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Introduction

ChromaPIX (CPIX) is a brand new ‘workstation’ approach to Slow Scan TV. The program is a full 32 bit Windows95® or WindowsNT 4® application that couples multiple front panels to a ‘virtual’ SSTV engine which is based on state of the art DSP (Digital Signal Processing) technology. The DSP engine can process SSTV images at near the theoretical limits of the SSTV signal specifications. The multiple front panel user interface provides a sophisticated workshop for image composition and processing.

System Highlights

DSP VM (Virtual Machine)

- Analog signal detection provides superior performance over ‘hard limited’ FM detectors by permitting sub-cycle frequency recovery.
- Adjustable digital filters allow you to tailor the VM to meet signal environment variations.
- DSP VM runs at all times to provide detector spectral display, tuning meter display, and receive autostart based on VIS or sync recovery.

User Interface

- Multiple front panels allow access to the VM . Use one panel to receive or transmit images while loading, compositing, or saving images on other panels.
- Most image operations are based on fast ‘drag and drop’ or ‘single click’ operations. All controls can be rapidly accessed using powerful tab function panels.
- Image processing functions include adjustment of brightness, contrast, hue, saturation, and sharpness. Additional median and average filters quickly remove noise from received images.
- Paint operations include most common functions as well as advanced drop shadows and realistically rendered image frames.
- A full toolbox of special effects controls is also included.
- Disk storage of images is handled by a thumbnail tray which provides small preview images of files on your disk as well as instant drag and drop access to your favorite directories. Load time effects make adding borders and drop shadows a snap. An integrated slide show allows you to easily display your image collection.

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System Requirements

- Pentium 90 or above. (May run on slower systems but not recommended)
- 16 MB of RAM. (As with all image processing software “more RAM is better’)
- TrueColor video card (16, 24, or 32 bit display) (limited support for 256 color displays)
- 16 bit, crystal controlled soundcard, with appropriate driver software
- Windows 95® or WindowsNT 4® (SP3)

A Word About Windows Screen Font Settings

It is strongly suggested that you run Windows with your display settings set to use ‘small fonts’. If you have trouble reading ‘small fonts’ the proper solution is to set you screen to a lower resolution. i.e. instead of 1024 x 768 on a 15” monitor you might try 800 x 600. If you use ‘large fonts’ Windows will scale up all of the screen elements including all controls and image boxes on the screen to accommodate the larger fonts. Unfortunately, ‘fixed elements’ such as actual bitmaps (SSTV pictures) will not be scaled up as it is important to maintain their original (actual) ‘pixel’ sizes. The effect of this is that you will end up with large forms on your screen which will waste precious screen area. By using ‘small fonts’, controls become more compact and more screen area is available for ‘real work’.

ChromaPIX Installation

Before installing CPIX please be sure that you ‘uninstall’ any older version of CPIX you may have on your system. Use the ‘Add/Remove Programs’ control panel to uninstall ChromaPIX. When prompted about controls that are no longer in use press the ‘no to all’ button.

If you received CPIX on a set of floppy disks insert disk 1 into your floppy drive, open the disk with Windows, and double click on the SETUP.EXE icon. Follow the installer instructions.

If you downloaded CPIX as several .ZIP files then either unzip the files onto individual floppy disks (i.e. Disk 1, Disk 2 ...), or unzip the files into a temporary folder on your hard drive. Then run SETUP.EXE either on the first floppy or in the temporary folder. Follow the installer instructions.

If you downloaded CPIX as one large .EXE file then just double click on that file to start the installation. Follow the installer instructions.

The ‘suggested default’ installation directory for CPIX is:

```
c:\Program Files\Silicon Pixels\CPIX
```


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Bug Reports

If you find a problem with ChromaPIX please document exactly how the problem can be reproduced and observed and email the report to either:

Jim Barber - `jlbarber@wolfenet.com`

or

William Montgomery - `William.Montgomery@cciw.ca`

Please include a full description of your computer system (memory, cpu, speed etc.) and ChromaPIX version number along with the bug report. Please also check the Silicon Pixels web page (`http://www.siliconpixels.com`) for any updates to the software or problem solutions in the FAQ. Your particular problem may have already been addressed in the FAQ or by a program update.

Registration

(All prices in US dollars)

Email registration: (you DL the program from our web site)	$120.00
Media shipment: (you request a disk set with registration)	$ 10.00
Replacement/update:	$ 15.00

Registered W95SSTV or Robot Helper users are eligible for a 30% discount when they register ChromaPIX, Unfortunately we cannot discount media shipments if they are requested.

Email registration: (for registered W95SSTV & Robot Helper users)	$ 84.00
Media shipment:	$ 10.00
Replacement/update:	$ 15.00

Unregistered copies of ChromaPIX are fully functional but will only run for 30 minutes per session.

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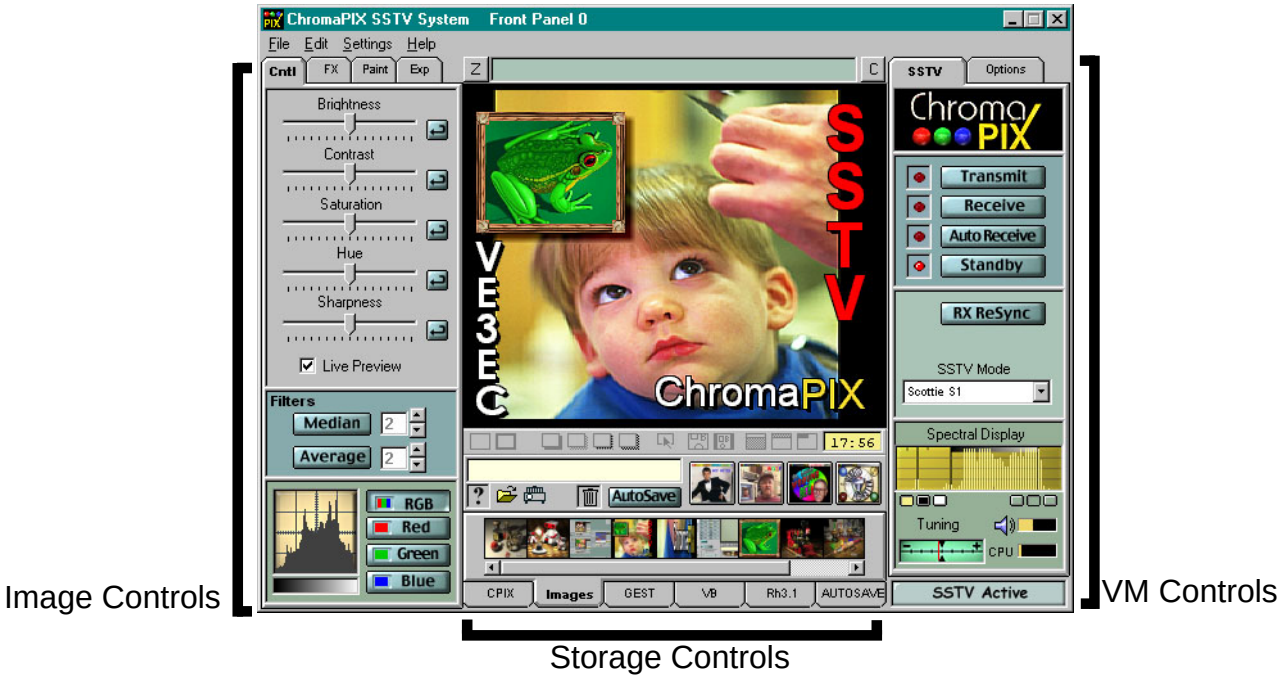
System Overview

GUI Layout



The user interface (GUI) controls are grouped together based on function.

The Image Controls group deals with image functions such as adjustments, filters, measurements, and special effects. The individual ‘tab panels’ further group the Image Controls into related functions.

The Storage Controls group of tools has to do with loading images from the disk drive and saving images back to the disk. Additional ‘load effects’ tools provide special effects while loading images. The thumbnail trays provide instant selection previews for picture files in your favorite directories.

The VM Controls group contains the user controls for the SSTV ‘engine’. These tools deal with the reception and transmission of the actual SSTV images. As there is only one sound card in the computer the VM controls on the GUIs can be instantly connected or disconnected to the sound system. If your sound card driver supports full duplex operation two GUIs can be connected to the sound card and used to send and receive SSTV signals at the same time.

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SSTV VM Control

The SSTV VM Control panel is used for all functions related to sending or receiving slow scan TV signals.

The four large controls at the top of the panel control the current mode of the SSTV engine.

Standby is the one of the two ‘idle’ states for the VM. When in standby mode the spectral display and tuning indicators are active and the video decoder is processing incoming audio, looking for VIS headers and other mode determining characteristics of the signal.

Auto receive is also an ‘idle’ state, except that if the VM detects an incoming SSTV video signal it can decode it will switch to the receive mode.

The receive button will force the VM into receive state and any detected video will be decoded.

The transmit button will transmit the current image in the selected SSTV transmission mode.

LED indicators beside the buttons reflect the current VM state.

The RX Resync button will tell the VM to attempt to resync on the current video stream. This is handy if QRM has caused initial missyncing of the signal.

The SSTV Mode dropdown list indicates the mode of the last received image or can be used to change modes before transmitting .

The Spectral Display provides a real-time histogram of the incoming SSTV audio signal. The three vertical graticule lines represent frequencies of 1200 Hz (sync), 1500 Hz (black), and 2300 Hz (white). The display at the left show a ‘typical’ SSTV spectral display with a small sync peak at 1200 Hz and video swinging the full 1500 Hz to 2300 Hz range. Some SSTV modes do not transmit a ‘sync’ signal so the sync peak will be missing. The spectral display is the quickest method of ensuring you are tuned to the correct frequency.

The small option buttons below the display are used to change the display color an trace style.

The Tuning Meter indicates how far off the ‘correct’ SSTV frequency you currently are. This meter is heavily damped so it can take several seconds to settle. The tuning meter is best suited for making fine adjustments to frequency after you use the spectral display to tune the signal.

The Audio level and CPU level meters indicate the SSTV audio input level from the sound card and the amount of CPU power that the program is currently using. SSTV reception is typically good with the audio meter indicating between 20% and 50% of full scale, but this level is generally not critical. CPU loading should typically be below 30%.

The SSTV Active button is used to connect and disconnect the front panels to the sound card. Since there is only one sound card in the system only one front panel can be ‘active’ at a time.

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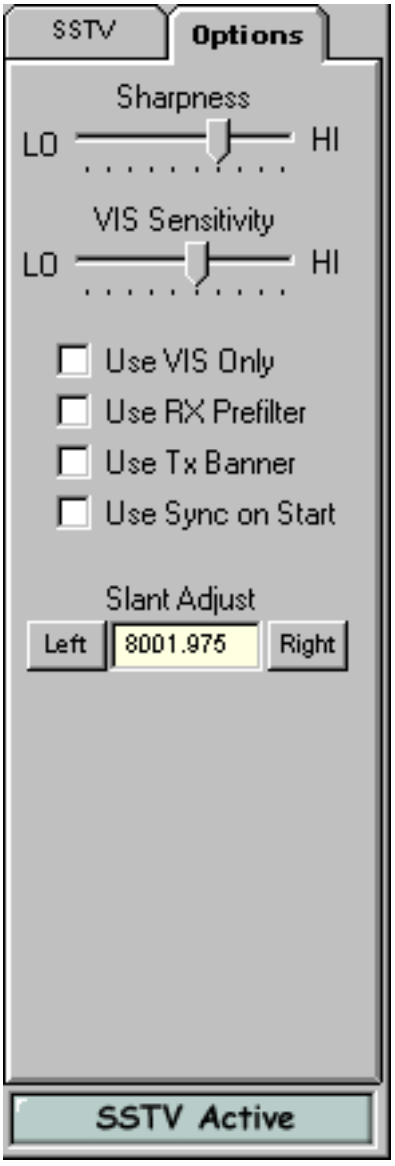

The VM Options panel contains controls used to adjust the operational characteristics of the SSTV virtual machine.

The sharpness slider can be used to adjust the video detector sharpness which in turn affects the received image sharpness.

The VIS Sensitivity slider selects how much noise immunity the VIS (SSTV header) detector has. If this setting is too high you may find that background noise or QRM will cause ‘false’ VIS starts.

Normally the SSTV detector will use a combination of VIS header and sync detection. If the Use VIS Only checkbox is ticked the detector will only look for VIS headers to determine the sstv mode.

The RX Prefilter can be selected to help remove out of band noise from the video detector. This will result in some degredation in received image sharpness.

The Use TX Banner checkbox can be used on registered versions of ChromaPIX to enable or disable the automatic 16 line picture header.

The Use Sync on Start checkbox is used to tell the VM to use the first 6 sync pulses after the VIS is received to establish the correct image phasing rather than relying just on the VIS header position.

The Slant adjust controls are used to vary the video sample clock frequency to compensate for inaccurate sound card crystals. If the incomming picture skews to the left (top to bottom) then pressing the ‘Right” button will adjust the clock frequency so that the skew moves towards the right. Similarly a right slanting image can be plulled left by pressing the ‘Left’ button.The nominal value for this control is 8000.000 but the correct setting for your system will be dependant on the accuracy of the crystal on your sound card.

An ‘experimental’ method that can be used to very accuratly set this value is to tune your receiver to WWV, set the SSTV Mode to ‘WWV’, and press the receive button.The ticks in the time signal are very accurate and will produce vertical lines as the image slowly paints on the front panel. Adjust the frequency so that the lines are exactly verticle. This technique works better at certain times of the hour as the ‘tick’ tones vary during some time periods.

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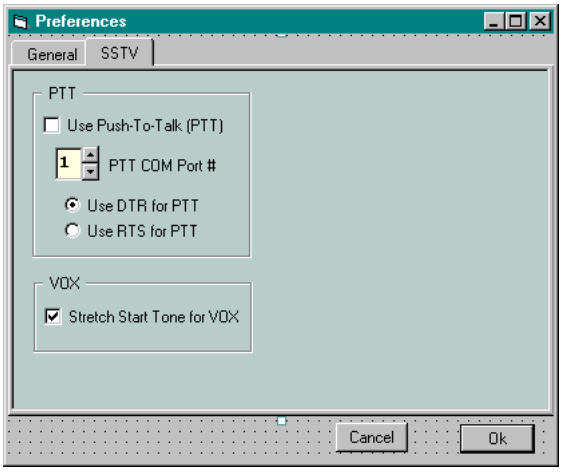
SSTV Preferences



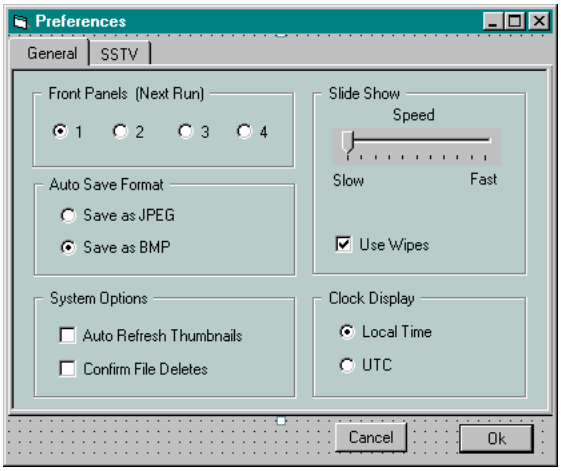
The SSTV tab in the preferences dialog also contains more system level options for the SSTV VM.

You can use one of the handshaking lines on your com port to control a push-to-talk relay for your radio.

You can select which com port you wish to use and also select whether to use the DTR (Data Terminal Ready) or RTS (Request To Send) lines. Please consult your system manuals for the correct pinouts for your ports

The Stretch Start Tone for VOX checkbox lengthens the SSTV start tone by 200 ms to allow time for the VOX circuit to key the transmitter. This ‘longer’ start tone can also improve VIS detection on the receiving end under noisy signal conditions.

General Preferences



The general preferences panel is used to set global options for the ChromaPIX system.

You can enable from one to four front panels to work with. This number is usually based on your available screen space.

Auto Save Format selects whether to use bitmap (.BMP) or JPEG (.JPG) formats for images that are ‘autosaved’. Bitmap images are higher quality but JPEG images will occupy much less disk space.

Auto Refresh Thumbnails forces the image trays to resync with your actual directory contents. This can be handy if you often use other programs to add or remove image files from directories shared with ChromaPIX.

If Confirm File Deletes is check you will then get a second chance when dragging thumbnails onto the trash well.

The slide show controls adjust the show speed and enable fancy transition wipes between images.

The Clock controls select between UTC and Local time displays.

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Storage Interface

The image storage system used in ChromaPIX is based on drag and drop loading and saving and the use of six thumbnail based image trays. To load an image from a disk file simply select the desired directory from the directory tabs along the bottom edge and then click and drag the image thumbnail from the image tray onto the main image window. To save an image drag from the main image window onto one of the six image trays.

ChromaPIX also makes extensive use of ‘selections’. Selections are rectangular areas of the screen that are used as either the source or destination of a particular operation. Selections are created by clicking on the main image window with the right mouse button and dragging out the selection rectangle to the desired size. Selections can be removed by clicking on the image window once with the right mouse button.

If a selection rectangle is active on the main image when you drag the image to the thumbnail tray, then only the selected area will be saved to disk. Also, if a selection is active when you load an image, then it will be loaded into the selected area.

Thumbnails are kept as small proxy images on your system to prevent delays when loading. Thumbnail preview have a file extension of .PRE. To change directories associated with a particular tab/image tray simply double click on the tab or select the folder button from the toolbar above.

You can obtain detailed information about any image by dragging its thumbnail onto the [?] well located just above the image tray. You can also delete a file by dragging the thumbnail onto the Trash well located to the left of the Autosave button.

ChromaPIX also contains a built in slide show program which will cycle through your current image tray. If wipes are enabled in the preferences dialog CPIX will randomly apply over 100 different image transition effects during the show. To activate the slide show just click on the slide projector button.

The Autosave button will automatically save received images to the Autosave folder which is located in the same directory that CPIX was installed into. In the general preferences dialog you can select whether to save these images as bitmaps (.BMP) files or JPEG compressed files (.JPG).

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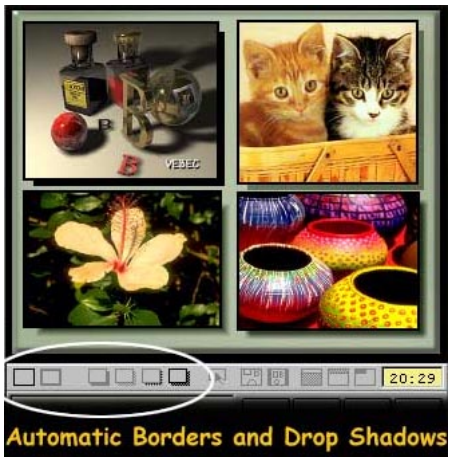
The four thumbnails located above the image tray hold the last four received images. You can instantly recall any of these images you clicking on the thumbnail button. These buttons are generally refered to as image history buttons. As new images are received the history buttons are filled from the left side and the oldest image is ‘pushed off’ the right side.

Load Effects

The ‘Load Effects’ buttons are located along the bottom of the main image window. These buttons affect the way images are loaded into the main window and are a key feature of ChromaPIX.

The two buttons on the left are used to automatically add a black border around any image loaded into a selection rectangle. The left button applies a one pixel border while the right button adds a 2 pixel border.

The next four buttons add various ‘drop shadows’ to images loaded into selection rectangles. From the left to right the drop shadow effects are ‘black, ‘grey’, ‘gradient grey’, and ‘soft shadow’.



The next three buttons enable live dragging and placement of images and also offer options for how images are loaded into selections.

If the ‘arrow’ button is active then images dragged onto the image area will appear to float over any current background images and can be positioned in real time to the desired loading location. Pressing the space bar will cycle the ‘grab point’ between the image center and the four corners. Live positioning is best suited for placing image fragments that are smaller than the full window size.

The next button will cause images loaded into a selection rectangle to maintain their aspect radio by fitting to one dimension and cropping off excess image in the larger dimension.

The final button will cause images to load into a selection rectangle by shrinking to fit while maintaining their aspect ratio..

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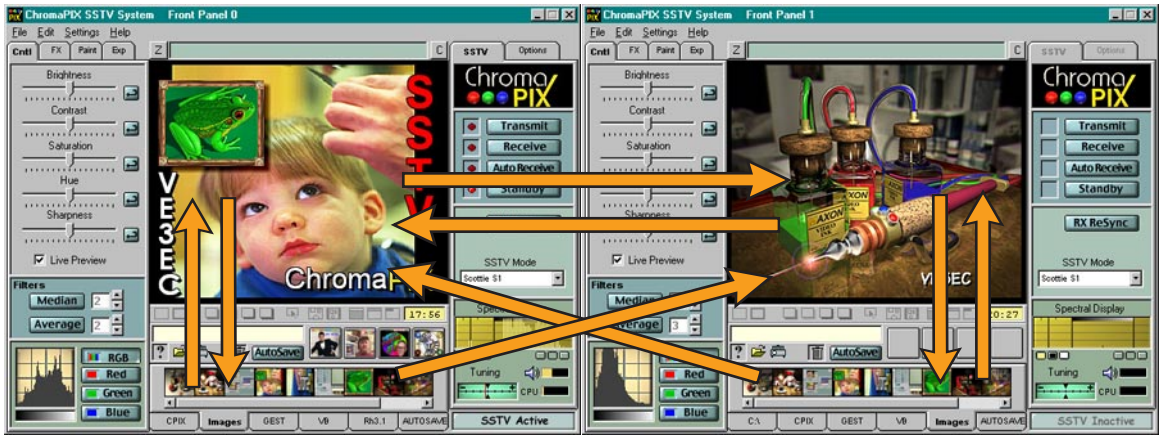
The last group of three buttons are used to assist when loading headers and images under headers.

When the first button is selected, thumbnails dropped onto the image window will load into the 320 x 240 pixel area under the top 16 line area. This leaves exactly the correct amount of space for a standard image header.

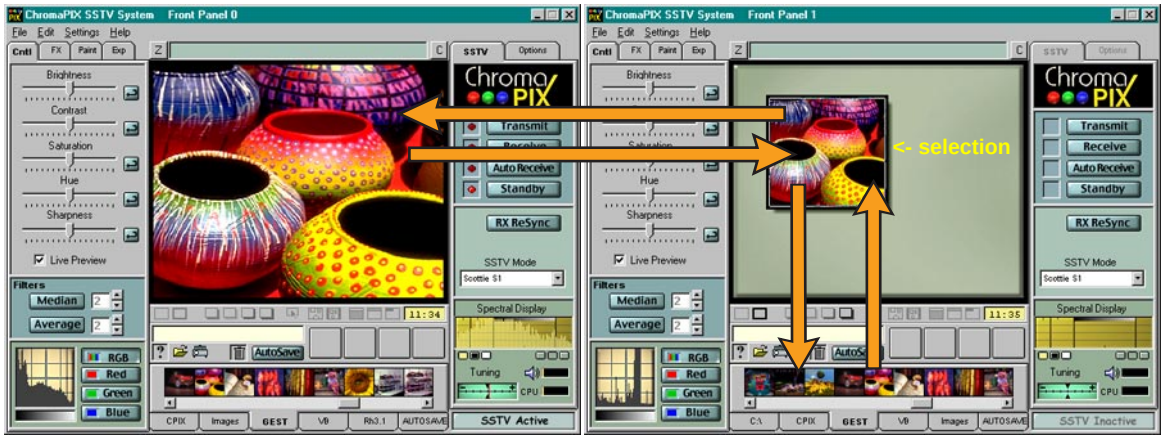
The middle button will load the dropped image into the top sixteen lines of the image, scaling the image to fit. Images applied with this button should already be close to 320 x 16 for best looking results. If you use a wide variety of headers it is suggested that you dedicate one of the six image trays to header images only. This will simplify selection and loading of custom headers.

The last button is used to simplify the loading of 'non standard' header images. When this button is selected, any image dropped onto the window will snap load into the top left corner without scaling.

Load & Save Drag Options



Load & Save Selection Drag Options



Remember: Create selection rectangles by dragging with the right mouse button.

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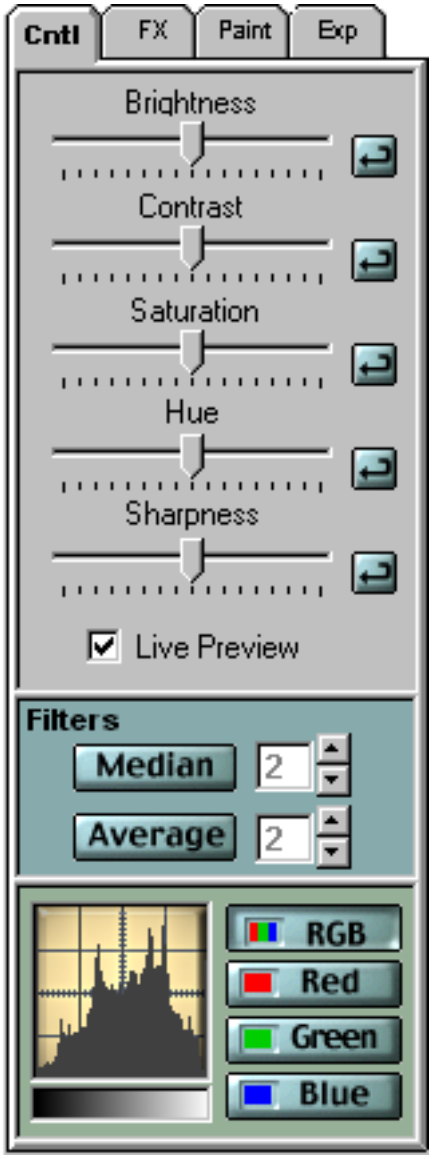
Image Controls



The image controls tab contains sliders and filters used to make common image adjustments.

The five main sliders adjust brightness, contrast, color saturation, color hue (tint), and image sharpness. If the 'live preview' checkbox is checked you will see the results of the adjustments in real time in the main image window. If a selection rectangle is active in the main image window then the effects of the sliders will be limited to the selected area only.

Once you have adjusted the sliders to give the desired results you can 'apply' the correction by clicking once on the main image. This will nail down the changes and return the sliders to their center position. Should you decide not to apply the changes, simply return the sliders to their center (neutral) positions. The small buttons to the right of the sliders will also center the buttons.

The two filters are user to remove noise from a received image. The Median Filter is best suited for removing single pixel 'impulse' noise with minimal blurring, while the average filter is often better for images with large amounts of noise. The numeric values beside the filters indicate the size of the filter kernel (i.e. 2x2 pixels, 3x3 pixels). If a selection is active then the filter will only apply to the selected area.

The image histogram at the bottom of the panel measures the distribution of brightness values in the image. Typical 'real' images (i.e. nor computer graphics) tend to have a bell shaped histogram which should stretch the full range from black to white. Low contrast images will have a compressed histogram curve and often be lacking in black or whites. Images that are too light or dark will have a curve that favors one end of the histogram.

The histogram display is a very useful tool to monitor the effects of the image control sliders. The buttons to the right of the histogram allow you to display individual color channels or the combined RGB data.

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Special Effects

The Special Effects (FX) tab contains tools that modify the central image in a number of artistic ways.

The Fills buttons group provide a fast method to clear the main image to black, grey, white, or any color. You can also generate a color bar test pattern. Another quick way to clear the main image to black is to use the small [C] button located to the above right of the main image window.

The Modify buttons group provides common rotations and translations as well as conversion to monochrome (black and white) and negative images.

The FX group provides an array of image effects including pixilation, and mosaic tile functions. A zoom function will expand any selected area to full image size.

Many of the FX functions also can be limited to a specific screen area through the use of a selection rectangle.

The Acquire are provides a standard TWAIN interface for importing images from scanners and video digitizers.

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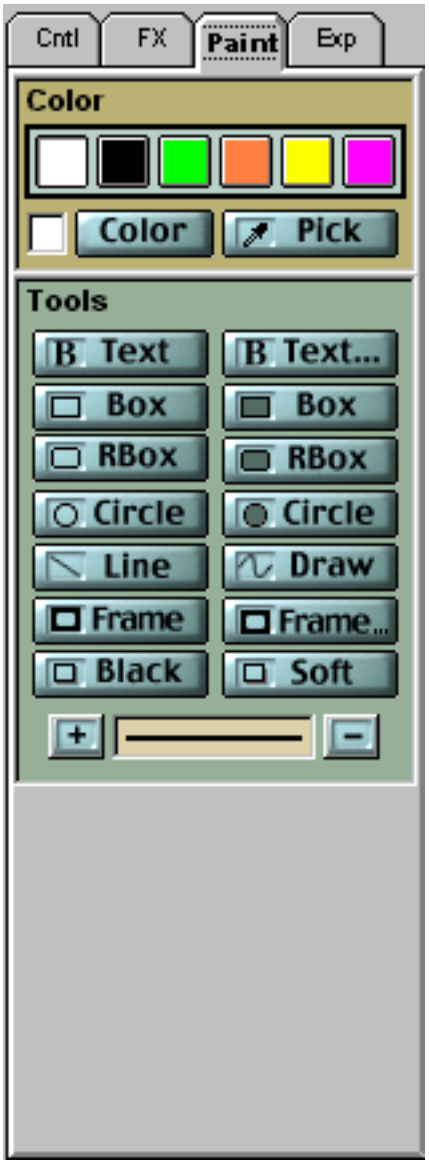
Paint Functions



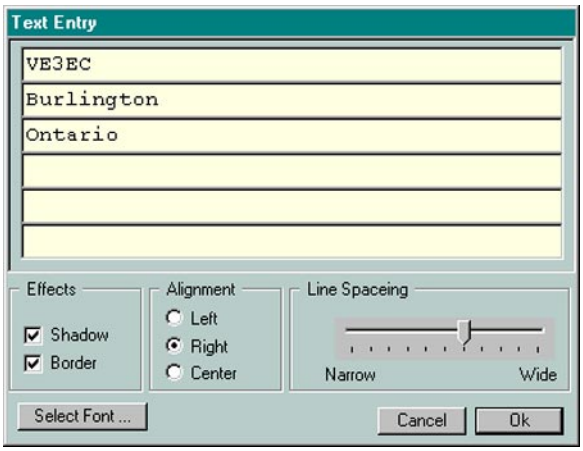
The Paint tab provides an array of common image painting tools as well as a color picker.

The color picker area contains six ‘paint wells’ where you can save your favorite colors. You can load any of the paint wells by dragging the current color patch, located to the left of the [Color] button, onto the paint well. To select a paint well color for use simply click on the desired color.

To use the Windows standard color selection dialog press the color button. To select a color from the image window press the Pick button (eyedropper).

The Tools area contains some common and not so common painting tools.

The Text... button displays the text entry dialog which can be used to enter up to six lines of text, adjust the line spacing, select the font, specify alignment, and select effects such as outlining and shadow. Once the text has been set up you simply move your mouse cursor onto the main image to position the text in real time. If you choose to change the text or color simply move you mouse off the main image and change the desired setting. Once the text is positioned, a left click with the mouse button will apply it onto the image. If you select the Text button you will bypass the text selection phase and your last selected text will be used again.



The next 8 buttons are used to draw standard shapes as well as lines and freehand curves.

The Frame... button is used for drawing picture frames around the image window or selected areas. This button will bring up the frame selection dialog which allows you to pick from an array of material, frame sizes and effects such as automatic soft shadows.

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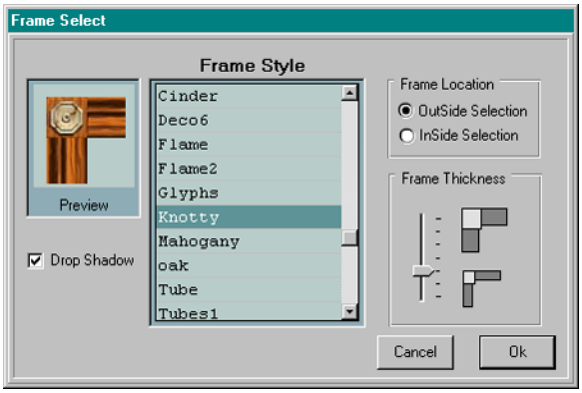
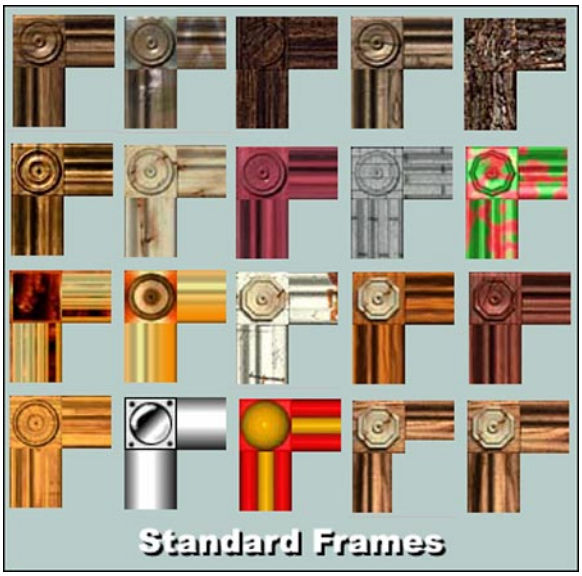
The Frame button will bypass the frame selection dialog and apply the frame style last selected.





The last two buttons generate either black or soft drop shadow effects below a selection rectangle.

The last control is used to change the line or pen thickness and is changed using the + and - buttons.

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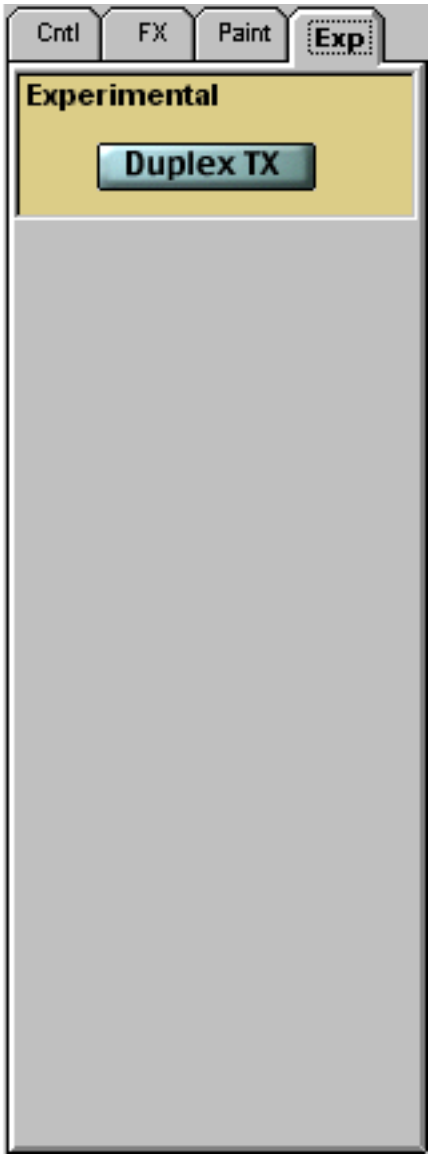
Experimental Tab



The Experimental tab is where you will find tools that are still under development or tools that are used for testing.

Currently the only tool on this tab is the full duplex transmit button. This button can be used to force any ‘non-VM active’ front panel to go into transmit mode. This is only supported if your sound card driver supports full duplex operation. If you use a loop back cable from the line output jack on your sound card to the line input jack you can then use one front panel to transmit to another. This is very handy for evaluating the ‘quality’ of the SSTV video decoder as there will be no ‘signal path’ components such as noise or phase distortion to affect the signal.

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