STREAMPIX 5

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About StreamPix 5

StreamPix is a specialized application designed to provide real-time digital video recording to PC memory or hard disk. Providing the hardware is adequate, video may be streamed from a camera at full frame rate without dropping any frames.

StreamPix is designed to be as easy to use as possible. Although StreamPix is a sophisticated program designed for high-speed image acquisition, the user-interface consists of VCR-style controls, menus and dialog boxes that are easy to use and follow.

Main features

- Real-time digital video recording to PC memory or hard disk in Windows XP/Vista/7.

- Acquisition from a huge variety of IEEE 1394, Color RGB, NTSC, RS170, USB, CameraLink, GigE, high resolution and high frame rate cameras.

- Uncompressed images capture directly to RAM or hard disk drive(s).

- Compressed image capture using Windows based codecs or StreamPix compression utilities.

- Capture/Export to common file formats like BMP, JPEG, TIFF, PNG, AVI, MOV and more.

- Easy browsing of captured sequences with VCR-style controls: Record, Play/Pause, Rewind, and Fast-Forward buttons

- Visit NorPix web site for a list of all ongoing supported cameras and frame grabbers : www.NorPix.com.

IMPORTANT : Please note that some features or commands described in this manual are not present in the "Single Camera" version of StreamPix 5.

Minimum system requirements

The minimum system requirements to run StreamPix successfully depends on how you will use the program. Therefore, the following guidelines are recommendations only.

StreamPix has the following minimum system requirements:

- A PC equipped with Core2 duo 2.4Ghz or better
- 4GB of RAM or higher.
- A supported IEEE, digital or analog camera and compatible frame grabber board.
- Windows XP/Vista/7, 32 or 64 bit.
- Monitor supporting resolution 1024x768 or more.
- A graphic adapter with good 2D performances (PCI Express 16x or better recommended).
- 7200 rpm hard disk(s) for recording with eventually RAID-0 configuration.

For sequences stored on hard disk, StreamPix will always assume sufficient bandwidth availability. If you are unsure of the capabilities of your system, please contact NorPix technical support for advice.

For high speed cameras or multiple camera setups, please check with NorPix for complete computer configurations.

Installing StreamPix

Important:
Before installing StreamPix, it is strongly recommended to read the installation notes for your particular video capture hardware. When StreamPix is installed, several components need to be registered with the system. If a particular required "DLL" file is missing, the correspondent StreamPix driver(s) will not be registered. When attempting to load the hardware driver from within StreamPix, an error message:"The DLL of the desired hardware is not correctly registered," will be displayed. Careful following of the installation notes will minimize the occurrence of such errors.

When purchased on a CD-ROM, StreamPix installation is automatically started by inserting the disk into the drive. Otherwise, to install StreamPix from the CD-ROM or from a web file, please select s*treampix5-setup.exe* and follow the on-screen instructions.

Authorization codes

There are two versions of StreamPix 5 : Single Camera and Multi-Cameras. The Single Camera version doesn't support multiple workspaces and it is suited to applications that require a single camera. StreamPix5.exe (Multi-Cameras) and StreamPix5-single.exe (Single Camera) also require distinct authorization codes.

Finally, each grabber is individually protected and needs a specific authorization code to be loaded. To enable the use of frame grabbers and cameras, please obtain the corresponding authorization codes from NorPix by contacting NorPix sales. You will be sent an authorization file (.npx) including the authorizations codes will be written. You then can either double-click the .npx file to register it or do it through StreamPix. There are 4 protection methods available :

Machine Code

This is the favored authorization method to be used if the external USB key method is not suitable. The machine code is built from a number of system parameters and can be retrieved by using SysInfo.exe.

External USB Key

Using the USB key ensures that the recording process is independent from a specific system. StreamPix may be loaded on different computers and the license can be from a computer to another. In order for StreamPix to read the license on the USB Key, a third party software driver must be installed on the computer. It is also possible to setup a server which will manage authorizations for multiple client computers on an internal network. This software is included on the StreamPix installation CD and may be downloaded from NorPix.

MAC address

The authorization code for a MAC address protection will allow the system with a matching MAC address to run the specified drivers. As the MAC address is an unique identifier, specific to each ethernet network card..

HDD serial number

The last possible protection method uses the serial number of the system primary hard disk drive (the drive where Windows is installed). However, should a primary hard disk failure, reformat or replacement occur, a new authorization code will be required.

StreamPix 5 Basics

Ribbon Interface overview
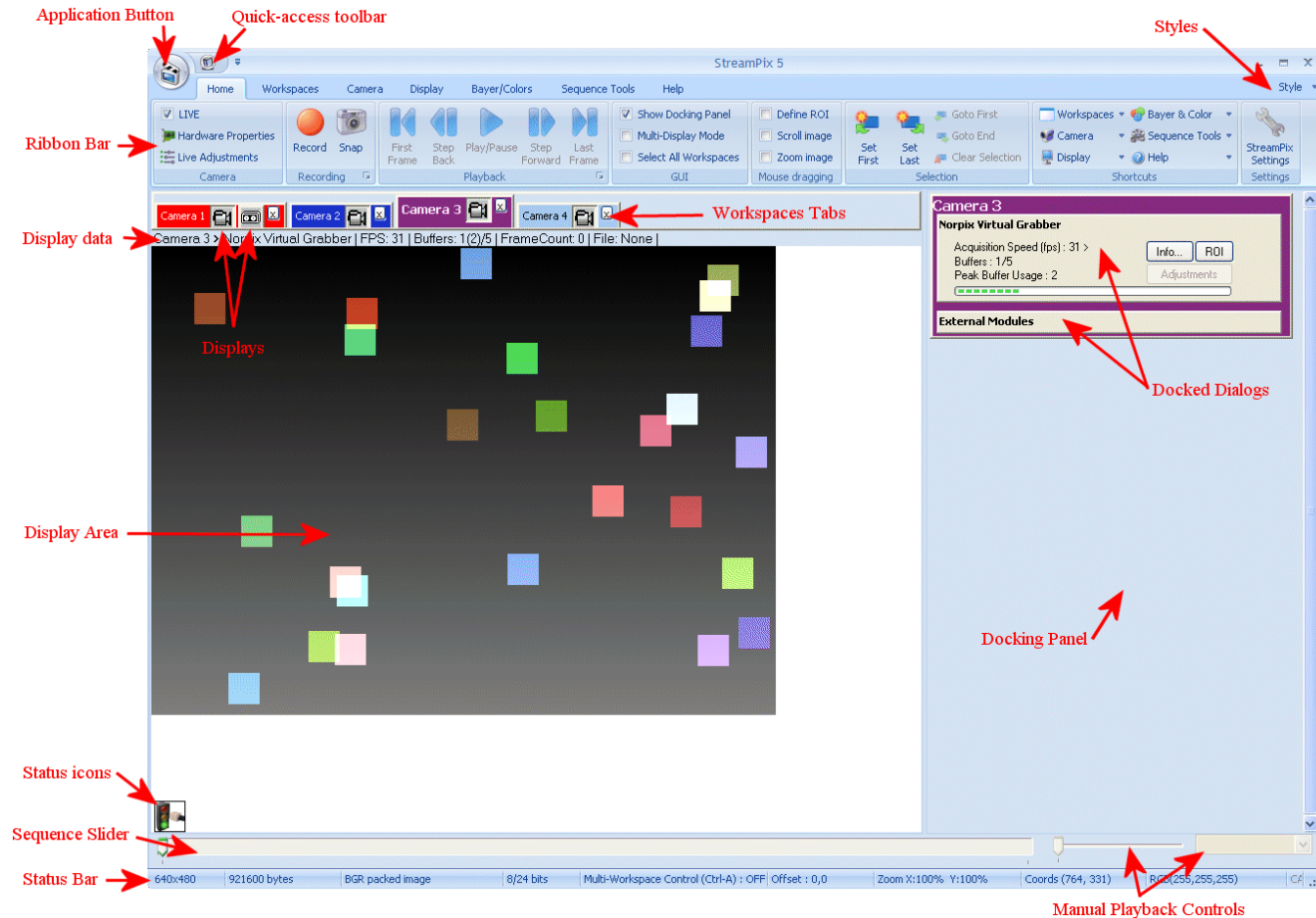
With StreamPix 5, the interface was migrated to the "ribbon" interface. Originally introduced with Microsoft Office 2007, ribbons are the modern way to help users find, understand and use commands efficiently and directly, with a minimum number of clicks, with less need to resort to trial-and-error, and without having to refer to Help.

Additionally, the Ribbon interface is 100% customizable, allowing the user to add/remove tabs and configure the content of each tabs. While it might take some time for users with a background using previous versions of StreamPix to adapt to the ribbon layout, we are confident that they will eventually like the improved ease-of-use. Now, let's go over some of the ribbon features.

First, ribbons support "styles", i.e. color schemes. StreamPix supports the four standard default schemes. You can change the current style using the [Style] button on the top-right corner of the StreamPix window.
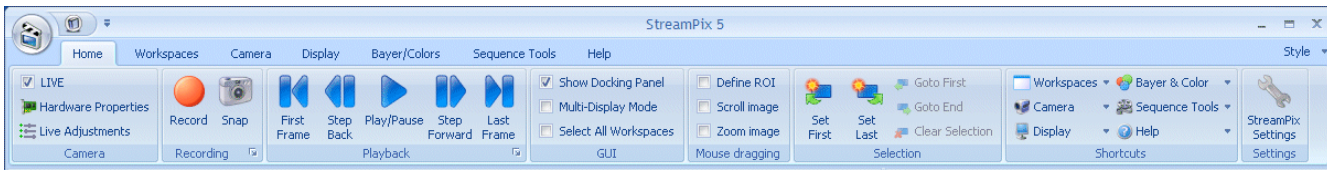
Next, applications using a ribbon interface don't have the standard menus row at the top of the window. Instead, all commands are layed out in a series of tabs. The "Home" tab shows the most frequently used commands. The rest of the commands are in the other tabs. Clicking on a tab will show it's commands. Furthermore, the ribbon bar can be minimized to save some space. To dock the ribbon bar, double-click on any one tab. While in this mode, clicking on a tab will show the available commands but as soon as the user click on one of the command, the ribbon bar will immediatly reminimize. Double-clicking on a tab again will restore the ribbon bar to its "always show" state.

The ribbon interface also has a round button, in the upper-left corner of the window, called the "application menu button". Clicking on it will display a standard menu. All commands related to file management are located in there. In the case of StreamPix, it means that every command related to the sequence files are here : creation, opening, saving, closing and exporting. The menu content will show different commands if multiple workspace are selected.

The content of the ribbon bar and the application menu can be fully customized from **StreamPix Settings > Interface**.
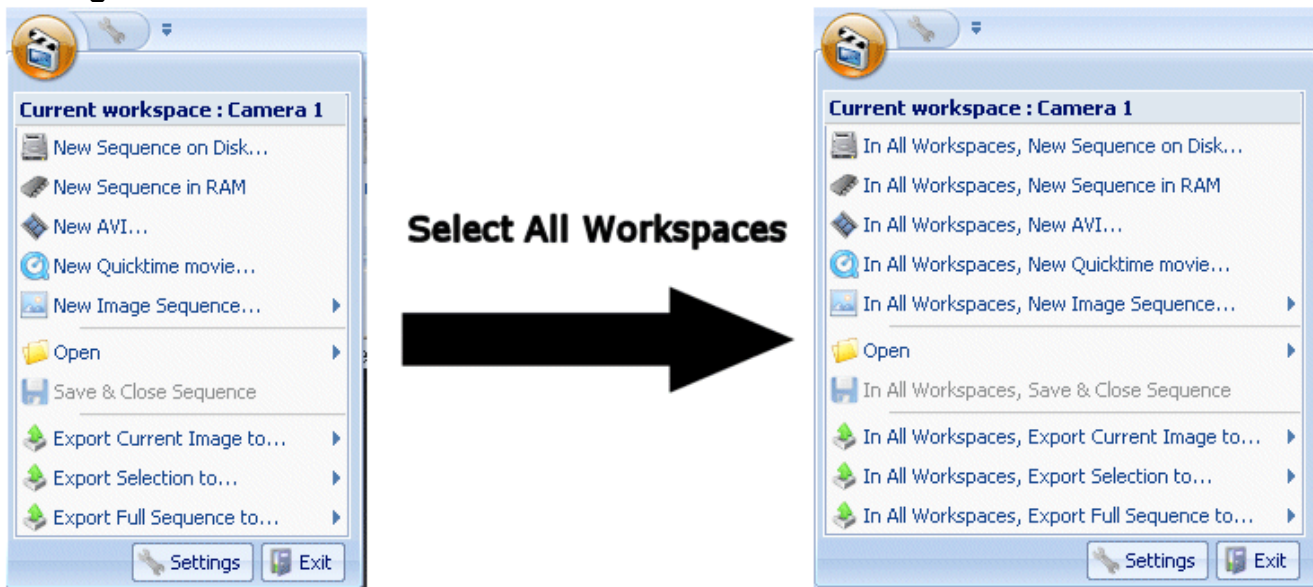
The ribbon interface also provide enhanced tooltips. Hovering the mouse cursor over a menu command (or any ribbon bar command) will show a tooltip with a short explanation about what the command does.
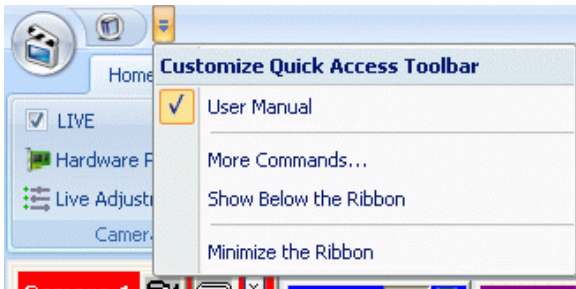
The ribbon interface also feature the Quick-access toolbar which is located in the title bar of the window. The toolbar can also be moved to appear just below the ribbon bar.

The Quick-access toolbar can be customized by the user to get a shortcut to any command available in either the application button menu or the ribbon bar.

Clicking "More commands..." in the Quick-Access toolbar menu will show this dialog. From here, the user can add any command to the toolbar. It is also possible to assign keyboard shortcuts to any command.
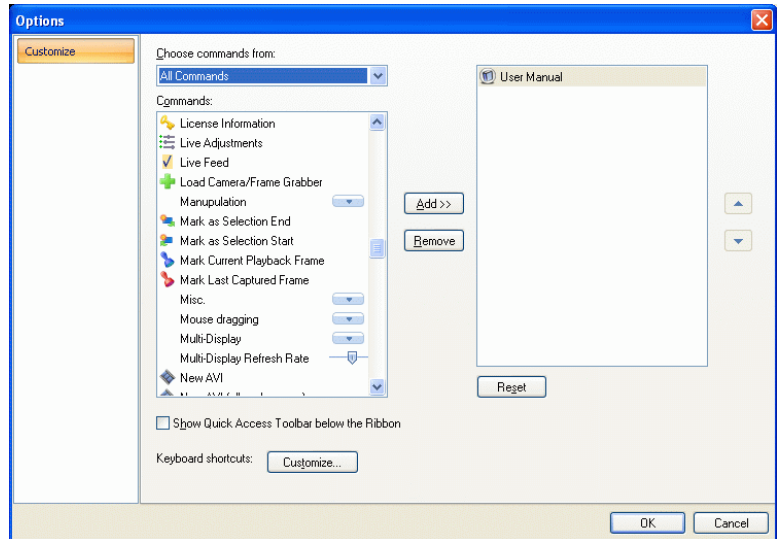
Faster !

One of the downside of the ribbon interface is that not all commands are accessible in a single click. Some scenarios might require the user to use a particular command that is not located in the "Home" tab, resulting in a lot of back-and-forth clicking between the tabs. Hopefully, StreamPix provides various ways to overcome this problem :

-Assign a keyboard shortcut to the command so it can be called from anywhere at anytime.

-Add the command to the Quick-Access toolbar. Items in this toolbar are always visible regardless of the currently selected tab. It might also be advisable to place the Quick-access toolbar under the ribbon bar for easier access.

-Customize the ribbon to add frequently used features to the "Home" tab.

Default list of Keyboard Shortcuts

(More can be added by the user)

Command	Keyboard shortcut
Toggle Bayer conversion on displayed frames	Ctrl-B
Bayer conversion Sample Factor 1:1	Ctrl-1
Bayer conversion Sample Factor 1:2	Ctrl-2
Bayer conversion Sample Factor 1:4	Ctrl-4
Bayer conversion Sample Factor 1:8	Ctrl-8
Close current workspace	Ctrl-F4
Toggle Display	Ctrl-D
Full-screen mode	F12
Go to Frame #	Ctrl-G
Select all workspaces	Ctrl-A
Toggle Multi-Display	Ctrl-M
Next Workspace	Ctrl-Tab
Toggle Recording	Ctrl-R
Snap a single frame	Ctrl-Space
Reset Zoom level	(numpad *)
Zoom in	(numpad +)
Zoom in (X axis only)	Ctrl - (numpad +)
Zoom in (Y axis only)	Alt - (numpad +)
Zoom out	(numpad -)
Zoom out (X axis only)	Ctrl - (numpad -)
Zoom out (Y axis only)	Alt - (numpad -)
Trigger Pre/Post event	Ctrl-P
Show/Hide docking panel	Alt-P
Show Window Task Manager	Ctrl-Alt-T
Help	F1

The Sequence slider

The sequence slider monitors the state of a sequence playback, its cursor indicating the image currently shown in the playback display. The cursor can be dragged to jump to any frames of the sequence. A red triangle appears under the slider to show where the next captured image will be stored in the sequence, which is normally at its end. The sequence slider is only used when working with sequence files (*.seq*) and AVI files (.avi). It has no use with quicktime movie (.mov) or images files (bmp, jpeg, etc.). The sequence slider can be placed at the top or bottom of the windows from **StreamPix Settings > Interface**.

The Manual playback controls

The manual playback controls allows review the current sequence/AVI at a fixed frame rate, without regard to the timestamps of each image. Moving the cursor to the right will gradually increase *forward* playback speed, moving it to the left will increase *backward* playback speed and leaving it in the middle will *pause* the playback. Speeds can also be selected from a drop-down list set in the **StreamPix Settings > Playback** page. Manual Playback controls must be enabled from the **StreamPix Settings > Playback** page to be shown.

Display Data

This status bar mostly shows information about the the current sequence : the frame rate of the *Live* feed, the buffer usage of the grabber. For the buffer usage, three values are shown : the current buffer usage, the peak buffer usage for the current session and the total number of buffers available. Which information to display and when to display it (live, playback or both) can be set from **StreamPix Settings > Displayed Data**.

The Workspace tabs

The picture in the ribbon interface overview shows 4 workspace tabs, each holding a button allowing to display the *Live.* If sequences are loaded, additional buttons will be shown there. Each workspace also has its own section in the docking panel. Right-click on a tab to rename the associated workspace.

Displays

Use the display buttons to switch from a display to another in the workspace. (ex : from Live feed to sequence file)

Display Area

The display area is the section of the window in which images are shown. The color of the display area can be adjust by using **Set Background Color** in the **Display** tab. If the used system barely meets the requirements for fast streaming, some CPU load can alleviated by using **Toggle Display** from the **Display** tab to turn off the display.

It is also possible to zoom the current display in or out by employing the zoom commads in the **Display** tab. The current zooming values appear in the image status bar. Zooming increases CPU load compared to normal image (1:1) rendering.

Status Icons

Those appear in the display area and provide various information :

The camera is streaming flawlessly.

The camera is dropping frames.

The camera streaming is stopped.

Recording.

Sequence view.

Playback.

This workspace has the focus. Interface's commands are applied on it.

Timeshift mode.

The watchdog (**Camera** tab) is enabled and its timeout value was reached.

Master workspace (used for synchronized browsing/playback).

Pre/Post Recording mode.

Waiting for I/O trigger.

Docking panel

The large window on right side of the StreamPix window is the Docking Panel. It holds the docked dialogs and can be resized by dragging its left border or hidden by unchecking **Show Docking Panel** in the **Home** tab.

Status bar

This status bar displays all relevant information about the image currently shown displayed in the display area. The parameters are, in order:

- Resolution, in pixels, shown as Width x Height
- Image size in bytes
- Image format (mono, color, bayer, etc)
- Bitdepth per channel / Total bitdepth
- Multi-Workspace control : ON if multiple Workspaces are controlled at the same time.
- Image offset in the display area (not the same as the offset on the camera CCD)
- Image zoom in X and Y. Used to zoom the image in and out.
- Pixel coordinates of the mouse cursor on the image.
- RGB color value of the pixel at mouse cursor position.

Using workspaces

Workspaces allow to load multiple cameras and sequences in a single instance of StreamPix.

For example, two workspaces could be created, named "Workspace A" and "Workspace B", each workspace having its own tab. Workspace A would control camera A and the resulting sequence file A, while Workspace B would control camera B and sequence file B. Changing active workspace would the be done by simply clicking on the appropriate tab.

To access Workspace management, click on the **Workspace Manager** button in the **Workspace** tab.
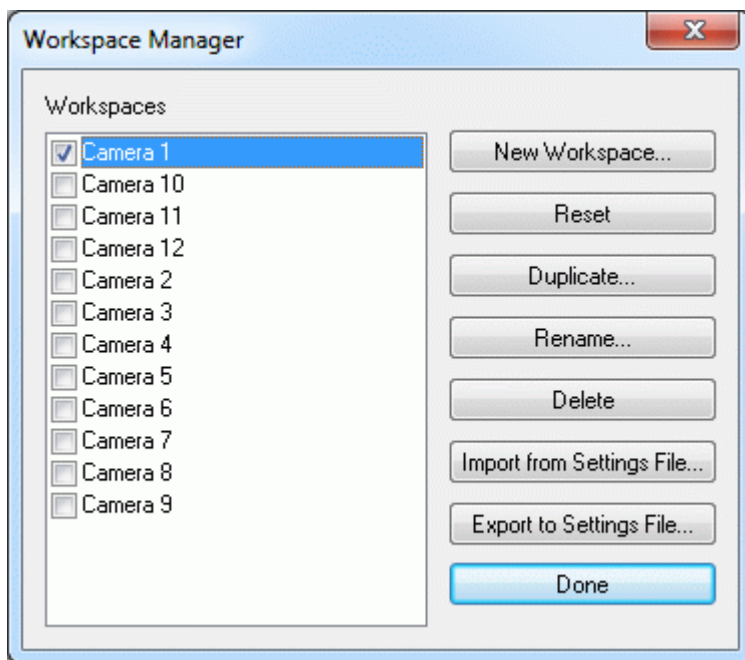
Having multiple workspace configuration can be useful, even when running a single camera. For instance, If a camera is used to grab images both in a room with normal light and in a dark room, the exposure time would need to be adjusted from one condition to another.

To avoid having to adjust exposure every time the camera is moved from one room to the other, workspaces can be used to save "presets". This can be done by first setting the grabber's for to normal lighting and naming its workspace "Normal", then setting it for the dark room and create a new workspace named "Dark".

An important thing to know is that grabber settings are saved *and* loaded in the workspace to which the grabber is connected. This way, when StreamPix is opened and "Dark" workspace is loaded, the camera settings will be reloaded according to the "Dark" presets.

Loading and controlling a camera

To get a live feed, StreamPix must first load a camera driver. When a new workspace is created, it will automatically ask the user to choose a grabber. The grabber used by an existing workspace can be selected by clicking on the **Load** button in the **Camera** tab. In either case, StreamPix will display this dialog asking the user select the camera or frame grabber.
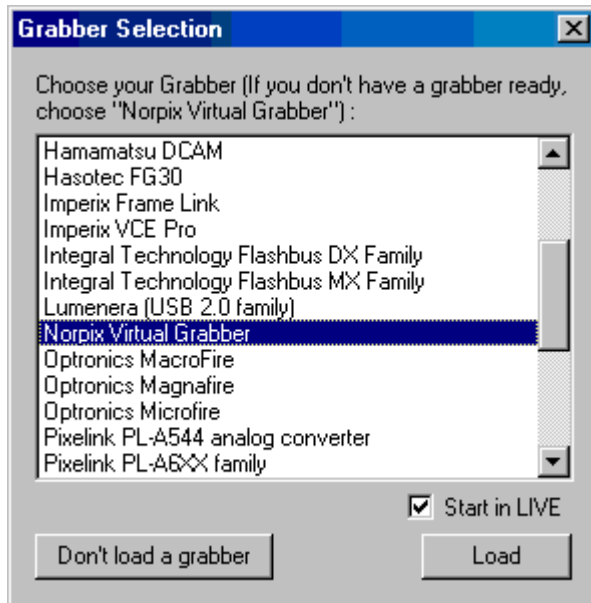
To select a camera in the list, highlight a camera or frame grabber driver from the list then click on the *Load* button. Even if no other drivers are found, the *Norpix Virtual Grabbe*r will always be always available.

StreamPix will check for the the appropriate codes authorizing the use of the selected grabber and will attempt to load it. If successful, the workspace tab of the current workspace will show a new display (a small camera icon), the *Live* feed from the camera. Note that, loading a grabber can fail if it is not connected or currently used by another application. The grabber can be unloaded by clicking on **Unload** in the **Camera** tab..

To prevent grabber from starting in *Live mode,* the *Start Live box* can be unchecked in the *Load Grabber* dialog box. This can particularly useful with frame grabbers as they often attempt to load a default configuration file and, since it is often incompatible with the camera , the driver could produce an error and might even crash StreamPix. Disabling Live startup allows to access the hardware properties and select the appropriate configuration files *before* launching the camera streaming.

Once loaded, the grabber will automatically start capturing images (except if the camera is in a triggered mode or if *Scroll Lock* is enabled). To toggle the *Live* feed on or off, use the **LIVE** checkbox in the **Home** tab (it might be useful to free some CPU load for other processes).

StreamPix was built to support a wide variety of grabbers and, as many grabbers have special properties and settings that are unique to them, it easily allows to adjust the settings of the loaded grabber by accessing them using the **Hardware Properties** or **Live Adjustments** buttons from the **Home** or **Camera** tabs.

Selecting destination file(s)

Before starting a recording, the destination where the captured images will be stored needs to be specified. StreamPix offer several possible destinations : sequence files (on disk or in RAM), image files (bmp, tiff, jpeg, etc) and movie files (avi & quicktime).

Sequence Files are files with the ".*seq*" extension, a NorPix proprietary format. This is the native format of StreamPix and the preferred format. The number of images it can hold is only limited by available disk space.

Sequence files have several advantages :

- The images are stored in their raw format, exactly as they were received from the camera, incurring no quality loss.
- Sequences can be used for playback in StreamPix.
- StreamPix can export image(s) from an existing sequence to any other format (image files or AVI)
- Each images is timestamped with the precise time at which they were captured. This allows accurate playback for sequences captured at variable speeds.
- Sequence files can be post-processed with various image processing functions (ex : applying a bayer conversion) and exported to any other format.

To create a sequence file to disk, simply use **Application Button > New Sequence on Disk** and choose a name for the sequence and the location to save it. To create a sequence file in RAM, select **Application Button > New Sequence in RAM**. RAM sequence are limited in size to the amount of system memory currently available so, when the sequences run out of memory, the recording automatically stops.

To create an AVI file, use **Application Button > New AVI** and select the desired codec from the *Save As* file dialog. To create an Quicktime file (StreamPix 32-bit versions only), use **Application Button > New Quicktime movie** and select the desired codec from the *Save As* file dialog. Finally, to capture directly to image files, select the desired format in the **Application Button > New Image Sequence** sub menu.

Close the destination file with the **Application Button > Save & Close** command when is no longer needed.

A previously captured sequence can be re-opened trough the **Application Button > Open Sequence** menu. You can also open a sequence by dragging a sequence file in the display area of the currently selected workspace. Another option is to drop the file on one of the workspaces tab to open the sequence file in the corresponding display. Finally, you can drop the sequence file in an empty space in the workspace bar to open the sequence in a temporary workspace.

To open one or more sequence files in temporary workspaces, use the **Application Button > Open Sequence(s) in temporary workspaces**.

Supported formats

Image Format	Advantages	Disadvantages
Norpix Sequence File (.*seq*)	The best format to stream to disk without losing any frames at high frame rates. Uncompressed, so no image quality loss. This format can only be read in StreamPix. NorPix Sequence File images can be exported to any supported format.	The .*seq* image format is not supported by anything but StreamPix.
Windows Bitmap (.bmp)	Uncompressed, so no image quality loss. Format is supported by a vast majority of image processing applications.	Raw images result in large file sizes. Supports 8 bit mono and 24 bit color images only, resulting in a loss of information for images using higher bit depth.
Tagged Image File (.tif)	Uses a lossless compression algorithm resulting in relatively smaller file size no loss of information. Supports mono and color images at any bit depth.	Compression algorithm is CPU intensive resulting in longer export times than with the Bitmap format.
Multipaged Tagged Image File (.tif)	Same as the non-multipaged tiff. Allows a full sequence of images to be stored in a single file.	Same as the non-multipaged tiff. Support for multipaged .tiff is scarce outside specialized applications.
Joint Photographic Experts Group (.jpg)	Good image compression. One of the most widespread formats on the Internet, meaning that almost anybody can view a .*jpg* image.	Supports 8 bit mono and 24 bit color images only, resulting in a loss of information for images using higher bit depth. The compression will result in image precision loss.
Flexible Image Transport System (.fits)	Uncompressed, so no image quality loss. Supports both mono and color images at any bit depth. A .*fits* file is composed of 2 segments: a header, which containing image format information and a table holding the image data. More about *fits* file format.	Color image are divided into 3 individual data files: red, green and blue. The color plan is appended to the file name.
Multipaged Flexible Image Transport System(.fits)	Same as the non-multipaged .*fits*. A full sequence of images is stored as a single file. The file contains multiple headers and data tables, one per exported image.	Same remarks as for non-multipaged fits.
Portable Network Graphics (.png)	Similar to .gif format. Excellent compression without any loss of quality.	Compression algorithm is CPU intensive resulting in longer export times than with any other format. Supports 8 bit mono and 24 bit color images only, resulting in

		a loss of information for images using higher bit depth.
Movie Clip (.avi)	Wide range of codec available according to the specific needs.	Some trial and error needed to find the right codec for a specific use. The relevant codec needs to be installed on all systems that will be used for playback. (Except for the uncompressed AVI which come bundled with Windows). The supported image format varies from one codec to another.
Quicktime Movie (.mov)	Requires Quicktime Player to be installed on the computer. Various codecs available. Only works on Windows 32-bit.	Some codecs might not be supported under Windows. Some codecs might not work or offer reduced functionnalities without a 3rd party license.

Starting/stopping a recording

Once the your grabber is loaded and the destination file is selected, recording can start. To start recording click on the **Record** button in the **Home** tab. To halt or resume a recording, press the **Record** button again.

While a sequence file is recording, frames are saved at the *Recording position*, shown by a red triangle under the sequence slider. The default recording position is after the last image of the sequence. To change the recording position, move the sequence slider to the desired position and click on **Set Recording Position** from the **Sequence** tab.

Note that the sequence slider will not be available if the destination file is an MOV or image file and that captured frames in these format will always be appended at the end of the destination. As StreamPix does not support viewing of MOV or image files, an external video or image viewer should be used.

Instead of recording all frames, single-frame snapshots of the live feed can be taken by using the **Snap One Frame** button in the **Home** tab.

Playback of a sequence

To review the captured sequence, enter the playback mode by either clicking on the display button representing a video tape icon in the workspace tab. You can go back and forth between live and playback displays by clicking the respective display buttons on the tabs..

Browsing the sequence can be done by moving the sequence slider. The sequence can also be reviewed at a fixed frame rate by using the manual playback controls. The following playback commands are available from the **Home** tab : **Play/Pause** (which will playback following the time stamps), **Step Back**, **Step Forward**, **First Frame** and **Last Frame**.

Controlling multiple cameras
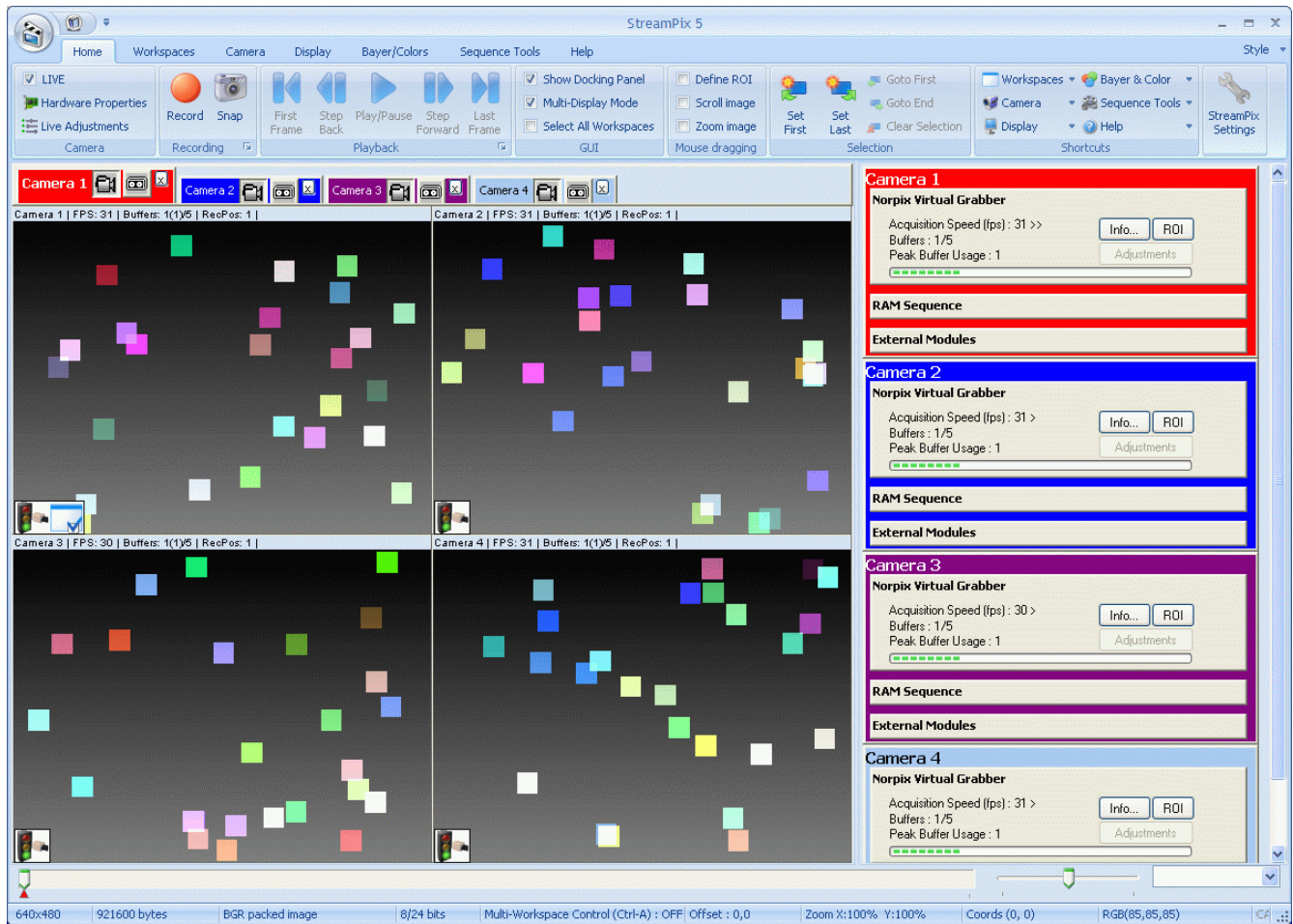
(Not available in the Single-Camera version)
To control multiple cameras at once, a new workspace needs to be created for each one (see Using Workspaces). Once your grabbers are loaded, multiple feed can be displayed simultaneously by using the Multi-Display capabilities of StreamPix. Multi-Display mode can be toggled from a checkbox in the **Home** tab or with the Ctrl-M keyboard shortcut.

It is possible to see both the *Live* and the sequence at the same time by right-clicking in an area and selecting the required display from the list. When using multiple grabbers, it is recommended to choose "*Display* [*workspace name*]" from the list. This will show a the current workspace display, selected in the workspace tab. The commands selected in the ribbons will apply to the currently selected workspace. Displays belonging to the currently selected workspace show a small overlay (a windows with a checkmark) in their display area.

Note that two areas can not show the same display at the same.

Bayer conversion, color correction and grading

Bayer conversion is the process by which raw images from a Bayer camera are color-converted using a Bayer interpolation algorithm. Some cameras equipped with a Bayer filter will perform the color interpolation process before images are sent to output. However, most cameras do not do this, leaving interpolation to applications like StreamPix.

A **Bayer filter** mosaic is a color filter array for arranging RGB color filters on a square grid of photo sensors. The term derives from the name of its inventor, **Dr. Bryce E. Bayer** of Eastman Kodak, and refers to a particular arrangement of color filters used in most single-chip digital image sensors used in digital cameras, camcorders, and scanners to create a color image. The filter pattern is 50% green, 25% red and 25% blue, and hence is also called BGGR, GBRG, GRBG or RGGB depending on the color of the first pixel in a 2x2-pixel square.
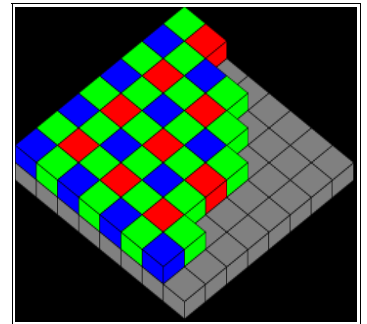
Bryce Bayer's patent called the green photo sensors *luminance-sensitive elements* and the red and blue ones *chrominance-sensitive elements*. He used twice as many green elements as red or blue to mimic the human eye's greater resolving power with green light.
The raw output of Bayer-filter cameras is referred to as a *Bayer pattern* image. Since each pixel is filtered to record only one of three colors, two-thirds of the color data is missing from each. To obtain a full-color image, various demosaicing algorithms can be used to interpolate a set of complete red, green, and blue values for each pixel. Different algorithms requiring various amounts of computing power result in final images of varying quality.

StreamPix includes Bayer conversion functionality as well as strong color balancing and grading. Color balance can independently be applied to any supported image format, i.e. raw images, color YUV or RGB. Changes to the color balance, saturation and contrast, plus specific adjustments to shadows and highlights can all be performed using those various tools.

Since a raw image contains all of the color information, StreamPix typically records images from such cameras as raw data. Bayer conversion and color grading is performed only when needed, namely when an image is being displayed, exported to an AVI movie or exported to an individual image file. This has two advantages: raw image size is 3 times smaller than color images, and CPU resources are conserved (Bayer rendering and color grading are quite computation-intensive).

For details about Bayer rendering, color correction or grading, please refer to the StreamPix settings > **Bayer/Color**(67) section.

HOW TO...

How to configure the output files formats ?

For sequence files, the compression settings and more can be configured from **StreamPix Settings > Sequence**. The AVI file settings (codec, audio, etc) are accessible from **StreamPix Settings > AVI**. Quicktime files are configurable from **StreamPix Settings > MOV**. Finally, image files (bmp, jpg, tif, etc) have a few settings that can be found in **StreamPix Settings > More... > Images**.

How to simplify the precedure to start a recording ?

First, you can enable the autonaming scheme for new files from **StreamPix Settings > Auto Naming**. When enabled, StreamPix won't show a prompt to chose a name for the destination file when doing a **New Sequence On Disk** , **New AVI On Disk** (etc). The naming scheme is fully configurable. Next, you could go in **StreamPix Settings > Recording,** select an auto-created file (such as a "sequence file on disk") and enable the auto creation of the file when the record button is pressed. With all the previous options enable, you only have to do a single click on the record button to automatically create the file and start recording.

How to record in a loop ?

Recording in a loop is possible only if the destination is an uncompressed sequence file. To record in a loop, go In **StreamPix Settings > Recording > Limits** and set the sequence limit to the number of frames to be captured in each loop. Then enable the option to loop when the limit is reached (else the recording will simply stop when the given number of frames is reached).

Ribbon Reference

The Application Menu
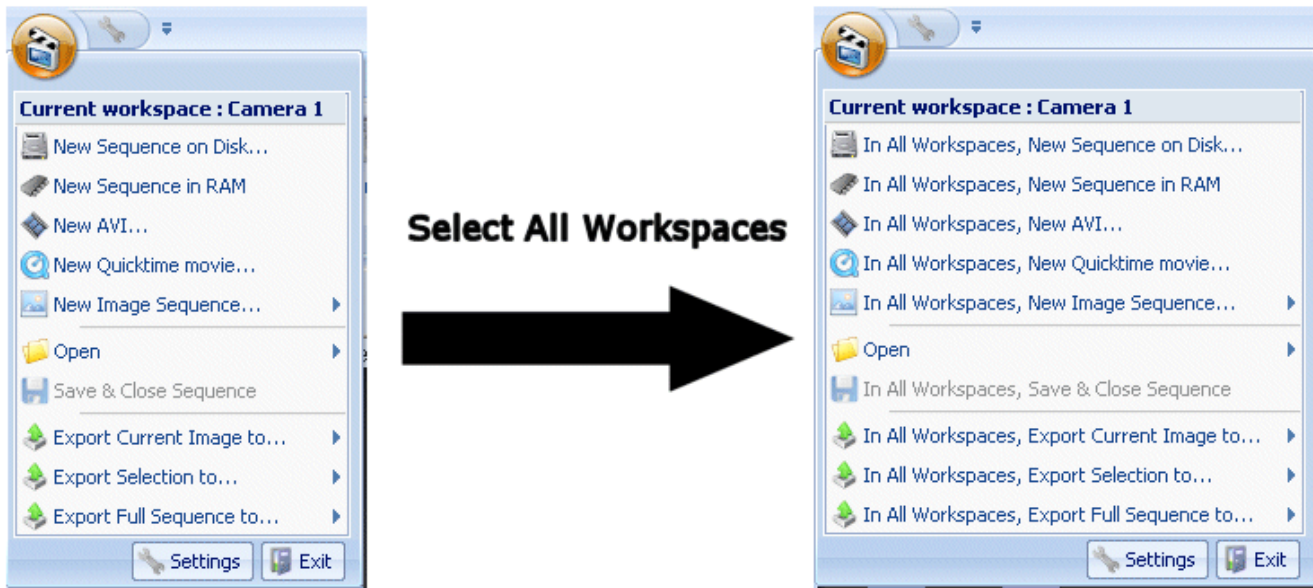
New Sequence on Disk

This creates a new sequence on disk. By default, the sequences on disk are not compressed and the frames are saved directly as they are received from the camera. This, may require special configurations for high frame rates or simultaneous use of multiple cameras (RAID, etc).

New Sequence in RAM

This creates a new sequence in RAM. Useful for short sequences with fast frame rates, as it allows for an higher transfer rate than a sequence on disk.

New AVI

Creates an empty AVI that will be used to capture images. Once the AVI is closed, the generated AVI file can be played back using MediaPlayer or any compatible AVI player. You can also playback the recorded AVI directly in StreamPix (See Open AVI)

New Quicktime movie

Creates an empty MOV that will be used to capture images. Once the MOV is closed, the generated MOV file can be played using the Quicktime player. This is only available on Windows 32-bit.

New Image Sequence

Enables capture to an image sequence. Supported formats are : Windows Bitmap (BMP), Joint Photographic Expert Group (JPG), Tagged Image File Format (TIF), Portable Network Graphic (PNG), Flexible Image Transport System (fit), Lossless JPEG2000 (jp2).

Open Sequence

This option will close any currently active sequence and open a previously saved sequence file. In the "Open" file dialog, there is also an option to load the sequence in RAM for faster playback/browsing. Note that if there is not enough RAM available, the sequence will only be partially loaded. Changes made to a sequence loaded in RAM aren't mirrored on the source sequence on disk.

Reopen Last Sequence

This will reload the last sequence used by the current workspace.

Open Sequence(s) in temporary workspaces

This option allows you to open multiple sequence files at once. Each sequence will be loaded in a temporary workspace.

Open AVI

This option will open an existing AVI file in playback mode.   Recording can't be done in a AVI in playback mode. AVI files that were not created by StreamPix might or might not play. Clicking **Play** after an AVI has been recorded will save & close the AVI, then will reopen it for playback.

Save & Close

This closes the active sequence, movie or image sequence. RAM sequences are discarded when closed. As such, saving a RAM sequence is done by exporting it to a file on disk prior to closing it. There is also an option in **StreamPix Settings > Sequence** to prompt to save a RAM sequence upon closing it.

Export

While the *.seq* file format is very convenient within the StreamPix application, it is not widely supported by 3rd party software, and often needs to be converted to a more common format.

Once the sequence is loaded, it can be exported to AVI movies, separate *.tif* images or any other standard file format. See the section Choosing an export format for more detailed information.

Note that sequence files and AVI files are the only exportable formats.

The File formats available for export are as follows:

     -Sequence file format (.seq)
     -Movie Clip (.avi)
     -Quicktime Movie (.mov)
     -BMP format (.bmp)
     -JPEG format (.jpg)
     -TIFF format (.tif)
     -PNG format (.png)
     -Flexible Image Transport System (fit)
     -Lossless JPEG2000 (jp2)
     -Digital Negative format(dng)
     -Windows Media Photo (wdp)

Current Image

Exports the image aligned with the sequence cursor .

Current Selection

Exports all images in the current selection. All images will be based on the filename typed in the "Save As..." dialog box. named

Full Sequence

Exports all images of the sequence. All images will be named based on the filename typed in the "Save As..." dialog box.

In All Workspaces, ...

(Not available in the Single-Camera version) Same as the default action but applied to all workspaces.

Sequence History
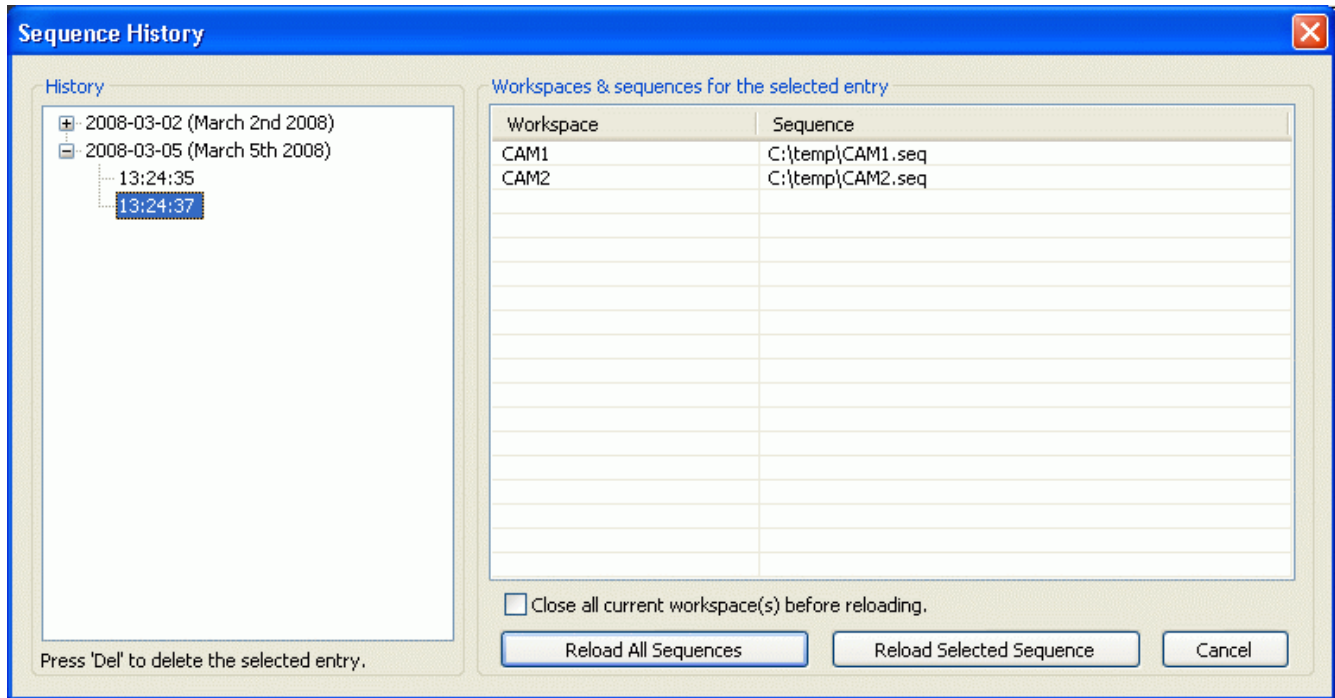
Allows you to reload previous recording sessions. The sessions are sorted by dates and hours. Select the desired hour and the workspaces/sequences that were loaded at that time will be shown. From there, you can either reload all those sequences or a specific one using the corresponding button. If the sequence can't be found because it was moved or deleted, an error message will be shown. It is also recommended to delete older or obsolete entries from the history from time to time (to reduce loading times).

Settings

Show the **StreamPix Settings** dialog.

Exit

Close StreamPix.

The Home tab

LIVE

Toggles camera streaming *on/off*. Turn streaming off to stop receiving frames from the camera.

Hardware Properties

See the Camera tab.

Live Adjustments

See the Camera tab.

Record

Clicking once on **Record** will start saving frames coming from the grabber to the destination file (sequence, AVI, images, etc), while clicking a second time on it will stop recording. If the destination is a sequence file, the recording will start at the *Recording Position*, usually located at the end of the sequence, unless modified with the **Set Recording Position** command.

Snap

Same as **Record**, except that the recording will automatically stop after 1 frame has been captured.

First Frame

Moves to the first frame of the sequence.

Step Back

Moves to the frame immediately before the current frame.

Play/Pause

Starts/stops the playback of the sequence, following the time stamp of every image. For instance, if there is a 5 second interval between two frames time stamps, the playback mechanism will actually wait 5 seconds before showing the next frame. This can be inconvenient for triggered captures or

appended sequences, as two consecutive frames may be separated by a long time interval. In such a case, use the *Step One Frame Forward* to bypass the "time step", or use the manual playback controls to playback at a fixed speed regardless of time stamps.

Reading frames from the sequence file consumes as much bandwidth as recording them. As such, avoiding doing playback while recording is strongly advised if there are any doubts about the system's performance.

Step Forward

Moves to the frame immediately following the current frame.

Last Frame

Moves to the last frame of the sequence.

Show Docking Panel

Show or hide the docking panel in which the docked dialogs appear.

Multi-Display mode

(Not available in the Single-Camera version) Toggles the Multi-Display on/off. Multi-display allows to see multiple workspaces simultaneously. It also allows to display both live feed and a sequence playback at the same time. The current multi-display layout can be customized from the button's drop-down menu or from the **Display** tab.

Select All Workspaces

(Not available in the Single-Camera version) Enabling **Select All Workspaces**, or pressing *Ctrl-A*, will highlights the workspace tabs in white and will automatically apply the commands in the Application Button menu and all playback/recording commands to all workspaces, unless specified otherwise in the Advanced Workspace Control (Workspace tab).

Mouse Dragging

Allows to modify settings such as the image ROI, the zoom factor or scroll the image by using the mouse.

Left and right mouse button functions for each mode are described in the table below:

Normal	N/A	N/A
Define ROI	*Dragging toward the bottom-right corner defines a ROI. *Dragging toward the top-left corner of the image will reset the camera to its maximum possible ROI. *Dragging toward the bottom-left or the top-right will abort the current ROI selection.	N/A
Scroll & Zoom	*Drag to scroll the image in the window. *Use the mouse wheel to zoom in/out in 5% increment.	Click to reset the image position to it's original size and position.

You can also use the QuickZoom feature by holding the "Ctrl" key while using the mouse. The QuickZoom feature is described in the "StreamPix Settings > Interface" section.

Selection

Selections are used to select the section of a sequence that is to be exported when the "Export > Current Selection" command is used. All selection buttons are made available when a sequence is loaded in the active workspace.

- **Set First** : The current image will be marked as the *selection start* and will also indicate the first image to be exported when using **Export > Current Sequence.**
- **Set Last** : The current image will be marked as the *selection end* and will also indicate the last image to be exported when using **Export > Current Sequence.**
- **Goto first** : This moves the sequence cursor to the *selection start*.
- **Goto last** : This moves the sequence cursor to the *selection end*.
- **Clear Selection** : This clear the selection.

Streaming Settings

Displays the StreamPix Settings dialog. Review the StreamPix Settings section for the details.

The Workspace tab

Previous Workspace

(Not available in the Single-Camera version) Sets the previous workspace in the workspace list as current/active.

Next Workspace

(Not available in the Single-Camera version) Sets the next workspace in the workspace list as current/active.

Close Current Workspace

(Not available in the Single-Camera version) Closes the current workspace. This can also be achieved by clicking on the [X] button in the workspace tab.

Working Folder

(Not available in the Single-Camera version) Changes the default folder used by the current workspace. This folder will become the default folder used for saving files created by this workspace and can also be used for file auto-naming. (see **StreamPix Settings > Workspace(s)**).

Recording Manager

(Not available in the Single-Camera version) When using a record manager, It is possible to customize for each separate workspace what will be the recording manager in usage:
- Use the default manager
- Use a custom manager so that workspace behave individually
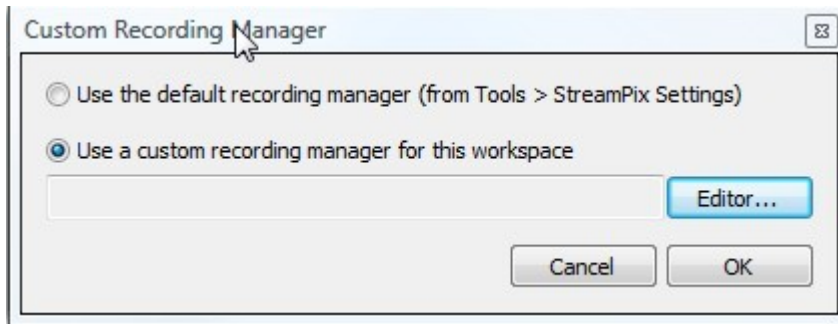
The default recording manager is defined in **StreamPix Settings > Recording Rate**.

Workspace Color

(Not available in the Single-Camera version) Sets the color associated with the currently selected workspace. The workspace tab and docked dialog will both be painted in the chosen color. This will facilitate working with them when multiple workspaces are loaded simultaneously. The tab's font color will either be white or black depending on the chosen color.

Workspace Settings

This allows the workspace to use different settings than those defined in the "StreamPix Settings" dialog.

Increment

Allows to see and edit the current value of the (increment) token used in some auto-naming schemes. If all workspaces are selected, the change is applied to every workspace.

Recording Rate

If the recording is done following a precise rate, this slider is used to set how many frames are skipped between each saved frames. For example, with a value of 2, 50% of the frames will be saved. So if the camera frame rate is 30 fps, using a value of 30 will save 1 frame every second. Go to "StreamPix Settings > Recording Rate" to enable this mode and configure the slider range.

Custom Token

Allows to set a custom value for the (customtoken) of the current workspace. See **StreamPix Settings > Auto Naming**. If blank, the workspace will use the default token. If all workspaces are selected, the change is applied to every workspace.

Edit Default Token

Edit the default (customtoken). Every workspace that doesn't use a custom token will use this value.

Master Workspace

(Not available in the Single-Camera version) Click on this to set the active workspace as the master. When all workspaces are selected (Ctrl-A) and a playback is started, every workspace will synchronize their playback with the master workspace. Synchronisation cab be done either on frame index or on time stamp (see StreamPix Settings > Playback). If no master is defined, playback is done independently in every workspace. You can also double click on a workspace's tab to quickly set/unset the master status.

Customize Workspace Control
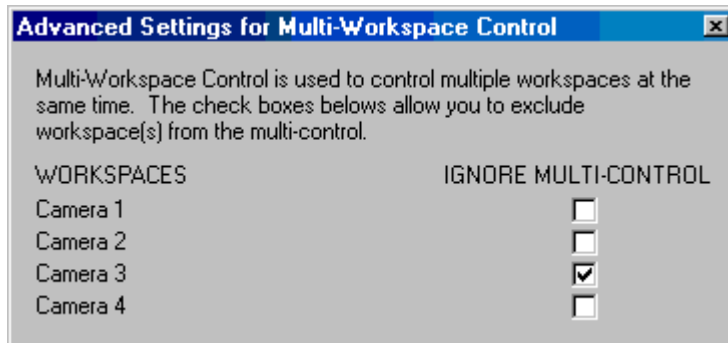
(Not available in the Single-Camera version) This is specific to the **Select All Workspaces** mode and is used to control multiple workspaces at the same time. Commands like those associated to *playback* and *recording* will be *broadcast* while *Hardware properties & Live adjustments* will not. The check box allows to exclude specific workspaces from the multi-control broadcast. For instance, the image to the left indicates that workspace "Camera 3" will not receive broadcast actions and that, inversely, any action done while "Camera 3" is the active workspace will not be broadcast to other workspaces.

Workspace Manager
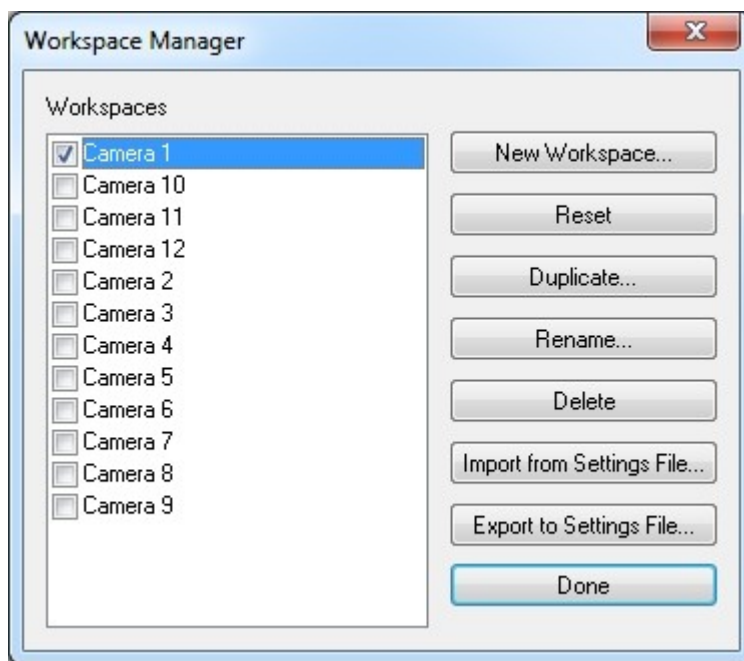
Select *New Workspace...* to create a new workspace. The name given will be used to create a section in the registry where the grabber settings will be saved, no two workspaces can have the same name. Moreover, a given grabber can not be loaded in more than one workspace at the same time.

Load and unload the workspaces by using the checkboxes.

The *Workspace Manager* also allows for a variety of actions. After selecting a workspace from the list, the user can select to: reset it to factory settings, make a duplicate of it, rename or delete it. Selecting **Close** from the **Workspace** ribbon will close the active workspace (this can also be done by clicking the [x] in the workspace tab).

Review the *Using Workspace* Section for an overview on how to use workspaces.

The Camera Tab
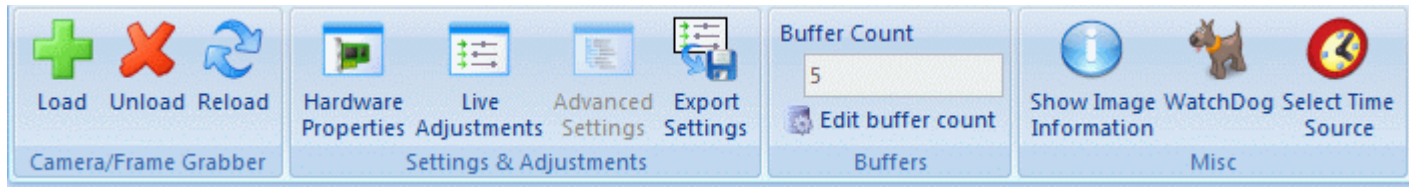
Load

A list of all supported grabbers is displayed here, allowing to select the one to be used. You also have the option to reload the camera with its default settings or load custom camera settings from a .xml file (created from "Export Settings").

Duplicate Camera Stream

(Not available in the Single-Camera version) This will show a dialog with every other workspace loaded. Select one of the workspace to get a copy of every frame captured by that workspace's camera. This can be useful if you want to save a stream to two different formats at the same time.

Unload

Unloads the current grabber (or duplicate), if any.

Reload

Reload the current grabber. Use this after changing the buffer count for a grabber. (Buffers are allocated when a grabber loads)

Hardware Properties

Settings shown in *Hardware Properties* require the grabber to stop streaming, as they can cause modifications in the image format, requiring buffer reallocation and other profound changes in StreamPix. For instance, modifying the ROI (region of interest) and capture bit depth (8 bits / 16 bits) hardware settings will change the image format. As such, accessing *Hardware Properties* while the grabber is in *Live* mode will automatically suspend *Live* to enable setting modifications.

Live Adjustments

Live Adjustments are grabber settings that can be changed while the camera is streaming, as they will not affect image format. For instance, exposure, gain and brightness are adjustable in *Live* mode, on most cameras. Accessing *Live Adjustments* while the grabber is not *Live* will automatically start the *Live* process. On most grabbers, every setting in *Live adjustment* will be also available in *Hardware*

Properties, although the opposite is not always true.

Advanced Settings

Advanced settings are available on some models of GigE cameras.

Export Settings

Export the current camera settings to an .xml file.

Buffer count

Changes the number of buffers allocated by the grabbers in this workspace. If 0 is used, the grabber will use the default value set in **Streampix Settings > Workspace(s)**.

Show Image Information

This will show complete information on the format of the frames received from the grabber.

Select Time Source

StreamPix image time stamping is typically performed when the image is received from the camera driver API. Because of that, it does not correspond to the exact time at which the camera sensor is exposed. The delay is typically equal to the sensor read out time plus the transfer time needed for all pixels to be received inside the computer memory plus the time the Windows Thread Scheduler will need to notify StreamPix that a new frame is ready. This total time is dependent on the capture media and some other parameters like the pixel clock. At worst, when the media bandwidth is used at its maximum, the time stamp can be off by up to 1/fps.

By default, each captured image is time stamp using the current computer time. However, Streampix supports also various other possible time sources. Provided you have purchase the External Time Source option, you can change from the default time source, to some other supported time source. You can also specify a time offset to be applied on the time stamp of each frame.

Watchdog

Here you can specify a timeout value in seconds. When the specified length of time elapses without a new frame being sent by the grabber, a yellow warning sign will be shown in the display area. For example, this can be useful if you want to get a visual notification when a camera has been disconnected.

The Display tab
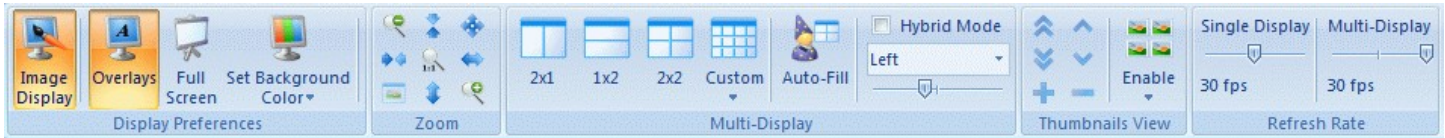
Toggle Display

Toggles the display of images on/off. On slower computers, it is recommended to disable the image display to alleviate some CPU load while recording.

Full Screen

Toggles the Full-screen mode on/off, making the StreamPix cover even the Windows taskbar. Use the F12 shortcut to toggle back to regular mode.

Overlays

Enables or disables the overlay icons (sequence, live, record, etc.)

Set Background Color

This allows to change the color of the display area in which images are displayed. The display area is white by default, so if the captured images have white borders, changing the background color will help to clearly see the borders. For low light conditions, a dark red color is often preferred.

Zoom

Zoom In and *Zoom Out* will respectively enlarge or reduce the displayed image by increments of 10%. *Reset Zoom to 100%* will reset the image size to 1:1 ratio. As having the zoom set higher or lower than 100% will use a bit of CPU, it is recommended to leave the zoom at 100% while recording, to free as much CPU as possible for the recording process.

Multi-Display

The various buttons of this group allow to configure the multi-display row/column count. Once the layout is done, you can assign a display to each area by right-clicking in each.

The *Auto-Fill* button will create enough rows and columns to show the the active display of every workspace and will automatically fills the areas.

While Multi-display is enabled, you can assign a particular display to any area by dragging the workspace tab or a specific display button by using the left mouse button while holding "Ctrl". Drag a

display icon from a workspace's tab to link to a particular display or drag the tab itself to link with the "active display" of a workspace.

You can also use the Hybrid Mode checkbox to toggle the Hybrid display which is a mix of single & multi displays. With this option enabled, the display area will be split in two. One side will be the regular multi-display area and the other side will show the currently selected dispay. The number of columns/rows in the hybrid multi-display area can be customized with the usual controls. You can also change the position and size of the hybrid display area. The multi-display area will be resized accordingly.

Thumbnails View

Click on [Enable] to toggle thumbnail view while the sequence is in playback mode. Using [+] and [-] will increase or decrease thumbnail size. Browsing can done with the arrow buttons or by clicking in the display area and using the mouse wheel to scroll. Click on the arrow button below [Enable] to show more options such as setting the subsampling or toggling the frame number shown on images. Click on a thumbnail to obtain information about it and double-click to move the playback position to this image.

Single-Display & Multi-Display Refresh Rates

These sliders allows to adjust the display areas refresh rates. This only affect the display refresh speed, there is no incidence on the camera frame rate or the capture rate. If the StreamPix window has trouble redrawing itself or if there is a noticable command input lag, lowering the refresh rate should help responsiveness by reducing the CPU usage.

The Bayer/Colors tab
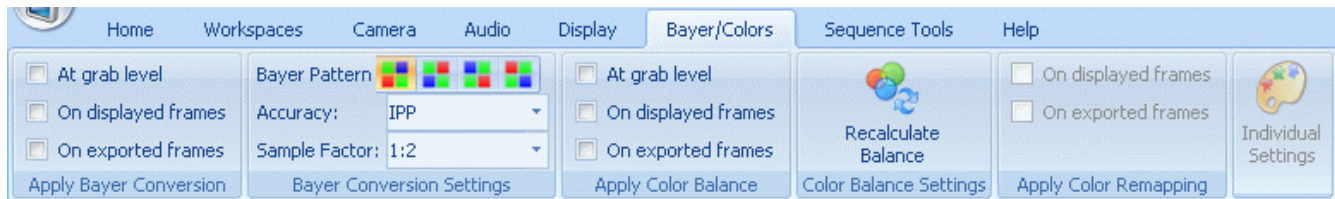
Apply XXX At Grab level

If this option is checked, the selected processing will be applied on images as the are received from the camera. As this is the earliest time at which image processing can be done, the frames will already be processed before being streamed to disk, displayed or exported.

Apply XXX on Displayed Frames

If this option is checked, the selected processing will be applied on images before they are drawn in the display area. The processing will only be done if the frame is actually drawn on screen. This process takes place at the end of the process chain and thus, doesn't affect frames before they have been recorded. Checking this will have no effect if **Apply XXX on Captured Frames** is also checked because the processing won't be done twice.

Apply XXX on Exported Frames

If this option is checked, the selected processing will be applied on sequence images before they are exported to another format. The source images remain unchanged.

Bayer Pattern

Chose the bayer pattern corresponding to the camera CCD.

Accuracy

The bayer conversion algorithm accuracy for high-quality conversion. This algorithm accuracy is only used when applying bayer conversion on exported frames. When applied at grab level or on displayed frames, StreamPix use the "Fast" accuracy.

- **Fast**: bilinear forward interpolation (fastest, less accurate).
- **Accurate(IPP)**: full bilinear algorithm using intel IPP library.
- **Adaptive HDDA:** Adaptive Homogeneity-Directed Demosaicing Algorithm (image with bit depth greater than 8 bit will first be converted down to 8 bit in order to apply this interpolation).

Sample Factor

Only affect bayer conversion done on displayed frames. Choosing 1:2, 1:4 and 1:8 will reduce the CPU usage required for the display at the expense of a smaller rendered image.

Recalculate Balance

Recalculate the Color Balance based on the next frame that will be processed using the color balance algorithm.

Individual Settings

(Not available in the Single-Camera version) It is possible to customize for each separate workspace individual parameters for both the Bayer color interpolation as well as for the color correction. The settings are identical as for the general settings, except that they are applied only for the current workspace.

When using Custom Bayer and Color Correction settings, one has to setup those settings for each workspace.

The Markers tab

Goto Previous Marker

Move the playback position to the previous marker relative to the current playback position. Browsing markers can also be done from the sequence docked dialog.

Goto Next Marker

Move the playback position to the next marker relative to the current playback position. Browsing markers can also be done from the sequence docked dialog.

Goto Reference Frame

Move the playback position to the reference frame. The sequence's reference frame can be set by various actions such as the **Trigger pre/post event** command.

Add Marker at Current Recording Position

This will add an event marker on the last frame captured. This command is typically used to mark a frame while a recording is taking place. A blue arrow will be displayed on the sequence bar to show the locations of the marked frames. You can use the event markers viewer in the sequence docked dialog to manage or quickly browse the marked frames.

Add Marker at Current Playback Position

This will add an event marker on the frame at the current playback position. This command is typically used to mark a frame while reviewing a recorded sequence. A blue arrow will be displayed on the sequence bar to show the locations of the marked frames. You can use the event markers viewer in the sequence docked dialog to manage or quickly browse the marked frames.

Move Reference Frame to Current Recording Position

This will set the current recording position as the reference frame. The reference frame's time stamp is used to deduce the relative time of every other images. By default, the first frame of a sequence is

used if no reference frame is chosen.
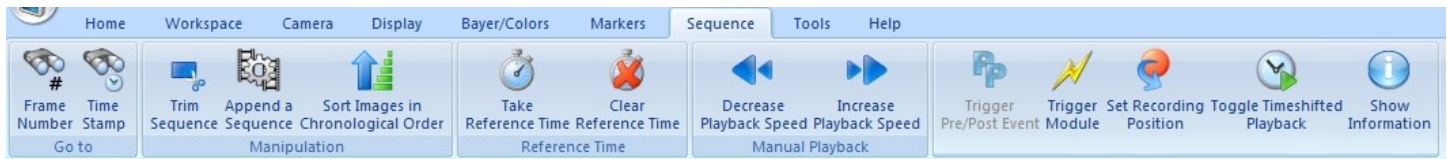
## Move Reference Frame to Current Playback Position

This will set the current playback position as the reference frame. The reference frame's time stamp is used to deduce the relative time of every other images. By default, the first frame of a sequence is used if no reference frame is chosen.
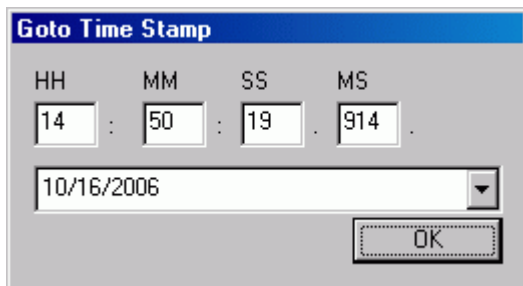
The Sequence Tab

Goto Frame

Allows to input a frame number (index in the sequence file) to jump to a specific image. Also works with AVI files.
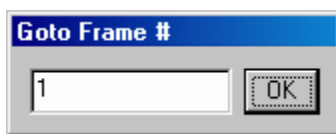
Goto Time Stamp

Allows to input a time stamp in order to jump the the frame closest to it. The dialog either asks for an absolute or relative time depending of the time mode selected in **StreamPix Settings > Playback**. Also works with AVI files.

Trim Sequence

This will trim the active sequence, keeping only the current selection. This operation can take a long time for big sequences as StreamPix will export the selection to a new sequence file, delete the original sequence, and finally rename and reopen the new sequence file.

Append a Sequence

A file-open dialog will allow to select a sequence of frames to append at the end of the current sequence. Both sequences must share the same image format (resolution, bitdepth, etc).

Sort Images in Chronological Order

When StreamPix is recording in a loop, the resulting sequence's frame order might not be properly arranged. For instance, the oldest frame might not be at position 1 in the sequence. The sort action will fix that by creating a new sequence file in which the frames are sorted according to their respective time stamps. Please note that this can be a lenghty operation on large sequence files.

Take Reference Time

Read the current system time and set this time as the reference time of the current sequence. The relative time of each image of the sequence will be computed using this time instead. This can be useful to set a reference time occuring before a recording starts. Using a reference time override the current reference frame (if any). It is also possible to do this automatically (See **StreamPix Settings > Recording**)

Clear Reference Time

Remove the reference time associated with the current sequence. The time of the sequence first frame will become the new reference.

Decrease Playback Speed

If the Manual Playback slider is enabled, clicking on this button will move the slider one notch to the left.

Increase Playback Speed

If the Manual Playback slider is enabled, clicking on this button will move the slider one notch to the right.

Trigger Pre/Post Event

If the Pre/Post Trigger is enabled, it will trigger the related event.

Trigger Module

Some modules can be triggered by clicking on this button instead of using their docking panel interface. Refer to the module's help to see if it supports this trigger button.

Set Recording Position

This will set the current playback's frame position as the recording position, causing the next frame recorded to overwrite this frame. By default, the recording position is one frame past the last frame of the sequence.
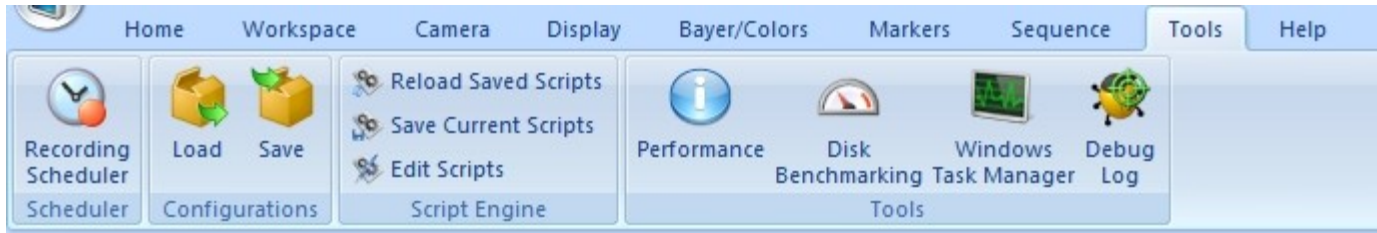
Toggle Timeshifted Playback

Activate or deactivate the timeshifted playback mode. See **StreamPix Settings > Timeshift** for more information.

Show Sequence Information

Shows various informations on the current sequence (or AVI) file if one is currently loaded.

The Tools tab

Recording Scheduler

StreamPix Recording Scheduler allows to setup recording sessions which can start/stop without user intervention. One-Time, daily, weekly or monthly recordings are available.

The recording scheduler allows one recording task to be defined. If you need more than one, you can use the Windows Task Scheduler. Some information on how to do that is available by clicking on [Advanced scheduling].

Except for the one-time recording, all other recording schedules will repeat until the task is deleted, either by creating a new task or by clicking on [Delete current recording task].

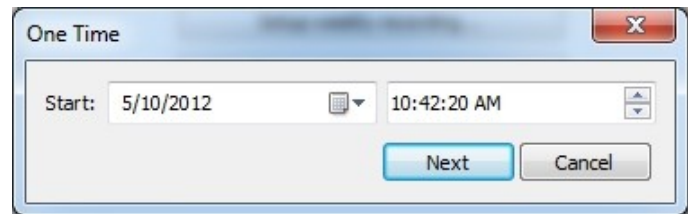When a recording command occur, by default, only the currently selected workspace will start recording. However, if "Select all workspace" is selected, then all workspaces will start recording.
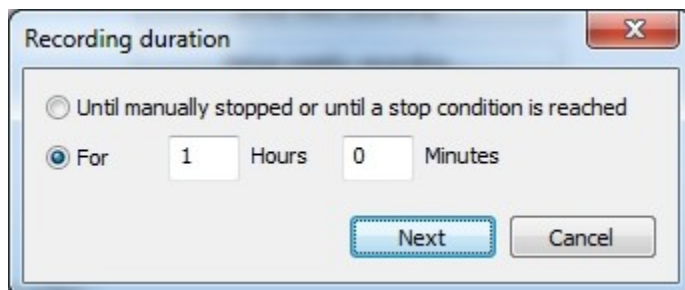
Once the recording mode is chosen, you can also either define a recording duration or tell StreamPix to keep recording until a stop condition is reached. For example, most recording scripts offer various stop conditions (see StreamPix Settings > Recording Rate).
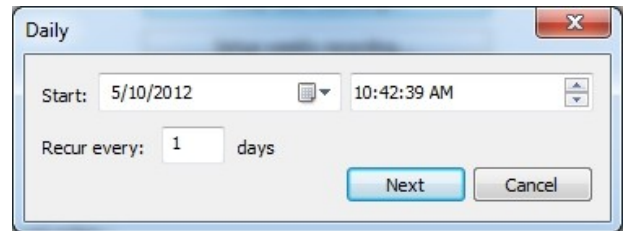
One-Time

Configure a recording session that will occur a single time at the given date and time.
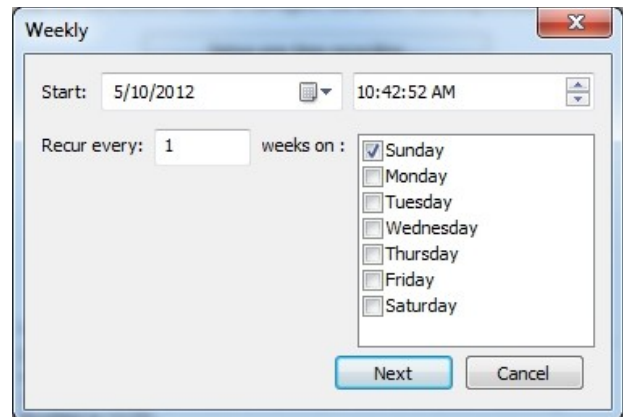
Daily

Configure a recording session that will occur daily. The first recording will be done on the given date and repeat every day (or every X days) at the chosen time.

Weekly

Configure a recording session that will occur weekly. One or more days of the week can be selected. The recording will then happen every X weeks after the selected date.

Monthly

Configure a recording session that will occur monthly. Select one of more months on which recordings have to be made.

Finally, select the repeat mode from the two available options :

-On a specific day of the month
 (ex : 4th).

-On a relative day of the month
 (ex : second tuesday).

Load/Save Configuration

All StreamPix settings are saved in the Windows registry. Saving a configuration will create a registry file (.reg) that will hold all current content of the StreamPix registry branch. This option can be used to save 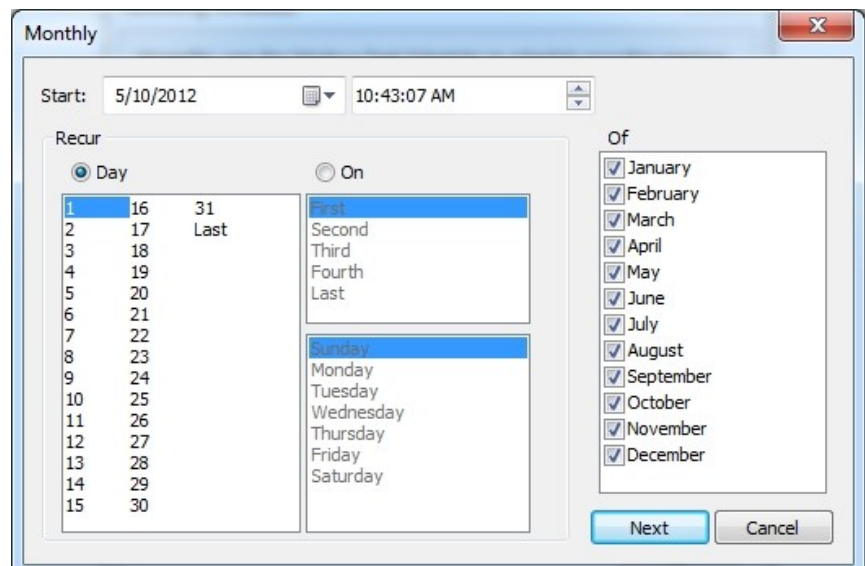a specific setup that needs to be reused later, or to alternate between different setups. Reloading a configuration will require to restart StreamPix. Administrator privileges are required, as Windows will ask for permission to write the file content to the registry.

Reload Saved Scripts

The loads the most recently saved scripts from the registry (if any).

Save Current Scripts

Saves the current scripts, including any modification to the scripts made from *Edit StreamPix Scripts*. The saved script can then be reloaded from *Reload Saved Scripts* or using the *Tools > StreamPix Settings > Session > Reload Scripts* option.

Performance

This will show an estimate of the RAM and bandwidth currently used by StreamPix (global and by workspaces).

Disk Benchmarking

Use this to launch the disk benchmarking utility bundled with StreamPix. This tool is used to evaluate the system capacity for streaming frames to the sequence file format.

Metadata Manager

Use this to launch NorPix Metadata Manager utility bundled with StreamPix. This tool is used to configure the metadata allocation in sequence files. You will need to restart StreamPix for the new settings to be applied.

Windows Task Manager

This will simply launch the standard Windows Task Manager. The Performance tab can be used to monitor CPU usage in order to analyze any frame drop that might occur.
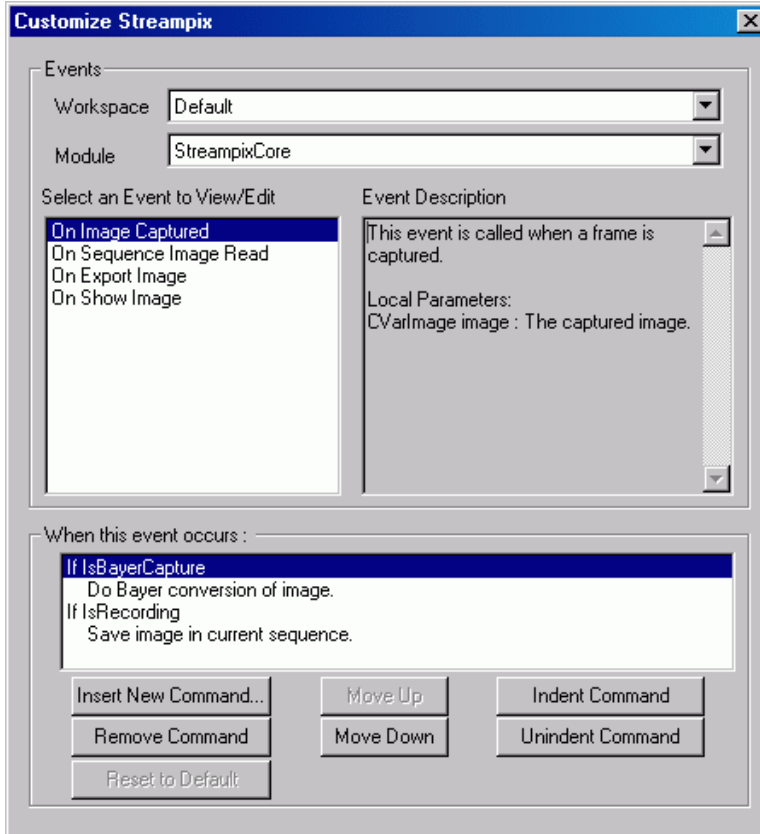
Debug Log

The Debug Log allows the user to see the internal status messages. This can be useful for solving various types of crashes. For instance, if StreamPix is unable to load the desired grabber, reviewing

the log as StreamPix attempts to load the grabber might give an indication about the cause of the problem.

Edit StreamPix Scripts

FOR EXPERIENCED USERS ONLY

This is the main dialog used for customization allowing to browse events by workspace using the *Workspace* drop-down list. Each workspace has at least one module, the *StreamPixCore* module, and may include additionnal modules if any plugin has been loaded in it.

Once a workspace and sub-module is selected, the list box in the middle of the dialog will show all events for the module.

Clicking on an event displays detailed information in the *Event Description* box and also lists all parameters available to the sub-module.

You can save your current scripts with Tools > Save Current Scripts. Next time you launch StreamPix, reload them using Help > Reload Saved Scripts.

When an event is selected, the bottom box shows what actions are taken when it is called, each line of a script calling a specific command. Using the buttons allow to customize the script for an event.

Insert New Command : Will make the *Select a command* dialog pop-up. The selected command is automaticaly appended at the end of the script.

Remove Command : This will remove the currently selected command.

Reset to Default : Should an event differ from its original behavior, clicking on this button will reset it to default script.

Move Up / Move Down : Use this to change the order in which commands are called when the event occurs.

Indent Command / Unindent Command : If one of the commands is a conditional statement, the line(s) that are indented below it will be called if the parameter becomes true. When the parameter is false, the script will simply jump to the next unindented line. Thus, indenting a script command line will make it conditional to its related event.

Double-clicking on a script line will show the current script command and its parameters.
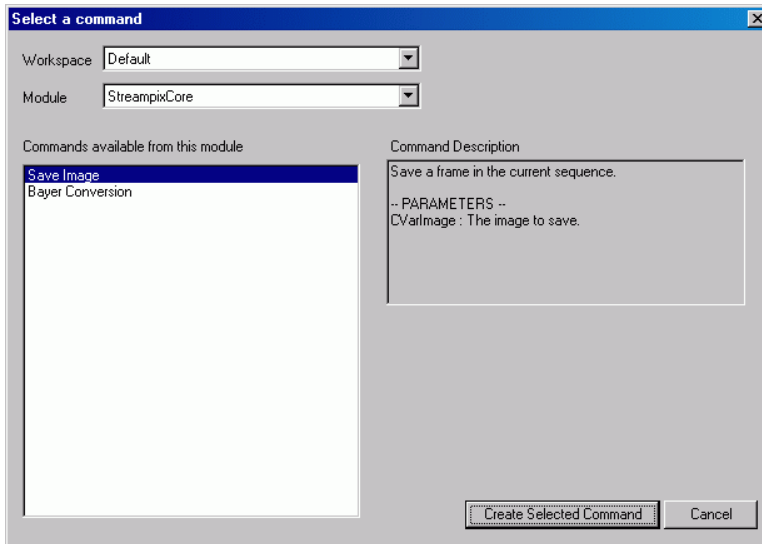
This dialog allows the user to select a command to add to the script of the event selected in the *Customize StreamPix* dialog. Normally, the command should only be chosen from the commands availables to a module of the current workspace. It is possible to select a command from another workspace, altough it will fail if the other workspace is not loaded.

Selecting a command from the list will show the command description along with the parameters required by the command. Once a command is selected, Clicking on *Create Selected command* will alow to allocate parameters for the command.
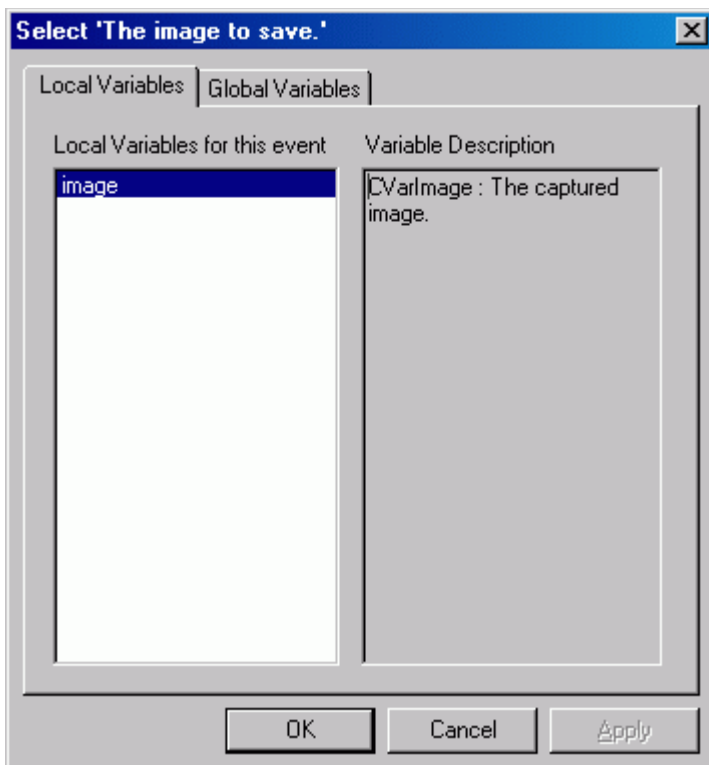
This allows to select the variables included in a command, showing a description of the parameter in the dialog title and a list of the variables compatible with it. Selecting a variable will also display a description of its contents.

The *Local Variables* tab will display the list of compatible variables local to the event, which are only accessible while the event is being executed. Clicking on the *Global Variables* will display variables that are always available, regardless of what event is being called. (see following dialog) Finally, the *User-creates Variables* panel is used to create your own variable, for example : a constant for a function that require a numerical value. (Like ScriptControl's "Sleep" command)
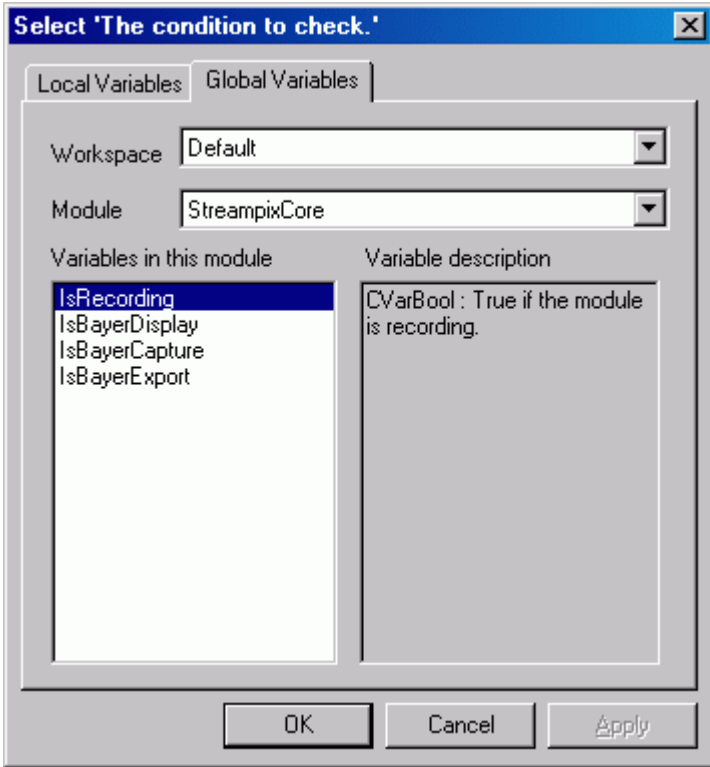
This dialog works in the same way as the *Local Variables* tab, displaying the compatible variables available on a global scale and not only for a specific event. The *Workspace* and *Module* drop-down lists allow to acces the global variables of any loaded workspace.
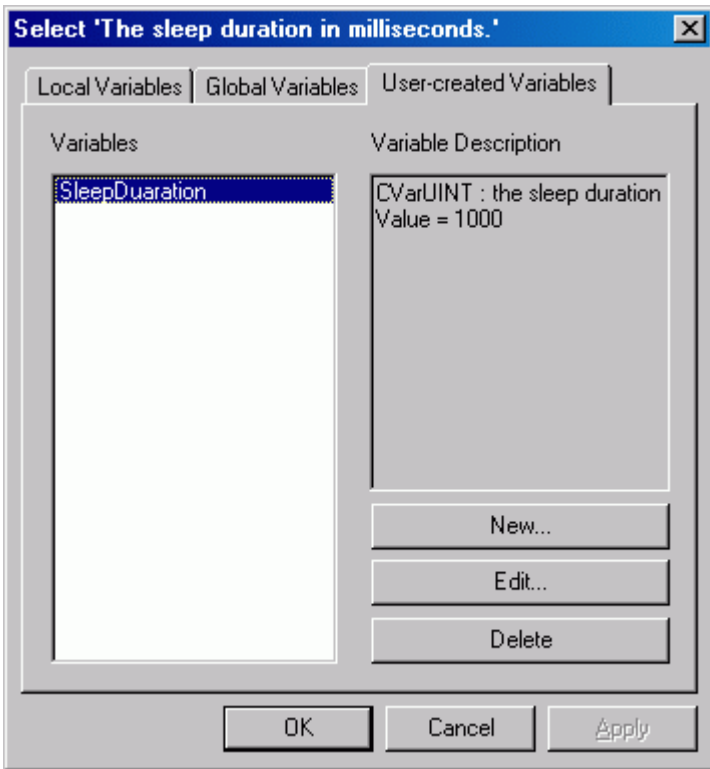
This dialog is similar to the last two. You can select an existing variable or create a new one, edit its value or delete it. Not all types of variable can be user-created. For example, the VarImage can't be user-created. However, VarBool and VarUINT can. If the buttons are disabled, then the requested type can't be created.

The Help tab
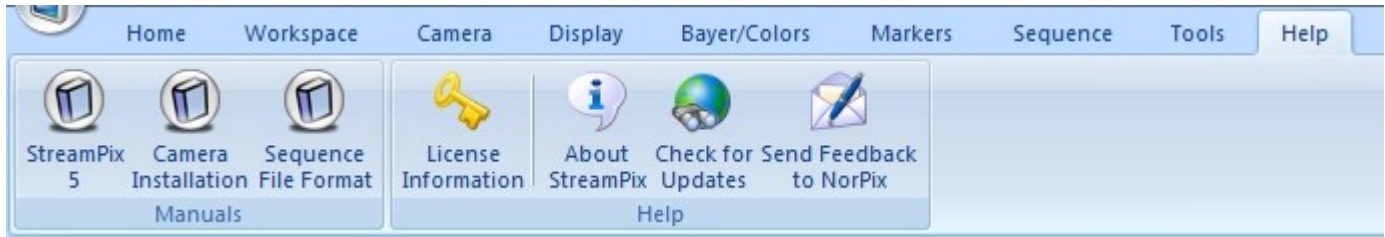
StreamPix 5 User Manual

To easily access this exquisite manual.

Camera Installation Manual

This manual hold detailed instruction on how to setup every camera supported by StreamPix.

Sequence File Format Manual

This manual provide information on the NorPix Sequence File format. This is can be useful if you want to extract image/data from a sequence file to process in a third party application such as Matcad.

License Information

Display all the authorization codes that are registered on the system for the current user.

About StreamPix

Accesses the Technical Support's contact information and shows the credits for StreamPix. The "Enable DLL Registration" button sets the file association for DLL files to regsvr32.exe as the default application used to "open" them. It is sometimes used in tech support procedures but should not be needed otherwise.

Check for Updates

This will connect to the Norpix FTP and download a small version file from it. The newest available version number will be compared to the version number of the installed software, calling a prompt indicating if a new version of StreamPix is available for download.

Send Feedback to NorPix

As StreamPix is a complex application and new features are constantly added to it, bugs sometimes

manage to affect the software. If you happen to find one, please notify us so we can squash it in time for the next release. Also, please use this feature to tell us about any suggestions or specific features that you would like to see implemented in a future version of StreamPix !
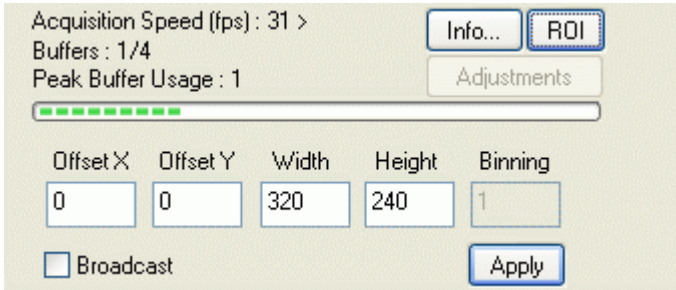
Docked dialogs

Grabber docked dialog

Clicking on [Info] will display information about the size and format of images captured by the grabber. When the grabber is Live, the acquisition speed, in frames per second, will be constantly updated.

The [ROI] allows to define a region of interest for all grabbers that support this feature. Coordinate assignment is done by entering the desired offset (in X and in Y), width and height and clicking on *Apply*. If broadcast is checked, the change will be applied to every other workspace.

Finally, if supported by the grabber, an [Adjustment] button will expand the dialog to show the grabber adjustments. (Same as "Camera > Live Adjustments"). Changes to the adjustments can also be broadcasted to other workspaces running another grabber of the same model.

Sequence docked dialog
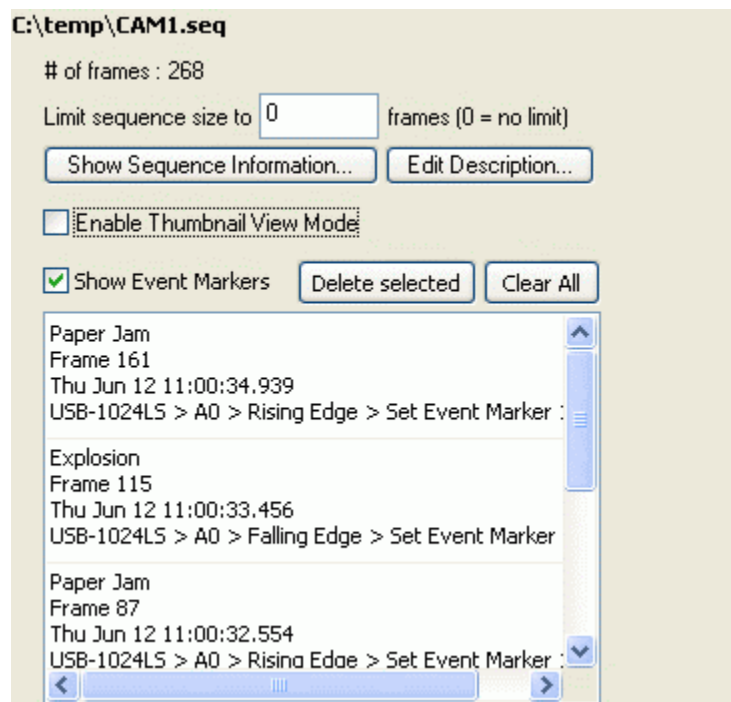
This docked dialog shows information related to the sequence. Click on [Show Sequence Information] to retrieve detailed information such as the number of frames in sequence, the average capture frame rate or image format. Click on [Edit Description] to write a short text message to be stored in the sequence header.

The number of frames the sequence will hold can be adjusted in this dialog to make sure that, according to the chosen option in **StreamPix Settings > Recording,** recording will restart from the beginning of the sequence or stop when recording position reaches this value. Default is "0" for standard, unlimited, recording.

Finally, any browsing with the sequence slider will be accordingly reflected in the thumbnails section.

Click on "Show Event Markers" to show each logged event. Events are created by "Set Event Marker" I/O actions that can be configured from the I/O Manager Docked DIalog (See next section). Click on any event to go to the associated frame in the sequence. Click on [Edit...] to edit the

selected marker description. You can also delete one or all events using the respective buttons. Event Marker information is saved in a separate xml file named after the sequence name. For example, markers for c:\folder\test.seq will be in c:\folder\test.xml.

I/O Manager docked dialog
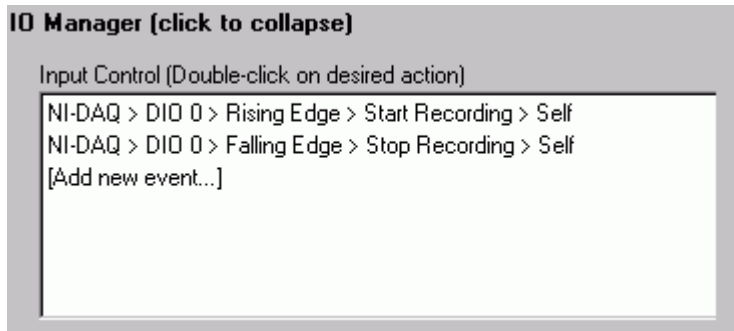
This docked dialog shows information related to the Inputs/Outputs actions. To create a new action, double-click on the [Add new event...] line. To edit or delete an existing action, double-click on the line describing that action. In both cases, the Input Action dialog will be shown.
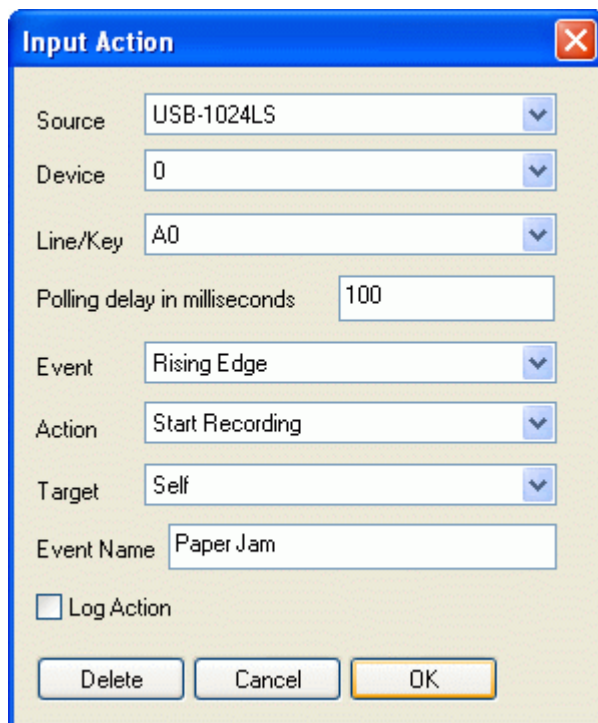
This dialog will display the settings of a new or existing action. There are several parameters to set :

Source : All IO devices detected by StreamPix are shown in this list. A source can either be related to the grabber (i.e : frame grabber with input lines) or an external IO device.

Line/Key : All available lines for the selected source are shown. Select the input line to monitor.

Polling delay : This is the interval at which the input line will get polled. If the value is too low, non-stop polling will be implemented, needlessly consuming the system's resources. However, a very high value might miss an event. For instance, if the input signal goes from level-low to level-high and back to level-low between two polling actions, StreamPix would not notice that an edge occurred.

Event : This is the event to monitor. The standard Level low, Level high, Rising edge & Falling edge are available.

Action : This is the action to be done once the event occurs. For now, the available actions are : "Start Recording" to start recording and "Stop Recording" to stop recording, while "Toggle Recording" will start recording if it is not currently recording and will stop if it is. "Line Testing" is a dummy action and will do nothing unless it is used in combination with the "Log Action" described below to test the input lines. "Trigger Pre/Post Event" will trigger an event when in Pre/Post Trigger mode. "Set event

marker" will set a marker on the current frame. More actions will be added over the course of further developments and customers requests.

Target : It can either be "Self" to apply the action to the Workspace only or "All Workspaces" to broadcast the action to all workspaces. The second action allows to synchronize multiple workspace without having to configure their IO Managers panels separately.

Event Name : This is the name of the event happening when the "Set Event Marker" action is selected. It is not used otherwise.

Log Action : If this is checked, each time the event is detected, StreamPix will send a debug output to the system. These outputs can be displayed using Tools > Debug Log. Use it with the "Line Testing" action to check that the lines are working properly.

Click on the [Delete] button to remove an existing action from the list. Click on [Cancel] to abort action editing. Click on [OK] to accept changes made to an existing action or create a new action.

'Pre/Post Trigger' docked dialog

This allows you to set custom a pre/post for an individual workspace. The behaviour is identical to the one in the **Pre/Post *Trigger*** page in the **StreamPix Settings** section.
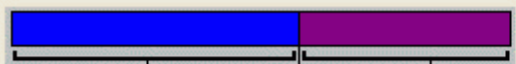
StreamPix settings

Auto Naming Settings
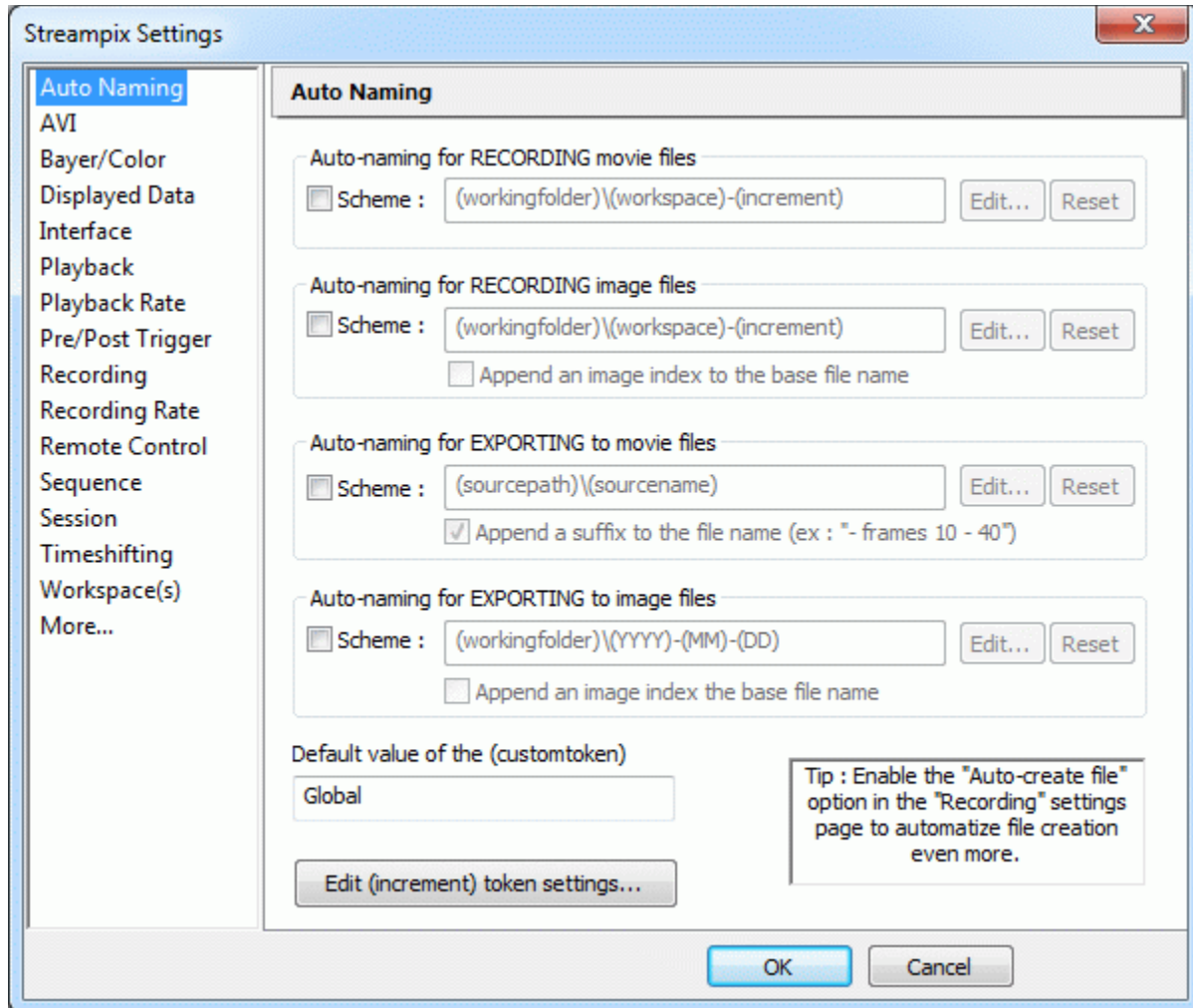
The *Auto Naming* allows to generate file names without requiring user input each and every time a file is created. Simply type a naming scheme in each edit box, making sure that the resulting path leads to a valid directory. Automatic File Naming can be enabled for recording/exporting movies and images files. The "Reset" buttons will restore the default naming scheme.

The "RECORDING" schemes are used when directly recording from the live stream while the "EXPORTING" are used when exporting from a sequence file. "Movies" are .seq, .avi and .mov. "Images" are .bmp, .jpg, .tif, etc.

Clicking on one of the "Edit" button will show this dialog, allowing the user to change the related autonaming scheme.
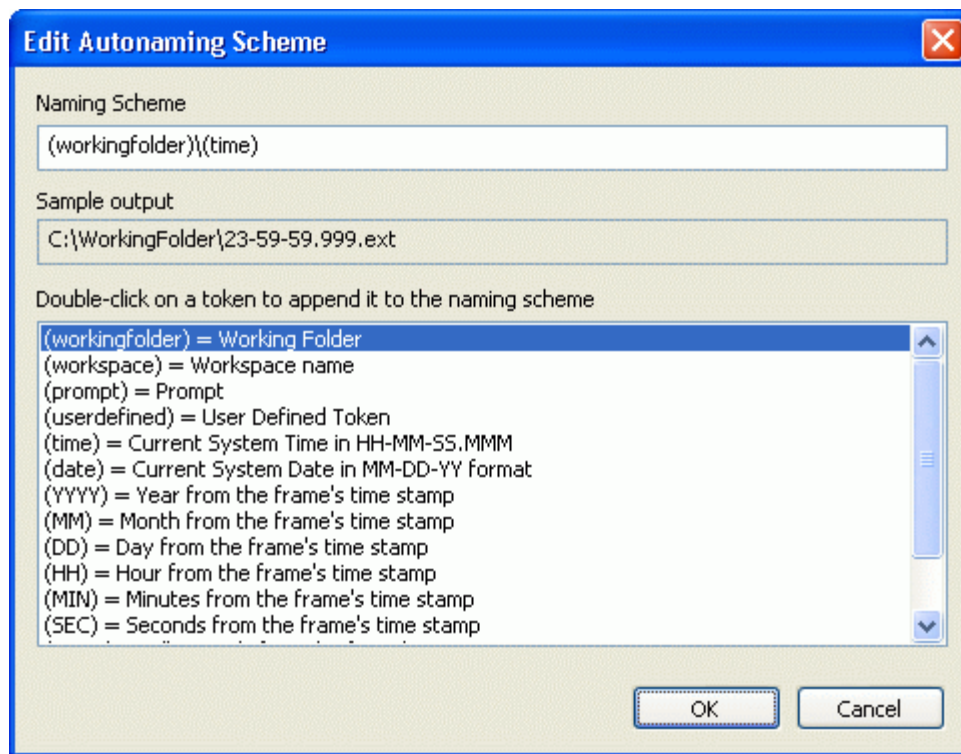
The dialog allows to create a naming scheme and show a typical output. Once you have created the scheme, click on OK to accept the changes and close the dialog. Double-clicking on a token will append it to the current naming scheme. Each token get replaced by an actual value at the time a file is created.

Here is a description of all available tokens. Some are not available in every scheme.
- *workingfolder* : This token will be replaced by the working folder of each workspace.
- *workspace* : This token will be replaced by name of the workspace.
- *prompt* : This will prompt for a specific string to use for each file created. This string will then replace the (prompt) token.
- *customtoken* : This token will be replaced by a string value defined by the user.
- *increment* : This token will be replaced by an incremental numerical value.
- *date* : This token will be replaced by the current system date.
- *time* : This token will be replaced by the current system time.
- *YYYY, MM, DD, HH, MIN, SEC, MSEC :* Those token will be replaced by the related time parts extracted from the timestamp of the current image. Mostly used for image files, they can also be used when creating sequences, AVI and MOV. In that case, the current system time will be used.
- *LTC :* This token will be replaced by the LTC time code in the image (if any).
- *index* : This token will be replaced by the image index in the sequence (when exporting from sequence to image files).
- *pindex* : Same as the "index" token, but the value will be padded using the padding specified in the "Images" settings page.

- *firstframetime* : This token is mostly used when working with RAM sequences that get saved to disk (or exported). The token will be replaced with the time of the first frame of the sequence.
- *sourcepath* : The path of the source file.
- *sourcename* : The name of the source file (without the extension)
- *AB* : Put "A "and "B" in alternance. Mostly used with PIV-style acquisition.

As two sequences can not be saved in the same file, make sure that every sequence created will have a unique name. With successive recordings, using the (*time)* token will prevent the "same-filename" overwriting problem. A good scheme could be: (workingfolder)\(*workspace)\(date) at (time),* as this *c*ould generate a sequence filename like this one: "C:\Camera 1\12-31-05 at 23-59-59.999.*seq*". This means that a folder would be created for each workspace and that every sequence from this workspace would be uniquely identified by the *date/time* part. It is recommended to test each naming scheme on a short recording before applying it to a complete recording session.

When creating a new image sequence (BMP, TIFF, etc), it is possible that the automatic naming scheme doesn't contain enough dynamic tokens (i.e. tokens that can help prevent generating the same file name twice). In that case, you can check the "Append an increment to the base file name" checkbox. When this is is checked, a base name will be generated for the first image and StreamPix will automatically reuse the same name for every other images, appending an index value to differenciate them. (-1, -2, -3, -4, etc...)

When using auto-recording, the default settings for the format will be used. The default settings are set in the following StreamPix Settings pages : "AVI", "MOV", "More... > Images" and "Sequence".

Back to the AutoNaming setting page, the next section allows the user to specify the default value of the (customtoken) and edit the (increment) token behavior.
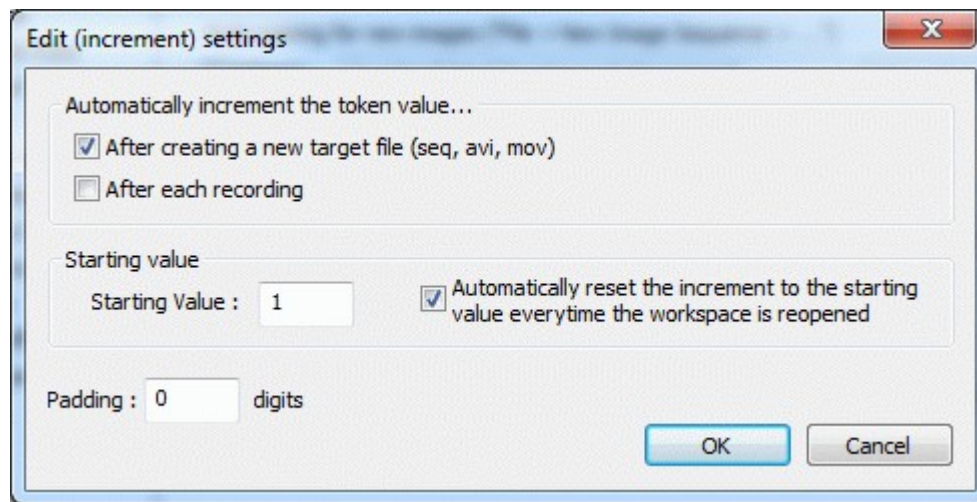
The (increment) token will start at the value specified in the "Starting Value" edit box. This value is normally reset every time the workspace is reopened (ex : everytime StreamPix launches), but that behavior can be overriden by unchecking the checkbox here. In that case, the starting value will be the last value used in the previous session.

You can specify at which time you want the increment to take place, either after each new file or after each recording. Default is "After creating a new target file" and should cover most needs, but the other option is there as a convenience (for peculiar recording scenarios).

Finally, you can also specify the increment's padding (in digits).

AVI settings
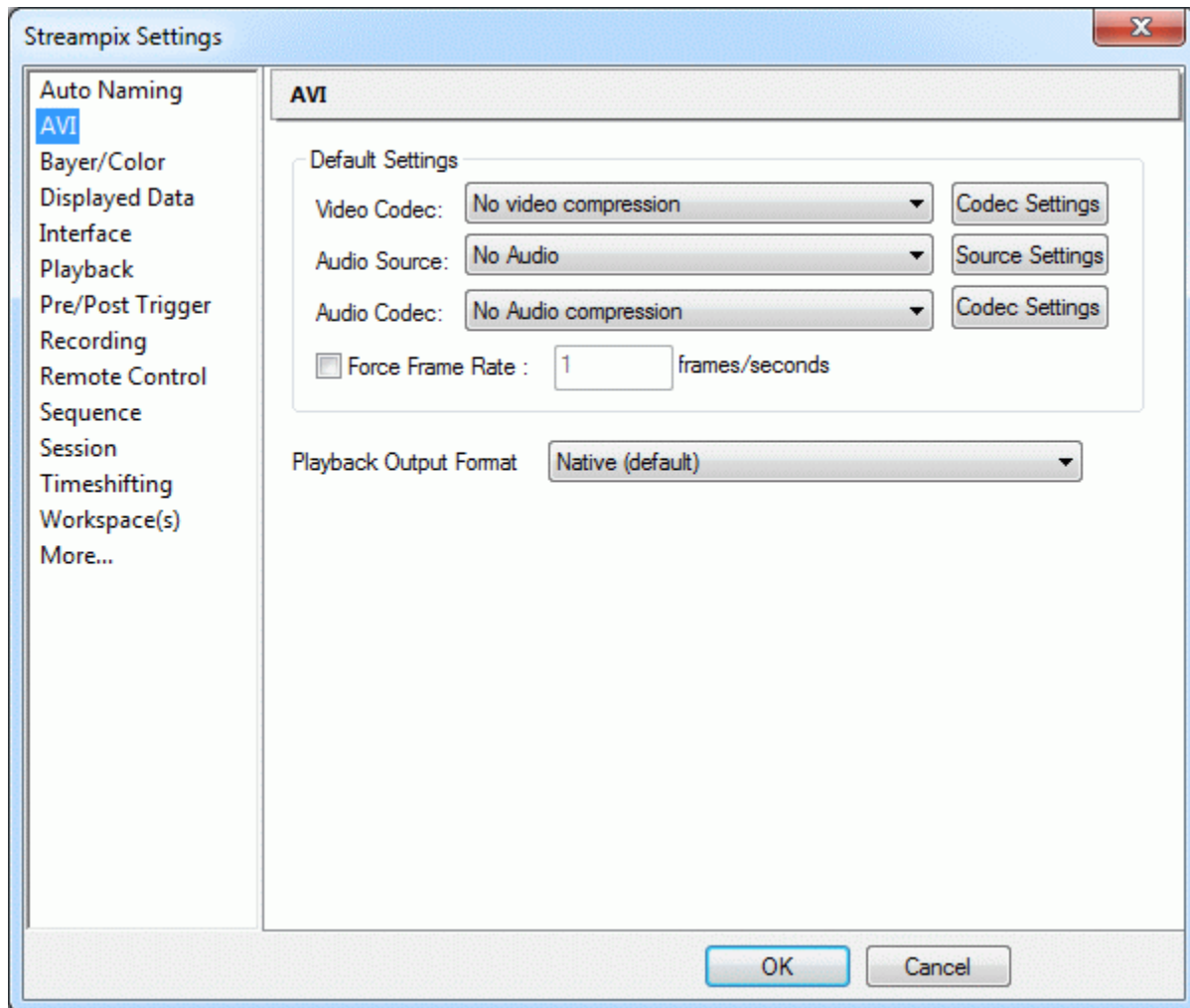
This page is used to set the codec options used when creating a new AVI file, which can also be accessed in the **Application Button > New AVI** dialog. However, if *Automatic File Naming* is enabled, the settings on this page are those that will be used.

Clicking on one of the [Codec Settings] will show the coedc's configurable settings if it has any.

The force frame rate option allows you to override the frame rate of the capture. This means that the AVI can be made to play slower or faster that the actual capture rate.

The playback output format can be converted from Native to BGR if needed. (Some external modules require the BGR format).

Bayer and Color Settings
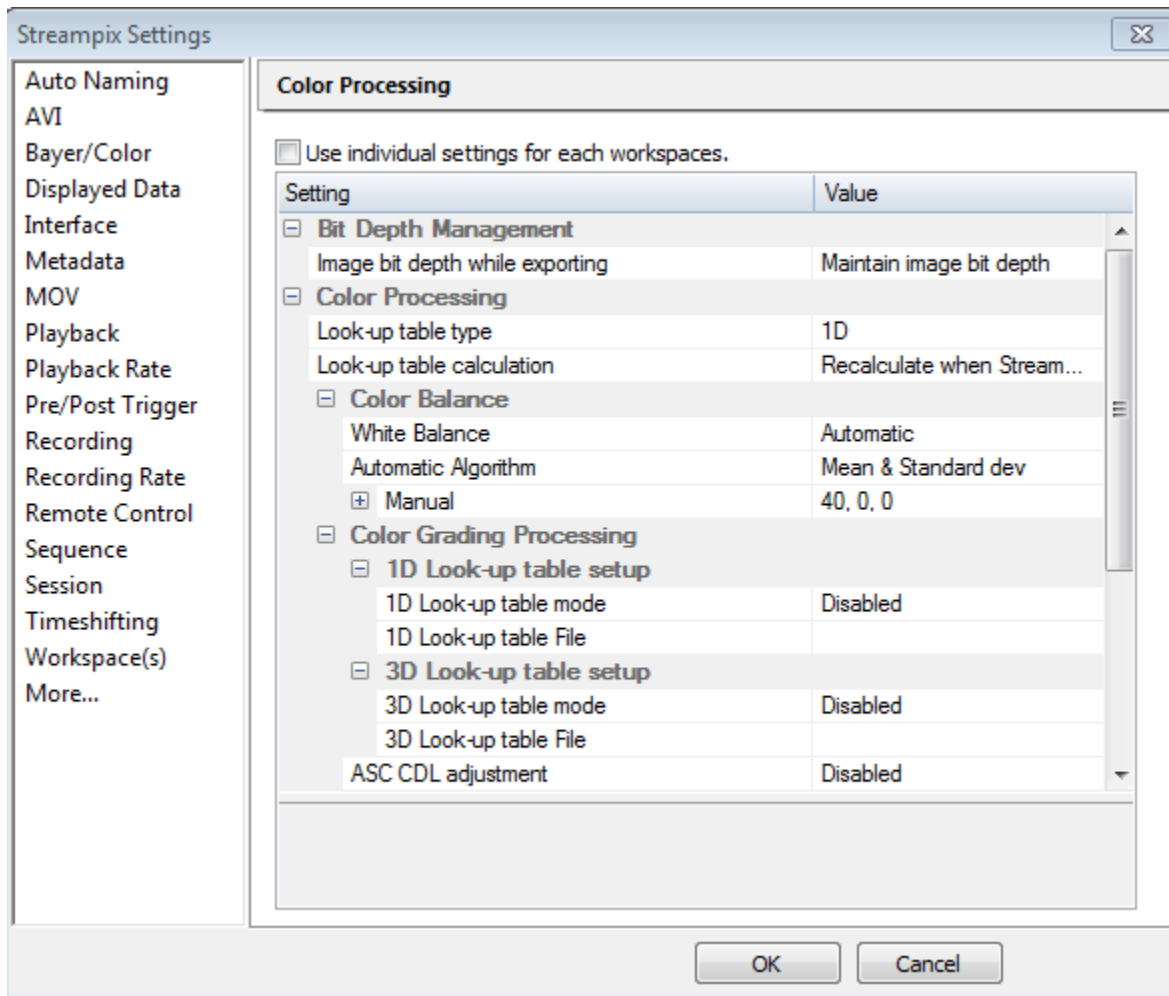
For general information about Bayer rendering, please refer to Bayer and Color grading section(26).

Bayer parameters and color correction parameters can either be set commonly for all workspaces or eventually individually per workspace. When switching to the per workspace mode (individual) settings can be access via **Individual Settings** in the **Workspace** tab.

This page allows to manage the parameters applied during Bayer conversion and color processing process.

Bit Depth Management

Image bit depth while exporting :By default while exporting, StreamPix will export a 10, 12, 14 or 16 to an 8 bit image. Selecting this option will enable to convert the image original bit depth to 8 bit or maintain it. For instance, 8 bit -> 8 bit, 10 bit -> 8 Bit, 10 bit -> 10 bit, 3x10bit RGB -> 3x8 bit RGB...
Note :The Bayer Accuracy "Adaptive HDDA" ignore this feature since it only supports 8 bit.

Color Processing

Look-up table type: Use either a 1D or 3 D LUT. This defines the type of look-up table (LUT) applied during color processing.3D LUT will require significant more RAM and initialization time, but allows better rendering. Selecting a1D or 3D LUT has no processing overload (exception of when exporting 10 bit images with a 3D LUT).

Look-up table calculation: To speed up all the color grading, Bayer interpolation and white balancing image rendering, a global look-up table taking into account all the parameters is calculated and saved to an XML file. That LUT is by recalculated each time StreamPix is restarted. To avoid the recalculation on start-up select "*Reload look-up table from file*".

Color Balance / White Balancing

Parameters related to the color balance also referred as white balancing can also be adjusted.

Color balance algorithms can be applied in conjunction with the Bayer rendering. It can also be applied on any color captured images, RGB or YUV format. All the color balance method can be applied for real time live display as well as when exporting.

Color balance is the adjustment of the RGB channels intensity of an image to match the color temperature of the illumination present at capture time. As it changes the overall mixture of colors in an image, color balance is used for generalized color correction.

Color balancing parameters can be adjusted manually or automatically calculated.

In Automatic mode, seven color balancing algorithms can be selected:
- **Mean equalization:** calculates the mean value of each channel and then adjusts each so that the mean value of the blue and red channels are equal to the green channel.
- **Gray world:** the sum of the red, green and blue channels is calculated and then adjusted so that the sum of the blue and red channel equals the green channel.
- **Standard deviation:** calculates the standard deviation of each color channel and then re-adjusts each to be 70 (on a 256 value scale).
- **Mean & standard deviation** (Slowest): adjusts the mean value of each channel to be 128, and sets the standard deviation of each channel to be roughly 70 (on a 256 value scale).
- **White World:**Will search for the whitest area in the image and assume this is real white to recalculate the WB by normalizing each channel and set the maximum value to "white". To get good result, make sure there is no saturated pixels on the image (use short exposure time for instance)
- **Scale by max:** calculates the max value of each channel and then rescale each channel to the maximum dynamic range.

Mean equalization, Gray World, Standard Deviation, Mean & Standard Deviation, White World and Scale by Max algorithms will use the first incoming image to calculate the balance coefficient. This is a one time operation that is not redo for each incoming images. One can force a recalculation by

using the shortcut ALT+R or press the *Recalculate look-up table* button in the Bayer/Color ribbon.

In manual mode, user can enter red, green and blue offset values to be applied for each color channel. The correction factor will be added (or subtract) for each pixel intensity. The parameter value is in percent of the total dynamic range: a +10% will add a constant of 25 grey level for a 8 bit (256 levels) image.

Color Grading Processing

Image color grading can either be performed using 1D or 3D look-up table. Those tables are calculated via 3rd party software and can be loaded within StreamPix. Note all the file format are supported both both 1D or 3D. Check each section for further details.

1D look-up table setup

1D Look up table mode: Enable the usage of a 1D LUT for color grading.
Beside the ability to load a LUT file, a predefined transform LUT is also available to apply a negative conversion.
1D look-up table File: Specifies the 1D look-up table file that can be loaded for processing. Current Supported format :

- Noprix 1D Text 1D LUT file(*.txt,*.nlt)
- Flame and lustre(*.3ld)file
- ColorCorrection(*.cc)
- ColorCorrectionCollection(*ccc)
- Cinespace file(*.csp)
- Houdini file(*.lut)
- Iridas_cube file(*.cube)
- Iridas_itx file(*.itx)
- Iridas_look file(*.look)
- Spi1d file(*.spi1d)
- Truelight(*.spi1d)

Norpix 1D LUT file can easily be generated manually for basic correction and grading. This file has the following format :

A text file, comma separated that can be Excel generated (save Excel file as a .csv format) can be used.

The text file syntax is very simple. Each line contains 4 entries: Level value to be remapped, followed with corresponding Blue, Green and Red values.

- There is no need to specify all the LUT values and entries. Only the needed value must be specified. All missing values will be interpreted as "Leave as is",
- Level can be specified as range using [-] characters,
- # comment a line,

◆   Out bound values are ignored.

Example:
#Index, Blue, Green, Red Remapping value
0, 255, 0, 0 : gray level 0 will be remapping as pure blue,
1, 10, 10, ,: gray level 1 will be remapping as Blue =10, Green =10, Red default (1),
[200,255], 255, 255, 255: gray levels 200 to 255 are Remapping to pure white

3D Lookup table setup

3D lookup table mode: Enable the usage of a 3D LUT for color grading. Only 3rd party LUT file can be imported.

3D lookup table File: Current Supported file format :
- Flame and lustre(*.3ld)file
- ColorCorrection(*.cc)
- ColorCorrectionCollection(*ccc)
- Cinespace file(*.csp)
- Houdini file(*.lut)
- Iridas_cube file(*.cube)
- Iridas_itx file(*.itx)
- Iridas_look file(*.look)
- Pandora_mga(*.mga)

ASC CDL adjustment :Enable the American Society of Cinematographers Color Decision List (ASC CDL) basic primary color grading adjustment. This can be used to apply basic gain, offset and gamma connections. Refer to the **Remapping via ASC CDL Formula** docked dialog section for further instructions.

Color Matrix correction

Color correction Matrix:

The color filter arrays used on all image sensors do not exactly match the response of the human eye. As such, a final level of tuning known as color correction or color saturation correction is required. The most commonly used form of color correction is a 3 X 4 matrix operation. See the following example:

B	142%	-32%	-10%	0.00%	**Bo**
G =	-15%	140%	-25%	0.00%	**Go**
R	-14%	-22%	136%	0.00%	**Ro**

Without correction, coefficients are:

B	100%	0%	0%	0.00%	**Bo**
G =	0%	100%	0%	0.00%	**Go**

R	0%	0%	100%	0.00%	**Ro**

Commonly, the sum of coefficients for a channel equals 100%. You should refer to the sensor color transfer function to determine to right coefficient to use.

Miscellaneous LUT Processing

Pseudo Color: This can be used for remapping monochrome images to pseudo color. Currently, 2 predefined look up table functions are available. Please contact Norpix if you feel more LUT should be added. *Pseudo color cannot be used with true color RGB or YUV images.* Available predefined LUT are:

- Rainbow,
- Inverted rainbow
- Hot
- Cold
- Saturated 3 level
- Saturated 5 level

Saturated level LUT are use to help figure out the camera exposure and gain settings. Those LUT displays in false color saturated pixels (red) and under exposed pixels (green):
Saturated 3 level (256 colors):
- *Grey level from 0 to 3 are display as green*
- *Grey level from 252 to 255 are display as red*

Saturated 5 level (256 colors):
- *Grey level from 0 to 5 are display as green*
- *Grey level from 250 to 255 are display as red*

Monochrome image processing: Depending on the need for data integrity, one may need to maintain across the 1D LUT processing the monochrome image format (default) or accept the image to be converted first as a color RGB image.

Window leveling: Linear window leveling can be performed for pixel depth greater that 8 bits. By default, StreamPix always displays the 8 most significant bits of captured images. Window leveling can highlight specific bit ranges on the images.

As an example, a 10 bit image can be leveled in 3 ways:
- 8 most significant bits (bit 2 to 10, default StreamPix setting)
- 8 middle significant bits (bit 1 to 9)
- 8 least significant bits (bit 0 to 7)

Displayed Data
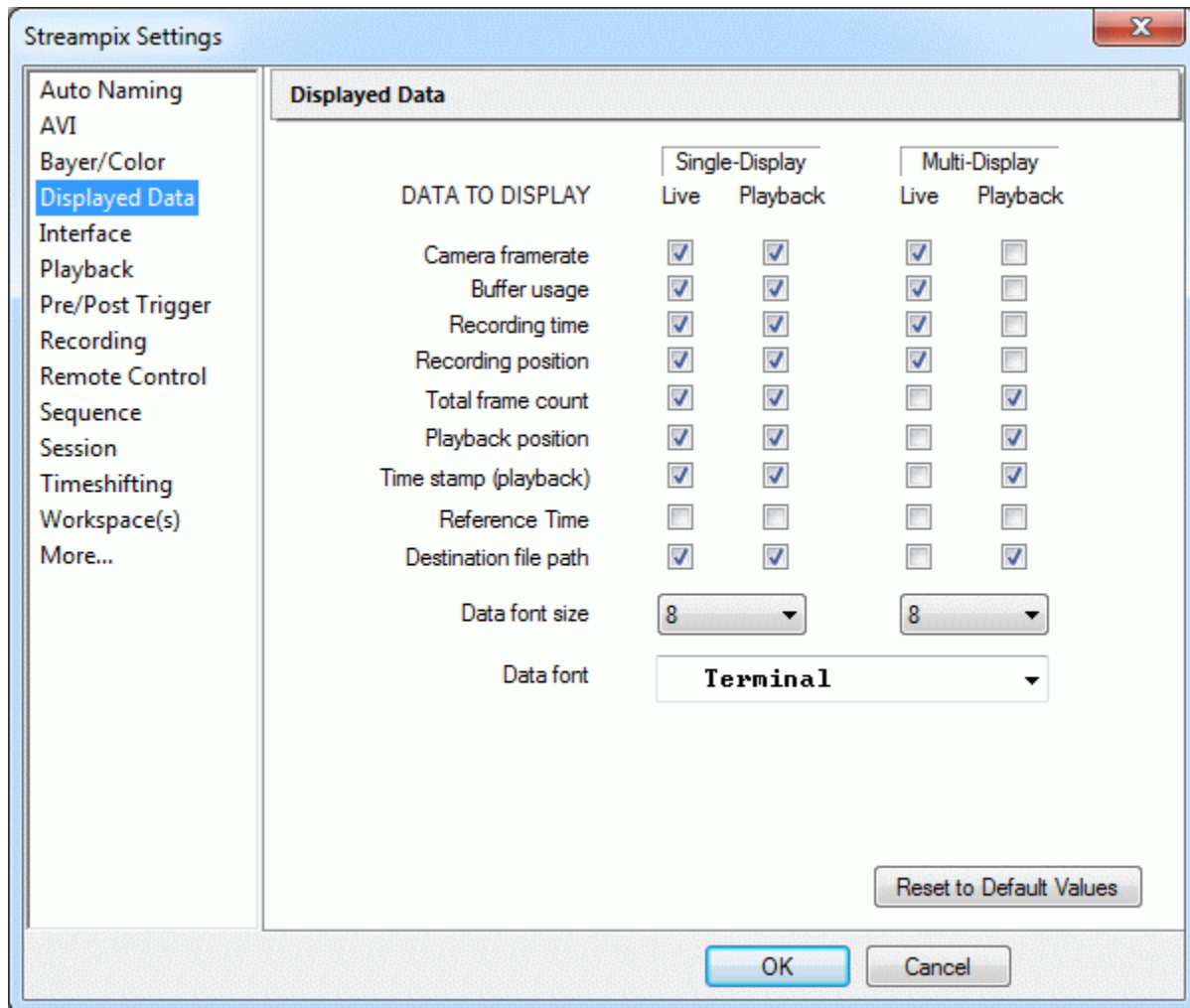
This page allows to customize the information displayed in the colored band above the image in the main display. You can select which information to show when in single display or in multi-display, in live or in playback.

You can also choose the font type and font size used. Only fixed-width font are available as it keep the text easy to read even when being updated. Using a larger font size will make text easier to read at the expense of having a smaller area left to display the image itself.

Interface settings
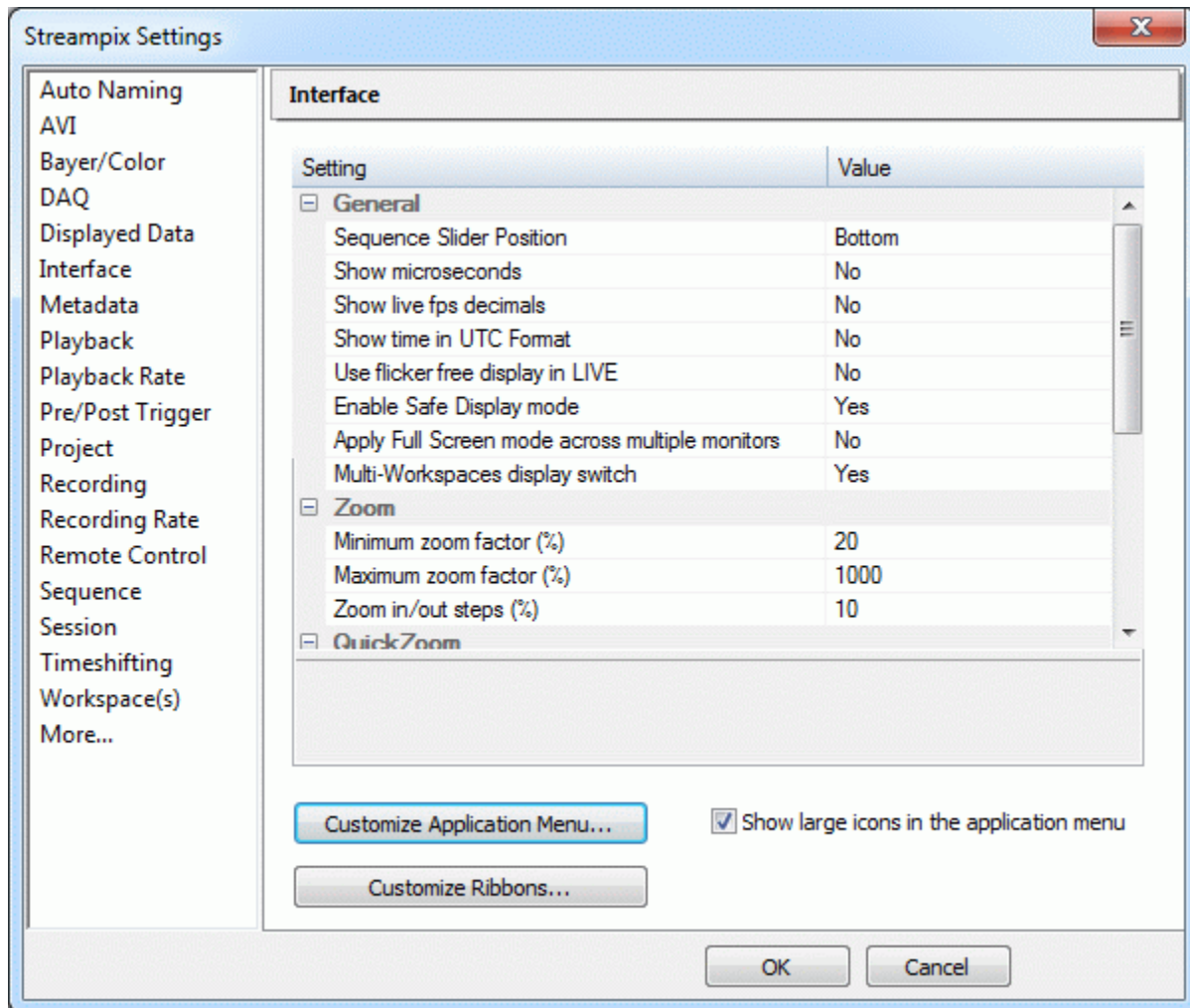
General

Sequence Slider Position : Allows to change default placement of the Sequence Slider bar. You can place it at the top (just below the ribbon bar) or at the bottom of the window (default).

Show microseconds : Display the timestamp's microseconds in the interface, altough it should only be used with a precise hardware time source. Default timestamping use the OS time, which has a precision of ~ 1 millisecond. You can select a different time source than the default system clock provided you have a supported device. Use **Select Time Source** from the **Workspace** tab to select a different time source.

Show absolute time stamps in UTC format : Make the absolute time stamps appear in Greenwich standard. (No time zone adjustment)

Apply Full Screen Mode across multiple monitors : Do what it says.

Multi-Workspace Display Switch : If enabled, when all workspaces are selected, switching the display to LIVE (or playback) will be done on every workspaces (not just on the current).

Zoom

Minimum zoom factor (%) : The minimum zoom factor allowed when zooming out.

Maximum zoom factor (%) : The maximum zoom factor allowed when zooming in.

Zoom in/out steps (%) : The zooming steps. For example, 10 means that each zoom in/out action, will change the zoom by 10%.

QuickZoom

The QuickZoom allows to quickly browse an image content. Two different zoom level can be preset to zoom in or out the image. Set the Full View value to the zoom factor at which the whole image is visible in the display area.

QuickZoom Level 1 : Set the zoom factor to a specific value when holding "Ctrl" while clicking in a display. The zoom will be centered on the pixel under the mouse.

QuickZoom Level 2 : Set the zoom factor to a specific value when holding "Ctrl-Shift" while cliking in a display. The zoom will be centered on the pixel under the mouse.

QuickZoom Full View : Set the zoom factor to a specific value when using the "Ctrl-*" key combination. The zoom will be centered on the pixel under the mouse.

ROI QuickZoom minimum size : Set the minimum size allowed for the Zoom ROI. The ROI QuickZoom allows to make a zone of the image use the full display area. If it is smaller than the minimum size, the ROI size will be increased accordingly. (Note : If the ROI is smaller than 4x4 pixels, the ROI action will be ignored)

Docked Dialog

(Not available in the Single Camera version) Which workspace is shown in the docking panel for each mode, *Single* or *Multi-Display*, can also be selected here. Differentiating each display of a Muti-Display array is facilitated by setting secific colors for each one in the **Select Workspace Color** in the **Workspace** tab.

Customizing the Ribbon interface

[Customize Application Menu] and [Customize Ribbons] allow to change the layout and content of the application menu (the round button at the top-left or the ribbon) and of the ribbons themselves.

By default, the menu uses small icons. On a HD screen (> 1024x768) you might want to use the large icons for better results. (see the checkbox)
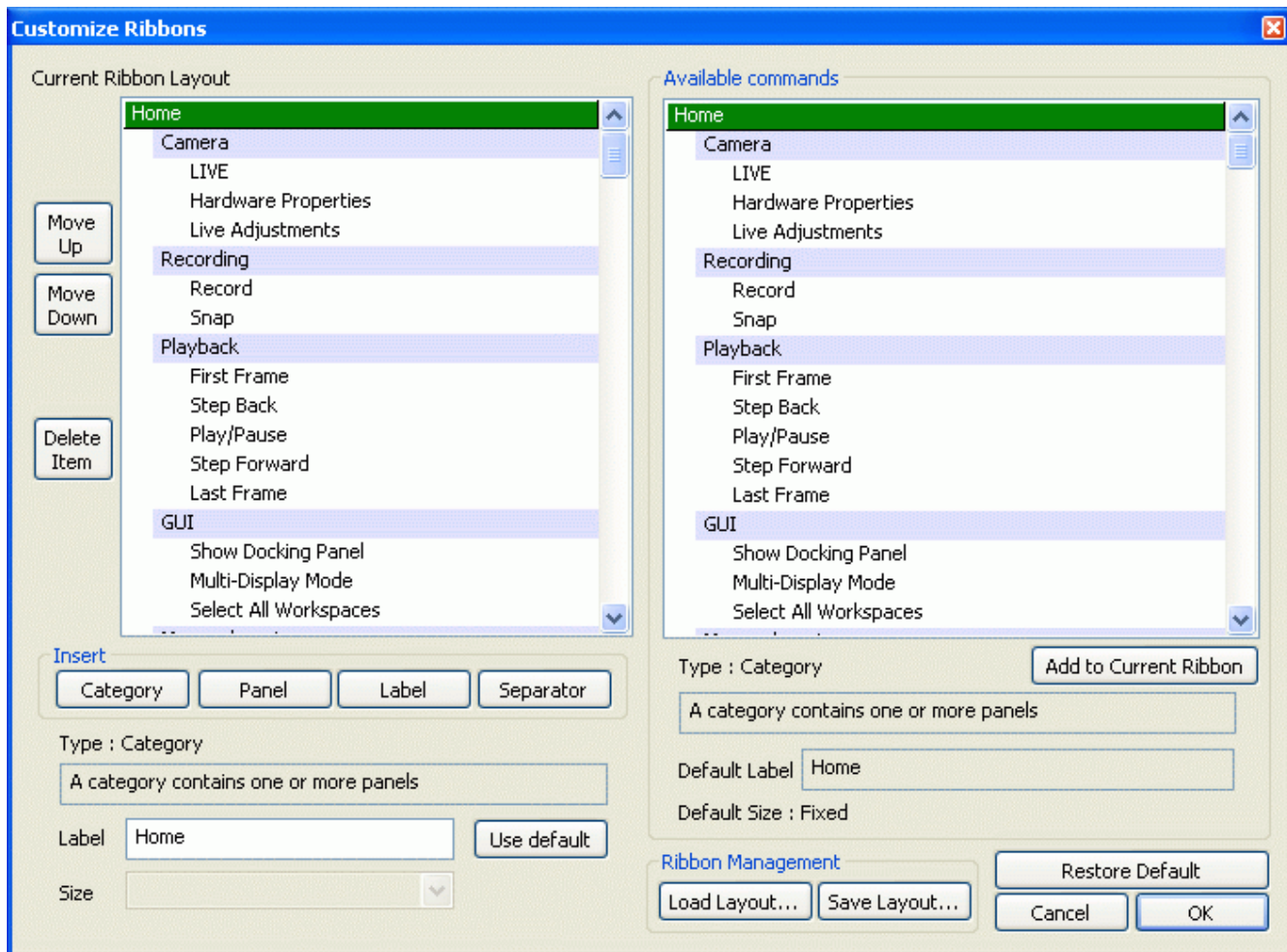
StreamPix will have to be restarted before the change(s) takes effect.

Click on [Customize Application Menu] to choose which items appear in the menu. Uncheck the items to hide them.
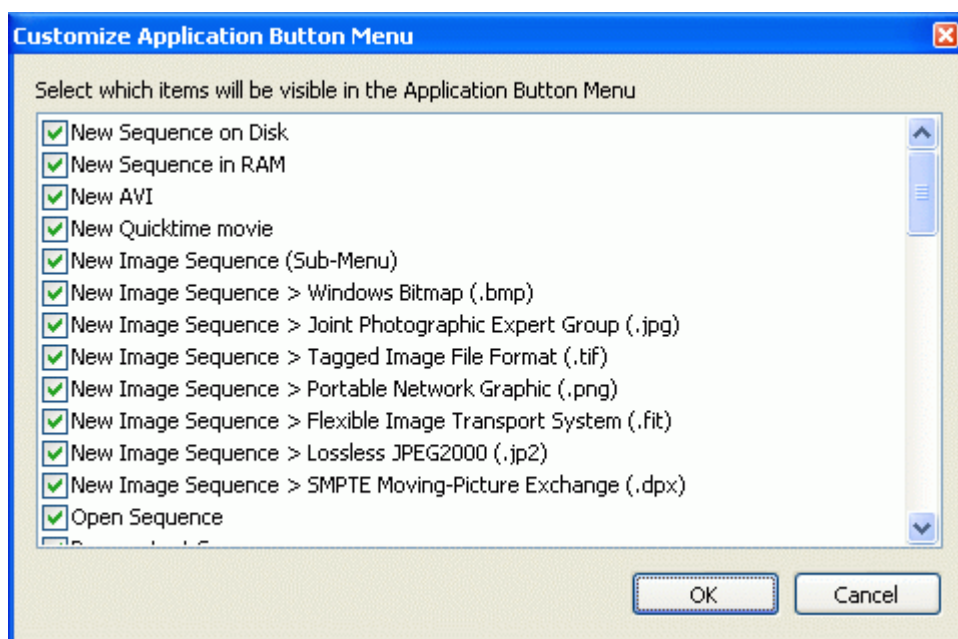
Clicking on [Customize Ribbons] will show the following dialog :

The current ribbon layout is shown on the left and all the available commands are on the right. Dark blue represent categories ("tabs"), light blue are the panels ("groups") and white are the individual controls.

Double-click (or click [Add to Current Ribbon]) on an item in the "Available commands" list will insert it in the "Current Ribbon Layout" list. You can use the [Move Up] / [Move Down] to reorder the items in the list. [Delete item] removes the item.

You can use the buttons in "Insert" to create your own custom categories, panels, labels or separators. Information about the currently selected item (in green in the list) is shown at the bottom of both list.

[Restore Default] will restore the default ribbons. [OK] will save the changes made (they will take effect next time StreamPix is launched). You can also load/save your ribbon configuration in case you frequently need to switch between different layouts.

Metadata settings
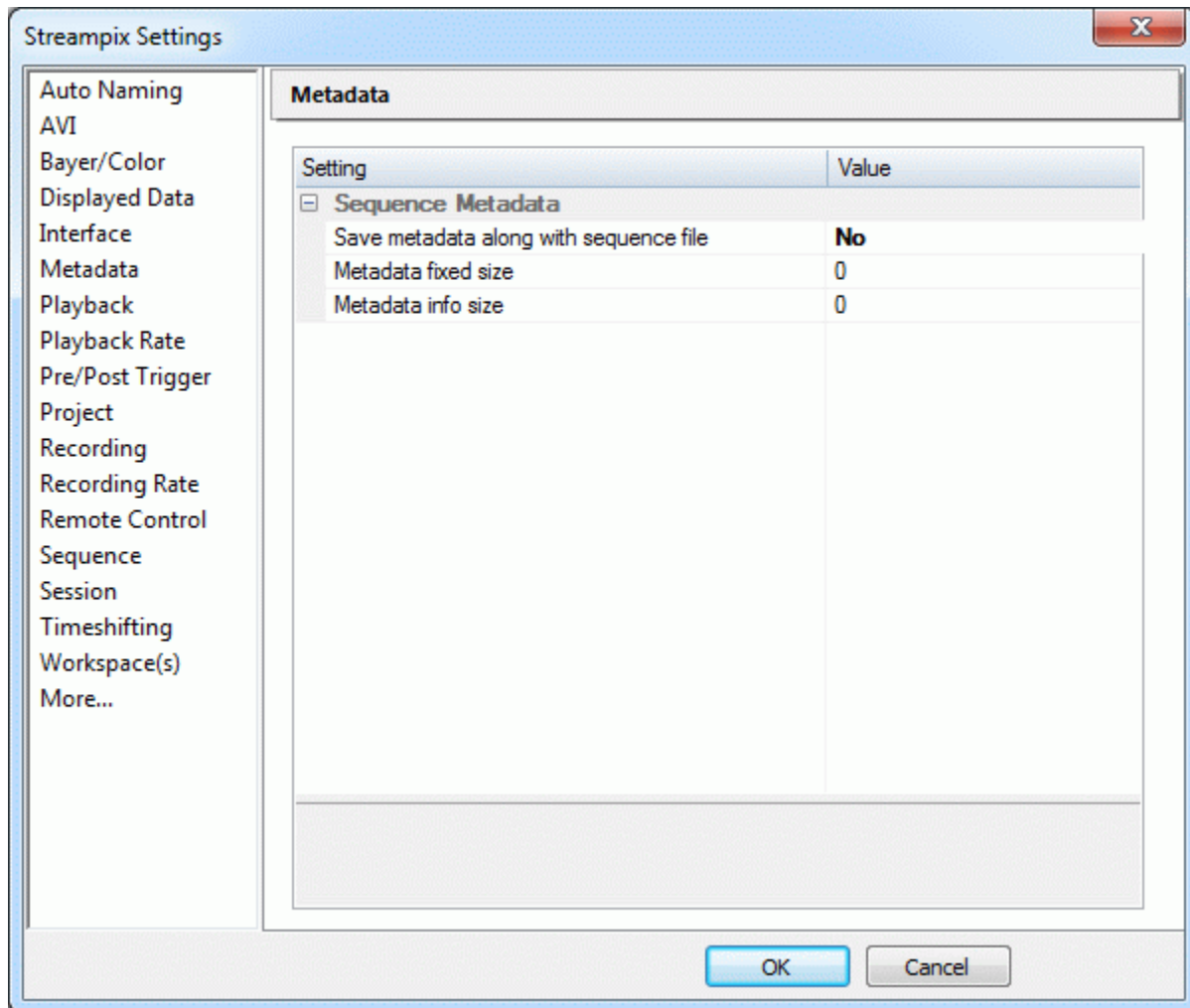
Save metadata along with sequence file : If enabled, when streaming to a sequence file, Streampix will also save the metadata bundled with the saved frames. You can see the metadata bundled with the images with the 'Metadata Spy Module' and/or the 'Metadata Overlay Module'. The metadata is saved in the same folder as the sequence in a file with the same name as the sequence with an added '.metadata' extension. Ex : "Capture123.seq.metadata"

Metadata constant size : If 0, the metadata will be stored with a dynamic size for optimal file usage. However, if you require recording in loops or pre/post (i.e. rewriting over old images & metadata), then you need to set a constant value for the size. This value can be computed using the 'Metadata Spy Module' which will monitor the live feed to estimate the minimum size needed. You can also use the 'Metadata Manager' from the 'Tools' ribbon.

Metadata info size : If you use a 3rd party module that use a custom metadata type, StreamPix need to save some information about this custom type to the metadata file. Use the 'Metadata Manager' to compute the required metadata info size.

MOV settings
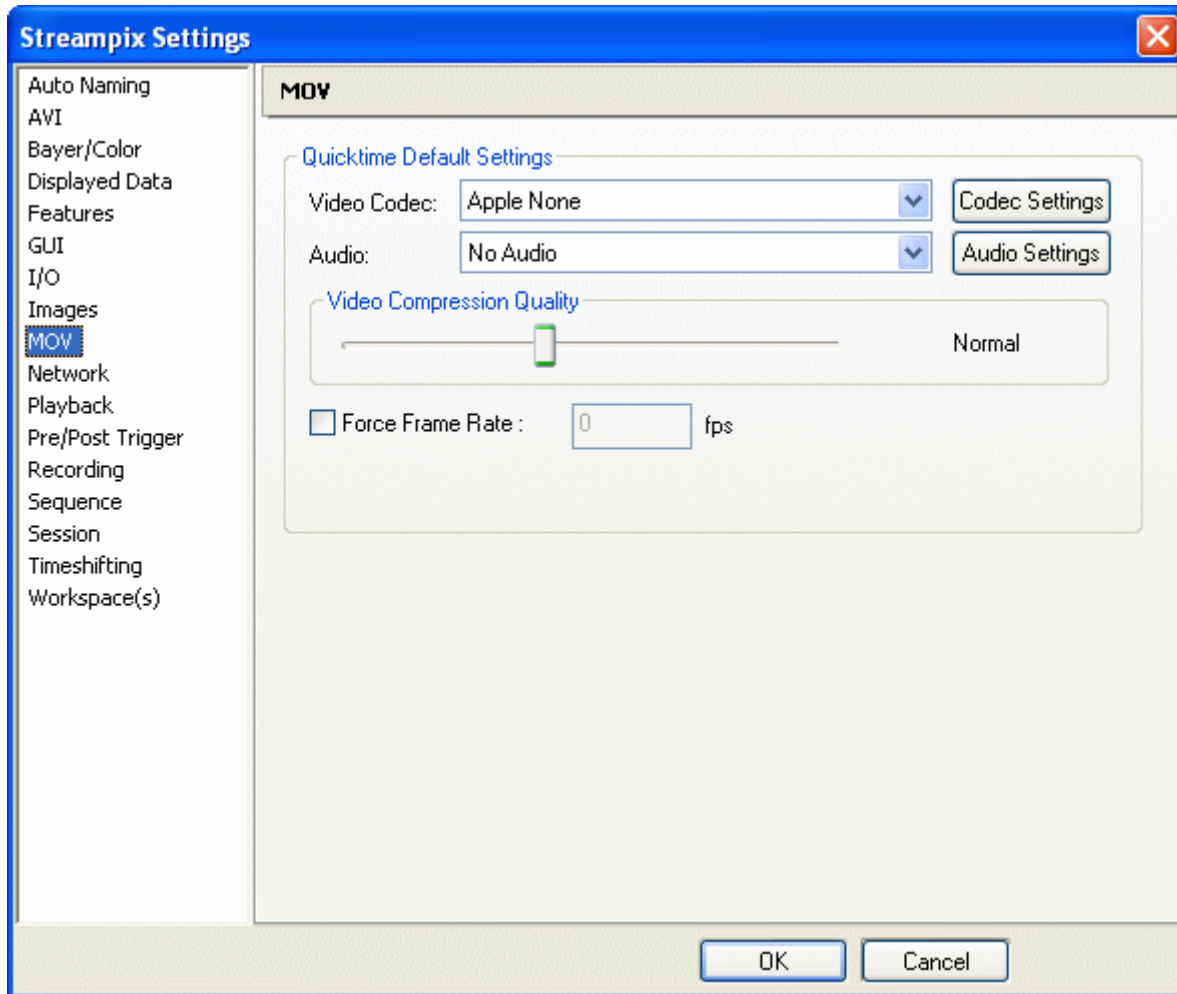
Important : the MOV format is only available on 32-bit Windows.

This page is used to set the default options used when exporting to a MOV file. If *Automatic File Naming* is enabled, those settings will be used. If the selected codec offers additionnal settings, clicking on [Codec Settings] will display a dialog custom to the codec.

For most codec, a higher Video Compression Quality will result in a larger file.

To get an uncompressed Quicktime file, choose "Apple None" as the Video Codec. Finally, note that some codecs will put watermark on the images (or simply won't work) if you don't have the required license.

You can also "Create a SMPTE timecode track" if you have an external LTC time source. This timecode track will be selectable in the Quicktime Player by clicking on the current time (ex : "00:00:00") and selecting "Timecode: Non-Drop-Frame" from the drop-down menu.

Playback settings
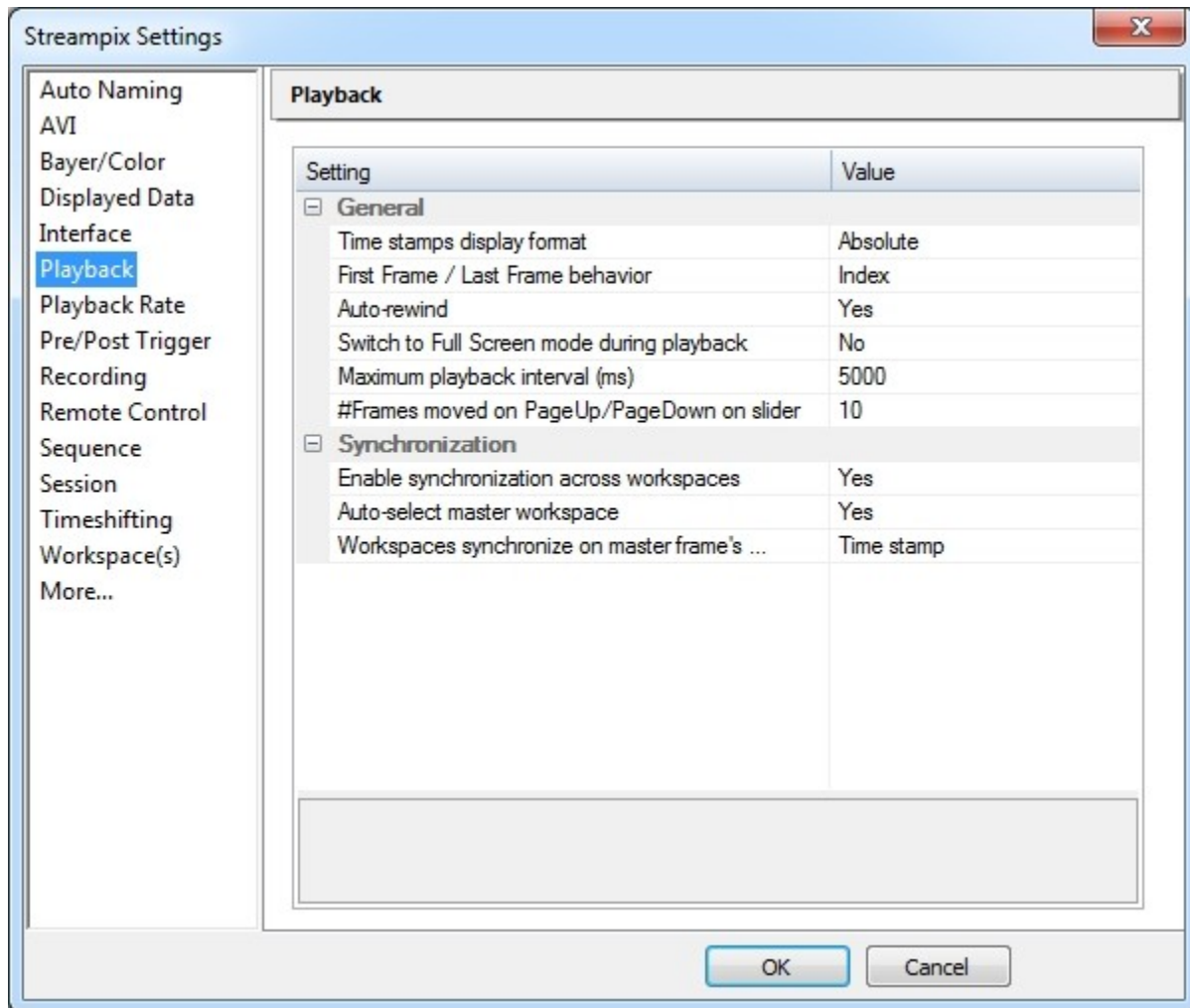
General

Time stamps display format : The time format used to display time in the interface. It can either show the relative time (relative to the first frame of the sequence) or the absolute time (actual date + time).

First Frame / Last Frame behavior : Configure the way the |< and >| playback buttons behave. Normaly, they will move to the first and last frame of the sequence file. However, there is also the option to have them move to the oldest or most recent frame (according to their time stamps). The second option is useful if you do loop recording or pre/post triggering.

Auto-Rewind : If enabled, StreamPix will continue playback from the start when the end of the sequence is reached (instead of stopping).

Switch to Full Screen mode during playback : If enabled, StreamPix will make the display area extend to the full screen while playing back a sequence or avi.

Maximum playback interval : During playback, the display is done following the time stamps. So if two successive images are 10 seconds apart, StreamPix will wait 10 seconds between the showing each image. This can be a problem is the recording is not done continuously. For example, you start a recording, stop it, then restart it later. To work around this problem, StreamPix uses a maximum playback interval value. For example, if you set this value to 1000 ms, the playback will proceed with, at most, a one second interval between each successive frames. Default value is 5000 ms.

#Frames moved on PageUp/PageDown on slider : When the sequence slider is selected, the PageUp/PageDown button can be used to move X frames forward or backward.

Synchronization

(The following features are not available in the Single Camera version)

The Multi-Workspace Synch allows customize the behaviour of the slider's cursor when moved while StreamPix is in **Select All Workspaces** mode and only relevant if every sequence in each workspace was captured at the same time. A master workspace must also be defined for the synchronization to be maintained.

Synchronize on master frame index. This is used if all used cameras have the same frame rate and started recording at the same time, as in hardware-triggered recording. For instance, moving one sequence to frame # 45 will bring every other sequence to frame #45.

Synchronize on master frame timestamp. The linked sequences will show the frames that were captured at the same time as the current frame. If a frame with the exact same time stamp can not be found, the sequence will show the frame captured before the requested time.

You can also allow StreamPix to automatically choose a workspace to be the master when all workspaces are selected. The master can always be changed manually by double-clicking on the desired workspace tab.

Playback Rate settings
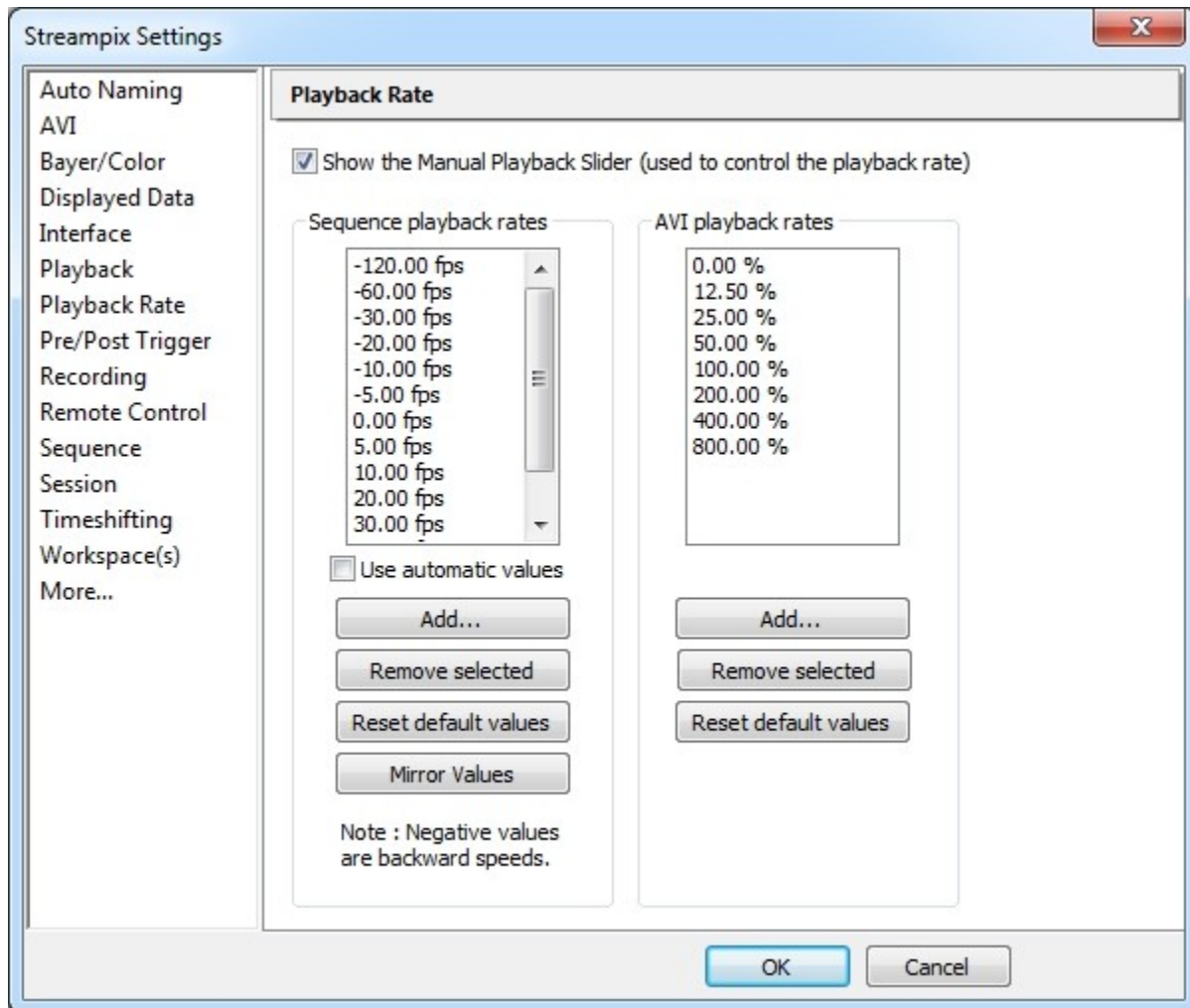
The Manual Playback Slider allows the user playback sequences and AVI files at variable speeds (slower & faster, forward & backward).

Sequence playback rates

Pressing [Add] allows to add a new fps value to the list, [Remove selected] erases the currently selected value and [Reset default values] returns the list to default values. [Mirror Values] will mirror the values. For example, if you list consist of 0, 10, -20, 30, [Mirror] will add -10, 20 and -30.

A negative FPS value indicates a backward playback and a positive value is a forward playback.

The zero (0.00 FPS) value is mandatory and is used as the "Paused" value and will be automatically added when the *OK* button is clicked on.

If *Use automatic values* is checked, StreamPix will dynamically build a custom list of FPS values based on the "Suggested frame rate" specified in the current sequence header.

AVI playback rates

AVI playback is handled differently as the values are percentages of the AVI normal speed. Compared to the regular playback speed, 50% will playback at half-speed and 200% will playback twice faster.

Pressing [Add] allows to add a new % value to the list, [Remove selected] erases the currently selected value and [Reset default values] returns the list to default values.

The zero (0% speed) and normal (100% speed) values are mandatory will be automatically added (as needed) when the *OK* button is clicked on.

AVI files don't allow backward playback so only positive values are allowed.

Pre/Post Trigger
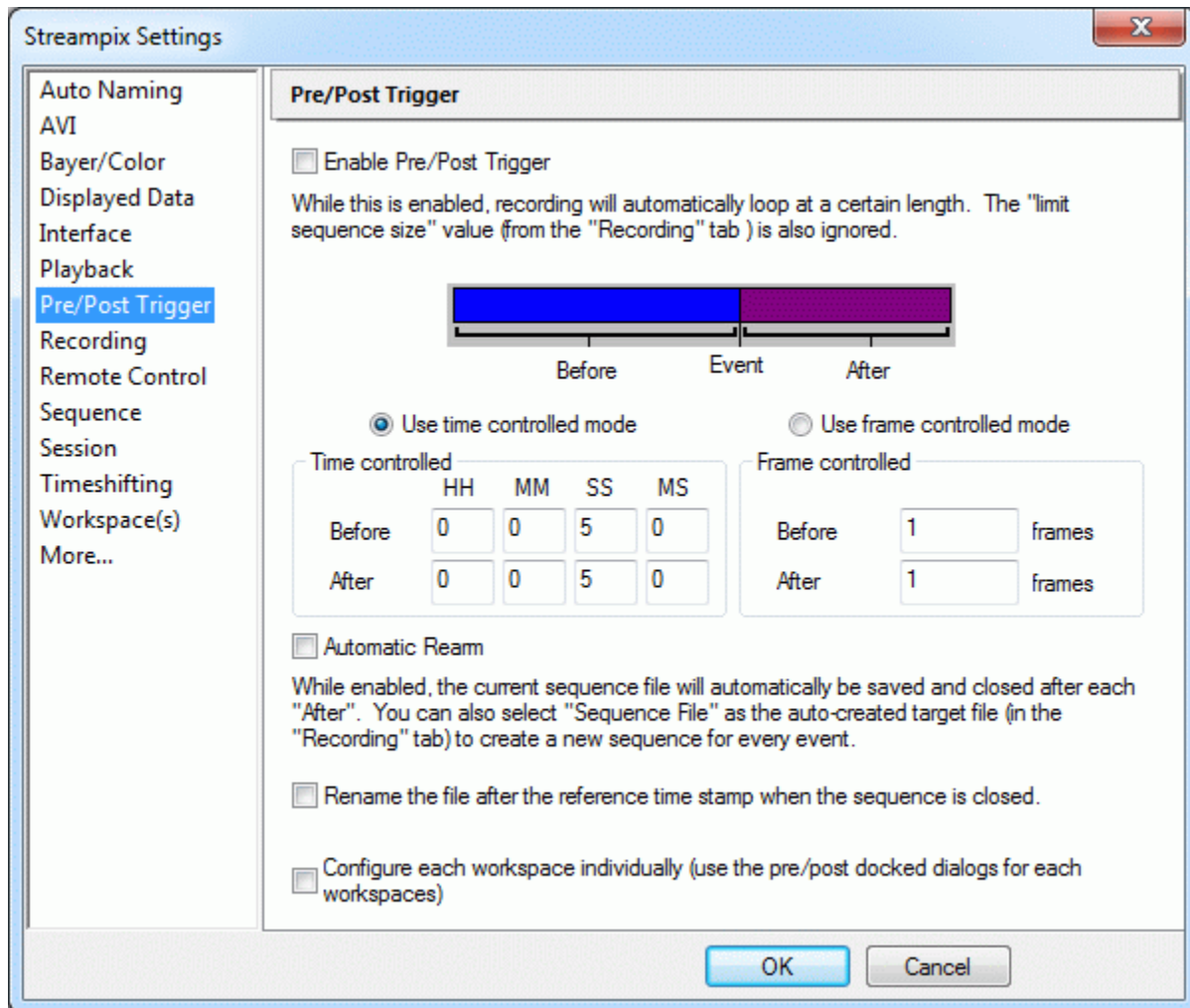
Pre/Post Trigger is a special recording mode. It is recommended to use this feature only with sequence files (on disk or in RAM), as the other formats (AVI, bmp, tiff, etc) do not support loop recording.

Pre/Post Trigger ignores the loop settings and always loops. Pre/Post Trigger also ignores the sequence limit, if any.

First define a duration for the "Pre" and the "Post" length.

In *time controlled mode*, when record is initiated, StreamPix will sum the two durations and factor in the current capture fps of the grabber, to compute the maximum number of frames in the sequence. When the maximum number of frames is reached, the recording will continue from the beginning, overwriting the oldest images.

In *frame controlled mode*, specify how many frames must be kept before the event and how many after.

When the Pre/Post event is triggered, either from an IO action (see IO Manager docked dialog) or from the **Trigger Pre/Post Event** command, StreamPix will continue recording for the "after" duration and stop automatically once that preset time has elapsed. The resulting sequence will include what happened before and after the event.

When the Pre/Post event occurs, the next frame to be captured will be marked as the reference frame. This means that when browsing the sequence and displaying the time stamps as relative instead of absolute, each frame's time will be relative to that reference frame instead of the first frame of the sequence. Since the frame "Event" will be marked as time 0, frames captured before it will present a negative time and those captured after will be identified by a positive time.

If the "Automatic Rearm" option is checked, the current target file (the sequence file) will automatically be saved and closed before StreamPix restarts recording. Using this along with the "Auto-Create file" option in **StreamPix Settings > Recording** will automatically create a new sequence file every time the Pre/Post Trigger event occurs.

If *Rename the file after the reference time stamp when the sequence is closed* is checked, then the sequence file will be renamed with the absolute time stamp of the reference frame. The file will be in the same location, but renamed to someting like "Fri May 09 14-03-47.22.seq" which show the date and time the reference frame of the sequence was captured.

Recording settings
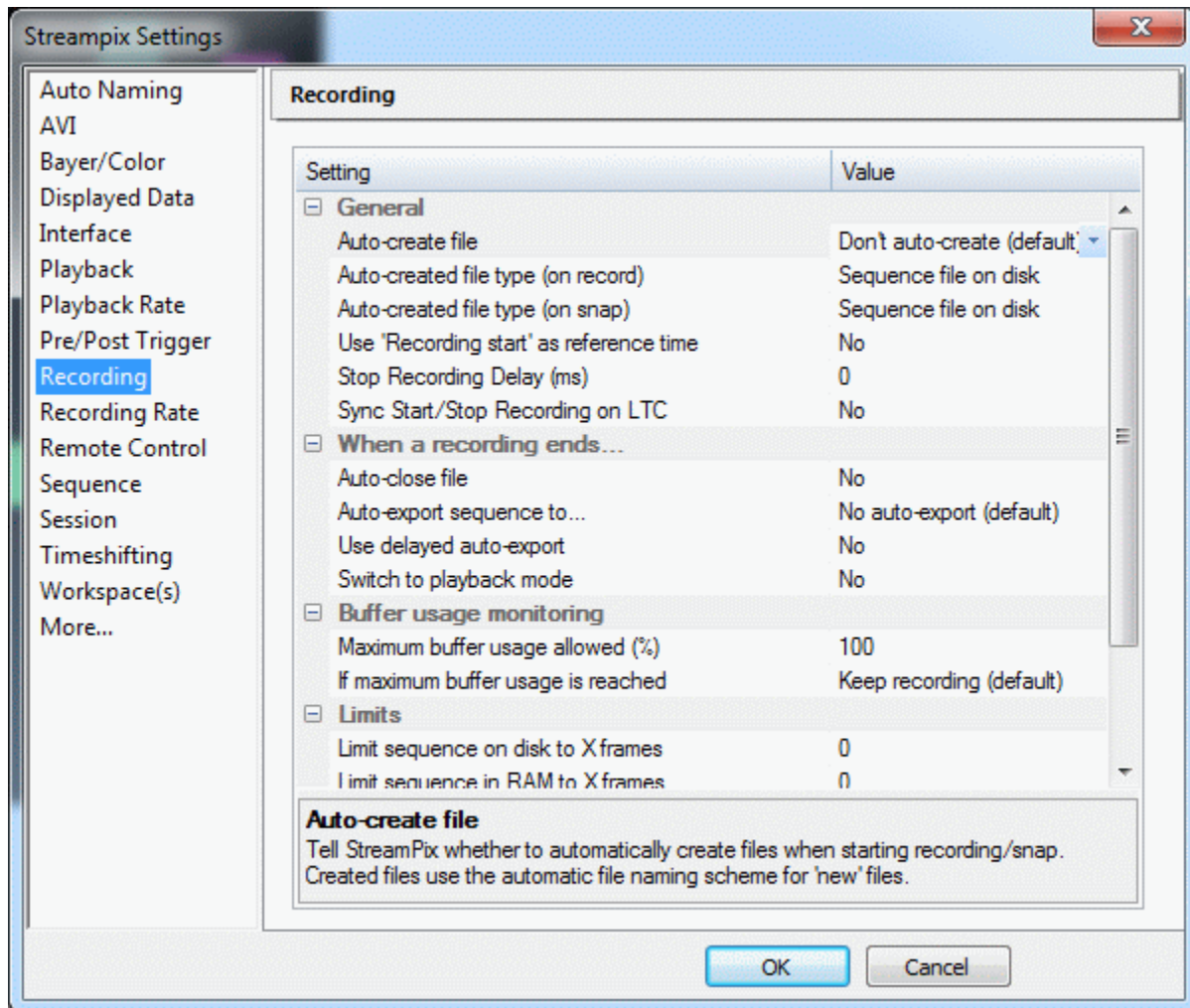
General

Auto-Create File : Define StreamPix's behavior when a recording/snap is initiated. "Never" won't do anything special. "If not current file" will automatically create a target file if the workspace hasn't any file opened. "Always" will close the current workspace file (if any) and create a new target file for the recording. The created files are named using the auto-naming scheme defined in the "Auto Naming" settings page.

Auto-created file type (on record) : Set what type of file is created when a recording triggers the auto creation of a target file.

Auto-created file type (on snap) : Set what type of file is created when a snap triggers the auto creation of a target file.

Use 'Recording start' as reference time : By default, StreamPix use the first captured frame timestamp as the reference time. Checking "When a recording starts, take the current time as the

sequence's reference time" will do exectly that. For example, this can be useful to get accurate relative times when the recording is manualy started but the image capture is controlled by a HW trigger. Or other cases where you need the reference time to be exactly the time at which the recording started.

Stop Recording Delay : Allows to specify a wait period between the time the record button is pressed (to stop the recording) and the time at which the recording will actually be stopped.

Synch Start/Stop Recording on LTC : special mode to synchronize start/stop recording on current time code received from an LTC reader board. If enabled, the current time code is rounded up to the second 0-frame time code (up to 2 seconds delay) and used to determine the exact time code value in the future when start/stop recording will occur. The same value is provided for all workspaces to ensure time synchronization.

When a recording ends...

Auto-close file : Automatically close the current file when the recording stops.
Auto-export sequence to... : Choose a format (SEQ, AVI, BMP, JPG, etc) to export to.
Use delayed auto-export : StreamPix will wait until every workspaces as stopped recording before exporting.
Switch to playback mode : The workspace display will automatically switch the playback mode.

Buffer usage monitoring

Maximum buffer usage allowed (%) : StreamPix can trigger an action if the buffer gets too high.

If maximum buffer usage is reached : StreamPix can either do nothing or stop the recording on the current workspace (or on all workspaces)

Limits

Limit sequence on disk/RAM to X frames: Specify the default number of frames to be captured in a sequence on disk or in RAM.

Loop recording when limit is reached : Define StreamPix behavior when the frame limit is reached. If the *Loop* option is enabled, the sequence will continue recording from the start. Otherwise, the recording will stop when the limit is reached. Those settings can be overridden at the workspace level, in the Sequence docked dialogs.

Recording Rate settings
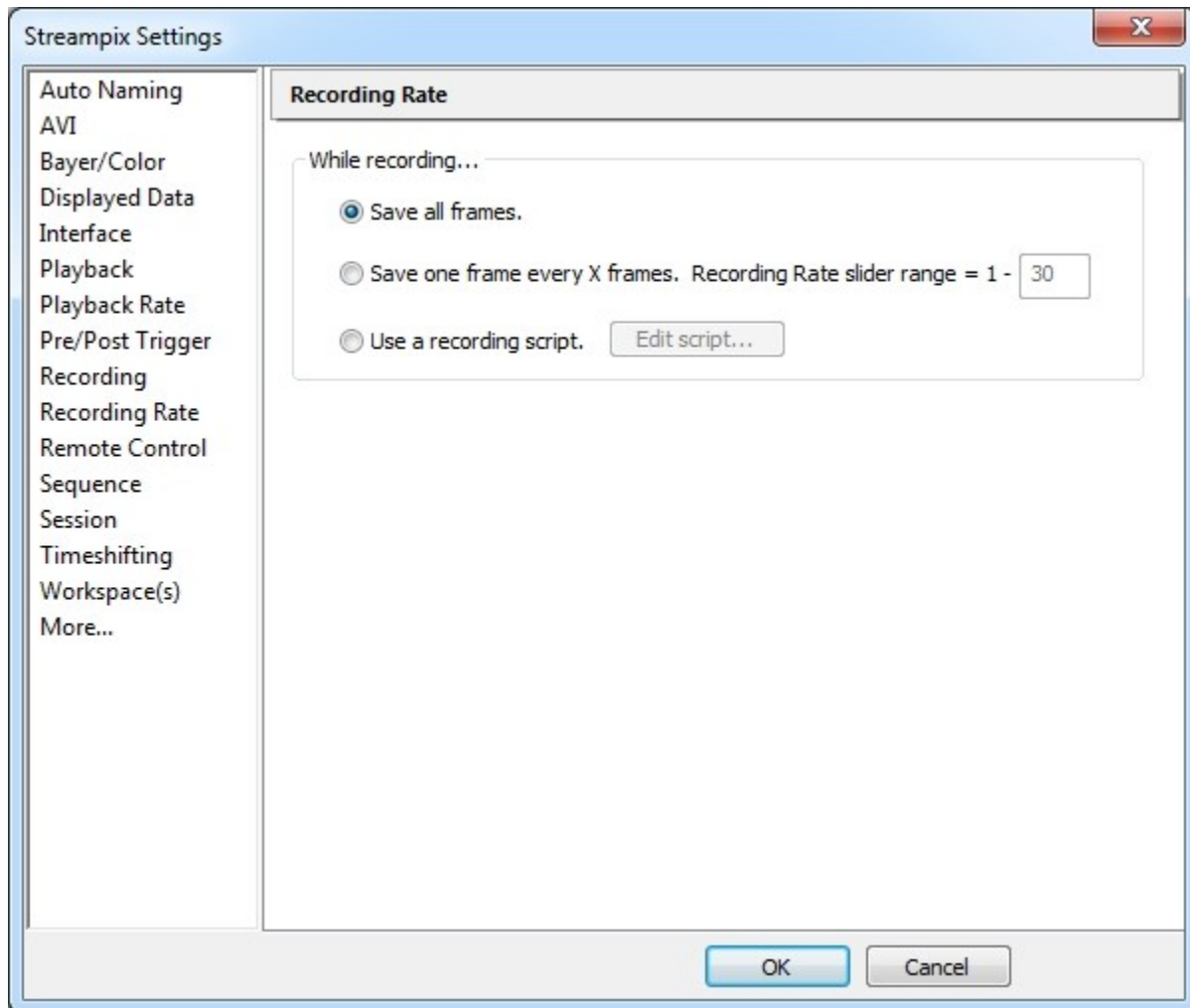
While Recording...

While recording, the default behavior is to save every acquired frame to the target file (sequence, AVI, etc). However, StreamPix offers two addionnal modes.

The first option is to reduce the recording rate to a factor of the camera acquisition rate. The "Recording Rate slider" in the Workspace tab allows you to set the recording rate for the current workspace (or for all workspaces if all workspaces are currently selected). You can also set the range of the slider from here.

The second option, the Recording Manager, offers an even finer control of the recording process. With it, clicking on the record button will start running a predefined recording script. You can make your own script using the 'Recording Manager Editor', see the Recording Manager section for detailed information and examples.

Remote Control
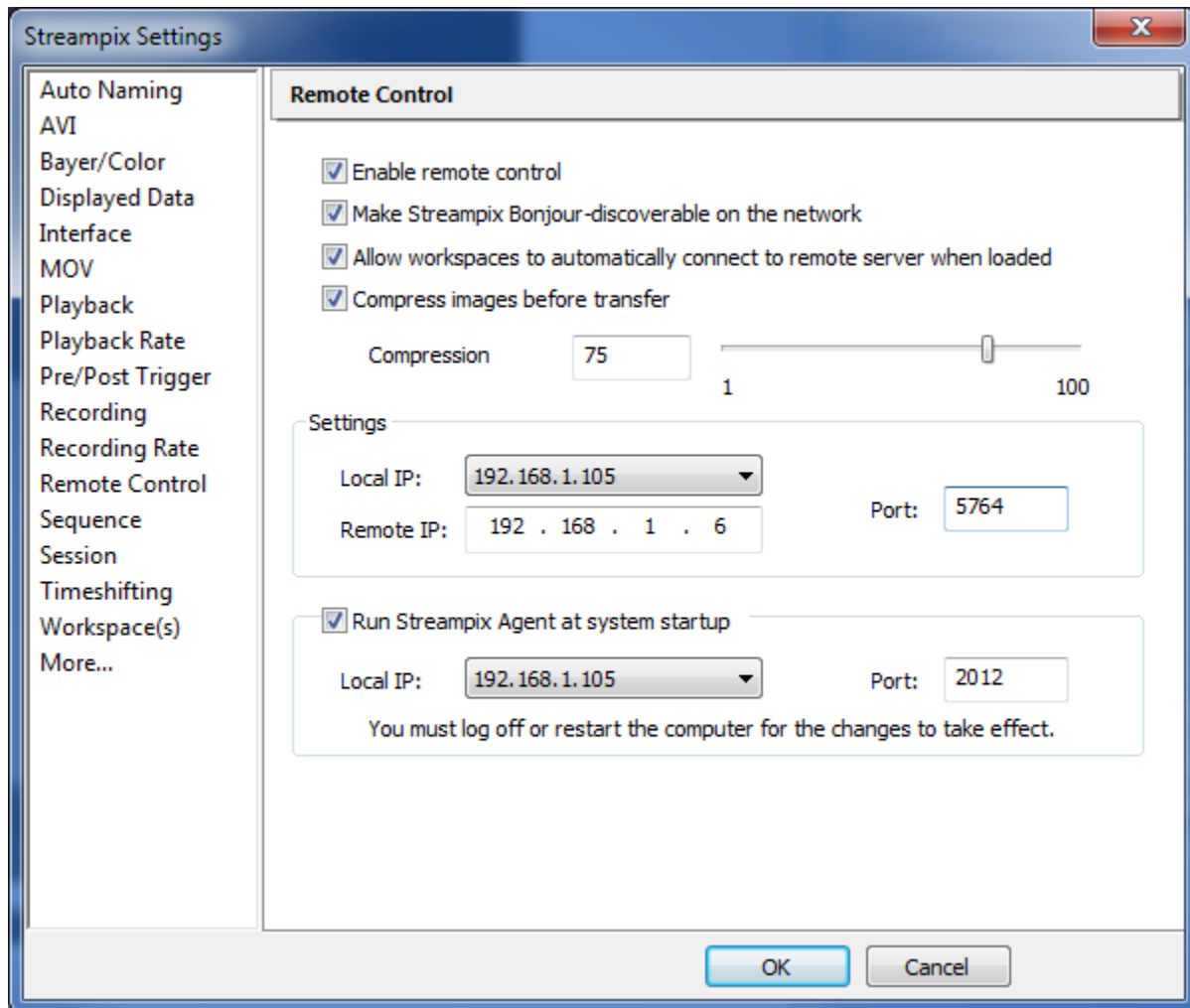
This page is used to connect workspace(s) to a remote server like StreamPix Remote.

StreamPix Remote is an external application that allows the user to remotely view, control and monitor multiple workspaces running on one or more computers on the local network. It is distributed separately from StreamPix.

To configure StreamPix 5 to connect to StreamPix Remote, follow the procedure below:
1. From the StreamPix Settings window, select the Remote Control page.
2. Check the Enable remote control check box to enable network communication.
3. Optionally, allow StreamPix Remote to discover StreamPix 5 computers on the network and workspace(s) to automatically connect to StreamPix Remote when loaded.
4. Enable image compression and set the compression quality. When the network bandwidth usage is high, this option can reduce the network traffic considerably.
5. To get connected select a local IP address and supply the same IP address and port number you specified when you configured StreamPix Remote to accept new connections. The connection will be possible only if both IP addresses are reachable.

6. In case more control over a remote computer is needed, you must enable StreamPix Agent. This tool will allow StreamPix Remote to:
- Shutdown or restart computer
- Log off user
- Launch StreamPix 5
- Forcibly quit StreamPix 5 (in case of crash or frozen GUI)
7. Click OK to save the changes and close the StreamPix Settings dialog.

When remote control is enabled a new dialog will show up on the StreamPix 5 docking panel interface for each workspace.
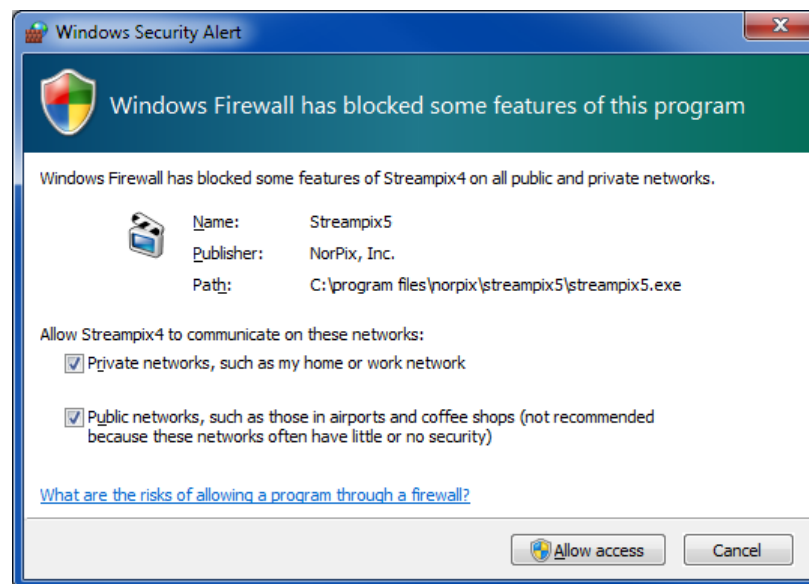
Remote Control - Connected to 192.168.1.6:5764

Connect | Disconnect | ☐ Broadcast
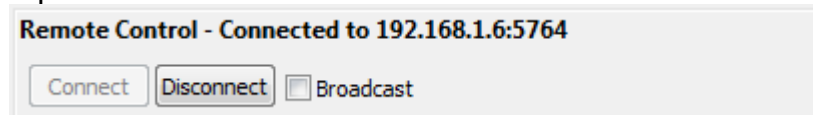
You can click on the Connect or Disconnect buttons to manually connect or disconnect current workspace to StreamPix Remote. Checking the Broadcast check box, will send the command to all other workspaces so you won't have to click Connect or Disconnect for each workspace.

A connection may fail if:
  • The server is not running nor accepting new connections.
  • The address and port number are not the same as those StreamPix Remote is listening to.
  • A firewall blocks the port that StreamPix Remote is listening to.
Make sure you configure the firewall to allow StreamPix 5 to access the network.

Windows Security Alert

Windows Firewall has blocked some features of this program

Windows Firewall has blocked some features of Streampix4 on all public and private networks.

Name: Streampix5
Publisher: NorPix, Inc.
Path: C:\program files\norpix\streampix5\streampix5.exe

Allow Streampix4 to communicate on these networks:
  ☑ Private networks, such as my home or work network

  ☑ Public networks, such as those in airports and coffee shops (not recommended because these networks often have little or no security)

What are the risks of allowing a program through a firewall?

Allow access | Cancel

Sequence Settings

General

Force frame rate : Overwrite the calculated frame rate of recorded sequence by a fixed value.

Force frame rate value : the fps value used if Force frame rate is enabled.

Sort frames before exporting : if you do loop recording or use the pre-post trigger, you might want to enable this. This will make sure that the frames in the sequence will be exported in their chronological order. This is especialy important when exporting to AVI or MOV.

Use nearest frame for goto and synch : When disabled (default), use the last frame to have been captured at the requested time. Enabling it will seek the closest frame (in time).

Open exported sequences in a temp workspace : If you want to automatically open sequences exported in a new temporary workspace for immediate viewing. This apply to every Export (current image, current selection & full sequence) to a sequence File (.seq).

RAM Sequence

When closing a RAM sequence : Allows to decide what happen when a RAM sequence is closing. The choices are : *Discard the sequence*, *Ask if the sequence is to be saved* or *Automatically save the sequence using the auto-naming scheme for exports.* (See **Auto Naming** settings)

Pre-allocated RAM frames : Pre-allocate the memory for uncompressed RAM sequences. Try this if the normal capture to RAM drops frames (burst recording).

Stop recording is available RAM is < (MB) : When recording to a RAM sequence, StreamPix can become irresponsive if the system run out of RAM. To avoid that, every second or so, StreamPix will check the amount of RAM available and if it reaches the critical value specified here, the recording will automaticaly be stopped.

Compression for new sequences & Compression for exported sequences

Here you can set the compression mode used by sequence files. By default, sequence files don't use compression, resulting in lossless quality and superior recording performance. Use sequence compression if disk space is a concern.

There are two sections : one for new sequences (i.e. sequence files used for direct recording) and one for exported sequences. This allows, for example, to record in uncompressed format, then later, export the sequence to a compressed format for archiving purposes.

Session settings
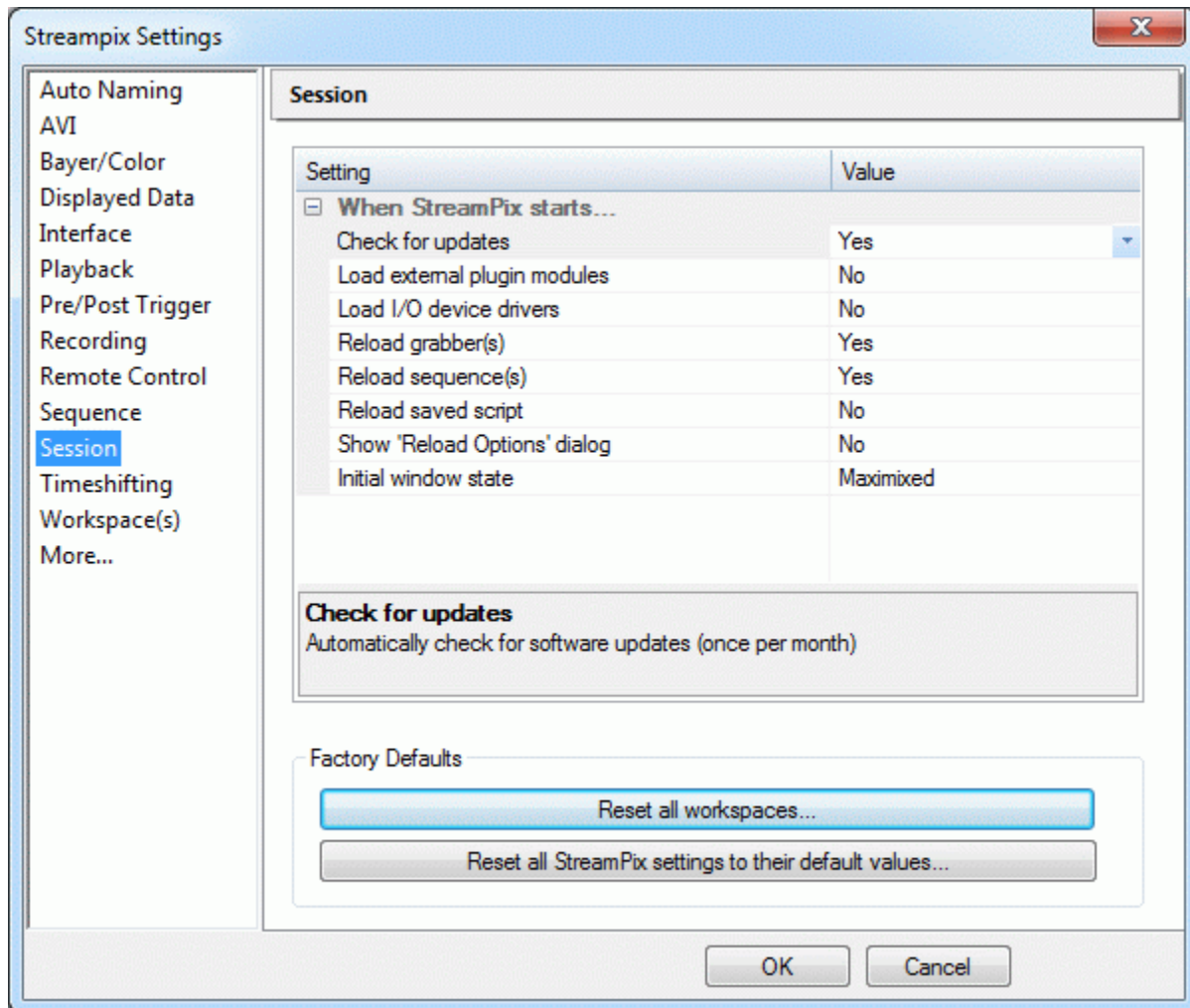
When StreamPix starts...

Check for updates : Automatically check if a new release of StreamPix is available. The check is done once per month.

Load external plugin modules : If you don't use any modules, skipping loading them will make StreamPix launch faster.

Load I/O device drivers : If you don't use the I/O manager, skipping loading the IO drivers will make StreamPix launch faster.

Reload grabber(s) : Automatically reload the camera / frame grabbers used in the last session.

Reload sequence(s) : Automatically reload sequences that were open in the last session.

Reload saved script : Reload the saved script. Don't enable unless needed.

Show 'Reload Options' dialog : If a crash occurs, the reload dialog will allows you to select which grabber/sequence to reload (or none at all). If disabled, everything will be reloaded as if nothing happened.

Initial window state : Initial window state when StreamPix is launched (normal, minimized, maximixed).

Factory Defaults

Allows to reset some settings to their default values. Resetting the workspace will erase all the workspaces while leaving the StreamPix settings intact. The other option reset everything.

Timeshifting
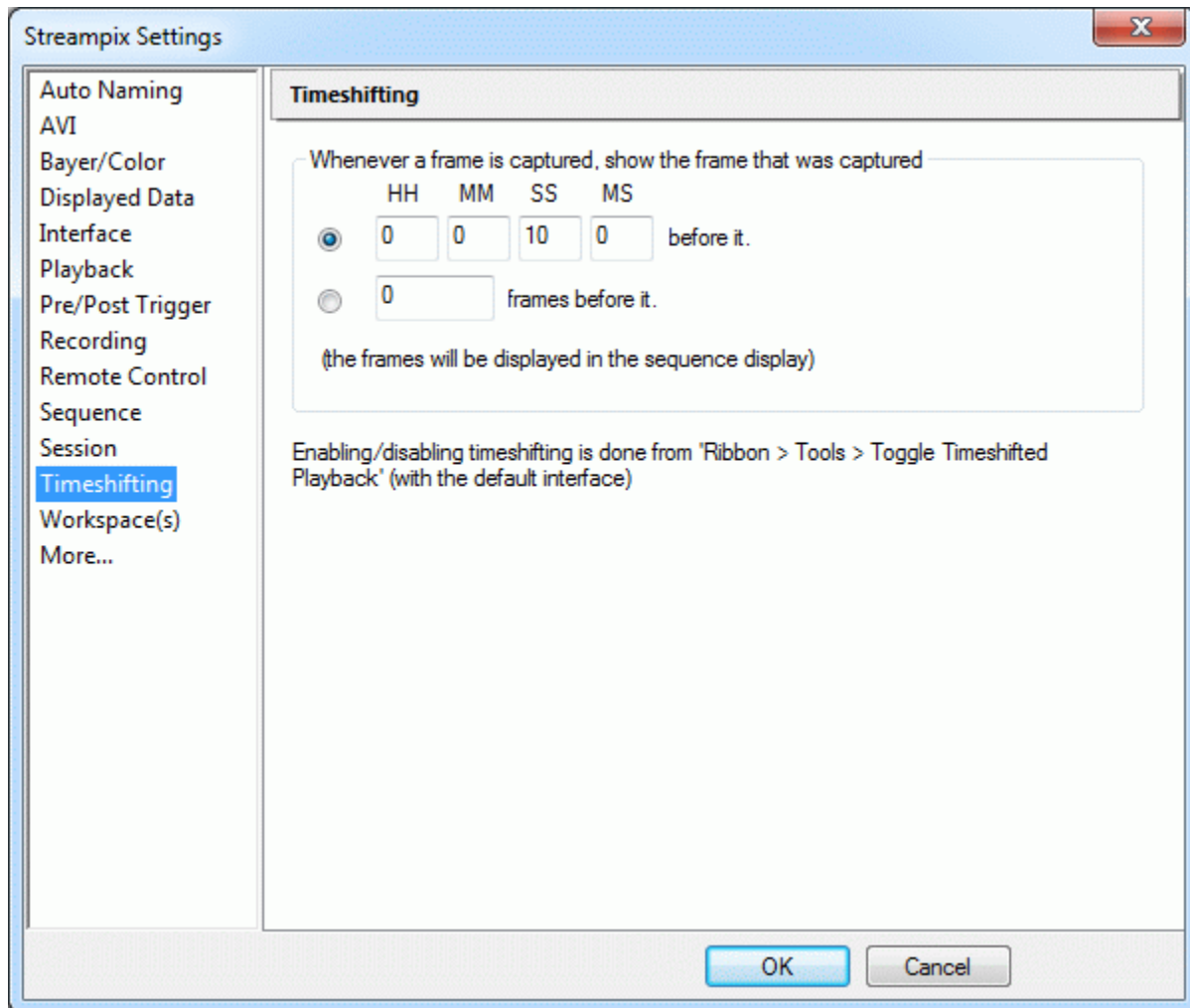
This page is used to configure the timeshifted playback function. You can specify the timeshift mode to be either based on a time delay or on a frame delay.

When the timeshift is enabled, StreamPix will slowly load the memory with information about each frame captured.

Then, you can use **Toggle Timeshifted Playback** from the **Sequence** tab to start/stop the playback. Every time a frame is captured, the sequence display will be updated with the frame that was captured X time or X frames before it.

It is also possible to use timeshifting on a looped recording. (see the *Recording* settings).

Warning : using Timeshifted playback require twice as much bandwidth as needed for a standard recording (because StreamPix has to fetch the old frames from the sequence file). If StreamPix drops frames, the computer might not have sufficient bandwidth to perform the simultaneous read/write operations. One way to reduce bandwidth usage is to do a loop recording in a RAM

sequence.

Finally, don't use the regular playback actions while a timeshifted playback is in progress (they won't work).

Workspaces settings
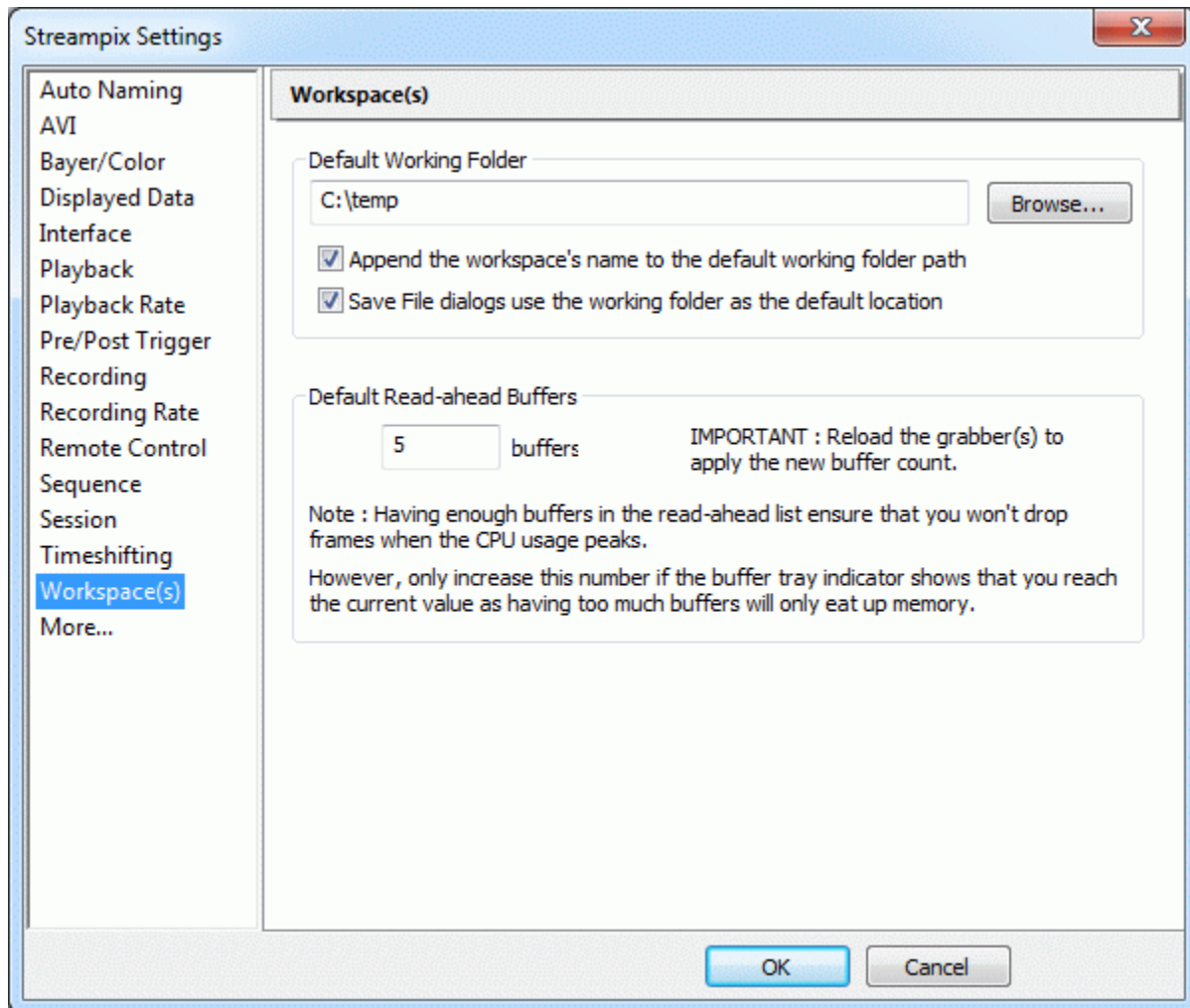
The default *Working Folder* to use for newly created workspaces can be set here. The default for this is "*C:\TEMP*" but can be can be set to any valid path. It is also possible to automatically append the workspace's name to the working folder path. This make it easy to store files related to each workspaces in their own folder.

By default, file dialogs (Save As / Open) start in the Working Folder. It is possible to override this and start in the last used folder instead. Uncheck the "Save File dialogs use the working folder as the default location" to do this.

Individual workspace may also use a custom working folder by using **Select Working Folder** in the **Workspace** tab.

Finally, you can set the default buffer count that will be used by each grabber. For example, if the camera runs at 30 fps, using 150 buffers means that you have a 5 seconds buffer in case the system experience lag at some point.

More...
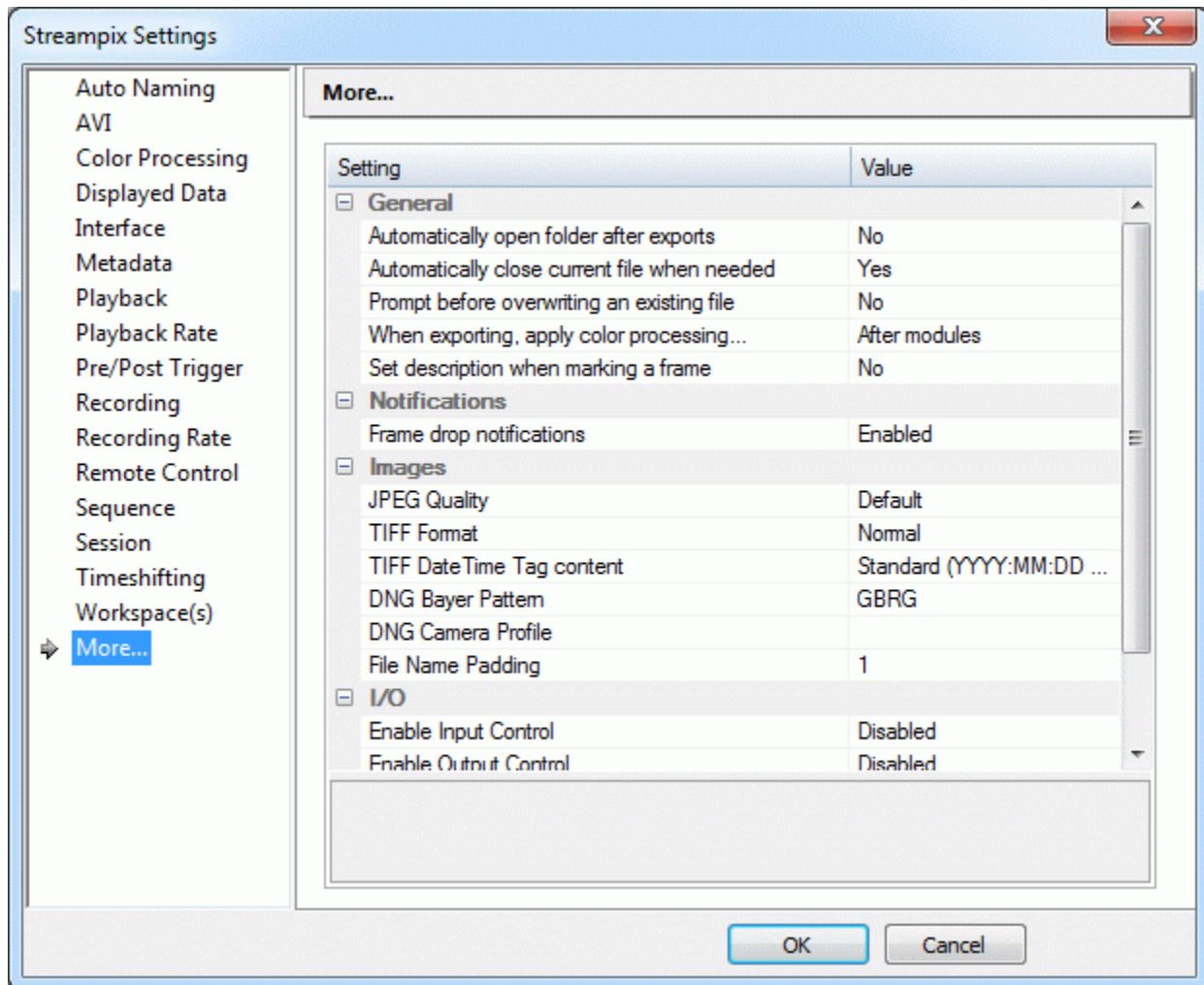
General

Automatically open folder after exports : If enabled, this will automatically open the folder where the files were exported in window explorer.

Automatically close current file when needed : If disabled, the user will get a prompt every time the current sequence, avi, etc are closed.

Prompt before overwriting an existing file : If enabled, when a file name generated from an auto-naming scheme would overwrite an existing file, StreamPix will show a prompt to confirm that the user wants to overwrite. Of course, it is recommended to avoid using this setting if files are automatically created when the record button is clicked as it would delay the recording start time.

When exporting, apply color processing : Either before or after modules. This setting is revelant if the module has overlays to put on the image before of after the image is bayer processed.

Set description when marking a frame : If enabled, the user will be automatically prompted to enter a description for each marked frame (at the time the frame is marked).

Notifications

Frame drop notifications : Disable the notification shown in the notification bar when frame drop is detected. You can still see there were frame dropped by looking in the grabber docked dialog.

Images

JPEG Quality : Quality for the JPEG files. Higher quality results bigger files and higher CPU usage.

TIFF Format : Normal or multi-paged (i.e. all images are saved in a single file).

TIFF Date Time Tag content : chose the format of the DateTime tag in the tiff file.

-Standard Time [YYYY:MM:DD HH:MM:SS] : the tiff specification format.
-Full Time [YYMMDD HHMMSSmmmuuu] : includes milliseconds and microseconds.
-Raw Time [time_t.mmmuuu] : include the standard UNIX 32-bit time_t value and the milliseconds/microseconds.
-LTC Time [HH:MM:SS-FF] : The source frames must have been captured with the support of a LTC timing device.

File Name Padding : Useful to browse the image files easily, as sorting them alphabetically will show them in capture order. Without padding, "image12.bmp" would be shown before "image2.bmp". Simply type the minimum number of digits to include in the file name.
DNG Bayer Pattern: enter the image Bayer pattern to be stored in the image file header.
DNG Camera Profile:enter the camera profile file name if available. When no profile is provided, default values are used for light settings and an identity matrix correction is applied. Use for instance Adobe's DNG Profile Editor (http://www.adobe.com) to create a profile file.

The default source light settings (21) can be changed by editing the following registry key:
    Key Path: HKEY_CURRENT_USER\Software\Norpix
    Key name: DefaultDNGSourceLight
    Key Type: DWORD
    Key Value: 21 (default)

    Other possible recommended values are:

        0 = Unknown
        1 = Daylight
        2 = Fluorescent
        3 = Tungsten (incandescent light)
        4 = Flash
        9 = Fine weather
        10 = Cloudy weather

11 = Shade
12 = Daylight fluorescent (D 5700 - 7100K)
13 = Day white fluorescent (N 4600 - 5400K)
14 = Cool white fluorescent (W 3900 - 4500K)
15 = White fluorescent (WW 3200 - 3700K)
17 = Standard light A
18 = Standard light B
19 = Standard light C
20 = D55
21 = D65 (Default-Neutral Sun Light)
22 = D75
23 = D50
24 = ISO studio tungsten

I/O

Enable Input Control : When enabled, the input docked dialog will be shown in each workspace allowing to monitor various input lines to trigger a recording.

Enable Output Control : When enabled, the output docked dialog will be shown in each workspace allowing to send out signals in reaction to various events.

Recording Manager Editor
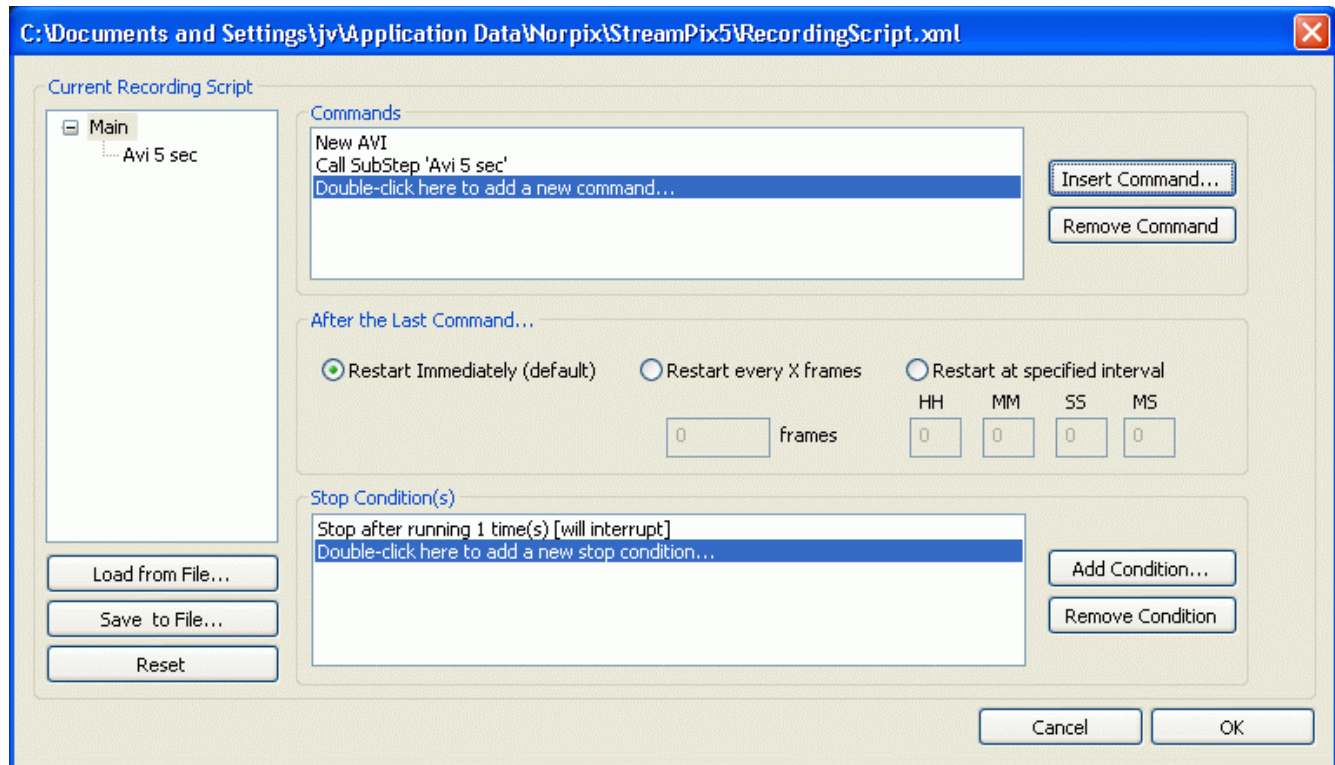
This dialog can be brought up from either 'StreamPix Settings > Recording Rate' or **Select Recording Manager** in the **Workspace** tab. It allows you to build your own recording scripts. The current script (if any) will be shown. [Save to file] will prompt you to save the current script to a file (in XML format). Click on [Reset] to clear the current recording script. [Load from file] allows you to reload script from a previsouly saved script file.

Each recording script is made of one or more steps. Each step can be made of any number of commands and/or substeps. The script is always ran sequentially starting when a recording begins. Understanding how to make a complex script is steep learning curve, but once you grasp the mechanisms, the flexibility of the Recording Manager engine can cover most recording needs.

Click on a step in the tree on the left hand side to show/edit this step. To delete a sub-step, delete the associated 'Call Sub-Step' command in its parent step. Don't forget that you can always ask support@norpix.com if you ever need help building a script.

Commands

Commands are instructions given to StreamPix. Whenever StreamPix acquires a new frame, a query will be made to the recording manager to know what is to be done with it.

Grab Frame : This command instructs StreamPix to save the frame to the current target file (sequence, etc). When encountering this command, the script execution will stop until a query is made by StreamPix.

Skip Frame : This command instructs StreamPix to discard the frame. It will not be saved. When encountering this command, the script execution will stop until a query is made by StreamPix.

Loop Recording : This command will loop the current sequence. i.e. The next saved frame will overwrite the first frame of the sequence and recording will continue from there.

New Sequence : Close the current sequence and create a new one based on the settings in "StreamPix Settings > Auto Naming".

New AVI : Close the current sequence and create a new AVI file based on the settings in "StreamPix Settings > Auto Naming".

New Images : Close the current sequence and create a new image sequence based on the settings in "StreamPix Settings > Auto Naming".

Wait For Query : This will stall the execution of the script until a new query is made by StreamPix.

Call Sub-Step : Will create a new sub-step which will be ran. Once the sub-step completes, execution of the script will resume.

Execute : Will run a shell command line instruction of your choice.

After the Last Command

Once the last command of a step as been processed, you can define what will happen using this section.

Restart immediately : Will immediately continue running the step from it's first command

Restart every X frames : The step will loop every X frames acquired.

Restart at specified interval : The step will loop at the specified time interval.

Stop Condition(s)

A step will continue running indefinitely until one of its stop condition occurs. Every step will also stop when the recording stops (ex : the user click on the record button a second time to stop the

recording). Most of the time, every sub-step should have at least one stop condition else the control will never be passed back to its parent step. When a step reaches one its stop condition, the step terminates and control is passed back to its parent step. If the Main Step reaches one of its stop condition, the recording is automatically stopped.

Every stop condition also has a property named "Can Interrupt". If it is enabled, the stop condition(s) will be evaluated after each command. If it is disabled, the stop condition(s) are only evaluated when the step reaches its end.

Do X Times : The step will stop after it has been ran X times.

Until X Frames : The step will stop once X frames have been captured by the step (and child steps).

For Time X : The step will stop after a certain time.

Until Time X : The step will stop when the system time reaches a predefined time.

Until IO : The step will stop when a specific IO event occurs (ex : Rising Edge).

Until Timed IO : The step will stop after the input level has been high or low for the specified amount of time.

Recording Manager - Script Examples

To grab at half the frame rate (Complexity : low)

* Main Step *
Commands : Grab Frame, Skip Frame.
After the Last Command : Loop Immediately.
Stop Conditions : None

Capture one minute every hour (Complexity : medium)

* Main Step *
Commands : Call SubStep "GrabFor1Min".
After the Last Command : Loop Every 1:00:00 (1 hour).
Stop Conditions : None.

* GrabFor1Min Step *
Commands : Grab Frame.
After the Last Command : Loop Immediately
Stop Conditions : For Time X = 1:00 (1 minute)

Pre/Post recording - Create a new sequence, capture in a 1 minute loop until Rising Edge, then capture for 10 seconds, then start anew. Stop after 10 sequences have been captured this way (Complexity : High)

* Main Step *
Commands : New Sequence, Call SubStep "Pre", Call SubStep "Post".
After the Last Command : Loop immediately.
Stop Conditions : Do 10 Times.

* Pre Step *
Commands : Call SubStep "GrabFor1MinLoop", Loop.
After the Last Command : Loop immediately.
Stop Conditions : Until Rising Edge on IO device (can interrupt).

* GrabFor1MinLoop Step *
Commands : Grab Frame.
After the Last Command : Loop immediately.
Stop Conditions : Do For 1 minute.

* Post Step *
Commands : Grab Frame.
After the Last Command : Loop immediately.
Stop Conditions : Do For 10 seconds.

Non linear Remapping via ASC CDL Formula

The American Society of Cinematographers Color Decision List (ASC CDL) has defined a format for the exchange of basic primary color grading information. A 3 parameters formula can be used to define most possible remapping and color correction.

The formula for ASC CDL color correction is:

$$out = (i * s + o)^p$$

where:

- *out* is the color graded pixel code value

- *i* is the input pixel code value (0=black, 1=white)

- *s* is slope (any number 0 or greater, nominal value is 1.0)

- *o* is offset (any number, nominal value is 0)
- *p* is power (any number greater than 0, nominal value is 1.0)

The formula is applied to the three color values for each pixel using the corresponding slope, offset, and power(gamma) for each color channel.
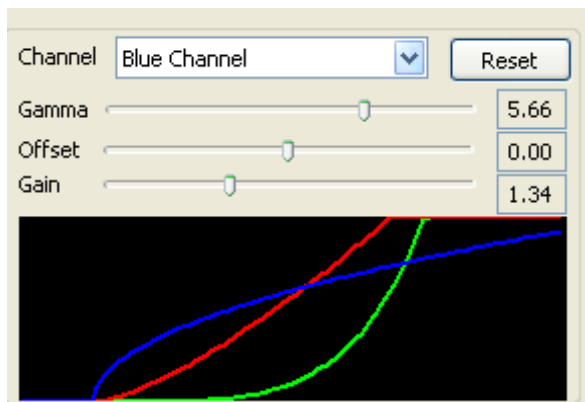
A Channel pull down menu allows the user to select which color channel should be controlled. Select *All Channels* to apply the same formula for all 3 channels, or select each color plan you want to work with.

The Reset Button allows the user to reset back to default values: Gamma(1), Offset(0), Gain(1).
 A registry key can be set to change some more ranges:

All key type are DWORD

key path: HKEY_CURRENT_USER\Software\Norpix\Streampix\Admin

Key name: GainRange : Set Gain range, default value: 8

Key name: GammaRange : Set Gamma range, default 8 (0,8)

Key name: OffsetRange : Set Offset range, default 2 (-2,2)

Key name: RealOffset = 1 : Enable display real pixel intensity offset value,default: 0

Plugin modules

Loading & unloading plugin modules
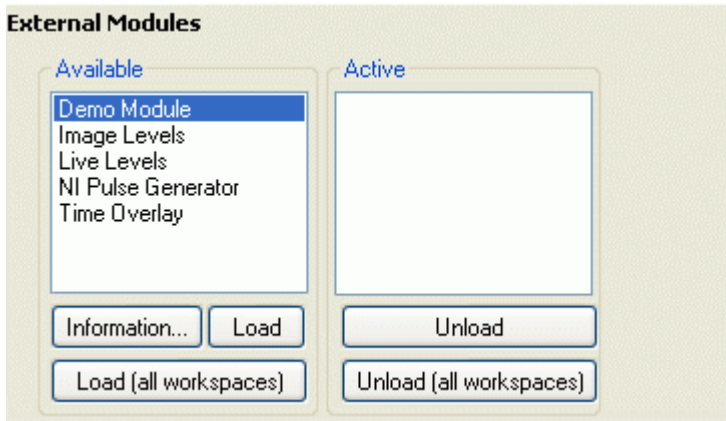
This docked dialog is used to load and unload external modules named or plugins. To load a plugin, select one from the available list on the left and click on *Load*. To close an external module, select its entry in the active list and click *Unload*.
Double-clicking also works to load/unload.

(Not available in the Single Camera version)
The two buttons at the bottom allow to load/unload a module in every workspaces in a single click.

Free Modules

AEC Control

The AEC Control Module provides the ability to configure and control an AEC (**Adrienne Electronics Corporation**) time code generator board. The module can also be used to read and display the current time code from a board that doesn't have time code generation capability.

The time code reader is enabled automatically each time the module is loaded and the current time code is displayed in the **Reader** field along with **Drop Frame (DF)** state, as shown below.
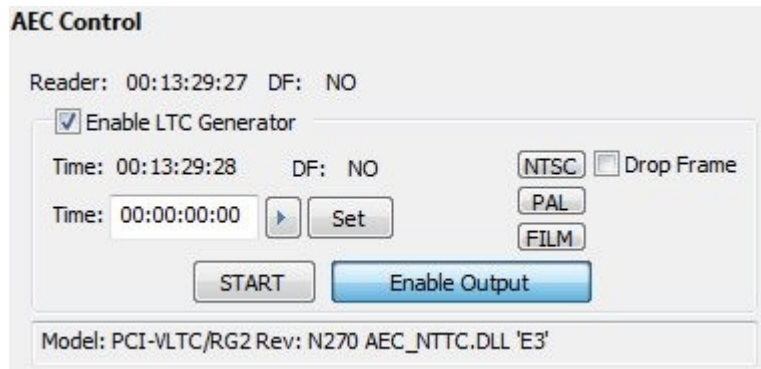
To enable the time code generator, if present, check the **Enable LTC Generator** check box. Generated time code is displayed in the **Time** field along with **Drop Frame (DF)** state. The time code generator can be configured to:

- generate a NTSC (with or without frame drop), PAL or FILM time code;
- start from a specified time (using computer clock);
- reset time;

To run the time code generator, simply click on the START button. To turn it off, click on the STOP button, as shown below. To leave the time code running but temporary disable the output click on the **Disable Output** button.
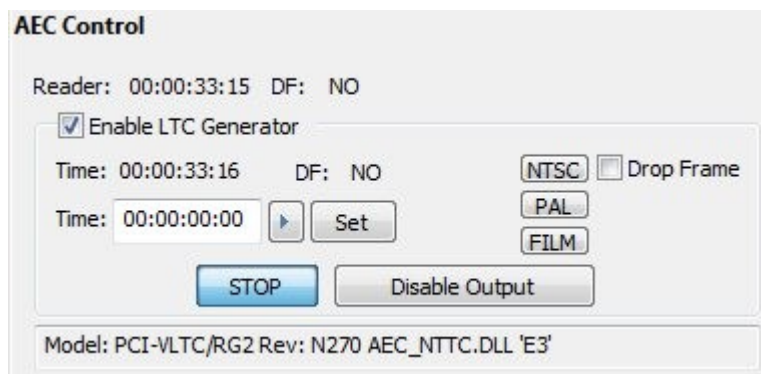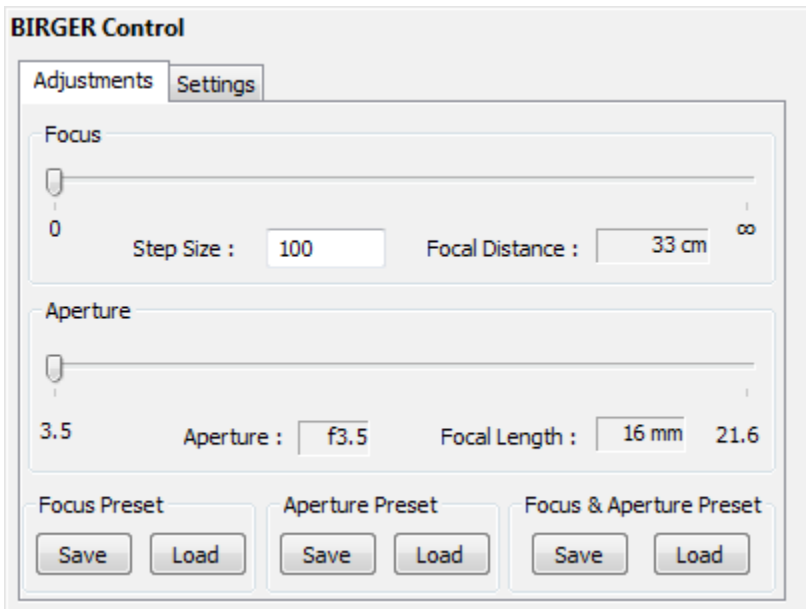
The **Model** status box on the bottom of the module window displays information about AEC hardware and driver version.

BIRGER Control

The BIRGER Control Module allows lens control via a BIRGER unit.
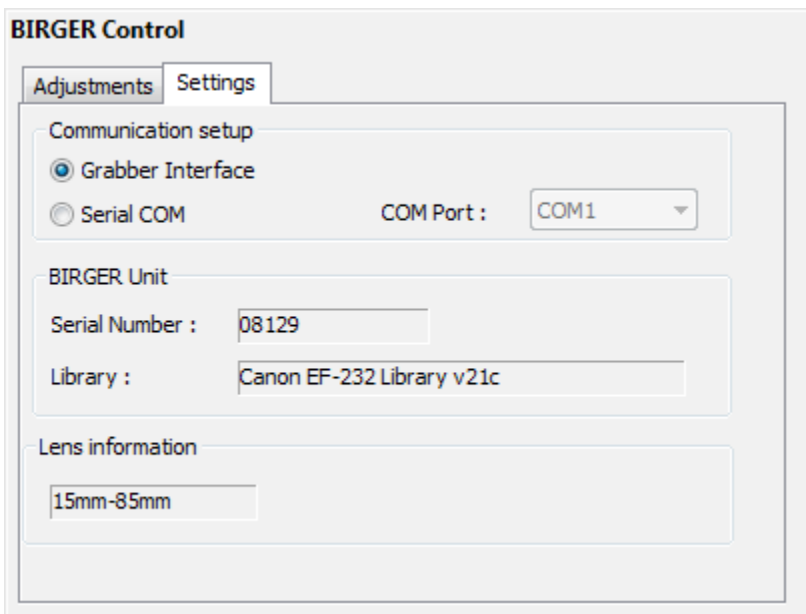
Adjustments Tab

This page allows changing the **focus** and the **aperture**. Also, the user can save/load focus and aperture presets. When the zoom changes, the aperture and aperture range values are updated. Also, when the focus changes, the focal distance is updated.

Settings Tab

This tab is used to set up the communication with the BIRGER unit.
If the unit is connected directly to the camera, the **Grabber Interface** should be used. For this, the serial communication should be already set up in the camera settings.
If the unit is connected to a COM port, then the **Serial COM** option should be selected.
If the module established a successful connection, it will display some information about the lens and the BIRGER unit.

Bitmap Overlay

The Bitmap Overlay Module provides the ability to "burn" a bitmap file (*.*bmp*) into each captured image. It supports all bitmap file formats (monochrome, 16 color, 256 color, 24-bit color). The bitmap file can be applied to all StreamPix supported image formats.

The Bitmap Overlay Module can be used, for instance, when some constant information needs to be applied on images, such as a logo or reticule.

General Tab

This includes general settings for the module.
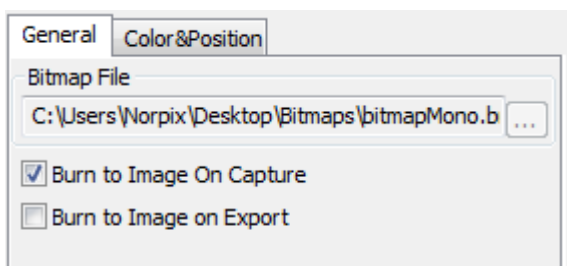
- Bitmap: Specify the bitmap File to be used.

- ***Burn to Image on Capture:*** Bitmap is burned in place of image pixels for each image at capture time.

- ***Burn to Image on Export:*** Bitmap is burned in place of image pixels for each image while exporting.

Generally, it is not necessary to check both options. For instance, if *burn to image on capture* is selected, the resulting image will include the bitmap. Upon export, there is no need to re-process the images again.

Color & Position Tab

This tab can be used to define the transparency color as well as the position where the bitmap will be burned to the image.
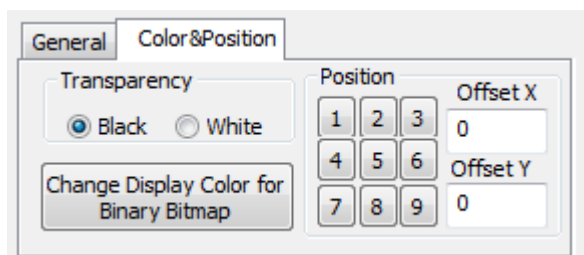
- **Transparency:** All bmp files must include either a white or black background color. That background color is used as a transparency color to display normal image pixels. All the colors, except the transparency color in the bitmap, will be displayed in the captured image.

- **Change Display Color for Binary bitmap:** Set display color for binary bitmap.

- **Position:** Select a position to overlay the bitmap on the captured image.

Crosshair Module

The crosshair module allows to burn a crosshair on your images.
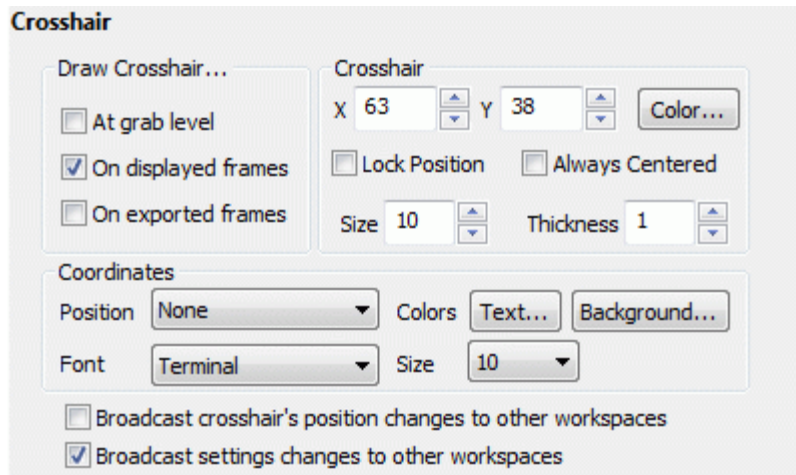
Draw Crosshair...

This section is used to determine when the crosshair burning is taking place.

When done "At grab level", the crosshair will be written on the images as soon as they are received from the camera.

"On displayed frames" will show the crosshair on image received from the camera but after any saving process occured. It will also show a crosshair on images read from a sequence file.

Finally, "On exported frames" will apply the crosshair to any images exported from a sequence, regardless of the destination format (seq, avi, bmp, jpg, etc)

Crosshair

"Pos" show the current X and Y pixel coordinates of the crosshair in the image. To move the crosshair, type in new values in those two boxes. You can also use the mouse to place the crosshair on the current image. To do so, simply left-click anywhere on it (dragging is also supported). Moving the crosshair with the mouse cannot be done while in multi-display mode.

Putting a checkmark on "Lock Position" will prevent accidentally changing the crosshair position while clicking around. While locked, the mouse control is disabled and the position boxes are read-only.

Select the size of the cursor with the "Size" box. The size is the number of pixels shown on each side of the center pixel. For example, selecting 5 will result in a crosshair made of two 11 pixels long lines.

"Thickness" allows to change the crosshair thickness. Specified in pixels.

Click on [Crosshair Color] to change the color of the crosshair. Default color is grey.

Clicking on [Center] will move the crosshair position to the exact center of the current image.

Coordinates

The module also allows to burn the pixel coordinates of the crosshair on the image. The coordinates are shown as a (X,Y) string.

To do so, first start by selecting the coordinates "Position" on the image. Choose from : None, Top-left, Top, Top-right, Bottom-left, Bottom, Bottom-right.

Then select the overlay colors : [Text] for the text color, [Background] for the text background color. If the text background color is the same as the text color, no background color will be used resulting in a transparent background.

Finally, select the "Font" and "Font Size" to use to draw the string. For best results, use fixed width fonts such as Terminal or Courier.

Broadcast

If [Broadcast crosshair's position changes to other workspaces] is checked, changing the crosshair position in this workspace will also change the crosshair position in every other workspace which also has the crosshair module loaded.

Checking [Broadcast settings changes to the other workspaces] will broadcast any changes made to the module settings (with the excecption of the crosshair's position) to every other workspace which also has the crosshair module loaded.

Comment overlay Module

The **Comment Overlay Module** allows users to overlay or burn directly to the image data multiple lines of text.

The module settings are performed via 2 separate tabs described below.

General Tab
This includes general settings for the module.
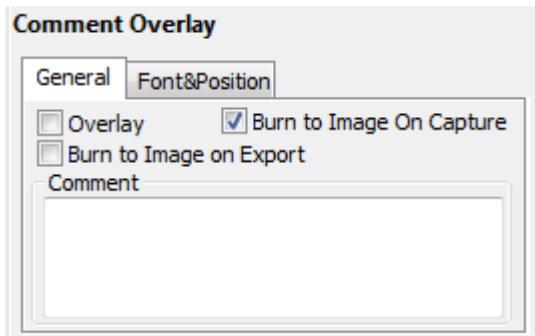
- Overlay : text is overlay within the image viewer area.

- Burn to Image on Capture: text is burned in place of image pixels for each image at capture time

- Burn to Image on Export: text is burned in place of image pixels for each image while exporting.

- Comment: Type multi-line text to be overlay or burn.

Font & Position Tab
This tab can be used to adjust font and position when overlay or burn to the image.

Not that the font and position rendering may be different for overlay mode versus burn mode: In overlay mode, font and position are applied only on the final image render bitmap for display. Hence zoom factor has no effect for instance. While burn to image, font and position are applied directly to the image pixels. Hence, zoom factor applied for display purpose may change th3e way the image and text are rendered.
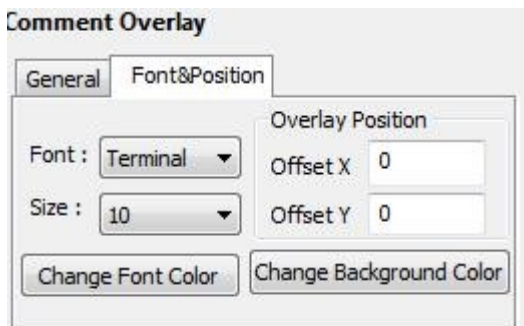
- Font : Select what font to use.

- Size: Select what font size to use.

- Overlay Position (OffsetX and offsetY): Set where to overlay Text.

- Change Font Color : Set overlay text color.

- Change background Color: Set overlay text

Exposure Time Reader

The exposure time reader module can be used to read the current exposure time value directly from the camera registers and display it in the image as a text overlay message.

In order to use that module, the related camera must include an *exposure* register. That register must be accessible from StreamPix Hardware Properties and Adjustments dialog.
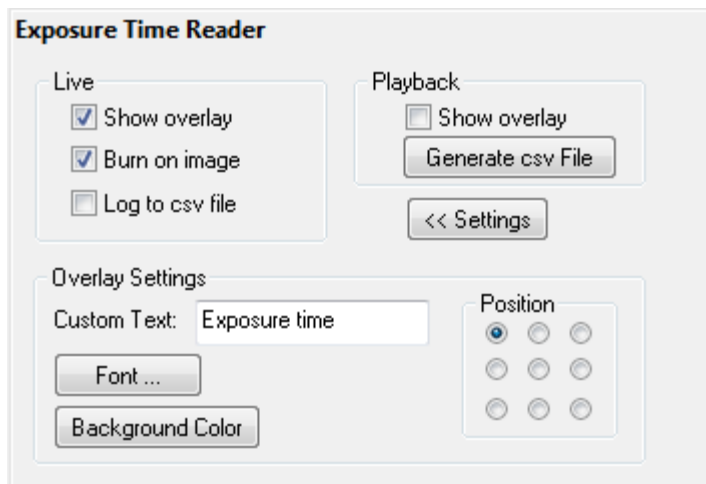
Exposure time values can be displayed on Live and/or Playback streams with the possibility to permanently write the values on the images or store them to a .CSV file.

Text overlay settings (font, position, background color) are also configurable.

Note: Upon receiving an image from the camera, the module will be reading the current camera exposure value and overwrite the first 4 pixels of the image with the binary coded value of the exposure.
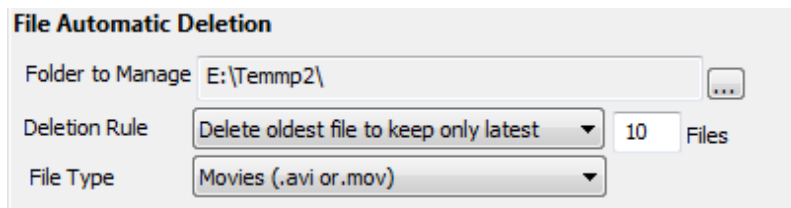
File Automatic Deletion

The File Automatic Deletion module can be used to automatically delete old files. This module is a great tool for unattended systems, where disk space must be monitored and maintained properly.

The module can monitor a predefined computer file folder. Two criteria are used to monitor disk space and eventually delete outdated files:
   - A maximum number of files can be defined (oldest file is deleted).
   - A Time out (in hour) can be defined so that all older files will be removed.

Folder to Manage: The folder that will be monitored.

Deletion Rule: The operating mode for removing old files:

Time Out: Delete files older than "XXX" Hours.
Number of file: Delete oldest file to keep only latest "XXX" Files.

File Type: File type to monitor.
            It is possible to specify a file type extension to be monitored.

            Sequence: Sequence file only
            Movies: .avi or .mov
            All Files: any files

Focus Assist

The Focus Assist module provides a mean to quickly adjust a camera's focus.
A red curve is going to appear on the image upon loading the module:
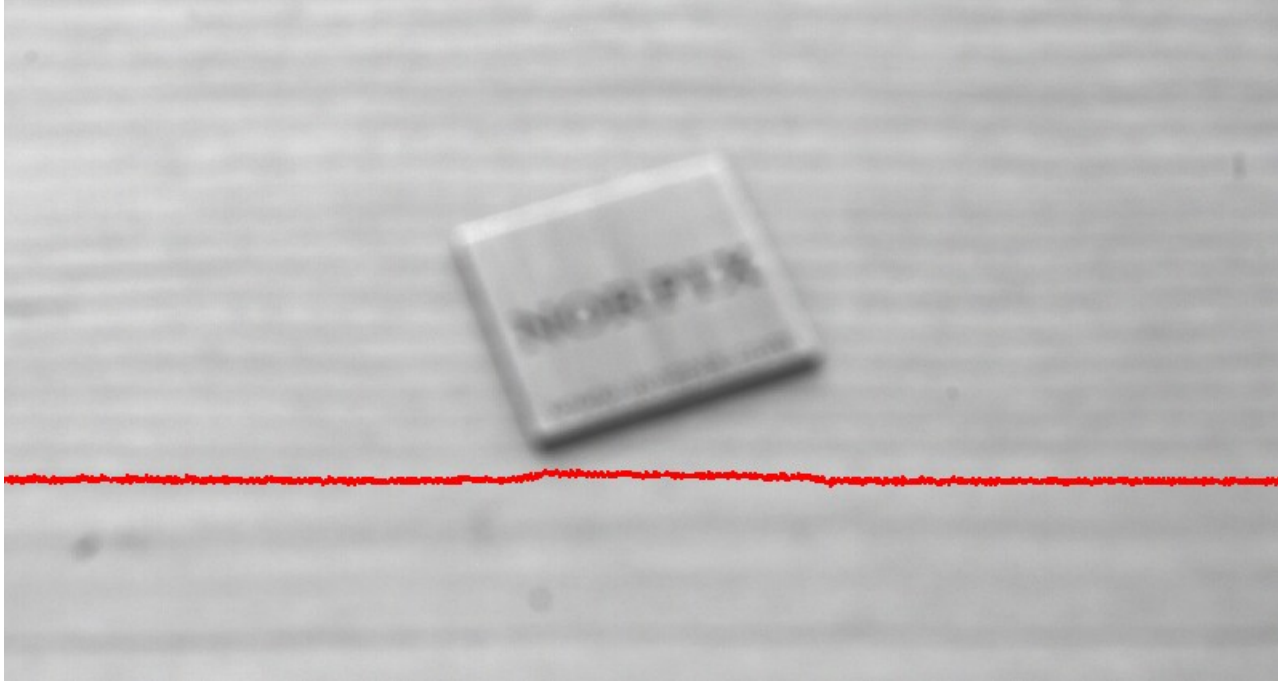
The line represents the average sharpness per pixel column. A flat line means the image is out of focus. A line marked with pikes means the image is in focus. Adjust the camera focus to have the steepest pikes:
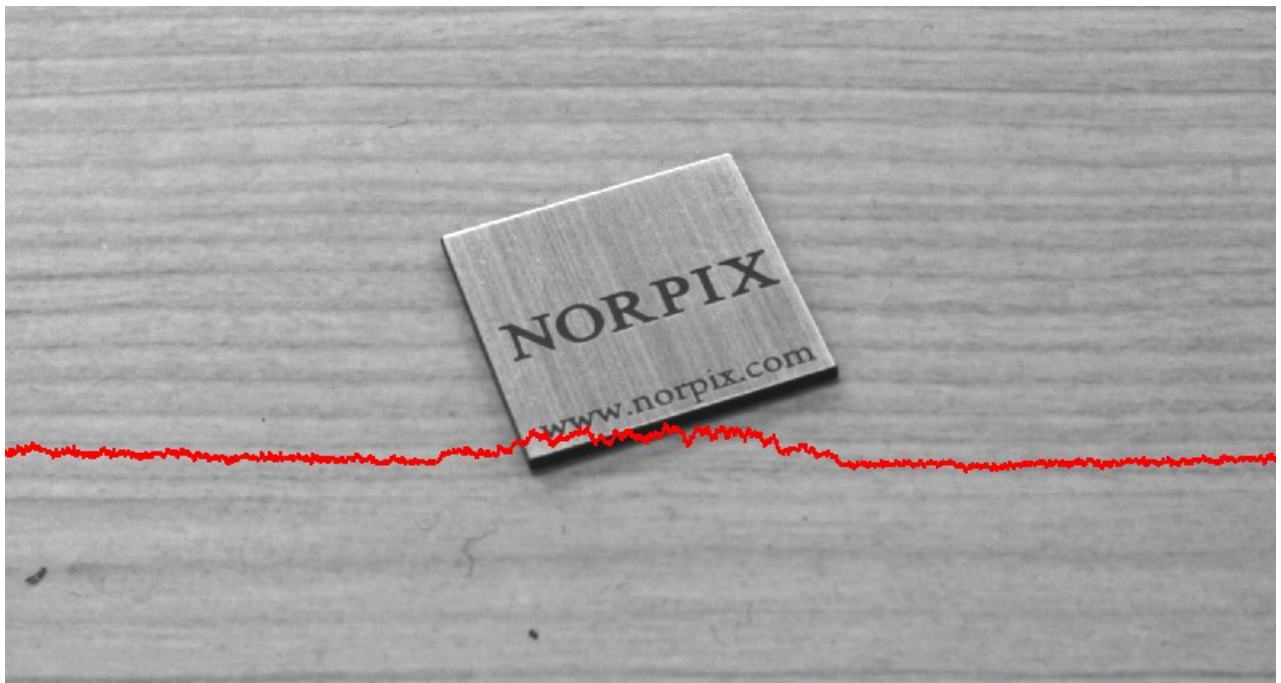
A ROI can be set to increase the tool's efficiency. The ROI can be set either manually, through the ROI Define field, or using the "Interactively click and drag to define ROI" button:

Histogram

This module compute the image histogram in real time. It supports monochrome, raw Bayer and color image format.

For monochrome and raw Bayer images, only the red channel is relevant.

For color images, the red, green and blue channels are calculated.

The *X-axis* represents the intensity of each channel while the *Y-axis* shows the percentage of pixels in the image that have this intensity.

The module can capture images and operate on the camera live stream or eventually from a pre-recorded sequence file during playback.

The **Settings** menu allows users to:
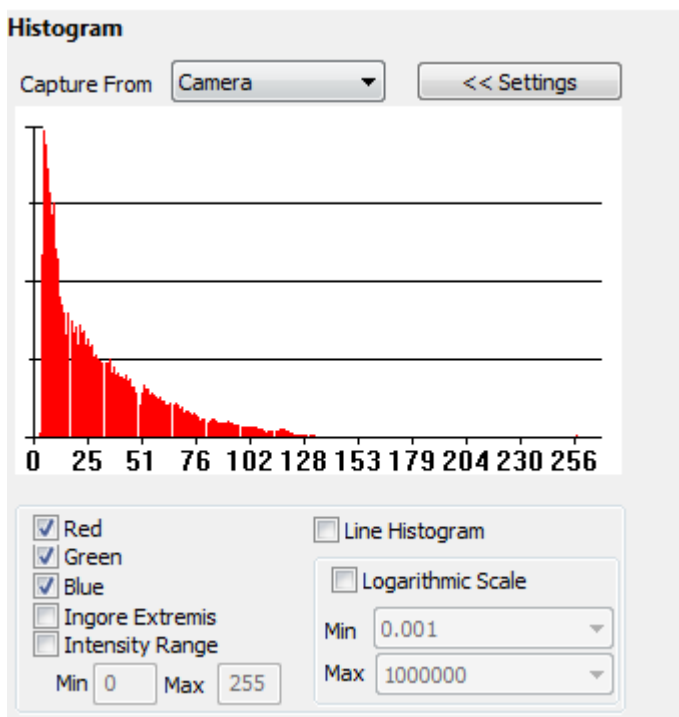
- Display only specific channels (ex : only green).

- Show the histogram as a series of lines or bar graph.

- Ignore extreme intensities.

- Plot the histogram using a logarithmic vertical scale.

- Plot only within a specific intensity range for better rendering.

The histogram is a powerful tool to adjust the brightness, contrast, offset, gain or exposure of the image to help obtain the best image quality for post-processing. To save CPU for time-critical operations, the Histogram Plugin should be unloaded when recording a sequence.

IDT Mx Camera Control Tool

This module allows to control and adjust some of the most important **IDT M3** camera features by sending specific commands to the camera using the **MVX SDK**, the camera API. Therefore, before loading the module, the communication with the camera must be set up properly and tested in the **MVX Control** application. For this module, the frame grabber that connects to the **IDT M3** camera must disable the serial communication. Otherwise, the module will not be able to connect to the communication port.

The **Image** page of the interface lets you adjust the **ROI (on X only)**, **Sync In**, **Gain**, **Exposure Time**, **Frame Rate**. Setting the **ROI** defines a new range for available frame rates. Changing the **Frame Rate** sets a new range for available shutter times.
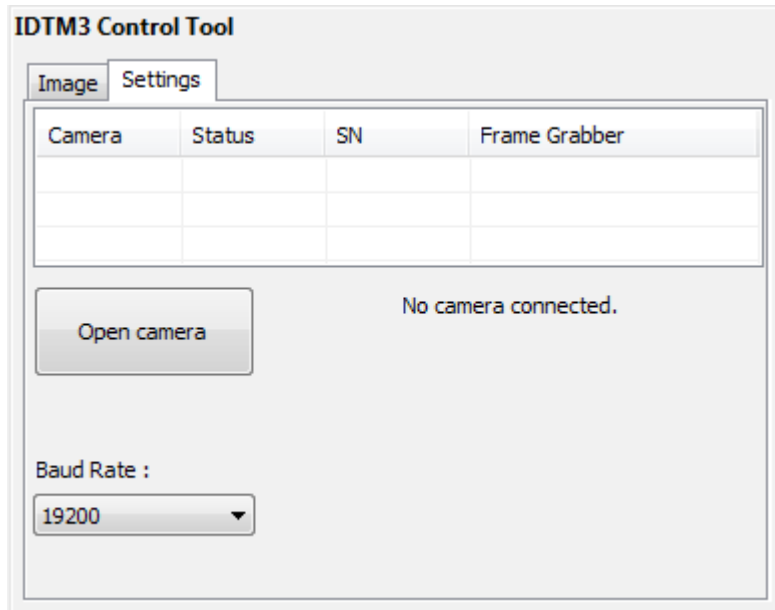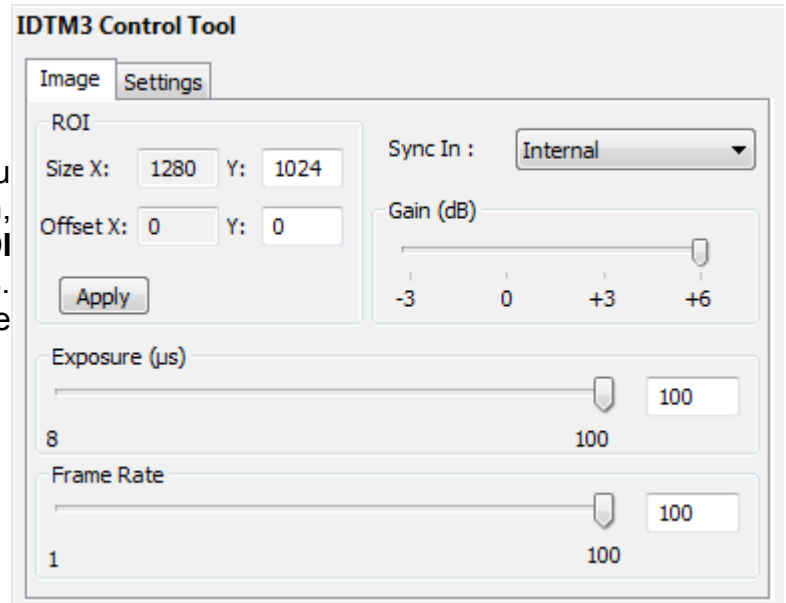
The **Settings** page allows you to open the camera you want to use. The available cameras are displayed in the list only after choosing the proper **Baud Rate.** Then, simply select the camera and press **Open camera.**

Note: When the camera is configured in 10 taps, use the STP4Admin application (found in the same folder as StreamPix5.exe) to set the **IDT M3 Control Tool module: 10 taps mode** setting to Yes.

Image Levels
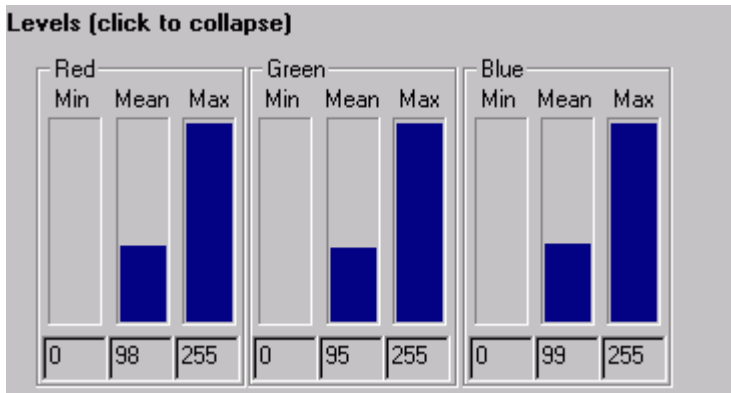
This allows to see the minimum, maximum and mean red, green and blue levels in an image. Once the *Image Levels* module is loaded, this docked dialog will be shown and will stay open until unloaded. If the minimum and maximum for one channel reads as 0 or 255, this could mean that one or more pixel of the image is under-exposed or saturated.
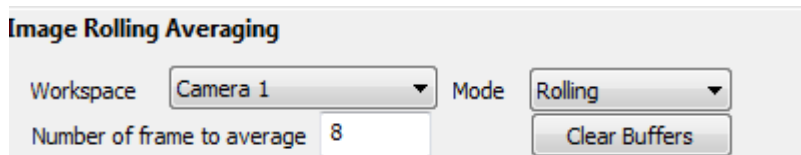
The *Image levels* module usefulness is reduced when working with an high-contrast image and, as the color levels are remapped for each image, it should be unloaded to lower CPU usage.

Image Rolling Average

The Image Rolling Average module can be applied on live captured frames from a camera or grabber device. It supports all image formats with the exception of pixel pack, BGR555 and 565.

The module can be used 2 ways:

- Rolling average mode: When loaded in the same workspace as the grabber device, the calculations are performed and applied "in place" to the images received from the grabber device. A rolling average is performed over the specific number of frames received last. The input and output frame rate are identical.

- When the module is loaded into a separate workspace than the grabber device, the operating mode can either be a rolling average or a standard frame averaging. In standard frame averaging mode, the output frame rate is the input rate divided by the number of frames to be averaged.

Workspace: The workspace of the video source or grabber device from where the image will be processed.

Number of frames to average: The depth size for the averaging calculation.

Mode: The available mode are automatically determined by the module, depending on its loading context.

Clear Buffers: Empty the average buffer. Any accumulated frames are lost.

During rolling average, output frames are unchanged until the module until the average buffer is filled.

Image Resize And Crop

The Image Resize And Crop module provides the ability to resize or crop the images from a camera to any desired size. This module is not supported when running StreamPix single camera version.

The module needs to be loaded into a separate workspace, since it produces a different image stream. It can be used while recording image or during live display. I8f you want to crop or resize an sequence already captured, rather use the Batch Processor utility.

- Source: Enter the workspace name from the corresponding video stream you want to resize.

- Interpolation: Select the interpolation scheme to use when resizing. Schemes are sorted by inverted speed and quality. Nearest Neighbor is the fastest algorithm, lowest quality.

- Full Image: Check if you want to resize the complete source image.

- Keep aspect ratio: Check if you want the maintain the original image aspect ratio.

- Source ROI: The Full Image box must be unchecked to define a Source ROI. This can be used to crop an original image.

- Destination Size: Allows to set the destination images' size.

- The Apply button instantly apply the ROI changes to the destination resized images.

- The Start button enable the resizing process.

Note that when resizing a raw Bayer image, the Bayer interpolation will be applied before the resizing to make sure the bayer pattern is not damaged during the resizing process. Also the image will be converter to color BGR 24 bit. Bayer settings are applied according the current workspace settings. Simply click Start/Stop button to get the parameter reloaded.

Image Rotation

This module can be used to rotate the image shown in the display area in real time. Pixels in the destination image that do not have any corresponding pixels in the source image are zeroed. Rotated pixels that do not fit in the destination image are clipped.

Because of the nature of the rotation process, where image size can be preserved or not, a new display area is added by the module to the workspace where it is loaded.

As a consequence, when using the multi-display mode in StreamPix 5, both images (original and rotated one) can be displayed simultaneously.
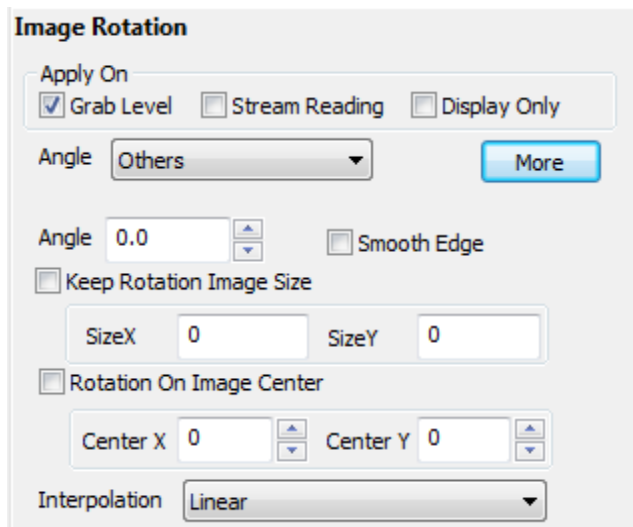
The module gives the flexibility to adjust the following parameters:

•X and Y Position of the center of rotation point (COR). The COR can eventually be defined outside of the image boundary. By default, COR is the image center point.

•Rotation angle, from 0 to 360 degrees, with decimal increments.

•Destination image size: The rotated image can keep the same image size as the source, or one can specify what will be the X and Y size. Useful for 90 degree rotation. By default, image size is identical.

•Interpolation algorithm: Nearest pixel (faster), bilinear or bicubic (slower, more CPU intensive)

•Because edges are typically degraded during image rotation, one can enable edge smoothing.

•By default, the module is using the camera / grabber as the image source, but can eventually be re-configured to be able to perform rotation using for source image a playback sequence or displayed image.

Most image formats are supported with the exception of all compressed image formats and pixel packed image formats as well as a few color image formats such as RGB555 and RGB565.

Image Merge

This module can combine multiple video sources together to create a larger image.

It can be applied while live or recording images (merge stream is recorded according the recording settings).

There is no alignment check, nor frame time stamp synchronization. The module only waits for receiving all frames from each source and combine images together into a single new image.

Sources should be the same image format for but can have different image size. Current implementation does not support all image format. Image format that includes pixel pack, are not supported. For other image formats, please contact Norpix tech support for an updated module.

Source image layout : set output image layout. Maximum is an array of 4x4

Keep input Format: by default output image format will be BGR.. User can check this option to force output image format to be the same as the source format.

Camera list: enter the different workspace name where are the source video stream. The quadrants are populated based on the index order, from top left to bottom right.

Merge On: Enable / Disable the merge processing.

The module can also be used to merge together pre-recorded sequences. The result is then exported to various output format, such as SEQ, AVI, series of images...

Kinect

The Kinect for Windows sensor includes cameras that deliver depth information, color data, and skeleton tracking data.

The Kinect module is designed for Kinect for Windows devices (Kinect for XBOX360 devices are not supported) and renders depth, video and skeleton data presenting the result as image overlay. It can be configured to trigger various actions in StreamPix, based on data received from the Depth stream.
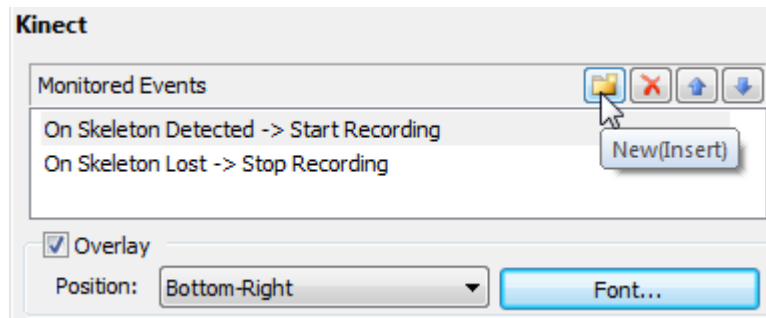
When you load the module, you can see the following:

✔ Red-green-blue (RGB) color image from the Kinect sensor, if the color stream is selected in current workspace.

✔ Background in gray scale and different people in different colors, if the depth stream is selected in current workspace. Darker colors indicate objects that are farther from the camera.

✔ Tracked skeletons of up to two people who have been detected within the frame.

If moving figures are too close to the camera, unreliable or odd images might appear in the skeleton and depth views. The optimal range is 2.6 to 13.12 feet (0.8 to 4 meters). The module detects people only if the entire body fits within the captured frame.

Note: Enabling any image processing on a Depth stream image will alter depth information as each pixel within the image contains depth data.

The folowing events can be detected on the color stream:

- **On Skeleton Detected** - when Kinect starts tracking at least one skeleton
- **On Skeleton Lost** - when Kinect stops tracking all skeletons

The folowing events can be detected on the depth stream:

- **On Skeleton Detected** - when Kinect starts tracking at least one skeleton
- **On Skeleton Lost** - when Kinect stops tracking all skeletons
- **On Distance Closer Than** - when depth is less than a certain value
- **On Distance Farther Than** - when depth is greater than a certain value
- **On Distance Within** - when depth is within a certain range

The following actions can be triggered:

- **None (testing mode)** - outputs a message in debug log

- **Start Recording** - starts recording if possible

- **Stop Recording** - stops recording if possible

- **Pre/Post** - triggers a Pre/Post event (to be used with the Pre/Post module)

- **Mark Frame** - marks current frame

- **Set Reference Time** - sets current time as "reference time"

Additionally the module provides the ability to display some useful data as image overlay:

- **Tracking Skeleton** - shows current tracking state

- **Color Timestamp** - shows current Color frame timestamp

- **Depth Timestamp** - shows current Depth frame timestamp

- **Skeleton Timestamp** - shows current Skeleton frame timestamp

- **Closest/Farthest Depth** - show the minimum and maximum depth values within a frame for all tracked skeletons.

For a complete documentation for the Kinect for Windows device, please visit
http://www.microsoft.com/en-us/kinectforwindows/

Live Levels & Sequence Levels

The *Live Level*s histogram monitor every frame captured by the grabber, computes their grey level averages and plots them in real time. The radio boxes enable selection of the display method for the histogram. *Show here* will set the graphic in the docked dialog and *Show in a Display* will show it in a new display in the *Workspace* tab. It is recommended to use a multi-display configuration with the *Show in a Display* to allow viewing the image and histogram at the same time.
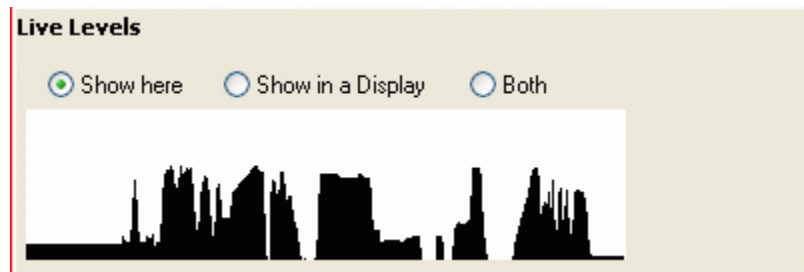
The Sequence Levels histogram is a similar module that allows to view the grey level averages for the frames in the current sequence. Everytime a frame is read from the sequence, the graph is updated to the new value. Browsing trough the sequence by using the sequence slider will provide a quick way to survey its general levels while pressing play will read and each frame in the playback sequence.

LTC Overlay

The LTC Overlay module will show the LTC value stored in the first 32 bits of each image (requires an supported LTC source device). The module has no docked dialog when loaded. However, it has a few settings that can be changed through the STP4Admin application (found in the same folder as StreamPix5.exe).

The settings are the following :"LTC Overlay Module show frame number" and "LTC Overlay Module font size".

Lynx IPX Camera Control

This module allows to control and adjust some of the most important Lynx ImperX camera features by sending specific commands to the camera via serial communication. Therefore, an ImperX camera must be loaded and the serial communication must be enabled before loading the module into the current workspace.
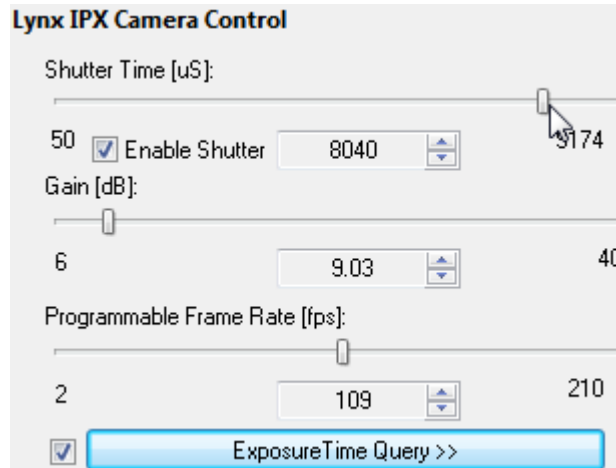
The Lynx IPX Camera Control module interface lets you quickly adjust three of the most important parameters of the camera: the Shutter Time (also known as exposure time), Gain and Frame Rate.

Optionally, the exposure time reader could be used to read the current exposure time value directly from the camera and display it as image overlay. Exposure time values can be shown on Live and/or Playback streams with the possibility to permanently write the values on the images or store them to a .CSV file.
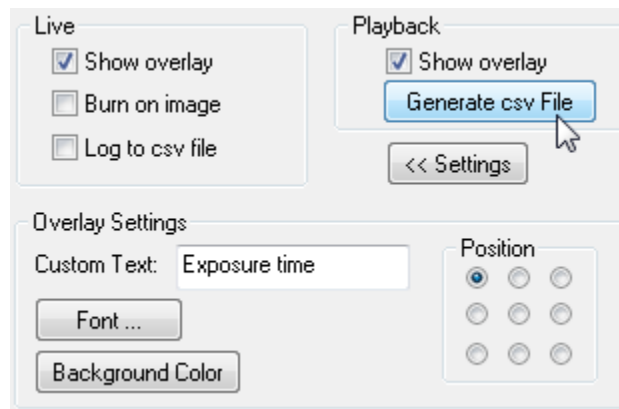
Text overlay settings (font, position, background color) are also configurable.

Matrix Switch

The Matrix Switch module allows to program a Smart-AVI 4x4 DVI Router device to work on two different modes:

- capture mode:
    - ➔ set video INPUT1 to OUTPUT1 and OUTPUT3
    - ➔ set video INPUT2 to OUTPUT2 and OUTPUT4
- playback mode:
    - ➔ set video INPUT3 to OUTPUT3
    - ➔ set video INPUT4 to OUTPUT4

Note: another DVI matrix configuration can be added at the user's request.

Metadata Overlay

The Metadata Overlay module can be used to display the metadata of an image as a string overlayed on the image.
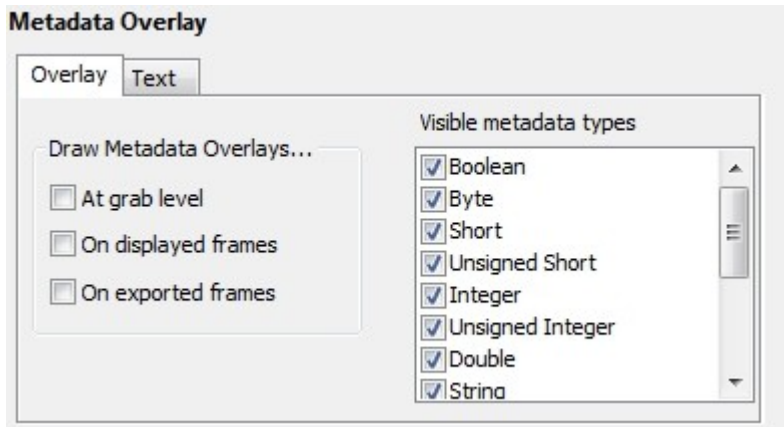
The first tab allows you to set which metadata types will be overlayed on the image (if present). Some metadata types might not show if they can't be represented a a string (i.e. some metadatas are stored in binary formats).

The "Draw Metadata Overlays" section is used to tell the module at which point(s) should the metadata strings be burned on the image.
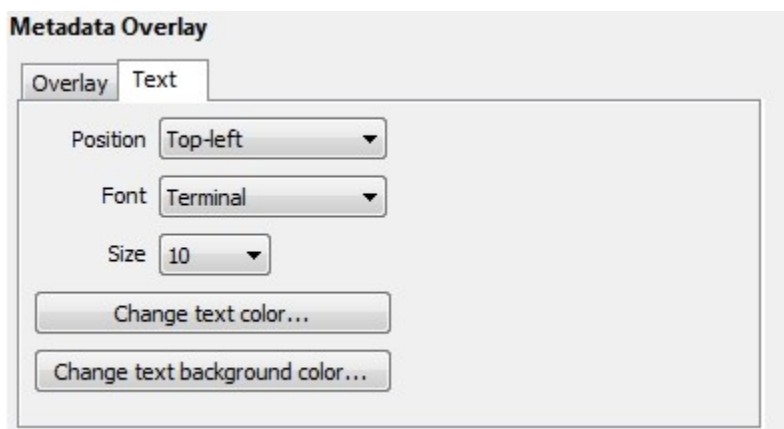
The second tab allows to configure the text appearance. The text position, font, size and color can be set from here. If the text and background color are the same, the text background will be transparent.

Metadata Spy

The Metadata Spy module can be used to setup metadata acquisition in StreamPix.
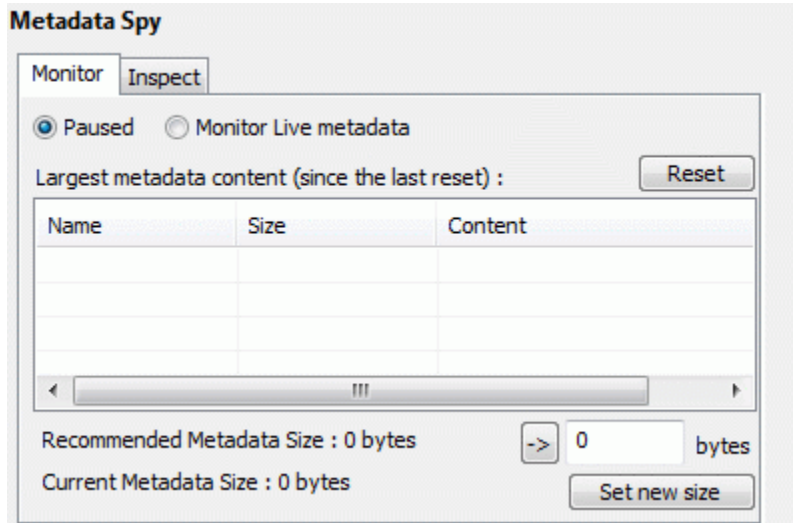
The first tab (Monitor) allows to monitor either the metadata of the live feed. This tab is useful to set the metadata size when using the constant metadata size mode. The largest metadata size seen will be shown as the 'Recommended Metadata Size'. Once the largest size is determined, you can click on [->] to copy this value to the edit box, then click on [Set new size] to write it value to the registry.

The "Current Metadata Size" is the maximum amount that can be stored after each image in a sequence file. It needs to be large enough to accomodate the largest metadata size that could come with an image. If you set the size to '0', the metadata will be stored with a dynamic size. However, keep in mind that you can't record in a loop when using with dynamic storage.
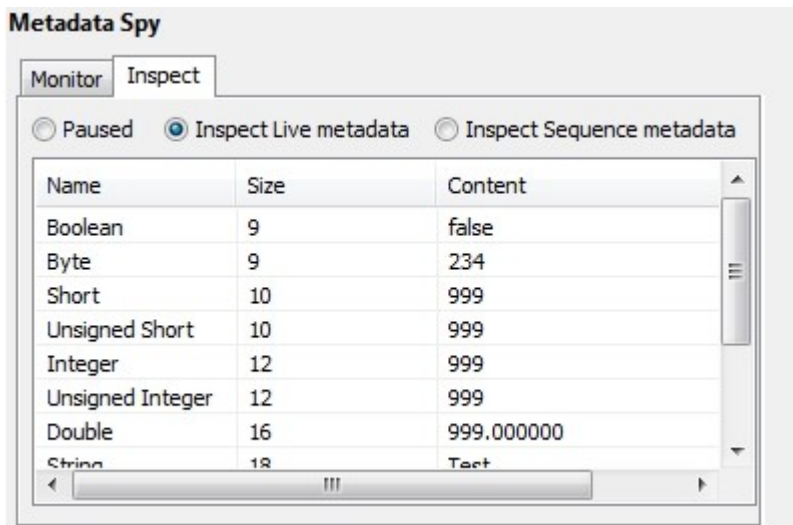
The second tab (Inspect) displays the metadata information for the currently show image (either from the live or from the current sequence).

In both tabs, the lists display the metadata name, the space (in bytes) required to store it, and its content (if formattable to a string). Each metadata value, regardless of its length comes with a 8 bytes header (this is why storing a single byte of metadata takes 9 bytes)
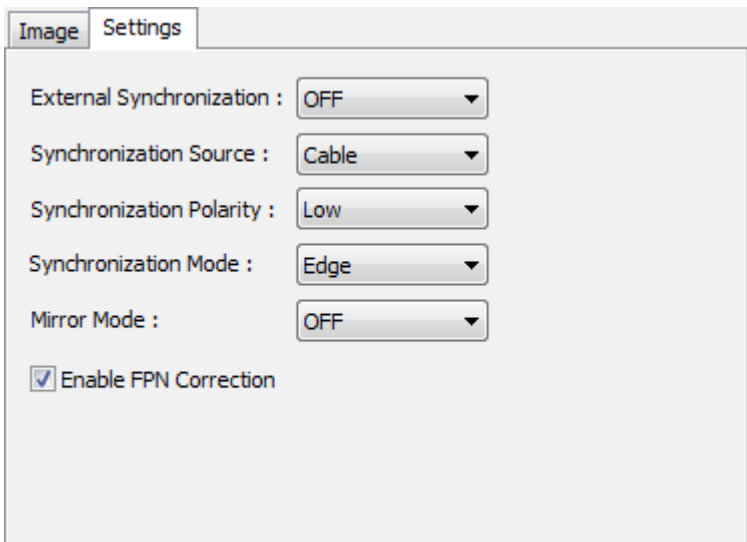
Mikrotron Camera Control Tool

This module allows to control and adjust some of the most important **Mikrotron** camera features by sending specific commands to the camera via serial communication. Therefore, the frame grabber that connects to the **Mikrotron** camera must be loaded and the serial communication must be enabled before loading the module into the current workspace.

The **Image** page of the interface lets you adjust the **ROI**, **Digital Gain**, **Black Level**, **Shutter Time**, **Frame Rate**. Setting the **ROI** defines a new range for available frame rates. Changing the **Frame Rate** sets a new range for available shutter times.
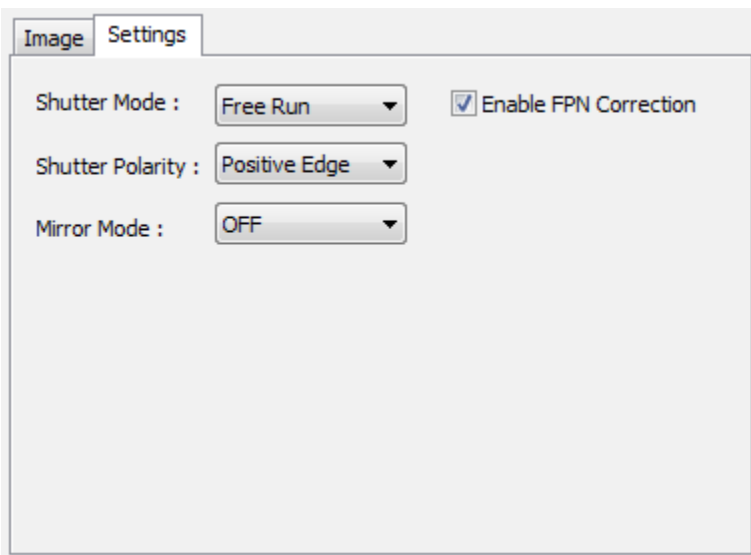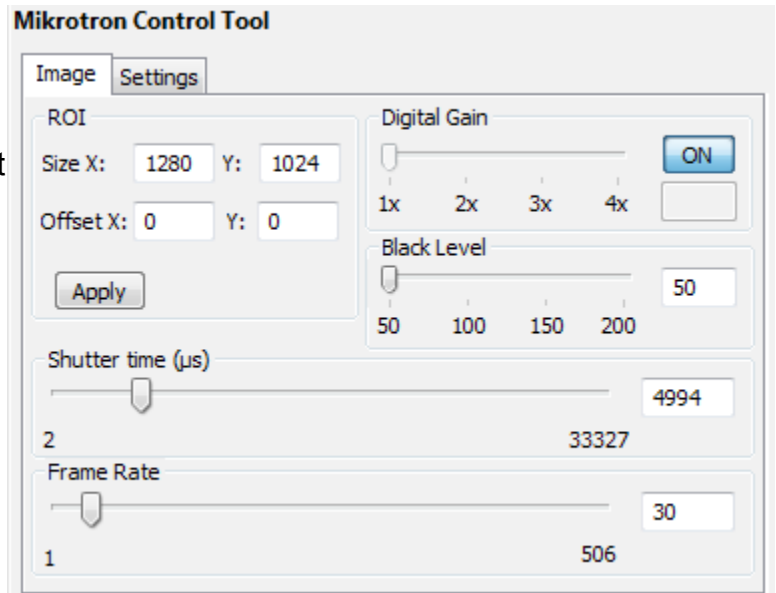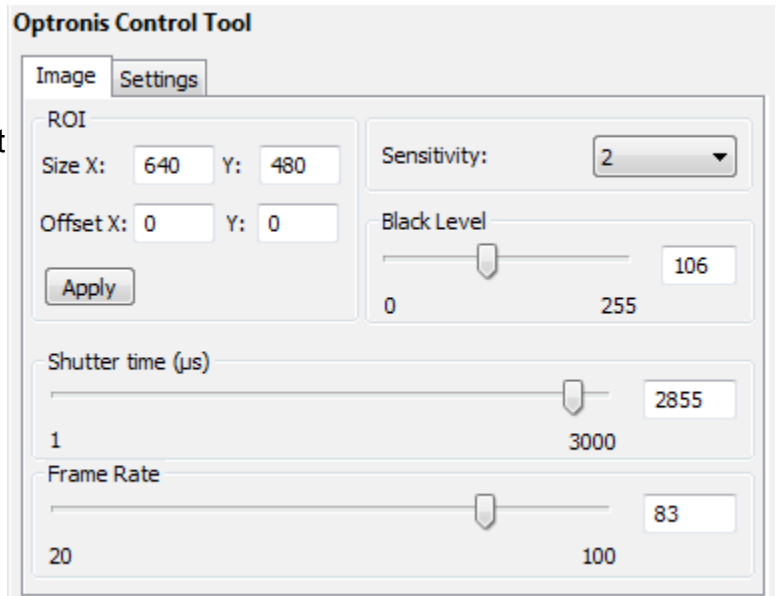
On the **Settings** page, the available features are: **Shutter Mode** (Free Run, PWC, Timer), **Shutter Polarity** (Positive or Negative Edge), **Mirror Mode** (OFF, X Only, Y Only, X and Y) and **FPN correction** (enabled or disabled).

Note: When the camera is configured in 10 taps, use the STP4Admin application (found in the same folder as StreamPix5.exe) to set the **Mikrotron Control Tool module: 10 taps mode** setting to Yes.

Optronis Camera Control Tool

This module allows to control and adjust some of the most important **Optronis** camera features by sending specific commands to the camera via serial communication. Therefore, the frame grabber that connects to the **Optronis** camera must be loaded and the serial communication must be enabled before loading the module into the current workspace.

The **Image** page of the interface lets you adjust the **ROI**, **Sensitivity (Gain)**, **Black Level**, **Shutter Time**, **Frame Rate**. Setting the **ROI** defines a new range for available frame rates. Changing the **Frame Rate** sets a new range for available shutter times.

On the **Settings** page, the available features are: **External Sync** (OFF, ON), **Sync Source** (Cable, Grabber), **Sync Polarity** (Low, High), **Sync Mode** (Edge, Level), **Mirror Mode** (OFF, X Only, Y Only, X and Y) and **FPN correction** (enabled or disabled).

Photon Focus Camera Control Tool

This module lets you adjust the **Photon Focus** camera features via serial communication, using the **PFRemote API.** Therefore, before loading the module, the communication with the camera must be set up properly and tested in the **PFRemote** application. For this module, the frame grabber that connects to the **Photon Focus** camera must disable the serial communication. Otherwise, the module will not be able to connect to the communication port.
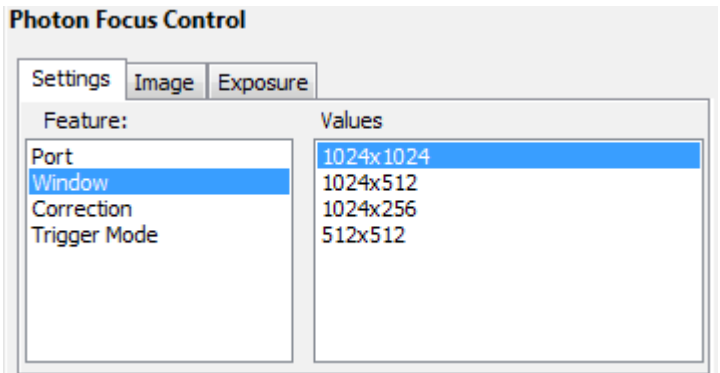
After a valid communication port has been selected in the **Settings** page, the module connects to the camera and new pages will become available: **Image**, **Exposure** and **Adjustments** page. These depend on the features supported by the camera model. If a feature is not visible or not accessible, it means that it's not supported.
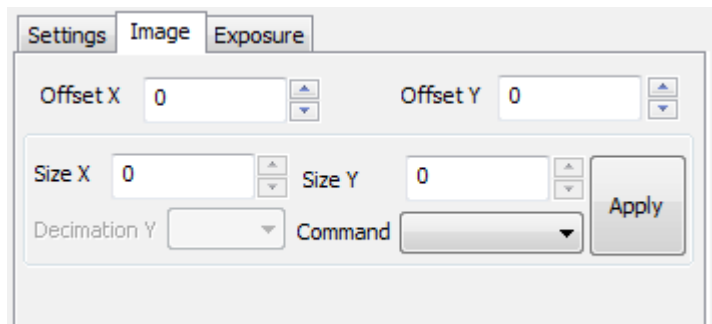
The adjustable features might include **ROI**, **Shutter Time**, **Frame Time**, **Trigger Mode**, **Correction**, **Simultaneous Readout**.
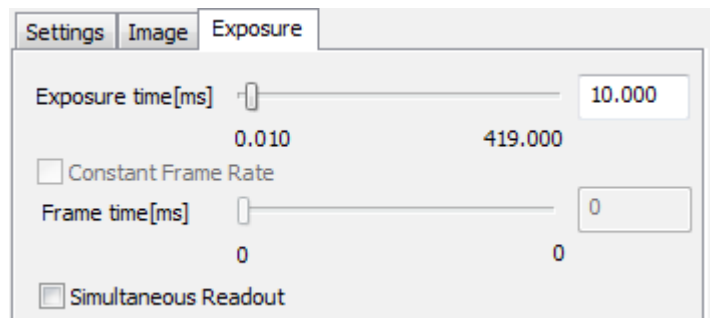
Point-To-Point Caliper

The Point-To-Point Caliper module lets you make point to point measurements on the current image.

To find the distance between two points, left-click on the first point and drag the mouse pointer to the second point. The module will draw a line between them, and the measured length will be shown. (For measurements to mean anything you must of course calibrate the module first, as explained below.) The line will remain visible until a new measurement is made or you click without dragging, or click the **Clear** button.

Measure tab

In the **Measure** tab, three options under **Draw Overlays** determine the circumstances in which overlays are drawn:
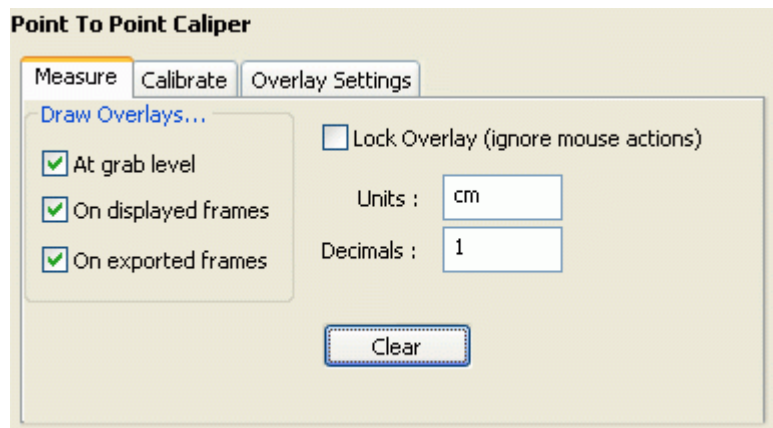
Check **At grab level** for overlays to be drawn on images as they are received from the camera.

Check **On displayed frames** for overlays to be shown regardless of image source (camera or sequence file) and regardless of whether overlays will be saved. Lastly, check **On exported frames** to apply overlays to images exported from a sequence, in all file formats (seq, avi, bmp, jpg, etc.).

Check **Lock Overlay** to make the module ignore mouse actions.

In the **Units** box, enter the unit of measurement desired (pixels, mm, m, cm, km, %, etc.).

In the **Decimals** box, enter the number of digits to show after the decimal point.

Click the **Clear** button to erase the current measurement line.

Calibrate tab

When you switch to the **Calibrate** tab the module enters calibration mode, which is used to set reference values. When you subsequently draw a measurement line, those values will be used to compute the line's real length. Switching to any other tab puts the module out of calibration mode.

To calibrate, start by selecting one of the 3 calibration methods available:

- **Inter-pixel** is the simplest method. It assumes that you know the exact distance between adjacent pixels on the image. To calibrate, enter that distance under **Calibrated Length**. The current calibrated length will appear as an overlay at the bottom of the image.

- **Between 2 points** is the standard method. This method requires you to left-click and drag the calibration line's handles to make a line of known length on the image. Enter that length under **Calibrated Length**. Note that if you subsequently redraw or remove the calibration line you will have to adjust the Calibrated Length value accordingly. For the best accuracy, use a longer calibration line.

- **Between 2 points (Horizontal & Vertical)** is an advanced method. It is only used for cameras that do not have square pixels, i.e. where the CCD's inter-cell distance is not the same horizontally and vertically. The calibration procedure is the same as for the previous method, except that you have to do it twice, once with a horizontal line and once with a vertical line. *Both must be done for measurements to be accurate.*

When calibration is completed, switch to the **Measure** tab and do a couple of test measurement lines to see if everything is correctly calibrated. If not, return to **Calibrate** and readjust the calibration.

Overlay Settings tab

This tab controls how the various overlays are drawn.

Style lets you select between two ways of displaying a measurement line: as a *Simple line*, with a *T at each end* or with **Handles**. T-end lines are the default.

InfoText lets you determine where and how to display the text indicating the length of the measurement line. You can position it to any corner of the image and select the font and font size. For best results, use a fixed-width font such as Terminal or Courier.
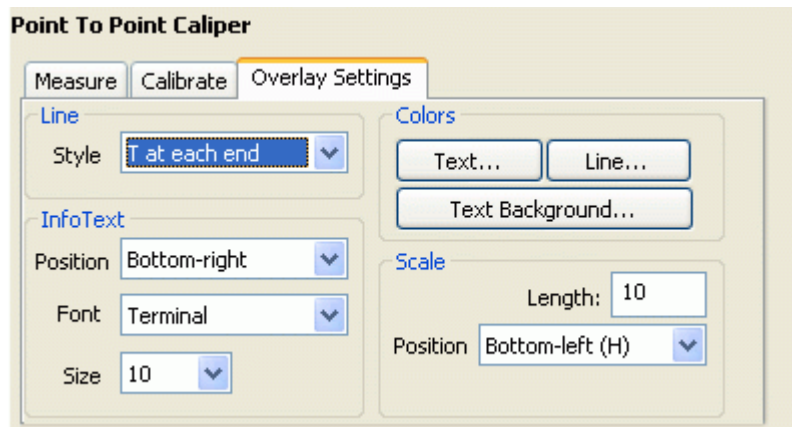
In the *Colors* box, click *Text* to change the color of text overlays (default is white on black). Click *Line* to change the color of the measurement line (default is pink). Under *Text Background*, if you select the same color as that used for text the background will be transparent to the image.

In the *Scale* box, enter the *Length* of the scale using the unit of measurement you selected in the **Measure** tab. From the pull-down list, select the corner of the image in which to position the scale, along with its orientation (H = horizontal, V = vertical). To hide the scale, select "None".

Note : When working with a line with "Handles", the line is moved by dragging its handles (the small circles at each extremities). At any time, double-clicking on any part of the image will move the handles near the mouse pointer. The precise start and end points of the line are in the exact middle of each handle.

Configurations Settings tab

This tab allows to switch between various configurations (i.e. calibrations).
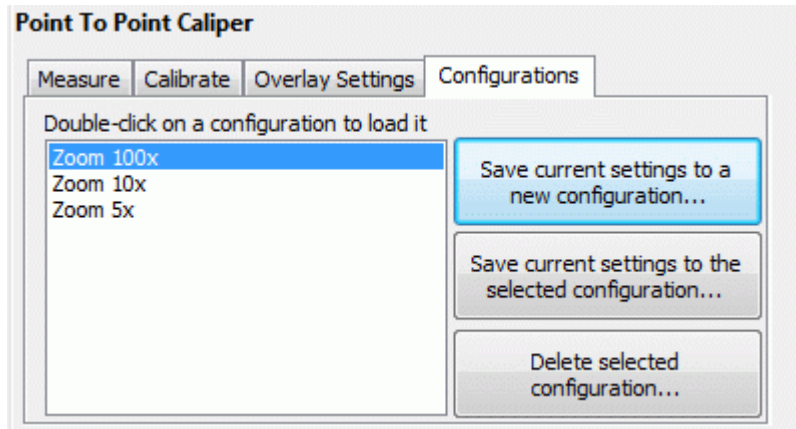
To create a new configuration, first define a calibration in the Calibrate tab. Then, click on [Save current settings to a new configuration]. The module will prompt for a name which will then be shown in the list of available configuration. Repeat for as many configurations as needed.

Once you have created all the different configuration, you can switch from one to another on-the-fly by double-clicking on the required configuration from the list. You can also overwrite an existing configuration with [Save current settings to the selected configuration]. Finally, delete unneeded configuration with [Delete selected configuration]. For both of these, the "selected configuration" refer to the configuration highlighted in the list and not the one currently loaded.

PTG Time Overlay

(This module is specific to Point Grey cameras)

Point Grey cameras include some specific time stamp information that can be added with each captured images. The PTG Time Overlay module allows users to decode that information and have it properly overlaid when the captured image is display.

It includes the support for the following 2 extra meta information provided by Point Grey camera API:
- **PC system clock**
- **Embedded image timestamp**

To enable that feature on the camera, simply open hardware properties, select Settings tab, and set "Time Stamp" to ON (default is OFF).

When that feature is on, embedded image timestamp is going to overwrite the first 4 pixels of an 8 bit image (32 bit). The same mechanism is used for the PC system clock: next 4 pixels (32 bit) includes the epoch time in second, and next 4 pixels (32 bit) include the epoch microseconds.
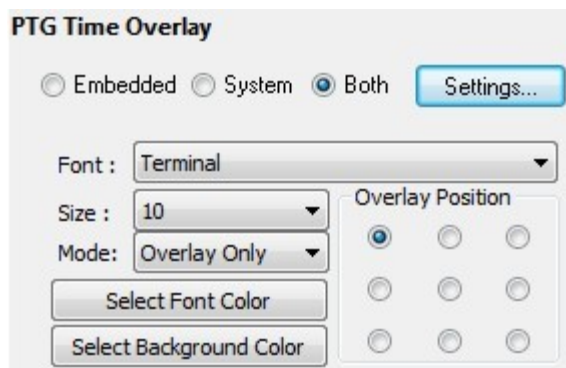
The PTG Time Overlay Module allows to "burn" or "overlay" the time stamp associated with each images directly on the image itself. You can specify the font type, size, position and location on the image. The overlay information can include Cycle time (embedded image timestamp) and or Epoch time.

This can be useful when capturing/exporting to AVI or image files because those formats don't have time stamp support.

Sequence Disk Space

The Sequence Disk Space module allows to calculate the available space for recording on a disk or in RAM. The module will use the disk that has been selected by the working folder option.

Free Space Estimation 71 %

Disk Sequence on C:

Total Space : 232.88 GB

Free Space : 163.80 GB (about 87607 images)
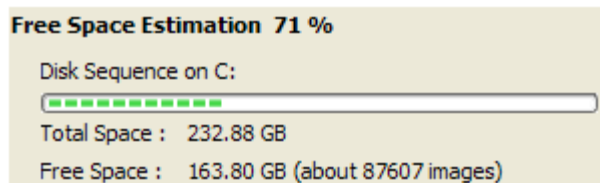
Time Overlay

The Time Overlay allows to "burn" the time stamp associated with each images directly on the image itself or have it overlay (no damage to the image data). This can be useful when capturing/exporting to AVI or image files because those formats don't have time stamp support.
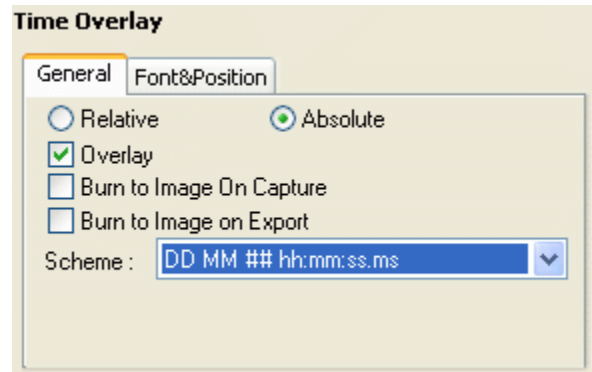
The time can be written as absolute or relative to the first frame of the sequence. Various scheme can be selected for formating the time stamp. Please contact Norpix if a specific scheme is required. It can easily be added.

In the "Font & Position" bat, you can specify the font type, font size. For best results, use fixed width fonts such as Terminal or Courrier.
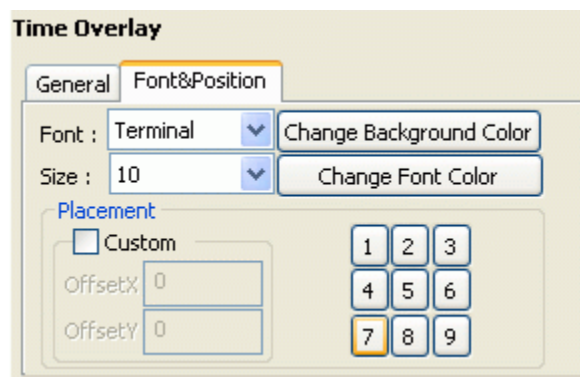
Use [Change Font Color] and [Change Background Color] to set the text overlay colors. If the text background color is the same as the font color, no background color will be used resulting in a transparent background.

The image location can be one of the 9 pre-defined positions or a custom position can be set by specifying a precise horizontal & vertical offset .

T.S. Sync Monitor

The Time Source Sync Monitor Module can be used in conjunction of StreamPix accurate time source devices. The module monitors the time source receiver devices and reports in real time synchronization status information. Supported hardware devices are:
- Meinberg (GPS and IRIG)
- Spectracom (GPS and IRIG)

Description of the various status mode:

TS: N/A 1) The current time source does not implement sync status.

TS: Unknown 2) An error occurs while querying sync status from the time receiver.

TS: Synced 3) The time source receiver is in sync with the reference time source (IRIG B or GPS world time).

TS: Free Run 4) The time source receiver is not in sync with the reference time source (IRIG B or GPS world time).

TS: Holdover 5) The time source receiver is no longer in sync with the reference time source (IRIG B disconnected or GPS satellite tracking lost), but the board internal clock is still accurate enough to deliver good time information

UDP Trigger Module

This module can be used to send notifications to StreamPix, using Ethernet UDP messages. These messages can be decoded by the module and trigger various StreamPix actions.

This module can only be loaded once. Hence, when used in a context of multiple workspaces, the module is loaded only once, but can forward messages to specific workspaces.

The current number of decoded messages is limited. Upon demand, we can add more messages and implement further functionnalities. Contact support@norpix.com for inquiry.

The message is formatted as a string with the following tokens:

Action#Number#[EventName(Workspace)]:User defined message

Action : Keyword. The module always checks messages by searching for this keyword.

#Number#: This is a number that can take any value. It will be retrieved by the module into a 32 bit integer, and is currently reserved for future usage.

EventName: The StreamPix event you want the module to trigger.
Possible values are (without the quotes):
> "*Pre/Post*"
> "*Start Record*"
> "*Stop Record*"
> "*Start Playback*"
> "*Stop Playback*"
> "*Mark Frame*"
> "*create new sequence and start recording*"
> [Seq file name token is defined by User defined message]
> "*Test*"

Workspace: The target workspace name. If workspace name is empty, target is current workspace or, if Selected All Workspace is active, target will be all workspaces.

User defined message : Any string the user wants to send. It can be retrieved by specific the module for some specific usage.

IP address: The IP address that the module will be listening from.

Port : The port number the module will be listening from.

Trigger Event: Enable/disable the module. When enabled, the module will forward received events to StreamPix and workspaces.

Log UDP message : All received messages will be log to a file, located in %AppData %\Norpix\UDPTrigger

Start/Stop monitoring: Turn on/off monitoring of the UDP messages.

In conjunction with the UDP Trigger Module, a .NET C# sample application is provided. It can be used to generate and send messages to the module. The sample files and code are installed with StreamPix in the folder:
 C:\Program Files\Norpix\Streampix5\UDPTrigSender.zip

Video Out

The Video Out module allows you to view multiple StreamPix real time camera feeds or stored video sequences simultaneously. The module can send video to any monitor output from a VGA adapter, meaning that the only limit to the number of concurrent video displays is the number of monitors available.

This module supports multiple VGA adapters, making it possible to use one VGA output per workspace for image display in addition to the standard display found in the main StreamPix user interface.

Each of the devices and monitor(s) driven by the module are labeled Video Out, in order to help differentiate them from the main display area where StreamPix is running.

The module can also be loaded using a single monitor configuration. The Video Out window will appear on top of the main StreamPix display area. Double click the image area to return to the main StreamPix window.

The Video Out module makes use of accelerated Microsoft DirectX 3D routines. Because of the usage of DirectX routines, the module has a low impact on the main CPU. Instead, it draws extensively from the GPU processing and display capabilities of the computer it is installed on. The latest DirectX Runtime libraries are required to run the module. (http://www.microsoft.com/downloads/en/default.aspx)

TVOut module refresh time value is set by:

Key: HKEY_CURRENT_USER\Software\Norpix\Streampix5\Setups\%Workspace%\TVOut\RefeshDurationTime

default value :25ms

The TVOut module includes several configuration tabs.

General Tab: Basic Settings
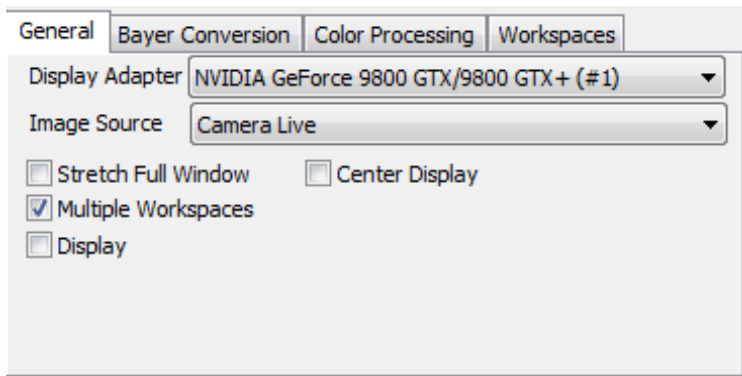
- Display Adapter: Select which TVOut monitor to drive. The monitor number corresponds to the identified display detected by the graphic adapter driver.

- Image Source: Select which video source to display, which can be either a live camera or a video sequence.

- Stretch Full Window: Stretch the displayed image so that it fits the entire TVOut monitor area.

- Center Display: Center the displayed image on the monitor (image is displayed in the top left corner when left unchecked).

- Multiple Workspaces: Enable/Disable Multiple Workspaces mode. If Multiple Workspaces mode is enabled, a Workspace tab is added. Enabling Multiple Workspace allows for the display of more than one workspace's content on the secondary monitor.

- Display: Check this option to activate the secondary display.

Bayer Conversion Tab: Use GPU to Compute the Bayer Rendering
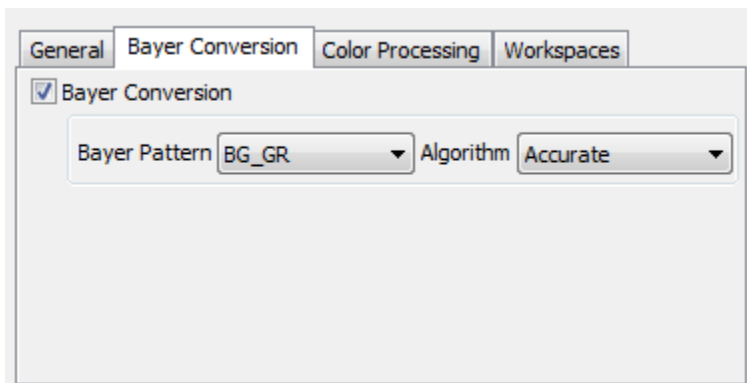
- Bayer Conversion: Enable/Disable conversion. Only useful if displaying a raw Bayer image.

- Bayer Pattern: Select the Bayer pattern matching your sensor.

- Algorithm: Select the Bayer conversion algorithm (Fast or Accurate).

Color Processing Tab: Use the GPU to White Balance or ASC CDL Color Correct Images
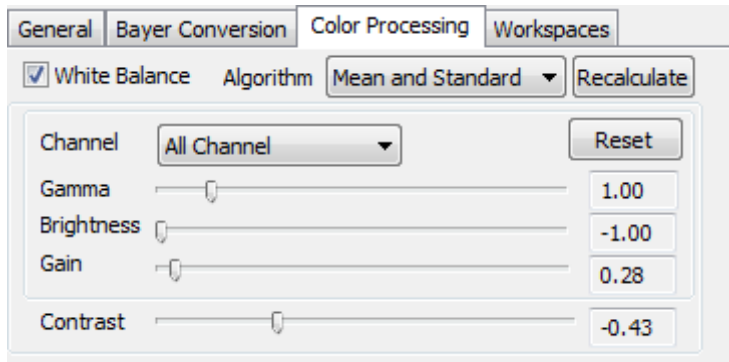
- White Balance: Enable/Disable auto white balance.

- Algorithm: Select the auto white balance algorithm:

Mean Equalization
Gray Word
Standard Deviation
Mean and Standard Deviation
When an algorithm is selected, the TVout module will recalculate white balance with the next incoming frame.

- Recalculate: Force the software to recalculate white balance using the next frame.

- The TVOut module supports ASC CDL grading color correction with revised contrast.

     The Channel pull down menu allows the user to select which color channel should be controlled. Select *All Channels* to apply the same formula for all 3 channels, or   select each individual color plan you want to work with.

     The Reset Button allows the user to reset back to the default values: Gamma (1), Brightness (0), Gain (1) and Contrast (0).

Workspaces Tab: Working with Multiple Workspaces

This tab is available only when the *Multiple Workspaces* check box is selected on the General tab. The Video Out display area can then be shared amongst selected workspaces.

Two display modes are available:
- Hybrid, where one workspace is displayed full screen and others are display as thumbnails,
- Split mode, where the Video Out area is equally split among the various workspaces. In split mode, the layout is defined using Video Layout X and Y parameters.

- Video Layout X or Y: Set row and column count.

- Display Mode: Select between the available display modes:
  - Hybrid with thumbnails on the right.
  - Hybrid with thumbnails on the bottom.
  - Equally Split between workspaces.
- Main Hybrid : Select the main
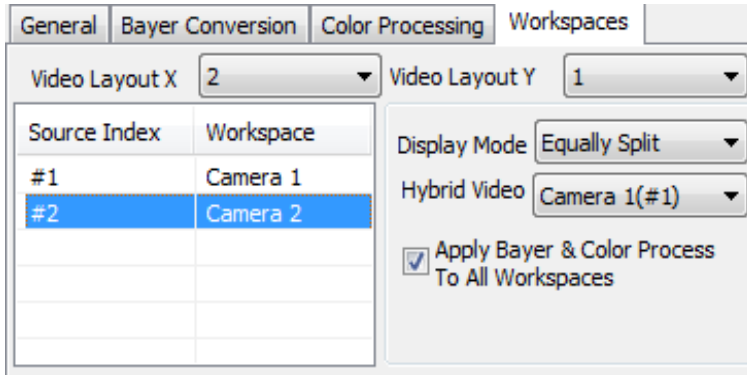
workspace source to be display

- Apply Bayer & Color Process to All Workspaces: Set to apply Bayer settings or color processing settings to all workspaces or the main video.

Premium Modules

Audio Trigger

This plugin monitors an audio input line and notifies StreamPix when the audio level is higher than a certain value (threshold).

To get started, select the capture audio device and sound format, set a threshold value and start monitoring the audio line.

Watch the audio level indicators and adjust the threshold value.
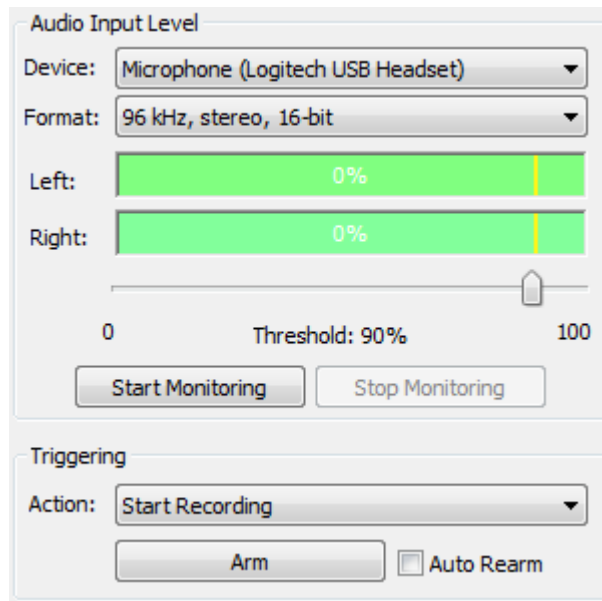
Then select an action to be executed by StreamPix when noise is detected. Available actions are:

- None (Testing Mode)
- Start Recording
- Stop Recording
- Pre/Post
- Mark Frame
- Set Reference Time

When done, click on the Arm button to arm the trigger. If the Auto Rearm option is checked the trigger will rearm itself automatically.

Audio Input Output

The Audio Input Output Module (AIOM) allows users to record from single or multiple audio track sources to a wav / bwav file format, in parallel to the video recording to a StreamPix sequence file. Great care has been taken so that the module maintains accurate synchronization between audio and video, provided there is sufficient disk bandwidth available to allow recording of both media.

To access the audio source devices (sound card), as well for playback, the module can either use a MME/DirectX or an ASIO driver.

- MME/DirectX: One stereo or two mono inputs and outputs can be handled. Different DirectX devices can be used by separate workspaces.
- ASIO: No limit on the possible number of channels. However, a single ASIO device can be loaded for the whole StreamPix.

Which driver interface should be selected? The MME/DirectX driver interface is always available, for all Windows compatible audio devices. The DX driver is somewhat limited, and can support only up to 2 audio channels. The ASIO driver typically exists with all professional related audio devices but ASIO4ALL is a hardware independent, low latency ASIO driver for WDM audio devices (http://www.asio4all.com/). The ASIO device driver, when available, is always preferable. It allows for better control of all the device properties, and can provide better quality data.

Among the module features we can mention:
- Per workspace implementation - one audio device per workspace.
- Auto audio file naming and generation while recording (audio file is created with the same name as the video sequence file but with the .wav extension).
- Uncompressed audio recording: The audio stream is captured from any Windows compatible audio device. If the audio device includes high quality digitizing options, the module will take advantage of those options.
- Synchronization with start / stop recording event.
- Synchronous playback with video.
- Automatic integration with file handling commands:
    - *File | Sequence Close* will close both video and audio files.
    - *File | Sequence Open* will open the sequence file and the corresponding wav file if it exists (provided the module is loaded into the workspace).

All features of the AIOM are grouped within 6 context related tabs. Depending on the audio device that is used with the module and the selected driver (DX or ASIO), tab contents may differ.

General Tab

- *Pass Through*: Allows input audio signal to pass directly to the output channel (monitoring). While recording, audio monitoring is turned off with MME/DirectX.
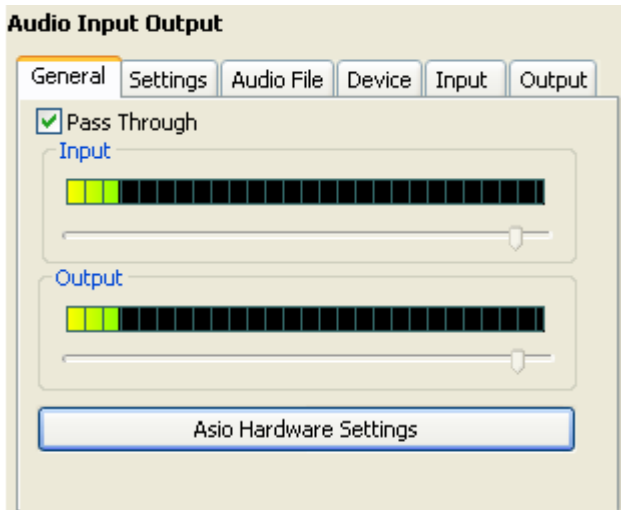
- *Level control sliders*: Level adjustment for both input and ouput channels (MME/Direct only. See below for ASIO).

- *Asio Hardware Settings*: Popup device specific ASIO hardware settings dialog. (Only when using ASIO driver).
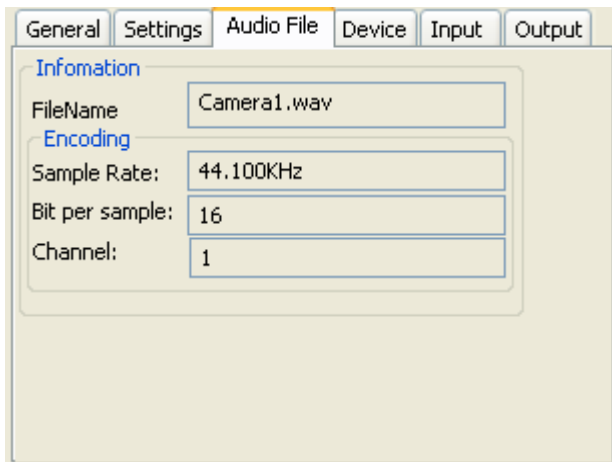
Settings Tab
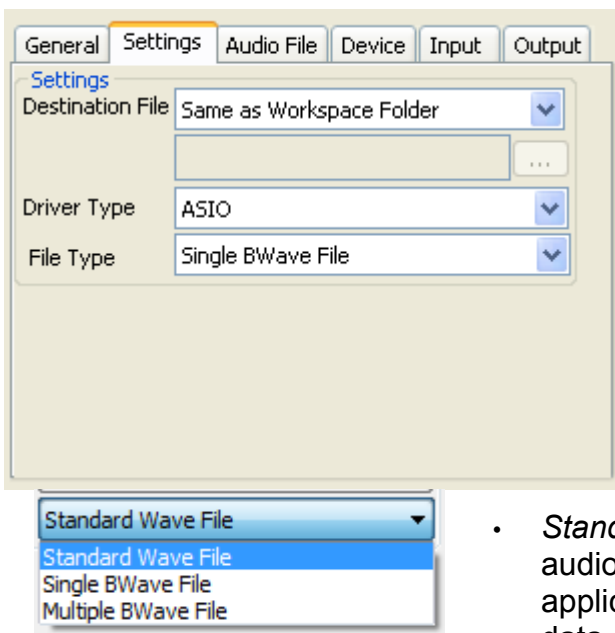
- *Destination File*: By default, the wav file is stored in the same folder as the video seq file. However, if disk bandwidth is not sufficient to handle it, an alternate storage path can be specified.

- *Driver Type*: Select what driver will be used to control the audio device: MME/DirectX or ASIO.

- *File Type*: The module can store the audio data to 3 possible audio formats. These formats are described below, with their respective advantages and drawbacks. All files are saved under the same .wav file extension.

- *Standard wave format :* The file includes only PCM encoded audio. It can be loaded and read by all media audio player applications. However, it includes no synchronization meta-data. During playback, the audio track will be started at the same time as with the video. Then no further synchronization is provided.

- *Single bwave format*: The whole audio stream is recorded into a single continuous bwav compatible file format (default). Bwav format includes the same data as a regular wav file, with the addition of synchronization meta-data, like an initial time stamp and LTC.

- *Multiple bwave format*: When pausing during recording, audio will need to be resynchronized with video upon resumption of recording. The is done by using separate bwav files for each recording section. Each bwave file contains meta-data that link the files together for accurate synchronization during playback.
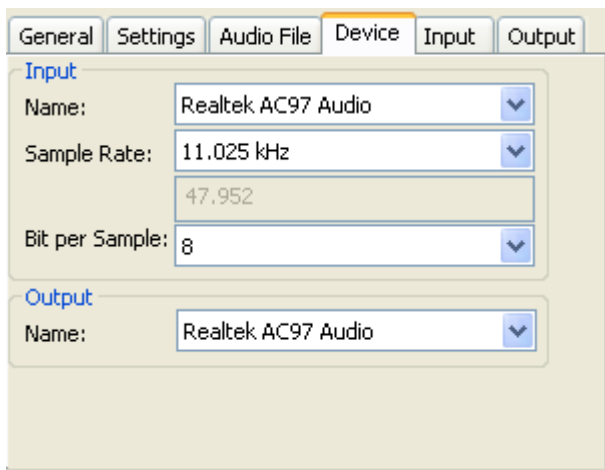
Audio File Tab

This tab contains only informative information about the audio data that will be stored in the file.
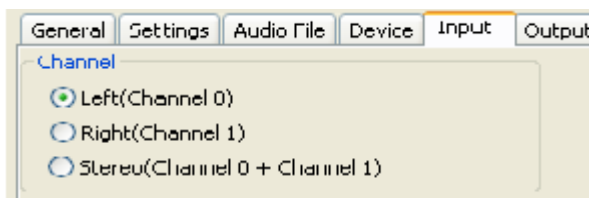
The information is dependent on some other parameters like the functionality available with the audio device in use.

Device Tab using a MME/DirectX device driver

- *Input device name*: Select the audio device you want to work with for your audio source. The selected device may only be used in a single workspace.

- *Input Sample rate:* Set the audio sampling rate.

- *Input Bit per sample* : 8/16bit.

- *Output device*: Select the output device you want to work with. Input and output devices can be different.

Input Tab using a MME/DirectX device driver:

- *Channel selection:* Limited to mono left, mono right and stereo.

Output Tab with an MME/DirectX device driver:

This tab is informal only.
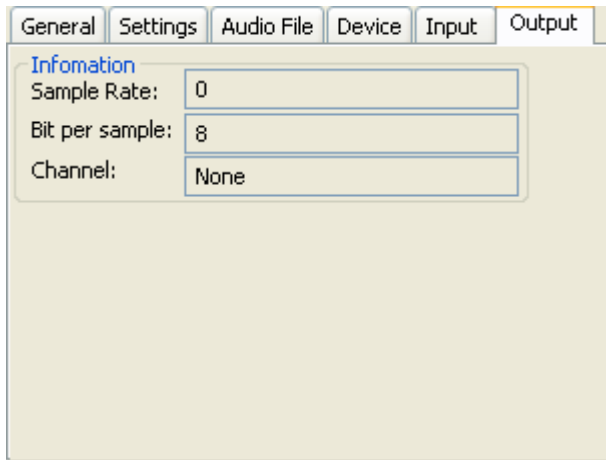
It displays various information about current output audio formats.

Device Tab using an ASIO device driver:
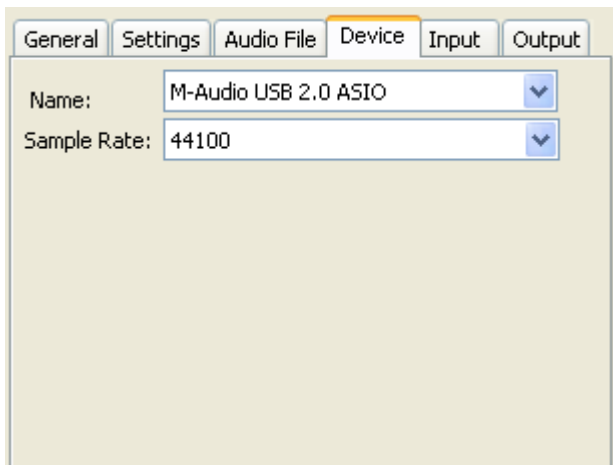
- *Device name*: Select an audio device that includes ASIO device driver support. Note that a specific ASIO driver must have been installed on the computer.

- *Sample Rate*: Select input and output audio sample rates. ASIO driver input and output channels require you to have the same sample rate.

Input Tab using an ASIO device driver:
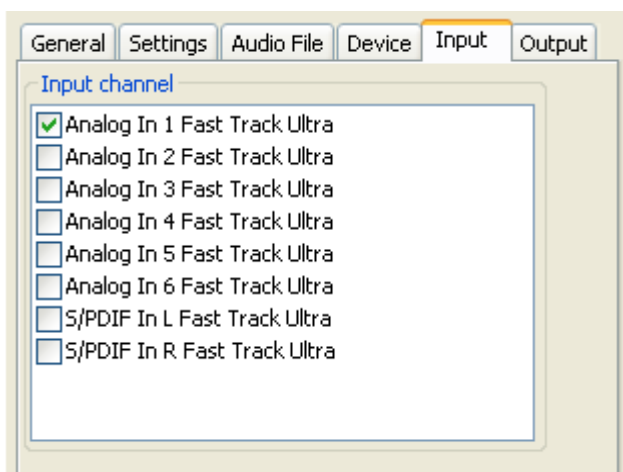
- *Input channel* : All the possible input channels of the device are listed there. Select whatever channel(s) you want to work with.

All channels will be recorded to the same WAV file. It is then possible to use a post recording utility to split the audio channels to **separate** wav files.

Output Tab with ASIO device driver:
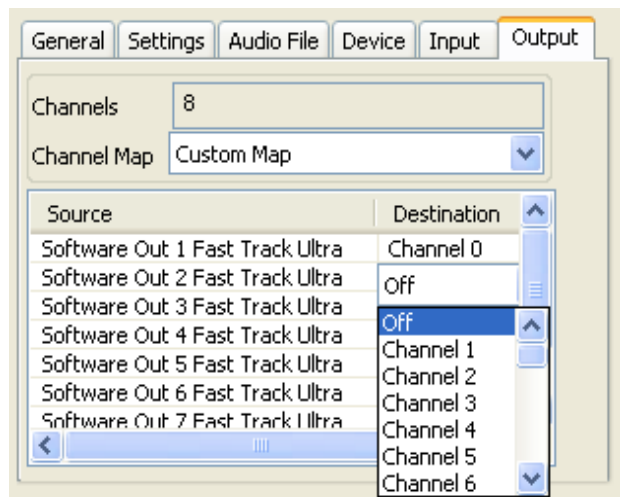
- *Channels*: Display the total number of output channels available with the device.

- *Channel Map*: Define the mapping of input channel to output channels. Using this feature, the module can redirect any input channel to any output channel. This is convenient when recording, for instance, 4 input channels while having only 2 output speakers.

  Default Map: Output each input channel to its corresponding output channel.

  Custom Map : Define your own mapping.

DAQ Capture Module

The DAQ Capture Module allows users to capture analog and digital data from various A/D converters and TTL input devices. This kind of data is generally described as one dimension data type (1D) in opposition to images that are two dimension data (2D).

Each 1D data reading is defined as a dataset. Each dataset includes one reading from a single or multiple A/D converter and/or single or multiple digital input.

1D dataset are recorded and stored into separate files from the image sequence file with a .daq file extension. The module supports reading from multiple A/D converters and digital inputs at once, provided this is from the same adapter. A single dataset is performed per received image.

Only one module can be loaded per workspace. Each module requires full and exclusive access to the A/D adapter. When using multiple cameras, if A/D reading needs to be separated per camera, multiple adapters are required.
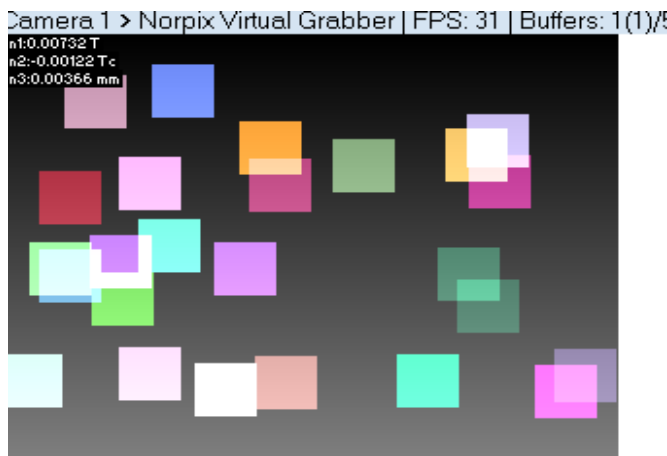
Each dataset can be displayed on the image by either overlaying or burning to image.

Among the module features we can mention:

- Per workspace implementation - one DAQ device per workspace.
- Auto DAQ file naming and generation while recording (.daq file is created with the same name as the video sequence file).
- Synchronization with start / stop recording event.
- Synchronous playback with video.

- Automatic integration with file handling commands:
  - *File | Sequence Close* will close both video and .daq files.
  - *File | Sequence Open* will open the sequence file and the corresponding .daq file if it exists (provided the module is loaded into the workspace).

General Tab
This includes general settings for the module.
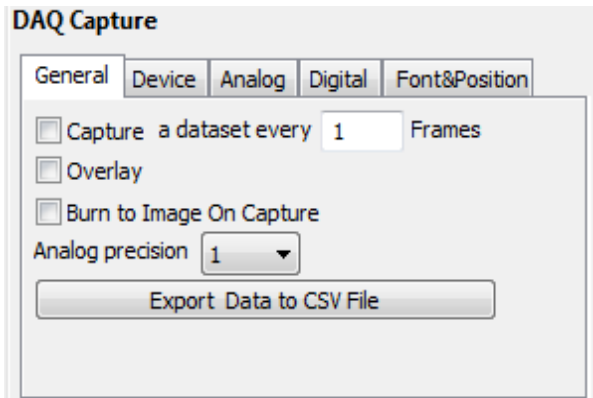
- Capture : Enables dataset capture. By default, when loaded, the module does not perform capture until fully configured. During capture, the configuration cannot be changed. Maximum capture rate is one dataset per image. Eventually, you can reduce the capture rate.

- Overlay : Enables overlay of the DAQ dataset on the screen.

- Burn to Image on Capture: DAQ dataset is burned in place of image pixels for each image. Useful when exporting images to other file formats where the .daq file cannot be reloaded for simultaneous playback.

- Analog DAQ data are printed as decimal numbers. Click the precision dialog to specify the number of digits to be printed.

- Export Data to CSV File: The .daq file contains binary information. Using that control, you can export current .daq files to an Excel compatible comma separated text file (.CSV file)

Device Tab
The device tab allows you to select a DAQ device to be used, and configure its hardware properties, and eventually overwrite the destination folder for the dataset .daq file.
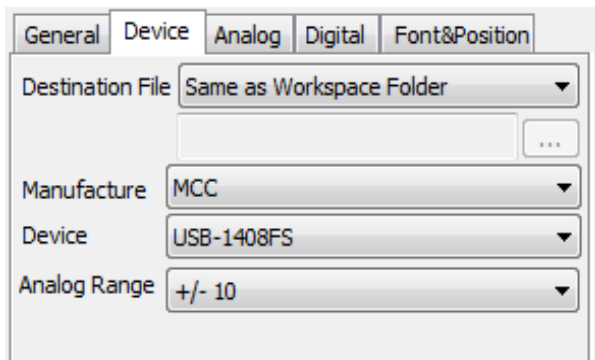
- *Destination File*: By default, the .daq file is stored in the same folder as the video seq file. However, if disk bandwidth is not sufficient to handle it, an alternate storage path can be specified.

- *Manufacture*: Select a device provider which is supported by StreamPix.

- *Device*: Select what device will be used.

- Analog Range: select what analog range will be used. It's only available for analog line (this is hardware dependent, and may not exist for all supported modules).

Analog Tab

This tab allows you to configure each A/D reading and conversion. Only first degree linear conversion is possible : $Y = A X + B$,
where:
- Y = printout value
- A = conversion slope

- • X= A/D reading
- • B= possible offset

- • Line : Analog line name from device , read only.

- • Name: Printed display name.

- • ParamA: Type to set conversion function parameter A.

- • ParamB: Type to set conversion function parameter B.

- • Unit: Unit name to be printed.

Font&Position Tab

This tab can be used to adjust font and position when overlay or burn to the image.

- • Font : Select what font to use.

- • Size: Select what font size to use.

- • Overlay layout : Set how to overlay DAQ data horizontal or vertical mode. In horizontal mode, all analog readings are displayed on a single horizontal line. In vertical mode, all analog readings are displayed one per line. Digital data is displayed on a separate column.

- • Overlay Position (OffsetX and offsetY): Set where to overlay DAQ data.

- • Change Font Color : Set overlay text color.

- • Change background Color: Set overlay text background color.

Distance Measuring Instrument Module (DMI)

The Distance Measuring Instrument Module is capable of controlling image capture rates for multiple cameras based on the received information from a Pulse Distance Interval signal (PDI).
Furthermore, current GPS readings and current milepost information can also be gathered during the image capture and recording process and embedded with each image.
The DMI module is made of the following components:

- A software module for StreamPix,
- An electronic counter device (usually plugged in to the image recording computer),
- Sync box that allows connecting various input and output signals together,
- A Pulse Distance Interval signal usually provided by a DMI device or wheel motion encoder (not provided),
- A NMEA compatible GPS device (not provided),
- One or multiple cameras for image capture.

DMI Sync Box:

The DMI module requires the usage of some internal electronic counter devices directly plugged into the computer. Supported devices are the Measurement and Computing 4301LS, the National Instruments NI6601 or NI6320 devices, which include some counters and IO control.
The sync box needs to be connected to the host computer via the provided cable.
The box includes also some output Hirose 4 pin output connector to power the cameras and forward the sync exposure pulses to each camera.

DMI sync box also includes 2 BNC connectors:
- **DMI Input:** That connector must receive the PDI signal from the wheel encoder. The PDI signal must be a TTL (0-5V) square wave signal. Pulse rates depend on the motion speed of the vehicle.
- **Camera Sync Output:** That auxiliary output can be used as a repeater signal to provide a similar pulse that is used to trigger the cameras.

DMI sync Box also include LEDs that can be used as tools for testing the behavior of the device:
- **Green PC Link LED:** When on, that indicates the sync box receives appropriate power from the computer.
- **Red DMI LED:** The LED will be flashing at the rate of the PDI. No motion will generate no pulse. Note that in order for the pulse to be visible, you may need to adjust the duration of the pulse via configuration of your DMI device. The LED is directly connected to the input line. If the PDI pulse duration is very short (a few milliseconds for instance) you may not visually see those. PDI pulse duration may be too short for the naked eye.   However, the NI device will still be able to properly handle pulses with durations as short as 50 nanoseconds.
- **RED Camera LED:** The LED will be flashing each time a capture signal is sent to each camera. When the LED is off, no image is captured.

Loading the software module:
The module can be loaded via External Module Docking panel. Select "DMI Positioning" and click Load.
Once loaded, the module will need to be setup properly via various tabs.
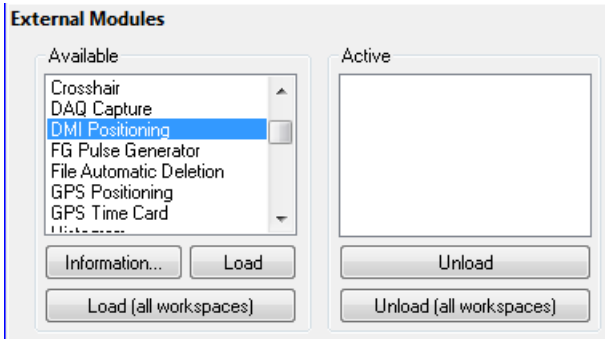
GPS related information will be setup via the Device Setup tab. Overlay information font and position can be setup via the Font and Position tab, while information related to the DMI control and camera sync will be set via the DMI tab.

Configuring the Module to work with NMEA GPS:

Select the Device Setup tab to configure information related to the GPS device. Select connection port USB or COM(rs232) as well as COM port parameters. Check with your GPS device for adjusting the parameters. All NMEA compatible GPS are supported by the module.
Once the GPS related parameters are properly configured, you can switch to the GPS tab. If images are capturing images, GPS information will be refreshed in that panel.

GPS tab:
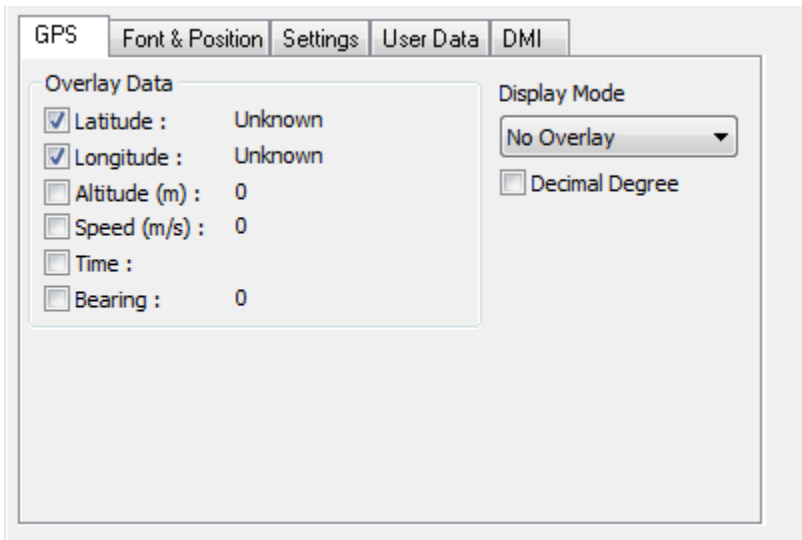
In that panel, the module allows the user to choose which information will be decoded from the NMEA string sent by the GPS device. Latitude, longitude, altitude, speed, bearing and time can be decoded. Depending on the GPS device, not all information may be transmitted. Check with your GPS provider in case some information cannot be displayed.
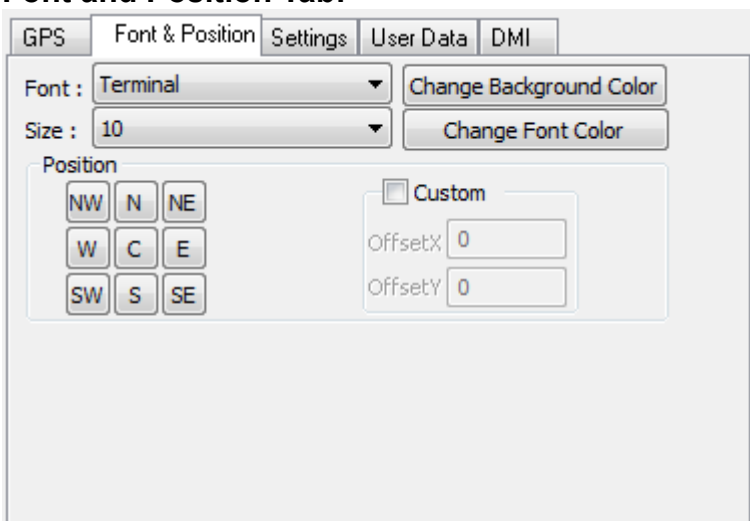
Since NMEA compatible GPS devices usually deliver a new message every second, this information is refreshed every second. As a consequence, all frames received between 2 messages will be

stamped with the same and constant information.

The Save GPS data to file can be used during recording. It will create a comma separated text file (.csv) that stores the selected GPS information along with the index of each image. The file is created in the same folder as the recorded sequence, AVI, MOV or image files and uses the recorded file name with a "_gps.txt" extension. If the destination media for recording is RAM rather than disk, the file is created in the C:\temp folder and is called "RAM sequence_gps.txt". If a File Name Padding value is specified in the **StreamPix settings > More...> Images** page, then that padding will be applied to the image index in the GPS text file.

It is possible to control the Display Mode for the GPS data: it can be "burned" on each image or simply be overlaid (no damage to the image data). You can specify the font type, size, position and location in the image via the font and position panel.

Font and Position Tab:

Predefined positions are available. Eventually, you can also select Custom and enter pixel coordinates to set the exact location of the text in the image.
Various fonts and sizes are available. Please note that the font size may look different when using the Overlay mode versus the burn to image mode. In overlay mode, zoom factor applied on the image display has no effect on the display font.

User Data tab:
The user data tab includes 3 lines where extra text can be enterred. That information will be stored into the csv log file with the GPS related coordinates.

DMI setup tab:

All information related to the DMI can be setup within that panel.

Trigger camera from DMI pluse : trigger cameras by DMI pluse. After select this option have to define trtigger pulse number.

Trigger camera by time : trigger cameras by time, After select this option have to define trtigger time.

Delay 2nd pluse : define the pluse delay for the 2nd pluse.
Miles per Pulse parameter defines the DMI incremental distance between each pulse. Refer to your DMI device documentation to enter the right value. An incorrect value will affect the MilePost calculation.DMI module support trigger camera by DMI pulse or time.

Initial Miles: At the beginning of a data logging campaign, an initial mile post value can be entered. MilePost will increment according to the received DMI pulses starting from that initial value.

MilePost: When enabled, the MilePost value is stored with the GPS collected data. If display mode overlay or burn to image is selected, MilePost value will be added. If Save GPS data to file is enabled, the .csv file will also contain the corresponding milepost reading for each image.

Log to file : log mile postion to the GPS csv file.

Reset: At any time, the MilePost value can be reset to the initial mile.

DMI pulses are directly linked to the travel distance of the vehicle. Image capture is synchronized with DMI pulses. Adjusting the Trigger camera every N Pulses value allows to define the camera capture rate according travel distance. Make sure to enter a proper value, compatible with the campaign image sample rate, vehicle maximum speed and camera maximum capture rate.

Finally, the DMI Module can accommodate various hardware devices mounted into the computer according to your configuration. Make sure to select the proper DMI input device.

Frame Grabber Pulse Generator

FG Pulse Generator

Pulse Frequency (Hz) 50   Turn ON

Start Delay (ms) 0   Stop Delay (ms) 0

This module is used to set up the internal timing generator, available on certain frame grabbers, to trigger camera exposure at a specified frequency. The cameras have to be configured, using their own software, to receive the exposure trigger from the frame grabber and not from another external source.

The module is easy to use. Enter the desired pulse frequency and use the "Turn ON" button to toggle the pulse generator on and off. The frequency precision can be set up to 2 decimals.
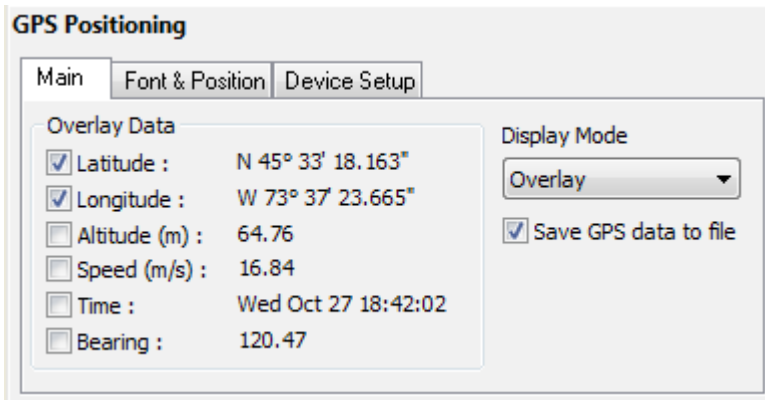
You can also specify a Start Delay (generator will start X ms after clicking the "Turn ON" button) and a Stop Delay (generator will stop X ms after clicking the "Turn OFF" button).

Note: Please check with Norpix for the up-to-date list of frame grabbers that support this feature.

GPS Positioning

This module is useful for displaying data received from NMEA compatible GPS devices.

The module allows the user to choose which information will be decoded from the NMEA string sent by the GPS device. Latitude, longitude, altitude, speed, bearing and time can be decoded. Depending on the GPS device, not all information may be transmitted. Check with your GPS provider in case some information cannot be displayed.

Since NMEA compatible GPS usually deliver a new message every second, this information is refreshed every second. As a consequence, all frames received between 2 messages will be stamped with the same and constant information.

The "Save GPS data to file" can be used during recording. It will create a comma separated text file that stores the selected GPS information along with the index of each image. The file is created in the same folder as the recorded sequence, AVI, MOV or image files and is using the recorded file name with a "_gps.txt" extension. If the destination media for recording is RAM rather than disk, the file is created in the working folder and is called "RAM sequence_gps.txt". If a File Name Padding value is specified in the **StreamPix Settings > More... > Images** page, then that padding will be applied to the image index in the GPS text file.

The GPS data can be "burnt" on each image or simply be overlaid (no damage to the image data). You can specify the font type, size, position and location in the image.
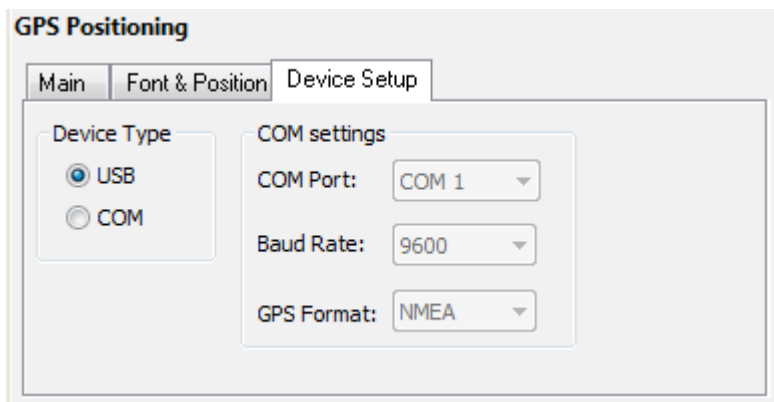
The GPS device can be connected via a USB or a COM port. For the COM port connection, the user can specify the COM port, baud rate and GPS device format (NMEA or GARMIN).
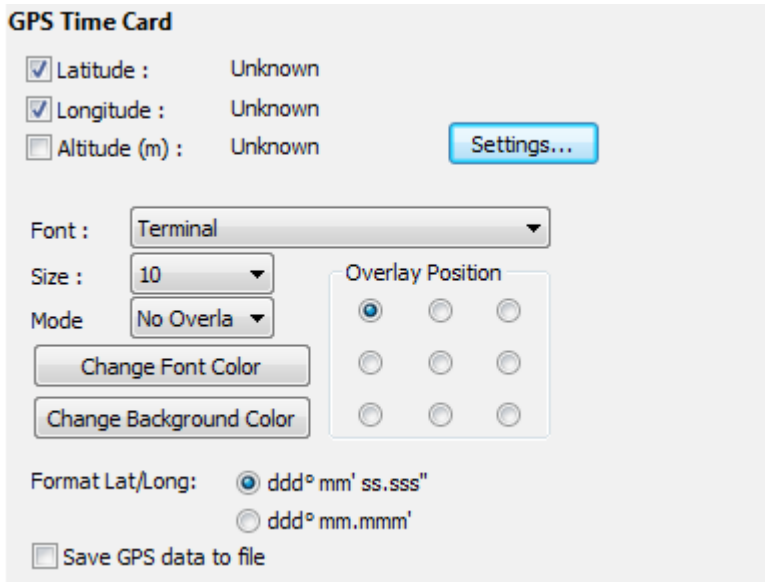
The GPS information can also be added in the auto-naming scheme, using the {GPSData} token. For example, when a new sequence is created using the auto-naming scheme, the token will be replaced by the GPS data (the same information that is overlaid or "burnt" into images).

Note: The GPS positioning module requires a separate license code.

GPS Time Card

This module is useful for displaying GPS data received from certain time source boards that have also GPS capabilities.

The module allows the user to choose which information will be decoded (latitude, longitude, altitude). Depending on the board, not all information may be transmitted.

Since GPS boards usually deliver a new message every second, this information is refreshed every second. As a consequence, all frames received between 2 messages will be stamped with the same and constant information.
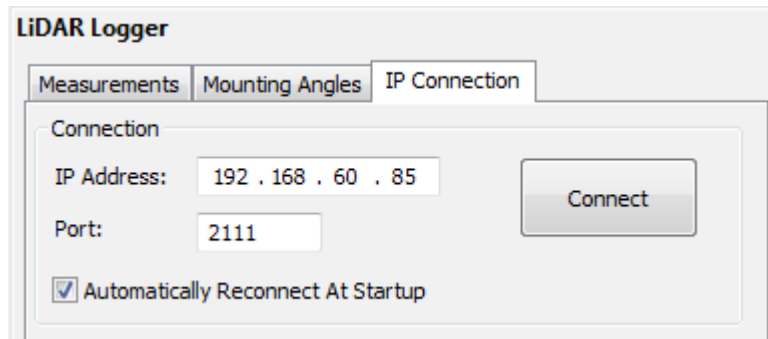
The GPS data can be "burnt" on each image or simply be overlaid (no damage to the image data). You can specify the font type, size and position on the image.

The "Save GPS data to file" can be used during recording. It will create a comma separated text file that stores the selected GPS information along with the index of each image. The file is created in the same folder as the recorded sequence, AVI, MOV or image files and is using the recorded file name with a "_gps.txt" extension. If the destination media for recording is RAM rather than disk, the file is created in the working folder and is called "RAM sequence_gps.txt".

Note: Please check with Norpix for the up-to-date list of time source boards that support this feature.

LiDAR Logger

This module connects to a Sick Bulkscan LMS 511 device. It allows the user to configure some of its parameters and to retrieve the data sent by the device.
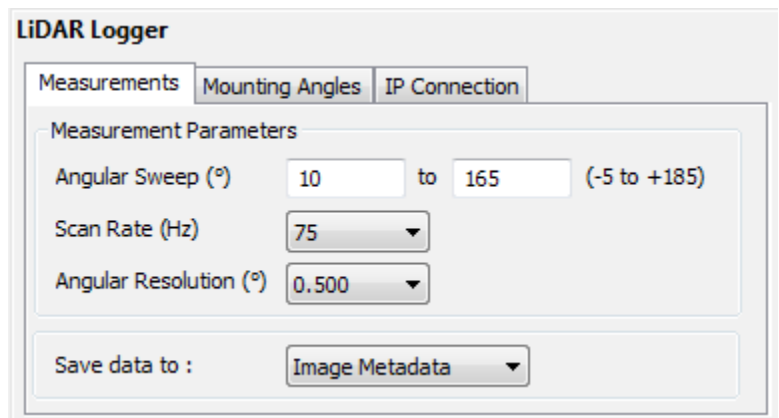
First, the user needs to establish the connection with the device, by filling in the corresponding IP address and port in the **IP Connection** page. These settings should be previously configured with the Sick SOPAS Engineering Tool available on the manufacturer's website. The connection can be initialized manually, by pressing the **Connect** button or automatically, if the *Reconnect at Startup* option is selected.
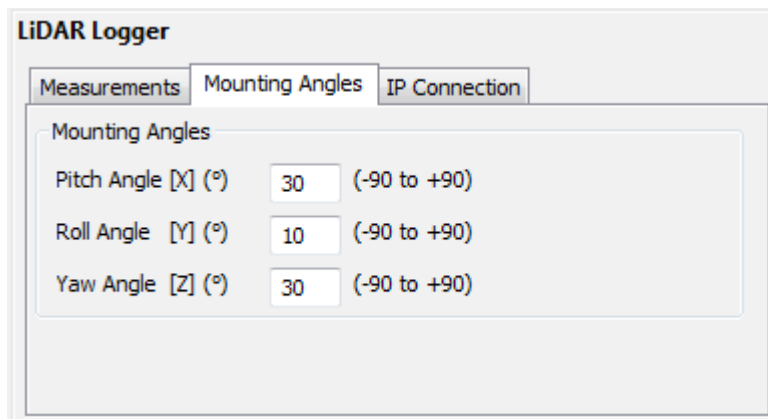
Then, in the **Measurements** page, several parameters can be adjusted: *Angular Sweep*, *Scan Rate* and *Angular Resolution*. Each time one of these parameters is changed, the new configuration is sent automatically to the device. Sometimes, reconfiguring the device might take a few seconds.

The data captured from the device can be saved separately in a log file and/or as metadata, embedded in each recorded image.

When saving to a log file, the module creates a text file in the same folder as the recorded sequence, AVI, MOV or image files and is using the recorded file name with a "_lidar.txt" extension. If the destination media for recording is RAM rather than disk, the file is created in the working folder and is called "RAM sequence_lidar.txt".

The **Mounting Angles** page allows the user to fill in the angles at which the device is mounted. These parameters are also saved along with the data received from the device.

The data structure of the LiDAR output is detailed below.

Sample entry:

1|2012/07/05 16:53:50 314|30,20,35|DATA_PKT_DISTANCE1_MEAS,3500,23826,1|
2500,0.000000,4294917296,761|405,3058,...

Image index in the sequence	1
(group delimiter)	|
Date	2012/07/05
Time	16:53:50
Milliseconds	314
(group delimiter)	|
X orientation	30 deg
Y orientation	20 deg
Z orientation	35 deg
(group delimiter)	|
Measurement type	DATA_PKT_DISTANCE1_MEAS (Distance measurement)
Scan Rate	35 Hz
Scan Count	23826 (unique scan line index for this device, will always increase by 1 with each scan line)
Scale Factor	1
(group delimiter)	|
Angular Step Width	2500 = 0.25 deg (in 1/10,000 deg units)
Scale Offset	0
Start Angle - 50000 (in 1/10,000 deg units)	4294917296 = -5 degrees = (2^{32} - 50000) = max long value
Number of Data Points	761 (190 deg sweep / 0.25 deg step + 1)
(group delimiter)	|
Data	< 761 Data Values ...> in millimeters from unit

Line Scan Viewer

This module has been designed to display and export to various format images from a line scan source. Contrary to area scan sources, line scan sources deliver a single line of pixels. Viewing a single line image where the line is replaced at a high rate is too challenging and of little interest. The Line scan display module allows a waterfall like display, where new lines to be displayed are appended to the previously displayed ones. Older lines eventually get removed.

Line scan cameras are used to capture web-type data and can be seen as one dimension devices, delivering one dimension images. The typical output of these cameras implements displaying multiple lines at the same time so that the viewer can picture what is happening under the camera. Also, line scrolling is required as the older scanned lines need to be discarded to make room for the newer ones.

Some line scan camera devices or frame grabbers can eventually combine a set of lines together to build a kind of area scan line image. The line scan viewer module can also accommodate those devices, and still present a waterfall like image display.

Page size and image size:

For line scan cameras, we define a page as the number of lines delivered by the camera within a single image. So a page is basically equivalent to an image. Except that the viewer will combine multiple pages to generate an image for display. Usually, the page size is 1 line. However, the line rate can be very high, sometimes delivering 20 000 lines per second, or 20 000 pages/images per second.

Managing 20 000 lines a second could be challenging for most software. However, combining those lines within, for instance, a single page made of 100 lines, allows StreamPix to deal with a more sedate 200 images per second.

The line scan viewer module can also be used to export acquired lines into various formats:
   • Combine consecutive lines into a single area scan like image (export to still images).
   • Convert to an equivalent area scan movie.

Once the module is loaded, you will notice a new tab in the workspace display area. This tab gives access to the linescan viewing pad, while you can still access the usual live camera pad and sequence pad.


The module includes 3 tabs to allow configuring various display and referring options.

General tab: display options

The line scan pad can display images from 2 sources: Direct from the *camera* or from the recorded *sequence* file.

When *Number of lines* is set to *automatic,* the number of lines in the waterfall display is adjusted to

the viewer window size. When set to *manual*, one can define how many lines will be simultaneously displayed.
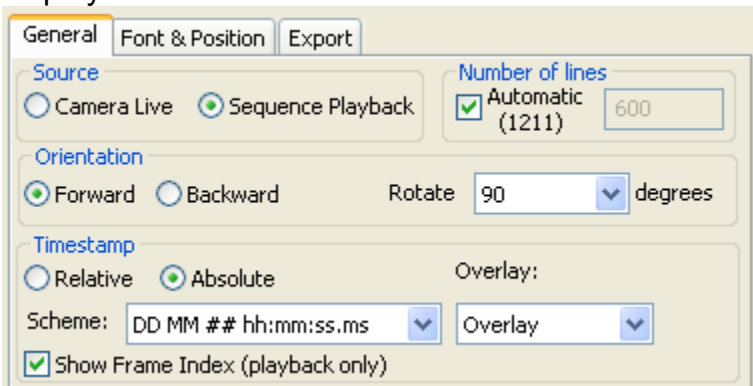
Depending on the scan direction of the web in front of the camera, adjust image orientation: *Forward* (most recent page is added at the end of the current set of lines) or *Backward* (most recent page is added at the beginning of current set of lines).

Depending on camera orientation, it is also possible to have the waterfall display vertically (*0 or 180* degrees), or horizontally (*90 or -90 degrees*).

A one page 100 line display of a rotated Pepsi pop can in front of a monochrome linescan sensor: Typical view from the camera tab or the sequence tab:
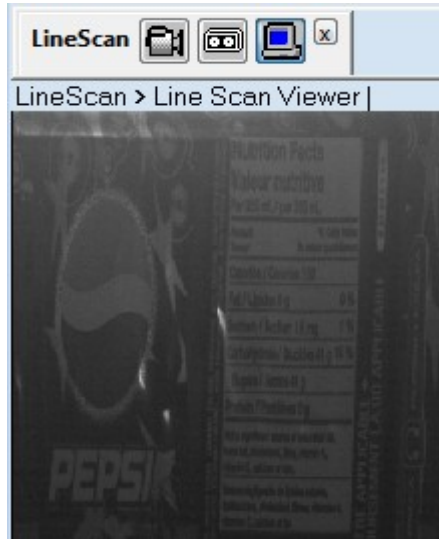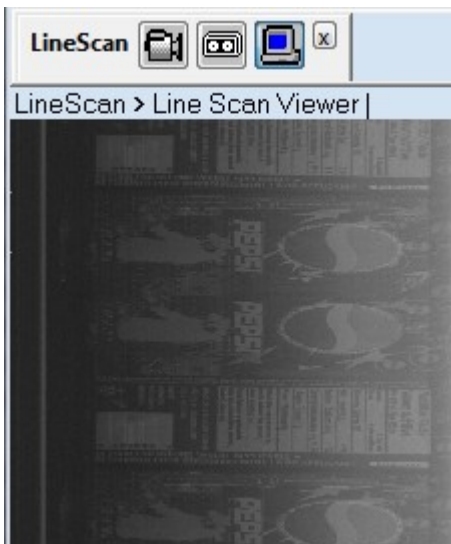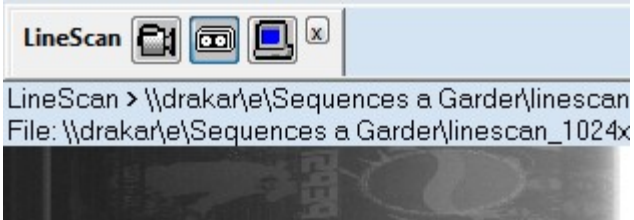
A waterfall view from the linescan viewer tab, vertically or horizontally oriented:

The module also includes an option to overlay captured time stamp for each page. When displaying an image from the camera source, the module will overlay the timestamp of the last page. In playback mode, 3 timestamps are overlayed: The oldest page, the middle of the view page and the newest page. The overlay position depends on the image orientation.

Several timestamp display *schemes* are available. Also, time can be overlayed as *absolute* or *relative* to the first captured page. Eventually, you can also overlay the *page index.*

Font & Position tab:
This allows customization of the timestamp overlay (position, font, text size, color and background color).

Export tab:
Exporting line scan pages can be done via the regular StreamPix export command. However, the module can be used to export the waterfall like display images.
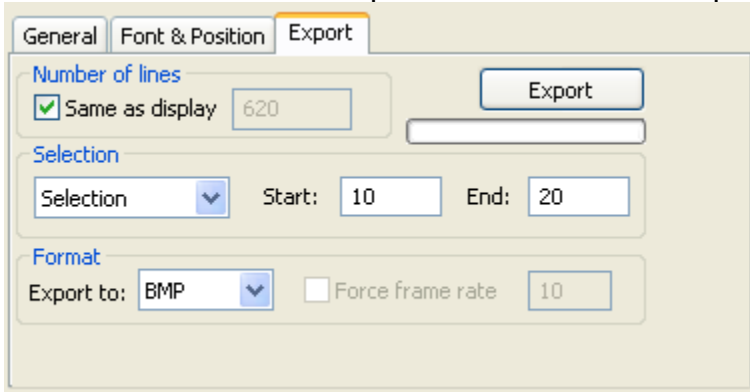
Consecutive lines in a page can be exported as an area scan like image. Set the *number of lines* to the desired size of the image to be either identical to the display area or to your own choice.
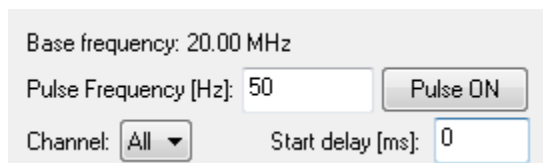
Supported export formats can be one of the following: *BMP, JPG, TIFF, PNG, FIT, JP2, DPX,* for still images, or *AVI, MOV (*32 bit only) and SEQ for movie-like rendering.

When exporting to a movie format, a custom *frame rate* can be set. By default, frame rate of the original sequence will be applied.

MCC Pulse Generator

The MCC Pulse Generator module allows to control the image acquisition speed of your camera or frame grabber and synchronize the acquisition between multiple workspaces. The cameras have to be configured to receive the exposure trigger from an external source (i.e. the MCC device).

To get started simply enter the pulse frequency to be generated. Since the pulse train triggers the camera exposure, the pulse frequency will determine the exact camera frame rate.

Base frequency: 20.00 MHz

Pulse Frequency [Hz]: 50   Pulse ON

Channel: All ▼   Start delay [ms]: 0

The MCC board can be programmed to generate a single pulse train by selecting a single channel, or multiple synchronized pulse trains if all channels (counters) are used.

Optionally, the MCC board can be programmed to start the pulse(s) with a certain delay.

Use the "Pulse ON" button to toggle the pulse train on and off.

Motion Detection

The Motion Detection module is designed to perform real time image processing (IP) on incoming images and upon detecting significant motion or change in the image, it can generate an event to StreamPix.
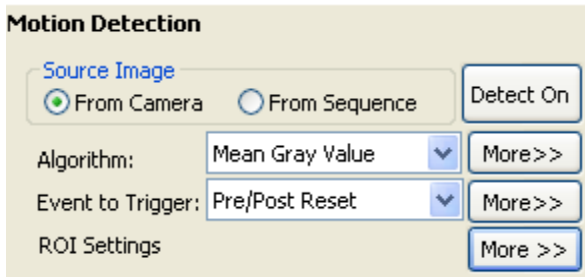
At load time, the module is not performing any detection. One has to push the "Detect On/Off" button to turn on the monitoring.

The Module can perform the analysis on the whole image area, or a region of interest (ROI) can be defined.

Three different image processing algorithms are available, depending on the nature of the scene or image to be monitored:

- Mean Gray Value: The module will calculate the average gray level in the defined ROI and upon a change from a reference value, will trigger the event.
- Absolute Difference: The module will calculate the pixel to pixel difference from a reference image and trigger the event when the difference reaches above a certain threshold.
- Max absolute Difference: The module will calculate the pixel to pixel difference from a reference image, search for the maximum difference value and trigger the event when the difference reaches above a certain threshold.

The Module can generate any of the five following StreamPix events:

- Start Recording,
- Stop Recording,
- Pre/Post Continuous: Continuously generate pre/post events until the condition resets,
- Pre/Post Reset: While waiting until the condition resets before generating a new pre/post event,
- Mark Frame.

Configuring Motion Detection Module:

The following parameters have to be configured:

- Image Source
- Detection Algorithm
- Event to Trigger
- ROI Settings
- Detect

Image Source:

The module can be applied on an incoming stream of images from a camera or eventually for tune up purposes, it can be applied while playing back a sequence. During playback, no events are generated since there is no point in managing recording status while playing back.

Algorithm:

Choose among 3 available algorithms, according to what you think will best suit your needs. Depending on the algorithm selection, some extra specific parameters need to be adjusted.
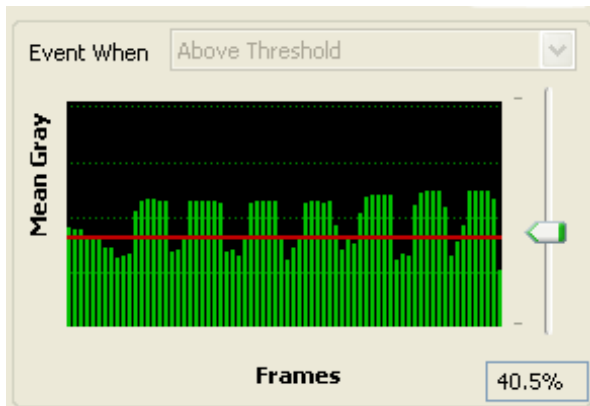
Mean Gray level:

- Select the condition for when the event should be triggered:
  - Above Threshold,
  - Below Threshold.
- Eventually adjust the threshold value.
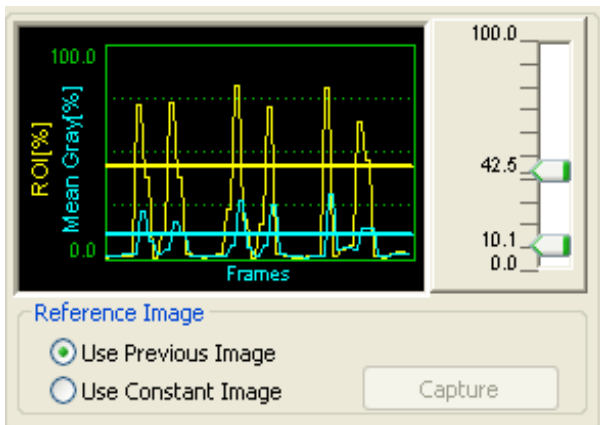
Absolute Difference:

- The percentage Mean Gray defines the minimum value in pixel intensity that must be encountered before an event is triggered.

- The percentage ROI specifies a minimum number of pixels where the change must occur.

- Since "Absolute Difference" is performing an image subtraction between the last received image and a reference image, you need to define

what the reference image will be. It can be the previous captured image or an image that is

defined as the reference. Use the capture button to capture and save the reference image to disk.

Max absolute Difference:

- ◆ The percentage grey defines the minimum value difference in pixel intensity that must be encountered before an event is triggered.

- ◆ The difference can be calculated between the current and last image or with a reference image (constant) that you need to define. Use the capture button to capture and save the reference image to disk.
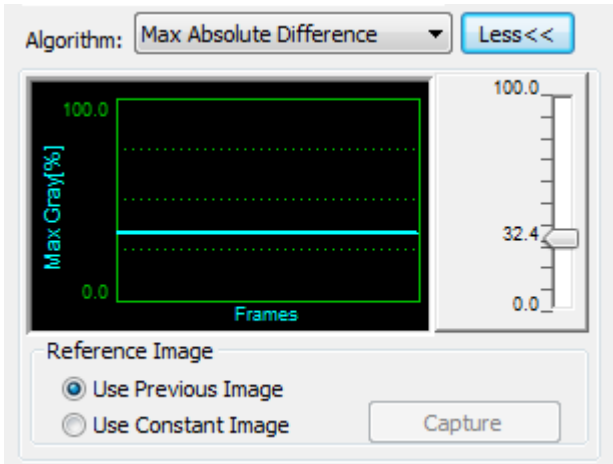
Select StreamPix event to be triggered:

There are five possible StreamPix events that the module can trigger:

- Start Recording,
- Stop Recording,
- Pre/Post Continuous,
- Pre/Post Reset,
- Mark Frame.
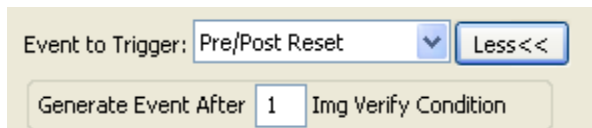
To make the module less sensitive to false detection, it is also possible to enable event triggering only after the condition was detected continuously for a specific number of consecutive frames.

Select ROI:

Motion Analysis can be performed either on a full image size, or using a specified region of interest (ROI). ROI can be defined by either manually entering the coordinate of the region in the image, or by interactively clicking and dragging an ROI on the display area.

NI Pulse Generator
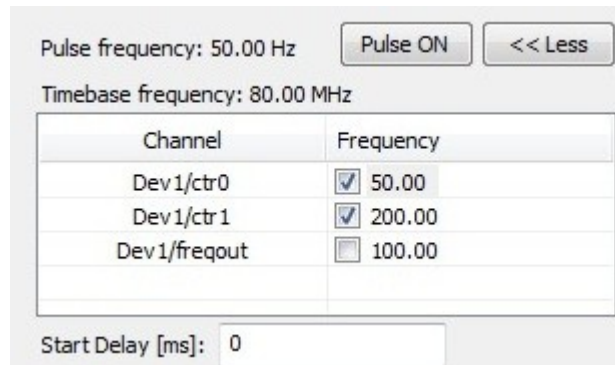
This module can be used to trigger camera connected to a National Instruments Legacy device. The module is quite simplistic. Enter the desired pulse frequency and use the [Turn ON] button to toggle the pulse generation on and off.

You can also specify a Start Delay (generator will start X ms after clicking the "Turn ON" button) and a Stop Delay (generator will stop X ms after clicking the "Turn OFF" button).

NI-DAQmx Pulse Generator

Similar to the NI Pulse Generator plugin, the NI-DAQmx Pulse Generator module is used to program a National Instruments board to generate continuous pulses with a specified frequency. The I/O board must be compatible with NI-DAQmx drivers and support pulse generation.

Simply enter the pulse frequency and use the "Pulse ON" button to toggle the pulse train(s) on or off. If multiple channels are selected, the pulse trains will start/stop in synch.
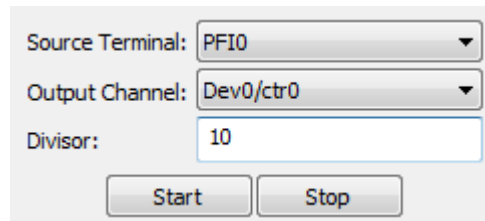
The pulse train triggers the camera exposure and so, it controls the camera frame rate. Assuming the board is programmed to generate multiple pulse trains having the same frequency, all the cameras will be synchronized, since the pulse trains are synchronized.

You can also specify a Start Delay (generator will start X ms after clicking the "Pulse ON" button).

NI Pulse Divider

The NI Pulse Divider module provides a way to divide a pulse train frequency. The National Instruments I/O board must be compatible with NI-DAQmx drivers and support pulse generation.

First specify the terminal where the input pulse that needs to be divided is present. Then select the output channel and enter a divisor. Use the Start and Stop buttons to start or stop the pulse train respectively.

Limitation: the divisor must be greater than 4.

SimulPix

The SimulPix module give the ability to combine to output of 2 cameras into a single image. The result image look like if the 2 images are superimposed. Currently, 2 algorithm can be applied for combining the 2 images:
- Merge 2 images together from the 2 separate sources (Alpha blending)
- Image division: any source can be divided by the other source

The module provides registration functionalities: the 2 images can be horizontally and vertically offset or rotated. In alpha bending mode, each source image can be display with separate color. The module perform the calculation in real time (less than 10 ms with an Intel Core 2 duo processor T7200) hence providing a real time visual feedback in single or multiple display mode.

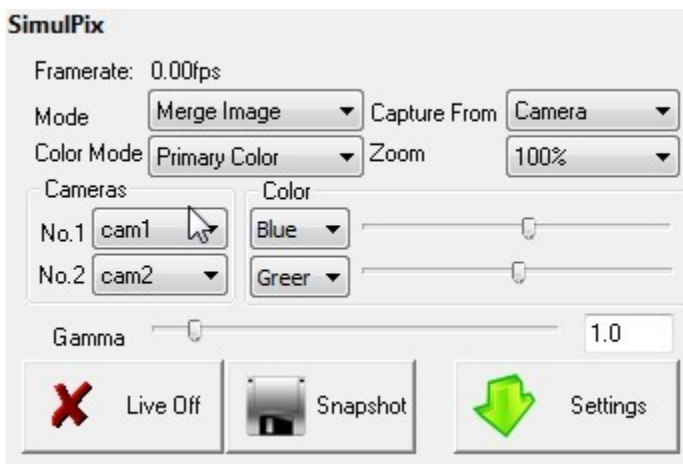The SimulPix module can work with cameras that acquire synchronously or not. SimulPix will wait until it receive an image from each camera before performing the rendering. If the 2 cameras are not capturing at the same time (synchronized or Genlock), this may result in short delay.

Each camera can have different image size and ROI, but must have the same bit depth. Image format should be monochrome, 8 10 or 12 bit.

All parameters except source cameras can be changed during runtime and are saved automatically. If you want to change the source cameras, you should stop the merging process.

The SimuPix Module can operate either on a live feed from 2 cameras, or it can also operate on a set of pre-recorded sequence file. Use the "**Capture From**" parameter to to select the operating mode.

To record the result image into a sequence, make sure to select all workspaces (CTRL+A), and from the file menu, select "In Every WorkSpace, New Sequence..."

Configuring *SimulPix* Module.

- Select the Operating mode (Merge, or Division)
- Select the Capture source, from cameras or sequence
- Select the two Workspace source within the Camera area.
- Eventually, select the color you want to be applied for each camera. Depending on the *Color Mode*, different coloring scheme are available:
  - *Monochrome :* Each camera image is represented with gray levels from back to white. Individual image intensities can be adjusted using the sliders.

  - *Primary Color :* Only the basic primary color of the color wheel are available: red,

green, blue, and combination of those like magenta, cyan and yellow.

o Any Color : Any color can be used,(more CPU demanding).

Once those parameters are selected, you can turn on the processing by clicking the "Live OFF / ON" button. Note, that on slow computer, since the calculation requires significant CPU, the overall computer respond time may become slower. If this is the case, possible work around are:
- Reduce image ROI of the process
- Reduce camera frame rate
- Turn off merge mode when not needed
- Disable rotation mode if not needed (see below)

Fine tuning SimulPix registration parameters:
By clicking the "Settings", the user interface expand to get you access to more registration parameters:
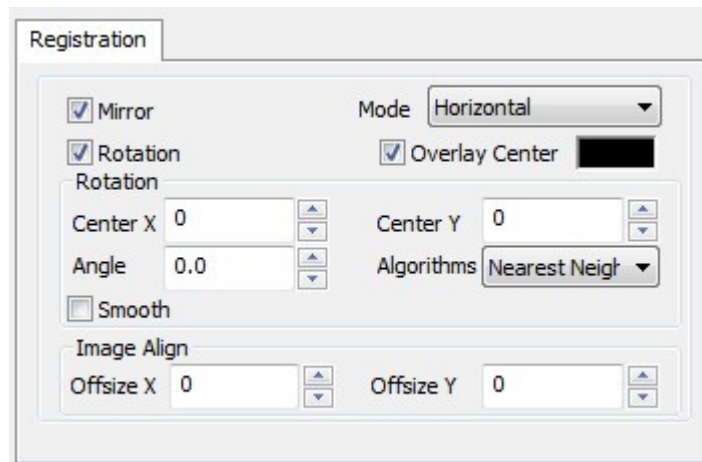
- Mirror: will allow second source to be either vertically or horizontally mirrored
- Rotation: will allow for optical geometric correction. The center of the rotation point can be overlay into the merge image to allow better tune up. Center point color can be selected by double clicking the color pad.
- Alignment: second source image can be horizontally or vertically offset.

Using the module in image division mode:

When running with image division mode, the following calculation are performed:

SimulPix = (Image camera1 - background) / [registration correction (Image camera2 - background)]

Background images can be acquired any time, by enabling and clicking the corresponding button. Background images are saved to disk and are always used when Apply is checked.

SimulPix includes an extra setting tab that allows the selection of various pseudo coloring display to allow better representing the calculation result.

SimulPix

Framerate: 0.00

Mode   No.1/No.2   ▼   Capture From   Camera   ▼

Color Mode   Pseudo Color   ▼   Zoom   100%   ▼

Cameras

No.1   cam1   ▼

No.2   cam2   ▼

Background

☑ Apply   Capture & Save Image

☑ Apply   Capture & Save Image

Gamma   1.0

✖ Live Off   Snapshot   ⬆ Settings

Registration   Division Settings

Pseudo Color   Rainbow ▼   Scaling Type   Power ▼

Scaling Slope   0.05

Scaling Offset   0
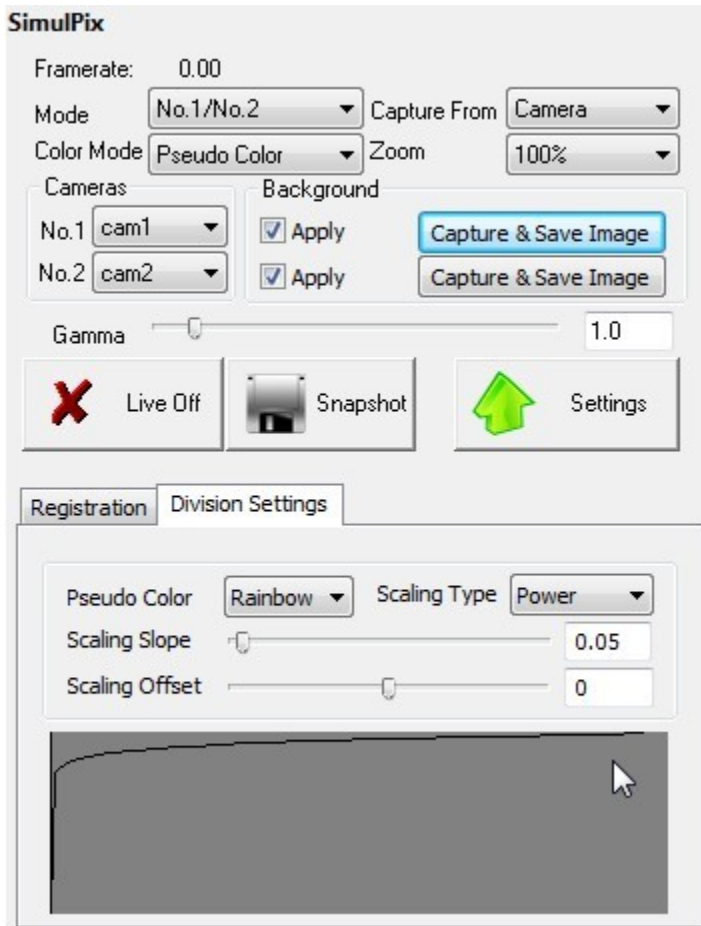
Result image can be pseudo colored with 2 different pseudo coloring LUT (rainbow or invert rainbow) and two scaling scheme can be applied.

Frame dropping issues:

By default, the SimulPix module is assuming both cameras deliver images at a constant rate and identical frame rate. It will monitor incoming image rate to make sure none of the cameras are dropping frames. Frame dropping from one camera would result in miss-synchronization of the 2 captured series of images, and incorrect image superimposed.

When an expected incoming frame timed out, the module will suspect a dropped frame and will make its best to drop an equivalent frame from the other camera. Monitoring is performed based on the time stamp given to each incoming frame at the image capture level.

When dropped frames are detected, SimulPix will log a message in the general log dialog. Dropped frame imply the removing of a corresponding frame from the other camera on the SimulPix stream sequence file. The 2 sequence files from both cameras are unchanged. Hence the number of images in each sequence may not be identical.

Example:

- Recording of a 100 frames sequence:
- Camera 1 dropped frame #25 and 76

- Camera 2 dropped frame #50

 Sequence file from camera 1 will include 98 frames. Time stamp difference between frame 24 and 25, as well as 75 and 76 will show twice the expected duration,

Sequence file from camera 2 will include 99 frames. Time stamp difference between frame 49 and 50, will show twice the expected duration,

Sequence file from Simulpix will include 97 frames. Time stamp difference between frame 24, 25, as well as 48, 49 and 73, 74 will show twice the expected duration.

When the 2 cameras does not run at the same frame rate, the monitoring functionality will prevent the module to operate. A registry key can be set to disable the frame drop monitoring process (default if no key exists: frame drop monitoring is on):

Key Path: HKEY_CURRENT_USER\Software\Norpix\Streampix5\Admin

Key Name: SyncChecking

Key Type: DWORD

Key Value: 1 enable, 0 disable monitoring

SendRM Support

SendRM.exe (Send Registered Message) is a small command line application that allows to send registered messages to any application.

The command line synthax is : SendRM "Window Name" "Message"

StreamPix 5 is able to process external messages that will start recordings, stop recordings, etc. More messages will be added with time and at users requests.

Here is the synthax for messages currently supported by StreamPix 5.

SendRM.exe "StreamPix 5" "WM_CLOSE"
SendRM.exe "StreamPix 5" "STREAMPIX_MESSAGE_START_RECORDING"
SendRM.exe "StreamPix 5" "STREAMPIX_MESSAGE_STOP_RECORDING"
SendRM.exe "StreamPix 5" "STREAMPIX_MESSAGE_SNAP_FRAME"
SendRM.exe "StreamPix 5" "STREAMPIX_MESSAGE_SAVE_AND_CLOSE"
SendRM.exe "StreamPix 5" "STREAMPIX_MESSAGE_TARGET_FORMAT" 1

You can call SendRM directly from the command line, the "Run" prompt, the Windows Scheduler, etc. Of course, StreamPix must be running at the time the messages are sent.

Here is some C++/Win32 code in case you want send messages directly from you application.

```
HWND targetWindow = FindWindow(NULL, _T("StreamPix 5"));

if(targetWindow)
{//For STREAMPIX_MESSAGE_XXX
    UINT registeredMessage = RegisterWindowMessage(_T("STREAMPIX_MESSAGE_XXX"));
    SendMessage(targetWindow, registeredMessage, NULL, NULL);
}
```

STREAMPIX_MESSAGE_START_RECORDING,   STREAMPIX_MESSAGE_STOP_RECORDING   and STREAMPIX_MESSAGE_SNAP_FRAME also have an optional argument identifying the target workspace's index. For example, this command will start the recording in the third workspace : SendRM.exe "StreamPix 5" "STREAMPIX_MESSAGE_START_RECORDING" 3

The STREAMPIX_MESSAGE_TARGET_FORMAT message require an additionnal parameter specifying the the target format. Use this table to find the desired format ID.

Format	ID for StreamPix 32-bit	ID for StreamPix 64-bit
Sequence on disk	0	0
Sequence in RAM	1	1
AVI	2	2
MOV	3	(Not available)
BMP	4	3
JPG	5	4
TIFF	6	5
PNG	7	6
FITS	8	7
JPEG 2K	9	8
DPX	10	9

For example, here is the command used to change the file target to AVI :
SendRM.exe "StreamPix 5" "STREAMPIX_MESSAGE_TARGET_FORMAT" 3

Sending this command directly from your code is similar to the way shown in the previous page, except that you use the ID as the wParam. Like this :
SendMessage(targetWindow, registeredMessage, 3, NULL);

Command Line Arguments

StreamPix support a few command line arguments.

StreamPix5.exe -r
Start a recording as soon as StreamPix finishes launching. If all workspaces were selected last time StreamPix was closed, every workspace will start recording. Configure que 'Auto-Created file type' settings and autonaming schemes to setup the destination files.

StreamPix5.exe -config "C:\Users\User\Documents\StreamPix5\Configurations\config.reg"
Will overwrite the current configuration with the configuration in the specified file. You can save your current configuration from Tools > Save Configuration.

StreamPix5.exe "C:\temp\sequence.seq"
Will load the specified sequence file in a temporary workspace.

Network license

In order to set up the network license, the Sentinel package 7.6.1 or later should be installed on the computer that holds the USB key. The Sentinel Protection installer runs under Windows 98/ME/NT/2000/XP/Server 2003/2008/Vista & Windows 7 (32 bit and 64 bit).

When installing, select all features and allow the setup to modify the firewall settings. Then, to enable the network licensing on the client computer, open Streampix, go under Help, License information, and select the "Search for network key on IP address" option.

Enter the IP address of the computer on which the USB key is installed (the computer should have a fixed IP address). Also, browse for the authorization codes file (.npx) compatible with the USB key.

The next time you restart the License information window (SysInfo.exe), it will search for the key on that specific IP. In the available codes list it should say now "USB protected". Any license is released after 3 minutes, if it's not used. For example, the Pulse Generator license is released 3 minutes after the module is unloaded is released 3 minutes after this feature is disabled. All licenses are released 3 minutes after Streampix is closed. In the event of a crash, the licenses are still released after 3 minutes.

The available licenses can be monitored using an http link. If, for example, the computer IP is 192.168.1.80, the address will be http://192.168.1.80:6002/

More details on the Sentinel Server can be found in the ReadMe.pdf file that comes with the Sentinel setup. By default, this file is installed in:

C:\Program Files\SafeNet Sentinel\Sentinel Protection Installer\7.6.1\English\.

Sequence files

For information on the sequence file format, see the documentation accessible from "Help > Sequence File Format".

Event Markers

Finally, the I/O markers are stored in an XML file with, for each event, in the following fields :

Name - The name of the I/O event as named when the I/O was configured.
Description - The event that occurred (rising edge, falling edge, etc) and the device & line on which it occurred.
FrameIndex - The index of the last frame to have been recorded when the event occurred.
Timestamp - The timestamp in seconds (in time_t format) of the last frame.
TimestampMS - The millisecond part of the timestamps.
TimeString - The timestamp, formatted in a readable string.
Valid - 1 for valid, 0 for invalid. When doing loop recording, if a marked frame gets overwritten, the associated event will still be kept but will be marked as invalid because the related frame no longer exist.