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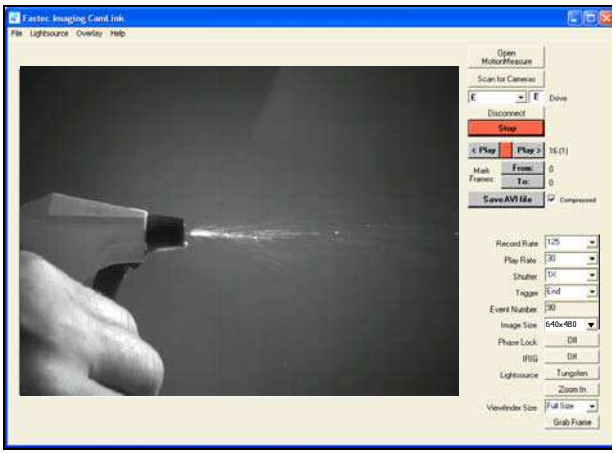
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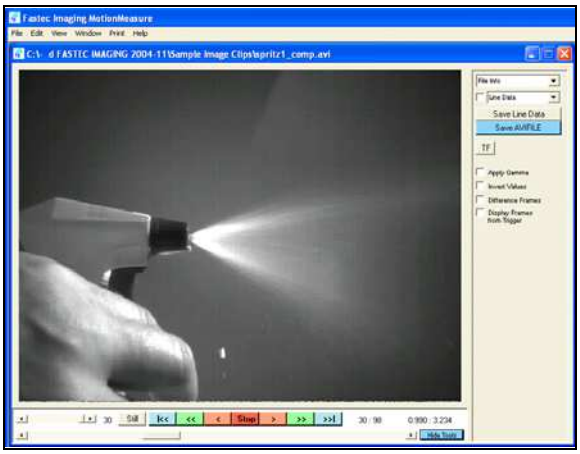
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FASTEC IMAGING™





MotionMeasure Suite

Operator's Manual

FASTEC IMAGING™

OM-MM0001 ***2005-03***

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Using this Guide

This document describes how to install and use the MotionMeasure Suite software. Step-by-step procedures describe:

- Software installation
- How to use CamLink to control camera settings
- How to use CamLink to remotely capture, observe, and save an event
- How to use the MotionMeasure AVI File Player window to open and play a stored event, and capture a Still image
- How to use the MotionMeasure AVI Player window to perform and display line measurement data
- How to use the MotionMeasure Still Image window to open, process and save a Still image

Additional Resources

Refer to the following documents for additional information about the Fastec Imaging systems and software.

Document Number	Title
QSG-MM0002	CamLink/MotionMeasure Quick Start Guide
QSG-TS0002	TroubleShooter Camera Quick Start Guide

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1. Software Installation

1.1. System Requirements

To efficiently run the CamLink/MotionMeasure software, the following minimum system requirements are recommended:

- A Windows Pentium II or equivalent PC or Laptop
- Windows 2000 or Windows XP or later Operating System
- USB 2.0 Port
- Minimum of 256 MB RAM
- 1 GB Free Disk Space
- A 24-bit graphics display
- USB 2.0 Compact Flash Card Reader (recommended)

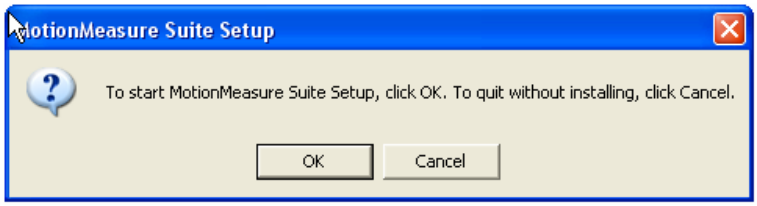
1.2. Software Installation

Both the CamLink and MotionMeasure programs require the presence of the Microsoft .NET Framework libraries version 1.1. The Setup program will determine if the libraries are installed.

- If your machine already has the libraries installed Setup will proceed directly to the MotionMeasure installation dialogs.
- If Setup needs to install the libraries you will be asked to install NET Framework libraries version 1.1 (refer to Step 2).

Step 1 Place the CamLink/MotionMeasure install disk into your computer. The MotionMeasure Suite Setup dialog box is displayed.

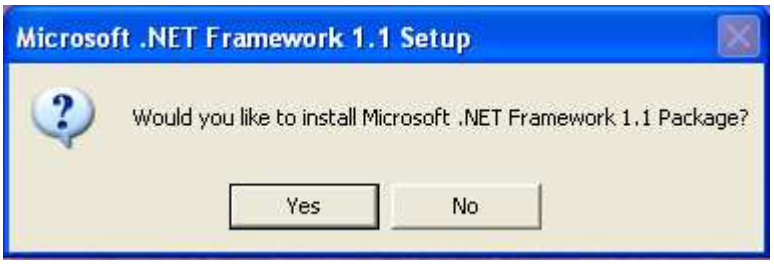
- If your computer is not configured to auto-run a CD, navigate to your CD drive and run Setup.exe to begin the installation process.



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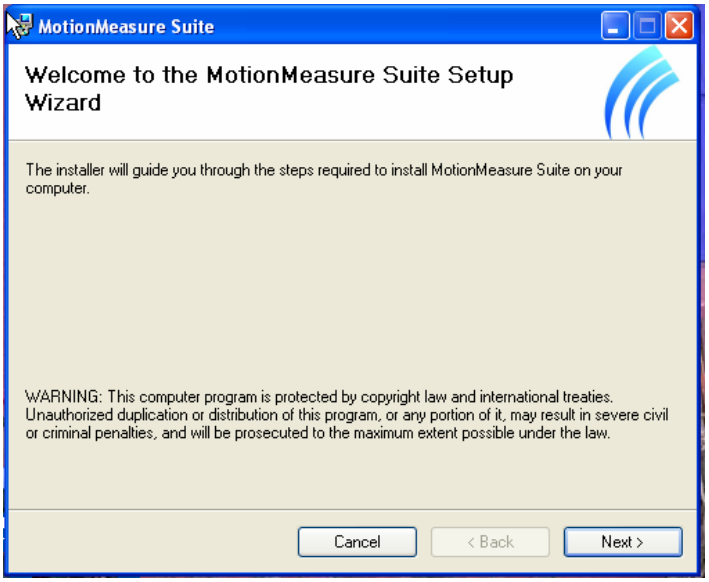
Step 2 Click the **OK** button, the following dialog box may be displayed. If not, proceed to step 3.

- If the following dialog box is displayed, you must install the Microsoft .NET Framework 1.1 Service Pack. The primary purpose of this service pack is improved security.



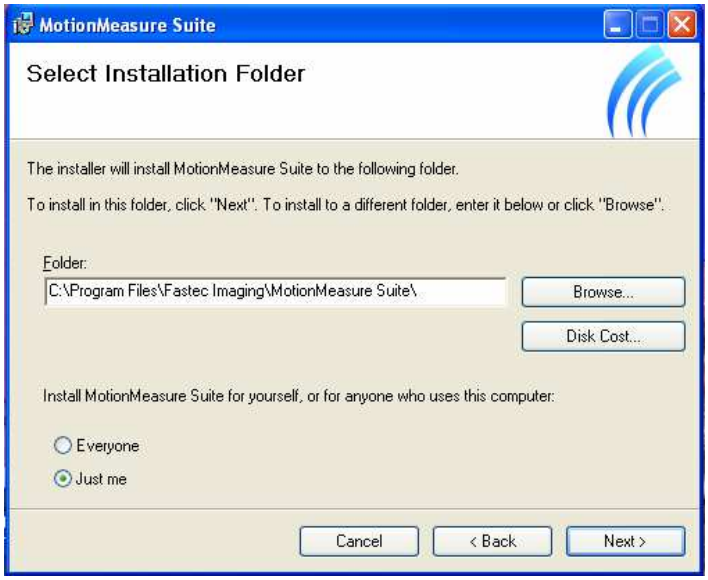
Click the **Yes** button to install the Microsoft .NET Framework 1.1 Service Pack.

Step 3 Click the **OK** button, the Setup Wizard Welcome dialog box is displayed.

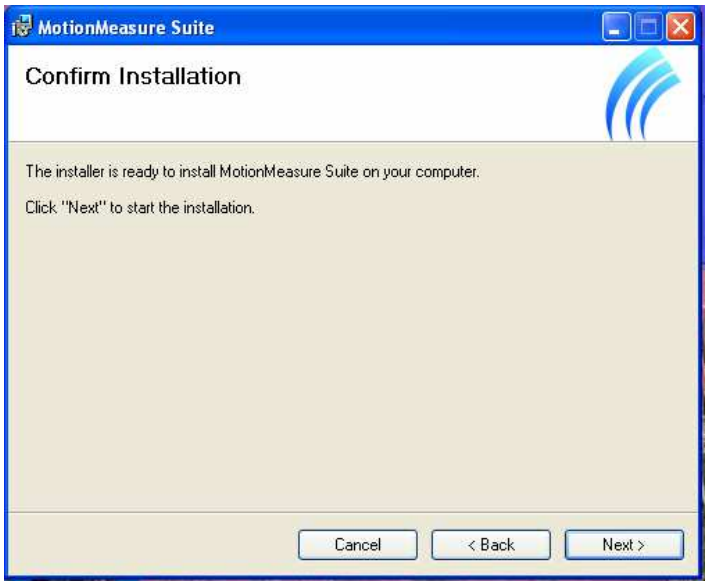


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Step 4 Click the **Next** button, the Select Installation Folder dialog box is displayed.

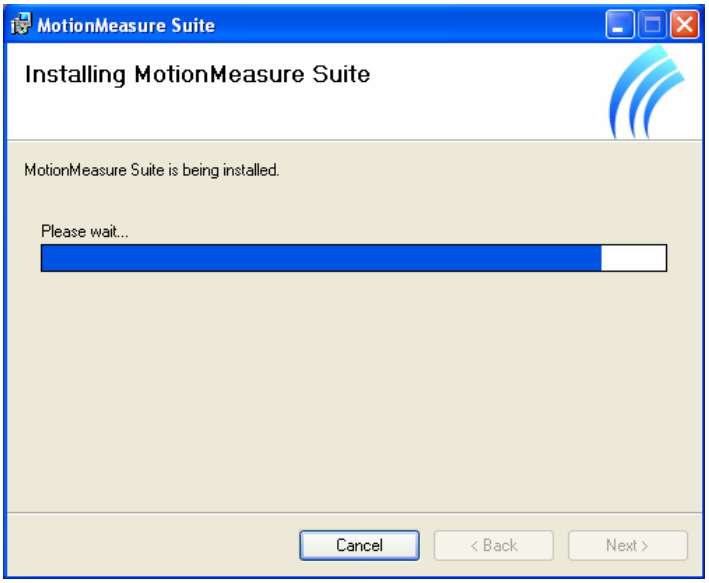


Step 5 Click the **Next** button, the Confirm Information dialog box is displayed.

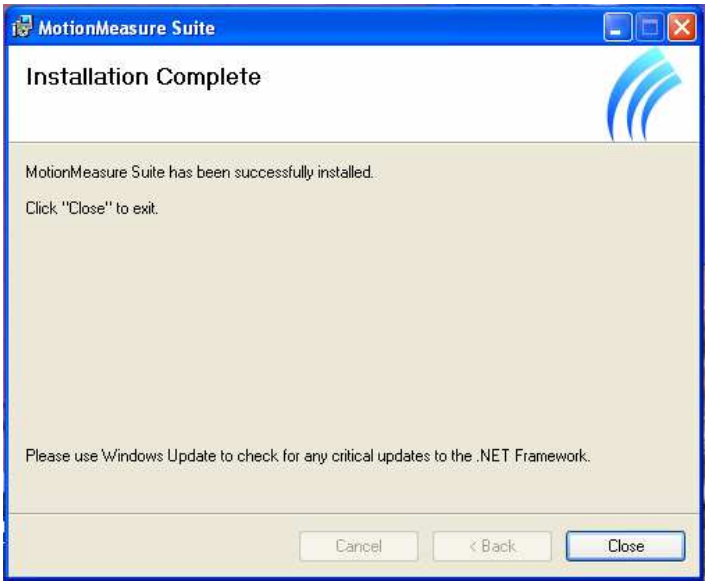


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Step 6 Click the **Next** button, the MotionMeasure Installation dialog box is displayed and the software is installed.



Step 7 After the software is installed, the following dialog box is displayed.



Step 8 Click the **Close** and **OK** buttons to complete the installation and exit the Install Wizard.

The software installation procedures are now completed. The MotionMeasure Suite is now installed and shortcuts to MotionMeasure and CamLink can be found on the desktop and in the Programs menu.

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1.3. Updating Your Installations:

The latest version of MotionMeasure is available at:

- http://www.tetracam.com/fastec/MMSetup.zip

The update is provided in a .ZIP file format and consists of an install program containing the updated executables and help files.

Check the version numbers on the web page against the version numbers on your programs. The program versions numbers can be found in the following locations:

- The splash screens when the programs are first opened
- The MotionMeasure **Help** menu, **About** submenu



Figure 1-1: CamLink and MotionMeasure Splash Screens

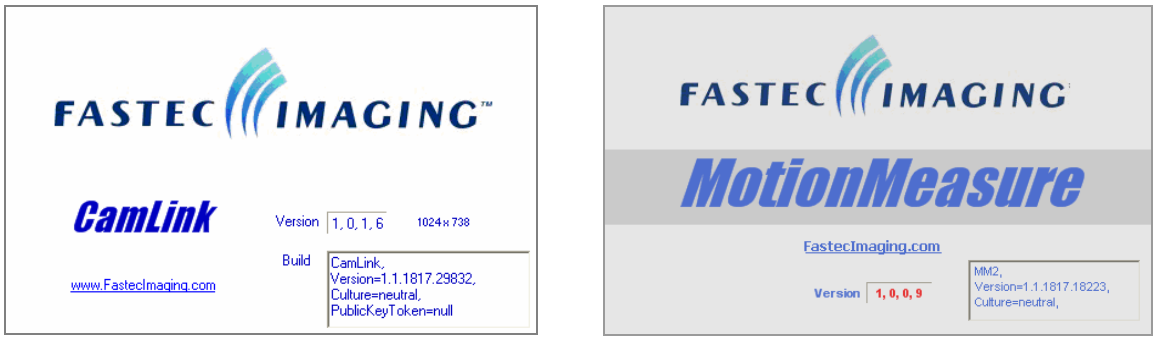


Figure 1-2: CamLink and MotionMeasure Help Menus, About Submenus

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2. The CamLink Program

2.1. CamLink Application Software Introduction

CamLink is a single window application that makes the camera appear as a mass storage device to your computer. CamLink provides the following:

- A direct interface to the Fastec Imaging cameras via the USB interface.
- Features a full size viewfinder window
- All the controls needed to configure and operate multiple Fastec Imaging cameras from your computer.

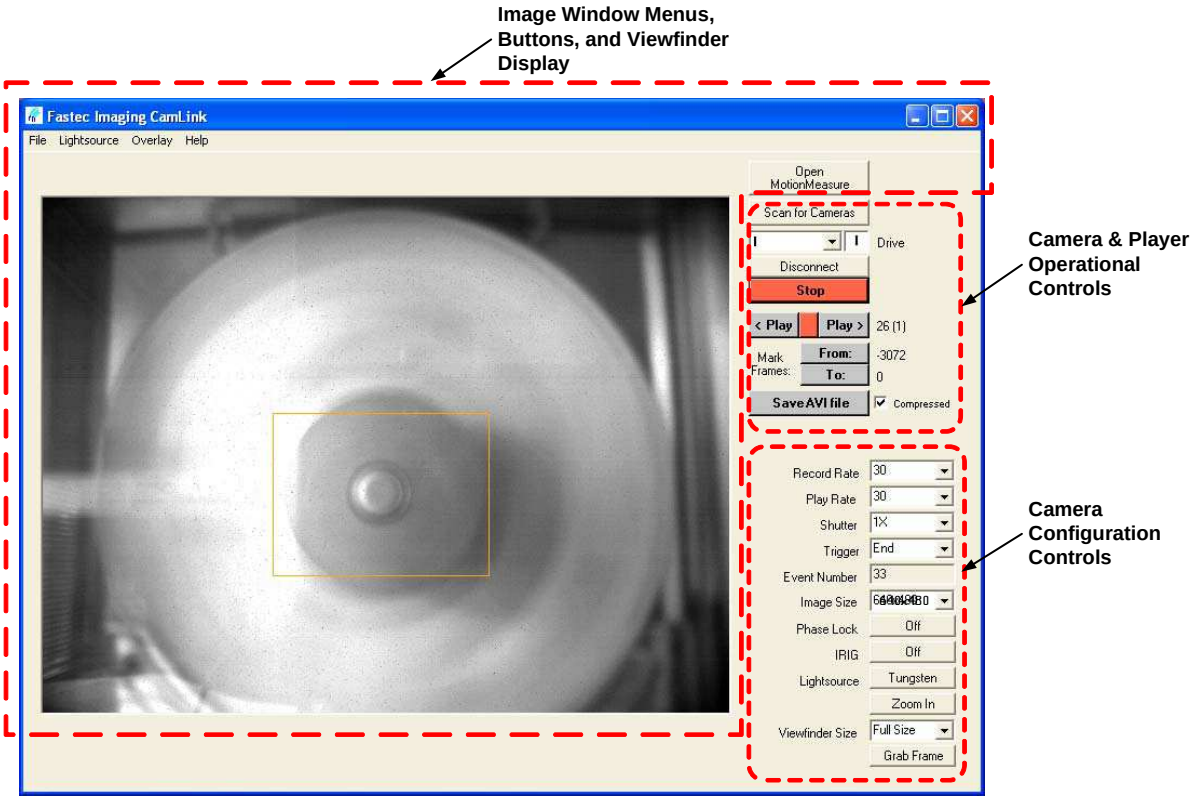


Figure 2-1: Camlink Main Window

The Camlink application window is divided into the following three sections:

- Image Window Menus, Buttons and Viewfinder Display
- Camera and Player Operational Controls
- Camera Configuration Controls

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2.2. CamLink Image Window Menus, Buttons, and Viewfinder Display

CamLink Image window menus and button are located across the top of the CamLink window. The viewfinder display is located below the menu bar.

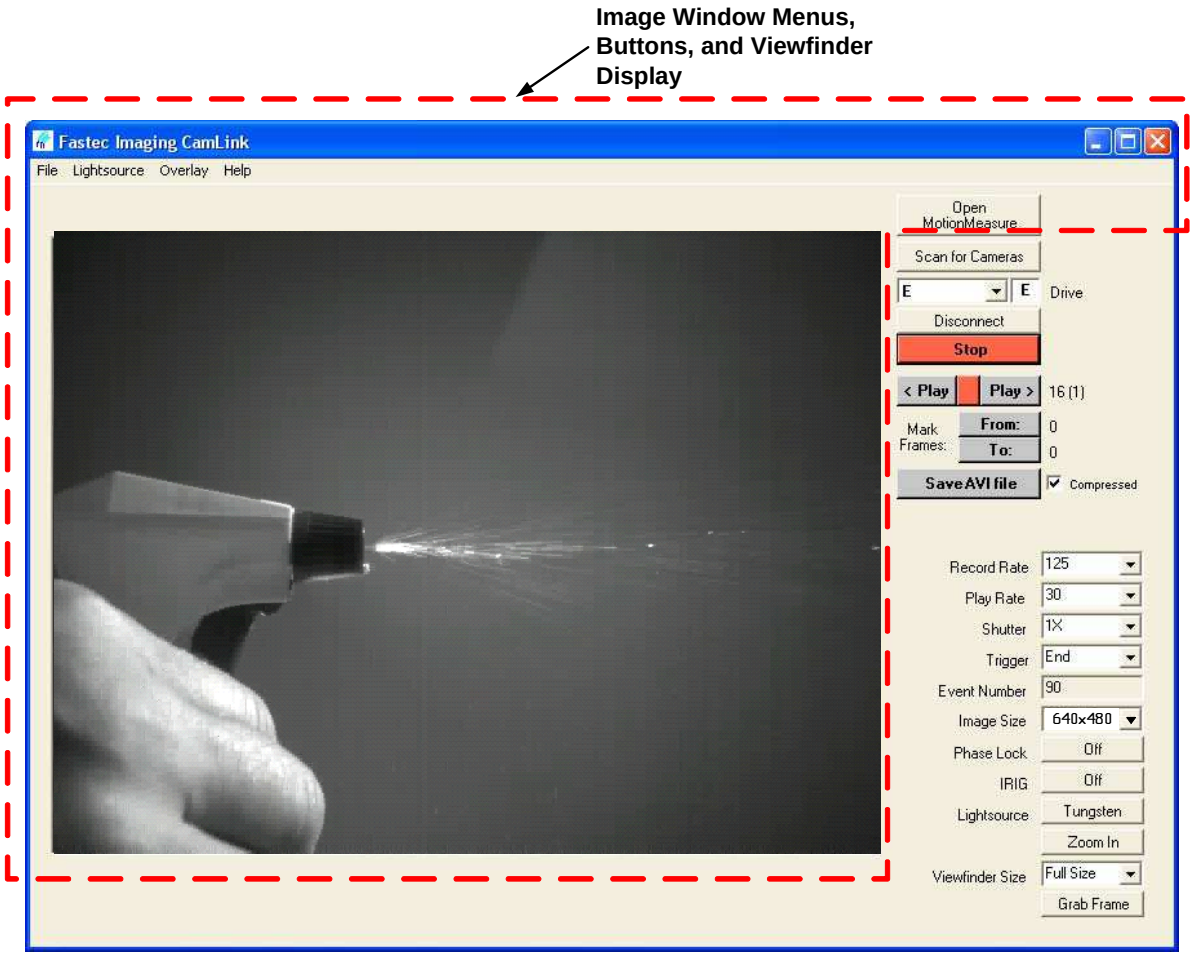


Figure 2-2: CamLink Image Window, Menus, Buttons, and Viewfinder Display

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2.2.1. File Menu

The File dropdown menu contains two commands.



Figure 2-3: CamLink Image Window, File Menu Commands

The commands perform the following functions:

Table 2-1: File Menu Commands

Command	Function
Open MotionMeasure	Start the MotionMeasure program.
Close Camlink	Close the CamLink program.

2.2.2. Lightsource Menu

The Lightsource menu contains three commands that effect how CamLink adjusts the data received from a color camera. These commands have no effect on monochrome (black and white) images.

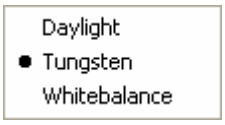


Figure 2-4: CamLink Image Window, Lightsource Menu Commands

Table 2-2: Lightsource Menu Commands

Command	Function
Daylight	Set program color processing constants to daylight balance.
Tungsten	Set program color processing constants to Tungsten balance.
White Balance	Allows CamLink to determine the color to be represented as neutral based upon the average color in the frame.

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2.2.3. Overlay Menu

An Overlay is a semi-transparent image that's displayed in the viewfinder window. It's useful for precisely reproducing a particular camera position.

The image is presented only on the green bitplane at a density level of 30%. This allows the viewfinder image coming from the camera to be seen "beneath" the overlay. An overlay can be loaded from a file or the Windows clipboard.

The Overlay menu contains three commands.



Figure 2-5: CamLink Image Window, Overlay Menu Commands

Table 2-3: Overlay Menu Commands

Command	Function
Load Overlay from File	Presents an Open File dialog allowing selection of an overlay image.
Load Overlay from Clipboard	Pastes the image contents of the clipboard in as an overlay.
Clear Overlay	Remove the currently loaded overlay.

2.2.4. Help Menu

The Help menu contains two commands.



Figure 2-6: CamLink Image Window, Help Menu Commands

Table 2-4: Overlay Menu Commands

Command	Function
CamLink Help	Opens the CamLink help utility.
About CamLink	Displays an About box with the CamLink version and build numbers. ❑ Includes a clickable link to www.fastecimaging.com

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2.2.5. CamLink Image Window Buttons

The CamLink Image Window contains four buttons.

Table 2-5: CamLink Image Window Buttons

Button	Function
Minimize Button 	Minimize the current window.
Maximize Button 	Maximize the current window.
Close Button 	Close the current window.
Open MotionMeasure Button 	Start the MotionMeasure Program.

2.2.6. Viewfinder Image Window

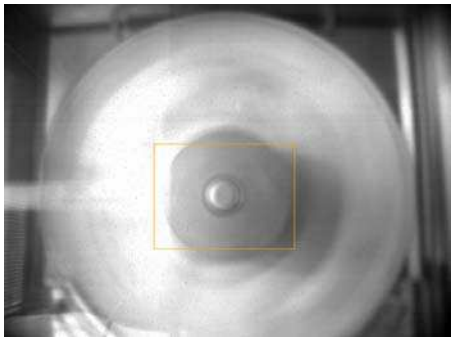


Figure 2-7: CamLink Viewfinder Image Window

A Fastec Imaging camera can be accessed from CamLink and commanded to write and store sequential viewfinder image files which are displayed in the CamLink viewfinder window.

- The camera re-writes the viewfinder "framebuf.dat" file approximately every tenth second.
- CamLink then reads and displays each new write in the viewfinder window.
- By default, the entire image is displayed in the viewfinder window.
- The **Zoom In** button is toggled to zoom in and out on the portion of the image enclosed in the orange rectangle in the center of the window.
- The orange zoom rectangle is centered on the cursor.

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2.3. CamLink Camera and Player Operational Controls

CamLink camera and player controls clustered at the top right side of the window are used to:

- Select a camera
- Control video media player
- Select a subset of video frames stored in camera memory
- Save a recorded event as an AVI file

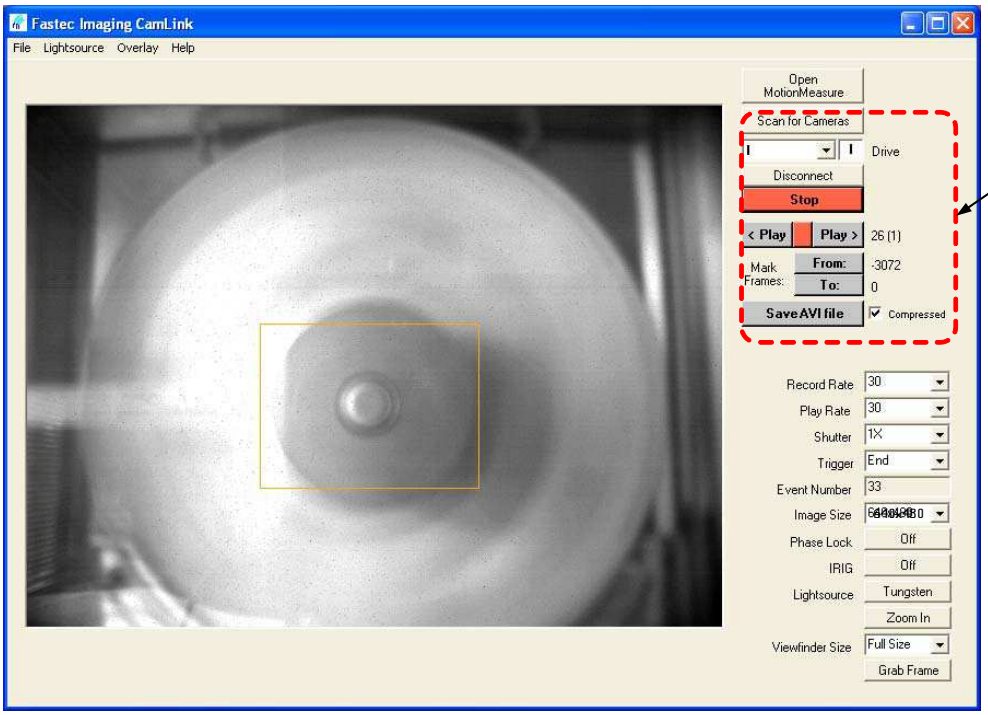


Figure 2-8: CamLink Camera and Player Controls

CamLink camera and player operational controls are identified and described in the following table.

Table 2-6: Camera and Player Operational Controls

	Button	Function
A.	**Scan for Camera Button** 	Scan for cameras.
B.	**Camera List Dropdown Text Box** 	Display Camera list, dropdown text box (maximum of 23 cameras).

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	Button	Function
C.	**Timer Stopped/ Record Buttons** 	Timer Stopped – Stop the software timer. Record - Scan for an operable camera, begin storing data in the camera image memory in a continuous loop mode.
	Disconnect/ Stop Buttons 	Disconnect – CamLink disconnects from the camera without storing any data in the camera image memory. Stop – Disconnect CamLink from the camera, store data in the camera image memory as directed by the trigger setting.
D.	**Play Backward Button** 	Display memory frames backwards starting with the most recent frame (0000) stored in memory.
	Stop Play Button 	Stop playback (not functional in Step mode).
	Play Forward Button 	Display memory frames forward starting with the earliest frame (-2183 or -4367) stored in memory.
E.	**Mark Frames Buttons** 	While playing frames from camera memory, click the From and To buttons to define a range of frames to be saved to an AVI file.
F.	**AVI File Save Button and Compressed Check Box** 	Save a range of frames in camera memory as an AVI file.

2.3.1. Scan for Camera Button

The **Scan for Camera** button (Table 2-6: A) is used to scan the system for any operable TroubleShooter or Ranger cameras. A list of cameras will appear in the dropdown text box directly below the button (Table 2-6: B). If no cameras are found the word none appears in the combo box.

- Cameras are listed by the drive letter that they represent.
- Up to 23 cameras can be listed
- CamLink always selects the first camera found. To select a different camera, just click on it's drive letter.

NOTE: If a Compact Flash (CF) card is installed in the camera, the camera will appear as a mass storage device and Camlink will not recognize it. Remove the CF card, then disconnect and re-connect the USB cable to initialize the camera as an imaging device recognizable to Camlink.

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2.3.2. Timer Stopped/ Record and Disconnect/ Stop Buttons

Click the **Timer Stopped** button (Table 2-6: C) to start the software timer. The button caption will change to **Disconnect**.

Click the **Record** button (Table 2-6: C).to begin recording. The button turns to red color and the caption reads **Stop**.

CamLink will disconnect the currently selected camera and stop live recording when you click on the **Disconnect** or **Stop** (Table 2-6: C) buttons.

2.3.3. Play/ Stop Buttons

The **Play** and **Stop** buttons (Table 2-6: D) are used to replay a stored event in the camera memory (not on the Compact Flash card). Stored events can be played in the forward or reverse direction. Stored events are displayed in a continuous loop until stopped.

2.3.4. Mark Frames From/ To Buttons

While viewing an event in camera memory, the **From** and **To** buttons (Table 2-6: E) are used to mark the beginning and ending points of a subset of event frames to be saved.

2.3.5. Save AVI File

AVI is the standard Windows video format. The **Save AVI File** button (Table 2-6: F) is used to save an event stored in camera memory to an AVI file.

- When the **Save AVI File** button is clicked, a file dialog box opens to assign a name and save-to location.
- If frame numbers where marked using the Mark Frames buttons, the recording will automatically stop at the end marked frame number.
- All the camera configuration data including IRIG time and date information is written to the AVI file.

Depending on the state of the **Compressed** checkbox, the event in camera memory can be saved as either a compressed or uncompressed AVI file.

- An event saved as an uncompressed AVI file does not lose any individual colors when saved
- An event saved as a compressed AVI file loses some individual colors but can be played back more rapidly and saves storage space.

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2.4. CamLink Camera Configuration Controls

CamLink camera configuration controls are clustered at the bottom right side of the window. These controls are used to:

- Remotely configure video cameras via the USB interface.
- Change viewfinder window size.
- Capture a video frame for processing and analysis.

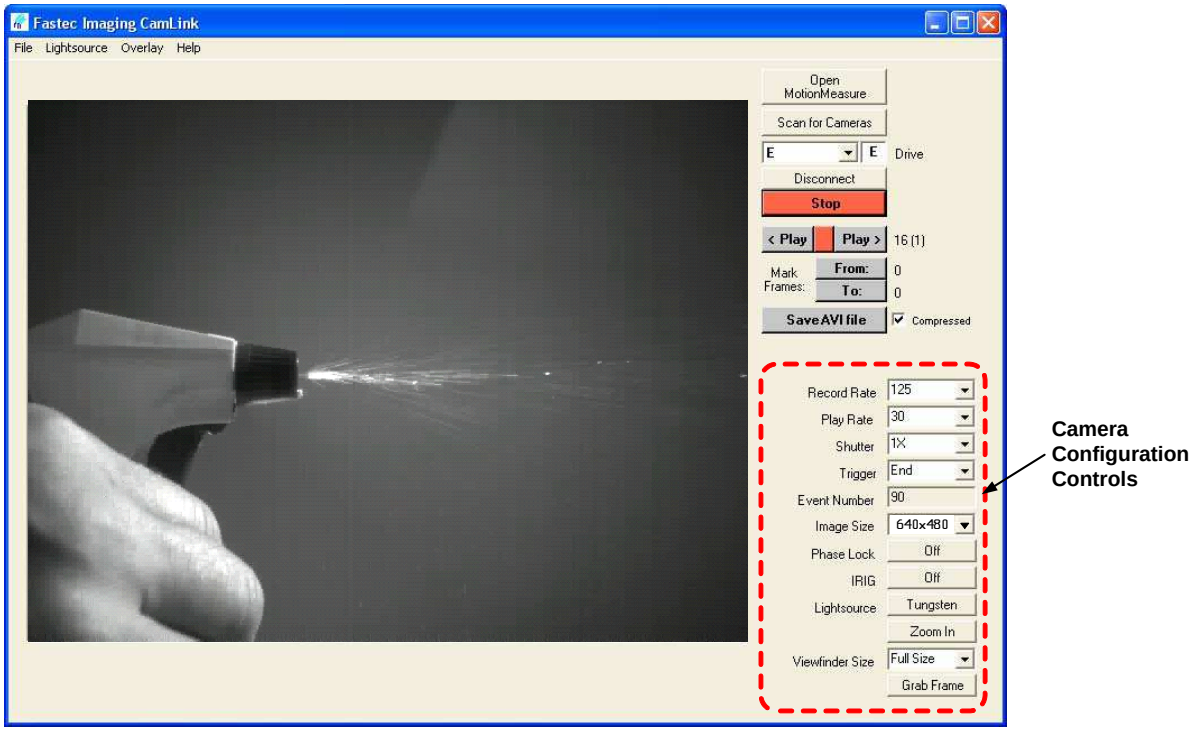
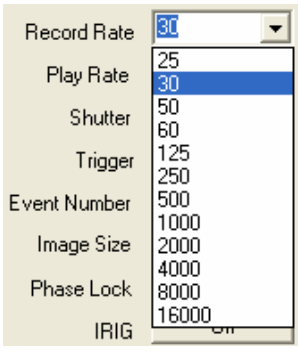


Figure 2-9: CamLink Camera Configuration Controls

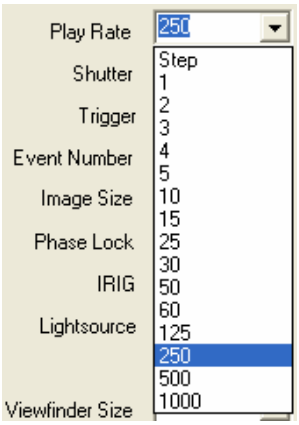
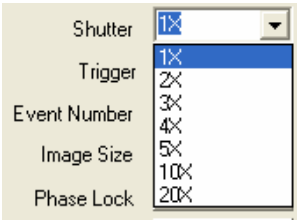
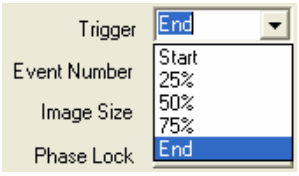
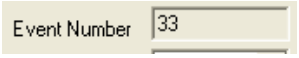
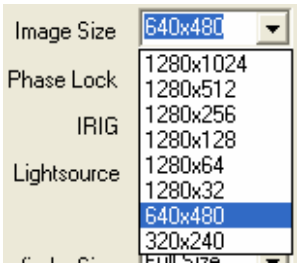
Camera and viewfinder operational controls are identified and described in the following table.

Table 2-7: Camera Configuration Controls and Functions

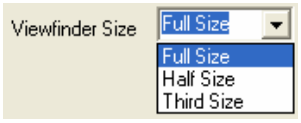
	Control	Function
A.	**Record Rate Dropdown List**	Set record speed in frames per second.



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	Control	Function
B.	**Play Rate Dropdown List** 	Set playback rate in frames per second.
C.	**Shutter Dropdown List** 	Set exposure time.
D.	**Trigger Dropdown List** 	Set the camera trigger point for image capture.
E.	**Event Number** 	Set the starting value for an event recording number.
F.	**Image Size Dropdown List** 	Set the camera image size.
G.	**Phase Lock Button** 	Set the camera to operate in Master or Slave mode.
H.	**IRIG Button** 	Synchronize a camera to an external IRIG standard time code.

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	Control	Function
I.	**Lightsource Button** 	Match camera color processing constants to an external light source.
J.	**Zoom In Button** 	Zoom in or out on the viewfinder window.
K.	**Viewfinder Size Dropdown List** 	Change the size of the viewfinder window.
L.	**Grab Frame Button** 	Copy the currently displayed frame to the windows clipboard.

2.4.1. Record and Play Rate Dropdown Lists

The **Record** and **Play Rate** dropdown lists (Figure 2-9) are used to remotely set record and playback rates

Video record time and the maximum number of frames recorded depend on the following:

- Camera frames per second setting
- Sensor resolution
- The size of camera memory

Video playback frame rate is user defined. The display rate is adjustable from:

- 1 to 1000 frames per second
- Frame-by-frame stepping

NOTE: The actual playback rate seen on your computer display is an averaged playback rate determined by such factors as the speed of the computer and the amount of video ram available.

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2.4.2. Shutter Dropdown List

The **Shutter** multiplier dropdown list (Figure 2-9) is used to remotely set the amount of time the camera shutter remains open for each recorded frame. The shutter speed is defined as the inverse values of the frame rate times the shutter multiplier. For example:

- **Frame Rate** = 250 fps (inverse value is 1/250 or .004 seconds)
- **Shutter Multiplier** = 4X (inverse value is 1/4th or .25)
- **Shutter speed** = .004 x .25 or .001 seconds

The following table displays shutter speeds based on selected Frame Rates and Shutter Multipliers.

Table 2-8: Shutter Speed Settings

	Record Rate in Frames per Second					
Shutter Multiplier	**50**	**60**	**125**	**250**	**500**	**1000**
1X	.020000	.017000	.008000	.004000	.002000	.00091
2X	.01000	.008300	.00400	.002000	.001000	.00050
3X	.006700	.005600	.002670	.001330	.000665	.000333
4X	.005000	.004200	.002000	.001000	.000500	.000250
5X	.004000	.003300	.001600	.000800	.000400	.000200
10X	.003300	.001000	.0004900	.000240	.000120	.000100
20X	.001000	.000833	.000400	.000200	.000100	.000050

Changing shutter does not change frame resolution. Faster shutter speeds will reduce blur and light in the frame.

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2.4.3. Trigger Dropdown List

The **Trigger** dropdown list (Figure 2-9) is used to select a trigger point.

Trigger Point

Video capture is referenced to the frame that's captured the moment you click on the CamLink Stop button or an external trigger input is detected by the camera. This frame is called the trigger point.

The trigger point is expressed as a percentage of the total frames captured, or as the Start (beginning) or End of the video frame capture.

Table 2-9: Trigger Points and Functions

Trigger	Function
Start	Begin capturing video frames in camera memory when the trigger point is detected. Make the trigger point the first frame captured.
25%	Retain 25% of the frames captured before the trigger point was detected. Record new frames in the remaining 75% of camera memory.
50%	Retain 50% of the frames captured before the trigger point was detected. Record new frames in the remaining 50% of camera memory.
75%	Retain 75% of the frames captured before the trigger point was detected. Record new frames in the remaining 25% of camera memory.
End	Stop capturing frames in camera memory once the trigger point is detected. Retain all frames recorded in camera memory up to the moment of the trigger.

External Trigger Signal

External trigger signals are connected through one of the BNC connectors located behind the access cover on the side of the camera. The trigger circuitry accommodates threshold levels from 3.3 volts to 30 volts DC. The remote trigger signal requires a low true signal (less than .7 volts DC).

The trigger input connector is the second from the bottom connector in the bank of four behind the access cover.

2.4.4. Event Number

Each recorded event is given an **Event Number** (Figure 2-9). Clicking the Record button automatically increments the Event Number appearing in the Event Number box.

If the camera has a number of events stored in memory, getting the camera configuration will set the Event Number to the number of events in storage. Event numbers range from 1 to 99.

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2.4.5. Image Size Dropdown List

The **Image Size** dropdown list (Figure 2-9) is used to display and set the camera image size. Fastec cameras can capture a number of image sizes. Select the desired image size from the dropdown list.

The main viewfinder window will resize to proportions correct for the selected image size.

2.4.6. Phase Lock Button

The **Phase Lock** button (Figure 2-9) is used to toggle the selected camera Phase Lock state between Off, Master and Slave. When using multiple cameras to record an event from several angles, one camera is set as MASTER and the other(s) are set to SLAVE, causing them to synchronize recording with the MASTER camera.

2.4.7. IRIG Button

The **IRIG** button (Figure 2-9) is used to toggle the selected camera's IRIG function on or off.

IRIG is a timing standard developed by the US military and stands for Inter Range Instrumentation Group. An IRIG signal needs to be introduced to the camera through one of the BNC connectors in the camera for it to mark frames properly

2.4.8. Lightsource Button

The **Lightsource** button is used to set the camera color processing constants to match the current environmental light source. This setting is also available on the main menu.

Cameras are affected by the color of the light used to illuminate the image. To electronically compensate for the color shifting caused by different illumination source, CamLink has different settings for natural light, artificial light, and color images.

Table 2-10: LightSource Controls and Functions

Control	Function
Daylight	Set program color processing constants to daylight balance.
Tungsten	Set program color processing constants to Tungsten balance.
Auto White Balance	Allows CamLink to determine the color to be represented as neutral based upon the average color in the frame.

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2.4.9. Zoom In Button

When the Record button is clicked Camlink begins reading and displaying camera frame buffer data in the viewfinder window.

The viewfinder window normally displays the entire frame buffer image. The **Zoom In** button is used to zoom on the portion of the image indicated by the orange rectangle. An enlarged view of the event image makes it easier to focus, see details, and to interact more precisely with the displayed image. To reposition the orange rectangle, click directly on the Viewfinder window

Clicking the **Zoom In** button a second time causes CamLink to display the entire frame buffer in the viewfinder window.

2.4.10. Viewfinder Size Dropdown List

The **Viewfinder Size** dropdown list is used to resize and display the camera frame buffer. All three sizes will fill the viewfinder window. Select either half or third size to lower display resolution and speed up the frame display rate.

2.4.11. Grab Frame Button

The **Grab Frame** button is used to copy the current viewfinder image to the Window clipboard. This feature is useful for archiving frames to record camera setups and perform image processing and analysis.

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2.5. CamLink How to Procedures

This section outlines the steps required to setup the camera, capture an event, observe a stored event, and save a stored event as an AVI file.

2.5.1. How to Setup the Camera

The following procedure describes how to setup and prepare the camera to capture an event.

Step 1 Install the MotionMeasure/CamLink software on your computer.

- ❑ Refer to Section 1.2, Software Installation.

Step 2 Connect power to the camera.

Step 3 Remove the Compact Flash card from the camera.

Step 4 Using a USB cable, connect the camera to your computer USB port.

Step 5 Raise the LCD display.

Step 6 Press the camera **POWER** button.

Step 7 If the MotionMeasure software was installed correctly, a window opens on the desktop indicating connection with the host showing the camera as in Figure 2-10.

- ❑ To your computer, the camera appears as a mass storage device.

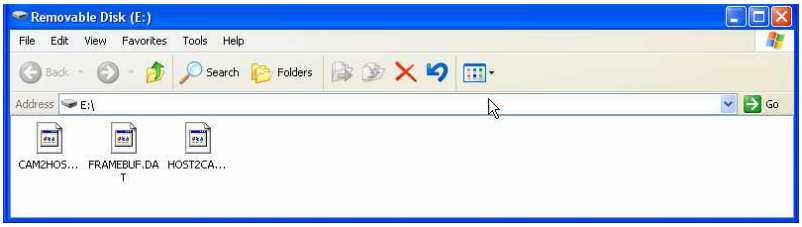


Figure 2-10: CamLink Camera Device Window

Step 8 Replace the CF card if you need to save images indefinitely.

Step 9 Position and focus the camera to capture an event.

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2.5.2. How to Capture an Event

The following procedure describes how to use the CamLink application to remotely capture an event in camera memory.

Step 1 Double-click on the Camlink desktop icon to open the CamLink application.

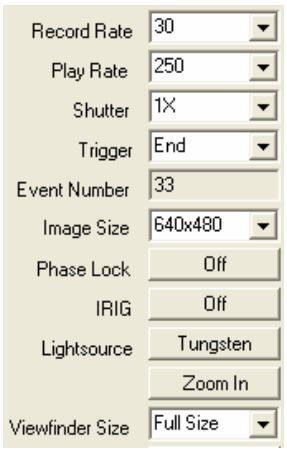
Step 2 Click on the **Scan for Cameras** button.



Step 3 Click on the desired camera drive letter.



Step 4 Change camera control parameters as required by your application requirements.



Step 5 Left-click on the green **Record** button to begin storing images in camera DRAM memory and display live image in the viewfinder window.



Step 6 Click the red **Stop** button to stop storing images.



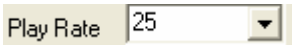
Step 7 If you need to recapture the event, press the **Record** button and repeat steps 5 and 6.

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2.5.3. How to Observe a Stored Event:

The following procedure describes how to use the CamLink application to remotely observe the event currently stored in the camera frame buffer memory.

Step 1 Set **Play Rate** to the desired speed.



Step 2 Press the **PLAY** buttons to observe the stored event in camera memory.



= Increment frames, start with the earliest frame stored in memory (-2183 or -4367).



= Decrement frames, start with the most recent frame stored in memory (-0000)

Step 3 If Play Rate is not in Step mode, use the red **Stop** button between Play buttons to stop playback. Note the beginning and ending frame numbers of the stored event of interest



Step 4 Images in memory are displayed in a continuous loop until the red **Stop** button is pressed.

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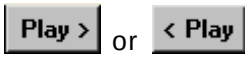
2.5.4. How to Save a Stored Event to File

The following procedure describes how to use the CamLink application to remotely save an event stored in the camera memory to an AVI file.

Step 1 Capture the event of interest in camera memory. Refer to Section 2.5.2, How to Capture an Event.

Step 2 When you stop recording, the Play Rate defaults to **Step**. Change the **Play Rate** to the desired viewing speed.

Step 3 Use the **Play** buttons to verify the captured data.



Step 4 Click on the red **Stop** button between Play buttons to stop playback.



Step 5 Click the **Save AVI File** button to save the event as an AVI file on the computer. The Save As dialog box is displayed.



The file may be created in either compressed or uncompressed form, depending on the state of the checkbox.

- ❑ Individual colors are lost
- ❑ Play back is faster
- ❑ Files are smaller in size

Step 6 Once the **Save As** Dialog box is displayed. Assign the file a name and save-to location.



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Step 7 Click the **Save** button to create the file. The Save AVI File button stays red while the images are being saved to the AVI file.



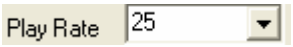
The actual frame copy rate when writing to an AVI file varies with the host computer processor speed and memory. All the camera configuration data including IRIG time and date information is written to the AVI file

2.5.5. How to Save a Subset of a Stored Event to File

In most cases, only a small subset of camera memory will contain the event of interest. The following procedure describes how to use the CamLink application to remotely save a subset of camera memory frames to an AVI file.

Step 1 Capture the event of interest in camera memory. Refer to Section 2.5.2, How to Capture an Event.

Step 2 Set **Play Rate** to a speed that will allow you to closely mark the first and last frame of the event of interest.



Step 3 Using the **Play** button, display the first frame of the stored event of interest (frame -2183 or -4367).



Step 4 Click the **From:** button to mark the frame.



Step 5 Using the **PLAY** buttons, display the last frame of the stored event interval of interest (frame 0000).



Step 6 Click the **To:** button to mark the last frame.



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Step 7 Press the **Save AVI File** button to save the marked frame interval as an AVI file on the computer.



The file may be created in either compressed or uncompressed form, depending on the state of the checkbox.

- Individual colors are lost
- Play back is faster
- Files are smaller in size

Step 8 Once the **Save As** Dialog box is displayed. Assign the file a name and save-to location.



Step 9 Click on the **Save** button. The Save AVI File button stays red while the images are being saved to the AVI file.



The actual frame copy rate when writing to an AVI file varies with the host computer processor speed and memory. All the camera configuration data including IRIG time and date information is written to the AVI file

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2.5.6. How to Create an Overlay

The following procedure describes how to create an overlay that can be used to position and align the camera to recreate a prior field of view. An overlay is useful for precisely reproducing a particular camera position. Overlays can be loaded from a file or the Windows clipboard.

Step 1 Left-click on the green **Record** button to begin storing images in camera DRAM memory and display live image in the viewfinder window.



Step 2 When the camera is correctly positioned and aligned with the field of view, click the **Grab Frame** button.



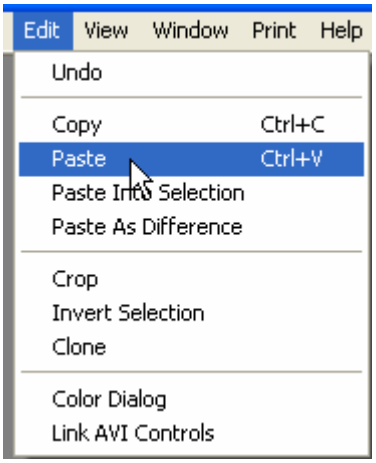
Step 3 Click the red **Stop** button to stop storing images in camera memory.



Step 4 Click on the **Open MotionMeasure** button.

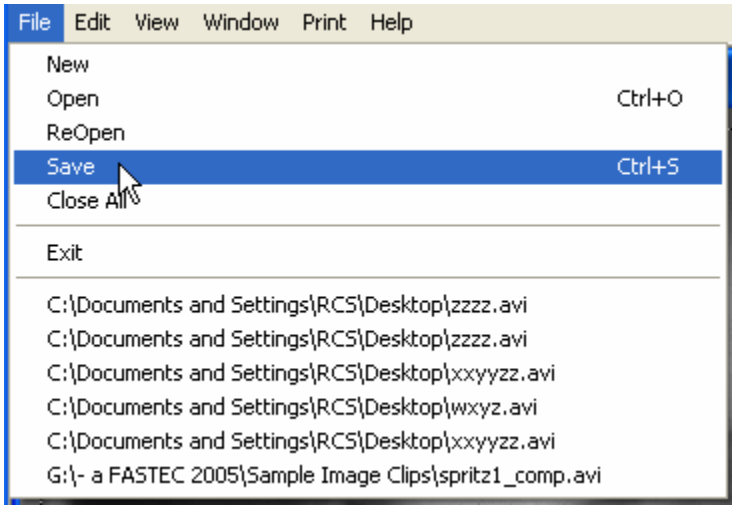


Step 5 Click on the **Edit** menu, select the **Paste** command. The frame grab is displayed in the MotionMeasure window.



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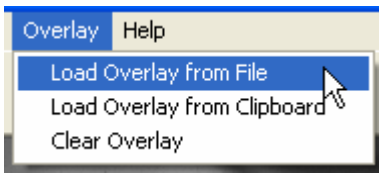
Step 6 Click on the **File** menu, select the **Save** command. Save the overlay as {your name}.bmp.



Step 7 The next time you need to precisely reproducing a particular camera position, left-click on the CamLink green **Record** button to begin storing images in camera memory and display live image in the viewfinder window.

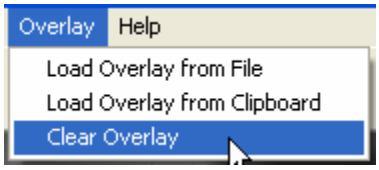


Step 8 Click on the **Overlay** menu, select the **Load Overlay from File** command.



Step 9 Position and align the camera viewfinder window with the overlay image.

Step 10 Click on the **Overlay** menu, select the **Clear Overlay** command.



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3. The MotionMeasure Program

MotionMeasure is a simple image editing program incorporating a versatile AVI and still file playback and analysis module. The program provides controls for opening and manipulating several image formats on the desktop.

Editing features include, tone, contrast, hue saturation brightness, gamma, scaling, rotation, sharpen, blur etc. In addition MotionMeasure allows bitplane translation, cloning and several other more specialized features.

3.1. MotionMeasure Window Overview

As in all Windows applications the Menu bar contains commands. The following table describes the MotionMeasure menus and commands options.

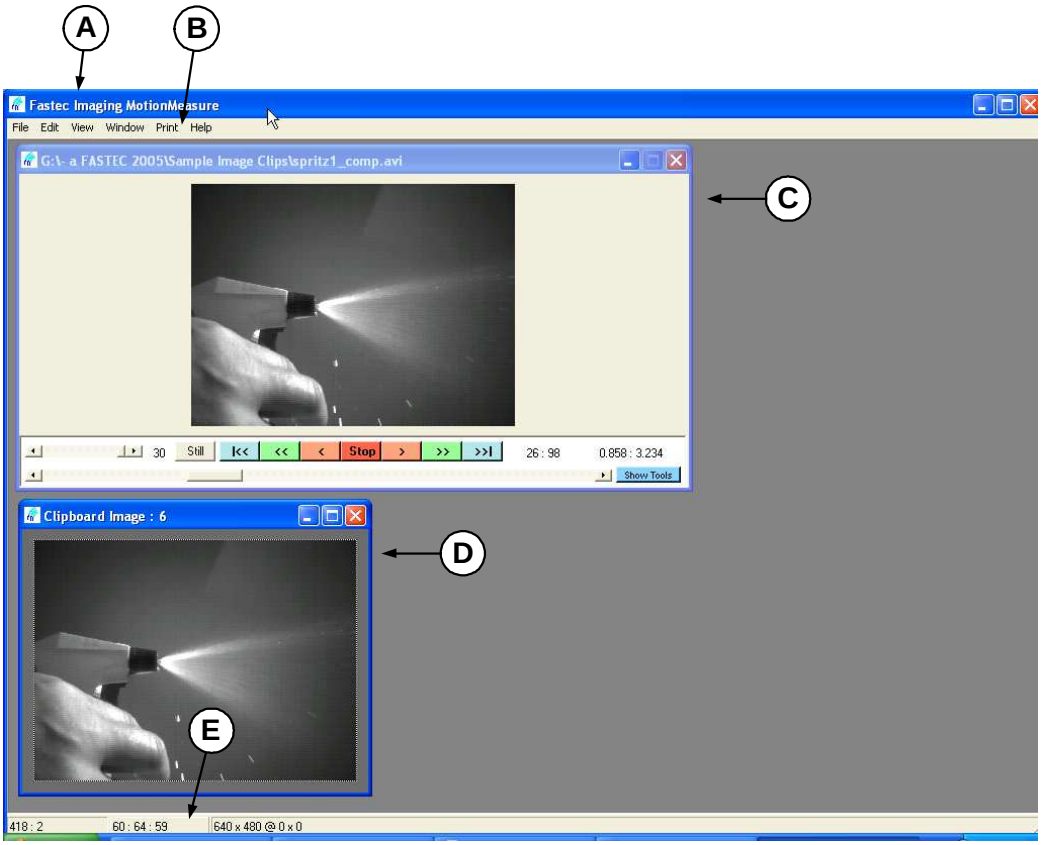


Figure 3-1: MotionMeasure Main Window

Table 3-1: MotionMeasure Window Components

	Component	Function
A.	**Title Bar**	Located at the top of the window. Displays the name of the program.
B.	**Menu Bar**	Located on the top part of the window below the Title bar. Contains MotionMeasure menus and commands.
C.	**AVI File Window**	Loaded from an AVI file

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	Component	Function
D.	**Still Image Window**	Loaded from the clipboard, JPEG, Windows BMP, GIF, TIF or WMF image file
E.	**Status Bar**	Located at the bottom of the window. The status bar displays from left to right: ❑ Cursor Position (X,Y) ❑ RGB values under cursor ❑ Current file location and name

3.2. MotionMeasure File Player Main Menu Overview

MotionMeasure File Player main menu commands and functions are described in the following menus.

3.2.1. File Menu

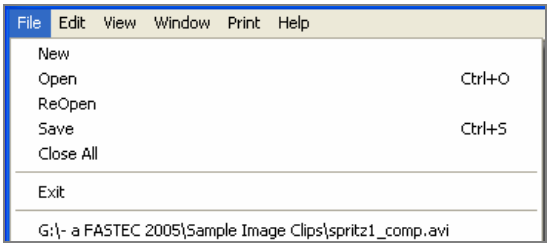


Figure 3-2: MotionMeasure, File Menu Commands

Table 3-2: File Menu Commands and Functions

Command	Function	AVI File	Still File
New	Opens a new empty child window.	✓	✓
Open	Opens a saved file from disk. MotionMeasure handles AVI, Jpeg, Windows BMP, GIF, TIF and WMF image file formats.	✓	✓
Reopen	Reopens the active image from disk, all current edits are lost.	✖	✓
Save	Saves the active image. A file dialog opens to allow choice of save to folder and filename.	✓	✓
Close All	Closes all open still and AVI files.	✓	✓
Exit	Quit the MotionMeasure application.	✓	✓

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3.2.2. Edit Menu

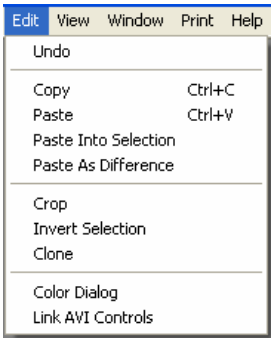


Figure 3-3: MotionMeasure, Edit Menu Commands

Table 3-3: Edit Menu Commands and Functions

Command	Function	AVI File	Still File
Undo	Undoes the last still file edits.	✖	✓
Copy	Copy a still image to the Windows clipboard.	✖	✓
Paste	Paste the clipboard contents into the program.	✖	✓
Paste Into Selection	Paste the clipboard contents into the selected area of the active image using the designated drop transparency value.	✖	✓
Paste As Difference	Paste the clipboard contents into the selected area of the active image, A differencing algorithm produces an image of the difference values of the two images	✖	✓
Crop	Crop the still image to the current rectangular selection area.	✖	✓
Invert Selection	Reverses the selection area affect by the Edit Tools palette. If a rectangular or freehand region is created, only the portion of the image outside the rectangle is affected by the tool.	✖	✓
Clone	Designates this image as a clone target. Available only after a clone source has been selected.	✖	✓
Color Dialog	Opens a Windows Color Dialog allowing selection of the color used for line drawing, image transparency, creation of new blank images etc.	✓	✓
Link AVI Controls	Check this item to link multiple AVI windows to one control panel. When linked, multiple AVI player windows will respond synchronously to one control panel. Very useful for comparing multiple views of the same event of interest.	✓	✖

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3.2.3. View Menu

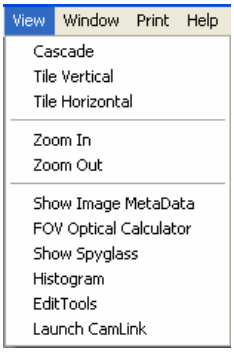


Figure 3-4: MotionMeasure, View Menu Commands

Table 3-4: View Menu Commands and Functions

Command	Function	AVI File	Still File
Cascade, Vertical, Horizontal Tile	The standard window tile and cascade functions are available.	✓	✓
Zoom In, Zoom Out	Click to change the image size on screen. Or use the "+, - and * " keypad keys.	✓	✓
Show Image MetaData	Displays any available metadata on the selected image.	✓	✓
FOV Optical Calculator	Open the FOV Calculator tool.	✓	✓
Show Spyglass	Display the spyglass magnifier window. To move the spyglass, simply click and drag.	✓	✓
Histogram	Opens the Histogram window. The Histogram window provides a graphic display of the image histogram.	✖	✓
Edit Tools	Opens the Edit Tools window. This window is the edit control center.	✖	✓
Launch CamLink	Open the CamLink application. Provides a USB interface to the camera(s).	✓	✓

3.2.4. Windows Menu

This menu displays a list of any open image windows. Click on the desired path to bring that image window to the front.

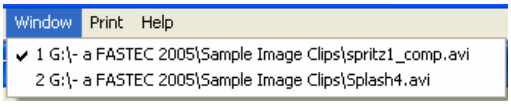


Figure 3-5: MotionMeasure, Windows Menu Commands

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3.2.5. Print Menu

This menu is used to print a still image. It does not print AVI file images from the AVI File Player window. The Print window displays a print preview of the image and provides controls for management of the final print. The labels at the top indicate the X and Y position of the image on the printed page and the final printed size

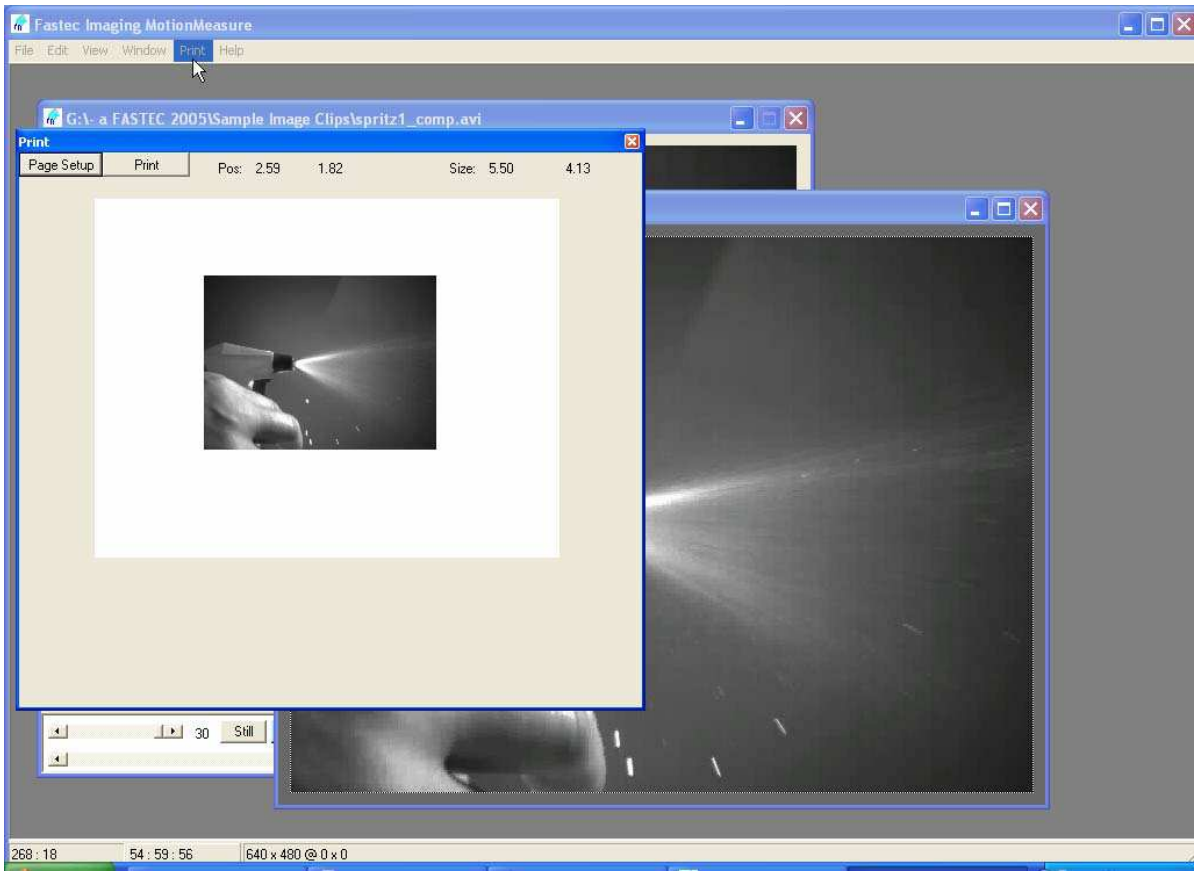


Figure 3-6: MotionMeasure, Print Menu Commands

Table 3-5: Print Menu Commands and Functions

Command	Function	AVI File	Still File
Page Setup Button	Opens the Windows printer setup dialog allowing printer selection and configuration.	✖	✓
Print Button	Spools the active image to the selected printer.	✖	✓
Position Label	To position the image on the preview page, left click and drag the upper left corner to the desired location.	✖	✓
Size Label	To resize the image, press the "Ctrl" key, left click and drag the lower right corner of the image to the desired size.	✖	✓

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3.2.6. Help Menu

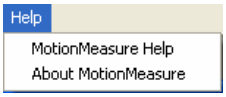


Figure 3-7: MotionMeasure, Help Menu Commands

Table 3-6: Help Menu Commands and Functions

Command	Function
MotionMeasure Help	Opens the program Help system.
About MotionMeasure	Displays a transparent splash screen containing the software version number. Click on the splash screen to close it.

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3.3. AVI File Player Window Overview

The AVI File Player window is a multi-purpose file playback and analysis tool. Opening an AVI file from disk presents the player window. MotionMeasure player controls clustered at the bottom of the window are used to:

- Zoom the image window
- Control AVI file playback
- Display several specialized tools

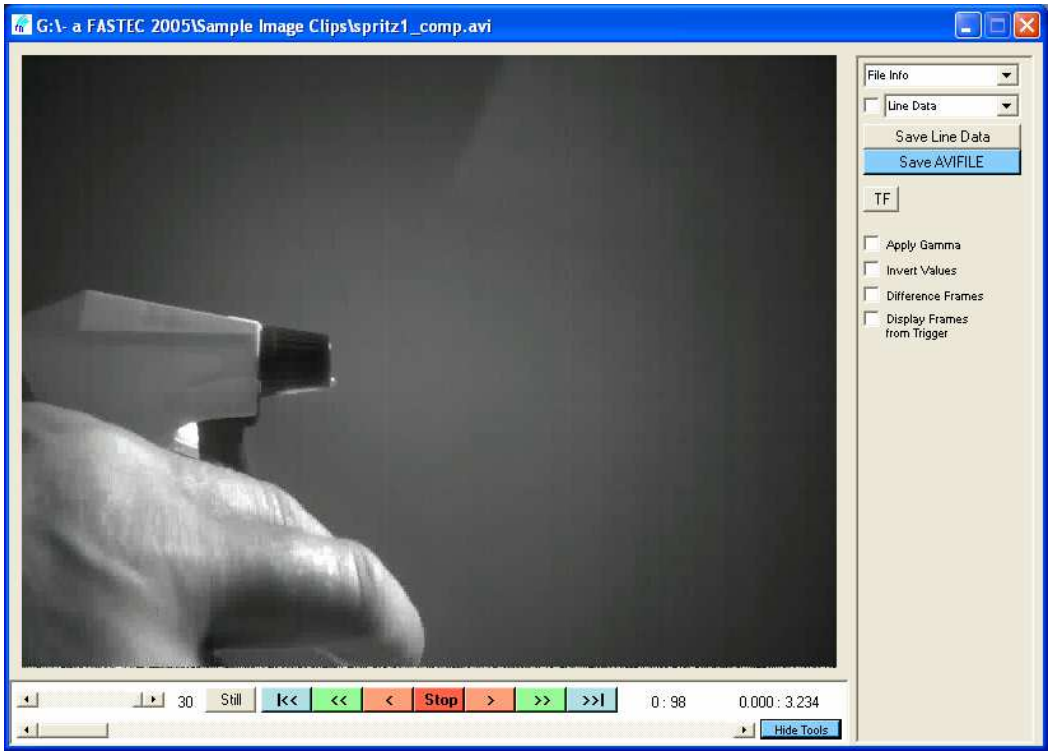


Figure 3-8: MotionMeasure, AVI File Player Controls

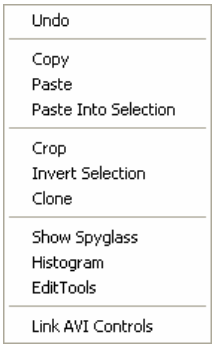
3.3.1. AVI File Player Window Operational Controls

MotionMeasure AVI file player operational controls are identified and described in the following table.

Table 3-7: AVI File Player Operational Controls

	Control	Function
A.	**Scroll Bar** 	Allows adjustment of playback rate in frames per second.
B.	**Still Button** 	The Still button allows grabbing the current frame. A still of the current frame is copied to the clipboard.

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	Control	Function
C.	**Player Control Buttons** 	In order from left to right: ❑ Go to Beginning ❑ Play Reverse ❑ Step Back ❑ Stop ❑ Step Forward ❑ Play Forward ❑ Go to End
D.	**Indicators** 	The indicators to the right of the control buttons display: ❑ Current frame : Total frames ❑ Current time : Total time
E.	**Scroll Bar**	Located below the playback control buttons. Allows for rapid adjustment of current file position.
	Show Tools Button 	Open additional tools on the right side of the AVI file player window.
F.	**Player Control Button Keyboard Shortcuts**	Keyboard shortcuts for step forward and back and go to beginning, go to end are provided: ❑ Home - Go to beginning ❑ End - Go to end ❑ Page Up - Step forward ❑ Page Down - Step backward
G.	**Player Image Zoom Keyboard Shortcuts**	Zoom In and Out ❑ Hold down the Ctrl key and toggle "**+**" to zoom in ❑ Hold down the Ctrl key and toggle "**-**" to zoom out Zoom Frame ❑ After zooming in or out, Hold down the "Ctrl" key, left click and drag the mouse. ❑ A frame appears indicating the area of the image that will display when the mouse is released.
	Edit Menu Popup 	Right-click the mouse to open the **Edit** menu.

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3.3.2. AVI File Player Window Toolbar Overview

Additional AVI File Player tools are displayed by clicking the Show Tools button. The tools can be hidden by clicking the Hide Tools button.

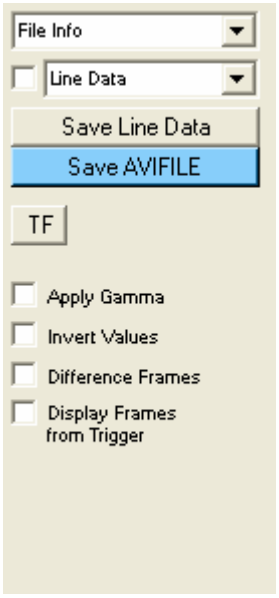


Figure 3-9: MotionMeasure, Additional AVI File Player Toolbar

MotionMeasure AVI file player toolbar components are identified and described in the following table.

Table 3-8: AVI File Player Toolbar Components

	Component	Function
A.	**File Info Dropdown List** 	Displays file information specific to the camera configuration when the file was recorded.
B.	**Line Data Check Box and Dropdown List** 	Click on the check box to enter the line measurement mode. Uncheck the check box to clear all line data and exit the line measurement mode. Line data dropdown list displays the following information about all measurement lines drawn: ❑ Line segment number ❑ Start and stop frames ❑ Line length ❑ Line angle in degrees ❑ Line length units per frame ❑ Velocity and acceleration
C.	**Save Line Data Button** 	Saves line data in a tab de-limited file.

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	Component	Function
D.	**Save AVIFILE Button** Save AVIFILE	Create a new subset of the current AVI file. ❑ Only that portion of the frame visible during playback is saved to the new AVI. ❑ Useful for cropping an event screen to the area of interest.
E.	**TF Button** TF	Reset the displayed frame to the trigger point embedded in the file information. ❑ This button has no effect if the Trigger Frame of the original event is not included in the file. ❑ If the file info includes IRIG time and date information, the IRIG time of each frame is displayed to the right of the TF button.
F.	**Apply Gamma Check Box** ☐ Apply Gamma	Apply Gamma correction to the RGB or grayscale AVI video images displayed in the AVI File Player. ❑ Gamma is a mathematical function used to correct the difference between the brightness perceived by your eyes and the actual digital brightness displayed by the monitor.
G.	**Invert Values Check Box** ☐ Invert Values	Invert the AVI video image displayed in the AVI File Player.
H.	**Difference Frames Check Box** ☐ Difference Frames	Display only the movement that occurs between adjacent frames.
I.	**Display Frames from Trigger Check Box** ☐ Display Frames from Trigger	Affects the frame number display. When unchecked: ❑ Frame numbers displayed are relative to the start of the file. ❑ All frame numbers will be positive. When checked: ❑ Frame numbers displayed are relative to the Trigger Point used when the original event was recorded. ❑ Frames occurring before the *Trigger Point* will have a negative number. ❑ Frames occurring after will have positive numbers. ❑ The Trigger Frame displays as frame 0.

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3.4. MotionMeasure Image Processing Tools

3.4.1. FOV (Field of View) Optical Calculator Command

This tool is designed to help you calculate the lens focal length or object working distance required to produce a desired Field of View.

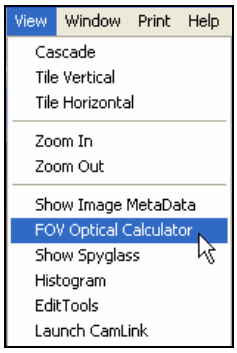


Figure 3-10: View Menu, FOV Optical Calculator Tool

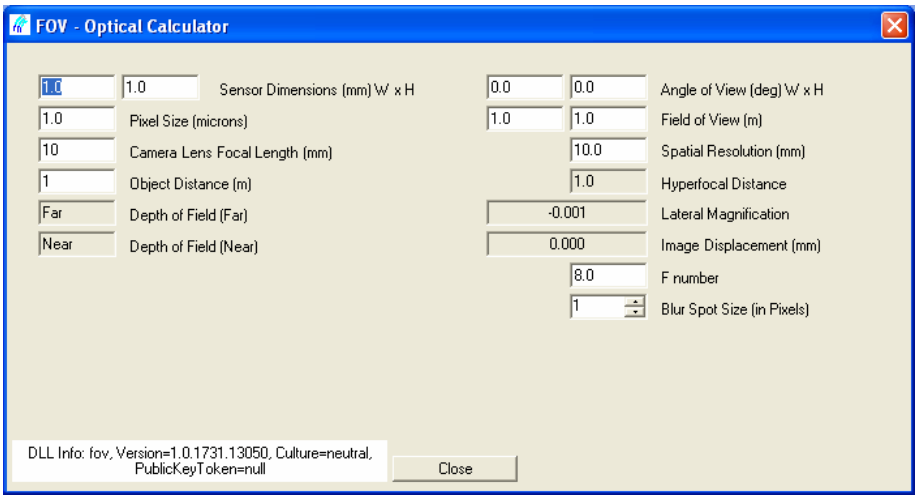


Figure 3-11: View Menu, FOV Optical Calculator Command

Text input boxes are provided for entry of the characteristics of the camera system.

- All the boxes, with the exception of Lateral Magnification, Image Displacement and Depth of Field (Far and Near), are both input and output.

- Changing the value in any box affects all the others.

Changing the value in any of the components causes an immediate re-calculation of all resulting values. FOV Optical Calculator components are identified and described in the following tables.

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Table 3-9: FOV Optical Calculator Components, Left Side

	Component	Parameters/ Outputs
A.	**Sensor Dimensions** 1.0 1.0 Sensor Dimensions (mm) W x H	Width and height in millimeters
B.	**Pixel Size** 1.0 Pixel Size (microns)	Size in microns
C.	**Camera Lens Focal Length** 10 Camera Lens Focal Length (mm)	Focal Length in millimeters
D.	**Object Distance** 1 Object Distance (m)	Distance in meters
E.	**Depth of Field (Far)** Far Depth of Field (Far)	Read only display.
F.	**Depth of Field (Near)** Near Depth of Field (Near)	Read only display.
G.	**Close Button** Close	Close the optical calculator

Table 3-10: FOV Optical Calculator Components, Right Side

	Component	Parameters/ Outputs
A.	Angle of View 0.0 0.0 Angle of View (deg) W x H	Angle of View in Degrees Recalculates the lens focal length.
B.	Field of View 1.0 1.0 Field of View (m)	Field of View in meters.
C.	Spatial Resolution 10.0 Spatial Resolution (mm)	Spatial resolution in millimeters. Re-calculates the object distance.
D.	Hyperfocal Distance 1.0 Hyperfocal Distance	Read only display. Displays maximum depth of field. Double-click this box to set the Object Distance equal to the Hyperfocal Distance.
E.	Lateral Magnification -0.001 Lateral Magnification	Read only display.
F.	**Image Displacement** 0.000 Image Displacement (mm)	Read only display.
G.	**F number** 8.0 F number	Lens F number setting. Re-calculates depth of field.
H.	**Blur Spot Size** 1 Blur Spot Size (in Pixels)	Blur spot in pixels. Calculate depth of field and hyperfocal distance.

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3.4.2. Histogram Command

This tool provides a graphic histogram display of a Still image file.

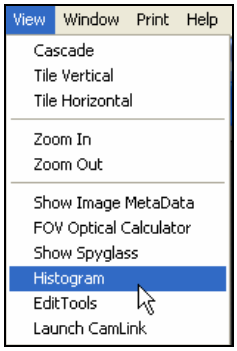


Figure 3-12: View Menu, Histogram Command

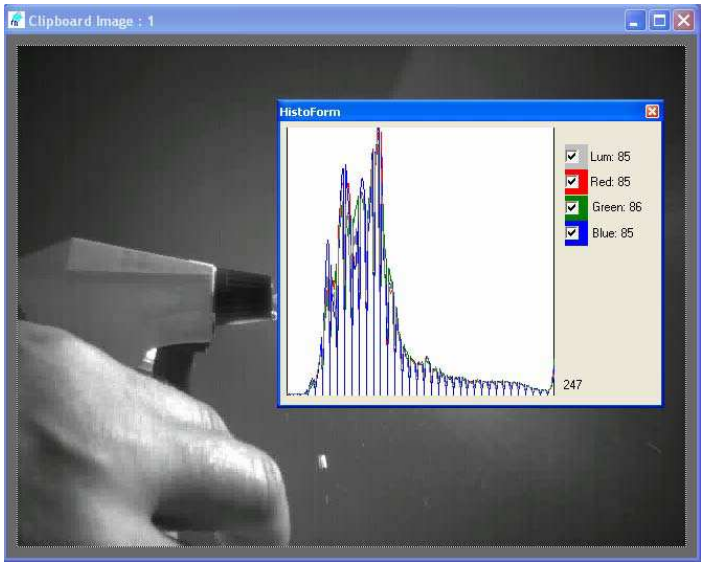


Figure 3-13: MotionMeasure, XXX

Histogram operation:

- To sample an image simply click in the image with the Histogram tool open. The entire image is sampled.
- To sample an area, click and drag the mouse to define one. Place the mouse cursor in the main graphic panel of the Histogram to see more information.

The four checkboxes and labels to the right, select the color to be plotted and indicate the average luminance value of the color. The current pixel value of the cursor location (on the histogram plot area) is indicated at lower right.

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3.4.3. Still Image Edit Tool Palette

This window is the main control center for MotionMeasure still image processing.

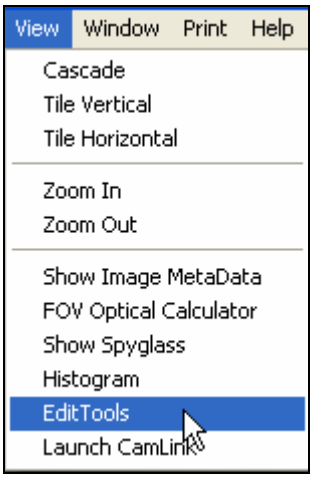


Figure 3-14: View Menu, Edit Tools Command



Figure 3-15: Edit Tools Palette

The Edit Tools window is "Modal", meaning that when it is open, only controls on the Edit Tools window can be selected

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Edit tools palette operational controls:

- Tools act on the entire image or the selection area if one is defined.
- Click the 

button to close the palette without applying any changes to the active image.
- Click the 

button to apply any changes and close the window.
- To cause the window to automatically re-open, check the 

check box.
- The tool window can be dragged by simply click and dragging.
- The image in the Edit Tools preview panel can be zoomed by pressing the Ctrl key while toggling the "+" or "-" keys.

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The Edit Tools palette has three tabbed pages.

- Basic page
- HSV page
- Setup page

Basic Tab

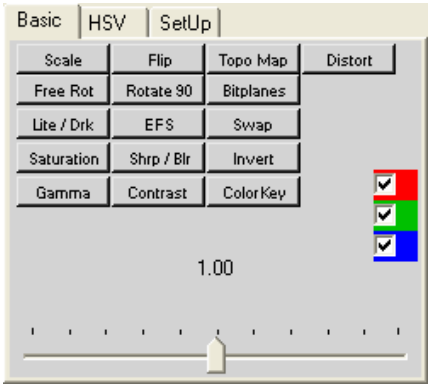


Figure 3-16: Edit Tools, Basic Tab

Table 3-11: Edit Tools, Basic Tab Components

	Component	Function
A.	**Scale Button**	Drag the scrollbar to adjust the image size.
B.	**Flip Button**	Default is a flip about the vertical axis (left to right mirroring of the image). To flip about the horizontal axis, hold down the "Ctrl" key.
C.	**Topo Map Button**	Generates a 3D map of pixel values. X and Y pixel locations are represented on an XY ground plane. ❑ Pixel values are represented on the Z axis. ❑ High values are at higher elevations, the reverse for low values. The scrollbars allow adjustment of strength of effect (upper bar) and rotation angle (lower bar). To cause the elevation of any one pixel to be represented by it's separate RGB values, hold down the "Ctrl" key.
D.	**Distort Button**	Distorts the image. Use the scrollbar to control the level of distortion.
E.	**Free Rot Button**	Drag the scrollbar to adjust the image rotation. ❑ By default rotation increments are 1.0 degrees. ❑ To fine-rotate in increments of 1/10th degree, hold down the "Ctrl" key.
F.	**Rot 90 Button**	Use for 90 degree rotations in either direction. ❑ By default rotations are clockwise. ❑ To rotate CCW, hold down the "Ctrl" key

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	Component	Function
G.	**Bitplanes Button**	Click the bitplanes you want to see isolated from the others. Use the color checkboxes to select the plane(s) to view
H.	**Lite/ Drk Button**	Enables a linear adjustment of all pixels, either up (lighter) or down (darker). Adjusts only those colors with checked Color Checkboxes.
I.	**EFS (Edge Find Smooth) Button**	Smooth the image without affecting the hard edges of the image. Use the scrollbar to control the intensity of the effect.
J.	**Swap Button**	Allows swapping any two bitplanes. Select the two planes to swap using the color checkboxes at the right
K.	**Saturation Button**	Click to expose a scrollbar allowing adjustment of image saturation. Adjusts only those colors with checked Color Checkboxes.
L.	**Shrp/ Blr Button**	Displays a scrollbar for setting the center value of the convolution mask. ❑ Set 0 for maximum blur. ❑ Set 25 for maximum sharpen. Adjusts only those colors with checked Color Checkboxes.
M.	**Invert Button**	Turns the selected plane(s) to negative. Select the plane(s) to invert using the color checkboxes at the right.
N.	**Gamma Button**	Displays the Gamma scrollbar. Drag and release the scroll button to see the effect of the change.
O.	**Contrast Button**	Displays two scrollbars for setting the histogram stretch limits. If Launch Histogram Tool is checked, the histogram will appear with two vertical lines showing the position of the upper and lower limit scrollbars. ❑ Pixel values between the lines will be stretched to fill 8-bit (256 value) space. Adjusts only those colors with checked Color Checkboxes.
P.	**Color Key Button**	Shows two scrollbars for setting the upper and lower masking limits. ❑ All values below the value selected on the lower scrollbar and all values above the value selected on the upper scrollbar will be turned black. ❑ Values between the upper and lower limits will remain unchanged. Select the plane(s) to modify using the color checkboxes at the right.

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HSV Tab

The HSV (Hue Saturation and Value) tab displays three trackbars used to adjust the overall hue, saturation of hue and value of the image or selected region.

The panel at the center of the tab displays a middle gray value on it's left side and a new color value indicating the result of the trackbar adjustments. The HSV tool adjusts only those colors with checked Basic tab Color check boxes.

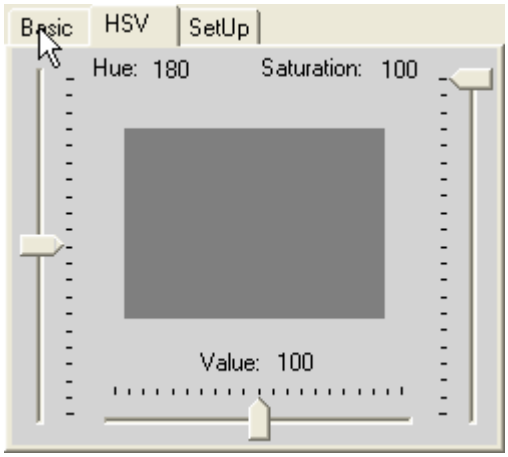


Figure 3-17: Edit Tools, HSV Tab

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Setup Tab

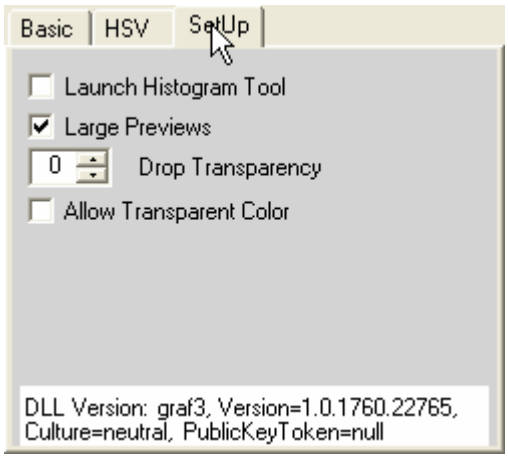


Figure 3-18: Edit Tools, Setup Tab

Table 3-12: Edit Tools, Setup Tab Components

	Component	Function
A.	**Launch Histogram Tool Check Box**	The program will auto open the Histogram window when appropriate.
B.	**Large Previews Check Box**	When checked, the active image will preview the edit changes. When not checked, only the image window on the Edit Tools palette shows the edit change.
C.	**Drop Transparency**	Settable from 0 to 100%. Controls the transparency (or opacity) of cloning and paste operations.
D.	**Allow Transparent Color Check Box**	Sets the color designated in the Color Dialog as being transparent in all paste operations. Areas of this color in the image being pasted will not appear in the resulting composite image.

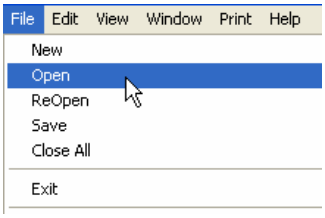
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3.5. AVI File Player How to Procedures

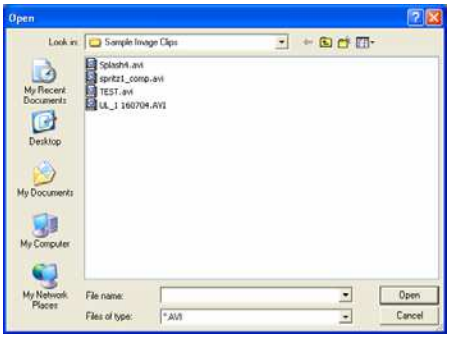
3.5.1. How to Open an Event from the AVI File Player Window

Step 1 Double-click the MotionMeasure desktop icon to start the program.

Step 2 From the **File** menu, left click the **Open** option. The File Open window is displayed.



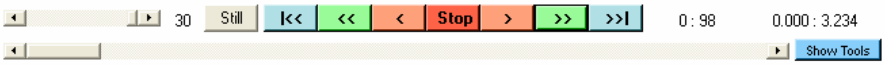
Step 3 Locate and left-click on the desired AVI **file name**, the file name is highlighted.



Step 4 Left-click the **Open** button, the AVI file is displayed in an AVI File Player window.



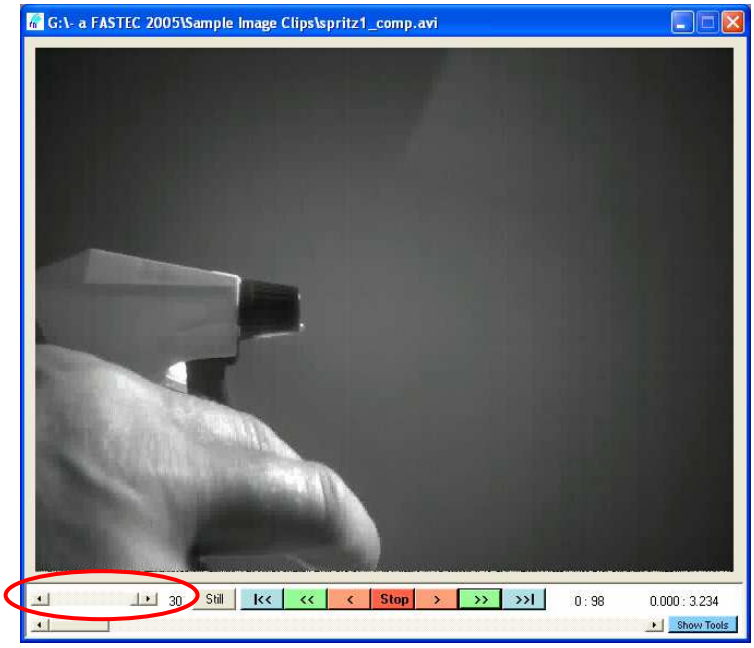
Step 5 Use the playback controls to view the AVI file contents



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3.5.2. How to the Change AVI File Player Event Frame Playback Rate

Step 1 Position the cursor on the Frame Playback Rate **scroll box** to the left of the Player controls.



Step 2 While holding down the left mouse button adjust the playback rate (frames per second). The current rate is displayed to the right of the scroll bar.



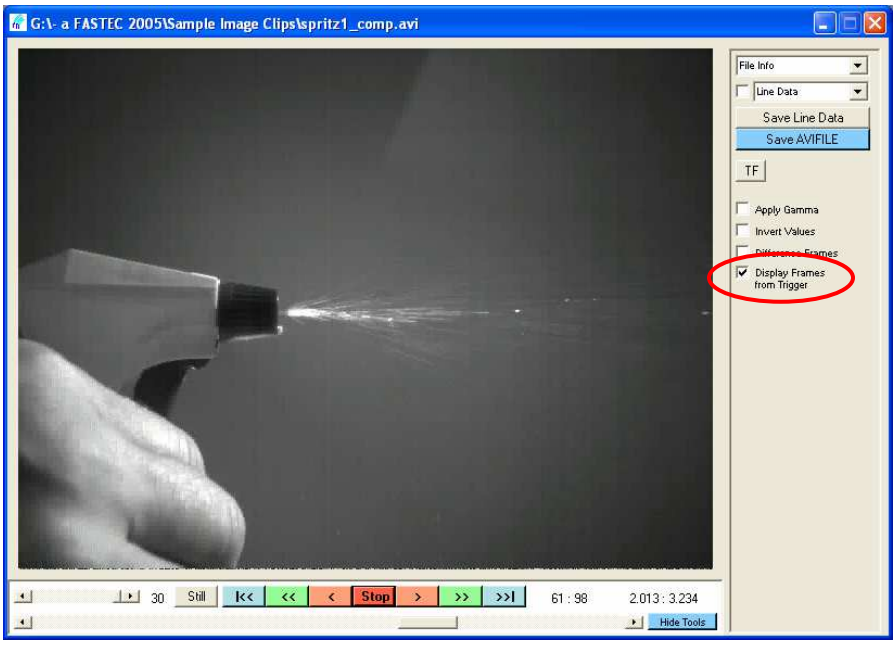
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3.5.3. How to Set the AVI File Player to Display Frames from Trigger

Step 1 Click on the **Show Tools** button.



Step 2 Click on the **Display Frames from Trigger** check box.



Step 3 The Frame indicator to the right of the player controls displays frames from trigger data.



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3.5.4. How to Save an AVI file from the AVI File Player

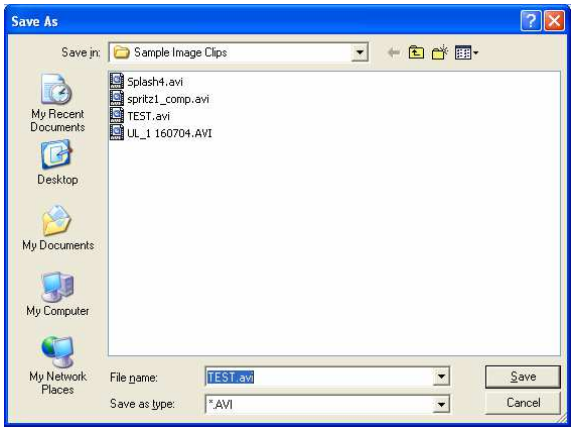
Step 1 While observing the AVI File Player window, use the AVI File Player controls to position the video to the first frame of the subset of frames to be saved.



Step 2 Click on the **Save AVI FILE** button. The **Save As** window is displayed.



Step 3 Assign a **File name** and **Save in** location to the new AVI file. Left-click the **Save** button.



Step 4 Only the portion of the frame visible during playback is written to the new AVI file.

To crop to a portion of the original AVI file frame:

- Zoom in by hold down the **Ctrl** key and toggle the "**+**" key.
- Hold down the **Ctrl** key and **Left** mouse button to reposition the zoom frame.
- Left-click in the AVI File Player window to hide the zoom frame.

Step 5 Using the AVI File Player controls, start the player.

Step 6 Click **Saving AVI** button to stop recording. All frames displayed during playback are written to the new AVI file.



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3.5.5. How to Perform Line Measurements on an AVI File Player Event

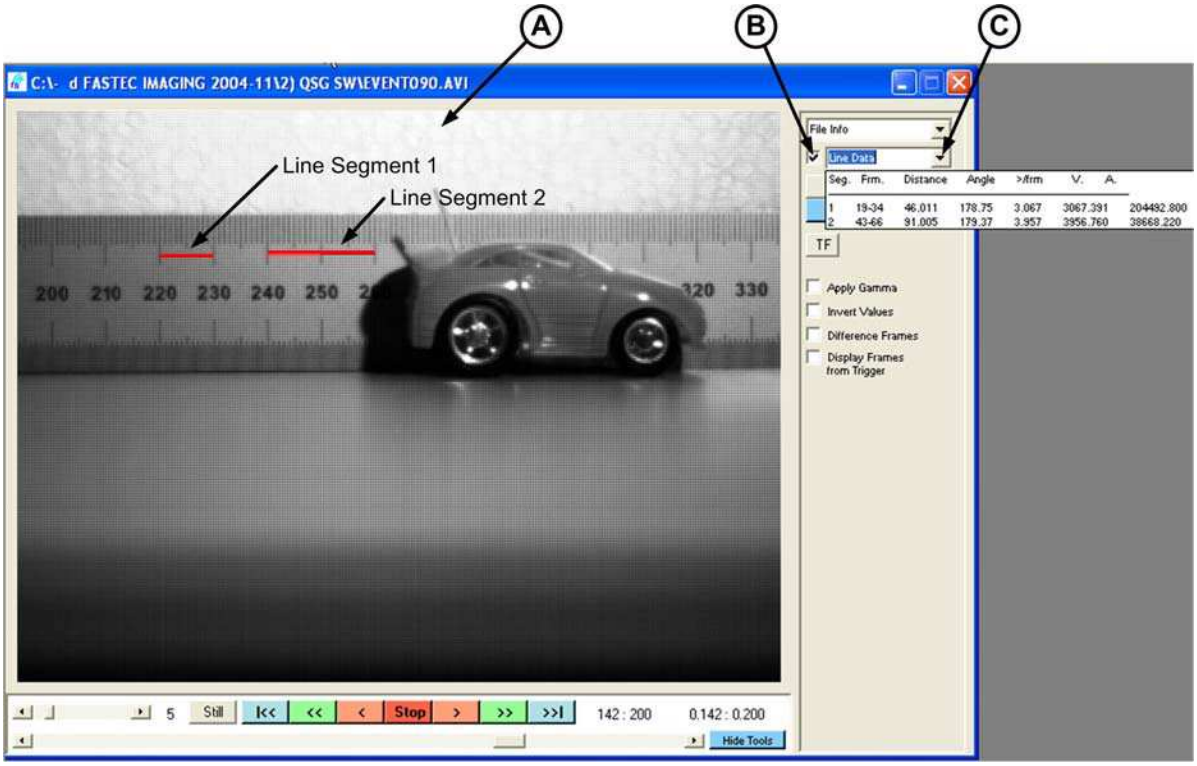


Figure 3-19: AVI Measurement Line Data

Step 1 Using the **File** menu **Open** command, Open the AVI file of interest.

- ❑ Ensure the field of view contains a measurement reference (i.e. Metric ruler in Figure 3-19)

Step 2 In the AVI Edit Tools window, click on the Line Data check box (Figure 3-19: B).



Step 3 To draw a measurement line (Figure 3-19: A):

- ❑ Use the Pg Up/Pg Down keys to view the first frame of the event of interest.
- ❑ Place cursor on the event starting point, depress and hold the left mouse button.
- ❑ Toggle the Pg Up key to advance frames to the event end point, position cursor on end point, release the left mouse button. A new measurement line is created.

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Step 4 To calculate pixel width, draw a reference line segment of known length in a single frame:

- ❑ Place cursor on line starting point (Figure 3-19: A, 240 mm).
- ❑ Hold down the left mouse button, move cursor to line end point (Figure 3-19: A, 260 mm), release mouse button.
- ❑ Line segment 1 data (Figure 3-19: C) now contains the number of pixels in 20 mm. Use the line data to calculate the width of one pixel.

Step 5 Left-click **Line Data** dropdown (Figure 3-19: C) to view data.

- ❑ Line sequence number
- ❑ Start and stop frames
- ❑ Distance between line end points in pixels
- ❑ Line angle (9 o'clock = 0 degrees, 12 o'clock = 90 degrees)
- ❑ Number of Pixels/Frame
- ❑ Velocity and acceleration in Pixels/Second

Step 6 To save Line Data, click the **Save Line Data** button.



Step 7 To clear line data, uncheck the **Line Data** check box.

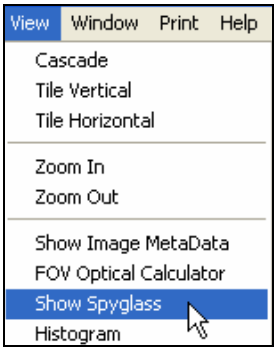


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3.5.6. How to Show or Hide the Spyglass

Step 1 Click on an image window displayed in the File Player window.

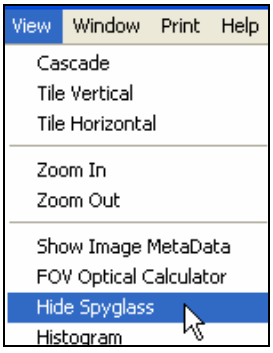
Step 2 From the **View** menu, select the **Show Spyglass** command. The Spyglass window is displayed.



Step 3 Position the cursor **crosshair** on the area of interest to view a zoomed image in the Spyglass window.



To hide the Spyglass, left-click the **View** menu, select the **Hide Spyglass** command.



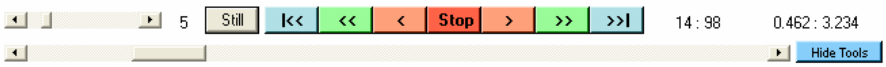
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3.6. Still Image Window How to Procedures

3.6.1. How to Capture, Paste, Save, Open and Print a Still Image

Step 1 **To capture a Still image:**

While observing the AVI File Player window, use the player controls to position the video to the event frame of interest.



Step 2 Left-click the **Still** button to capture the displayed still image frame in the windows clipboard.



Step 3 **To paste a still image into the player window:**

Hold the **Ctrl** key down and press the "**v**" key to paste the still image from the clipboard into the AVI File Player window.

Step 4 **To save a still image frame:**

Hold the **Ctrl** key down and press the "**s**" key. The Save As window is displayed.

Step 5 Assign a **File name** and **Save in** location to the new still image file. Left-click the **Save** button.

Step 6 **To open a saved still image file:**

Hold the **Ctrl** key down and press the "**o**" key. The file **Open** window is displayed.

Step 7 Select a **Look in** location and **File name,** left-click the **Open** button. The still image file is displayed in the AVI File Player window.

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3.6.2. How to Zoom In or Out, Crop a Still Image, and Show or Hide the Image Spyglass

Step 1 **To Zoom In or Out on an image:**

Hold the **Ctrl** key down and press the "**+**" or "-" keys to Zoom in or out on the image.

Step 2 **To crop a Still Image:**

Left-click the mouse inside the still image window to be cropped.

Step 3 Hold down the **left mouse** button and drag the mouse to create a rectangular crop box.



Step 4 From the **Edit** menu, click on the **Crop** command. The area outside the rectangle is cropped. The contents of the rectangle is displayed in the still image window.



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3.6.3. Still Image Window Special Properties and Actions

Each new still image opened from disk, or clipboard is placed in its own image window. The following procedure describes how to perform special properties and actions on the image window.

How to Select an Image Region to Edit

Step 1 Open a Still image.

Step 2 Click and drag the mouse to form a rectangular area.

- ❑ The selected area is indicated by a frame.

Step 3 To select a free-hand (irregular) region, hold down the "**P**" key, then click and drag the mouse.

- ❑ The selection is indicated by a green outline.

Step 4 To reposition a selection region, place the cursor within the region, holding down the "**Ctrl**" key then click and drag the mouse.

- ❑ The region outline will be dragged with the mouse position.

How to Copy and Drag a Region

Step 1 Open a still image.

Step 2 Place the cursor within the region, hold down the "**D**" key then click and drag the mouse.

- ❑ A copy of the selection is dragged to the new location. The selection is dropped onto the image using the selected Drop Transparency value.

How to Clone Pixels

Step 1 Open a still image.

Step 2 Set the clone source point by clicking the mouse on the image while pressing the **"C"** key.

Step 3 On the main **Edit** menu, select the Clone command.

Step 4 Position the cursor over the clone target and left **click**.

- ❑ Pixel values are cloned to the cursor position using the current Drop Transparency value.

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How to View a High Zoomed Still Image

Step 1 Press and hold the **"Shift"** key then left click the mouse. As the mouse is moved the image is dragged along.

Step 2 To stop, release the **"Shift"** key.

How to Smear a Region of a Still Image

Step 1 Open a Still image.

Step 2 Click on the image while pressing the "S" key.

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