



FASTCAMERA SERIES

FASTVIEWER
AND
FASTVIEWER LIBRARY
USER'S MANUAL

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Document Name: Fast Motion User's Manual
Document Number: xxxxxxxx
Revision History: 1.0 Dec 25, 2002
2.0 April 12, 2003

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I. INTRODUCTION

This manual covers the FastVision FASTVIEWER software. This software suite is divided into two parts. The first is the FASTVIEWER APPLICATION which is a Windows GUI based application for easy and convenient frame grabber and camera configuration and acquisition. The second is the FASTVIEWER LIBRARY which enables the software developer to embed FASTVIEWER functionality into their application.

II. FASTVIEWER APPLICATION

A. INTRODUCTION

1. Introduction

FastViewer Application is a digital recording system that is based on the Alacron FastSeries family of frame grabbers. The application works under Windows 2000/NT operating systems. The FastViewer system enables recording of video from a variety of digital and analog sources.

The FastViewer Application enables recording of high frame rate images into system memory (RAM) and/or disk files. The maximum recording rate to the system memory is 90 MB/s. The Frame rate to the disk files depends on the hardware configuration.

FastViewer software includes the FastReplay application, that allows offline browsing of directories that contain images saved in TIFF format as recorded by the FastViewer system.

2. Installation

Follow these instructions to install the FastViewer software:

Insert the FastViewer installation CD-ROM into your CD-ROM drive.

Access your CD-ROM drive, go to "\Setup" directory and double click "**fastviewer2-win2k-obj-x.y.z.exe**" to run the FastViewer installation.

Follow the "InstallShield Wizard" on screen instructions.

After the installation is complete, reboot the PC System to complete the software installation and the environment setup.

B. USER'S GUIDE

1. Camera Settings

After initiating the FastViewer application, the first step to start using the FastViewer software, is to select the camera type by opening the "Select Camera" Dialog (Figure 1). This dialog enables you to select the camera type, camera frame size, rate and the shutter speed. Additional attributes of camera parameters (if any) are displayed at the bottom of the dialog. After selecting the camera type, the camera details appear in the camera setting frame at the main application window.

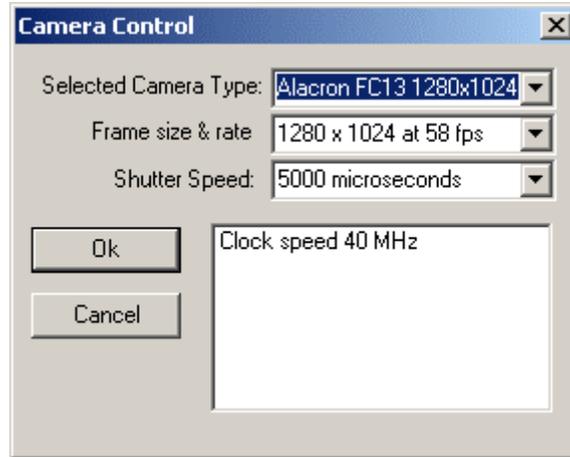


Figure 1: Select Camera dialog box

2. Recording Options

a) Grab button

Pressing the *Grab* button starts a continuous grabbing operation. Video frames captured from the camera are stored in the system memory in a circular buffer. During grabbing, the image area at the main application window is continuously updated with the latest video image from the camera at a refresh rate that depends on camera characteristics and system configuration.

Zooming and panning functions are available by using the mouse. The grabbing operation continues until the user presses the *Stop Grab* button or until a trigger signal is received - according to trigger definition (see Triggered Grabbing section C).

b) Grab To HD button

Pressing the *Grab To HD* button opens up a standard save file dialog. The user should choose a folder and provide a filename – under which all captured frames will be saved. Immediately after confirming the filename, the system will begin saving the grabbed images to the selected directory as RAW data. If a recording schedule is defined the data is saved according to that schedule. (See Section D.2)

There are 3 options to stop the grabbing process:

- Grabbing terminates per definitions in the recording schedule.
- If a recording schedule is not defined, the system stops the grabbing after saving 1000 images.
- Manual termination by pressing the Stop Grab button.

At the end of the grabbing process, the images that were previously stored as RAW data, are converted to a TIFF format. A progress bar that appears at that time enables viewing the progress of saving and converting. The maximum conversion rate is dependent on image size and system configuration (Hard drive type, controller, RAM size, etc.). Using relatively large system RAM allows achieving burst writing at high frame rates.

During grabbing to the system hard disk, the image area at the main window is updated at a lower refresh rate - to prevent disturbance to system performance.

c) Stop Grab button

Once a grab command is initiated, the Stop Grab button stops the acquisition process of the images and storing of images to the buffer.

When the Grab to HD command is selected the Stop Grab button stops the grabbing process manually. The saved RAW data images are converted to a TIFF image format. Zooming and panning features are available.

3. Triggered Grabbing

FastViewer provides a Trigger feature that enables capturing and viewing of images that occurred before and after a “trigger” signal was initiated. The amount of images to be captured prior to “Trigger” is defined by the Trigger % - see Figure 2: Trigger setup dialog box.

The FastViewer trigger function is a “Stop On Trigger” function, i.e. the system has to be in a “Grab” mode before receipt of the trigger signal.

The trigger signal can be either software driven - using the Fire Trigger button, or hardware-driven - using one of the trigger input lines in the frame grabber connector. When a trigger signal is received, the current frame in the frames buffer is marked as a reference ID frame 0. All the frames accumulated prior to “Trigger” will be marked with a negative ID frame number - relative to their position to the trigger, and all frames accumulated past the “trigger” – will be bear a positive ID number.

The trigger percent – to be defined by user - determines the size of the frames buffer to be allocated to the pre-trigger images.

The recordings process ends when the buffer is filled up or when the user activates the Stop Grab button.

After recording, the images are stored in the system RAM and may be viewed by using the preview buttons, or they may be saved by pressing the Save TIFF button.

Note: The images are not saved automatically to the hard disk.

Table 1 summarizes the system behavior at different trigger percentage options :

Table 1: Trigger definitions

Trigger Percent	Buffer State	Process
0%	Full	Continue to record one full-length buffer after receiving the trigger. If the user stops the recording, the frames that were recorded until then are available.
0%	Partial	Continue to record one full buffer. If the user stops the recording the frames that were recorded are available.
100%	Full	The recording stops immediately and a full buffer is available- with all "historic" frames that were grabbed prior to "trigger".
100%	Partial	The recording stops and the frames that were recorded are available.
Between n 0% to 100%	Full	Continue recording until the post-trigger value is achieved and return a full buffer. If the user stops the recording a full buffer is returned.
Between n 0% to 100%	Partial	Continue recording until the post-trigger value is achieved and return a full buffer, which includes the post-trigger frames and the pre-trigger frames. When the user stops the recording the pre-trigger frames and the post-trigger frames that were recorded are returned.

Note: The size of the buffer depends on the amount of system RAM reserved for the FastViewer system.

a) Trigger Settings

Pressing the *Trigger Setup* button opens the trigger setup dialog as shown in Figure 2.

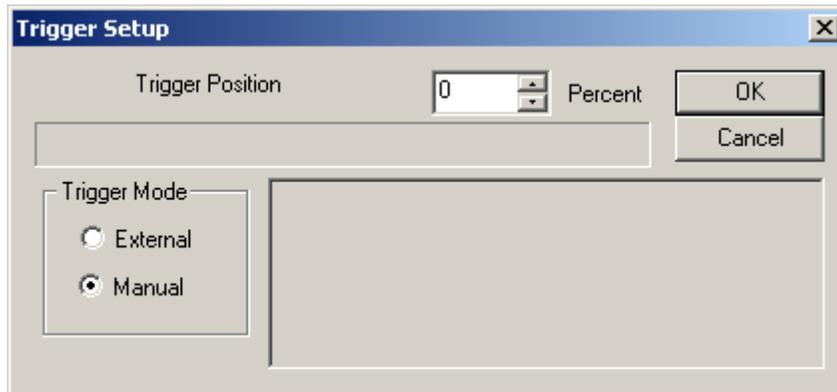


Figure 2: Trigger setup dialog box

Trigger Setup enables you to define the trigger percentage value and trigger mode. The default trigger percentage is 0%, which means that the system will perform full buffer recording after receiving a trigger command. Trigger percentages are between 0% to 100% in 1% increments. A progress bar –located below the trigger percentage - indicates the % value graphically. The default trigger mode is manual, which means that the user fires the trigger. The external trigger mode inhibits the software trigger operation and passes the trigger control to the frame grabber.

The trigger set up and mode are part of the trigger settings frame at the main application window.

b) Fire Trigger button

Pressing this button fires the software trigger to control the triggered grabbing operation as described above.

4. Video/Frame Manager

FastViewer provides Video/Frame controls to enable the user to view the images that were stored in the system memory and to save them as a collection of TIFF files or as an AVI movie file. The user can also determine the frame rate and the “zoom in” and “zoom out” scale. Figure 3 and Table 2 present all the Video/Frame Manager controls

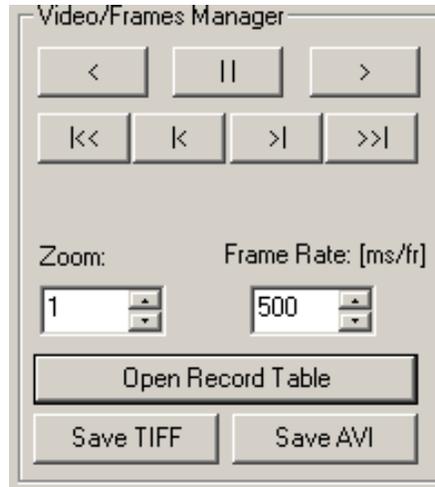


Figure 3: Video/Frame Manager controls

a) Play back buttons

Table 2: Play back buttons

	Play the recorded images from the current frame to the end of the recorded buffer according to the frame rate.
	Play the recorded images from the current frame to the beginning of the recorded buffer according to the frame rate.
	Pauses the images play process.
	Moves to the beginning of the buffer and displays the first image in the recorded buffer.
	Moves to the end of the buffer and displays the last image in the recorded buffer.
	Moves forward through the recorded buffer manually frame by frame.

⏪	Moves backwards through the recorded buffer manually frame by frame.
---	--

b) Recording Schedule

Pressing the Open Record Table button opens up the recording schedule table, shown in Figure 4, which enables the definition of frames that have to be captured and allows skipping unwanted frames. The recording table can be fragmented to many recording strips to allow flexibility of capture.

When working in the 'Triggered Grabbing' mode, frames are stored in the system RAM memory, and the recording table determines the frames that should be saved to hard disk when the *Save TIFF* button is activated.

When working in 'continuous grabbing to HD' (activating the Grab to HD button), the recording table determines the frames that should be saved to the hard disk. Using the recording table in this mode allows the user to save long video frames sequence limited only by the amount of free hard disk space.

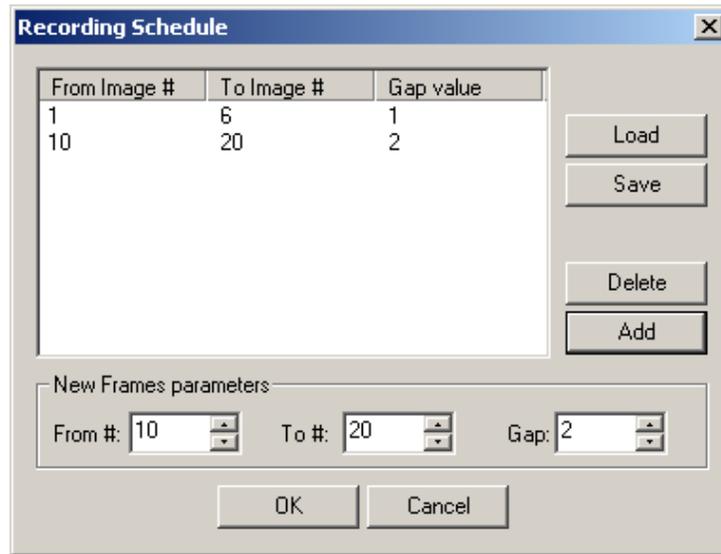


Figure 4: Recording schedule

To add a new entry to the table the user has to define the desired "From frame number", the "To frame number" and the frame skip "Gap" - in the new frames parameters and press the "Add" button. In case of a conflict between the new parameters and the table, an error message will appear.

In order to delete an entry in the table the user has to select that line in the table and press the "Delete" button. The record table data can be saved to a file by pressing the "save" button, and can be loaded from a file by pressing the "Load" button and selecting a desired file.

5. Relation Between Record Sequence Table and Grabbing Mode

a) Continuous Grabbing

When the record table is defined the grabbing and saving to hard disk process will be performed according to that table.

If the table is empty, it will be considered as a one-line table starting from frame number 1 to frame number 1000 recording every frame.

b) Triggered Grabbing (see Figure 3)

- **Save TIFF button** – After the trigger operation is terminated, the raw data located in the system RAM can be stored to the hard disk. The save option follows the recording schedule- if defined, otherwise the whole content of the frame buffer will be saved.
- **Save AVI button** - In Triggered Grabbing mode, after the trigger stops the user can save the raw data to the disk in an AVI movie format. This save option **does not** work according to the recording schedule even if it is defined.

C. FASTREPLAY

The FastReplay (fig 5) allows viewing of a sequence of video frames that were previously grabbed and saved to hard disk using the FastViewer system.

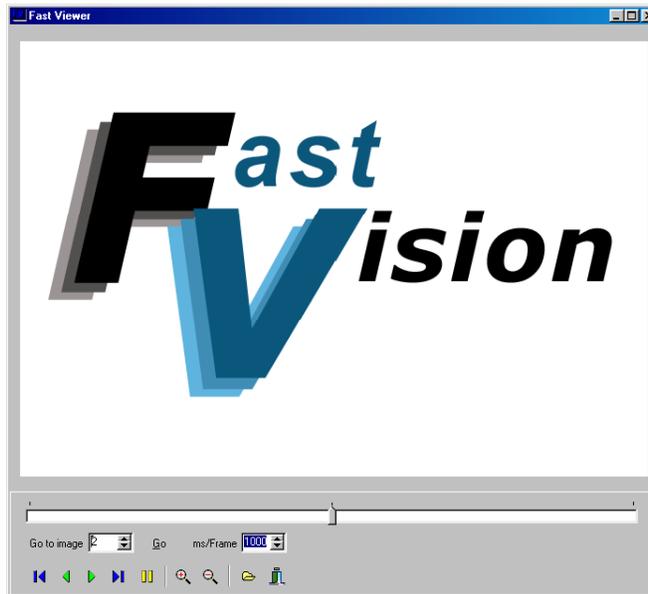


Figure 5: Fast Viewer

The first step in viewing is to load an image file from the disk files by pressing the  "Browse Directories" button. The viewer displays the first image in the directory that can contain up to 10000 images. Attributes of the camera settings and the image description are presented at the bottom of the viewer for each image.

1. Zoom and pan options

Zoom in button - Every click on that button will enlarge the image size by a factor of 2 in both dimensions. The mouse wheel can also operate the zoom.

Zoom out button - Every click on that button will scale the image size down by a factor of 2. Moving the mouse wheel backward also operates the zoom.

Panning is available when the image is greater than the viewer window. Dragging the image with the mouse left button activates panning.

2. Play back buttons

The play back buttons enable to display forward and backwards all the images in the directory according to the defined frame rate (msec/frame). Displaying of the images begins at the current image that appears in the viewer. The track bar represents the current image position. Dragging the arrow in the track bar enables browsing manually through the images.

III. FASTVIEWER LIBRARY

A. INTRODUCTION

1. Purpose

The FastViewer Library part of the ***FASTVIEWER User's Manual*** provides calling specifications and descriptions for the FastVision FastViewer Library of fast image capture functions.

2. Audience

This section of the manual is intended for technical personnel responsible for developing video capture application software to run on Alacron boards. This manual assumes familiarity with operating system commands to configure the software and with the C programming language.

B. FASTVIEWER LIBRARY

The FastVision FastViewer Library for the FastSeries family of TriMedia-based processor boards is based on Alacron Runtime (ALRT) software. The FastViewer Library enables capturing sequences of high frame rate images from a variety of digital and analog sources into system

memory (RAM). The FastViewer Library supports developing capture application under Microsoft Windows 2000 and XP.

This section provides an overview of the FastViewer Library data types and functions. Function calling sequences, return values and other specifics are provided in the next chapter.

1. Library Versions

The FastViewer Library is distributed with a dynamically linked library for the host computer and with a set of TriMedia programs and capture profile files suitable for the different types of boards and input sources. Host programs that wish to use FastViewer Library functions should link to `alfml.lib`.

2. Include File

Application programs using the FastViewer Library should include `<alfml.h>`, which is in the `%ALFAST%\include` installation directory.

3. Data Types- Matrices and Images

A matrix or image is a two-dimensional array of values defined by a pointer (or array address), a vertical stride, the number of rows and the number of columns. These values may either be real or complex. The vertical stride defines the address increment from one row of the array to the next, and allows the referencing of "sub-arrays" of the image. The FastViewer Library uses row-major order. Successive locations in memory contain successive elements of a row, until the end of the row, which is followed by the first element of the next row. If a program desires column-major order, swap the row and column input arguments to achieve the desired result.

4. Summary of Functions

The FastViewer Library contains the following functions:

- AlfmlOpen
- AlfmlClose
- AlfmlSetCallBack
- AlfmlStartGrab
- AlfmlStopGrab
- AlfmlGetImage
- AlfmlGetLastImageIndex
- AlfmlGetBufferSize
- AlfmlGetFramesCount
- AlfmlSetChannel
- AlfmlGetLastError
- AlfmlGetErrorStr

C. FASTVIEWER LIBRARY REFERENCE

This chapter provides detailed documentation on the functions in the FastViewer Library. Each function is listed on a separate page showing input arguments, output arguments, and execution functionality.

AlfmlOpen

C Usage

```
int AlfmlOpen(char* filename, imdev_t* fgrab)
```

Arguments

filename	A valid path and file name of the capture profile file.
fgrab	A handle to the frame grabber if it exists. This handle must be used in other library functions that refer to the same session.

Description

This function attempts to find a frame grabber, to initialize it according the selected capture profile file and to establish a communication link between the frame grabber and the program.

Return Values:

On success, this function returns zero value and set the fgrab variable to a valid handle. On failure, this function returns an error code and set the fgrab variable to Null. To get extended error information, call AlfmlGetLastError().

Example:

```
...
int iAlRes;
imdev_t fgrab;
...
iAlRes = AlfmlOpen("c:\\usr\\alfast\\lib\\capture\\eia.cap",
&fgrab);
if(!iAlRes)
{
    // ShowErrorMessage..
}
```

AlfmlClose

C Usage

```
void AlfmlClose(imdev_t fgrab)
```

Arguments

fgrab	A handle to the frame grabber that previously allocated with AlfmlOpen() function.
-------	--

Description

Releases control of the frame grabber. After calling this function the fgrab handle is no longer valid.

AlfmlSetCallback

C Usage

```
int AlfmlSetCallback(imdev_t fgrab, void* Func, void*
                    userData)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
Func	Address of the callback function.
userData	Pointer to a user structure that will be returned to the user as a callback parameter.

Description

Connects a callback function that will be fired every time an event received from the frame grabber. The event are received at the end of the buffer and after acquiring every imagePerEvent images.

The callback function definition is

```
int AlfmlCallBack(int reason, void* userData, int
imageIndex)
```

Example:

```
int MyCallBack(int reason, void* dlg, int index)
{
    MyDlgType* aDlg = (MyDlgType*)dlg ;

    if(reason == 1) // new image grabbed
    else if(reason == 2) // The buffer is full
}

alfmlSetCollBack(fgrab, MyCallBack, this);
```

AlfmlStartGrab

C Usage

```
int AlfmlStartGrab(imdev_t fgrab, int grabMode, int
                  imagesPerEvent, int skipCount)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
grabMode	The type of acquisition to perform. Can be GRAB_CONTINUOUS or GRAB_ONE_SHOT.
imagesPerEvent	The number of images that are acquired before calling the Callback function with ImageReady event.
skipCount	The number of frames to skip between each acquired image. A value of 0 acquires all the images.

Description

Starts a continuous acquisition. The grabMode parameter can have two values, which are defined, at the library header file:

AL_GRAB_CONTINUOUS - The board grab images continuously and when it reaches the end of the buffer, it continues placing the next image at the beginning of the frame buffer.

AL_GRAB_ONE_SHOT - The board grabs images continuously and stops when the frame buffer is full. At the end it generates an AL_GRAB_FINISHED event.

During the grabbing the frame grabber can produce events to notify the application when new image is available. The value of the imagesPerEvent parameter determines the number of frames the board acquired before generating an event (AL_IMAGE_READY).

Return Values:

On success, this function returns zero value. On failure, this function returns an error code. To get extended error information, call AlfmlGetLastError().

Example:

```
int iGrabRes;
iGrabRes = AlfmlStartGrab(fgrab, AL_GRAB_CONTINUOUS, 1, 0);
if(!iGrabRes)
{
    // ShowErrorMessage
}
```

AlfmlStopGrab

C Usage

```
int AlfmlStopGrab(imdev_t fgrab)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
-------	---

Description

Stops an acquisition in progress. Call this function only after starting a continuous acquisition. Once this function stops an acquisition, you can restart the acquisition with the AlfmlStartGrab() function.

Return Values:

On success, this function returns zero value. On failure, this function returns an error code. To get extended error information, call AlfmlGetLastError().

After receiving the stop command, the frame grabber generates an AL_GRAB_FINISHED event.

Example:

```
...
int iGrabRes;
iGrabRes = AlfmlStopGrab(fgrab);
if(!iGrabRes)
{
    // ShowErrorMessage
}
```

AlfmlGetImage

C Usage

```
image_t AlfmlGetImage(imdev_t fgrab, int imageIndex)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
imageIndex	The index of the image in the ring buffer.

Description

Returns an image from the ring acquisition buffer. Use this function to get access to the grabbed images.

Return Values:

On success, this function returns a variable of type image_t. On failure, this function returns NULL.

Example:

```
image_t img;  
int iLast;  
  
iLast = AlfmlGetLastImageIndex(fgrab);  
img = AlfmlGetImage(fgrab, iLast);
```

AlfmlGetLastImageIndex

C Usage

```
int AlfmlGetLastImageIndex(imdev_t fgrab)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
-------	---

Description

Returns the index in the frames ring buffer of the last grabbed image.

Return Values:

Index of the last grabbed image.

Example:

```
image_t img;  
int iLast;  
  
iLast = AlfmlGetLastImageIndex(fgrab);  
img = AlfmlGetImage(fgrab, iLast);
```

AlfmlGetFramesCount

C Usage

```
int AlfmlGetFramesCount(imdev_t fgrab)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
-------	---

Description

Returns the number of frames grabbed since the start of an acquisition.

AlfmlGetBufferSize

C Usage

```
int AlfmlGetBufferSize(imdev_t fgrab)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
-------	---

Description

Returns the number of frames allocated at the ring buffer.

AlfmlSetChannel

C Usage

```
int AlfmlSetChannel(imdev_t fgrab, int inputChannel)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
inputChannel	Selected input channel.

Description

Selects one of the video inputs to be active. The first channel is 0 and the last channel is according to the specified board been used. The default channel after calling AlfmlOpen() is channel 0.

Return Values:

On success, this function returns zero value. On failure, this function returns an error code. To get extended error information, call AlfmlGetLastError().

AlfmlGetLastError

C Usage

```
int AlfmlGetLastError(imdev_t fgrab)
```

Arguments

fgrab	A valid handle to the board previously allocated with AlfmlOpen() function.
-------	---

Description

Returns the error code of the last FastViewer Library function executed.

Return Values:

This function returns the last error code and 0 if there is no pending error.

AlfmlGetErrorStr

C Usage

```
AlfmlGetErrorStr(int errorCode, char* errStr)
```

Arguments

errorCode	A valid handle to the board previously allocated with AlfmlOpen() function.
errStr	A storage for error message text.

Description

This function returns the error text corresponding to an error code. The caller must allocate a minimum of 64 bytes for message storage before calling this function.

Return Values:

IV. GENERAL INFORMATION

TROUBLESHOOTING

There are several things you can try before you call FastVision Technical Support for help.

- _____ Make sure the computer is plugged in. Make sure the power source is on.
- _____ Go back over the hardware installation to make sure that the system is properly installed.
- _____ Go back over the software installation to make sure you have installed all necessary software.
- _____ Run the Installation User Test to verify correct installation of both hardware and software.
- _____ Run the user-diagnostics test for your main board to make sure it's working properly.
- _____ Insert the FastVision CD-ROM and check the various Release Notes to see if there is any information relevant to the problem you are experiencing.

The release notes are available in the directory: `\usr\fastvision\alinfo`

V. FASTVISION TECHNICAL SUPPORT

FastVision offers technical support to any licensed user during the normal business hours of 9 a.m. to 5 p.m. EST. We offer assistance on all aspects of processor board and PMC installation and operation.

A. CONTACTING TECHNICAL SUPPORT

To speak with a Technical Support Representative on the telephone, call the number below and ask for Technical Support:

Telephone: **603-891-4317**

If you would rather FAX a written description of the problem, make sure you address the FAX to Technical Support and send it to:

Fax: **603-891-1881**

You can email a description of the problem to support@fast-vision.com

B. RETURNING PRODUCTS FOR REPAIR OR REPLACEMENTS

Our first concern is that you be pleased with your FastVision products.

If, after trying everything you can do yourself, and after contacting FastVision Technical Support, you feel your hardware or software is not functioning properly, you can return the product to FastVision for service or replacement. Service or replacement may be covered by your warranty, depending upon your warranty. The first step is to call FastVision and request a "Return Materials Authorization" (RMA) number. This is the number assigned both to your returning product and to all records of your communications with Technical Support. When an FastVision technician receives your returned hardware or software he will match its RMA number to the on-file information you have given us, so he can solve the problem you've cited.

When calling for an RMA number, please have the following information ready:

- _____ Serial numbers and descriptions of product(s) being shipped back
- _____ A listing including revision numbers for all software, libraries, applications, daughter cards, etc.
- _____ A clear and detailed description of the problem and when it occurs
- _____ Exact code that will cause the failure
- _____ A description of any environmental condition that can cause the problem

All of this information will be logged into the RMA report so it's there for the technician when your product arrives at FastVision. Put boards inside their anti-static protective bags. Then pack the product(s) securely in the original shipping materials, if possible, and ship to:

FastVision, LLC.
131 Daniel Webster Highway, #529
Nashua, NH 03060
USA

Clearly mark the outside of your package:

Attention **RMA #XXX**

Remember to include your return address and the name and number of the person who should be contacted if we have questions.

C. REPORTING BUGS

We at FastVision are continually improving our products to ensure the success of your projects. In addition to ongoing improvements, every FastVision product is put through extensive and varied testing. Even so, occasionally situations can come up in the fields that were not encountered during our testing at FastVision.

If you encounter a software or hardware problem or anomaly, please contact us immediately for assistance. If a fix is not available right away, often we can devise a work-around that allows you to move forward with your project while we continue to work on the problem you've encountered.

It is important that we are able to reproduce your error in an isolated test case. You can help if you create a stand-alone code module that is isolated from your application and yet clearly demonstrates the anomaly or flaw.

Describe the error that occurs with the particular code module and email the file to us at:

support@fast-vision.com

We will compile and run the module to track down the anomaly you've found.

If you do not have Internet access, or if it is inconvenient for you to get to access, copy the code to a disk, describe the error, and mail the disk to Technical Support at the FastVision address below.

If the code is small enough, you can also:

FAX the code module to us at 603-891-1881

If you are faxing the code, write everything large and legibly and remember to include your description of the error.

When you are describing a software problem, include revision numbers of all associated software.

For documentation errors, photocopy the passages in question, mark on the page the number and title of the manual, and either FAX or mail the photocopy to FastVision.

Remember to include the name and telephone number of the person we should contact if we have questions.

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