

TECH NEWS

Making The Original Film Recordings

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Filmmakers do not normally look upon their work as using a camera to make recordings on film. Yet the camera does record whatever the lens picks up and directs towards the film, and the recordings do portray objects and scenes in a more or less faithful manner, providing that the appropriate focus and aperture setting are used.

The idea that the camera records whatever the lens "sees" becomes more obvious when a tree in a picture appears to be growing out of the top of a person's head, or the shadows in a winter scene turn out to be blue instead of what appeared to the cameraman's eye, at the time of exposure, to be a neutral gray.

Photographers and filmmakers have been encouraged to look upon film as an artistic and creative medium. The beginner is urged to start out by making pictures, instead of learning the principles of photographic image reproduction. The best way to learn what makes a good picture, we are told, is to see a lot of good pictures.

Today, pictures can be made without film, using an electronic (television) camera and videotape as the recording medium. Here, the approach is different — the object is to accurately reproduce the original objects and scenes. The program people working in front of the camera are responsible for the artistic and creative aspects of picture production.

These differences in approach give significantly different results. For example, copies (dubs) of original videotape recordings are normally made on ma-

chines set up in a standardized manner with a test tape, and the playback machines are optimized on a color bar recording at the head end of each program. When film prints are being made from original negatives, adjustments must be made in the printer settings for each scene to compensate for color and density variations in the negatives. The aim in film timing (grading) is to produce the best possible picture appearance on a projection screen, and it is almost always necessary to make still further adjustments in telecine camera controls, when film prints are being reproduced, to obtain acceptable video signals.

There is no intention here to try to show that either of these approaches to picture-making is better than the other. But it is important to know why so much controversy surrounds the use of film in television programs.

Generating Video Signals from Films

From the earliest days of television, every broadcasting station had at least one telecine for reproducing films. In North America the usual practice was to set up two film projectors and a slide projector, with their light beams directed into a television camera by means of an optical multiplexer. At first, a television technician was assigned to each telecine, to adjust the camera controls so as to compensate for variations in the amount of light reaching the camera due to scene-to-scene differences in picture image densities: the objective was to produce consistent, peak, white and black signal levels at the telecine camera output.

Television engineers complained that the non-uniform characteristics of the film images, causing the annoying variations in signal output, must have been the result of carelessness in making the films, or that filmmakers simply did not understand television requirements. When their protests failed to bring significant improvements in film uniformity, auto-

matic signal level control devices were installed in telecines, and the technicians, formerly employed in manually adjusting signals levels, were assigned to other duties.

Of course, there has never been any requirement in motion picture-making to maintain uniform highlight and shadow densities. The densities in these areas of the picture images can be allowed to vary over a considerable range, producing variations in projected screen brightness that actually enhance picture appearance. Often the highlights are deliberately made as bright as possible for pictorial effect, and these areas in the film images may be very nearly at clear film base. It should not be difficult to imagine what happens when a film such as this is being reproduced in a telecine, with the camera set up for peak white density of 0.30 (as specified by television standards). At the start of the scene, signal level would suddenly increase far above the safe limit of 100 IRE units, and would have to be brought down at once, either by an operator turning a knob in the telecine control unit, or by the automatic signal level control circuit, so as to reduce the amount of light entering the camera. This would, at the same time, reduce the brightness of other picture elements, making the entire scene unacceptably dark in the television pictures.

Proposals for Controlling Film Image Densities

So long as television broadcasters operated the telecine equipment and the reproduction of films in the television system, there seemed to be no alternative but to devise some way to control the densities of film images within prescribed limits.

SMPTE Recommended Practice RP42-1972 specifies that the density corresponding to television white should be 0.30 or 0.40, while the maximum density may be as high as 2.50, depending on scene contrast and film transfer charac-

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teristics; but both image gradation and color in these areas may be distorted or lost in the television picture.

The same issue of SMPTE Journal in which this recommended practice appears (Sept. 1972) has another Recommended Practice RP27.7, giving specifications for a gray scale operational alignment test pattern for setting up telecine cameras. The lightest steps of the test pattern have a density of 0.30 (50% transmission).

In Nov. 1959, the Canadian Broadcasting Corp. had a series of three papers in SMPTE Journal with the title "An Engineering Approach to Television Film." In these papers proposals were made to improve the uniformity of film image densities, including the use of a spot photometer to measure the brightness of highlight and shadow areas in scenes, and a special calculator for determining appropriate camera aperture settings.

Later on, in the March 1969 issue of SMPTE Journal, CBC had another series of three papers with the title "An Engineering Approach to Color Telecine." In these papers the concepts in the Nov. 1959 papers were extended to include color film reproduction. It was also proposed that films intended for use in television should be viewed in a standard film review room, in conditions simulating reproduction in a telecine set up with color test patterns.

The work by CBC to improve film reproduction in telecine has attracted attention around the world, and has had significant effects on television film production practices. But filmmakers have been less than enthusiastic over the use of spot photometers for setting camera exposure; and attempts by equipment manufacturers to encourage the use of electronic accessories for film cameras, giving video monitoring signals, have not been notably successful. Even the use of automatic, camera exposure control — so successful in the operation of Super 8 amateur cameras — has not been accepted by 16mm. professional filmmakers.

Film Post Production on videotape — A New Approach

For years filmmakers have been insisting that there must be some alternative to the rigorous demands of television broadcasters for more uniformity in film image densities. But surely, few could have anticipated that they would one day have the opportunity to make television pictures from their own films.

Within the past year or two the role of film in television has changed dramatically. At the same time, quite startling improvements have been achieved in film

reproducing methods, and in the quality of the pictures obtainable from film.

As the changeover from film to electronic news gathering (ENG) began to take place, many television broadcasters set to work to eliminate on-air telecine operations altogether, by transferring film programs to videotape prior to scheduled air times. Soon, video post-production companies and motion picture laboratories were installing telecine equipment to make film-to-videotape transfers, and advertising agency representatives were personally supervising film transfer operations. These, and others like them, demanded more flexible and versatile film reproducing facilities, and the personal attention of skilled operating personnel, to produce the best possible television pictures from film.

These developments have completely altered the previous attitude towards film as a source of television pictures. With the flying spot scanner to reproduce the film images, and the highly sophisticated electronic picture modifying systems now available, the old restrictions on films intended for television are being abandoned. Filmmakers are now insisting that the television pictures from film should look like directly-projected screen displays. This is a far cry from television broadcasters' demands of only a few years ago, that the pictures from film should match the pictures from live television cameras.

Of course, the old problems with film, that broadcasters had to deal with when they were responsible for film reproduction, did not simply vanish when this new approach was adopted. All the old problems — scene-to-scene variations in highlight and shadow densities, and sometimes quite large shifts in color — still exist. But now we have better equipment, and more flexible methods for dealing with these problems.

In the transmission of film programs directly to the public, as part of a television station's broadcasting service, adjustments of telecine controls have to be made at the start of each scene while the film is running. But when a film is being transferred to videotape the equipment can be stopped, and scenes can be re-recorded with the most favorable settings of telecine controls. Facilities are now available for storing individual scene corrections in a memory, and applying these corrections automatically at the start of each scene during a continuous transfer of the film to videotape. With these facilities, each scene can be viewed and corrected during a preview or rehearsal session, and successive scenes can be matched by rewinding the film and putting

in the previously selected picture modifications from the memory. All of this can be done from a central post-production console while the corrected color picture displays appear on conveniently located television monitors.

In these film post production operations there is still the same need to maintain uniform, peak, white and black signal levels, and make adjustments of the telecine controls to compensate for variations in highlight and shadow densities. But now the adjustments can be made at the start of each scene during the preview and rehearsal session, and recorded in the memory along with the other picture modifying adjustments. Previously difficult scenes, in which people appear against bright sky backgrounds, can often be salvaged with the variable gamma controls now available in the new generation telecines.

As filmmakers gain direct access to television film reproducing facilities, the importance of maintaining uniform film image characteristics will become more apparent. The new, more versatile facilities may appear to give filmmakers greater latitude, but films with the smallest density and color variations, scene-to-scene, will always yield the best television pictures.

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