Photron FASTCAM Viewer Operation Manual

Rev.2.41
English Version

PHOTRON LIMITED
2005

Photron

Table of contents

1. Photron FASTCAM Viewer (PFV) Software

1.1. Overview of Photron FASTCAM Viewer (PFV)

The Photron FASTCAM Viewer (FASTCAM Control Software) is a Windows-based application software program that makes possible to control Photron's FASTCAM series high-speed video cameras from the PC, including operations such as camera setup, framing and downloading.

Its features are as follows:

■PC Control Function of High-Speed Cameras

Connectivity to PC via interfaces such as IEEE1394, PCI bus, etc.
Setup of camera framing conditions
Batch control of multiple cameras
Display and zooming of live camera imagery
Setup of trigger modes and start of recordings

■Recording and Playback Control of Cameras

Playback of image data recorded in the camera processor memory
Block Playback - Normal Play, Fast Forward Play, Reverse Play and Jog
Image quality adjustment – Contrast, Gamma and Brightness
Enlarging and reducing image size
Sync display of analog waveform data (MCDL)

■Download of Recorded Image Data

Download of image data recorded in memory / Download by block
Support of various image formats such as BMP, TIFF, JPEG, PNG, RAW, RAWW, AVI and FTIF

■Preview of Recorded Image Data

Preview on PC screen of mage data downloaded to PC's main memory
Synchronized play of image data from multiple cameras and moving image data read from stored files

■Readout and Display of Stored Image Data and Re-Storing of Selected Data

Plays image data stored in the PC in general-purpose formats
Re-storing and format conversion of selected portions of image data

1.2. PFV Version Information

This manual covers the following version of the Photron FASTCAM Viewer (PFV) software:

PFV Software Version	Ver.2410

1.3. Required Environment

The FASTCAM Control Software requires the following environment for it to work.

Required PC	PC/AT-compatible computer
Required OS	Windows 98, 98SE, Me or 2000 Professional, XP Home, XP Professional *1 DirectX 8.1 or later *2 *3
CPU	Intel Pentium or Equivalent *4 Recommended CPU: Pentium III 1GHz or higher
Memory	Minimum: 64MB *5 Recommended: 256 MB *6
HDD	Over 20 MB to install software, or Over 70 MB when DirectX is not installed
Display resolution	1024 x 768, High color or more
Other items	Large-capacity HDD or removable recording media recommended for image data saving CD-ROM required for software installation

*1. OS is dependent on the camera that is to be connected to the PC. See the camera user's manual for detail.

*2. You need to install DirectX8.1 or later in the PC to import and export AVI2.0 compatible image data. With Windows XP, however, you do not need to install DirectX8.1 because it is included in the OS.

*3. Microsoft, Windows and DirectX are registered trademarks of Microsoft Corporation in the US and other countries

*4. Pentium is a registered trademark of Intel Corporation.

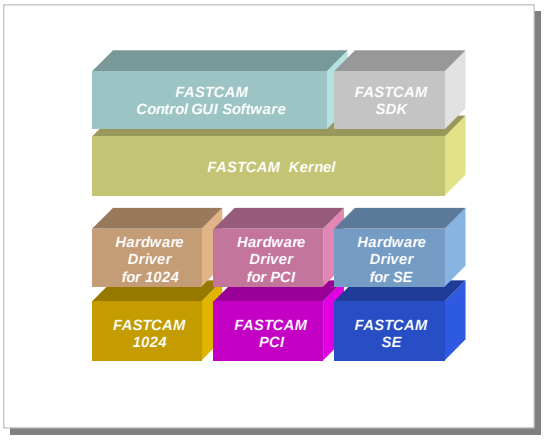
*5. Minimum memory capacity depends on the OS being used.

*6. For multiple-camera operation or running a high-resolution camera, the recommended environment is the minimum requirement.

1.4. Architecture of PFV

The PFV and FASTCAM-SDK (Software Development Kit for Photron high-speed cameras) are so designed that they work together, seamlessly, on one common kernel.

This guarantees that the user can utilize the shared operating and developing environment without regard to the difference in specifications of cameras and hardware interface. To operate the software on the PC under this configuration, installation of hardware drivers and Control Software is necessary.



Hardware drivers require a different method of installation from others depending on the camera model. Refer to the user's manual of each of the hardware devices and make sure in advance that all drivers have been installed properly.

1.5. PFV and OS Compatibility

The following is the list of Photron FASTCAM High-Speed Cameras that the PFV supports.

Camera Model	OS/Interface	Windows 2000 Professional	Windows XP Home/Professional	Driver
FASTCAM-APX RS	IEEE1394	√	√	Yes
FASTCAM-APX RS	Photron Opt I/F	√	√	Yes
FASTCAM-APX	IEEE1394	√	√	Yes
FASTCAM-APX	100BASE-TX	√	√	No
FASTCAM-APX	Photron Opt I/F	√	√	Yes
FASTCAM-ULTIMA512	IEEE1394	√	√	Yes
FASTCAM-ULTIMA512	100BASE-TX	√	√	No
FASTCAM-ULTIMA512	Photron Opt I/F	√	√	Yes
FASTCAM ultima1024	IEEE1394	√	√	Yes
FASTCAM ultima1024 R2	IEEE1394	√	√	Yes
FASTCAM ultimaSE	IEEE1394	√	√	Yes
FASTCAM-1024PCI	PCI Bus	√	√	Yes
FASTCAM-1280PCI	PCI Bus	√	√	Yes
FASTCAM-512PCI	PCI Bus	√	√	Yes
FASTCAM-PCI R2	PCI Bus	√	√	Yes

Note: Photron Opt I/F: Photron Optical Interface

Note: √ denotes compatibility

2. Installation

This section describes the procedure of installing the Photron FASTCAM Viewer software.
To use the PFV software, hardware-connection of a high-speed video camera and PC and installation of hardware drivers are must be made in advance. For such connections, refer to the instruction manuals of each of the equipment and devices.

The method of hardware driver installation varies by the camera model. Follow the driver installation manual of each of the hardware devices and install all the drivers before installing this control software.

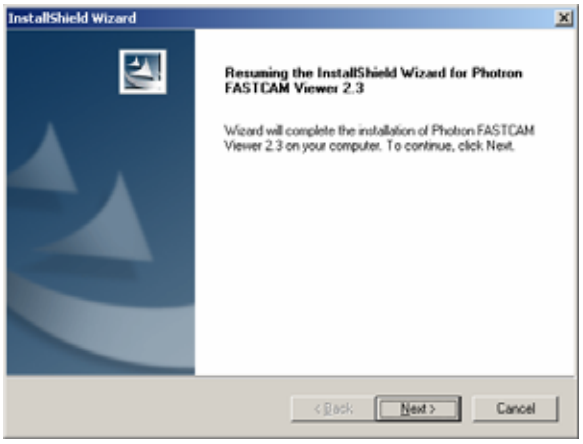
2.1. Installation of PFV Software

The installation procedure is as shown below. The following windows are examples of Windows 2000 Professional.

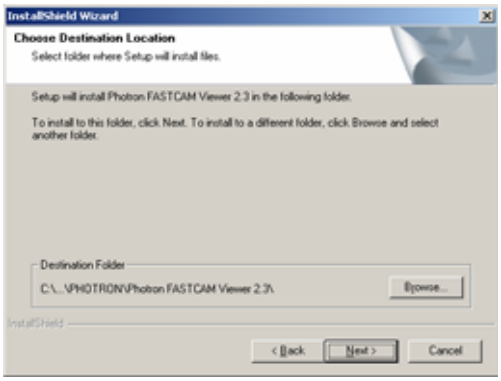
When the software of an old version is installed, please uninstall.

1. Load the attached CD-ROM in the CD drive of the PC and refer CD-ROM from [My Computer].

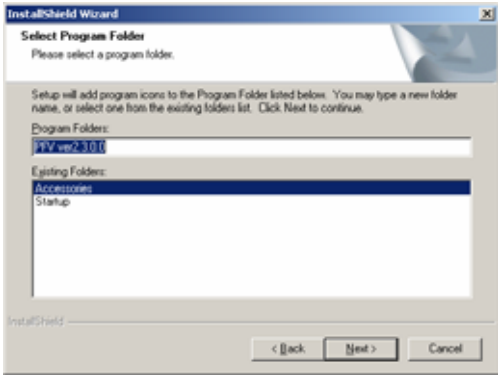
2. Open the [PFV setup] folder from the CD-ROM and double click [setup.exe]. The setup program starts up and reads the install program. After reading the program, the following dialog box is displayed. Click the [Next] button to go ahead.



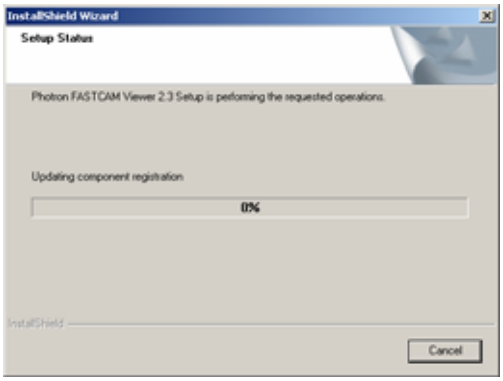
3. The directory selection dialog box is displayed to install the software. Click the [Browse….] button as necessary to select the directory for installation. After selection, click the [Next] button.



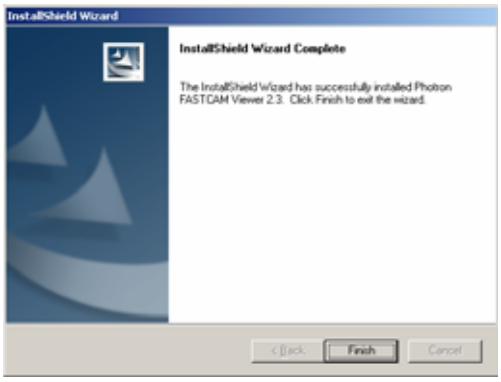
4. The folder selection dialog box is displayed to register the program. Just click the [Next] button to go to the next window.



5. The setup program copies necessary files to the PC.



6. After the files are copied, the following dialog box is displayed. Click the [Finish] button to complete the installation.

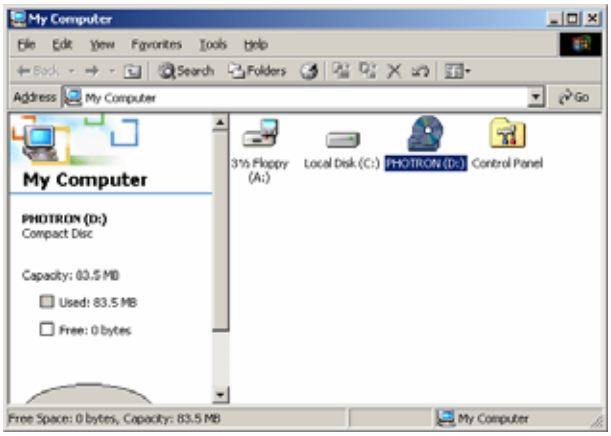


2.2. Installation of DirectX

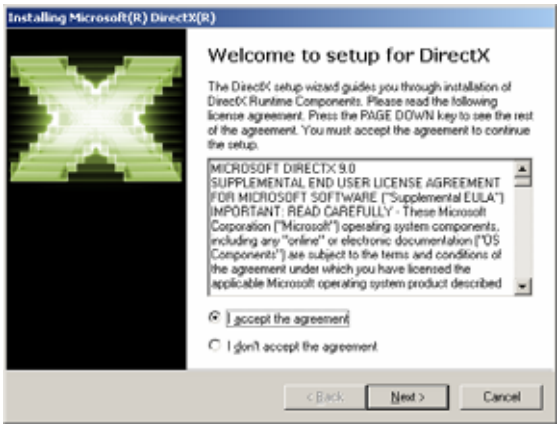
To read in and read out moving image files of AVI2.0 format from PFV software under operation systems other than Windows XP, you need to install DirectX8.1, or later, that is offered by Microsoft Corporation. The following is the procedure of installation.

Note: As to faults and questions that might result from the installation of DirectX, refer to support information that is offered in the Website of Microsoft Corporation.
In the following explanation, windows that are displayed when installing DirectX9.0 on Windows 2000 are used.

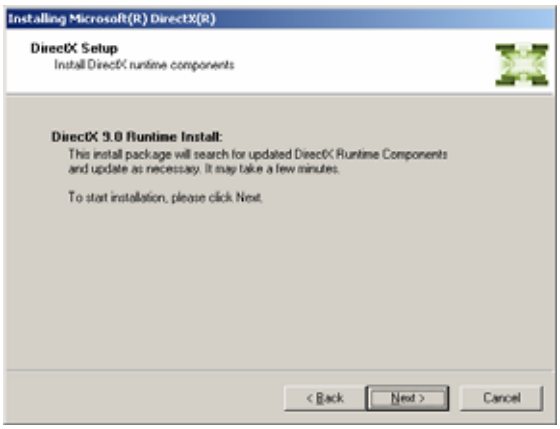
Place the attached CD-ROM in the CD-ROM drive of the PC and reference it from [My computer].



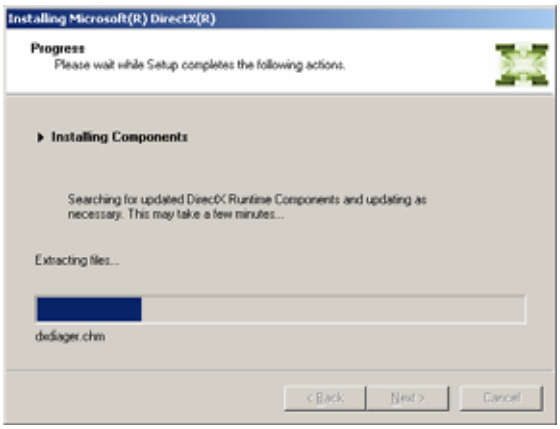
Open the [DirectX9] folder in the [DirectX] folder from the CD-ROM and double click on [dxsetup.exe]. The setup program starts up and read in the install program
After the setup program has been read in, the following dialog box is displayed. To confirm the conditions of license agreement, select [I accept the agreement] and press the [Next] button.



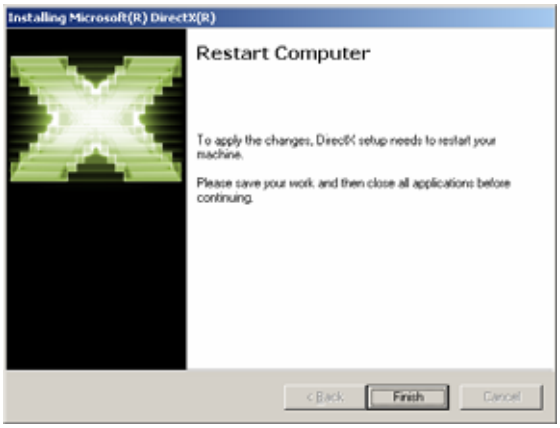
Installation begins. Press the [Next] button.



Installation takes several minutes. Wait for a while.



When installation is done, the below window is displayed. Press the [Finish] button to reboot.



2.3. Installation of Hardware drivers

This section discusses the procedure for hardware driver installation.
In order for you to use the PFV (Photron FASTCAM Viewer), you need to install relevant hardware driver programs as well as connecting your high-speed camera to the PC and other hardware devices. For details of hardware connection, refer to the instruction manuals attached to each hardware devices.
The method of hardware driver installation varies by the camera model. Install driver software programs referring to the driver installation manual attached to each hardware device before beginning installation of this control software program.

2.3.1. IEEE1394 I/F Compatible Cameras

Applicable camera models: FASTCAM-APX RS; FASTCAM-APX; FASTCAM-ultima 512; FASTCAM-ultima1024 R2; FASTCAM-ultima SE

Installation on Windows2000 Professional

Install the driver in the following manner.

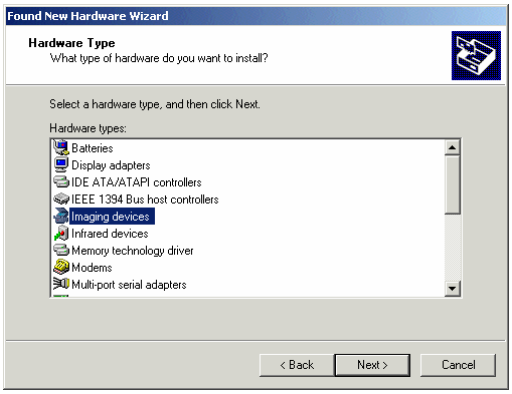
Note: Before starting installation, make sure that the IEEE1394 interface has been properly installed in the computer. See the hardware manual for details.

1. Connect with the cable between the IEEE1394 interface terminal and the terminal on the PC, and switch the PC on to start the OS.

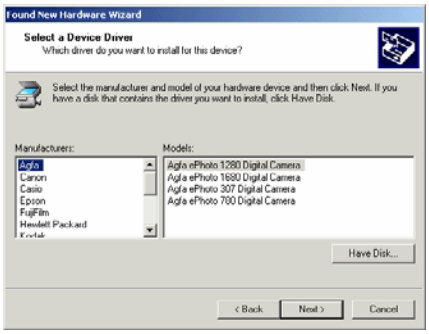
After login, the following window is displayed by the hardware detection wizard. Click the [Next] button to go to the next window.

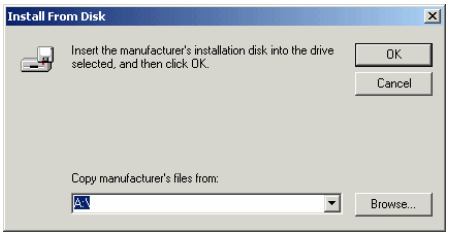
2. Make sure that the PHOTRON camera name has been properly recognized (the displayed name may be different from model to model being used). In the check box for driver detection method selection, select the [Display a list of the known drivers...] option.

3. Select the type of hardware from this list. Select [imaging devices] and click the [Next] button.

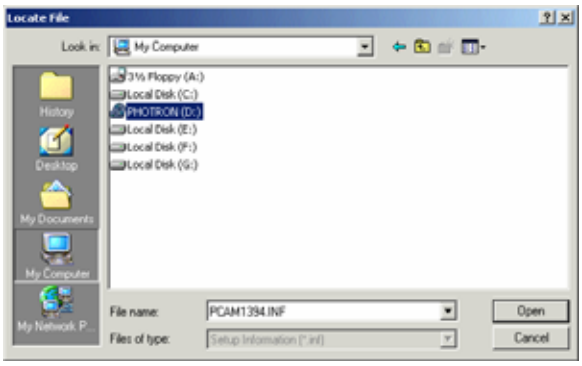


4. The device driver selection window is displayed. Click the [Have Disk...] button and the file reference dialog box appears.

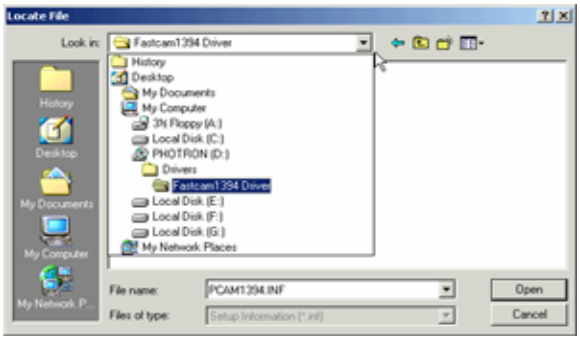




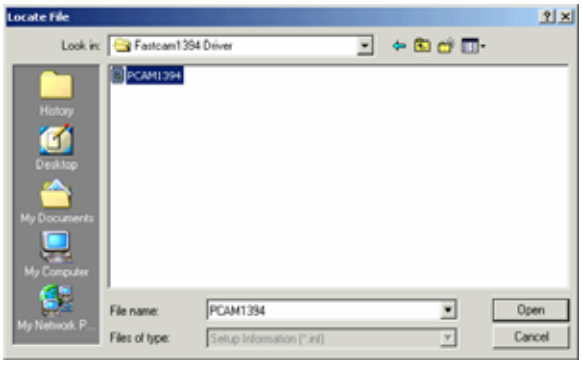
5. Load the attached CD-ROM in the CD driver of the PC and select the location.



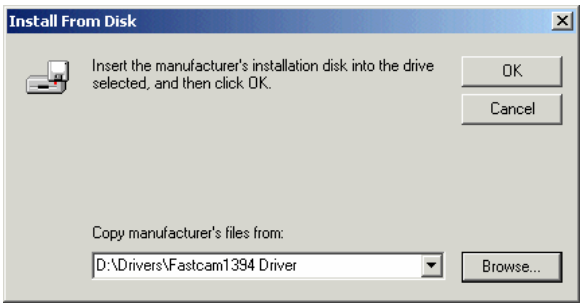
6. The contents of the CD-ROM are laid out as shown below. Select the [Fastcam 1394 Driver] folder below the [Drivers] folder.



7. Select the [PCAM1394.INF] file in the [Fastcam1394 Driver] folder and click the [Open] button.



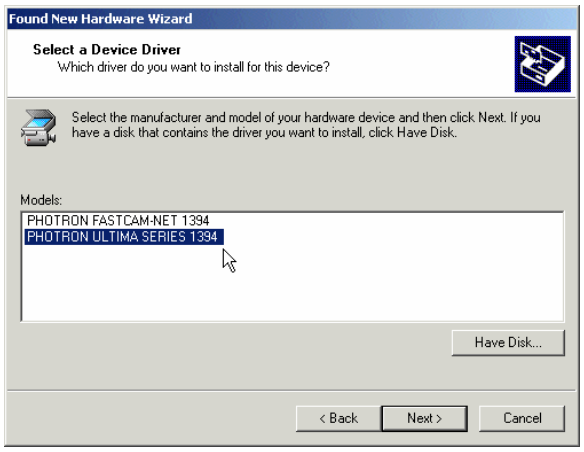
8. After making sure the directory of the file to copy is correct, click the [OK] button.



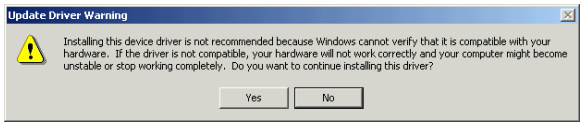
9. Select the model name of the camera being used in the model selection window.

FASTCAM-APX: PHOTRON FASTCAM-MAX/APX 1394
FASTCAM-ULTIMA512 : PHOTRON FASTCAM-NEO/Ultima512 1394
FASTCAM-APX RS : PHOTRON FASTCAM-APX RS 1394
FASTCAM-ultima1024 R2 : PHOTRON ULTIMA SERIES 1394
FASTCAM-ultima SE : PHOTRON ULTIMA SERIES 1394

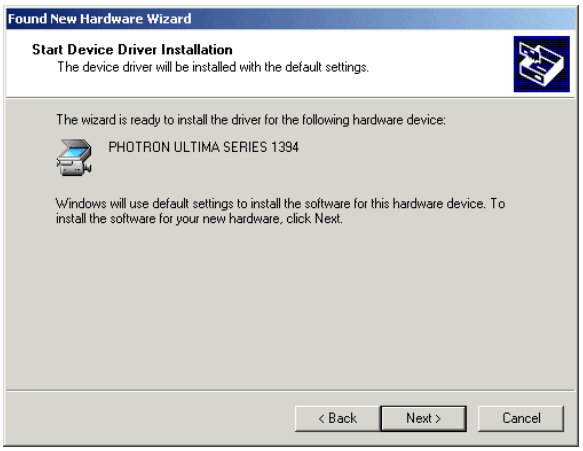
After selection, press the [Next] button.



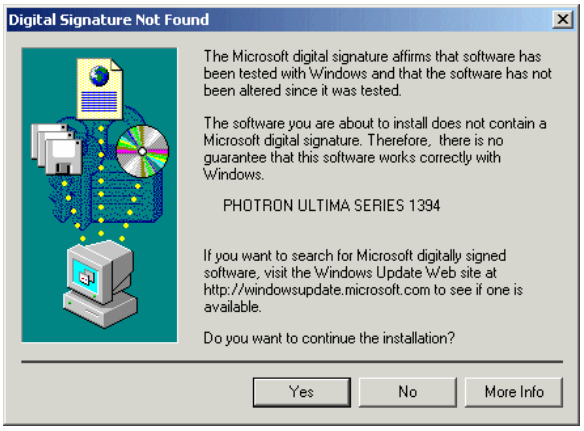
10. The below warning window appears. Just click the [Yes] button to go ahead.



11. The installation start window shows up. Click the [Next] button to proceed.



12. The digital signature dialog box is displayed. Click the [Yes] button.

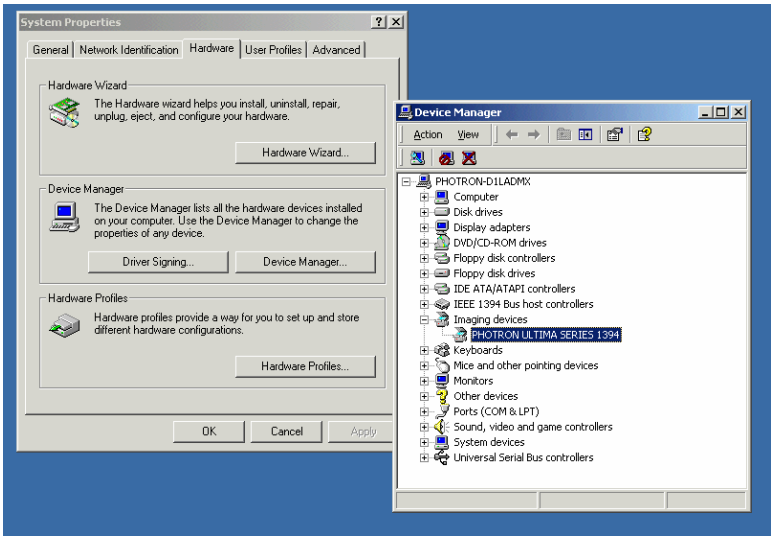


13. After all the necessary files have been read in, the installation completion dialog box shows up. Click the [Finish] button to finish installation.

14. See if the driver has been installed properly.

Start with the [Control Panel] button, and then click the [System] icon. Select [Hardware], and click the [Device Manager] button.

Make sure if the Photron camera is working properly as an imaging device.



The above concludes the hardware driver installation. Now go to software installation.

Installation on Windows XP Professional

Applicable camera models: FASTCAM-APX RS; FASTCAM-APX; FASTCAM-ultima 512; FASTCAM-ultima1024 R2; FASTCAM-ultima SE

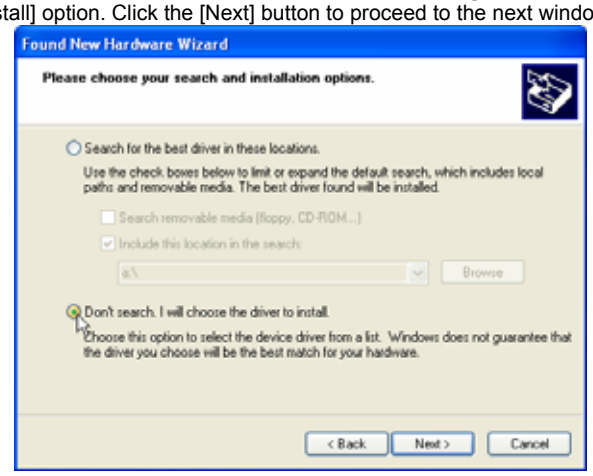
Install the driver in the following manner:

Note: Before starting to install the driver, make sure that an IEEE1394 I/F has been correctly installed on the PC. See the hardware manual for details of the interface.

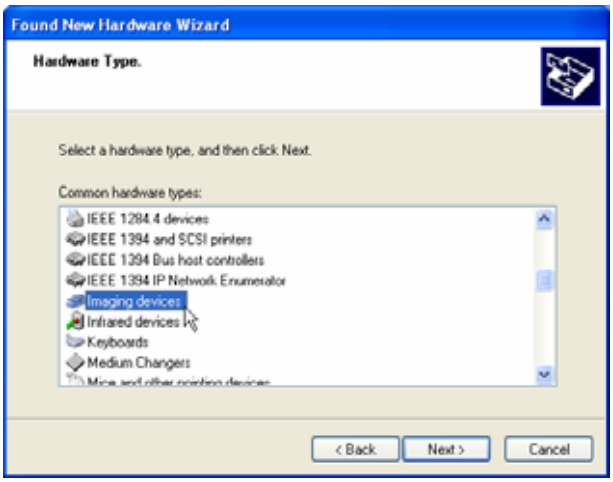
Connect with the cable between the IEEE1394 connectors on the camera and the PC. Turn on power of the PC to start up the OS.

1. After login, the below window appears. Make sure that the PHOTRON camera name has been properly recognized on the device install window (the displayed name may be different from model to model being used).
   Click the [Next] button to proceed to the next window.

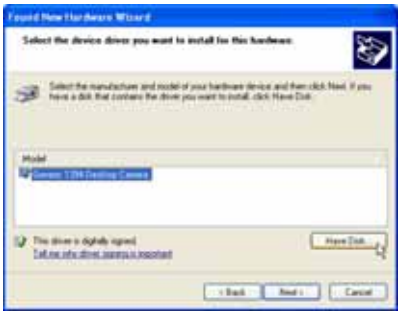
2. In the check box for driver detection method selection, select the [Don't search. I will choose the driver to install] option. Click the [Next] button to proceed to the next window.



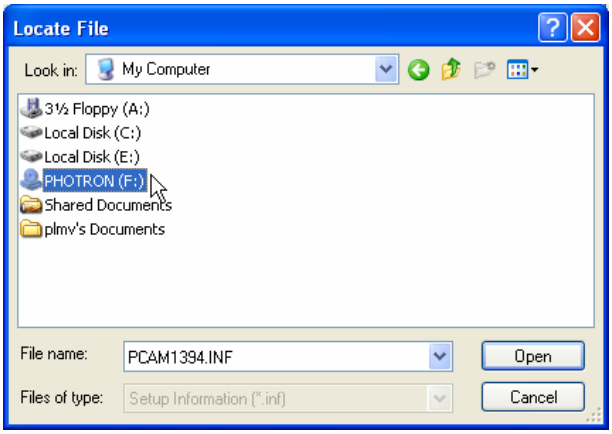
3. Select the type of hardware from this list. Select [Imaging devices] and click the [Next] button.



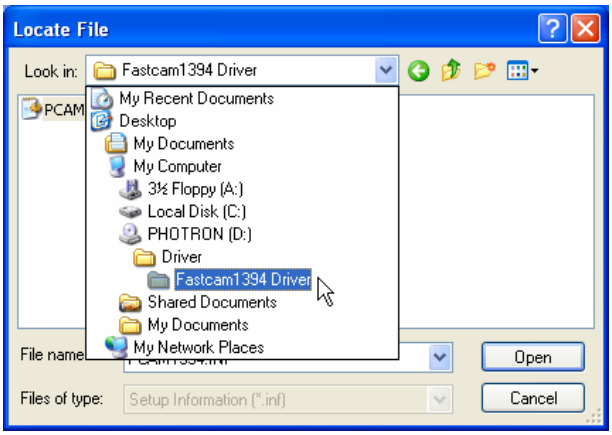
4. The device driver selection window is displayed. Click the [Have Disk...] button and the file reference dialog box appears.



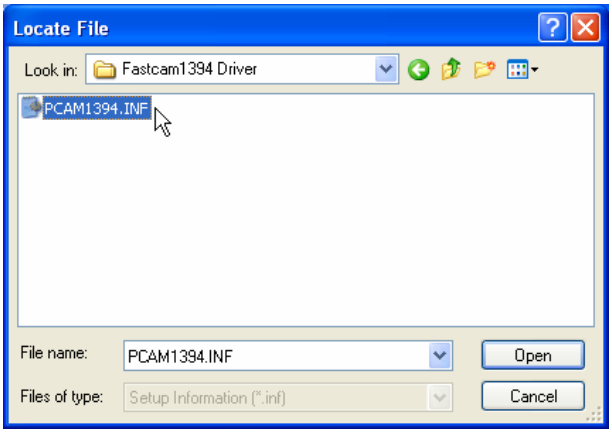
5. Load the attached CD-ROM in the CD drive of the PC and select the location.



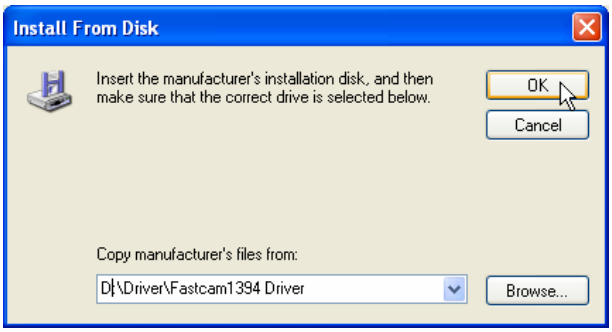
6. The contents of the CD-ROM are laid out as shown below. Select the [Fastcam 1394 Driver] folder under the [Driver] folder.



7. Select the [PCAM1394.INF] file in the [Fastcam1394 Driver] folder and click the [Open] button.

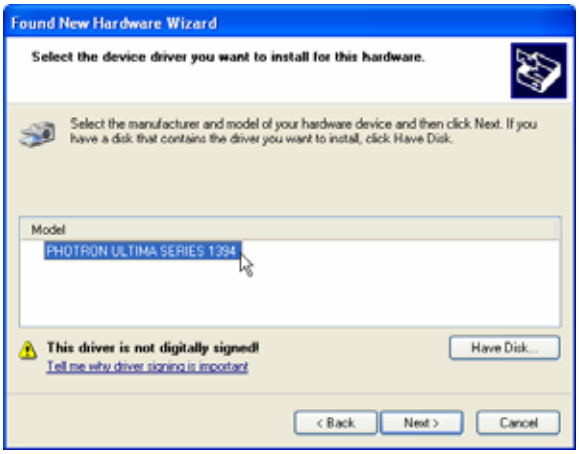


8. Make sure the directory of the file to copy is correct, and click the [OK] button.

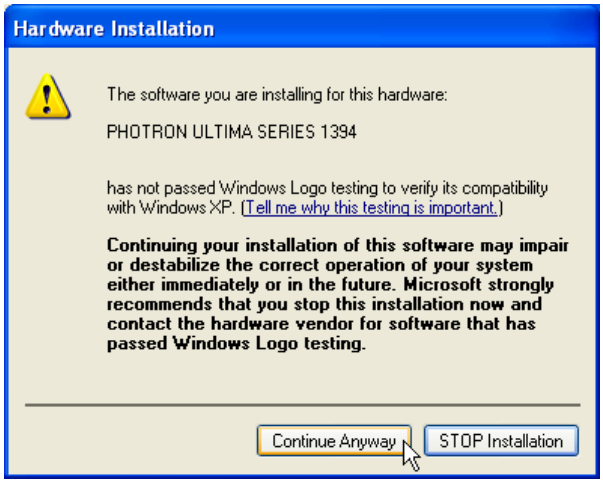


9. Select the model name of the camera being used in the model selection window.
   FASTCAM-APX: PHOTRON FASTCAM-MAX/APX 1394
   FASTCAM-ULTIMA512 : PHOTRON FASTCAM-NEO/Ultima512 1394
   FASTCAM-APX RS : PHOTRON FASTCAM-APX RS 1394
   FASTCAM-ultima1024 R2 : PHOTRON ULTIMA SERIES 1394
   FASTCAM-ultima SE : PHOTRON ULTIMA SERIES 1394

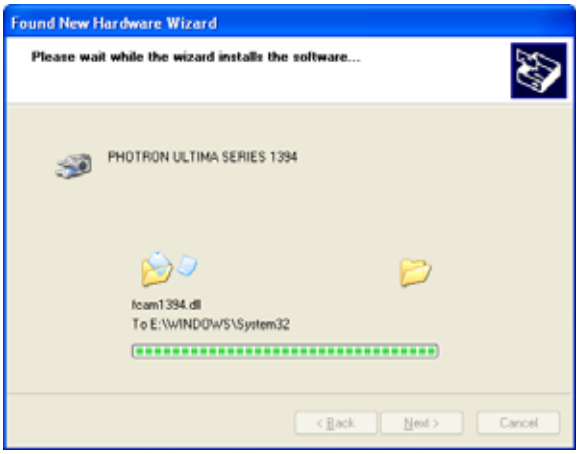
After selection, press the [Next] button.



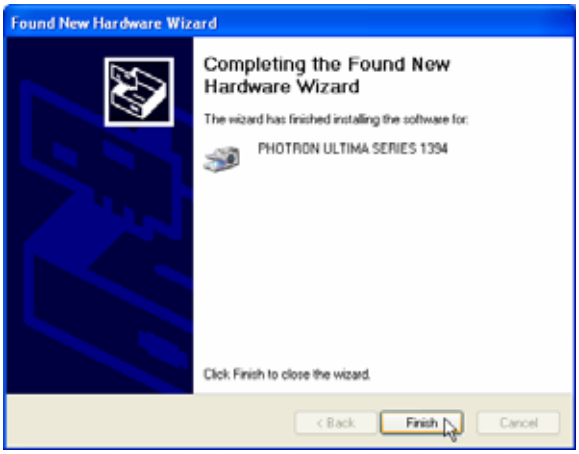
10. The following warning appears. Click the [Continue Anyway] button to go ahead.



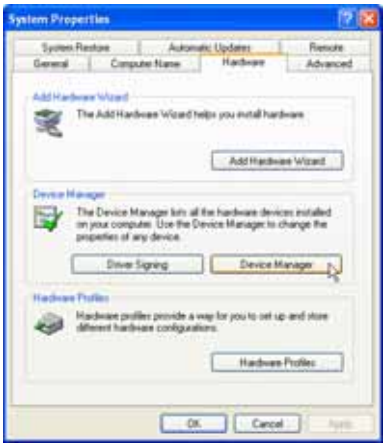
11. The installation start window appears. Click the [Next] button to proceed.

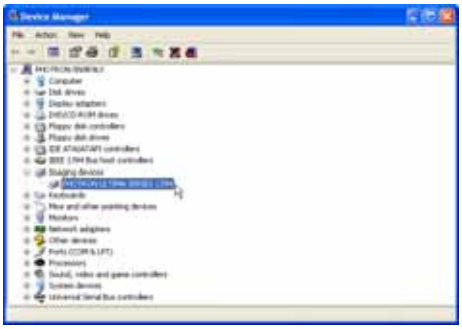


12. After all the necessary files have been read in, the installation completion dialog box appears. Click the [Finish] button to finish installation.



13. See if the driver has been installed correctly.
Go from [Control panel]. Click the [System] icon. Select the [Hardware] tag and click the [Device manager] button.
Make sure that the Photron camera is working properly as an imaging device.



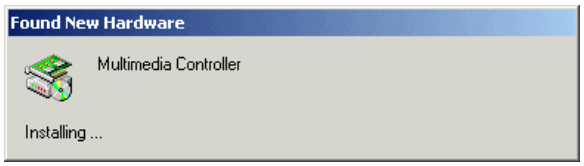


The above has completed the hardware driver installation. Now proceed to software installation.

2.3.2. PCI Board Camera (FASTCAM-PCI R2)

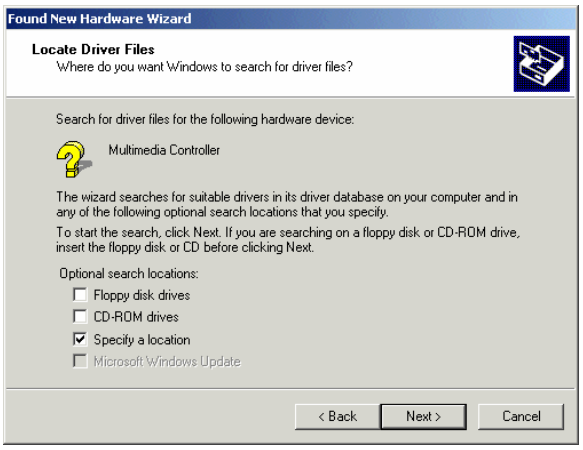
Installation on Windows 2000 professional

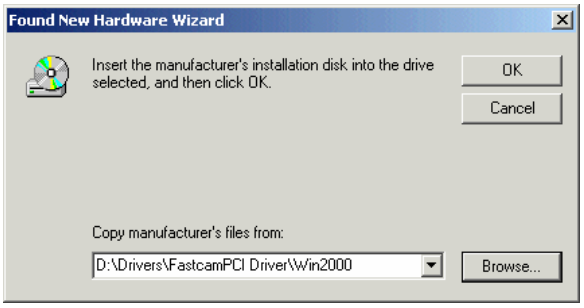
Install the driver in the following manner:
1. After installing the PCI Board in the PC's PCI bus, turn on power to start up OS. After login, the following window is displayed by Found New Hardware wizard. Click the [Next] button to proceed to the next window.



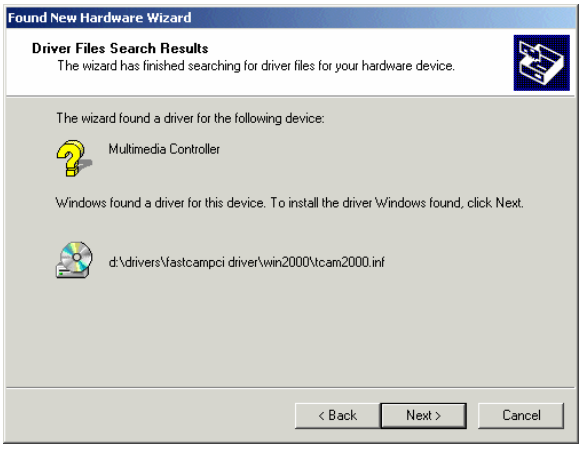
2. Make sure if the Photron camera name is properly recognized in the device installation window. In the driver selection method check box, select the [Search for a suitable driver for my device] option.

3. Set the check box ON in [Specify a location], load the attached CD-ROM in the CD drive of the PC. In the reference location, select the location where the FASTCAM-PCI Windows 2000 driver is stored.

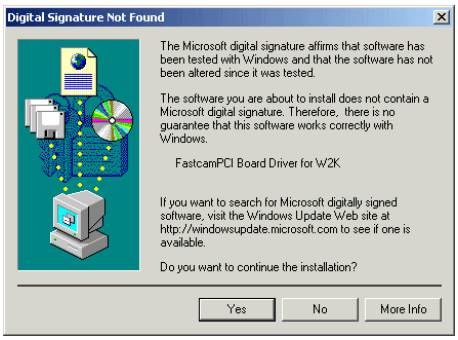




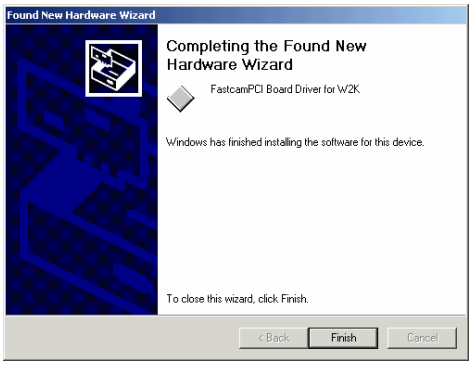
4. As soon as the driver is detected, the following window is displayed and preparation for installation is made. Click the [Next] button to proceed.



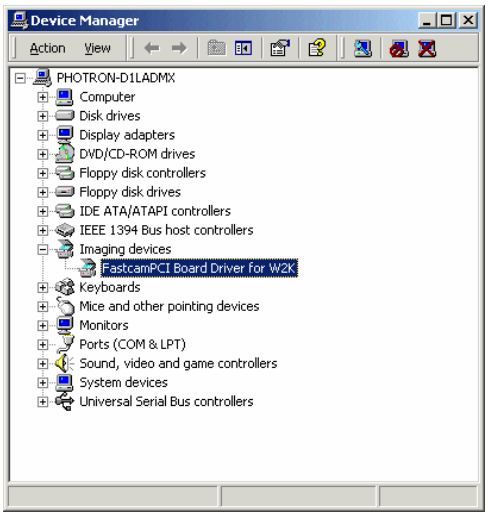
5. Digital signature dialog is displayed. Click the [Yes] button to go ahead.



6. After all the necessary files have been read in, the installation completion dialog box appears. Click the [Finish] button to finish installation.



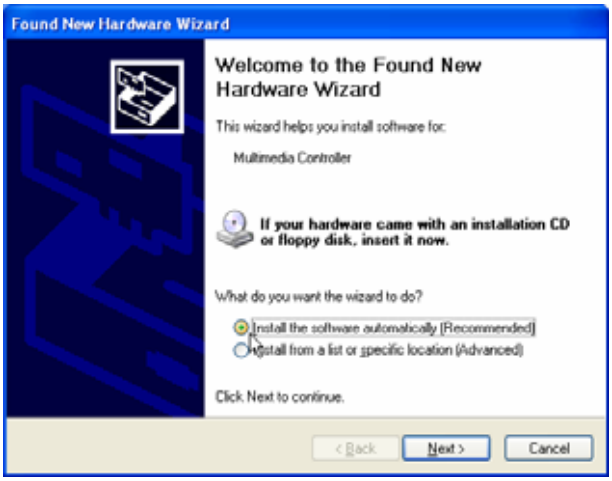
7. Make sure in [Device Manager] if the Photron camera is properly working as an imaging device.



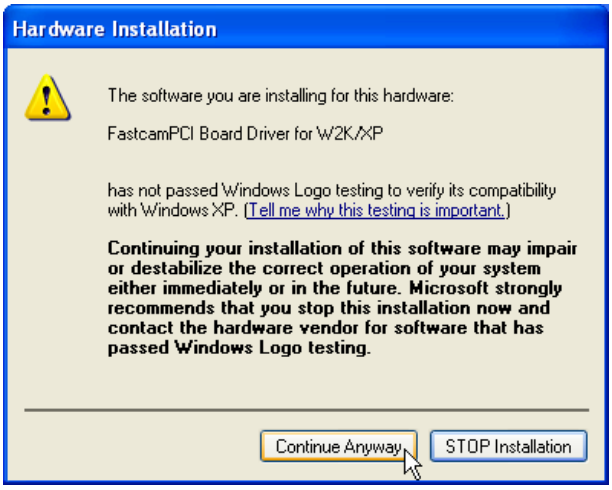
Installation on Windows XP Professional

Install the driver in the following manner:

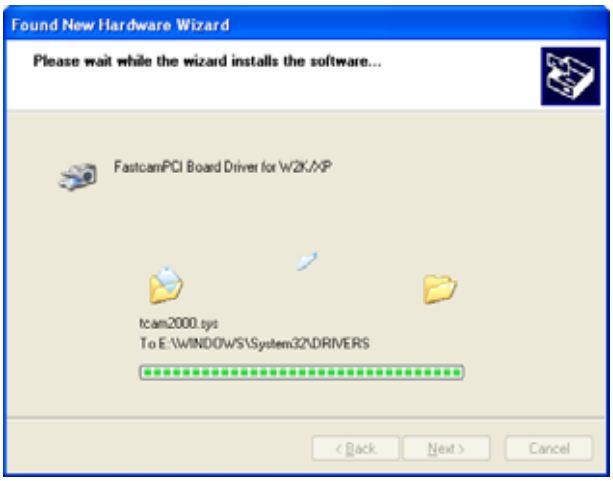
1. After installing the PCI Board in the PC's PCI bus, turn on power to start up OS. After login, the following window is displayed by Found New Hardware Wizard. Click the [Next] button to proceed to the next window.

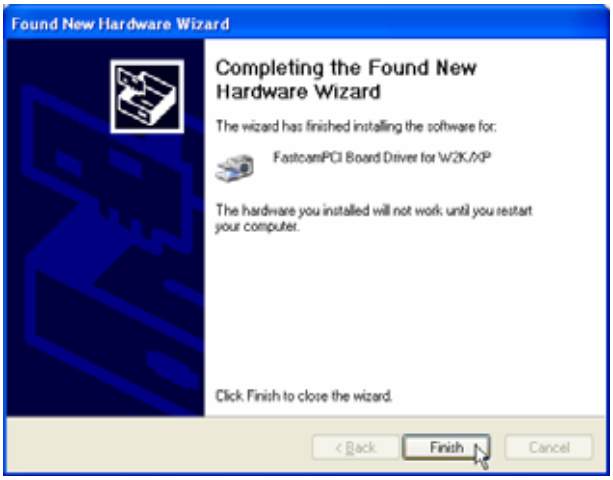


2. Make sure that the Photron camera name has be correctly recognized on the Hardware Installation window. Click the [Continue Anyway] button to proceed.

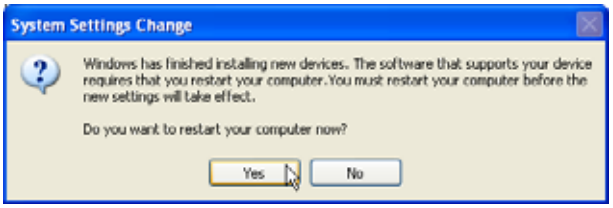


3. After necessary files have been read, the installation complete dialog box appears. Click the [Finish] button to complete the installation.

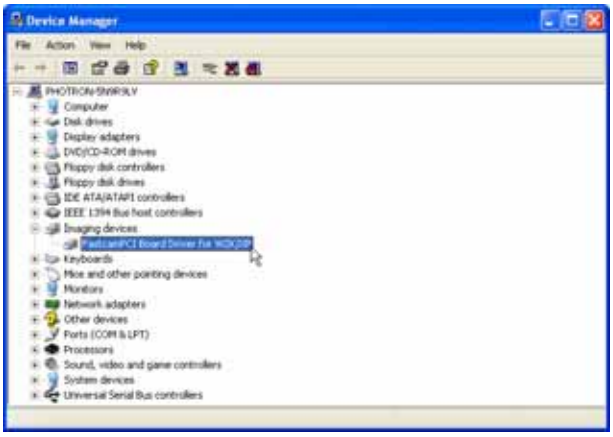




4. Restart the PC according to the instruction.



5. Check in the [Device manager] if the Photron camera working correctly as an imaging device.



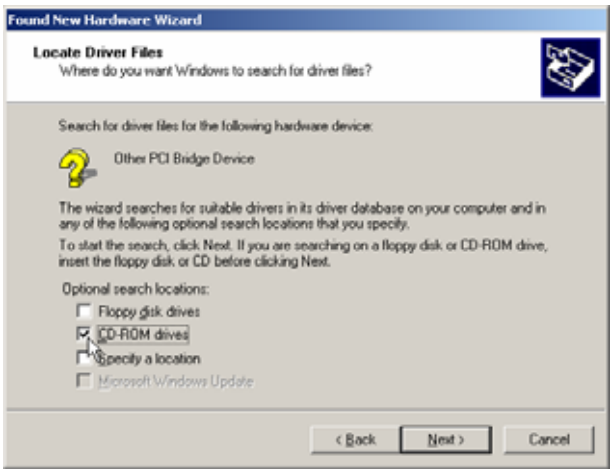
2.3.3. PCI-Board Camera (FASTCAM-X 1280PCI)

Installation on Windows 2000 professional

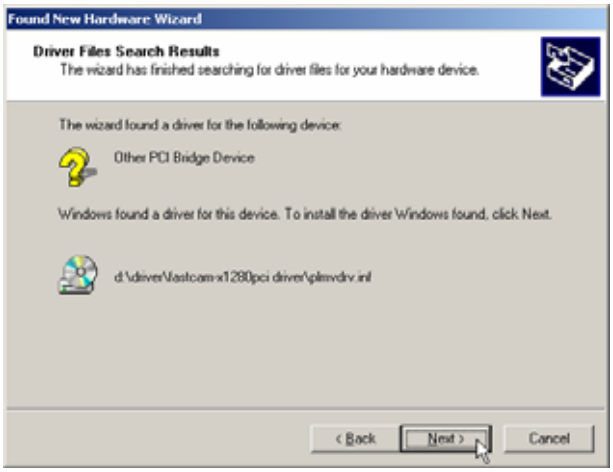
Install the driver in the following manner:
1. After installing the PCI Board in the PC's PCI bus, turn on power to start up OS. After login, the following window is displayed by the hardware detection wizard. Click the [Next] button to proceed to the next window.

2. Select the [Search for a suitable driver for my device] option.

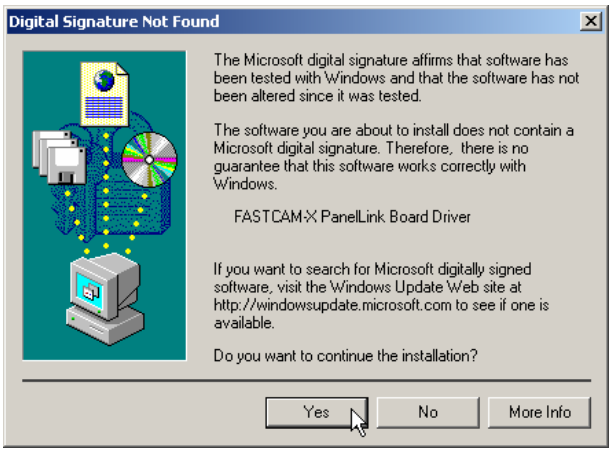
3. Set the check box ON in [CD-ROM drives], load the attached CD-ROM in the CD drive of the PC.



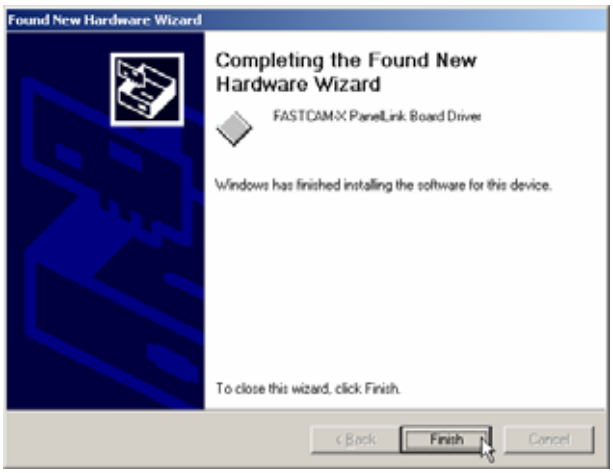
4. As soon as the driver is detected, the following window is displayed and preparation for installation is made. Click the [Next] button to proceed.



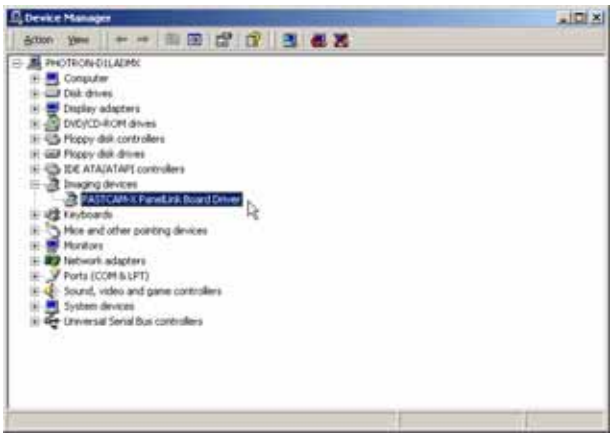
5. Digital signature dialog is displayed. Click the [Yes] button to go ahead.



6. After all the necessary files have been read, the installation completion dialog box appears. Click the [Finish] button to finish installation.



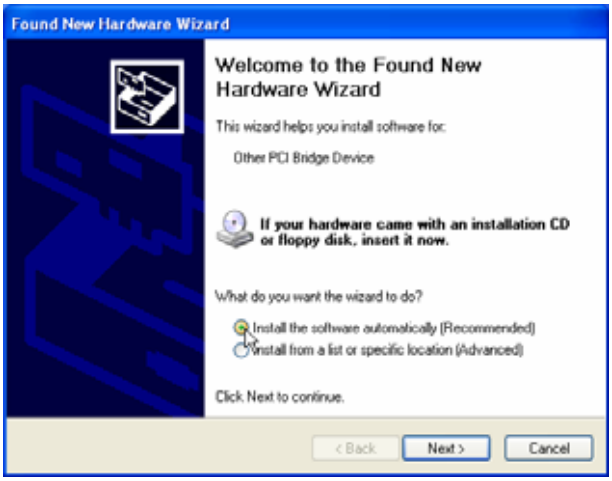
7. Make sure in [Device Manager] if the Photron camera is properly working as an imaging device.



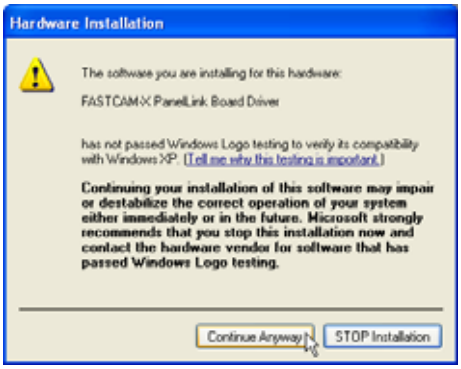
Installation on Windows XP Professional

Install the driver in the following manner:

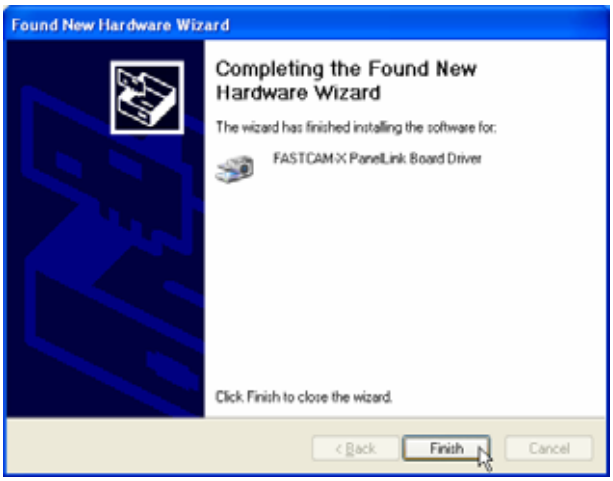
1. After installing the PCI Board in the PC's PCI bus, turn on power to start up OS. After login, the following window is displayed by the Found New Hardware Wizard. Click the [Next] button to proceed to the next window.



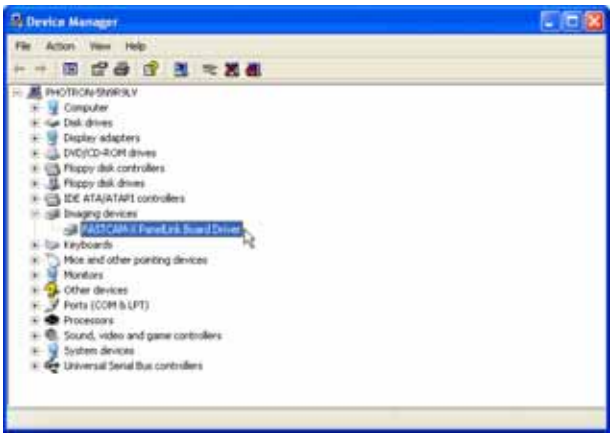
2. Make sure that the Photron camera name has be correctly recognized on the Hardware Installation window. Click the [Continue Anyway] button to proceed.



3. After all the necessary files have been read in, the installation complete dialog box appears. Click the [Finish] button to complete the installation.



4. Make sure in [Device Manager] if the Photron camera is properly working as an imaging device.



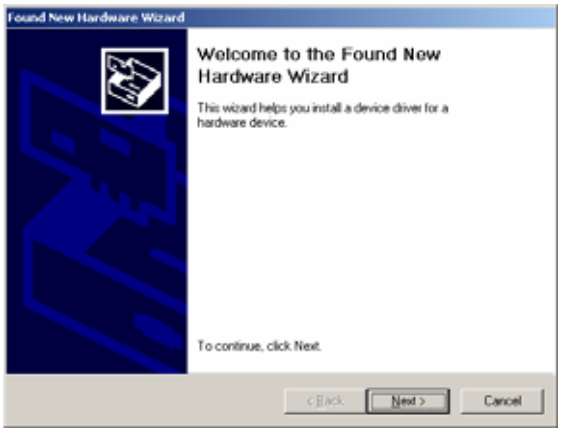
2.3.4. Installation of Photron Optical I/F Driver

Applicable camera models: FASTCAM-APX RS; FASTCAM-APX; FASTCAM-ultima 512

Installation on Windows2000 Professional

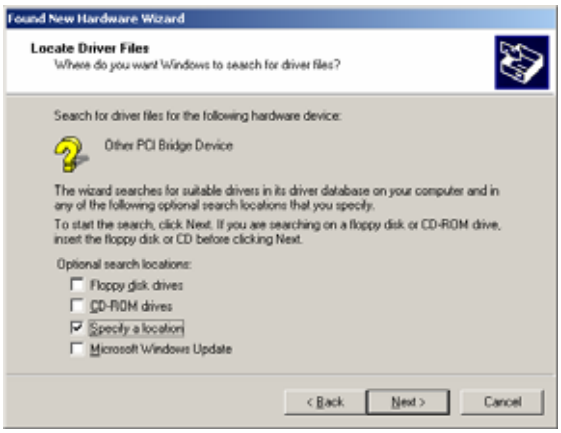
The procedure of installation is as follows:

After installing the PCI board in the PCI bus of the PC, switch the PC on and start up the OS.
After login, the following window is displayed by the Found New Hardware Wizard. Press the [Next] button to go to the next window.

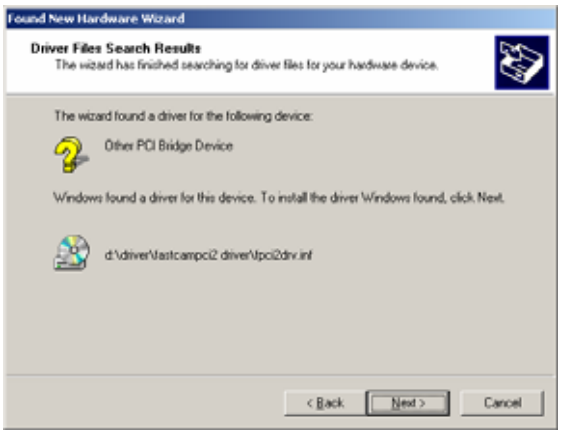


Make sure that a PCI device has been recognized in the install window. Check the [Search for a suitable driver for my device] option. Click the [Next] button to proceed to the next window.

Check the check box for [Specify a location], and set the attached CD-ROM in the CD-ROM drive. Specify the [Fastcam Optical Driver] folder in the [Driver] for reference.

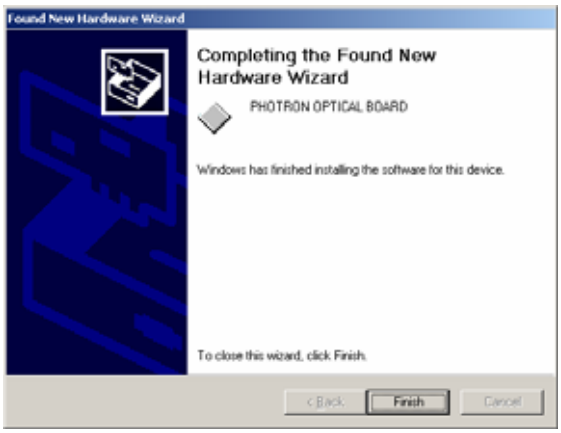


When a driver is detected, the below window is displayed and preparation for installation begins. Press the [Next] button to go to the next window.

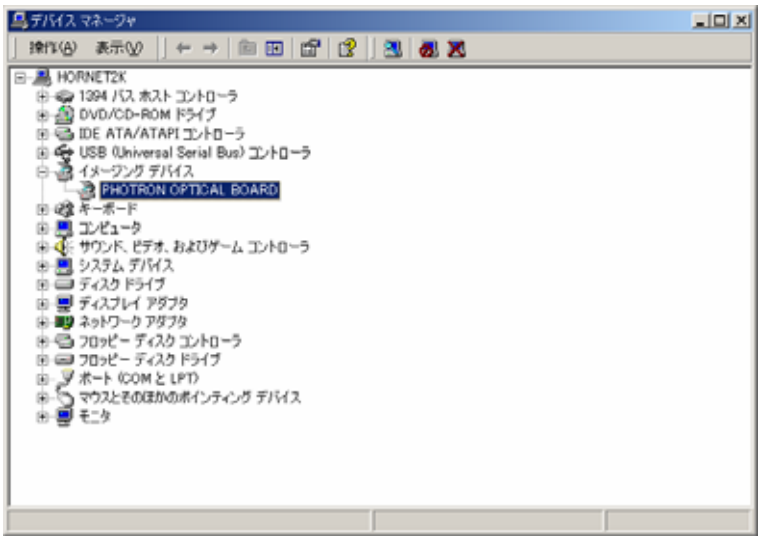


A dialog for digital signature is displayed as shown below. Press the [Yes] button to go to the next window.

After a necessary file has been read in, the following dialog box is displayed showing the installation has completed. Press the [Finish] button to complete the installation procedure.



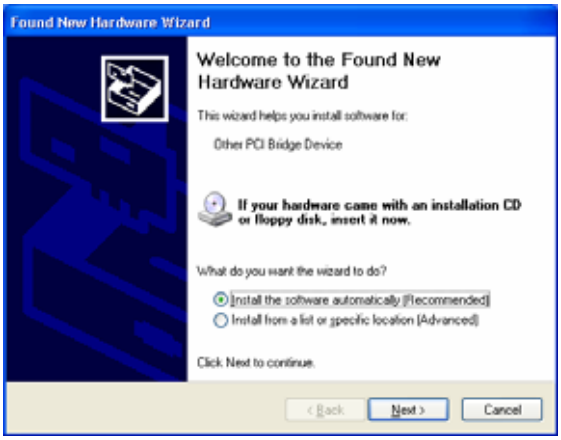
Make sure by the [Device Manger] that the optical I/F board is properly functioning as an imaging device.
Note: The camera name is not shown in this window.



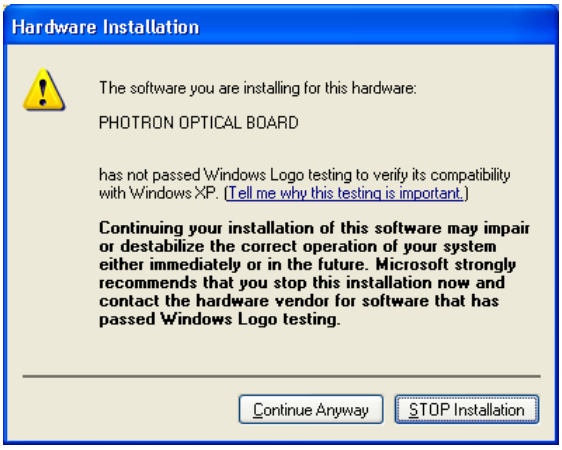
Installation on Windows XP Professional

Applicable camera models: FASTCAM-APX RS; FASTCAM-APX; FASTCAM-ultima 512

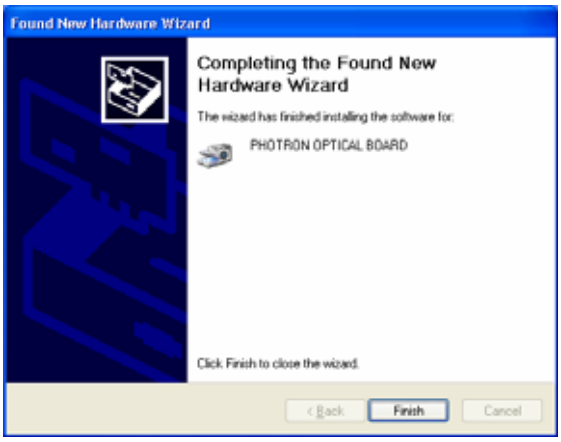
The procedure of installation is as follows:
After installing the PCI board in the PCI bus of the PC, switch the PC on and start up the OS.
After login, the following window is displayed by the Found New Hardware Wizard. Press the [Next] button to go to the next window.



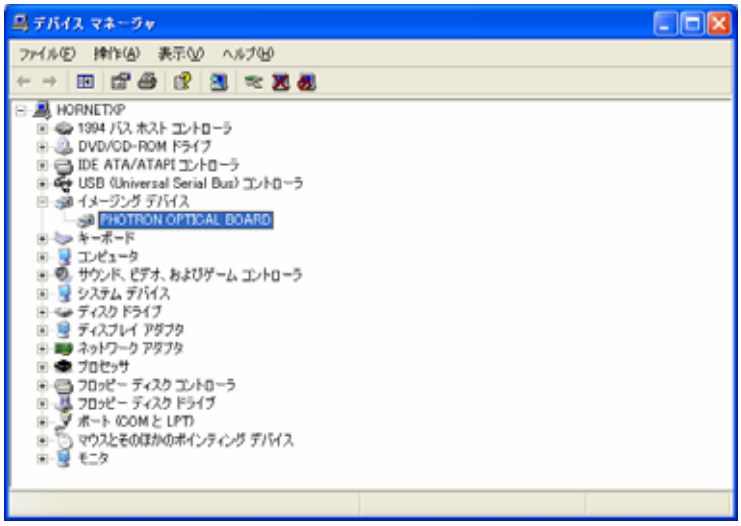
Make sure that PHOTRON OPTICAL BOARD has been recognized in the install window. Press the [Continue Anyway] button to continue the installation procedure.



After necessary files have been read in, the following dialog box is displayed showing the installation has completed. Press the [Finish] button to complete the installation procedure.



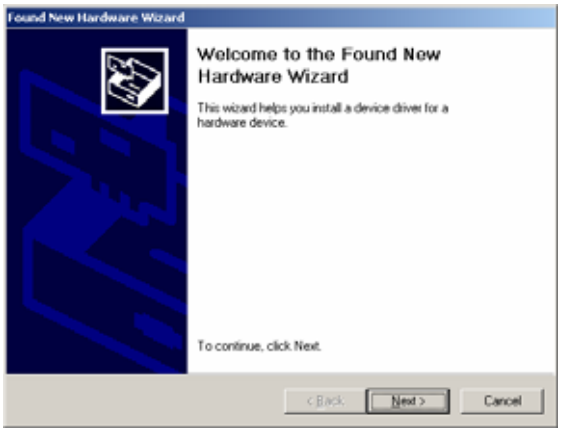
Make sure by the [Device Manger] that the optical I/F board is properly functioning as an imaging device.
Note: The camera name is not shown in this window.



2.3.5. Installation of Driver for FASTCAM-512PCI

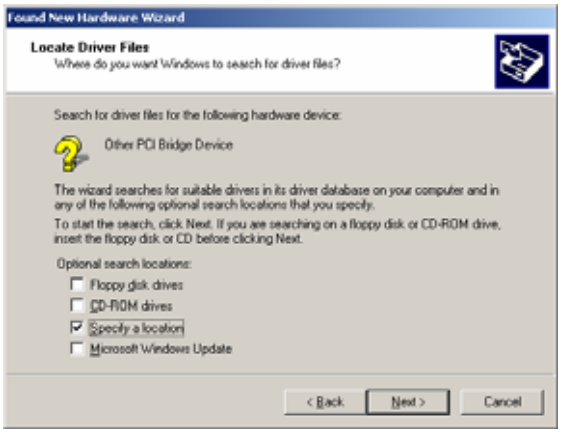
Installation on Windows2000 Professional

The procedure of installation is as follows:
After installing the PCI board in the PCI bus of the PC, switch the PC on and start up the OS.
After login, the following window is displayed by the Found New Hardware Wizard. Press the [Next] button to go to the next window.

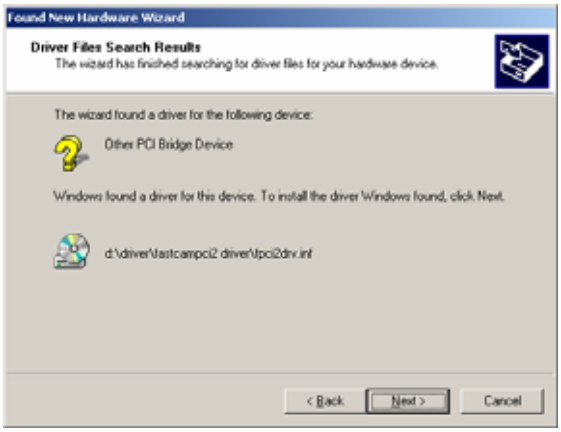


Make sure that a PCI device has been recognized in the install window. Check the [Search for a suitable driver for my device] option. Click the [Next] button to proceed to the next window.

Check the check box for [Specify a location], and set the attached CD-ROM in the CD-ROM drive. Specify the [Fascam512PCI Driver] folder in the [Driver] for reference. Click the [Next] button to proceed to the next window.

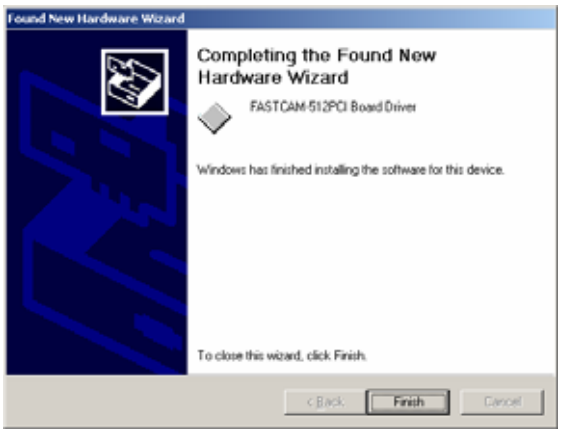


When a driver is detected, the below window is displayed and preparation for installation begins. Press the [Next] button to go to the next window.



A dialog for digital signature is displayed as shown below. Press the [Yes] button to go to the next window.

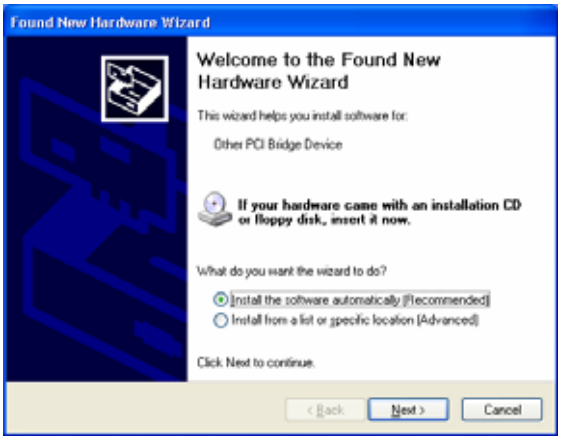
After necessary files have been read in, the following dialog box is displayed showing the installation has completed. Press the [Finish] button to complete the installation procedure.



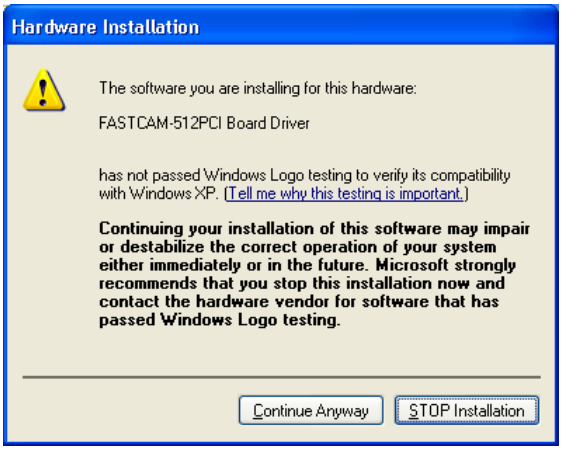
Make sure by the [Device Manger] that the Photron camera is properly functioning as an imaging device.

Installation on WindowsXP Professional

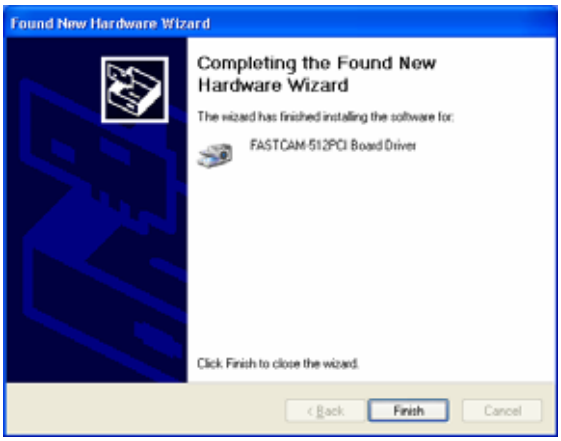
The procedure of installation is as follows:
After installing the PCI board in the PCI bus of the PC, switch the PC on and start up the OS.
After login, the following window is displayed by the Found New Hardware Wizard. Press the [Next] button to go to the next window.



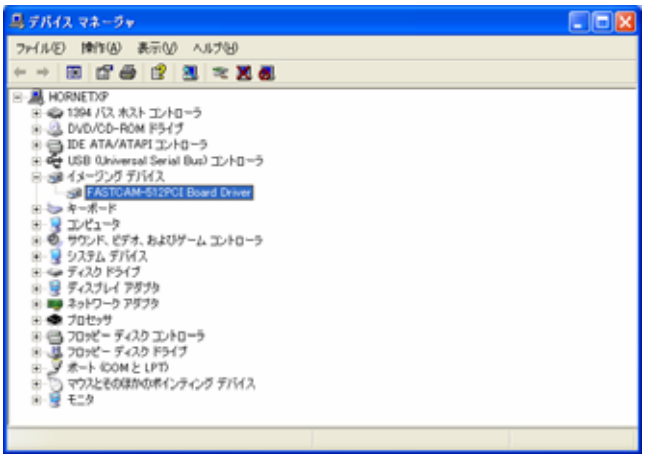
Make sure that the Photron camera has been recognized in the install window. Press the [Continue Anyway] button to continue the installation procedure.



After necessary files have been read in, the following dialog box is displayed showing the installation has completed. Press the [Finish] button to complete the installation procedure.



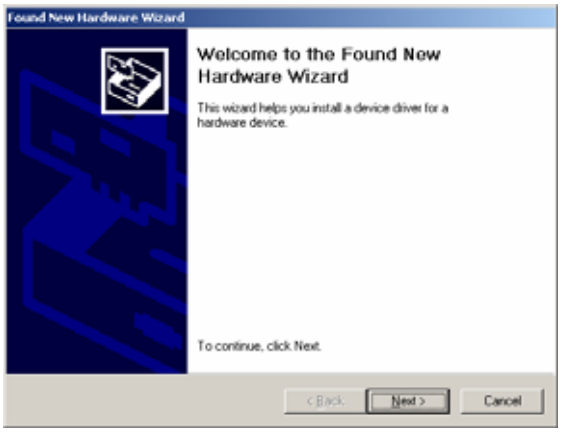
Make sure by the [Device Manger] that the Photron camera is properly functioning as an imaging device.



2.3.6. Installation of Driver for FASTCAM-1024PCI

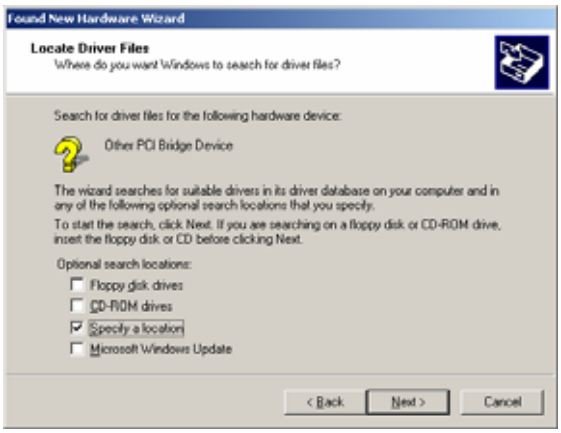
Installation on Windows2000 Professional

The procedure of installation is as follows:
After installing the PCI board in the PCI bus of the PC, switch the PC on and start up the OS.
After login, the following window is displayed by the Found New Hardware Wizard. Press the [Next] button to go to the next window.

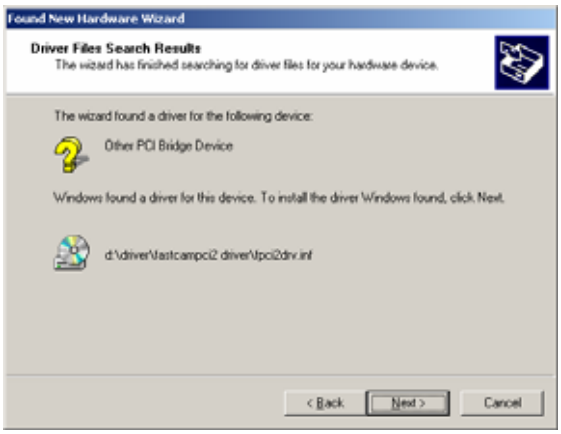


Make sure that the new PCI device has been recognized in the install window. To select a method for searching a driver, check the checkbox for the [Search a driver best suited for the device] option.

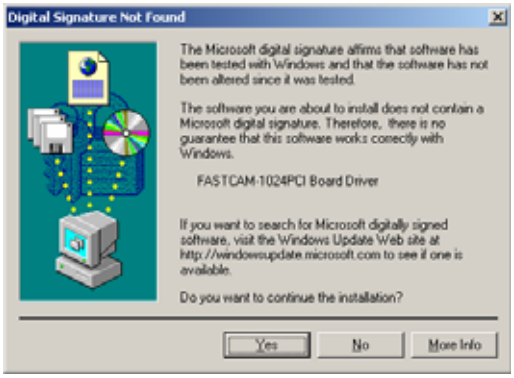
Check the check box for [Specify a location], and set the provided CD-ROM in the CD-ROM drive. Specify the [Fastcam 1024PCI Driver] folder in the [Driver] folder for reference.



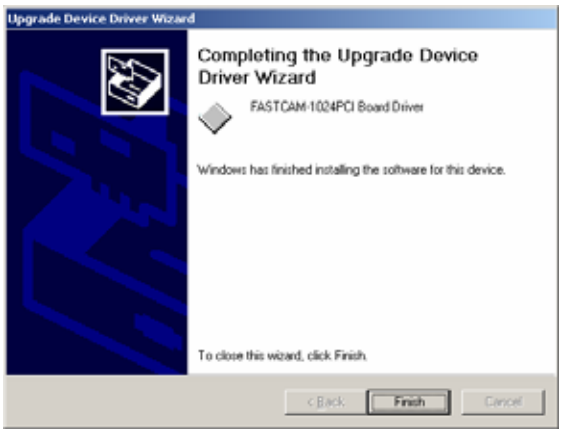
When a driver is detected, the below window is displayed and preparation for installation begins. Press the [Next] button to go to the next window.



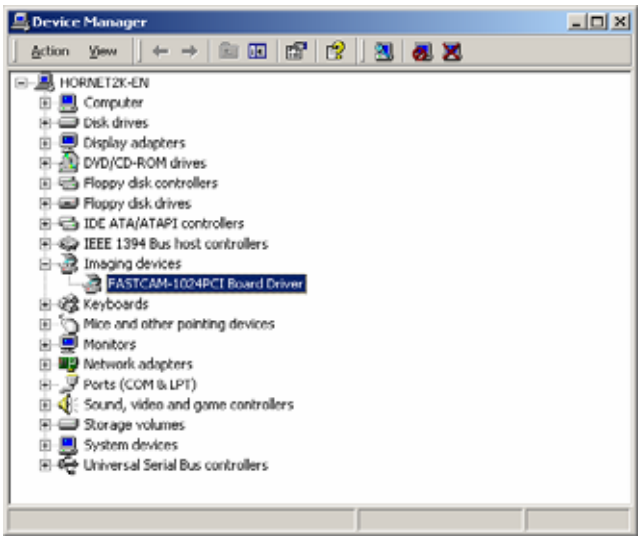
A dialog for digital signature is displayed as shown below. Press the [Yes] button to go to the next window.



After necessary files have been read in, the following dialog box is displayed showing the installation has completed. Press the [Complete] button to complete the installation procedure.

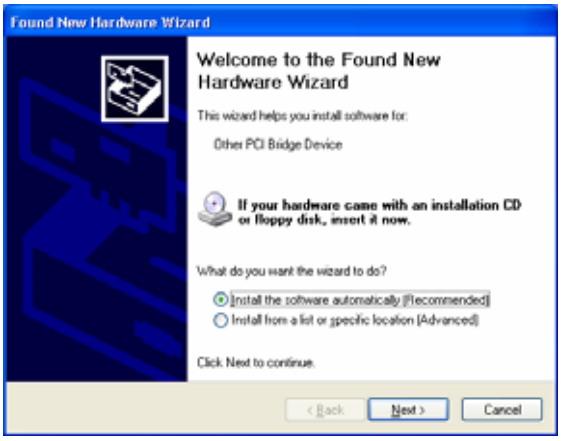


Make sure in the [Device Manger] that the Photron camera is properly functioning as an imaging device.

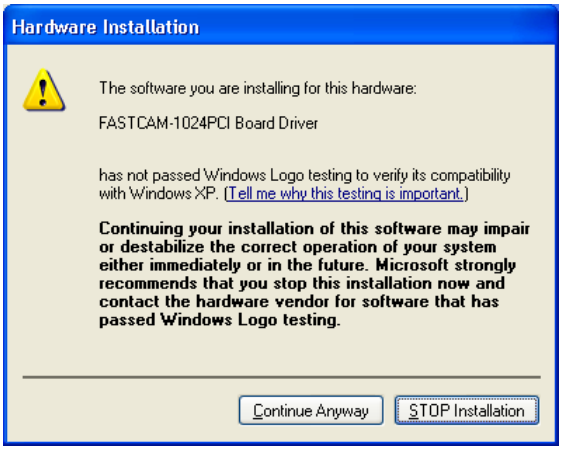


Installation on WindowsXP Professional

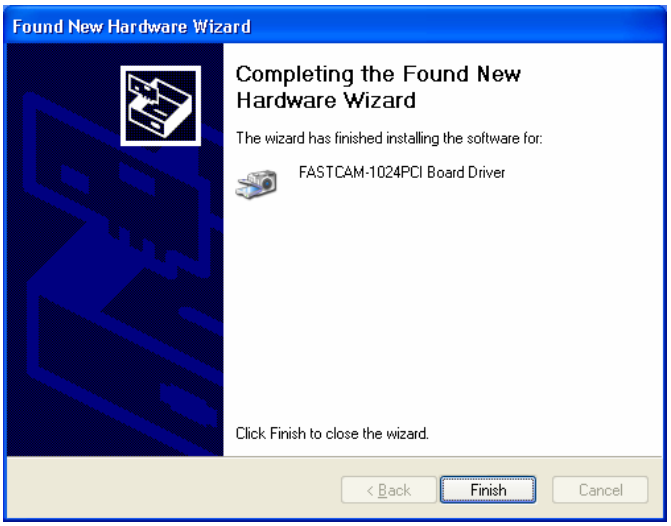
The procedure of installation is as follows:
After installing the PCI board in the PCI bus of the PC, switch the PC on and start up the OS.
After login, the following window is displayed by the Found New Hardware Wizard. Press the [Next] button to go to the next window.



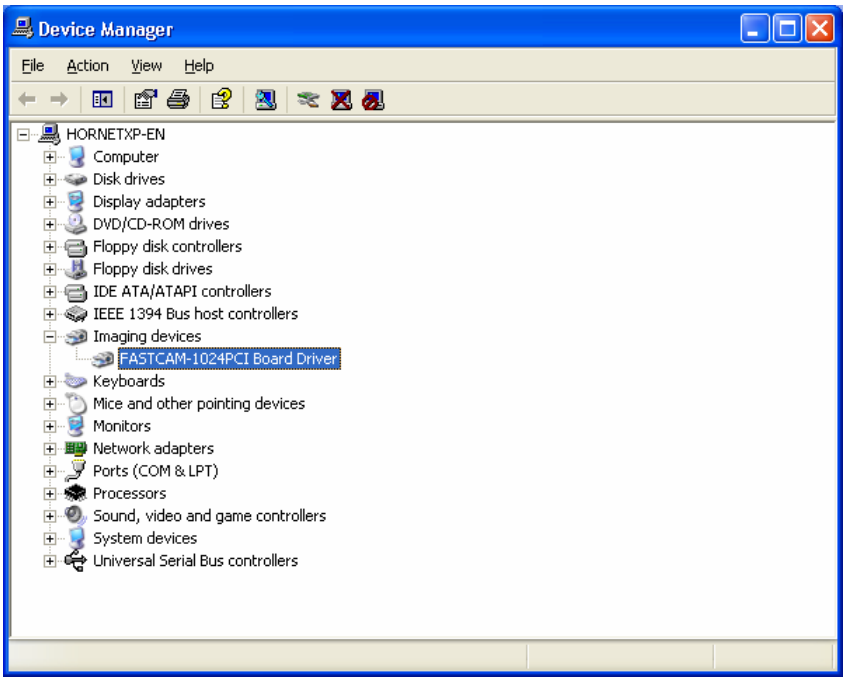
Make sure that the Photron camera has been recognized in the install window. Press the [Continue] button to continue the installation procedure.



After necessary files have been read in, the following dialog box is displayed showing the installation has completed. Press the [Complete] button to complete the installation procedure.



Make sure in the [Device Manger] that the Photron camera is properly functioning as an imaging device.



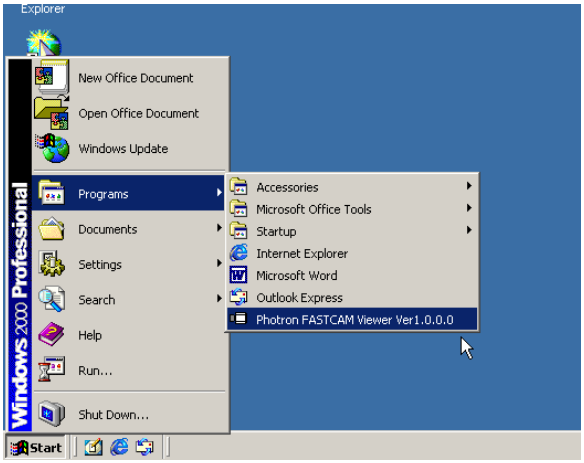
3. Operation of Software

The PFV controls a high-speed video camera from the PC extending a seamless set of functions such as camera setup, framing, image viewing, data download, data filing with simple operations. This section discusses the basic operation of this software simulating the procedure of an actual framing and playback session.

3.1. Starting up Software

First, look into the hardware manuals to make sure the equipment and devices are correctly connected.

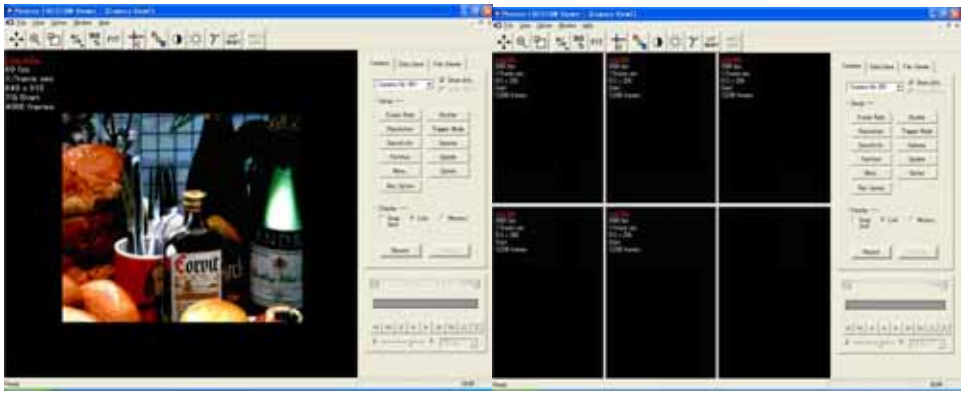
In the [Start] menu, select [Program], and left click [Photron FASTCAM Viewer X.X], [PFV verX.X.X.X] (With WindowXP, go from [Start] to [All programs], to [Photron FASTCAM Viewer X.X] and to [PFV verX.X.X].



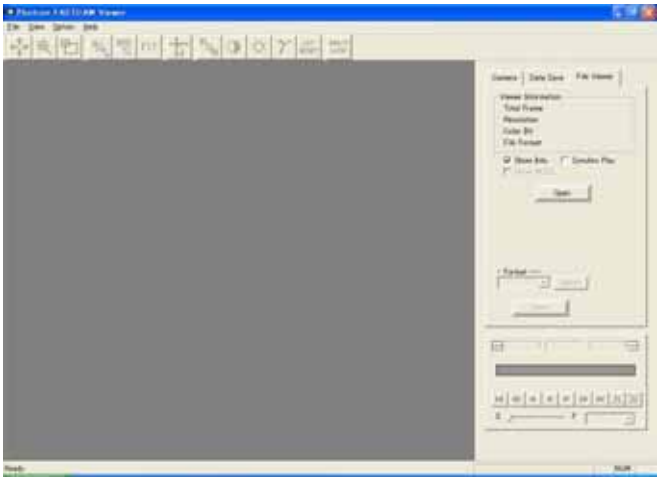
Or, click the  icon with your mouse and the Control Software starts up on the screen as shown below.

The basic window opens. For a multiple-camera operation, divided view windows of the same number as the cameras are displayed.

After the opening screen is displayed, the basic view screens open up. In a multi-camera operation, the screen is divided into view windows of the same number as the connected cameras (one view window opens up to each of the cameras).



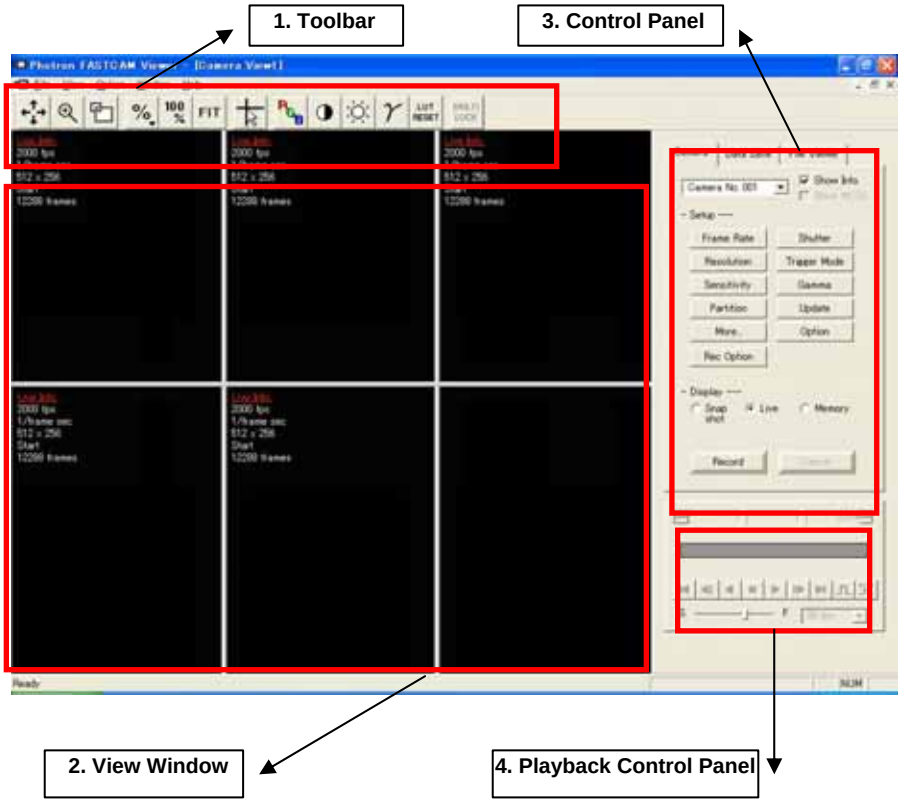
When no camera is connected, the File Open Tag screen opens up, which is used to view previously downloaded image files. In case no view window shows up even though a camera is connected, check the connections and camera power switch.



Note: With stand-alone cameras, such as the FASTCAM-APX, initialization of the camera itself takes some time. Wait for a minute until the camera has been completely initialized and then turn the PFV on. Otherwise, malfunctioning of the PFV may result

3.2. Basic screen layout

When the software starts up with cameras connected, view windows corresponding to the number of cameras appear as shown below.



1. Toolbar (See 3.5 for details)

This toolbar offers control functions such as zooming, contrast/brightness/gamma setting of the image displayed in the view window.

2. View Window (See 3.4 for details)

This window displays the live image from the relevant camera and playback image from the memory. The status of each camera is shown in the upper left corner of each window.

3. Control Panel (See 3.6 for details)

This area is divided into three parts: camera parameter setting and framing, data saving, and file reading.

4. Playback Control Panel (See 3.9 for details)

This panel has all the controls necessary for playback of recorded images and reading image data from files.

5. I.I. Toolbar (See section 4.19. for details)

This toolbar is use to control operation of image intensifiers.

3.3. Viewing live images

3.3.1. Basic Operation for Live Image Display

The following is how to display live camera images in the view window.

1. Select camera(s) to display live images from (multi-camera operation)

Select camera(s) in the pull down box in the upper part of Camera Control Panel (all the connected cameras are shown in the box)

2. Select LIVE mode

Check to make sure the LIVE mode box has been selected.

3. Display live image

Live image from the camera is displayed in the view window.

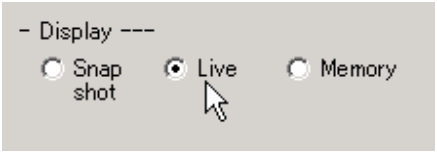
→ If no live image is displayed

Check the following items:

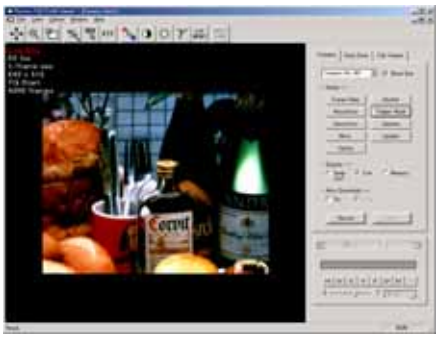
・ If connection between the camera and processor is good.
・ If lens iris is properly open.
・ If shutter speed and framing rate are correctly set.

1. Select camera(s)

2. Select LIVE mode



3. Display live image



3.3.2. Controls for displayed image (how to use toolbar)

The FASTCAM Control Software has control functions of image displayed in the view window such as zooming and contrast adjustment. Each of the controls is operated by clicking icons on the toolbar.

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬

① Pan
After selecting the icon, left-drag the view window to scroll the image up or down, left or right.

② Zoom
Select the icon, left-drag the view window up or down to change the magnification of the displayed image.

③ Window zoom
Select the icon. Pick an area of interest by clicking two diagonal points. Then zoom up the selected area.

④Magnification selection
Click the icon to pull down the menu of predetermined magnifications to choose from.

⑤ Pixel resolution
Displays the image with the same resolution as the view window resolution.

⑥ FIT
Automatically readjusts the magnification so that the image fits the present size of the view window.

⑦ Cross cursor
Select the icon to have the cross cursor displayed on the screen. The cursor can be fixed to any position within the screen by a left click of the mouse.

⑧ RGB plane selection
You can choose an RGB plane on which settings of contrast/gamma/brightness should be reflected. Every time you click on the icon, the selected plane changes from R to G to B to RGB and repeats in this order. This function is not available with monochrome cameras.

⑨ Contrast
Provides contrast readjustment to the image displayed in the view window. The readjustment is effective on the displayed image only: the image data to be recorded remains intact.

⑩ Brightness
Provides brightness control to the image displayed in the view window. The change is effective on the displayed image only: the image data to be recorded remains intact.

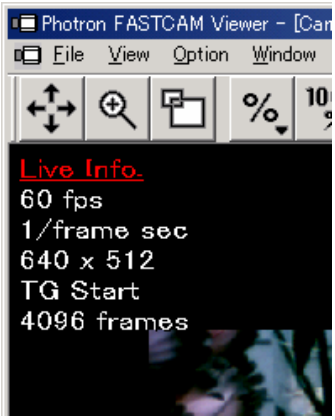
⑪ Gamma
Provides gamma readjustment to the image displayed in the view window. The adjustment is effective on the displayed image only: the image data to be recorded remains intact.

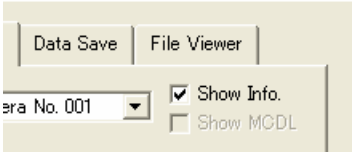
⑫ LUT reset
Resets to default status all the settings of contrast, brightness and gamma.

⑬ MULTILOCK
In multiple camera operation, this icon makes control from the toolbar commonly effective to all the view windows.

3.3.3. Display of View Window Information

In the upper left corner of the PFV view window, information of settings of the active camera, whose output image is being displayed, is overlaid. This information display can be switched Show/Hide by checking the Show Info checkbox on the Camera tab.
This displayed information is not recorded on the image data.

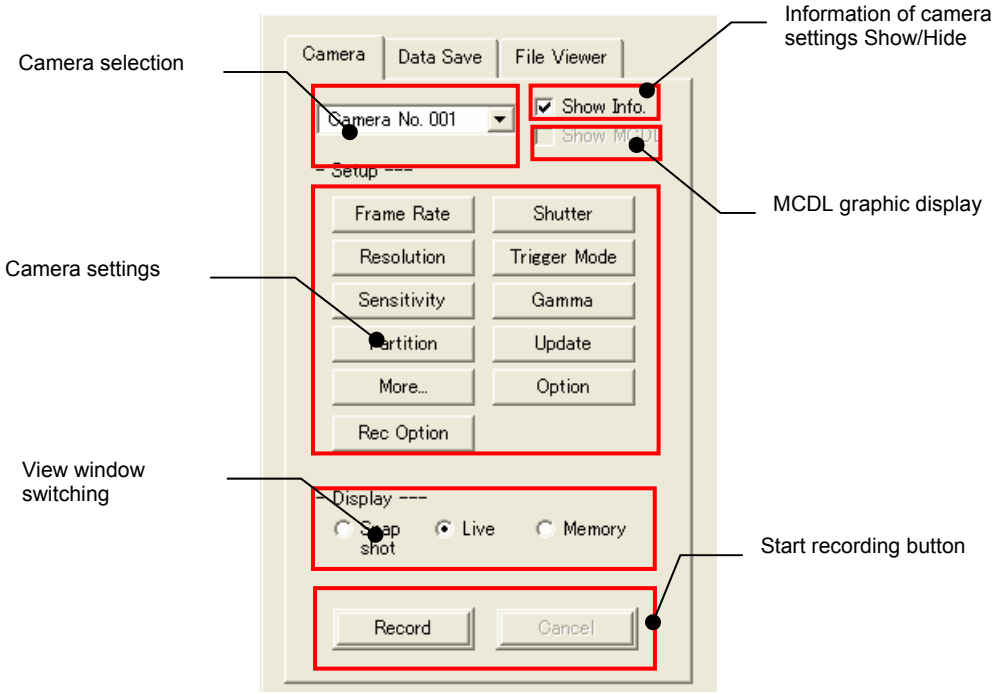




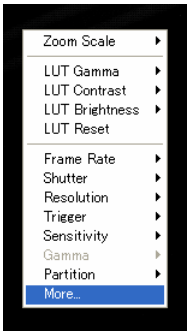
3.4. Setting up camera parameters

In high-speed video recording, you need to set up the framing rate, shutter speed and resolution in accordance with the movement of the target subject before starting to record. With this software, all the setting of camera parameters can be done from the menu on the control panel (Camera tab).

3.4.1. Camera Panel Operation

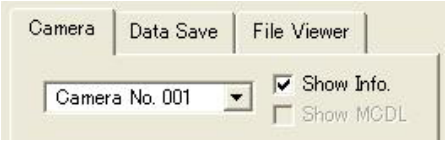


Some of the frequently used items, such as camera settings, can also be selected by the menu that is displayed by a right click on the view window.



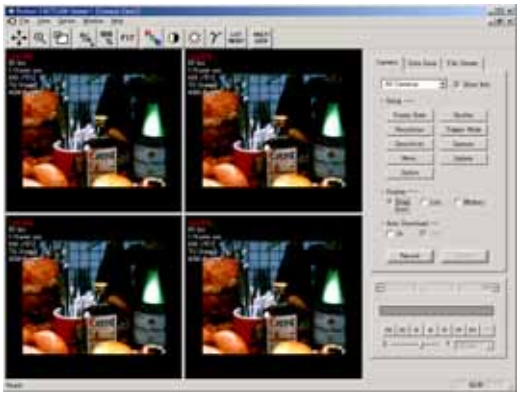
3.4.2. Selection of Camera

Select cameras in the following manner:



When multiple cameras are connected to the system, all settings that are made from the camera panel are also effective to the cameras being selected by this pull-down box.

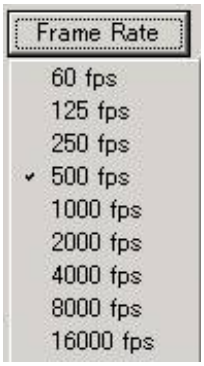
Simultaneous setting and synchronized recording on multiple cameras
When multiple cameras are connected and the view window is divided, settings made from the camera panel, with “All Camera” selected, are applied to all of the selected cameras.
Also, when “All Cameras” is selected and divided view windows are displayed, a synchronized recording takes place at a press on the “Start” button.



Note: To make an accurately-synchronized recording, all the camera hardware involved must be set up in a synchronized status with vertical sync signal supplied from a master sync signal source and slave camera assignment prior to recording. For detail of settings for multi-camera operation, see the operation manual of each of the cameras.

3.4.3. Selection of Frame Rate (Frame Rate)

The Frame Rate menu displays the frame rates that can be set on the connected cameras.

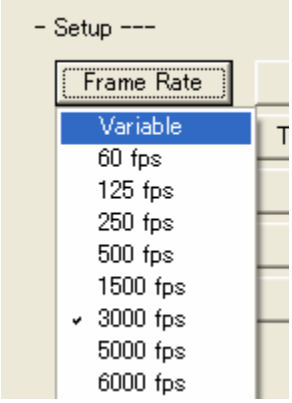


When the frame rate is changed, the shutter speed and resolution are automatically set to the default value for the newly-set frame rate.

VARIABLE Frame Rate Feature

Photron cameras with the VARIABLE Frame Rate feature allow for operation with a parameter setup (frame rate and resolution) selected from many patterns prepared in addition to those preset as default settings.

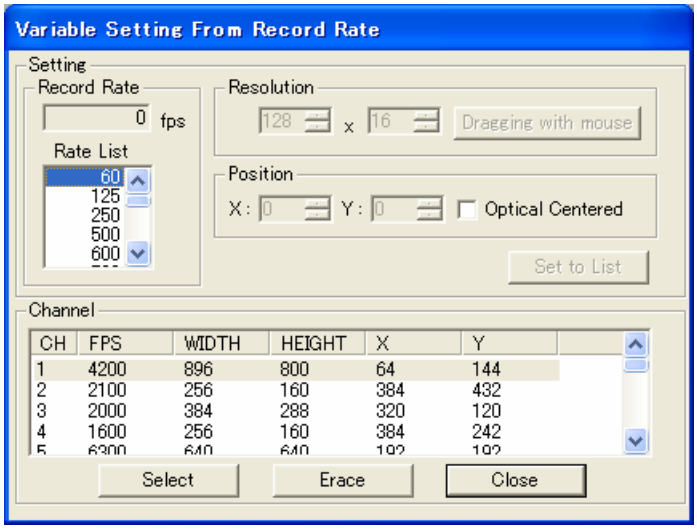
With a camera with VARIABLE frame rate feature, the [Frame Rate] button of the PFV software is displayed as shown below and is used to select a setup prepared for the VARIABLE frame rate mode.



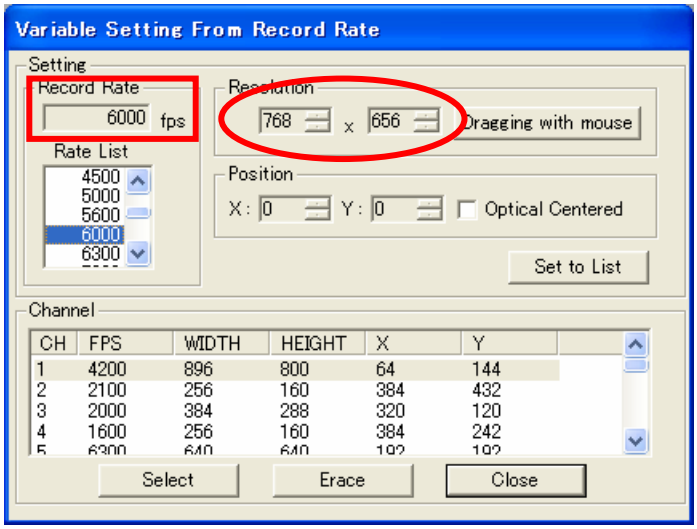
To use the VARIABLE frame rate feature, click the [Variable] item in the pull-down menu.

1) Selection of Frame Rate/Resolution Combination Patterns

When you select the [Variable] item, the following dialog box appears for setting up. In the following example, your desired frame rate (recording frame speed) is selected being first followed by the resolutions that are available for selection under the selected frame rate, finalizing the selection of a combined pattern of frame rate and resolution.

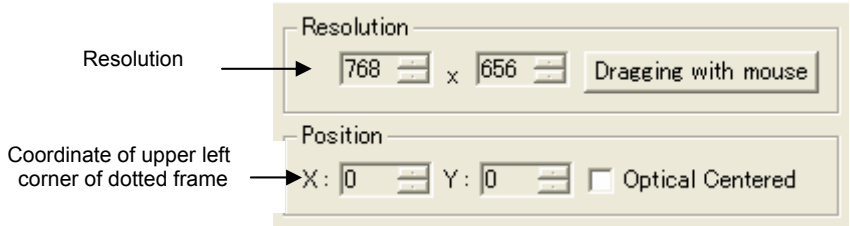


First, select a frame rate from the Rate List using the mouse and double click it to set the selected frame rate to [Record Rate]. Then the maximum image resolution available to that frame rate is set to the [Resolution] field. In the below example, a double-click on [6000 fps] in Rate List displays 6000 fps in the Record Rate field and, at the same time, the maximum resolution of 768 x 656 is set in the Resolution field.



At this time, the resolution and the position of image is shown with a dotted frame in the live picture on the PFV screen.

You can change the numbers for resolution and position by the spin buttons (Up - Down buttons) of each edit box to set them to your desired numbers. At this time, the dotted line frame on the screen changes its shape and position according to the settings being made.



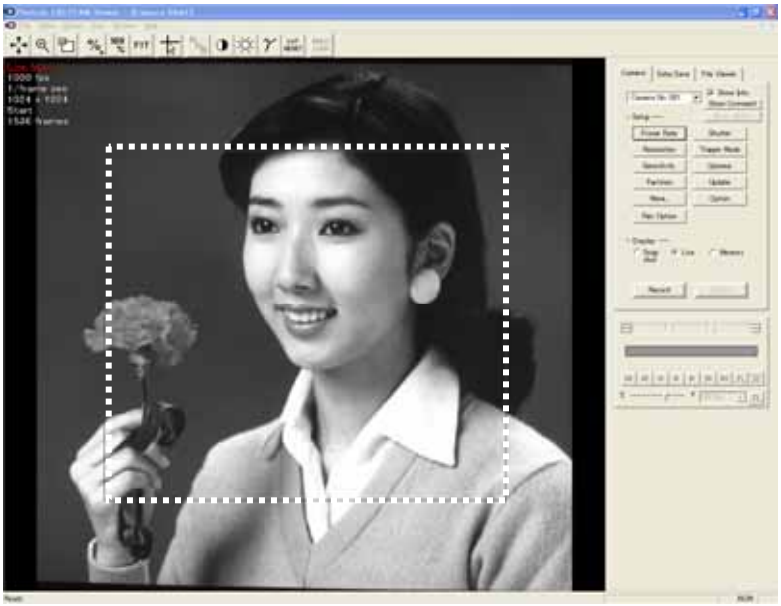
By checking the [Optical Centered] checkbox, the center of the frame being selected is fixed to the center of the live image frame (optical center).

Resolution and position of an image frame can be set up by dragging a rectangle on the live image with your mouse.

The [Dragging with mouse] button, when it is pressed, makes the dialog disappear. On the live image, draw a rectangle representing an area of your desired frame resolution with the mouse (on the live image, press the left mouse button at a point that you wish to make the upper left corner and drag to a point that you wish to make the lower right corner of an image resolution area). Note that you cannot set an image resolution area that exceeds the maximum allowable resolution set by the frame rate that has been set in Record Rate.

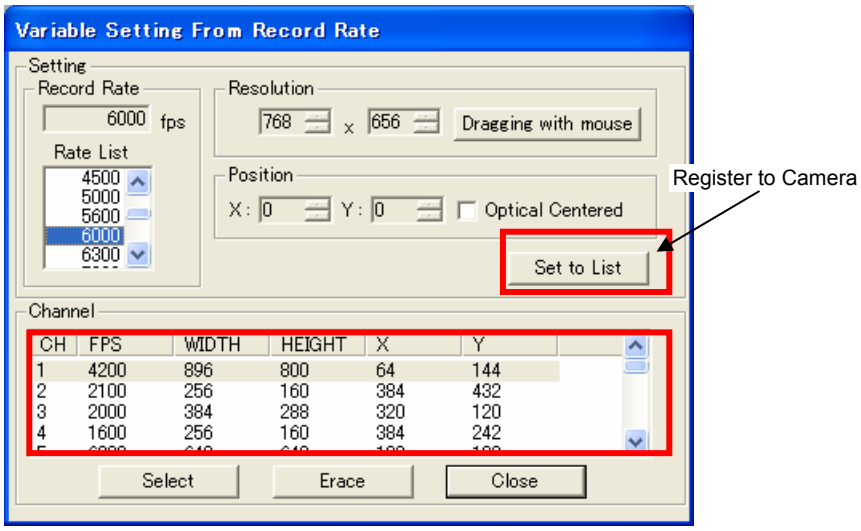
Increment of resolution is made at the minimum area of 128 x 16 pixels. Position is changed by the minimum distance of 64 pixels horizontally and 8 pixels vertically.

When you set the image resolution with the [Optical Centered] checkbox checked, the center of image resolution area being set stays in the center of the live image (optical center) and only the size of the area changes as you drag the mouse.



2) Registering Selected Frame Rate/Resolution in Camera

When you have decided on a frame rate and resolution, you must register the combination pattern in the camera memory.



There are twenty (20) channels where you can register combination patterns of frame rate and resolution. All twenty registered patterns are displayed in the list in the lower part of the dialog. The list shows the following parameters:

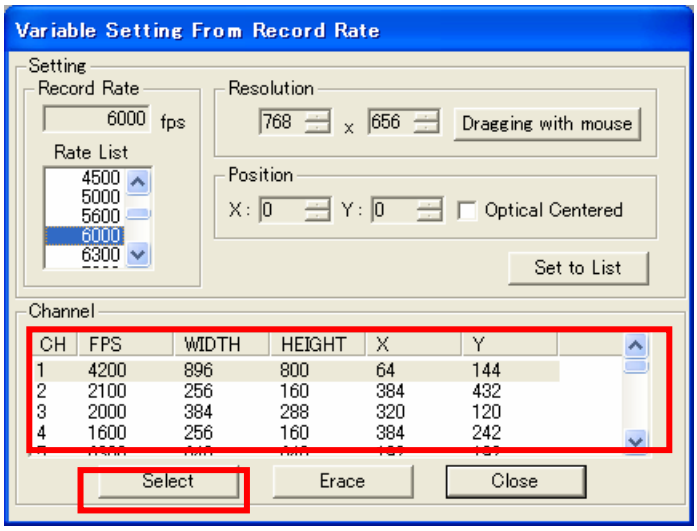
CH	Channels available for user registration. Numbered from 1 to 20.
FPS	Frame rate (frames per second) that is currently set.
WIDTH	Number of pixels in the horizontal (X) direction that is currently set.
HEIGHT	Number of pixels in the vertical (Y) direction that is currently set.
X	Shows the x-value of the upper left coordinate of a selected rectangle with the upper left corner of the full-resolution rectangle as the coordinate origin (x=0, y=0).
Y	Shows the y-value of the upper left coordinate of a selected rectangle with the upper left corner of the full-resolution rectangle as the coordinate origin (x=0, y=0).

Register a decided combination pattern in the following manner:

1. Click the number of a channel where you wish to register the pattern.
2. Press the [Set to List] button with the mouse and the combined pattern of frame rate, resolution and frame position is registered in the channel.
3. If you wish to erase any of registered patterns, select the number of a channel you wish to erase and press the [Erase] button.

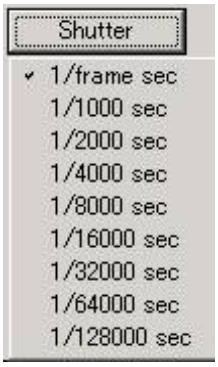
3) Using Registered Frame Rate/Resolution Pattern

You can select any of the patterns registered in the camera memory from the Channel List by clicking the number of channel whose registered patter you wish to use and press the [Select] button. The selected frame rate, resolution and position are now set up in the camera and are used for recording.



3.4.4. Selection of Shutter Speed (Shutter)

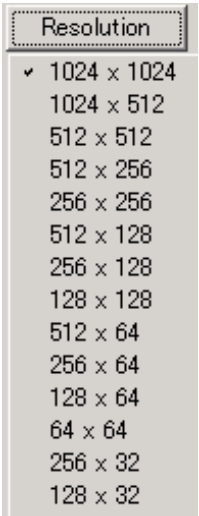
The Shutter Speed menu displays the shutter speeds that can be set on the connected cameras.



Note: When the frame rate is changed, the shutter speed is automatically set to the default value (1/frame rate sec.) for the newly-set frame rate.

3.4.5. Selection of Framing Resolution (Resolution)

The Resolution menu displays resolution that can be set on the connected cameras.

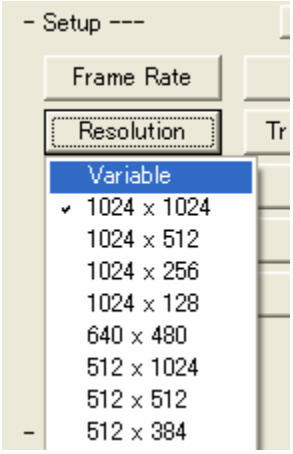


Note: When the frame rate is changed, the resolution is automatically set to the default value (maximum resolution) for the newly-set frame rate.

VARIABLE Resolution Feature

Photron cameras with the VARIABLE Resolution feature allow for operation with a resolution setup selected from many resolution patterns with different position and frame rate prepared in addition to those preset as default settings.

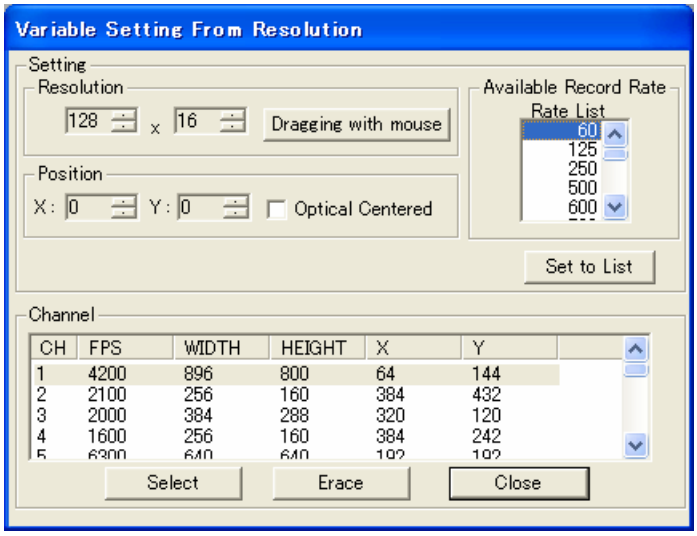
With a camera with VARIABLE resolution feature, the [Resolution] button of the PFV software is displayed as shown below and is used to select a setup prepared for the VARIABLE resolution mode.



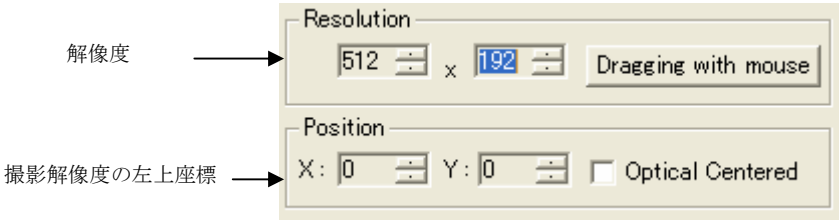
To use the VARIABLE resolution feature, click the [Variable] item in the pull-down menu

1) Selection of Frame Rate/Resolution Combination Patterns

When you select the [Variable] item, the following dialog box appears for setting up. In the following example, your desired resolution is selected, followed by the frame rates that are available for selection under the selected resolution, finalizing the selection of a combined pattern of resolution and frame rate.



You can change the numbers for resolution and position by the spin buttons (Up - Down buttons) of each edit box to set them to your desired numbers. At this time, the dotted line frame on the screen changes its shape and position according to the settings being made.



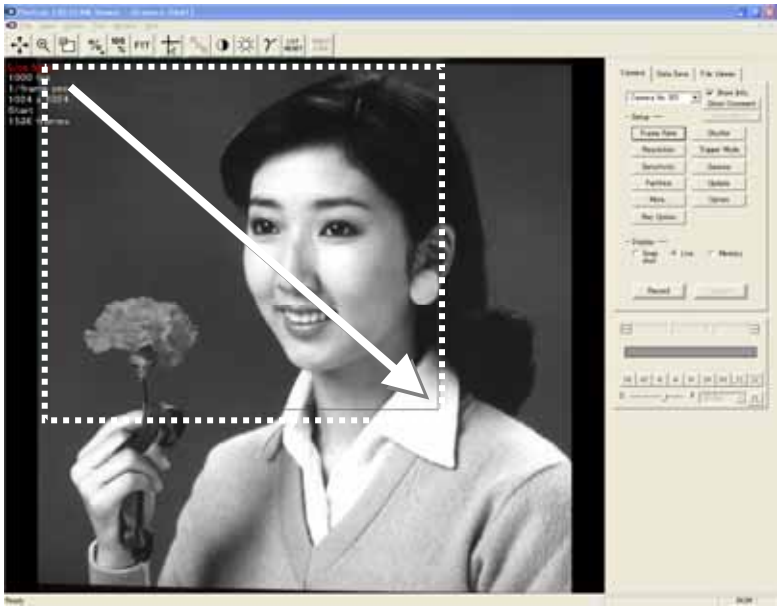
By checking the [Optical Centered] checkbox, the center of the frame being selected is fixed to the center of the live image frame (optical center).

Resolution and position of an image frame can be set up by dragging a rectangle on the live image with your mouse.

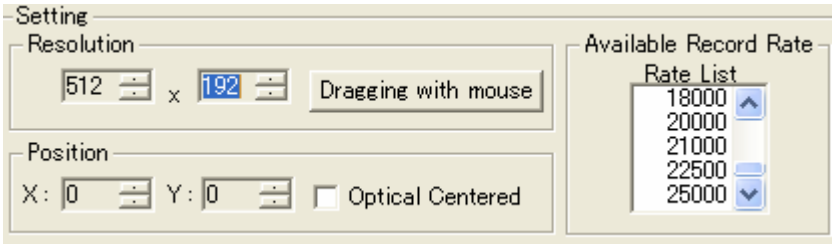
The [Dragging with mouse] button, when it is pressed, makes the dialog disappear. On the live image, draw a rectangle representing an area of your desired frame resolution with the mouse (on the live image, press the left mouse button at a point that you wish to make the upper left corner and drag to a point that you wish to make the lower right corner of an image resolution area and release the mouse button).

Increment of resolution is made at the minimum area of 128 x 16 pixels. Position is changed by the minimum distance of 64 pixels horizontally and 8 pixels vertically.

When you set the image resolution with the [Optical Centered] checkbox checked, the center of image resolution area being set stays in the center of the live image (optical center) and only the size of the area changes as you drag the mouse.

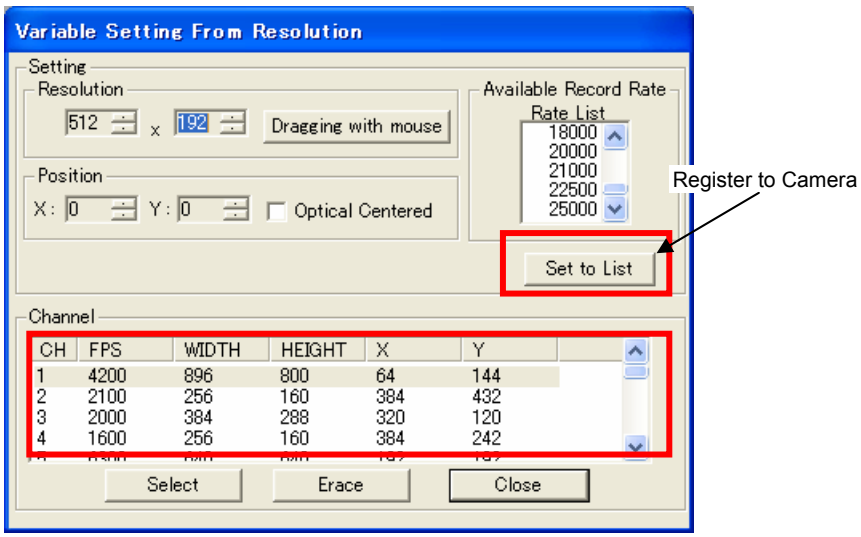


When setting of resolution is done, frame rates that are available under the set resolution are shown in the [Available Record Rate] list to the right of the dialog box.



2) Registering Selected Frame Rate/Resolution in Camera

When you have decided on a frame rate and resolution, you must register the combination pattern in the camera memory.



There are twenty (20) channels where you can register combination patterns of frame rate and resolution. All twenty registered patterns are displayed in the list in the lower part of the dialog. The list shows the following parameters:

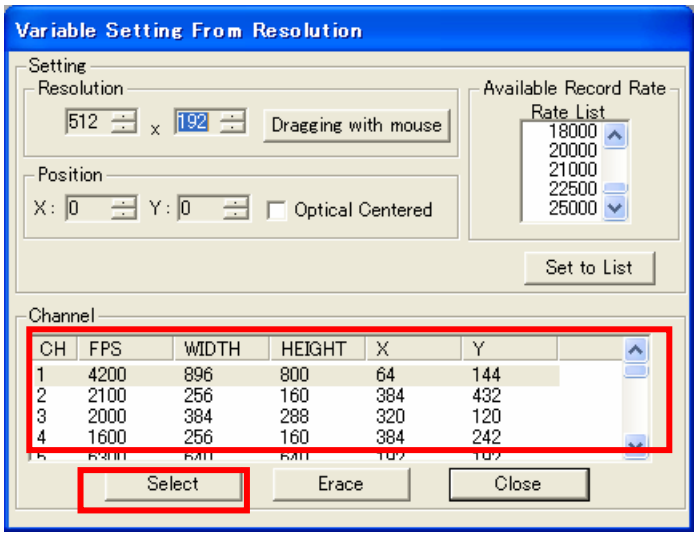
CH	Channels available for user registration. Numbered from 1 to 20.
FPS	Frame rate (frames per second) that is currently set.
WIDTH	Number of pixels in the horizontal (X) direction that is currently set.
HEIGHT	Number of pixels in the vertical (Y) direction that is currently set.
X	Shows the x-value of the upper left coordinate of a selected rectangle with the upper left corner of the full-resolution rectangle as the coordinate origin (x=0, y=0).
Y	Shows the y-value of the upper left coordinate of a selected rectangle with the upper left corner of the full-resolution rectangle as the coordinate origin (x=0, y=0).

Register a decided combination pattern in the following manner:

1. Click the number of a channel where you wish to register the pattern.
2. Press the [Set to List] button with the mouse and the combined pattern of frame rate, resolution and frame position is registered in the channel.
3. If you wish to erase any of registered patterns, select the number of a channel you wish to erase and press the [Erase] button.

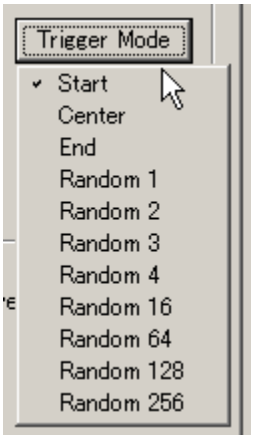
3) Using Registered Frame Rate/Resolution Pattern

You can select any of the patterns registered in the camera memory from the Channel List by clicking the number of channel whose registered patter you wish to use and press the [Select] button. The selected frame rate, resolution and position are now set up in the camera and are used for recording.



3.4.6. Selection of Trigger Mode (Trigger Mode)

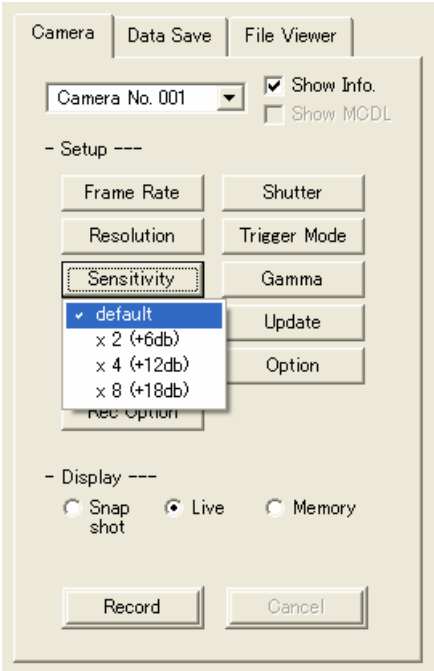
The Trigger Mode menu displays trigger modes that can be set on the connected cameras.



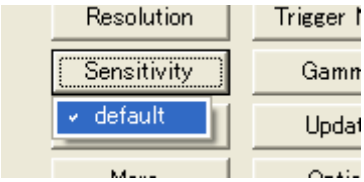
For the detail of trigger modes, see relevant sections in user's manual of the cameras.

3.4.7. Selection of Camera Sensitivity (Sensitivity)

The Sensitivity menu selects the gain level on camera(s). A higher sensitivity (gain) setting generally makes it possible to record low light level objects, but it also increases the noise level.

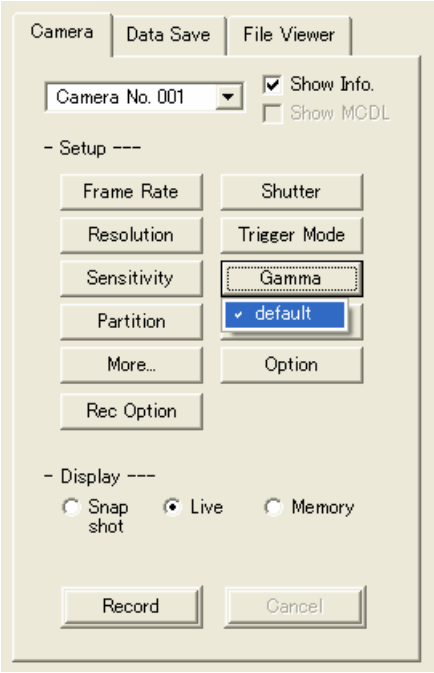


With camera models that do not have gain level adjustment feature, the menu shows “default” only



3.4.8. Selection of Gamma Correction Level (Gamma)

The Gamma menu sets the gamma correction level on cameras.
Note: The default value is always selected on cameras, which have a LUT adjustment function, by their own preset window.

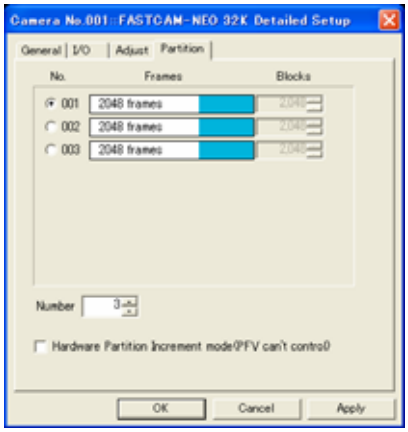


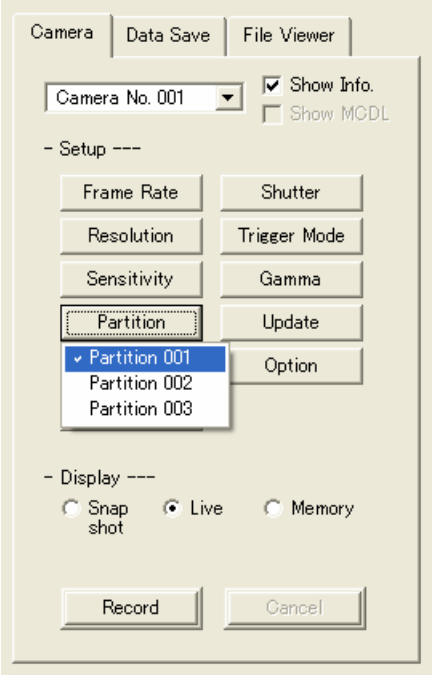
For detail of gamma level setting, see the user's manual of camera models that have a LUT adjustment feature.

3.4.9. Selection of Partition (Partition)

A partition is selected for use out of those within the memory divided by the partitioning function of the camera.
Note: This function is not available with a camera that has no partitioning feature.

The below figure shows an example of a 3-division partitioning (the figure shown in the FASTCAM-Ultima 512 user's manual).





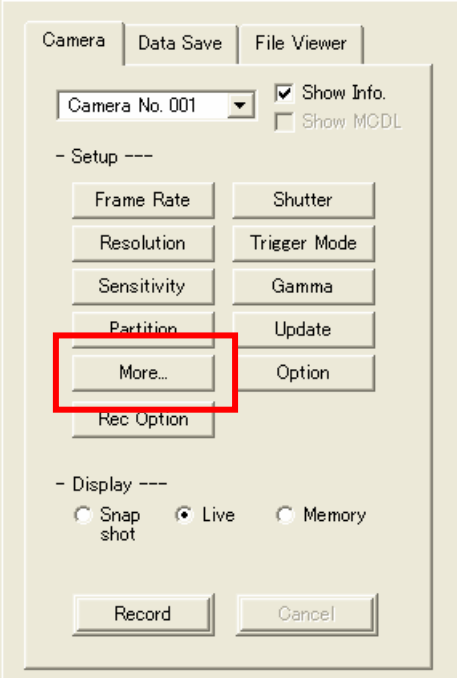
Partitioning is set from the Partition tab in the "More" menu for detailed camera setting of each camera.

For detail of the portioning feature, see section 3.4.10. of this manual.

Note: This function is not available with cameras without partitioning feature.

3.4.10. Model-by-Model Camera Parameter Setting

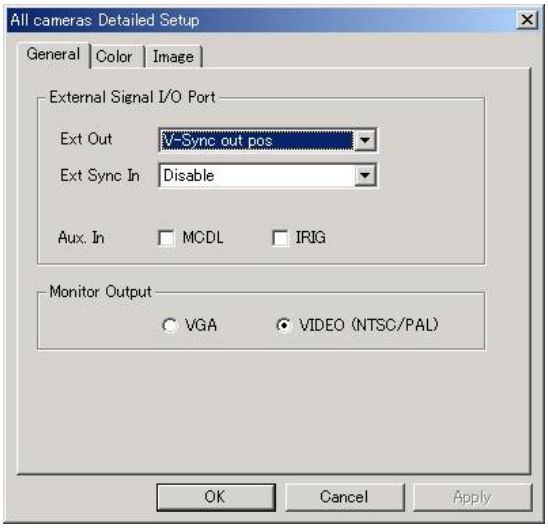
Each of the PHOTRON high-speed video cameras has its own parameters to be set for operation. This software calls up those parameters by the “More…” button to make detailed setup of them. Please note the screen window varies by the model.



FASTCAM-ultima1024 R2

Detailed settings for the FASTCAM-ultima 1024 R2 are shown in three sections – General, Color and Image tabs.

FASTCAM-ultima1024 R2 > General Tab



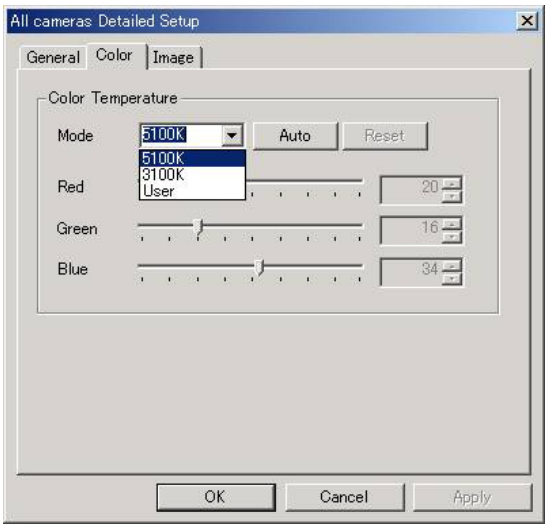
EXT OUT
Sets the type and polarity of the signal output from EXT OUT on the processor.

EXT Sync In
Sets the EXT Sync In terminal on the processor to any of Disable/Positive/Negative.

Aux. IN
Switches ON/OFF the input signal (MCDL/IRIG) input on AUX IN

Monitor Output
Switches video output between VGA and NTSC.

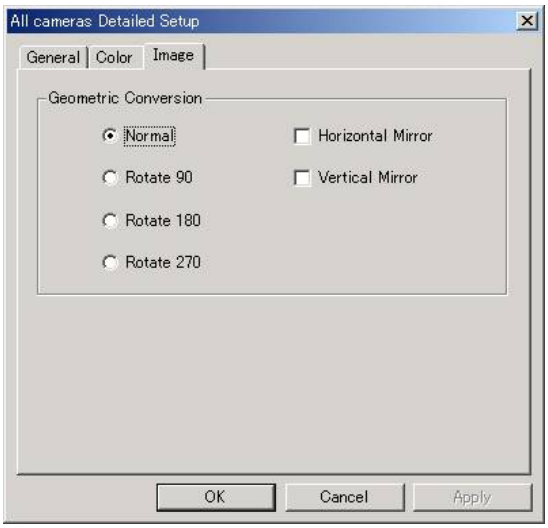
FASTCAM-ultima1024 R2 > Color Tab



Color Temperature (color model)

Sets the color temperature to any of two default and one user-defined settings. You can readjust white balance by the left mouse button with the [AUTO] button depressed.

FASTCAM-ultima1024 R2 > Image Tab



Geometric Conversion

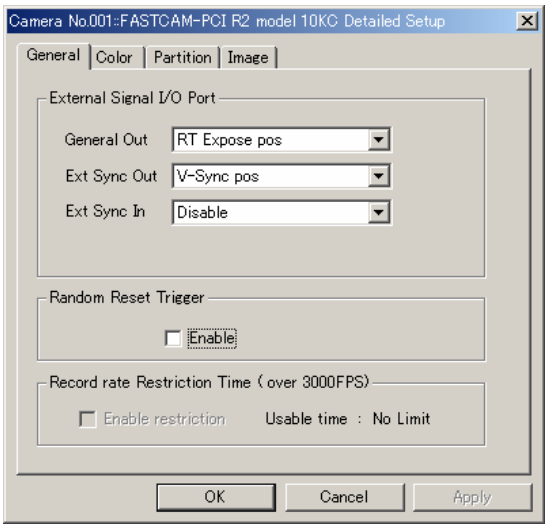
Rotation and mirror inversion of displayed image are set as follows:

■Normal
Displays normal image.
■Rotate 90
Displays image 90-degree rotated clockwise.
■Rotate 180
Displays image 180-degree rotated clockwise.
■Rotate 270
Displays image 270-degree rotated clockwise.
■Horizontal Mirror
Displays horizontally mirrored image.
■Vertical Mirror
Displays vertically mirrored image.

FASTCAM-PCI R2

Detailed settings for the FASTCAM-PCI R2 are shown in four sections – General, Color, Partition and Image tabs.

FASTCAM-PCI R2 > General Tab



External Signal I/O Port

[General Out]
Sets the type and polarity of the signal output from GENERAL OUT on the processor.
[Ext Sync Out]
Sets the type and polarity of the signal output from EXT OUT on the processor.
[EXT Sync In]
Selects Valid/Invalid of EXT Sync In on the processor.

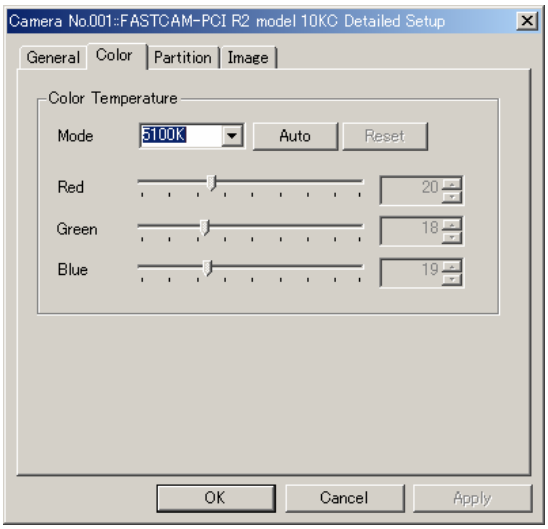
Random Reset Trigger

Enables the RANDOM RESET mode that resets the vertical sync signal to start a recording when a trigger is input.

Record Rate Restriction Time

Sets the timer to protect the imaging sensor from being damaged when the camera runs at a high speed over 3000 fps.

FASTCAM-PCI R2 > Color Tab

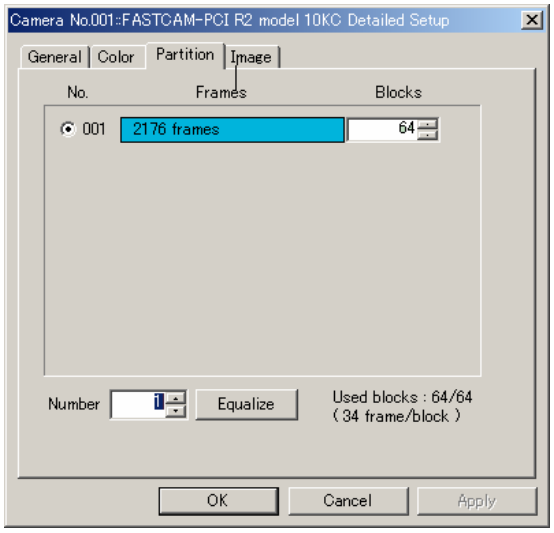


Color Temperature (color model)

Sets the color temperature to any of two default and one user defined settings from the pull-down menu. You can readjust white balance by selecting a rectangle in the white area within screen by the left mouse button with the [AUTO] button depressed.

See also:
Non-synchronized Reset Trigger Mode (page 120)

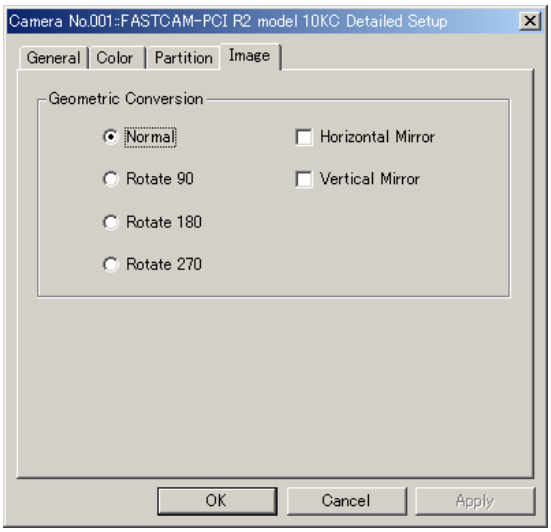
FASTCAM-PCI R2 > Partition Tab



Number

Sets the number of partitions for the memory in the camera to be divided into for a memory partitioning operation. By pressing the [Equalize] button, you can equalize the number of blocks within all partitions.

FASTCAM-PCI R2 > Image Tab



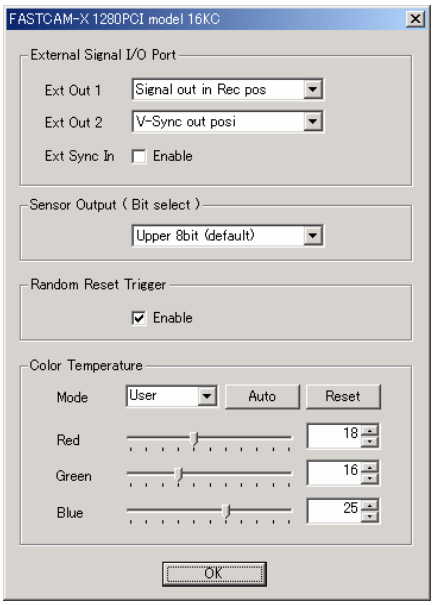
Geometric Conversion

Rotation and mirror inversion of displayed image are set as follows:

■Normal
Displays normal image.
■Rotate 90
Displays image 90-degree rotated clockwise.
■Rotate 180
Displays image 180-degree rotated clockwise.
■Rotate 270
Displays image 270-degree rotated clockwise.
■Horizontal Mirror
Displays horizontally mirrored image.
■Vertical Mirror
Displays vertically mirrored image

FASTCAM-1280PCI

Detailed settings for the FASTCAM-1280PCI are made in the dialog shown below



External Signal I/O Port

[Ext Out 1]
[Ext Out 2]
Sets the type and polarity of the signal output from EXT OUT on the processor.
[EXT Sync In]
Sets the EXT Sync In terminal on the processor to Valid or Invalid.

Sensor Output

You can select upper, middle or lower 8 bits out of the 10-bit sensor output

Random Reset Trigger

Enables the RANDOM RESET mode that resets the vertical sync signal to start a recording when a trigger is input.

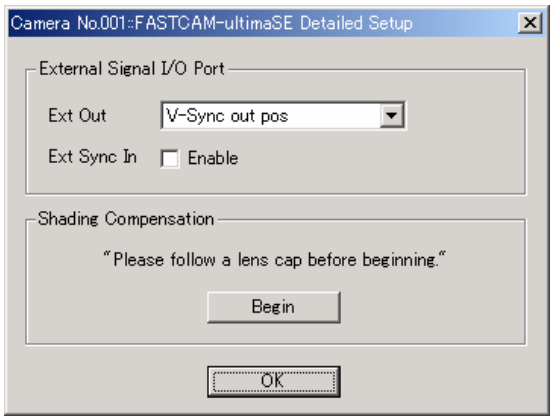
Color Temperature (Color model)

Sets the color temperature to any of two default and one user defined settings from the pull-down menu. You can readjust white balance by selecting a rectangle in the white area within screen by the left mouse button with the [AUTO] button depressed.

See also:
Non-synchronized Reset Trigger Mode (page 120)

FASTCAM-ultimaSE

Detailed settings for the FASTCAM-ultimaSE are made in the dialog shown below.



External Signal I/O Port

[EXT OUT]
Sets the type and polarity of the signal output from General Out on the processor.
[EXT Sync In]
Selects Valid/Invalid of EXT Sync In on the processor.

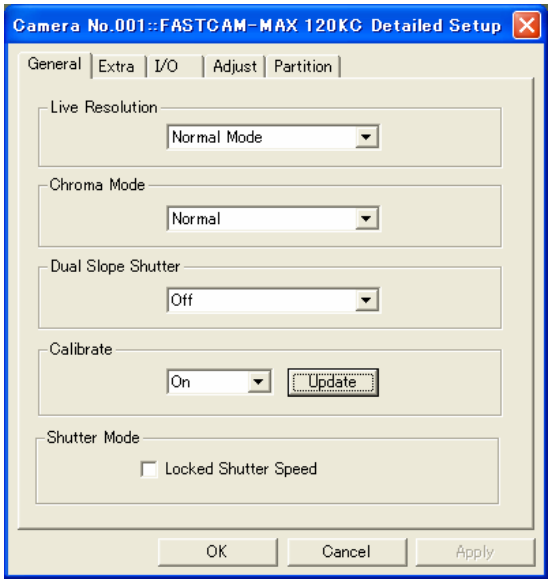
Shading Compensation

A press on the [Begin] button starts an automatic shading correction process.

FASTCAM-APX

Detailed settings for the FASTCAM-APX are shown in five sections – General, Extra, I/O, Adjust and Partition tabs.

FASTCAM-APX > General Tab



Live Resolution
Selects a resolution for live display. If you feel the update speed is too slow, you can speed it up by changing the resolution to a coarser one. For normal use, set it to [Normal Mode].

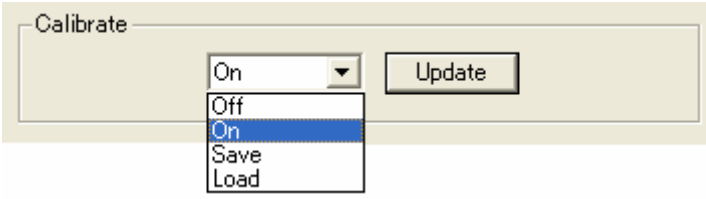
Chroma Mode (Color model)
Selects a mode for the color correction process.

Dual Slope Shutter
Sets the Extended Dynamic Range mode effective.

Calibrate

Performs shading correction (black-level correction) of the image sensor, which offsets and cancels the non-uniformity of black level among imaging pixels.

To shoot a black level image, the image sensor must be totally covered. Place a lens cap on the lens and select [On] in the [Calibrate] window to shoot a black level image. The black level image is stored in the temporary memory in the camera and, at the same time, shading correction is done.

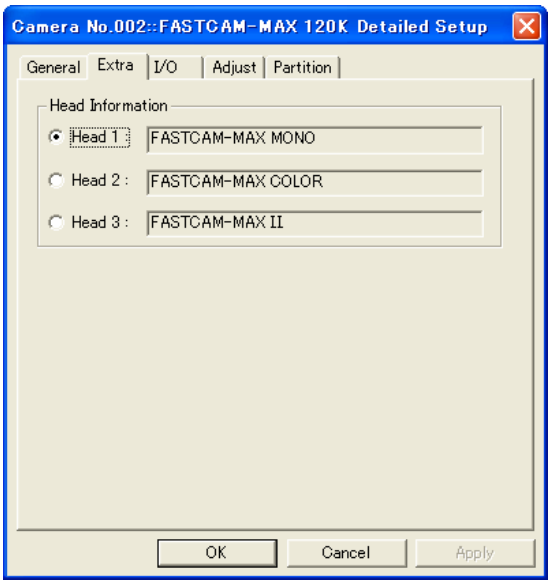


Off	No shading correction is performed.
On	At the moment this is pressed, a black level image is acquired by the camera and shading correction is performed.
Load	When this is pressed, the black level image stored in the camera's involatile memory is loaded and shading correction is performed.
Save	Stores the currently-used black level image in the camera's involatile memory.
Update	Updates the displayed image on the PFV screen.

Shutter Mode

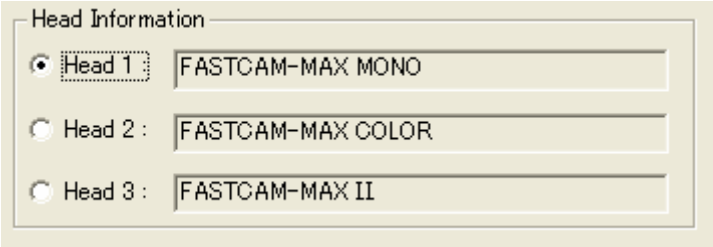
When the frame rate is changed, the shutter speed is automatically set to [1/frame rate] sec. If you check this checkbox, the previous shutter speed is retained as long as it is a valid number. With some of the cameras, depending on their firmware version, this function is not available for use.

FASTCAM-APX > Extra Tab

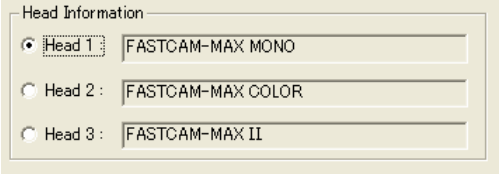


Head Information

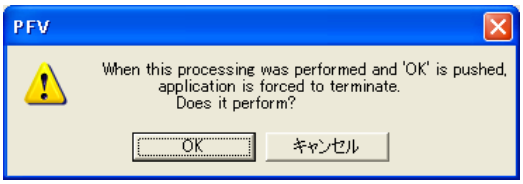
Make selection in this menu to use a camera head switching among those connected to your FASTCAM-APX system.
Up to three different camera heads are connected for selection to a FASTCAM-APX system. The currently registered camera heads are displayed as shown below:



Select a camera head in the following manner:
1. The radio button has been selected for the currently used camera head.

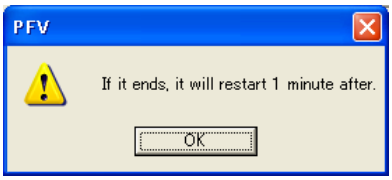


2. Click the radio button for the camera head that you wish to switch to. A dialog box of alert appears.



Once the switching to a new camera head is effected, the PFV automatically shuts down and restarts. Click the OK button to actually execute the switching.

3. When the PFV software restarts, the settings for the processor are reloaded. Reloading takes about one minute. A dialog for confirmation appears. Click the OK button.



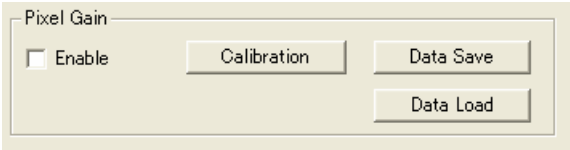
4. Now the “Extra” dialog box appears. Press the OK button and the PFV software automatically shuts down.

5. About one minute later, the PFV software restarts. Settings for the newly selected camera are loaded, which completes the camera head switching procedure.

Pixel Gain

Pixel Gain is a correction function to readjust the gain of each pixel of the image sensor independently By using this Pixel Gain function, in conjunction with the normal shading correction feature, the overall non-uniformity arising from the lighting condition and specific characteristics of the optical system and image sensor is reset to zero.

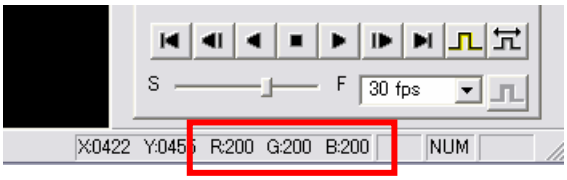
The following shows how to perform pixel gain correction by the Pixel Gain feature:



1. Performing shading correction
Before using the Pixel Gain function, normal shading correction must be performed. Using the Calibrate feature in the General tab, perform shading correction. At this time, the image resolution must be set to the maximum number available and the image sensor must be completely covered with a lens cap placed on the lens (see Calibrate in page 88).

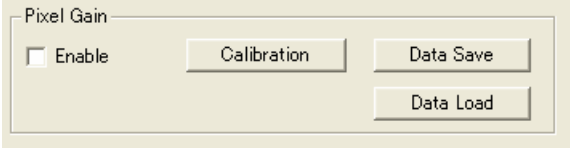
2. Performing Pixel Gain
Remove the lens cap and make sure the camera is set to the maximum resolution after the shading correction procedure in the above. Acquire a white level image by shooting a target with uniform illumination such as a back-lit surface light source or uniformly illuminated white wall.

3. Readjustment of Brightness Level
Select the crosshair cursor from the PFV toolbar and set the cursor somewhere within the live image displayed on the screen. With this done, the RGB luminance values of the point where the cursor is standing are shown in the status bar in the bottom of the PFV screen. By using the lens iris, set these values somewhere in the range of 150 to 200 (but never to a white saturated level).

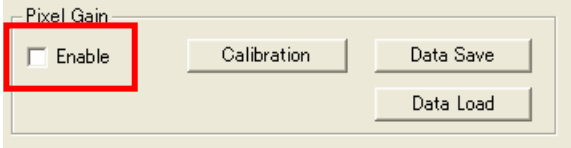


With this setting, click the [Calibration] button. A confirmation dialog box opens. Click the [OK] button in it to acquire a reference image for correction. In about ten seconds, acquisition of a reference image and necessary calculations are done.
The calculated setting is automatically stored as the setup information, together with the camera head ID information, in the folder where the PFV is installed.

Note: When you changed camera heads, you must perform shading correction on the new camera to store setup information for it. The setup information for the previous camera is retained in the PC and is automatically loaded when the previous camera is connected to the current system again.



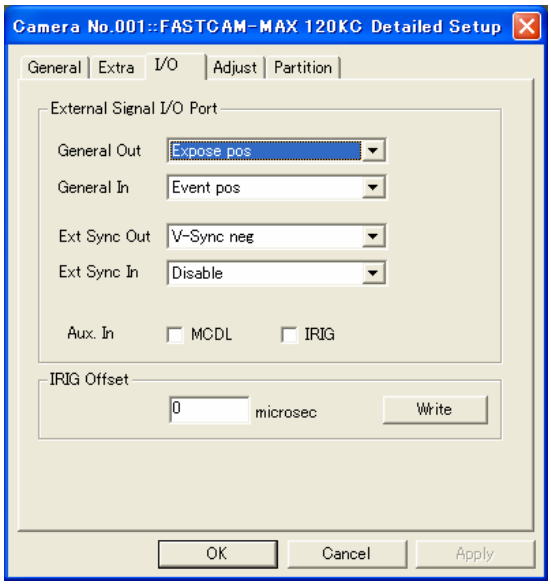
4. Now, enable the Pixel Gain function by checking the Enable checkbox.



Note: The result of this correction is not reflected in the output to the NTSC/PAL video monitor.

Note on Data Save/Data Load features:
When you wish to generate a set of correction data every time you change lighting conditions and optical setups, you can save the white level image data acquired by the Pixel Gain function as a setup file (extension “.gdf”) by pressing the Data Save button and use the stored data by the Data Load button.

FASTCAM-APX > I/O Tab



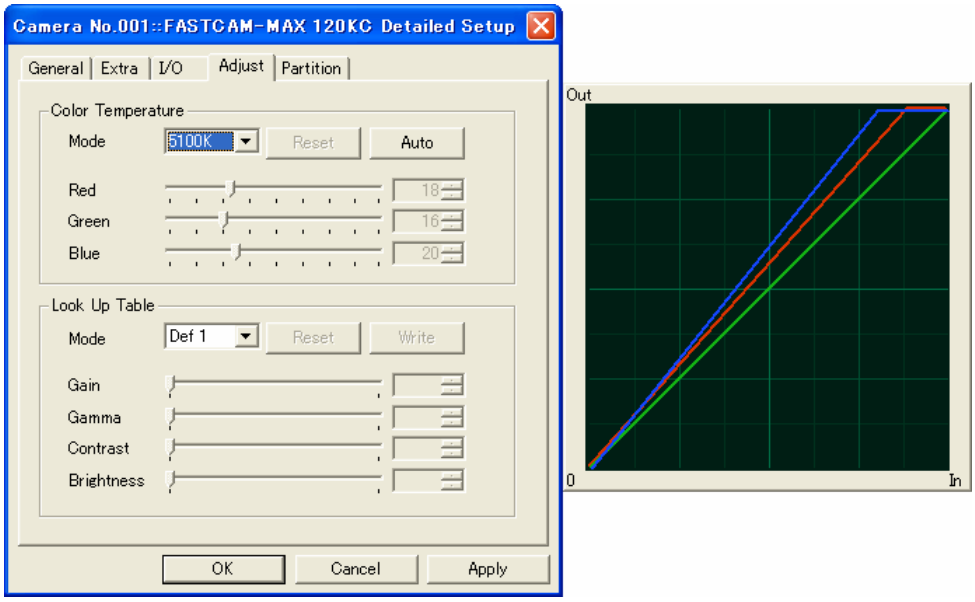
External Signal I/O Port

[General Out]
Sets the type and polarity of the signal output from GENERAL OUT on the processor. However, this is not valid with some of cameras depending on their firmware version number.
[General In]
Selects Valid/Invalid of GENERAL IN on the processor.
[Ext Sync Out]
Sets the type and polarity of the signal output from EXT OUT on the processor.

IRIG Offset

Sets the offset value of the IRIG signal from zero to up to 999999 micro sec at the increment of microsecond. With some of cameras, depending on their firmware version, this feature is not available for use.

FASTCAM-APX >Adjust Tab



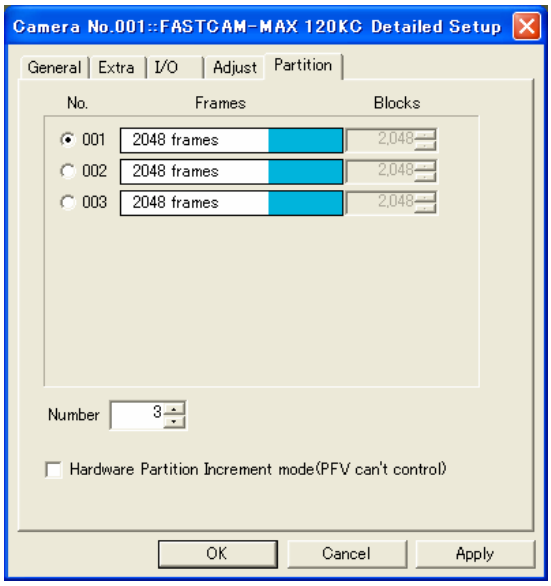
Color Temperature (color model)

Sets the color temperature to any of two default and one user defined settings from the pull-down menu. You can readjust white balance by selecting a rectangle in the white area within screen by the left mouse button with the [AUTO] button depressed.

Look Up Table

Holds LUT predetermined settings of four default and one user-defined values to choose from. You can set Gain, Gamma, Contrast or Brightness monitoring the graph displayed in the window to the right of the Tab.

FASTCAM-APX >Partition Tab



Number

Sets the number of partitions for the memory in the camera to be divided into for a memory partitioning operation.

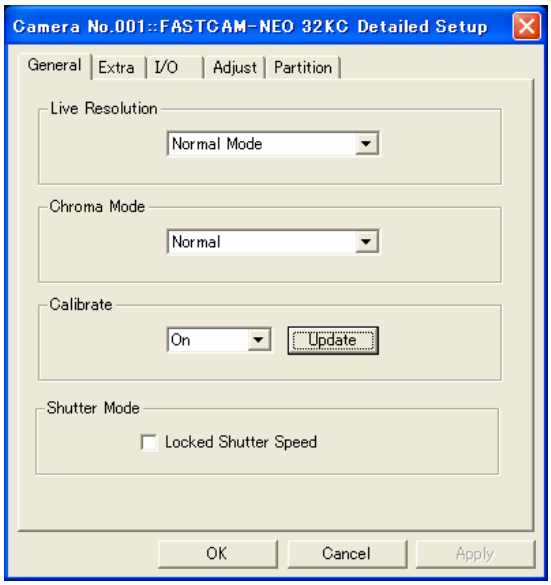
Hardware Partition Increment mode

Check the checkbox, and you will automatically go to the next partition after a recording is done. Note this function is performed in the camera and cannot be controlled from the PFV.

FASTCAM-ultima512

Detailed settings for the FASTCAM-ultima512 are shown in five sections – General, Extra, I/O, Adjust and Partition tabs.

FASTCAM-ultima512 >General Tab



Live Resolution
Selects a resolution for live display. If you feel the update speed is too slow, you can speed it up by changing the resolution to a coarser one. For normal use, set it to [Normal Mode].

Chroma Mode (color model)
Selects a mode for color correction.

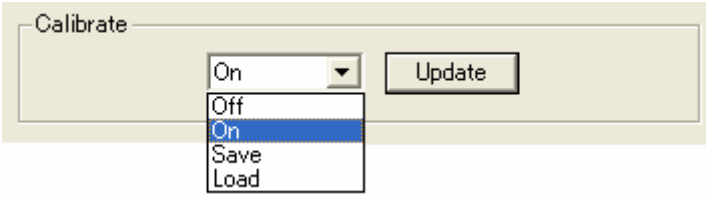
Calibrate
Executes settings for calibration. Select [On] in the Comp box to start a calibration process. The commands that are displayed are in the same arrangement as that for the camera menu

Shutter Mode
When the frame rate is changed, the shutter speed is automatically set to [1/ (frame rate)] sec. If you check this checkbox, the previous shutter speed is retained as long as it is a valid number. With some of the cameras, depending on their firmware version, this function is not available for use.

Calibrate

Performs shading correction (black-level correction) of the image sensor, which offsets and cancels the non-uniformity of black level among imaging pixels.

To shoot a black level image, the image sensor must be totally covered. Place a lens cap on the lens and select [On] in the [Calibrate] window to shoot a black level image. The black level image is stored in the temporary memory in the camera and, at the same time, shading correction is done.

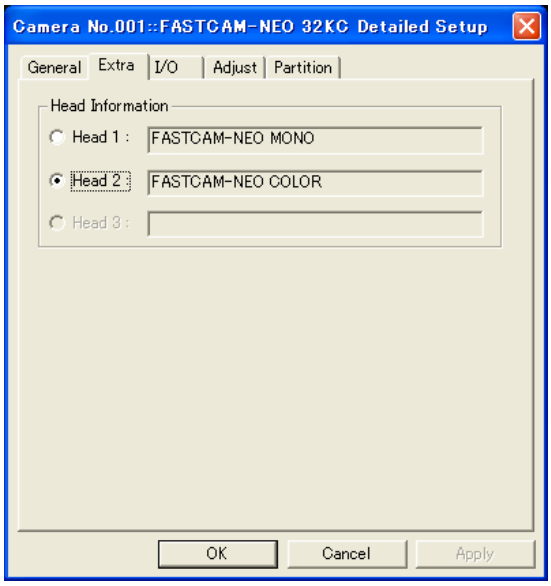


Off	No shading correction is performed.
On	At the moment this is pressed, a black level image is acquired by the camera and shading correction is performed.
Load	When this is pressed, the black level image stored in the camera's involatile memory is loaded and shading correction is performed.
Save	Stores the currently-used black level image in the camera's involatile memory.
Update	Updates the displayed image on the PFV screen.

Shutter Mode

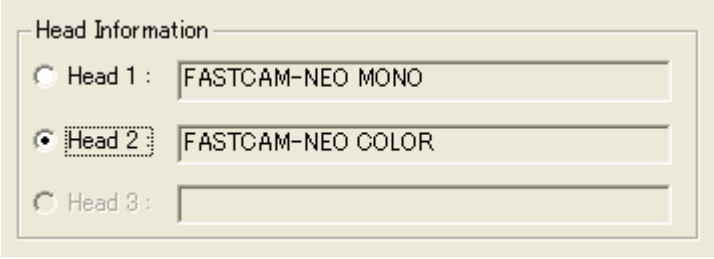
When the frame rate is changed, the shutter speed is automatically set to [1/frame rate] sec. If you check this checkbox, the previous shutter speed is retained as long as it is a valid number. With some of the cameras, depending on their firmware version, this function is not available for use.

FASTCAM-ultima512 >Extra Tab

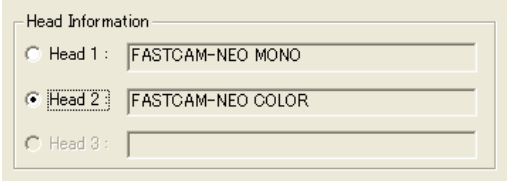


Head Information

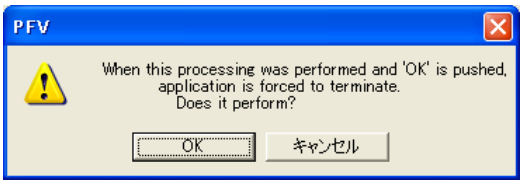
Make selection in this menu to use a camera head switching among those connected to your FASTCAM-ultima512 system.
Up to three different camera heads are connected for selection to a FASTCAM-ultima512 system. The currently registered camera heads are displayed as shown below:



Select a camera head in the following manner:
1. The radio button has been selected for the currently used camera head.

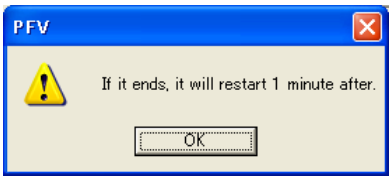


2. Click the radio button for the camera head that you wish to switch to. A dialog box of alert appears.



Once the switching to a new camera head is effected, the PFV automatically shuts down and restarts. Click the OK button to actually execute the switching.

3. When the PFV software restarts, the settings for the processor are reloaded. Reloading takes about one minute. A dialog for confirmation appears. Click the OK button.



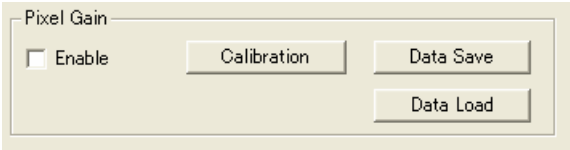
4. Now the “Extra” dialog box reappears. Press the OK button and the PFV software automatically shuts down.

5. In about a minute, the PFV software restarts. Settings for the newly selected camera are loaded, which completes the camera head switching procedure.

Pixel Gain

Pixel Gain is a correction function to readjust the gain of each pixel of the image sensor independently By using this Pixel Gain function, in conjunction with the normal shading correction feature, the overall non-uniformity arising from the lighting condition and specific characteristics of the optical system and image sensor is reset to zero.

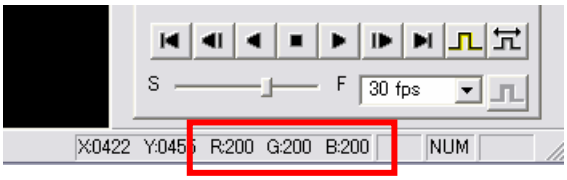
The following shows how to perform pixel gain correction by the Pixel Gain feature:



1. Performing shading correction
Before using the Pixel Gain function, normal shading correction must be performed. Using the Calibrate feature in the General tab, perform shading correction. At this time, the image resolution must be set to the maximum number available and the image sensor must be completely covered with a lens cap placed on the lens (see Calibrate in page 88).

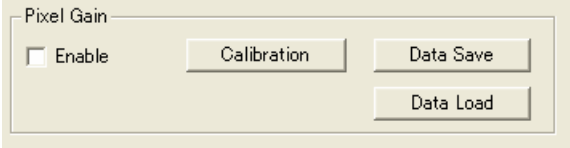
2. Performing Pixel Gain
Remove the lens cap and make sure the camera is set to the maximum resolution after the shading correction procedure in the above. Acquire a white level image by shooting a target with uniform illumination such as a back-lit surface light source or uniformly illuminated white wall.

3. Readjustment of Brightness Level
Select the crosshair cursor from the PFV toolbar and set the cursor somewhere within the live image displayed on the screen. With this done, the RGB luminance values of the point where the cursor is standing are shown in the status bar in the bottom of the PFV screen. By using the lens iris, set these values somewhere in the range of 150 to 200 (but never to a white saturated level).

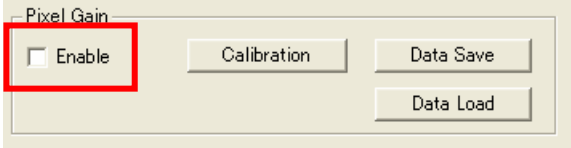


With this setting, click the [Calibration] button. A confirmation dialog box opens. Click the [OK] button in it to acquire a reference image for correction. In about ten seconds, acquisition of a reference image and necessary calculations are done.
The calculated setting is automatically stored as the setup information, together with the camera head ID information, in the folder where the PFV is installed.

Note: When you changed camera heads, you must perform shading correction on the new camera to store setup information for it. The setup information for the previous camera is retained in the PC and is automatically loaded when the previous camera is connected to the current system again.



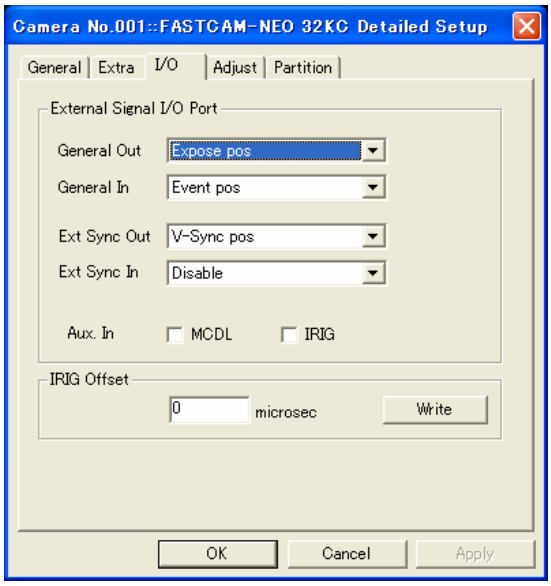
4. Now, enable the Pixel Gain function by checking the Enable checkbox.



Note: The result of this correction is not reflected in the output to the NTSC/PAL video monitor.

Note on Data Save/Data Load features:
When you wish to generate a set of correction data every time you change lighting conditions and optical setups, you can save the white level image data acquired by the Pixel Gain function as a setup file (extension “.gdf”) by pressing the Data Save button and use the stored data by the Data Load button.

FASTCAM-ultima512 > I/O Tab



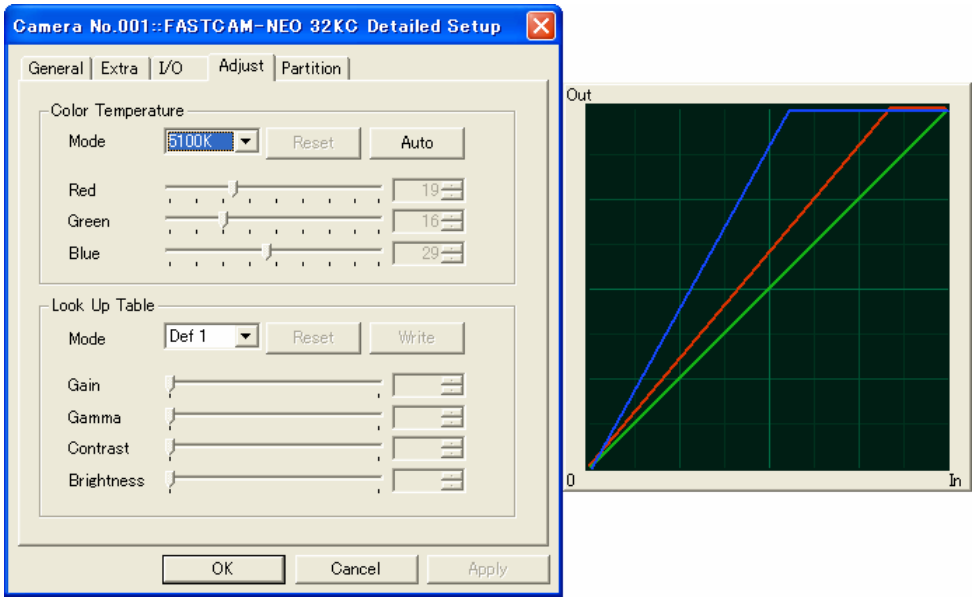
External Signal I/O Port

[General Out]
Sets the type and polarity of the signal output from GENERAL OUT on the processor. However, this is not valid with some of cameras depending on their firmware version.
[General In]
Selects Valid/Invalid of GENERAL IN on the processor.
[Ext Sync Out]
Sets the type and polarity of the signal output from EXT OUT on the processor.
[Ext Sync In]
Selects Valid/Invalid of GENERAL IN on the processor.
[Aux.In]
Selects Valid/Invalid of MCDL or IRIG on the processor.

IRIG Offset

Sets the offset value of the IRIG signal from zero to up to 999999 micro sec at the increment of microsecond. With some of cameras, depending on their firmware version number, this feature is not available for use.

FASTCAM-ultima512 >Adjust Tab



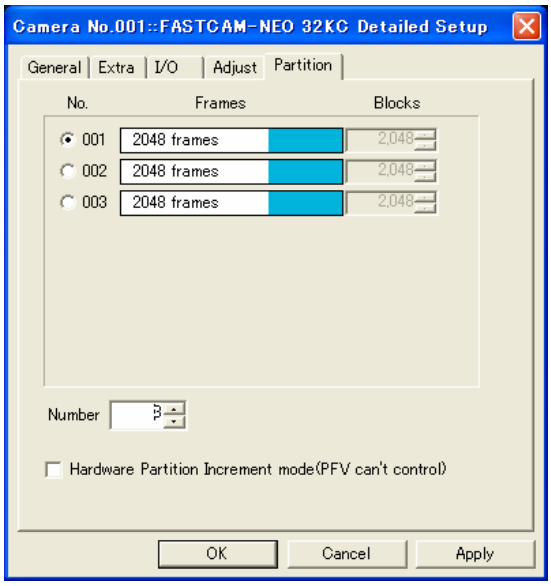
Color Temperature (color model)

Sets the color temperature to any of two default and one user defined settings from the pull-down menu. You can readjust white balance by selecting a rectangle in the white area within screen by the left mouse button with the [AUTO] button depressed.

Look Up Table

Holds LUT predetermined settings of four default and one user-defined values to choose from. You can set Gain, Gamma, Contrast or Brightness monitoring the graph displayed in the window to the right of the Tab.

FASTCAM-ultima512 >Partition Tab



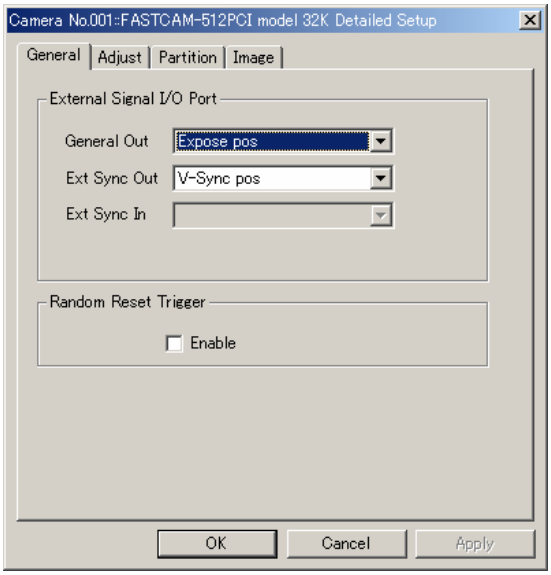
Number
Sets the number of partitions for the memory in the camera to be divided into for a memory partitioning operation.

Hardware Partition Increment mode
Check the checkbox, and you will automatically go to the next partition after a recording is done. Note this function is performed in the camera and cannot be controlled from the PFV.

FASTCAM-512PCI

Detailed settings for the FASTCAM-512PCI are shown in four sections – General, Adjust, Partition and Image tabs.

FASTCAM-512PCI > General Tab



External Signal I/O Port

[General Out]
Sets the type and polarity of the signal output from GENERAL OUT on the processor.
[Ext Sync Out]
Sets the type and polarity of the signal output from EXT OUT on the processor.
[Ext Sync In]
Selects Valid/Invalid of EXT SYNC IN on the processor.

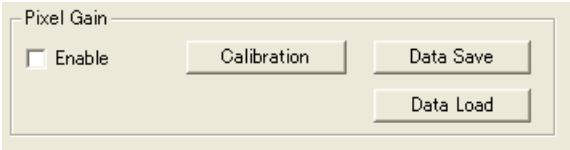
Random Reset Trigger

Enables the RANDOM RESET mode that resets the vertical sync signal to start a recording when a trigger is input.

Pixel Gain

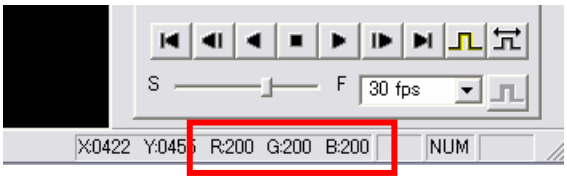
Pixel Gain is a correction function to readjust the gain of each pixel of the image sensor independently By using this Pixel Gain function, in conjunction with the normal shading correction feature, the overall non-uniformity arising from the lighting condition and specific characteristics of the optical system and image sensor is reset to zero.

The following shows how to perform pixel gain correction by the Pixel Gain feature:



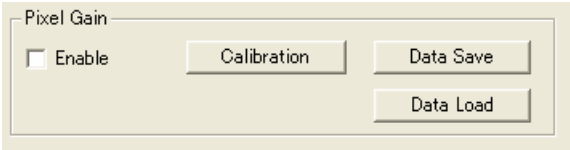
1. Performing Pixel Gain
Remove the lens cap and make sure the camera is set to the maximum resolution after the shading correction procedure in the above. Acquire a white level image by shooting a target with uniform illumination such as a back-lit surface light source or uniformly illuminated white wall.

2. Readjustment of Brightness Level
Select the crosshair cursor from the PFV toolbar and set the cursor somewhere within the live image displayed on the screen. With this done, the RGB luminance values of the point where the cursor is standing are shown in the status bar in the bottom of the PFV screen. By using the lens iris, set these values somewhere in the range of 150 to 200 (but never to a white saturated level).

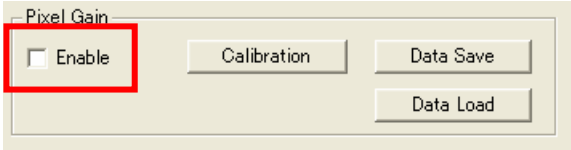


3. With this setting, click the [Calibration] button. A confirmation dialog box opens. Click the [OK] button in it to acquire a reference image for correction. In about ten seconds, acquisition of a reference image and necessary calculations are done.
The calculated setting is automatically stored as the setup information, together with the camera head ID information, in the folder where the PFV is installed.

Note: When you changed camera heads, you must perform shading correction on the new camera to store setup information for it. The setup information for the previous camera is retained in the PC and is automatically loaded when the previous camera is connected to the current system again.

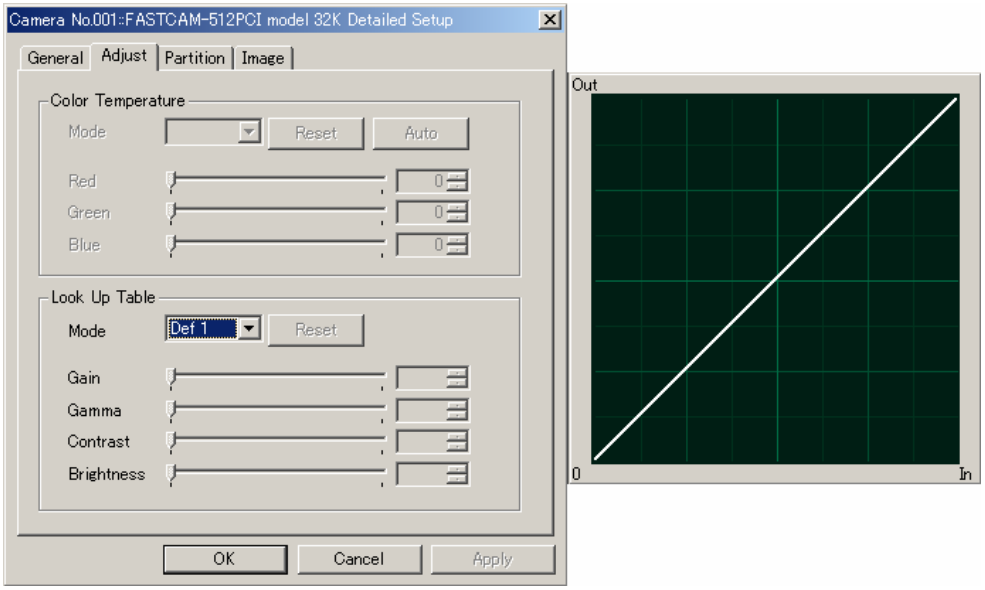


4. Now, enable the Pixel Gain function by checking the Enable checkbox.



Note on Data Save/Data Load features:
When you wish to generate a set of correction data every time you change lighting conditions and optical setups, you can save the white level image data acquired by the Pixel Gain function as a setup file (extension ".gdf") by pressing the Data Save button and use the stored data by the Data Load button.

FASTCAM-512PCI > Adjust Tab



Color Temperature (color model)

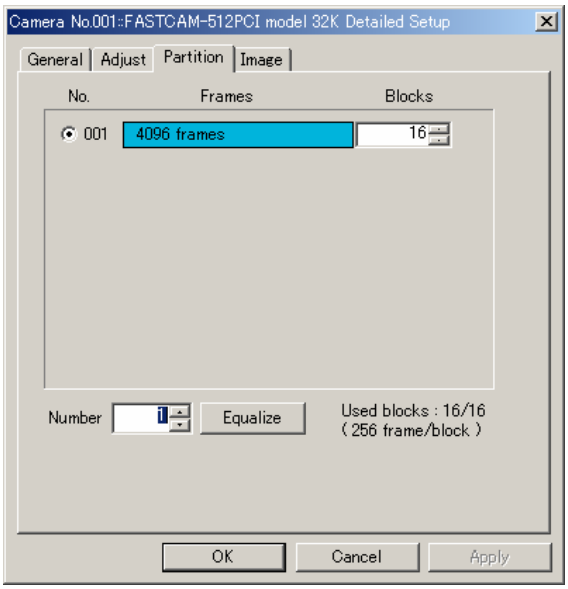
Sets the color temperature to any of two default and one user defined settings from the pull-down menu. You can readjust white balance by selecting a rectangle in the white area within screen by the left mouse button with the [AUTO] button depressed.

Look Up Table

Holds LUT predetermined settings of four default and one user-defined values to choose from. You can set Gain, Gamma, Contrast or Brightness monitoring the graph displayed in the window to the right of the Tab.

See also Non-Synchronized Reset Trigger Mode (page 120).

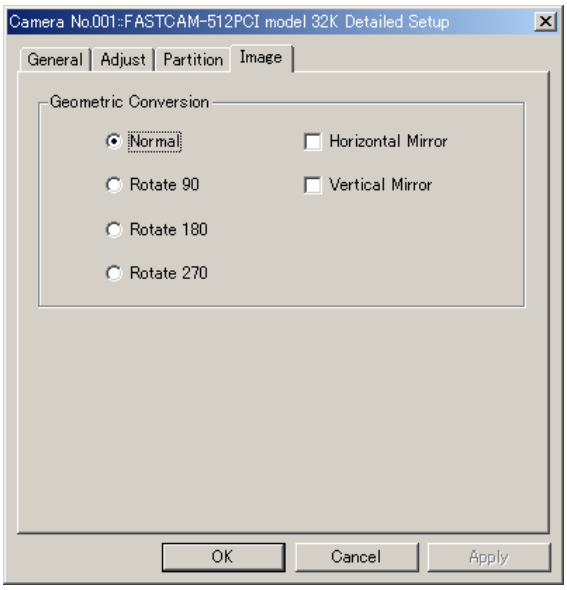
FASTCAM-512PCI > Partition Tab



Number

Sets the number of partitions for the memory in the camera to be divided into for a memory partitioning operation. By pressing the [Equalize] button, you can equalize the number of blocks within all partitions.

FASTCAM-512PCI > Image Tab



Geometric Conversion

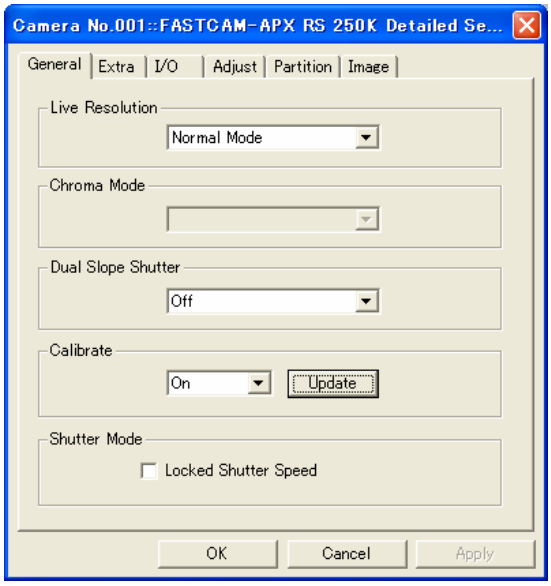
Rotation and mirror inversion of displayed image are set as follows:

■Normal
Displays normal image.
■Rotate 90
Displays image 90-degree rotated clockwise.
■Rotate 180
Displays image 180-degree rotated clockwise.
■Rotate 270
Displays image 270-degree rotated clockwise.
■Horizontal Mirror
Displays horizontally mirrored image.
■Vertical Mirror
Displays vertically mirrored image.

FASTCAM-APX RS

The detailed description of procedure for settings for the FASTCAM-APX RS are divided into six sections, General, Extra, Interface, Adjust, Partition and Image:

FASTCAM-APX RS > General Tab



Live Resolution

This box sets the image resolution for live image display. When you feel the update rate of live image is too slow, you may be able to speed it up by reducing the image resolution. Use the [Normal Mode] setting for usual operation.

Chroma Mode (color model)

Selects the mode of color correction process.

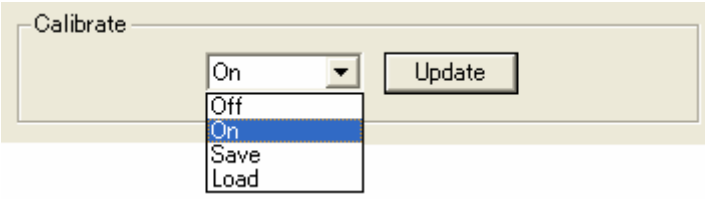
Dual Slope Shutter

Sets up the Extended Dynamic Range mode. It has the following limitations:
1. It is effective on monochrome cameras only.
2. It cannot be used with electronic shutter speed higher than 1/100,000 seconds.

Calibrate

Performs shading correction (black-level correction) of the image sensor, which offsets and cancels the non-uniformity of black level among imaging pixels.

To shoot a black level image, the image sensor must be totally covered. Place a lens cap on the lens and select [On] in the [Calibrate] window to shoot a black level image. The black level image is stored in the temporary memory in the camera and, at the same time, shading correction is done.

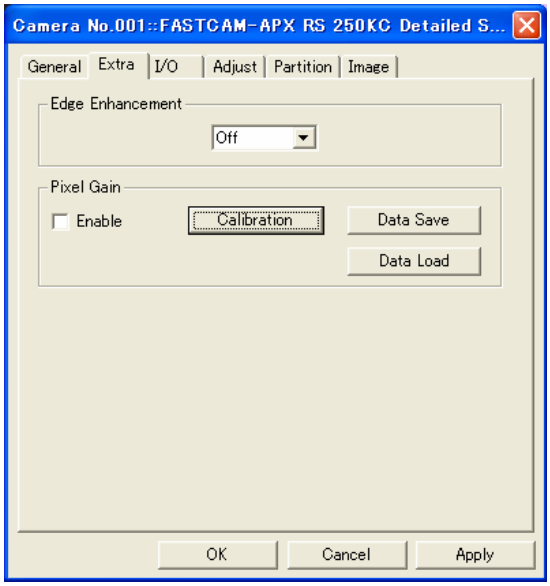


Off	No shading correction is performed.
On	At the moment this is pressed, a black level image is acquired by the camera and shading correction is performed.
Load	When this is pressed, the black level image stored in the PC's memory is loaded and shading correction is performed.
Save	Stores the currently-used black level image in the PC's memory.
Update	Updates the displayed image on the PFV screen.

Shutter Mode

When the frame rate is changed, the shutter speed is automatically set to [1/frame rate] sec. If you check this checkbox, the previous shutter speed is retained as long as it is a valid number. With some of the cameras, depending on their firmware version, this function is not available for use.

FASTCAM-APX RS > Extra タブ



Edge Enhancement

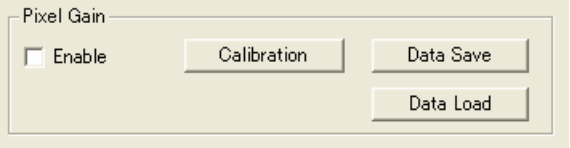
The FASTCAM-APX RS camera has the edge enhancement feature. It offers three levels of edge enhancement – Mode 1 (Low), Mode 2 (Medium) and Mode 3 (High).

When this optional feature is set, the operational mode the camera and process on the PFV software are changed. Therefore, the result of edge enhancement is reflected on the displayed video image on the PFV screen as well as the video output signal from the processor.

Pixel Gain

Pixel Gain is a correction function to readjust the gain of each pixel of the image sensor independently By using this Pixel Gain function, in conjunction with the normal shading correction feature, the overall non-uniformity arising from the lighting condition and specific characteristics of the optical system and image sensor is reset to zero.

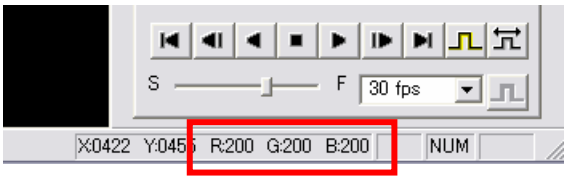
The following shows how to perform pixel gain correction by the Pixel Gain feature:



1. Performing shading correction
Before using the Pixel Gain function, normal shading correction must be performed. Using the Calibrate feature in the General tab, perform shading correction. At this time, the image resolution must be set to the maximum number available and the image sensor must be completely covered with a lens cap placed on the lens (see Calibrate in page 88).

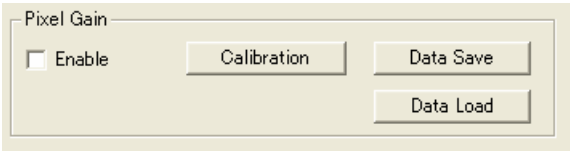
2. Performing Pixel Gain
Remove the lens cap and make sure the camera is set to the maximum resolution after the shading correction procedure in the above. Acquire a white level image by shooting a target with uniform illumination such as a back-lit surface light source or uniformly illuminated white wall.

3. Readjustment of Brightness Level
Select the crosshair cursor from the PFV toolbar and set the cursor somewhere within the live image displayed on the screen. With this done, the RGB luminance values of the point where the cursor is standing are shown in the status bar in the bottom of the PFV screen. By using the lens iris, set these values somewhere in the range of 150 to 200 (but never to a white saturated level).

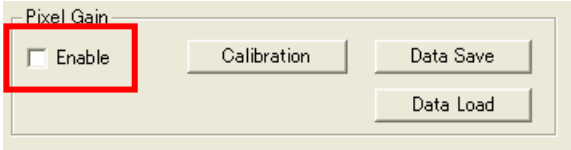


With this setting, click the [Calibration] button. A confirmation dialog box opens. Click the [OK] button in it to acquire a reference image for correction. In about ten seconds, acquisition of a reference image and necessary calculations are done.
The calculated setting is automatically stored as the setup information, together with the camera head ID information, in the folder where the PFV is installed.

Note: When you changed camera heads, you must perform shading correction on the new camera to store setup information for it. The setup information for the previous camera is retained in the PC and is automatically loaded when the previous camera is connected to the current system again.



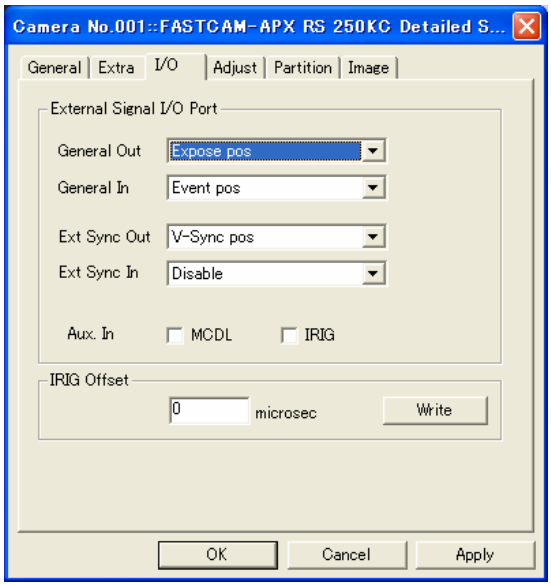
4. Now, enable the Pixel Gain function by checking the Enable checkbox.



Note: The result of this correction is not reflected in the output to the NTSC/PAL video monitor.

Note on Data Save/Data Load features:
When you wish to generate a set of correction data every time you change lighting conditions and optical setups, you can save the white level image data acquired by the Pixel Gain function as a setup file (extension ".gdf") by pressing the Data Save button and use the stored data by the Data Load button.

FASTCAM-APX RS > I/O Tab



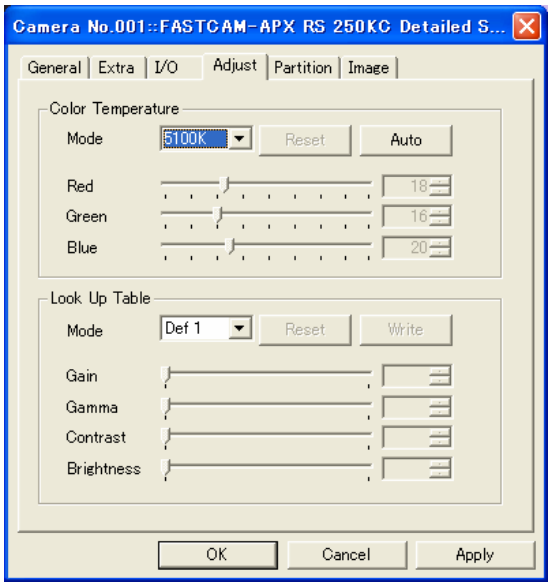
External Signal I/O Port

[General Out]
Sets the type and polarity of the signal output from GENERAL OUT on the processor. However, this is not valid with some of cameras depending on their firmware version.
[General In]
Selects Valid/Invalid of GENERAL IN on the processor.
[Ext Sync Out]
Sets the type and polarity of the signal output from EXT OUT on the processor.
[Ext Sync In]
Selects Valid/Invalid of GENERAL IN on the processor.
[Aux.In]
Selects Valid/Invalid of MCDL or IRIG on the processor.

IRIG Offset

Sets the offset value of the IRIG signal from zero to up to 999999 micro sec at the increment of microsecond. With some of cameras, depending on their firmware version number, this feature is not available for use.

FASTCAM-APX RS > Adjust Tab



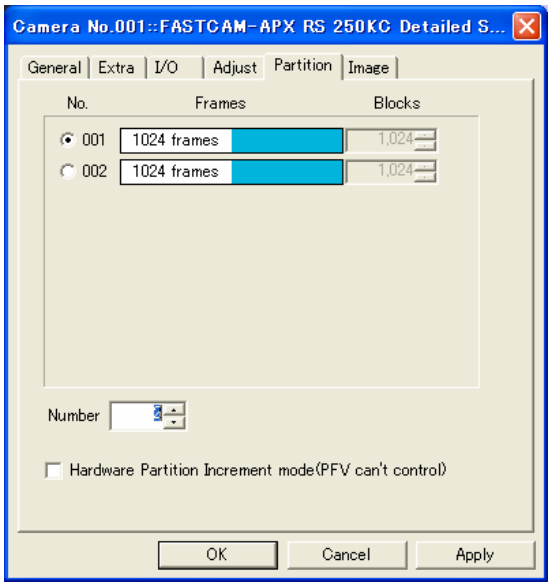
Color Temperature (color model)

Sets the color temperature to any of two default and one user defined settings from the pull-down menu. You can readjust white balance by selecting a rectangle in the white area within screen by the left mouse button with the [AUTO] button depressed.

Look Up Table

Holds LUT predetermined settings of four default and one user-defined values to choose from. You can set Gain, Gamma, Contrast or Brightness monitoring the graph displayed in the window to the right of the Tab.

FASTCAM-APX RS > Partition Tab



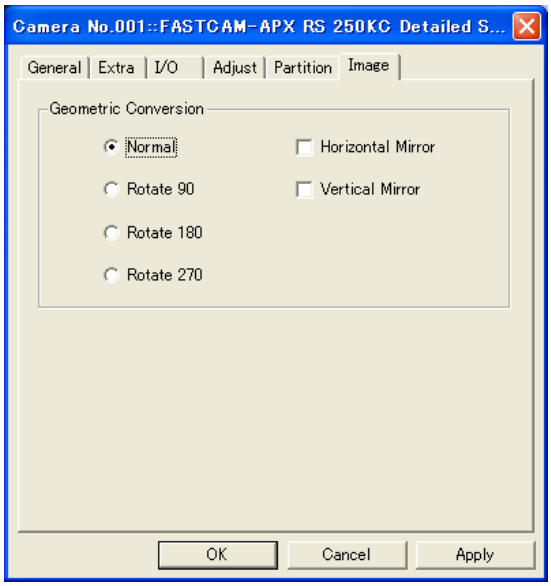
Number

Sets the number of partitions for the memory in the camera to be divided into for a memory partitioning operation.

Hardware Partition Increment mode

Check the checkbox, and you will automatically go to the next partition after a recording is done. Note this function is performed in the camera and cannot be controlled from the PFV.

FASTCAM-APX RS > Image Tab



Geometric Conversion

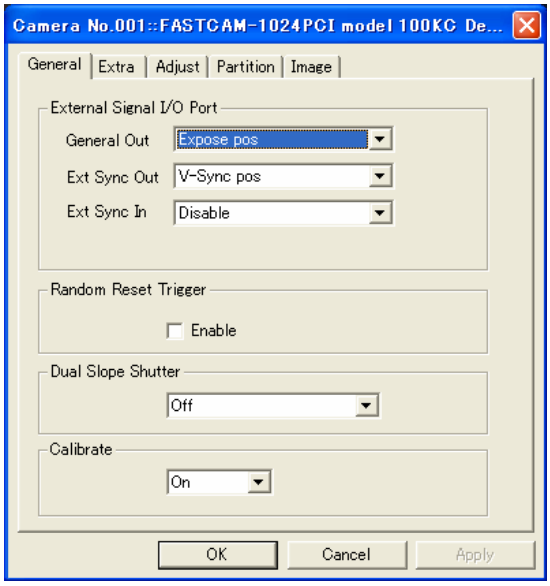
Rotation and mirror inversion of displayed image are set as follows:

■Normal
Displays normal image.
■Rotate 90
Displays image 90-degree rotated clockwise.
■Rotate 180
Displays image 180-degree rotated clockwise.
■Rotate 270
Displays image 270-degree rotated clockwise.
■Horizontal Mirror
Displays horizontally mirrored image.
■Vertical Mirror
Displays vertically mirrored image.

FASTCAM-1024PCI

Detailed settings for the FASTCAM-1024PCI are shown in five sections – General, Extra, Adjust, Partition and Image tabs.

FASTCAM-1024PCI > General Tab



External Signal I/O Port

[General Out]
Sets the type and polarity of the signal output from GENERAL OUT on the processor.
[Ext Sync Out]
Sets the type and polarity of the signal output from EXT OUT on the processor.
[Ext Sync In]
Selects Valid/Invalid of EXT SYNC IN on the processor.

Random Reset Trigger

Enables the RANDOM RESET mode that resets the vertical sync signal to start a recording when a trigger is input.

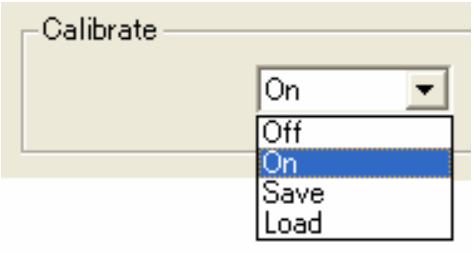
Dual Slope Shutter

Makes settings for Extended Dynamic Range mode with the following limitations:
* It is effective only when the Random Reset Trigger mode is selected.
* This function is not available for use for electronic shutter speed of faster than 1/90000 sec or framing rate of higher that 90000 fps.

Calibrate

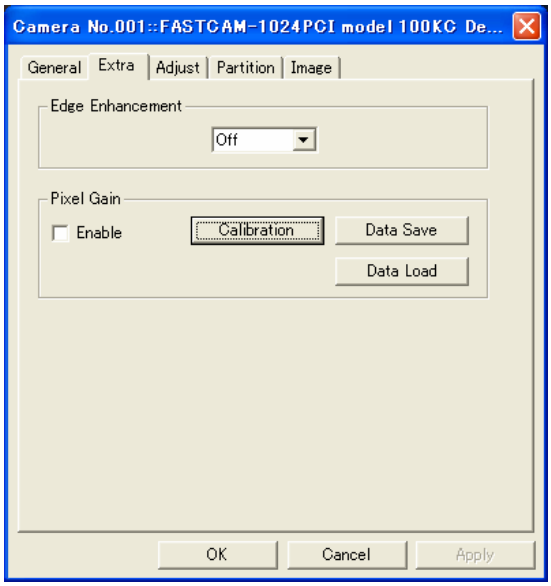
Performs shading correction (black-level correction) of the image sensor, which offsets and cancels the non-uniformity of black level among imaging pixels.

To shoot a black level image, the image sensor must be totally covered. Place a lens cap on the lens and select [On] in the [Calibrate] window to shoot a black level image. The black level image is stored in the temporary memory in the camera and, at the same time, shading correction is done.



Off	No shading correction is performed.
On	At the moment this is pressed, a black level image is acquired by the camera and shading correction is performed.
Load	When this is pressed, the black level image stored in the PC's memory is loaded and shading correction is performed.
Save	Stores the currently-used black level image in the PC's memory.

FASTCAM-1024PCI > Extra Tab



Edge Enhancement

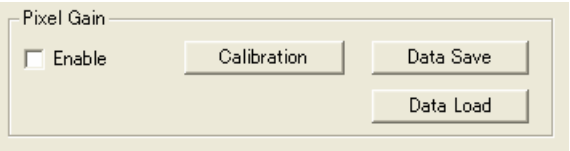
The FASTCAM-APX RS camera has the edge enhancement feature. It offers three levels of edge enhancement – Mode 1 (Low), Mode 2 (Medium) and Mode 3 (High).

When this optional feature is set, the operational mode the camera and process on the PFV software are changed. Therefore, the result of edge enhancement is reflected on the displayed video image on the PFV screen as well as the video output signal from the processor.

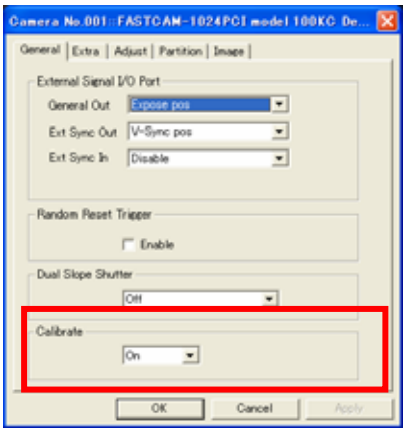
Pixel Gain

Pixel Gain is a correction function to readjust the gain of each pixel of the image sensor independently By using this Pixel Gain function, in conjunction with the normal shading correction feature, the overall non-uniformity arising from the lighting condition and specific characteristics of the optical system and image sensor is reset to zero.

The following shows how to perform pixel gain correction by the Pixel Gain feature:

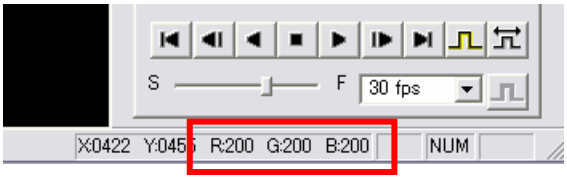


1. Performing shading correction
Before using the Pixel Gain function, normal shading correction must be performed. Using the Calibrate feature in the General tab, perform shading correction. At this time, the image resolution must be set to the maximum number available and the image sensor must be completely covered with a lens cap placed on the lens (see Calibrate in page 88).



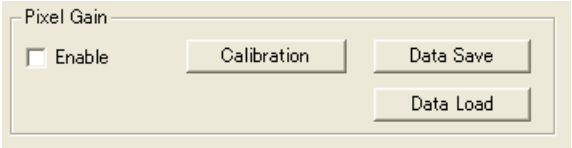
2. Performing Pixel Gain
Remove the lens cap and make sure the camera is set to the maximum resolution after the shading correction procedure in the above. Acquire a white level image by shooting a target with uniform illumination such as a back-lit surface light source or uniformly illuminated white wall.

3. Readjustment of Brightness Level
Select the crosshair cursor from the PFV toolbar and set the cursor somewhere within the live image displayed on the screen. With this done, the RGB luminance values of the point where the cursor is standing are shown in the status bar in the bottom of the PFV screen. By using the lens iris, set these values somewhere in the range of 150 to 200 (but never to a white saturated level).

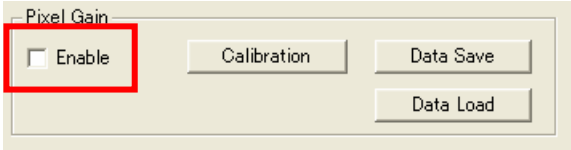


4. With this setting, click the [Calibration] button. A confirmation dialog box opens. Click the [OK] button in it to acquire a reference image for correction. In about ten seconds, acquisition of a reference image and necessary calculations are done.
The calculated setting is automatically stored as the setup information, together with the camera head ID information, in the folder where the PFV is installed.

Note: When you changed camera heads, you must perform shading correction on the new camera to store setup information for it. The setup information for the previous camera is retained in the PC and is automatically loaded when the previous camera is connected to the current system again.

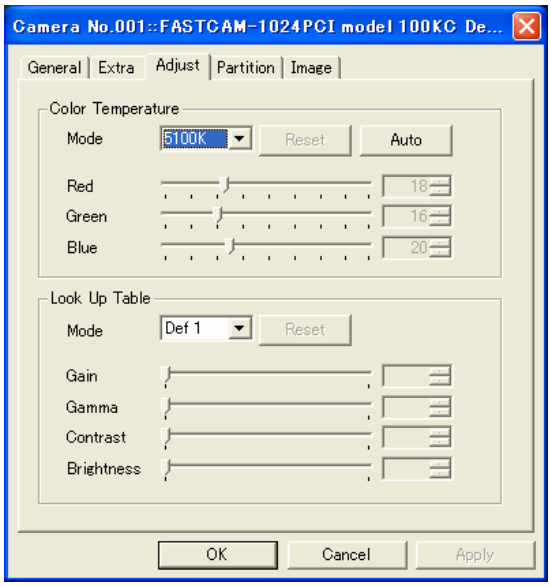


5. When the [Enable] checkbox is checked, the correction data the user has set becomes effective. When the checkbox is not checked, the default correction data is applied.



Note on Data Save/Data Load features:
When you wish to generate a set of correction data every time you change lighting conditions and optical setups, you can save the white level image data acquired by the Pixel Gain function as a setup file (extension ".gdf") by pressing the Data Save button and use the stored data by the Data Load button.

FASTCAM-1024PCI > Adjust Tab



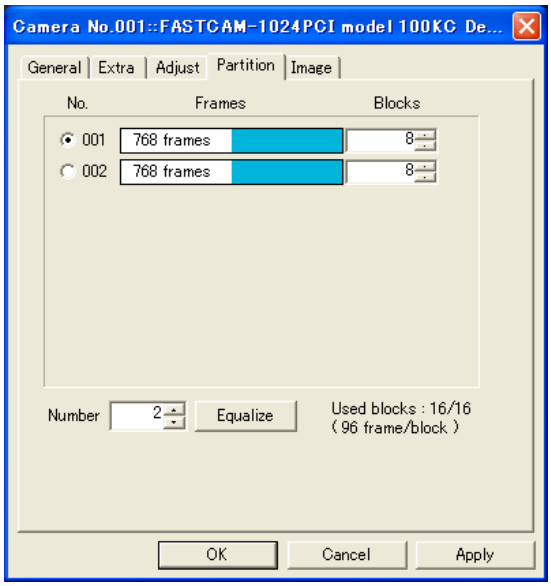
Color Temperature (color model)

Sets the color temperature to any of two default and one user defined settings from the pull-down menu. You can readjust white balance by selecting a rectangle in the white area within screen by the left mouse button with the [AUTO] button depressed.

Look Up Table

Holds LUT predetermined settings of four default and one user-defined values to choose from. You can set Gain, Gamma, Contrast or Brightness monitoring the graph displayed in the window to the right of the Tab.

FASTCAM-1024PCI > Partition Tab



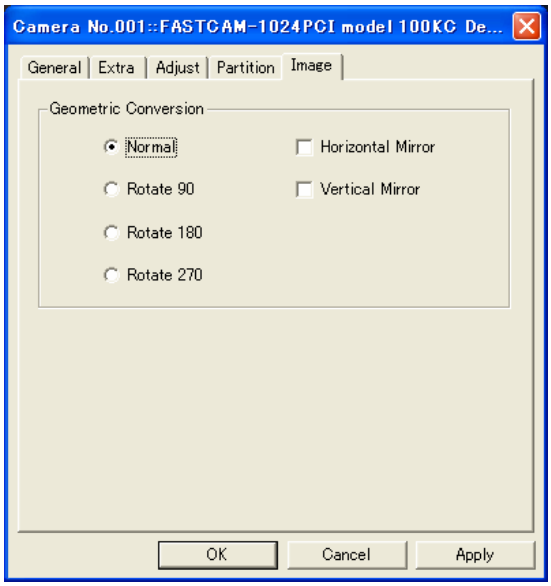
Number

Sets the number of partitions for the memory in the camera to be divided into for a memory partitioning operation.

Hardware Partition Increment mode

Check the checkbox, and you will automatically go to the next partition after a recording is done. Note this function is performed in the camera and cannot be controlled from the PFV.

FASTCAM-1024PCI > Image Tab



Geometric Conversion

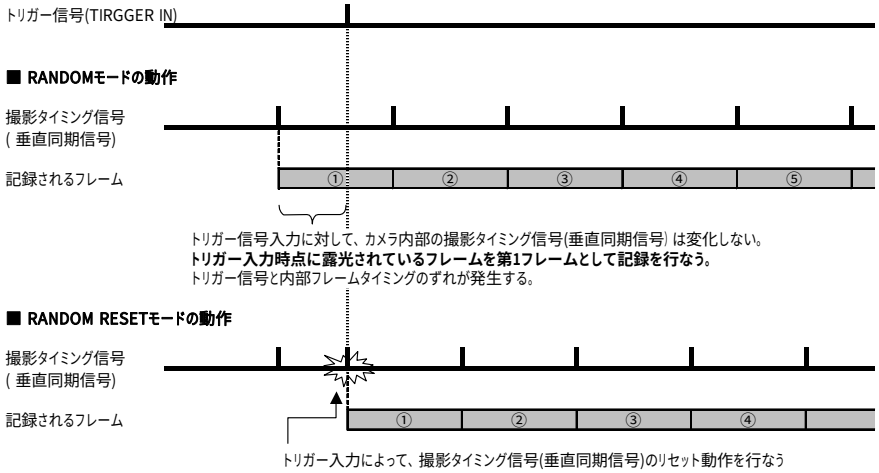
Rotation and mirror inversion of displayed image are set as follows:

■Normal
Displays normal image.
■Rotate 90
Displays image 90-degree rotated clockwise.
■Rotate 180
Displays image 180-degree rotated clockwise.
■Rotate 270
Displays image 270-degree rotated clockwise.
■Horizontal Mirror
Displays horizontally mirrored image.
■Vertical Mirror
Displays vertically mirrored image.

RANDOM RESET Mode

The RANDOM RESET mode is a recording mode where the accuracy of recording start time is improved by resetting the timing of recording by the trigger signal to precisely match the timing of trigger and start of recording.

The below chart shows the relationship between the trigger and start of recording for RANDOM (and START) and RANDOM RESET modes:



Note in the above chart the difference of the start time of recording against the trigger signal between the two modes.

In the RANDOM and START modes, a recording is initiated by a trigger signal while the internal record time is going on regardless of the time of the incoming trigger. Because of this, the start time of recording the first frame can be offset in advance of the trigger time by up to almost one frame. Moreover, there is no way to know the magnitude of the offset.

In the RANDOM RESET mode, on the other hand, the internal record time is reset by the incoming trigger signal and restarts going. This makes it possible to know the time difference between the entry of the trigger and the start of the first frame recording (it normally takes 100 ns for the internal record time to reset after the arrival of a trigger signal)

Availability of Random Reset Trigger Modes by the Camera Model

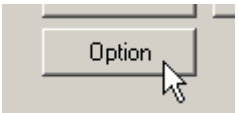
Camera Model	START Mode	RANDOM Mode	How to Set
FASTCAM-1280PCI	Yes	Yes	Set items in “General” tab in “More” button.
FASTCAM-512PCI	Yes	Yes	
FASTCAM-1024PCI	Yes	Yes	
FASTCAM-PCI R2	No	No	
FASTCAM-APX RS	No	Yes	Select Random Reset mode in Trigger Mode button.
FASTCAM-MAX	No	Yes	
FASTCAM-NEO	No	Yes	
FASTCAM-ultima SE	No	No	Asynchronous reset mode not supported.

3.4.11. Input/output of PFV setup file

This function outputs all the settings of camera parameters, software environment and file saving modes to a file, and reads the same data at the next start up of the system to restore the settings.

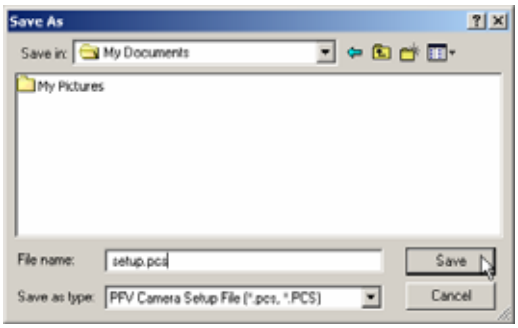
Display of Camera Setup File Dialog

Click the Option button and the “PFV Camera Setup File" dialog opens up.



Storage of Camera Setup Files

Click the Save button to store the settings in a file. When the file selection window appears, enter a file name and click the Save button. The file you have just specified is output. A setting information file with an extension pcs is stored in the specified directory.



Reading in Camera Setup Files

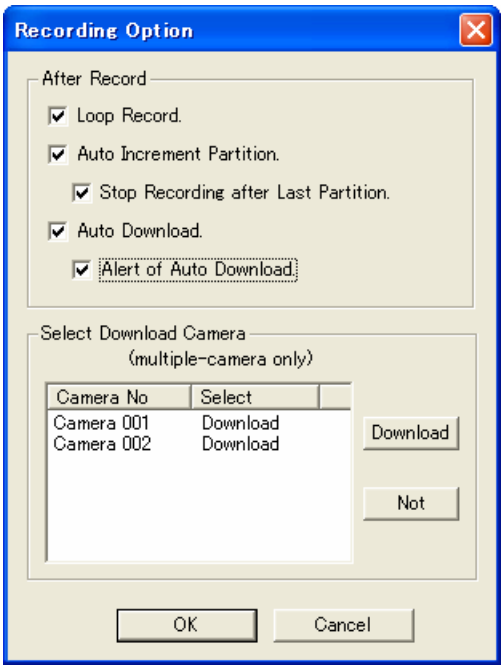
To read in settings from a file, click the Load button.
Files are displayed in the file selection window. Select a PCS file and click the Open button. The PFV then reads in the settings contained in the PCS and updates the settings of cameras and the PFV.

3.4.12. Updating Camera Status (Update)

Click this button to update camera parameter settings by the PFV software.
The PFV communicates with the camera processor on a regular basis to keep the camera settings synchronized with the software. However, if you wish to update the camera for sure with the new settings you have just made on the PFV screen, click this button.

3.4.13. Detailed Settings for Recording and Automatic Download

This dialog allows for detailed settings on the PFV for recording.



■Loop Record
This feature sets the camera for the next operation following a recording.

Check OFF (Default)	After a recording finishes, the system goes to the Memory Display mode and displays the image from the trigger frame.
Check ON	After a recording finishes, the system stays in the Live mode. If you start another recording in this mode, the previously recorded frames are overwritten.

■ Auto Increment Partition
After a recording finishes, when partitions are set, the system automatically goes to the next partition if this feature is checked. This feature is available for use only when partition is set.

■ Stop Recording After Last Partition
This function is available for use only when Auto Increment Partition is checked (ON).
When multiple partitions are set, this function halts the recording operation at the finish of recording of the last partition to prevent overwriting.

Check ON	At the finish of recording of the last partition (for example, partition 4 when there are four partitions set), the system halts the recording operation to prohibit any overwriting.
Check OFF	At the finish of recording of the last partition, the system automatically goes to partition 1 to overwrite it.

■ Auto Download

This function allows for automatic downloads of image data, recorded in the processor memory, to the PC after recording.

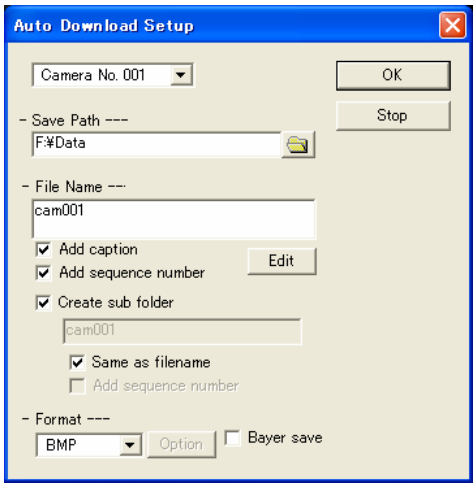
Check ON	The recorded image data, temporarily recorded in the processor memory, is automatically downloaded to a specified directory in the PC.
Check OFF	No download of recorded image data takes place.

■ Alert of Auto Download

This option is available for use only when Auto Download is ON.
For automatic download, this option allows for confirmation of directory to sequentially store the recorded image data or for downloading the image in a specified directory.

Check ON	At start of a recording (i.e. Record button is pressed), Auto Download Setup dialog (below figure) appears for setting a directory and file format for download storing.
Check OFF	Download storage of image data is excuted according to the conditions set in the Data Save tab.

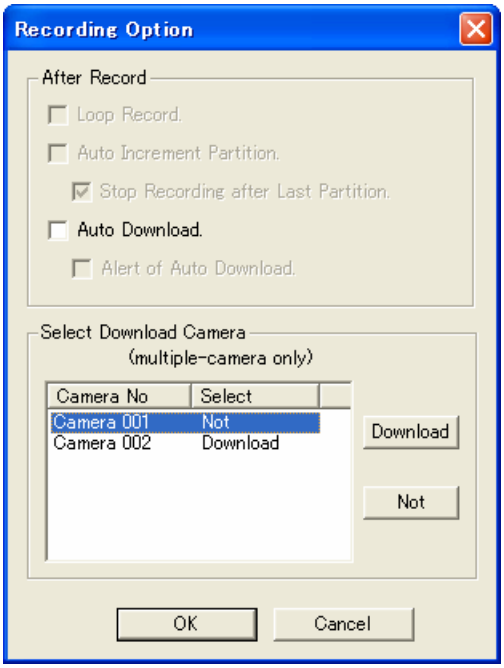
Auto Download Setup Dialog



Note: See also subsection 3.7.7.

■ Select Download Camera (available only when multiple cameras are used)

When multiple cameras are used for recording, execution of automatic download is set selectively to any of the cameras.



Click a camera, on which you wish to make a selection of Download or Not (no download), to make it ready for selection, then click the Download or Not button as you wish.

3.4.14. Switching View Window Display

This function allows for selecting the mode of image displayed in the View Window from the following:

Snapshot (one single live frame is displayed at each click)
Live (live image is displayed continuously)
Memory (image data recorded in the memory is displayed)

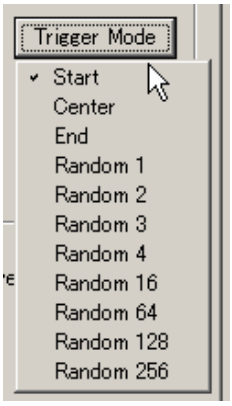
3.5. Start A Recording - Explanation of Trigger Modes

Recording is initiated by pressing the software Trigger-In button. The FASTCAM series cameras offer several trigger modes to meet requirements of different framing conditions to capture target objects without fail. This section discusses each of the trigger modes offered.

The [Trigger Mode] submenu specifies any of the modes of recording offered. The following nine trigger modes are available to choose from:

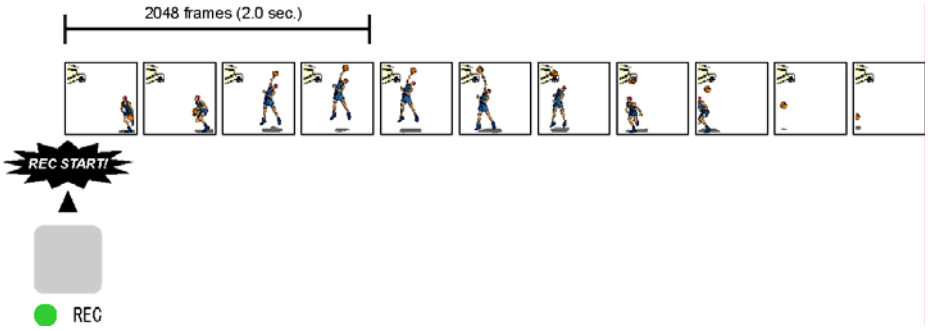
- START
- CENTER
- END
- RANDOM
- MANUAL
- RANDOM RESET
- RANDOM CENTER
- RANDOM MANUAL
- DUAL FRAME RATES

Note: The trigger modes that can be used vary by the camera model.



3.5.1. START Mode

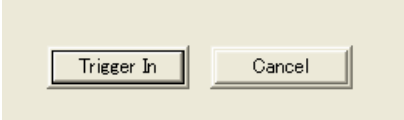
The START mode is a recording mode where the camera starts recording at the moment the REC button is pressed and continues to record until the memory is full, and stops recording. This mode is useful to shoot any event which you know exactly when will take place.
For example, a camera that is capable of recording for two seconds records images of a high-speed event for two seconds right after the REC button is pressed.



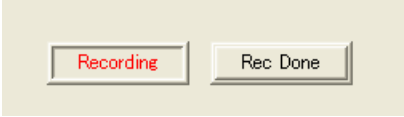
Recording Procedure for START Mode

In the LIVE mode, the button shows like this. The camera is ready to turn into trigger-ready status.

Click the Record button to turn the camera into trigger-ready status. The button turns to “Trigger In”.



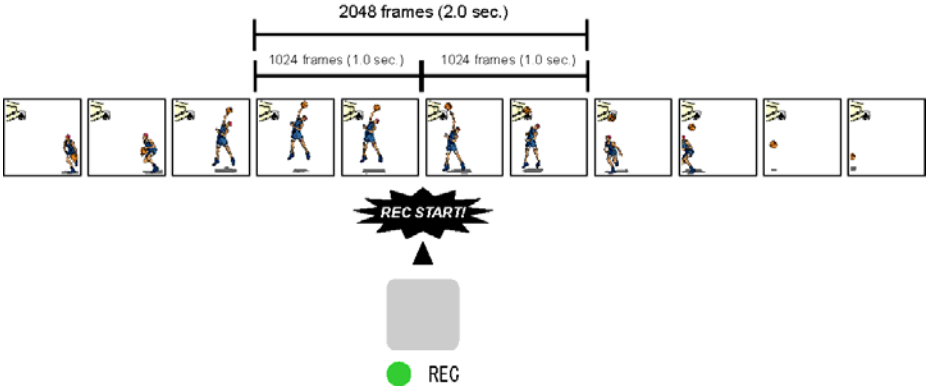
Now you can start a recording. Click the Trigger In button to start recording. While recording, the button shows “Recording” in red letters.
To stop recording any time during recording, click the Rec Done button.



When recording is done, the PFV goes to the memory mode and playback of recorded image data becomes ready.

3.5.2. CENTER Mode

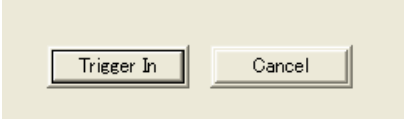
The CENTER mode is a recording mode where the camera records equal number of frames before and after the frame at which the REC button is pressed. This mode is useful when you wish to observe the behavior of a moving object before and after the major event takes place of it.
For example, a camera that is capable of recording for a total of two seconds records images of a high-speed event for one second each before and after the REC button is pressed.



Recording Procedure for CENTER Mode

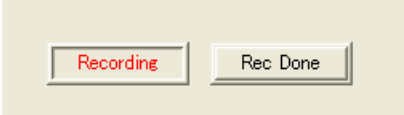
In the LIVE mode, the button shows like this. The camera is ready to turn into a trigger-ready status.

Click the Record button to turn the camera into a trigger-ready status. The button turns to “Trigger In”.



Click the Trigger In button to turn the camera into a “Loop Recording” status. In this operation status, the system is continuously writing the image data from the camera head into the memory. The button shows “Endless Rec” in red letters.
To stop recording any time during recording, click the Rec Done button.

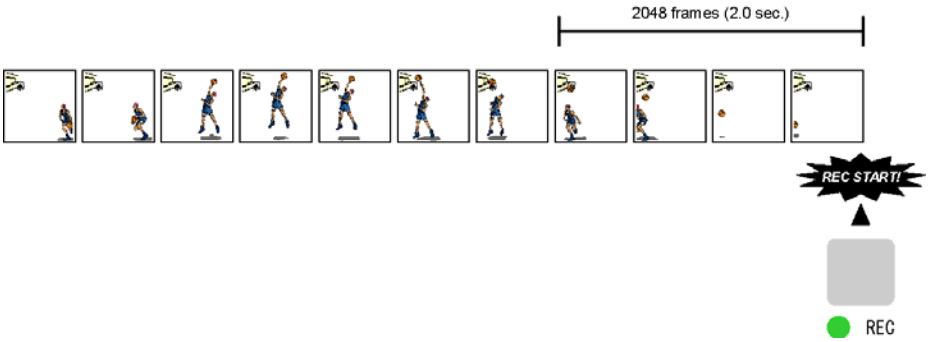
Click the Endless Rec button to enter recording timing. The button shows “Recording” in red letters.
To stop recording any time during recording, click the Rec Done button.



When recording is done, the PFV goes to the memory mode and playback of recorded image data becomes ready.

3.5.3. END Mode

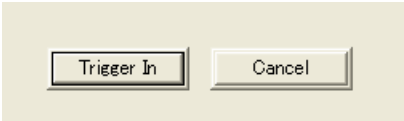
The END mode is a recording mode where the camera records images of an event taking place right before the REC button is pressed. This mode is useful to shoot any event which you do not know exactly when will begin and end.
For example, a camera that is capable of recording for two seconds records images of a high-speed event for two seconds right before the REC button is pressed.



Recording Procedure for END Mode

In the LIVE mode, the button shows like this. The camera is ready to turn into a trigger-ready status.

Click the Record button to turn the camera into a trigger-ready status. The button turns to “Trigger In”.

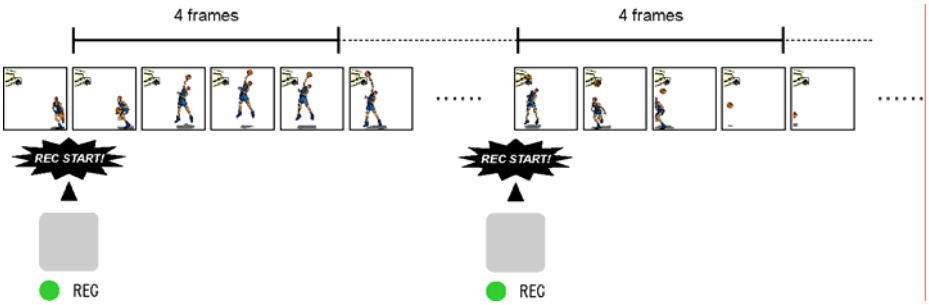


Click the Trigger In button to turn the camera into a “Loop Recording” status. In this operation status, the system is continuously writing the image data from the camera head into the memory. The button shows “Endless Rec” in red letters.
To stop recording any time during recording, click the Rec Done button.

Click the Endless Rec button to enter a trigger. The camera records the image data right before the click on the button into the memory and end recording. The PFV goes to the memory mode.

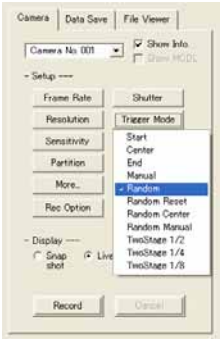
3.5.4. RANDOM Mode

The RANDOM mode is a recording mode where the camera records an event for a predetermined number of frames at every press on the REC button. This mode is useful to shoot any event that takes place intermittently, using a signal generator connected to the camera that sends out a trigger signal to the camera at every occurrence of the event. The number of frames to record at every trigger can be set to any number by the frame from 1 to the maximum number of available frames in the memory.

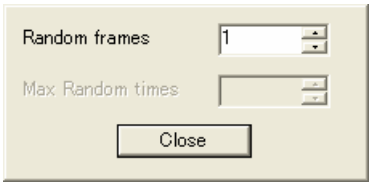


Pre-Settings for Random Mode

Select the Random mode from the Trigger Mode pull-down menu.



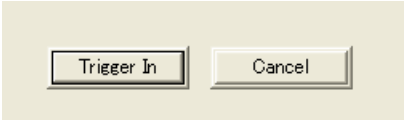
A window is displayed as shown below to set the number of frames to record at every incoming trigger. In the “Random frames” field, enter a number of frames that you wish to set for recording at each trigger. When you are done, click the “Close” button to close the window.



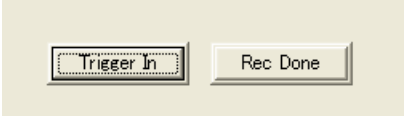
Recording Procedure for Random Mode

In the LIVE mode, the button shows like this. The camera is ready to turn into a trigger-ready status.

Click the Record button to turn the camera into a trigger-ready status. The button turns to “Trigger In”.

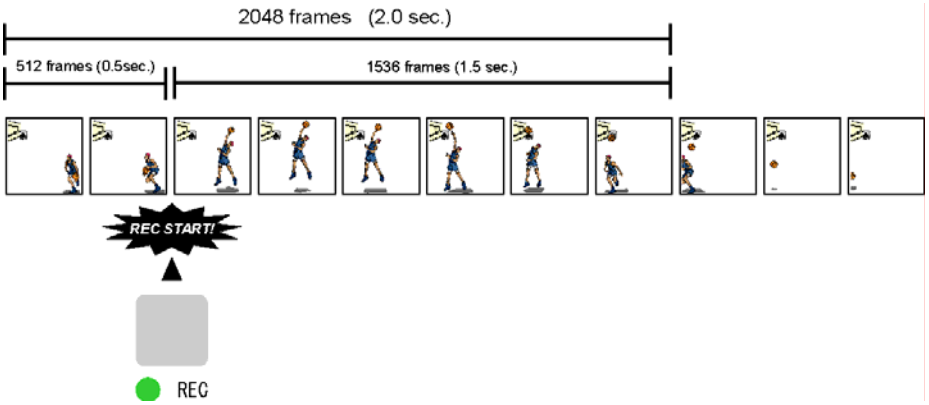


At the moment you wish to shoot, click the Trigger In button to let the camera record the preset number of frames. The camera then stops and returns to the trigger-ready status. Repeat this triggering process as many times as necessary.
To end the recording process in the Random mode, click the Rec Done button. The camera finishes the recording session and goes to the Memory mode making itself ready for playback.



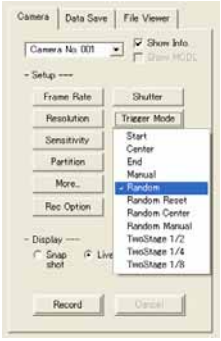
3.5.5. MANUAL Mode

The MANUAL mode is a recording mode where the camera records images of an event before and after the REC button is pressed. Unlike the CENTER mode, the number of frames to be recorded before and after the occurrence of the event can be freely set. For example, a camera that is capable of recording for a total of two seconds may be set to record 0.5 seconds before and 1.5 seconds after the REC button is pressed.

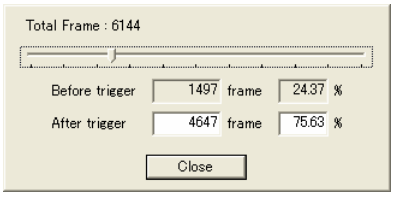


Pre-Settings for Manual Mode

Select the Manual mode in the “Trigger Mode” pull-down menu.



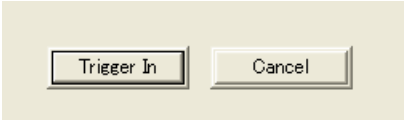
A window is displayed as shown below to set the number of frames to record before AND after every incoming trigger. Use the scroll bar to set the number of frames, and consequently the percentage of the entire memory capacity, to record before and after a trigger.
When you are done, click the “Close” button to close the window.



Recording Procedure for Manual Mode

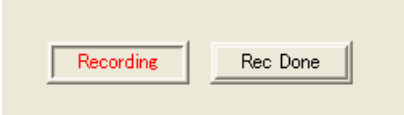
In the LIVE mode, the button shows like this. The camera is ready to turn into a trigger-ready status.

Click the Record button to turn the camera into a trigger-ready status. The button turns to read “Trigger In”.



Click the Trigger In button to turn the camera into a “Loop Recording” status. In this operation status, the system is continuously writing the image data from the camera head into the memory. The button shows “Endless Rec” in green letters.
To stop recording any time during recording, click the Rec Done button.

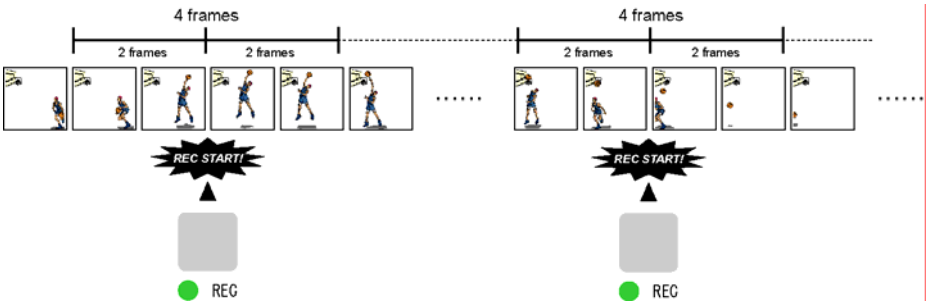
Click the Endless Rec button to start recording. The button shows “Recording” in red letters. The camera now records the preset number of frames before and after each trigger, respectively, in the memory.
To stop recording any time during recording, click the Rec Done button.



When recording is done, the PFV goes to the memory mode and playback of recorded image data becomes ready.

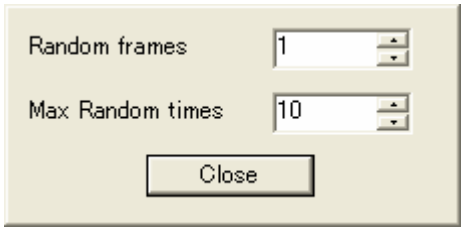
3.5.6. RANDOM CENTER Mode

The RANDOM CENTER mode is a recording mode where the camera records, like the RANDOM mode, an event for a predetermined number of frames at every press on the REC button. The difference is, while the RANDOM mode records a predetermined number of frames right after the entry of a trigger, the RANDOM CENTER mode records an equal number of frames before and after the trigger. This mode is useful to shoot any event that takes place intermittently, using a signal generator connected to the camera that sends out a trigger signal to the camera at every occurrence of the event. The number of frames to record at every trigger can be set to any number by the frame from 1 to the maximum number of available frames in the memory.



Pre-Settings for Random Center Mode

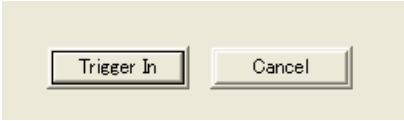
Select the Random Center mode in the “Trigger Mode” pull-down menu.
A window is displayed as shown below to set the number of frames to record at every incoming trigger.
Enter the number of frames you wish to record at a trigger.
Also, enter the maximum number of triggers you are planning to give during the upcoming recording session.
When you are done, click the “Close” button to close the window.



Recording Procedure for Random Center Mode

In the LIVE mode, the button shows like this. The camera is ready to turn into a trigger-ready status.

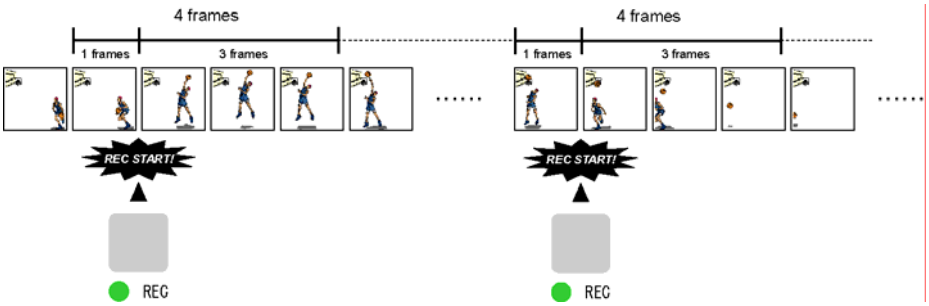
Click the Record button to turn the camera into a trigger-ready status. The button turns to read “Trigger In”.



At the moment you wish to shoot, click the Trigger In button to let the camera record the preset number of frames. The camera then stops and returns to the trigger-ready status. Repeat this triggering process, clicking the “Endless Rec” button, for the number of preset times.
When the camera has done the preset number of triggering, it ends the recording session. The PFV goes to the Memory mode making itself ready for playback.
To stop recording process anytime during the Random Center mode, click the Rec Done button. The camera stops recording, and the PFV goes to the Memory mode making itself ready for playback.

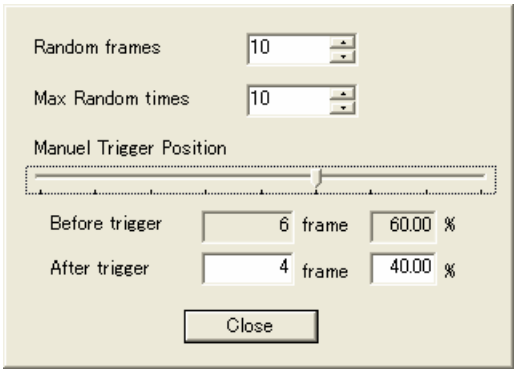
3.5.7. RANDOM MANUAL Mode

The RANDOM MANUAL mode is a recording mode where the camera records, like the RANDOM mode, an event for a predetermined number of frames at every press on the REC button. The difference is, while the RANDOM mode records the predetermined number of frames right after the entry of a trigger, the RANDOM MANUAL mode records the number of frames differently predetermined before and after the trigger. This mode is useful to shoot any event that takes place intermittently, using a signal generator connected to the camera that sends out a trigger signal to the camera at every occurrence of the event. The number of frames to record at every trigger can be set to any number by the frame from 1 to the maximum number of available frames in the memory.



Pre-Settings for Random Manual Mode

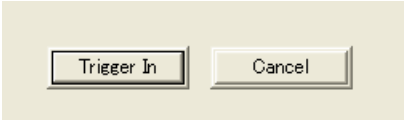
Select the Random Manual mode in the “Trigger Mode” pull-down menu.
A window is displayed as shown below to set the number of frames to record at every incoming trigger.
Enter the number of frames you wish to record at a trigger in the “Random frames” field.
Also, enter the maximum number of triggers you are planning to give during the upcoming recording session in the “Max Random times” field.
In the “Manual Trigger Position” field, use the scroll bar to set the number, and consequently the ratio, of frames to record before and after a trigger.
When you are done, click the “Close” button to close the window.



Recording Procedure for Random Manual Mode

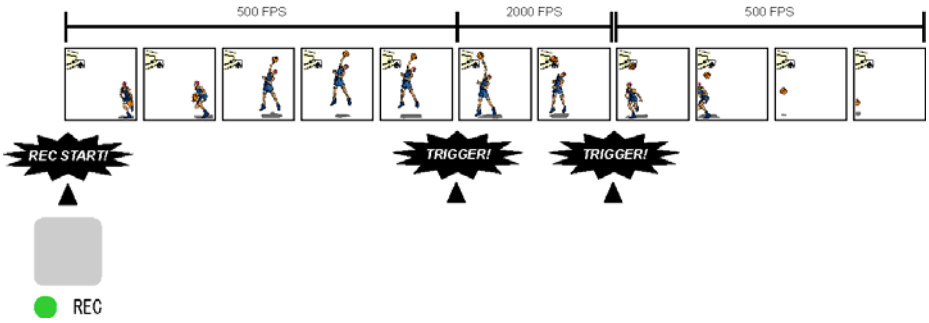
In the LIVE mode, the button shows like this. The camera is ready to turn into a trigger-ready status.

Click the Record button to turn the camera into a trigger-ready status. The button turns to read “Trigger In”.



At the moment you wish to shoot, click the Trigger In button to let the camera record the preset number of frames. The camera then stops and returns to the trigger-ready status.
Repeat this triggering process, clicking the “Endless Rec” button, for the number of preset times.
When the camera has done the preset number of triggering, it ends the recording session. The PFV goes to the Memory mode making itself ready for playback.
To stop recording process anytime during the Random Center mode, click the Rec Done button. The camera stops recording, and the PFV goes to the Memory mode making itself ready for playback.

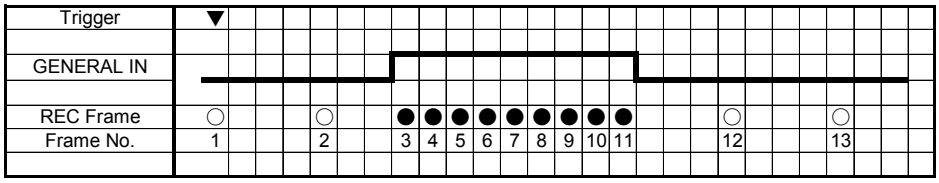
3.5.8. DUAL FRAME RATE Mode



The DUAL FRAME RATE mode is a recording mode that has a unique feature of changing the frame rate during recording. For example, while recording the movement of a basketball player shooting a goal, you can raise the framing rate instantaultima512usly for the brief moment the player dunks for subsequent observation with a higher time resolution.

To use the DUAL FRAME RATE mode, first set the higher frame rate you wish to shoot at. The lower frame rate is set to 1/2, 1/4 or 1/8 of the higher rate.

The below chart shows a concept of a DUAL FRAME RATE mode operation (relationship between GENERAL IN and recorded frames) for a 1/4 frame rate setting.



Triggering for a DUAL FRAME RATE mode operation is the same as that for the START mode.

For stand-alone cameras such as the FASTCAM-APX RS and APX, switching between Lo/Hi frame rates is done by TTL signal entered to GENERAL IN. It is not possible to send Hi/Lo switching signal from the PFV software.

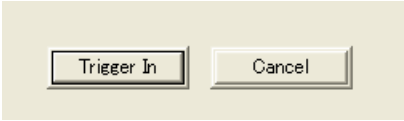
For PCI board cameras such as the FASTCAM-ultima 512PCI and 1024PCI, switching between Lo/Hi frame rates is done by TTL signal entered to the T-SW IN connector.

External TTL signal is only used for switching of Dual Frame Rate operation. When the signal is High (+5 V), the frame rate is Low and vice versa.

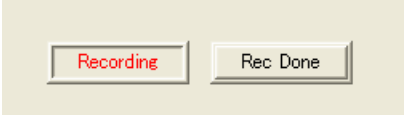
Recording Procedure for Dual Frame Rate Mode

In the LIVE mode, the button shows like this. The camera is ready to turn into a trigger-ready status.

Click the Record button to turn the camera into trigger-ready status. The button turns to “Trigger In”.



Now you can start a recording. Click the Trigger In button to start recording. While recording, the button reads “Recording” in red letters.
To stop recording any time during recording, click the Rec Done button.



When recording is done, the PFV goes to the memory mode and playback of recorded image data becomes ready.

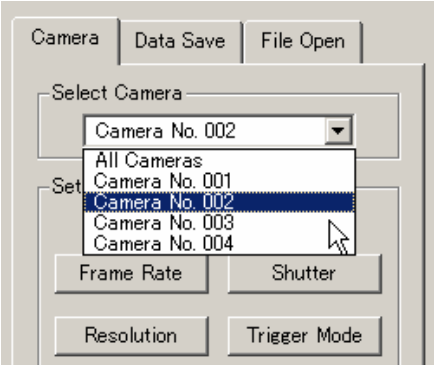
3.6. Playback of Recorded Images

3.6.1. Basics of Playback Operation

After recording images in memory, you can play back the recorded images by software operation. This section discusses the procedure to play back recorded images.

1. Select camera(s) to play back

Select camera(s) to play back from the pull-down box on the Camera Control Panel. The pull-down box lists all the cameras that are currently connected.



2. Check memory play back mode

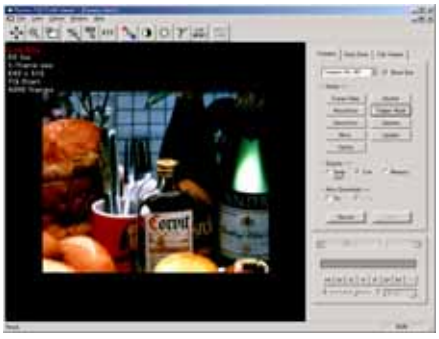
Make sure the Memory Check Box has been selected.

3. Display images

The view windows display recorded images.

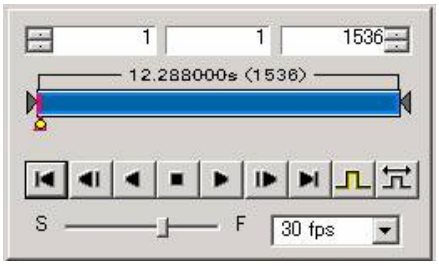
Use the toolbar to readjust contrast, brightness, gamma and magnification.

See section 3.5 for details of toolbar operation.



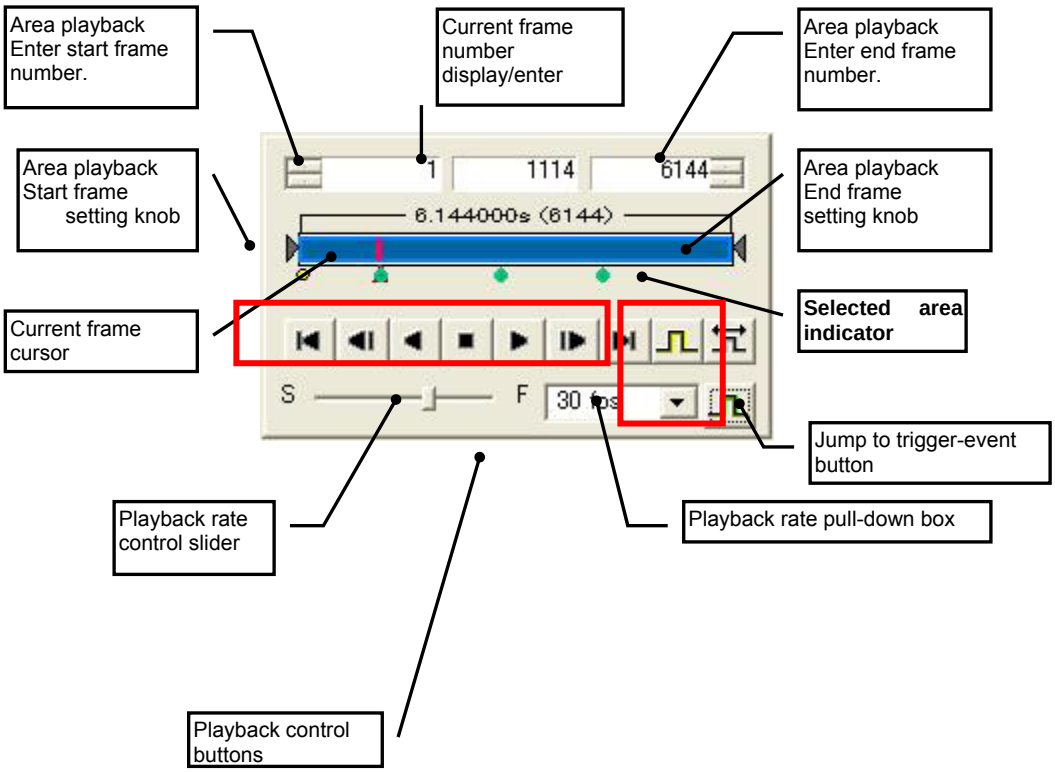
4. Playback control

The displayed images are controlled by the playback control panel. See subsection 3.9.1 for details.



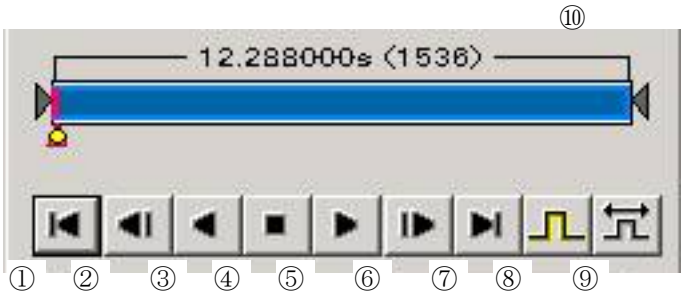
3.6.2. Playback control panel operation

The playback control panel provides control on normal and reverse play, fast forward, fast reverse, jogging, trigger point pickup, etc. with the same ease as the video cassette recorder. It also controls block playback range assignment and playback speed.



3.6.3. Basics of playback control

The camera-recorded images or image data read from files can be played back by simple control allowing normal and jog playback. The function of each button is shown below.



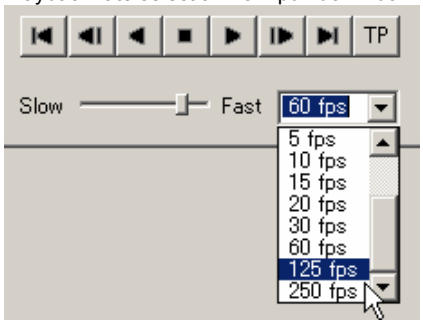
① Jump to first frame
② Reverse jog play
③ Reverse play
④ Stop
⑤ Play
⑥ Jog play
⑦ Jump to last frame
⑧ Jump to trigger point
⑨ Adjust trigger point on/off
⑩ Playback slide bar

In Reverse play (3) and Play (5), the sequence of played frames automatically repeats itself.

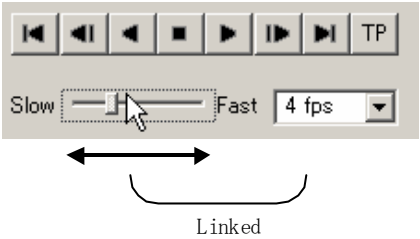
3.6.4. Playback rate control

Playback rate of camera-recorded images or image data read from files can be controlled on the PC monitor. The playback rate is set by the slider bar or from the pull-down box. The layback rate set by these controls work on both normal and reverse playback operations.

Playback rate selection from pull-down box



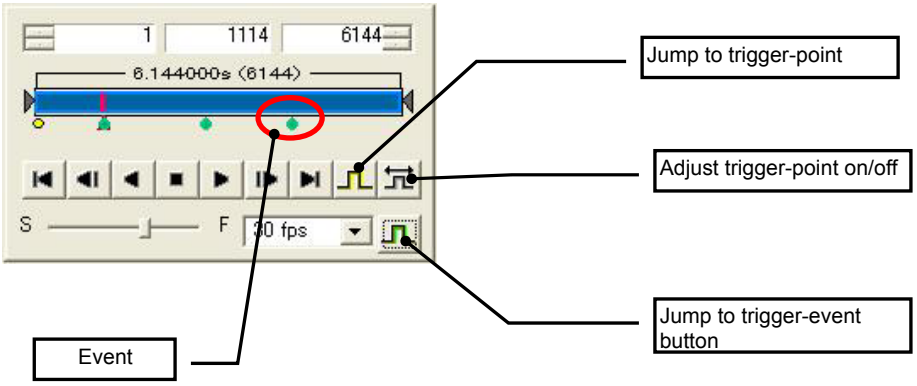
Playback rate setting by slider bar



3.6.5. Jump to Trigger-Event

You can jump to the trigger-frame by pressing the “Jump to trigger-frame” button. Also, you can jump to a virtual trigger-frame by pressing the ↓ button that appears at a press on the “Adjust trigger-point on/off” button

If your camera has “Event marker” function, you can jump to the event frame by pressing the “Jump to trigger-event” button. (this may not be available depending on the firmware version).

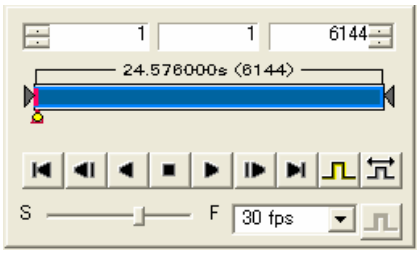


3.6.6. Setting Virtual Trigger Frame

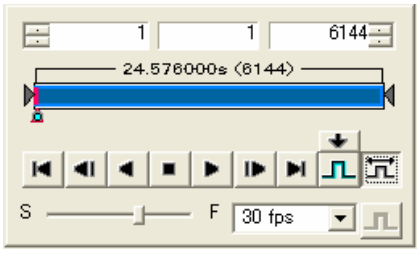
In addition to the trigger frame for actually recording images, the PFV software has a feature called the Virtual Trigger Frame that allows for assigning any frame a “virtual trigger frame” to which the PFV can jump at a press of a button. This is a useful feature for you to remember any particular frame as a reference point within a recording session.

How to Set Virtual Trigger Frame

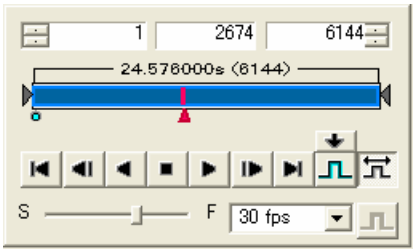
In the case of a footage recorded in the Start Trigger mode, shown below, the trigger frame is positioned at the left end of the time-line. You are ready to set a virtual trigger frame now.



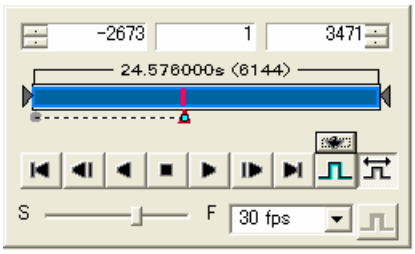
Click the “Virtual Trigger Frame” button to turn it ON. The button now looks “recessed“. Also, an arrow “⇩” button appears right above the “Move to Trigger Frame” button.



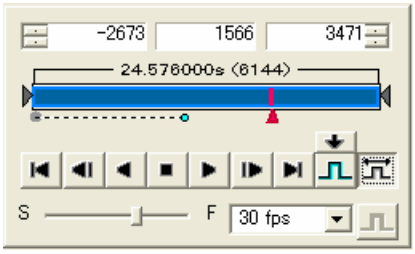
Move the red bar to the frame that you wish to assign the virtual trigger frame.



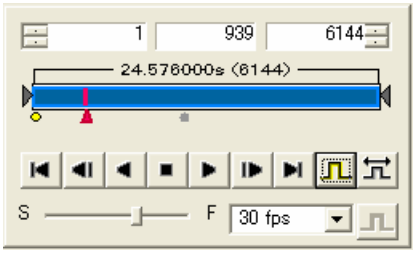
With the red bar on the frame that you wish to assign the virtual trigger frame, press the arrow "⇩"button. The frame has now been assigned the virtual trigger frame, and the original trigger frame has now been disabled. As a clear indication of the virtual trigger frame, the PFV has set a dotted line between it and the original trigger point as shown below.



Press the "Move to Trigger Frame" button with the red bar anywhere within the displayed timeline (as shown below), and the red bar immediately moves to the virtual trigger frame.

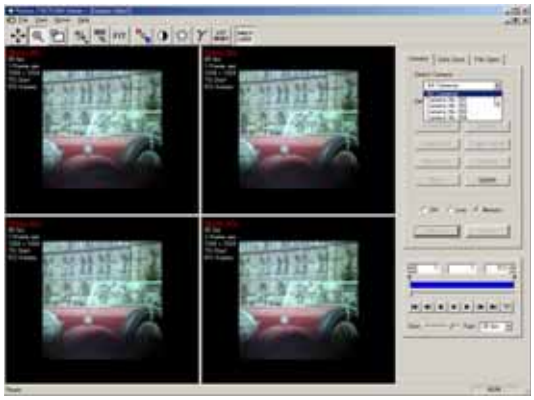


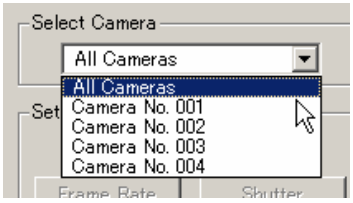
To enable the original trigger frame, click the "Virtual Trigger Frame" button to turn it OFF.
The button now looks flat (not recessed) and the dotted line has disappeared.
Press the "Move to Trigger Frame" button now, and the trigger frame indicator moves back to the original trigger frame position (the left end of the time-line).

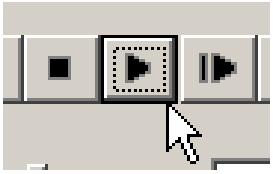


3.6.7. Multi-camera sync playback

When multiple cameras are connected to the system and [All Camera] is selected with the view window in the separate mode, all the cameras play back in synchronization.







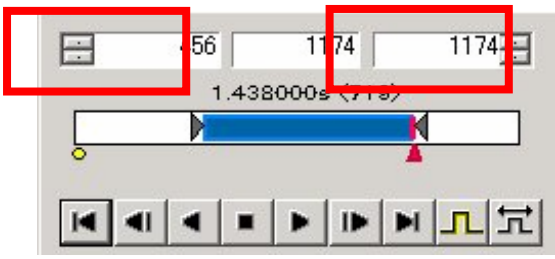
3.6.8. Setting playback area

This control software has a feature to play back only a selected area out of the whole recorded image data. Selection of an area is done from the playback control panel.

The following two ways of setting an area for playback are available.

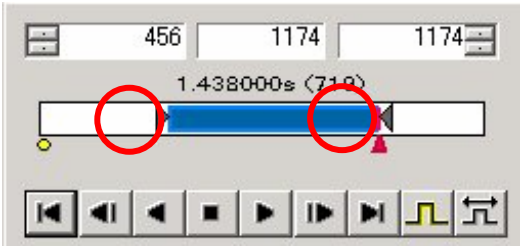
1. Area setting by entering frame numbers

Use the area setting boxes to set a playback area. Either enter a desired frame number to Start and End boxes, or click the spin control by your mouse, to set the start and end frames of an area for playback. The blue playback area indicator shows the relative position of a selected area within the whole recording.



2. Area setting by mouse

To set a rough playback area, just drag the area control knobs by your mouse. Both start and end frames can be set by the mouse. The frame counts are automatically updated as the knobs are dragged.



The playback area data assigned here is retained even after function tabs on the control panel are changed, and can be used for image download area assignment and filing the image data as well.

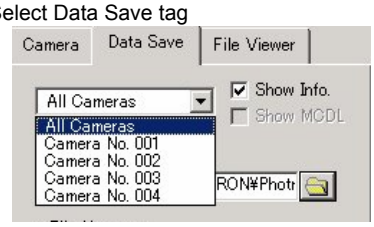
3.7. Image data downloading and filing

The image data recorded in the processor memory is automatically erased as soon as the camera system is shut down. To retain recorded image data, you need to download the data to your PC and save as a file. This section discusses the procedure to download and file recorded image data.

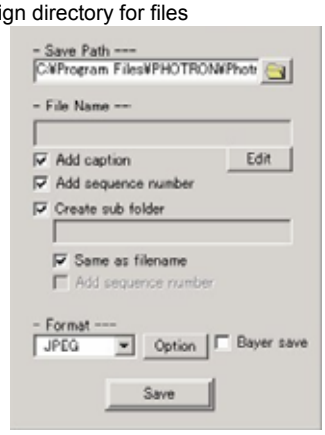
3.7.1. Saving all the recorded image data from camera

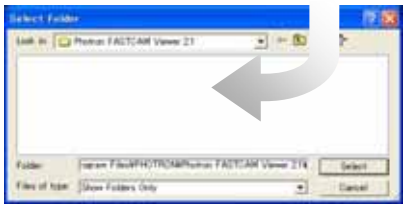
Follow the procedure below to download all the recorded image data to save in file.

① Select Data Save tag



② Assign directory for files





③Select file format / Download and save

① Select a camera

Select Data Save tag on the control panel.
In multi-camera operation, select a camera whose image data you wish to save from the pull-down menu.

② Assign directory for files

Assign directory to save files. Because the image data may be fairly large, be sure to assign a directory that has sufficient capacity.
You can assign directory by typing in Path box or clicking the Browse button.

③ Select file format

Select a format for saving the image data. Some formats will activate Option button requiring you to set further parameters (compression rate, etc.).

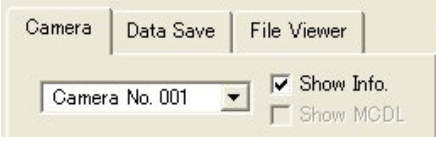
④ Download and save

Click the Save button to download image data from the camera processor to PC and save the image data in file. Download and saving of image data takes much time because the data amount of high-speed imagery is usually large.

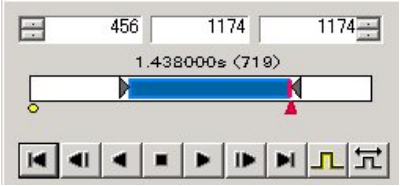
3.7.2. Saving selected portions of recorded image data

Follow the procedure below to download and save only selected portions of recorded image data.

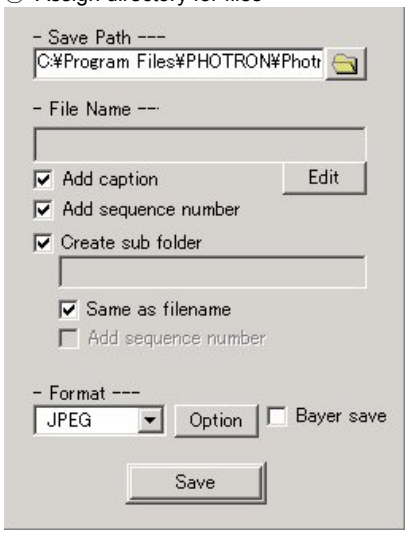
① Select Data Save tag



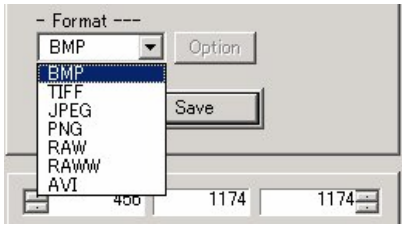
② Select block to save



③ Assign directory for files



④ Select file format / Download and save



① Select a camera

Select Data Save tag on the control panel.
In multi-camera operation, select a camera whose image data you wish to save from the pull-down menu.

② Select block to save

Select a portion of recorded image data that you wish to download and save using the playback area selection bar or selection box in Playback Control Bar

③ Assign directory for files

Assign a directory to save files in. Because the image data may be fairly large, be sure to assign a directory that has sufficient capacity.
You can assign directory by typing in Path box or clicking Browse button.

④ Select file format

Select a format for saving the image data. Some formats will activate Option button requiring you to set further parameters (compression rate, etc.).

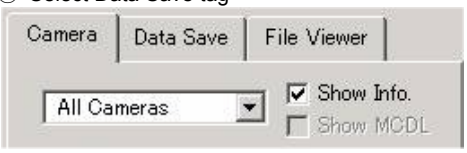
⑤ Download and save

Click the Save button to download image data from the camera processor to PC and save image data in file. Download and saving of image data takes a much time because the data amount of high-speed imagery is usually large.

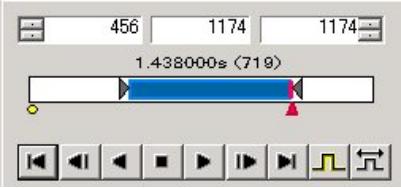
3.7.3. Saving image data from multiple cameras

Follow the procedure below to download and save in file all or selected portion of image data from ALL of the connected cameras.

① Select Data Save tag

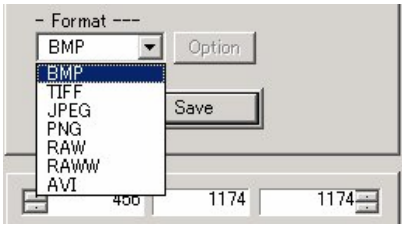


② Select block to save



③ Assign directory for files

④ Select file format / Download and save



① Select all cameras

Click the Data Save tag on the control panel. Select [All Cameras] from the pull-down menu.

② Select block to save

Select a portion of recorded image data that you wish to download and save using the playback area selection bar or selection box in Playback Control Bar. This area selection is commonly effective on all the connected cameras.

③ Assign directory for files

Assign a directory to save files in. Because the image data may be fairly large, be sure to assign a directory that has sufficient capacity.
You can assign a directory by typing in the Path box or clicking the Browse button.

④ Select file format

Select a format for saving the image data. Some formats will activate Option button requiring you to set further parameters (compression rate, etc.).

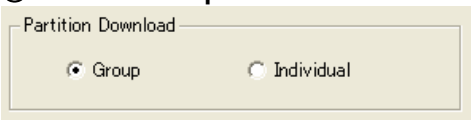
⑤ Download and save

Click the Save button to download image data from the camera processor to PC and save image data in file. Download and saving of image data takes much time because the data amount of high-speed imagery is usually large.

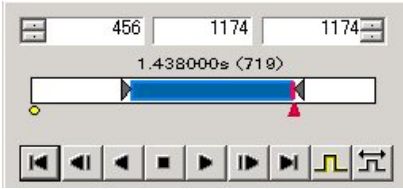
3.7.4. Batch Storage of Image Data from Multiple Partitions

This section describes the procedure to batch-store images from all of or some of selected partitions.

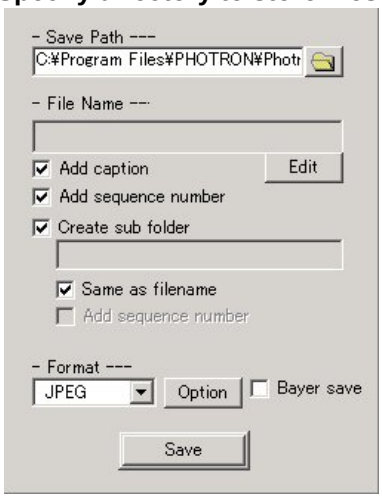
① Select "Group"



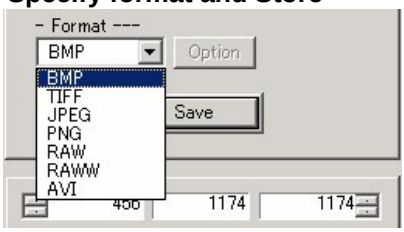
② Specify range of images to store



③ Specify directory to store files in



④ Specify format and Store



① Select "Group"

Make sure that "Group" is selected in Partition Download setup window.

② Specify range of images to store

To specify a range of images to store, first select the Camera tag. Then specify a range of images that you wish to store using the playback area bar or playback frame specifying box in the play control panel
Repeat the above for each of partitions that you wish to download.

③ Specify directory to store files in

Now you specify a directory where you wish to store the files in
Note that the image data can be fairly large and you should be very careful to specify a directory that has a sufficient remaining capacity. To specify, either enter the directory name in the Path box or click the Browse button to select the directory.

Note: Be sure to check the Add sequence number. Otherwise, you will have the overwriting warning message coming up every time one partition of data is downloaded

④ Specify file format

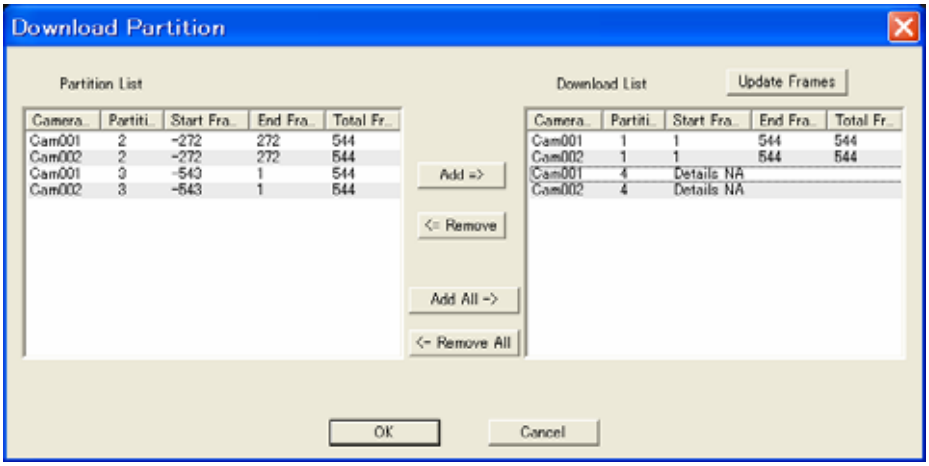
You specify the format you wish to use to store image data.
Depending on the format you may choose, the Option button becomes active allowing you to make more detailed setups such as compression rate.

⑤ Execute download

Press the Save button and the Download Partition dialog appears as shown in the next page.

⑥ Select Partitions

The Download Partition dialog looks like the below figure:



Select a partition that you wish to download from the Partition List in the left and press the Add button to register it in the Download List. If you wish to unselect any of the partitions listed in the Download List, select it and press the Remove button.

If you wish to select or remove all, use the Add All or Remove All button.

If you restarted the PFV after a recording, there may be a chance that the frame information of the recording is not properly acquired (indicated “Details NA”). In such a case, you can restore the frame information from the camera by setting that particular partition in the Download List and pressing the Update Frames button.

Note: When many partitions and cameras are involved, it may take some time to download.

Select a partition(s) and press the OK button and download begins.

3.7.5. Automatic Download for Storage of Image Data

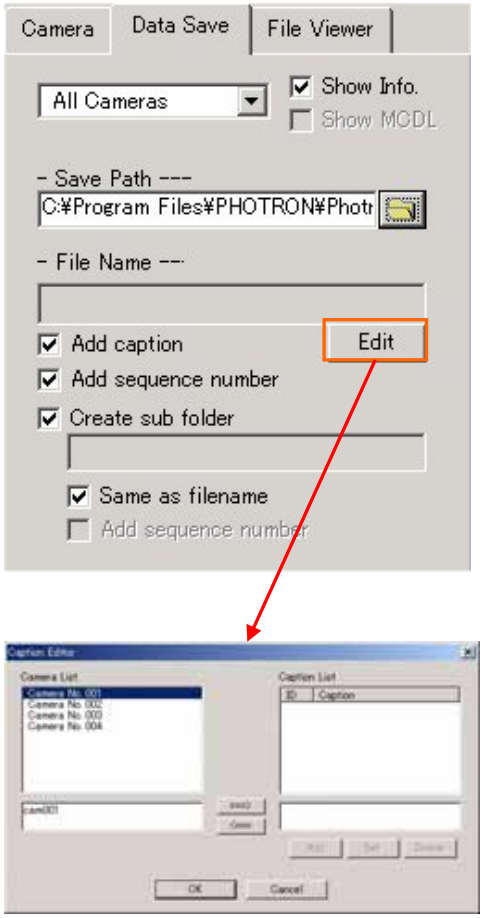
The automatic download function allows for data download to the PC as soon as a recording session ends.

To use this function, it is necessary to predetermine a range of image data to download and set up a directory to store the downloaded data in advance.

For details of Automatic Download, see section 3.5.13.

3.7.6. Editing Camera Names (Captions)

You can attach a comment to each of the cameras by entering a character string to the Caption text box. The caption character string can also be added to the image file name or subfolder name. The following is a discussion on the Caption Editor that performs group editing of captions.



① Tab selection

Select the Data Save tag on the control panel.

② Opening dialog

Click the Edit button in the Data Save tag to open the Caption Editor dialog box.
The list of connected cameras is displayed on the left of the dialog, and in the edit box below it, the caption of the selected camera is shown. On the right hand side of the dialog box, the list of captions registered on PFV (Photron FASTCAM Viewer) is displayed, and below it, the character string of the selected caption is shown.

③ Setting caption to camera

Click each of the items in the Caption List to have the character string displayed in the edit box.
Click the "<==" button to set the character string displayed in the edit box to the camera that has been selected.

④ Registering and renewing captions

Click the "==>" button and the caption character string of the selected camera is copied to the edit box on the right hand side.
Click the "Add" button to register the character string in the edit box as a new item. You can assign any title to the caption as an ID (a default number is assigned and incremented).
Click the “Set” button to replace the contents of the selected caption with the character string shown in the edit box below the Caption List.

⑤ Deleting caption

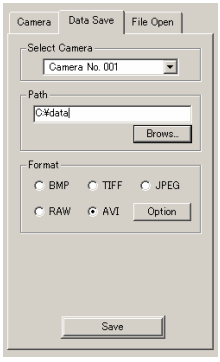
Click the "Delete" button to delete the selected caption from the Caption List.

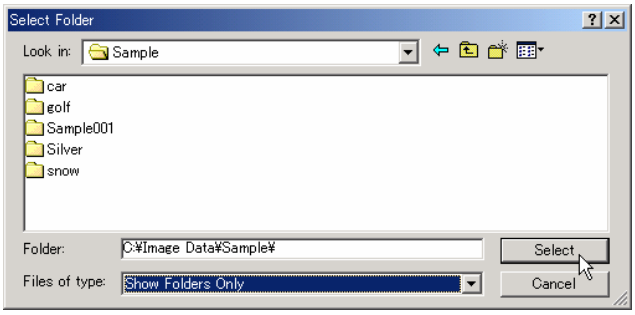
3.7.7. Automatic Numbering and Captioning Feature

This subsection discusses the convention for automatic file name numbering feature that is used to file the image data captured by this control software.
The folder and file names for filing image data under this application is generated under the following rule:

Generating main folder

The directory assigned by [Save Path] input box becomes the main folder. If the folder assigned by the input box does not exist, a new folder must be made following the current description.





Generating of subfolders

When the check box [Create subfolder] is turned on, a new subfolder for the data file is generated under the main folder.
When the check box [Add on filename] is turned on, a new subfolder with a caption letter string, assigned in [Caption] input box, and camera ID number is made under the main folder. When the check box is turned off, a subfolder with a camera ID number is made under the main folder.
The camera ID number consists of C### (camera number) and S#### (4-digit session number). The session number starts with 0001 and, if a subfolder of the same name already exists, it automatically increment to 0002 to generate a new subfolder.

Example: When the [Caption] letter string is “TEST”, the subfolder name for camera 1 will be:

- “TEST_C001S0001” , if the check box [Add on filename] is on, and
- “C001S0001” , if the check box if off.

Generation of file names by automatic numbering

When [SAVE] is executed, the software automatically carries out the numbering process (except for AVI format) of file name using a 6-digit serial number following the letter string from [Caption], and saves the image data (of the pre-selected area) in the newly generated subfolder.

Example: When the [Caption] letter string is “TEST”,

a) For AVI format

A file named “TEST_C001S0001.avi” is generated.

b) For formats other than AVI

A serial numbered file with the name of “TEST_C001S0001######.extension” is generated (###### is a 6-digit number). The 6-digit number always starts with 000001 regardless of the frame number of the pre-selected area or the interval of frames to be saved.

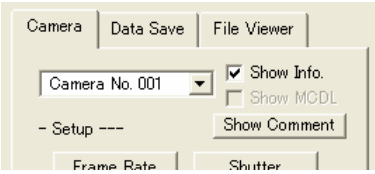
3.7.8. Writing and Displaying Comments

With the PFV, you can add comments in the text format to recorded image data. The following describes how to write and display comments.

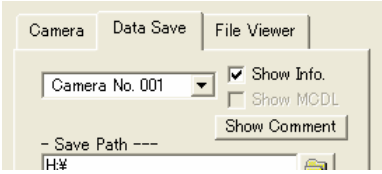
Writing and displaying comments
Writing and displaying comments can be done from Camera, Data Save or File View tab.

With any of the above tabs selected, click the Show Comment button.

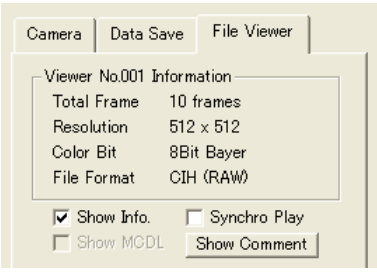
Camera tab



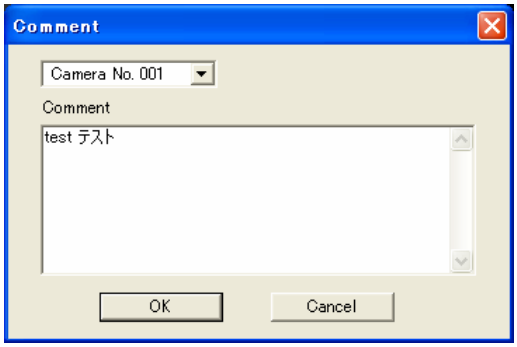
Data Save tab



File Viewer tab



Comment input dialog appears as shown below. If there is any comment already written, it is displayed in the dialog box.
Write, or edit, any comment from the keyboard and click the OK button.

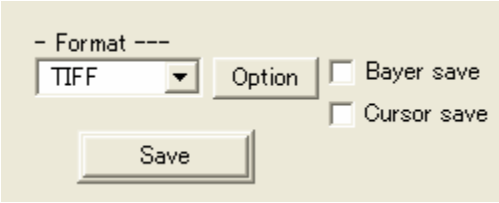


The entered comment is stored in the CIH file (camera information file) together with other framing information.

The maximum number of letters or numerals is 255. CR or LF codes are not supported, and so no line feed is possible.

3.7.9. Optional Functions for File Saving

Optional functions for saving files are described below:



① Bayer Save

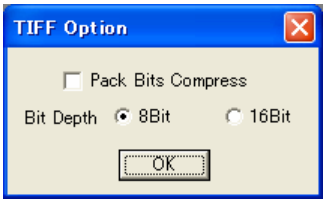
In a single-sensor color video camera, RGB color filters are arrayed in a checkerboard manner over the array of sensor pixels to generate grayscale signals with latent color information, which are processed under a certain algorithm and are turned into RGB color signals. A typical example of the algorithm used to generate color image signals is the famous Bayer method that is used in the Photron color camera systems.
The PFV system can store the raw grayscale signals as they are output from the camera's single sensor, prior to conversion to color signals. This technique is called the Bayer Save.

Check the Bayer save checkbox in the control panel, and the data of the camera sensor is stored as is, which is called "Bayer save". In the case with a single-sensor camera, the data amount is the same regardless of the camera being color or monochrome, and the output file size consequently remains the same.

Note that, even with a color camera, the data is basically monochrome and the displayed file is monochrome data (Bayer data)

Note: With the FTIF format, the data is automatically saved in Bayer save.

② TIFF Option



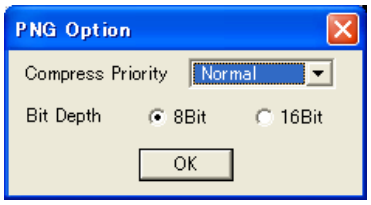
■ Pack Bits Compress
Checkbox selects Active (checked) or Inactive (unchecked) of Pack Bits compression.
When it is unchecked, the image data remains uncompressed.

■ Bit Depth
Selects depth of image: 8 or 16 bits

③ JPEG Option

■ Compression quality
Sets the quality of compressed image: the higher the value, the higher the picture quality and the lower the compression rate.

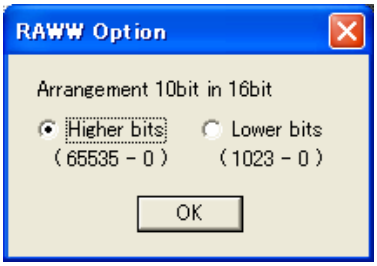
④ PNG Option



■ Compress Priority Selects priority for compression: speed, normal or file size
■ Bit Depth Selects depth of image: 8 or 16 bits

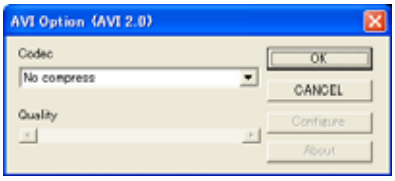
Note: See also section 6.5.

⑤ RAWW Option



■ Arrangement 10 bits in 16bits
Determines where to place 10-bit data within 16-bit data (higher bits or lower bits)

⑥ AVI Option



Note the difference of the option dialog window between AVI 1.0 and 2.0

■ Compression Program (Codec)
Selects Codec for AVI output

■ Quality of Compression
Set quality for the selected Codec. The higher the quality of compression, the larger is the file size.

■ Configure
If the selected Codec has its own readjustment dialog, you can change settings.

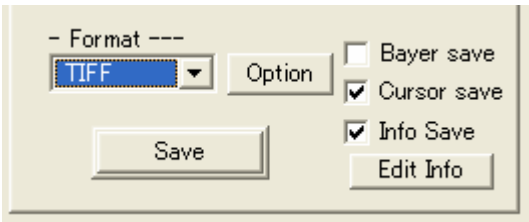
■ Version Information
Indicates the version information of the selected Codec

Note: Codec programs have different specifications and all listed codec programs are not necessarily usable. If a codec is not usable, you will have an error when storing.
Note: PFV does not guarantee the performance of codec programs other than no compression.

See also:
Section 6.8. AVI File Format
Subsection 5.1.10. Put default play rate into AVI file

3.7.10. Storing Image Data with Additional Information

The PFV can add varied information, such as crosshair cursor, frame rate, time elapsed, etc., over the image data at the time of downloading from memory, reading in or re-writing



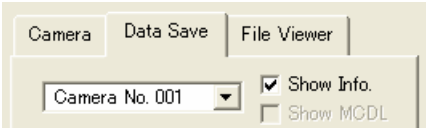
① Cursor Save

Check the Cursor Save checkbox in the control panel, and the cross cursor is recorded as part of image data, superimposed on the image.
The color of the cross cursor recorded on the image is as follows:

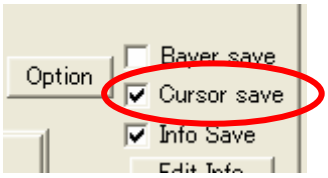
Color camera:	The color when it is locked within an image
Monochrome camera:	White if the grayscale of the pixel underneath is 0 to 127 (for 8-bit data) Black if the grayscale of the pixel underneath is 128 to 255 (for 8-bit data)

Adding Crosshair Cursor over Image

1. Select the Data Save or File Viewer tab on the control panel.



2. Check the Cursor save checkbox on the control panel to switch it ON.



3. Have the crosshair cursor displayed on the screen and click at the position where you wish to have the cursor locked overlaid.

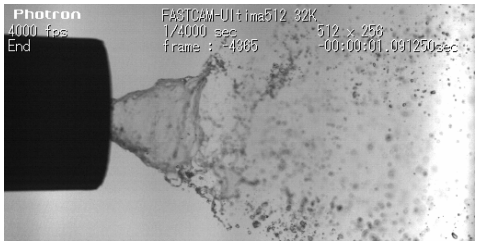
4. Select a filing format you wish to use and click the Save button.

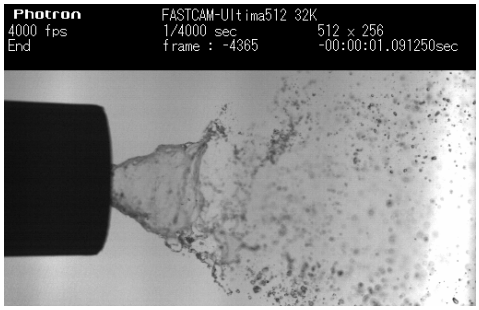
Note: This feature is not available for RAW, RAWW/ or FTIF format

② Saving Image Date with Framing Information Overlaid (Info Save)

This feature allows for storing image data overlaid with various framing information in the form of a CIH file that is automatically generated during recording.

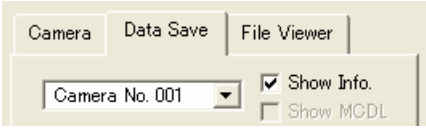
Examples of overlaid framing information:



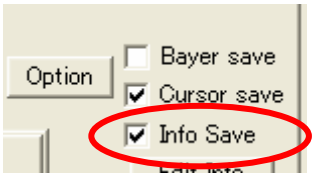


How to Overlay Framing Information on Image Data

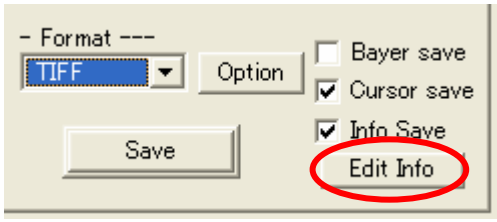
1. Select the Data Save or File Viewer tab on the control panel.



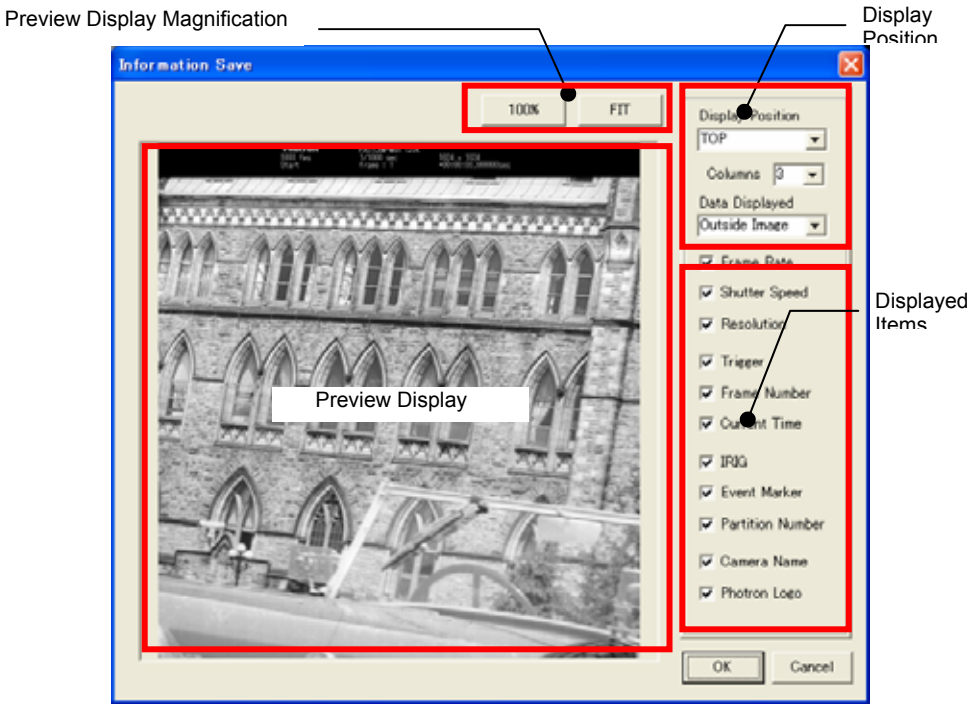
2. Check the Info Save checkbox on the control panel to switch it ON.



3. Click the Edit Info button.



4. The Information Save dialog appears and setup menu is displayed.



■ Preview Display
The PFV displays a preview screen of stored image date overlaid with framing information.

■ Preview Display Magnification
You select 100 % (pixel-to-pixel compatible) or FIT (full image) for display.

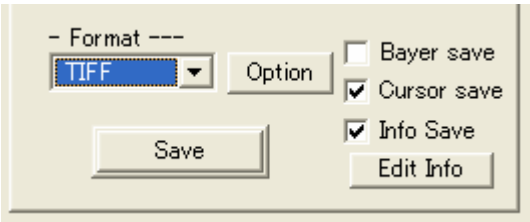
■ Display Position

Display Position	Displayed position is selected from TOP (top portion of screen), LEFT (left-hand side of screen), RIGHT (right-hand side of screen) or BOTTOM (bottom of screen)	
Columns	Specifies the number of lines for TOP or BOTTOM display.	
Data Displayed	Outside Image	Information is added to outside of image area.
	Inside Image	Information is added over image (overlaid).

■ Displayed Items
You can select additional information items to overlay on the image from the following:

Information Item	Description
Frame Rate	The frame rate recorded in CIH file is displayed in FPS (Frames Per Second)
Shutter Speed	The shutter speed recorded in CIH file is displayed in Seconds.
Resolution	The resolution recorded in CIH file is displayed in pixels.
Trigger	The trigger mode recorded in CIH file is displayed.
Frame Number	The frame number of moving image sequence is displayed. The number begins with “0” (zero) which is the trigger frame for a recording.
Current Time	The real time in second is displayed for the displayed image. The count begins with “0” (zero) which is the trigger frame for a recording.
IRIG	For image sequence recorded with IRIG time code, IRIG time is displayed to each displayed frame.
Event Marker	For image sequence recorded with event markers, Event N (number) is displayed (N = 1 to 10).
Partition Number	The memory partition numbers used in a recording are displayed.
Camera Name	The model name of camera used for recording is displayed.
Photron Logo	Photron’s logo is displayed.
Comment	Displays saved comments. (Ref. 3.8.8.)

5. Select a file format that you wish to use for storing information and click the Save button.



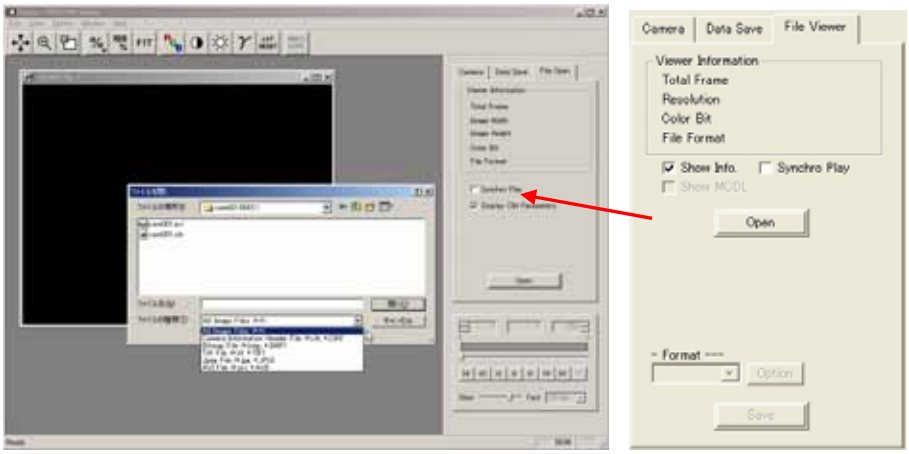
Note: Cursor is not available for saving in the RAW, RAWW or FTIF file format

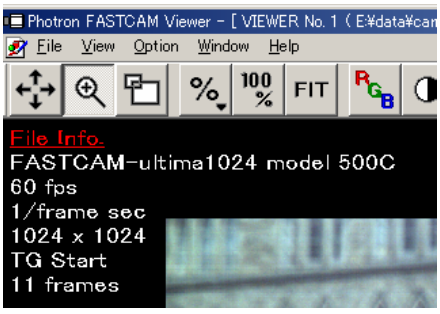
3.8. Reading saved data from file

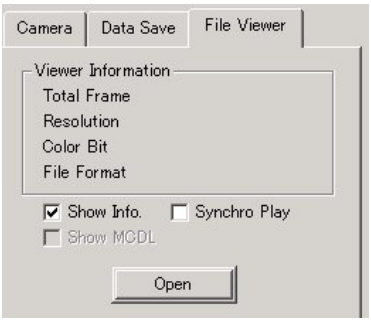
As well as controlling the cameras from the PC and downloading and saving image data, the FASTCAM Control Software provides the function of reading and displaying the filed image data from the PC. This section discusses the procedure of reading and displaying filed image data.

3.8.1. Reading in and Playback of Image Data Files

Procedures for reading in image data files and display of playback image are discussed here.







① Select tab

Select the File Open tab in the control panel

② Open up file

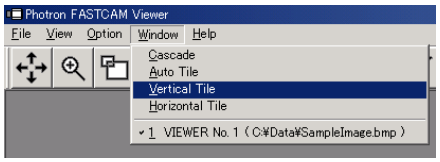
Click the Open button and a dialog box opens up for selecting the directory where the file you wish to open is saved.
Select the image data file of your interest. A view window of CIH, BMP, TIFF, JPEG or AVI format opens and displays the image in it.

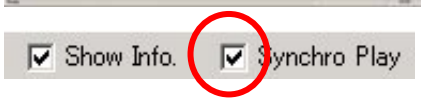
③ Playback of file

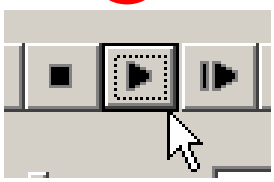
You can control playback functions from the playback control panel. You can also effect various readjustments to and zooming of the displayed image from the toolbar.
If the image data was recorded on a Photron camera and has its CIH (Camera Information Header), all the pertinent information regarding the image data is shown on the control panel.
Turn the [Display CIH Parameters] check box ON to display the information regarding the framing parameters.

3.8.2. Reading multiple files and simultaneous playback

The multiple window feature of this software can read multiple movie files at one time and play them back on the screen simultaultima512usly. It is a useful feature for simultaultima512us analysis of multiple, coincidental events.







① Open up multiple files

Click the File Open button in the [File Open] tab on the control panel, and select a file that you wish to open. Repeat this on other files that you wish to open. Each of the selected movie image files is opened in a corresponding View Window.

② Align view windows

Select a command from the pull-down menu Windows(W) to place two view windows in any position within the screen. Select the Auto button and the software will place the currently opened windows distributed in the most appropriate positions.

③ Lock up opened image files

Select the [SYNCPLAY] check box from the toolbar to activate the icons.
In this status, display adjustment and playback control of all the opened image files are simultaultima512usly carried out.

④ Play back images

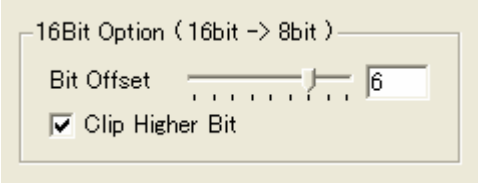
Play two of the opened image files from the playback control bar. The selected two movie image files will be simultaultima512usly displayed.

Set the check box [Synchro Play] OFF, and each of the images in the view windows is played individually.

3.8.3. Display of 16-bit Data

RAWW and 16-bit PNG data files store one plaultima512f image data in a 16-bi data format. This section discusses how a 16-bit data file is displayed.

When a 16-bit data file is opened, a control window, as shown below, appears on the control panel.



The PFV displays a 16-bit image using 8 bits out of the available 16 bits that make up the whole image. This is because the Windows cannot display image data that has over 8 bits.

The PFV allows you to select any 8 contiguous bits to display out of the 16 by adjusting Bit Offset. You can change the bits to display by moving the slider, left and right, or entering a number in the edit box.

Also, by checking the “Clip Higher Bit” check box, you can suppress bits that are higher than the specified bit in the edit box. For normal use, keep the check box checked.

3.9. Re-saving image file data

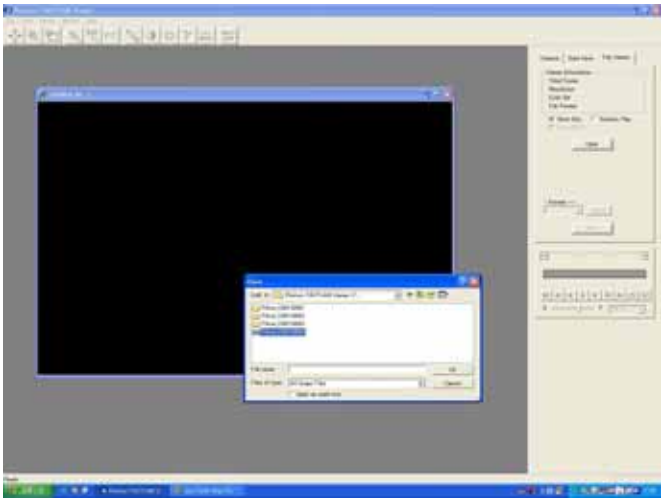
This section discusses how to re-save image data read from a file in another data format.

① Select tab

Select the File Open tab on the control panel.

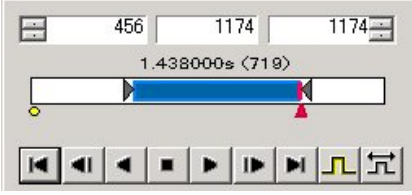
② Opening files

Click the Open button and a dialog box opens to select the directory where files are stored. Pick any of the files. The file format can be CIH, BMP, TIFF, JPEG or AVI. The View window opens and the selected image is displayed.



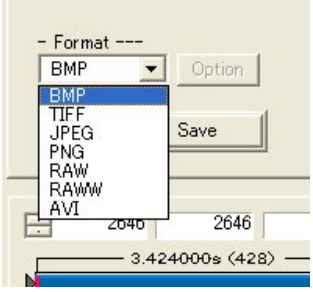
③ Selecting area for re-saving

You can select an area for re-saving in the same manner as area selection for playback. Select an area that you wish to re-save on the playback control.



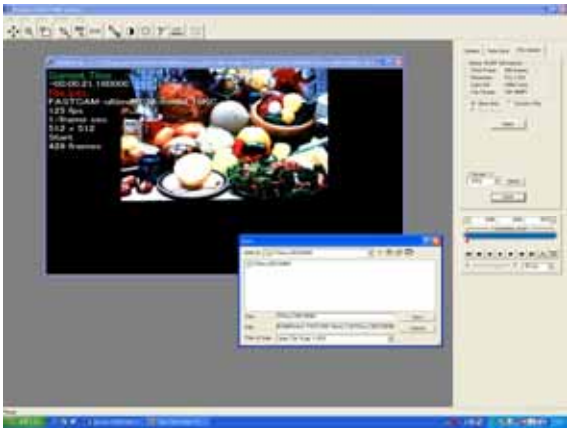
④ Selecting file format

Select a format for re-saving the image data. Some of the formats will activate Option buttons to set parameters for re-saving (compression ratio, etc.).
Note: You cannot select FTIF at restoring.



⑤ Re-saving image data

Click the Save button to open up the window to assign a title and directory for the file. Type the title for the data in the Title box. You can assign the directory to re-save the file by typing directly in the Path box or by browsing the folder list to select a directory.



Click the Save button to re-save. A certain length of time may be needed for re-saving depending on the file format and compression ratio.

4. Controlling Optional Hardware Devices

The PFV offers operational features that enable control of camera setting up, recording, viewing recorded images, downloading image data and saving data files in simple, seamless operation. This section describes its additional functionality of controlling optional hardware devices.

4.1. Using PHOTRON MCDL BOX

The PHOTRON MCDL BOX is an analog waveform recording device specifically designed for use with Photron high-speed cameras.
Photron high-speed cameras with MCDL/IRIG input feature can, in addition to exporting MCDL data, graphically display such data on the PFV screen. It can display not only the currently saved data but also data stored in files (data from the MCDL simultaneously recorded with image by the PFV).

4.1.1. Displaying data recorded in camera

① Recording input from the MCDL

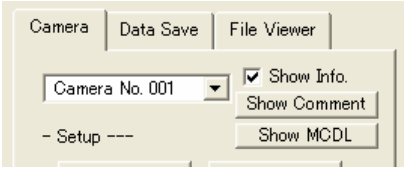
Record image with camera parameters set to the need of the framing and with the MCDL function switched on.

② Setting camera to memory playback mode

Select the Camera or Data Save tab on the control panel. Make sure that the system is in the memory playback mode.

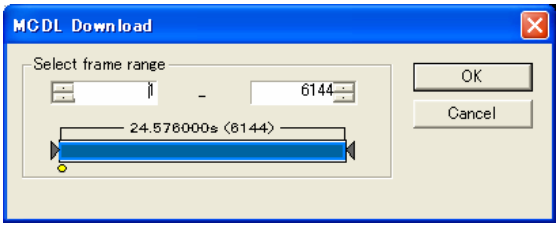
③ Switching MCDL display on

Click [Show MCDL] button on the control panel. This button remains gray (inactive) when MCDL data is NOT being simultaneously recorded with image.

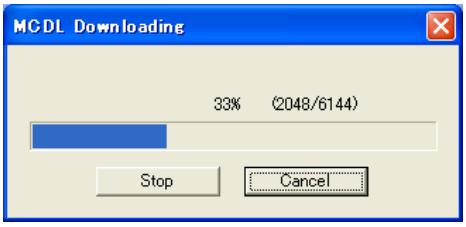


④ Assigning area for download

Check the checkbox and the area assignment dialog box appears. Select an area for download and press the OK button.

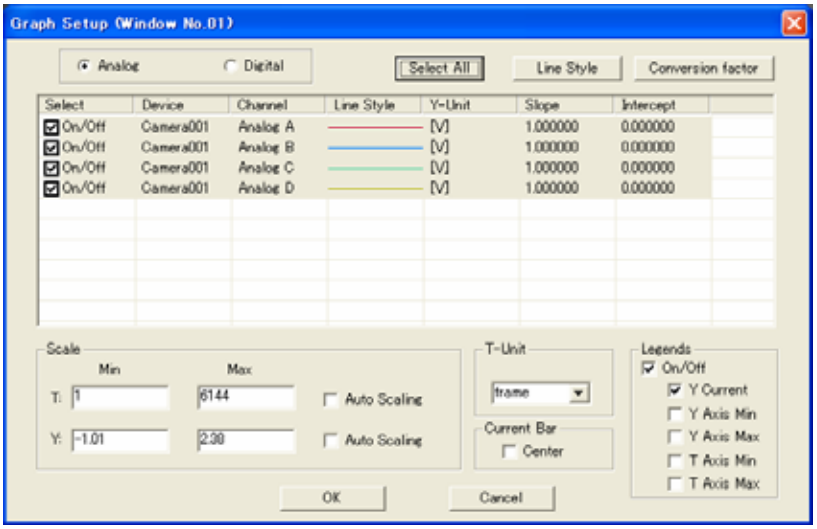


MCDL data is downloaded.



④ Graphic display of MCDL data

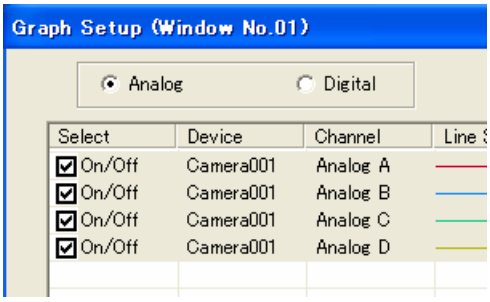
When download is done, the MCDL graphic setup dialog (Graph Setup) appears.



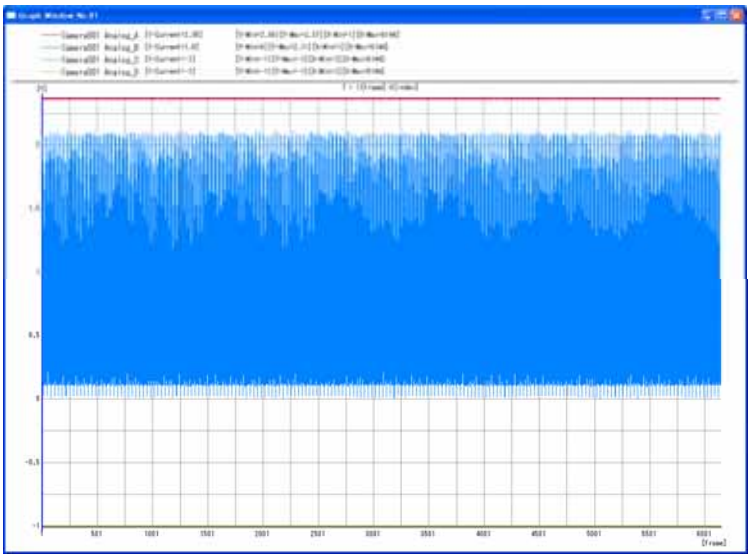
1) Displaying analog waveform

To display analog waveform data from the MCDL, select the Analog check box as shown below.

Then, select channels of data that you wish to have displayed. Use the On/Off check boxes in the Select column to select channels of data to graphically display on the screen.



Click the OK button and a graph window is displayed.

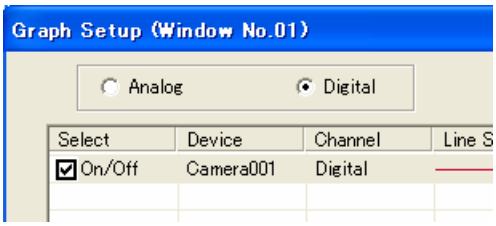


Right-click on the graph window and the MCDL graphic setup dialog (Graph Setup) returns on the screen for you to make any necessary settings and changes.

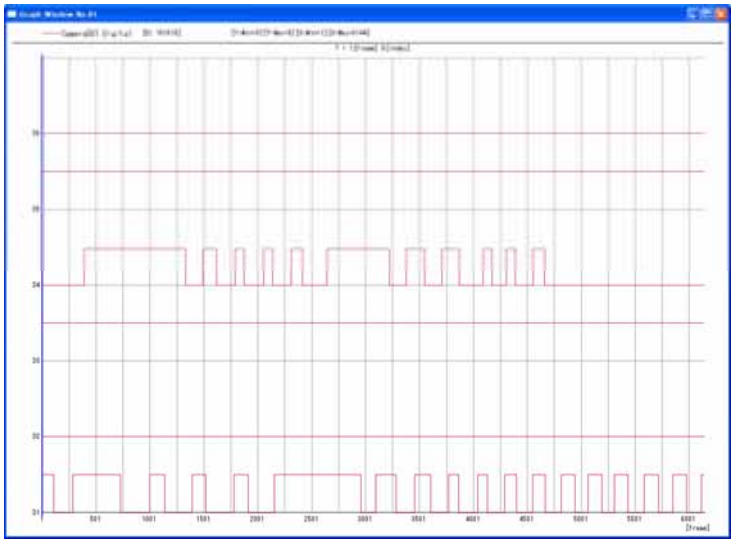
2) Displaying digital waveform

To have digital signal data from the MCDL, select the [Digital] check box.

Then, to have graphical display of the data, select the channels of data that you wish to have displayed. Select channels by checking the On/Off checkboxes in the Select column.



Click the OK button and a graph window is displayed as shown below:



Right-click on the graph window and the MCDL graphic setup dialog (Graph Setup) returns on the screen for you to make any necessary settings and changes.

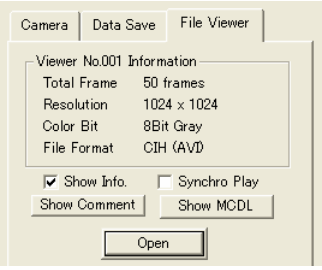
4.1.2. Displaying MCDL data recorded in files

① Opening a file

Select the File View tab on the control panel and open a stored CIH file.

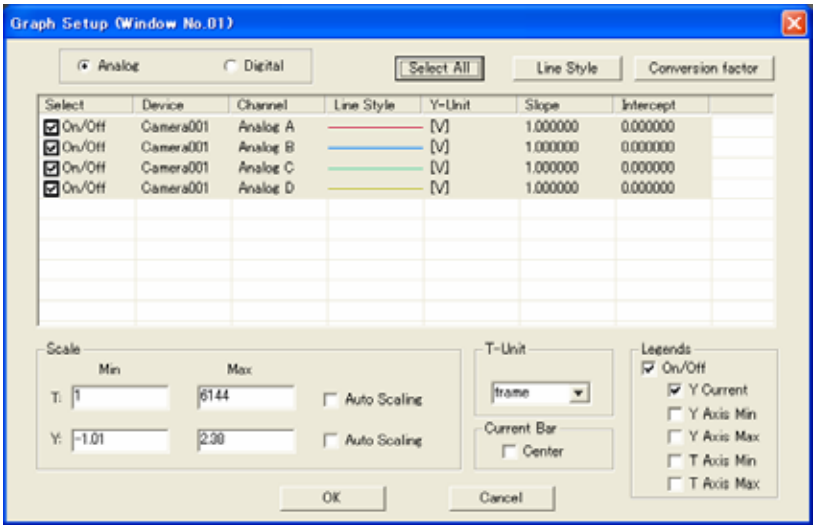
② Turning MCDL display on

Click the [Show MCDL] button on the control panel. This button remains gray (inactive) when MCDL data is NOT being simultaneously recorded with image.



③ Graphic display of MCDL data

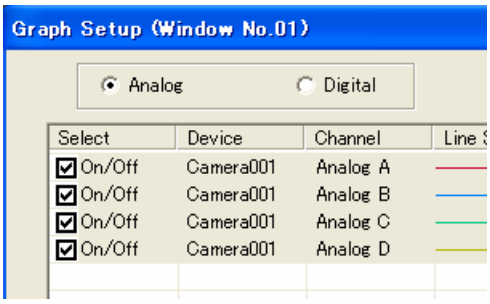
The MCDL graphic setup dialog (Graph Setup) appears.



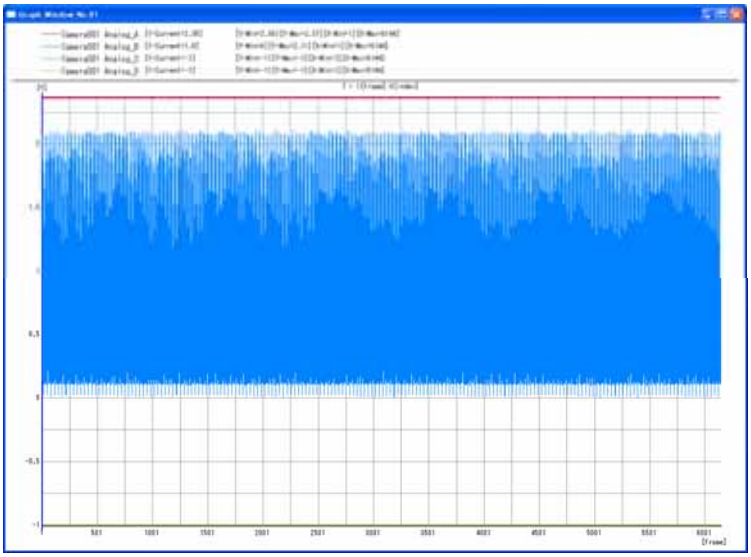
1) Displaying analog waveform

To display analog waveform data from the MCDL, select the Analog check box as shown below.

Then, select channels of data that you wish to have displayed. Use the On/Off check boxes in the Select column to select channels of data to graphically display on the screen.



Click the OK button and a graph window is displayed.

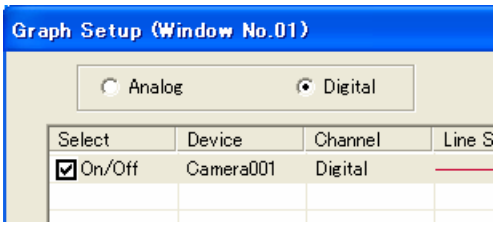


Right-click on the graph window and the MCDL graphic setup dialog (Graph Setup) returns on the screen for you to make any necessary settings and changes.

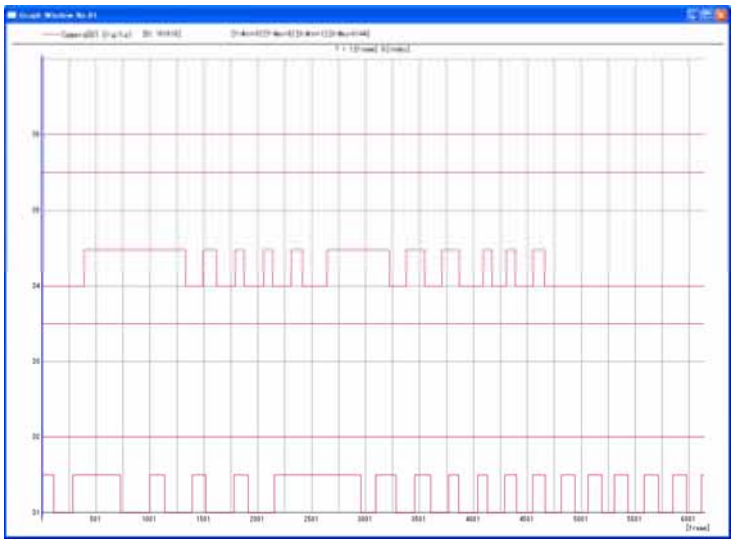
2) Displaying digital waveform

To have digital signal data from the MCDL, select the [Digital] checkbox.

Then, select channels of data that you wish to have displayed. Use the On/Off check boxes in the Select column to select channels of data to graphically display on the screen.



Click the OK button and the graph window appears.



Right-click on the graph window and the MCDL graphic setup dialog (Graph Setup) returns on the screen for you to make any necessary settings and changes.

4.1.3. Exporting MCDL data

With a camera having an MCDL/IRIG option incorporated, external analog input data of 2 or 4 channels, digital data of 6 channels and the IRIG time code data can be stored in synchronization with the image data using the MCDL box.

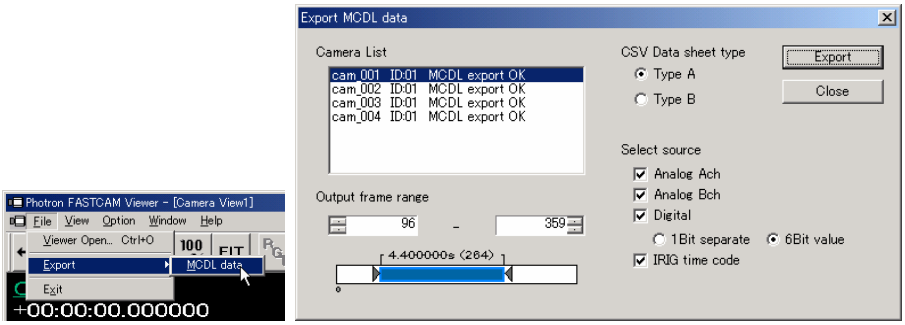
To export MCDL data into CSV format files, follow the below procedure:

① Set camera to memory playback mode

Select the Camera or Data Save tab on the control panel and make sure that the Memory is in the memory playback mode.

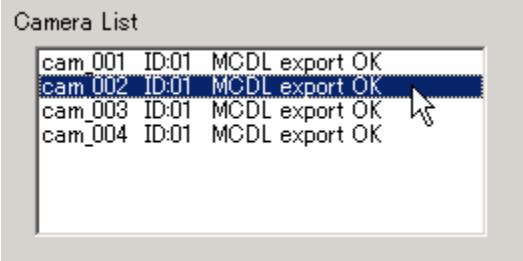
② Select MCDL export window

In the pull-down menu [File(F)] in the main window, click [Export(E)], and then select MCDL data(m) to open up the MCDL export setting window.



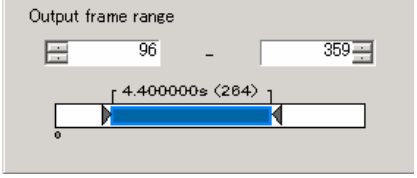
③ Select camera

All the connected cameras are listed on the right had side of the window. Those cameras that can accept MCDL data are marked with “MCDL export OK”. Select a camera to which you wish to export MCDL data.



④ Select export range

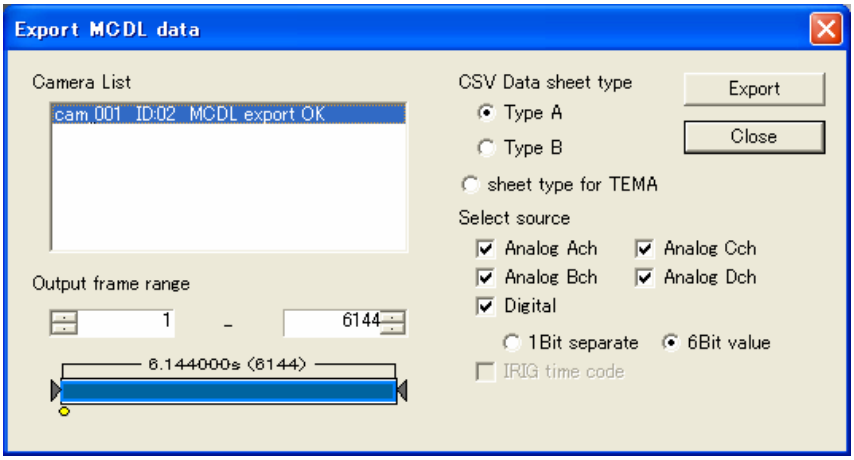
When a camera is selected, other control buttons are activated. Select a range of frames in “Output frame range” where you wish to export MCDL data



⑤ Setting CSV output

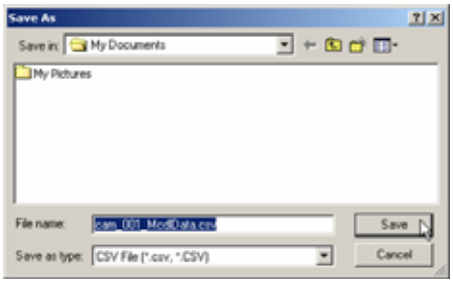
From “CSV Data sheet type”, select Type A or B for CSV (see Section 4.8. MCDL export format).
Check any of the check boxes for data source that you wish to select to export. For digital sources, you must select oultima512f the two data formats – 6 channels of 1-bit separate data or 6-bit data.

If you wish to use the output format in compliance with the waveform data import feature (ISO format) of the TEMA dynamic analysis software, select the [sheet type for TEMA] in the Export MCDL data window.



⑥ Export to a file

After all the above settings are completed, click the Export button to display the Selection window. Input the file and click the Save button to start exporting.



4.1.4. Graphic display option

① Display mode

Select graphs from the analog and digital channels. The below figure shows the setup window with analog channels are selected.
表示するグラフを、アナログチャンネル（Analog）デジタルチャンネル(Digital)から選択します。下図はデジタルチャンネルを選択した際の設定ウィンドウです。

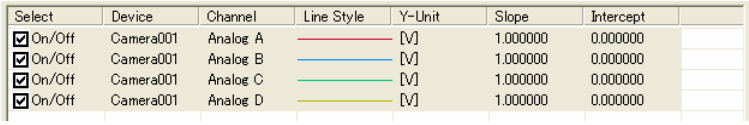
Here is a description about the channel list:

Select	Device	Channel	Line Style	Y-Unit	Slope	Intercept
☑ On/Off	Camera001	Analog A		[V]	1.000000	0.000000
☑ On/Off	Camera001	Analog B		[V]	1.000000	0.000000
☑ On/Off	Camera001	Analog C		[V]	1.000000	0.000000
☑ On/Off	Camera001	Analog D		[V]	1.000000	0.000000
①	②	③	④	⑤	⑥	⑦

①	Select	Sets on or off of display of data acquired by MCDL.
②	Device	Shows name of the camera used to acquire MCDL data.
③	Channel	Shows the channel name of MCDL.
④	Line Style	Sets color, line type and width of lines used for graphic display. Right-click a line in this column to change the line style.
⑤	Y-Unit	Shows the unit of data acquired by MCDL. Right-click here to change unit.
⑥	Slope	Shows the slope (graduation) of graph. Right-click here to change graduation value.
⑦	Intercept	Shows the Y-intercept of graph. Right-click here to change the intercept value.

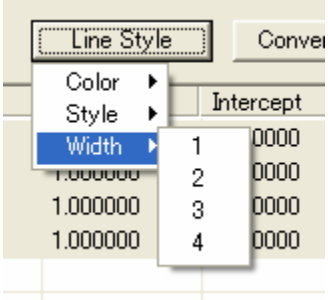
② Selection of channel of data to display

Selection of channels for graphic display is done by checking items in the Select column. Check the checkbox of channels that you wish to display in the graph window.

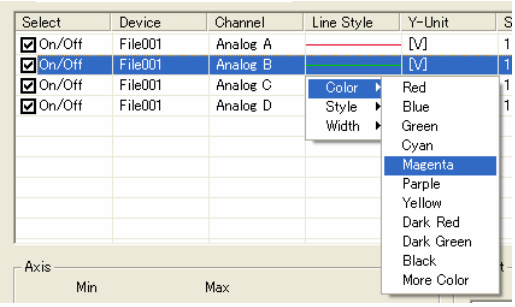


③ Setting line style for graph

You can set the line style – color, type and width – for each of the channels. After selecting a channel, use the pull-down button to select an item to set.

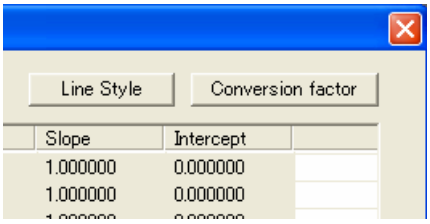


Or, you can access the line style menu by directly right-clicking on Line Style of a selected channel.

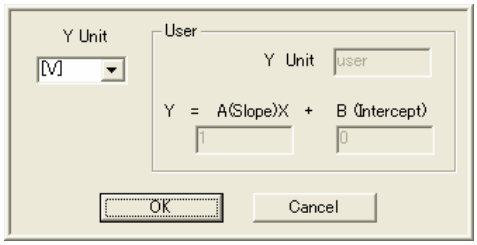


④ Setting unit, slope and intercept of displayed graph

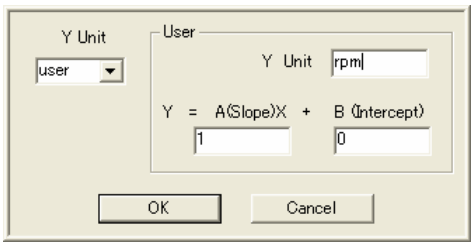
Press the [Conversion factor] button in the upper right corner and a dialog appears as shown in the next page.



You can change the unit of the displayed data in the [Y Unit] pull-down.



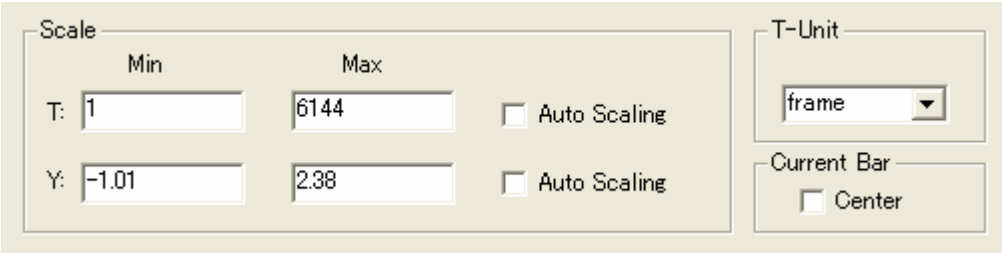
Select [user] and you can set any unit in the [Y Unit] field as you like.



Write a unit of you choice in the [Y Unit] field. Also, you can set the slope and intercept for the graph you are going to display. Slop = 1 and Intercept = 0 are normally used.

Note: The unit set here is applied to all channels of data. Individual setup of unit is not possible.

⑤ Setting range of graphic display



Scale

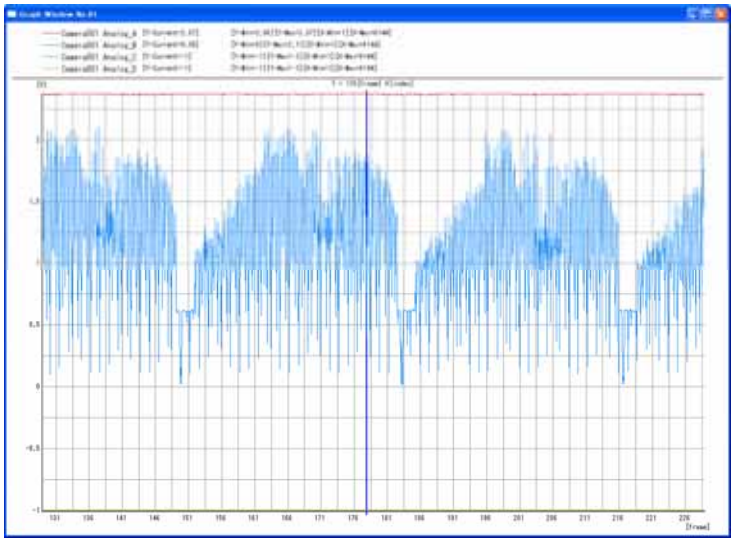
Changes the display range of graphs. Check both T and Y Auto Scaling checkboxes, and the system automatically readjust so that all the data can be set within an appropriate range. You can directly input numbers to set a range, without checking the checkboxes.

T Unit

Offers different units to choose from for the time axis.

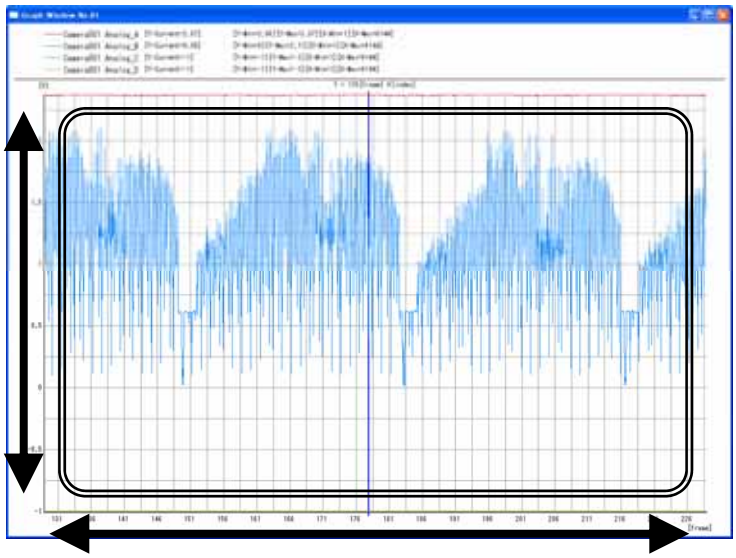
Current Bar

The Current Bar moves in synchronization with the image display showing the temporal correlation between the playback image of a moving event and its relevant waveform data. It usually moves across the screen, but when the [Center] checkbox of [Current Bar] is checked, the bar is fixed to the center of the screen and the graph in the background moves across the screen.



⑥ Graph display

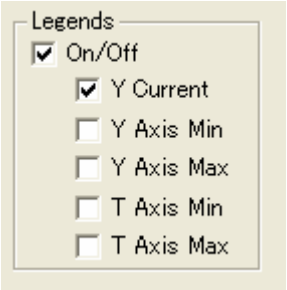
The display area for the displayed graph of waveform can be controlled by the mouse.



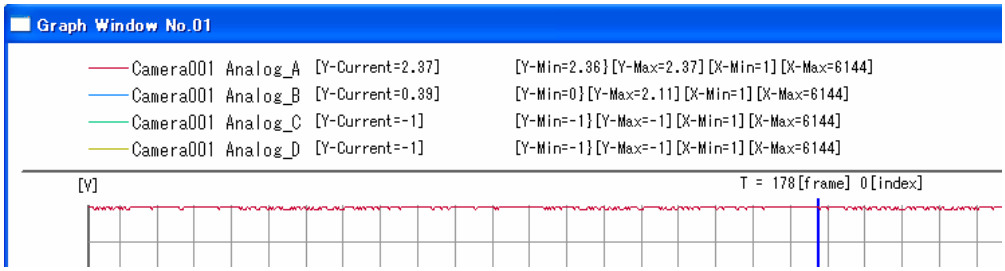
The position of Current Bar can be moved by left-clicking and dragging of the mouse in the area within the double lines.

The size of graph display area can be changed by left-clicking and dragging (left or right, or, up or down) of the mouse.

Legends



Legends can be displayed or hidden by checking or unchecking the relevant checkboxes. Items that can be set are Maximum, Minimum and Current values.



4.2. Using Analog Waveform Input PCI Board Made by Interface Corp.

The PFV software allows for use of Analog Input Board made by Interface Corporation to record analog signals along with high-speed video image of an event for synchronized playback of graph and moving images. This section describes how to set up the Interface Analog Input Board.

Note 1: The functions of the Interface Analog Board of graphic display of waveform data and data export are basically the same as Photron MCDL (see 4.1.)

Note 2: Refer to the Interface Analog Board user's manual for instructions of board and driver installation, setting up.

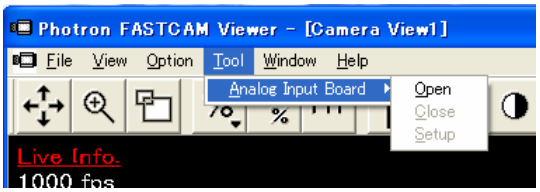
Note 3: For detailed instructions of setting and description of functionality, see the user's manual of each board.

Manufacturer: Interface Corporation
http://www.interface.co.jp/
Bus master device, 12 bits, S2 point multiple AD conversion; Interface: 12 bits, 1 point DA Conversion board, Model PCI-3525

4.2.1. Setting up on PFV software

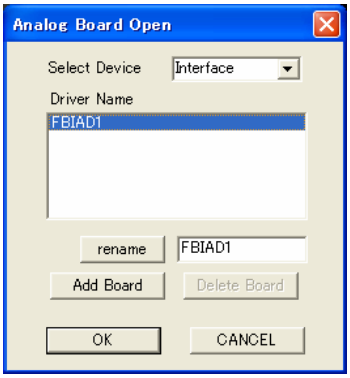
1. Opening the board

To use the analog input board, it must be opened from the PFV as shown below:
Select [Tool] in the menu, and go to [Analog Input Board] and then to [Open].



2. Selecting board

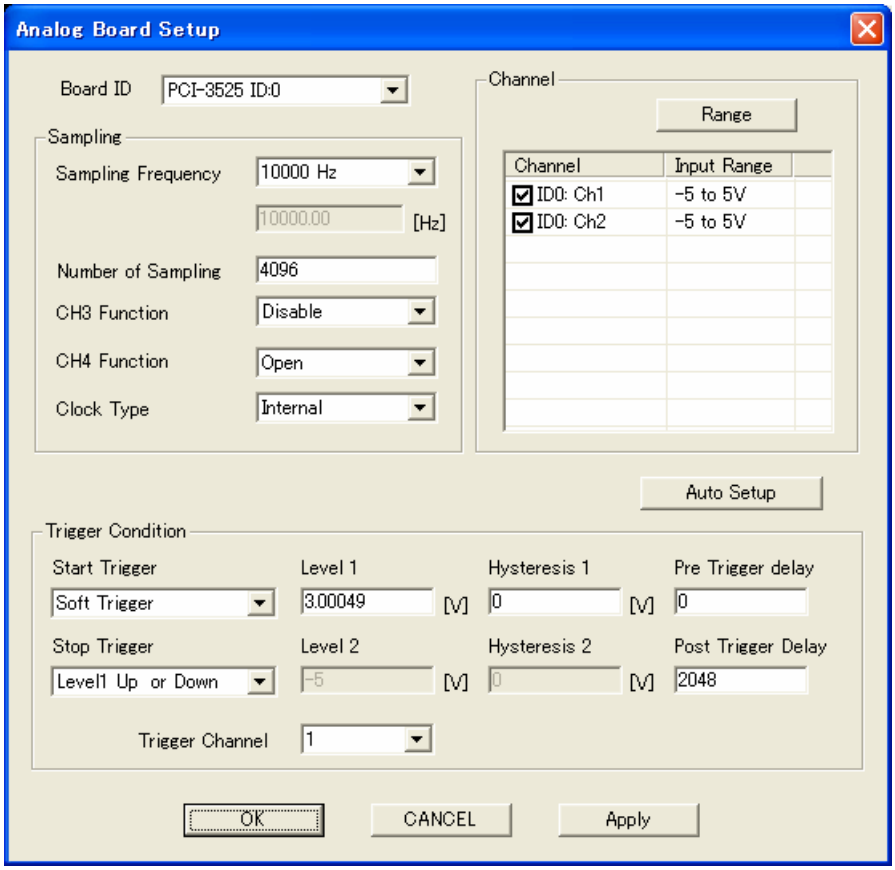
Select your desired analog input board.



Select Device
Select the manufacturer's name of the board you wish to use. This is only needed when there are installed boards from more than two manufacturers.

Driver Name
Set the name of the board that you are going to use. Check the board's device name from the device manager. When you wish to change a device name, select the device name that you wish to change and the [Rename] and [Edit] buttons become active. Edit the name in the edit box and press the [Rename] button to set it. When you are going to use multiple boards by simultaneous sampling, press the [Add Board] button and add a board of your choice (see item 5. below for details). Press the [OK] button and the Setup window is displayed.

3. Setting up boards
The below window appears. This window may be displayed from the [Tool] menu, going to [Analog Input Board] and then to [Setup].



(A) Sampling Frequency
Press the ▼ button of [Sampling Frequency], and frequencies that can be set are displayed. Select a sampling frequency of your choice.
*The frequencies that can be set must be set to a number that is the frame rate multiplied by an integer, presupposing a synchronized recording with the camera. Also, there are sampling frequencies that can be allowed by the board's specification. Consequently, only those sampling frequencies that meet these two

conditions are displayed in the list. If you select the [user] in the bottom of the list, you can set a sampling frequency of your own choice, regardless of the conditions described in the above, provided that your sampling frequency that is out of the board's specification is automatically replaced with a closest approximate value meeting the specification.

（B）Auto Setup

This button, when pressed, automatically sets the number of samples, pre-trigger delay, post-trigger delay and triggering conditions from the camera's frame rate and triggers, and the sampling frequency set for the board.

Note 1: This setting is an example directly related to the camera setup. The trigger condition must be finally set to the user's specific needs and environment.

Note 2: Currently, the number of samplings that can be set has not been specified. And so, when the sampling frequency is set to a high number, you are likely to get an error message when you press the [OK] button (it is so made in order to inform the user of the lack of linkage with the camera).

Note 3: Linkage with the camera can only be established when the camera has been set in the Start, Center or End trigger mode. Accordingly, the [Auto Setup] button can only be effective under the above condition.

（C）Channel

Check the checkboxes for the channels that you wish to use. When you wish to change the voltage range, select a channel and change the voltage using the [Range] button, or place the mouse cursor on the channel you wish to change the voltage of and right-click to display available voltages, and select one.

（D）Number of Sampling

Sets the number of samples to make.

（E）CH3 Function

Sets the function of Channel 3 to Disable (Unused), Trigger In (External trigger input), Trigger Out (Trigger output), Clock In (External clock input) or Clock Out (Clock output).

（F）CH4 Function

Sets the function of Channel 4 to Disable (Unused), Open (Analog output), Trigger In (External clock input), Trigger Out (Trigger output) or Clock Out (Clock output).

（G）Clock Type

Selects a type of clock from Internal (Internal clock), External Up (Rising edge of external clock) or External Down (Falling edge of external clock).

（H）Start Trigger、（I）Stop Trigger

Selects a condition for starting and stopping a recording from the following:

a) Soft Trigger（Sends a trigger in sync with Record button of PFV）
b) External Down（At the falling edge of external trigger）
c) External Up（At the rising edge of external trigger）
d) Sampling Num（Trigger is given when a specified number of samples have been acquired – Stop trigger only）
e) Level1 Up（A trigger is sent at the moment the rising voltage input to Trigger Channel passes the preset level 1 voltage）
f) Level1 Down（A trigger is sent at the moment the falling voltage input to Trigger Channel passes the preset level 1 voltage）
g) Level1 Up or Down（A trigger is sent at the moment the voltage (regardless of rising or falling) input to Trigger Channel passes the preset level 1 voltage）

h) Level2 Up（A trigger is sent at the moment the rising voltage input to Trigger Channel passes the preset level 2 voltage）
i) Level2 Down（A trigger is sent at the moment the falling voltage input to Trigger Channel passes the preset level 2 voltage）
j) Level2 Up or Down（A trigger is sent at the moment the voltage (regardless of rising or falling) input to Trigger Channel passes the preset level 2 voltage）
The following conditions allow for operation with linkage to the analog output feature of PCI-3525. The PFV does not support the analog output feature and requires the use of software provided by the board manufacturer.
k) DA Start（When analog output starts）
l) DA Stop（When analog output ends）
m) DA Output（When analog output is updated）
n) DA Sampling Num（When specified number of analog outputs are attained）

（J）Trigger Channel
Specifies the channel number to input reference voltage when Level 1 or Level 2 is specified for triggering condition.

（K）Level 1/Level 2
Specifies the trigger voltage for Level 1 (or Level 2).

（L）Hysteresis 1/Hysteresis 2
Specifies the hysteresis voltage for Level 1 (or Level 2).

（M）Pre Trigger Delay
Sets the sampling start/end timing to the time of trigger input minus the specified number of delayed samples.

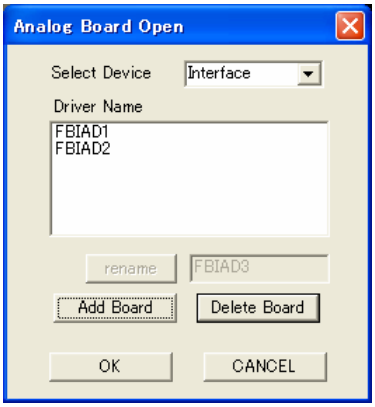
（N）Post Trigger Delay
Sets the sampling start/end timing to the time of trigger input plus the specified number of delayed samples.

When you are done with all settings, press the [OK] button to complete the setting procedure. The system is ready to record waveform signal data in sync with the camera at the entry of a trigger.

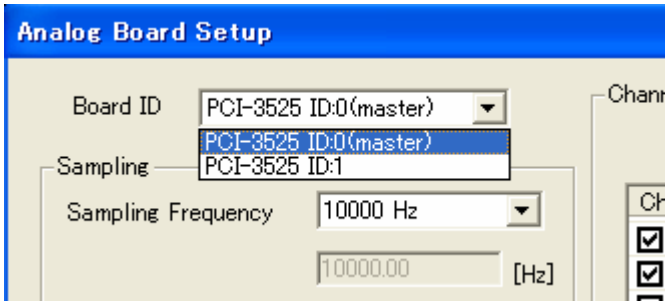
4. Closing board
To close the board, go to the [Tool] menu and select [Analog Input Board], and then [Close]. When the PFV is shut down, the board is automatically closed.

5. Simultaneous Sampling with Multiple Analog Waveform Boards

To use multiple boards for simultaneous sampling, add boards by pressing the [Add Board] button in the [Analog Board Open] window.



The board shown as (master) in the Board ID list in the [Analog Board Setup] window is set as the master board and the other boards are all slaves.



Remarks for simultaneous sampling with multiple boards:
1. The triggering conditions are set to the master board. When you set External signal and Level trigger, you should use the master board.

2. Sampling conditions
* The sampling conditions are commonly set among the boards, but the channel may be individually set on each board.

* Triggering conditions can be set to start only. The condition for stop is fixed to the number set for Sampling Num.

* The Pre Trigger Delay and Post Trigger Delay functions cannot be used.

4.3. Using Analog Waveform Input PCI Board Made by Contec Co.

The PFV software allows for use of Analog Input Board made by Contec Company Limited to record analog signals along with high-speed video image of an event for synchronized playback of graph and moving images. This section describes how to set up the Contec Analog Input Board.

Note 1: The functions of the Interface Analog Board of graphic display of waveform data and data export are basically the same as Photron MCDL (see 4.1.)

Note 2: Refer to the Interface Analog Board user's manual for instructions of board and driver installation, setting up.

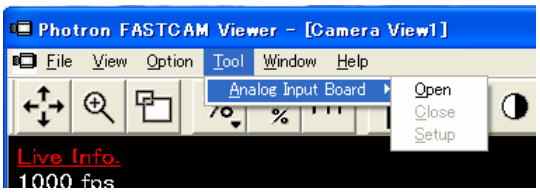
Note 3: For detailed instructions of setting and description of functionality, see the user's manual of each board.

Manufacturer: Contec Company Limited
http://www.contec.co.jp/
High-speed, high-functionality analog input PCI-bus board
Model: AD12-16U (PCI) EH

4.3.1. Setting up on PFV software

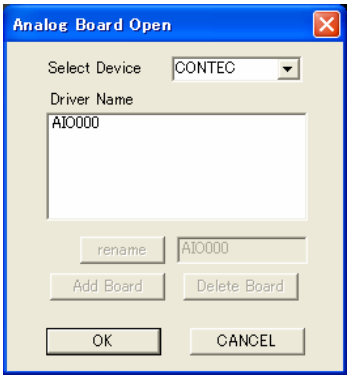
1. Opening the board

To use the analog input board, it must be opened from the PFV as shown below:
Select [Tool] in the menu, and go to [Analog Input Board] and then to [Open].



2. Selecting board

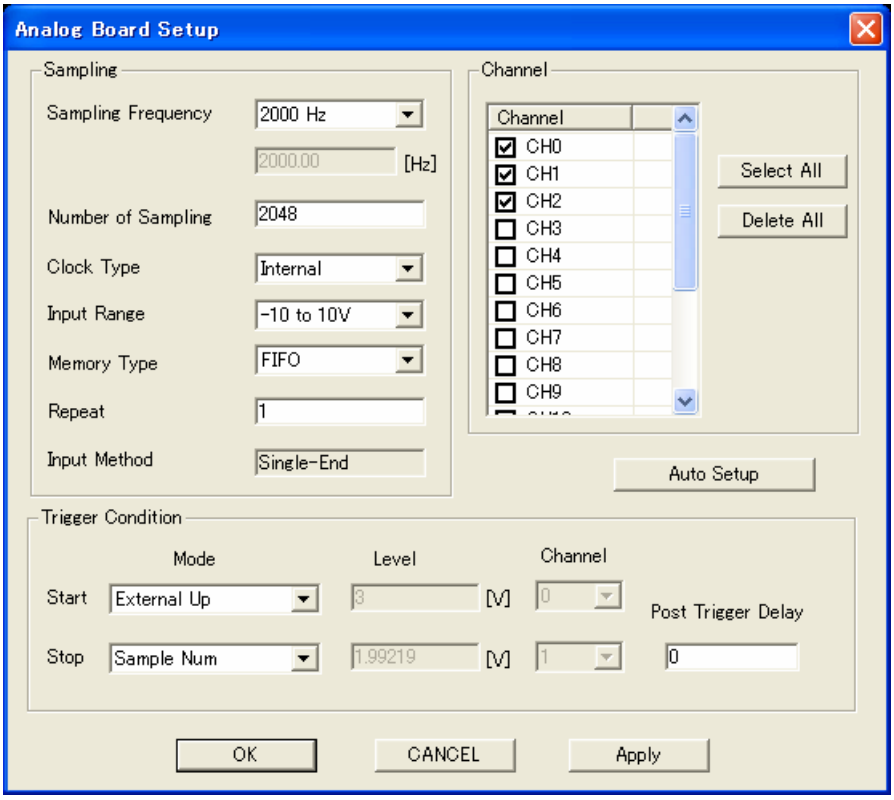
Select your desired analog input board.



Select Device
Select the manufacturer's name of the board you wish to use. This is only needed when there are installed boards from more than two manufacturers.

Driver Name
Set the name of the board that you are going to use. Check the board's device name from the device manager. When you wish to change a device name, select the device name that you wish to change and the [Rename] and [Edit] buttons become active. Edit the name in the edit box and press the [Rename] button to set it. Press the [OK] button and the Setup window is displayed.

3. Setting up boards
The below window appears. This window may be displayed from the [Tool] menu, going to [Analog Input Board] and then to [Setup].



(A) Sampling Frequency
Press the ▼ button of [Sampling Frequency], and frequencies that can be set are displayed. Select a sampling frequency of your choice.
*The frequencies that can be set must be set to a number that is the frame rate multiplied by an integer, presupposing a synchronized recording with the camera. Also, there are sampling frequencies that can be allowed by the board's specification. Consequently, only those sampling frequencies that meet these two conditions are displayed in the list. If you select the [user] in the bottom of the list, you can set a sampling frequency of your own choice, regardless of the conditions described in the above, provided that your sampling frequency that is out of the board's specification is automatically replaced with a closest approximate value meeting the specification.

（B）Auto Setup
This button, when pressed, automatically sets the number of samples, pre-trigger delay, post-trigger delay and triggering conditions from the camera's frame rate and triggers, and the sampling frequency set for the board.

Note 1: This setting is an example directly related to the camera setup. The trigger condition must be finally set to the user's specific needs and environment.

Note 2: Currently, the number of samplings that can be set has not been specified. And so, when the sampling frequency is set to a high number, you are likely to get an error message when you press the [OK] button (it is so made in order to inform the user of the lack of linkage with the camera).

Note 3: Linkage with the camera can only be established when the camera has been set in the Start, Center or End trigger mode. Accordingly, the [Auto Setup] button can only be effective under the above condition.

（C）Channel
Check the checkboxes for the channels that you wish to use.

（D）Input Range
Sets the input voltage range. Set it to match the jumper pin setting on the board. Actual input voltage setup is only made by the jumper pins and this setting is only used for calculation at DA conversion.

（E）Number of Sampling
Sets the number of samples to make.

（F）Clock Type
Sets the type of clock to Internal (Internal clock) or External (External clock).

（G）Memory Type
Sets the memory type to FIFO or RING.

（H）Repeat
Sets the number of repeating. The repeat number means the repetition of sampling starting from the sampling to the end of sampling including the sampling delay. This is set when Random or Random Reset trigger mode is used.

（I）Input Method
Means the connection method of analog signal input. The connection method is only set by jumper settings on the board. Single-end or Differential (input) is displayed.

（J）Trigger Conditions
* You can set start and stop trigger conditions separately.
* Following modes are available to choose from for start and stop trigger conditions:
  a) Soft Trigger（Sends a trigger signal in sync with the Record button on the PFV screen) (start trigger only)
  b) Sampling Num（Trigger is given when a specified number of samples have been acquired – Stop trigger only）
  c) External Down（At the falling edge of external trigger）
  d) External Up（At the rising edge of external trigger）
  e) Level Up（A trigger is sent at the moment the rising voltage input to Trigger Channel passes the preset level of voltage）
  f) Level Down（A trigger is sent at the moment the falling voltage input to Trigger Channel passes the preset level of voltage）

g) Level Up or Down（A trigger is sent at the moment the voltage (regardless of rising or falling) input to Trigger Channel passes the preset level of voltage）

（K）Level for Start and Stop Conditions

Sets the trigger voltage when Level is specified for Mode of Trigger Condition.

（L）Channel for Start and Stop Conditions

Specifies the channel to input analog trigger signal when Level is specified for Mode of Trigger Condition.

（M）Post Trigger Delay

Sets the sampling start/end timing to the time of trigger input plus the specified number of delayed samples.

When you are done with all settings, press the [OK] button to complete the setting procedure. The system is ready to record waveform signal data in sync with the camera at the entry of a trigger.

4. Closing board

To close the board, go to the [Tool] menu and select [Analog Input Board], and then [Close]. When the PFV is shut down, the board is automatically closed.

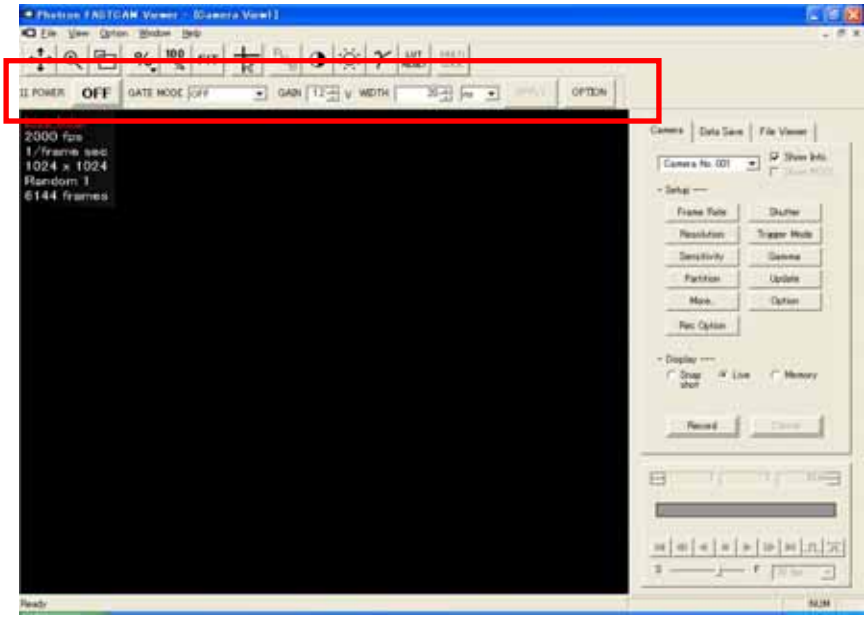
4.4. Controlling Image Intensifier

When an image-intensified camera, such as the FASTCAM-APX I2, is connected to the system, the image intensifier can be controlled from the PFV. The following discusses how the control is executed.

Note: The image intensifier is a delicate instrument and so you must read the hardware manual carefully and use care when operating it.

4.4.1. Image Intensifier Toolbar

When the PFV is started up with an image-intensified camera connected to the system, the intensifier control toolbar is displayed in addition to the normal toolbar.



The intensifier toolbar shows the camera status in the right-hand side of it and is active when the system is in the Live or Snapshot mode. Note it cannot be used in the Data Save or File Viewer mode.

① ② ③ ④ ⑤ ⑥ ⑦

① Power Button

This switches power on or off for the intensifier. The above figure shows the status of power being off. The button turns red, as shown below, when power is on.

② Switching Gate Mode

This switches the gate mode of the intensifier. When the system power is on, but if the gate mode is off, no image is output. When the system power is switched off, the gate mode turns off.

③ GAIN Adjustment

This adjusts the intensifier gain in the range of 0.1 to 5.0 VDC.

④ WIDTH Adjustment

This adjusts the WIDTH value of the intensifier. The lower limit is 20 nsec. The upper limit varies by the frame rate being used.

⑤ WIDTH Unit Adjustment

This selects the unit for the gate width of the intensifier. The default unit is ns (nsec.).

⑥ Apply Button

When the intensifier is activated, the parameter settings are applied to the intensifier only when this button is pressed after selecting GAIN and WIDTH values. When the intensifier is not powered, this button is inactive.

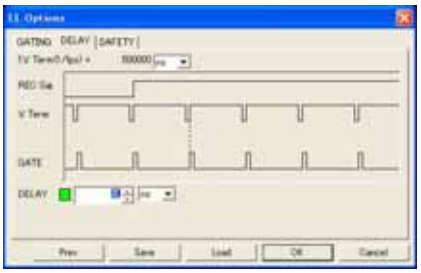
⑦ Option Button

This button, when pressed, displays a dialog box to change the detailed parameters for the intensifier.

4.4.2. Dialog for Image Intensifier Optional Settings

Press the OPTION button on the intensifier toolbar and a dialog as shown below appears:

Width, Cycle and Time are set in the GATING tab.



Delay is set in the DELAY tab.

All the above values are closely interrelated and may not be changed freely depending on the values of related items.
Example: When the value for Time is increased, those for Cycle and Width have to be decreased.

Changes the settings for burn protection circuit for the intensifier in the SAFETY tab.

■ "Enable I.I. Safety Function"
This option, when checked, automatically shuts the power to the image intensifier off when a live image of brightness over a predetermined level is sent to the processor.

■ "Value lock"
This option, if checked, evaluates the image quality regardless of the frame rate, shutter speed or intensifier gain. When it is checked off, the parameters set for the intensifier gain in the above-shown window. (2.0V : 1.1, 3.0V : 36.2, 4.0V : 758.5, 4.6V : 2275.5)

For the parameters, the values that are shown in the above window are suggested for normal operation.

① Prev
This button, when pressed, sends the current settings on the image intensifier option dialog to the intensifier.

② Save
This button, when pressed, stores the current settings on the image intensifier option dialog in a file with an extension of iicf.

③ Load
This button, when pressed, reads in the stored image intensifier setting file. Note that the frame rate must be set to the value same as that used for storage. When a different frame rate is specified, a warning message is displayed. Change the frame rate accordingly and reload.

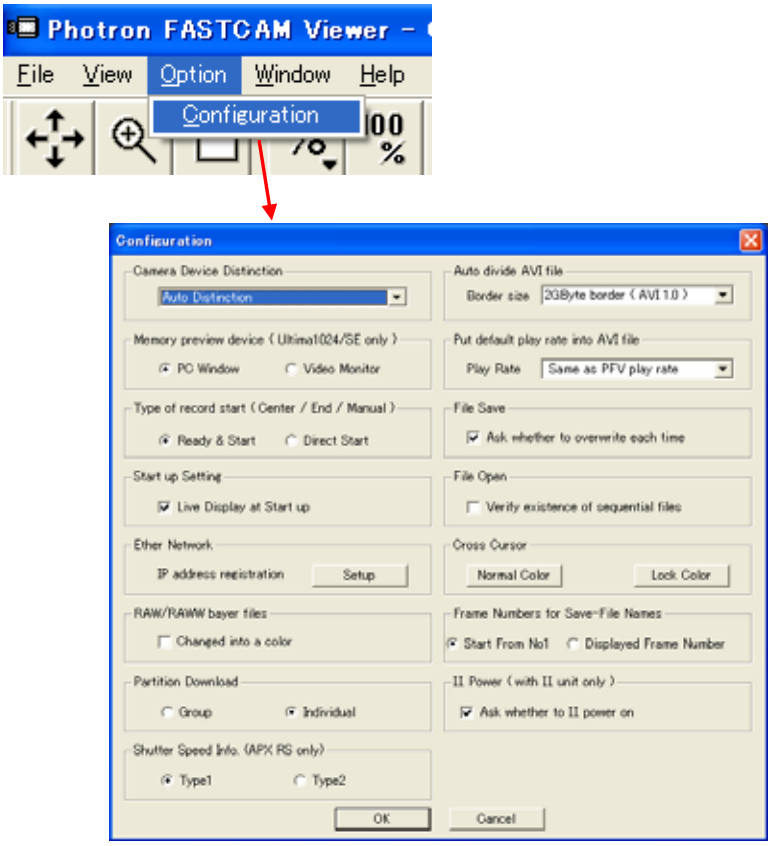
④ OK
This button, when pressed, applies all the current settings on the image intensifier option dialog to the intensifier and closes the dialog.

⑥ CANCEL
This button, when pressed, reverts the settings to their previous status (before the dialog was opened) and closes the dialog.

5. Setting Environment for PFV

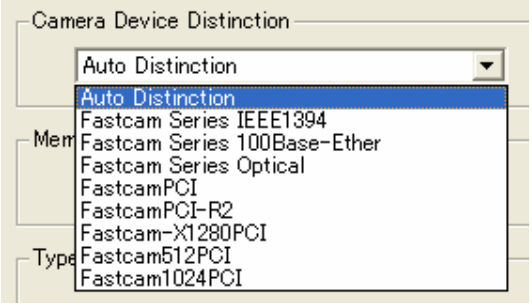
5.1. Setup Dialog for PFV

This section discusses how to set up the PFV environment.



5.1.1. Selection of Camera Models

This window selects the model and type of the camera to be recognized at start-up of the PFV.
Make a selection in the pull-down menu in the upper-left corner and click the OK button.
Note: The change is reflected in the next start-up of the PFV.



Auto Distinction	PFV automatically recognizes the types of the camera models connected. When mixed types of cameras are connected, PFV recognizes them in the priority order of 1394-Interface cameras, Photron Optical I/F cameras, FASTCAM-PCI cameras, FASTCAM-PCI R2 cameras, FASTCAM -X1280PCI cameras, FASTCAM-512 PCI cameras and FASTCAM-1024PCI cameras. Note: Use the Auto Distinction mode of camera type recognition for usual operation. Note: Camera types other than the above cannot be connected. Note: A camera of 100BASE-TX I/F is not recognized automatically.
Fastcam Series IEEE 1394	PFV recognize cameras with IEEE1394 I/F connection.
Fastcam Series 100Base-Ether	PFV recognizes cameras with a 100BASE-TX I/F connection. This mode must be selected when cameras with 100BASE-TX I/F connection is used.
Fastcam Series Optical	PFV recognizes cameras with Photron Optical I/F connection.
Fastcam PCI	PFV recognizes FASTCAM-PCI cameras connected to the PCI bus.
Fastcam PCI-R2	PFV recognizes FASTCAM-PCI R2 cameras connected to the PCI bus.
Fastcam-X 1280PCI	PFV recognizes FASTCAM-X1280PCI cameras connected to the PCI bus.
Fastcam-512PCI	PFV recognizes FASTCAM-512 PCI cameras connected to the PCI bus.
Fastcam-1024PCI	PFV recognizes FASTCAM-1024 PCI cameras connected to the PCI bus.

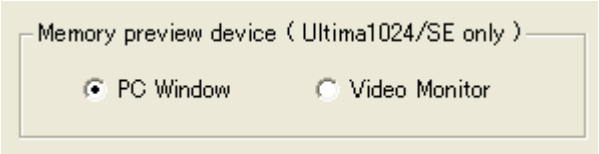
Note: In any of the above modes of camera recognition, except for the Auto Distinction mode, the PFV does not recognize camera types other than the one the recognition mode names.

Note: No camera, which is not recognized by any of the above modes, can operate in a system it is connected to.

5.1.2. Setup of Playback Image Output (Memory preview device)

(Ultima1024 R2 and SE models)

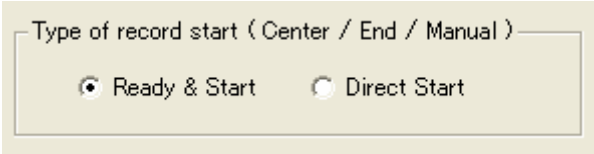
This selects the PFV window screen or the video monitor screen connected to the camera device for display of recorded images.



When you select the “PC Window” and click the OK button, the played image is displayed on the PFV window screen. Note, however, the display speed may be slower depending on the image resolution. When you select the “Video Monitor” and click the OK button, the imaged is displayed on the video monitor screen. The image on the PFV window is not updated in this case.

5.1.3. Direct Start of Recording (Type of record start)

The PFV needs two steps of operation to start a recording – “Make ready for start recording” and “Start recording”. This is a provision to avoid starting a recording by mistake.
Only in the recording modes involving an endless recording, one-step operation of “Start recording” is allowed skipping the “Make ready for start recording” step.



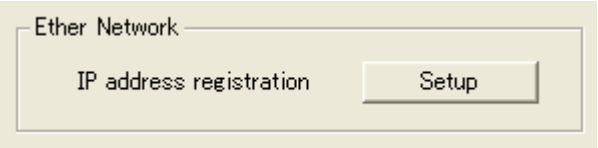
Select the “Ready & Start” and click the OK button to start a recording in the usual two-step operation. Click the “Record” button and the indication of the button changes to “Trigger In”. Now click the “Trigger In” button and an endless recording starts.
Select “Direct Start” and click the OK button and the system sets to the Direct Start mode. Click the “Record” button and an endless recording starts immediately.

5.1.4. Live Display at Start-up of PFV (Start up Setting)

Check the "Live Display at Start up" check box and “LIVE” display automatically begins at the next start-up of the PFV. Remove the check in the check box and only one frame of LIVE image (a snapshot) is displayed at the next start-up of the PFV.

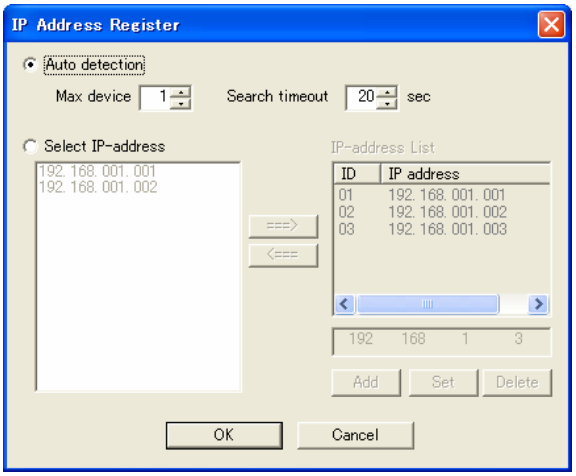
5.1.5. Registration of IP Address (Ether Network)

(For Cameras with 100BASE-TX Interface)



No driver needs to be installed for cameras with 100BAE-TX interface. However, the IP address of the camera must be registered with the PFV instead. Press the “Setup” button and the IP address registration dialog appears.

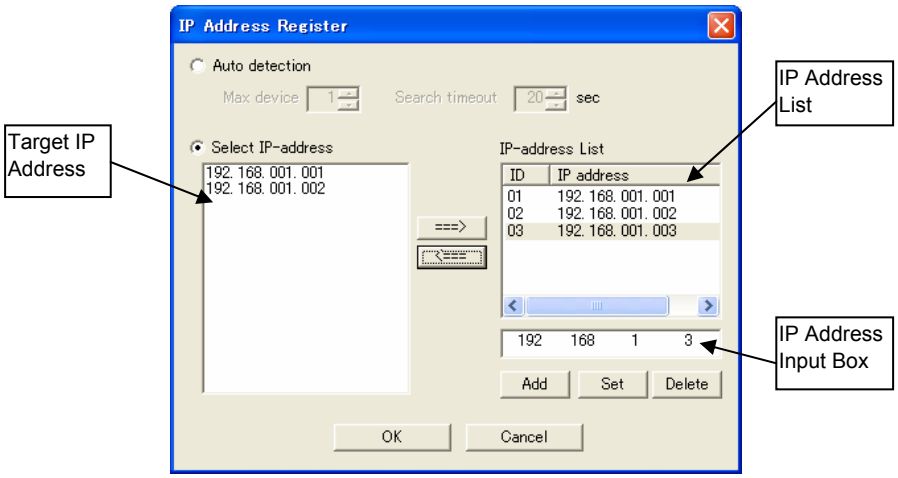
Note: Select “Fastcam Series 100Base-Ether” at the time of camera model selection.



■ Auto detection
The PFV automatically recognizes Photron cameras with 100BASE-TX interface that are present on the TCP/IP network. In this mode, though the IP address need not be registered, it takes sometime before the camera recognition process completes.

■ Max device
This sets the maximum number of cameras that should be recognized during the automatic camera recognition process.

■ Search timeout
This sets the time for automatic camera recognition time-out.



■ Select IP-address

This is a mode of camera recognition in which the IP addresses of connected cameras are pre-registered and only those cameras with a pre-registered IP address are recognized.

■ IP Address Input Box

This is a field to input the IP address of a connected camera to pre-register. Press the “Add” button after entry of an IP address, and the IP address is registered in the IP address list.

■ IP Address List

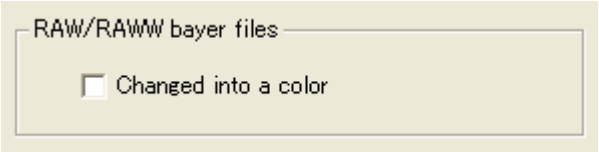
This is a list of registered IP addresses. Choose any IP address in the list and press the “Delete” button, and the IP address is deleted from the list. Press the “Set” button with an IP address chosen, and the IP address is replaced with the one currently shown in the IP address input box.

■ Target IP Address

This is a list of Target IP addresses. With any of the IP addresses chosen in the IP address list, press the “🡐” button and the IP address is registered as the target IP address.
Choose any IP address in the IP address list and press the “🡒” button, and the IP address is deleted from the list.

5.1.6. Color Transformation of RAW/RAWW Bayer Files

(APX / ULTIMA512 Models)

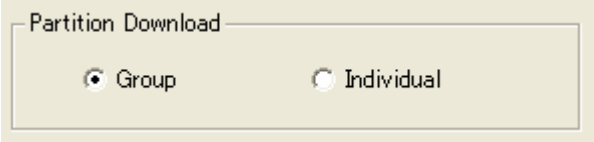


Though Bayer-saved image files, even if they are shot by a color camera, are displayed as monochrome pictures, Bayer image data saved in the RAW or RAWW format can be displayed as a color image by using the palette file that is simultaneously output. To choose to execute this process, check the “Changed into a color” check box.

Note: To read in Bayer data from other cameras, check the “Changed into a color” check box off.
Note: This process is effective only with files stored by the PFV Version 2.2 or later.

5.1.7. Setting Group Download of Partitions

This function downloads image data in target partitions, specified in each camera, as a group.



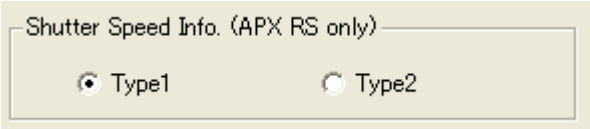
■ Group
When the “Group” download is selected, a dialog window appears that allows for selection of partitions to form a group.

■ Individual
This is the usual download of image data from individual partitions, one at a time.

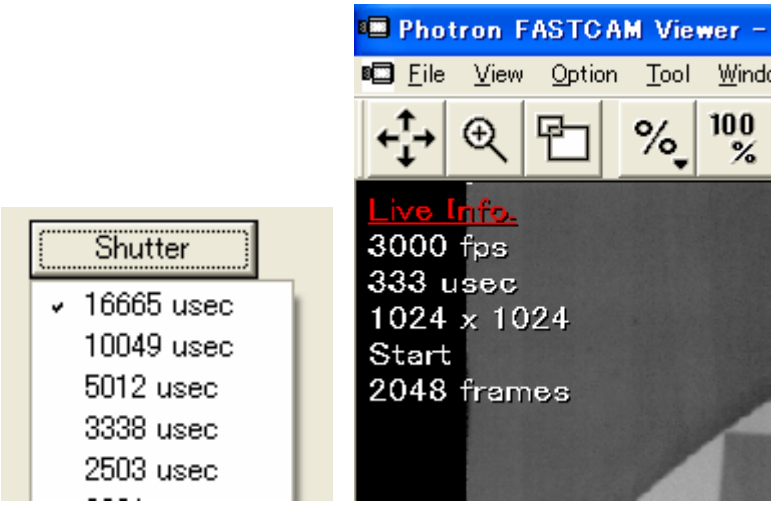
5.1.8. Display of Shutter Speed (Shutter Speed Info)

This offers the function of switching the form of shutter speed (exposure time) display.

Available to: FASTCAM-APX RS

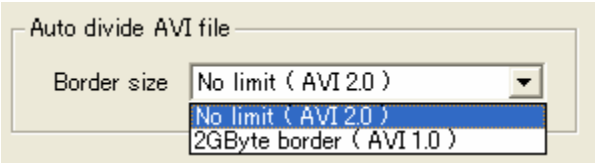


Select Type 1 and the shutter speed (exposure time) is displayed in 1/xxxxx (sec), and Type 2 the exposure time in micro seconds.



5.1.9. Setting Automatic Division of AVI Files

This sets the maximum size of a file allowed for storing recorded image data in the AVI format file.
If you wish to store image data larger than the predetermined maximum file size, the AVI file is automatically divided into several sub files and stored (see Section 5.5. AVI Files for detail).



Change the selected item in the pull-down menu and click the OK button.

■ "No limit (AVI 2.0)"
The AVI file is not divided. In this mode, the AVI file is stored in the AVI2.0 format regardless of the file size.

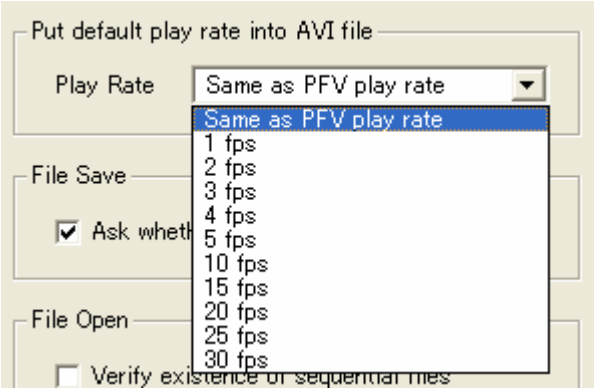
Note: If the disk drive is not in the NTFS format, storage stops when the file size reaches 4 GB.

Note: To handle AVI2.0 data, in and out, the software application DirectX 8.1 or later must be installed in the system. With an application that is not compatible with DirectShow, image data may not be read in properly.

■ "2GByte border (AVI 1.0)"
This selection sets the file size limit of 2 GB (standard). In this mode, the image data is stored in the AVI1.0 format.

5.1.10. Setting Default Playback Speed for AVI Files

The display rate for the played AVI image file can be selected from the menu as shown below:

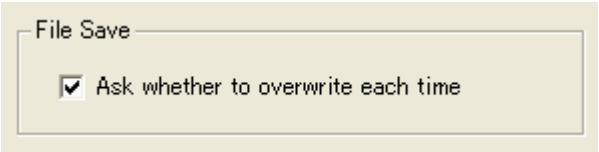


■ "Same as PFV play rate"
The image data file is played at the same rate as the one that was set on the PFV (set in the play control panel in the PFV control panel) when the image data was originally output. If the original output rate was over 30 fps, however, the play speed for the AVI file is automatically set to 30 fps.

■ Speed range from "1 fps" to ”30 fps”
Select any of the playback speed from the menu, 1 fps to 30 fps, and the AVI file is played back at the selected speed.

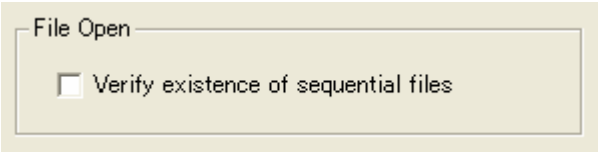
5.1.11. Overwrite Confirmation (File Save)

It is a normal procedure that an overwrite confirmation is asked for when a file is stored and the same name is already existing in the folder. If you check the check box “Ask whether to overwrite each time” off, the data is stored overwriting the existing file without a confirmation or warning message displayed.



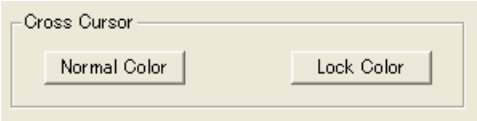
5.1.12. Checking Data Files (File Open)

This is a function to check the data file when reading in a CIH file. Check the check box “Verify existence of sequential files” on, the checking process is executed. Note it takes time to check a file with a large data size.



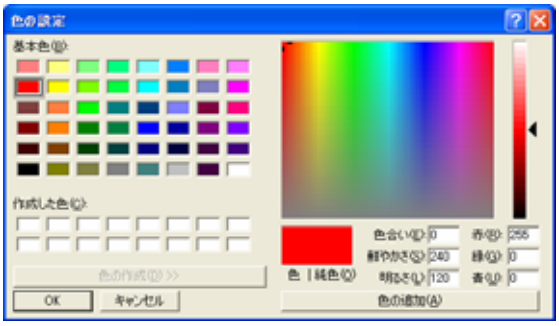
5.1.13. Changing Color of Crosshair Cursor (Cross Cursor)

This function changes the color or the crosshair cursor.



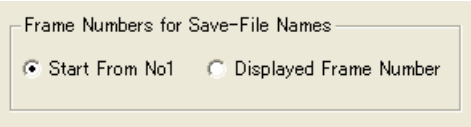
■ "Normal Color"
This button displays, when pressed, a dialog box to change the cursor color in normal (floating) status.

■ "Lock Color"
This button displays, when pressed, a dialog box to change the cursor color when it is locked. The color that is set here is also used as the cursor color when storing image data with a color camera.



5.1.14. Storing Display Frame Number/Name

This function name the still image file with a frame number that is the same as the number used at download.

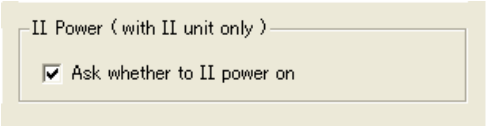


■ "Start From No1"
This option, when selected, always names the still image files with a number starting with 1. This is the option suggested for normal use.

■ "Displayed Frame Number"
This option, when selected, names the still image files with a number that is the same as the number that is shown on the PFV (with negative frame numbers, a minus symbol is attached). Note that, depending on the application, a file name of a negative number may cause a fatal problem in analysis.

5.1.15. Warning Message for Image Intensifier (I.I. Power)

This function selects whether to issue a warning message when turning on the image intensifier.



■ "Ask whether to I.I. Power on"
This option, when selected, displays a warning message when the intensifier is powered on.

6. Appendix

This section provides miscellaneous information regarding the control software.

6.1. Photron CIH File

6.1.1. Overview of CIH File

CIH stands for “Camera Information Header”. It is a text format file that contains all the information pertaining to the movie image data recorded by the Photron high-speed camera including the camera parameter settings, framing conditions. Its extension is “cih”. The file is automatically generated and recorded under the subfolder while recording the framed image data under this control software.

6.1.2. Format of CIH File

CIH files can be opened by the Windows memo or text editor. The following shows examples of contents.

#Camera Information Header	
Date : 2003/5/12	: Date the data recorded
Time :19:50	: Time the data recorded
Camera Type : Fastcam-ULTIMA512 32KC	: Camera name, type
Camera ID : 1	: Camera ID number
Scene Name : cam001	: Scene name
Session Number : 1	: Session number
Record Rate(fps) : 500	: Recording rate
Shutter Speed(s) : 1/500	: Shutter speed
Trigger Mode : Start	: Trigger mode
Gamma Correction :	: Gamma
Gain Level: 4	: Gain level
Color Temperature : 5100K	: Color temperature
Color Balance R : 20	: White balance Red
Color Balance G : 16	: White balance Green
Color Balance B : 34	: White balance Blue
Original Total Frame : 1536	: Total number of frames originally stored
Total Frame : 1536	: Total number of frames recorded
Start Frame : 1	: First recorded frame
Correct Trigger Frame : 1	: Triggered frame when recorded
Save Step : 1	: Interval of stored frames
Image Width : 512	: Image size – Width
Image Height : 512	: Image size – Height
Color Type : Color	: Color or monochrome
Color Bit : 24	: Color image depth in bits
File Format : Bmp	: File format
Effective Bit Depth : 8	: Effective number of bits
Effective Bit Side : Higher	: Effective position of bits
Comment Text :	: Comment
IRIG Mode : File	: IRIG data storage mode
IRIG File : C001S0001.irg	: IRIG data file name
MCDL Mode : File	: MCDL data storage mode
MCDL File : C001S0001.mcd	: MCDL data file name

6.1.3. Reading image data from CIH file

Select a CIH file when reading a file by File open tag, and the related image data file is automatically read. The entire serial numbered image data files or AVI files that are saved in the same folder as the CIH files having the same file format and file name are automatically read by selecting a CIH file.

Example 1: Files with CIH file name of “Data.cih” with Bmp file format

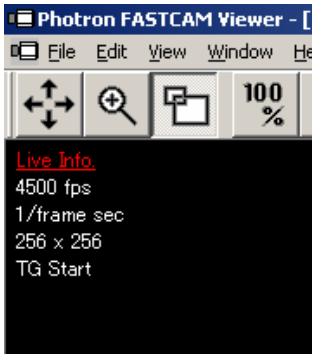
All the serial numbered files with data######.extension (###### is a six-digit number) saved in one folder are read.

Example 2: Files with CIH file name of “Data.cih” with AVI file format

All the files with a Data.avi file name saved in the one folder are read.

Refer [** file name auto numbering feature] for the convention of naming of serial numbered files that can be read.

Note: This control software supports view window overlay feature of framing information when opening files by CIH.



6.2. BMP File Format

The BMP format is a file format for bitmap data that is used under the Windows standard environment. The PFV supports bitmap of uncompressed 8-bit grayscale, or 24-bit full color. The extension is “bmp”.

6.2.1. BMP Format - Basic Information

File format	1 frame to 1 image file; Automatic serial numbering
Extension	Caption letter string + CxxxSyyyy+zzzzzz.bmp xxx: 3-digit camera serial number yyyy: 4-digit ID number for the data of this name zzzzzz: six-digit serial number starting with 000001
Optional settings	

6.3. TIFF File Format

The TIFF (Tagged Image File Format) format is a file format for bitmap data. The PFV supports bitmap of uncompressed and compressed PackBits format. The extension is “tif”.

The PFV supports 8-bit (24-bit color) and 16-bit (48-bit color) image data outputs.

6.3.1. TIFF Format - Basic Information

File format	1 frame to 1 image file; Automatic serial numbering
Extension	Caption letter string + CxxxSyyyy+zzzzzz.tif xxx: 3-digit camera serial number yyyy: 4-digit ID number for the data of this name zzzzzz: 6-digit serial number starting with 000001
Optional settings	PackBits compression ON/OFF Selection of 8 or 16 bits

6.3.2. IFD (Image File Directory) Tag

The Image File Directory (IFD) tag is attached to TIFF files (it is assumed that the user has practical knowledge of TIFF Specifications Rev. 6.0 published by Aldus).
The IFD tag specifies how to interpret the data contained in a TIFF file. It shows the position and amount of the pixel data and the frame data. It always starts with an even-numbered address, the first two bytes showing the number of entries that it contains.

Tag 256	Image Width
Tag 257	Image Length
Tag 258	Bits Per Sample
Tag 259	Compression
Tag 262	Photometric Interpretation
Tag 273	Strip Offsets
Tag 274	Orientation
Tag 277	Samples Per Pixel
Tag 278	Rows Per Strip
Tag 279	Strip Byte Counts
Tag 284	Planar Configuration
Tag 320	Color map

6.4. JPEG File Format

The JPEG format is a file format for compressed still images.
The PFV supports 8-bit “Lossy” compression only: formats of “Lossless” compression or over10 bits are not supported. The extension is “jpg".

The PFV uses the Intel JPEG Library.

6.4.1. JPEG Format - Basic Information

File format	1 frame to 1 image file; Automatic serial numbering
Extension	Caption letter string + CxxxSyyyy+zzzzzz.jpg xxx: 3-digit camera serial number yyyy: 4-digit ID number for the data of this name zzzzzz: 6-digit serial number starting with 000001 Title letter string + xxxxxx.jpg (xxxxxx is a 6-digit serial number starting with 0001)
Optional settings	Sets compression quality from 0% (high compression) to 100% (high image quality)

6.5. PNG File Format

The PNG (Portable Network Graphics) format is a file format for compressed still image data. The "Lossless" compression technique is used.
The PFV supports 8-bit (24-bit color) and 16-bit (48-bit color) image data outputs. The extension is "png".

6.5.1. PNG Format – Basic Information

File Format	1 frame to 1 image file; Automatic serial numbering
Extension	Caption letter string+CxxxSyyyy+zzzzzz.png *xxx: 3-digit camera ID number *yyyy: 4-digit ID number for image data of this name *zzzzzz: 6-digit serial number starting with 000001
Optional Settings	Selection of 8 or 16 bits Selection of priority on image quality, standard or speed for compression process

6.6. RAW File Format

The RAW is an uncompressed binary data file format without header information. In the RAW format, the PFV stores color image data in the order of RGBRGBRGB, etc. Each of RGB planes is recorded as 8-bit data. The extension is “raw”.

6.6.1. RAW Format - Basic Information

File format	1 frame to 1 image file; Automatic serial numbering
Extension	Caption letter string+CxxxSyyyy+zzzzzz.raw xxx: 3-digit camera serial number yyyy: 4-digit ID number for the data of this name zzzzzz: six-digit serial number starting with 000001
Optional settings	

Note: The order of items contained in the RAW format may vary from one software to another.

Note: To read in a RAW format file on the PFV, a CIH file is necessary.

6.7. RAWW File Format

The RAWW format is an uncompressed binary data file format. The PFV stores color image data in the order of interleave: RGBRGBRGB, etc. Each of RGB planes is recorded as 16-bit data. The extension is “raww”.

6.7.1. RAWW Format – Basic Information

File Format	1 frame to 1 image file; Automatic serial numbering
Extension	Caption letter string+CxxxSyyyy+zzzzzz.raww *xxx: 3-digit camera ID number *yyyy: 4-digit ID number for image data of this name *zzzzzz: 6-digit serial number starting with 000001
Optional Settings	Selection of Higher or Lower 10 bits of 16 bits data

Note: The RAWW format is Photron’s proprietary file format. With applications that support the 16-bit RAW format, there is a good chance of reading in RAWW format files by changing the extension to “raw”.

Note: To read in a RAWW format file on the PFV, a CIH file is necessary.

6.8. AVI File Format

The AVI format is a file format for moving image files that is normally used in the Windows environment. By installing CODEC (a compression option) in the Windows environment, image data files of varied compression formats can be supported. The extension is “avi”.

6.8.1. AVI Format - Basic Information

File format	1 sequence for 1 image file
Extension	Caption letter string + CxxxSyyyy+.avi xxx: 3-digit camera serial number yyyy: 4-digit ID number for the data of this name
Optional items	Sets compression option (WindowsOS dependant)

6.8.2. AVI 1.0 and AVI 2.0 Formats

The size of an AVI format file (AVI1.0) is limited to 2 GB, maximum, under its specification. An AVI format file with an over 2 GB file size is specified as the OpenDML format (AVI2.0)

Commercially available software programs that do not support the OpenDML format cannot read in AVI data file of AVI2.0 format.
Also, under the restriction by the Windows OS specification, it is not possible to generate files of over 4 GB using the OpernDML file format if the filing system of the storage disk drive is FAT32.

To overcome this size restriction problem, the PFV has an automatic AVI file dividing feature. This feature enables the automatic dividing and generation of a new file if the total size of the current image data file reaches a predetermined limit. Also, it can switch the automatically divided and generated file from AVI1 to AVI2 by the preset size. The divided file size is selected from “2 GB (AVI1.0)” or “No dividing limit (AVI2.0)” (see "3.14. PFV Settings” for detail).
If you wish to select “No dividing limit”, the use of NTFS for the filing system in the storage disk drive is recommended. IF you use the FAT32 for filing, the output is automatically shut off as soon as the data file size reaches 4 GB.

The divided file names are as follows:

Note: Multiple camera information files (*.cih) are also generated.

Example of file:

File name:	sample.avi and sample.cih
Stored size:	5.5GB
Dividing limit:	2GB

Stored results (file made):

sample-00.avi	(2.0GB)
sample-01.avi	(2.0GB)
sample-02.avi	(1.5GB)
sample-00.cih	
sample-01.cih	
sample-02.cih	

6.9. FTIF File Format

The FTIF (FASTCAM Tagged Image File) format is Photron's proprietary modified TIFF format. The FTIF ver. 1.0 supports 8-bit image data only.

The data is uncompressed, but because the data from the camera imaging sensor is stored as is (Bayer-saved), the output data from a color camera is stored as a file 1/3 of size of uncompressed file stored by other method.
The PFV supports data conversion of FTIF color data to read in.

Note: The specification of the FTIF format is subject to change without prior notice.

6.9.1. FTIF File Format – Basic Information

File Format	1 frame to 1 image file; Automatic serial numbering
Extension	Caption letter string+CxxxSyyyy+zzzzzz.raww *xxx: 3-digit camera ID number *yyyy: 4-digit ID number for image data of this name *zzzzzz: 6-digit serial number starting with 000001
Optional Settings	On/Off of PackBits compression

6.9.2. IFD (Image File Directory) Tag

The IFD (Image File Directory) tag is same as the image file directory tag that is attached to each of the FTIF files, except that Video Border Data is added.

Tag 256	Image Width
Tag 257	Image Length
Tag 258	Bits Per Sample
Tag 259	Compression
Tag 262	Photometric Interpretation
Tag 273	Strip Offsets
Tag 274	Orientation
Tag 277	Samples Per Pixel
Tag 278	Rows Per Strip
Tag 279	Strip Byte Counts
Tag 284	Planar Configuration
Tag 320	Color map
Tag 34071	FTIF Video Border Data

6.9.3. FTIF Video Border Data (Camera Image Information)

The Video Border Data (Camera Image Information) is contained in the location that is pointed by the "offset" value given in the directory entry of "tag=34701" in the file.

Note however that with the FTIF format, different to what is specified for the TIFF format, the data is aligned in its own way. Because of this fact, before reading in a FTIF file, you should decide if there is a letter string "FTF" in the FTIF Info.

This data is of a fixed length of 128 bytes and in the following structure:

Offset	Item	Value	Data format	Bytes
+0	FTIF Info	"FTF"（Fixed）	ASCII char	3
+3	FTIF Version	1	char	1
+4	Application Info	"PL" Application name (output source)	ASCII char	2
+6	Application Version	Output application Ver. SDK Ver. For PFV (PL).	char	2
+8	Flag 1	Bit0 to Bit3 Chroma Mode Bit4 Trigger Frame 0=No 1=Yes Bit5 IRIG 0=Off 1=On Bit6 MCDL 0=Off 1=On Bit7 Color Mode 0=Grayscale 1=Color	char	1
+9	Camera Type	0x00=Grayscale 0x01=Reserved 0x10=Reserved 0x11=Reserved 0x12=Reserved 0x13=Reserved 0x14=Reserved 0x15=MAX/APX 0x16=NEO/ultima512 0x17=Reserved 0x18=Reserved	char	1
+10	Geometry	0=Normal	char	1
+11	Camera ID		char	1
+12	Session Number		char	1
+13	Record Rate		long	4
+17	Shutter Speed		long	4
+21	Frame Number		long	4
+25	Trigger Mode		char	1
+26	IRIG			
+26	IRIG Data		short	2

+28	IRIG Year		short	2
+30	IRIG Days		char	1
+31	IRIG Hours		char	1
+32	IRIG Minutes		char	1
+33	IRIG Microseconds		long	4
+37	MCDL			
+37	MCDL	Digital(0)	char	1
		Analog A(0)	short	2
		Analog B(0)	short	2
		Analog C(0)	short	2
		Analog D(0)	short	2
		Digital(1)	char	1
		Analog A(1)	short	2
		Analog B(1)	short	2
		Analog A(1)	short	2
		Analog B(1)	short	2
		Digital(2)	char	1
		Analog A(2)	short	2
		Analog B(2)	short	2
		Analog C(2)	short	2
		Analog D(2)	short	2
		Digital(3)	char	1
		Analog A(3)	short	2
		Analog B(3)	short	2
		Analog C(3)	short	2
		Analog D(3)	short	2
		Digital(4)	char	1
		Analog A(4)	short	2
		Analog B(4)	short	2
		Analog C(4)	short	2
		Analog D(4)	short	2
		Digital(5)	char	1
		Analog A(5)	short	2
		Analog B(5)	short	2
		Analog C(5)	short	2
		Analog D(5)	short	2
		Digital(6)	char	1
		Analog A(6)	short	2
		Analog B(6)	short	2
		Analog C(6)	short	2
		Analog D(6)	short	2
		Digital(7)	char	1
		Analog A(7)	short	2
		Analog B(7)	short	2
		Analog C(7)	short	2
		Analog D(7)	short	2
		Digital(8)	char	1
		Analog A(8)	short	2
		Analog B(8)	short	2
		Analog C(8)	short	2
		Analog D(8)	short	2
		Digital(9)	char	1
		Analog A(9)	short	2
		Analog B(9)	short	2
		Analog C(9)	short	2
		Analog D(9)	short	2

6.9.4. Video Border Data（Camera Image Information）

The following is an example of Video Border Data for usual TIFF file format:

Offset	Item	Value	Data format	Bytes
+0	Header Info		ASCII char	10
+10	Video Type	1=color 2=mono	char	1
+11	Session ID		char	1
+12	Camera ID		char	1
+13	Record Rate	0=External 1=60fps 2=125fps 3=250fps 4=500fps 5=1000fps 6=2000fps 7=4000fps 8=8000fps 9=16000fps	char	1
+14	Exposure	0= External 1=1/60sec 2=1/125sec 3=1/250sec 4=1/500sec 5=1/1000sec 6=1/2000sec 7=1/4000sec 8=1/8000sec 9=1/16000sec 10=1/32000sec 11=1/64000sec 12=1/128000sec	char	1
+15	Record Mode	0=Record 1=Record stop 2=Record Trigger	char	1
+16	White Balance	0=5100K 1=3100K 2=user	char	1
+17	ROC	0=ROC Off 1=ROC On 1frame 2=ROC On 20frames 3=ROC On 50frames	char	1
+18	MCDL	0=MCDL Off 1=MCDL On	char	1
+19	IRIG	0=IRIG Off 1=IRIG On	char	1
+20	White Balance Coefficients	RGB	3floatingpoint#1	12
+32	Frame Number		short	2
+34	Trigger Frame	0=Trigger Frame 以外 1=Trigger Frame	char	1
+35	Real Time			
+35	Seconds		BCD	1
+36	Minutes		BCD	1
+37	Hours		BCD	1
+38	Day		BCD	1

+39	Month		BCD	1
+40	Year		BCD	1
+41	IRIG			
+41	IRIG Days	Hundredth Value	char	1
		Tenth Value	char	1
		Unit Value	char	1
+44	IRIG Hours	Tenth Value	char	1
		Unit Value	char	1
+46	IRIG Minutes	Tenth Value	char	1
		Unit Value	char	1
+48	IRIG Seconds	Tenth Value	char	1
		Unit Value	char	1
		Microseconds	long	4
+54	Elapse Time	Minutes	short	2
		Seconds	long	4
+60	MCDL	Digital(0)	char	2
		Analog A(0)	char	2
		Analog B(0)	char	2
		Digital(1)	char	2
		Analog A(1)	char	2
		Analog B(1)	char	2
		Digital(2)	char	2
		Analog A(2)	char	2
		Analog B(2)	char	2
		Digital(3)	char	2
		Analog A(3)	char	2
		Analog B(3)	char	2
		Digital(4)	char	2
		Analog A(4)	char	2
		Analog B(4)	char	2
		Digital(5)	char	2
		Analog A(5)	char	2
		Analog B(5)	char	2
		Digital(6)	char	2
		Analog A(6)	char	2
		Analog B(6)	char	2
		Digital(7)	char	2
		Analog A(7)	char	2
		Analog B(7)	char	2
		Digital(8)	char	2
		Analog A(8)	char	2
		Analog B(8)	char	2
		Digital(9)	char	2
		Analog A(9)	char	2
		Analog B(9)	char	2
+120	White Clip	0 to 255	char	1
+121	Exposure		short	2
+123	Motion Corder Frame Number.		long	4

6.10. MCDL Export Format

6.10.1. MCDL File

FASTCAM Ultima1024 has a function called MCDL (Multi-Channel-Data-Link) that takes input signals from external sources and sample them in synchronization with the image data being recorded. This software outputs the sampled MCDL data in the CSV file format.

6.10.2. CSV Output Format

The CSV file consists of a header indicating the framing parameters set on the camera followed by MCDL data. There are two types of data format (Type A and Type B) to choose from:

TYPE A data format

The Type A data format handles the data by the number of samples. The number of samples per image frame is 10. So, the total count of data is calculated by multiplying the number of recorded frames by 10.

PHOTRON MCDL DATA	
SheetType	A
Date	2002/3/4
CameraType	Fastcam Ultima1024 10KC
CameraID	0
FrameRate(fps)	500
ShutterSpeed(s)	1/1000
ImageWidth	1024
ImageHeight	1024
TriggerMode	Center
NumberOfFrames	10
FrameRange	-5 to 5

DataNo	FrameNo	SampleNo	Digital	AnalogA	AnalogB	IRIG_Doy	IRIG_Hour	IRIG_Minute	IRIG_Second
0	-5	0	*	*	*	*	*	*	*
1	-5	1	*	*	*	*	*	*	*
2	-5	2	*	*	*	*	*	*	*
3	-5	3	*	*	*	*	*	*	*
4	-5	4	*	*	*	*	*	*	*

TYPE B data format

The Type B data format handles the data by the recorded image frame. The data group consists of analog A and B channels each multiplied by 10 samples, and digital channel x 10 samples followed by the IRIG data.

PHOTRON MCDL DATA	
SheetType	B
Date	2002/3/4
CameraType	Fatscam Ultima1024 10KC
CameraID	0
FrameRate(fps)	500
ShutterSpeed(s)	1/1000
ImageWidth	1024
ImageHeight	1024
TriggerMode	Center
NumberOfFrames	10
FrameRange	-5 to 5

DataNo	FrameNo	Digital0	・・・	Digital9	AnalogA0	・・・	AnalogA9	AnalogB0	・・・	AnalogB9	・・・
0	-5	*		*	*		*	*		*	
1	-4	*		*	*		*	*		*	
2	-3	*		*	*		*	*		*	
3	-2	*		*	*		*	*		*	
4	-1	*		*	*		*	*		*	

6.11. MCD Format

6.11.1. MCD Format

When the MCDL is used with the PFV, the data is output in the MCD format, together with the CIH file, at time of download. The extension is .mcd.

The MCD file is made of binary data of 172 bytes to one frame. The data for 100 frames is therefore 17,200 bytes.

The following is the data structure of the MCD format:

+0	Frame number 1	Digital(0)	char	1
		Digital(1)	char	1
		Digital(2)	char	1
		Digital(3)	char	1
		Digital(4)	char	1
		Digital(5)	char	1
		Digital(6)	char	1
		Digital(7)	char	1
		Digital(8)	char	1
		Digital(9)	char	1
		Not used		2
		Analog A(0)	float	4
		Analog A(1)	float	4
		Analog A(2)	float	4
		Analog A(3)	float	4
		Analog A(4)	float	4
		Analog A(5)	float	4
		Analog A(6)	float	4
		Analog A(7)	float	4
		Analog A(8)	float	4
		Analog A(9)	float	4
		Analog B(0)	float	4
		Analog B(1)	float	4
		Analog B(2)	float	4
		Analog B(3)	float	4
		Analog B(4)	float	4
		Analog B(5)	float	4
		Analog B(6)	float	4
		Analog B(7)	float	4
		Analog B(8)	float	4
		Analog B(9)	float	4
		Analog C(0)	float	4
		Analog C(1)	float	4
		Analog C(2)	float	4
		Analog C(3)	float	4
		Analog C(4)	float	4
		Analog C(5)	float	4
		Analog C(6)	float	4
		Analog C(7)	float	4
		Analog C(8)	float	4
		Analog C(9)	float	4
		Analog D(0)	float	4
		Analog D(1)	float	4
		Analog D(2)	float	4
		Analog D(3)	float	4

		Analog D(4)	float	4
		Analog D(5)	float	4
		Analog D(6)	float	4
		Analog D(7)	float	4
		Analog D(8)	float	4
		Analog D(9)	float	4
+172	Frame number 2	Digital(0)	char	1
		Digital(1)	char	1
		Digital(2)	char	1
		Digital(3)	char	1
		Digital(4)	char	1
		Digital(5)	char	1
		Digital(6)	char	1
		Digital(7)	char	1
		Digital(8)	char	1
		Digital(9)	char	1
		Not used		2
		Analog A(0)	float	4
		Analog A(1)	float	4
		Analog A(2)	float	4
		Analog A(3)	float	4
		Analog A(4)	float	4
		Analog A(5)	float	4
		Analog A(6)	float	4
		Analog A(7)	float	4
		Analog A(8)	float	4
		Analog A(9)	float	4
		Analog B(0)	float	4
		Analog B(1)	float	4
		Analog B(2)	float	4
		Analog B(3)	float	4
		Analog B(4)	float	4
		Analog B(5)	float	4
		Analog B(6)	float	4
		Analog B(7)	float	4
		Analog B(8)	float	4
		Analog B(9)	float	4
		Analog C(0)	float	4
		Analog C(1)	float	4
		Analog C(2)	float	4
		Analog C(3)	float	4
		Analog C(4)	float	4
		Analog C(5)	float	4
		Analog C(6)	float	4
		Analog C(7)	float	4
		Analog C(8)	float	4
		Analog C(9)	float	4
		Analog D(0)	float	4
		Analog D(1)	float	4
		Analog D(2)	float	4
		Analog D(3)	float	4
		Analog D(4)	float	4
		Analog D(5)	float	4
		Analog D(6)	float	4
		Analog D(7)	float	4
		Analog D(8)	float	4
		Analog D(9)	float	4

+0	Frame number 3	Digital(0)	char	1
		Digital(1)	char	1
		Digital(2)	char	1
		Digital(3)	char	1
		Digital(4)	char	1
		Digital(5)	char	1
		Digital(6)	char	1
		Digital(7)	char	1
		Digital(8)	char	1
		Digital(9)	char	1
		Not used		2
		Analog A(0)	float	4
		Analog A(1)	float	4
		Analog A(2)	float	4
		Analog A(3)	float	4
		Analog A(4)	float	4
		Analog A(5)	float	4
		Analog A(6)	float	4
		Analog A(7)	float	4
		Analog A(8)	float	4
		Analog A(9)	float	4
		Analog B(0)	float	4
		Analog B(1)	float	4
		Analog B(2)	float	4
		Analog B(3)	float	4
		Analog B(4)	float	4
		Analog B(5)	float	4
		Analog B(6)	float	4
		Analog B(7)	float	4
		Analog B(8)	float	4
		Analog B(9)	float	4
		Analog C(0)	float	4
		Analog C(1)	float	4
		Analog C(2)	float	4
		Analog C(3)	float	4
		Analog C(4)	float	4
		Analog C(5)	float	4
		Analog C(6)	float	4
		Analog C(7)	float	4
		Analog C(8)	float	4
		Analog C(9)	float	4
		Analog D(0)	float	4
		Analog D(1)	float	4
		Analog D(2)	float	4
		Analog D(3)	float	4
		Analog D(4)	float	4
		Analog D(5)	float	4
		Analog D(6)	float	4
		Analog D(7)	float	4
		Analog D(8)	float	4
		Analog D(9)	float	4

The above continues on to the last frame.

Note: The analog data is in the floating decimal mode, and the digital data Low (0) or High (1).

6.12. IRG Format

6.12.1. IRG Format

When the IRIG is used with the PFV, the data is output in the IRG format, together with the CIH file, at time of download. The extension is .irg.

The IRG file is made of binary data of 20 bytes to one frame. The data for 100 frames is therefore 2,000 bytes.

The following is the data structure of the IRG format:

+0	Frame number 1	Year	long	4
		Months	char	1
		Not used		1
		Days	char	1
		Not used		1
		DayOfYears	long	4
		Hours	char	1
		Minutes	char	1
		Seconds	char	1
		Not used		1
		Nano seconds	long	4
+20	Frame number 2	Year	long	4
		Months	char	1
		Not used		1
		Days	char	1
		Not used		1
		DayOfYears	long	4
		Hours	char	1
		Minutes	char	1
		Seconds	char	1
		Not used		1
		Nano seconds	long	4
+40	Frame number 3	Year	long	4
		Months	char	1
		Not used		1
		Days	char	1
		Not used		1
		DayOfYears	long	4
		Hours	char	1
		Minutes	char	1
		Seconds	char	1
		Not used		1
		Nano seconds	long	4

The above continues on to the last frame.

Note: Year / Months / Days are reserved but are usually unused. To acquired a date, DayOfYears is used.

6.13. Camera Setup File (PCS)

6.13.1. PCS Format

The Camera Setup File is a binary filing system specifically prepared for the PFV to store recording conditions. The settings stored are those currently set at the time of storing in the PCS file.

The following list shows items that are stored by the PCS file:

Items
Basic Items
Number of connected cameras
Model names of connected cameras
Viewer division status for multiple camera operation
Camera Tab “Setup”
Frame rate
Resolution
Shutter speed
Trigger mode
Number of frames to record in Random Trigger mode
Number of frames before and after a trigger for Manual Trigger mode
Number of frames before and after a trigger for Random Manual Trigger mode
Gamma value
Gain level
Items in “More” Tab
Items in “General” and “I/O” Tabs
Ext Sync in (External sync input) settings
Ext Sync in (External sync input) polarity
Ext Sync In (External sync input) mode
Ext Sync Out (External sync output) settings
General In (General input) mode
General Out (General output) mode
Operation time restriction On/Off (FASTCAM-PCI R2)
Grayscale change settings (FASTCAM-1280PCI)
Chroma mode (FASTCAM-APX/512)
Dynamic range expansion feature (FASTCAM-APX/APX RS/1024PCI)
IRIG offset value (FASTCAM-APX/512/APX RS)
Shutter mode (FASTCAM-APX/512/APS RS)
Live mode resolution change (FASTCAM-APX/512/APX RS)
External monitor output mode (FASTCAM-ultima1024 R2)
Reset trigger On/Off (FASTCAM-1280PCI/1024PCI/512PCI/PCI R2)

MCDL feature On/Off (FASTCAM-APX/512/APX RS, FASTCAM-ultima1024 R2)
IRIG feature On/Off (FASTCAM-APX/512/APX RS, FASTCAM-ultima1024 R2)
“Color” and “Adjust” Tabs
Color temperature mode
Color temperature user setup list
Gamma value for R, setting on LUT
Gamma value for G, setting on LUT
Gamma value for B, setting on LUT
Contrast value for R, setting on LUT
Contrast value for G, setting on LUT
Contrast value for B, setting on LUT
Brightness value for R, setting on LUT
Brightness value for G, setting on LUT
Brightness value for B, setting on LUT
LUT mode
Partition Tabs
Current partitions
Number of partition divisions
Partition block list
Partition function ON/OFF
Image tab
Geometry conversion (rotation, mirror) mode
Rec Options
Loop record setting ON/OFF
Automatic increment partition setting ON/OFF
Stop-Recording-After-Last-Partition setting ON/OFF
Automatic download setting ON/OFF
Alert of automatic download ON/OFF
Automatic download range, start frame
Automatic download range, end frame
Automatic download range, trigger frame
Setting for automatic download of multiple cameras (Download/Not)
Information overwriting for storage (Info Save) ON/OFF
Information overwriting for storage (Info Save) mode Out / In
Information overwriting for storage (Info Save) position TOP / LEFT / RIGHT / BOTTOM
Information overwriting for storage (Info Save) display imtems
Information overwriting for storage (Info Save) columns（number of lines for TOP / BOTTOM）
Data Save Tabs
Adding caption to stored file ON/OFF (Add Caption setting）

Caption name
Adding auto sequential number to file name ON/OFF（Add Sequence Number setting）
Creating sub-folder for storage ON/OFF（Create sub-folder setting）
Giving same name to sub-folder as the file name ON/OFF (Same as filename setting)
Adding auto increment number to sub-folder ON/OFF (Add Sequence Number setting）
Detail Setting for File Storing
Bayer save ON/OFF
Crosshair cursor display function ON/OFF
Format option (TIFF)
Format option (JPEG）
Format option (PNG）
Format option (RAWW）
Format option (AVI)
Option-Configuration Setting Items
Playback image output setting (Memory preview device）(Ultima1024 & SE)
Direct recording start (Type of record start) ON/OFF
Live display at PFV startup (Startup setting）
RAW/RAWW Bayer file color conversion (RAW/RAWW Bayer files) ON/OFF
Partition download setting (Partition Download) ON/OFF
AVI file automatic division setting (Auto divide AVI file) ON/OFF
AVI file default playback rate setting (Put default play rate into AVI file）
Confirmation of overwriting (File Save) ON/OFF
Data file check (File Open) ON/OFF
Crosshair cursor color (Normal Color)
Crosshair cursor lock color (Lock Color)
Display frame number/name storing (Frame Number for Save-File Names) ON/OFF
Intensifier warning message (I.I. Power) ON/OFF
Other System Information
PCS file version

Photron FASTCAM Viewer (PFV) Operation Manual

English Version

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In Americas and Antipodes:
PHOTRON USA, INC.
9520 Padgett Street, Suite 110
San Diego, CA 92126-4446,
USA
Phone: 858-684-3555
Fax: 858-684-3558
E-mail: image@photron.com
www.photron.com

In Europe, Africa and India:
PHOTRON EUROPE LIMITED
Willowbank House
84 Station Road
Marlow, Bucks SL7 1NK, U.K.
Phone: +44(0) 1628 89 4353
Fax: +44(0) 1628 89 4354
E-mail: image@photron.com
www.photron.com

In other areas:
PHOTRON LIMITED
Fujimi 1-1-8, Chiyoda-Ku
Tokyo 102-0071, Japan
Phone: +81 3 3238 2170
Fax: +81 3 3238 2171
E-mail: image@photron.com
www.photron.co.jp