Differential (Diff) Phase and Gain

What does differential refer to? Difference. What does phase mean? Angle. What does gain mean? Boost, amplitude.

Slide of vector scope. B-Y 0, Q 33, Magenta 61, R-Y 90, Red 104, I 123, Yellow 167, Burst 180, Green 241, Cyan 284, -I 303, Blue 347.

Concept of test for differential gain is to measure difference in chroma amplitude over various luminance levels. The test signal is generated with exactly the same chroma amplitude on all ten steps. The standard amplitude of the chroma modulated on each step is 40 IRE.

Luminance levels: we use 7.5 to 100 IRE in NTSC. Run a ramp from 7.5 to 100 IRE; see the ramp on the waveform monitor. Diagram 1. How to add a color to a black/gray/white ramp? Modulate the luminance ramp with 3.58 MHz, in the same phase as burst and the same amplitude (-20 to 20). Could also do this in ten steps instead of a linear ramp. Diagram 2.

If you do the testing with a waveform monitor, set the filter to pass only the chroma portion of the video (removing all low-frequency luminance portions). The result will reveal any variance in chroma amplitude (without concern for luminance) or differential gain. Trying to measure does the chrominance change as the luminance changes.

Don't confuse brightness of a color with the saturation of a color. If hold up a gel over a varying intensity light, one part of the light through the gel will be lighter than the light through another part of the gel, but both lights have the same saturation. Diagram 3 of the cone that had brightness and saturation at right angles.

The variable adjustment on the vector scope gives us a lot of gain. Slide of a luminance-only ramp (horizontal gradient). What's the color of burst? It is 180 degrees, near yellow with a little green. You see this when you have a monitor in cross-pulse, that yellow-green vertical line in horizontal interval near the black line of horizontal sync.

Put signal from the 3.58 MHz modulated luminance ramp out to the end (the outer ring of the waveform monitor) with the variable knob; this is how to calibrate the vector scope for this measurement. Arcs along 180 degree line marked with dG standing for differential gain. Read how far back on the arcs where you see the disturbance. This is how much differential gain is in the system (how much the ramp got modified as luminance goes from 7.5 to 100 IRE). This is caused by circuitry that isn't working within the linear portion.

As I modulate my amplitude, could run into problems with either amplitude or phase.

Differential phase is any change in chroma phase either against time or because of amplitude variances. The test signal generator makes modulated stair-step at only one phase, regardless of the amplitude. Any difference in phase over the display is measured as differential phase. Differential phase marked as dphi (d and the greek letter phi); diagram 4. There are also angles as the units of this measurement.

This is more a measure for VTRs or other recording devices, not for cameras. You have to record the test signal onto a tape and then play it back and hook up the vector scope on the output. Test signal called a **modulated ramp**, created by a test signal generator.

The small box is the 5% box, the large box is the 40% box. Diagram 5.

On a luminance level that changes, what is the effecton a constant chrominance level?

Can have color bars a little hot (higher than the center of the 5% box); this may mean that you need to send in the signal generator for calibration.

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