

Leaptronix[®]

LA-series Operating Manual

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Warranty Description of Logic Analyzer

Leaptronix provides a one-year warranty of spare parts and assembly, from the date of delivery, for the products produced and sold by itself. In the event of any defect within the warranty period, Leaptronix will deliver materials and repair the defect products at its own cost, with exception of consumables. To acquire the warranty services, the customers shall, at the beginning of warranty, notify Leaptronix by the following ways, and make proper arrangements for the services:

- (1) Fill data in the product warranty, and send the product warranty to Leaptronix by fax.
- (2) Notify Leaptronix service personnel by telephone the complete data in the product warranty.

In the occurrence of warranty, the customers shall, at its own cost, package and deliver the defect products to the agents or distributor service center designated by Leaptronix.

If the locality of customers and Leaptronix service center are at the same country, Leaptronix will pay the mailing expenses; otherwise, the customers shall pay all transport expenses, tariffs, taxes and any other expenses.

This warranty doesn't apply to any defect, failure or damage arising from improper use, incorrect or insufficient maintenance and servicing. Leaptronix will not deliver services in either of the following cases:

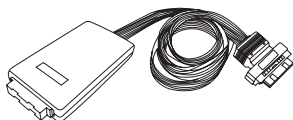
- (1) Damage not caused by Leaptronix personnel during assembly, repair or servicing.
- (2) Damage caused by improper use or connection to incompatible equipments.
- (3) Any damage or malfunction caused by use of non-Leaptronix consumables.
- (4) Damage arising out of modification or integration with other products, in respect of which subsequently leads to more difficulty or time in services. This warranty is provided by Leaptronix, which assumes no warranty of any transaction and resale for special purposes. Repair or replacement of defect products by Leaptronix shall be deemed as a remedy measure for the customers within the warranty period. Under no circumstances will Leaptronix be liable for any indirect, special, incidental or consequential damages, whether or not giving warnings in advance.

Warranty Description of Consumables of Logic Analyzer

The spare parts or assembly components other than the analyzer body and junction box are consumables not covered in the warranty service. The spare parts and assembly components shall be checked within 30 days after procurement; in the case of any abnormality, the designated agents shall be notified immediately, and defect spare parts or components shall be attached for replacement.

List of consumables or assembly components:

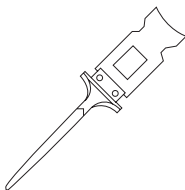
- 8CH signal capture box
(including color cable)



- 8CH signal capture cable



- signal capture hook



- USB A to B Cable



Chapter 1 Product Description

1-1 Product Overview

Since its founding in 1980, Leaptronix was always devoted to IC burning and measurement, and also committed itself to delivering perfect R&D environment and top-quality measuring instruments.

In response to the measurement demands and further combination with other industries in digital times, Leaptronix was established to offer the most important digital measurement instrument: logic analyzer series, typically represented by "LA-2050".

LA-2050 is a fault-free digital signal analyzer with 32CH, 500MHz sampling rate and 200MHz, which enables real-time tracking and capture of targeted signals on an independent instrument, but also stores, visualizes and analyzes the printed waveforms. So, it's a perfect tool for analysis and debugging, helping you to complete your task for rapid troubleshooting and product development.

1-2 Safety Notes

All operations, maintenance and servicing must adhere to the following safety notes and precautions. Our company shall not assume any responsibility for any unexpected results arising from misuse of the instruments due to failure of following the safety notes.

1. Please make sure that input AC voltage is correct, the fuse is properly installed, and the standard specifications are noted in the Product Description.
2. This instrument is equipped with protective ground terminal. To avoid electric shock, please confirm that three-wire power cord is used, and the instrument and power ends are properly grounded.
3. Only fuses compliant with voltage and current specifications can be replaced and utilized.
4. Don't use this instrument nearby combustible gas or flame.
5. Don't remove the housing of instrument during operation, or adjust and replace spare parts in order to avoid misoperation and unnecessary danger!



WARNING!

This symbol warns you of the danger. Failure to correct operation or compliance with the operating procedure may lead to personal injury. Continuous use is prohibited unless the operating procedure is fully understood.



CAUTION!

This symbol reminds you of the danger. Failure to correct operation or compliance with the operating procedure may lead to instrument damage. Continuous use is prohibited unless the operating procedure is fully understood.

1-3 Product Specifications and Characteristics

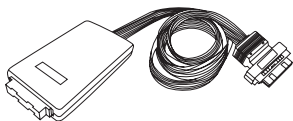
Item	Specification	
Time sequence analysis(capture frequency)	500MHz(Max)	
State analysis(External clock)	200MHz(Max)	
Bandwidth	200MHz(Max)	
Channel	8CH x 4 Port(0~31CH)	
Memory	Total memory	4M Bytes
	Memory depth	1M bits/CH
Trigger	Trigger number	1~255
	Trigger mode	Pattern/ Edge/AND/OR
	Trigger channel	32CH
	Advance/delay trigger	YES
	Trigger PAT	3 (Edge or Pattern)
	Continuous/discontinuous trigger	YES
	Trigger output	YES(TTL Level)
	Trigger pulse width	YES
	Bus analysis	YES
Surge capture	YES	
Reference voltage	Range	-4V~+4V
	Accuracy of reference voltage	±50mV
Max. input voltage	±30V	
Input impedance	100KΩshunted by 10pF	
Temperature	Operating temperature	0°C~45°C(41°F~113°F)
	Storage temperature	-40°C~75°C(-56°F~167°F)
Phase error	1ns typical , 2ns Max	
PC-Link interface	USB 2.0	
Power supply	Input voltage	AC: 90~240V,50~60Hz
	Fuse	AC: 250V/2.0A
Power consumption	Normal power consumption	18.0W
	Max. power consumption	20.0W
Volume	31cm x 15cm x 9cm (length x width x depth)	
Weight	3.8kg	

1-4 Accessory List

NO	Name	Quantity	Remarks
01	LA-2050	1	
02	Signal capture box	4(32CH)	Including color cable
03	Signal capture cable	4(32CH)	
04	Signal capture hook	1	36
05	Optical disc	1	Including on-board software, driver and manual
06	USB Cable	1	
07	Service warranty card	1	
08	Package acceptance form	1	Listing product package assemblies
09	Operating manual	1.	
10	AC power cord	1	3-wire

1-5 Optional Components

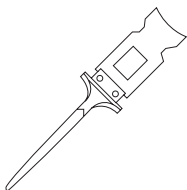
- 8CH signal capture box (including color cable)



- 8CH signal capture cable



- signal capture hook



- USB A to B Cable



Chapter 2 Assembly

2-1 Check prior to Assembly

1. The ex-factory instruments are already tested and checked. Please unpack and check firstly to ensure the instruments are free of damage during the transportation.
2. Check if the accessories and quantities are complete according to the list of accessories, otherwise notify the company or local agent immediately for timely handling.

2-2 Operating Location

1. The fan and housing hole of the instrument form a circulative heat-radiating system. It shall be located in well-ventilated positions without jamming of air holes.
2. Operating temperature: $0^{\circ}\text{C}\sim 45^{\circ}\text{C}$.
3. The instrument may be affected by the electromagnetic field generated and nearby instruments. In such case, a spacing over 10Cm shall be required. It's advisable to install this instrument far away from the electromagnetic field or other places with possible interference.

2-3 Specifications of Input Power

1. Before AC power is turned on, please confirm if AC voltage complies with the acceptable input voltage. The input voltage is marked in the description on the rear panel.
2. Input voltage: AC 90~240V, 50/60Hz.

Note! Please confirm firstly if input voltage complies with the operating voltage.

2-4 Utilization of Backup Fuses

Please make sure of the fuse specification if backup fuse is required:

- Fuse: 250V/2Amp.
- Another kind of fuse may be added into the fuse holder.

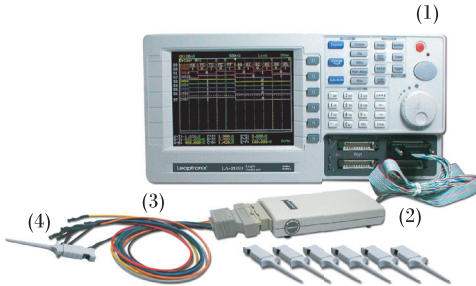
Note! the fuse shall be procured and replaced based on the specifications, otherwise the instrument may be damaged.

2-5 Connection of LA System

2-5-1 Connection sequence of LA system

(1)LA unit ->(2)signal capture box(including color cable) ->
(3)signal detection cable->(4)signal capture hook

System connection diagram is as follows:



* Note! don't place the signal detection cable directly onto the port of LA in order to avoid damage of LA.

* Send to the factory for repair or replacement in the case of breakup or damage.

2-5-2 Description of components

- Signal capture box(including color cable)



-> Insert the connector into Port

- Signal detection cable

Single-pin terminal is inserted into terminal or test point of DUT.->

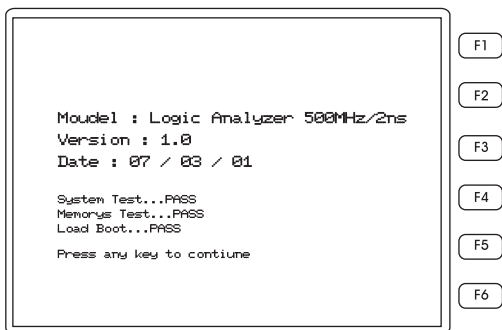
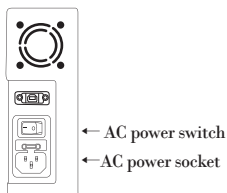


->Insert the connector into the signal capture box.

- * Note! don't place the signal capture cable directly onto the port of LA in order to avoid damage of LA.
- * Send to the factory for repair or replacement in the case of breakup or damage.

2-6 Startup Test

1. Insert one end of power cord into AC-in at left of LA, And the other end into AC power socket.
2. Press "I" of AC power switch and change to "I" from "0".
3. Press again orange power control switch at right upper side of LA front panel, the red LED is highlighted. Once upon buzzing one time, LA starts self-test, and enters into the following initial display, indicating the completion of startup test.



4. Press the power control switch about 2~3 seconds and then release it, the system is switched off after data storage.

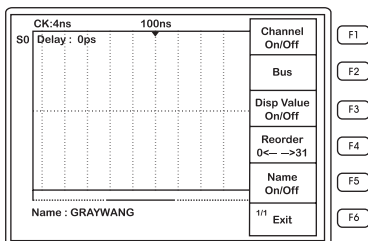
3-1 Description of Front Panel

No.	Items	Functional descriptions
1	Display function	System display area, displaying waveform, message and functions
2	F1~F6 function keys	The function keys shall be adjusted by linking with main control keys on the panel
3	Option key	Including: Channel, Change Page, Auto-Scale, Cursors, File, Utility, Main delays, Grid and Logic levels
4	Capture key	Including three function key (Single, Auto-store, Run/Stop) and a waveform erase key(Erase)
5	Power control keys	Keys of power switch
6	Orientation key	Waveform control: left-right, zoom-in/-out
7	Trigger keys	Selecting Int/Ext Clock and Trigger state setting
8	Shuttle key	Used to move left, right, up and down
9	Control key	Used for data entry and editing
10	Signal input port	4 signal I/O ports
11	Trigger Out	Send a $\overline{\text{H}}$ (Active High)signal, Provide another device for synchronous operation

3-1-1 Menu(item) control keys are described below:

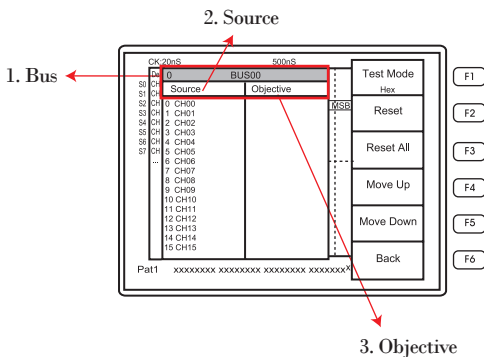
1. Channel Setting key:

After pressing the channel keys, 6 functional boxes at right-hand correspond to F1~F6 function keys. Adjust to preset channel using the shuttle (whitened location). Functionalities of functional keys:







F1 --Channel ON/Off: set ON or OFF of the channels

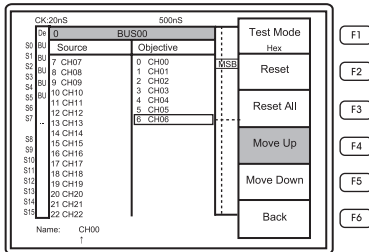
F2 --Bus: set the bus; the system is available with 16 BUS displays, each of which has 2 Channel~16 Channel. It's displayed below after entering into this mode:



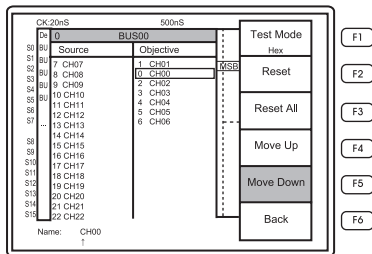
Functional descriptions:

1. Bus: the system is available with 16 BUS, select the intended BUS with shuttle. 
 2. Source: source channel. select the intended channel with shuttle , then put the selected channel into Objective by **Enter** key.
 3. Objective: confirmed channel. If channel is provided, select the intended channel with shuttle , then put the selected channel into Source by **Enter** key.
- * Select the options to be set with  orientation key, select Bus by pressing "**^**", select Source by pressing "**<**", select Objective by pressing "**>**".

- F1** -Text Mode(numerical mode): select Hex(hexadecimal system) or Dec(decimal system).
- F2** -Reset: clear all CH to be edited in a certain Bus.
- F3** -Reset All: clear all Buses that have been edited.
- F4** -Move Up: move up CH selected in Objective, as shown below:



- F5** - Move Down: move down CH selected in Objective, as shown below:



- F6** - Back: back to the preceding option.
- F3** - Disp Value On/Off(numerical display): display value on waveform, shown as ON or OFF
- F4** - Reorder 0←→31(reorder 0 ~31): reorder and display channels and names(CH0~CH31).
- F5** - Name On/Off: ON/OFF of channel name, ON during startup, and OFF during switching-off. As shown above, the operating state is shown as red color.
- F6** - Exit: exit from the setting state of channel.

2. **Change Page** Change page key:
- Press this key and change to the second page when the number of channels or Buses on the screen exceeds 16, namely, switch back press again.
 - The functional page can also be changed by "trigger".
3. **Auto-Scale** Auto-scale key:
Search the captured existing signal waveforms through auto-search by LA, which are automatically displayed on LCD about 3~5 seconds

***Signals below 10Hz cannot be searched.**

4. **Cursors** Cursor setting key:
6 T, A~F 6 vertical cursors are displayed by pressing this key, and the time interval of A~B, A~T, B~T, C~D, C~T, D~T, E~F, E~T, F~T are displayed and represented by ns/us/ms.

* Press "A←→B" key, cursor B is displayed as a solid line, and B is at an enable state; "←" and "→" may shift cursor B, and change the time interval of B~A and B~T; press 1 time again, cursor C is displayed, and C is at an enable state; "←" and "→" may shift cursor C, and change the time interval of C~D and C~T.

* press "<" key, cursor T is an enable axle, and the screen turns left; press ">" the screen turns right; press "Λ", the display waveform is at zoom-in state, press "V", the display waveform is at zoom-out state.

* T cursor display is returned press again the cursor setting key. In such case, the display could also be turned left, right and zoomed-in/-out along with four orientation functions of the orientation key.

* Alternatively, the detailed shift of solid cursor could be adjusted by using the shuttle.

5. **File** File setting key:




Press this key, F1~F4 can be used to manage the file function items:

- F1** - Load Setting: 5 functional keys (F1~F5) are available. The system setting data must be firstly stored and then accessed.
- F2** - Save Setting: 5 functional keys (F1~F5) are available for the user to store the system setting data.
- F3** - Load Waveform: 5 functional keys (F1~F5) are available to access the stored system settings and signal waveform data.
- F4** - Save Waveform: 5 functional keys (F1~F5) are available for the user to store the system setting data and the captured signal waveform data.
- F6** - Exit: back to the main display.



6. **Utility** Utility key:

Press this key, F1,F2,F3,F4,F5 are available.

- F1 - Display Mode: waveform display or character display mode are available.
- F2 - B/W(background of LCD is black or white): setting ON/OFF of LCD background.
- F3 - PC-Link: the captured signal waveform could be sent via USB2.0 to PC port for zoom-in, visualization and printing. For the operation in relation to on-line PC, refer to Chapter 5.
- F4 - RAM Size(memory size): the memory size could be adjusted by turning shuttle.
- F5 - Language interface language setting: select the interface language by F1~F3.
- F6 - Exit: back to the main display.

7.  Main delays setting key:
F1~F3: F1: 10%, F2: 50%, F3:90%; for F2: 50%, it indicates that, based on trigger center axle and "T" axle, the benchmark is displayed at 50% of LCD display, and the percentage could be adjusted by shuttle.
8.  Grid ON/OFF key:
Press this key, the vertical scale of time axle's broke line on LCD could be controlled for ON/OFF.
9.  logic levels key:
Press this key, the logic levels could be changed in combination with F1~F3 function keys. The system default value is:
TTL: 1.5V CMOS: 2.5V ECL: -1.3V

* If selecting and pressing any of F1/F2/F3, logic levels are displayed at lower part of LCD.

* Port1~Port4 is selected by  orientation key, logic levels of every Port are adjusted and set by shuttle key.  (0.1V for every Pat).

* After setting, a single logic level is taken as a high or low reference value.

* Adjustable system range: -4.0V~+4.0V.

3-1-2 Capture control keys are described below:

1. **Single** Single trigger key:
Only a single signal is captured and displayed. "pat" label is displayed at right upper hand of LCD, signal capture is stopped once completion of capture.
2. **Auto-store** Auto-store key:
The test results are overlapped and displayed on the screen. In such case, flashing "pat" label is displayed at right upper hand of LCD.
* Stop this function by pressing **Run/Stop**.
3. **Run/Stop** Run/stop key:
Control run/stop of triggering, with the switching behavior displayed at right upper hand of LCD.
If data is captured, "pat" is flashing, otherwise it indicates external signal has a trigger mode different from that set by the user. Stop by pressing "Stop" key.

* Press **Run/Stop**, the triggered signal will be displayed, and the last captured signal waveform will be updated and displayed immediately on LCD.
Moreover, the signal waveform will be captured continuously.

* Press again **Run/Stop**, signal capture is stopped, and the last captured signal is displayed on LCD.
4. **Erase** Erase key:
 - a. Erase the overlapped images automatically stored, in combination with auto-store key.
 - b. Press erase key under Trigger option to set the trigger conditions of all channels into Don't Care.
 - c. Under delay input function, clear the delayed value as 0 by pressing erase key.

3-1-3 Trigger control keys are described below:


1. **Int/Ext** Internal/external clock key:
Used to switch internal/external modes.
- F1** - Internal mode, trigger with internal frequency signal of LA,
namely, the so-called asynchronous trigger mode or time mode.
- F2** - External mode, trigger with external frequency signal of LA,
namely, the so-called synchronous trigger mode or state mode.


* The character label of selected mode is blue.

2. Trigger

Trigger key:

Press this key, F1~F5 represent the optional trigger modes:

F1 - a. Continuous(continuous ON/OFF): set multiple-PAT trigger conditions as continuous/discontinuous. (in combination with "" key).

b. Trigger Counter: set the range of trigger between 1~255(in combination with "" key).

F2 - a. Pat 1: select and perform Pat 1 trigger condition (in combination with "" key).

b. Pulse Width: select pulse width as a trigger condition, Set which channel ">", "=", "<".



F3 - Pat 2: select and perform Pat 2 trigger condition.

F4 - Pat 3: select and perform Pat 3 trigger condition.

F5 - OR Pat: select and perform OR trigger condition.

* Setting mode of trigger conditions:

F1: L (Low) F2: H (High) F3: X (Don't Care)

F4:  (Active High) F5:  (Active Low) F6: Back

* Shift red cursor to the channel positions with shuttle key.

* Set the trigger state of channel by pressing F1~F5.

* Various channels will be displayed for separate setting or change. The neglected channel could be set into Don't Care, or not display on LCD! Exit by pressing F6.

3-1-4 Character key:

Numerical and character key:



1. Numerical key: 0,1,2,3,4,5,6,7,8,9. Press these keys to display English characters and other symbols contained in the numerical keys.

2. **DEL** : delete unnecessary characters.

3. **A↔B** : switch the cursor A~cursor F

4. **→** : control the cursor rightwards; "**←**": control the cursor leftwards.

5. **Enter** : enter key. Enter into delay and search functions by pressing this key under non-channel setting.

F1 - delay: enter the delay value, enable it to be displayed immediately on the center of screen (press Enter key after entering, or press Erase to clear the value as 0 Sec)

F2 - search: used to search a certain data in the channel. You may select single channel or bus search.
(The following displays are shown press Enter)

F4 - Search the position of preceding value

F5 - Search the position of next value

F6 - Back to the main display

3-1-5 Special function keys:



Up/down, left/right orientation keys:

1. Press “ \wedge ” , “ \vee ” , you can change the zoom-in/out of waveform, and select logic levels, trigger PAT and Sample Rate.
2. Press “ \lt ” , “ \gt ” , you can visualize by adjusting the left and right position of waveform, or shift and select PAT under trigger.



Shuttle key: the shuttle key has the following functions:

1. Select the channel to be displayed or to be preset.
2. Select the channel for which the trigger condition is to be set.
3. Set the logic levels.
4. Set the percentage of memory storage.

Function key: F1~F6

F1

F2

F3

F4

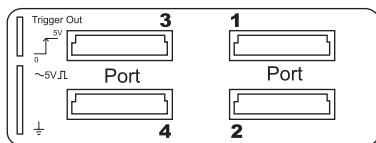
F5

F6

1. F1~F6 functions are available if combined with the settings of Channel/ File/Utility/Main delays/Logic levels/INT/EXT/Trigger.
2. Utilization of F1~F6 functions shall follow the functional descriptions at right-hand of LCD.

3-1-6 Signal input port

1. Port1~4, four ports for signal capture input.



Port 1: CH 0 ~ CH 7

Port 2: CH 8 ~ CH15

Port 3: CH16 ~ CH23

Port 4: CH24 ~ CH31

Every Port has a junction box and a group of 10 signal capture cables (including GNDx2)

2. Reference square-wave clock:



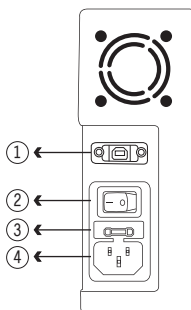
The system is available with: a $\sim 5V$ square-wave clock for calibration and self-measurement of channels. The reference square-wave of the channel could be displayed by linking the signal capture line or signal capture hook with the clock terminal.

3. Trigger Out:

When the instrument is triggered, an " \uparrow " (Active High) signal is sent to another instrument for synchronous operation.

4. GND(grounding): used synchronously with 2, 3.

3-2 Description of Lateral Interface



1. USB2.0 interface, PC-Link.
2. AC input power switch (0: OFF, 1: ON): the power control switch of the front panel could be controlled efficiently only when AC power switch is firstly turned ON.
3. AC fuse holder.
4. Three-wire socket of AC power cord.


3-3 Description of Rear Panel



1. Tips on precautions
2. Product names and serial number
3. Description of safety regulations

Chapter 4 Operating Instructions

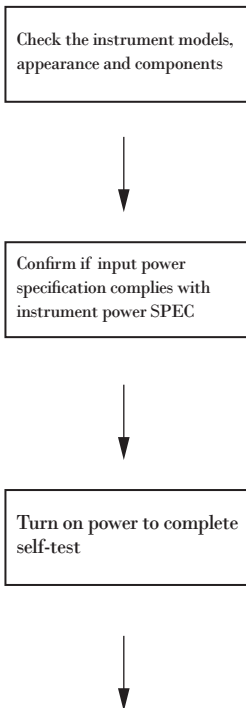
4-1 Startup of System Power

1. Confirm if AC power complies with input power of the instrument.
2. Turn AC power switch at left-hand of LA from “0” to “1”, so AC power is turned on.
3. The red LED indicator is ON press power control switch  at right upper hand of LA front panel. If buzzer gives a "buzz", "system test", etc, will be displayed on LCD.
4. After completion of self-test, the following is displayed at lower part of LCD:
Press any key to continue . . .

Enter into the operating interface immediately by pressing any key(excluding power control switch), or halt about 8 seconds.

4-2 Shortcut Operation

LA-2050 shortcut flow graph



LA-2050 shortcut operation description

Check if the instrument is operated properly.

a. Check if the models and components are completely provided.

b. Check if the instrument appearance is free of damage.

Confirm the specifications of input power.

a. confirm if instrument power complies with input AC power.

b. Insert AC power cords attached with the product.

Startup Test:

a. Turn on power switch at left panel of the instrument, "0"→"1".

b. Press power control switch at right upper corner of front panel. In the case of normal startup, the buzzer gives 1 buzz, and power indicator is highlighted.

c. After a few seconds of self-test, the system is changed automatically to operating interface

LA-2050 shortcut flow graph

Set CH numbers and names
(0~32)

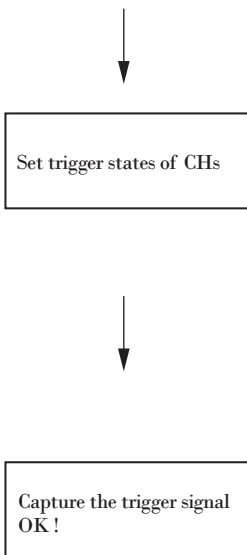


Set the logic levels

LA-2050 shortcut operation description

4. Set CH numbers and names:
 - a. After pressing “Channel” key, you can set with F1~F5: channel numbers, ON/OFF and channel names.
 - b. Adjust the cursor to the intended position with shuttle key.
 - c. Set various parts where required.
 - d. Exit from CH setting by pressing F6.

5. Set the logic level:
 - a. Press “Logic Levels” key, set the category and high/low value of logic levels according to the functions of F1~F3.
 - b. set firstly: TTL or CMOS or ECL, then adjust the value of logic levels with shuttle key.
 - c. Exit from setting by pressing F6.

LA-2050 shortcut flow graphLA-2050 shortcut operation description

6. Set trigger state of CHs:

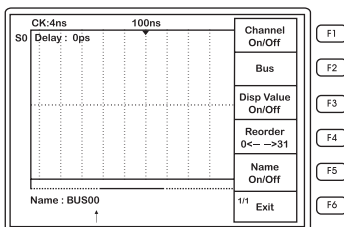
- a. Enter into trigger state setting by pressing "trigger" key.
- b. Shift to CHs by shuttle key, the red position means the setting position.
- c. Set by selecting Low, High, X, \uparrow , \downarrow , where necessary.
- d. Exit from setting by pressing F6.

7. Capture trigger signal:

- a. Turn on the intended test panel or circuit, press "Run/Stop" to capture the necessary trigger signal.
- b. Alternatively, stop by pressing "Single" key to capture a single trigger signal.

4-3 Setting of Channel Number and Name

1. Enter into the following channel setting state interface by pressing Channel
After selecting the channels to be modified with shuttle, F1~F6 are displayed, with the operations described below:



Used to set or change the channel name. The following appears at left lower part of LCD:

Name: BUS00



Note:

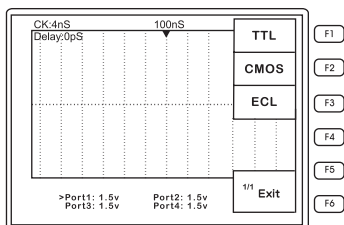
- BUS00 under Name represents the name of CH0.
- "↑" indicates the character entry position of channel name. After the name is changed by character key, the remaining characters may be deleted by pressing "DEL" key. At most 8 characters are used for channel name, along with English and numerical number.
- Change the name of CH0 by pressing Enter, and then switch the channel by shuttle.



- Exit from the setting by pressing F6.

- F1 : Select ON/OFF of this channel, then press F1 after turning shuttle to highlight the channel to be adjusted.
- F2 : Available with 16 BUS displays, each of which permits 2Channel~16 Channel.
- F3 : Numerical value is displayed on waveform, ON or OFF.
- F4 : Reorder the channels by CH0~CH31.
- F5 : ON/OFF key, if ON is "red", the channel names are displayed, if OFF is "red", the channel names are not displayed.
- F6 : Exit from setting display.


4-4 Adjustment of Logic Levels of Channels


1. Enter into logic levels setting display by pressing




Press  to select the Port (blue > indicates the existing Port), then adjust the voltage using shuttle key .

- F1, F2, F3 adjustable function keys:

Press , it indicates "logic level" is TTL, and default: 1.5V, the voltage of signal to be captured could be adjusted using shuttle or "V", "Λ".

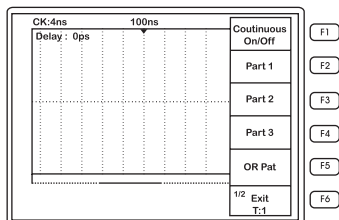
Press , it indicates "logic level" is CMOS, and default: 2.5V, the voltage of signal to be captured could be adjusted using shuttle or "V", "Λ".

Press , it indicates "logic level" is ECL, and default: -1.3V, the voltage of signal to be captured could be adjusted using shuttle or "V", "Λ".

- After completion of setting, exit by pressing F6:Exit, and the settings are stored. If "logic level" is pressed again, previous setting mode and value are displayed.
- Press again F1~F3: original standard settings are resumed, allowing to adjust the logic levels with shuttle. After "logic level" is set, the modes and settings of channels shall be consistent.

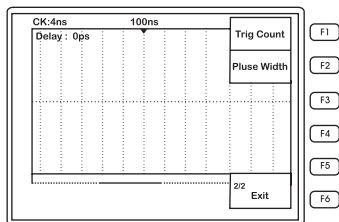
4-5 Setting of Trigger State of Channels

1. Enter into trigger state displays of channels by pressing **Trigger**



2. The optional trigger states are displayed at right hand of LCD:
 F1: continuous On/Off F2: PAT 1 F3: PAT 2
 F4: PAT 3 F5: OR PAT F6: Exit

3. Change to the second page by pressing **Change Page**



F1: trigger number (trigger after 1~255 times)

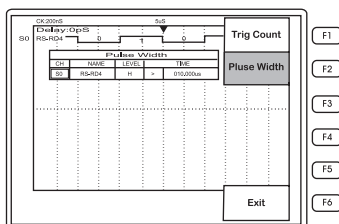
F2: pulse width

The trigger number may be adjusted by "shuttle" or "numerical key" and "→", "←".

*Initial state: "001"

(If setting is less than 1, the system takes 1 as a trigger condition)



(If setting is more than 255, the system takes 255 as a trigger condition)



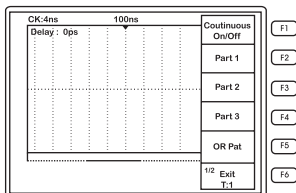
Pulse width: the external signal pulse width could be set for trigger.

Optional functions of pulse width:

1. CH: select trigger channel (S0~S31): select the measured channel with shuttle.
2. NAME: display channel name (the names of selected channels are displayed)
3. LEVEL: set the trigger logic level by selecting "H" or "L" with shuttle.
4. Selection of trigger condition: ">" (more than), "=" (equal), "<" (less)
Trigger conditions could be adjusted using shuttle.
5. TIME: setting of pulse width
6. Unit adjustment: "S", "mS", "uS", "nS". These units could be adjusted using shuttle.

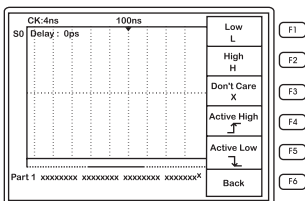
* Every option is changed using , "<" , ">" of , and the settings are adjusted using , numerical key and "→", "←".

The Trigger steps are described below:



Trigger

1. Enter into trigger state display of channels by pressing
2. After entering into PAT—(Pat 1) by pressing F2, the existing states of channels are displayed at lower part of LCD:



Pat 1 xxxxxxxx xxxxxxxx xxxxxxxx xxxxxxxx


* Initial state: "Don't Care" .

3. Change the position of cursor to the channel with shuttle, "x" at lower part of LCD indicates the position of setting.

Press **F1** , the setting of channel is changed to "L", namely, trigger at low logic level(L).

Press **F2** , the setting of channel is changed to "H", namely, trigger at high logic level(H).

Press **F3** , the setting of channel is changed to "Don't care", namely, in a default or neglect state.

Press **F4** , the setting of channel is changed to "  ", namely, trigger when low logic level is turned to high logic level.

Press **F5**, the setting of channel is changed to " \neg ", namely, trigger when high logic level is turned to low logic level.

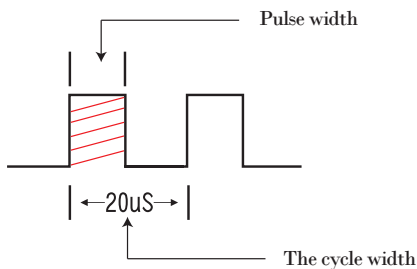
4. Make the shuttle cursor point to CH1. Press **F2**, setting of CH1 is changed to H logic level, and so on. The settings are shown below:

Pat 1 xxxxxxxx xxxxxxxx xxxxxxxx xxxxxxHL


Exit from this setting by pressing **F6** Exit.

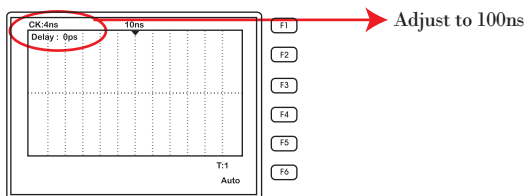
Reference example of pulse width:


If the frequency to be measured is 50KHz, the cycle width is 20uS, and pulse width 10uS.

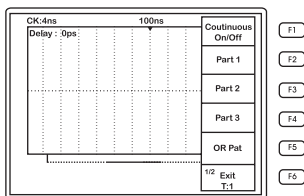


The setting steps:

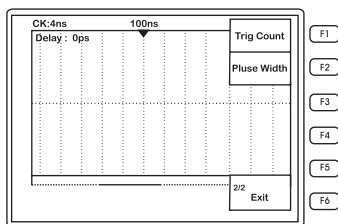
1. With  in the main display, adjust the sample rate by pressing "~", "^".
* When Sample Rate is adjusted, it requires faster than adjusting external pulse width.



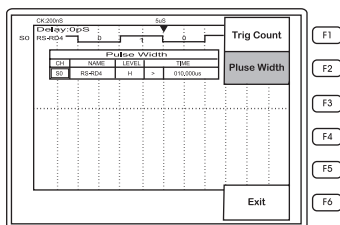
2. Enter into trigger state display of channels by pressing 



3. Change to the second page by pressing Change Page



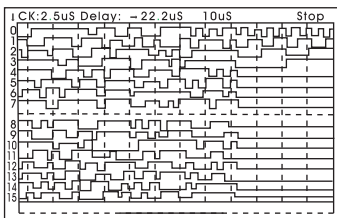
4. Select pulse width by pressing F2



5. Select channels (from S0~S31) using shuttle.
6. Set logic level as "H" (starting when external signal is High)
7. Set "=" (equal)
8. Adjust to "010.000uS"
9. Perform Run/Stop key to capture the waveform and display on LCD.

4-6 Capture of Trigger Signal

1. After completion of settings, the capture hook of signal junction box is linked to the pin of objects.
2. Start to capture the triggered signal waveform after the object is energized.
3. 3 capture modes for trigger signal waveform are available where necessary.
4. Mode 1: press , it indicates it's intended to capture a single trigger signal. After capture, the operation is stopped, and the waveform is displayed on LCD.



*"Run" is displayed at right upper corner of LCD, if capture is performed, or "Stop" is displayed if capture is stopped.

Mode 2: press , "Run" is displayed at right upper corner of LCD, the first captured signal waveform will be displayed on LCD, and then replaced by the second one. Signal capture is stopped press this key again. The last triggered signal waveform is displayed on LCD.

Mode 3:

Press , "Run" is displayed at right upper corner of LCD, the captured signal waveform could be automatically stored, and displayed on LCD. In such case, the captured signal waveform will be continuously overlapped and displayed on LCD.



Stop the signal capture state by pressing

Press , you can erase the signal waveform automatically stored and overlapped on LCD, in combination with auto-store key.


4-7 Visualization of Captured Signal Waveform

After capture of trigger signals by the preceding 3 modes, the signal waveforms of various channels could be visualized, where necessary.

Change the page by pressing .

1. There are 32 CHS that can be used and displayed by LA-2050, of which 16CH are displayed on LCD, and Page1 or Page2 is used to change the page and visualize the display.
2. Page 1:CH0~CH15 are defaults, Page 2:CH16~CH31.
3. Change previous or next channel by pressing  (previous),  (next).

Zoom-in/out of waveform and shift of T cursor:



1. Zoom-in waveform display on LCD by pressing  "Λ" over orientation key.

2. Zoom-out waveform display on LCD by pressing "∨".

3. Shift T cursor leftwards by pressing "<" at left hand of orientation key; in the case of fixed sampling rate, the increment for every shift delay depends upon the times of Zoom-in/out.

4. Shift T cursor rightwards by pressing ">" at right hand of orientation key; in the case of the same sampling rate, the increment for every shift delay depends upon the times of Zoom-in/out.

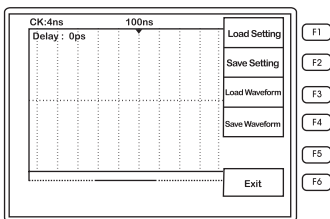
Time computation for A~F cursors and T cursor:

1. Press , A~F cursors and T cursor are simultaneously displayed on LCD.
2. Change A~F cursors by pressing , the selected one is a solid line. Shift it to the starting and ending position of waveform to be calculated by using "→", "←", then time difference of two cursors may be computed under the waveform.

4-8 Save and Load of Waveform Data

Save waveform data

1. Enter into save waveform and load waveform by pressing "file setting" key, as shown below:



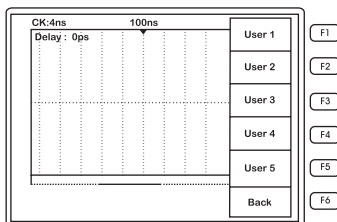
F1: load setting F2: save setting F3: load waveform,
F4: save waveform F6: Exit

2. Enter into save waveform by pressing **F4**, wherein there are 5 groups of waveforms for saving; press **F1**, it indicates waveform data is saved at the designated position of F1.

3. Back by pressing **F6**

4. Enter into load waveform by pressing F3, wherein there are 5 groups of waveforms for loading; press **F1**, you can load waveform of F1, press **F6** 2 times, you can return to waveform visualization display.

Save system setting



As shown above:


1. Enter into save setting by pressing **F2**, wherein there are 5 groups of system setting data for saving; press **F1**, it indicates the data is saved at the designated position of F1.

2. Back by pressing **F6**

3. Enter into load setting by pressing **F1**, wherein there are 5 groups of system setting data for loading; press **F1**, it indicates the system setting data is loaded at the designated position of F1.

4. You can return to waveform measurement display by pressing **F6** 2 times.

4-9 Turn off Power of LA System

1. If it's intended to switch off LA in the operating state, press  to turn off the power.

2. The following appears at lower part of LCD:

Save Boot Wait

It's closed 3~4 seconds after relevant system data is saved.

3. Turn off power of AC or remove AC power cord:


If the instrument is in idle state for a long time, turn off AC power switch at left hand of LA from "1" to "0".

Chapter 5 Operation of PC-LINK

5-1 Installation of PC-LINK

1. PC- Link is mainly used to send the captured signal waveform of LA to PC for saving, visualization, search and printing.
2. PC- Link has a communication interface USB 2.0, so USB driver shall be installed.
3. PC-Link application software attached onto CD (or "load area" of Leaptronix website) shall be installed into PC:
After the program is unzipped, an installation key will pop up, click this key and follow the steps on PC display for installation.
4. After completion of installation procedure and steps, a blue key will appear at PC desktop, indicating the completion of installation.

5-2 Operation of PC-LINK

1. If trigger signal waveform is already captured at LA-2050 terminal, this signal waveform could be loaded to PC via USB 2.0.
2. Press **Utility** at LA terminal, the following appear at right hand of LCD:
F1~F5 function options, select F3 as PC Link function, and press F3, indicating this host terminal is ready to send waveform data.
3. Click LA's button  at PC, enter into LA operating display as follows:



5-3 Software System Requirements

CPU: 3.0GHz or higher.

Ram: at least 512MB.

HD: 50MB.

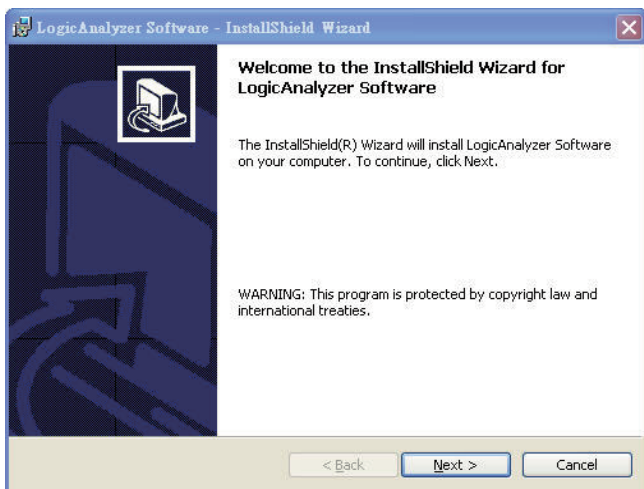
Port supporting USB2.0.

5-4 Software Installation

Step1: close all running programs.

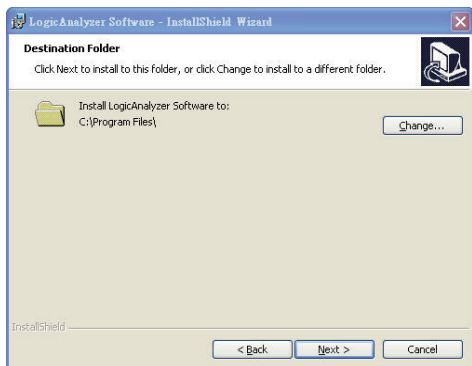
Step2: place CD in the optical drive, and install by the following steps.

If auto-play of the optical drive is activated, the following display will appear:

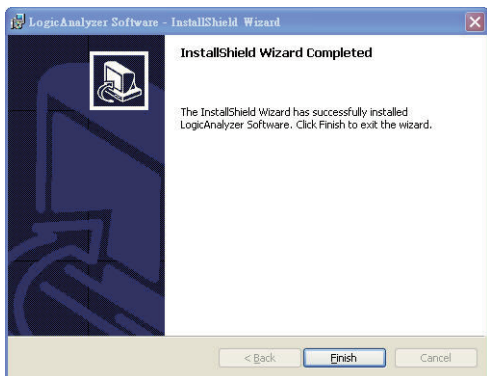


If Optical disc isn't automatically performed, press "Start" button of Windows, then press "Execute". Enter "D: \setup.exe" (assuming optical drive is: "D: \") in "Activate" field.

Step3: press "Next", the option display of installation path will appear:

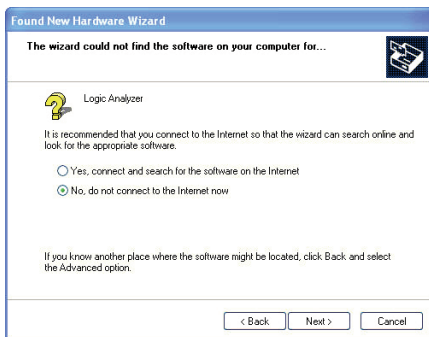


Step4: start installation by pressing "Next", and finally press "Finish".



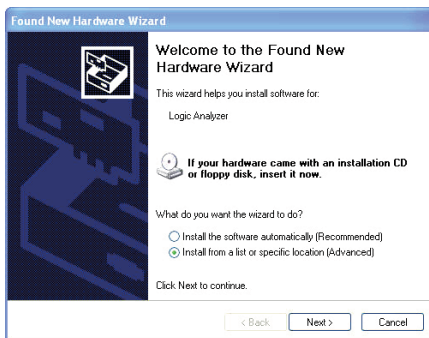
5-5 Hardware Installation

Step1: Logic Analyzer is linked to PC via USB; in the case of first installation, the following display will appear:



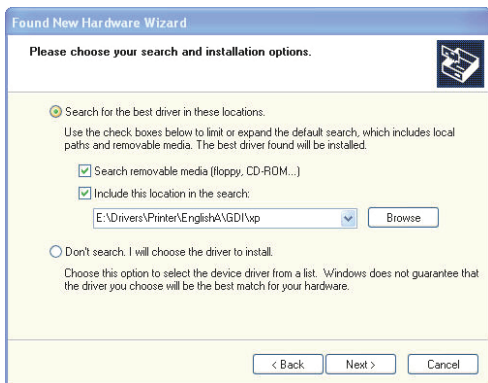
Select “yes, only now”.

Step2: the following display appears press "Next".



Select “Install from list or specific location”

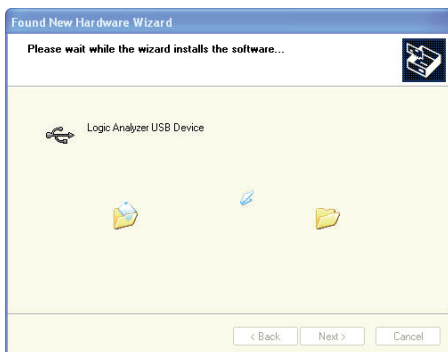
Step3: the following display appears press "Next"



Select "this location is included during search", and press "review".



There is a “Driver” folder under the installed data folder (preset as: c:\program files\Logic Analyzer V2.0); select the data and press "Confirm".
Step4: after pressing "Confirm", select "Next" to start installation of the intended Driver.

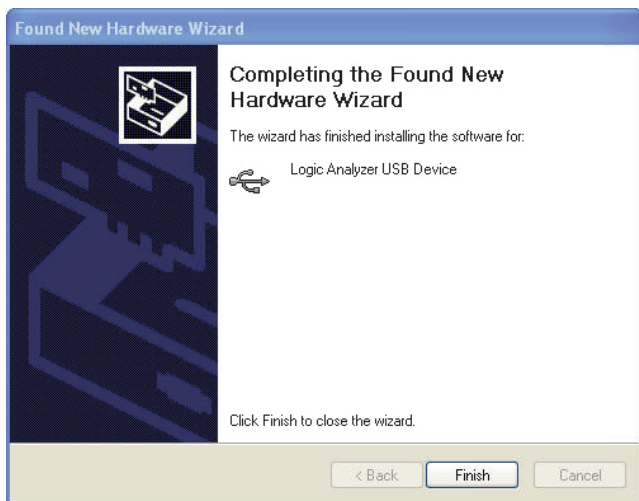


The following warning window will appear during installation:



Select “Continue to install” for completion of Driver installation.

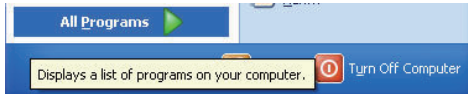
Step5: after completion of installation, press “Finish”.



5-6 Software Execution

Method 1:

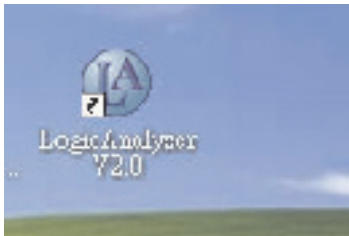
1. Press "Start" function key, select "all programs".



2. Start the software by selecting LogicAnalyzer V2.0 -> LogicAnalyzer V2.0.



Method 2: start the software by clicking directly the software tag on the desktop.



5-7 Interface

5-7-1 Model Selection

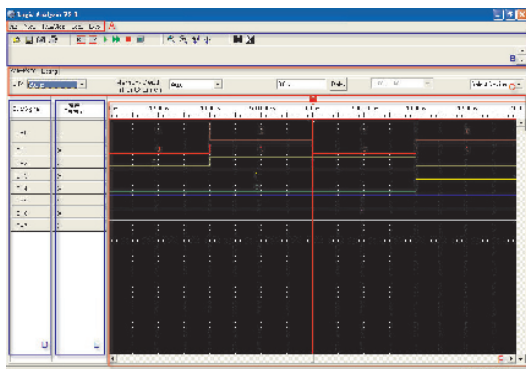


Select the types by pull-down menu.

5-7-2 Operating Interface

(1) Window

1. Waveform window



- A: Functional option list.
- B: Tool list.
- C: Message list.
- D: Display of channel names.
- E: Display of trigger mode.
- F: Waveform display area.

(2) Menu

1. File menu



Load: load the files saved in PC.

Save: save the existing data into file.

Import: import the data of host computer to PC.

Export: export PC data to the host computer.

Capture: capture the existing display into file.

Report: put the existing data into report.

Print: print the existing waveform.

Exit: close the existing programs.

2. View menu



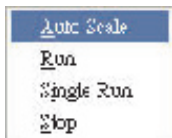
Zoom In: zoom-in waveform.

Zoom Out: zoom-out waveform.

Grid Style: grid style switching.

B/W: background color switching.

3. Run/Stop menu



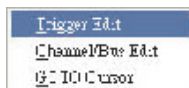
AutoScale: auto-search.

Run: continuous sampling.

Single Run: single sampling.

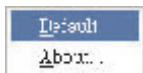
Stop: stop.

4. Tool menu



- a. Trigger Edit:
set trigger conditions.
- b. Channel/Bus Edit:
Set Channel/Bus.
- c. GOTO Cursor:
Position the cursor.

5. Help menu



- Default: ex-factory setting.
- About: software information.

(3) List of Operations

1. File function list



A: load. B:save.
C: capture display. D: print.

2. Advanced function list



A: call BUS setting dialog box. B: call Trigger setting dialog box.
C: single sampling. D: continuous sampling.
E: stop. F: auto-search.

3. Utility operation list



A: zoom-out. B: zoom-in.
C: new cursor. D: cursor spacing display.
E: grid style. F: background white.

5-8 Detailed Operations

5-8-1 File Functions

(1) Save

Method 1:

Select "File" menu and then "Save".

Method 2:

Click the disc pattern on the tool list.



(2) Load

Method 1:

Select "File" menu and then "Load".

Method 2:

Click the file folder pattern on the tool list.



(3) Export

Connect Logic Analyzer with PC via USB.

Then, select "File" menu and Export, thus exporting data to Logic Analyzer.

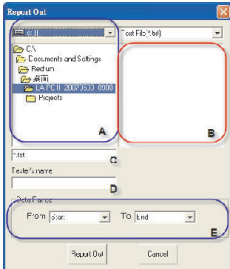
(4) Import

Connect Logic Analyzer with PC via USB.

Then, select "File" menu and Import, thus importing data from Logic Analyzer to PC software.

(5) Report Print-out

Select "File" menu and then "Report Out" to call "Report Out Dialog Box".



Report Out Dialog Box:

- A: Route selection
- B: File selection
- C: File name entry box
- D: Name of test personnel
- E: Selection of export range

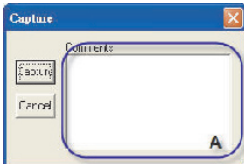
(6) Capture

Method 1:

Select "File" menu and then "Capture" to call capture dialog box.

Method 2:

Click and select the camera pattern on the tool list to call the capture dialog box.



Capture dialog box:

- A: if there is any input comment, the comments will be automatically added to left upper corner.

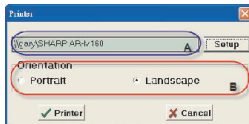
(7) Print

Method 1:

Select "File" menu and then "Print" to call print dialog box.

Method 2:

Click and select the printer pattern on the tool list to call the print dialog box.



Print dialog box:

A: Printer currently selected

B: Portrait or landscape

5-8-2 Waveform capture

(1) Auto-search

Method 1:

Select "Run/Stop" menu and then "Auto Scale" to search automatically waveform data and set the system parameters.

Method 2:

Click the display pattern on the tool list to search automatically waveform data and set the system parameters.



(2) Single sampling

Method 1:

Select "Run/Stop" menu and then "Single Run" to capture individually the waveform data.

Method 2:

Click single arrow pattern on the tool list to capture individually the waveform data.



(3) Continuous sampling

Method 1:

Select "Run/Stop" menu and then "Run" to capture continuously the waveform data.

Method 2:

Click dual arrow pattern on the tool list to capture continuously the waveform data.



(4) Stop

Method 1:

Select "Run/Stop" menu and then "Stop" to stop all operations.

Method 2:

Click the red square pattern on the tool list to stop all operations.



5-8-3 Waveform analysis

(1) Grid style

Method 1:

Click "View" menu and then "Grid Style" to change the grid display mode.

Method 2:

Click the grid pattern on the tool list to change the grid display mode.



(2) Background color

Method 1:

Click "View" menu and then "B/W" to change the background color.

Method 2:

Click the B/W pattern on the tool list to change the background color.



(3) Waveform zoom-in

Method 1:

Click "View" menu and then "Zoom In" to zoom-in the waveform.

Method 2:

Click zoom-in (+) pattern on the tool list to zoom in the waveform.



(4) Waveform zoom-out

Method 1:

Click "View" menu and then "Zoom Out" to zoom-out the waveform.

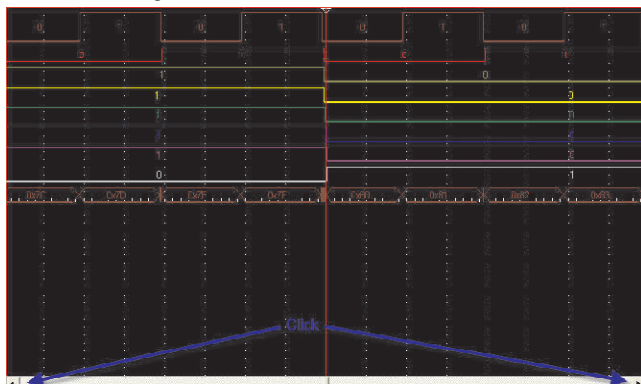
Method 2:

Click zoom-in (-) pattern on the tool list to zoom out the waveform.



(5) Waveform shift

Drag the scroll axle below the waveform display to shift the waveform leftwards or rightwards.



Adjust the position of waveform

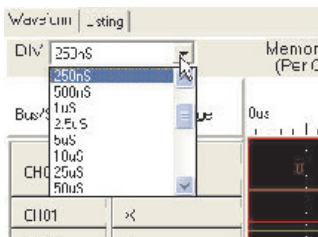
D-IC0	X
D-IC1	X
D-IC2	X
D-IC3	X
D-IC4	X
D-IC5	X
D-IC6	X
D-IC7	Pattern1 ↑
BJECC	Pattern1 = ✕

Press and drag the left mouse button on the left side to adjust the position of waveform. The selected channel is highlighted by a red box.

5-8-4 Settings

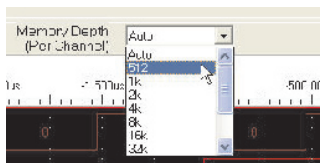
1. Setting of sampling frequency

Click the pull-down menu of the tool list under "waveform window".



2. Setting of memory depth

Click the pull-down menu of the tool list under "waveform window".

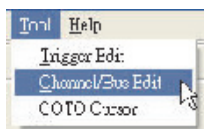


*In the case of bigger memory depth and lower sampling frequency, it takes longer time to capture data. In such case, "Auto" option could be selected to enable automatic setting of memory depth for faster data capture.

3. Setting of Channel/ BUS

Method 1:

Click "Tool" menu and then "Channel/Bus Edit" to call Channel/BUS edit dialog box.



Method 2:

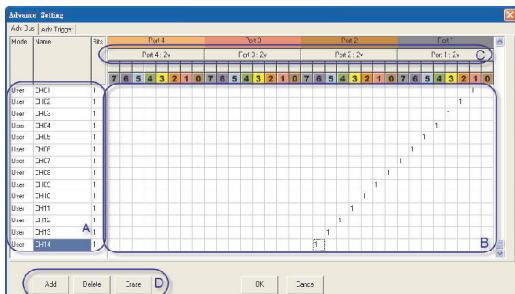
Click right mouse button in waveform display under waveform mode, select "Advance BUS" from the pull-down menu to call Channel/BUS edit dialog box.



Click right mouse button in data area under state mode, and select "Advance BUS" from the pull-down menu to call Channel/BUS edit dialog box.



(1) BUS setting display



A: Channel state;

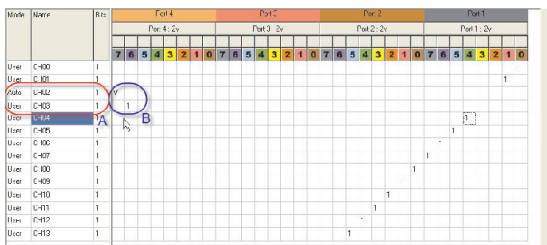
“Mode”, “name” and “bits in channel” from left to right.

B: Channel/BUS setting zone

C: PORT voltage display

D: Function key

(2) Channel Setting



A: Current state;

This setting is valid only when the channel is BUS.

Bits indicate the quantity of Bit(Channel) in the channel, 1 is single channel, 0 is shut-off; the others bigger than 1 is BUS.

B: Since "Auto" and "User" modes are valid only when the channel is BUS, the setting of channel is not affected even if Channel is displayed by numerical value or selection.

(3) Bus Setting

BUS or Channel is set by dragging with left mouse button at Channel/BUS setting zone.

Mode	Name	Bits	Port 4				Port 3				Port 2				Port 1									
			Port 4 : 2v				Port 3 : 2v				Port 2 : 2v				Port 1 : 2v									
			7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2
User	C-000	1																						
User	C-001	1																						
Auto	U-002	8	V	V	V	V	V	V	V															1
User	C-003	10																						
User	U-004	1																						
User	C-005	1																						
User	C-006	1																						
User	C-007	1																						
User	C-008	1																						
User	C-009	1																						
User	C-010	1																						
User	U-011	1																						
User	C-012	1																						
User	C-013	1																						

A: Current state;

Auto represents auto-judgement mode.

User represents user-defined mode.

Bits indicate the quantity of Bit(Channel) in the channel, 1 is single channel, 0 is shut-off; the others bigger than 1 is BUS.

B: BUS display under Auto mode;

C: BUS display under User mode;

1. Auto mode

Since no arrangement issue exists in Auto mode, it's displayed by selection;

MSB to LSB is arranged from left to right in this mode.

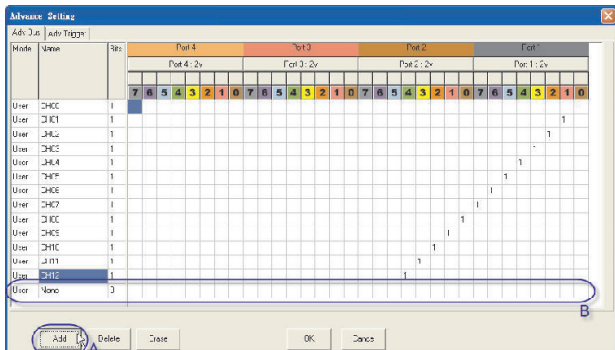
Switching mode: the mode is switched to "Auto" by clicking "User".

2. User mode

BUS arrangement is user-defined for numerical display. A smaller arrangement number of BUS indicates MSB, otherwise LSB.

Switching mode: the mode is switched to "User" by clicking "Auto".

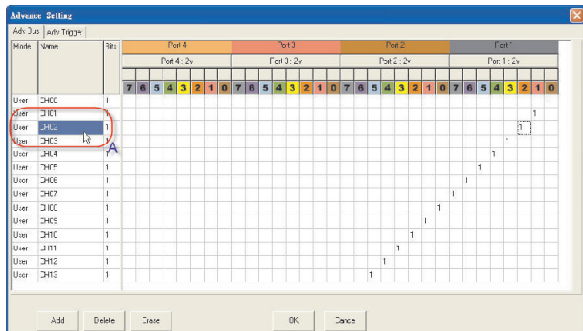
(4) New channel



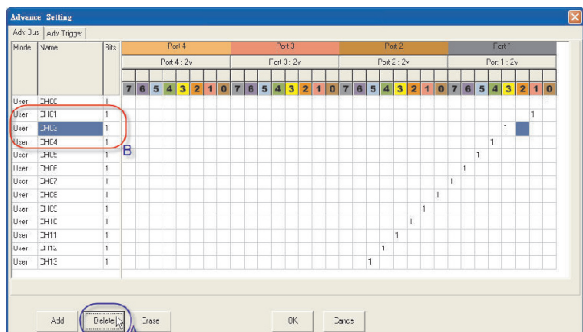
A: Press “Add” at the lower position.

B: Add a new void channel at the lowest position of all channels for the user.

(5) Delete channel

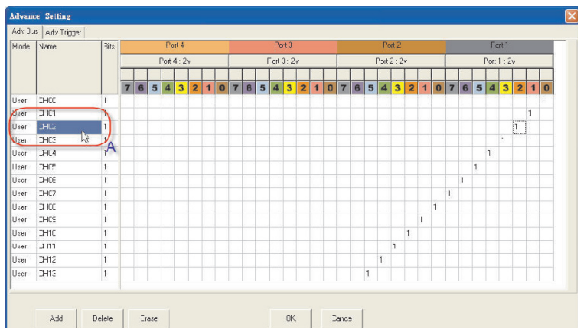


Firstly, select the channel to be deleted.

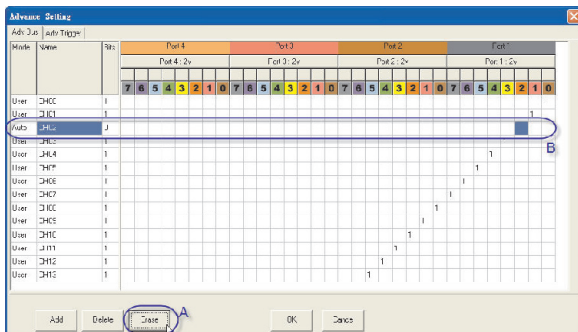


- A: Click “Delete” at lower position.
 B: The selected channel will be deleted.

(6) Erase channel



Firstly, select the channel to be erased.



A: Click “Erase” at lower position.

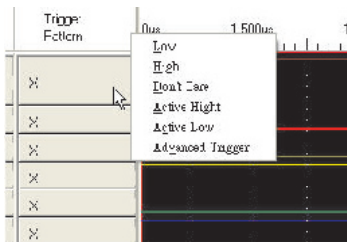
B: The selected channel will be erased.

4. Trigger setting

(1) Simple Trigger setting

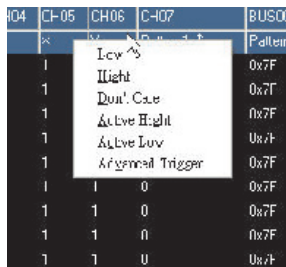
Method 1:

Call the rapid setting list by double-clicking "Trigger/Pattern" field of the channel in the "waveform window".



Method 2:

Call the rapid setting list by double-clicking "Sample/Trigger" field of the channel under "state mode".



(2) Advanced Trigger setting

Method 1:

Click "Tool" menu and then "Trigger Edit" to call Channel/BUS Edit dialog box.



Method 2:

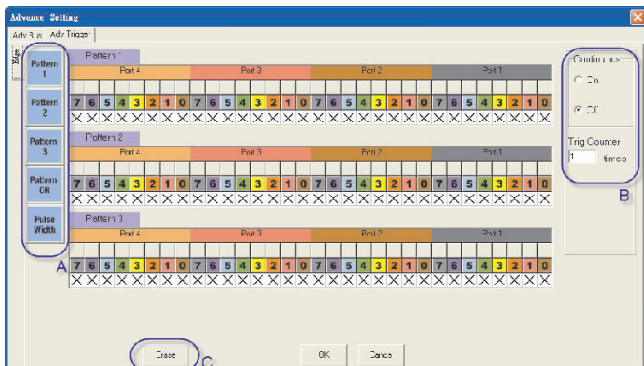
Press right mouse button of waveform display under waveform mode, select "Advance Trigger" from pull-down menu to call Trigger Edit dialog box.



Press right mouse button at data zone under state mode, select "Advance Trigger" from pull-down menu to call Trigger Edit dialog box.



(I) Trigger setting page



A: Pattern mode switching.

B: Trigger Counter and continuous/discontinuous setting.

C: Erase key.

(II) Erase Pattern setting

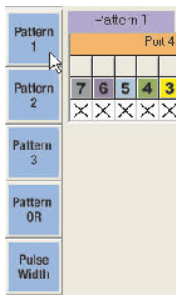
Press the lower "Erase" key to erase all existing Pattern settings;

All Trig states reset to "Don't Care" under Pattern mode.

The settings are set as "CH0" "High" "=" "0" "ns" under Pulse width mode.

(3) Pattern

(I) Pattern switching



Click the left Pattern key for mode switching.

(II) Setting of Pattern



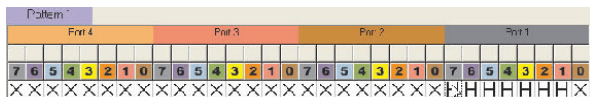
A: Pattern state zone.

To change the trigger mode of Pattern, call the state menu in the state zone by right mouse button:

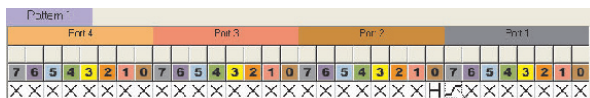


The state of channel can be set by clicking the required state.

1. In the case of “Low”, “High” and “Don’t Care”, press and hold the left mouse button on the state, then drag leftwards and rightwards to set rapidly the trigger state.

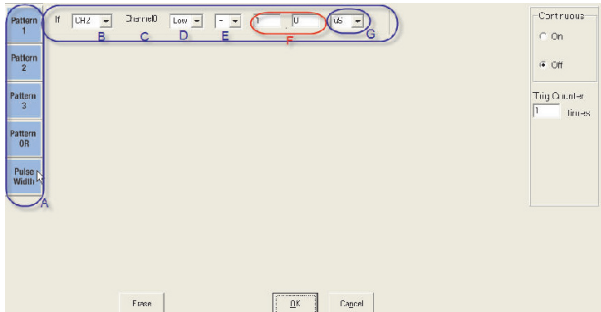


2. In the case of “Raising” and “Falling”, press and hold the left mouse button on the state, then drag leftwards and rightwards to shift the position of “Raising” and “Falling”.



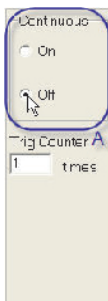
- * Note: only “Low”, “High” and “Don’t Care” trigger state can be selected under Pattern2 and Pattern3. * Either "Raising" or "Falling" can be set under Pattern1 and Pattern OR.
- * Under Pattern2 and Pattern3, the next Pattern is compared only when the setting state of previous Pattern is already achieved. Trigger is effected when the setting state of all Patterns is met.
- * Under Pattern OR mode, Trigger is effected if either Pattern1 or Pattern OR state is met.

(4) Pulse width



- A: Switch to PulseWidth setting page by clicking “Pulse Width” button of left Pattern column.
- B: Select the channel. (CH0~CH31)
- C: Channel name(auto-display).
- D: Select logic level. (Low, High)
- E: Select condition. (<, =, >)
- F: Enter time
- G: Select time unit

(5) Continuous and discontinuous

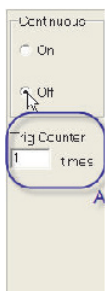


A: Click “On” and “Off” in “Continuous” at right information column.

* This function is effective only in the case of “Pattern2” and “Pattern3”.

* If continuous/discontinuous is set as "On", trigger is effected only Pattern2 and Pattern3 match continuously Pattern state, without mixture of other states; otherwise no continuous data is required for triggering.

(6) Trigger Counter



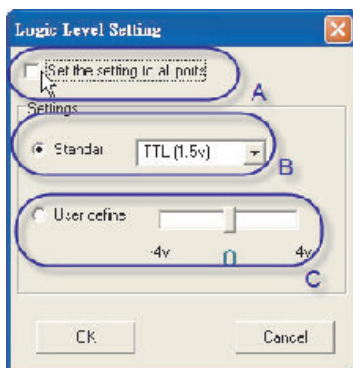
A: Enter the intended times in the entry box of “Trig Counter” at right-hand information column, within the range of 1~255 times.

* If the entry exceeds 255 times, 255 times is limited during system setting.

5. Voltage setting



Call the voltage setting dialog box by clicking the upper voltage display zone with left mouse button in BUS setting page.



- A: Click this option, all Port voltages are set consistently, otherwise set individually.
- B: Standard voltage setting; “TTL”, “ECL” and “CMOS”.
- C: User define; user-defined voltage logic level.

6. Delay



Call delay entry dialog box by clicking “Delay” key on the tool list.



A: Select unit.

BKSP: delete a character by cursor.

Clear: clear the contents in the entry box.

"←", "→": left and right shift of cursor.

7. Change the channel name

Method 1:

CH00	X
CH01	X
CH02	X
CH03	X
CH04	X
CH05	X
CH06	X
CH07	Pattern
3_JECC	Pattern

Under the “waveform window”, double click the channel name to call the name setting dialog box.

Method 2:

Under the "state mode", double-click the channel name to call the name setting dialog box.

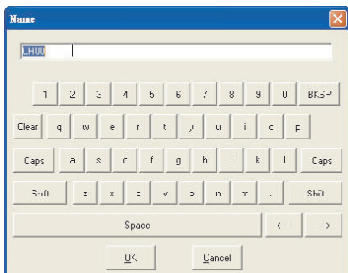
Sample Number	CH00	CH01	CH02	CH03	CH04	CH05
	X	X	X	X	X	X
12		1	1		1	1

Method 3:

Voce	Name	Dis
Jsc	CH00	1
Jsc	CH01	1
Jsc	CH02	1
Jsc	CH03	1
Jsc	CH04	1
Jsc	CH05	1
Jsc	CH06	1
Jsc	CH07	1
Jsc	BUSJJ	8

Under “BUS” setting dialog box, double-click the channel name to call the name setting dialog box.

Name setting dialog box:



BKSP: delete a character by cursor.

Clear: clear the contents in the entry box.

Caps: big/small number switching.

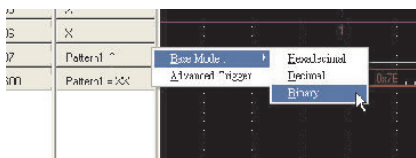
Shift: character/symbol switching.

"←", "→" : left and right shift of cursor.

8. Switch BUS numerical display mode

Method 1:

Under the "waveform window", double click the "Sample/Trigger" field of the channel to call the numerical display options.



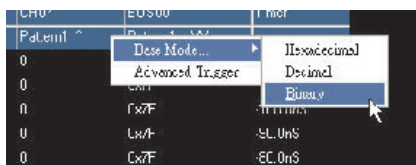
Hexadecimal: display in hexadecimal system.

Decimal: display in decimal system.

Binary: display in binary system.

Method 2:

Under the "state mode", double click the "Sample/Trigger" field of the channel to call the numerical display options.



Hexadecimal: display in hexadecimal system.

Decimal: display in decimal system.

Binary: display in binary system.

9. Cursor setting

(1) Add new cursor

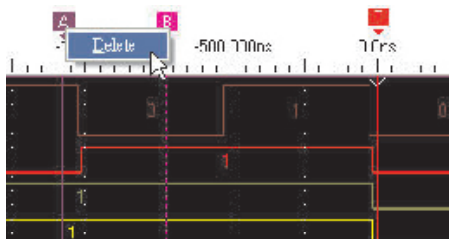
A new cursor is added into "waveform window" or "state mode" by clicking "Add" icon on the tool list.



* The quantity of cursors is limited to 26.

(2) Delete cursor

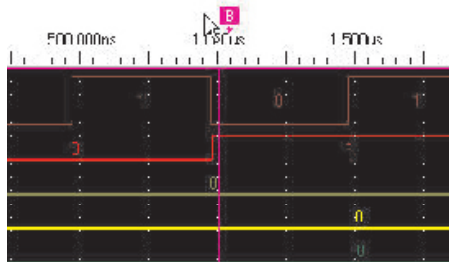
Call the function options by clicking the right mouse button on the cursor to be deleted.



Delete the selected cursor by clicking "Delete".

(3) Shift cursor

Press and hold left mouse button on the intended cursor, drag leftwards and rightwards to shift the position of cursor.

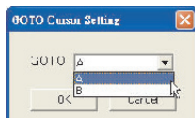


Method 3:

Click "Tool" menu and then "GOTO Cursor" to call Channel/BUS edit dialog box.



Click "GOTO Cursor" to call the cursor and search the dialog box.



Select the cursor to be searched from the pull-down menu.

Enable the central point to align the trigger cursor by clicking "GOTO Trigger".

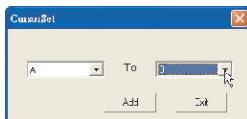
Enable the central point to align the starting point of data by clicking "GOTO Begin".

Enable the central point to align the ending point of data by clicking "GOTO End".

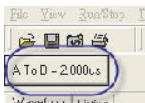
(5) Cursor time



Call the cursor time dialog box by clicking "Set" icon on the tool list.



A new cursor time display is added onto the tool list by selecting the starting and ending cursors and then clicking "Add".



5-9 Shortcut Flow Process

1. Link the Logic Analyzer to computer.
2. Switch the Logic Analyzer to PC-Link mode.
3. Perform Logic Analyzer PC software.
4. Select device.



5-1 Select auto-search key on the tool list.

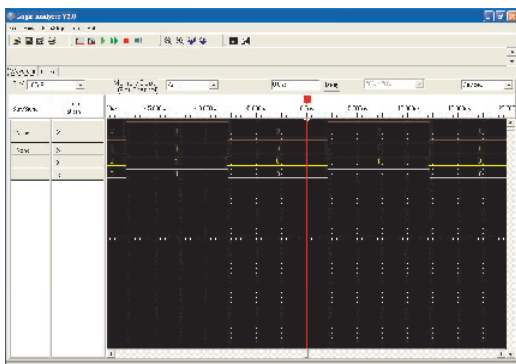
Auto-search key on operation column



“Auto-search” can detect automatically if it’s possible to capture signals, Auto-scale sampling frequency and memory depth.

5-2

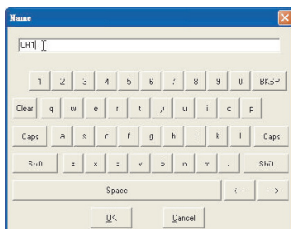
The waveform can automatically appear if it’s captured



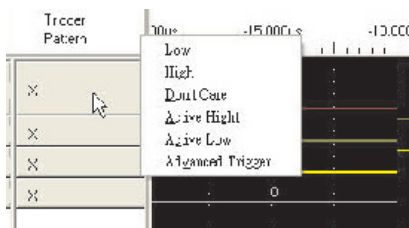
6-1. Call the name setting dialog box by double click the name display zone.

Bus/Signal	Trigger Pattern
Ncre	X
Nrra	X
	X
	X

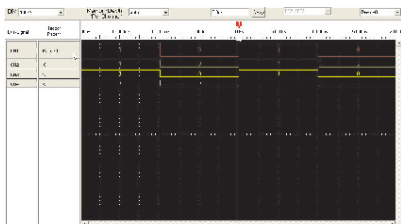
6-2. All signals are named using dialog box.



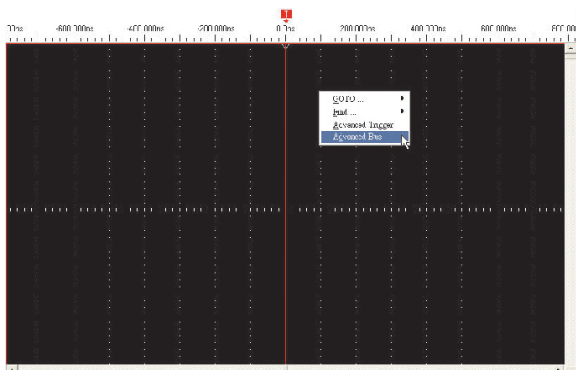
7-1. Call simple trigger options by double click “Trigger / Pattern” field.



7-2. After completion of setting, the waveform is triggered according to the set trigger state.



8-1. If auto-search is not used, the channel is set by pressing right button in the waveform display zone.



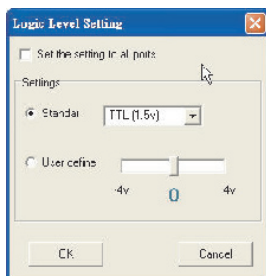
8-2. BUS combination and Channel assignment are performed by means of dragging.

Mode	Name	Rtz	Port 4		Port 3		Port 2		Port 1																									
			Port 4: 2v	Port 3: 2v	Port 2: 2v	Port 1: 2v																												
User	C-11	1	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
User	C-12	1																																
User	C-13	1																																
User	C-14	4																									1	4	3	2				

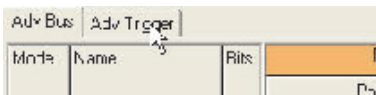
- 8-3. Call the voltage setting dialog box by clicking left mouse button on the voltage display zone.



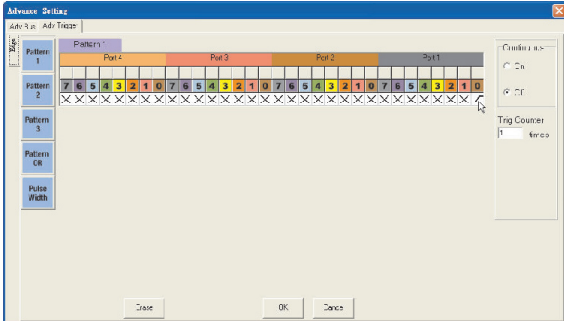
- 8-4. Set voltage in the dialog box.



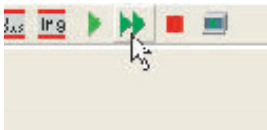
- 8-5. Switch to the trigger page by clicking the upper Trigger subpage.



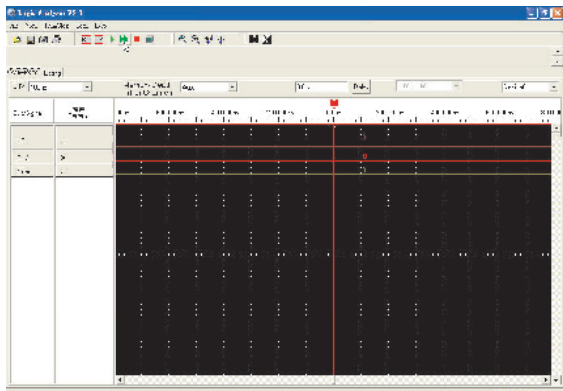
8-6. Set advance trigger in the Trigger page.



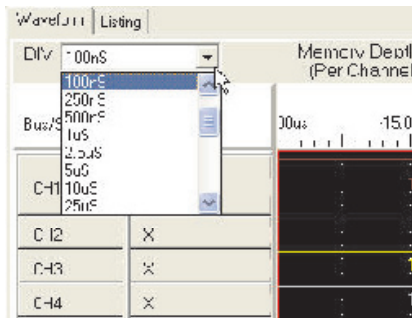
8-7. Return to the waveform window, and capture the waveform by pressing dual-arrow on the upper tool list.



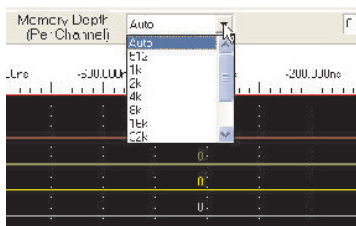
8-8. After data capture, set trigger by repeating the above 6~7 steps.



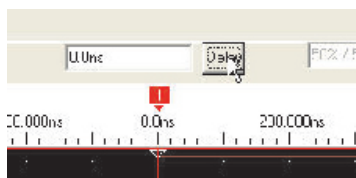
9. Return to waveform window, set the sampling frequency by clicking “DIV” pull-down menu on the tool list.



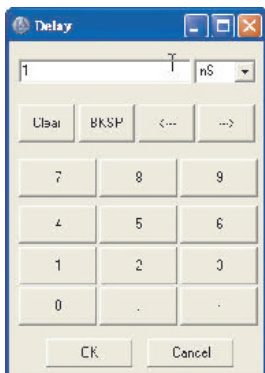
10. Set the memory depth by clicking “Memory Depth” pull-down menu on the tool list.



11. Enter Delay value by click “Delay” key on the tool list.



Enter Delay value into the dialog box with Delay.



Chapter 6 Calibration

Description

It's advisable to calibrate the instrument since an error between setting and import/export value exists due to certain factors after a period of time (often 1 year).

6-1 Calibration Mode

Two calibration modes are described below:

1. The user shall apply for calibration and then send the instruments back to the factory; this company provides ex-factory calibration report.
 2. Calibration is recommended if spare parts are to be replaced (calibration expense is listed in the maintenance cost statement).
- * The repair and calibration shall be performed by the warranty method within the warranty period.

* No auto-calibration by the user is currently unavailable.

Chapter 7 Maintenance, Repair and Utilization

Description

Maintenance and repair is divided into: maintenance by users and maintenance by factory.

7-1 Maintenance by Users

1. The users may maintain the devices without removing the instrument housing.
2. If, in the case of correct AC input power, the instrument is still disabled when PowerSwitch at left panel is “1” and Power key on the frontal panel is pressed, the fuse is already burnt. Make sure AC power cord is removed when replacing the fuse. Then, replace the fuse by opening the fuse holder.

©Note: utilization of nonconforming fuses may lead to damage, burnout or even serious fire hazard and inability of product warranty.

3. It's required to avoid covering or jamming of air inlet/outlet to ensure normal operation for a long period of time.
4. It's required to prevent penetration of water droplet or other liquid.
5. Corrosive cleaning agent or solvents or those with poor chemical-resistance shall be avoided when rubbing the instrument.
6. Sharp substances or strong collision shall be avoided against scratching or damage of LCD panel.

7-2 Maintenance by Factory

The components shall be maintained or replaced by the manufacturer or distributor in either of the following cases:

1. After the fuse in good working order is replaced and AC power is confirmed, the instrument cannot still be opened normally.
2. The system is still maintained at open interface after startup, but it's unable to log in operable interface.
3. Continuous operation cannot proceed in the presence of error message.
4. The front, lateral and rear panels cannot be operated due to damage of components, and the housing must be removed when replacing spare parts.

*** Warning: please send back the products with original packaging materials, or package carefully to avoid damage of products due to vibration, collision and falling.**

7-3 Troubleshooting

1. Description: please read carefully the operating instructions if certain problems or doubts are encountered when logic analyzer is employed.

2. Operating questions and countermeasures:

Q1: In the event of Power on during startup, why the power indicator isn't highlighted, and it's unable to display normally?

Ans: Check if power cord is fastened securely, the fuse in fuse holder is normal, and AC power switch is at "I".

Q2: Why is the power indicator (red) highlighted after startup, but no on-screen display exists?

Ans: The system may not be opened, just press again Power Switch key.

Q3: Why isn't there message responding after pressing F1~F6 keys.

Ans: F1~F6 keys at right hand of screen are only used when control key is pressed. When F1~F6 exist at right hand of LCD, functional adjustment is required.

Q4: How is the signal capture terminal employed with signal capture hook?

Ans: After inserting Pin of signal capture hook into single-pin socket of signal input terminal, and then snap the object by capture hook.

Q5: Why cannot the signal waveform be captured during normal circuit operation?

Ans: 1. Make sure that signal capture hook contacts normally with the test point.
2. Make sure that signal wire at both ends of junction box is free of damage and linked normally to the host computer.

Q6: How does signal capture line and loop of every channel work normally?

Ans: Connect the signal capture line of every channel to the reference square-wave of LA, and observe if the square-wave can be captured.

Q7: During normal operation of circuit, can the waveform be captured after triggering? (are solid materials connected normally)

Ans: Confirm if the set LA trigger state, mode and logic level conform to the specification characteristics of test circuit.

Q8: During normal work of test circuit, why cannot the waveform be captured after triggering?

Ans: scan automatically the signal of test point by pressing blue key "Auto-Scale" on the operating panel; after signal waveform is captured by LA, adjust T cursor and zoom-in/out parameters to observe the waveform.

Q9: How to procure the signal capture hook or consumable spare parts?

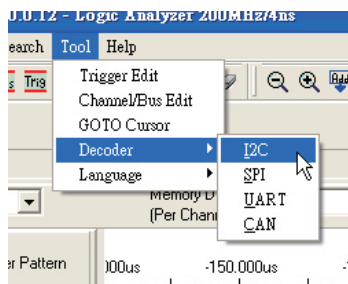
Ans: The backup spare parts could be procured through the customer service or business service units.

Appendix A: I2C series bus decode

1. Start I2C Decode function

Method 1

Select “Tool”→“Decoder”→“I2C” to start the I2C decode function.

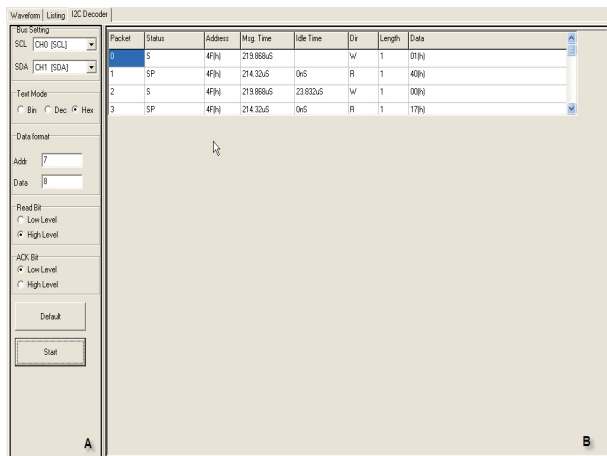


Method 2

Click and select the I2C pattern on the tool list to start the I2C decode function.



2. Interface



The screenshot displays the I2C Decoder interface. On the left, the 'Bus Setting' panel (labeled 'A') includes dropdown menus for SCL (CHO [SCL]) and SDA (CH1 [SDA]), a 'Text Mode' section with radio buttons for Bin, Dec, and Hex (Hex is selected), and 'Data format' fields for Addr (7) and Data (8). Below these are radio buttons for 'Read Bit' (High Level selected) and 'ACK Bit' (Low Level selected), along with 'Default' and 'Start' buttons. The main area (labeled 'B') contains a table with the following data:

Packet	Status	Address	Msg. Time	Idle Time	Dir	Length	Data
0	S	4Fh	219.868uS		W	1	01h
1	SP	4Fh	214.32uS	0uS	R	1	40h
2	S	4Fh	219.868uS	23.832uS	W	1	00h
3	SP	4Fh	214.32uS	0uS	R	1	17h

A: Parameters setting

B: Display of Data

3. Parameters setting

Bus Setting

SCL [CH0 [SCL]]

SDA [CH1 [SDA]]

Text Mode

Bin Dec Hex

Data format

Addr [7]

Data [8]

Read Bit

Low Level

High Level

ACK Bit

Low Level

High Level

Default

Start

Block	Item	Function
Bus Setting	SCL	SCL channel setting
	SDA	SDA channel setting
Text Mode	Bin	Set the display in binary system
	Dec	Set the display in decimal system
	Hex	Set the display in hexadecimal system
Data format	Addr	Address length
	Data	Data length
Read Bit	Low Level	Set the Read Bit level low
	High Level	Set the Read Bit level high
ACK Bit	Low Level	Set the ACK Bit level low
	High Level	Set the ACK Bit level high
Default		Reset to factory default
Start		Start analysis

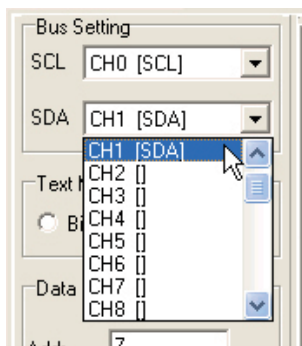
4. Display field

Packet	Status	Address	Msg. Time	Idle Time	Dir	Length	Data
--------	--------	---------	-----------	-----------	-----	--------	------

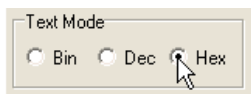
Field	Function
Packet	Packet counter
Status	S: Start
Address	P: Stop
Msg. Time	Display of address
Idle Time	Message continuous time
Dir	Message idle time
Length	Write or load
Data	Packet length
	Data

5. Setting Procedures

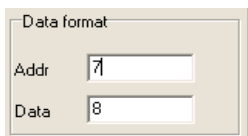
Step 1: Setting channels of SCL and SDA



Step 2: Setting of text mode.



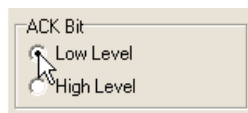
Step 3:
Setting of address bit and data bit.



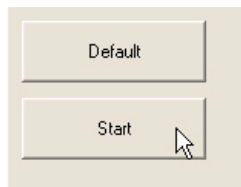
Step 4:
Setting of READ BIT level high or low.



Step 5:
Setting of ACK BIT level high or low.



Step 6:
Select "Start" button to analyze I2C message.

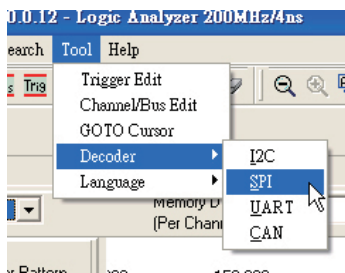


Appendix B: SPI series bus decode

1. Start SPI Decode function

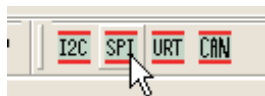
Method 1

Select “Tool”→“Decoder”→“SPI” to start the SPI decode function.

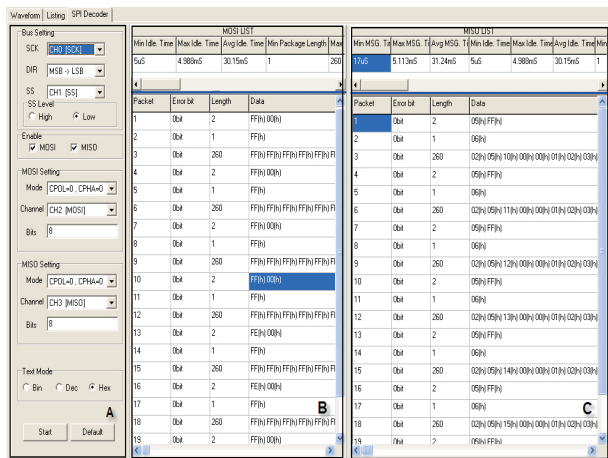


Method 2

Click and select the SPI pattern on the tool list to start the SPI decode function.



2. Interface



- A: Parameters setting
- B: Display of MOSI list
- C: Display of MISO list

3. Parameters setting

Bus Setting

SCK: CH0 [SCK]

DIR: MSB -> LSB

SS: CH1 [SS]

SS Level: High Low

Enable: MOSI MISO

MOSI Setting

Mode: CPOL=0, CPHA=0

Channel: CH2 [MOSI]

Bits: 8

MISO Setting

Mode: CPOL=0, CPHA=0

Channel: CH3 [MISO]

Bits: 8

Text Mode: Bin Dec Hex

Start Default

Block	Item	Function
Bus Setting	SCK	SCK channel setting
	DIR	Data direction setting
	SS	SS channel setting
SS Level	High	Set the SS level high
	Low	Set the SS level low
Enable	MOSI	Start the MOSI analysis
	MISO	Start the MISO analysis
MOSI Setting	Mode	MOSI mode setting
	Channel	MOSI channel setting
	Bits	Bits setting
MISO Setting	Mode	MISO mode setting
	Channel	MISO channel setting
	Bits	Bits setting
Text Mode	Bin	Set the display in binary system
	Dec	Set the display in decimal system
	Hex	Set the display in hexadecimal system
Start		Start analysis
Default		Reset to factory default

4. Display field

Packet	Error bit	Length	Data	Msg. Time	Abs. Time	Idle. Time
--------	-----------	--------	------	-----------	-----------	------------

Field	Function
Packet	Packet counter
Error bit	Error bit
Length	Package length
Data	Data
Msg. Time	Message continuous time
Abs. Time	Continuous time plus idle time
Idle Time	Message idle time

5. Statistics Field

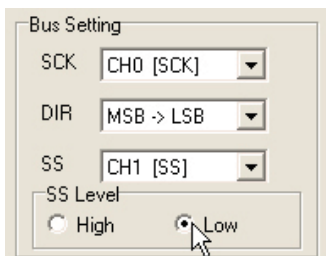
Min MSG. Time	Max MSG. Time	Avg MSG. Time	Min Idle. Time	Max Idle. Time	Avg Idle. Time	Min Package Length	Max Package Length	Total Package Length	Min Error-Bit	Max Error-Bit	Total Error-Bit
17µs	5.113ms	31.24ms	5µs	4.988ms	30.15ms	1	260	1579	0 bit	0 bit	0 bit

Field	Function
Min MSG. Time	Minimum time of message
Max MSG. Time	Maximum time of message
Avg MSG. Time	Average time of message
Min Idle Time	Minimum time of message idling
Max Idle Time	Maximum time of message idling
Avg Idle Time	Average time of message idling
Min Package Length	Minimum length of package
Max Package Length	Maximum length of package
Total Package Length	Total length of package
Min Error Bit	Minimum Error Bit
Max Error Bit	Maximum Error Bit
Total Error Bit	Total Error Bit

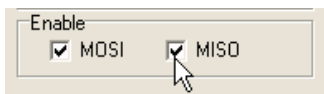
6. Setting Procedures

Step 1: Channel setting:

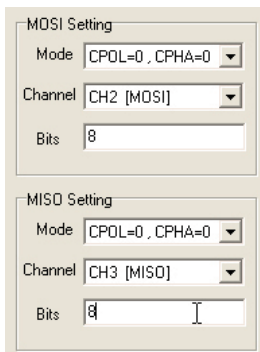
Setting the decode channel and the SS level high or low.



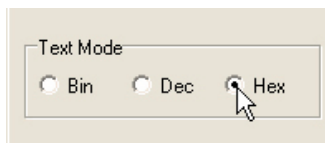
Step 2: Enable MISO or/and MOSI.



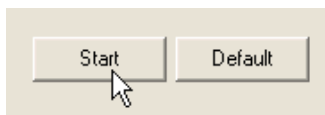
Step 3: Setting channels and parameters of MISO and MOSI.



Step 4: Setting of text mode.



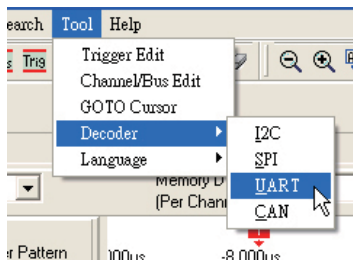
Step 5: Select "Start" button to analyze SPI message.



Appendix C: UART decode

1. Enable Decoder

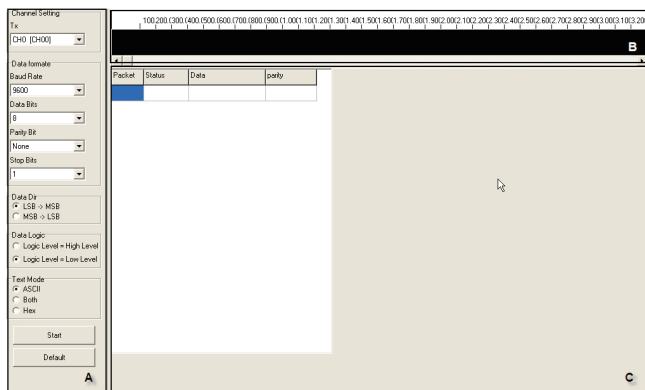
a: Select Tool → Decoder → UART to enable UART Decoder



b: Click UART icon to enable UART Decoder.



2. Interface



- A: Parameter setting
B: Waveform and data.
C: Data information

3. Parameter setting

Channel Setting

Tx

Data format

Baud Rate

Data Bits

Parity Bit

Stop Bits

Data Dir
 LSB -> MSB
 MSB -> LSB

Data Logic
 Logic Level = High Level
 Logic Level = Low Level

Text Mode
 ASCII
 Both
 Hex

Block	Item	Function
Channel Setting	Channel	Select a channel to decode
Data format	Baud Rate	Set Baud Rate
	Data Bits	Set Data Bits
	Parity Bit	Set Parity
	Stop Bits	Set Stop Bits
Data Dir	LSB->MSB	Set LSB as a priority
	MSB->LSB	Set MSB as a priority
Data Logic	Logic Level = High Level	Set logic level High
	Logic Level = Low Level	Set logic level Low
Text Mode	ASCII	Show data in ASCII format
	Both	Show data in ASCII and HEX format
	Hex	Show data in HEX format
Start		Start to decode
Default		Reset to factory default

4. Display Block

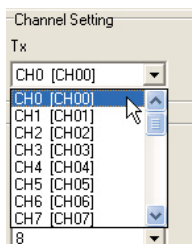
Packet	Status	Data	parity

Block	Function
Packet	Packet counter
Status	S: Start P: Stop
Data	Data
Parity	Result of Parity check

5. Setting Procedures

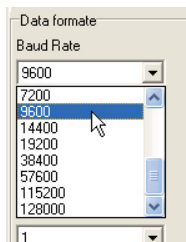
Step 1:

Set Channel

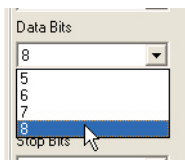


Step 2:

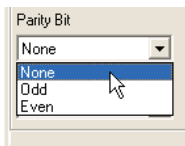
Set Baud Rate



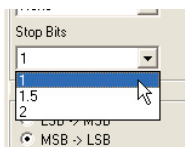
Step 3:
Set data Bits



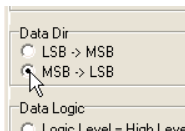
Step 4
Set Parity But



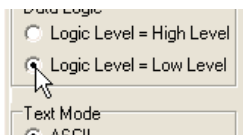
Step 5:
Set Stop bits



Step 6:
Set LSB or MSB



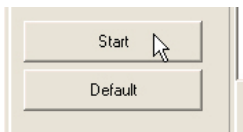
Step 7:
Set Logic Level



Step 8:
Set text mode



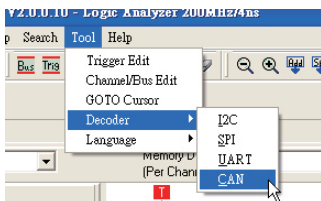
Step 9:
Press start to decode



Appendix D: CAN decode

1. Enable CAN Decoder

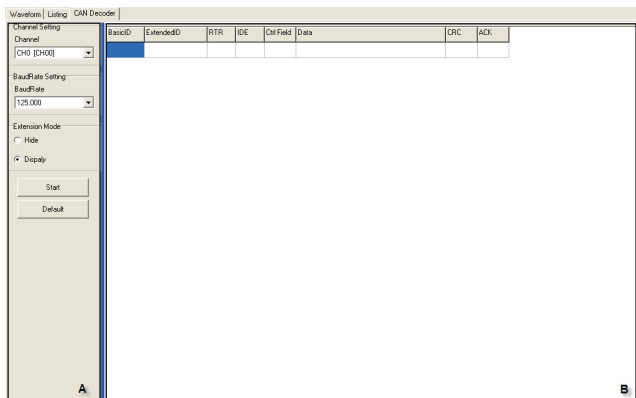
a: Select **Tool** → **Decoder** → **CAN** to enable CAN Decoder



b: Click CAN icon to enable CAN Decoder



2. Interface



A: Data setting

B: Data display

3. Parameter setting

Channel Setting

Channel

CHO [CH00] ▼

BaudRate Setting

BaudRate

125,000 ▼

Extension Mode

Hide

Display

Start

Default

Block	Item	Function
Channel Setting	Channel	Select a channel to decode
BaudRate Setting	BaudRate	Set Baud Rate
Extension Mode	Hide	Hide Extension ID
	Display	Show Extension ID
Start		Start to decode
Default		Reset to factory default

4. Display Block

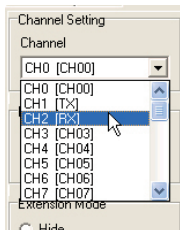
BasicID	ExtendedID	RTR	IDE	Ctrl Field	Data	CRC	ACK
---------	------------	-----	-----	------------	------	-----	-----

Block	Function
Basic ID	Show Basic ID
Extended ID	Show Extended ID
RTR	Show RTR value
IDE	Show IDE value
Ctrl Field	Show Control Field value
Data	Show DATA content
CRC	Show CRC value
ACK	Show ACK

5. Setting Procedures

Step 1:

Select a channel to decode



Step 2:

Set Baud Rate

