Historical Techie Tidbits

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The best early colour movie camera was the Technicolor DF24 which simultaneously shot three strips of B& W negative film with filters corresponding to Blue, Green and Red. This additive colour concept is the same as that used in modern digital cameras. The DF24 camera was 8 ft tall and weight 500 lbs. and required a large operational crew. For projection, the three strips were printed onto three B&W negative films that were then dyed Yellow, Magenta, and Cyan (subtractive process), which were sandwiched together to produce a positive print.

Modern colour slide films also use the same subtractive colour process except that colours layers are coated onto a single film base.

The sensor in modern digital cameras use B,G, R cells close to each other (Same additive colour process as DF24 movie camera)

The 1939 movie, Wizard of Oz, was shot with the DF24. When it was being converted to electronic form in 1989, the technicians were astonished that the brilliance of the colours (Yellow brick road, Dorothy's ruby red shoes and the Emerald city) could not be displayed on an electronic display, which is in essentially the sRGB colour space. Electronic displays have not improved much since that time and actually became worse when LCD displays were first introduced.

Colour film can have a wide colour gamut and Kodak developed the Pro Photo RGB colour gamut to accommodate the colour gamut of films.

The movie "Dunkirk" was deliberately shot with film because the producer wanted the better colour gamut and tonal range of projected film over digital projection.

Films can approximate the colour gamut of digital camera sensors, but electronic displays can not. So you are likely to see better colours with slide projection than you see on your computer monitor.

Luminance range summary:

Human eye: 24 stops 16,000.000:1
Colour negative film; 16 to 17 stops; 16 stops = 64,000:1
Digital cameras 11 to 14 stops 14 stops = 16,000:1
Electronic Displays: 8 to 10 stops: 10 stops = 1,000:1
Video and digital movies are driving the desire to expand colour gamut of electronic display to match the range available in your editing program.

The above information is captured in the following graphic: