

Book Review

Electronic Cinematography

By Harry Mathias and Richard Patterson. Wadsworth Publishing Co., Belmont, CA, 1985. Illus., 251 pp., glossary and index, 7½ × 9½ in., hardcover, \$24.

Subtitled *Achieving Photographic Control over the Video Image*, this book will give its intended film-oriented readers a bridge into the realm of video which, the authors maintain, is already merging into a third, more subtle art form, combining the creative values and production techniques of both film and video.

Electronic Cinematography is co-authored by an able team. Harry Mathias has worked as an innovator in both media for 18 years, having perfected the first Mini-Cam portable system for film-style production. He conducts seminars on the new merging of the film and video technologies and is a member of SMPTE committees on worldwide HDTV production standards. Richard Patterson is former editor of *American Cinematographer* magazine and has directed and edited film and television documentaries. His writing skills are evident in converting Mathias's sometimes unorthodox ideas into lively, readable prose.

The authors' stated objective of electronic cinematography is to combine the most sophisticated film techniques with the versatility of video that cannot be achieved with film alone, to attain new levels of creative and aesthetic refinement. That objective is accomplished by maximizing the degree of control over all production aspects, centralizing the decision-making process. Lighting control, for instance, is maximized by using single-camera techniques, which allow custom lighting for each camera angle as well as the use of filtering and diffusion materials more common to film practice.

Chapter 1 sets the tone by asserting that, "To introduce a new era of visual and pictorial control we must begin by questioning old ideas of style and old production habits. If we do not question them, they will be rejected anyway, and we will never know why." To that end the authors posit that video production personnel must adopt a new perspective on conventional practices and that those in film production must learn the basics of video cameras, recorders, and processing equipment. The book has been written for cinematographers rather than engineers, not with the intention that they should become engineers, but that they be able to fulfill their part in the bargain to be gained through mutual understanding. As an engineer in the television end of things (also with some experience as an amateur cinematographer), I would agree that the

authors have, with its writing, made a significant first step toward their goal. The cinematographer and the video engineer can each get a better appreciation and some working knowledge of the other's discipline from this book, thereby advancing the emerging art of electronic cinematography.

Having acknowledged his role and responsibility in promoting production practices which, at least as yet, have not gained industry acceptance, Harry Mathias poses the classic confrontation between the cinematographer, who wants to create a certain mood by lighting a set in a certain cinematic way, and the video engineer, whose response is, "white level at 100 units and black at 7.5 units." I, too, ran into that mentality when, years ago, I tried to convince a certain broadcaster not to use the automatic black level control on its film chains, because it pulls the high noon shadows of the baseball players' cap visors down into the blacks so that "you can't tell the players," even with a program. But today, the vast majority of my associates and, I suspect, engineers throughout the broadcast industry would modify the quoted statement to something like, "no luma (and not too much chroma) outside the range between 7.5 and 100 IRE, please," thereby granting the deserved artistic freedom.

The first chapter continues laying the groundwork of controversy by presenting five "common fallacies about video":

1. *Video is cheaper* — if you aren't after the quality that good film or good video requires, in terms of crew, lighting, and grip equipment. Furthermore, the authors contend, rental on video equipment tends to be higher because of its greater rate of obsolescence. The point made here is that, although videotape stock may be cheaper than film stock plus processing, it depends heavily on the desired result, whether tape or film cost is significant or should govern the choice.

2. *Video requires less lighting than film*. The authors cite the example of a high-contrast outdoor scene, pointing out the well-known fact that for this case, the only way to reduce the contrast range to the more limited range reproducible by video is to use more fill light. No comment is given on the relative requirements for optimally lighting an interior set to create a desired mood by the two media.

3. *Video is more sensitive than film*. Mathias and Patterson believe this "fallacy" originated at the time ENG became prevalent, and the video camera rivaled the film camera for news gathering. They state that the "myth . . . is simply not true. At their best, current video cameras are

about as sensitive as Eastman color negative type 5247 or 7291. The new higher-speed color negatives are at least twice as sensitive as the best video camera."

The foregoing statements, I believe, should be more explicit as to what disparate characteristics of the two processes are being matched, and for what purpose, in order for the advantage of "greater film sensitivity" to be gained, even in the context of electronic cinematography. Surely the reader, whether of film or video engineering orientation, deserves to know what type of film is being compared with what electronic image pickup (for instance, Saticon or charge-coupled device), and the formats of the respective film and video cameras.

For a possibly absurd example, if a large-format (e.g., 30mm Plumbicon) video camera is being compared with a 16mm film camera using Kodak type 7294 color negative, how much neutral-density filtering is required on the film camera (when it is fitted with a lens having the same angular coverage) to permit its *f*-stop to be adjusted so as to restrict the depth of field to match that of the video camera? For those conditions, then, what is the speed advantage? And how about the appearance of graininess and the transfer characteristics and colorimetry under those conditions? The authors treat these matters in good, if sometimes qualitative, tutorial fashion in other chapters. Ambiguous comparative statements such as this one, however, used categorically to support a quantified claim of sensitivity, should be qualified with a relevant and unambiguous example. (Also, sensitivity is not defined, but could be assumed to mean a complete filling of the displayed tone range, rather than the threshold of useful perception as might be defined by photo-interpreters.)

4. *It is easier and faster to light for video because you can see the end result on the monitor as you light*. The authors' apparent total disdain for video monitors for creative lighting, especially if the release product is not for transfer to film, is difficult for me to understand. They consider the photometric devices by which gray-scale tracking and black-to-peak-white ratio can be quickly matched to be impractical for field use because a special test signal is required. (This is normally a square white window in a black background, available on almost any stand-alone test signal generator that would be used as the field unit color bar reference.) This match, among monitors of the same manufacture (possibly requiring that the kinescopes also be selected for close gamma match) is easily made to an accuracy better than the best colorist can detect on a side-by-side basis. Certainly, the fact that a monitor, like a home receiver, can be misadjusted should not relegate this ultimate display device — the proof of the aesthetic pudding — to a place of implied (and almost stated) universal distrust.

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I do not mean to dispute Mathias's preference for the light meter for preliminary lighting of a set, and the use of the waveform monitor (WFM) when the adjusted camera is available on the set. I would agree that a picture monitor on the set, even if set up by photometric means and placed in an area of uniformly low ambient illumination, should not be used for final lighting judgments. And, I'm confident that he would agree that the floor monitor is a legitimate and very useful device for blocking scenes and camera angles. But, I wonder whether he would entertain my suggestion that the picture monitor has its place in the semifinals of lighting, as a relative reference for gaffers to look at as they make changes in placement and adjustment under the orders of the director of photography who looks at a "sacred" picture monitor (as well as the WFM) under fixed ambient lighting in the control room. Which brings us to the last "fallacy."

5. *A waveform monitor is only for video engineers.* Mathias and Patterson devote an entire chapter to the waveform monitor, stating that, next to the light meter, it is the most valuable piece of equipment a cinematographer can have. They believe that even most video engineers do not understand how to use a WFM properly in a creative context, and set out to enlighten both parties. I found worth remembering their rule of thumb in the chapter on tone reproduction: when using the nine-step EIA chip chart with the black chip set at 20 IRE and the white chip at 100 units, the total of the camera gamma setting and the resulting midgray, or crossover chip luminance, expressed as a decimal fraction, is always close to unity. Also, for the normally used gamma of 0.45, each marked 20-IRE scale division on the WFM represents roughly one *f*-stop or a doubling of the scene brightness.

I would agree that cinematographers as well as engineers should have an understanding of the waveform monitor more thorough than the WFM chapter presents, as I shall soon suggest. The text gives an elementary description, designed for the cinematographer with no previous knowledge of video, of the horizontal and vertical-rate displays (two lines or two fields), pointing out the salient features of the video signal in the absence of imaging: blanking, sync, color burst, and the 7.5-IRE video black level. It is unfortunate that the bulk of oscillograms used for illustrating the various waveforms presented were taken with the burst absent, including Fig. 5.4, for which the text specifically points out the burst. In other figures the burst and chroma are attenuated by using the "IRE" high-frequency rolloff position. This flaw in selecting the photos for the text would be recognized immediately by any video engineer, but it would probably confuse the novice film person for whom the book is primarily written.

I found this potential for confusion to be even worse for the figures illustrating the discussion of setting black level in Chapter 9. Figure 9.2(a) is an example of "poor" adjustment and 9.2(b), of "correct" black level adjustment. The poor example shows considerable shading in the oscillogram, covering a range of perhaps 20 IRE. The correct example, by contrast, seems too good to be true. It shows an almost perfectly flat base line at 7.5 IRE pedestal level with a faint 2 IRE of grass above and a scant 1 IRE of grass below. After a little thought, I decided that it is too good to be true: the burst in the correct photo is completely missing, whereas it is at its normal 40-IRE amplitude in the poor photo. It appears that, if the pictures are from the same camera at all, most of the dark-current shading, evident in the poor, or "before," version was "clipped out" by setting the camera black levels very near the blanking potential, and then using a processing amplifier pedestal control to reset the 7.5 IRE level for the "after" version. On top of this, apparently to further clean things up (for purposes of illustration?), the burst was completely removed. Such misleading illustrations deprive the reader of an important "feel" for what one can really expect to achieve with practical, rather than textbook equipment.

I would hope the authors would want to correct these inconsistencies in a second edition but I would suggest that a further improvement could be made in their discussion of the waveform monitor, especially in view of their placing a very high value on its use by the cinematographer. The IRE response, which I mentioned previously, used in Figs. 5.2 and 5.8, should be explained in some detail. It is evidenced by the attenuation of the color burst to about 10% of its normal, flat-frequency-response bandwidth value of 40 IRE units peak-to-peak amplitude on the WFM. This 20-dB burst attenuation, as some engineers would prefer to call it, is very useful for evaluating the waveform shown in Fig. 5.8, a horizontal-rate display of two gray scales running in opposite directions.

The video engineer uses this intended luminance-only response to eliminate the chroma and electrical noise (grass) that would tend to obscure the tracking, or gray-scale balancing adjustment of the *R*, *G*, and *B* components in the matrixed luma signal. This is done by setting the black level, gamma, and gain controls of the red and blue channels against those of the master controls, which include the green channel, for minimum thickness of each gray step. This is described in Chapter 9 on levels and color balance in setting up the camera. The cinematographer could, from such a discussion showing illustrations of the same gray-scale waveform with and without the IRE filter, readily appreciate that the luma response (which is essentially all the eye responds to in the modeling or texture of the image)

is made clearer by this removal of most of the chroma.

It would also be instructive for the cinematographer to realize that chroma alone can be selected in the WFM's "3.58 band-pass" position, for which the chroma appears as a symmetrical envelope modulating or riding on a horizontal line about the zero axis, signifying the lack of luminance or value in the display. The video engineer may prefer to demonstrate or optimize gray-scale tracking by this alternative method of observation, "tuning" the appropriate video controls as before, but, in this case, for minimum observed chroma response.

Other useful knowledge would be that the WFM can be intentionally miscalibrated (for special mysterious engineering-only purposes) by a detented gain control, just as a picture monitor can be misadjusted. It can also provide 2X and 5X normal sensitivities in the vertical axis, to magnify a selected portion of the gray-scale range, and it can expand the horizontal time base to look at as little as 1/50 of the normal two-line trace duration.

Mathias and Patterson's treatment of video art for the film-oriented includes four chapters on aspects of the video camera: (1) Mechanics and Optics, (2) Electronics and Image Characteristics, (3) Back Focus and Registration, and (4) Levels and Color Balance. Besides other chapters already mentioned above, there are chapters on color, exposure, lighting for video, video recording, peripherals (time-base correctors, time code, and the like), post-production, and high-definition television. All are well organized and the interrelated aspects of the various chapter headings are cross-referenced in the text. There is a good table of contents as well as a useful index and glossary, designed for those with production, rather than engineering orientation.

To be sure, my technical eyebrows were raised a few times as I read this book, and I believe that in a future edition it would be desirable to write with more technical rigor, and to provide more quantitative and technical labeling of the otherwise excellent artwork as a didactic aid. Nevertheless, I have tried to limit my technical critique to matters for which the video novice's pragmatic working knowledge might be impaired by the current presentation.

Mathias and Patterson recap with a philosophical discourse on "The Creative Potential of the Electronic Image." They warn that "people working in video devote more thought and effort to technical considerations than to aesthetic concerns. This tends to advance technology at the expense of art." In a section they call "Electronic Versus Photochemical," they ask whether there is any reason for cinematographers to do electronically what they have been doing for years with film, especially where video in its standard forms has relatively limited contrast



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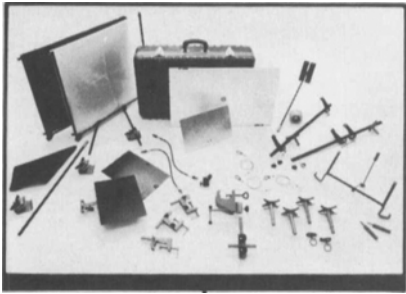
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range and resolution: "In other words, if it works, why fix it?" The immediate answer is that the relatively instantaneous nature of the electronic medium and its potential for computer manipulation and digital effects, including color correction, that are next to impossible with film alone, are more than sufficient justification in this still-evolving technology.

The next section, "Electronic Plus Photochemical" extends the answer, asserting that debates about the relative merits of the two media as separate entities may miss the point that it may be possible to combine them so as to gain the salient advantages of both worlds. The numerous hybrid production techniques (shoot on film/edit on tape/release on film, shoot and edit on tape, release on film, and so on) are said to be possible and commercially viable. The "film look," achieved largely by single-camera production and lighting techniques, is being emulated in

high-quality video cameras by gamma-compression circuits whereby highlight details are retained, with the more gradual overload characteristic of film. The use of 30 frames/sec film to minimize image motion discontinuities is a reality for those who still prefer the "look" of a film-to-tape transfer, and digital noise-reducing techniques, available for other aspects of video technology, are being developed to reduce the appearance of graininess in film-to-tape transfers.

That video technology is a tool for creativity rather than an end in itself is a not-so-original thought that I believe, along with Harry Mathias and Richard Patterson, should be shared to a greater degree by both film and video people in achieving a common and transcending art. Their book is a step, but only a step, they agree, in promoting that goal.

— *Raymond Hallows
Princeton, N.J.*

Obituary

Norman T. Prisament

Norman T. Prisament, a Life Fellow of the SMPTE and recipient of the Society's Samuel L. Warner Memorial Award in 1979, died suddenly on January 8, at the age of 63. Prisament made several outstanding contributions to the design and manufacture of sound recording equipment throughout his technical career, particularly at Magna-Tech Electronic Co., Inc., where he was president from 1972 until the time of his death.

Prisament was born on October 27, 1922, in New York City. He attended Brooklyn Technical High School, earning an electrical degree in 1940. He moved on to Brooklyn Polytechnic Institute to pursue his engineering career, but his studies were interrupted by a tour of duty in World War II as a Naval Coast Guard Electronics Officer. He completed his studies at Brooklyn Polytechnic in 1948.

Prisament further developed his talents in the field of electronics as an engineer at National Cine Equipment, Inc., then served as president of Arlington Electric Products, Inc. He later went on to Reevesound Co. Inc., as plant manager. He then joined Magna-Tech.

It was at Magna-Tech where Prisament began to make his presence felt in the motion-picture sound recording field, and where he attained outstanding rank among his engineering peers. He was largely responsible for the development of several new products at Magna-Tech, including electronic pulse-driven high-speed dubbers and recorders, electronic pulse-driven high-speed projectors and in-



Norman T. Prisament

terlock systems, and an SMPTE interlock videotape recorder-to-sprocket machine.

In 1973, the Academy of Motion Picture Arts and Sciences presented an award to Prisament in recognition of his technical achievements.

Prisament was an active and involved member of the SMPTE. He served, from 1975 until the time of his death, on the Committee on Audio Recording and Reproduction Technology, and in 1978 was appointed chairman of the Papers Committee on Film Sound.

He was also on the Board of Technical Advisors of the Institute of Audio Research, and was a member of the Audio Engineering Society and the Westchester County (N.Y.) Chapter of the U.S. Power Squadron.

Prisament is survived by his wife, Gloria, three children, and three grandchildren.