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Chapter 1

Introduction

⌨ What is the Acute-LA logic analyzer?

Acute-LA includes LA2000P, Pocket-LA, and TravelLogic series. There are 2 models in LA2000P series: LA2132P/LA2164P; 3 models in Pocket-LA series: PKLA1116/PKLA1216/PKLA1616; and 3 models in TravelLogic series: TL2036/TL2136/TL2236. The LA2000P has 32 or 64 channels; the Pocket-LA has 16 channels, all of which are equipped with 200MHz timing sampling rate and 75MHz state analysis capability. The TravelLogic has 36 channels, all of which are equipped with 4GHz timing sampling rate and 200MHz state analysis capability. They are PC-based instruments connected via PCI/Parallel/USB interface and controlled by LA-viewer software application. LA-viewer will work on Window95/98/ME/NT/2000 and XP. Based on Windows GUI with user-friendly features, the **Acute LA** is easy to understand and operate.

Acute LA has multifunction features, allowing each research and development project to be processed independently without interfering with each other.

Since the **Acute-LA** is computer based, the **LA-viewer** is easy to upgrade by downloading the latest software version from the Acute web site at http://www.acute.com.tw/. We also accept customer's input to improve **LA-Viewer** functionality, which will be incorporated into the standard software.

⌨ Packing list of the LA2000P

	Content	LAxx32P	LAxx64P
1.	LA2000P mainframe	1	1
2.	Signal isolation amplifier pod	2	4
3.	Signal connector /8-color 1x16 line	2	4
4.	Ground line /1x2 line with red mark	2	4
5.	Gripper (Black)	34	68
6.	Interface card (PCI)	1	1
7.	PCI card connection flat cable (25pins)	1	1
8.	PC to LA Power Jack cable (4PDC-Jack)	1	1
9.	12VDC2A power adapter & Power Cord	1	1
10.	Printer round cable	1	1
11.	USB2Printer cable (optional)	1	1
12.	Installation CD	1	1
13.	Manual	1	1
14.	Screw	1	1

1.	2.	3.	4.	5.

6.	7.	8.	9.	10.

🖥 **Packing list of the Pocket-LA**

	Item	PKLA 1116/1216/1616
1.	Pocket-LA mainframe	1
2.	Signal connector /8-color 1x16 line	1
3.	Ground line /1x2 line with red mark	1
4.	Gripper (Black)	18
5.	USB A-B cable (1.8m)	1
6.	Installation CD	1
7.	Manual	1

1.	2.	3.	4.	5.

⌨ Specification of the LA2000P

Specification		LA2132P	LA2164P
Power	Power (Internal/External)	PC Power / Adapter (12V)	
	Static Power Dissipation	3.6W	
	Max Power Dissipation	11W	
Interface	Internal	PCI card	
	External	Parallel (EPP, Bi-direction) **USB** optional	
Timing Analysis (Sampling Rate)		200 MHz ~ 100Hz	
State Analysis (External Clock)		75MHz	
Bandwidth		75MHz	
Channels		32	32/64
Memory	Storage Depth/Channel	Standard: 64/128k bits*	
Trigger	Condition	Pattern & Edge	
	Channels	32	32/64
	Pass Count	0 ~ 4095	
	Width: less/exceed	10 bits	
	Delay	28.5 bits	
	Trigger Levels	16	
	Level to Level setting	Continue/Discontinue	
	Level Logic Type	AND/OR	
	Pre/Post Trigger	Yes	
	Output to Scope	TTL Level	
	Delay to BNC	< 80ns	
Threshold	Range	+6.8V ~ -7.2V	
	Accuracy	±55mV	
Maximum Input Voltage		±30V	
Impedance		500KΩ shunted by 10pF	
Temperature	Operating	5°C ~ 45°C (41°F ~ 113°F)	
	Storage	-40°C ~ 75°C (-40°F ~ 167°F)	
Data Skew		< 2ns	
Dimensions	Length x Width x Height (mm)³	197 x 147 x 42 (mm)³	

* : Enhance memory size : 256K/512K bits；1M/2M bits

⌨ Specification of the Pocket-LA

	Specification	PKLA1x16
Power	Power Source	USB bus-power (+5V)
	Static Power Dissipation	0.75W
	Max Power Dissipation	<2.5W
Interface		**USB**
Timing Analysis (Sample Rate)		200MHz ~ 100Hz
State Analysis (External Clock)		75MHz
Bandwidth		75MHz
Channels		16
Memory	Storage Depth per Channel	1M bits*
Trigger	Condition	Pattern & Edge
	Channels	16
	Post Trigger	Yes
	Trigger Levels	1 (Edge or Pattern)
	Pass Count	0 ~ 255
Threshold	Range	+6.8V ~ -7.2V
	Accuracy	±55mV
Maximum Input Voltage		±30V
Impedance		500KΩ shunted by 10pF
Temperature	Operating	5°C ~ 45°C (41°F ~ 13°F)
	Storage	-40°C~75°C (-40°F~67°F)
Data Skew		< 2ns
Dimensions	Length x Width x Height (mm) [3]	117 x 72 x 20 (mm) [3]

* :

PKLA1116 : Memory depth 128K bitts/channel

PKLA1216 : Memory depth 256K bits/channel

PKLA1616 : Memory depth 1M bits/channel

🖥 Specification of the TravelLogic Series

Specification		TL2x36
Power	Power Source	USB bus-power (+5V)
	Static Power Dissipation	0.75W
	Max Power Dissipation	< 2.5W
Interface		**USB 2.0** (USB 1.1 Compatible)
Timing Analysis (Sample Rate)		4GHz
State Analysis (External Clock)		200MHz
Bandwidth		200MHz
Channels		36
Memory	Storage Depth per Channel	72M bits[*]
Trigger	Resolution	250ps
	Channels	36
	Conditions	4
	Level for each Condition	16
	Pre\Post Trigger setting	Yes
	Pass Count	0 ~ 4095
	Event Types	Word, Channel, Transition, Glitch, Width
	Serial Protocol	UART, I²C, I²S, SPI
	Input port (for stack)	TTL 3.3V
	Output port (for stack)	TTL 3.3V
Threshold	Range	+6.0V ~ -6.0V
	Accuracy	±100mV + 5%*Vth
Maximum Input Voltage		±40V DC 15 Vpp AC
Impedance		200KΩ shunted by 5pF
Temperature	Operating	5°C ~ 45°C (41°F ~ 113°F)
	Storage	-10°C~65°C (-14°F~149°F)
Data Skew		< 1ns
Dimensions	Length x Width x Height (mm) [3]	123 x 76 x 21 (mm) [3]

* :

TL2036 : Memory depth 180K bitts/channel

TL2136 : Memory depth 18M bits/channel

TL2236 : Memory depth 72M bits/channel

🖥 The principle of Logic Analyzer

1.) Digitize

Equivalent Circuit
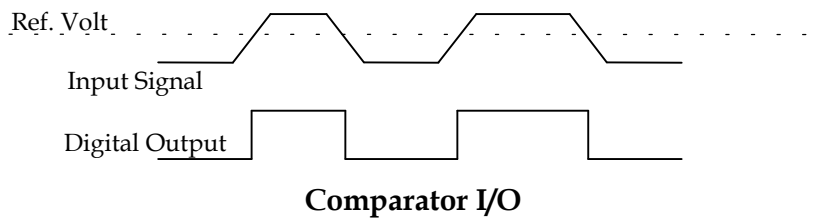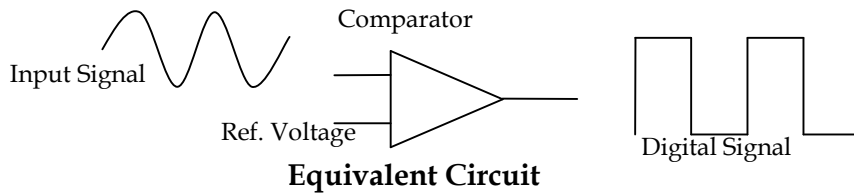
Comparator I/O

The Equivalent circuit above describes the first step of Logic Analyzer to digitize the probed signal using a comparator. The reference voltage of the comparator may be adjusted by software application.

2.) Sampling
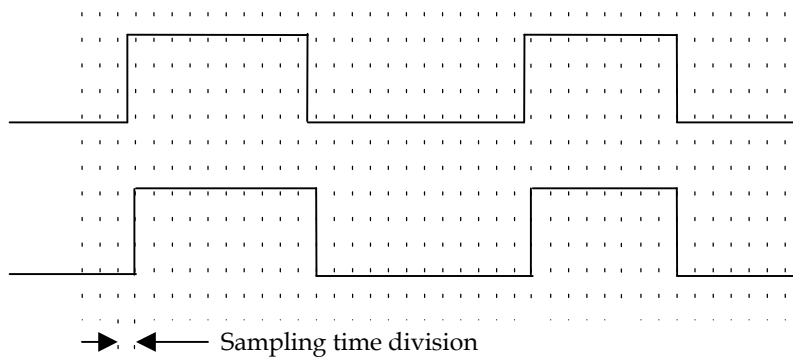
The principles of signal capture

※ Sampling time = 1 / (Sampling Rate)

After the digitizing process, the digital signal state will be recorded in the LA memory. Then, the PC will read back the memory data and display them on the PC screen.

3.) Trigger circuit

Initiated by a trigger signal, which is generated by the trigger circuit, the Logic analyzer starts capturing and recording. As with an oscilloscope, the trigger circuit parameters can be set. If the probing signal satisfies the condition, the trigger signal will enable the LA-memory record data until the memory full. In some cases, the memory depth of the LA may not be enough to capture all of the desired data. So, it is very important to set trigger parameters properly in order to capture the data you want. The advanced and versatile trigger functions of LA2000P can help you to solve this problem.

The simplified block diagram below describes this operation.

Trigger circuit function block
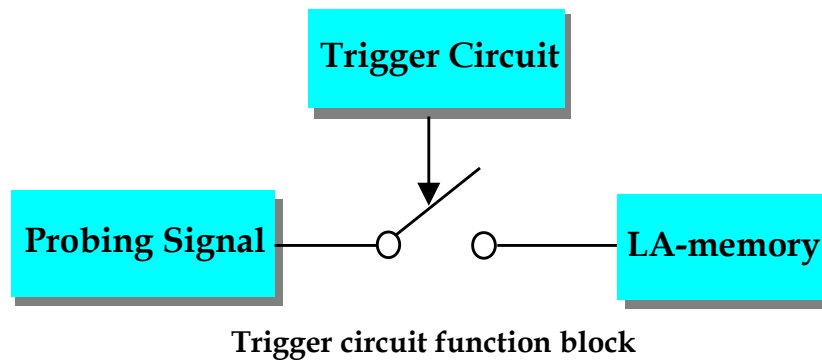
4.) Relationship between Trigger Cursor and LA-Memory

The relationship between the Trigger Cursor and LA-memory can be difficult to understand. Although there is deep memory for each channel of the Logic Analyzer, it can be difficult to capture the desired data unless the trigger parameters are set properly. Memory Depth means the memory size of each channel, e.g. 128kbits memory depth can save 128kdata samples. If you set the sampling rate to 100MHz, it means the LA will capture probing signal and save the samples into 128kbits memory at 10ns intervals. At this sampling rate, the LA can record about 1.31ms of data (= 128k * 10ns = 131072 * 10ns). Hence, when you move the trigger cursor to the front of the memory, the LA will record 1.31ms data after the trigger. If the trigger cursor is moved to the middle of the memory, the LA will capture 655us data before the trigger point and the balance of 655us data after the trigger point. So, by moving the Trigger Cursor to various points along the LA-memory, the ratio of data captured before and after the Trigger can be adjusted. However, sometimes the data before the Trigger may not appear as expected. This is affected by the Pre-Trigger setting. For example:

This example assumes the following: Pre-Trigger function disabled, Trigger Cursor of LA, with 128kbits memory depth, moved to the middle of memory and sample rate set to 100MHz. The LA can capture data 655us before and after the trigger event. If the trigger condition occurs more than 655us after data capture starts, 655us of pre-trigger data will be displayed. However, if the trigger condition occurs less than 655us after data capture starts, for example 50us, only 50us of pre-trigger data will be displayed. The preceding 605us of data will be displayed a logic state 0, not the actual DUT (Device Under Test) data. To avoid this, enable the Pre-Trigger function to force the LA to fill the Pr-Trigger memory. The Pre-Trigger function disables the trigger circuit until the captured data has filled the Pre-Trigger memory. The displayed Pre-Trigger data will show actual DUT data, but may also include trigger events. This approach may be desirable, depending on the data you wish to capture.

There are several other ways of viewing Pre-Trigger data. We will use the previous example to discus these. First,[if the LA does not receive a trigger signal until the Pre-Trigger memory is filled (655us), then the Pre-Trigger memory will be valid. Second solution is to assign a more discriminating trigger condition that will avoid or reduce the trigger event frequency. Third, you may set the PASS COUNT to delay the trigger point. It is a good way to deal with a continuous trigger signal. For example, if a trigger event occurs every 50us, and the PASS COUNT value is set to 14, the first 14 trigger events will be ignored. This will allow 700us (14x50us) of time to fill the pre-trigger memory.

5.) Relationship between LA-PC Interface and Memory

Generally, a PC-based instrument needs one interface to connect with PC such as ISA, PCI, Parallel port and USB port. However, these interfaces cannot continuously transfer data in the Windows OS. So, the Acute LA memory is transferred to the PC after the Acute LA has completed the data acquisition process. The PC-based LA has its own high speed LA-memory. This method assures that the speed of the PC interface does not affect the integrity of the data being captured. The speed of the PC interface will have an effect on the time required to transfer the LA-memory contents to the PC. The more memory the Acute LA has, the greater the effect. We recommend using a high-speed PC interface if the Acute LA you will be using has the increased memory option.

🖳 System Requirement

LA2000P and Pocket-LA

- PC Pentium 100 (or above) compatibles, Pentium 600 CPU (or above) recommended.
- One PCI bus slot. (Internal LA-PC interface use only)*
- PC memory above 64M bytes RAM.
- At least 32M bytes available in hard disk.
- CD-ROM drive (for installation).
- Display specification, 640x480 VGA (or above), 800x600 or 1024x768 recommended.
- 101 keyboard, Windows keyboard recommended.
- 2 or 3 buttons mouse.
- Printer port (External LA-PC interface use)*
- USB port (optional)**
- Printer (optional).
- Microsoft Window 95/98/ME/NT/2000/XP OS.

TL2x36 Series

- Above Intel Pentium-II compatible PC (1 GHz or faster recommended).
- One USB A type port (USB2.0 recommended).
- Windows 98/ME/2000/XP/Vista Operating System.
- 128MB Memory available.
- Disk Space more than 80MB.
- CD Drive for installation program.
- 640x480 VGA or higher (1024x768 or higher recommended).
- Keyboard & Mouse.

*   **The PCI and Printer port are no requirement for Pocket-LA series.**
**   **No support USB interface in Windows 95/98OSR1/NT.**

Chapter 2

Installation

🖳 Installation Flow Chart

```
                          ┌──────────┐
                          │  START   │
                          └────┬─────┘
                               │
                               ▼
                          ◇ Is
            Y      ◇ Pocket-LA /
            ┌──────── TravelLogic? ◇
            │                    │
            ▼                    │ N
  ┌─────────────────────┐       ▼
  │ Pocket-LA /         │  ┌──────────┐
  │ TravelLogic         │  │ LA2000P  │
  └─────────┬───────────┘  └────┬─────┘
            │                   │
            ▼                   ▼
  ┌─────────────────────┐   ◇ Internal or   External
  │ Link Pocket-LA /    │   ◇ External? ◇──────────┐
  │ TravelLogic to PC   │         │                │
  │ in USB cable        │         │ Internal       │
  └─────────┬───────────┘         ▼                ▼
            │              ┌─────────────┐  ┌─────────────┐
            ▼              │ Hardware (1)│  │ Hardware (2)│
  ┌─────────────────┐     └──────┬──────┘  └──────┬──────┘
  │ Driver Setup    │            │                │
  └─────────┬───────┘            │◄───────────────┘
            │                    ▼
            ▼              ┌─────────────┐
  ┌─────────────────┐     │ Accessories │
  │ Application     │     └─────────────┘
  └─────────┬───────┘
            │
            ▼
      ┌──────────┐
      │   END    │
      └──────────┘
```
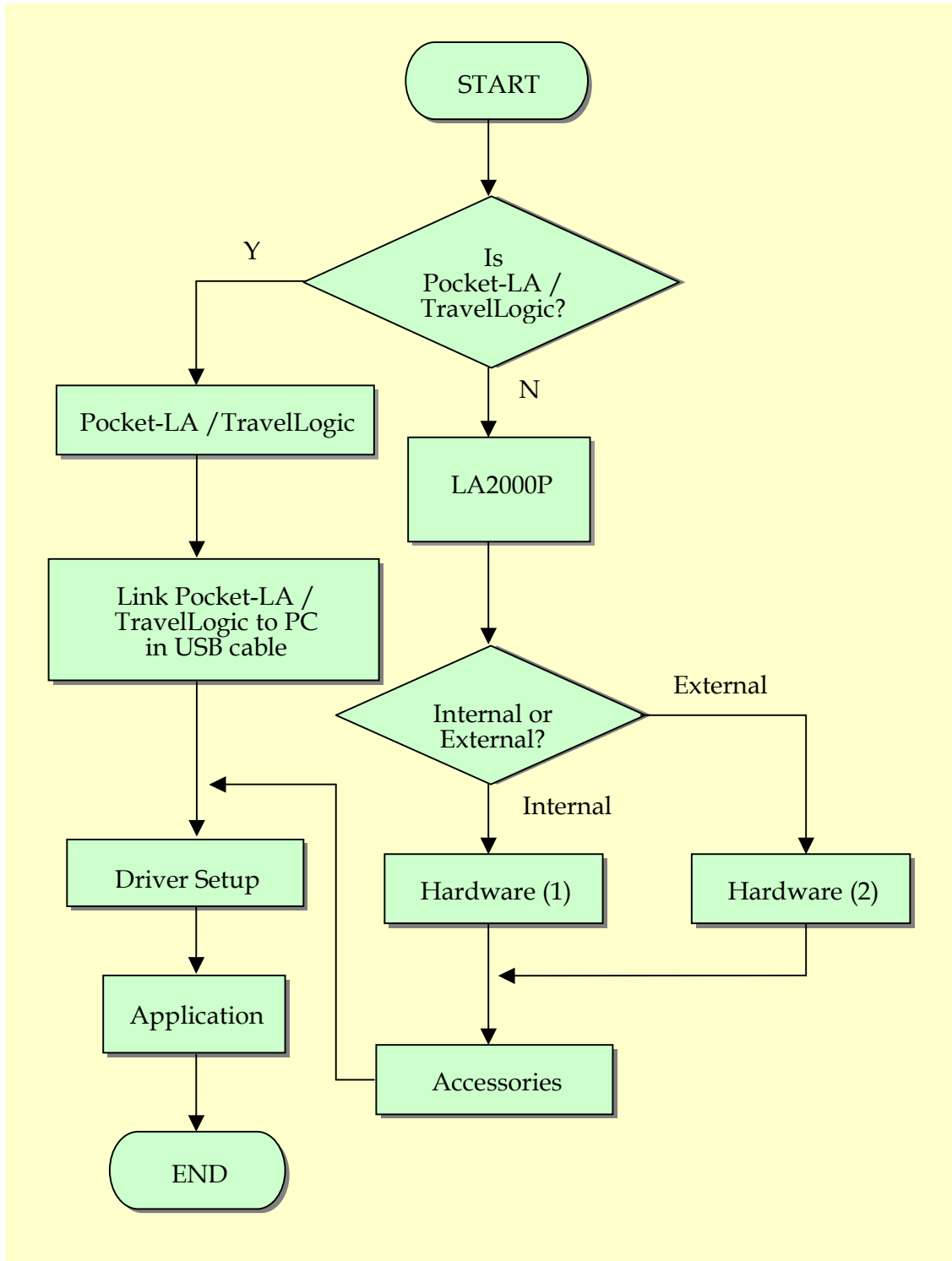
💻 Installation Procedures

Hardware (1)
--LA2000P Internal Interface Installation

Fig2-1. Interface Card

1. Turn off the power of your PC and open your PC case.
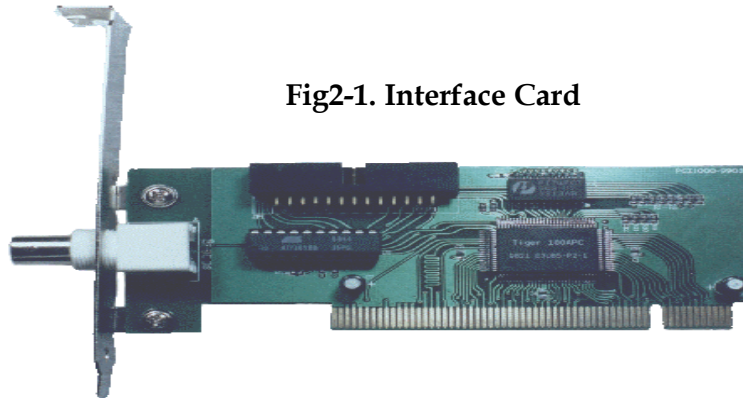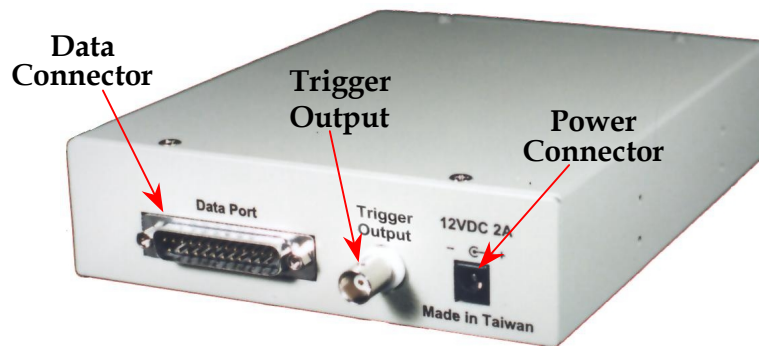2. Insert the interface card into your PC's PCI bus and tighten the screws of the interface card.
3. Insert the LA2000P mainframe into your PC's 5.25″ floppy disk slot.

Fig2-2. LA2000P Mainframe rear panel

4. Connect the LA-PCI cable from the interface card to the Data Port of LA2000P.
5. Plug the PC power connector (5V, 12V) through 4PDC-Jack cable into the LA2000P power connector (on LA2000P mainframe's rear side).

Hardware (2)

--LA2000P External Interface Installation

1. Connect PC through printer round cable to LA mainframe. (You may also use USB2Printer cable to connect PC USB port with LA2000P.)
2. Plug Power Adapter into LA power connector.
3. (For USB interface only) When you plug USB2Printer cable into PC's USB port, Windows OS will find the new device. Please insert driver disc for installation.
4. (For Parallel interface only) Turn on your PC and configure printer port to EPP mode in BIOS setting screen. (Note: refer to Troubleshooting chapter.)

Accessories Installation

1. Connect Signal isolation amplifier pod flat cable (refer to Page 5 Equipment) to LA2000P mainframe according to the order of the labels A, B, C, D.
2. Connect Signal connector line (16Pins) to Signal isolation amplifier pod; connect the probes to the other end.
3. Connect Ground line (2Pins) to Signal isolation amplifier pod, connect the probes to the other end.
4. Connect Ground line probe to DUT* Ground.
5. Connect Signal connector line probes to DUT's signals.

* DUT means Device Under Testing

Driver Setup

There are 3 kinds of driver setup for different LA-PC interface and OS. (***Note:*** *USB interface is not available in Windows95/98SP1/NT OS.)*

1. First situation: (driver setup is unnecessary)
   ➢ Printer Port + Windows95
   ➢ Printer Port + Windows98
   ➢ Printer Port + Windows ME
   ➢ Printer Port + Windows NT
   ➢ PCI + Windows NT

   Please jump to Application Setup.

2. Second situation: (PnP/Plug & Play)
   - ➢ PCI + Windows OS (NT except)
   - ➢ USB + Windows OS

   Please refer to *A1-A13*.

3. Third situation:(none PnP, driver is required.)
   - ➢ Printer Port + Windows 2000
   - ➢ Printer Port + Windows XP

   Please jump to Application Setup.

   (Application setup will install driver automatically.)

A1. After hardware installation is finished, please turn on your PC's power and start to enter Windows operation system.

A2. Insert the installation disk into CD-ROM drive.

A3. Double click "***Add/Remove Hardware***" at Control Panel.

A4. Choose the "***Add a Device***" item.

A5. Windows OS will try to search a popular known hardware after Step-13, but no one can be found.

A6. Please choose "***Add a new device***"

A7. Select the hardware by yourself. No auto-search.

A8. Choose "***Other devices***" at Windows 2000; choose "Display all devices" at Windows XP, it will take a long time, please be patient.

A9. Click "***Have Disk…***"

A10. Indicate directory to the root of CD-ROM

A11. Choose "***Acute EPP & ISA Interface Driver***"

A12. If the driver setup successful, you will find the "***Acute PC-based Instrument***" item in the Device Manager. Congratulation, please jump to Application Setup.

A13. If the driver cannot setup well, please refer to Trouble Shooting section or visit the FAQ page of our web site. You may also contact us directly.

Application Setup

1. Insert the installation disk into CD-ROM drive
2. Click **My Computer** and enter CD-ROM drive to run the **Setup.EXE** file in the root of the disk.
3. Fill destination folder according as the installation program hints.
4. Setup will start the LA Viewer application.

5. Once the installation is completed, you may find the LA Viewer icon either in **Desktop** or **Programs**. You may double click either icon to start the LA Viewer.

6. If the "*Enter DEMO Mode*" message popped up at LA Viewer launching, some problem probably occurred. Please refer to **Troubleshooting** section in Chapter-5.

7. Please refer to **Quick Use**.

⌨ Questions

If you have any question with the installation procedures, please refer to the Troubleshooting in Chapter 5 or contact us directly. In addition, should you have any opinion or suggestion, please feel free to call us. You may also email to us. We will reply you as soon as possible.
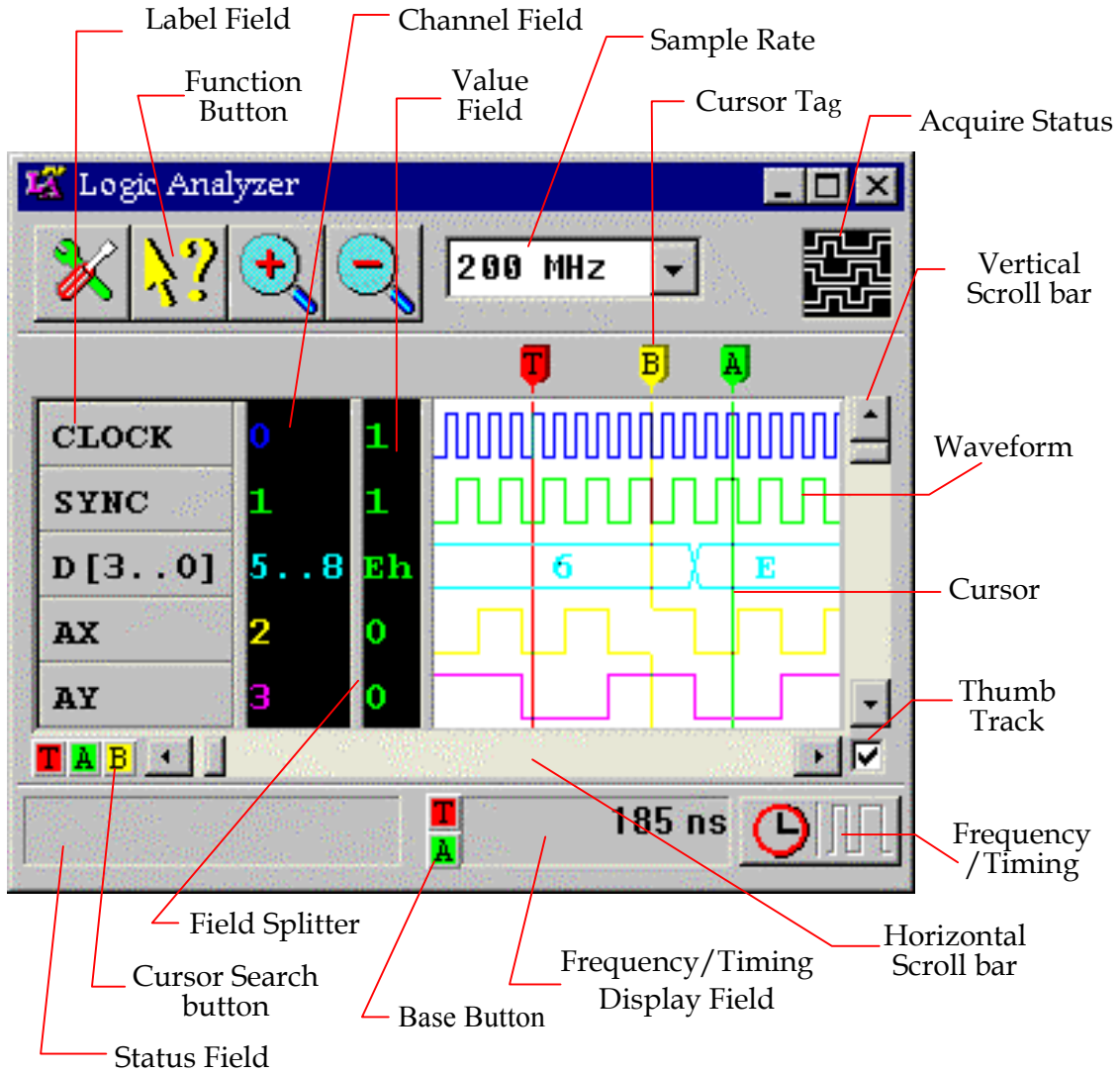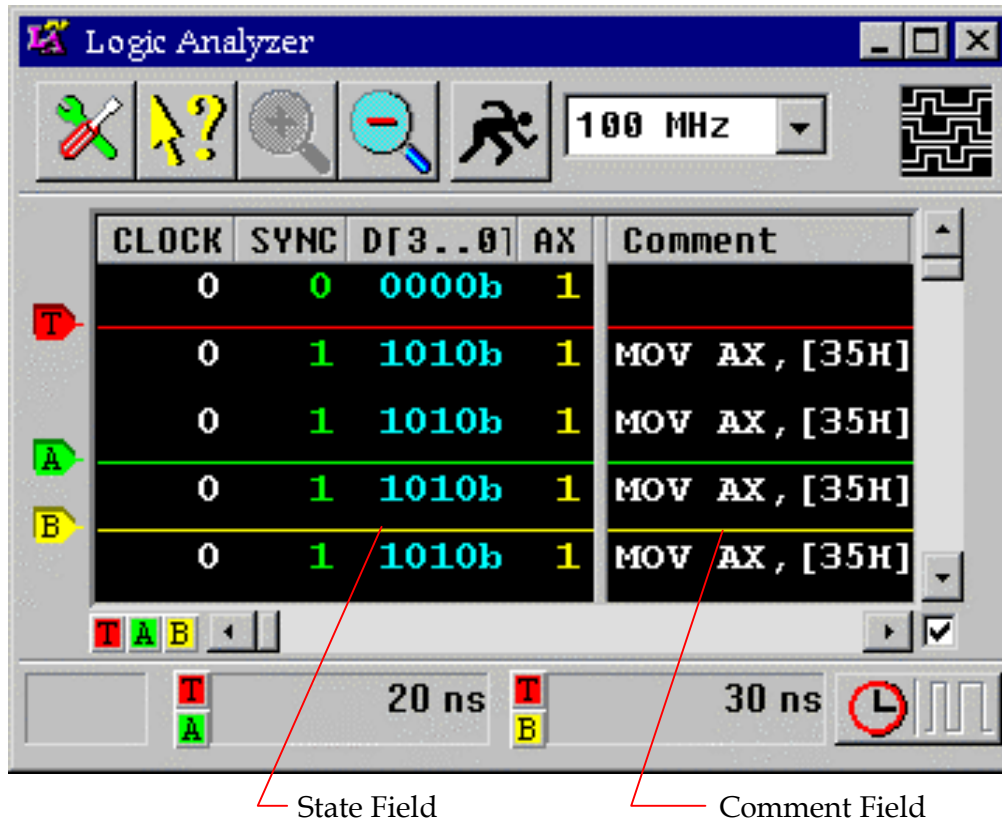
Chapter 3

Operations

⌨ Screen

Timing Analysis Screen:

State Analysis Screen:

State Field   Comment Field

🖳 Quick Use

Please see the following steps to quickly learn how to operate the Acute-LA.

1. Execute the LA Viewer programs.
2. Click the **Configure threshold** button and choose the threshold according to the target signal.
3. Pop up the **Label Menu** (Move the mouse to the **Label Field** and click the right button of the mouse.)
4. To choose **Add Label** on the **Label Menu**, a dialog box will appear.
5. Set up the label name, channel numbers, and the label color.
   The label name can be text and numeric, but no more than 32 characters.
6. Repeat procedure 3, 4, and 5 till all label names are set up.
7. Adjust the sampling rate to conform to the target signal (ideal value should be 4 to 6 times of the target signal's highest frequency value).

8. Click the **Configure Trigger** button to set up trigger condition.

9. Connect the ground lines to the target system's ground.

10. Connect grippers to the target system in accordance with the label names previously defined.

11. When using the state analysis, change the clock source from internal clock to external clock and connect the clock channel to the target system as the clock source. Then, switch the mode to state analysis screen by clicking the Timing/State button.

12. Move the trigger cursor to a proper position. (Click the **T** button or drag the **T Tag** in the **Waveform field**).

13. Click the **Acquire Data** button to start acquiring data.

▦ Scroll Bar Definition

The Vertical Scroll bar will scroll the waveform up or down.

The Horizontal Scroll bar will scroll the waveform position horizontally through the entire range of memory.

The following is an explanation of the Horizontal Scroll bar function:
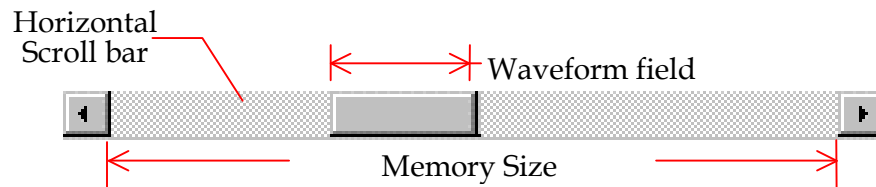
▦ Status Menu

To pop up the **Status Menu**, you have to move the cursor to the value field and click the right button of the mouse (see the exhibit on the right). It can show the instant status or instant frequency of the channel you choose.
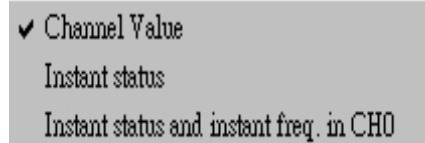
🖳 Label Menu

To pop up the **Label Menu**, you have to move the cursor to the label field and click the right button of the mouse (see the exhibit on the right). However, the cursor's position will affect the activating status: To pop up the menu at the position with no label, called "global mode label menu", will enable all labels in the label field; To pop up the menu at one label will enable this one setting only. Some label menus cannot be opened when they are shaded.

Undo
Add Label
Add All Label
Delete Unused Labels
Delete Label
Delete All Labels
Modify Label Name
Configure Labels
Combine Labels
Arrange Labels
Decompose Labels
Sorting Labels

🖳 Move Cursor

There are six cursors on the waveform field: one is the trigger cursor (T); the others are cursor A through cursor E. There are three ways to move these cursors:

1. Use the left button of the mouse to drag the cursor tag, which is on the top of the waveform field in the timing mode and on the left side of state field in the state mode.
2. Move the mouse to the cursor of the waveform or state field, and use the left button of the mouse to drag the cursor line.
3. Use "←" or "→" to move the chosen cursor. In state analysis, use "↑" or "↓" instead of "←" or "→". (The cursor will be selected when you press the corresponding key.)

Although method 1 and 2 look similar, they are actually different operations: When the cursor is out of the viewable range, you cannot use method 2 to move it, but you may drag the cursor tag into the field using method 1 since of the cursor tag is on the edge of the field. Nevertheless, there is an advantage to use method 2: The waveform screen will follow the cursor line when the line is dragged to the screen edge, but it can't in method 1. Using method 2, the Value Field also represents the data values for the selected cursor. Try each method to gain a better understanding.

🖳 Search Cursor

There are six buttons located between the label field and the status field to represent the preceding six cursors. The left button "T" is used for searching the trigger cursor, button "A" for cursor A, etc. When you click any of these buttons, the chosen cursor will be displayed at the center* of the waveform field. Meanwhile, the color and value of the Value Field will change to represent the cursor's position. However, the cursor may not be at the center of the waveform field if the cursor has already been moved to the forefront.

* Center definition: The distance of the center in the waveform field to the field's left edge should be a factor of 128 in pixel unit.

🖳 Field Adjustment

Each field size is adjustable. These fields include the label field, the channel number field, the value field, and the waveform field.

In timing analysis, there are three field-splitters between the aforementioned four fields to use for adjusting the size of these fields. As the mouse is moved to either splitter, the mouse's shape will be changed to a splitter cursor. You may drag it to adjust field size. In state analysis, each label's size and comment field are adjustable. When you move mouse between two labels, the splitter cursor will appear. Then, you may drag it to change the label's size.

Note! When you move a field splitter to the left, all fields to the right of this splitter will be moved for the same distance. Hence, it's possible to move some fields out of the window. By increasing the size of the LA Viewer window, you may be able to see all fields and easily adjust the size of each field.

🔍 **Zoom In**

The waveform field is displayed in pixel units. If there is no zoom-in or zoom-out, one pixel equals the period of the inverse of the sampling rate. For example: At 1MHz sampling rate, each pixel is 1us. To zoom in the waveform to four times, each pixel represents 250ns(=1us/4).

Hence, when the waveform is enlarged, you will see the waveform widened. Note! When you zoom in or zoom out, the waveform is enlarged or shrunk based on the center of the screen. The zoom-in factors include 2, 4, 8, 16, and 32. When you click the zoom-in button to the max factor 32, the button's color turns gray and the waveform can't be enlarged until you press the zoom-out button.

In state analysis, the zoom-in function is disabled.

🔍 **Zoom Out**

The waveform field is displayed in pixel unit. If there is no zoom-in or zoom-out, one pixel equals the period of the inverse of the sampling rate. For example: At 1MHz sampling rate, each pixel is 1us. To zoom out the waveform to four times, each pixel represents 4us(=1us*4).

Hence, when the waveform is shrunk, you will see the waveform narrowed. Note! When you zoom in or zoom out, the waveform is enlarged or shrunk based on the center of the screen. The zoom-out factors include 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024 and 2048. When you click the zoom-out button to the max factor 2048, the button's color turns gray and the waveform can't be shrunk until you press the zoom-in button.

In state analysis, the zoom-out function is disabled.

🏃 Acquire Data

Before acquiring signal data, you have to set label's name and trigger parameters, connect grippers with target system, and move the trigger cursor to appropriate position. When you click the Acquire-Data button, acquiring symbol at the up right of the window will show a rolling display. In addition, some buttons will turn to gray color; it means these functions cannot work until the acquiring action finished.

After acquiring data, these signals will be displayed on the waveform field. Jump to the trigger cursor; you should find here the values that satisfied the trigger parameters. Sometimes, the memory before the trigger position is empty with no data. That might be because the trigger occurred instantly after clicking the Acquire-Data button. So, if you want to see the waveform before the trigger cursor, there are several ways: one is to click "Pre-Trigger" function (only available on the LA2000P series); the others please refer to the "**Relationship between Trigger Cursor and LA-Memory**" at page 11.

If the trigger signal does not occur after clicking Acquire-Data, the LA will stay in the acquiring state. You may force it to stop by clicking the **Stop Acquire** button. Meanwhile, **the waveform field will still show acquired data in front of trigger cursor.**

🏃 Repetitive Acquisition

Repetitive Acquisition is similar to the **Acquire Data** mode. The difference is that after acquiring data and shown, the Repetitive-Acquisition will repeat this action until you click the Stop-Acquisition button. When you force the acquisition to stop, the waveform field will keep the latest waveform data.

✋ Stop Acquisition

Whether using the Acquire-Data or Repetitive-Acquisition process, you may always stop acquiring by clicking the Stop-Acquisition button. The waveform field will keep the last waveform data at Repetitive-Acquisition process, but it will show the new acquiring data in front of the trigger cursor at Acquire-Data process.

⌨ Frequency & Timing

When the data is shown in the waveform field, you may use the cursors A through cursor E referred to the trigger cursor to analyze the frequency and timing of these signals. There are three fields displaying the frequency and timing (only one or two may be visible if the window is too small) of each cursor with respect to the trigger cursor. You may change the display unit by clicking the Frequency/Timing-Switch button beside these columns. The smallest value of timing unit is the inverse of the sampling rate (if the sampling rate is 200MHz, then the smallest value is 5ns). When the display unit is frequency in hertz, the sampling rate will be the largest value. When the sampling rate is set using the external clock, the frequency measurement unit will be "c", meaning **Clocks**.

⌨ Hot Key Definition

1. Cursor Left and Right (Timing) Label Move (State Mode)	← , →
2. Label Up and Down (Timing) Cursor Move (State Mode)	↑ , ↓
3. Next page or Prior page (Waveform)	**Page Up, Page Down**
4. Next page or Prior page (Channel)	**Ctrl + Page Up, Ctrl + Page Down**
5. Search Trigger cursor	**T**
6. Search Cursor A, B, C, D, E	**A, B, C, D, E**
7. Data Acquire	**Enter**
8. Repetitive Acquire	**Ctrl + Enter**
9. Stop Acquire	**Escape**
10. Zoom In	**Pad +**
11. Zoom Out	**Pad -**
12. Configure Trigger	**Ctrl + T**
13. Configure Threshold	**Ctrl + V**
14. Toolbox	**Ctrl + U**
15. Search Pattern	**Ctrl + S**
16. Search Next	**Ctrl + N**
17. Print	**Ctrl + P**
18. Configure Interface Card	**Ctrl + H**
19. Configure Environment	**Alt + Enter**
20. Help	**F1**
21. Quick Help	**Shift + F1**
22. Sampling Rate	**Ctrl + F**
23. Timing/Frequency Switch	**Space**
24. Add Label	**Insert**
25. Delete Label	**Del**
25. Pop-up Label Menu	**F2**
26. Undo	**Ctrl + Z** or **Alt + Back-Space**

⌨ **Add Label**

You may add a label by selecting **Add Label** from label menu. Once you enable the **Add Label**, you will find a dialog box with two options: *Add Label Set* and *Add Single Label*. The label set is grouped by Pod. Choose *Add Label Set*, if you find some pods are shaded, that means the corresponding signals are unavailable in the LA. The *Add Single Label* consists of label name, channel number, and waveform color. Once you finish setting and click "Ok", the label field will display this additional label.

⌨ Add All Labels
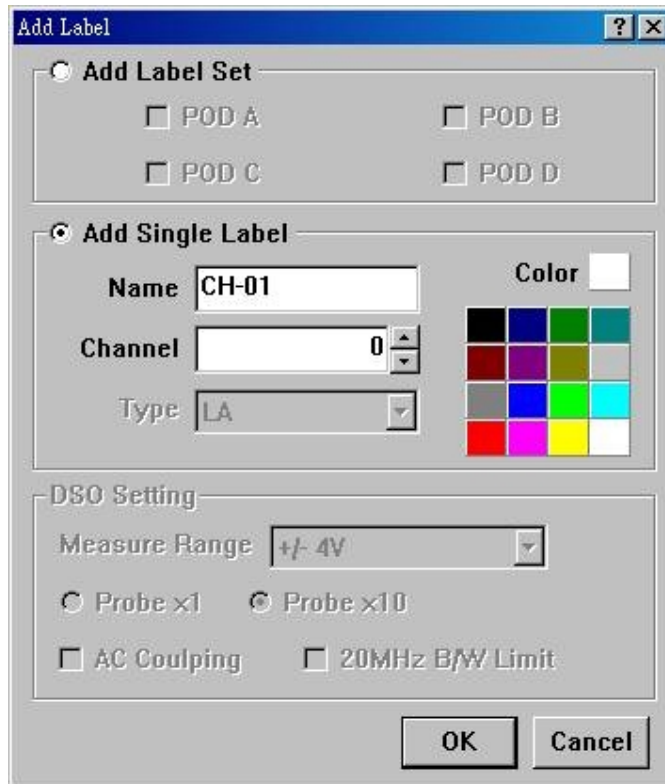
| Add Label |
| Add All Label |
| Delete Unused Labels |
| Delete Label |
| Delete All Labels |
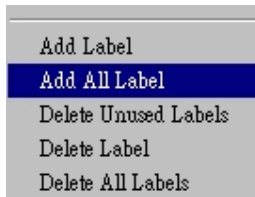
The **Add All Labels** will do following: number all channels and display these channels in the label fields (e.g., CH-00, CH-36 etc.). Only 32 channels (CH-00 to CH-31) are available for LAxx32P, and LAxx64P at the sampling rate 200 MHz. On the other hand, there are 64 channels (CH-00 to CH-63) available for LAxx64P at the sampling rate under 200 MHz. The PKLA series has 16 channels.

A pop-up warning dialog will appear after adding all labels: "Delete the exist labels?" By selecting "No", the duplicate label will not be added. By selecting "Yes", all exiting labels will be deleted.

⌨ Move, Select Label and Quick Combine

To move a label, drag the label to between any other two labels. You may see the *insert mark* appear then release the mouse button to place the label. However, if you drag the label up or down out of the label field, the field will scroll up or down automatically. In state analysis, the labels are located at the top of the window. So, up and down action will be changed to left and right. The other actions are similar between timing and state analysis. Note! By pressing **Ctrl** or **Shift** button and then clicking the Mouse's left button, you may choose multiple channels and move them together.

These labels can also be merged to form a bus. The action is similar to move a label. You will see the *Combine Signal* mark when 🔲 you drag the label into another label. The bus name will be that of the un-moved label. And the bus order of these labels is: new insert-label is High Bit; original-label is Low Bit.

⌨ Delete Label

There are three ways to delete labels:

1. Move the mouse to one label and click the mouse's right button, and to select the **Delete Label** item from pop-up label menu.

2. Press the **Del** key to delete highlighted label. You may use **Ctrl** or **Shift** key to select multiple labels and delete them as a group.

3. Select the **Delete All Labels** item, and then click "Yes" to delete all labels at the same time.

⌨ Modify Label Name

There are two ways to modify a label name. One is from within the **Configure Label** dialog box. The other way is to select the **Modify Label Name** on the pop-up label menu. The label name will appear in an editing cell and you may type any new name in the cell. However, you may not use the same name for two different labels, and its length cannot exceed 31 characters. Note! "A" and "a" represent different symbols. The label names are case sensitive. The legal symbols for label name include **[,], _, -, !, ~.**

⌨ Configure the Label Parameter(s)

You may either choose the **Configure Labels** from the label menu (see left) or double click a label name to configure the label parameter(s). The label parameter(s) can be set up for a single label or a group of labels. Label parameters include Name, Channel, Color, Value Type, Sig. Type (signal type), Waveform

Invert, etc. The value type is HEX, DEC, OCT, BIN, or ASC. The signal type is to set up the way to analyze the captured signal and there are five types: Digital, and UART in a single label (see below).
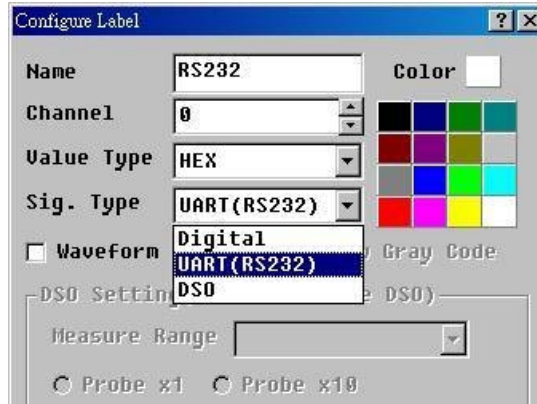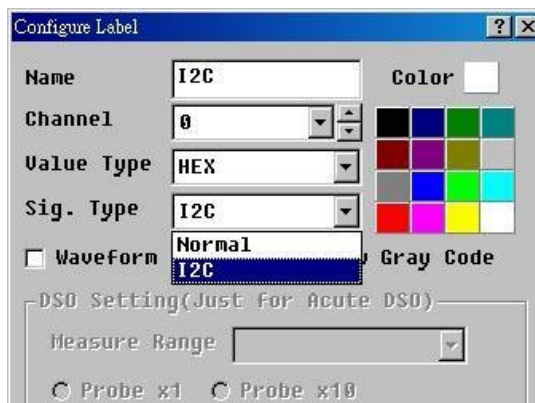

UART

You may set Baud Rate, Protocol, or Auto Detect to analyze UART signal. If you use the **UART Trigger** from **TravelLogic** of the **Configure Environment** dialog box (hard trigger), you cannot set protocol. **UART Trigger** is master setting.
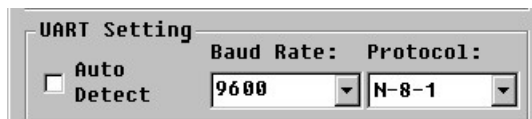
I2C (2 channels), I2S (3 channels), and SPI (3 channels) in a group labels (see below).

I²C

I2C (2 channels), one is clock, the other is data. Channel 0 is clock (SCK) and channel 1 is data (SDA) in Channel Field (see below). In order to analyze I2C, you must combine two channels to form a bus.

Note! The channel of **data (SDA)** must be in the higher bit of the bus **(MSB)** and the channel of **clock (SCK)** must be in the lower bit of the bus **(LSB)**.
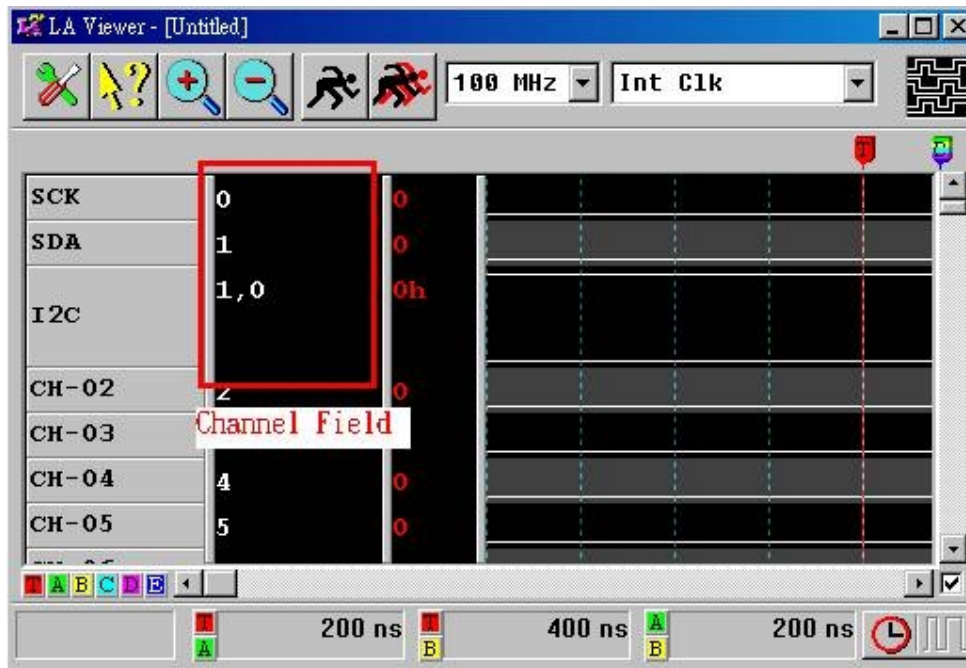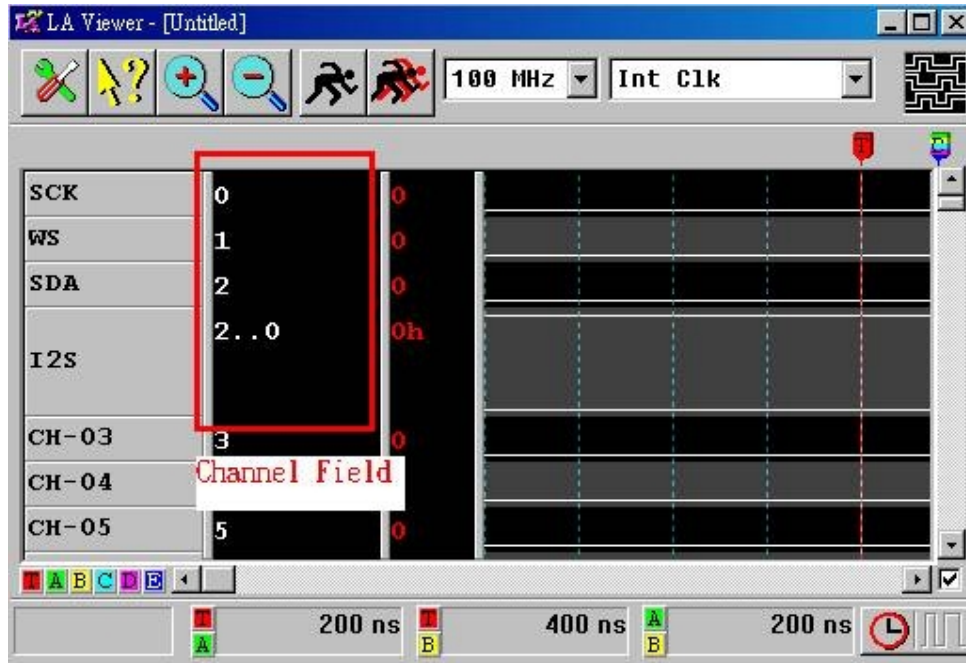

I²S

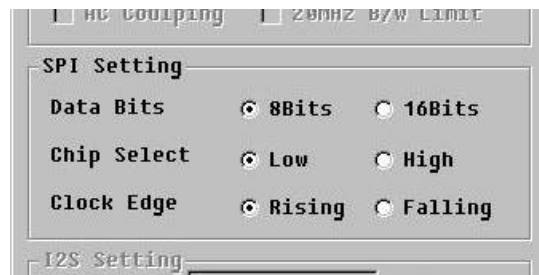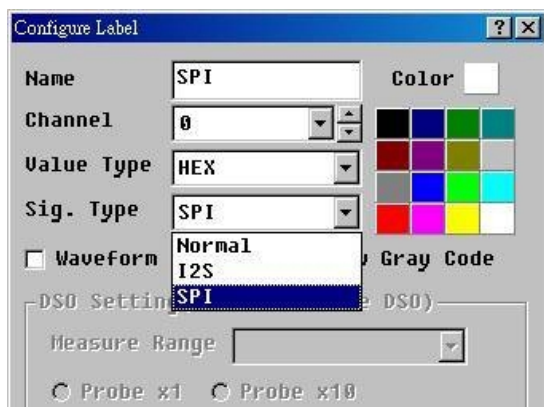I2S Setting: Setting the numbers of the bits to analyze.
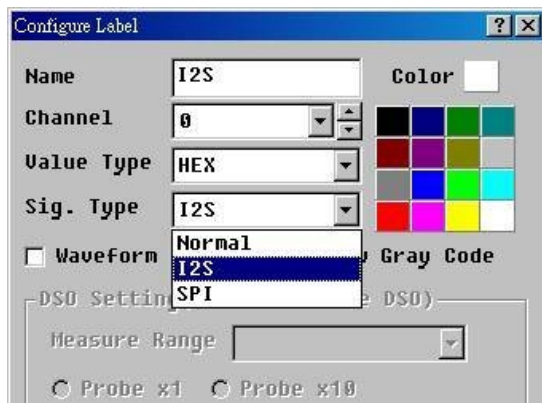
I2S (3 channels), there are clock, word select and data. Channel 0 is clock (SCK), channel 1 is word select (WS) and channel 2 is data (SDA) in Channel Field (see below). In order to analyze I2S, you must combine three channels to form a bus.

Note! The channel of **data (SDA)** must be in the higher bit of the bus **(MSB)** and the channel of **clock (SCK)** must be in the lower bit of the bus **(LSB)**. In channel field, the left number is MSB and the right number is LSB.

SPI

SPI Setting:

Data Bits	Select the numbers of the data bit. 8, 16 bits.
Chip Select	Select "Low" or "High" to decide the Chip Select enable level.
Clock Edge	Decide the timing to latch data.

SPI (3 channels), there are clock, chip select and data. Channel 0 is clock (SCK), channel 1 is chip select (CS) and channel 2 is data (SDA) in Channel Field (see below). In order to analyze SPI, you must combine three channels to form a bus.

Note! The channel of **data (SDA)** must be in the higher bit of the bus **(MSB)** and the channel of **clock (SCK)** must be in the lower bit of the bus **(LSB)**. In channel field, the left number is MSB and the right number is LSB.

The waveform invert is to invert the waveform (see the exhibit on the right).

You may change the channel number of a group labels in the Channel box on the **Configure Labels**. But, the channel number changes must be done one by one.
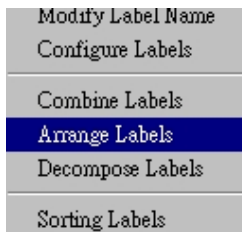
⌨ Combine Labels

Quick mode:
Please refer to page 30.

Dialog box mode:
Select the **Combine Labels** item from pop-up label menu to enter dialog box mode. In the dialog, there are three items: the *Group Label Name*, the *Source* field, and the *Destination* field. All the labels in the label field are displayed at the *Source* field, you may select and move any label to the *Destination* field by clicking "→" button between the *Source* field and the *Destination* field. On the other hand, if you want to move the signal from the *Destination* field to the *Source* field, then you have to click "←" button between the *Source* field and the *Destination* field. The lower and higher bit of the bus label will be displayed on the upper/lower side of the *Destination* field. Once you finish combining labels, remember to assign a new label name.
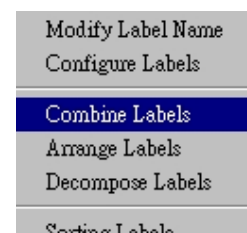
🖥 Arrange Labels

To arrange a bus label is to re-order the bus label's bits. You need to enable label menu from a bus label; otherwise, the **Arrange Labels** will be in gray color in the label menu. The way of using the dialog box of **Arrange Labels** is similar to that of **Combine Labels**. The only difference between these two dialog boxes is that the *Source* field will only show channel numbers of the bus label. Also, you have to move all items in the *Source* field to the *Destination* field; otherwise, you CANNOT finish this action.

🖥 Decompose Labels

You may move the mouse to the bus label and click the right button of the mouse to select the **Decompose Labels** item. The bus label will be decomposed and turn into renamed labels. For example, if a bus label (named XA) is composed of four channels. Once the bus label is decomposed, the four channels will be named XA-3, XA-2, XA-1, and XA-0.

🖥 Undo

You may use **Undo** to recover any change you made, such as Move labels, Combine Labels, Decompose labels, Add Labels, Delete Labels and so on. Whenever you use **Undo**, the latest change is recovered back to the previous status. However, the undo buffer can only accommodate 256 label names. Hence, not all the changes made can be recovered if the buffer is full and a portion of the old data has already been deleted. If you want to maximize the usefulness of the undo function, delete unused labels.

⌨ Sorting Labels

Sorting Labels means that all labels in the label field are sorted alphabetically, in either ascending or descending order.

Modify Label Name
Configure Labels

Combine Labels
Arrange Labels
Decompose Labels

Sorting Labels

⌨ Delete Unused Labels
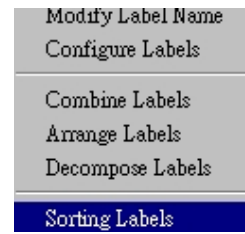
Add Label
Add All Label
Delete Unused Labels
Delete Label
Delete All Labels

If you find some labels are shaded, that means it is unused. You can select the **Delete Unused Labels** item from pop-up label menu and delete unused labels.

Chapter 4

Functionality
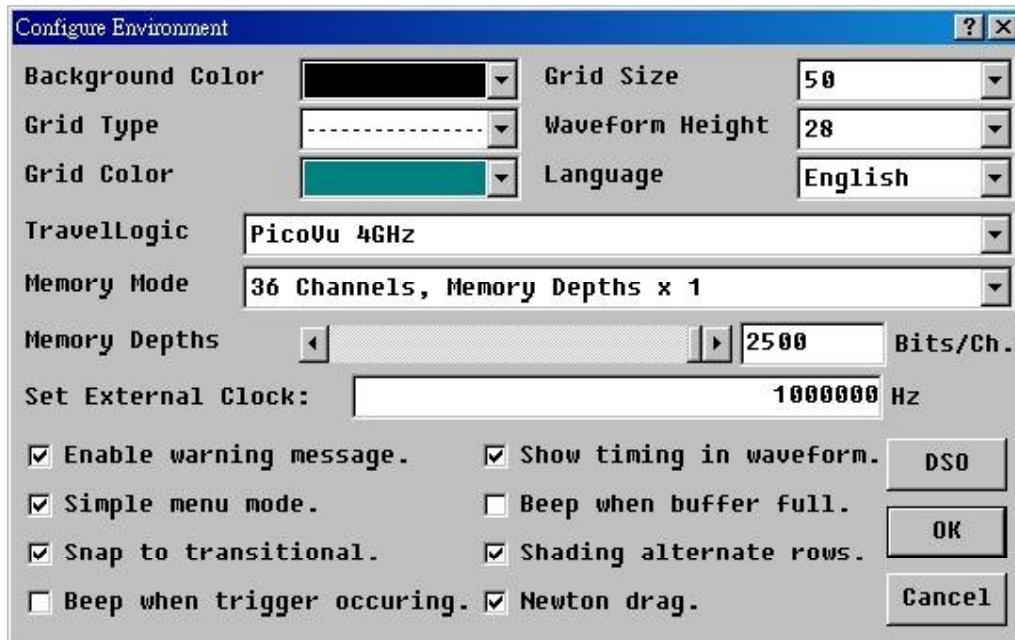
Interface Card Configuration

There is one dialog box pop-up when you click the "**Interface Card Configuration**" button. The dialog box will show you the LA's model number and connection interface. The LA Viewer detects the LA to PC interface automatically. If something is wrong with the connection, it will tell you the possible problems you may run across. You can solve them as instruction in the dialog box.
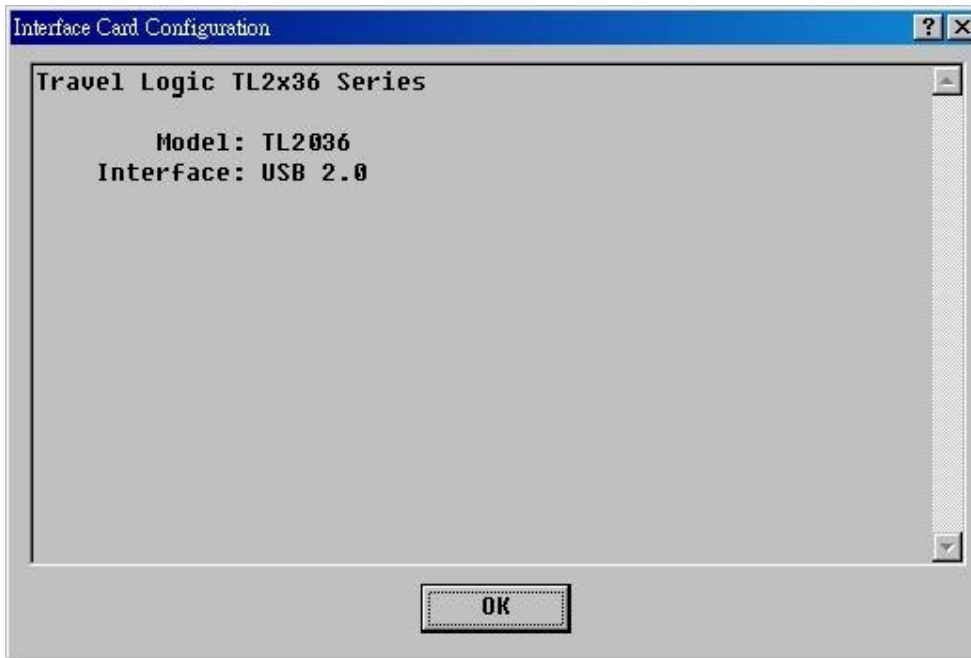
![icon] Configure Environment

There are several parameters in the dialog box as follows:

```
Configure Environment                                          [?][X]

Background Color   [ black       ▼]   Grid Size        [50      ▼]
Grid Type          [--------------▼]   Waveform Height  [28      ▼]
Grid Color         [ teal        ▼]   Language         [English ▼]
TravelLogic        [ PicoVu 4GHz                                ▼]
Memory Mode        [ 36 Channels, Memory Depths x 1            ▼]
Memory Depths       [◄]                        [►][2500    ] Bits/Ch.
Set External Clock:  [                        1000000] Hz

☑ Enable warning message.    ☑ Show timing in waveform.   [ DSO    ]
☑ Simple menu mode.          ☐ Beep when buffer full.
☑ Snap to transitional.      ☑ Shading alternate rows.    [ OK     ]
☐ Beep when trigger occuring. ☑ Newton drag.              [ Cancel ]
```

Background Color	The LA Viewer background color.
Grid Type	There are six types available for the waveform field, such as dot, linear...
Grid Color	There are 16 colors available for the grid.
Grid Size	The unit of the grid size is pixel of the screen.
Waveform Height	The height of the waveforms will affect the maximal number of waveforms that can be displayed in the waveform field. You may change it from 16 to 100 with an interval of 2.
Language	The LA Viewer supports both Chinese and English messages. You may use either language depending upon your needs. However, Windows messages will appear in the operating system's default language.
TravelLogic	Trigger types.
Memory Mode	It can adjust memory depths by choosing channels
Memory Depth	The user may set the memory depth. The horizontal scroll bar can scroll the memory depth.

Set External Clock	The user may set the external clock. The LA Viewer does not know the external clock, so the waveforms are displayed as the external clock set here. However, if the external clock is random, then the timing shown is meaningless. If the external clock used is changed, you need to re-set the external clock to the same; otherwise, the timing of the waveforms is not correct.
Warning Message	When the sampling rate is changed, the LA Viewer will pop up a warning message. You may turn it off from here.
Simple menu mode	When you make the window size smaller, some buttons will disappear and move into the toolbox. So, the Toolbox will list those functions on the top of the window. However, when you disable simple menu mode, you may activate any function from the toolbox regardless of the menu mode.
Beep when trigger occurring	If you enable this item, you will hear a beep sound when the trigger condition is met.
Show timing in waveform	In the waveform of one signal (not the combined signals), it shows the Low and High.
Beep when buffer full	This function makes the LA beep when the buffer is full after successfully triggering, but the sound is different from the beep sound when trigger occurs.
Shading alternate rows	In order to distinguish channels to use two colors.

⌨ Change Sampling Rate

The ACUTE-LA's sampling rate ranges from 4GHz to 1Hz for internal clock or 200MHz for external clock. When you change the sampling rate, the previous waveform will be lost since the time unit has changed. A warning message box will pop up and ask if you want to wipe out the latest waveform. There is also another message in the box: "Do not display this warning message box later?" If you select that item, then the warning message box will not appear when you change the sampling rate until you enable the warning message from the **Configure Environment** dialog box.

4GHz, click the "**Configure Environment**" icon button on the main screen and the "**Configure Environment**" dialog box will show as Figure 1 below, the choose the **PicoVu 4GHz** in TravelLogic box.
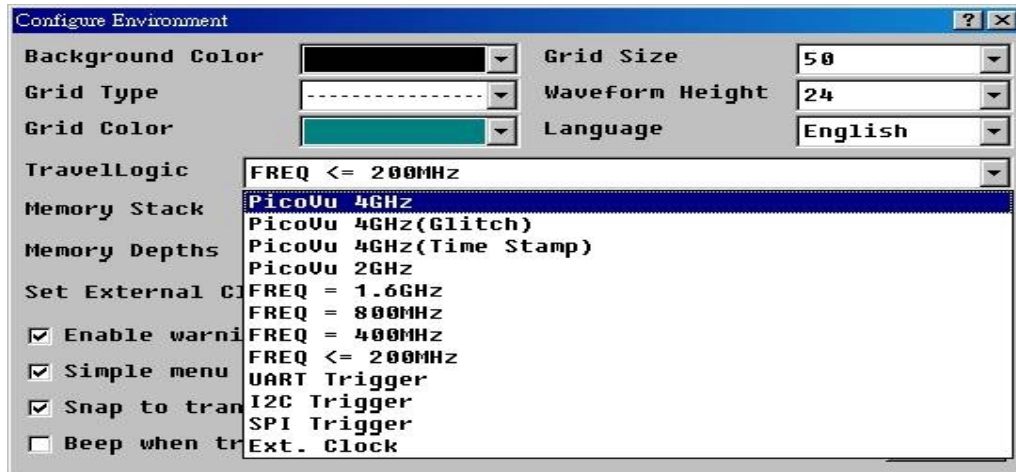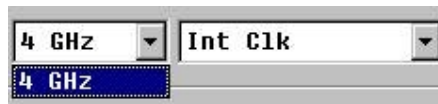

Figure 1

When using the **PicoVu 4GHz**, you will see "**4 GHz**" at the top right corner of the main screen.

But there is no other sampling rate, you must to select other item in TravelLogic box. For example, 200MHz.
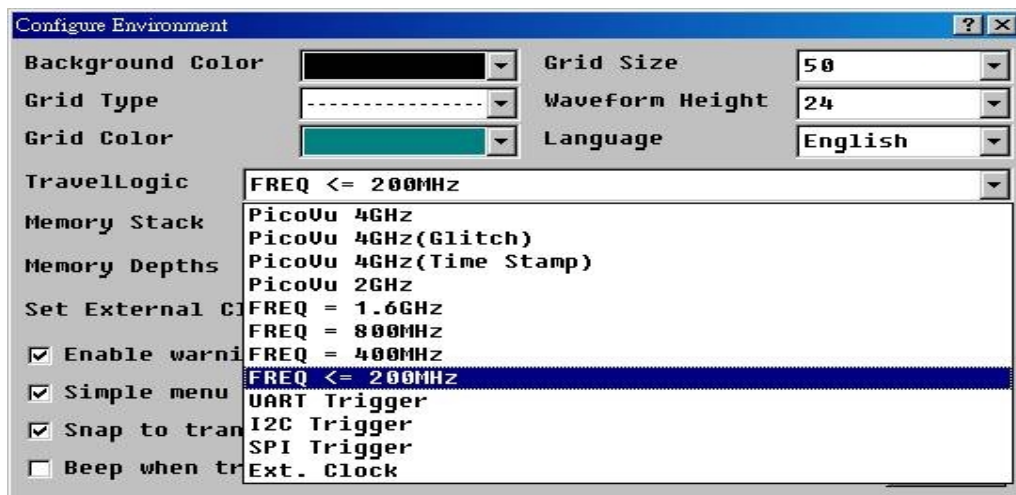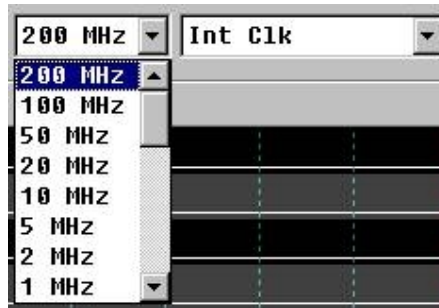

Figure 2

When using the **FREQ <= 200MHz**, you will see "**200 MHz**" at the top right corner of the main screen. The sampling rate range from 200MHz to 1Hz for internal clock.

For external clock, please connect the external clock to the right channel, which is indicated in the sampling rate pull down menu.

⌨ External Clock

To use the external clock, click the "**Configure Environment**" icon button on the main screen and the "**Configure Environment**" dialog box will show as Figure 1 below, then choose the **Ext. Clock** in **TravelLogic** box.
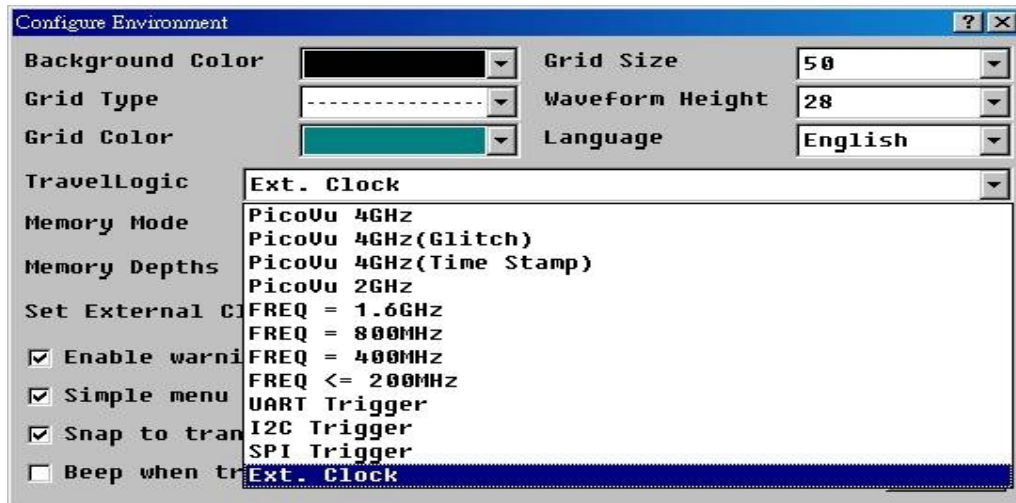

Figure 1

Set External Clock

When the above working environment is configured, input the external clock, it will show as Figure 2.
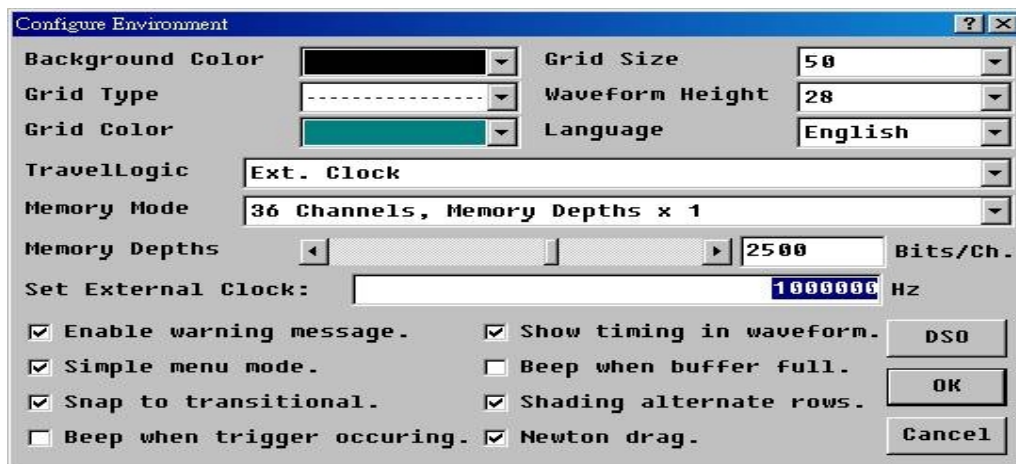

Figure 2

Once the above parameters are set, you will see "EXT" at he top right corner of the main screen. Only last channel can be set the external clock channel, for example, There are 36 channels, CH35 is the last channel. It will show as Figure 3.
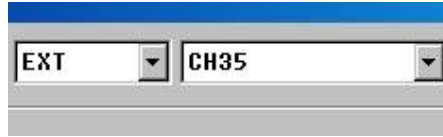

Figure 3

When using the External Clock, the dialog box will show the below items.

! CH35	It is to invert the waveform of CH35.
CH34 & CH35	It is to use the AND operator to calculate the waveform of CH34 and CH35.
CH34 # CH35	It is to use the OR operator to calculate the waveform of CH34 and CH35.

Configure Trigger

There are five modes of trigger setting:

1. Single Level Mode
2. Multi-Level Mode
3. Dual/Multi Condition Mode
4. Trigger Width
5. Disable Trigger Condition
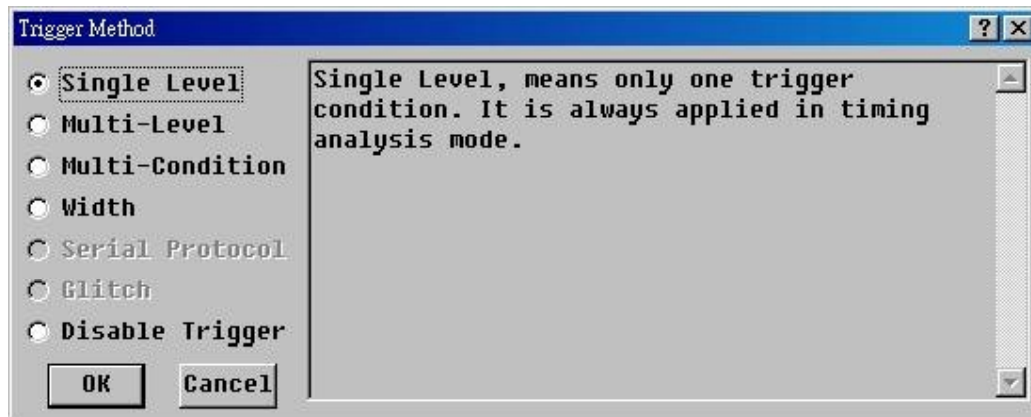
When using the LA2000P series and TravelLogic series, the **Configure Trigger** dialog box will show the above items. Using the PKLA series, only Single Level Mode is available. Each mode describes its meaning at the right side as the item selected. Let's see the details of these trigger modes:

Mode 1: Single Level Mode

There are two ways of setting this mode:

1. *Direct Mode*

There are 64 buttons to correspond 64 channels. Some buttons in gray color, either unavailable or undefined in the label field, cannot be changed. The other available buttons can either be set as "1", "0", "X", "↑", "↓", or "↕ " state. But, only one channel can be set as the "↑", "↓" and "↕ " state.

> 0 : Low
> 1 : High
> X : Don't Care
> ↑ : Low to High (Rising Edge)
> ↓ : High to Low (Falling Edge)
> ↕ : Change

The *Pre-Trigger* function is at the up-left side of the box. If this function is enabled, the LA will ignore the trigger signal until the probing data has filled memory from its head to the trigger cursor. For a detailed description, please refer to the "*The Principle of Logic Analyzer*" section.

The other function in the Trigger menu is *Pass Count*. This means the number of times the trigger condition is ignored before the trigger is enabled. If the pass count is set to "0", the LA's trigger circuit will send a trigger signal to the LA's record system upon the first occurrence of the trigger condition, and the LA will stop acquiring when the memory is full. If the pass count is set to "N", the trigger circuit will not send the trigger signal to the record system until the trigger condition has occurred "N+1" times, and then the LA will stop acquiring when the memory is full. The pass count range is different in the various LA models.

The *Delay Trigger* function will postpone the trigger signal to the LA's record system until the setting value time out. This is very useful to compensate for the limitation of the LA's memory depth. Sometimes, it is useful to record data long after the trigger point. However, the memory size of the LA may not accommodate this. In this situation, you may set a proper delay time to overcome this limitation. The delay time

even can be lengthened to the 4000 times of memory depth. (Depending on the model.)
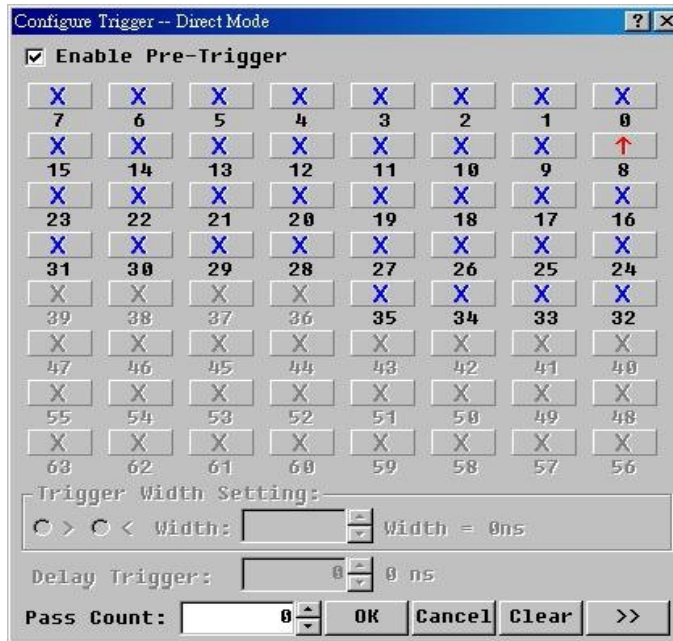Delay trigger is not available on the PKLA series.
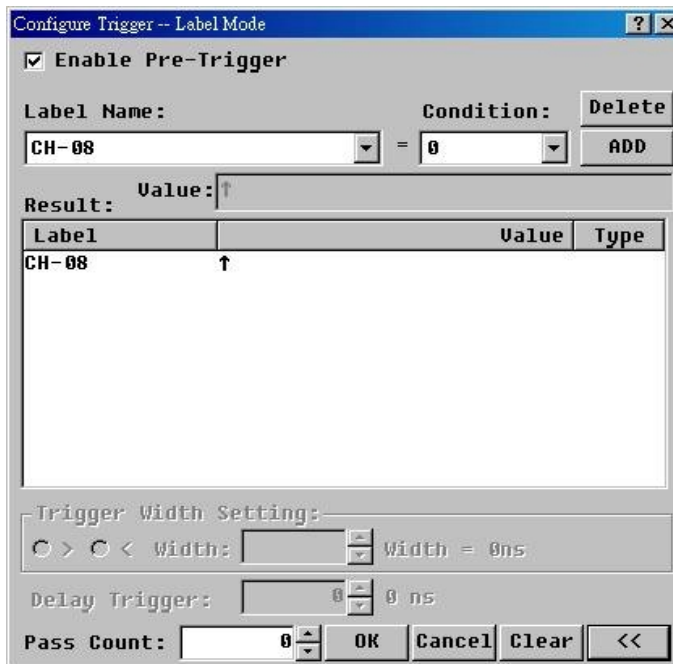

Fig. 4-2

2. *Label Mode*

Fig. 4-3

Click the ">>" or "<<" button to switch between the *Direct Mode* and *Label Mode*. In the *Label Mode*, select one label from the *Label Name* box to set the trigger condition. The *Condition* combo box will be changed according to the selected label type: single label or a bus label. If it is a single label, then the condition lists will be "1", "0", "X", "↑", "↓" and "↕ ". If it is a bus label, then the condition lists will be *HEX*, *DEC*, *OCT*, *BIN* and *ASC*. After choosing the proper condition, you will have to fill a value into the *Value* field. The legal value depends on the *Condition* setting. In HEX, the **0** to **9** and **A** to **F** are legal. In DEC, the **0** to **9** are legal. In OCT, the **0** to **7** are legal. In BIN, the "1", "0", "X", "↑", "↓" and "↕ " are legal. In ASC, the **A** to **Z**, **a** to **z**, **0** to **9** are legal.

Note: You may press **"/"** key to generate "↑", press "\" to generate "↓", and press "|" to generate "↕ ". ("|"="Shift+\")

Once the above parameters are set, and the *ADD* button has been clicked, these parameters will be showed in the *Result* field. If you want to change any parameter, just click the item in the result field and make the changes, or you may delete any parameter by clicking the *DEL* button. *Pass Count* operation is the same as described in *Direct Mode*.

Note 1: The *Direct Mode* or *Label Mode* value is interchangeable.

Note 2: These parameters can be saved as a project file, and can be retrieved when needed.

Mode 2: Multi-Level Mode

The *Multi-Level* mode consists of several *Single Levels*. There is a maximum of 16 trigger levels in the LA2000P and TravelLogic series. Each level has to be set independently as a *Single Level* setting. However, the *Pre-Trigger*, *Pass Count* and *Delay Trigger* will be the same in every level.

Beside each level button, there is a small button to control the relationship to the next level. This is a circular function with respect to the *Continue*, *Discontinue* and *Ending* command. Let's discuss the sample in Fig.4-4: Level 1 and level 2 are continuous trigger conditions, level 2 and level 3 are discontinuous trigger conditions, level 3 through 6 are continuous, level 6 and 7 are discontinuous, etc. Two neighboring buttons without a gap indicates that the two levels are continuous trigger. Alternately, two levels with a gap indicates discontinuous trigger. As shown in Fig.4-4, level 13 through 16 are gray indicating that only trigger level 12 will be used.

What is the difference between continuous trigger and discontinuous trigger? First, let's discuss the principles of Multi-level Triggering. As in Single Level Mode, the trigger circuit will send a trigger signal to the LA record system when the trigger condition occurs; then the LA will stop acquiring after the memory is full. However, in the Multi-level mode, when the probing data has satisfied the 1st trigger level, the trigger signal will not be send, but will enable the 2nd trigger level circuit. As shown in Fig.4-4, the trigger signal will not be sent until the probing data has satisfied all 12 trigger-levels in order. For the continuous type of the two-neighbor trigger level, the probing data has to satisfy the conditions for 2 trigger clocks. (See *Capture Mode* section) If the probing data has satisfied the 1st trigger level in the Nth trigger clock and it is not satisfied with the 2nd trigger level in the N+1th trigger clock, the trigger circuit state will return to the 1st level checkpoint. But, for the discontinuous

Fig.4-4

type, the trigger circuit state will stay in the 2nd level checkpoint and will go to the 3rd level checkpoint after the probing data meets the 2nd level condition, regardless of the probing data during in the N+1th trigger clock or later.
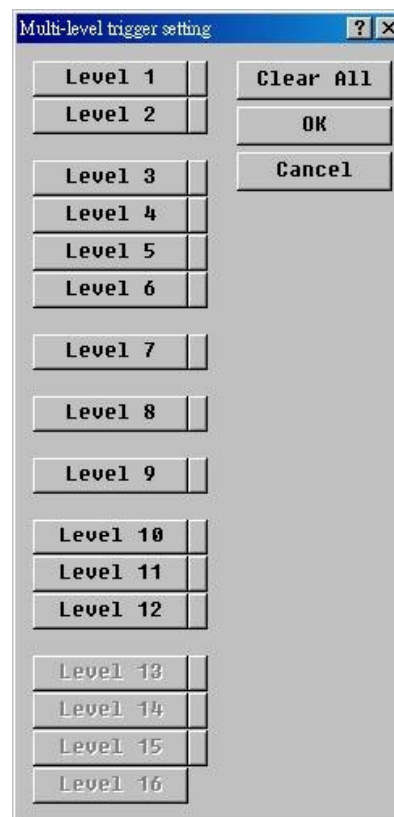
Ex. If our probing signals include an 8 channel data bus (named Data_Bus) and 1 channel control signal (named Data_Strobe) and have to meet the trigger condition defined as 5Ah and falling edge, then you have to configure the 1st trigger level condition as Data_Bus=5Ah, Data_Strobe=High, and the 2nd trigger level condition as Data_Bus=5Ah, Data_Strobe=Low. You also have to set the two-neighbor levels as continuous type. Otherwise, you will get a wrong result as follows.

Trigger Clock	Data Bus	Data Strobe
N	5Ah	High
N+1	1Ah	Low
N+2	2Ah	High
N+3	3Ah	High
N+4	4Ah	Low
N+5	5Ah	Low

The above probing data will satisfy the discontinuous trigger condition at the Nth and N+5th trigger clock but will fail to satisfy the continuous type because of the garbage during the N+1 to N+4. Generally, you will use the continuous type in State Analysis with Ext Clk. In most microprocessors, one command consists of several state codes. So, you can use the microprocessor system clock as the LA's Ext Clk input to analyze the microprocessor's action.

There is no edge trigger setting in Multi-level mode. You may also use the continuous type to form an edge trigger. The user may choose either of the two types according their requirements and situation.

Mode 3: Dual/Multi Condition Mode

Both the single level and multi-level triggers belong to the single sequential trigger condition. The trigger condition occurs only when the probing data has satisfied every trigger level in order. However, the dual/multi condition mode has parallel ways to check the two/multi independent sequential trigger conditions. Whichever one satisfies all trigger levels of its sequence first will generate the trigger signal. The configuration of the dual condition mode is the same as that for the multi-level mode. However, there are 16 levels in each sequence. As shown in Fig.4-6.

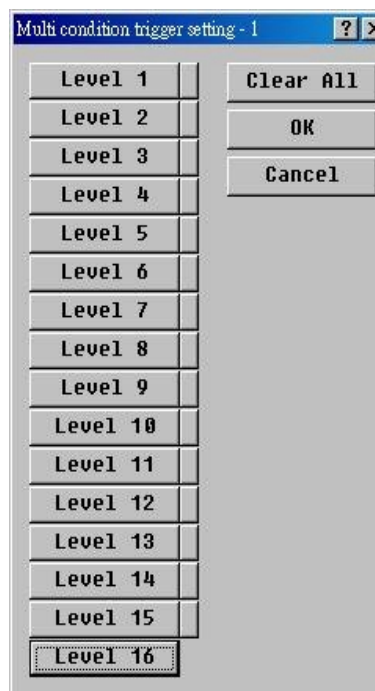Note: Using the LA2000P or PKLA series, only Dual Condition Mode is available.

Fig.4-6

Fig.4-5

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Mode 4: Trigger Width

The *Trigger Width* mode is like the single level mode but adds the width condition check. User may choose the ">" or "<" item to adjust for a suitable width value to filter the probing data trigger condition. As shown in Fig. 4-7. For example, if the trigger condition is set as 35h and ">100ns" width trigger condition, even when the probing data satisfies the 35h value the system will not generate a trigger signal until the trigger condition exists for over 100ns. Conversely, if the width is set to "<100ns", the
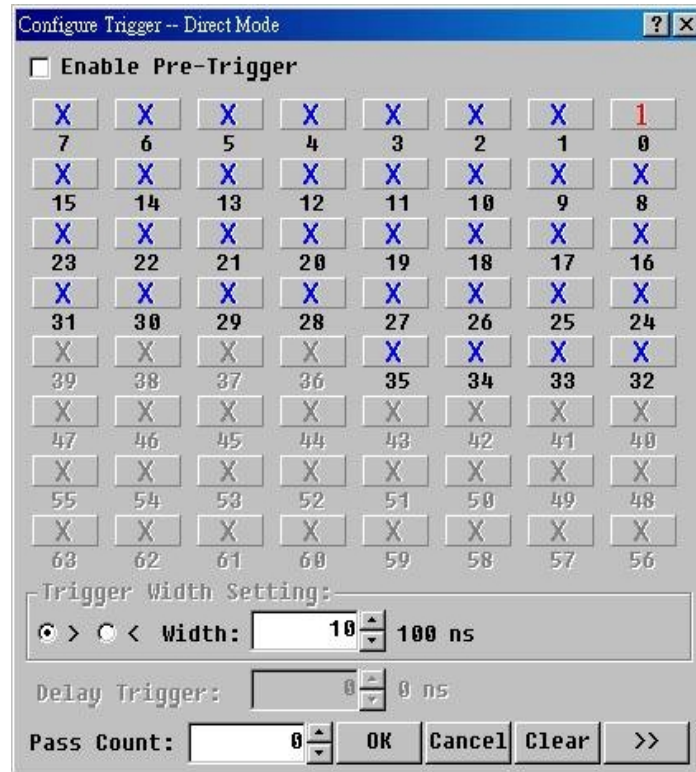

Fig.4-7

system will not generate a trigger signal if the probing data satisfies the 35h condition for more than 100ns.

Note: The trigger width cannot support edge condition.

Mode 5: Disable Trigger Condition

If you just want to view the probing data without any limitation, you can disable the trigger condition. The trigger signal will be send immediately after clicking the *Acquire Data* button and the LA will record until the memory full. In this situation, the trigger cursor is meaningless. However, this mode can be useful in gaining an understanding of the system under test, allowing you to select sampling rate and trigger criteria.

🖳 UART Trigger

To use the UART Trigger, click the "**Configure Environment**" icon button on the main screen and the "**Configure Environment**" dialog box will show as Figure 1 below, then choose the **UART Trigger** in the **TravelLogic** box.
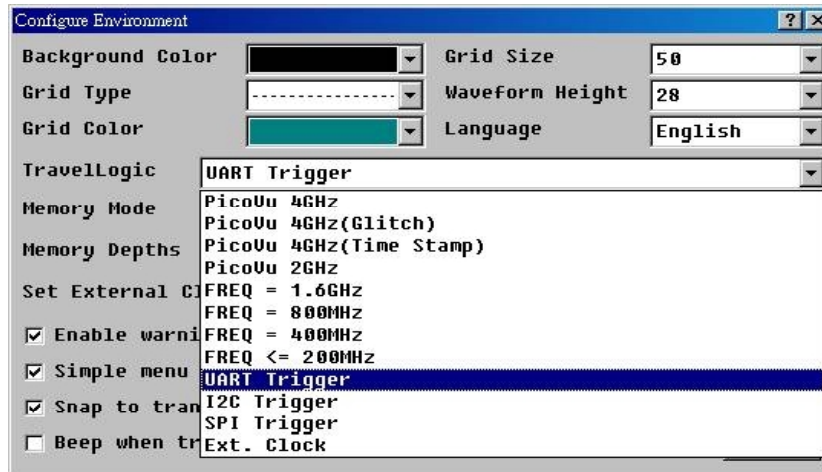

Figure 1

Memory Mode box is to choose the maximum memory depth per channel. When you select 36 channels as shown in Figure 2 below, the maximum memory depth per channel is total memory size divided by 36. For instance, if it is the TL2236 and 36 channels chosen, then 72M bits (total memory) / 36 = 2M bits (maximum) per channel, or 2 channels chosen, then 72M bits /2 = 36 M bits (maximum) per channel.
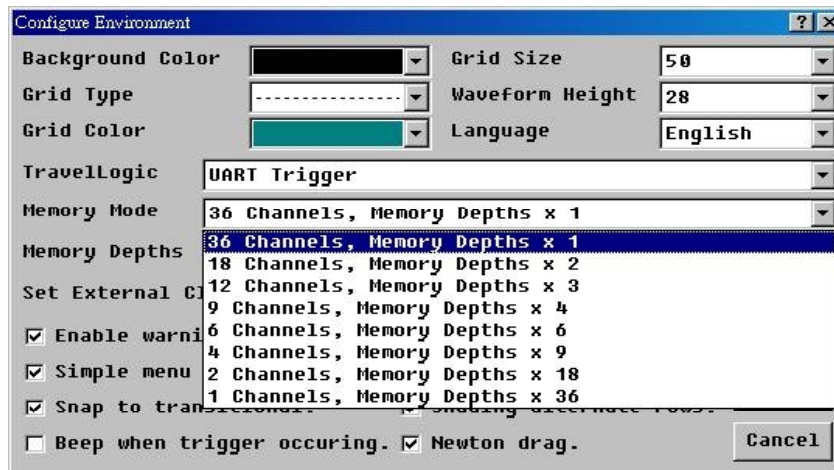

Figure 2

—55—

Memory Depth is to adjust the memory depth per channel by moving the scroll bar in the Memory Depth box as shown in Figure 3. This function provides convenience when you use only 2 or 4 channels to trigger the UART signal and need less than the maximum memory depth per channel.
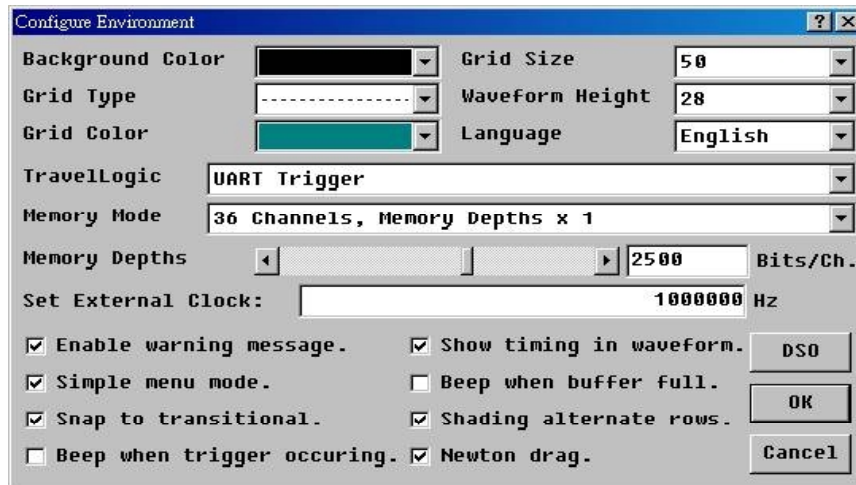

Figure 3

Trigger Parameters and Trigger Conditions

Once the above UART trigger environment is set, click the "**Configure Trigger**" button to set up the trigger parameters (upper half) and IF-Then conditions (lower half) as the **UART Trigger** box shown in Figure 4 below.
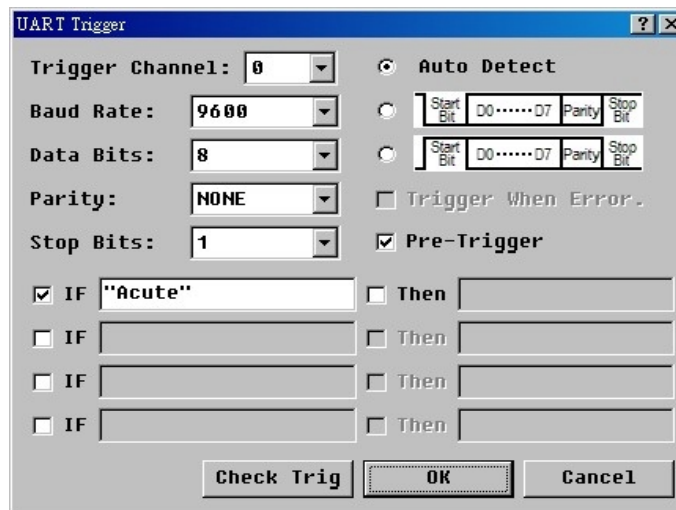

Figure 4

Trigger Parameters are:

Trigger Channel	Only **one** channel can be set.
Baud Rate	**110 ~ 921,600** bits per second **(bps)**
Data Bits	The number (5, 6, 7, or 8 only) of bits to characterize the captured data.
Parity	**EVEN, ODD, NONE.**
Stop Bits	**1, 2.**
Trigger Type	**Auto Detect** **Falling Edge Triggered / Positive Edge Triggered.**

Trigger Conditions use IF-Then condition clause with **three** types of input: **Character, String, Dec-Code** or **Hex-Code**.

A **Character** or a **String** must be within single or double quotation marks '_' or "_" like 'A' or "Acute". **Dec-Code** and **Hex-Code** is a decimal and hexadecimal number ('**h**'), e.g., '**A**' = **65** and **41h**.
A **String** is can also be input by Character, String, or Hex-Code with a blank space among them. For example, "**Acute**" string can also be input as '**A**'_"**cute**" or '**A**'_63h_'**u**'_'**t**'_65h.

Note: Only **16** characters are allowed in a string.

In the 4 **IF-Then** trigger conditions, you can input 1, 2, 3, or 4 of them. When either one condition is met and **needed only**, the trigger succeeds. For instance, you input 2 trigger conditions, IF '**a**' Then '**b**' and IF '**c**' Then '**d**', at the same time; when '**a**' is detected first and '**b**' is detected next, the trigger starts and stops right after to '**b**'.

The "**Check Trig**" button is to check the length of the input string and 16 characters only.
The **Pre-Trigger** function will ignore the trigger signal until the probing data has filled memory from its head to the trigger cursor. For a detailed description, please refer to the "**Configure Trigger**" section.
Once the above parameters are set, and you must to set up a single label's parameter on the main screen (Please refer to the **Configure the Label Parameter(s)**). Setting up the **Signal Type** is **UART** to analyze signal.

⌨ SPI Trigger

To use the SPI Trigger, click the "**Configure Environment**" icon button on the main screen and the "**Configure Environment**" dialog box will show as Figure 1 below, then choose the **SPI Trigger** in the **TravelLogic** box.
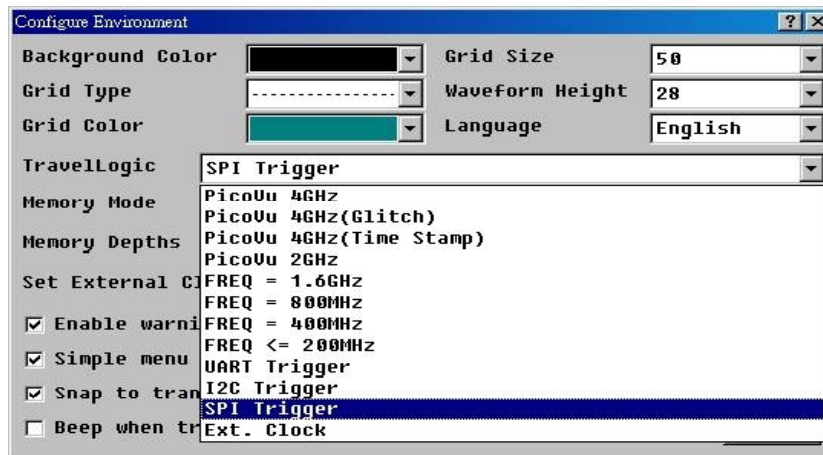

Figure 1

Trigger Parameters and Trigger Conditions

Once the above SPI trigger environment is set, click the "**Configure Trigger**" button to set up the trigger parameters (upper half) and IF-Then conditions (lower half) as the **SPI Trigger** box shown in Figure 2 below.
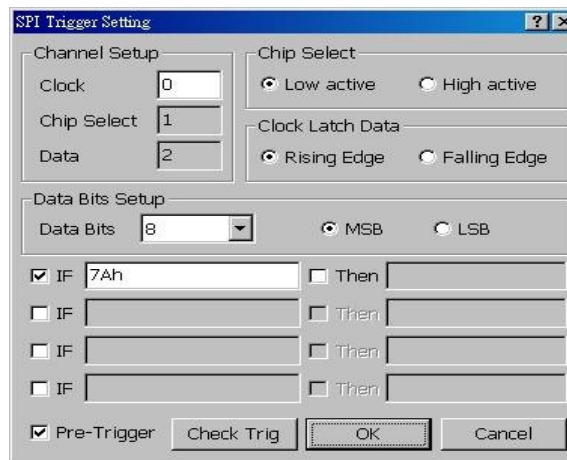

Figure 2

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Trigger Parameters are:

Channel Setup	Select channels, SPI(3 channels) in a group labels.
Chip Select	Select "Low" or "High" to decide the Chip Select enable level.
Clock Latch Data	Decide the timing to latch data.
Data Bits Setup	Select the numbers of the data bit. 8, 16 bits.
MSB/LSB	Decide to transmit data from MSB->LSB or LSB->MSB.

Trigger Conditions use IF-Then condition clause with **three** types of input: **Character, String, Dec-Code** or **Hex-Code**.

A **Character** or a **String** must be within single or double quotation marks '_' or "_" like 'A' or "Acute". **Dec-Code** and **Hex-Code** is a decimal and hexadecimal number ('**h**'), e.g., '**A**' = **65** and **41h**.

A **String** is can also be input by Character, String, or Hex-Code with a blank space among them. For example, "**Acute**" string can also be input as '**A**'_"**cute**" or '**A**'_**63h**_'**u**'_'**t**'_**65h**.

Note: Only **16** characters are allowed in a string.

In the 4 **IF-Then** trigger conditions, you can input 1, 2, 3, or 4 of them. When either one condition is met and **needed only**, the trigger succeeds. For instance, you input 2 trigger conditions, IF '**a**' Then '**b**' and IF '**c**' Then '**d**', at the same time; when '**a**' is detected first and '**b**' is detected next, the trigger starts and stops right after to '**b**'.

The "**Check Trig**" button is to check the length of the input string and 16 characters only.

The **Pre-Trigger** function will ignore the trigger signal until the probing data has filled memory from its head to the trigger cursor. For a detailed description, please refer to the "**Configure Trigger**" section.

Once the above parameters are set, and you must to set up a single label's parameter on the main screen (Please refer to the **Configure the Label Parameter(s)**). Setting up the **Signal Type** is **SPI** to analyze signal.

⌨ I2C Trigger

To use the I2C Trigger, click the "**Configure Environment**" icon button on the main screen and the "**Configure Environment**" dialog box will show as Figure 1 below, then choose the **I2C Trigger** in the **TravelLogic** box.
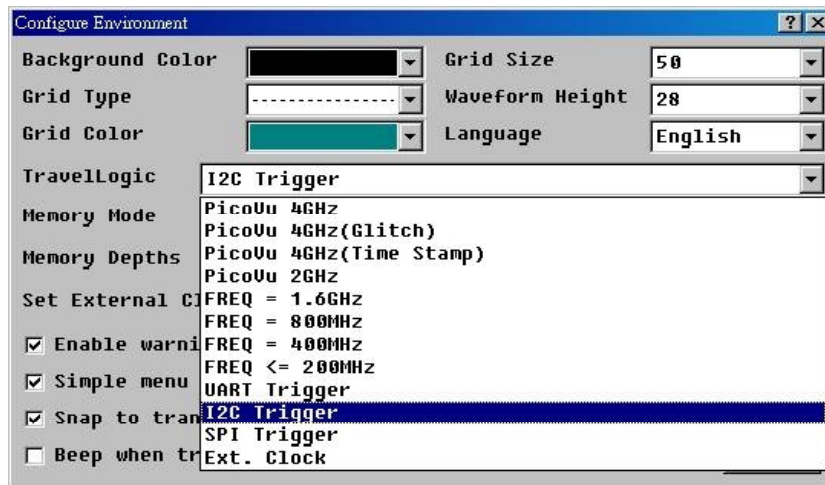

Figure 1

Trigger Parameters and Trigger Conditions

Once the above I2C trigger environment is set, click the "**Configure Trigger**" button to set up the trigger parameters (upper half) and IF-Then conditions (lower half) as the **I2C Trigger** box shown in Figure 2 below.
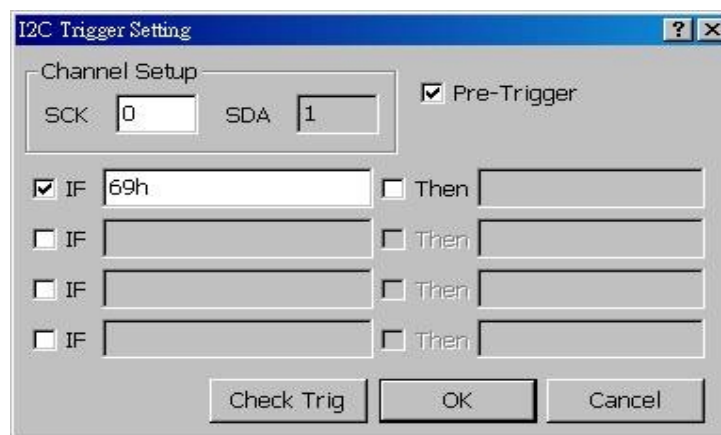

Figure 2

Trigger Parameters are:

Channel Setup	Select channels, I2C(2 channels) in a group labels.

Trigger Conditions use IF-Then condition clause with **three** types of input: **Character, String, Dec-Code** or **Hex-Code**.

A **Character** or a **String** must be within single or double quotation marks '_' or "_" like 'A' or "Acute". **Dec-Code** and **Hex-Code** is a decimal and hexadecimal number ('**h**'), e.g., '**A**' = **65** and **41h**.

A **String** is can also be input by Character, String, or Hex-Code with a blank space among them. For example, "**Acute**" string can also be input as '**A**'_"**cute**" or '**A**'_63h_'**u**'_'**t**'_65h.

Note: Only **16** characters are allowed in a string.

In the 4 **IF-Then** trigger conditions, you can input 1, 2, 3, or 4 of them. When either one condition is met and **needed only**, the trigger succeeds. For instance, you input 2 trigger conditions, IF '**a**' Then '**b**' and IF '**c**' Then '**d**', at the same time; when '**a**' is detected first and '**b**' is detected next, the trigger starts and stops right after to '**b**'.

The "**Check Trig**" button is to check the length of the input string and 16 characters only.

The **Pre-Trigger** function will ignore the trigger signal until the probing data has filled memory from its head to the trigger cursor. For a detailed description, please refer to the "**Configure Trigger**" section.

Once the above parameters are set, and you must to set up a single label's parameter on the main screen (Please refer to the **Configure the Label Parameter(s)**). Setting up the **Signal Type** is **I2C** to analyze signal.

⌨ I2S Trigger

To use the I2S Trigger, click the "**Configure Environment**" icon button on the main screen and the "**Configure Environment**" dialog box will show as Figure 1 below, then choose the **I2S Trigger** in the **TravelLogic** box.
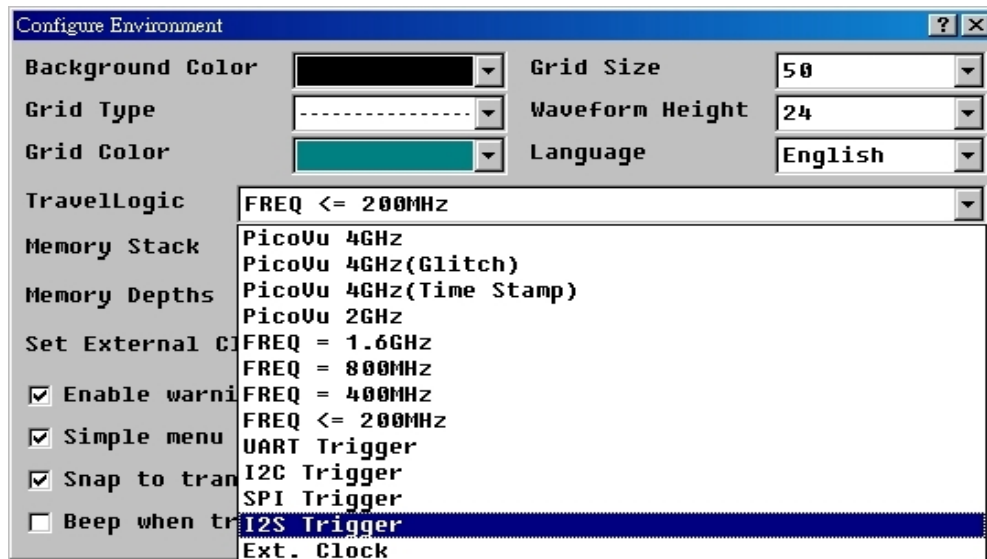

Figure 1

Trigger Parameters and Trigger Conditions

Once the above I2S trigger environment is set, click the "**Configure Trigger**" button to set up the trigger parameters (upper half) and Trigger Parameter (lower half) as the **I2S Trigger Setting** box shown in Figure 2 below.
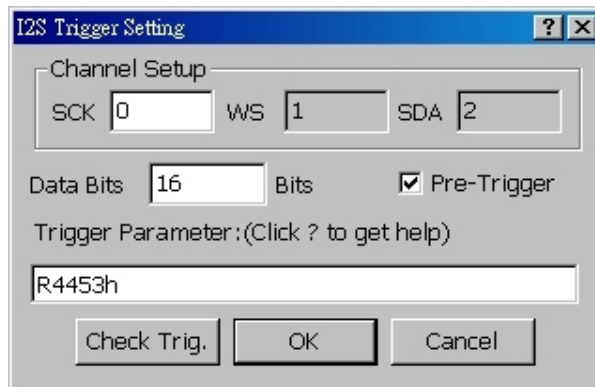

Figure 2

Trigger Parameters are:

Channel Setup	Select channels, I2S(3 channels) in a group labels.
Data Bits	Select the numbers of the data bit. 1 ~ 24 bits.

Trigger Parameter has **two** types of input: **Dec-Code** or **Hex-Code**.

Dec-Code and **Hex-Code** is a decimal and hexadecimal number ('**h**'), e.g., **65(decimal)** and **41h(hexadecimal)**.

There are two channels: Left and Right. The data can be filled in Left (with "L") and Right (with "R"). For example, **R4453h** or **L5132h**.

The data can be input with a blank space among them. It indicates that these data is continuous. For example, **R4453h_L5132h_R4562h**.

The data can be also input with a "-" among them. It indicates that these data is discontinuous. For example, the data includes R4453h_L5132h_R4562h_L3562h_R3654h, if you want to find the R4453h and L3562h, please input **R4453h_-_L3562h**.

Note: The input data, **16** maximum.

The "**Check Trig**" button is to check the input data.

The **Pre-Trigger** function will ignore the trigger signal until the probing data has filled memory from its head to the trigger cursor. For a detailed description, please refer to the "**Configure Trigger**" section.

Once the above parameters are set, and you must to set up a single label's parameter on the main screen (Please refer to the **Configure the Label Parameter(s)**). Setting up the **Signal Type** is **I2S** to analyze signal.

🖳 Glitch Trigger

To start the glitch trigger, click the "**Configure Environment**" icon button on the main screen and the **"Configure Environment"** dialog box will show as in Figure 1 below, then choose the **PicoVu 4GHz(Glitch)** in the **TravelLogic** box.
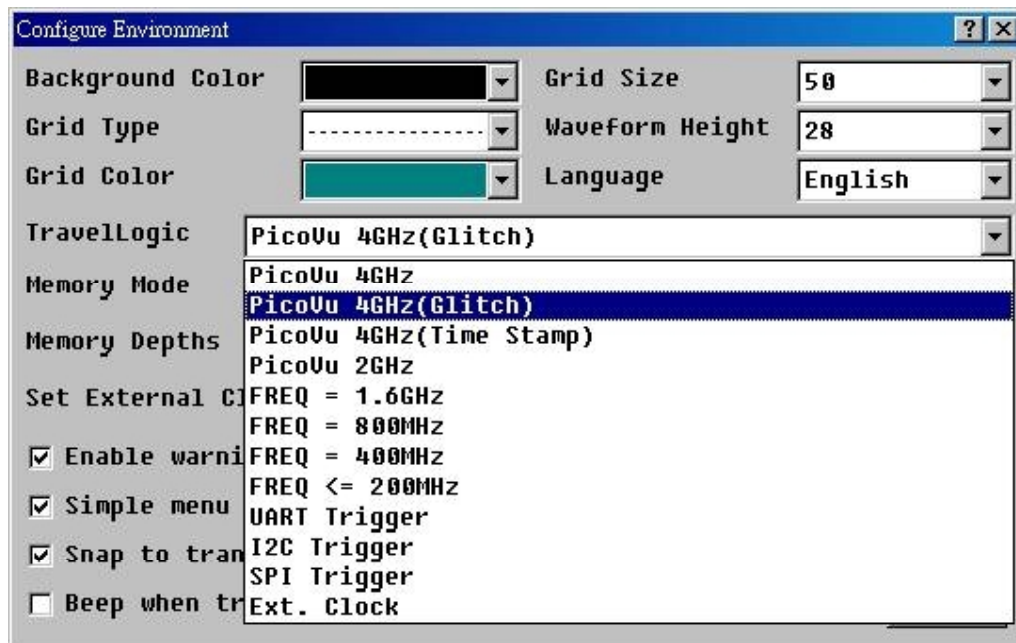

Figure 1

Trigger Parameters

When the above working environment is configured, click the "**Configure Trigger**" icon button on the main screen, the **Glitch Trigger Setting** dialog box will show as Figure 2 below.
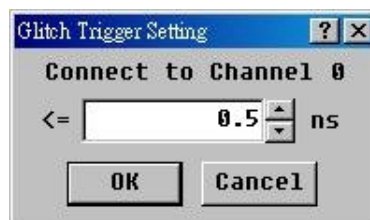

Figure 2

Note: Only **Channel 0** can be set as the glitch trigger channel.

Functionality

Parameter range: **0.5 ~ 8.25 nano second (ns) with interval of 0.25 ns.**

The trigger starts when the captured data (glitch) meets (< or =) the parameter, For example, if the parameter is 0.5 ns and captured glitch is triggered, the screen will look like the Figure 3 shown below.
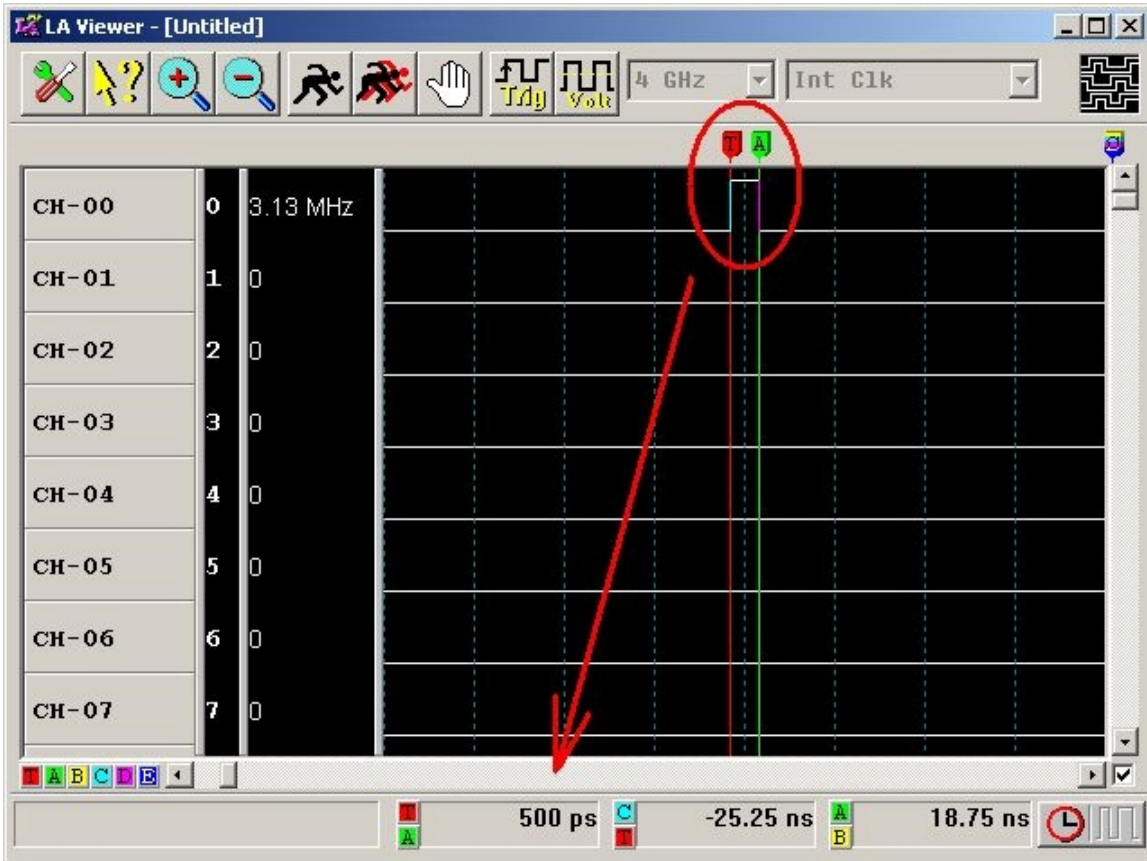

Figure 3

🖳 Time Stamp

Time Stamp only records when the captured data has rising or falling edges in order to maximum the length of the data is captured on a limited and fixed memory depth.
To start the Time Stamp, click the "**Configure Environment**" icon button on the main screen and the "**Configure Environment**" dialog box will show as Figure 1 below; select the **PicoVu 4GHz**(**Time Stamp**) in the **TravelLogic** box.
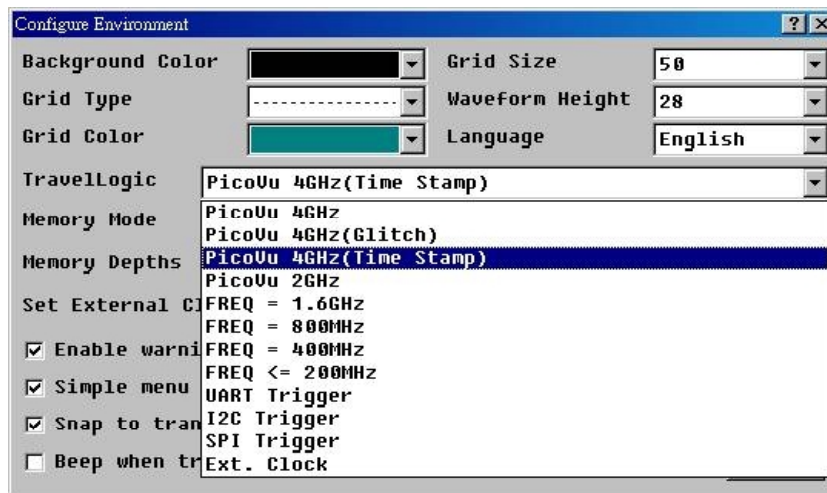

Figure 1

In Time Stamp, both **Memory Mode** and **Memory Depth** functions are not available as shown in Figure 2 below.
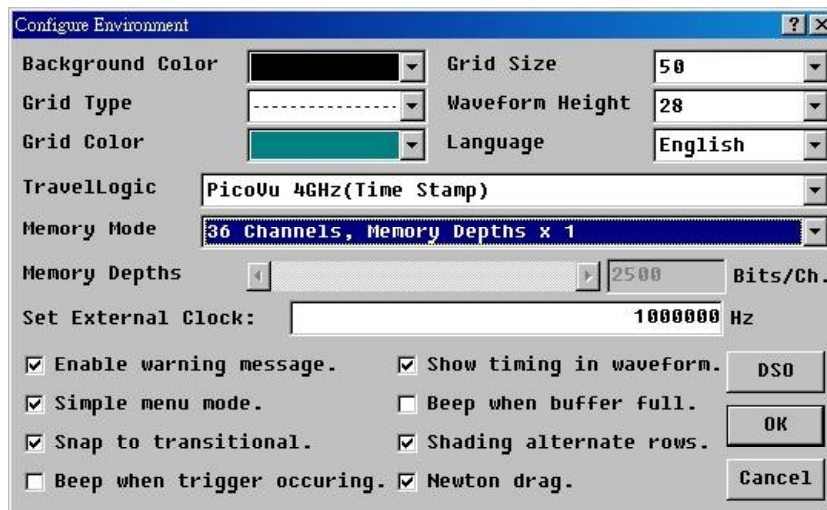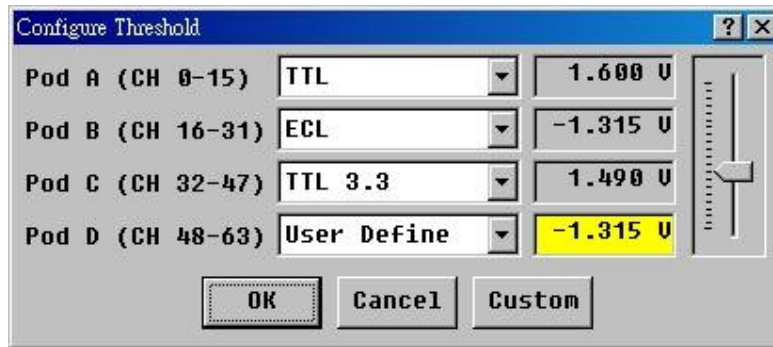

Figure 2

🔲 Configure Threshold

In digital systems, the determination of logic high/low depends on whether the signal is greater than or less than the threshold. The threshold configuration is a group setting in each pod of LA. Each pod includes 8/16 channels. You may configure the threshold for each pod separately. If the target system is a standard voltage level, you may use one of the default thresholds. However, if the default thresholds cannot satisfy our requirements, then you may choose **User Define** and adjust its value from the voltage field. You are also allowed to save some frequently used thresholds through the **Custom Threshold** dialog box for special target systems.

Note: If the voltage level of the probing signal is very close to the threshold setting, the acquiring data will be unstable.

🔲 Custom Threshold

After clicking the *Custom* button, fill the name and voltage in the box, then click the *Add* button to create a new threshold. Newly created items may be deleted, but you cannot delete the *User Define* item itself, which is used by the system. The new threshold will appear in the threshold list in the *Configure threshold* dialog box.

Search Specified Pattern or State

How do you search for a pattern in the waveform field of so much acquired data? The LA Viewer provides the **Search Specified Pattern** function to solve the problem. For setup instructions please refer to the *Label Mode* in the **Configure Trigger** section. The difference here is that you can set a searching criteria. If the searching pattern is the same as the trigger condition, just click the *Default* button, and then the trigger condition values will be automatically selected. The system will start to search the specified waveform once you click **OK**. If the system fails to find the specified search criteria, it will not move any cursors but show a message "**Can not find the specified waveform!**" in the status field. If the system finds the specified search criteria, then the *Cursor B* will be moved to where the match is found. Also, the *Status field* will show the number of matches.
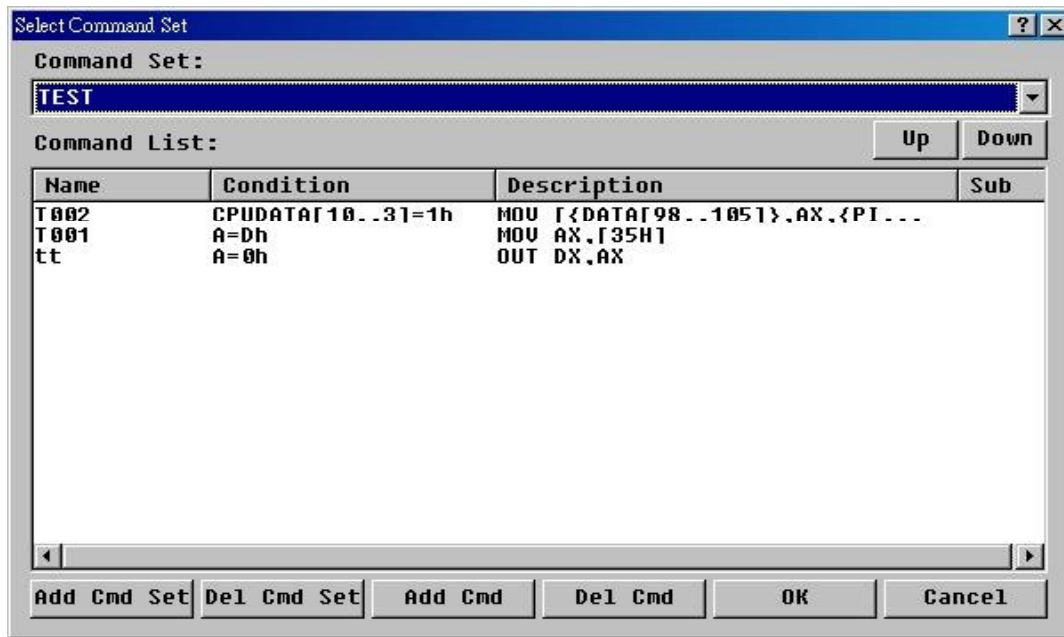
🔍 Search Next

After searching the specified pattern, you may search for the next match by clicking the **Search Next** button. The system will search for the next match, beginning at **Cursor B** to the end of the waveform field. However, the *Pass Count* function will be ignored.

📋 Select Command Set

In state analysis, the LA Viewer will follow a *Command Set* and show the state's description in the comment field. This will allow you to quickly recognize patterns of data. You may select the proper command set for different target systems. It is allowed to add more command sets or delete them by clicking the "*Add Cmd Set*" button and the "*Del Cmd Set*" button. Each command set is a group of several commands and a description. When you add a new command set, you have to add some commands from the "*Add Cmd*" dialog box.

In fact, the command set is saved as a file with **CMS** extension name, and it must reside in the LA Viewer working directory. This file is stored in a text format similar to **Excel's CSV**. So, you may use the *Microsoft Excel* to load the file and edit it.

The details of the selected command set will show in the *Command List* field. There are 4 parts to the field:

1. *Name*: The command name is only to identify each command in one command set.

2. *Condition*: There are at most 3 conditions to define one command. These conditions are specified in the "*Add Command*" dialog box. The command is valid when the probing signal data satisfies these conditions.

3. *Description*:   The *Comment* field in state analysis will show this command's description. How do you edit in the *Description*? The *Description* includes constant and variable parameters. One variable represents one label's name. A variable has to be contained within the "{ }" brackets. The *Comment* field will show constant parameters directly, but using the label's value to instead of the variable. If there is no label to represent one variable, the *Comment* field will show "***" instead of the variable. Note! You may not define over 3 variables in one command.

4. *Sub*: For sequential commands. (Not available.)

⌨ Add Command

Add Command	
Name	Write
Label 1	Bus
Vaule 1	33h
Label 2	Addr
Value 2	11110000b
Label 3	
Value 3	
Description	MOV AX,[{Addr}]

☐ Has Sub-Command   OK   Cancel

Add Command is a sub-function of the **Select Command Set**. Every command set can define many commands for a given target system.   There are 8 columns in the **Add Command** dialog box. The first column is the command name, which is only for identification purposes. The 2nd to 7th columns are the 3 pairs of conditions to define the command. One, two or all three pairs can be filled on. These value columns can be filled in decimal, hexadecimal (with "**h**"), octal (with "**o**"), or binary (with "**b**") values. The 8th column is the description field. Please refer to the **Select Command Set** section.

Timing & State Analysis Switch

This button switches between the timing and state analysis screens. Timing analysis is used to measure and understand the timing relationships among waveforms. In state analysis, you will see the value and command list instead of the waveform in order to understand the data flow. Therefore, the data must be sampled by an external clock, otherwise it will be insignificant. If you want to analyze the state, you must switch the sampling rate to the *External* item and connect the target clock as the clock source.

Print

The waveform or state value can be printed from the current mode in timing or state analysis. It also can be printed as a file. The file format supports BMP in timing analysis, and TXT or CSV in state analysis.
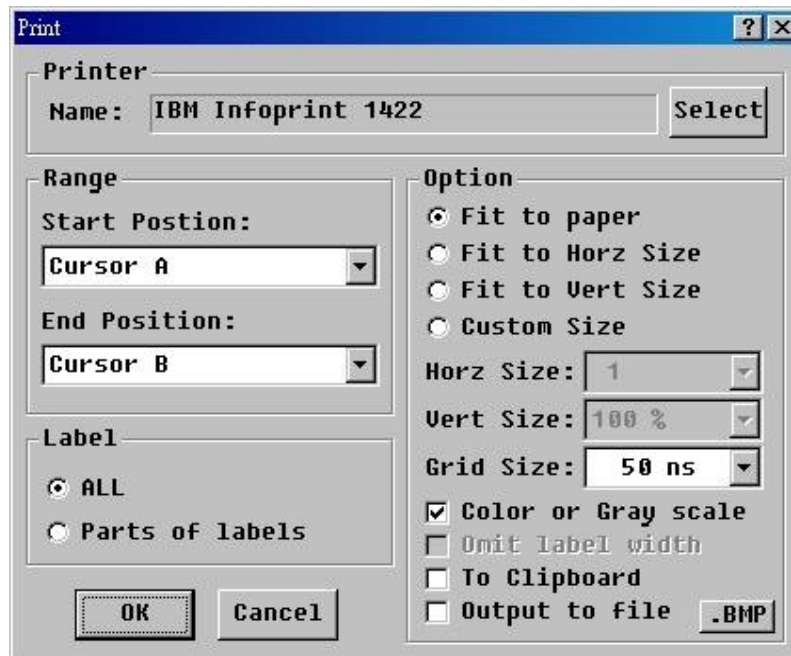
Introductions:

1. Type of printer

Please select a suitable printer and configure the driver setting. The LA Viewer will call the printer driver of Windows OS to print.

2. Range

   You may define the range to print the waveform or status depending upon you need. The range can be the whole buffer or the duration between two cursors.

3. Labels

   You may print all labels or highlighted labels.

4. Page

   There are 4 types of page settings. The first setting, will force the ranges and labels to be printed on one page. The second setting forces the waveform to fit into the page's width, but the waveform height will be adjusted in proportion. The third is the vertical setting that will force the printout to fit into the page's height. Also, you can adjust the horizontal proportion in order to zoom in or zoom out of the waveform. The last is any proportion. You can change the horizontal and vertical proportion according to your needs. All of these are disabled for printing state data.

5. Grid

   You may either print the grid or not. If you do, you can adjust the grid size. It is disabled for printing state data.

6. Print color

   If this item is disabled, the background will be printed in white and the others will be printed in black. If this item is enabled, then all colors shown on the screen will be printed as seen. It is recommended to change the background color to white when color is enabled, otherwise, the entire printed page will be difficult to read.

7. Omit label width

   When printing in state mode, the labels will affect the width. Therefore, you may not see all the labels on one page. So, you may need to enable this item to see all labels in one page with the label name being truncated.

8. To Clipboard

   You can paste the waveform to any Graphic Application.

9. Output to bitmap file (or text file)

   You can copy the waveform to a bitmap file (BMP format) in **Timing Analysis** mode, or to a text file in **State Analysis** mode. When you enable the *Output to file (BMP)* item, you can adjust bitmap size with the size button. If these printed waveforms are over the page size, it will generate numerous bitmap files with serialized file names. Ex. Output to A.bmp file, which requires 6 pages, will generate A.bmp, A0001.bmp, A0002.bmp, A0003.bmo, A0004.bmp and A0005.bmp.

🖊 Load Project

You may click the Load Project button to retrieve a project***** from the registry to replace the current configuration.

💼 Save Project

You may save the current configuration as a project by clicking the **Save Project** button.

💼 Clean Project

You may click the **Clean Project** button to remove some unneeded projects.

* The items of a project

|	
1. Label name	6. Sample rate
2. Width of label field	7. Cursor position
3. Width of channel field	8. Memory Setting
4. Width of value field	9. Trigger condition
5. Zoom In, zoom out factor	10. Threshold

Load Waveform

A waveform file includes the waveform data and the project data. The LA Viewer will ask you if you want to download the project when you are loading a waveform file. If you choose **NO**, then the waveform data will be merged into the current project. So, when you load the waveform file without project data and the current project is very different from the project associated with the waveform file, you will see a different waveform than you previously saved.

Save Waveform
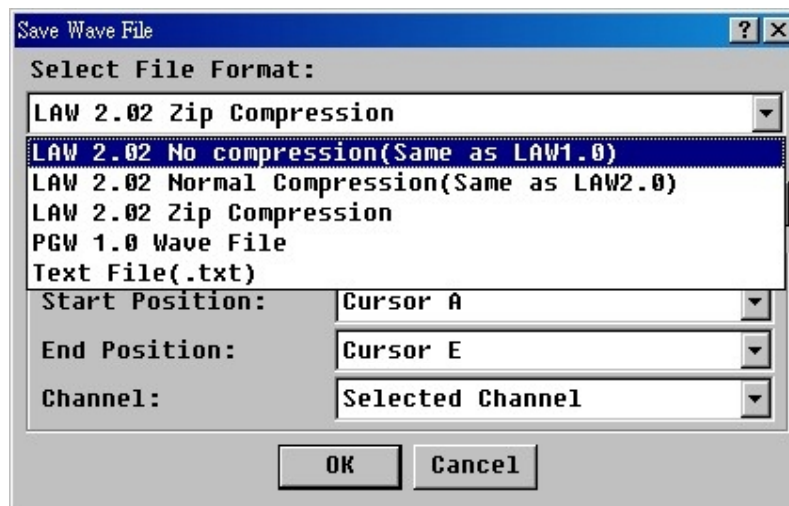
All acquired data can be saved as a file. There are three formats: One is the **LAW** for the *LA Viewer*; another one is the **PGW** for the *PG Editor* and text file(.txt). When saving a *LAW* file, all created label data will be saved and the project data will be combined as well. **LAW** has three file formats: *LAW 1.0*(No Compression), *LAW 2.0*(Normal Compression), and *LAW 2.01*(Zip Compression). It is not allowed to save a portion of the labels in the *LAW*, but it is possible to in the *PGW* file. (The PG's channels, 50 maximum, are fewer than the LA's, 64 channels.) Because of the different memory size between LA and PG, please define a waveform range to avoid translation error when loading the file in the PG Editor.

⌨ How to control the Acute-LA by yourself

We provide a dynamic link library (DLL) "*LARUN.DLL*" file for you to control the LA yourself. Using the file, you may link with your program developed by Visual Basic, Visual C, Delphi, and Borland C++ Builder or other. If you are interested in it, please visit our web site to get more information or contact us directly. We also provide one *Active X* object named the *AxLaRun.OCX* for VB, VC, and so on.

Chapter 5

Digital Data Logger

⌨ **Digital Data Logger**

Digital Data Logger is independent of the LA Viewer and it can save all acquired data for a long time. To start the Digital Data Logger, you may find the Digital Data Logger icon either in Desktop or Programs. You may double click either icon (   ) to start the Digital Data Logger and the "Digital Data Logger" dialog box will show as Figure 1 below.
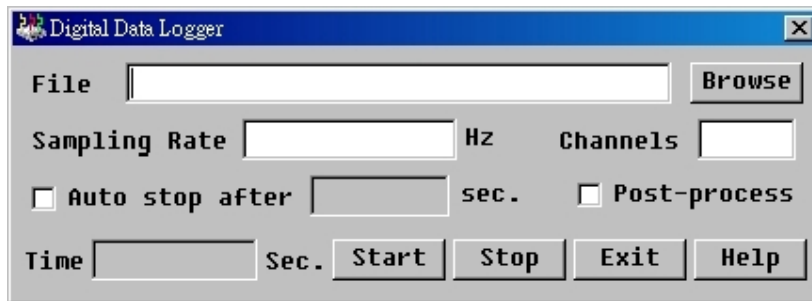

Figure 1

Parameters：

File：	Input the file name as xxx.log.
Sampling Rate：	In "Hz", can be an integer or decimal number. IF the number is not accepted, the software will pick a closest sampling rate.
Channels：	The number of channels used.
Auto stop after sec.：	The desired time (seconds) for the data acquisition.
Post-process：	For higher (lower) data rate, use (not to use) this function to analyze the data after (during) the acquisition process.
Time sec.：	The time (seconds) used for the data acquisition.

Note: The captured data may be lost sometimes due to the sampling rate used is too high, but, will be remarked in the captured file.

Data Format：

The captured data contain three types of format: Information (sampling rate and format), Time (when the edge changes / in decimal number), and Data (in hexadecimal number).

In the sampling rate is set at 1000Hz, the captured data will look like Figure 2 shown below. For example, 0000000000026 within the red frame means the edge changes at 26/1000th second; 00003FFFF within the blue frame means the data value for 36 channels at 26/1000th second.

```
Sampling Rate = 1000.00Hz
Format: Sample Clocks(Dec), Data(Hex)
```

000000000000026	00003FFFF
000000000000076	00007FFFE
000000000000126	0000FFFFC
000000000000176	0001FFFF8
000000000000226	0003FFFF0
000000000000276	0007FFFE0
000000000000326	000FFFFC0
000000000000376	001FFFF80
000000000000426	003FFFF00
000000000000476	007FFFE00

Figure 2

Chapter 6

Stack with Tektronix Scope
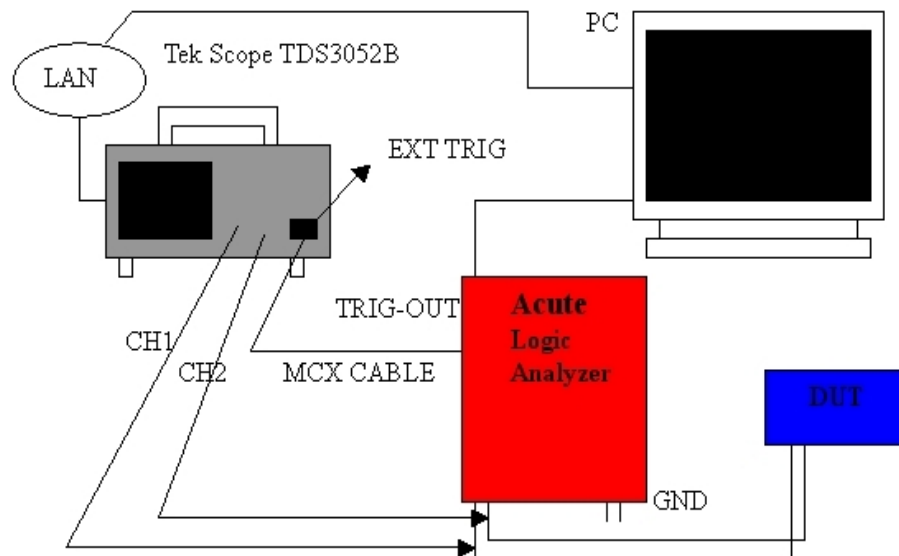
⌨ Stack with Tektronix Scope

How to stack the Acute Logic Analyzer with the Tektronix Scopes ?

First, you need to download the software "**NI SIGNALEXPRESS TEKTRONIX EDITION v2.5**" from the following website: **http://tinyurl.com/6jnc2u** and install the software on your PC.

Note: the "stack" function applies to the following Tektronix scope models: **TDS 1000/1000B**, **TDS 2000/2000B**, **TDS 3000/3000B**, **DPO 4000**, **MSO4000, TDS 5000B** series.
Note: the "stack" function applies to the following Acute logic analyzer models: **PKLA1616+, LA1000P, LA2000P** series, and **TL2x36** series.

The "stack" hardware framework is like the picture below:
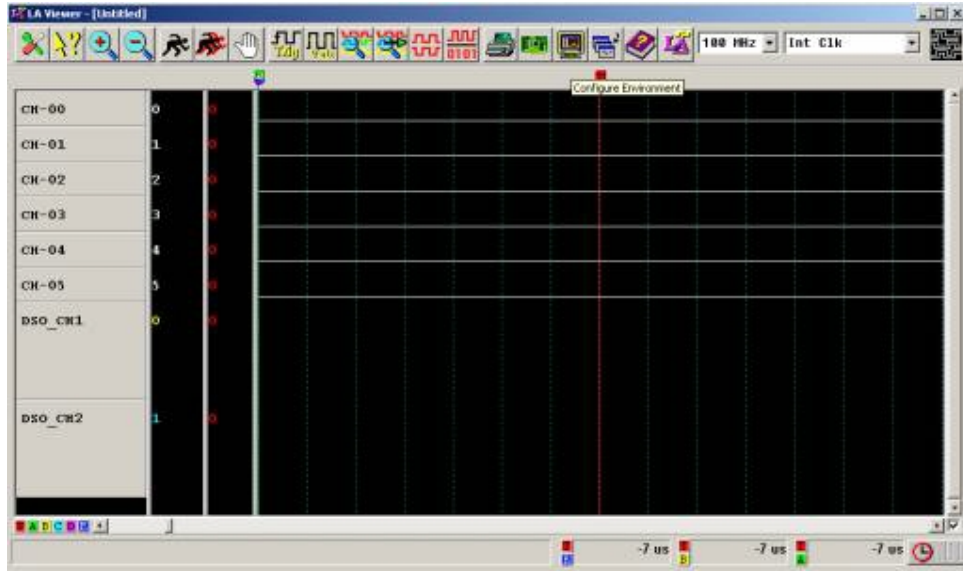
Take the Tektronix **TDS 3025B** scope for instance, it connects with the PC over the Ethernet, then connect the Acute Logic Analyzer with the **TDS 3025B** scope with an MCX cable.

Run the "**LA Viewer**" software and click the "**Configure Environment**" button on the main screen and the "**Configure Environment**" dialog box will show as below.
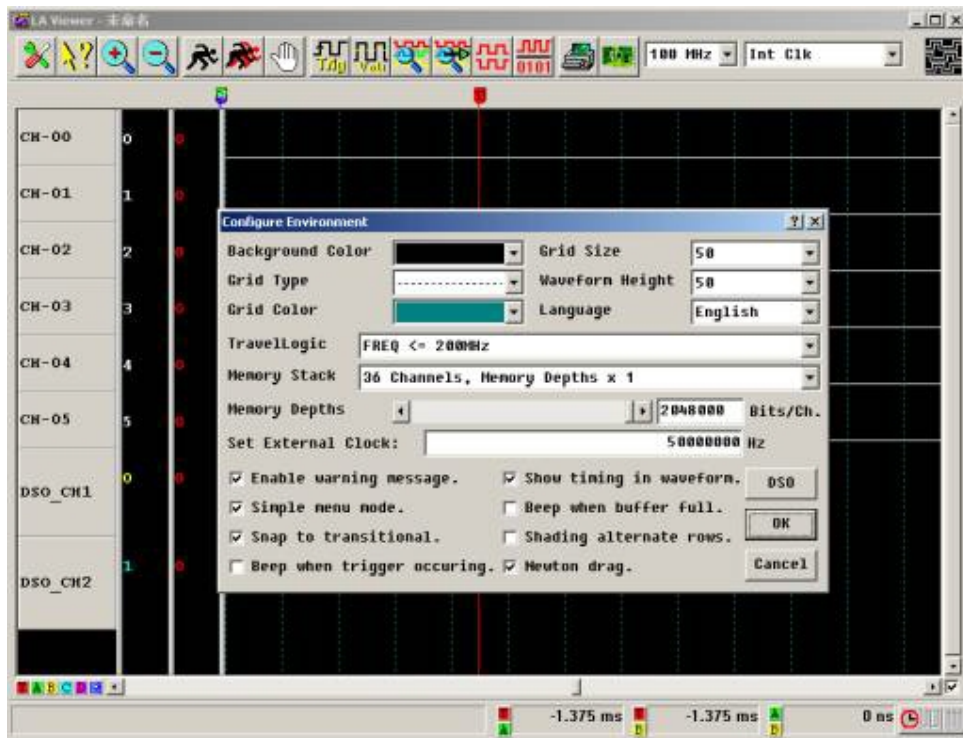
Push the button "**DSO**" and it shows DSO Stack Setting dialog box as below:
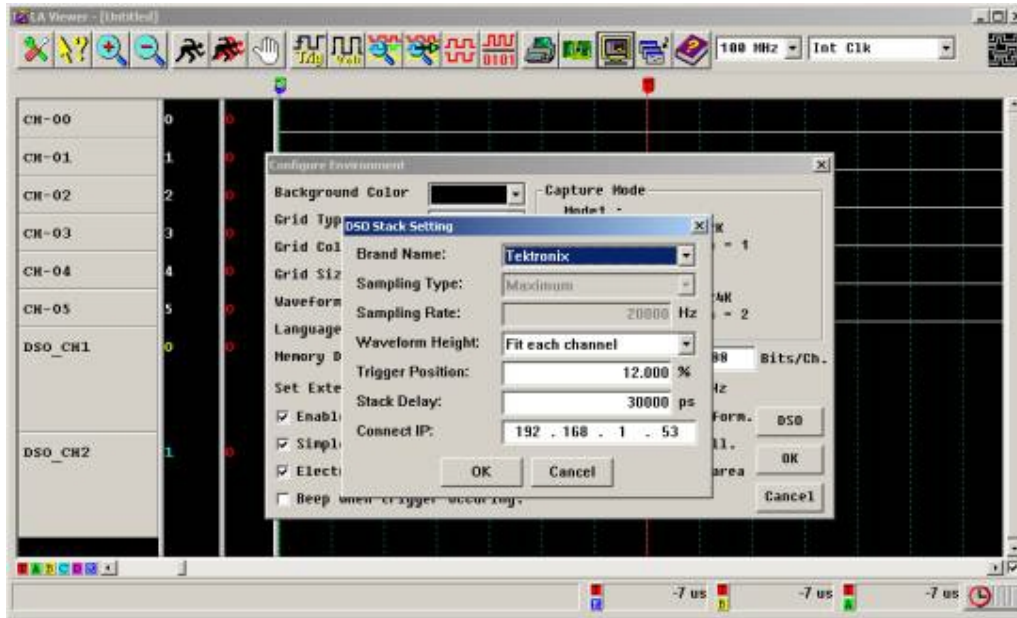
To **Connect IP**, push the "**Application**" button on the front panel of the Tektronix Scope; the push "**System I/O**" -> "**I/O**" -> "**Ethernet Networking Setting**" -> "**Change Instrument Setting**" to configure the Instrument IP Address. Or you can push the "**DHCP/BOOTP**" button to generate an IP address automatically.

We have **Connect IP: 192.168.1.53** in our example.

Waveform Height: we select "**Fit each channel**", it means that the waveform height is decided by the height of the label **DSO_CH1** and **DSO_CH2**. If you select "**Fit all channel**", it will decide the waveform height according to the voltage of the signal you measure. For example: **DSO_CH1** is a signal and its voltage is **2.5V**; **DSO_CH2**, its voltage is **5.0V**. The waveform height of the DSO_CH2 will be two times than the one of the **DSO_CH1**.

Trigger Position: this setting is only supported by Acute DSO. **Stack Delay**: you can correct the delay time due to the stack cable connected LA and DSO; it takes a little time when LA sends a trigger signal to DSO. If a delay time is **30ns,** you can configure the Stack Delay **–30ns** to adjust it.
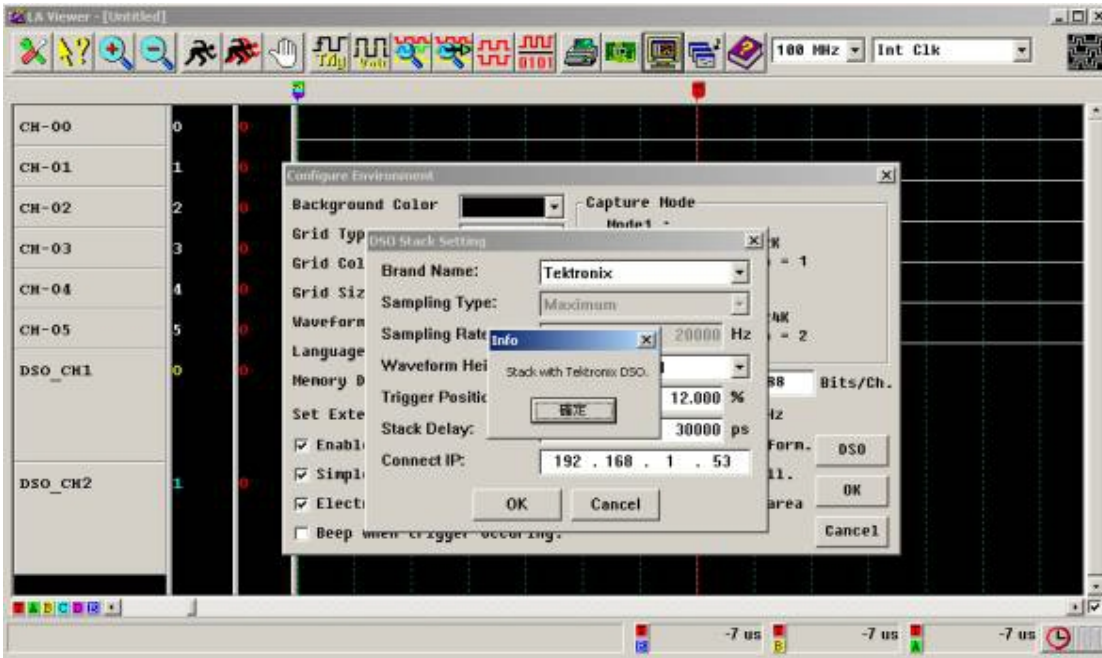
We have configured DSO Stack Setting and have measured a 80MHz and 7Bits width counter, for example. We connect CH1 and CH2 of the Scope with CH-00 and CH-02 of the logic analyzer respectively as below:
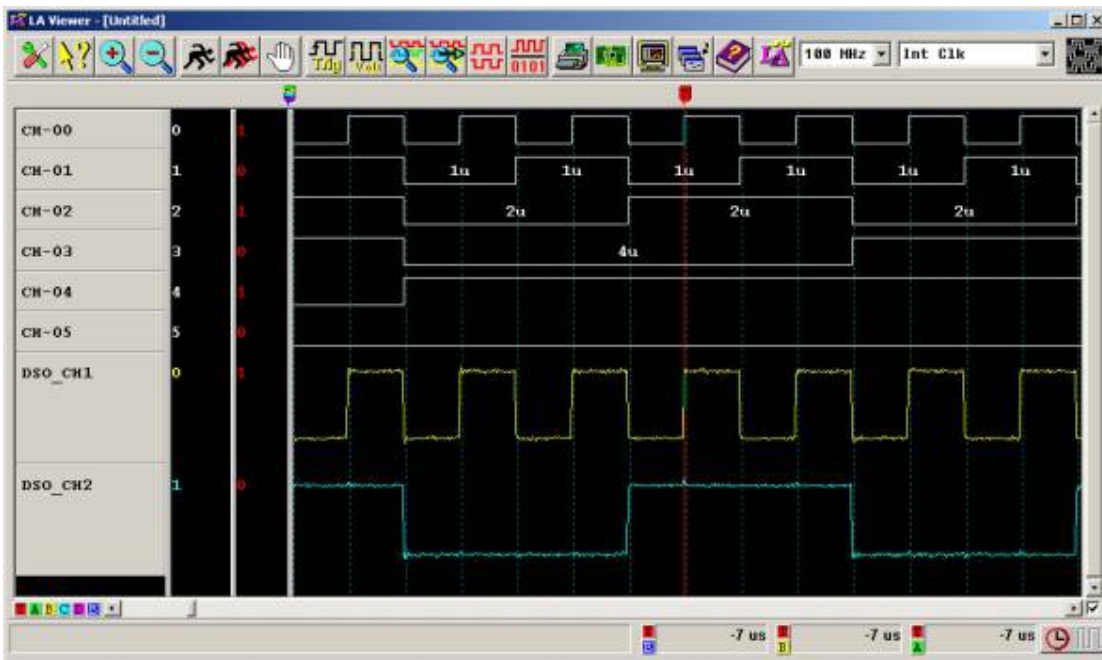
*Acute DSO (DS1002/1102/1302) Trigger position range: 0%~100%; DS1202 Trigger position range: 0%~12.5%.

Note: You can connect and control the Tektronix scope through Ethernet of USB interface.

Chapter 7

Miscellaneous

🖳 Notes

1. You may launch several *LA Viewer* programs simultaneously, but be sure that the PC has enough memory.

2. There are two major reasons to run two LA Viewer programs simultaneously. One is to compare two different waveforms, the other is when there are two or more projects need to be measured simultaneously; however, only one project is allowed to acquire the data at a time. Hence, if you click the acquire data button when another project is acquiring the data, a warning message "**LA2xxx is busy**" will pop-up. You may click it again after the previous project has finished.

3. At least one ground line is needed to connect the signal isolation amplifier pod to the target system. If too much noise or cross talk occurs from the measured waveform; then you will need to connect one more ground line to improve the measurement quality.

4. Although the four pods are marked as A, B, C, and D, they are interchangeable. But, it is recommended that you **Do Not Change** these pods to avoid unnecessary confusion of the channel numbers, unless you want to check the function of each pod.

5. Make sure you **do not connect** the printer round cable to the LA and Printer at the same time. Otherwise, unexpected outcome may happen. But it is possible to use Acute-LA and Acute-PG at the same time.

6. If you use the internal connection, please insert the LA mainframe into the lowest disk slot of the PC, since the pod's cables may interfere with something below the LA such as the floppy disk drive and CD-ROM drive.

7. To use the external trigger, connect a special cable with a BNC to the back of the LA. The cable's specification must be RG-58A/U (50 Ohm) coaxial cable.

8. If the standard probe is too thick to connect to the target system's pins, please contact us to buy a special probe, or look for another suitable source.

9. LA-viewer allows you to define one channel number in two or more labels. But, please remember that these labels correspond the same channel with the same trigger condition.

⌨ Tips

1. **Search Next**. This is quite useful in finding subsequent data that matches the trigger conditions. To do this, click default button in the search specified pattern dialog box in order to omit other settings, and click **Ok**. After acquiring data, move Cursor B to the trigger cursor position and click **Search Next**.

2. **Add Label**. If you need to add many labels, use "Add All Channels", rename desired labels, then delete unneeded labels.

3. When using the 2 models of the LA2164P to measure target signals, and selecting 100MHz or 200MHz sampling rate, please connect the signals that need 200MHz sampling to 0-31 channels. This is because channels 32-63 are not available in 200MHz sampling rate.

4. Pressing **T** or **A-E** keys, will center the screen on the selected cursor.

⌨ Troubleshooting

1. Once the installation is finished, if the warning message "Enter DEMO Mode" still pops up when launching the LA Viewer, please check following steps:

A. External connection (Printer Port) for LA2000P:

   a. Check Power Cord connection.

   b. Check the LA's interface cable connection.

   c. Please confirm the PC BIOS is set for parallel port in EPP mode and refer to the following table:

Priority	BIOS mode	Description
1	EPP 1.9	High efficiency (recommend)
2	ECP + EPP 1.9	Same as above
3	EPP	EPP 1.9 or EPP 1.7
4	EPP 1.7	Less efficient than EPP 1.9
5	SPP + EPP 1.7	Same as above
6	ECP + EPP 1.7	Same as above
7	ECP + Bi-direction	Less efficient than EPP
8	Bi-direction	Same as above
9	ECP	Some PC work, some don't
10	ECP + SPP	Same as above
11	SPP	Same as above
12	Normal	Not support

   d. Re-launch the LA Viewer after checking above steps.

   e. If the LA still does not operate properly, please contact us.

B. Internal connection (PCI Card) for LA2000P:

   a. Check the Power Jack connection.

   b. Check the PCI card for proper seating.

   c. Check the flat cable of the PCI card to the LA.

   d. Go to "Device Manager" to check the PCI device. (Please refer to the *Hardware Installation* section.)

   e. If the PCI device exists there, please check the LA Viewer version and update it to the newest.

   f. When the LA Viewer updating has finished, please reboot Windows OS.

   g. If the LA Viewer you are using is not the latest, please visit our web site to download the latest version and re-install it again.

h. If the PCI device does not exists in "Device Manager", please reboot PC and check it again.
i. If the LA still does not operate properly, please contact us.

C. USB interface for Pocket-LA and LA2000P:

a. Check the PC or USB Hub power.
b. Check the USB connections.
c. Go to "Device Manager" to check the USB device. (Please refer to the *Hardware Installation* section.)
d. If the USB device exists there, please check the LA Viewer version and update it to the newest.
e. When the LA Viewer updating has finished, please reboot Windows OS.
f. If the LA Viewer you are using is not the latest, please visit our web site to download the latest version and re-install it again.
g. If the USB device does not exists in "Device Manager", please re-plug the USB cable and check it again.
h. If the USB device still not exists there, please reboot the PC and check it again.
i. Please note if there is any non-ACUTE device appearing in the USB cable plug. If so, please contact us directly.

2. If the waveform is abnormal after acquiring, please check following steps:

A. Check if probes are appropriately connected to the signal connector lines.
B. Check if signal connector lines are appropriately connected to the Pocket-LA.
C. Check if grippers are appropriately connected to the target system.
D. Check the signal from the target system. (Connect two grippers to the same target point to make isolate the problem.)
E. Click the **Acquire Data** button again.

🖳 **Memo**

🖳 Memo