



Hi-Dcam II ~ Link

Version 3.0

User Manual



NAC Image Technology
Pixoft Diagnostic Imaging Ltd
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Introduction

This manual describes the operational procedures for NAC Hi-Dcam II high-speed cameras.

Installation

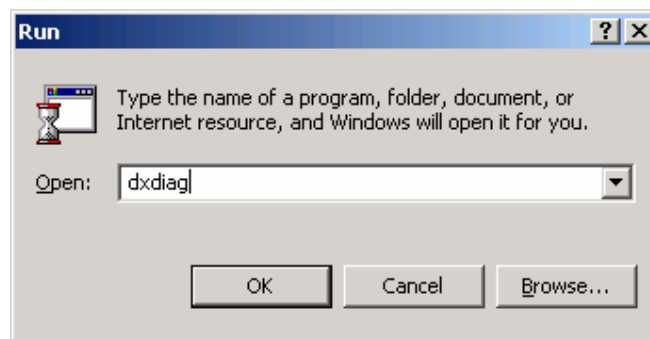
Software Installation

For a trouble free installation you should first install the Hi-Dcam Link software and then the Hi-Dcam II PCI Board.

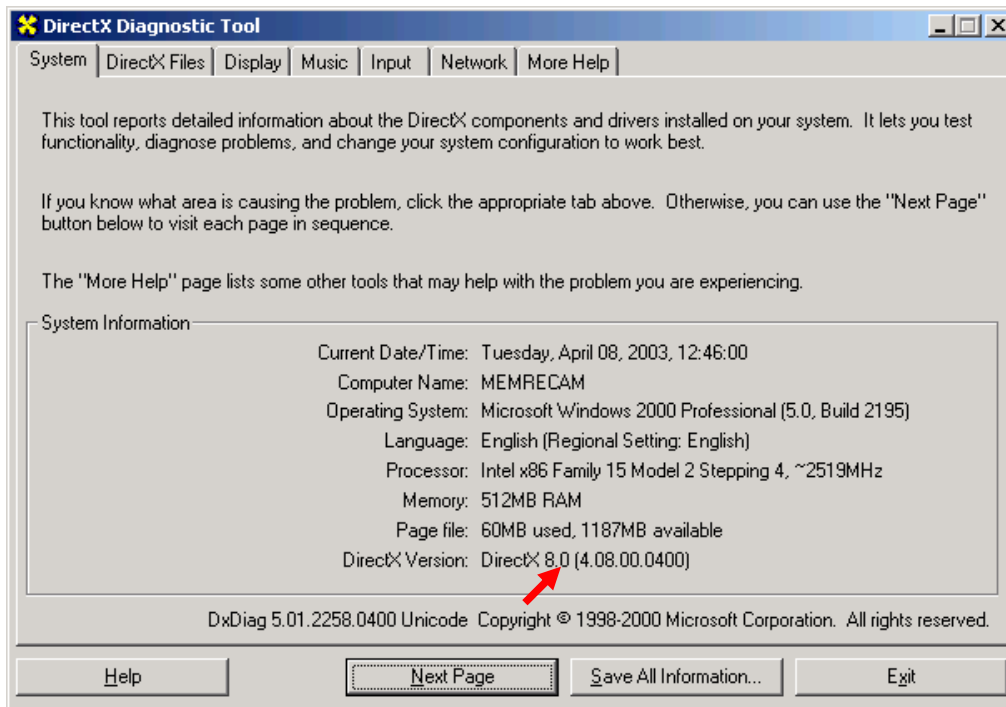
Microsoft™ DirectX

NOTE: Microsoft™ DirectX® version 8.1 is required. The following steps will guide you through the inspection and update process of DirectX®.

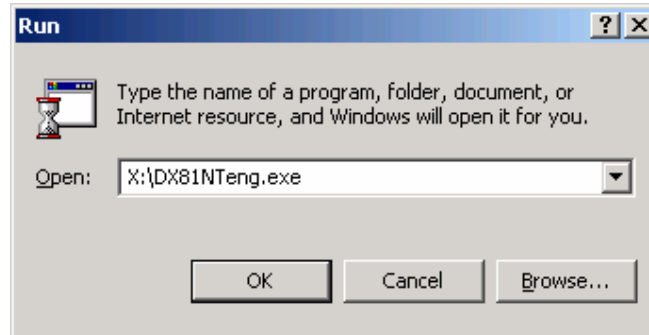
1. From the Start Menu run the DirectX® diagnostic utility with the command **dxdiag**. Click the [OK] button.



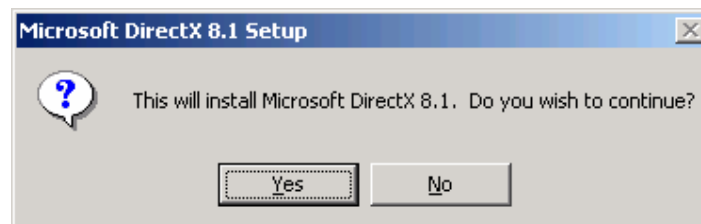
2. Inspect which version of DirectX® is installed in your computer. If the current version is older than DirectX® 8.1 continue the update process. **If DirectX® 8.1 or newer is shown move onto the Hi-Dcam II Link software installation.** Click the [Exit] button.



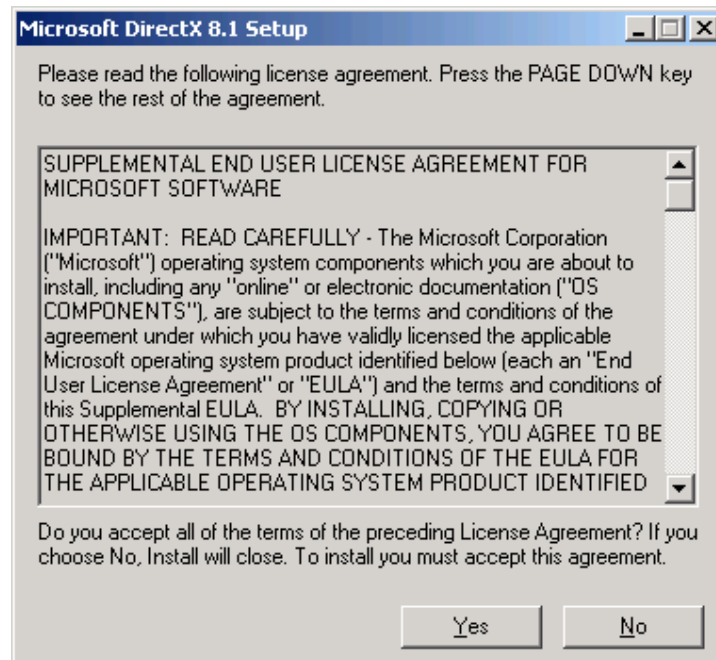
3. From the Start Menu run the DirectX® 8.1 installation file at **X:\dx81NTeng.exe** where X represents the CD-ROM drive letter for your particular computer. Click the [OK] button.



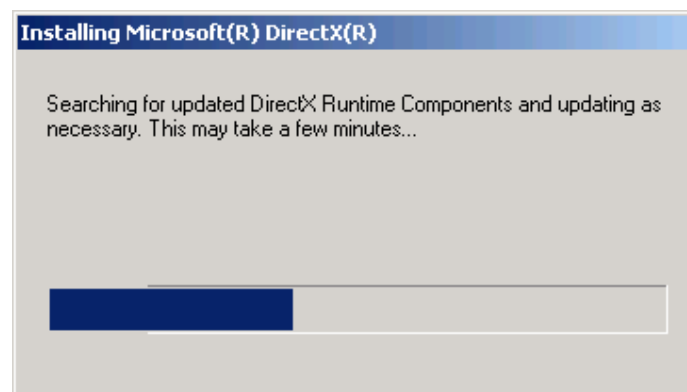
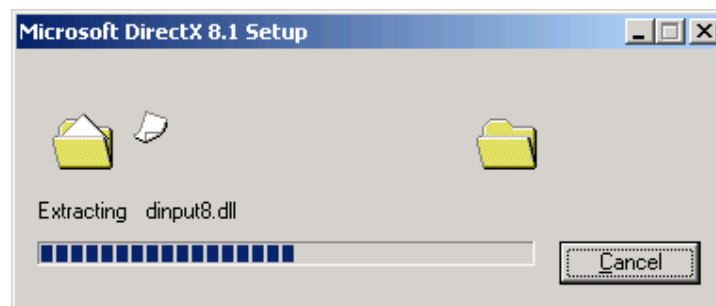
4. In the "Microsoft DirectX 8.1 Setup" window click the [Yes] button to begin installation.



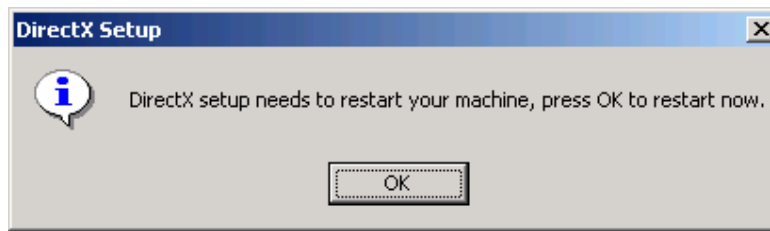
5. In the "Microsoft DirectX 8.1 Setup" window read the License Agreement. Click the [Yes] button to accept the agreement.



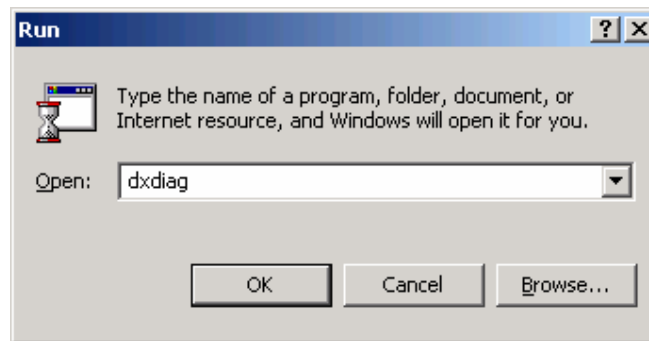
6. Please wait while the DirectX® components and drivers are extracted and installed.



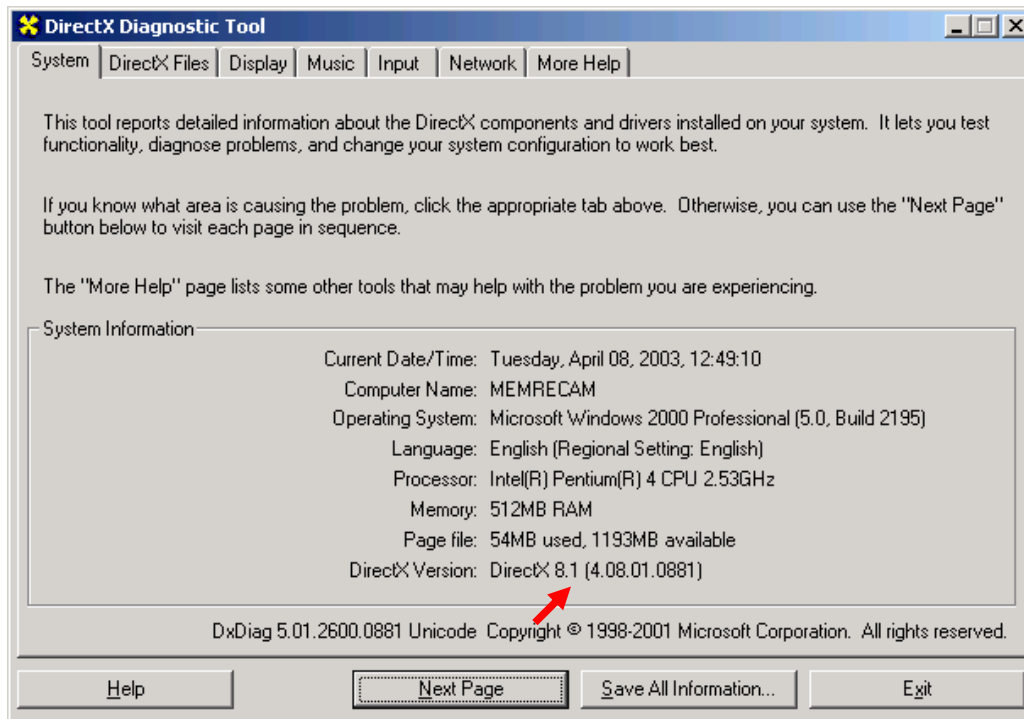
7. In the “DirectX Setup” window click the [OK] button to reboot.



8. Once Windows® restarts verify that DirectX® was updated by running the diagnostic utility again. From the Start menu run the command **dxdiag**. Click the [OK] button.



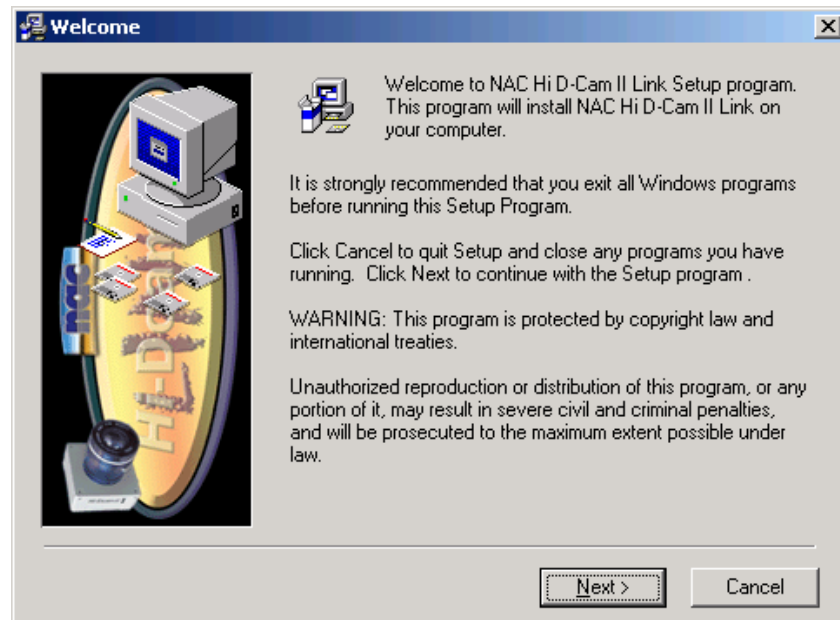
9. Verify that DirectX® 8.1 is now shown. Click the [Exit] button.



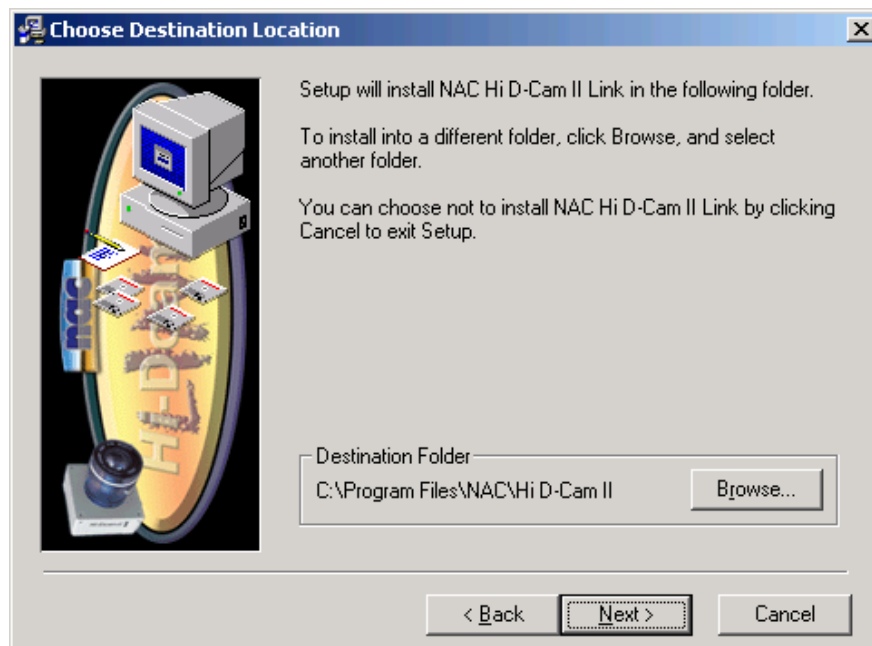
Hi-Dcam Link II Software Installation

Follow these steps before installing the PCI boards:

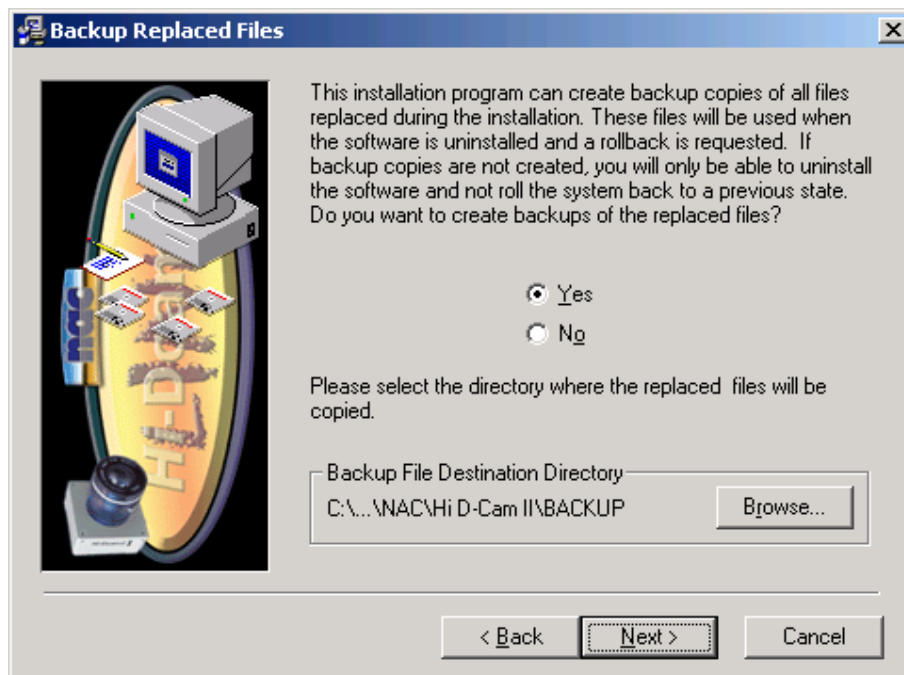
1. From Windows Explorer or My Computer look inside the CD-Rom and find the install program called **HiDcamII.exe** this will be version 3.0.0.1
2. In the “Welcome” window click the [Next] button.



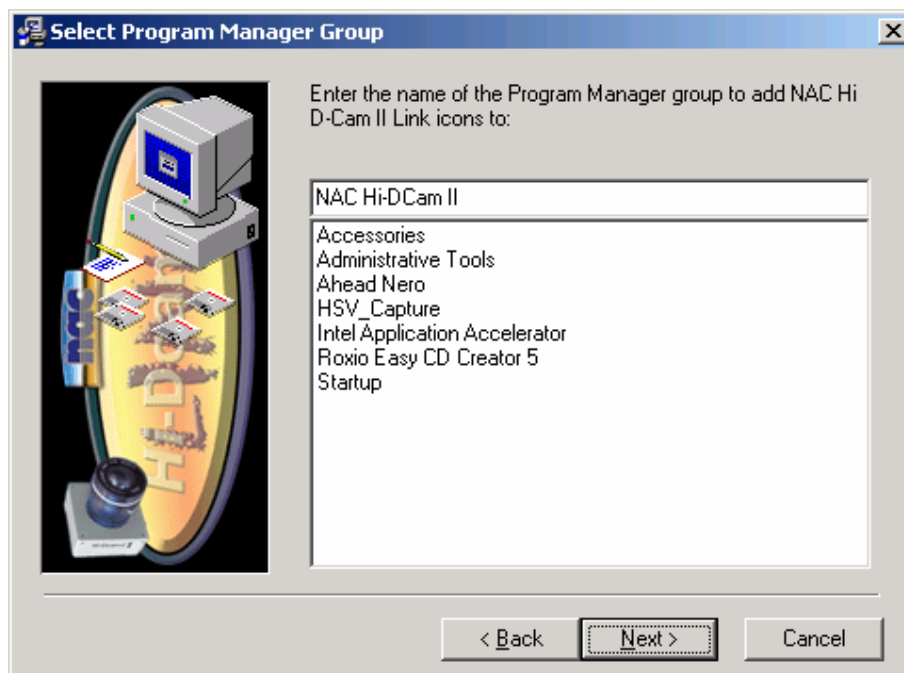
3. In the “Choose Destination Location” window click the [Next] button to accept the default target directory.



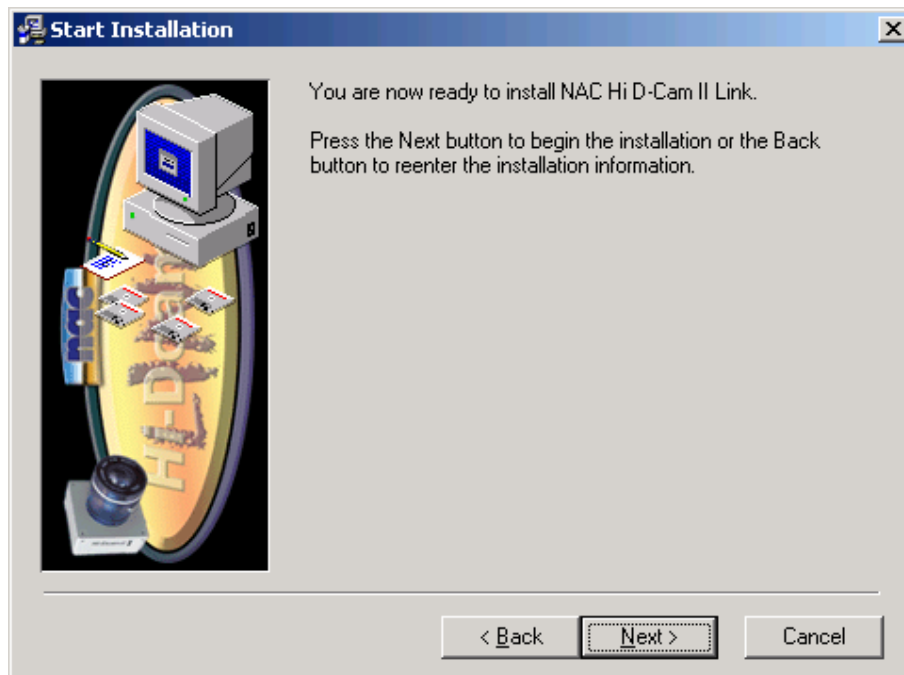
4. In the “Backup Replaced Files” window click the [Next] button to backup all replaced files. If you do not wish to backup these files, click the **No** radio button and then click the [Next] button.



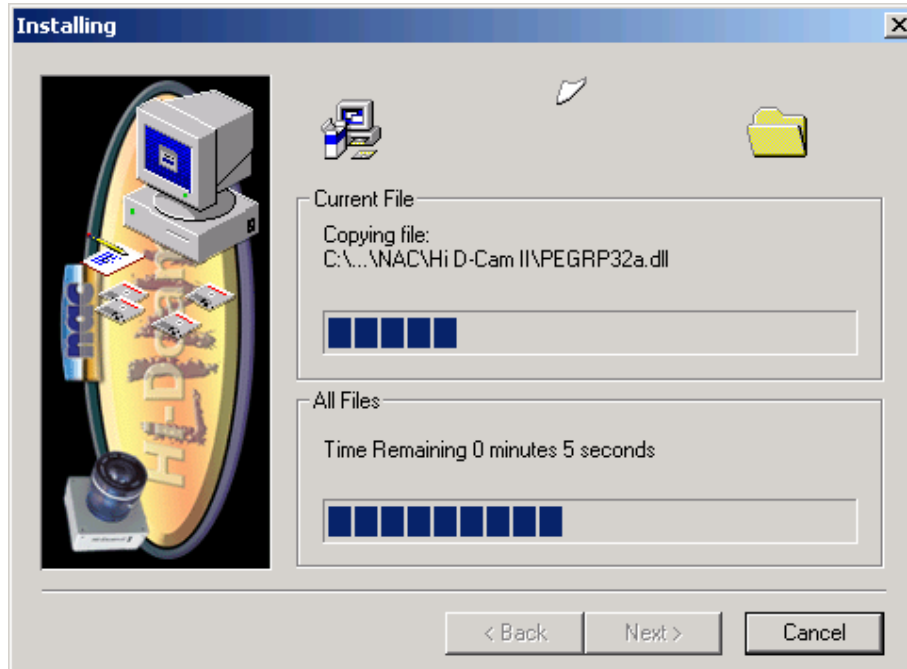
5. In the “Select Program Manager Group” window click the [Next] button to accept the default program folder.



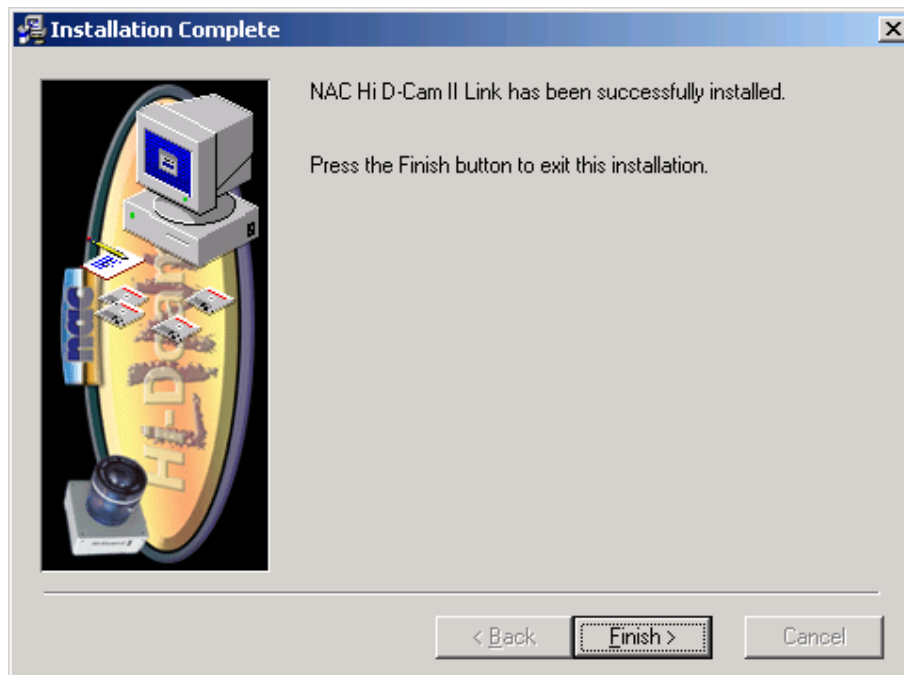
6. In the “Start Installation” window click the [Next] button to begin the installation.



7. Please wait for the software components to be installed.



8. In the “Installation Complete” window click the [Finish] button to exit.

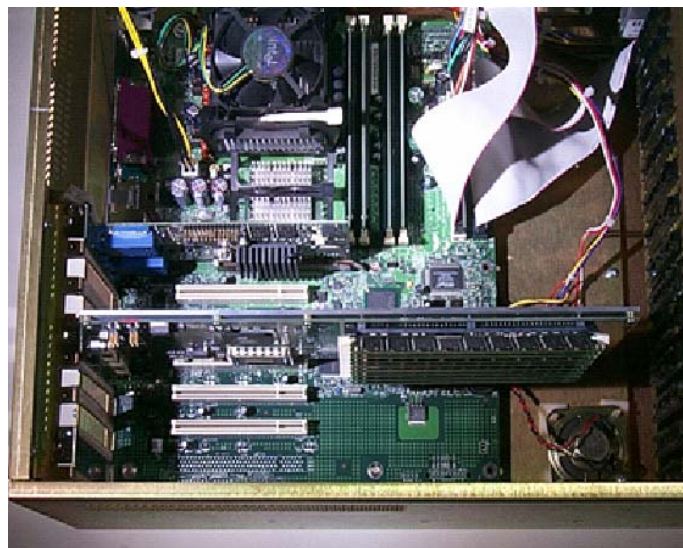


9. Finally shut down the computer from the Start menu.

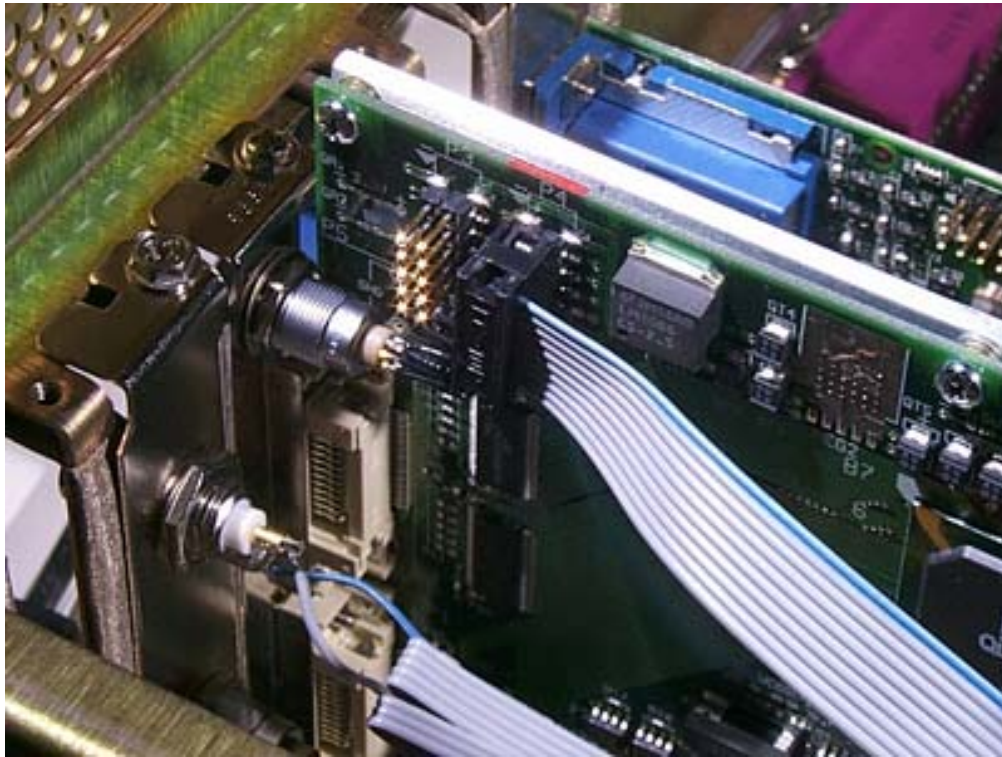
Hardware Installation

CAUTION: Power down your system before opening the computer case. Handle electronic devices with care.

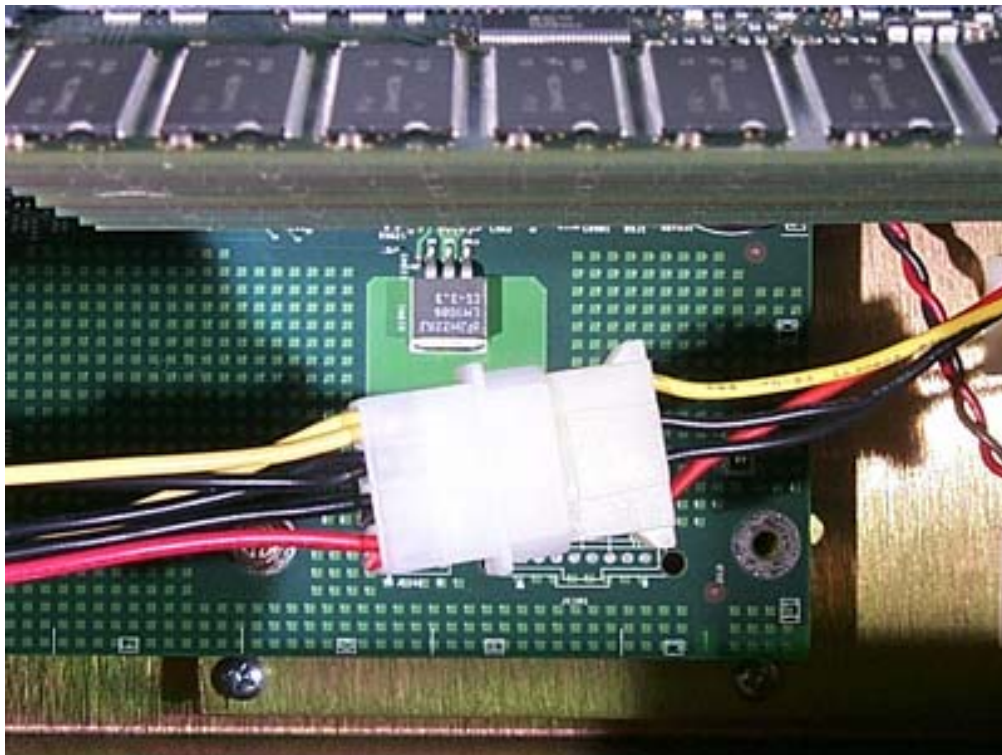
1. Remove the computer case cover. Install the *Hi-Dcam II* PCI Controller in any empty PCI slot on your system board.



2. Connect the trigger ribbon cable to connector P4 on the *Hi-Dcam II* PCI Controller.



3. Connect the power cable to the power supply.

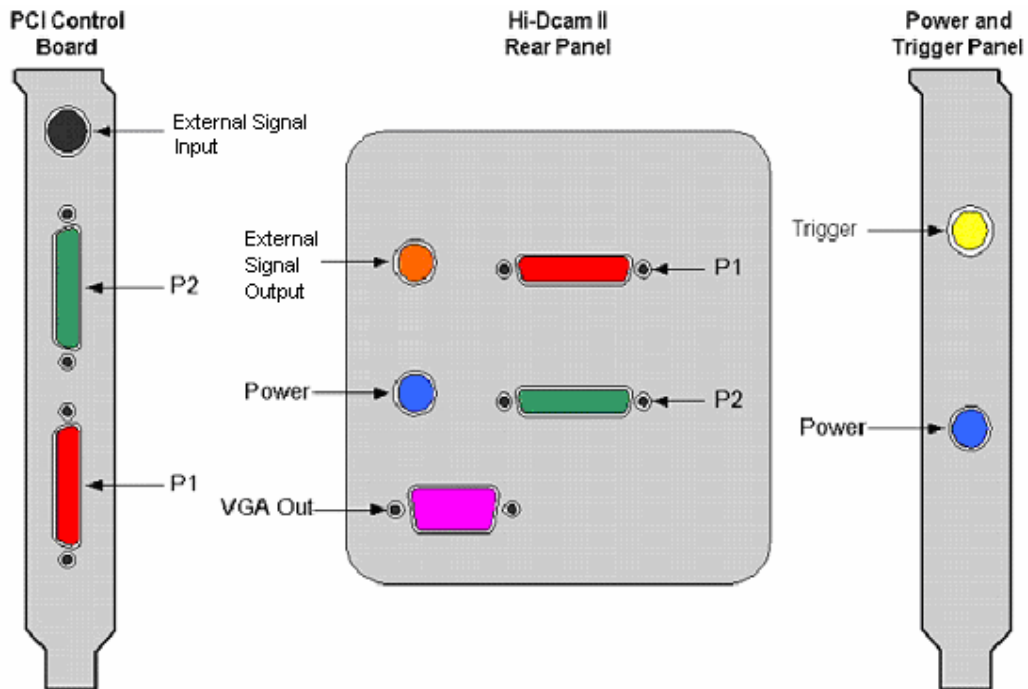


4. Connect the *Hi-Dcam II* PCI Controller to the Camera Head using the supplied Data and Power cables.

Connect **P1** on the PCI Controller to **P1** on the Camera Head

Connect **P2** on the PCI Controller to **P2** on the Camera Head

Connect **Power** on the Power / Trigger Panel to **Power** on the Camera Head



Restore the computer case cover. Connect Power and turn computer system on.

External Signal Input/Output

These two connectors, one on the camera head, the other on the PCI Control board are used to synchronise two or more cameras together. The output signal from the camera head's rear panel provides a timing pulse that can be inputted via a LVDS converter to the input signal port on the PCI control board. Please see the section called Connections to get more instructions on synchronising of multiple cameras.

Hi-Dcam II PCI controller configuration

NOTE: These steps assume that all software and hardware have been installed. Please wait while the PCI card is recognized and the “Found New Hardware Wizard” window appears.

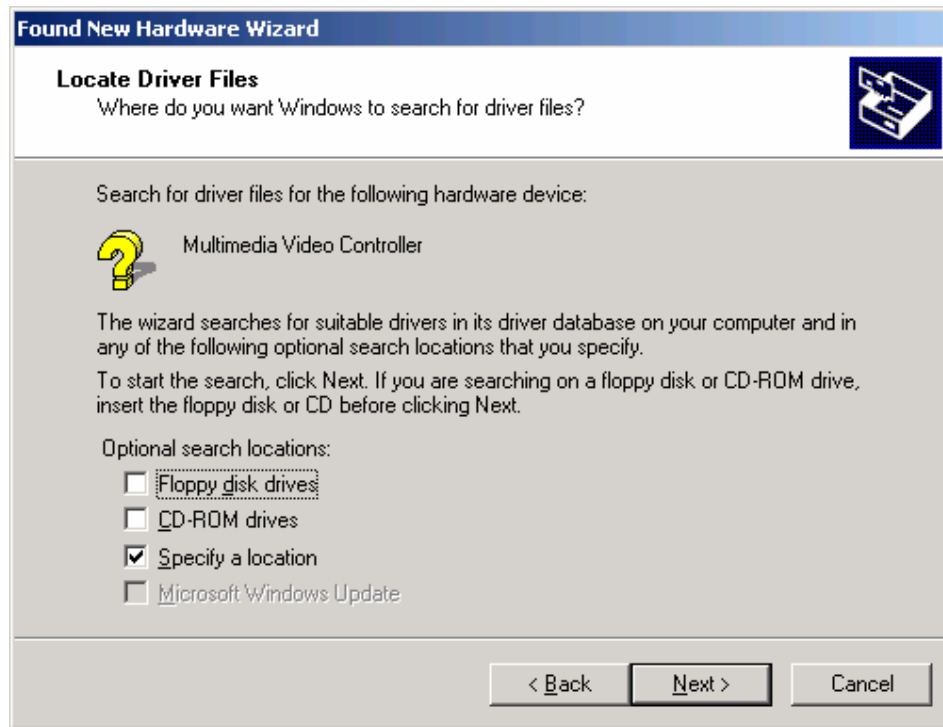
1. In the “Found New Hardware Wizard” window click the [Next] button.



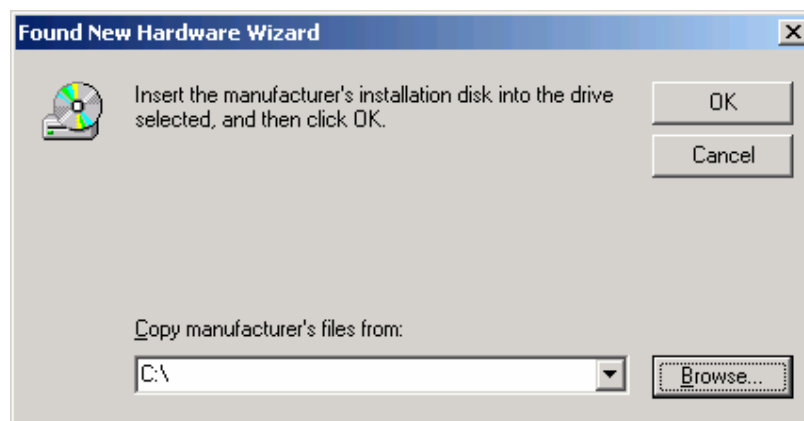
2. In the “Found New Hardware Wizard” window verify that the “Search for suitable driver for my device” radio button is selected. Click the [Next] button.



3. In the “Found New Hardware Wizard” window check the “Specify a location” box. Click the [Next] button.



4. In the “Found New Hardware Wizard” window click the [Browse] button.

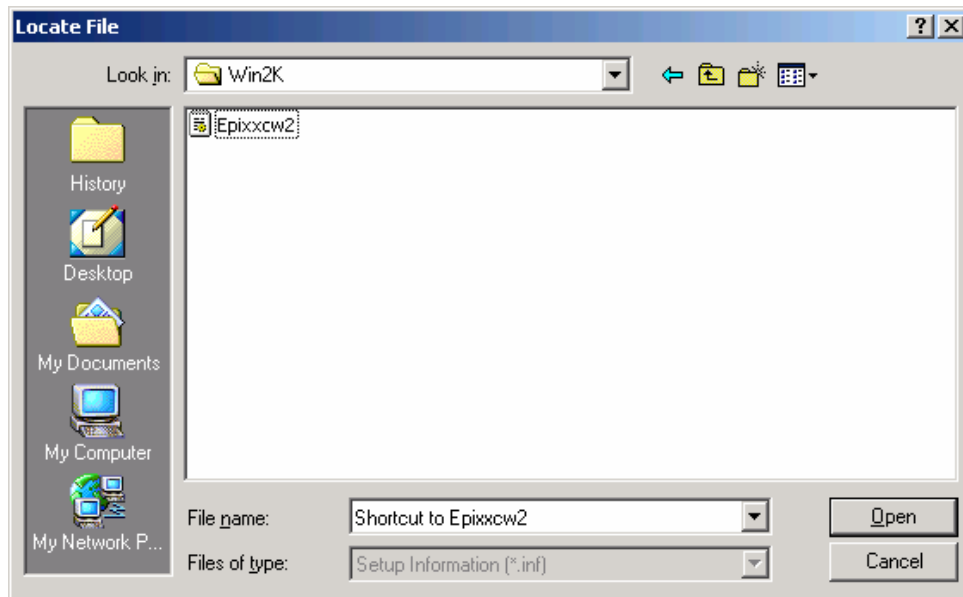


5. In the “the “Found New Hardware Wizard” window click the [Browse] button. Search for the driver located here:

C:\Program Files\NAC\Hi D-Cam II\Drivers\Win2K\Epixxcw2.inf

Select the “Epixxcw2.inf” file and click to [Open] button.

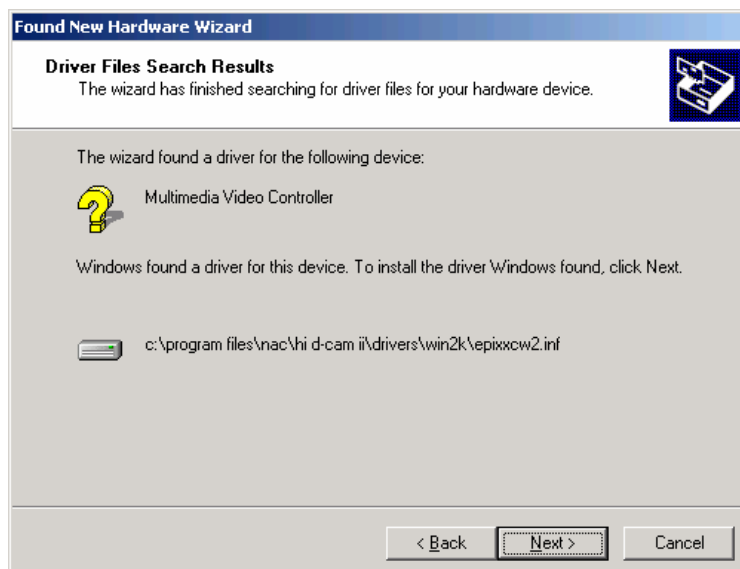
You may however have specified somewhere different when you installed the software. In the drivers folder there are also different folders for different operating systems.



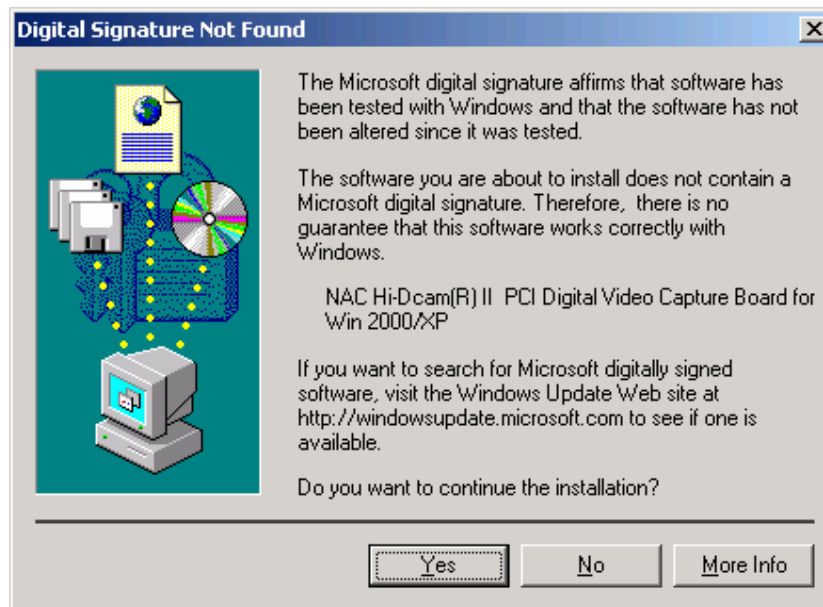
6. In the “Found New Hardware Wizard” window click the [OK] button.



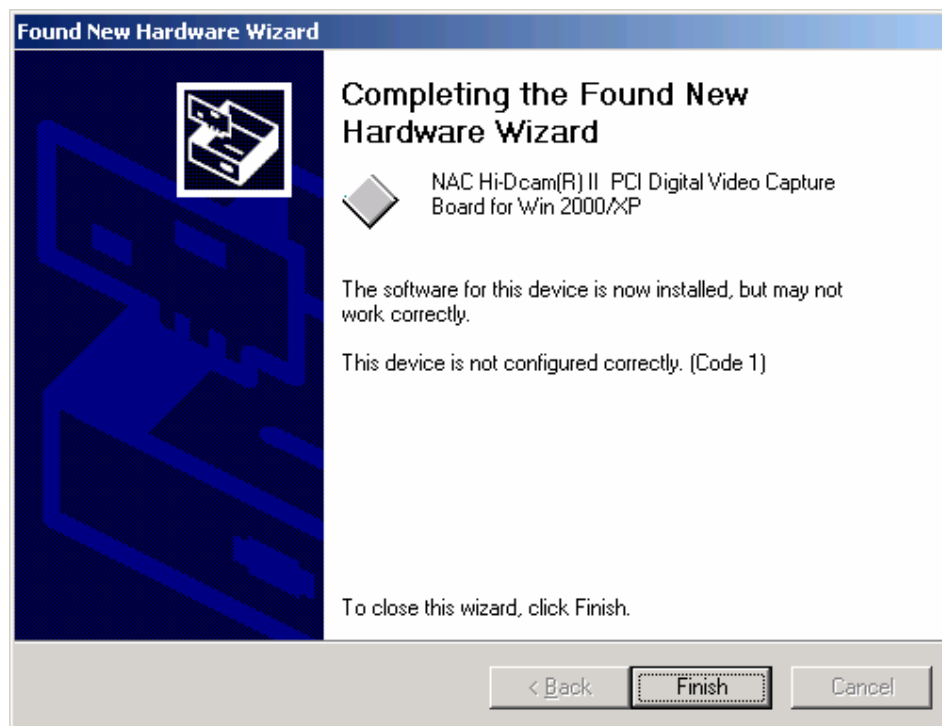
7. In the “Found New Hardware Wizard” window click the [Next] button.



8. In the “Digital Signature Not Found” window click the [Yes] button.



9. In the “Found New Hardware Wizard” window click the [Finish] button.



10. Restart the computer from the Start menu.

Connections

Single Camera Operating Mode

If the installation above was followed correctly the computer is now setup to operate in single camera mode. The trigger input on the power / trigger back plate needs to be connected to a BNC trigger cable to provide an external triggering to stop/start recordings.

Multiple Camera Operating Mode

If two or more camera are to be used in the same computer install the new PCI boards as the first PCI board was following the same procedures above. To synchronise the additional cameras an external signal needs to be inputted to the slave PCI board this signal is exported from the 'External Signal Output' on the master camera's head. Using the supplied cabling and the TTL to LVDS signal converter the output of which is connected to the 'External Signal Input' on the PCI control board, this synchronises the cameras together. For 3 or more slave cameras in the same PC the slave synchronisation signal can be copied internally by daisy chaining the P3 sockets from each of the slave PCI control boards.

For triggering a multiple camera PC system the trigger cable always must be connected to the first PCI control board's Power and Trigger Panel closest to the CPU. This board will then be in charge of triggering all subsequent board regardless of the setup, master or slave. These cameras then need to be setup in the software as to where they get there timings from. Please see below for an explanation on how to do this.



Pin Assignment for the Flash Trigger

The flash trigger output connector type on the back of the Hi-Dcam II is a micro-miniature push-pull lock type connector, the Hirose HR 10A-7R-4S. The corresponding connector is the Hirose HR 10A-7P-4P. The receptacle provides a TTL signal for an external flash. This signal can be programmed, deactivates, tied to an effective exposure signal generated internally, tied to an external flash input or permanently on. These options can be change in the Default Setting Window box, see the section entitled Preference below.

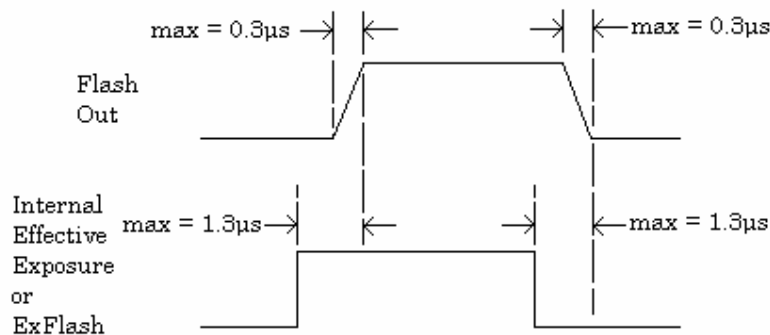
The TTL active high output has the following characteristics:

- High output minimum. 4.5V at 10mA output load, shortcut current 50mA (+40%/-20%)
- Low output maximum 0.5V at -10mA output load, shortcut current -50mA (+40%/-20%)

The pin assignment is given below showing the output schematic of the flash trigger connector:

Pin Number	Signal Name	Direction	Level	Function
2	Flash Output	Output	TTL Signal	Flash trigger; the HIGH signal is current limited to 50mA $\pm 20\%$
1, 3	Not Connected			
4	DC GND	Input	Ground	DV ground

The Flash Out put signal is short circuit proof. The signal is electrically isolated from other signals in the camera. See the timing diagram below:



The software

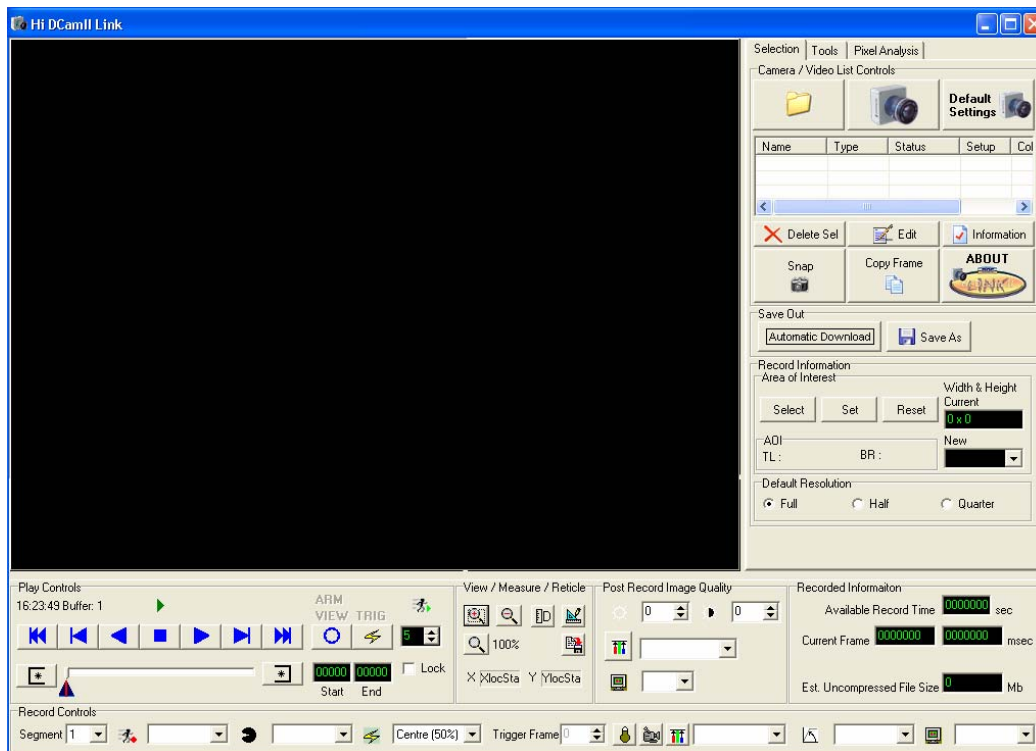
You can open the software from the following location:

START MENU | Programs | NAC Hi-DCam II | Hi D Link

If you like you can copy this short cut to your desktop. See your Windows™ Guide for how to do this.

The Main Window

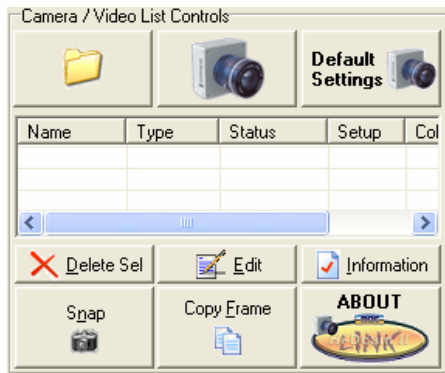
When the software starts it will look like the screen shot below:



This window is divided into three areas. The first is the video window, which is the black area in the top left. The area at the bottom is the play and record controls. The area on the right is the Main controls and tools. The area on the right is split up into 3 tabbed pages, called Selection, Measure Tools and Pixel Analysis.

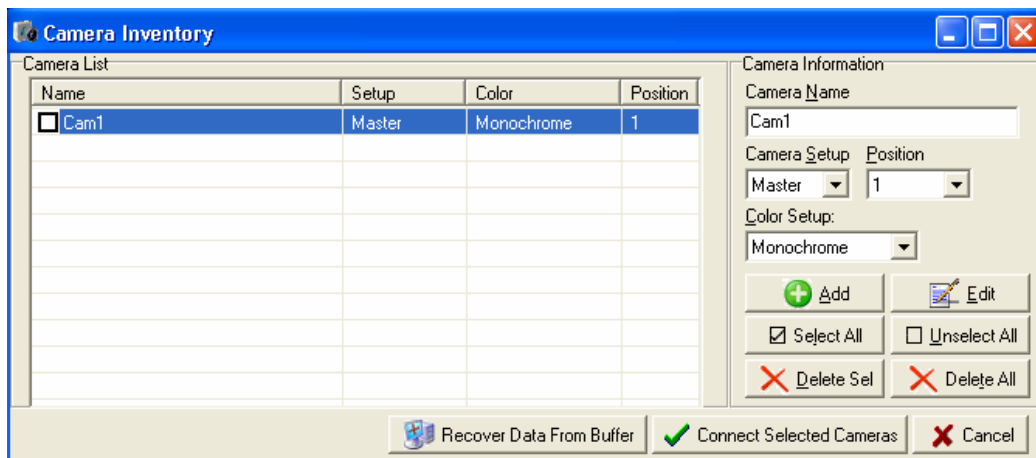
Connecting a Camera

On the selection tab there is a box at the top called 'Camera / video list controls', here is a grid, and some control buttons.

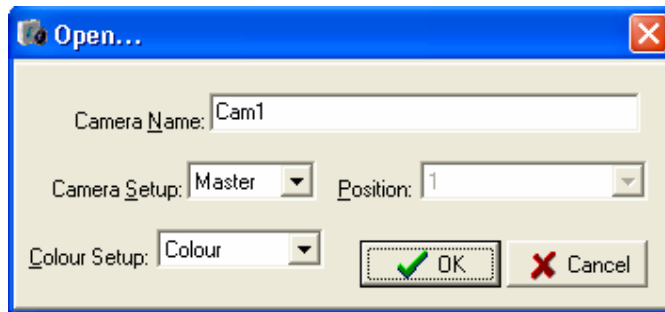


To add a camera:

1. Click the Camera button on the top row in the middle.
2. Another window will appear called 'Camera Inventory'; this will load up any previously used cameras into the grid.



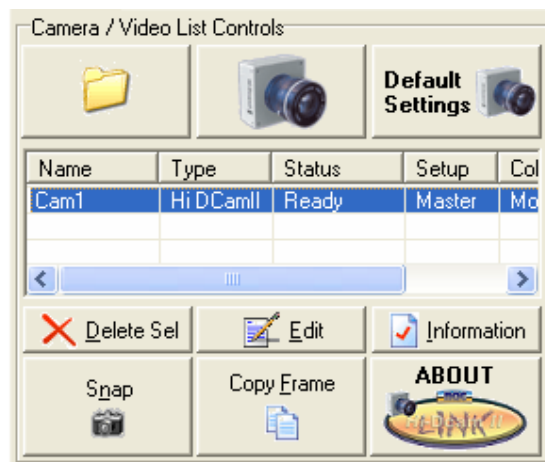
3. If the camera that is required for use is already in the list and the settings are correct tick the box next to the camera's name and click the 'Connect Selected Cameras' button. This will then connect the camera and make it ready for use.
4. If however there is no camera in the list or another camera is needed, enter the new camera information in the camera information boxes and click the 'Add' button. This will add the new camera to the list, and then tick the box next to the camera's name click the 'Connect Selected Cameras' button. This will connect the camera and make it ready for use.
5. If the camera is already information is incorrect, select the camera in the list and a blue bar will change position and highlight the newly selected camera. Then click the 'Edit' Button this will then display the window below, here any of the information can be changed and the changes saved by clicking the 'Connect Selected Cameras' button or disregarded by clicking the 'Cancel' button. Note the 'Position' field can not be changed.



6. After any changes have been made the camera can be connected by ticking the camera's name and clicking the 'Connect Selected Cameras' button, this will also save all the cameras in the list even if not checked to memory for future use. Clicking the 'Cancel' button will not connect any camera and disregard any changes made.

The camera setup options are, Master and Slave, Master cameras will generate its own timings and export them. Slave cameras will require timings from another camera. The 'Slave' mode is used to frame synchronizes two or more camera. Colour Setup applies a Bayer RGB pattern if it's a colour camera or uses a single monochrome channel if monochrome is chosen. Depending on the colour setup of the camera in position 1 will determine which colour setup gets applied to all subsequent cameras.

7. The 'Camera / video list controls' box will now look like this. The status column in the grid will show what tasks the camera is performing while the software attempts to connect it. If more than one camera was checked in the camera inventory window the software will attempt connection which each camera in the position order starting with the camera connected to the PCI board closest to the CPU on the motherboard, Position 1.



There are two other buttons above the grid list which can:

1. The Folder icon on the button on the top left can open up AVI's, streams of BMPs, TIFs and JPEGs, and BIN's (Raw Binary data from the PCI control board's buffers for review.
2. The 'Default Settings' button opens up the 'Preferences' window, see below.

Also there are some other buttons to below the grid which can:

1. 'Delete Sel' - Deletes the highlighted camera or video in the grid list.
2. 'Edit' - Brings up the Edit box as before in the camera inventory window. It allows the camera's mode, colour and name to be changed.
3. 'Information' - Opens another window displaying the camera's information.
4. 'Snap' - Takes an image from the highlighted camera and displays them to the screen.
5. 'Copy Frame' - Copies the frame showing in the image window and places on the Windows™ clipboard.
6. 'About' - Displays information relating to the Hi-Dcam II Link software.

Recovering Data from the Buffer

To recover data from the buffer perform the following:

1. Open up the 'Camera Inventory' window as above.
2. Tick the camera whose data needs to be recovered.
3. Click the 'Recover data from Buffer' button this will connect the camera and attempt to recover any data on the board and load up the trigger frame as it would after making a recording. Then the camera is ready for normal use.

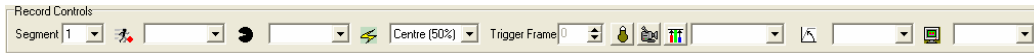
Data can only be recovered from a full restart if the computer has not lost power. If it has lost power the RAM on the PCI board will be wiped clean.













Making a Recording

To make a recording do the following, after connecting to a camera:

- 1) **Select the Memory Segment** : This box will be filled up with the number of memory segments the board has been made into. To change this see below.
- 2) **Select recording parameters** : Use the Record Info to set the Frames per second, shutter speed and trigger mode.
- 3) **Push the View/Arm Button** : You are in view mode. You can set up the shot and focus either using the on screen display (slow update) or via the VGA output from the camera head.
- 4) **Push the View/Arm button again** : you are in ARM Mode. The system is waiting for a trigger.
- 5) **Trigger** : Either from the software or the external hardware trigger.
- 6) **Review the recording** : When the system has finished the recording you will be back in ready mode. You can review the recording using the VCR controls.
- 7) **Set the save range** : use the scroll bar to set the range of interest.
- 8) **Save the images** : push Save as, you can save as a series of images or as an AVI or save out the entire board's buffer data which is an efficient means of downloading all of the recording quickly which then can be loaded back into the board for post-record operations. Depending on the Image size will depend on what AVI Codec's are allowed. You can ALWAYS use uncompressed and NAC MJPEG or Pixoft's Squeeze codec as available.

Record Controls



Use this ...	To do this...
 Segment 1	Memory Segment Set the memory segment in use.
	Frame Rate Set the Frames Per second (Pictures Per Second)
	Shutter Set the Shutter Speed (Exposure Time)
	Trigger To Set the Trigger Mode
	Trigger Frame Sets the number of “Pre Trigger frames” when using a custom trigger
	Low Light Mode Switch the camera to Low Light Mode. In View Mode the camera will operate at the equivalent of 1/60 Shutter regardless of settings. This is used to set up the view without the need for bright lighting
	sVGA Out Switch ON and OFF the sVGA out signal from the camera head.
	White Balance Set the White balance. Select from the Drop down list. If you select CUSTOM then you should push the  button () and then click the image to set the white balance at the clicked pixel
	Gain Set the Gain. Increasing the gain will assist with low light situations but it will begin to introduce noise if used above 6dB.
	Gamma Sets the gamma from with either 1, 1.8 or 2.2












Notes once a recording has been made the ‘Record info’ settings are ‘disabled’ and cannot be changed. To re-enable them you must put the camera back into VIEW mode. **WARNING:** This will ERASE any recording already made.





The Trigger

When armed the system is constantly recording in a loop. The trigger is used to STOP recording. A start trigger would have the effect of recording “one more entire memory” and then stopping recording. An end trigger would have the effect of stopping recording immediately. A centre or custom trigger would be somewhere between these two extremes. See ‘Preferences’ for further details. After data has been captured clicking the trigger button will load the trigger frame into the viewing area.

Play Controls

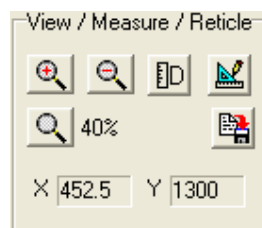







Use this ...	To do this...	When?
 Rewind	Jump to the first frame of the recording, or the first frame of the sub range (see below)	After a recording
 Step Backwards	Step one frame backwards	After a recording
 Play Backwards	Play the capture sequence backwards. Pushing this button 2x will put the system into LOOP mode. The system will keep looping about the sub range	After a recording
 Stop playback	Stop playback or looping playback	After a recording
 Play Forwards	Play the capture sequence Forwards. Pushing this button 2x will put the system into LOOP mode. The system will keep looping about the sub range	After a recording
 Step Forwards	Step one frame forwards	After a recording
 Fast Forward	Jump to the last frame of the recording, or the last frame of the sub range (see below)	After a recording
 VIEW/ARM	Put the camera(s) into VIEW or ARM Mode. Pushing this button once will put the camera into VIEW Mode. A Live image will be displayed on the screen and also through the sVGA Output of the camera head if turned on. Pushing the button a second time will put the camera into ARM Mode. The camera is recording and waiting for a trigger	When you are preparing to make a recording
 TRIGGER (software)	Triggers the recording. This button will initiate a “stop recording” sequence. Depending on the trigger settings this will be immediate or after a given delay. A hardware trigger via the BNC connection has the same effect.	When you want to record
 Mark IN	Sets the Start position of the sub-range of images	After a recording
 Mark OUT	Sets the End position of the sub-range of images	After a recording

	Mark IN Frame Num	When the Mark IN button is pressed or the slider-bar sub-range triangle is used the current frame number is displays in here as the sub-range start frame. A frame number can also be typed in here and set by either hitting the 'Enter' key or by clicking the Mark IN button.	After a recording
	Mark OUT Frame Num	When the Mark Out button is pressed or the slider-bar sub-range triangle is used the current frame number is displays in here as the sub-range End frame. A frame number can also be typed in here and set by either hitting the 'Enter' key or by clicking the Mark OUT button.	After a recording
	Replay Speed	Sets the requested FPS replay speed	After a recording
	Lock Speed	Maintains the requested replay speed by skipping frames if necessary	After a recording

The slider bar below the above button is used to indicate the current position, with a thick grey tick running along the bar. The red line indicates the trigger frame. The triangles below can help set the sub-range of the images.

View / Measure / Reticle Functions



Use this ...		To do this...
	Zoom IN	Zoom into the image in 10% steps
	Zoom OUT	Zoom out the image in 10% steps
	Reset Zoom	Resets the image to 100% Zoom
	Measure Distance	Measure Distances. After depressing this button you can click and drag on the image. The info box to the right of the screen will display the distance of the line you are dragging. If the image has been calibrated then this will be a calibrated measurement, if it has not been calibrated then it will be given in pixels. The same function is also available from the 'Tools' Tab Page
	Calibrate Scene	Calibrate the Scene. After depressing this button you will be required to click on two points in the image for which you

know the distance apart. You will then have to enter this distance into a dialog as shown below. This information will be used for measuring tools.



Save to
reticle file

Saves data to a reticle file. You will be prompted for a filename for a reticle file. Now wherever you click the image the position of the click will be saved in a comma separated format to the file specified and displayed on the image with a cross-hair. This will continue until you depress the reticle button again. See below under ‘Tool’ For more in-depth instructions.

Calibrate and Reticle functions are repeated on the Measure Tools Tab.

Image Quality Settings

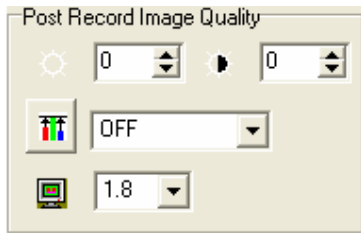





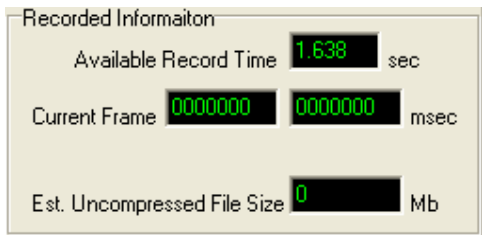


Image quality settings are only available AFTER a recording has been made.

Use this ...		To do this...
	Brightness	Adjust the brightness of the image
	Contrast	Adjust the contrast of the image
	White Balance	Adjust the White Balance of the image. Select from the Drop down list. If you select CUSTOM then you should push the button () and then click the image to set the white balance at the clicked pixel
	Gamma	Sets the gamma from with either 1, 1.8 or 2.2

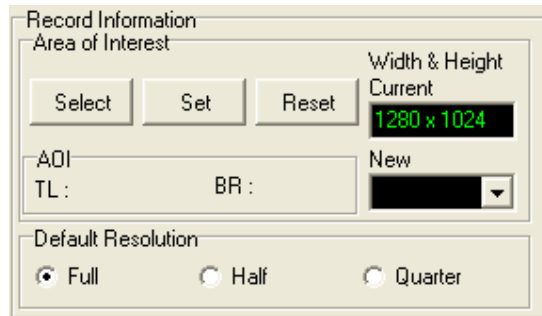
Recorded Information



This section is for information purposes only. It displays the following:

1. Available record time.
2. The current frame number and time of the frame (relative to trigger).
3. The *estimated* uncompressed file size.

Record Information

The image shows a software dialog box titled "Record Information". It has a tabbed interface with the "Area of Interest" tab selected. Inside this tab, there are three buttons: "Select", "Set", and "Reset". To the right of these buttons is a section labeled "Width & Height" with a "Current" display showing "1280 x 1024" in green text on a black background. Below the buttons is a section for "AOI" with two input fields labeled "TL :" and "BR :". To the right of these fields is a "New" label and a dropdown menu. Below the "Area of Interest" tab is another tab labeled "Default Resolution". Under this tab, there are three radio buttons: "Full" (which is selected), "Half", and "Quarter".

Area of Interest

You do not need to record the full resolution image. You have the option to select an area of interest. This will benefit you with longer record times and also smaller image files.

To select an area of Interest you should be in READY Mode. (Not VIEW or ARM):

1. Update the image by clicking the 'SNAP' Button.
2. Push the 'Select' Button. The image will automatically 'zoom to fit'.
3. Use your mouse to drag an area of interest.
4. When you let go of the mouse button the 'background' will be tinted RED to show you the area of interest selected.
5. If you are happy with the selection then click 'SET'.
6. If not then Drag again.
7. To reset a previously set Area of Interest, click the 'Reset' Button.

There are some predefined resolutions to choose from in the 'New' drop down combo box. Selecting one of these will alter the resolution on all cameras.

Once a new resolution has been chosen the computer will work out the available record time. This will increase as the resolution gets smaller.

Note this AOI is applied to all cameras in the PC.

Default Resolution

The default resolution allows you to reduce the Horizontal (and Vertical- optional) resolution without needing to specify an AREA of Interest. This is useful if you are using a Frame rate of more than 500fps and wish to avoid the "letter box" effect, or if you wish to gain extra record time. Depending on you preferences, this option will make the horizontal (or horizontal and vertical) resolution either half or quarter of the maximum allowed. See also Preferences.

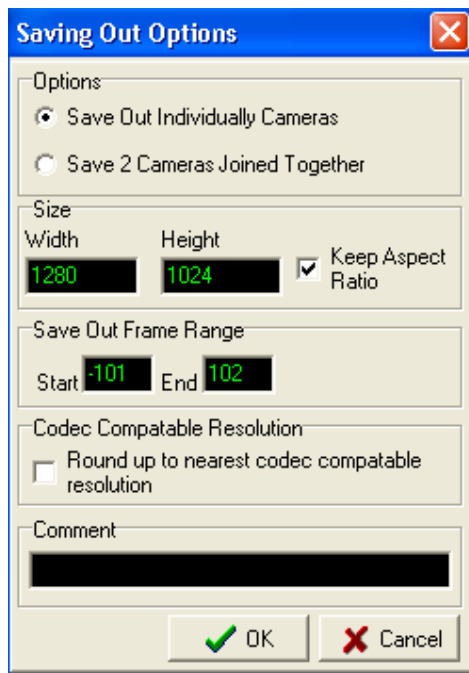
Saving Out



Hi Dcam II Link allows the saving out of recorded images, either separately or if there are two cameras in the PC, two recorded images can be saved out joined together. A comment typed here will be added to the frame information if frame information is included on the image output. See 'Preferences' below.

To save out from a single camera:

1. First the range needs to be set of which frames are required to be saved out. This can be changed by using the slider controls or the 'Mark In' and 'Mark Out' button in the 'Play Controls'.
2. Click the 'Save As' button



3. The above window will appear, choose the 'Save Out Individually checked Files' bullet, this is the default option. If the image size is too big, there is an option to reduce the size of the images saved out, in these boxes are the current width and height, if new figures are added into these boxes then the images will be first reduced before saved out into an AVI files. The 'Keep Aspect Ration' checkbox if checked will keep the images from appearing stretched, by altering the width or height accordingly.
4. If the range was not set before clicking the 'Save As' button the range can be altered here if need be.
5. If the chosen resolution is not a codec compatible one, ticking the checkbox will place a black edge around the bottom and right side of the image

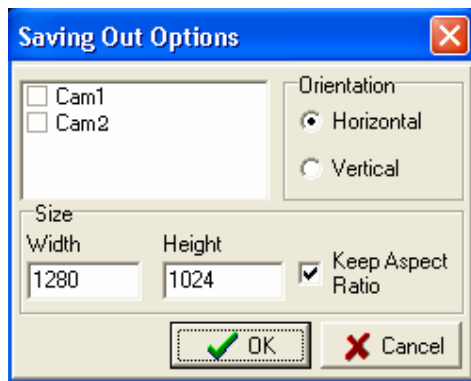
increasing width and height to make the resolution compatible, without stretch or enlarging the image.

6. There is the option to enter a text comment associated with the recording.
7. When the required settings are set, click the 'Ok' button.
8. Another window will appear asking for a filename and a location.
9. Then another window will appear asking if the AVI is to be compressed, if so select on in the drop down list and click 'Ok'.
10. Now the AVI will be saved out, and the progress will be indicated in the progress bar.

If at anytime the save needs to be stop, clicking the 'Cancel' button will stop the saving out.

To save out two camera's images:

1. Select the required range as with the single camera, but take note that the range will be applied to both cameras' images.
2. Then click the 'Save As' button.
3. Select the 'Save 2 Files Joined Together' bullet; the re-size option will now be shaded out.
4. Make sure the range is correct and click the 'Ok' button.
5. Then the window will change to:

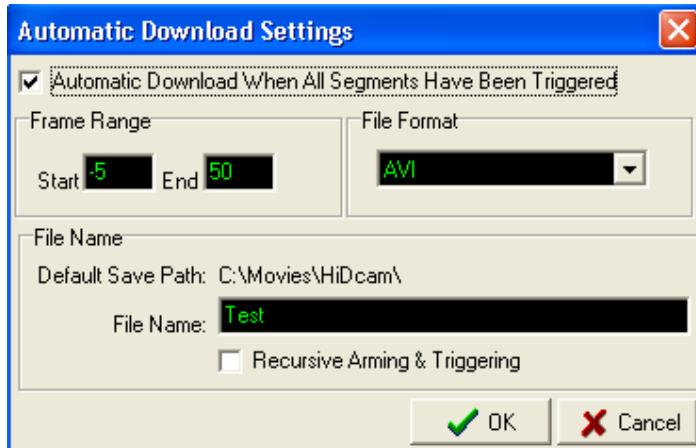


6. If there are more than 2 cameras in the PC, they will also be displayed in this list box. But only 2 can be ticked.
7. Select whether the images are to be placed side-by-side (Horizontal) or on top of one another (Vertical).
8. Then if the images need to be reduced select the required measurement as with the Single camera saves out.
9. Once the required settings have been entered, click the 'Ok' button.
10. Then input a filename and location when the next window appears.
11. When another window appears select the compression if any.
12. Then watch the progress bar as the AVI is made.

Note Other file format can be saved out along with AVI; BMPs, TIFs and JPEGs images stream can be saved out also. One important file format is the raw binary data (BIN) format. This saves out the entire PCI board's buffers to a file with '.bin.' extension. Another file is also created with the extension '.hdc'. These two files need

to be kept together as one with out the other will mean that the data can not be loaded back into the PCI board's buffers at a latter date.

Automatic Download

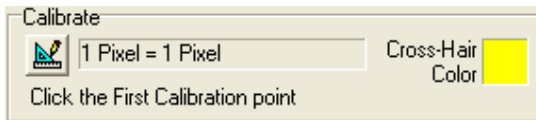



Click this button will display the above options. These options affect how the software operates after it has recorded into to all of memory segments. When the last memory segment has been triggered and recorded into, if the Automatic Download is checked then the software automatically saves out segments into the required format and range in the pre-defined location. If the selected file format was BIN (Raw binary data direct from the PCI memory buffers) the entire memory is saves out in one file, not by segments, when it comes to loading this BIN file back into the PCI board's memory all the segments used will be setup accordingly. Save as BIN reduces the time spent downloading from the board as there is no conversion or compression to perform. It takes approximately 90 seconds to download 1GB of data.

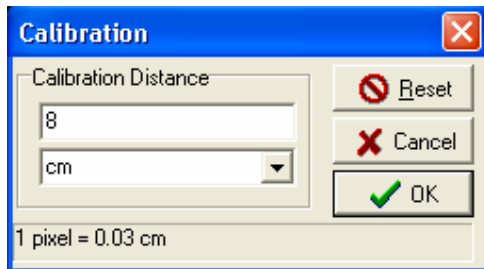
The Recursive Arming & Triggering check box is used after download has taken place; if it's ticked the software resets the segments and goes into arm mode in the first segment waiting for a trigger.

Tools

Calibration

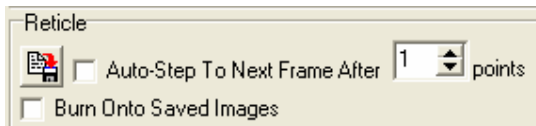


This tool is used to calculate basic depth correction. Click the  button will allow the user to select two point on the image that the distance apart is know.



After clicking two points on the image you will see the dialog above. Enter the distance apart of the two points and the units of measure. You can select the unit from the drop down list or enter it manually. Click OK when you have finished. To reset the calibration (to 1 pixel = 1 pixel) push the reset button.



Reticle



This tool is used to mark the image at specific points of interest. There are some options available to aid the user. The user can have the software step through to the next frame automatically by checking the 'Auto-Step to Next Frame' checkbox, then the number of points on the image before stepping to the next frame, and whether to burn the point's crosshairs onto the images when saving out and reviewing.

Grid

Hi Dcam II Link allows the overlay of a grid onto the images.

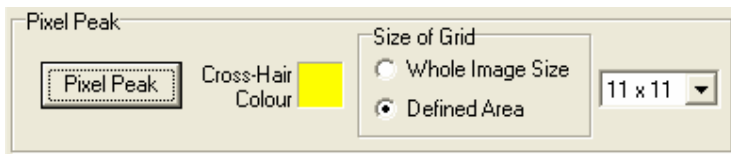
Use this ...		To do this...
	Grid On	Toggle the grid ON and OFF
	Set Start	Set the start point of the grid. Both Polar and Line grids will begin at the point set. Press the button and then click the image.
Grid Type		Different types of Grid to draw. Y is Vertical Lines, X is Horizontal Lines. Polar will be concentric circles moving out from the Start Position
Rotate		Rotates the Grid by the degrees set. No use for polar grid function
Frequency		The spacing of the grid lines. This value will relate to the calibration. If no calibration is performed than it will be in pixels

Pixel Analysis

Note for multi-camera systems. For all pixel tool the first camera that is ticked the programme comes to will uses the images provided from this camera, any subsequent cameras tick will be ignored. To view there camera's pixel values make sure that camera's name is ticked and no other.

Pixel Peak

The pixel peak group box at the top of the tabbed page allows the pixel values to be extracted from the current images displayed in the video window.



There are various options to choose from, to have a look at a defined area of 11 pixels by 11 pixels:

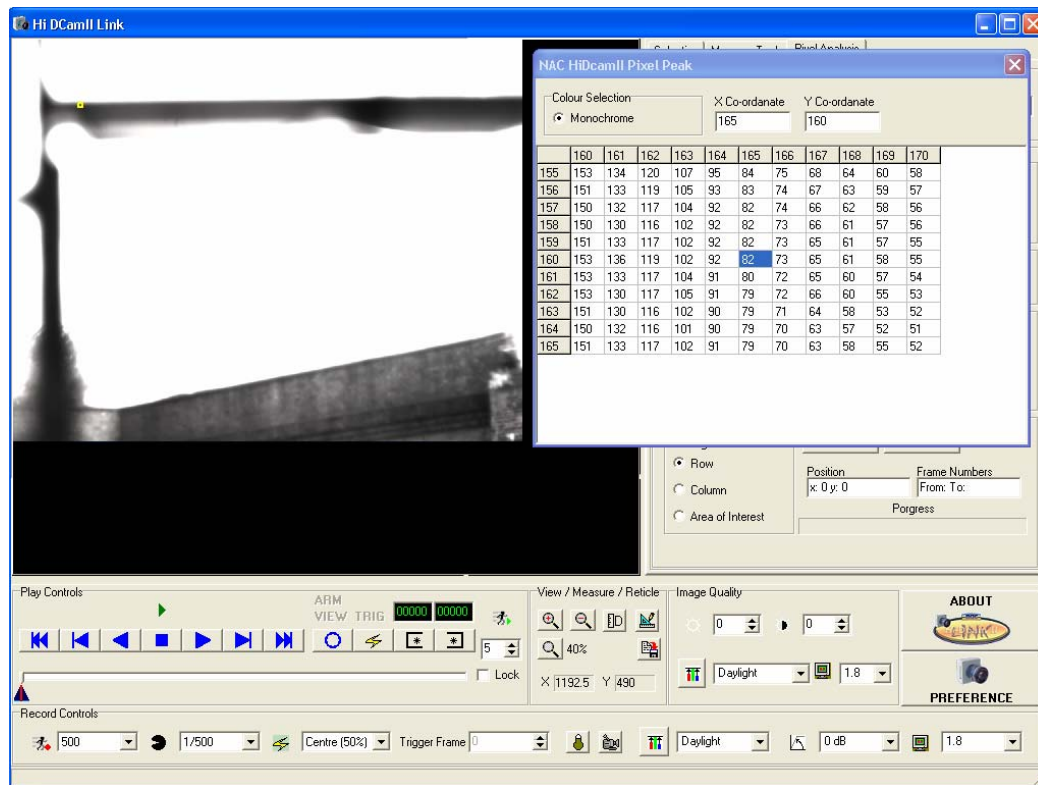
1. Select the 'Defined Area' bullet, its default position.
2. Then select the '11x11' option in the drop down box. This is only enabled when 'Defined Area' is selected.
3. The click the 'Pixel Peak' button.
4. A new window will appear:

A screenshot of the 'NAC HiDcamII Pixel Peak' window. It has a title bar with a close button. Inside, there's a 'Colour Selection' section with a radio button for 'Monochrome' (which is selected). To the right are two input fields for 'X Co-ordinate' and 'Y Co-ordinate', both containing the number '5'. Below these is an 11x11 grid of pixel values. All values in the grid are '254'. The cell at row 5, column 5 (0-indexed) is highlighted with a blue background.

	0	1	2	3	4	5	6	7	8	9	10
0	254	254	254	254	254	254	254	254	254	254	254
1	254	254	254	254	254	254	254	254	254	254	254
2	254	254	254	254	254	254	254	254	254	254	254
3	254	254	254	254	254	254	254	254	254	254	254
4	254	254	254	254	254	254	254	254	254	254	254
5	254	254	254	254	254	254	254	254	254	254	254
6	254	254	254	254	254	254	254	254	254	254	254
7	254	254	254	254	254	254	254	254	254	254	254
8	254	254	254	254	254	254	254	254	254	254	254
9	254	254	254	254	254	254	254	254	254	254	254
10	254	254	254	254	254	254	254	254	254	254	254

5. This window contains a colour selection option at the top along with the middle x and y co-ordinates highlighted by the blue box on the grid below.
6. Because the camera is monochrome, there will be no colour options, it the camera was a colour model; there would be the option to view the Red, Green and Blue Channels. The Grid contains the pixel values at the pixel position marked at the top and left sides.

To select a different area to peak at click on a new location on the current images:

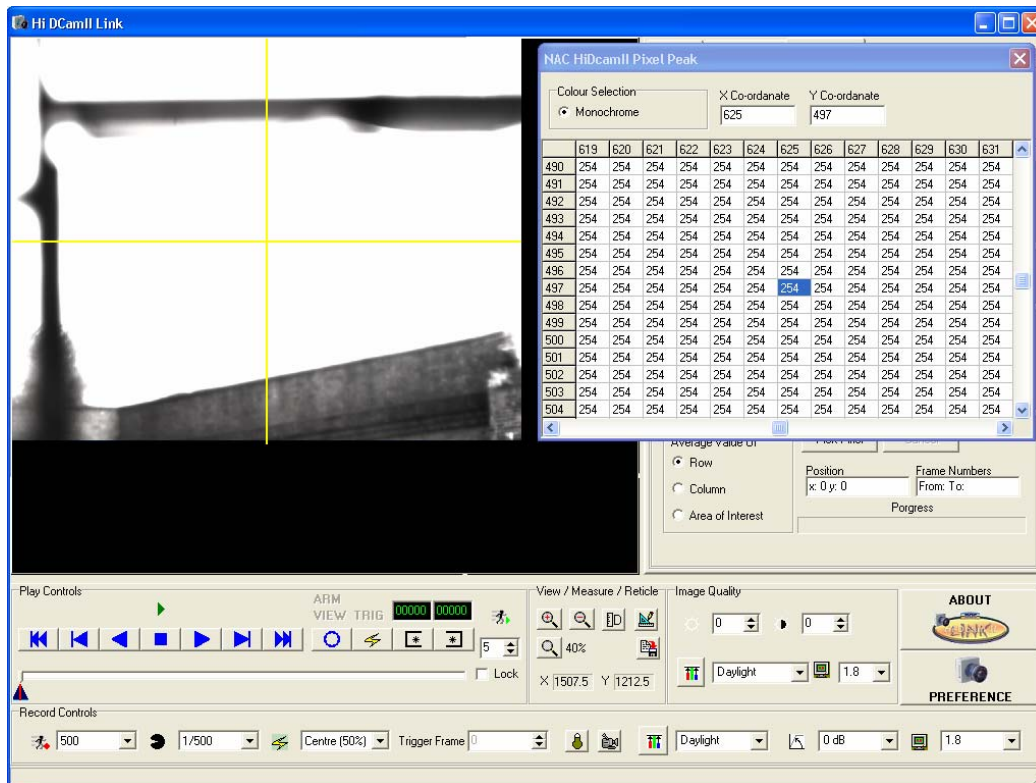


7. A yellow square will now indicate the pixels being looked at in the grid, and the grid will update to view the pixel's values. The centre x and y position is the pixel that was click on the images, and the co-ordinates are stored in the edit boxes above.

The grid will keep updates as long as its window is open, closing the window will stop displaying the pixel's values.

There is another option in the Pixel Peak box, 'Whole Image Size'. If this option is select the drop down box is disabled. Then click the 'Pixel Peak' button will open another window and fill the grid with the whole images pixel's values.

Note if the image size is big, filling the grid may take some time.



With this option select the grid automatically goes to the centre of the images and highlights the centre pixel. Again click on the image will display the pixel values around the area click with the area clicked being at the centre display of the grid and the co-ordinates being displayed in the edit boxes above. A yellow cross hair will appear on the image indicating the co-ordinates chosen.

Note to change the colour used on the image to show the user the area being viewed, click the 'Cross-Hair Colour' box, a colour dialog box will appear and another colour can be chosen. The default is yellow.

Pixel Views

Pixel Views

Display Options For All Tools

☒ Red Chanel ☐ Intensity 1 RGB / 3

☐ Green Chanel ☐ Intensity 2 RGB Formula

☐ Blue Chanel

Row/Column Intensity

Pick Pixel Position Orientation

x: 0 y: 0 ☒ Row

☐ Coloumn

Intensity Over Time

Pick Pixel Cancel

Position Frame Numbers

x: 0 y: 0 From: To:

Progress

Average Intensity over time

Pick Pixel Cancel

Position Average Value Of

x: 0 y: 0 ☒ Row

Frame Numbers ☐ Column

From: To: ☐ Area of Interest

Progress

At the top of this box is 'Display Options For All Tools', this box changes settings for the following three pixel functions. This option with the bullet in will only display that channel in the graphs.

Row/ Column Intensity

Row/Column Intensity

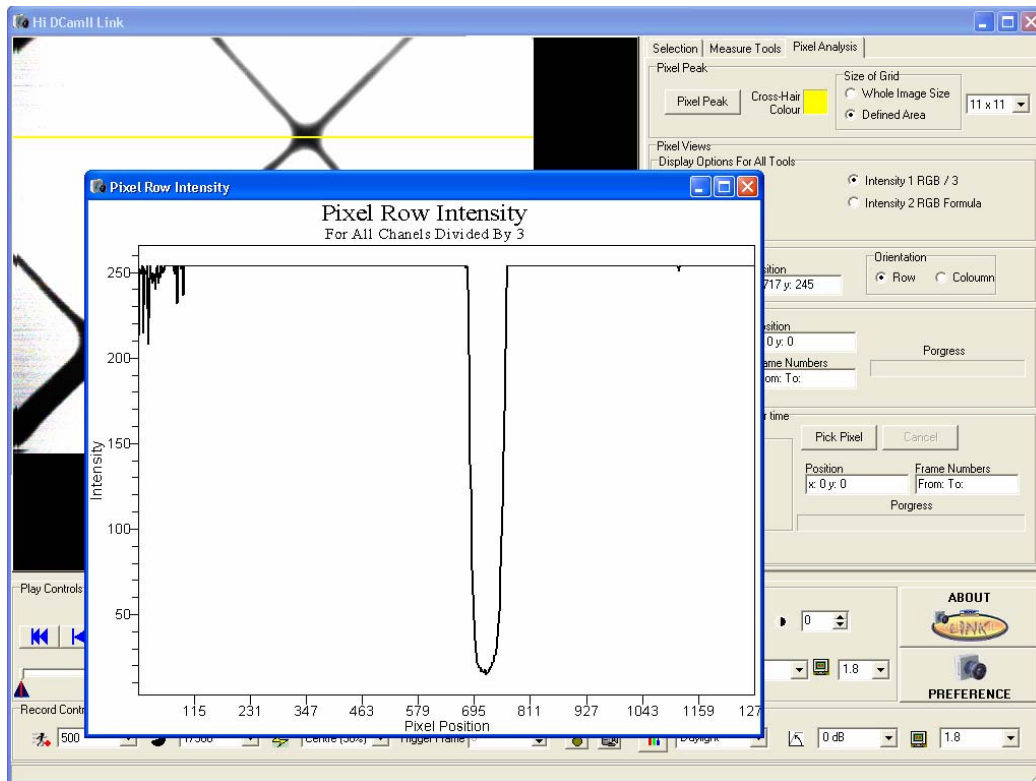
Pick Pixel Position Orientation

x: 0 y: 0 ☒ Row

☐ Coloumn

This function extracts from the current frame the pixel values (intensity's) along a pre-selected Row or Column. To use:

1. Select whether you wish to view a row or column.
2. Click the 'Pick Pixel' button.
3. Next click on the image of the requested row/ column.
4. A new window will appear and line will be drawn representing the row or column.

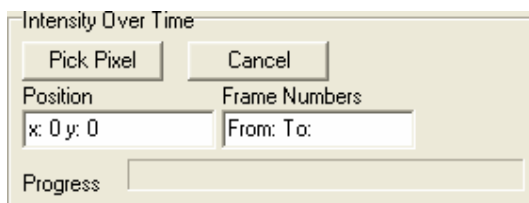


5. The window contains a graph show the pixel intensity on the left ranging from 0 to 155, and on the bottom the pixel's position. In the case of a row from left to right or if a viewing a column from top to bottom.
6. The graph represents the pixel value for what every channel is select in the 'Display Options for All Tools'.
7. To change the selected channel, simply choose another bullet.
8. The programme also allows the change of orientation from row to column or vice versa.

Note for monochrome camera, changing the to Red, green or blue channels will produce incorrect values, choice RGB / 3 or use the formula to obtain the correct pixel values.

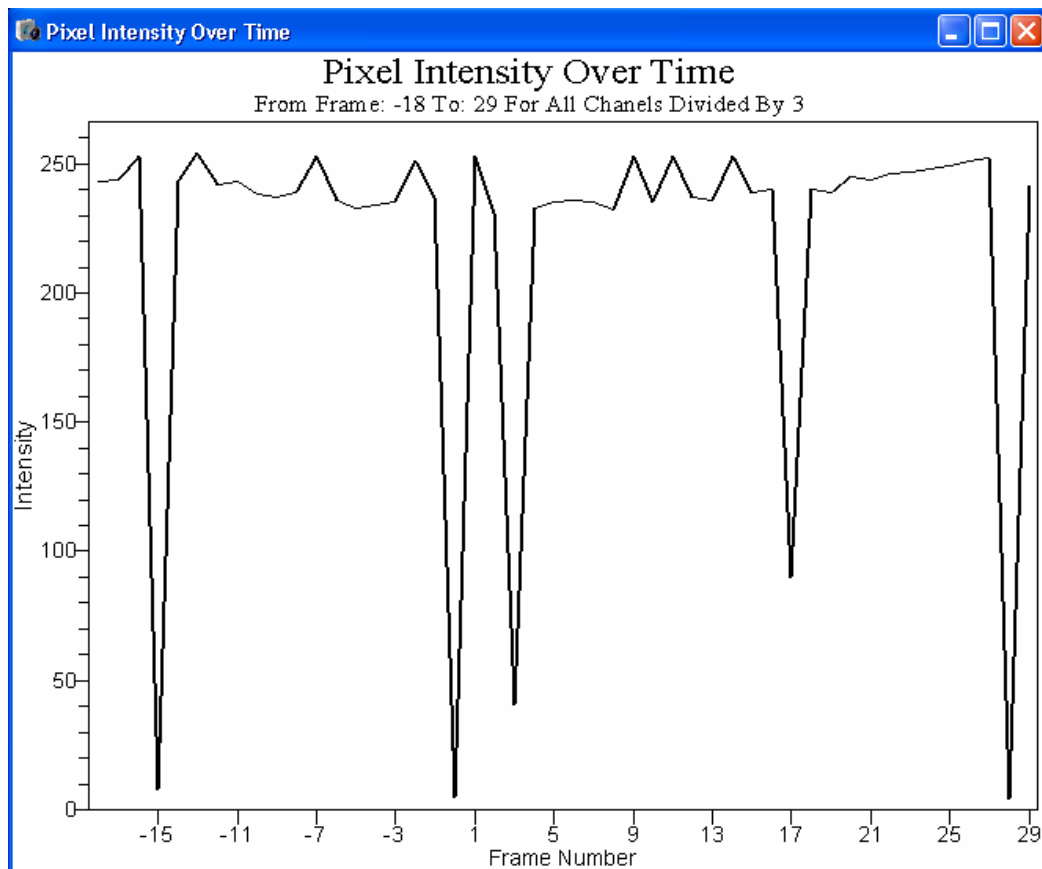
Intensity over Time

This function can only be carried out after recording. It takes the pixel' values depending on what is selected in the 'Display Options for All Tools' box at the given co-ordinates, and then finds out that intensity over the range selected in the 'Play Controls' box on the sub range slider.



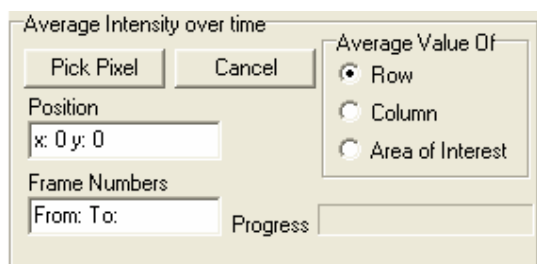
To use this function:

1. Select the channel to be viewed in the 'Display Options for All Tools' box.
2. Select the correct range using the 'Play Controls' sub range slider.
3. Click the 'Pick Time' button.
4. Select the required pixel by click on its location with the mouse.
5. The cursor will change to an hourglass and the programme will run through each frame and decode the selected pixel's value.
6. The progress bar will indicate the progress of the function.
7. To cancel this function at any time, click the 'Cancel' button.
8. When the programme has finished gathering the results, a new window will open:



9. Once the graph is open the window needs to be closed before any other functions can be used.
10. To change the channel or ranges close the window and start again.

Average Intensity Over Time



This function is very similar to the above function, but instead of just finding out a specific pixel's value, this function will work out the average intensity for a row, column or area on each image within the ranges set. To use this function on a row or column:

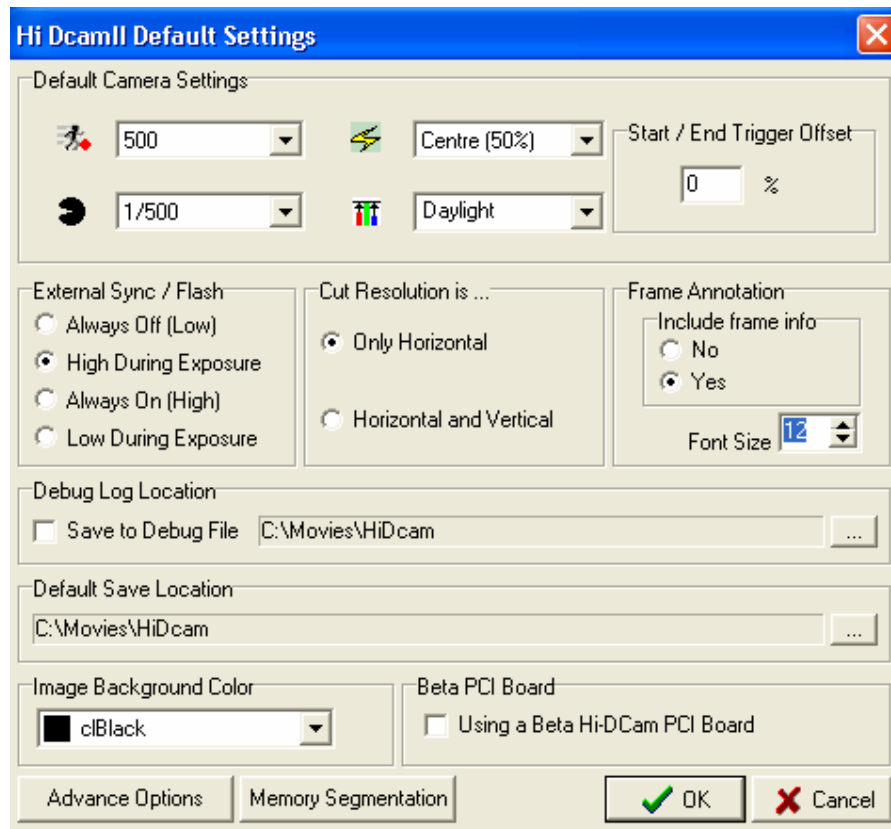
1. Select the channel via the 'Display Options for All Tools' box.
2. Select whether a row, column or area is required.
3. Select the range required by moving the mark IN and mark OUT slider triangles or inputting the frame number direct.
4. Clicking the 'Pick Pixel' button.
5. The click the pixel on the image which the row or column goes through.
6. The progress bar will indicate the progress of the function.
7. To cancel this function at any time, click the 'Cancel' button.
8. When the programme has finished gathering the results, a new window displaying the average intensities over time for the row column.

To use an area of interest follow the above except select the 'Area of Interest' bullet and then drag the area of interest on the image after clicking the 'Pick Pixel'.

Miscellaneous

Preferences

The 'Default Settings' button will show the preferences screen.



The image shows a Windows-style dialog box titled "Hi DcamII Default Settings". It contains several sections for configuring camera settings. The "Default Camera Settings" section includes dropdowns for shutter speed (500), aperture (Centre (50%)), and ISO (1/500), along with a "Start / End Trigger Offset" field set to 0%. The "External Sync / Flash" section has radio buttons for "Always Off (Low)", "High During Exposure" (selected), "Always On (High)", and "Low During Exposure". The "Cut Resolution is ..." section has radio buttons for "Only Horizontal" (selected) and "Horizontal and Vertical". The "Frame Annotation" section has radio buttons for "Include frame info" (selected) and "No", with a "Font Size" spinner set to 12. The "Debug Log Location" section has a checkbox for "Save to Debug File" and a text field for the file path "C:\Movies\HiDcam". The "Default Save Location" section has a text field for the path "C:\Movies\HiDcam". The "Image Background Color" section has a dropdown set to "clBlack". The "Beta PCI Board" section has a checkbox for "Using a Beta Hi-DCam PCI Board". At the bottom, there are buttons for "Advance Options", "Memory Segmentation", "OK", and "Cancel".

Hi DcamII Default Settings

Default Camera Settings

Shutter Speed: 500
Aperture: Centre (50%)
ISO: 1/500
Start / End Trigger Offset: 0 %

External Sync / Flash

- ☐ Always Off (Low)
- ☒ High During Exposure
- ☐ Always On (High)
- ☐ Low During Exposure

Cut Resolution is ...

- ☒ Only Horizontal
- ☐ Horizontal and Vertical

Frame Annotation

Include frame info

- ☐ No
- ☒ Yes

Font Size: 12

Debug Log Location

☐ Save to Debug File C:\Movies\HiDcam

Default Save Location

C:\Movies\HiDcam





Image Background Color

clBlack

Beta PCI Board

☐ Using a Beta Hi-DCam PCI Board

Advance Options Memory Segmentation OK Cancel

Use this ...		To do this...
Start/End Trigger Offset		The % of memory to “delay” when using a Start or End trigger. (see Below)
External Sync / Flash		Set the state of the External Sync from the camera head.
Include frame info		Denote whether frame information (Frame Number, time, shutter, trigger, comments) are displayed on the output images.
Frame Info Font Size		Set the Font size of the Frame Info
Debug Log File		Save Debug Information to a specified log file
Default Save Location		Select and save a default folder to save video files to
Image Background Colour		Sets the colour for the image window
Cut Resolution		Set the default cut resolution mode
	Frame Rate	Set the Default Frame rate
	Shutter	Set the Default Shutter
	Trigger	Set the default trigger Mode
	White Balance	Set the Default White Balance

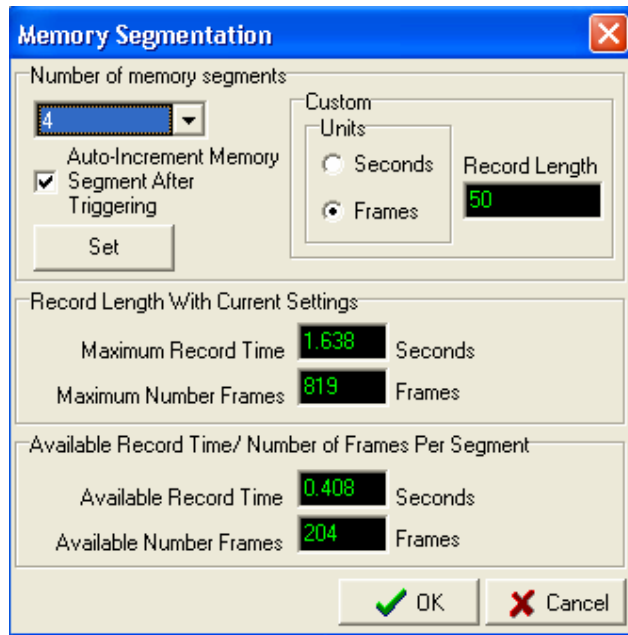
Start End Trigger Offset

Example {1} if you have 100 frames available a start trigger would normal cause a further 100 frames to be recorded before recording stops. A 10% offset would cause a further 90frames to be recorded.

Example {2} if you have 200 frames available an end trigger would normal cause a recording to stop immediately. A 10% offset would cause a further 20 frames to be recorded.

Memory Segmentation

On clicking this button will open up the following window:



The 'Memory Segmentation' dialog box is shown with a blue title bar and a close button. It contains three main sections. The top section, 'Number of memory segments', has a dropdown menu set to '4', a checkbox for 'Auto-Increment Memory' which is checked, and a 'Set' button. To the right is a 'Custom' box with 'Units' set to 'Frames' (radio button selected) and a 'Record Length' of '50'. The middle section, 'Record Length With Current Settings', shows 'Maximum Record Time' as '1.638' seconds and 'Maximum Number Frames' as '819'. The bottom section, 'Available Record Time/ Number of Frames Per Segment', shows 'Available Record Time' as '0.408' seconds and 'Available Number Frames' as '204'. At the bottom are 'OK' and 'Cancel' buttons.

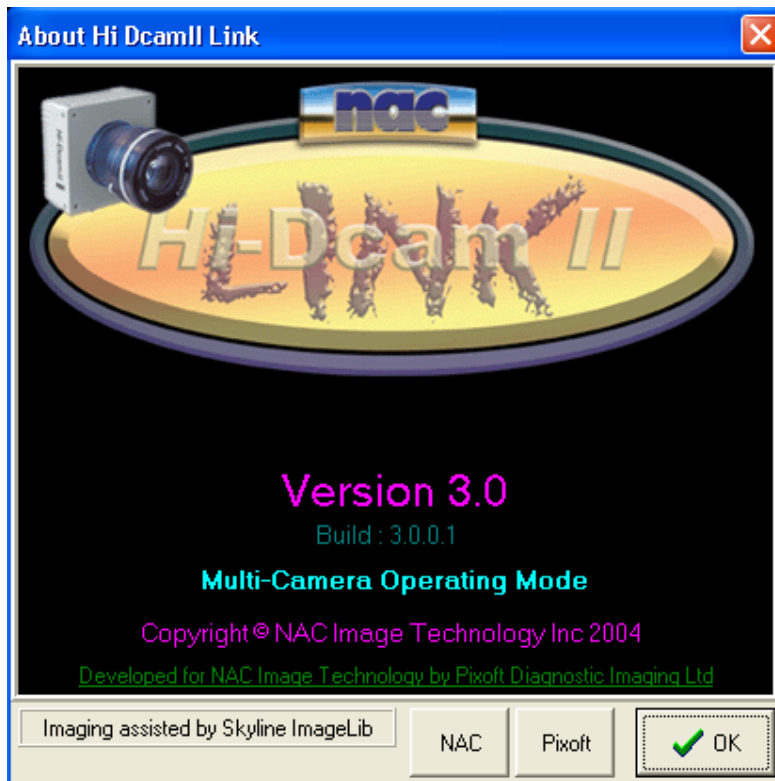
Section	Parameter	Value	Unit
Number of memory segments	Number of memory segments	4	
	Record Length (Custom)	50	Frames
Record Length With Current Settings	Maximum Record Time	1.638	Seconds
	Maximum Number Frames	819	Frames
Available Record Time/ Number of Frames Per Segment	Available Record Time	0.408	Seconds
	Available Number Frames	204	Frames

This window controls the number of segments the PCI board is made into. A segment is part of the total available video memory. The top half of the window is where the user can select how many segments there are. This can be inputted either by selecting how many from the drop down list which are 1, 2, 4, 8, 16 or custom. Selecting custom from the drop down list enables the custom box on the right; here the user can input the number of seconds or frames required per segment. If a camera is connected the user can click the set button which will set the new memory segmentation settings and update the boxes below.

These boxes contain the maximum record time in seconds and frames and the available record time in seconds and frames per segment.

If 'Auto-Increment Memory Segment After triggering' is checked then once the trigger has been received whilst recording in the current segment the software will automatically jump to the next segment and re-arm itself awaiting the next trigger. This will keep happening until the user clicks the stop button or it's the last segment been used. If it's the last segment one of two things will occur. The first is that the software will stop and await further instructions from the user; the second is that if the Auto-Download feature is turned on then it will begin downloading the camera's segment one at a time one camera at a time. Please see the 'Auto Download' section for more advice.

About



The about box displays, the current version, and build number underneath, and what operating mode the programme is working in:

1. Multi-Camera.
2. Single Camera.