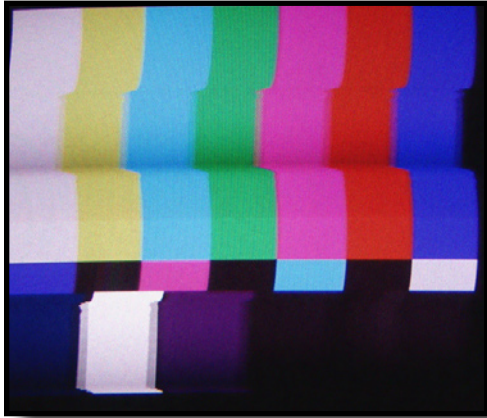

DVR AND MULTIPLEXER STABILITY PROBLEMS

Does one or more of the video images on your digital video recorder (DVR) or Multiplexer seem to be jumping or rolling as if the vertical hold is bad on a monitor?



If they are, the problem likely has one of three possible causes. The following paper describes the most common causes for image instability and provides some solutions. These nagging “little” problems can cost you many hours and dollars to resolve. We believe that we have a reasonably priced solution to your stability problem!

Today’s world is a world where both analog and digital video are attempting to peacefully co-exist in the same system.

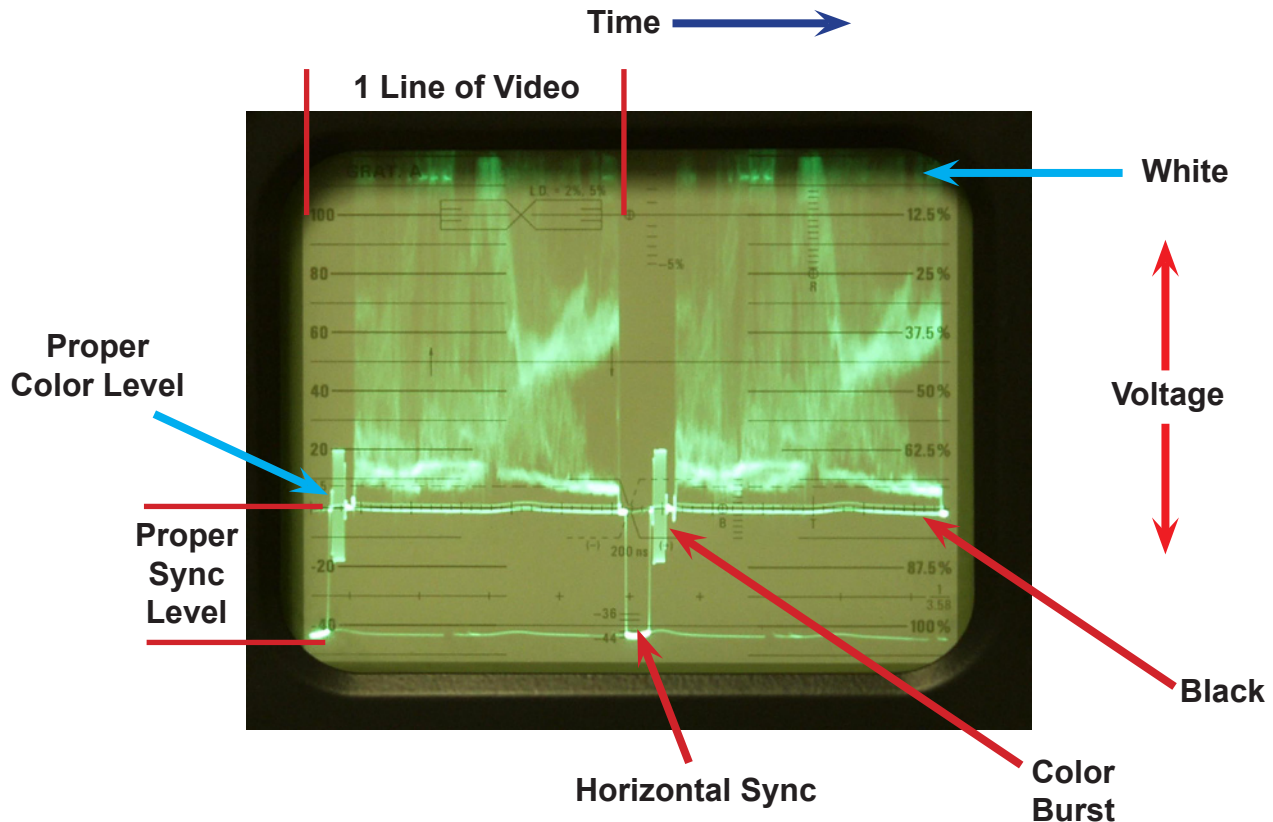
In the past, purely analog world, life was simple. You connected the camera to a switcher, a VCR, a monitor and life was good. While there were a few issues such as ground loops and cross talk between cameras to be dealt with, these were grounding issues and usually were easy to troubleshoot and resolve. Today as we straddle the threshold between the analog and the digital world we find that life has gotten considerably more complicated. For no apparent reason, the digital image or picture doesn’t always behave itself. When you connect the camera to a test monitor it looks OK but once connected into the system, the problems and the headaches begin. We’ve all stood there scratching our heads wondering what to do next to resolve this type of problem. The test monitor says it’s OK but the stupid digital box simply doesn’t like the signal. To determine the cause of the problem you could:

1. Curse out the engineer that designed the stupid digital box and hope the problem goes away. (I have yet to have any success with this approach).
2. You could go through the trouble of getting an Oscilloscope and analyzing the signal.
3. You could call the friendly salesman who sold you the unit and try to have them talk you through a troubleshooting procedure.
4. Or, provided you work for a large company, you could have the “video expert” drop by to have a look. This should help to quickly resolve the problem but the cost of the installation just went deeply into the red and the boss definitely won’t be happy. Once you determine the cause, what do you do to fix it? So, please take a few minutes and read this paper. It will help you to better understand the problem and the various solutions. To begin with, the following is a brief description of the Analog video signal.

THE BASICS OF ANALOG VIDEO

In a nut shell, the analog video is made up of the following signals:

- >Horizontal and Vertical sync (The black bars in the rolling image)
- >Color Burst and Chromanance (Color information signal)
- >Video or image information (Black and white picture information)



As long as these individual parts of the composite video signal are within their proper ranges, the digital world is happy. But let one or more of these signal parts get out of its acceptable range and your problems have begun. Besides ground loops, the most common problems in a digital video device are low signal level and/or poor signal frequency response due to cable length, quality and/or type.

GROUND LOOP PROBLEMS

Our paper on ground loop problems and its solutions are explained in simple terms in our "Ground Loop troubleshooting guide" which is available on our Web site:

www.compuvideosystemsinc.com

REASONS FOR PICTURE INSTABILITY

The First Problem We Will Highlight Is The Loss Of Signal Level:

The Horizontal sync and the Vertical sync are used to tell any recording, switching, digital processing or display device where the picture (video) signal begins and ends so that the device can properly process it. In the digital process in addition to the previous uses, the Digital clock is controlled by the Horizontal sync or the Color burst signal. Because of the accuracy of the digital processing, for an image to be digitized these signals must have the proper level.

Long Cable Runs (Over 500 Feet):

The longer the cable run, the greater the signal level loss. The video signal is specified as 1 volt peak to peak into 75 ohms. As the cable gets longer, the resistance and capacitance per foot of the cable is added to the source resistance and when it finally gets terminated, the signal can be considerable less than the 1 volt peak to peak that you started at the camera with. Due to the high capacitance, mini Coax can be a real signal killer if used in runs as little as 75 feet. The quality of the cable used is important in longer cable runs! Check the resistance and capacitance per foot, the lower the better!

Improperly Terminated Cable Run:

(Multiple terminations) This problem will have the same impact as long cable runs. Usually this problem occurs when "T" connectors and/or loop thru's are used in a signal path. The video signal is designed to go from one point to a second point and then stop, having a single 75 ohm termination at the very end of the run. While computer networks can use a "star" pattern for networking, analog video can not. If you "T" off and feed another unit that is terminated, you now have a double termination which will lower the signal level by approximately 1/3. If you loop thru a device and don't turn off the built in terminator you also double terminate the signal. To prevent this, use a Video Distribution amplifier (electronic "T"), which can drive each device with its own feed.

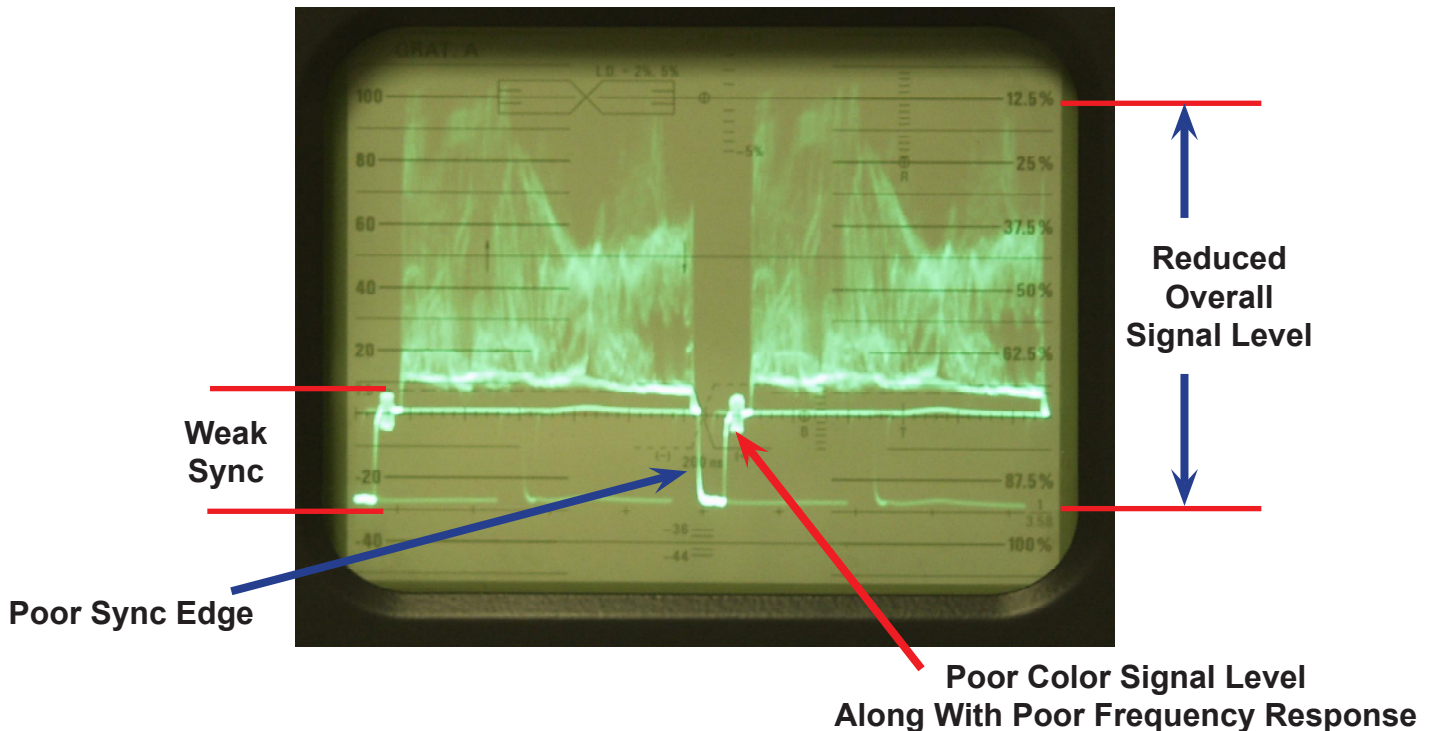
APL Circuit Problems:

Depending on the quality of the video capture circuitry you may see what is called an "Average Picture Level (APL)" problem. If you have a large changing amount of white in the picture you can get sync compression, which can affect the digital clock. The problem appears when the camera scene suddenly goes from a dark scene to a bright scene. This causes the area that the sync is sampled at to be compressed and have a smaller window for sampling.

Loss Of High Frequencies Due To Cable Length And Type:

Poor frequency response is reflected in poor washed out color and loss of the fine detail in the picture. Depending on how the digital system is designed, the processor may decide that the image is Black and White instead of color. The ability to identify an individual when a recording is reviewed could be severely reduced. Poor frequency response causes several signal errors that can cause instability in a digitally processed picture. It affects the Horizontal Sync edges used to lock the digital clock that is used to digitize or capture the video signal. This is where the problem usually lies. If the signal is improperly terminated due to using T connectors, the signal amplitude or level is low. If you have excessive High frequency losses, the sync edge will tend to be rolled off (less square or sharp). This has a tremendous effect on the clock stability. With longer cable lengths and various cable types, losses of the high frequency and the color signal are the rule. Passive Cat-5 systems usually display high frequency losses that increase with cable length. The quality and makeup of the cable will also have an effect on the amount of loss per foot of cable. As the high frequency losses increase, the sync edge starts to round off, causing greater instability in the clock and overall image instability.

After 1000' Of CAT-5



SYSTEM TROUBLESHOOTING

Trouble Shooting is done using our VST-320 Test Unit.

Step 1: Disconnect all of the inputs to the Digital unit

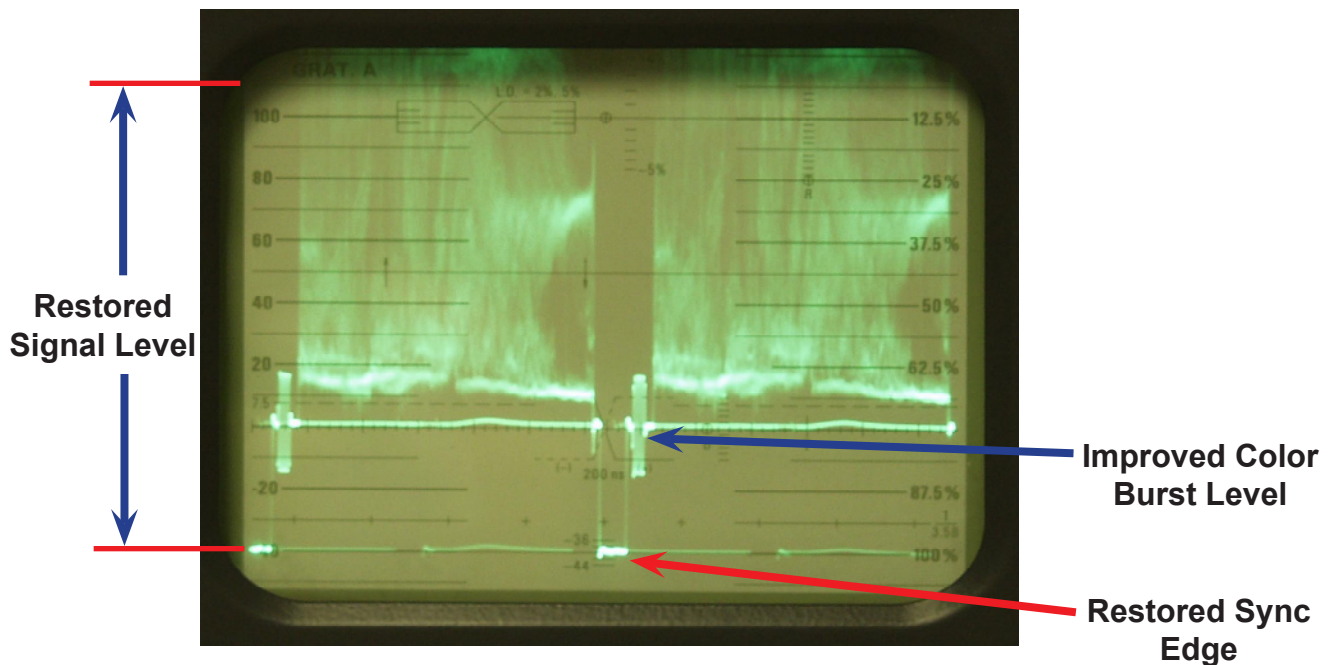
Step 2: One at a time, connect the feeds from the camera to a monitor that is terminated. There can be no loop through. Check each image for poor image sharpness or slight instability. Using a note pad, make a comment on each camera as you check it.

Step 3: Once complete, connect monitor to the output of the digital device. Now connect input one and monitor it on the output of the digital device. While watching the output of the digital device on a monitor, connect each camera, one at a time to input #1. Watch the picture for any stability problems. Mark the ones that show any image instability, picture flipping/rolling, color shifting or color banding. Again, check for stability problems and make a note of them. Disconnect the feed to input 1 and connect another camera to input 1. Continue to check it and make any notes on stability and image quality. Connect all of the known good cameras to the digital device. Check its output for any unstable images.

Step 4: Connect one of the problem cameras to the system. If any of the other images start to become unstable, it is usually an indication that you have a ground loop some place in the system.

Step 5: Once you have identified which cameras are at fault you need to connect the CVS VST-320 test unit to the first "bad" camera and run through the test for Signal level loss (LDA-100). Set the unit up for the DA-20. Connect the output of the unit to the digital device. Adjust the HF control clockwise. The image will most likely stabilize and the picture will actually look sharper. If it does not appear to have as much contrast as the good images, adjust the "Gain" control to improve it. If this solves the problem you need to install a DA-20. Most of the time you will find the combination of the Ground Loop blocking circuit along with the gain and high frequency adjust of the DA-20 will resolve most of your problems.

After DA-20



If there is still some instability, set the switches for the CCA-200 and adjust the "Cable Comp" control. This will also improve the signal frequency response. If you have RG-59U cable runs that are in excess of 1200 feet you should have a CCA-200 at the receiving end of the cable run.

By using our DA-20 to compensate for high frequency roll off, you can recover, to a certain extent, the sharpness of the sync edge. This will also help to improve the image sharpness and color levels.

When you have coax runs of over 500 feet, depending upon the quality of the cable you may start to see the effects of the cable's frequency response.

With some of these mini coax cables can have an effect beginning at 50 feet!

Ground loops can occur between two cameras, through the DVR or some other single receiver that is common to both cameras. By isolating them completely with one of our multi DA's you have one less problem to deal with.

SYSTEM DESIGN

Troubleshooting these problems can consume many man-hours. If the system were designed with our units in at the beginning, these problems would never come into the picture. This leads to happy customers, recommendations and repeat business. If you add a DVR to an existing system, by using Video DA's you prevent these problems. You also get the benefit of having each processing product isolated from each other. If the multiplexer in the system goes down, you can disconnect it without having to disabled the whole system. With Color video systems, Loop-thru's can cause problems. If the input stage is not designed properly on any of one or more of the pieces of equipment in the video path you can have some serious problems. Say box #1 loads down the color signal and box #2 loads down the high frequency, both boxes will display problems because they share the same signal. If you have each one separately amplified and the Video DA has the proper isolation, you could have a direct short on one of the outputs and it will have no impact on the other feeds.

COMPU-VIDEO SYSTEMS INC.

CVS