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Four-field NTSC sequence

480*i* is also known as 525/59.94.

In 480*i* NTSC video, the total number of subcarrier cycles per line is $455/2$, an odd multiple of one-half. Since each frame has an odd number of lines, subcarrier can fall in one of two relationships with the start of a frame. *Colorframes* denoted *A* and *B* are distinguished by the phase of subcarrier at 0_H at the start of the frame: *Frame A* at 0°, and *Frame B* at 180°. This relationship is also referred to as a four-field sequence of fields 1, 2, 3, and 4 (or I, II, III, and IV), corresponding to A_{ODD}, A_{EVEN}, B_{ODD}, B_{EVEN}.

$$\frac{455}{2} \times 525 = 119437.5$$

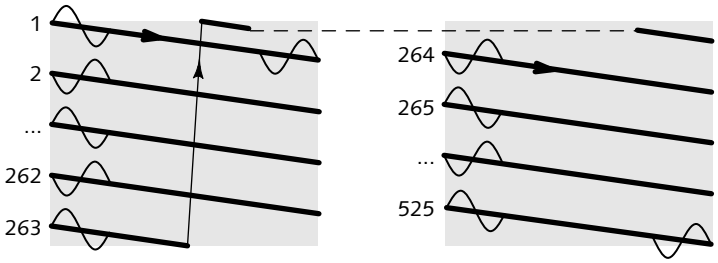

Figure 1 **Four-field NTSC sequence**

In Figure 1, superimposed on line 1, I show a positive-going cycle of subcarrier. Since that line has an odd number of subcarrier halfcycles, line 2 starts with a negative-going cycle. The alternating sequence continues until the end of the field. (I number the figure as if all 263 lines of NTSC are present in the first field, though you could consider this example to show a raster having just 9 lines.)

The top halfline of the second field is effectively the continuation of the bottom line of the first field. Since that line starts with a positive-going cycle, the first line of the second field – line 264 – starts with a negative-going cycle. The alternating sequence continues to the last (bottom) line of the second field, which is positive-going.

Continuing the sequence to the start of the second frame, the first line of the first field must be opposite to the previous line, that is, it must be negative-going. Every line in colorframe B has the opposite subcarrier phase to the corresponding line of colorframe A. The subcarrier phase sequence through the four fields is 0°, 180°, 180°, and 0°.

For further detail, see my book cited in the margin.

Poynton, Charles, *Digital video and HDTV algorithms and interfaces* (San Francisco: Morgan Kaufmann, 2003).