Television Reproduction of Face Tones

By L. C. HARROP

One of the most noticeable shortcomings of general color television viewing is the variation of face tones from show to show, or during a show, or from camera to camera. The problem is discussed in general terms in regard to film, live and videotaped shows. Some attempts at solving the problem are described.

The Problem

Face tones are the focal point or center of interest in television pictures. Their reproduction sets the color balance for the whole scene; color film timers use them as a reference and color receivers fitted with phase controls are adjusted for best flesh colors according to individual taste or judgment. One exception is sports broadcasts or documentaries where color balance is adjusted to give the most pleasing results for very familiar objects such as grass or sky, perhaps to the detriment of face tones.

The objective in color television is not only to have good face tones to aid in the enjoyment and acceptance of shows, but also to have a consistent quality from show to show. The eye is extremely sensitive to variations in face tones, but is very accommodating to a variety of face tones once they are established. A camera shows a vast difference between flesh tones in incandescent light and in sunlight if it is not adjusted with alignment or filters for each condition. With humans, logic enters into the process of color perception by insisting that, since it is the same face, it must look the same under almost any lighting condition. However, when face tones change suddenly from show to show, or during a show, the tolerance to wide variations of colors is defeated, and there is a distinct and annoying urge on the part of the viewer to make corrections.

Perhaps an additional factor in the reproduction of face tones on television is encountered in news broadcasting where the appearance of the news reader becomes very familiar on a daily basis and the repeated appearance of face tones to which the viewer has become accustomed adds to the total acceptance or integrity of the news package.

Film Shows

Although there is, unfortunately, a great variation in color balance in film shows, such as late night movies, in general, films produced for television tend to be more uniform in color balance than live or videotaped shows. There are several contributing factors for this. Fewer experts pass judgment on the color balance in labs supplying the film compared with the number of technical crews operating studios. Labs have reference or test films as secondary standards. Standard viewing conditions for color film for television are coming into use. Color film has a "built-in" color balance when properly exposed and processed. Finally, telecine operation can remedy many color errors in the film.

Live Cameras

In studio operations, the starting point is invariably a color camera aligned to a gray scale. Given the stability of modern electronic components, color rendition of a camera is a repeatable process within certain tolerances. However, all makes of cameras have color errors and different cameras, even of the same model, have variations of these basic errors. Thus, a video operator has as a "starting point" a variety of these basic errors from which to select one camera to which the others are matched, or he may slightly correct the selected camera according to his judgment of best face tones. One typical camera displays color values in the region of face tones with too much red and a Modified CIE color error of 13. Luminance is about 63% of the required value.

What Are Good Face Tones?

An exact match of luminance, hue and saturation between the scene and the monitor may be considered as the total requirement for good face tone reproduction, and it is certainly an excellent starting point. However, the viewer, who cannot see the actual set, must make a judgment, based upon memory, of the visual sensations experienced when he last saw a comparable real-life scene. It has been shown that memory produces consistent shifts in brightness and color values. In addition, there is a "show business" aspect to television where people are made "larger than life" and attention is purposely directed to flesh tones. It was done in monochrome television, not only by exaggerating the luminance values of face tones by the combined effect of key lighting and an apparent white compression effect in a picture with limited contrast range, but also by the use of the close-up, which is the forte of television. Color television employs similar studio techniques. Is some color compensation required or desirable for this effect? Another factor in the perception of colors is the resolving power of the TV system. It has been shown that apparent color saturation varies with the sharpness of a picture.

Makeup

Extensive use is made of makeup in color television, principally to reduce shine when performers are exposed to studio lighting. Once again television cameras tend to exaggerate this effect which is, at times, objectionable. Another use of makeup is to average out the natural color variations between faces, which is also exaggerated by the system. With the possible exception of women performers, makeup should not be used to mask natural face tones, at least not more than absolutely necessary.

Monitors

Some measure of subjective judgment is always required in a control room. The adjustment of the monitor, viewing conditions and the condition of the monitor are all of first importance. Fortunately, comparison instruments and photoelectric measuring devices are now on hand to adjust the monitor to the correct white point (Illuminant D_{6500}) and peak brightness. The adjustment for picture black, which is somewhat dependent on ambient light, is more difficult. Monitors should also be adjusted for uniform color response over the brightness range. Recommended viewing conditions for best color judgments are specified in CPT-2 (L. C. Harrop, "Viewing conditions for evaluation of color television pictures," *Jour. SMPTE, 79:* 542, June 1970).

Reference Face Tones

Until cameras can be relied upon to give optimum and uniform reproduction of face tones, and this will involve accuracy of adjustment as well as camera performance, a reference test transparency or print viewed with the correct light source may be required in control rooms as an interim solution. This practice is being followed by at least one network and is being investigated by the Canadian Broadcasting Corp.

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