SEALEY Professional TOOLS

AUTO SERVICE LINE

TA330

HAND HELD AUTOMOTIVE SINGLE CHANNEL OSCILLOSCOPE AND MULTIMETER

Original Language Version

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Safety Summary

1. ELECTRICAL SAFETY

❒ **WARNING!** It is the responsibility of the owner and the operator to read, understand and comply with the following:
You must check all electrical products, before use, to ensure that they are safe. You must inspect power cables, plugs, sockets and any other connectors for wear or damage. You must ensure that the risk of electric shock is minimised by the installation of appropriate safety devices. A Residual Current Circuit Breaker (RCCB) should be incorporated in the main distribution board. We also recommend that a Residual Current Device (RCD) is used. It is particularly important to use an RCD with portable products that are plugged into a supply which is not protected by an RCCB. If in any doubt consult a qualified electrician. You may obtain a Residual Current Device by contacting your Sealey dealer.
You must also read and understand the following instructions concerning electrical safety.

1.1. The **Electricity at Work Act 1989** requires all portable electrical appliances, if used on business premises, to be tested by a qualified electrician, using a Portable Appliance Tester (PAT), at least once a year.

1.2. The **Health & Safety at Work Act 1974** makes owners of electrical appliances responsible for the safe condition of those appliances and the safety of the appliance operators. **If in any doubt about electrical safety, contact a qualified electrician.**

1.3. Ensure that the insulation on all cables and on the appliance is safe before connecting it to the power supply. See 1.1.1. and 1.1.2. and use a Portable Appliance Tester.

1.4. Ensure that cables are always protected against short circuit and overload.

1.5. Regularly inspect transformer plug for wear or damage.

1.6. **Important:** Ensure that the voltage marked on the appliance matches the power supply to be used.

1.7. **DO NOT** pull the plug from the socket by the cable.

1.8. Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

1.9. **DO NOT** connect or disconnect probes or test leads whilst they are connected to a voltage source.

1.10. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for rating information before making connections to the product. To avoid shock hazard, use a correctly rated probe for your measurement.

1.11. Protect the oscilloscope from electro-magnetic fields, static electricity and high temperatures.

1.12. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for rating information before making connections to the product.

1.13. **DO NOT** touch exposed connections and components when power is on.

1.14. Connect the probe output to the measurement device before connecting the probe to the circuit under test. Disconnect the probe input and the probe reference lead from the circuit under test before disconnecting the probe from the measurement device.

2. GENERAL SAFETY

✓ Familiarise yourself with the applications, limitations, and potential hazards of the oscilloscope.

✓ Keep the oscilloscope clean and in good condition.

✓ Disconnect circuit power and discharge capacitors before testing resistance, continuity and diodes.

✓ Remain vigilant when using the oscilloscope on, or near, machinery where there are rotational parts such as belts, pulleys and fans.

✓ Remove ill fitting clothing. Remove ties, watches, rings, and other loose jewellery, and contain and/or tie back long hair.

✓ Maintain correct balance and footing. Ensure the floor is not slippery and wear non-slip shoes.

✓ Keep Product Surfaces Clean and Dry.

✗ **DO NOT** use the oscilloscope if damage is suspected. If suspected damage occurs with the device, have it inspected by qualified service personnel before further operations.

✗ **DO NOT** get the oscilloscope wet or use in damp or wet locations or areas where there is condensation.

✗ **DO NOT** use the oscilloscope for any purpose other than for which it is designed.

✗ **DO NOT** allow untrained persons to operate the oscilloscope.

✗ **DO NOT** operate the oscilloscope when you are tired or under the influence of alcohol, drugs or intoxicating medication.

✗ **DO NOT** operate in a potentially explosive environment/atmosphere.

❒ **WARNING:** ***The warnings, cautions and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood that common sense and caution are factors which cannot be built into this product, but must be applied by the operator.***

CONTENTS

Chapter I Introduction

1-1 Unpacking and Checking

After unpacking the oscilloscope please follow the checking procedure listed below.

1. **Check whether or not damage exists due to transportation.**
   If any damage of the packing box or foam protective mattress exists, please keep the packing box or foam protective mattress and contact your Sealey Dealer.
2. **Check the accessories.**
   The accessories that comes with the scopemeter should be checked for any missing or damage. If any, please contact your Sealey Dealer.
3. **Check the oscilloscope.**
   If any damage of the oscilloscope appearance or malfunction exists, please contact your Sealey dealer . Please keep the packing material if damage of the scopemeter was caused during transportation.

1-2 Introduction for this Product

This digital oscilloscope has been developed according to the requirements of research, development, production, debugging and repair. It integrates the functions of an oscilloscope and a multimeter. In contrast to a traditional oscilloscope, this product contains a built in lithium battery and can work without an external power supply and is therefore ideal for field work where its portability is a distinct advantage. The product has three trigger modes, Automatic, Normal and single. You can lock and save non-periodical signal on the screen which is a facility not available on traditional oscilloscopes.

The oscilloscope features compactness, beautiful appearance and friendly interface.

This oscilloscope can quickly and accurately detect the faults of the circuit under test and serve as an electronic engineer's assistant, bringing you great convenience in your work.

1-2-1 Functions

- Oscilloscope function.
- Multimeter Function

1-2-2 Characteristics

- The high resolution display (320 x 240 pixels) provides full information feedback.
- A high capacity lithium battery is used to power the product. The oscilloscope is suitable for applications in various fields and can be conveniently gripped by one hand or placed on it's tilt stand.
- Waveform and waveform parameter(s) can be displayed simultaneously on the screen,

13 parameters can be measured and displayed, such as maximum value, minimum value, mean value, mean square root, peak to peak value, period, frequency, positive pulse width, negative pulse width, rise time, fall time, etc.

- Automatic setting function to set time base and amplitude range
- Streamline design, light weight (about 700g)

Chapter 2. Basic operation

2-1 Charging the Battery

Before you use the oscilloscope for the first time, you should charge the battery for about 10 hours; after that, 6 hours is sufficient. (Do not take any measurement during charging; otherwise the measurement accuracy and stability may be affected.)

2-2 Power On

The keyboard layout of the oscilloscope is as shown below.

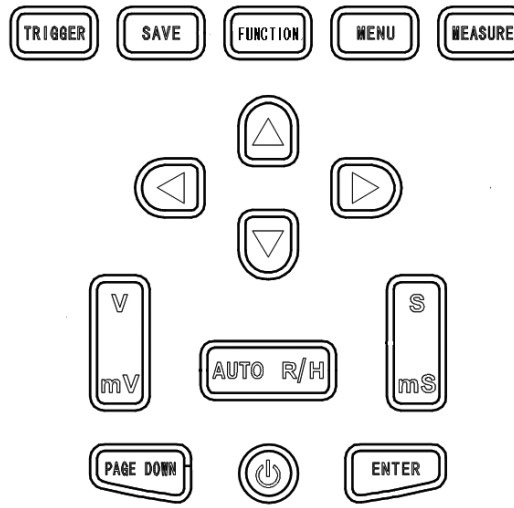
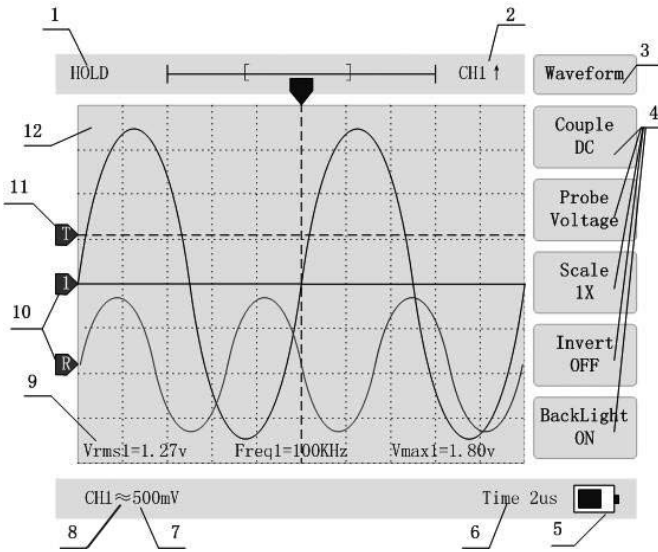


Figure 1 Keyboard layout

Brief instruction for the keys:

1. **TRIGGER**
   Used to open the TRIGGER interface.
2. **FUNCTION**
   Used to open the FUNCTION interface.
3. **MEASURE**
   Used to open the MEASURE interface.
4. **ENTER**
   Used to set or confirm the selected item.
5. **S mS**
   Used to zoom in or zoom out of the time base.
6. **" ▲ " / " ▼ "**
   Used to move the position of some waveform up/down.
7. **AUTO**
   To automatically display a fit waveform.
8. **SAVE**
   Used to open the SAVE interface.
9. **MENU**
   Used to display setting options.
10. **PAGE DOWN**
    Used to select the desired item to be set.
11. **R/H**
    Used to lock/unlock the waveform.
12. **V mV**
    Used to zoom in or zoom out the amplitude of waveform.
13. **" ◀ " / " ▶ "**
    Used to move the position of waveform to left/right.

Press the " ① " key to turn on the oscilloscope , the first interface displayed is as below.



1. Status (" RUN " or " HOLD ")
2. Trigger Type
3. Name of Present Interface
4. Present Parameter Settings
5. Battery Charge Indicator/ Charging Indicator
6. Time Base
7. Vertical Range
8. Couple Status
9. Automatically Measured Parameter
10. Channel Reference Position
11. Trigger signal Position
12. Grid Display

Figure 2 Scope Interface

This interface consists of three areas: The main area is waveform area, the right area is the setting area, and the bottom area is the status bar.

The waveform area displays grid, waveform, arrowhead for indicating the position of waveform, indicator of whether waveform is locked (" HOLD " appears) or in sampling mode (" RUN " appears), as well as the presently selected parameters measured. Every 25 dots forms a grid, the horizontal direction refers to time axis, with range of X s/div, X ms/div, X μs/div or X ns/div per grid, while the vertical direction refers to amplitude axis, with range of X V/div or X mV/div. The arrowhead with number or letter in it indicates the zero position of the amplitude of the waveform. About the number or letter, **1** means the first channel , **2** means the second channel, **T** indicates the position of trigger level, and **R** means reference waveform channel. The " RUN " or " HOLD " on the top left of screen indicates that the waveform is in sampling status or is locked. The parameters which you select to be measured, (e.g. the measured signal's period, amplitude, peak to peak value, root mean square value, mean value) are displayed according to your selections near the bottom of grid. On the bottom of grid shows the opened channel(s), the amplitude range of channel, the currently selected channel, battery/charging status indicator.

The setting area displays on your requirement the present settings, which you can change. You can select desired coupling type (AC, DC, Ground), attenuation coefficient of probe, displaying waveform normally or inversely, and etc.

The status bar shows the measured channel, input type of channel, whether the present channel is selected (the selected channel is displayed in reverse, while the unselected channel is displayed normally), amplitude range of channel, horizontal time base, charge/charging status of battery.

2-3 System Set-up and Automatic Set-up

2-3-1 Set-up of system parameters

The purpose of the system set-up is to provide a suitable observation condition so that you can do your work easily. All you need to do is to set your oscilloscope according to your preference and habit then save the set-up immediately. The oscilloscope will use the saved set-up next time you turn it on. The set-up covers vertical and horizontal ranges ,backlight ,language ,parameters to be measured automatically, etc. Some are described below.

Pressing **MENU** to open the MENU interface, then press **PAGE DOWN** to select the desired item you want to change or set, press **ENTER** to change or set the selected item.

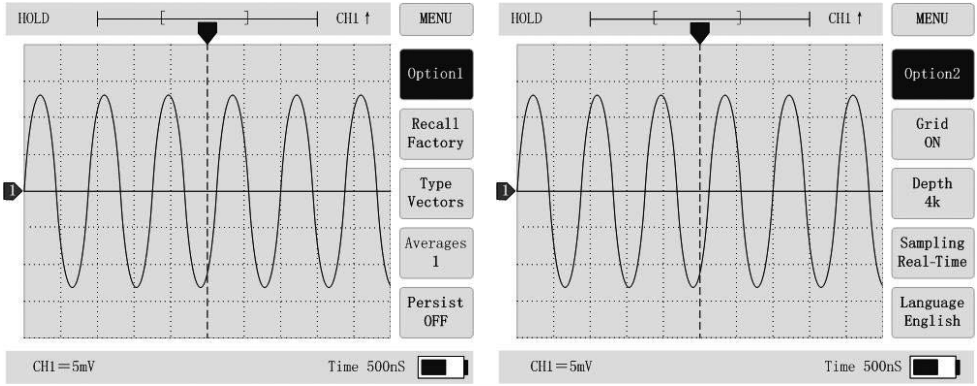


Figure 3 MENU Interface

The explanations for the MENU interface is listed in Table 1.

Table 1

Menu Function	Option	Description
Recall	Factory	Reset the oscilloscope to the factory settings and erase all the data saved in the oscilloscope's memory. The oscilloscope will sound 7 beeps after erasion.
Display type	Vectors	Display the data by drawing lines between sampling points.
	Dots	Display sampling points directly.
Average	1、2、4、8、16、32、64	Select the desired the average sampling times.
Persist	ON	Turn on waveform persistence.
	OFF	Turn off waveform persistence.
Grid	ON	Display the screen background grid.
	OFF	Close the screen background grid.
Sampling	Real-time	The sampling mode is set to real time sampling.
Language	Chinese	Select the desired language.
	English	

Horizontal range is controlled by pressing " **S** " or " **mS** ", while vertical range is controlled by pressing " **V** " or " **mV** ".

Parameters to be measured automatically are selected in the MEASURE interface. For more detailed information, see the 3-4 Section.

2-3-2 Automatic set-up

You can select that the oscilloscope sets the horizontal and vertical system control values automatically according to the input signal so as to suit waveform to observation. Press **AUTO**, the oscilloscope will automatically set the function items listed in Table 2.

Table 2

Function	Setup
Vertical " V/div "	Adjust to an appropriate range.
Signal inversion	Close
Horizontal position	Centre
Time base	Adjust to an appropriate range.
Trigger type	Edge
Trigger level	The centre of the waveform
Trigger mode	Auto

2-3-3 Saving a set-up and resetting the scopemeter

The methods mentioned above can be a quick way to use the oscilloscope. You can set the oscilloscope to suit your needs, and then save the set-up you have made. The next time yo turn on the oscilloscope, it will use the set-up you saved. To save your set-up, press **SAVE** to open the SAVE interface press **ENTER** to set the Mode item to "Set-up" , then press **PAGE DOWN** to select the Save item and press **ENTER** for confirmation.

2-4 Adjusting Channel and Locking/Unlocking waveform

2-4-1 Adjusting channel

The oscilloscope has a signal input channel (CH) and an external trigger signal input channel. The CH represents the signal input channel; and the REF or FFT has the similar conception as CH so that it can be treated as a channel when being operated by you.

1. For all channels including FFT and REF, the keys " ▲ " and " ▼ " can be used to adjust the vertical position of waveform. The resolution of the keys changs with the vertical range.
2. For all channels including MATH and REF, the keys " **V** " and " **mV** " can be used to adjust the vertical resolution of waveform. Vertical range sensitivity is adjusted in a 1- 2- 5 step sequence. Pressing the " **V** " key decreases the vertical sensitivity, while pressing the " **mV** " key increases the vertical sensitivity. When you use the " **V** " and " **mV** " keys to adjust the amplitude of FFT waveform, the amplitude is adjusted in 1-2-5 step sequence and displayed in percentage.
3. Only the selected channel can be adjusted with the " ▲ ", " ▼ ", " **V** " or " **mV** " key. The vertical range adjustment of REF (reference) waveform corresponds to the waveform settings of its storage location.

2-4-2 Channel's run or stop

Measurement input channel can sample signal continuously or stop sampling and hold the waveform, this can be done by pressing **R/H**; or you can select a trigger mode, the oscilloscope will perform sampling, or stop sampling and hold the waveform according to the test result.

Note:

When the oscilloscope is in Hold status, the vertical range and time base can also be adjusted to some extent.

2-5 Power Off

When you have finished you work, you can turn off the oscilloscope by pressing the " ⏻ " key. When the battery's charge level reaches the lower limit, the oscilloscope will turn off automatically. In this condition, you should charge the battery.

Chapter 3 Oscilloscope

After you turn on the oscilloscope,the display shows the initial interface as shown in Figure 1. If you want to return to the interface when you are in other interfaces, double-click **TRIGGER**, **SAVE**, **FUNCTION**, **MENU**, or **MEASURE** key.

Before using the scope function, you should set the oscilloscope's vertical and horizontal sysytems first. To get a steady, clear waveform, sometimes the trigger system also needs to be set. The related instructions are described in the following sections.

3-1 Setup of Vertical System

3-1-1 Coupling setting of signal input channel

In the main interface (as shown in Figure 1), the channel's operation menu is displayed. This interface is explained in Table 3.

Table 3

Function	Setup	Description
Couple (coupling)	AC	DC component of input signal is blocked.
	DC	Both AC and DC components of input signal are allowed to pass.
	Ground	Input signal is blocked.
Probe	Voltage	Used when a voltage probe is connected.
	Current	Used when a current probe is connected.
Scale	1X	Select the appropriate attenuation factor as your voltage probe set.
	10X	
	100X	
	1000X	
	1mV/A	Select the appropriate one as your current probe set.
	10mV/A	
Invert	ON	Display waveform inversely.
	OFF	Display waveform normally.
Backlight	ON	Turn ON the backlight.
	OFF	Turn OFF the backlight.

For example, the measured signal is a sinusoidal signal containing DC bias. In the main interface, press **PAGE DOWN** to select the " Couple " item, then press **ENTER** to select desired couple type (also called coupling type). If AC-coupling is selected (" AC " appears), the DC component contained in the measured signal is blocked, and the waveform is shown in Figure 4. If DC-coupling is selected (" DC " appears), both AC and DC components of input signal are allowed to pass, and the waveform is shown in Figure 5. If Ground-coupling is selected (" GND " appears), both the DC and AC components of the measured signal are blocked, and the waveform is shown in Figure 6.

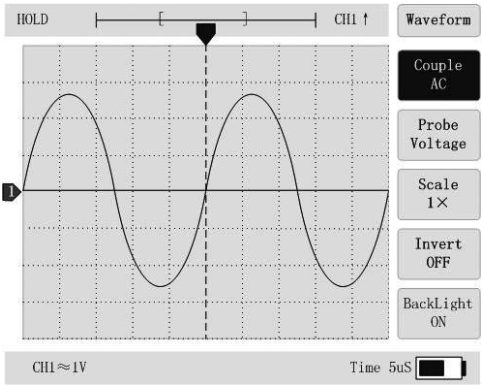


Figure 4 Waveform in AC-coupling status

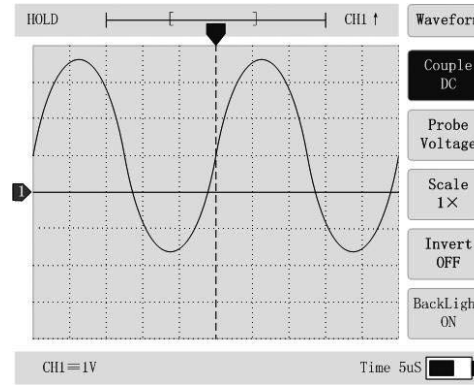


Figure 5 Waveform in DC-coupling status

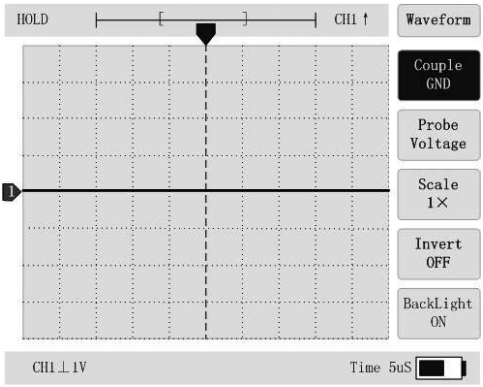


Figure 6 Waveform in GND couple status

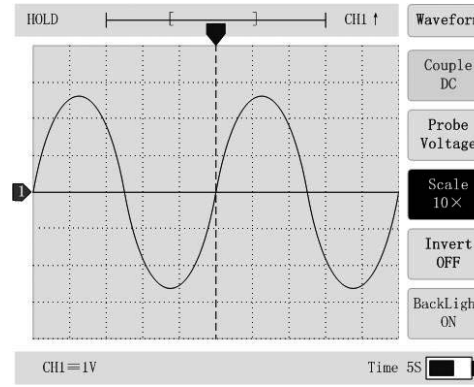


Figure 7 Waveform with probe set to 10 : 1

Adjusting probe's attenuation factor

To match the attenuation factor of the probe you use, you must make a corresponding attenuation setting for the probe in the channel operation menu; for example, when the attenuation factor of the probe is 10:1, the attenuation setting of the input channel should be set to " 10X " so as to avoid range indication error and wrong measurement data.

The illustration of Figure 7 shows the waveform in the corresponding vertical range when the probe of 10:1 is applied.

In the main interface, press **PAGE DOWN** to select the " Probe " item, and select " Voltage " for this item by pressing **ENTER**, press **PAGE DOWN** to select the " Scale " item, then press **ENTER** to select desired probe ratio (1X, 10X, 100X or 1000X). If you want to use current probe, set the Probe item to " Current " instead and then select " 1A/mV " or " 10A /mV " for the " Scale " item.

Reversing the polarity of the displayed waveform

When the " Invert " item is set to " ON ", the waveform will be inversed.

3-1-2 Amplitude

By using the " **V** " and " **mV** " keys, you can switch the vertical range from 5mV to 5V, in 1-2-5 step sequence (5mV, 10mV, 20mV, 50mV, 100mV, 200mV.....5V).

The vertical position of waveform can be moved with the " ▲ " and " ▼ " Keys, the arrowhead with channel indicator in it will move with the waveform, this arrowhead indicates the zero-level position of the waveform.

3-2 Setup of the Horizontal System

You can use horizontal control system to change the time base and move the horizontal position of the currently displayed waveform in memory. The horizontal centre of the screen is the time reference point of waveform. The waveform will expand or contract relative to the screen centre when the time base is changed.

The horizontal system is controlled by the 4 keys described below.

Keys " S " and " mS ": Used to adjust primary time base (s/div).

Keys " ◀ " and " ▶ ": Used to adjust the horizontal position of channel waveform (including mathematical operation waveform). The resolution of the key changes with the time base.

Explanation for indicators:

1. " [ ] " indicates the present waveform window's position in memory.
2. " ▼ " indicates the trigger position in memory.
3. The unit of primary time base is s/div.

3-3 FFT Function

As an usual function, FFT is mainly used to make harmonic wave analysis on waveform and determine communication malfunction or the quality of the power supply, and etc. The FFT interface is as Figure 8 and is explained in Table 4.

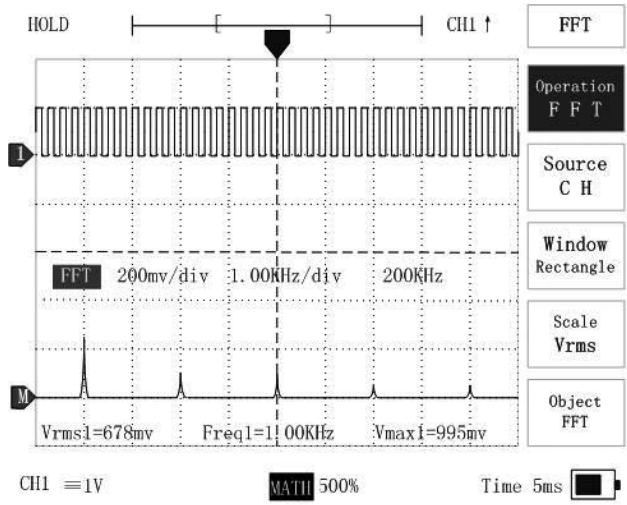


Figure 8. FFT Interface

Table 4

Function	Setting	Description
Source	CH	Select CH to analyze.
Window	Rectangle Hanning Hamming Blackman	window functions
Scale	Vrms DBVrms	effective value of voltage(v/div) effective value of voltage (db/dive)
Object	FFT CH	Control FFT waveform Control the waveform of CH

3-4 Automatic Measurement Function

Press **MEASURE** to display the MEASURE interface (Figure 9), which consists of 6 pages.

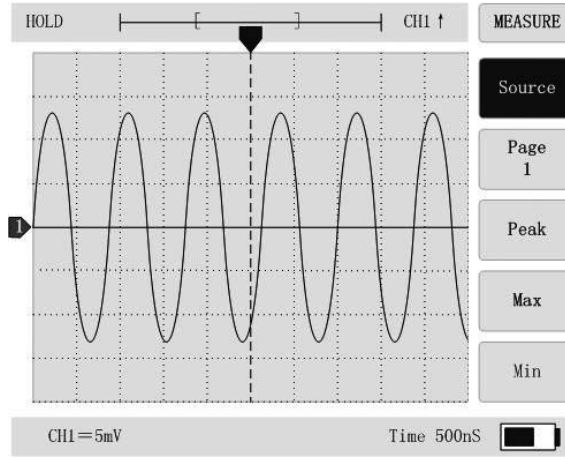


Figure 9 MEASURE Interface

The scopemeter can measure the parameters listed in Table 5.

Table 5

Function	Description	Display (Voltage Probe)	Display (Current Probe)
Peak to Peak value	To measure the peak to peak value of signal	Vpp	App
Maximum	To measure the maximum of signal	Vmax	Amax
Minimum	To measure the minimum of signal	Vmin	Amin
Average	To measure the mean value of signal	Vavr	Aavr
Root-Mean-Square	To measure the root mean square of signal	Vrms	Arms
Top value	To measure the top value of waveform	Vtop	Atop
Bottom value	To measure the base value of waveform	Vbas	Abas
Frequency	To measure the frequency of signal	Freq	Freq
Period	To measure the period of signal	Prid	Prid
Positive pulse width	To measure the positive pulse width of signal	+Wid	+Wid
Negative pulse width	To measure the negative pulse width of signal	-Wid	-Wid
Rise time	To measure rise time of signal	Rise	Rise
Fall time	To measure fall time of signal	Fall	Fall

Operation Instruction

Press **MEASURE** to display the MEASURE interface. In the interface, press **PAGE DOWN** to select the desired item or measurement, then press **ENTER** to confirm your selection or select the desired page (for the " Page " item only).

Note:

Only three measurements can be selected and executed by the oscilloscope at the same time; if one more measurement is selected, the first measurement will be closed automatically.

To cancel all measurements you have selected, press **ENTER** when the " ClearALL " item is selected. If measurement data exceeds the visual range, the display will show "****".

3-5 Storage Function (waveform and setting)

You can set the oscilloscope according to your habit and then save the settings. This is a feature of the oscilloscope .

After you set the oscilloscope in the status you need, press **SAVE** to open the SAVE interface. In the interface, select the " Mode " item with the **PAGE DOWN** key, then press **ENTER** until " Setup " is shown. Then press **PAGE DOWN** to select the " Save " item, and press **ENTER** to execute saving the settings. The oscilloscope will be in the status next time you power on it.

You can save waveform when it is displayed on the screen. To do it, press **SAVE** to open the SAVE interface, select the " Mode " item and set it to " Waveform ", then select a desired storage location (in the " Storage " item) for the waveform, and then select the " SAVE " item and press **ENTER**.

There are two ways to recall the saved waveform:

One is that you recall a saved waveform from the SAVE interface. To do it, first you must open the channel to which the saved waveform belongs. In the SAVE interface, set the " Mode " item to " Waveform ", select the storage location where the waveform you want is saved, and then select the " Load " item and press **ENTER**. Now, on the screen, the saved waveform is recalled and takes place of the waveform of the currently measured signal of the same channel.

The second is that the saved waveform is used as reference waveform which is used to be compared with the waveform of the currently measured signal. This is called REF function. In this function, you recall a saved waveform, which will appear on the screen with the present waveform for comparison in order to find out the difference between the two waveforms, and by this means the cause of malfunction can be quickly determined.

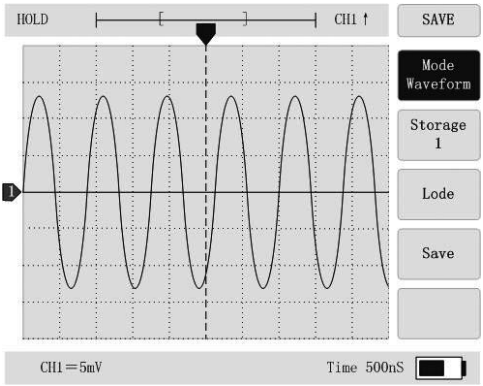


Figure 10 Save Interface for Waveform

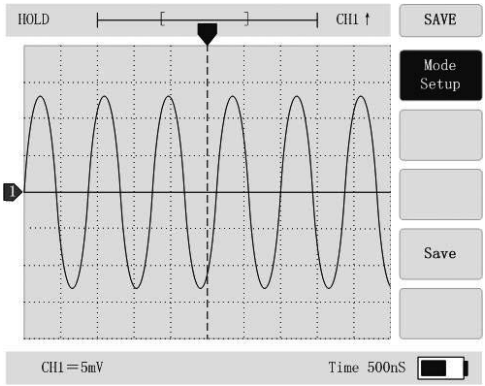


Figure 11 Save Interface for Setup

The SAVE interface is explained in Table 6.

Table 6

Function	Setting	Description
Mode	Waveform Setup	Saving or calling out waveform is selected. Saving setup is selected.
Storage	1、2、3、4、 5、6	Memory's storage location for the waveform to be saved or recalled. The oscilloscope can store 1 setup and 6 groups of waveforms.
Load	————	Recall the saved waveform from the specified storage location.
Save	————	Save present waveform to the specified storage location or save setup to memory.

REF Function

During the actual test, the malfunction's cause of the circuit under test can be determined by using scopemeter to measure and observe the waveform of related circuit component and comparing the component's waveform with the reference waveform. This method is very applicable when you have detailed reference waveforms of the circuit test points.

Press **FUNCTION** to open the FUNCTION interface, then press **PAGE DOWN** to select the " REF " item and press **ENTER** to display the REF interface, which is explained in Table 7.

Table 7

Function	Setting	Description
Storage	1、2、3、4、5、6	Indicate the present storage location.
Status	Valid	There is waveform saved at the present storage location.
	Invalid	There is no waveform saved at the present storage location.
Source	CH	Select the saved waveform of CH channel as the reference
Invert	ON	Display the reference waveform inversely.
	OFF	Display the reference waveform normally.
Object	REF	Select the reference waveform to control.
	CH	Select the waveform of CH channel to control.

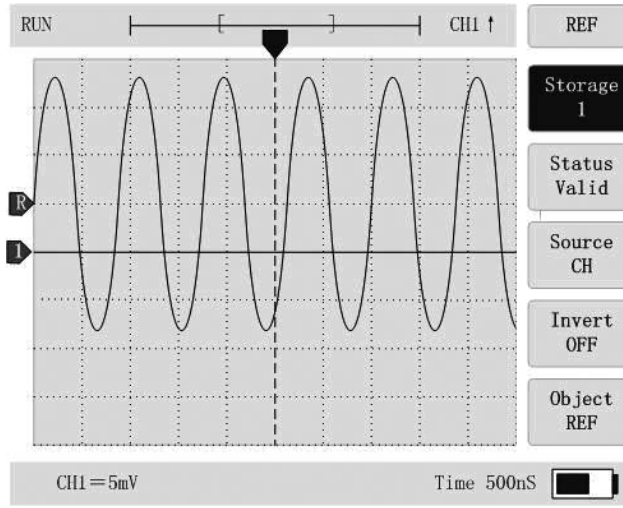


Figure 12 REF Interface

Operating Instruction

1. Press **FUNCTION** to open the FUNCTION interface. Press **PAGE DOWN** to select the " REF " item and then press **ENTER** to open the REF interface. Select the " Storage " item and press **ENTER** to select the desired storage location.
2. Press **PAGE DOWN** until the " Object " item is selected, then press **ENTER** to select " REF " or " CH " to select desired waveform to control.
3. Press the " **V** " or " **mV** " key to change the vertical range of the selected waveform to meet your need.
4. Press the " ▲ " or " ▼ " key to change the vertical position of the selected waveform to a desired position.

Explanation:

1. **Storage Location:**
   A specific memory area (named 1, 2, 3, 4, 5 or 6) for waveform storage.
2. **Load:**
   Recall saved waveform from the specified storage location (1, 2, 3, 4, 5, or 6) of memory.
3. **Save:**
   Save present waveform to the specified storage location (1, 2, 3, 4, 5, or 6) of memory or save setup.
4. **Data Upload:**
   After you have connected the oscilloscope to a PC with the supplied USB cable, installed the supplied driver (PL2303_XP2KME98Driver_Setup.zip), and run the communication software (showwave.exe), you can transfer the oscilloscope's saved or present waveform(s) to the PC and save it as a file. For detailed information, read the software instruction in this manual.

3-6 Trigger Function

Trigger function makes it possible to observe and lock the waveform we want, and display it steadily on the screen. There are three basic trigger modes: Auto, Normal and Single.

In Auto mode, the oscilloscope displays a steady waveform according to triggering when it detects triggering. If there is no triggering detected, it samples signal at a fixed interval and displays the sampling results, so the oscilloscope can always display the waveform of the measured signal.

In Normal mode, acquisition of waveforms can only be done when the triggering condition is satisfied.

In Single mode, sampling is performed on a waveform when one trigger is detected, then sampling ceases.

3-6-1 Edge trigger

Edge trigger is the most usual way of triggering. Edge triggering occurs when the trigger input passes through a given level in the specified direction. You can select on which edge triggering should occur, and select internal triggering or external triggering .

Press **TRIGGER** to display the trigger interface (Figure 13). In this interface, trigger control is active. If you press the " ▲ " or " ▼ " key, an arrowhead with " T " in it will appear on the left of the waveform area, this arrowhead indicates the position of the present trigger level. The currently selected trigger channel and triggering edge type (rising edge or falling edge) are indicated on the right top of the waveform display area.

Press **PAGE DOWN** to select the " Type " item, then Press **ENTER** until " Edge " triggering type is selected, and then press the " ▲ " or " ▼ " key to change the position of the trigger level, and you can set the trigger level according to the waveform's position, amplitude and the desired observation area of the waveform. Press the " ◀ " or " ▶ " key to change the trigger point's position on the screen, the

arrowhead which is on the top of the waveform display area and indicates the trigger position will move, so you can get more information before or after triggering.

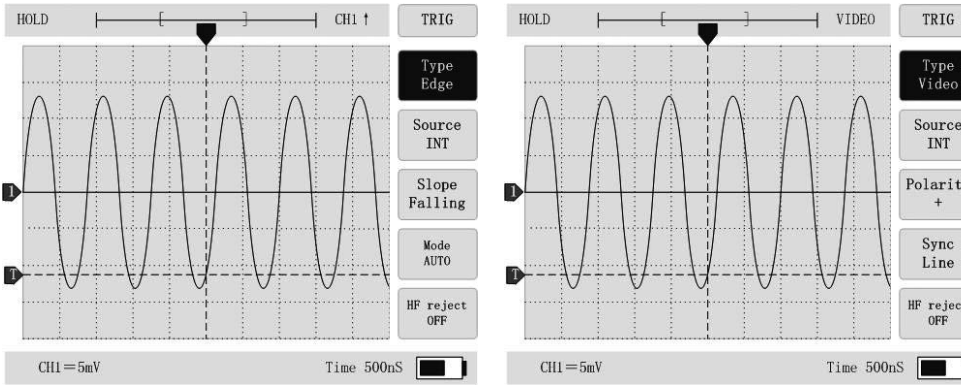


Figure 13 Trigger Interface

The explanations for the edge trigger interface are listed in Table 8.

Table 8

Function	Setting	Description
Trigger Type	Edge type	Triggering occurs on rising or falling edge of waveform.
Source	INT	Set the signal of channel 1 as the trigger signal source.
	EXT	Set the external signal as trigger signal.*
Slope	Rising	Triggering on the rising edge of the signal is selected.
	Falling	Triggering on the falling edge of the signal is selected.
Mode	Automatic	Acquisition of waveforms is possible even if there is no triggering condition detected.
	Normal	Waveforms can only be performed when the triggering condition is satisfied.
	Single	The sampling is performed on a waveform when one trigger is detected, then sampling ceases.
HF reject	ON	Enable high frequency reject.
	OFF	Disable high frequency reject.

* The external triggering channel is mainly used for digital signal input; the input voltage must be CMOS or TTL level and the frequency must be higher than 10kHz.

3-6-2 Video trigger

In this mode the trigger signal is either a field signal or a line signal which has been separated from an original video signal.

A synchroniser separator circuit further breaks down a field signal into either an odd or even field signal.

There are therefore three trigger options to choose from in this mode as laid out in table 9.

Table 9

Function	Setting	Description
Trigger Type	Video type	Triggering occurs on a field or line synchronising signal of video signal.
Source	INT	Set the signal of channel1 as the input signal
Polarity	+	Set the trigger signal in normal.
	–	Set the trigger signal in reverse.
Sync (Video Type)	Line	Select line synchronising signal as trigger signal.
	Field 1	Select odd field synchronising signal as trigger signal.
	Field 2	Select even field synchronising signal as trigger signal.
HF reject	ON	Enable high frequency reject.
	OFF	Disable high frequency reject.

Chapter 4 Multimeter

After you turn on the oscilloscope, scope interface is displayed. To enable the multimeter function, press **FUNCTION**, then press **PAGE DOWN** to select " DMM " and press **ENTER**. Then press **PAGE DOWN** to select desired measurement function and press **ENTER** to open its measurement interface.

4-1 Voltage Measurement

Caution: Maximum input voltage: 600V CAT **I**, 300V CAT **II**.

The voltage measurement Interface is shown in Figure 14.

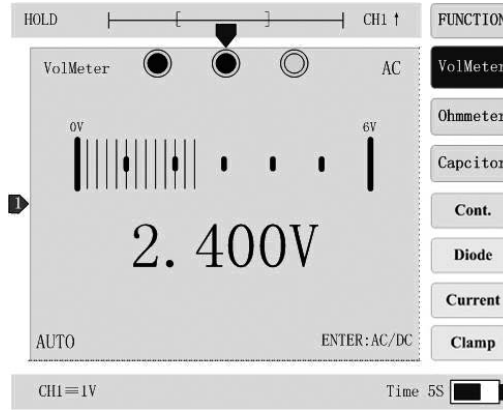


Figure 14 Voltage Measurement Interface

In the interface, the main area shows the bargraph, under which the reading is displayed.

Press ENTER to switch between DC voltage and AC voltage measurements, the display will show the corresponding symbol.

Press **V** to change from autorange mode to manual range mode, continue to press **V** to cycle through different manual ranges, press **AUTO** to return to autorange mode. The bar graph provides a direct viewing measurement result.

4-2 Resistance Measurement

Resistance measurement function has 6 ranges: 600Ω, 6kΩ, 60kΩ, 600kΩ, 6MΩ, and 60MΩ. The resistance measurement interface is as Figure 15.

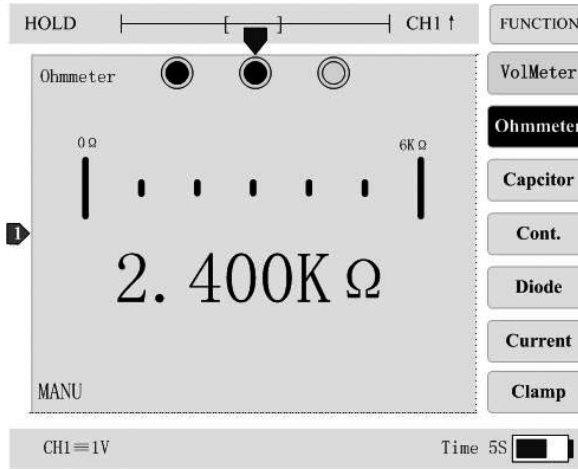


Figure 15 Resistance Measurement Interface

In the interface, the main area shows the bar graph, under which the reading is displayed.

Press **V** to change from autorange mode to manual range mode, continue to press **V** to cycle through different manual ranges, press **AUTO** to return to autorange mode. The bar graph provides a directviewing measurement result.

4-3 Capacitance Measurement

The capacitance measurement ranges from 6.000nF to 6mF, in 7 ranges. Capacitance measurement interface is as Figure 16.

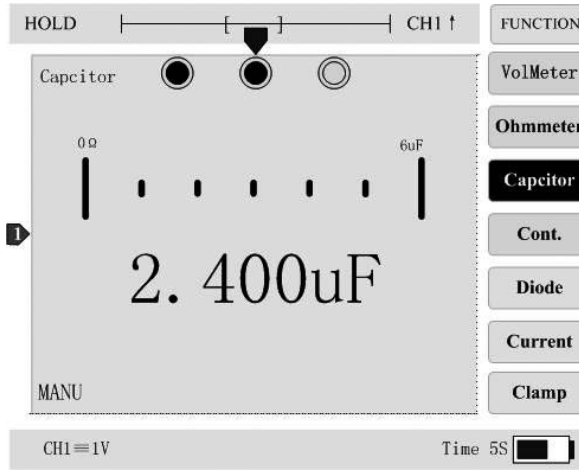


Figure 16 Capacitance Measurement Interface

In the interface, the main area shows the bar graph, under which the reading is displayed.

Press **V** to change from autorange mode to manual range mode, continue to press **V** to cycle through different manual ranges, press **AUTO** to return to autorange mode. The bar graph provides a direct viewing measurement result.

Note:
For measurements in the 6nF range, the test current is so small that the test leads are very likely to be interfered by external environment. To minimize the external interference to the test leads, directly connect the capacitor to be measured to the input terminals or use test leads as short as possible to connect the capacitor to the terminals.

4-4 Continuity Test

Continuity tests are performed in the 600Ω range. When the resistance of the circuit is less than about 25Ω, the built-in buzzer will sound. The continuity test interface is as Figure 17.

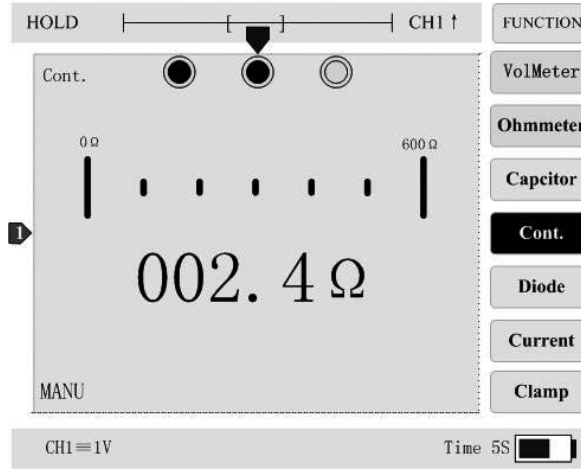


Figure 17 Continuity Test Interface

In the interface, the main area shows the bar graph, under which the reading is displayed.

4-5 Diode Test

If the forward voltage drop of the diode under test is more than 2V or if input terminals are open, the display will show the overload indicator " OL "; if the voltage drop is less than 0.25V, the built-in buzzer will sound. The bar graph indicates the test results. The diode test interface is as Fig.18.

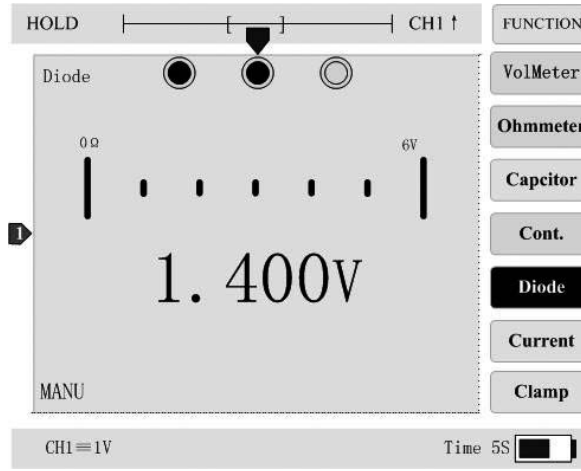


Figure 18 Diode Test Interface

In the interface, the main area shows the bar graph, under which the reading is displayed.

4.6 Current Measurement

The current measurement function has two ranges: 60mA, 600mA.

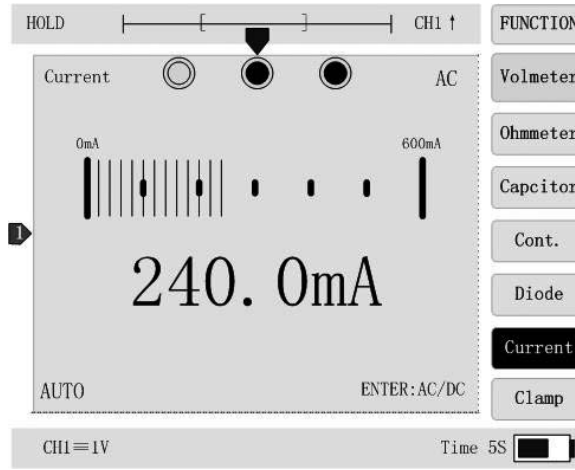


Figure 19 Current Measurement Interface

In the interface, the main area shows the bargraph, under which the reading is displayed.

Press **ENTER** to switch between dc current and ac current measurements, the display will show the corresponding symbol.

Press **V** to change from autorange mode to manual range mode, continue to press **V** to cycle through different manual ranges, press **AUTO** to return to autorange mode. The bar graph provides a direct viewing measurement result.

4.7 Clamp Ammeter Measurement

The clamp ammeter current measurement interface has two ranges: 10mV/A, 1mV/A.

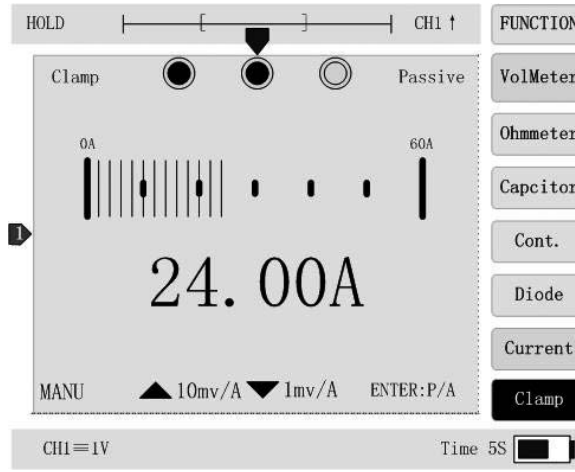


Figure 20 Current Measurement Interface

In the interface, the main area shows the bar graph, under which the reading is displayed.

According to the sensitivity of the clamp ammeter you use, press the " ▲ " key to change to the 10mV/A setting, the measurement range will become 60A or; press the " ▼ " key to to change to the 1mV/A setting, the range will become 600A.

Press **ENTER** to select passive clamp or active clamp according to the clamp you use.

Appendix

Appendix A Main Technical Data

Performance

Oscilloscope Performance	
Bandwidth(-3dB)	20MHz
Sample Rate	Max 80MSa/s
Channels	1
Input Coupling	AC, DC or Ground
Rise Time	< 17.5ns
Input Impedance	1MΩ, ≤ 20pF
Max Input Voltage	1x CAT II 300V 10x, 100x CAT I 600V
Vertical Resolution	8 bit
Vertical Sensitivity	5mV/div - 5V/div
Horizontal Resolution	50ns/div
Horizontal Sensitivity	50ns - 5s
Record Length	4K/channel
Memory Capacity	6 groups of waveforms + 1 setup
Trigger Mode	Auto, Normal, Single
Trigger Type	Edge trigger, Video trigger
Basic Performance	
Screen	320×240 pixels, with LED backlight
Communication	USB, PC software
Battery	3.7V lithium polymer battery, 4Ah
Adapter	Input Voltage: 100 - 240Vac Output: DC5V ± 10%, 1000mA
Size	210×140×55mm
Weight	about 700g

Performance of multimeter	
Display	6000 counts
Input	Max. Input Voltage: 600V CAT I, 300V CAT II
Continuity Test	Beeps in 600Ω range (< 25Ω)
Diode Test	If voltage drop of the diode under test is more than 2V or if input terminals are open, the display will show " OL ". If voltage drop is less than 0.25V, the built-in buzzer will sound.
Capacitance Measurement	6.000nF - 6mF, 7 ranges
Current Measurement	60.00mA, 600.0mA (2 ranges)
Resistance Measurement	600.0Ω - 60.00MΩ, 6 ranges
Voltage Measurement	600.0mV - 600V, 4 ranges
Clamp Ammeter Measurement	10mV/A, 1mV/A (2 ranges)

Specification

Conditions at calibration temperature ±5°C, and waiting 30 minutes after power on before proceeding

Specification of Oscilloscope	
Vertical System: channels of Scopemeter	
Bandwidth (-3dB)	20MHz
Accuracy	5 mV/div - 20 mV/div: ± 5%
	50 mV/div - 5 V/div: ± 3%
Vertical Offset Accuracy (DC)	± 0.2div ± 2mV ± 0.5% of offset
Trigger sensitivity	DC to 20MHz: 0.8 div
Specification of probe	
Rise time	X1 23.3ns
	X10 17.5ns
Bandwidth	X1 DC to 15MHz
	X10 DC to 20MHz
Input Impedance	X10 10MΩ (including oscilloscope's input resistance 1MΩ)
Input Capacitance	X1 46pF (without oscilloscope's input capacitance)
	X10 about 15pF

Specification of Multimeter	Accuracy form: ± (% of reading + digits)		
Function	Range	Frequency, test current, or load voltage	Condition: at calibration temperature ± 5°C, for 1 year
DC Voltage	600.0mV		± (1.0% + 8)
	6.000V		± (0.5% + 8)
	60.00V		± (0.5% + 8)
	600.0V		± (0.5% + 8)
AC Voltage	6.000V - 600.0V	40Hz - 400Hz	± (1.0% + 10)
		400Hz - 2000Hz	± (5.0% + 10)
AC + DC Voltage	6.000V - 600.0V	40Hz - 400Hz	± (1.0% + 10)
		400Hz - 2000Hz	± (5.0% + 10)
Resistance	600.0Ω		± (1.0% + 5)
	6.000KΩ		± (1.0% + 5)
	60.00kΩ		± (1.0% + 5)
	600.0kΩ		± (1.0% + 5)
	6.000MΩ		± (1.0% + 5)
	60.00MΩ		± (2.0% + 10)
DC Current	60.00mA		± (1.0 + 10)
	600.0mA		± (1.0 + 10)
AC Current	60.00mA - 600.0mA	40Hz - 400Hz	± (1.0 + 10)
		400Hz - 2000Hz	± (5.0 + 10)
AC + DC Current	60.00mA - 600.0mA	40Hz - 400Hz	± (1.0 + 10)
		400Hz - 2000Hz	± (5.0 + 10)
Capacitance	6.000nF		± (5.0% + 8)
	60.00nF		± (3.0% + 8)
	600.0nF		± (3.0% + 8)
	6000nF		± (3.0% + 8)
	60.00μF		± (3.0% + 8)
	600.0μF		± (5.0% + 8)
	6.000mF		± (8.0% + 8)
Diode	2.000V	Test Current: 0.5mA	
Continuity	Buzzer beeps if the resistance is less then 25Ω.		

Note: Do not take any measurement during charging the built-in battery; otherwise the measurement error may exceed the specified accuracy range.

Appendix B Trouble Shooting

1. The oscilloscope does not start up.

The battery may be completely empty. In this case the oscilloscope will not start up, even if it is powered by the battery charger. Charge the battery first: charge the oscilloscope with the battery charger without turning it on. Wait about 15 minutes and try turning on the oscilloscope again. If the problem remains, contact your Sealey Dealer.

2. The oscilloscope turns off automatically after operating for only several seconds.

Maybe the battery is empty. Please check the battery charge indicator on the right bottom of the screen. Charge the battery if it is empty.

3. How to Change between AC Voltage and DC Voltage measurements.

Press **F2** when voltage measurement interface is displayed.

4. In the scope mode, the measurement result is 10 times bigger or smaller than the actual value.

Check whether the channel A or channel B's probe attenuation factor setting matches the switch setting of this probe.

5. In the scope mode, the waveform is displayed but is not stable.

In the trigger interface, try the following steps:

1. Check whether the setting of the " Source " item is the channel you actually use, select a correct channel for the " Source " item.
2. Check whether the setting of the " Type " item is correct. For common signals under test, you should select " Edge " (edge trigger) for this item. For video signals, you should select " Video " (video trigger) for this item. Only when you have selected a proper trigger type can the waveform stabilize.
3. Try using another trigger mode. (There are three trigger modes: Auto, Normal,Single.)

Appendix C How to Use the Input Terminals

The oscilloscope's input terminals are shown in Figure 21.

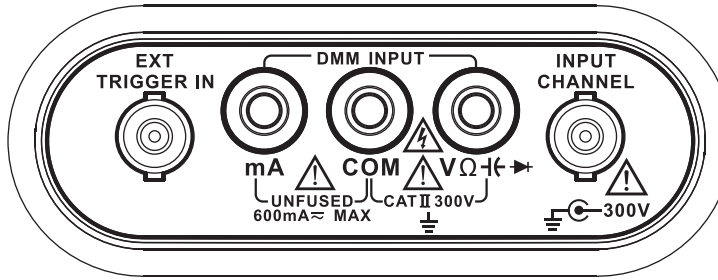


Figure 21 Input Terminals (top view)

Refer to the above figure, the three terminals marked by " DMM INPUT " are for multimeter measurements:

" **COM** " Terminal — common terminal for all multimeter measurements

" **mA** " terminal — input terminal for the current measurements made by using the test leads.

" **VΩ** " terminal — input terminal for all voltage, resistance, capacitance, continuity, and diode measurements as well as the current measurements which are made by using clamp ammeter function.

The " **INPUT CHANNEL** " terminal is a scope measurement input terminal. It is used to connect the test probe.

The " **EXT TRIGGER IN** " terminal is a scope input terminal for the external trigger signal input.

Please use the exact terminal(s) for your measurements and make sure that the input signal to be connected to the oscilloscope is suitable for it. To avoid damage to the oscilloscope or personal injury, never input an over voltage/current to the oscilloscope.

Appendix D Compensating the Probe

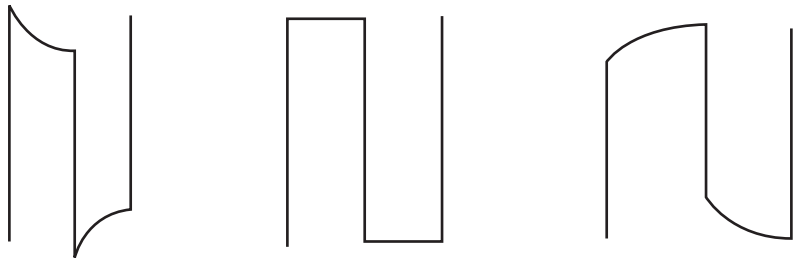
The probe needs to be set according to the input signal. A signal of large amplitude should be attenuated and a signal with high frequency requires a setting of small input capacitance. The attenuation setting of the oscilloscope must match the attenuation factor of the probe in order to obtain correct reading.

When you connect probe to the oscilloscope for the first time, you must adjust the probe's compensation capacitance in order to mach the input channel. If the probe is not properly adjusted, the measurement results may be inaccurate or incorrect.

Use the following procedure to adjust the probe's compensation capacitance:

1. Connect the probe to the " **INPUT CHANNEL** " terminal. Select the attenuation setting " 10X " for the Scale item in the scope interface and set the switch of the probe to the " 10X " position, then connect the probe to a squarewave signal of 1kHz. (**Note:** The oscilloscope does not have the test signal output function, so you should connect the probe to the output of a qualified signal generator.)
2. Check the shape of the waveform on the display.

Figure 22



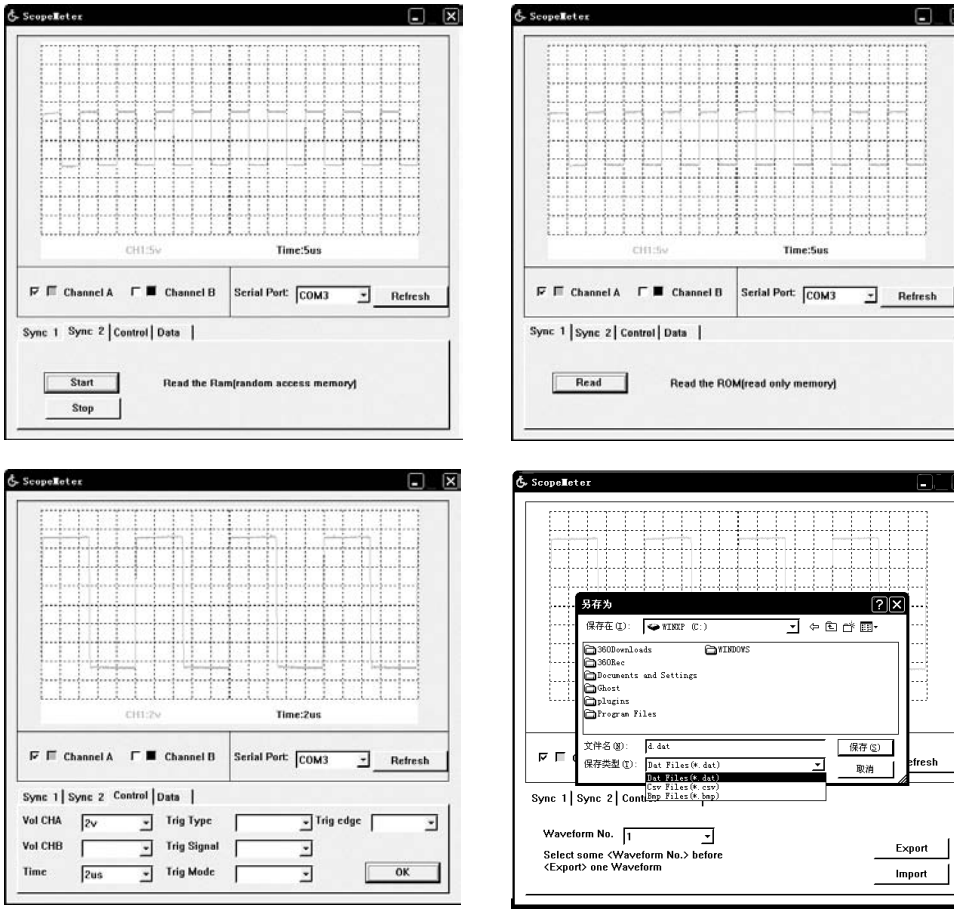
Over Compensated **Correctly Compensated** **Under Compensated**

3. If the waveform shows that it has been over compensated or under compensated, use a non-metallic tool to adjust the trimmer on the probe for the flattest squarewave available.

4. The TA330 oscilloscope probe is used when very accurate measurememts are required. This is the only probe that can be calibrated. For normal automotive testing, calibration wil not be necessary when using the alternative leads and probes supplied.

Appendix E Software Instruction

The application's interfaces are as below:



Application Interfaces

Instruction

Check boxes of Channel A and Channel B: Used to select the desired channel whose waveform you want to display.

" Serial Port " drop-down list box: Used to select serial port for communication.

Syn 1: Used to recall the waveforms saved in the memory of the oscilloscope.

" Read " Button: Used to execute recalling the saved waveforms.

Syn 2: Used to receive the real-time waveform(s) from the oscilloscope.
" Start " Button: Used to execute receiving the real-time waveform(s).
" Stop " Button: Used to stop receiving.

Control: Used to control the scopemeter. You can control: vertical range, time base, trigger type, trigger signal, and trigger mode.

Data: Used to open a waveform file or save waveform as a file.

" Waveform No. " drop-down list box: Used to select a memory storage location where the saved waveform(s) you want to display is stored.

Note: You should press the " Read " button on SYN 1 part to upload the saved waveforms from the scopemeter's memory beforehand.

" Export " Button: Used to save the present waveform as a file in BMP, CSV, or DAT format.

" Import " Button: Used to open and display a waveform file of DAT format.

Operation Procedure

1. Run the supplied USB driver (**PL2303_XP2KME98Driver_Setup.exe**) to install it in your computer.
2. Turn on the oscilloscope, make sure it is in scope function.
3. Connect one end of the data line to the USB port (located at the right side of the oscilloscope and beside the display) of the oscilloscope, connect the other end of the data line to a USB port of your computer.
4. Run the application " **showwave.exe** ". If you have not connected the data line between the the oscilloscope and your PC, click the" Refresh" button on the application interface to refresh the interface and select the proper serial port.
5. Click " Syn 1 ", then click the " Read " button, the application will upload the saved waveforms from the 6 storage locations and display them one by one. When the process finishes, click " Data ", then select a desired storage location in the " Waveform No. " drop-down list box, the corresponding saved waveform will be displayed. You can save the waveform as a file in BMP, CSV, or DAT format.
   In the Syn 2 part, click the " Start " button to get the real-time waveform from the oscilloscope . You can change to the Control part to control the oscilloscope or to the Data part to save waveform.
   In the Data part, you can observe waveform or save waveform, or open a waveform file. BMP file can be embedded in another file, CSV file can be used for waveform analysis, and DAT file can be opened by the application.

scopemeter

Accessories

Software CD, plus items shown below.

fig.1

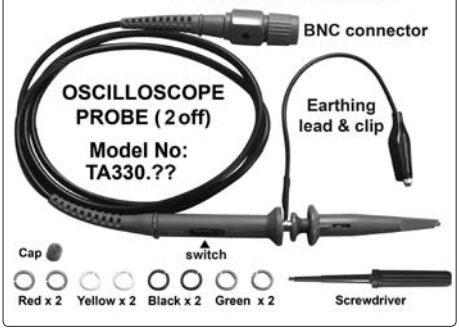
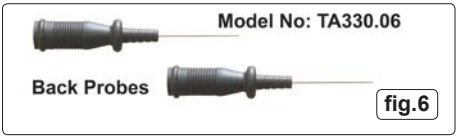
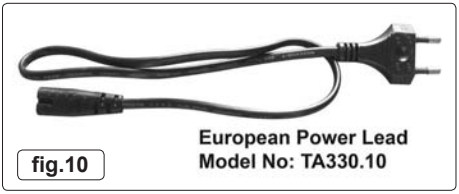


fig.2

fig.3

fig.4





SEALEY POWER PRODUCTS

EC DECLARATION OF CONFORMITY

We the sole importers into the UK, hereby declare that the equipment described below

Description and Function: **Hand-Held Automotive Single Channel Oscilloscope & Multimeter**

Model/Type: **TA330**

Manufacturing Date / Serial number (optional): .....

Manufacturer's authorised representative within the EC: **Jack Sealey Ltd. Kempson Way, Suffolk Business Park, Bury St. Edmunds, Suffolk, IP32 7AR**

Conforms to the requirements of the following Directives, as indicated.

- ☒ 2006/42/EC Machinery Directive
- ☒ 2006/95/EC Low Voltage Directive
- ☒ 2004/108/EC EMC Directive
- ☒ 93/68/EEC CE Marking Directive
- ☐ 2009/105/EC the Simple Pressure Vessels Directive
- ☐ 2000/14/EC Outdoor Noise Emissions Directive
- ☐ 2002/96/EC WEEE Directive
- ☐ 2002/95/EC RoHS Directive
- ☐ 97/23/EC Pressure Equipment Directive

And the following harmonised standard(s)

BS EN 61010 part 1: 2010

BS EN 61010 part 031: 2002 + A1: 2008

BS EN 61326 part 2-1: 2006

BS EN 55022: 2006 + A1: 2007

BS EN 61000 part 3-2: 2006

BS EN 61000 part 3-3: 1995 + A2: 2005

BS EN 55024: 1998 + A1: 2001 + A2: 2003

Additional technical standards and specifications (if applicable): .....

Technical file compiled by: **Jack Sealey Ltd**.

Signed: .....

Date: 26-Aug-2011 **Place:** Bury St.Edmunds.

Name: Tim Thompson

Position: Commercial Director

CE

Being the responsible person appointed by the manufacturer.

Sealey Power Products, Kempson Way, Suffolk Business Park, Bury St. Edmunds, Suffolk, IP32 7AR
01284 757500 01284 703534 sales@sealey.co.uk www.sealey.co.uk

DISPOSAL OF THIS ARTICLE

Dear Customer,
If you at some point intend to dispose of this article, then please keep in mind that many of its components consist of valuable materials, which can be recycled.

Please do not discharge it in the garbage bin, but check with your local council for recycling facilities in your area.