



DSP Slow Scan TV

User Guide

© 1997 - 2002 Silicon Pixels
Manual Version 1.6





Copyright

The program 'ChromaPIX' is owned by Jim Barber and William Montgomery (Silicon Pixels) and is protected under the Canadian and United States copyright laws and international treaty provisions. Therefore you must treat 'ChromaPIX' like any other copyrighted material (i.e. book or musical recording) except that you may (a) make copies of 'ChromaPIX' solely for backup or archival purposes, (b) transfer the software to hard disks provided that only one copy of the software is used at any one time, and (c) distribute 'ChromaPIX' to other users or on-line systems providing that the package is unaltered. You may not distribute your registration number.

Warranty

The 'ChromaPIX' software includes no expressed or implied warranties of merchantability and fitness for a particular purpose, with respect to the software, or accompanying manuals. The authors, in no event, shall be liable for damages, whatsoever arising out of the use of or inability to use the 'ChromaPIX' software.

Introduction

ChromaPIX (CPIX) is a brand new 'workstation' approach to Slow Scan TV. The program is a full 32 bit Windows 95/98®, NT® 4, 2000, or XP application that couples multiple front panels to a 'virtual' SSTV engine based on state of the art DSP (Digital Signal Processing) technology. The DSP engine can process SSTV images to near the theoretical limits of the SSTV signal specifications. The multiple front panel user interface provides a sophisticated workshop for image display, 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.
- Integrated Internet backchannel link for text messages and image transfer.
- Logbook with automated QSL text generation.

System Requirements

- Pentium 90 or faster. (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 sound card, with appropriate driver software
- Windows 95®, Windows 98®, WindowsNT® 4 (SP6 min.), Windows 2000® or Windows XP®

A Word About Windows Screen Font Settings

We 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 your 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 have downloaded a CPIX update patch file you should not uninstall your previous version of CPIX. When you run the patch file it will simply replace some of the CPIX files with those required by the newer version.

If you received CPIX on a CD simply insert the disk and follow the installer instructions.

If you downloaded CPIX as one large 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`

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: N7CXI@SiliconPixels.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 CD 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.

ChromaPIX registration is available from the following agents:

USA and worldwide

Jim Barber, N7CXI
P.O. Box 579
Selah, WA 98942 USA
Email: N7CXI@SiliconPixels.com
www: <http://www.SiliconPixels.com>

Japan

Fusanori Koide, JG1VEM
5-4-26, Kyonan-cho,
Musashino-City,
Tokyo, 180-0023 JAPAN
Email: jg1vem@ktx.or.jp
www: <http://www.ktx.or.jp/~jg1vem>

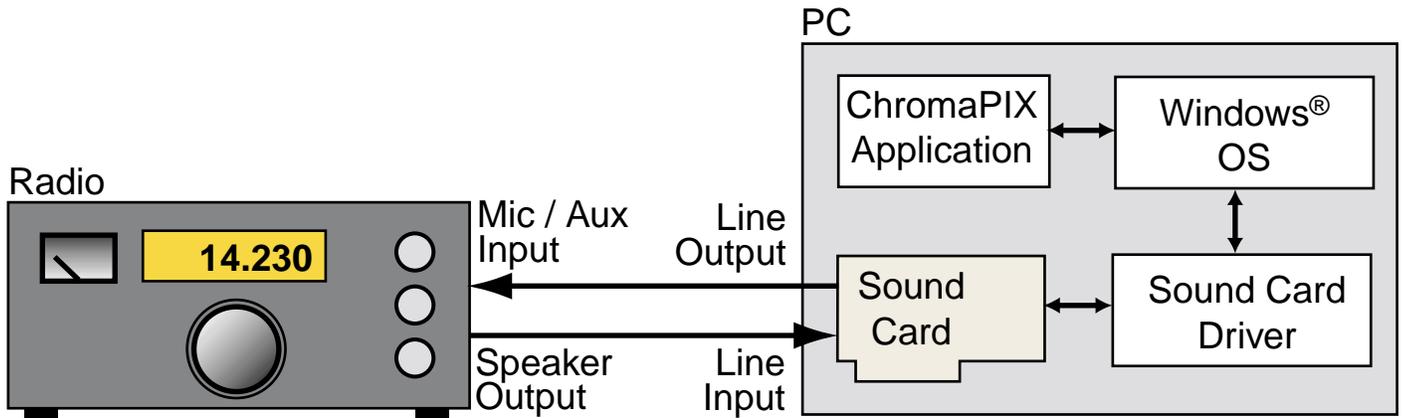
United Kingdom

Roger Wilkins, G3XFA
50, Brookside, BARNWELL,
Peterborough, PE8 5PS UK
Email: RTWilkins@compuserve.com

Secure on-line registration using a credit card is also available through Kagi at:

<http://order.kagi.com/cgi-bin/register1.cgi?QLW>

System Overview



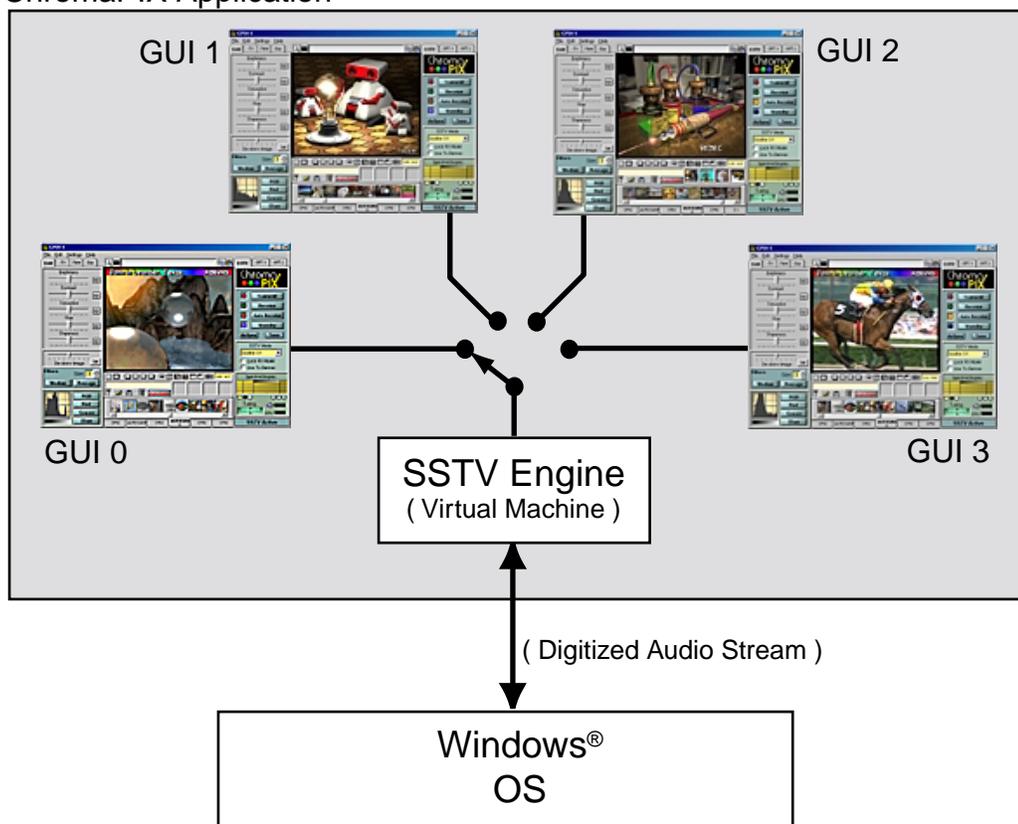
ChromaPIX System Block Diagram

ChromaPIX is a 32 bit SSTV program that runs on Intel® based PCs under Windows® 95, 98, NT4, 2000, or XP.

For SSTV image reception, audio is fed from a suitable output (speaker or aux out) of a radio receiver tuned to a SSTV signal to the 'Line Input' jack of a 16 bit Windows® sound card. ChromaPIX then processes the SSTV audio signal by accessing the audio card through standard Windows® API (Application Programmers Interface) calls. Windows® in turn then communicates with the sound card hardware using the sound card driver software supplied either on the Windows® installation CD or obtained from the sound card manufacturer. It is strongly recommended that you check to be sure you are running the latest version of the driver software for your sound card. Typically you may obtain sound card driver updates directly from the card manufacture's web sit on the Internet.

SSTV transmission again uses the Windows® API calls to generate the SSTV audio signal on the sound card. This SSTV audio is then fed into a suitable input (Microphone or Aux input) of the radio transmitter, and out over the 'air'. The transmitter can either be keyed manually or may use VOX. Alternatively, a small PTT (push-to-talk) circuit can be built which connects to a com port on the PC.

ChromaPIX Application

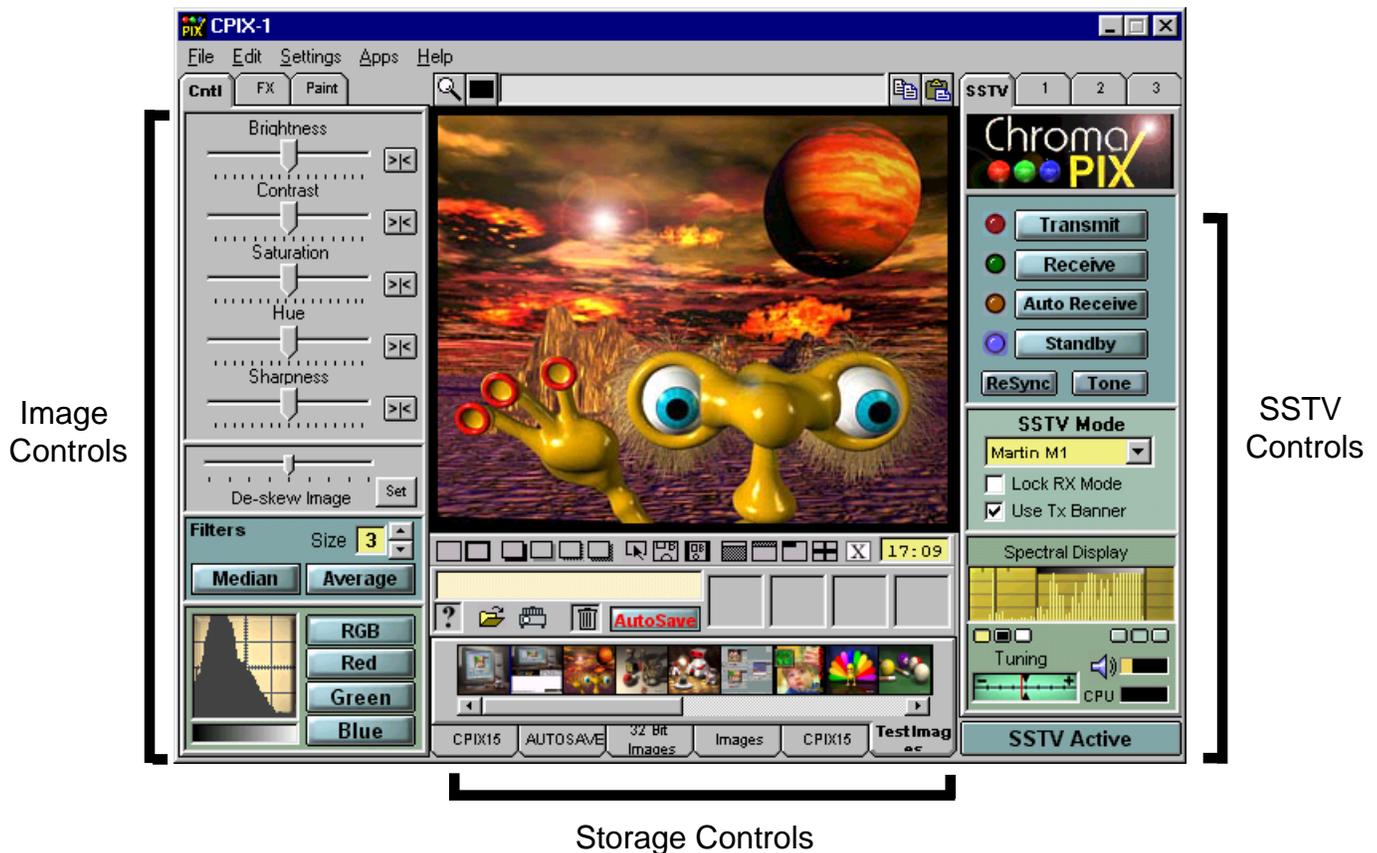


ChromaPIX Application Functional Block Diagram

The ChromaPIX application software is comprised of a DSP (Digital Signal Processor) based SSTV engine (Virtual Machine) which communicates with a number of user interface panels (GUIs). The number of panels can vary from 1 to 4 depending on screen space available and personal preference.

The VM (Virtual Machine) is responsible for providing SSTV signal recovery and SSTV transmission. The use of DSP technology enables superior signal recovery (and clarity) especially under poor signal conditions. The VM also provides a real time spectral display of the incoming audio as well as a fine tuning analog tuning meter. The VM utilizes multi-threading to concurrently detect sync pulses and recover mode information, decode VIS headers, decode SSTV video, provide audio pre-filtering, generate the real time spectral display, and generate SSTV transmission audio. The VM can be rapidly switched between the multiple GUIs to provide instant SSTV resources. The GUIs that are not connected to the VM can continue to be used for image processing, image loading/saving, or image composition.

GUI Layout



The graphical user interface (GUI) controls are grouped together by 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.

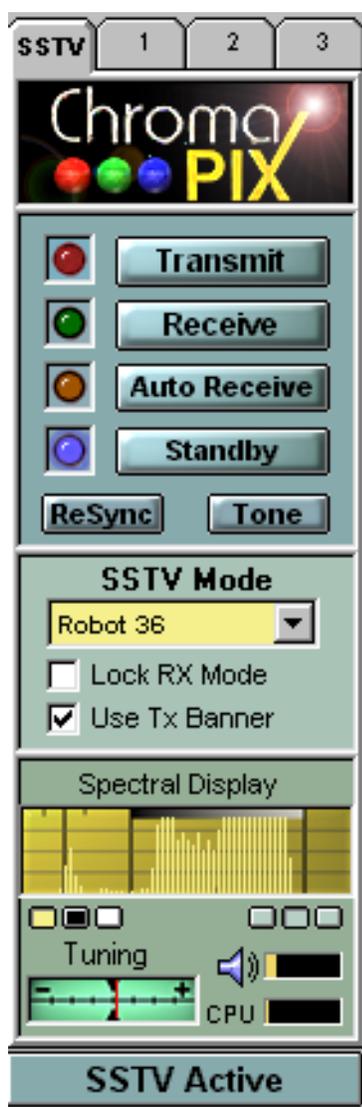
The *SSTV VM Controls* group contains the user controls for the SSTV 'engine'. These tools deal with the reception and transmission of the actual SSTV images. As there is only one sound card in the computer the SSTV controls on the GUIs can be instantly connected or disconnected to the sound system. 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.

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 (VM).

Standby is 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 will switch to receive mode.

The receive button will force the VM into receive state and any detected video will be decoded. If the Rx LED flashes during image reception this indicates that the VM has detected and is using sync pulses for image timing.

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

Keyboard shortcut keys 'T', 'R', 'A', 'S' can also be used to select the main VM buttons.

LED indicators beside the buttons reflect the current VM state.

The RX Re-sync button instructs the VM to attempt to Re-sync on the current video stream. This can be handy if QRM has caused initial mis-syncing of the video signal.

The Tone button transmits a 1750 Hz 'repeater access' tone for 2.2 seconds.

The SSTV Mode drop-down 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 shows a 'typical' SSTV spectral display with a small sync peak at 1200 Hz and video swinging between 1500 Hz and 2300 Hz. 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 audio frequency.

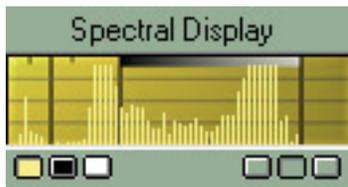
The small option buttons below the display are used to change the display color and trace style.

The Tuning Meter indicates how far you are offset from the 'correct' SSTV frequency. 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.

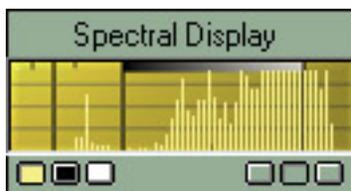
The Audio level and CPU level meters indicate the SSTV audio input level from the sound card and the amount of CPU power that the program is currently using. SSTV reception is typically good with the audio meter indicating between 20% and 50% of full scale, but this level is generally not critical. CPU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

The 'SSTV Active' button toggles the connection between the GUI (front panel) and the VM (SSTV Engine). Since there is only one sound card in the system only one front panel can use it at a time except in the case of full duplex sound cards where a second GUI can transmit while the first is connected to the VM.

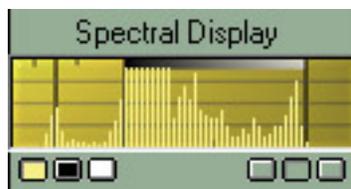
Spectral Display Tuning Examples



This SSTV signal is too low in frequency. Notice that the sync peak on the left is below the 1200Hz scale mark. The video component is also falling below the 1500 Hz to 2300 Hz range. Tune your SSB transceiver for a higher pitch.

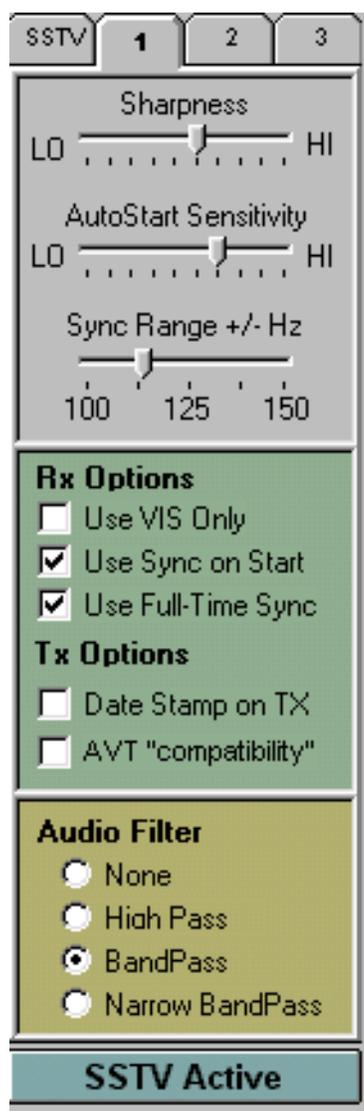


This SSTV signal is too high in frequency. Notice that the sync peak on the left is above the 1200Hz scale mark. The video component is also falling above the 1500 Hz to 2300 Hz range. Tune your SSB transceiver for a lower pitch.



This SSTV signal is correctly tuned. The 'sync' signal is centered on the 1200 Hz scale mark and the video components are within the 1500 Hz to 2300 Hz range.

VM Tab 1



The VM Options 1 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. As you decrease the Sharpness you are adding additional DSP filter stages which in turn will consume more CPU bandwidth.

The Autostart 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.

The Sync Range slider adjusts the amount of error that will be accepted when looking for sync signals. Lower values provide better immunity from false starts but require more accurate tuning of the receiver to the SSTV signal.

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. (normally left unchecked)

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. (normally checked)

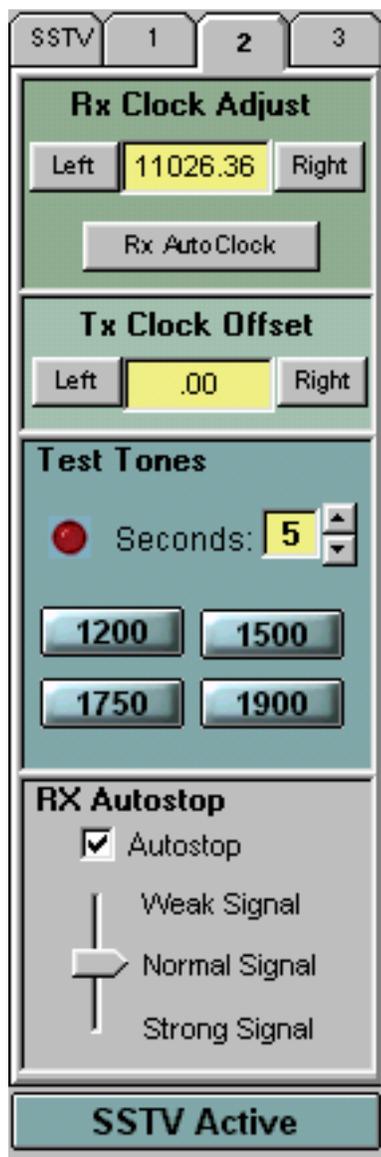
Use Full-Time Sync will force the VM to use the sync pulses within the video (if available) to align the received image. This option works best on strong signals where noise does not interfere with the sync signals.

The Date Stamp on TX checkbox causes the current date, and optionally time and/or callsign, to be added at the bottom of an image before it is transmitted.

The AVT compatibility checkbox will cause AVT 94 mode to run for a full 256 lines instead of the 'standard' 200 lines.

The Audio Filter panel selects the type and shape of DSP audio passband filtering used. Under quiet channel conditions such as VHF/UHF operation there is no need to activate the audio filter. With the audio filter set to 'none' you will always get the sharpest image detection. This is especially true when using fast modes such as Robot 36 second. The 'high pass' audio filter is best suited for removing low frequency noise (i.e. hum) from the received SSTV audio. For general SSB SSTV operation the standard 'bandpass' filter will provide the best trade-off between noise immunity and video sharpness. Under heavy QRN/QRM conditions the 'narrow bandpass' filter will excel at removing out of (SSTV) band audio.

VM Tab 2



The Option 2 tab contains controls that are normally accessed during CPIX setup or when running on-air tests.

The Rx Clock Adjust is used to correct for any oscillator errors in the sound card clock. The sound card oscillator should run at exactly 11,025.00 kHz but most cards use low cost oscillators that can be considerably off this frequency. Depending on how far off frequency your sound card clock happens to be when you receive a SSTV image it will either appear 'slanted' or may be heavily torn horizontally.

Some sound cards have separate receive and transmit clocks. In those systems it is always best to adjust your Rx clock first and then set the TX clock offset necessary for the receiving station to receive your images with no slant.

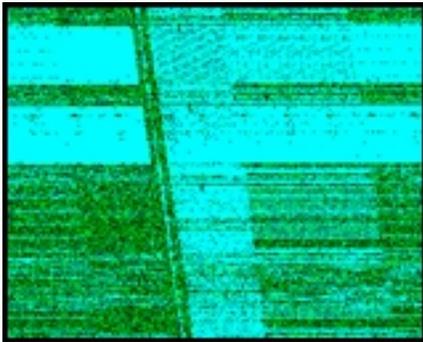
The 'Test Tones' buttons can be used to generate audio signals at 1200, 1500, 1750, and 1900 Hz.

The Autostop option will tell the VM to stop receiving if the sync signal disappears. The slider optimizes the missing sync detector for different band conditions.

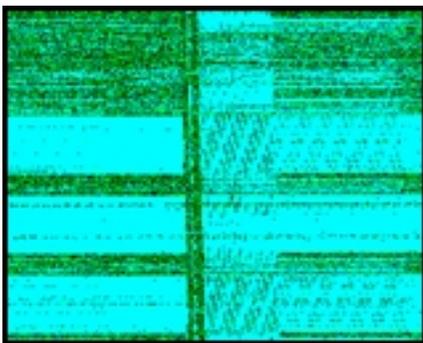


Rx Clock Misadjusted

The image above illustrates a typical image received with the Rx clock not properly adjusted. There are a number of options for adjusting the receive clock. If you have access to a station who you know is transmitting properly clock signals (most are) you can simply click on the 'Left' or 'Right' buttons to move the slant in that direction. After each adjustment you should ask the other station to re-send the image. In the above example you would click a number of times on the 'Left' button to move the slant to the left. The actual image above is a result of an Rx clock misadjustment of about -5 Hz in the 'Scotty 1' mode. The amount of apparent slant will vary depending on the mode being received but once the clock is correct all modes will also be correct. If you happen to know the correct clock frequency for your card you can also directly enter it by editing the clock values shown. The TX offset is the difference from the Rx clock in hertz.

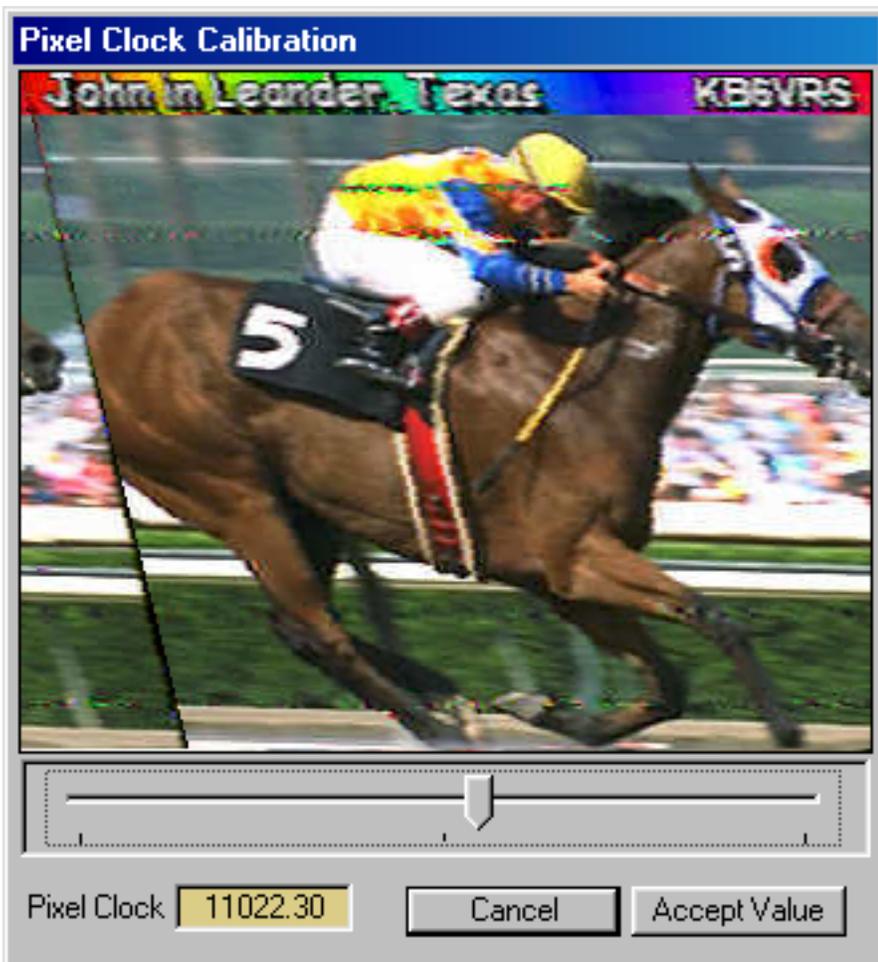


WWV (incorrect Rx clock)



WWV (correct Rx clock)

Another method of adjusting the Rx clock is to use a time signal broadcast such as WWV. To do this you should set the Rx mode to 'WWV' and then press the receive button. While the time signal is not a true SSTV signal the video detector will attempt to decode the one second 'ticks' and should display an image similar to what is shown on the left. The upper image was received with a slight error in the Rx clock while the lower image was received with a properly adjusted clock. While this can be a somewhat time consuming process it will give you very accurate results and does not require the use of another SSTV station.



By far the simplest method of adjusting the Rx clock is to use the 'Rx Autoclock' function. To use the autoclock feature just receive an image from a station who is already known to be calibrated and then press the 'Rx Autoclock' button. This will open the Pixel Clock Calibration panel as shown here. Use the slider at the bottom of the image to adjust the picture for minimal slant and then press the 'Accept Value' button. You may find that you have to repeat this process a couple of times to obtain the best alignment. You will also notice that the corrected pixel clock (Rx Clock) value is displayed as you adjust the image.

VM Tab 3



The VM controls tab 3 contains controls for special modes of system operation.

The TX Slide Show panel is used to transmit all of the images in the current thumbnail tray separated by a user selectable delay. This feature could be used by a demonstration station operating on a specialized channel.

On the Full Duplex TX panel the 'Start TX' button can be used to force any 'non-VM active' front panel 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.

The 'tone' button is used to transmit a 1750 Hz repeater access tone.

The SSTV Repeater Controls can be used to configure ChromaPIX as a half duplex SSTV repeater. When the repeater is active ChromaPIX will operate in the following modes.

Listen Mode: -any valid SSTV picture will be received and will replace the last image received. The received picture will not be repeated.

Query Mode: -if a valid repeater trigger tone is detected (1.5 seconds minimum of 1750 Hz) the repeater will send back a CW 'K'. After a 10 second delay and if no SSTV signal is received during that time the repeater will transmit the last image received in the mode that it was received in.

Store and Re-send Mode: -if a valid repeater trigger tone is detected (1.5 seconds minimum of 1750 Hz) the repeater will send back a CW 'K'. If within the next 10 seconds a valid SSTV signal is detected, the image will be received by the repeater. After a 10 second delay at the end of the received image, the repeater will re-send that image in the mode that it was received.

Repeater Notes:

- 1/ The repeater is designed for use on 'quiet' bands and is generally not suitable for busy HF bands.
- 2/ The standard repeater access tone system can be false triggered by QRM or hetrodynes.
- 3/ SSTV repeater operation may not be legal in some contries. Please check your local regs.

VM Tab 3 (cont.)

If the 'Allow Query' checkbox is unchecked then the repeater will not respond to query requests but will continue to operate as a receive and forward station.

If the 'Enable Beacon' checkbox is checked the repeater will broadcast a beacon ID image every 15, 30, or 60 minutes as selected by the option buttons. The image file to be used for the beacon is selected in the 'Files' section of the Preferences Dialog. The beacon time is based on the current hourly time rather than elapsed time since activation. (i.e. If a 30 minute beacon is enabled then it would transmit at 8:00, 8:30, 9:00, etc.)

Internet Back-Channel Control



Internet Back-Channel Control



Connected and Ready to Send

The Internet back-channel (INetBC) control provides a handy method of exchanging short text messages and pictures when band conditions might not be optimal.

To display the control window press the [Show] button located at the bottom of Tab 3 on the main CPIX front panel. When the control window is first displayed it will come up in 'Listen' mode waiting for another station to connect.

Your local TCP/IP address will be displayed at the top of the panel. If you have multiple network interfaces (ie. LAN and Dial-Up) then a scrolling list will show your currently active addresses and you can use the scroll arrows to display the TCP/IP address that you are using to connect to the Internet.

To make a connection to another station running CPIX either ask the remote operator for his Internet address or give him yours. The address of the remote station can then be entered into the area to the right of the [connect] button in normal nnn.nnn.nnn.nnn format.

Once the address is entered press the [Connect] button to establish a connection to the remote station. Note: the station that you are trying to connect to must be connected to the Internet, must be running CPIX 1.5 or newer and must have the INetBC panel open and in the 'Listening' mode.

Once connected you can send short 'chat' messages between the stations by entering the message in the box to the right of the [Send Text] button and then pressing that button. Outbound text is echoed in the message window and incoming text lines start with '->' characters.

Internet Back-Channel Control (con't)

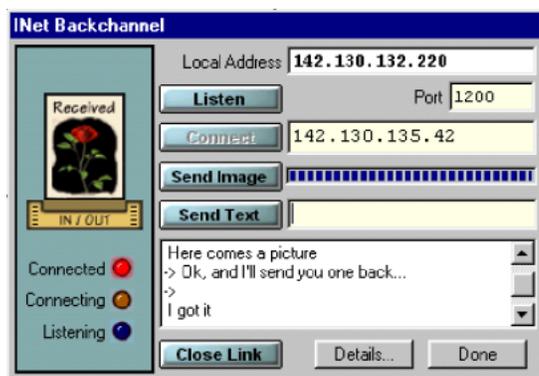
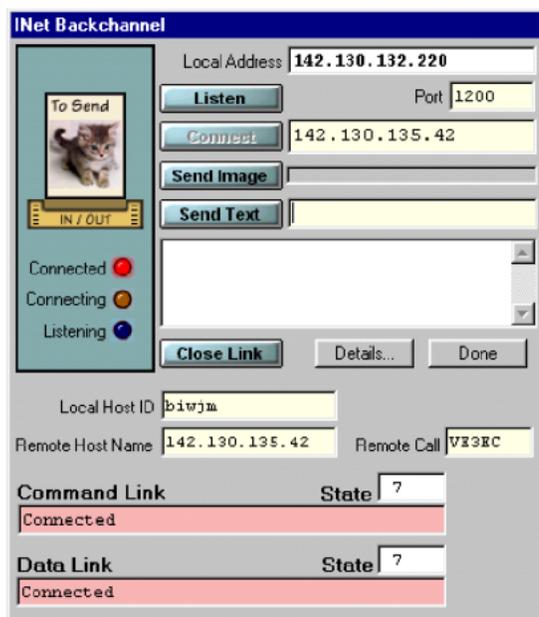


Image Received

To send a picture to the remote station load the picture into the main image window of any CPIX front panel and then drag that picture from the CPIX main window onto the In/Out tray on the INetBC panel. Once the image is dropped a generic 'outbound' (To Send) icon will appear in the In/Out tray. When the [Send Image] button is pressed the image will leave your In/Out tray and appear as a generic 'inbound' (Received) icon in the In/Out tray of the remote station. To view the image the remote station operator must drag the 'Received' icon onto the main image window of any CPIX front panel.

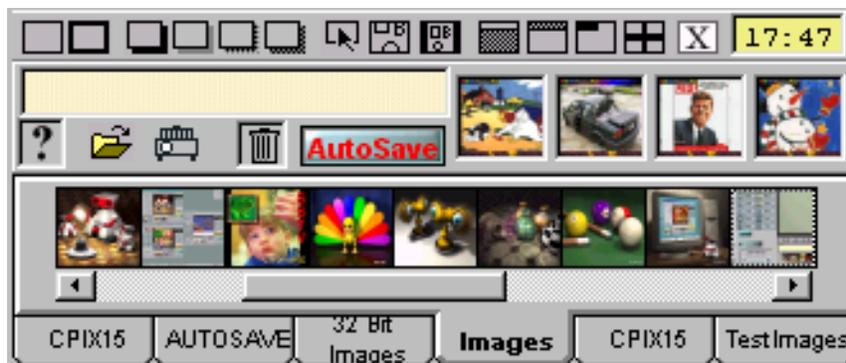


The [Details...] button will display more information on the status of the connection as well as expanded user information.

Standard Windows TCP sockets are used to transfer commands and data. If a machine is behind a proxy server such as WinGate then the system must be set up to pass socket connections, typically through the use of a TCP stack 'shim' such as WinGate Internet Client (WGIC) and Winsock Redirector Protocol (WRP). Remote systems then must connect to the IP address of the proxy server rather than the (Intranet) address of the CPIX workstation.

Note: If your Internet connection is via a dial in line then you must bring the connection up before attempting to connect with the INetBC system.

Storage Interface



The image storage system used in ChromaPIX is based on drag and drop loading and saving and the use of six thumbnail 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.

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.

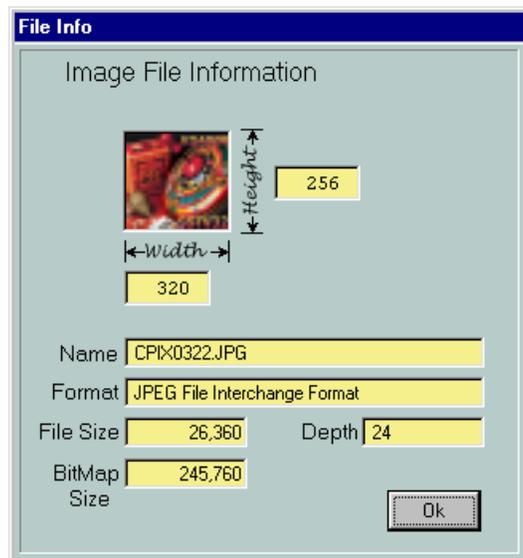
You can obtain detailed information about any image by dragging its thumbnail onto the [?] well located just above the image tray. (See 'File Info' dialog on next page)

You can also delete a file by dragging the thumbnail onto the Trash well located to the left of the Autosave button.

You can also use the arrow keys to move the thumbnail selection left or right, load the image with the [return] key, or delete the imagefile with the [delete] key. If you turn off file delete confirmation in the preferences you can very quickly use the keyboard shortcuts to clean up cluttered image trays.

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 selected in the preferences panel. In the general preferences panel you can select whether to save these images as bitmaps (.BMP) files or JPEG compressed files (.JPG). Generally you should select JPEG for autosaved files as .BMP files can rapidly fill your disk drive.

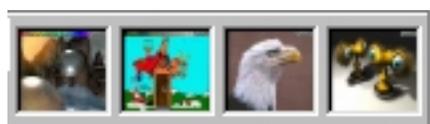


File Info Display



The information box which normally displays file names as you move the mouse pointer over the thumbnails has two additional uses. If you are receiving a SSTV image from another CPIX user who has the caller ID feature enabled then you will see his call displayed. If you later load an image that contains the caller ID data and click on the [?] button you will see a display indicating who sent the original image.

The caller ID feature may not function under very poor signal conditions.



The four thumbnails located above the image tray hold the last four received images. You can instantly recall any of these images by double clicking on the thumbnail button or dragging the thumbnail onto the image window. These buttons are generally referred 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



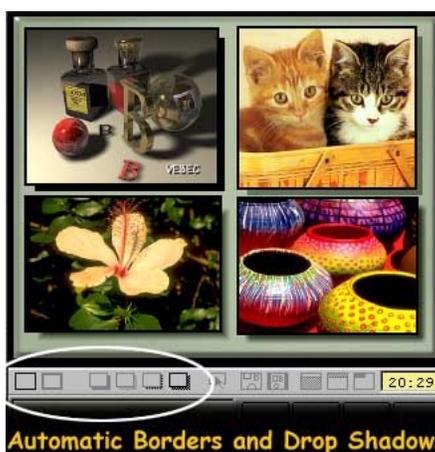
The ‘Load Effects’ buttons are located along the bottom of the main image window. These buttons affect the way images are loaded into the main window and are a key feature of ChromaPIX. Load effects buttons can either remain active or ‘auto clear’, based on the setting in the ‘general’ preferences panel.



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 arrow button enables live dragging and placement of images. 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 left button will cause images loaded into a selection rectangle to maintain their aspect ratio by fitting to one dimension and cropping off excess image in the larger dimension.

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

Load Effects (Cont.)



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

When the left 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 next 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 next 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.

The right button will load (and scale) images into one of the four image quadrants. If you drag an image to the image window it will load into the quadrant that it is released over. If you double click on a thumbnail with 'the quad load' button active the image will load into the next sequential quadrant. Using the 'quad load' button you can rapidly load up to four quarter sized images for transmission.

Load Effects (Cont.)



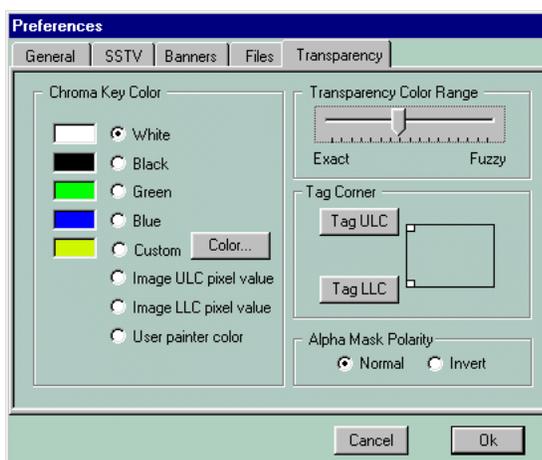
The [X] button is used to enable transparency when loading images from disk. ChromaPIX supports two types of transparent image formats, Alpha Channel and Chroma-Key.

Alpha Channel: 32 bit images can contain an 8 bit (grey-scale) 'Alpha' channel which defines the amount of transparency for each corresponding area in the RGB (24 bit) channels. Alpha channel (32 bit) images have the the advantage that picture areas can have varying degrees of transparency from full transparent to fully opaque. This can result is very smooth blending between the 32 bit image and the background image it is being loaded over. This is particularly true when edgues are antialiased with transparency. Alpha channel images can be generated automatically by most computer graphics rendering programs or manually within most higher end photo editing programs.

Chroma-Key: When dealing with 24 bit or lower color depths it is possible to define a color or range of colors that will be interpreted as 'transparent' when they are loaded. This is a similar concept to the 'blue screen' system used to superimpose live video behind TV announcers.

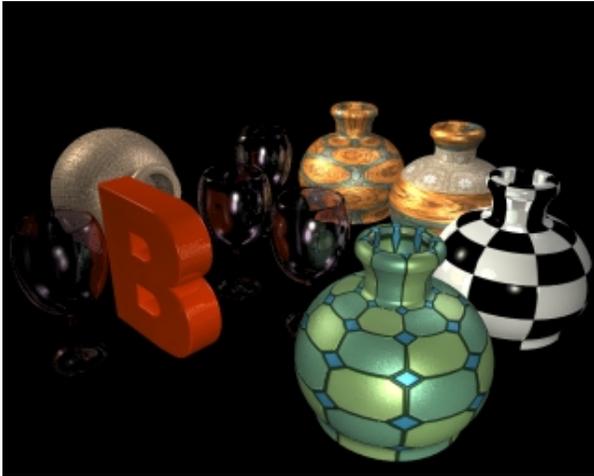
If you 'right click' on the [X] button the Transparency Preferences panel will open. For a complete description of the transparency options please see the Preferences section of this manual.

Note: It is handy to use the live position load effects button  to position the transparent 'overlays'.

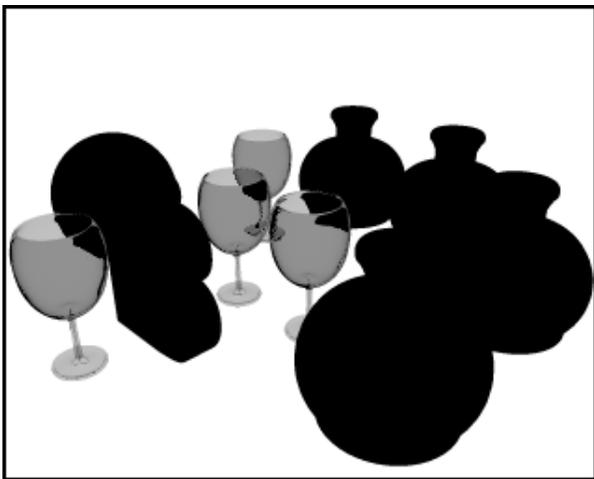


Transparency Preferences

Transparency Examples - 32 Bit Images



This is a 32 bit image generated by Cinema4D which contains an eight bit Alpha transparency channel. Note: If an image contains an Alpha channel then that information will be used and any Chroma-Key settings will be ignored.



This is the 8 bit Alpha channel contained in the image above. Notice how vases are fully opaque (black) while the wine glasses are semi-transparent. Notice also that the background (white) is fully transparent.



When the image was loaded with the [X] transparency button activated the Alpha channel in the source image was used to determine how much of the background image (color bars) show through in the resulting image.

Transparency Examples - Chroma-Key Images



This is the original 24 bit color image.



The image was edited in PhotoShop® to select the area around the person and fill that area with a solid green color. We will use this solid green to represent the area where the background image will show through this image. This image was then saved to disk.

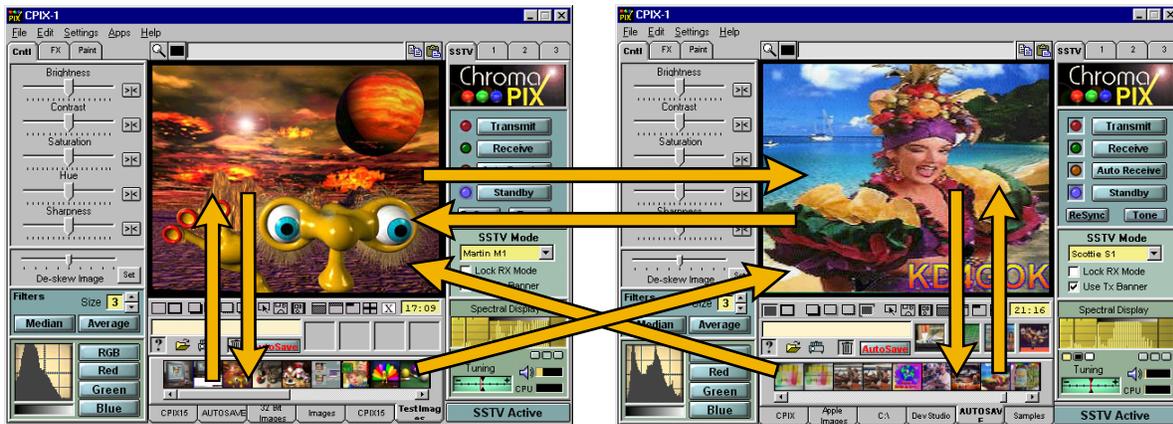


The transparency prefs setting in ChromaPIX was set to use 'green' as the transparent color. The above image was then loaded over the standard color bars to give this result.

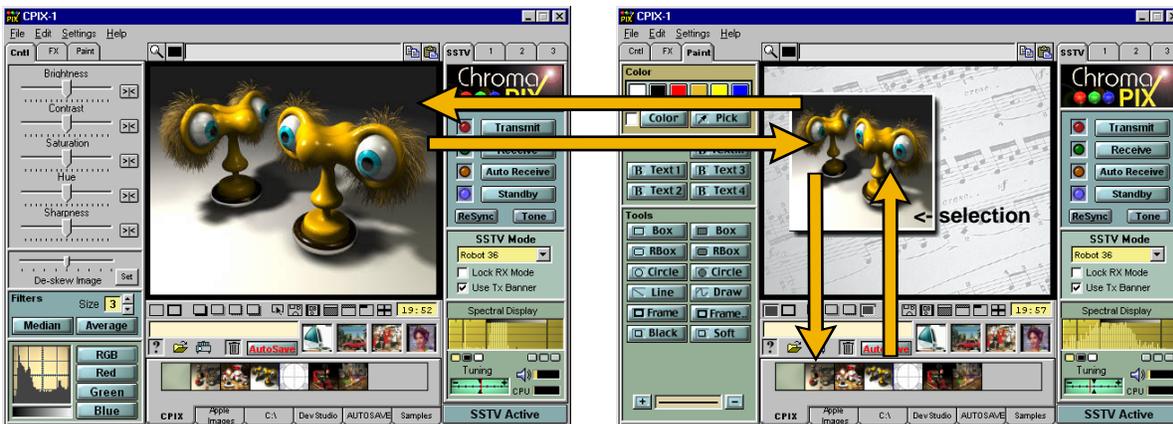
Image Selections

Image selections are created by dragging out a selection rectangle on the image window with the right mouse button. Selected areas can then be saved to disk or dragged to other image windows. If a selection rectangle is active on the image window then thumbnails dragged to that window will load into only the selected area. Selection rectangles also work for normal clipboard copy and paste operations. Most of the image processing and special effects operations can also be limited to a specific area by the use of a selection rectangle. To remove a selection rectangle right click on the image without dragging the mouse. If the shift key is depressed while drawing the selection rectangle the selection will be constrained to a 5 : 4 aspect ratio.

Load & Save Drag Options



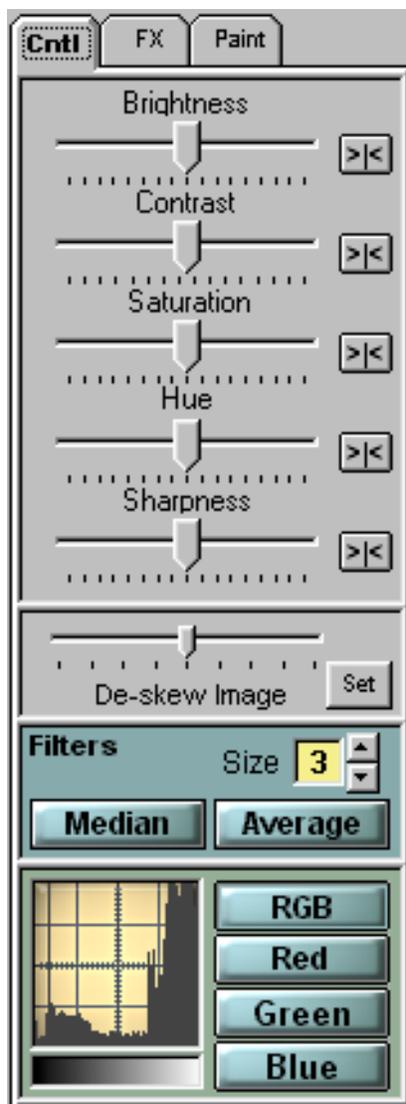
Load & Save Selection Drag Options



Remember: Create selection rectangles by dragging with the right mouse button on the main image window..

→ = 'Click and Drag'

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.

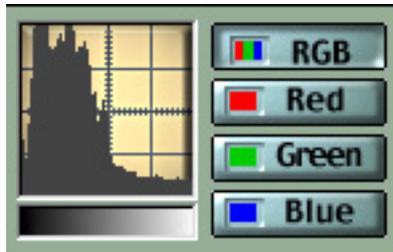
Once you have adjusted the sliders to give the desired results you can 'apply' the correction by clicking once on the main image. This will nail down the changes and return the sliders to their center position. Should you decide not to apply the changes, simply return the sliders to their center (neutral)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

The 'De-skew Image' slider can be used to correct images that were received from a station with an incorrect TX clock. This control only affects the current image displayed and does not adjust the local Rx or TX clock frequencies. (see autoclock on Opt2 tab)

The two filters are used 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. not 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.

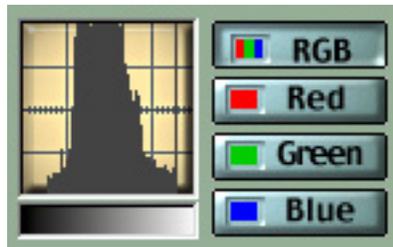
The histogram display is a very useful tool to monitor the effects of the image control sliders. The buttons to the right of the histogram allow you to display individual color channels or the combined RGB data.



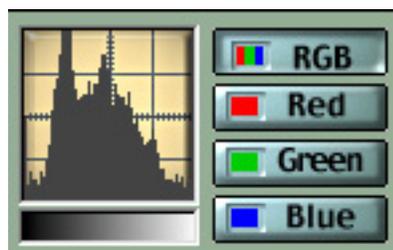
This image is too dark. The histogram indicates that most pixels are of the lower (darker) values. Adjust by increasing image brightness.



This image is too light. The histogram indicates that most pixels are of the upper (lighter) values. Adjust by decreasing image brightness.



This image is too low in contrast. Most pixels are in the mid grey region with no blacks or whites. Adjust by increasing the image contrast



This image is just right. The pixel brightness values span the entire range while still exhibiting a 'bell like' distribution.

Special Effects



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

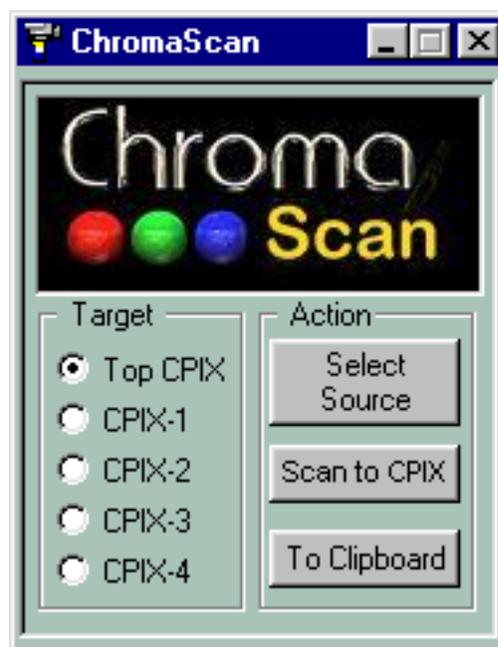
The Fills buttons group provide a fast method to clear the main image to black, grey, white, or any color. You can also generate a color bar test pattern. Another quick way to clear the main image to black is to use the small [Black] button located above the main image window. Other 'Fills' include Color Bars, Grayscale Bars, Resolution Test chart, and Linearity Test chart.

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.

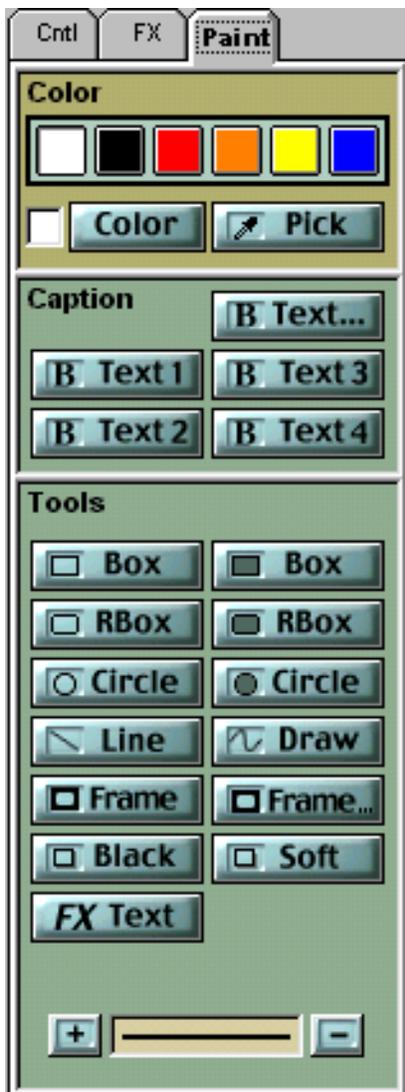
Many of the FX functions also can be limited to a specific screen area through the use of a selection rectangle.

The Acquire buttons activate ChromaSCAN or ChromaCAP input modules which ship with ChromaPIX. ChromaScan is an input helper which interfaces with Twain based devices such as scanners. ChromaCAP is a 'Video for Windows' helper which interfaces to digital video sources such as TV cameras.





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

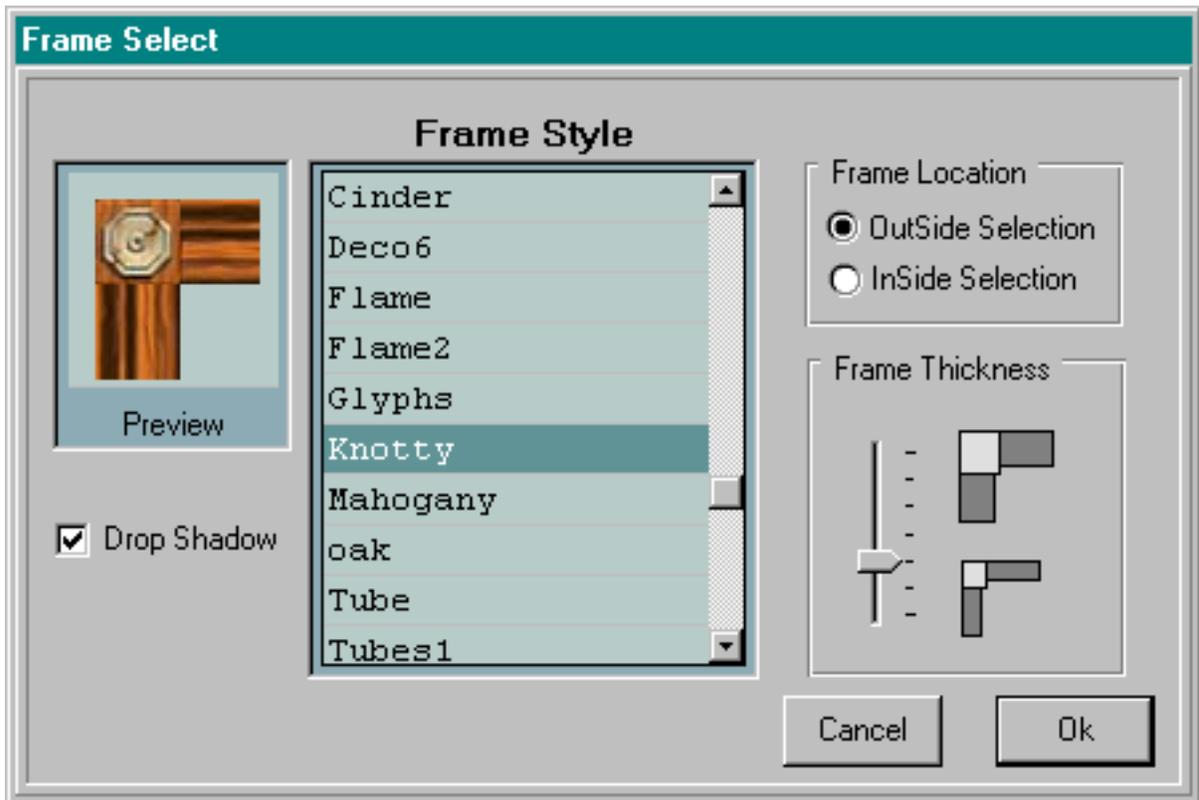
The Frame... button is used for drawing picture frames around the image window or selected areas. This button will bring up the frame selection dialog which allows you to pick from an array of material, frame sizes and effects such as automatic soft shadows.

The Frame button will bypass the frame selection dialog and apply the frame style last selected (see next page for more frames information).

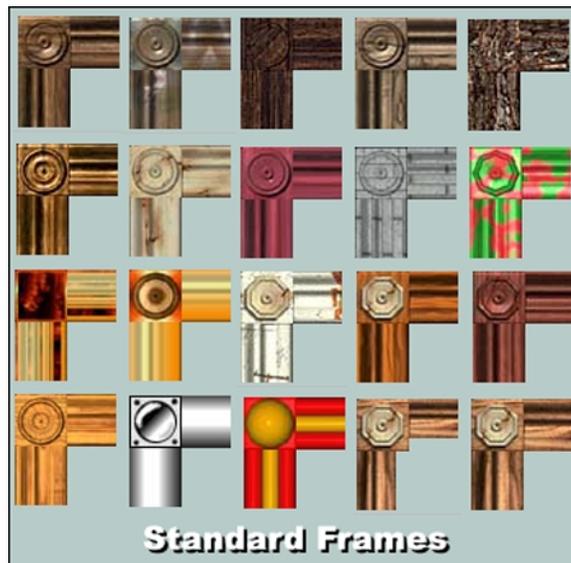
The last two buttons generate either black or soft drop shadow effects below a selection rectangle.

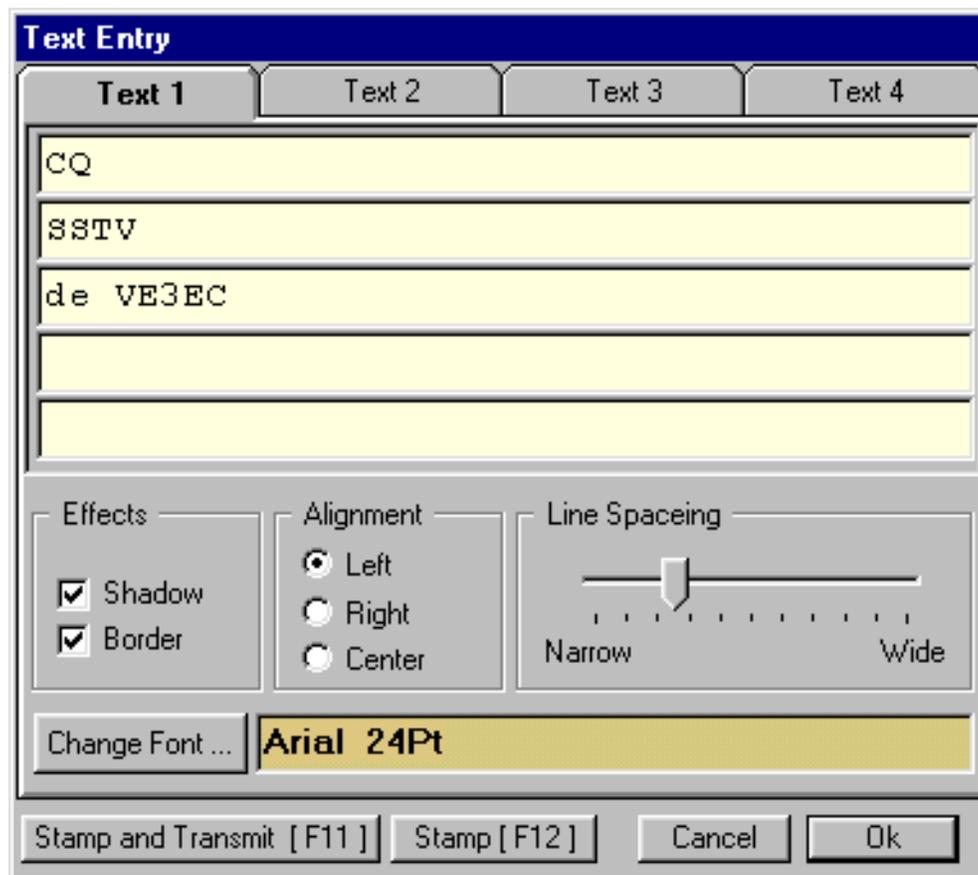
The FX Text button brings up the fancy text control (see following description).

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



Frame Selection Dialog





The Text... button displays the text entry panel which can be used to enter four separate messages, each with up to six lines of text. You can also 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 your 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.

The Text1 through Text4 buttons bypass the Text Entry panel and directly display the requested text message.

The text edit system in ChromaPIX has a number of shortcuts to simplify fast direct entering of messages. At any time you can jump directly to the Text Entry dialog by pressing the 'M' (message) key on the keyboard. Once in the Text Entry dialog the first line of text will be selected (highlighted). You then have the option of just typing new text to replace the current text or pressing the 'tab' key to move to the next line. As you move to the next text line it will also become selected to enable rapid replacement to editing. Once the text has been entered a simple press of the 'return' key will take you directly to message positioning on the screen. You can also adjust the text size while positioning it by pressing the '+' or '-' keys on the keyboard.

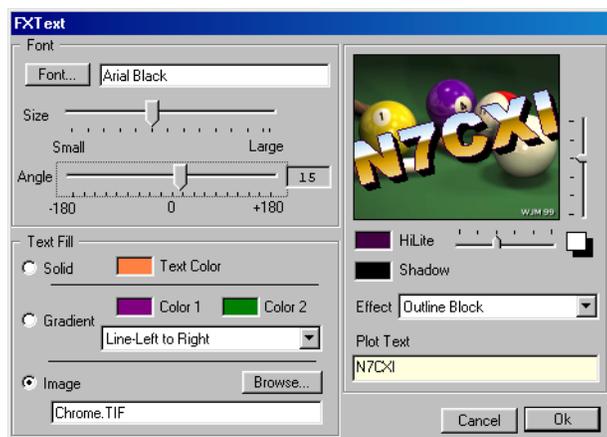
You can also display the message entry window while receiving an image. Text messages can then be edited and can interactively positioned over the image when reception is complete. There are also two additional buttons at the lower left of the message panel which automate the addition of message text to the image.

[Stamp and Transmit] (or F11) will automatically add the message text to the image once it is finished being received and then go into transmit mode. If an image is not being received then the current image will be stamped with the text message and transmit will start.

[Stamp] (F12) will automatically add the message text to the image once it is finished being received but will not automatically start transmitting.

These functions are tailored for the contest operator who must rapidly enter image report text with minimal effort.

FXText Painter Tool



The FXText Painter Tool is designed for adding fancy text when compositing images. Text may be continuously scaled and rotated in real time while observing the effect in a preview window.

Text may also be filled with a solid color, a gradient color pattern, or another image. CPIX 1.5 ships with an assortment of image fill files but you are free to use any of your own images. The default directory for the sample images is the 'Text Fill Images' directory located within your CPIX installation directory. Images will be stretched and scaled to fit the current text string. As most text string tend to be short and wide, you will find that images of similar aspect ratios give the best fill results.

As well as fills you can also select various text edge effects to simulate raised or stamped text. The text shadow is also adjustable.

The keyboard shortcut 'F' can be used to easily open the FXText tool window.

Menu Commands

File Menu

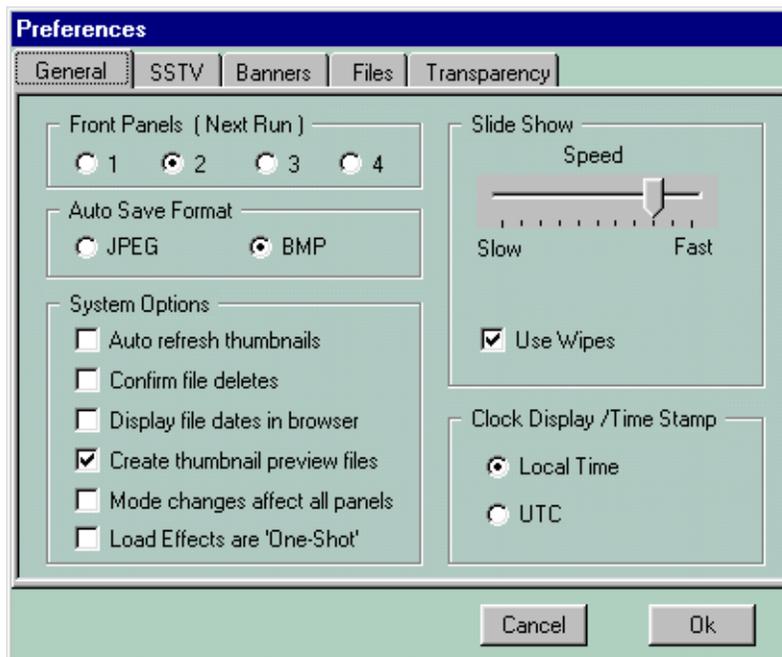
Load Image...	(Ctrl+O)	Displays a standard Windows® file open dialog and allows you select any image file to load into the current GUI. If a selection rectangle is active then the image will be loaded into the selection. Image load effects buttons are also active for image loads.
Save Image...	(Ctrl+S)	Displays a standard Windows® file save dialog and allows you to save the current GUI image in any of the supported file formats. If a selection rectange is active then only the selected area of the image will be saved.
Print Setup		Displays the Windows® printer setup dialog.
Print	(Ctrl+P)	Prints the current GUI image.
Exit		Exit the ChromaPIX program.

Edit Menu

Undo	(Ctrl+Z)	Undo the last command.
Copy	(Ctrl+C)	Copy the current image or selected image area to the clipboard. The clipboard may be used to transfer CPIX images to other applications.
Paste	(Ctrl+V)	Paste the clipboard image to the GUI or to the selected image area. Load effects buttons are active for paste ioperations.
Live Paste		Paste the clipboard image to the GUI using realtime positioning.

Settings Menu

Preferences



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

The 'Front Panels' buttons are used to select the number of GUIs (front panels) that will be used the next time ChromaPIX is started. The number of front panels to use is typically determined by screen size and resolution. Most users will find that two GUIs will be the best setting for screens from 800 x 600 to 1024 x 768. If you are running at 1280 x 1024 or higher you may wish to run with four GUIs. One other consideration is the use of Windows GDI resources. Each GUI will consume about 15% of the very limited 64K GDI space allocated by Windows 95 or 98. You may find that you will run low of GUI space if you run four GUIs and also run other heavy graphics applications. Windows NT does not have the 64K GDI limitation.

The 'Auto Save Format' panel selects between JPEG or bitmap (BMP) image file formats for images that are to be autosaved. JPEG images will occupy much less disk space but do show some quality loss. BMP files are larger but do not lose any image quality.

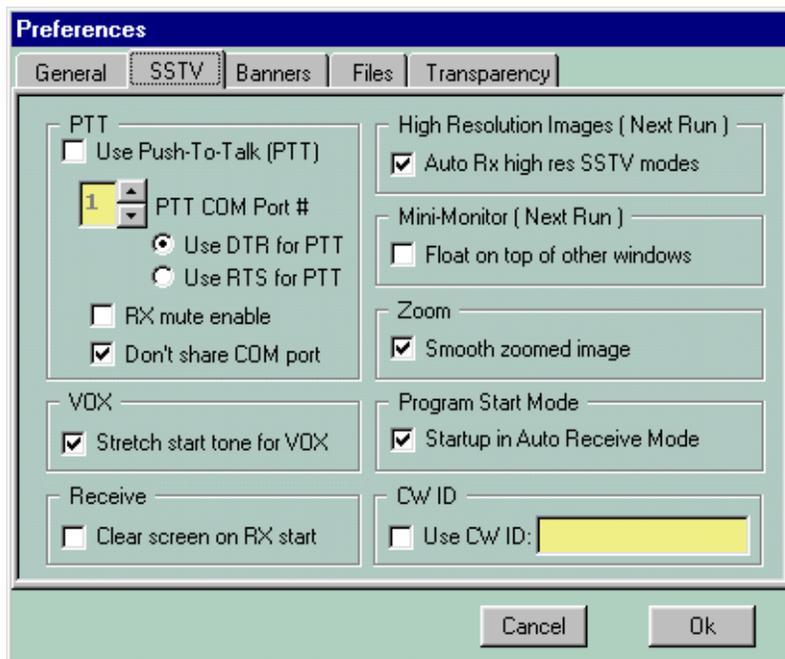
The 'System Options' panel allows you to configure many system options. Auto Refresh Thumbnails will cause image thumbnails to be refreshed whenever scrolling or changing tabs. This can be handy if you have added images to the current tab directory from outside ChromaPIX. Confirm File Deletes takes away the 'oops' factor when trashing images. The Display Dates in Browser adds file creation date display to the normal file name display shown when moving the mouse pointer over thumbnails. Create Thumbnail Preview Files allows you to disable thumbnail file creation if you really don't want them. The 'Mode Changes Affect all Panels' check box will cause SSTV mode changes on one GUI to be tracked on all other GUIs.

The 'Load Effects are 'One Shot'' option causes the load effects buttons to auto clear after an image has been loaded.

The 'Slide Show' panel has controls for adjusting the show speed and special effects (wipes).

The 'Clock Display / Time Stamp' controls set your preference for the time zone used.

Preferences (cont.)



The SSTV tab in the preferences panel contains additional 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 also select which com port you wish to use and 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

RX mute enable uses the alternate PTT line to generate a receiver mute signal.

Don't share COM port can lock your PTT COM port while running ChromaPIX so that other applications cannot alter it.

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.

The 'Receive' panel allows you to specify that you want the currently displayed image cleared when a new image is being received.

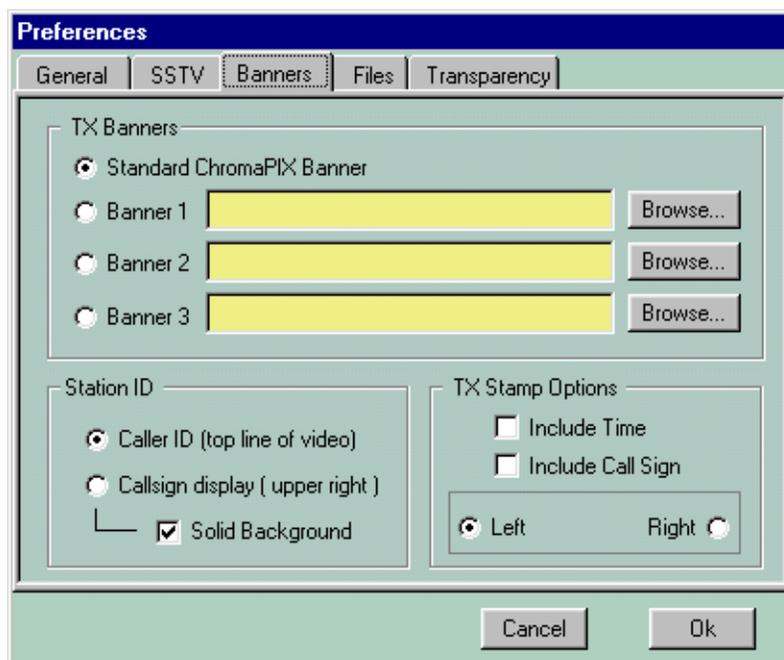
The 'Auto Rx high res SSTV modes' checkbox allows you to lock out modes other than the normal 320 x 256 modes. This can be handy when operating under heavy QRM or noise conditions where false VIS code detection might cause you GUIs to resize.

The 'Mini-Monitor control adjusts the behavior of the small RX monitor window. This window can either act as a 'normal' window or can 'float' on top of all other windows. The Mini-Monitor is a small display window that is displayed when you press the space bar. When the mini-monitor is displayed the other full size GUIs will be minimized to the task bar. Pressing the space bar a second time (if the mini-monitor window has 'focus') will hide the mini-monitor and restore the GUIs. While in the mini-monitor mode you can resize the mini-monitor window and also control the VM using the 'S' - standby, 'A' -auto Rx, and 'R"-receive keyboard shortcut keys.

The 'Smooth zoomed images' checkbox selects whether full screen 'zoomed' images are resized (fast but pixelated) or resampled (slow but smooth).

The 'Startup in Auto Receive Mode' selects whether ChromaPIX will startup in 'standby' or 'Auto Receive' modes.

Preferences (cont.)



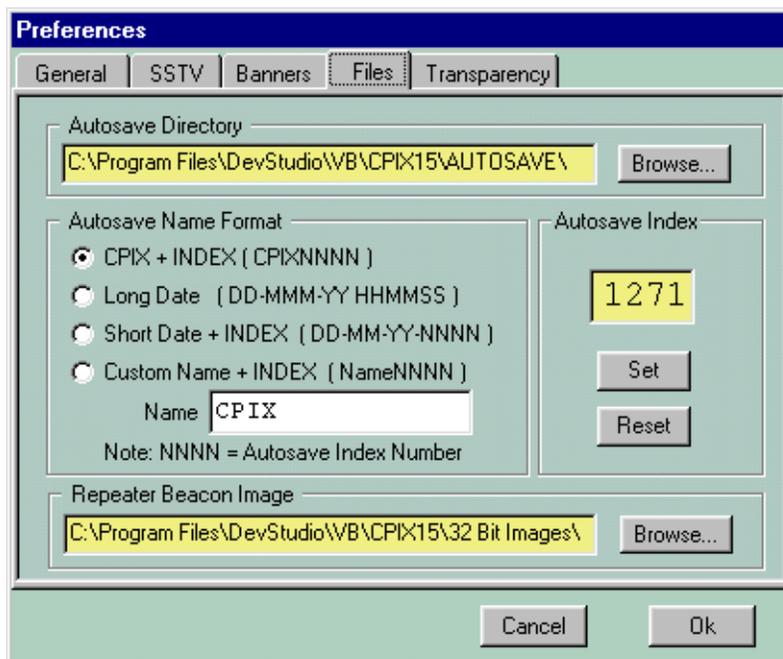
The 'Banners' tab in the preferences panel includes settings for transmit banners, station ID options, and possible additional time and station ID 'date stamps' (see OPT1 tab on right GUI panel for 'Date Stamp on TX' enable checkbox)

TX banners are image files that will automatically be loaded into the current image on transmit if the 'Use Tx Banner' checkbox is checked on the SSTV main controls panel. Banner images are loaded into the top left corner of the image and although they can be any size are generally 320W x 16H. You can select up to three banner files and switch between them (or the standard 'CPIX' banner' using the option buttons located to the left of the banner captions. The text areas to the right of the banner caption should contain the complete file path to the desired image file. The easiest way to select the file is the use the 'Browse...' buttons and use the standard Windows® file open selector.

The Station ID panel is used to select the type of ID used when transmitting SSTV images. The caller ID system encodes your callsign on the first line of video and will be decoded and displayed by anyone receiving the image using ChromaPIX. The caller ID can detect received ID errors caused by poor signal conditions or QRM and may not display the caller ID under those conditions. The second option is to display your callsign in the upper left corner of your image either with a solid or transparent background.

The TX Stamp Options enable additional data to be added to the TX stamp and provide for positioning the stamp either left or right justified at the bottom of the image.

Preferences (cont.)

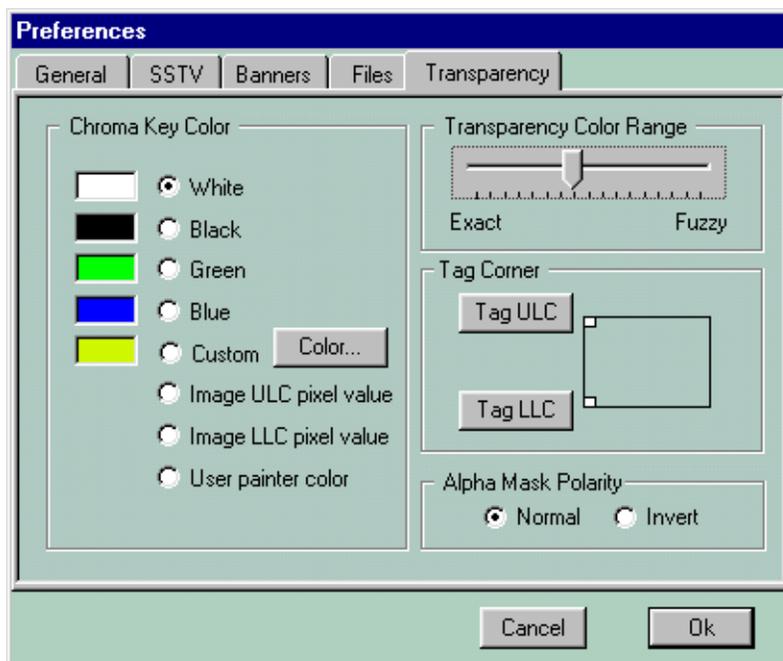


The 'Files' tab in the preferences panel deals with 'Autosave' options. You can specify where you would like to autosave images to on your drive using the 'Autosave Directory' panel. The text box should contain a valid path to the directory that will hold your autosaved images. Again, use the 'Browse...' button to select the directory using the standard Windows® file open selector.

The Autosave Name Format panel can be used to select between several name generation schemes for autosaved image files. The default is to name the files as CPIXnnnn.xxx where nnnn is a four digit index number that increments on every autosave. There are also options for using a date or date + index number scheme, or for selecting a custom name plus index. The index value can also be changed to a new starting value using the 'Autosave Index' panel. Index numbers are integers that range from 0000 to 9999. If you have over 10,000 autosaved images in one directory then it is time to do some housecleaning.

The Repeater Beacon Image path is used to select which image file will be used if the repeater beacon is activated. The easiest method of selecting the file is to use the 'Browse...' button.

Preferences (cont.)



The 'Transparency' tab panel is used to adjust how ChromaPIX interprets transparency information when loading files.

The left panel allows you to select what 'color' will be treated as 'transparent' when loading non-32 bit images with the transparency load effects button [X] enabled. You can select from several 'standard' colors, a custom picked color, the color of the pixel in the upper left corner (ULC) or lower left corner (LLC) of the image being loaded or the currently selected painter color.

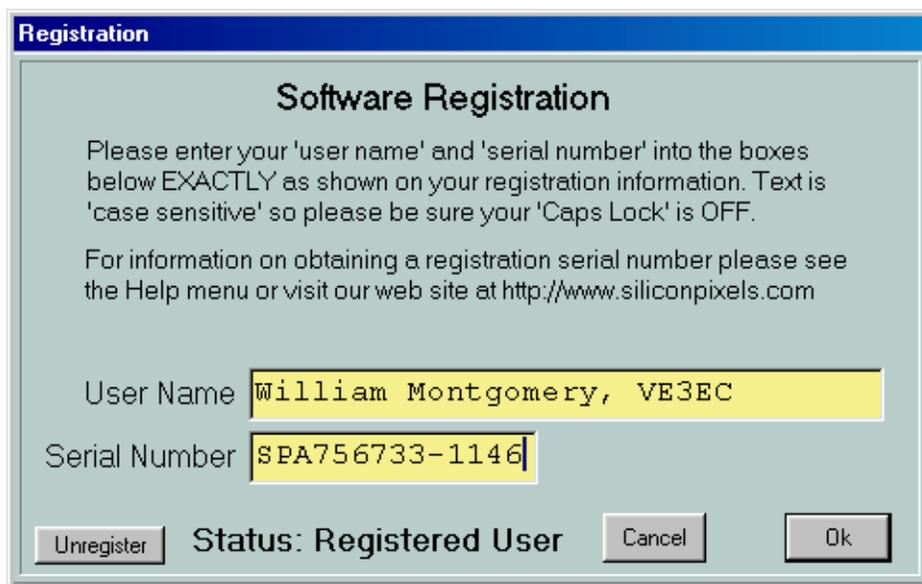
The Transparency Color Range slider adjusts whether only the 'transparent color' or colors close to the 'transparent color' are treated as transparent. This is handy when you want to use a common background color such as black or white but there may be some 'almost black' or 'almost white' pixels mixed in.

The Tag Corner buttons are a handy way to set the pixel colors in the ULC or LLC of the currently loaded image to the transparent color selected on the left. Later you can then load the image with ULC or LLC Chroma Key Color selected. This is particularly handy when using an odd background color as the transparent color.

The Alpha Mask Polarity is only for 32 bit images and selects whether a 00 alpha mask pixel value represents fully transparent or fully opaque.

Settings Menu (cont.)

Save Current Mode As Default	Tells ChromaPIX to remember the current SSTV mode as the default startup mode the next time the program is run.
Open Soundcard Input Controls	Displays Windows sound recording controls (mixer)
Open Soundcard Output Controls	Displays Windows sound playback controls (mixer)
Registration	Displays registration dialog as shown below. Registration information is case sensitive and spaces and commas are important. Please enter your registration details exactly as you received them.



Help Menu

Release Notes...	F1	Displays ChromaPIX release notes.
Registration Info.		Displays information about registering ChromaPIX
About...		Displays ChromaPIX splash screen with version information.

Keyboard Shortcuts

M Open Text Message Window
+ Increase Font Size (while positioning message)
- Decrease Font Size (while positioning message)

F Open the FXText Window

Z Zoom image to full screen

S Standby

A Auto Receive

R Receive

T Transmit

Y Re-sync Receive

(space) Toggle Mini-Monitor Display

cntl-c Copy Selection to Clipboard

cntl-v Paste Clipboard to Selection

cntl-o Load Image File

cntl-s Save Image to File

cntl-z Undo Last Operation

F1 CPIX Release Notes

→ Select Next Thumbnail

← Select Previous Thumbnail

[Return] Load Selected Image

[Delete] Delete Selected Image

[Shift] Constrain drawing of selection rectangle to 5:4 aspect