Table of Contents

Safety Information

Please review the following safety information to avoid injury and to prevent damage to the DS-1000 or any equipment connected to it.

Symbol definitions:

	This symbol indicates that the manual should be referred to.
⚠ **WARNING**	WARNING denotes that, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning until the indicated conditions are fully understood and met.
⚠ **CAUTION**	CAUTION denotes that, if not correctly performed or adhered to, could result in damage to or destruction of the DS-1000. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.
NOTE	NOTE denotes to refer to the manual, which provides operational information of which the user should be aware.

⚠ WARNING

- **Do not operate without cover(s) or panel(s).**
  Do not operate the DS-1000 with any cover(s) or panel(s) removed. This may result in electric shock or fire hazard if any part(s) inside is touched.

- **Use USB2.0 power only**
  The DS-1000 is and **should be** powered by the PC's USB2.0 port. Use **only** the DS-1000 USB cable within the DS-1000 soft case to connect to the PC's USB2.0 port.

- **Do not operate in an explosive environment.**

- **Do not operate in wet or damp conditions.**

- **If there is smoke, abnormal smell or abnormal sound, unplug the USB cable from the DS-1000 immediately.**

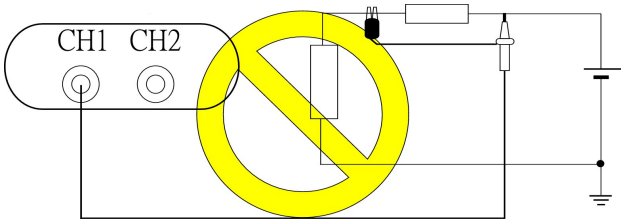
- **Do not modify or operate the DS-1000 if there is any suspected damage; have it inspected by qualified service personnel.**

⚠ WARNING

- **Connect the Probe Properly**

  The probe ground lead is at ground potential. Do not connect the ground lead to an elevated voltage. Connect the ground lead of the probe to earth ground only.

Prohibited



  Do not connect or disconnect probes or test leads while they are probed to a voltage source.

- **Use an attached USB cable**

  DC +5V is supplied by the USB port of the PC. Do not apply power from other power source.

⚠ CAUTION

- **Observe ALL Terminal Ratings.**

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

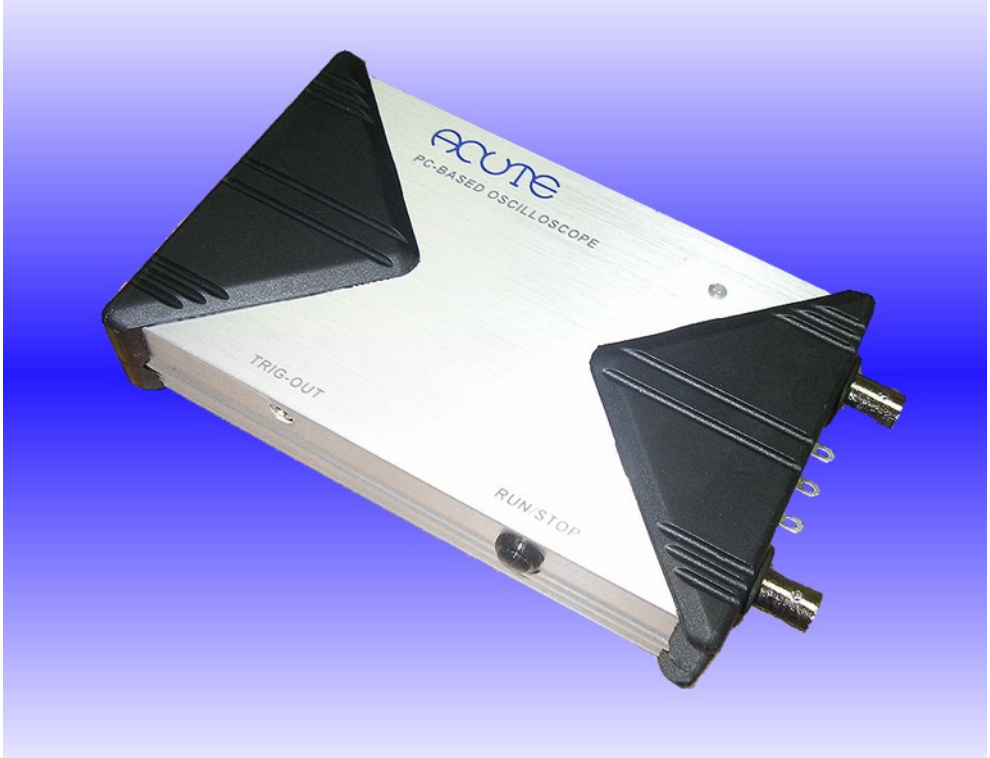
- **Do not operate in the following environments**
  - In direct sunlight.
  - In extremely hot and/or humidity areas.
  - With constant mechanical vibrations.
  - In areas with strong lines of magnetic forces or impulse voltage.

- **If not using the DS-1000 for an extended period, remove the USB cable from it.**

Chapter 1

Introduction

What is the DS-1000 series digital storage oscilloscope?



The DS-1000 series is a PC-based, pocket-sized digital storage oscilloscope (DSO) designed and manufactured by Acute Technology Inc. It has three models: DS-1002, DS-1102, and DS-1202 with the same functionality as its stand-alone peers. Detailed specifications are listed on the next page.

Easy to carry: It is very portable; notebook co-operability makes mobility easy.

Easy to use: Leverage the storage capacity and power of applications within a PC/Notebook.

Packing list

	Item	DS-1000
1.	Pocket-DSO mainframe	1
2.	250MHz probes (1x/10x)	2*
3.	Probe accessory pack	2
4.	USB A-B cable	1
5.	Installation CD	1
6.	Quick Manual	1
7.	DSO soft case	1

1.	2.	3.	4.	5.
				

*** DS-1002 provides 2 100MHz probes (1x/10x).**

Specifications

DS-1000 Specifications

Acquisition	
Mode	Real-time sampling, Equivalent sampling, Roll mode, Average, Envelope
Input	
Input Coupling	AC, DC, GND
Input Impedance	1MΩ±1% // 21pF±5%
⚠Max. Input Voltage	42Vpk (DC + AC peak)
Vertical	
Channel	2 (**DS-1202** allows stacking of up to max. 6 channels.)
Vertical Resolution	9 bits /channel @ 5mV/DIV- 10V/DIV (8 bits @ 2mV/DIV)
Sensitivity	2mV/DIV to 10V/DIV (as 2-5-10 step)
Bandwidth	**DS-1102**, **DS-1202**: DC to 200MHz **DS-1002**: DC to 100MHz
Bandwidth Limitation	Approx. 20MHz
Range	8 divisions
Offset Level	±4 divisions
Offset Increments	0.1 division
DC accuracy	±3%
Time Base	
Sampling Rate	**DS-1102**, **1202**: Real-time sampling: 200MS/s @ 1Ch, 100MS/s @2Ch(Single Shot) Equivalent sampling: 5GS/s (Repetitive) **DS-1002**: Real-time sampling: 100MS/s @ 1Ch, 50MS/s @2Ch(Single Shot) Equivalent sampling: 2.5GS/s (Repetitive)
Time Base Range	2ns/DIV to 10s/DIV (as 2- 5-10 step)
Accuracy	100ppm
Range	10 Divisions
Delay Trigger	320 Divisions (DS-1002, 1102), 2,560 Divisions (DS-1202)
Time Resolution	200ps
Record Length	**DS-1002**, **1102**: 2k points/channel to 64k points/channel **DS-1202**: 2k points/channel to 512k points/channel Roll Mode: 32k points/channel (Log Length = Hard Disk limitation)
Trigger	
Type	Rising, Falling, Delay-Trigger, TV-Trigger (**DS-1002** no TV trigger)
Mode	Auto, Normal and Single (***with RUN/STOP hardware button on the DSO device***)
Source	CH1, CH2, Ext-Trig
Coupling	DC, HF rejection
Sensitivity	5mV/DIV~10V/DIV=1div, 2mV/DIV=1.5div
Trigger Level	±4 divisions
Trigger Increments	0.1 division
Measurement and Processing	
Special function	Auto set, Monitor from Internet (TCP/IP)

Measurement	Vpp, Vmax, Vmin, Vamp, Vtop, Vbase, Vupper, Vmiddle, Vlower, Vmean, Vrms, Positive overshoot, Negative overshoot, Period, Frequency, Pulse width
Cursor	Time difference, Voltage difference
Math	Add, Sub, Multiplication, Division
FFT	Rectangular (Vertical scale: dbV RMS, Linear RMS)
Export Data	WORD, EXCEL, CSV, TEXT, HTML, Clipboard, Hardcopy, Preview
Trigger Input/Output	
EXT-TRIG Input Limitation	TTL Level
EXT-TRIG Acknowledge Level	1.6V to 5V, rising/falling edge
EXT-TRIG Acknowledge Freq.	">10ns" and ">0.1 TIME/DIV"
TRIG-OUT	3.3v rising edge, 20ns delay after trigger occurs (only for **DS-1202** stack function)
Calibration Output	
Level	Approx. 3.3V
Frequency	1kHz ±0.5%
Environment	
Operation	0 to +50
Storage	-10 to +60
Physical	
Interface	USB2.0 (USB1.1 compatible)
Power	USB bus power
Dimension (device only)	135x80x26mm
Weight (device only)	230 g
Accessories	
Probes	**DS-1102**, **1202**: 250MHz probe (1x/10x) x2 **DS-1002**: 100MHz probe (1x/10x) x2
Others	Installation CD, USB2.0 cable, User manual, Soft case.

DS-1202 Spec. Limitations in Stack Mode

Acquisition	
Mode	Real-time sampling, Average, Envelope Equivalent sampling and Roll mode only available in the Master-DSO
Time Base	
Sampling Rate	Real-time sampling: 200MS/s @ 1Ch/DSO, 100MS/s @ 2Ch/DSO Equivalent sampling: 5GS/s only for the Master-DSO
Time Base Range	2ns/DIV to 100ms/DIV (as 2-5-10 step) for the Master and the Slave DSOs 200ms/DIV to 10s/DIV (Roll mode) only for the Master-DSO
Trigger	
Source	CH1, CH2, Ext-trig in the Master-DSO (N/A for the Slave-DSO)
Jitter	+/- 200ps in the Master-DSO; +/- 10ns in the Slave-DSO

System Requirements

- Pentium 1.2GHz (or higher compatibles), Pentium 2.0GHz CPU (or higher) recommended.
- PC memory 64M bytes of RAM minimum.
- At least 32M bytes of available hard disk space.
- CD-ROM drive (for installation).
- Display specification, 640x480 VGA (or higher), 800x600 or 1024x768 recommended.
- 101 keyboard, Windows keyboard recommended.
- 2 or 3 buttons mouse.
- USB port (USB2.0 preferred, USB1.1 acceptable)
- Printer (optional).
- Microsoft Windows 98se/ME/NT/2000/XP OS.

Chapter 2

Installation

Installation Procedures

➢ Device Driver Installation for Windows98se

1. Insert installation CD, if you see a hardware wizard, please cancel it. Then connect the USB cable to the DS-1000 and the PC or notebook computer.
2. Windows will find a USB device automatically and enter the hardware wizard (Figure 1).

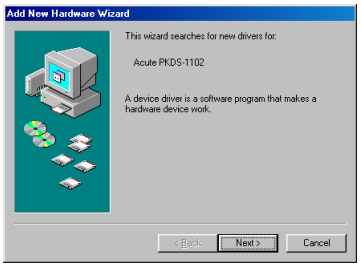


Figure 1

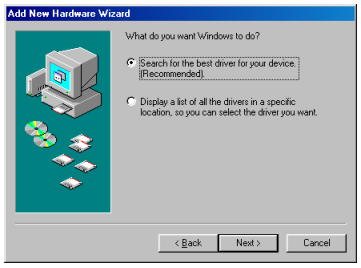


Figure 2

3. Choose "Search for the best driver for your device. (Recommended)" to find the proper driver automatically (Figure 2).
4. Choose "CD-ROM Drive", and click "Next" (Figure 3).

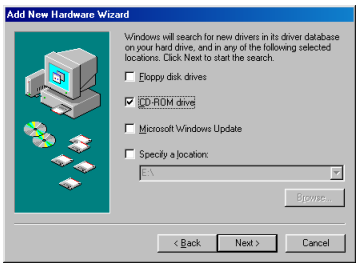


Figure 3

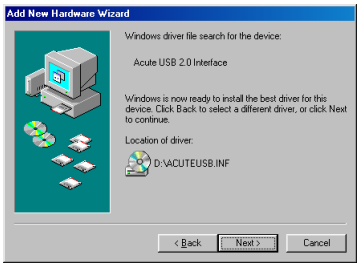


Figure 4

5. A proper driver will be found, click "Next" (Figure 4).
6. If your PC doesn't have an "usbscan" driver, the wizard will need a Window OS CD-ROM to install it.
7. Click "Finish" (Figure 5) once Windows has installed the DSO driver.

Figure 5

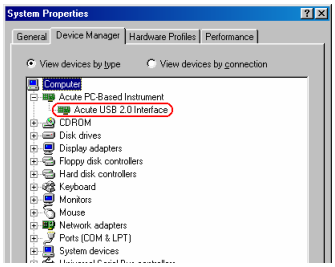


Figure 6

8. You may see "Acute USB 2.0 Interface" in Device Manager (Figure 6). It means that the DS-1000 USB interface is installed. If an exclamation or question mark appears on the ""Acute USB 2.0 Interface", that indicates the device is in a problem state. Please visit the FAQ page of our web site at http://www.acute.com.tw or email us at service@acute.com.tw.

➢ Device Driver Installation for Windows 2000

1. Insert installation CD, if you see a hardware wizard, please cancel it. Then connect the USB cable to the DS-1000 and the PC or notebook computer.
2. Windows will find a USB device automatically and enter the hardware wizard. (Figure 1)

Figure 1

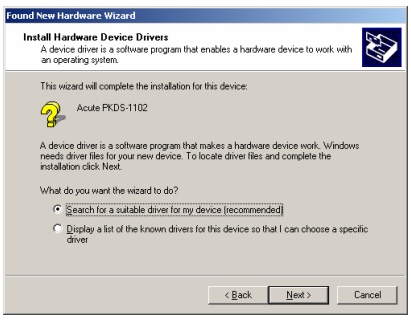


Figure 2

3. Choose "Search for a suitable driver for my device (Recommended)" to find the proper driver automatically (Figure 2).
4. Choose "CD-ROM Drive", and click "Next" (Figure 3).

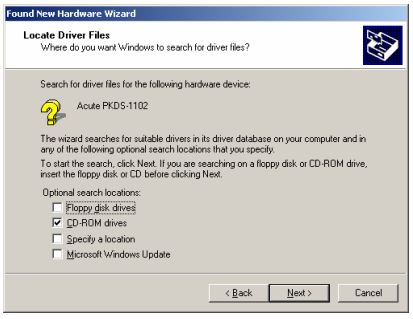


Figure 3

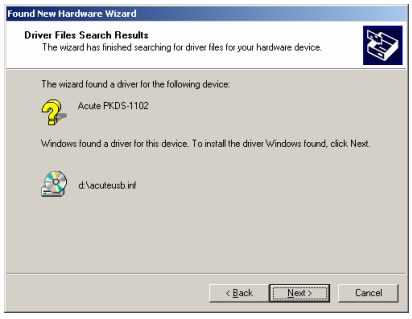


Figure 4

5. A proper driver will be found, click "Next" (Figure 4).
6. Click "Finish" (Figure 5) once Windows has installed the DSO driver.
7. You may see the "Acute USB 2.0 Interface" in Device Manager (Figure 6). It means that the DS-1000 USB interface is installed. If an exclamation or question mark appears on the "Acute USB 2.0 Interface", that indicates the device is in a

problem state. Please visit the FAQ page of our web site at http://www.acute.com.tw or email us at service@acute.com.tw.

Figure 5

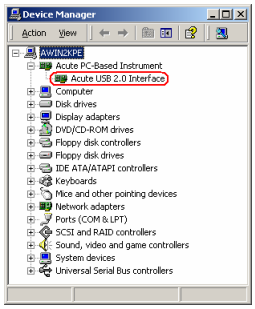


Figure 6

➢ Device Driver Installation for Windows XP

1. Insert installation CD, if you see a hardware wizard, please cancel it. Then connect the USB cable to the DS-1000 and the PC or notebook computer.
2. Windows will find a USB device automatically and enter the hardware wizard (Figure 1). Choose "yes. This time only".

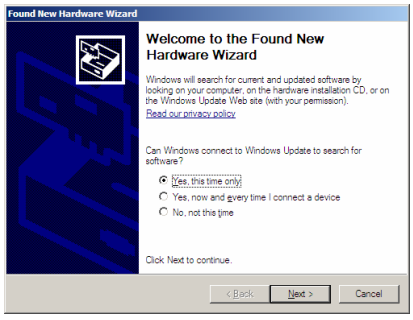


Figure 1

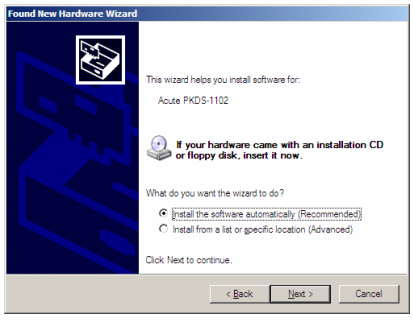


Figure 2

3. Choose "Install the software automatically (Recommended)" to find the proper driver automatically (Figure 2). Click "Next".
4. Windows will search for a proper driver for the DS-1000 (Figure 3); this could take a while.

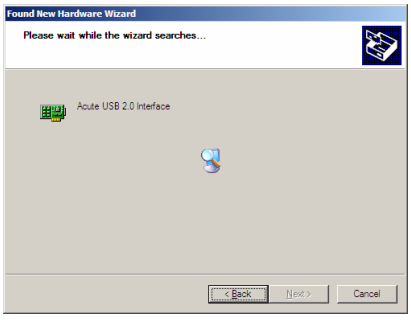


Figure 3

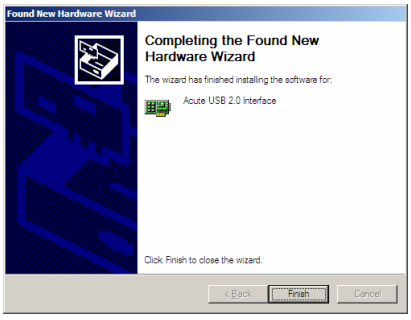
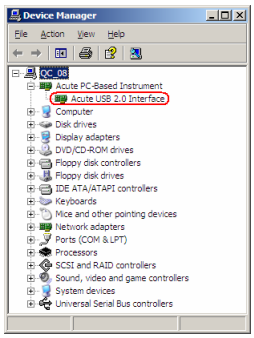


Figure 4

5. Click "Finish" (Figure 5) once Windows has installed the DSO driver.

6. You may see the "Acute USB 2.0 Interface" in Device Manager (Figure 6). It means that the DS-1000 USB interface is installed. If an exclamation or question mark appears on the "Acute USB 2.0 Interface", that indicates the device is in a problem state. Please visit the FAQ page of our web site at http://www.acute.com.tw or email us at service@acute.com.tw.

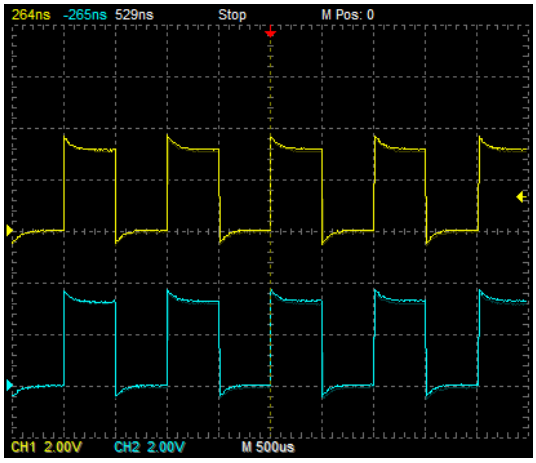


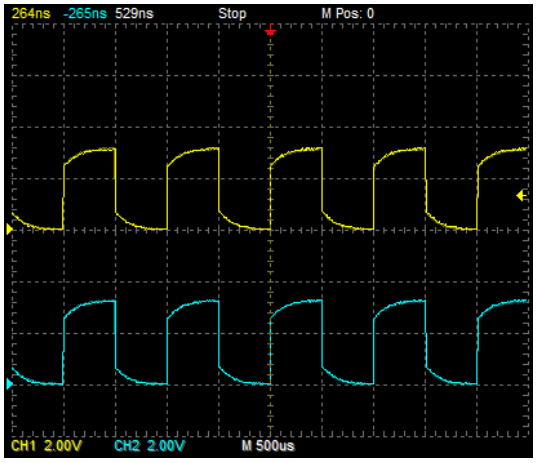
Application Installation

1. When you want to install the latest version of the DS-1000 Application (AP) software, please **REMOVE** the current DS-1000 AP in your PC. This will **NOT** change any existing project file(s) or environment parameter(s).
2. Insert the installation CD into the CD-ROM drive.
3. Double click the CD-ROM drive icon to enter the auto-installation procedure. If there is no response, run setup.exe from the CD-ROM root directory. The CD has other application software for other Acute products, such as logic analyzer and programmable data generator. The software, if installed, will enter DEMO mode since no such hardware exists.
4. Change the default folder if you want to use another directory.
5. Start the DSO software installation.
6. Once the installation is completed, you may find the DSO icon either on the **Desktop** or in the **Programs** group. You may double click either icon to start the DSO AP.
7. If you enter "DEMO Mode" when you launch the DS-1000 AP, this means that some problem has occurred. Please contact your dealer or email us at service@acute.com.tw.

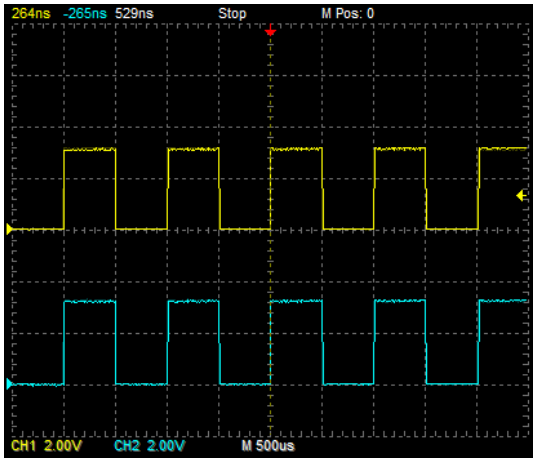
Quick Start: (Calibration)

1. Connect the two probes to the DS-1000's Channel 1 and Channel 2 BNC connectors.
2. Switch the Probe to "x10".
3. Connect the two probe ground leads to the DS-1000's ground terminal.
4. Connect the two probe tips to the DS-1000's "Probe Comp. (3.3V)" terminal.
5. Launch the DSO AP from Windows Desktop.
6. Push the "Auto Set" button.
7. If you see the waveforms shown below:





Adjust the trimmer located in the probe's BNC plug to obtain a flat-top square waveform as shown below.

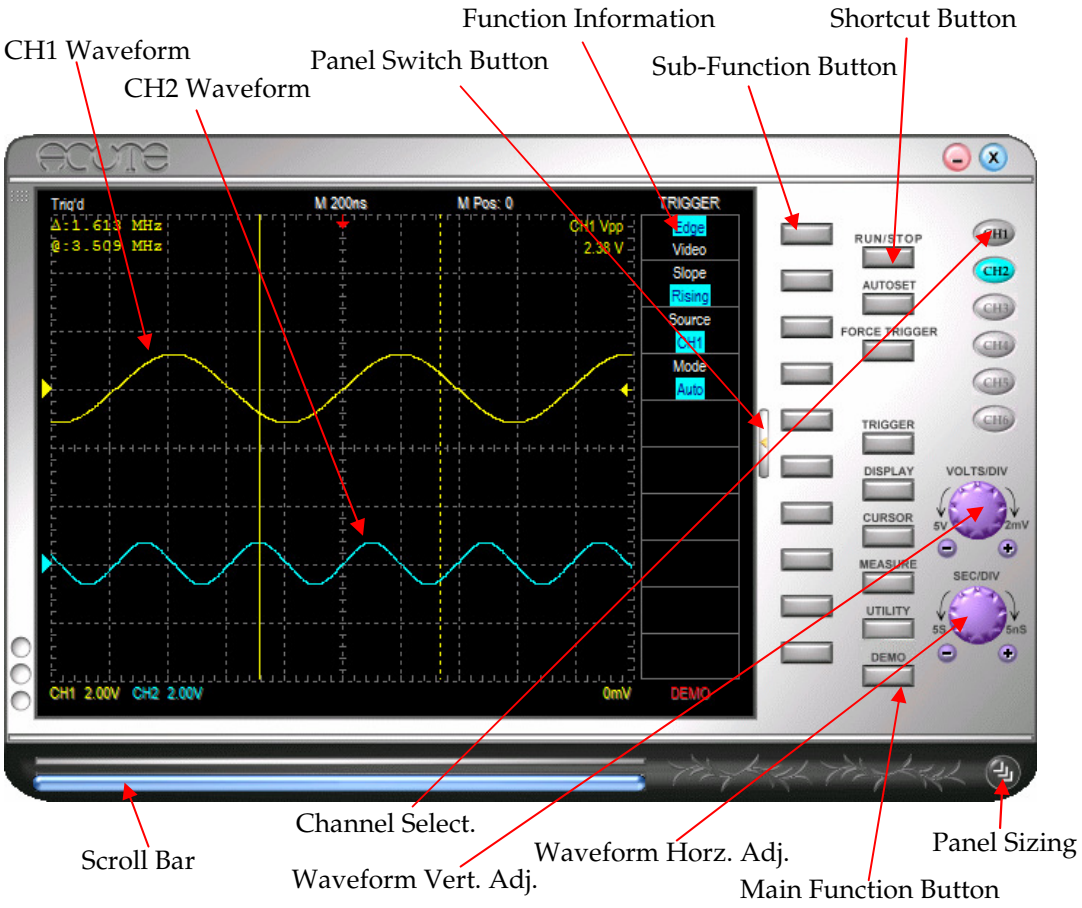


8. Switch the Probe to the "REF" position.
9. Push the "Utility" button.
10. Push "Calibration" Function Button.
11. During calibration, the DSO AP will ask you to switch the Probe to"x10".
12. Once calibration has finished, you can change the time base or vertical division to check the result of the calibration.

Chapter 3

Operations

Screen



Channel Switch Button

There are 6 channels, CH1, CH2…, CH6 on the upper right corner of the panel as shown above. When you are operating one DSO-1000, only CH1 and CH2 are available and the rest of the channel buttons, with gray font, are not available like CH3 - CH6 as shown on the left. (CH3, CH4)/(CH3, CH4, CH5, CH6) are available if two/three of the DSO-1000 units are stacked. CH1, with gray button and black font, as shown on the left, is available but not activated. If you click on the CH2 button, its functions will be activated and its color turns to blue as shown on the left. Each activated channel button has its own color, which is identical to that of the waveform of the channel.

VOLTS/DIV Knob

The VOLTS/DIV knob is used to change the vertical voltage scale. On the screen's lower-left corner, a voltage scale (for each division is) displayed. There are 8 vertical divisions on the screen. For example, if the corner displays "CH1 2.00V", this means that the voltage scale is 2 Volts for each vertical division and the voltage distance from top to bottom of all 8 divisions on the screen is 16 Volts. There are two small buttons near the VOLTS/DIV knob; one is "-"(zoom out), the other is "+" (zoom in). You can click your mouse's left button (or "-") or the right button (or "+") on the VOLTS/DIV knob to increase or decrease the voltage scale. Also, the mouse wheel (if so equipped) can be used to adjust the voltage scale even faster.

SEC/DIV Knob

The SEC/DIV knob is used to change the time scale. On the upper center of the screen, a time scale is displayed. This represents each horizontal time division, set to 50us in the example above. You can move the mouse to the SEC/DIV knob and then click the left or right button of the mouse to increase or decrease the time scale. If your mouse has a wheel, you can use the wheel to quickly adjust the time scale. There are two small buttons near the SEC/DIV knob. One is "–", the other is "+". These two small buttons are used for adjusting the time scale if the mouse has only one button.

On the screen's upper-center edge, a time scale for each division is displayed. There are 10 divisions on the screen. For example, if the time scale displays "M 50μs", this means that the time scale is 50 μs for each horizontal division. There are two small buttons near the SEC/DIV knob; one is "-"(zoom out), the other is "+" (zoom in). You can click your mouse's left button (or "-") or the right button (or "+") on the SEC/DIV knob to increase or decrease the time scale. Also, the mouse wheel (if so equipped) can be used to adjust the time scale even faster.

Main Function Button

There are seven main function buttons: Trigger, Display, Cursor, Measure, Utility, Save/Recall, and Acquire under the Full mode screen. When you disconnect the DS-1000 from your PC and launch the DSO AP, the program automatically changes to Demo mode and the Acquire button becomes the Demo button. If you still want to use the Acquire function under Demo mode, please switch the DSO AP to Skin mode, then you can find the Acquire function under the pull-down function menu on upper right corner.

Sub-Function Button

There are ten sub-function buttons, which work in conjunction with the seven main function buttons. However, not all sub functions are available in each main function. You may trigger each sub function by clicking the left or right button of the mouse. For example, [if you] click the right button of the mouse under the sub function for probe type, the sub function will be activated in this order: “x1”, “x10”, “x100”. Clicking the right button under the same sub function activates the sub function in the opposite order: “x100”, “x10” or “x1”.

RUN/STOP Button

The Run/Stop button runs or stops the signal acquisition process. The DS-1000 also has a hot key RUN/STOP button, which performs the same function. This button is on the side of the DS-1000 units.

FORCE TRIGGER Button

When the TRIGGER is set to Normal or Single Shot mode and the unit is not triggered, the “FORCE TRIGGER” button is used to force the DS-1000 to trigger.

AUTOSET Button

DS-1000 will automatically adjust its Voltage, Time, and Trigger parameters for the

signals under test to display their waveforms. However, it could take some time for the DS-1000 to do so due to the many possible combinations of DS-1000 parameters and signal characteristics. So, the "AUTOSET" button is used to adjust Voltage, Time, and Trigger parameters of the DS-1000 for tested signals and display the signals' waveform more quickly than may be achieved manually. The "AUTOSET" button, when pushed, will find the parameters of the signal applied to the active channel. For example, if the "Channel Switch" button is set to CH1, then the Voltage, Time, and Trigger parameters of the CH1 signal(s) will be the benchmark parameters used for the "AUTOSET" function.

Set to 50% Button

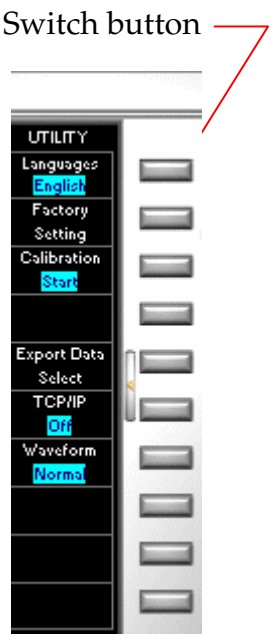
Pushing the "Set to 50%" button will cause the DS-1000 to fine tune the trigger level to the mean voltage of the trigger signal.

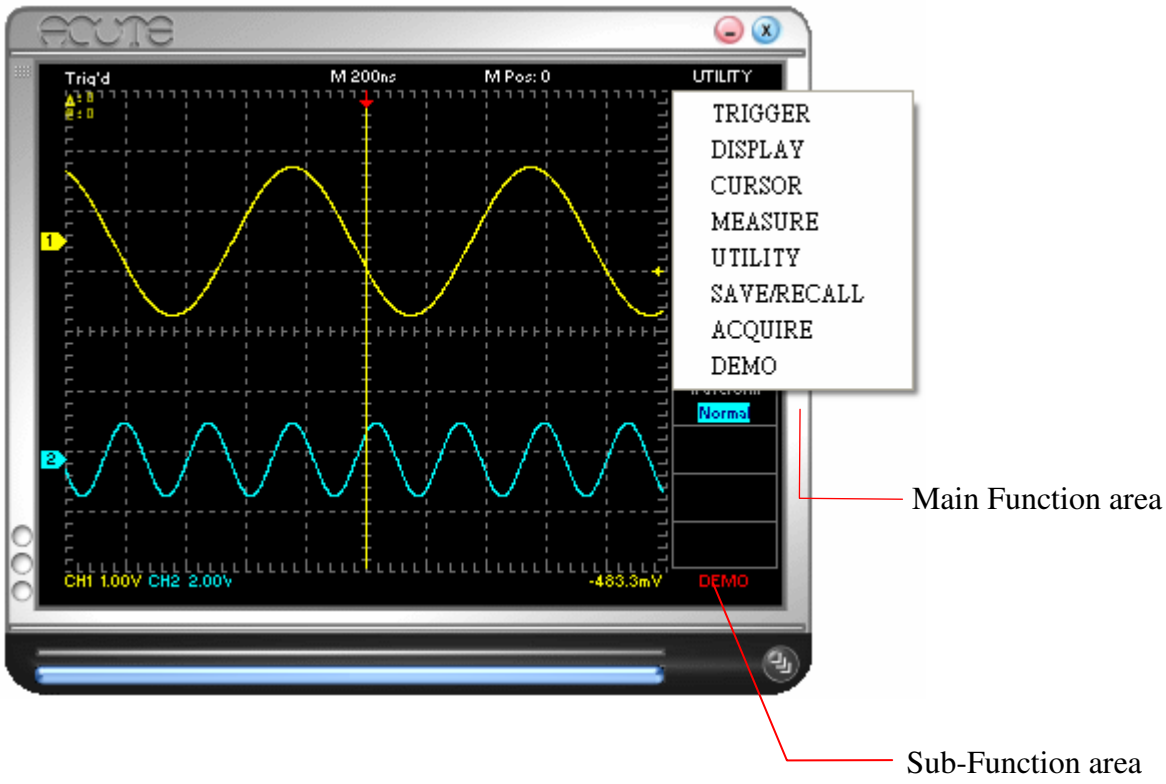
Hard Copy Button

The "Hard Copy" button can be used to print (hard copy) the waveform on the screen to the default–printer. Also, you may generate output with different parameters in "Preview" under the "Export" sub-function of the Utility main function.

Panel Switch Button

There are 2 display modes for the DS-1000 AP panel; one is the full panel mode, with function buttons on the right of the panel. The other is the skin panel mode, with function buttons hidden. The "Panel Switch" button is used to switch the DS-1000 AP between the full panel mode and the skin panel mode. There are some differences in the operations of these 2 panels.





Skin Panel

In the skin panel, the main function buttons are hidden; but the main functions and sub functions can be found in the pull-down menu on the upper right panel.

Threshold

The trigger Threshold is represented by an arrow symbol on the right side of the panel. When you drag the arrow with the mouse, a horizontal dashed line moves accordingly. This is how the trigger threshold is adjusted. The trigger threshold information is displayed on the lower right of the panel.

Channel

Channel markers are shown on the left side of the panel. Each channel has its own tag. You can move any channel's tag to adjust the channel's level.

Scroll Bar

The Scroll bar is a light blue line under the panel. You can see the waveform in different time segments by moving the scroll bar. Double click the left button of the mouse on the scroll bar to move the display to the middle (50%) of the time scale.

Panel Sizing Knob

The Panel size knob is on the lower right of the panel. You can drag the knob to adjust the size of the panel.

Trigger

The Trigger is represented by a red arrow symbol on top of the panel. You can drag the trigger symbol to adjust the trigger time.

Chapter 4

Functionality

Trigger

A. Edge/Video

Trigger has two types: one is Edge; the other is Video. Common signals can be triggered on their rising or falling edges. For Video signals, the Trigger must be switched to video; the signals can be NTSC□PAL□or SECAM. Sub functions change between Edge and Video.

B. Slope

Slope is used to select the Edge on which to trigger.

C. Source

Source is used to choose a channel's signals between/among channels to be the trigger.

D. Mode

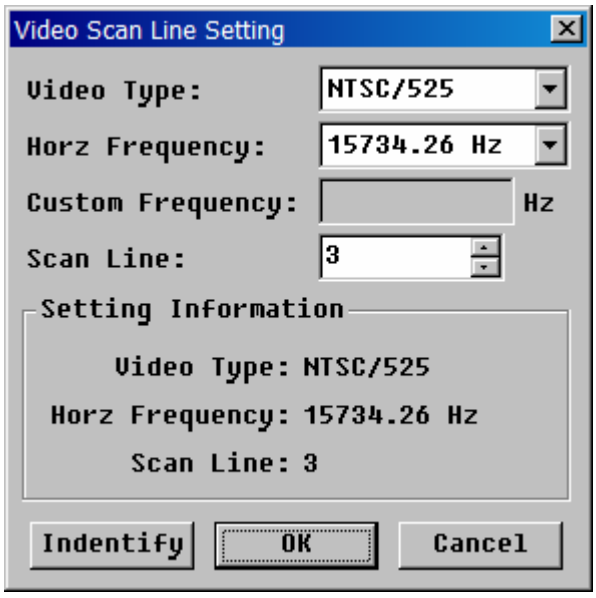
The Trigger system has 3 modes: Auto, Normal, and Single Shot. Under "Auto", when the SEC/DIV setting is 200ms or greater, DS-1000 automatically turns to "Roll Mode".

E. Memory Depth

Under single shot mode, you can adjust memory depth to 2000□4000□8000□16000□32000□64000 (DS-1002, DS-1102) or 512000 (DS-1202).

F. Video Trigger On

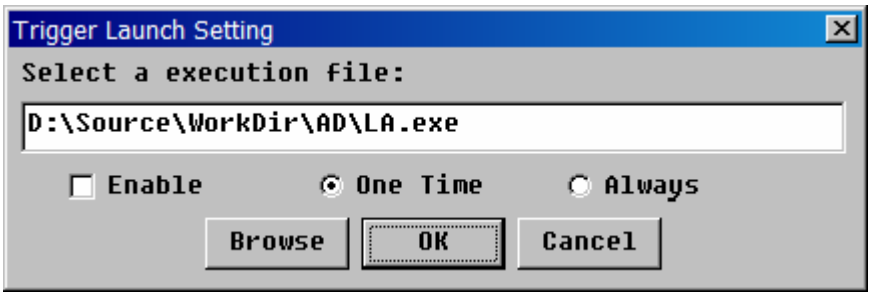
"Video Trigger On" sets the trigger to Field, Odd Field, Even Field, or a Scan Line.



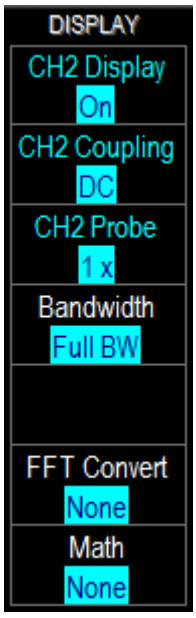
DS-1202 (only) also offers "Video Scan Line Setting". Different video signals have different line numbers; NTSC has 525 lines, PAL or SECAM has 625 lines. If the scan line number is set to "0", the DS-1202 will scan the lines randomly. If you move the mouse to the scan line area, the cursor turns into a wheel icon. The mouse wheel can be used to select the desired number. If the mouse doesn't have a wheel, click the

right side sub-function button, a "Video Scan Line Setting" dialog box (above) will appear. You can choose Video Type, Horizontal Frequency, and number of scan line. Video type can be NTSC, PAL or SECAM. Horizontal frequency can be adjusted according to the signal under test. The "Identify" button on the lower left corner of the "Video Scan Line Setting" dialog box identifies the signal type and horizontal frequency. Also, you may change the cursor type to horizontal and change the unit from voltage to IRE for the convenience of video measurement.

G. Launch Setting



Launch Setting is a sub function under Trigger; it is used to launch an external execution file when trigger(s) is activated. Under "Trigger", click "Trigger Launch Setting" and "Enable" to enable this sub function. There are two options for launch setting: "One Time", or "Always". "One Time" means an external execution file will be launched but only ***one time*** when the first trigger is activated. "Always" means an external execution file will be launched ***every time*** the trigger(s) is activated. However, the use of "Always" could result in computer crashes because too many launched external execution files may take too much memory or other resources of your PC.



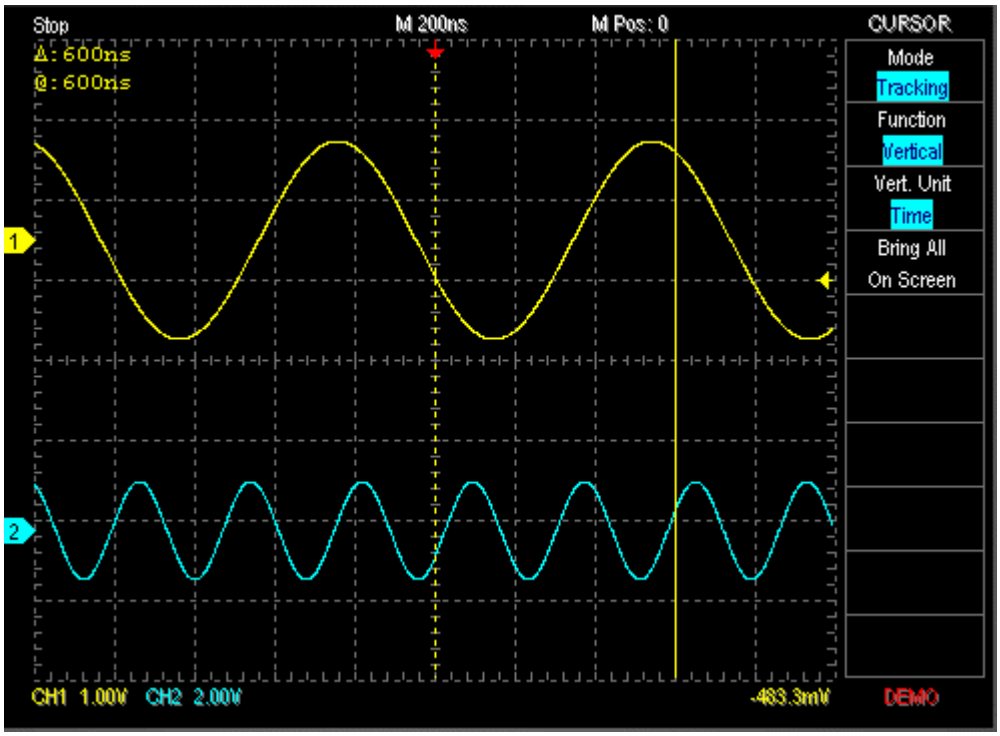
Display

"Display" is a sub function that can be defined with different parameters such as display or not, coupling (AC, DC, or GND), probe multiplier (x100, x10, or x1), and bandwidth limitation (20MHz, or full bandwidth), for each channel. The probe multiplier displayed should be identical to the value of the physical probe. "Display" has two sub functions: FFT, and MATH. FFT can transform the channel selected into FFT. MATH includes □A+B□,

□A-B□, □B-A□, and □X-Y□; □A+B□, □A-B□ or □B-A□ operations of add, or subtract between values of CH1 and CH2. □X-Y□ is "Lissajous Pattern" with CH1 as time axis and CH2 as voltage axis.

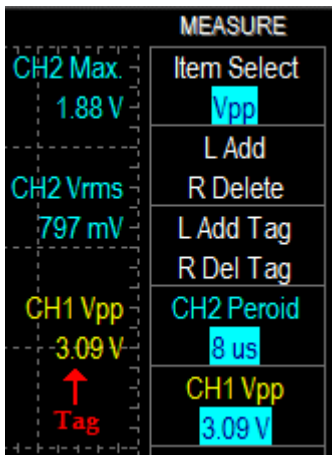
Cursor

There are two cursors: Time (two vertical lines) and Voltage (two horizontal lines). The two vertical (or horizontal) lines are used measure relative time or voltage of points on the signal under test. The two lines are shown as one yellow solid line and one yellow dashed line, or both lines can be hidden. Cursor information, shown on the upper left of the panel, contains two symbols: "@", and "Δ". "@" means either the Time difference between Cursor and Trigger or the Voltage difference between the Cursor and Ground. "Δ" means either the Time difference or Voltage difference between the two cursors. Cursors can be moved independently (Independent mode) or together at a fixed distance (Tracking mode). If the cursors are moved out of the panel, click the sub function button "Bring All On Screen" to bring the cursors into view.



Measurement

Measurement has the following items: Frequency, Period, Max., Min., High, Low, Vpp, Vrms, Mean, +Duty, -Duty, +Width, -Width. If you click "Item Select" under Measurement, you will see a pull-down menu with these items. Then, choose the item, the channel, and the position of the measurement display. Measurement display has two sub functions: Data area, and Waveform area. "Add" and "Delete" buttons are used in the Data area to add or delete measurement values. "Add Tag" and "Del Tag" buttons are used in the Waveform area to add or delete measurement values.



Utility

A. Languages

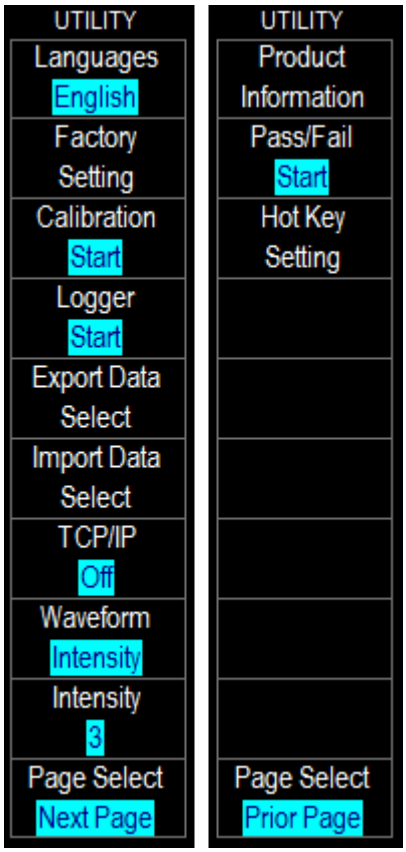
English and Traditional Chinese are used in the DS-1000 AP and can be switched anytime to your preference.

B. Factory

The DS-1000 will automatically change its original setup values through the calibration process. Factory is a sub function with a button that can be pushed to return all setup values to their original factory settings.

C. Calibration

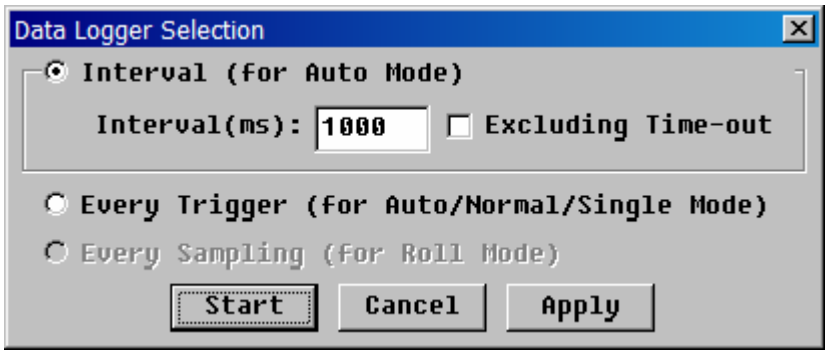
Changes in temperature or humidity may change the DS-1000's original setup values. Calibration can adjust the setup values to the most appropriate levels.



D. Logger

"Logger" records (saves) waveform data in your computer's hard disk. "Logger" has three sub functions: Interval, Every Trigger, and Every Sampling.

1. Interval (Auto Mode only)
   "Interval" saves waveform data in an interval (in tens of milli-second increments that can be defined in edit box and ***Only*** works in "Auto" mode. "Interval" logs waveform data whenever trigger is activated or time-out periods. You may only log trigger-activated waveforms by clicking "excluding time-out".
2. Every Trigger (Auto/Normal/Single Mode)
   "Every Trigger" saves waveform data whenever trigger is activated in "Auto", "Normal", or "Single" mode; but not in "Roll" mode.
3. Every Sampling (Roll Mode only)
   "Every Sampling" ***Only*** works in "Roll" mode (when SEC/DIV >= 200ms) and repeatedly saves waveform data as long as there is space in the hard disk.



There are two different file types, "*.dsow" and "*.log", for the above "Logger" functions.

"*.dsow" is the same file type as that of the Reference waveform format; it works for "Interval" and "Every Trigger", and can be retrieved from the "Save/Recall" function. Since there could be many "*.dsow" files be retrieved, "Waveform Viewer/Waveform Album", a powerful and user-friendly viewer program, can be used to browse many "*.dsow" files at the same screen.

"*.log" works for "Every Sampling" and can only be retrieved through the "Import data" function.

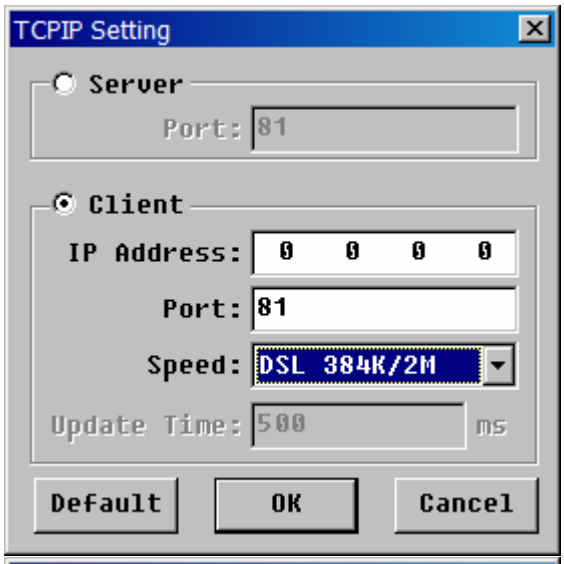
E. Export data

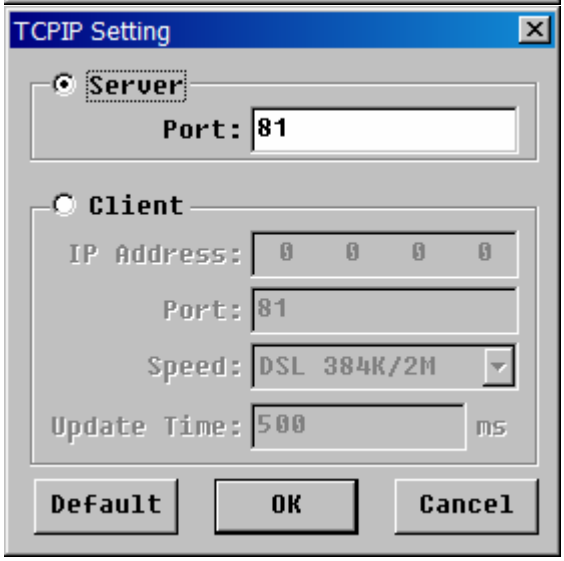
"Export data" exports waveform data or a setup file (*.set), that contains pre-setup parameters such as SEC/DIV, VOLT/DIV, Channel number, Threshold, etc. The information disclosure sub-function can capture the DS-1000 waveform information and change it to a different format. For example: Print out, preview, Word, Excel, text, or clipboard, etc.

F. Import data

"Import data" imports waveform data, or a setup file (*.set) described in "Export data". The information disclosure sub-function can capture the DS-1000 waveform information and change it to a different format. For example: Print out, preview, Word, Excel, text, or clipboard, etc.

G. TCP/IP - By using the TCP/IP function, the DSO program can transfer the screen image to another computer and display it simultaneously. If you click "TCP/IP", the dialog box on the right appears. There are two options: "Server", and "Client". In "Server", type the port number for the "Server" PC that is to be remotely controlled by a "Client" PC. In "Client", there are two choices, TCP/IP, or DSO AP (described below), to connect and control the "Server" PC.





Ease of use:

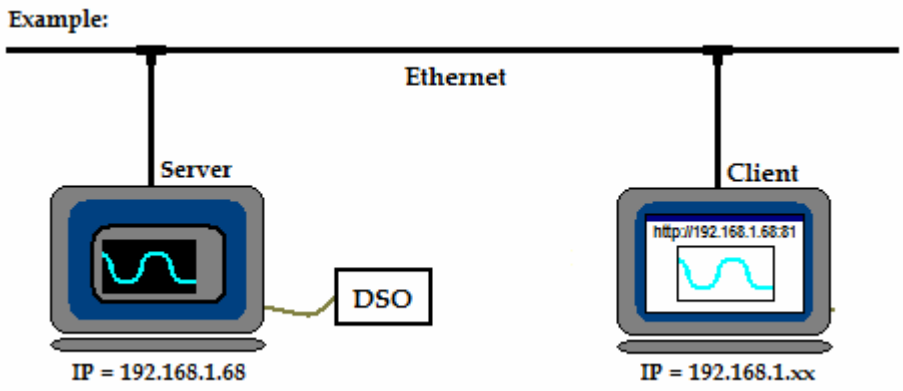
Method 1:

1. Host part □□ Start □ → □ Execute □ → input □cmd.exe /k ipconfig.exe /all□□check IP Address(ex. 192.168.1.68)□
2. Host part□□DSO Program□ → □ Utility □ → □ TCPIP □ switch ON□
3. Client part□Run□Internet Explore□□

4. Client part□Input□http://192.168.1.68:81□□

Method 2:

1. Run DSO program on "Client" PC.
2. Click TCP/IP sub-function.
3. Select client mode in TCP/IP dialog box (see figure above).
4. Type in the IP address (refer to step 1 of method 1) and port number.
5. Select the appropriate speed from speed combo box.
6. You may use a custom speed setting if all of the default speeds do not conform to the server and client connection.



H. Waveform

Waveform has four modes: "Normal", "Intensity", "Bezier", and "Dot". "Normal" displays the exact waveform captured by DS-1000 in real time. "Intensity" copies the Intensity characters on the screen and retains the old waveform on the screen until the new waveform appears; then the old waveform fades out. Under "Intensity", you can choose different degrees (1-8) of brightness. Click the left (right) button of the mouse to increase (decrease) brightness. "Bezier" only shows the waveform information if it is less than the dot number of the screen. "Bezier" helps to bring a spiked waveform back to a better-shaped waveform. "Dot" displays every single dot in order to show the real sampling data.

I. Page Select

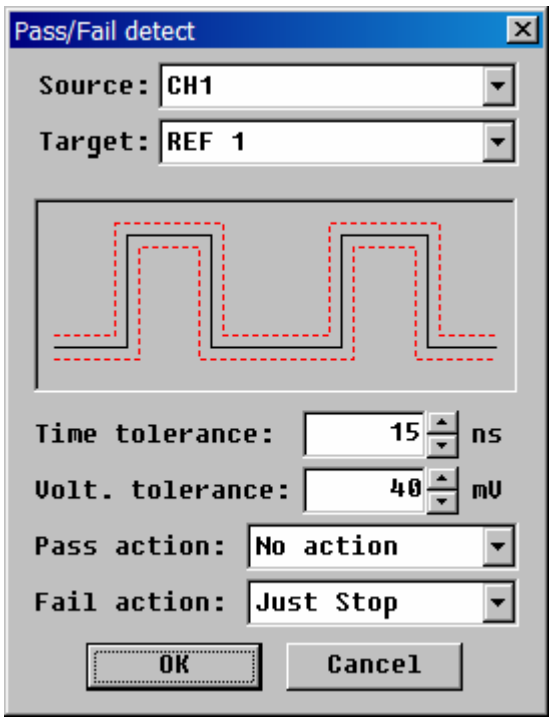
"Page Select" is used to select the group of sub functions in "Utility", which has too many sub functions to be shown within one screen.

J. Product Information

"Product Information" contains information regarding the DS-1000 hardware, software, firmware, production date, etc. The information can be very useful for technical support.

K. Pass/Fail Setting

"Pass/Fail", also called "Go/No Go", is used for auto-test purposes. Pick a reference waveform and set the desired benchmark tolerance range for time, and voltage of the waveform to create a waveform "tunnel". Any probed waveform goes through the "tunnel". If the signal stays within the tolerance range of the "tunnel", it Passes, otherwise, it Fails. Setting procedure is as below:

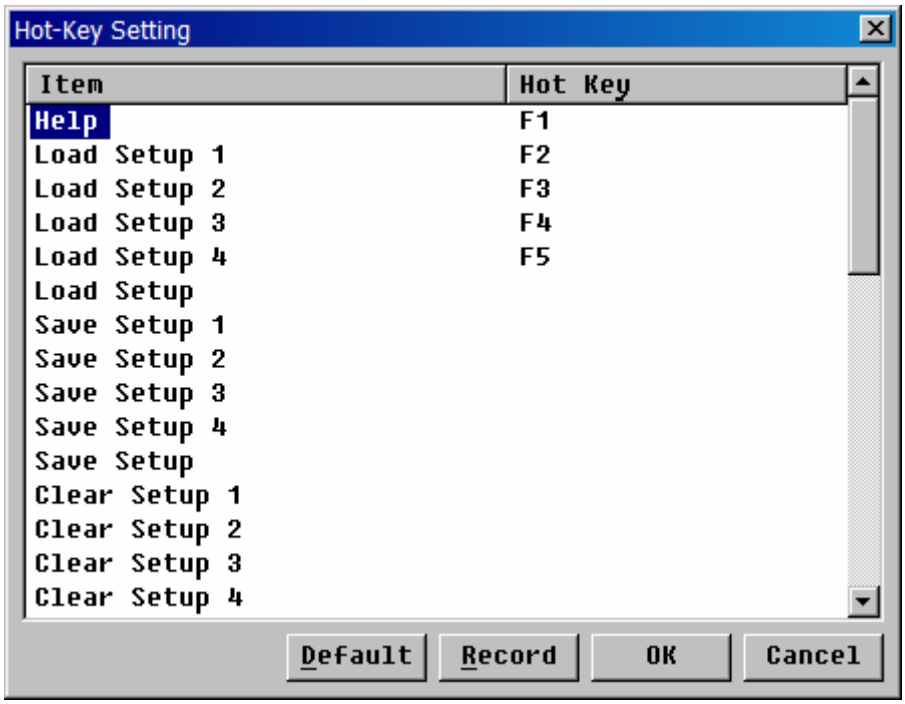


1. Use "Save/Recall" to show the reference waveform (see "Save/Recall" section).
2. Enter "Pass/Fail" dialog box.
3. Input benchmark tolerance levels for time, and voltage.
4. Set action for "Pass", or "Fail".

Sometimes, spurious "Fail" events may occur due to instability or noise in the source waveform. To avoid this, either use the "Average" function or turn on the 20MHz bandwidth limit to reduce signal noise.

L. Hot Key Setting

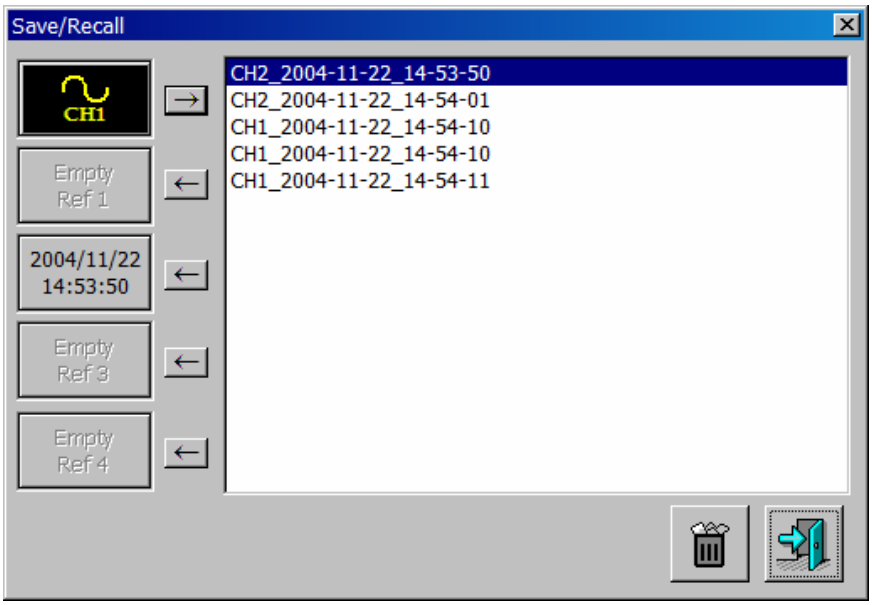
"Hot Key Setting" is a very easy-to-use function, especially for non-engineering users, such as production line operators, who need to operate DS-1000 for production purposes. In the "Hot-Key Setting" dialogue box, you may create "Hot Key" with function(s) or sub-function(s) in a "define" list, or you can delete the "Hot Key" by pressing the "Escape" key. However, please note that not every function key can be defined as a "Hot Key".



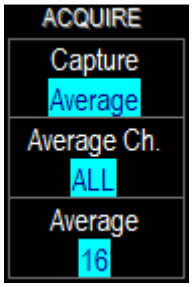
Save/Recall

Save/Recall saves or recalls waveforms for comparison purposes. There are four reference waveforms that can be used (save/recall). Enter "Save/Recall" in the dialog box and save the waveform to file as in the dialog box (on the right), then use the saved file waveform as the reference.

"Save/Recall" has another sub-function, "Setup", to set up parameters such as Time/Div, Volt/Div, Ground Offset, Threshold, Focus Channel… etc. There are four **Setup**s; and each **Setup**, with its own time tag, is easy to save, load, clear, or distinguish. You may create more **Setup**s, up to 35 sets, in "Hot Key Setting" or even more sets in "Export data" and "Import data".



Acquire



"Acquire" has four options: Sample, ETS, Average, and Envelope. "Sample" captures signal(s) and displays the actual waveform. "ETS" records high-frequency repetitive waveform signals and merges them to display a finely defined waveform. However, when the SEC/DIV setting is > 500ns, the DS-1000 will automatically switch to "Sample" mode.

"Average" mode is used to average the noise of signals. "Envelope" mode is used to display entire waveforms on the screen in order to show the maximum and the minimum values of these waveforms.

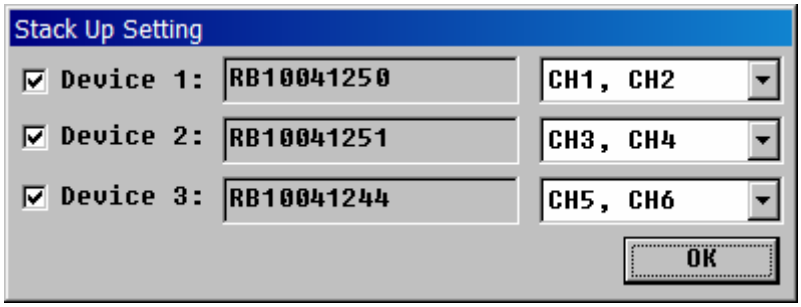
Chapter 5

How to stack more than one DSO

How to stack more than one DSO

Two or three DS-1000 devices can be stacked to form a 4/6-channel DSO. There are "Trigger Output" and "Trigger Input" connections for each device. One device's "Trigger Output" when connected to another one's "Trigger Input" with a stack cable will synchronize the devices. Also, a third device can be stacked in the same manner.

If 3 devices are stacked, the DS-1000 AP shows the following dialog box along with the 3 devices' respective serial numbers. The Master device is associated with "CH1, CH2" and the Slave devices are associated with "CH3, CH4" and "CH5, CH6". There is a check box in front of each device; upon first use, you must check the box to activate the device (highlighted). The Master is interchangeable among the 3 devices. In other words, the device you select for "CH1, CH2" turns into the Master.



There are some limitations in "Stack" mode as shown below.

Acquisition	
Mode	Equivalent sampling and Roll mode only work in the Master DSO.

Time Base	
Sampling	Real-time sampling: the same as individual unit. Equivalent sampling: the same as individual unit, only for the Master DSO
Time Base Range	5ns/DIV to 100ms/DIV (1-2-5 step) for the Master DSO and the Slave DSO(s); 200ms/DIV to 10s/DIV (Roll mode) only for the Master DSO

Trigger	
Source	CH1, CH2, Ext-Trig in the Master DSO (N/A for the Slave DSOs)
Jitter	+/- 200ps in the Master DSO; +/-10ns in the Slave DSO

Chapter 6

Miscellaneous

APPENDIX

Auto mode	The waveform will be refreshed either when trigger occurs or after time-out.
Normal mode	The waveform will be refreshed every time trigger occurs.
Single-Shot mode	The waveform will be refreshed the first time trigger occurs.
Roll mode	The waveform will not be refreshed but will be displayed in roll mode if SEC/DIV > 200ms.
Vpp	Peak to peak voltage.
Vrms	Root-mean square voltage.
TV Field	Trigger on composite video pattern in every field.
TV Odd Field	Trigger on composite video pattern in odd fields.
TV Even Field	Trigger on composite video pattern in even fields.
TV Scan Line	Trigger on composite video pattern in every scan line.

Memo

Memo

Memo