GL500A

midi LOGGER dual

USER'S MANUAL
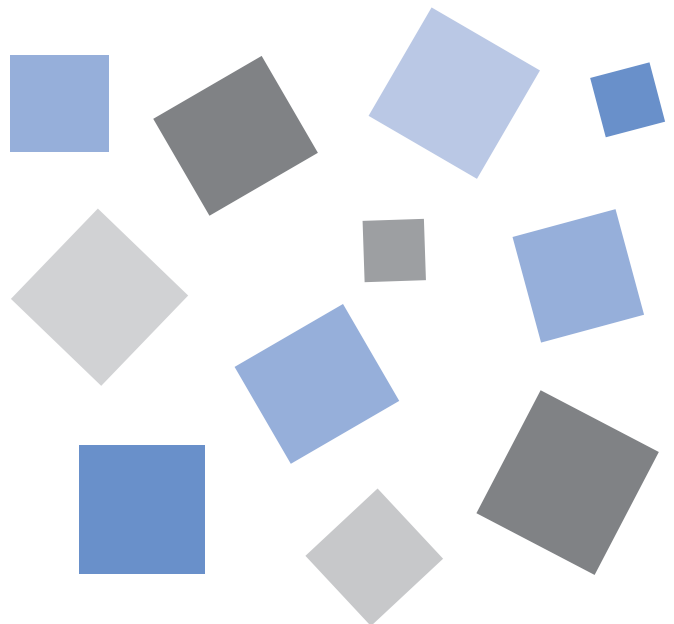
GRAPHTEC

Introduction

Thank you for purchasing the GL500 midi LOGGER dual.
Please read this manual thoroughly before attempting to use your new product to ensure that you use it correctly and to its full potential.

Notes on Use

Be sure to read all of the following notes before attempting to use the GL500 midi LOGGER dual.

1. Note on the CE Marking

The GL500 complies with the EN61326 (1997+A1:1998+A2:2001 Class A) standard based on the EMC directive (89/336/EMC). It also conforms to the EN61010-1 (1993/A2:1995) standard based on the LV directive (72/73/EEC). The AC adapter complies with the EN60950 safety standard.
Although the GL500 complies with the above-mentioned standards, be sure to use it correctly in accordance with the instructions and notes provided in its User's Manual.
Moreover, use of the GL500 by incorrect procedures may result in damage to the GL500 or may invalidate its safeguards. Please confirm all of its notes regarding use and other related information to ensure correct use.

2. Warning

This is a Class A product according to the EMC directive.
In a domestic environment, this product may cause radio interference or may be affected by radio interference to the extent that proper measurement cannot be performed.

3. Notes for Safe Operation

(1) Be sure to use the Graphtec-supplied AC adapter. In environments where there is a lot of noise or where the power supply is unstable, we recommend that you ground the GL500.

(2) When a high-voltage signal cable has been connected to the main unit's analog signal input terminal, avoid touching the leads of the input terminal's signal cable to prevent electrical shock due to high voltage.

(3) Ensure that the GL500's power source is positioned so that it can easily be disconnected.

4. Notes on Functions and Performance

(1) Be sure to connect the main unit to an AC or DC power supply that conforms to the rated range. Connection to a non-rated power supply may cause the main unit to overheat and break down.

(2) Do not block the vents on the main unit.
Continued operation with the vents blocked may cause the main unit to overheat and break down.

(3) To avoid malfunctions and other damage, avoid using the GL500 in the following locations.

- Places exposed to high temperature and/or high humidity, such as in direct sunlight or near heating equipment. (Operating range - Temperature: 0 to 40°C, Humidity: 30 to 80% RH)
- Locations subject to excessive salt spray or heavy fumes from corrosive gas or solvents.
- Excessively dusty locations.
- Locations subject to strong vibrations or shock.
- Locations subject to surge voltages and/or electromagnetic interference.

(4) If the main unit becomes soiled, wipe it off using a soft, dry cloth. Use of organic solvents (such as thinner or benzene) causes deterioration and discoloration of the outer casing.

(5) Do not use the GL500 in the vicinity of other devices which are susceptible to electromagnetic interference.

(6) Measured results may not conform to the stated specifications if the GL500 is used in an environment which is subject to strong electromagnetic interference.

(7) Insofar as possible, position the GL500 input signal cables away from any other cables which are likely to be affected by electromagnetic interference.

(8) For stabilized measurement, allow the GL500 to warm up for at least 30 minutes after turning it on.

To Ensure Safe and Correct Use

- To ensure safe and correct use of the GL500, read this Manual thoroughly before use.

- After having read this Manual, keep it in a handy location for quick reference as needed.

- Do not permit small children to touch the GL500.

- The following describes important points for safe operation. Please be sure to observe them strictly.

Conventions Used in This Manual

To promote safe and accurate use of the GL500 as well as to prevent human injury and property damage, safety precautions provided in this manual are ranked into the five categories described below. Be sure you understand the difference between each of the categories.

DANGER
This category provides information that, if ignored, is highly likely to cause fatal or serious injury to the operator.

WARNING
This category provides information that, if ignored, is likely to cause fatal or serious injury to the operator.

CAUTION
This category provides information that, if ignored, could cause physical damage to the GL500.

HIGH TEMPERATURE
This category provides information that, if ignored, is likely to cause burns or other injury to the operator due to contact with high temperature.

ELECTRICAL SHOCK
This category provides information that, if ignored, is likely to expose the operator to electrical shock.

Description of Safety Symbols

The ⚠ symbol indicates information that requires careful attention (which includes warnings). The point requiring attention is described by an illustration or text within or next to the ⚠ symbol.

The ⃠ symbol indicates action that is prohibited. Such prohibited action is described by an illustration or text within or next to the ⃠ symbol.

The ❗ symbol indicates action that must be performed. Such imperative action is described by an illustration or text within or next to the ❗ symbol.

Safety Precautions

⚠ WARNING

Be sure to securely connect the GL500's power cable.

- After checking that the Power switch is turned off, connect the power cable's female plug to the GL500 and then connect its male plug into the electrical socket.
- Use of the GL500 without the power cable securely plugged into the electrical socket may result in electrical shock due to current leakage.
- Before running the GL500 using a DC power supply, be sure to ground the protective ground terminal (⏚) to avoid electrical shock and fire hazards. For grounding, use a ground wire with a diameter of at least 0.75 mm^2. When using the GL500 in an environment where grounding is not possible, ensure that the voltage to be measured is no greater than 50 V (DC or rms).

Securely connect the power cable
Make sure that the socket has a good protective ground

If the GL500 generates smoke, is too hot, emits a strange odor, or otherwise functions abnormally, turn off its power and unplug its power cable from the electrical socket.

- Use of the GL500 in such status may result in a fire hazard or electrical shock.
- After checking that smoke is no longer being generated, contact your sales representative or nearest Graphtec vendor to request repair.
- Never try to perform repair yourself. Repair work by inexperienced personnel is extremely dangerous.
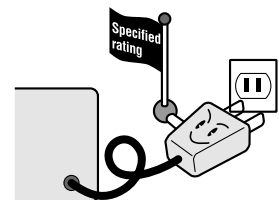
Amateur repair prohibited
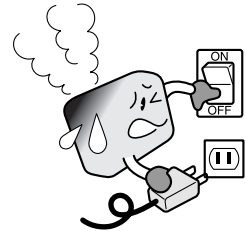
Before turning on the GL500, ensure that the electric socket's supply voltage conforms to the GL500's power rating.

- Use of a different supply voltage may cause damage to the GL500 or a fire hazard due to electrical shock or current leakage.

Use of a different supply voltage prohibited

Never disassemble or remodel the GL500.

- Such action may cause a fire hazard due to electric shock or current leakage.
- Contact with a high-voltage component inside the GL500 may cause electric shock.
- If repair is required, contact your sales representative or nearest Graphtec vendor.

No disassembly

Avoid using the GL500 in extremely dusty or humid places.

- Such use may cause a fire hazard due to electrical shock or current leakage.

Use prohibited

Watch out for electrical shock
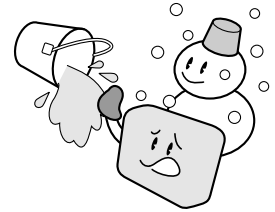
Safety Precautions

⚠ WARNING

Avoid using the GL500 in places where it may be exposed to water such as bathrooms, locations exposed to wind and rain, and so on.

Avoid water

Watch out for electrical shock

Prevent dust or metallic matter from adhering to the power supply connector.
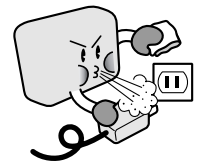
• Adhesion of foreign matter may cause a fire hazard due to electrical shock or current leakage.

No foreign matter

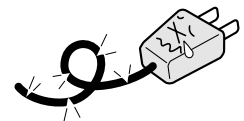Watch out for electrical shock

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Never use a damaged power cable.

• Use of a damaged cable may result in a fire hazard due to electrical shock.
• If the cable becomes damaged, order a new one to replace it.

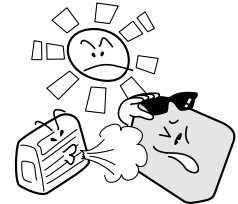Unplug the power cable from the socket

Safety Precautions

⚠ CAUTION

Do not use or store the GL500 in a location exposed to direct sunlight or the direct draft of an air conditioner or heater.

- Such location may impair the GL500's performance.

Storage/Use prohibited

Do not place coffee cups or other receptacles containing fluid on the GL500.

- Fluid spilling inside the GL500 may cause a fire hazard due to electrical shock or current leakage.

Avoid fluids
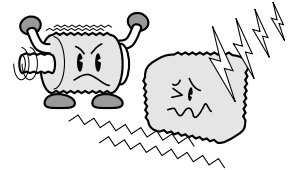
Watch out for electrical shock

Do not use the GL500 in a location subject to excessive mechanical vibration or electrical noise.

- Such location may impair the GL500's performance.

Use prohibited

To insert or disconnect the power cable or a signal input cable, grasp the power cable's plug or the signal input cable's connector.

- Pulling the cable itself damages the cable, resulting in a fire hazard or electrical shock.

No pulling
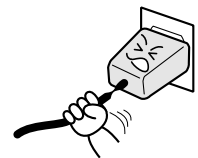
If fluid or foreign matters enters inside the GL500, turn off the Power switch and disconnect the power cable from the electrical socket.

- Use in such status may cause a fire hazard due to electrical shock or current leakage.
- Contact your sales representative or nearest Graphtec vendor to request repair.

Unplug the power cable from the socket
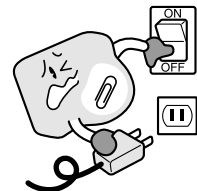
Do not input a voltage that exceeds the permissible input voltage range that is specified on the GL500's label.

- Exceeding the specified voltage input range may cause electrical shock or a fire hazard.

Use prohibited

Safety Precautions

⚠ CAUTION

Do not attempt to lubricate the GL500's mechanisms.

- Such action may cause the GL500 to break down.

🚫

No lubrication
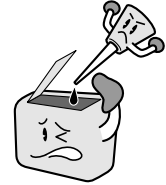
Never clean the GL500 using a volatile solvent (such as thinner or benzene).

- Such action may impair the GL500's performance.
- Clean off any soiled areas using a soft dry cloth.

⚠

No volatile solvents

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1   General Description

2   Checks and Preparation

3   Settings and Measurement

4   Software

5 Specifications

CHAPTER *1*

General Description

This chapter provides a general description of the GL500 and its features.

1.1   Overview

The GL500 is capable of faithful measurement of sudden events, both low- and high-speed, while simultaneously performing data capture or long-term measurement. It is a compact, lightweight data logger that comes equipped with a large color display monitor and built-in memory, and can be connected to a PC via a USB or LAN cable to enable on-line settings, measurement, and data capture.

1.2 Features

A5-size Device Capable of Handling Mixed-signal Isolated and Non-isolated Inputs

The compact A5-size body enables easy portability. Three types of input terminal units are provided: an isolated voltage input terminal unit, an isolated voltage/temperature input terminal unit, and a non-isolated voltage/temperature input terminal unit. Select one unit or a combination of units to suit your measurement application. The units can be easily installed and removed using a one-touch operation, and they can be combined to increase the number of channels up to a maximum of 16. In addition, the multifunction input capability enables the handling of both logic and pulse signals. An alarm output function is also provided.

Note: Please consult your sales representative or nearest Graphtec vendor for more information on combining and increasing the number of input terminal units.
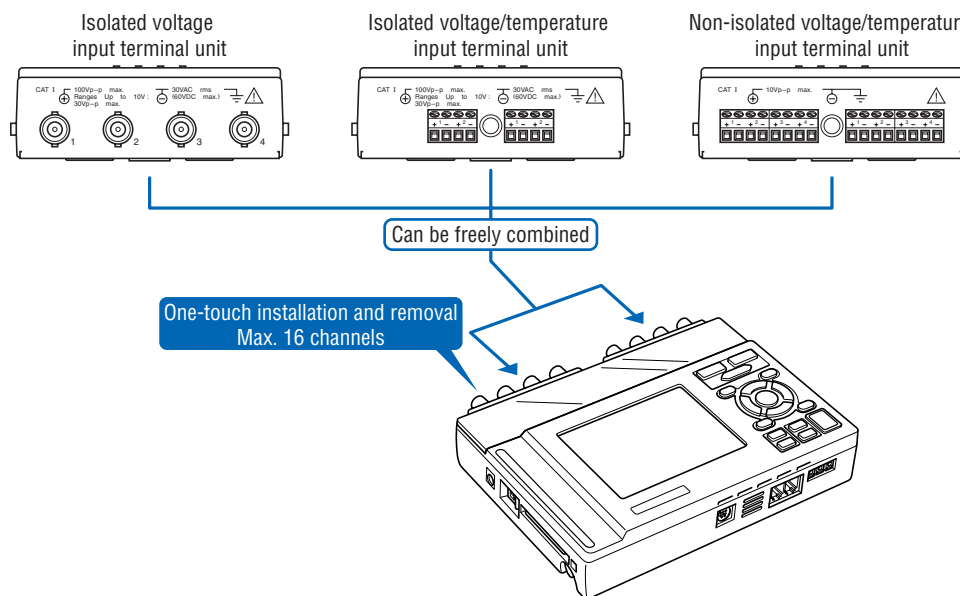
Dual High-speed and Low-speed Sampling

If an unexpected event occurs during measurement at low-speed sampling (max. 1 ms), that part of the data can be measured at high-speed sampling (max. 2µs) at a high definition. 4 MB of memory are provided for current data, and 32 MB for event data. In addition, since a PCMCIA card slot is also built in, large volumes of data can be captured to these memory storage devices.

- Low-speed sampling data : current data
- High-speed sampling data : event data
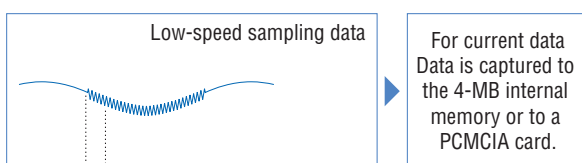
Low-speed sampling data capture times

		1ms	100ms	10s
Data capture conditions	4-MB internal memory	Approx. 3 minutes	Approx. 5 hours	Approx. 23 days
	64-MB PCMCIA card	Approx. 53 minutes	Approx. 3 days	Approx. 370 days

High-speed sampling data capture times

	2µs	5µs	10µs	20µs	1ms
When limited to 1 ch	Approx. 6.4 seconds	Approx. 16 seconds	Approx. 32 seconds	Approx. 1 minute	Approx. 53 minutes
When limited to 2 ch		Approx. 13 seconds	Approx. 26 seconds	Approx. 53 seconds	Approx. 44 minutes
When limited to 4 ch			Approx. 20 seconds	Approx. 40 seconds	Approx. 33 minutes
When limited to 8 ch				Approx. 26 seconds	Approx. 22 minutes

USB Drive Mode

The USB drive function allows a PC to recognize a PC card inserted into the GL500 as an external drive. The USB drive mode function is enabled by connecting the GL500 to a PC,and then pressing the START key to turn on the GL500.

Dedicated Pursuit of Ease of Use

Cursor keys have been used to enable user-friendly operation using only the fingertips, in the same way as a mobile phone is used. Even first-time users can easily follow the step-by-step setting menus to perform setups and check measurement data on the easy-to-read data displays. Event data that occurred during measurement can be reviewed together with the current data on dual stacked screens. Moreover, since the application software screens are similar in appearance to those of the GL500 screens, they can be used intuitively, in the same manner. Waveform and digital data screens can be displayed at the same time.
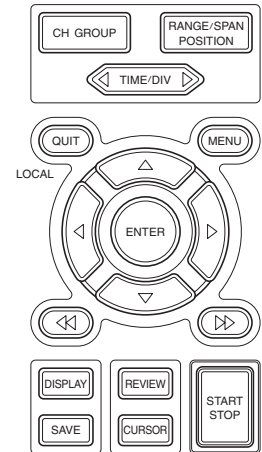
• **Cursor Keys Used for Effortless Operation**
  Operation similar to that of a mobile phone has been realized.
  User-friendly operation using just the fingertips

• **Worry-free Battery Charging during Normal Use**
  Battery charging can be performed even during measurement. In the same way as with a notebook computer, the battery drive can be used whenever you like, making this a convenient function when you want to use the device quickly for measurement outdoors.
  The time required for charging depends on the temperature. Charging is performed after the temperature has been monitored. Depending on the length of continuous use, there may be times when the internal temperature rises and battery charging stops. After the power supply is turned off and the internal temperature drops, battery charging is restarted.

Simple, High-speed Connection to a PC

The built-in USB 2.0 interface enables easy connection to a personal computer. Data can be easily transferred at a high-speed 1-ms rate. Moreover, remote measurement via the LAN connection and data transfer using a PCMCIA card are also enabled.
Simple setups and easy-to-read data displays facilitate computer operation, and current data can be displayed in real time up to the maximum 1-ms sampling speed. Moreover, the application software enables unexpected events that occur during measurement to be captured as event data. The event data that you want to check can be displayed together with the current data on dual stacked screens.
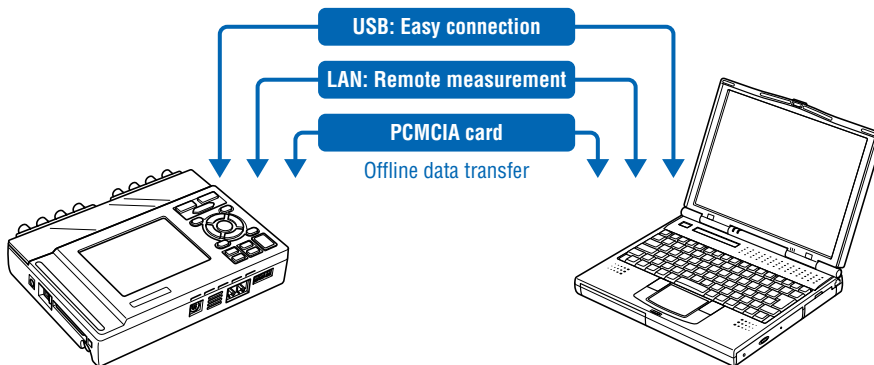
1.3 Operating Environment

This section explains the operating environment for the GL500.

Ambient Operating Conditions

(1) Ambient temperature and humidity (the GL500 must be operated within the following ranges.)
  - Temperature range: 0 to 40°C (15 to 30°C when using the battery)
  - Humidity range: 30 to 80% RH

(2) Environment (do not use in the following locations.)
  - Locations in direct sunlight or with high humidity, such as near heaters
  - Locations exposed to salty air, corrosive gases, or organic solvents
  - Dusty locations
  - Locations subject to vibration or impact
  - Locations subject to voltage surge or electromagnetic interference such as lightning or electric furnaces

(3) Installation category (over-voltage category)
  - The GL500 conforms to the IEC664 installation category I.

CHECKPOINT

If condensation occurs...
Condensation occurs in the form of water droplets on the device surfaces and interior when the GL500 is moved from a cold to a warm location. Using the GL500 with condensation present will cause malfunctioning. Wait until the condensation has disappeared before turning on the power.

Warming-up Before Use

The GL500 should be allowed to warm up with the power turned on for approximately 30 minutes to ensure that it operates according to the specified performance.

Configuration When in Use

Do not use the GL500 standing upright or at an angle. It must always be laid flat.
Usage Configuration: Flat
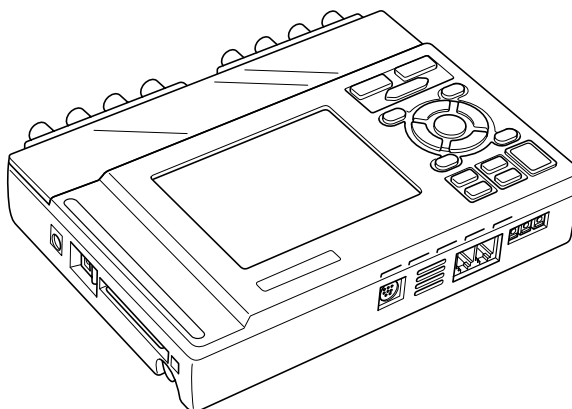
⚠ CAUTION

Do not block the air vents on the GL500, as this will cause malfunctioning.

1.4   Notes on Temperature Measurement

Please observe the following precautions when performing temperature measurement.

(1)   Do not block the air vents. Always provide a space of at least 30 cm on all sides of the GL500.

(2)   For stabilized temperature measurement, allow the GL500 to warm up for at least 30 minutes after turning it on.

(3)   Exposure of the input terminals to direct drafts, direct sunlight, or abrupt changes in temperature may impair the equilibrium of the input parts and result in measurement errors. To measure temperature in such an environment, take appropriate countermeasures such as changing the installation site of the GL500.

1.5   Notes on Using the Monitor

The monitor is an LCD display unit, and so the display will vary depending on the operating environment.

CHECKPOINT

If the screen saver function is used, it will operate and clear the screen if no operations are performed during the preset time. If the screen saver operates, press any key to restore the display.

⚠ CAUTION

- Condensation may form on the LCD screen if the GL500 is moved from a cold to a warm location. If this occurs, wait until the LCD screen warms up to room temperature.
- The LCD screen is manufactured to extremely high precision. Black dots may appear, or red, blue, and green dots may not disappear. Likewise, streaks may appear when viewed from certain angles. These phenomena are due to the LCD screen construction, and are not signs of a fault.

1.6   Changing the Display Language

You can choose English, French, or Japanese as the language displayed on the screen. The default display language is set to English (US) when the GL500 is shipped overseas. To change the display language, perform the (Language) settings described on page 3-25.

CHAPTER *2*

Checks and Preparation

This chapter explains how to check the GL500's external casing and accessories, and how to prepare the GL500 for operation.

2.1   Checking the Outer Casing

After unpacking, check the GL500's outer casing before use. In particular, please check for the following:

• Surface scratches
• Other flaws such as stains or dirt

2.2   Checking the Accessories

After unpacking, check that the following standard accessories are included. The accessories included will differ depending on the model purchased.

Standard Accessories

Item	Remarks	Quantity
Quick Start Guide	GL500-UM-851	1
CD-ROM	User's Manual, Application software	1
LCD protector	For protecting the LCD surface	1
AC cable/AC adapter	100 to 240 VAC, 50/60 Hz	1
Core	Must be attached when the GL500 is used in the EU region	1
Screwdriver for input terminal unit	Fits inside the main unit	1

Optional Accessories

Item	Option No.	Remarks
4VF input terminal unit	4VF	Input terminals for 4 channels (can be mounted in the main unit)
4MF input terminal unit	4MF	Input terminals for 4 channels (can be mounted in the main unit)
8MS input terminal unit	8MS	Input terminals for 8 channels (can be mounted in the main unit)
Battery pack	B-517	
Logic/alarm cable	B-513	Bare tips (2-m length)
DC drive cable	B-514	Bare tips (2-m length)
BNC-BNC cable	RIC-112	1.5-m length
BNC-Banana clip cable	RIC-113	1.5-m length
BNC-Alligator clip cable	RIC-114	1.5-m length

2.3   GL500 Part Names and Functions

This section describes the names and functions of parts of the GL500.

(4) Monitor

(2) Data capture LED   (3) Battery charging
LED

(5) Control panel keys

(1) Power LED

Top panel

(11) External trigger terminal

Not used

(6) Power connector

(10) GND terminal

(7) Power switch

Not used

(8) PCMCIA slot

(9) Logic or Pulse input/alarm
output terminal

(12) Input terminal unit 2

(12) Input terminal unit 1

(17) Screwdriver for use with
the input terminal units

Bottom panel

(13) USB connector terminal

(14) LAN connector terminal

(15) Monitor control dial

(16) Battery

(1) Power LED .... This LED is lit when the power switch is in the 'On' status.

(2) Data capture LED .... This LED is lit while data is being captured.

(3) Battery charging LED .... This LED is lit when the battery is being charged.

(4) Monitor .... Displays the setting menus and measurement data.

(5) Control panel keys .... Used for the main operations, including settings, and starting and stopping measurement.

(6) Power connector .... Terminal for connecting the AC/DC power cables.

(7) Power switch .... Switch for turning on the power.

(8) PCMCIA slot .... Used for inserting the PCMCIA card (PC card).

(9) Logic or Pulse input/alarm output terminal

.... Used for logic or pulse input and alarm output.

(10) GND terminal .... Connects the main unit to ground.

(11) External trigger terminal .... Terminal for the input of external triggers.

(12) Input terminal units 1 & 2 ... Used to connect the 4VF, 4MF, and 8MS input terminal units.

(13) USB connector terminal .... Terminal for connecting the USB cable.

(14) LAN connector terminal ..... Terminal for connecting the LAN cable.

(15) Monitor control dial .... Used to adjust the monitor contrast.

(16) Battery .... Backup battery used in the case of an AC or DC power failure.

(17) Screwdriver for use with the input terminal units

.... Used to connect the signal input cables to the input terminal units.

Note: Attach the LCD protector to the surface of the LCD display when you want to protect it.

2.4 Monitor Part Names and Functions

This section describes the monitor unit on top of the GL500.

(2) Simplified message display area
(5) Key lock
(6) Remote
(4) PCMCIA card access display
(7) AC drive
(1) Processing mode display area
(3) Time/Div display area
(8) Battery drive
(9) Date/Time display area
(16) Event data display
(10) Alarm display area
(17) Scale upper limit
(11) Analog signal monitor area
(17) Scale lower limit
(12) Logic/Pulse settings display area
(18) Memory/PCMCIA display area
(13) Memory block capture display area
(15) Waveform/settings window display area
(14) Pen display

(1) Processing mode display area
.............................Displays the processing mode currently set.
(2) Simplified message display area
.............................Displays the system status. ("Free Running") is usually displayed.
For example, "Armed" is displayed when waiting for a trigger signal.
(3) Time/Div display area ....Displays the current time scale.
(4) PCMCIA card access display
.............................The red LED flashes while data on the PCMCIA card is being accessed.
(5) Key lock ....Lit when the GL500 is in key lock status. To enable key lock status, hold down the two [◁◁] and [▷▷] keys for at least three seconds.
(6) Remote ....Lit when the GL500 is in remote status.
(7) AC drive ....Lit when the AC power supply is being used.
(8) Battery drive ....Lit when the battery is being used.
(9) Date/Time display area ....Displays the current date and time.
(10) Alarm display area ....Displays the alarm outputs.
(11) Analog signal monitor area
.............................Displays the input signal values for each channel.
(12) Logic/Pulse settings display area
.............................Logic : Displays the operation status.
Pulse: Displays the measured values.
(Display switching: Off, Logic, Pulse)
(13) Memory block capture display area
.............................Different colors are used to indicate the status of the data captured to memory.
(14) Pen display ....Pens are displayed for each group.

(15) Waveform/settings window display area

............................Displays the measurement signal waveforms. The menu windows are also displayed when the condition setting keys are pressed.

(16) Event data display ....Displays the event data capture status.

(17) Scale upper/lower limit ......Displays the measurement scale for the range set.

(18) Memory/PCMCIA display area

............................Displays the capture status of the current data (memory and PCMCIA).

2.5　Control Panel Key Names and Functions

This section describes the control panel keys.
See Section 3.1 "Description of Control Keys (Setting/Capturing)" and 3.4 "Data Replay" for further information.
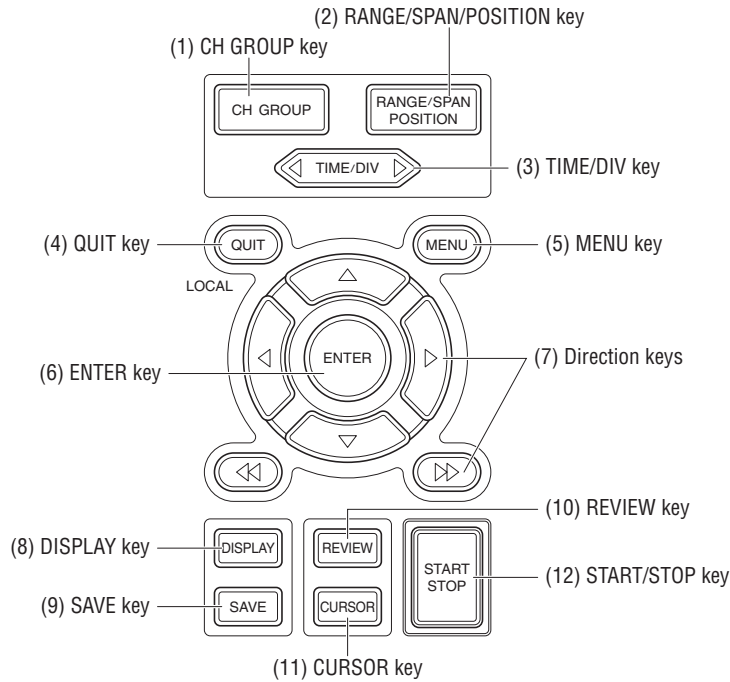
(1) CH GROUP key .... Switches between channel groups.

(2) RANGE/SPAN/POSITION key

.... Switches through the INPUT, RANGE, SPAN, and POSITION settings on the monitor display. These settings can be specified for each channel. *** It switches through the TRACE/SPAN/POSITION displays during replay.**

(3) TIME/DIV key .... Used to switch the time axes.

(4) QUIT key .... Used to cancel the displayed setting item.
Also used to close the Data Review Display.
Also used to cancel the REMOTE status.

(5) MENU key .... Switches through the various setting menus.

(6) ENTER key .... Enters the details set in the current setting window.
A waveform search can be made from Current to Event, and Event to Current in the 2-screen view mode.

(7) Direction keys (◁▷△▽) .... These keys move the cursor on the screen in the direction indicated.

　　Direction keys (◁◁ ▷▷) .... Use these keys to scroll the memory data waveforms and move the cursor. Hold down both keys together for at least three seconds to enable key lock status. To cancel key lock status, press them again for at least three seconds.

(8) DISPLAY key .... Switches through the Waveform, Enlarged Waveform, and Digital Data screens.
It switches effective screens between Current and Event in the 2-screen view mode.

(9) SAVE key .... Used to save memory data and make a copy of the displayed screen.

(10) REVIEW key .... Replays the captured data.
It switches "2-screen to 1-screen", or "1-screen to 2-screen" during 2-screen replay.

(11) CURSOR key .... Press the CURSOR key to switch between Cursor A and B.

(12) START/STOP key .... Press this key to start measurement or to stop measurement when measurement is in progress.

2.6   Connecting to a PC

The GL500 can be connected to a PC via a LAN cable or a USB cable.

Connection Using a LAN Cable

Use the LAN cable to connect the GL500 to a PC.

LAN cable
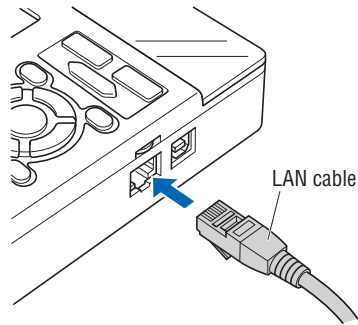
Connection using a USB Cable

Use the USB cable to connect the GL500 to a PC.

USB cable

✪ CHECKPOINT
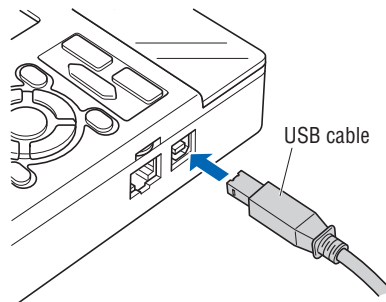
If the USB cable is used, the USB driver must be installed in your PC. See Section 4.2, "Installing the USB Driver", for the installation procedure.

2.7   Connecting the Power Cable and Turning on the Power

This section describes how to connect the power cable and turn on the power. The connection method will vary depending on the type of power supply used.

Connecting to an AC Power Supply

Use the AC cable and AC adapter that are provided as accessories.

⚠ **CAUTION**

The AC adapter provided with the GL500 must be used.

(1)   Plug the AC cable into the AC adapter.

When Using the GL500 in the EU region
Attach the provided core to the AC cable.
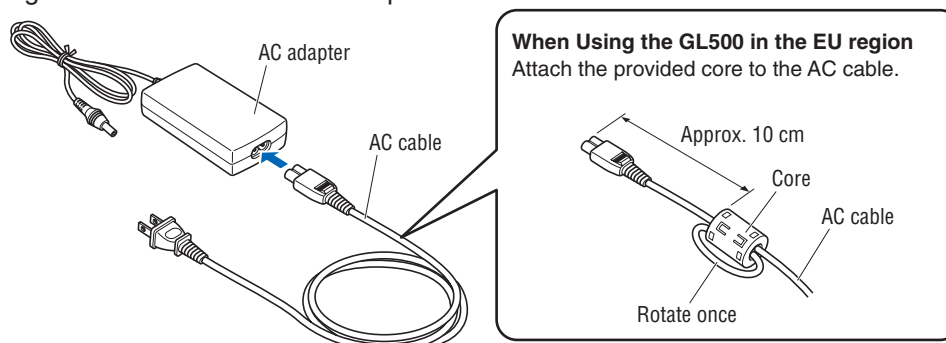
(2)   Connect the output side of the AC adapter to the power connector on the GL500.
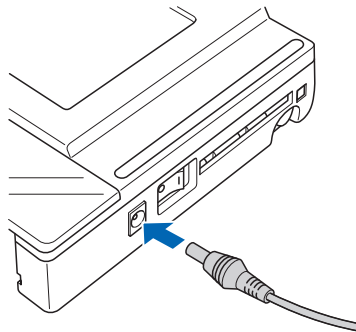
(3)   Using the screwdriver provided as a standard accessory, press against the button underneath the ground terminal while connecting the grounding cable to the GL500. Connect the other end of the cable to ground.

Grounding cable
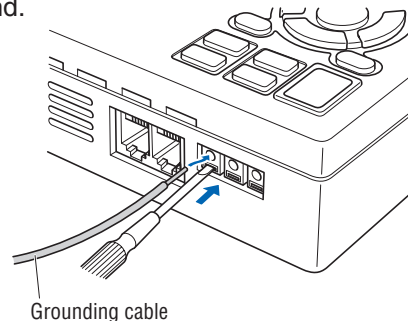
(4)   Plug the AC cable into the mains power outlet.

(5)   Press the power switch on the GL500 to the ON side to turn on the power.

⚠ **CAUTION**

Always connect the GND terminal and refer to the safety precautions. The GL500 must be grounded even when connected to other devices and sharing a common ground level.

Connecting to a DC Power Supply

Use the optional DC drive cable (B-514).

> ⚠ **CAUTION**
> - Use a power supply within the 8.5 to 24 VDC range.
> - The B-514 DC drive cable must be used.

(1) Configure the tip of the DC drive cable (B-514, 2-m length) to enable it to be connected to the DC power supply.

(2) Connect the DC input side of the DC drive cable to the DC power supply.

> ⚠ **CAUTION**
> Be sure to check the polarity of the wire tips when performing wiring.

(3) Connect the DC output side to the power connector on the GL500.

B-514
(8.5 to 24 VDC power supply)

Shielded lead (– side)

White (+ side)
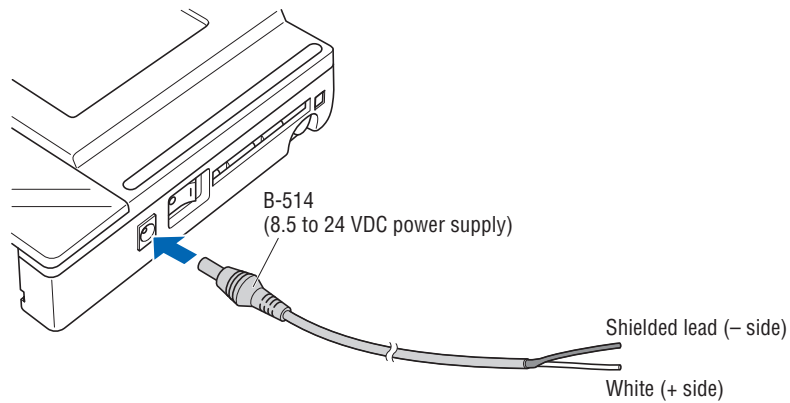
(4)   Press the power switch on the GL500 to the ON side to turn on the power.

2.8　Using the Battery Pack (Option)

Use the battery pack for data back-up when the AC power supply is interrupted by a power failure or brownout. For the expected operating time when using the battery pack, see Section 5.3, "Accessory/Option Specifications".

Mounting the Battery Pack

(1)　Use a screwdriver to remove the battery pack cover from the bottom panel.
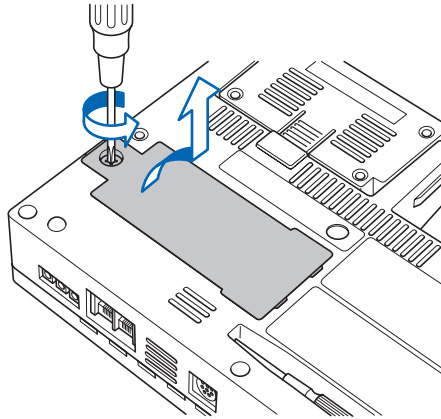
(2)　Mount the battery pack in the direction shown by the arrow.

Battery pack
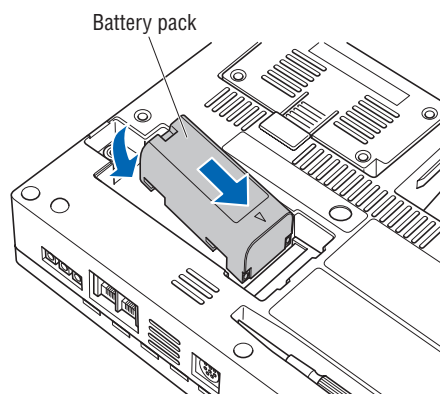
(3)　Reattach the cover, and fasten the screw in place.
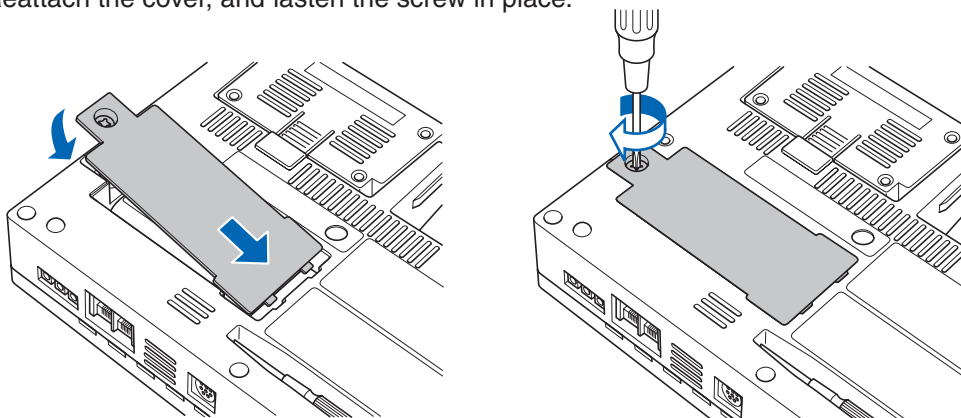
⚠ **CAUTION**

Do not use the GL500 without the cover fastened in place.

Charging the Battery

Expected time required for charging
When using the GL500 for charging: Approx. 4 hours (when the power supply is OFF)

Using the GL500 for Charging

The battery pack is charged by mounting it in the GL500, and supplying it with AC power. The battery cannot be charged, however, if the internal temperature has risen during continuous operation.

(1) Mount the battery pack in the GL500 (see the previous section for the mounting procedure).

(2) Turn on the power to the GL500. (See Section 2.7, "Connecting the Power Cable and Turning on the Power").

Battery charging LED

Power LED
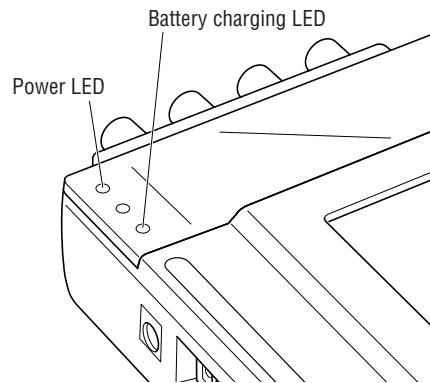
CHECKPOINT

• If battery charging is attempted while the GL500 is being used continuously or immediately afterwards, charging may not be performed. However, charging will start automatically as soon as the GL500 has cooled down.

• If input is being made directly from the DC power supply instead of the AC adapter, the DC voltage must be at least 16V.

2.9 Inserting and Removing a PCMCIA Card

This section describes how to insert and remove a PCMCIA card.

⚠ **CAUTION**

- Adequate precautions against static electricity must be taken when handling PCMCIA cards.
- Do not remove the PCMCIA card if the PCMCIA card access display on the monitor is flashing red. Data loss or malfunctions may occur.

Inserting a PCMCIA Card

Insert the PCMCIA card into the slot as far as it will go.
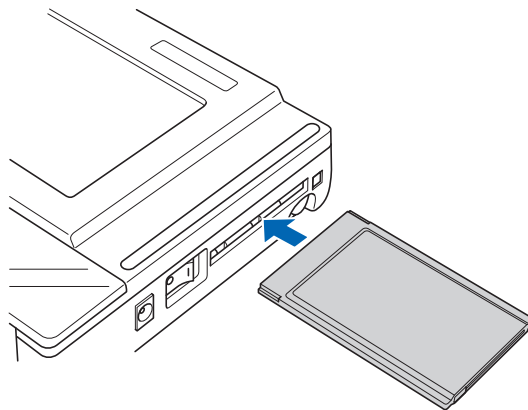
Removing a PCMCIA Card

Press the eject button next to the PCMCIA card slot so that the button protrudes. Press it once more to eject the PCMCIA card.

Press

Press once more
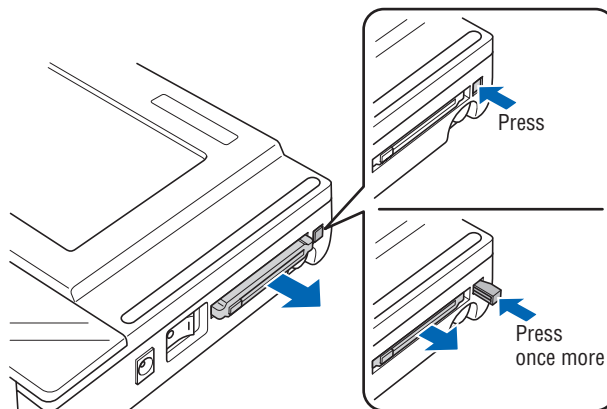
2.10 Mounting and Removing the Input Terminal Unit

This section describes how to mount and remove the input terminal unit.

⚠ **CAUTION**

- Make sure that the power supply has been turned off before mounting or removing the input terminal unit.
- The input terminal units that can be used are the 4VF, 4MF, and 8MS units. Input terminal units for the GL400 model cannot be used with the GL500.

Mounting the Input Terminal Unit

(1) Remove the cover from the input terminal mounting area.
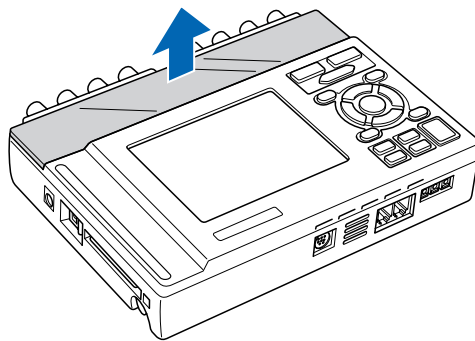
(2) As shown in the figure below, insert the input terminal unit in the GL500. At this time, be sure to check that the input terminal unit is locked onto the connector.
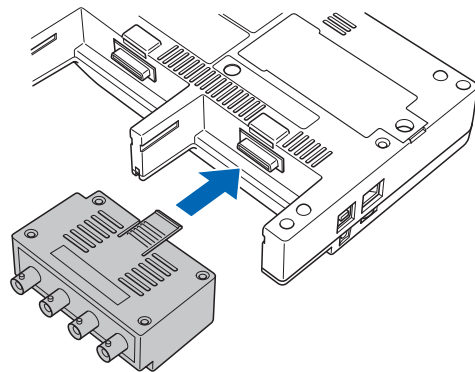
Removing the Input Terminal Unit

(1) Remove the cover from the input terminal mounting area.

(2) Press down on the lock button while pulling the input terminal unit towards you. At this time, grip the input terminal unit firmly while removing it.
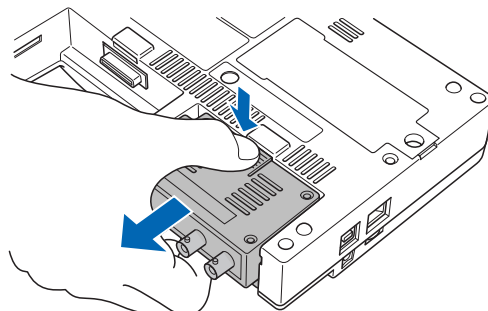
(3) Replace the cover for the input terminal mounting area.

2.11 Connecting the Signal Input Cables to the Input Terminal Unit

This section describes how to connect the signal input cables to the input terminal unit.

4VF Input Terminal Unit

This is a 4-channel isolated voltage input terminal unit.

CHECKPOINT

This input terminal unit is for use with the GL500 model only. Do not mount input terminal units for other models such as the GL400 in the GL500.

Terminal Configuration and Input Signal Types

+ ....High-voltage terminal (terminal for high-voltage input signals)
− ....Low-voltage terminal (terminal for low-voltage input signals)

Item	Description
Input configuration	Isolated input for each channel, scanning method, unbalanced input
Input terminal	BNC connector
Analog voltage	100, 500 mV/FS; 1, 5, 10, 50, 100 V/FS
Sampling interval*1	Current: 1 to 500 ms; 1 to 30 s; 1 to 30 min; 1 h
	Event: 2 to 500 μs; 1 to 500 ms; 1 s
A/D resolution	14-bit
Frequency characteristic	DC coupling: DC to 20 kHz (+1/–3dB Typ)
Permissible input voltage	Between + and – terminals: 50 to 100 V range: 100 Vp-p max.
	100 mV to 10V range: 30 Vp-p max.
	Between input terminals and GND: 30 VAC rms, 60 VDC max.
Filter	Off, Line, 5, 50, 500 Hz

1   The maximum sampling interval will depend on the number of channels being used.

4MF Input Terminal Unit

This is a 4-channel isolated voltage and temperature input terminal unit.

> **CHECKPOINT**
>
> This input terminal unit is for use with the GL500 model only. Do not mount input terminal units for other models such as the GL400 in the GL500.

Terminal Configuration and Input Signal Types

Use the provided screwdriver to loosen the terminal screws. Insert the cables in the terminals, and then tighten the screws to hold the cables in place.

+ .... High-voltage terminal (terminal for high-voltage input signals)

– .... Low-voltage terminal (terminal for low-voltage input signals)

Item	Description
Input configuration	Isolated input for each channel, scanning method, unbalanced input
Analog voltage	100, 500 mV/FS; 1, 5, 10, 50, 100 V/FS
Thermocouples	K, J, E, T, R, S, B, N, W (WRe 5-26)
Sampling interval*1	Current: 1 to 500 ms; 1 to 30 s; 1 to 30 min; 1 h
	Event: 2 to 500 μs; 1 to 500 ms; 1 s
A/D resolution	14-bit
Frequency characteristic	DC coupling: DC to 20 kHz (+1/–3dB Typ)
Permissible input voltage	Between + and – terminals: 50 to 100 V range: 100 Vp-p max.
	100 mV to 10V range: 30 Vp-p max.
	Between input terminals and GND: 30 VAC rms, 60 VDC max.
Filter	Off, Line, 5, 50, 500 Hz

*1 The maximum sampling interval will depend on the number of channels being used.

8MS Input Terminal Unit

This is an 8-channel non-isolated voltage and temperature input terminal unit.

 CHECKPOINT

> This input terminal unit is for use with the GL500 model only. Do not mount input terminal units for other models such as the GL400 in the GL500.

Terminal Configuration and Input Signal Types
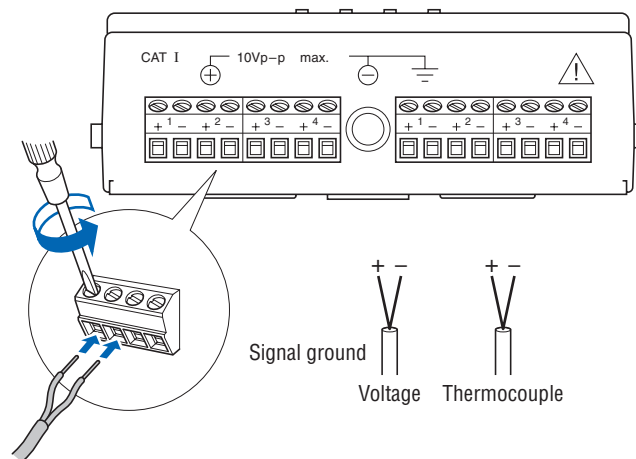
Use the provided screwdriver to loosen the terminal screws. Insert the cables in the terminals, and then tighten the screws to hold the cables in place.

+ .... High-voltage terminal (terminal for high-voltage input signals)

−....................................... Low-voltage terminal (terminal for low-voltage input signals)

Item	Description
Input configuration	Isolated input for each channel, scanning method, balanced input
Analog voltage	100, 500 mV/FS; 1, 5, 10 V/FS
Thermocouples	K, J, E, T, R, S, B, N, W (WRe 5-26)
Sampling interval*1	Current: 1 to 500 ms; 1 to 30 s; 1 to 30 min; 1 h
	Event: 2 to 500 μs; 1 to 500 ms; 1 s
A/D resolution	14-bit
Frequency characteristic	DC coupling: DC to 20 kHz (+1/−4.5dB Typ)
Permissible input voltage	Between + and − terminals: 100 mV to 10 V range: 10 Vp-p max.
Filter	Off, Line, 5, 50, 500 Hz

*1 **The maximum sampling interval will depend on the number of channels being used.**

2.12 Noise Countermeasures

Be sure to connect the chassis GND of the measuring device.

Ensure that the chassis GND wire of the measuring device is connected to a good ground.
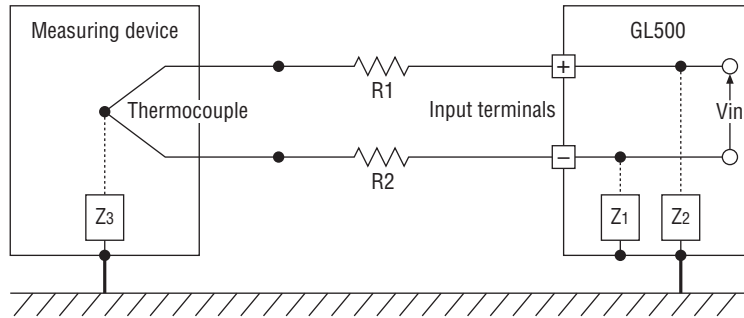
Connect the signal chassis GND and the measuring device chassis ground.

Use a short, thick lead to connect the chassis GND of the measuring device to the GL500's chassis GND. It will be even more effective if the ground potentials are the same.
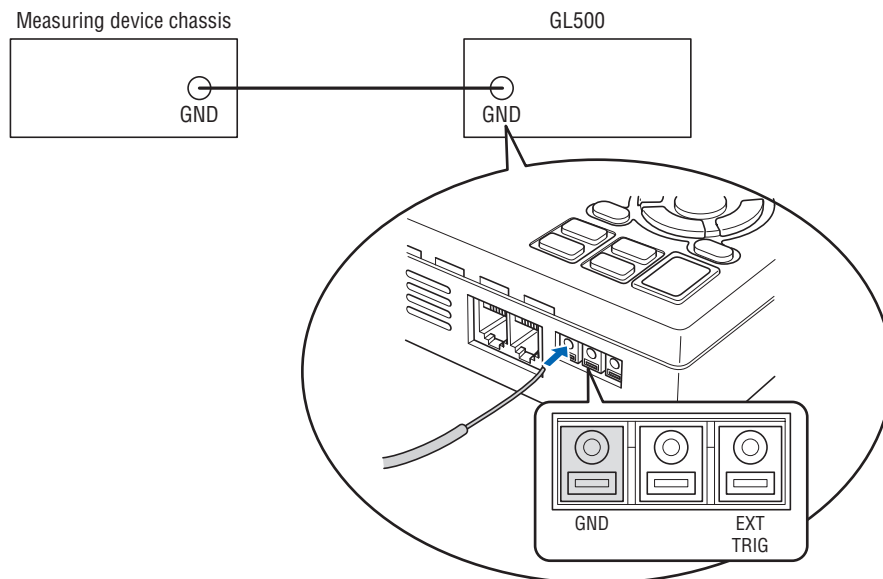
2.13 Logic or Pulse Input/Alarm Output Functions

Connect the round connector of the logic/alarm cable (B-513, option) to the logic or pulse input/alarm output terminal on the GL500.

Logic/alarm cable
(B-513: 2-m length)
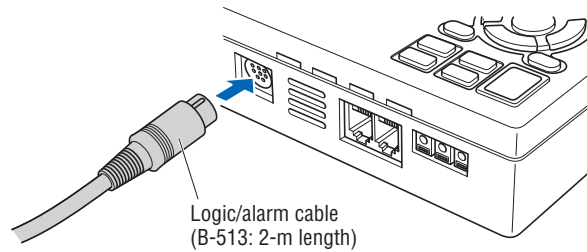
Logic Input or Pulse Input Functions

Item	Description
Number of channels	4
Input voltage range	0 to +30V max. (single-ended ground input)
Threshold level	High: +3.1V or higher, Low: +2.4V or lower
Input resistance	Approx.9K

Alarm Output Functions

Item	Description
Number of channels	4
Maximum rating	VCEO (voltage between collector and emitter): 30V
	IC (collector current): 0.5A
	PC (Collector dissipation): 0.2W

Alarm Output Circuit

GL500   +5V

100K
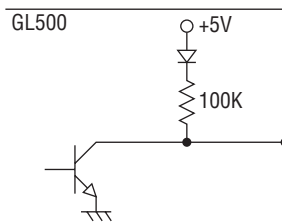
Maximum rating
VCEO (voltage between collector and emitter): 30V
IC (collector current):   0.5A
Note: Be sure to not to exceed the maximum ratings

Wiring

The cables have bare tips. Please perform wiring as required.

Applicable Item	Number	Lead Color
Logic input	1	Orange/red
Pulse input	2	Orange/black
(Setting can be	3	Gray/red
switched)	4	Gray/black
Alarm output	1	White/red
	2	White/black
	3	Yellow/red
	4	Yellow/black
Common ground	GND	Pink
	GND	Pink
	GND	Shielded lead

Orange/red
Orange/black   Logic input/pulse
Gray/red   input signals
Gray/black

White/red
White/black   Alarm output
Yellow/red
Yellow/black

Pink
Pink   GND
Shielded lead

Logic alarm cable (B-513)
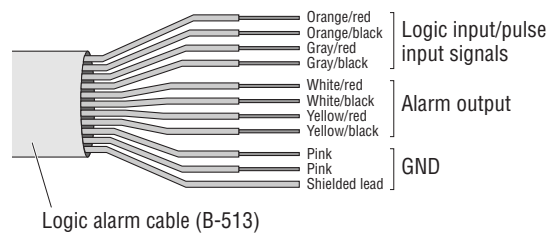
2.14 External Trigger Functions

External Trigger Functions

Item	Description
Number of channels	1
Input voltage range	0 to +30V max. (single-ended ground input)
Threshold level	High: +3.1V or higher, Low: +2.4V or lower
Input resistance	Approx. 9K
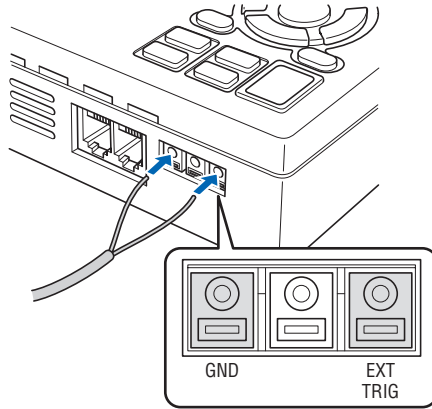
2.15 Setting the Date and Time

If you are using the GL500 for the first time, charge the internal rechargeable battery and then make the date and time settings.

⚠CAUTION

If the GL500 was not used for a period of approximately three months, the internal rechargeable battery may be discharged and the date and time reverted to the initial settings. If this happens, charge the battery before using the GL500.

How to Charge the Rechargeable Battery

Using the AC adapter provided, connect the GL500 to a mains power outlet, turn on the power switch, and then leave the GL500 connected for at least 24 hours.

How to Set the Date and Time

Press the [MENU] key, display [OTHR], and then set the date and time at the Date/Time Settings sub-menu. For details, see "Date/Time" on page 3-26.

CHAPTER *3*

Settings and Measurement

This chapter describes the setting and measurement procedures for the GL500.

3.1 Descriptions of Control Keys (Setting/Capturing)

Control panel keys are provided for easy measurement.

- (1) CH GROUP key
- (2) RANGE/SPAN/POSITION key
- (3) TIME/DIV key
- (10) QUIT key
- (11) MENU key
- (5) Direction keys
- (6) DISPLAY key
- (7) REVIEW key
- (4) START/STOP key
- (8) SAVE key
- (9) CURSOR key
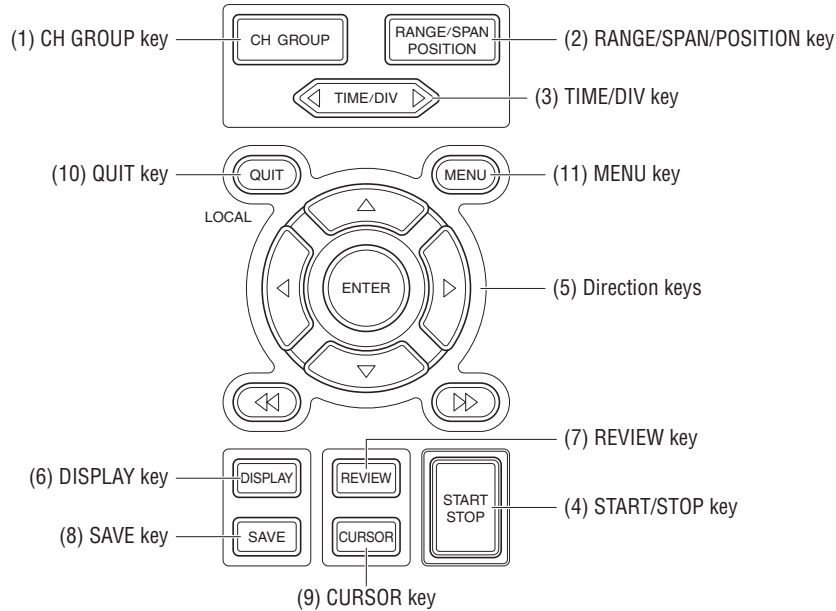
1. CH GROUP key

This key selects the channels in groups. Press the key to move to the next group of channels. The number of channels varies according to the type of input terminal unit installed.
If CALC settings have been made, Calc. display data is displayed when the CH GROUP key is pressed.

1 to 8 → 9 to 16 → Calc.
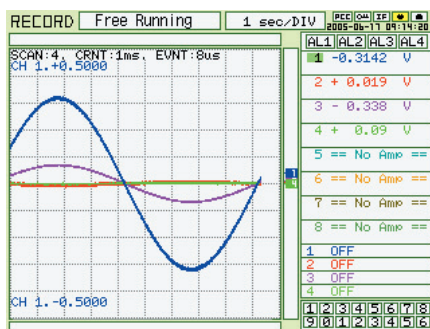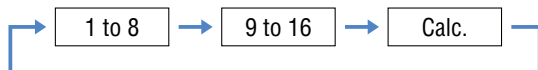
Waveform + Digital Display Screen
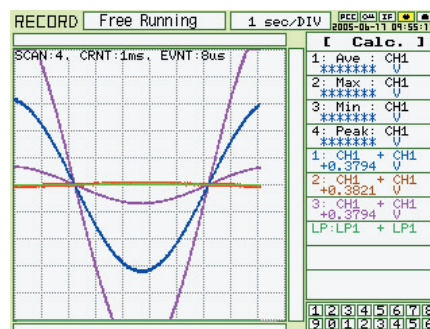
Waveform + Calculation Display Screen

Function operations display

Arithmetic operations display

2. RANGE/SPAN/POSITION key

These settings can be made or changed for each channel individually, even during free-running or data-capturing.

⚡ CHECKPOINT

The free-running basic screen is used for monitoring the measurement status only, and its settings cannot be changed. In addition, the INPUT and RANGE setting can only be changed if data has not been captured.

Selecting the Parameters

Press the RANGE/SPAN/POSITION key to switch through the setting screens. Each time the key is pressed, the screen changes.
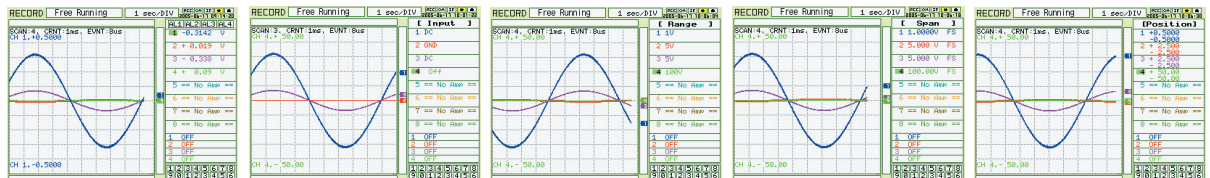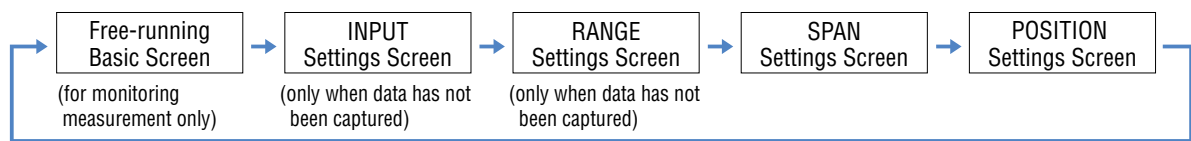
Free-running Basic Screen	→	INPUT Settings Screen	→	RANGE Settings Screen	→	SPAN Settings Screen	→	POSITION Settings Screen
(for monitoring measurement only)		(only when data has not been captured)		(only when data has not been captured)				

Free-running Basic Screen   **INPUT Settings Screen**   **RANGE Settings Screen**   **SPAN Settings Screen**   **POSITION Settings Screen**

Setting Procedure

Use the direction keys to move to the setting parameter and to make selections (settings).
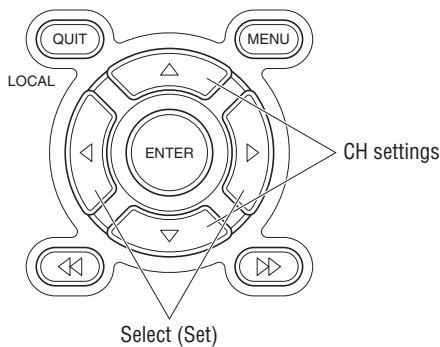
• **INPUT Settings**

The input settings vary according to the type of built-in AMP

Voltage AMP (4VF): DC, GND, OFF

Temperature AMP (4MF/8MS): DC, TEMP, GND, OFF

RANGE settings

The voltage and temperature settings vary according to the settings made in the MENU (AMP) screen.

• **Voltage**

4VF/4MF: 100 • 500 mV • 1 • 5 • 10 • 50 • 100 V ↔

8MS: 100 • 500 mV • 1 • 5 • 10 V ↔

• **Temperature**

4VF/8MS: TC-K • TC-J • TC-T • TC-R • TC-E • TC-B • TC-S • TC-N • TC-W ↔

SPAN settings

100 mV setting	1.00 to 200.00 mV/F.S.	10 V setting	0.100 to 20.000 V/F.S.
500 mV setting	5.0 to 1000.0 mV/F.S.	50 V setting	0.50 to 100.00 V/F.S.
1 V setting	0.0100 to 2.0000 V/F.S.	100 V setting	1.000 to 200.00 V/F.S.
5 V setting	0.050 to 10.000 V/F.S.		
Temperature*1	50.0 to 2200.0 °C/F.S.		

1 With the temperature ranges, the measurement range will depend on the type of sensors used. If you want to make detailed settings, please set the range again.

POSITION settings

The position can be moved as follows.

Voltage ranges: In 10% units of the range

Temperature ranges: In 10% units of the following ranges (4MF amp only):
            50.0, 100.0, 200.0, 500.0, 1000.0, 2000.0

3. TIME/DIV key

Press the TIME/DIV key to switch through the waveform display speeds. The waveform display speed changes each time the key is pressed. (When the display format is 2-screen, the DISPLAY key can be used to switch between Current and Event, and to select TIME or DIV.

```
                    |        sec/DIV        |        min/DIV        |        hour/DIV       |
                    1 • 2 • 5 • 10 • 20 • 30 • 1 • 2 • 5 • 10 • 20 • 30 • 1 • 2 • 5 • 10 • 12 • 24
        Current  ◄─────────────────────────────────────────────────────────────────────────►


                    |        µsec/DIV       |        msec/DIV       |
                    20 • 50 • 100 • 200 • 500   1 • 2 • 5 • 10
        Event    ◄───────────────────────────────────────────────►
```

TIME/DIV display
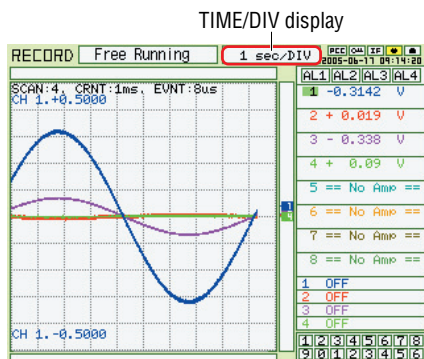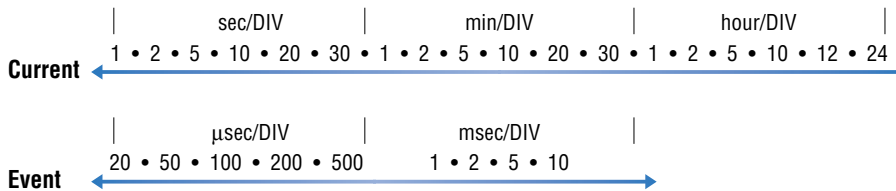
4. START/STOP key

Press the START/STOP key to select the START status (Armed or Recording). Press it once again to select the STOP status (Free Running).
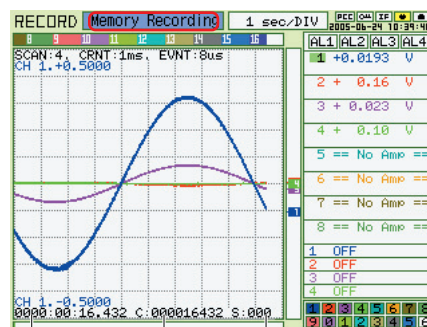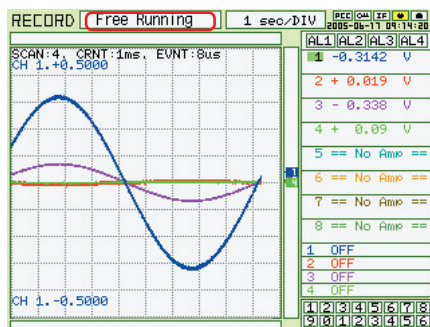
Data capture time from the START time

Current data capture time

Skipped data display when data is captured to a PC card

5. Direction keys

Direction keys (◁▷△▽) : These keys move the cursor on the screen in the direction indicated.

Direction keys (◁▷) : Press these keys to scroll through captured data, move the cursor, and to select text and values on menu screens.

Direction keys (◁◁ ▷▷) : Press these keys to scroll through captured data, move the cursor, enable/ disable key lock status, and to move the position when making text settings.

6. DISPLAY key

Press this key to switch through the measurement modes: Free-running Basic, Enlarged Waveform, and Digital.

| Free-running Basic Screen → Enlarged Waveform Screen → Digital Screen |

Free-running Basic Screen   **Enlarged Waveform Screen**   **Digital Screen**
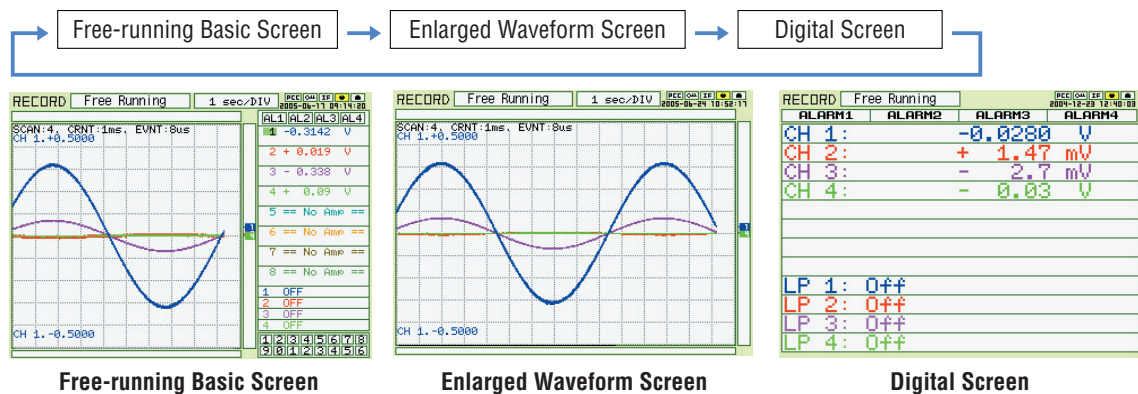
Free-running Basic Screen: Both waveform and digital data are displayed together.

Enlarged Waveform Screen: Only waveforms are displayed over the entire screen.

Digital Screen: 8 channels of analog data and 4 channels of logic/pulse data are displayed.

7. REVIEW key

If the REVIEW key is pressed on the free-running screen after the capturing operation has been completed, captured data are displayed. If the key is pressed during capture, current data being captured and cursors are displayed. *See Section 3.4 "Data Replay" for captured data replay.

When captured data is replayed
Select the type of data to be displayed.

REVIEW display during measurement
Press the QUIT key to return to the main capture screen.

Main capture screen

Event data status display

Cursors
Current data capacity and cursor positions
Cursor value data display

Realtime measurement data display (Press the RANGE/SPAN/POSITION key to switch through the RANGE, SPAN, and POSITION displays.)

8. SAVE key

Press the SAVE key to save data (memory data capture), to make a copy of the screen and to save data between cursors.

```
Save
[Data Save]
Path:    A:\<AUTO.GBD>    ▽
Execute:   ▷
[BMP Copy]
Path:    A:\<AUTO.BMP>    ▽
Execute:   ▷
[Between Cursors]
Save to Card              ▽
[QUIT]Exit
```

Data Save: Current data and Event data are saved to the PCMCIA card.

BMP Copy: The display screen can be saved in bitmap format.

Data save between cursors: Captured data between cursors can be saved in a designated format. GBD (binary) or CSV (EXCEL) format are available.

9. CURSOR key

When the REVIEW key has been pressed and the replayed data is displayed, the cursor key can be used to select three cursor modes.
Press the CURSOR key to switch between Cursor A or B. (Enabled when Cursor synchronization is OFF. See Section 3.4 "Data Replay" for Readout.)

CursorA: Cursor A is moved.

CursorB: Cursor B is moved.

CursorA&B: Cursor A and B are moved together.

(When Cursor synchnonization is ON. See Section 3.4 "Data Replay" for Readout.)

✦ CHECKPOINT

Cursor A is displayed as a red long wavy line,while cursor B is displayed as a blue short wavy line.

10. QUIT key

Use the QUIT key for operations such as those described below.
• To switch a MENU screen to a measurement screen.
• To close the selected screen.
• To stop operation according to the message displayed on the menu
• To close a selected screen such as an enlarged screen, digital screen and to return to a basic screen

11. MENU key

If the MENU key is pressed on the free-running basic screen, the system setting menu can be displayed. See Section 3.3 "Description of the System Setting Menu (Measuring)" for further information.

3.2   Setting Procedures

See the separate volume, "Easy! Measurement Guide – Main unit" for detailed measuring procedures.

3.3   Description of Basic Setting Menu (Setting)

The QUIT and MENU keys enable detailed settings to be made.
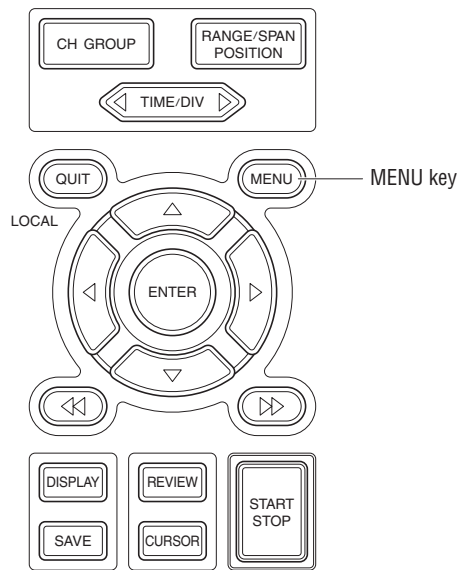
MENU key

Press the MENU key to switch through the AMP, CRNT, EVNT, CALC, FILE, I/F, OTHR and INFO setting menus. The [◁▷] direction keys can also be used to switch through the setting menus.

① AMP Settings

AMP Menu Structure

Setting		Selections available	Setting method
No. of CH		1 to (the number of channels on the input terminal unit)	ENTER→Select→ENTER
Logic/Pulse		Off, Logic, Pulse	ENTER→Select→ENTER
Input	4VF amp	DC, GND	ENTER→Select→ENTER
	4MF/8MS amp	DC, TEMP, GND	ENTER→Select→ENTER
Range	4VF amp	100, 500 mV 1, 5, 10, 50, 100 V	ENTER→Select→ENTER
	4MF amp	100, 500 mV 1, 5, 10, 50, 100 V	ENTER→Select→ENTER
		TC-K, TC-J, TC-T, TC-R, TC-E, TC-B, TC-S, TC-N, TC-W	
	8MS amp	100, 500 mV 1, 5, 10 V	ENTER→Select→ENTER
		TC-K, TC-J, TC-T, TC-R, TC-E, TC-B, TC-S, TC-N, TC-W	
Filter		Off, Line, 5, 50, 500 Hz	ENTER→Select→ENTER
EU (Engineering Unit Settings)	Function	Off, On (effective when On has been selected)	ENTER→Select→ENTER
	Lower – Setting Value – Upper Unit	Settings	
		• Meas. Value (Upper/Lower)	ENTER→Set numeric value→ENTER
		• EU Value (Upper /Lower)	ENTER→Set numeric value→ENTER
		• Dec pt	ENTER→Select→ENTER
		• Unit	ENTER→Select→ENTER
		• Select	ENTER→Select→ENTER
	Register		ENTER
Misc. (only when ALL has been selected)		Span All Settings	ENTER→Set numeric value→
		• Upper/Lower	ENTER→Execute
Misc.		Annotation Strings (alphanumerics, symbols)	ENTER→Select→OK
		• Color: Current Color, Set Color	ENTER→Select→Register
		• Perform Auto Zero ADJ., Reset Auto Zero ADJ., Set zero point as	Press ENTER to execute
Pulse	Mode	Revol., Counts, Inst.	ENTER→Select→Register
	Color	Set	ENTER→Select→Register
	Range	Revol.: 5, 50, 500, 5k 50k RPM/F.S.	ENTER→Select→ENTER
		Counts: 5, 50, 500, 5k 50k C/F.S.	
		Inst: 5, 50, 500, 5k 50k C/F.S.	
	Filter	Off, On	
	EU (Engineering Unit Settings)	Function: Off, On	ENTER→Select→ENTER
		• Setting values, unit selection, unit	ENTER→Select→Register
			(Use direction keys to select value)
	Slope	H, L	ENTER→Select→ENTER
Logic	Color	Set Color	ENTER→Select→Register
	Filter	Off, On	ENTER→Select→ENTER

✦ CHECKPOINT

When the CH setting is ALL, the Input, Range and Filter settings are the same for all the channels in that group.

No. of CH .... Confirms the number of channels for measurements.

Logic/Pulse .... Selects whether to use Logic or Pulse measurement.

> Off
> Logic
> Pulse
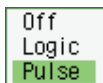
Off: Not used
Logic: Enables 4-channel logic measurement.
Pulse: Enables 4-channel pulse measurement.

Input .... Selects the input coupling status.
DC: Used for measuring direct-current voltage.
TEMP: Used for measuring temperature.

off: Not used.

Range .... Specifies the range of signal input to be measured.

Voltage: 100, 500 mV   1, 5, 10, (50, 100) V

Note: The values in parentheses ( ) can only be used with the 4VF/4MF units.

Temperature (4MF/8MS):

TC-K, TC-J, TC-T, TC-R, TC-E, TC-B, TC-S, TC-N, TC-W

Available SPAN Settings
<Voltage Ranges>

Range	Maximum SPAN		Minimum SPAN	
	Lower to Upper SPAN [mV]	Lower to Upper SPAN [V]	Upper SPAN minus Lower SPAN	
1		−1.1000 to +1.1000		10 mV
5		−5.500 to +5.500		50 mV
10		−11.000 to +11.000		100 mV
50		−55.00 to +55.00		500 mV
100	−110.00 to +110.00	−110.00 to +110.00	1.0 mV	1V
500	−550.0 to +550.0		5.0 mV	

<Temperature Ranges>

Range	Maximum SPAN	Minimum SPAN
	Lower to Upper SPAN	Upper SPAN minus Lower SPAN
K	-200.0 to +1370.0	50°C
J	-200.0 to +1100.0	50°C
T	-200.0 to +400.0	50°C
R	0.0 to +1600.0	50°C
E	-200.0 to +800.0	50°C
B	600.0 to +1820.0	50°C
S	0.0 to +1760.0	50°C
N	0.0 to +1300.0	50°C
W	0.0 to +2315.0	50°C

Filter .... Sets the filter status. Please set the filter to ON when there is likely to be noise in the input.

Off, Line (1.5 Hz), 5, 50, 500 Hz

EU (Engineering Unit Settings)

.... This menu is used to scale the measured values and convert them to other units.

Function (EU) .... Sets the EU function to Off or On.

Lower - EU - Upper Unit ..... Sets the EU function's conversion value and unit. If the ENTER key is pressed here, the following window is displayed.

(a) Meas. Value   (b) EU Value   (c) Dec pt   (e) Select   (d) Unit   (f) Choose

If the following message appears, follow the instructions to reduce the number of digits to be output by one.

```
Out of input range
_____
[ENTER] Apply
```

CHECKPOINT

The Scaling operation is calculated using a ratio of the Meas. Value or EU Value settings. If a ratio value that the GL500 cannot process is specified, the message above appears.

(a) Meas. Value

Specifies the numeric value to be converted. Set two points, the Upper and Lower parameters.

(b) EU Value

Specifies output after conversion. Set two points, the Upper and Lower parameters.

(c) Dec pt

This parameter specifies the decimal point position of the values specified for EU Value.

(d) Unit

Specifies the converted unit. The unit can be specified as a user-defined character string consisting of alphanumeric text. It can also be specified by using the Select setting to select a unit.

(e) Select

Selects the type of engineering unit.

(f) Choose

Selects the converted unit. The unit displayed here is the unit for the type of engineering unit selected by the Select setting.

To specify a unit that is not displayed here, specify a user-defined character string as the Unit setting. Moreover, the setting specified here is displayed as the Unit setting.

Setting Example

	Upper Value	Lower Value
Specified Value	+2.5000	−2.5000
EU Value	+10.000	−10.000

Misc. (ALL) .... When ALL has been selected, the Misc. menu contains a SPAN setting function that enables all the SPAN settings for the group to be set simultaneously to the same values.
Upper, Lower: Input the required values on the displayed setting screen.
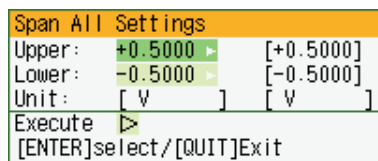
Misc. (EACH CHANNEL) .... When EACH CHANNEL has been selected, settings such as annotation and automatic resetting of the zero point can be performed.
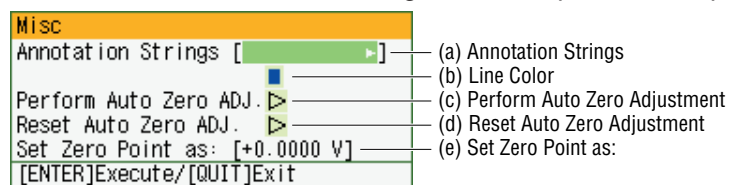
(a) Annotation Strings

Annotation settings (to display comments, etc.) can be made for each channel.

Input procedure

```
Annotation Strings

ABCDE
A a 0 + ← ↓  OK    [Alph Big]
A B C D E F G H I J K L M N O
P Q R S T U V W X Y Z



[↑ ↓ ← →]Select,
[←←]Back,[→→]Forward
[ENTER]Input/[QUIT]Exit
```
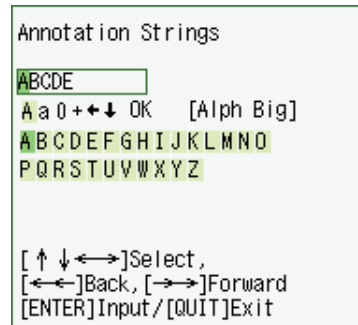
- Up to 11 characters can be input for each channel.
- Text, numerals, and symbols can all be used.
- Display legend

  A : Select to input upper-case text.

  a : Select to input lower-case text.

  0 : Select to input numerals.

  + : Select to input symbols.

  ← : Move to the position where you want to delete text, and then select this symbol to delete that text.

  ↓ : Move to the position where you want to input text or a symbol, and then select this symbol to select the text or symbol for input.

  OK : Select to save the input text.

⚠ **CAUTION**

If [* *] displayed on the screen, this indicates that text from the application software has been input in a format that cannot be displayed on the GL500 monitor.

(b) Line Color

Use the Color Settings window to change the display colors for each channel.

```
Color Settings
Current Color:      ████████
Set Color:          ████████
R: 0 ▶ G: 0 ▶ B:31 ▶



Register ▷
[ENTER]select/[QUIT]Exit
```
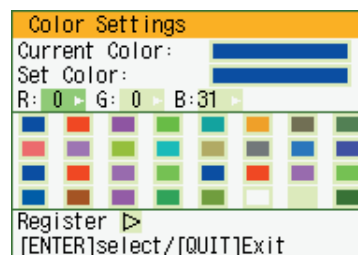
Other Misc. settings

For voltage settings, zero point adjustment can be performed automatically, and the zero point reset.

```
Misc
Annotation Strings [        ▶]
                      ■
Perform Auto Zero ADJ. ▷
Reset Auto Zero ADJ.   ▷
Set Zero Point as: [+0.0000 V]
[ENTER]Execute/[QUIT]Exit
```
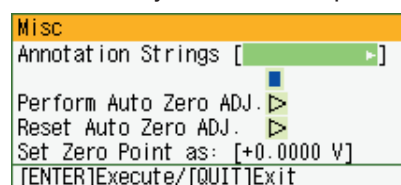
(c) Perform Auto Zero ADJ
Sets the current input voltage as the zero point voltage value.

(d) Reset Auto Zero ADJ
Cancels the zero point voltage value, and displays the input voltage.

(e) Set Zero Point as
Displays the current zero point voltage value.

Pulse .... The signals that can be input to the pulse input terminals for data processing are Revol., Counts, and Inst.

• Mode: Select from Revol., Counts, and Inst.

Revol: Counts the number of pulses per second, and displays the values multiplied by 60 as rpm values.

Counts: Displays a count of the number of pulses for each sampling interval from the start of measurement.

Inst.: Displays the number of pulses for each sampling interval.

• Color: Use to change the display colors for each channel.

• Range: Can be set for each of the modes.

Mode	Range	Maximum number of pulse inputs
Revol.	5, 50, 500, 5k, 50k RPM/F.S	50k/s
Counts	5, 50, 500, 5k, 50k C/F.S.	50k/sampling interval
Inst.	5, 50, 500, 5k, 50k C/F.S.	50k/sampling interval

• Filter: Set the filter to On when there is likely to be noise in the input.
Off: Disables the filter
On: Enables the filter

• EU (Engineering Unit Settings):
This menu is used to scale the measured values and convert them to other units.

```
Engineering Unit Settings
EU:      Off ▼
         Meas.Value EU Value
Upper:   + 5.000    +100.00   Dec pt ▼
Lower:   − 5.000    −100.00
Select:  Length ▼   Choose ▼
Unit:    V
Register ▷
[ENTER]select/[QUIT]Exit
```
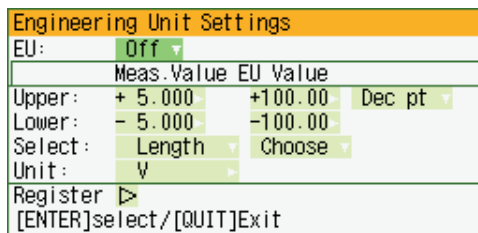
Meas. Value: Specifies the numeric value to be converted.

EU Value: Specifies output after conversion.

Unit: Specifies the converted unit. The unit can be specified as a user-defined character string consisting of alphanumerics. It can also be specified by using the Select setting to select a unit.

Select: Selects the type of engineering unit.

Choose: Selects the converted unit. The unit displayed here is the unit for the type of engineering unit selected by the Select setting.

• Slope: Sets the condition for the input signal operation.
H : Operates when the signal is a rising signal.
L : Operates when the signal is a falling signal.

Logic .... Color

- Color specification for each channel:
  This parameter enables the display colors for each channel to be changed.
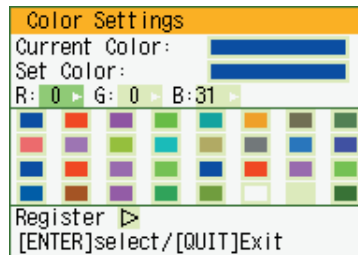
- Filter: Set the filter to On when there is likely to be noise in the input.
  Off: Disables the filter
  On: Enables the filter

② CRNT Settings

This menu is used to set the conditions for low-speed data capture.
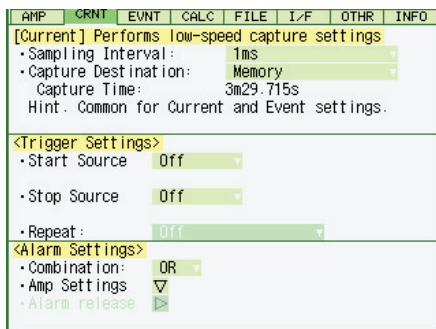
CRNT (CURRENT) Menu Structure

Setting	Selections available	Setting method
Sampling Interval	1, 2, 5, 10, 20, 50, 100, 200, 500 ms 1, 2, 5, 10, 20, 30 s 1, 2, 5, 10, 20, 30 min 1h	ENTER→Select→ENTER
Capture Ddestination	Memory, PC card	ENTER→Select→ENTER
File Name	Specify file (only when PC card has been selected) • File Type: GBD, CSV • File : Folder name, file name	ENTER→Select→ENTER
Trigger Settings		
Start	Source: Off, Amp, Date, Ext.	ENTER→Select→ENTER
Stop	Source: Off, Amp, Date, Ext., Time, Ev. full	ENTER→Select→ENTER
Repeat	Off, On	ENTER→Select→ENTER
Alarm Settings		
Combination	OR, AND	ENTER→Select→ENTER
Amp Settings	H, L, Win In, Win Out	ENTER→Select→ENTER

[Current] Settings

Sampling Interval .... Specifies the sampling interval for data capture.

Capture Destination .... Specifies the data capture destination.

```
Memory
PC Card
```

Memory: 4 MB (2 Mwords)
The amount of data that can be captured decreases as the number of channels used increases.

PC card: Use commercially-available PC cards in the built-in PCMCIA card slot to capture data. The amount of data that can be captured is determined by the memory capacity of the card used. For details on the types of cards that can be used, see Section 5.1, "Standard Specifications".

CHECKPOINT

When the captured data is Binary data, use 1 data = 2 bytes as a reference. Accordingly, if the memory is 12 Mbytes, approximately 6 Mwords of data can be captured. However, since there is also some auxiliary data present, data larger than this reference figure will be captured. In addition, when the Excel data format is used, the data will increase to 7-8 times in size. The data capture time will be shorter than that for Binary data.

File Name .... This parameter is displayed when PC card is selected as the capture destination.

File Type: This sets the file format for the data to be saved.

```
Data Save Destination
File Type : GBD  ▼
Name Type : GBD
Folder    : CSV

Register     ▷
[ENTER]Select/[QUIT]Exit
```

- GBD: Binary format
- CSV: Excel format

Name Type: Either Auto or User can be selected.

```
Data Save Destination
File Type : GBD  ▼
Name Type : Auto ▼
Folder    : Auto
          User
Register     ▷
[ENTER]Select/[QUIT]Exit
```

Folder: The currently selected folder is displayed. Settings cannot be made here.

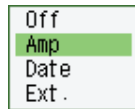File name (User): A new folder and a new file are created here.

```
[format]
<\>
<GL500>
<GL500ENG>
<RECYCLED>
<Sample>
[Make new folder]



[*.GBD]      4 Files
[←←][→→]Change display
[←][→]Move folder
[ENTER]Select
```

<Trigger Settings>

Start

Source ....   Specifies the trigger condition that must be met in order to initiate measurement.

```
Off
Amp
Date
Ext.
```

Off: No trigger is used. Instead, measurement is initiated by pressing the START/STOP key.

Amp→Amp Settings (Level Trigger)

The start of measurement is triggered when the level trigger condition is satisfied.

Note: Set the Level condition as the level value of the range (voltage, temperature) set for the specified channel.

Date: Measurement starts at the specified time.

Note: Since measurement starts at the specified time, make sure that the GL500 time settings are correct. Moreover, if Repeat has been set to On, data capture will start at the specified time each day.

Ext.: The start of measurement is triggered when a signal is input from an external trigger terminal.

Stop

Source ....   Specifies the trigger condition that must be met in order to stop measurement.
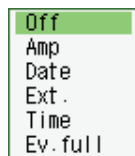
```
Off
Amp
Date
Ext.
Time
Ev.full
```

Off: No trigger is used. Instead, measurement is stopped by pressing the START/STOP key.

Amp→Amp Settings (Level Trigger)

Measurement is stopped when the level trigger condition is satisfied.

Note: Set the Level condition as the level value of the range (voltage, temperature) set for the specified channel.

Combination: Sets the output conditions for stopping (ending) measurement.

OR: Measurement is stopped when one of the output conditions is satisfied.

AND: Measurement is stopped when all of the output conditions are satisfied.

Date: Measurement is stopped at the specified time.

Note: Since measurement stops at the specified time, make sure that the GL500 time settings are correct. Moreover, if Repeat has been set to On, data capture will stop at the specified time each day.

Ext.: Measurement is stopped when a signal is input from an external trigger terminal.

Time: Sets the amount of time from the start until the end of measurement. The time can be specified from 1 second to 9999 hours.

```
Time:
Time:    0 hr00 min01 sec
Register ▷
[ENTER]select/[QUIT]Exit
```
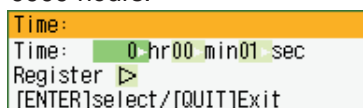
Ev. full: Measurement stops when all the memory blocks are filled with event capture data.

⚡ CHECKPOINT

Please make the following settings when using the Level Trigger function.

```
Trigger Settings (Level Trigger)
CH   Mode    Lower-Level-Upper
 1:   H      +0.0000    V
 2:   L      +  0.00    V
 3:  Win In  +  0.000 + 2.500  V▽
 4:  Win Out +  0.00 + 12.50   V▽
 5:  --- No AMP ---
 6:  --- No AMP ---
 7:  --- No AMP ---
 8:  --- No AMP ---
LP   Mode    Lower-Level-Upper
 1:   Off
 2:   Off
 3:   Off
 4:   Off
 Register  ▷
[ENTER]select/[QUIT]Exit
```

• Mode

  Off: The level trigger function is disabled.

  H: The trigger is activated when the signal input rises to (or exceeds) the specified trigger level.

CH.1
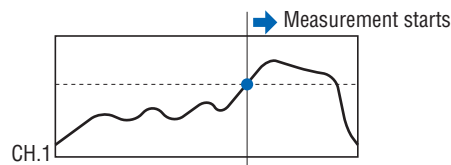
  L: The trigger is activated when the signal input falls to (or goes below) the specified trigger level.

CH.1
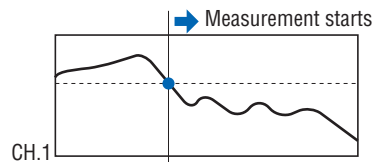
  Win In: Specifies the lower and upper limits of the trigger level for each channel. When the signal input goes within (or is within) both limits, the trigger condition is met.

CH.1
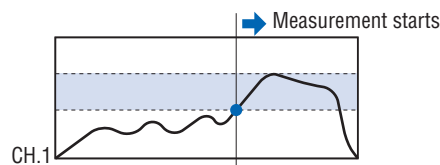
  Win Out: Specifies the lower and upper limits of the trigger level for each channel. When the signal input goes outside (or is outside) both limits, the trigger condition is met.

CH.1
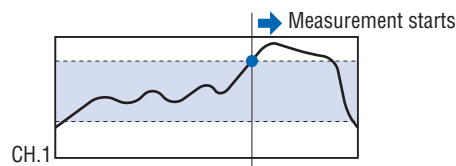
• Lower - Level - Upper

Specifies the trigger activation levels for the selected Mode condition setting.

When the Mode setting is H or L: Input a value in the Set Value box.

```
Set Value:  +0.0000
Limits:    [-1.0000, +1.0000]
[ENTER]Register
```

When the Mode setting is Win In or Win Out: Input the Upper and Lower values.

```
Trigger Settings (Level Trigger)
CH    Mode     Lower-Level-Upper
 1:    H        +0.0000     V
 2:    L        +  0.00     V
 3:   Win In    + 0.000 + 2.500  V▽
 4:   Win Out   +  0.00 + 12.50  V▽
 5:   --- No AMP ---
 6:   --- No AMP ---
 7:   --- No AMP ---
 8:   --- No AMP ---
LP    Mode     Lower-Level-Upper
 1:    Off
 2:    Off
 3:    Off
 4:    Off
Register  ▷
[ENTER]select/[QUIT]Exit
```

Repeat .... Unless Off has been selected for the Start and Stop conditions, measurement is performed repeatedly.

Off: Single measurement operation

On: Repeated measurement

<Alarm Settings >

Combination .... Specifies the alarm output conditions.

OR: Outputs an alarm when one of the alarm conditions is met.

AND: Outputs an alarm when all of the alarm conditions are met.

🔖 CHECKPOINT

The logic/alarm cable (B-513, option) is required for alarm output.

Amp Settings (Level Trigger)
.... Specifies the alarm output conditions.

```
Amp Settings (Level Trigger)
CH    Mode     Lower-Level-Upper      Output
 1:    H        +0.0000     V            1
 2:    L        + 0.000     V            1
 3:   Win In    + 0.000 + 2.500  V▽      1
 4:   Win Out   +  0.00 + 12.50  V▽      1
 5:    Off
 6:    Off
 7:    Off
 8:    Off
LP    Mode     Lower-Level-Upper      Output
 1:    X
 2:    X
 3:    X
 4:    X
Register  ▷
[ENTER]select/[QUIT]Exit
```

Off: The alarm function is disabled.

H: An alarm is generated when the signal input rises to (or exceeds) the specified alarm level.

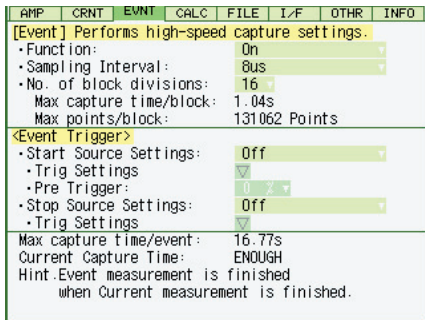L: An alarm is generated when the signal input falls to (or goes below) the specified alarm level.

Alarm release .... Cancels the alarm when alarm setting is ON and capturing is stopped. Press the MENU key and ENTER key to cancel the alarm during capture.

* Alarm hold can be set on the OTHR Menu.

③ EVNT Settings

This menu is used to set the conditions for high-speed data capture.

```
| AMP  | CRNT | EVNT | CALC | FILE | I/F  | OTHR | INFO |
[Event] Performs high-speed capture settings.
·Function:                On
·Sampling Interval:        8us            ▽
·No. of block divisions:   16
  Max capture time/block:  1.04s
  Max points/block:        131062 Points
<Event Trigger>
·Start Source Settings:    Off            ▽
 ·Trig Settings            ▽
 ·Pre Trigger:             0 %▽
·Stop Source Settings:     Off            ▽
 ·Trig Settings            ▽
Max capture time/event:    16.77s
Current Capture Time:      ENOUGH
Hint.Event measurement is finished
     when Current measurement is finished.
```

EVNT (EVENT) Menu Structure

Setting	Selections available	Setting method
Event		
Function	Off, On	ENTER→Select→ENTER
Sampling Interval	2, 4, 5, 8, 10, 20, 50, 100, 200, 500 µs	ENTER→Select→ENTER
	1, 2, 5, 10, 20, 50, 100, 200, 500 ms 1 s	
No. of block divisions	1, 2, 4, 6, 8, 16	ENTER→Select→ENTER
Event Trigger		
Start Settings		
• Source	Off, Amp, Ext.	
• Amp Settings	Combination, CH, Mode, Lower - Level - Upper, Logic, Pulse	
Pre Trigger	0 to 100% (in 10% increments)	
Stop Settings		
• Source	Off, Amp, Ext.	
• Amp Settings	Combination, CH, Mode, Lower - Level - Upper, Logic, Pulse	

[Event] Settings

Function .... Specifies whether to enable or disable the capture of event data.

                                  Off: The capture of event data is disabled.

                                  On: The capture of event data is enabled.

Sampling Interval .... Specifies the sampling interval for the capture of event data.

2us	100us	50ms
4us	200us	100ms
5us	500us	200ms
8us	1ms	500ms
10us	2ms	1s
20us	5ms	
40us	10ms	
50us	20ms	

✓ CHECKPOINT

The maximum sampling interval depends on the number of data capture channels.

• When only 1 ch is used: 2 µs (4 µs)
• When 2 ch are used: 4 µs (8 µs)
• When 4 ch are used: 8 µs (20 µs)
• When 8 ch are used: 20 µs (40 µs)
• When 12 ch are used 40 µs (50 µs)
• When 16 ch are used: 40 µs (100 µs)

Note: The values in parentheses apply when there are temperature channels being used.

No. of block divisions
.... Specifies the number of memory blocks. (1 to 16 blocks)
If the number of memory blocks is small, the amount of data that can be captured is correspondingly large.

> **CHECKPOINT**
>
> If both the Sampling Interval and No. of block divisions settings are made, the "Max capture time/block" and "Max points/block" parameters are displayed.

<Event Trigger>
Start Settings

Source .... Specifies the start condition for the capture of event data.

> Off
> Amp
> Ext.

Off: The START/STOP key is used to initiate data capture.

Amp: The start of data capture is triggered when the condition specified for CH, Logic, or Pulse is satisfied.

Ext.: The start of data capture is triggered when a signal is input from an external trigger terminal.

Amp Settings (Edge)........... Specifies the conditions for the start of measurement.

Combination

OR: Measurement is started when one of the trigger conditions is satisfied.

ALL: Measurement is started when all of the trigger conditions are satisfied.

CH: Specifies the analog input channels.

Mode: Specifies the ↑, ↓, Win In, Win Out trigger condition.

Lower - Level - Upper
Specifies the levels for the trigger condition selected in Mode.
Logic: Specifies the L and H levels for each channel.

Pulse: Selects the slope for the specified channel.

Pre Trigger .... Specifies the effective range of the data before the trigger level.
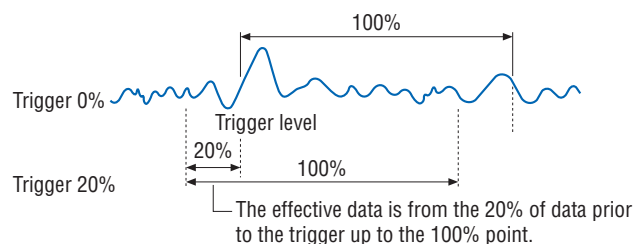
> **CHECKPOINT**
>
> The event data that is displayed when current data is replayed after data capture has been completed is in the form of a mark if a trigger was activated. The pre-trigger portion of the data captured is not displayed.

Stop Settings

Source .... Specifies the stop condition for the capture of event data.

> Off
> Amp
> Ext.

Off: The START/STOP key is used to stop data capture.

Amp: The stopping of data capture is triggered when the condition specified for CH, Logic, or Pulse is satisfied.

Ext.: The stopping of data capture is triggered when a signal is input from an external trigger terminal.

Amp Settings (Edge) .... Specifies the condition for the stopping of measurement.

Combination

OR: Measurement is stopped when one of the trigger conditions is satisfied.

AND: Measurement is stopped when all of the trigger conditions are satisfied.

CH: Specifies the analog input channels.

Mode: Specifies the $\uparrow$, $\downarrow$, Win In, Win Out trigger condition.

Lower - Level - Upper
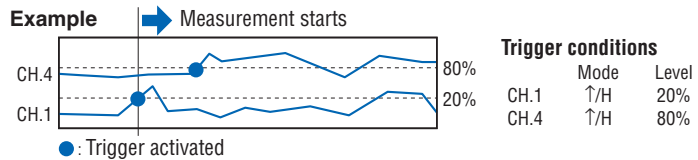　　Specifies the levels for the trigger condition selected in Mode.

Logic: Specifies the L and H levels for each channel.

Pulse: Selects the slope for the specified channel.

🏁 CHECKPOINT

EDGE OR
After all of the target channels have reached a level that does not satisfy the trigger condition, the start of measurement is triggered when any one of the target channels satisfies the trigger condition.

Example ➡ Measurement starts

CH.4		80%
CH.1		20%

● : Trigger activated

Trigger conditions

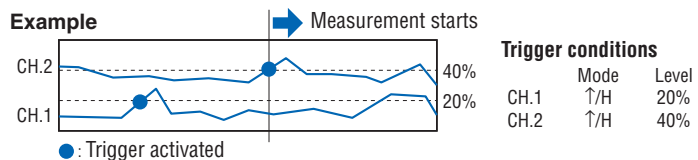|	Mode	Level
CH.1	$\uparrow$/H	20%
CH.4	$\uparrow$/H	80%

EDGE AND
After all of the target channels have reached a level that does not satisfy the trigger condition, the start of measurement is triggered when all of the target channels satisfy the trigger condition. Moreover, once a channel meets the trigger condition, it becomes a triggered channel.

Example ➡ Measurement starts

CH.2		40%
CH.1		20%

● : Trigger activated

Trigger conditions

	Mode	Level
CH.1	$\uparrow$/H	20%
CH.2	$\uparrow$/H	40%

---

④ CALC Settings

```
AMP  CRNT  EVNT  CALC  FILE  I/F  OTHR  INFO
[Calculation] Makes Stat./Arith. Calc settings
<Statistical>
No.: Function    CH
 1 :  Average    CH 1
 2 :  Max        CH 1
 3 :  P-P        CH 1
 4 :  RMS        CH 1
<Arithmetic> 1-3=Analog, 4=Pulse
 1 :  Off    CH 1  +  CH 1
 2 :  Off    CH 1  +  CH 1
 3 :  Off    CH 1  +  CH 1
 4 :  Off    LP 1  +  LP 1
Hint.The CH GROUP key displays the calc. results.
```

CALC Menu Structure

Setting		Selections available	Setting method
Statistical	Function	Average, Max, Min, P-P, RMS	ENTER→Select→ENTER
	CH	Channel specification	ENTER→Select→ENTER
Arithmetic		Off, On	ENTER→Select→ENTER
		Channel specification	ENTER→Select→ENTER
		+, −, *, /	ENTER→Select→ENTER
		Channel specification	ENTER→Select→ENTER

\<Statistical\>

These settings are used to determine the parameters for calculation processing.

Function .... There are five types of between-cursor calculation functions, and four of these can be selected.

```
Off
Average
Max
Min
P-P
RMS
```

Off: Calculation is not performed.

Average: The simple average value of the data being captured is displayed.

Max: The maximum value of the data being captured is displayed.

Min: The minimum value of the data being captured is displayed.

P-P: The peak value of the data being captured is displayed.

RMS: The RMS value of the data being captured is displayed.

$$R.M.S = \sqrt{\Sigma D^2/n} \qquad D: data \qquad n: number\ of\ data$$

Channel specification: Specifies the channels for calculation.

CHECKPOINT

- The calculation results displayed during data capture are displayed on the CALC screen.
- Statistical calculation can only be performed during data capture. The settings for statistical calculation of the captured data and actual execution of the calculation are made in the Readout Menu. For further details, see "Statistical Calculation" on page 3-36.

\<Arithmetic\>

The following settings are provided for performing arithmetic calculation of 2 channels.

Function .... Select the arithmetic operation from the 4 types shown below.

+: Adds the channel on the right to the channel on the left.

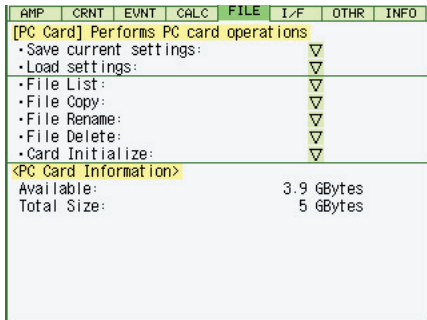− : Subtracts the channel on the right from the channel on the left.

*: Multiplies the channel on the left by the channel on the right.

/: Divides the channel on the left by the channel on the right.

⑤ FILE Settings

This menu is used to save or load the PCMCIA card settings, manage files, or return settings to their factory defaults

```
AMP   CRNT  EVNT  CALC  FILE  I/F   OTHR  INFO
[PC Card] Performs PC card operations
·Save current settings:              ▽
·Load settings:                      ▽
·File List:                          ▽
·File Copy:                          ▽
·File Rename:                        ▽
·File Delete:                        ▽
·Card Initialize:                    ▽
<PC Card Information>
Available:                   3.9 GBytes
Total Size:                    5 GBytes
```

FILE Menu Structure

Setting	Selections available	Setting method
Save current settings	Auto, User	ENTER→Select→ENTER
	File Name (when User) File: Folder name, File name	ENTER→Select→Execute
Load settings	Select File	ENTER→Select→Execute
File List	Select File	ENTER→Select→Execute
File Copy	Select file to load	ENTER→Select→Execute
	Select file to write	ENTER→Select→Execute
File Rename	Select file to change	ENTER→Select→Execute
	New file name	ENTER→Specify file→OK
File Delete	Select file to delete	ENTER→Select→Execute
Card Initialize	Format: Super floppy, HDD format	ENTER→Select→ENTER
	Type: Quick, Normal	ENTER→Select→ENTER
	Volume Label: Specify a volume label	ENTER→Specify file→Execute

Save current settings .... Saves the currently selected settings. When this parameter is selected, a submenu appears for selecting the save destination and file name.

```
Save Settings
Name Type : Auto ▼
Folder    :  Auto
             User

Execute      ▷
[ENTER]Select/[QUIT]Exit
```
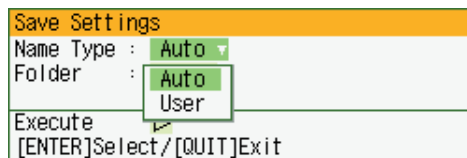
Auto: A file name is created using the date and time.

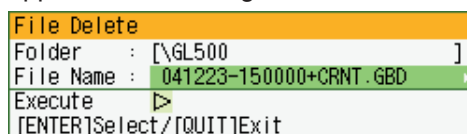User: The user-specified file name is saved.

Load settings .... Loads settings from the PCMCIA card. When this parameter is selected, a submenu appears for specifying the source and file name.

File List .... Displays a list of the files. When this parameter is selected, a submenu appears for browsing the folders and specifying files.

File Copy .... Copies the specified file. When this parameter is selected, a submenu appears for specifying the source file and the destination file.

File Rename .... Renames the specified file. When this parameter is selected, a submenu appears for selecting the file you wish to rename and its new file name.

File Delete .... Deletes the specified file. When this parameter is selected, a submenu appears for selecting the name of the file to be deleted.

```
File Delete
Folder    : [\GL500          ]
File Name : 041223-150000+CRNT.GBD ▶
Execute      ▷
[ENTER]Select/[QUIT]Exit
```

Card Initialize .... Reformats the PCMCIA card.

```
Card Initialize
Initialize mode:Drive Format
Format:           Super Floppy  ▼
Type:             Quick  ▼
Volume Label:                    ▶
Execute        ▷
[ENTER]Select/[QUIT]Exit
```

Format: Select from Super floppy and HDD-compatible format

Type:　 Select Quick Format or Normal Format

Volume Label:

　　This parameter specifies the volume label of the card to be reformatted. Specify a volume label of up to 11 characters.

PC Card Information .... Displays the volume of data on the PC card. No settings can be made here.

CHECKPOINT

- The file extensions used are as follows.
    - [*****.CND]:　　　　　Setting parameters file
    - [*****+CRNT.GBD]: CRNT (Current) binary file data
    - [*****+EV**.GBD]:　EVNT (Event) binary file data
        - EV** (Event) memory block number
    - [*****+CRNT.CSV]: CRNT (Current) text file data
- If a User file name that is the same as the name of an existing file is specified, "CP" will be added to the file name.
    - [*****_CP+CRNT.GBD]
- If data capture was made using the same file, the file will be saved as the original file name (up to 100 characters) with +CP added. For subsequent data capture operations, data will be saved to the last file (a 100-character file) by overwriting the existing data.
    - [***_rep***+CRNT.GBD]: captured data when On was selected for Repeat (Current Binary file data)
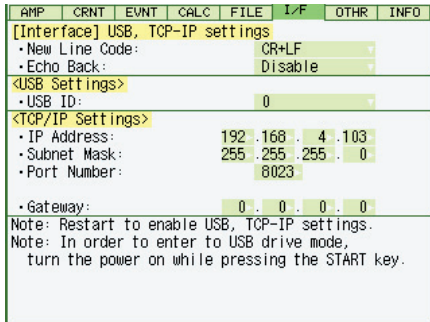   - [***_rep***+EV**.GBD]:　captured data when On was selected for Repeat (Event Binary file data)
- The file save destinations for current and event data will the locations specified as the data save destinations in the FILE menu.

⚠ CAUTION

Do not remove the PCMCIA card from the GL500 during a file operation. The GL500 may malfunction if the card is removed at this time.

⑥ I/F Settings

This menu is used to set the conditions for connecting the GL500 to your computer.

```
AMP  | CRNT | EVNT | CALC | FILE | I/F | OTHR | INFO
[Interface] USB, TCP-IP settings
·New Line Code:           CR+LF
·Echo Back:               Disable
<USB Settings>
·USB ID:                  0
<TCP/IP Settings>
·IP Address:       192 .168 . 4 .103
·Subnet Mask:      255 .255 .255 . 0
·Port Number:          8023

·Gateway:            0 . 0 . 0 . 0
Note: Restart to enable USB, TCP-IP settings.
Note: In order to enter to USB drive mode,
  turn the power on while pressing the START key.
```

I/F (Interface) Menu Structure

Setting	Selections available	Setting method
New Line Code	CR+LF, LF, CR	ENTER→Select→ENTER
Echo Back	Enable, Disable	ENTER→Select→ENTER
USB ID	0 to 7	ENTER→Select→ENTER
IP Address	Numeric setting	ENTER→Select→ENTER
Subnet Mask	Numeric setting	ENTER→Select→ENTER
Port Number	Numeric setting	ENTER→Select→ENTER
Gateway	Numeric setting	ENTER→Select→ENTER

New Line Code .... Sets the new line code. Select from CR+LF, LF, or CR.

Echo Back .... This function can be specified as Enable or Disable.

USB ID Setting .... Sets the ID number for the GL500. Specify a number from 0 to 7.

TCP-IP Settings .... Sets the TCP-IP.

                IP Address: Sets the IP address.

                Subnet Mask: Sets the subnet mask.

                Port Number: Sets the port number.

CHECKPOINT

- Be sure to restart the GL500 after making or changing the settings. If the equipment is used as it is, the computer connection may not be performed correctly.
- The USB drive mode function allows a PC to recognize the PC card inserted into the GL500 as an external drive. (Connect the GL500 to a PC, and then press the START key to turn on the GL500.)

⑦ **OTHR Settings**

Other miscellaneous settings are made here.

OTHR (Other) Menu Structure

Setting	Selections available	Setting method
Grid	Off, On	ENTER→Select→ENTER
Alarm Hold	Off, On	ENTER→Select→ENTER
Scale View Mode	1 Ch, All Ch, Off	
Confirm Start/Stop	Off, On	
Screen Saver	Off, 1, 2, 5, 10, 30, 60 min	ENTER→Select→ENTER
Power On Start	Enabled, Disabled	ENTER→Select→ENTER
Decimate waveform	Off, On	ENTER→Select→ENTER
Room Temp. Compensation	Internal, External	ENTER→Select→ENTER
Temp. Unit	°C, °F	ENTER→Select→ENTER
Date/Time	Date, time settings	ENTER→Select→Confirm
Language	Japanese, English (US), English (UK), French	ENTER→Select→ENTER
Return to default settings	Yes, No	ENTER→Select→ENTER

Grid .... The Grid parameter for display can be specified as either On or Off.

Off: Only the waveforms (without any grid) are displayed.

On: The waveforms are displayed on a grid.

Alarm Hold .... Specifies whether or not to hold the alarm generated.

* Alarm settings are made on the alarm setting section of the CRNT menu.

Off: Dose not hold alarm.

On: Holds until alarm is canceled.

* Cancellation is done in the alarm cancellation section of the CRNT menu.

Scale View Mode .... This parameter specifies the mode for scale display.

1 Ch: A scale is displayed for the specified channel.

All Ch: Scales for all the channels are displayed.

Off: Scales are not displayed.

Confirm Start/Stop .... This parameter is displayed when a trigger is used for the Start/Stop operations.

Off: The Start or Stop operation is enabled as soon as the START/ STOP key is pressed.

On: When the START/STOP key is pressed, a message asking you to confirm the Start/Stop operation is displayed.

Screen Saver .... Turns off the display if the GL500 is not operated within the specified interval, thus prolonging the product life of the display.

```
Off
1min
2min
5min
10min
30min
60min
```
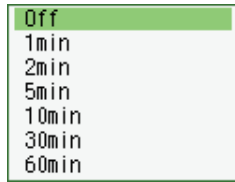
Off: The screen saver does not operate.

Time: The interval can be specified as 1, 2, 5, 10, 30, or 60 minutes.

Power On Start .... Initiates measurement as soon as the GL500 is turned on.

Disable: Disables the Power On Start function.

Enable: Enables the Power On Start function.

Decimate waveform .... This parameter displays sampled data if the TIME/DIV parameter is changed when captured data is displayed.

Off: Displays the captured data.

On: Displays sampled captured data. (The number of samples is determined automatically.)

Room Temp. Compensation

.... This parameter enables room temperature compensation settings when thermocouples are used. You can select from either Internal or External room temperature compensation.

Internal: The GL500's room temperature compensation settings are used.

External: Select this parameter when performing measurement using different compensation settings.

Note: The Internal setting is normally used.

Temp. Unit .... This parameter specifies the temperature unit.

°C: Celsius

°F: Fahrenheit

Date/Time .... This parameter sets the date and time. When this setting is selected, a submenu appears for setting the date and time.

```
Date/Time:
Date:     2005 -01 -21
Time:       15 :49 :16
Register ▷
[ENTER]select/[QUIT]Exit
```
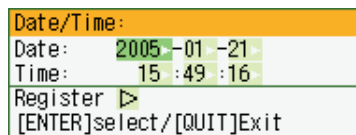
Language .... This parameter sets the GL500's display language.

```
Japanese
English(US)
English(UK)
French
```

Japanese: The display is in Japanese.

English US: The display is in English.

English UK: The display is in English.

French: The display is in French.

Return to default settings .... This parameter returns all the settings to the factory defaults.

```
Are you sure ?
_____
[ENTER]Yes/[QUIT]No
```
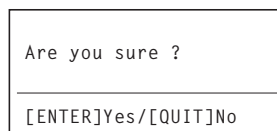
⑧ INFO Display

The GL500's system settings are displayed here. Use this window to check the version and other information.

```
| AMP | CRNT | EVNT | CALC | FILE | I/F | OTHR | INFO |
[Firmware]
 Main CPU Firmware:      Ver.2.00
[FPGA]
 Memory Control:         Ver. 3
[Network]
 MAC Address  :          00.03.76.00.00.00
```

3.4   Data Replay

Data captured at the GL500 can be replayed on the monitor, and various functions such as waveform search, statistical calculation, and data save can be performed. The functions of the keys vary according to the operation mode.

This section describes the keys used during replay. See Section 3.1 "Basic Settings and Measurement section". And please see the separate volume, "Easy! Measurement Guide – Main unit" for details of the data replay method.
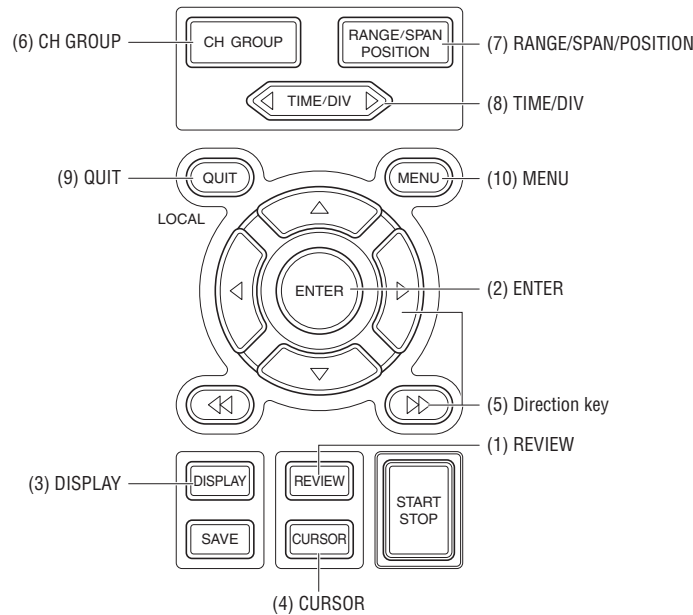
1. REVIEW

Press the REVIEW key on the free-running screen to replay captured data after the measurement operation has been completed.

There are three displays available: "2-screen View" "Current 1-screen View" and "Event 1-screen View".

• 2-screen View

Data between cursors (Selected channel data)
Event data capture block display   Pen number display area
Current data
Event data
Display position within the amount of captured data
Cursor positions
Data between cursors (Time)
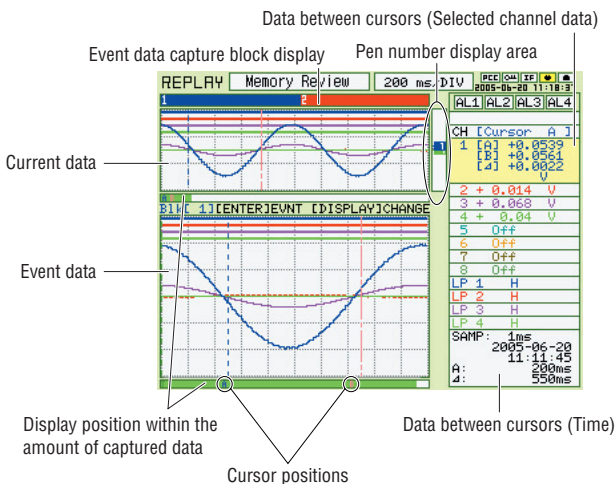
When data are captured to the main memory, the basic screen is 2-screen View.

* Excluding single replay of event files when the event function is off and a PCMCIA card is replayed. (In this case, 1-screen View)

• Both current and event screens are replayed. The former is displayed on the upper screen, and the latter on the lower screen.

* The screen with the pen number display area is effective. The current screen is effective in the figure to left.

• The color number displayed on the event data display area indicates the current area corresponding to the event data.
Waveforms in this area can be easily searched on both "Current to Event" and "Event to Current".

• Press the REVIEW key to switch to 1-screen view.

• The simplified message display area indicates:
When main memory data are replayed: "Memory data Review"
When PC card data are replayed: "PC Card data Review"

• Current 1-screen View

Simplified message display area

Span display
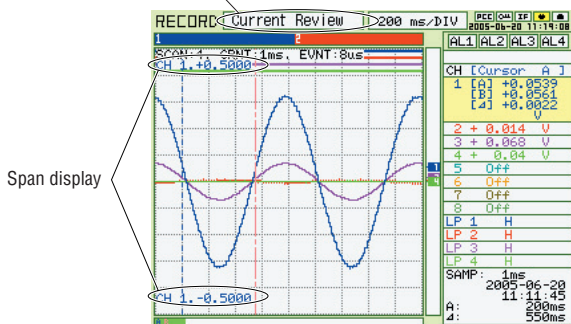
- Replays current waveforms on 1-screen.
- In case of 2-screen View, press the REVIEW key to switch to 2-screen View.
- Displays "Current data Review" on the simplified message display area.
- *Same applies to Main memory replay and PC card data replay.*

• Event 1-screen View

Event block display

Trigger position display
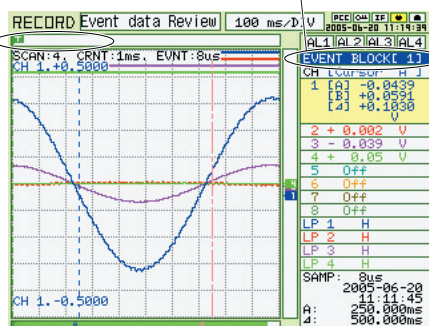
- Replays event waveforms on 1-screen.
- In case of 2-screen View, press the REVIEW key to switch to 2-screen View.
- Displays the event block number being replaying in the display area on the right area of the screen.
- *Event 1-screen View is not enabled for data captured when the event function is off.*
- Displays "Event data Review" in the simplified message display area.
- *Same applies to Main memory replay and PC card data replay.*

When the PCMCIA card is inserted into the main unit.

Press the REVIEW key on the free-running screen to display the message box below. Select the data to be replayed.
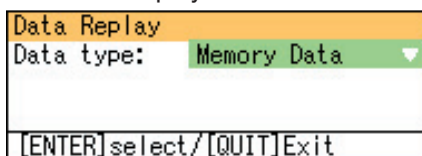
Setting	Selections available	Setting method
Data Type	Main memory PC card file	ENTER→Select→ENTER
Execute		

Moves from 2-screen view to each screen

<2-screen View (Current screen enabled)>

Event waveform search available area

<Current 1-screen View>

REVIEW key

Event waveform search
(Detailed waveform confirmation)

ENTER key

Current waveform search
(Overall event confirmation)

<2-screen View (Event screen enabled)>

Current waveform search available area

REVIEW key

<Event 1-screen View>
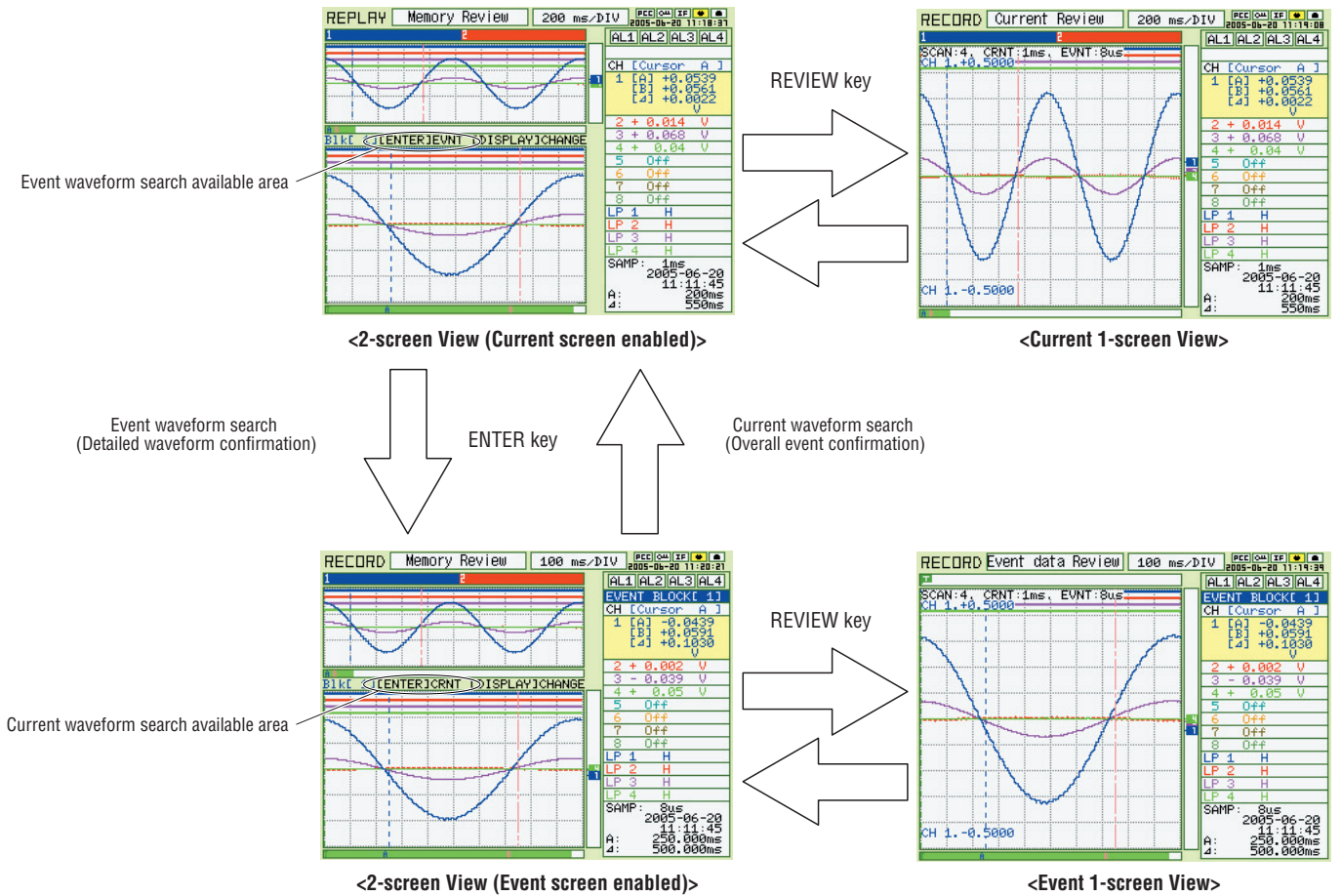
Descriptions of the marks displayed between the current and event screens in the 2-screen view mode

- Blk[*]: Indicates the event block number displayed on the event screen.
- [ENTER]EVNT: When it is displayed, press the ENTER key to search for event waveforms corresponding to the current waveform.
- ENTER]CRNT: When displayed, press the ENTER key to search current waveforms corresponding to the event.
- [DISPLAY]CHANGE: Switches the enabled screens between current and event.

2. ENTER

Makes a waveform search between current and event on 2-screen view.

Point the cursor at the waveform to make a search. Press the ENTER key to display the corresponding waveforms. (Either cursor A or B).

• Specifies each setting item on the Readout Menu.

*Readout Menu: Press the MENU key on the replay screen to display the Readout Menu. See Section 3.4 "Data Replay" for Readout.

Waveform search from Current to Event – Detailed waveform confirmation
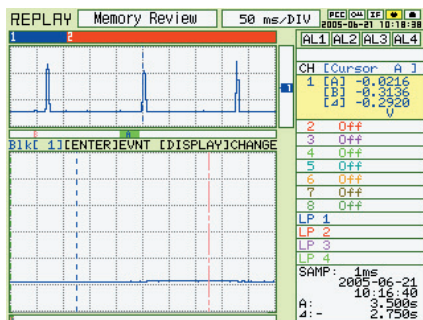
ENTER key
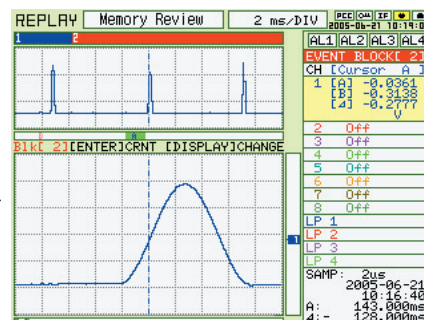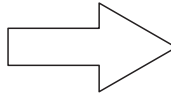
Point the cursor at the waveform to make an event search on the current screen. (Either cursor A or B. Cursor A is positioned in the figure above.)

Detailed waveform is displayed on the event screen. Waveforms that are difficult to confirm on the current screen can be recognized easily on the event screen.

Waveform search from Event to Current – Overall flow confirmation
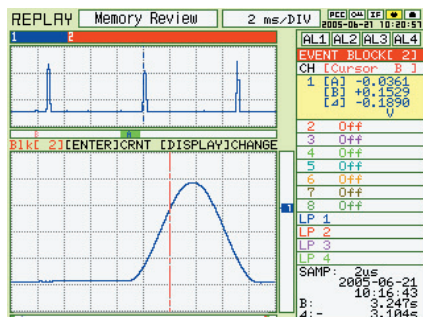
ENTER key
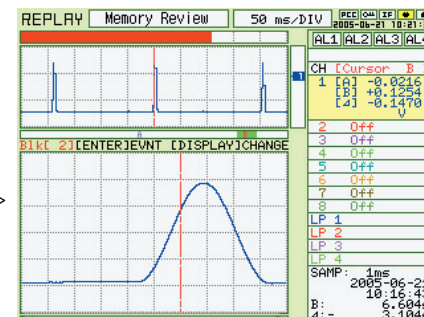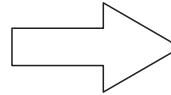
Point the cursor at the waveform to make a current search on the event screen. (Either cursor A or B. Cursor B is positioned in the figure above.)

Waveform corresponding to the event waveform is displayed on the current screen. The figure above indicates that the searched waveform was generated 6.604 seconds after measurement started.

CHECKPOINT

Note that search accuracy is not absolute accuracy.the computer connection may not be performed correctly.

Search accuracy varies according to sampling interval.

In the case above, the current sampling interval is 1 ms, and the event search accuracy has a margin of error of plus or minus 1 ms.

3. DISPLAY

Switches the enabled screen between current and event on 2-screen view. It is used mainly to switch screens in an area current/event waveform search is not enabled.

4. CURSOR

When cursor synchronization function is off on the Readout Menu, switches the cursor A and B. When the function is on, Cursor A and B are displayed,and are moved together using the direction keys.

* Readout Menu: Press the MENU key on the replay screen to display the Readout Menu. See Section 3.4 "Data Replay" for Readout.

5. Direction Key

Direction keys(◁▷△▽) .... Moves a cursor on the replay screen in the direction of the arrow.
The keys can scroll captured data, move a cursor, and select parameters on the menu.

Direction keys(◁◁ ▷▷) .... Scrolls captured data and moves a cursor at high speed.

6. CH GROUP

Each time the CH GROUP key is pressed, a group (unit) is changed. The number of channels depends on the type of terminal block unit.
Press the CH GROUP key when CALC is set to display arithmetical operation display data.
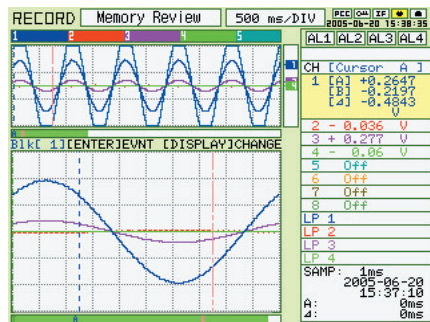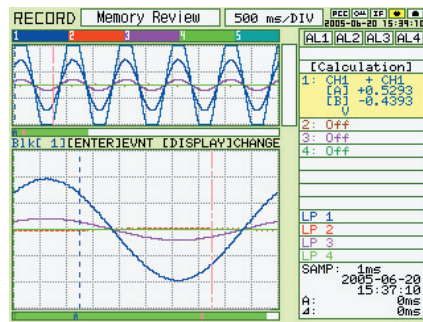
Replay basic screen   **Calculation screen (Arithmetical operation)**

7. RANGE/SPAN/POSITION

Switches [Display/Non-display] and changes [SPAN] and [POSITION] of the replayed waveform data for each channel individually.

Selecting items

Each time the RANGE/SPAN/POSITION key is pressed, the replay setting screen is changed. (e.g. 2-screen Review)

Replay basic screen → TRACE setting screen → SPAN setting screen → POSITION setting screen
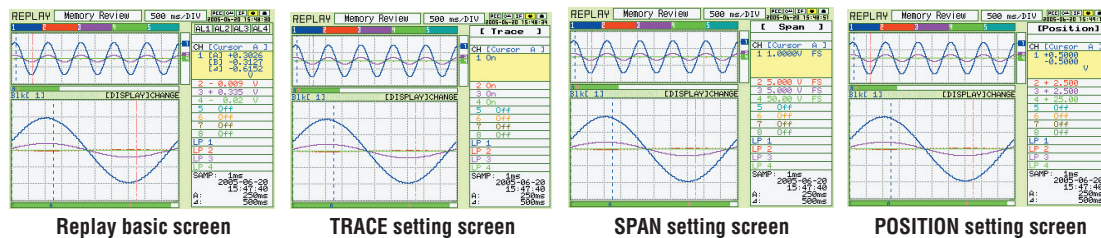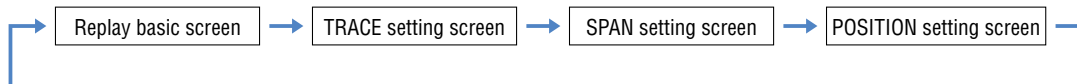
| Replay basic screen | TRACE setting screen | SPAN setting screen | POSITION setting screen |

Setting procedures

Use the DIRECTION keys to move and select the settings.

CH setting

Selecting (setting)
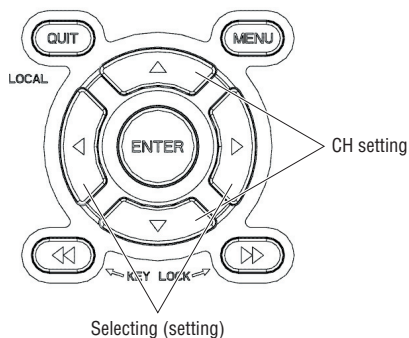
- **TRACE**

  Switches Display/Non-display of a replayed waveform.

- **SPAN**

  See Section (2) RANGE/SPAN/POSITION of 3.1 "Basic settings and Measurement".

- **POSITION**

  See Section (2) RANGE/SPAN/POSITION of "3.1 Basic

8. TIME/DIV

Section (3) TIME/DIV of 3.1 "Basic settings and Measurement".

9. QUIT

Use the QUIT key for operations such as those described below.
- To switch a replay screen to a free-running basic screen.
- To close a selected screen.
- To stop operation according to the message displayed on the Readout Menu
- To close each screen such as TRACE screen and calculation screen,and return to a basic replay screen.

10. MENU

Press the MENU key on the replay screen to open the Readout Menu (Data processing selecting).

Readout Menu

Press the Menu key after the data has been replayed to display the Readout Menu. Various functions for processing data are specified in this menu.
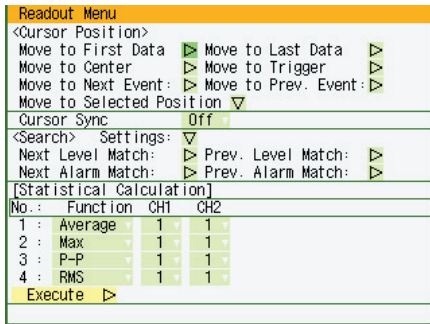
Readout Menu Structure

Setting	Selections available	Setting method
Cursor Position		
Move to First Data		
Move to Last Data		ENTER
Move to Center		
Move to Trigger		
Move to next event	Enabled during 2-screen review and current 1-screen review.	ENTER→Select→ENTER
Move to previous event	(Not enabled during event 1-screen review)	
Move to Selected Position	Method: Position, Time, Event	ENTER→Select→ENTER
	Move to: (In the case of POSITION) Between upper and lower limits	ENTER→Specify numeric value →ENTER
	Move at: (In the case of TIME) Specified time	ENTER→Specify numeric value →ENTER
	Move to: (Event) Specifies event block	ENTER→Select→ENTER
	Execute	ENTER
Cursor synchronization	on, off	ENTER→Select→ENTER
Search		
Search Settings		
Level Settings	CH, Mode: Off, H, L, Win In, Win Out LP, Mode Logic: X. L, H Pulse: Off, H, L, Win In, Win Out Combination: OR, AND	ENTER→Select→ENTER
Alarm Settings	Output No.: 1 to 4 Slope: Both, H, L	ENTER→Select→ENTER
	Register	ENTER
Next Alarm Match	Enabled when current data alarms have been captured	ENTER→Select→ENTER
Prev. Alarm Match		
Next Level Match		
Prev. Level Match		
Statistical Calculation		
Function	Off, Average, Max, Min, P-P, RMS	ENTER→Select→ENTER
CH	CH1: Select channel, CH2: Select channel	ENTER→Select→ENTER
	Execute	ENTER

Cursor Position .... The following functions can be selected for Cursor Position.

Move to First Data: Moves the cursor to the start of the data.

Move to Last Data: Moves the cursor to the end of the data.

Move to Center: Moves the cursor to the center of the data.

Move to Trigger: Moves the cursor to a trigger point in the data.

Move to next event: Move a cursor to the position of the next event.

Move to previous event:

Move a cursor to the position of the previous event.

Move to Selected Position:

Moves the cursor to the specified position.

```
Position
 Time
```

• Position: Moves the cursor at the specified time interval from the start of measurement. The interval is specified in 0.1-s units up until the end of measurement.

```
Move to Selected Position
Method:        Position ▼
Move to:    +       0.000   s
[Information]
Start Point:       +0.000   s
End  Point:       +57.707   s
Execute      ▷
[ENTER]Select/[QUIT]Exit
```

• Time: Moves the cursor to the specified date and time.

```
Move to Selected Position
Method:        Time      ▼
Move at:    2004-12-23 14:57:57▽
[Information]
Start Point:  Dec 23 2004 14:57:57
End  Point:   Dec 23 2004 14:58:54
Execute      ▷
[ENTER]Select/[QUIT]Exit
```

• EVENT: Specifies and moves event blocks to be moved.

(Not enabled during event 1-screen Review)

```
Move to Selected Position
Method:        Event     ▼
Event block:  1  ▼



   Execute   ▷
[ENTER]Select/[QUIT]Exit
```

Cursor synchronization .... Sets the switch of cursor synchronization

• off: Asynchronous cursor mode

Press the CURSOR key to switch the cursors A and B, and the DIRECTION keys to move the effective cursors.

• on: Synchronous cursor mode

Two cursors move together in parallel.

Search .... Searches can be made for a data position that satisfies the specified Level condition, the specified Alarm condition, and conditions which satisfy specific search conditions within the captured data.

• Level Search

CH: Selects the channels used for setting the Level condition.

Mode: Selects the condition from Off, H, L, Win In or Win Out.

Lower-Level-Upper:
        Sets the search levels for captured data.

LP

  When pulse data has been captured:
        Selects the channel for setting the pulse level.

  When logic data has been captured:
        Sets the search conditions.

Combination:
        Selects the method, OR or AND, for setting the CH and LP conditions.

• Alarm Search

Alarm output number:
        Specify the number that has been set for the alarm settings (1 to 4).
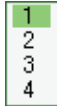
Alarm slope:
        Specify the generation condition for the alarm search.

Both: Both rising and falling

H: Rising only

L: Falling only

• Conditions which satisfy specific search conditions

Next Alarm Match: Moves the cursor to the next alarm position.

Prev. Alarm Match: Moves the cursor to the previous alarm position.

Next Level Match: Moves the cursor to the next level position.

Prev. Level Match: Moves the cursor to the previous level position.

Next Event Match: Moves the cursor to the next event position.

Prev. Event Match: Moves the cursor to the previous event position.

Statistical Calculation.......... Statistical calculation is performed on the replay data between the cursors.

Function:
        There are five types of between-cursor calculation functions, and four of these can be selected.
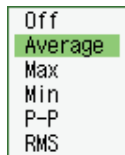
Off: Calculation is not performed.

Average:
        The simple average value of the data between the cursors is displayed.

Max: The maximum value of the data between the cursors is displayed.

Min: The minimum value of the data between the cursors is displayed.

P-P: The peak value of the data between the cursors is displayed.

RMS: The RMS value of the data between the cursors is displayed.

$$R.M.S = \sqrt{\Sigma D^2/n} \qquad \text{D: data} \qquad \text{n: number of data}$$

Channel specification:

Specify the two channels that you want to perform calculation for as CH1 and CH2. After all the conditions have been set, select Execute to display the between-cursor calculation results.

```
Calculation Results
1: Average
 CH 1: + 216.3  mV
 CH 1: + 216.3  mV
2: Max
 CH 2: + 23.53  mV
 CH 1: + 222.1  mV
3: P-P
 CH 3: + 0.025  V
 CH 1: + 14.1   mV
4: RMS
 CH 4: + 0.004  V
 CH 1: + 216.4  mV
[QUIT]key to close.
```

Save to Card (Between Cursors) *Note: Enabled when the Replay screen is displayed*

.... The specified replay data between the cursors can be saved to a specified file format.

File Type: Specifies the file format for saving data.

```
Data Save Destination
File Type :  GBD  ▼
Name Type :  GBD
Folder    :  CSV

Register     ▷
[ENTER]Select/[QUIT]Exit
```

• GBD: Binary format

• CSV: Excel format

Name Type: There are two methods: Auto or User.

```
Data Save Destination
File Type :  GBD  ▼
Name Type :  Auto ▼
Folder    :  Auto
             User
Register     ▷
[ENTER]Select/[QUIT]Exit
```

Folder: When Auto has been selected, a folder name is created.

File Name: When User has been selected, a new folder and a new file are created here.

⚠ CAUTION

Data can only be saved if it has been captured to a PCMCIA card (data storage media). Data saved to the internal memory will be erased when the power is turned off.

CHAPTER 4

Software

This chapter describes the software installation.

4.1 System Requirements

Make sure that the computer on which you plan to install the software meets the following requirements.

Item	System requirements
OS	Windows 2000, XP
CPU	Pentium 4 or higher
Memory	At least 256 MB (512 MB recommended)
HDD	100 MB (1 GB recommended) additional space required for installing the application software
Display	1024 x 768 resolution or higher 65535 colors or more (16-bit or more)
Other	TCP-IP port, USB port, CD-ROM drive (for installing from CD) USB 2.0 required for high-speed applications

CHECKPOINT

Even when using a PC that meets the system requirements, measurement data may not be captured correctly depending on the PC status (e.g. running other applications or the storage media used). Exit all other applications before capturing data to the internal hard disk.

4.2   Installing the USB Driver

This section describes how to install the USB driver.

Checking the version of your USB driver

This section describes how to view the version of the USB driver if it is already installed.

(1) Opening "Device Manager"
     Select "Control Panel" → "System" → "Hardware" tab or right-click "My Computer", select "Properties" → "Hardware" tab → "System Properties" window, then click the "Device Manager".

(2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".

(3) Updating the driver
     Select the "Driver" tab and click the "Driver Details" button.

(4) Select [...\GTCUSBR.SYS] to view the version of the driver file.

Installing the USB Driver

This section describes how to install the USB driver.

(1) Insert the User's Guide CD-ROM provided as a standard accessory into the PC CD-ROM drive.

(2) Connecting the GL500 to the PC.
Connect the GL500 to the PC using the USB cable, and then turn the power on.

(3) Install the USB driver. The installation procedure depends on the type of operating system and whether or not you are installing the driver for the first time.
Windows XP: Driver software is to be installed for the first time.
                      Driver software is already installed.
Windows 2000: Driver software is to be installed for the first time.
                      Driver software is already installed.

Windows XP: Driver software is to be installed for the first time.

Installing the USB driver

(1) Detecting the hardware
Connect the USB cable to the PC and GL500. The "Found New Hardware" message appears.

(2) Starting the wizard
In the "Found New Hardware Wizard" window, select "Install from a list or specific location (Advanced)" under "What do you want the wizard to do?" and click "Next".

(3) In the "Please choose your search and installation options." window, select "Don't search. I will choose the driver to install." and click "Next".

(4) In the "Select the device driver you want to install for this hardware." window click "Have Disk".

(5) In the "Install from Disk" window, browse the CD-ROM under "Copy manufacturer's files from", select "USB DRIVER" → "GTCUSBR.INF" and click "OK".

(6) In the "Select the device driver...." window, "Graphtec DM/GL/WR Series USB Driver" appears in the "Model" box. Select it and click "Next".

(7) Installing the driver
Windows XP starts installing the driver.

(8) Completing installation
The "Completing the Found New Hardware Wizard" window appears. Click "Finish" to exit the wizard.

### Windows XP: Driver software is already installed.

Updating the USB driver

(1) Opening "Device Manager"
Select "Control Panel" → "System" → "Hardware" tab or right-click "My Computer", select "Properties" → "Hardware" tab → "System Properties" window, then click the "Device Manager" button.

(2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".

(3) Updating the driver
Select the "Driver" tab and click "Update Driver".

(4) Starting the update wizard
The "Hardware Update Wizard" appears. Select "Install from a list or specific location (Advanced)" under "What do you want the wizard to do?" and click "Next".

(5) In the "Please choose your search and installation options." window, select "Don't search. I will choose the driver to install." and click "Next".

(6) In the "Select the device driver you want to install for this hardware." window, click "Have Disk".

(7) In the "Locate File" window, browse the CD-ROM, select "USB DRIVER" → "GTCUSBR.INF" and click "Open".

(8) Return to the "Select the device driver..." window and click "Next".

(9) Installing the driver
Windows XP starts installing the driver. Depending on the OS setting, "The software you are installing for this hardware has not passed Windows Logo Testing to verify its compatibility with Windows XP" message may appear. Simply click "Continue Anyway".

(10) Completing the Installation
The "Completing the Hardware Update Wizard" window appears. Click "Finish" to exit the wizard.

Windows 2000: Driver software is to be installed for the first time.

Installing the USB driver

(1) Starting the wizard
Connect the USB cable to the PC and the GL500. The "Found New Hardware" wizard appears.

(2) In the "Found New Hardware Wizard" window, select "Search for a suitable driver for my device (Recommended)" under "What do you want the wizard to do?" and click "Next".

(3) In the "Locate Driver File" window, select "CD-ROM drive" under "Optional search locations" and click "Next".

(4) Browse the CD-ROM, select "USB DRIVER" → "GTCUSBR.INF" and click "OK".

(5) "The wizard found a driver" message appears. Click "Next".

(6) Completing installation
The "Completing Found New Hardware Wizard" window appears. Click "Finish" to exit the wizard.

Windows 2000: Driver software is already installed.

Updating the USB driver

(1) Opening "Device Manager"
Select "Control Panel" → "System" → "Hardware" tab or right-click "My Computer", select "Properties" "Hardware" tab "System Properties" window, then click the "Device Manager" button.

(2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".

(3) Updating the driver
Select the "Driver" tab and click "Update Driver".

(4) Starting the update wizard
"Upgrade Device Driver Wizard" appears. Click "Next".

(5) In the "Install Hardware Device Drivers" window, select "Display a list of the known drivers for this device so that I can choose a specific driver." under "What do you want the wizard to do?" and click "Next".

(6) In the "Select a Device Driver" window, click "Have Disk".

(7) In the "Locate File" window, browse the CD-ROM, select "USB DRIVER" → "GTCUSBR.INF" and click "OK".

(8) Return to the "Select a Device Driver" window and click "Next".

(9) In the "Start Device Driver Installation" window, click "Next".

(10) Completing installation
The "Completing the Upgrade Device Driver Wizard" window appears. Click "Finish" to exit the wizard.

4.3 Connecting to a PC

The GL500 can be connected to a PC via a LAN cable or a USB cable.

Connection Using a LAN Cable

Use a LAN cable to connect the GL500 to a PC.
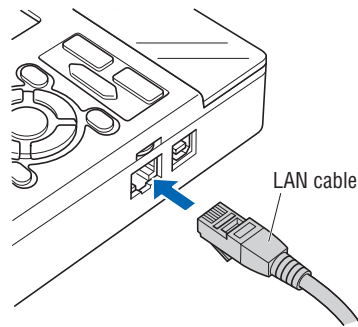
LAN cable

Connection Method

When connecting the GL500 directly to a PC, use a cross type LAN cable.

LAN cable (cross)
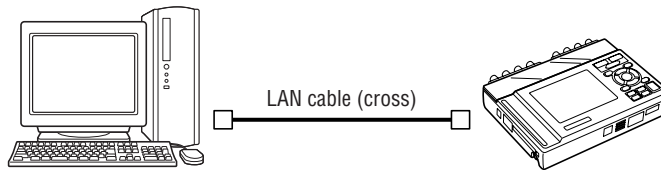
Connection Using a USB Cable

Use a USB cable to connect the GL500 to a PC.

USB cable

CHECKPOINT
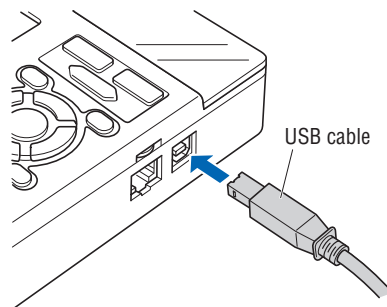
When using a USB cable, a USB driver must be installed in the PC. See Section 4.2, "Installing the USB Driver" for the installation procedure.

Connection Method

When connecting the GL500 directly to a PC, use an A-B type USB cable.

USB cable (A-B type)
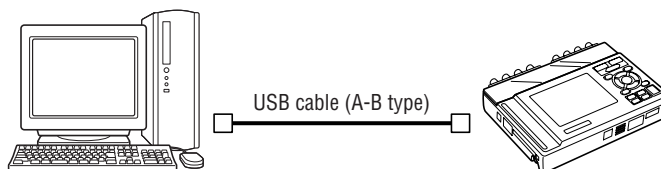
4.4   Installing the GL500 Application Software

This section describes how to install the application software and the system setting tools used to control and set the GL500.

(1) Insert the User's Guide CD-ROM provided into the PC CD-ROM drive.

(2) Click the Taskbar's Start button, and then click the Run... icon to open the "Run" window.

(3) Enter the CD-ROM drive name and \English\GL500 Application\SETUP.EXE as the name of the file you wish to open. If the disk is in drive D, for example, enter "D\English\GL500 Application\SETUP.EXE" in the box to launch the installer.

(4) Continue, following the instructions on the screen.

CHECKPOINT

Be sure to observe the following points when connecting the GL500 to a PC.

- Do not connect any devices apart from a mouse or a keyboard to any of the other USB terminals on your PC.
- Set the PC's power-saving functions to Off.
- Set the Screen Saver to Off.
- Set the anti-virus software auto update and scan scheduler functions to Off. Also, set the Windows auto update and scheduler functions to Off.

4.5　Setting the IP Address and Device ID

The GL500 Configuration Tools window is used to set the IP address and Device ID. These can also be set using the GL500. For details, see Chapter 3, "Settings and Measurement".

IP Address:	Used when performing measurement via a network.
Sub Net Mask:	Used when performing measurement via a network.
Mac Address:	Used to confirm the Mac address.
Port Number:	Used when performing measurement via a network.
Device ID:	Used when performing measurement via USB.
Firmware Version:	Used to check each version number.

CHECKPOINT

- When setting the IP address, port number, or device ID using the Configuration Tools, the GL500 should be connected directly to the PC using a USB cable.
- When using multiple GL500 units, they should each be connected separately, and not via a USB hub.
- When connecting via LAN, make the settings outlined below and then ensure that the computer's system requirements are met before making the connections.

(1) Connect the GL500 to the PC using a USB cable.
Select "Start" → "Programs" → "GL500 Application" → "GLCONFIG.EXE" to launch the GL500 Configuration Tools and display the window as shown below.
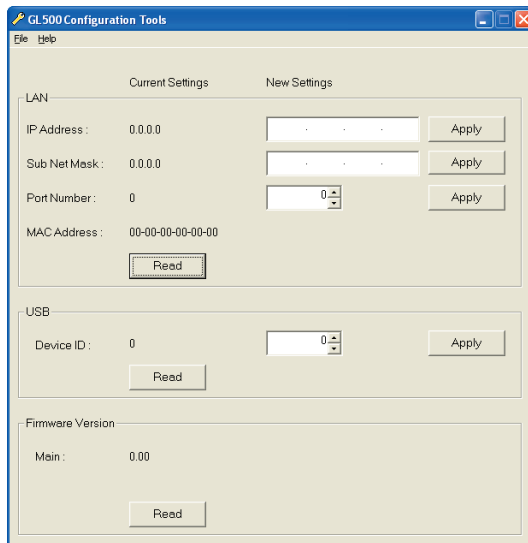
(2) LAN Settings
Click "Read" to display the current settings. To set a new IP Address, Subnet Mask and/or Port Number, enter the new settings and then click "Apply".

(3) USB Setting
Click "Read" to display the current setting. To set a new Device ID, enter the new Device ID number and then click "Apply".

(4) Firmware Version
Click "Read" to display the Main version number. Use this function to check the version number of your equipment.

(5) When all the settings have been completed, exit from GL500 Configuration Tools.

4.6   Menu Configuration and System Settings

Starting the Application Software

Click "Start" → "Programs" → "GL500 Application" to launch the application software. Once the program has started up, the following window is displayed.

(22) X Axis Width
(5) GL500   (6) GL400/350   (7) GL500 + GL400/350   (21) X Axis Format   (23) Capture Interval
(1) Connect   (2) Review PC   (3) Print   (10) Settings   (11) Start   (12) Stop   (4) EXIT
(8) Status Display
(9) Info Message
(15) X-T
(8) Status Display
(17) X-Y
(18) FFT
(19) Past/Current
(20) Y Axis Range
(13) Review Device
(14) Calculation
(24) Alarm
(25) Logic
(26) Generated Event Log
(27) Alarm History
(31) Current data   (30) Display of Current data between cursors   (29) Cursor Info   (28) Monitor

Menu Configuration

Menu Name	Selections	
(1) Connect	Connection method	GL500, GL400/350
	Connect, Disconnect, Save Conditions, Load Conditions	
	State	USB, TCP-IP
		USB ID
		IP Address, Port, Subnet Mask
(2) Review PC	Open File	
	Superimpose	
	Convert then Save	File Path: Format, Path
		Data: All, Cursor
		Spot Samples: Off, Select from 2 to 1000 points
	Display in Excel	Data: All, Cursor
		Spot Samples: Off, Select from 2 to 1000 points
	Print	
(3) Print		
(4) EXIT		
(5) GL500		
(6) GL400/350	Settings (only when the GL400 or GL350 is connected)	
(7) GL500 + GL400/350	Only when the GL500 and a GL400 or GL350 model are both connected.	
(8) Status Display	Stopped, Armed, Recording, Free Running	
(9) Info Message	Start Time, Capture Time, Capture Interval	

Menu Name		Selections
(10) Settings	AMP	Number, Event Max. Speed Sampling
		Select CH (From 1-8 to 9-16)
		Analog AMP Settings: All CH, Line Color, Annotation, Input, Range, Filter, Span Upper Limit, Span Lower Limit, Unit
		Logic, Pulse Settings: Logic/Pulse (Off, Logic, Pulse)
		Logic Settings: CH, Line Color, Filter
		Pulse Settings: Input, CH, Line Color, Range, Filter, Slope
	Current	Device Settings: Sampling Interval (USB 2.0: 1 ms, USB 1.0, TCP-IP: 10 ms)
		PC Card Settings: File Name, File Path
		Trigger Settings: Start (Function), Stop (Function), Trigger Repeat
		Amp Trigger Settings: Select CH, Start Trigger, Stop Trigger, Combination
		Alarm Settings: Select CH, Function, Upper, Lower, Alarm Output, Combination
	Event	Event: Function, Auto Save to PC after Capture, Sampling Interval, No. of Memory Block Divisions, Capture Time per Block
		Event Trigger Settings: Start Trigger (Source, CH, Function, Upper, Lower, Unit, Pre-trigger, Combination) Stop Trigger (Source, CH, Function, Upper, Lower, Unit, Combination)
	File	PC Data Capture Settings: File Name, Auto File Name, Format, File Path
		Auto Backup Settings: Create Backup File, Backup Interval
		PC card operation at the device: Data Transfer, Copy File, Delete File, Delete Folder, Format
	Scaling	Select CH: From 1-8 to 9-16 • Meas. Output: CH, Function, Upper, Lower, Unit • Scaling Output: CH, Upper, Lower, Unit
		Pulse Settings • Meas. Output: CH, Function, Upper, Unit • Scaling Output: CH, Upper, Unit
	Arithmetic, XY, FFT	Stat Calc: Statistics
		Arithmetic Operation: Func., Line Color, CH A, Operator, CH B
		XY: Disp, Line Color, X Axis, Y Axis
		FFT: Disp, CH, Window, dB Specification, Averaging Mode, Weighted Average Mode, Number of Averages
	Other	Synchronize PC and device clocks, Room Temp. Compensation, Power On Start, Store the settings to the GL500, Temp. Unit, Sampled Waveform Display, Factory Default Settings
		Send E-Mail: Send Email when alarm is generated, Mail Address, Comments, SMTP Server, Sender Mail Address
	Information	Version, Device Information
(11) Start		
(12) Stop		
(13) Review Device	Open File	Device, Path, Create Folder, Delete, Device Memory Data
	Convert then Save	File Path: Format, Path
		Data: All, Cursor
		Spot Samples: Off, Select from 2 to 1000 points
	Open in Excel	Data: All, Cursor
		Spot Samples: Off, Select from 2 to 1000 points
(14) Calculation		
(15) Y-T		
(16) Digital View	1-16, Pulse 1 to Pulse 4	
(17) X-Y		
(18) FFT		
(19) Past/Current		
(20) Y Axis Range	Range 1: Analog CH, Pulse	
	Range 2: Analog CH, Pulse	

Menu Name	Selections
(21) X Axis Format	Relative Time, Absolute Time
(22) X Axis Width	10 s to 24 h
(23) Capture Interval	
(24) Alarm	1 to 4
(25) Logic	1 to 4
(26) Generated Event Log	Double-click to display
(27) Alarm History	Enabled when an alarm is generated
(28) Monitor	CH, Color, Level
(29) Cursor Info	Enabled when cursors are displayed
(30) Display of Current data between cursors	
(31) Current Data	

4.7   PC Connection Settings

The GL500 can be connected to a computer via USB or TCP-IP (LAN). Make the setting required for connection in the Connect window.

Click the "Connect" button on the main screen to display the Connect window.
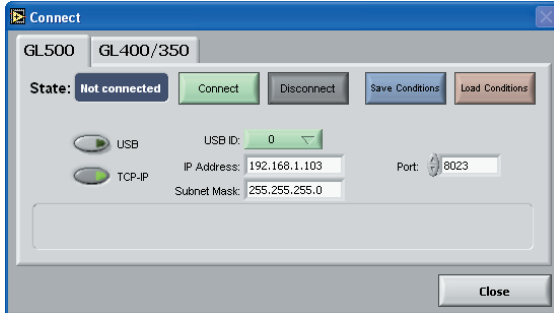
Select GL500 or GL400/350.

Select USB or TCP-IP.

• USB
  USB ID: Set the ID number for the GL500 connected (when using the USB interface)

• TCP-IP
  IP Address: Set the IP address for the GL500 connected (when using the TCP-IP connection).

  Port: Set the port number for the GL500 connected (when using the TCP-IP connection).

Connect: Click the "Connect" button to connect the GL500 to the computer when all the settings have been made. If "OK" is displayed for "State", click the "Close" button to make the connection.

CHECKPOINT

If the connection parameters have not been set correctly, "NG" is displayed for "State". Set the parameters correctly, and then click the "Connect" button once again.

Disconnect: Click this button to cancel the Connect status. If the GL500 is not connected and this button is clicked, "Not connected" will be displayed for "Status".

Save Conditions: Click this button to save the setting conditions. Please specify the file name and save destination. The file name will have a .cfg extension.

Load Conditions: Click this button to load previously-saved setting conditions.

4.8   Application Software Measurement Example

The following procedures explain how to perform measurement using your computer and the application software provided. For these explanations, the USB cable is used to connect the GL500 to the computer.

1. Connecting to Your PC

Connect the GL500 to your computer. For the connection method, see Section 4.3, "Connecting to a PC", and Section 4.7, "PC Connection Settings".

2. Inputting Signals

(1) Connect the signal input cables to the input terminal unit(s). For details on the connection procedure, see Section 2.11, "Connecting the Signal Input Cables to the Input Terminal Unit".

(2) Turn on the GL500's power switch.

(3) Check that waveforms are being displayed on the GL500 monitor. The waveforms may be straight lines, depending on the input signals and the setting ranges used.

3. Launching the Application Software

(1) Launch the GL500 application software.

(2) Click the "Connect" button on the main screen to display the Connect window, and then make the required settings.
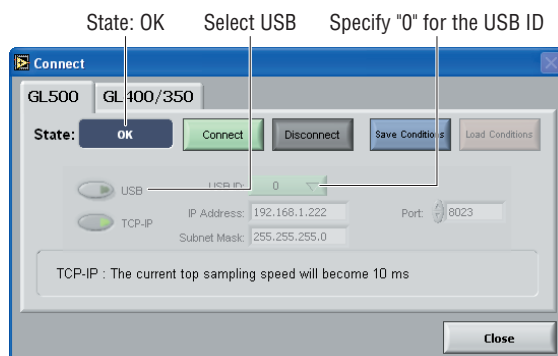
• Select USB

• Specify "0" for the USB ID

(3) Click the "Connect" button. If the connection is successful, "OK" is displayed for "State".

(4) Click the "Close" button to return to the main screen.

4. Setting the Parameters

(1) Waveforms of the input signals are displayed on the main screen.

Settings

Click the "Settings" button.

(2) AMP Settings
The screen changes to a parameter settings screen. Select the "AMP" tab to display the "AMP" setting screen.

Number of data capture channels   Input   Range   Filter
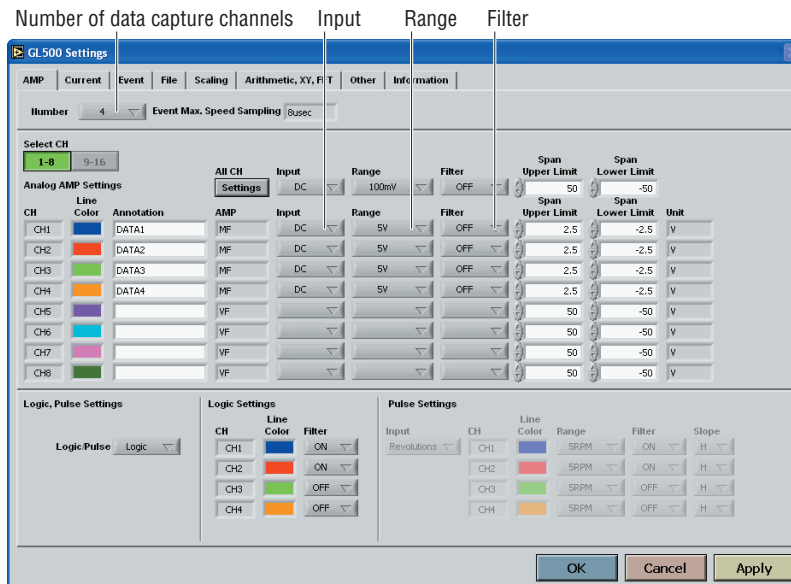
Specify the number of data capture channels for "Number". Use the number of input signals for this value.
Make the "Input", "Range", and "Filter" settings for the selected channels. In the screen displayed above, the following settings were made.

- Input: DC
- Range: 5V
- Filter: OFF

(3) Current Settings
Select the "Current" tab to display the "Current" setting screen.

Sampling Interval   Data Capture Settings
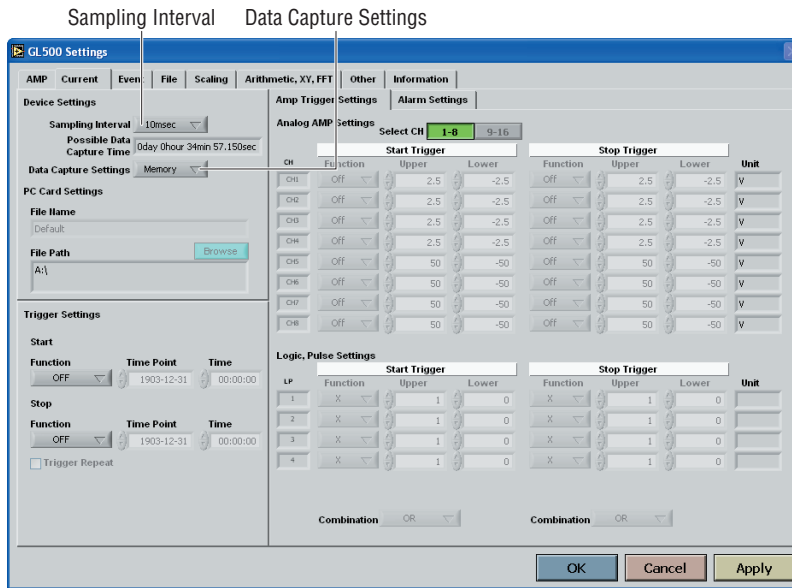
Make the "Sampling Interval" and "Data Capture Setting" settings. In the screen displayed above, the following settings were made.

• Sampling Interval: 10 ms

• Data Capture Settings: Memory

(4) Event Settings
Select the "Event" tab to display the "Event" setting screen.

Function   Sampling Interval   No. of Memory Block Divisions
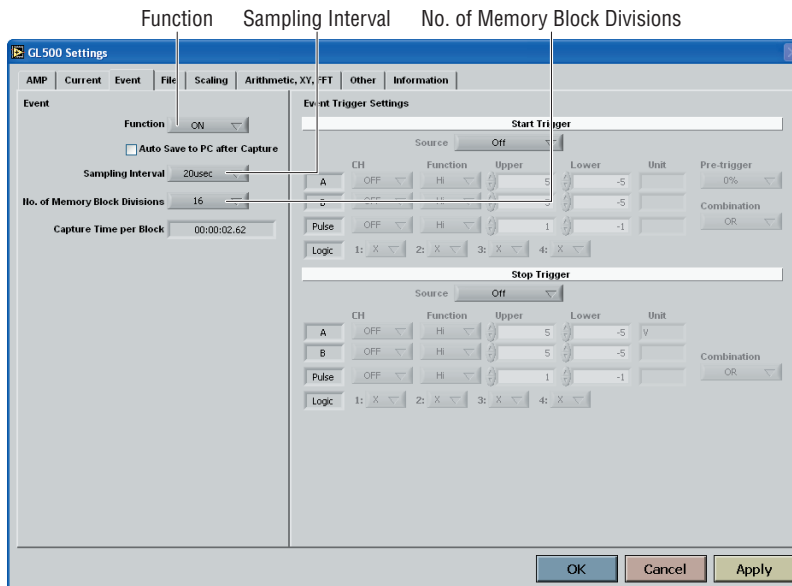
Make the "Function", "Sampling Interval", and "No. of Memory Block Divisions" settings. In the screen displayed above, the following settings were made.

• Function: ON

• Sampling Interval: 20 μsec

• No. of Memory Block Divisions: 16

(5) File Settings
Select the "File" tab to display the "File" setting screen.

Auto File Name   File Path
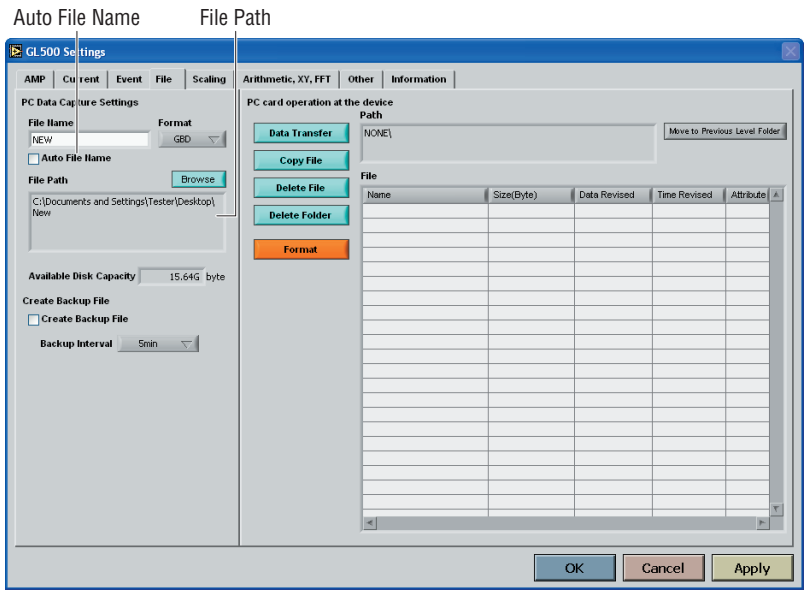
Make the "Auto File Name" and "File Path" settings for data capture at the PC. In the screen displayed above, the following settings were made.

• Auto File Name: Checked (Enabled)

• File Path: PC save location specified

(6) Ending a Setting Operation
Click the "Apply" button, and then the "OK" button to return to the main screen.

5. Capturing Input Data

(1) Press the "Start" button to start data capture.

(2) The captured waveforms and the memory capture status are displayed.

Captured waveforms   Start

Memory capture status
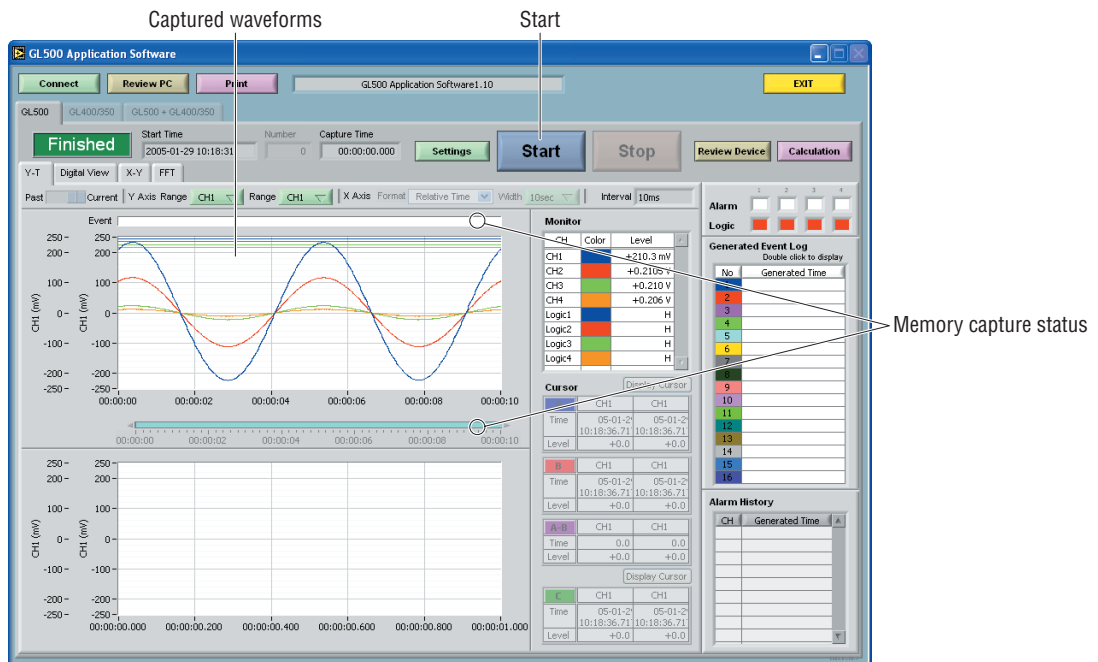
(3) Displaying current data
Select "Current" from the "Past/Current" selections. Current data is displayed on the screen.
Past data between the cursors is displayed in the lower part of the screen.

Current   Cursors   Current data
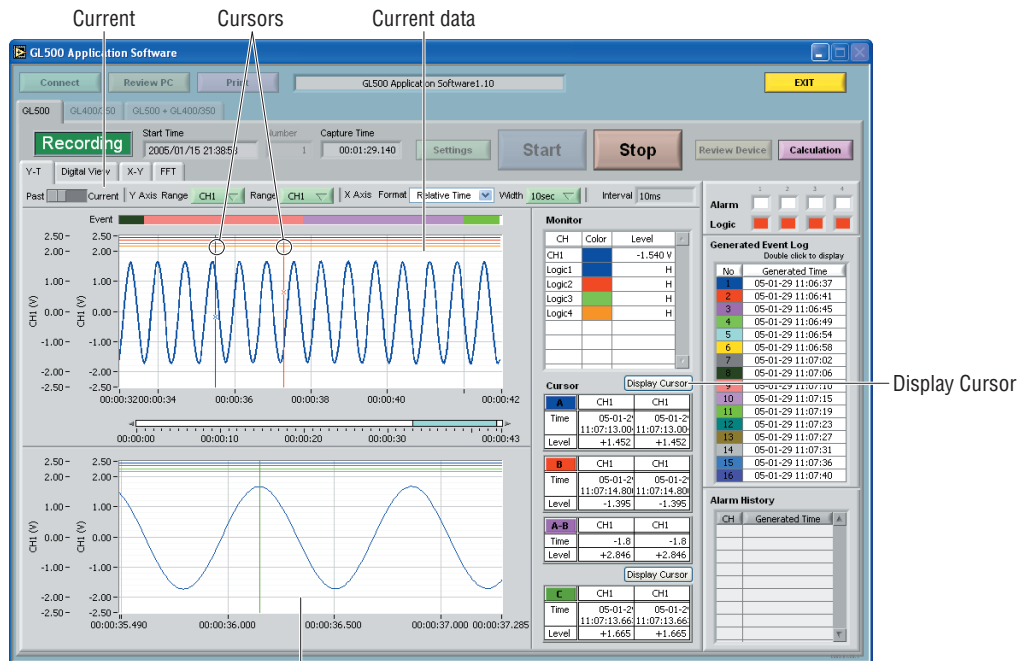
Display Cursor

Display of data between cursors when Past was selected

(4) Digital View
Select the "Digital View" tab to display the input data as digital values

Digital View
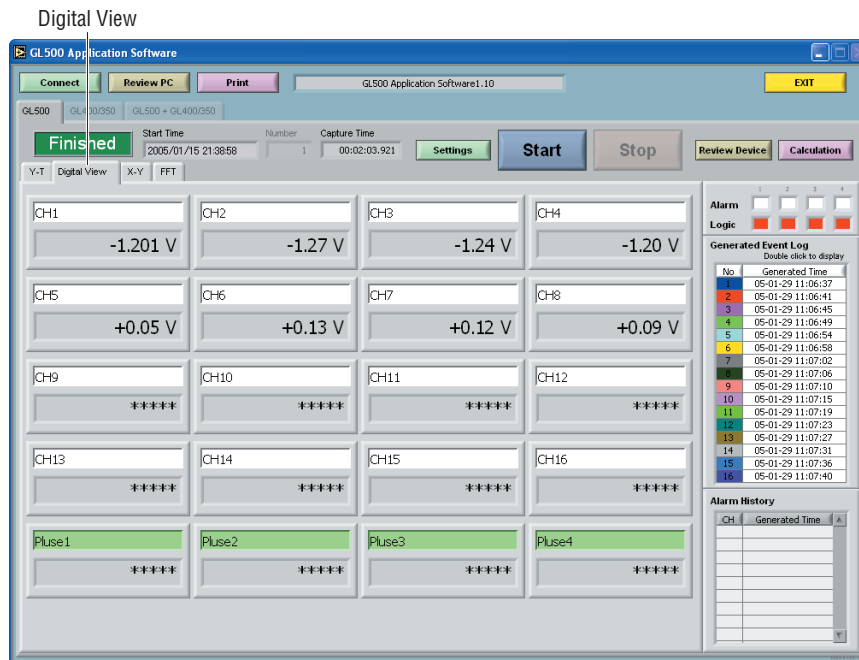
6. Replaying Data

(1) Replaying PC Data
Click the "Review PC" button to replay data captured to the computer.

Review PC
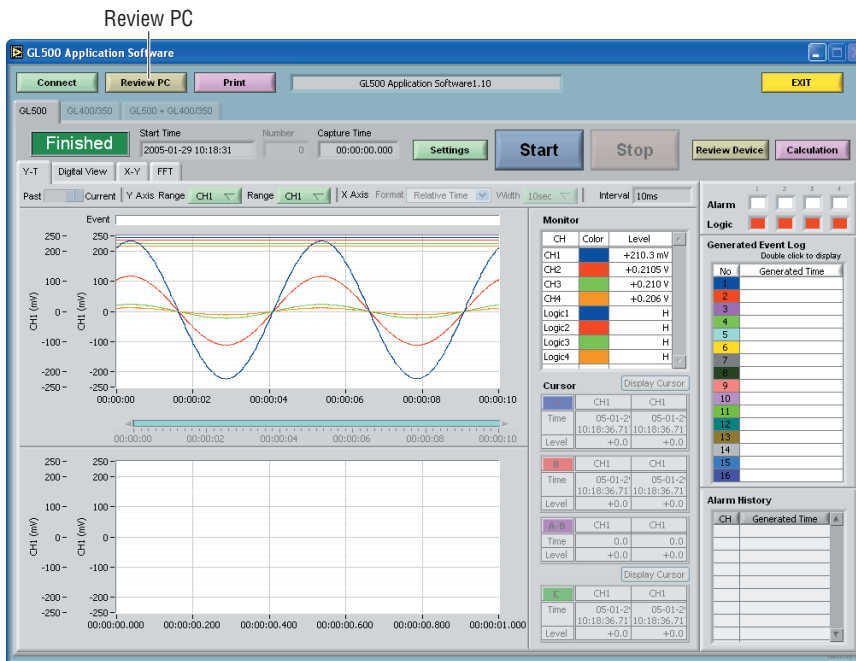
(2) Selecting a File
Click the "Open File" button to display the "Open" window.
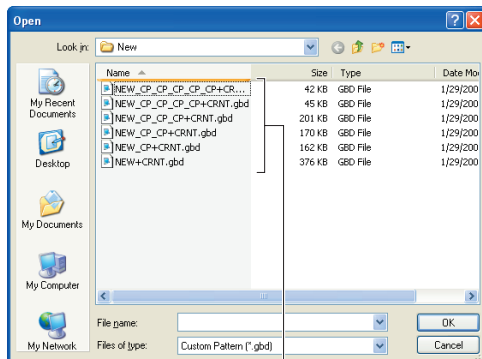
Captured files

Select a captured file, and then click the "OK" button to display waveforms for the selected file on the replay screen.

(3) Printing Displayed Data
Click the "Print" button to output the displayed screen to a printer.

Print
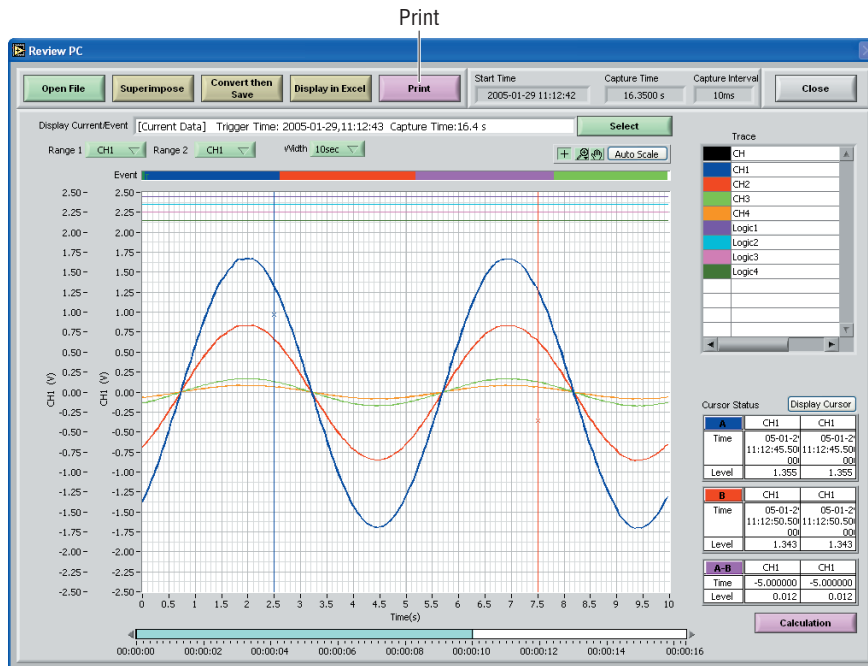
7. Exiting the Application Software

(1) Click the "Close" button to close the replay screen.

(2) Select "Connect" on the main screen and then click the "Disconnect" button to end connection with the PC.

(3) Click the "EXIT" button on the main screen to exit the application software.

4.9   Measurement Parameter Settings

Click the "Settings" button on the main screen to enable device and measurement parameters for the GL500 to be made.

CHECKPOINT

The GL500 settings are changed whenever the "OK" or "Apply" button is clicked in each setting screen.

AMP

(1)   Number: Specify the number of channels for data capture. (1, 2, 4, 8, 12, 16).

Event Max. Speed Sampling: Varies according to the number of data capture channels.

(2)   Select CH
Specify the measurement parameters for the connected channels.

Select CH: Settings are performed in 8-channel groups.

(3)   Analog AMP Settings

All CH: Sets the Input, Range, and Filter values to the same values for all the channels in the displayed group. Click the "Settings" button underneath "All CH" to make the settings.

Line Color: Specify the color for each channel.

Annotation: Up to 11 characters can be input for each channel.

⚠ CAUTION

If 2-byte characters are used, they will be displayed as [**] on the GL500 monitor. Be sure to use only single-byte characters.

Input: Specify the input condition parameters.
OFF, DC, Temp (MF and MS amp units only)

Range
• DC: 100, 500 mV, 1, 10, (50, 100) V
Note: The values in parentheses ( ) are for the 4VF and 4 MF amp units only.
• Temp: Specify one of the following:
TC-K, TC-J, TC-T, TC-E, TC-B, TC-R, TC-S, TC-N, TC-W

Filter: Use the filter function when you want to cut out noise in the input.
   OFF, Line, 5, 50, 500 Hz

Span Upper Limit: Specify the upper limit of the span for the selected range.

Span Lower Limit: Specify the lower limit of the span for the selected range.

Unit: The measurement unit is displayed during measurement.

(4) Logic, Pulse Settings

Logic/Pulse: Specify the condition to be used for measurement.
   Off, Logic, Pulse

(5) Logic Settings

Line Color: Specify the color.

Filter: Off: Disabled
   On: Enabled

(6) Pulse Settings

Input: OFF, Counts, Revolutions, Inst.
- OFF: Pulses are not measured.
- Counts: Displays the cumulative number of pulses for each sampling interval from the start of measurement.
- Revolutions: Counts the number of pulses at 1-second intervals and then multiplies them by a factor of 60 to display them as revolutions.
- Inst.: Counts the number of pulses for each sampling interval.

Line Color: Specify the color.

Range: The range that can be set depends on the mode selected.

Mode	Range	Maximum number of pulse inputs
Counts	5, 50, 500, 5k, 50k C/F.S.	50 k/sampling interval
Revolutions	5, 50, 500, 5k, 50k RPM/F.S.	50k/s
Inst.	5, 50, 500, 5k, 50k C/F.S.	50 k/sampling interval

Filter: Off: Disabled
   On: Enabled

Slope: Set the condition for the input signal operation.
   Hi: Operates when the signal is a rising signal.
   Lo: Operates when the signal is a falling signal.

Current

This screen is used to set the parameters for low-speed data capture.
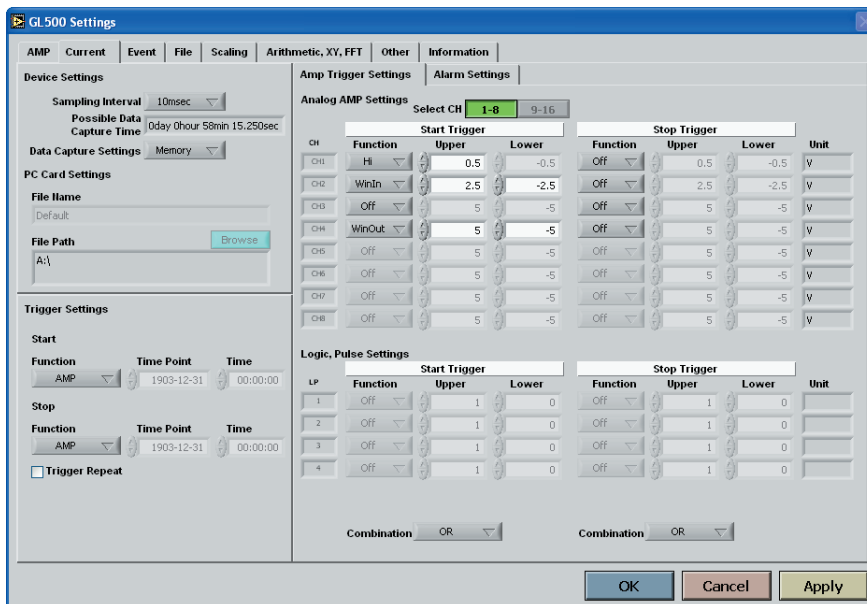
(1) Device Settings
Select the sampling interval for data capture.

Sampling Interval: 1, 2, 5, 10, 50 ms, 100, 200, 500 ms,
1, 2, 5, 10, 20, 30 s, 1, 2, 5, 10, 30, 30 min, 1 h

CHECKPOINT

• USB 2.0: From 1ms; TCP-IP: From 10 ms

• CSV Save condition
1: 10 ms   2: 20 ms   4: 50 ms   8: 100 ms   12: 200 ms   16: 200ms

• Data may not be captured correctly, depending on the computer's operating environment. If this is the case, either select a slower sampling rate or reduce the number of channels.

Possible Data Capture Time: Displays the amount of data capture time, depending on the sampling rate and the capacity.
Data Capture Settings: Select the data capture destination.
PC card, Memory

(2) PC Card Settings

File Name : Input a file name for the captured data.

File Path: Use the "Browse" function to select the capture destination, create folders, and delete files.

(3) Trigger Settings
These settings are used to specify the measurement start and end conditions.

• Start

Function: Specify the trigger condition that must be met in order to initiate measurement.

Off: No trigger is used. Instead, measurement is initiated by pressing the START/ STOP key.

Amp: The start of measurement is triggered when the level trigger condition is satisfied.
Note: See the CHECKPOINT on page 3-19 for more details on the Level Trigger.

Date: Measurement starts at the specified time.
Note: If Trigger Repeat has been specified, perform the date and time settings.

Ext.: The start of measurement is triggered when a signal is input from an external trigger terminal.

- Stop

Function: Specify the trigger condition that must be met in order to stop measurement.

Off: No trigger is used. Instead, measurement is stopped by pressing the START/ STOP key.

Amp: Measurement is stopped when the level trigger condition is satisfied.
Note: See the CHECKPOINT on page 3-19 for more details on the Level Trigger.

Date: Measurement stops at the specified time.
Note: If Trigger Repeat has been specified, perform the date and time settings.

Ext.: Measurement is stopped when a signal is input from an external trigger terminal.

Time: Set the amount of time from the start until the end of measurement. The time can be specified in 1-s increments.

Event: Measurement stops when all the memory blocks are filled with event capture data.

Trigger Repeat: Insert a check to enable repeated measurement.

(4) Amp Trigger Settings

Select CH: Select the channel display group.

1 to 8, 9-16

- Start Trigger

CH: Select the channels for which you want to specify a start trigger.

Function: Specify the Trigger Start condition.

Off: Click the "Start" key to start measurement.

Hi: The trigger is activated when the signal input rises to (or exceeds) the specified upper limit.

Lo: The trigger is activated when the signal input falls to (or goes below) the specified lower limit.

Win In: The trigger is activated when the signal input goes within (or is within) both limits.

Win Out: The trigger is activated when the signal input goes outside (or is outside) both limits.

Upper: Input the signal input value for the upper limit.

Lower: Input the signal input value for the lower limit.

Combination: Select either AND (all conditions met) or OR (any one of the conditions is met) for the channels for which the Start Trigger has been specified.

- Stop Trigger

CH: Select the channels for which you want to specify a stop trigger.

Function: Specify the Trigger Stop condition.

Off: Click the "Stop" key to stop measurement.

Hi: The trigger is activated when the signal input rises to (or exceeds) the specified upper limit.

Lo: The trigger is activated when the signal input falls to (or goes below) the specified lower limit.

Win In: The trigger is activated when the signal input goes within (or is within) both limits.

Win Out: The trigger is activated when the signal input goes outside (or is outside) both limits.

Combination: Select either AND (all conditions met) or OR (any one of the conditions is met) for the channels for which the Stop Trigger has been specified.

(5) Alarm Settings

Select CH: Select the channel display group.
            1 to 8, 9-16

Function: Specify the condition for alarm generation.
             Off, Hi, Lo, Win In, Win Out

Upper: Specify the Upper Limit Value for the condition specified in Function.

Lower: Specify the Lower Limit Value for the condition specified in Function.

Alarm Output: Specify the number of alarm outputs to an external device.
              1-4

Combination: Specify the condition for alarm output.
              OR, AND

Event

This screen is used to set the parameters for high-speed data capture.
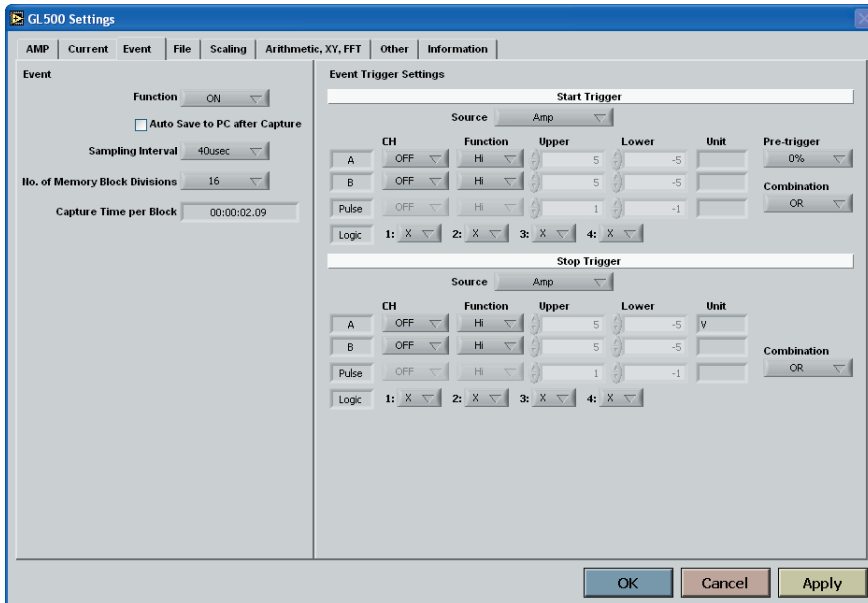
(1) Event

Function: Specify whether to enable or disable the capture of event data.

Disabled: Event data is not captured.

Enabled: Event data is captured.

Auto Save to PC after Capture

Sampling Interval: Specify the sampling interval for the capture of event data.

CHECKPOINT

- The maximum sampling interval depends on the number of data capture channels.
  When only 1 CH is used: 2 μs   When 4 CH are used: 8 μs
  When 2 CH are used: 4 μs   When 10 CH are used 40 μs

- For temperature measurement the maximum sampling interval depends on the data capture channels.

Without temperature		With temperature	
1CH: 2 μs	8CH: 20 μs	1CH: 4 μs	8CH: 40 μs
2CH: 4 μs	12CH: 40 μs	2CH: 8 μs	12CH: 50 μs
4CH: 8 μs	16CH: 40 μs	4CH: 20 μs	16CH: 100 μs

No. of Memory Block Divisions: Specify the number of memory block divisions.
1, 2, 4, 8, 16 (1 to 16 blocks)

CHECKPOINT

If a large number of divisions is specified, the amount of data that can be captured to each block decreases

---

Capture Time per Block: The capture time displayed is the capture time obtained by automatically calculating the memory capacity of the memory blocks with respect to the sampling interval.

(2) Event Trigger Settings

• Start Trigger

Source: Specify the start condition for the capture of event data.

Off: Click the Start key to initiate data capture.

Amp: The start of data capture is triggered when the Edge condition is satisfied.
Note: See the CHECKPOINT on page 3-24 for more details on the Edge conditions.

Ext.: The start of data capture is triggered when a signal is input from an external trigger terminal.

CH: Select Analog, Logic, or Pulse channels.

A, B: Analog channels

Logic: Logic channels

Pulse: Pulse channels

⚡ CHECKPOINT

Logic and Pulse cannot be selected at the same. Select either Logic or Pulse.

Function: Specify the Trigger Start condition.

A, B: Off: The Trigger function is disabled.

Hi: The trigger is activated when the signal input rises to (or exceeds) the specified trigger level.
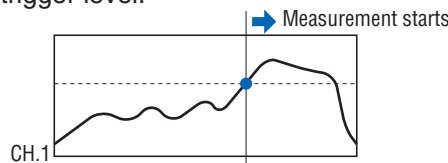
Lo: The trigger is activated when the signal input falls to (or goes below) the specified trigger level.
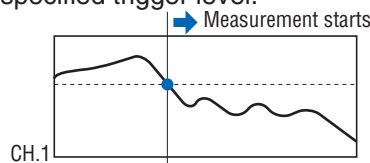
Win In: Specify the lower and upper limits of the trigger level for each channel. When the signal input goes within (or is within) both limits, the trigger condition is met.
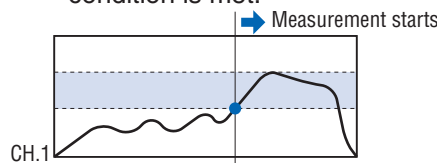
Win Out: Specify the lower and upper limits of the trigger level for each channel. When the signal input goes outside (or is outside) both limits, the trigger condition is met.

Logic: Off: Triggering is not performed.

Hi: The trigger is activated when the Logic signal rises to the Hi level.

Lo: The trigger is activated when the Logic signal falls to the Lo level.

Pulse: Off: Triggering is not performed.

Hi: The trigger is activated when the Pulse signal rises to the Hi level.

Lo: The trigger is activated when the Pulse signal falls to the Lo level.

Upper: Input the signal input value for the upper limit

Lower: Input the signal input value for the lower limit.

Unit: The unit specified in Scaling is displayed.

Pre-trigger: Specify the effective range of the data before the trigger level as a percentage.
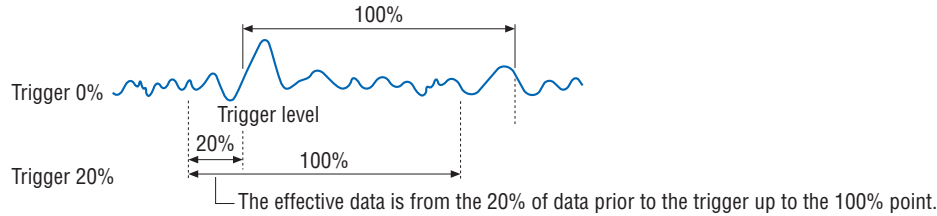
Combination: Combination: Four combinations of setting conditions can be selected.

      OR: The trigger is activated when any one of the specified conditions is met.

      AND: The trigger is activated when all of the specified conditions are met.

• Stop Trigger

Source: Specify the stop condition for the capture of event data.

      Off: Click the Stop key to stop data capture.

      Amp: Data capture is stopped when the Edge condition is satisfied.

          Note: See the CHECKPOINT on page 3-24 for more details on the Edge conditions.

      Ext.: Data capture is stopped when a signal is input from an external trigger terminal.

CH: Select Analog, Logic, or Pulse channels.

    A, B: Analog channels

    Logic: Logic channels

    Pulse: Pulse channels

✎ CHECKPOINT

    Logic and Pulse cannot be selected at the same. Select either Logic or Pulse.

Function: Specify the Trigger Stop condition.

    A, B: Off: The Trigger function is disabled.

        Hi: The trigger is activated when the signal input rises to (or exceeds) the specified trigger level.

        Lo: The trigger is activated when the signal input falls to (or goes below) the specified trigger level.

        Win In: The trigger is activated when the signal input goes within (or is within) both limits

        Win Out: The trigger is activated when the signal input goes outside (or is outside) both limits.

    Logic: Off: Triggering is not performed.

        Hi: The trigger is activated when the Logic signal rises to the Hi level.

        Lo: The trigger is activated when the Logic signal falls to the Lo level.

    Pulse: Off: Triggering is not performed.

        Hi: The trigger is activated when the Pulse signal rises to the Hi level.

        Lo: The trigger is activated when the Pulse signal falls to the Lo level.

Upper: Input the signal input value for the upper limit.

Lower: Input the signal input value for the lower limit.

Unit: The unit specified in Scaling is displayed.

Combination: Four combinations of setting conditions can be selected.

      OR: The trigger is activated when any one of the specified conditions is met.

      AND: The trigger is activated when all of the specified conditions are met.

File

The settings related to files are made here.
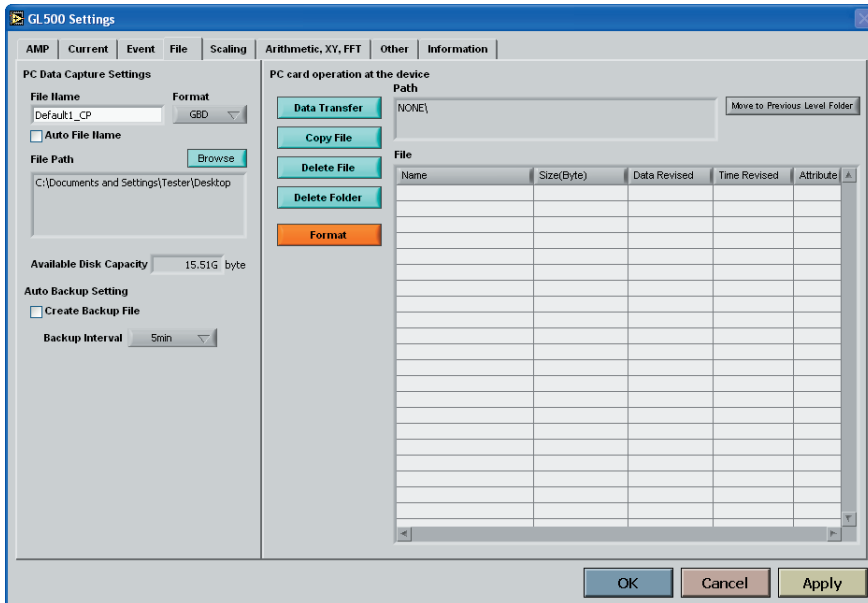
(1) PC Data Capture Settings

File Name: Specify the file name when capturing data to the computer.

Auto File Name: Insert a check to enable the file to be saved automatically. The date and time will be appended to the file name.

Format: GBD, CSV
   Specify the data format for saving measurement data.

File Path: Specify the file path when saving data to a computer.

(2) Auto Backup Settings

Create Backup File: Check this box for auto data backup.

Backup Interval: Specify the backup interval.
   5, 10, 30 min
   1, 2, 6, 12, 24 hours

CHECKPOINT

- The data backup location uses the same file path set in PC Data Capture Settings. The file name is automatically assigned.
- PC Data Capture Settings File Name _xx_bk.GBD (xx: consecutive numbers).

(3) Data Transfer
Data captured at the GL500 can be transferred to a computer. Select the required file from the File List, and click the "Data Transfer" button to transfer the data to the specified location.

(4) Copy File

Data captured at the GL500 can be copied to another destination. Click the "Copy File" button to display a submenu for selecting the file to be copied and the copy destination.
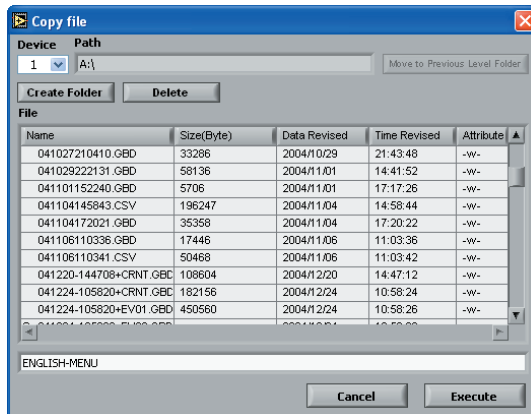
(5) Delete File

Data captured at the GL500 can be deleted. Select the file you want to delete and then click the "Delete File" button to delete it.

(6) Delete Folder

Folders created at the GL500 can be deleted. Select the folder you want to delete and then click the "Delete Folder" button to delete it.

(7) Format

When you click the "Format" button, a confirmation dialog box will be displayed. Click the OK button to start the initialization process.

The PCMCIA card will be initialized. All the data captured to the card will be erased. Be sure to make a data backup before initializing the card.

Scaling

Use the Scaling function to perform calculation functions on the measured values and the scaling values that are proportional to the respective values.
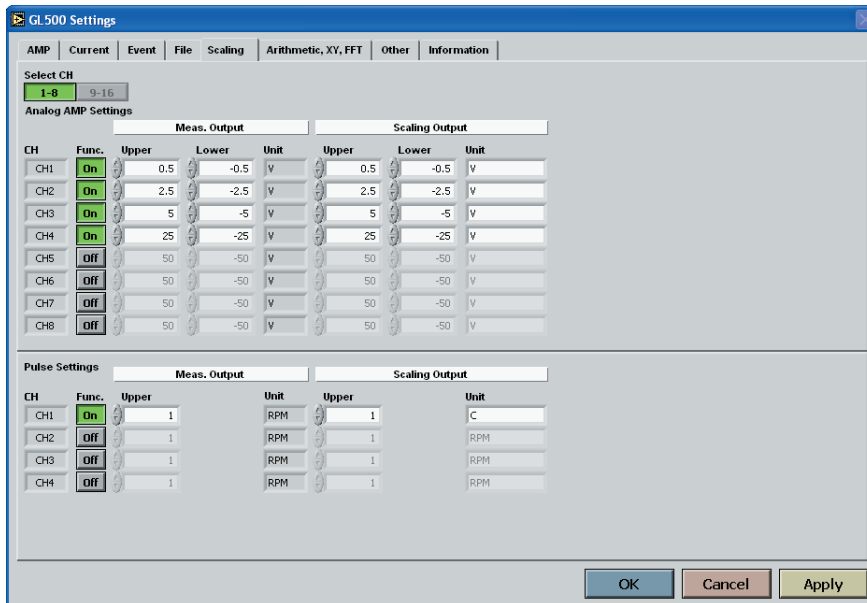
(1) Select CH
   Specify the channels in groups of eight. Two groups, [1 to 8] and [9 to 16], can be specified.

   • Meas. Output

   Func.: On (Enabled), Off (Disabled)
         Select On to enable scaling.

   Upper: Displays the Upper Limit Value of the set span.

   Lower: Displays the Lower Limit Value of the set span.

   Unit: Displays the unit for the set range.

   • Scaling Output
   This function is used to specify the values for conversion and the unit when the measured values are scaled.

   Upper: Specify the Upper Limit value for conversion.

   Lower: Specify the Lower Limit value for conversion.

   Unit: Input the unit for conversion.

(2) Pulse Settings

   • Meas. Output

   Function: On (Enabled), Off (Disabled)

   Upper: Specify the Upper Limit value.

   Unit: Displays the unit for the set range.

   • Scaling Output

   Upper: Specify the Upper Limit value for conversion.

   Unit: Input the unit for conversion.

Arithmetic, XY, FFT
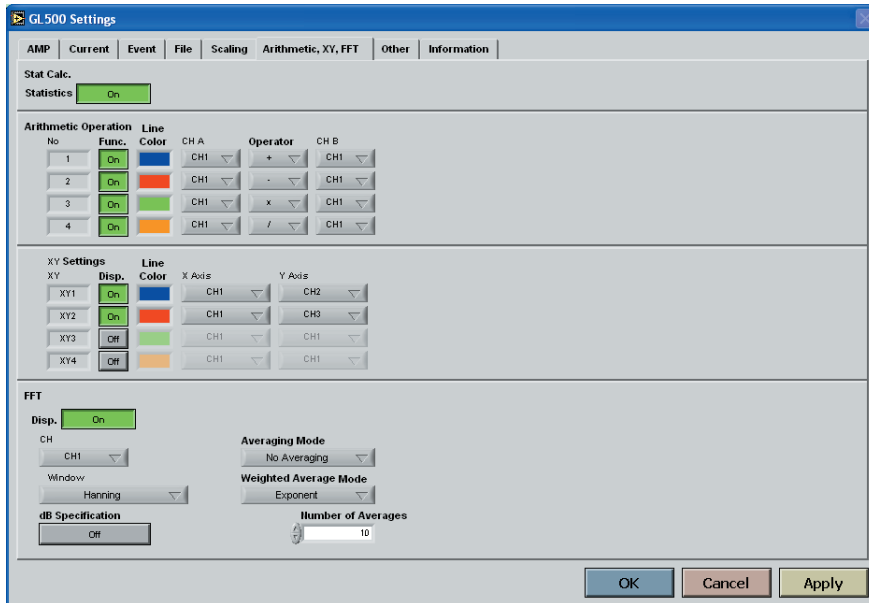
(1) Stat Calc.

Select this function when you want to display statistical calculations (Statistics).

Off: Calculations are not displayed.

On: Calculations are displayed.

> **CHECKPOINT**
>
> Depending on the number of measurement channels and the sampling interval used, waveform display may not be performed correctly. In this case, either slow down the sampling rate or reduce the number of channels.

(2) Arithmetic Operation

These settings specify the processing for arithmetic operations.

Func.: Four types of operations can be selected as On or Off.

On: Enabled

Off: Disabled

Line Color: Specify the line color.

CH A: Specify the first channel for arithmetic operations.

Operator: Specify the operator for arithmetic operations (+, –, x, /).

CH B: Specify the second channel for arithmetic operations.

(3) XY

Specify a combination of the X channel with one of the Y channels to display measurement data in XY format. Up to 4 combinations can be specified

Disp: Select On for XY display of the selected combination.

On: Enabled

Off: Disabled

Line Color: Specify the colors.

X Axis: Specify the channel for displaying X-axis measurement data.

Y Axis: Specify the channel for displaying Y-axis measurement data.

(4) FFT

Use these settings to perform frequency analysis (power spectrum) of the measurement channels.

Disp: Select On to enable the FFT function.

    On: Enabled

    Off: Disabled

CH: Specify the channel for analysis.

Window: Specify the type of window for frequency analysis processing.

    Rectangular, Hanning, Hamming, Flat Top

dB Specification: Specify whether or not to use dB for the unit.

    Off: The amplitude is displayed using the Vrms2 unit.

    On: The amplitude is displayed using the dB unit.

Averaging Mode: Performs averaging of the analysis channel.

    No averaging, Vector averaging, RMS averaging, Peak hold

Weighted Average Mode: This mode can be selected for averaging.

    Linear, Exponential

Number of Averages: Specify the number of averages for the averaging mode and weighted average mode parameters.

Other

The GL500 device settings and email settings when an alarm has been generated are made here.
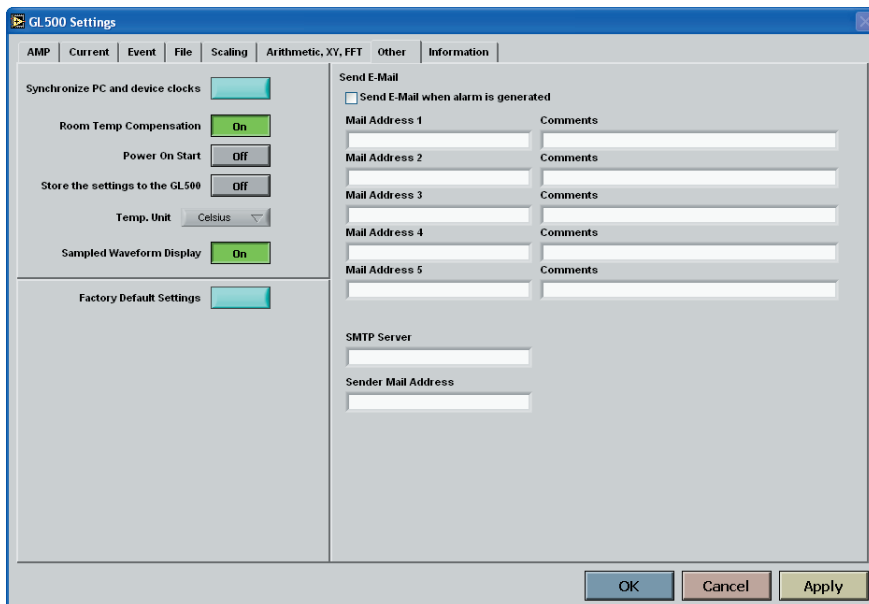
(1) Synchronize PC and device clocks
Click this button to change the GL500's clock setting to match that of the computer.

(2) Room Temp. Compensation: On (Enabled), Off (Disabled)
This function is only used when a temperature range has been specified. "On" is normally selected. When making this setting, there is a choice between Internal (the GL500's room temperature compensation settings are used) or External. Select External only when you have the necessary equipment and know-how.

(3) Power On Start: On (Enabled), Off (Disabled)
This function enables the settings that were in effect when measurement last ended to be used to start measurement as soon as the power is switched on.

CHECKPOINT
• If Power On Start is used to start measurement operations and the application software is used to connect the GL500, the status display will be made during data capture. (Waveform display will not be performed).
• If the Power On Start status is enabled for the GL500 while it is connected using the application software, disconnect the GL500 and then reconnect it.

(4) Store the settings to the GL500: On (Enabled), Off (Disabled)
Select whether or not to save the settings made using the software to the GL500.

(5) Temp. Unit: Celsius (°C), Fahrenheit (°F)
Select the temperature unit you want to use for display during temperature measurement.

(6) Sampled Waveform Display: Off (Disabled), On (Enabled)
Select On to perform sampling of the waveform display data.

(7) Factory Default Settings
This parameter returns all the settings to the factory defaults.

(8) Send E-mail
Send Email when alarm is generated: Check this box to enable this function.
Mail Address: Email can be sent to five locations.
Please set the addresses in accordance with your computer system.
Comments: Comments can be recorded for each email setting to explain the contents.
(Email is actually sent when an alarm is generated.)

Information

The device status control information is displayed here. This information can be used for maintenance purposes, but it cannot be input directly.
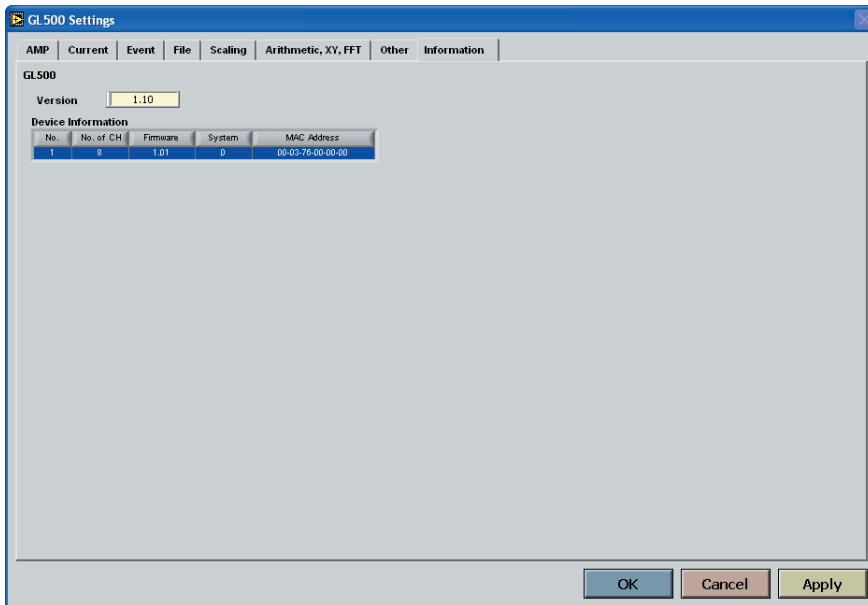
4.10 View Functions

The display can be changed to suit the type of measurement being performed. It is also used to perform measurements and make settings.

Data Capture Start/Stop

When the measurement conditions have been set, "Finished" is displayed in the Status Display box and waveforms of the measured data are displayed. If "Start" is selected in this status, the display changes to "Recording" and data capture starts according to the settings made in the setting screens.
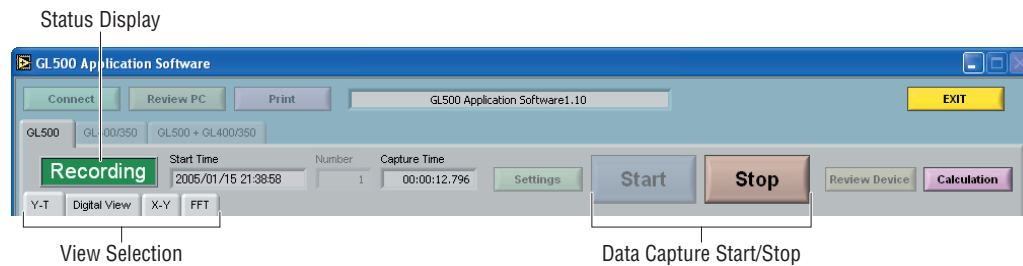
GL400/350

Use this view when a GL400 or GL350 model is connected. Operations are the same as those for the GL500, except for the Settings menu.

> **CHECKPOINT**
> The GL400/350 cannot use the USB 2.0 connection. Use USB 1.0 when connecting these models.
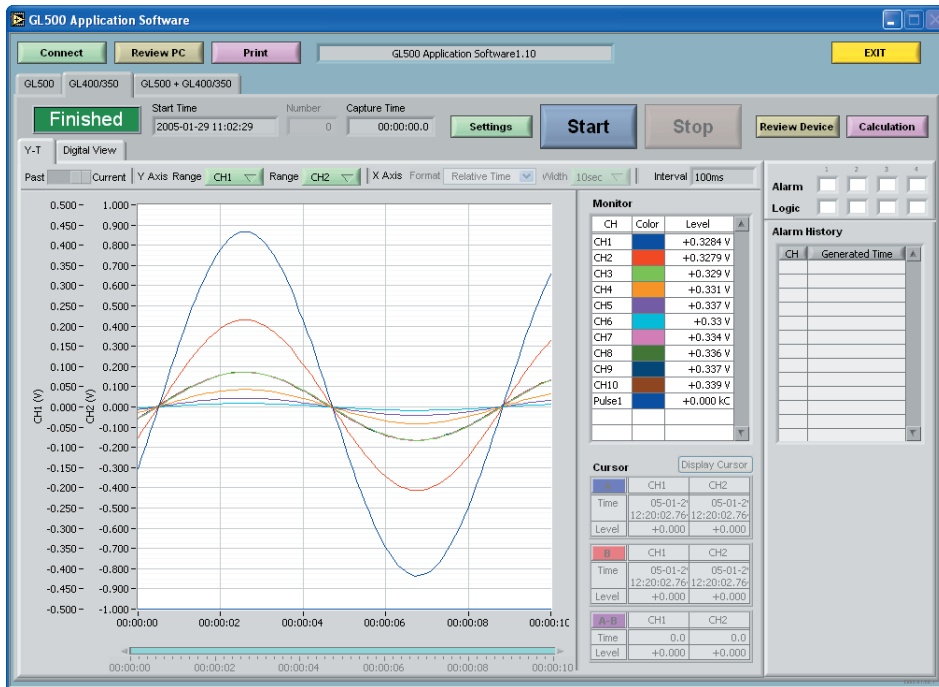
Menu Structure

Menu Name		Setting Parameters
Settings	AMP	Select CH: From 1-10 to 91-100
		Analog AMP Settings: Line Color, Annotation, Input, Range, Filter, Unit
		All CH: Input, Range, Filter
		Logic/Pulse Settings, Device Number 1 to 10
		Logic: On, Off
		• Line Color: 1 to 4
		Pulse: Line Color, Input, Range, Slope
	Span	Select CH: From 1-10 to 91-100
		Analog Span: Upper, Lower
	Scaling	Select CH: From 1-10 to 91-100
		• Meas. Output: Func, Upper, Lower
		• Scaling Output: Upper, Lower, Unit
		Pulse Settings Device Number: 1 to 10
		• Meas. Output: Function, Upper
		• Scaling Output: Upper, Unit
	Data	Device Settings: Sampling Interval, Data Capture Settings
		PC Card Settings: File Name, Format, File Path
		PC Settings: File Name, Auto File Name, Format, File Path
		Auto Backup Settings: Backup Interval
	Alarm	Select CH: From 1-10 to 91-100
		Alarm Settings: Function, Upper, Lower, Alarm Output, Combination
		Alarm, Logic, Pulse Settings, Device Number: 1-10
		Logic: Function, Alarm Output
		Pulse: Function, Upper, Lower, Alarm Output

Menu Name		Setting Parameters
Settings	Trigger	Trigger Settings • Start: Function, Alarm Output • Stop: Function, Alarm Output, Time • Trigger Repeat
		Level Trigger Settings • Start: CH, Function, Upper, Lower • Stop: CH, Function, Upper, Lower
	File	PC Card Operation • Data Transfer, Copy File, Delete File, Delete Folder • Card Initialize, Path, File • Device Number: 1-10 • Path, File
	Stat Calc. Arithmetic Operation	Stat Calc.: Function, CH Arithmetic Operation: Function, CH A, Operator, CH B
	Other	Device Number: 1-10
		Synchronize PC and device clocks, Room Temp. Compensation, AC Line Frequency, Burn out, Power On Start, Store the Settings to the GL400/350, Factory Default
	Information	Software Application Version, Device Information

For further details on the GL400/350 screen, please refer to the GL400/350 User's Manual.

CHECKPOINT

The "XY Settings", "Report" and "Send E-Mail" parameters that can be set at the GL400/350 are not displayed in the "GL400/350" screen, and cannot be set. On the other hand, the "Stat Calc. and Arithmetic Operation" function settings that are displayed in the "GL500" screen have been added to the GL400/350 screen. For further details on the "Statistics, Calculation" functions, see "Arithmetic, XY, FFT" on page 4-31.

GL500 + GL400/350

Use this view to display the parameters that were set using the GL500 and GL400/350 setting screens.

Current data   Current data between the cursors

GL500 Screen   GL400 Screen
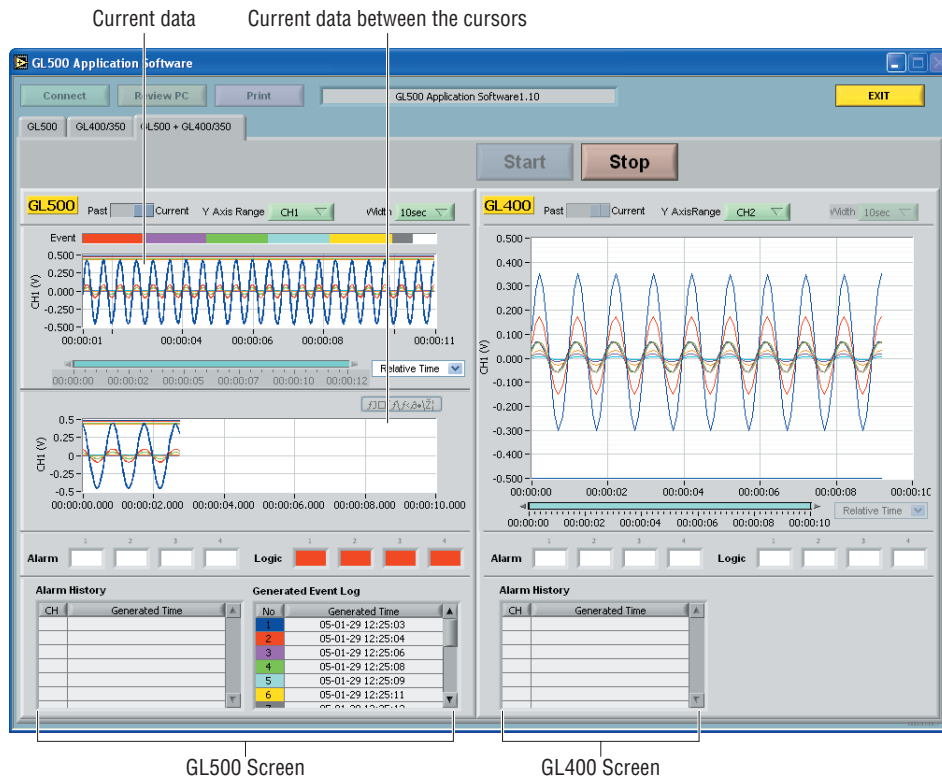
Data capture start and stop operations can be performed using this screen.

CHECKPOINT

The GL500 cannot be used together with the GL400 or GL350 to perform simultaneous measurement Moreover, multiple GL400 or GL350 units cannot be connected when using this application software.

Y-T

The Y-T screen is a waveform display screen, and is used to display event data and the data between cursors. When the GL500 is connected, waveforms showing the measurement status are always displayed.

(1) Current Data Display
The X axis is used for the time axis, and the Y axis for the measurement range.
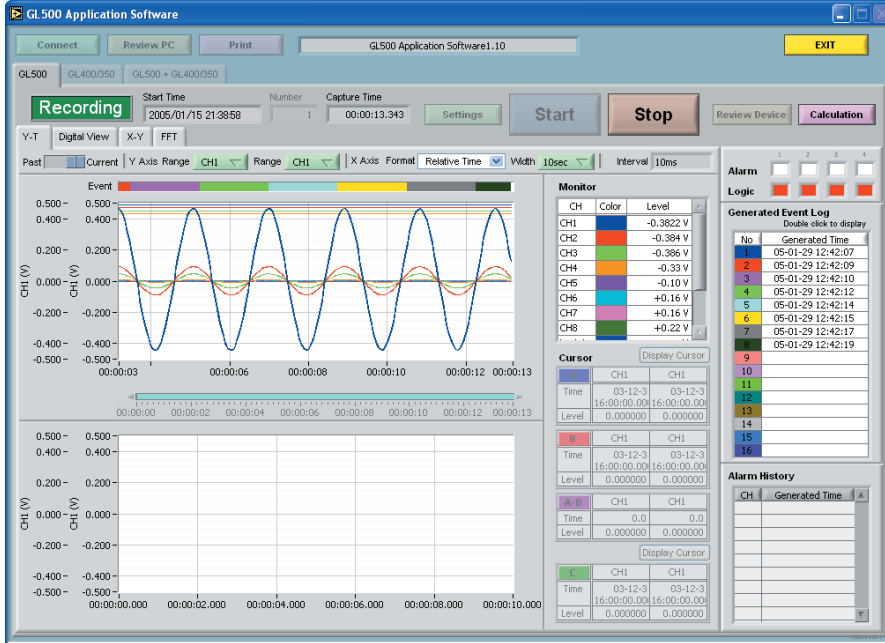
Y Axis Range 1, 2: Y-axis scaling can be displayed for two channels.

Channel: If you click on a color for one of the displayed channels, that color is removed from the display and the waveform for that channel will not be displayed.

X Axis Width: Changing the displayed value enables the width of the time axis to be changed.

Note: Enabled only during data capture.

(2) Current Data between Cursors Display
During measurement, the current data between the cursors is displayed.

Note: Enabled only during data capture.

(3) Event Data Replay
    If the time at which an event occurred is displayed in the Generated Event Log, the event data
    is captured. Double-click the number of the event that you want to display to transfer the data
    from the GL500 and display it on the Review Event screen.
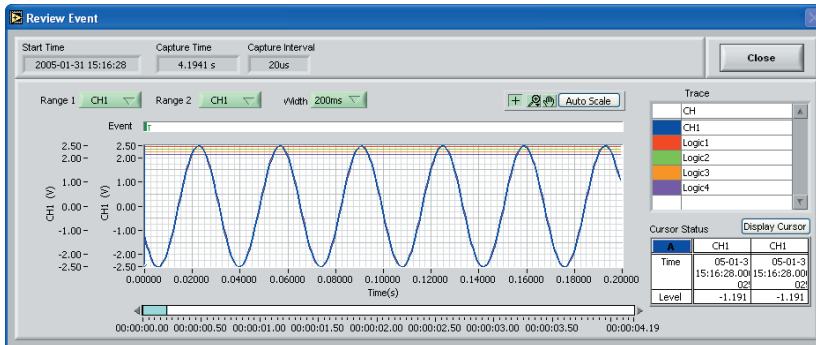
Digital View

The Digital View screen displays up to a maximum of 16 channels of digital data together with four
channels of Pulse digital data.

X-Y
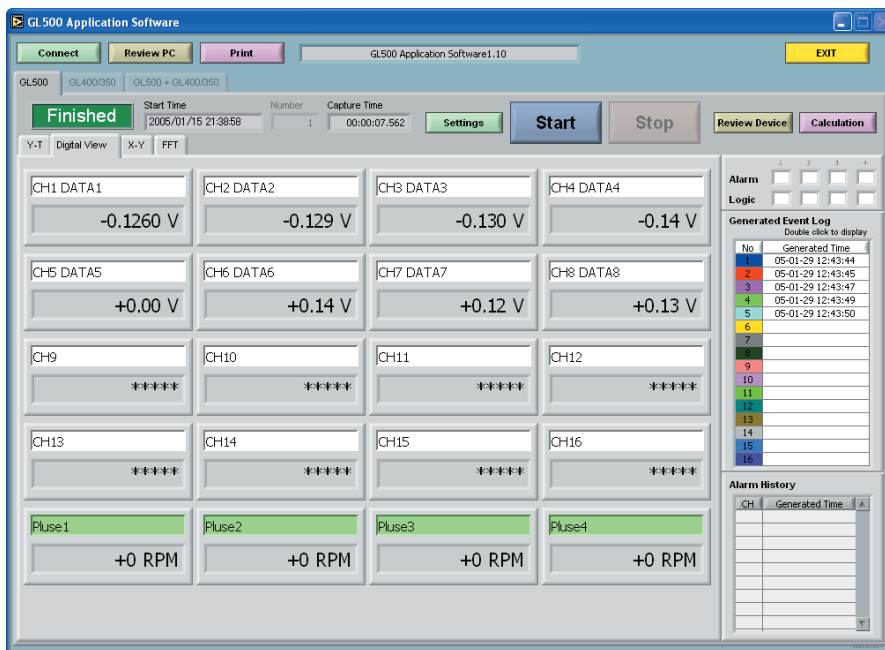
Specify a combination of X-axis and Y-axis channels to display measurement data in an X-Y format. See "Arithmetic, XY, FFT" on page 4-31 for further details on how to specify the X- and Y-axis channels.
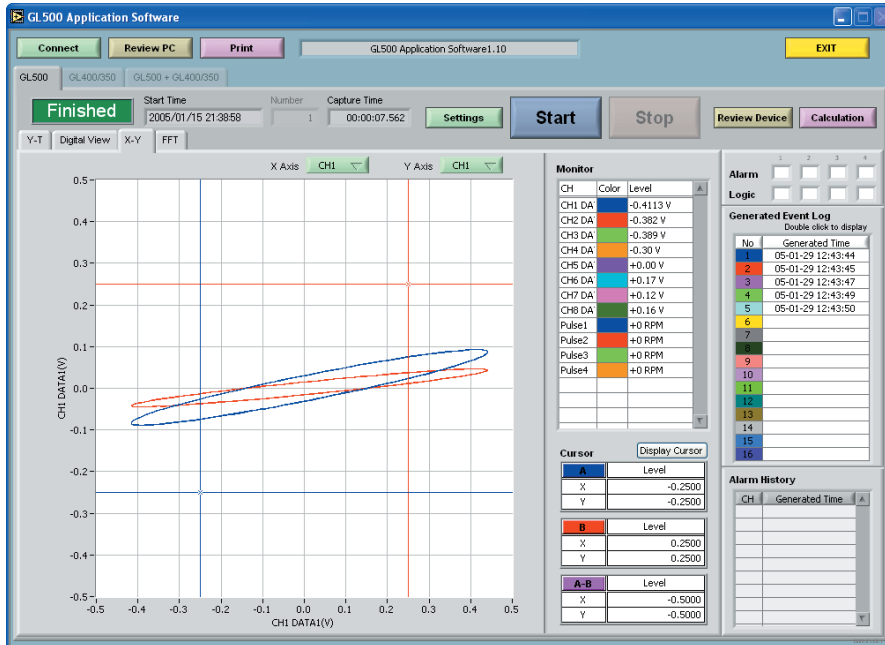
FFT

Measurement data is analyzed using the FFT function and then displayed. See "Arithmetic, XY, FFT" on page 4-31 for further details on how to specify the parameters for analysis.
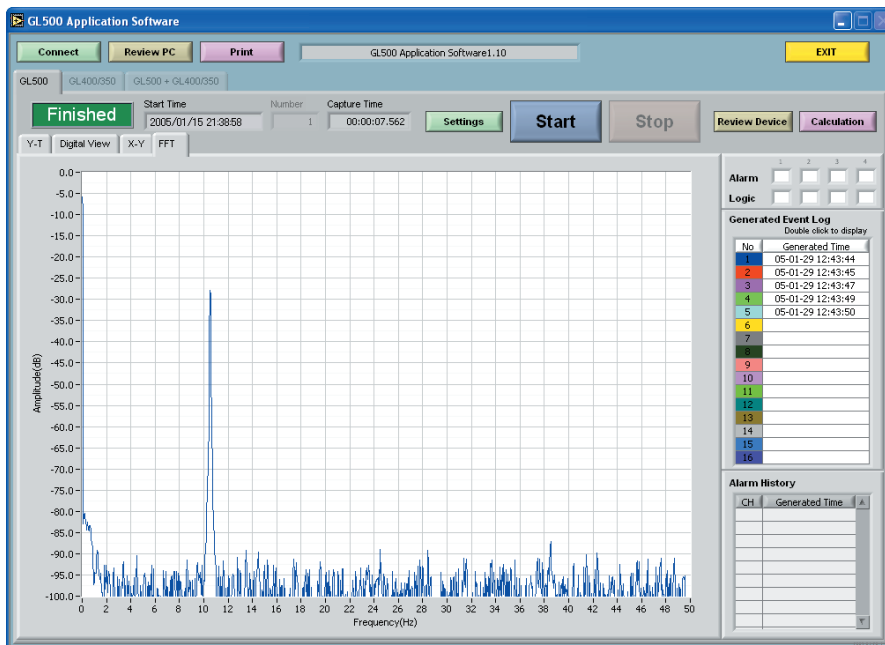
The frequency axis changes automatically according to the Current sampling interval setting.

Calculation

When the "Cal culation" screen is displayed, the displayed items can be switched between "Maximum, Minimum" and "Statistics, Calculation". For Calculation, the detailed settings made for the arithmetic operations are displayed.

Maximum, Minimum Display

Statistics, Calculation Display

CHECKPOINT

The "Calculation" Display is enabled when the Statistics setting was selected as ON in "Arithmetic, XY, FFT" (see page 4-31). Moreover, depending on the number of measurement channels and the sampling interval used, waveform display may not be performed correctly. In this case, either slow down the sampling rate or reduce the number of channels.

4.11 Review Device

Use this function to replay the data captured at the GL500. The captured data can be replayed when the GL500 is in online status.

Insert a PCMCIA card in the PCMCIA card slot, and then click the "Review Device" button to start data replay. When the "Review Device" button is clicked, the Review Device submenu appears.
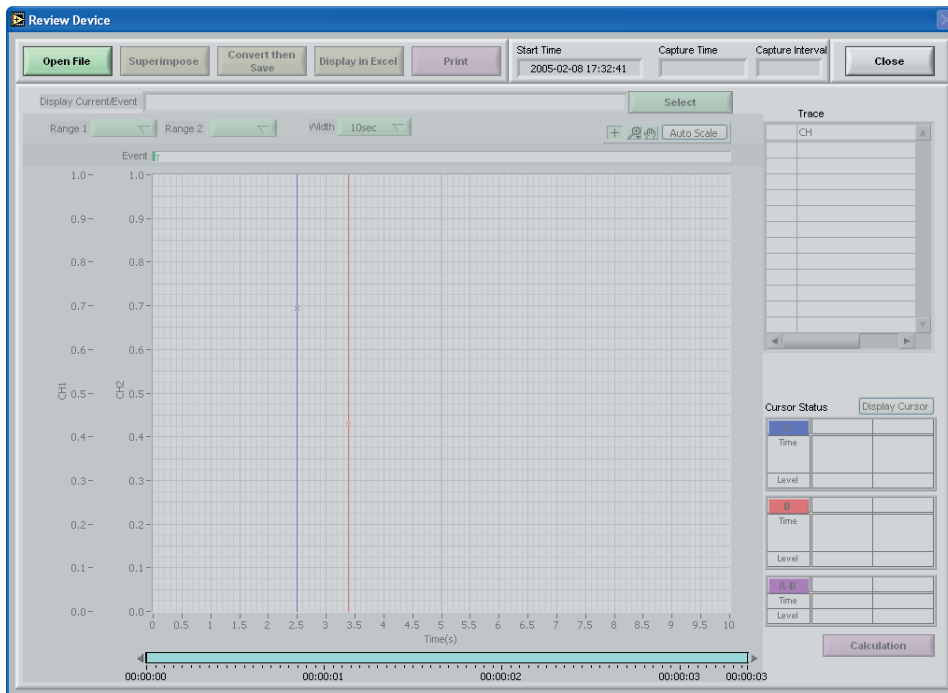
Opening a File

(1) Click the "Open File" button to display the data files on the PCMCIA card.
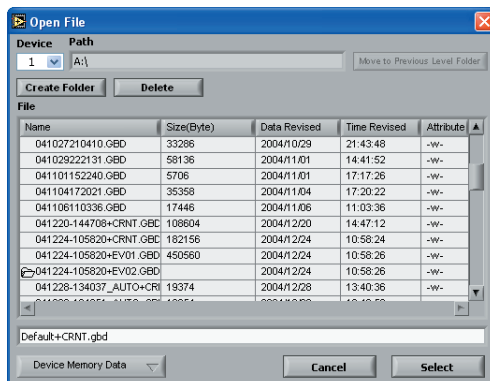
File: Select one of the displayed files to display the file data.

Device Memory Data: Click this button to replay the current/event data captured to the GL500's internal memory. (This button cannot be selected if there is no data in the internal memory).

(2) Select the file to be displayed. The data is displayed on the screen. If waveforms are displayed, the data can be checked and converted if required.
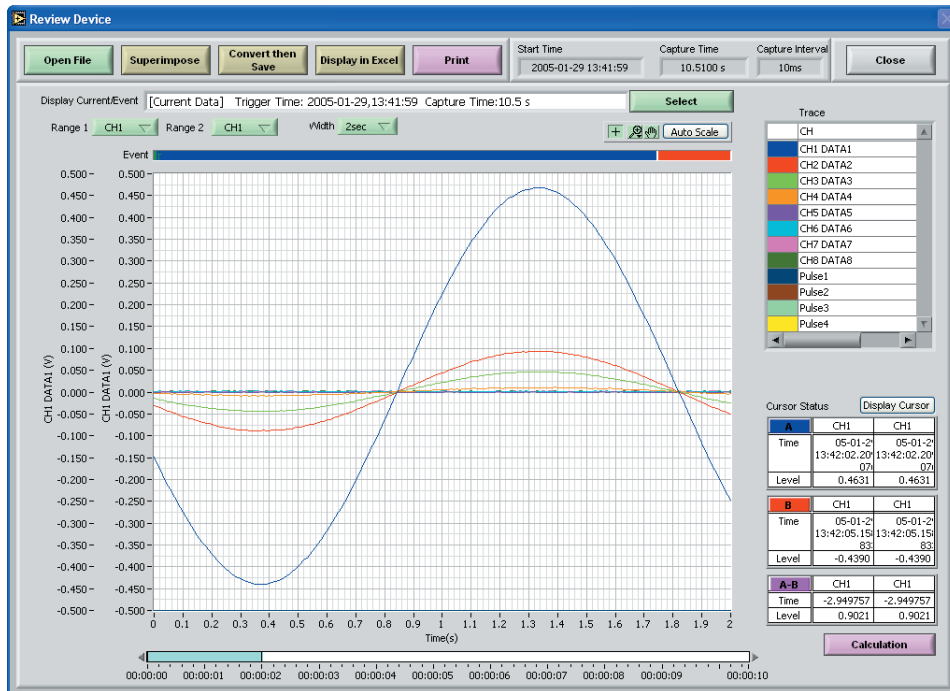

• The capture Start Time, Capture Time and Capture Interval are displayed at the upper right of the screen. Moreover, the selected file name is displayed in the upper part of the waveform display.

• Two channel ranges can be displayed for Y Axis. Specify the channels as required.

• Waveform Show/Hide
If a waveform display color within the Trace list is clicked once, the waveform display for that channel disappears. Click the color once more to redisplay it. Use this function when you need to distinguish between overlapped waveforms.

• Waveform View Range
A scroll bar is displayed underneath the waveform display to indicate which part of the data is displayed. Simply move the scroll bar to the required position for fast display of that data.

• Cursor Status
Two cursors, A and B, are displayed. The cursor information for the two selected waveform channels is displayed at the lower right.

CHECKPOINT

• The cursor status waveform data information displayed will be the information for the channels specified as the Y Axis Range 1 and 2 channels.
• If Device Memory Data was selected for Review Device, the event data names will be displayed when Select is clicked on the Display Current/Event screen.
Event Data(1): (1) indicates the Memory Block No.

If data is selected here, that data is displayed.

Superimpose

A different waveform can be superimposed on the waveform that was displayed when the "Open File" button was clicked.

Click the "Superimpose" button to display the "Select File to Superimpose" screen.

Add: Adds the file that you want to superimpose.

Delete: Deletes the file that was superimposed.

OK: Displays the selected data.

Cancel: Cancels the selection.

CHECKPOINT
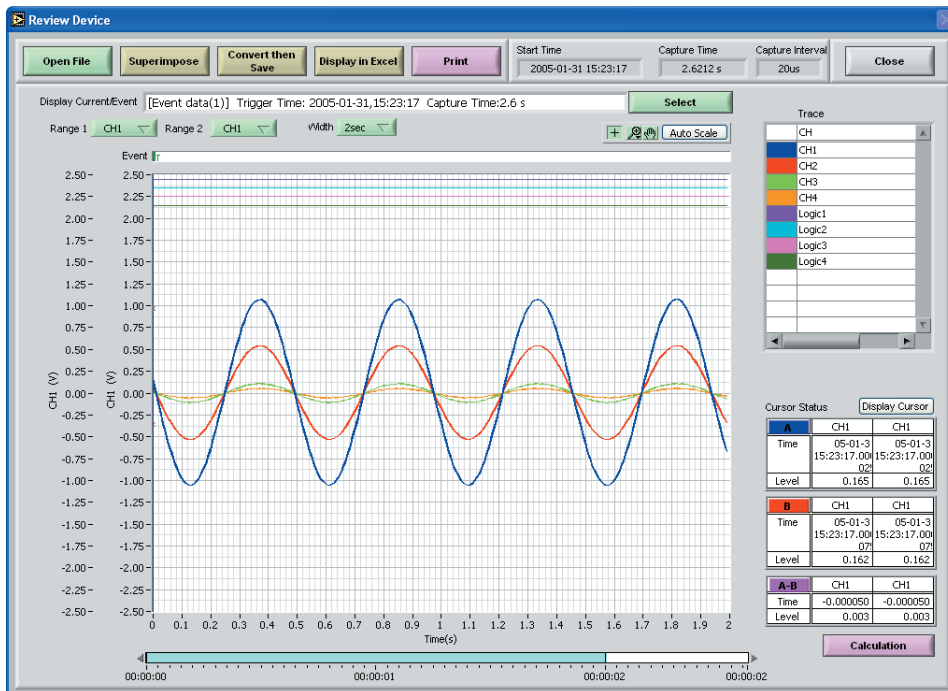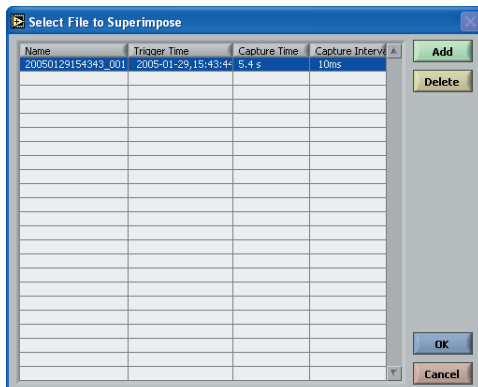
Only data that was captured at the computer can be used for superimposing. If there is no data in the computer, save data to the computer before performing a Superimpose operation.

Convert then Save

After data has been converted, click the "Convert then Save" button to display the following submenu.
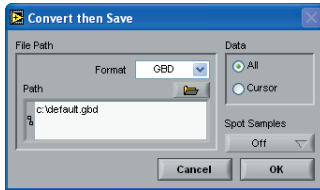
(1) Format

GBD: Binary format.

Note: Use this format if you want to replay the saved data.

CSV: A TXT format for processing data in Excel.

Note: If data is converted using this format, data analysis cannot be performed.

(2) Path: Specify the data save location for the converted data.

(3) Data

All: All the measured data is converted.

Cursor: Only the data between the A and B cursors is converted.

(4) Spot Samples

Off: Spot sampling is not performed

2, 5, 10, 20, 50, 100, 200, 500, 1000: Data is sampled at the point interval specified.

Display in Excel

This function displays the captured data that is being replayed in Excel format.
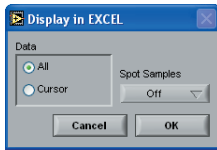
(1) Data

All: All the measured data is converted.

Cursor: Only the data between the A and B cursors is converted.

(2) Spot Samples

Off: Spot sampling is not performed

2, 5, 10, 20, 50, 100, 200, 500, 1000: Data is sampled at the point interval specified.

Example

 CHECKPOINT
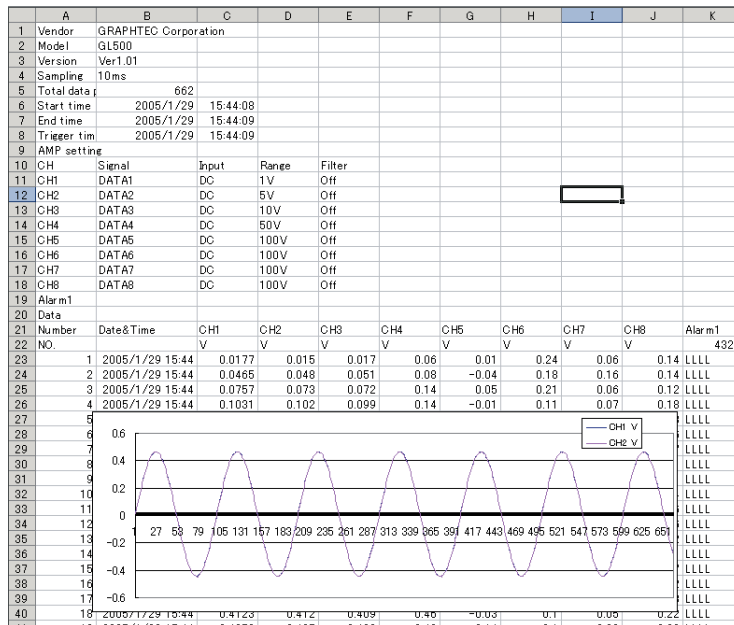
When Windows 2000 is used, errors may appear when the EXCEL file is closed. If this happens, use Windows XP instead.

Print

Click "Print" to output the displayed screen to the printer.

4.12 Review PC

This function replays the data captured to the computer. Data can be replayed in both online or offline status.

Replay the data captured to the computer.
Click the "Review PC" button to display the Review PC submenu.
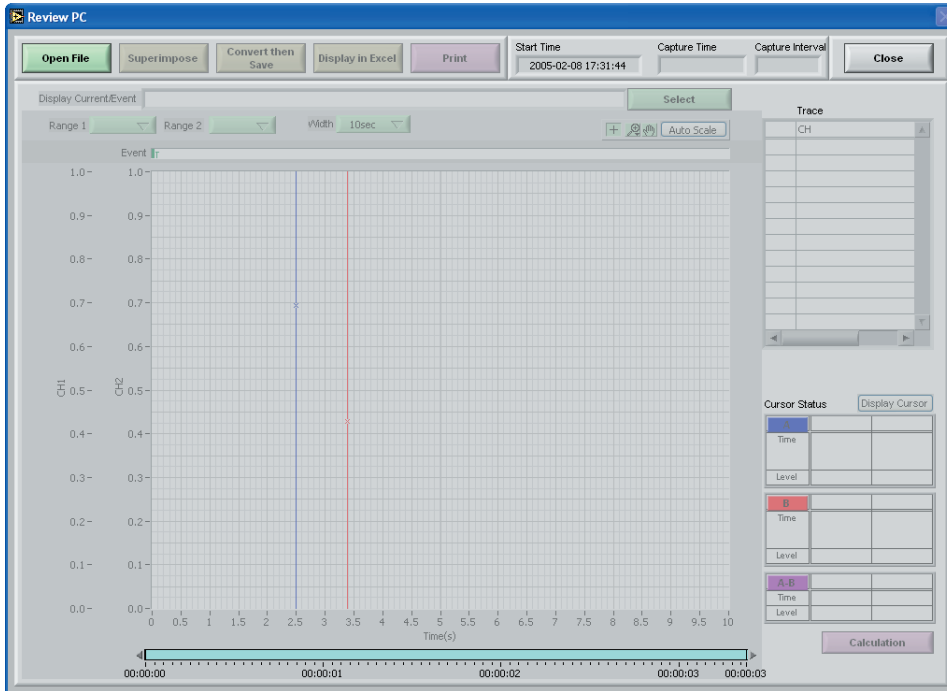
Opening a File

(1) Click the "Open File" button to display the connected PC's data files.
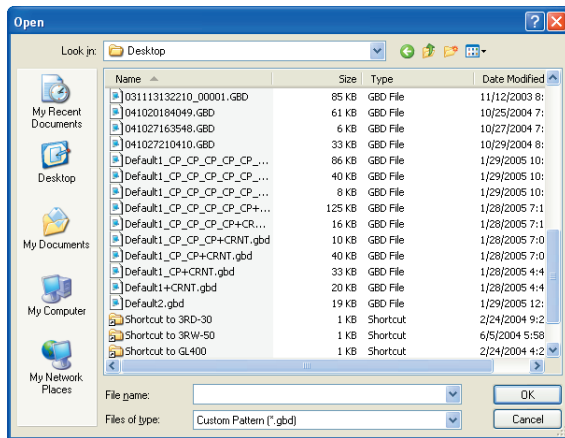
(2) Select the file to be displayed, and then click the OK button. If waveforms are displayed, the data can be checked and converted if required.
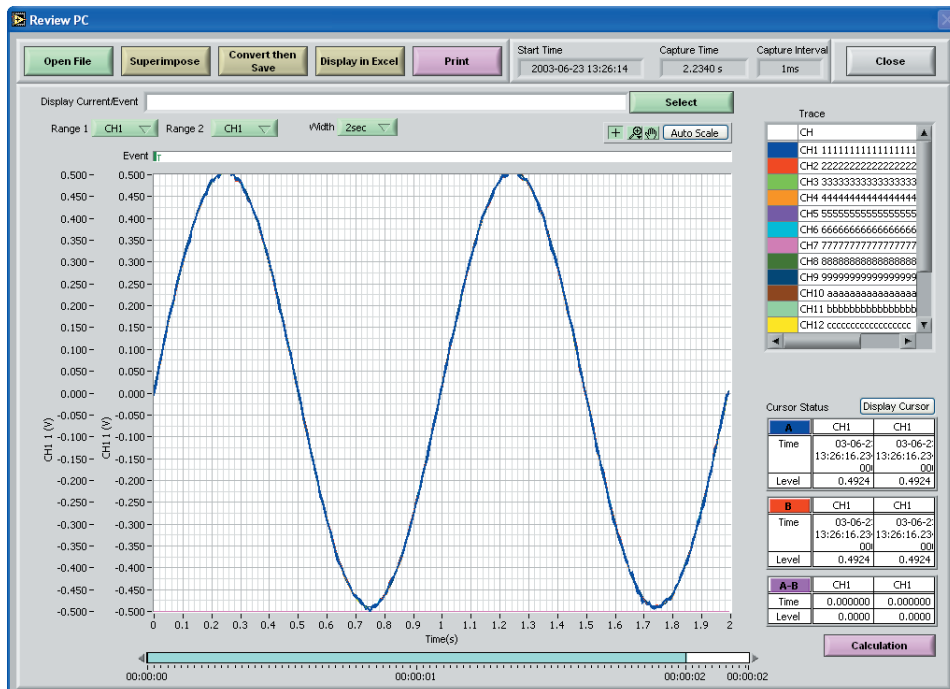
• The capture Start Time, Capture Time and Capture Interval are displayed at the upper right of the screen. Moreover, the selected file name is displayed in the upper part of the waveform display.

• Two channel scales can be displayed for the Y Axis. Specify the channels as required.

• Waveform Show/Hide
If a waveform display color within the Trace list is clicked once, the waveform display for that channel disappears. Click the color once more to redisplay it. Use this function when you need to distinguish between overlapped waveforms.

• Waveform View Range
A scroll bar is displayed underneath the waveform display to indicate which part of the data is displayed. Simply move the scroll bar to the required position for fast display of that data.

• Cursor Status
Two cursors, A and B, are displayed. The cursor information for the two selected waveform channels is displayed at the lower right.

![CHECKPOINT logo] **CHECKPOINT**

- The cursor status waveform data information displayed will be the information for the channels specified as the Y Axis Range 1 and 2 channels.
- If the data file for the event data that was captured at the same time as the current data has been saved to the same folder, select the current data and then for "Display Current/Event", click the "Select" button to display the event data file names.

Select a file name from the list displayed on the screen to display the data for that file. Details of the data being displayed are shown in the box at the top of the screen.
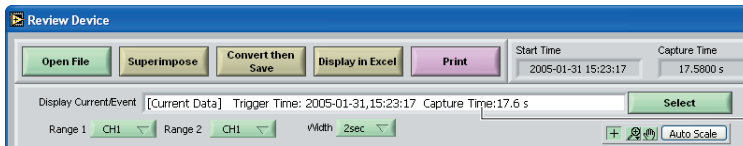
Example of a Current data display
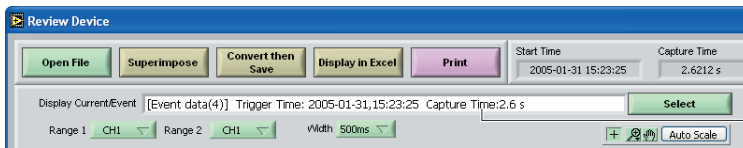
Example of an Event data display

Superimpose

A different waveform can be superimposed on the waveform that was displayed when the "Open File" button was clicked.
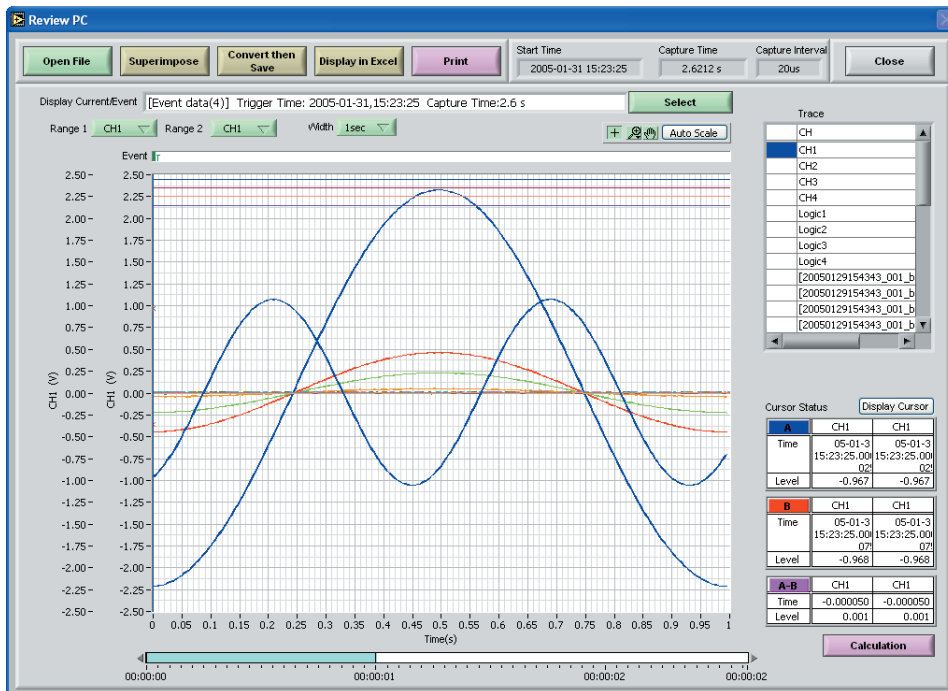
Click the "Superimpose" button to display the "Select File to Superimpose" screen.
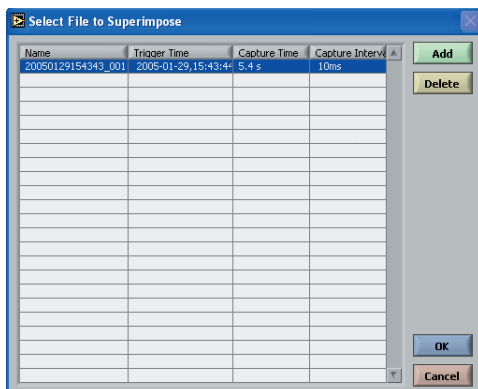
Add: Adds the file that you want to superimpose.

Delete: Deletes the file that was superimposed.

OK: Displays the selected data.

Cancel: Cancels the selection.

Convert then Save

The procedure for converting the displayed data is the same as for "Review Device". Please refer to Section 4.11, "Review Device".

Display in Excel

The procedure for displaying the data in Excel format is the same as for "Review Device". Please refer to Section 4.11, "Review Device".

Print

Click "Print" to output the displayed screen to the printer.

4.13 Logic, Alarm Display

When the GL500 is in online status, the logic (4 channels) and alarm (4 channels) status can be monitored on-screen. Logic data can also be monitored as waveforms. Moreover, if a GL400 or GL350 device is also connected, the display can be switched through three modes.

Example of a GL500 Alarm Display

	1	2	3	4
Alarm				
Logic				

Generated Event Log
Double click to display

No	Generated Time
1	05-01-29 10:15:04
2	05-01-29 10:15:06
3	05-01-29 10:15:09
4	05-01-29 10:15:11
5	05-01-29 10:15:14
6	05-01-29 10:15:16
7	05-01-29 10:15:19
8	05-01-29 10:15:22
9	05-01-29 10:15:24
10	05-01-29 10:15:27
11	05-01-29 10:15:30
12	05-01-29 10:15:32
13	05-01-29 10:15:35
14	05-01-29 10:15:38
15	
16	

Alarm History

CH	Generated Time

Example of a GL400/350 Alarm Display

	1	2	3	4
Alarm				
Logic				

Alarm History

CH	Generated Time
1	05-01-29 10:15:04
2	05-01-29 10:15:06

Example of a GL500 + GL400/340 Alarm Display

	1	2	3	4		Logic	1	2	3	4			1	2	3	4		Logic	1	2	3	4
Alarm												Alarm										

Alarm History

CH	Generated Time

Generated Event Log

No	Generated Time
1	05-01-29 12:25:03
2	05-01-29 12:25:04
3	05-01-29 12:25:06
4	05-01-29 12:25:08
5	05-01-29 12:25:09
6	05-01-29 12:25:11
7	05-01-29 12:25:13

Alarm History

CH	Generated Time

CHAPTER 5

Specifications

This chapter describes the basic specifications for the GL500.

5.1   Standard Specifications

Standard Specifications

Item	Description
Number of analog input terminal units mountable	2 units
External input/output	Trigger input, Logic input or Pulse input, Alarm output
PC interface	Ethernet (10 Base-T/100 Base-TX); USB (Ver. 2.0) standard
Internal memory devices	Current memory : 4 MB (total); Event memory : 32 MB PCMCIA card slot (Type 2) standard
Data backup functions	Setup conditions: EEPROM; Clock: lithium secondary battery
Operating environment	0 to 40°C, 30 to 80% RH (15 to 30°C when the battery is used)
Withstand voltage	1 minute at 500 Vp-p (between each input channel and main unit chassis)
Power supply	AC adapter: 100 to 240 VAC, 50/60 Hz DC input: 8.5 to 24 VDC Battery pack (option): 7.2 VDC (2200 mAh)

Power consumption
    +24 V drive
	4VF/4MF-AMP x 1
	  LCD ON: 0.46A, LCD OFF: 0.4A, During battery charging: add 0.42A to the values at the left
	4VF/4MF-AMP x 2
	  LCD ON: 0.61A, LCD OFF: 0.55A, During battery charging: add 0.42A to the values at the left
	8VS-AMP x 1
	  LCD ON: 0.35A, LCD OFF: 0.27A, During battery charging: add 0.42A to the values at the left
	8VS-AMP x 2
	  LCD ON: 0.37A, LCD OFF: 0.3A, During battery charging: add 0.42A to the values at the left

+12 V drive	4VF/4MF-AMP x 1
	  LCD ON: 0.9A, LCD OFF: 0.75A, Battery cannot be charged
	4VF/4MF-AMP x 2
	  LCD ON: 1.2A, LCD OFF: 1.05A, Battery cannot be charged
	8MS-AMP x 1
	  LCD ON: 0.7A, LCD OFF: 0.55A, Battery cannot be charged
	8MS-AMP x 2
	  LCD ON: 0.8A, LCD OFF: 0.65A, Battery cannot be charged

+8.5 V drive	4VF/4MF-AMP x 1
	  LCD ON: 1.35A, LCD OFF: 1.1A, Battery cannot be charged
	4VF/4MF-AMP x 2
	  LCD ON: 1.85A, LCD OFF: 1.55A, Battery cannot be charged
	8MS-AMP x 1
	  LCD ON: 1A, LCD OFF: 0.75A, Battery cannot be charged
	8MS-AMP x 2
	  LCD ON: 1.15A, LCD OFF: 0.85A, Battery cannot be charged

External dimensions	212 x 162 x 45 mm
Weight[1]	800 g
Other	Beeper (key, etc.) Holes to enable mounting on DIN rails

*1   Excluding the AC adapter and battery; including one amplifier unit.

Internal Memory Devices

Item	Description
Memory capacity	Internal memory: 4 MB (current data), 32 MB (event data)
	PC card slot: Depends on the type of card used
PC card standard	Type 2
Usable card types	Compact Flash (adapter required)
	Memory Stick (adapter required)
	MicroDrive (1 GB)
Memory contents	Setup conditions
	Measured data
	Screen copy

PC Interface

Item	Description
Interface types	Ethernet (10 Base-T, 100 Base-TX)
	USB (Ver. 2.0)
Functions	Data transfer to the PC (realtime, memory)
	PC control of the GL500
Realtime data transfer speed	1 ms maximum[1]

1 Depends on the interface and the number of channels used.

Monitor

Item	Description
Display	4.7-inch STN color LCD (320 x 240 dots)
Displayed languages	English, French, Japanese
Backlight life	Approx. 36,000 hours (at 23°C, as a reference)
Backlight	Screen saver function provided (1, 2, 5, 10, 30, 60 min.)
Contrast adjustment	Provided

Input Unit Specifications (4VF)

Item		Description
Number of input channels		4
Input terminal type		BNC
Input method		Scanning All channels isolated, unbalanced input
Measurement ranges	Voltage	100 mV, 500 mV; 1, 5, 10, 50, 100 V
	Temperature	N/A
Input filter	Type	Line, 5 Hz, 50 Hz, 500 Hz (Line = 1.5 Hz)
	Attenuation	(–3 dB) at –6 dB/oct.
Frequency response		DC to 20 kHz (+1/–3 dB typ)
Measurement accuracy	Voltage	±0.3% of F.S.
(23°C±3°C) when 30 minutes have elapsed after the power was switched on; Line filter On; When the capture mode is Current	Temperature	N/A
A/D converter		14-bit
Temperature coefficient	Zero point	0.02% of F.S./°C
	Gain	0.02% of F.S./°C
Insulation resistance		At least 50 MΩ (at 500 VDC)
Withstand voltage		Between input terminals and GND: 1 minute at 500 VAC
Input resistance		1 MΩ
Allowable signal source resistance		Within 500 Ω
Maximum permissible input voltage		
Between +/– terminals		100 mV to 10 V range: 30 V 50 V to 100 V range: 100 V
Between insulated parts		33 VAC rms (60 VDC)
Common mode rejection ratio		80 dB typ.
Noise		–46 dB typ. (with +/– terminals shorted)

Input Unit Specifications (4MF)

Item		Description
Number of input channels		4
Input terminal type		Screw-type terminal
Input method		Scanning All channels isolated, unbalanced input
Measurement ranges	Voltage	100 mV, 500 mV; 1, 5, 10, 50, 100 V
	Temperature	K, J, E, T, R, S, B, N, W
Input filter	Type	Line, 5 Hz, 50 Hz, 500 Hz (Line = 1.5 Hz)
	Attenuation	(−3 dB) at −6 dB/oct.
Frequency response		DC to 20 kHz (+1/−3 dB typ.)
Measurement accuracy[1]	Voltage	±0.3% of F.S.

(23°C±3°C)
when 30 minutes have elapsed after the power was switched on;
Line filter On;
When the capture mode is Current
	Temperature	<TC-K, J, E>
		  −200 to 0°C: ±(1% of rdg + 3.5°C)
		  Other: ±(0.2% of rdg + 3.5°C)
		<TC-T>
		  −200 to 0°C: ±(0.8% of rdg + 3°C)
		  Other: ±(0.2% of rdg + 3°C)
		<TC-R, S>
		  0 to 200°C: ±9.5°C
		  200 to 800°C: ±6.5°C
		  Other: ±(0.2% of rdg + 4.5°C)
		<TC-B>
		  600 to 700°C: ±9.5°C
		  Other: ±(0.2% of rdg + 5.5°C)
		<TC-N>
		  0 to 1300°C: ±(0.2% of rdg + 3.5°C)
		<TC-W>
		  0 to 2315°C: ±(0.2% of rdg + 4°C)
		  (Including reference contact compensation accuracy)

A/D converter		14-bit
Temperature coefficient	Zero point	0.02% of F.S./°C
	Gain	0.02% of F.S./°C
Insulation resistance		At least 50 MΩ (at 500 VDC)
Withstand voltage		Between input terminals and GND: 1 minute at 500 VAC
Input resistance		1 MΩ
Allowable signal source resistance		Within 500 Ω
Maximum permissible input voltage Between +/− terminals		100 mV to 10 V range: 30 V 50 V to 100 V range: 100 V
Between insulated parts		33 VAC rms (60 VDC)
Common mode rejection ratio		80 dB typ.
Noise		−46 dB typ. (with +/− terminals shorted)

1   Thermocouples used: T: 0.32ϕ, Other types: 0.65ϕ.

Input Unit Specifications (8MS)

Item		Description
Number of input channels		8
Input terminal type		Screw-type terminal
Input method		Scanning All channels non-isolated, balanced input
Measurement ranges	Voltage	100 mV, 500 mV; 1, 5, 10 V
	Temperature	K, J, E, T, R, S, B, N, W
Input filter	Type	Line, 5 Hz, 50 Hz, 500 Hz (Line = 1.5 Hz)
	Attenuation	(–3 dB) at –6 dB/oct.
Frequency response		DC to 20 kHz (+1/– 4.5 dB typ.)
Measurement accuracy[1]	Voltage	±0.3% of F.S.

(23°C±3°C)
when 30 minutes have elapsed after the
power was switched on;
Line filter On;
When the capture mode is Current
	Temperature	\<TC-K, J, E\>
		  –200 to 0°C: ±(1% of rdg + 3.5°C)
		  Other: ±(0.2% of rdg + 3.5°C)
		\<TC-T\>
		  –200 to 0°C: ±(0.8% of rdg + 3°C)
		  Other: ±(0.2% of rdg + 3°C)
		\<TC-R, S\>
		  0 to 200°C: ±9.5°C
		  200 to 800°C: ±6.5°C
		  Other: ±(0.2% of rdg + 4.5°C)
		\<TC-B\>
		  600 to 700°C: ±9.5°C
		  Other: ±(0.2% of rdg + 5.5°C)
		\<TC-N\>
		  0 to 1300°C: ±(0.2% of rdg + 3.5°C)
		\<TC-W\>
		  0 to 2315°C: ±(0.2% of rdg + 4°C)
		  (Including reference contact compensation accuracy)

A/D converter		14-bit
Temperature coefficient	Zero point	0.02% of F.S./°C
	Gain	0.02% of F.S./°C
Insulation resistance		Non-isolated
Withstand voltage		Non-isolated
Input resistance		1 MΩ
Allowable signal source resistance		Within 500 Ω
Maximum permissible input voltage		
Between +/– terminals		100 mV to 10 V range: 10 V
Between insulated parts		Non-isolated
Common mode rejection ratio		Non-isolated
Noise		–46 dB typ. (with +/– terminals shorted)

1 Thermocouples used: T: 0.32φ, Other types: 0.65φ.

5.2   Function Specifications

Function Types

Item	Description
Display screen	Waveform display + digital display, Full-screen waveform display, Digital display *Note: Can be key-toggled*

Sampling interval	Current data: 1, 2, 5, 10, 20, 50, 100, 200, 500 msec
	                    1, 2, 5, 10, 20, 30 sec 1, 2, 5, 10, 20, 30 min 1 hour
	Event data: (2, 4, 5, 8, 10) 20, 40, 50, 100, 200, 500 μsec
	                    1, 2, 5, 10, 20, 50, 100, 200, 500 msec 1 sec
	Note: Selection of the values within parentheses ( ) depends on the type of amplifier installed and the number of channels used.

EU (Scaling function)	4 points can be set for each channel
Review function	Data replay during data capture
Data save functions	Capture to internal memory Capture to internal memory and automatic save to a PC card Direct capture to a PC card (current data only) Setup conditions saved to a PC card Copy of data screen saved to a PC card
Statistical calculation	Types of operation: Average value, peak value, maximum value, minimum value, RMS Number of operations: A maximum of 4 can be set simultaneously Arithmetic operations: +, −, x, / (calculation can be performed for 2 channels of data only) Method: Realtime operation*1 *Note: The calculation results are displayed in the digital display mode*
Search functions	Function: Searches the captured data for the required number of points Search types: Level, alarm, event
Annotation input function	Function: A comment can be input for each channel Inputtable characters: Alphanumerics Number of characters: 11

1   Arithmetic operations can only be performed in real time. Statistical calculations are captured in real time.

Trigger Functions (Current)

Item	Description
Trigger repeat	Off, On
Trigger types	Start: Data capture starts when a trigger is activated. Stop: Data capture stops when a trigger is activated.
Trigger settings	Start: Off, Level, Date, External Stop: Off, Level, Date, External, Time, Event full
Alarm judgment modes	Analog, Logic or Pulse AND or OR • Analog: H, L, Window In, Window Out • Logic: 4-ch pattern • Pulse: H, L, Win In, Win Out

Trigger Functions (Event)

Item	Description
Trigger types	Start: Off, Level, External Pre-trigger: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 % Stop: Off, Level, External

External Input/Output Functions

Item	Description
Input/output types	Trigger input (1 ch), Logic input (4 ch) or Pulse input (4 ch), Alarm output (4 ch) *Note: Switching between Logic and Pulse enabled*
Input specifications	Input voltage range: 0 to + 30 V max. (single-ended ground input) Input threshold level: HIGH: +3.1 V or higher, LOW:+2.4 V or lower Input resistance: Approx.9K
Alarm output specifications	Output format: Open collector output (100 kΩ pull-up to +5 V) Output conditions: Level judgment, window judgment, logic pattern judgment, pulse judgment *Note: Alarm output is judged according to the current sample rate.*
Pulse input	Revolutions mode (engines, etc.) • Function: Counts the number of pulses per second, and displays the values multiplied by 60 as rpm values • Ranges: 5, 50, 500, 5 k, 50 k RPM/F.S. Counts mode (electric meters, etc.) • Function: Displays a count of the number of pulses for each sampling interval from the start of measurement • Ranges: 5, 50, 500, 5 k, 50 k C/F.S. Inst. mode • Function: Displays the number of pulses for each sampling interval. Resets the count value for each sampling interval. • Ranges: 5, 50, 500, 5 k, 50 k C/F.S. Maximum number of pulse inputs • Counts, Inst. modes: 50 k/sampling interval • Revolutions mode: 50 k/s

5.3   Accessory/Option Specifications

Control Software

Item	Description
Compatible operating system	Windows 2000/XP
Functions	Main unit control, realtime data capture, data conversion
Main unit settings	Input settings, memory settings, alarm settings, trigger settings
Captured data	Realtime data (CSV, Binary) Memory data (CSV, Binary) PC card data
Displayed items	Analog waveforms, logic waveforms, pulse waveforms, digital values
Display modes	Waveform display, digital display
File conversion	Between cursors, all data
Monitor functions	Alarm monitor enables the sending of email to the specified address
Dual-screen function	Displays the current data together with past data
Max./Min.	Displays the maximum, minimum, and current values during measurement
FFT functions	

Battery Pack (Option)

Item	4VF	4MF	8MS
Capacity	7.2V/2200 mAh		
Battery type	Lithium secondary battery		
Running time at +25°C (The running time varies according to the environment)	When the LCD is ON • x1: Approx. 40 minutes • x2: Approx. 20 minutes When the LCD is OFF • x1: Approx. 1 hour and 30 minutes • x2: Approx. 40 minutes	When the LCD is ON • x1: Approx. 40 minutes • x2: Approx. 20 minutes When the LCD is OFF • x1: Approx. 1 hour and 30 minutes • x2: Approx. 40 minutes	When the LCD is ON • x1: Approx. 1 hour and 30 minutes • x1: Approx. 1 hour When the LCD is OFF • x1: Approx. 2 hours • x1: Approx. 1 hour and 30 minutes
Charging method	Mount in the main unit While the GL500 is in use, factors such as the condition of the installed amplifiers, the operating temperature, and the length of continuous use may prevent charging of the battery. (Charging is controlled by monitoring the temperature)		
Time required for charging	Approx. 4 hours when the power supply is OFF		
Switchover in the case of a power failure	Because the battery is used together with the AC adapter, the power supply will be switched automatically to the battery drive in the event of a power failure. ***Note: The AC adapter is the primary power source.***		
Operating environment	15 to 30°C		
Other functions	When the battery is running low, memory data is saved automatically to the PC card. When data is being saved directly to the PC card, the file is closed automatically.		

5.4 External Dimensions

GL500

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