MiDAS 2.0 Player

A MiDAS Software Utility

User Guide

Version 2.1.7

xcitex

Exciting Technologies

DOCUMENTATION AND LEGAL NOTICES

Contents

Playing Recorded Videos

The MiDAS Player is a software utility that allows users to review video, data, analysis and notes that were acquired with MiDAS or with other video acquisition products. The MiDAS Player contains all the playback features of MiDAS2.0, including slow-motion playback and image processing.

The Play Tab

The MiDAS Play tab is the only tab that does not change or cannot be removed from the MiDAS Control Panel. The MiDAS Player also uses the exact same Play tab. This tab controls all the playback functions from within MiDAS

Playback control is established using the following features of the Play tab:
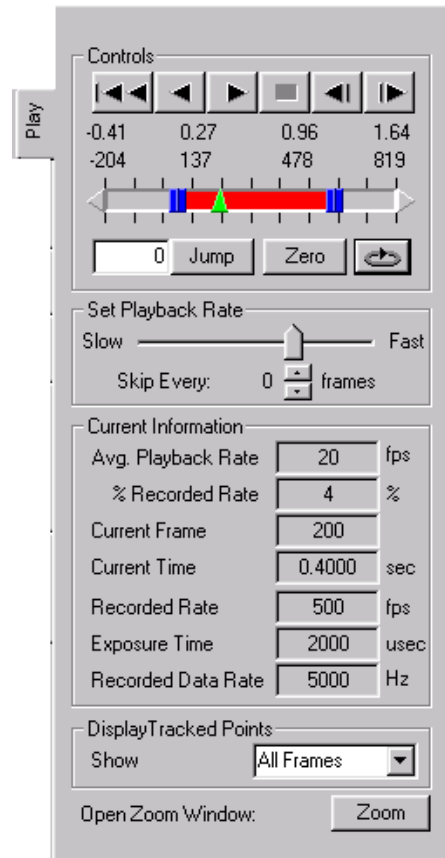
Controls

The following controls are available by clicking on the control buttons:

- Skip to beginning of the entire recording or the Reference Frame or to the beginning of the current memory buffer or burst recording.

- Skip to the end of the entire recording or the Reference Frame or to the beginning of the next memory buffer or burst recording.

- Play Backward

- Play Forward

- Step Backward

- Step Forward

- Stop (square box)
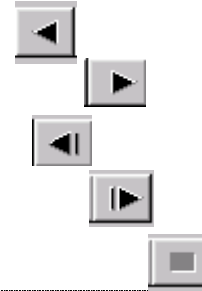
Slide Bar	The slide bar allows the operator to quickly move to a specific part of the playback cycle. Just click on the center triangle (green) of the slider and, holding down the left
	mouse button, drag the slider to the desired position. The time and the frame numbers are displayed directly above the slide bar. The active area is displayed in red. The inactive area is displayed in gray.
Slide Bar Range Brackets	The slide bar range brackets are used to establish the beginning and end of the playback range. The range brackets are two squares (blue) with a red interior. To approximately select the beginning of the playback range, click on the left square and, holding down the left mouse button, drag the slider to the desired position. To fine-tune your range, click on the arrows (as shown above) at the end of the slide bar.
Jump to Frame Number	This feature allows the operator to immediately and repeatedly jump to a specific place in the video clip. This is a valuable feature for returning to a specific event.
Set Current Frame to Zero	By clicking the **ZERO** button, the current frame of the video playback is reset to become the Reference Frame 0 and the current datum is reset to become the Reference Datum 0. Set Current Frame to Zero cannot be undone from within MiDAS. If you make a mistake, close the video display window and
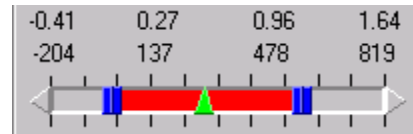
	load the file directly again.
Continuous Loop Playback	By clicking on this button, the playback is continuously looped between the brackets described above. When this button is not selected, the playback stops at the end of the selected range.
ZOOM button	By clicking this button, you can select a portion of the image to magnify. Click within a video image with the left mouse button and, holding down the left mouse button, drag within the image until a square frame is visible and of the desired size. When the mouse button is released, a separate window appears of the magnified image.
Display Tracked Points	Select whether you desire to display points on the video image from a previous or current image analysis.

The following displays are found on the Play tab:

Frame Number	The current frame number
Time	The time associated with the current frame
Recorded Rate	The rate at which the video was recorded
Exposure Time	The exposure setting during that recording
Recorded Data Rate	The rate at which the synchronized data was recorded.

Setting the Playback Rate

Set Playback Rate	The actual playback rate on the computer screen is determined by many factors, including the number of synchronized images, the video RAM and the speed of the computer processor. Therefore, MiDAS provides a slider between "slow" and "fast". Set the relative speed of playback by clicking on the center post of the slider and, holding down the left mouse button, drag the slider to the desired position.
Skip Every N Frames	This feature allows the operator to speed up the display

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	update rate by skipping frames. Default is 0 frames.
Average Playback Rate	The rate at which the video is actually being played on your display, in frames per second. MiDAS will sample a few frames and determine the average playback rate for your configuration and settings. This number is updated every few seconds.
% Recorded Rate	The average playback rate divided by the original recording rate of that video image, expressed in percent. For example, if a video was recorded at 250 fps and if you are playing back at 20 fps, MiDAS will display 8%.

Playback Shortcut Bar

Under each video display, you will find shortcuts to buttons and features also found in the "Play" tab in the Control Panel.

These controls include the following:

Playback Controls	These provide the standard play, reverse, rewind, stop, and step controls. The slider beneath the buttons allows for quick scanning through the video and indicates the current position within the video.
Frame and Time	The frame number and time stamp relative to the trigger event are displayed next to the playback controls.
Zoom	The "Z" zoom button allows you to zoom in on a region of interest in the video during playback. When the button is pressed, you can draw a box within the video display and a new zoomed window will appear. The box you have drawn within the video display can also be dragged around to other regions of the display. In order to resize the box, simply press the zoom button once again and draw a new box.
Extended Play Options	The "C" checkbox selects a continuous playback mode. When this option is selected, the video will automatically loop around to the beginning whenever the end of the video is reached.

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> The "S" checkbox selects synchronized playback. This option allows for synchronized playback of multiple video files. When synchronized, the frame position of each of the video files is incremented (or decremented) by the same amount relative to some starting position for each file.

The following displays are found on the Shortcut bar:

Frame Number	The current frame number
Time	The time associated with the current frame

Overriding the Default Record Rate

MiDAS knows the rate at which the video was recorded for all MiDAS-generated images. If you are importing a file from another acquisition program, MiDAS may not recognize the configuration file format. If MiDAS is unable to determine the rate at which the video was recorded, it will default to 30 fps. In such a case, you may override the default MiDAS rate, as follows:

1. Click on the Options menu.

2. Click on Override Record Rate. The window shown at right appears:

3. Either use the slider bar to select or directly type the correct frame rate in the edit box.

4. Click OK.
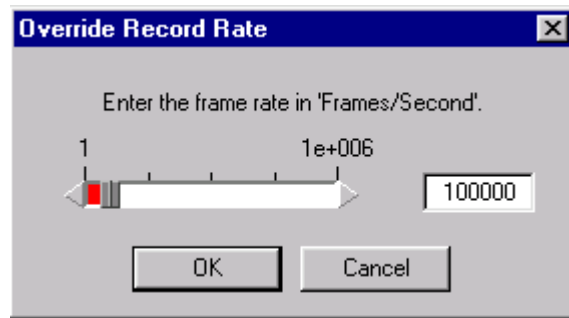
Playing Multiple Synchronized Videos

If multiple windows are in the MiDAS console, then the video display window with the active blue stripe across the top is addressed by the Play tab. You may synchronize multiple video images in playback by using the sync button in the Play tab on the Control Panel or by using the "s" button on the Playback shortcut bar. This option allows for synchronized playback of multiple video files. When synchronized, the frame position of each of the video files is

incremented (or decremented) by the same amount relative to some starting position for each file. Associated data is automatically synchronized as well.

To enable synchronized playback:

1. Click on the first video display window.

2. Position the video at the desired first frame for synchronized playback. This sets the starting position to the current frame for that video display.

3. Select the "s" checkbox in the playback shortcut bar under the video image.

4. Repeat steps 1 to 3 for each video you desire to synchronize.

5. Press the "Play" button on the Play tab or on any one of the synchronized video display shortcut bars and all the synchronized windows will play simultaneously.

To remove a video image from synchronization:

1. Stop the playback.

2. Deselect the "s" checkbox of that video image.

3. Resume playback.

Note: When using BOTH continuous playback and synchronized playback, only select the "C" checkbox in the window in which you press the "Play" button

To quickly synchronize multiple images, click on **TOOLS**, then SYNC ALL TO ZERO FRAME.

Zooming and Panning

MiDAS provides four methods for magnifying an image or a portion of an image.

1. Resize the window. Click on the window frame and drag the window open. The window size, in pixels, is displayed in the status bar.

2. Zoom region. Either right click within a window and select **SET ZOOM REGION** or click on the **ZOOM** button in the Play tab. Draw a box around the zoom feature using the mouse.

3. Zoom in. To zoom the image, right click within a window and select **ZOOM.** Move the cursor up and down the screen to magnify and minify the image. Alternatively, hold down the shift key and move the cursor.

4. View size. Set the magnification using the view settings under the **VIEW** menu.

To pan a magnified image, right click within a window and select **PAN.** Move the cursor within the screen to move the image. Alternatively, hold down the ctrl-shift keys and move the cursor.

There are three components to MiDAS Camera View and Playback windows – the window frame, the actual image size and the zoom region size.

The 'frame' is the outside container of the window, much like a picture frame. The frame size is measured in display pixels.

The 'Actual Image' is the complete image, at full resolution. This is also termed the image or camera resolution. . The image may be larger than the frame or larger than the desktop itself.

The "Zoom Region" is the portion of the actual image that is actually displayed within the window frame, measured in actual image pixels.

For example, the following image of a cricket player was recorded at 480x420 pixels: The zoom region -- the player's head, as shown at upper right -- is 80x70 pixels.
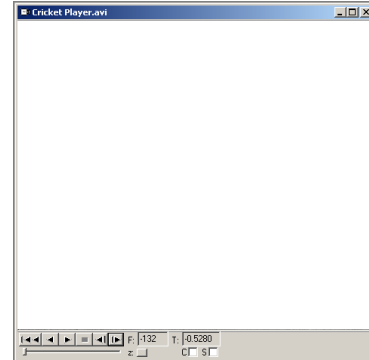
When the zoom region is placed in a window frame of 640x560 pixels, the final displayed image looks as shown below.
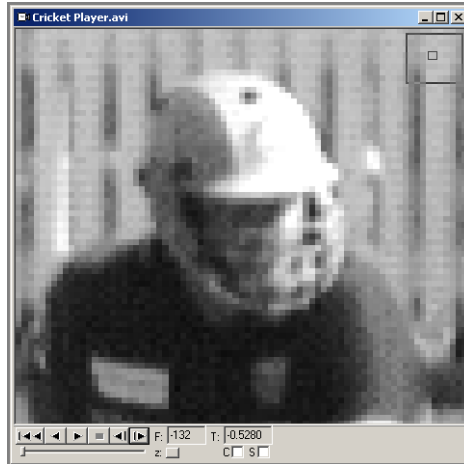
In this example, the MiDAS status bar will report the following numbers (pixels)

Actual Image size: 480x420
Zoom region size: 80x70
View Window size: 640x560.

In this example, the image is magnified 8x (8 times) the actual image size, based on pixel numbers (640x560 divided by 80x70 equals 8).

Magnification of the image can be achieved in any of the following ways:

- Increase the size of the window frame by clicking on one side and dragging it larger;

- Increase the size of the view by zooming in on the zoom region. This can be achieved by either changing the View percentage from the menu bar, increasing the View percentage using a contextual (right-click) command, or by using the click-drag zoom feature.

Note: A zoom ratio of 1 means that the image and the frame are the same size. A zoom ratio of greater than 1 means the image is larger than the window frame and that only a portion of the image (i.e. the zoom region) is displayed within the window frame.

The following zoom and magnification commands are very useful. These can be accessed via either the menu under View or by right clicking within a View window:

View Actual Pixels	When selected, this command sets the zoom region and the window frame to be equal to the actual image size. That is, everything is displayed within a frame at 1:1.
View x %	When selected, this command sets the window frame to be a multiplier times the actual image size. For example, if 200% is selected in the above example, the frame is set to 960x840 pixels.
	If the new frame size is larger than the desktop area permits, then the image is zoom magnified to the correct value and the window frame limited to the maximum size permitted by the desktop. For example, if 400% is selected in the above example, the image is magnified 4x to 1920x1680, but only the available number image is displayed (for example 969x848). In this case, the status bar will display the number of image pixels contained within the frame in the zoom region size box and the View window size will be the available display dimensions.
View Max	When selected, this command determines the largest window frame of the correct aspect ratio that will fit within the desktop area. It then fits the entire image within a frame of this size. In this case, the status bar will display a zoom region equal to the View window size.
Fit in Window	When selected, this command fits the entire image into the window frame. This command does not change the window frame size, just the image size. In this case, the status bar will display a zoom region equal to the window frame.
Zoom Image	This command allows you to use your mouse or trackball to easily zoom the magnification up or down of the image. When selected, the mouse cursor turns to a 4-pringed star on the view window. Simply roll the mouse or trackball up the image to zoom up (magnify) or roll downward to zoom down (minify).
	Note: During zooming, the geometric center of the image remains the same.
	The zoom box appears in the upper right corner of the window showing you the zoom ratio – the size of the zoom region relative to the actual image size.

Pan Image	This command allows you to use your mouse or trackball to easily pan the image – move the image in any direction to optimize its location.. When selected, the mouse cursor turns to a 4-pringed star on the view window. Simply roll the mouse or trackball in any direction to scroll the image in that direction.. The location box appears in the upper right corner of the window showing you the relative size and location of the window on the actual image size. The status bar indicates the size of the zoom region, in pixels.
Set Zoom Window	This command lets you draw a box around any portion of the image and create a separate Zoom Window. A zoom window behaves exactly like a Playback Window, and can be further interacted with as described above (pan, zoom, change view size, etc..)

To magnify the image to the largest possible size permissible by your video display, click on the Magnify button within the window toolbar. Click on the restore button to restore it to the previous size.

If the visible resolution exceeds the view resolution (e.g. the image is magnified), a small zoom map will be displayed that illustrates the current visible size and position relative to the overall view size and location. The zoom map position may be moved to any corner of the screen by right clicking within the window and selecting **ZOOM MAP LOCATION**.

Displaying Synchronized Time

To display associated frame-by-frame time information directly below the video display, right click within the image and select **TEXT INFO**. Examples of typical information include the trigger time from when the video was acquired, frame time stamping, GPS location, and camera orientation information. When selected, the information is displayed directly beneath the video display as shown.
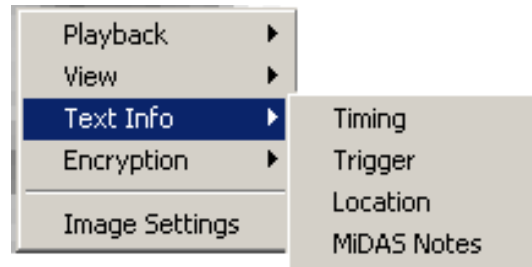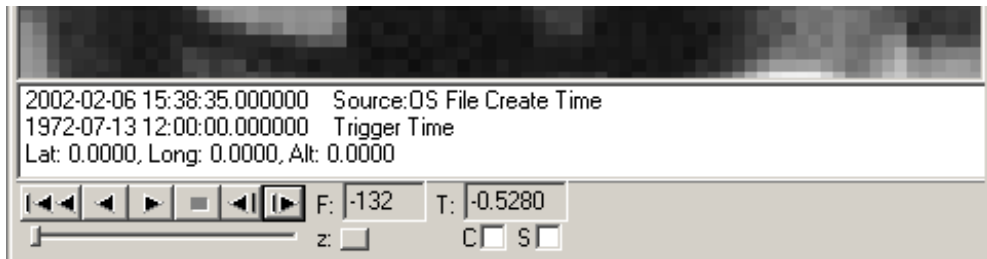
The information that is displayed is summarized as follows: .

Timing	The top line –Timing – shows the actual time as recorded either from the Operating System clock or an external clock source such as an IRIG generator or GPS satellite .
	Text information will appear below the video sequence, in the following format:
	"Year-Month-Day-Hour-Minute-Second-Fraction of Second "– Source: "Source Text"
Trigger	The second line – Trigger – shows the actual time that an external trigger or Trigger Stop button selection was received. Text information will appear below the video sequence, in the following format.:
	"Year-Month-Day-Hour-Minute-Second-Fraction of Second" Trigger Time
Location	The third line – Location – shows the physical location, as recorded from a GPS satellite and external camera tracker, in latitude, longitude, altitude, azimuth and elevation. Text information will appear below the video sequence, in the following format:
	"Lat ###.####, Long ###.####, Alt ###.####"
Camera Pointing	The fourth line – Pointing – shows the azimuth and elevation of a camera tracker . Text information will appear below the video sequence in the following format.
	"Azimuth ###.####, Elevation ###.#### "

To maintain compatibility across all recording options, you have the option to display the time and position information even if you don't have the TS module. MiDAS will either display un-initialized numbers as is the case for latitude, longitude, and altitude, or it will display information taken from another source as is the case for Timing.

"Source Text" for Timing will be one of the following text descriptions:

Source: Synch from External Source	This text is displayed next to the Frame Time, when the sequence that you are viewing was recorded with a MiDAS TS module enabled. It means that the information was fundamentally obtained, as described above, from the external time source (GPS, IRIG-B, etc.). It also means that this was the first camera in a multi-camera chain.
Source: OS System Clock at Acquisition	This text is displayed next to the Frame Time, when the sequence that you are viewing was recorded with MiDAS but did not use the MiDAS TS module. This means that the frame time is derived from the system clock time at the end of the recording. It also means that this was the first camera in a multi-camera chain.
Source: Derived from Master	This text is displayed next to the Frame Time, when the sequence that you are viewing was recorded with a MiDAS. It means that the information was fundamentally obtained, as described above, from the external time source or the OS system clock. It also means that this camera was "down the chain" (i.e. not the first camera) in a multi-camera chain.
Source: OS File Create Time	This text is displayed next to the Frame Time, when the sequence that you are viewing was recorded with MiDAS before the TS module was available, or you used another system to acquire the sequence. It means that time is derived from the time of file creation. The last frame is treated as if it were created at file creation time.

Verifying Demo Status

MiDAS and the MiDAS Player allow you to download and analyze various demo files supplied by Xcitex. These files are specially watermarked to unlock certain features within MiDAS and the MiDAS Player. Typically, these files are supplied for technical support purposes, for sales support purposes or for confidential exchange of data between Xcitex and customers. To verify the demo status of a file supplied by Xcitex:

1. Open the file using the **FILE → OPEN** commands.

2. Click on **TOOLS → VERIFY DEMO STATUS**.

3. Check the message box that appears to confirm status of the file.

Playing Synchronized Data Sequences

When the acquisition is completed, the Play tab is automatically brought forth and both Video Playback and Data Playback windows are opened. The Live Video display window is minimized for later use. If multiple windows are in the MiDAS console, then the window with the active blue stripe across the top is addressed by the Playback tab. Details of the Play tab are described in Chapter 7.

You can "play" the video/data using any of the following techniques:

1. The controls on the Play tab

2. The controls on the Video Playback window

3. The single step controls on the Data Playback window

4. Dragging the cursor in the Data Playback window

The first two options are described in detail in Chapter 7. The Data Playback window appears as shown at right:

The Data Playback window has a waveform display with some button features along the top and right side. A single blue cursor
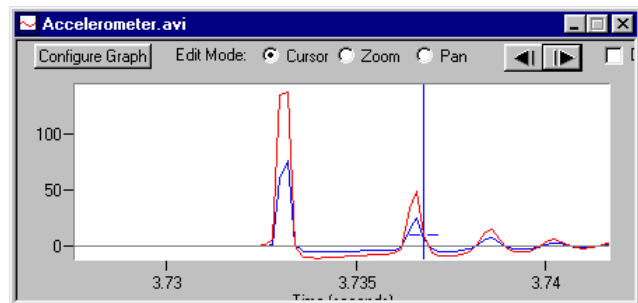
shows the location of the video/data counter, in data points. Along the bottom, the time position is displayed. The user settable features of the Data Playback window are as follows:

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Step Back	This button causes the data cursor to jump one single step backwards. Note that since there might be multiple data points per frame of video, the video frame might not advance every time this button is pressed. For example, if 10 data points per frame were selected, then this button would have to be pressed 10 times to advance the video one frame.
Step Forward	This button causes the data cursor to jump one single step forwards. Note that since there might be multiple data points per frame of video, the video frame might not advance every time this button is pressed.
	For example, if 10 data points per frame were selected, then this button would have to be pressed 10 times to advance the video one frame.
Edit Mode: Cursor	When the Cursor mode button is selected, the user has control of the cursor with the mouse. By clicking and dragging the cursor, both the video frames and data are advanced synchronously.
	A "jump advance" feature is also provided – just click anywhere within the waveform window and the cursor jumps to that position and the video is updated
Edit Mode: Zoom	When the Zoom mode button is selected, the user can change the zoom magnification of the waveform window. Simply click and drag within the waveform window to create a box around the feature that you desire to amplify. When the mouse is released, the waveform is zoomed.
	Double-click anywhere within the waveform window to de-zoom the window to the full range.
Edit Mode: Pan	When the Pan mode button is selected, the user can drag the graph up, down left or right.
Display Values	When enabled, the right side of the Data Playback window will display the cursor values for all the active channels.
Data Index	The current data point number of the current acquisition. Note that the data index is not the same as the frame number

	since multiple data points can be acquired per video frame.
Time	The current time position of the cursor and the video.

To modify the appearance of the Data Window, follow these steps.

1. Open a Data Graph Window, as shown above.

2. Click on the **CONFIGURE GRAPH** button. The window at right appears:

The top half of the window is displayed to selecting the active channels to display or to block from display.
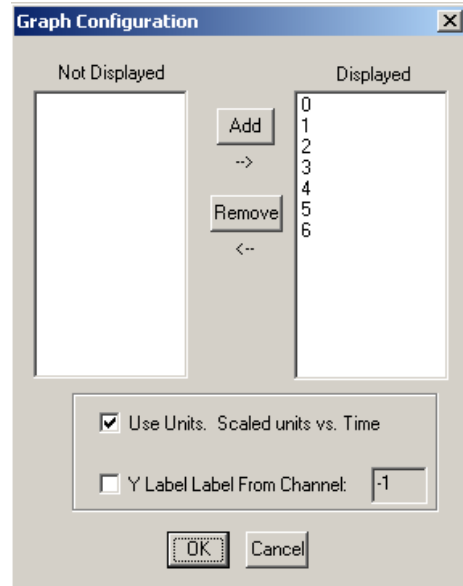
The bottom half of the window contains the following selection information:

Use Units	When this option is selected, the Y-axis (vertical axis) is displayed in units rather than volts.
Y Label from Channel x	When selected, this option calculates the maximum of the Y-axis label with the data from the selected channel (must be an active channel). If only one channel is active, or if this checkbox is unselected, the Y-axis maximum value will be calculated as the maximum of the first active channel (e.g. channel 0).
OK	Saves the settings and returns to the main Data Playback window.

To activate or deactivate any channels, use the **ADD** and **REMOVE** buttons. The "Displayed" channels are shown on the right side of the ledger. The "Not Displayed" channels are shown on the left side. To move, simply highlight the channel of interest and press the **ADD** or **REMOVE** buttons.

New graphs can be created by clicking on **TOOLS**, then **CREATE NEW GRAPH**. A single screen appears asking for the name of the new graph. Once the new graph appears on the MiDAS console, use the **CONFIGURE GRAPH** button to customize its appearance.
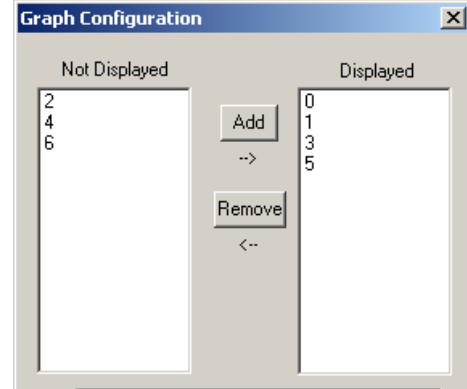
Playing MiDAS Notes

To review MiDAS notes saved with an image sequence or with a data sequence, simply click on **FORWARD NOTE STEP** button or **BACKWARD NOTE STEP** button. You will be automatically advanced to the next sequential note (video or data).

If your video sequence already has notes recorded, a color button will appear in the lower right portion of the video window. Right click on this button and MiDAS Notes will appear.
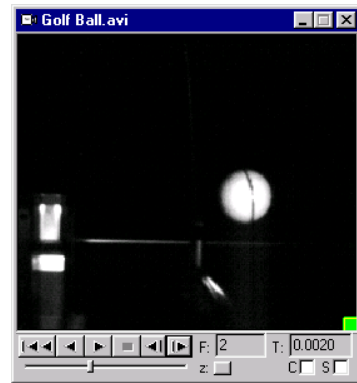
All MiDAS Notes are stored in the MiDAS Binary File. Therefore, the notes can be viewed with any free MiDAS Player. After you have completed recording, analyzing, and adding commentary to your measurement, you have the freedom to freely distribute the results to your colleagues and managers.

Image Processing

MiDAS includes various techniques for improving image quality and image contrast. Such image manipulation is termed image processing. While image processing tools are very useful for general viewing, they are typically used to improve accuracy of tracking features for the purposes of analyzing motion.

Improving a recorded video image

To improve the appearance of the video image, you can apply either a sharpen or smoothing filter.

Under the **IMAGE PROCESSING** menu item, select **FILTERING**. You can also reach these options through the **SYSTEM CONFIGURATION** window. Select one of the following three options for viewing your video images:
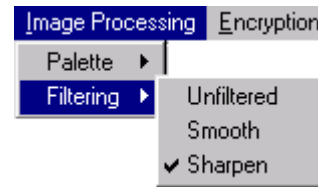
|	
Sharpen	When enabled, the video is passed through an image sharpening algorithm that enhances the edges and removes some of the pixelization effects that occur during low resolution recordings.
Smooth	When enabled, the video is passed through an image smoothing algorithm that reduces the edge contrast and improves appearance of the image
Unfiltered	When selected, the image is unprocessed.

Image Enhancement

To access the image settings screen, under the **IMAGE PROCESSING** menu item, select **IMAGE SETTINGS**.

If you are viewing a color video image, the following dialog window appears:
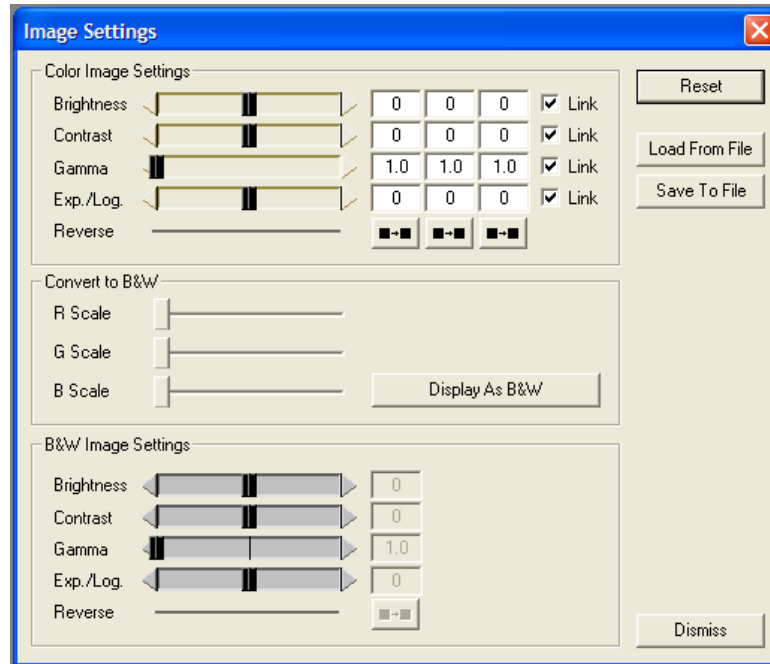
If you are viewing a monochrome (black and white) video image, a smaller window which only contains the bottom portion of the above window appears :
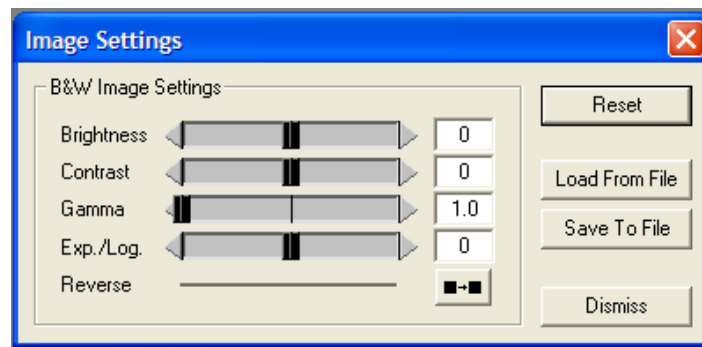
This image processing windows allow you to set all the parameters about the image, save your settings and restore them for later use. Note that there are the same sets of sliders for color and

monochrome (black and white) images. For the color settings, the individual red, green and blue channels of the color images can be independently adjusted or, if linked, adjusted as a group. The channel sliders for red, green, and blue can be hidden or kept fixed by clicking on the R, G, and B buttons above each column.

The various image settings are:

Brightness	Adjusts the brightness of the image. The brightness of the image is the maximum white level.
Contrast	Adjusts the contrast of the image. The contrast of the image is the normalized ratio of whites minus blacks.
Gamma	Adjusts the gamma of the image. The gamma of the image affects the brightness of the displayed result on your monitor.
Exp./Log.	Adjusts the exponential/logarithmic palette function. With a normal palette, '0' is black and '255' is white and the ratio of the input to output is linear. That is, input 134 maps to output 134. By adjusting this value, you can change the slope of the input/output curve to be either exponential (more blacks) or logarithmic (more whites). A more detailed explanation is provided below.
Reverse	Changes the color palette such that whites and blacks are reversed.
Link	Links the Red, Green and Blue channel sliders together.
Display as B&W	Converts color images to monochrome images using the conversion factors indicated by the R, G, and B sliders.
R Scale	Amount of red channel to include when converting from color to monochrome.
G Scale	Amount of green channel to include when converting from color to monochrome
B Scale	Amount of blue channel to include when converting from color to monochrome.
Reset	Sets all the functions to their default levels.
Load from File	Allows previously stored image settings to be loaded for this image.

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Save to File	Allows you to save certain image settings into an LUT (Look Up Table) format for later retrieval.
Dismiss	Closes the window with the current settings.

The Exp./Log, and Reverse features allow you to improve the image contrast to enhance the tracking success. Understanding that MiDAS looks for objects that have some "color" or, more specifically, a "level of grayscale", changing these values adjusts the "palette" to improve the white-on-black image contrast. A level of grayscale is best described as the level between black (a value of '0' on an 8-bit gray scale) and white (a value of '255' on an 8-bit gray scale).

A description of these image processing palette options is given below. The images on the left are examples of the effects of each of the palette options. The plots on the right show the mapping of pixel intensity values from the original (horizontal axis) to the processed (vertical) image after applying the new palette.

To help in understanding the palette mapping plots, here is an example using the reverse palette. For a given pixel intensity of X in the original image, we move upward at coordinate X until we intersect with the blue line, then we move horizontally to find the new pixel value in the processed image, in this case it would be Y. This is done for every pixel in the image, producing the final processed image as shown in the figures on the left.
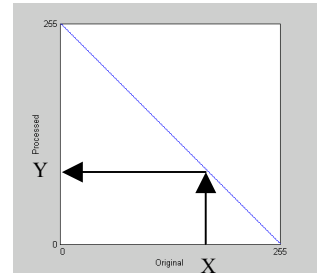
Normal   This option uses a normal palette, where '0' is black and '255' is white. This is the default and standard palette with no processing occurring. In other words, the processed pixels are identical to the original pixels.
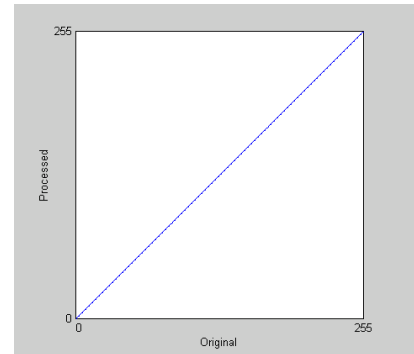
Reverse

This option uses a reverse palette, where '255' is black and '0' is white. This will invert the image so that light regions are dark and dark regions are light. Contrast is not affected.
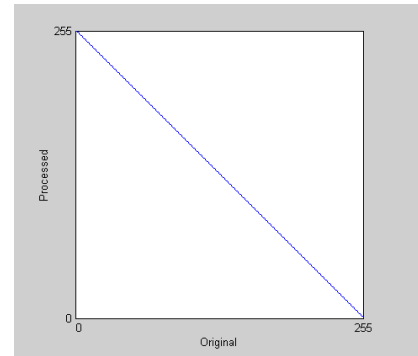

Logarithmic

Slide the Exp./Log. slider towards the left. The plot on the right shows multiple mappings for different parameter values. As the parameter is decreased to lower numbers (e.g. –150 to -250), the mapping approaches a straight line (i.e. no processing). This palette increases the contrast in dark regions and decreases the contrast in light regions. This has the effect of bring out more detail in the dark regions and making light regions very light.
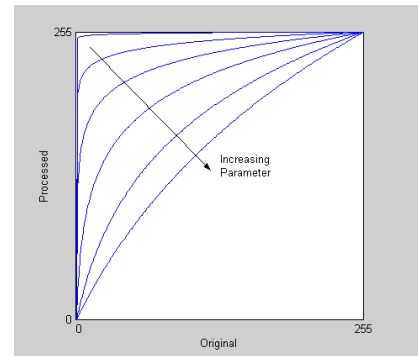
Exponential

Sliding the Exp./Log. slider towards the right produces an exponential palette, the opposite of the logarithmic palette. This palette increases the contrast in light regions and decreases the contrast in dark regions. This has the effect of making dark regions darker and bringing out more detail in lighter regions. Typical values are positive numbers (e.g. 150 to 250).
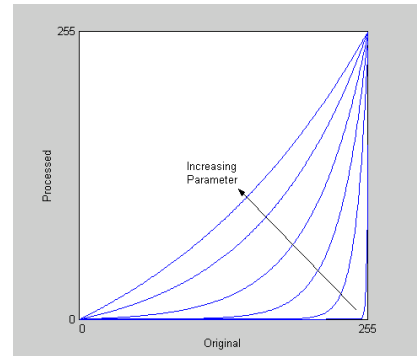
Bayer Decoding Settings

When you have completed a recording, or if you have loaded a Bayer formatted file, you can view and modify the color coefficients that are used to decode the Bayer images in the video. The Bayer Decoding Settings window can be accessed through the main menu, under Image Processing – Bayer – Decoding Settings, or by right clicking on the playback window and selecting Bayer Decoding Settings.

Saving Video and Data

You can save your video and data in a few formats. Video can be saved in Windows video (AVI) format or as a series of JPEG, Bitmap (BMP) or TIFF images. Data can be saved either in a tab-delimited text format (TXT) or in Microsoft Excel (XLS) format.

Depending on which window is live (e.g. the title bar across the top is highlighted), the save options change under the FILE menu column. I

1. <u>If the Data Playback Window is selected (active)</u>, then both **SAVE DATA AS TEXT** and **EXPORT DATA** options are visible under the File menu column.

Save Data as Text	Saves the data into a file of type *.AU2, where AU2 is a proprietary suffix to MiDAS. This file type is designed as a tab delimited text file. MiDAS associates the AU2 suffix with Wordpad (a Microsoft Windows native text editing software package) during the installation process.
Export Data to Excel	Opens an Excel spreadsheet on the MiDAS console and places the data from all channels being exported directly into the spreadsheet. Note that Excel has a limitation of 65,536 lines – do not try to export data to Excel if more than 65,536 data points have been acquired.

2. <u>If a Video Playback window is selected (active)</u>, the **SAVE AS…** is the only visible option under the FILE menu.

The **SAVE AS...**window has various options for saving video, data and spreadsheet files.
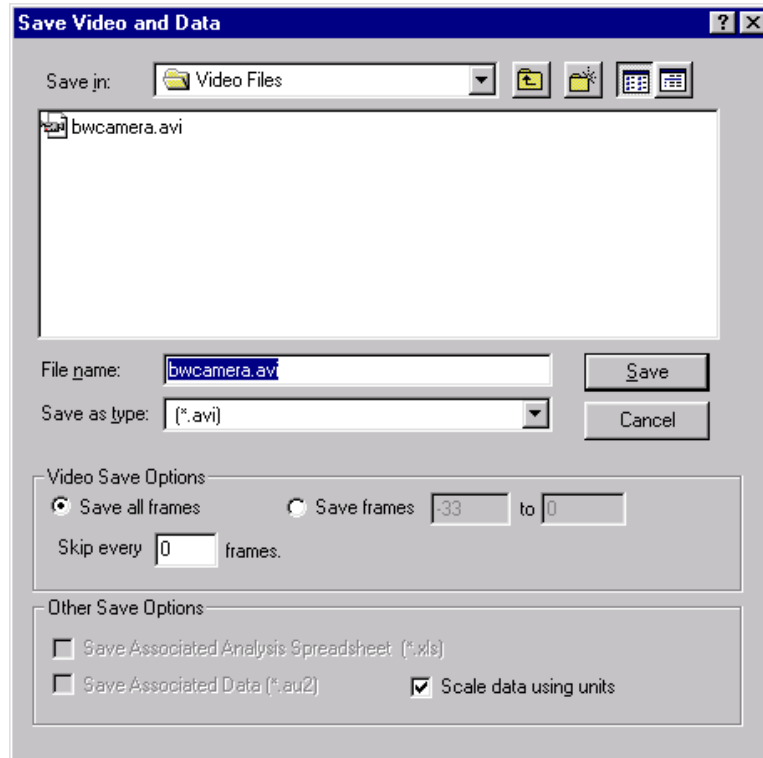
The user must configure the save using the following information:

|	
File Name	The Microsoft Windows compatible file name and associated folder location on the hard drive or network.
File Type	Select the desired file type from the drag down list.
Save all Frames	Save all Frames from the current video clip. Note that typical high-speed monochrome video images require approximately 45 MB/second of recording time, while color images require approximately 135 MB/second of recording time.
Save Frames M to N	Save a range of the frames, designated by frame numbers. A shortcut to creating M and N is to use the playback slide bar located on both the Play tab and the Play shortcut bar under

	each video display window. By sliding the bar from one location to another, a blue bar appears on the Play tab. The blue bar defines the range of saving.
Skip every N frames	Skips frames during saving – this is a valuable way to save hard drive space. A value of 1 skips every other frame.
Save Associated Spreadsheet Analysis	Saves the associated spreadsheet as *Filename.XLS*. To save an associated Spreadsheet with the video, select the **SAVE ASSOCIATED SPREADSHEET** checkbox on the bottom of the Save As screen prior to saving.
Save Associated Data	Saves the associated data as Filename.AU2. To save associated data with the video, select the **SAVE ASSOCIATED DATA** checkbox on the bottom of the Save As screen prior to saving.
Scale data using Units	When selected, data is saved in scaled units as entered in the configuration window. When not selected, data is saved in measured voltages.

3. <u>If an Excel Spreadsheet window is selected (active)</u>, the **SAVE SPREADSHEET AS...** options are visible under the FILE menu column. All spreadsheets are saved in their native Excel form as *Filename.XLS*.

Standard Windows AVI Codecs

If you have selected to save a video to an AVI file, MiDAS will present you with the Video Compression Dialog window. The various codecs listed in this dialog are provided by your operating system.

It is highly recommended that you save using the "Full Frames (Uncompressed)" option. The other common codecs are lossy. Using a lossy codec will result in degradation of your video data. MiDAS provides these alternatives for your convenience when storage space is limited.
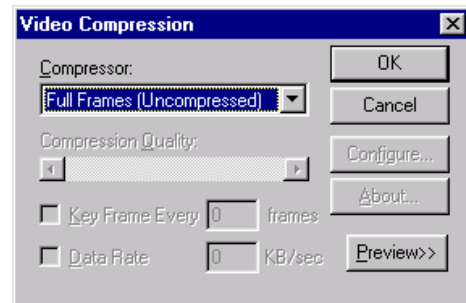
To use video compression:

1. Save your video sequence. The screen at right appears:

2.   Under the menu item labeled Compression, select one of the AVI codecs that is listed.

Note: The displayed list is derived from the codecs on your operating system.

3. Press **OK**.

Saving to a Sequence of Image Files

If you have selected to save a video as a sequence of image files, MiDAS will append an underscore and frame numbers to the file name entered. MiDAS will attempt to intelligently handle cases when you have entered a file name which ends with a number or contains underscores and numbers. Prior to executing the final save, MiDAS will display a confirmation dialog containing the pattern of image file names which will be saved. Please check the resulting pattern to see if it matches your desired naming/numbering scheme.

It is also possible to over-writ e a sequence of image files. In the Save Dialog window, if you select an image file that is already a part of a sequence, MiDAS will prompt you asking if you wish to overwrite the existing sequence. If you select **OK**, MiDAS will delete the entire selected sequence of image files, and then save the new sequence of images.

WARNING: Use caution when over-writing a sequence of image files, ALL image files matching the pattern selected will be deleted. Pay close attention to the pattern displayed in the confirmation dialog when over-writing an existing sequence.

Loading and Importing Files

Using the **OPEN** command under the FILE menu brings up the following screen.

In this dialog window, you may type in the file name to load, or you can click on the specific AVI file.

For loading a sequence of image files, you can click on any image in the sequence and MiDAS will load
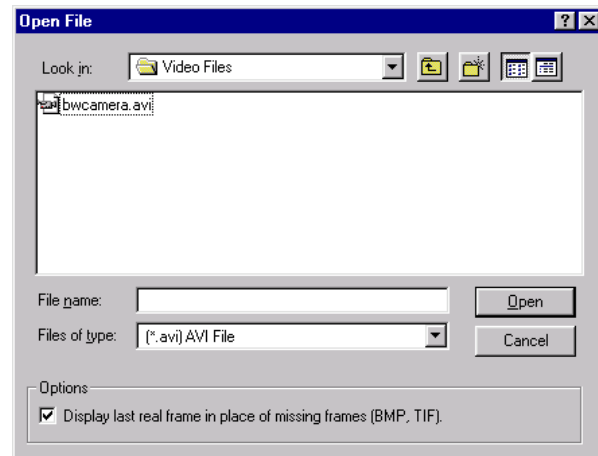
the complete sequence of image files that match the same pattern. For example, if you select *Image_009.BMP*, MiDAS will load all files that match the pattern *Image_*.BMP*, where "*" is replaced by a frame number only.

The option "Display last real frame…" determines how to handle missing frames in a sequence of image files. If this option is checked, whenever a missing frame (missing file in a sequence) is encountered, the last real frame is displayed instead. If this option is not selected, then missing frames will be ignored and skipped during playback. The default behavior for this option can be set within **SYSTEM CONFIGURATION**, under the **OPTIONS** menu item, as discussed in Chapter 6.

If video (in an AVI or an image sequence) and associated data were saved together, then they will share the same filename. For example, associated video and data files would be saved as *Filename.AVI* and *Filename.AU2* respectively. In the case of an image sequence, the data file would be saved using the image sequence prefix (the filename without the underscore or frame number). For example, when saving to a BMP sequence, the frames would be numbered *Image_*.BMP* and the data file would be saved as *Image.AU2*.

If the Auto Load Data when Loading Video option has been enabled in the **SYSTEM CONFIGURATION** window under the **OPTIONS** menu item, then MiDAS will search for a file of *Filename.AU2*. If one is found, it will be opened in a Data Playback window at the same time as the *Filename.AVI* file.

Data files can be opened in any text editor (e.g. Notepad, Wordpad, Microsoft Word, etc.). The AU2 file extension is associated automatically with Wordpad.

Playback Decoding and Saving

The Bayer decoding color coefficients can also be modified after you have completed a recording. You can access the Bayer Decoding Settings window from the main menu, under Image Processing – Bayer – Decoding Settings, or by right clicking on the playback window and selecting Bayer Decoding Settings. The Bayer Decoding Settings window appears and functions exactly like the Color Adjustments window.

When you save a recording from the playback view, you have the option to save the video as a color video or as a Bayer formatted file. If you save the video as color, the current color coefficients will be applied to do the conversion and the resulting output will be a true color file. If you save the video as a Bayer formatted file, then the raw Bayer frames will be stored to the file and an associated color coefficients file (.clr) will be stored to hold the color coefficients that are used for decoding.

There are two immediate benefits to storing as a Bayer formatted file. If you store in Bayer format, the resulting file will be three times smaller than if you stored as color. Also, if you store in Bayer format, you can modify the Bayer Decoding Settings at any time to adjust the color of the displayed video.
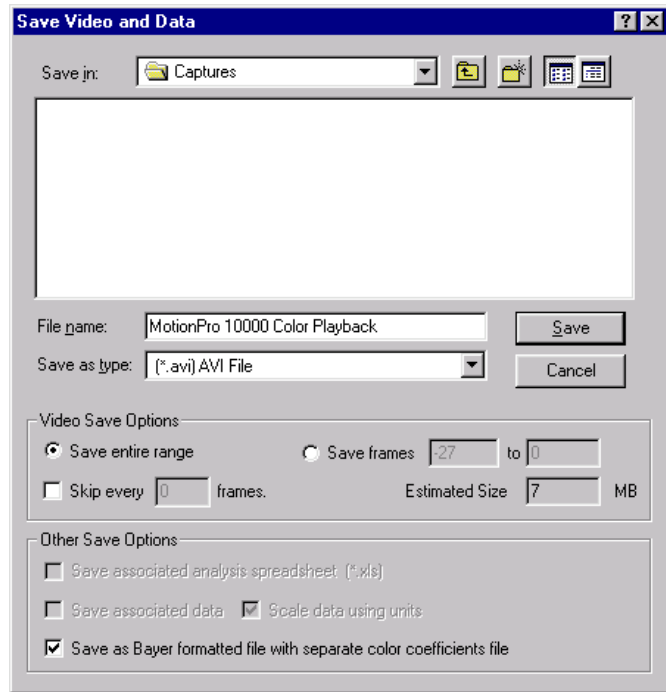
The MiDAS File Formats

With each MiDAS measurement you make and save, MiDAS creates numerous files on your hard drive. It is important to copy all the MiDAS files when archiving or moving the information. The files are as follows:

AVI	Standard Microsoft Windows Video format. MiDAS can save video into AVI file format.
BMP	Standard bitmap file format. MiDAS can save video as a series of sequential BMP images.
TIF	Standard tag image file format. MiDAS can save video as a series of sequential TIFF images.

JPG	Standard jpeg compressed file format. MiDAS can save video as a series of sequential JPG images.
CFG	MiDAS configuration file. Contains all the configuration information about your measurement so that when you open a measurement back up, MiDAS or the MiDAS Player knows the frame rate, shutter speed, etc. of the original recording
AU1	Reserved for MiDAS-LC data files
AU2	MiDAS data files. Tab-delimited text files that contain all the data from a measurement.
AU3	MiDAS binary file. See the next chapter for more details.
XLS	Standard Microsoft Excel file format MiDAS SA analysis is saved in this format.
CAM	MiDAS camera file for the Lens Calculator. This file contains the information about each camera (resolution, frame rates, etc.) for each camera. CAM files are editable in a text editor.
LUT	MiDAS image processing look-up table values. Contains settings for modifying an image using MiDAS image processing tools.
CLR	MiDAS color balancing file. Contains the Bayer decoding coefficients for color files, plus any color temperature settings and gray balance settings.

How to Decrypt Video and Data

When MiDAS has opened encrypted video and data files, the video display will appear as random noise. There are two menu locations to decrypt the video and data. From the **ENCRYPTION** menu item, select **DECRYPT CURRENT AVI**, or you can right-click in the video display, and then select **ENCRYPTION** and **DECRYPT CURRENT AVI** from the context menu that appears.
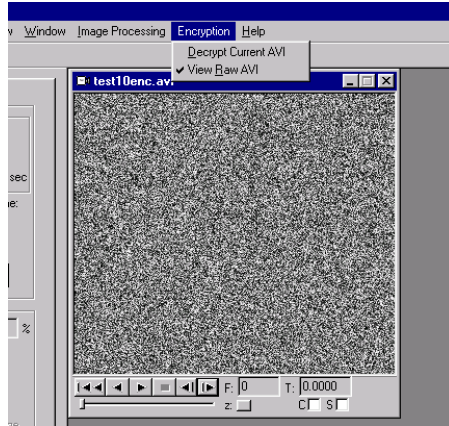
You will be prompted to enter the pass-phrase with the same dialog window that was used for encryption. Remember, pass-phrases are case-sensitive.

If you have entered an incorrect pass-phrase, the video will still appear as random noise. You must select **DECRYPT CURRENT AVI** and enter the correct pass-phrase.

Once the correct pass-phrase has been entered, the video display should show the decrypted video frames. The resulting decrypted video and data can be treated just like any other normal video and data. For example, you can run manual or auto-tracking analysis on the video frames, or you can save the files as decrypted versions. The original encrypted files on the hard drive remain encrypted. The decryption occurs on-the-fly in memory.

If you wish to verify that the original file remains encrypted or if you wish to keep the file open, but want to require the re-entry of the pass-phrase for viewing, you can select the **VIEW RAW AVI** option from the menu. Whenever this option is selected, the video that is being played is the raw data directly from the hard drive with no decryption processing.
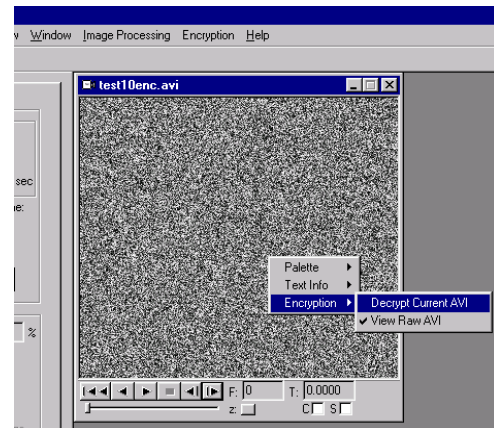
MiDAS uses the widely used DES algorithm for encryption. DES is an acronym for the U.S. Government's Data Encryption Standard. It is identical to the ANSI standard Data Encryption Algorithm (DEA). The DES algorithm users a 56-bit key and operates on 64-bit blocks of data. Inside MiDAS, video is encrypted on a frame-by-frame basis and data is encrypted on a per-file basis.

Configuration Settings

The MiDAS Tab Manager

The choice of which tabs to display in the Control Panel can be set using the Tab Manager.

The Tab Manager lists all the possible tabs that could be displayed. The "Play" tab is always displayed by default. The other tabs can be selectively displayed or hidden by clicking on the checkboxes on the right and then clicking on **APPLY**.

Each of the tabs may have different modes of operation. For instance, the Record tab can be set to record just Video, or it can record Video & Data.

Non-licensed tabs can be displayed, however, the features within those Tabs will not be active. This allows individuals to view the possible functionality within the various other tabs. The **DEFAULT** button will automatically set the display settings to the tabs that have been licensed.
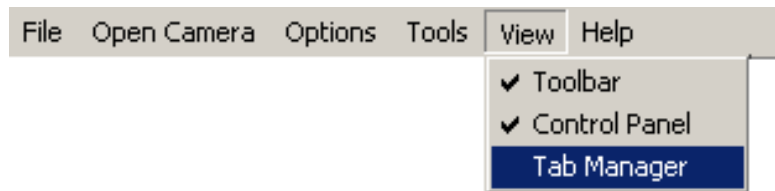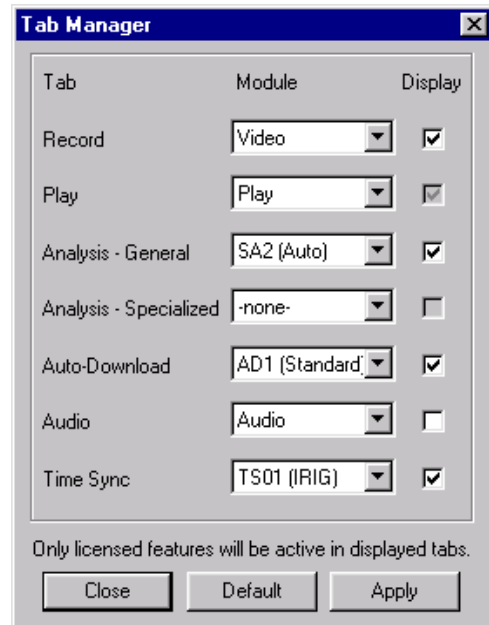
The Tab Manager can be displayed by selecting **VIEW** and then **TAB MANAGER** from the top menu bar.

The Control Panel is typically docked on the left or right side of the MiDAS window. It can also be undocked and repositioned anywhere on the screen. To undock the Control Panel, double-click near the top of the docked region of the Control Panel.

Configuration Options

The following are options are available with all MiDAS Base software. Standard input and output functions (**SAVE, LOAD, IMPORT, EXPORT**, etc.) are described in Chapter 10 "Saving and Loading". The **VIEW** option (toolbar) is self-explanatory.

Under the **OPTIONS** menu item, the **SYSTEM CONFIGURATION** window can be accessed. Within this window are various options for personalizing your version of MiDAS. The options are as follows:

Prompt before closing attachments	When enabled, this option instructs MiDAS to prompt the user before closing any window on the console (e.g. data window, video window, or spreadsheet window)
Prompt before overwriting existing files	When enabled, this option instructs MiDAS to warn the user that an overwrite is requested and to ask confirmation before proceeding.
Auto-load Data when loading Video	When enabled, this option instructs MiDAS to look for a data file that is associated with the requested video file. If such a data file is located, MiDAS opens both the video and data file. If no such file is found, MiDAS only opens the requested video file.
Prompt before overwriting camera images	When enabled, this option instructs MiDAS to prompt the user when an existing image in the camera is about to be lost. Typically, this message appears when the LIVE button is pressed after a playback.
Display last real frame in place of missing frames for image sequences	When playing a video comprised of a sequence of image files (BMP, TIF), if there is a missing frame in the sequence of images, MiDAS will by default skip the missing frame and continue the playback with the next available frame in the sequence. When this option is selected, MiDAS will display the last real frame in place of the missing frame, and in the upper left hand corner of the video, it will display "Missing" to indicate that this frame is a repeated frame.
Automatically update GPS information	When enabled, MiDAS automatically synchronizes video recording timing to the network of GPS satellites. See Chapter 15 for more information. When not selected, MiDAS uses the OS clock for time synchronization
Disable web hyperlinks from logos	When enabled, the MiDAS logo does not open the default system browser.
Automatically display timing text under video window	When enabled, the timing text is automatically displayed below each Playback window.
Automatically display trigger text under video window	When enabled, the trigger time is automatically displayed below each Playback window.

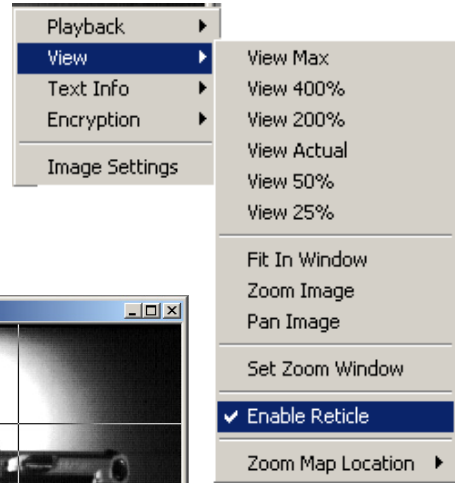|	
window	
Reduce flicker in live and playback views	When selected, this feature reduces the amount of flicker in the live and playback views, for a higher-quality image appearance. If not selected, screen flicker will be more prevalent, but the software will update the images faster.
Display color images in Bayer format by default	When selected, MiDAS displays color images in native monochrome Bayer pattern for faster operation.

The Reticle

When enabled, the Reticle function displays a crosshair reticle on the view window (all types). The location of the reticle, in pixels from the upper left corner of the image (0,0) is displayed in the furthest left box on the status bar.

To enable and disable the reticle function, right click within any view window, then select/unselect Enable Reticle. The position of the reticle, in pixels from the upper right corner of the window is displayed in the Status Bar.

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