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**User's  
Manual**

**701992  
XviewerEYE  
Video and Waveform Viewer  
Feature**

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Thank you for purchasing the XviewerEYE Video and Waveform Viewer Software. This manual, focused on Windows XP, explains features and operations of the video and waveform viewer. To ensure correct use, please read this manual thoroughly before beginning operation.

Keep this manual in a safe place for quick reference in the event a question arises. For information, operation, and safety precautions regarding features other than the video and waveform viewer features, read the following manual.

Manual Title	Manual Number	Description
701992 Xviewer User's Manual	IM 701992-01E	The manual explains all features and operations of Xviewer other than the video and waveform viewer features.

## Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions. The figures given in this manual may differ from the actual screen.
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## Revisions

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# Symbols and Notations Used in This Manual

## Marking

The following marking is used in this manual:

**Note** Calls attention to information that is important for proper operation of the instrument.

## Notation Used in the Procedural Explanations

On pages that describe the operating procedures in each chapter, the following notations are used to distinguish the procedures from their explanations.

**Procedure** Carry out the procedure according to the step numbers. All procedures are written with inexperienced users in mind; experienced users may not need to carry out all the steps.

**Explanation** This section describes the setup items and the limitations regarding the procedures.

## Notation in Boldface

Boldface type indicates the names of user-controlled panel keys, and soft key items and menu items displayed on screen.



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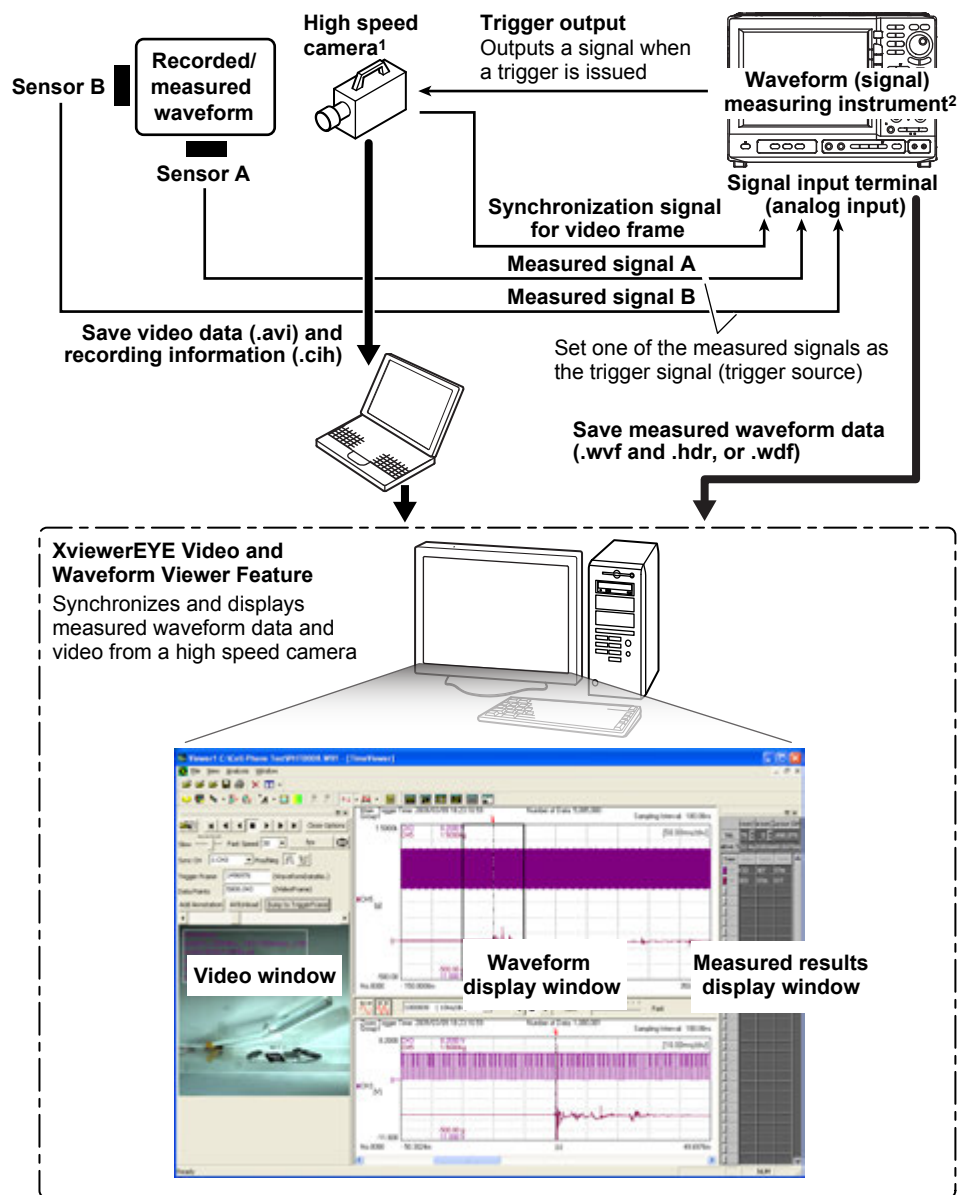
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# 1.1 System Configuration

XviewerEYE is a video and waveform viewer software that synchronizes and displays waveform data measured by a waveform measuring instrument with video from a high speed camera based on the trigger position, enabling analysis. It uses measured signal as trigger source. When a trigger is issued, it captures the waveform data of the measured signal into the measuring instrument, and at the same time, outputs the trigger signal from the measuring instrument to the camera. The video data and recording information just before and after this trigger output is saved. By loading the video data and recording information from the camera after loading the captured and saved waveform data into a personal computer (hereinafter referred to as PC), it is possible to synchronize and display the waveform and the video on the display of the PC.

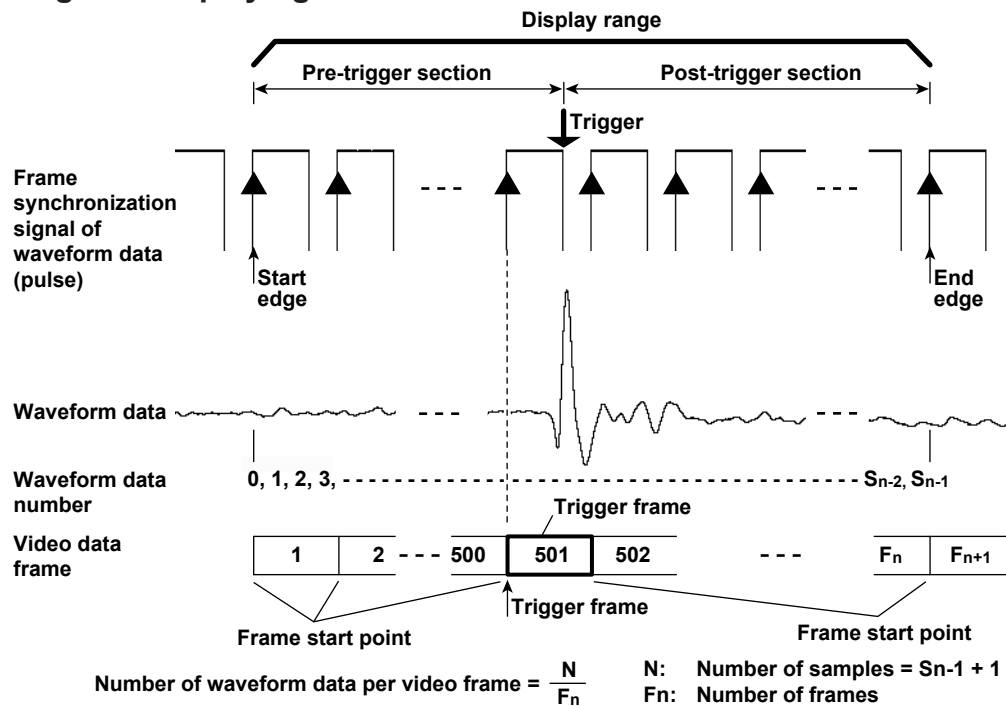


1 For the list of supported high speed cameras, see the XviewerEYE page on the Web site of our measuring instrument products.

2 For the list of supported waveform measuring instruments from YOKOGAWA, see User's Manual IM 701992-01E.

## 1.2 Displaying Video and Waveform (Measured Signal)

### Synchronizing and Displaying Video and Waveform



#### Auto-synchronization process

Video and waveform are automatically synchronized and displayed using recording information and waveform data information.

- Recording speed, number of frames in video, number of frames in the pre-trigger section, and number of frames in the post-trigger section are loaded from the recording information (.cih file).
- Number of pulses in the synchronization signal is loaded from the waveform data (.wvf file).
- The edge of the synchronization signal directly preceding the trigger is detected. The video data frame corresponding to that edge is regarded as the trigger frame, and the start point for that frame is regarded as the trigger frame start point. Each frame in the video data (.avi file) is arranged relatively from the trigger.

#### Controlling the Display

##### • Close Options

You can perform setup operations such as play, reverse play, stop, move between frames, repeat, and change speed. Video and waveform data are synchronized and displayed.

##### • More Options

- When you want to disable auto-synchronization and specify a desired synchronization position instead, you can change the trigger frame start point while checking the video and the waveform.
- You can change the number of waveform data per video frame according to the specification of the synchronization signal.
- You can add and delete annotations to the video, and unload the video.

#### Displaying Multiple Videos

When there are multiple video data that correspond to a single waveform data, up to four videos can be displayed at the same time.



### **Saving the Setup Information for the Video Data**

When video data is loaded, a setting information file (.sync) is automatically created using the same name and same directory as the video file. When you open the video data the next time, the video data is displayed using the setup information when you closed the video data.

### **Printing the Viewer Window Screen**

You can print the Viewer window screen by pasting its screenshot to a third party document or image editing software using the Copy to Clipboard feature of your PC.


### **Initializing the Display Setup Items of the Video Window**

You can reset the display setup items of the Video window to the condition immediately after loading the video data.

# 2.1 Loading Waveform and Video Data/Unloading Video

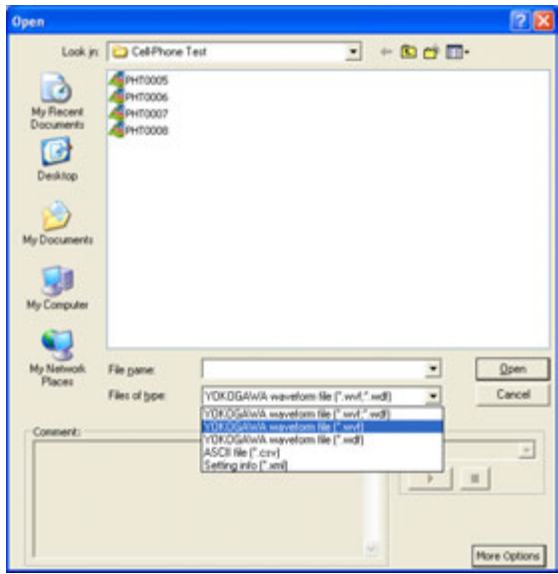
## Procedure

### Loading Waveform Data

1. Click  or select **File > Open**. The Open File dialog box appears..

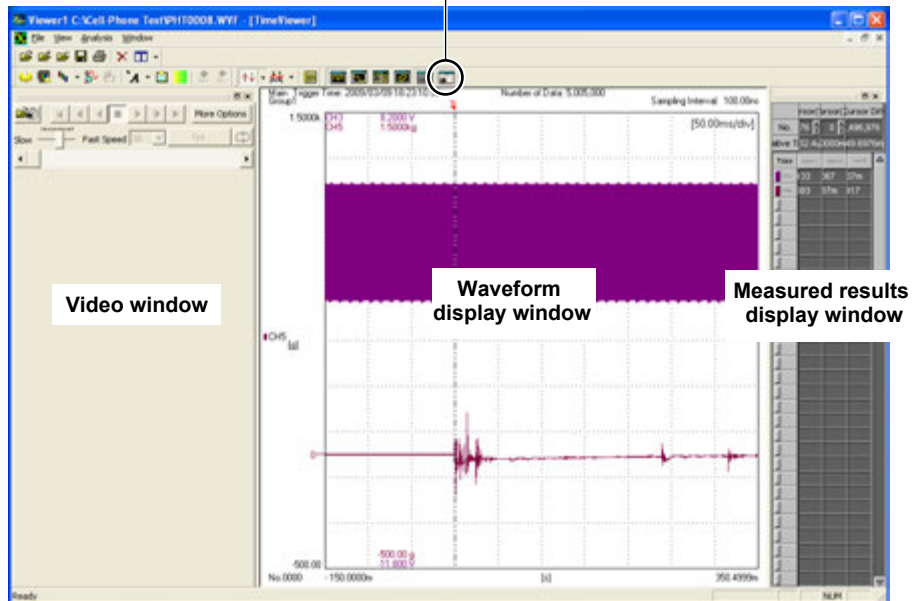


2. To display a waveform, select or enter the name of the waveform data file (extension .wvf or .wdf) and then click **Open**.



Display Example

Display/hide the Video window




## 2.1 Loading Waveform and Video Data/Unloading Video



### Displaying the Zoomed Waveform

You can zoom to the waveform to observe the changes in the waveform closely.

- **Displaying the Zoomed Waveform Window**

3. Click  or select **Window > Zoom Window**. A zoomed view of the section enclosed by the bold lines (zoom box) in the main waveform display window will be displayed.

- **Setting the Zoom Factor**

4. To increase or reduce the zoom factor, click the  or .

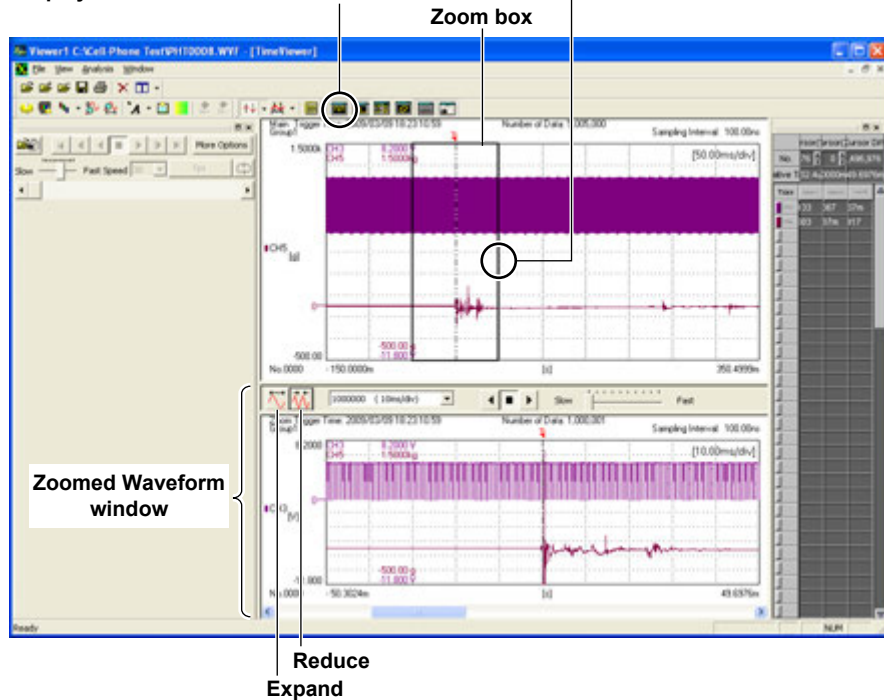
- **Moving the zoom position**

5. When you point to the zoom box with the mouse, the pointer changes to the hand icon. Move the zoom box left or right to adjust the zoom position.

#### Move the zoom position

When you point to the zoom box with the mouse, the pointer changes to a hand icon and you can move the zoom position.

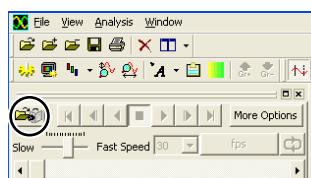
#### Display/hide the Zoomed Waveform window



You can use other procedures to set the zoom factor or move the zoom position. You can also zoom along the vertical axis. See User's Manual IM 701992-01E for details.

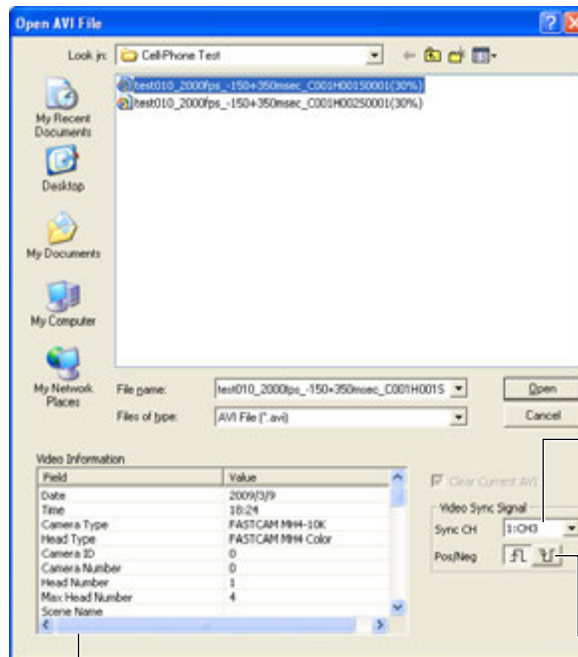
### Loading Video Data

3. Click . The Open File dialog box appears.



4. Select or enter the name of the video data file (extension .avi) and then click Open.

5. Select Video Sync Signal.
6. Click **Open**. The video is displayed.



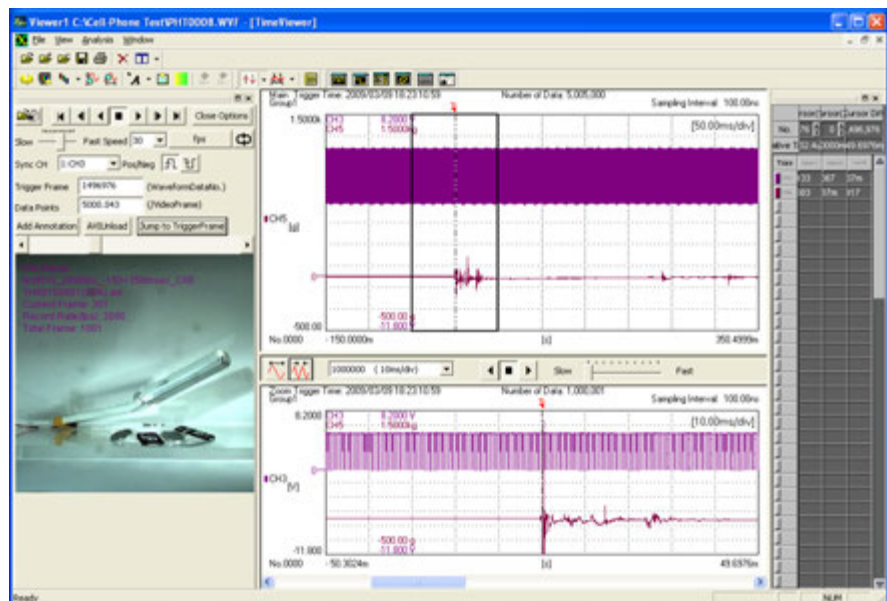
**Video Sync Signal**  
Select which channel of the waveform measuring instrument you used to input the synchronization signal of the video frame from the high speed camera.

Select the polarity you set for synchronization timing.

**Video Information**

The recording information regarding the video data file you selected and input is displayed.

**Display Example**



For procedures such as playing or stopping the video, see section 2.2.

To display multiple video data that correspond to a single waveform data, go to step 7.  
To unload the video data, go to step 10.

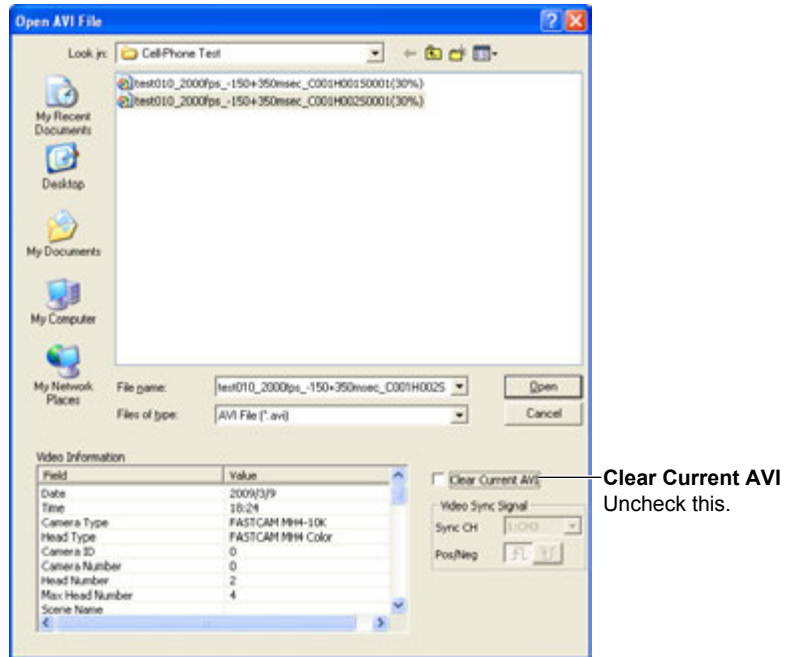
**Loading Multiple Video Data**

**Note**

When performing Play or Reverse Play of the video, you cannot perform the load operation for the video data. Perform the load operation after stopping the video. For procedures such as playing or stopping the video, see section 2.2.

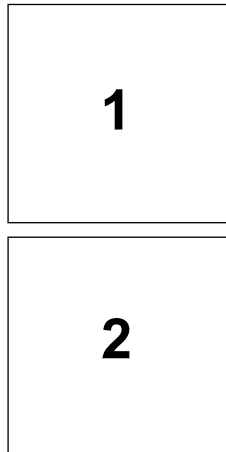
## 2.1 Loading Waveform and Video Data/Unloading Video

7. Repeat steps 3 and 4.
8. Uncheck **Clear Current AVI**.
9. Click **Open**. The new video is displayed with the previous video remaining in the screen.
  - Up to four videos can be displayed simultaneously.
  - If you open the file without unchecking Clear Current AVI in step 8, all previous videos are unloaded and only the new video is displayed.

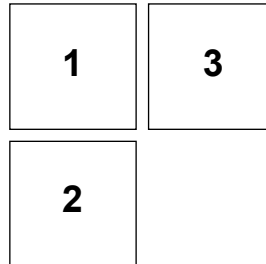


### Display Example

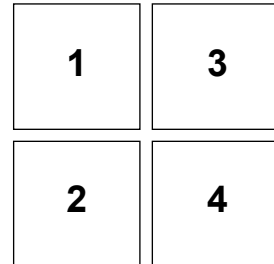
#### Two



#### Three



#### Four



### Unloading the Video

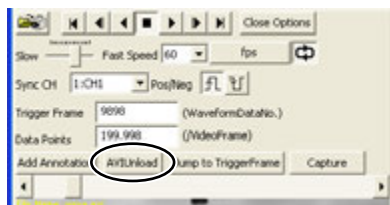
10. Click More Options. Various setup items are displayed. More Options changes to Close Options.



**Note**

When performing Play or Reverse Play of the video, you cannot perform the setup operation of setup items in More Options. Perform the setup operation after stopping the video. For procedures such as playing or stopping the video, see section 2.2.

11. Click **AVIUnload**. All displayed videos are unloaded.

**Explanation****Loading Waveform Data**

The extension for the waveform data file to load is .wvf or .wdf.

For a waveform data file with extension .wvf, a header file (extension .hdr) with the same name must exist in the same source folder.

**Displaying the Zoomed Waveform**

You can display the zoomed waveform. This is useful to observe the changes in the waveform closely.

There are various procedures other than the ones explained to set the zoom factor or move the zoom position. You can also zoom along the vertical axis. See User's Manual IM 701992-01E for details.

**Loading Video Data**

Load the waveform data and then the video data. You cannot load only the video data.

- In the dialog box displayed when loading the video data, select Video Sync Signal and the synchronization timing.
- The extension for the video data file is .avi.
- When you measure the signals from the sensor with the waveform measuring instrument, select which channel of the instrument you used to input the synchronization signal from the high speed camera.
- Select which polarity of the synchronization signal you set the synchronization timing to.
- When video data is loaded, a recording information file is loaded at the same time. If the recording information file is not in the same save destination (the same directory), a load error occurs. The extension for the recording information file is .cih.
- When the video contains an inappropriate frame synchronization signal, the synchronization process after loading the video file might fail. Confirm that the frame synchronization signal is measured correctly.

**Loading Multiple Video Data**

You can display the new video with the previous video remaining in the screen. Up to four videos can be displayed simultaneously.

**Unloading the Video**

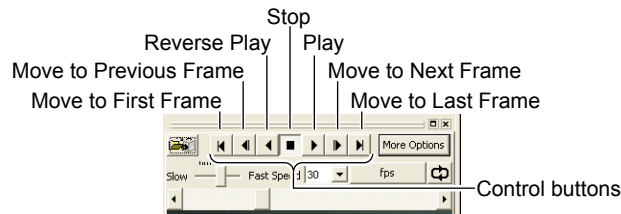
You can unload the displayed video without closing the Viewer window. To display it again, load the video data.

## 2.2 Controlling the Display of the Video

### Procedure

#### Play, Reverse Play, Stop, Move between Video Frames

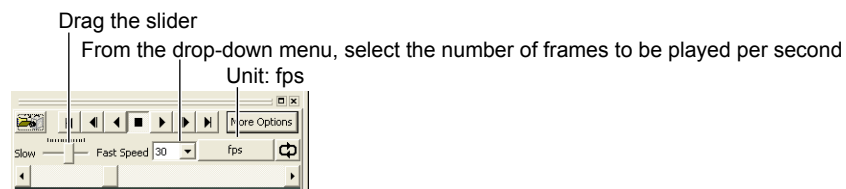
Click each control button.



#### Changing the Speed of Play/Reverse Play

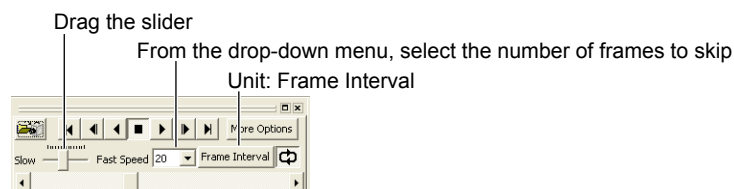
- **Setting by Number of Frames to be Played per Second**

Click the unit for playing speed to switch it to fps, and then select the number of frames to be played per second from the drop-down menu. You can also drag the slider to set this value.





- **Setting by Number of Frames to Skip**

Click the unit for playing speed to switch it to Frame Interval, and then select the number of frames to skip from the drop-down menu. You can also drag the slider to set this value.



For Reverse Play, the same speed as Play is applied.

#### Repeat/Reverse Play

Click  to Repeat or Reverse Play. When you click  during Repeat or Reverse Play, the repeat ends.



**Explanation**

You can perform setup operations such as play, reverse play, stop, move between frames, repeat, and change speed. Video and waveform data are synchronized and displayed.

**Changing the Speed of Play/Reverse Play**

- **Setting by Number of Frames to be Played per Second**

You can select the speed by setting the number of frames to be played per second.

Set this after switching the unit to fps.

Selectable range: You can select from 1 to 1000 shown in the drop-down menu.

- **Setting by Number of Frames to Skip**

You can select the speed by setting the number of frames to skip. Set this after switching the unit to Frame Interval.

Selectable range: You can select from 1 to 1000 shown in the drop-down menu.

For Reverse Play, the same speed as Play is applied. The speed set in Reverse Play is also applied for Play.

**Repeat/Reverse Play**

You can set whether or not to perform Repeat or Reverse Play by just clicking the corresponding button.



## 2.3 Changing the Synchronization Setup Items of Video and Waveform

### Procedure

#### Displaying More Options



1. Click **More Options**. Various setup items are displayed.  
More Options changes to Close Options.



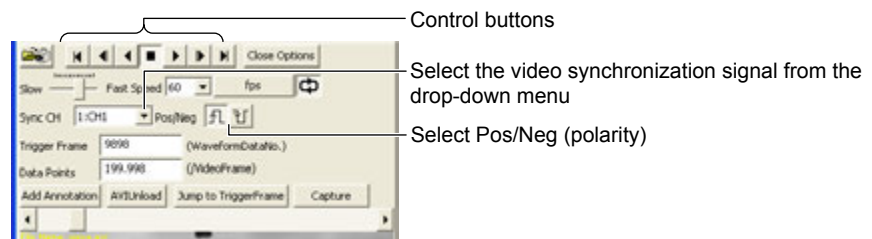
#### Note

When performing Play or Reverse Play of the video, you cannot perform the setup operation of setup items in More Options. Perform the setup operation after stopping the video. For procedures such as playing or stopping the video, see section 2.2.

#### Changing the Video Synchronization Signal

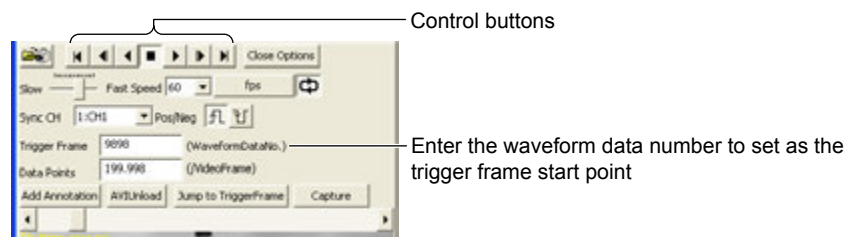
2. Select the input channel for **Sync CH** from the drop-down menu.
3. For **Pos/Neg**, click the  (rising edge) or  (falling edge) to select the synchronization timing.
4. Click a control button. The video and the waveform are synchronized and displayed according to the specified video synchronization signal and synchronization timing.

For operations of control buttons, see section 2.2.



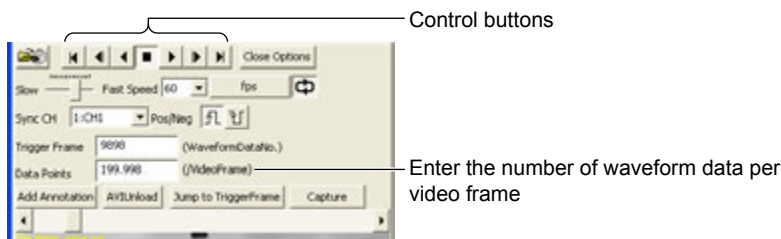
#### Changing the Waveform Data Number for the Trigger Frame Start Point

2. Enter the waveform data number to set as the **Trigger Frame**.
3. Click **Jump to TriggerFrame**. The trigger frame start point on the waveform is moved to the waveform data corresponding to the number set in step 2.
4. Click a control button. Synchronization and display is started from the waveform and trigger frame video at the jump destination.
  - If you skip step 3 and perform step 4 directly after step 2, synchronization and display will still be started from the waveform and trigger frame video at the jump destination.
  - For operations of control buttons, see section 2.2.



### Changing the Number of Waveform Data per Video Frame

2. Enter the **Data Points** per video frame.
3. Click a control button. Synchronization and display are started with the specified number of waveform data per video frame.  
For operations of control buttons, see section 2.2.



### Explanation

#### Changing the Video Synchronization Signal

You can change the synchronization signal for video and waveform to synchronize and display them. This is useful when changing the synchronization signal from the one you selected when loading the video data to another one.

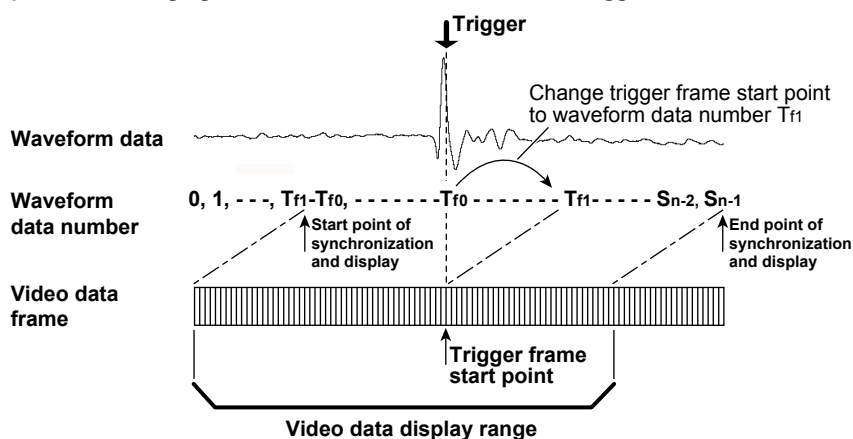
- You can select from the input channels shown in a drop-down menu.
- You can change the polarity of the synchronization timing.

#### Changing the Waveform Data Number for the Trigger Frame Start Point

You can set where on the waveform you want to position the trigger frame start point of the video. You can change the trigger frame start point while checking the video and the waveform.

- Enter the waveform data number to specify the waveform data at the trigger frame start point.
- When you click a control button such as Play or Reverse Play, the display jumps to the specified waveform data, and synchronization and display is started from the waveform data and trigger frame video at the jump destination.
- When using Repeat or Reverse Play, the start point of synchronization and display is moved for an offset that equals to the difference between the waveform data number at the trigger point and the specified waveform data.

#### Repeat after Changing the Waveform Data Number for the Trigger Frame Start Point



### Changing the Number of Waveform Data per Video Frame

You can increase and decrease the number of waveform data per video frame.

- The selectable range is 1 to the number of samples of waveform data (corresponds to  $S_{n-1} + 1$  in the figure above).
- The number of waveform data per video frame is automatically set when waveform and video data are loaded. This number might not be an integer.

## 2.4 Annotating the Video

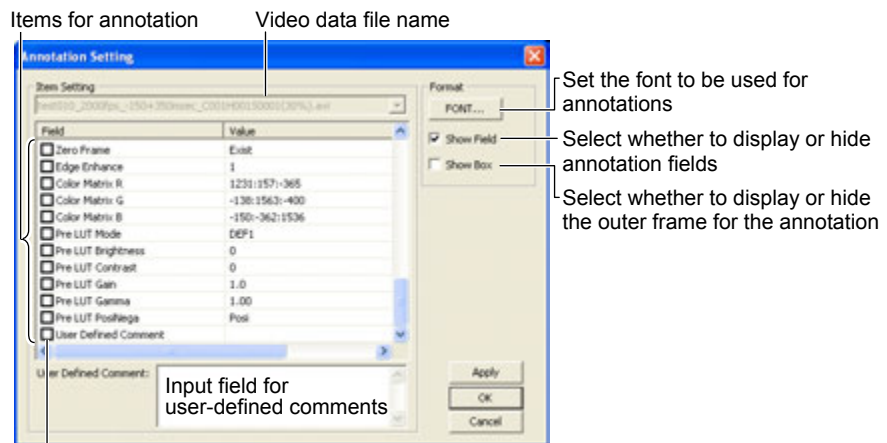
### Procedure

#### Adding Items to Existing Annotations and Deleting from Existing Annotations

1. Point the annotated video area with the mouse and double-click. The Annotation Setting dialog box appears.



2. Click the  beside the item to display as an annotation. A check mark is displayed. If a check mark is already displayed, it disappears. The item with a check mark is displayed as an annotation.
3. Set the **format**.
4. Click **OK** or **Apply**. The checked annotation is added to the existing annotation and the unchecked annotation is deleted from the existing annotation. When you click Apply, the annotation is added to or deleted from the video without the Annotation Setting dialog box being closed. Since the Annotation Setting dialog box remains open, you can continue selecting items.



Check here to add a user-defined comment to the annotation.

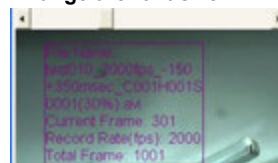
#### Moving Annotations and Changing the Font Size for Annotations

5. Point the annotated video area (that contains the annotation you want to move) with the mouse and click. The annotation is selected, and a white frame is displayed around it.
6. Drag and drop the selected annotation with the mouse.
7. Point the annotated video area (that contains the annotation you want to change the font size) with the mouse and click. The annotation is selected, and a white frame is displayed around it.
8. Drag one of the four corners of the white frame.

Move



Change the font size



### Adding an Annotation

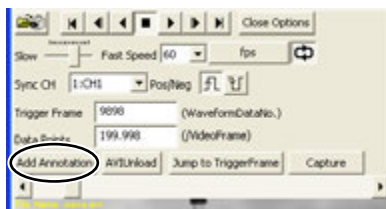
1. Click **More Options**. Various setup items are displayed. More Options changes to Close Options.



#### Note

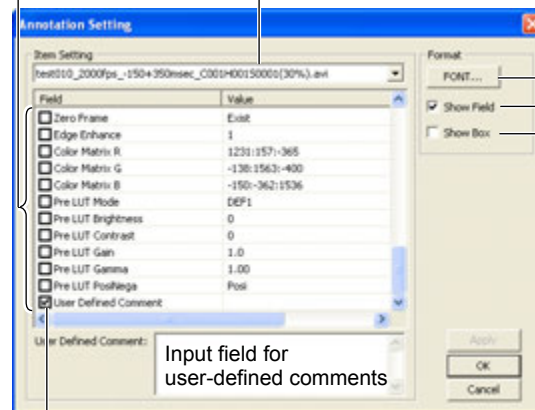
When performing Play or Reverse Play of the video, you cannot perform the setup operation of setup items in More Options. Perform the setup operation after stopping the video. For procedures such as playing or stopping the video, see section 2.2.

2. Click **Add Annotation**. The Annotation Setting dialog box appears.



3. Click the  beside the item to display as an annotation. A check mark is displayed. If a check mark is already displayed, it disappears. The item with a check mark is displayed as an annotation.
4. Set the **format**.
5. Click **OK**. A new annotation is added to the video.

Items for Annotation      Video data file name



- Set the font to be used for annotations
- Select whether to display or hide annotation fields
- Select whether to display or hide the outer frame for the annotation

Check here to add a user-defined comment to the annotation.

### Display Example

New annotation  
Fields and their values for the annotation are displayed.



Outer frame for the annotation

### Deleting an Annotation

6. Point the annotated video area (that contains the annotation you want to delete) with the mouse and click. The annotation is selected, and a white frame is displayed around it.
7. Press the **Delete** key on the keyboard of your PC. The selected annotation is deleted.




### Explanation

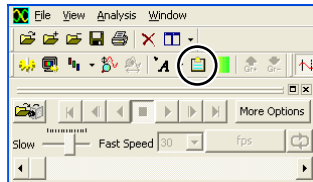
You can add annotations to the video, or delete annotations from the video. You can also move annotations within the Video window.

- You can select an annotation within the recording information of video data.
- You can set the type and color of the font used in annotations.  
See section 4.7 of User's Manual IM 701992-01E for details.
- You can select whether to display or hide annotation fields.
- You can select whether to display or hide the outer frame for the annotation.
- You can add a user-defined comment as an annotation.
- When you open the same video data file as before after unloading the video or exiting XviewerEYE, annotations are displayed with the setup conditions immediately before exiting.

## 3.1 Printing the Screen

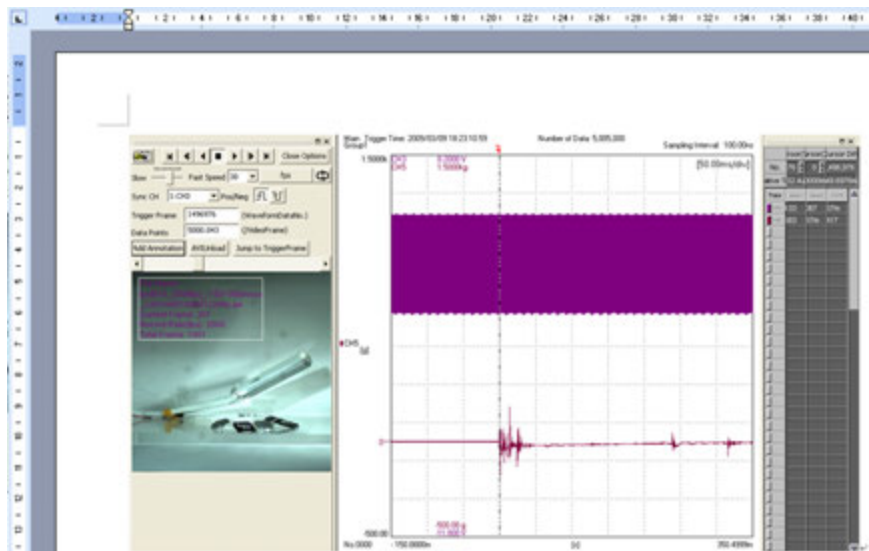
### Procedure

1. Click . The image of the Viewer window that displays video, waveform, and measured results is copied to the clipboard of your PC.



2. Start a third party document or image editing software, and perform paste from clipboard.

### Example of pasting



3. Print the document with the pasted image.

### Explanation

When the Video window is displayed, the image of the displayed Viewer window cannot be printed out directly. Copy the image to the clipboard and paste it to a third party document or image editing software to print the data.

Similarly, to save the data, paste the image to a third party document or image editing software and save that data.

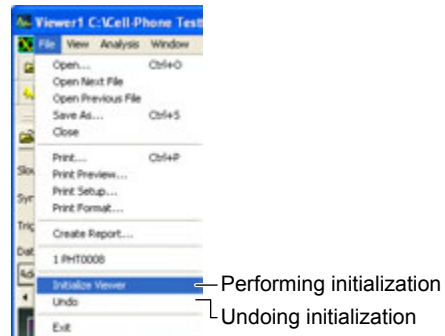
## 3.2 Initializing the Display Setup Items of the Video Window

### Procedure

#### Performing Initialization

Select **File > Initialize Viewer**. The display setup items of the Video window are initialized.

The display setup items of the Waveform and Result windows are also initialized.



#### Undoing Initialization

Select **File > Undo**. The setup items immediately before initialization is resumed.

### Explanation

#### Initialization

You can reset the display setup items of the video window to the condition immediately after loading the video data. This is useful to undo the ongoing settings or start over from the beginning. The display setup items of the waveform and result windows are also initialized.

#### Undoing Initialization

When you perform Undo, the setup items immediately before initialization is resumed

#### Initialized Items


Among the display setup items in the video window, the following items are initialized:

- Preference of Close Options or More Options
- Preference of whether or not to use Repeat or Reverse Play
- Video Sync Signal
- Synchronization timing (Pos/Neg)
- Trigger frame start point
- Number of waveform data per video frame
- Annotation for the video

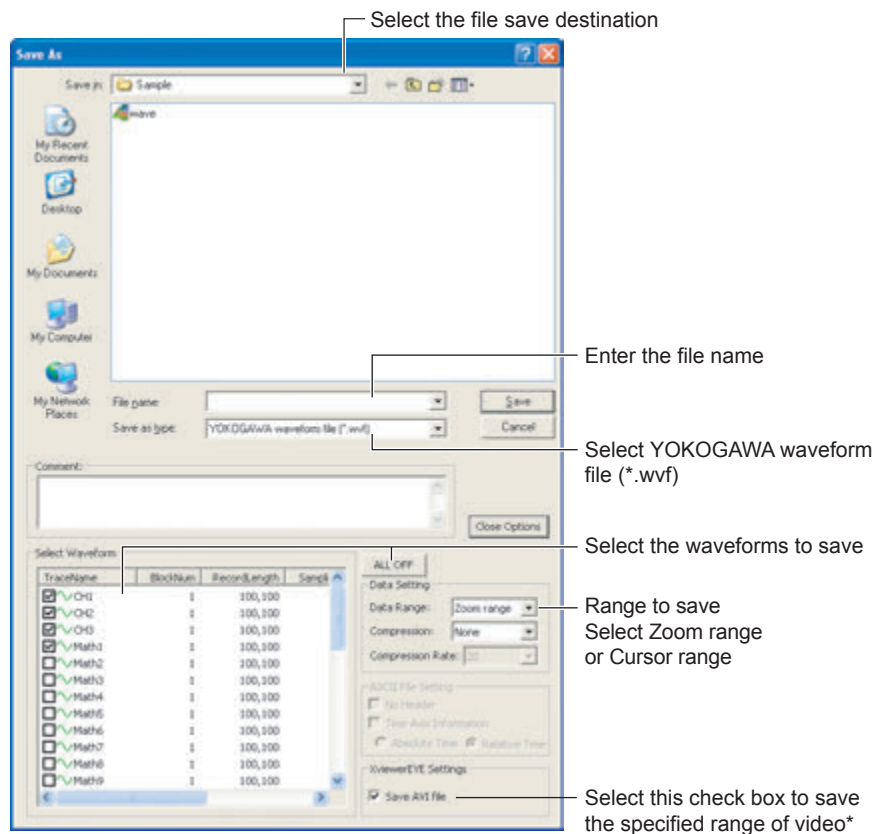
For information about which items are initialized among display setup items in the waveform or result window, see User's Manual IM 701992-01E.

## 3.3 Saving Waveform Data and Video Data

### Procedure

- Load the waveform and video data, and specify the range of data to save using either of the following methods.
  - In the zoomed waveform window, zoom in on the range of waveform to save.
  - Using cursors, specify the start and end points of the range to save.
- Click  or select **File > Save As**. The Save As dialog box appears. Set the save destination and the file name, set Save as type to **YOKOGAWA waveform file (\*.wvf)**, and click **More Options**.

Set Data Range to **Zoom range** or **Cursor range** according to the method you specified in step 1. Under XviewerEYE Settings, select the **Save AVI file check box**. Enter comments, set necessary options, and then click **Save**.



\* You can select this check box only when video data is displayed in the video window and the Data Range is set to Zoom range or Cursor range.

When data saving is complete, the following data files are created in the specified destination.

- Waveform file (.wvf)
- Video file (.avi)
- Video information file (.cih)
- Synchronization file (.sync)



#### Explanation

#### XviewerEYE Settings

If you select the Save AVI file check box, video data in the save range is also saved. If Data Range is set to All or video data is not displayed in the video window, the XviewerEYE Settings area become unavailable.

#### Files That Are Saved

When you specify a data save range and save the video and waveform data, the following data files will be created.

- Waveform file (.wvf)
- Video file (.avi)\*
- Video information file (.cih)
- Synchronization file (.sync)

\* The video data file is uncompressed AVI.

XviewerEYE can load and display these files.

#### **Note**

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- Even if the trigger position is not within the specified save range, synchronization of the video and waveform is sustained.
- If Compression under Data Setting is set to PP Comp or Decim, a synchronization file (.sync) will not be created.

The synchronization file (.sync) is created when you open a saved waveform file (.wvf) and the video file (.avi) that was saved with the waveform file is loaded.

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## 3.4 Saving Playback Video for Each XviewerEYE Window

### Procedure

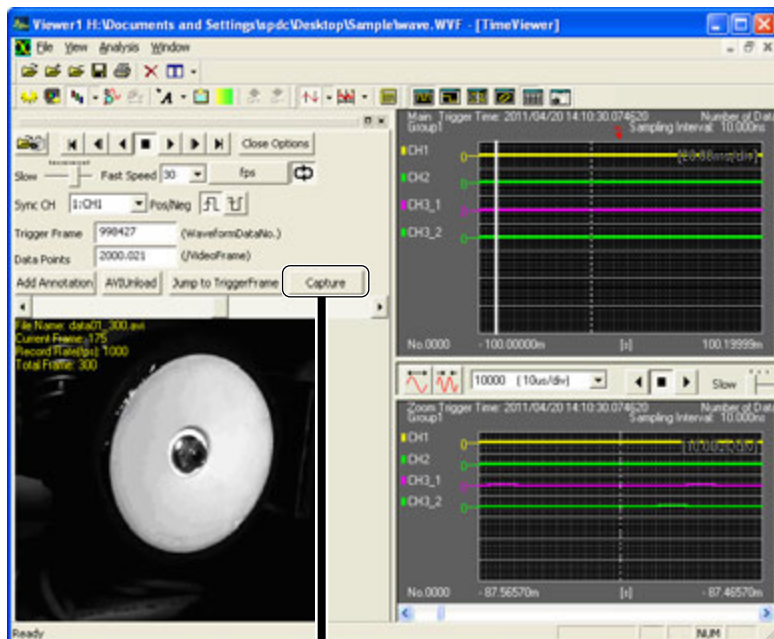
#### Saving Playback Video to AVI Files

1. Click **More Options**. Various setup items are displayed. More Options changes to Close Options.

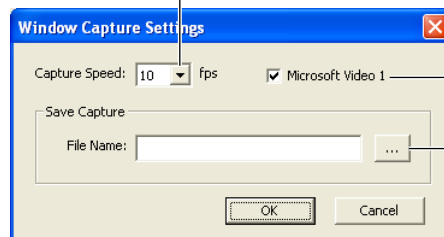


2. Click **Capture**.

The Window Capture Settings dialog box appears. Set the capture speed, codec usage, name of the file to save to, and save destination, and then click **OK**.



Video frames per second  
(1, 2, 3, 4, 5, 10, 15, 20, 25, 30)



Enable or disable codec  
(Microsoft Video 1)

Set the file name and  
save destination

The playback video of each XviewerEYE window is saved in AVI format.

### 3.4 Saving Playback Video for Each XviewerEYE Window

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#### Explanation

#### **Capture Speed**

Set the number of video frames per second.

Selectable range: 1, 2, 3, 4, 5, 10, 15, 20, 25, 30

#### ***Note***

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Depending on the performance of the PC that you are using, you may not be able to save the playback video at the specified number of frames.

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#### **Enabling or Disable Codec (Microsoft Video 1)**

Select the check box to compress the video data using the Microsoft Video 1 codec.

The AVI files that are created can be embedded in report and presentation materials for demonstration purposes.

## 4.1 Features

Item	Specification
Synchronizing and Displaying Video and Waveform	Synchronizes and displays waveform data measured by a waveform measuring instrument and video from a high speed camera*. Up to four images can be displayed at the same time.
Controlling the Display	Close Options Play, reverse play, stop, move between frames, repeat, and change speed. More Options Change video synchronization signal, change synchronization timing, change waveform data number at the trigger frame start point, change number of waveform data per video frame, add annotations to video or delete annotations from video.
Saving the Setup Information for the Video Data	When video data is loaded, a setting information file (.sync) is saved using the same name as the video file. (The software saves the file automatically, so no operation is needed.)
Initializing the Display Setup Items of the Video Window	You can reset the display setup items of the video window to the condition immediately after loading the video data.
Saving Portions of Waveform Data and Video Data	You can save video data and waveform data of a specified data range.
Saving Playback Video to AVI Files	For each XviewerEYE window, the playback video data and waveform data can be saved in AVI format.

\* For the list of supported high speed cameras, see the XviewerEYE page on the Web site of our measuring instrument products.

## 4.2 System Environment Requirements

This chapter describes the system environment required for XviewerEYE features. Only the items different from the specifications described in User's Manual IM 701992-01 are listed.

Item	Specification
PC	CPU Pentium 4 3.2 GHz or better, or Pentium Dual Core Processor or better Memory 1 GB or more (2 GB or more recommended) HDD Free space: 2 GB or more (100 GB or more recommended when saving video data)
Display	XGA or higher (SXGA or higher recommended), Colors: 65536 or more

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