

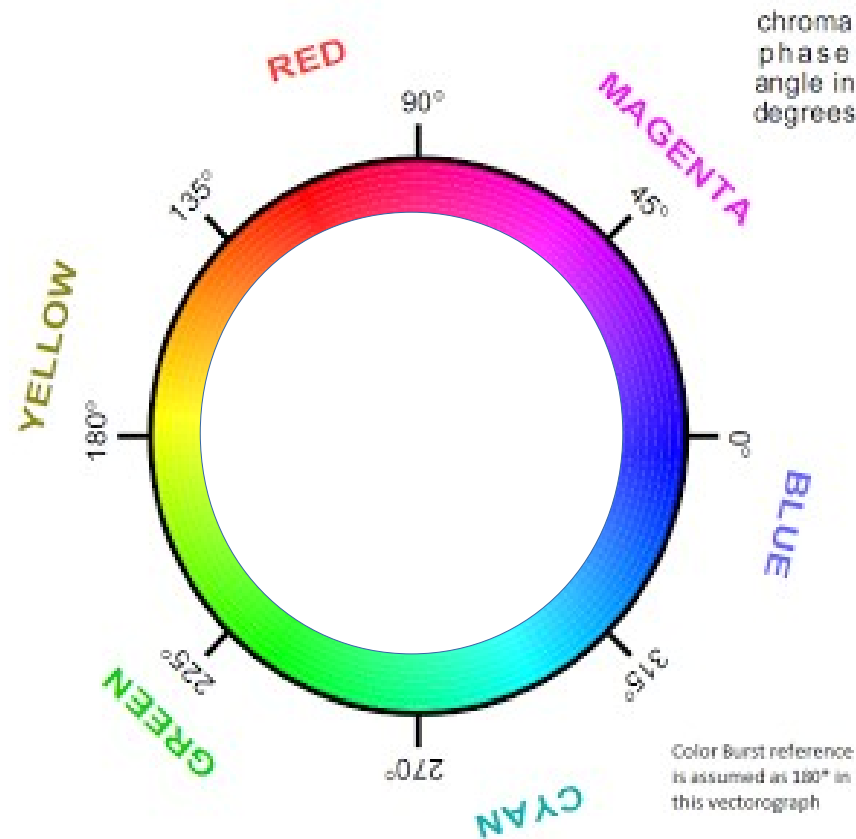
NTSC Artifact Colors: TNG

KansasFest 2017

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NTSC: Never The Same Color

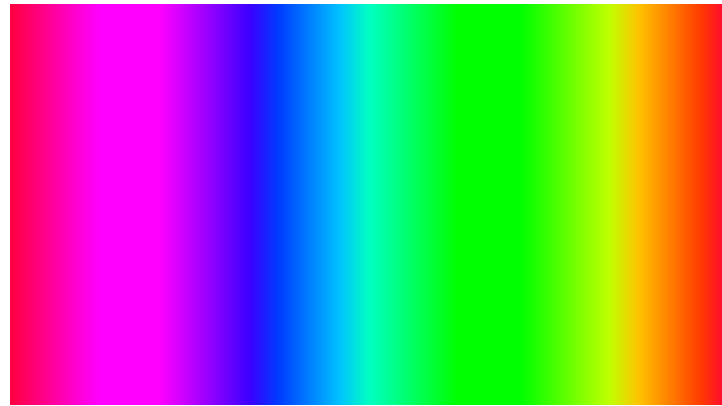
- Luminance Signal: Brightness
- Chroma Signal: Color
 - Dependent on phase angle



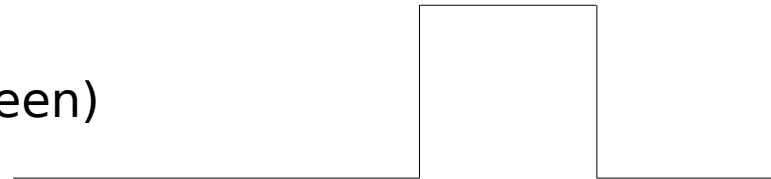
Artifact Colors

- Pixels narrower than chroma cycle
 - Interpreted as color depending on where they lie in the chroma cycle

Chroma Cycle



Pixel Output (Green)



Apple II Artifact Color Modes

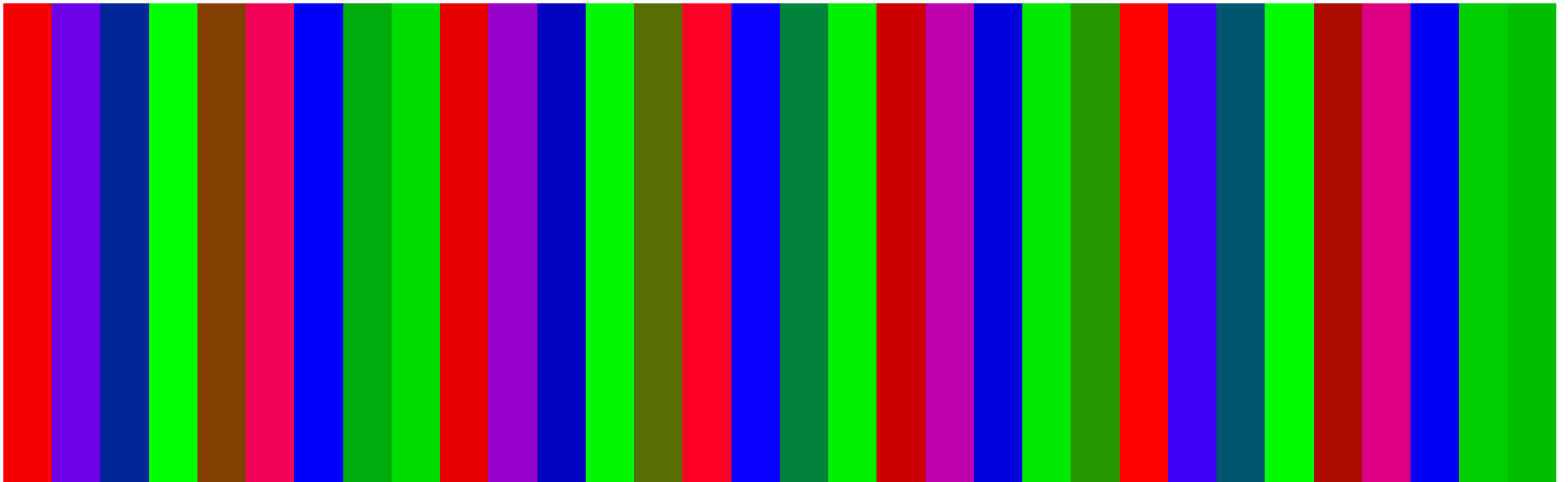
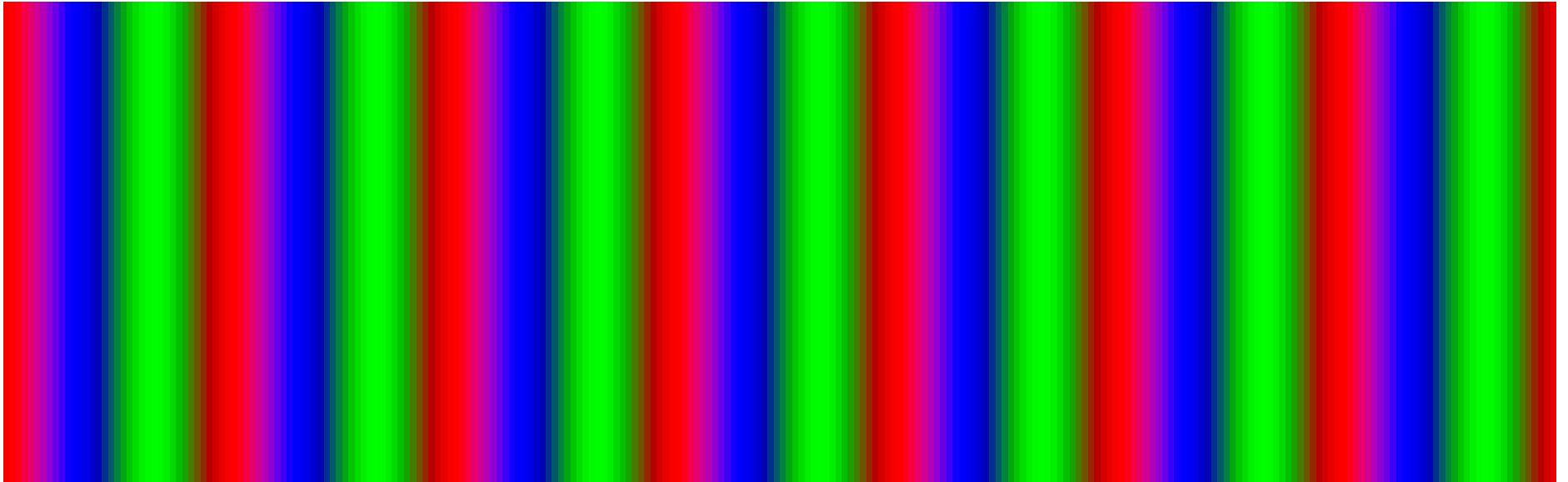
- Apple II designed around NTSC color
- 16 GR colors (nibble data replicated 3.5 times/cell)
- 6 HGR colors (4 originally) with limitations
 - 2 pixels/chroma cycle + half pixel shift
 - Hard to program
- Apple IIe added 560 DHGR pixel mode
 - 16 colors (same as GR)
 - 4 pixels/chroma cycle = 16 combinations
 - Even harder to program



What About IIGS?

- Blasted for poor composite colors in SHR
- Why?
 - 640 SHR pixels in same space as 560 DHGR pixels
 - This equates to 4.57142857 pixels / chroma cycle
 - Ugh
 - 32 SHR pixels = 7 chroma cycles
 - All may not be lost....
 - 8088MPH! IBM PC CGA NTSC demo, anyone?

NTSC vs SHR



Mapping SHR to NTSC

- Map 32 SHR pixels at 4 levels to chroma
 - Naive approach: 32 pixels → 7 5-bit pixels
 - 140 horizontal pixels to map (poorly)
 - Slightly better: 32 pixels → 8 4.57-bit pixels
 - 160 horizontal pixels to map (less poorly)
 - Better: 32 pixels → tracking NTSC RGB output
 - 640 horizontal pixels subtracting off previous 4.57
 - Best: 32 pixels → tracking NTSC + error
 - 640 horizontal pixels subtracting 4.57 plus error

Source code:

<https://github.com/dschmenk/SHR-NTSC>