

Digital High Speed

MEMRECAM fxLink

Waveform Input Software

Model SP-631



User Manual

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Reference Number

00173-0A **MEMRECAM** fxLink Waveform input software, September 2008

2007.06.05

Please Read Carefully Before Using

Safety Precautions

Before using, please read the following precautions. Depending on the device, the following symbols and warnings are shown for items requiring particular safety precautions during handling. For these notations, please read the warnings before beginning operation.

DANGER

If the indications shown are ignored, dangerous conditions could result in death or serious injury.

WARNING

If the indications shown are ignored, potentially dangerous conditions could result in death or serious injury.

CAUTION

If the indications shown are ignored, potentially dangerous conditions could result in slight or moderate injury. This is also a warning sign of unsafe operation and indicates the potential of damage to this device or connected devices.

Operating Precautions

Safety alert symbol



This is the safety alert symbol. This symbol alerts you or others to the danger and/or items or operating concerns relating to the use of this device.

This mark is also used when there is important information relating to operation. Read the message by this symbol carefully and follow the instructions for safe and appropriate use of this device.

Grounding terminal symbol



This symbol indicates the site of a protective grounding terminal. If not grounded, electrical shock could be received from the metallic and other parts of this device. Due to this danger, please make sure it is grounded. When connecting to an electric outlet using a 3P-2P convertible plug, connect with the outside grounding terminal of the convertible plug grounding wire.

Warning



Power switch must be turned off before connecting or disconnecting cables. If the cables are connected or disconnected leaving the power switch ON, it may cause electrical shock as well as damage on the equipment.

High voltage warning



When replacing fuses, conduct with the power cable unplugged from the electric plug. Do not open the cover. Depending on the device, there may be parts that generate high voltage internally so opening the cover could result in electrical shock.

There may be problems with the conditions and circumstances of use for this device not stated above. As a result, sufficiently understand the general provisions noted in the Operation Manual of this device before using. Also, directly contact the retail outlet as soon as possible if there are any questions about this device.

Provisions Regarding Use and Warranty

NAC Image Technology provides a warranty for operation of the software product within the following limits and operation under normal conditions of use described in the Operation Manual.
NAC Image Technology does not offer any other warranty related to this product.

1. **Warranty**

If this software does not function normally at delivery due to a defective medium or other reason, it will be replaced free of charge.

2. **Support Services**

NAC Image Technology will provide essential information on bugs and upgrades relating to our software. This service will be available for a period of one year from the date of software delivery.

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NAC Image Technology shall be liable for this software only as stated in 1. and 2. above.

NAC Image Technology shall bear no liability for damage occurring as the result of use of this software.

Methods of use for this software are explained, and this Operation Manual is complete but NAC Image Technology shall bear no liability for damage occurring as the result of any omissions.

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Copyright for this software is retained by NAC Image Technology. NAC Image Technology authorizes customers the use of this software under the following conditions.

5. **Range of Use**

This software may not be used on multiple computers simultaneously.

6. **Duplication Limitations**

Other than for the purposes of customer backup, this software may not be copied in part or in its entirety.

7. **Third Party Use**

Third party usage by any method such as lease, grant or transfer of this software or copies is not allowed.

8. **Liability after Modifications or Upgrades**

If there are modifications or upgrades to this software not administered by NAC Image Technology, NAC Image Technology does not guarantee its normal operation. Also, NAC Image Technology shall bear no liability for damage occurring due to modifications or upgrades on this software.

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Overview

1.1 Basic function

The integrated fxLink Waveform Input software performs the following tasks:

- Simultaneous operation of MEMRECAM GX and fx cameras and analog data (waveform data) acquisition using a PC.
- Save waveform data files
- Change display settings of waveform files (NWF)
- Synchronized playback of image files and waveforms
- Zoom and scroll within waveform data graph
- Display multiple images and waveforms simultaneously
- Print waveform data graph
- Export waveform data to CSV (comma) or TSV (tab) files

Minimum Computer Requirements

Hardware	IBM Compatible PC
CPU	Pentium 4, 1.4 GHz or better
Memory	512 MB
Display	Full Color, 1280x768 resolution
OS	Windows XP Pro SP2 Windows 2000 Pro SP4
HDD	100 GB or more recommended
Network	FCAL / Fibre Channel recommended Ethernet (IEEE 802.3u 100 BASE-TX Half Duplex)
Drive	CDROM (installation)
USB	USB 2.0 for Waveform input device and License key

Waveform Input Device Specifications

Model	DT9836	<table><tr><th>Channels Used</th><th>Max. Sampling Freq. (Hz)</th></tr><tr><td>1</td><td>100000</td></tr><tr><td>2</td><td>71428</td></tr><tr><td>3</td><td>55555</td></tr><tr><td>4</td><td>45454</td></tr><tr><td>5</td><td>38461</td></tr><tr><td>6</td><td>33333</td></tr><tr><td>7</td><td>29411</td></tr><tr><td>8</td><td>26315</td></tr></table>	Channels Used	Max. Sampling Freq. (Hz)	1	100000	2	71428	3	55555	4	45454	5	38461	6	33333	7	29411	8	26315
Channels Used	Max. Sampling Freq. (Hz)																			
1	100000																			
2	71428																			
3	55555																			
4	45454																			
5	38461																			
6	33333																			
7	29411																			
8	26315																			
Max Freq.	255KHz																			
Voltage Ranges	±10V,±5V																			
Voltage Settings	All channels have the same setting																			
Channel Gap	None																			
Model	DT9834																			
Max Sampling Freq.	Please refer to table on right																			
Voltage Ranges	±10V,±5V,±2.5V,±1.25V																			
Voltage Settings	Each channel can be set																			
Channel Gap	2μ sec. (When using multiple channels)																			

2

Installation

2.1 Installation Instructions

Please install the device driver for the Waveform Input Device found in the included installation CD. These drivers can be installed before or after the MEMRECAM control software (fxLink / GXLink) is installed.

Ensure that the MEMRECAM control software version is GXLink Ver 1.14 or later and fxLink Ver 3.00 or later. If an earlier version of the MEMRECAM control software is installed, please un-install the older version and install a newer version before continuing. For installation instructions of the control software, please refer to the operation manual.

The steps to install the Waveform Input device are as follows:

- Install the Device Drivers from the Installation CD
- Connect the Waveform Input Device to the USB port
- Install the Device Drivers using the Found New Hardware Wizard (Wizard will appear two times)
- Install the HASP Drivers
- Run the MEMRECAM Control Software (Chapter 3)

2.2 Waveform Input Device Drivers Installation

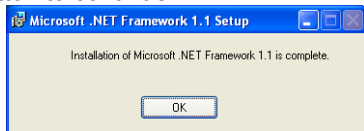
- 1 Insert the Waveform Input Device installation CD. Select the **Install Drivers** tab on the left hand side. Click the **[Install Now]** button to continue.



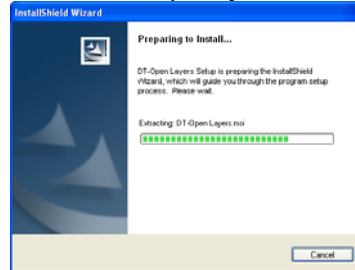
- 2 Microsoft .NET Framework 1.1 may need to be updated. If prompted, select the **[I agree]** radio button and click the **[Install]** button to continue.



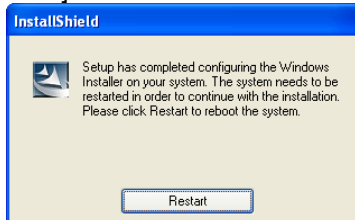
- 3 After the update is complete, click the **[OK]** button to continue.



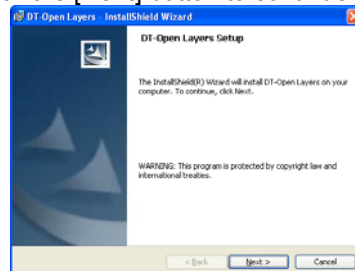
- 4 The Waveform Device drivers will then be extracted to a temporary folder.



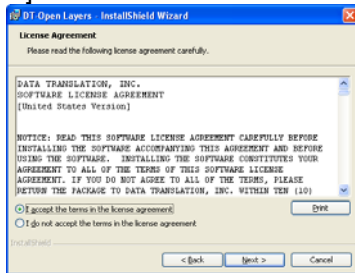
- 5 If prompted to reboot the system, click the **[Restart]** button to continue.



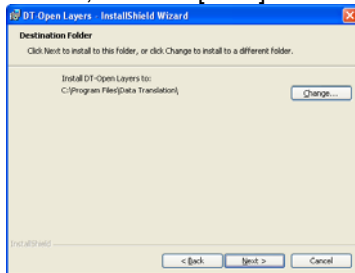
- 6 Click the **[Next]** button to continue.



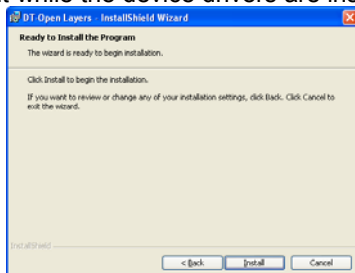
- 7 Read the **End User Agreement**. Select the **[I accept]** radio button and click the **[Next]** button to continue.



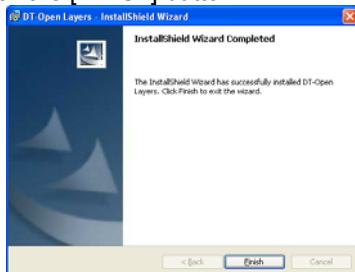
- 8 To install the drivers in the default destination, click the **[Next]** button.



- 9 To continue click the **[Install]** button and wait while the device drivers are installed.



- 10 Click the **[Finish]** button.

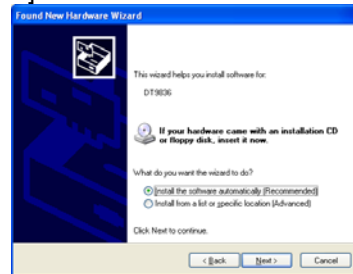


- 11 Power up the Waveform Input Device and connect it to any available USB 2.0 port on your computer.

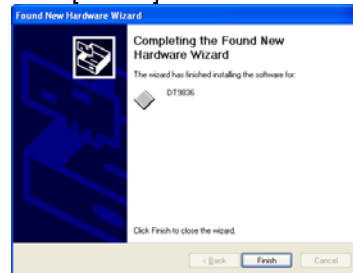
- 12 In the **Found New Hardware Wizard**, select the **[No, not at this time]** radio button and click the **[Next]** button to continue.



- 13 Select the **[Install software automatically]** radio button and click the **[Next]** button.



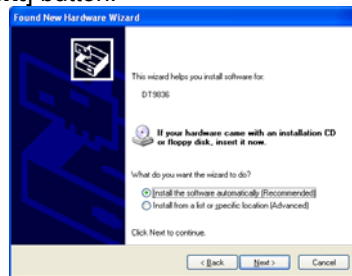
- 14 Click the **[Finish]** button to continue.



- 15 The **Found New Hardware Wizard** may appear again, select the **[No, not at this time]** radio button and click the **[Next]** button to continue.



- 16 Select the **[Install software automatically]** radio button and click the **[Next]** button.



- 17 Click the **[Finish]** button to continue.



2.3 Hasp Installation

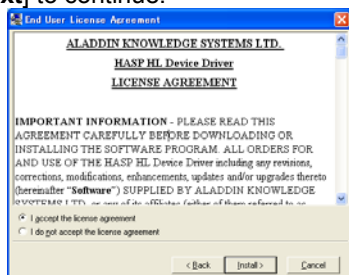
- 1 Insert the GXLink/fxLink installation into the CD drive. Browse for this installer file **X:/HASPdrivers/HASPUserSetup.exe** and double click to begin the installation



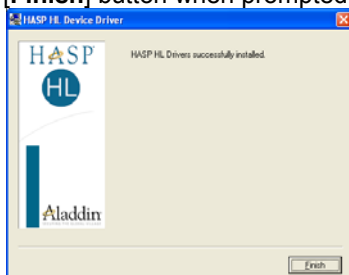
- 2 The **Welcome** window shows the driver version to be installed. Click **[Next]** to continue.



- 3 After reading the License Agreement select the **[I Agree]** radio button and click **[Next]** to continue.



- 4 To end the HASP driver installation, click the **[Finish]** button when prompted.



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3

Operation

3 Operation

This chapter describes operation of the MEMRECAM Control Software (hereinafter, GXLink / fxLink). Screen shots of GXLink Ver 2.04 have been used for demonstration. GXLink procedures and operations are similar to those of fxLink.

3.1 USB License Key

Please verify that the license key is connected to your computer's USB port before you start GXLink / fxLink.

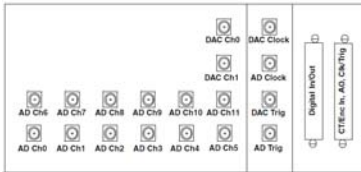


NOTE: If the license key is not connected to the USB port the waveform input functions will not be accessible.

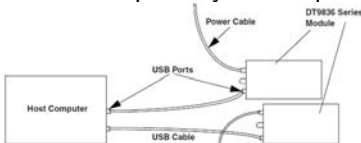
3.2 Connections Sequence

Ensure that the waveform input device is connected properly to the computer before GXLink / fxLink connects to the camera

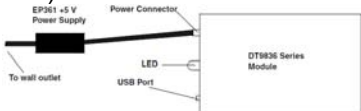
- 1 Connect the signal sources to the Waveform Input Device first (refer to the Waveform Device's operation manual).



- 2 Next, connect the Waveform Input Device to the USB 2.0 port in your computer.

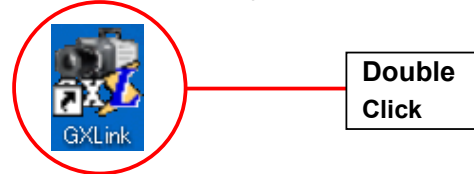


- 3 Connect the Waveform Input Device to the external power source and power it up (refer to the Waveform Device's operation manual).

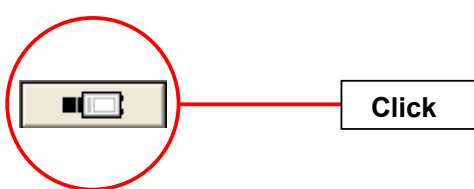


- 4 Power up the MEMRECAM camera and wait for it to complete the boot sequence.

- 5 Open GXLink / fxLink by double clicking the icon on the desktop.

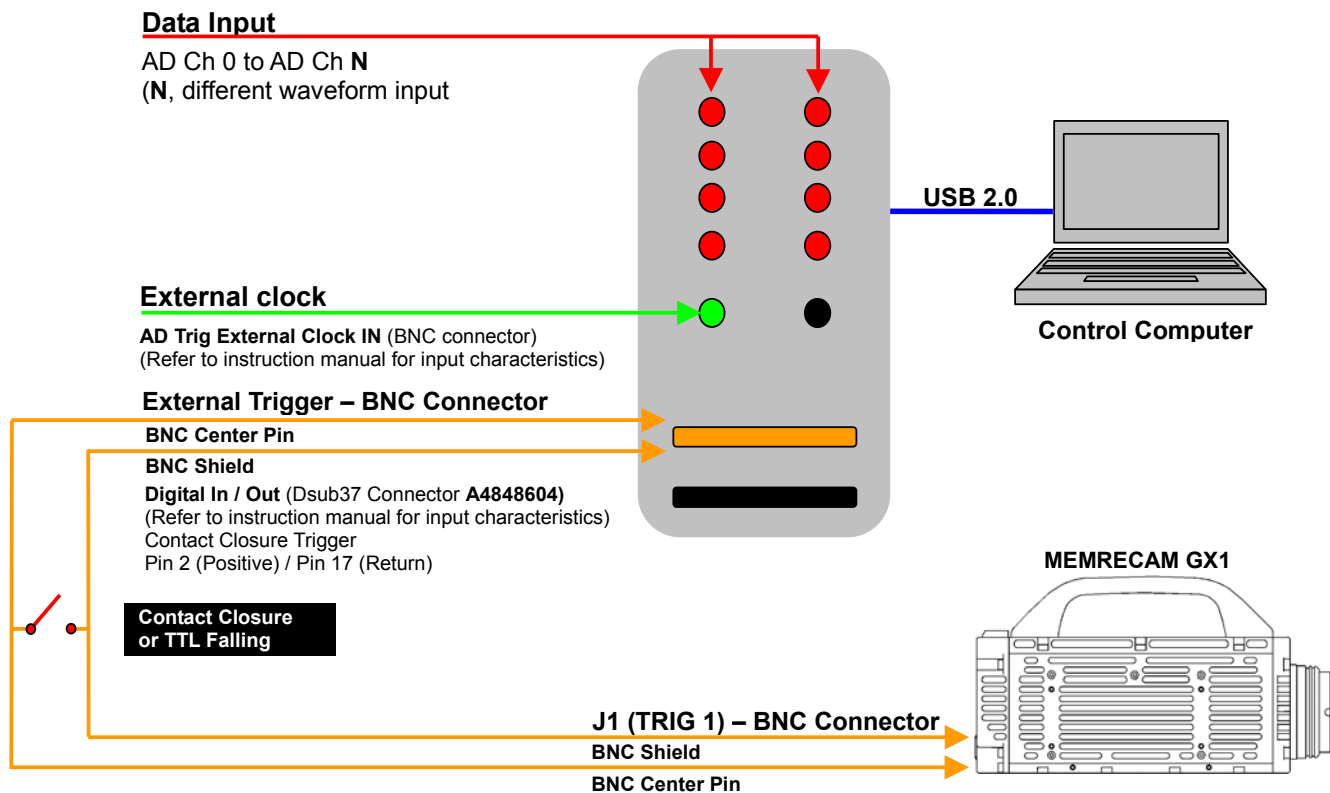


- 6 Click the Connect button to establish communication with the MEMRECAM camera.



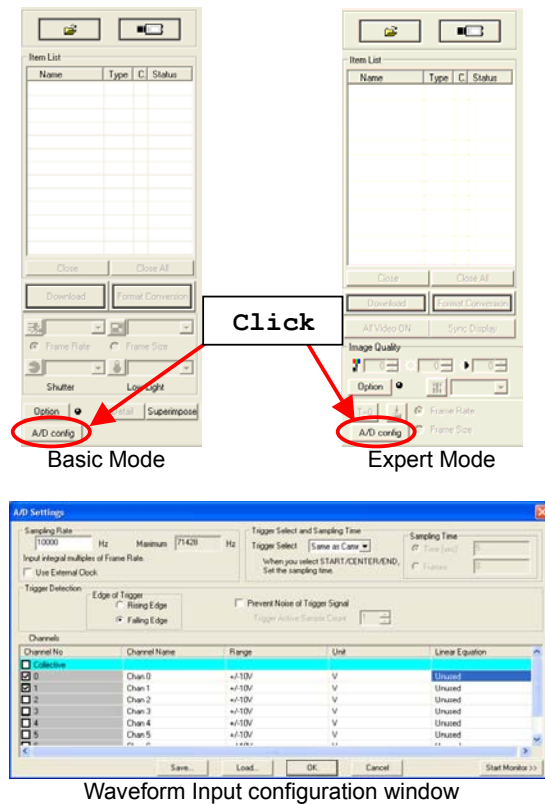
GX1 - Connections

DT9834 or DT9836



3.3 Waveform Input Configuration

With GXLink / fxLink open, click the **[A/D config]** button to open the Waveform Input configuration window.



- Sampling Rate**
 Enter the desired sampling rate in Hz. The maximum allowable sampling rate varies on the waveform input device model. Please refer to page 5-2.
- Use External Clock**
 Fill the check in the box if an external clock is used. Even when using an external sampling clock frequency, please enter. Please refer to page 5-3 for additional information regarding the use of an external clock.
- Trigger Select**
[START] trigger point at the beginning of data sampling.

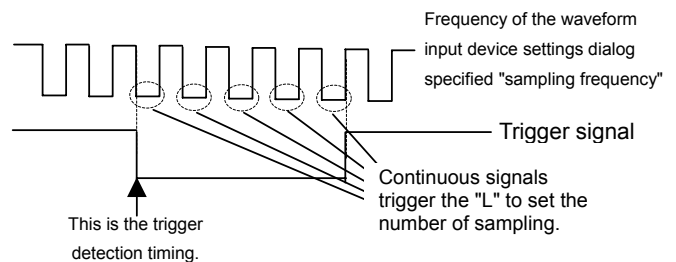
[CENTER] trigger point at the middle of data sampling.

[END] trigger point at the end of data sampling.

[Same as Camera] The duration of the camera image and data recording is the same. In case of multiple cameras, the longest image duration is used.

- Sampling Time**
 Set the **Sampling Time** when the trigger setting is **START / CENTER / END**. The Sampling Time can be set in **Time [sec]** or **Frames**.
- Edge of Trigger**
 Select the polarity of the trigger signal.
- Prevent Noise of Trigger Signal**
 The checkbox enables and disables a noise filter.

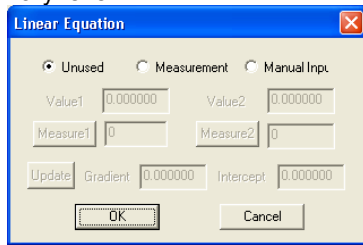
Example: a trigger signal "falling":



- Channel No**
 Select the desired channels to be used by filling the check box to the left.
- Channel Name**
 Used to enter a nickname for each channel.
- Range**
 Used to select the input voltage range. The voltage range varies on the waveform input device model. Please refer to page 5-2.
- Unit**
 Enter a display name for the Unit.

- **Linear Equation**

Double-click within the row to open the dialog box. Set to display the graphed data as raw waveform or converted at the primary level.



[Unused] Waveform data as shown in the chart.

[Measurement] Enter a quantity when there are two values as a physical amount of the measured voltage, (X, Y). The following formula calculates the slope and intercept.

[Update] Tilt and section can be updated with the click of a button.

[Manual] Enter slope and intercept manually.

- **Buttons Explanation**



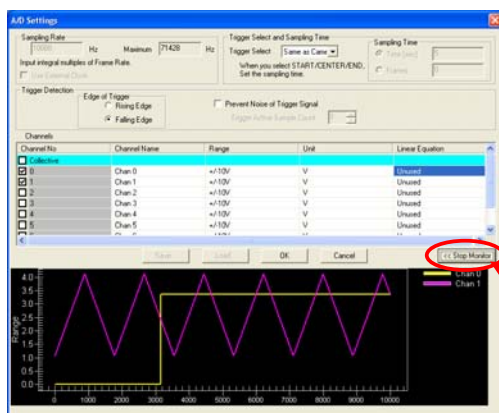
[Save] To save these settings to a file

[Load] Load previously saved settings.

[OK] Applies and saves the current settings. The dialog window is closed.

[Cancel] The dialog window is closed. Any changes in settings are not saved.

[Start Monitor] Begin real-time display of any selected channels.



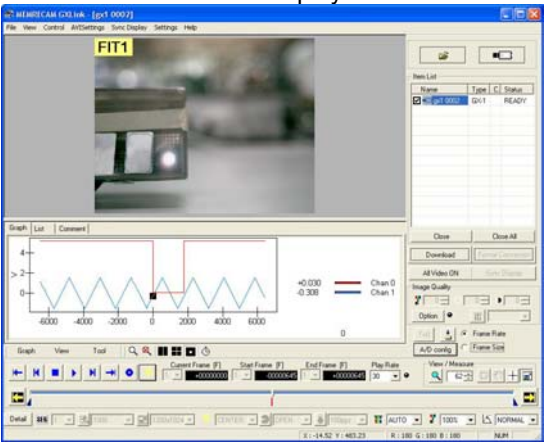
To stop real-time display, click the [Stop Monitor] button.

3.4 Waveform Input

GXLink / fxLink manages simultaneous image and waveform data recordings. The system can be triggered by clicking the **[Trigger]** button or an external trigger signal (refer to page 5-3).

CAUTION: There is a time delay when triggering by clicking the **[Trigger]** button. This will cause for the trigger time between the camera and waveform data not to match. To ensure that the trigger time matches use and external trigger input. T-0 is displayed for the waveform sampling and the image frame where the trigger input was received.

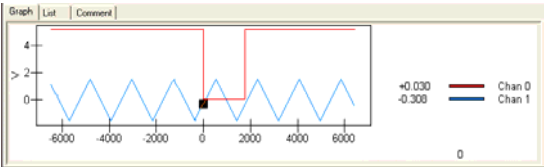
After the recording is complete, the images and waveform data are displayed



- **Waveform Data Comments**
Text can be entered in the comments tab. Text entered is saved in the waveform file. After each recording, the comment field is empty.



- **Waveform data graphs**
The Waveform data graph is displayed immediately after a recording is made. Refer to page 3-12 for information on changing the graph format. During playback, the cursor movement corresponds to the image and waveform data being displayed. Click on the Channel data lines to move the current frame.



- **Waveform data List**
The list format cannot be changed. Click on a line to move the current frame.

Sample No	Time[sec]	Chan 0 [V]	Chan 1 [V]
-4	-0.000400	5.168152	-0.324707
-3	-0.000300	5.162559	-0.325317
-2	-0.000200	5.163879	-0.316467
-1	-0.000100	5.165710	-0.314941
0	0.000000	5.165259	-0.305222
1	0.000100	0.029907	-0.309448
2	0.000200	0.030076	-0.307312
3	0.000300	0.031738	-0.298157
4	0.000400	0.032654	-0.296326
5	0.000500	0.029297	-0.292053
6	0.000600	0.028992	-0.289917

3.5 Saving Files

Waveform data files (NWF format) are saved at the same time images are downloaded from the cameras as per the following format:

- The filenames for the MCFF and NWF files is the same. The (underscore “_”) character cannot be used.
- These files are saved in the same destination folder.

Example 1: Single-camera image (mcf) download with waveform data file (nwf).

fxData folder

```

├── k5-2330.mcf
└── k5-2330.nwf (Waveform file)
  
```

Example 2: Single-camera image (mcf) download with waveform data file (nwf).

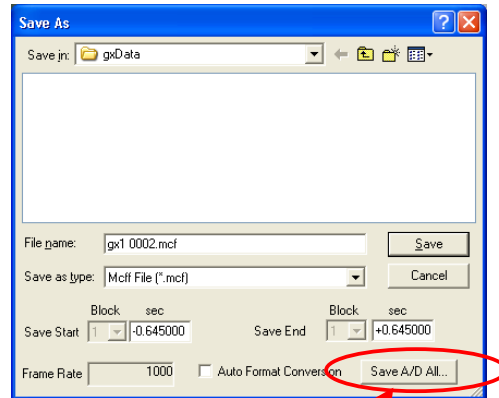
fxData Folder

```

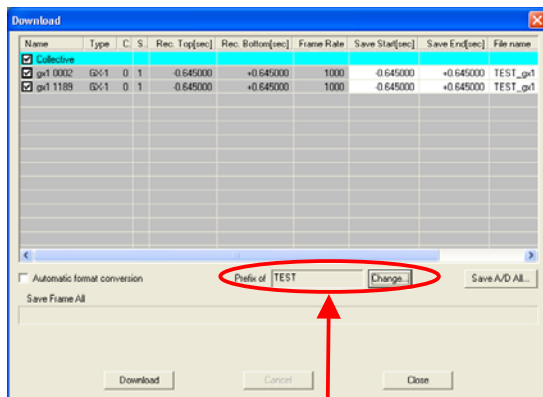
├── TEST_k5-2330.mcf
├── TEST_k5-2331.mcf
└── TEST.nwf (Waveform file)
  
```

- A prefix can be added to the filenames when downloading using the Multi-cameras (Collective). Click the [Change] button to add a prefix.

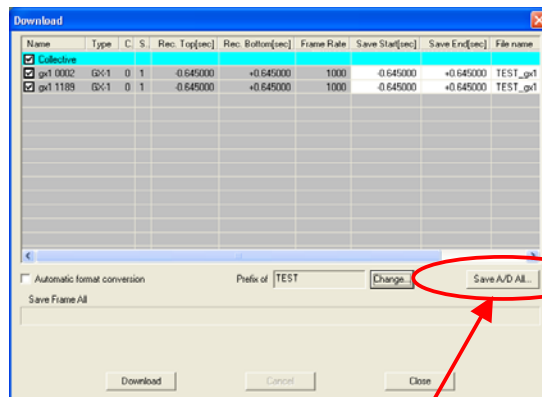
- When downloading images from multiple cameras, only one waveform data file is created. As a default, the range (time) of waveform data to be saved is the same as the image range to be downloaded. To download the complete Waveform data click the [Save A/D All] button. A separate file is created with the “_all” suffix.



GUI Single Camera (Individual)
Click [Save A/D All]



Click the [Change] button



GUI Multi Camera (Collective)
Click [Save A/D All]

3.6 Opening Files

Waveform data and image files are saved in the same destination folder. Browse for files with similar filenames.

- Image files (mcf) and waveform data files (nwf) with the same filename

fxData folder

- k5-2330.mcf
- k5-2330.nwf (Waveform file)

- If the complete Waveform data has been saved, open the image file (mcf) and the Waveform data file with the “**_all**” suffix.

fxData folder

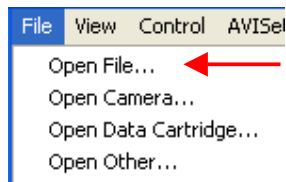
- k5-2330.mcf
- k5-2330_all.nwf (Waveform file)

- Image files (mcf) and Waveform data files with the same **prefix**.

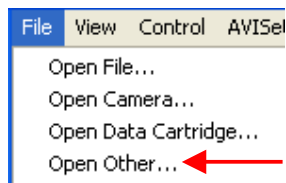
fxData folder

- TEST**_k5-2330.mcf
- TEST**_k5-2330.nwf (Waveform file)

- From the “**File**” menu, the “**Open File**” dialogue will open image files (mcf) with its corresponding Waveform data file (nwf). If a Waveform data file is opened individually, no image will be shown.



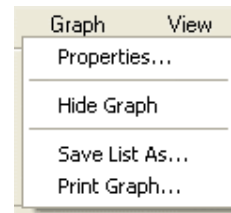
- From the “**File**” menu, the “**Open Other**” dialogue will open Waveform data file (nwf) only.



3.7 Waveform Graph Settings

Graph Menu

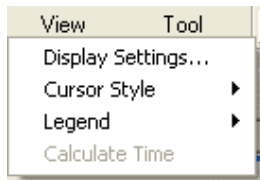
The **Graph** drop down menu is located at the lower left hand side of the Waveform window.



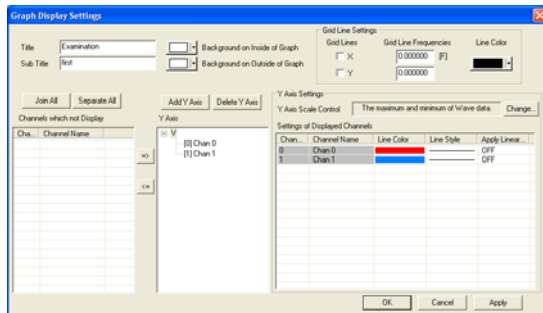
- Properties** – Details sampling settings
- Hide Graph / Display Graph** – Turns the graph display ON / OFF
- Save List as** – Export the Waveform data to a comma delimited (csf) or tab-delimited (tsv) file
- Print Graph** – Print the Waveform chart.

View Menu

The **View** drop down menu is located at the lower left hand side of the Waveform window.



- **Display Settings** – Opens the **Graph Display Settings** window.



[**Title**] Graph Title

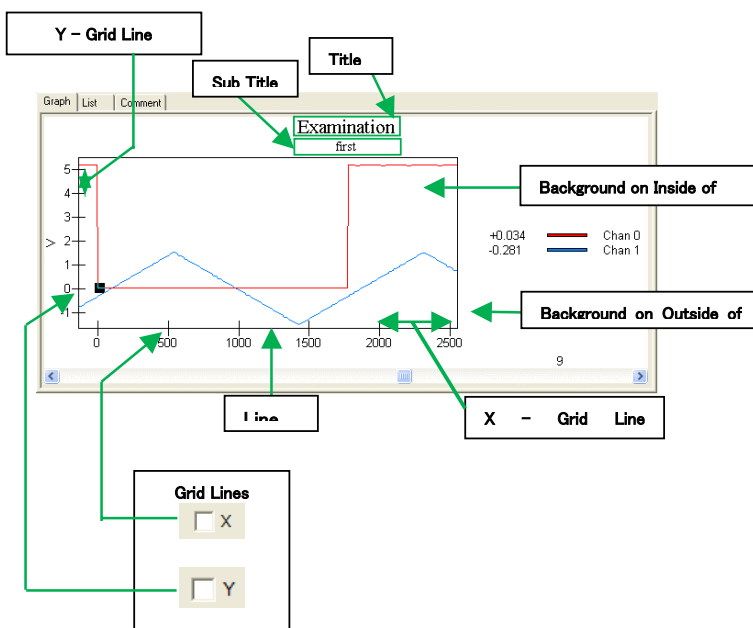
[**Subtitle**] Graph Subtitle

[**Background on Inside of Graph**] Inside Graph Color

[**Background on Outside of Graph**] Outside Graph Color

[**Line Color**] Graph lattice line color

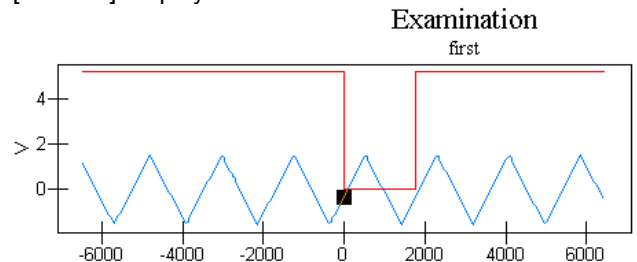
[**X / Y Grid Line Frequencies**] Enter scale value for X / Y axis



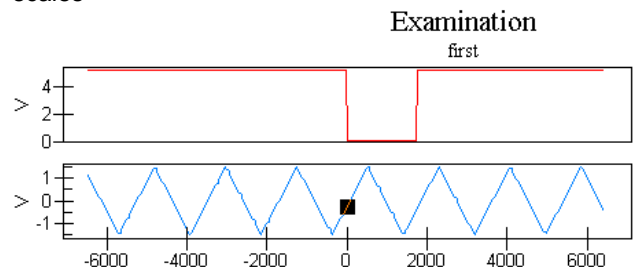
[**Grid Lines**] ☐ X Display vertical Line

[**Grid Lines**] ☐ Y Display horizontal Line

[**Join All**] Displays all waves in the same scale



[**Separate All**] Displays all waves in separate scales



Unused Channels - Channels that will not be displayed on the chart are listed on the left under "Channel which not display"

[**Add Y Axis**] Adds a new Y-axis to the graph. An unused channel must be available to add the new Y-axis. After the new Axis is named, a channel can be associated from the list on the left.

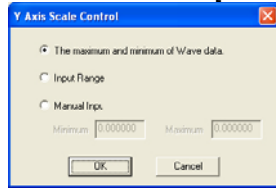
[**Delete Y Axis**] Deletes the selected Y-axis from the graph. If a channel is associated with the Y-axis, it is returned to the unused channel list

=> To display a channel and associate it to a Y-axis.

<= To return a channel to the Unused Channels list

Y Axis Settings

[Y Axis Scale Control] The Y axis scale can be changed to show different values. To open the dialogue window click the **[Change]** button.



- **The maximum and minimum of Wave data**
The max and min input value is shown
- **Input Range**
The input channel's voltage range is shown. If the waveform data does not fit in the chart use **Max/Min** or **Manual Input** settings.
- **Manual Input**
Enter a range manually

Settings of Displayed Channels

Line Color, Line Shape and Linear Equation can be set for each Data Line.

Cursor Style

Change the style for the cursor that follows the data in each current frame

[Vertical Line Cursor] Vertical Line to Y Axis

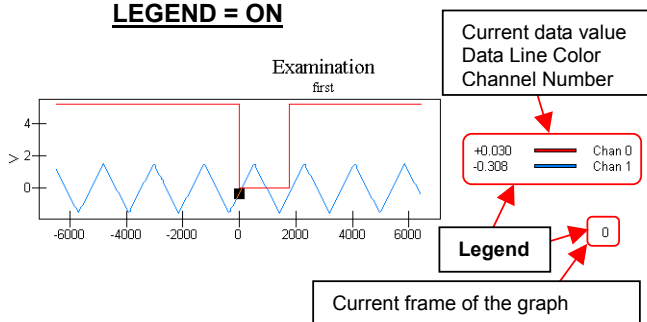
[Data Across Cursor] Horizontal Line to X Axis and Vertical Line to Y Axis

[Data Square Cursor] A square highlights the current data value

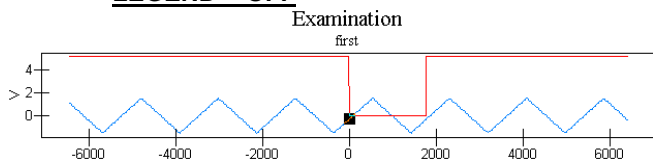
Legend

Turns the Legend ON or Off

LEGEND = ON



LEGEND = OFF



Tool menu

The **Tool** drop down menu is located at the lower left hand side of the Waveform window.



[Zoom in on Playback Range] During playback, the Waveform data zooms in the specified range. Click and drag the mouse over the graph will also specify an area to zoom in.

[Reset Zoom] Zoom view resets

[Set this Graph as Tick Master] The time frame when playing update interval, the waveform data sampling frequency







Example: If the image was recorded at a frame rate of 1,000pps and the waveform data was sampled at 10,000Hz then for every frame the waveform data is updated 10 times. When playing the image at 30pps the waveform data will be updated every 3 frames.

[Graph T=0 Setting] Set current graph T = 0 time to image frame. Image T = 0 does not change.

[Graph T=0 Reset] Waveform data T = 0 set to the sampling time. Image T = 0 does not change.

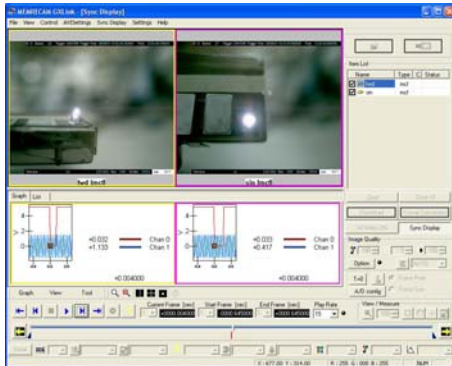
Toolbar



-  **Zoom in on Playback Range**
-  **Reset Zoom**
-  **Vertical Line Cursor**
-  **Data Across Cursor**
-  **Data Square Cursor**
-  **Set this Graph as Tick Master**

3.8 Synchronous Display

Multiple images and waveforms can be played in sync where time and frames match.



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4

Restrictions

4 Restrictions

4.1 Settings that prohibit Waveform recordings

Waveforms cannot be recorded when the cameras are set to the following modes:

- Burst Trigger
- Multi-trigger recording
- EST mode ON