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tech tips

How To Troubleshoot TV Color Problems With Your VA62A Universal Video Analyzer™

TV color problems are often difficult to troubleshoot because of the parallel color signal paths (the bandpass amps and color oscillator both feed the demodulators). A logical step-by-step troubleshooting procedure will keep you from going in circles through the circuits. This Tech Tip explains how to use your VA62A to troubleshoot color problems in a minimum amount of time.

Divide The Color Circuits From The Rest Of The Receiver

Problems in the tuner, IF stages, video detector, or chroma takeoff coil (the comb filter in receivers using one) cause symptoms nearly identical to problems in the color circuits. Countless hours have been wasted troubleshooting circuits, unsoldering ICs, and ordering unnecessary parts, only to find that a trap had been misadjusted in the IF stages or that a coil had gone bad in the chroma takeoff circuits.

The quickest way to isolate color problems is to always start at the chroma input. This immediately divides the complicated color circuits from the equally complicated input circuits, so you can be sure you are working in the right part of the receiver. Here's how the VA62A substitute signals let you quickly confirm where to begin troubleshooting.

Isolate Problem To Color Circuit

Substitute the VA62A's COLOR BARS pattern at the chroma input (just after the 3.58 MHz bandpass filter) to check the operation of the entire chroma circuit (Figure 1). Use the VIDEO PATTERN position of the DRIVE SIGNAL switch, while the VA62A's RF signal (connected to the antenna input) holds the vertical, horizontal, and video circuits in sync. This allows you to use the CRT as your indicator, as you simply look to see if normal color returns to the bar pattern on the CRT.

You don't need to disconnect any components when substituting signals with the VA62A. The VA62A swamps out questionable receiver signals and replaces them with its own good signals. Simply adjust the VA62A's DRIVE LEVEL control until the built-in digital PPV meter shows the same amplitude as the schematic's scope waveform at your test point. The autoranging meter measures the true peak-to-peak amplitude of the substitute signal for safe, predictable results.

Use the VA62A's 10-bar gated rainbow COLOR BARS pattern at the chroma input because it closely resembles the pure chroma signal normally present after the chroma takeoff coil (the Chroma Bar Sweep and NTSC Color Bar patterns have luminance levels which may cause unpredictable results when substituted at the chroma input). The VA62A's improved gated rainbow pattern contains NTSC-standard color burst and proper chroma levels so good color circuits work normally.

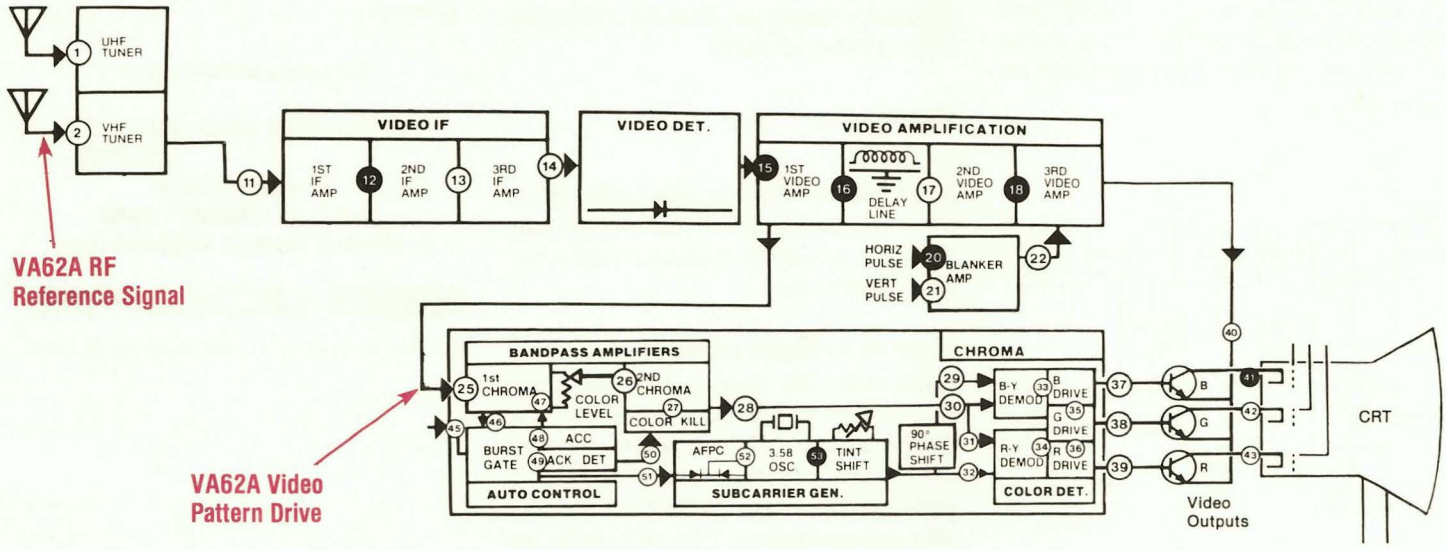

Fig. 1: Substitute a normal signal at the chroma input to see whether color is restored to the CRT.

If substituting at the chroma input restores color, don't troubleshoot the color circuits; you know they are working properly. The problem is before the chroma input. (This one test can save you hours or weeks of troubleshooting the wrong stage, so always use it first). Move your substitute signal back to the video detector and then back through the IF stages, if necessary, to find out where the color signal disappears.

If substituting a known-good signal at the chroma input doesn't restore normal color, you know the problem is in the chroma circuits. A symptom of missing color is often caused by problems in the color oscillator, so check the 3.58 MHz oscillator path next.

3.58 MHz Color Oscillator

Check the 3.58 MHz oscillator path by substituting the 3.58 MHz Drive signal at the output of the color oscillator (at the crystal input on a chroma IC). If the substitute 3.58 MHz signal restores color to the picture, you know the problem is in the 3.58 MHz oscillator path. Check the color oscillator and crystal as well as the burst gate for defects.

If substituting a known good signal at the output of the color oscillator doesn't restore color, you know the problem is in the bandpass amplifiers or demodulators.

Demodulators

Check the color demodulators by substituting COLOR BARS Drive Signal at the demodulator's chroma input while still substituting 3.58 MHz Drive at the output of the color oscillator (points 2 and 3 in Figure 2). This supplies good signals to both the demodulator inputs. If color isn't restored, you know the problem is in the demodulators.

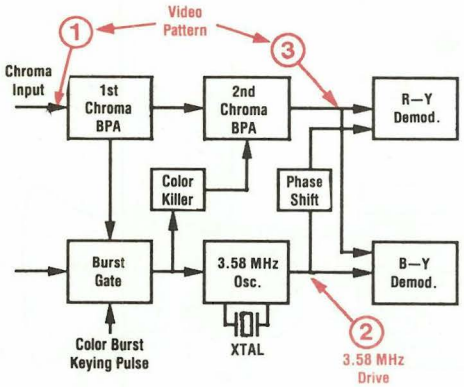

Figure 2: A couple of quick substitutions in the color circuits show you which stages are working properly.

If the substitute input signals restore color to the picture, you know the demodulators are working properly. The problem is in the bandpass amplifiers.

Bandpass Amps

Check the bandpass amplifiers by stepping back through the amplifier stages, substituting COLOR BARS Drive Signal to identify which stage is stopping the color signals.

If the defective stage is controlled by the color killer, use your VA62A DC Power Supply to substitute the proper DC voltage on the color killer input to the amplifier stage. If substituting the proper color killer voltage restores color, check the color killer.

Chroma IC

When troubleshooting color problems in a set using a chroma IC, use the same basic troubleshooting methods outlined above, with a couple of additional steps. When you narrow the trouble to the bandpass amps, do one final test. Use the VA62A's DC meter to test the DC level coming from the color level control. If the DC voltage is missing, the IC won't produce color.

When you have color problems in a set using a combined video/chroma IC, be sure to check the B+ supply to the IC. You might not think to do this, because the same pin feeds power to the luminance circuits inside the combined IC. You might think that a B+ problem would kill the luminance signals if it affected color. While this is true of missing B+, it's not always true when the supply voltage is low. Then, the color is often affected before luminance.

Sandcastle

A complete loss of picture is the most common Sandcastle-related problem, but the Sandcastle signal can also cause mysterious color symptoms. Here's how:

One of the Sandcastle signals is the "color burst keying pulse" (the top part of the Sandcastle signal - Figure 3). This keying pulse is formed by delaying a horizontal flyback pulse or sync pulse so it occurs at the same time as color burst. The pulse is used to turn on the burst gate and color killer during color burst. If the delay is lost, the keying pulse arrives during the sync pulse instead of during the color burst. This causes the color to drop out, because the color killer thinks

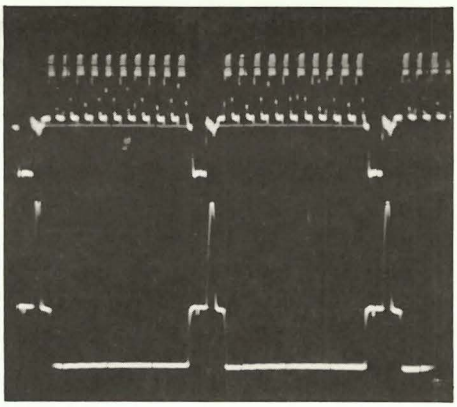

Figure 3: The top part of the Sandcastle signal is the "color burst keying pulse" which should occur at the same time as color burst.

there is no color burst (there is no color during sync).

If the pulse delay is too long, the burst gate may pick up color from the left edge of the picture instead of from the color burst. The result is changing flesh tones, depending on the background color along the left-hand edge of the picture. For example, the flesh tones will be one color when there is a blue wall behind the person and another color if there is a red wall.

Check whether the keying pulse is properly timed by substituting the VA62A's HORIZ KEY PULSE in place of the pulse developed by the TV. Simply substitute the VA62A signal at the Sandcastle test point. There should be no shift in colors when you do this. (You will see vertical retrace lines because the VA62A swamps out the normal vertical blanking part of the Sandcastle signal). If the VA62A signal causes a shift in colors or if color returns, troubleshoot the Burst Keying Amplifier portion of the Sandcastle generator.