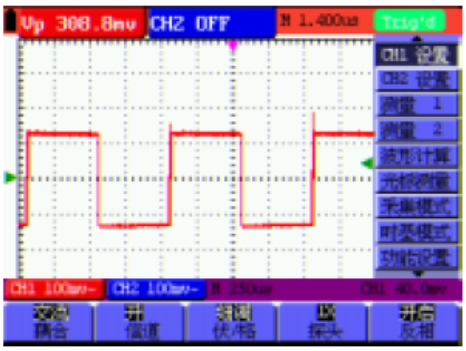
Inverted waveform: The displayed signal reverses 180 degrees relatively to the ground potential

Press **F5 Invert** to start Invert; again press **F5 Invert** to close Invert.

You can see a screen that looks like the following figure:



Close Invert



Start Invert

Make the MATH function menu Setting

The **MATH** functions in showing the result of adding, subtracting, multiplying or dividing calculatio CH1 and CH2 channel waveforms. Also, the result of arithmetic operation can be measured with gri cursor. The amplitude of the calculated waveform can be adjusted with CH1 VOL or CH2 VOL ver scale, which is displayed in the scale factor form. The amplitude ranges from 0.001 through 10 and ste the 1-2-5 form, that is, it can be expressed as 0.001X, 0.002X, 0.005X…10X. The position of calculated waveform can be adjusted up and down with the **CHM ZORE** key used.

The corresponding operation function table

Setting	Description
CH1-CH2	CH1 waveform minus CH2 waveform.
CH2-CH1	CH1 waveform minus CH2 waveform
CH1+CH2	Add CH1 waveform into CH2 waveform.
CH1*CH2	Multiply CH1 waveform and CH2 waveform.
CH1/CH2	Divide CH1 waveform by CH2 waveform.

To perform the **CH1+CH2** waveform calculation, do the following:

1. Press the **MENU** key and the function menu appears at the right of the screen.
2. Press the MUNU UP or MENU DOWN key to select MATH and 5 options are displayed at bottom of the screen.
3. Press the **F3 CH1+CH2** key and the obtained waveform **M** appears on the screen. Again, press F3 key and Close the waveform **M**.
4. Press the **OSD OPTION** key and the following is displayed on the screen:

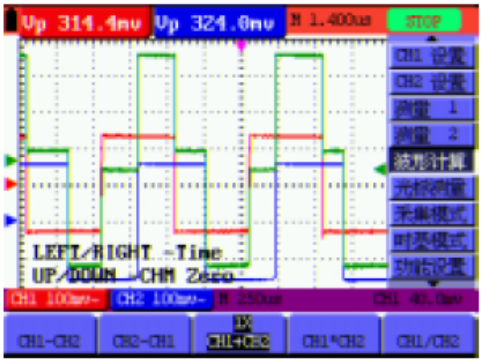
   LEFT/RIGHT – Time Base

   UP/DOWN – CH1 Vol
5. Press the **OSD UP or OSD DOWN** key to adjust the amplitude of the waveform **M**.
6. Again, press the **OSD OPTION** key twice and the screen shows the following:

   LEFT/RIGHT – Time

   UP/DOWN – CHM Zero
7. Press the **OSD UP or OSD DOWN** key to adjust the position of the waveform M.

Now, look at the display and you will find a screen that looks like the following figure:


Vp 314.4mv
Vp 324.0mv
M 1.400us
STOP
CH1 设置
CH2 设置
测量 1
测量 2
波形计算
光标测量
采集模式
时类模式
功能设置
LEFT/RIGHT -Time
UP/DOWN -CHM Zero
CH1 100mv~
CH2 100mv~
M 250us
CH1 40.0mv
CH1-CH2
CH2-CH1
CH1+CH2
CH1*CH2
CH1/CH2

Setting the Trigger System

The **Trigger** defines the time when the acquisition of data and display of waveform start. If it is set correctly, the trigger can turn an unstable display into a significant waveform.

When starting the acquisition of data, the oscilloscope collects sufficient data to draw the waveform at the left side of the triggering point. With waiting for the triggering condition, the oscilloscope is gathering data continuously. After a trigger is detected, the oscilloscope gathers enough data continuously to draw the waveform at the right side of the triggering point.

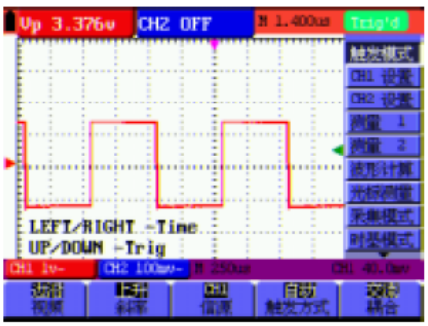
To make a trigger mode setting, do the following:

1. Press the **MENU** key and the function menu appears at the right of the screen.
2. Press the MUNU UP or MENU DOWN key to select MATH and five items selectable are displayed at the bottom of the screen.
3. Select and press one from **F1 through F5** key to make a different setting.
4. Press the **OSD OPTION** key and the following is shown on the screen:

   LEFT/RIGHT – Time

   UP/DOWN – Trig
5. Press the **OSD UP or OSD DOWN** key to adjust the trigger level position.

Now, look at the display: you can see a screen in the following figure:



Triggering Control

There are two triggering modes including Edge triggering and Video triggering. Each trigger mode is set by different function menu.

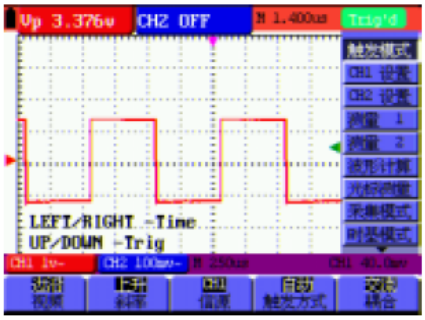
Edge triggering: It occurs when the trigger input passes through a given level along the specified direction.

Video triggering: Perform video field trigger or line trigger on the standard video signals.

The following describes the Edge triggering and Video triggering menus respectively.

Edge triggering

The Edge triggering is a mode by which trigger occurs at the triggering threshold value of the input signal edge. With the **Edge triggering** selected, the trigger happens on the rise or fall edge of the input signal, shown as the following figure.



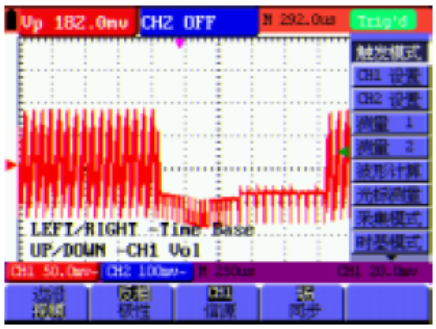
The **Edge triggering** menu is described in the following table.

Function menu	Settings	Description
Slope	Rise	Triggering on the rise edge of the signal.
	Fall	Triggering on the fall edge of the signal.
Signal source	CH1	CH1 is used as the trigger source.
	CH2	CH2 is used as the trigger source.
Trigger mode	Auto	Acquisition of waveforms is possible even if there is no triggering condition detected.
	Normal	Acquisition of waveforms can only be done when the triggering condition is satisfied.
	Single shot	The sampling is performed on a waveform when one trigger is detected, then stop sampling. .
Coupling	AC	With this mode selected, the DC component is prevented from passing-though.
	DC	All dc components are allowed.
	Noise suppression	Noise signals are prohibited.
	HF suppression	The HF part of the signal is prohibited and only the HF component is allowed.
	LF suppression	The LF part of the signal is prohibited and only the LF component is allowed.

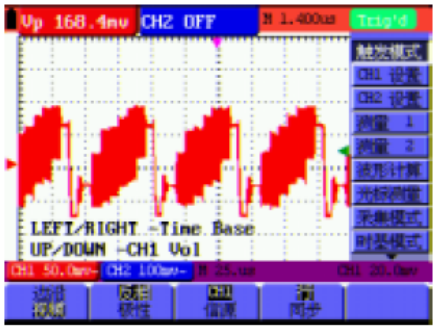
Video triggering

With **Video triggering** selected, the oscilloscope performs the **NTSC, PAL** or **SECAM** standard video signals field or line trigger.

Now, you can see a screen that looks like the following figure:



Video field trigger



Video line trigger

The Video triggering menu is described in the following table

Function menu	Settings	Description
Polarity	Normal	Applicable to the video signal in which the black level is of low level.
	Invert	Applicable to the video signal of which the black level is of high level.
Signal source	CH1	Select CH1 as the trigger source.
	CH2	Select CH2 as the trigger source..
SYNC	Line	Make a video line trigger synchronization setting
	Field	Make a video field trigger synchronization setting..

Acquiring Mode Setting

The **Acquiring Mode** menu is described in the list shown as below:

Function menu	Settings	Description
Sampling		Normal sampling mode.
Peak Detection		Used to detect the jamming glitch and reduce the possible blurring.
Average value		Used to reduce the random and unrelated noises. Several average factors are available for being selected.
Average factor	4, 16, 64 or 128	Select the average factor.

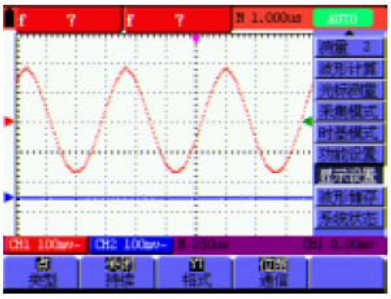
Display Setting

The Display Setting menu is described in the following table:

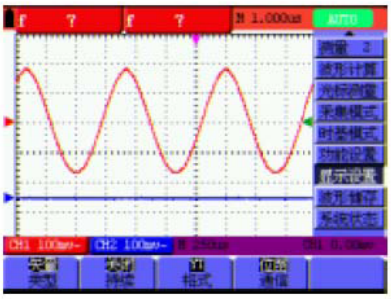
Function menu	Settings	Description
Type	Vector	The vector is filled up spaces between neighboring sampling points in the display.
	Dot	Only sampling points are displayed.
Persistence	Close 1s 2s 5s Infinite	Setting persistence time for each sampling point.
Display format	YT	Display the relative relationship between vertical voltage and horizontal time.
	XY	Display CH1 on the horizontal axis and CH2 on the vertical axis.
Communication	Bitmap	The data transmitted in communication are bitmaps.
	Vector	The data transmitted in communication are vectors.

Display Style

The display style includes **Vector** and **Dot** displays, shown as the following figure:



Dot style



Vector style

Persistence

With **Persistence** function selected, the displayed saved original data gradually decay in color and the new data are bright in color; with infinite persistence mode selected, the recorded points will be kept on the screen till the controlled value is changed.

XY mode:

This mode is only applicable to CH1 and CH2. With the XY mode selected, CH1 is displayed on the horizontal axis and CH2 is on the vertical axis; when the oscilloscope is under the sampling mode in which no trigger is found, the data appear in light spots.

Operations for various control keys are shown as below:

- The **CH1 VOL** and **CH1 ZORE** for CH1 are used to set the horizontal scale and position.
- The **CH2 VOL** and **CH2 ZORE** for CH2 are used to set the vertical scale and position continuously.

The following functions do not work in the XY display mode:

- Reference or digital value waveform
- Cursor
- Auto Setting
- Time base control
- Trigger control

Waveform Saving Setups

The oscilloscope can save 4 waveforms, which can be displayed on the screen with the present waveform. The recalled waveform saved in the memory cannot be adjusted,

The **waveform saving /recalling menu** is described in the following list:

Function menu	Setups	Description
Signal source	CH1 CH2 MATH	Select the displayed waveform which you want to save.
Address	A, B, C and D	Select the address for saving or recalling a waveform.
Saving		Store the waveform of a selected signal source into the selected address.
Addresses A, B, C and D	Close Start	Close or start displaying the waveforms stored in address A, B, C or D.

To save a waveform on CH1 in address A, do the following:

1. Press the **MENU** key and the function menu appears at the right of the screen.
2. Press the **MUNU UP** or **MENU DOWN** key to select the Waveform Saving. Four items selectable are displayed at the bottom of the screen.

3. Press the **F1** key to select the signal source CH1.

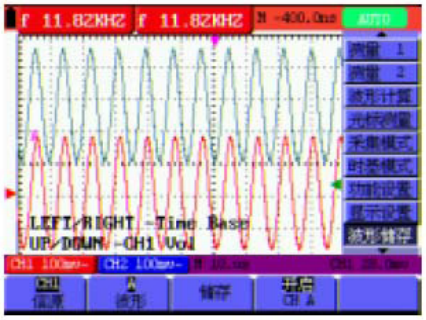
4. Press the **F2** key to select the address A.

5. Press the F3 key to save the waveform on CHI1 in address A.

To display the saved waveform on the screen, do the following:

6. Press the **F4** key to select Start for the address A. The waveform saved in address A will be displayed on the screen in green color.

Now, you can see a screen that looks like the following figure.



Function Setting Menu

The function setting menu is described in the following list:

Function menu	Setting	Description
Factory setting		Resume the instrument to its factory settings.
Self-correcting		Perform the self-correcting procedure.
LANGUAGE	CHINESE ENGLISH	Select the display language of the operation system.

Self-correcting:

The self-correcting program can improve the accuracy of the oscilloscope under the ambient temperature to the maximum. If the ambient temperature variation is equal to or larger than 5 Celsius degrees, the self-correcting program should be performed to gain the maximum accuracy.

Before the self-correcting program is performed, the probe or lead should be disconnected with the input connector, then, select **Self-correcting** item. After confirming that everything is ready, press the "**Self-correcting**" key and enter into the self-correcting program.

Making Automatic Measurements

The oscilloscope can perform 5 types automatic measurements such as frequency, cycle, average value, peak-to-peak value and root mean square value. And gives two kinds of measurement results simultaneously on the screen,

The function menu for automatic measurements is described in the following list:

Function menu	Settings	Description

Frequency	CH1 CH2	Measure the frequency of CH1 Measure the frequency of CH2
Cycle	CH1 CH2	Measure the cycle of CH1. Measure the cycle of CH1
Average value	CH1 CH2	Measure the average value of CHI. Measure the average value of CH2.
Peak-to-Peak value	CH1 CH2	Measure the peak-to-peak value of CH1. Measure the peak-to-peak value of CH2.
RMS value	CH1 CH2	Measure root mean square (RMS) value of CH1. Measure root mean square (RMS) value of CH2.

To measure the frequency of CH1 with **Measurement 1** and the frequency of CH2 with **Measurement 2**, do the following:

1. Press the **MENU** key and the function menu is shown at the right of the screen.
2. Press the **MUNU UP** or **MENU DOWN** key to select **Measurement 1**. Five options appear at the bottom of the screen.
3. Press the **F1** key to select the frequency measurement as **CH1.** The measurement window 1 on the screen turns into one red in color and shows the frequency of CH1.
4. Press the **MUNU UP** or **MENU DOWN** key to select **Measurement 2**. Five options appear at the bottom of the screen.
5. Press the **F4** key to jump to the peak-to-peak measurement as **CH2**. The measurement window on the screen turns into one blue in color and shows the peak-to-peak value of CH2.

Now, you can see a screen that looks like the following figure:

Setting the Cursor Measurements

This oscilloscope allows you to make manual cursor measurements on time and voltage. The signal sources include Channel 1(CH1), Channel 2 (CH2), MATH, storage address A and storage address B.

The cursor measurement menus are listed and described in the following table:

Function menus	Settings	Description
Type	Close Voltage Time	Close the cursor measurement. Display the voltage measurement cursor and menu. Display the time measurement cursor and menu.
Signal sources	CH1, CH2, ATH, address A and address B.	Select the waveform channel on which the cursor measurement will be performed.

To make a voltage measurement on CH1, doing the following:

1. Press the **MENU** key and the function menus are displayed at the right of the screen.
2. Press the **MUNU UP** or **MENU DOWN** key to select **Cursor Measurement**. Two options are shown at the bottom of the screen.
3. Press F1 key to select the measurement type Voltage. Two purple crossing dashed lines V1

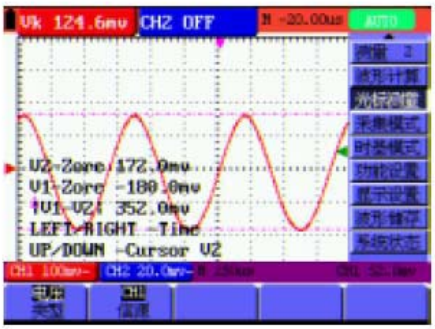
and V2 are shown on the screen.

4. Press the **F2** key to select the measured channel **CH1**.

5. Press and hold the **OSD OPTION** key till the **UP/DOWN CURSOR V1** is visible on the screen. At this time, adjust **OSE UP** or **OSD DOWN** and you can see that the dashed line V1 is moving up and down while the measured voltage value of V1 relative to the zero position of CH1 appears on the screen.

6. Press and hold the OSD OPTION key till UP/DOWN CURSOR V2 appears on the screen. Now, adjust the OSE UP or OSD DOWN and you can observe the dashed line V2 moving up and down while the measured voltage value of V2 relative to the zero position of CH1 is displayed on the screen. Also, the absolute values of V1 and V2 can be shown on the screen.

Now, you can see a screen that looks like the following figure.



To use the cursor for a time measurement on CH2, do the following:

1. Press the **MENU** key and the function menus are displayed at the right of the screen.

2. Press the **MUNU UP** or **MENU DOWN** key to select **Cursor measurement** key. Two key labels selectable are shown at the bottom of the screen.

3. Press the **F1** key to the measurement type **Time.** Two vertical dashed lines T1 and T2 appear on the screen.

4. Press the **F2** key and jump to the measured channel **CH2**.

5. Press and hold the **OSD OPTION** key till the **UP/DOWN CURSOR T1** appears on the screen. Then, adjust the **OSE UP** or **OSD DOWN** and you can observe the dashed line moving left and right. At the same time, the time value of **T1** relative to the **screen middle point position** will be displayed on the screen.

6. Keep pressing on the **OSD OPTION** key till the **UP/DOWN CURSOR T2** is displayed on the screen. Then, adjust the **OSE UP** or **OSD DOWN** and you can find that the dashed line **T2** is moving right and left while the time value of **T1** relative to the **screen middle point position** appears on the screen. You can also observe the absolute time values and frequencies of **T1** and **T2.**

Now, you can see a screen that looks like the following figure.

System State Menu:

The system state menu is used to display information about the present horizontal system, vertical system, trigger system and others. The operation steps are shown as below.

1. Press the **MENU** key and the function menu is displayed at the right of the screen.
2. Press the **MUNU UP** or **MENU DOWN** key to select the **System State.** Four options appear at the bottom of the screen.
3. Sequentially press key **F1** through **F4** key and the corresponding state information will be shown on the screen.

The screen that looks like the following figure will be displayed.