## Logic Analyzer

GLA-1016/1032/1132

### **USER MANUAL**

GW INSTEK PART NO. 82LA-11320Mo



ISO-9001 CERTIFIED MANUFACTURER



### EC Declaration of Conformity

#### We

#### GOOD WILL INSTRUMENT CO., LTD.

(1) No.7-1, Jhongsing Rd., Tucheng City, Taipei County, Taiwan

(2) No. 69, Lu San Road, Suzhou City (Xin Qu), Jiangsu Sheng, China

declare, that the below mentioned product

#### **Type of Product: Logic Analyzer**

#### GLA-1016, GLA-1032, GLA-1132

are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (89/336/EEC) and the amendments in the Council Directive 92/31/EEC, 93/68/EEC.

For the evaluation regarding the Electromagnetic Compatibility, the following standards were applied:

<b>© EMC</b>		
EN 55022: 1998 + A1:20	)00 +A2:2003	EN 55024: 1998+A1:2001+A2:2003
Conducted		Electrostatic Discharge
Emission	Class A	IEC 61000-4-2: A2:2001
Radiated		Radiated Immunity
Emission		IEC 61000-4-3: 2002 + A1:2002
		Electrical Fast Transients
		IEC 61000-4-4: 2004 (Not Applied)
		Surge Immunity
		IEC 61000-4-5: :2001(Not Applied)
		Conducted Susceptibility
		IEC 61000-4-6: 2003 + A1:2004 (Not Applied)
		Power Frequency Magnetic Field
		IEC 61000-4-8: 2001
		Voltage Dip/ Interruption
		IEC 61000-4-11: 2004 (Not Applied)

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# **Safety Instructions**

This chapter contains important safety instructions that must be followed when operating GLA and when keeping it in storage. Read the following before any operation to insure safety and to keep the best condition for GLA.

### Symbols and Guidelines

Symbol	Caution symbol identifies conditions or practices that could result in damage to GLA or to other properties.					
General Guideline	<ul><li>Do not place any heavy object on GLA.</li><li>Avoid severe impacts or rough handling that leads to damaging GLA.</li></ul>					
$\wedge$	• Do not discharge static electricity to GLA.					
	• Do not disassemble GLA unless you are qualified as service personnel.					
Cleaning GLA	• Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid into GLA.					
	• Do not use chemicals or cleaners containing harsh materials such as benzene, toluene, xylene, and acetone.					
Operation Environment	Location: Indoor, no direct sunlight, dust free, almost non-conductive pollution (Note below) • Relative Humidity: < 80% • Altitude: < 2000m					
WARNING	• Temperature: 0°C to 50°C					
Storage Environment	Location: Indoor • Relative Humidity: < 80% • Temperature: -40°C to 80°C					

# **GLA** Overview

This chapter describes GLA series features and appearances in a nutshell. Use the Package Contents section to check if there is any missing component.

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## Main Features

Series lineup	GLA-1016: 16 channels, 256Kbit/channel
	• GLA-1032: 32 channels, 128Kbit/channel
	• GLA-1132: 32 channels, 1Mbit/channel
Characteristics	• Internal clock range: $100$ Hz ~ $200$ MHz
	• External clock range: $0.001$ Hz ~ $100$ MHz
	• Rich trigger functionalities: voltage level, count, page, position, delay time and clock, edge and level configuration
	• Memory utilization: max. x255 ratio data compression
	Signal characteristic filtering: Enable function
	• Various signal display mode: waveform, listing, time, frequency, and address
	• I <sup>2</sup> C, RS-232C waveform analyzer
	Waveform statistics function
	Compact, lightweight profile
	• PC operation with GUI environment
	• Fast communication: USB 2.0, 1.1 compatible
	• USB bus powered
	• Various file export: operation setting, waveform data, display image

## Package Contents

Check the contents before using GLA series. Contact your local dealer in case there is a missing item.



GLA-1016	<ul><li>Signal Cable: 8pin*2, 2pin*1, 1pin*1, 250mm</li><li>Signal Grip: 20pcs</li></ul>
GLA-1032	<ul> <li>Signal Cable: 16pin*1, 8pin*2, 2pin*1, 1pin*1, 250mm</li> <li>Signal Grip: 36pcs</li> </ul>
GLA-1132	<ul> <li>Signal Cable: 16pin*1, 8pin*2, 2pin*1, 1pin*1, 250mm</li> <li>Signal Grip: 36pcs</li> </ul>

## Panel Overview

Input Connector S	Start Run Switch LED	Read LED	Trigger LED	Power LED
GUINSTER	400			Power Switch
				USB Connector
USB Connector	For power input ( USB 1.1/2.0 comp	USB bus) an batible.	d communio	cation between the PC.
<u>!</u>	USB2.0 is strongly Make sure the cab attached cable).	recommen le is also con	ded for smo mpatible wit	oth display update. h 2.0 high speed (use the
Power Switch	Switch On-E: L	ED On (red	i)	
Power LED	Switch Off: ]	LED Off	- OWEN	
Trigger LED	Turns On when th page61 (LED deta	ne trigger co ils), page47	ndition is m (trigger in g	et. For details, see eneral).
Read LED	Turns On when G see page61.	LA transmi	t waveform	data to PC. For details,
Run LED	Turns On when G see page61.	LA is waitin	ng for trigger	r condition. For details,
Start Switch	Triggers signal cap Single Run	oturing. This For Run/St	is the same op details, so	functionality as the ee page74.

### Input Connector

						C5 I ¤				D1 	D2 		D4 I ¤		D6 I IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	D7 1 ¤			For Ext Mo IOA	en: dul IOB IOB	sio e IOC	n — C GN I	D	( 	GND I	
	A0	н А1	A2	T A3	П А4	T A5	A6	i A7	н В0	н В1	B2	B3	ĭ B4	B5	B6	B7			F	T 2_0	 T_0	) S_	0 (	CLK	GND	
A0~	D7						Sig GL	nal i A-1	inp 01	ut 1 6.	terr	nin	al. (	C0 -	~ (	27, 1	D0	~ ]	D7	are	no	ot ap	pli	cab	le to	
VDD GND	), I( )	AC	/В	/C	,		+3.	.3V	po	wei	r, I(	Эp	ort	, G	NE	) te:	rmi	nal	foi	ex ex	ten	sio	n m	lodi	ıle.	
Ì	7						Do pur	no pos	t us e.	se t	hes	e co	onn	lect	ors	otł	ner	tha	n e	xte	nsic	on r	noc	lule	usaş	ge
R_O	, Т <u></u>	_0	, S	5_C	)		Ou Rea Trig Sta: con	tpu id o ggei rt o iditi	t sig utp t ou tp on.	gna out utp ut . Fo	uls f (R_ ut ( (S_ or d	T_O T_O T_O leta	moi inc O) i ind ils,	nito lica ind icat	orin tes icat ces pa	ig di wa tes t GL ge6	ata vefe rig A s 1.	cap orn ger tar	otur n da con ted	ing ata ndit wa	an is tr tion itin	d tr rans 1 ha g fo	igg sfer s oo or ti	er t red ccu	imin to P rred, er	g. C, and
CLK							Ext For	tern : det	al ( tails	syr 5, s	nch: ee p	ron page	ous e41	) cl	ocł	x sig	gnal	in	put,	, 0.0	001	Hz	~ `	100	MHz	2.
GNE	C						Gro	oun	d te	ern	nina	ıl.					(	GN	D		-					
<u>_</u> !	7						We con tern cap	stro inec nin turi	ong tin als ng.	g b to	reco oth ens	omi n tw ure	mer ro C sta	nd Gro ble	unc da	l ta	=		ID		-					

## **Display Overview**



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Shortcut	Display	Description
Alt + f	<u>F</u> ile	File operation (page29).
Alt + u	B <u>u</u> s/Signal	Bus/Signal configuration (page39).
Alt + r	T <u>rigg</u> er	Trigger configuration (page47).
Alt + s	Run/ <u>S</u> top	Data capturing (page74).

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Alt + d	<u>D</u> ata	Data operation (page76) and display setup (page62).
Alt + t	Tools	Display setup (page62), Shortcut key setup (page100), I <sup>2</sup> C analysis (page90), and RS-232C analysis (page94).
Alt + w	<u>W</u> indow	Display configuration (page67) and organizing multiple files (page37).
Alt + h	<u>H</u> elp	Help file (page103) and system information (page102).

### Tool bar

Toolbar collects icons for major operations, sorted in groups.

To enable/disable each group, select  $\underline{T}$ ools $\rightarrow$ Customize... from the menu and go to the Toolbar tab. For details, see page63.

Standard group	Page30	Page31
	Create a new project file	Open a project file
	Page32	Page36
	Save the project file	Print out the display
Trigger group	Page40	Page43
	Configure sampling rate	Configure signal/bus
	Page57	Page51
	Setup enable function	Setup bus trigger properties
	Page48 Setup signal trigger properties	Page53 Setup general trigger properties
	Page42 Enable/disable data	compression
Run/Stop group	Page74	Page74
	Single run	Continuous run
	Page75 Stop running	

Sampling group	M4     321     Page41       Select sampling memory size	Page41 Select sampling frequency
Trigger content set group	<b>4 509 •</b> Page56 Set trigger position	Page 1 Page54 Set trigger page
	Count 1 Page5 Set trigger count	4
Display mode group	Page65 Horizontal unit in address	Page65 Horizontal unit in time
	Page65 Horizontal unit in frequency	
Windows group	Page67 Waveform display mode	Page67 Listing display mode
Mouse pattern group	Normal arrow mode	Page88 Area selection (Enclose) mode
	Page79 Hand mode	Page97 Show waveform statistics
Zoom group	Page88 Show all waveform data	Page89 Limit the waveform display area
	Zoom in to/out of data	Page87
Data group	Page78 Delete data bar	Page79 Move A bar to the center
	Page79 Move B bar to the center	Page79 Move T bar (trigger) to the center

	Page78 Add data bar	Page83 Search data
	le Page81 Go to the previous edge	Page81 Go to the next edge
Show time/height group	Page69 Show waveform timing	Page90 Analyze I <sup>2</sup> C waveform
group	Page94 Analyze RS-232C waveform	Height 18 Page66 Change the waveform bar height
Trigger delay group	Trigger Delay 10 Set and show the amount of trig	Page56 gger delay

### Horizontal measurement bar

Displays the horizontal scale and measurement results of the display. For details, see page65.

Horizontal range	Scale:73.737KHz Total:20.48ms(372.893us	Scale (upper line) shows the data acquisition clock frequency.
		Total (lower line) shows the total length of data acquired by GLA, followed by the length covered by the analysis range bar. For analysis range details, see page89.
Position Display Pos:Ons Trigger Pos:Ons		Display Pos (position) shows the timing of the display center position.
	A Pos≔150ns  ▼ B Pos:150ns  ▼	Trigger Pos (position) shows the trigger timing. For details, see page79.
		A/B Position shows user-defined bar timings. For details, see page79.
Time/frequency difference	A - T = 6.667MHz B - T = 6.667MHz A - B = 3.333MHz ▼	Shows the distance between two bars, whether trigger or user-defined, in time, frequency, or address point. For details, see page65.

Compression

Compr-Rate:0.063

Shows the data compression ratio when the compression mode is enabled. For details, see page42.

### Bus/Signal and Trigger list

Bus/Signal	Trigger
A0 Bus1	• • • •
- 🧹 A1	
🚽 🖌 🖊 🖊 🖉	

Signal and bus names are shown in colored codes, with matching trigger setting on the right side.

Bus/signal setup details $\rightarrow$ page39.

Trigger setup details→page47.

## **Operation Shortcuts**

This is the collection of all operations available from the menu, icon, or keyboard shortcut. The "Keyboard map" on the Help menu also opens the shortcut list.

### File menu

Description	Shortcut	lcon	Menu
Close GLA software.	Alt+F4	_	<u>F</u> ile→Exit
Create a new file.	Ctrl+N		<u>F</u> ile→New
Open a file.	Ctrl+O	<b>2</b>	<u>F</u> ile→Open
Close the file.	Ctrl+F4	—	<u>F</u> ile→Close
Save the file.	Ctrl+S		<u>F</u> ile→Save
Save the file in a different name.	—		<u>F</u> ile→Save As
Save waveform data and setting info into *.txt or *.csv file.	Ctrl+Shift+E		<u>F</u> ile→ <u>E</u> xport
Save the screen snapshot into *.jpg or *.bmp file.	Ctrl+C	—	<u>F</u> ile→Capture Window
Select the language.	—		<u>F</u> ile→Language
Prints out the screen snapshot.	Ctrl+P	5	<u>F</u> ile→Print
Shows the screen snapshot printout preview.	—		<u>File</u> $\rightarrow$ Print Preview
Opens the standard printer setup window.	—	—	<u>F</u> ile→Print Setup
Switch between files.	Ctrl+Tab		$\underline{W}$ indow $\rightarrow$ 1, 2,
Display multiple files at once.	—	—	<u>W</u> indow→Cascade, Horizontal Vertical

### Bus/Signal menu

Description	Shortcut	lcon	Menu
Open the Sampling setup dialogue window.	_	<b></b>	B <u>u</u> s/Signal→Sampling Setup
Decrease the sampling rate.	F2		—
Increase the sampling rate.	F3		—
Open the Channel setup dialogue window.	_	₩ę.	B <u>u</u> s/Signal→Channels Setup
Group signals into bus.	Ctrl+G	—	B <u>u</u> s/Signal→Group into Bus
Ungroup bus into signals.	Ctrl+U	—	B <u>u</u> s/Signal→Ungroup from Bus

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Expand the bus.			B <u>u</u> s/Signal→Expand
Collapse the bus.	—		B <u>u</u> s/Signal→Collapse
Automatically adjust the channel row width (only in listing mode)	—	—	B <u>u</u> s/Signal→Format Row→Auto Size
Move the cursor up.	Up	—	B <u>u</u> s/Signal→Format Row→Move Up
Move the cursor down.	Down	—	$B_{\underline{u}s}/Signal \rightarrow Format$ Row→Move Down
Hide the signal/bus.	-	—	B <u>u</u> s/Signal→Format Row→Hide
Show all the signal/bus.	—	—	B <u>u</u> s/Signal→Format Row→Show All
Set the signal/bus color.	-	—	B <u>u</u> s/Signal→Format Row→Color
Rename signal or bus.			B <u>u</u> s/Signal→Rename

### Trigger menu

Description	Shortcut	lcon	Menu
Open the Bus trigger setup dialogue window.	_	ψ <mark>®</mark> ≊	T <u>rigg</u> er→Bus
Open the Signal trigger setup dialogue window.	—	ллг Ч т	'T <u>rigg</u> er→Signal
Open the General trigger properties dialogue window.	_	¥ <sup>III</sup>	T <u>rigger</u> →Properties
Change signal trigger condition.	Space	—	T <u>r</u> igger→

### Run/Stop menu

Description	Shortcut	lcon	Menu
Single run.	F5		Run/ <u>S</u> top→Single Run
Continuous run.	F6	$\blacktriangleright \flat$	Run/ <u>S</u> top→Repetitive Run
Stop running.	F7		Run/ <u>S</u> top→Stop

### Data menu

Description	Shortcut	lcon	Menu
Go to the next data page.	PageDown	—	—
Go to the previous data page.	PageUp		_
Go to the beginning of data.	Home		—
Go to the end of data.	End	_	—
Move the waveform position right.	Right		_

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Move the waveform position left.	Left	—	_
Add data bar.	Alt+A	<b>+</b> ≧ Ba⊢	<u>D</u> ata→Add Bar
Delete data bar.	Alt+B	Bar	<u>D</u> ata→Delete Bar
Move T bar to the display center.	T, Ctrl+T	<b>T</b> <mark>≧</mark> Ba⊨	<u>D</u> ata→GoTo→GoTo Trigger
Move A bar to the display center.	A, Ctrl+A	A¥ Bar	<u>D</u> ata→GoTo→GoTo A Bar
Move B bar to the display center.	B, Ctrl+B	В₽	<u>D</u> ata→GoTo→GoTo B Bar
Move any bar (T, A, B, Ds, Dp, user defined bar) to the display center.	_	_	<u>D</u> ata→GoTo→GoTo More
Move to the previous edge.	F11	14	<u>D</u> ata→Before
Move to the next edge.	F12	<p]< p=""></p]<>	<u>D</u> ata→After
Move the display sideway (use the Hand pointer).	Н	<u></u>	<u>D</u> ata→Hand
Select the zoom area (use the Enclose pointer)	Е		<u>D</u> ata→Enclose
Use the normal pointer.	Esc	R	<u>D</u> ata→Normal
Search data.	Ctrl+F	<b>B</b> B	<u>D</u> ata→Find Data Value
Zoom in.	F9	ли К	<u>D</u> ata→Zoom In
Zoom out.	F8	<u>.</u>	<u>D</u> ata→Zoom Out
Undo the last zoom.	Ctrl+Z	кЭ.	<u>D</u> ata→Undo Last Zoom
Show all data.	F10		<u>D</u> ata→Show All Data
Adjust the display range to analysis bar.	—		_
Select the data analysis range.	—	—	<u>D</u> ata→Select Analytic Range
Show waveform analysis result.	—		—
Show waveform data in binary.	—		<u>D</u> ata→Show As→ <u>B</u> inary
Show waveform data in decimal.	—	—	$\underline{D}$ ata→Show As→ $\underline{D}$ ecimal
Show waveform data in hexadecimal.	—	—	<u>D</u> ata→Show As→ <u>H</u> exadecimal
Show waveform in square form.	_		<u>D</u> ata→Wave Mode→ Square Waveform
Show waveform in sawtooth form.	—		<u>D</u> ata→Wave Mode→ Sawtooth Waveform
Activate data compression.			_

### Tools menu

Description	Shortcut	lcon	Menu
Open the display customize dialogue window.	_	_	<u>T</u> ools→Customize
Open the I <sup>2</sup> C analysis dialogue window.	—	Ľ	<u>T</u> ools $\rightarrow$ Analy IIC Wave
Open the RS-232 analysis dialogue window.	—		<u>T</u> ools→Analy UART Wave
Show the waveform timing.	_	8	<u>T</u> ools $\rightarrow$ Show time of waveform

### Window menu

Description	Shortcut	lcon	Menu
Open the display customize dialogue window.	_	_	<u>T</u> ools→Customize
Show the waveform view.	—	55	<u>W</u> indow→Waveform Display
Show the listing view.	—		$\underline{W}$ indow $\rightarrow$ Listing Display
Show the waveform timing.	—	8	<u>W</u> indow→Show time of waveform
Switch between files.	Ctrl+Tab		<u>W</u> indow→1, 2,
Display multiple files at once.	—	—	<u>W</u> indow→Cascade, Horizontal, Vertical

### Help menu

Description	Shortcut	lcon	Menu
Open the Help file.	F1	_	<u>H</u> elp→GWInstek Logic Analyzer
Open the keyboard shortcut list.	_		<u>H</u> elp→Keyboard Map
Send a bug reporting email.	_		<u>H</u> elp→Report a Problem
Show the software version.	_	—	<u>H</u> elp→About GWInstek Logic Analyzer

# Installation

This chapter describes software installation, activation, and functionality check. Follow these instructions to properly install GLA series.

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## Software Installation

### PC requirement

The readme.txt file in the CD-ROM also contains this information.

OS	Windows 98 Windows Me Windows 2000 Windows XP	
CPU	Windows 98/Me: 166MHz minimum Windows 2000/XP: 300MHz minimum	
RAM	Windows 98/Me/2000: 128MB minimum Windows XP: 256MB minimum	
Hard disc	100MB minimum	
USB	1 USB host connector, 1.1 or 2.0 compatible (2.0 strongly recommended)	

License

### Installation procedure

**Setup activation** Insert the software CD-ROM into the PC. If the below Setup screen does not appear, double-click the Setup.exe file.

Click the INSTALL button.



Read the license term and select  $\underline{a}$ ccept, click  $\underline{N}$ ext.

agreement	🕼 GWINSTEK Logic Analyzer - InstallShield Wizard
	License Agreement
	Please read the following license agreement carefully.
	LICENSE AGREEMENT
	IMPORTANT-READ CAREFULLY : This LICENSE AGREEMENT is entered into effect between GWINSTEK Technology Co., Ltd. (hereinafter "GWINSTEK") and Customer (Individual or Registered Company).
	Whereas, GWINSTEK owns a software product, including computer software as a package product for certain computer products, relevant intermediary, product information, electronic file and internet on-line downloadable software, electronic file and service, known as " GWINSTEK Logic Analyzer" (hereinafter "GWINSTEK LA").
	Whereas, GWINSTEK represents and warrants that it is the owner of the entire right, title,
	• I accept the terms in the license agreement
	$\bigcirc$ I <u>d</u> o not accept the terms in the license agreement
	Instalishield
	< <u>B</u> ack <u>N</u> ext > Cancel

**User information** Enter your user name and organization. Set the range of user access: All users or the user currently logged in.

🕼 GWINSTEK Logic Analyzer - InstallShield Wizard	×
Customer Information	
Please enter your information.	
User Name:	
GLA User	
Organization:	
GWInstek	
Install this application for:	
Anyone who uses this computer (all users)	
C Only for <u>m</u> e ()	
InstallShield	
< Back Next >	Cancel

#### Setup type Select the setup type.

Complete setup: All features will be installed. The program directory is automatically set.

Custom setup: Installed features and program directory are set by the user. See the next page.

况 GWINS	TEK Logic Analyzer - InstallShield Wizard	×
Setup Typ Choose	he setup type that best suits your needs.	and an and a second second
Please se	lect a setup type.	
ତ <u>Com</u>	All program features will be installed. (Requires the most disk space.)	
C Cust	om Choose which program features you want installed and where they will be installed. Recommended for advanced users.	
InstaliShield –	< <u>B</u> ack <u>N</u> ext > Cancel	

Custom setup The custom setup option allows users to select the program features and directory. Installed features can be modified later (page25).

GWINSTEK Logic Analyzer - InstallShield	Wizard
Select the program features you want installed.	
Click on an icon in the list below to change how a feature is	installed.
Main App     Examples     Tutorial	Feature Description All the files are main of application must be installed.
	This feature requires 2924KB on your hard drive.
Install to:	
C:¥Program Files¥GWINSTEK¥GLA-1032¥	<u>C</u> hange
nstalishied	
Help Space < Back	Next > Cancel

PC reboot Reboot the PC when the installation is completed.



Driver installation By default the driver is installed together with the main program. In case the PC requires a separate software driver installation, select USB\_LA.inf file in the software package.

### Uninstall, repair, modification

This page assumes the GLA software is already installed.

Uninstall	Select UnInstall from the PC startup menu,				
	🎼 Logic A	Analyzer UnInstall			
	Or select <u>R</u> er	move in the Program Maintenance mode (see below).			
Modify/repair	Insert the software CD-ROM and activate Setup.exe. The Program Maintenance menu appears.				
	GWINSTEK Logic Analyzer - InstallShield Wizard  Program Maintenance Modify, repair, or remove the program.				
	ে Modify	Change which program features are installed. This option displays the Custom Selection dialog in which you can change the way features are installed.			
	C Repair	Repair installation errors in the program. This option fixes missing or corrupt files, shortcuts, and registry entries.			
	C <u>R</u> emove	Remove GWINSTEK Logic Analyzer from your computer.			
	Installshield ———	< <u>B</u> ack <u>N</u> ext > Cancel			

 $\underline{\mathbf{M}}$  odify option: Lets the user re-select the installed features.

Repair option: Checks the program status and fixes any broken files.

<u>R</u>emove option: Uninstalls the software.

## Power Up

This section assumes the software is already installed.

## Hardware connection

Connect GLA and the PC via the USB cable. Press the GLA power switch and make sure the power LED turns On.



## Software activation



1. Double-click the desktop GLA icon GLA-1032 or activate the GLA from the program startup menu.

🖬 GWINSTEK	🖬 GLA-1032 🔸	👕 Logic Analyzer
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- 2. If the hardware connection error message appears, try the following.
  - \* Reset the GLA USB connection and try again.
  - \* Make sure GLA and PC are connected by a single USB cable (Do not use USB extension cable).

GWINSTEK Logic Analyzer		
Hardware connection failed!		
Run Demo Retry Exit		

3. If there is already a setup file (\*.gla) being saved, the software asks whether to open it.



- 4. The display appears.

## Demonstration mode

You can still run the software without the GLA hardware. When the Hardware connection failure message appears, click Run Demo button.

GWINSTEK Logic Analyzer						
Hardware connection failed!						
Run Demo Retry Exit						

Most of the software features are available, except for signal capturing. You can even recall the old waveform data to be displayed.

## Functionality Check

Hardware connection	Activate GLA (page26) and connect the signal source to one of the input terminals.							
Signal capturing	<ul> <li>Do one of the following actions to capture the signal.</li> <li>Press the Start button on GLA</li> <li>Click the Run button on the display</li> <li>Press F5 (shortcut for the single run)</li> <li>Select Single Run from the Run/Stop menu</li> </ul>							

Make sure the signals appear on the display, at the corresponding terminals.

# **File Operation**

Open/Close	Open GLA software					
. ,	Close GLA software					
	Create a file					
	Open a file	31				
	Close the file					
Save	Save the project file	32				
	Save the project file in a different name					
	Export the data	32				
	Save the display image	34				
Printout	Print					
	Print Preview					
	Printer Setup					
Handling multiple	Switch between files	37				
files	Display multiple files					

## Open/Close

### Open GLA software

Activates GLA software.

Note

Startup Menu	🛗 GWINSTEK	▶ 🛗 GLA-1032 → 🍟 Logic Analyzer
Desktop icon	GLA-1032	

If there is already a setup file (\*.gla) being saved, the software asks whether to open it or not.

LogicAna	alyzer	×
<u>.</u>	Do you want to open the last saved f	ile?

### Close GLA software

Closes GLA software	<u>.</u>
Menu	<u>File</u> $\rightarrow$ Exit
Shortcut key	Alt+F4
Create a file	
Creates a new project	t file.
Menu	<u>Eile</u> $\rightarrow$ New
Shortcut key	Ctrl+N
lcon	
File format	LaDocx.gla (x stands for integers: 1, 2, 3)

## **GWINSTEK**

### Open a file

Opens an existing set	up file.
Menu	<u>F</u> ile _ Open
Shortcut key	Ctrl+O
lcon	Ê
File format	*.gla
File properties	File Preview       FileName:       Top_Secret       FileDate:       07/05/06         FileAuthor:       GWInstek       FileTime:       08:49:00         FileTitle:       Innvative Technology         FileMemo:       Captures the moment our advanced innovation breaks the industry benchmark.

The File open dialogue windows shows the file properties of the pointed \*.gla file.

File name, project, author, title, and note can be set at Save As dialogue (page32).

### Close the file

Closes the active project file. Menu  $File \rightarrow Close$ Shortcut key Ctrl+F4

## Save

### Save the project file

Overwrites and saves the active Logic Analyzer project file. If the file has never been saved before, the Save As window appears.

Menu	<u>F</u> ile _ Save
Shortcut key	Ctrl+S
lcon	
Save the proje	ct file in a different name
Saves the active Logic A	Analyzer file in a different name, or in a different directory.
Menu	<u>File</u> $\rightarrow$ Save As
File format	*.gla
Dialogue window	The Save As dialogue window includes File property corner where you can fill in the project name, project staff name, and additional note. These information can be viewed when opening the file,
	Note: Shows the initial status of UART data.

### Export the data

Saves waveform data and setup information into \*.txt or \*.csv format.

Menu <u>File</u> <u>Export...</u>

Shortcut key	Ctrl+Shift+E	
Dialogue window	Save As Save in: Readme.txt	
	File <u>n</u> ame: Save as <u>t</u> ype: Display Parameter © Yes Display Data's Ran from Beginni [1023	Save       Text Files(*.txt)     Cancel       O Data Display Mode     Cancel       No     Vertically       ge     Image: Concel       ng of Data     to       End of Data     1025
File Type	*.txt *.csv	Plain Text format. Comma-Separated Values format. Each waveform data is listed in tables as separate entities.
Display parameter	The setup infor • File name, siz • Sampling mo • Ram size, dat • The number • Trigger level, • Bar position	rmation includes the following: ze, date de, sampling frequency za compression ratio of Bus/channel count, page, Enable setting
	Yes	The file contains system measurement setup information as well as waveform data.
	No	The file contains only the waveform data.
Data display mode	Vertical	Sets the waveform data format into: Horizontal direction – channel Vertical direction – waveform data
	Horizontal	Sets the waveform data format into: Horizontal direction – waveform data Vertical direction – channel

Display data Specifies the range of the saved data. The gray area shows the position of the selected item.

- From:/ To: Beginning of data
  - End of data
  - Trigger bar
  - A bar
  - B bar
  - User defined

### Save the display image

Saves the whole or part of the PC screen snapshot image, in Jpeg (\*.jpg) or Bitmap (\*.bmp) format.

Menu	<u>F</u> ile _ Capture Window							
Shortcut key	Ctrl+C							
Dialogue window	Capture Window Capture to  Capture to  File  Clipboard  MSPaint  Capture Region  FullScreen  Select Region							
	Selection line color Note text color Capture	I opposite of color Cancel						
Note	Note: Adds the entered c	omment to the captured						

snapshot.

	Note color	Clicking the icon opens the chart for selecting the note text color. Default: black.						
Capture to	File	The captured snapshot is saved to an external file. File format: *.jpg, *.bmp						
	Clipboard	The captured snapshot is saved to the Windows Clipboard, to be pasted into other applications.						
	MSPaint	The captured snapshot is opened in Microsoft Paint, in *.bmp format.						
Capture region	FullScreen	The full screen is captured (same as pressing the PrtSc key).						
	Select Region	A cropping tool appears, allowing capture of selected area.						
	GWINSTEK Logic Ana File Bus/Signal Trigger Control Control Control Control Control Control Scale 15 2030s Scale 15 2030s	Ivzer - [LaDoc2.gla]         Run/Stop Data Tools Window Help         Image: Window Help						

) 🧀 🖬 🍎 🛙	11, 12, W	🖗 👯 📲	D) 🕨	DD 🔲 🕴	≥ 2K	▼ (♣)	an 10	IMMI 🔻		K 50% 🕶 ·	🎼 Page	1	•	Count
3 🚯 🔝	A 📰	🙀 🖑 📓		38ns 🔻	R .			👪 14	¢۱	🐻 🎦 Height	18	-	Trigge	r Delay
Scale:15.938ns			Di	splay Pos:Or	าร				A Po	s:-150ns 🗸				A - 1
Total:20.48us			Tr	igger Pos:On	IS				B Po	s:150ns 👻				B - 1
us/Signal	Trigger		-318.75	ns	-239.0	063ns	-15	A 9.375ns		-079.688ns		Jhs		79.688
🖌 🚹					_							0.25us		
🖌 AO 🚽												0.25us		
Bus1												0		
🥑 A4												0.25us		
🧪 A5												0.25us		<u>ا ا</u>
🖌 A6												0.25us		
🖉 A7												0.25us		
🖌 B0												10.25us		
🥖 B1												10.25us		
🥖 B2												0.25us		
B3												10.25us		
🧭 B4												10.25us		
🧪 B5												0.25us		
🖌 B6												0.25us		
/ B7												0.25us		
🖌 C0												0.25us		
🧪 C1												0.25us		
🥖 C2												10.25us		
C3												10.25us		
🥑 C4												10.25us		
🧪 C5												10.25us		
🖌 C6												0.25us		
<i>d</i> C7												0.25us		
( 55	111 X X													

Selection line Clicking the icon opens the crop tool color chart. Checking the opposite of color radio



**opposite of color** selects the opposite of the specified color, as in the above figure (white line).

## Printout

### Print

Prints out the waveform image.

Menu	<u>F</u> ile _ Print
Shortcut key	Ctrl+P
lcon	<b>a</b>

### **Print Preview**

Shows waveform image printout preview. The file name and the date are also printed out.

Menu

<u>F</u> ile	$\rightarrow$	<b>Print Preview</b>	

File Name		Date
-LaDoc2.gla		2006-06-08
824 246,038av ma 2014 - 25 246 - gra	Diasu- FoxOra I ager Hoder Triasu- Di Cottyn Biscoton	> FLa-ICC+v  + E FLa ICC+a  + 1 52 554 r = 052 eccorr

### Printer Setup

Opens the standard printer setup dialog window.

Menu

<u>F</u>ile \_ Print Setup...
# Handling Multiple Files

This section assumes more than one files are already opened.

## Switch between files

Menu	Click the target file accessible from the Windows menu.
	<u>₩</u> indow <u>1</u> LaDoc2.gla:1 <u>2</u> LaDoc2.gla:2
Shortcut key	Ctrl+Tab
Display multi	ple files
Menu	Casecade Horizontal <u>W</u> indow _ Vertical
Cascade format	SWINSTEK Logic Analyzer - LaDoc1         Die Bur/Symi Trigger Run/Stop Data Tools Window Help         Die Die Konger Run/Stop Data Tools Window Help         Die Die Die Konger Run/Stop Data Tools Window Help         Die Die Die Konger Run/Stop Data Tools Window Help         Die Die Die Konger Run/Stop Data Tools Window Help         Die Die Die Die Konger Run/Stop Data Tools Window Help         Die



#### Vertical format



# **Bus/Signal Setup**

Sampling /	Clock source	41
Compression setup	Sampling RAM size	41
	Compression mode	42
Bus/Signal setup	Add/Delete	43
	Group/Ungroup	44
	Rename	45
	Hide/Show signals and buses	46

# Sampling/Compression Setup

GLA can setup the clock source, sampling frequency, memory size, and data compression.

Menu	B <u>u</u> s/Signal <sub>→</sub> , Sampling Setup			
lcon				
Context menu	Bus/Signal Trigger			
Dialogue Window	Sampling Setup         Clock Source         Asynchronous Clock         Internal Clock         Frequency:       100KHz         Synchronous Clock         External Clock         Rising Edge       Frequency:         Rising Edge       Frequency:         The external clock voltage level is the same as the port trigger level			
	Samolino       RAM Size       Compression Mode       Enable Mode         RAM Size:       2k       Compression data       Enable Setup         Channel number will be limited to 32       Compression data       Enable Setup         Apply       OK       Cancel       Help       Restore Defaults			

Clock source	Internal (asynchronous) clock	Toolbar icon 100Mi rmm Frequency is selectable from 18 frequency range. Range: 100Hz ~ 200MHz.
	External (synchronous) clock GND I I I I I CLK GND	The clock signal needs to be connected to the CLK input terminal. Range: 0.001Hz ~ 100MHz. Rising edge or falling edge is selectable.



To ensure accurate measurement, choose a sampling frequency at least four times that of the target signal.

Sampling RAM size Toolbar icon



Select the amount of waveform memory GLA captures in a single run. Note that large memory size slows down display update rate.				
RAM size	Channel	Compression	Enable mode	
2k bits	16/32	Yes	Yes	
16k bits	16/32	Yes	Yes	
32k bits	16/32	Yes	Yes	
64k bits	16/32	Yes	Yes	
128k bits	16/32	Yes	Yes	
256k bits	16 only	No	No	
(GLA-1016/1032)				
256k bits	32	Yes	Yes	
(GLA-1132)				
512k bits	32	Yes	Yes	
(GLA-1132 only)				
1M bits	32	Yes	Yes	
(GLA-1132 only)				
2M bits	16	No	No	
(GLA-1132 only)				



# Signal/Bus setup

## Add/Delete

Menu	B <u>u</u> s/Signal 🔔 🔀 Channels Setup			
lcon	<b>2</b>			
Context menu	Bus/Sienal Trieger -OT22ar Bus/Sienal Trieger -OT22ar Bus Sampling Setup A2 A3 A4 A4 A5 A5 A6 Format Row Rename Bus Ctrl+Click on the Bus/Signal list and select Channel Setup.			

### Dialogue window



Use the right side bar to scroll up or down. Port C and D are not available in GLA-1016.

Add Bus/Signal

Click the Add Bus/Signal button. A new signal named Newx (x stands for 0, 1, 2...) appears on top of A0.

Port			
Tr. Condition		$\mathbb{X}$	$\mathbb{X}$
En. Qualifier		$\mathbb{X}$	$\mathbb{X}$
A0	7	6	5
A1	7	6	5
		<u> </u>	-

Port			
Tr. Condition		$\mathbb{Z}$	$\mathbb{X}$
En. Qualifier		$\mathbb{Z}$	$\mathbb{X}$
Nem1	7	6	5
140 111	L ' .	0	
AO	7	6	5
A0 A1	, 7 7	6 6	5 5

Delete	Select the target signal/bus and click either:
Bus/Signal	Delete Bus/Signal – the selected single bus or signal. Or
Delete Bus/Signal	
Delete All	Delete All – all buses and signals.

Restore Default	Restores the default status	(all channels are active).
Restore Defaults		

# Group/Ungroup

Group signals into bus, or ungroup a bus into signals.

Menu	B <u>u</u> s/Signal <sub>→</sub> Group into Bus <sub>(group)</sub>
	$B_{us}/Signal \rightarrow Ungroup from Bus _(ungroup)$
Shortcut keys	Ctrl+G (group) Ctrl+U (ungroup)
Method1	Open the Channels setup dialogue window, select the grouped signals and press Ok. The following example shows that ChannelD0 ~ D3 are grouped into D0 bus.Channel Setup dialogueResult $\overline{\text{Port}}$ $\overline{\text{D}}$ $\overline{\text{Condition}}$ $\overline{\text{Port}}$ $\overline{\text{D}}$ $\overline{\text{C}}$ $\overline{\text{D}}$ $\overline{\text{C}}$ $\overline{\text{D}}$ $\overline{\text{D}}$ $\overline{\text{C}}$ $\overline{\text{D}}$ $\overline{\text{D}}$ $\overline{\text{C}}$ $\overline{\text{D}}$ $\overline{\text{D}}$ $\overline{\text{D}}$ <t< td=""></t<>
 Method2	In the main display, select the range of signals by pressing the Shift

Method2In the main display, select the range of signals by pressing the Shift<br/>key and clicking the signal names. Then choose Bus/Signal  $\rightarrow$ <br/>Group. A bus named Busx (x stands for 1, 2, 3...) is formed. To<br/>ungroup the bus, choose Ungroup from Bus menu.

Picking up the signal (D0 ~ D3)

Result



### Rename

Method1

Click the target signal in the display.



Click again on the target signal, OR

Select Rename from the menu,



Right-click and select Rename from the context menu.



Type in the new name and press Enter key to confirm.



Method 2 In the Channels setup dialogue window (page43), Click the target signal name, and type in the new name.

57		U	)
B5	7	6	Ę
B6	7	6	Ę
B7	7	6	Ę

## Hide/Show signals and buses

This function hides signals and buses from display but do not delete them. Show All function can reveal them. For deleting signals and buses, see page43.



A1

A2 A3 A2 A3

# **Trigger Setup**

	This chapter describes how to configure the triggering conditions.
Signal triggering	Set the condition individually
condition setup	Set conditions for multiple channels49Reset all trigger conditions50
Bus triggering	Operator (Trigger condition)52
condition setup	Reset all trigger conditions52
General triggering	Trigger level53
properties setup	Trigger Count54
	Trigger Page54
	Trigger position56
	Trigger delay56
Enable Trigger	Enable Qualifier58
function setup	Enable Period59
	Delay Start Point59
Trigger output signal	Trigger Output Signal61

# Signal Triggering Condition Setup

Trigger condition	Don't care	GLA captures all data regardless of its condition.				
	High	GLA triggers capturing the signal when the level is high.				
	Low	GLA triggers capturing the signal when the level is low.				
	Rising edge	GLA triggers capturing the signal when the level is changing from low to high.				
	Falling edge	GLA triggers capturing the signal when the level is changing from high to low.				
	Either edge	GLA triggers capturing the signal when the level is changing from one level to another, low to high or high to low.				

**Set the condition** The following method sets the trigger condition for each channel individually.

### Method1

Bus/Signal	Trigger
arren 🥖 🗚	
📥 🥢 🖌 🖌	

Select the target signal (A1 in this case) and:

Click the Trigger condition icon repeatedly

OR

Press the space bar repeatedly.

Method2

			T <u>r</u> igger	Run/ <u>S</u> top
			🗬 Bus	
			💞 Signa	l
			📲 Prope	erties
			🛛 Don't	Care
			🔚 High	
			🛄 Low	
			🖊 Rising	g Edge
Bus/Signal	Trigger		🔪 Fallin	g Edge
- A1	T X T		X Eithe	r Edge
A0 -		$\rightarrow$	Rese	t

Select the target signal (A1 in this case) and click the Trigger list, then select the trigger condition from the Trigger menu.

Set conditions for multiple channels This method sets the trigger condition for multiple channels at once.

Open the Trigger dialogue window.



Right-click on the Trigger list area and select Signal.

### Dialogue window

		7	6	5	4	3	2	1	0
Dowt 0	Enable Qualifier	$\otimes$	$\otimes$	$\boxtimes$	$\otimes$	$\otimes$	$\otimes$	$\otimes$	$\otimes$
Orth	Trigger Condition								
PortB	Enable Qualifier		$\boxtimes$						
	Trigger Condition								
<b>B</b> O	Enable Qualifier	$\otimes$	$\boxtimes$	$\boxtimes$	$\otimes$	$\otimes$	$\otimes$	$\boxtimes$	$\boxtimes$
ono	Trigger Condition								
Port D	Enable Qualifier	$\otimes$	$\boxtimes$	$\boxtimes$	$\boxtimes$	$\otimes$	$\boxtimes$	$\boxtimes$	$\boxtimes$
ortb	Trigger Condition								

Click the target signal repeatedly and select the appropriate trigger condition.

# Reset all trigger conditions

Resets all the channel trigger conditions to Don't care (default) state.

Choose Reset from the Trigger menu

T <u>r</u> igger	$\rightarrow$	Reset	OR
------------------	---------------	-------	----

Click the Reset button in Signal Trigger Setup dialogue.



<u>V</u>alue:

xxxx

○ <u>D</u>ecimal

Cancel

•

Ok.

# Bus Triggering Condition Setup

Bus Name:

Edit Base Mode

🖲 <u>B</u>inary

Bus1

Menu	T <u>rigg</u> er 🔔 👯 Bus
lcon	ψ <sup>™</sup> T
Context menu	Bus/Signal Bus/Signal A0 A1 A2 Bus
	Right-click on the Trigger list for the target bus (Bus1 in this case) and select Bus menu.
Dialogue window	Bus Trigger Setup

Operator:

C <u>H</u>exadecimal

==

Operator (Trigger condition)	==	GLA triggers capturing data when the entered value matches the real data.			
		Value:			
		Binary			
		Sets the value in binary mode: 0, 1, x (don't care).			
		Hexadecimal			
		Sets the value in Hexadecimal value: $0 \sim F$ .			
		Decimal			
		Sets the value in Decimal value: $0 \sim 9$ .			
	Don't care	GLA triggers capturing data regardless of the value.			
Reset all trigger conditions	Resets all the bus trigg Choose Reset from the	er conditions to Don't care (default) state. e Trigger menu.			
	T <u>r</u> igger <sub>→</sub> Res	set			

# General Triggering Properties Setup

This function sets the triggering properties applicable to all channels and buses.

Menu	T <u>r</u> igger _ <b>v</b> <sup>iii</sup> Properties			
lcon	+ <sup>(1)</sup>			
Context menu	Bus/Signal Bus1 A0 A1 A2 A3 Bus Properties			

Right-click on the Trigger list and select Properties menu.

Trigger Properties

Dialogue window

rigger Prope	erties					
Trigger Properties	Trigger Delay	1				
Trigger Level —			_			
Port A		1.5 0	n			
Port B CM	10S(5v) 🔻	2.5 (	n			
Port C EC	L 🔽	-1.3 (	n			
Port D Us	er Defin 💌	0	n			
Trigger Count –			_			
10	<b>•</b>					
(Min:1, Max:68	5535)					
		OK	Cancel	Defau	ilt Help	

Port C and Port D are not available for GLA-1016.

Trigger level	Set the triggering level for each port, $A \sim D$ .				
	Туре	Level			
	TTL	1.5V			
	CMOS (5V)	5V			
	CMOS (3.3V)	3.3V			
	ECL	-1.3V			
	User Defined	$-6 \sim 6 \mathrm{V}$			

Trigger Count	Toolbar icon	Count 1 💌					
	Sets the number of times GLA skips triggering condition. Setting is available in pull-down (1, 2, 3, 4, 5, 10, 15, 20) or direct entering.						
	Example						
	1 💌	GLA star triggering	GLA starts capturing data at the first triggering condition (default).				
	5 GLA trigg		GLA starts capturing data at the fifth triggering condition.				
	3861	You can directly type in any number, up to 65,535.					
Trigger Delay	Trigger Properties				×		
dialogue window	Trigger Properties Trigger De	alay					
	Trigger Page Trigger Page (Min:1, Max:8192) Trigger Position Trigger Position T Pos = Ons , Start Pos = Note: When more than one view.	-010.23ms , End P e trigger pages are	C Delay T Trigger D [10us (Min:10us Trigger D [1 (Min:1,Ma: Pos = 10.25ms selected, the trig	Time and Clock elay Time , Max:167.762s) elay Clock x:16776191) geer bar disappear	s from the		
		ОК	Cancel	Default	Help		

Select the Trigger Delay tab in the Trigger Properties dialogue.

### Trigger Page

Toolbar icon

Page This function sets the length of skipped waveform (in data memory blocks) after the triggering condition. Setting is available in pull-down (1, 2, 3, 4, 5, 10, 15) or direct entering.

1

Waveform data in a single page = Sampling RAM size (for RAM size setting, see page41)

### Maximum trigger page for different RAM size

RAM size	GLA-1016	GLA-1032	GLA-1132
2Kbit	8192	8192	8192
16Kbit	1024	1024	1024
32Kbit	512	512	512

# GWINSTEK

### Error! Style not defined.

64Kbit	256	256	256
128Kbit	128	128	128
256Kbit	128	128	64
512Kbit	N/A	N/A	32
1Mbit	N/A	N/A	16
2Mbit	N/A	N/A	16

### Trigger Page Example



GLA captures the data at the first triggering condition (default).



Sampled data = the first memory block



GLA captures the data at the third memory block after triggering condition occurs.



Sampled data = the third memory block



You can directly type in any number, up to the value shown below.



Trigger page disables Trigger delay/clock function (page56), vice versa.

Trigger position





Sets the amount of pre-triggering data that GLA captures, selectable from the pull-down menu.



- 0% means GLA starts capturing data right after the triggering condition (no pre-triggering data).
- 50% means half of the captured • data belongs to waveform prior to the triggering condition (default).
- 100% means all of the captured data belongs to waveform prior to the triggering condition.

Trigger delay 10 Toolbar icon Trigger Delay Delays the data capturing range in reference to the Trigger condition. Trigger The amount of delay can be set as Time... 100us (Min:10us, Max:167.762s) Or number of clocks. 10 Original range (Min:1,Max:16776191) Delay Revised range

Trigger delay disables Trigger page function (page54), vice versa. Trigger delay / Trigger page



# Enable Trigger Function Setup

Enable function lets GLA capture data portions only that match specified waveform condition – in other words, filters out unnecessary signal. The collected data portions are presented as a continuous stream of signal.



• When using the Compression mode (page42).

NOT available

Menu

Select Sampling Setup from the Bus/Signal menu. Click Enable Setup button in the dialogue window.



Dialogue window	Enable S	Setup								×
	Enable		7	6	5	4	3	2	1	0
	Port 0	Trigger Condition	$\otimes$	$\boxtimes$	$\otimes$	$\boxtimes$	$\otimes$	$\boxtimes$	$\otimes$	$\boxtimes$
	PortA	Enable Qualifier		-						
	DautD	Trigger Condition	$\otimes$	$\boxtimes$	$\otimes$	X		X	X	$\otimes$
	Fortb	Enable Qualifier								
	David C	Trigger Condition	$\boxtimes$	$\boxtimes$	$\otimes$	$\boxtimes$		$\boxtimes$	$\otimes$	$\boxtimes$
	Forto	Enable Qualifier								
	DautD	Trigger Condition	$\otimes$	X	$\otimes$	$\otimes$	X	X	X	$\boxtimes$
	PortD	Enable Qualifier								
	Enable Set Enable Enable C Acc	up le Delay Activation cording to Enable Qualif posite of Enable Qualifi	ïer er	Select Se	t Delay Si tart Edge ind Edge eriod+De	tart Point e elay		Delay Tin 10 (Min:10us (Max:655	ne: us :) .35ms)	
		ОК			ancel	R	estore De	efaults		Help

Enable Qualifier Click on the target channel icon and select the condition.



The signal level does not matter – always captured (default).



The signal level must be high.



The signal level must be low.

### Example

The following Enable condition means:

		7	6	5	4	3	2	1	0
PortA	Trigger Condition	$\otimes$							
	Enable Qualifier								

GLA captures signals only when Port A has the following condition. A0  $\sim$  A7: 01101101



The minimum distance, between each Enable qualified data block, is 2 clocks. Otherwise (if the distance is only one clock) GLA continues capturing data and do not delete unnecessary bits.

Enable Period	This options controls when GLA actually captures data, in reference to the Enable Qualifier condition set.				
	Check the Enable Delay radio button.				
	According to	GLA captures signals when input signals match the Enable Qualifier.			
	Opposite of	GLA captures signals when input signals DO NOT match the Enable Qualifier.			

**Delay Start Point** This function fine-tunes the length of captured waveform, in reference to the Enable Qualifier condition. Delay Time configures the length of time (user-defined). Three types of delay setting, Start Edge, End Edge, and Period+Delay are available.

### Example Enable Qualifier

A0 ~ A3 condition is set as follows. Enable Qualifier condition: 0001, Delay Time: 100us

3	2	1	0		
	$\otimes$	$\boxtimes$	$\otimes$	Delay Time:—	
				100	us

Start Edge

GLA starts recording (capturing) signals at the beginning of Enable Qualifier match, for the Delay Time duration.



End Edge

GLA starts recording (capturing) signals at the end of Enable Qualifier match, for the Delay Time duration.







When completed	When the Enable	e setting is comp	bleted, press OK (	(confirm) or
	Cancel button. R	estore Defaults o	disables all the qu	alifier settings.
	ОК	Cancel	Restore Defaults	Help

# Trigger Output Signal

GLA has three output signals which can be used for monitoring trigger condition.

GND Connector RO TO SO CLK GND Three signals, S\_O, T\_O, and R\_O, output high level (3.3V) under specific conditions. Outputs high level from when the Start key is Signal S\_O pressed, or the Run command becomes description (Start Out) active, until the end of data capturing. or F5 T\_O Outputs high level from when the trigger condition is met, until the end of data (Trigger Out) capturing. Outputs high level from when the data R\_O capturing has finished (GLA starts (Read Out) transferring data to PC) until the transfer is completed. Data capture-Diagram Start Trigger End Input-S\_0 ΤО R\_O Data transfer



GLA cannot capture the next data while R\_O is high (data transfer not completed yet).

# **Display Setup**

Toolbar setup	Toolbar Setup	63
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Waveform view	Signal display	67
setup	Enable/Disable grid	68
	Square/Sawtooth waveform	69
	Waveform timing display	69
Color setup	Background color	71
	Waveform (Foreground) color	72

# Toolbar Setup

Menu

Select Customize from the Tools menu. Click the Toolbars tab. Click the target toolbar to activate/deactivate it.



✓Run/Stop	
✓Sampling	
✓Trigger Content Set	
☑ Display Mode	
✓Windows	
Mouse Pattern	
✓Zoom	
✓Data	
Show Time/Height	
Iv∏Trigger Delav	

#### Context menu

Right-click on the blank space in the Toolbar. Click the target toolbar to activate/de-activate each group.

Count 1 🖵 —	
	Standard
Trigger Delay	Trigger
B - T = 7153 ▼	Run/Stop
· · ·	Sampling
	Trigger Content set
·····	Display mode
•	Windows
✓	Mouse pattern
	Zoom
✓	Data
✓	Show time/height
•	Trigger delay

# 

Toolbar list	Standard	
	Trigger	🗰 🏹 🎬 🐢 🐺 🕫 🔟
	Run/Stop	
	Sampling	₩ 16ł - ₩ 100KHz - ₩
	Trigger Content Set	👫 509 ▼ 📲 Page 1 ▼ Count 1 ▼
	Display Mode	
	Windows	
	Mouse Pattern	R 🕅 🖑 🛗
	Zoom	📓 🚢 62.74509 💌 💘
	Data	-  A¥ B¥ T¥ +¥ ∰ l♦ ♦∫ Bar Bar Bar Bar Bar
	Show Time/Height	😿 皆 💾 Height 🛛 18 💌
	Trigger Delay	Trigger Delay 1

# Horizontal/Vertical Scale Setup

## Horizontal unit

Sets the horizontal unit used in the Scale and Position bar.

Menu	<u>T</u> ools <sub>→</sub> Cus	<u>T</u> ools $\rightarrow$ Customize				
Dialogue Window	Customize ToolBars	Shortcut Key   a Data Mode Ime Mode	C Frequency Mode			
Icon & Display	Address mode (default)	Time mode	Frequency mode			
		٩				
	Scale:1.59375	Scale:15.938ns	Scale:62.745MHz			
	A - T = 15	A - T = 150ns	A - T = 6.667MHz			
Horizontal rule	er					
Sets the horizontal rule	er scale.					
Menu	<u>T</u> ools $\rightarrow$ Cus	tomize 🔔	Customize			
Dialogue Window	Ruler Mode C Regular Scale	Time/Address	s Scale			
Display	Regular Scale (d	efault)				

### Time/Address Scale



## Waveform height

Sets the signal/bus displayed height.

Menu	<u>T</u> ools $\rightarrow$ Customize $\rightarrow$ Customize
Toolbar icon	Height 18 💌
Dialogue Window	Bus/Signal Height
Range	18 (default) ~ 100 points
Display	<pre>18 points (default) 18 points (default) 30 points</pre>

# Signal Display Setup

## Signal display

Sets the viewing style for signals and buses.

- Waveform view puts each channel waveform horizontally.
- Listing view puts each channel vertically, in binary form.

Menu	🔀 Waveform Display Window 🔔 📰 Listing Display	
Toolbar icon	(Waveform view) (Listing view)	
Waveform view (default)	GWINSTEK Logic Analyzer - [LaDoc2.gla]             G' Elle Bus/Signal Trigger Run/Stop Data Tools Window Help             C          G          G	10ns 1667MHz   •
	Bus/Sienal       Trieser       -01530*       140 575ns       140 575ns       223 125ns       302 813ns       382 5ns         A1       A2       A3       A4       A	

### Listing view

_	-																																
Ĩ	GWINSTE	K Lo	gic	An	alyz	er	- [L	aDo	oc1	:2]																							
27	File Bus/S	Signa	T	rigg	er	Run	/Ste	ap	Dat	а	Tool	s '	Wind	low	He	alp																	
		l en e						- I- 5					_						_				_				-	_			_	_	1
	) 📂 🖬 🏐	- <b>1</b>	6 1		° 4	γŒ		5	> M			4 [2]	< 🔻	r   14	ыļл	<b>w</b> []	00M	•	m	•	🏘 🏳	U% •	-	🕅 Pa	sge	μ.		- (	Count	: 1		•	
1		a		. K	89			11	Ìns		-		-1	AK	B <u>-</u> 2 ]	Fi2 🛉	2					He	eight		18	<b>v</b>	Trie	zer	Delav				1
_				<u></u>				115	D'				Dar	Dwr	DAF E	our Di				2	150					_					100		_
	Scale: TUns								Disp	nay r	osun	s								Pos:-	Touns	°.  ▼.							- 1	1 - 1	= 100	ins	•
	Total:20.48us								Ing	ger P	os:Uns	5							в	Pos:1	50ns	•							E	3 - Т	= 150	Ins	•
		40	Δ1	Δ2	43	Δ4	45	46	Δ7	BO	B1	B2	B3	B4	85	B6	B7	C0	01	02	03	C4	05	C6	07	DO	D1	D2	D3	D4	D5	D6	D7
	Bus/Signal	HU I		<b></b>	no l		-0		<u> </u>	00	01	52	03	04	00	00	107	00		02	0.5	°4	~	00	<u> </u>	00		02		04	00	00	07
		1	1	1		1	1	1	1	1	1	1		•	1	1	1	1	1	1		1	•	1	1	1	1	1		1	•	1	1
							_		_		_	_		_	_			_		_			_		_			_			_	_	_
	-33	U U	U.	U U	I N	U.	U.	I N	U.	U U	U N	ų.	U.	N.	ų.	U U	U N	U.	U.	N.	U U	U U	N.	U.	U.	U.	U.	N.	U.	U.	U.	N.	U I
	-31	I N	I N	1 1	18	L N	L N	18	L N	1 1		L N	N.	N.	L N	1 1	1 1	L N	N.	Ň	1 11	N I	Ň	L N	N.	I N	L N	L N	l N I	Ц.	N I	Ш	N I
	-30	l ñ	ň	ň	I II	I II	ň	I II	I II	I II	I II I	I II	ň	ň	I II	I II	I II	i ii	ň	ň	I II	ň	ň	ň	ň	I II	ň	ň	i ii i	ň	ň	й.	n l
	-29	Ū	Ū	Ū	ΙŪ	Ū	Ū	ΙŪ	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū
	-28	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		U	U	U	U	U	U	U	U
	-27	U U	U.	U	I U	U.	U	I U	U.	U	U U	U.	U	U.	U.	U	U.	U.	U	U.	U	U	U.	U	U.	U.	U	U.	U.	U	U.	U.	U
	-20				18			18																				U.		U.		U.	
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	-22	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū		Ū	Ū	Ū	Ū		Ū	Ū	Ū
	-21	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
	-20	U 11	18	1 1	12	L N	U	12	L U .	1 1		U		U	U	1 1	1 11	U	U.,	U.	18.		U.	U	U	1 1	U	U .		U.		U.	<u> </u>
	-19		I N	I N	I N	I N	L N	I N	N N	I N		N N	N.	n n	N N	I N	I N	n n	I N	n n	I N	N.	n n	n n	I N	I N	H H	I N	N N	Ň	n n	ň	N I
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	-16	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū	Ū
A	-15	U U	U U	U	I U	U	U	I U	U	U	U 1	U	U.	U.	U	U	U U	U	U.	U.	U	U.	U.	U	U.	U	U	U	U 1	U	U.	U.	U
	-14	U U	U U.	I U	I U	U U .	U.	I U	U U	U U	וטו	U.	U.	U.	U.	U U	I U	U.	U.	U.	1 11	U U	U.	U.	U.	1 1	U.	U.	וטו	U.	U I	U.	U I
	-13		N N	L N			L N			L N			<b>N</b>	n n	N N	I N	N N	N.	L N	N.		N N	N.	N.	L N		N.	L N		U.		N.	U I
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	-9	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
	-8	U	U	U	U U	U	U	U U	U	U		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
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	-3	ŬŬ	Ŭ	Ŭ	Ιŭ	Ŭ	Ŭ	Ιŭ	Ŭ	Ŭ	ΤŭΙ	Ŭ	Ũ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ	Ũ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ	Ŭ	Ũ	Ũ	Ũ	Ũ	U
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		<b>III</b> U				- 0			- 0			- 0			- 0			- 0						-0					- 0 -				

## Enable/Disable grid

Show/hide the vertical gridline in the waveform area.

Menu	<u>T</u> ools $\rightarrow$ Customize $\rightarrow$ Cus	stomize
Dialogue Window	Correlated Setting ✓ Auto-Close ✓ Show Gridline ✓ Show Tooltip	

Display

### With grid (default)

		<b>•</b>	
1.7	92ms	1.956ms	2.119ms
1 I I		1 I I I I I I I I I I I I I I I I I I I	

### Without grid

							<b>-</b>						
		1.75	92ms		1.956ms					2.119ms			
1	1	1	1	1	1	1	1		1	1	1		
			$\times$		X								

## Square/Sawtooth waveform

Selects the waveform edge shape.

Menu			Square waveform
	Data → V	Nave Mode _	Sawtooth waveform
Context menu	Right-click on	a the waveform area a	and select Wave Mode.
	R Normal I Show all Dat IN Undo Last Z Show As Wave Mode Color	Esc ta F10 loom Ctrl+Z ↓ ✓ Squar Sawto	e Waveform oth Waveform
Display	Square wav	eform (default)	
		5	
	Sawtooth w	vaveform	
		5	
Waveform tin	ning display	y	

Shows/hides timing information inside waveforms.

Menu Tools 🚽 🐻 Show Time of Waveform

Toolbar icon



## Display

## Without timing information (default)



## With timing information

ļ		5 10										J.
	і I	1		і I	1	1		1	1	1	1	
2		4			4				4			
 2		4			4				4			
0.005												

# Color Setup

# Background color

Sets the waveform background color.

Menu	<u>T</u> ools $\rightarrow$ Customize $\rightarrow$ Customize
Dialogue Window	Color       ForeGround Color         Background Color       ForeGround Color         Image: After the background is altered, corresponding color automatic change contrast ratio .
Change color	Press the Background Color bar.       Background Color         BackGround Colors       Image: Colors Settings         Colors Settings       Image: Colors Settings         Wave BackGround:       Image: Color Settings         List BackGround Color1:       Image: Color Setting Seting Setting Setting Setting
Contrast with foreground	Check the radio if you want the foreground (waveform) color to be automatically adjusted, following the background color change.
Display	Black background (default)

### White background



## Waveform (Foreground) color

Sets the waveform color.

Menu	<u>T</u> ools $\rightarrow$ Customize $\rightarrow$ Customize
Dialogue window	Color Background Color ForeGround Color After the background is altered, corresponding color automatic change contrast ratio .

Context menu Right-click on the Bus/Signal list, Trigger list, or on the waveform, select Color menu. The target waveform color can be changed on the spot.

### Bus/Signal list



#### Waveform

Uns	50ns	100ns
	Find Data Value GoTo Place	Ctrl+F •
	<ul> <li>Enclose</li> <li>Hand</li> <li>Normal</li> </ul>	E H Esc
	<mark>∭ Show all Data</mark> ⊷ Undo Last Zoom	Ctrl+Z
	Show As Wave Mode	*
	Color	

Trigger list


Dialogue Window	Use the single arrow to change individual waveform color. Use the dual arrows to change all waveform colors at once.
	All Optional Items:     A0   A1   A2   A3   A4   A5   A7   B0   B1     Change   Quit
Restore default	When the changes become complicated, use the Restore button

Restore defa settings <u>Restore Defaults</u> in the Configure dialogue window.

# Signal Capturing

This chapter describes how to run/stop capturing signals.

## Single Run

Captures data for a single period.

Menu	Run/ <u>S</u> top _ ▶	Single Run
Toolbar icon	▶	
Shortcut key	F5	
Panel operation	Simm	Press the Start switch.
Capturing succeeded	Toolbar icon (go back to default)	Status bar (left bottom) End !!!
Capturing failed	Toolbar icon	Status bar (left bottom) Waiting.

### Continuous Run

Continuously captures data. Once the memory becomes full, GLA dumps the waveform data on the display, then restart capturing. This process is repeated until the Stop command (see next page) is issued.



Shortcut key	F6	
Capturing succeeding	Status bar (bottom left) keeps updating the amount of captured data in reference to the memory.	
Capturing failed	Status bar (bottom left) stays in the waiting mode. Waiting	
	Data is not captured while GLA is dumping stored waveform da on the display.	lta

## Stop Running

Stops capturing data.

Menu	Run/ <u>S</u> top <sub>→</sub> ■ Stop	
Toolbar icon		
Shortcut key	F7	
Capturing stopped	Toolbar icon (go back to default)	Status bar (left bottom) End !!!

# **Data Operation**

Once GLA captures the data, several operations become available. This chapter describes how to search, view, and analyze the captured data effectively.

Data bar	Activate data bar77					
operation	Add/Delete data bar78					
	Move data bar79					
Waveform	Waveform Position81					
position	Move the cursor up/down82					
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	Data Search Step83					
	Bus search step85					
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	Enclose (flexible ratio zoom)88					
	Show all data88					
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	Analysis step91					
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analysis	Analysis step95					
Waveform	Waveform Statistics97					
statistics	Statistics setup step97					

# Data Bar Operation

Data bar shows the signal position which can be used as a place marker. Using the data bar, you can measure relative time, frequency, and points between data.

## Activate data bar

Default state	Five data bars are available by default: From left, Ds (start range) A, T (trigger), B, and Dp (end range).							
	-TJUUS - ODDUS							
Unit	Data bar unit is selecta Press the toolbar icon	ble from address point, to select. For unit select	time, and frequency. ion details, see page65.					
	Address mode	Time mode	Frequency mode					
			<b>*</b>					
	A - T = 15	A - T = 150ns	A - T = 6.667MHz					
Position	The positions of the b shown on the toolbar. Click the arrow to	ars are A Pos:-19 B Pos:15 o select the displayed bar	5  ▼  ▼ 					
	<ul> <li>♦I I B Pos:-15 ▼</li> <li>B Pos:15 ▼</li> </ul>	nt 18 🔻 Trige	er Delay					
	5 T A B		OK Cancel					
Relative distance	The distance between also shown on the tool	each bar is $A - T = 1$ bar. $B - T = 1$	5   <b>▼</b> 5   <b>▼</b>					
		A = B = 3	30 🔫					

Click the arrow icon **v** to select the displayed distance.



## Add/Delete data bar

Add a bar	Menu	$\underline{D}$ ata $\_$ $\underset{Bar}{\overset{\bullet}{\overset{\bullet}}}$ Add Bar
	Toolbar icon	+ 2 Ba⊢
	Dialogue window	Add Bar       Setting         Setting       OK         Bar Name       C         Bar       Cancel         Bar Pos       0         You can specify the bar color and position.
Delete a bar	Menu	Data _ <mark>∎a</mark> Delete Bar…
	Toolbar icon	Bar
	Dialogue window	Delete Bar ×

Select the added bar and delete it.

Note: The default bars (T, A, B, Ds, Dp bar) cannot be deleted.

## G<sup>w</sup>INSTEK

### Move data bar

Move a bar manually	Toolbar icon	<"						
,	Move the bars manually using the mouse. Point the arrow close to the bar until it changes into Hand shape or double arrow. Move the bar right or left.							
	Note: The T bar posi	tion is fixed to the center.						
	Hand	Double arrow						

# Move a bar to the pointed location

You can move a bar to the exact location that you point in the display.

Right-click the location you want to move the bar, in the display. Select Place from the context menu.

0 -5 -5		5	
 🗰 Find Data Value	Ctrl+F		
Place	•	Place A	Ctrl+A
Bi Enclose	E H	Place Mo	re

The target bar (in this case, A bar) moves to the click location.

-	15					-10	2	<u>N</u>			-5					Ĵ					5			
1 T	L	1	1	1	1	1	1		- I -	1	1	1	1	1	1	1	1	1	1	1	I I.	1	1	1
	1										1													
	1																							
											-													

For moving bars other than A or B, select the option from the context menu.

Place More...

Note: The T bar position is fixed.

Move a bar to the Move the bars to the center position of the display instantly. display center

Menu





#### Context menu

Right-click on the display and select Go to.

-5		5	
📕 Find Data Valu	ue Ctrl+F		
GoTo	•	∎, Bar GoTo Trigger	Т
Place	•	👫 GoTo A Bar	A
🕅 Enclose	E	🛃 GoTo B Bar	в
🖤 Hand	Н	GoTo More	
	Find Data Valu GoTo Place Enclose	Find Data Value Ctrl+F GoTo Place Enclose Hand	→5 →5 →5 →5 →5 →5 →5 →5 →5 →5

Automatically adjust bar position to signal edge When this option is enabled, the bars automatically moves to signal edges when there are close.

☑ Show Tooltip

I	Menu	<u>T</u> ools	→ <sup>(</sup>	Customize	$\rightarrow$
		Custo	nize	]	
	Check the Auto-Close	radio.	Co	rrelated Setting Auto-Close	
				Show Gridlin	ne

# Waveform Position

Here we describe how to move the whole waveform display together.

Move the previous edge to	Search the previous data edge of the selected signal, move it to the display center.		
the center	Menu <u>D</u> ata _ l <b>4</b> Before		
	lcon	l <b></b> ♦	
	Shortcut key	F11	
Move the next edge to the	Search the next data edge of the selected signal, move it to the display center.		
center	Menu	Data _ ♦J After	
	lcon	14	
	Shortcut key	F12	
Move the display left-right manually	Move the display area left or right manually. The mouse arrow changes into Hand style, allowing direct manipulation of waveform positions.		
	Menu	Data 🔔 🖑 Hand	
	lcon	En	
	Shortcut key	Н	

Context menu

Right-click on the display area and select Hand.



### Move the cursor up/down



# Data Search

Search data in the waveform and move the data bars.

Menu	Data _ 👪 Fi	ind Data Valu	Je
lcon	<b>#</b>		
Shortcut key	Ctrl+F		
Context menu	Right-click on the disp	play and select Fin	d Data Value.
Dialogue window	Waveform-find Bus/Signal Name: A0 Find: Rising Edge Start At: © Beginning Of Data © Trigger © LastFound	MinPosition: MinPosition: MinPosition: Mhe C A Bar C B Bar C OtherBar C OtherBar	Previous Close MaxPosition: MaxPosition: Place A Bar Place B Bar Other Bar
Data Search Step	1. Select the signal.	Bus/S A0	ignal Name:
	2. Select the signal of	condition. Find: High Risin Fallin Eithe Low	g Edge ng Edge r Edge
	Rising Edge	Falling Edge	Either Edge

High	Low
3. Select the search s	start position.
Start At: C Beginning Of C Trigger C LastFound Address: 12	Data O A Bar O B Bar O OtherBar
Beginning	The beginning of the captured data.
Trigger	Where the trigger condition occurred.
Last Found	Where the last data search ended (available after at least one data search).
A Bar	A Bar position.
B Bar	B Bar position.
Other Bar	The bar other than A or B. Click <b>E</b> Toolbar icon for adding a new Bar. For more details, see page43.
4. Select which bar t when the target d found.	o place ata is O Place A Bar O Place B Bar O Other Bar C
5. Search the data. P or Previous, to sea forward or backw waveform.	Press Next arch ard in the <b>Previous</b>

Bus search step	1. Select the Bus.	Bus/Signal Name:
	2. Select the Bus	condition.
	Normal Bus	Find: == Not= In Range Not In Range
	I <sup>2</sup> C Bus	Start Stop Read Write Ack Nack Address Data
	3. Set the Bus value Enter the value into Minimum Maximum colu	lue range. MinPosition: e directly 0 and 0 umn. MaxPosition: 3
	==	Search the Bus condition where its value equals the MinPosition value.
	Not=	Search the Bus condition where its value is NOT equal to the MinPosition value.
	In Range	Search the Bus condition where its value is within the Min/Max Position range.
	Not In Range	Search the Bus condition where its value is outside the Min/Max Position range.
	4. Select the sear	ch start position.
	-Start At: C Beginning C Trigger C LastFound Address: 12	Of Data C A Bar C B Bar d C OtherBar

Beginning

The beginning of the captured data.

Trig	ger	Where the trigger condition occurred.	
Last Found		Where the last data search ended (available after at least one data search).	
ΑB	ar	A Bar position.	
ΒB	ar	B Bar position.	
Oth	er Bar	The bar other than A or B. Click Toolbar icon for adding a new Bar. For more details, see page78.	
5.	Select which ba when the target found.	r to place data is O Place A Bar O Place B Bar O Other Bar C  T	
6.	Search the data or Previous, to forward or back waveform.	. Click Next search sward in the Previous	
7.	To see the total data match, clic statistic button.	number of k the <b>Statistic</b> 67	

# Zoom In/Out

Zoom in	Menu	Data 🔔 🙀 Zoom In
	Toolbar icon	👗 100% 💌 🎇
	Shortcut key	F9
	Zoom ratio	x2
Zoom out	Menu	Data 🔔 🗯 Zoom Out
	Toolbar icon	👗 100% 🔽 🎇
	Shortcut key	F8
	Zoom ratio	÷2
Undo the last zoom	Menu	<u>D</u> ata <sub>→</sub> Undo Last Zoom
	Shortcut key	Ctrl+Z
	Context menu	B 15 20 2
	Right-click on the signal display and select Undo Last Zoom.	Image: Find Data Value Ctrl+F         GoTo         Place         Image: Find Data Value Ctrl+F         GoTo         Place         Image: Find Data         Image: Find Data <t< td=""></t<>

Color ...

Enclose (flexible ratio zoom)	Enclose function zooms t horizontal size. When sele cropping tool to select the	function zooms the selected area into full screen al size. When selected, the mouse arrow changes into a tool to select the zoom range.	
	Menu	Data 🔔 🔛 Enclose	
	lcon		
	Shortcut key	Е	
	Context menu Right-click on the signal display and select	Pis  20  21    Pis  Pind Data Value  Ctrl+F    GoTo  Place	
	Enclose.	Enclose     E       (*)     Hand     H       Image: Normal     Esc	
Show all data	Squeeze and show all the	captured data into a single screen.	
	Menu	Data _	
		📰 Show all Data	
	lcon		
	Context menu	B 15 20 25	
	Right-click on the signal display and select Show all Data.	Image: Find Data Value     Ctrl+F       GoTo     Image: Place       Image: Place     Image: Place       Image: Place	
		Show all Data ∽ Undo Last Zoom Ctrl+Z	

### Manual Display/Analysis Range Setting

You can set the display range manually, OR

You can limit the range of data for I2C (page90), or RS-232 (page94), or Waveform statistics (page97) analysis, to delete unnecessary chunk of data.



#### Example



# I<sup>2</sup>C Bus Analysis

Background	This function analyzes the widely popular I <sup>2</sup> C (Inter-Integrated Circuit) bus protocol by extracting the attributes from the captured data.				
	The bus consists of (Serial Clock Line).	The bus consists of two lines, SDA (Serial Data Line) and SCL (Serial Clock Line).			
	The Data consists of	The Data consists of the following elements.			
	Start condition	Indicates the beginning of communication.			
	↓ Address	7-bit device address, MSB first.			
	↓ R/W	Read or Write acknowledge bit.			
	↓ ACK	Acknowledgement bit. Confirms reception of the previous byte.			
	↓ Data	8-bit (one byte) data, MSB first. The combination of ACK and Data is repeated for the duration of the communication.			
	$\downarrow$ Stop condition	Indicates the end of communication.			
Menu	Tools _ 🖺 /	Analyze IIC Wave			
lcon	IIC				

Dialogue window SPECIAL BUS IIC SETUP		
Choose Channel Bus Name IIC DATA SDA A0 SCL A1		
	Bus Setting IIC Bus Text © Binary © Decimal © Hexadecimal Bus Color Data / Address Start Bit Read Bit Write Bit Ack/NoAck Stop Bit	
	Start Stop OK Cancel Default	
Analysis step	<ol> <li>Limit the analysis range if necessary. Select "Select Analytic Range" from the Data menu. Limit the analysis range by</li> <li>moving Ds and Dp bar . For details, see page89.</li> </ol>	
	<ol> <li>Enter the name of the new I<sup>2</sup>C Bus, created upon analysis</li> <li>Bus Name IIC DATA</li> </ol>	
	<ul> <li>3. Select the SDA (Serial Data Line) and SCL (Serial Clock Line) channel.</li> <li>SDA AO SCL A1 </li> </ul>	
	<ul> <li>4. Select how the I2C Bus value will be displayed: Binary, Decimal, or Hexadecimal.</li> <li>IIC Bus Text</li> <li>Binary O Decimal O Hexadecimal</li> </ul>	

5. Select the color of the new I<sup>2</sup>C analysis Bus. Click each bus element's color bar and select a new color from color chart.

15



6. Click the I2C Customize button

and open the Customize window.

Customize	×
Read / Write bit Active Read Bit Conditions Hi C Low Ack Bit	Data Area     OK       Contents     Address     Data       Name     ADDRESS     DATA       Number of Bit     7     8
Don't Stop Analysis When NACK happen     Ack Bit Conditions     Ack Bit = Hi     NoAck Bit = Low	Address left shift one bit then AND Read/Write bit

- Select the Read/Write bit activation and polarity. Click the Active radio button and activate or deactivate Read/Write bit.
- In active mode, click the Read Bit Conditions radio button and select the polarity. The Write Bit gets the opposite polarity.

-Read Bit Conditions -• Hi C Low

Read / Write bit-

Active

Select whether the NACK (Non-acknowledge) sign stops I<sup>2</sup>C analysis or not.



• Low

Ack Bit Conditions

O Hi

- Select the ACK bit polarity.
   NoACK bit gets the opposite polarity.
- 11. Enter the Data/Address display name and their bit length.



12. Address can be shifted one bit left and then ANDed with Read/Write bit.



13.	Press OK, Cancel, or	OK	
	Default.		
	Default contents:	Cancel	
	Read/Write active	Default	
	Read Bit High		
	Stop analysis upon NACK		
	Ack Bit Low		
	Address 7 bit/Data 8 bit		
	No Address shift		

14. Start/Stop I<sup>2</sup>C analysis.

Stop

A new I2C bus will be created with the result shown as configured.

Start

Bus/Signal	Trigger	101.5 132.75 164 195.25
/ New2 / New1 / New0		
		STOP X START X ADDRESS: 1E X
<ul> <li>SDA (New2)</li> <li>SCL (New1)</li> </ul>		

# **RS-232C Signal Analysis**

Background This function analyzes the RS-232C signal protocol by extracting the attributes from the captured data.

	8 <sup>,</sup> 8 8
Start bit	A single bit which indicates the beginning of data packet.
↓ Data	4 to 8 bits data contents.
↓ Parity bit	A single bit for detecting error: the number of 1s in the data, including parity bit, is always odd or even.
↓ Stop bit	A single bit which indicates the end of data packet.

RS-232C consists of a single line, including the following elements.

The other Baud Rate	elements include: The transmission speed: 300 ~ 115200 bit/s.
Direction	The data order: MSB or LSB first.

Menu 🔄 🔄 📅 Analyze UART Wave

lcon

Dialogue window	SPECIAL BUS UART SETUP
	Chose Channel     A0     Data Bit     8     Stop Bit     1       Buat Rate     9600     Parity Setup     none par     Data Direction     MSB->L5
	UART Bus Text C Binary C Decimal C ASCII
	Use the reverse data level to decoding
	Start Stop OK Cancel Default

Analysis step	1.	Limit the analysis range if necessary. Select "Select Analytic Range" from the Data menu. Move Ds and Dp bar and limit the range. For details, see page89.	
	2.	Select the signal channel.	AO
	3.	Select the Baud rate.	9600 💌
	4.	Select the Data Bit: 4 ~ 8.	Data Bit 8 4 5 6 7 <b>8</b>
	5.	Select the Stop Bit width: 1, 1.5, 2.	Stop Bit 1
	6.	Select the Parity: none, odd, even.	Parity Setup none party Bus Color odd parity Data Bit even parity
	7.	Select the Data direction: MSB first, or LSB first.	Data Direction MSB->LS MSB->LS LSB->MSB
	8.	Select how the data value is displayed in the analysis result: binary, decimal, hexadecimal, or ASCII text.	UART Bus Text O Binary O Decimal O Hexadecimal O ASCII

9. Select the color of the RS-232 analysis result. Click each element's color bar and select a new color from color chart.



10. If the reversed polarity data should be used, click the radio.



11. Start/Stop RS-232 analysis.

Start Stop

The result is displayed as configured.

157.308	Sus 265.308us	515.308us	765.308us	1.015ms
ST.	IART	DATA = 0X30		STOP

## Waveform Statistics

Ĩ.

The Statistics function shows the number of cycles included in the waveform. Cycle period and waveform range are configurable.

Toolbar icon

Dialogue		'he statisti	cs windo	w appears	s at the bo	ottom of	the displa	ay.
window	<b>x</b> []	Channel Option	Item Option	Condition Opt	ion Warning O	ption Refrest	n 🗖 Filter	
		CHANNEL	Integrated	Positive per	Negative p	Eligible inte	Eligible posi	Eligible neg
	- 10	AO	3	3	3	0	0	0
	- 10	A1	3	3	3	0	0	0
	- 10	A2	0	0	1	0	0	0
	- 111	A3	0	0	1	0	0	0
	- 10	A4	0	0	1	0	0	0



 Select the target channel if necessary. Press the Channel Option button. The option window opens. Check or uncheck the signals.

#### Channel Option

		_	_		_				_
Channe	el Or	btior							X
									_
	7	6	5	4	З	2	1	0	
Port A	<b>v</b>	•	•	•	ঘ	ন	ন	⊽	
Port B	•	•	•	•	•	•	₹	⊽	
Port C	~	•	•	•		•	•	~	
Port D	•	•	•	•	Ы	•	◄	⊽	
Select	tall	Cle	ar all		OK		Car	ncel	

4. Select the included item. Press the Item Option button. The Item selection window appears. Check (uncheck) items to be included (excluded) in the statistics window.

#### Item Option



Probe	The probe name for each signal.
Integrated periodicities	The number of full cycles included in the waveform.
Positive periodicities	The number of positive cycles included in the waveform.
Negative periodicities	The number of negative cycles included in the waveform.
Eligible integrated periodicities	The number of full cycles included in the waveform, which meet the conditions (see below).
Eligible positive periodicities	The number of full cycles included in the waveform, which meet the conditions (see below).
Eligible negative periodicities	The number of full cycles included in the waveform, which meet the conditions (see below).

5. Set the cycle period condition, if necessary. Press the Condition Option button. The conditions window opens. Make sure the radio is checked.

#### Condition Option

Conditions Option	×
Eligible integrated periodicities	
20us <= Time <= 20us	
Eligible positive periodicities	
10us <= Time <= 10us	
Eligible negative periodicities	
10us <= Time <= 10us	
OK Cano	:el

		Start conditions setting
Eliş per	gible integrated riodicities	Full cycle period, in ns/us/ms/s. GLA counts the number of full cycle that has the same period.
Eliş per	gible positive riodicities	Positive cycle period, in ns/us/ms/s. GLA counts the number of positive cycle that has the same period.
Eliş per	gible negative riodicities	Negative cycle period, in ns/us/ms/s. GLA counts the number of negative cycle that has the same period.
6.	Check the Filter radio to filter out incomplete data.	Filter
7.	Press the Refresh button. The statistics windows updates the result.	Refresh

# **System Setting**

# Keyboard Shortcut Setup

Shows the model name and software version. The default setting can be viewed from the setup dialogue window, or from Help menu  $\rightarrow$  Keyboard Map, or this user manual page16.

Menu	Tools _ Customize Shortcut Key
Dialogue Window	Customize       ToolBars       Shortcut Key         Commands:       Current Keys:         Down       Alt+B       Assign         End       Esc       F3         Find Data Value       F3       Remove         Find Data Value       Reset All         Currently affected to :       Select New Shortcut Key:         Description:       Delete Bar         Bar       Delete Bar

Click inside the New Shortcut key window and press the keys.

Select New Shortcut Ctrl+Shift+B	Key:
Click the Assign button.	Assign
Current Keys:	
Alt+A Ctrl+Shift+B	

The new shortcut is added to the list.

Assign a new

shortcut

Remove a shortcut	Select the target shortcut key inside the Current Keys window. Current Keys: Alt+A Ctrl+Shift+B
	Click the Remove button. Remove The shortcut gets deleted. Current Keys:
Restore default	Report All
	Click the Reset All button.

All shortcut keys settings goes back to the default state.

# System Information

## Version Information

Shows the model name and software version.

Menu	Help 🔄 💡 About GWINSTEK Logic Analyzer	
Dialogue Window	About Logic Analyzer G凹INSTEK 固線電子算業股份有限公司 Control INSTRUMENTED, ID	×
	GLA-1032 Software Version : V2.01 Logo (C) Good Will Instrument Co., Ltd. All right reserved.	

## Automatic Software Update

GLA checks the software update at power up, then automatically installs the applicable files.

Menu

Check On/Off the Update radio button.





GLA checks the update information by accessing the server on the web. When there is no internet connection, a warning message will be generated.

# **Help Information**

## Main Help

Opens the main Help file, which includes this manual contents.

Menu	$\underline{H}elp \ \_ \ GWINSTEK \ Logic \ Analyzer \ Help$
Shortcut key	F1
Keyboard Shor	cut
Opens the keyboard she	ortcut file.
Menu	<u>H</u> elp <sub>→</sub> Keyboard Map
Tooltip	
Shows/hides popup wit toolbar icons and wave	dow for showing brief descriptions when the mouse scrolls over orms.
Menu	Check On/Off the Show Tooltip radio button.
	Tools $\_$ Customize $\_$ Customize
Dialogue window	Correlated Setting ✓ Auto-Close ✓ Show Gridline ✓ Show Tooltip

### Example

Toolbar (I <sup>2</sup> C setup)	Waveform
Beight 18 50ns <del>-</del>	Uns 50ns
In special bus IIC setup	
special bus IIC setup	A0 = 0 A0[Time] = 20ns



The tooltip on the status bar (the bottom left side of the display) is always On.

# FAQ

The USB is slow, though the PC is USB 2.0 compatible.

Make sure the cable is compatible with 2.0 high speed (use the attached one).

#### The message "Hardware connection failed" pops up.

Make sure GLA is powered up and pressing the Retry button.

Disconnect/reconnect USB cable.

Do not use extension cable for USB. Make sure GLA and PC are connected by a single USB cable.

#### GLA does not capture signal, or the result is inaccurate.

Check all signal connections, including the ground terminal, are secure. Use both 2 GND cables for stable ground connection. Make the distance between GLA and device under test as short as possible.

The sampling rate has to be more than four times that of the signal frequency.

Regarding trigger: Make sure the trigger threshold matches the signal settings. Trigger counter and trigger page should not be too large.

If the external clock is used, the clock rate might be too low, especially if the internal clock captures signals.

#### A large portion of the input signal is irrelevant and consumes memory.

Use the Enable function to set a specific signal condition that triggers data capturing. In this way, you will not waste too much memory for irrelevant data. See page57 for details.

#### A large amount of data (more than 32Mbit) is required.

Use the Data compression feature. It uses lossless compression technique so there will be no data loss. See page42 for details.

Trigger condition does not occur.

Make sure trigger threshold matches signal setting. If the trigger condition is too complex, simplify the setting to make it easier for data capturing.

Sampling frequency of the input signal is very low.

Try using the external clock so that the acquiring period is extended. Here is the frequency range for internal and external clock.

Internal: 100Hz ~ 200MHz External: 0.001Hz ~ 150MHz

If there is still a problem, please contact your local dealer or GWInstek at <a href="http://www.gwinstek.com.tw">www.gwinstek.com.tw</a> / marketing@goodwill.com.tw.

# Specification

The specifications apply under the following conditions: GLA is powered on for at least 30 minutes, within  $+20^{\circ}C^{+}+30^{\circ}C$ .

		GLA-1016	GLA-1032	GLA-1132
Channels		16	32	32
Memory Total/Per Channel		4Mbits/ 256kbits	4Mbits/ 128kbits	32Mbits/ 1Mbits
Interface		USB 2.0(1.1)		
Operating System		Win98/ 98SE /Me /2000 /XP		
Time Analysis		Maximum 200MHz		
State Analysis	vsis 0.001Hz ~ 100MHz			z
Trigger	Channel	16	32	32
	Condition	Edge/Pattern		
	Pre/Post trigger	0% ~ 100%		
	Level	1		
	Threshold	+6V ~ -6V		
	Accuracy	±93mV		
	Count	1 ~ 65535		
	Page	Maximum 8191		
Input	Maximum Input Voltage	±30V		
	Impedance		500k <b>Ω</b> /10pF	

## Specification (cont.)

The specifications apply under the following conditions: GLA is powered on for at least 30 minutes, within  $+20^{\circ}C^{+}+30^{\circ}C$ .

		GLA-1016	GLA-1032	GLA-1132	
Enable	Channel	16	32	32	
	Enable Condition	Don't care, Low, High			
	Enable Delay	1 ~ 65535ms			
Data	Skew	<1.5ns			
	Compression Channels	16	24	24	
	Compression Ratio	Maximum 255			
	Signal	Positive/ Negative,			
	Statistics	Full cycle within length condition			
	Protocol Analyzer	I2C, RS-232C			
Current	Static	Maximum 200mA			
Consumption	Working	Maximum 400mA			
Power	Static	Maximum 1W			
dissipation	Working	Maximum 2W			
Power	Interface	USB			
	Working voltage	4.5V ~ 5.5V			
Temperature	Operating	0°C ~ 50°C			
•	Storage	-40°C ~ 80°C			
Dimension		102D × 39H × 137W(mm)			
Weight		Approx. 340g			
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