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APPLICATION

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INTRODUCTION AND HOUSE KEEPING

We have received two areas of comments on the first issue of our Application notes. The first concerned a typo on my part, not the printer, which is found in issue No. 1 under Subcarrier. The base frequency is 14.318180 MHz, not 14.38180 MHz. The second question was as to in which direction a monitor sweeps the beam across the screen, as discussed in the section labeled Blanking. If you face the monitor, and look at the screen as you would to view the display, then the sweep is from your left to your right.

Keep those cards and letters coming, we want to address your needs and concerns.

SYSTEM TIMING

Television production systems require vertical synchronization, horizontal synchronization, color phase synchronization, and color subcarrier to horizontal phase synchronization. Let's look at what this means and how to deal with real world situations of system synchronization or timing. If we can imagine a television picture which is split in half by a vertical line (half way thru a horizontal wipe), most of the timing needs are shown in this imaginary picture. First we must assume that the production switcher is working up to specs, and that the two different pictures associated with this split screen picture are well adjusted color camera feeds.

The first obvious thing we would notice if the two cameras are not even close to synchronous is that the left side of the split screen picture is clear and stable, while the right side might be rolling vertically, tearing horizontally and even changing colors. Any or all of these undesirable things can happen. Each of these three different problems point to three different portions of synchronizing problems. The vertical rolling indicates the lack of vertical synchronizing, the horizontal tearing indicates the lack of horizontal synchronizing and the color changing indicates the lack of color or burst synchronization.

Next, if the left half of the picture is not moving as described above, but the picture is out of position or simply the wrong color, the indications are then that the two cameras are both locked to the same synchronizing source, but not phased together. Phasing, or timing, is the adjustment of electronics or cable length to assure that the two signals get to the switcher at the same time relative to vertical sync, horizontal sync and burst. Mis-adjusted vertical phase will cause the right half of the picture to be vertically offset or moved up or down relative to the left half. Incorrect horizontal phase will cause the right half of the picture to be offset to the left or right relative to the left half, and incorrect burst or color phase will cause the right half to appear as the wrong color.

So, now that we know how to see what's wrong, how do we fix it? Well, system timing is somewhere between a science and an art form and the good news is that science is winning the race. The most traditional way to time a system is by using one sync generator, a lot of distribution amplifiers, a whole lot of cable and more time than you can believe. How we accomplished system timing was to calculate which source would be the last to arrive and then assure that all other sources would arrive just as late. We usually were close, but not quite right, so then we used a waveform monitor and a vectorscope to measure the timing differences. We do this by looking at the horizontal sync pulses of both our reference and the source in question on two channels of the same waveform monitor and measure the horizontal time difference. Color phase difference is measured by viewing those same two signals on two channels of a vectorscope and measuring the phase difference of the burst reference of the two signals. We then calculated the correction length, re-cut cables and measured the signals again on the waveform monitor and vectorscope. The whole process consumed a lot of time, usually days not hours.

GENLOCK

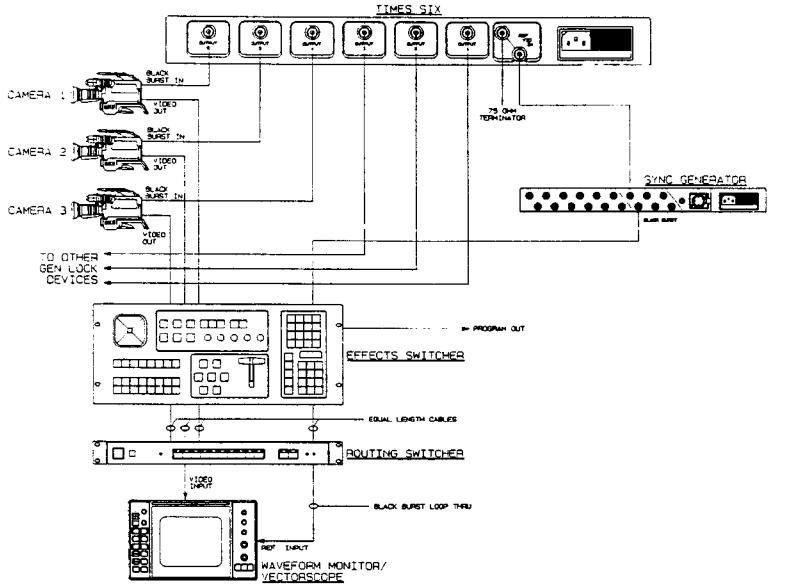
We then got devices which genlocked, or had a local sync generator built into the device, which required something like sync and sub carrier, or black burst which the device uses as reference so as to lock or synchronize that source. The device has local adjustments to set horizontal and subcarrier phase so that when its picture got to where it was going it was both locked and phased relative to the source. The only problem with this system is that the knobs and switches to do the various phase adjustments were at that device, and one usually had to have a second person at the waveform monitor and vectorscope location giving directions like "backup . . . NO, the other way . . . a bit more . . . STOP . . . back a bit". We've all been there.

REMOTE CONTROLLED GENLOCK

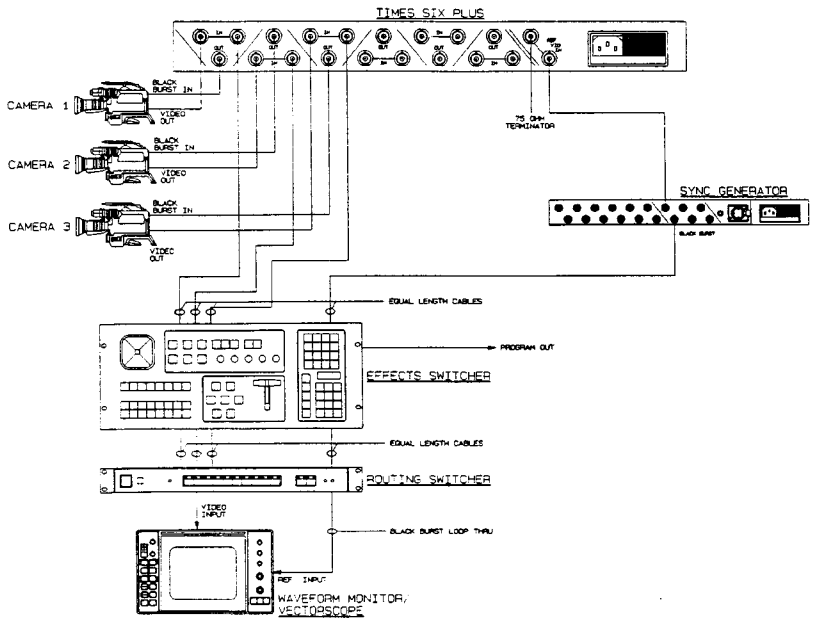
Times Six and Times Six Plus were developed to relieve that two person tug-of-war. What we have with these two instruments are a one rack unit device which can be mounted at the monitoring station, receive an input black burst reference and distribute black burst to six different devices, allowing individual horizontal and subcarrier phases to be adjusted at the monitoring station. They have genlocking sync generators with six black burst outputs which can be individually phased, both horizontal and subcarrier. The Times Six Plus goes a step further, it makes the phasing adjustments automatically. Both devices have a looping input for black burst reference to which they genlock. That means that they can also operate 'stand-alone'. They both have six separate and adjustable black burst outputs to go to six genlockable devices. The only outwardly visible difference is that the Times Six Plus requires video from the controlled devices be connected to the Times Six Plus so that it might look at the input video and automatically adjust the phase of the black burst feed to that controlled device. System timing, with the Times Six Plus, is finally an automatic operation requiring only that we press a button.

Here are two typical system interconnect drawings showing the difference in use of the Times Six and the Times Six Plus.

TIMES SIX
TYPICAL APPLICATION



TIMES SIX PLUS
TYPICAL APPLICATION



We invite your suggestions, corrections, questions, and descriptions of your solutions so that we might share them with everyone. Feel free to call or write Mark Everett with your input.