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APPLICATION

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SC/H PHASE

I have received some requests for a more complete definition of SC/H phase. I will try to explain it to you from a whole other direction. First, the math can show what the fuss is all about. I have stated earlier that Subcarrier divided by 227.5 gives the Horizontal rate. What that means, in other terms, is that there are 227.5 cycles of Subcarrier per line of video. A fairly obvious result is that reference burst on each line is exactly ½ cycle out of phase with the line before or after that line. The next fact is that Horizontal is divided by 262.5 to get the Vertical rate. Another way to view that is to say that there are 262.5 lines of video per field. Do the Subcarrier math (227.5 multiplied by 262.5), and the result is that there are 59,718.75 cycles of burst in a field of video. If we then multiply that number (59,718.75) by 2 or 3 or 4, we find that we finally reach an even number of cycles of burst in four fields. That number is 238,875.

How Many Fields in a Color Picture?

So now the reason why "it takes four fields to make a color picture" should be more clear. The more proper statement is that in color television, it takes four fields to complete the color cycle. Two fields of color television video do make a complete picture.

The next part of the problem requires that I first restate a fairly obvious fact. Almost any color sync generator going will function as described above, the problem is to get two of them to behave exactly the same in a genlock environment. The basic explanation is that in older, non SC/H phased, sync generators the subcarrier and horizontal lock and phase adjustments are totally independent. In those older style generators, genlock will allow one generator to lock a second exactly two color fields out of phase. The reason is that the Vertical and Horizontal pulses in color fields 1 and 3 (or 2 and 4) are identical. The only difference is the phase of the subcarrier, and since these types have separate locking circuits, they don't care about the phase relationship between Subcarrier and Horizontal sync. The burst phase difference between field 1 and 3 (or 2 and 4) is half a cycle. When adjusting burst phase, we actually move the picture (relative to its' own horizontal sync) left or right by something less than one 227th of the picture width, not too much, but enough to be obvious when doing match framed edits.

SC/H Phased Sync Generators

SC/H phased sync generators do all internal timing to first assure that the stand alone pulses are all timed from the same clock, and that any timing drift will affect all pulses exactly the same. These generators then have to genlock so that they will not destroy the integrity of the pulse relationship. The subcarrier phase adjustment of an SC/H phased sync generator has to move the horizontal with the subcarrier, and the horizontal phase adjustment has to move the subcarrier in 360° steps. Just think of them as course and fine adjustments.

Last, just to assure that every sync generator is 'singing the same tune' SC/H phase has been further defined. The start point is found on line 10 of color field 1. The subcarrier phase is observed at the leading edge of horizontal sync. At that point it should be at a zero crossing and going positive. This is an arbitrary decision. There is nothing magic about line 10, field 1, or subcarrier going positive, it's just that everyone has agreed to this reference.

The next issue will finish this discussion, and move to some other particular issues with sync generators. Please feel free to contact Mark Everett with your questions or comments.