Operation Handbook

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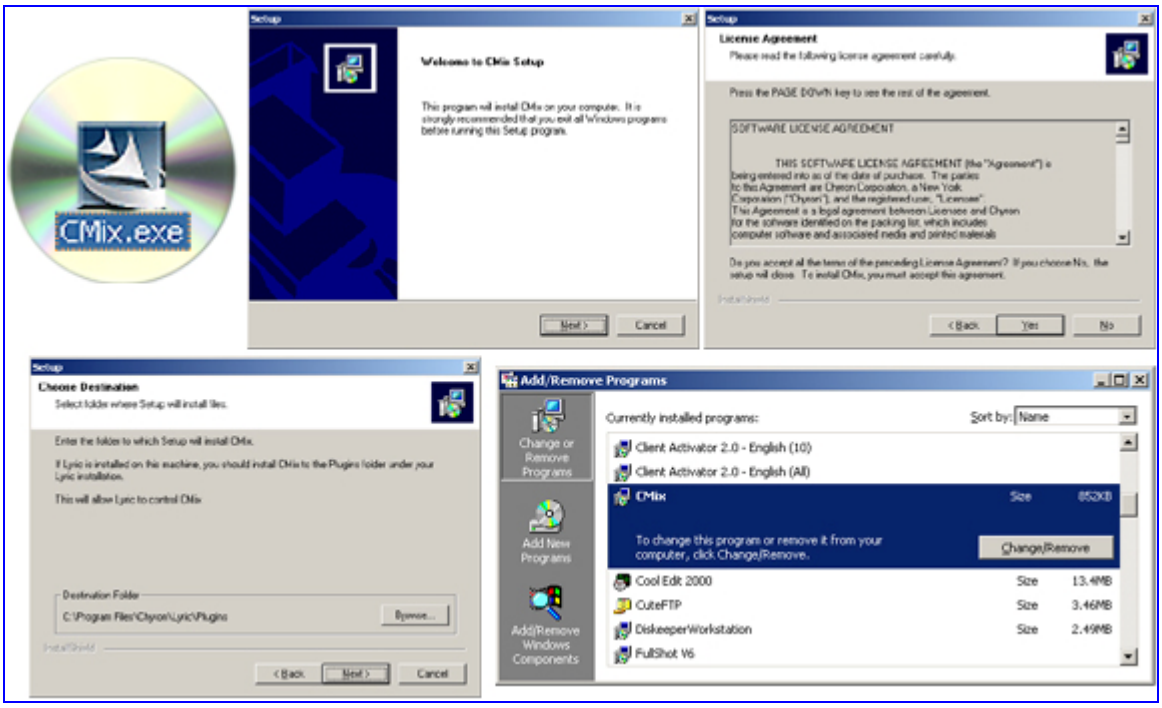
Introduction

CMix is a 1RU-rack mount device providing two output channels, each displaying an independent mix of up to 4 input layers over optional Program video. CMix is connected to a host machine via the Universal Serial Bus (USB). Originally designed for use with Duet LE/LEX, CMix can also be used to expand the mixing capabilities of Duet SD systems, or with conventional PCs equipped with broadcast-quality video sources for use as a standalone router/switcher.

Software Installation

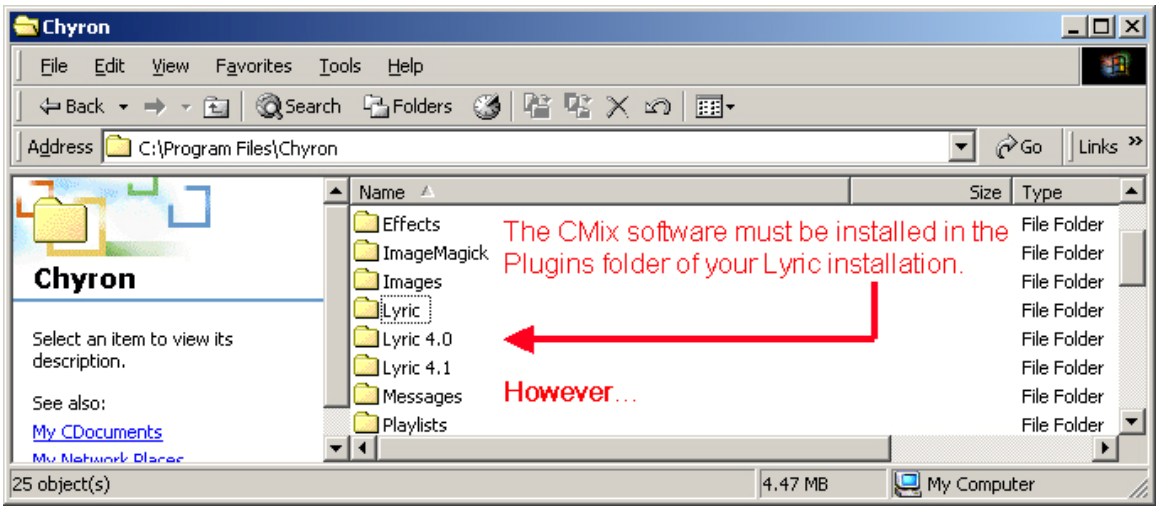
CMix's software control panel is available in two ways: as a standalone application for use outside of Lyric, or as a Lyric plugin. The standalone application is available in Chyron's digital pcCODI Software Developer's Kit and is discussed in the documentation included with the SDK.

For more information on Lyric Plugins and the LEIF architecture, consult Lyric's On-Line Help.

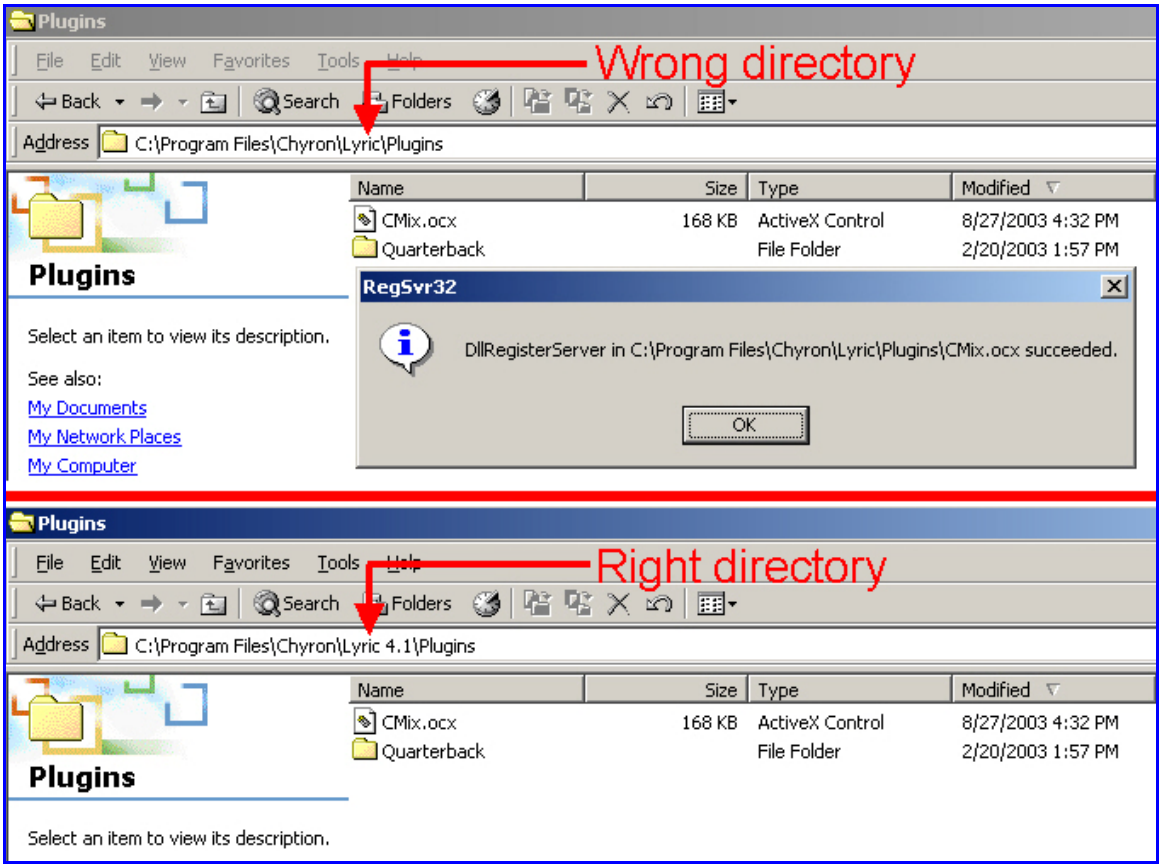


CMix's plugin software for Lyric is installed by the familiar Install Shield process. Locate the **CMix.exe** on the included CD and double-click it. The install process begins. Follow the instructions in the installation script, and click **Next** as needed. (To uninstall the CMix software, use the Windows Add/Remove Program facility, as seen in the lower right corner of the illustration above.)

CMix's software is an ActiveX control with the **.ocx** extension. **As with all Lyric Plugins, the file *CMix.ocx* must be located in the proper directory on your system. It should be in the *Plugins* folder of the Lyric installation that contains the copy of Lyric with which it will be used.** If your system includes multiple versions of Lyric, **make sure** the .ocx file is in the **correct version's installation!** See the illustrations on the next page.

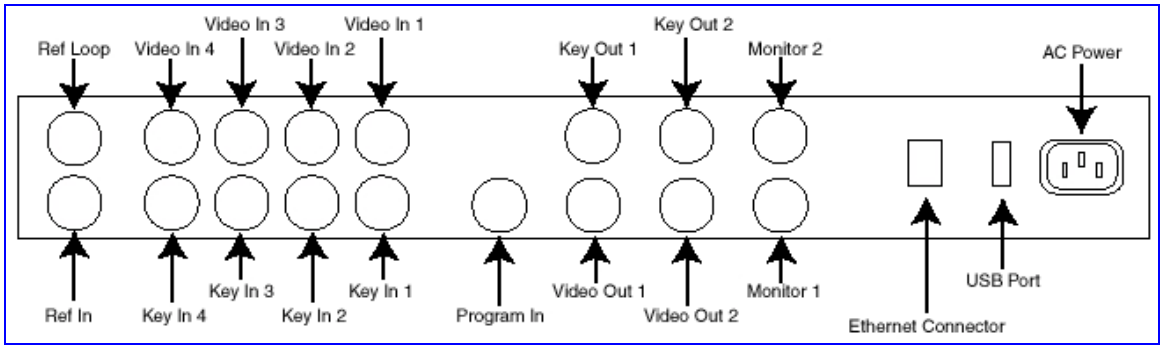


The system pictured here contains different versions of Lyric. In the first illustration below, the installation script did not place the file in the appropriate directory. The operator's intent here is to use CMix with Lyric Version 4.1.



Top: Installation into the directory for the *wrong* version of Lyric.
Bottom: The CMix.ocx has been moved to the appropriate directory, in this case, Lyric Version 4.1

CMix's Connections



Rear panel of CMix chassis

USB Port

The Windows 2000 operating system will detect and configure new USB connections.

Ethernet Connector

Not used at this time.

Video Outputs

Signal: SMPTE 259M/CCIR-656 SDI Format, except for the analog monitor outputs (next item).

Monitor 1 & Monitor 2

These BNC connectors offer **analog** video monitoring output for each of the system's two outputs (SDI VIDEO OUTs 1 & 2). Connect to standard NTSC/PAL monitors. These video outputs are low-resolution and are not suitable for broadcast.

Video Out 1 & Key Out 1

SDI video and key output from **Mixer 1**of the CMix. If **ANC DATA** is enabled, ancillary data from the Program In, including Closed Captioning on lines 21 and 284 will appear at this output.

Video Out 2 & Key Out 2

Provides video and appropriate key signal from **Mixer 2** of CMix.

Video Inputs

Signal format: SMPTE 259M/CCIR-656 SDI

CMix's four video and key input pairs may be combined in any order by means of compositing and/or blending layers. All mixer settings may be controlled as animation elements by Chyron's Lyric application or other programs created with the digital pcCODI Developer's Kit. Typical inputs to the Mixer are video from a clip player or from a character generator. Multiple graphics planes can be combined; for instance, CMix could simultaneously composite elements created by CAL and Lyric applications, a bug inserter and an animated background orginating from clip playout.

For mixing, a video input must have an associated **key** input. If there is no **Key In** for a given Video In, a 100% **matte** signal will be assigned, covering all lower layers in the mixer.

Program In

NOTE

This video input may be used as a digital genlock source; selection of analog or digital genlock may be set in software (see Ref In for more about analog genlock).

The Program In signal is essentially a fifth video layer, distinct from the four Video and Key Input pairs. Program Video is always below Layer 4. All Layers are on top of Program Video. Note that Program In is where the system takes in Closed Captioning as well as other Ancillary data. This data is passed through CMix and preserved on the Video Out 1 & 2 signals. The Program In signal is protected by a **bypass relay** that automatically routes the signal to Program Out 1 in case of system power loss.

Video In and Key In, Pairs 1 - 4

These pairs of video and key inputs comprise CMix's four fully-manipulable layers. Each of these four signals may be routed to either or both of CMix's output channels. The arrangement of output layers defines visual display priority. Layer 1 is on Top and layer 4 is on the bottom. Program Video is always below layer 4. All Layers are on top of the Program Video.

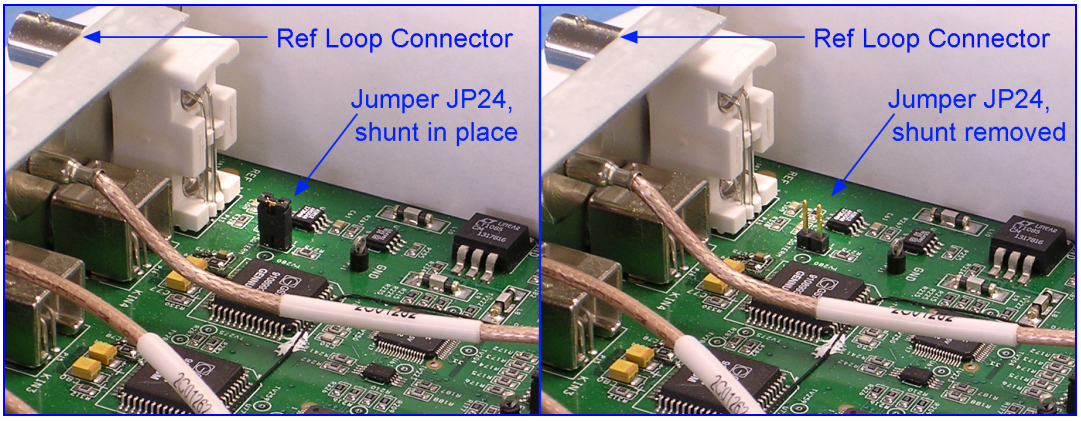
Analog Reference Connections

CMix may be optionally genlocked to the SDI Program Video Input or to an analog composite video black burst reference signal. Selection of genlock source is made in software.

Ref Loop

This BNC connector is an **output** of the black burst signal received at the **Ref In** connector. This provides a means to share analog sync with other devices, such as Chyron's digital pcCODI-type Video Processors, clip players and other mixers and switchers.

To share blackburst among multiple systems using the Ref Loop facility, you must remove the shunt at jumper JP24, located on the printed circuit board near the Ref Loop and Ref In connectors.



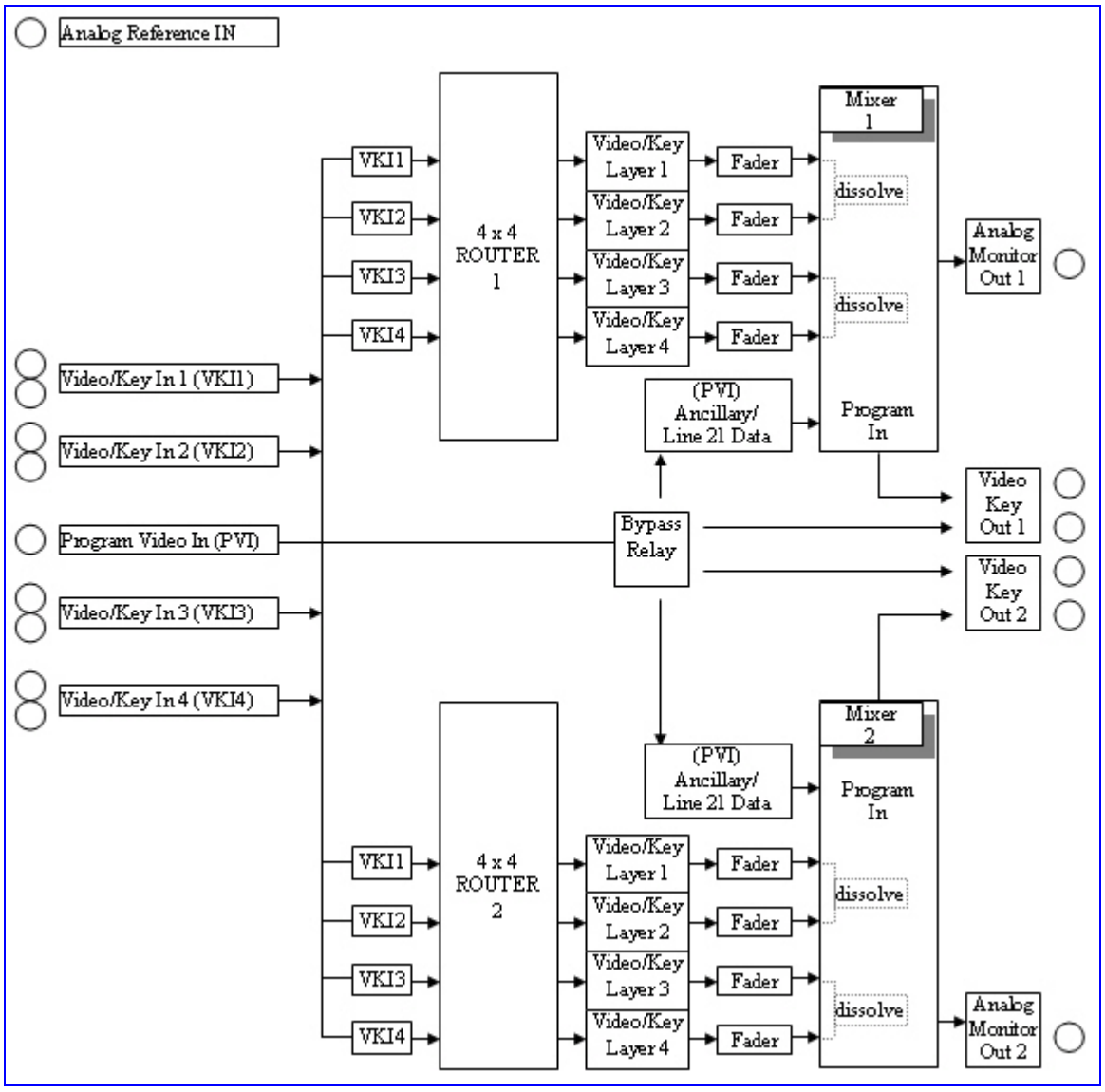
Remove the shunt at jumper JP24 to share analog genlock

Ref In

Connect a composite analog black burst signal to this BNC connector. **Also note that this video input may be used as an analog genlock source**; your selection of analog or digital genlock may be set in software (see Video In for more about digital genlock and §5 for more about software used with CMix).

Hardware Topology

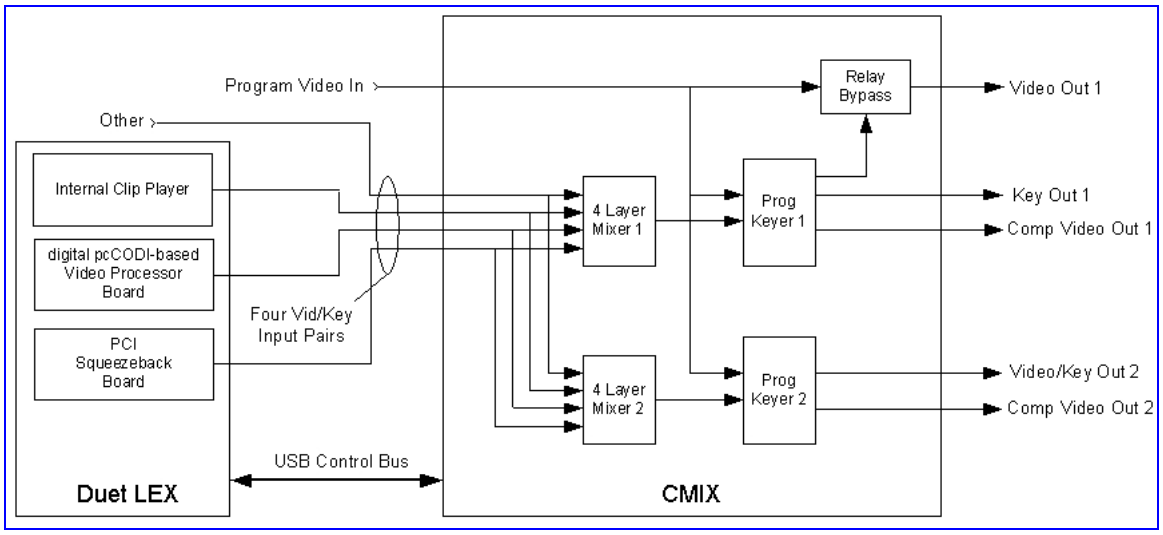
Basic System



CMix block diagram

Sample Setup

The diagram below shows CMIX used with a Chyron Duet LEX equipped with optional Internal Clip Player and Squeezeback board. Such an arrangement might be used to send a completely produced feed from a news network's regional bureau to its central facility, using the Chyron systems' resources to minimize demand on other assets, such as switchers and keyers at the central facility.



Example of CMix connected to Duet LEX for USB control and 3 video sources

In such an arrangement, Program Video In might be a camera signal showing a news anchorperson. Duet LEX's Video Processor Board could be generating a Lyric-created lower-third, while its Internal Clip Player and Squeezeback Board worked together to place footage from a reporter in a movable, shrinkable region over the anchorperson's shoulder. In this way, all compositing and/or keying is done at the remote location.

Operating CMix Via the Lyric Application

Access CMix's controls in Lyric through the Tools menu.

CMix is designed to allow mixing between output channels of a Duet LE/LEX system.This device combines four video/key input pairs plus one program video input layer into a single video/key pair output. The system contains two independent sets of mixing logic controlling two video/key outputs. The mixers share the same inputs, but the inputs can be assigned to different layers in each mixer.

System Setup

All components in the system must share a common gen/lock source. The usual configuration routes an analog black burst signal to CMix's Reference input and all of the graphics boards in the Duet LE/LEX. Duet LE/LEX systems have an internal cable that connects the reference inputs of all of the boards to a single external BNC. Connecting the analog black burst to any BNC labeled as REF IN should lock all of the boards in the system.

VPB Setup

With Lyric running, access the Duet Hardware configuration menu and go to the "Setup Board Configuration" tab.

1. Set the **Key In** control to "On", even if you don't have a key input to the VPB. (Setting it to "Off" will set the key output from that channel to 100% for the full frame, masking all lower layers in the mixer.)

2. Set the **Video** control to "Insert". (The other setting, "Video Only", disables the graphics from the VPB to the output.)

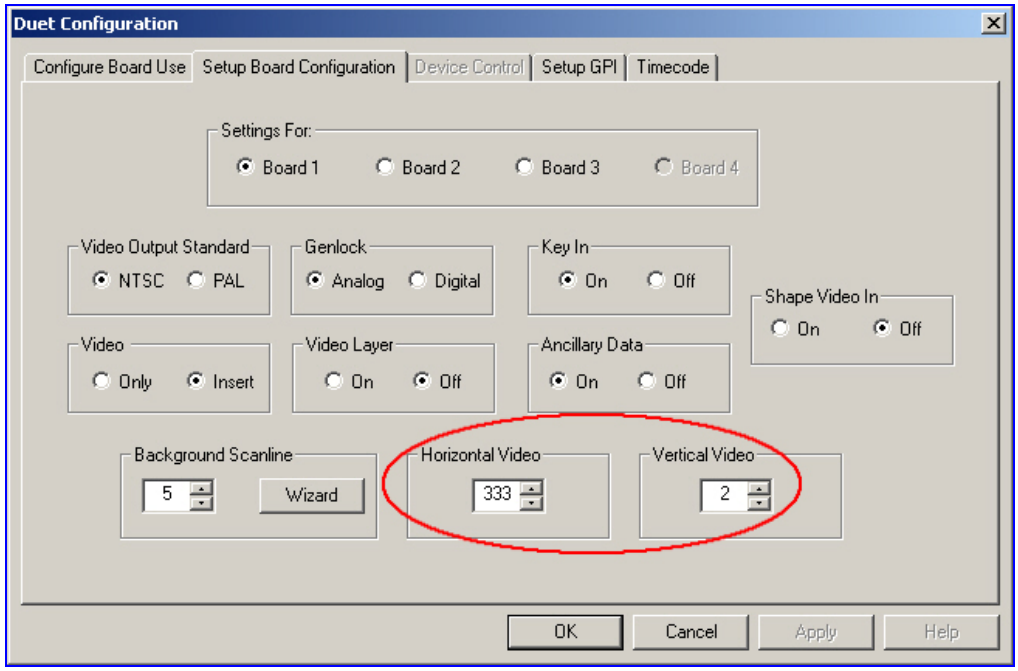
3. Set the **Video Layer** control to "Off". It is possible to key the VPB graphics over a Program Video input and then send this output to the CMix, but the system's video timing would be substantially altered. See the discussion about video timing issues on Page 8.

4. To preserve Closed Caption data on line 284 (the CC line of the second field), set **Ancillary Data** to "On". (Setting this control to "Off" will generate VPB video on line 284. The VPB will never generate graphics on line 21. This action preserves any Closed Caption data that might appear there.)

Squeezeback Setup

Video Layer should be set to "Off". (Since the Squeezeback board has no Key Input, setting the Video Layer to "On" will set the Key output of the board to 100% for the full frame, starting at line 20. This would block any lower layer and the program video in the CMix.)

Video Timing Issues



Recommended Horizontal and Vertical Delay Settings on Duet LE or LEX.

Proper mixing of the video sources requires that their timing be matched. There is no time base correction inside the unit.

The **Duet Configuration** menu (**Setup Board Configuration** tab) on the Duet LEX should be used to set all of the graphics boards with the same vertical and horizontal delay. This ensures that a graphic read by one frame buffer will appear in the same place on-screen as the other frame buffers.

Note that it is inadvisable to connect a single video source to both CMix's Program input and the inputs on any of Duet LE/LEX's VPBs. This is a function of the one-scan line delay created by the circuitry of the VPBs. (If the same signal were fed to both CMix's Program input and a VPB, the version of the signal passing through the latter would appear one line lower on CMix's output.) If you must use such an arrangement, the signal going to CMix's Program input should first be routed through a 1-scan line delay device.

When a **Squeezeback board** is being used to resize the video input, there will be a one-frame delay between that board's input and output. As noted above, if the same program input is being fed to both a Squeezeback board and the Program In of the CMix, the program video from the Squeezeback will be one line lower than the Program video. This cannot be corrected with the Squeezeback's controls. Again, to correct this, a one-scan line delay must be introduced from the Resizer In to the Program In of the CMIX.

Chyron strongly recommends using the Squeezeback board to resize and reposition alternate video sources into the Program video output, but should not be used to resize Program Video before connection to a CMix input.

To resize Program Video, connect the video output of the CMix to the Resizer input of the Squeezeback; this places the Squeezeback board downstream of the CMix. In this configuration, the video output of the Squeezeback cannot be connected to the CMix input without causing timing problems at the switcher.

Internal Clip Player Issues

When the Lyric application is launched, the Internal Clip Player's "DigiSuite" hardware may initialize its key output to a full frame of 100% out. If the CMix layer assigned to the Clip Player is active, this will block all the lower layers. This condition may be corrected by reading a Clip file that starts with no key output.

Unlike the VPB and Squeezeback boards, the Internal Clip Player generates video on lines 21 and 284. If the clip player is generating a full frame of video, it will cover lines 21 and 284. The graphics boards (VPBs and/or Squeezeback boards) will never cover line 21 and will only cover line 284 if Ancillary Data is set to "Off".

The Output 1 and Output 2 Controls

The **checkbox** at the top of each output section enables the controls within that section. Un-clicking a checkbox to disable an Output hides that Output's individual controls. This allows the user to create a mix effect for one channel without affecting the other.

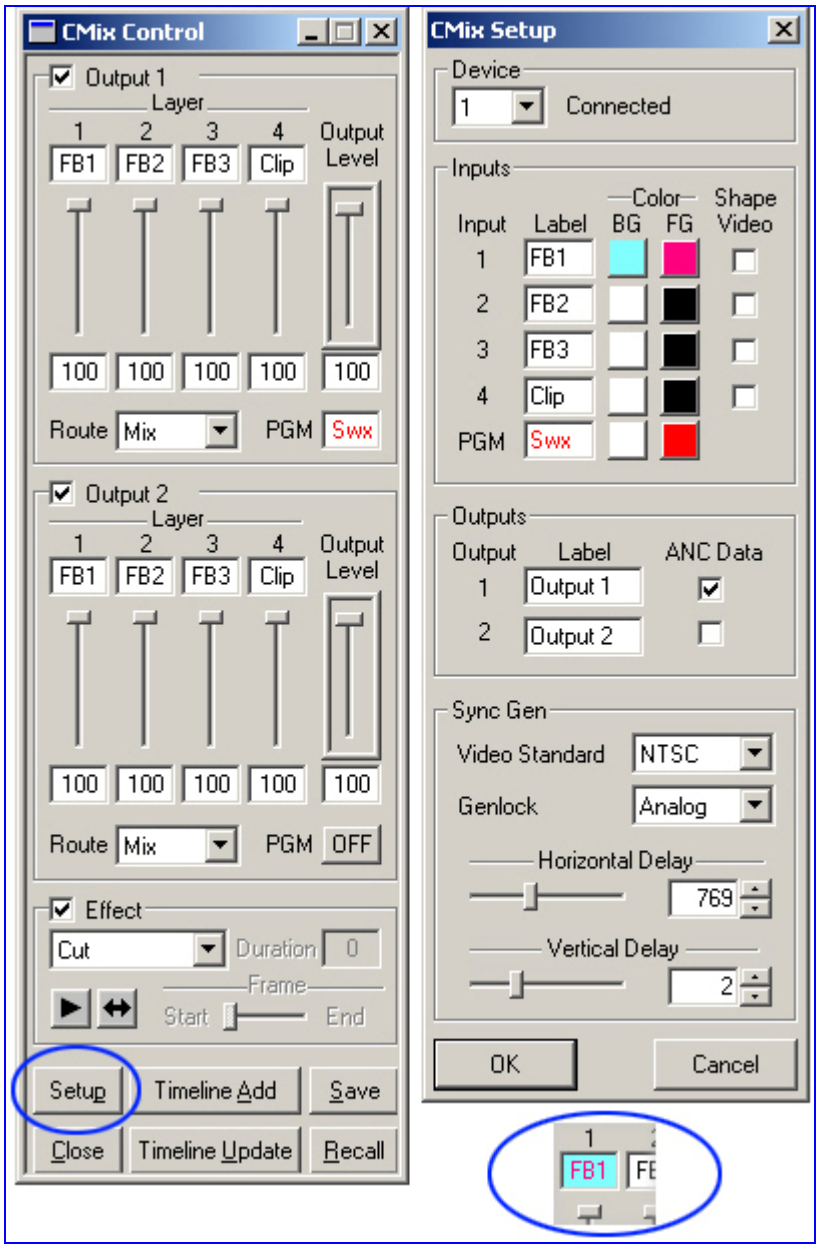
- **Video Inputs**

It may be helpful to assign signal sources to inputs with some concern for the easiest arrangement to remember. (For instance, your Duet LEx's Frame Buffer 1 to CMix's Input 1, Frame Buffer 2 to Input 2, etc.)

These labels (including the label for the Program input) may be changed to indicate what sources are connected to which inputs. For this purpose, use the **Setup** function by clicking the button circled below left. Note that you may use the color chips and text entry fields on the Setup menu to vary the appearance of each input's label on the CMix interface, as seen in the lower right portion of the illustration below.

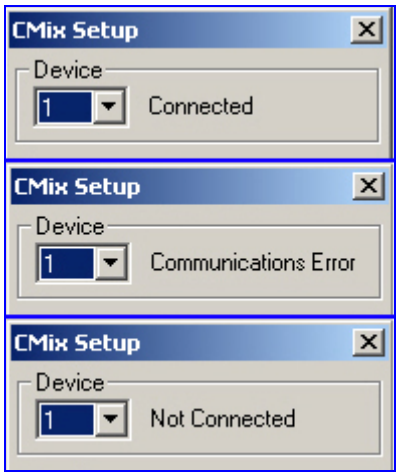
- *The* **Layer** *sliders*

Any of CMix's inputs can be assigned to any layer by clicking the label window; this action opens a dropdown list of the available channels. (An **Off** option is also available in these dropdowns if you wish to disable the layer in the mix completely).



CMix's main controls (left) and controls-setup panel (right)

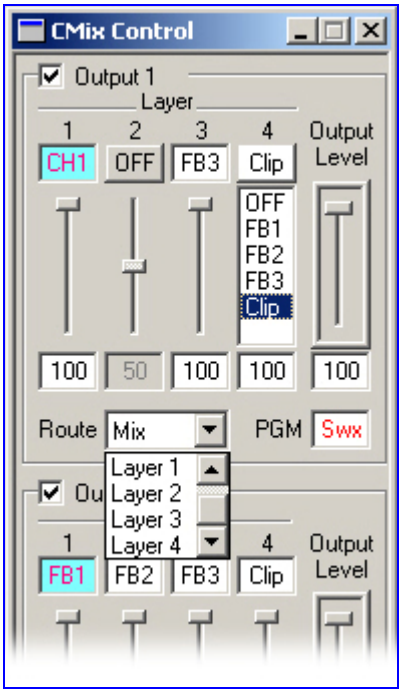
The Setup menu also contains a USB communication status indicator for the external device (such as a Duet LE or LEX) controlling CMix. At this time, the **Device** dropdown is not used; only a single external system may be connected to CMix at a given time.



USB connection status displayed at the top of the Setup panel

Each Output section's **Layer** sliders (**1** through **4**) correspond to CMix's four Video-Input-and-Key-Input pairs. These sliders control the **transparency** of each layer in the mix.

Remember: Any of the four inputs (which excludes the Program input) may be assigned to any of the four layers.



Input-to-layer assignments and layer transparency levels

- The **Output** slider

The **Output** slider to the right of the Layer sliders controls the overall transparency of the entire mix.

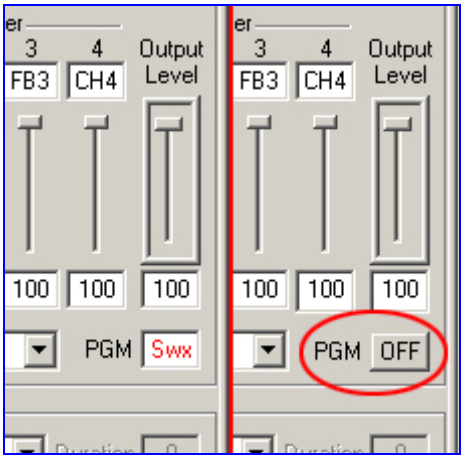
- The **Route** dropdown list

The **Route** dropdown at the bottom of each Output section contains these selections: **Mix**, **Layer 1**, **Layer 2**, **Layer 3** and **Layer 4**. Use this dropdown to send one layer's signal at a time, full on, to the Output channel. Selecting Mix returns the system to normal operation.

NOTE

The Route controls affect ALL of CMix's Output(s). Their effect is NOT confined to the Monitoring outputs.

- The **Program** input control



The Program input can only be assigned to a source or turned off.

The **Program** input to the system's mixes can only be turned on and off, as seen above right; its level may not be varied. Clicking on the Program window toggles the input on and off (so be careful with your mouse!). If the Program source is turned off, CMix inserts black in its place, and all other components of the mix(es) you've created are unaffected.

Effects

This section selects a **Cut**, **Dissolve** or **Fade** effect to be used when the mix is rendered to output. These effects consist of starting and ending mixer states for each of CMix's two outputs, when the output is enabled. When **Dissolve** or **Fade** is selected, the user may specify a **Duration** in video Frames. The Duration and Frame controls are disabled if Cut is selected.

The **Play** button renders the effect to output. Interpolation between starting and ending values is always linear.

The **Swap** button executes the programmed effect and switches the signal on Output 1 to Output 2 and vice-versa. Note that when a CMix is connected to a Duet LE or LEX system, the "regular" Swap button fullfills the same function as described above.

To set up an effect, move the **Frame** slider to Start and set the Layer and Output level controls to their desired initial values. Move the Frame slider to End and set the Layer and Output levels to their desired final values. Note that the level controls can only be adjusted when the Frame slider is at either Start or End.

The Frame slider also serves as a "scrub" control for previewing an effect.

If you wish to execute a **Dissolve** effect, the combined transparency of Layers 1 and 2 must equal 100% (the same requirement applies also to the combined transparency of Layers 3 and 4). Note that if the sliders are set to incorrect values, the control panel will correct the settings automatically.

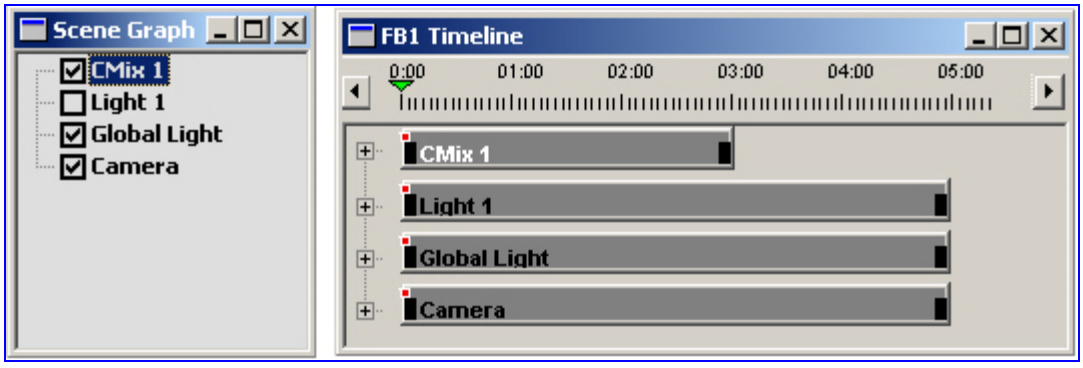
CMix's Effect controls

Other Controls

- Setup As mentioned above, the **Setup** control opens a menu in which you may label the inputs and outputs of CMix, in addition to setting each input's Video Shaping.

- Timeline Add A mixer effect can be added to the current scene by clicking the **Timeline Add** button. The mixer effect appears as an object on the timeline* (as well as on the Scene Graph). By default, the length of the new entry will be the effect duration specified in the Mixer Control Panel. However, this value as well as the start time of the effect can be modified using Lyric 's standard Timeline editing tools (mouse or keypad controls). You may click "Timeline Add" more than once to add multiple mixer effects to the timeline as separate objects; however, the start and stop times must not overlap.

*Keep in mind that the "CMix" element on the Timeline and Scene Graph is not a separate "real" object visible on the Canvas. However, inclusion of the object in the Timeline, Scene Graph and Keyframe Graph is how Lyric incorporates the recorded values of the Mixer settings into the composition.



A 'mix object' as seen on the Scene Graph and Timeline

- Save and Recall Dynamic effects or static mixer settings can be saved to a file by clicking on the **Save** button. Note, however, that the CMix panel's Save button ***only stores CMix settings and effects information!*** The files created in this manner have the familiar **.lyr** extension, and can be entered in the Lyric Playlist for automated playback based on timecode or other control parameters. These Lyric messages can also be read from the Canvas via a Message Number and the Read controls, or by opening a file with an alphanumeric name. Settings and effects saved in the file execute immediately when read back.

  To save a complete Lyric composition containing text, light sources and other 'real' objects in addition to CMix effects, use the **Timeline Add** control to incorporate CMix effects execution information into a savable Lyric message.

  Clicking the Save or Recall buttons displays the standard Windows file selector, open to the default Message directory set up in Lyric Preferences.

- Timeline Update Click this control to be certain that your most recent changes to Mixer video settings are applied to Mix objects on the Timeline.

- Close This button closes the CMix Control panel. Be sure you've saved your work before closing the panel.

Appendix: CMix Specifications and Environmental Requirements

Video I/O Format	SMPTE 259M/ ITU-656; 525/625 lines, 10-bit serial data
Video Outputs	2 Video Out & Key Out pairs (2 independent channels), 2 Analog Monitor Video Outputs, Reference Loop (output of analog blackburst received at Ref In connector)
Video Inputs	4 Video In & Key In pairs, Program Video In, Reference In (analog blackburst only)
Bit Rate	270 MB/second
Source Impedance	75 Ohms
Signal Amplitude	800 millivolts @75 Ohms
DC Offset	0 +/- 0.1 volt
Rise/Fall Times	.60 nsec +/ - 0.25 nsec from 20 to 80% of full scale
Relative Jitter	+/- 0.600 nsec
Environmental	Temp. Range: 0° to 50° C/32° to 122° F. Relative Humidity: 20% to 90%, non-condensing
Dimensions	**Height**: 1.7” (4.3 cm) **Width**: 19” (48.3 cm) **Depth**: 19.6” (49.8 cm) **Weight**: 16 lbs (7.27 kg)
Power Requirements	100 - 240 VAC @4.5 Amperes, 60 or 50 Hz, auto-switching.
Peak Inrush Current	80 Amperes, maximum

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