Preface

Dear users:

Hello! Thank you for purchasing the new handheld oscilloscopes from Jin Han electronic. In order to use this instrument properly, please read the full text of this manual carefully before using it, especially for the "safety precautions" part. It's better to keep the manual for proper custody after you have finished reading it, please put it together with the instrument or the place you can access at any time for future inspection during use.

Copyright

Hefei Jin Han Electronic Technology Co., Ltd. All rights reserved.

Jin Han-electronic products are protected by China or other countries' patent, including patent has been made or pending. Our Company reserves the right to change product specifications and prices. Jin Han reserves All rights. Licensed software products are all by Jin Han, protected by national copyright laws and international treaty provisions.

If the original purchaser sells or transfers the products to third party within two years from the date of purchase, the two-year warranty period shall be from the date of the products purchased by original buyer

from Jin Han or authorized distributors. Probes and other accessories and fuses are not guaranteed.

If the product is proven defectively in applicable warranty period, Jin Han has discretion to repair the defective product without charge for parts and labor costs, or replace the defective product with an equivalent product (determined by Jin Han). The parts, modules and replacement products, used for warranty by Jin Han, may be new or reconditioned with performance as new. All replaced parts, modules and products will become the property of Jin Han.

The "Customer" hereinafter referred to the person or entity guaranteed the rights by the provisions according to the statement. To obtain service under this warranty, Customer must notify Jin Han defects during the applicable warranty period, and make the appropriate arrangements for the performance of services. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Jin Han, while prepaid freight and provide a copy of purchase proof of the original purchaser. For customers from Hong Kong, Macao, Taiwan and overseas, if the product is returned to the service center, customers should be responsible for paying all shipping charges, duties, taxes and any other fees.

This warranty does not apply to any defects due to accident, normal wear and tear of machine parts, using the product outside the scope of the provisions, defect, malfunction or damage caused by improper use, improper or inadequate maintenance. Jin Han has no obligation to provide the following services in accordance with the provisions of this warranty:

a) Repair the damage caused by other service personnel's installation, repair or maintenance for the products, not by Jin Han service personnel.

b) Repair the damage caused by improper use or connection to incompatible equipment

c) Repair any damage or malfunction caused by using the battery not supplied by Jin Han
d) Repair the products that has been modified or integrated with other products (if such modification or integration increases the time or difficulty of servicing the product).

This warranty made for this product by Jin Han, used to replace any other express or implied warranty. Jin Han and distributors refused to make any implied warranty used for a particular purpose of merchantability or fitness. In the case of breach of this warranty, repairing or replacing the defective products is the sole and exclusive remedy to customers. No matter whether Jin Han and distributors are pre-advised of the possibility of any indirect, special, incidental or consequential damages, Jin Han and distributors are not responsible to these damages.

General safety requirements

The following safety precautions are to avoid injury and prevent this product or any other product connected to it damage. To avoid possible danger, be sure to use this product in accordance with the provisions.

Only trained personnel could perform maintenance procedures.

1. **Avoid fire and personal injury**

● Correct plug and pull

Do not plug and pull when the probe or test leads are connected to a voltage source.

● Properly connected probe

Probe wire and the ground potential are same，do not connect the ground wire to a high voltage. And during the test, do not touch exposed contacts and components.

● View all terminal ratings

In order to avoid the impact of fires and excessive current, please view all ratings and markings of this product. Please refer to the product before connecting the product instructions for more information about ratings.

●Do not Operate Without Covers

If the cover or panel has been removed, do not operate this product.

●Avoid circuit exposed

Do not touch exposed connections and components after boot.

●Suspected product malfunction, do not operate

If you suspect that the product has failed, Please check it by qualified personnel or contact.

● Maintain adequate ventilation

● Do not operate in wet conditions

● Do not operate in flammable and explosive environment

4

● Please keep this product surfaces clean and dry

2. Safety Terms and Marks

Terms in this manual, the following terms may appear in this manual:

Warning: Warning statements indicate conditions and behaviors which might endanger the safety of life.

Note: Note the statement pointed out conditions and behaviors that may cause this product and other property damage.

Terms on the Product: These terms may appear on the product
DANGER: Indicates that there is a direct risk of harm exists near the mark.
WARNING: Indicates a potential risk of injury near the mark.
Note: indicate a potential danger to the products and other property
Symbols on the Product: These symbols may appear on the product

High pressure   Protective earthing   Attention   Measurement of ground

Foreword

This manual introduces the operation of JHJDS30 series handheld digital storage oscilloscope. The manual includes the following chapters:

◆User guide: a brief introduction to handheld digital storage oscilloscope's front panel, user interface, functional check and probe compensation.
◆Features and Operation: a detailed presentation for functions and operations of oscilloscope, signal generator, multimeter，recorder，the center of the serial port.
◆Application example: provide some measurement examples, for reader reference.
◆System prompts and troubleshooting:
◆Service and support:

This manual contains the following three handheld digital storage oscilloscopes; specific models are shown in the table below:

	Oscilloscope				Multimeter	Signal generator	Serial port & Recorder
	Channel	Bandwith	Sampling Rate	Storage depth			
JDS3051A	2	50MHz	250MSa/S	16K	YES	YES	YES
JDS3072E	2	70MHz	5000MSa/S	16K*2	NO	YES	YES
JDS3082A	2	80MHz	500MSa/S	16K*2	YES	YES	YES

Note: JDS3072E has no multimeter.

JHJDS30 series handheld digital storage oscilloscope provides users with simple and clear front panel function, for basic operation. Each buttons are marked with letter or symbol for appropriate functions, the user can operate more intuitively, conforms to the use of traditional instruments, the user can have skilled use without spending a lot of time to learn and be familiar with it. To speed up adjustment, easy to measure, the user can press the "AUTO" button; the instrument will show suitable waveforms and gear position.

Except for ease of use, JHJDS30 series handheld digital storage oscilloscope has high performance indicators and powerful functions for faster measurement task. Through 250 MSa/s-500MSa/S real-time sampling rate, can observe faster signal on the JHJDS30 series handheld digital storage oscilloscope. Powerful trigger and analyzes makes it easy to capture and analysis waveform. Clear liquid crystal display and function of mathematical operations makes it easy to observe more quickly and clearly and analysis the signal problems for users.

In addition, JHJDS30 series handheld digital storage oscilloscope has signal generator function, the user can bring up the usual signal waveform for need, greatly satisfy user's requirements.

JHJDS30 series digital oscillographic table provides unique waveform display interface and a variety of measurement functions. It can be widely used in engineering survey, out testing, automotive electronics, frequency converter, research, design, education, training and other fields, including virtual circuit measurement and fault solution.

From the performance characteristics given below, can understand how the handheld digital storage oscilloscope series satisfy your measurement requirements.

◆Isolated oscilloscope/oscillographic table with oscilloscope, signal generator, multimeter functions.

- ◆ Can observe signal data through serial port center
- ◆ Recorder function
- ◆ A serial port center
- ◆ 4.3 inch 16-bit true color TFT 400*272
- ◆ Maximum 80MHZ bandwidth, sampling rate 500Msa/s, 16 KPTS storage depth
- ◆ Support USB firmware upgrade
- ◆ Have the edge trigger function, can automatically detect support（50Hz—60MHz）
- ◆ A variety of waveform mathematical functions together
- ◆ Support Chinese, English and Russian menu display
- ◆Support time, voltage cursor measurement
- ◆ Automatic, normal, single trigger mode
- ◆ Support automatic shutdown function and power saving mode, the time can be set up
- ◆ The cursor measurement function
- ◆ Screenshot of waveform can be retained and put into the computer through USB
- ◆ With holder for easy placement
- ◆ Power supply through USB

JHJDS30 series handheld digital storage oscilloscope ACcessories:

Accessories List

Product / Parts Parameter	JDS3051A	JDS3072E	JDS3082A
Color	Blue/Black	Blue/Black	Blue/Black
Material	ABS	ABS	ABS
Probe	One P6100(x1/x10)	Two P6100(x1/x10)	Two P6100(x1/x10)
Signal source line	One	One	One
Multimeter pen	One red and one black	No	One red and one black
Mini USB cable	One	One	One
Instruction	U-Disk	U-Disk	U-Disk
18650 battery	No	No	No
Charger	One	One	One
Probe calibration kit	One	One	One
Lens protective film	One	One	One
Certificate	Yes	Yes	Yes
Length*width*height (machine)	22*12.8*4(cm)	22*12.8*4(cm)	22*12.8*4(cm)
Weight(machine)	0.65(kg)	0.65(kg)	0.65(kg)
Length*width*height (package)	28.5*23.2*8.1(cm)	28.5*23.2*8.1(cm)	28.5*23.2*8.1(cm)
Gross weight	1.35(kg)	1.25(kg)	1.35(kg)

Content

The First Chapter   Introductory guide

JHJDS30 series handheld digital storage oscilloscope is small, lightweight portable instruments. Provide customers the front panel with convenient and easy to operate, can perform basic tests.
This chapter mainly elaborates how to perform the following tasks:
△General inspection
△The front panel and the user interface
△Holding a storage oscilloscope connected input
△Functional check
△The probe compensation

1.1 General inspection

When you get a new JHJDS30 series oscilloscope, it is strongly recommended that you follow the steps below to check the oscilloscope.
Check whether there is damage caused by transportation:
If it is found that packaging carton or foam cushion serious breakage, please keep, until the whole machine and accessories pass electrical and mechanical tests.
Check accessories:

About provided details of accessories, in front of this manual has instruction. You can refer to it to check if accessories are missing or damaged. If you find accessories missing or damaged, please contact our dealers.

Check the machine:

If it is found that the appearance of instrument damaged, the operation of the instrument failed or never pass the performance test, please contact sales or dealers. If the instrument damaged caused by the transport, please keep the package. Notify the transportation department and sales or dealers. We will arrange repair or replacement for you.

1.2 The front panel and the user interface

When you get an oscilloscope, you need to be familiar with its front panel. This chapter will introduce the front panel keys of oscillographic table layout and how to use. Please read this chapter carefully before any operation.
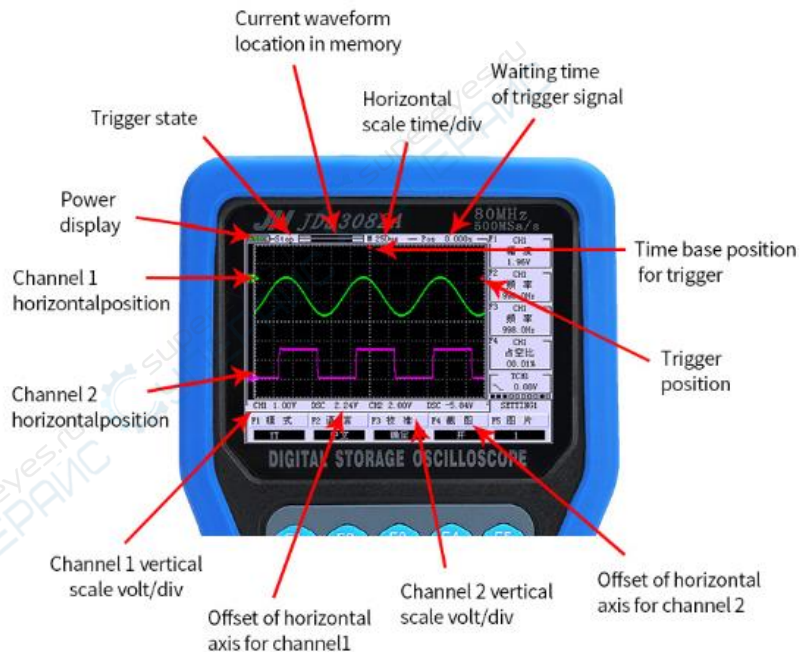
The front panel and key layout（picture 1-1）：

The front panel of buttons can be used some function directly, except for displaying menu on the interface. The menu shown on the interface provides all of the advanced features.

NOTICE: We select a product called JDS3082A as a description, and other products can refer to it. The button functions of the three products are the same. In addition, JDS3072E has no multimeter function,

Multi-function selection button

Display HORI menu

Channel 1 and 2 menu

AUTO setting

RUN/STOP

OK button

Adjust vertical voltage scale

The interface of Multimeter function

Display TRIG menu

Power

Menu button

Display measure menu

Adjust trigger voltage

Shift cursor button

Time base setting and horizontal movement

USB interface

Picture 1-1

Display interface (picture 1-2)

Picture 1-2

1.3 Holding a storage oscilloscope connected input

Instructions ：
1. The oscilloscope probe
2. Oscilloscope analog channel input
3. Oscilloscope analog channel input
4. The signal generator output
5. stents
6. probe clip
7. Multimeter pen (NO included in JDS3072E)
8. Multimeter input pin (NO included in JDS3072E)
four round pins are respectively 10 a current
current mA stall, grounding, voltage

Note: JDS3051A has one analog channel for number 2 and one digtial channel for number 3.

Picture 1-3

1.4 Functional check

Perform a quick functional check to verify that the oscilloscope is working properly. Please proceed as follows:

1. confirm the oscilloscope has been installed on the battery, Long press on the oscilloscope panel "PWR" button to let go when the interface to be displayed.

2. Switch oscilloscope probe on the set to 10X and connect the probe with oscilloscope channel 1. The probe connector slot on the convex keys aligned on CH1 coaxial connectors, Press down to connect, and then rotated to the right to tighten the probe.

3. The probe and the probe ground clip connected to the signal generator corresponding connectors(Recommended input 1KHZ, about 3V peak-peak square wave).

4. Set the CH1 menu attenuation coefficient of the probe is 10 x (key order CH1 - > F3 Select 10 x). Press the AUTO button and wait for a moment, this screen will display frequency 1 KHZ, peak value to 3 v square wave signal.

5. Close CH1 and open CH2, repeat steps 2 and 3.


Picture 1-4

19
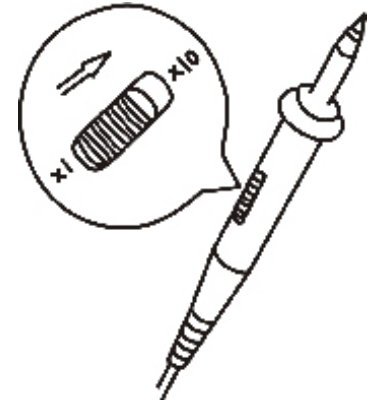
1.5 The probe

1. The safety of the probe
Probe body surrounding protection Settings can protect the fingers to prevent electric shock.
Prior to any measurement, connect the probe to the oscilloscope and grounding terminal.
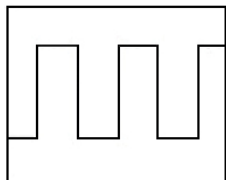2. The probe compensation (see the probe specification)
   In the first connect the probe to any input channel, adjustment is required, make the probe to the input channel. Without compensation correction probe will lead to a measurement error or mistakes. If adjust probe compensation, please click the following steps:
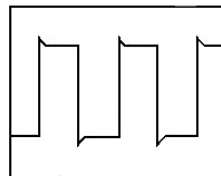(1) The channel attenuation is set to 10 x, the switch on probe options menu is also set to 10 x, and the oscilloscope probe connected to channel 1. If using the probe hook-tip, ensure reliable contact with the probe.
(2)Connect the probe tip and the signal generator output connector, Grounding clip and signal generator is connected to the ground connector, Display Channel, Then press the "AUTO" (automatic) button.
(3)Check the shape of the waveform display. As Figure 1-5.
(4) If necessary, adjust the probe, repeated operation when necessary.
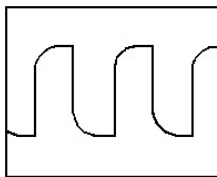
Under compensation   Appropriate compensation   over compensation

Figure 1-5

1.6 Preliminary using oscilloscope display signal automatically

JHJDS30 series hand held digital storage oscilloscope has the function of signal automatically set. ACcording to the input signal, can automatically adjust parameters such as voltage, time base and trigger mode, so as to achieve the best state of signals. Automatically set to work, the requirements of the measured signal frequency is greater than or equal to 50 Hz.

This part mainly do a demonstration of automatic display signal to the customer who preliminary use oscilloscope, but do not introduce all the functions of oscilloscope. The specific steps are as follows:

Figure 1-6 boot screen

21

(1) after equipped with batteries, long press the red "PRW" key in the top right corner of the oscilloscope, until I heard a buzzer sound can let go, oscilloscope is into Boot screen at this time, as shown in figure 1-6

(2) enter the boot screen, choose instrument working mode by selecting the button F1 ~ F5, the default is selected "oscilloscope", then entered into the oscilloscope operating interface automatically selected after about 3s.

(3) Connect probe to channel 1 (CH1) and put probe to 10x,then grounding clip to receive the signal

(4) Press the "CH1", then press "F3", set probe to 10 x

(5) Probe needle contact with signal source need to test, press the "AUTO" button, at this point, the oscilloscope is automatically set vertical, horizontal and trigger system, and will be display the best effect of waveform for the signal.

The second chapter Oscilloscope operation

The user from the previous chapter have probably learned how to set the JHJDS30 series oscilloscope from the menu bar. This chapter will introduce each function settings of the oscilloscope. The content of this chapter is as follows:

△ End connections
△ Automatic measurement
△ Display system
△ Vertical system
△ Level system
△ Trigger system
△ Storage system
△ Secondary system
△ Cursor measurement
△ Mathematical functions

2.1 End connections

As shown in figure 2-1: from left to right in the order:
CH1、CH2 OUT
For JDS3051A:
CH1：Analog channel
CH2：Digital channel
OUT：The output of signal generator

Figure 2-1 connection

For JDS3072E and JDS3082A
CH1 and CH2: Analog channel
OUT: The output of signal generator

2.2 Automatic measurement

JHJDS30 series handheld digital storage oscilloscope/oscillographic table has an automatic setting function.
ACcording to the input signal, automatically adjusting the voltage stall, time base, and triggering the best

way to form display."AUTO" is for automatically setting.

● If there is more than one channel signal, the channel with the lowest frequency signal as the trigger source.

● Found no signal, connect the channel 1 to a signal, press "AUTO" button.

2.3 Display system

Table 2-1 display system function menu

Function menu	Set	Instructions
Display type	Vector	Showed by means of connection between the sampling points
Display mode	Y-T	Display vertical voltage relative to the time scale (horizontal)
	X-Y	Display(**NO included in JDS3051A**)
Display brightness	Back-light	Can be set from 1 to 5
Color	/	Color or monochrome display
Language	/	Chinese or English

Display system Settings

1. The backlit Settings: press "MENU" button, find the backlight Settings, press "F5" key set the backlight, the brightness.

2. Language: press "MENU" button, find language setting, press "F2" setting language, can be set both Chinese and English display interface.

3. The color Settings: press "MENU" button, find the color Settings, press "F3" button to set the color, can be set color and monochrome display

4. Mode: press "MENU" button, find the mode setting, press "F1" setting mode, can be set Y - T or x-y mode display

5. Long press "MENU" button, can enter the instrument function interface, can choose by F1 ~ F5 select button. As shown in figure 2-2
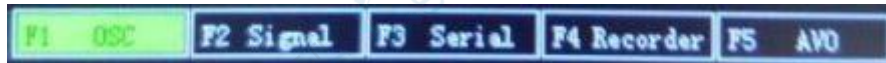
Figure 2-2 Instrument selection function interface

2.4 The vertical system

JHJDS30 series handheld digital storage oscilloscope, every channel has an independent operating menu. When press the CH1 and CH2 bond, the operating menu will be displayed at the bottom of the screen.

To change the CH1 and CH2 vertical Settings, follow these steps:

1. Press the CH1 and CH2 bond, function menu will be displayed at the bottom of the screen.
2. Press the F1 ~ F5 to choose various states.
Now you can see the below menu:

Figure 2-3 channel 1, 2 menu item

Table 2-2 in detail the function of each menu item

channel	CH1	channel 1
	CH2	channel 2
Display	On	Open the display waveform
	Off	Close display waveform
Probe	1X	Select one data according to the probe attenuation coefficient, to keep vertical deflection coefficient correctly.
	10X	
	100X	There are three types：1X、10X、100X
Coupling	AC	Stop the DC component of input signal
	DC	the AC and DC component of input signal
Invert	On	Open the inverse function
	Off	Close the inverse function

27

1.Set the channel coupling

Take signal to CH1 channel for example, measured signal is a square wave signal containing AC component.

● CH1, for example, enter a signal contains the DC component.
   Press the "CH1"→"F4" select Settings to AC. Only allow AC component to pass, DC component is filter. Waveform displays as shown in figure 2-4.

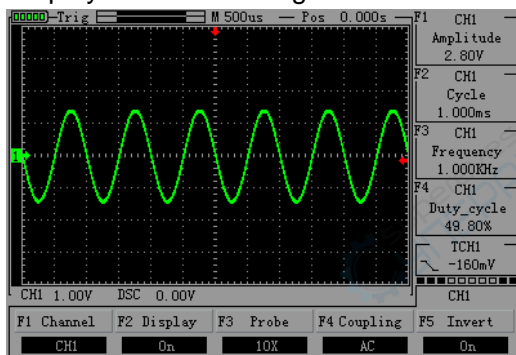● Press the "CH1"→"F4" select Settings to DC. AC and DC components are allowed to pass. Waveform displays as shown in figure 2-5.

Figure 2-4 Coupling AC
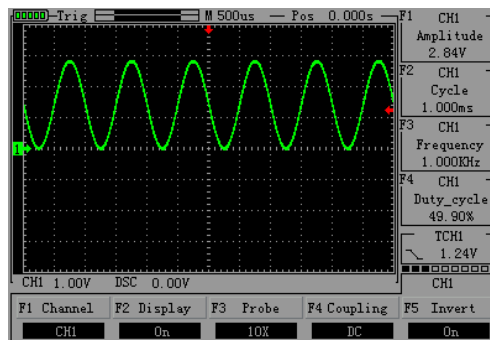
Figure 2-5 Coupling DC

2. Probe scale setting
To cope with the attenuation factor of the probe set, User need adjust the probe attenuation scale factor in channel operation menu. If the probe attenuation coefficient ratio is X10,Oscilloscope input channel ratio should be set to 10X, to avoid the display of information and measurement data errors occur.

Press CH1 and CH2 key, press the F3 choose appropriate Settings, the Settings will be saved to you to change the Settings again. As shown in figure 2-6

● Press "CH1"→"F3" set the probe for 10 x

3.Waveform reverse setting
● Press the "CH1"→"F5" will reverse phase can be set to "on" see waveform inverse, as shown in figure 2-7
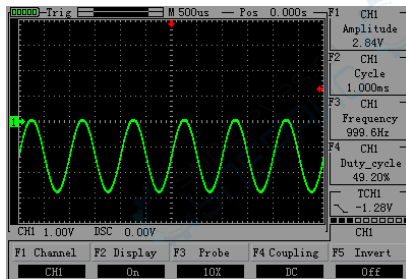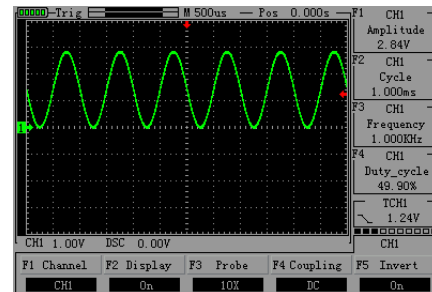

Figure 2-6 set probe 10 x

Figure 2-7 waveform inverse

4. Waveform display Setting
  By setting allows any channel of waveform display or not.
  For example: To set the waveform does not display the CH1
● Press "CH1"→"F2", set the CH1 channel does not display
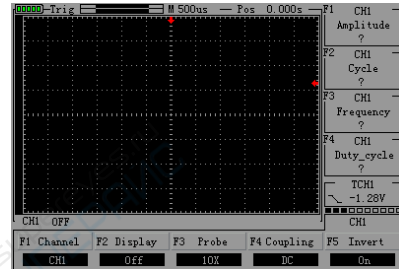 The waveform. As shown in figure 2-8

Figure 2-8

5 .Vertical volts/division adjustment setting
When adjusting the vertical volts/div, the range is 100mV/div-50V/div (probe 10X),Stepping way to 1-2-5,Or 10mV/div-5V/div (probe 1X), 1V/div-500V/div (probe 100X). Take the CH1 for example:
●If you set the vertical direction 2.00V/div, probe is set to 1 x gear as an example, Press " " to adjust the vertical v/case, at the same time can press" " to move the entire waveform up, down. As shown in figure 2-9
●If you set the vertical direction 1.00V/div, the steps in the above example. As Figure 2-10
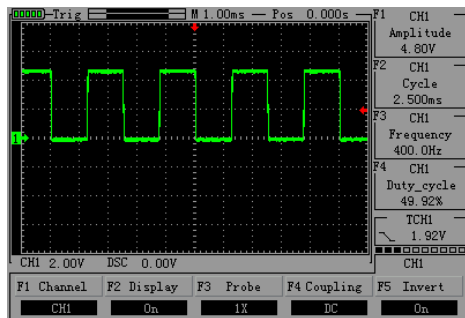●Set the waveform relatively level move up or down. As figure 2-11
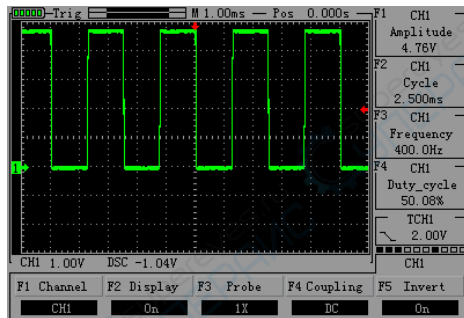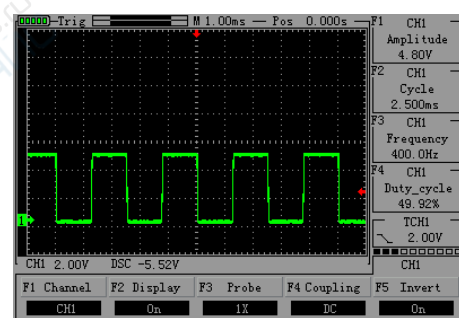
30

Figure 2-9 **Figure 2-10** **Figure 2-11**

2.5 Horizontal Systems

Horizontal System Set level scale and level trigger point position, level center of the screen calibration is waveform time benchmark (reference). Changing the horizontal scale causes the waveform relative to the screen center expansion or contraction,Change the horizontal position relative to the change point of the waveform trigger position.

the change of Horizontal position is to display waveform changed position relative to the level of trigger

31

point.
● Time base　（TIME/DIV）
　Use the buttons below to change the base size, base show horizontal on each of the big length of time
● Press the " " button to change the level of scale, in order to enlarge or reduce waveform. As shown in figure 2-12

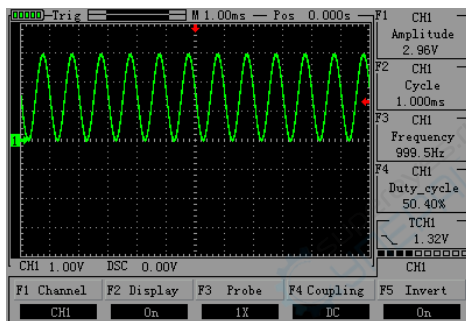If you want to stop the waveform acquisition, then press "RUN" button can be realized. As figure 2-13
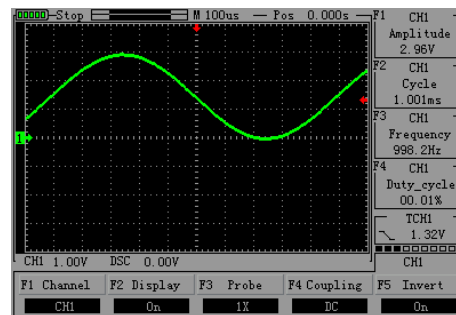

Figure 2-12

Figure 2-13

● Press the " ◁ ▷ " button to adjust the channel
waveforms of horizontal position. The amplitude changes
according to the change of the time base. As figure 2-14
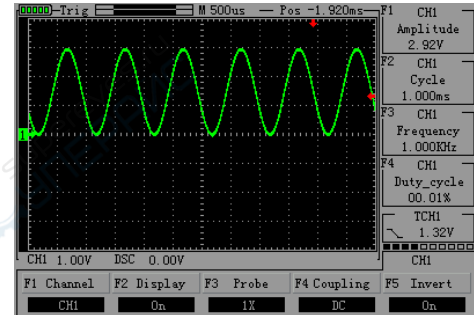
Figure 2-14

2.6 Trigger system

The trigger determines when the oscilloscope starts to acquire data and display waveforms. Once the trigger is set up correctly, it can convert the unstable display into meaningful waveforms. Trigger Control menu button ┌──────┐
│ TRIG │
└──────┘
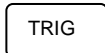
● Trigger Control

Trigger: The oscilloscope trigger mode is edge triggered.

●EdgeTrigger: When the edge of the trigger signal reaches a given level, trigger occurs. Edge trigger is triggered on the input signal edge trigger threshold. When "Edge", that is

33

input at the rising edge, falling edge triggered
Table 2-3 edge-triggered menu function table

Source	CH1	Set CH1 as trigger source.
	CH2	Set CH2 as trigger source.
slope	up	Select the trigger signal to trigger on the rising edge
	down	Select the trigger signal to trigger on the falling edge
triggered	automatic	Set in the absence of detectable also can collect waveform trigger conditions
	normal	Set only a triggering condition is satisfied only waveform
	single	Set capture a waveform when a trigger is detected, then stop

Instructions:
Set the source:
1, press "TRIG" to display trigger menu, according to the signal input, press "F1" choose "CH1" or "CH2".
Set the trigger level
2, press the "CH1" button, then pr⟨△⟩ "⟨▽⟩" button to adjust the lower left panel channel 1
 mark; Click "TRIG" and press "⟨▽⟩" button on the right side panel again adjusting trigger flag arrow, according to the trigger marks relative channel 1 position and the current vertical per division on behalf of the voltage value to set the trigger level size.

Set up the slope

3, Press "F3" button to choose the slope for the "up" or "down".
   Set the trigger mode:
4, press "F4" choose "automatic", "normal" or "single".
 As figure 2-15, 2-16
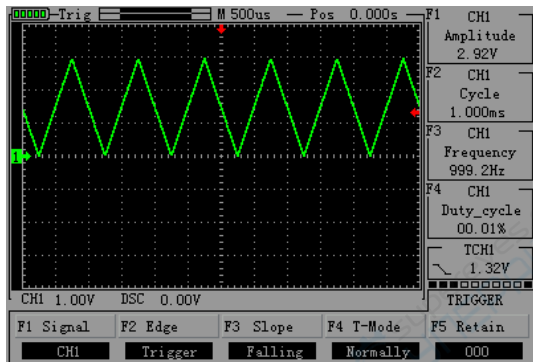
Figure 2-15 normal trigger
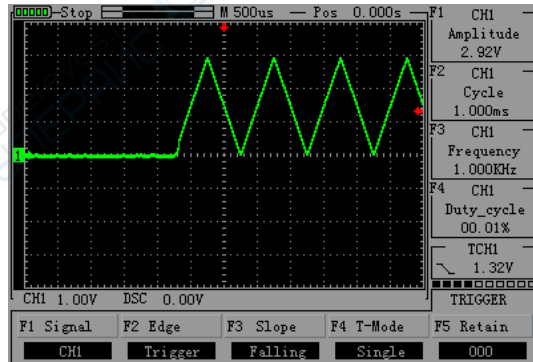
Figure 2-16 single trigger

35

2.7 The storage system

JHJDS30 series handheld digital storage oscilloscope can save two reference waveforms(Ref - A, the Ref - B)、six screenshots at internal memories

● First, find a screen shot interface by press "MENU"→"F4" Screen shot is set to "off"

● Reference waveform storage: press the "MATH" find reference waveform Settings→ "F1" Settings stored reference waveform Ref - A, then press "OK" button, which shows "SAVING" reference waveform is saved

● See the reference waveform: according to the "MATH"→"F1"→"F3" open the Ref - A reference waveform, as figure 2-17
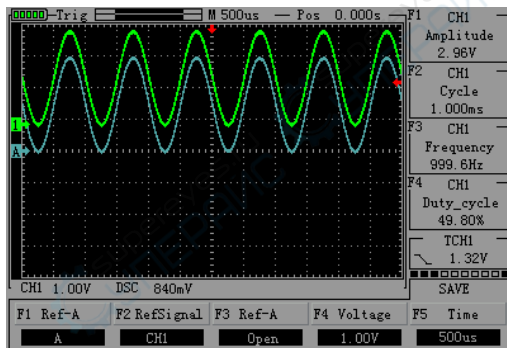
Figure 2-17

● Intercepting waveforms images: press "MENU" can be set to find the screenshot of the page - "F4" the screenshot is set to "on", then press "OK" to save screenshots, need to save a screenshot, press "F5" set the screenshots serial number. The waveform images used in this manual are from oscilloscope screenshots.

● Check capture images:

Turn off the oscilloscope first, and then connect the oscilloscope and computer with USB, and at the same time, press the "OK" button and "PRW" button let go when screen is bright; At this point, the computers will be prompted to have U disk inserted, open the U disk can see pictures of interception. After the operation, please click on the computer to exit the U disk mode, then disconnect the cable, long press oscilloscope "PRW" button to turn it off.

2.8 Auxiliary system

● Auxiliary function can be set by pressing the "MENU" key and F1 ~ F5 selection function key.
  "MENU" button pop-up auxiliary system function set MENU. Table 2-4

Table 2-4 auxiliary function table menu

The function menu	Directions

voice	Set the voice "on" or "off"
Automatic shutdown	Can be set up "ten minutes", "30 minutes after shutdown or" Never "(Never) to turn off
Save electricity	Can be set up for 20 seconds, "40 seconds," 60 seconds "and" enter power saving mode after the "300 seconds" or "Never" mode
Factory pattern to restore	Restore the factory Settings

Settings voice: press "MENU" find auxiliary function MENU page, → Press "F2" set the voice "on" or "off".
Set automatic shutdown: press "MENU" find auxiliary function MENU page, →Press "F3" set the automatic shutdown time.
Settings save electricity: press "MENU" find auxiliary function MENU page,→Press the "F4" set time to save power.
Set up the factory pattern recovery: press "MENU" find auxiliary function MENU page, press "F1" →"F5" the recovery of oscilloscope.

F1 Factory	F2 Sound	F3 Shutdown	F4 Lowlight	F5 Backlight
Reset	On	10min	Never	5
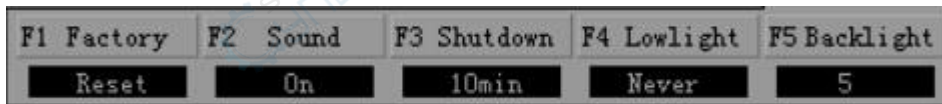
● MEAS：Press the "MEAS", the screen will display the current measurement menu

2.9 The cursor measurement

In this mode, the cursor X or Y way come in pairs, and can be manually adjust the spacing of the cursor. Reading is the measurement of voltage or time value. Manual cursor measurement, follow these steps:

● When using the cursor, needs to set the source into the channel you measure first. Press the "HORI"→"F2" select source channel (setting for CH1)

● Press the "F1" choose "time", "voltage" or "off"

● By clicking on the "◀", "▶", "▲","▼"button to adjust the cursor position. as figure 2-18.2-19
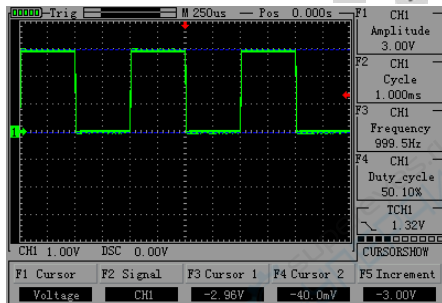
Figure 2-18
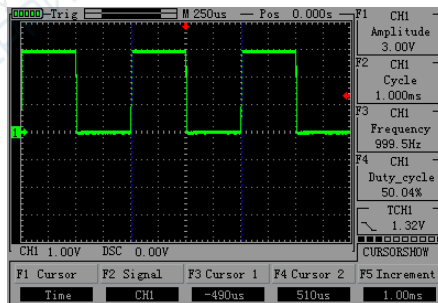
Figure 2-19

2.10 Mathematical function

Mathematical function is to display the function of addition, subtraction by CH1 and CH2 channel wave forms.

Table 2-5 math menu functions (No included JDS3051)

Function menu	set	instructions
Display	On or off	Set the waveform operation on or off
Operation	CH1+CH2	Channel 1 waveform + Channel 2 waveform
	CH1-CH2	Channel 1 waveform - Channel 2 waveform
	CH2-CH1	Channel 2 waveform - Channel 1 waveform

● Press the "MATH" button, then press "F2" set the display "on", press "F3" choosing operation mode.

Note: only dual-channel oscilloscopes JDS3072E and JDS3082A have this function.

The third chapter   Signal generator

This chapter mainly introduces the signal generator interface and how to use the signal generator. Signal generator interface is at a glance, it is also very convenient to operate. Content summary:

△ Introduction of user interface of signal generator
△ Signal generator operating instructions
△ Custom waveform of signal generator

Table 3-1 generator parameters

waveform	frequency	amplitude	The offset	Duty cycle
Sine wave	1HZ～20MHZ	100mV～4V	±2V	/
Square wave	1HZ～5MHZ	100mV～4V	±2V	0%～100%
Triangle wave	1HZ～1MHZ	100mV～4V	±2V	/
Oblique wave	1HZ～1MHZ	100mV～4V	±2V	/
Custom waveform	1HZ～1MHZ	100mV～4V	±2V	/

3.1 Introduction of user interface of signal generator

1.waveform
2.frequency
3.amplitude
4.offset
5.Duty ratio
6.display frequency

7.display amplitude
8. display duty cycle
9. display offset
10. display the waveform
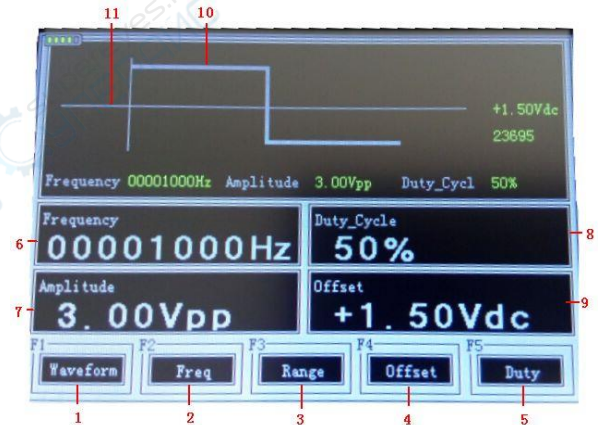11.x, y coordinate

Figure 3-1 signal generator interface

3.2 Signal generator operating instructions

● Select signal generator: press "F2" select "signal generator" after boot; can also long press "MENU" into function selection MENU interface of the oscilloscope, when the oscilloscope in other operating interface, then press "F2" choose "generator".

● After entering the signal generator interface, operate signal generator formally as follow

① Set the waveform type: press "F1" button to choose the signal waveform which needed, each time you press "F1" can switch a waveform and displayed on the screen, choose one of waveform, press "OK" to confirm.

② Set frequency: press "F2" button and then use'▲▼◀▶" button to adjust the frequency size, after setting, press" OK "to confirm.

③ Set amplitude: press "F3" button and then use '▲▼◀▶ button to adjust the amplitude size, after setting, press" OK "to confirm.

④ Set offset: press "F4" key and then use"▲▼◀▶' button to set the offset size, after setting, press" OK "to confirm.

⑤ Set the duty cycle: press "F5" key and then use "▲▼◀▶ button to adjust the size of duty ratio, after setting, press" OK "to confirm.

● After setting waveform parameter, can observe the waveform from signal generator output through the oscilloscope. For example, it sets an "+ 1.50" offset, "3 v" amplitude, 1KHZ frequency triangular wave, as figure 3-2: (Duty cycle is only valid for square wave)

Figure 3-2

43

3.3 Custom waveform of signal generator

● Instruction of custom waveform parameters, as table 3-2

Table 3-2 custom waveform parameters format

Text parameter format	Instruction
Waveform version information	14020 28007 00001 this three data represent the version information of waveform, each must have it before customized
Waveform amplitude value	For example: 00300 stand for waveform amplitude is 3 v, the amplitude values can be manually modified
The wave offset	For example: 00150 stand for offset + 1.5 V, the first character stand for plus or minus, 0 is plus and 1 is minus, the last four characters is offset, can be manually modified
Waveform duty ratio	For example: 00050, stand for waveform duty ratio is 50%, can be manually modified
Coefficient of frequency division 1	Formula: (((125000 * 0 xa3d)/(65536 * 2)) * 25)/frequency + 1
Coefficient of frequency division 2	Formula: ((frequency * (points + 1) * (coefficient of frequency division 1) * 65536 * 2) / 25000) / 250000
Points	Formula: ((u32) ((u32) (((250000 * 0 xa3d)/(65536 * 2)) * 25000)/frequency)/frequency division coefficient of 1) - 1
Data	Points out, according to the points to fill in the corresponding values

● Custom waveform instructions

① Create a new text document, write the calculated data into text according to table 3-2 format and save, copy the text documents into the oscilloscope. The oscilloscope has two custom waveforms, can enter the oscilloscope USB interface to view waveform parameters in text document BX1, BX2.

② Enter into the signal generator interface, press the " '->" ' or " ' button to call a stored custom waveform, see the waveform after long press" MENU "-> press" F1 "into the oscilloscope interface, can be displayed custom waveform.

The fourth chapter Multimeter function is introduced and the operation

this chapter introduces the oscilloscopes multimeter functions gradually, provides a basic operation on menu and use examples. Multimeter use 4 mm safety rubber socket input, 10 a, mA, COM, V Ω input terminals.

Content summary:

△ Multimeter interface introduction

△ Multimeter instructions

4.1 Multimeter interface introduct
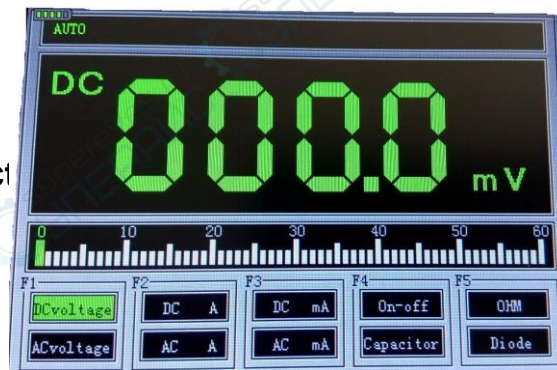
Figure 4-1 multimeter interface

Note: JDS3072EA has no this function

Table 4-1 Multimeter Range

Measuring type	Range					
DC voltage	600.0mV	6.000V		60.00V	600.0V	1000V
AC voltage	600.0mV	6.000V		60.00V	600.0V	750V
DC current	60.00mA/600.0mA			6.000A/10.00A		
AC current	60.00mA/600.0mA			6.000A/10.00A		
resistance	600.0 Ω	6.000Ω	60.00kΩ	600.0kΩ	6.000MΩ	60.00MΩ
capacitance	40.00 nF	400.0nF	4.000uF	40.00uF	400.0uF	4000uF
diode	0V～2.0V					
On and off	Below 30 Ω in 600.0 Ω gear detection, sounding					

Note: capacitance test need to contact with both ends of capacitance for 30 s

4.2 Multimeter instructions

Table 4-2 multimeter operation keys function description

keys	instructions
F1	Select "DC voltage" shortcut key, AC voltage, DC voltage switch button
F2	Select the "DC A" shortcut key, "DC A" "AC A" switch button
F3	Selected "DC mA " shortcut key, "DC mA", "AC mA" switch button
F4	Select the "on-off" shortcut key, "on-off", "capacity" switch button
F5	Selected "resistance" shortcut key, "resistance" and "diode" switch button
RUN	Multimeter run/maintained (HOLD) button
▲	Press set to manual, range can be set by this button
AUTO	Press set to automatic

1. DC and AC voltage measurement

① Connect black pens with "com "terminal of the instrument, red pens connect "VΩ"terminal .

② Long press "PRW" button of ScopeMeter to boot and then press "F5" button (or if the oscilloscope in other interface ,holding down the "MENU" button then press "F5") to switch to the multimeter function interface.

③ Press the "F1" button to select the DC voltage, or press the "F1" once again and switch to the "AC voltage".

④ Connect the test pen to voltage or power supply under test, the display value can be read.

At the same time, the red pens polarity can also be read by the value of the positive and negative through the LCD display (when measure voltage non-polarity display) the instrument defaults to "automatic" range.

2.DC and AC current measurement

① Press "F2" or "F3" , adjust to the required range

② Connect black pens with "com "terminal of the instrument, red pens connect "mA"terminal, the Max. input current is 600 mA for this terminal.

③ Put the test pen into the circuit under test to read values.

Note: if the current signal under test is unknown before unmeasured, please press "F2" to gear to the "DC A" or "AC A".

3.On and off test

① Connect black pens with "com "terminal of the instrument, red pens connect "VΩ"terminal .

② by pressing the "F4" button to select "on-off" file.

③ when the test less than 30 Ω resistance or lines, buzzer alarm.

4.Capacitance measurement

① Connect black pens with "com "terminal of the instrument, red pens connect "VΩ"terminal .

② by pressing the "F4" key to switch to the "capacity".

③ Connect the test pens to two ends of the capacitor and stay for about 30 seconds, the capacitance value can be read.

5.Resistance measurement

① Connect black pens with "com "terminal of the instrument, red pens connect "VΩ" terminal.

(2) Press "F5" button to select "resistance".

(3) Connect the test pens to two ends of the resistance, the display, value can be read, range also can be set manually if necessary.

6.Diode measurement

① Connect black pens with "com "terminal of the instrument, red pens connect "VΩ" terminal

(2) Press "F5" key to switch to the "diode" file.

(3) Connect the test pens to two ends of the **Diode or lines under test**, read value. (measured diode reading is for diode conduction voltage drop)

Note:

A. The instrument shows a forward and reverse pressure drop, when the diode is reverse connection, instrument value is negative.

B. Diode and on-off range default are "automatic", no manually range.

C. When testing on and off, to ensure "voices" has been open, otherwise, the buzzer will not sound.

Settings can according to the following steps:

Long press "MENU" button, then press "F1" into the interface, and then press the "MENU" button, find the voice operation MENU, press "F2", set voice "on".

7. **Data remain functional**
Press the "RUN" button on the instrument, the data will remain being displayed on the screen, screen displays the word "HOLD", even if the input signal change or eliminate, value will not change.
Note 1: when using a multimeter to measure, the oscilloscope probe do not be grounded!
Note 2: please select correct measuring gear and measured again after range!

The fifth chapter   The recorder and serial port center using

This hand-held oscilloscope not only has signal generator function, also integrated with recorder and serial port center function, greatly convenient for all aspects of customer's demand. Recorder can record the waveform automatically and display on the screen. This chapter's main content is as follows:
△ The use of the recorder
△ Serial center operations

5.1 The use of the recorder
● First enter into the recorder interface: press the "PRW" button, press "F4" key to enter the recorder interface after boot (can be long press "MENU" -> "F4" if the oscilloscope in other interface). Figure 5-1
● Enter the interface, the horizontal line in the middle of screen is in the state of moving from left to right,

connect the probe to the oscilloscope, and then contact to the signal recorded, press "F3" can enter into record state, then press "F1" button to stop recording.

● After recording the waveform, can press "F5" to playback waveform record. As figure5-2

Note: the range of recorder to record waveform frequency is below 20 Hz waveform, waveform can be displayed when adjust the time base for above 100 ms manually in oscilloscope interface.
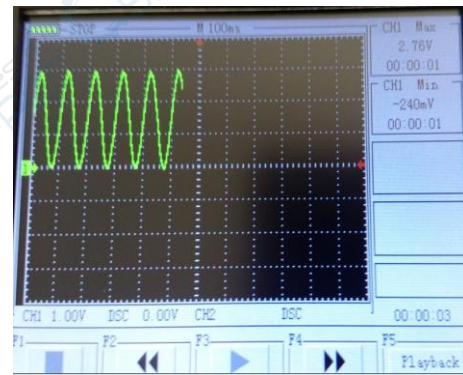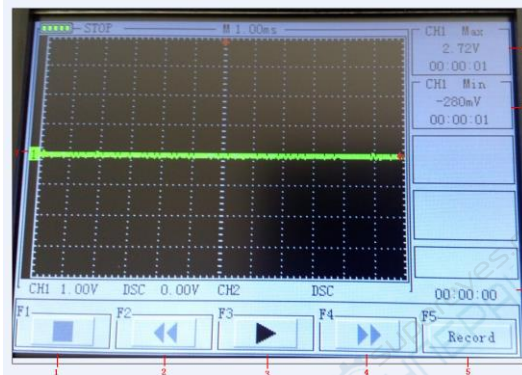
5-1 The recorder interface   **5-2   Record playback**

5.2 Serial port center operation

●First enter into the oscilloscope interface: press the "PRW" button, press "F1" key to enter the oscilloscope operation interface after boot, and then press "CH2" -> "F3" set gear to 1 x. (this step is very important)
● Set probe gear to 1 x.
● Enter into Serial port center interface: long press "MENU" -> "F3". Menu interface is as follows:

Serial port center menu page（page1/2）
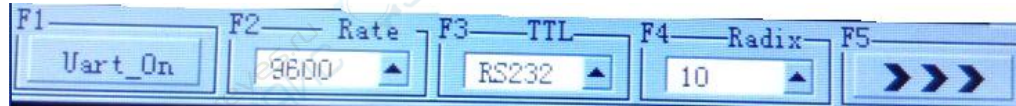
Serial port center menu page（page2/2）
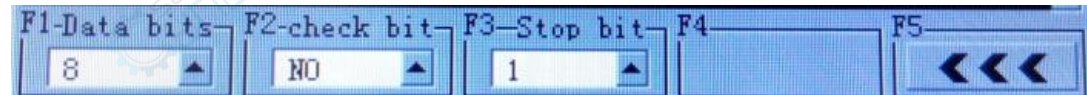
Table 5-1

Menu item		Instructions
Serial port	Serial port on, or off	Open or close a serial port
Baud rate	1200~115200	Set the serial port baud rate, can be set to 1200 ~ 115200 a total of 10 kinds of baud rate
TTL	RS232、TTL	Set the communication level mode
decimal	10 16	Set the data type
》》》	/	Turn to next page of menu
Data bits	8 9	Set the data transmission digits
parity bit	NO ODD EVEN	Set the parity bit
Stop bit	1 0.5 2 1.5	Set the stop bit
File	SAVE NOSAVE	Set to save or not save the file
《《《	/	Turn to the previous page of menu

● Simple test

Here simply test the data from the computer serial port, the operation is as follows:

（1）Open the computer "serial master " serial debugging tools, set the baud rate to 9600, 8 bits, NO parity bit, stop bit 1, send data "11 22" in hexadecimal. As figure 5-3

(2) set serial port same as (1), select parameters by one of F1 ~ F5 menu items, then by pressing the "　　" or"▼",　 finally press the" OK "key.

（3）Open the computer serial port, and set to cycle send (here set sending per 1000 ms), press "F1" key to open the serial port serial center, at this point can observe the data "11 22" in hexadecimal through computer serial port from the display window. As figure 5-4
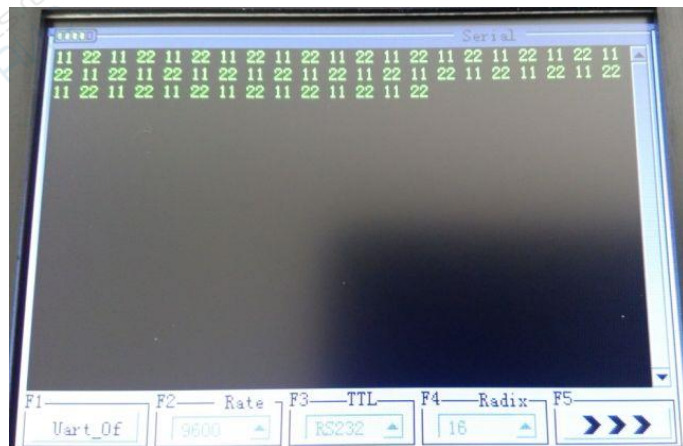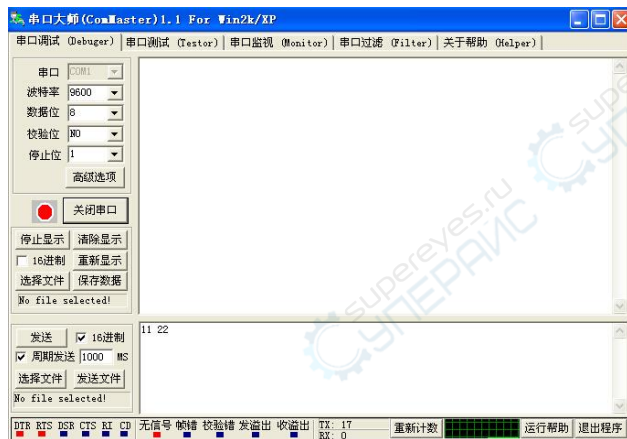
Figure 5-3 serial port master   **Figure 5-4 serial center interface**

The sixth chapter   Application Examples

6.1 Simple signal measurement

Measure an unknown signal in circuit, display and measure the signal frequency and amplitude rapidly.
● To quickly display the signal, please do the following steps:

（1）Set the probe menu attenuation coefficient as 10X, and switch the probe to 10X., connect the probe to the oscilloscope channel 1 (CH1).

（2）Long press "PRW" button, then press "F1" to enter the oscilloscope (or if the oscilloscope in other functional interface, press "MENU" -> "F1").

（3）Connect probe clamp to circuit, CH1 probe connect to the circuit.

（4）Press the "AUTO" button.

Digital storage oscilloscope is automatically set to waveform shows best. Based on this, you can further adjust the vertical and horizontal gear of waveform, until the waveform display meet your requirements.

● For automatic measurement signal voltage and time parameter

Digital storage oscilloscope can be automatic measurement for most display signal, to measure the signal frequency and peak value, please do as the following steps:

（1）Press the "AUTO" button, can quickly measure the current waveform.

（2）Press CH1 button to turn page ,can observe frequency and peak values.

At this point, the frequency and peak values measured values are displayed on the screen on the right side position. As shown in figure 6-1

6.2 The cursor measurement

The digital storage oscilloscope can measure a variety of waveform parameters automatically. All of the automatic measurement parameters can be measured by the cursor. Use the cursor can measure waveform on time and voltage quickly .

57
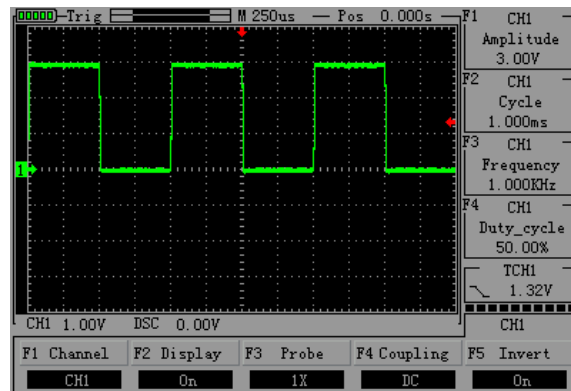
● Measuring peak voltage of the square wave signal   **Figure 6-1 square wave**

CH1 channels, for example, to measure the square-wave signal peak voltage, please do as the following steps:

(1)Press the "HORI" button to enter the main base state of the cursor Settings.

(2)Press "F1" button sets the cursor type to "voltage", press "F2" button to set the source to the CH1.

(3)You can see the cursor 1 and 2 cursor location through the cursor display window (relative to the middle of zero voltage horizontal reference) and increment (the differential pressure after the cursor 2- cursor 1).

(4)By " ◀ "," ▶ "button to adjust the position of the cursor 2" ▲ ', " ▼ ' buttons to adjust the position of the cursor 1.And the position change and increment will update and display in cursor display window. You can see two green lines. As shown in figure 6-2, 6-3
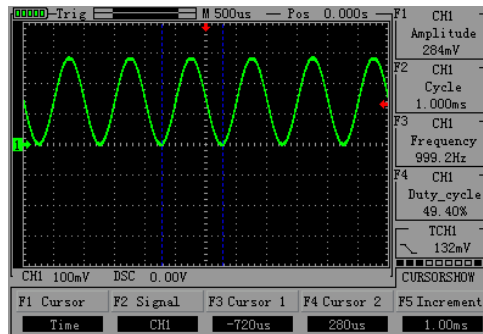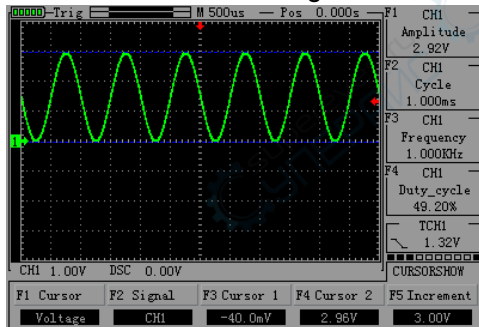

58

Figure 6-2 cursor measure time

Figure 6-3 cursor measure voltage

6.3 Capture the Single Signal

The advantages and characteristics of digital storage oscilloscope is that could easily capture pulse, burr and other non periodic signal, if capture a single signal, you need to have certain prior knowledge for the signal first, then could set the trigger level and trigger along. If you are uncertain about the signal, you can look at trigger by automatic or normal way, to identify the trigger level and trigger along.

Steps are as follows:

● As aforesaid set probe and CH1 channel attenuation coefficient to 10 x.

● Set the trigger:

(1) Press CH1 - press "F3" button, set the coupling to the "DC".

(2) Press "TRIG" button, display the edge-triggered menu Settings.

(3) Under this menu, press "F1" set edge type for the "slope", press "F2" button to set the source to the CH1, press "F3" button to set the trigger mode for the "single".

(4) Press the "RUN" button, the left upper corner of the screen shows "Ready", waiting for the signal to conform to the trigger condition. If a signal reach the trigger condition, sampling once time, displayed on the screen. Using this function is easy to catch a sudden things, for example, the sudden low level: sets the edge trigger to drop along the trigger, press

59
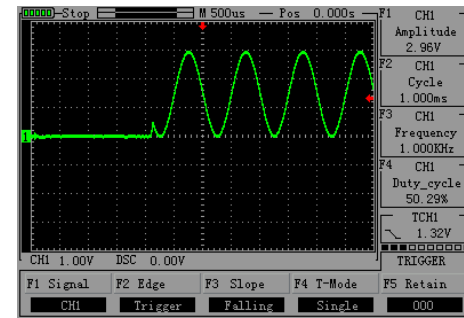
"RUN" button to start waiting, when there is a low level occurs, the machine will automatically trigger and record waveform before and after a period of time of trigger. It can change the horizontal position of triggered location by "HORI", then get negative delay trigger of different lengths, it is advantageous for the observation of high level before and after the waveform. As shown in figure 6-4

6.4 Serial port center print uclinux starting information

This example introduces using oscilloscope serial print center uclinux startup information. First of all, enter into the oscilloscope interface set channel 2 (CH2) to X1, then connect probe to CH2, clamp to serial port GND, probe to serial port TXD. Finally, enter the center of serial port set baud rate to 115200, set the data to decimal and opens serial port. When starting the uclinux system, you can observe serial print uclinux startup information in the screen of oscillograph. As shown in figure 6-5
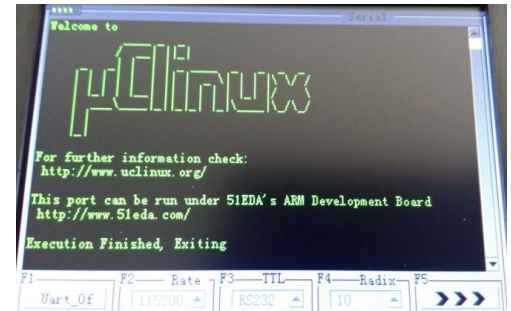
Figure 6-5

6.5 Generate sine wave signal

This handheld digital storage oscilloscope with function signal generator, the signal generator can produce sine wave, square wave, triangle wave, oblique wave four kinds of wave shape. Will introduce signal generator generate sine signal (3 v, 1 KHZ) .Steps are as follows:

①Long press "PRW" button, then press "F2" into the signal generator interface (or if the oscilloscope in other functional interface, long press "MENU" -> "F2")

② Enter the operation interface, press "F1" set the waveform type, set sine wave.

③ Press "F2" button, and then by pressing the " ▲ ▼ ◀| |▶ " button to adjust the signal frequency size and press the" OK "key, set 1 KHZ.

④ Press "F3" button, and then by pressing the " ▲ ▼ ◀| |▶ "button to adjust the signal amplitude size, press" OK "button, set 3 v

⑤ Press "F4" button, and then by pressing the " ▲ ▼ ◀| |▶ " button to adjust the signal offset, press" OK "button, set + 0.00.

After all set, finally shows the waveform as figure 6-6, figure 6-7:
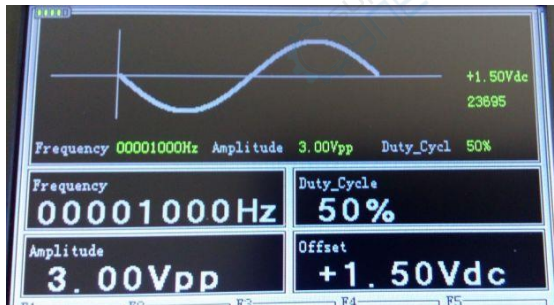
61
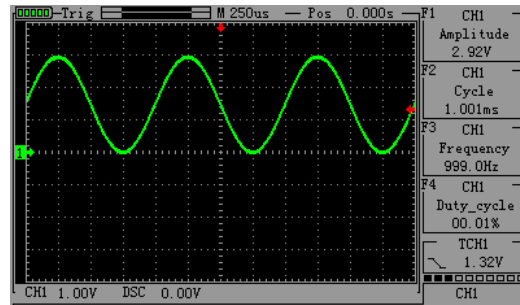
Figure 6-6 generate sine wave   **Figure 6-7 sine wave**

6.6 Use Multimeter to measure DC voltage

● Using automatic (AUTO) to measure DC voltage

　① Long press "PRW" button, then press "F5"
　　into the multimeter interface(Or if the oscilloscope
in other functional interface, long press "MENU" -> "F5")

　② Press the "F1" button to select "DC voltage".
　③ Connect multimeter pens and the DC voltage under test.
　　As shown in figure 6-8
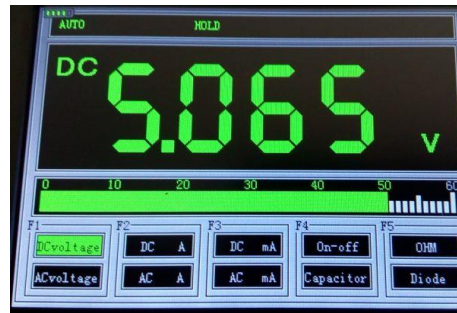
The seventh Chapter System prompts and troubleshooting

7.1 Prompting Message

SAVEING：When stored waveform or screenshot, the system will have the prompt show, and in the middle of the screen has a progress bar.

CLOSING: After startup when long press "PRW", when the battery is too low, or when to oscilloscope set off time, system will have the prompt, and in the middle of the screen has a progress bar.
USER1 RUNNING: Waveform signal generator can run
USER3 NO FILE: Signal generator no have waveform file

7.2 Fault handling

1. If you press the "PRW" oscilloscope still have black screen, no any display, please follow the steps below:
(1) Open the instrument battery back cover, and check whether there is a battery power supply or leakage, bilge gas, etc
(2) if you have a multimeter, can measure the lithium battery voltage on both ends (not lower than 3.0 V is normal)
(3) When finished check, restart the instrument.
(4) If this product still can't use normally, please contact us.
2. After collecting signal, the signal waveform does not appear in the picture, please follow the steps below:
(1) Check whether the probe is normal connection on the signal cables.
(2) Check whether signal cable is normal connection on the BNC.
(3) Check whether the probe is normal connection to object under test.
(4) Check whether the object under test has signal.

(5) Collect the signal again.

3. the measured voltage amplitude value is 10 times greater or smaller than the actual value 10 times:

Check whether the channel attenuation coefficient is consistent with actual use of probes attenuation ratio.

4. Waveform can display, but can not be stabilized:

Check whether trigger source set of triggering menu is consistent with the actual signal input channel.

5. Press the "RUN" button without any display:

Check whether the trigger mode of trigger menu is in a "normal" or "single", and whether the trigger level is beyond waveform range. If yes, make trigger level in center, or set the trigger mode to "AUTO".

6. Waveform display in ladder shaped:

This phenomenon is normal. Maybe the level time base gear is too low, increase the level of time base can improve horizontal resolution, can improve the display.

The eighth Chapter Service and support

8.1 Warranty description (JHJDS30xx series handheld digital storage oscilloscope)

We guarantee the production and products on sale will not appear material and process defects within two years from the delivery date by authorized dealer. If it is proved defective in the detailed rules of product

warranty, we will supply repair or replacement service.

Except for the warranty in the profile or usage guarantee, we do not make any express or implied warranty, including but not limited to implied warranties of merchantability and special applicability. Our company is not responsible for indirect damage, special damage, or damage caused by this.

Appendix A: technical specifications

Unless otherwise specified, all technical specifications are used to set the attenuation switch as 10 x of the probe and the series oscilloscope. To verify the oscilloscope is in line with the technical specifications, the oscilloscope must meet the following conditions:

● Oscilloscope must run continuously more than thirty minutes within the specified operating temperature.

● If the operating temperature range reach or exceed 5 degrees, must be calibrated, except for the specifications marked "typical", all specifications are guaranteed.

● The oscilloscope must belong to the factory calibration period.

Notice : JDS3072E has no multimeter, and bandwith is 70MHz. The others Parameters are same with JDS3082A

Technical specifications

	JDS3051A	JDS3082A/JDS3072E

Oscilloscope		
The max sampling rate	250 MSa/s	500MSa/S
Analog Channel	1	2
Digital Channel	1	NO
Bandwidth	50MHz	80MHz / 70MHz
The vertical resolution	8bits	8bits
Vertical sensitivity	10mV-5V (Probe 1X); 100mV-50V(Probe 10X); 1V-500V(Probe 100X);(1,2.5,5 Stepping)	10mV-5V (Probe 1X); 100mV-50V(Probe 10X); 1V-500V(Probe 100X);(1,2.5,5 Stepping)
The input impedance	1MΩ 25pF	1MΩ2%, 20±5pF
Input coupling	AC、DC	AC、DC
Display mode	Y-T	Y-T;X-Y

Input voltage	40V (Probe X1); 400V(Probe X10); 4000V(Probe X100)	40V (Probe X1); 400V(Probe X10); 4000V(Probe X100)
The time base	10ns-50ms(1,2.5,5 Stepping) ; 100ms-5s(Scan)	10ns-50ms(1,2.5,5Stepping) ; 100ms-5s(Scan)
The storage depth	16k	16k per channel
Trigger mode	Automatic , normal and single	Automatic , normal and single
Trigger type	The rising edge, falling edge	The rising edge, falling edge
Automatic detection	Support(50Hz-60MHz）	Support(50Hz-60MHz）
Mathematical operations		CH1+CH2, CH1-CH2, CH2-CH1
Measurement	The peak to peak value,duty cycle, period,frequency, max ,min, average,root mean square	The peak to peak value,duty cycle, period,frequency, max ,min, average,root mean square
Cursor	Time, voltage	Time, voltage

Multimeter		
The full scale reading	6000 count	6000 count
DC voltage	60.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V.	60.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 1000V.
AC voltage	60.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 750V.	60.00mV, 600.0mV, 6.000V, 60.00V, 600.0V, 750V.
DC current	60.00mA/600.0mA, 6.000A/10.00A.	60.00mA/600.0mA, 6.000A/10.00A.
AC current	60.00mA/600.0mA, 6.000A/10.00A.	60.00mA/600.0mA, 6.000A/10.00A.
Resistance	600.0Ω, 6.000kΩ, 60.00kΩ, 600.0kΩ, 6.000MΩ, 60.00MΩ	600.0Ω, 6.000kΩ, 60.00kΩ, 600.0kΩ, 6.000MΩ, 60.00MΩ
Capacitor	40.00nF, 400.0nF, 4.000μF, 40.00μF, 400.0μF, 4000μF (keep 30s on cap if using this function).	40.00nF, 400.0nF, 4.000μF, 40.00μF, 400.0μF, 4000μF (keep 30s on cap if using this function).

Diode	0V~2.0V.	0V~2.0V.
On-off detecting	In 600Ω gear detection, buzzer when less than 30 Ω	In 600Ω gear detection, buzzer when less than 30 Ω
The signal generator		
Frequency	Sine wave (1Hz-20MHz), Square wave (1Hz-5MHz), Triangle wave/Skew wave (1Hz-1MHz)	Sine wave (1Hz-20MHz), Square wave (1Hz-5MHz), Triangle wave/Skew wave (1Hz-1MHz)
Duty cycle	0% - 100%	0% - 100%
Amplitude Offset +\- 0V - 2V	100mV - 4V	100mV - 4V
Offset	+\- (0V - 2V)	+\- (0V - 2V)
Serial port center		
Baud rate	115200 - 1200	115200 - 1200

Data bits	8 ,9	8 ,9
Parity bit	NO ， ODD， EVEN	NO ,ODD, EVEN
Stop bit	1，0.5，2，1.5	1, 0.5, 2, 1.5
Hex	10， 16	10 , 16
Recorder		
Time base	100ms - 5s	100ms - 5s
Recording time	Record a group of waveform every second,it can most record 10mins	Record a group of waveform every second,it can most record 10mins
Others		
Screen	4.3 inch, 16 bit true color, TFT 400*272,	4.3 inch, 16 bit true color, TFT 400*272,
Language	Support Chinese , English and Russian	Support Chinese , English and Russian

Certificate	CE , FCC	CE , FCC
The standard of charger	European standard or Amercian standard	European standard or Amercian standard

Appendix B: Daily maintenance and cleaning

Daily maintenance

Please do not store or place your instrument in where the LCD display will be exposed to direct sunlight for a long time.
Please do not let the instrument or probe touch spray, liquid and solvent, in order to avoid the instrument and probe damaged.

Please charge battery in time when the battery is finished using.

Cleaning

Examine instruments and probes usually according to the operation situation. Please clean the surface of instrument as following steps:

1. Use soft cloth to wipe the dust out of the instrument and probe. When clean LCD screen, be careful not to scratch the transparent plastic protective screen.

2. Use a piece of wet soft cloth but not dripping to wipe instrument, please remove the battery before wiping. Use downy detergent or clean water to scrub. Do not use any corrosive chemical reagent, to avoid damage to the instrument and probe.

Warning: Before reinstalling the battery, please make sure the instrument is completely dry to avoid the damage of electrical short circuit caused by moisture to instrument.