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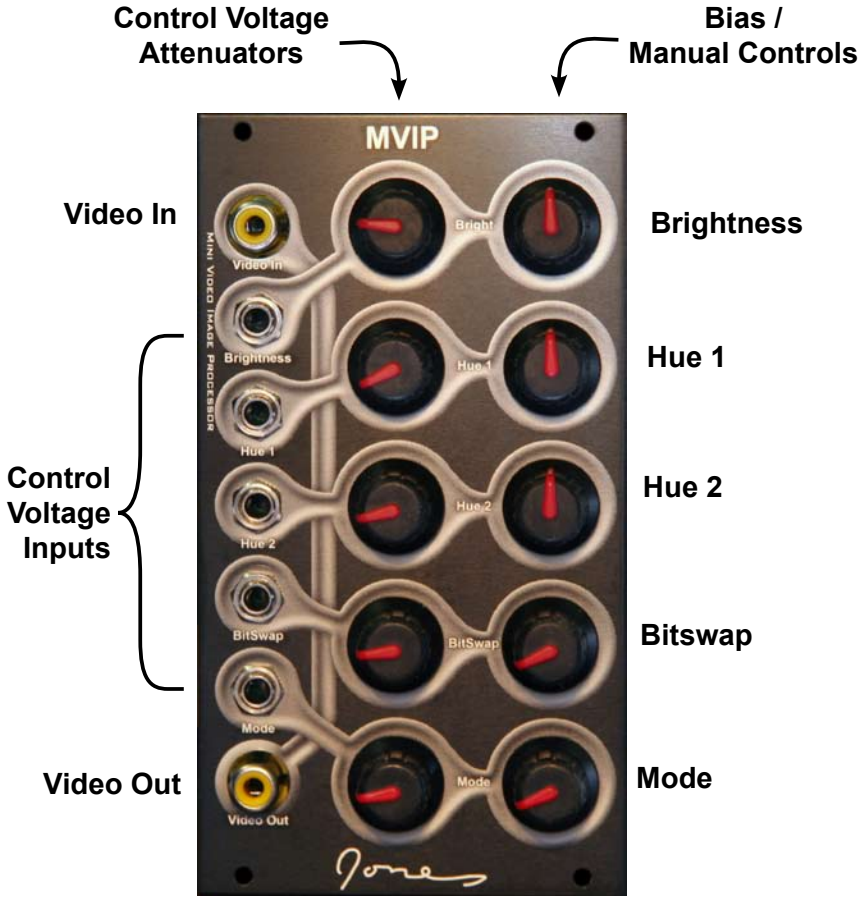
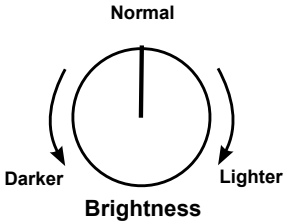
MVIP

Mini Video Image Processor

A module for Euro rack audio modular synthesizers. Designed as a stand-alone video processor to add video abilities to an audio synthesizer. Mechanically, power, and control voltage compatable with Doepfer and other Euro synth modules.

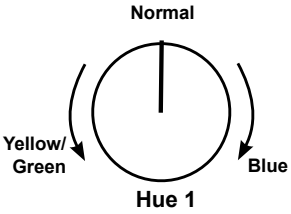


Brightness - Controls the brightness of the incoming video. When using the bitswap feature, the brightness control pushes the incoming video up and down through the various thresholds created by the bitswap. Otherwise it simply lightens or darkens the video.

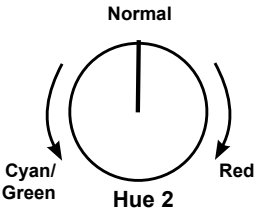


Hue Controls - There are two hue controls. They are not like the normal hue control found on some TV sets, which shift all the colors. These each balance the color of the image between normal and two specific hues. (one when you turn the control up and one when you turn it down).

Internally the MVIP works in “component” video format, which consists of three signals. Y (luminance) plus R-Y and B-Y (also known as Pr and Pb) which define the colors. The two hue controls are like balance or bias controls for R-Y and B-Y.

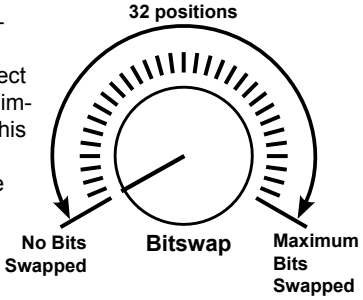


Hue 1 - This balances the B-Y part of the color signal. This means that it shifts the normal video image towards yellow/green or towards blue (slightly magenta blue) when turned up or down from center.



Hue 2 - This balances the R-Y part of the color signal. This means that it shifts the normal video image towards cyan/green or towards red (slightly magenta red) when turned up or down from center.

Bitswap - The MVIP digitizes the composite video input into a 24 bit digital signal with 8 bits of luminance (black and white), 8 bits of R-Y (one range of colors) and 8 bits of B-Y (another range of colors).



As the Bitswap control or CV (control voltage) is turned up, various bits of the digital video signal are swapped with other bits. This has the effect of rearranging the colors and shades of gray in the image with very strong edges dividing the changes. This can create very stark color and luminance changes in the image. But it will also amplify any noise in the image.

There are 32 positions to the knob and control voltage. Each step swaps the color bits in various ways. Every 8 steps the luminance bits are swapped in a different way, with the severity of the bit swapping going up each 8 steps. So as this knob is turned up it starts out with somewhat subtle color changes and the effect gets stronger and stronger as more and more bits are swapped, until the knob (or CV) is all the way up. At that point the bits have been rearranged to the point of there being little relation to the original shades of gray or colors.

Mode - The Mode control is the most complex. Too complex to label the front panel with all the details. But after using it for a few minutes it becomes pretty obvious and fairly easy to remember.

The mode control is divided into four equal sections. Each section is further divided into smaller steps related to the the major mode. The number of smaller steps depends on the specific mode.

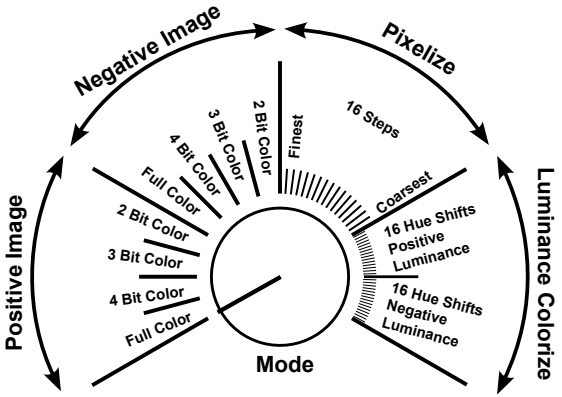
Positive Image Mode - When the mode control is all the way counter-clockwise, or the control voltage is all the way down, the mode is set to put out normal positive full color video. As the Mode control goes up there are 4 variations of positive video in that first 1/4 turn of the control. Full color, 4-bit color, 3-bit color, and 2-bit color. The 4, 3, and 2-bit color modes are reduced colors. They have roughly 16, 8 and 4 colors respectively, though the actual number varies since the reduced number of bits are for luminance and the two hue signals. Meaning that 2-bit color has 2 bits of luminance, 2 bits of R-Y, and 2 bits of B-Y. The resulting image could therefore have anywhere from 4 through 64 colors/shades of gray, in theory, though typically only has a few more than 4.

Negative Image Mode - The next quarter turn of the control gives the same type of selection, but with negative video. So Full color negative, plus 4-bit, 3-bit, and 2-bit reduced color negative modes.

Pixelization Mode - The third quarter of the Mode control gives sixteen variations of image pixelization. The finest pixelization first and as you turn the control the pixelization gets coarser and coarser. The pixelization only happens horizontally, so each scan line is still seen in the image but the image turns into columns of wide pixels.

Luminance Colorizing - The final quarter turn of the Mode control gives luminance colorizing effects. In these modes the original colors of the image are removed and the black and white portion of the image is used to create artifical colors. The hue of those colors is based on the brightness of the original image. So the colors shift as the image gets brighter. These modes are further divided into two groups. There are sixteen steps of colorizing with the luminance being positive, and sixteen more with it negative.

Each of the sixteen steps within those two groups shift the hues of all colors, so that different colors are used for the various shades of gray of the original image. Turning the mode control within those groups is like turning the conventional hue control on a TV set, shifting all colors at once.



Control Voltages - All five of the controls on the MVIP have coresponding control voltage inputs, and each of those have an attenuator. So oscillators or other CV sources can be used to adjust the brightness or hue controls, sweep through the various bitswap modes, or change the main mode function.

All CV inputs and all knobs are active at all times, no matter what the mode is. But in certain modes some of the controls might seem to have less effect than they do in other modes. For example, when the Mode control is set to one of the reduced color modes the Bitswap control will have less effect since many of the bits are no longer being used.

In the Luminance Colorizing modes the Hue 1 and Hue 2 controls still change the colors in the image, but they are changing the artificial colors created by the colorizing mode rather than shifting the original colors like they do in all other modes.

When using the Bitswap modes, the Brightness control not only shifts the brightness of the image but also moves the hard edges in the image created by swapping bits because those edges are defined by the shades of gray and colors of the original image. So shifting the brightness creates a sort of motion in the image as those thresholds move through the shades of the original image.

Because the Mode control is divided into several sections, attenuating the control voltage going into the Mode control can be used to limit the changes to stay within one group of modes. This can create interesting effects such as the pixelization getting coarser and finer as the voltage changes. Of course you can also enlarge the voltage so it crosses the boundaries between modes, for example creating bars in the image where each bar is a different mode.

Since the first three controls (Brightness, Hue 1, Hue 2) are normally in the center position and go up or down from there, as you increase the CV levels they turn those controls up and down. The Bitswap and Mode controls have their “Normal” position fully counterclockwise so you only get back to “normal” video when the control voltages are at their lowest.

The control voltage inputs are sampled by the circuitry at about 6 times the horizontal scan frequency, or about 90 KHz. Because of that, as oscillators going in get close to or above 15 KHz you will start to see diagonal lines in the image from the sampling of the oscillations. Since only a few current Euro oscillators even go that high, you might never notice this.

PAL/NTSC - The MVIP automatically detects the format of the video going in to it and puts out video of the appropriate format (NTSC and PAL only). So if you feed in an NTSC signal, an NTSC signal is what comes out. Feed in PAL, PAL comes out.

When no image is fed into the input, the MVIP can still be used to create video using oscillators fed into the CV inputs. When doing this, since there is no video input to auto-detect the format, a jumper on the back of the module decides if the MVIP puts out PAL or NTSC. The jumper is near the top back of the module and is marked.

Since most people generally work in one or the other format, this jumper is usually set once before first installing the module and never needs to be changed. Also, since using oscillators without external video is generally not as interesting as processing video signals, most people use the MVIP with some type of video going in.