GRAPHTEC

GL500A

SIMPLE GUIDE TO MEASUREMENT

- Part of the Main Portion –

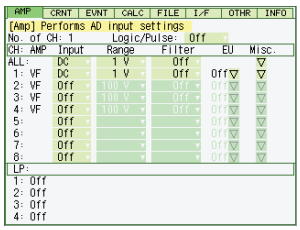
Let's capture waveforms and replay them.

Taking a simple example of recorder measurements of voltage waveforms, we will explain the flow "from capturing data to replay" using the following procedure.

Set up the procedure for capturing waveforms.

The procedure for setting capture conditions with an example waveform will be explained.
→ Proceed to "How to Make GL500 Settings"

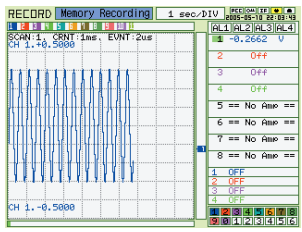
MENU



Perform data capture.

Let's explain the procedure for data capture "from start to end."
→ Proceed to "How to Capture Data."

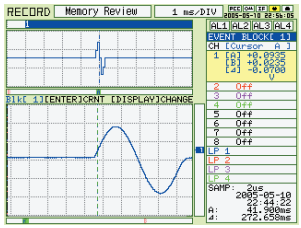
START
STOP



Replay data.

We will explain the "replay/display procedures" for waveforms captured and recorded in GL500's internal memory.
→ Proceed to "How to Capture Data."

REVIEW



In "SIMPLE GUIDE TO MEASUREMENT-- Part of the Main Portion --," we will explain the measurement example using the menu shown on GL500's monitor.

Regarding the measurement procedure for using application software with a PC, refer to "4.8 Application Software Measurement Example" in the operating manual for GL500A (MANUAL NO. GL500-UM-152).

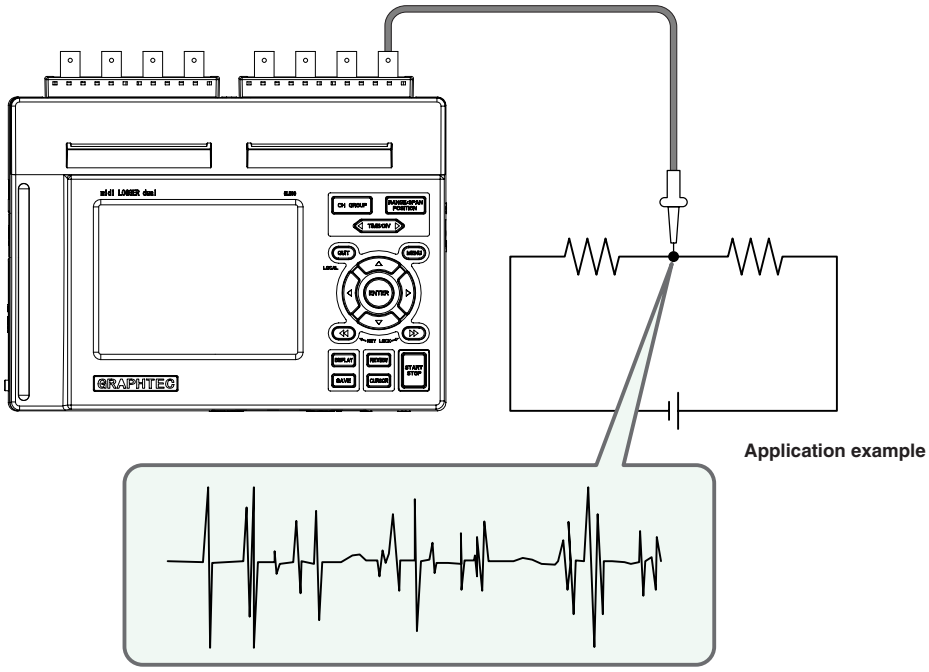
Now, this is the example waveform....

Example

When a waveform such as that shown in the figure is observed, or is expected to be observed, we should measure a detailed voltage waveform over a data capture period of 10 minutes.

Key points

- Use only channel 1 for input (set all the other channels to Off).
  Note: You can use any channel you like, but we have used channel 1 for the procedure described.
- Since we want to perform detailed waveform measurement, we will make Event settings here.
- Select the GL500's internal memory as the Data Save Destination.
  Note: PC card can be specified instead of Internal memory, but we have used Internal memory for the procedure described.



Application example

Note: Before Performing Measurement... Perform measurement only after you have read through Chapter 2 "Checks and Preparation" in the GL500A User's Manual (GL500-UM-152).

Note: The circuit and voltage waveform shown in the figure are only examples used to illustrate the procedure, not actual representations.

Proceed to "How to Make the GL500 Settings"

In “How to Make the GL500 Settings,” we will explain the procedure for setting the capture conditions indicated in “Example” shown above.

Before actually explaining the procedure, let’s introduce the keys used here and related setting screens.

First, the keys used in the “How to Make GL500 Settings” will be introduced.

Action you want to perform	Press this key
• Display a Menu screen • Move the Menu tab cursor	MENU
Move the cursor	ENTER
Set a parameter	ENTER
Switch from the "1 to 8CH" to the "9 to 16CH" analog channel display	CH GROUP
• Close the menu • Close the sub-menu or message box	QUIT
Change “On/Off RANGE-SPAN-POSITION” of the input waveform (it is possible on the Free-Running screen).	RANGE/SPAN POSITION + ENTER

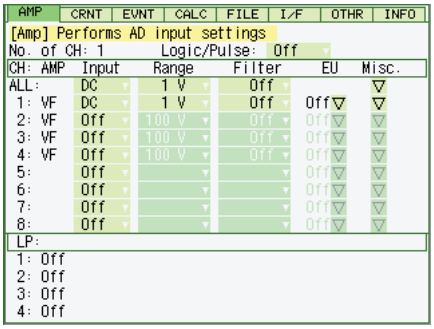
Next, let's introduce "Set Screens."

The following four menus are used to make the data capture settings.
Each time the [MENU] key is pressed, the setting tab switches to the next tab.

Setting Menu Structure

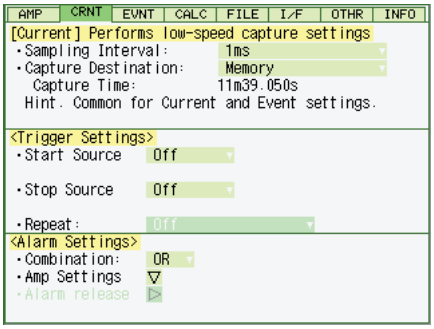
AMP — Used to make settings for the installed amps.

Sets the AMP input channels.
Here we select Channel 1 for the input channel as described in the key points for the example: "Use only channel 1 for input".



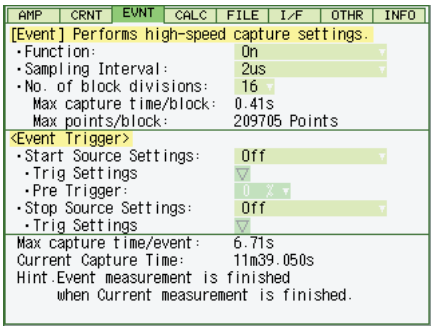
CRNT — Sets the conditions for the capture of Current data (low-speed data).
Specifies the data capture destination.
Sets the alarm conditions (not set in this example).

Current data is the data used to display the entire input waveform.
Here we specify a capture time of at least "10 minutes" and "Memory" as described in the example.



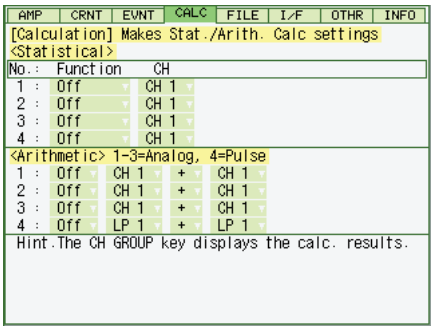
EVNT — Sets the conditions for the capture of Event data (high-speed data).

Event data is data that displays the details for one part of the Current data.
Here we make settings to enable "Detailed waveform measurement" as described in the example.



CALC — Sets the Statistical and Arithmetic Calculation conditions.

This menu is not used in our example, and so we set all the parameters to "Off".



Then, let's execute setting.

❶ Press the [MENU] key

(MENU) The GL500 setting menu screen is displayed.

Note: Press the [MENU] key, while the Free Running screen is displayed.

❷ Make the AMP settings

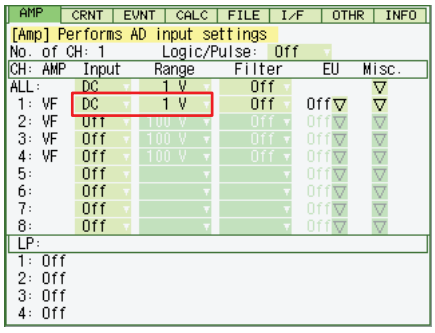
Select the AMP tab, and make the amp-related settings.

- Select "DC" for the input for CH1, and select "1V" for the range.

Note: As Event data sampling will be performed at 2μs intervals, set all the other channels to "Off".

Note: Because no logic/pulse signals will be captured in this example, set the channel to "Off."

Note: For the range setting value, select a value from the voltage waveform used to perform measurement. In this example, we set the range to 1V.



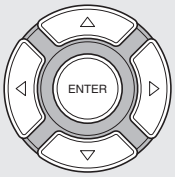
To display a menu

(1) Press the [MENU] key.

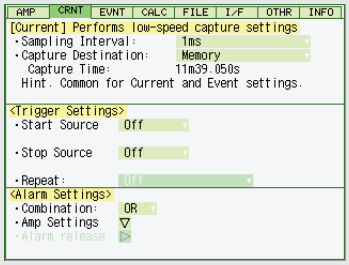
(MENU)

The menu screen is displayed.

(2) Use the (◁▷△▽) keys to select the parameters, and then press the [ENTER] key.



Example: When [CRNT] has been selected



To close a menu

Press the [QUIT] key while a menu is being displayed.

(QUIT)

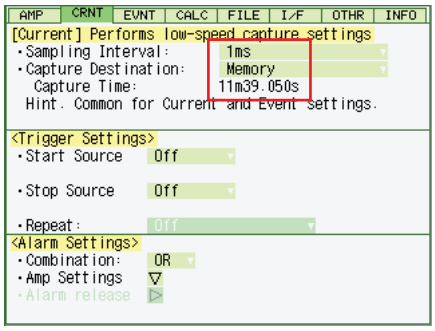
Closes the displayed menu. Operations started by menu settings can be ended and settings cancelled at any time by pressing the [QUIT] key.

❸ Make the CRNT Settings

Select the CRNT tab, and make the settings related to the capture of current data (low-speed data).

- Set the sampling interval to enable data capture for at least 10 minutes. In this example we have used 1 ms for the setting.
- Select Memory for the capture destination.

Note: Here we have used "Memory" for the procedure described.

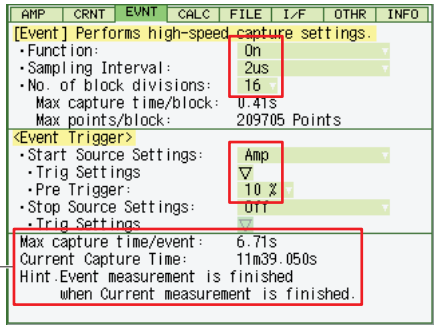


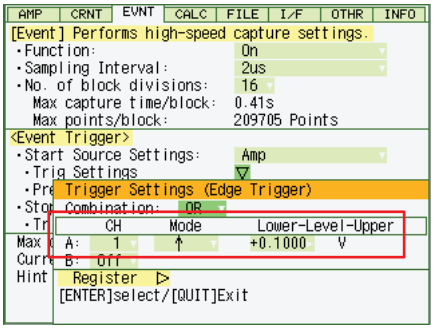
❹ Make the EVNT Settings

Select the EVNT tab, and make the settings related to the capture of event data (high-speed data).

- Set Function to On.
- Set Sampling Interval to 2 µs. (to perform the most detailed measurement)
- Set No. of block divisions to 16. (freely-selectable)
- Set Amp for Start Source Settings.
- Set Trig Setting to CH1, ↑, +0.1000V (judge the appropriate settings from the waveform)
- Set Pre Trigger to 10%. (freely-selectable)

Check the data capture time setting

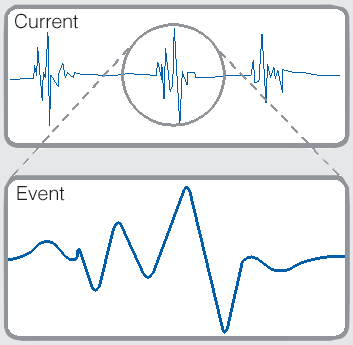




Proceed to "How to Capture Data"

About Current Data (Low-speed data)...

- Current data is data that is captured at a high-speed sampling interval (max. 1ms).
- Current data is displayed as a waveform. The entire input waveform is displayed.



About Event Data (High-speed data)...

- Event data is data that is captured at a high-speed sampling interval (max. 2µs).
- Event data is displayed a section of the Current data in detail so that you can check minute variations in the values that were difficult to check in the Current data.

About the Event triggers A and B....

- There are two Event triggers, A and B. If you want to use both triggers, you can specify a combination trigger (OR or AND).

In “How to Capture Data,” the operational procedure from the start of capturing data to the end will be explained.

Before actual explanation, let’s now introduce the keys and screens used during data capturing.

To begin with, the keys used in “How to Capture Data” are as follows:

Action you want to perform	Press this key
• Start data capture • Stop data capture	START STOP
Switch among the Waveform, Enlarged Waveform, and Digital Display screens	DISPLAY
Enter a parameter setting	ENTER
Select a display channel	ENTER
Change the SPAN-POSITION of waveforms during data capture (changes in the waveform display, “On/Off, RANGE” during data capture is prohibited).	RANGE/SPAN POSITION + ENTER

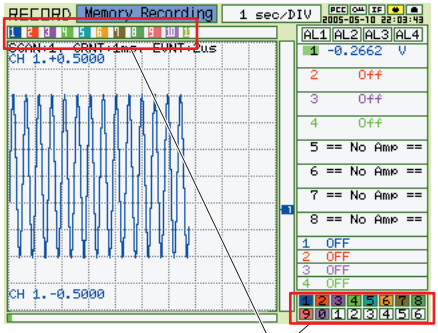
Action you want to perform	Press this key
Switch between the "1 to 8 CH" and "9 to 16CH" channel displays	CH GROUP
• Return to the default screen • Cancel a setting	QUIT
Change the time scale	TIME/DIV
Replay data during a data capture operation	REVIEW

Next, we will introduce screens used during data capturing.

There are three types of Free Running screens that can be displayed during data capture, as shown below.
When the screen displayed is the Waveform screen, press the [DISPLAY] key to switch to the Enlarged Waveform screen. Press the [DISPLAY] key again to switch to the Digital Display screen.

Note: When the [QUIT] key is pressed, the "standard screen displayed during data capturing" returns to the monitor.

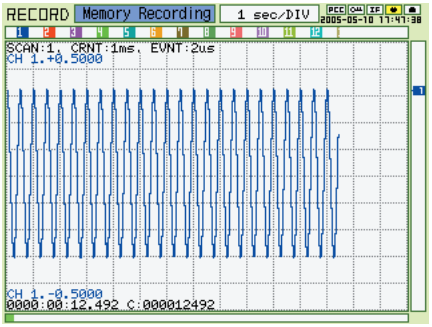
Standard screen displayed during data capturing



Displays the Event data capture status.

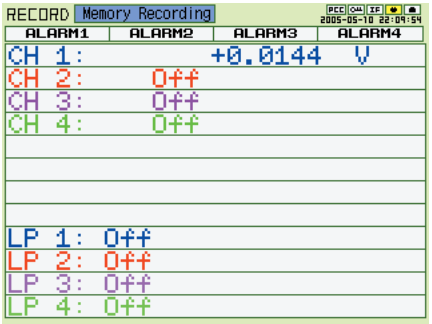
- This is the default screen that is displayed during data capture.
- The GL500 status is displayed in the simplified message display area.
  Free Running status: "Free Running"
  During data capture: Capture destination
  When capturing data to the internal memory: "Memory Recording"
  When capturing data to a PCMCIA card: "PC card"

Enlarged Waveform screen



- Displays only the waveform section across the entire screen.

Digital Data screen



- Displays digital data.
- Use the [CH GROUP] key to switch between the "1 to 8 CH" and "9 to 16CH" analog channel displays.

Then, let's capture data!

❶ Press the [START/STOP] key

When the [START/STOP] key is pressed, you can tell whether there is any data stored in the GL500's internal memory from the message box that is displayed.

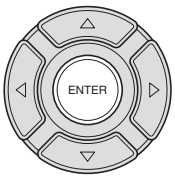
When there is no data stored in the internal memory

START
STOP

When there is data already stored in the internal memory

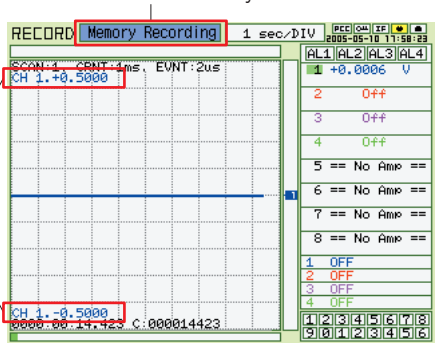
❷ Press the [ENTER] key

Data capture starts.

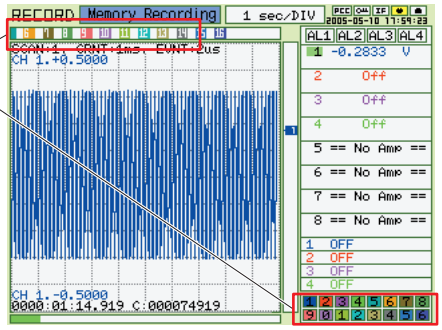


This indicates that data capture to the internal memory has started.

Scale display



When the blocks in the memory block capture display section and the event data display section are filled with color, this indicates that event data has been captured.

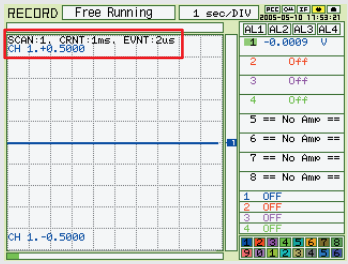


What to do if you don't want the confirmation message displayed when the [START/STOP] key is pressed

- Select the OTHR tab on the menu screen.
- Select Off for the Start/Stop confirmation message.

Easy confirmation of the settings

The number of scans, Current and Event sampling intervals and the scale settings can be confirmed at a glance.



If Off has been selected for the Start/Stop confirmation message, the operation described in Step ❷ is not required. Data capture starts after the operation is Step ❶ is performed.

What to do if you don't want the Scale values displayed

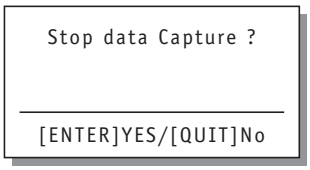
- Select the OTHR tab on the menu screen.
- Select Off for the Scale display mode.

Note: This setting must be made before data capture starts.

To stop data capture

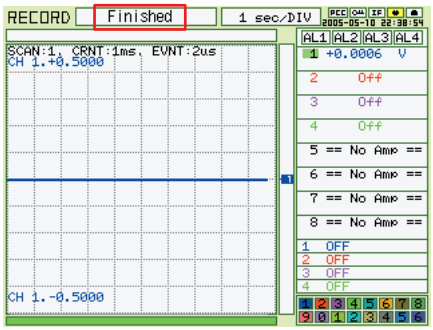
❸ Press the [START/STOP] key

The "Stop data Capture?" confirmation message box is displayed.



The "Finished" message displayed in the simplified message display area indicates that the capture of current data has ended. In this case, no further data capture will be performed,(Data capturing of Events is completed. In this example, data capture was completed in 11 minutes and 39.050 seconds.) If the [START/STOP] key is pressed, the Free Running screen returns.

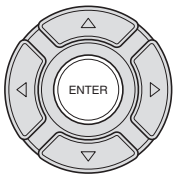
Note: If the [START/STOP] key is pressed when the "Finished" message is not displayed, data up until that point is captured.



❹ Press the [ENTER] key

Data capture is stopped.

Note:The Free Running screen returns.



Data capture is completed

Proceed to "How to Replay Data"

Convenient RANGE/SPAN/POSITION key

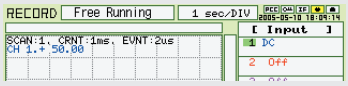
Press this key to switch among the [INPUT], [RANGE], [SPAN], and [POSITION] settings, and the alarm display section.

Use the up and down arrow keys to select the channel, and the left and right arrow keys to make the changes.

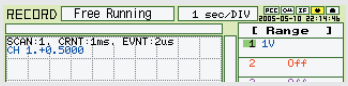
Note: Only the [SPAN] and [POSITION] settings can be changed during a data capture operation.

Note: If the [QUIT] key is pressed, the basic screen returns.

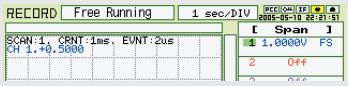
[Input]: Enables On or Off to be selected for each analog input channel.



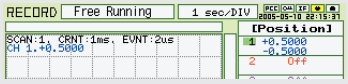
[Range]: Enables the waveform range to be changed.



[Span]: Enables the waveform span to be changed.



[Position]: Enables the waveform position to be changed.



If Off has been selected for the Start/Stop confirmation message, the operation described in Step ❹ is not required. Data capture stops after the operation is Step ❸ is performed.

In “How to Replay Data,” the procedure to replay data saved in the internal memory during the operation “How to Capture Data” will be explained.

Before actually explaining the procedure, however, let us introduce the keys used here and the screens shown during replay.

First, the keys used in “How to Replay Data” are as follows.

Action you want to perform	Press this key
• Replay captured data • Switch between the 2-screen and 1-screen replay screens	REVIEW
Switch between the [1 to 8CH] and [9 to 16CH] channel displays	CH GROUP
Switch between cursors A and B	CURSOR
• Close the replayed data display • Close the displayed pop-up menu	QUIT
Save waveform data and the displayed screen data to a PCMCIA card	SAVE
Move, search, or perform calculation on the displayed position of the replayed data	MENU

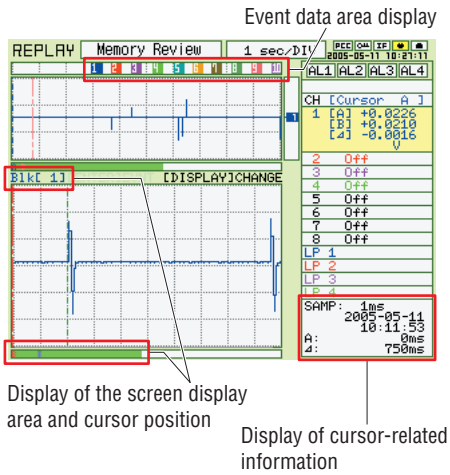
Action you want to perform	Press this key
Select a display channel	ENTER
Change the On/Off, SPAN and POSITION settings displayed for the replayed waveform	RANGE/SPAN POSITION + ENTER
Search the Current or Event waveform on the 2-screen display	ENTER
Move the cursor	ENTER or
Change the time scale	TIME/DIV
Switch between the Current and Event screens on the 2-screen display	DISPLAY

Then, replay screens will be introduced.

There are three types of data replay screens that can be displayed, as shown below.

The functions that are common to all three screens are the waveform "Display/Do not Display", "Change Span", "Change Position" "Waveform Search" and "Between-Cursor Calculation" functions.

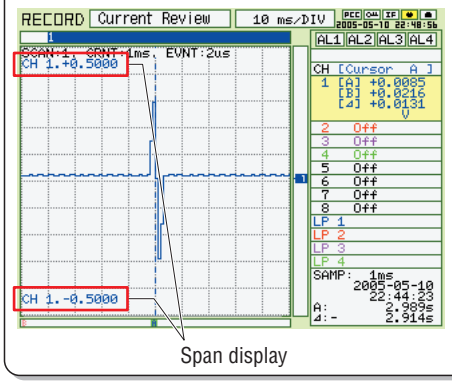
2-screen data replay



- Both the Current data and Event data screens are displayed. The upper screen is the Current data screen, and the lower screen is the Event data screen.
- If the capture destination is internal memory, the default screen is the 2-screen replay screen.

  Note: The 1-screen replay screen will be the default screen if Off was selected for the Event function or if single replay was selected for the event file when replaying data captured to a PCMCIA card.
- The colored numbers displayed in the Event data display area indicate the Current area with respect to the Event data.
  The waveform search functions "From Current to Event" and "From Event to Current" can be easily performed on the waveform displayed in this area.
- Press the [REVIEW] key to switch to the 1-screen replay screen.
- The following messages are displayed in the simplified message area:
  When internal memory data is replayed: "Memory Review"
  When PC card data is replayed: "Replaying PC card data".

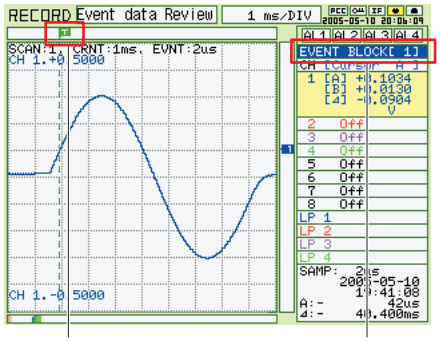
1-screen Current data replay



- The Current data waveform is displayed on a single screen.
- When displaying this screen from a 2-screen replay, press the [REVIEW] key to switch back to 2-screen replay.
- "Current Review" is displayed in the simplified message area.

  Note: The replay of both the GL500's memory and the PC card data replay shall be the same display.

1-screen Event data replay



- The Event data waveform is displayed on a single screen.
- When displaying this screen from a 2-screen replay, press the [REVIEW] key to switch back to 2-screen replay.
- "Event data Review" is displayed in the simplified message area.

  Note: The replay of both the GL500's memory and the PC card data replay shall be the same display.
- The event block number that is currently being replayed is displayed at the right side of the screen.

  Note: The Event 1 screen replay cannot be performed for data captured when the Event function was set to Off.

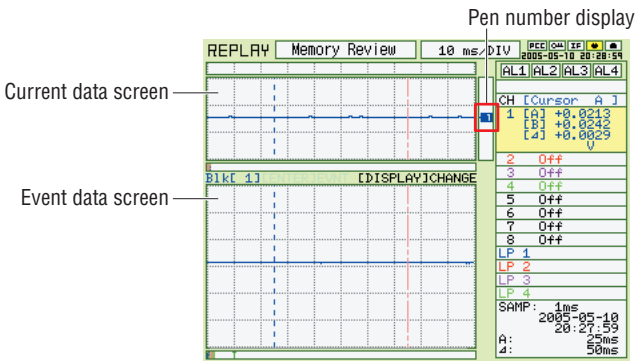
Now, let's replay data!

❶ Press the [REVIEW] key

REVIEW

- The data captured to the GL500's internal memory is replayed.
- When internal memory data is replayed, it is displayed in the default 2-screen format.

  Note: Excluding cases in which the Event function is Off.
- The screen with the pen numbers displayed is the active screen.
- The figure below shows that the Current data screen is active.

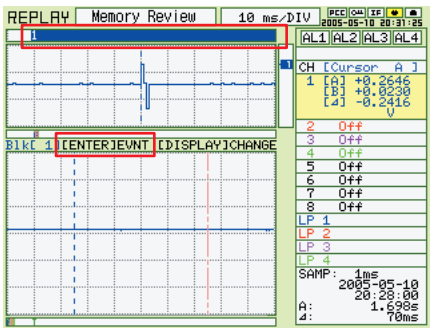


❷ Display the Current data waveform

- Align the cursor with the position on the waveform where you want to search for Event data.

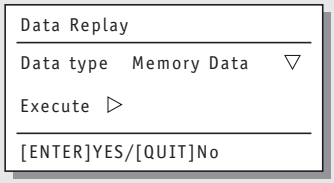
  Note: You can use either Cursor A or B for this operation.
- An Event data search can only be performed in the area displayed in color in the Event data display area.

  Note: "[ENTER] EVNT" is displayed for the corresponding Event data in the center of the screen.



When you want to replay data from a PCMCIA card

Confirm that the PCMCIA card is inserted in the GL500's card slot and then press the [REVIEW] key. The following message box is displayed. Select "PC Card" for the "Data type" parameter, and then press the [ENTER] key.



When you want to end the data replay operation

- Press the [QUIT] key to close the data replay screen and display the Free Running screen.

  QUIT

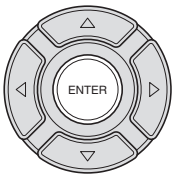
  GL500 is in Calculation, Trace, Span, or Position mode, press the QUIT key several times while the message box is displayed.
- If you perform data replay once again after data replay has been stopped, the screen that was displayed immediately before data replay was stopped is displayed in the 2-screen format. The waveform position is stored in memory for your peace of mind for times such as when you end the data replay operation by mistake.

To switch between the active screens

- During a 2-screen data replay operation, press the [DISPLAY] key to switch between the Current and Event active display screens.
  The screen with the pen numbers displayed is the active display screen.

  DISPLAY
- Functions such as moving Cursors A and B, changing the SPAN and POSITION and the [TIME/DIV] key operations are made with respect to the active screen.

❸ Press the [ENTER] key

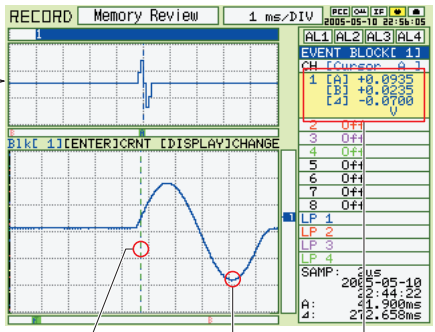


Search for the Event data waveform

- The Event data search results with respect to the Current data waveform are displayed.
- An Event data search can only be performed in the area displayed in color in the Event data display area.

Note: "[ENTER]EVNT" is displayed in the center of the screen.

Detailed waveform search completed



Trigger position

Voltage confirmation

Waveform where the Event search was made

Phenomena that were difficult to confirm on the Current data waveform can be easily confirmed on the Event data waveform.

Event trigger conditions

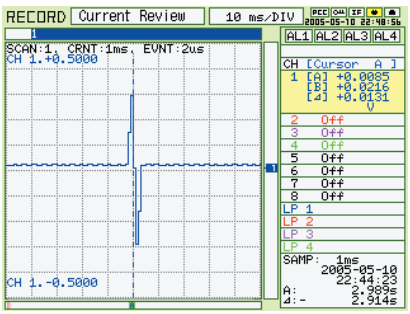
We can ascertain that data was captured using the following conditions:
+0.1000V, ↑, 10% pre-trigger

To expand the screen to an easy-to-read single-screen display

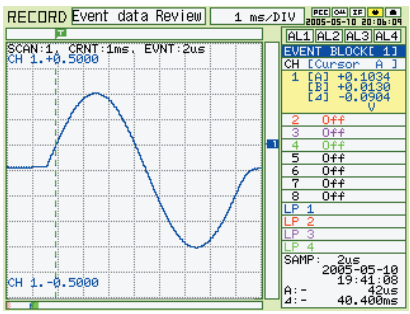
REVIEW

- With the display screen in the 2-screen replay status, press the [REVIEW] key to expand the active screen to a single-screen display.

Current data 1-screen replay



Event data 1-screen replay



To return the display to the 2-screen replay screen

REVIEW

- With the display screen in the 1-screen replay status, press the [REVIEW] key to switch to the 2-screen replay screen.

Note: This operation can only be performed if the 1-screen replay screen was enabled by pressing the REVIEW key when the 2-screen replay screen was displayed.

Notes on the text displayed in the Current and Event screens

The meaning of each of the displayed text items is as follows.

- **Blk [*]:**
  Indicates the event block number displayed in the Event screen.
- **[ENTER] EVNT:**
  If the [ENTER] key is pressed when this text is displayed, a search is made for the Event waveform with respect to the Current data.
- **[ENTER] CRNT:**
  If the [ENTER] key is pressed when this text is displayed, a search is made of the Current waveform with respect to the Event data.
- **[DISPLAY] CHANGE:**
  Switches the active screen from the Current screen to the Event screen and vice versa.

Regarding waveform display precision in the 2-screen replay…

Please note that the search accuracy is not absolute accuracy.
The search accuracy varies according to the sampling interval. In this example, since the Current data sampling interval is 1 ms, the event data search accuracy shifts in the range of ±1 ms.

A further search function....

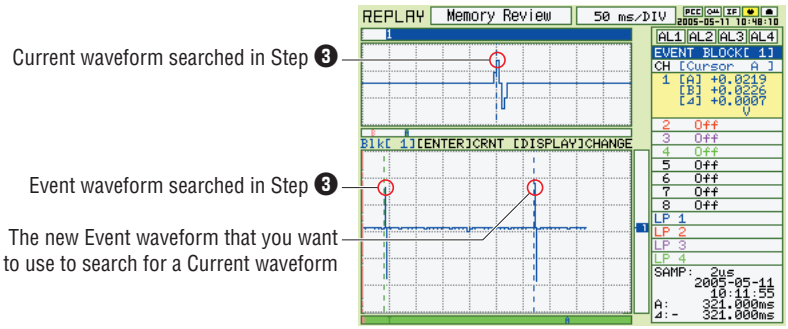
Now, let's search the Event waveform in order to display the Current waveform

❹ Search for the Current waveform on the Event waveform

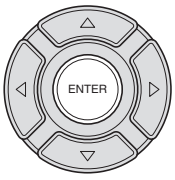
- Align the cursor with the position on the Event waveform where you want to search for Current data.

  Note: You can use either Cursor A or B for this operation.

- If the display screen is a 1-screen replay screen, press the [REVIEW] key to display a 2-screen replay screen.



❺ Press the [ENTER] key

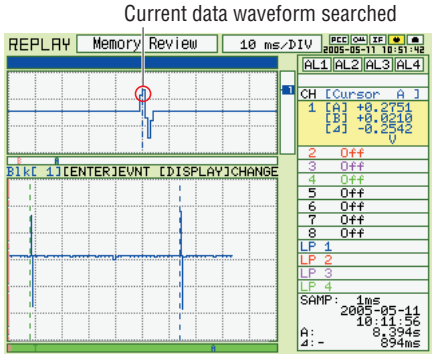


Search for the Current data waveform

- The Current data waveform with respect to the Event data waveform is displayed.

Use the Current data for an overall check

Current data waveform searched



Here we can ascertain that the waveform we searched for was generated 8.394s after measurement was started.

Convenient RANGE/SPAN/POSITION key

Press this key to switch among the [Trace], [Span], and [Position] settings, and the alarm display section.

RANGE/SPAN
POSITION

Use the up and down arrow keys to select the channel, and the left and right arrow keys to make the changes.

Note: Only the [SPAN] and [POSITION] settings can be changed during a data capture operation.

[Trace]: Enables the waveform "Display / Do not display" function.

[Span]: Enables the waveform span to be changed.

[Position]: Enables the waveform position to be changed.

Regarding waveform display precision in the 2-screen replay...

Please note that the search accuracy is not absolute accuracy.
The search accuracy varies according to the sampling interval. In this example, since the Current data sampling interval is 1 ms, the Current data search accuracy shifts in the range of ±1 ms.

❻ Press the [QUIT] key

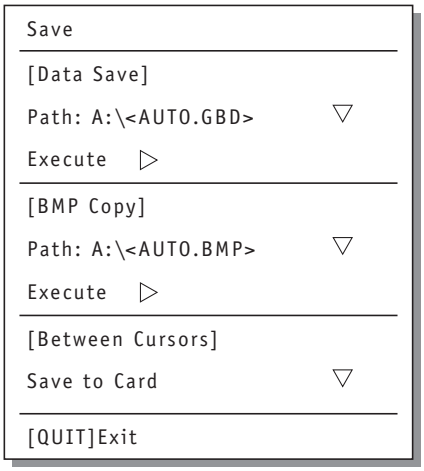
QUIT

- The data replay screen closes.
- The screen returns to the Free Running display screen.

How to save memory captured in the GL500's internal memory to a PCMCIA card

SAVE

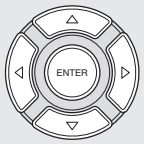
- Insert the card into the PCMCIA slot of the GL500.
- Press the [SAVE] key.
- A menu box is displayed.
- Select the "Save" destination.
- Align the cursor with the "Execute" parameter and then press the [ENTER] key to start the saving of data to the PCMCIA card.



Saving data to a PCMCIA card

Three types of data can be saved to a PCMCIA card as follows.

- "Data Save":
  Saves the data captured in the GL500's internal memory to a PCMCIA card.
- "BMP Copy":
  Saves the currently displayed screen to a PCMCIA card. The data is saved in BMP format.
- "Between Cursors" (only when the data replay screen is a 1-screen replay screen):
  Saves the data between the A and B cursors on the 1-screen replay screen to a PCMCIA card. The data is saved in either GBD or CSV format.

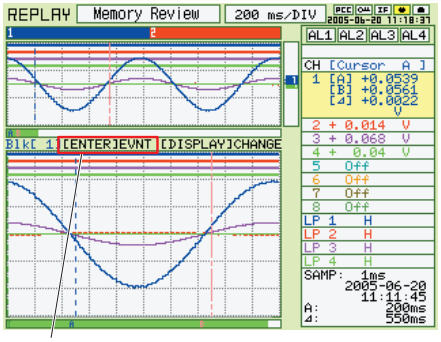


To select the “Save” destination, press the [ENTER] key in the item of “Save” destinations, and choose it through the [DIRECTION] key.

Could you successfully obtain the waveform display?
Finally, let's review the replayed screens.
Now, you can quickly understand the relations among replayed screens.

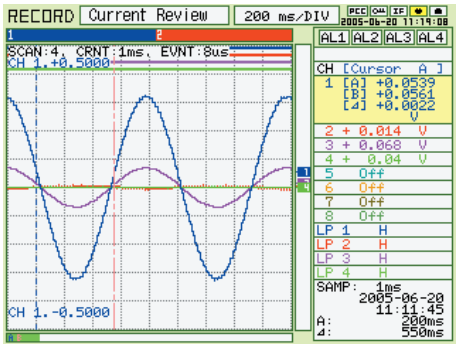
Review of replayed screens

2-screen replay (Current screen is effective)



Event waveform displayable area

Current 1 screen replay



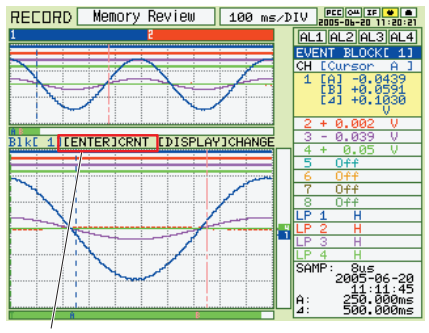
[REVIEW] key

Current waveform display
(Confirm the overall flow)

[ENTER] key

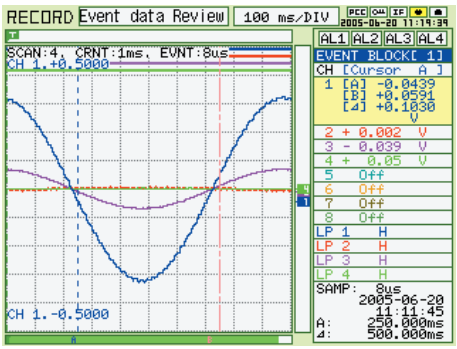
Event waveform display
(Detailed waveform confirmation)

2 screen replay (Event screen is effective)



Current waveform displayable area

Event 1 screen replay



[REVIEW] key

Letters to be shown between Current event screens in the 2-screen replay mean the following:

- Blk[*]: Indicates the Event block number shown on the Event screen.
- [ENTER]EVNT: When the [ENTER] key is pressed while letters are shown, the EVENT waveform corresponding to the Current is displayed.
- [ENTER]CRNT: When the [ENTER] key is pressed while letters are shown, the Current waveform corresponding to the Event is displayed.
- [DISPLAY]CHANGE: Effective screens for Current and Event are mutually transferred.

There are cases in which a message is displayed when capture setting is carried out through a menu. We will explain the massage displayed.

Displayed message

```
Event measurement time
exceeds Current measurement
time. Event measurement will
be finished when Current
measurement will be finished.
Proceed?

[ENTER]YES/[QUIT]No
```

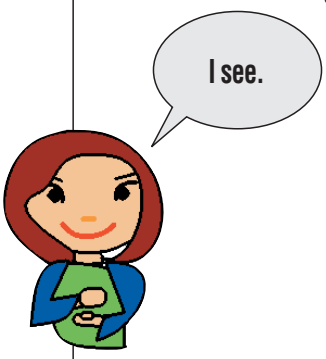
Meaning

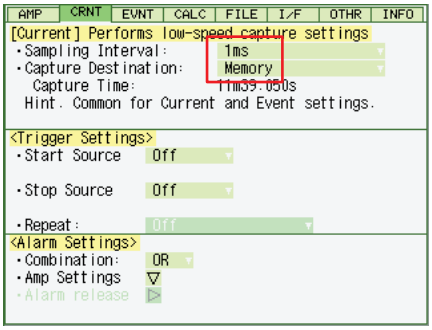
This message may be displayed after the Current and Event sampling intervals were specified. The meaning is that the specified Event data capture time exceeds that of the Current data capture time. If "YES" is selected by pressing the [ENTER] key, the capture of Event data will end at the same time that the capture of Current data ends.

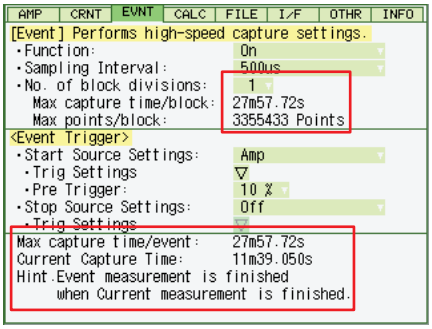
Explanation

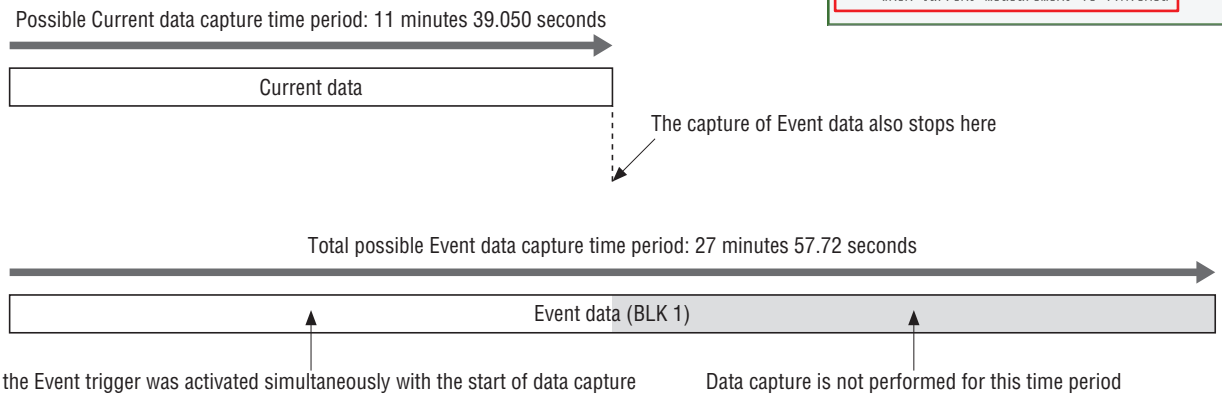
In this example, 1 ms was selected as the sampling interval for Current data, and 500µs as the sampling interval for Event data. If the Event trigger is activated simultaneously with the start of data capture, Event data capture also stops when Current data capture stops after 11 minutes and 39.050 seconds have elapsed.

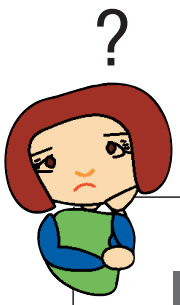
Note: Even if the total allowable Event data capture time period is within the allowable Current data capture time period, the trigger activation condition(s) specified for the Event trigger may cause data capture to be stopped partway through.











Displayed message

```
Auto event trigger reqd ?
Trigger for lowest channel
is set to Start trigger A.

[ENTER]YES/[QUIT]No
```

Meaning

This message may be displayed when you have made a Current trigger setting on the Menu screen. In the following instances, the Current trigger setting can be automatically used for the Event trigger setting:

- Start Source Settings: Off
  or
- Start Source Settings: Amp
- Trig Settings: Off (both A and B)

Explanation

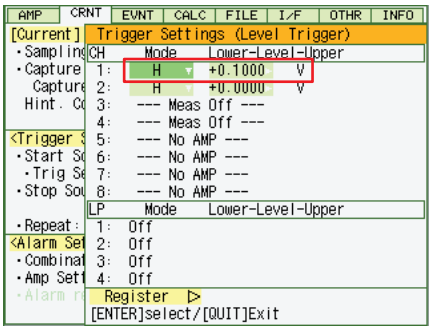
When the Current trigger has been set to the values shown in the figure:

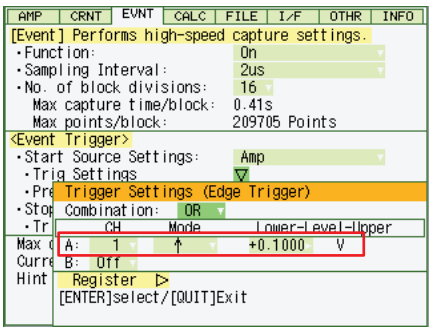
- CH1 H +0.1000V
- CH2 H +0.0000V

If "YES" is selected when the pop-up message is displayed, the Event trigger can be automatically set to the setting specified for CH1.

This function eliminates the need to set the Event trigger.

Note: If "No" is selected by pressing the [QUIT] key, automatic setting is not performed. Moreover, if the Event trigger setting is performed before the Current trigger setting, automatic setting is not performed. The pop-up message is always displayed when automatic setting can be performed.





Tha specifications, etc, in this manual are subject to change without notice.

GL500-UM-552

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GRAPHTEC CORPORATION